GARMIN
Garmin International, Inc.
1200 East 151st Street
Olathe, Kansas 66062
P: 913-397-8200 F: 913-397-8282

17-Feb-26

Manufacturer: Garmin International, Inc.
Address: 1200 E. 151st St.
Olathe, KS 66062-3426
U.S.A.
Chile Representative: Matías Rodríguez Correa
Rosario Norte 660 piso 24, Las Condes Santiago
Province CP 7550083, Chile
Contact Email: matias.rodriguez@garmin.com

Subject: SUBTEL, Chile (Resolution 737) Certification Compliance 2026

Commercial Name: Forerunner 570, 42 mm

	Información (Information)
Tipo de equipo (Equipment type)	Portable Digital Transceiver
Marca (Brand)	Garmin GARMIN.
Modelo (Model)	A04909
Tecnología o modulación (Technology or modulation)	ASK for NFC / GFSK for ANT / GFSK for BTBR / π/4-DQPSK, 8DPSK for BTEDR / GFSK for BLE / DSSS for 802.11b / OFDM for 802.11g/n
Frecuencias (Frequencies)	13.56 MHz / 2402-2480 MHz / 2402-2480 MHz / 2402-2480 MHz / 2402-2480 MHz / 2412-2462 MHz
Ganancia de antena (dBi) (Antenna gain (dBi)	ANT –3.30 dBi / BT –3.30 dBi / BT –3.30 dBi / BLE –3.30 dBi / 802.11b/g/n –3.30 dBi
P.i.r.e. (E.I R P.)	-65.51 dBm, 0.00 mW / -0.51 dBm, 0.89 mW / 5.87 dBm, 3.86 mW / 7.72 dBm, 5.91 mW / -0.51 dBm, 0.89 mW / 17.72 dBm, 59.15 mW
Módulos (Modules)	NFC, ANT, BTBR, BTEDR, BLE, WiFi

As all measurements for NFC are made in radiated mode to comply with the field strength limits, gain information is not required to be noted in the reports or any additional documentation. Declaration of Conformity Statement: the equipment previously identified complies with the provisions established in the Technical Standard for Small Range Equipment, approved by Exempt Resolution No.1,985 of 2017, of the Undersecretary of Telecommunications.

Declaración de conformidad: El equipo anteriormente identificado cumple con las disposiciones establecidas en la Norma Técnica para Equipos de Corto Alcance, aprobada mediante la Resolución Exenta N° 1.985 de 2017, de la Subsecretaría de Telecomunicaciones.

TEST REPORT

Report Number: R15607055-E1

Applicant	:	Garmin International Inc. 1200 East 151st Street Olathe, KS 66062-3426, USA
Model	:	A04909
FCC ID	:	IPH-04909
IC	:	1792A-04909
EUT Description	:	Extremity Worn Digital Transceiver
Test Standard(s)	:	FCC 47 CFR PART 15 SUBPART C ISED RSS-247 ISSUE 3 ISED RSS-GEN ISSUE 5 + A1 + A2

Date Of Issue:
2025-04-17

Prepared by:
UL LLC
12 Laboratory Dr.
Research Triangle Park, NC 27709 U.S.A.
TEL: (919) 549-1400

CERT #0751.06

REPORT REVISION HISTORY

Rev.	Issue Date	Revisions	Revised By
V1	2025-01-17	Initial Issue	Chandler Stanley
V2	2025-04-17	Revised Operational Duty Cycle	Charles Moody

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400

This report shall not be reproduced except in full, without the written approval of UL LLC

TABLE OF CONTENTS

This report shall not be reproduced except in full, without the written approval of UL LLC

This report shall not be reproduced except in full, without the written approval of UL LLC

1. ATTESTATION OF TEST RESULTS

COMPANY NAME: Garmin International Inc.
1200 East 151St Street
Olathe, KS 66062-3426, USA

EUT DESCRIPTION: Extremity Worn Digital Transceiver

MODEL: A04909

SERIAL NUMBER: 3493239303, 3493238982

SAMPLE RECEIPT DATE: 2024-10-21 and 2024-12-04

DATE TESTED: 2024-10-21 to 2025-01-03

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
CFR 47 Part 15 Subpart C ISED RSS-247 Issue 3 ISED RSS-GEN Issue 5 + A1 + A2	Refer to Section 2

UL LLC tested the above equipment in accordance with the requirements set forth in the above standards. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. All samples tested were in good operating condition throughout the entire test program. Measurement Uncertainties are published for informational purposes only and were not taken into account unless noted otherwise.

This document may not be altered or revised in any way unless done so by UL LLC and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL LLC will constitute fraud and shall nullify the document.

Approved & Released
For UL LLC By:

Brian Kiewra
Project Engineer
Consumer, Medical and IT Segment
UL LLC

Prepared By:

Chandler Stanley
Engineer
Consumer, Medical and IT Segment
UL LLC

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

2. TEST RESULTS SUMMARY

This report contains info provided by the customer which can impact the validity of results. UL LLC is only responsible for the validity of results after the integration of the data provided by the customer.
Below is a list of the data/info provided by the customer:

1) Antenna gain and type (see section 6.3)
2) Worst-case data rates (see section 6.5)

FCC Clause	ISED Clause	Requirement	Result	Comment
See Comment		Duty Cycle	Reporting purposes only	ANSI C63.10 Section 11.6.
-	RSS-GEN 6.7	99% OBW	Reporting purposes only	ANSI C63.10 Section 6.9.3.
15.247 (a) (2)	RSS-247 5.2 (a)	6dB BW	Compliant	None
15.247 (b) (3)	RSS-247 5.4 (d)	Output Power		
See Comment		Average power	Reporting purposes only	Per ANSI C63.10, Section 11.9.2.3.2.
15.247 (e)	RSS-247 5.2 (b)	PSD	Compliant	None
15.247 (d)	RSS-247 5.5	Conducted Spurious Emissions		
15.209, 15.205	RSS-GEN 8.9, 8.10	Radiated Emissions		
15.207	RSS-Gen 8.8	AC Mains Conducted Emissions		

3. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC 47 CFR Part 2, FCC 47 CFR Part 15, ANSI C63.10-2020, KDB 558074 D01 15.247 Meas Guidance v05r02, KDB 414788 D01 Radiated Test Site v01r01, RSS-GEN Issue 5 + A1 + A2, and RSS-247 Issue 3.

4. FACILITIES AND ACCREDITATION

UL LLC is accredited by A2LA, certification # 0751.06, for all testing performed within the scope of this report. Testing was performed at the locations noted below.

	Address	ISED CABID	ISED Company Number	FCC Registration
☐	Building: 12 Laboratory Dr RTP, NC 27709, U.S.A	US0067	2180C	825374
☒	Building: 2800 Perimeter Park Dr. Suite B Morrisville, NC 27560, U.S.A		27265	

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

5. DECISION RULES AND MEASUREMENT UNCERTAINTY

5.1. METROLOGICAL TRACEABILITY

All test and measuring equipment utilized to perform the tests documented in this report are calibrated on a regular basis, with a maximum time between calibrations of one year or the manufacturers' recommendation, whichever is less, and where applicable is traceable to recognized national standards.

5.2. DECISION RULES

The Decision Rule is based on Simple Acceptance in accordance with ISO Guide 98-4:2012 Clause 8.2. (Measurement uncertainty is not taken into account when stating conformity with a specified requirement.)

5.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	UNCERTAINTY
Radio Frequency (Spectrum Analyzer)	141.2 Hz
Occupied Channel Bandwidth	1.22%
RF output power, conducted	1.3 dB (PK) 0.45 dB (AV)
Power Spectral Density, conducted	2.47 dB
Unwanted Emissions, conducted	1.94 dB
All emissions, radiated	6.01 dB
Conducted Emissions (0.150-30MHz) - LISN	3.40 dB
Temperature	0.57°C
Humidity	3.39%
DC Supply voltages	1.70%
Time	3.39%

Uncertainty figures are valid to a confidence level of 95%.

5.4. SAMPLE CALCULATION

RADIATED EMISSIONS

Where relevant, the following sample calculation is provided:
Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB)
36.5 dBuV + 18.7 dB/m + 0.6 dB – 26.9 dB = 28.9 dBuV/m

MAINS CONDUCTED EMISSIONS

Where relevant, the following sample calculation is provided:
Final Voltage (dBuV) = Measured Voltage (dBuV) + Cable Loss (dB) + Limiter Factor (dB) + LISN Insertion Loss.
36.5 dBuV + 0 dB +10.1 dB+ 0 dB = 46.6 dBuV

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

6. EQUIPMENT UNDER TEST

6.1. EUT DESCRIPTION

The EUT is an extremity worn digital transceiver with BT, BLE, ANT/ANT+, 802.11b/g/n 2.4GHz WLAN, NFC, and Global Navigation Satellite System (GNSS) receiver. This report covers testing on the ANT/ANT+, BLE, and 2.4GHz WLAN radios.

6.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum conducted output power as follows:

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
2412 - 2472	802.11b	12.69	18.58
2412 - 2472	802.11g	20.69	117.22
2412 - 2472	802.11n HT20	21.02	126.47
2402 - 2480	ANT/ANT+	2.79	1.90
2402 - 2480	BLE 1Mbps	2.77	1.89
2402 - 2480	BLE 2Mbps	2.89	1.95

6.3. DESCRIPTION OF AVAILABLE ANTENNAS

The antenna(s) gain and type, as provided by the manufacturer' are as follows:
The radio utilizes an antenna with the following type and maximum gain:

Type	Frequency Range (MHz)	Maximum Gain (dBi)
Bezel Antenna	2402-2480	-3.3

6.4. SOFTWARE AND FIRMWARE

The software version installed on radiated units during testing was 3.51.
The software version installed on conducted units during testing was 53.07.

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

6.5. WORST-CASE CONFIGURATION AND MODE

Radiated emissions below 1GHz, above 18GHz, and power line conducted emission were performed with the EUT set to transmit at the channel with highest PSD as worst-case scenario.

For 2.4 WLAN, PSD was taken at the mid channel power setting (highest) for all channels.

Power is not distributed equally among all channels and therefore radiated spurious emissions between 1GHz and 18GHz were performed on mid channel and the highest power low and high channels. Band edge scans were performed on all inner/outer channels up to mid channel power.

The fundamental of the EUT was investigated in three orthogonal axes, X, Y, and Z. The worst-case orientation was determined to be the Z orientation. Therefore, all testing was performed with the EUT in the Z orientation.

The client has elected to declare operational duty cycles of 86% for BLE and 13% for ANT/ANT+ resulting in duty cycle correction factors of -1.31dB and -17.72dB respectively. FAQ#3c from the KDB 558074 was used to determine the average emissions for BLE and ANT/ANT+.

6.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
AC Adaptor	Garmin/Phihong	AQ27A-59CFA	N/A	N/A

I/O CABLES

I/O Cable List						
Cable No.	**Port**	**# of Identical Ports**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
1	Proprietary	1	4 pin Proprietary	Non-Shielded	<3m	Used for charging only

TEST SETUP

EUT was configured using its own built-in push buttons prior to testing. For final emissions testing, the EUT was connected to AC mains.

SETUP DIAGRAMS

Please refer to R15607055-EP1 for setup diagrams

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

7. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

Test Equipment Used - Wireless Conducted Measurement Equipment

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
	Common Equipment				
	Conducted Room 1				
90410	Spectrum Analyzer	Keysight Technologies	N9030A	2024-06-14	2025-06-14
245765	Environmental Meter	Fisher Scientific	06-662-4	2024-01-24	2025-01-24
211058	Real-Time Peak Power Sensor 50MHz to 8GHz	Boonton	RTP5000	2024-08-01	2025-08-01
SOFTEMI	Antenna Port Software	UL	Version 2024.2.23	NA	NA
Power Software	Boonton Power Analyzer	Boonton	Version 3.0.13.0	NA	NA
	Additional Equipment used				
CBL028	SMA Cable	Sucoflex	104PEA	2024-02-16	2025-02-16

Test Equipment Used - Radiated Disturbance Emissions Test Equipment (Morrisville – Chamber 1)

Equip. ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
0.009-30MHz					
135144	Active Loop Antenna	ETS-Lindgren	6502	2024-10-02	2025-10-02
1-18 GHz					
135143	Double-Ridged Waveguide Horn Antenna, 1 to 18 GHz	ETS Lindgren	3117	2024-02-07	2026-02-07
Gain-Loss Chains					
91974	Gain-loss string: 0.009-30MHz	Various	Various	2024-05-08	2025-05-08
91979	Gain-loss string: 1-18GHz	Various	Various	2024-05-08	2025-05-08
Receiver & Software					
206496	Spectrum Analyzer	Rohde & Schwarz	ESW44	2024-08-29	2025-08-29
SOFTEMI	EMI Software	UL	Version 9.5 (18 Oct 2021)		
Additional Equipment used					
241205	Environmental Meter	Fisher Scientific	15-077-963	2023-09-05	2025-09-05

Test Equipment Used - Radiated Disturbance Emissions Test Equipment (Morrisville – Chamber 2)

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

Equip. ID	Description	Manufacturer/Brand	Model Number	Last Cal.	Next Cal.
30-1000 MHz					
159203	Hybrid Broadband Antenna	Sunol Sciences Corp.	JB3	2024-03-05	2026-03-05
Gain-Loss Chains					
91978	Gain-loss string: 25-1000MHz	Various	Various	2024-05-10	2025-05-10
Receiver & Software					
197954	Spectrum Analyzer	Rohde & Schwarz	ESW44	2024-08-29	2025-08-29
SOFTEMI	EMI Software	UL	Version 9.5 (18 Oct 2021)		
Additional Equipment used					
200540	Environmental Meter	Fisher Scientific	15-077-963	2023-07-19	2025-07-19

Test Equipment Used - Radiated Disturbance Emissions Test Equipment (Morrisville – Chamber 4)

Equip. ID	Description	Manufacturer/Brand	Model Number	Last Cal.	Next Cal.
1-18 GHz					
89509	Double-Ridged Waveguide Horn Antenna, 1 to 18 GHz	ETS Lindgren	3117	2023-05-23	2025-05-23
18-26.5 GHz					
204704	Horn Antenna, 18-26.5GHz	Com-Power	AH-826	2023-07-20	2025-07-20
Gain-Loss Chains					
207640	Gain-loss string: 1-18GHz	Various	Various	2024-05-22	2025-05-22
225795	Gain-loss string: 18-40GHz	Various	Various	2024-05-22	2025-05-22
Receiver & Software					
197955	Spectrum Analyzer	Rohde & Schwarz	ESW44	2024-04-16	2025-04-16
SOFTEMI	EMI Software	UL	Version 9.5 (18 Oct 2021)		
Additional Equipment used					
241204	Environmental Meter	Fisher Scientific	15-077-963	2023-09-05	2025-09-05

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

Test Equipment Used - Line-Conducted Emissions – Voltage (Morrisville – Conducted 1)

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
CBL087	Coax cable, RG223, N-male to BNC-male, 20-ft.	Pasternack	PE3W06143-240	2024-04-04	2025-04-04
179892	Environmental Meter	Fisher Scientific	15-077-963	2024-08-12	2025-08-12
80391	LISN, 50-ohm/50-uH, 250uH 2-conductor, 25A	Fischer Custom Com.	FCC-LISN-50/250-25-2-01	2024-08-01	2025-08-01
70374	EMI Test Receiver 9kHz-7GHz	Rohde & Schwarz	ESCI 7	2024-07-30	2025-07-30
52859	Transient Limiter, 0.009-100MHz	Electro-Metrics	EM-7600	2024-04-04	2025-04-04
PS216	AC Power Source	Elgar	CW2501M	NA	NA
84681	ANSI C63.4 1m extension cable	UL	Per Annex B of ANSI C63.4	2024-04-04	2025-04-04
SOFTEMI	EMI Software	UL	Version 9.5 (18 Oct 2021)		

This report shall not be reproduced except in full, without the written approval of UL LLC

8. MEASUREMENT METHOD

On Time and Duty Cycle: ANSI C63.10-2020 Section 11.6

6 dB BW: ANSI C63.10-2020 Subclause -11.8.2

Occupied BW (99%): ANSI C63.10-2020 Section 6.9.3

Output Power: ANSI C63.10-2020 Subclause -11.9.1.2 Method PKPM1 Peak-reading power meter
ANSI C63.10-2020 Subclause -11.9.2.3.2 Method AVGPM-G (Measurement using a gated RF average-reading power meter)

PSD: ANSI C63.10-2020 Subclause -11.10.2 Method PKPSD (peak PSD)

Conducted emissions non-restricted frequency bands: ANSI C63.10-2020 Subclause -11.11 and 6.10.4

Radiated emissions restricted frequency bands: ANSI C63.10-2020 Subclause -11.12.1 and 6.10.5

General radiated emissions: ANSI C63.10 Subclause - 6.3-6.6

AC Power-line conducted emissions: ANSI C63.10-2020, Section 6.2.

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

9. ANTENNA PORT TEST RESULTS

Note: To reduce file size of report, only representative plots are included for some conducted test data in section 9.

9.1. ON TIME AND DUTY CYCLE

LIMITS

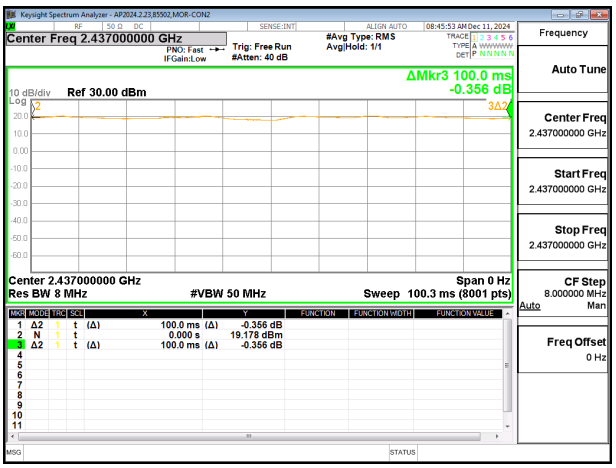
None; for reporting purposes only.

PROCEDURE

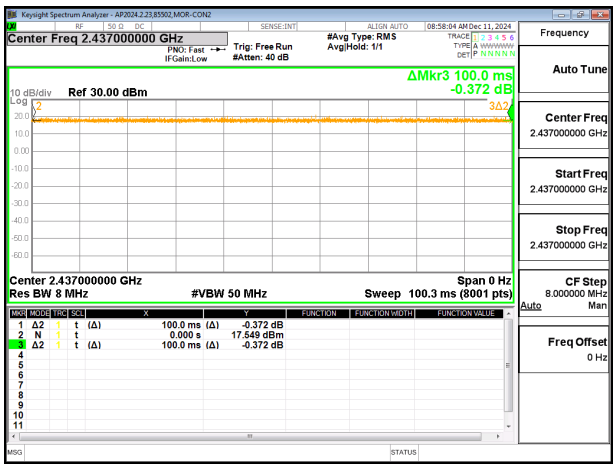
KDB 558074 Zero-Span Spectrum Analyzer Method.

Mode	ON Time B (ms)	Period (ms)	Duty Cycle x (linear)	Duty Cycle (%)	Voltage Duty Cycle Correction Factor (dB)	RMS Duty Cycle Correction Factor (dB)
802.11b	100.00	100.00	1.000	100.00	0.00	0.00
802.11g	100.00	100.00	1.000	100.00	0.00	0.00
802.11n HT20	100.00	100.00	1.000	100.00	0.00	0.00
ANT/ANT+	100.00	100.00	1.000	100.00	0.00	0.00
BLE 1Mbps	100.00	100.00	1.000	100.00	0.00	0.00
BLE 2Mbps	100.00	100.00	1.000	100.00	0.00	0.00

The client has declared operational duty cycles of 86% for BLE and 13% for ANT/ANT+.
BLE DCCF = 20log(0.85) = -1.41dB
ANT/ANT+ DCCF = 20log(0.13) = -17.72dB

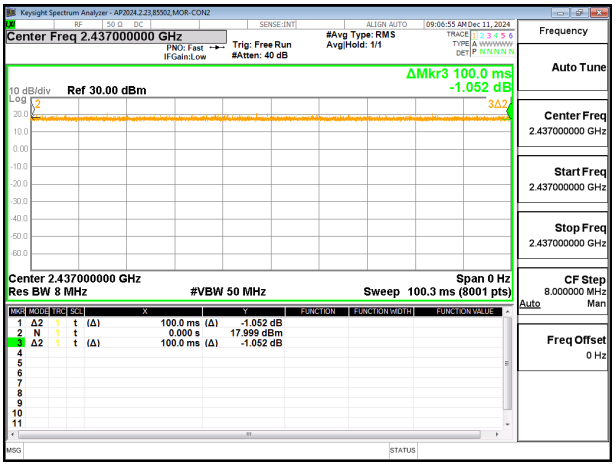


DUTY CYCLE 802.11b MODE

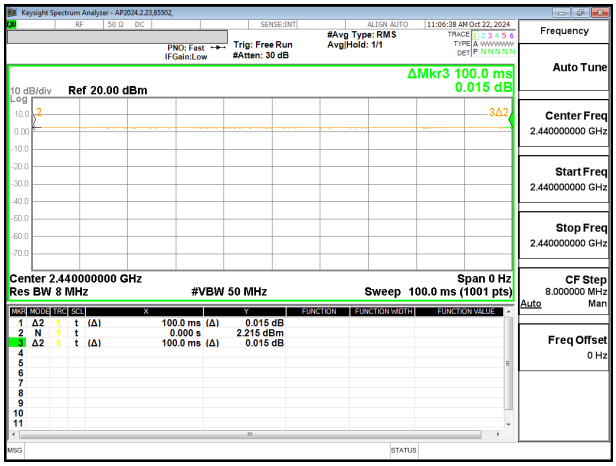


DUTY CYCLE 802.11g MODE

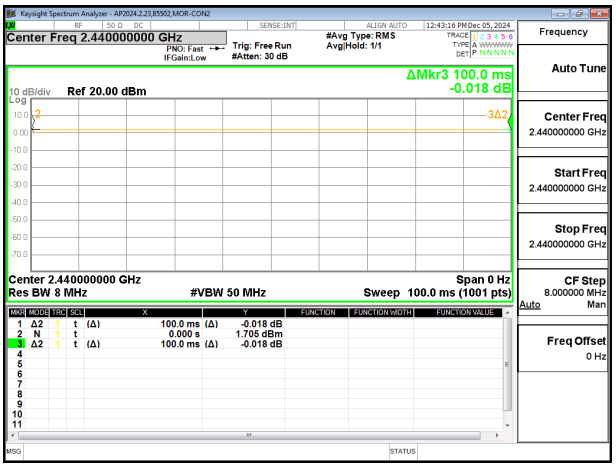
UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC



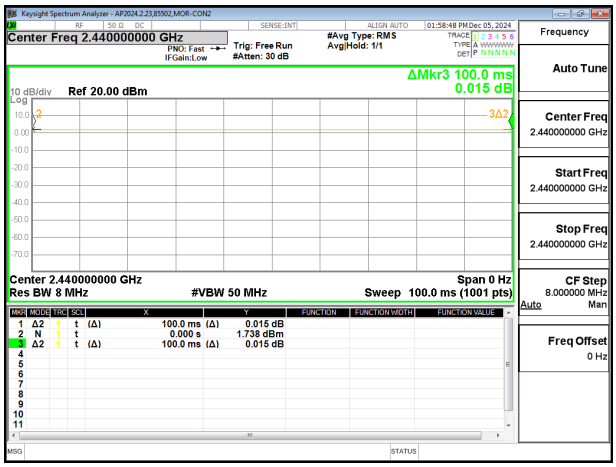
DUTY CYCLE 802.11n HT20 MODE



DUTY CYCLE ANT/ANT+ MODE



DUTY CYCLE BLE 1Mbps



DUTY CYCLE BLE 2Mbps

This report shall not be reproduced except in full, without the written approval of UL LLC

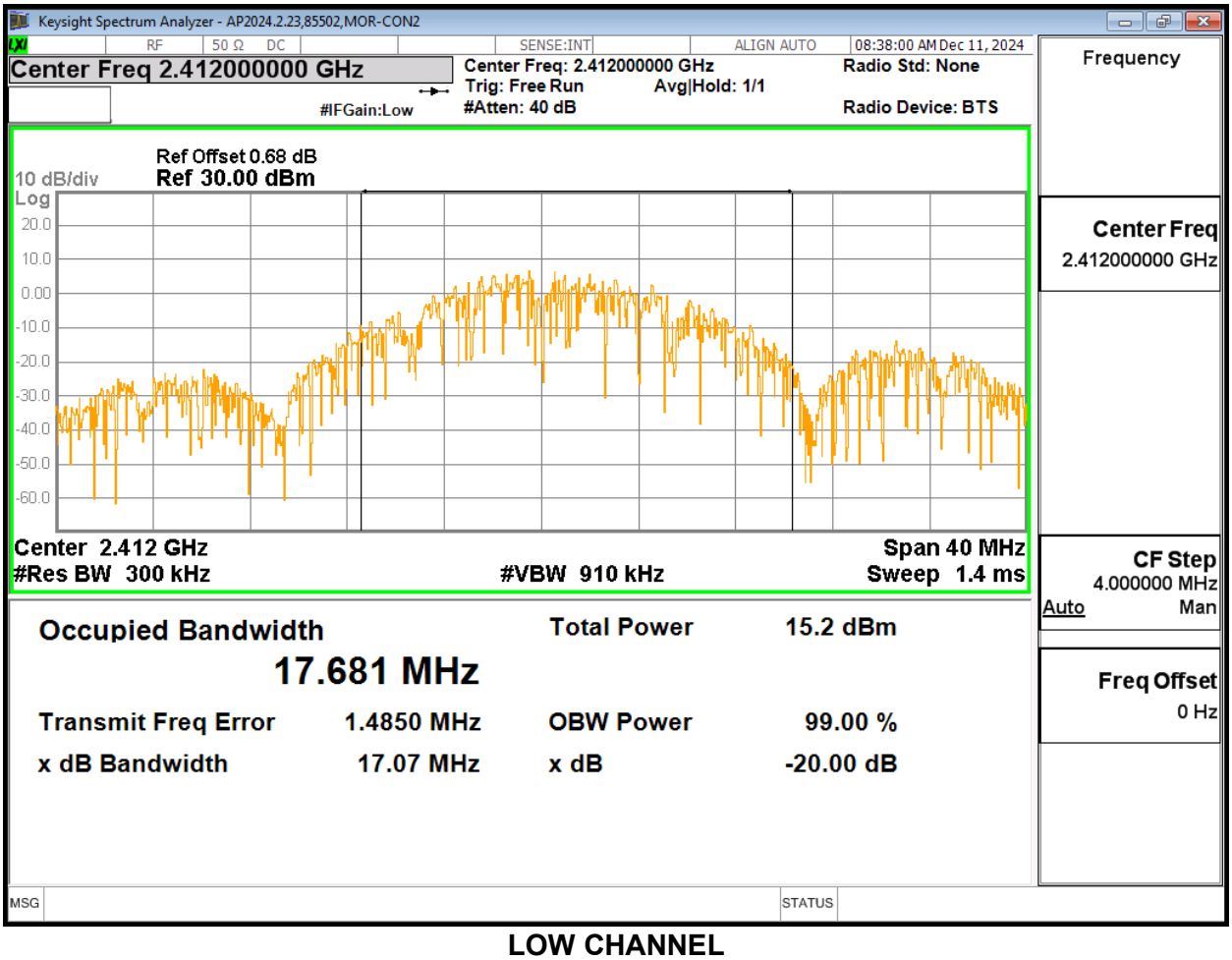
9.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

9.2.1. 802.11b MODE

Channel	Frequency (MHz)	99% Bandwidth Chain 0 (MHz)
Low 1	2412	17.681
Mid 6	2437	16.145
High 13	2472	15.011

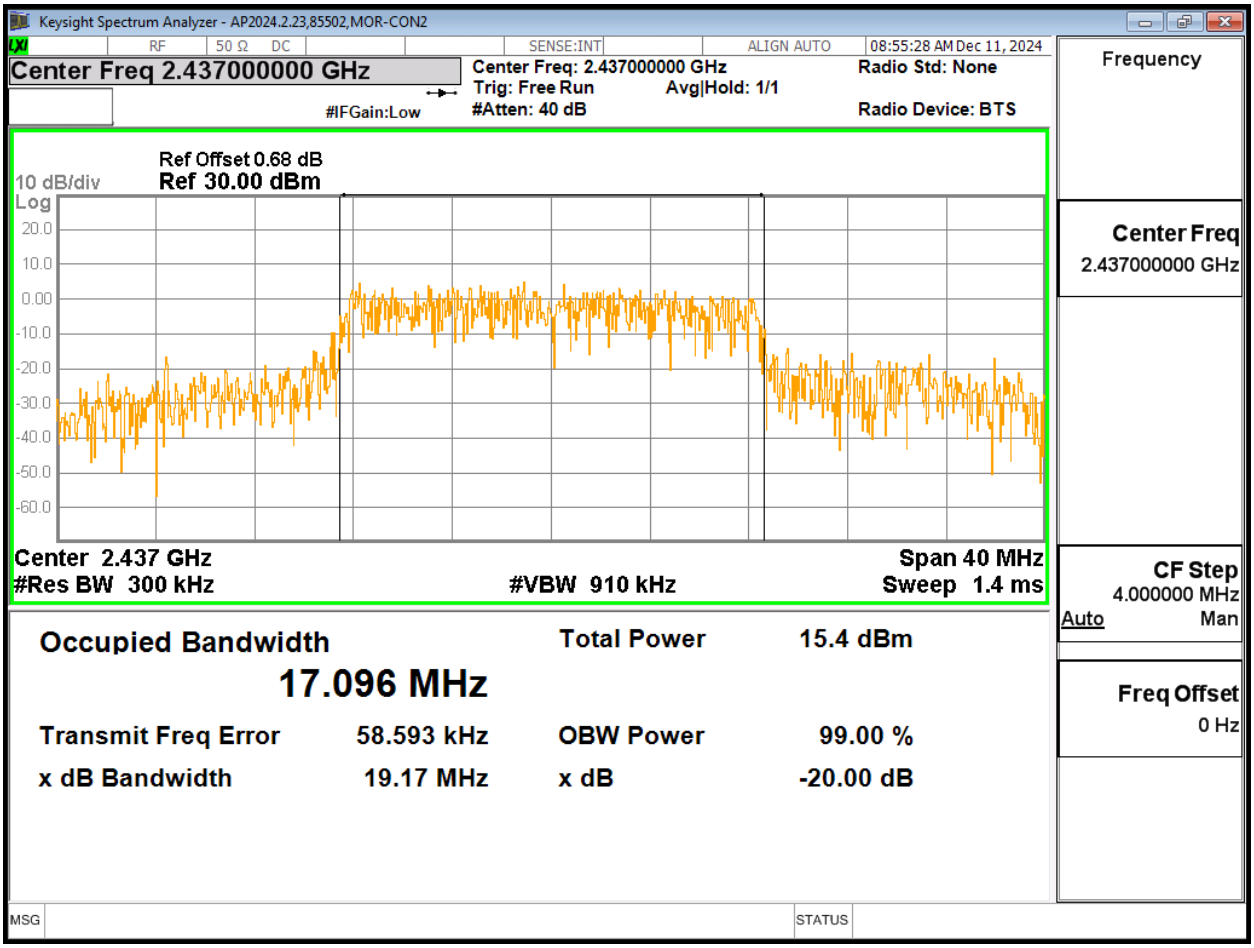


LOW CHANNEL

This report shall not be reproduced except in full, without the written approval of UL LLC

9.2.2. 802.11g MODE

Channel	Frequency (MHz)	99% Bandwidth Chain 0 (MHz)
Low 1	2412	16.620
Mid 6	2437	17.096
High 13	2472	16.255

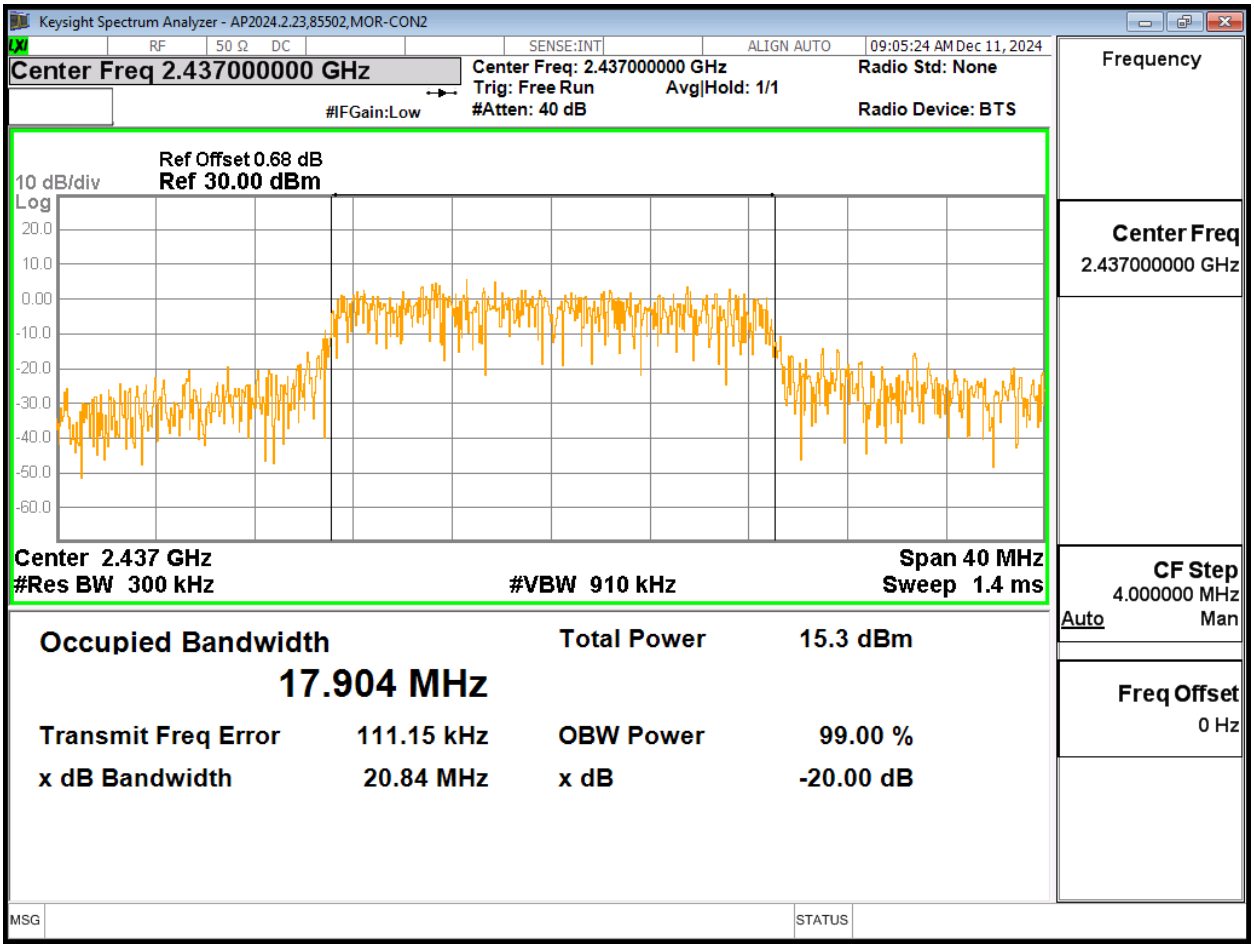


MID CHANNEL

This report shall not be reproduced except in full, without the written approval of UL LLC

9.2.3. 802.11n HT20 MODE

Channel	Frequency (MHz)	99% Bandwidth Chain 0 (MHz)
Low 1	2412	17.515
Mid 6	2437	17.904
High 13	2472	17.131

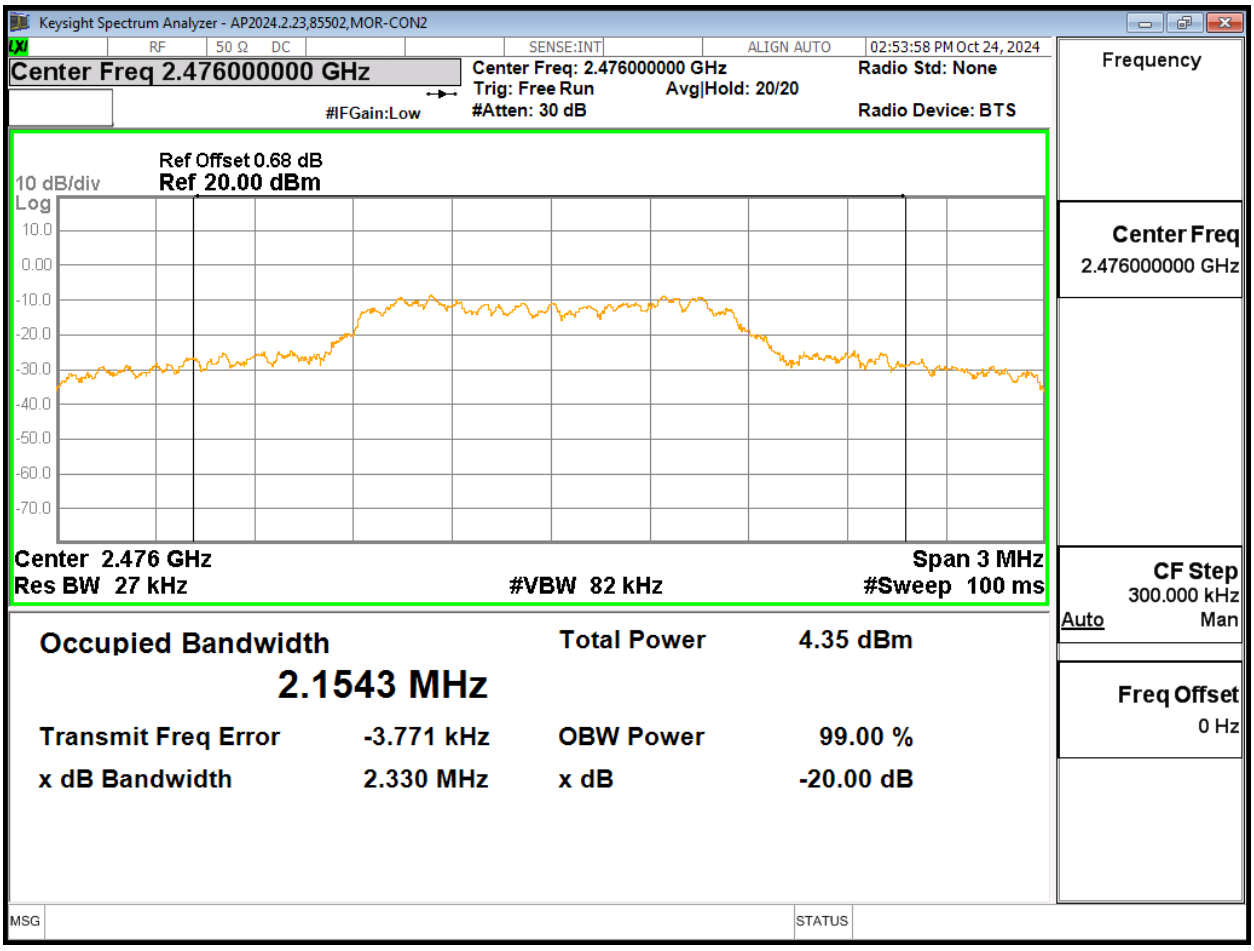


MID CHANNEL

This report shall not be reproduced except in full, without the written approval of UL LLC

9.2.4. ANT/ANT+ MODE

Frequency (MHz)	99% Bandwidth Chain 0 (MHz)
2402	1.2369
2404	1.2148
2440	1.4061
2476	2.1543
2478	2.0328
2480	1.8066

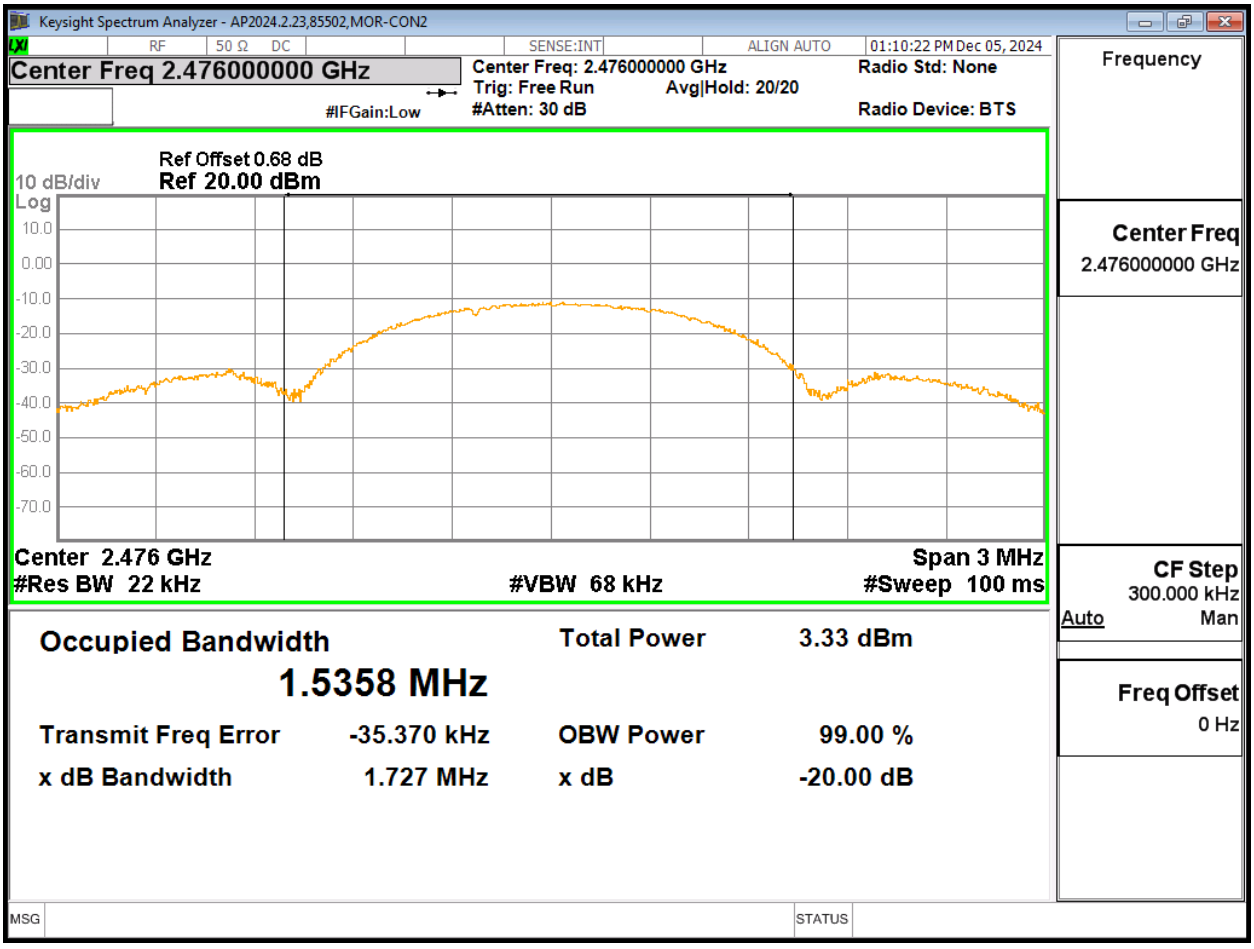


HIGH CHANNEL

This report shall not be reproduced except in full, without the written approval of UL LLC

9.2.5. BLE 1Mbps MODE

Channel	Frequency (MHz)	99% Bandwidth Chain 0 (MHz)
Low 37	2402	1.2451
Low 0	2404	1.1737
Mid 17	2440	1.2731
High 35	2476	1.5358
High 36	2478	1.3325
High 39	2480	1.3305

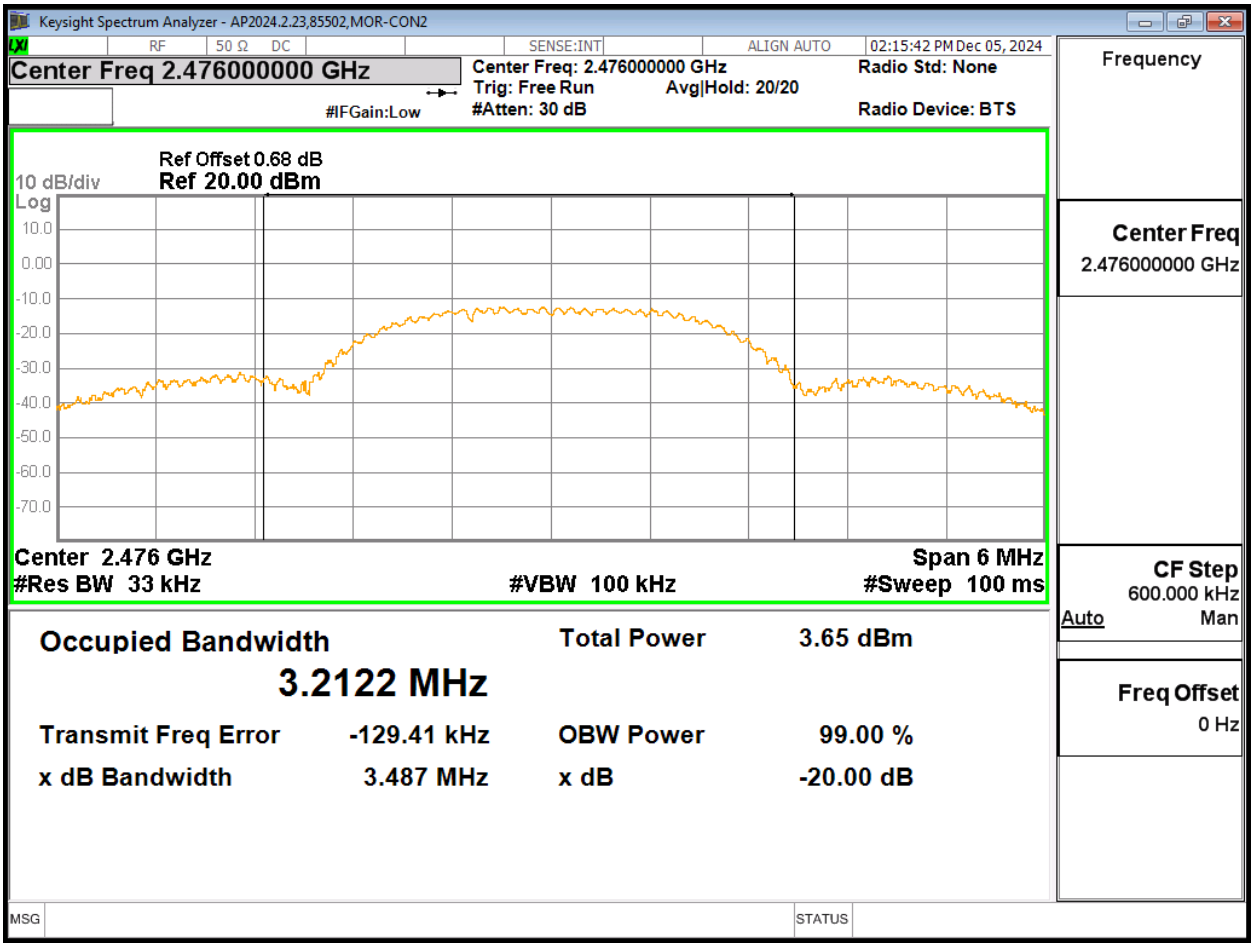


HIGH CHANNEL 35

This report shall not be reproduced except in full, without the written approval of UL LLC

9.2.6. BLE 2Mbps MODE

Channel	Frequency (MHz)	99% Bandwidth Chain 0 (MHz)
Low 37	2402	2.4403
Low 0	2404	2.2860
Mid 17	2440	2.5299
High 35	2476	3.2122
High 36	2478	2.7144
High 39	2480	2.6272



HIGH CHANNEL 35

This report shall not be reproduced except in full, without the written approval of UL LLC

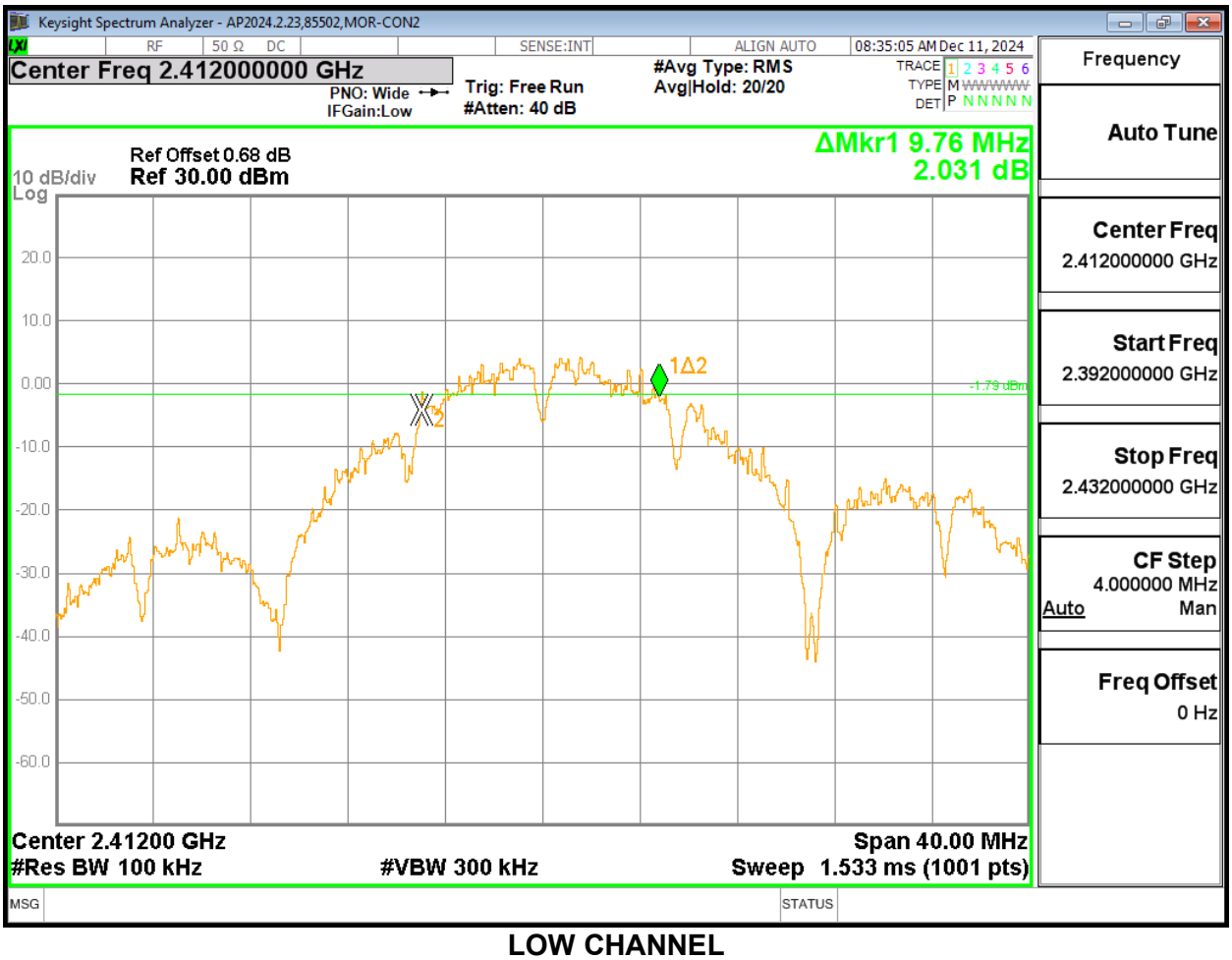
9.3. 6 dB BANDWIDTH

LIMITS
FCC §15.247 (a) (2)
RSS-247 5.2 (a)

The minimum 6 dB bandwidth shall be at least 500 kHz.

9.3.1. 802.11b MODE

Channel	Frequency (MHz)	6 dB BW Chain 0 (MHz)	Minimum Limit (MHz)
Low 1	2412	9.76	0.5
Mid 6	2437	8.16	0.5
High 13	2472	9.16	0.5

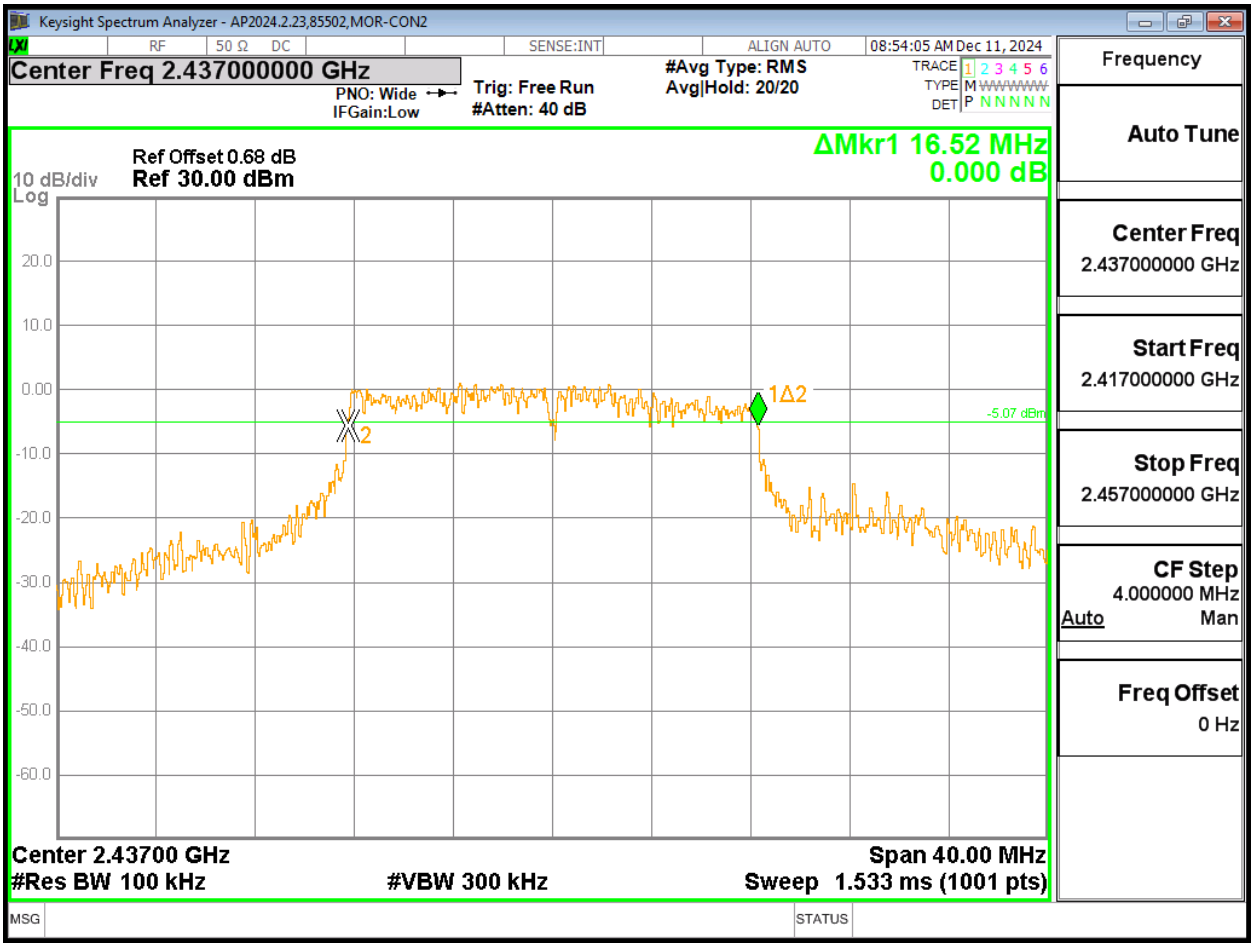


LOW CHANNEL

This report shall not be reproduced except in full, without the written approval of UL LLC

9.3.2. 802.11g MODE

Channel	Frequency (MHz)	6 dB BW Chain 0 (MHz)	Minimum Limit (MHz)
Low 1	2412	16.20	0.5
Mid 6	2437	16.52	0.5
High 13	2472	16.12	0.5

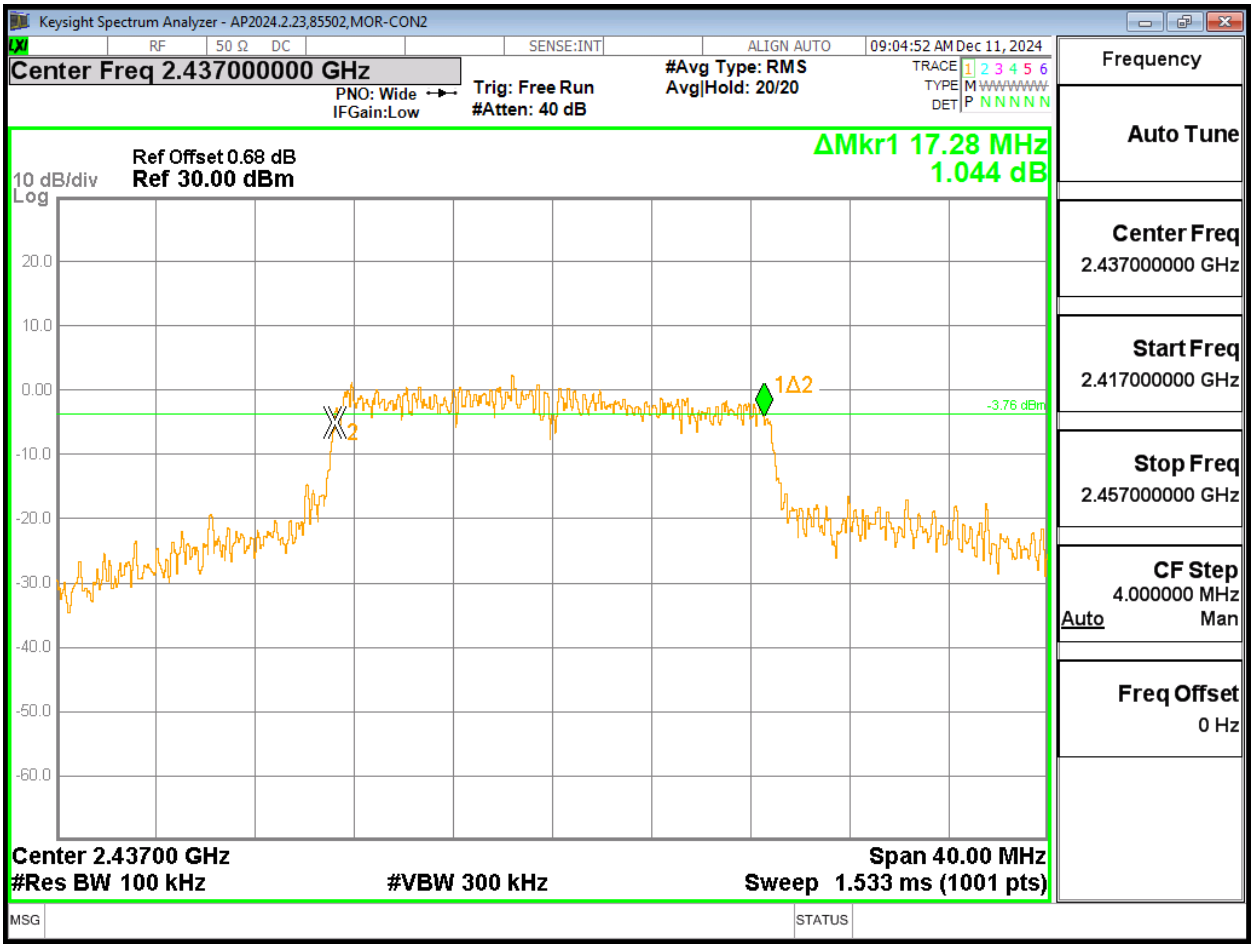


MID CHANNEL

This report shall not be reproduced except in full, without the written approval of UL LLC

9.3.3. 802.11n HT20 MODE

Channel	Frequency (MHz)	6 dB BW Chain 0 (MHz)	Minimum Limit (MHz)
Low 1	2412	16.36	0.5
Mid 6	2437	17.28	0.5
High 13	2472	16.60	0.5

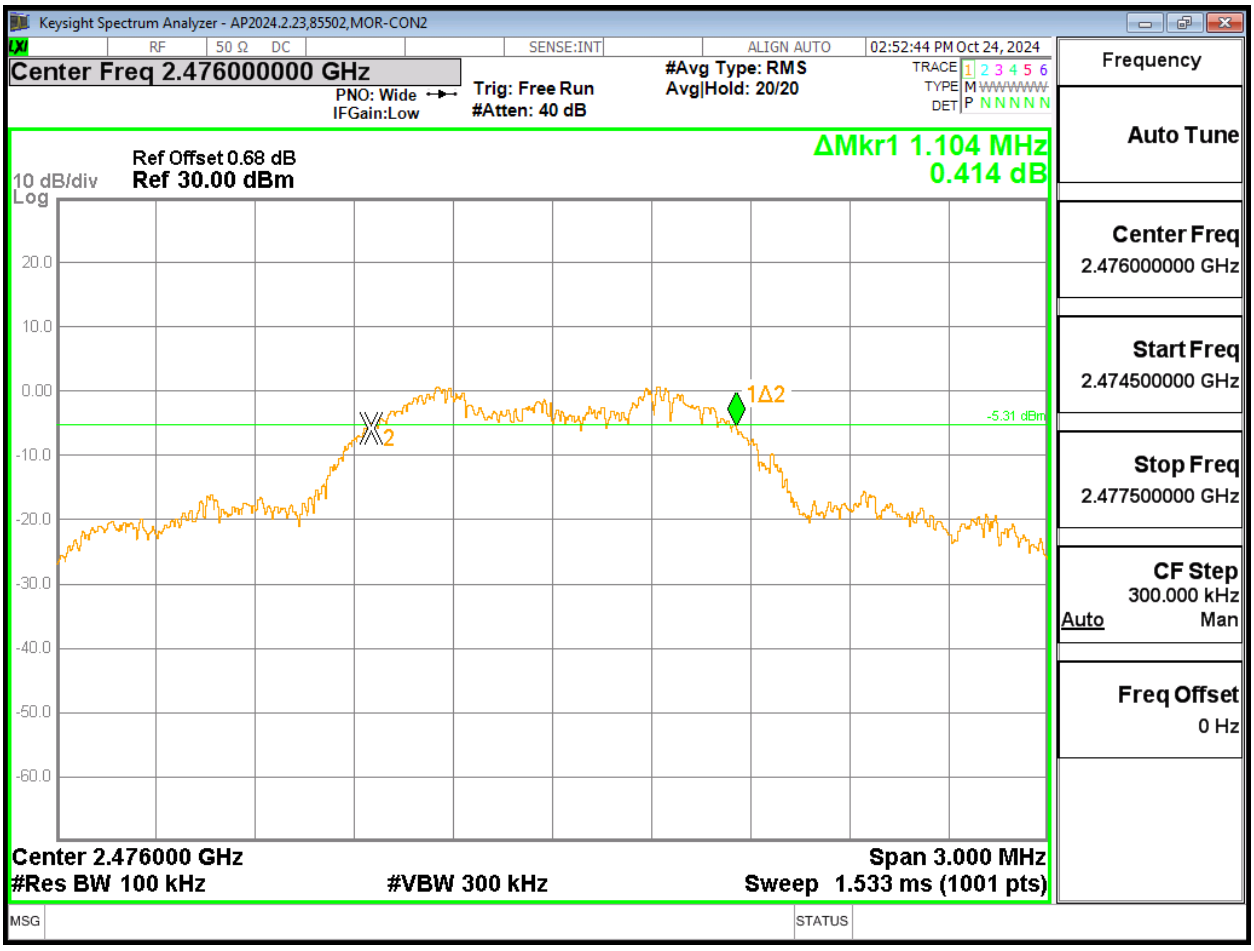


MID CHANNEL

This report shall not be reproduced except in full, without the written approval of UL LLC

9.3.4. ANT/ANT+ MODE

Frequency (MHz)	6 dB Bandwidth Chain 0 (MHz)	Minimum Limit (MHz)
2402	0.681	0.5
2404	0.621	0.5
2440	0.867	0.5
2476	1.104	0.5
2478	1.05	0.5
2480	0.951	0.5

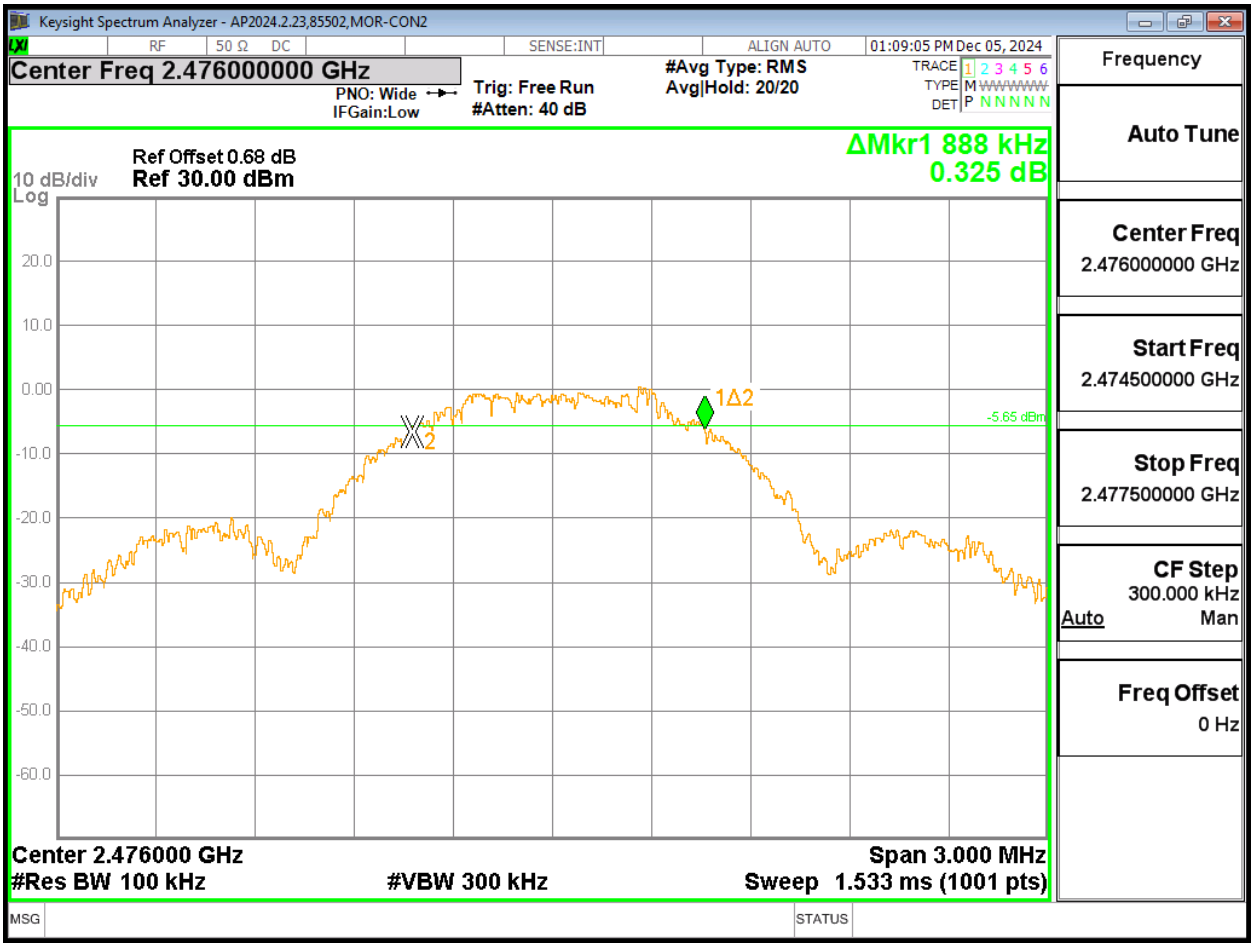


HIGH CHANNEL

This report shall not be reproduced except in full, without the written approval of UL LLC

9.3.5. BLE 1Mbps MODE

Channel	Frequency (MHz)	6 dB Bandwidth Chain 0 (MHz)	Minimum Limit (MHz)
Low 37	2402	0.663	0.5
Low 0	2404	0.669	0.5
Mid 17	2440	0.729	0.5
High 35	2476	0..888	0.5
High 36	2478	0.798	0.5
High 39	2480	0.858	0.5

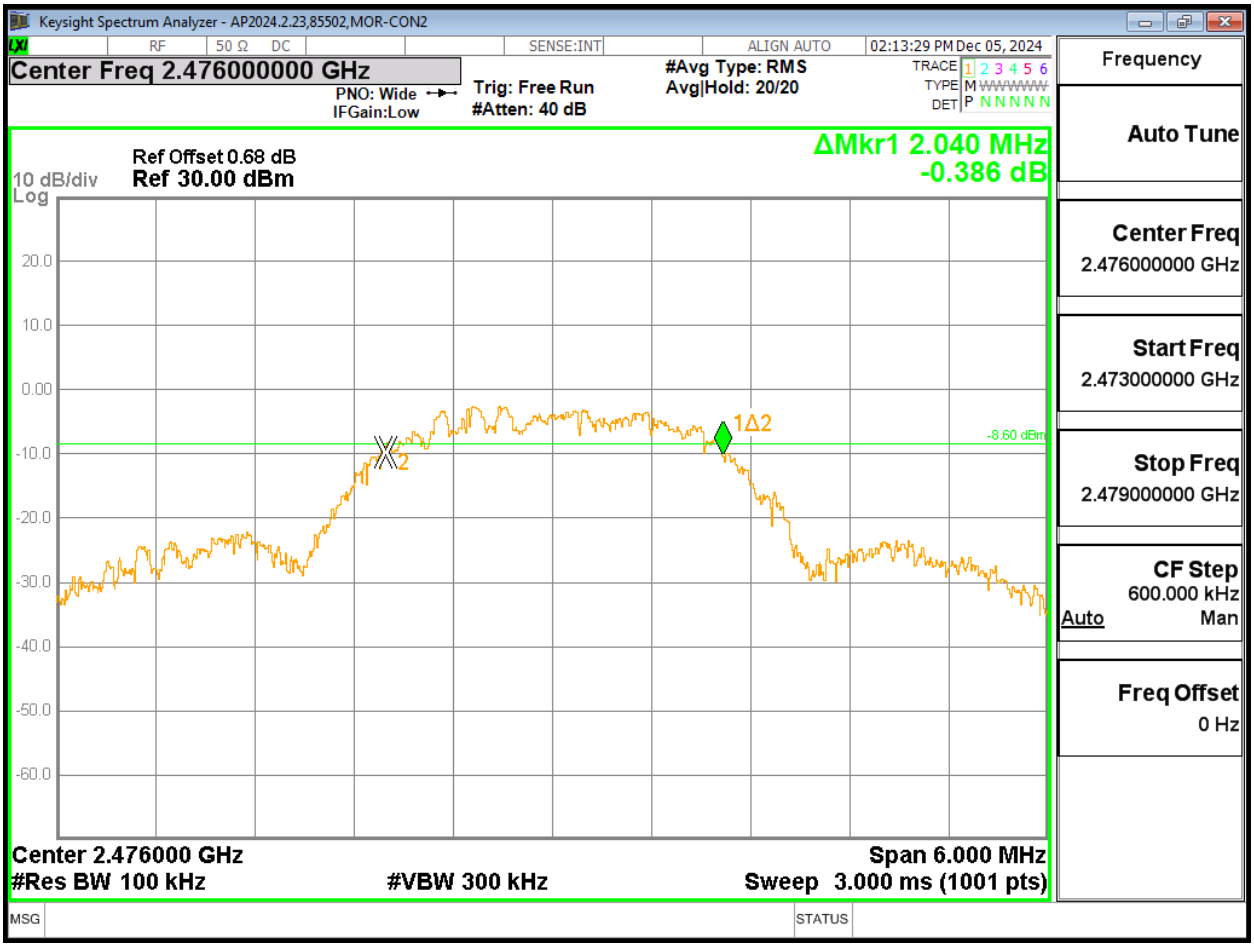


HIGH CHANNEL 35

This report shall not be reproduced except in full, without the written approval of UL LLC

9.3.6. BLE 2Mbps MODE

Channel	Frequency (MHz)	6 dB Bandwidth Chain 0 (MHz)	Minimum Limit (MHz)
Low 37	2402	1.302	0.5
Low 0	2404	1.050	0.5
Mid 17	2440	1.404	0.5
High 35	2476	2.040	0.5
High 36	2478	1.782	0.5
High 39	2480	1.764	0.5



HIGH CHANNEL 35

This report shall not be reproduced except in full, without the written approval of UL LLC

9.4. OUTPUT POWER

LIMITS

FCC §15.247 (b) (3)
RSS-247 5.4 (d)

TEST PROCEDURE

The transmitter output is connected to a power meter.

The cable assembly insertion loss of .68 dB (cable) was entered as an offset in the power meter.

The power output was measured on the EUT antenna port using SMA cable connected to a power meter via wideband power sensor. Peak output power was read directly from power meter.

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

RESULTS

9.4.1. 802.11b MODE

Test Engineer:	85502
Test Date:	2024-12-12

Results:

Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Power Limit (dBm)	Margin (dB)
Low 1	2412	12.26	30.00	-17.74
Mid 6	2437	12.19	30.00	-17.81
High 12	2467	12.69	30.00	-17.31
High 13	2472	12.18	30.00	-17.82

This report shall not be reproduced except in full, without the written approval of UL LLC

9.4.2. 802.11g MODE

Test Engineer:	85502
Test Date:	2024-12-12

Results:

Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Power Limit (dBm)	Margin (dB)
Low 1	2412	17.52	30.00	-12.48
Low 2	2417	19.25	30.00	-10.75
Low 3	2422	20.1	30.00	-9.9
Mid 6	2437	20.69	30.00	-9.31
High 7	2442	20.16	30.00	-9.84
High 8	2447	19.18	30.00	-10.82
High 9	2452	18.26	30.00	-11.74
High 10	2457	17.88	30.00	-12.12
High 11	2462	16.96	30.00	-13.04
High 12	2467	15.35	30.00	-14.65
High 13	2472	14.04	30.00	-15.96

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

9.4.3. 802.11n HT20 MODE

Test Engineer:	85502
Test Date:	2024-12-12

Results:

Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Power Limit (dBm)	Margin (dB)
Low 1	2412	16.84	30.00	-13.16
Low 2	2417	19.91	30.00	-10.09
Low 3	2422	20.68	30.00	-9.32
Mid 6	2437	21.02	30.00	-8.98
High 7	2442	20.56	30.00	-9.44
High 8	2447	18.79	30.00	-11.21
High 9	2452	18.46	30.00	-11.54
High 10	2457	18.28	30.00	-11.72
High 11	2462	16.41	30.00	-13.59
High 12	2467	15.61	30.00	-14.39
High 13	2472	14.62	30.00	-15.38

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

9.4.4. ANT/ANT+ MODE

Test Engineer:	85502
Test Date:	2024-10-21

Frequency (MHz)	Chain 0 Meas Power (dBm)	Power Limit (dBm)	Margin (dB)
2402	-2.14	30.00	-32.14
2404	2.47	30.00	-27.53
2440	2.74	30.00	-27.26
2476	2.79	30.00	-27.21
2478	2.46	30.00	-27.54
2480	-2.20	30.00	-32.20

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

9.4.5. BLE 1Mbps MODE

Test Engineer:	85502
Test Date:	2024-12-05

Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Power Limit (dBm)	Margin (dB)
Low 37	2402	-2.31	30.00	-32.31
Low 0	2404	2.45	30.00	-27.55
Mid 17	2440	2.69	30.00	-27.31
High 35	2476	2.77	30.00	-27.23
High 36	2478	-2.40	30.00	-32.40
High 39	2480	-2.80	30.00	-32.80

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

9.4.6. BLE 2Mbps MODE

Test Engineer:	85502
Test Date:	2024-12-05

Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Power Limit (dBm)	Margin (dB)
Low 37	2402	-2.69	30.00	-32.69
Low 0	2404	2.53	30.00	-27.47
Mid 17	2440	2.77	30.00	-27.23
High 35	2476	2.89	30.00	-27.11
High 36	2478	-2.31	30.00	-32.31
High 39	2480	-2.77	30.00	-32.77

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

9.5. AVERAGE POWER

LIMITS

None; for reporting purposes only

TEST PROCEDURE

The transmitter output is connected to a power meter.

The cable assembly insertion loss of .68 dB (cable) was entered as an offset in the power meter.

The power output was measured on the EUT antenna port using SMA cable with 10dB attenuator connected to a power meter via wideband power sensor. Gated average output power was read directly from power meter.

This report shall not be reproduced except in full, without the written approval of UL LLC

9.5.1. 2.4 WLAN Results

Test Engineer:	85502
Test Date:	2024-12-12

Mode	Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)
802.11b	Low 1	2412	9.74
	Mid 6	2437	9.75
	High 12	2467	10.42
	High 13	2472	9.55
802.11g	Low 1	2412	12.23
	Low 2	2417	14.56
	Low 3	2422	15.35
	Mid 6	2437	15.66
	High 7	2442	14.87
	High 8	2447	13.57
	High 9	2452	13.11
	High 10	2457	13.22
	High 11	2462	11.44
	High 12	2467	9.31
	High 13	2472	7.81
802.11nHT20	Low 1	2412	10.67
	Low 2	2417	15.45
	Low 3	2422	16.16
	Mid 6	2437	16.09
	High 7	2442	15.09
	High 8	2447	13.19
	High 9	2452	13.02
	High 10	2457	13.16
	High 11	2462	10.42
	High 12	2467	9.18
	High 13	2472	8.03

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

9.5.2. ANT/ANT+

Test Engineer:	85502
Test Date:	2024-10-21

Frequency (MHz)	Chain 0 Meas Power (dBm)
2402	-2.42
2404	2.19
2440	2.52
2476	2.49
2478	2.15
2480	-2.53

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

9.5.3. BLE 1Mbps Mode

Test Engineer:	85502
Test Date:	2024-12-05

Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)
Low 37	2402	-2.56
Low 0	2404	2.19
Mid 17	2440	2.48
High 35	2476	2.49
High 36	2478	-2.74
High 39	2480	-3.15

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

9.5.4. BLE 2Mbps Mode

Test Engineer:	85502
Test Date:	2024-12-05

Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)
Low 37	2402	-2.98
Low 0	2404	2.21
Mid 17	2440	2.49
High 35	2476	2.50
High 36	2478	-2.73
High 39	2480	-3.13

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

9.6. POWER SPECTRAL DENSITY

LIMITS

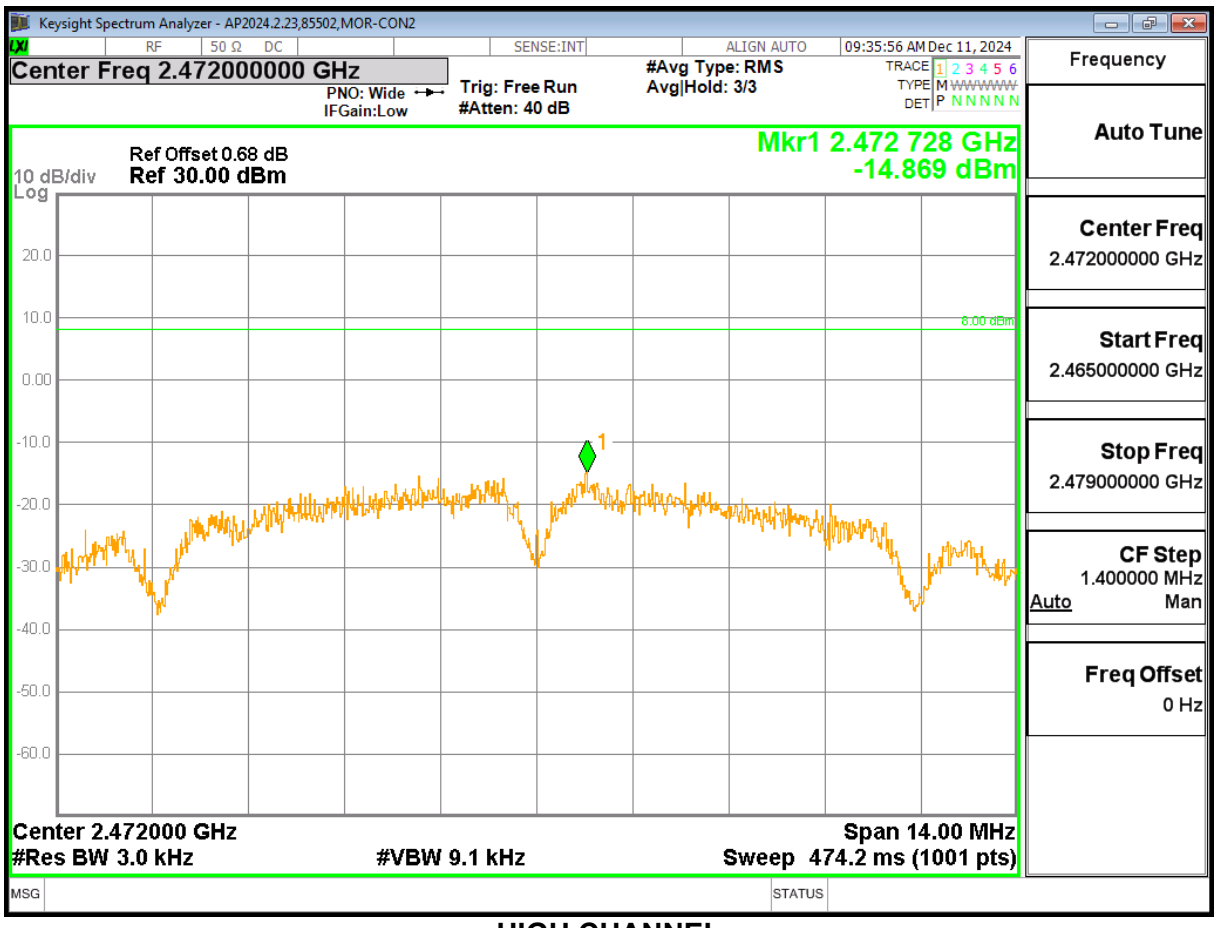
FCC §15.247 (e)
RSS-247 (5.2) (b)

The power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

9.6.1. 802.11b MODE

PSD Results

Channel	Frequency (MHz)	Chain 0 Meas (dBm/ 3kHz)	Limit (dBm/ 3kHz)	Margin (dB)
Low 1	2412	-15.49	8.0	-23.5
Mid 6	2437	-17.08	8.0	-25.1
High 13	2472	-14.87	8.0	-22.9



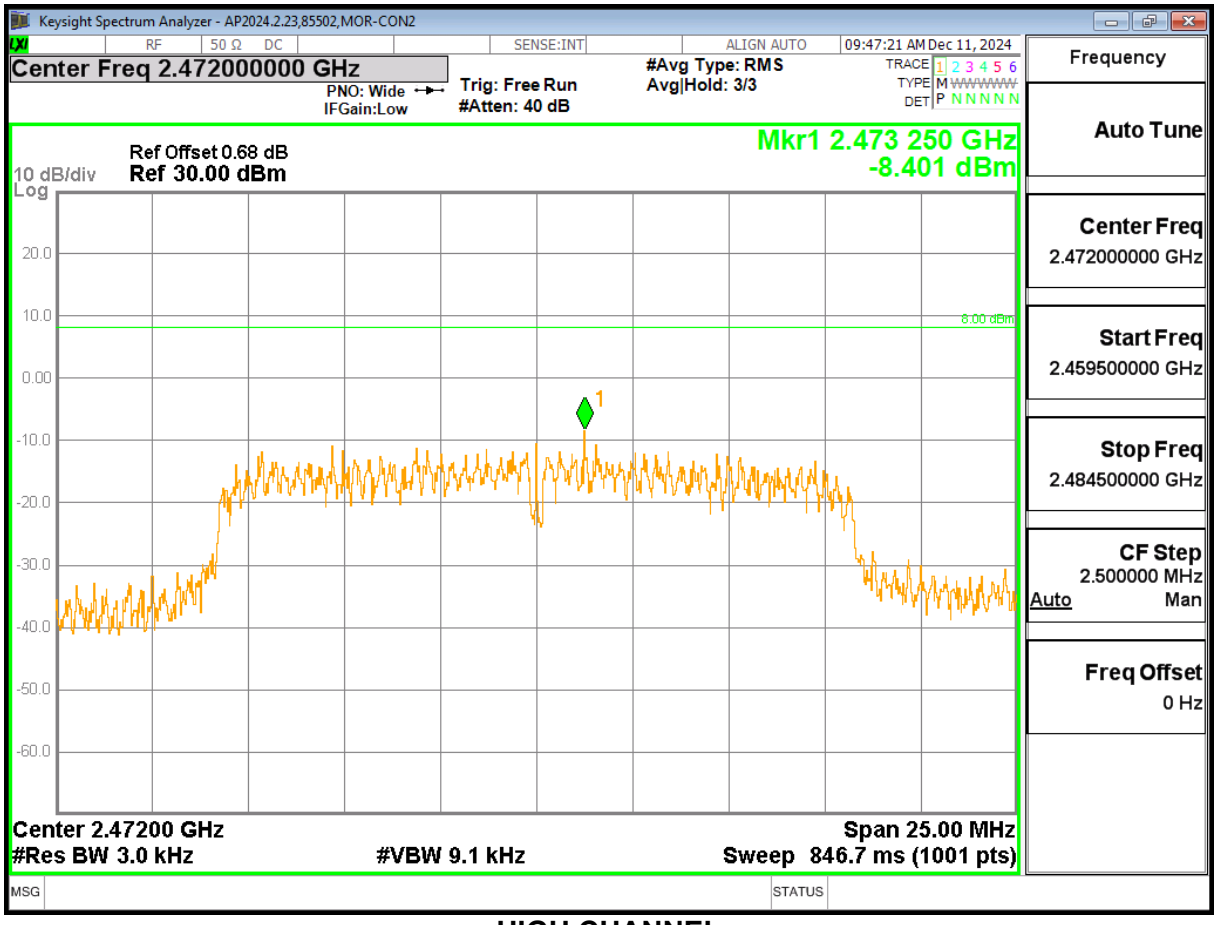
HIGH CHANNEL

This report shall not be reproduced except in full, without the written approval of UL LLC

9.6.2. 802.11g MODE

PSD Results

Channel	Frequency (MHz)	Chain 0 Meas (dBm/ 3kHz)	Limit (dBm/ 3kHz)	Margin (dB)
Low 1	2412	-13.84	8.0	-21.8
Mid 6	2437	-11.69	8.0	-16.4
High 13	2472	-8.40	8.0	-16.4



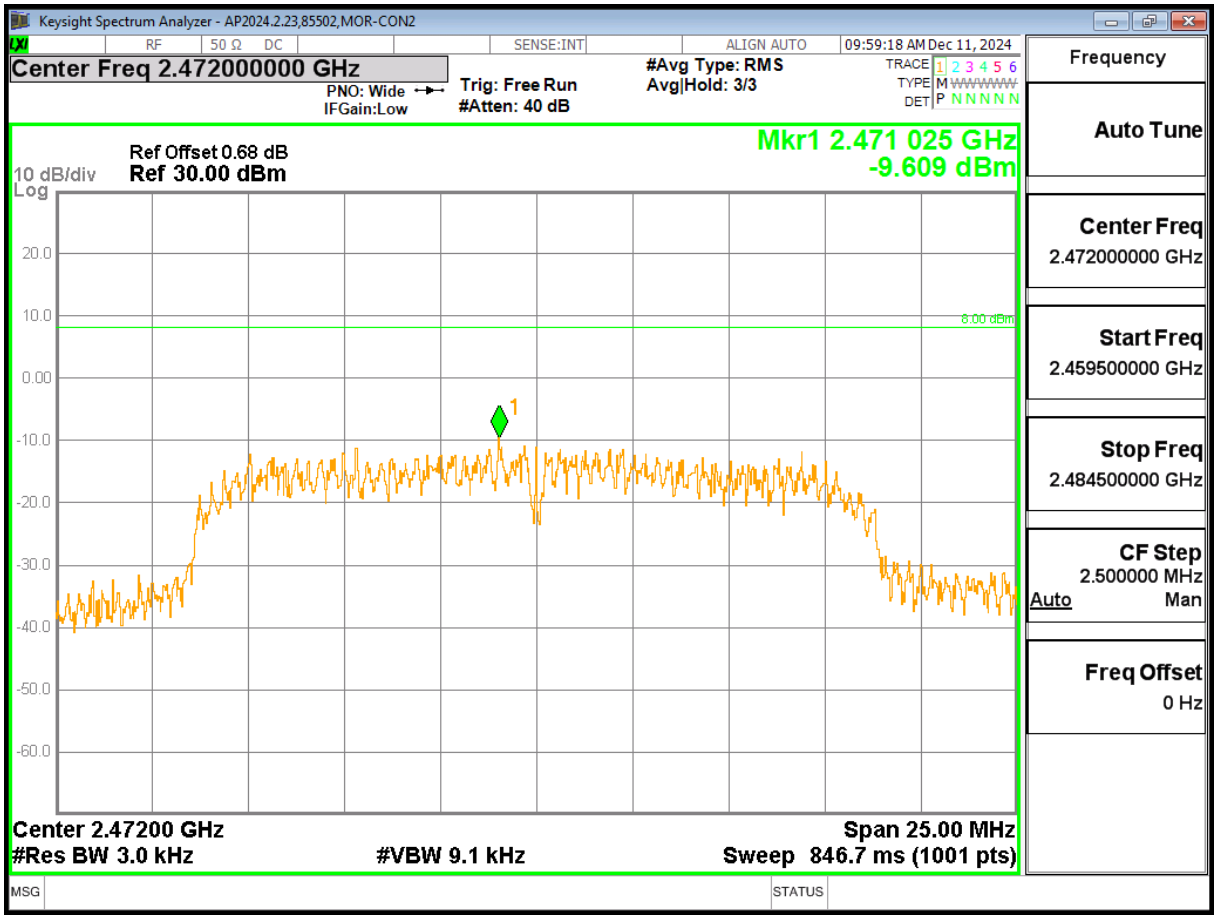
HIGH CHANNEL

This report shall not be reproduced except in full, without the written approval of UL LLC

9.6.3. 802.11n HT20 MODE

PSD Results

Channel	Frequency (MHz)	Chain 0 Meas (dBm/ 3kHz)	Limit (dBm/ 3kHz)	Margin (dB)
Low 1	2412	-11.70	8.0	-19.7
Mid 6	2437	-9.99	8.0	-18.0
High 13	2472	-9.61	8.0	-17.6



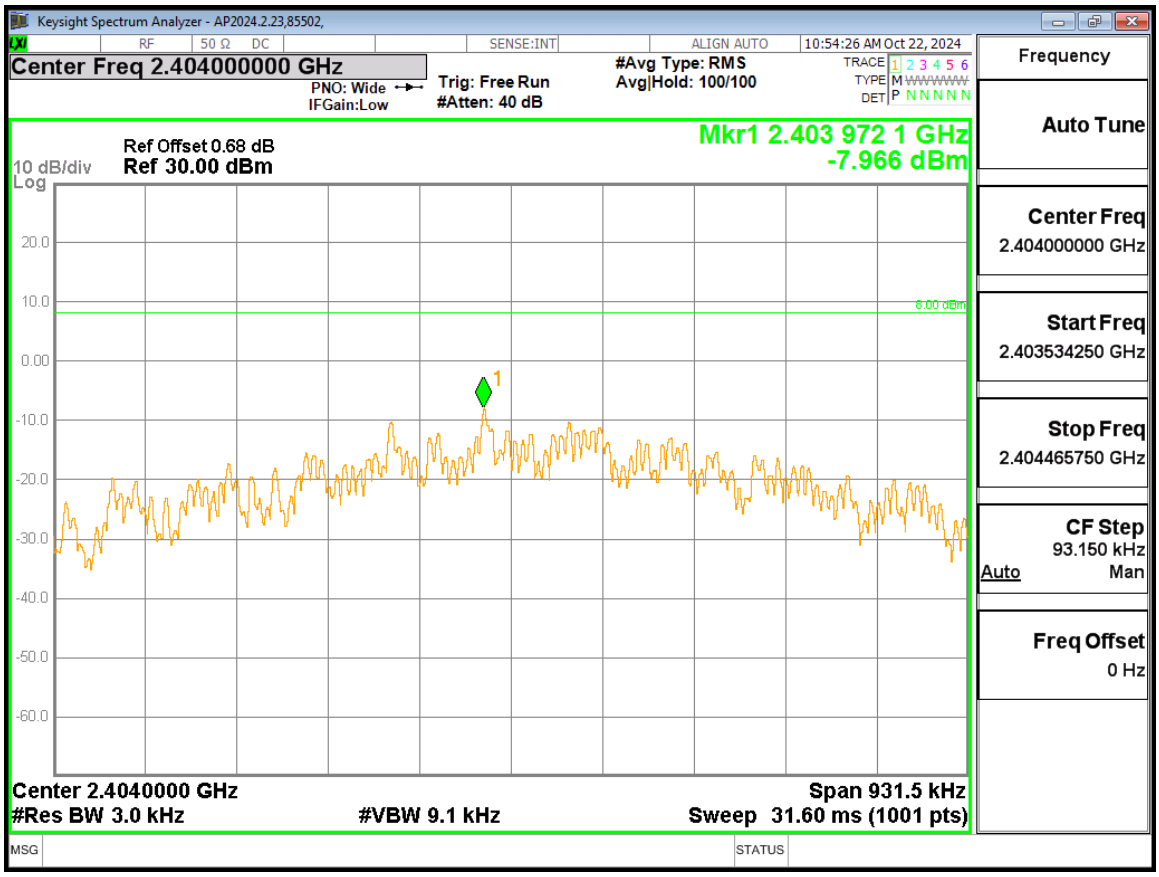
HIGH CHANNEL

This report shall not be reproduced except in full, without the written approval of UL LLC

9.6.4. ANT/ANT+ MODE

PSD Results

Frequency (MHz)	Chain 0 Meas (dBm/ 3kHz)	Limit (dBm/ 3kHz)	Margin (dB)
2402	-16.29	8.0	-24.3
2404	-7.97	8.0	-16.0
2440	-13.14	8.0	-21.1
2476	-10.39	8.0	-18.4
2478	-11.67	8.0	-19.7
2480	-19.09	8.0	-27.1



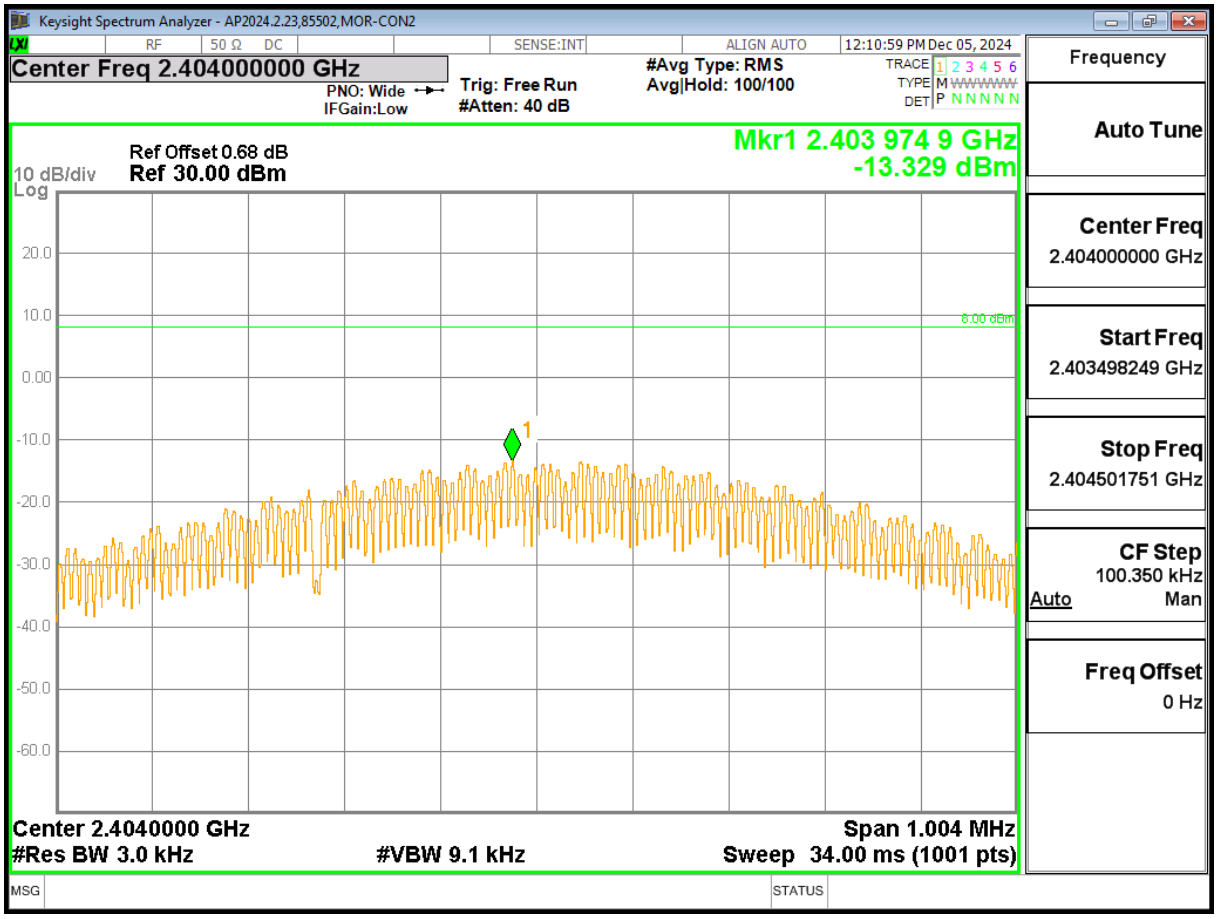
LOW CHANNEL 1

This report shall not be reproduced except in full, without the written approval of UL LLC

9.6.5. BLE 1Mbps MODE

PSD Results

Channel	Frequency (MHz)	Chain 0 Meas (dBm/ 3kHz)	Limit (dBm/ 3kHz)	Margin (dB)
Low 37	2402	-19.63	8.0	-27.6
Low 0	2404	-13.33	8.0	-21.3
Mid 17	2440	-14.60	8.0	-22.6
High 35	2476	-16.08	8.0	-24.1
High 36	2478	-20.28	8.0	-28.3
High 39	2480	-20.91	8.0	-28.9



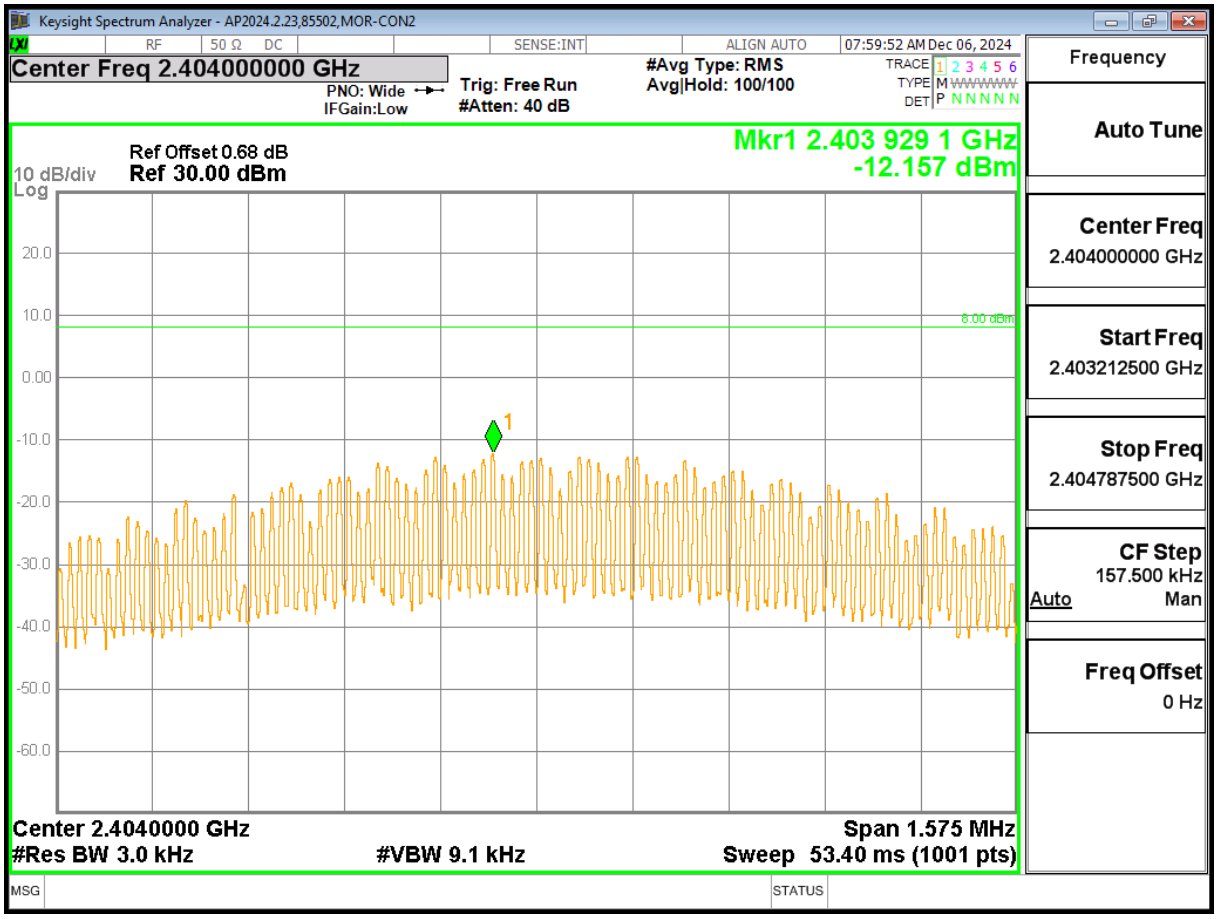
LOW CHANNEL 0

This report shall not be reproduced except in full, without the written approval of UL LLC

9.6.6. BLE 2Mbps MODE

PSD Results

Channel	Frequency (MHz)	Chain 0 Meas (dBm/ 3kHz)	Limit (dBm/ 3kHz)	Margin (dB)
Low 37	2402	-19.30	8.0	-27.3
Low 0	2404	-12.16	8.0	-20.2
Mid 17	2440	-14.98	8.0	-23.0
High 35	2476	-16.11	8.0	-24.1
High 36	2478	-20.71	8.0	-28.7
High 39	2480	-20.92	8.0	-28.9



LOW CHANNEL 0

This report shall not be reproduced except in full, without the written approval of UL LLC

9.7. CONDUCTED SPURIOUS EMISSIONS

LIMITS

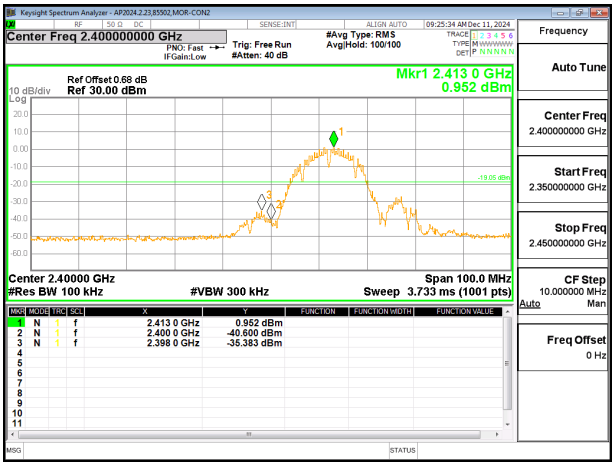
FCC §15.247 (d)
RSS-247 5.5

Output power was measured based on the use of peak measurement, therefore the required attenuation is -20 dBc.

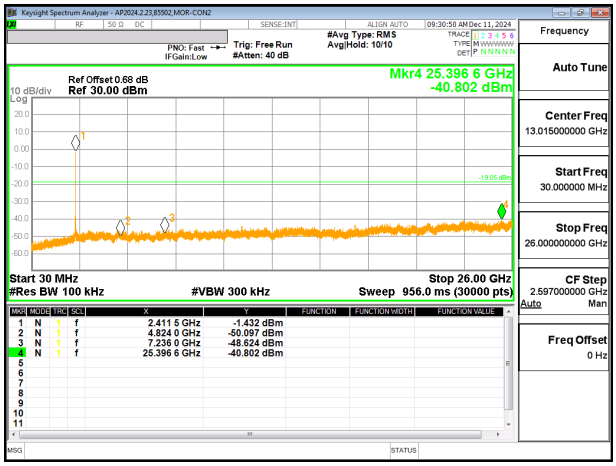
RESULTS

This report shall not be reproduced except in full, without the written approval of UL LLC

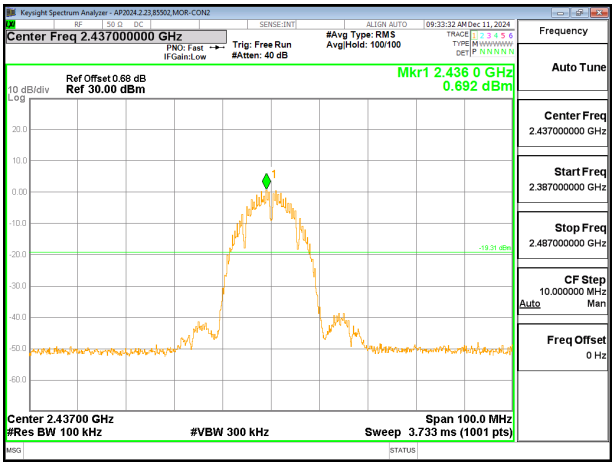
9.7.1. 802.11b MODE



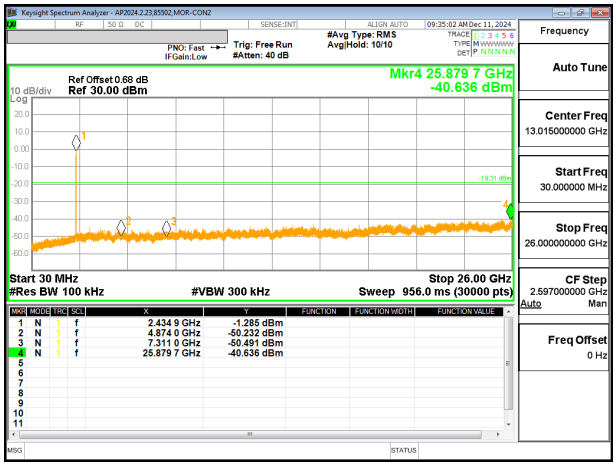
LOW CHANNEL 1



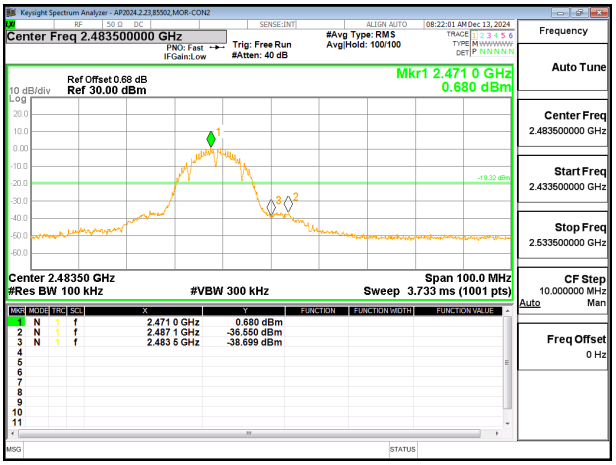
LOW CHANNEL 1



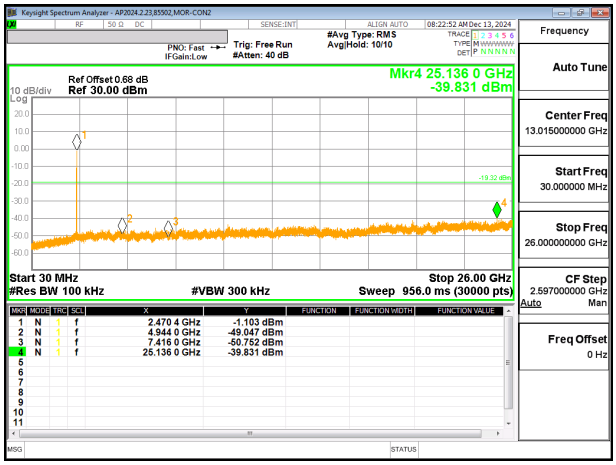
MID CHANNEL 6



MID CHANNEL 6



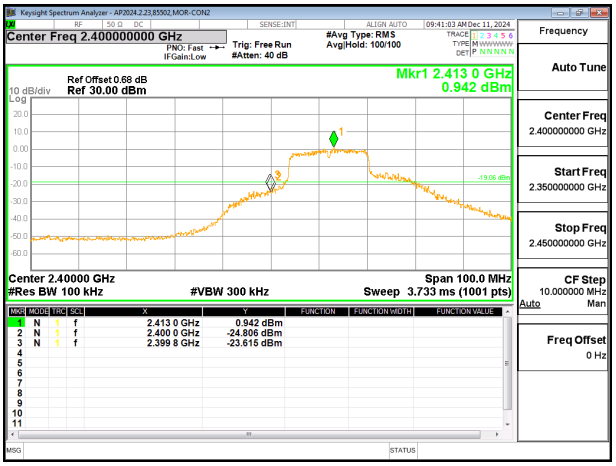
HIGH CHANNEL13



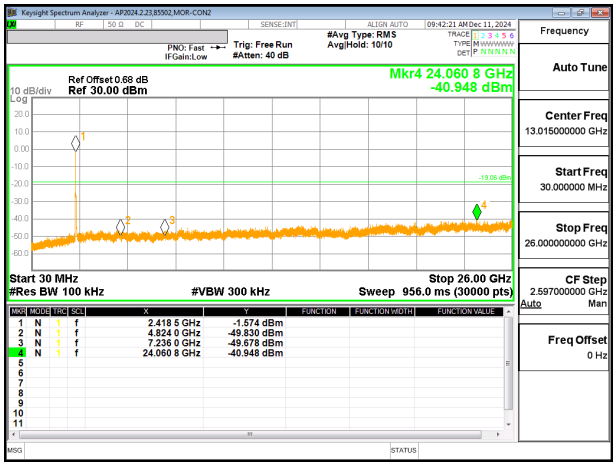
HIGH CHANNEL 13

This report shall not be reproduced except in full, without the written approval of UL LLC

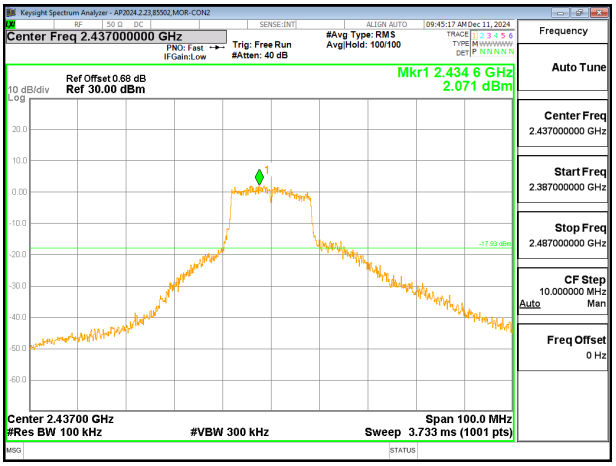
9.7.2. 802.11g MODE



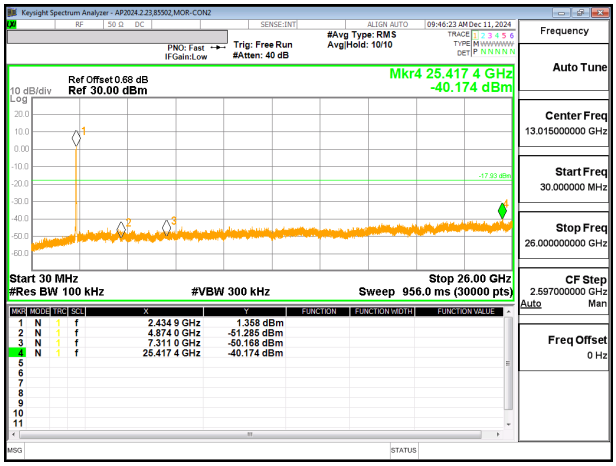
LOW CHANNEL 1



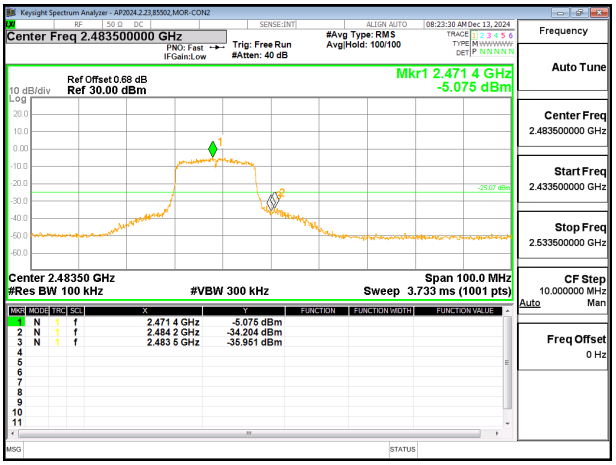
LOW CHANNEL 1



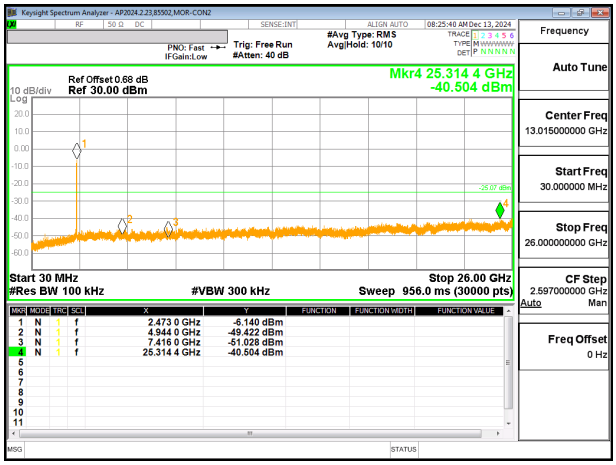
MID CHANNEL 6



MID CHANNEL 6



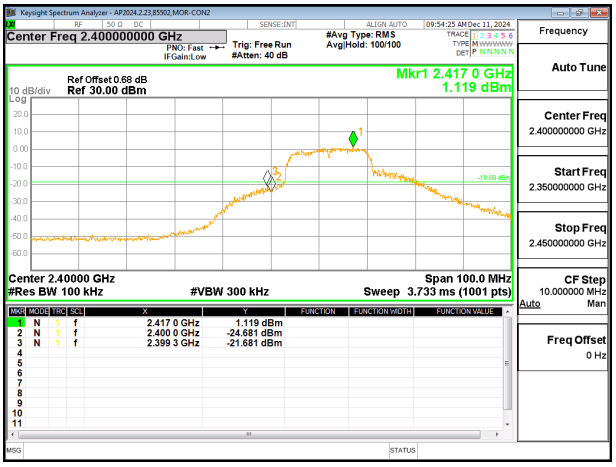
HIGH CHANNEL 13



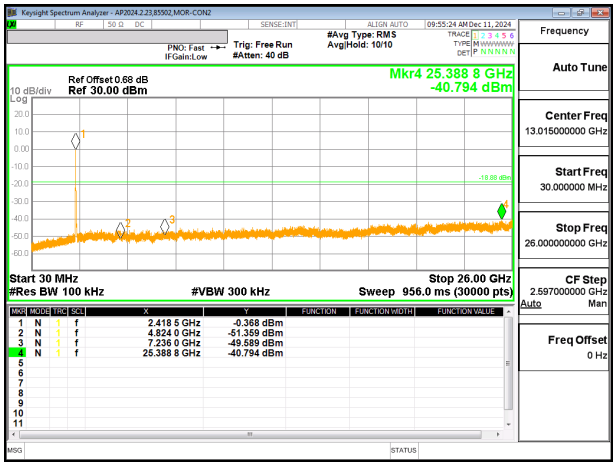
HIGH CHANNEL 13

This report shall not be reproduced except in full, without the written approval of UL LLC

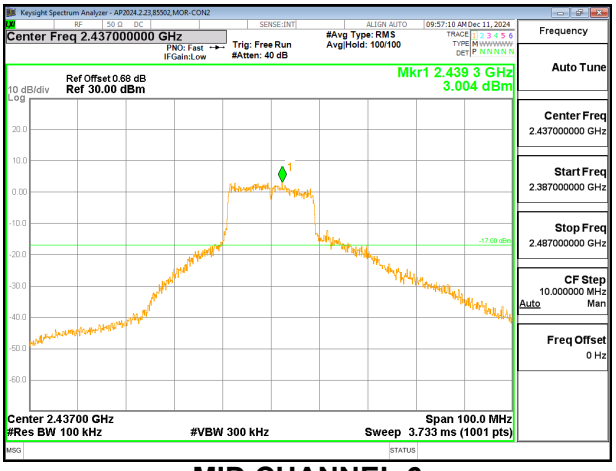
9.7.3. 802.11n HT20 MODE



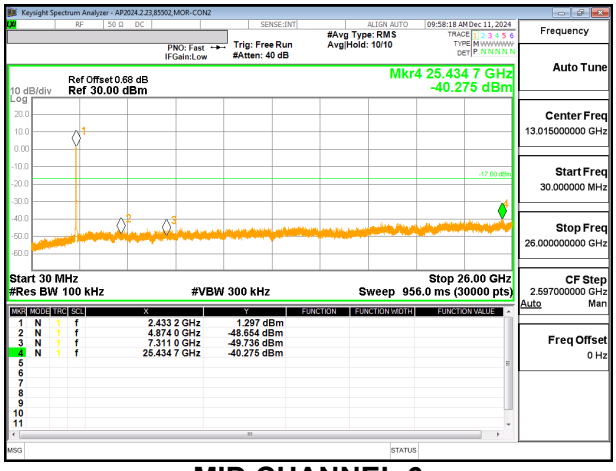
LOW CHANNEL 1



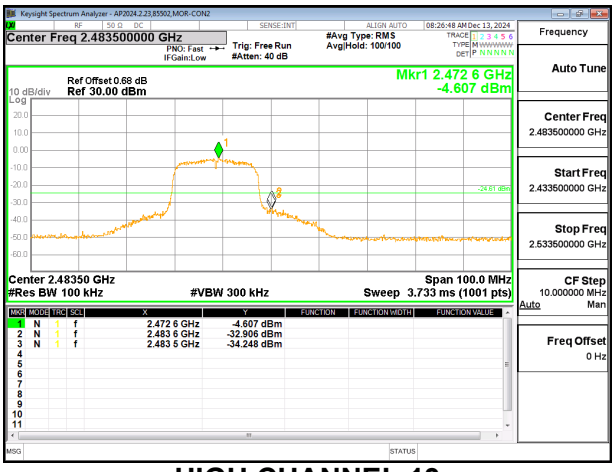
LOW CHANNEL 1



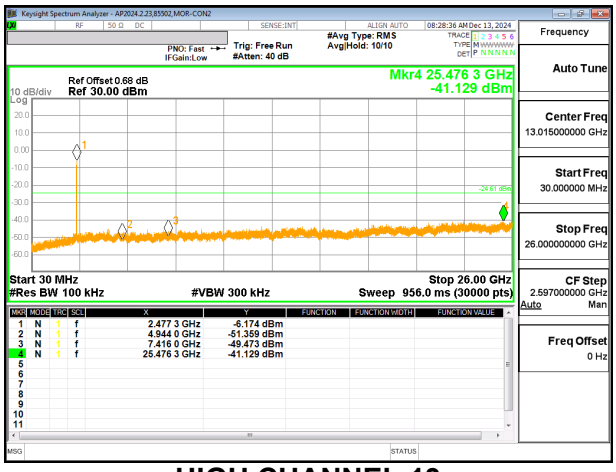
MID CHANNEL 6



MID CHANNEL 6



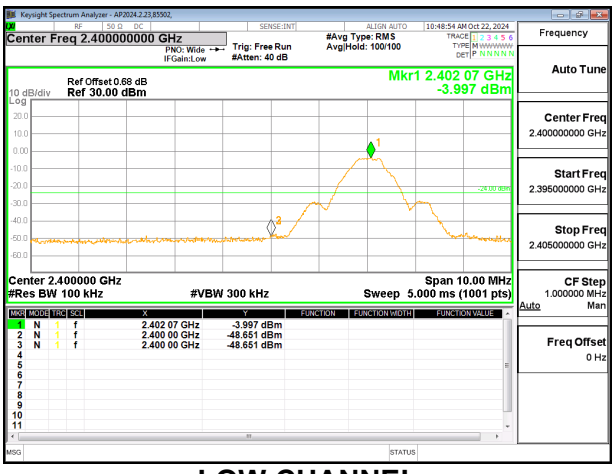
HIGH CHANNEL 13



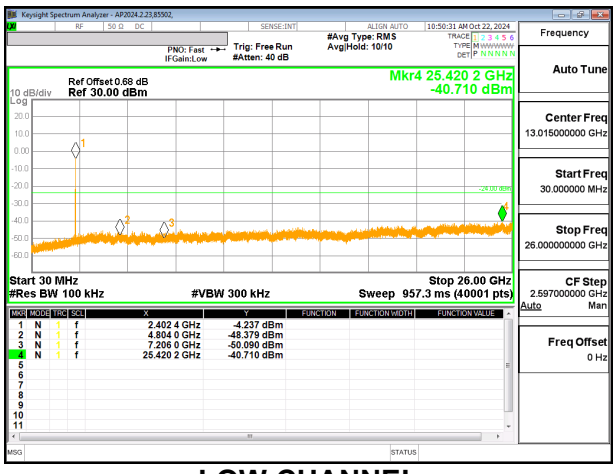
HIGH CHANNEL 13

This report shall not be reproduced except in full, without the written approval of UL LLC

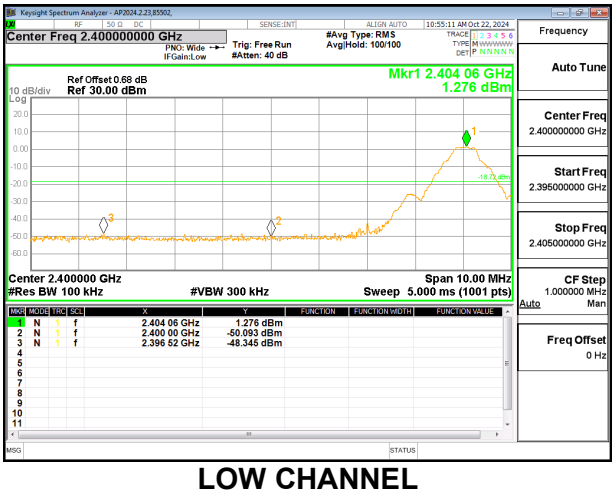
9.7.4. ANT/ANT+ MODE



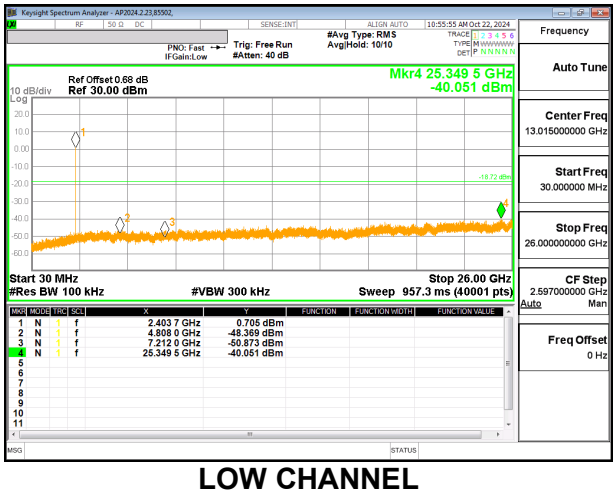
LOW CHANNEL



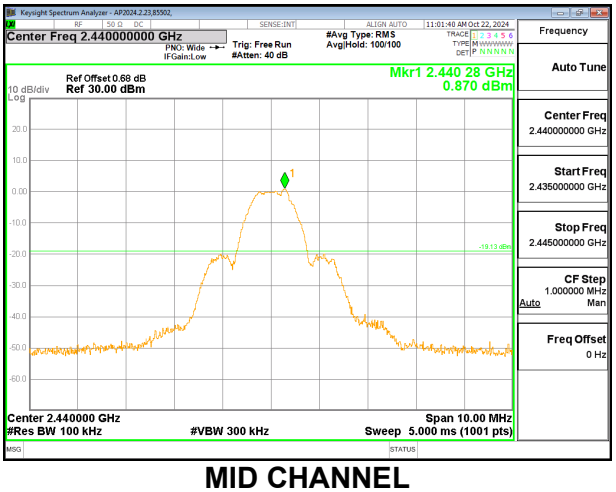
LOW CHANNEL



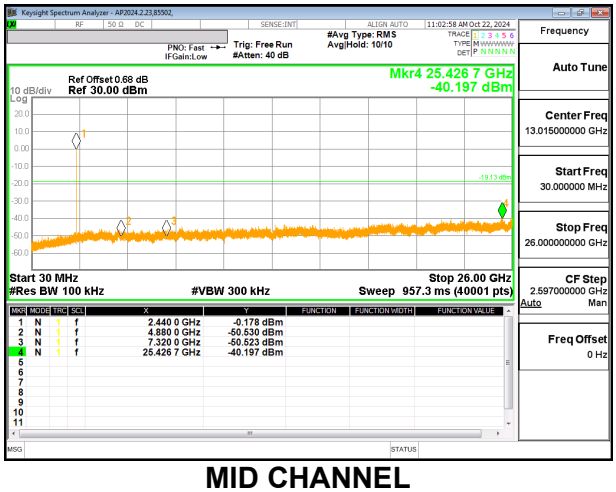
LOW CHANNEL



LOW CHANNEL

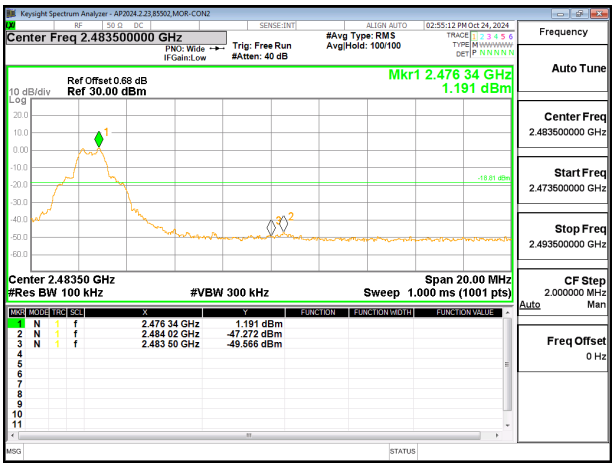


MID CHANNEL

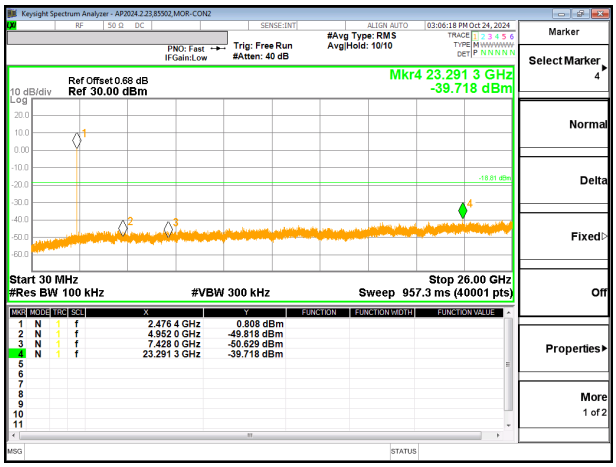


MID CHANNEL

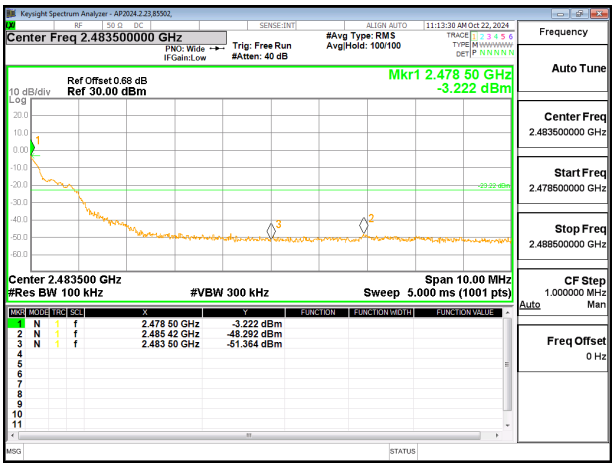
This report shall not be reproduced except in full, without the written approval of UL LLC



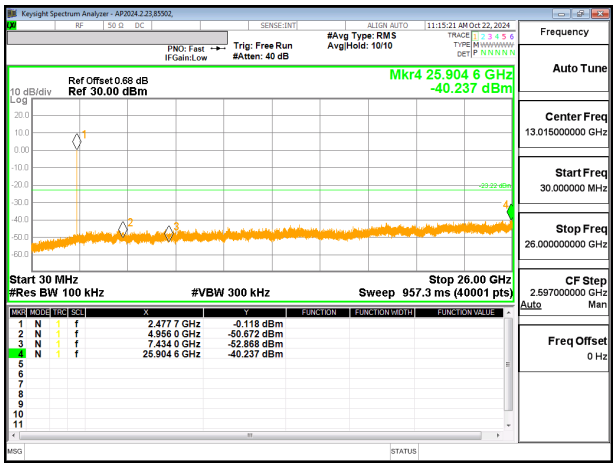
HIGH CHANNEL



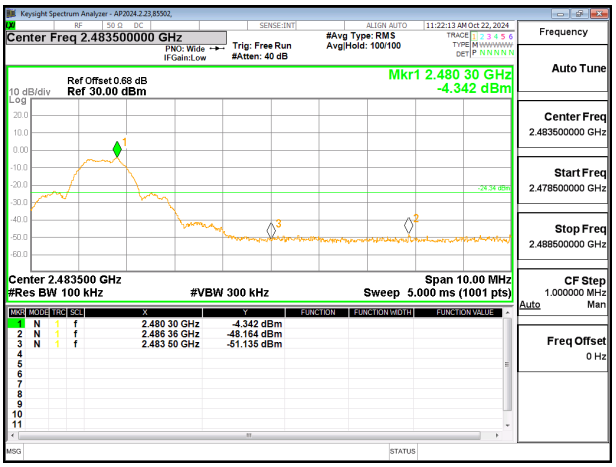
HIGH CHANNEL



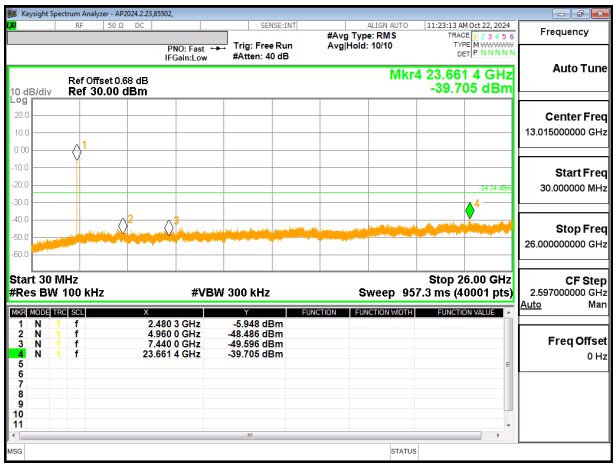
HIGH CHANNEL



HIGH CHANNEL



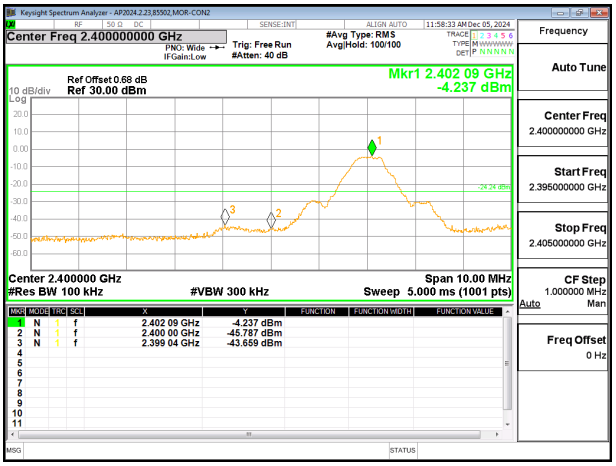
HIGH CHANNEL



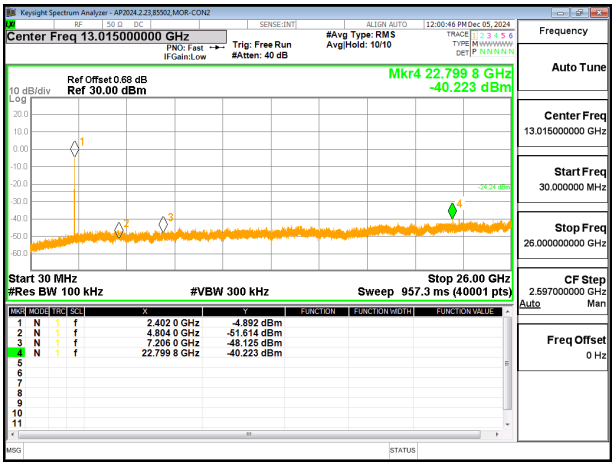
HIGH CHANNEL

This report shall not be reproduced except in full, without the written approval of UL LLC

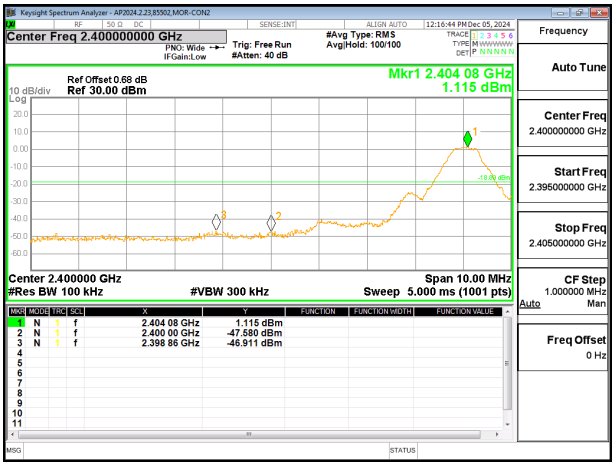
9.7.5. BLE 1Mbps MODE



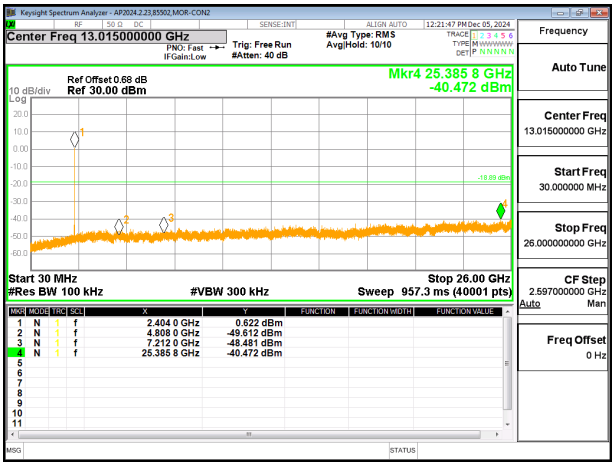
LOW CHANNEL 37



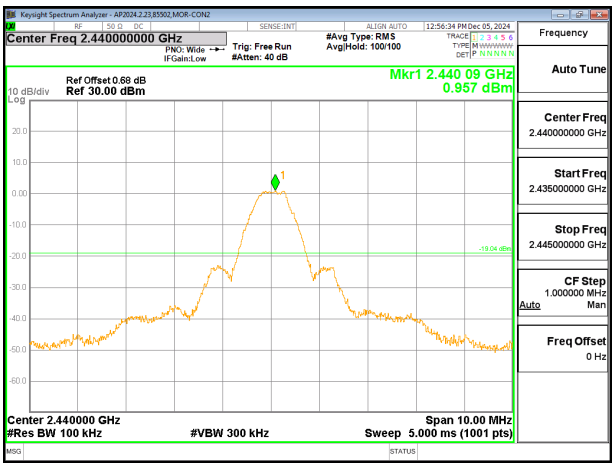
LOW CHANNEL 37



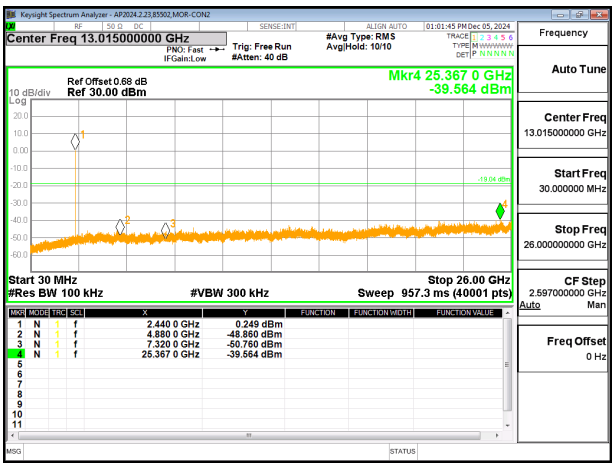
LOW CHANNEL 0



LOW CHANNEL 0

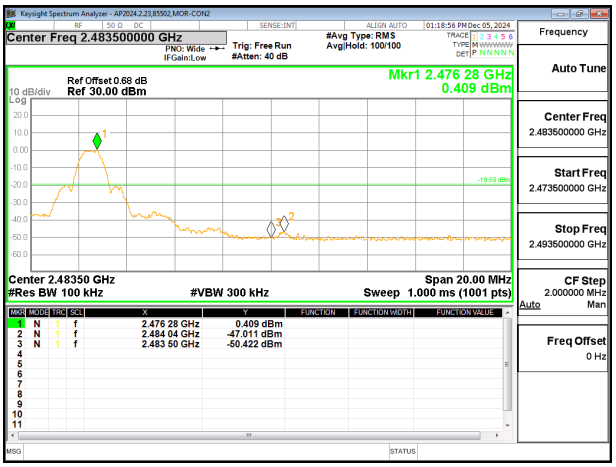


MID CHANNEL 17

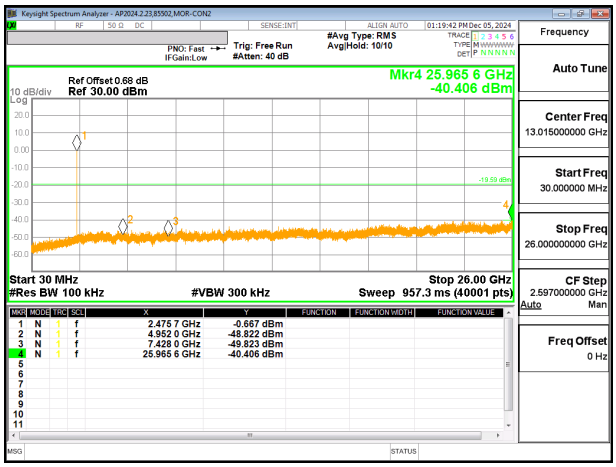


MID CHANNEL 17

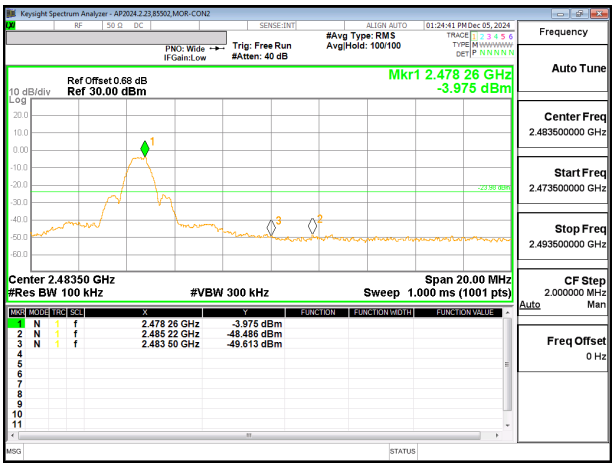
This report shall not be reproduced except in full, without the written approval of UL LLC



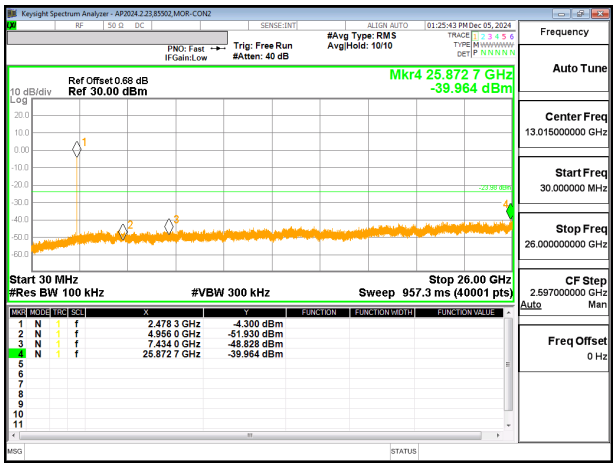
HIGH CHANNEL 35



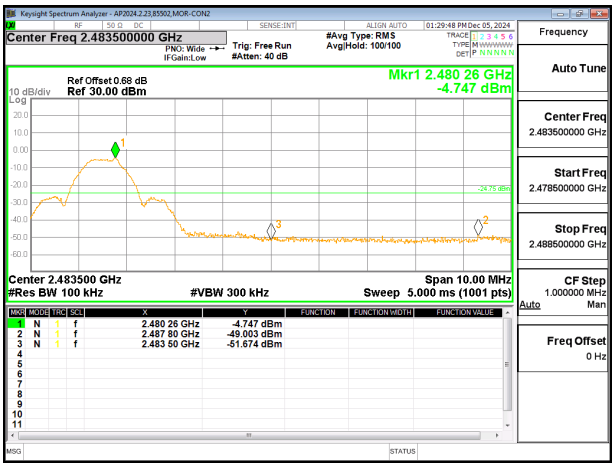
HIGH CHANNEL 35



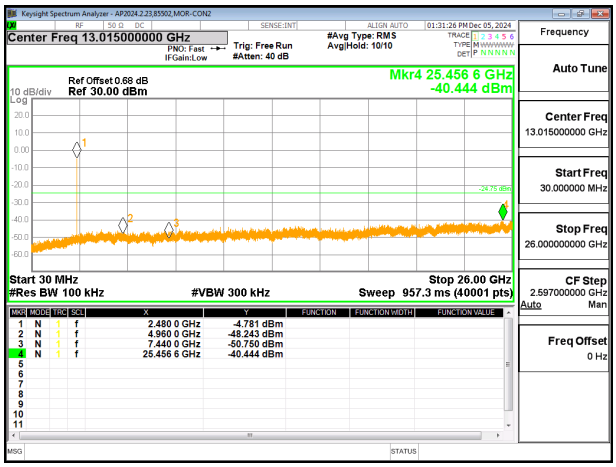
HIGH CHANNEL 36



HIGH CHANNEL 36



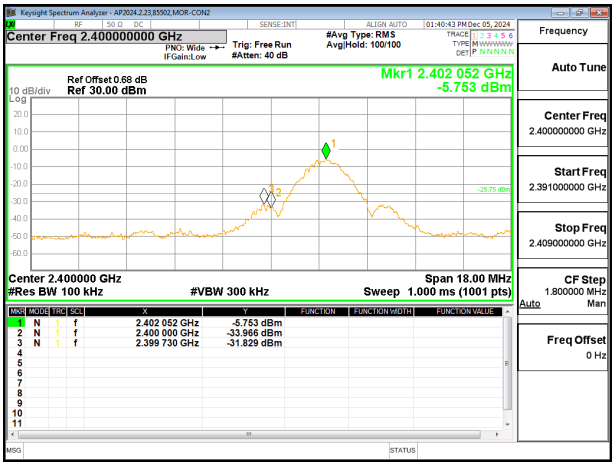
HIGH CHANNEL 39



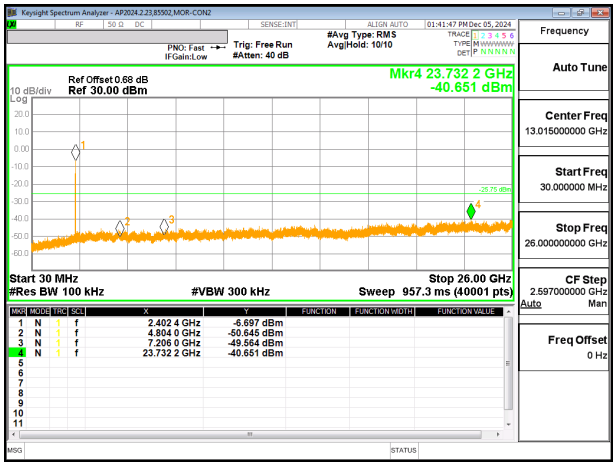
HIGH CHANNEL 39

This report shall not be reproduced except in full, without the written approval of UL LLC

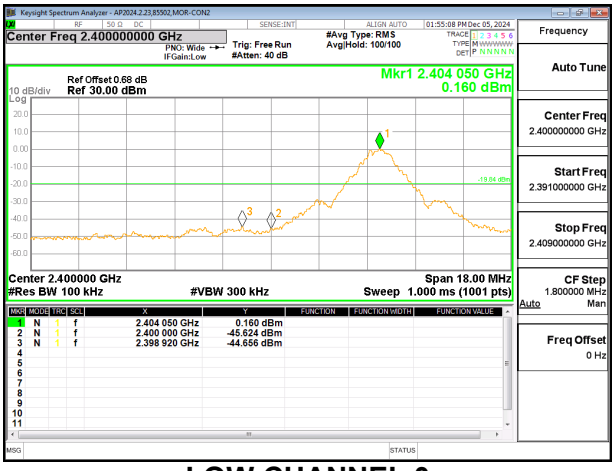
9.7.6. BLE 2Mbps MODE



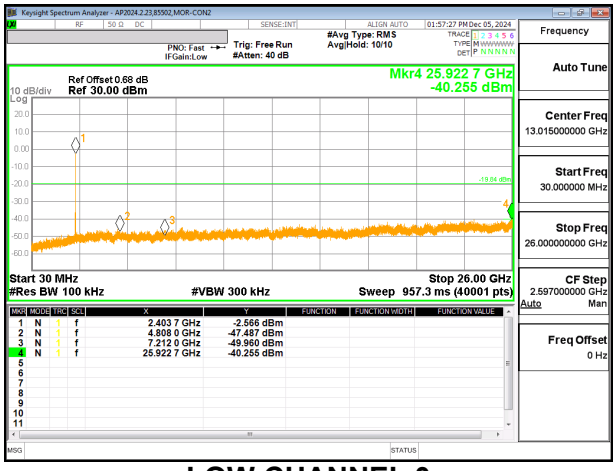
LOW CHANNEL 37



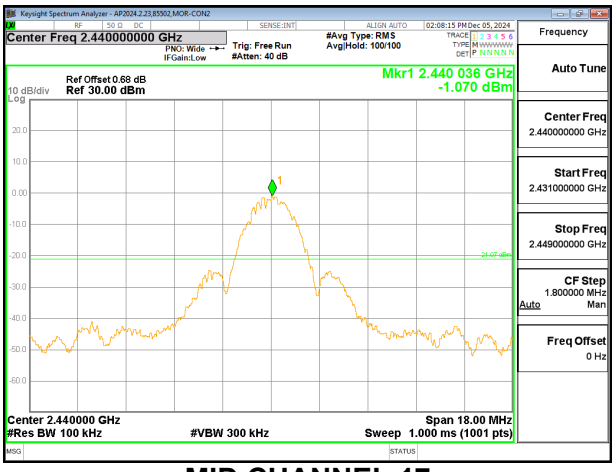
LOW CHANNEL 37



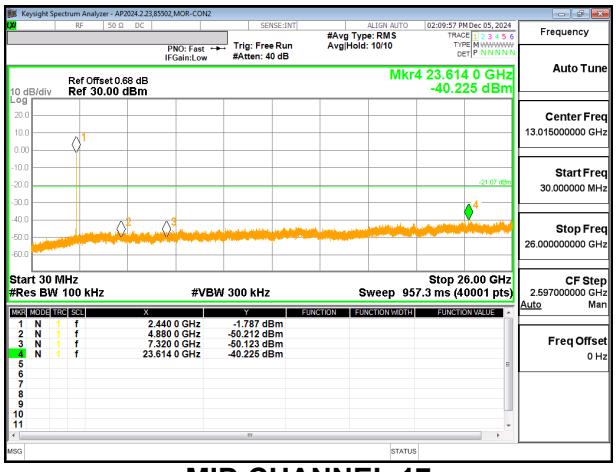
LOW CHANNEL 0



LOW CHANNEL 0

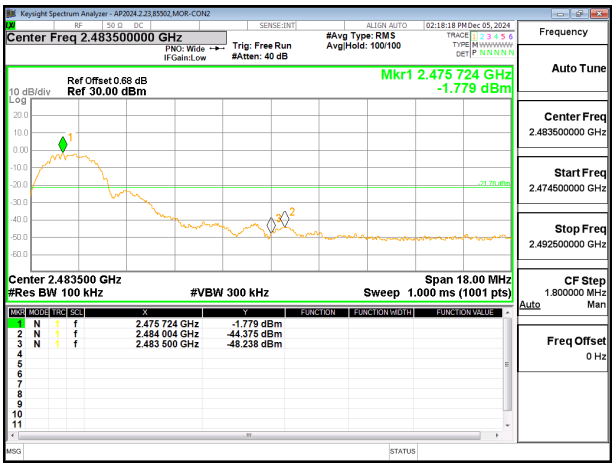


MID CHANNEL 17

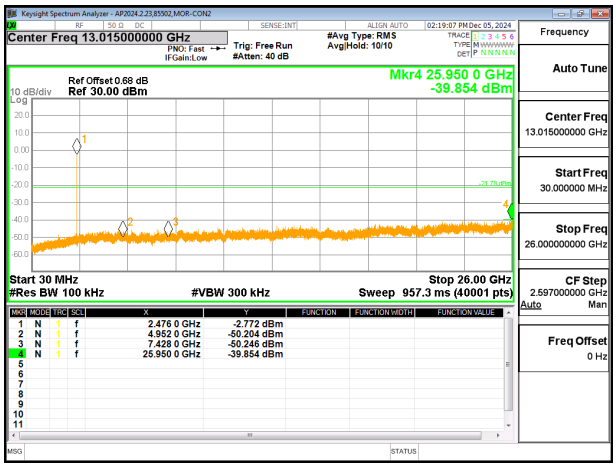


MID CHANNEL 17

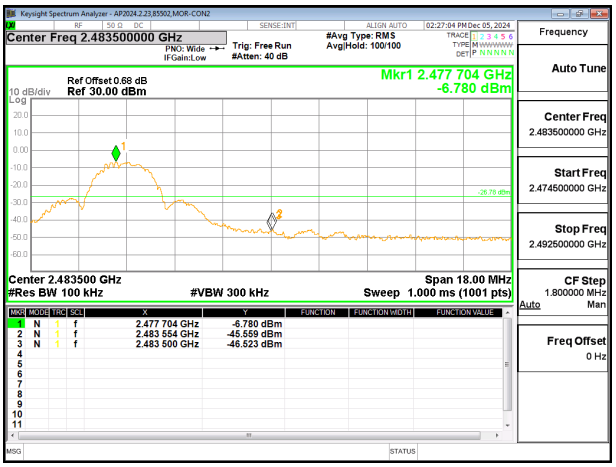
This report shall not be reproduced except in full, without the written approval of UL LLC



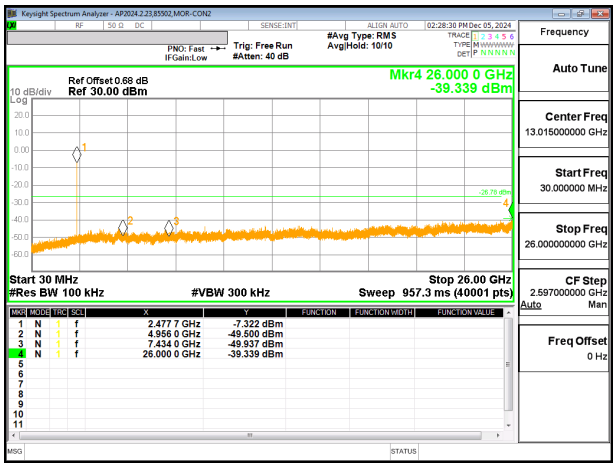
HIGH CHANNEL 35



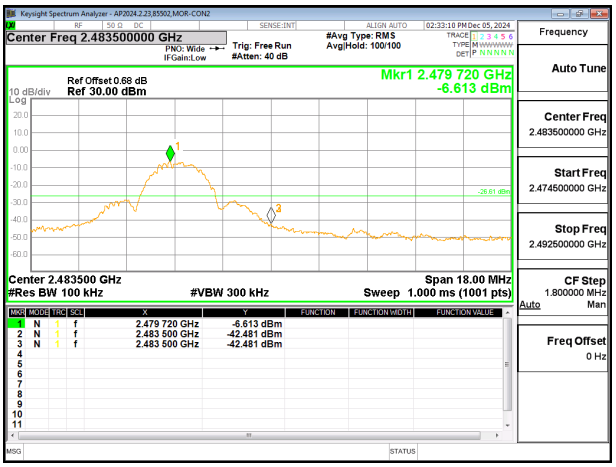
HIGH CHANNEL 35



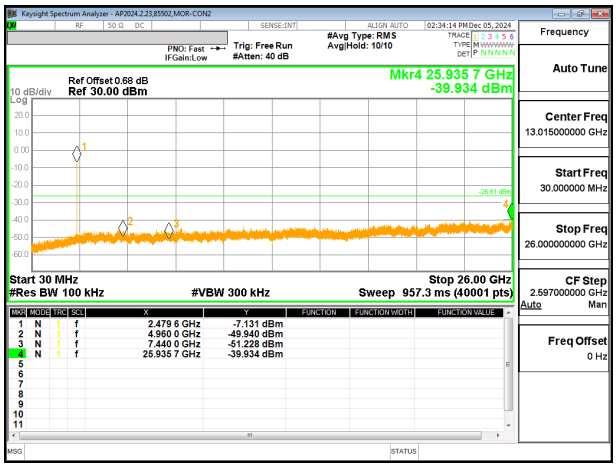
HIGH CHANNEL 36



HIGH CHANNEL 36



HIGH CHANNEL 39



HIGH CHANNEL 39

This report shall not be reproduced except in full, without the written approval of UL LLC

10. RADIATED TEST RESULTS

LIMITS

FCC §15.205 and §15.209

Frequency Range (MHz)	Field Strength Limit (uV/m) at 3 m	Field Strength Limit (dBuV/m) at 3 m
0.009-0.490	2400/F(kHz) @ 300 m	-
0.490-1.705	24000/F(kHz) @ 30 m	-
1.705 - 30	30 @ 30m	-
30 - 88	100	40
88 - 216	150	43.5
216 - 960	200	46
Above 960	500	54

IC RSS-GEN Clause 8.9 and 8.10

Frequency Range (kHz)	Field Strength Limit (uA/m) at 3 m	Field Strength Limit (dBuV/m) at 3 m
0.009-0.490	6.37/F(kHz) @ 300 m	-
0.490-1.705	63.7/F(kHz) @ 30 m	-
1.705 - 30	0.08 @ 30m	-
Frequency Range (MHz)	**Field Strength Limit (uV/m) at 3 m**	**Field Strength Limit (dBuV/m) at 3 m**
30 - 88	100	40
88 - 216	150	43.5
216 - 960	200	46
Above 960	500	54

TEST PROCEDURE

The EUT is placed on a non-conducting table 80 cm above the ground plane for measurement below 1GHz; 1.5 m above the ground plane for measurement above 1GHz. The antenna to EUT distance is 3 meters. The EUT is configured in accordance with ANSI C63.10. The EUT is set to transmit in a continuous mode.

For measurements below 1 GHz the resolution bandwidth is set to 100 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements in the 30-1000MHz range, 9kHz for peak and/or quasi-peak detection measurements in the 0.15-30MHz range and 200Hz for peak and/or quasi-peak detection measurements in the 9 to 150kHz range. Peak detection is used unless otherwise noted as quasi-peak or average (9-90kHz and 110-490kHz).

For pre-scans above 1 GHz the resolution bandwidth is set to 1 MHz; the video bandwidth is set to 3MHz for peak measurements.

For final measurements above 1 GHz the resolution bandwidth is set to 1 MHz; the video bandwidth is set to 3 MHz for peak measurements and as applicable for linear voltage average

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

measurements. For ANT and BLE, AV measurements are being corrected using DCCF per KDB 558074 FAQ#3(c).

The spectrum from 1 GHz to 18 GHz is investigated with the transmitter set to low, middle, and high channels in each applicable band. Below 1GHz and above 18GHz emissions, the channel with the highest PSD was tested.

The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized in both the vertical and the horizontal positions.

3D antenna use - For below 30MHz testing, investigation was done on three antenna orientations (parallel, perpendicular, and ground-parallel).

Base on FCC 15.31 (f) (2): measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field.

KDB 414788 Open Field Site (OFS) and Chamber Correlation Justification

OFS and chamber correlation testing had been performed and chamber measured test result is the worst-case test result.

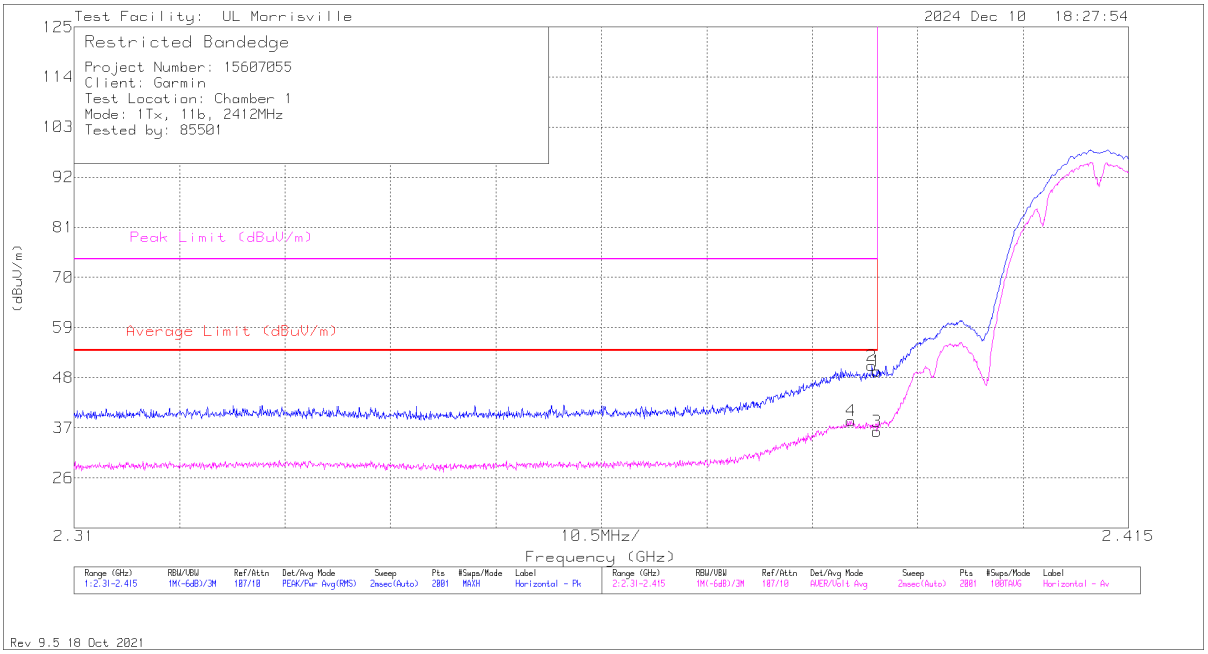
This report shall not be reproduced except in full, without the written approval of UL LLC

10.1. TRANSMITTER ABOVE 1 GHz

10.1.1. TX ABOVE 1 GHz 802.11b MODE IN THE 2.4 GHz BAND

BANDEDGE (LOW CHANNEL, 2412MHz)

HORIZONTAL RESULT

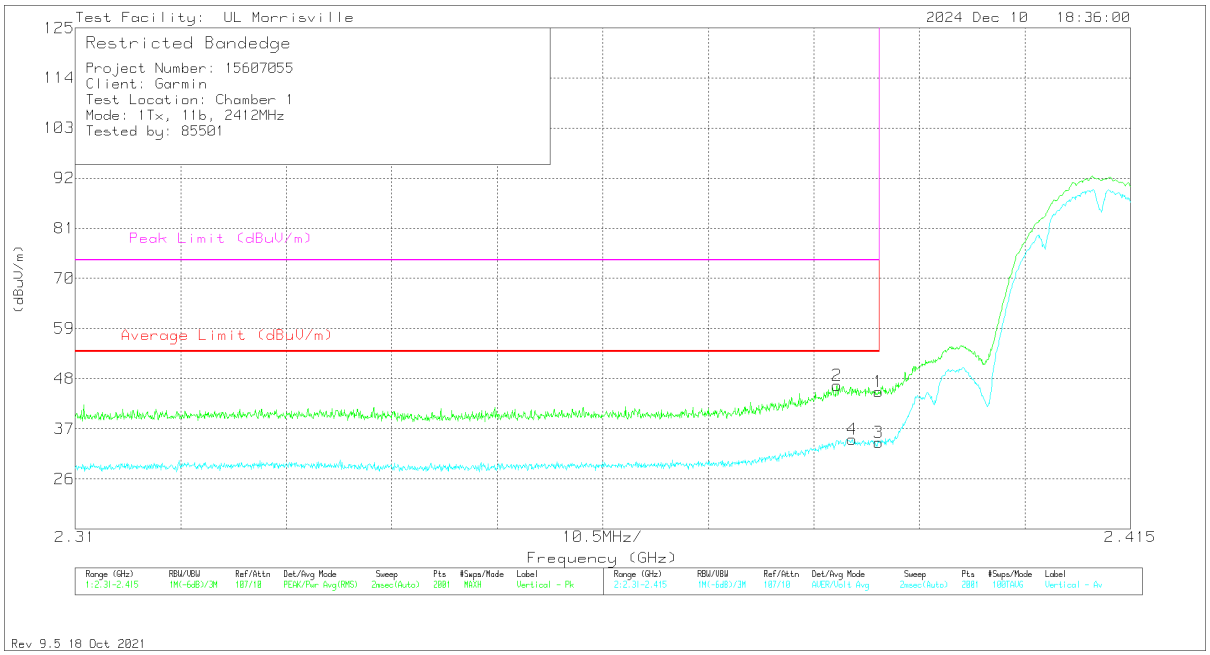


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	135143 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.38996	41.51	Pk	31.9	-24	49.41	-	-	74	-24.59	136	162	H
2	* ** 2.38943	42.69	Pk	31.9	-24	50.59	-	-	74	-23.41	136	162	H
3	* ** 2.38996	28.29	ADV	31.9	-24	36.19	54	-17.81	-	-	136	162	H
4	* ** 2.38739	30.5	ADV	31.9	-23.9	38.5	54	-15.5	-	-	136	162	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
ADV - Linear Voltage Average

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

VERTICAL RESULT



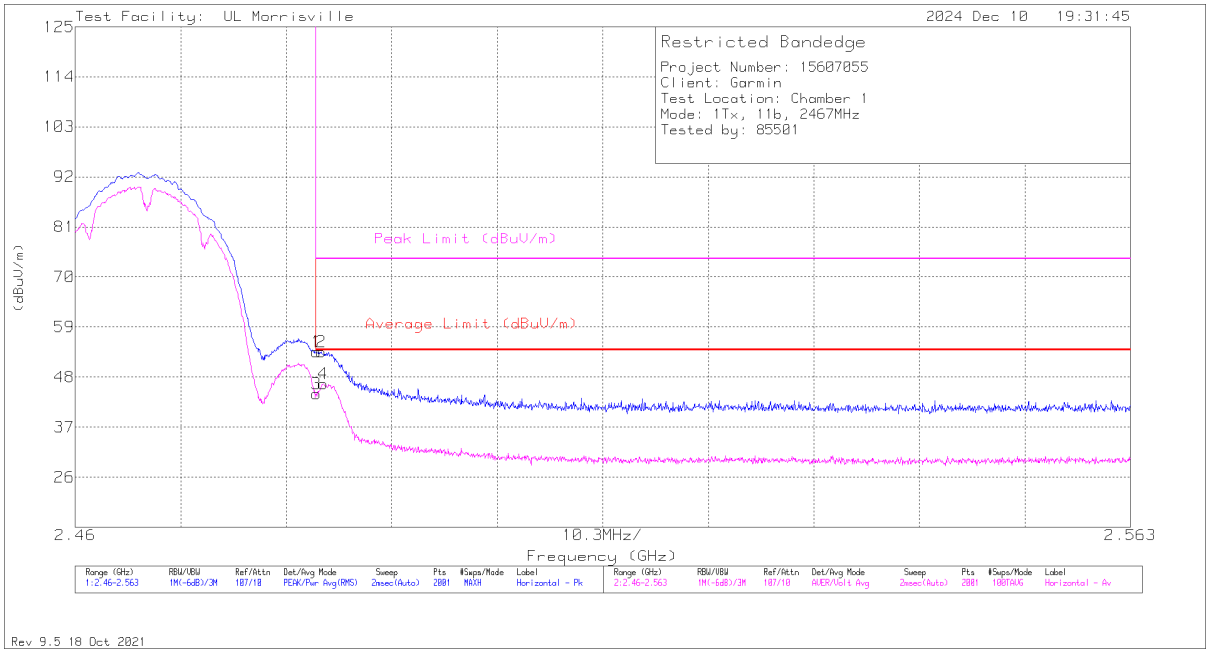
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	135143 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.38996	37.21	Pk	31.9	-24	45.11	-	-	74	-28.89	209	145	V
2	* ** 2.38581	38.51	Pk	31.9	-23.9	46.51	-	-	74	-27.49	209	145	V
3	* ** 2.38996	26.09	ADV	31.9	-24	33.99	54	-20.01	-	-	209	145	V
4	* ** 2.38733	26.66	ADV	31.9	-23.9	34.66	54	-19.34	-	-	209	145	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
ADV - Linear Voltage Average

This report shall not be reproduced except in full, without the written approval of UL LLC

BANDEDGE (HIGH CHANNEL, 2467MHz)

HORIZONTAL RESULT

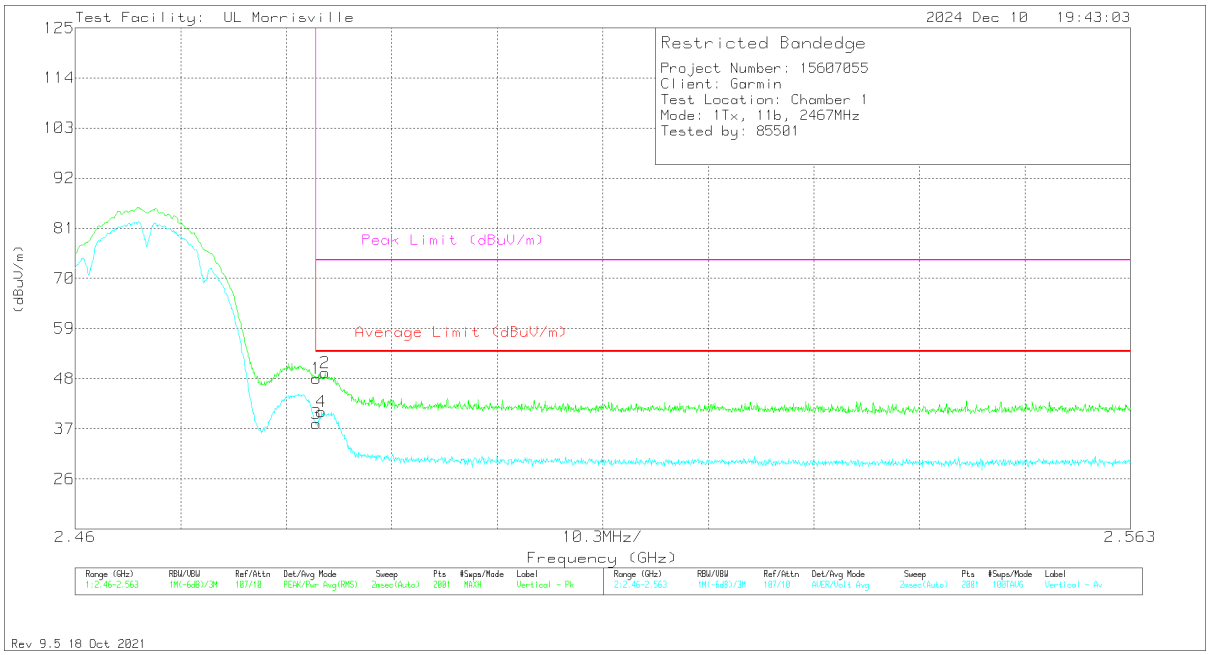


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	135143 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.48354	45.04	Pk	32.2	-23.7	53.54	-	-	74	-20.46	139	132	H
2	* ** 2.484	45.11	Pk	32.2	-23.8	53.51	-	-	74	-20.49	139	132	H
3	* ** 2.48354	35.83	ADV	32.2	-23.7	44.33	54	-9.67	-	-	139	132	H
4	* ** 2.48421	38.13	ADV	32.2	-23.8	46.53	54	-7.47	-	-	139	132	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
ADV - Linear Voltage Average

This report shall not be reproduced except in full, without the written approval of UL LLC

VERTICAL RESULT



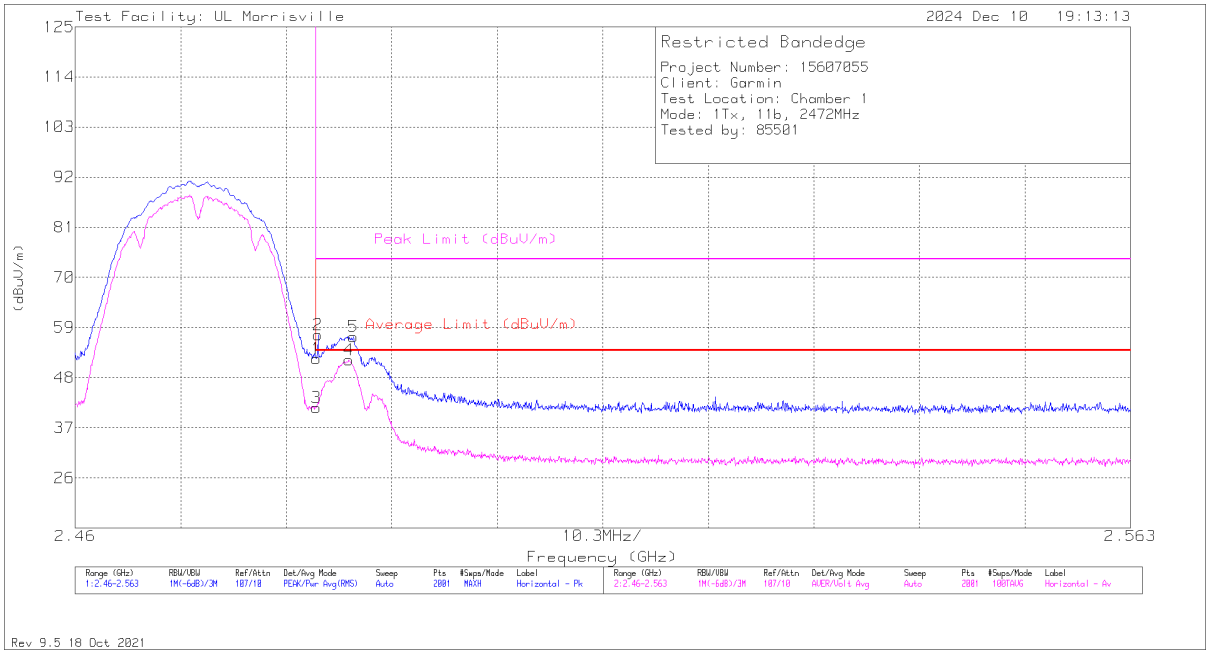
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	135143 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.48354	39.59	Pk	32.2	-23.7	48.09	-	-	74	-25.91	139	172	V
2	* ** 2.48441	40.84	Pk	32.2	-23.8	49.24	-	-	74	-24.76	139	172	V
3	* ** 2.48354	29.59	ADV	32.2	-23.7	38.09	54	-15.91	-	-	139	172	V
4	* ** 2.48405	32.3	ADV	32.2	-23.8	40.7	54	-13.3	-	-	139	172	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
ADV - Linear Voltage Average

This report shall not be reproduced except in full, without the written approval of UL LLC

BANDEDGE (HIGH CHANNEL, 2472MHz)

HORIZONTAL RESULT

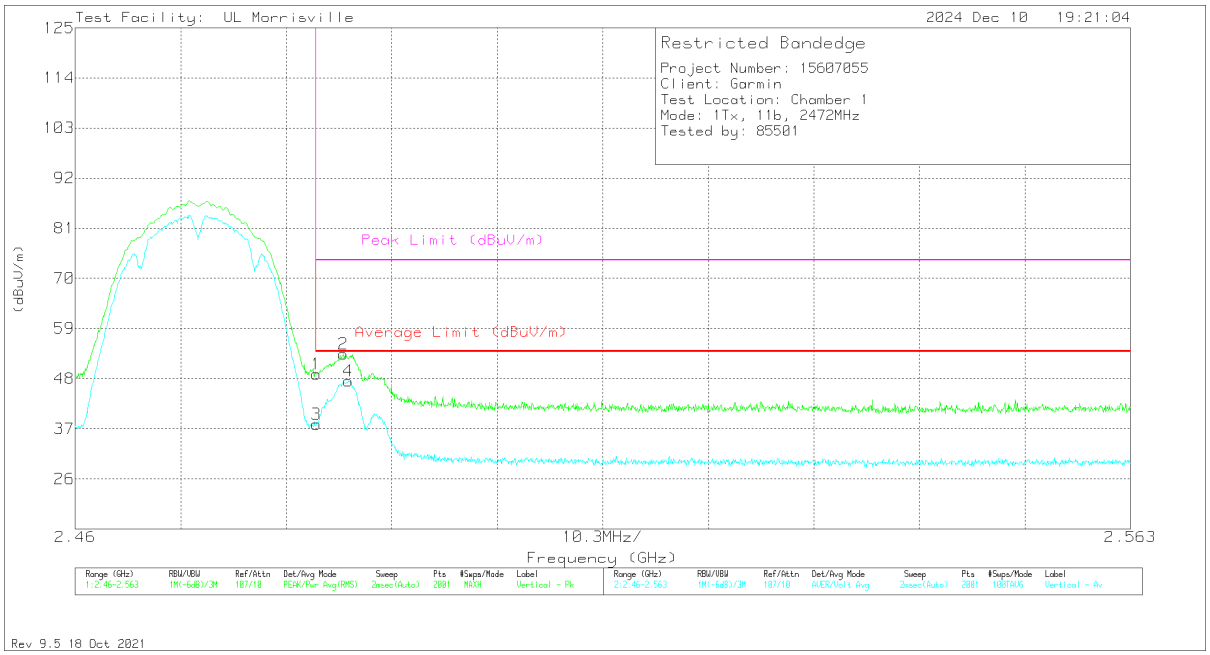


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	135143 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.48354	43.65	Pk	32.2	-23.7	52.15	-	-	74	-21.85	137	135	H
2	* ** 2.48369	48.9	Pk	32.2	-23.7	57.4	-	-	74	-16.6	137	135	H
5	* ** 2.48714	48.75	Pk	32.2	-24	56.95	-	-	74	-17.05	137	135	H
3	* ** 2.48354	32.89	ADV	32.2	-23.7	41.39	54	-12.61	-	-	137	135	H
4	* ** 2.48673	43.65	ADV	32.2	-23.9	51.95	54	-2.05	-	-	137	135	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
ADV - Linear Voltage Average

This report shall not be reproduced except in full, without the written approval of UL LLC

VERTICAL RESULT



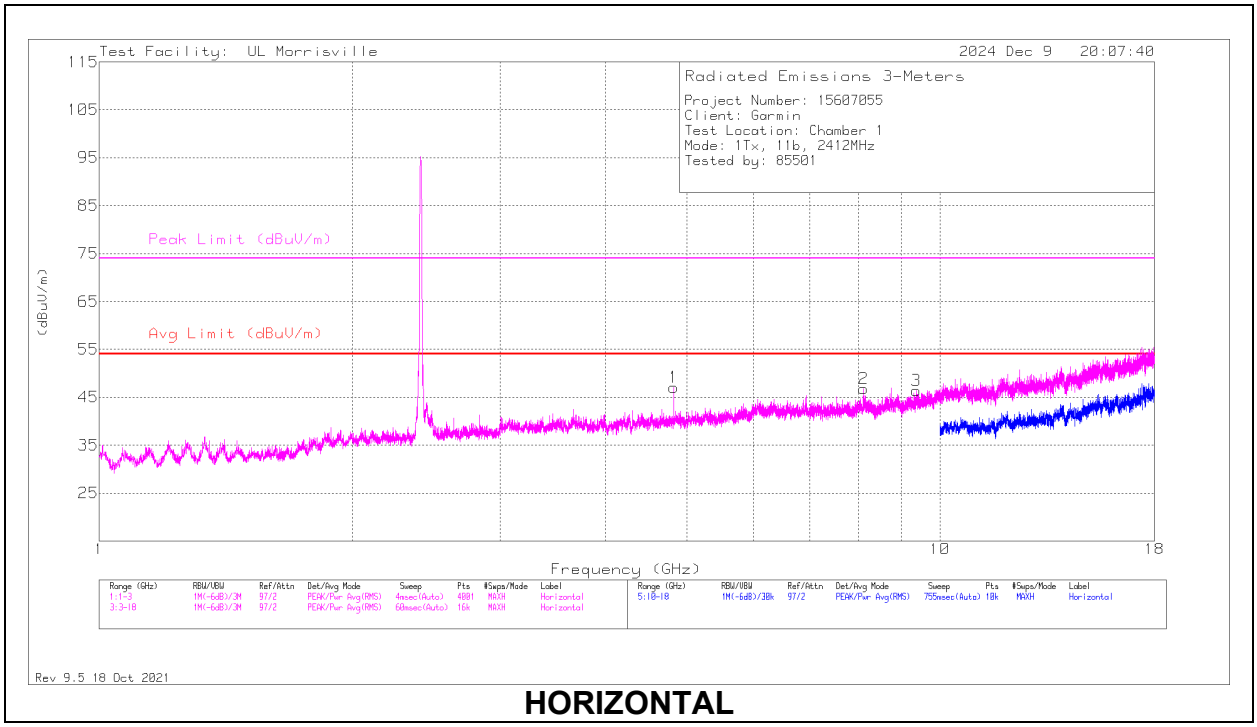
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	135143 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.48354	40.46	Pk	32.2	-23.7	48.96	-	-	74	-25.04	220	168	V
2	* ** 2.48616	45.13	Pk	32.2	-23.9	53.43	-	-	74	-20.57	220	168	V
3	* ** 2.48354	29.47	ADV	32.2	-23.7	37.97	54	-16.03	-	-	220	168	V
4	* ** 2.48668	39.16	ADV	32.2	-23.9	47.46	54	-6.54	-	-	220	168	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
ADV - Linear Voltage Average

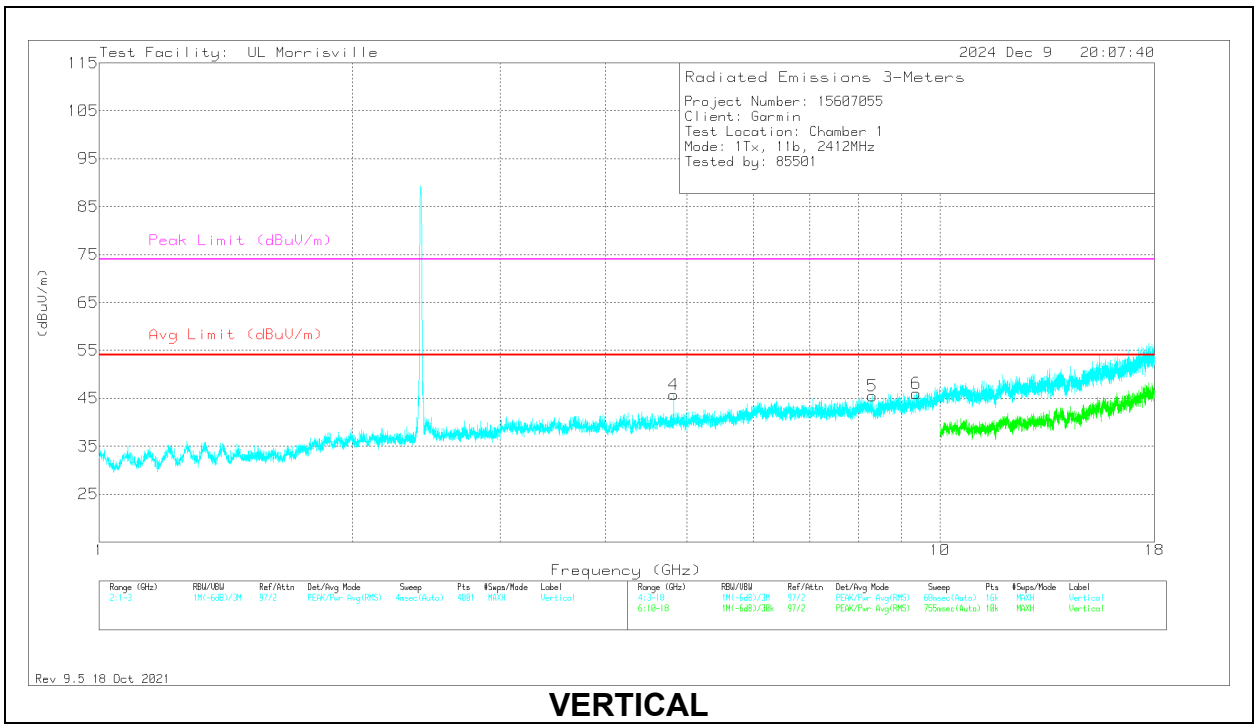
UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL



HORIZONTAL



VERTICAL

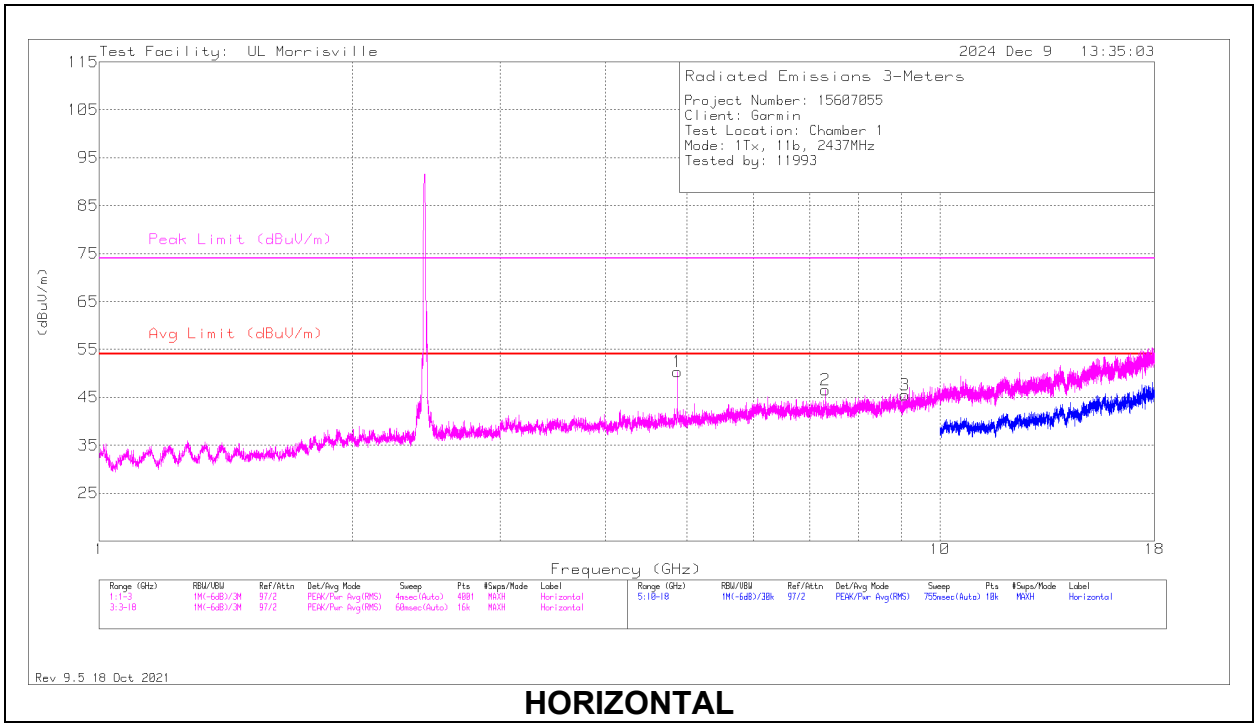
This report shall not be reproduced except in full, without the written approval of UL LLC

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	135143 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 4.82344	58.52	Pk	33.9	-45.4	47.02	54	-6.98	74	-26.98	0-360	101	H
2	* ** 8.10938	51.87	Pk	35.9	-41	46.77	54	-7.23	74	-27.23	0-360	200	H
3	* ** 9.37594	50.46	Pk	36.2	-40.3	46.36	54	-7.64	74	-27.64	0-360	200	H
4	* ** 4.82344	57.28	Pk	33.9	-45.4	45.78	54	-8.22	74	-28.22	0-360	101	V
5	* ** 8.31375	50.39	Pk	35.8	-40.7	45.49	54	-8.51	74	-28.51	0-360	200	V
6	* ** 9.37219	50.13	Pk	36.2	-40.3	46.03	54	-7.97	74	-27.97	0-360	101	V

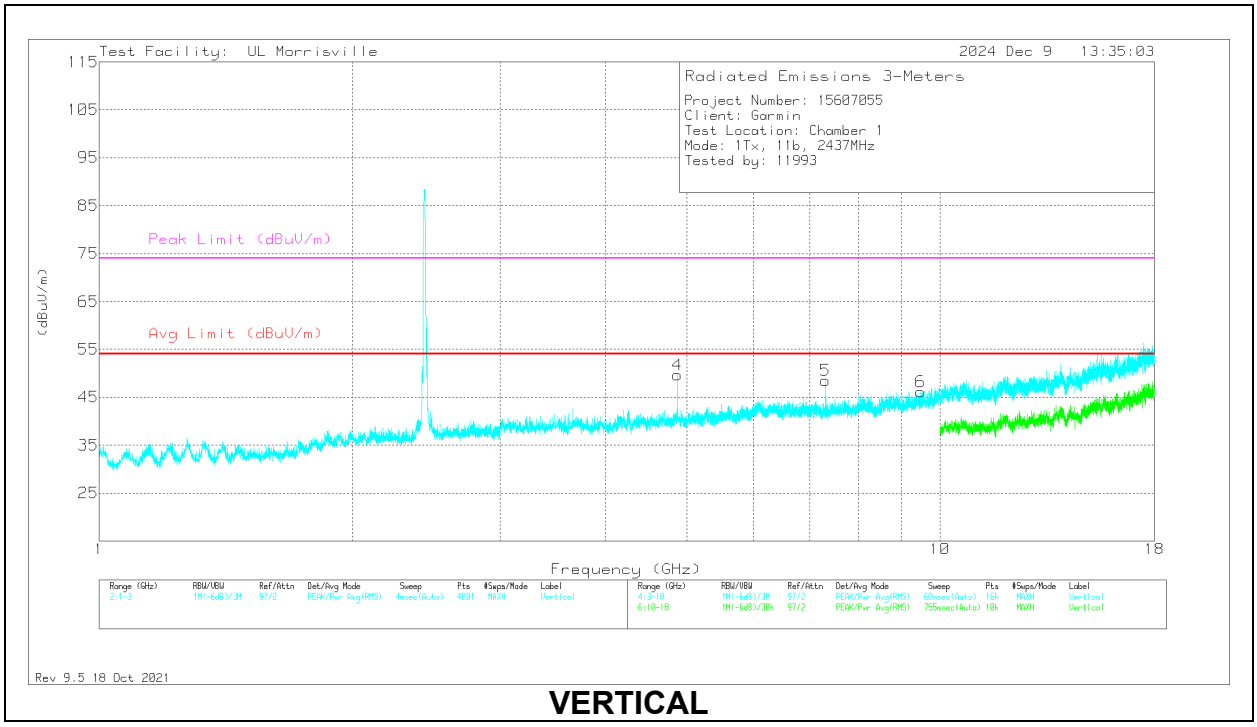
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

MID CHANNEL



HORIZONTAL



VERTICAL

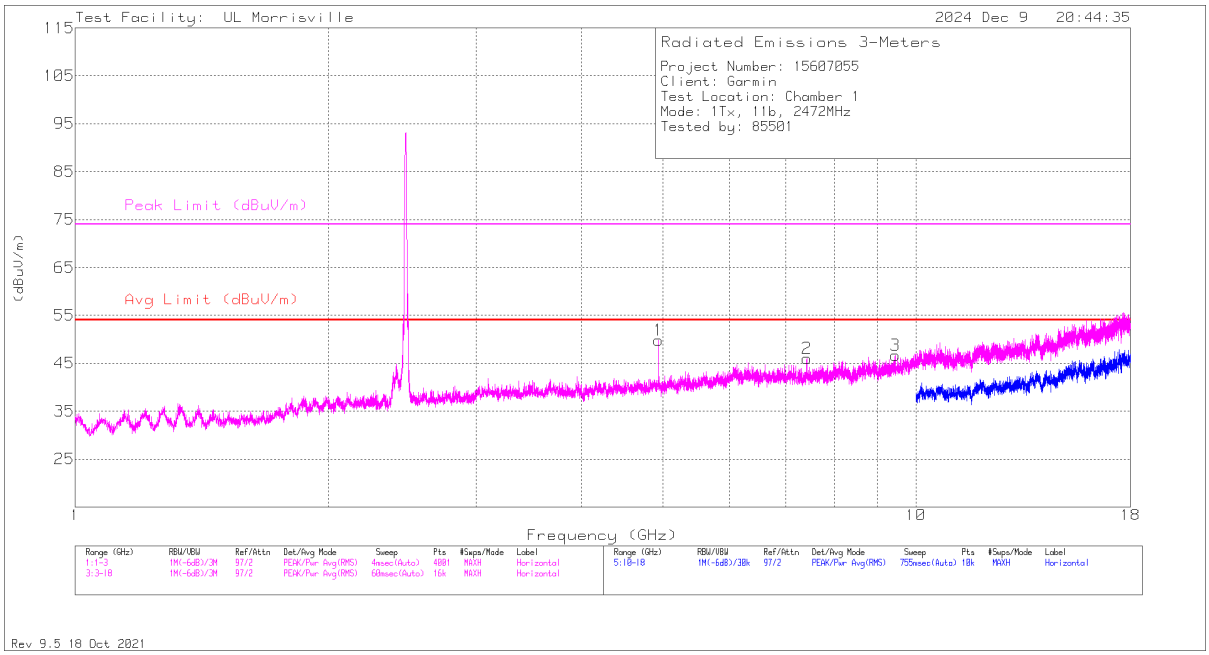
This report shall not be reproduced except in full, without the written approval of UL LLC

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	135143 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 4.874	63.94	PK2	34	-44.8	53.14	-	-	74	-20.86	191	127	H
	* ** 4.87401	60.66	ADV	34	-44.8	49.86	54	-4.14	-	-	191	127	H
2	* ** 7.3125	52.88	Pk	35.4	-41.7	46.58	54	-7.42	74	-27.42	0-360	101	H
3	* ** 9.09375	49.94	Pk	35.9	-40.3	45.54	54	-8.46	74	-28.46	0-360	101	H
4	* ** 4.87389	63.15	PK2	34	-44.8	52.35	-	-	74	-21.65	155	138	V
	* ** 4.87396	59.43	ADV	34	-44.8	48.63	54	-5.37	-	-	155	138	V
5	* ** 7.31163	57.88	PK2	35.4	-41.7	51.58	-	-	74	-22.42	201	230	V
	* ** 7.31168	50.77	ADV	35.4	-41.7	44.47	54	-9.53	-	-	201	230	V
6	* ** 9.495	50.19	Pk	36.4	-40.4	46.19	54	-7.81	74	-27.81	0-360	101	V

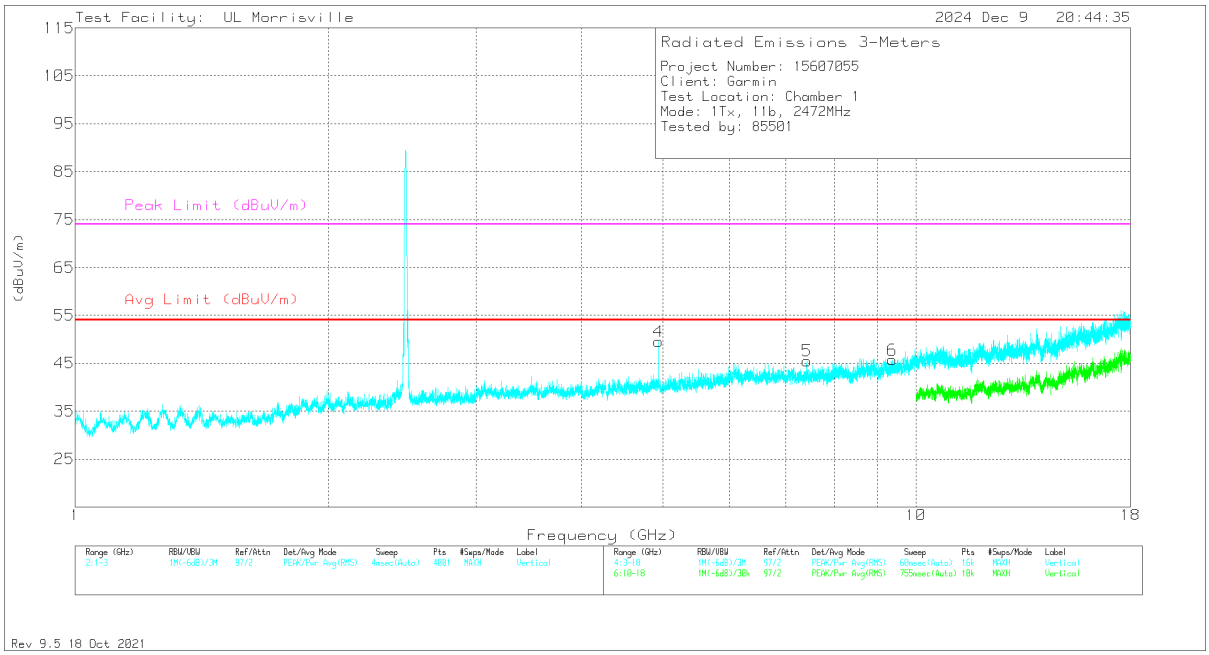
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
PK2 - Maximum Peak
ADV - Linear Voltage Average

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

HIGH CHANNEL



HORIZONTAL



VERTICAL

This report shall not be reproduced except in full, without the written approval of UL LLC

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	135143 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 4.94386	61.6	PK2	34.1	-44.4	51.3	-	-	74	-22.7	191	121	H
	* ** 4.94398	57.95	ADV	34.1	-44.4	47.65	54	-6.35	-	-	191	121	H
2	* ** 7.4175	51.77	Pk	35.4	-41.2	45.97	54	-8.03	74	-28.03	0-360	101	H
3	* ** 9.45469	51.05	Pk	36.4	-40.8	46.65	54	-7.35	74	-27.35	0-360	200	H
4	* ** 4.94395	62.43	PK2	34.1	-44.4	52.13	-	-	74	-21.87	148	109	V
	* ** 4.94402	58.46	ADV	34.1	-44.4	48.16	54	-5.84	-	-	148	109	V
5	* ** 7.41656	51.3	Pk	35.4	-41.2	45.5	54	-8.5	74	-28.5	0-360	101	V
6	* ** 9.37031	49.89	Pk	36.2	-40.4	45.69	54	-8.31	74	-28.31	0-360	200	V

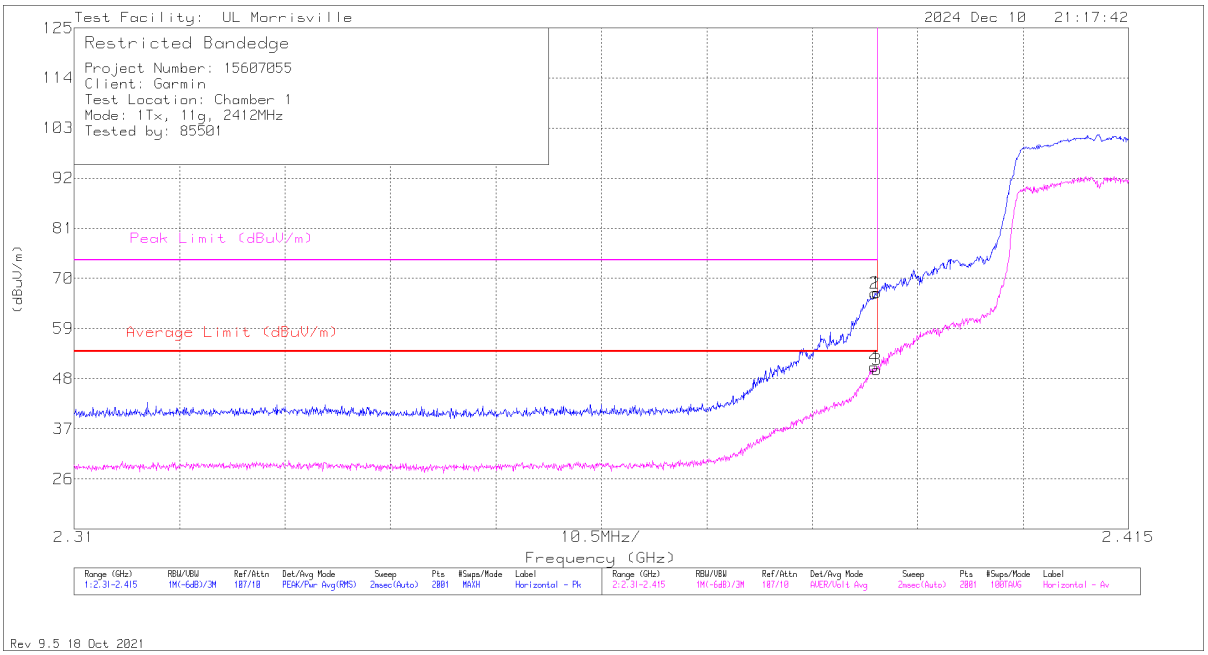
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
PK2 - Maximum Peak
ADV - Linear Voltage Average

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

10.1.2. TX ABOVE 1 GHz 802.11g MODE IN THE 2.4 GHz BAND

BANDEDGE (LOW CHANNEL, 2412MHz)

HORIZONTAL RESULT

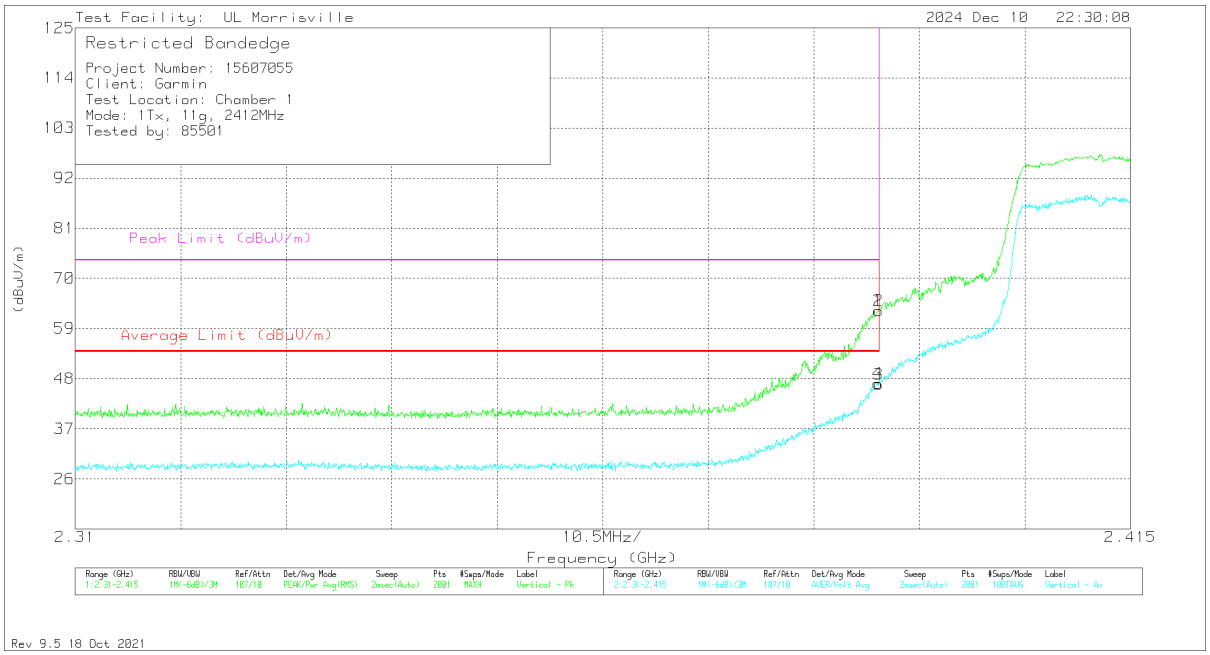


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	135143 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.38996	59.04	Pk	31.9	-24	66.94	-	-	74	-7.06	308	138	H
2	* ** 2.38975	58.87	Pk	31.9	-24	66.77	-	-	74	-7.23	308	138	H
3	* ** 2.38996	42.12	ADV	31.9	-24	50.02	54	-3.98	-	-	308	138	H
4	* ** 2.3897	42.68	ADV	31.9	-24	50.58	54	-3.42	-	-	308	138	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
ADV - Linear Voltage Average

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

VERTICAL RESULT



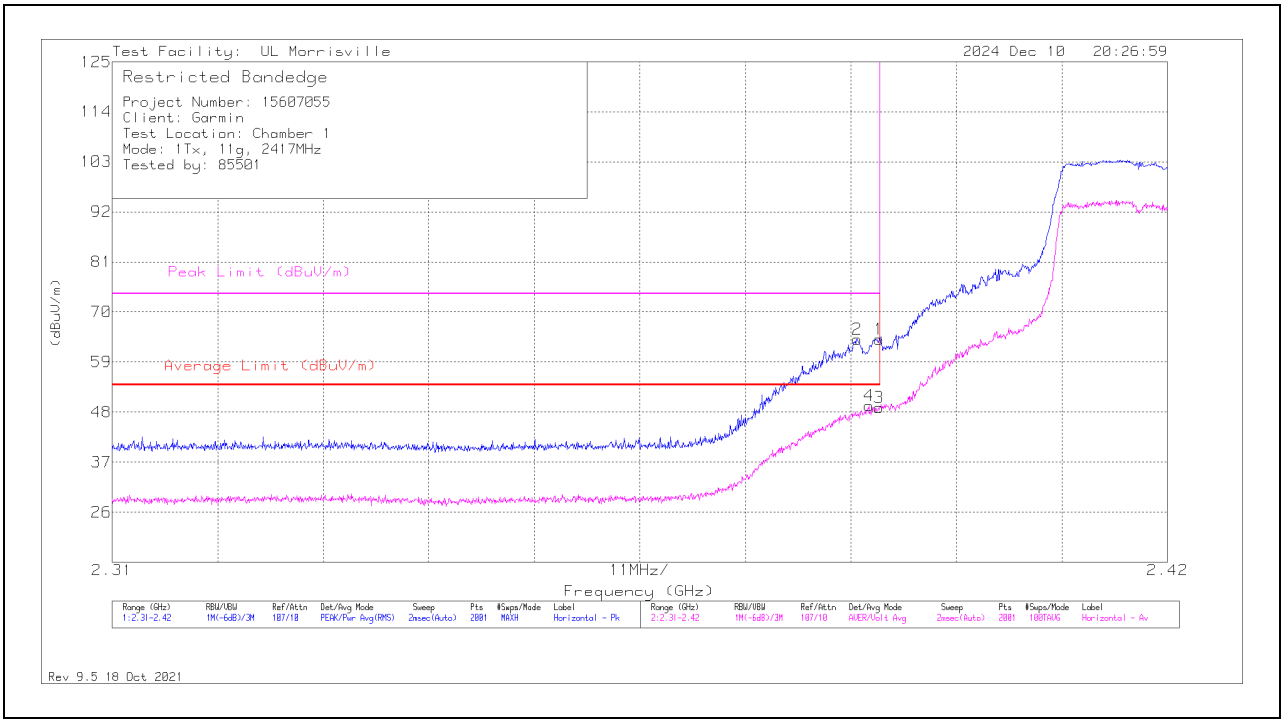
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	135143 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.38996	54.99	Pk	31.9	-24	62.89	-	-	74	-11.11	229	326	V
2	* ** 2.38991	55.01	Pk	31.9	-24	62.91	-	-	74	-11.09	229	326	V
3	* ** 2.38996	38.84	ADV	31.9	-24	46.74	54	-7.26	-	-	229	326	V
4	* ** 2.38985	39.02	ADV	31.9	-24	46.92	54	-7.08	-	-	229	326	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
ADV - Voltage Average

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

BANDEDGE (LOW CHANNEL, 2417MHz)

HORIZONTAL RESULT

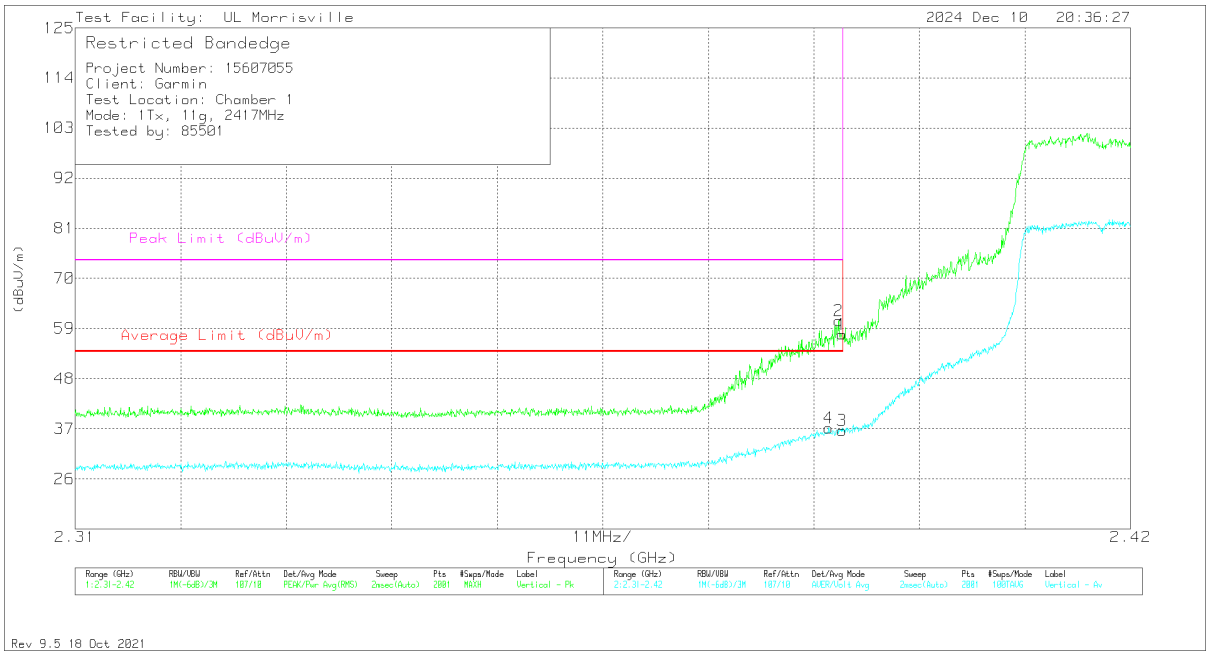


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	135143 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.38997	56.12	Pk	31.9	-24	64.02	-	-	74	-9.98	130	169	H
2	* ** 2.38766	56.02	Pk	31.9	-23.9	64.02	-	-	74	-9.98	130	169	H
3	* ** 2.38997	41.09	ADV	31.9	-24	48.99	54	-5.01	-	-	130	169	H
4	* ** 2.38887	41.57	ADV	31.9	-24	49.47	54	-4.53	-	-	130	169	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
ADV - Linear Voltage Average

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

VERTICAL RESULT



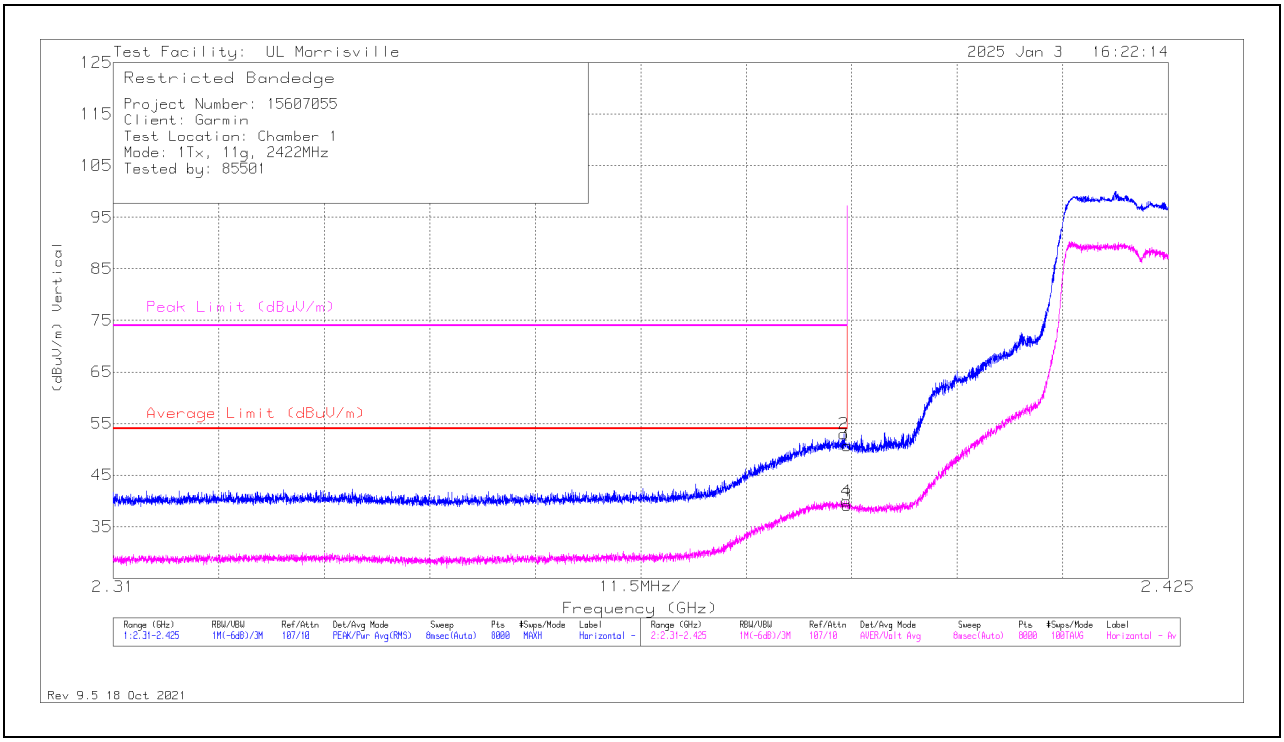
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	135143 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.38997	49.84	Pk	31.9	-24	57.74	-	-	74	-16.26	130	169	V
2	* ** 2.38959	52.83	Pk	31.9	-24	60.73	-	-	74	-13.27	130	169	V
3	* ** 2.38997	28.76	ADV	31.9	-24	36.66	54	-17.34	-	-	130	169	V
4	* ** 2.38854	29.31	ADV	31.9	-24	37.21	54	-16.79	-	-	130	169	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
ADV - Linear Voltage Average

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

BANDEDGE (LOW CHANNEL, 2422MHz)

HORIZONTAL RESULT

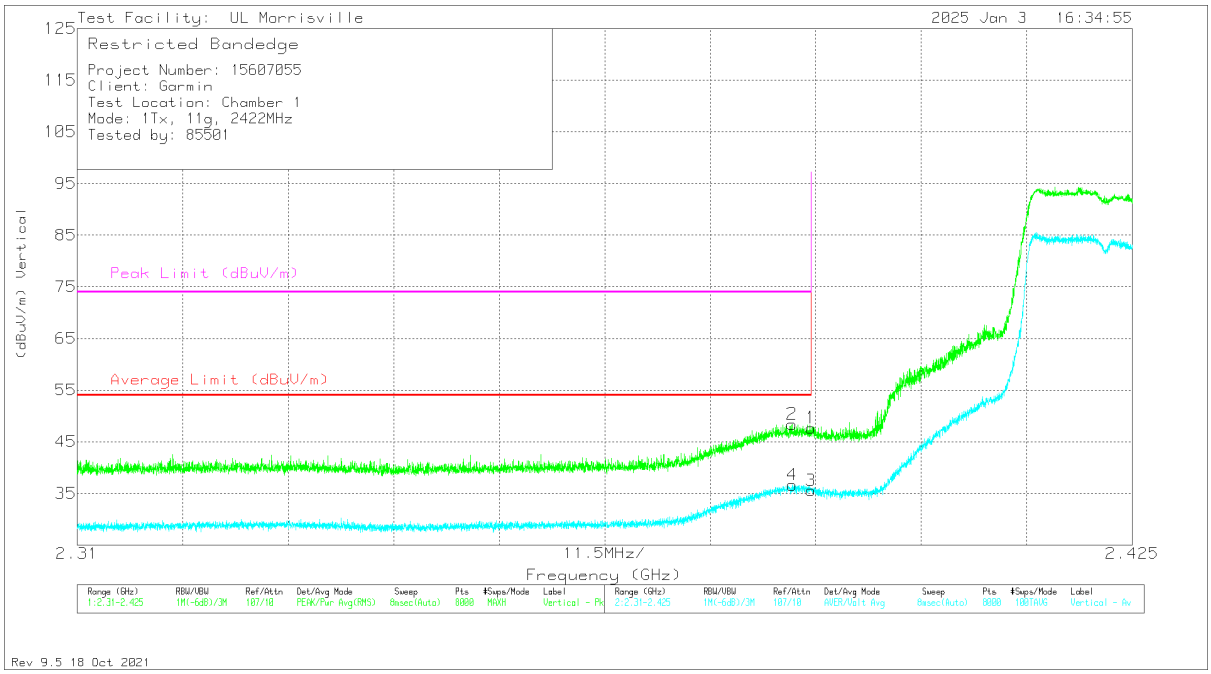


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	135143 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.38999	42.88	Pk	31.9	-24.1	50.68	-	-	74	-23.32	117	182	H
2	* ** 2.38966	45.07	Pk	31.9	-24	52.97	-	-	74	-21.03	117	182	H
3	* ** 2.38999	31.4	ADV	31.9	-24.1	39.2	54	-14.8	-	-	117	182	H
4	* ** 2.38994	32.05	ADV	31.9	-24	39.95	54	-14.05	-	-	117	182	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
ADV - Linear Voltage Average

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

VERTICAL RESULT



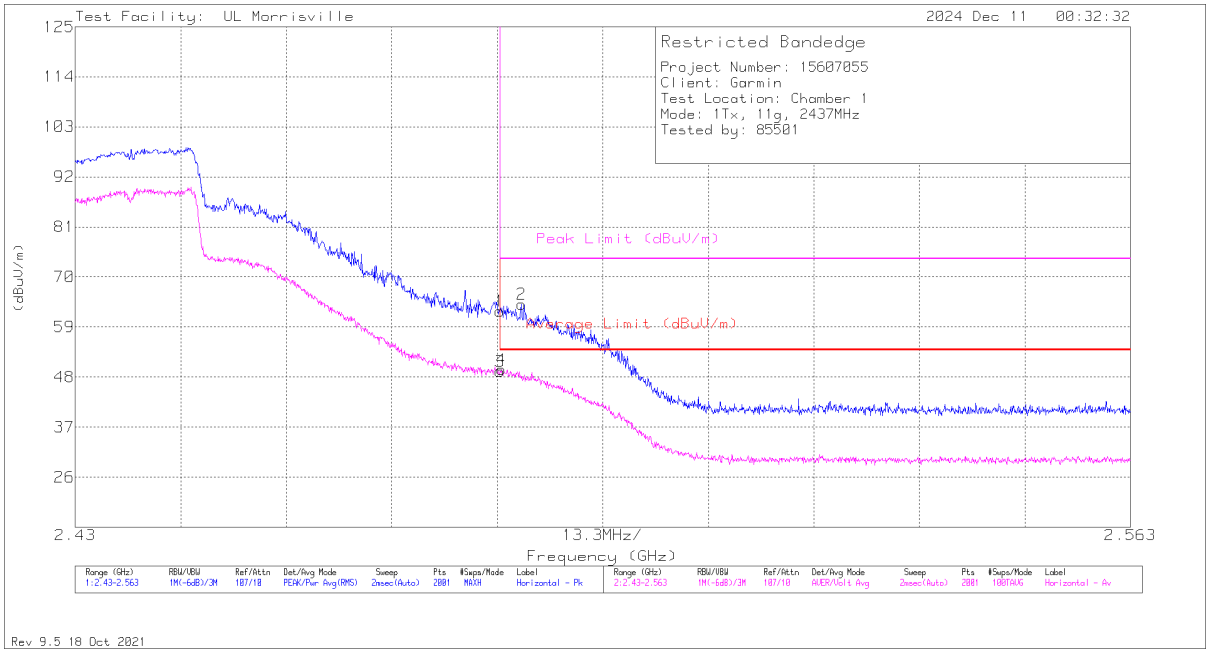
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	135143 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.38999	39.86	Pk	31.9	-24.1	47.66	-	-	74	-26.34	117	286	V
2	* ** 2.38791	40.4	Pk	31.9	-23.9	48.4	-	-	74	-25.6	117	286	V
3	* ** 2.38999	27.75	ADV	31.9	-24.1	35.55	54	-18.45	-	-	117	286	V
4	* ** 2.38792	28.64	ADV	31.9	-23.9	36.64	54	-17.36	-	-	117	286	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
ADV - Linear Voltage Average

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

BANDEDGE (MID CHANNEL, UPPER BAND, 2437MHz)

HORIZONTAL RESULT

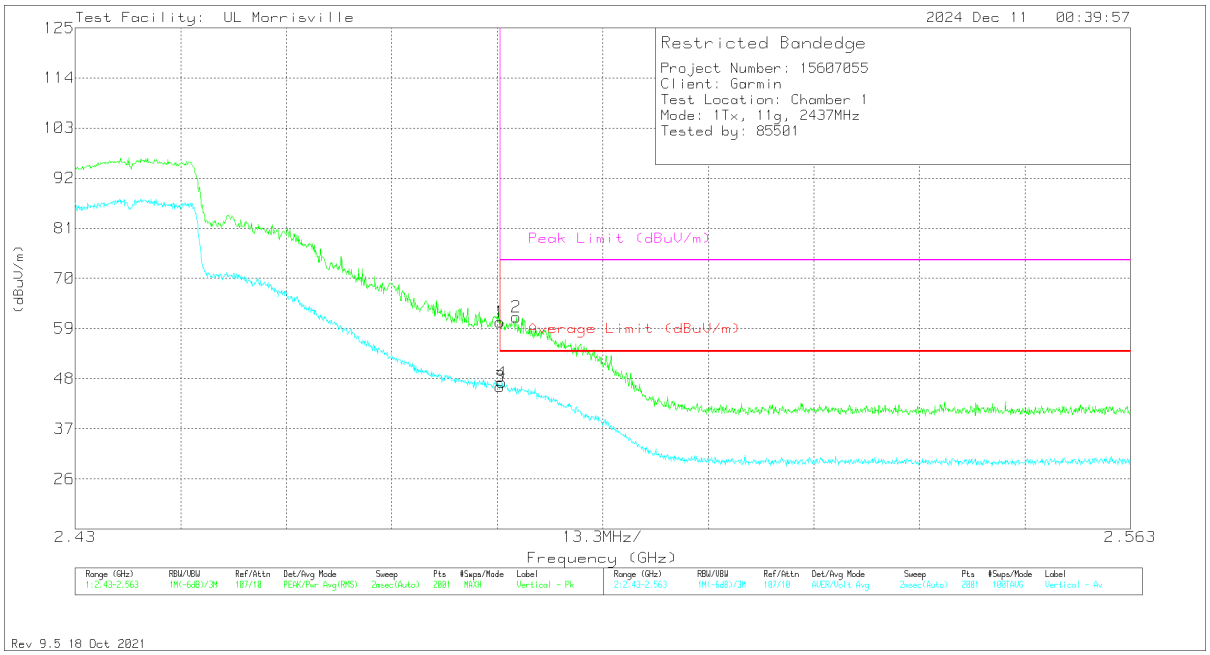


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	135143 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.48353	54.05	Pk	32.2	-23.7	62.55	-	-	74	-11.45	13	139	H
2	* ** 2.48626	55.73	Pk	32.2	-23.9	64.03	-	-	74	-9.97	13	139	H
3	* ** 2.48353	40.71	ADV	32.2	-23.7	49.21	54	-4.79	-	-	13	139	H
4	* ** 2.48373	41.13	ADV	32.2	-23.7	49.63	54	-4.37	-	-	13	139	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
ADV - Linear Voltage Average

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

VERTICAL RESULT



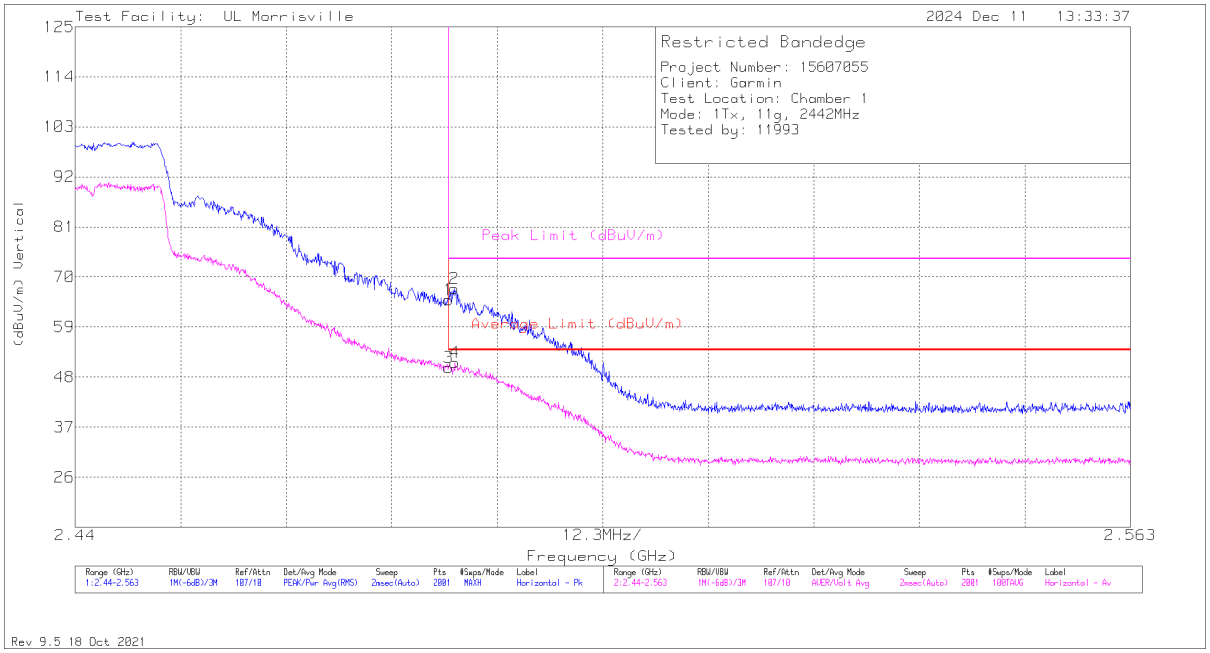
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	135143 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.48353	51.96	Pk	32.2	-23.7	60.46	-	-	74	-13.54	221	169	V
2	* ** 2.48559	53.25	Pk	32.2	-23.9	61.55	-	-	74	-12.45	221	169	V
3	* ** 2.48353	37.79	ADV	32.2	-23.7	46.29	54	-7.71	-	-	221	169	V
4	* ** 2.4838	38.64	ADV	32.2	-23.7	47.14	54	-6.86	-	-	221	169	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
ADV - Linear Voltage Average

This report shall not be reproduced except in full, without the written approval of UL LLC

BANDEDGE (HIGH CHANNEL, 2442MHz)

HORIZONTAL RESULT

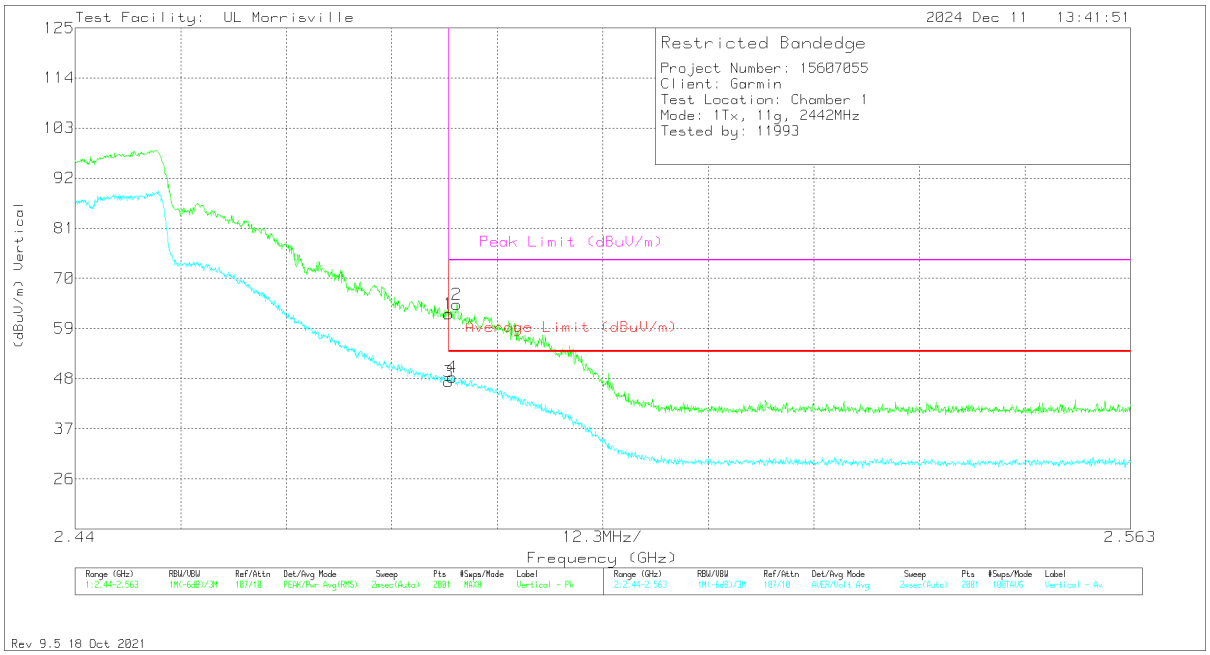


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	135143 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.48354	56.43	Pk	32.2	-23.7	64.93	-	-	74	-9.07	139	106	H
2	* ** 2.48416	59.08	Pk	32.2	-23.8	67.48	-	-	74	-6.52	139	106	H
3	* ** 2.48354	41.6	ADV	32.2	-23.7	50.1	54	-3.9	-	-	139	106	H
4	* ** 2.48428	42.79	ADV	32.2	-23.8	51.19	54	-2.81	-	-	139	106	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
ADV - Linear Voltage Average

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

VERTICAL RESULT



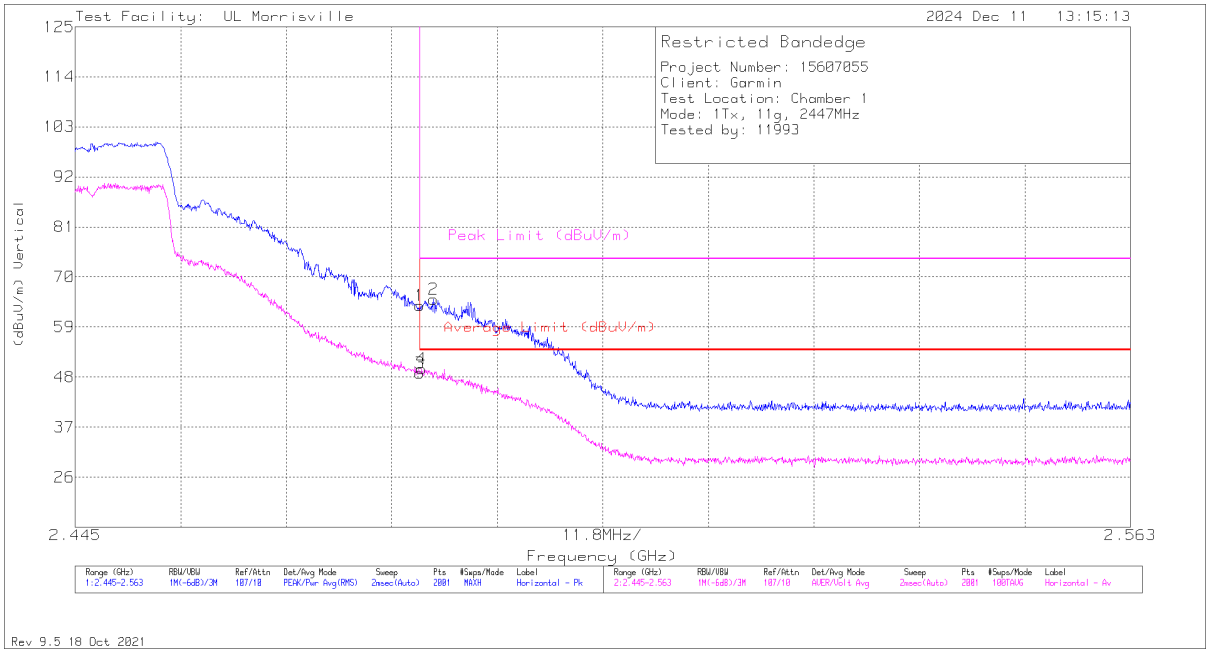
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	135143 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.48354	53.73	Pk	32.2	-23.7	62.23	-	-	74	-11.77	274	106	V
2	* ** 2.48446	55.92	Pk	32.2	-23.8	64.32	-	-	74	-9.68	274	106	V
3	* ** 2.48354	38.85	ADV	32.2	-23.7	47.35	54	-6.65	-	-	274	106	V
4	* ** 2.48397	39.87	ADV	32.2	-23.8	48.27	54	-5.73	-	-	274	106	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
ADV - Linear Voltage Average

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

BANDEDGE (HIGH CHANNEL, 2447MHz)

HORIZONTAL RESULT

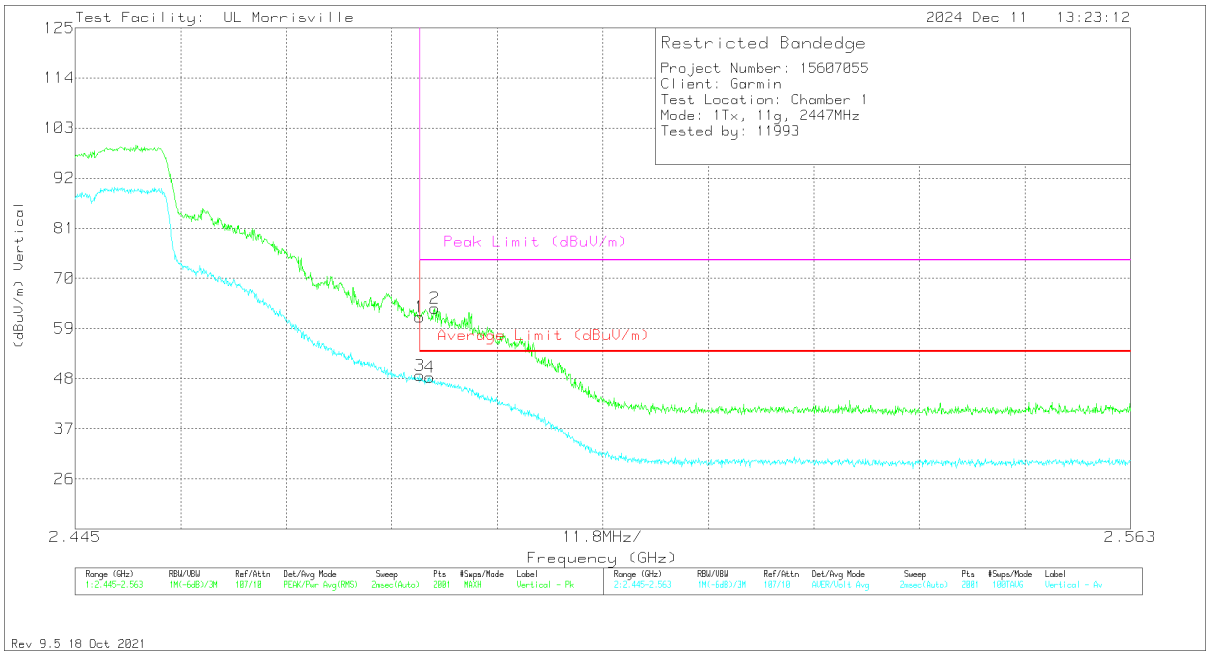


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	135143 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.48353	55.2	Pk	32.2	-23.7	63.7	-	-	74	-10.3	318	136	H
2	* ** 2.48506	56.67	Pk	32.2	-23.8	65.07	-	-	74	-8.93	318	136	H
3	* ** 2.48353	40.36	ADV	32.2	-23.7	48.86	54	-5.14	-	-	318	136	H
4	* ** 2.48376	41.34	ADV	32.2	-23.7	49.84	54	-4.16	-	-	318	136	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
ADV - Linear Voltage Average

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

VERTICAL RESULT



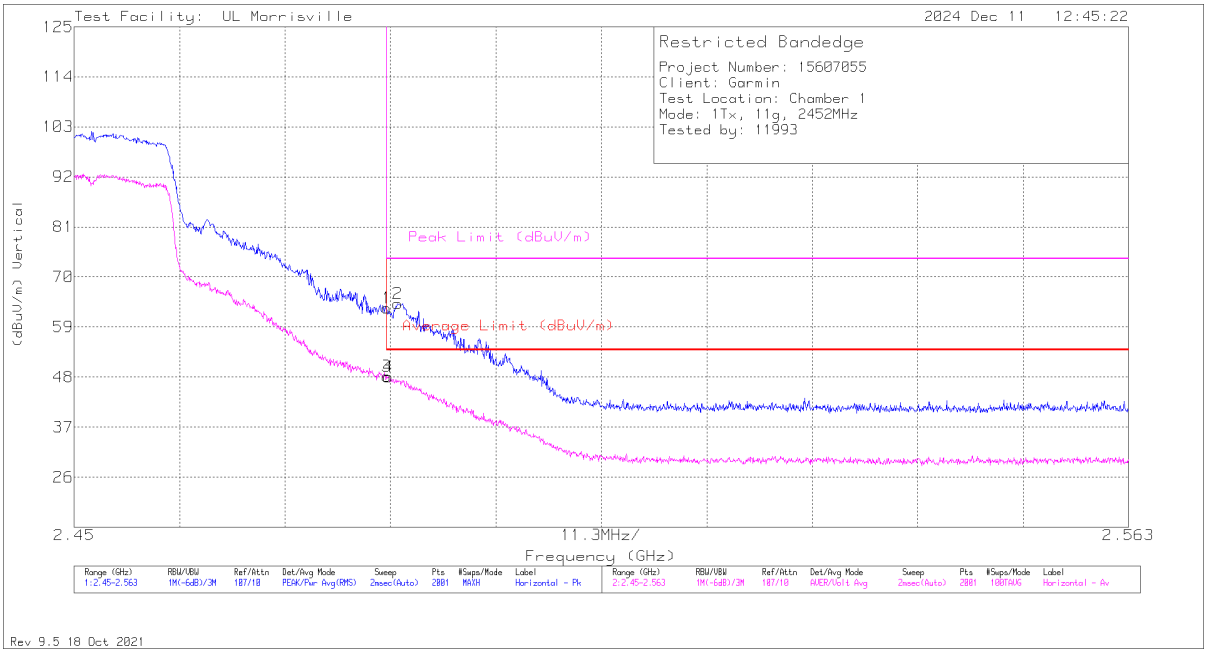
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	135143 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.48353	53.08	Pk	32.2	-23.7	61.58	-	-	74	-12.42	277	104	V
2	* ** 2.48524	55.03	Pk	32.2	-23.8	63.43	-	-	74	-10.57	277	104	V
3	* ** 2.48353	40.17	ADV	32.2	-23.7	48.67	54	-5.33	-	-	277	104	V
4	* ** 2.48465	39.87	ADV	32.2	-23.8	48.27	54	-5.73	-	-	277	104	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
ADV - Linear Voltage Average

This report shall not be reproduced except in full, without the written approval of UL LLC

BANDEDGE (HIGH CHANNEL, 2452MHz)

HORIZONTAL RESULT

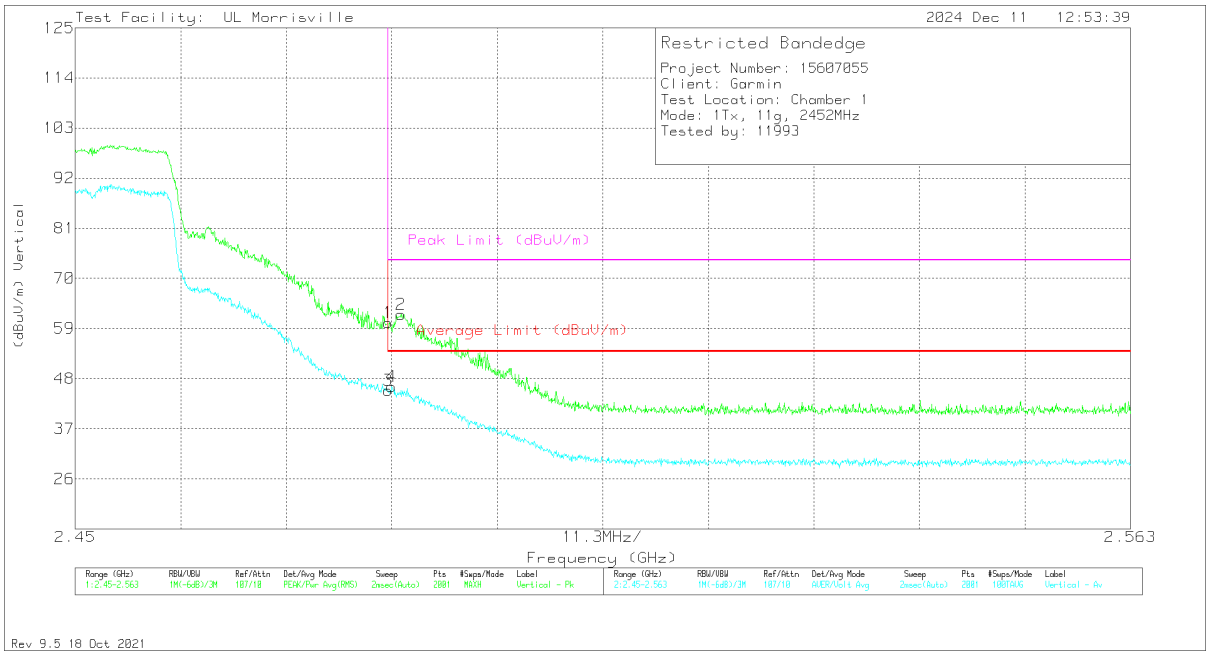


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	135143 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.4835	54.71	Pk	32.2	-23.7	63.21	-	-	74	-10.79	294	117	H
2	* ** 2.48469	55.74	Pk	32.2	-23.8	64.14	-	-	74	-9.86	294	117	H
3	* ** 2.4835	39.67	ADV	32.2	-23.7	48.17	54	-5.83	-	-	294	117	H
4	* ** 2.48367	39.56	ADV	32.2	-23.7	48.06	54	-5.94	-	-	294	117	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
ADV - Linear Voltage Average

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

VERTICAL RESULT



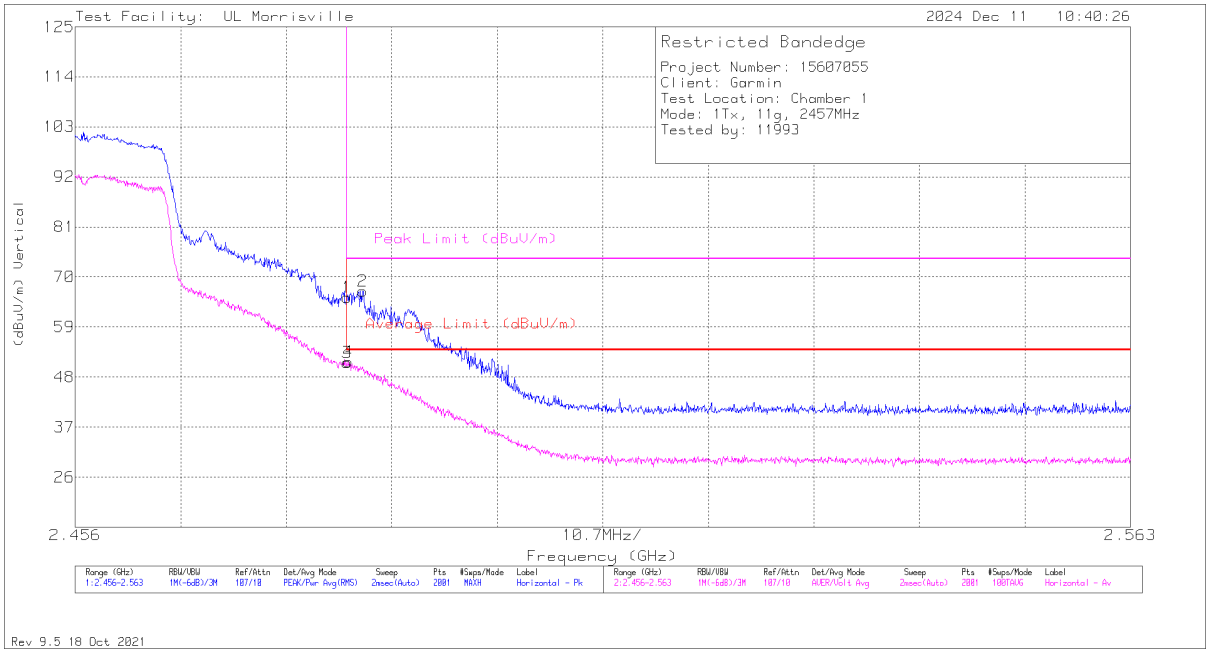
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	135143 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.4835	51.79	Pk	32.2	-23.7	60.29	-	-	74	-13.71	193	162	V
2	* ** 2.48486	53.71	Pk	32.2	-23.8	62.11	-	-	74	-11.89	193	162	V
3	* ** 2.4835	36.92	ADV	32.2	-23.7	45.42	54	-8.58	-	-	193	162	V
4	* ** 2.4839	37.77	ADV	32.2	-23.7	46.27	54	-7.73	-	-	193	162	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
ADV - Linear Voltage Average

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

BANDEDGE (HIGH CHANNEL, 2457MHz)

HORIZONTAL RESULT

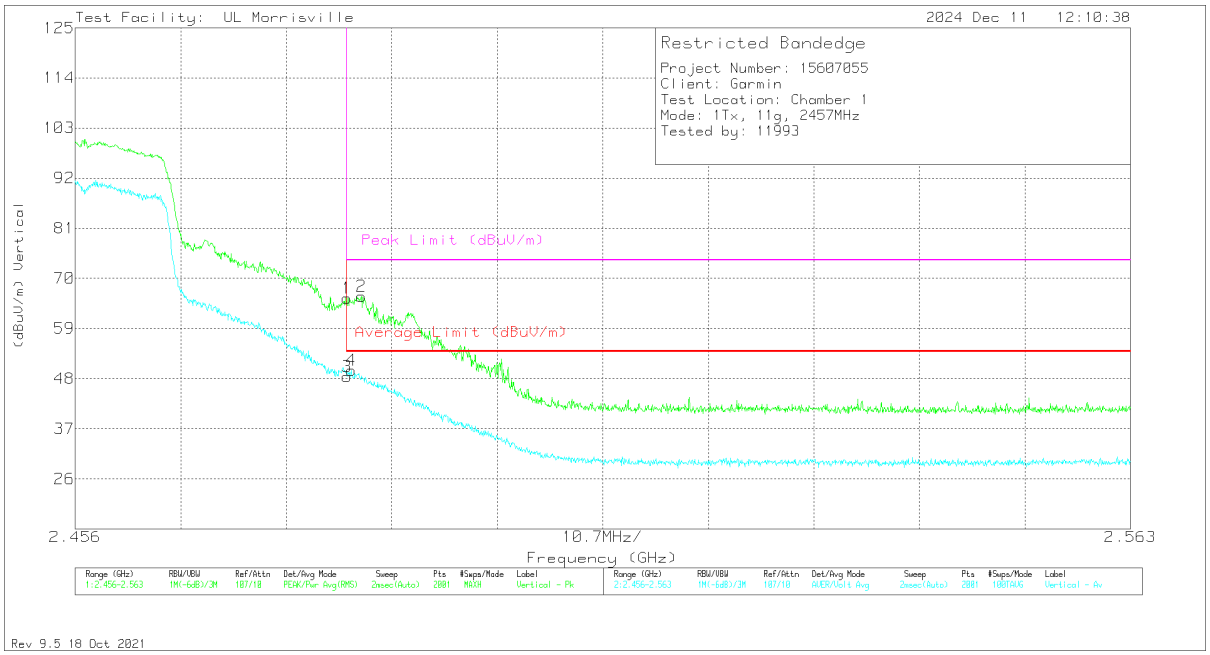


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	135143 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.48355	56.97	Pk	32.2	-23.7	65.47	-	-	74	-8.53	349	120	H
2	* ** 2.48516	58.55	Pk	32.2	-23.8	66.95	-	-	74	-7.05	349	120	H
3	* ** 2.48355	42.69	ADV	32.2	-23.7	51.19	54	-2.81	-	-	349	120	H
4	* ** 2.48371	42.79	ADV	32.2	-23.7	51.29	54	-2.71	-	-	349	120	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
ADV - Linear Voltage Average

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

VERTICAL RESULT



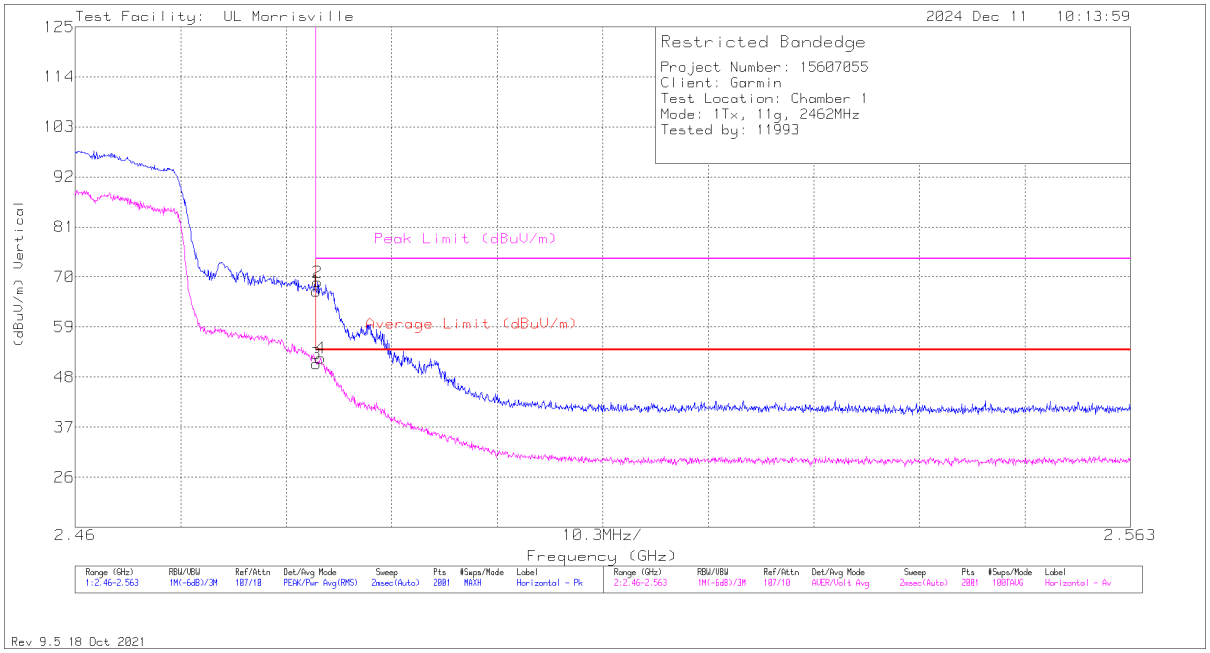
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	135143 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.48355	57.11	Pk	32.2	-23.7	65.61	-	-	74	-8.39	197	138	V
2	* ** 2.48505	57.67	Pk	32.2	-23.8	66.07	-	-	74	-7.93	197	138	V
3	* ** 2.48355	39.97	ADV	32.2	-23.7	48.47	54	-5.53	-	-	197	138	V
4	* ** 2.48398	41.38	ADV	32.2	-23.8	49.78	54	-4.22	-	-	197	138	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
ADV - Linear Voltage Average

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

BANDEDGE (HIGH CHANNEL, 2462MHz)

HORIZONTAL RESULT

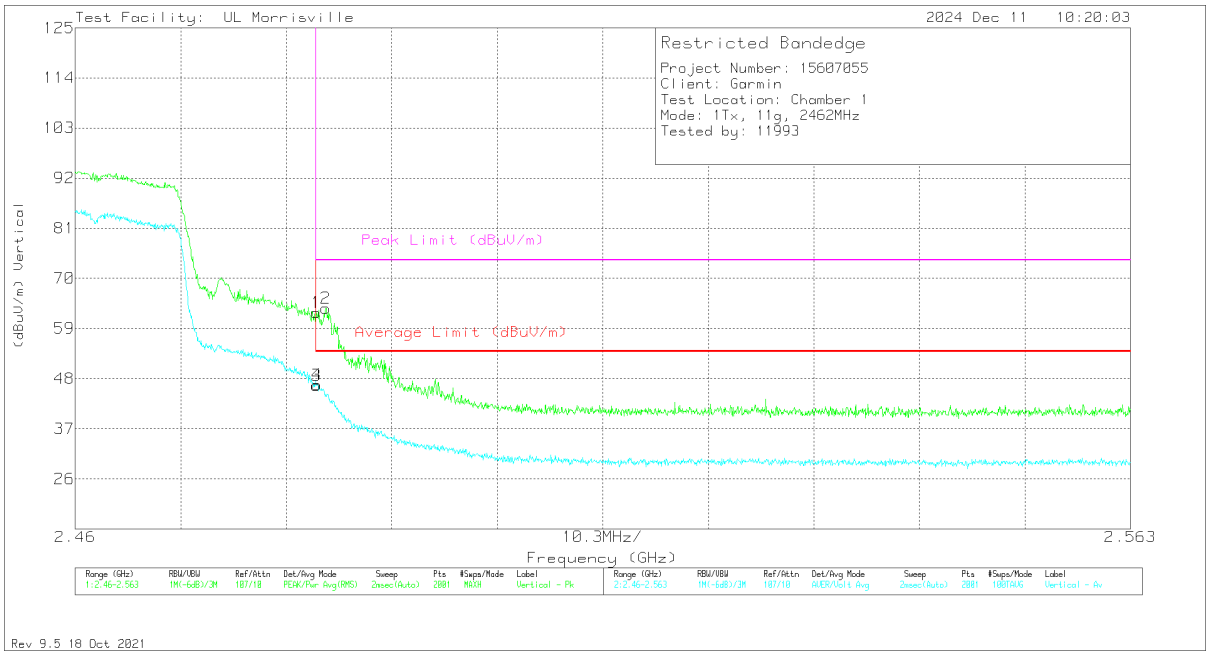


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	135143 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.48354	58.35	Pk	32.2	-23.7	66.85	-	-	74	-7.15	339	120	H
2	* ** 2.48364	60.39	Pk	32.2	-23.7	68.89	-	-	74	-5.11	339	120	H
3	* ** 2.48354	42.41	ADV	32.2	-23.7	50.91	54	-3.09	-	-	339	120	H
4	* ** 2.48395	43.72	ADV	32.2	-23.7	52.22	54	-1.78	-	-	339	120	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
ADV - Linear Voltage Average

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

VERTICAL RESULT



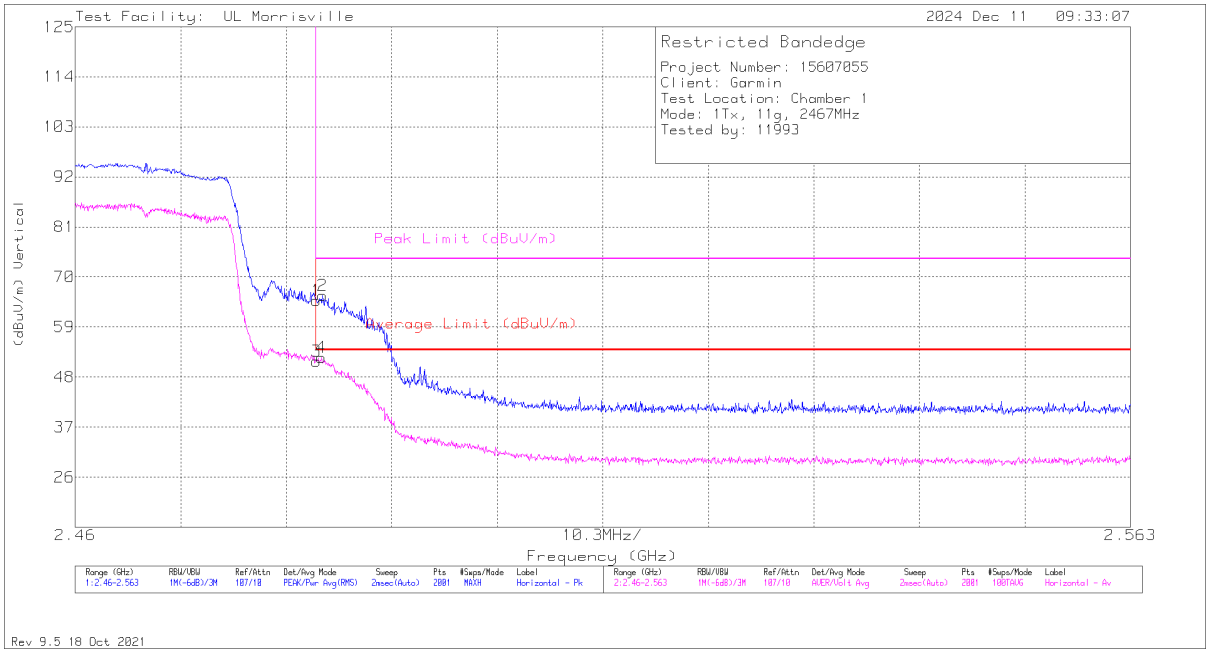
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	135143 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.48354	53.96	Pk	32.2	-23.7	62.46	-	-	74	-11.54	324	127	V
2	* ** 2.48446	55.08	Pk	32.2	-23.8	63.48	-	-	74	-10.52	324	127	V
3	* ** 2.48354	37.99	ADV	32.2	-23.7	46.49	54	-7.51	-	-	324	127	V
4	* ** 2.48359	38.18	ADV	32.2	-23.7	46.68	54	-7.32	-	-	324	127	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
ADV - Linear Voltage Average

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

BANDEDGE (HIGH CHANNEL, 2467MHz)

HORIZONTAL RESULT

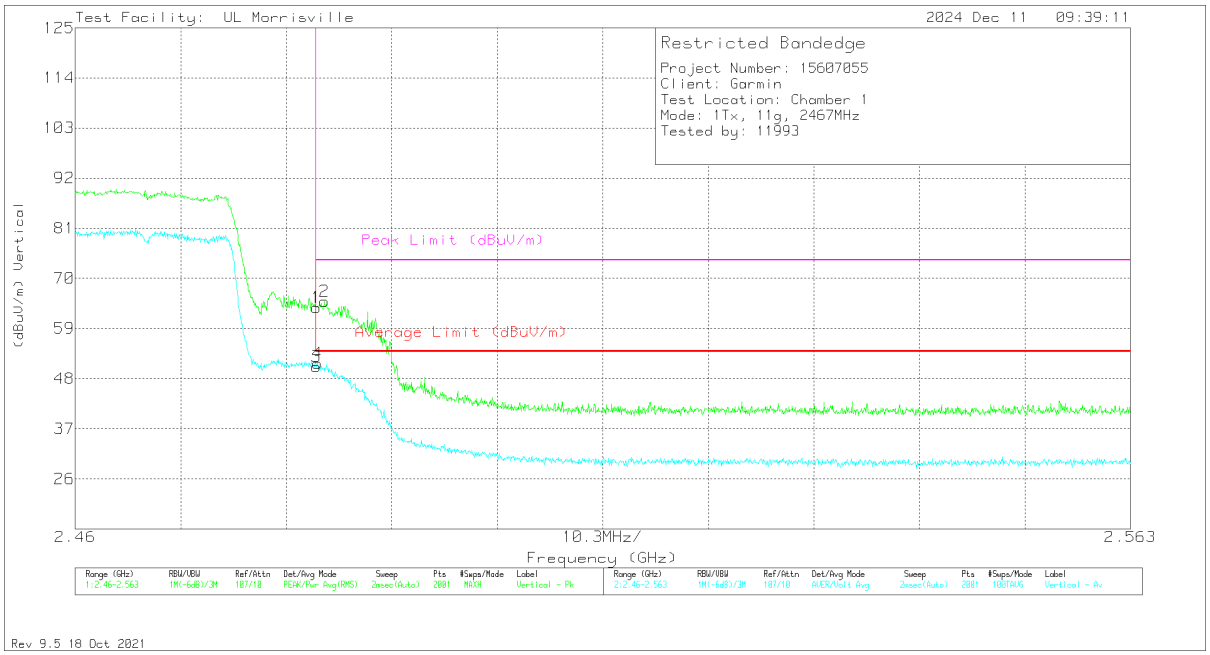


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	135143 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.48354	56.29	Pk	32.2	-23.7	64.79	-	-	74	-9.21	137	130	H
2	* ** 2.48415	57.49	Pk	32.2	-23.8	65.89	-	-	74	-8.11	137	130	H
3	* ** 2.48354	43.03	ADV	32.2	-23.7	51.53	54	-2.47	-	-	137	130	H
4	* ** 2.48405	43.94	ADV	32.2	-23.8	52.34	54	-1.66	-	-	137	130	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
ADV - Linear Voltage Average

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

VERTICAL RESULT



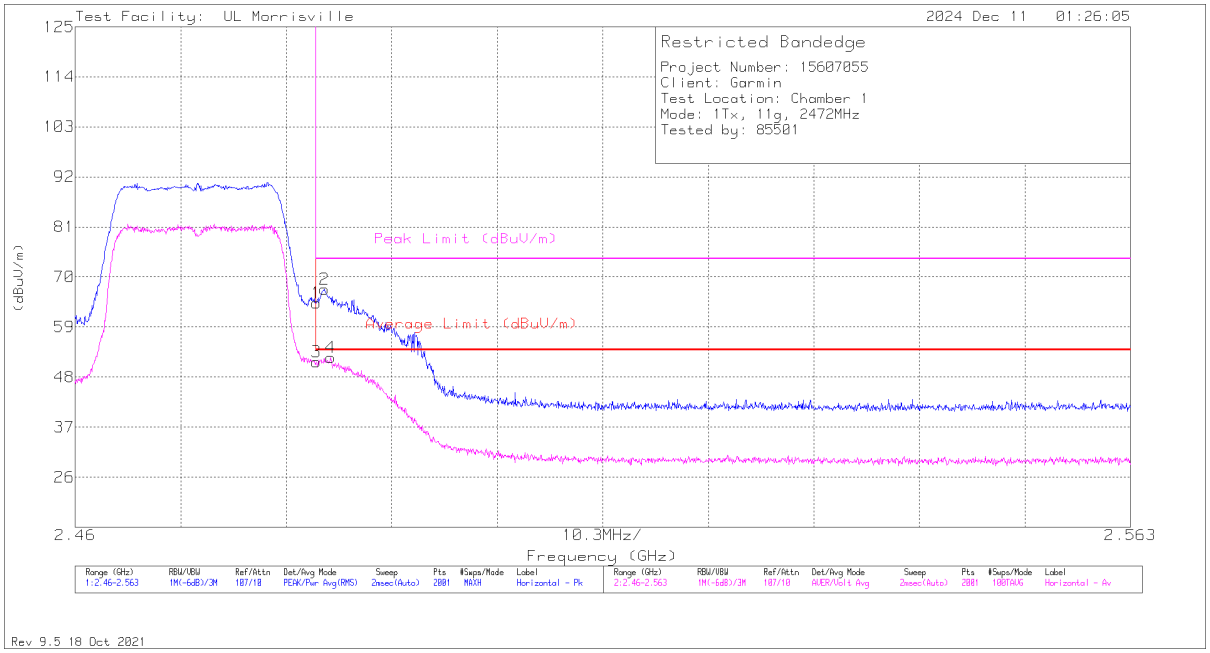
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	135143 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.48354	55.13	Pk	32.2	-23.7	63.63	-	-	74	-10.37	152	124	V
2	* ** 2.48431	56.55	Pk	32.2	-23.8	64.95	-	-	74	-9.05	152	124	V
3	* ** 2.48354	42.21	ADV	32.2	-23.7	50.71	54	-3.29	-	-	152	124	V
4	* ** 2.48364	42.82	ADV	32.2	-23.7	51.32	54	-2.68	-	-	152	124	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
ADV - Linear Voltage Average

This report shall not be reproduced except in full, without the written approval of UL LLC

BANDEDGE (HIGH CHANNEL, 2472MHz)

HORIZONTAL RESULT

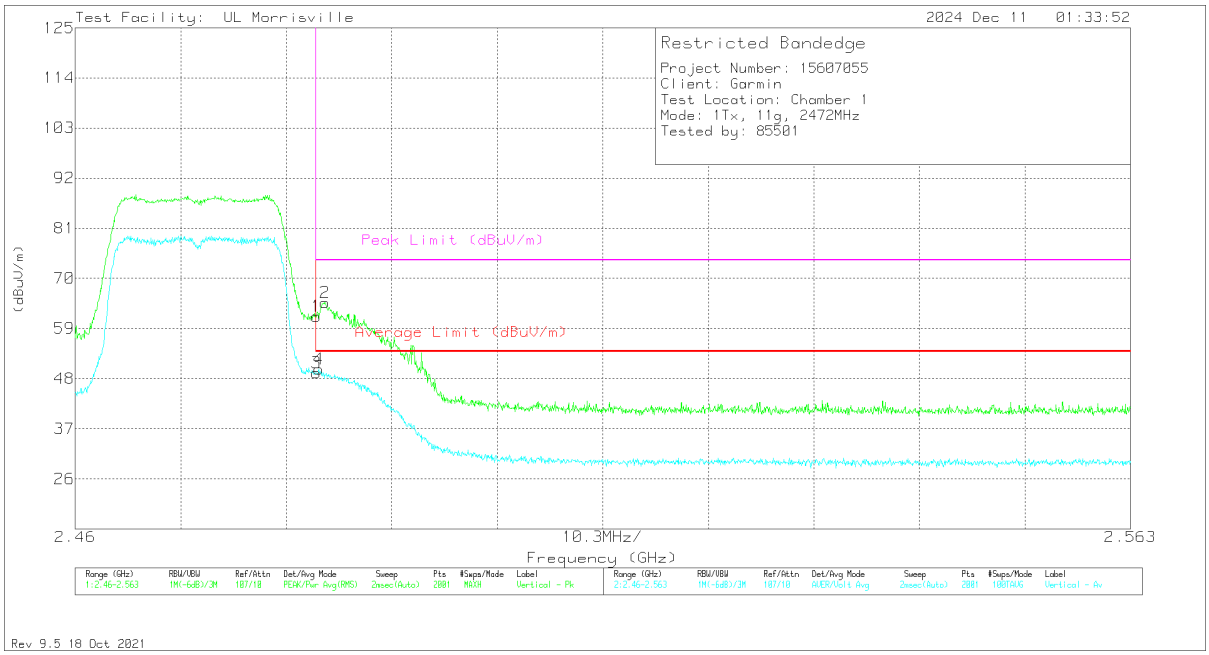


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	135143 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.48354	55.82	Pk	32.2	-23.7	64.32	-	-	74	-9.68	134	152	H
2	* ** 2.48431	58.88	Pk	32.2	-23.8	67.28	-	-	74	-6.72	134	152	H
3	* ** 2.48354	42.83	ADV	32.2	-23.7	51.33	54	-2.67	-	-	134	152	H
4	* ** 2.48493	43.86	ADV	32.2	-23.8	52.26	54	-1.74	-	-	134	152	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
ADV - Linear Voltage Average

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

VERTICAL RESULT



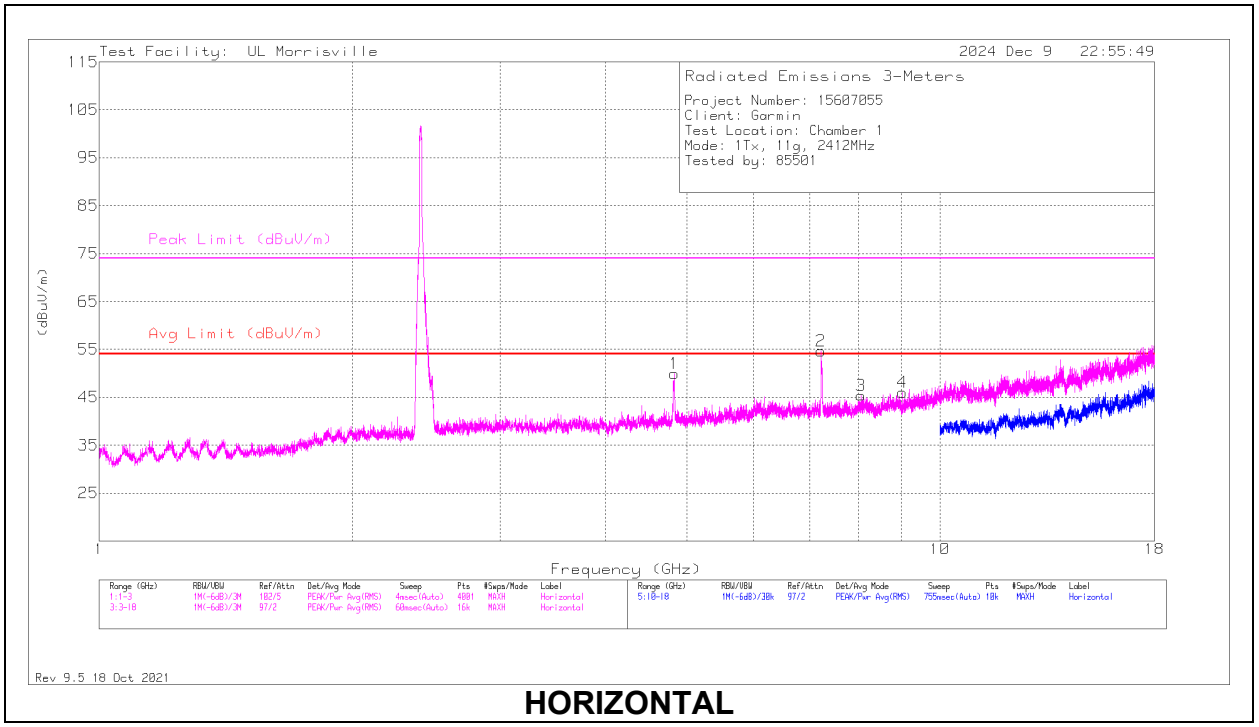
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	135143 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.48354	53.2	Pk	32.2	-23.7	61.7	-	-	74	-12.3	211	158	V
2	* ** 2.48441	56.31	Pk	32.2	-23.8	64.71	-	-	74	-9.29	211	158	V
3	* ** 2.48354	40.8	ADV	32.2	-23.7	49.3	54	-4.7	-	-	211	158	V
4	* ** 2.48379	41.66	ADV	32.2	-23.7	50.16	54	-3.84	-	-	211	158	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
ADV - Linear Voltage Average

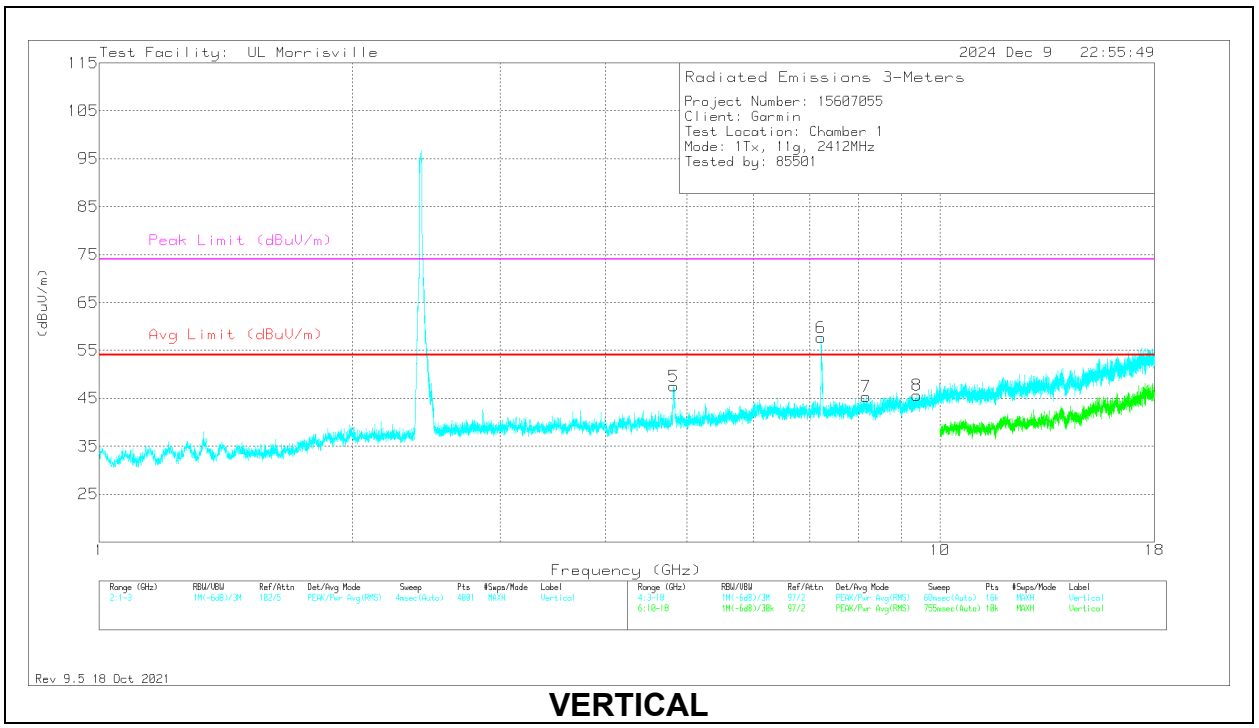
UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL



HORIZONTAL



VERTICAL

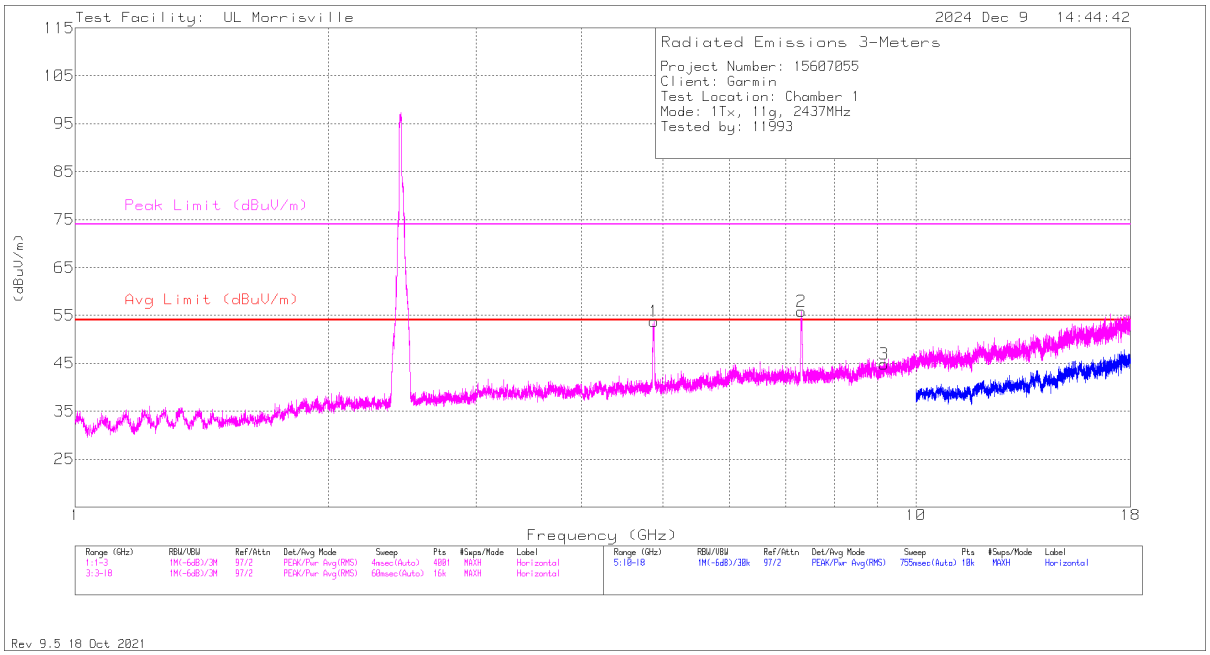
This report shall not be reproduced except in full, without the written approval of UL LLC

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	135143 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 4.82923	65.36	PK2	33.9	-45.2	54.06	-	-	74	-19.94	195	115	H
	* ** 4.82967	52.39	ADV	33.9	-45.2	41.09	54	-12.91	-	-	195	115	H
3	* ** 8.05875	50.52	Pk	35.9	-41	45.42	54	-8.58	74	-28.58	0-360	199	H
4	* ** 9.03281	49.52	Pk	35.8	-39.3	46.02	54	-7.98	74	-27.98	0-360	199	H
5	* ** 4.82344	59.02	Pk	33.9	-45.4	47.52	54	-6.48	74	-26.48	0-360	101	V
7	* ** 8.16938	50.33	Pk	35.9	-40.9	45.33	54	-8.67	74	-28.67	0-360	101	V
8	* ** 9.39094	49.6	Pk	36.2	-40.2	45.6	54	-8.4	74	-28.4	0-360	101	V
6	7.22156	63.87	Pk	35.4	-41.6	57.67	-	-	-	-	0-360	200	V
2	7.2225	60.81	Pk	35.4	-41.6	54.61	-	-	-	-	0-360	101	H

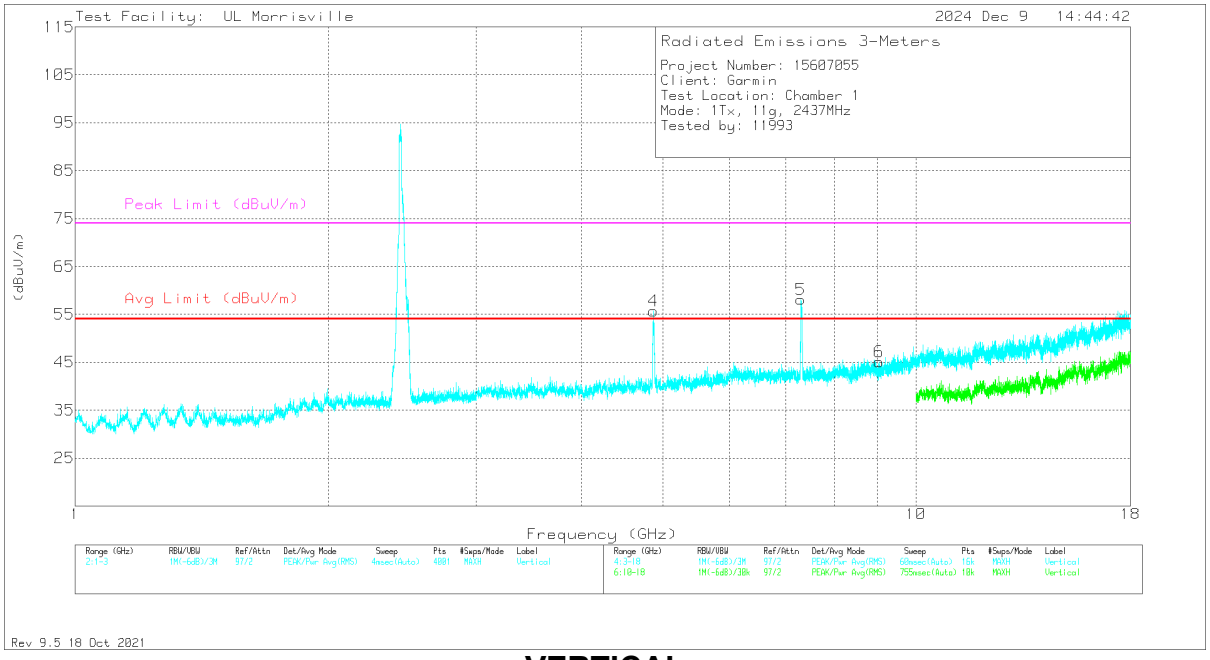
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
PK2 - Maximum Peak
ADV - Linear Voltage Average

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

MID CHANNEL



HORIZONTAL



VERTICAL

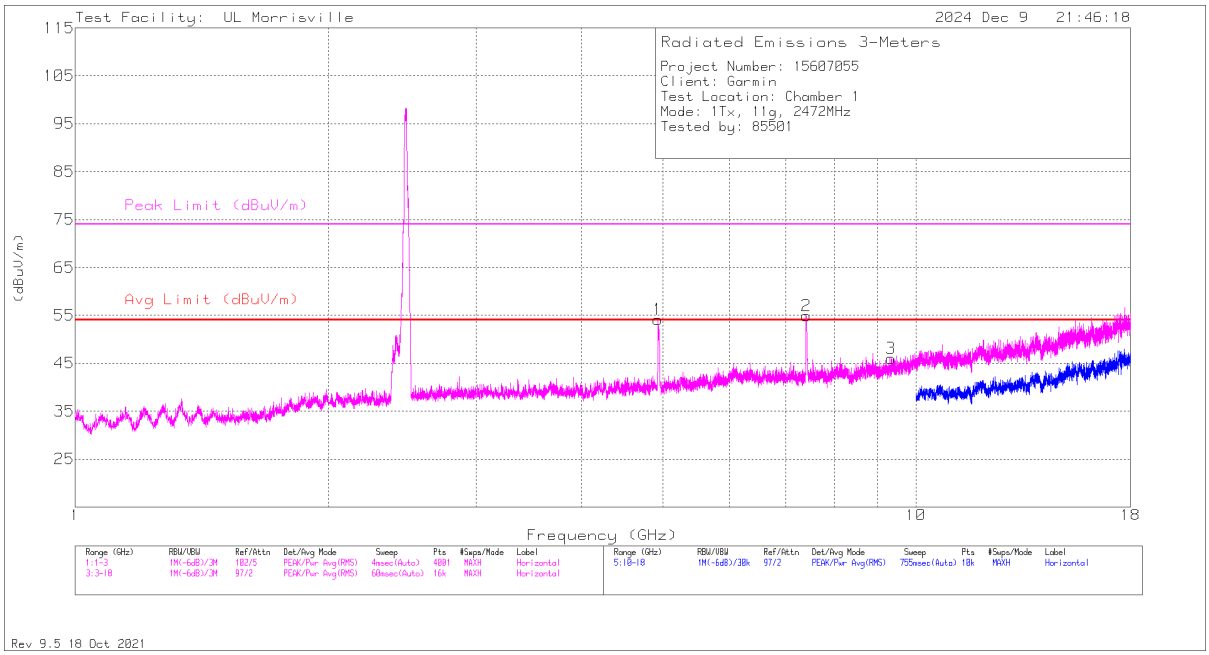
This report shall not be reproduced except in full, without the written approval of UL LLC

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	135143 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 4.8774	67.88	PK2	34	-44.8	57.08	-	-	74	-16.92	193	169	H
	* ** 4.8758	54.98	ADV	34	-44.8	44.18	54	-9.82	-	-	193	169	H
2	* ** 7.31464	65.09	PK2	35.4	-41.6	58.89	-	-	74	-15.11	296	126	H
	* ** 7.31035	52.21	ADV	35.4	-41.7	45.91	54	-8.09	-	-	296	126	H
3	* ** 9.165	48.94	Pk	36	-40.1	44.84	54	-9.16	74	-29.16	0-360	101	H
4	* ** 4.87375	68.89	PK2	34	-44.8	58.09	-	-	74	-15.91	146	110	V
	* ** 4.87145	54.83	ADV	34	-44.9	43.93	54	-10.07	-	-	146	110	V
5	* ** 7.30959	68.04	PK2	35.4	-41.7	61.74	-	-	74	-12.26	194	247	V
	* ** 7.31004	55.68	ADV	35.4	-41.7	49.38	54	-4.62	-	-	194	247	V
6	* ** 9.03563	48.92	Pk	35.8	-39.6	45.12	54	-8.88	74	-28.88	0-360	101	V

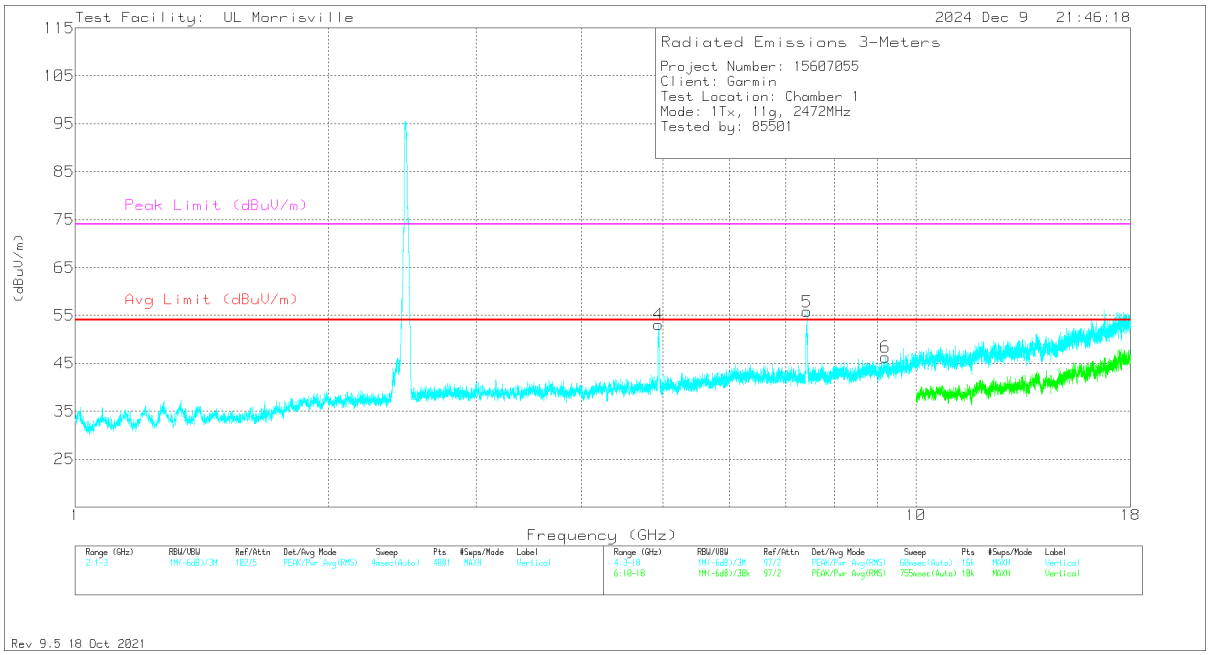
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
PK2 - Maximum Peak
ADV - Linear Voltage Average

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

HIGH CHANNEL



HORIZONTAL



VERTICAL

This report shall not be reproduced except in full, without the written approval of UL LLC

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	135143 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 4.93881	68.6	PK2	34.1	-44.2	58.5	-	-	74	-15.5	188	134	H
	* ** 4.93879	55.9	ADV	34.1	-44.2	45.8	54	-8.2	-	-	188	134	H
2	* ** 7.40547	63.42	PK2	35.4	-41.6	57.22	-	-	74	-16.78	91	154	H
	* ** 7.40634	49.7	ADV	35.4	-41.5	43.6	54	-10.4	-	-	91	154	H
3	* ** 9.34969	50.39	Pk	36.2	-40.6	45.99	54	-8.01	74	-28.01	0-360	200	H
4	* ** 4.94367	69.01	PK2	34.1	-44.3	58.81	-	-	74	-15.19	137	153	V
	* ** 4.94527	54.67	ADV	34.1	-44.4	44.37	54	-9.63	-	-	137	153	V
5	* ** 7.4179	63.76	PK2	35.4	-41.2	57.96	-	-	74	-16.04	193	142	V
	* ** 7.4175	51.14	ADV	35.4	-41.2	45.34	54	-8.66	-	-	193	142	V
6	* ** 9.19594	49.87	Pk	36	-39.6	46.27	54	-7.73	74	-27.73	0-360	200	V

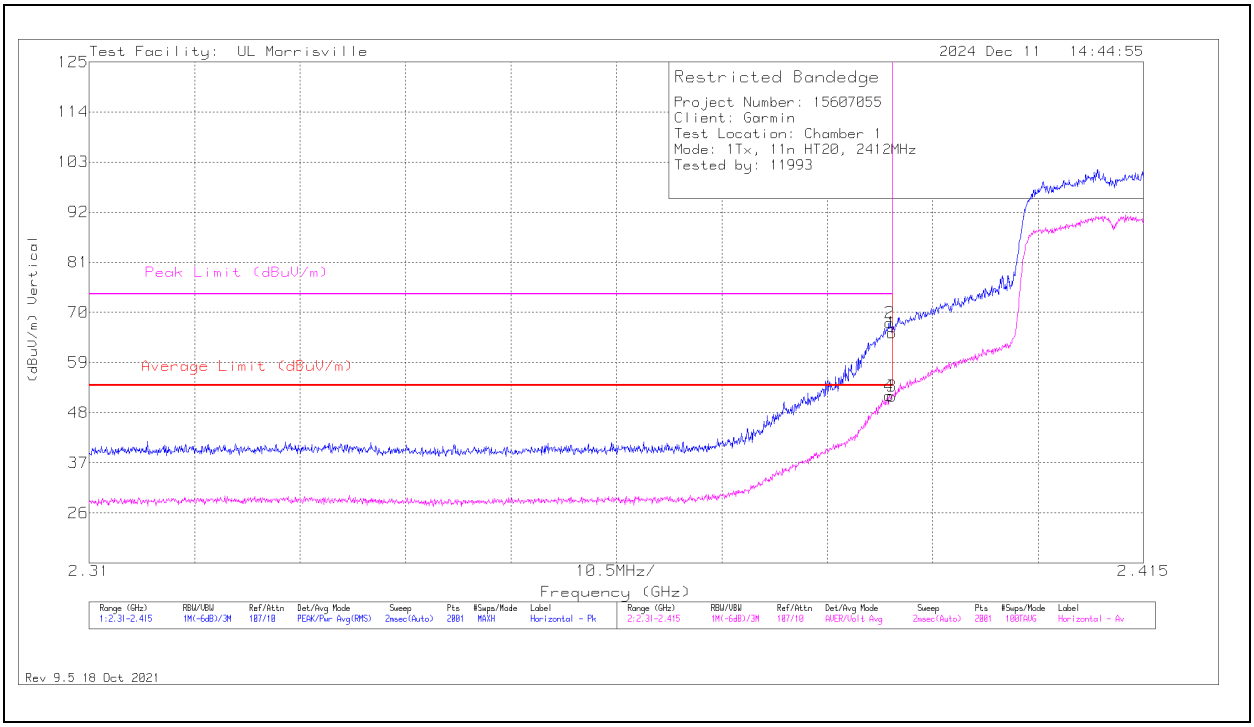
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
PK2 - Maximum Peak
ADV - Linear Voltage Average

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

10.1.3. TX ABOVE 1 GHz 802.11n HT20 MODE IN THE 2.4 GHz BAND

BANDEDGE (LOW CHANNEL, 2412MHz)

HORIZONTAL RESULT

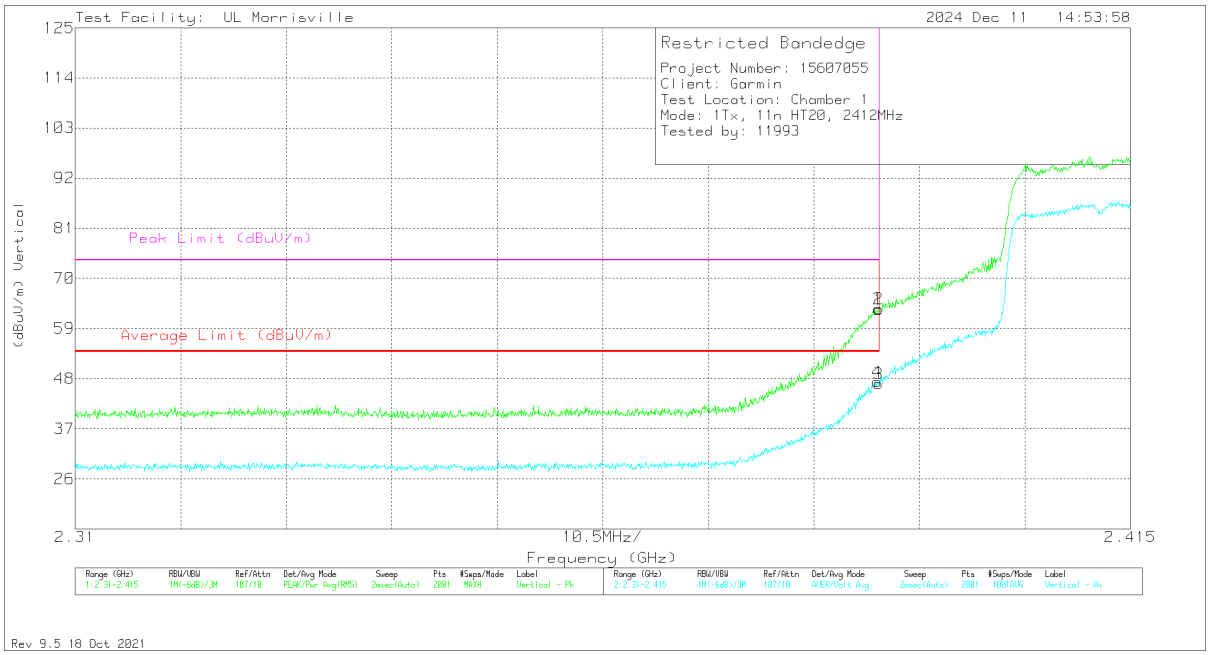


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	135143 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.38996	57.58	Pk	31.9	-24	65.48	-	-	74	-8.52	278	121	H
2	* ** 2.38975	59.79	Pk	31.9	-24	67.69	-	-	74	-6.31	278	121	H
3	* ** 2.38996	43.71	ADV	31.9	-24	51.61	54	-2.39	-	-	278	121	H
4	* ** 2.3897	43.79	ADV	31.9	-24	51.69	54	-2.31	-	-	278	121	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
ADV - Linear Voltage Average

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

VERTICAL RESULT



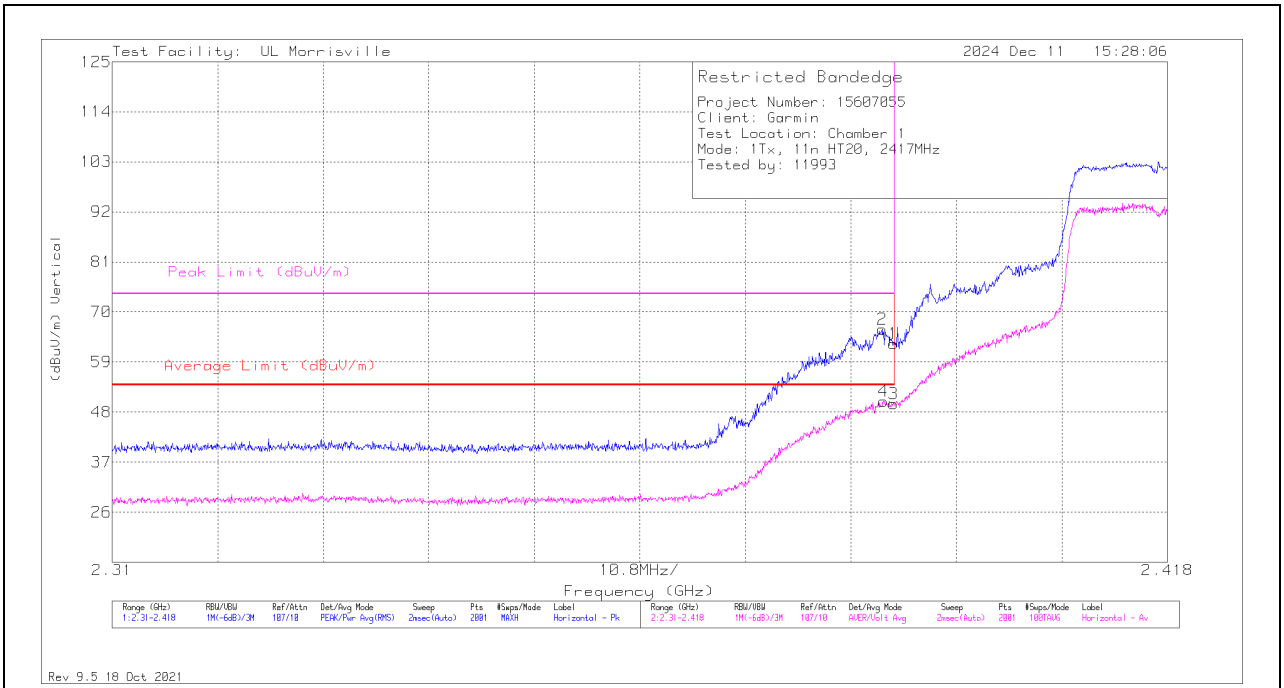
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	135143 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.38996	55.3	Pk	31.9	-24	63.2	-	-	74	-10.8	208	121	V
2	* ** 2.38991	55.47	Pk	31.9	-24	63.37	-	-	74	-10.63	208	121	V
3	* ** 2.38996	38.97	ADV	31.9	-24	46.87	54	-7.13	-	-	208	121	V
4	* ** 2.3898	39.38	ADV	31.9	-24	47.28	54	-6.72	-	-	208	121	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
ADV - Linear Voltage Average

This report shall not be reproduced except in full, without the written approval of UL LLC

BANDEDGE (LOW CHANNEL, 2417MHz)

HORIZONTAL RESULT

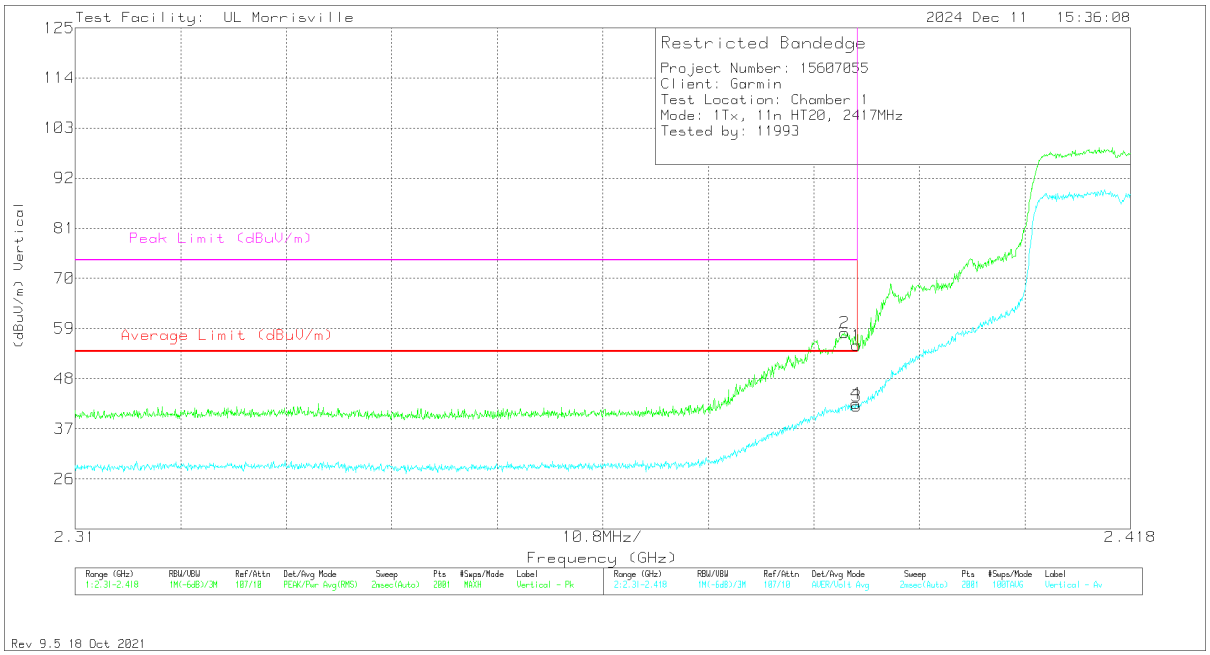


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	135143 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.38997	55.12	Pk	31.9	-24	63.02	-	-	74	-10.98	269	246	H
2	* ** 2.38879	58.37	Pk	31.9	-24	66.27	-	-	74	-7.73	269	246	H
3	* ** 2.38997	41.89	ADV	31.9	-24	49.79	54	-4.21	-	-	269	246	H
4	* ** 2.38895	42.53	ADV	31.9	-24	50.43	54	-3.57	-	-	269	246	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
ADV - Linear Voltage Average

This report shall not be reproduced except in full, without the written approval of UL LLC

VERTICAL RESULT



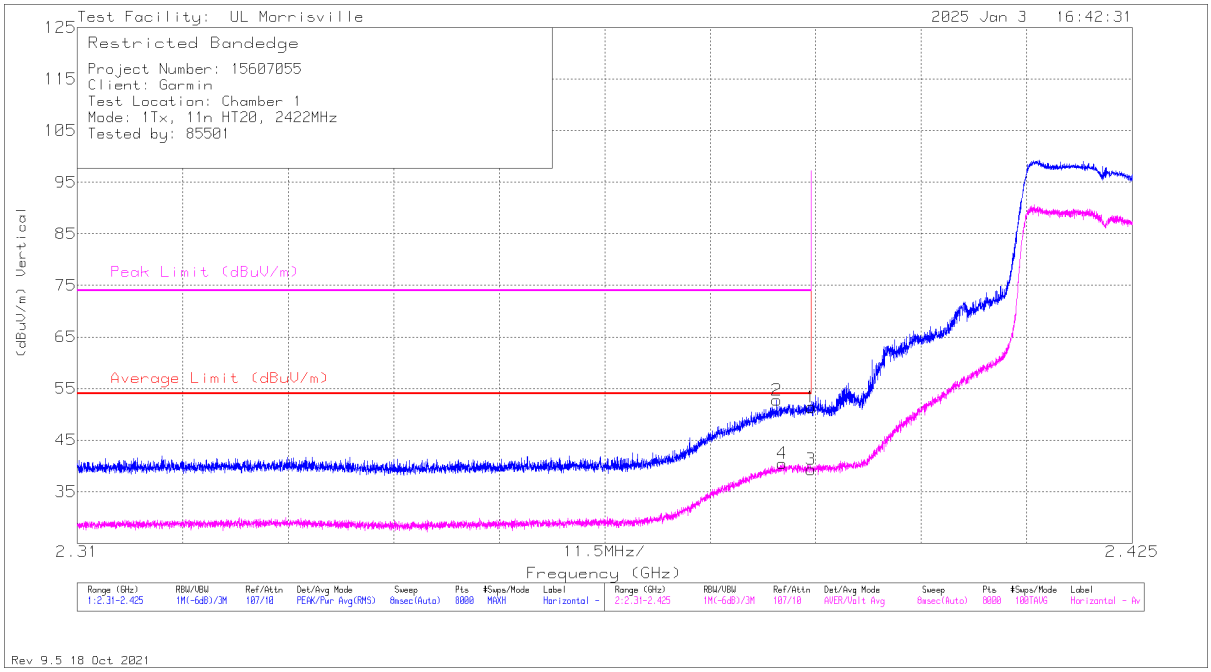
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	135143 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.38997	47.38	Pk	31.9	-24	55.28	-	-	74	-18.72	64	305	V
2	* ** 2.38873	50.16	Pk	31.9	-24	58.06	-	-	74	-15.94	64	305	V
3	* ** 2.38997	34.13	ADV	31.9	-24	42.03	54	-11.97	-	-	64	305	V
4	* ** 2.38992	34.61	ADV	31.9	-24	42.51	54	-11.49	-	-	64	305	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
ADV - Linear Voltage Average

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

BANDEDGE (LOW CHANNEL, 2422MHz)

HORIZONTAL RESULT

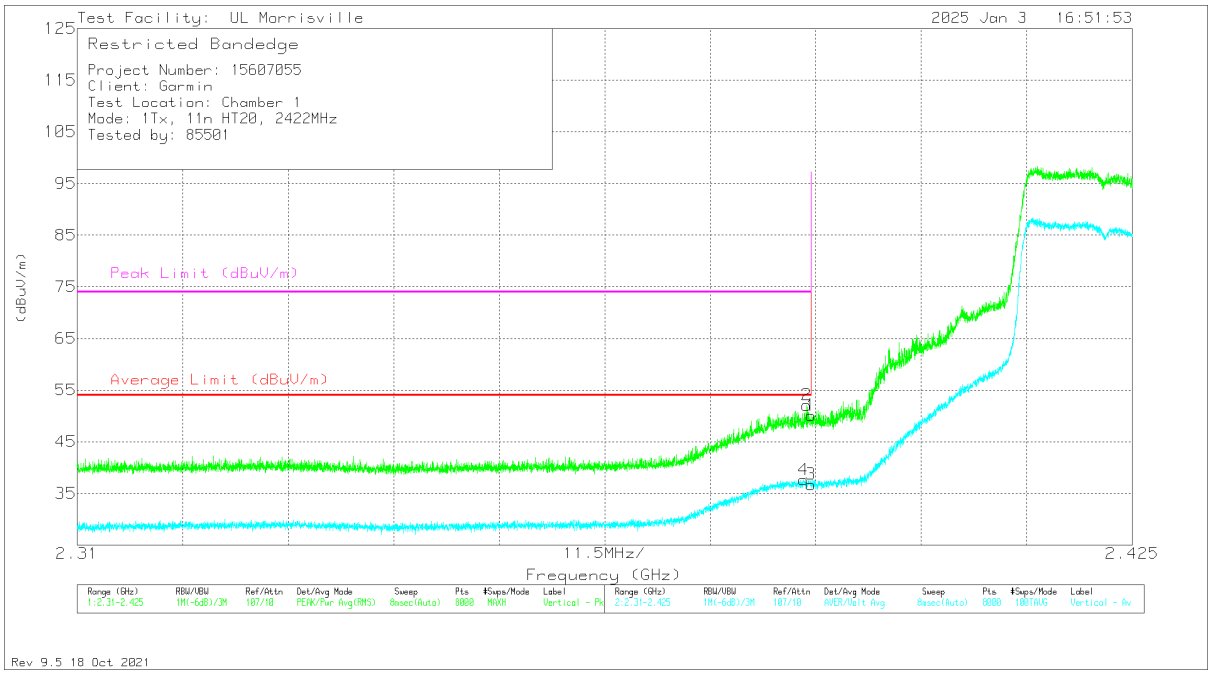


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	135143 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.38999	43.58	Pk	31.9	-24.1	51.38	-	-	74	-22.62	137	104	H
2	* ** 2.38626	44.74	Pk	31.9	-23.9	52.74	-	-	74	-21.26	137	104	H
3	* ** 2.38999	31.51	ADV	31.9	-24.1	39.31	54	-14.69	-	-	137	104	H
4	* ** 2.38685	32.48	ADV	31.9	-23.9	40.48	54	-13.52	-	-	137	104	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
ADV - Linear Voltage Average

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

VERTICAL RESULT



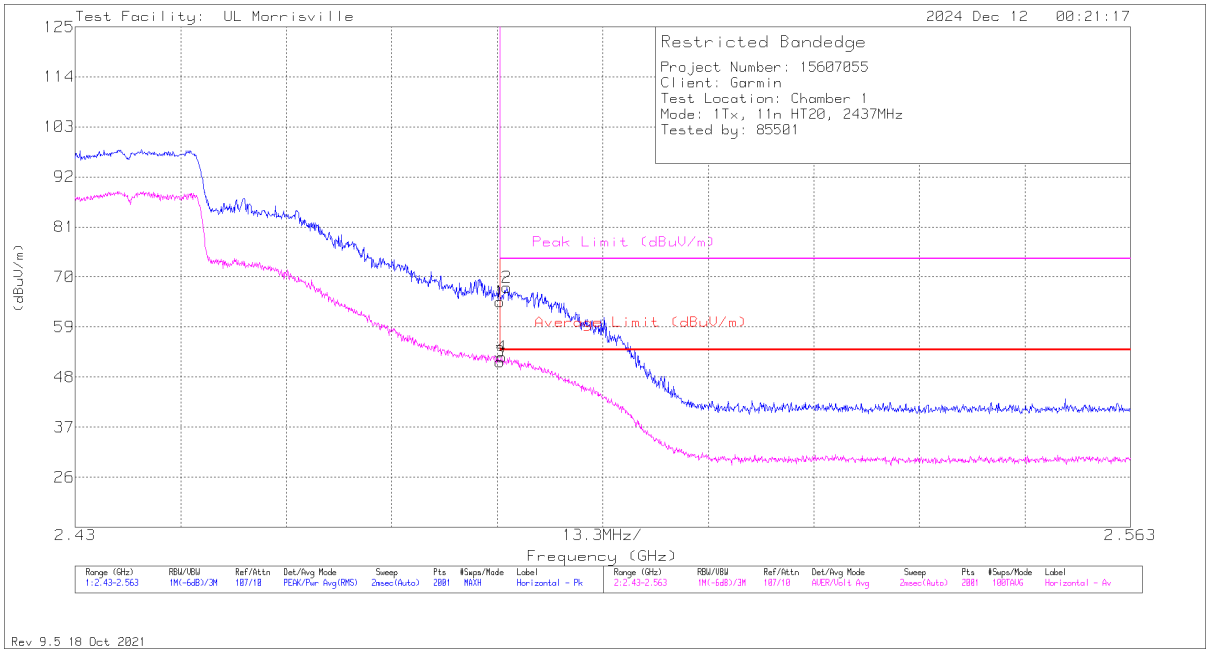
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	135143 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.38999	42.28	Pk	31.9	-24.1	50.08	-	-	74	-23.92	128	136	V
2	* ** 2.38953	44.19	Pk	31.9	-24	52.09	-	-	74	-21.91	128	136	V
3	* ** 2.38999	28.94	ADV	31.9	-24.1	36.74	54	-17.26	-	-	128	136	V
4	* ** 2.38919	29.73	ADV	31.9	-24	37.63	54	-16.37	-	-	128	136	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
ADV - Linear Voltage Average

This report shall not be reproduced except in full, without the written approval of UL LLC

BANDEDGE (MID CHANNEL, UPPER BAND, 2437MHz)

HORIZONTAL RESULT

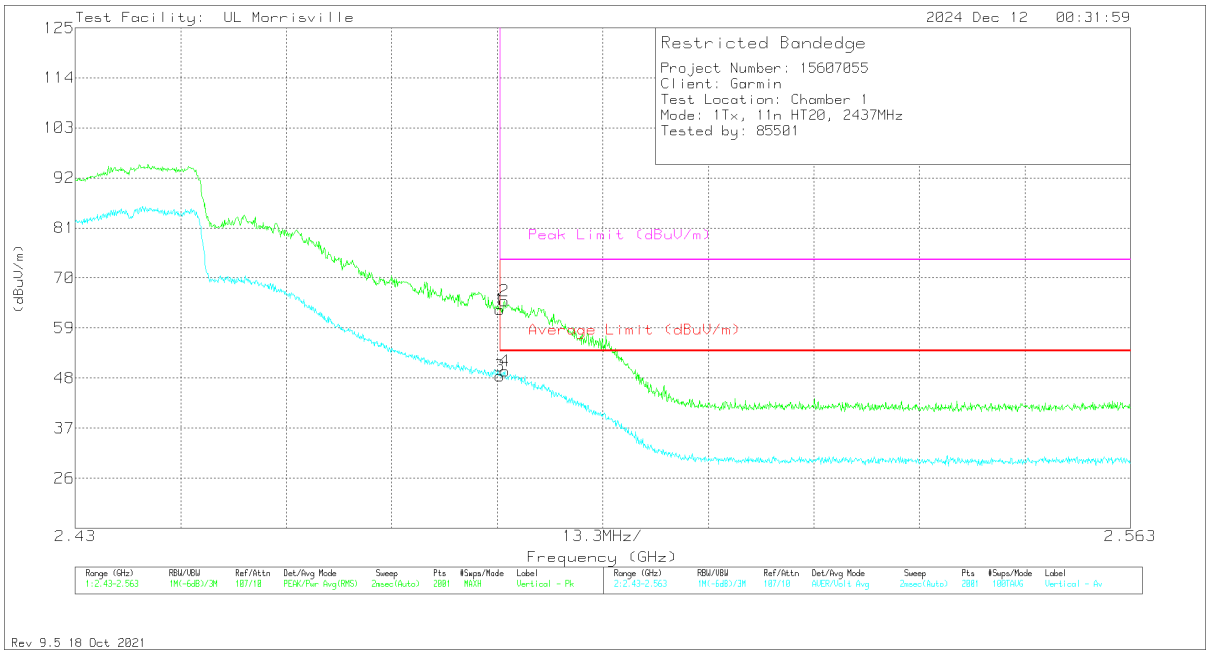


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	135143 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.48353	56.05	Pk	32.2	-23.7	64.55	-	-	74	-9.45	18	232	H
2	* ** 2.4844	59.33	Pk	32.2	-23.8	67.73	-	-	74	-6.27	18	232	H
3	* ** 2.48353	42.79	ADV	32.2	-23.7	51.29	54	-2.71	-	-	18	232	H
4	* ** 2.4838	43.94	ADV	32.2	-23.7	52.44	54	-1.56	-	-	18	232	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
ADV - Linear Voltage Average

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

VERTICAL RESULT



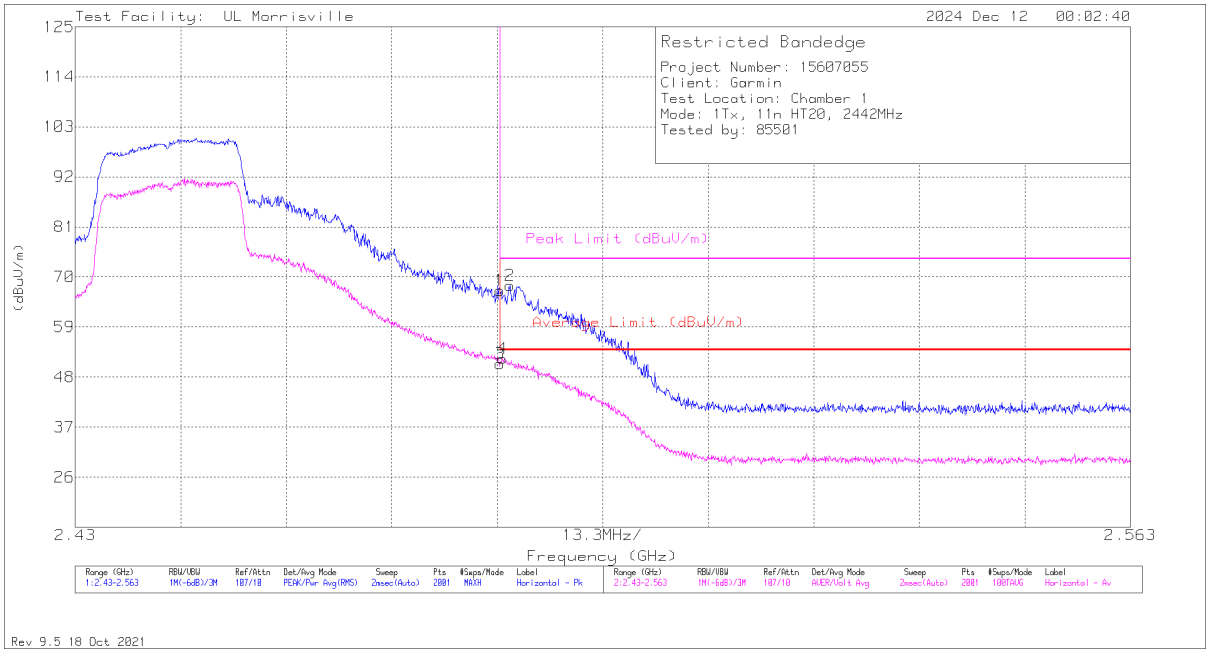
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	135143 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.48353	54.55	Pk	32.2	-23.7	63.05	-	-	74	-10.95	102	393	V
2	* ** 2.48406	56.58	Pk	32.2	-23.8	64.98	-	-	74	-9.02	102	393	V
3	* ** 2.48353	39.97	ADV	32.2	-23.7	48.47	54	-5.53	-	-	102	393	V
4	* ** 2.48413	41.13	ADV	32.2	-23.8	49.53	54	-4.47	-	-	102	393	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
ADV - Linear Voltage Average

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

BANDEDGE (HIGH CHANNEL, 2442MHz)

HORIZONTAL RESULT

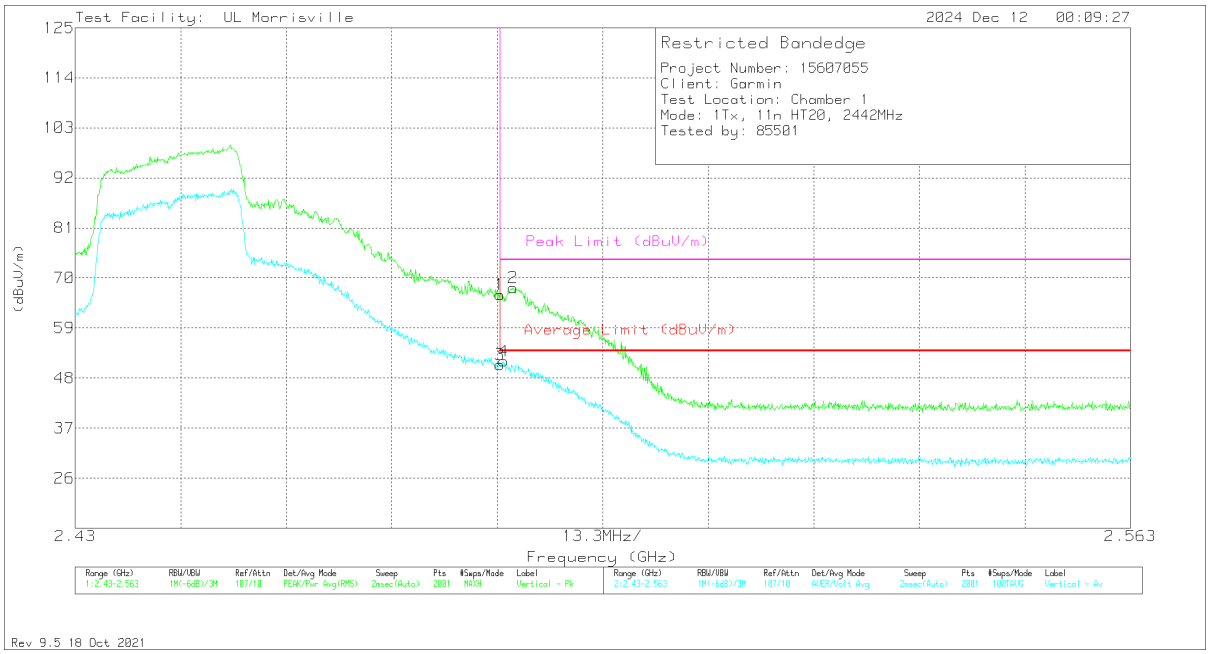


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	135143 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.48353	58.52	Pk	32.2	-23.7	67.02	-	-	74	-6.98	300	114	H
2	* ** 2.4848	59.75	Pk	32.2	-23.8	68.15	-	-	74	-5.85	300	114	H
3	* ** 2.48353	42.48	ADV	32.2	-23.7	50.98	54	-3.02	-	-	300	114	H
4	* ** 2.48387	43.59	ADV	32.2	-23.7	52.09	54	-1.91	-	-	300	114	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
ADV - Linear Voltage Average

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

VERTICAL RESULT



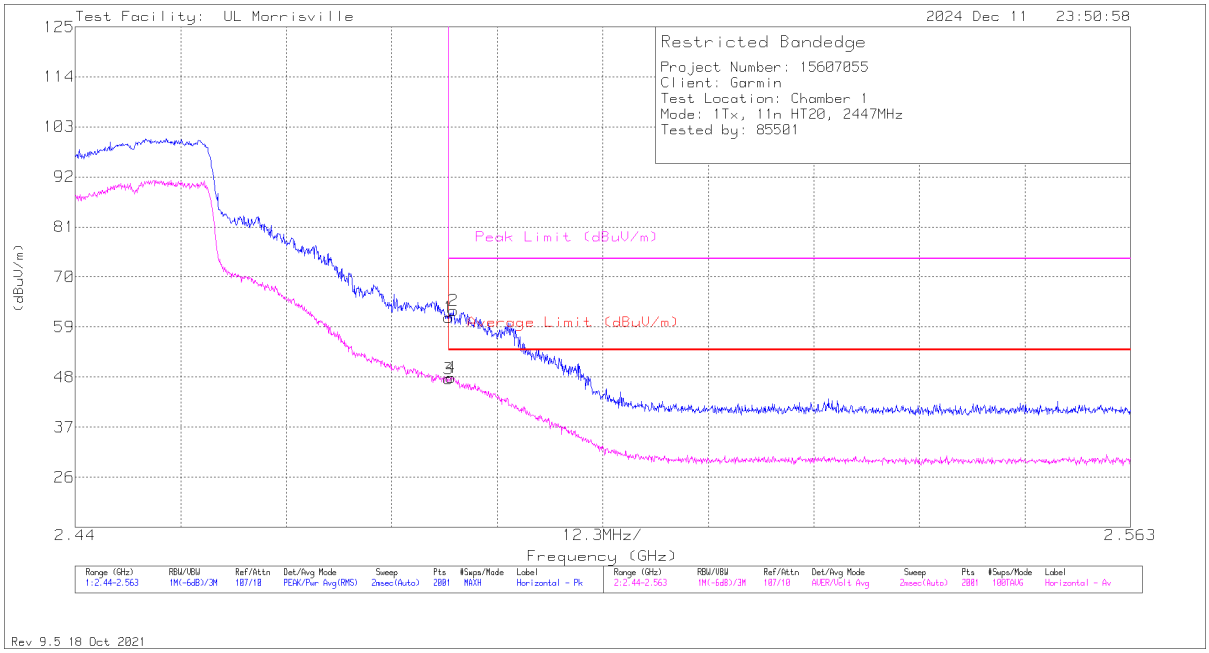
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	135143 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.48353	57.87	Pk	32.2	-23.7	66.37	-	-	74	-7.63	197	158	V
2	* ** 2.4852	59.43	Pk	32.2	-23.8	67.83	-	-	74	-6.17	197	158	V
3	* ** 2.48353	42.39	ADV	32.2	-23.7	50.89	54	-3.11	-	-	197	158	V
4	* ** 2.484	43.3	ADV	32.2	-23.8	51.7	54	-2.3	-	-	197	158	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
ADV - Linear Voltage Average

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

BANDEDGE (HIGH CHANNEL, 2447MHz)

HORIZONTAL RESULT

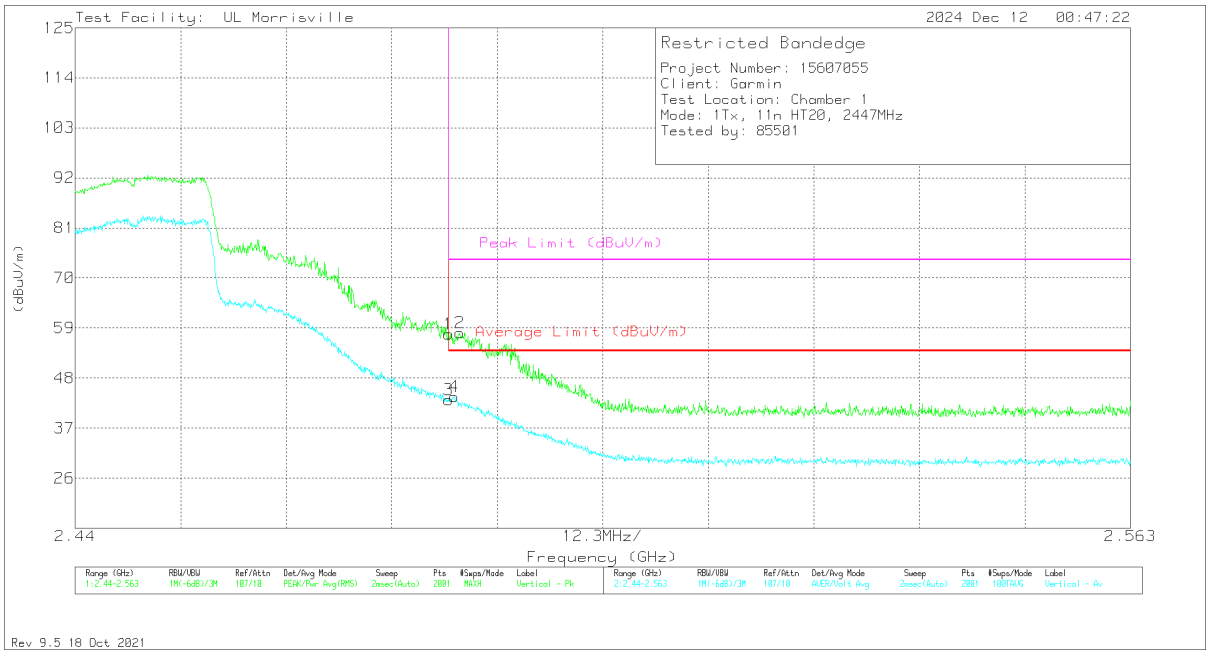


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	135143 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.48354	52.59	Pk	32.2	-23.7	61.09	-	-	74	-12.91	130	106	H
2	* ** 2.4841	54.23	Pk	32.2	-23.8	62.63	-	-	74	-11.37	130	106	H
3	* ** 2.48354	39.14	ADV	32.2	-23.7	47.64	54	-6.36	-	-	130	106	H
4	* ** 2.48379	39.45	ADV	32.2	-23.7	47.95	54	-6.05	-	-	130	106	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
ADV - Linear Voltage Average

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

VERTICAL RESULT



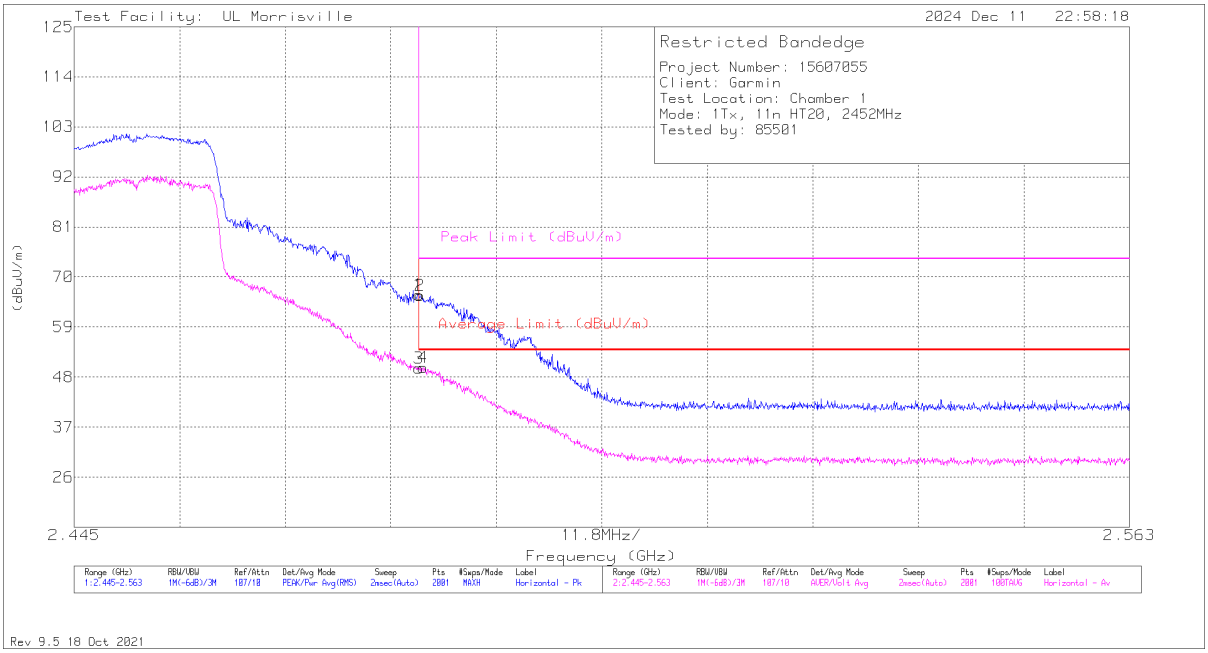
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	135143 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.48354	49.17	Pk	32.2	-23.7	57.67	-	-	74	-16.33	307	383	V
2	* ** 2.48483	49.54	Pk	32.2	-23.8	57.94	-	-	74	-16.06	307	383	V
3	* ** 2.48354	34.76	ADV	32.2	-23.7	43.26	54	-10.74	-	-	307	383	V
4	* ** 2.48416	35.5	ADV	32.2	-23.8	43.9	54	-10.1	-	-	307	383	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
ADV - Linear Voltage Average

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

BANDEDGE (HIGH CHANNEL, 2452MHz)

HORIZONTAL RESULT

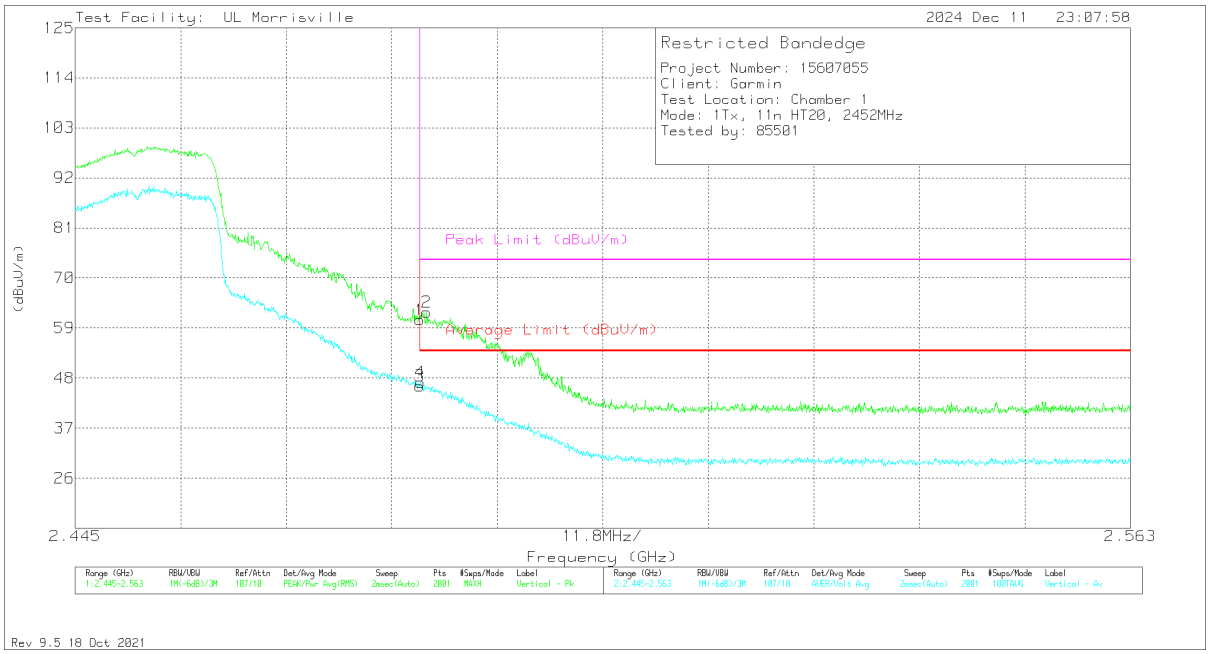


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	135143 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.48353	57.62	Pk	32.2	-23.7	66.12	-	-	74	-7.88	145	125	H
2	* ** 2.48365	57.4	Pk	32.2	-23.7	65.9	-	-	74	-8.1	145	125	H
3	* ** 2.48353	41.49	ADV	32.2	-23.7	49.99	54	-4.01	-	-	145	125	H
4	* ** 2.484	41.71	ADV	32.2	-23.8	50.11	54	-3.89	-	-	145	125	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
ADV - Linear Voltage Average

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

VERTICAL RESULT



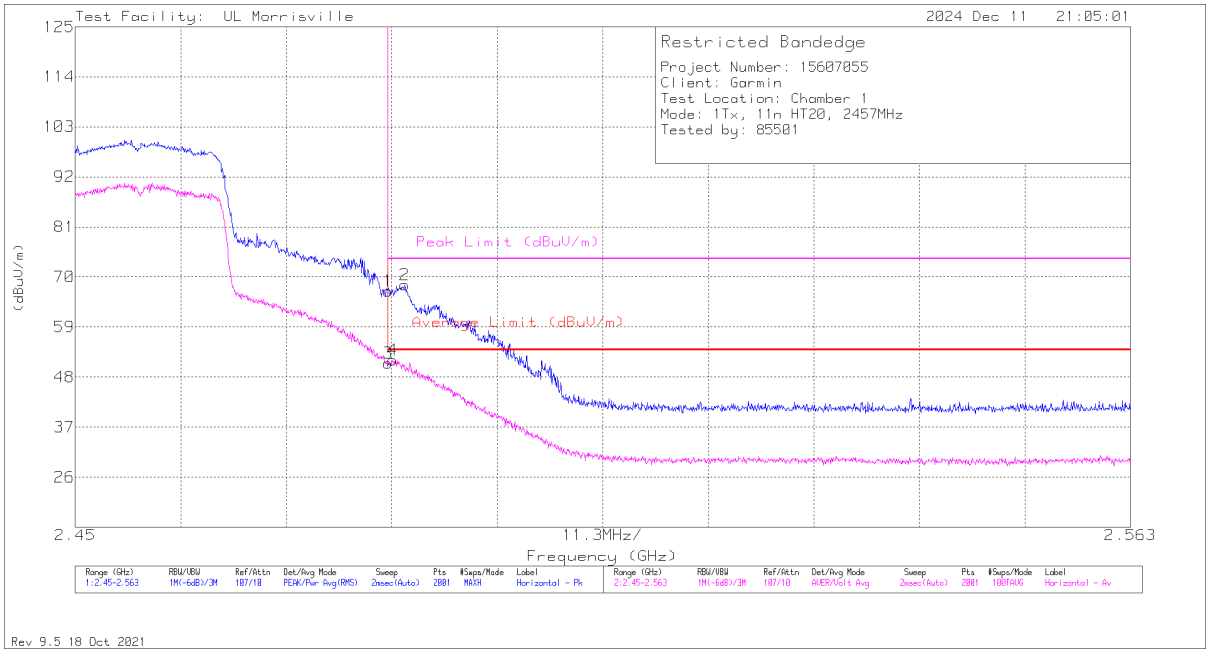
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	135143 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.48353	52.28	Pk	32.2	-23.7	60.78	-	-	74	-13.22	203	148	V
2	* ** 2.48429	54.1	Pk	32.2	-23.8	62.5	-	-	74	-11.5	203	148	V
3	* ** 2.48353	37.71	ADV	32.2	-23.7	46.21	54	-7.79	-	-	203	148	V
4	* ** 2.48359	38.58	ADV	32.2	-23.7	47.08	54	-6.92	-	-	203	148	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
ADV - Linear Voltage Average

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

BANDEDGE (HIGH CHANNEL, 2457MHz)

HORIZONTAL RESULT

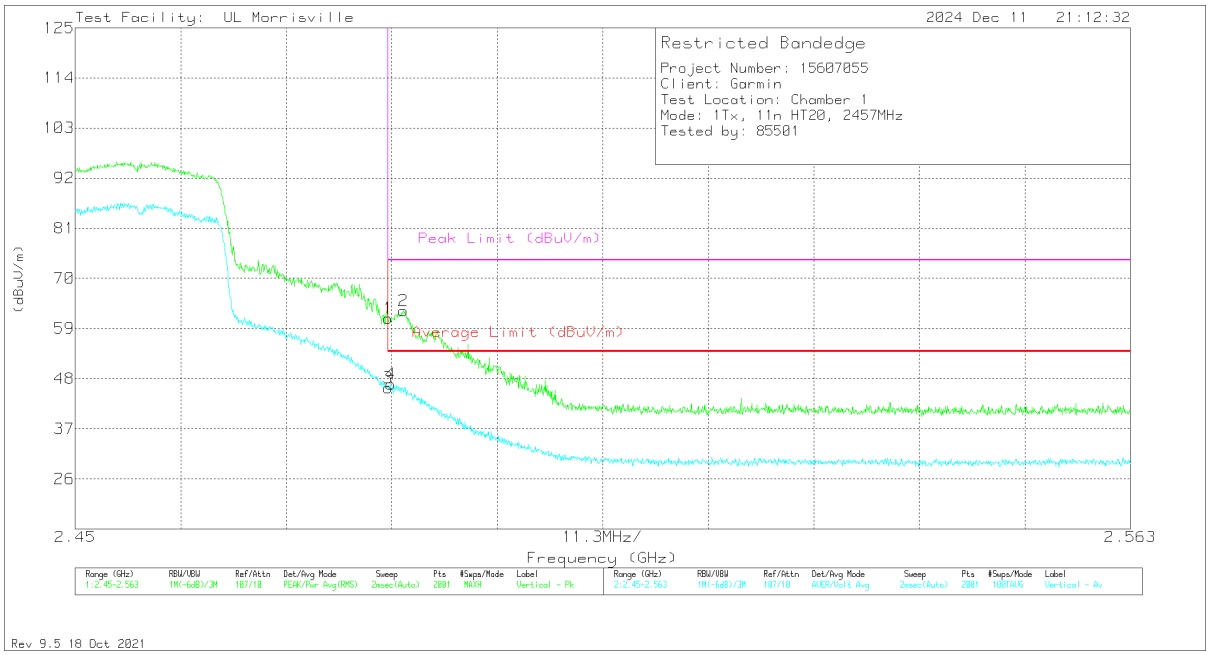


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	135143 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.4835	58.41	Pk	32.2	-23.7	66.91	-	-	74	-7.09	8	229	H
2	* ** 2.48531	59.86	Pk	32.2	-23.8	68.26	-	-	74	-5.74	8	229	H
3	* ** 2.4835	42.6	ADV	32.2	-23.7	51.1	54	-2.9	-	-	8	229	H
4	* ** 2.48401	43.33	ADV	32.2	-23.8	51.73	54	-2.27	-	-	8	229	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
ADV - Linear Voltage Average

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

VERTICAL RESULT



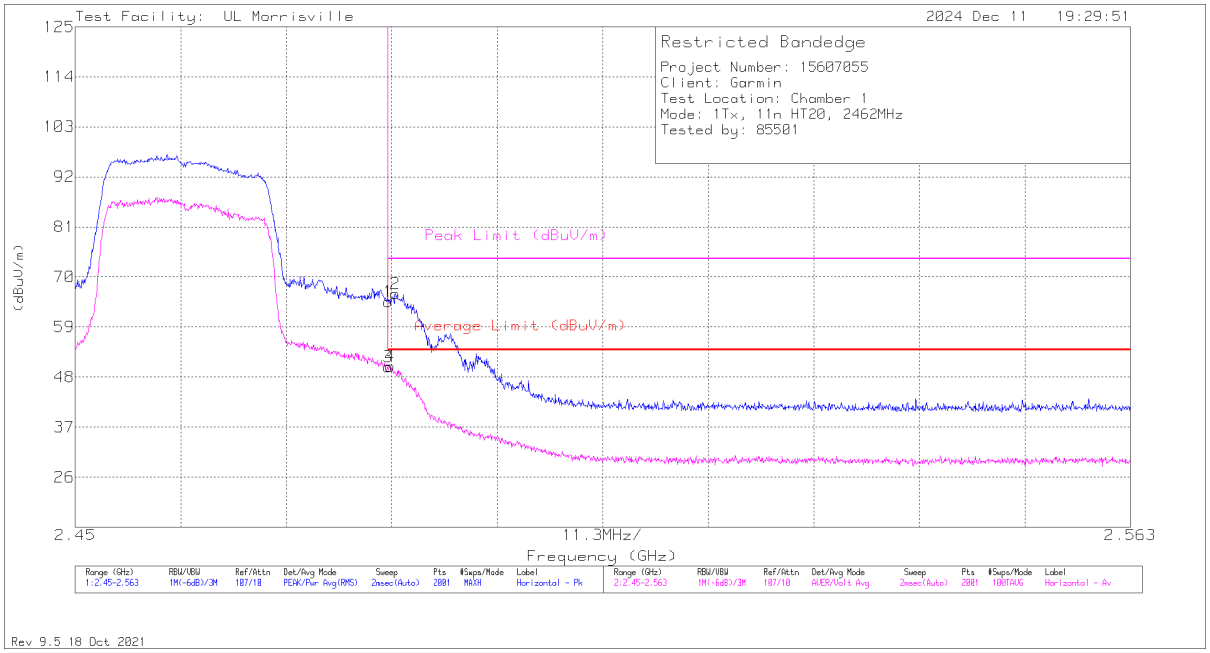
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	135143 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.4835	52.72	Pk	32.2	-23.7	61.22	-	-	74	-12.78	89	275	V
2	* ** 2.48514	54.46	Pk	32.2	-23.8	62.86	-	-	74	-11.14	89	275	V
3	* ** 2.4835	37.5	ADV	32.2	-23.7	46	54	-8	-	-	89	275	V
4	* ** 2.48379	38.28	ADV	32.2	-23.7	46.78	54	-7.22	-	-	89	275	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
ADV - Linear Voltage Average

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

BANDEDGE (HIGH CHANNEL, 2462MHz)

HORIZONTAL RESULT

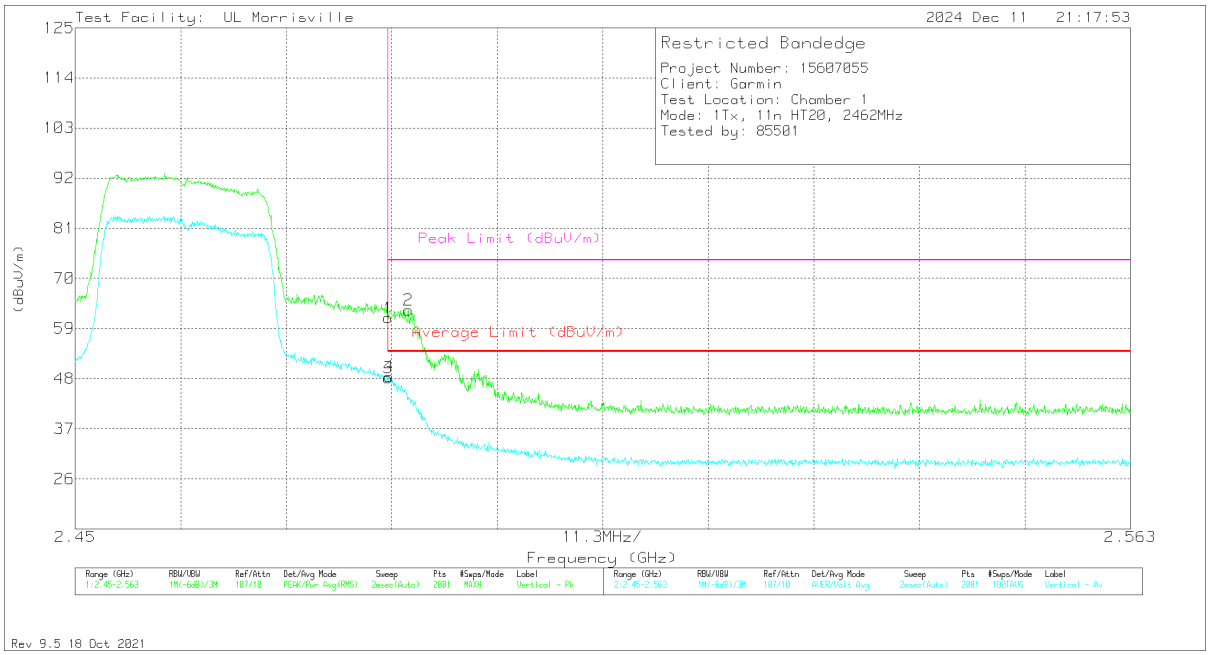


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	135143 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.4835	56.09	Pk	32.2	-23.7	64.59	-	-	74	-9.41	287	293	H
2	* ** 2.4843	57.9	Pk	32.2	-23.8	66.3	-	-	74	-7.7	287	293	H
3	* ** 2.4835	41.76	ADV	32.2	-23.7	50.26	54	-3.74	-	-	287	293	H
4	* ** 2.48373	41.9	ADV	32.2	-23.7	50.4	54	-3.6	-	-	287	293	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
ADV - Linear Voltage Average

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

VERTICAL RESULT



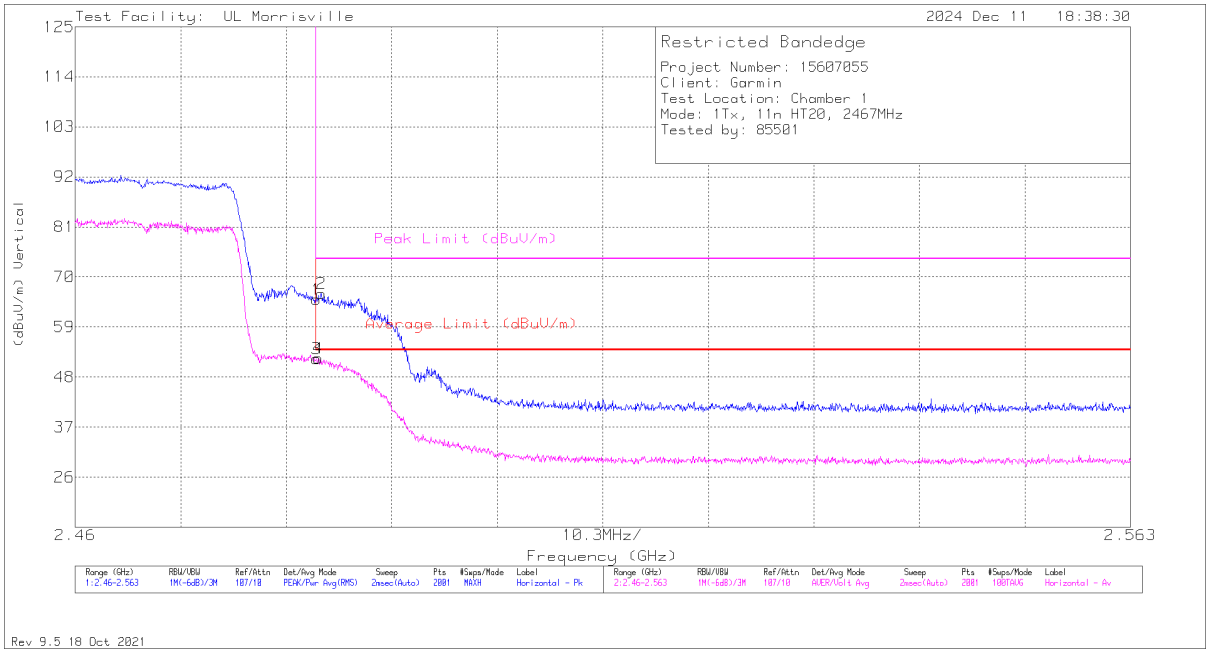
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	135143 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.4835	52.83	Pk	32.2	-23.7	61.33	-	-	74	-12.67	89	275	V
2	* ** 2.48571	54.8	Pk	32.2	-23.9	63.1	-	-	74	-10.9	89	275	V
3	* ** 2.4835	39.67	ADV	32.2	-23.7	48.17	54	-5.83	-	-	89	275	V
4	* ** 2.48362	39.99	ADV	32.2	-23.7	48.49	54	-5.51	-	-	89	275	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
ADV - Linear Voltage Average

This report shall not be reproduced except in full, without the written approval of UL LLC

BANDEDGE (HIGH CHANNEL, 2467MHz)

HORIZONTAL RESULT

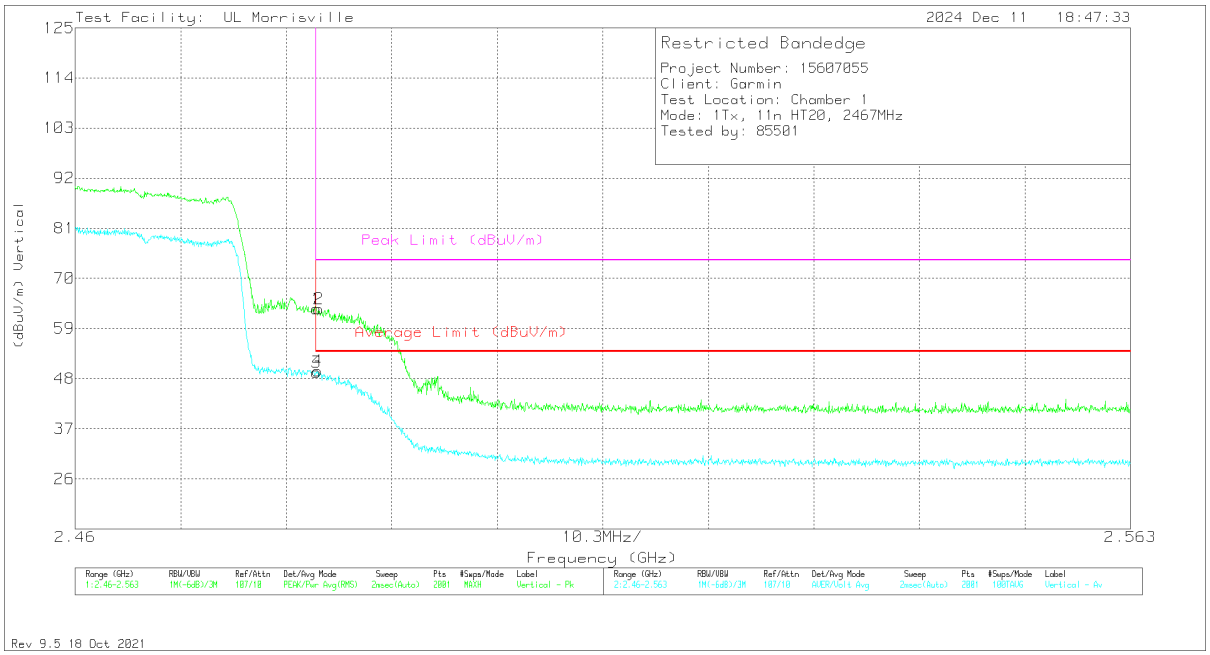


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	135143 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.48354	56.55	Pk	32.2	-23.7	65.05	-	-	74	-8.95	19	323	H
2	* ** 2.48405	57.98	Pk	32.2	-23.8	66.38	-	-	74	-7.62	19	323	H
3	* ** 2.48354	43.54	ADV	32.2	-23.7	52.04	54	-1.96	-	-	19	323	H
4	* ** 2.48374	43.61	ADV	32.2	-23.7	52.11	54	-1.89	-	-	19	323	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
ADV - Linear Voltage Average

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

VERTICAL RESULT



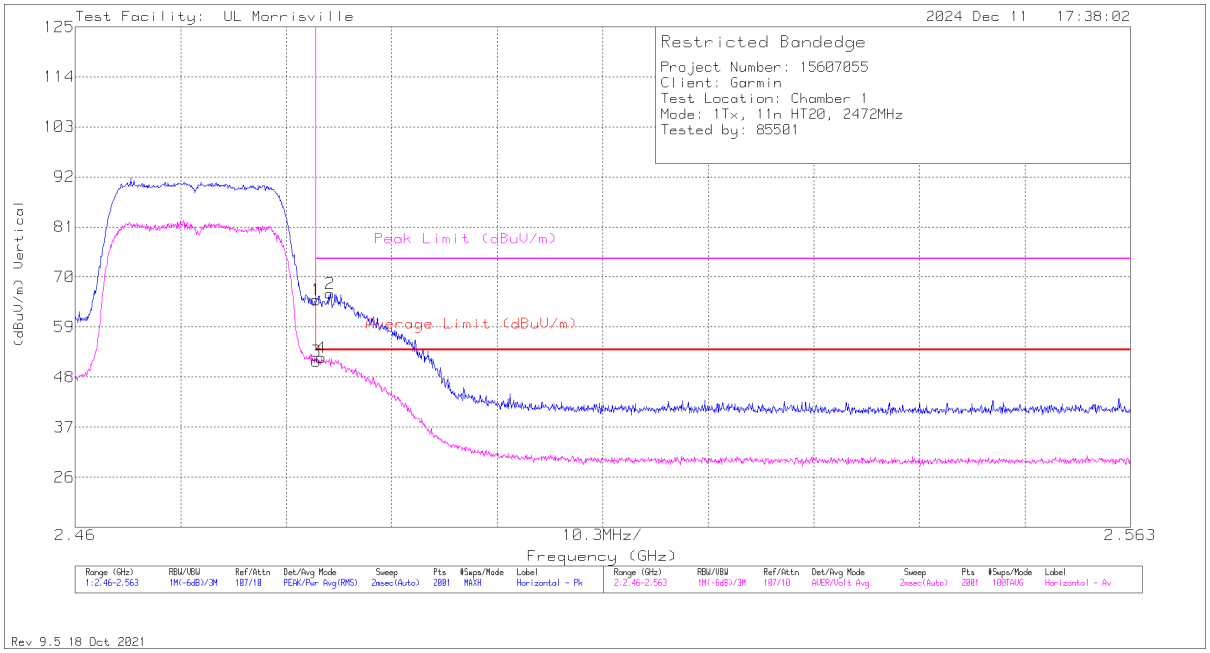
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	135143 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.48354	54.76	Pk	32.2	-23.7	63.26	-	-	74	-10.74	103	396	V
2	* ** 2.48379	54.77	Pk	32.2	-23.7	63.27	-	-	74	-10.73	103	396	V
3	* ** 2.48354	40.97	ADV	32.2	-23.7	49.47	54	-4.53	-	-	103	396	V
4	* ** 2.48364	41.17	ADV	32.2	-23.7	49.67	54	-4.33	-	-	103	396	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
ADV - Linear Voltage Average

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

BANDEDGE (HIGH CHANNEL, 2472MHz)

HORIZONTAL RESULT

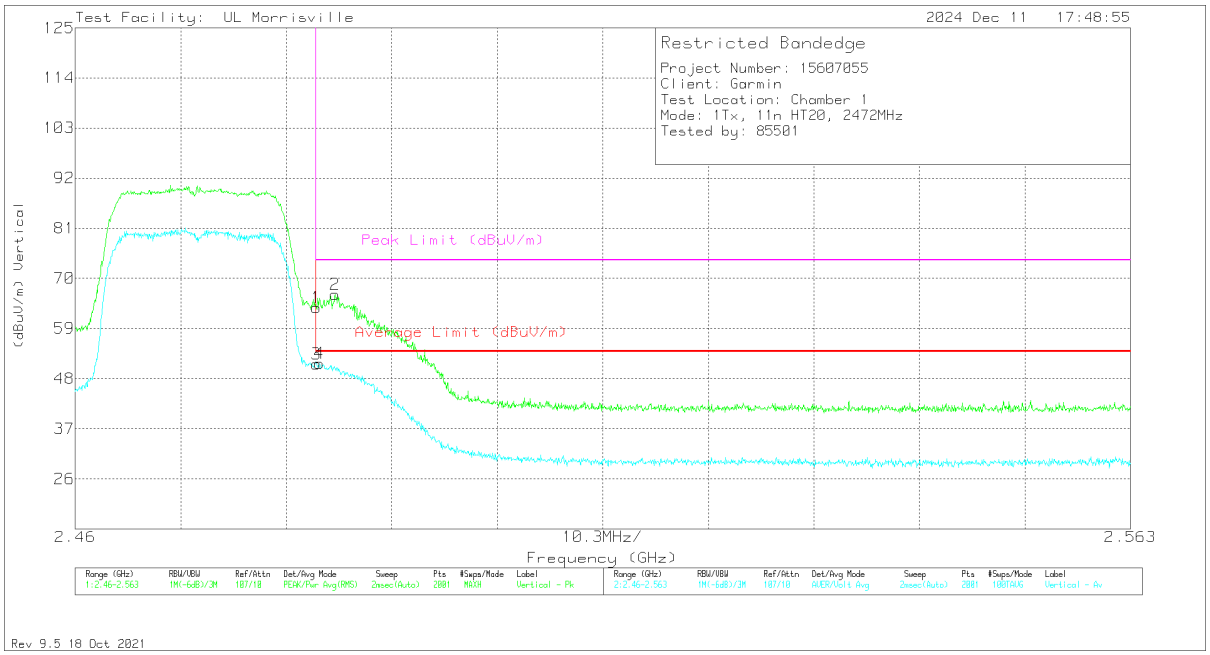


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	135143 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.48354	56.46	Pk	32.2	-23.7	64.96	-	-	74	-9.04	290	292	H
2	* ** 2.48487	58.01	Pk	32.2	-23.8	66.41	-	-	74	-7.59	290	292	H
3	* ** 2.48354	42.95	ADV	32.2	-23.7	51.45	54	-2.55	-	-	290	292	H
4	* ** 2.48405	43.84	ADV	32.2	-23.8	52.24	54	-1.76	-	-	290	292	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
ADV - Linear Voltage Average

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

VERTICAL RESULT



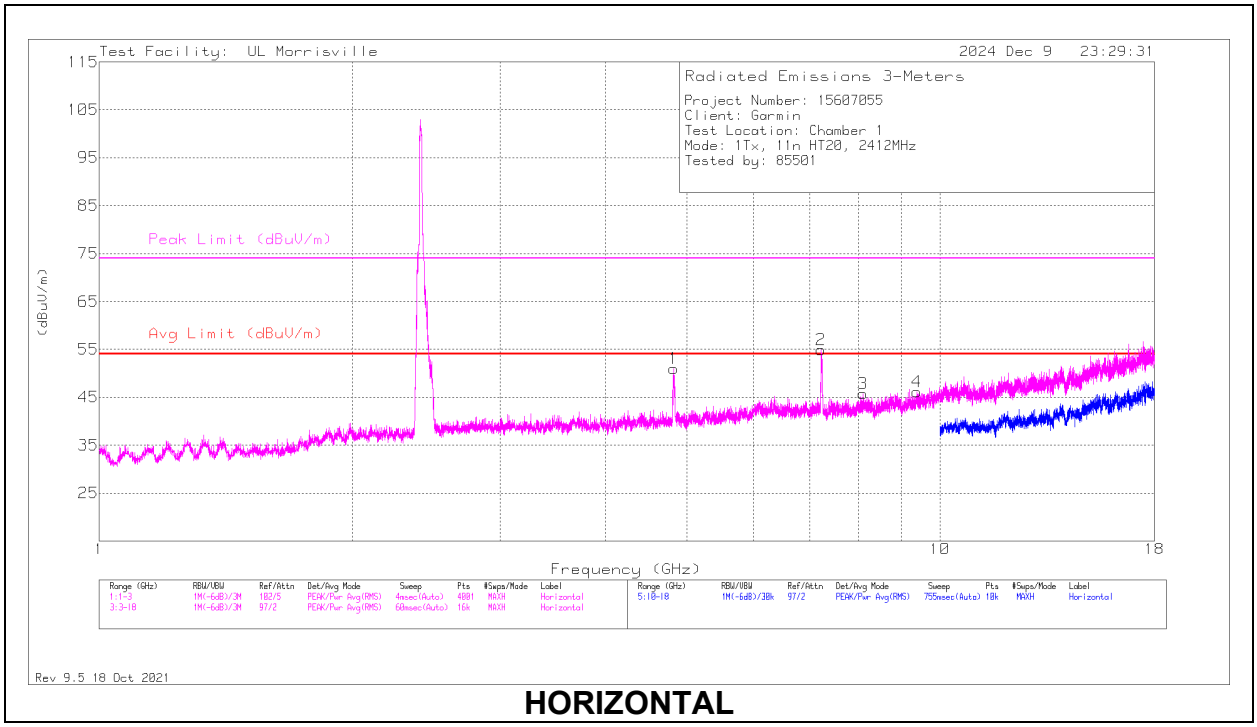
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	135143 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.48354	55.13	Pk	32.2	-23.7	63.63	-	-	74	-10.37	352	263	V
2	* ** 2.48539	58.12	Pk	32.2	-23.8	66.52	-	-	74	-7.48	352	263	V
3	* ** 2.48354	42.7	ADV	32.2	-23.7	51.2	54	-2.8	-	-	352	263	V
4	* ** 2.48384	42.81	ADV	32.2	-23.7	51.31	54	-2.69	-	-	352	263	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
ADV - Linear Voltage Average

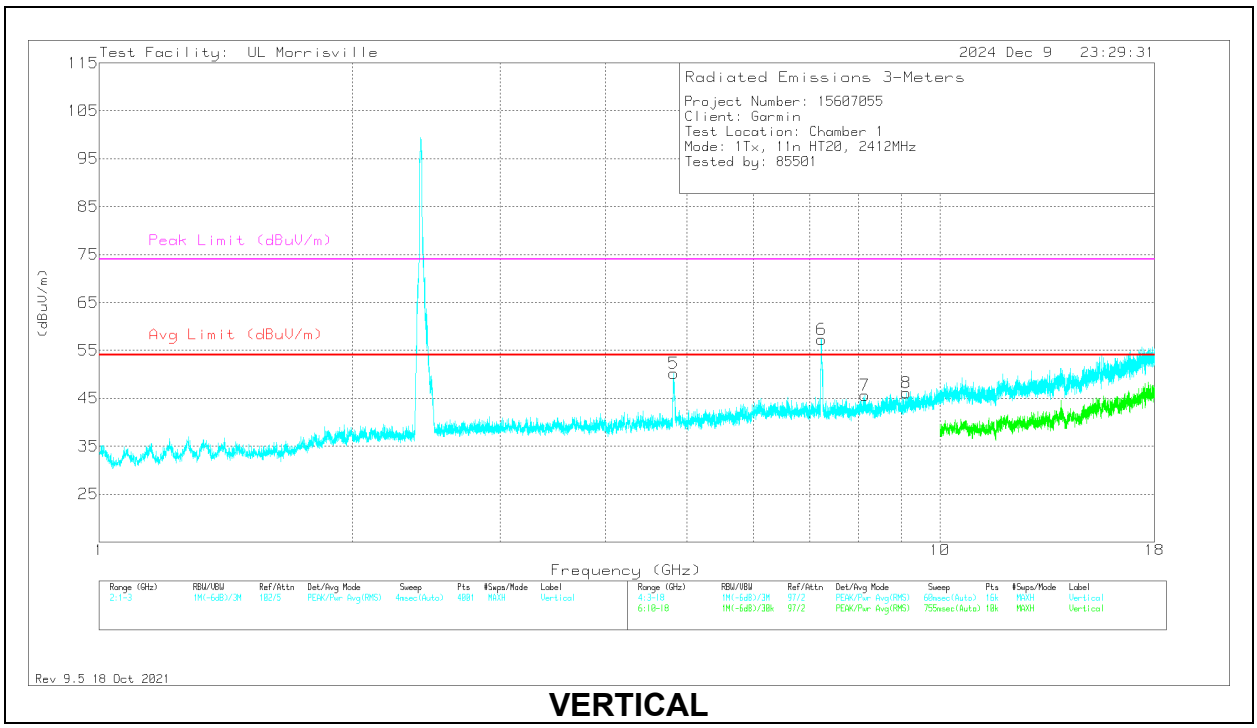
UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL



HORIZONTAL



VERTICAL

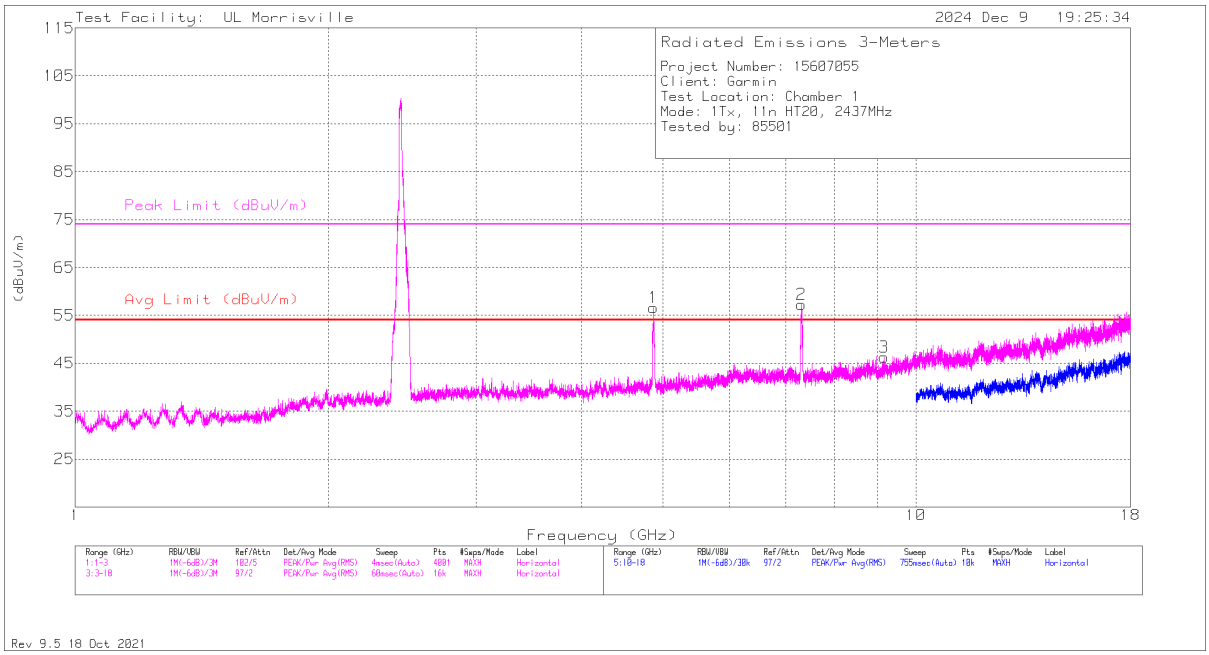
This report shall not be reproduced except in full, without the written approval of UL LLC

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	135143 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 4.82157	67.97	PK2	33.9	-45.5	56.37	-	-	74	-17.63	186	110	H
	* ** 4.82254	53.64	ADV	33.9	-45.4	42.14	54	-11.86	-	-	186	110	H
3	* ** 8.10656	50.74	Pk	35.9	-40.9	45.74	54	-8.26	74	-28.26	0-360	199	H
4	* ** 9.39281	49.9	Pk	36.3	-40.1	46.1	54	-7.9	74	-27.9	0-360	199	H
5	* ** 4.82826	64.33	PK2	33.9	-45.2	53.03	-	-	74	-20.97	203	104	V
	* ** 4.82876	51.24	ADV	33.9	-45.2	39.94	54	-14.06	-	-	203	104	V
7	* ** 8.13938	50.67	Pk	35.9	-40.9	45.67	54	-8.33	74	-28.33	0-360	101	V
8	* ** 9.11906	50.43	Pk	35.9	-40.2	46.13	54	-7.87	74	-27.87	0-360	101	V
2	7.22625	61.55	Pk	35.4	-42	54.95	-	-	-	-	0-360	101	H
6	7.23	64.26	Pk	35.4	-42.4	57.26	-	-	-	-	0-360	200	V

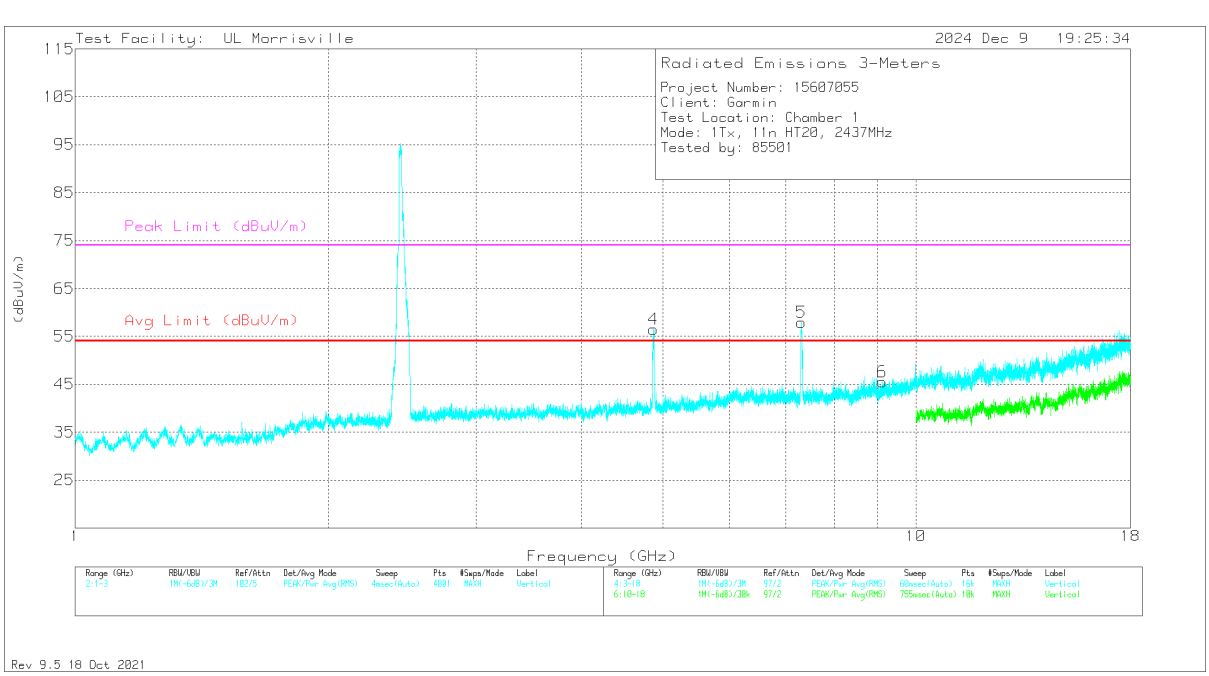
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
PK2 - Maximum Peak
ADV - Linear Voltage Average

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

MID CHANNEL



HORIZONTAL



VERTICAL

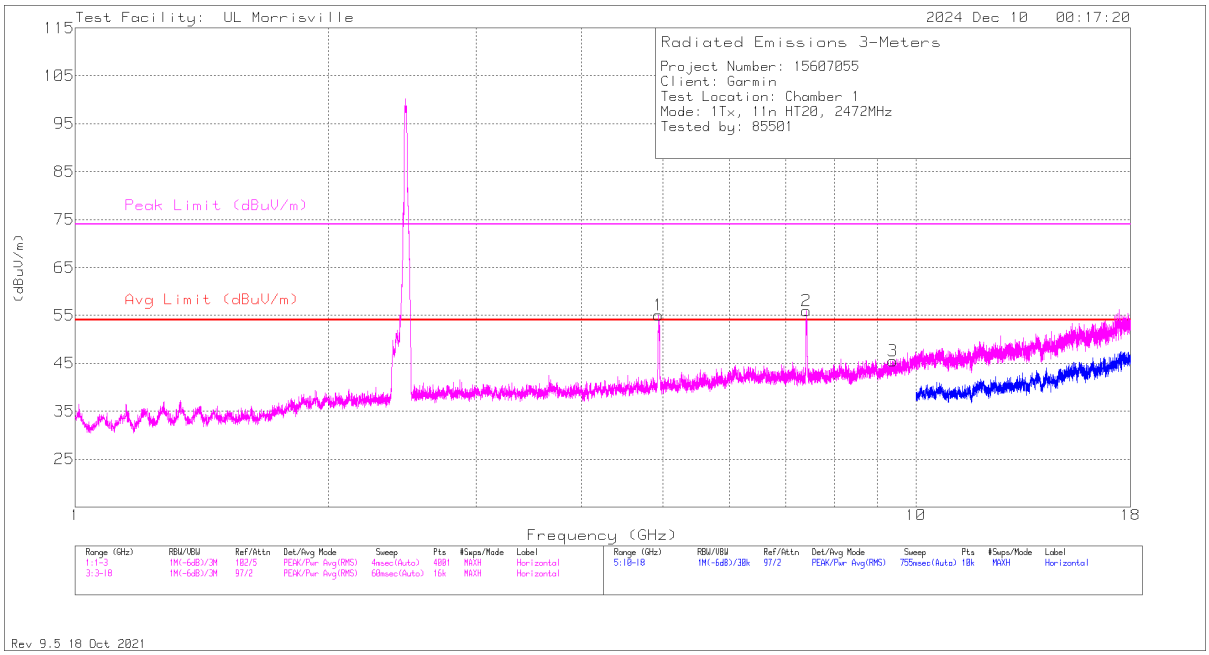
This report shall not be reproduced except in full, without the written approval of UL LLC

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	135143 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 4.87175	70.48	PK2	34	-44.8	59.68	-	-	74	-14.32	176	117	H
	* ** 4.87272	56.71	ADV	34	-44.8	45.91	54	-8.09	-	-	176	117	H
2	* ** 7.30955	67.59	PK2	35.4	-41.7	61.29	-	-	74	-12.71	298	111	H
	* ** 7.30976	54.28	ADV	35.4	-41.7	47.98	54	-6.02	-	-	298	111	H
3	* ** 9.16594	50.38	Pk	36	-40.1	46.28	54	-7.72	74	-27.72	0-360	101	H
4	* ** 4.87156	72.09	PK2	34	-44.8	61.29	-	-	74	-12.71	113	132	V
	* ** 4.87136	57.75	ADV	34	-44.9	46.85	54	-7.15	-	-	113	132	V
5	* ** 7.30952	67.78	PK2	35.4	-41.7	61.48	-	-	74	-12.52	189	173	V
	* ** 7.30768	55.03	ADV	35.4	-41.7	48.73	54	-5.27	-	-	189	173	V
6	* ** 9.12	49.88	Pk	35.9	-40.3	45.48	54	-8.52	74	-28.52	0-360	200	V

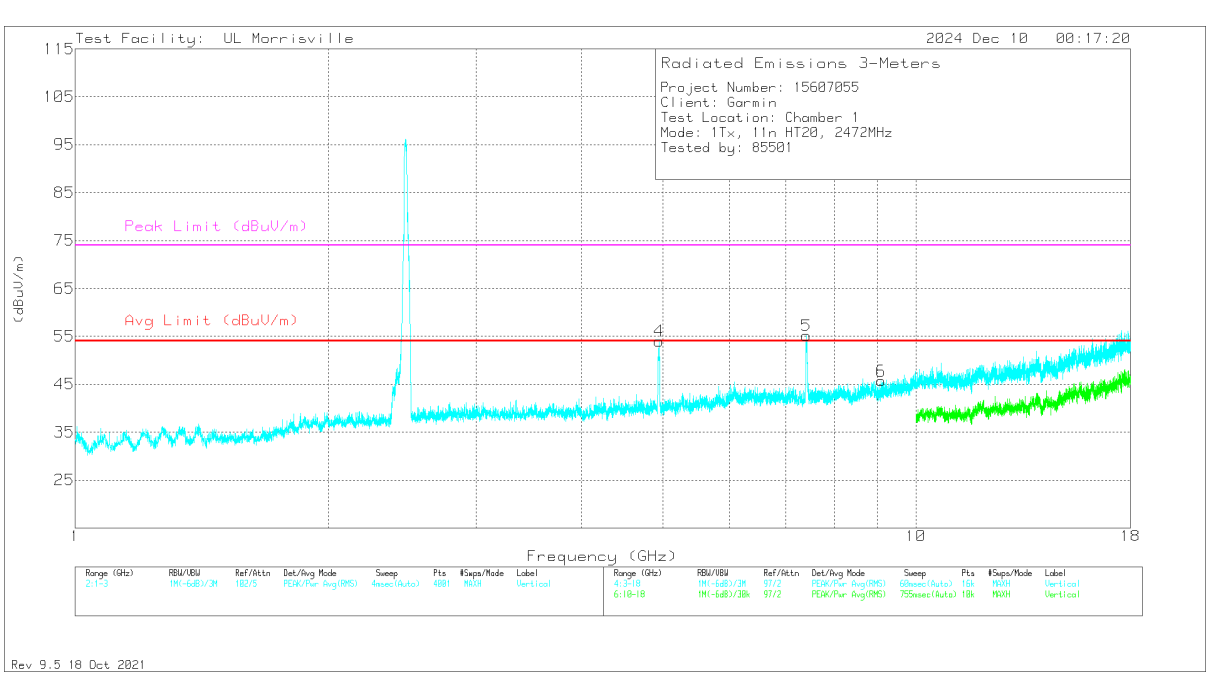
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
PK2 - Maximum Peak
ADV - Linear Voltage Average

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

HIGH CHANNEL



HORIZONTAL



VERTICAL

This report shall not be reproduced except in full, without the written approval of UL LLC

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	135143 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 4.94166	69.15	PK2	34.1	-44.3	58.95	-	-	74	-15.05	121	211	H
	* ** 4.94405	55.68	ADV	34.1	-44.4	45.38	54	-8.62	-	-	121	211	H
2	* ** 7.41146	64.88	PK2	35.4	-41.3	58.98	-	-	74	-15.02	216	301	H
	* ** 7.41171	51.48	ADV	35.4	-41.3	45.58	54	-8.42	-	-	216	301	H
3	* ** 9.39281	49.34	Pk	36.3	-40.1	45.54	54	-8.46	74	-28.46	0-360	200	H
4	* ** 4.94744	68.05	PK2	34.2	-44.5	57.75	-	-	74	-16.25	85	323	V
	* ** 4.94717	54.87	ADV	34.2	-44.5	44.57	54	-9.43	-	-	85	323	V
5	* ** 7.40266	65.86	PK2	35.4	-41.7	59.56	-	-	74	-14.44	318	344	V
	* ** 7.40469	51.52	ADV	35.4	-41.6	45.32	54	-8.68	-	-	318	344	V
6	* ** 9.09656	49.99	Pk	35.9	-40.2	45.69	54	-8.31	74	-28.31	0-360	101	V

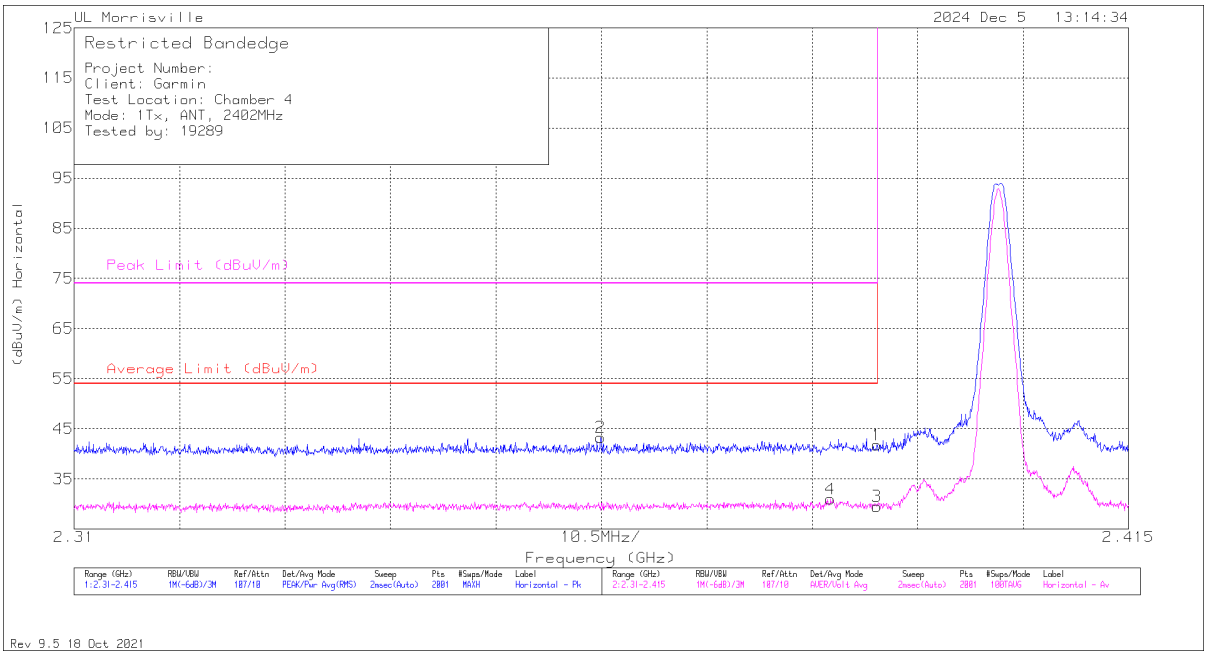
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
PK2 - Maximum Peak
ADV - Linear Voltage Average

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

10.1.4. TX ABOVE 1 GHz ANT/ANT+ MODE IN THE 2.4 GHz BAND

BANDEDGE (LOW CHANNEL, 2402MHz)

HORIZONTAL RESULT

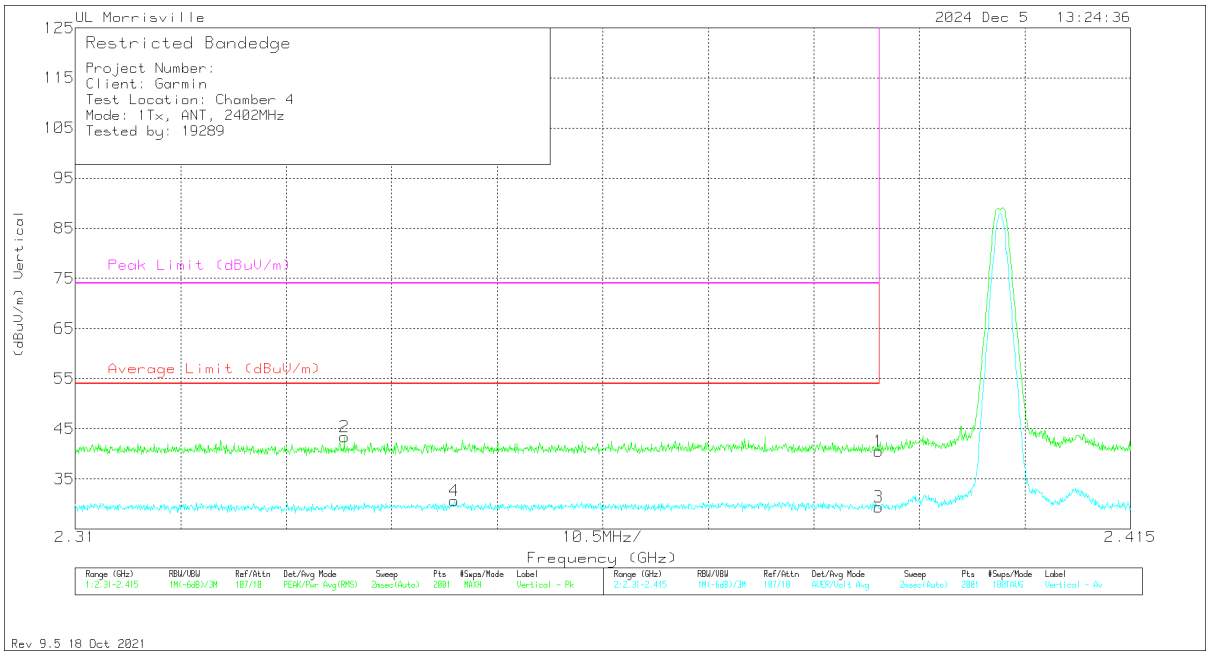


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	89509 ACF (dB/m)	Gain/Loss (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.38996	32.97	Pk	32	-23.2	0	41.77	-	-	74	-32.23	187	120	H
2	* ** 2.36245	34.32	Pk	31.9	-23	0	43.22	-	-	74	-30.78	187	120	H
3	* ** 2.38996	20.75	ADV	32	-23.2	-17.72	11.83	54	-42.17	-	-	187	120	H
4	* ** 2.38534	22.15	ADV	32	-23.2	-17.72	13.23	54	-40.77	-	-	187	120	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
ADV - Linear Voltage Average

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

VERTICAL RESULT



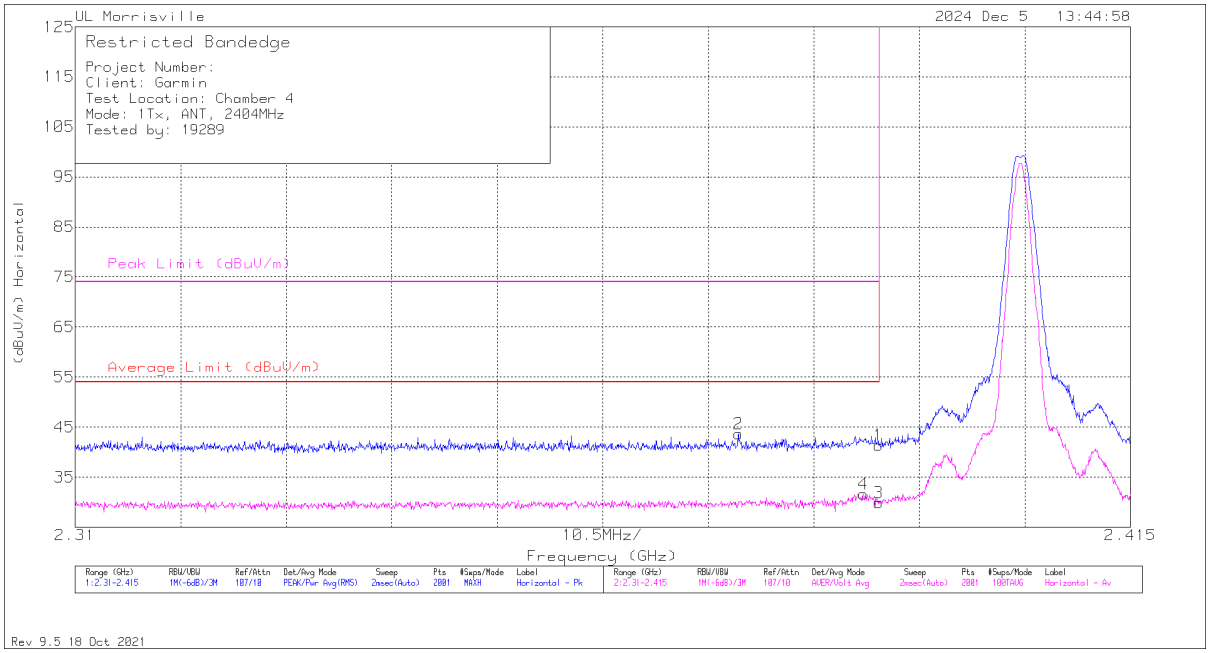
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	89509 ACF (dB/m)	Gain/Loss (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.38996	31.75	Pk	32	-23.2	0	40.55	-	-	74	-33.45	207	118	V
2	* ** 2.33678	34.68	Pk	31.9	-23.2	0	43.38	-	-	74	-30.62	207	118	V
3	* ** 2.38996	20.61	ADV	32	-23.2	-17.72	11.69	54	-42.31	-	-	207	118	V
4	* ** 2.3477	21.72	ADV	31.8	-22.9	-17.72	12.9	54	-41.1	-	-	207	118	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
ADV - Linear Voltage Average

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

BANDEDGE (LOW CHANNEL, 2404MHz)

HORIZONTAL RESULT

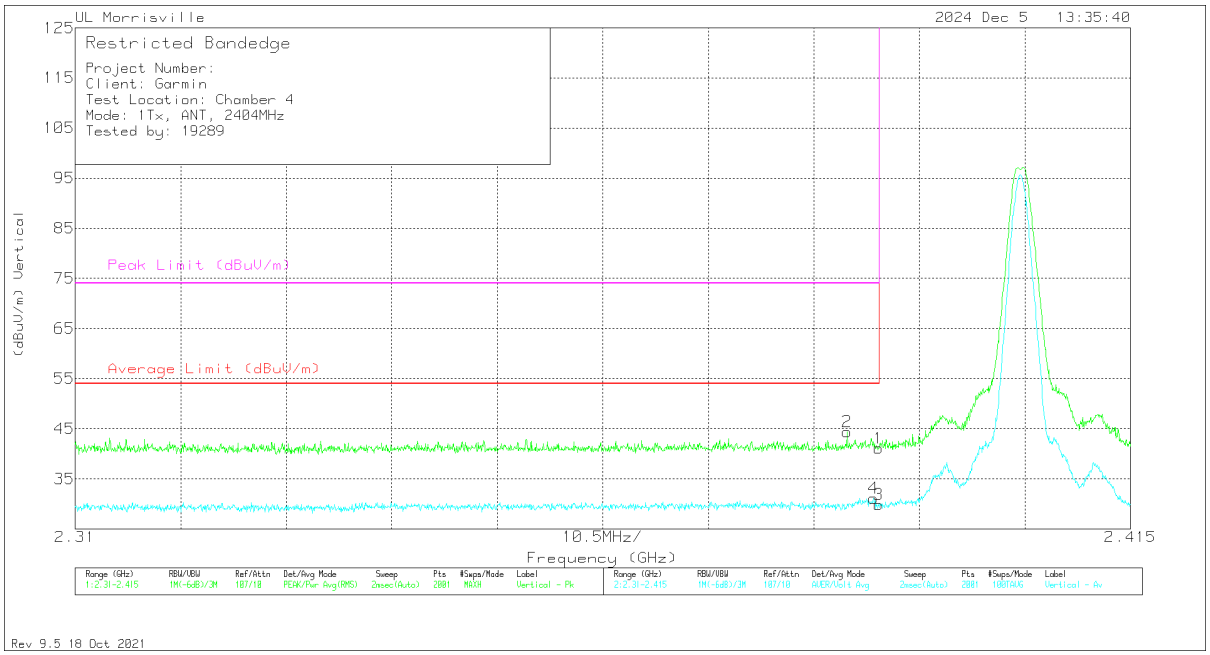


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	89509 ACF (dB/m)	Gain/Loss (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.38996	32.55	Pk	32	-23.2	0	41.35	-	-	74	-32.65	198	164	H
2	* ** 2.37599	34.52	Pk	32	-22.9	0	43.62	-	-	74	-30.38	198	164	H
3	* ** 2.38996	21.04	ADV	32	-23.2	-17.72	12.12	54	-41.88	-	-	198	164	H
4	* ** 2.38844	22.81	ADV	32	-23.2	-17.72	13.89	54	-40.11	-	-	198	164	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
ADV - Linear Voltage Average

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

VERTICAL RESULT



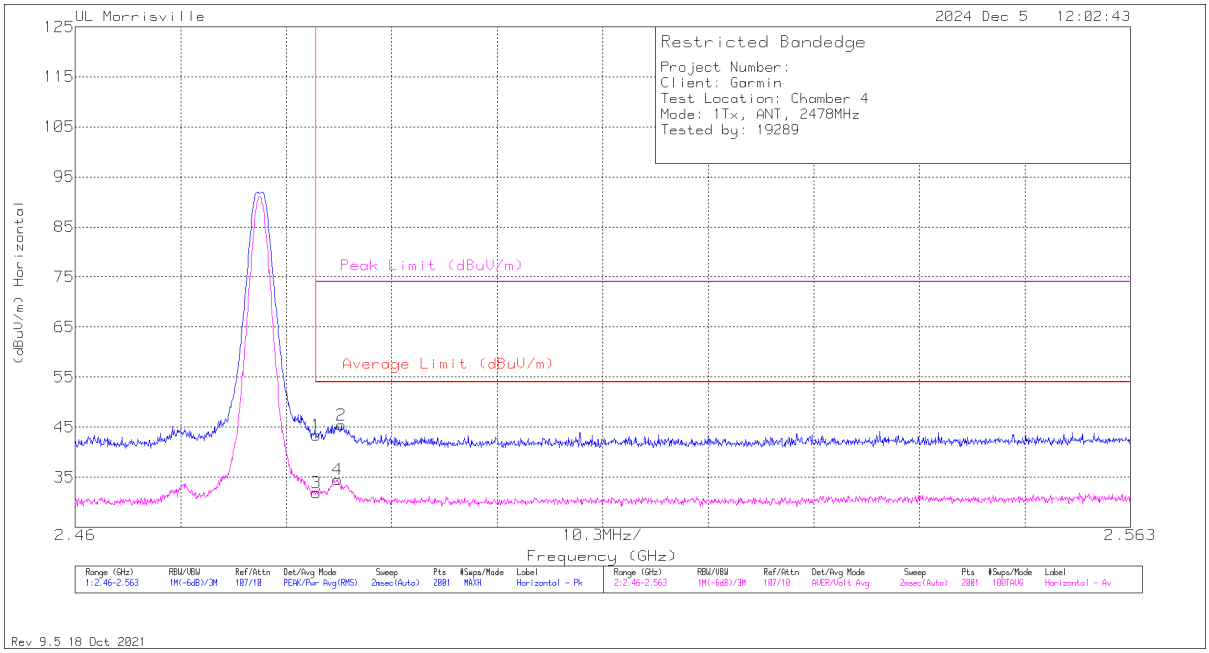
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	89509 ACF (dB/m)	Gain/Loss (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.38996	32.29	Pk	32	-23.2	0	41.09	-	-	74	-32.91	28	104	V
2	* ** 2.38681	35.7	Pk	32	-23.3	0	44.4	-	-	74	-29.6	28	104	V
3	* ** 2.38996	21.07	ADV	32	-23.2	-17.72	12.15	54	-41.85	-	-	28	104	V
4	* ** 2.38943	22.33	ADV	32	-23.2	-17.72	13.41	54	-40.59	-	-	28	104	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
ADV - Linear Voltage Average

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

BANDEDGE (HIGH CHANNEL, 2478MHz)

HORIZONTAL RESULT

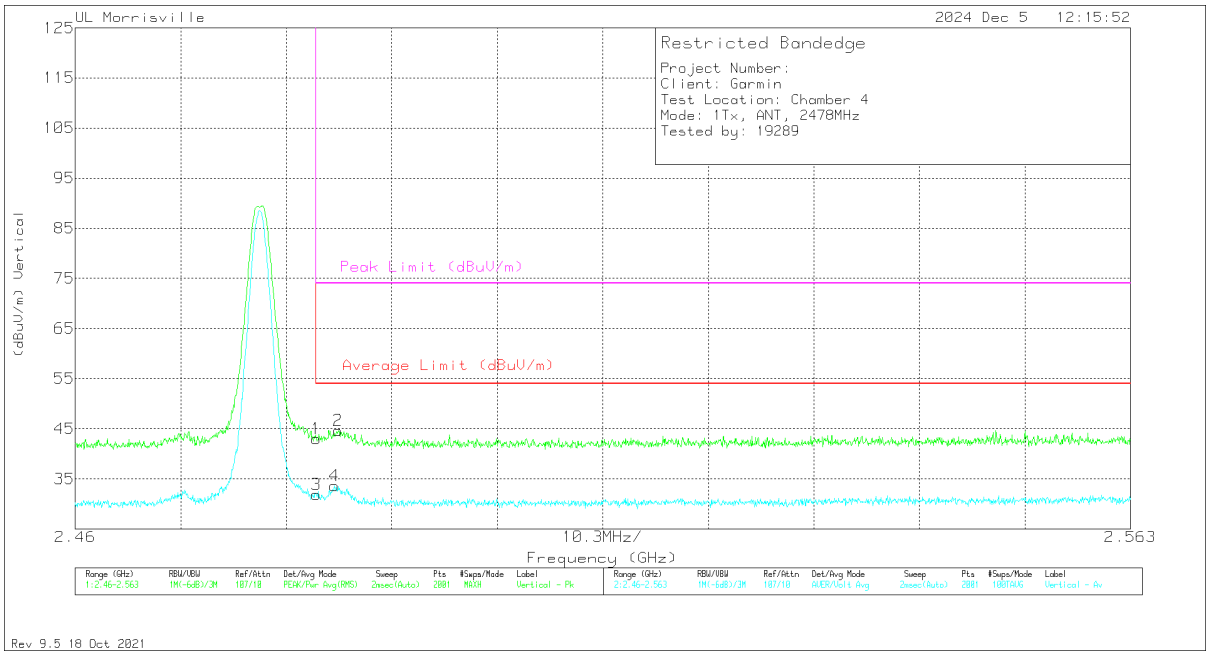


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	89509 ACF (dB/m)	Gain/Loss (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.48354	33.91	Pk	32.3	-22.8	0	43.41	-	-	74	-30.59	237	257	H
2	* ** 2.48596	35.95	Pk	32.3	-22.8	0	45.45	-	-	74	-28.55	237	257	H
3	* ** 2.48354	22.36	ADV	32.3	-22.8	-17.72	14.14	54	-39.86	-	-	237	257	H
4	* ** 2.4856	25.05	ADV	32.3	-22.8	-17.72	16.83	54	-37.17	-	-	237	257	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
ADV - Linear Voltage Average

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

VERTICAL RESULT



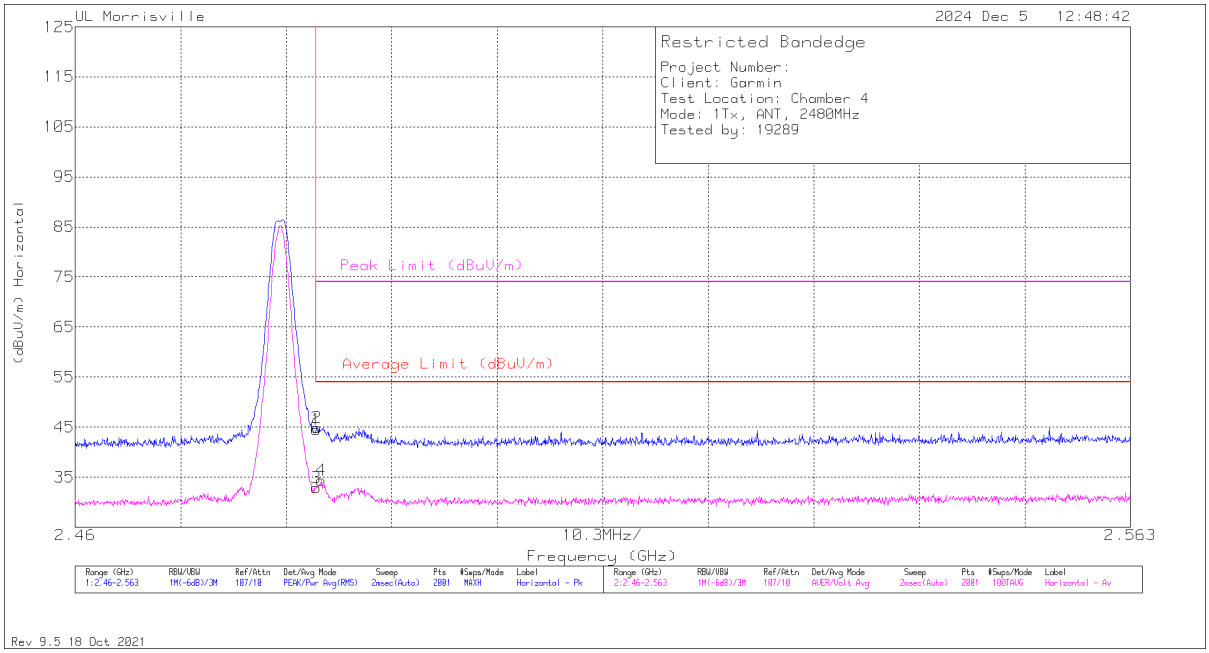
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	89509 ACF (dB/m)	Gain/Loss (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.48354	33.54	Pk	32.3	-22.8	0	43.04	-	-	74	-30.96	61	246	V
2	* ** 2.48565	35.18	Pk	32.3	-22.8	0	44.68	-	-	74	-29.32	61	246	V
3	* ** 2.48354	22.35	ADV	32.3	-22.8	-17.72	14.13	54	-39.87	-	-	61	246	V
4	* ** 2.48529	24.13	ADV	32.3	-22.8	-17.72	15.91	54	-38.09	-	-	61	246	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
ADV - Linear Voltage Average

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

BANDEDGE (HIGH CHANNEL, 2480MHz)

HORIZONTAL RESULT

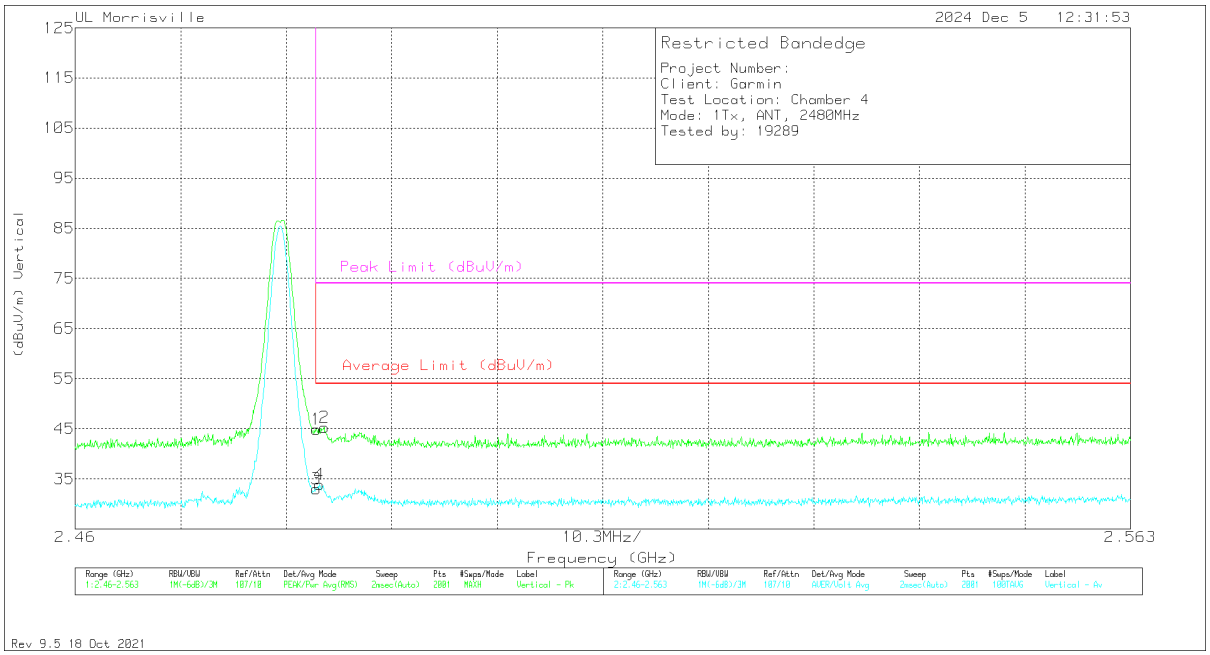


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	89509 ACF (dB/m)	Gain/Loss (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.48354	34.99	Pk	32.3	-22.8	0	44.49	-	-	74	-29.51	50	139	H
2	* ** 2.48359	35.4	Pk	32.3	-22.8	0	44.9	-	-	74	-29.1	50	139	H
3	* ** 2.48354	23.35	ADV	32.3	-22.8	-17.72	15.13	54	-38.87	-	-	50	139	H
4	* ** 2.484	24.89	ADV	32.3	-22.8	-17.72	16.67	54	-37.33	-	-	50	139	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
ADV - Linear Voltage Average

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

VERTICAL RESULT



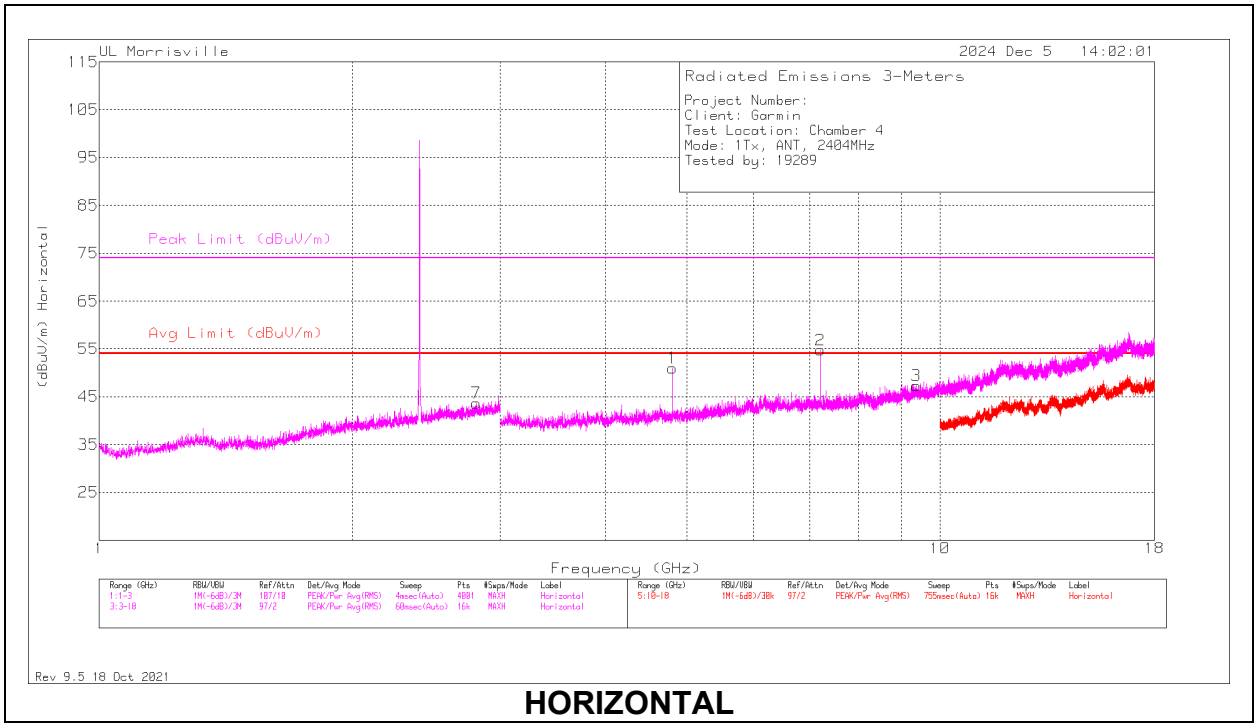
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	89509 ACF (dB/m)	Gain/Loss (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.48354	35.4	Pk	32.3	-22.8	0	44.9	-	-	74	-29.1	54	238	V
2	* ** 2.48431	35.77	Pk	32.3	-22.8	0	45.27	-	-	74	-28.73	54	238	V
3	* ** 2.48354	23.54	ADV	32.3	-22.8	-17.72	15.32	54	-38.68	-	-	54	238	V
4	* ** 2.48384	24.41	ADV	32.3	-22.8	-17.72	16.19	54	-37.81	-	-	54	238	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
ADV - Linear Voltage Average

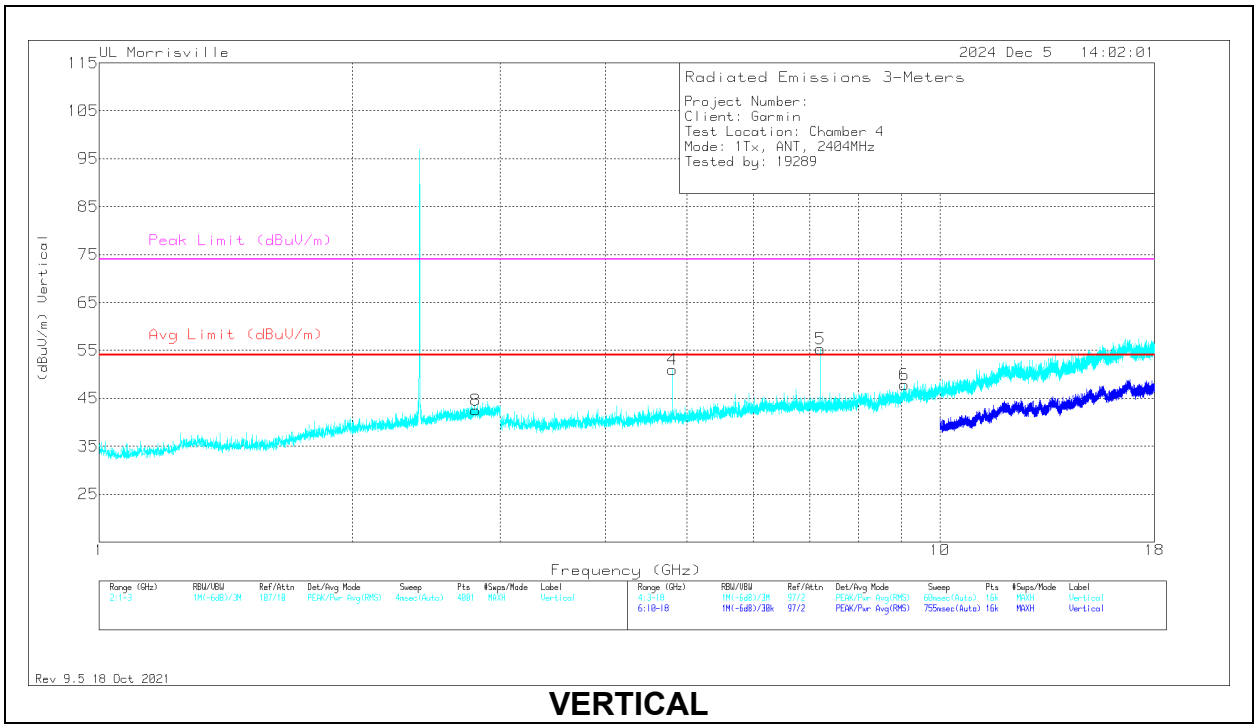
This report shall not be reproduced except in full, without the written approval of UL LLC

HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL



HORIZONTAL



VERTICAL

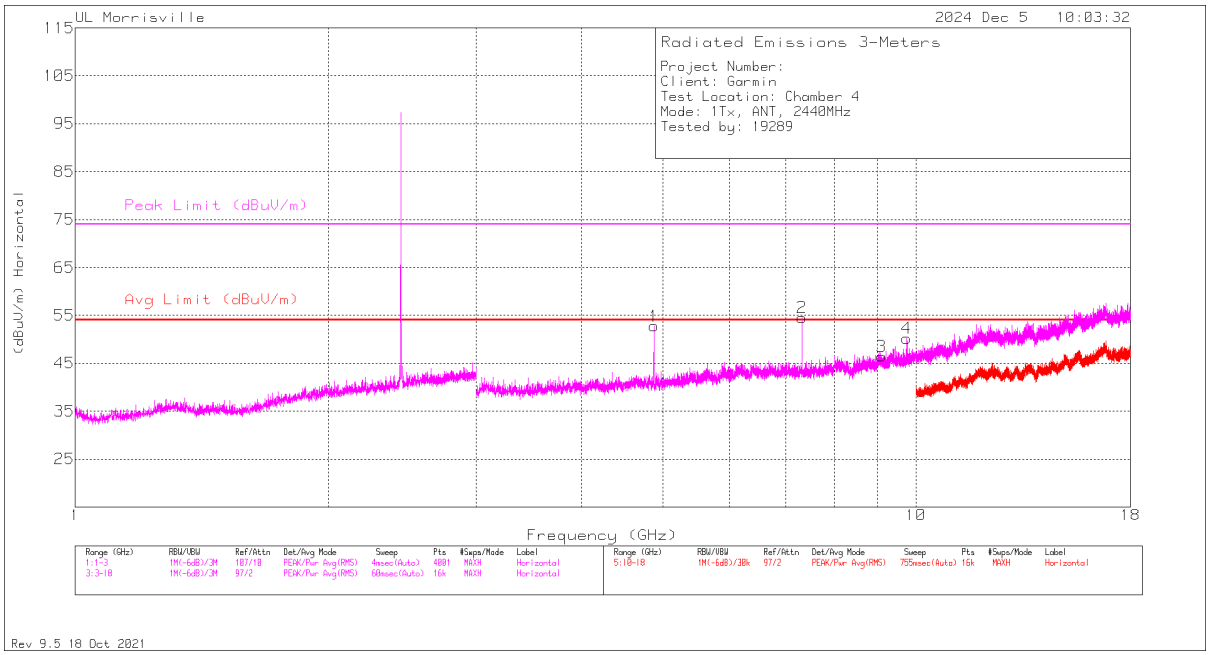
This report shall not be reproduced except in full, without the written approval of UL LLC

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	89509 ACF (dB/m)	Gain/Loss (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
7	* ** 2.808	33.24	Pk	32.5	-22.1	0	43.64	54	-10.36	74	-30.36	0-360	100	H
8	* ** 2.8065	32.14	Pk	32.5	-22.1	0	42.54	54	-11.46	74	-31.46	0-360	200	V
1	* ** 4.80751	49.79	PK2	34.1	-31.3	0	52.59	-	-	74	-21.41	254	109	H
	* ** 4.8075	43.28	ADV	34.1	-31.3	-17.72	28.36	54	-25.64	-	-	254	109	H
3	* ** 9.375	35.5	Pk	36.6	-24.8	0	47.3	54	-6.7	74	-26.7	0-360	100	H
4	* ** 4.8075	49.07	PK2	34.1	-31.3	0	51.87	-	-	74	-22.13	207	130	V
	* ** 4.80753	42.37	ADV	34.1	-31.3	-17.72	27.45	54	-26.55	-	-	207	130	V
6	* ** 9.07125	36.1	Pk	36.2	-24.5	0	47.8	54	-6.2	74	-26.2	0-360	200	V
2	7.21125	47.03	Pk	35.6	-27.9	0	54.73	-	-	-	-	0-360	100	H
5	7.21313	47.57	Pk	35.6	-27.9	0	55.27	-	-	-	-	0-360	200	V

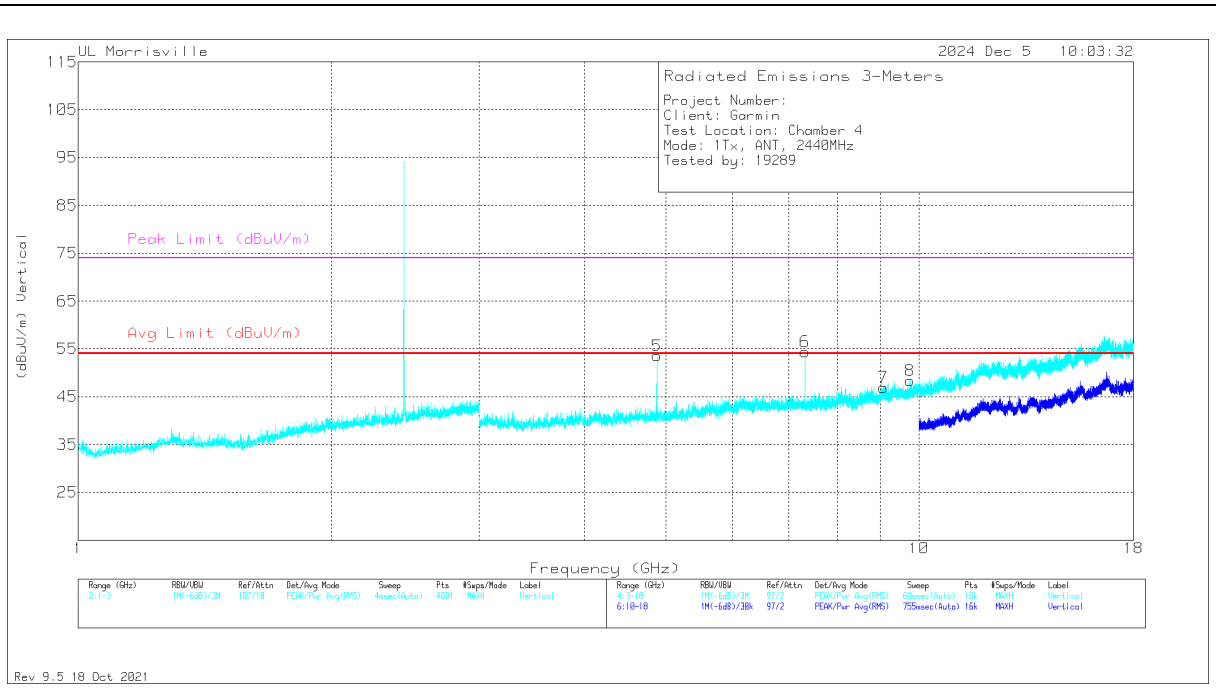
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
PK2 - Maximum Peak
ADV - Linear Voltage Average

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

MID CHANNEL



HORIZONTAL



VERTICAL

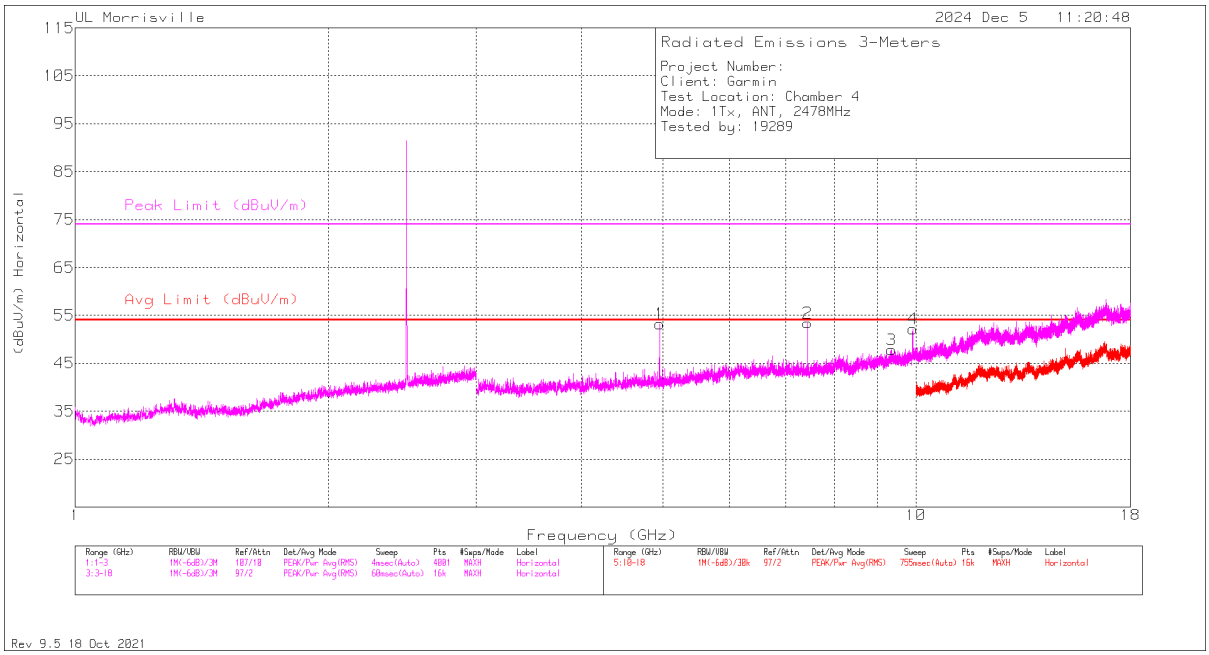
This report shall not be reproduced except in full, without the written approval of UL LLC

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	89509 ACF (dB/m)	Gain/Loss (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 4.88043	52.23	PK2	34	-31	0	55.23	-	-	74	-18.77	243	113	H
	* ** 4.88005	47.46	ADV	34	-31	-17.72	32.74	54	-21.26	-	-	243	113	H
2	* ** 7.31934	48.1	PK2	35.6	-27.7	0	56	-	-	74	-18	176	107	H
	* ** 7.31957	41.8	ADV	35.6	-27.7	-17.72	31.98	54	-22.02	-	-	176	107	H
3	* ** 9.10031	34.77	Pk	36.3	-24.6	0	46.47	54	-7.53	74	-27.53	0-360	100	H
5	* ** 4.88031	51.94	PK2	34	-31	0	54.94	-	-	74	-19.06	196	112	V
	* ** 4.87998	47.02	ADV	34	-31	-17.72	32.3	54	-21.7	-	-	196	112	V
6	* ** 7.32073	49.44	PK2	35.6	-27.7	0	57.34	-	-	74	-16.66	201	274	V
	* ** 7.32057	43.61	ADV	35.6	-27.7	-17.72	33.79	54	-20.21	-	-	201	274	V
7	* ** 9.0675	35.22	Pk	36.2	-24.5	0	46.92	54	-7.08	74	-27.08	0-360	200	V
4	9.75938	38.53	Pk	36.9	-25.2	0	50.23	-	-	-	-	0-360	100	H
8	9.76031	36.66	Pk	36.9	-25.2	0	48.36	-	-	-	-	0-360	200	V

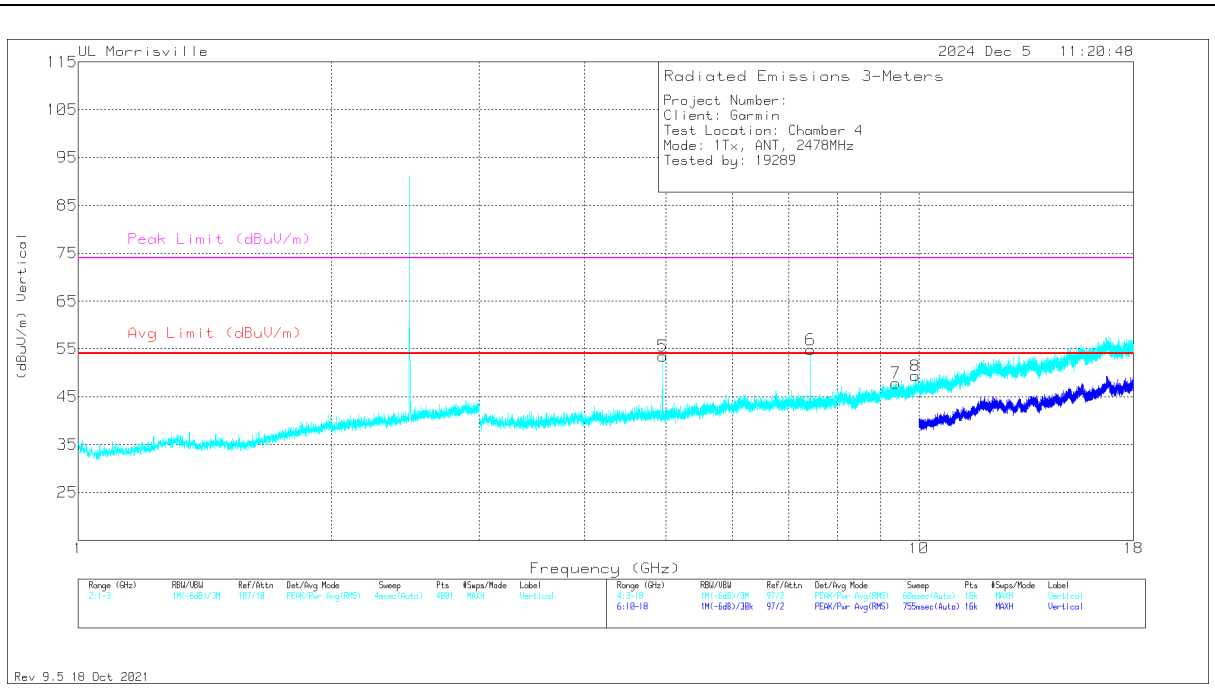
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
PK2 - Maximum Peak
ADV - Linear Voltage Average

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

HIGH CHANNEL



HORIZONTAL



VERTICAL

This report shall not be reproduced except in full, without the written approval of UL LLC

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	89509 ACF (dB/m)	Gain/Loss (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 4.95641	52.39	PK2	33.9	-31	0	55.29	-	-	74	-18.71	242	159	H
	* ** 4.95596	47.23	ADV	33.9	-31	-17.72	32.41	54	-21.59	-	-	242	159	H
2	* ** 7.43472	47.88	PK2	35.7	-27.9	0	55.68	-	-	74	-18.32	159	101	H
	* ** 7.43467	41.49	ADV	35.7	-27.9	-17.72	31.57	54	-22.43	-	-	159	101	H
3	* ** 9.35063	35.69	Pk	36.5	-24.4	0	47.79	54	-6.21	74	-26.21	0-360	100	H
5	* ** 4.95548	50.31	PK2	33.9	-31	0	53.21	-	-	74	-20.79	158	182	V
	* ** 4.9561	44.85	ADV	33.9	-31	-17.72	30.03	54	-23.97	-	-	158	182	V
6	* ** 7.43475	50.31	PK2	35.7	-27.9	0	58.11	-	-	74	-15.89	227	229	V
	* ** 7.43463	44.42	ADV	35.7	-27.9	-17.72	34.5	54	-19.5	-	-	227	229	V
7	* ** 9.39	36.1	Pk	36.6	-24.8	0	47.9	54	-6.1	74	-26.1	0-360	200	V
8	9.91125	37.56	Pk	37	-25.2	0	49.36	-	-	-	-	0-360	200	V
4	9.91313	40.45	Pk	37	-25.3	0	52.15	-	-	-	-	0-360	100	H

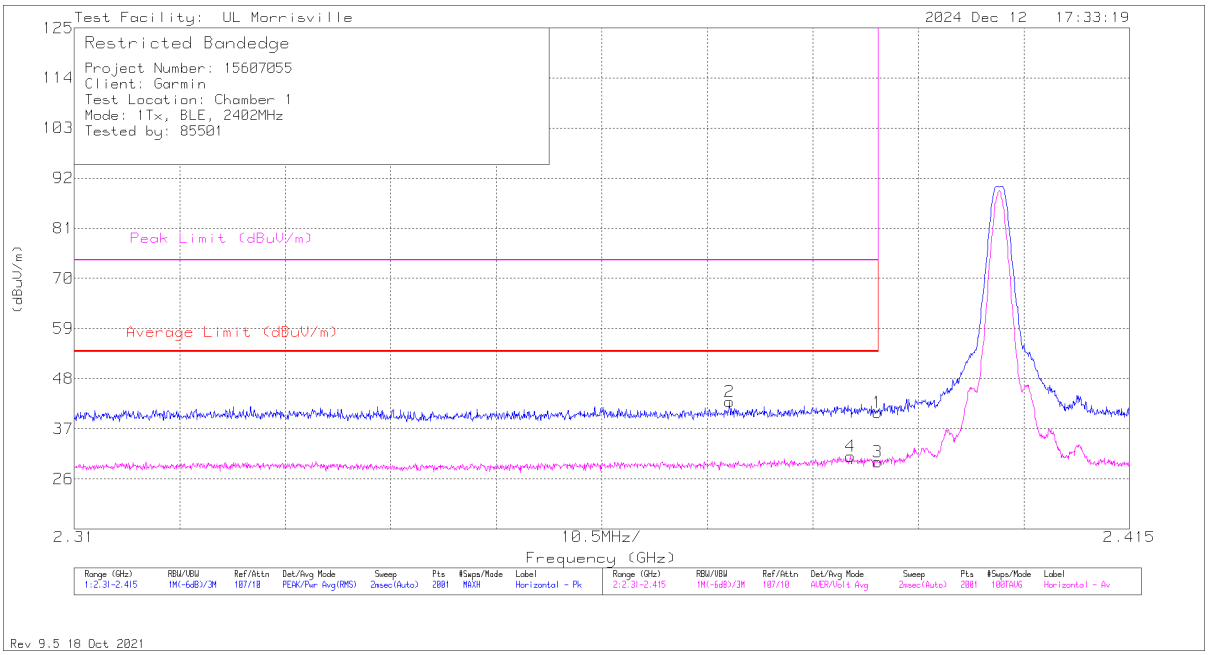
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
PK2 - Maximum Peak
ADV - Linear Voltage Average

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

10.1.5. TX ABOVE 1 GHz BLE 1Mbps MODE IN THE 2.4 GHz BAND

BANDEDGE (LOW CHANNEL, 2402MHz)

HORIZONTAL RESULT

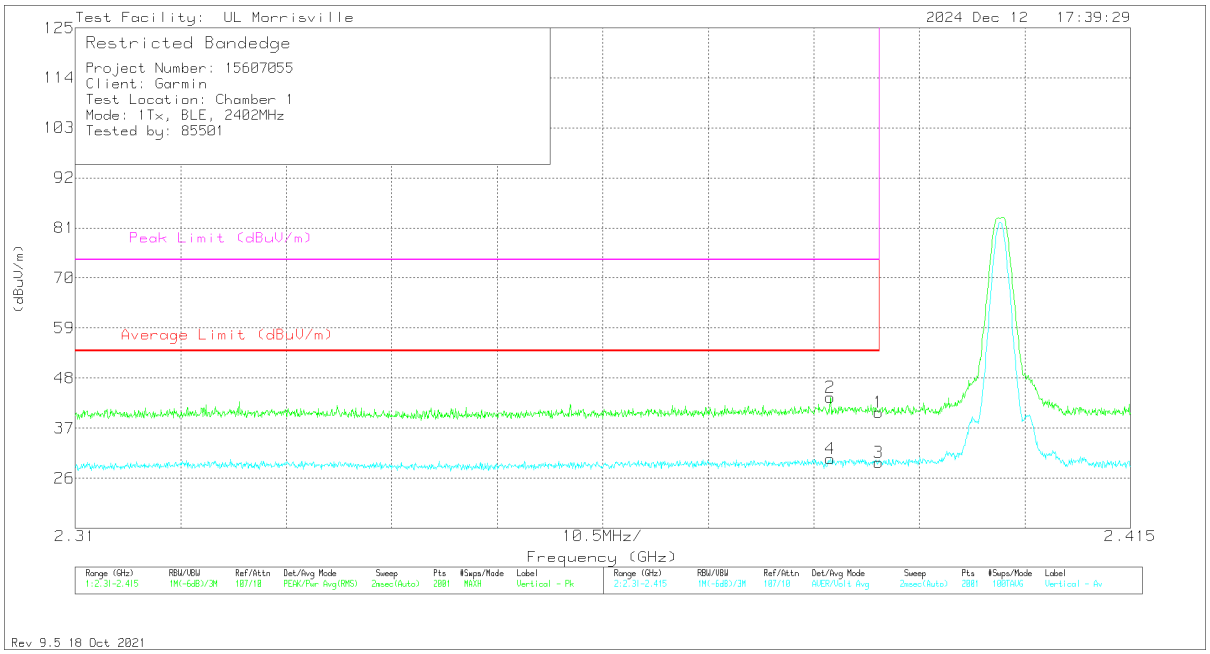


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	135143 (dB/m)	Gain/Loss (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.38996	32.66	Pk	31.9	-24	0	40.56	-	-	74	-33.44	272	320	H
2	* ** 2.37521	35.4	Pk	31.9	-24.3	0	43	-	-	74	-31	272	320	H
3	* ** 2.38996	21.83	ADV	31.9	-24	-1.41	28.32	54	-25.68	-	-	272	320	H
4	* ** 2.38723	22.94	ADV	31.9	-23.9	-1.41	29.53	54	-24.47	-	-	272	320	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
ADV - Linear Voltage Average

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

VERTICAL RESULT



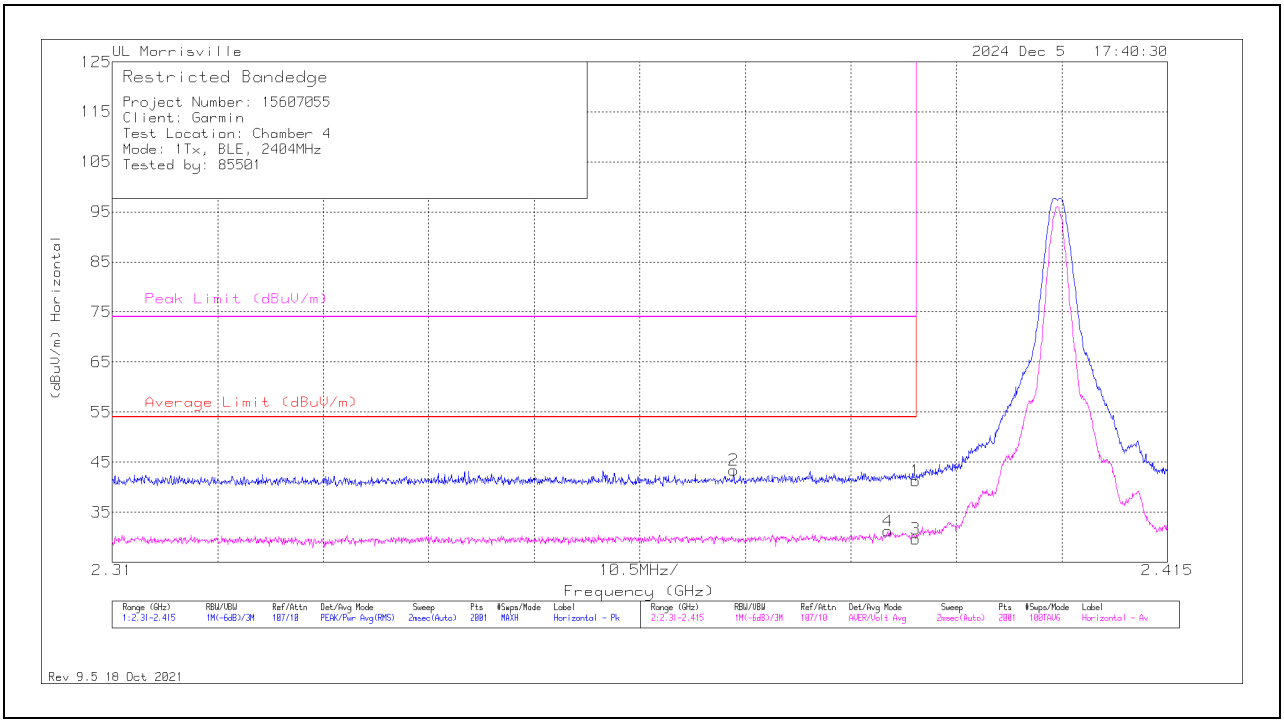
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	135143 (dB/m)	Gain/Loss (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.38996	32.54	Pk	31.9	-24	0	40.44	-	-	74	-33.56	148	116	V
2	* ** 2.38513	35.92	Pk	31.9	-24	0	43.82	-	-	74	-30.18	148	116	V
3	* ** 2.38996	21.59	ADV	31.9	-24	-1.41	28.08	54	-25.92	-	-	148	116	V
4	* ** 2.38513	22.33	ADV	31.9	-24	-1.41	28.82	54	-25.18	-	-	148	116	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
ADV - Linear Voltage Average

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

BANDEDGE (LOW CHANNEL, 2404MHz)

HORIZONTAL RESULT

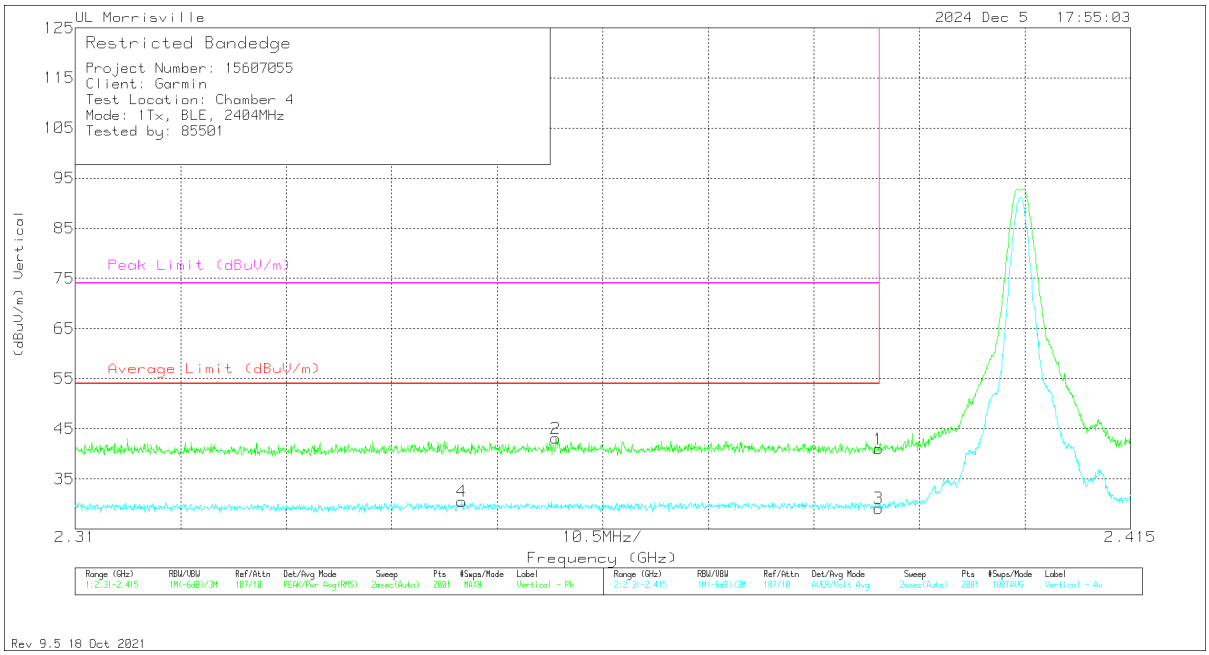


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	89509 ACF (dB/m)	Gain/Loss (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.38996	32.49	Pk	32	-23.2	0	41.29	-	-	74	-32.71	200	107	H
2	* ** 2.37185	34.47	Pk	31.9	-23	0	43.37	-	-	74	-30.63	200	107	H
3	* ** 2.38996	20.78	ADV	32	-23.2	-1.41	28.17	54	-25.83	-	-	200	107	H
4	* ** 2.38718	22.5	ADV	32	-23.3	-1.41	29.79	54	-24.21	-	-	200	107	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
ADV - Linear Voltage Average

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

VERTICAL RESULT



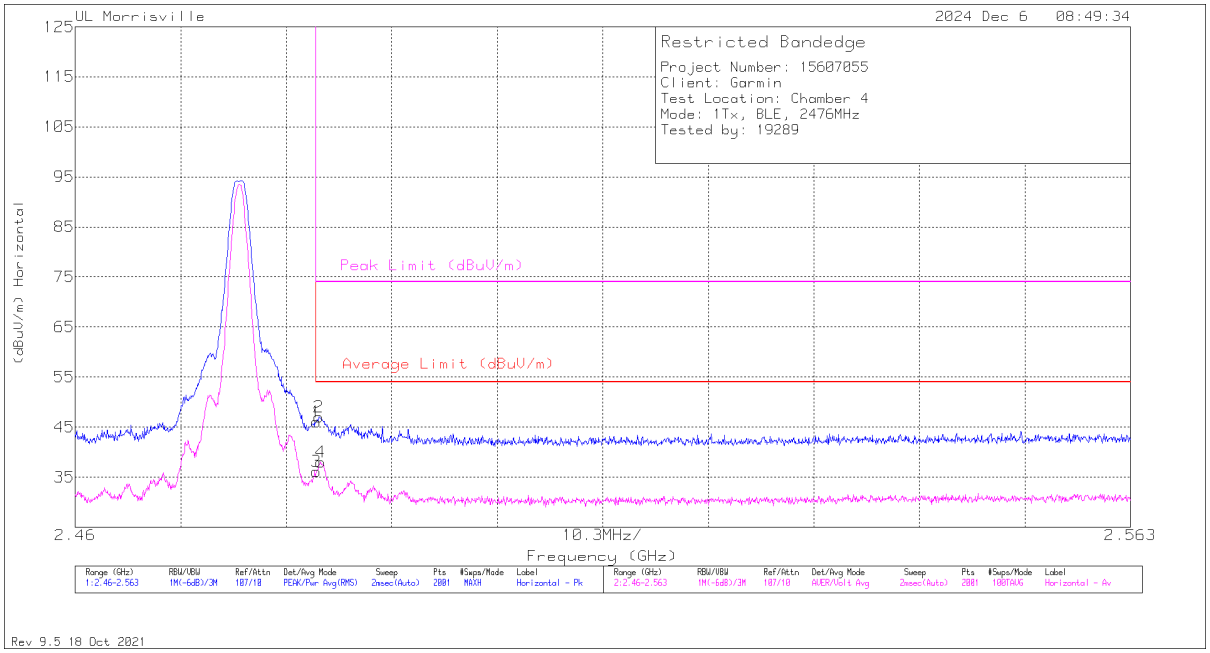
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	89509 ACF (dB/m)	Gain/Loss (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.38996	32.15	Pk	32	-23.2	0	40.95	-	-	74	-33.05	30	283	V
2	* ** 2.35783	34.18	Pk	31.9	-23	0	43.08	-	-	74	-30.92	30	283	V
3	* ** 2.38996	20.28	ADV	32	-23.2	-1.41	27.67	54	-26.33	-	-	30	283	V
4	* ** 2.34848	21.57	ADV	31.8	-22.9	-1.41	29.06	54	-24.94	-	-	30	283	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
ADV - Linear Voltage Average

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

BANDEDGE (HIGH CHANNEL, 2476MHz)

HORIZONTAL RESULT

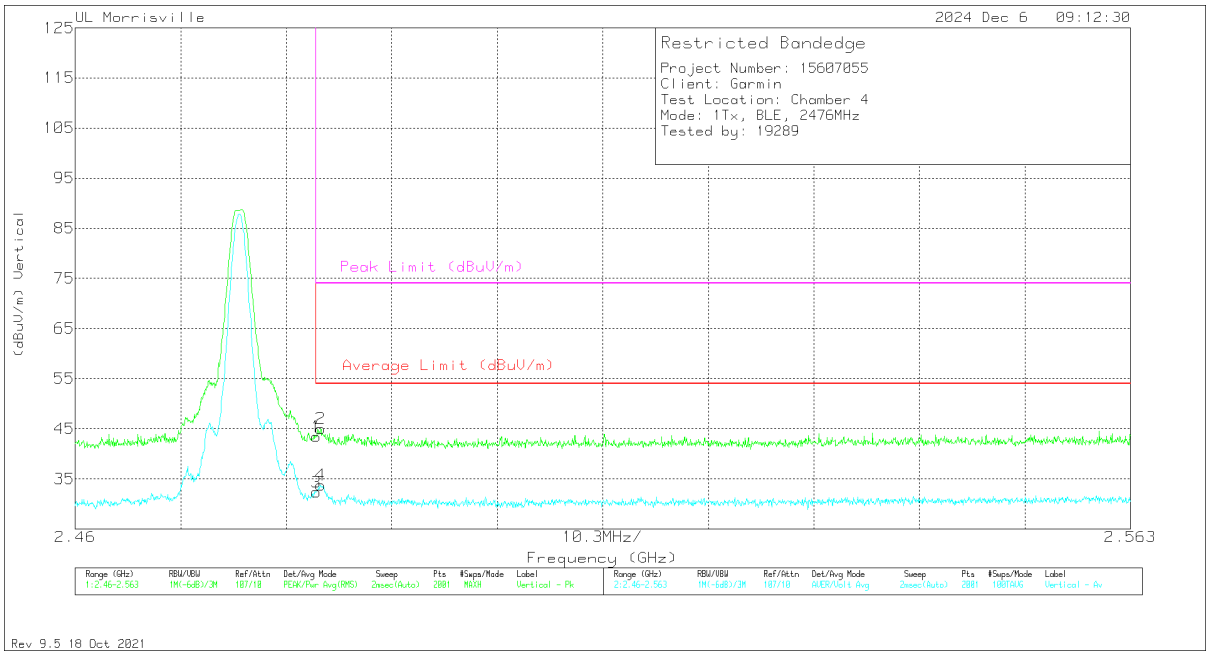


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	89509 ACF (dB/m)	Gain/Loss (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.48354	36.53	Pk	32.3	-22.8	0	46.03	-	-	74	-27.97	62	122	H
2	* ** 2.48379	37.5	Pk	32.3	-22.8	0	47	-	-	74	-27	62	122	H
3	* ** 2.48354	26.67	ADV	32.3	-22.8	-1.41	34.76	54	-19.24	-	-	62	122	H
4	* ** 2.48395	28.47	ADV	32.3	-22.8	-1.41	36.56	54	-17.44	-	-	62	122	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
ADV - Linear Voltage Average

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

VERTICAL RESULT



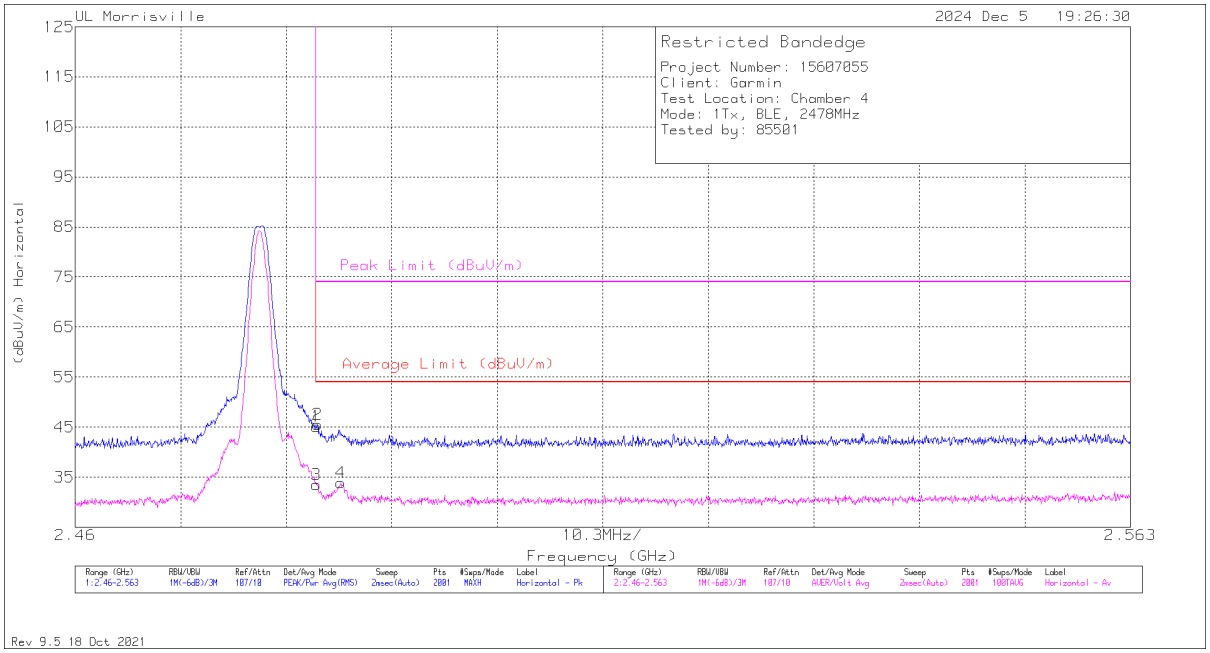
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	89509 ACF (dB/m)	Gain/Loss (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.48354	33.95	Pk	32.3	-22.8	0	43.45	-	-	74	-30.55	3	111	V
2	* ** 2.48395	35.49	Pk	32.3	-22.8	0	44.99	-	-	74	-29.01	3	111	V
3	* ** 2.48354	22.82	ADV	32.3	-22.8	-1.41	30.91	54	-23.09	-	-	3	111	V
4	* ** 2.48395	24.22	ADV	32.3	-22.8	-1.41	32.31	54	-21.69	-	-	3	111	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
ADV - Linear Voltage Average

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

BANDEDGE (HIGH CHANNEL, 2478MHz)

HORIZONTAL RESULT

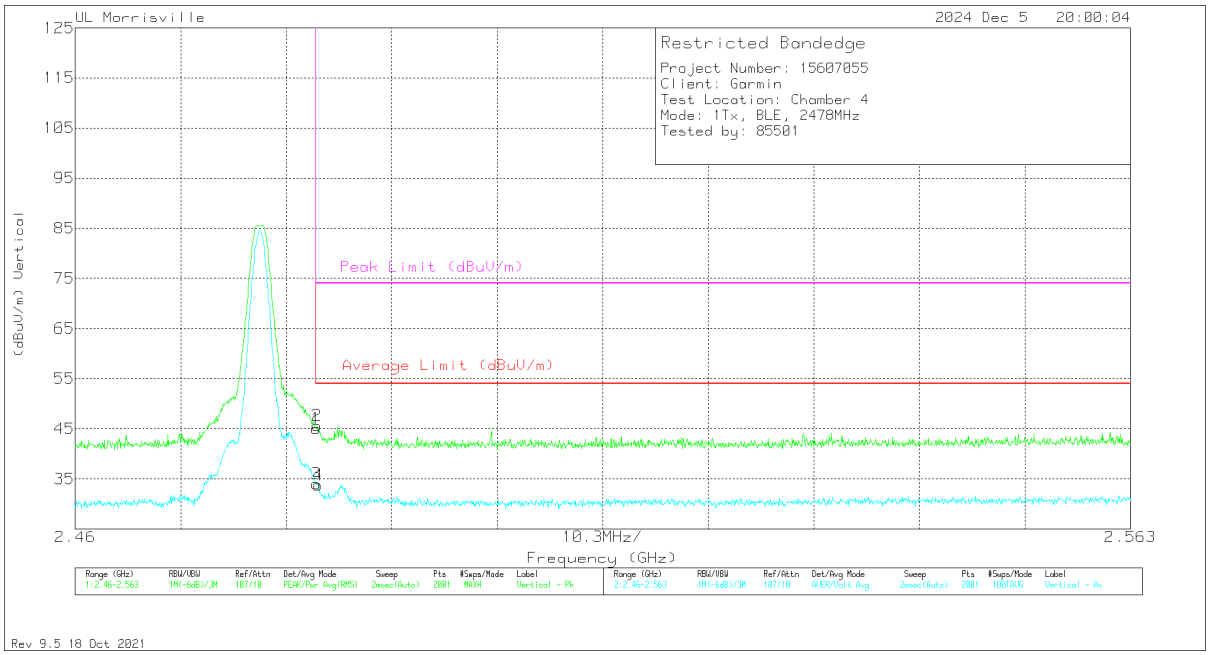


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	89509 ACF (dB/m)	Gain/Loss (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.48354	35.69	Pk	32.3	-22.8	0	45.19	-	-	74	-28.81	45	235	H
2	* ** 2.48364	36	Pk	32.3	-22.8	0	45.5	-	-	74	-28.5	45	235	H
3	* ** 2.48354	24.03	ADV	32.3	-22.8	-1.41	32.12	54	-21.88	-	-	45	235	H
4	* ** 2.4859	24.41	ADV	32.3	-22.8	-1.41	32.5	54	-21.5	-	-	45	235	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
ADV - Linear Voltage Average

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

VERTICAL RESULT



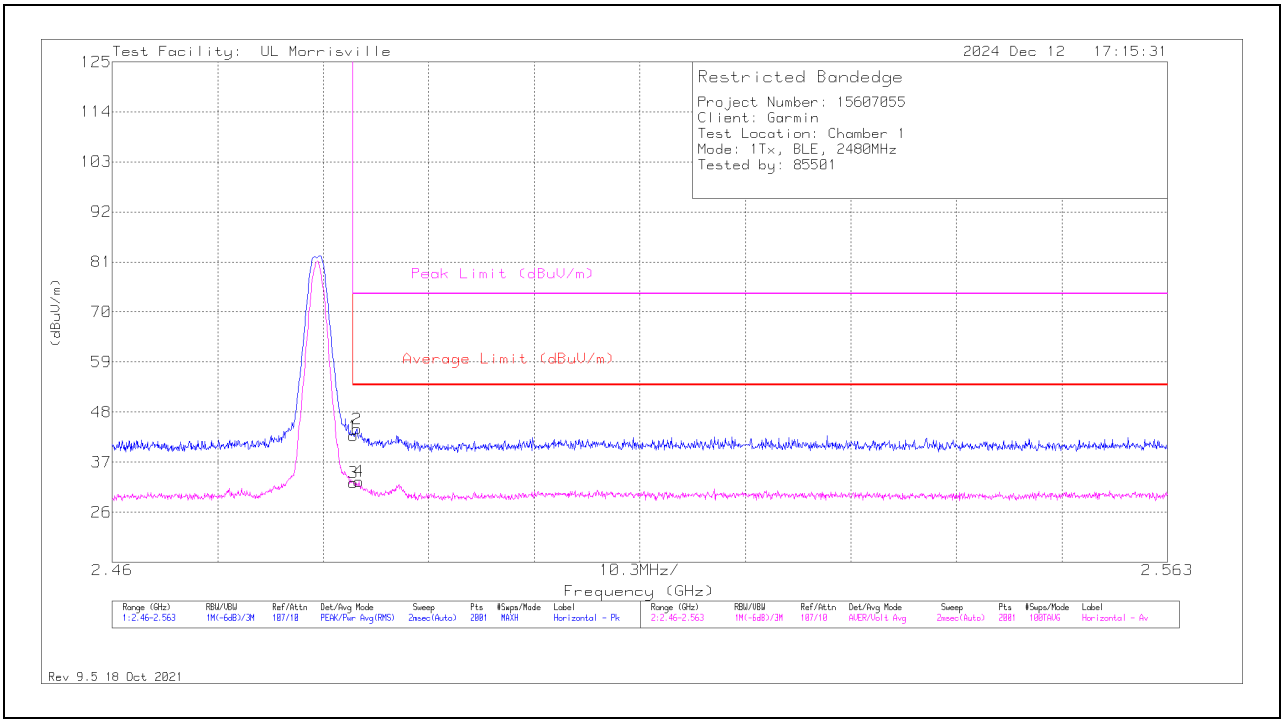
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	89509 ACF (dB/m)	Gain/Loss (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.48354	35.49	Pk	32.3	-22.8	0	44.99	-	-	74	-29.01	46	246	V
2	* ** 2.48359	36.14	Pk	32.3	-22.8	0	45.64	-	-	74	-28.36	46	246	V
3	* ** 2.48354	24.47	ADV	32.3	-22.8	-1.41	32.56	54	-21.44	-	-	46	246	V
4	* ** 2.48369	24.3	ADV	32.3	-22.8	-1.41	32.39	54	-21.61	-	-	46	246	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
ADV - Linear Voltage Average

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

BANDEDGE (HIGH CHANNEL, 2480MHz)

HORIZONTAL RESULT

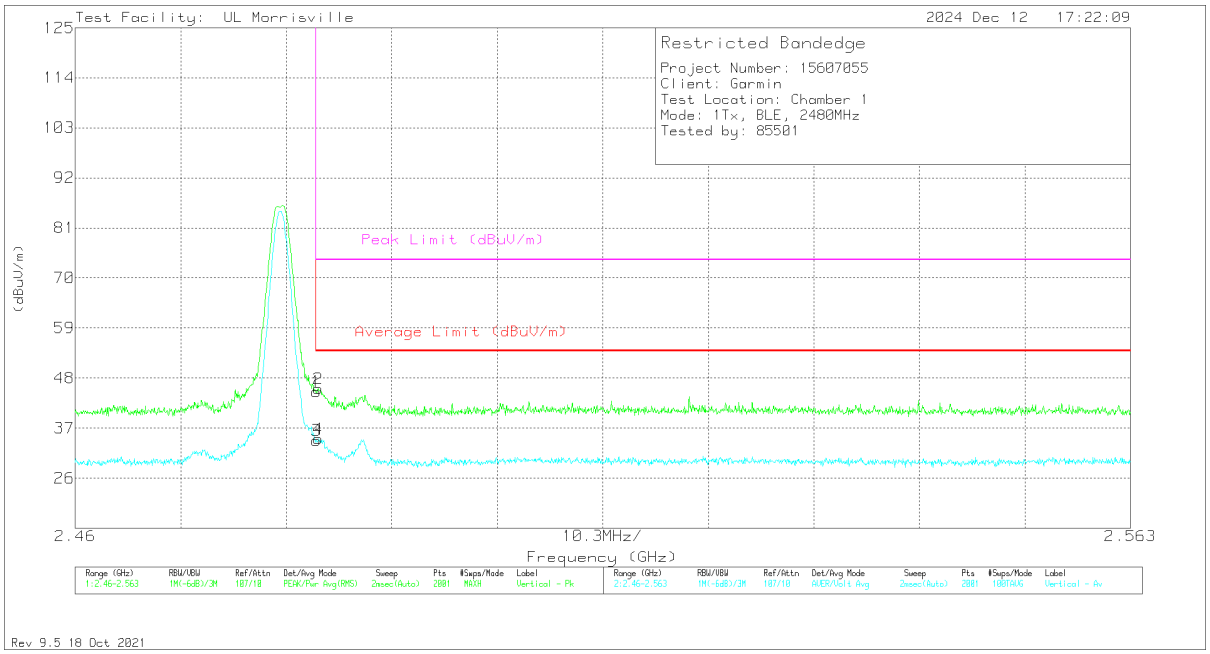


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	135143 (dB/m)	Gain/Loss (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.48354	34.24	Pk	32.2	-23.7	0	42.74	-	-	74	-31.26	17	384	H
2	* ** 2.4839	35.76	Pk	32.2	-23.7	0	44.26	-	-	74	-29.74	17	384	H
3	* ** 2.48354	23.98	ADV	32.2	-23.7	-1.41	31.07	54	-22.93	-	-	17	384	H
4	* ** 2.4841	24.41	ADV	32.2	-23.8	-1.41	31.4	54	-22.6	-	-	17	384	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
ADV - Linear Voltage Average

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

VERTICAL RESULT



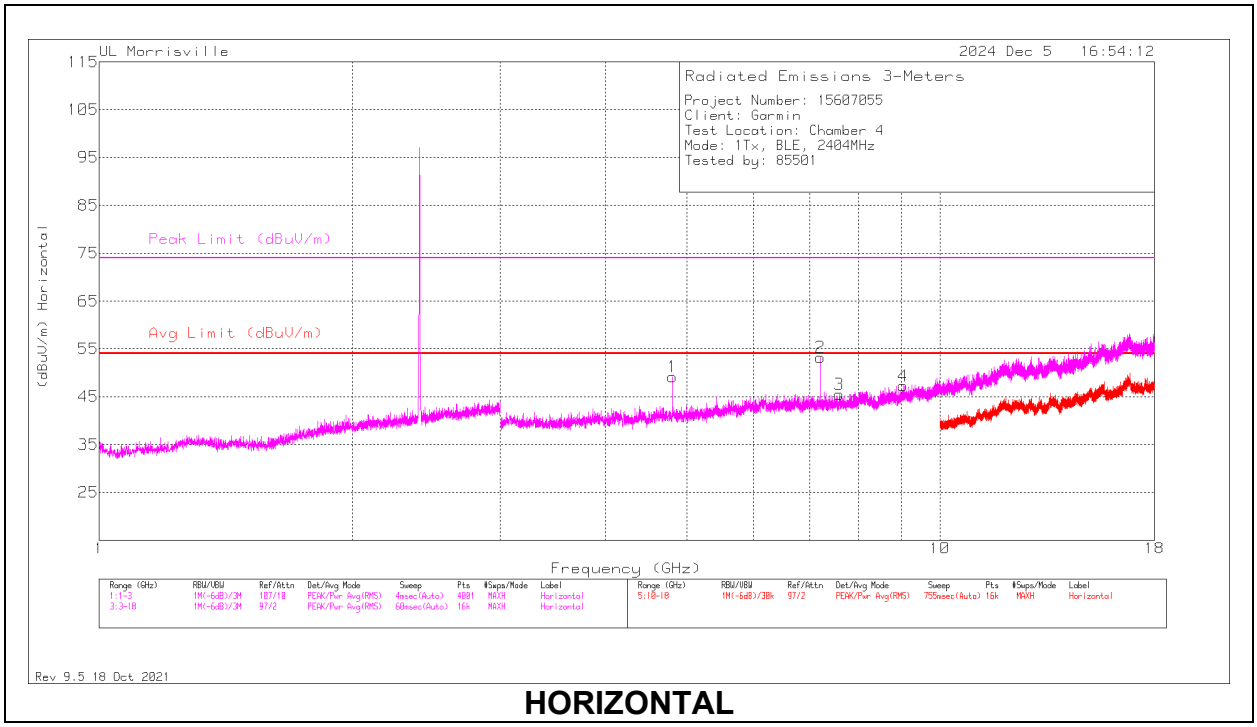
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	135143 (dB/m)	Gain/Loss (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.48354	36.52	Pk	32.2	-23.7	0	45.02	-	-	74	-28.98	156	345	V
2	* ** 2.48374	37.13	Pk	32.2	-23.7	0	45.63	-	-	74	-28.37	156	345	V
3	* ** 2.48354	25.8	ADV	32.2	-23.7	-1.41	32.89	54	-21.11	-	-	156	345	V
4	* ** 2.48374	26.11	ADV	32.2	-23.7	-1.41	33.2	54	-20.8	-	-	156	345	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
ADV - Linear Voltage Average

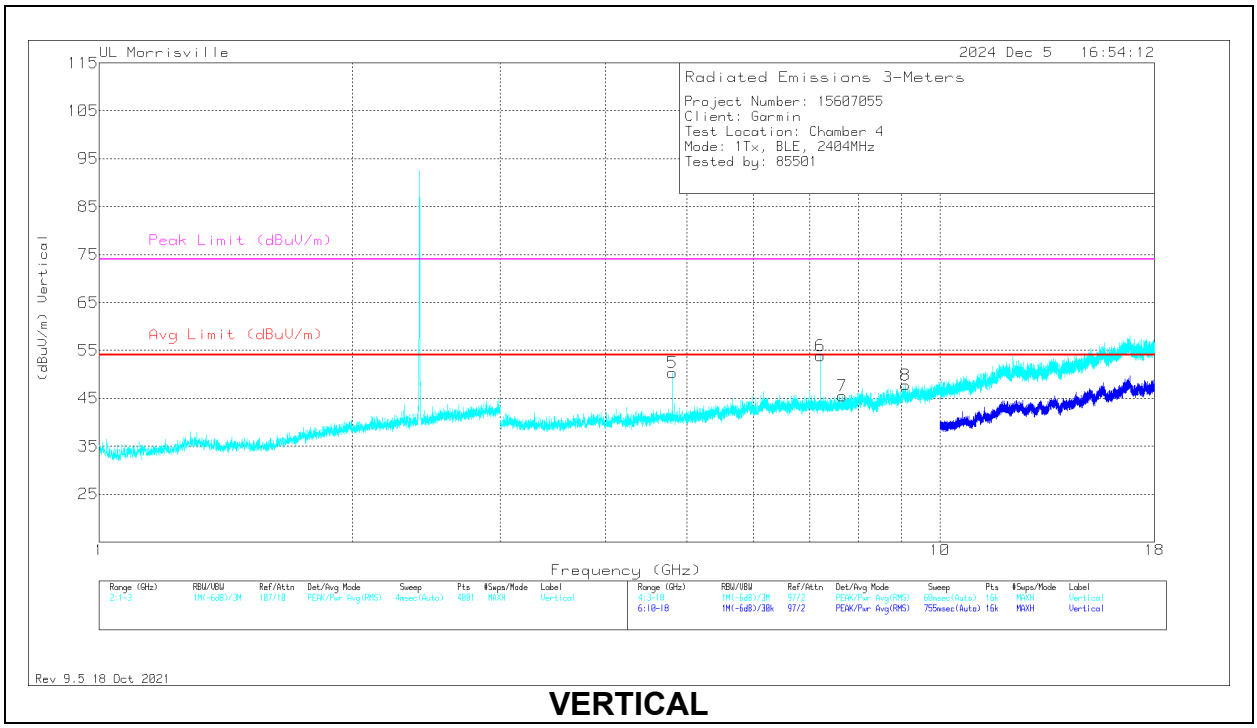
UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL



HORIZONTAL



VERTICAL

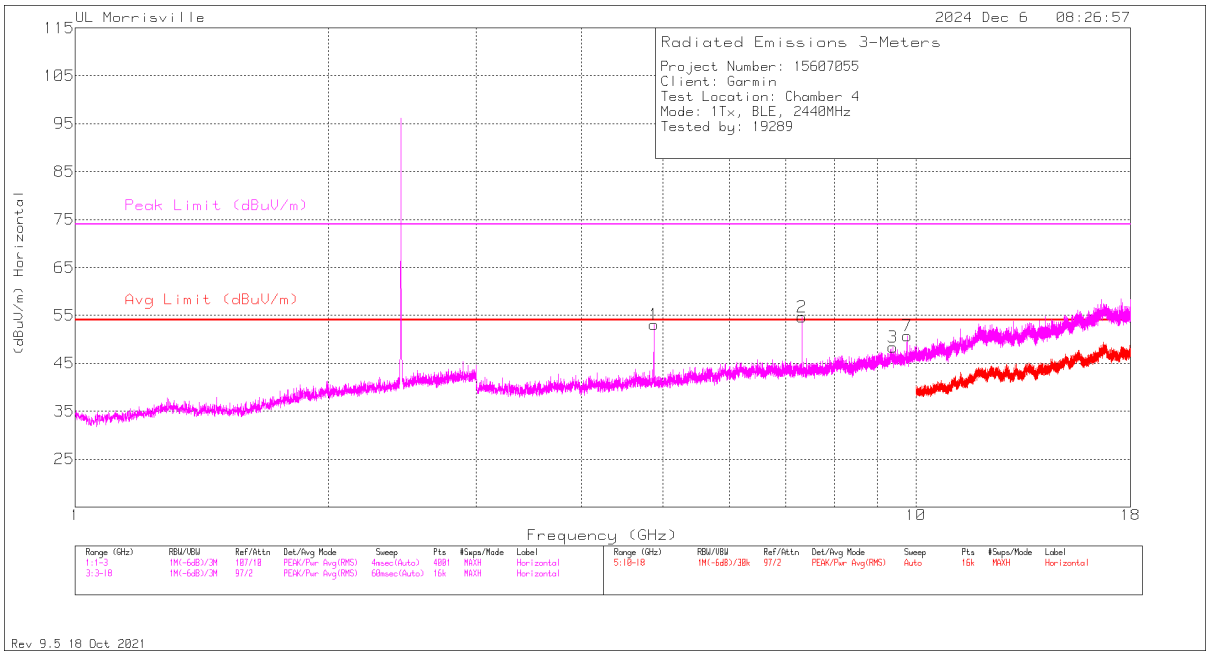
This report shall not be reproduced except in full, without the written approval of UL LLC

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	89509 ACF (dB/m)	Gain/Loss (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 4.80747	50.41	PK2	34.1	-31.3	0	53.21	-	-	74	-20.79	223	112	H
	* ** 4.80755	43.84	ADV	34.1	-31.3	-1.41	45.23	54	-8.77	-	-	223	112	H
3	* ** 7.59281	37.1	Pk	35.7	-27.3	0	45.5	54	-8.5	74	-28.5	0-360	100	H
4	* ** 9.04313	35.06	Pk	36.2	-24	0	47.26	54	-6.74	74	-26.74	0-360	100	H
5	* ** 4.80741	48.98	PK2	34.1	-31.3	0	51.78	-	-	74	-22.22	264	187	V
	* ** 4.80742	41.87	ADV	34.1	-31.3	-1.41	43.26	54	-10.74	-	-	264	187	V
7	* ** 7.65563	37.2	Pk	35.7	-27.4	0	45.5	54	-8.5	74	-28.5	0-360	200	V
8	* ** 9.0975	36.18	Pk	36.3	-24.7	0	47.78	54	-6.22	74	-26.22	0-360	200	V
2	7.21125	45.5	Pk	35.6	-27.9	0	53.2	-	-	-	-	0-360	100	H
6	7.21125	46.2	Pk	35.6	-27.9	0	53.9	-	-	-	-	0-360	200	V

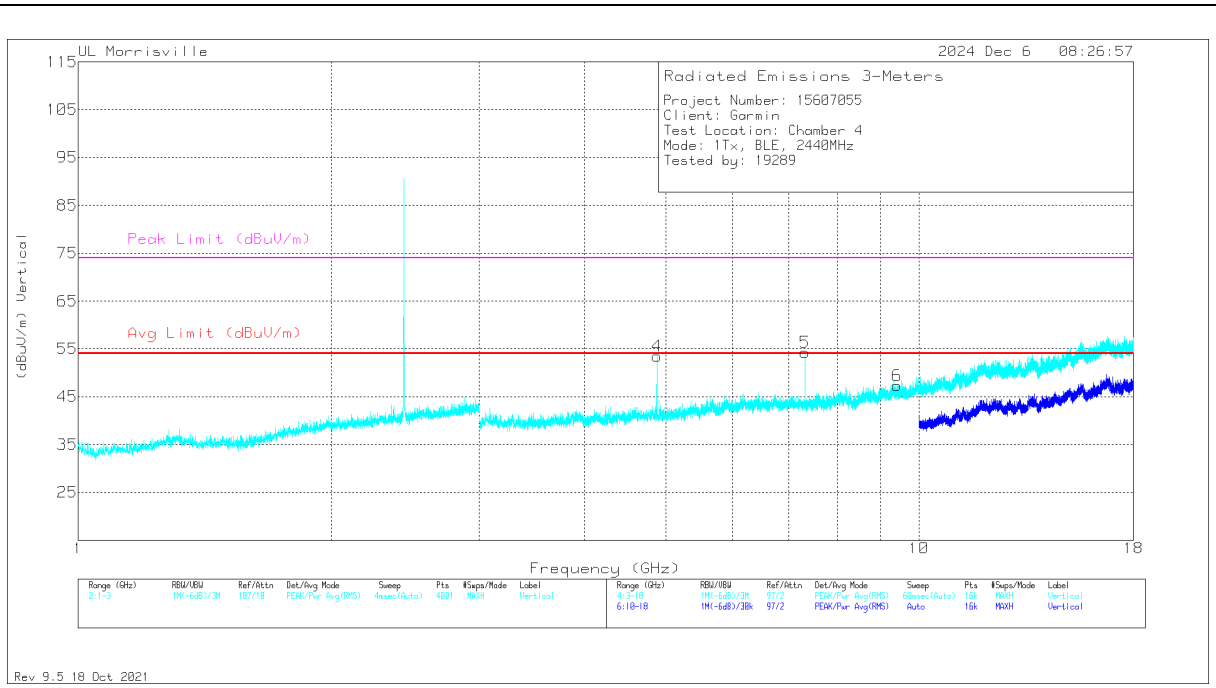
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
PK2 - Maximum Peak
ADV - Linear Voltage Average

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

MID CHANNEL



HORIZONTAL



VERTICAL

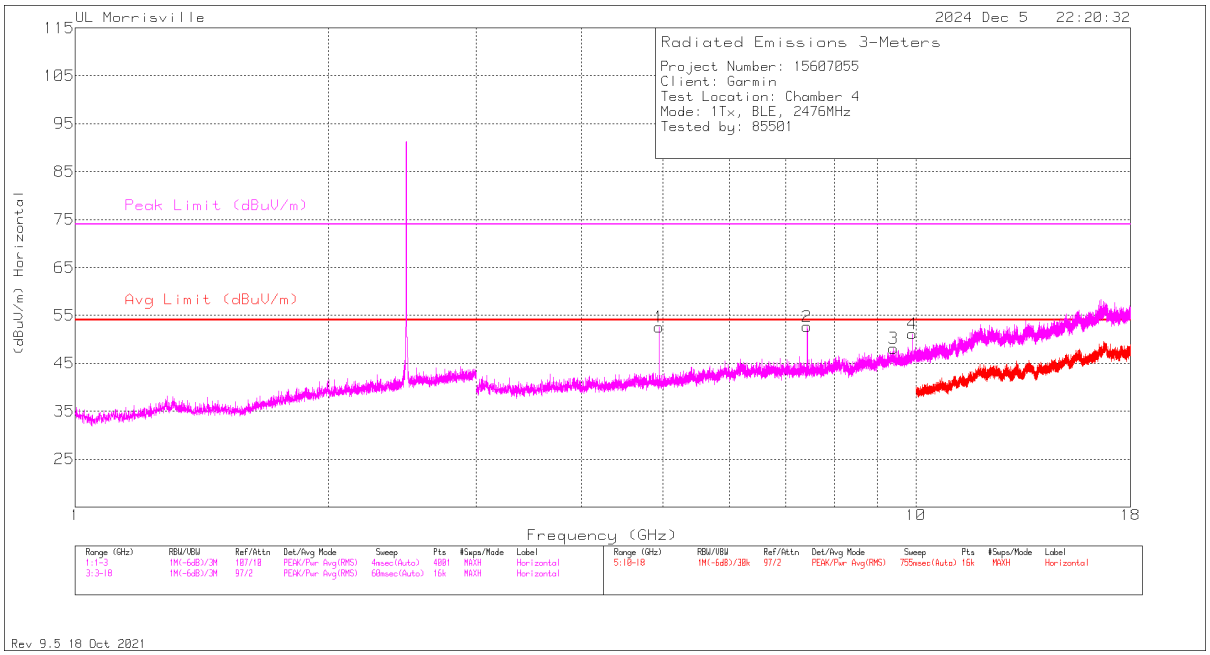
This report shall not be reproduced except in full, without the written approval of UL LLC

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	89509 ACF (dB/m)	Gain/Loss (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 4.87968	51.06	PK2	34	-31	0	54.06	-	-	74	-19.94	223	272	H
	* ** 4.88002	45.7	ADV	34	-31	-1.41	47.29	54	-6.71	-	-	223	272	H
2	* ** 7.31934	49.17	PK2	35.6	-27.7	0	57.07	-	-	74	-16.93	158	103	H
	* ** 7.32056	43.27	ADV	35.6	-27.7	-1.41	49.76	54	-4.24	-	-	158	103	H
3	* ** 9.39375	35.37	Pk	36.6	-24.7	0	47.27	54	-6.73	74	-26.73	0-360	100	H
4	* ** 4.88041	51.15	PK2	34	-31	0	54.15	-	-	74	-19.85	158	200	V
	* ** 4.88007	46.46	ADV	34	-31	-1.41	48.05	54	-5.95	-	-	158	200	V
5	* ** 7.32068	49.11	PK2	35.6	-27.7	0	57.01	-	-	74	-16.99	240	255	V
	* ** 7.32048	42.87	ADV	35.6	-27.7	-1.41	49.36	54	-4.64	-	-	240	255	V
6	* ** 9.40875	36.06	Pk	36.6	-25.3	0	47.36	54	-6.64	74	-26.64	0-360	200	V
7	9.76125	38.99	Pk	36.9	-25.2	0	50.69	-	-	-	-	0-360	100	H

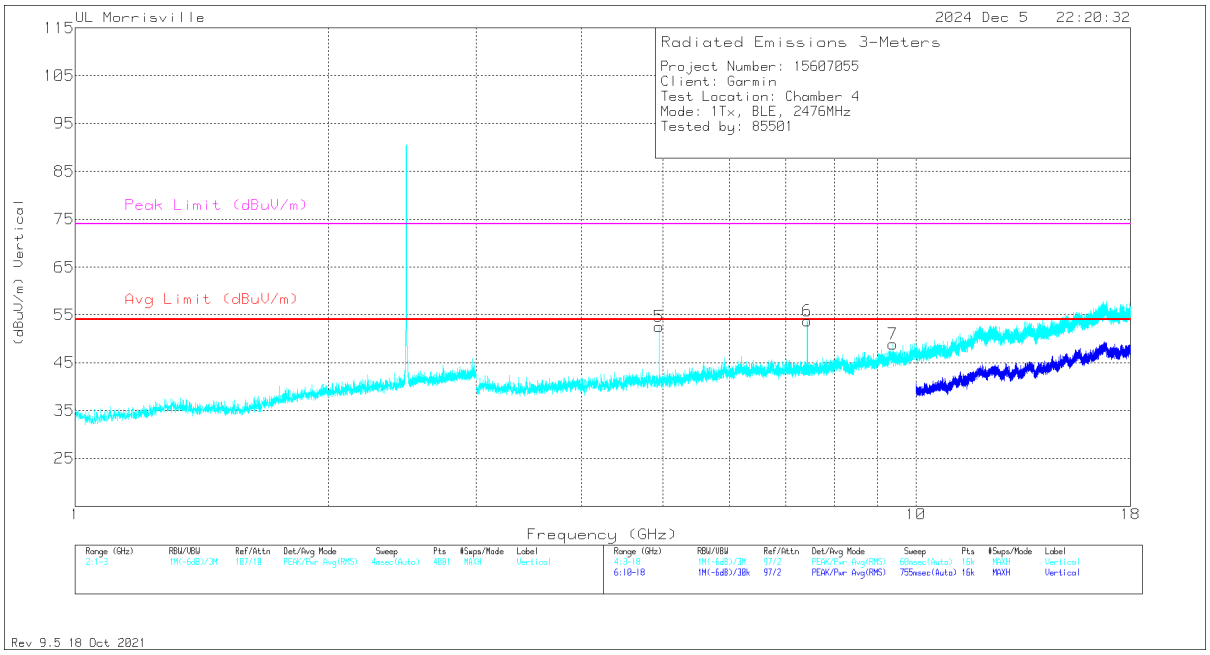
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
PK2 - Maximum Peak
ADV - Linear Voltage Average

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

HIGH CHANNEL



HORIZONTAL



VERTICAL

This report shall not be reproduced except in full, without the written approval of UL LLC

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	89509 ACF (dB/m)	Gain/Loss (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 4.9511	52	PK2	33.9	-31	0	54.9	-	-	74	-19.1	223	118	H
	* ** 4.95267	44.37	ADV	33.9	-31	-1.41	45.86	54	-8.14	-	-	223	118	H
2	* ** 7.4268	48.71	PK2	35.7	-27.8	0	56.61	-	-	74	-17.39	158	102	H
	* ** 7.42699	41.95	ADV	35.7	-27.8	-1.41	48.44	54	-5.56	-	-	158	102	H
3	* ** 9.39967	37.68	PK2	36.6	-25	0	49.28	-	-	74	-24.72	56	324	H
	* ** 9.40174	25.04	ADV	36.6	-25.1	-1.41	35.13	54	-18.87	-	-	56	324	H
5	* ** 4.95108	50.33	PK2	33.9	-31	0	53.23	-	-	74	-20.77	163	103	V
	* ** 4.95283	42.23	ADV	33.9	-31	-1.41	43.72	54	-10.28	-	-	163	103	V
6	* ** 7.42955	49	PK2	35.7	-27.8	0	56.9	-	-	74	-17.1	244	202	V
	* ** 7.42907	41.51	ADV	35.7	-27.8	-1.41	48	54	-6	-	-	244	202	V
7	* ** 9.39513	37.35	PK2	36.6	-24.7	0	49.25	-	-	74	-24.75	53	186	V
	* ** 9.39395	25.38	ADV	36.6	-24.7	-1.41	35.87	54	-18.13	-	-	53	186	V
4	9.90188	39.48	Pk	37	-25.3	0	51.18	-	-	-	-	0-360	100	H

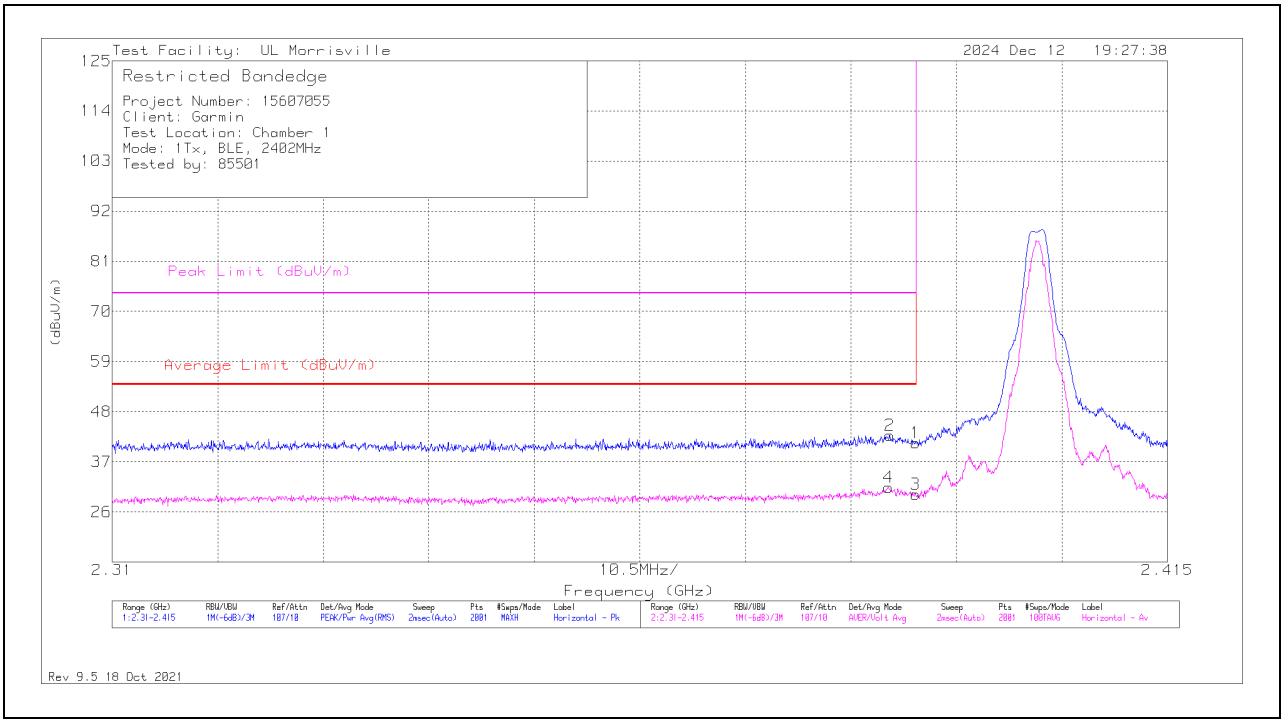
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
PK2 - Maximum Peak
ADV - Linear Voltage Average

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

10.1.6. TX ABOVE 1 GHz BLE 2Mbps MODE IN THE 2.4 GHz BAND

BANDEDGE (LOW CHANNEL, 2402MHz)

HORIZONTAL RESULT

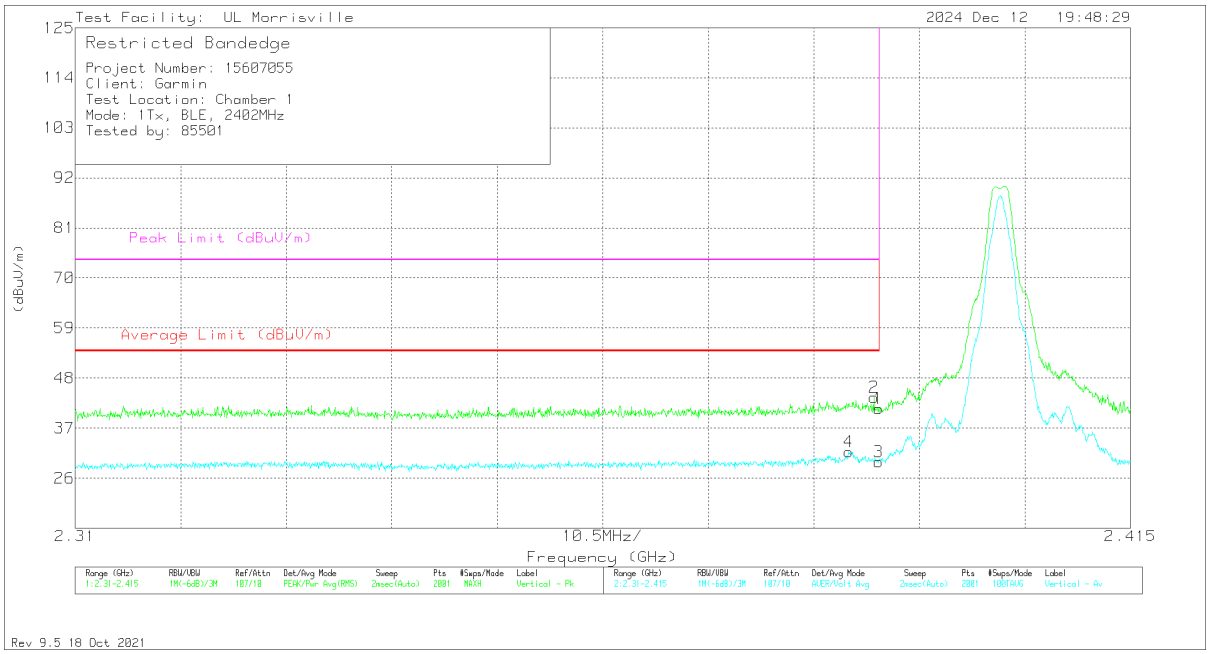


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	135143 (dB/m)	Gain/Loss (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.38996	33.22	Pk	31.9	-24	0	41.12	-	-	74	-32.88	34	174	H
2	* ** 2.38739	34.77	Pk	31.9	-23.9	0	42.77	-	-	74	-31.23	34	174	H
3	* ** 2.38996	22.02	ADV	31.9	-24	-1.41	28.51	54	-25.49	-	-	34	174	H
4	* ** 2.38723	23.37	ADV	31.9	-23.9	-1.41	29.96	54	-24.04	-	-	34	174	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
ADV - Linear Voltage Average

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

VERTICAL RESULT



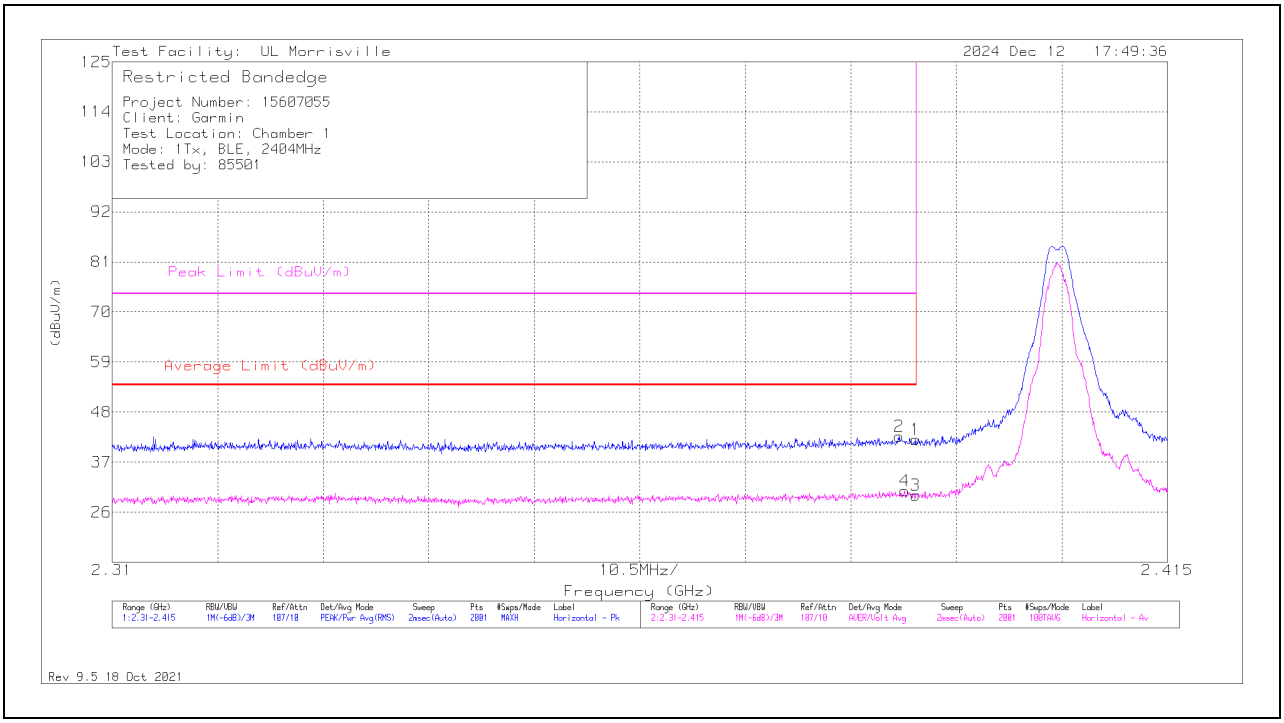
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	135143 (dB/m)	Gain/Loss (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.38996	33.37	Pk	31.9	-24	0	41.27	-	-	74	-32.73	151	254	V
2	* ** 2.38949	35.82	Pk	31.9	-24	0	43.72	-	-	74	-30.28	151	254	V
3	* ** 2.38996	21.64	ADV	31.9	-24	-1.41	28.13	54	-25.87	-	-	151	254	V
4	* ** 2.38697	23.84	ADV	31.9	-23.9	-1.41	30.43	54	-23.57	-	-	151	254	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
ADV - Linear Voltage Average

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

BANDEDGE (LOW CHANNEL, 2404MHz)

HORIZONTAL RESULT

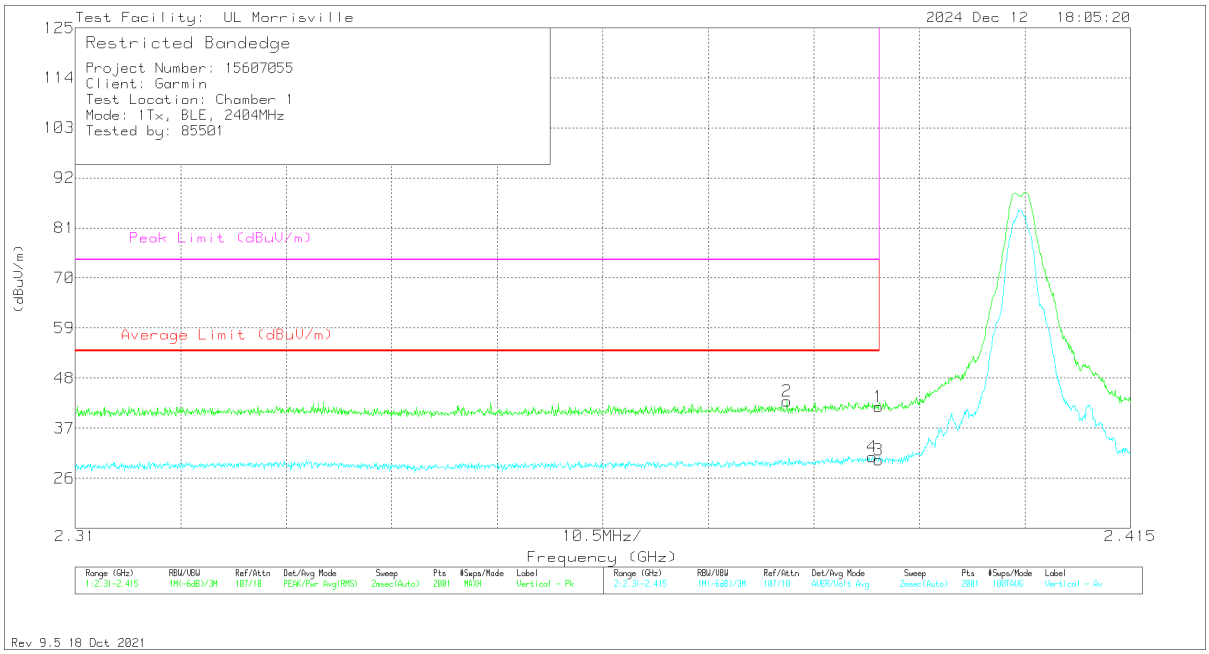


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	135143 (dB/m)	Gain/Loss (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.38996	34.13	Pk	31.9	-24	0	42.03	-	-	74	-31.97	292	384	H
2	* ** 2.38833	34.82	Pk	31.9	-24	0	42.72	-	-	74	-31.28	292	384	H
3	* ** 2.38996	21.87	ADV	31.9	-24	-1.41	28.36	54	-25.64	-	-	292	384	H
4	* ** 2.38886	22.74	ADV	31.9	-24	-1.41	29.23	54	-24.77	-	-	292	384	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
ADV - Linear Voltage Average

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

VERTICAL RESULT



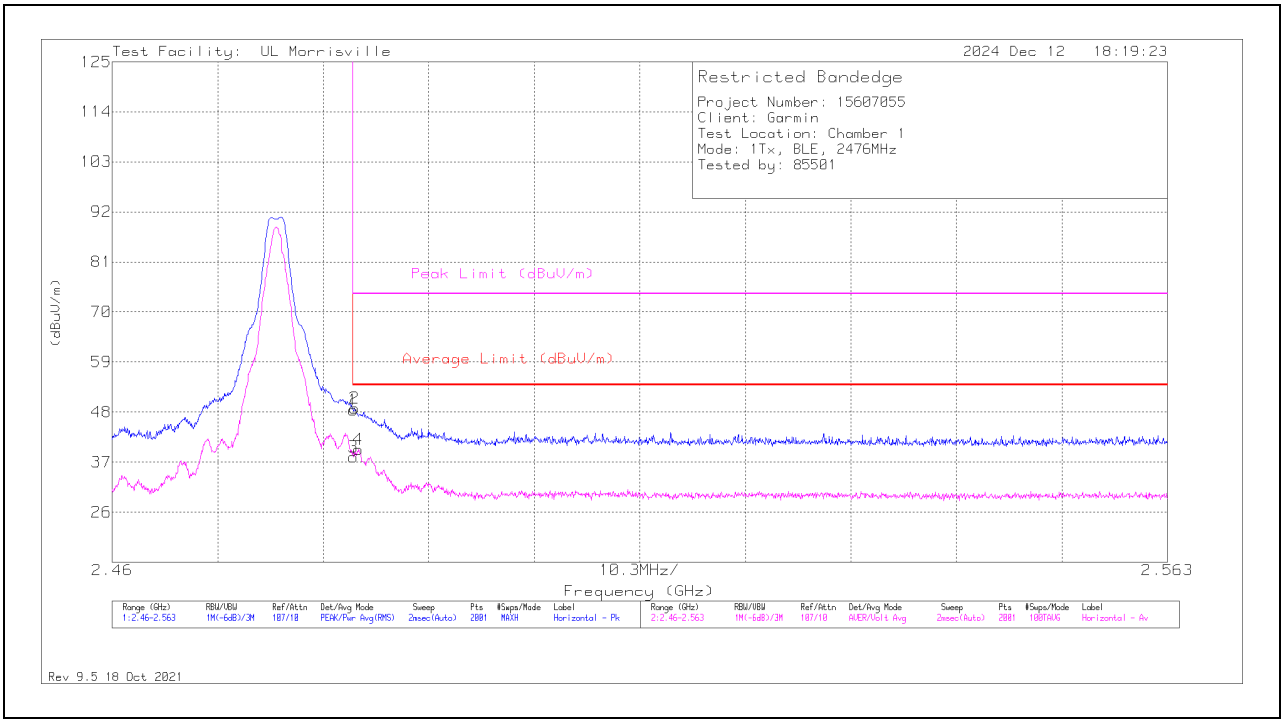
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	135143 (dB/m)	Gain/Loss (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.38996	33.85	Pk	31.9	-24	0	41.75	-	-	74	-32.25	295	174	V
2	* ** 2.38082	35.1	Pk	31.9	-24.1	0	42.9	-	-	74	-31.1	295	174	V
3	* ** 2.38996	22.14	ADV	31.9	-24	-1.41	28.63	54	-25.37	-	-	295	174	V
4	* ** 2.38928	22.83	ADV	31.9	-24	-1.41	29.32	54	-24.68	-	-	295	174	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
ADV - Linear Voltage Average

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

BANDEDGE (HIGH CHANNEL, 2476MHz)

HORIZONTAL RESULT

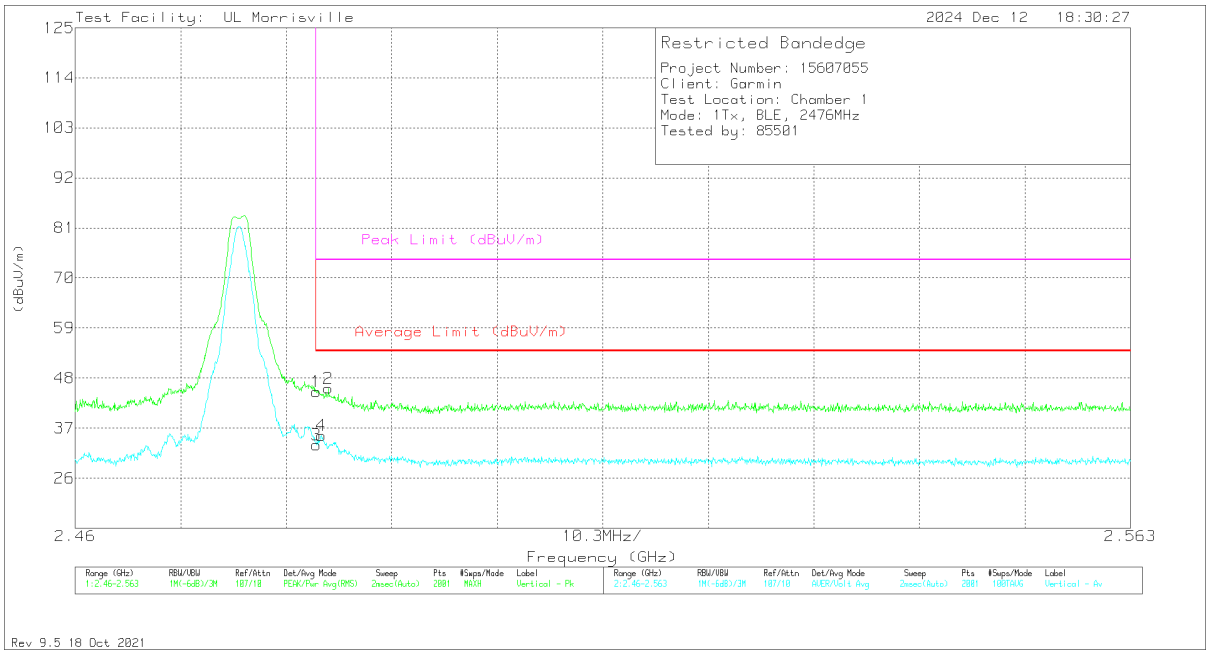


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	135143 (dB/m)	Gain/Loss (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.48354	39.98	Pk	32.2	-23.7	0	48.48	-	-	74	-25.52	342	175	H
2	* ** 2.48364	40.32	Pk	32.2	-23.7	0	48.82	-	-	74	-25.18	342	175	H
3	* ** 2.48354	29.65	ADV	32.2	-23.7	-1.41	36.74	54	-17.26	-	-	342	175	H
4	* ** 2.48405	31.36	ADV	32.2	-23.8	-1.41	38.35	54	-15.65	-	-	342	175	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
ADV - Linear Voltage Average

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

VERTICAL RESULT



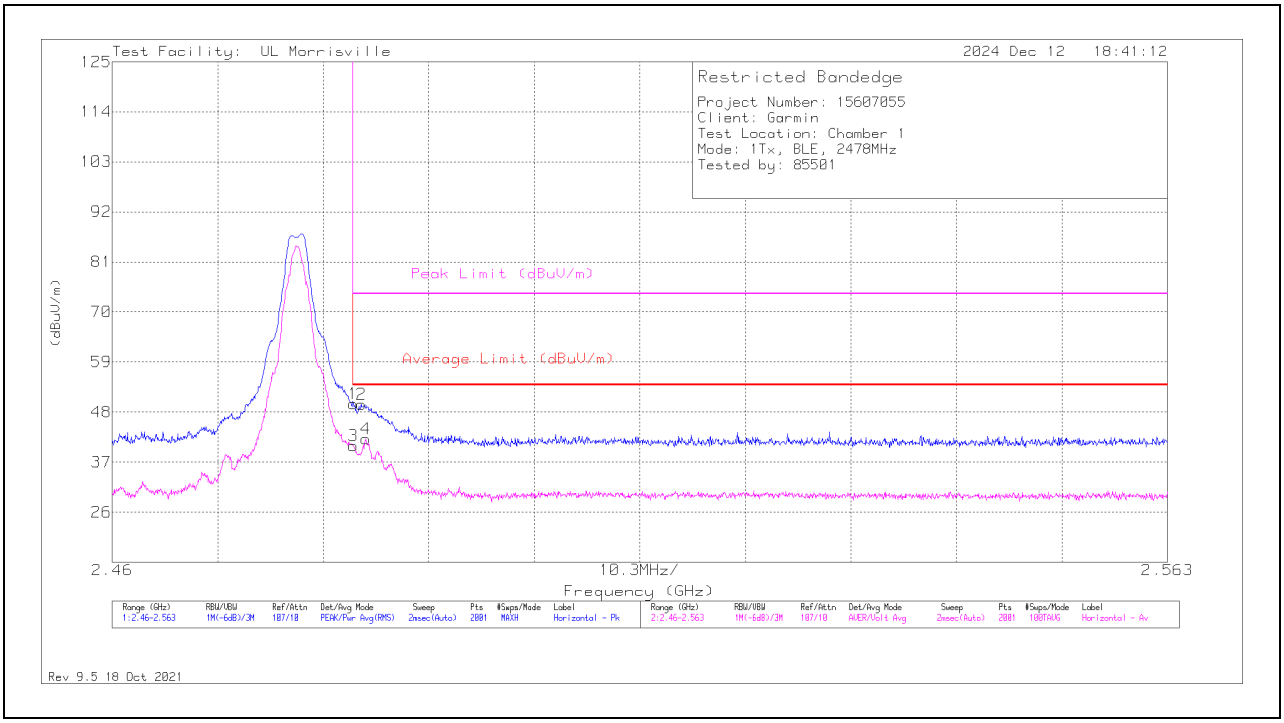
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	135143 (dB/m)	Gain/Loss (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.48354	36.47	Pk	32.2	-23.7	0	44.97	-	-	74	-29.03	342	175	V
2	* ** 2.48472	37.36	Pk	32.2	-23.8	0	45.76	-	-	74	-28.24	342	175	V
3	* ** 2.48354	24.82	ADV	32.2	-23.7	-1.41	31.91	54	-22.09	-	-	342	175	V
4	* ** 2.48405	26.93	ADV	32.2	-23.8	-1.41	33.92	54	-20.08	-	-	342	175	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
ADV - Linear Voltage Average

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

BANDEDGE (HIGH CHANNEL, 2478MHz)

HORIZONTAL RESULT

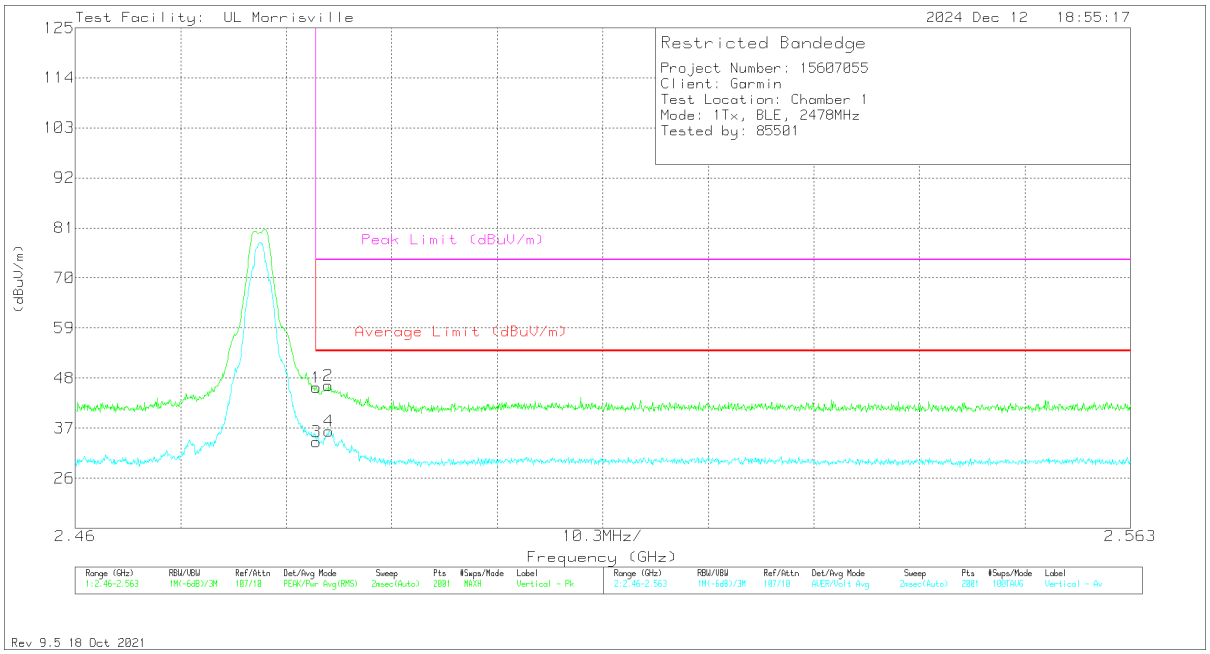


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	135143 (dB/m)	Gain/Loss (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.48354	41.33	Pk	32.2	-23.7	0	49.83	-	-	74	-24.17	337	145	H
2	* ** 2.48431	41.27	Pk	32.2	-23.8	0	49.67	-	-	74	-24.33	337	145	H
3	* ** 2.48354	32.16	ADV	32.2	-23.7	-1.41	39.25	54	-14.75	-	-	337	145	H
4	* ** 2.48477	33.71	ADV	32.2	-23.8	-1.41	40.7	54	-13.3	-	-	337	145	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
ADV - Linear Voltage Average

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

VERTICAL RESULT



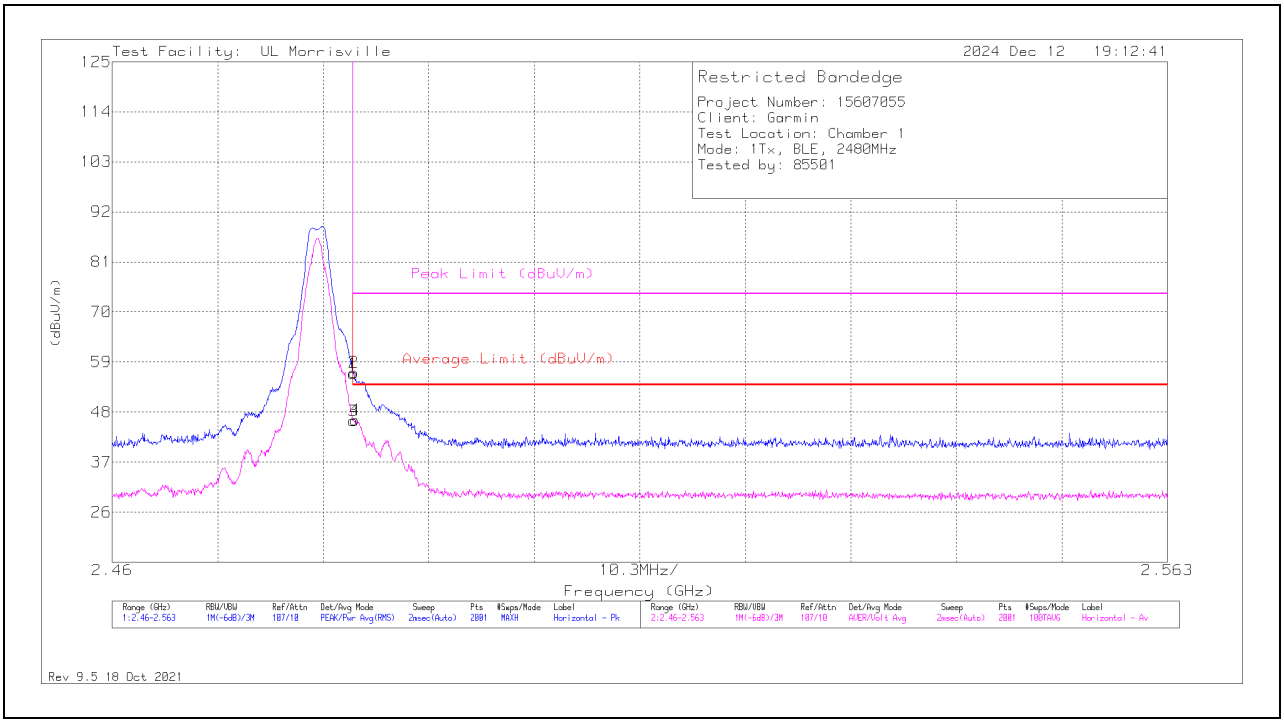
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	135143 (dB/m)	Gain/Loss (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.48354	37.41	Pk	32.2	-23.7	0	45.91	-	-	74	-28.09	292	174	V
2	* ** 2.48472	37.93	Pk	32.2	-23.8	0	46.33	-	-	74	-27.67	292	174	V
3	* ** 2.48354	25.52	ADV	32.2	-23.7	-1.41	32.61	54	-21.39	-	-	292	174	V
4	* ** 2.48477	27.93	ADV	32.2	-23.8	-1.41	34.92	54	-19.08	-	-	292	174	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
ADV - Linear Voltage Average

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

BANDEDGE (HIGH CHANNEL, 2480MHz)

HORIZONTAL RESULT

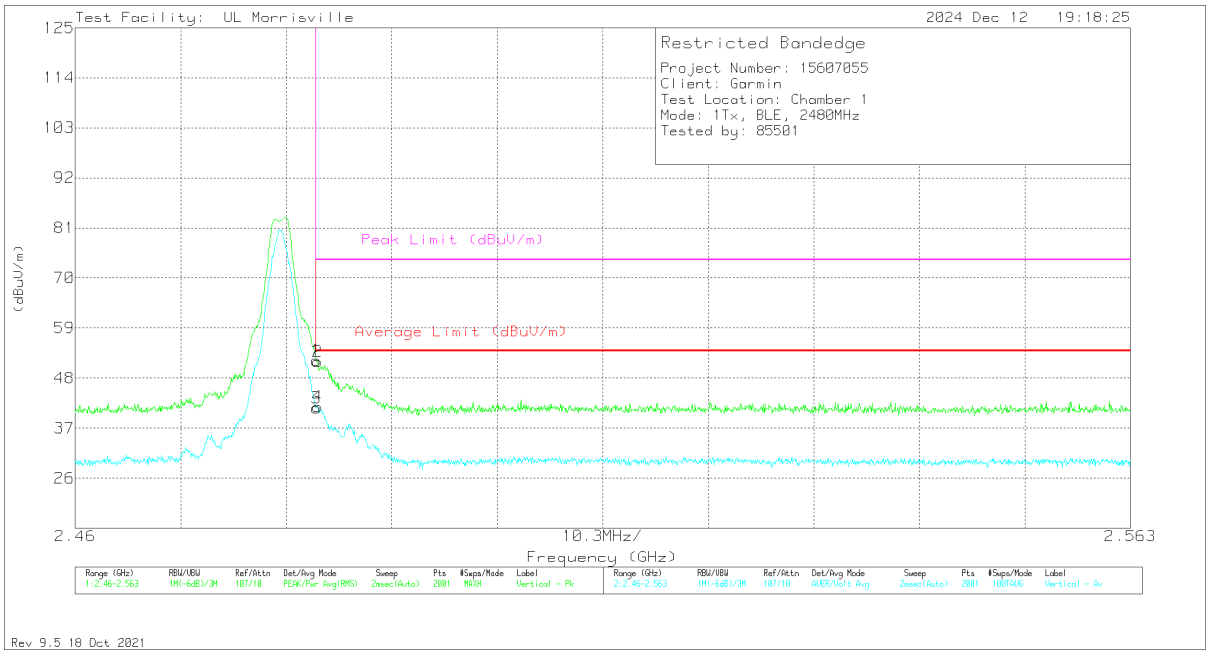


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	135143 (dB/m)	Gain/Loss (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.48354	47.96	Pk	32.2	-23.7	0	56.46	-	-	74	-17.54	345	142	H
2	* ** 2.48359	48.17	Pk	32.2	-23.7	0	56.67	-	-	74	-17.33	345	142	H
3	* ** 2.48354	37.55	ADV	32.2	-23.7	-1.41	44.64	54	-9.36	-	-	345	142	H
4	* ** 2.48369	37.71	ADV	32.2	-23.7	-1.41	44.8	54	-9.2	-	-	345	142	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
ADV - Linear Voltage Average

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

VERTICAL RESULT



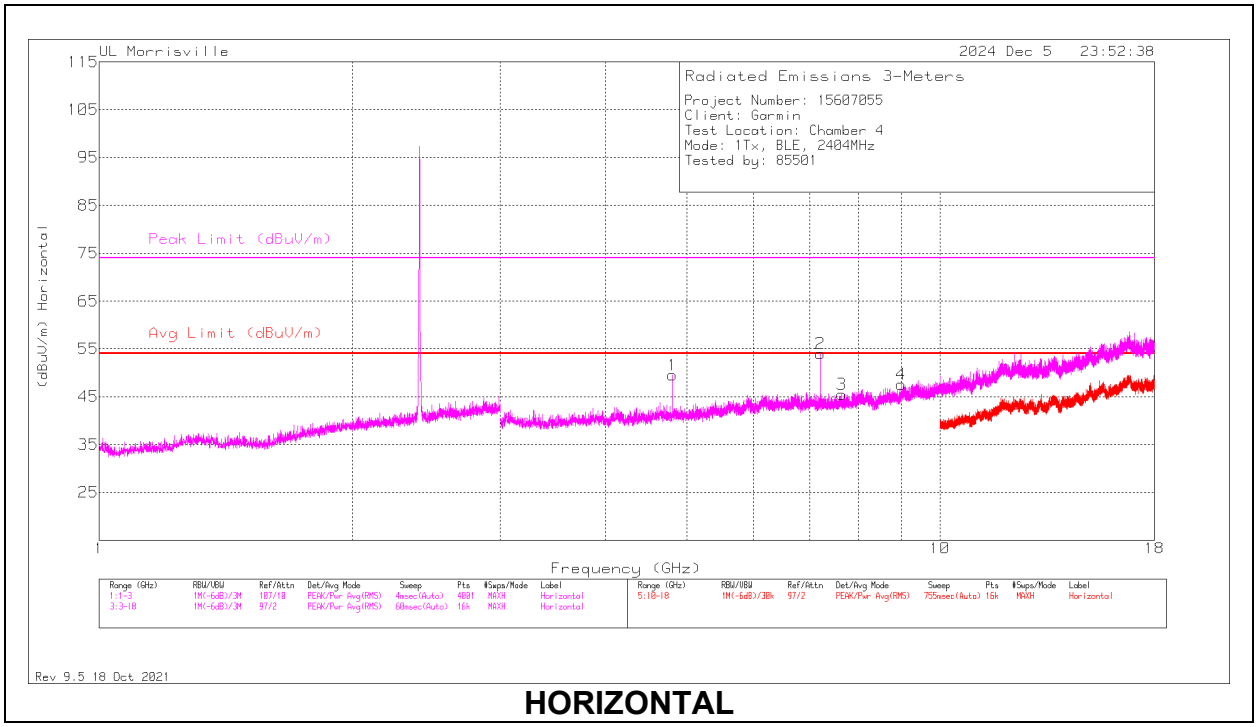
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	135143 (dB/m)	Gain/Loss (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.48354	43.43	Pk	32.2	-23.7	0	51.93	-	-	74	-22.07	342	156	V
2	* ** 2.48364	43.08	Pk	32.2	-23.7	0	51.58	-	-	74	-22.42	342	156	V
3	* ** 2.48354	32.95	ADV	32.2	-23.7	-1.41	40.04	54	-13.96	-	-	342	156	V
4	* ** 2.48364	33.23	ADV	32.2	-23.7	-1.41	40.32	54	-13.68	-	-	342	156	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
ADV - Linear Voltage Average

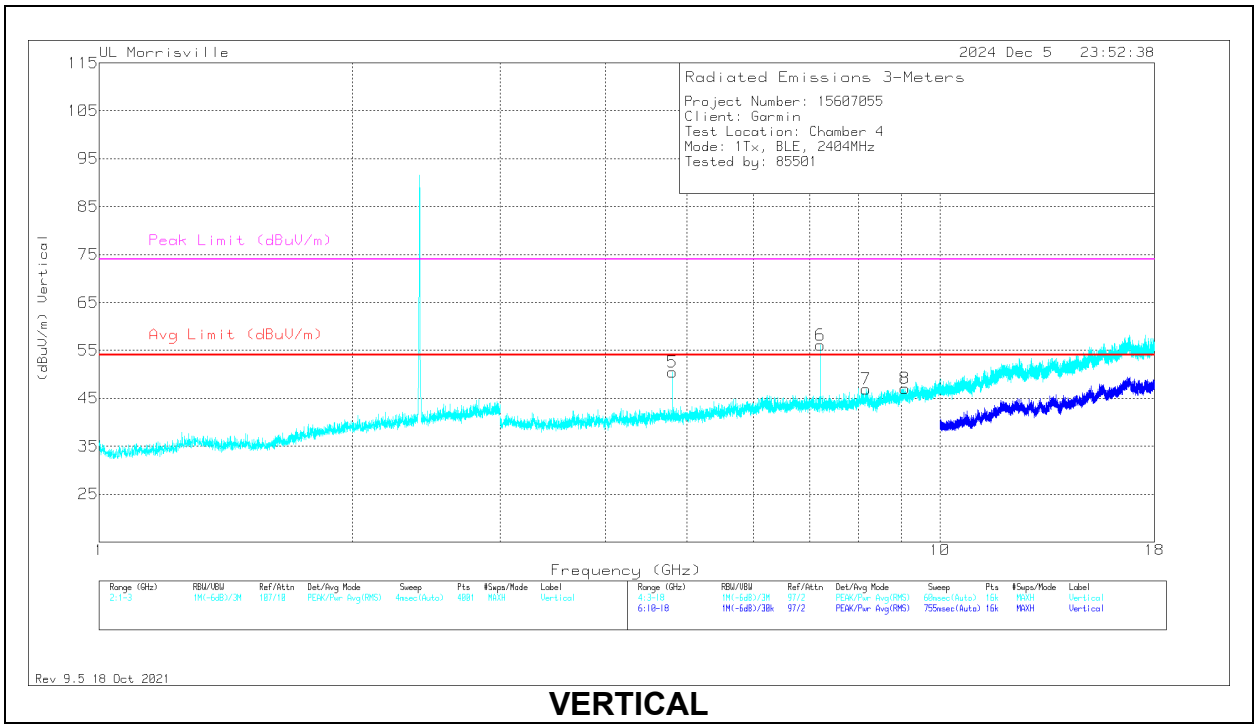
UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL



HORIZONTAL



VERTICAL

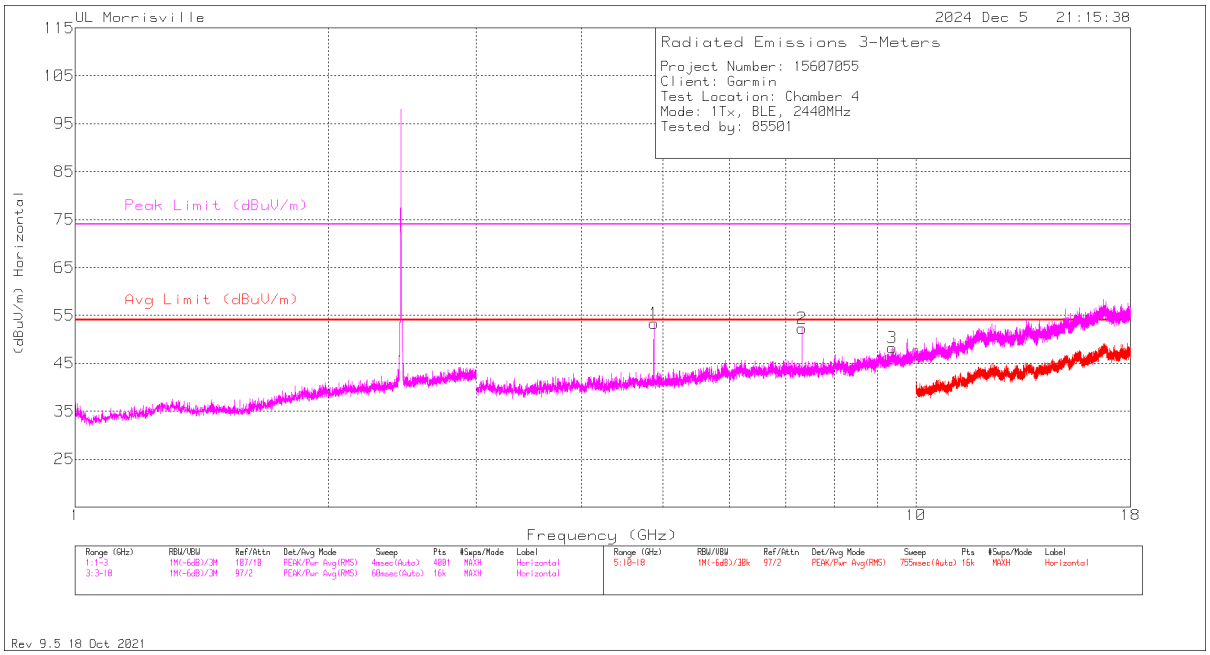
This report shall not be reproduced except in full, without the written approval of UL LLC

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	89509 ACF (dB/m)	Gain/Loss (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 4.80706	50.37	PK2	34.1	-31.3	0	53.17	-	-	74	-20.83	218	101	H
	* ** 4.80691	43.55	ADV	34.1	-31.3	-1.41	44.94	54	-9.06	-	-	218	101	H
3	* ** 7.64438	37.05	Pk	35.7	-27.2	0	45.55	54	-8.45	74	-28.45	0-360	100	H
4	* ** 9.00281	36.24	Pk	36.2	-24.9	0	47.54	54	-6.46	74	-26.46	0-360	100	H
5	* ** 4.80694	48.95	PK2	34.1	-31.3	0	51.75	-	-	74	-22.25	158	104	V
	* ** 4.80695	40.67	ADV	34.1	-31.3	-1.41	42.06	54	-11.94	-	-	158	104	V
7	* ** 8.17125	37.69	Pk	35.8	-26.6	0	46.89	54	-7.11	74	-27.11	0-360	200	V
8	* ** 9.08625	35.48	Pk	36.3	-24.7	0	47.08	54	-6.92	74	-26.92	0-360	200	V
2	7.21031	46.3	Pk	35.6	-27.9	0	54	-	-	-	-	0-360	100	H
6	7.21031	48.37	Pk	35.6	-27.9	0	56.07	-	-	-	-	0-360	200	V

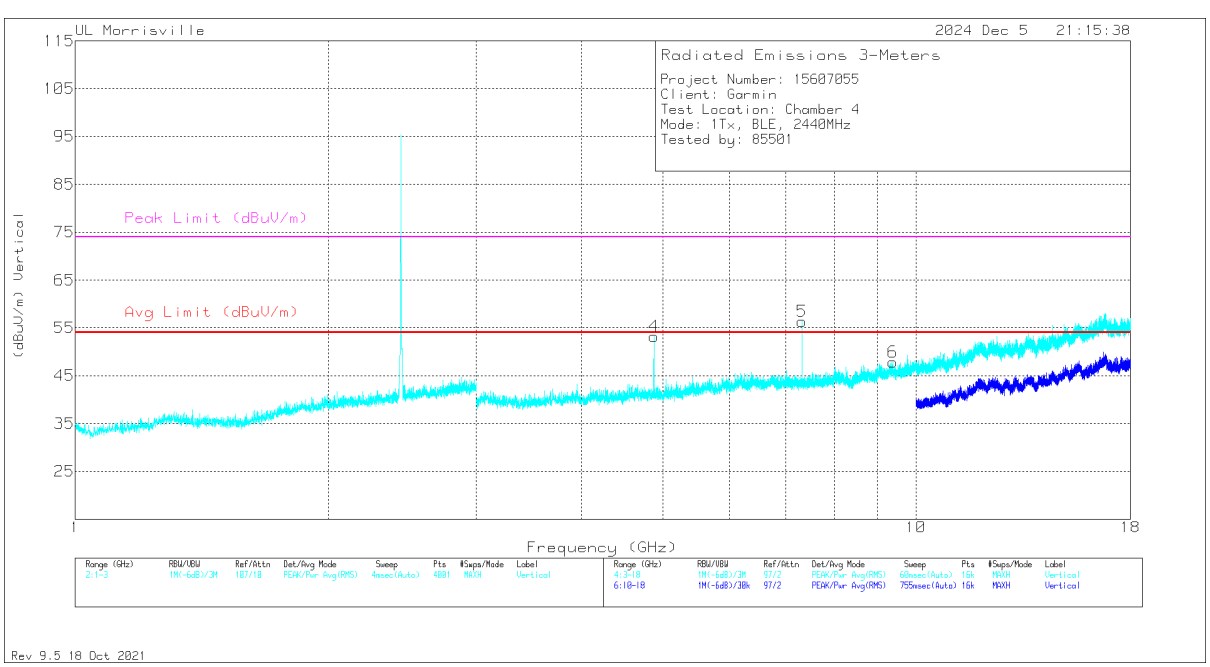
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
PK2 - Maximum Peak
ADV - Linear Voltage Average

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

MID CHANNEL



HORIZONTAL



VERTICAL

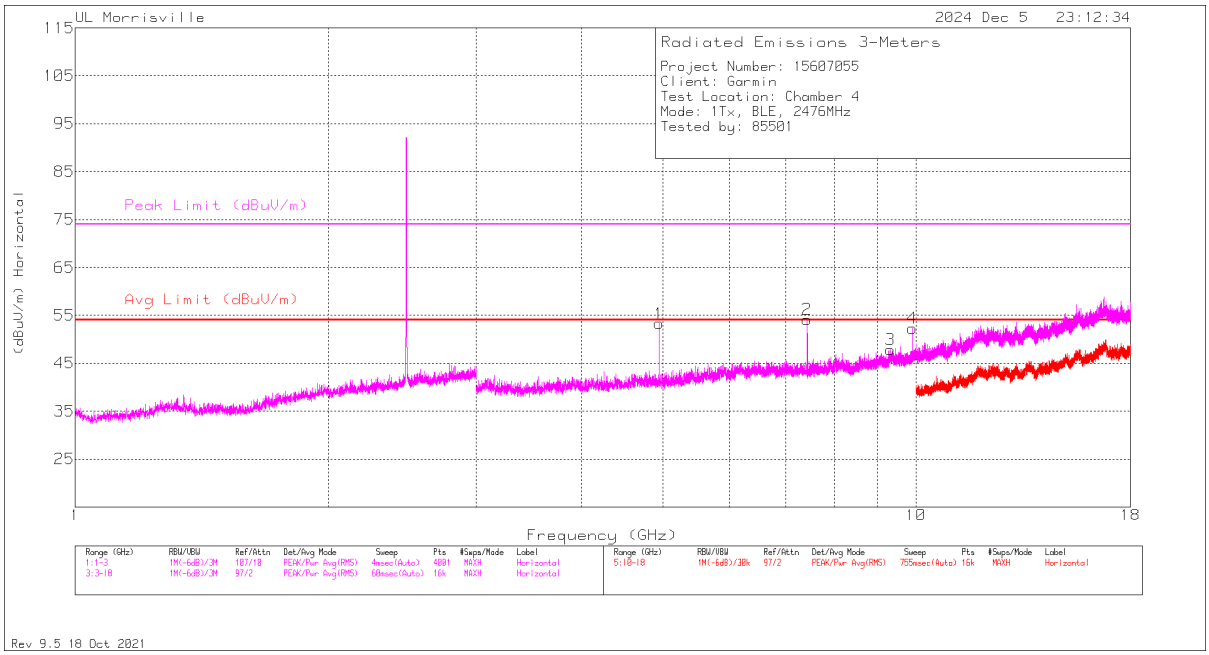
This report shall not be reproduced except in full, without the written approval of UL LLC

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	89509 ACF (dB/m)	Gain/Loss (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 4.88072	52.93	PK2	34	-31	0	55.93	-	-	74	-18.07	220	117	H
	* ** 4.88034	45.81	ADV	34	-31	-1.41	47.4	54	-6.6	-	-	220	117	H
2	* ** 7.31885	46.93	PK2	35.6	-27.7	0	54.83	-	-	74	-19.17	114	105	H
	* ** 7.31895	39.12	ADV	35.6	-27.7	-1.41	45.61	54	-8.39	-	-	114	105	H
3	* ** 9.36831	37.63	PK2	36.5	-24.6	0	49.53	-	-	74	-24.47	296	378	H
	* ** 9.36853	24.77	ADV	36.5	-24.6	-1.41	35.26	54	-18.74	-	-	296	378	H
4	* ** 4.87934	50.02	PK2	34	-31	0	53.02	-	-	74	-20.98	229	184	V
	* ** 4.88011	42.47	ADV	34	-31	-1.41	44.06	54	-9.94	-	-	229	184	V
5	* ** 7.32108	48.73	PK2	35.6	-27.7	0	56.63	-	-	74	-17.37	149	211	V
	* ** 7.3211	41.4	ADV	35.6	-27.7	-1.41	47.89	54	-6.11	-	-	149	211	V
6	* ** 9.38344	36.23	Pk	36.6	-25	0	47.83	54	-6.17	74	-26.17	0-360	200	V

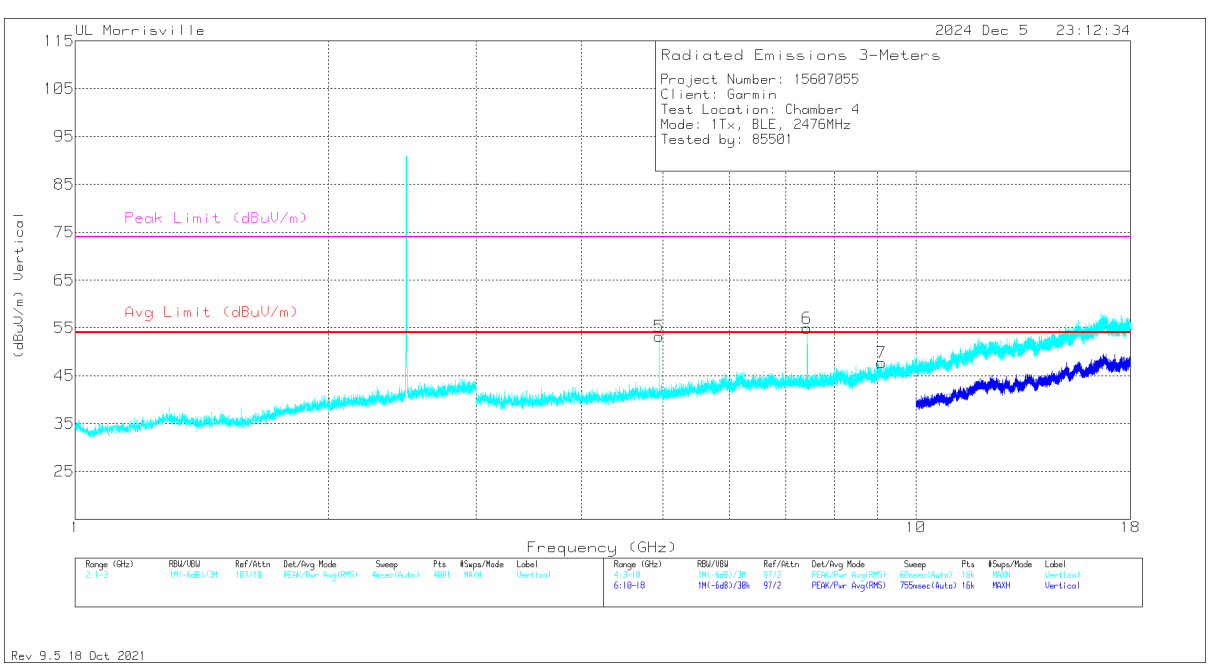
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
PK2 - Maximum Peak
ADV - Linear Voltage Average

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

HIGH CHANNEL



HORIZONTAL



VERTICAL

This report shall not be reproduced except in full, without the written approval of UL LLC

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	89509 ACF (dB/m)	Gain/Loss (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 4.95242	52.08	PK2	33.9	-31	0	54.98	-	-	74	-19.02	213	103	H
	* ** 4.95201	47.46	ADV	33.9	-31	-1.41	48.95	54	-5.05	-	-	213	103	H
2	* ** 7.42719	48.93	PK2	35.7	-27.8	0	56.83	-	-	74	-17.17	162	105	H
	* ** 7.42843	42.42	ADV	35.7	-27.8	-1.41	48.91	54	-5.09	-	-	162	105	H
3	* ** 9.32156	35.96	Pk	36.4	-24.5	0	47.86	54	-6.14	74	-26.14	0-360	100	H
5	* ** 4.95145	51.9	PK2	33.9	-31	0	54.8	-	-	74	-19.2	192	149	V
	* ** 4.95198	47.37	ADV	33.9	-31	-1.41	48.86	54	-5.14	-	-	192	149	V
6	* ** 7.42853	50.08	PK2	35.7	-27.8	0	57.98	-	-	74	-16.02	233	205	V
	* ** 7.42858	44.16	ADV	35.7	-27.8	-1.41	50.65	54	-3.35	-	-	233	205	V
7	* ** 9.11063	35.89	Pk	36.3	-24.5	0	47.69	54	-6.31	74	-26.31	0-360	200	V
4	9.90469	40.52	Pk	37	-25.2	0	52.32	-	-	-	-	0-360	100	H

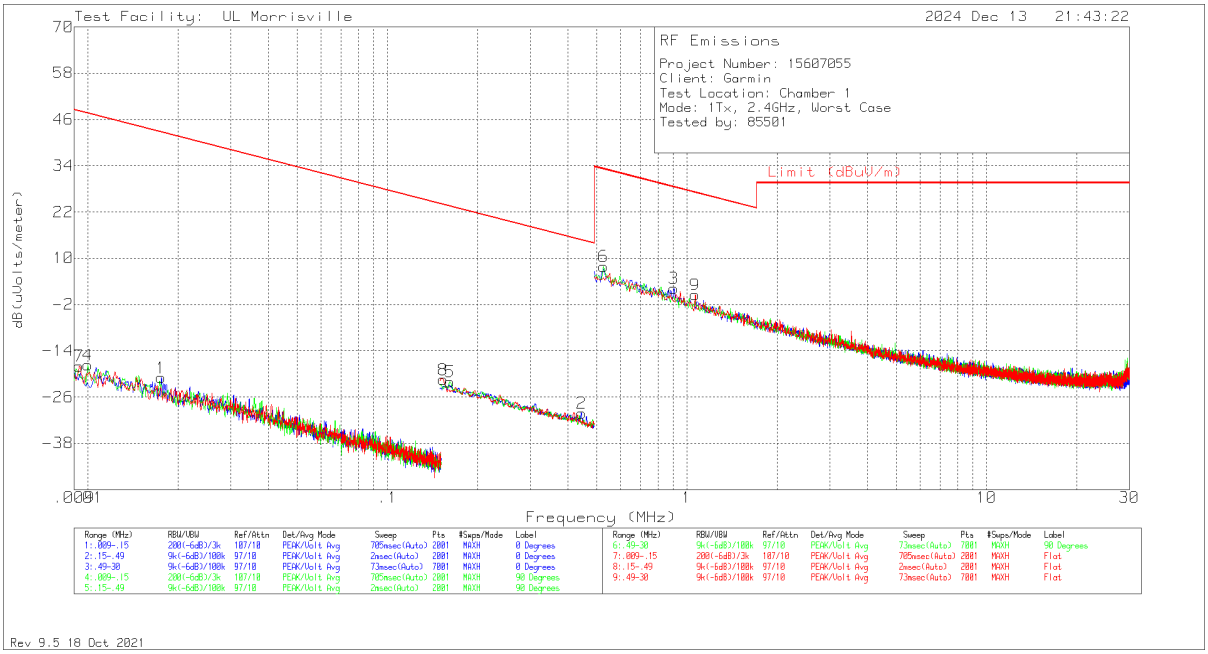
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
PK2 - Maximum Peak
ADV - Linear Voltage Average

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

10.2. WORST CASE SPURIOUS BELOW 30MHZ

Note: All measurements were made at a test distance of 3 m. The measured data was extrapolated from the test distance (3m) to the specification distance (300 m from 9-490 kHz and 30 m from 490 kHz – 30 MHz) to clearly show the relative levels of fundamental and spurious emissions and demonstrate compliance with the requirement that the level of any spurious emissions be below the level of the intentionally transmitted signal. The extrapolation factor for the limits were 40*Log (test distance / specification distance).

10.2.1. 2.4 WLAN

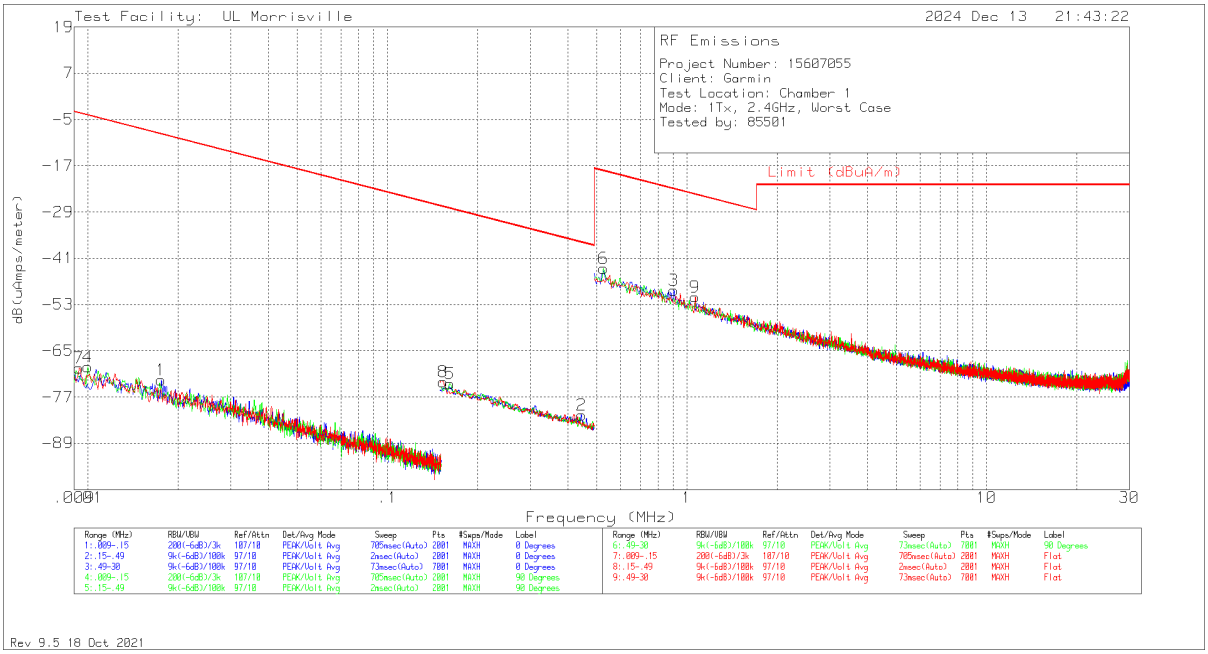


ANTENNA- THREE ORIENTATIONS (E-FIELD)

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	135144 (dB/m)	Gain/Loss (dB)	Dist. Corr. Factor (dB)	Corrected Reading dB(uVolts/meter)	QP/AV Limit (dBuV/m)	PK Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Loop Angle
7	.00936	43.08	Pk	18.8	.1	-80	-18.02	48.18	68.18	-66.2	0-360	Flat
4	.00999	43.96	Pk	18.2	.1	-80	-17.74	47.61	67.61	-65.35	0-360	90 degs
1	.01759	43.99	Pk	14.9	.1	-80	-21.01	42.7	62.7	-63.71	0-360	0 degs
8	.15357	47.4	Pk	11	.1	-80	-21.5	23.88	43.88	-45.38	0-360	Flat
5	.16173	46.8	Pk	11	.1	-80	-22.1	23.43	43.43	-45.53	0-360	90 degs
2	.44427	38.68	Pk	11	.1	-80	-30.22	14.65	34.65	-44.87	0-360	0 degs
6	.52794	36.8	Pk	11	.1	-40	7.9	33.15	-	-25.25	0-360	90 degs
3	.90317	31.07	Pk	11	.1	-40	2.17	28.49	-	-26.32	0-360	0 degs
9	1.06338	29.37	Pk	11	.1	-40	.47	27.07	-	-26.6	0-360	Flat

Pk - Peak detector

This report shall not be reproduced except in full, without the written approval of UL LLC



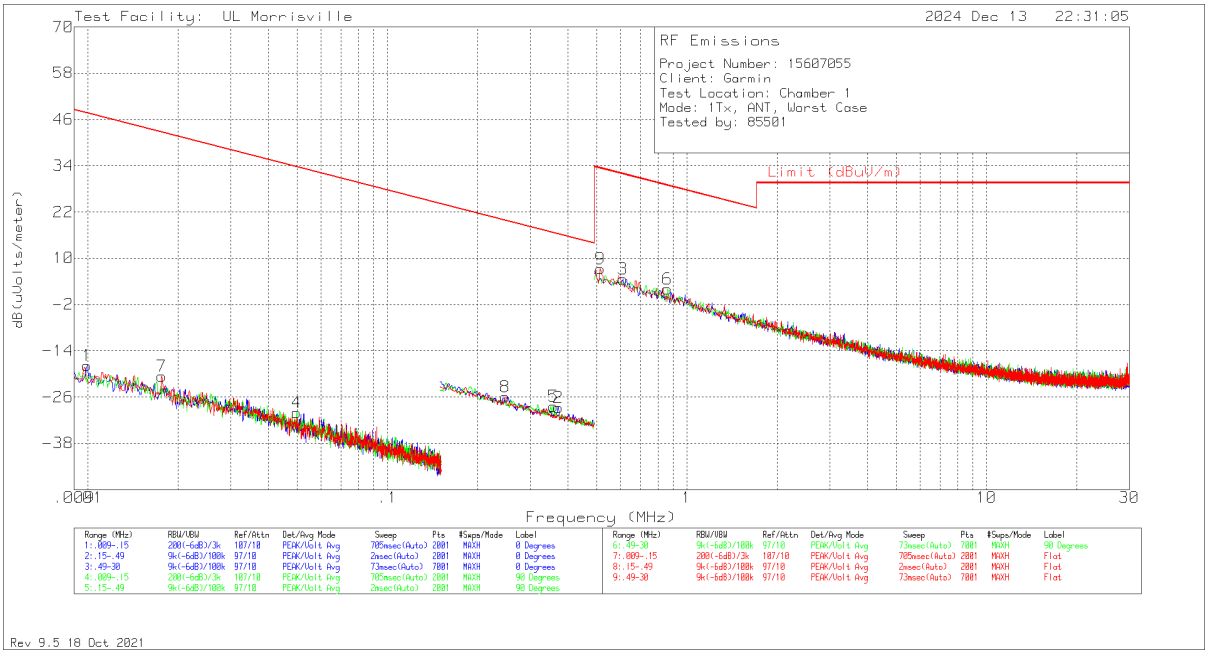
ANTENNA- THREE ORIENTATIONS (H-FIELD)

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	135144 (dB/m)	Gain/Loss (dB)	Dist. Corr. Factor (dB)	Corrected Reading dB(uAmps/meter)	QP/AV Limit (dBuA/m)	PK Limit (dBuA/m)	Margin (dB)	Azimuth (Degs)	Loop Angle
7	.00936	43.08	Pk	-32.7	.1	-80	-69.52	-3.32	16.68	-66.2	0-360	Flat
4	.00999	43.96	Pk	-33.3	.1	-80	-69.24	-3.89	16.11	-65.35	0-360	90 degs
1	.01759	43.99	Pk	-36.6	.1	-80	-72.51	-8.8	11.2	-63.71	0-360	0 degs
8	.15357	47.4	Pk	-40.5	.1	-80	-73	-27.62	-7.62	-45.38	0-360	Flat
5	.16173	46.8	Pk	-40.5	.1	-80	-73.6	-28.07	-8.07	-45.53	0-360	90 degs
2	.44427	38.68	Pk	-40.5	.1	-80	-81.72	-36.85	-16.85	-44.87	0-360	0 degs
6	.52794	36.8	Pk	-40.5	.1	-40	-43.6	-18.35	-	-25.25	0-360	90 degs
3	.90317	31.07	Pk	-40.5	.1	-40	-49.33	-23.01	-	-26.32	0-360	0 degs
9	1.06338	29.37	Pk	-40.5	.1	-40	-51.03	-24.43	-	-26.6	0-360	Flat

Pk - Peak detector

This report shall not be reproduced except in full, without the written approval of UL LLC

10.2.2. ANT/ANT+

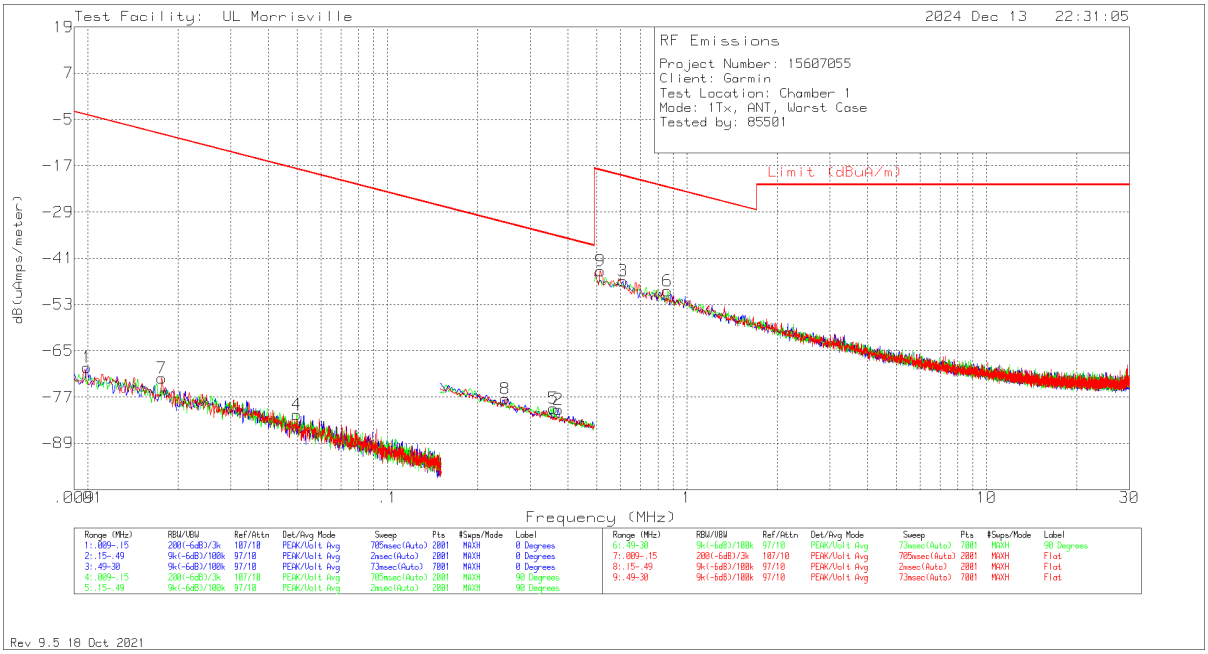


ANTENNA- THREE ORIENTATIONS (E-FIELD)

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	135144 (dB/m)	Gain/Loss (dB)	Dist. Corr. Factor (dB)	Corrected Reading dB(uVolts/meter)	QP/AV Limit (dBuV/m)	PK Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Loop Angle
1	.00992	43.82	Pk	18.3	.1	-80	-17.78	47.67	67.67	-65.45	0-360	0 degs
7	.01766	44.42	Pk	14.9	.1	-80	-20.58	42.66	62.66	-63.24	0-360	Flat
4	.04983	38.39	Pk	11.5	.1	-80	-30.01	33.66	53.66	-63.67	0-360	90 degs
8	.24707	43.09	Pk	10.9	.1	-80	-25.91	19.75	39.75	-45.66	0-360	Flat
5	.35766	40.64	Pk	10.9	.1	-80	-28.36	16.53	36.53	-44.89	0-360	90 degs
2	.37168	40.27	Pk	10.9	.1	-80	-28.73	16.2	36.2	-44.93	0-360	0 degs
9	.5153	36.19	Pk	11	.1	-40	7.29	33.36	-	-26.07	0-360	Flat
3	.61226	33.54	Pk	11	.1	-40	4.64	31.87	-	-27.23	0-360	0 degs
6	.86101	30.92	Pk	11	.1	-40	2.02	28.9	-	-26.88	0-360	90 degs

Pk - Peak detector

This report shall not be reproduced except in full, without the written approval of UL LLC



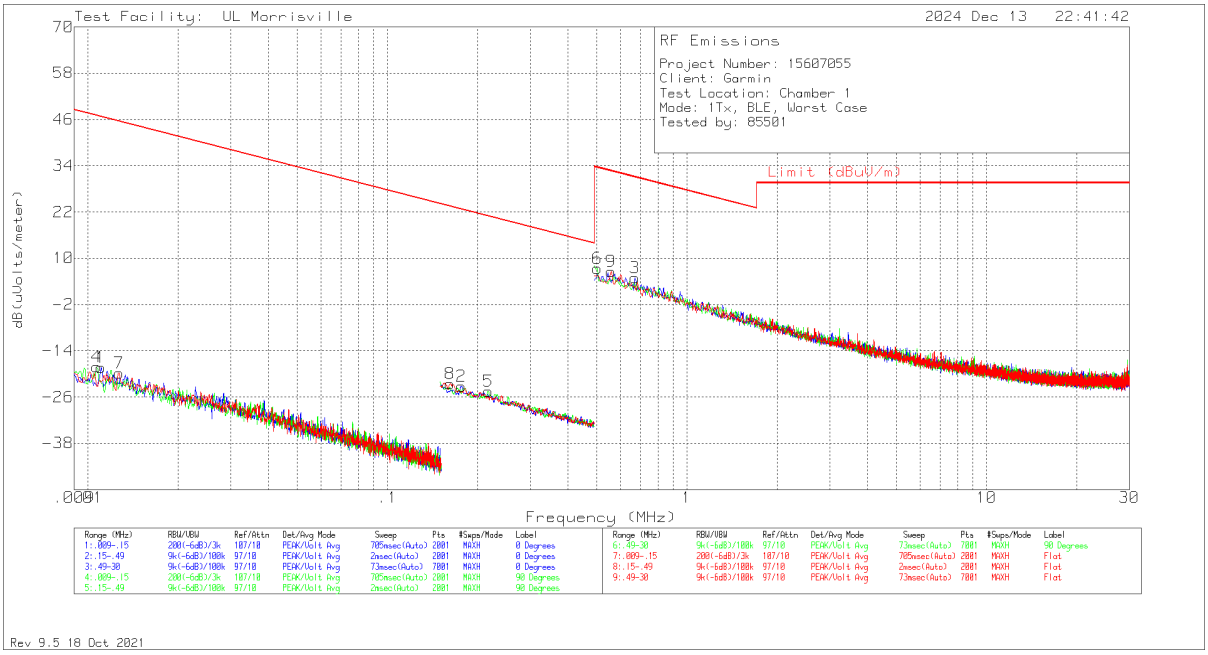
ANTENNA- THREE ORIENTATIONS (H-FIELD)

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	135144 (dB/m)	Gain/Loss (dB)	Dist. Corr. Factor (dB)	Corrected Reading dB(uAmps/meter)	QP/AV Limit (dBuA/m)	PK Limit (dBuA/m)	Margin (dB)	Azimuth (Degs)	Loop Angle
1	.00992	43.82	Pk	-33.2	.1	-80	-69.28	-3.83	16.17	-65.45	0-360	0 degs
7	.01766	44.42	Pk	-36.6	.1	-80	-72.08	-8.84	11.16	-63.24	0-360	Flat
4	.04983	38.39	Pk	-40	.1	-80	-81.51	-17.84	2.16	-63.67	0-360	90 degs
8	.24707	43.09	Pk	-40.6	.1	-80	-77.41	-31.75	-11.75	-45.66	0-360	Flat
5	.35766	40.64	Pk	-40.6	.1	-80	-79.86	-34.97	-14.97	-44.89	0-360	90 degs
2	.37168	40.27	Pk	-40.6	.1	-80	-80.23	-35.3	-15.3	-44.93	0-360	0 degs
9	.5153	36.19	Pk	-40.5	.1	-40	-44.21	-18.14	-	-26.07	0-360	Flat
3	.61226	33.54	Pk	-40.5	.1	-40	-46.86	-19.63	-	-27.23	0-360	0 degs
6	.86101	30.92	Pk	-40.5	.1	-40	-49.48	-22.6	-	-26.88	0-360	90 degs

Pk - Peak detector

This report shall not be reproduced except in full, without the written approval of UL LLC

10.2.3. BLE

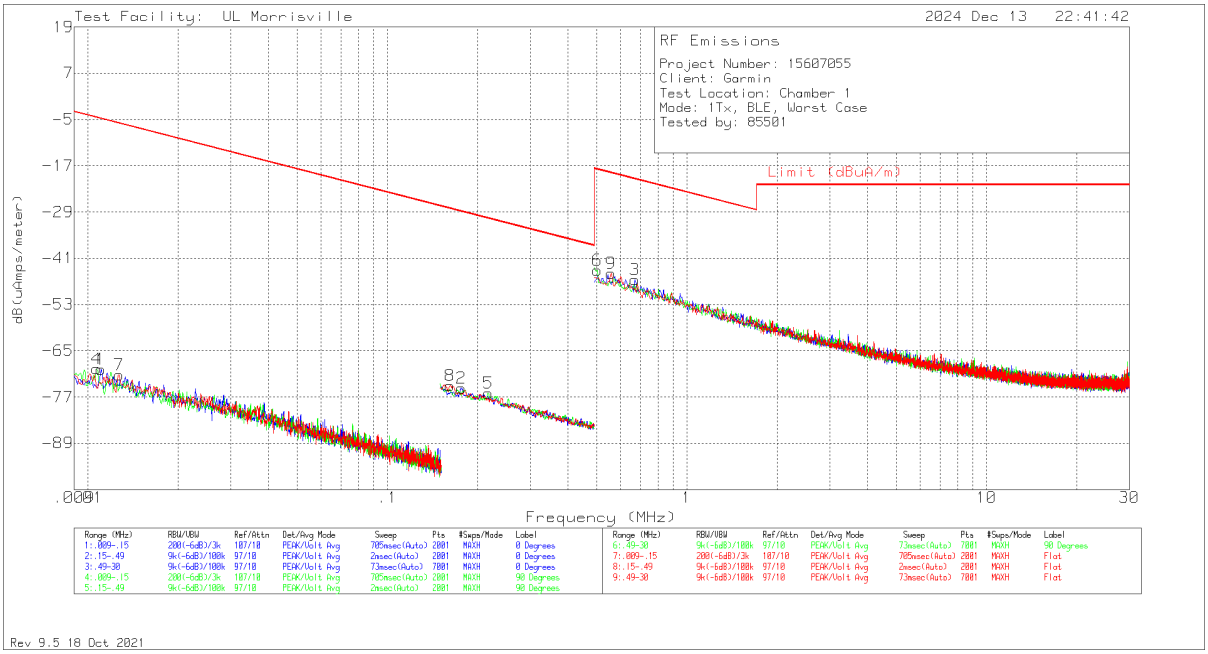


ANTENNA- THREE ORIENTATIONS (E-FIELD)

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	135144 (dB/m)	Gain/Loss (dB)	Dist. Corr. Factor (dB)	Corrected Reading dB(uVolts/meter)	QP/AV Limit (dBuV/m)	PK Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Loop Angle
4	.0107	43.78	Pk	17.9	.1	-80	-18.22	47.01	67.01	-65.23	0-360	90 degs
1	.01106	43.89	Pk	17.7	.1	-80	-18.31	46.73	66.73	-65.04	0-360	0 degs
7	.01269	43.16	Pk	17	.1	-80	-19.74	45.53	65.53	-65.27	0-360	Flat
8	.16207	46.34	Pk	11	.1	-80	-22.56	23.41	43.41	-45.97	0-360	Flat
2	.17661	45.69	Pk	11	.1	-80	-23.21	22.66	42.66	-45.87	0-360	0 degs
5	.21707	44.5	Pk	10.9	.1	-80	-24.5	20.87	40.87	-45.37	0-360	90 degs
6	.50265	36.25	Pk	11	.1	-40	7.35	33.58	-	-26.23	0-360	90 degs
9	.55746	35.5	Pk	11	.1	-40	6.6	32.68	-	-26.08	0-360	Flat
3	.67129	33.81	Pk	11	.1	-40	4.91	31.07	-	-26.16	0-360	0 degs

Pk - Peak detector

This report shall not be reproduced except in full, without the written approval of UL LLC



ANTENNA- THREE ORIENTATIONS (H-FIELD)

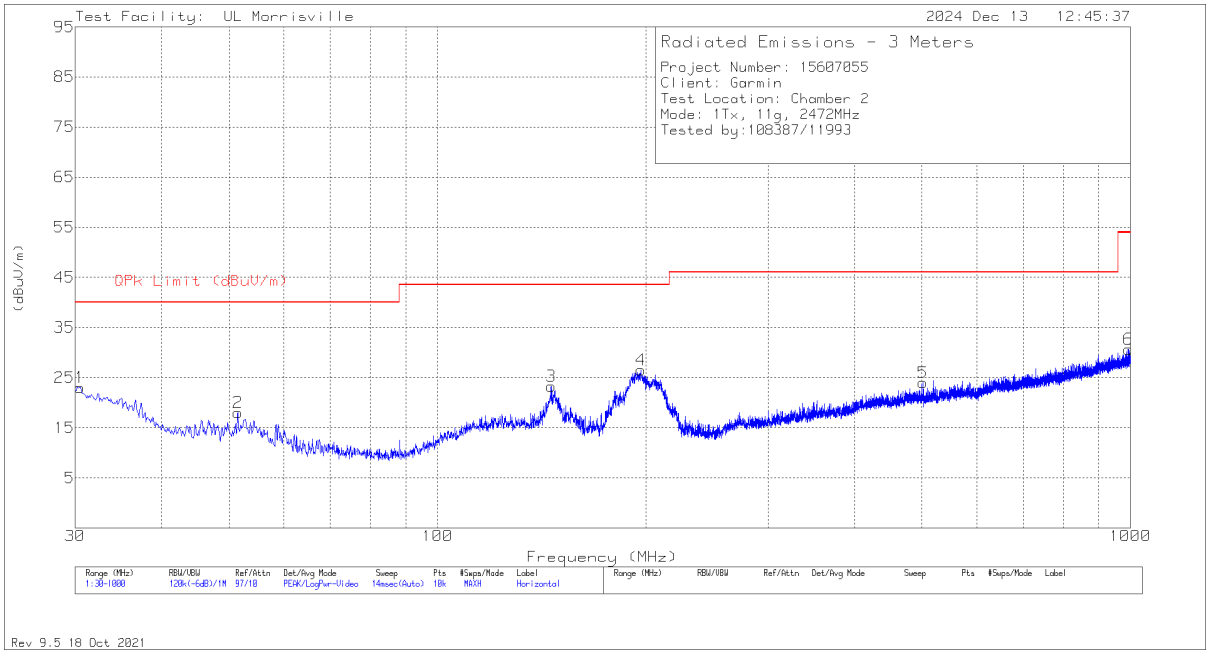
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	135144 (dB/m)	Gain/Loss (dB)	Dist. Corr. Factor (dB)	Corrected Reading dB(uAmps/meter)	QP/AV Limit (dBuA/m)	PK Limit (dBuA/m)	Margin (dB)	Azimuth (Degs)	Loop Angle
4	.0107	43.78	Pk	-33.6	.1	-80	-69.72	-4.49	15.51	-65.23	0-360	90 degs
1	.01106	43.89	Pk	-33.8	.1	-80	-69.81	-4.77	15.23	-65.04	0-360	0 degs
7	.01269	43.16	Pk	-34.5	.1	-80	-71.24	-5.97	14.03	-65.27	0-360	Flat
8	.16207	46.34	Pk	-40.5	.1	-80	-74.06	-28.09	-8.09	-45.97	0-360	Flat
2	.17661	45.69	Pk	-40.5	.1	-80	-74.71	-28.84	-8.84	-45.87	0-360	0 degs
5	.21707	44.5	Pk	-40.6	.1	-80	-76	-30.63	-10.63	-45.37	0-360	90 degs
6	.50265	36.25	Pk	-40.5	.1	-40	-44.15	-17.92	-	-26.23	0-360	90 degs
9	.55746	35.5	Pk	-40.5	.1	-40	-44.9	-18.82	-	-26.08	0-360	Flat
3	.67129	33.81	Pk	-40.5	.1	-40	-46.59	-20.43	-	-26.16	0-360	0 degs

Pk - Peak detector

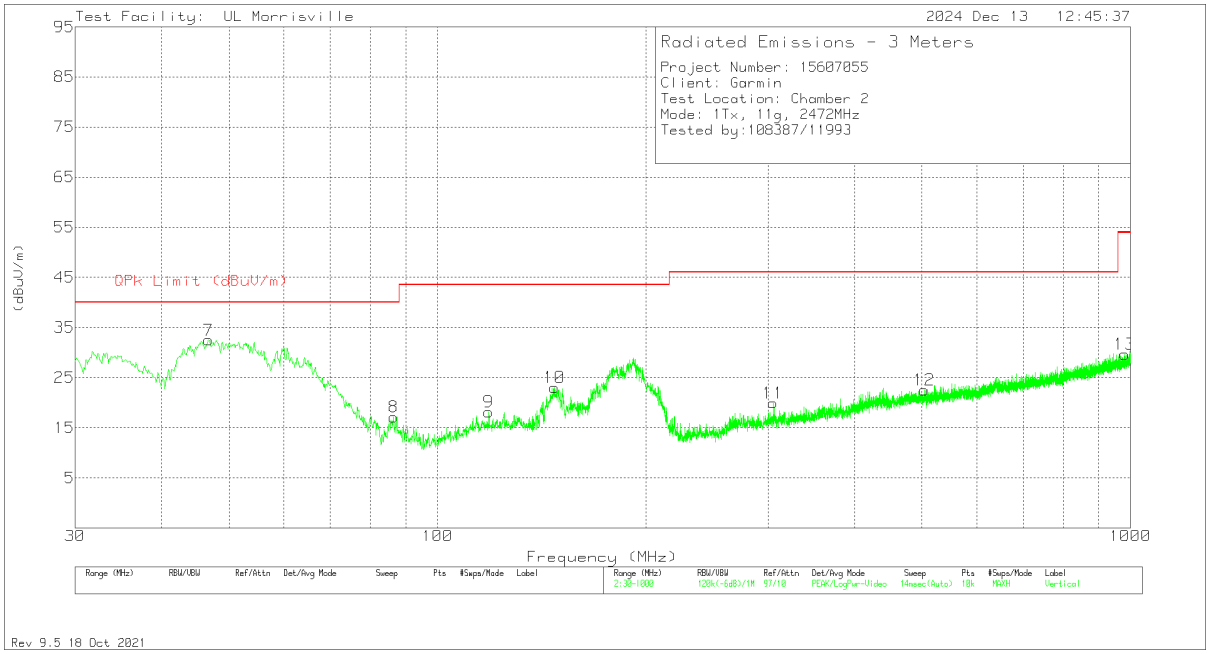
This report shall not be reproduced except in full, without the written approval of UL LLC

10.3. WORST CASE SPURIOUS BELOW 1 GHZ

10.3.1. 2.4 WLAN



HORIZONTAL



VERTICAL

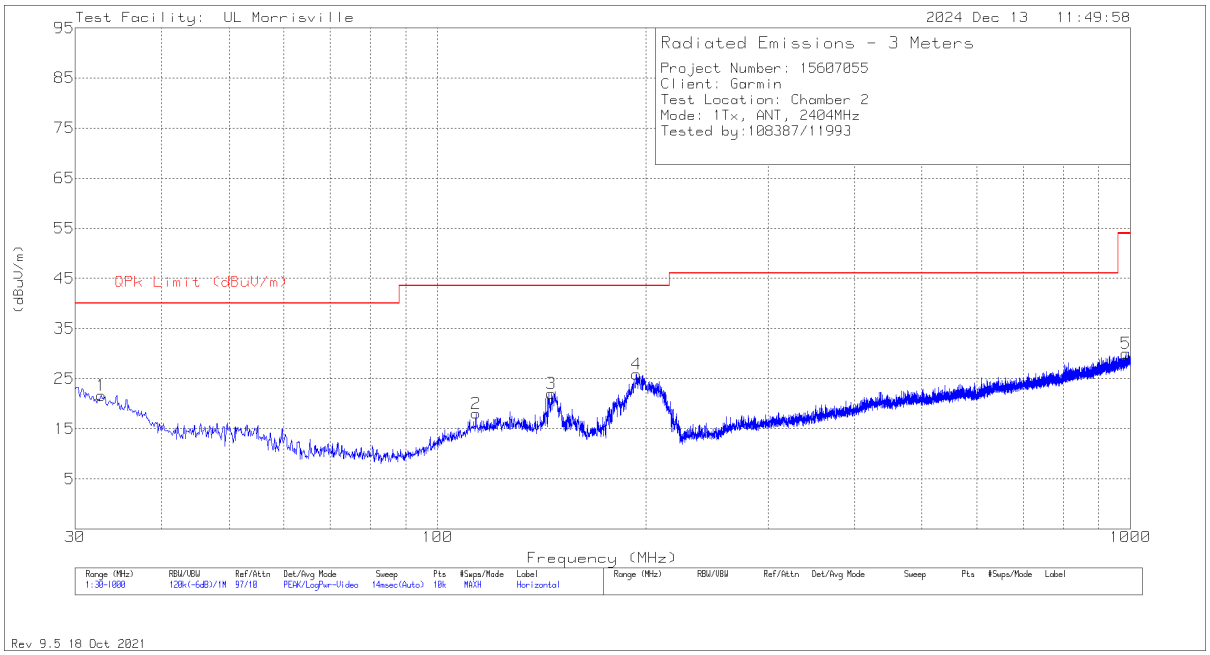
This report shall not be reproduced except in full, without the written approval of UL LLC

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	159203 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
5	** 502.196	28.08	Pk	24.2	-28.3	23.98	46.02	-22.04	0-360	399	H
6	* ** 992.919	25.8	Pk	29.9	-25	30.7	53.97	-23.27	0-360	299	H
9	* ** 118.561	28.65	Pk	20.1	-30.6	18.15	43.52	-25.37	0-360	199	V
12	** 504.039	26.65	Pk	24.2	-28.3	22.55	46.02	-23.47	0-360	101	V
13	* ** 980.6	24.93	Pk	29.8	-25.1	29.63	53.97	-24.34	0-360	199	V
1	30.485	27.55	Pk	27.1	-31.6	23.05	40	-16.95	0-360	199	H
7	46.684	48.18	Pk	15.8	-31.5	32.48	40	-7.52	0-360	101	V
2	51.534	35.29	Pk	14	-31.3	17.99	40	-22.01	0-360	199	H
8	86.454	34.39	Pk	13.8	-31	17.19	40	-22.81	0-360	101	V
3	145.915	34.57	Pk	19.1	-30.4	23.27	43.52	-20.25	0-360	199	H
10	147.564	34.36	Pk	19.1	-30.4	23.06	43.52	-20.46	0-360	101	V
4	196.646	38.11	Pk	18.5	-30.1	26.51	43.52	-17.01	0-360	199	H
11	305.189	29.06	Pk	20.1	-29.2	19.96	46.02	-26.06	0-360	101	V

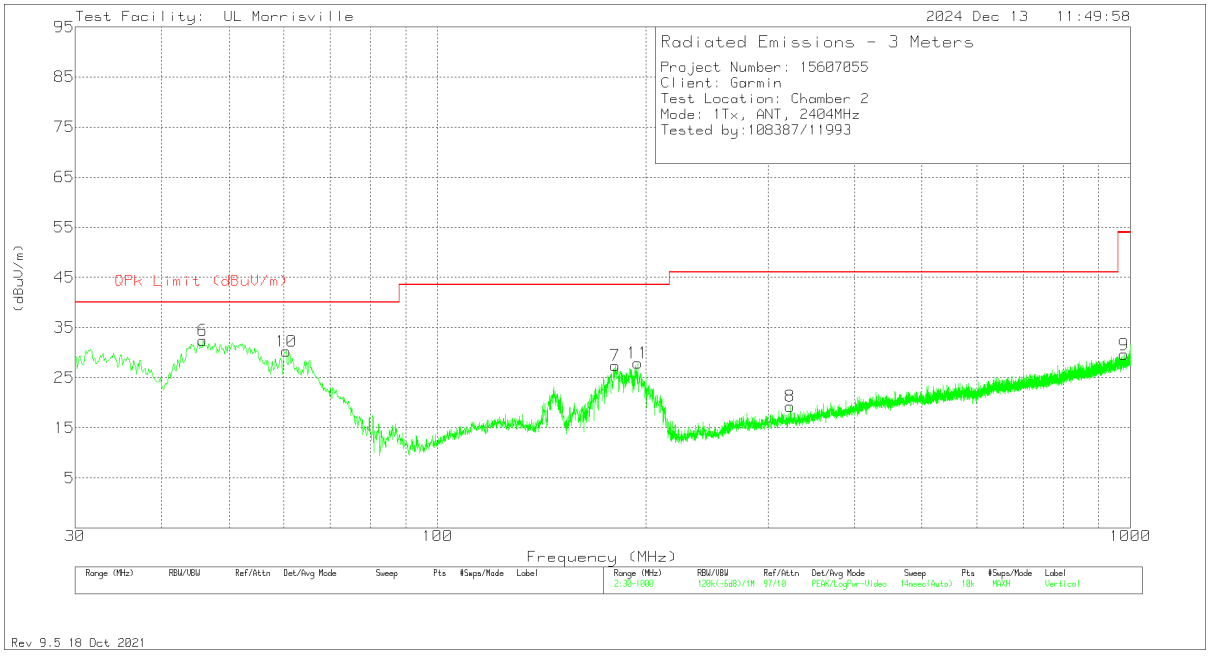
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

10.3.2. ANT/ANT+



HORIZONTAL



VERTICAL

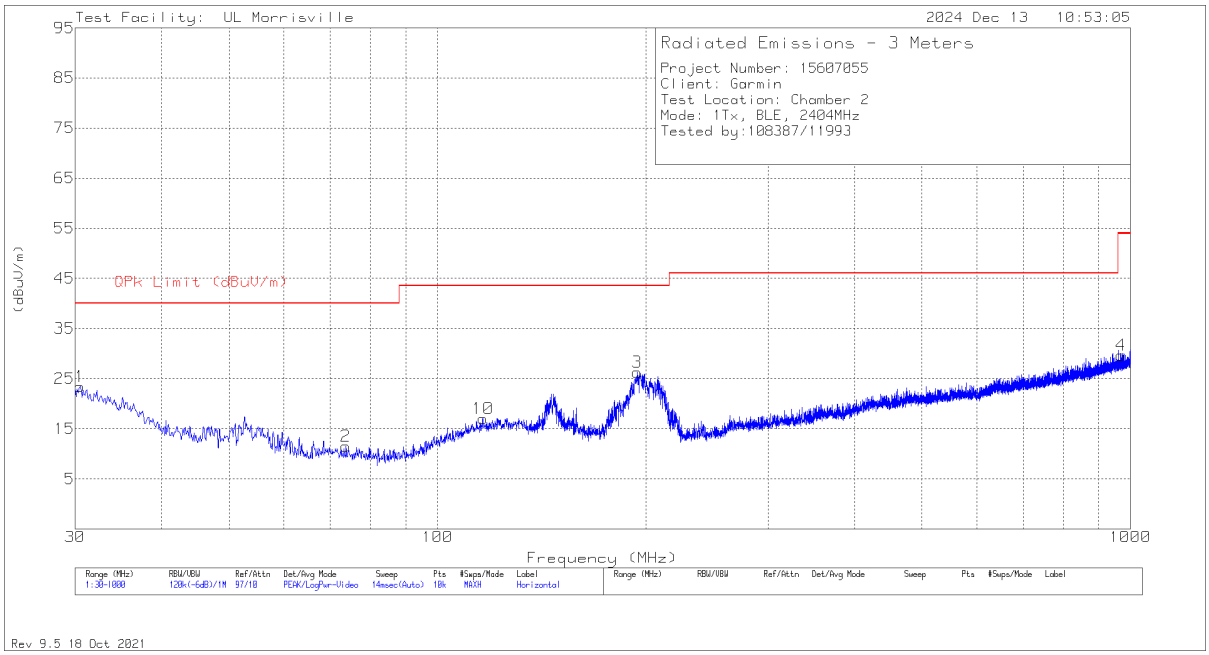
This report shall not be reproduced except in full, without the written approval of UL LLC

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	159203 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	* ** 113.711	29.08	Pk	19.7	-30.7	18.08	43.52	-25.44	0-360	199	H
5	* ** 985.547	25.37	Pk	29.8	-25.1	30.07	53.97	-23.9	0-360	299	H
8	* ** 323.037	27.95	Pk	20.5	-29.2	19.25	46.02	-26.77	0-360	199	V
9	* ** 979.921	25.1	Pk	29.7	-25.2	29.6	53.97	-24.37	0-360	199	V
1	32.716	27.66	Pk	25.6	-31.6	21.66	40	-18.34	0-360	299	H
6	45.811	47.58	Pk	16.3	-31.5	32.38	40	-7.62	0-360	101	V
10	60.458	47.44	Pk	14	-31.2	30.24	40	-9.76	0-360	101	V
3	146.109	33.3	Pk	19.1	-30.4	22	43.52	-21.52	0-360	199	H
7	180.35	39.77	Pk	17.8	-30.2	27.37	43.52	-16.15	0-360	101	V
4	193.93	37.87	Pk	18.1	-30.1	25.87	43.52	-17.65	0-360	199	H
11	194.512	39.85	Pk	18.2	-30.1	27.95	43.52	-15.57	0-360	101	V

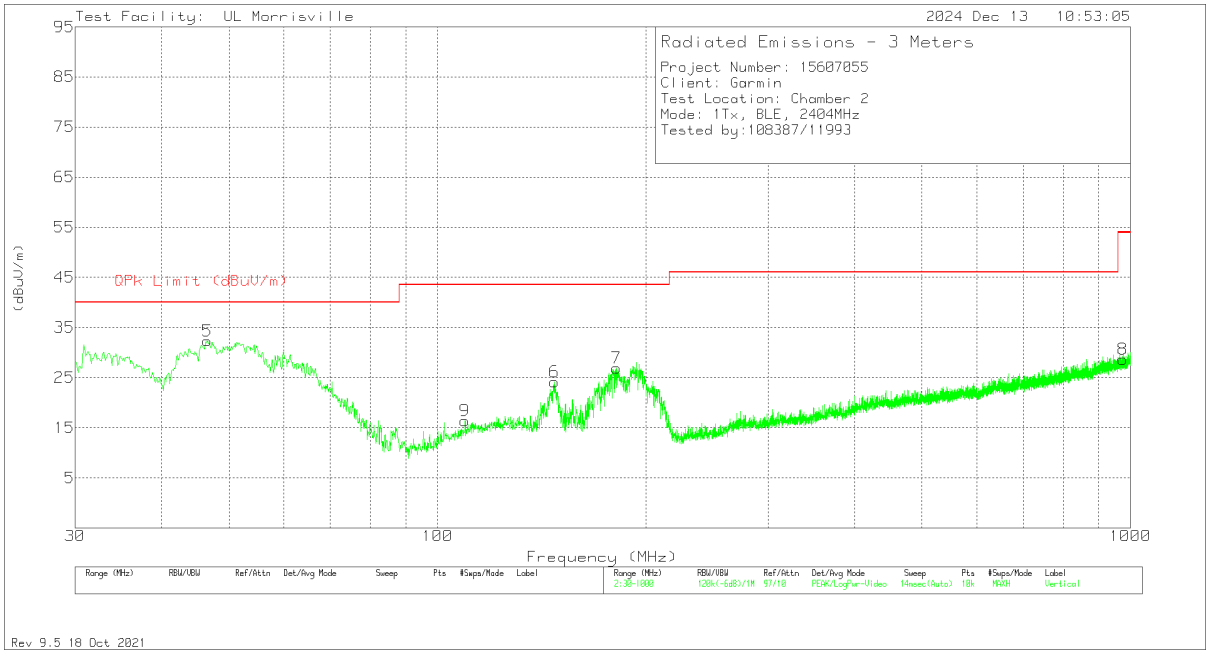
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

10.3.3. BLE



HORIZONTAL



VERTICAL

This report shall not be reproduced except in full, without the written approval of UL LLC

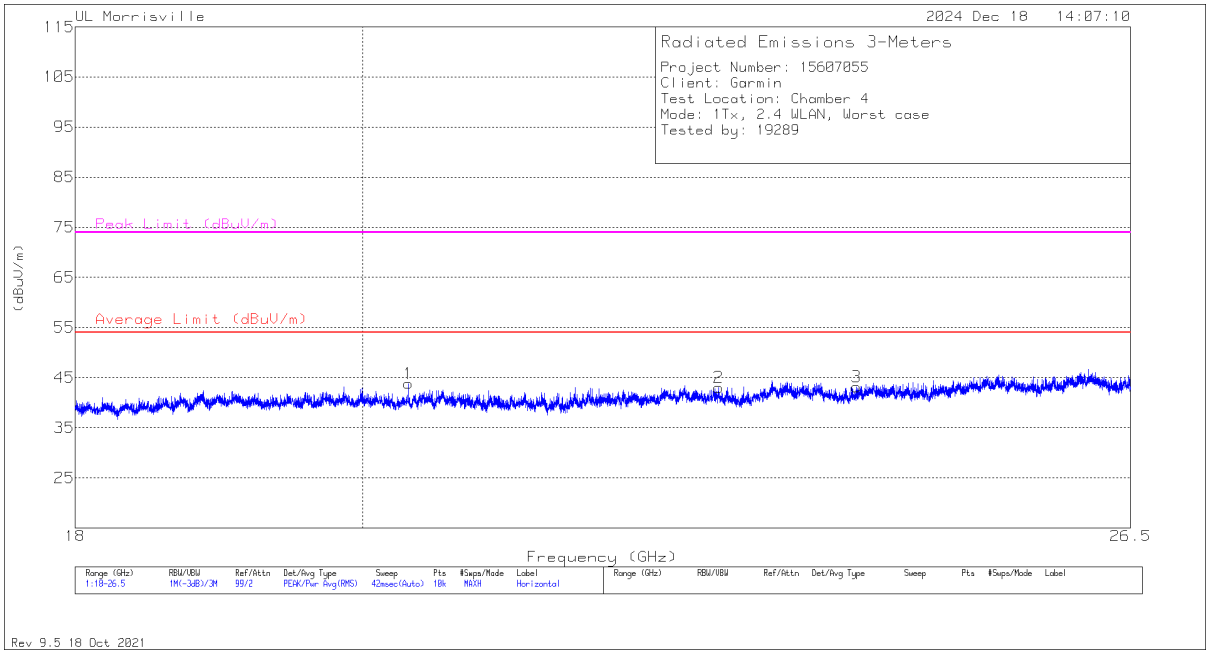
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	159203 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	* ** 73.747	28.23	Pk	14.5	-31.2	11.53	40	-28.47	0-360	199	H
4	* ** 968.863	25.33	Pk	29.7	-25.4	29.63	53.97	-24.34	0-360	199	H
10	* ** 116.427	27.75	Pk	19.9	-30.6	17.05	43.52	-26.47	0-360	101	H
8	* ** 974.78	24.13	Pk	29.7	-25.2	28.63	53.97	-25.34	0-360	299	V
9	* ** 109.54	28.24	Pk	19	-30.8	16.44	43.52	-27.08	0-360	101	V
1	30.485	27.93	Pk	27.1	-31.6	23.43	40	-16.57	0-360	101	H
5	46.49	47.95	Pk	15.9	-31.5	32.35	40	-7.65	0-360	101	V
6	147.37	35.45	Pk	19.1	-30.4	24.15	43.52	-19.37	0-360	101	V
7	181.126	39.24	Pk	17.8	-30.1	26.94	43.52	-16.58	0-360	101	V
3	194.221	38.24	Pk	18.1	-30.1	26.24	43.52	-17.28	0-360	199	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector

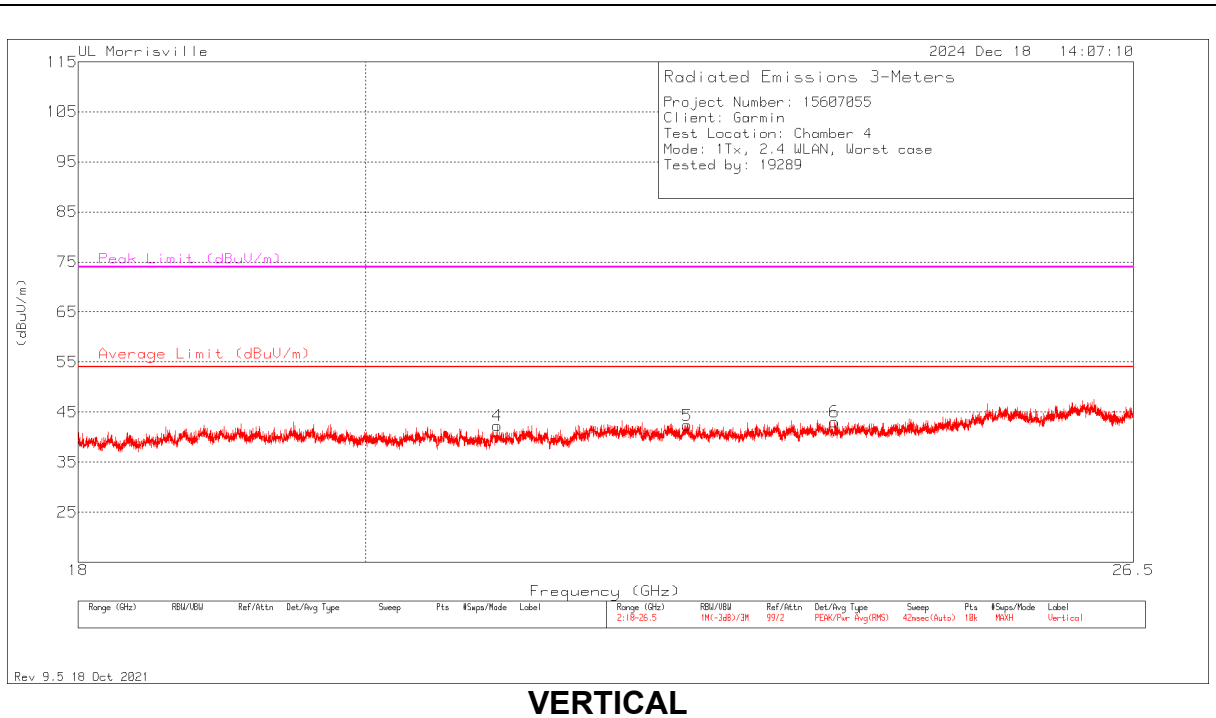
UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

10.4. WORST CASE SPURIOUS 18-26 GHZ

10.4.1. 2.4 WLAN



HORIZONTAL



VERTICAL

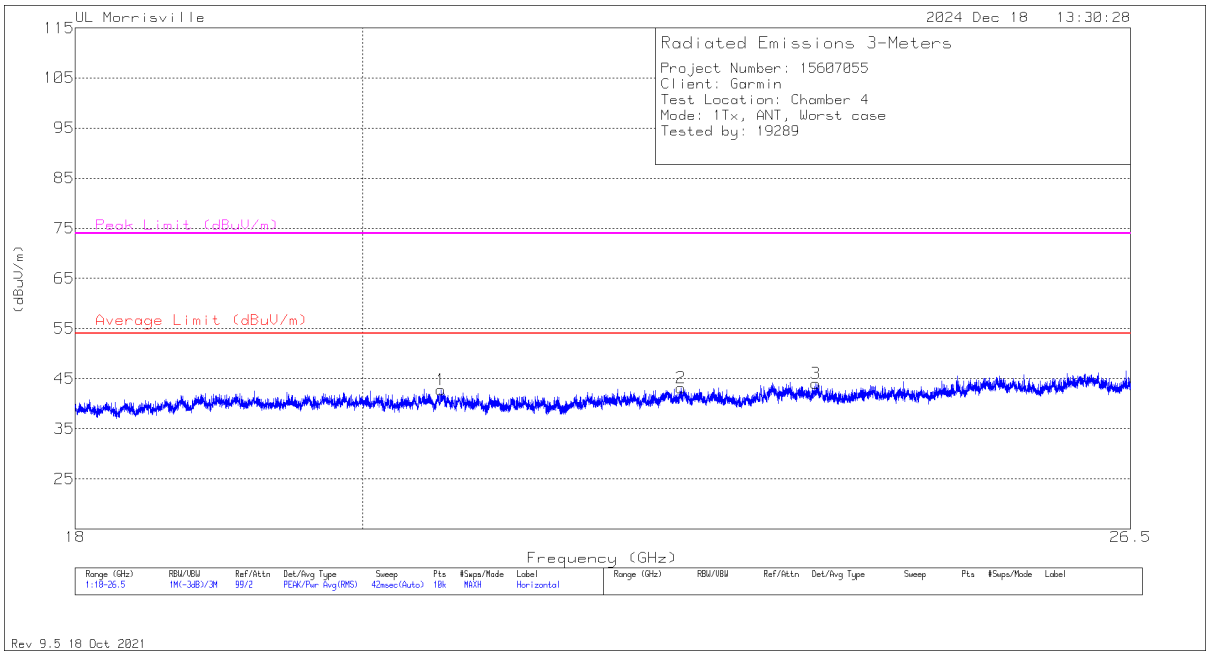
This report shall not be reproduced except in full, without the written approval of UL LLC

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	204704 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 20.33982	51.04	Pk	33.6	-40.8	43.84	54	-10.16	74	-30.16	0-360	100	H
2	* ** 22.78842	48.22	Pk	34.1	-39.3	43.02	54	-10.98	74	-30.98	0-360	100	H
3	* ** 23.9664	46.99	Pk	34.5	-38.3	43.19	54	-10.81	74	-30.81	0-360	200	H
4	* ** 20.98745	49.75	Pk	33.6	-41.1	42.25	54	-11.75	74	-31.75	0-360	200	V
5	* ** 22.50285	47.74	Pk	34.2	-39.6	42.34	54	-11.66	74	-31.66	0-360	150	V
6	* ** 23.75137	46.9	Pk	34.4	-38.3	43	54	-11	74	-31	0-360	200	V

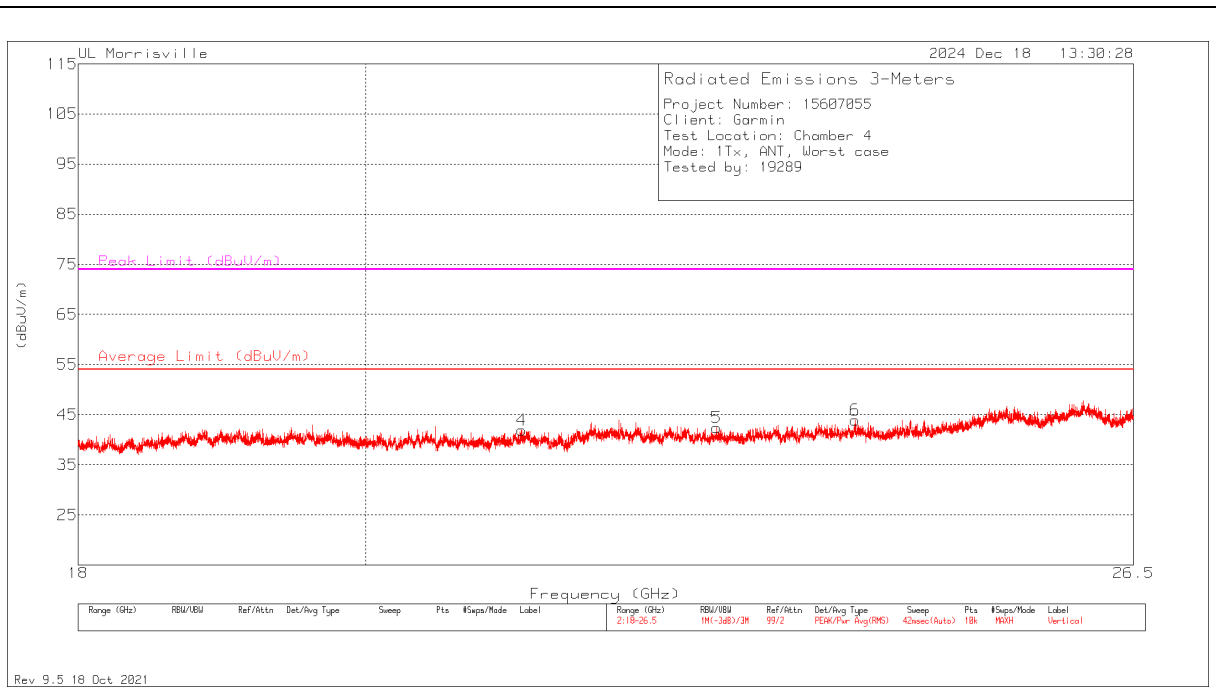
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

10.4.2. ANT/ANT+



HORIZONTAL



VERTICAL

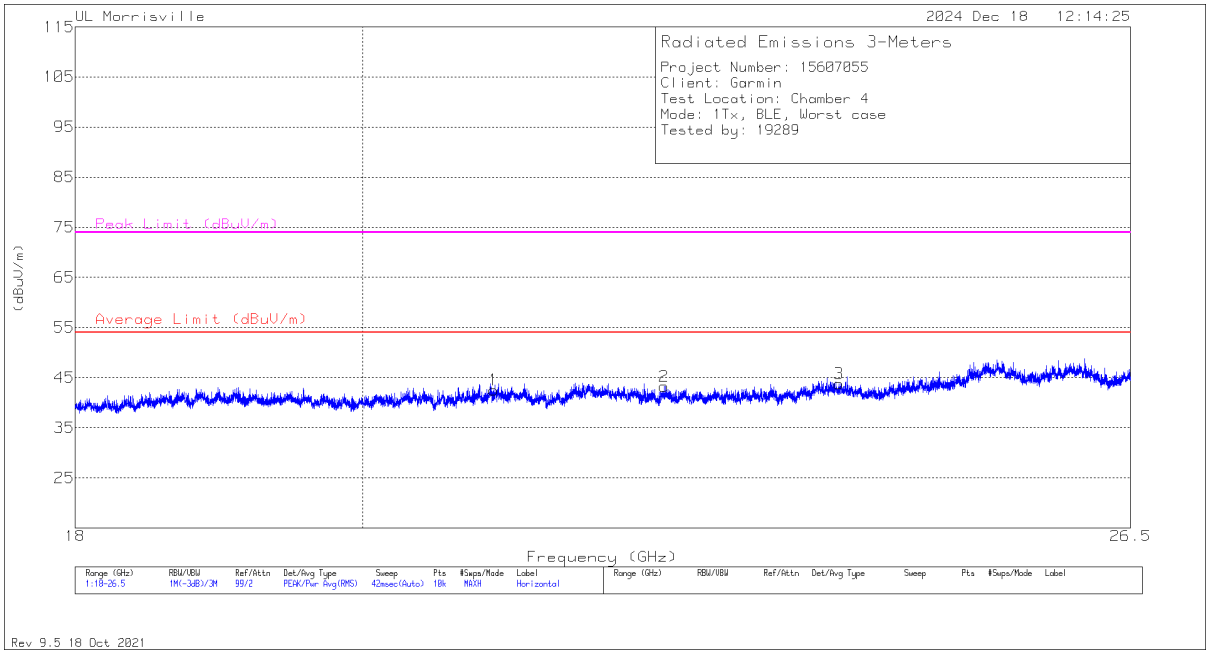
This report shall not be reproduced except in full, without the written approval of UL LLC

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	204704 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 20.58119	49.57	Pk	33.7	-40.5	42.77	54	-11.23	74	-31.23	0-360	100	H
2	* ** 22.4748	48.67	Pk	34.2	-39.7	43.17	54	-10.83	74	-30.83	0-360	150	H
3	* ** 23.61284	48.11	Pk	34.6	-38.7	44.01	54	-9.99	74	-29.99	0-360	100	H
4	* ** 21.17698	48.69	Pk	33.6	-40.4	41.89	54	-12.11	74	-32.11	0-360	150	V
5	* ** 22.74593	47.96	Pk	34.1	-39.7	42.36	54	-11.64	74	-31.64	0-360	300	V
6	* ** 23.93241	47.59	Pk	34.4	-38.1	43.89	54	-10.11	74	-30.11	0-360	150	V

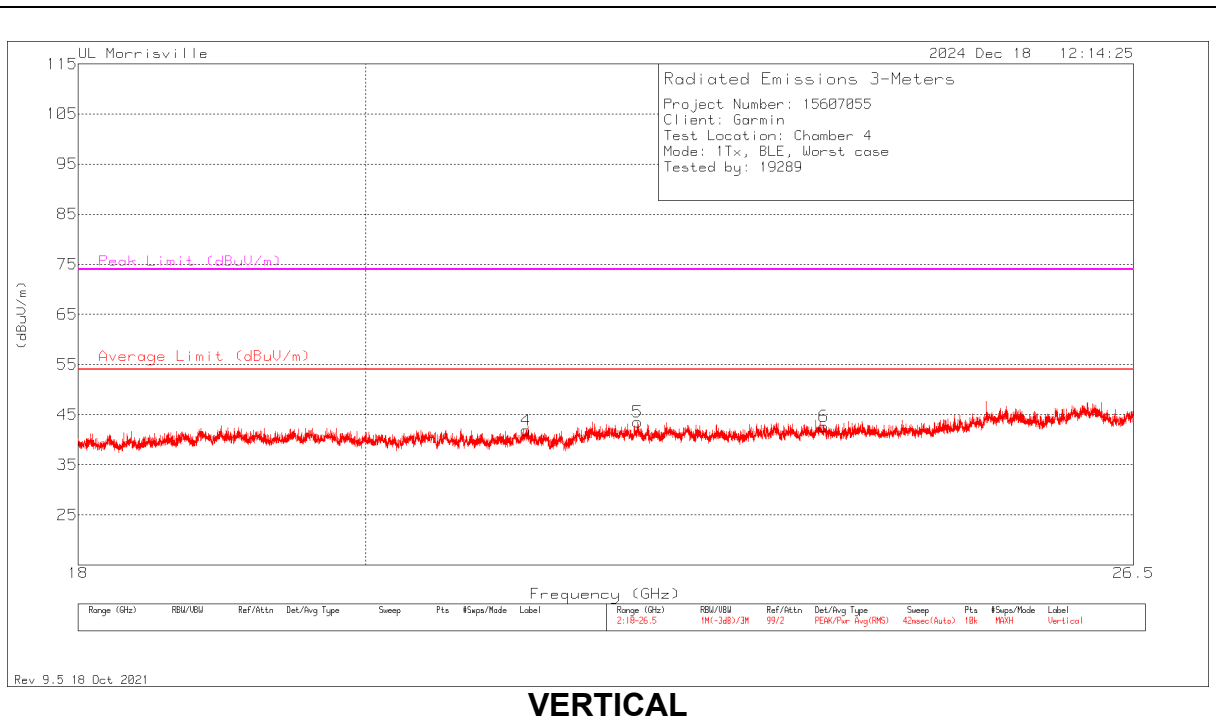
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

10.4.3. BLE



HORIZONTAL



VERTICAL

This report shall not be reproduced except in full, without the written approval of UL LLC

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	204704 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 20.98405	50.02	Pk	33.6	-41.1	42.52	54	-11.48	74	-31.48	0-360	100	H
2	* ** 22.33542	49.33	Pk	34.2	-40.3	43.23	54	-10.77	74	-30.77	0-360	150	H
3	* ** 23.81342	47.81	Pk	34.4	-38.4	43.81	54	-10.19	74	-30.19	0-360	100	H
4	* ** 21.21098	48.75	Pk	33.6	-40.5	41.85	54	-12.15	74	-32.15	0-360	150	V
5	* ** 22.09574	48.81	Pk	34.3	-39.6	43.51	54	-10.49	74	-30.49	0-360	200	V
6	* ** 23.65703	46.61	Pk	34.5	-38.5	42.61	54	-11.39	74	-31.39	0-360	300	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

11. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)
RSS-Gen 8.8

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56 *	56 to 46 *
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency.

TEST PROCEDURE

The EUT is placed on a non-conducting table 40 cm from the vertical ground plane and 80 cm above the horizontal ground plane. The EUT is configured in accordance with ANSI C63.10.

The receiver is set to a resolution bandwidth of 9 kHz. Peak detection is used unless otherwise noted as quasi-peak or average.

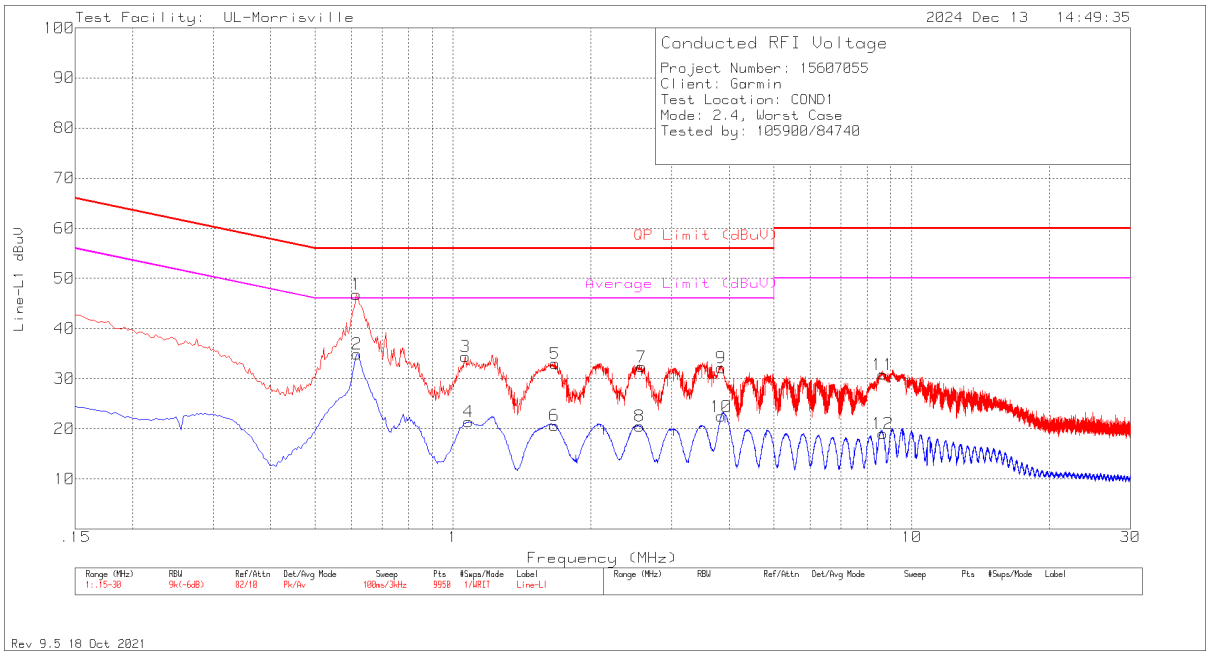
Line conducted data is recorded for both lines.

This report shall not be reproduced except in full, without the written approval of UL LLC

11.1. AC POWER LINE

11.1.1. 2.4 WLAN

LINE 1 RESULTS

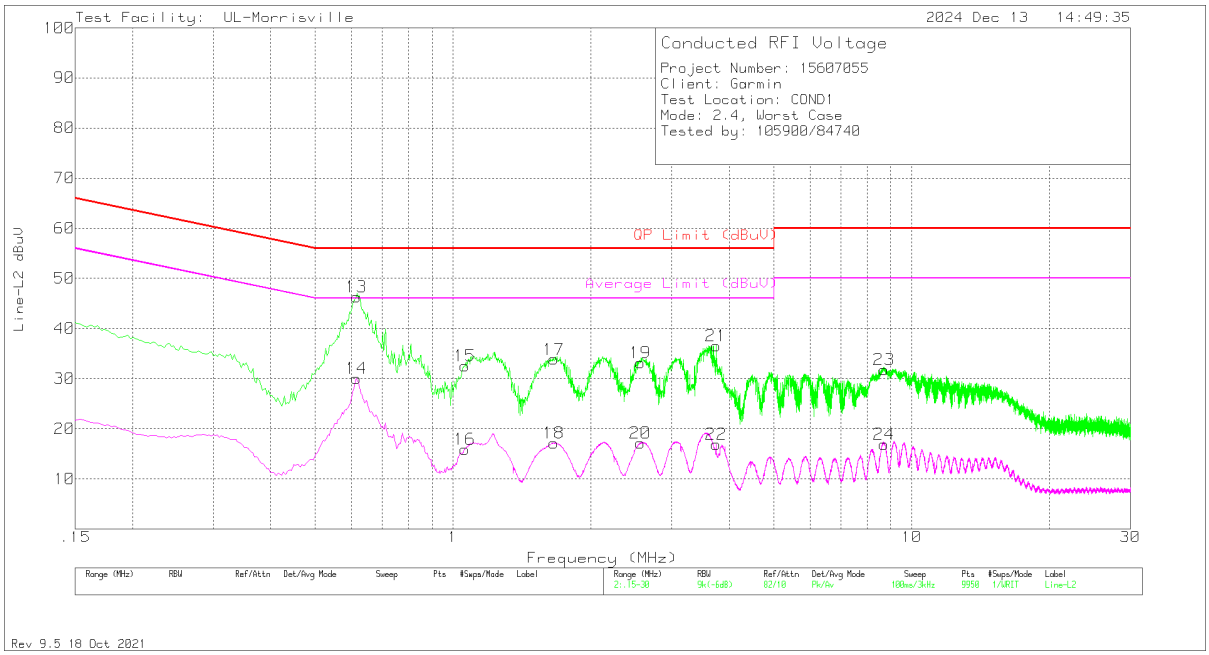


Range 1: Line-L1 .15 - 30MHz										
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN VDF (dB)	Cbl/Limiter (dB)	Corrected Reading dBuV	QP Limit (dBuV)	Margin (dB)	Average Limit (dBuV)	Margin (dB)
1	.615	37	Pk	0	9.8	46.8	56	-9.2	-	-
2	.618	25.12	Av	0	9.8	34.92	-	-	46	-11.08
3	1.065	24.65	Pk	0	9.8	34.45	56	-21.55	-	-
4	1.08	11.58	Av	0	9.8	21.38	-	-	46	-24.62
6	1.665	10.86	Av	0	9.8	20.66	-	-	46	-25.34
5	1.671	23.18	Pk	0	9.8	32.98	56	-23.02	-	-
8	2.556	10.73	Av	0	9.8	20.53	-	-	46	-25.47
7	2.577	22.55	Pk	0	9.8	32.35	56	-23.65	-	-
9	3.84	22.3	Pk	0	9.9	32.2	56	-23.8	-	-
10	3.84	12.56	Av	0	9.9	22.46	-	-	46	-23.54
11	8.655	20.74	Pk	.1	10	30.84	60	-29.16	-	-
12	8.655	8.94	Av	.1	10	19.04	-	-	50	-30.96

Pk - Peak detector
Av - Average detection

This report shall not be reproduced except in full, without the written approval of UL LLC

LINE 2 RESULTS



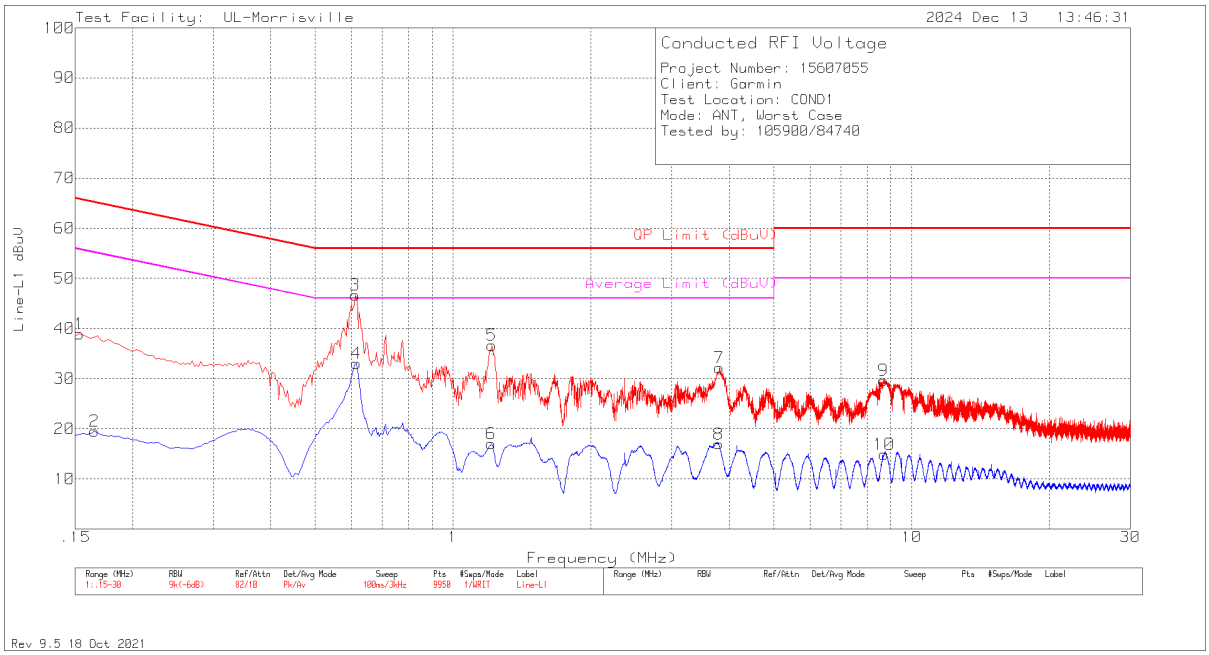
Range 2: Line-L2 .15 - 30MHz										
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN VDF (dB)	Cbl/Limiter (dB)	Corrected Reading dBuV	QP Limit (dBuV)	Margin (dB)	Average Limit (dBuV)	Margin (dB)
13	.615	36.49	Pk	0	9.8	46.29	56	-9.71	-	-
14	.615	20.25	Av	0	9.8	30.05	-	-	46	-15.95
15	1.062	22.79	Pk	0	9.8	32.59	56	-23.41	-	-
16	1.062	6.11	Av	0	9.8	15.91	-	-	46	-30.09
17	1.659	24.05	Pk	0	9.8	33.85	56	-22.15	-	-
18	1.659	7.32	Av	0	9.8	17.12	-	-	46	-28.88
19	2.562	23.37	Pk	0	9.8	33.17	56	-22.83	-	-
20	2.562	7.31	Av	0	9.8	17.11	-	-	46	-28.89
21	3.75	26.63	Pk	0	9.9	36.53	56	-19.47	-	-
22	3.75	7	Av	0	9.9	16.9	-	-	46	-29.1
23	8.709	21.64	Pk	.1	10	31.74	60	-28.26	-	-
24	8.709	6.8	Av	.1	10	16.9	-	-	50	-33.1

Pk - Peak detector
Av - Average detection

This report shall not be reproduced except in full, without the written approval of UL LLC

11.1.2. ANT/ANT+

LINE 1 RESULTS

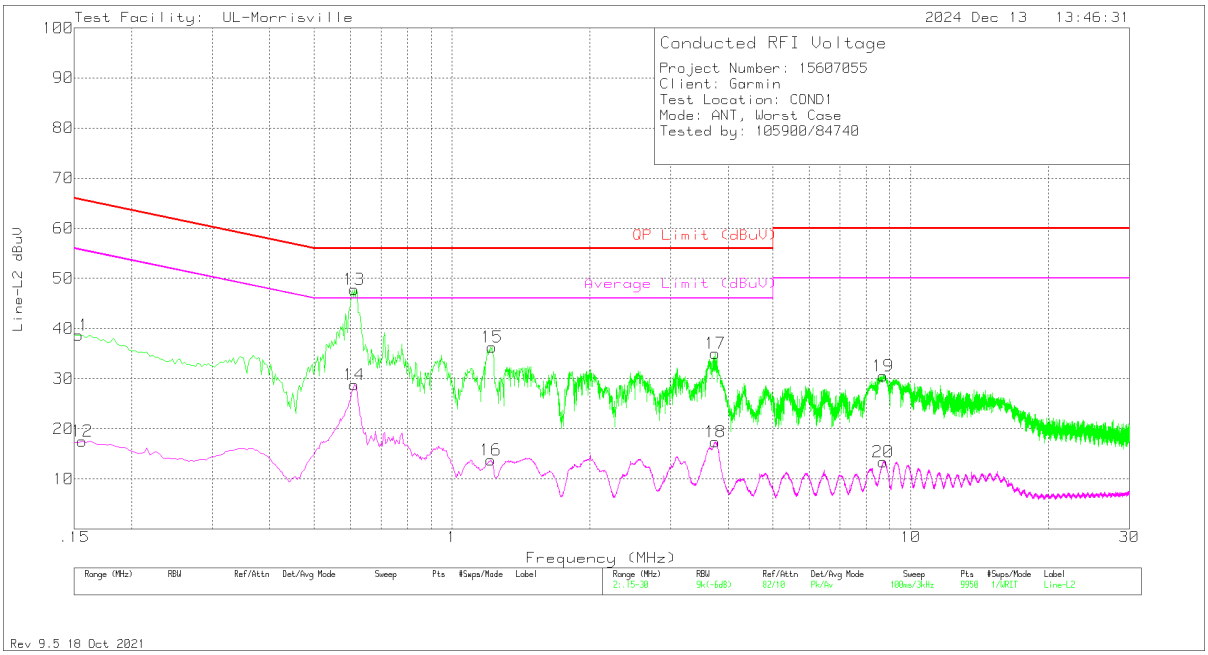


Range 1: Line-L1 .15 - 30MHz										
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN VDF (dB)	Cbl/Limiter (dB)	Corrected Reading dBuV	QP Limit (dBuV)	Margin (dB)	Average Limit (dBuV)	Margin (dB)
1	.153	28.92	Pk	.2	9.8	38.92	65.84	-26.92	-	-
2	.165	9.57	Av	.2	9.8	19.57	-	-	55.21	-35.64
3	.612	36.93	Pk	0	9.8	46.73	56	-9.27	-	-
4	.615	23.21	Av	0	9.8	33.01	-	-	46	-12.99
5	1.215	26.82	Pk	0	9.8	36.62	56	-19.38	-	-
6	1.212	7.22	Av	0	9.8	17.02	-	-	46	-28.98
7	3.81	22.3	Pk	0	9.9	32.2	56	-23.8	-	-
8	3.792	7.05	Av	0	9.9	16.95	-	-	46	-29.05
9	8.682	19.51	Pk	.1	10	29.61	60	-30.39	-	-
10	8.703	4.83	Av	.1	10	14.93	-	-	50	-35.07

Pk - Peak detector
Av - Average detection

This report shall not be reproduced except in full, without the written approval of UL LLC

LINE 2 RESULTS



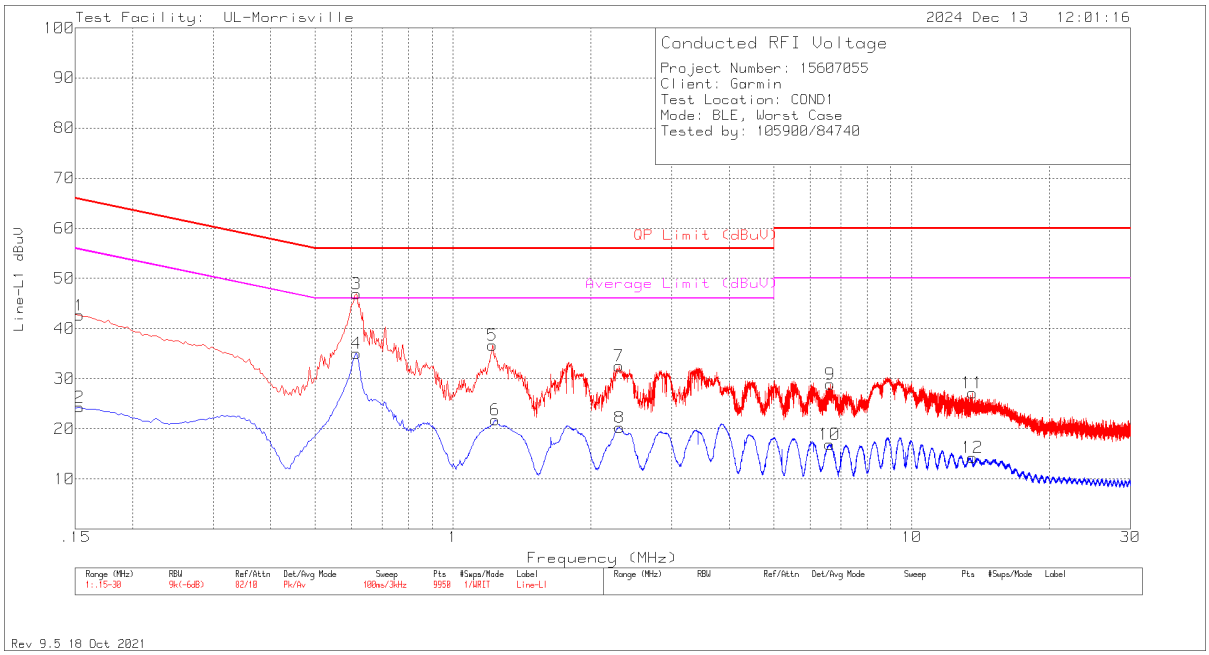
Range 2: Line-L2 .15 - 30MHz										
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN VDF (dB)	Cbl/Limiter (dB)	Corrected Reading dBuV	QP Limit (dBuV)	Margin (dB)	Average Limit (dBuV)	Margin (dB)
11	.153	28.7	Pk	.2	9.8	38.7	65.84	-27.14	-	-
12	.156	7.54	Av	.2	9.8	17.54	-	-	55.67	-38.13
13	.612	38.02	Pk	0	9.8	47.82	56	-8.18	-	-
14	.612	18.97	Av	0	9.8	28.77	-	-	46	-17.23
15	1.224	26.49	Pk	0	9.8	36.29	56	-19.71	-	-
16	1.215	3.92	Av	0	9.8	13.72	-	-	46	-32.28
17	3.753	25.11	Pk	0	9.9	35.01	56	-20.99	-	-
18	3.753	7.48	Av	0	9.9	17.38	-	-	46	-28.62
19	8.706	20.43	Pk	.1	10	30.53	60	-29.47	-	-
20	8.7	3.28	Av	.1	10	13.38	-	-	50	-36.62

Pk - Peak detector
Av - Average detection

This report shall not be reproduced except in full, without the written approval of UL LLC

11.1.3. BLE

LINE 1 RESULTS

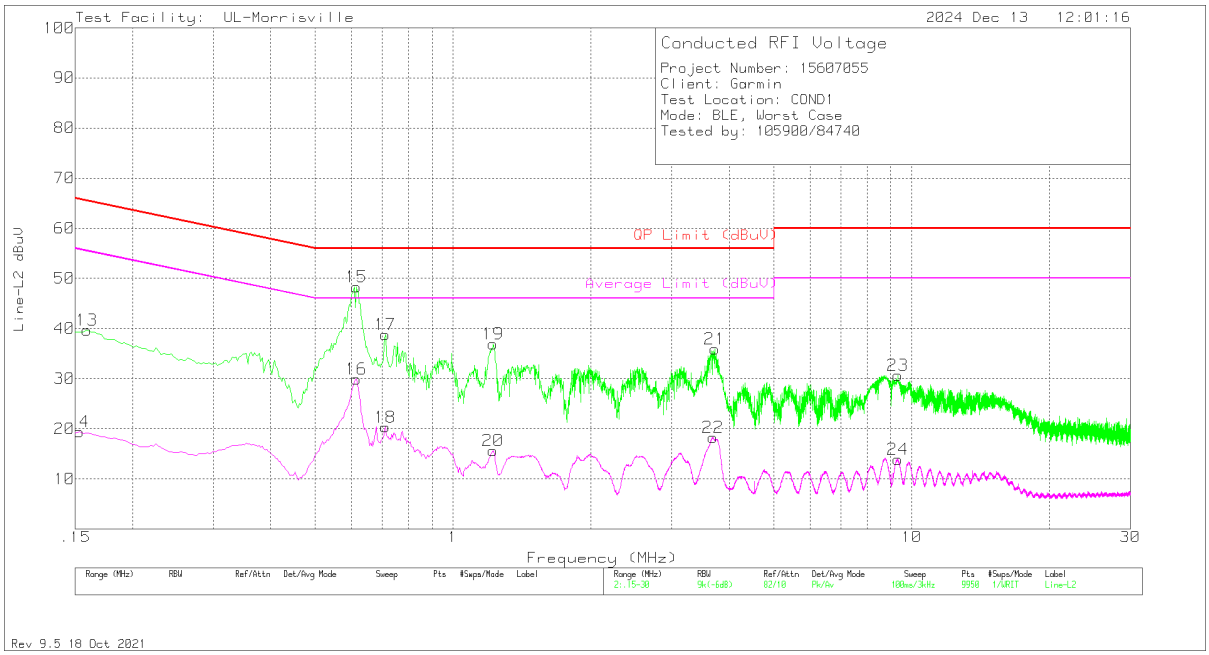


Range 1: Line-L1 .15 - 30MHz										
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN VDF (dB)	Cbl/Limiter (dB)	Corrected Reading dBuV	QP Limit (dBuV)	Margin (dB)	Average Limit (dBuV)	Margin (dB)
1	.153	32.62	Pk	.2	9.8	42.62	65.84	-23.22	-	-
2	.153	14.33	Av	.2	9.8	24.33	-	-	55.84	-31.51
3	.615	37.1	Pk	0	9.8	46.9	56	-9.1	-	-
4	.615	25.25	Av	0	9.8	35.05	-	-	46	-10.95
5	1.218	26.91	Pk	0	9.8	36.71	56	-19.29	-	-
6	1.236	11.99	Av	0	9.8	21.79	-	-	46	-24.21
7	2.304	22.75	Pk	0	9.8	32.55	56	-23.45	-	-
8	2.307	10.42	Av	0	9.8	20.22	-	-	46	-25.78
9	6.639	18.92	Pk	.1	9.9	28.92	60	-31.08	-	-
10	6.63	6.93	Av	.1	9.9	16.93	-	-	50	-33.07
11	13.563	17.04	Pk	.1	10	27.14	60	-32.86	-	-
12	13.563	4.18	Av	.1	10	14.28	-	-	50	-35.72

Pk - Peak detector
Av - Average detection

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

LINE 2 RESULTS



Range 2: Line-L2 .15 - 30MHz										
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN VDF (dB)	Cbl/Limiter (dB)	Corrected Reading dBuV	QP Limit (dBuV)	Margin (dB)	Average Limit (dBuV)	Margin (dB)
13	.159	29.63	Pk	.2	9.8	39.63	65.52	-25.89	-	-
14	.153	9.37	Av	.2	9.8	19.37	-	-	55.84	-36.47
15	.615	38.55	Pk	0	9.8	48.35	56	-7.65	-	-
16	.615	20.15	Av	0	9.8	29.95	-	-	46	-16.05
17	.711	28.95	Pk	0	9.8	38.75	56	-17.25	-	-
18	.711	10.53	Av	0	9.8	20.33	-	-	46	-25.67
19	1.224	27.17	Pk	0	9.8	36.97	56	-19.03	-	-
20	1.221	5.89	Av	0	9.8	15.69	-	-	46	-30.31
21	3.723	26.03	Pk	0	9.9	35.93	56	-20.07	-	-
22	3.693	8.34	Av	0	9.9	18.24	-	-	46	-27.76
23	9.339	20.53	Pk	.1	10	30.63	60	-29.37	-	-
24	9.333	3.75	Av	.1	10	13.85	-	-	50	-36.15

Pk - Peak detector
Av - Average detection

This report shall not be reproduced except in full, without the written approval of UL LLC

12. SETUP PHOTOS

Please refer to R15607055-EP1 for setup photos

END OF TEST REPORT

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

TEST REPORT

Report Number: R15513446-E1

Applicant	:	Garmin International Inc. 1200 East 151St Street Olathe, KS 66062-3426, USA
Model	:	A04909
FCC ID	:	IPH-04909
IC	:	1792A-04909
EUT Description	:	Extremity Worn Digital Transceiver
Test Standard(s)	:	FCC 47 CFR PART 15 SUBPART C: 2024 RSS-210 ISSUE 11: 2024 RSS-GEN ISSUE 5 + A1 + A2: 2021

Date Of Issue:
2025-01-17

Prepared by:
UL LLC
12 Laboratory Dr.
Research Triangle Park, NC 27709 U.S.A.
TEL: (919) 549-1400

CERT #0751.06

REPORT REVISION HISTORY

Rev.	Issue Date	Revisions	Revised By
v1	2024-12-17	Initial Issue	Chandler Stanley
V2	2025-01-17	Revised EUT description	Chandler Stanley

This report shall not be reproduced except in full, without the written approval of UL LLC

TABLE OF CONTENTS

This report shall not be reproduced except in full, without the written approval of UL LLC

This report shall not be reproduced except in full, without the written approval of UL LLC

1. ATTESTATION OF TEST RESULTS

COMPANY NAME: Garmin International Inc.
1200 East 151St Street
Olathe, KS 66062-3426, USA

EUT DESCRIPTION: Extremity Worn Digital Transceiver

MODEL: A04909

SERIAL NUMBER: 3493239303, 3493239060, 3493238982

SAMPLE RECEIPT DATE: 2024-10-21

DATE TESTED: 2024-10-22 to 2024-11-05

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
FCC PART 15 SUBPART C: 2024	
ISED RSS-210 Issue 11:2024	Refer to Section 3
ISED RSS-GEN Issue 5 + A1 + A2: 2021	

UL LLC tested the above equipment in accordance with the requirements set forth in the above standards. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. All samples tested were in good operating condition throughout the entire test program. Measurement Uncertainties are published for informational purposes only and were not taken into account unless noted otherwise.

This document may not be altered or revised in any way unless done so by UL LLC and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL LLC will constitute fraud and shall nullify the document.

Approved & Released
For UL LLC By:

Brian Kiewra
Engineer
Consumer, Medical and IT Segment
UL LLC

Prepared By:

Chandler Stanley
Engineer
Consumer, Medical and IT Segment
UL LLC

This report shall not be reproduced except in full, without the written approval of UL LLC

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with:

- ANSI C63.10-2020
- FCC 47 CFR Part 2
- FCC 47 CFR Part 15C
- RSS-GEN Issue 5 + A1 + A2: 2021
- RSS-210 Issue 11:2024

3. SUMMARY OF TEST RESULTS

Requirement Description	Requirement Clause Number	Result	Remarks
Occupied Bandwidth	FCC §15.215 (c) RSS-Gen 6.7	Compliant	None
Fundamental Measurements.	FCC §15.225 (a-d) FCC §15.209 (d) IC RSS-210, Annex B.6 IC RSS-GEN, Section 8.9 (Transmitter)		
Tx Spurious Emissions			
Frequency Stability	FCC §15.225 (e) RSS-210, Annex B.6		
AC Mains Line Conducted Emissions	FCC §15.207 IC RSS-GEN, Section 8.8		

4. FACILITIES AND ACCREDITATION

UL LLC is accredited by A2LA, Certificate Number #0751.06, for all testing performed within the scope of this report. Testing was performed at the locations noted below.

	Address	ISED CABID	ISED Company Number	FCC Registration
☐	Building: 12 Laboratory Dr RTP, NC 27709, U.S.A	US0067	2180C	825374
☒	Building: 2800 Perimeter Park Dr. Suite B Morrisville, NC 27560, U.S.A		27265	

This report shall not be reproduced except in full, without the written approval of UL LLC

5. DECISION RULES AND MEASUREMENT UNCERTAINTY

5.1. METROLOGICAL TRACEABILITY

All test and measuring equipment utilized to perform the tests documented in this report are calibrated on a regular basis, with a maximum time between calibrations of one year or the manufacturers' recommendation, whichever is less, and where applicable is traceable to recognized national standards.

5.2. DECISION RULES

The Decision Rule is based on Simple Acceptance in accordance with ISO Guide 98-4:2012 Clause 8.2. (Measurement uncertainty is not taken into account when stating conformity with a specified requirement.)

5.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	U_{Lab}
Radio Frequency (Spectrum Analyzer)	419.38 Hz
Occupied Channel Bandwidth	1.22%
RF output power, conducted	1.3 dB (PK) 0.45 dB (AV)
Power Spectral Density, conducted	2.47 dB
Unwanted Emissions, conducted	1.94 dB
All emissions, radiated	6.01 dB
Conducted Emissions (0.150-30MHz) - LISN	3.40 dB
Temperature	0.57°C
Humidity	3.39%
DC Supply voltages	1.70%

Uncertainty figures are valid to a confidence level of 95%.

5.4. SAMPLE CALCULATION

RADIATED EMISSIONS

Where relevant, the following sample calculation is provided:
Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB)
36.5 dBuV + 18.7 dB/m + 0.6 dB – 26.9 dB = 28.9 dBuV/m

MAINS CONDUCTED EMISSIONS

Where relevant, the following sample calculation is provided:
Final Voltage (dBuV) = Measured Voltage (dBuV) + Cable Loss (dB) + Limiter Factor (dB) + LISN Insertion Loss.
36.5 dBuV + 0 dB +10.1 dB+ 0 dB = 46.6 dBuV

This report shall not be reproduced except in full, without the written approval of UL LLC

6. EQUIPMENT UNDER TEST

6.1. DESCRIPTION OF EUT

The EUT is an extremity worn digital transceiver with BT, BLE, ANT+, 802.11b/g/n 2.4GHz WLAN, NFC, and Global Navigation Satellite System (GNSS) receiver. This report covers the full testing of the NFC radio.

6.2. MAXIMUM ELECTRIC FIELD STRENGTH

The transmitter has a maximum peak radiated electric field strength as follows:

Fundamental Frequency (MHz)	E-Field (dBuV/m)
13.56	29.72

6.3. SOFTWARE AND FIRMWARE

The software version installed during testing was 3.51.

6.4. WORST-CASE CONFIGURATION AND MODE

The fundamental of the EUT was investigated under three orthogonal orientations X, Y, and Z. The Y orientation was determined to be the worst-case orientation. Therefore, all final radiated testing was performed with the EUT in the Y orientation.

In addition, Type A, B, and F with and without a tag were investigated to determine the worst case based on the highest power and spurious emissions. Type A with a tag was determined to be the worst case and therefore selected for all final tests.

The distance between the EUT and NFC reader was also investigated, and the worst-case condition occurs when the NFC reader and EUT are separated by 3cm; therefore, all final radiated testing was performed with the EUT and NFC reader separated by 3cm.

This report shall not be reproduced except in full, without the written approval of UL LLC

6.5. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
NFC Reader	Synnix Technology Co.	CL-2100R	NFCREAD#1	NA
Laptop	Lenovo	T14	PF4FKVY8	NA
Laptop Charger	Lenovo	ADLX65YCC2D	NA	NA
AC Adaptor	Sony	XQZ-UC11-010-236-21	32223W09205418	NA

I/O CABLES

I/O Cable List						
Cable No.	**Port**	**# of Identical Ports**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
1	Proprietary	1	4 pin Proprietary	Non-Shielded	<3m	Used for charging only

SETUP DIAGRAM

Please refer to R15513446-EP1 for setup diagrams

This report shall not be reproduced except in full, without the written approval of UL LLC

7. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

Test Equipment Used - Wireless Conducted Measurement Equipment

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
Common Equipment					
Conducted Room 1					
90411	Spectrum Analyzer	Keysight Technologies	N9030A	2024-08-01	2025-08-01
207726	Temp/Humid Chamber	Thermotron	SM-32-8200	2024-01-12	2025-01-12
179892	Environmental Meter	Fisher Scientific	15-077-963	2024-08-12	2025-08-12
SOFTEMI	Antenna Port Software	UL	Version 2024.2.23	NA	NA
Additional Equipment used					
24962	Near Field Probe Kit	EMC Test Systems	7405	NA	NA

Test Equipment Used - Radiated Disturbance Emissions Test Equipment (Morrisville – Chamber 1)

Equip. ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
0.009-30MHz					
135144	Active Loop Antenna	ETS-Lindgren	6502	2024-10-02	2025-10-02
30-1000 MHz					
90629	Hybrid Broadband Antenna	Sunol Sciences Corp.	JB3	2024-01-30	2026-01-30
Gain-Loss Chains					
91974	Gain-loss string: 0.009-30MHz	Various	Various	2024-05-08	2025-05-08
91976	Gain-loss string: 25-1000MHz	Various	Various	2024-05-08	2025-05-08
Receiver & Software					
197954	Spectrum Analyzer	Rohde & Schwarz	ESW44	2024-03-05	2025-03-05
SOFTEMI	EMI Software	UL	Version 9.5 (18 Oct 2021)		
Additional Equipment used					
241205	Environmental Meter	Fisher Scientific	15-077-963	2023-09-05	2025-09-05

This report shall not be reproduced except in full, without the written approval of UL LLC

Test Equipment Used - Line-Conducted Emissions – Voltage (Morrisville – Conducted 1)

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
CBL087	Coax cable, RG223, N-male to BNC-male, 20-ft.	Pasternack	PE3W06143-240	2024-04-04	2025-04-04
179892	Environmental Meter	Fisher Scientific	15-077-963	2024-08-12	2025-08-12
80391	LISN, 50-ohm/50-uH, 250uH 2-conductor, 25A	Fischer Custom Com.	FCC-LISN-50/250-25-2-01	2024-08-01	2025-08-01
75141	EMI Test Receiver 9kHz-7GHz	Rohde & Schwarz	ESCI 7	2024-08-01	2025-08-01
52859	Transient Limiter, 0.009-100MHz	Electro-Metrics	EM-7600	2024-04-04	2025-04-04
PS216	AC Power Source	Elgar	CW2501M	NA	NA
SOFTEMI	EMI Software	UL	Version 9.5 (18 Oct 2021)		
Miscellaneous					
84681	ANSI C63.4 1m extension cable.	UL	Per Annex B of ANSI C63.4	2024-04-04	2025-04-04

This report shall not be reproduced except in full, without the written approval of UL LLC

8. 20dB and 99% BANDWIDTH

LIMITS

§15.215 (c) Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§ 15.217 through 15.257 and in subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

TEST PROCEDURE

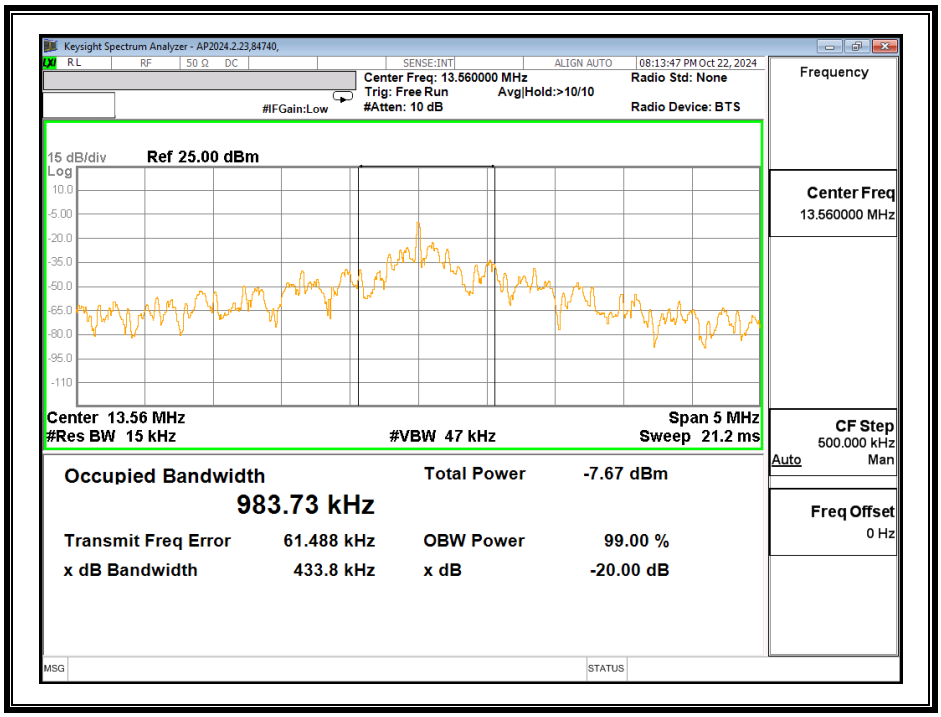
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1-5% of the 20dB bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

RESULTS – TAG ON

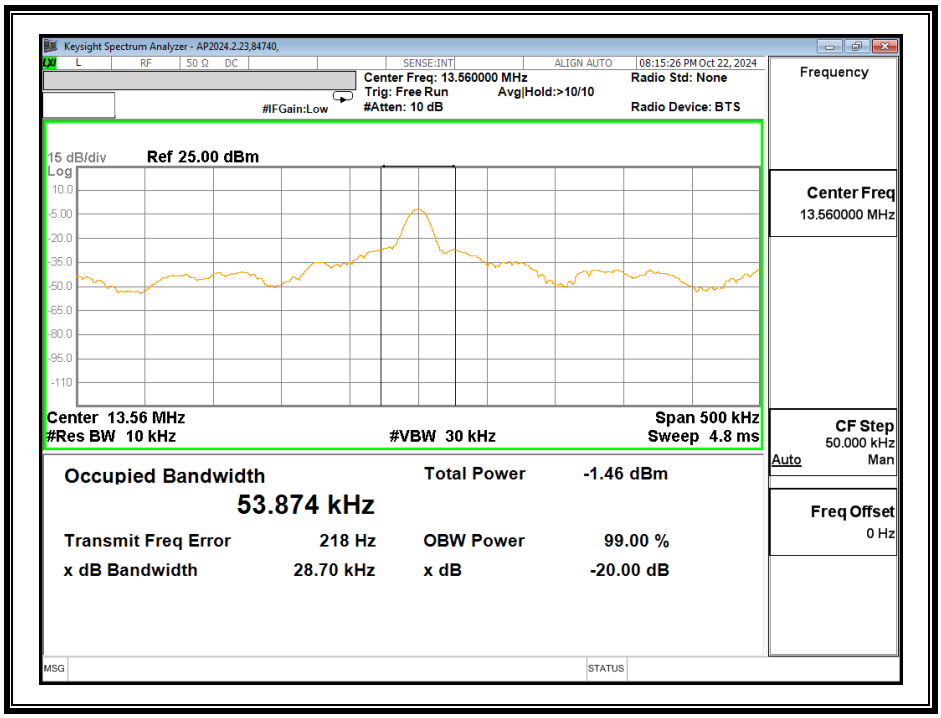
Mode	Frequency (MHz)	20dB Bandwidth (kHz)	99% Bandwidth (MHz)
Type A	13.56	433.8	0.98373
Type B	13.56	28.7	0.053874
Type F	13.56	1093	1.7428

This report shall not be reproduced except in full, without the written approval of UL LLC

8.1. Type A (CE Mode)



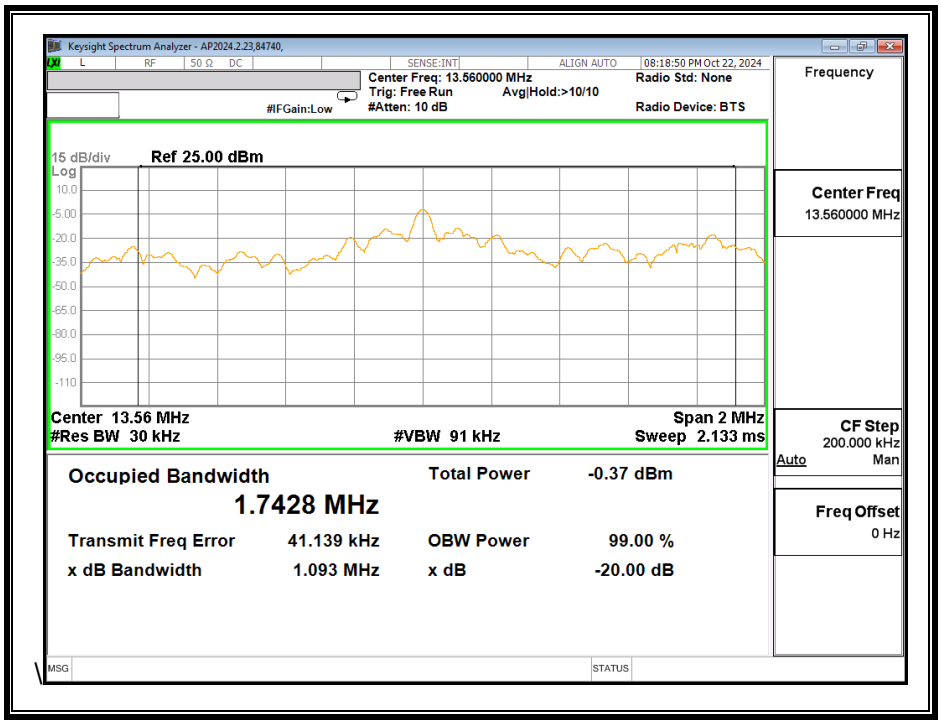
8.2. Type B (CE Mode)



Note: Because the measured signal is CW or CW-like, adjusting the RBW per C63.10 would not be practical since the measured bandwidth will always follow the RBW.

This report shall not be reproduced except in full, without the written approval of UL LLC

8.3. Type F (CE Mode)



This report shall not be reproduced except in full, without the written approval of UL LLC

9. RADIATED EMISSION TEST RESULTS

9.1. LIMITS AND PROCEDURE

LIMIT

FCC §15.225
IC RSS-210, Annex B.6
IC RSS-GEN, Section 8.9 (Transmitter)

(a) The field strength of any emissions within the band 13.553–13.567 MHz shall not exceed 15,848 microvolts/ meter at 30 meters.

(b) Within the bands 13.410–13.553 MHz and 13.567–13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters.

(c) Within the bands 13.110–13.410 MHz and 13.710–14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters.

(d) The field strength of any emissions appearing outside of the 13.110– 14.010 MHz and shall not exceed the general radiated emission limits in § 15.209 as follows:
§15.209 (a) Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Limits for radiated disturbance of an intentional radiator		
Frequency range (MHz)	Limits (µV/m)	Measurement Distance (m)
0.009 – 0.490	2400 / F (kHz)	300
0.490 – 1.705	24000 / F (kHz)	30
1.705 – 30.0	30	30
30 – 88	100**	3
88 - 216	150**	3
216 – 960	200**	3
Above 960	500	3

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g. §§ 15.231 and 15.241.
§15.209 (b) In the emission table above, the tighter limit applies at the band edges.

Formula for converting the filed strength from uV/m to dBuV/m is:
Limit (dBuV/m) = 20 log limit (uV/m)

In addition:
§15.209 (d) The emission limits shown the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emissions limits in these three bands are based on measurements employing an average detector.

§15.209 (d) The provisions in §§ 15.225, measuring emissions at distances other than the distances specified in the above table, determining the frequency range over which radiated emissions are to be measured, and limiting peak emissions apply to all devices operated under this part.

This report shall not be reproduced except in full, without the written approval of UL LLC

TEST PROCEDURE

ANSI C63.10 - 2020

The EUT is an intentional radiator that incorporates a digital device, the highest fundamental frequency generated or used in the device is 13.56 MHz; therefore, the frequency range was investigated from 9kHz to the 10th harmonic of the highest fundamental frequency, or 1000 MHz, whichever is greater.

Note: For all Below 30MHz test data, all measurements were made at a test distance of 3 m. The measured data was extrapolated from the test distance (3m) to the specification distance (300 m from 9-490 kHz and 30 m from 490 kHz – 30 MHz) to clearly show the relative levels of fundamental and spurious emissions and demonstrate compliance with the requirement that the level of any spurious emissions be below the level of the intentionally transmitted signal. The extrapolation factor for the limits were 40*Log (test distance / specification distance)

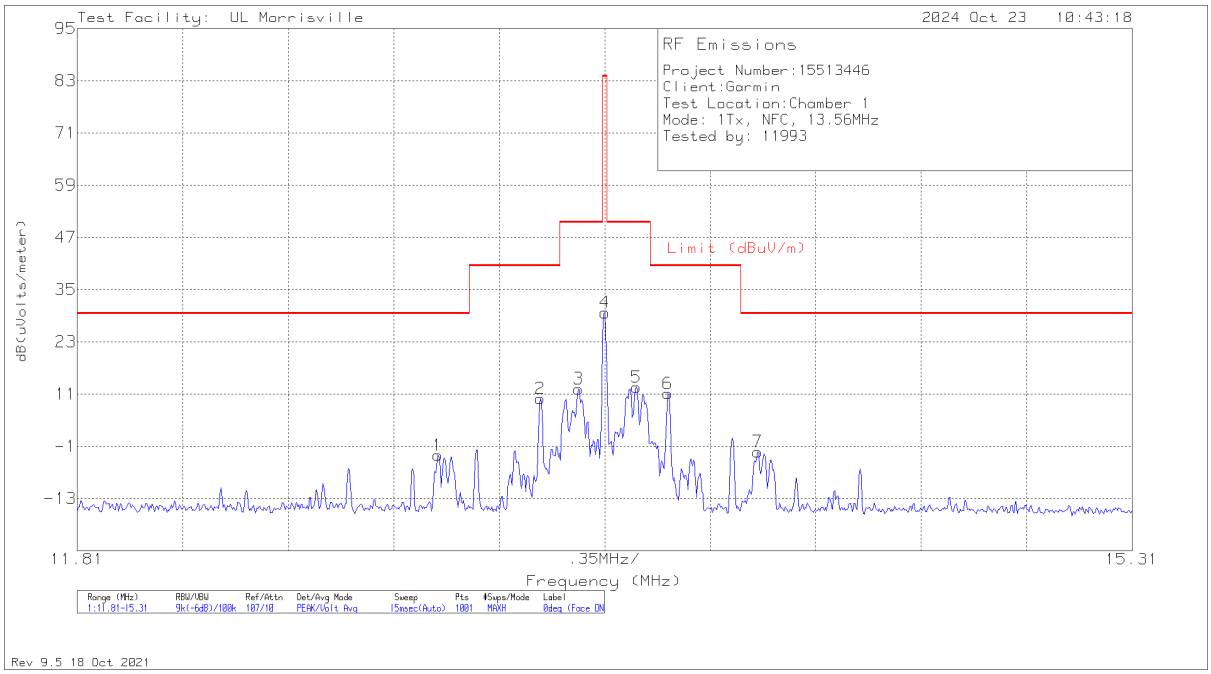
RESULTS

This report shall not be reproduced except in full, without the written approval of UL LLC

9.2. FUNDAMENTAL AND SPURIOUS EMISSIONS (<30MHz)

9.2.1. TYPE A, TAG ON

FUNDAMENTAL

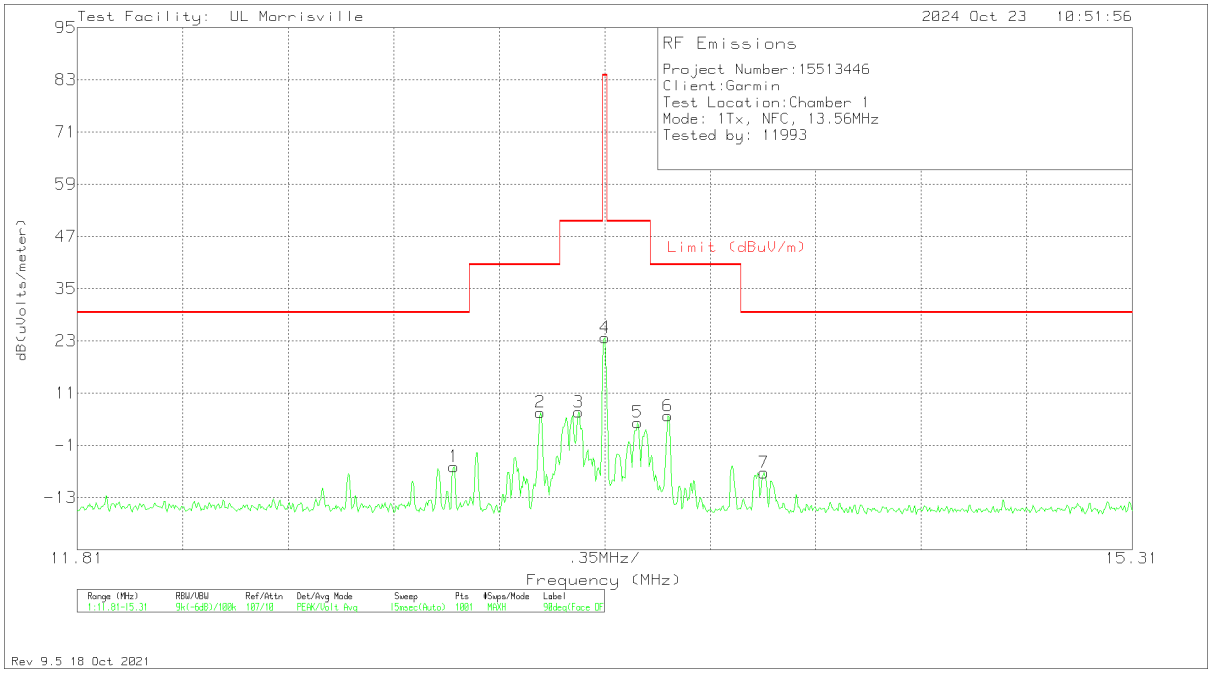


ANTENNA FACE ON

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	135144 (dB/m)	Gain/Loss (dB)	Dist. Corr. Factor (dB)	Corrected Reading dB(uVolts/meter)	Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Loop Angle
1	13.007	26.54	Pk	9.8	.6	-40	-3.06	29.5	-32.56	163	0 degs
2	13.3465	39.57	Pk	9.8	.6	-40	9.97	40.5	-30.53	163	0 degs
3	13.4725	41.79	Pk	9.8	.6	-40	12.19	50.5	-38.31	163	0 degs
4	13.56	59.32	Pk	9.8	.6	-40	29.72	84	-54.28	163	0 degs
5	13.665	42.14	Pk	9.8	.6	-40	12.54	50.5	-37.96	163	0 degs
6	13.77	40.79	Pk	9.7	.6	-40	11.09	40.5	-29.41	163	0 degs
7	14.0675	27.42	Pk	9.7	.6	-40	-2.28	29.5	-31.78	163	0 degs

Pk - Peak detector

This report shall not be reproduced except in full, without the written approval of UL LLC

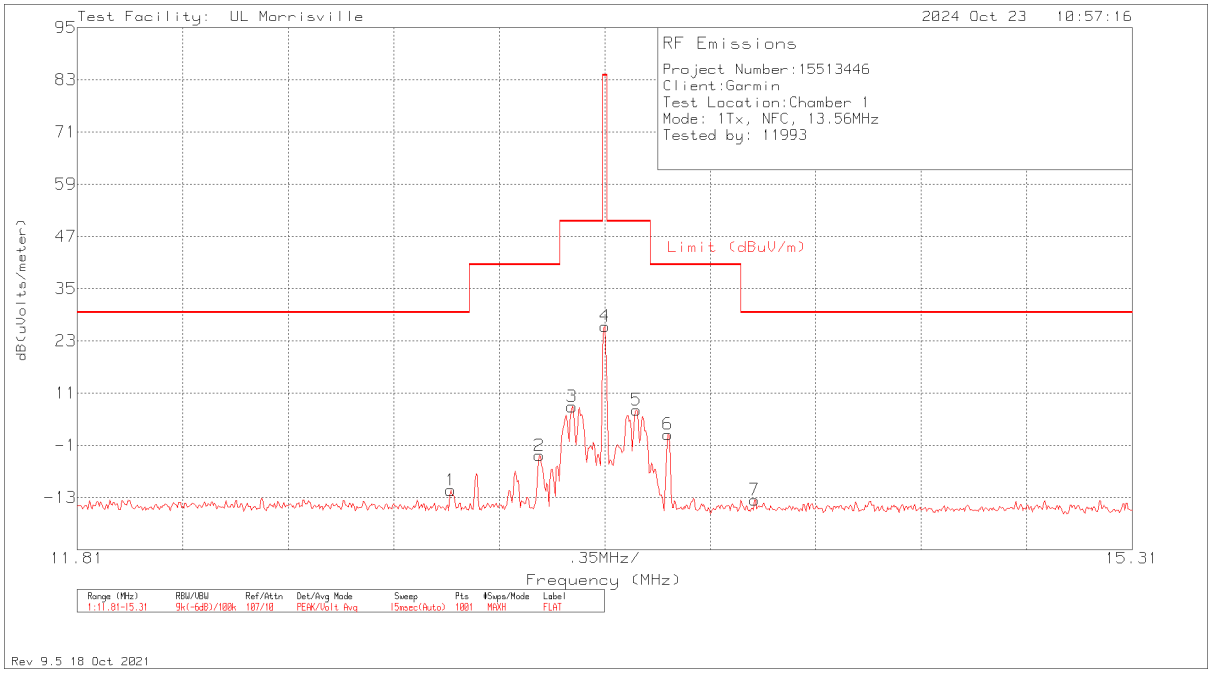


ANTENNA FACE OFF

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	135144 (dB/m)	Gain/Loss (dB)	Dist. Corr. Factor (dB)	Corrected Reading dB(uVolts/meter)	Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Loop Angle
1	13.0595	23.7	Pk	9.8	.6	-40	-5.9	29.5	-35.4	70	90 degs
2	13.3465	36.16	Pk	9.8	.6	-40	6.56	40.5	-33.94	70	90 degs
3	13.4725	36.23	Pk	9.8	.6	-40	6.63	50.5	-43.87	70	90 degs
4	13.56	53.32	Pk	9.8	.6	-40	23.72	84	-60.28	70	90 degs
5	13.6685	33.85	Pk	9.8	.6	-40	4.25	50.5	-46.25	70	90 degs
6	13.77	35.45	Pk	9.7	.6	-40	5.75	40.5	-34.75	70	90 degs
7	14.0885	22.41	Pk	9.7	.6	-40	-7.29	29.5	-36.79	70	90 degs

Pk - Peak detector

This report shall not be reproduced except in full, without the written approval of UL LLC



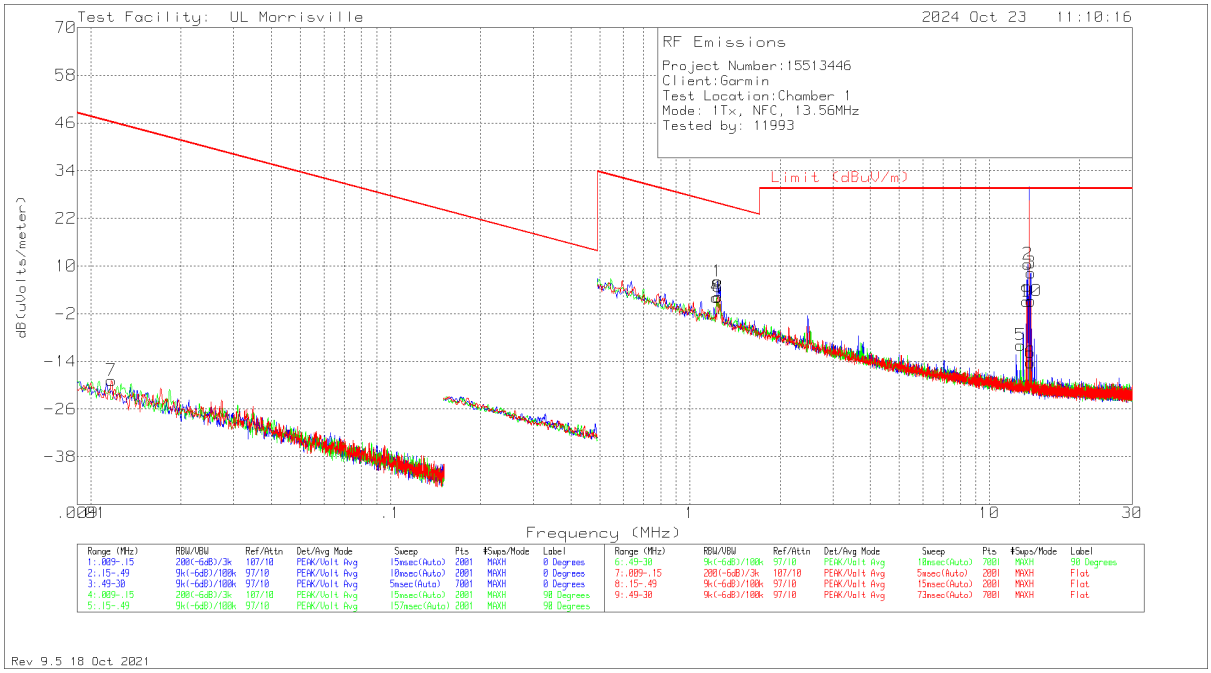
ANTENNA FACE FLAT

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	135144 (dB/m)	Gain/Loss (dB)	Dist. Corr. Factor (dB)	Corrected Reading dB(uVolts/meter)	Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Loop Angle
1	13.049	18.27	Pk	9.8	.6	-40	-11.33	29.5	-40.83	261	Flat
2	13.343	26.25	Pk	9.8	.6	-40	-3.35	40.5	-43.85	261	Flat
3	13.4515	37.49	Pk	9.8	.6	-40	7.89	50.5	-42.61	261	Flat
4	13.56	55.95	Pk	9.8	.6	-40	26.35	84	-57.65	261	Flat
5	13.665	36.72	Pk	9.8	.6	-40	7.12	50.5	-43.38	261	Flat
6	13.77	31.2	Pk	9.7	.6	-40	1.5	40.5	-39	261	Flat
7	14.057	16.15	Pk	9.7	.6	-40	-13.55	29.5	-43.05	261	Flat

Pk - Peak detector

This report shall not be reproduced except in full, without the written approval of UL LLC

SPURIOUS EMISSION – E FIELD



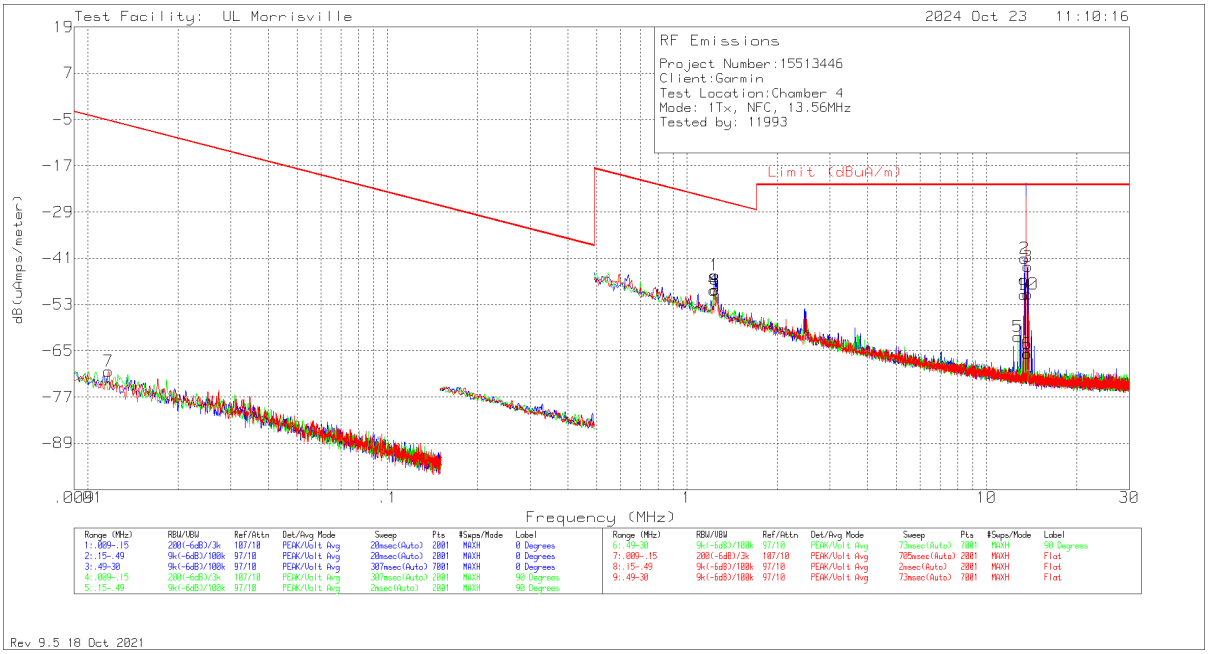
<30MHz SPURIOUS EMISSIONS

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	135144 (dB/m)	Gain/Loss (dB)	Dist. Corr. Factor (dB)	Corrected Reading dB(uVolts/meter)	QP/AV Limit (dBuV/m)	PK Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Loop Angle
7	.0117	43.61	Pk	17.5	.1	-80	-18.79	46.24	66.24	-65.03	0-360	Flat
4	1.2278	30.93	Pk	11	.2	-40	2.13	25.82	-	-23.69	0-360	90 degs
1	1.23623	34.96	Pk	11	.2	-40	6.16	25.76	-	-19.6	0-360	0 degs
8	1.24045	31.07	Pk	11	.2	-40	2.27	25.73	-	-23.46	0-360	Flat
5	12.71218	19.62	Pk	9.9	.6	-40	-9.88	29.54	-	-39.42	0-360	90 degs
9	13.3488	30.7	Pk	9.8	.6	-40	1.1	29.54	-	-28.44	0-360	Flat
2	13.43312	40.11	Pk	9.8	.6	-40	10.51	29.54	-	-19.03	0-360	0 degs
6	13.69873	15.33	Pk	9.8	.6	-40	-14.27	29.54	-	-43.81	0-360	90 degs
3	13.7704	38	Pk	9.7	.6	-40	8.3	29.54	-	-21.24	0-360	0 degs
10	13.7704	30.94	Pk	9.7	.6	-40	1.24	29.54	-	-28.3	0-360	Flat

Pk - Peak detector

This report shall not be reproduced except in full, without the written approval of UL LLC

SPURIOUS EMISSION – H FIELD



<30MHz SPURIOUS EMISSIONS

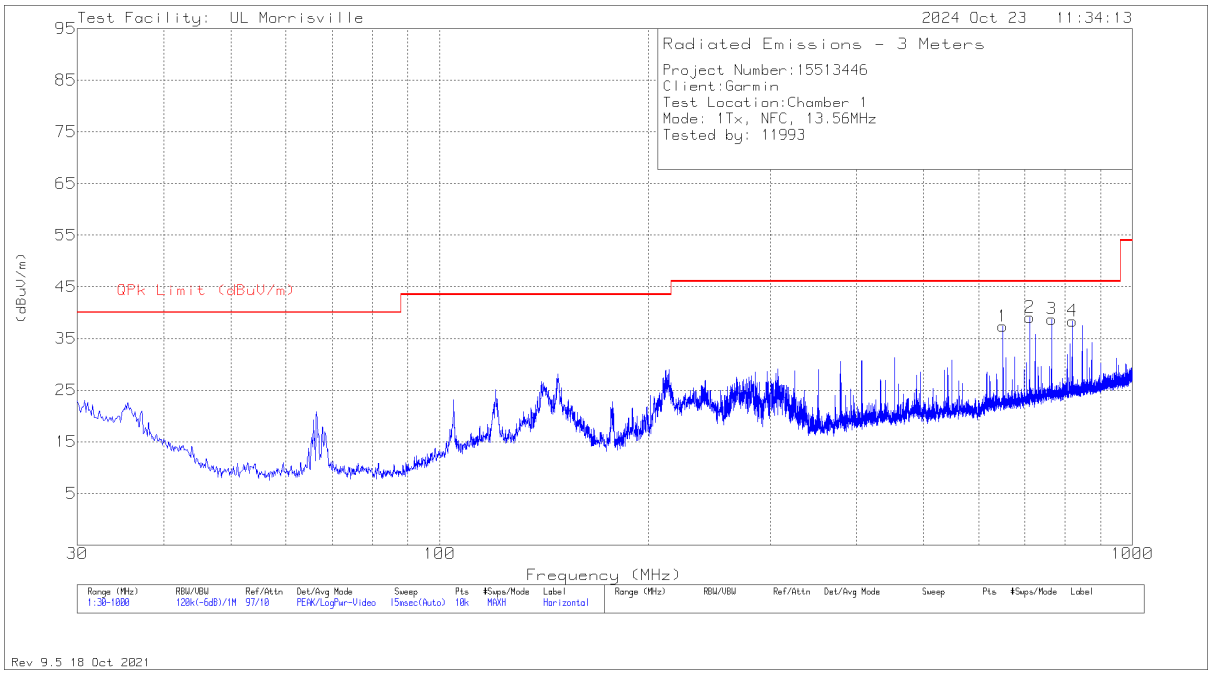
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	135144 (dB/m)	Gain/Loss (dB)	Dist. Corr. Factor (dB)	Corrected Reading dB(uAmps/meter)	QP/AV Limit (dBuA/m)	PK Limit (dBuA/m)	Margin (dB)	Azimuth (Degs)	Loop Angle
7	.0117	43.61	Pk	-34	.1	-80	-70.29	-5.26	14.74	-65.03	0-360	Flat
4	1.2278	30.93	Pk	-40.5	.2	-40	-49.37	-25.68	-	-23.69	0-360	90 degs
1	1.23623	34.96	Pk	-40.5	.2	-40	-45.34	-25.74	-	-19.6	0-360	0 degs
8	1.24045	31.07	Pk	-40.5	.2	-40	-49.23	-25.77	-	-23.46	0-360	Flat
5	12.71218	19.62	Pk	-41.6	.6	-40	-61.38	-21.96	-	-39.42	0-360	90 degs
9	13.3488	30.7	Pk	-41.7	.6	-40	-50.4	-21.96	-	-28.44	0-360	Flat
2	13.43312	40.11	Pk	-41.7	.6	-40	-40.99	-21.96	-	-19.03	0-360	0 degs
6	13.69873	15.33	Pk	-41.7	.6	-40	-65.77	-21.96	-	-43.81	0-360	90 degs
3	13.7704	38	Pk	-41.8	.6	-40	-43.2	-21.96	-	-21.24	0-360	0 degs
10	13.7704	30.94	Pk	-41.8	.6	-40	-50.26	-21.96	-	-28.3	0-360	Flat

Pk - Peak detector

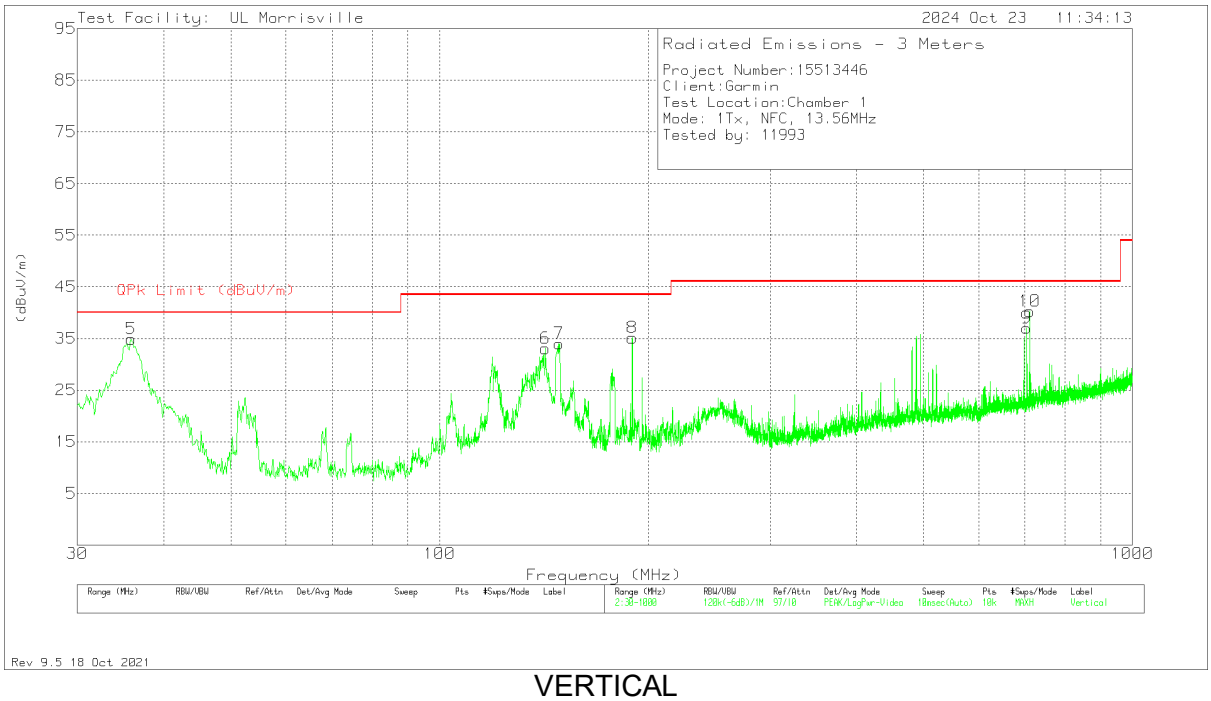
This report shall not be reproduced except in full, without the written approval of UL LLC

9.3. TX SPURIOUS EMISSION 30 TO 1000 MHz

9.3.1. TYPE A, WITH TAG



HORIZONTAL



VERTICAL

This report shall not be reproduced except in full, without the written approval of UL LLC

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	90629 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
5	35.8767	39.17	Qp	22.8	-31.5	30.47	40	-9.53	144	103	V
6	142.229	44.27	Pk	19.3	-30.5	33.07	43.52	-10.45	0-360	100	V
7	148.922	45.31	Pk	18.8	-30.1	34.01	43.52	-9.51	0-360	100	V
8	189.856	47.23	Pk	17.9	-30	35.13	43.52	-8.39	0-360	100	V
1	649.83	39.37	Pk	25.9	-27.9	37.37	46.02	-8.65	0-360	100	H
9	704.053	38.62	Pk	26.4	-28	37.02	46.02	-9	0-360	100	V
2	711.328	40.6	Pk	26.5	-28	39.1	46.02	-6.92	0-360	100	H
10	711.3208	36.8	Qp	26.5	-28	35.3	46.02	-10.72	262	108	V
3	765.551	39.77	Pk	27.1	-28.1	38.77	46.02	-7.25	0-360	100	H
4	819.871	38.09	Pk	27.9	-27.6	38.39	46.02	-7.63	0-360	100	H

Pk - Peak detector
Qp - Quasi-Peak detector

This report shall not be reproduced except in full, without the written approval of UL LLC

10. FREQUENCY STABILITY

LIMIT

§15.225 (e) The frequency tolerance of the carrier signal shall be maintained within ±0.01% of the operating frequency, over a temperature variation of -20 degrees to +50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

IC RSS-210, Annex B.6
Carrier frequency stability shall be maintained to ±0.01% (±100 ppm).

TEST PROCEDURE

ANSI C63.10-2020 Clause 6.8

RESULTS

No non-compliance noted.

Nominal/High Voltage: 5.5Vdc.

10.1. TYPE A, WITH TAG

Reference Frequency: EUT Channel 13.56 MHz @ 20ºC Limit: ± 100 ppm = 1.356 kHz										
Power Supply	Envir. Temp	Frequency Deviation Measureed with Time Elapse								
(Vdc)	(ºC)	Startup (MHz)	Delta (ppm)	@ 2 mins (MHz)	Delta (ppm)	@ 5 mins (MHz)	Delta (ppm)	@ 10 mins (MHz)	Delta (ppm)	Limit (ppm)
5.50	50	13.5595032	0.276	13.5595236	-1.234	13.5595265	-1.443	13.5595299	-1.698	± 100
5.50	40	13.5595114	-0.335	13.5595037	0.233	13.5595031	0.277	13.5595026	0.320	± 100
5.50	30	13.5595129	-0.439	13.5595107	-0.281	13.5595091	-0.159	13.5595078	-0.065	± 100
5.50	***20***	***13.5595069***	***0.000***	***13.5595071***	***-0.018***	***13.5595071***	***-0.013***	***13.5595071***	***-0.013***	***± 100***
5.50	10	13.5595615	-4.030	13.5595458	-2.871	13.5595416	***-2.562***	13.5595385	-2.332	± 100
5.50	0	13.5595644	-4.241	13.5595626	-4.106	13.5595593	-3.867	13.5595571	-3.699	± 100
5.50	-10	13.5595658	-4.342	13.5595672	-4.445	13.5595667	-4.407	13.5595664	-4.390	± 100
5.50	-20	13.5595661	-4.364	13.5595665	-4.398	13.5595659	-4.348	13.5595652	-4.298	± 100
4.50	20	13.5595151	-0.603	13.5595104	-0.261	13.5595098	-0.217	13.5595094	-0.182	± 100

Tested by: 33499/84740 and 84740
Test date: 2024-10-30 and 2024-11-05

This report shall not be reproduced except in full, without the written approval of UL LLC

11. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)
RSS-Gen 8.8

Frequency of Emission (MHz)	Conducted Limit (dBµV)	
	Quasi-peak	Average
0.15-0.5	66 to 56 *	56 to 46 *
0.5-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency.

TEST PROCEDURE

The EUT is placed on a non-conducting table 40 cm from the vertical ground plane and 80 cm above the horizontal ground plane. The EUT is configured in accordance with ANSI C63.10.

The receiver is set to a resolution bandwidth of 9 kHz. Peak detection is used unless otherwise noted as quasi-peak or average.

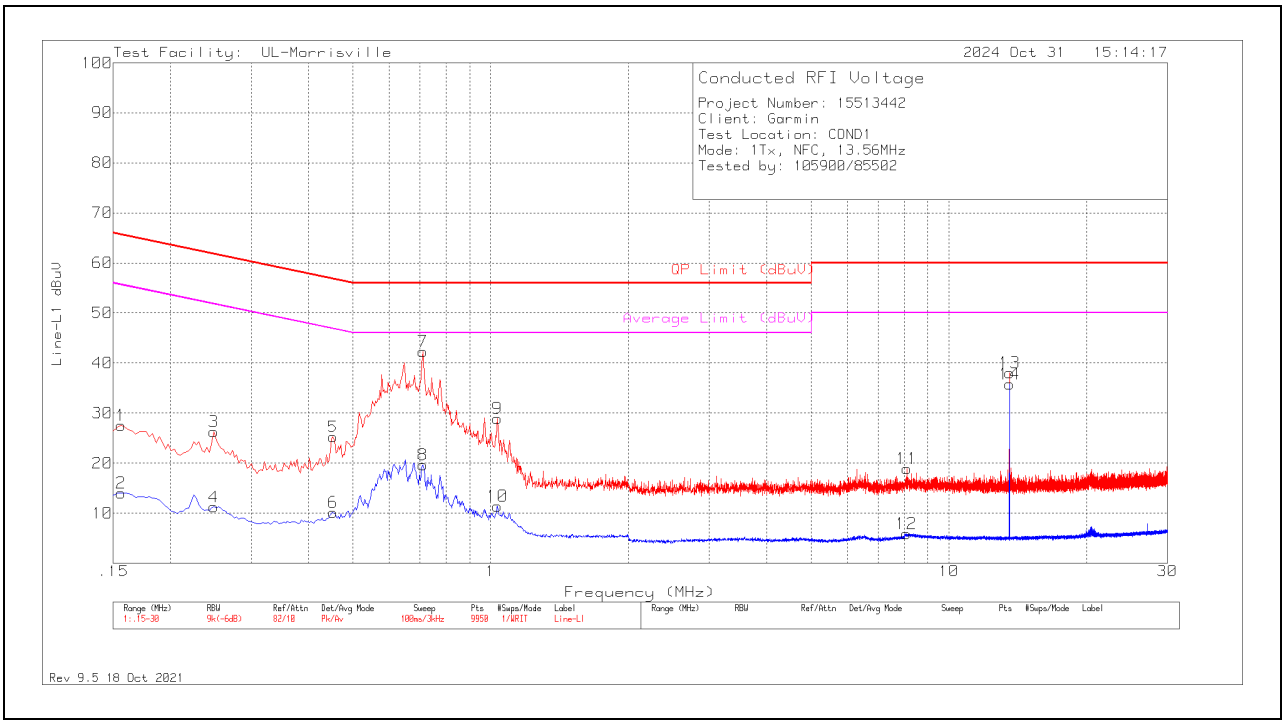
Line conducted data is recorded for both lines.

RESULTS

This report shall not be reproduced except in full, without the written approval of UL LLC

11.1. AC POWER LINE NORM

LINE 1 RESULTS

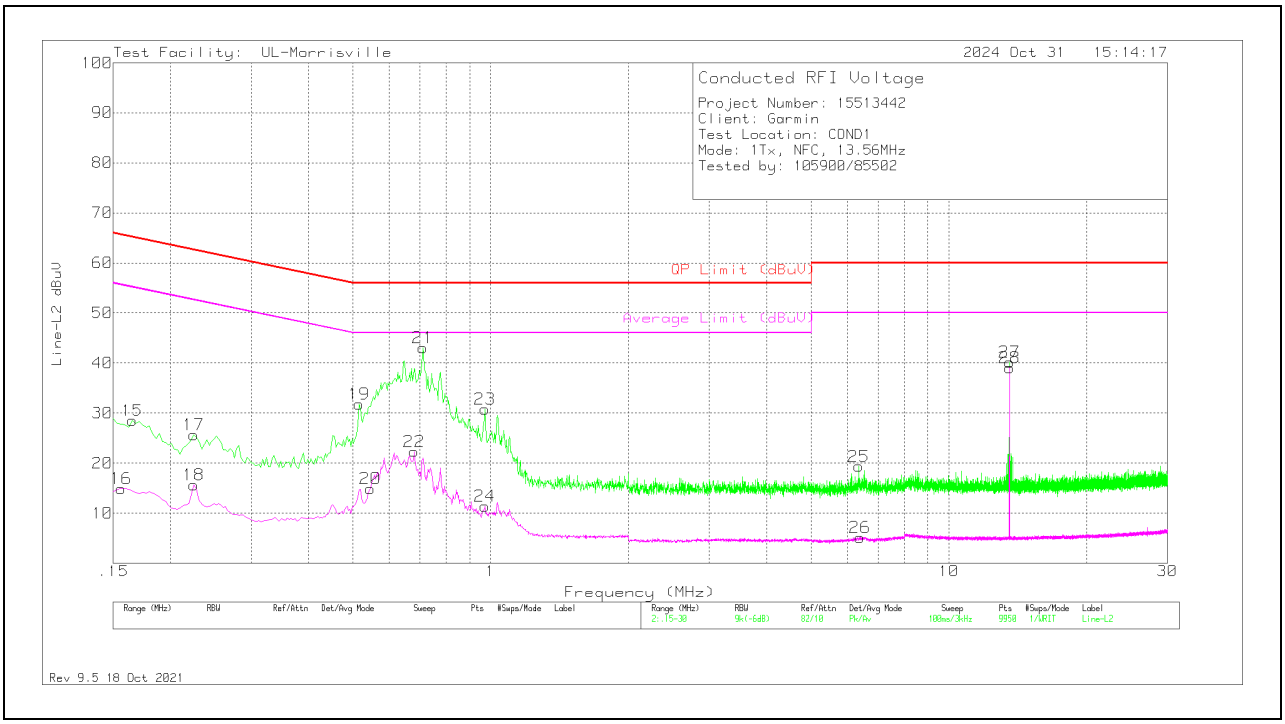


Range 1: Line-L1 .15 - 30MHz										
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN VDF (dB)	Cbl/Limiter (dB)	Corrected Reading dBuV	QP Limit (dBuV)	Margin (dB)	Average Limit (dBuV)	Margin (dB)
1	.156	17.52	Pk	.2	9.8	27.52	65.67	-38.15	-	-
2	.156	4.01	Av	.2	9.8	14.01	-	-	55.67	-41.66
3	.249	16.39	Pk	.1	9.8	26.29	61.79	-35.5	-	-
4	.249	1.3	Av	.1	9.8	11.2	-	-	51.79	-40.59
5	.453	15.32	Pk	.1	9.8	25.22	56.82	-31.6	-	-
6	.453	.24	Av	.1	9.8	10.14	-	-	46.82	-36.68
7	.711	32.48	Pk	0	9.8	42.28	56	-13.72	-	-
8	.711	9.84	Av	0	9.8	19.64	-	-	46	-26.36
9	1.035	19.11	Pk	0	9.8	28.91	56	-27.09	-	-
10	1.035	1.59	Av	0	9.8	11.39	-	-	46	-34.61
12	8.082	-4.27	Av	.1	10	5.83	-	-	50	-44.17
11	8.094	8.76	Pk	.1	10	18.86	60	-41.14	-	-
13	13.56	27.93	Pk	.1	10	38.03	60	-21.97	-	-
14	13.56	25.66	Av	.1	10	35.76	-	-	50	-14.24

Pk - Peak detector
Av - Average detection

This report shall not be reproduced except in full, without the written approval of UL LLC

LINE 2 RESULTS



Range 2: Line-L2 .15 - 30MHz										
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN VDF (dB)	Cbl/Limiter (dB)	Corrected Reading dBuV	QP Limit (dBuV)	Margin (dB)	Average Limit (dBuV)	Margin (dB)
16	.156	4.94	Av	.2	9.8	14.94	-	-	55.67	-40.73
15	.165	18.48	Pk	.2	9.8	28.48	65.21	-36.73	-	-
17	.225	15.76	Pk	.1	9.8	25.66	62.63	-36.97	-	-
18	.225	5.69	Av	.1	9.8	15.59	-	-	52.63	-37.04
19	.516	21.96	Pk	0	9.8	31.76	56	-24.24	-	-
20	.546	5.05	Av	0	9.8	14.85	-	-	46	-31.15
22	.681	12.53	Av	0	9.8	22.33	-	-	46	-23.67
21	.711	33.28	Pk	0	9.8	43.08	56	-12.92	-	-
23	.972	21.01	Pk	0	9.8	30.81	56	-25.19	-	-
24	.972	1.63	Av	0	9.8	11.43	-	-	46	-34.57
25	6.357	9.33	Pk	.1	9.9	19.33	60	-40.67	-	-
26	6.402	-4.87	Av	.1	9.9	5.13	-	-	50	-44.87
27	13.56	30.05	Pk	.1	10	40.15	60	-19.85	-	-
28	13.56	28.98	Av	.1	10	39.08	-	-	50	-10.92

Pk - Peak detector
Av - Average detection

This report shall not be reproduced except in full, without the written approval of UL LLC

12. SETUP PHOTOS

Please refer to R15513446-EP1 for setup photos

END OF TEST REPORT

This report shall not be reproduced except in full, without the written approval of UL LLC

TEST REPORT

Report Number: R15607055-E2

Applicant	:	Garmin International Inc. 1200 East 151st Street Olathe, KS 66062-3426, USA
Model	:	A04909
FCC ID	:	IPH-04909
IC	:	1792A-04909
EUT Description	:	Extremity Worn Digital Transceiver
Test Standard(s)	:	FCC 47 CFR PART 15 SUBPART C ISED RSS-247 ISSUE 3 ISED RSS-GEN ISSUE 5 + A1 + A2

Date Of Issue:
2025-01-17

Prepared by:
UL LLC
12 Laboratory Dr.
Research Triangle Park, NC 27709 U.S.A.
TEL: (919) 549-1400

ACCREDITED
CERT #0751.06

REPORT REVISION HISTORY

Rev.	Issue Date	Revisions	Revised By
V1	2025-01-17	Initial Issue	Chandler Stanley

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400

This report shall not be reproduced except in full, without the written approval of UL LLC

TABLE OF CONTENTS

This report shall not be reproduced except in full, without the written approval of UL LLC

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

1. ATTESTATION OF TEST RESULTS

COMPANY NAME: Garmin International Inc.
1200 East 151St Street
Olathe, KS 66062-3426, USA

EUT DESCRIPTION: Extremity Worn Digital Transceiver

MODEL: A04909

SERIAL NUMBER: 3493239303, 3493238982

SAMPLE RECEIPT DATE: 2024-10-21 and 2024-12-04

DATE TESTED: 2024-12-04 to 2024-12-18

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
CFR 47 Part 15 Subpart C ISED RSS-247 Issue 3 ISED RSS-GEN Issue 5 + A1 + A2	Refer to Section 2

UL LLC tested the above equipment in accordance with the requirements set forth in the above standards. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. All samples tested were in good operating condition throughout the entire test program. Measurement Uncertainties are published for informational purposes only and were not taken into account unless noted otherwise.

This document may not be altered or revised in any way unless done so by UL LLC and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL LLC will constitute fraud and shall nullify the document.

Approved & Released
For UL LLC By:

Brian Kiewra
Project Engineer
Consumer, Medical and IT Segment
UL LLC

Prepared By:

Chandler Stanley
Engineer
Consumer, Medical and IT Segment
UL LLC

This report shall not be reproduced except in full, without the written approval of UL LLC

2. TEST RESULTS SUMMARY

This report contains info provided by the customer which can impact the validity of results. UL LLC is only responsible for the validity of results after the integration of the data provided by the customer.
Below is a list of the data/info provided by the customer:

1) Antenna gain and type (see section 6.3)
2) Worst-case data rates (see section 6.5)

FCC Clause	ISED Clause	Requirement	Result	Comment
See Comment		Duty Cycle	Reporting purposes only	Per ANSI C63.10, Section 11.6.
See Comment	RSS-GEN 6.7	20dB BW/99% OBW	Reporting purposes only	ANSI C63.10 Sections 6.9.2 and 6.9.3
15.247 (a)(1)	RSS-247 (5.1) (b)	Hopping Frequency Separation	Compliant	None
15.247 (a)(1)(iii)	RSS-247 (5.1) (d)	Number of Hopping Channels		
15.247 (a)(1)(iii)	RSS-247 (5.1) (d)	Average Time of Occupancy		
15.247 (b)(1)	RSS-247 (5.4) (b)	Output Power		
See Comment		Average Power	Reporting purposes only	Per ANSI C63.10, Section 11.9.2.3.2.
15.247 (d)	RSS-247 (5.5)	Conducted Spurious Emissions	Compliant	None
15.209, 15.205	RSS-GEN 8.9, 8.10	Radiated Emissions		
15.207	RSS-Gen 8.8	AC Mains Conducted Emissions		

3. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC 47 CFR Part 2, FCC 47 CFR Part 15, ANSI C63.10-2020, KDB 558074 D01 15.247 Meas Guidance v05r02, KDB 414788 D01 Radiated Test Site v01r01, RSS-GEN Issue 5 + A1 + A2, and RSS-247 Issue 3.

4. FACILITIES AND ACCREDITATION

UL LLC is accredited by A2LA, certification # 0751.06, for all testing performed within the scope of this report. Testing was performed at the locations noted below.

	Address	ISED CABID	ISED Company Number	FCC Registration
☐	Building: 12 Laboratory Dr RTP, NC 27709, U.S.A	US0067	2180C	825374
☒	Building: 2800 Perimeter Park Dr. Suite B Morrisville, NC 27560, U.S.A		27265	

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

5. DECISION RULES AND MEASUREMENT UNCERTAINTY

5.1. METROLOGICAL TRACEABILITY

All test and measuring equipment utilized to perform the tests documented in this report are calibrated on a regular basis, with a maximum time between calibrations of one year or the manufacturers' recommendation, whichever is less, and where applicable is traceable to recognized national standards.

5.2. DECISION RULES

The Decision Rule is based on Simple Acceptance in accordance with ISO Guide 98-4:2012 Clause 8.2. (Measurement uncertainty is not taken into account when stating conformity with a specified requirement.)

5.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	UNCERTAINTY
Radio Frequency (Spectrum Analyzer)	141.2 Hz
Occupied Channel Bandwidth	1.22%
RF output power, conducted	1.3 dB (PK) 0.45 dB (AV)
Power Spectral Density, conducted	2.47 dB
Unwanted Emissions, conducted	1.94 dB
All emissions, radiated	6.01 dB
Conducted Emissions (0.150-30MHz) - LISN	3.40 dB
Temperature	0.57°C
Humidity	3.39%
DC Supply voltages	1.70%
Time	3.39%

Uncertainty figures are valid to a confidence level of 95%.

5.4. SAMPLE CALCULATION

RADIATED EMISSIONS

Where relevant, the following sample calculation is provided:
Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB)
36.5 dBuV + 18.7 dB/m + 0.6 dB – 26.9 dB = 28.9 dBuV/m

MAINS CONDUCTED EMISSIONS

Where relevant, the following sample calculation is provided:
Final Voltage (dBuV) = Measured Voltage (dBuV) + Cable Loss (dB) + Limiter Factor (dB) + LISN Insertion Loss.
36.5 dBuV + 0 dB +10.1 dB+ 0 dB = 46.6 dBuV

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

6. EQUIPMENT UNDER TEST

6.1. EUT DESCRIPTION

The EUT is an extremity worn digital transceiver with BT, BLE, ANT/ANT+, 802.11b/g/n 2.4GHz WLAN, NFC, and Global Navigation Satellite System (GNSS) receiver. This report covers testing on the BT radio.

6.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum peak conducted output power as follows:

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
2402 - 2480	Basic GFSK	9.17	8.26
2402 - 2480	Enhanced DQPSK	10.66	11.64
2402 - 2480	Enhanced 8PSK	11.02	12.65

6.3. DESCRIPTION OF AVAILABLE ANTENNAS

The antenna(s) gain and type, as provided by the manufacturer' are as follows:
The radio utilizes an antenna with the following type and maximum gain:

Type	Frequency Range (MHz)	Maximum Gain (dBi)
Bezel Antenna	2402-2480	-3.3

6.4. SOFTWARE AND FIRMWARE

The software version installed on radiated units during testing was 3.51.
The software version installed on conducted units during testing was 53.07.

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

6.5. WORST-CASE CONFIGURATION AND MODE

Radiated emissions below 1GHz, above 18GHz, and power line conducted emission were performed with the EUT set to transmit at the channel and mode with the highest average output power as worst-case scenario.

Band edge and radiated emissions between 1GHz and 18GHz were performed with the EUT set to transmit at the highest power on low, middle and high channels.

The fundamental of the EUT was investigated in three orthogonal orientations X, Y, and Z. The worst-case orientation was determined to be the Z-orientation; therefore, all testing was performed with the EUT in the Z-orientation.

8PSK testing will cover DQPSK due to higher power.

Worst-case packet size:
GFSK mode: DH5
8PSK mode: 3-DH5

Note: To reduce size of report only representative plots are included for some conducted testing.

6.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
AC Adaptor	Garmin/Phihong	AQ27A-59CFA	N/A	N/A

I/O CABLES

I/O Cable List						
Cable No.	**Port**	**# of Identical Ports**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
1	Proprietary	1	4 pin Proprietary	Non-Shielded	<3m	Used for charging only

TEST SETUP

EUT was configured using its own built-in push buttons prior to testing. For final emissions testing, the EUT was connected to AC mains.

SETUP DIAGRAMS

Please refer to R15607055-EP1 for setup diagrams

This report shall not be reproduced except in full, without the written approval of UL LLC

7. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

Test Equipment Used - Wireless Conducted Measurement Equipment

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
	Common Equipment				
	Conducted Room 1				
90410	Spectrum Analyzer	Keysight Technologies	N9030A	2024-06-14	2025-06-14
245765	Environmental Meter	Fisher Scientific	06-662-4	2024-01-24	2025-01-24
211058	Real-Time Peak Power Sensor 50MHz to 8GHz	Boonton	RTP5000	2024-08-01	2025-08-01
SOFTEMI	Antenna Port Software	UL	Version 2024.2.23	NA	NA
Power Software	Boonton Power Analyzer	Boonton	Version 3.0.13.0	NA	NA
	Additional Equipment used				
CBL028	SMA Cable	Sucoflex	104PEA	2024-02-16	2025-02-16

Test Equipment Used - Radiated Disturbance Emissions Test Equipment (Morrisville – Chamber 1)

Equip. ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
0.009-30MHz					
135144	Active Loop Antenna	ETS-Lindgren	6502	2024-10-02	2025-10-02
1-18 GHz					
135143	Double-Ridged Waveguide Horn Antenna, 1 to 18 GHz	ETS Lindgren	3117	2024-02-07	2026-02-07
Gain-Loss Chains					
91974	Gain-loss string: 0.009-30MHz	Various	Various	2024-05-08	2025-05-08
91979	Gain-loss string: 1-18GHz	Various	Various	2024-05-08	2025-05-08
Receiver & Software					
206496	Spectrum Analyzer	Rohde & Schwarz	ESW44	2024-08-29	2025-08-29
SOFTEMI	EMI Software	UL	Version 9.5 (18 Oct 2021)		
Additional Equipment used					
241205	Environmental Meter	Fisher Scientific	15-077-963	2023-09-05	2025-09-05

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

Test Equipment Used - Radiated Disturbance Emissions Test Equipment (Morrisville – Chamber 2)

Equip. ID	Description	Manufacturer/Brand	Model Number	Last Cal.	Next Cal.
30-1000 MHz					
159203	Hybrid Broadband Antenna	Sunol Sciences Corp.	JB3	2024-03-05	2026-03-05
Gain-Loss Chains					
91978	Gain-loss string: 25-1000MHz	Various	Various	2024-05-10	2025-05-10
Receiver & Software					
197954	Spectrum Analyzer	Rohde & Schwarz	ESW44	2024-08-29	2025-08-29
SOFTEMI	EMI Software	UL	Version 9.5 (18 Oct 2021)		
Additional Equipment used					
200540	Environmental Meter	Fisher Scientific	15-077-963	2023-07-19	2025-07-19

Test Equipment Used - Radiated Disturbance Emissions Test Equipment (Morrisville – Chamber 4)

Equip. ID	Description	Manufacturer/Brand	Model Number	Last Cal.	Next Cal.
18-26.5 GHz					
204704	Horn Antenna, 18-26.5GHz	Com-Power	AH-826	2023-07-20	2025-07-20
Gain-Loss Chains					
225795	Gain-loss string: 18-40GHz	Various	Various	2024-05-22	2025-05-22
Receiver & Software					
197955	Spectrum Analyzer	Rohde & Schwarz	ESW44	2024-04-16	2025-04-16
SOFTEMI	EMI Software	UL	Version 9.5 (18 Oct 2021)		
Additional Equipment used					
241204	Environmental Meter	Fisher Scientific	15-077-963	2023-09-05	2025-09-05

Test Equipment Used - Line-Conducted Emissions – Voltage (Morrisville – Conducted 1)

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
CBL087	Coax cable, RG223, N-male to BNC-male, 20-ft.	Pasternack	PE3W06143-240	2024-04-04	2025-04-04
179892	Environmental Meter	Fisher Scientific	15-077-963	2024-08-12	2025-08-12
80391	LISN, 50-ohm/50-uH, 250uH 2-conductor, 25A	Fischer Custom Com.	FCC-LISN-50/250-25-2-01	2024-08-01	2025-08-01
70374	EMI Test Receiver 9kHz-7GHz	Rohde & Schwarz	ESCI 7	2024-07-30	2025-07-30
52859	Transient Limiter, 0.009-100MHz	Electro-Metrics	EM-7600	2024-04-04	2025-04-04
PS216	AC Power Source	Elgar	CW2501M	NA	NA
84681	ANSI C63.4 1m extension cable	UL	Per Annex B of ANSI C63.4	2024-04-04	2025-04-04
SOFTEMI	EMI Software	UL	Version 9.5 (18 Oct 2021)		

This report shall not be reproduced except in full, without the written approval of UL LLC

8. MEASUREMENT METHODS

On Time and Duty Cycle: ANSI C63.10-2020 Section 11.6

Occupied BW (20dB): ANSI C63.10-2020 Section 6.9.2

Occupied BW (99%): ANSI C63.10-2020 Section 6.9.3

Carrier Frequency Separation: ANSI C63.10-2020 Section 7.8.2

Number of Hopping Frequencies: ANSI C63.10-2020 Section 7.8.3

Time of Occupancy (Dwell Time): ANSI C63.10-2020 Section 7.8.4

Output Power: ANSI C63.10-2020 Section 7.8.5

Conducted Spurious Emissions: ANSI C63.10-2020 Section 7.8.7

Conducted Band-Edge: ANSI C63.10-2020 Section 7.8.7.2 and 6.10.4

Radiated Band-edge: ANSI C63.10-2020 Section 6.10.5

Radiated Spurious Emissions: ANSI C63.10-2020 Sections 6.3 to 6.6 and 7.8.8

AC Power Line Conducted Emissions: ANSI C63.10-2020, Section 6.2.

This report shall not be reproduced except in full, without the written approval of UL LLC

9. ANTENNA PORT TEST RESULTS

9.1. 20 dB AND 99% BANDWIDTH

LIMITS

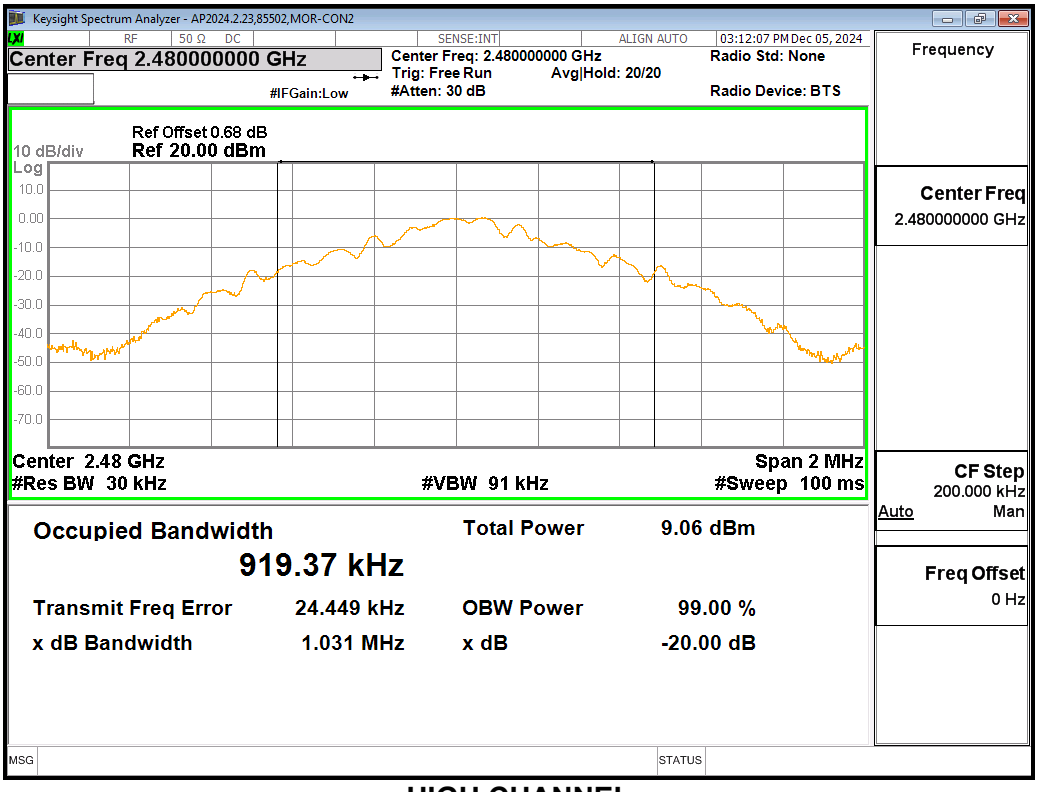
None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The RBW is set to 1-5% of the 20 dB bandwidth. The VBW is set to ≥ RBW. The sweep time is coupled.

9.1.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION

Channel	Frequency (MHz)	20dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	2402	1.030	0.915
Mid	2441	1.030	0.917
High	2480	1.031	0.919

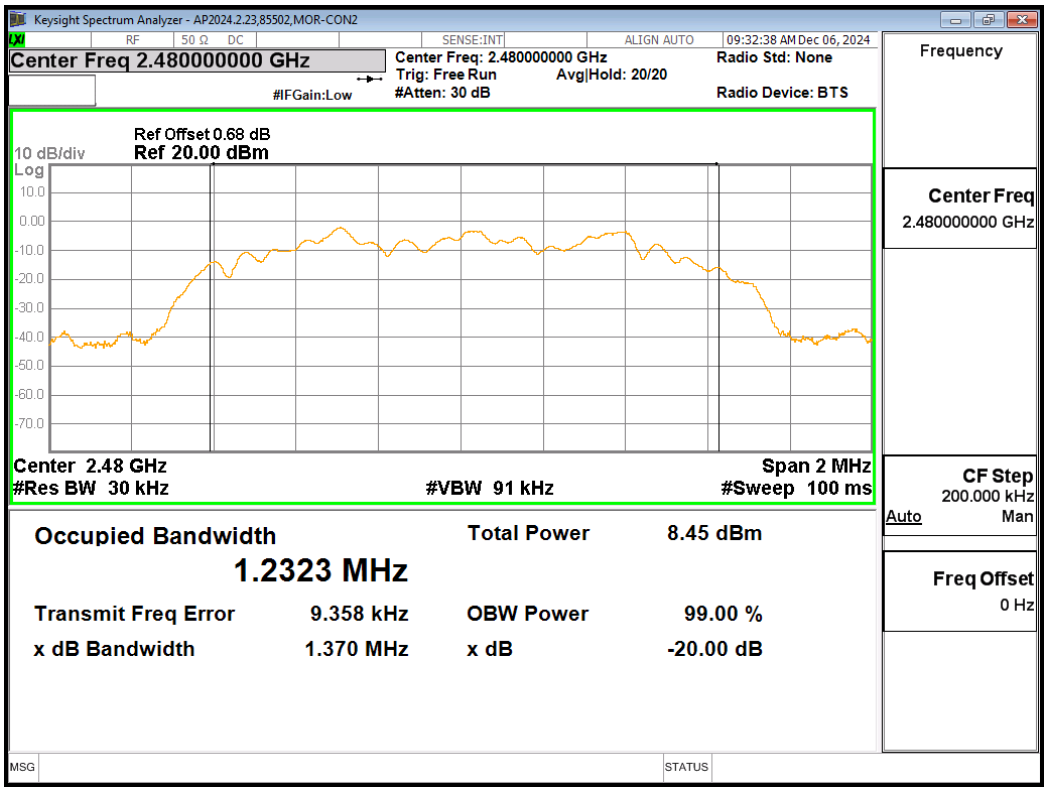


HIGH CHANNEL

This report shall not be reproduced except in full, without the written approval of UL LLC

9.1.2. BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION

Channel	Frequency (MHz)	20dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	2402	1.369	1.2306
Mid	2441	1.373	1.2320
High	2480	1.370	1.2323



HIGH CHANNEL

This report shall not be reproduced except in full, without the written approval of UL LLC

9.2. ON TIME AND DUTY CYCLE

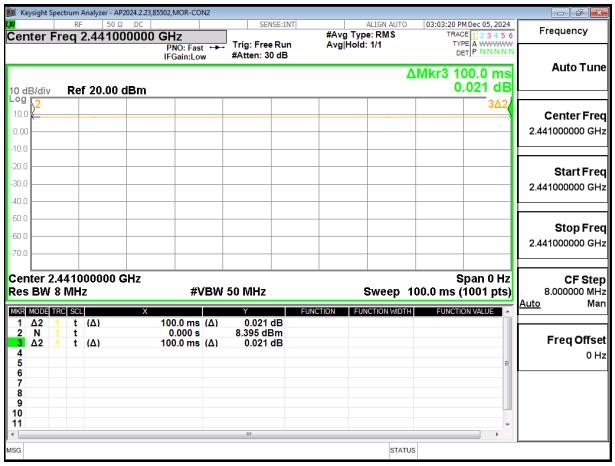
LIMITS

None; for reporting purposes only.

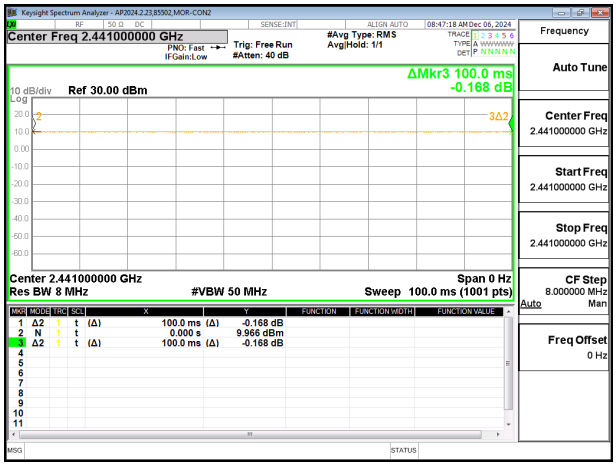
PROCEDURE

ANSI C63.10, Section 11.6 : Zero-Span Spectrum Analyzer Method.

Mode	ON Time B (ms)	Period (ms)	Duty Cycle x (lineari)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	1/T Minimum VBW (kHz)
GFSK	100.00	100.00	1.000	100.00	0.00	0.010
8PSK	100.00	100.00	1.000	100.00	0.00	0.010



GFSK



8PSK

This report shall not be reproduced except in full, without the written approval of UL LLC

9.3. HOPPING FREQUENCY SEPARATION

LIMITS

FCC §15.247 (a) (1)
RSS-247 (5.1) (b)

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hoping channel, whichever is greater.

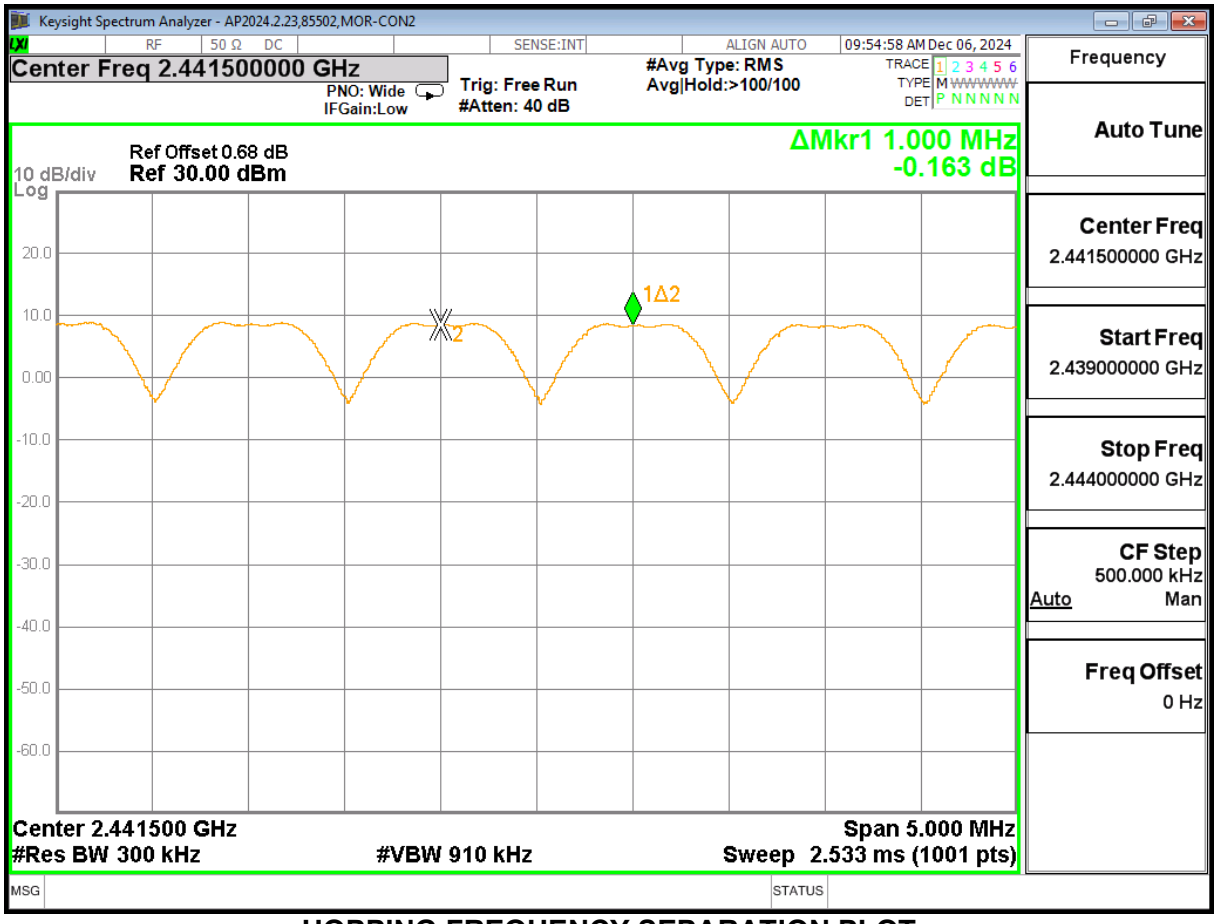
Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The RBW is set to 300 kHz and the VBW is set to VBW >= RBW. The sweep time is coupled.

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

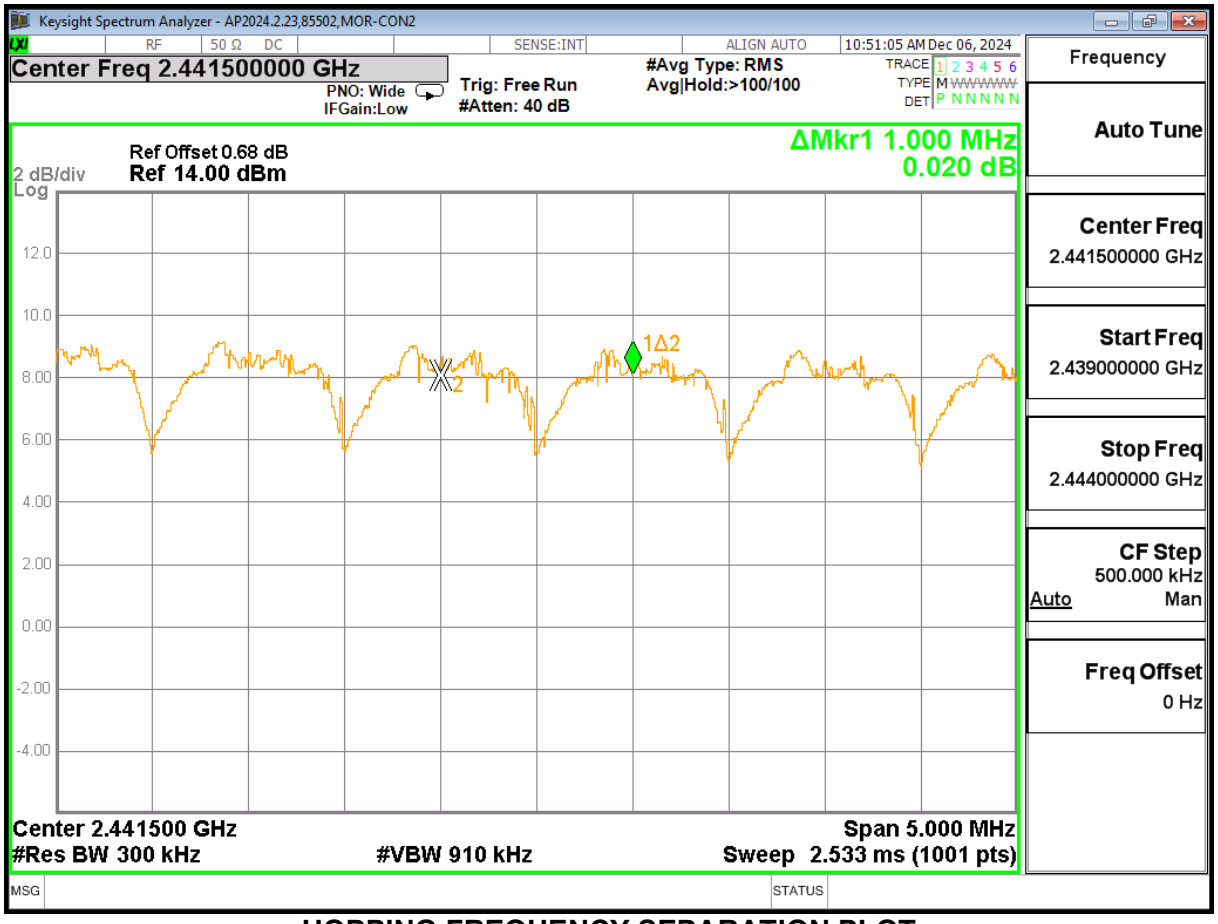
9.3.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION



HOPPING FREQUENCY SEPARATION PLOT

This report shall not be reproduced except in full, without the written approval of UL LLC

9.3.2. BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION



HOPPING FREQUENCY SEPARATION PLOT

(20dB BW) x (2/3) = (1.373 MHz) x (2/3) = 0.9153 MHz
0.9153 MHz < 1 MHz

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

9.4. NUMBER OF HOPPING CHANNELS

LIMITS

FCC §15.247 (a) (1) (iii)
RSS-247 (5.1) (d)

Frequency hopping systems in the 2400 – 2483.5 MHz band shall use at least 15 non-overlapping channels.

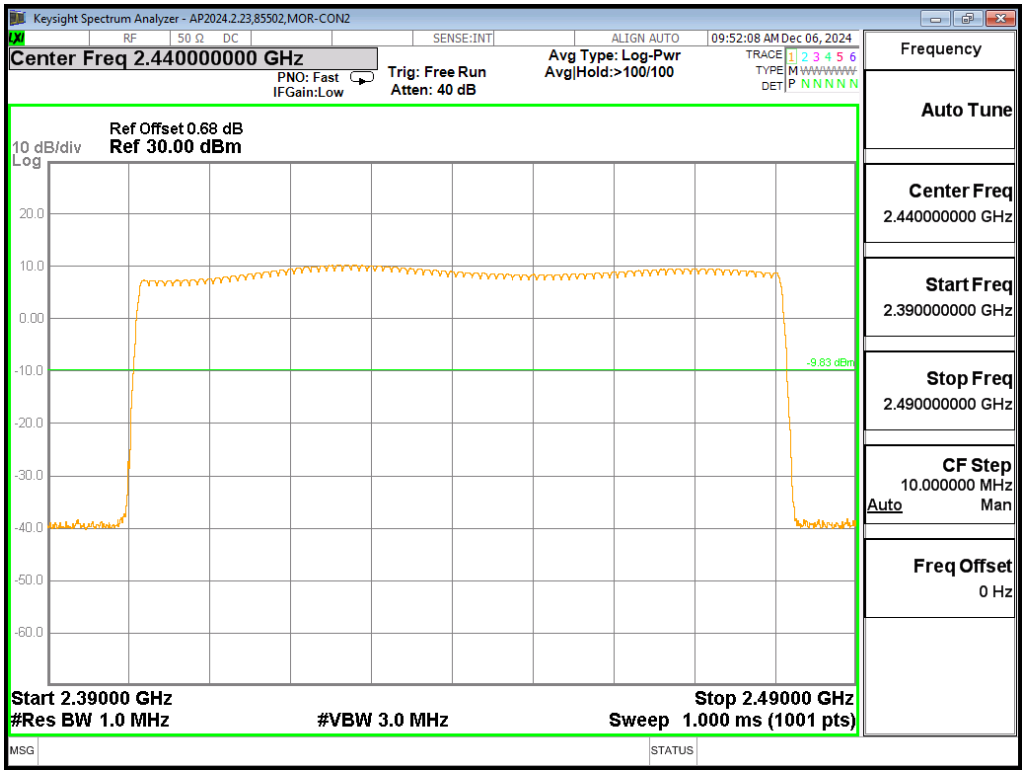
TEST PROCEDURE

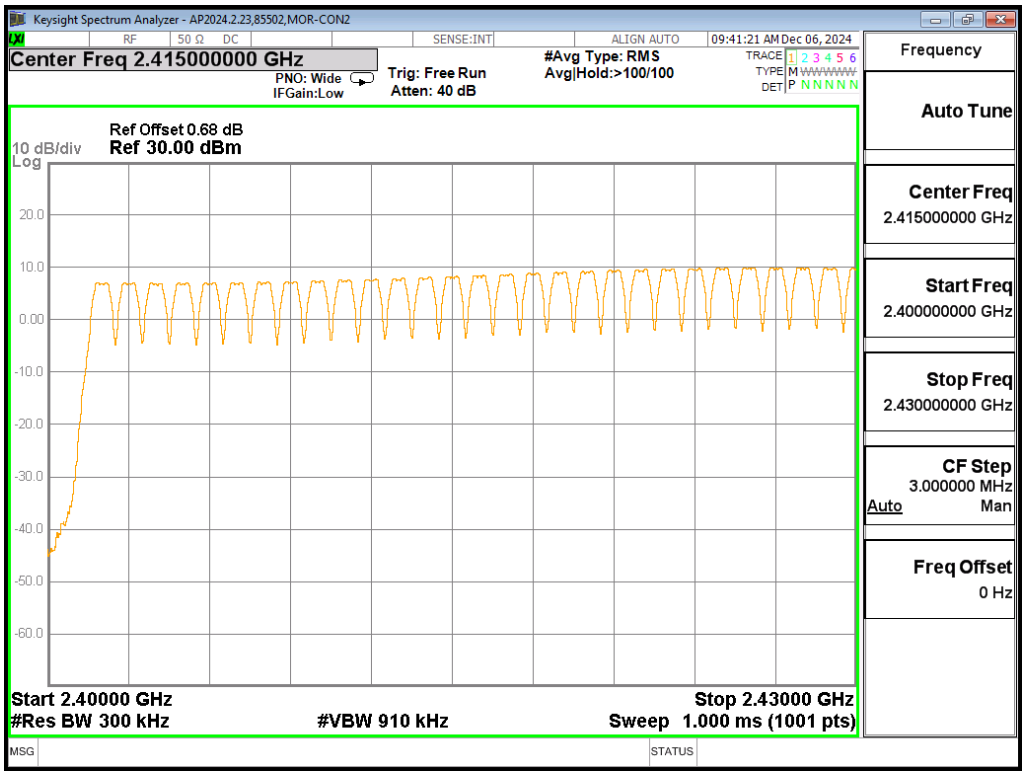
The transmitter output is connected to a spectrum analyzer. The span is set to cover the entire authorized band, in either a single sweep or in multiple contiguous sweeps. The RBW is set to a maximum of 1 % of the span. The analyzer is set to Max Hold.

Normal Mode: 79 Channels Observed

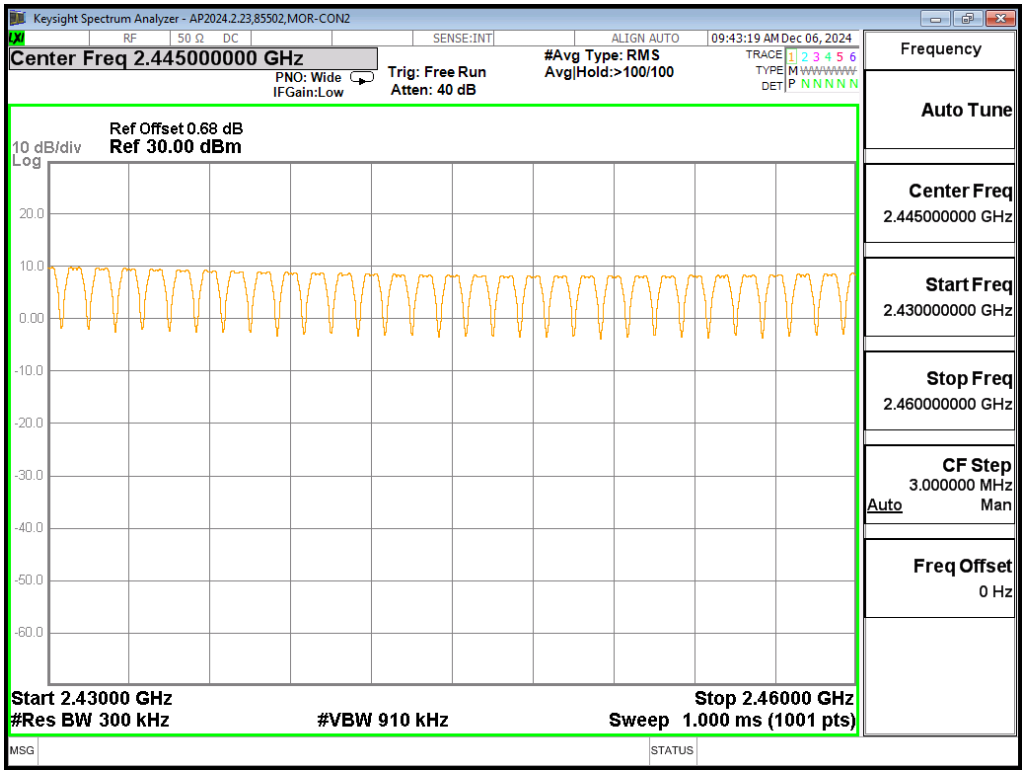
This report shall not be reproduced except in full, without the written approval of UL LLC

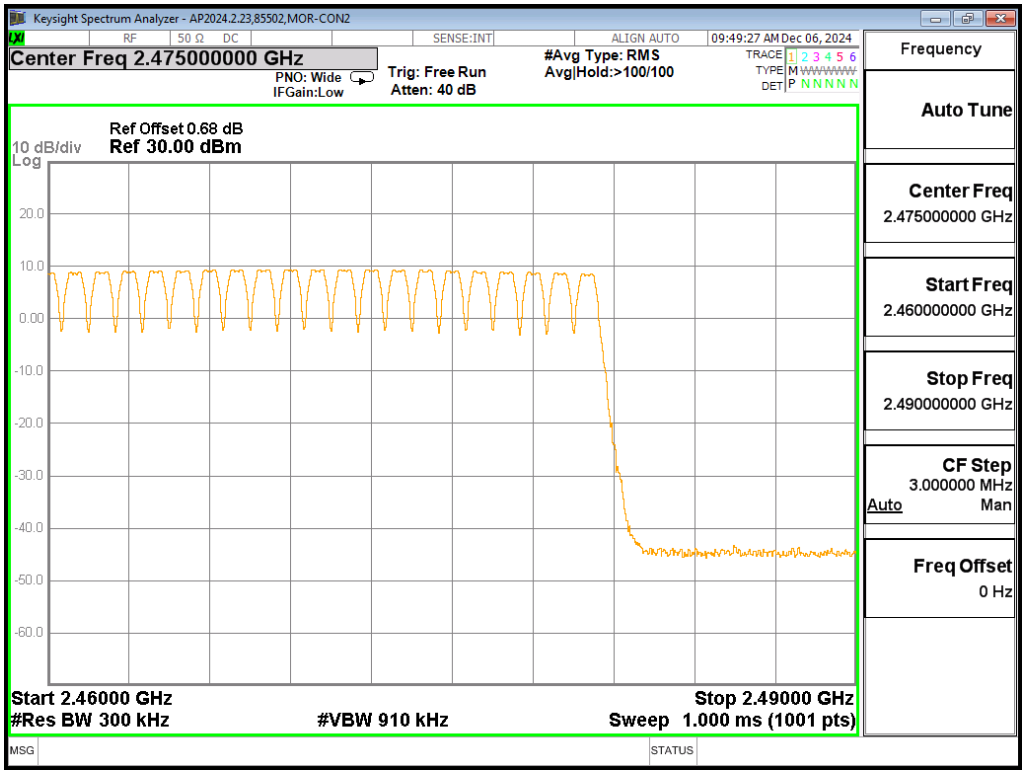
9.4.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION





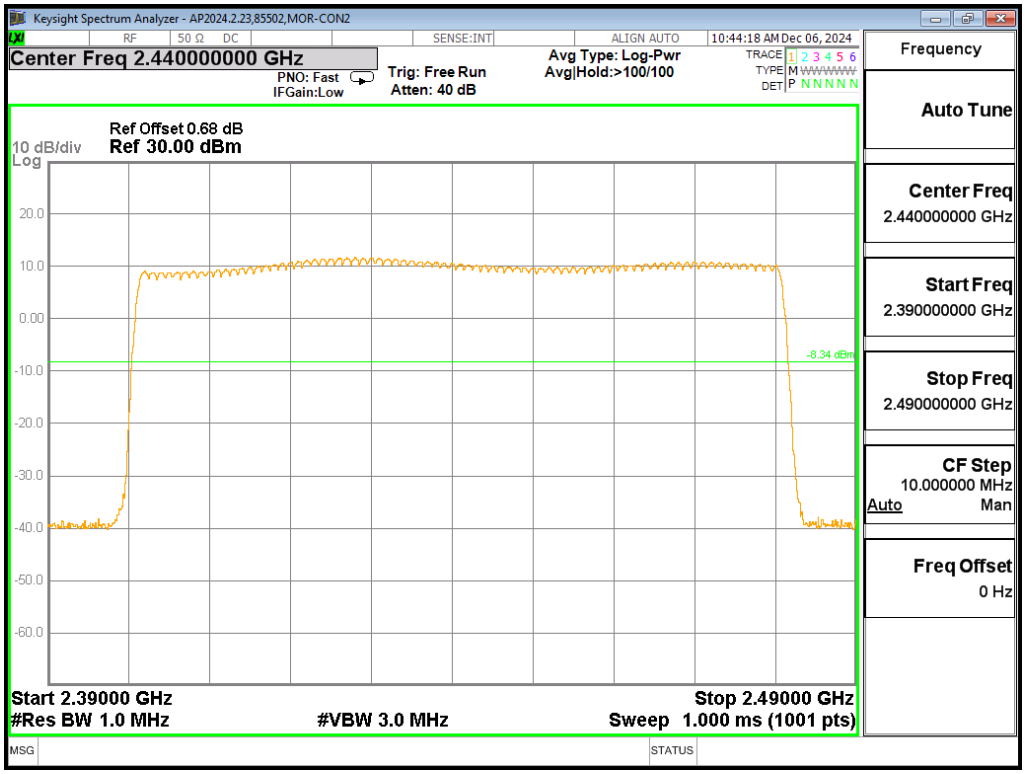
This report shall not be reproduced except in full, without the written approval of UL LLC

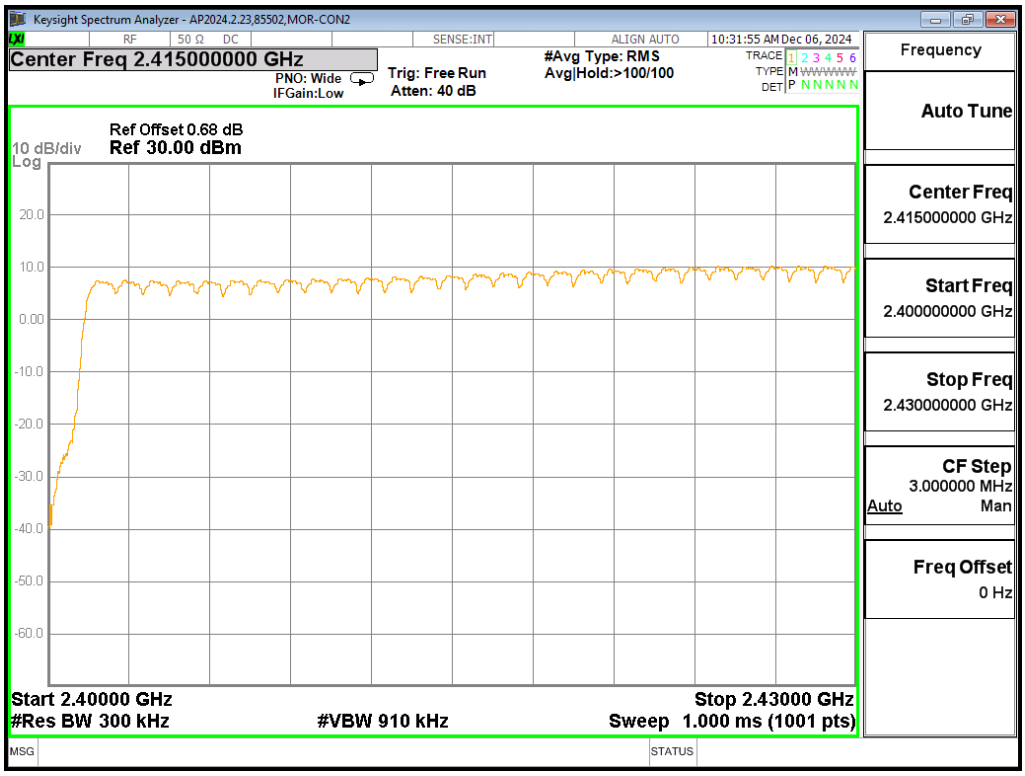




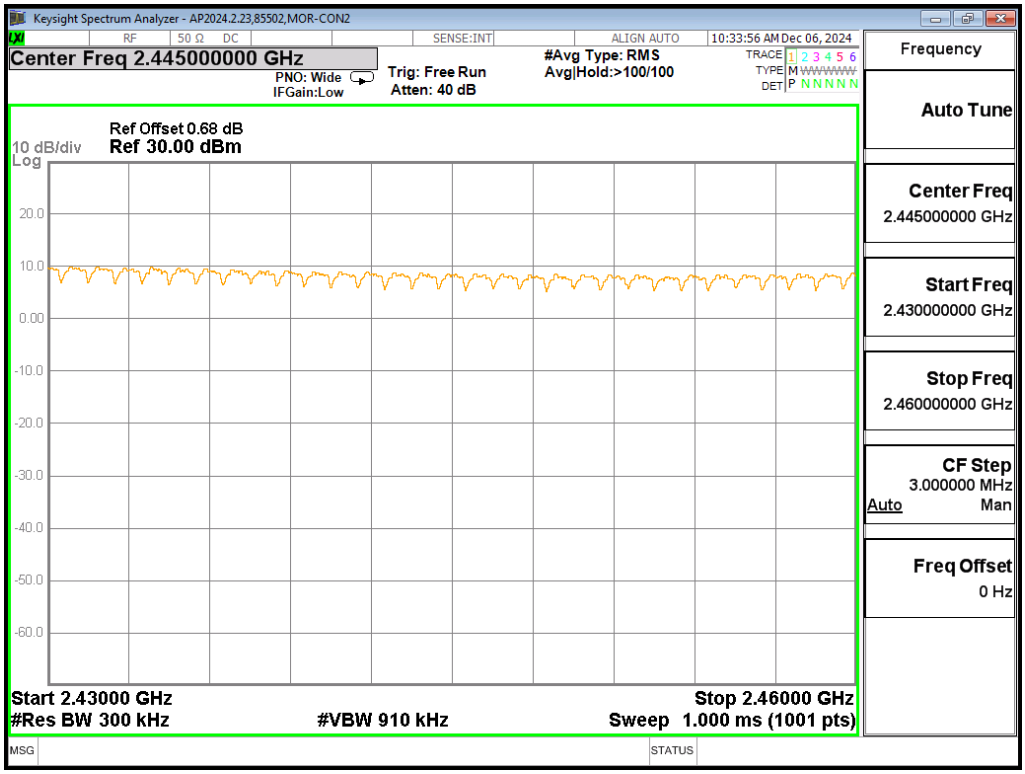
This report shall not be reproduced except in full, without the written approval of UL LLC

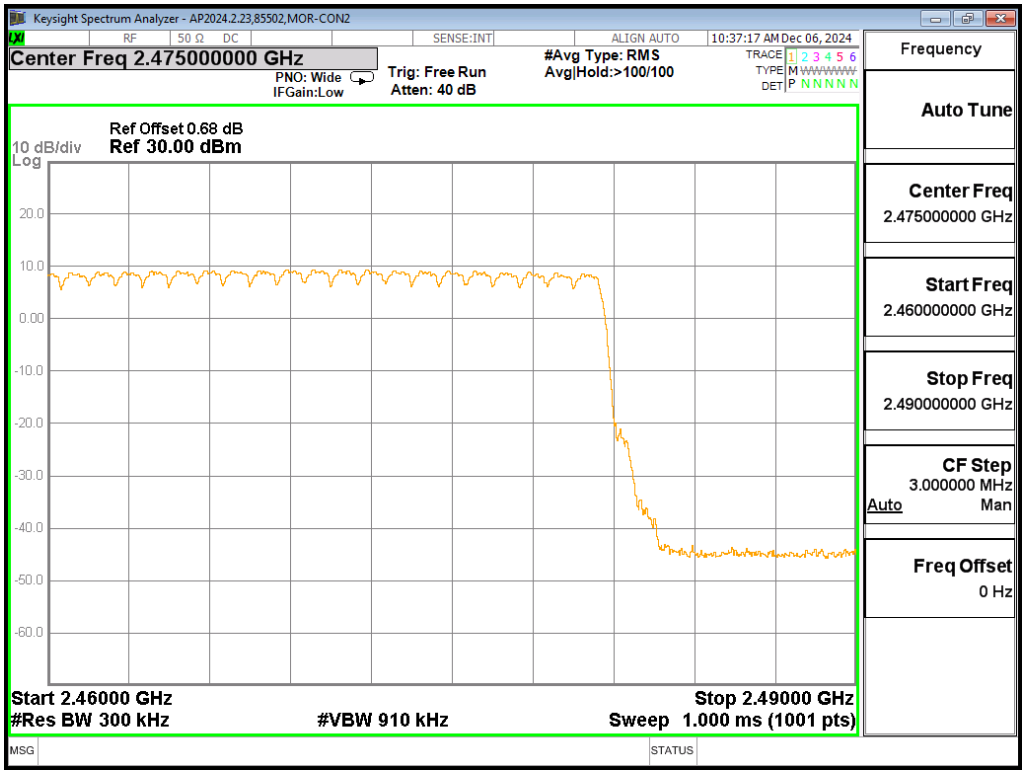
9.4.2. BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION





This report shall not be reproduced except in full, without the written approval of UL LLC





This report shall not be reproduced except in full, without the written approval of UL LLC

9.5. AVERAGE TIME OF OCCUPANCY

LIMITS

FCC §15.247 (a) (1) (iii)
RSS-247 (5.1) (d)

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The span is set to 0 Hz, centered on a single, selected hopping channel. The width of a single pulse is measured in a fast scan. The number of pulses is measured in a 3.16 second scan, to enable resolution of each occurrence.

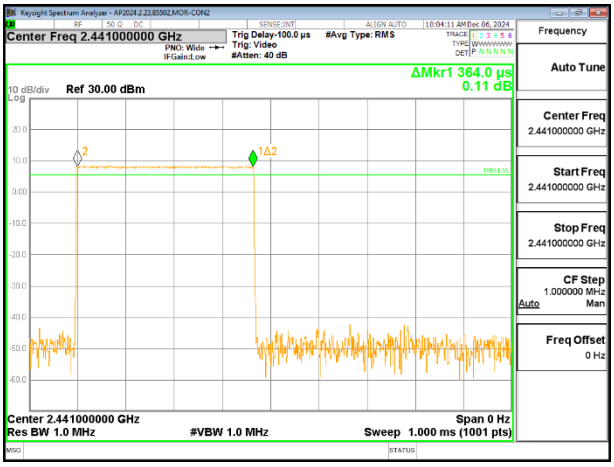
The average time of occupancy in the specified 3.16 second period (79 channels * 0.4 s) is equal to 10 * (# of pulses in 3.16 s) * pulse width.

For AFH mode, the average time of occupancy in the specified 8 second period (20 channels * 0.4 seconds) is equal to 10 * (# of pulses in 0.8 s) * pulse width.

9.5.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION

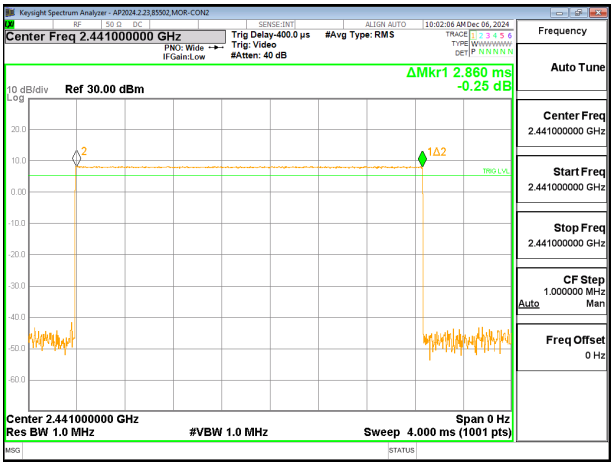
DH Packet	Pulse Width (msec)	Number of Pulses in 3.16 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
GFSK Normal Mode					
DH1	0.364	31	0.1128	0.4	-0.2872
DH3	1.618	14	0.2265	0.4	-0.1735
DH5	2.86	7	0.2002	0.4	-0.1998
DH Packet	Pulse Width (sec)	Number of Pulses in 0.8 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
GFSK AFH Mode					
DH1	0.364	7.75	0.02821	0.4	-0.3718
DH3	1.618	3.5	0.05663	0.4	-0.3434
DH5	2.86	1.75	0.05005	0.4	-0.3500

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

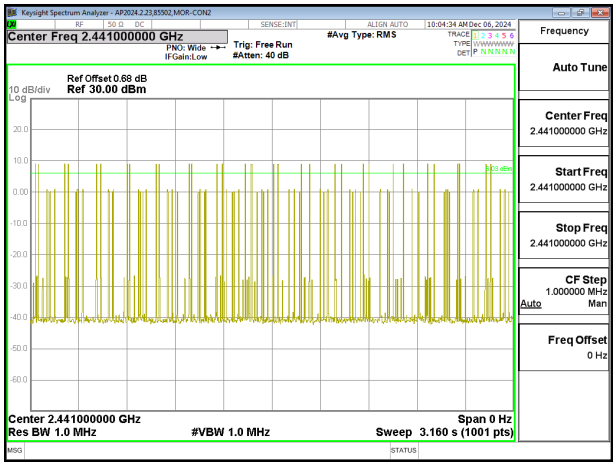


PULSE WIDTH – DH1

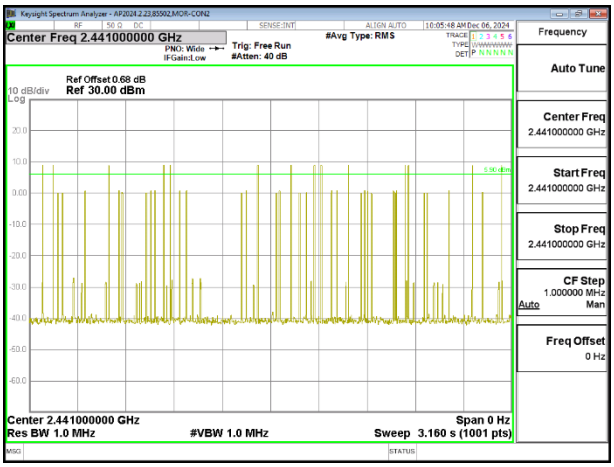
PULSE WIDTH – DH3



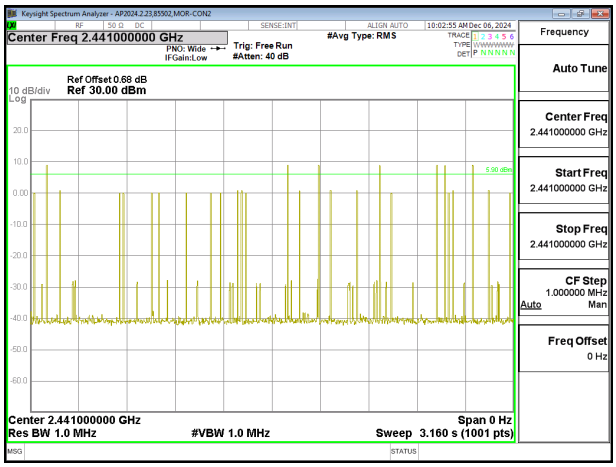
PULSE WIDTH – DH5



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH1



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH3



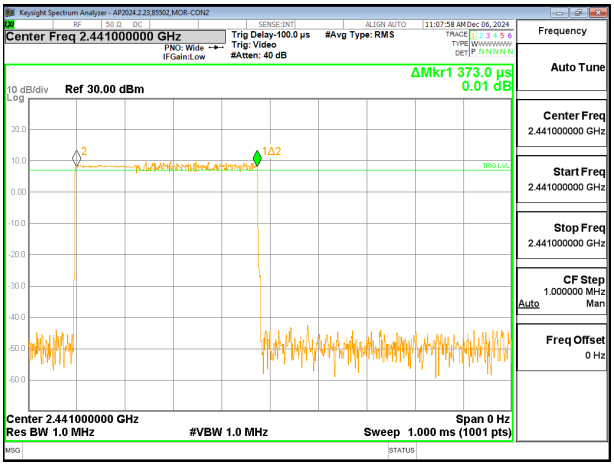
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH5

This report shall not be reproduced except in full, without the written approval of UL LLC

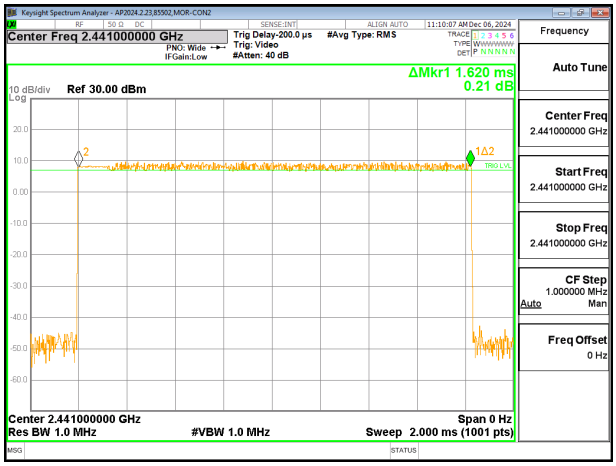
9.5.2. BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION

DH Packet	Pulse Width (msec)	Number of Pulses in 3.16 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
8PSK Normal Mode					
DH1	0.373	32	0.1194	0.4	-0.2806
DH3	1.62	16	0.2592	0.4	-0.1408
DH5	2.868	8	0.2294	0.4	-0.1706
DH Packet	Pulse Width (sec)	Number of Pulses in 0.8 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
8PSK AFH Mode					
DH1	0.373	8	0.02984	0.4	-0.3702
DH3	1.62	4	0.06480	0.4	-0.3352
DH5	2.868	2	0.05736	0.4	-0.3426

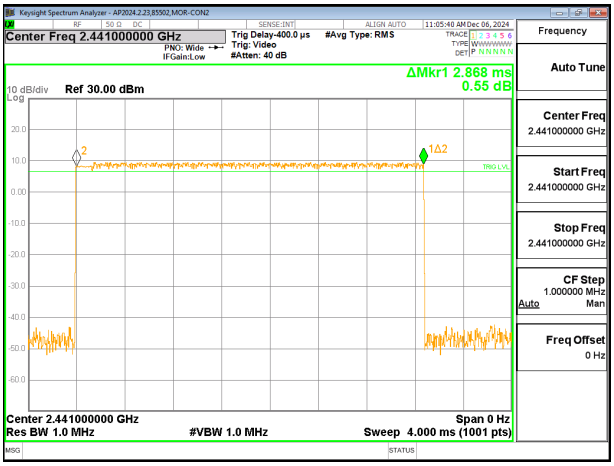
This report shall not be reproduced except in full, without the written approval of UL LLC



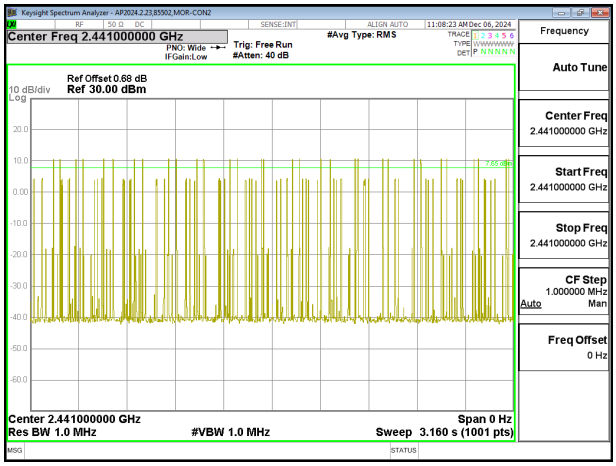
PULSE WIDTH – DH1



PULSE WIDTH – DH3

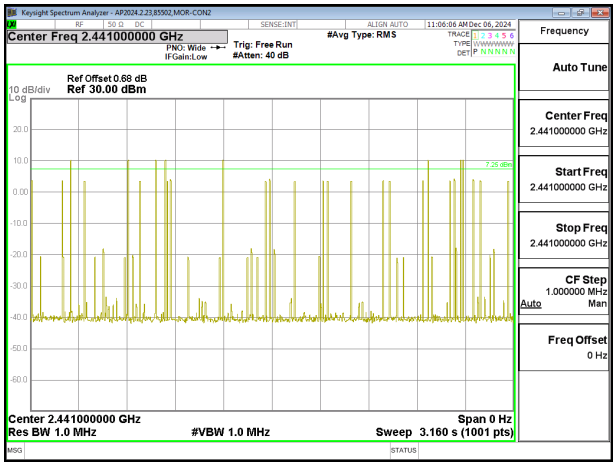


PULSE WIDTH – DH5



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH1

NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH3



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH5

This report shall not be reproduced except in full, without the written approval of UL LLC

9.6. OUTPUT POWER

LIMITS

§15.247 (b) (1)
RSS-247 (5.4) (b)

The maximum antenna gain is less than 6 dBi, therefore the limit is 30 dBm. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts

TEST PROCEDURE

Measurements performed using a wideband gated RF power meter.

The cable assembly insertion loss of 0.68 dB (including 0.68 dB cable) was entered as an offset in the power meter.

The power output was measured on the EUT antenna port using SMA cable connected to a power meter via wideband power sensor. Peak output power was read directly from power meter.

9.6.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION

Tested By:	85502
Date:	2024-12-04

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	7.57	30	-22.43
Middle	2441	9.17	30	-20.83
High	2480	8.95	30	-21.05

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

9.6.2. BLUETOOTH ENHANCED DATA RATE DQPSK MODULATION

Tested By:	85502
Date:	2024-12-04

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	8.92	30	-21.08
Middle	2441	10.66	30	-19.34
High	2480	10.46	30	-19.54

9.6.3. BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION

Tested By:	85502
Date:	2024-12-04

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	9.35	20.969	-11.619
Middle	2441	11.02	20.969	-9.949
High	2480	10.67	20.969	-10.299

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

9.7. AVERAGE POWER

LIMITS

None; for reporting purposes only

TEST PROCEDURE

Measurements performed using a wideband gated RF power meter.

The cable assembly insertion loss of 0.68 dB (including 0.68 dB cable) was entered as an offset in the power meter.

The power output was measured on the EUT antenna port using SMA cable connected to a power meter via wideband power sensor. Gated average output power was read directly from power meter.

9.7.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION

Tested By:	85502
Date	2024-12-04

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	6.98
Middle	2441	8.59
High	2480	8.44

9.7.2. BLUETOOTH ENHANCED DATA RATE DQPSK MODULATION

Tested By:	85502
Date	2024-12-04

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	5.91
Middle	2441	7.71
High	2480	7.51

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

9.7.3. BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION

Tested By:	85502
Date	2024-12-04

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	6.48
Middle	2441	8.18
High	2480	7.79

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

9.8. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)
RSS-247 5.5

Limit = -20 dBc

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

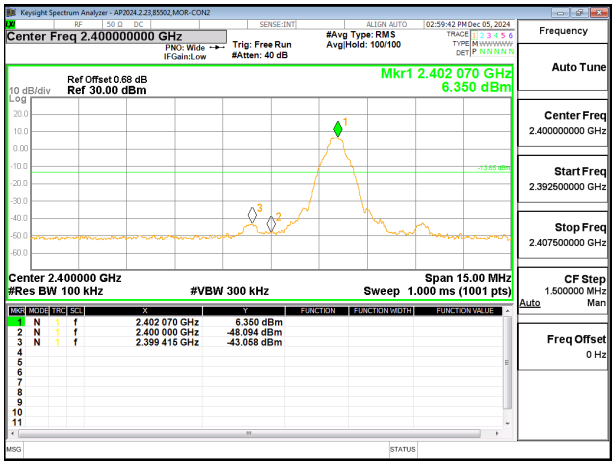
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

The bandedges at 2.4 and 2.4835 GHz are investigated with the transmitter set to the normal hopping and hopping modes.

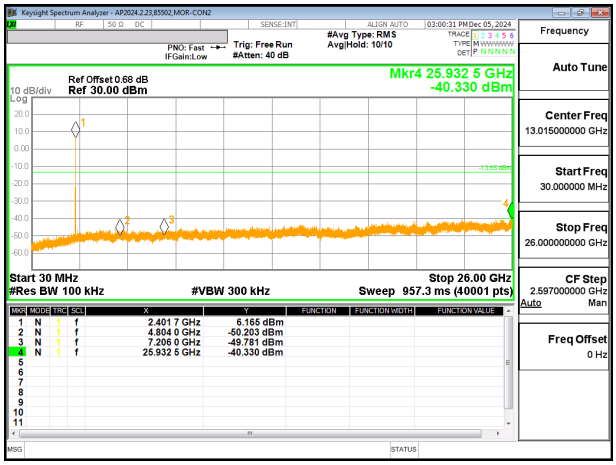
UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

9.8.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION

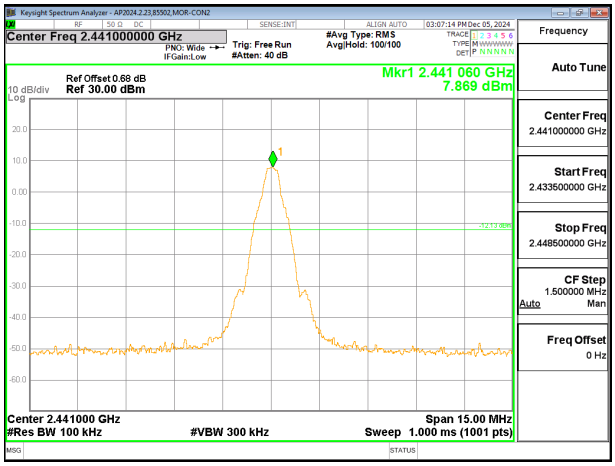
SPURIOUS EMISSIONS, NON-HOPPING



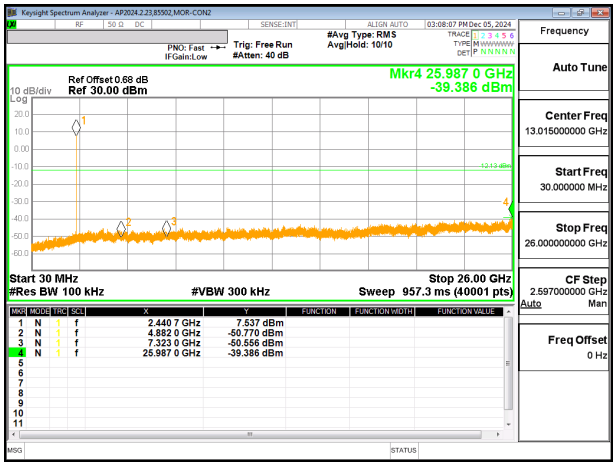
LOW CHANNEL BANDEDGE



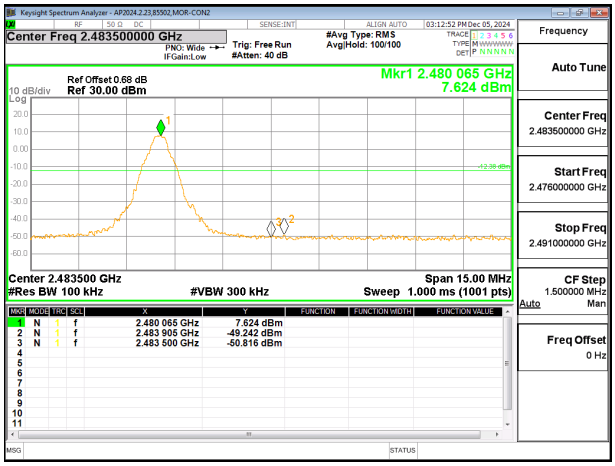
OUT-OF-BAND LOW CHANNEL



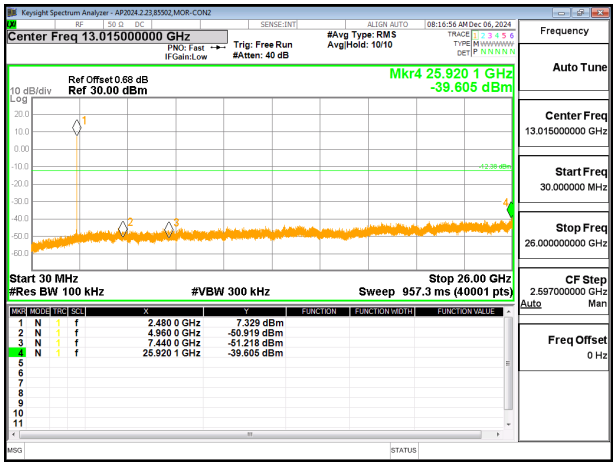
IN-BAND REFERENCE LEVEL



OUT-OF-BAND MID CHANNEL



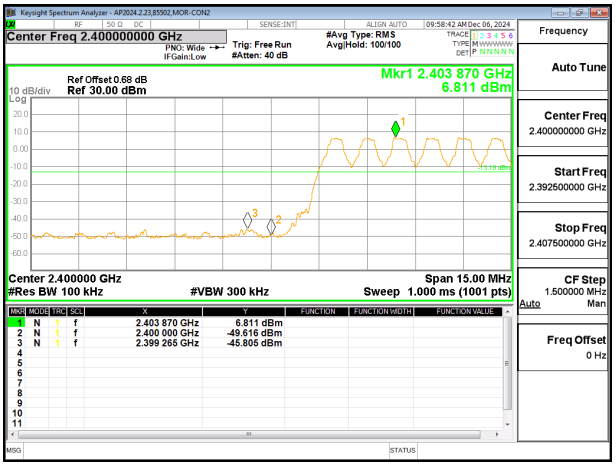
HIGH CHANNEL BANDEDGE



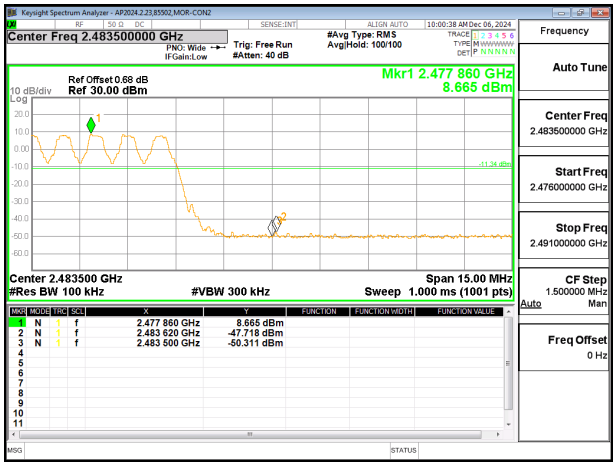
OUT-OF-BAND HIGH CHANNEL

This report shall not be reproduced except in full, without the written approval of UL LLC

SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON



LOW BANDEDGE

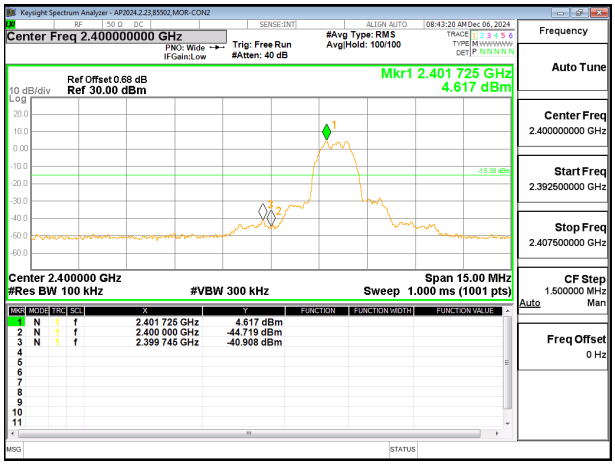


HIGH BANDEDGE

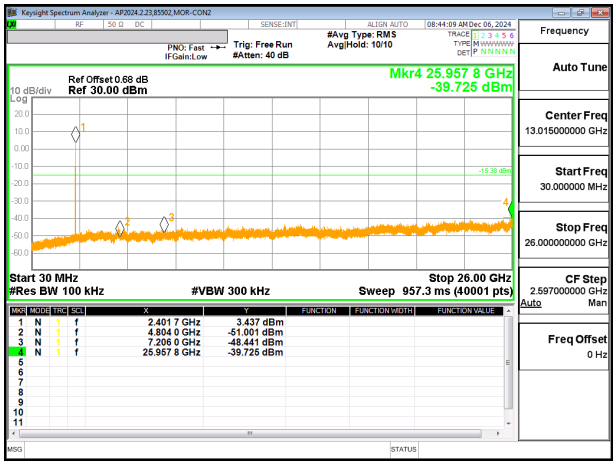
This report shall not be reproduced except in full, without the written approval of UL LLC

9.8.2. BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION

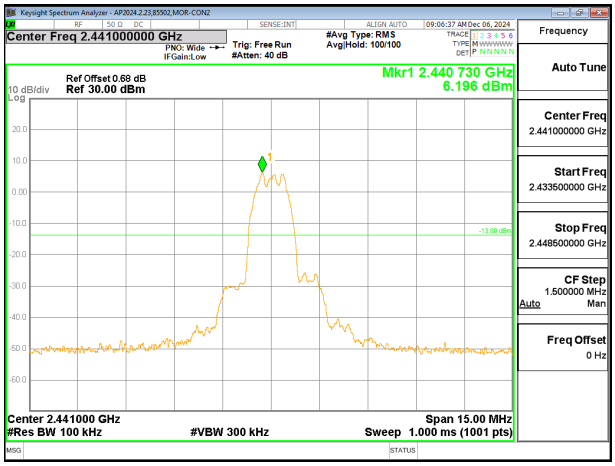
SPURIOUS EMISSIONS, NON-HOPPING



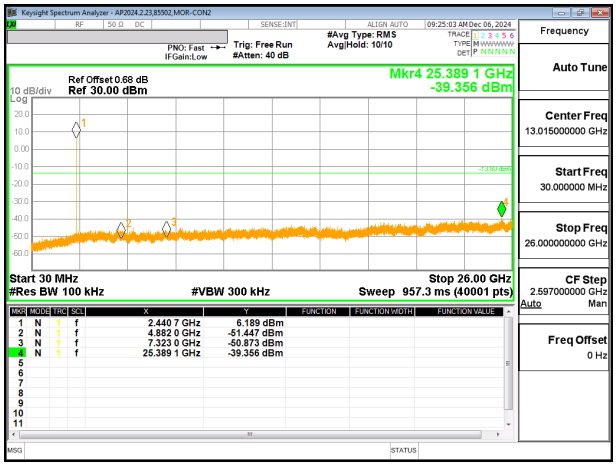
LOW CHANNEL BANDEDGE



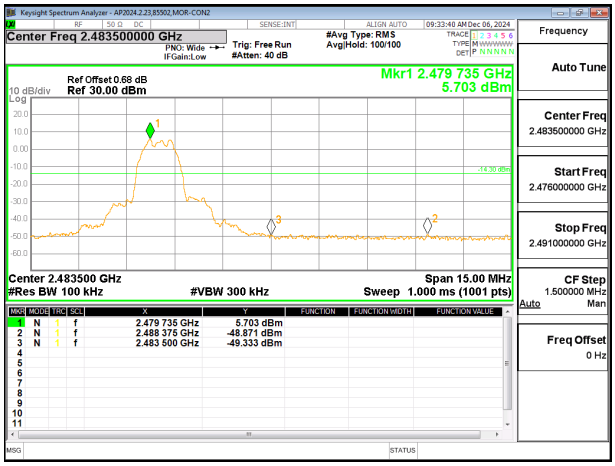
OUT-OF-BAND LOW CHANNEL



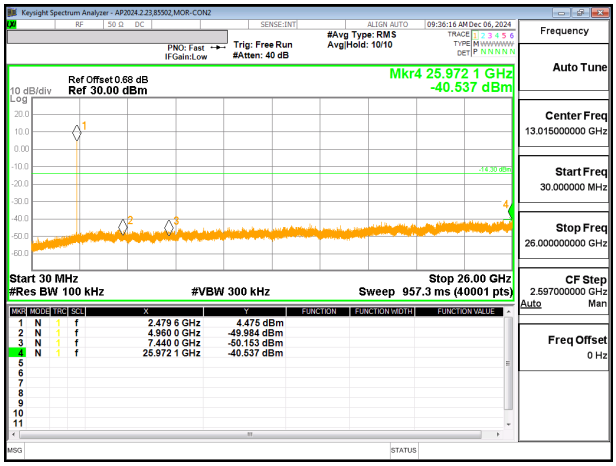
IN-BAND REFERENCE LEVEL



OUT-OF-BAND MID CHANNEL



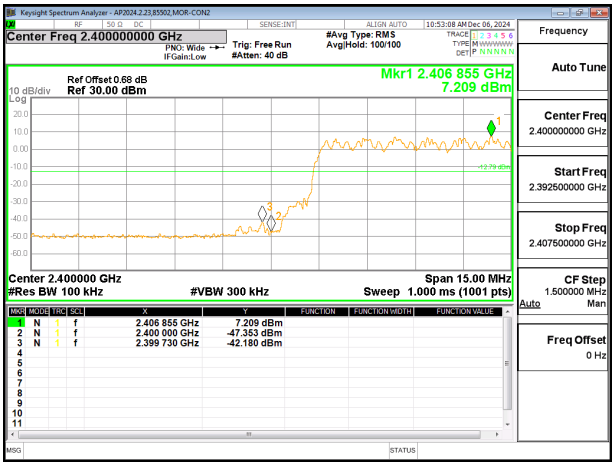
HIGH CHANNEL BANDEDGE



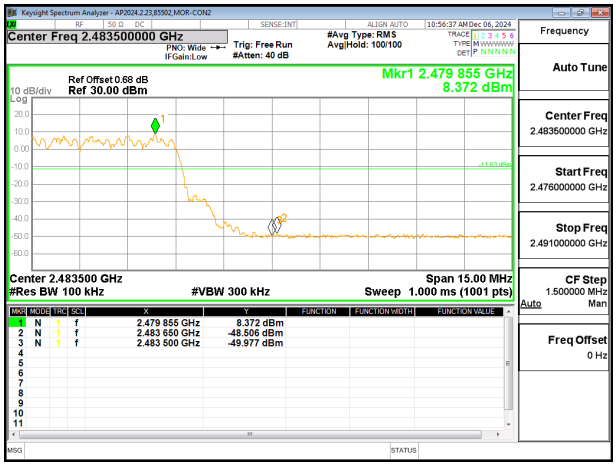
OUT-OF-BAND HIGH CHANNEL

This report shall not be reproduced except in full, without the written approval of UL LLC

SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON



LOW BANDEDGE



HIGH BANDEDGE

This report shall not be reproduced except in full, without the written approval of UL LLC

10. RADIATED TEST RESULTS

LIMITS

FCC §15.205 and §15.209

Frequency Range (MHz)	Field Strength Limit (uV/m) at 3 m	Field Strength Limit (dBuV/m) at 3 m
0.009-0.490	2400/F(kHz) @ 300 m	-
0.490-1.705	24000/F(kHz) @ 30 m	-
1.705 - 30	30 @ 30m	-
30 - 88	100	40
88 - 216	150	43.5
216 - 960	200	46
Above 960	500	54

IC RSS-GEN Clause 8.9 and 8.10

Frequency Range (kHz)	Field Strength Limit (uA/m) at 3 m	Field Strength Limit (dBuV/m) at 3 m
0.009-0.490	6.37/F(kHz) @ 300 m	-
0.490-1.705	63.7/F(kHz) @ 30 m	-
1.705 - 30	0.08 @ 30m	-
Frequency Range (MHz)	**Field Strength Limit (uV/m) at 3 m**	**Field Strength Limit (dBuV/m) at 3 m**
30 - 88	100	40
88 - 216	150	43.5
216 - 960	200	46
Above 960	500	54

TEST PROCEDURE

The EUT is placed on a non-conducting table 80 cm above the ground plane for measurement below 1GHz; 1.5 m above the ground plane for measurement above 1GHz. The antenna to EUT distance is 3 meters. The EUT is configured in accordance with ANSI C63.10. The EUT is set to transmit in a continuous mode.

For measurements below 1 GHz the resolution bandwidth is set to 100 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements in the 30-1000MHz range, 9kHz for peak and/or quasi-peak detection measurements in the 0.15-30MHz range and 200Hz for peak and/or quasi-peak detection measurements in the 9 to 150kHz range. Peak detection is used unless otherwise noted as quasi-peak or average (9-90kHz and 110-490kHz).

For pre-scans above 1 GHz the resolution bandwidth is set to 1 MHz; the video bandwidth is set to 3MHz for peak measurements.

For final measurements above 1 GHz the resolution bandwidth is set to 1 MHz; the video bandwidth is set to 3 MHz for peak measurements. Average measurements are calculated based on KDB 558074 D01 15.247 Meas Guidance v05r02.

This report shall not be reproduced except in full, without the written approval of UL LLC

The spectrum from 1 GHz to 18 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each applicable band. Below 1GHz and above 18GHz emissions, the channel with the highest output power was tested.

The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized in both the vertical and the horizontal positions.

3D antenna use - For below 30MHz testing, investigation was done on three antenna orientations (parallel, perpendicular, and ground-parallel).

Base on FCC 15.31 (f) (2): measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field.

KDB 414788 Open Field Site (OFS) and Chamber Correlation Justification

OFS and chamber correlation testing had been performed and chamber measured test result is the worst-case test result.

KDB 558074 D01 15.247 Meas Guidance v05r02

Use of a duty cycle correction factor (DCCF) is permitted for calculating average radiated field strength emission levels for an FHSS device in 15.247. This DCCF can be applied when the field strength limit (e.g., within a Government Restricted band) and the conditions specified in Section 15.35(c) can be satisfied. The average radiated field strength is calculated by subtracting the DCCF from the maximum radiated field strength level as determined through measurement. The maximum radiated field strength level represents the worst-case (maximum amplitude) RMS measurement of the emission(s) during continuous transmission (i.e., not including any time intervals during which the transmitter is off or is transmitting at a reduced power level). It is also acceptable to apply the DCCF to a measurement performed with a peak detector instead of the specified RMS power averaging detector.

Note that Section 15.35(c) specifies that the DCCF shall represent the worst-case (greatest duty cycle) over any 100 msec transmission period.

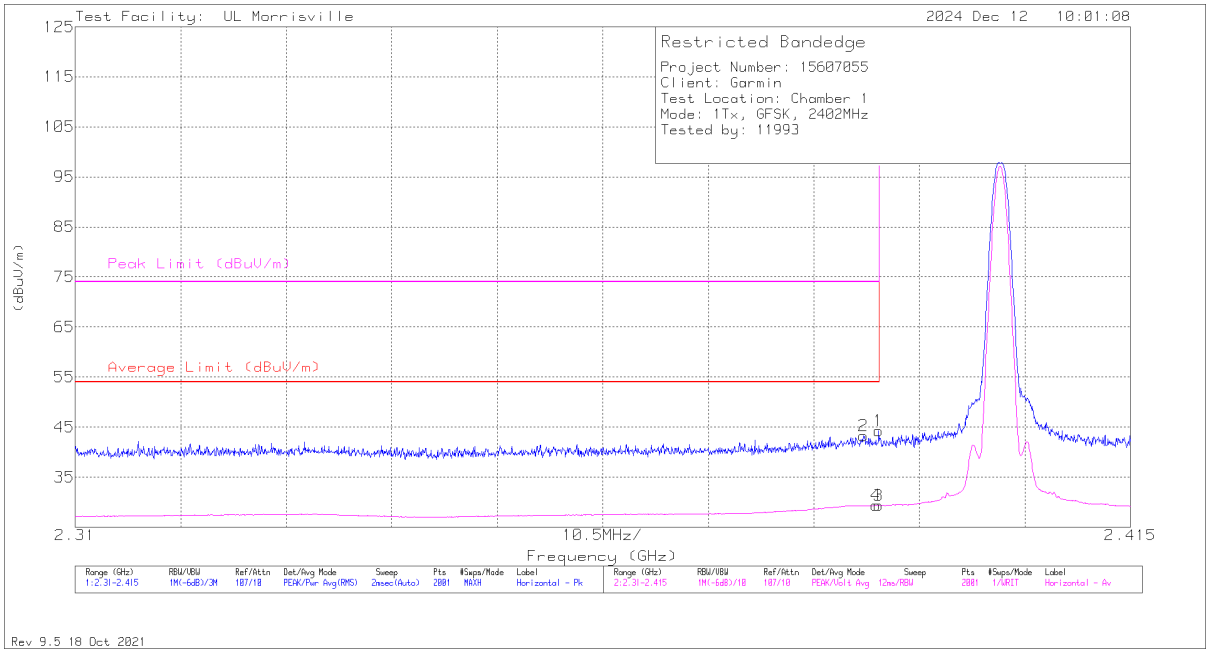
UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

10.1. TRANSMITTER ABOVE 1 GHz

10.1.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION

BANDEDGE (LOW CHANNEL)

HORIZONTAL RESULT

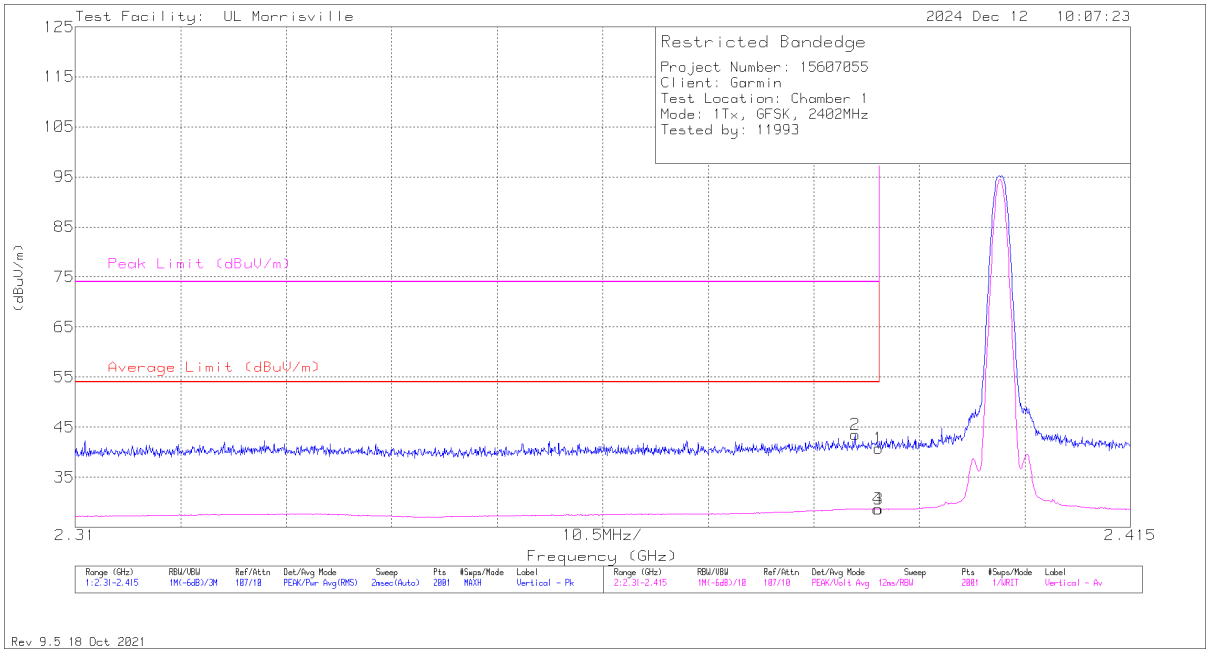


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	135143 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.38996	36.39	Pk	31.9	-24	44.29	-	-	74	-29.71	259	101	H
2	* ** 2.38844	35.39	Pk	31.9	-24	43.29	-	-	74	-30.71	259	101	H
3	* ** 2.38996	21.42	VA1T	31.9	-24	29.32	54	-24.68	-	-	259	101	H
4	* ** 2.3897	21.49	VA1T	31.9	-24	29.39	54	-24.61	-	-	259	101	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
VA1T - Linear Voltage Average VB=1/Ton where: Ton is transmit duration

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

VERTICAL RESULT



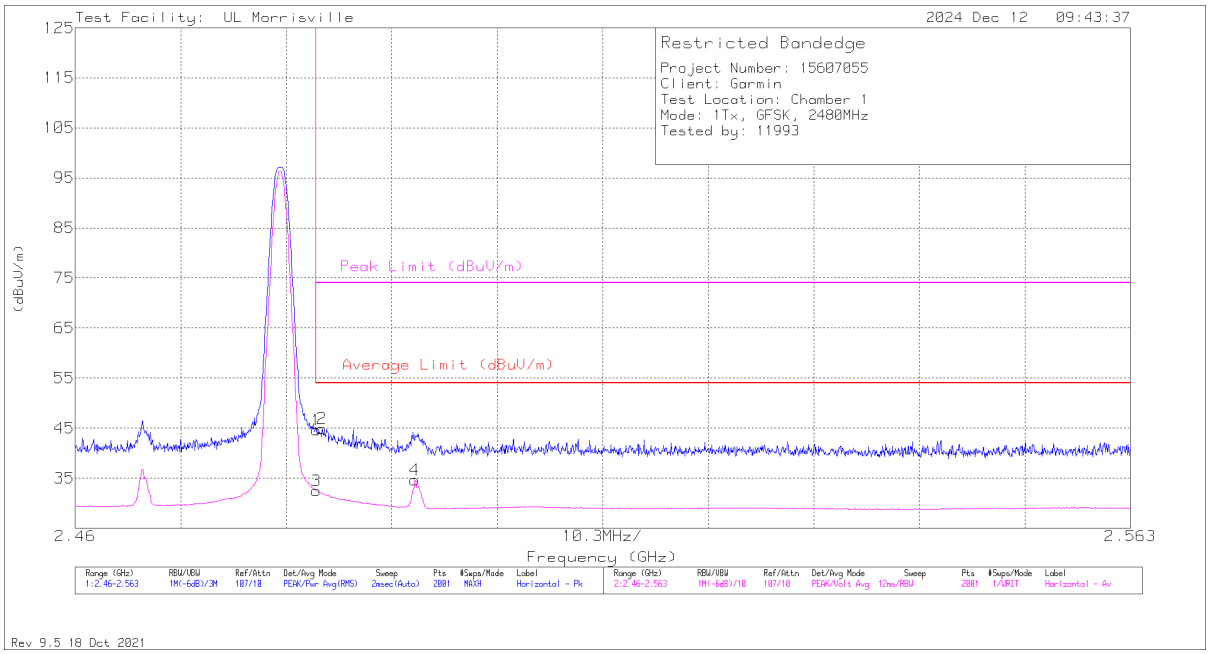
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	135143 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.38996	32.88	Pk	31.9	-24	40.78	-	-	74	-33.22	313	101	V
2	* ** 2.3876	35.55	Pk	31.9	-23.9	43.55	-	-	74	-30.45	313	101	V
3	* ** 2.38996	20.71	VA1T	31.9	-24	28.61	54	-25.39	-	-	313	101	V
4	* ** 2.38985	20.74	VA1T	31.9	-24	28.64	54	-25.36	-	-	313	101	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
VA1T - Linear Voltage Average VB=1/Ton where: Ton is transmit duration

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

BANDEDGE (HIGH CHANNEL)

HORIZONTAL RESULT

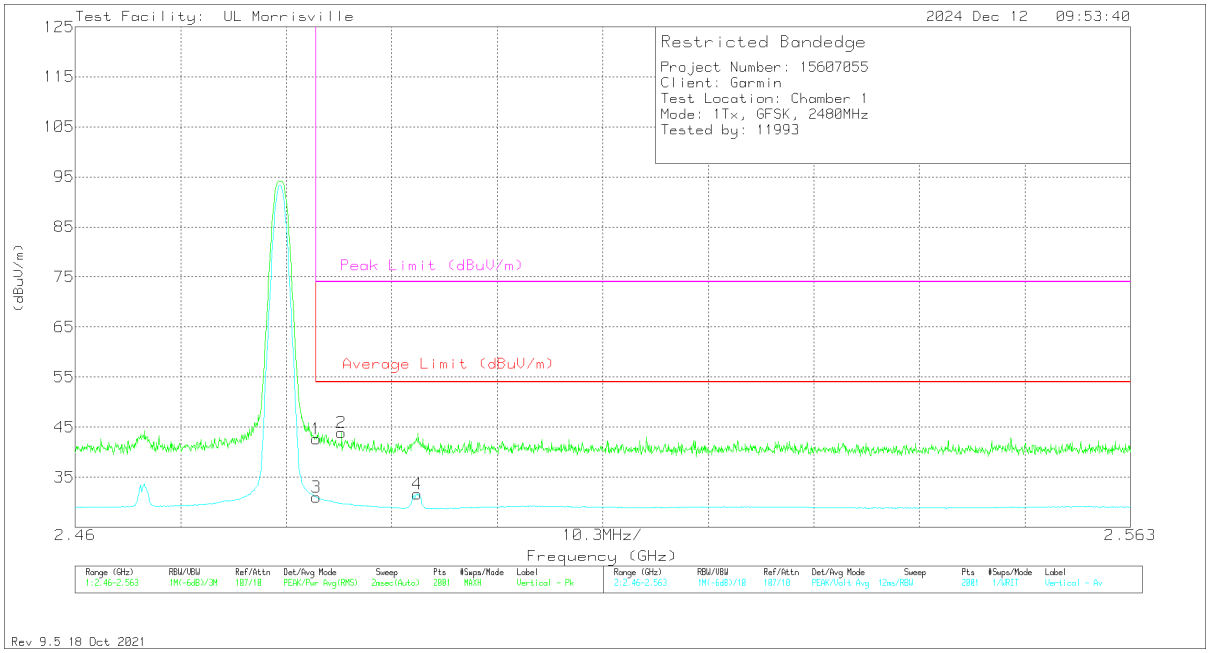


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	135143 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.48354	36.09	Pk	32.2	-23.7	44.59	-	-	74	-29.41	109	111	H
2	* ** 2.4841	36.51	Pk	32.2	-23.8	44.91	-	-	74	-29.09	109	111	H
3	* ** 2.48354	23.95	VA1T	32.2	-23.7	32.45	54	-21.55	-	-	109	111	H
4	* ** 2.49317	26.77	VA1T	32.3	-24.4	34.67	54	-19.33	-	-	109	111	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
VA1T - Linear Voltage Average VB=1/Ton where: Ton is transmit duration

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

VERTICAL RESULT



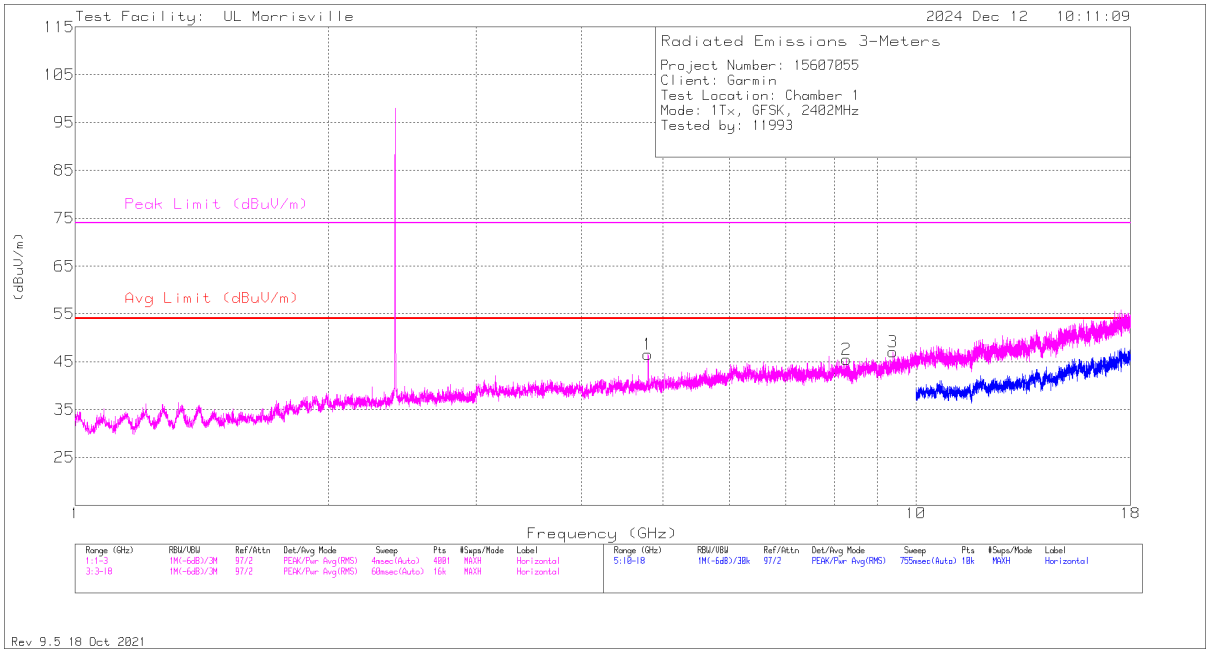
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	135143 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.48354	34.18	Pk	32.2	-23.7	42.68	-	-	74	-31.32	295	106	V
2	* ** 2.48601	35.6	Pk	32.2	-23.9	43.9	-	-	74	-30.1	295	106	V
3	* ** 2.48354	22.46	VA1T	32.2	-23.7	30.96	54	-23.04	-	-	295	106	V
4	* ** 2.49337	23.74	VA1T	32.3	-24.4	31.64	54	-22.36	-	-	295	106	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
VA1T - Linear Voltage Average VB=1/Ton where: Ton is transmit duration

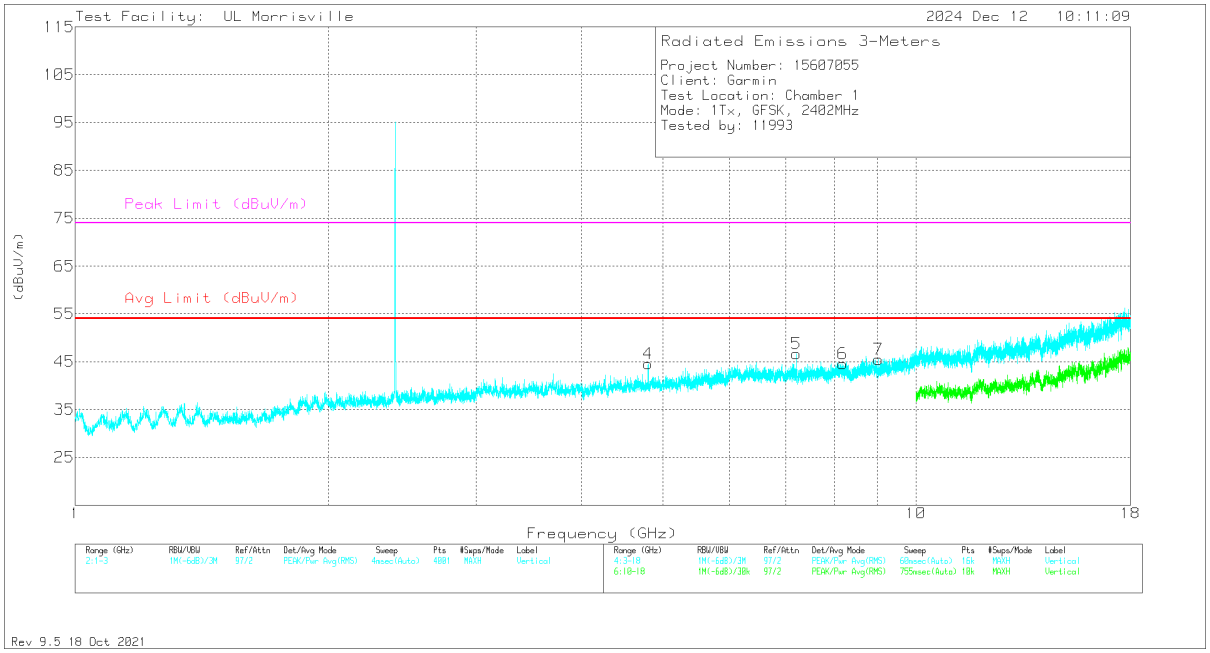
UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL RESULTS



HORIZONTAL



VERTICAL

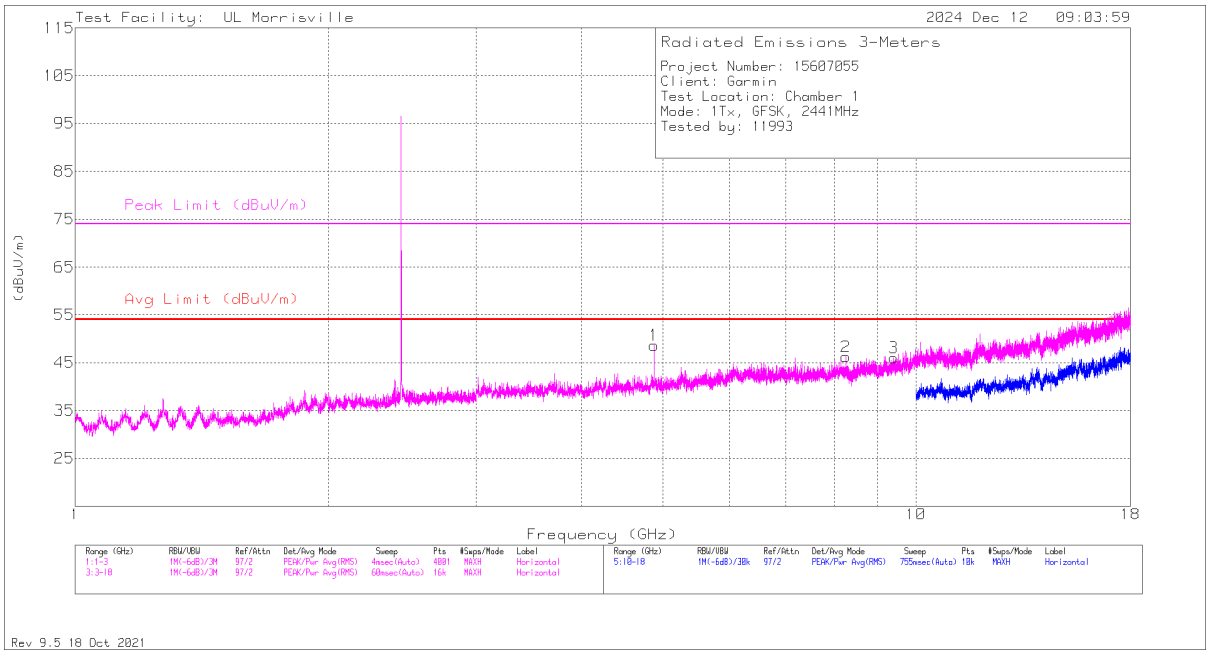
This report shall not be reproduced except in full, without the written approval of UL LLC

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	135143 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 4.80281	58.26	Pk	33.9	-45.6	46.56	54	-7.44	74	-27.44	0-360	101	H
2	* ** 8.27344	50.27	Pk	35.9	-40.7	45.47	54	-8.53	74	-28.53	0-360	200	H
3	* ** 9.39188	50.88	Pk	36.3	-40.1	47.08	54	-6.92	74	-26.92	0-360	200	H
4	* ** 4.80375	56.23	Pk	33.9	-45.6	44.53	54	-9.47	74	-29.47	0-360	101	V
6	* ** 8.18531	49.54	Pk	35.9	-40.9	44.54	54	-9.46	74	-29.46	0-360	200	V
7	* ** 9.03188	49.15	Pk	35.8	-39.4	45.55	54	-8.45	74	-28.45	0-360	101	V
5	7.20563	53.51	Pk	35.4	-42.2	46.71	-	-	-	-	0-360	200	V

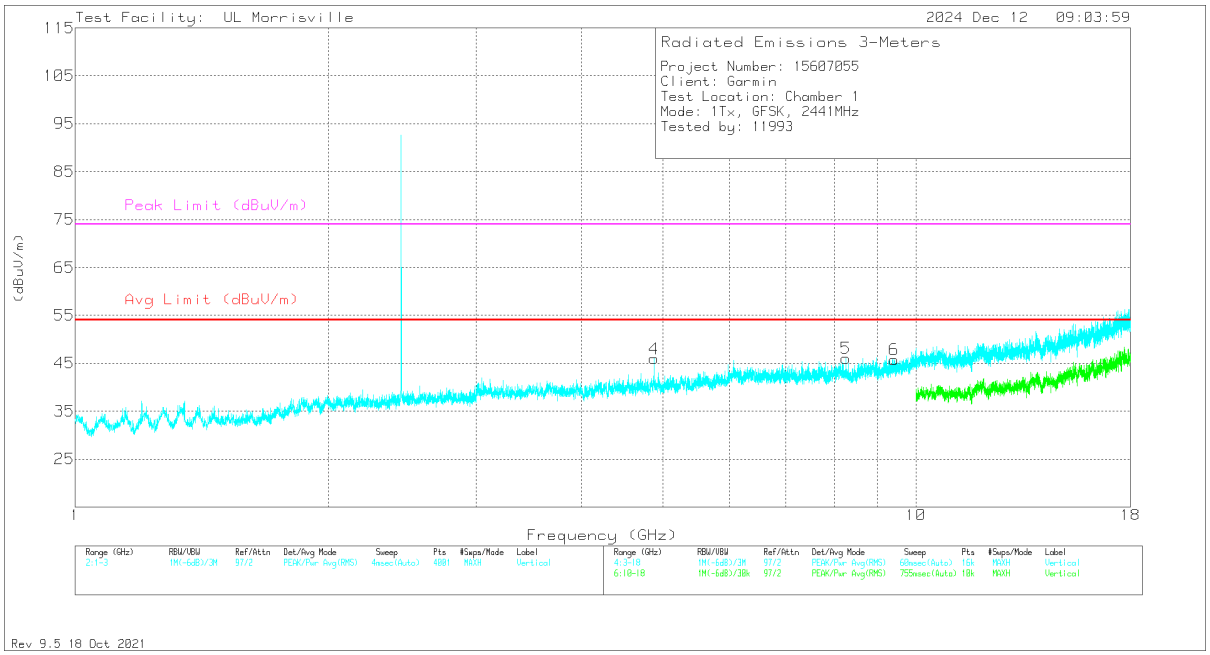
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

MID CHANNEL RESULTS



HORIZONTAL



VERTICAL

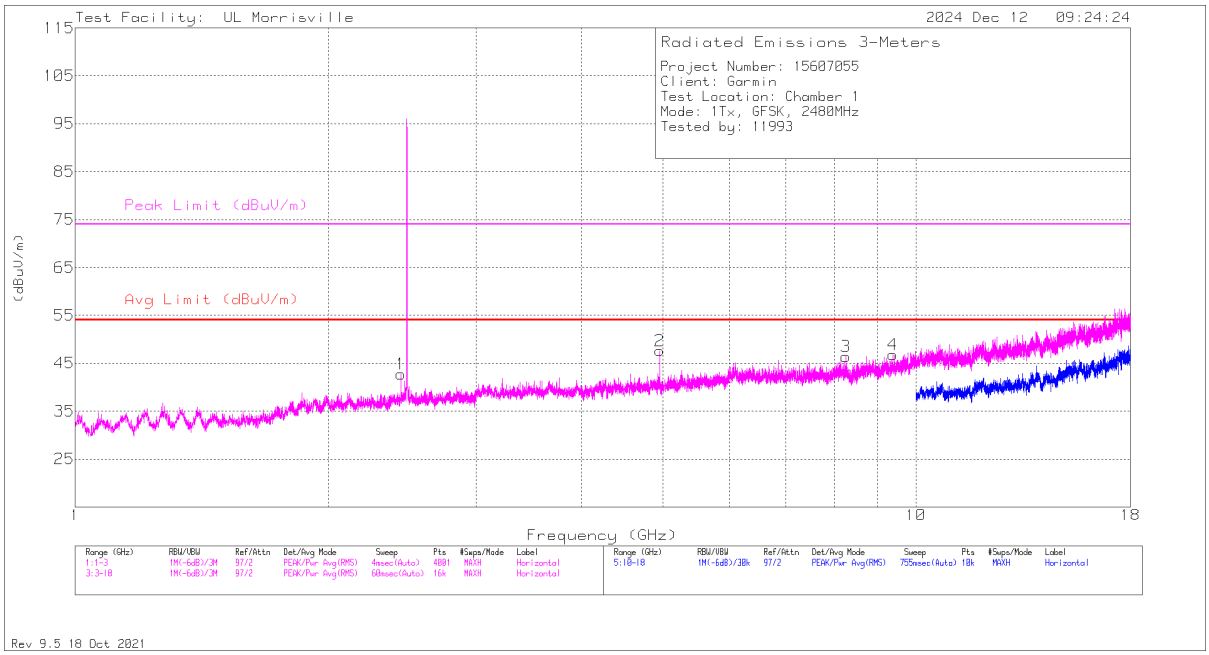
This report shall not be reproduced except in full, without the written approval of UL LLC

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	135143 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 4.88176	62.2	PK2	34	-44.7	51.5	-	-	74	-22.5	185	113	H
	* ** 4.88201	56.71	V1TV	34	-44.7	46.01	54	-7.99			185	113	H
2	* ** 8.26125	50.92	Pk	35.9	-40.6	46.22	54	-7.78	74	-27.78	0-360	101	H
3	* ** 9.41438	49.49	Pk	36.3	-39.8	45.99	54	-8.01	74	-28.01	0-360	101	H
4	* ** 4.88156	56.65	Pk	34	-44.7	45.95	54	-8.05	74	-28.05	0-360	200	V
5	* ** 8.26031	50.85	Pk	35.9	-40.7	46.05	54	-7.95	74	-27.95	0-360	101	V
6	* ** 9.42469	49.83	Pk	36.3	-40.4	45.73	54	-8.27	74	-28.27	0-360	200	V

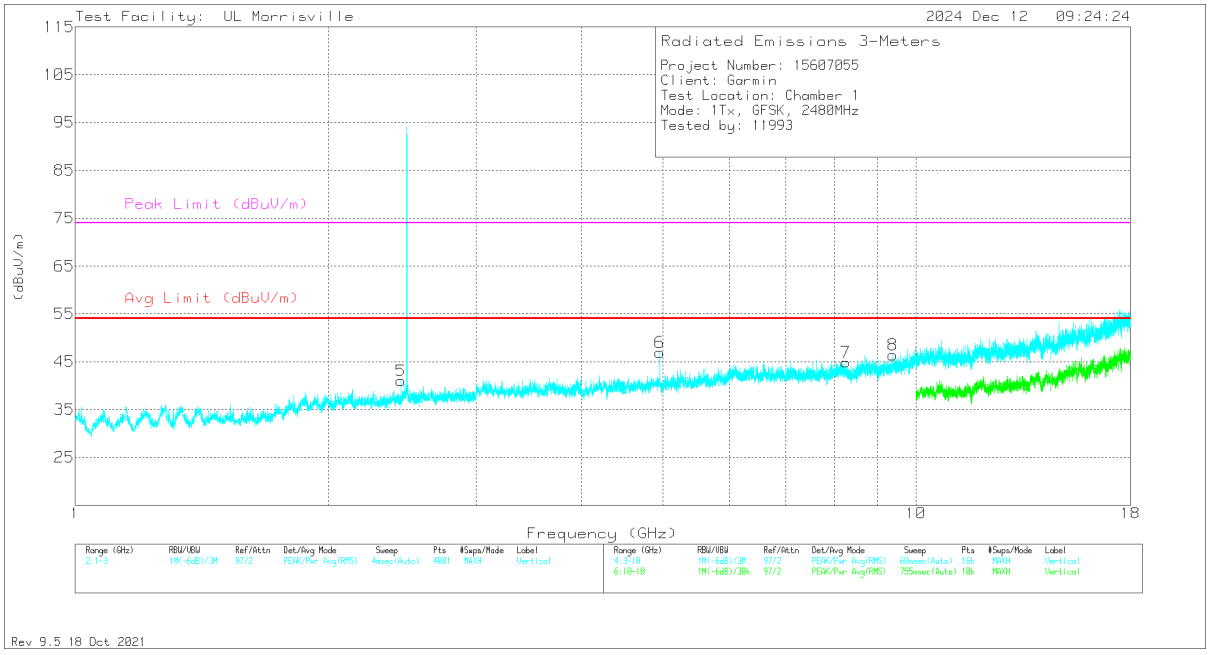
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
PK2 - Maximum Peak
V1TV - VB=1/Ton, Linear Voltage Average where: Ton is packet duration

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

HIGH CHANNEL RESULTS



HORIZONTAL



VERTICAL

This report shall not be reproduced except in full, without the written approval of UL LLC

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	135143 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	* ** 4.96031	58.25	Pk	34.2	-44.8	47.65	54	-6.35	74	-26.35	0-360	101	H
3	* ** 8.26031	51.17	Pk	35.9	-40.7	46.37	54	-7.63	74	-27.63	0-360	101	H
4	* ** 9.39	50.81	Pk	36.2	-40.2	46.81	54	-7.19	74	-27.19	0-360	199	H
6	* ** 4.96031	57.53	Pk	34.2	-44.8	46.93	54	-7.07	74	-27.07	0-360	101	V
7	* ** 8.26125	49.6	Pk	35.9	-40.6	44.9	54	-9.1	74	-29.1	0-360	101	V
8	* ** 9.38719	50.51	Pk	36.2	-40.3	46.41	54	-7.59	74	-27.59	0-360	101	V
1	2.44	35.2	Pk	32.1	-24.5	42.8	-	-	-	-	0-360	101	H
5	2.4405	33.39	Pk	32.1	-24.5	40.99	-	-	-	-	0-360	200	V

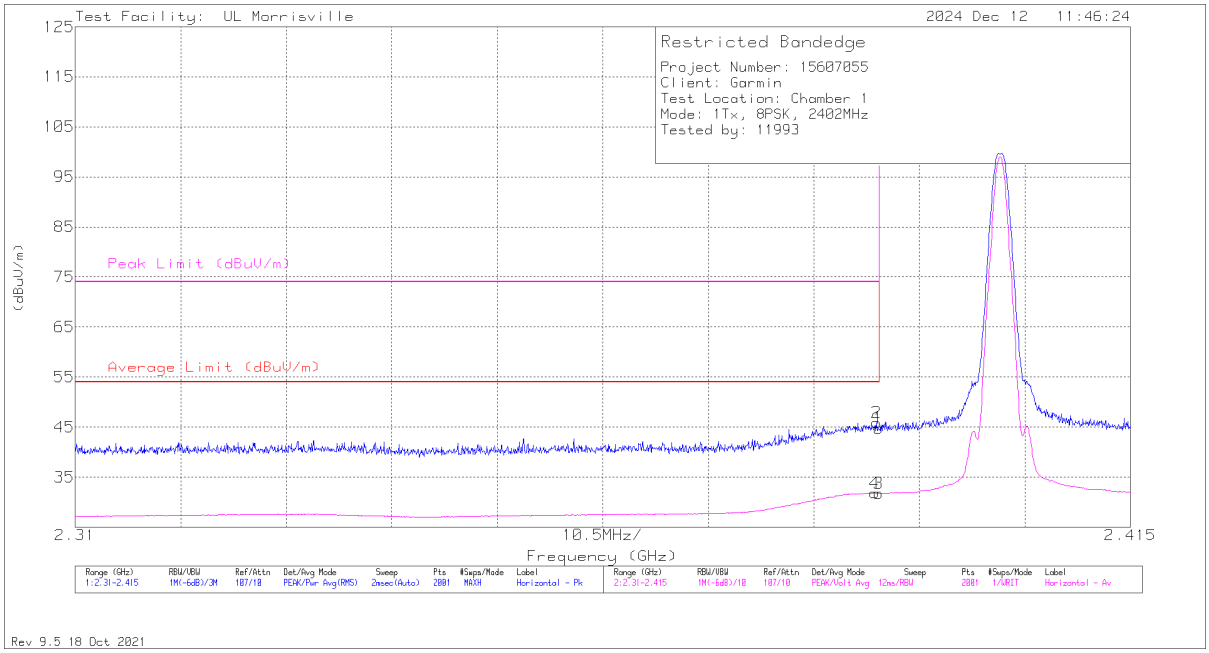
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

10.1.2. BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION

BANDEDGE (LOW CHANNEL)

HORIZONTAL RESULT

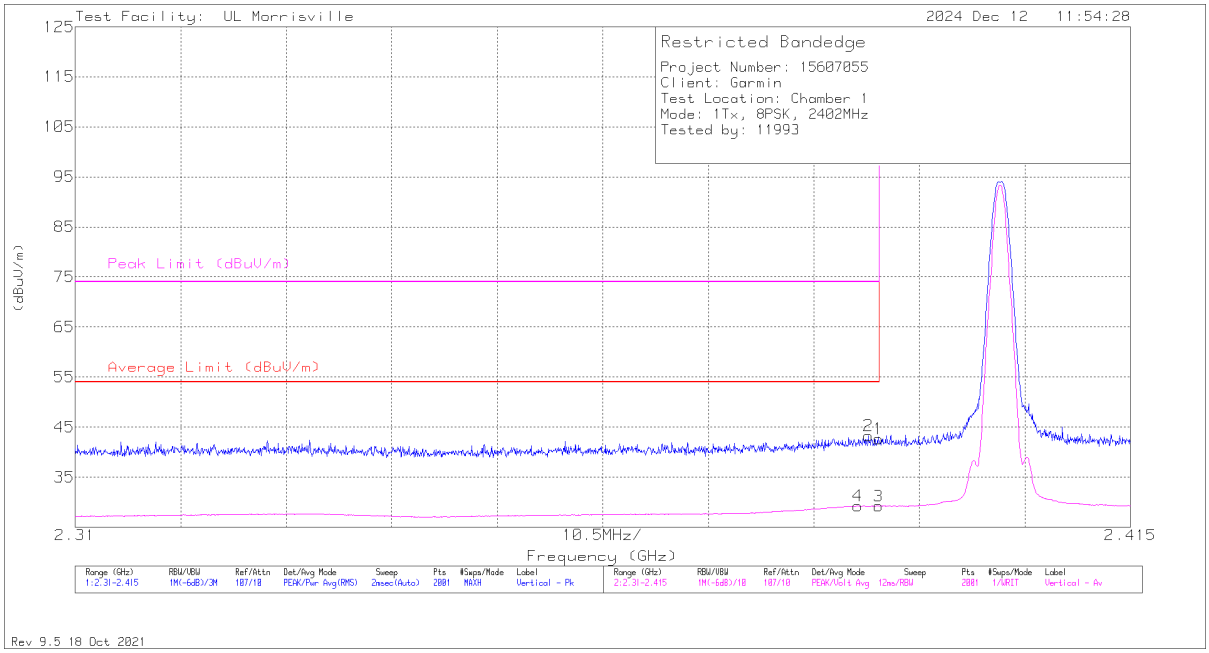


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	135143 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.38996	36.91	Pk	31.9	-24	44.81	-	-	74	-29.19	300	101	H
2	* ** 2.38975	37.98	Pk	31.9	-24	45.88	-	-	74	-28.12	300	101	H
3	* ** 2.38996	23.89	VA1T	31.9	-24	31.79	54	-22.21	-	-	300	101	H
4	* ** 2.38954	23.91	VA1T	31.9	-24	31.81	54	-22.19	-	-	300	101	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
VA1T - Linear Voltage Average VB=1/Ton where: Ton is transmit duration

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

VERTICAL RESULT



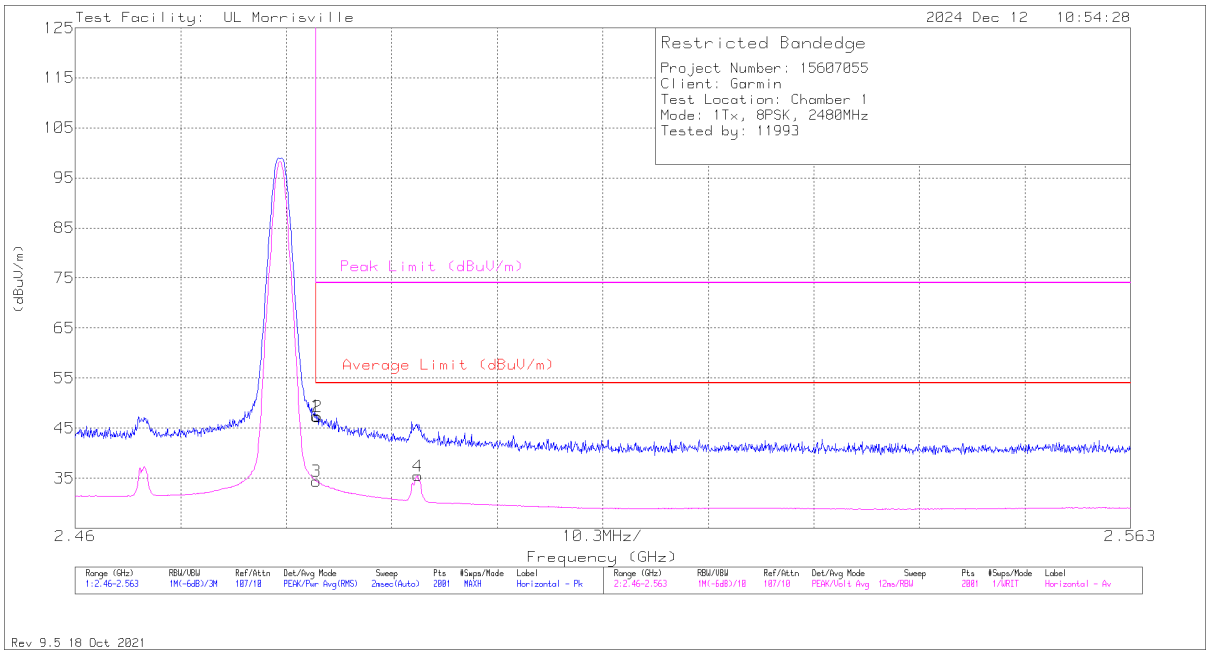
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	135143 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.38996	34.77	Pk	31.9	-24	42.67	-	-	74	-31.33	302	101	V
2	* ** 2.38891	35.41	Pk	31.9	-24	43.31	-	-	74	-30.69	302	101	V
3	* ** 2.38996	21.29	VA1T	31.9	-24	29.19	54	-24.81	-	-	302	101	V
4	* ** 2.38786	21.24	VA1T	31.9	-23.9	29.24	54	-24.76	-	-	302	101	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
VA1T - Linear Voltage Average VB=1/Ton where: Ton is transmit duration

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

BANDEDGE (HIGH CHANNEL)

HORIZONTAL RESULT

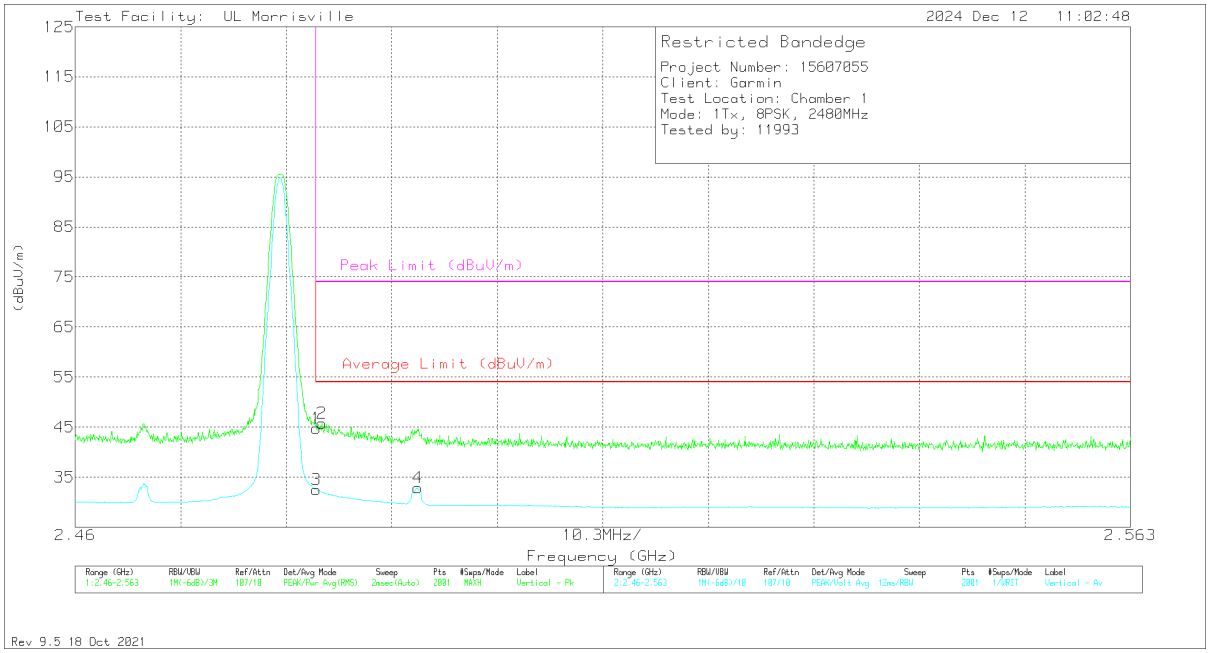


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	135143 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.48354	38.85	Pk	32.2	-23.7	47.35	-	-	74	-26.65	348	140	H
2	* ** 2.48364	38.77	Pk	32.2	-23.7	47.27	-	-	74	-26.73	348	140	H
3	* ** 2.48354	25.92	VA1T	32.2	-23.7	34.42	54	-19.58	-	-	348	140	H
4	* ** 2.49342	27.54	VA1T	32.3	-24.4	35.44	54	-18.56	-	-	348	140	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
VA1T - Linear Voltage Average VB=1/Ton where: Ton is transmit duration

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

VERTICAL RESULT



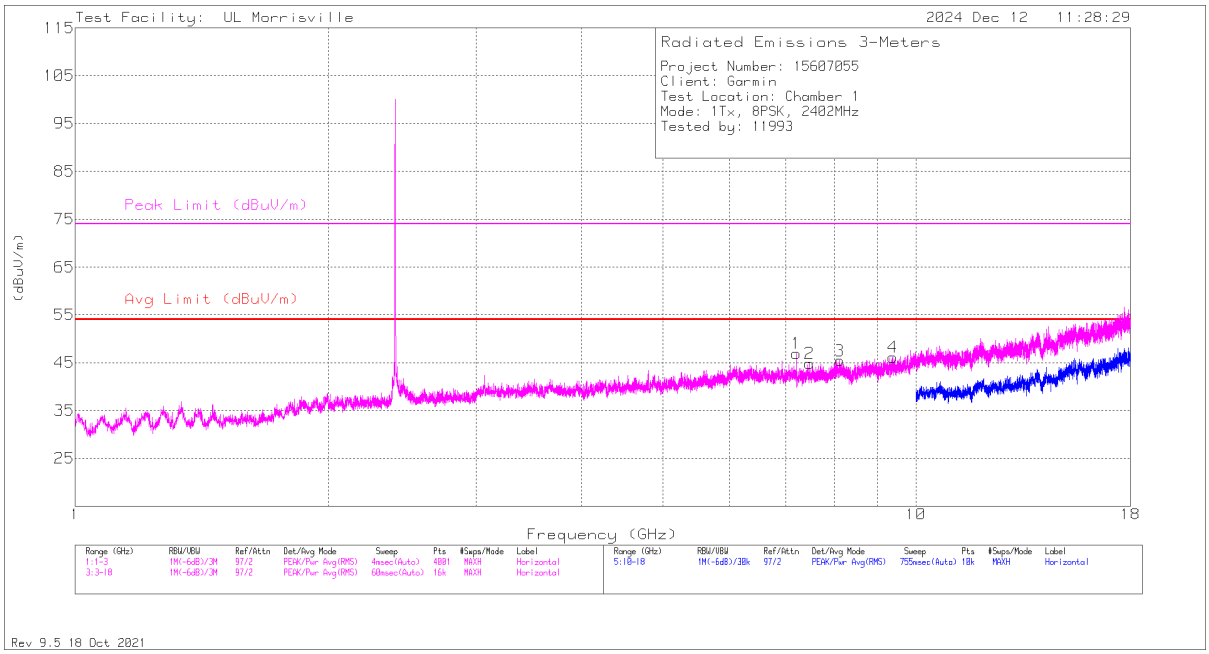
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	135143 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.48354	36.3	Pk	32.2	-23.7	44.8	-	-	74	-29.2	340	141	V
2	* ** 2.4841	37.38	Pk	32.2	-23.8	45.78	-	-	74	-28.22	340	141	V
3	* ** 2.48354	24.01	VA1T	32.2	-23.7	32.51	54	-21.49	-	-	340	141	V
4	* ** 2.49342	24.94	VA1T	32.3	-24.4	32.84	54	-21.16	-	-	340	141	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
VA1T - Linear Voltage Average VB=1/Ton where: Ton is transmit duration

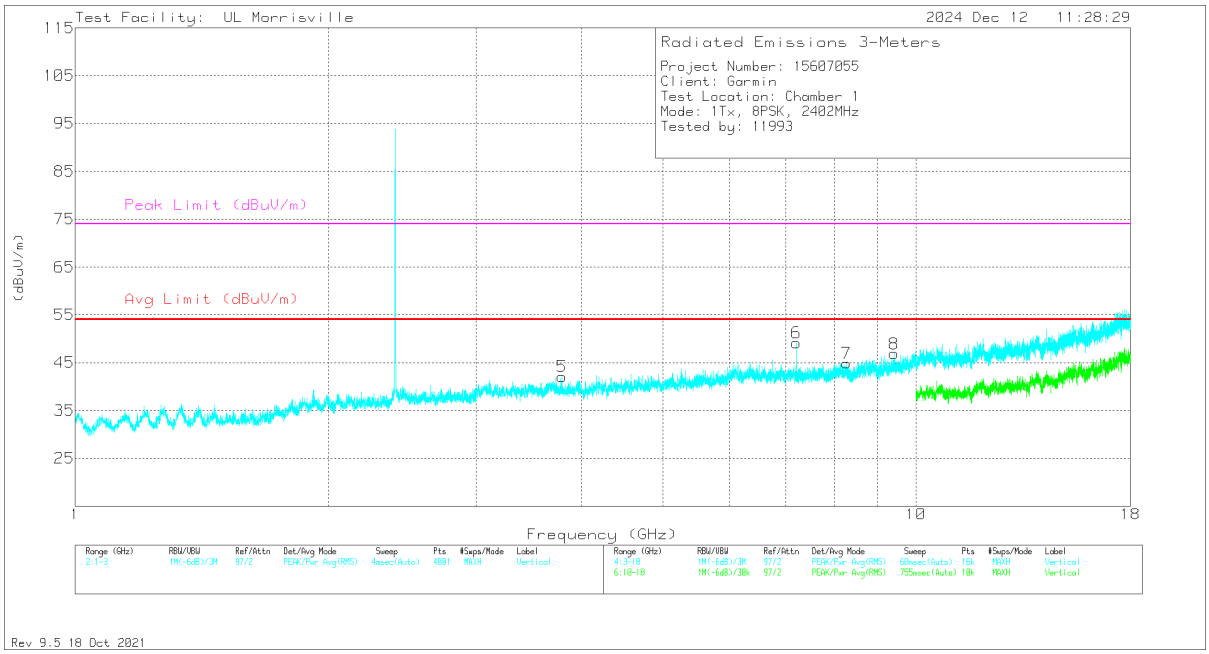
UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL RESULTS



HORIZONTAL



VERTICAL

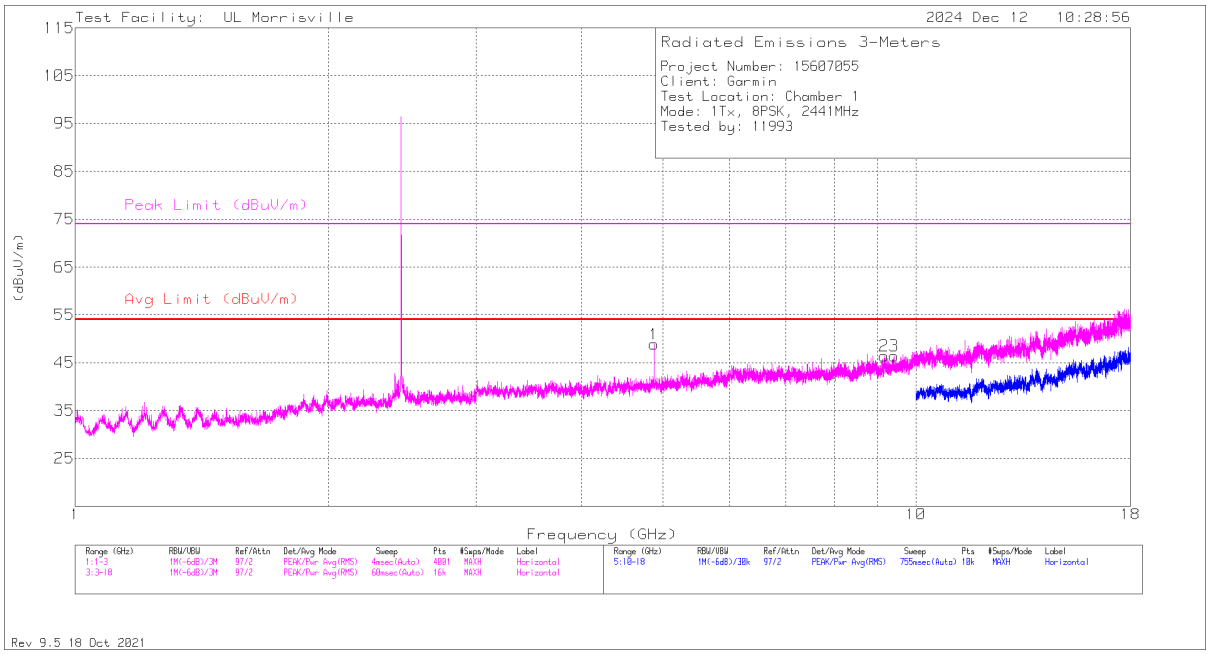
This report shall not be reproduced except in full, without the written approval of UL LLC

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	135143 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	* ** 7.47656	50.59	Pk	35.5	-41.2	44.89	54	-9.11	74	-29.11	0-360	200	H
3	* ** 8.1225	50.83	Pk	35.9	-41.3	45.43	54	-8.57	74	-28.57	0-360	200	H
4	* ** 9.39281	49.93	Pk	36.3	-40.1	46.13	54	-7.87	74	-27.87	0-360	101	H
5	* ** 3.79313	52.8	Pk	33.1	-43.8	42.1	54	-11.9	74	-31.9	0-360	101	V
7	* ** 8.26406	49.5	Pk	35.9	-40.5	44.9	54	-9.1	74	-29.1	0-360	101	V
8	* ** 9.41531	50.27	Pk	36.3	-39.7	46.87	54	-7.13	74	-27.13	0-360	101	V
1	7.20563	53.72	Pk	35.4	-42.2	46.92	-	-	-	-	0-360	200	H
6	7.20563	55.91	Pk	35.4	-42.2	49.11	-	-	-	-	0-360	200	V

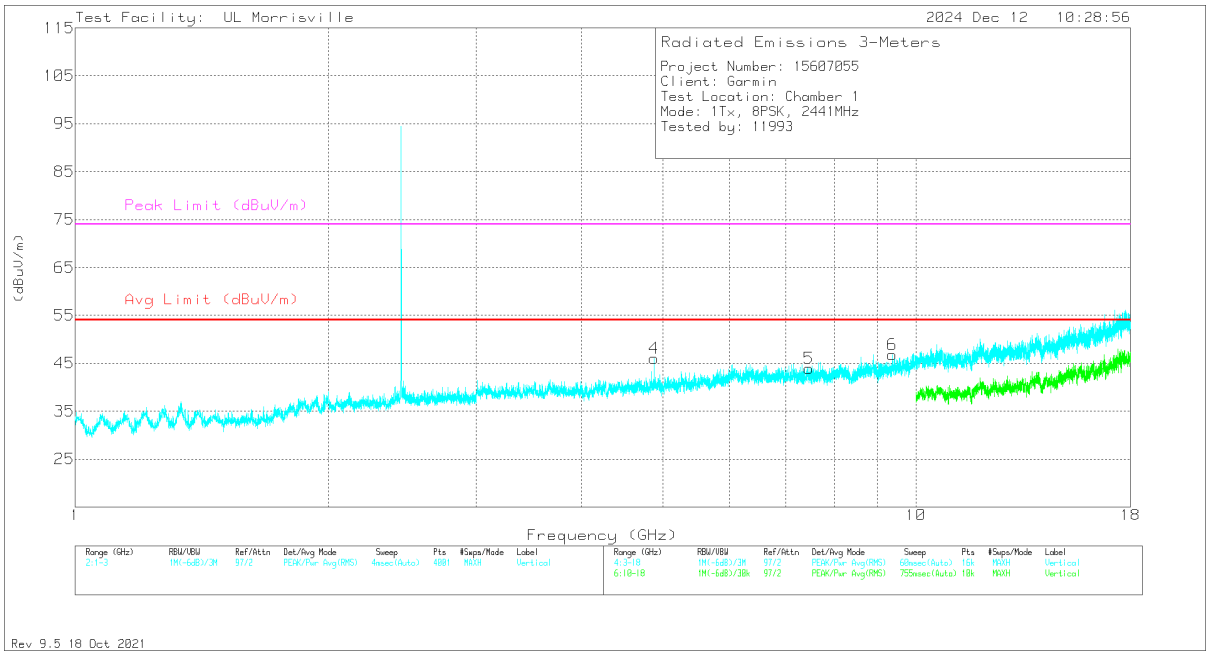
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

MID CHANNEL RESULTS



HORIZONTAL



VERTICAL

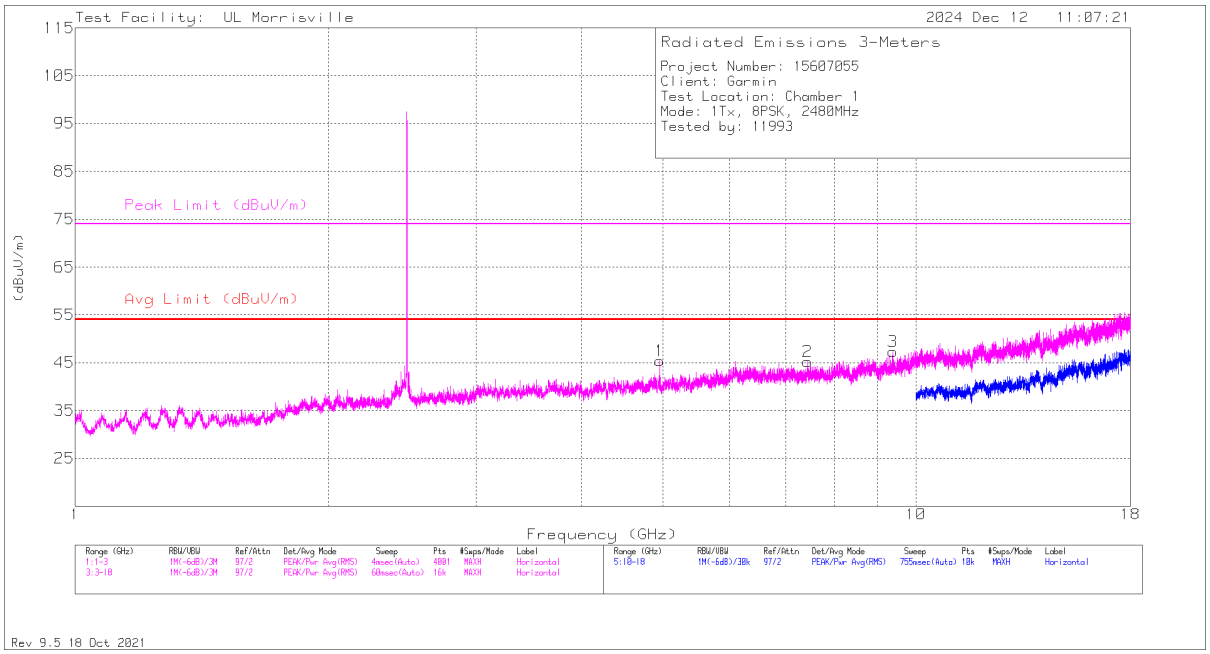
This report shall not be reproduced except in full, without the written approval of UL LLC

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	135143 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 4.8824	58.42	PK2	34	-44.8	47.62	-	-	74	-26.38	181	117	H
	* ** 4.88202	56.5	V1TV	34	-44.7	45.8	54	-8.2	-	-	181	117	H
2	* ** 9.17438	50.54	Pk	36	-40.1	46.44	54	-7.56	74	-27.56	0-360	101	H
3	* ** 9.41906	49.99	Pk	36.3	-39.9	46.39	54	-7.61	74	-27.61	0-360	101	H
4	* ** 4.88156	56.77	Pk	34	-44.7	46.07	54	-7.93	74	-27.93	0-360	101	V
5	* ** 7.46625	49.68	Pk	35.5	-41.3	43.88	54	-10.12	74	-30.12	0-360	200	V
6	* ** 9.37219	50.92	Pk	36.2	-40.3	46.82	54	-7.18	74	-27.18	0-360	200	V

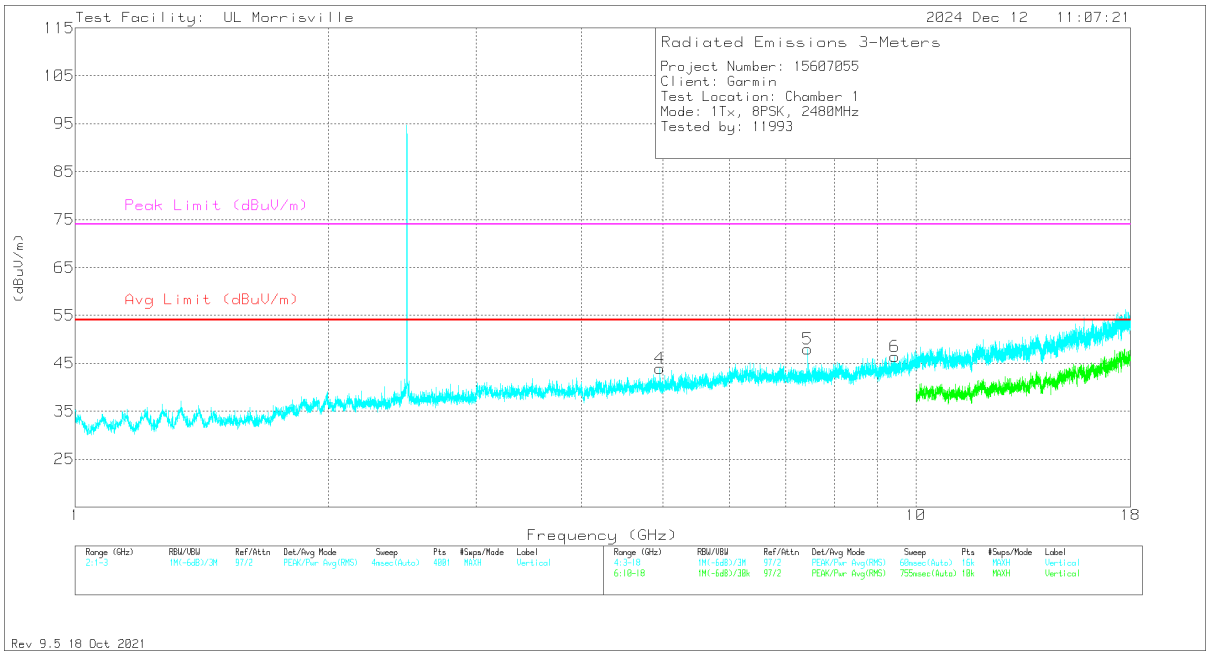
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
PK2 - Maximum Peak
V1TV - VB=1/Ton, Linear Voltage Average where: Ton is packet duration

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

HIGH CHANNEL RESULTS



HORIZONTAL



VERTICAL

This report shall not be reproduced except in full, without the written approval of UL LLC

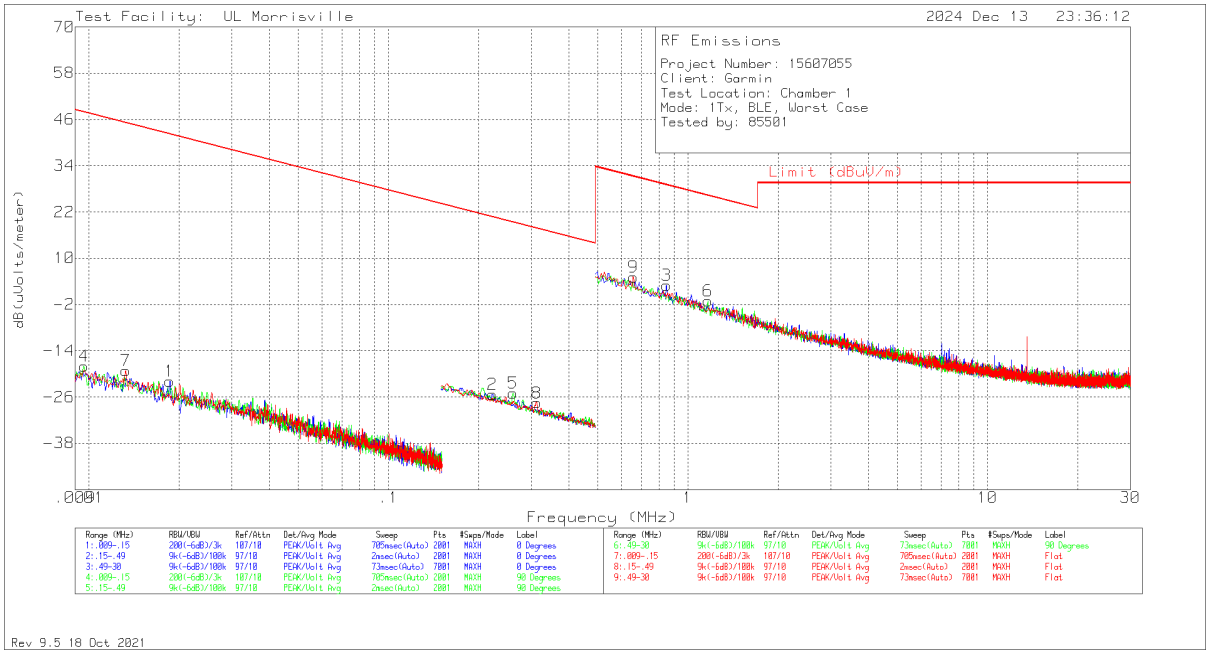
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	135143 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 4.95938	56.02	Pk	34.2	-44.8	45.42	54	-8.58	74	-28.58	0-360	101	H
2	* ** 7.43906	50.88	Pk	35.4	-41	45.28	54	-8.72	74	-28.72	0-360	200	H
3	* ** 9.39469	51.02	Pk	36.3	-40	47.32	54	-6.68	74	-26.68	0-360	200	H
4	* ** 4.96031	54.55	Pk	34.2	-44.8	43.95	54	-10.05	74	-30.05	0-360	101	V
5	* ** 7.43951	50.59	PK2	35.4	-41	44.99	-	-	74	-29.01	190	165	V
	* ** 7.44	47.59	V1TV	35.4	-41.1	41.89	54	-12.11	-	-	190	165	V
6	* ** 9.43125	50.54	Pk	36.3	-40.4	46.44	54	-7.56	74	-27.56	0-360	200	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector
PK2 - Maximum Peak
V1TV - VB=1/Ton, Linear Voltage Average where: Ton is packet duration

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

10.2. WORST CASE SPURIOUS BELOW 30MHZ

Note: All measurements were made at a test distance of 3 m. The measured data was extrapolated from the test distance (3m) to the specification distance (300 m from 9-490 kHz and 30 m from 490 kHz – 30 MHz) to clearly show the relative levels of fundamental and spurious emissions and demonstrate compliance with the requirement that the level of any spurious emissions be below the level of the intentionally transmitted signal. The extrapolation factor for the limits were 40*Log (test distance / specification distance).

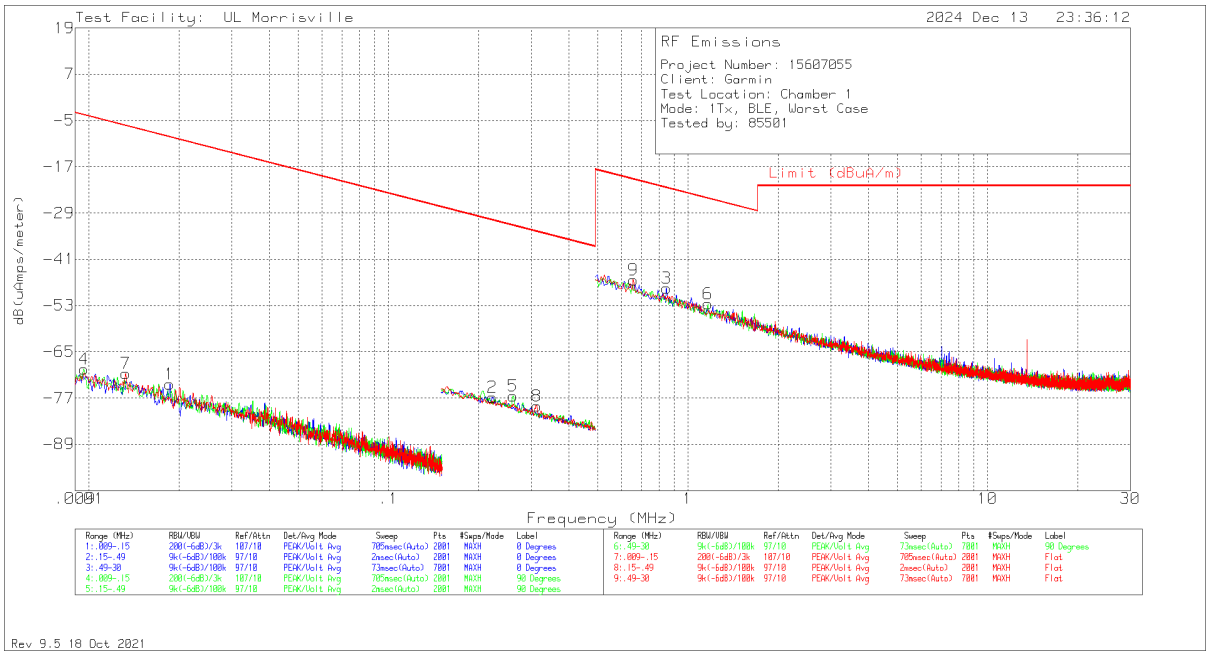


ANTENNA- THREE ORIENTATIONS (E-FIELD)

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	135144 (dB/m)	Gain/Loss (dB)	Dist. Corr. Factor (dB)	Corrected Reading dB(uVolts/meter)	QP/AV Limit (dBuV/m)	PK Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Loop Angle
4	.00964	43.44	Pk	18.5	.1	-80	-17.96	47.92	67.92	-65.88	0-360	401	90 degs
7	.01326	43.92	Pk	16.8	.1	-80	-19.18	45.15	65.15	-64.33	0-360	401	Flat
1	.01859	43.56	Pk	14.5	.1	-80	-21.84	42.22	62.22	-64.06	0-360	401	0 degs
2	.22259	43.72	Pk	10.9	.1	-80	-25.28	20.65	40.65	-45.93	0-360	401	0 degs
5	.26033	43.99	Pk	10.9	.1	-80	-25.01	19.29	39.29	-44.3	0-360	401	90 degs
8	.31286	41.48	Pk	10.9	.1	-80	-27.52	17.7	37.7	-45.22	0-360	401	Flat
9	.65864	34.06	Pk	11	.1	-40	5.16	31.23	-	-26.07	0-360	401	Flat
3	.84836	31.95	Pk	11	.1	-40	3.05	29.03	-	-25.98	0-360	401	0 degs
6	1.16456	27.74	Pk	11	.2	-40	-1.06	26.28	-	-27.34	0-360	401	90 degs

Pk - Peak detector

This report shall not be reproduced except in full, without the written approval of UL LLC



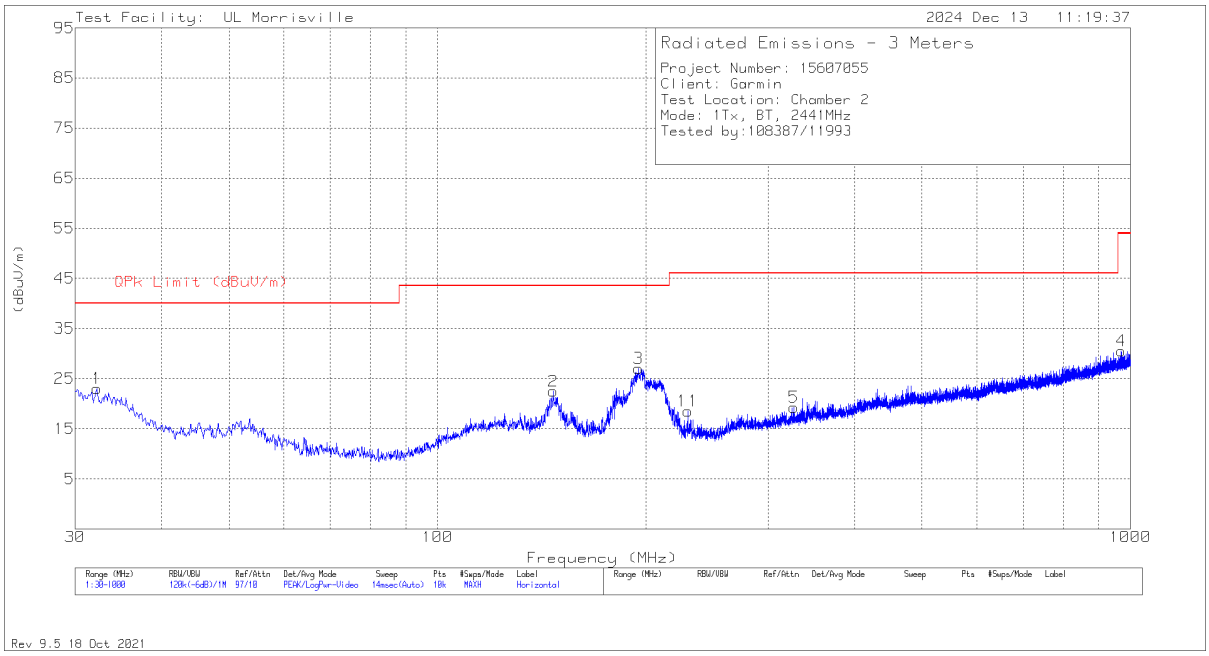
ANTENNA- THREE ORIENTATIONS (H-FIELD)

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	135144 (dB/m)	Gain/Loss (dB)	Dist. Corr. Factor (dB)	Corrected Reading dB(uAmps/meter)	QP/AV Limit (dBuA/m)	PK Limit (dBuA/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Loop Angle
4	.00964	43.44	Pk	-33	.1	-80	-69.46	-3.58	16.42	-65.88	0-360	401	90 degs
7	.01326	43.92	Pk	-34.7	.1	-80	-70.68	-6.35	13.65	-64.33	0-360	401	Flat
1	.01859	43.56	Pk	-37	.1	-80	-73.34	-9.28	10.72	-64.06	0-360	401	0 degs
2	.22259	43.72	Pk	-40.6	.1	-80	-76.78	-30.85	-10.85	-45.93	0-360	401	0 degs
5	.26033	43.99	Pk	-40.6	.1	-80	-76.51	-32.21	-12.21	-44.3	0-360	401	90 degs
8	.31286	41.48	Pk	-40.6	.1	-80	-79.02	-33.8	-13.8	-45.22	0-360	401	Flat
9	.65864	34.06	Pk	-40.5	.1	-40	-46.34	-20.27	-	-26.07	0-360	401	Flat
3	.84836	31.95	Pk	-40.5	.1	-40	-48.45	-22.47	-	-25.98	0-360	401	0 degs
6	1.16456	27.74	Pk	-40.5	.2	-40	-52.56	-25.22	-	-27.34	0-360	401	90 degs

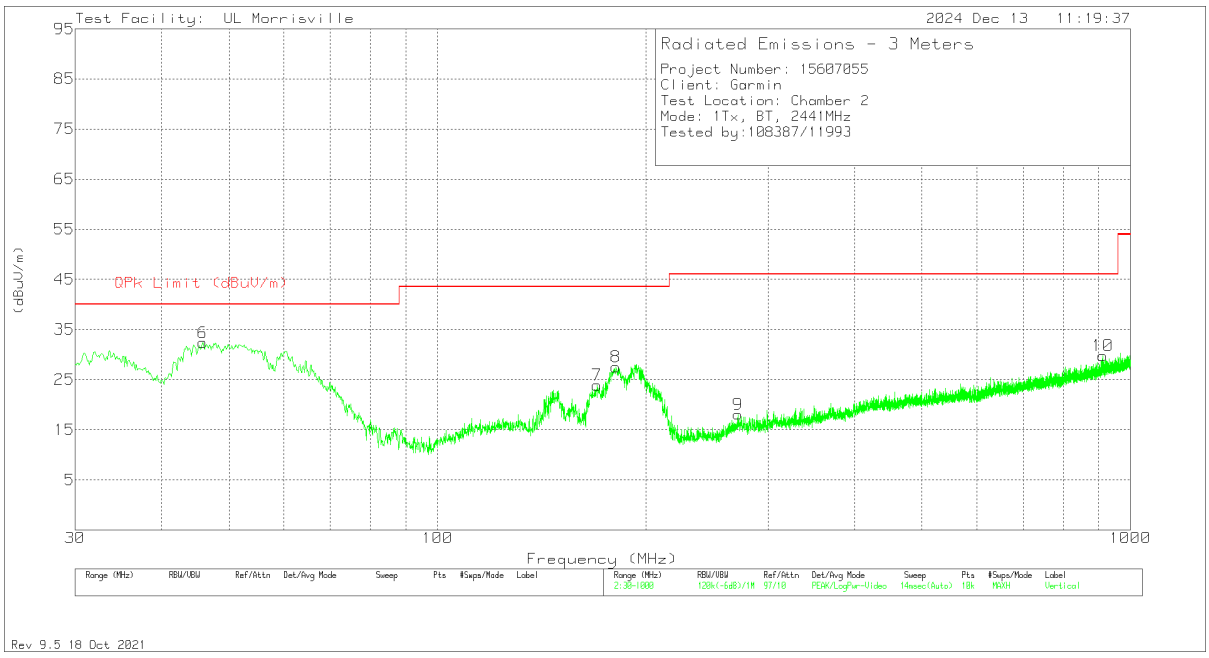
Pk - Peak detector

This report shall not be reproduced except in full, without the written approval of UL LLC

10.3. WORST CASE SPURIOUS 30-1000MHZ



HORIZONTAL



VERTICAL

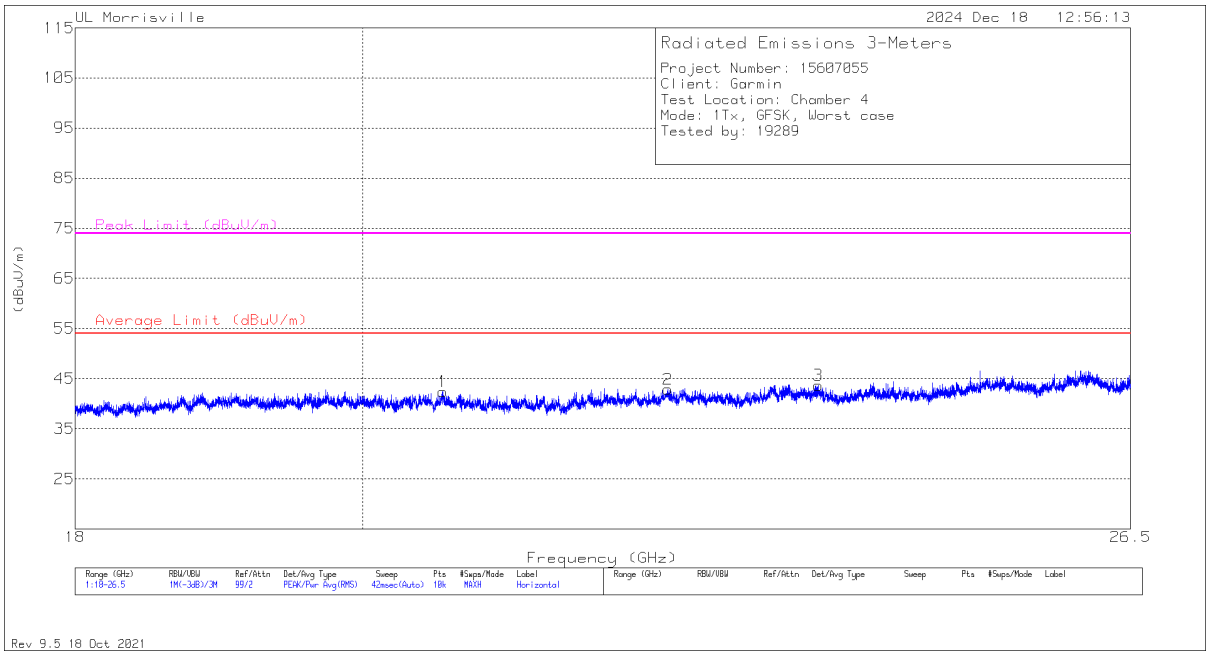
This report shall not be reproduced except in full, without the written approval of UL LLC

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	159203 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
4	* ** 970.124	26.27	Pk	29.7	-25.4	30.57	53.97	-23.4	0-360	199	H
5	* ** 326.529	27.95	Pk	20.5	-29.2	19.25	46.02	-26.77	0-360	199	H
7	* ** 170.068	35.94	Pk	18.3	-30.3	23.94	43.52	-19.58	0-360	101	V
9	* ** 271.627	27.88	Pk	19.8	-29.6	18.08	46.02	-27.94	0-360	101	V
10	** 912.215	26.92	Pk	29	-26.1	29.82	46.02	-16.2	0-360	199	V
1	32.231	28.77	Pk	25.9	-31.6	23.07	40	-16.93	0-360	101	H
6	45.811	47.56	Pk	16.3	-31.5	32.36	40	-7.64	0-360	101	V
2	146.885	33.77	Pk	19.1	-30.4	22.47	43.52	-21.05	0-360	199	H
8	181.029	39.86	Pk	17.8	-30.1	27.56	43.52	-15.96	0-360	101	V
3	195.094	38.82	Pk	18.3	-30.1	27.02	43.52	-16.5	0-360	101	H
11	229.723	30.58	Pk	17.6	-29.7	18.48	46.02	-27.54	0-360	101	H

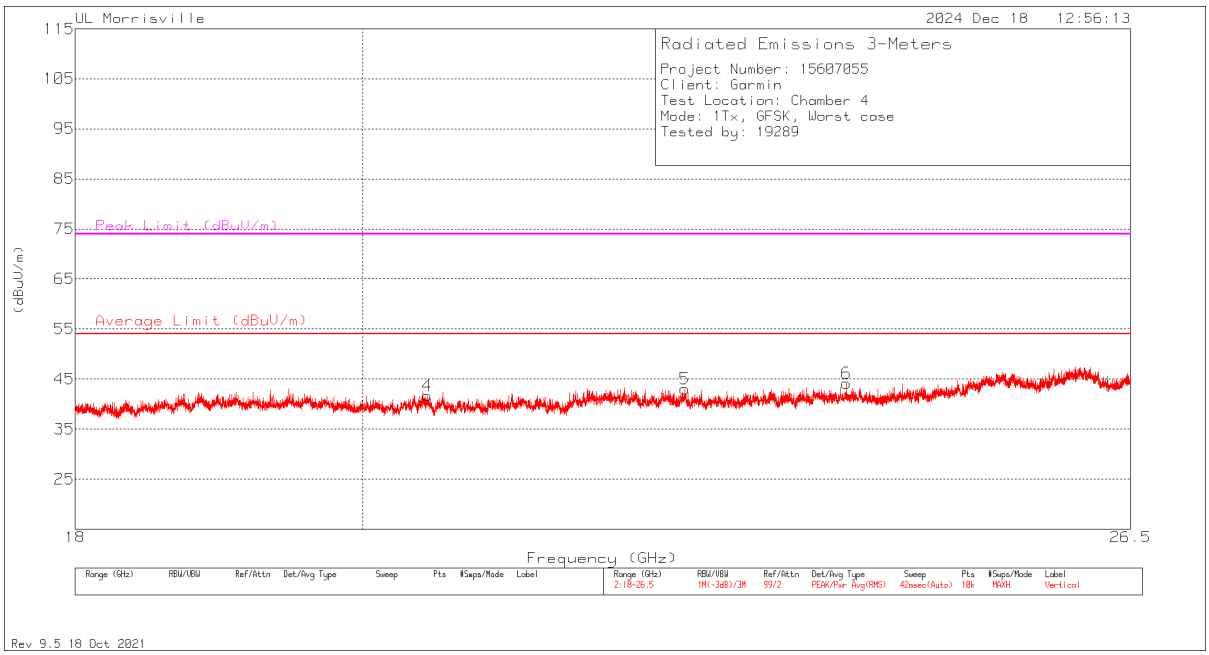
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

10.4. WORST CASE SPURIOUS 18-26GHz



HORIZONTAL



VERTICAL

This report shall not be reproduced except in full, without the written approval of UL LLC

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	204704 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 20.59819	48.89	Pk	33.7	-40.2	42.39	54	-11.61	74	-31.61	0-360	100	H
2	* ** 22.36941	49.05	Pk	34.1	-40.3	42.85	54	-11.15	74	-31.15	0-360	100	H
3	* ** 23.63579	47.51	Pk	34.6	-38.4	43.71	54	-10.29	74	-30.29	0-360	150	H
4	* ** 20.47835	49.11	Pk	33.7	-41.1	41.71	54	-12.29	74	-32.29	0-360	300	V
5	* ** 22.5054	48.31	Pk	34.2	-39.5	43.01	54	-10.99	74	-30.99	0-360	200	V
6	* ** 23.87971	48.12	Pk	34.4	-38.4	44.12	54	-9.88	74	-29.88	0-360	150	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

11. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)
RSS-Gen 8.8

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency.

TEST PROCEDURE

The EUT is placed on a non-conducting table 40 cm from the vertical ground plane and 80 cm above the horizontal ground plane. The EUT is configured in accordance with ANSI C63.10.

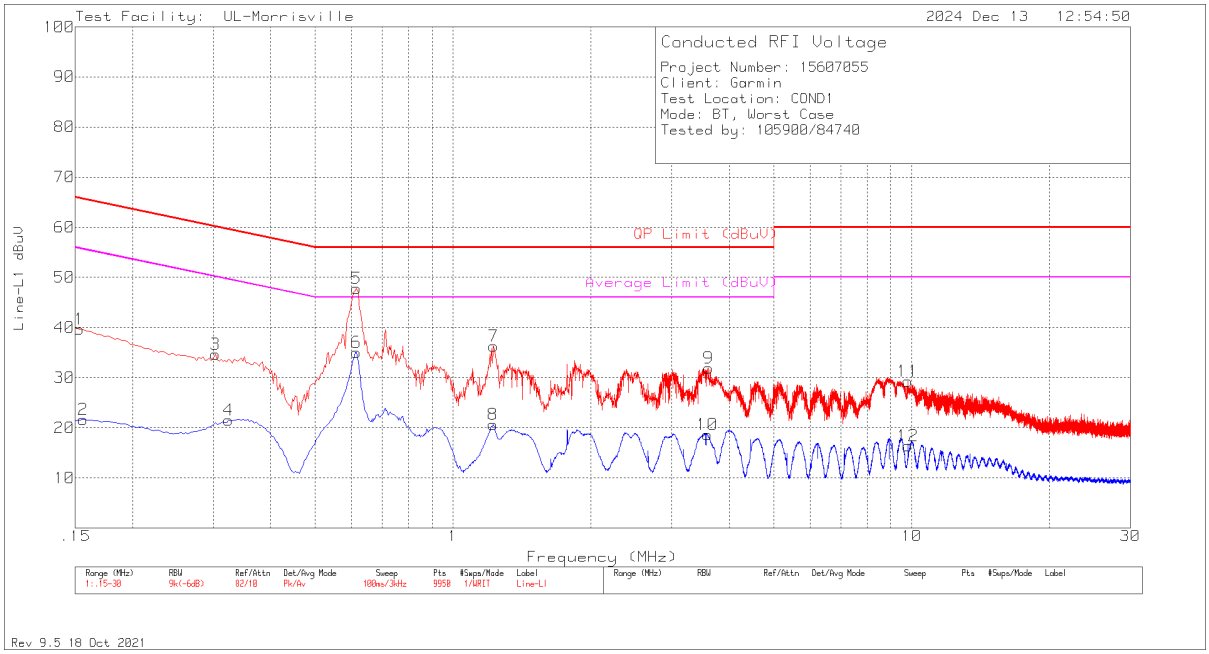
The receiver is set to a resolution bandwidth of 9 kHz. Peak detection is used unless otherwise noted as quasi-peak or average.

Line conducted data is recorded for both lines.

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC

11.1. AC POWER LINE

LINE 1 RESULTS

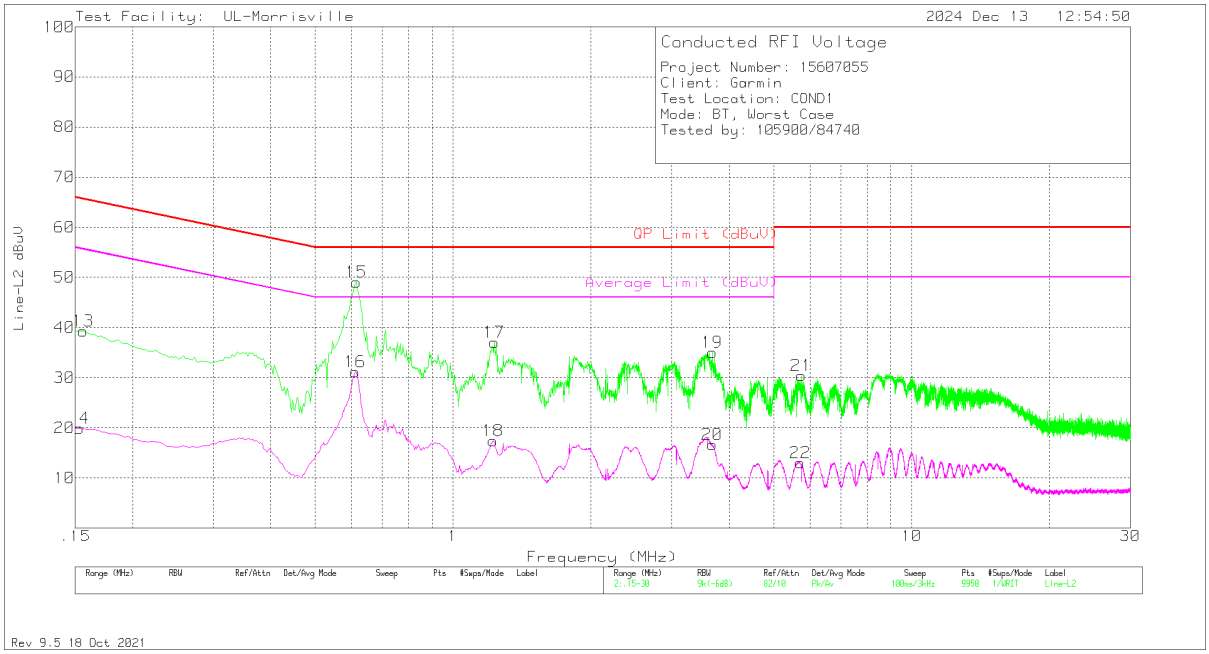


Range 1: Line-L1 .15 - 30MHz										
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN VDF (dB)	Cbl/Limiter (dB)	Corrected Reading dBuV	QP Limit (dBuV)	Margin (dB)	Average Limit (dBuV)	Margin (dB)
1	.153	29.67	Pk	.2	9.8	39.67	65.84	-26.17	-	-
2	.156	11.65	Av	.2	9.8	21.65	-	-	55.67	-34.02
3	.303	24.74	Pk	.1	9.8	34.64	60.16	-25.52	-	-
4	.324	11.59	Av	.1	9.8	21.49	-	-	49.6	-28.11
5	.615	37.99	Pk	0	9.8	47.79	56	-8.21	-	-
6	.615	25.25	Av	0	9.8	35.05	-	-	46	-10.95
7	1.227	26.52	Pk	0	9.8	36.32	56	-19.68	-	-
8	1.221	10.83	Av	0	9.8	20.63	-	-	46	-25.37
9	3.609	21.98	Pk	0	9.9	31.88	56	-24.12	-	-
10	3.582	8.79	Av	0	9.9	18.69	-	-	46	-27.31
11	9.816	19.21	Pk	.1	10	29.31	60	-30.69	-	-
12	9.816	6.25	Av	.1	10	16.35	-	-	50	-33.65

Pk - Peak detector
Av - Average detection

This report shall not be reproduced except in full, without the written approval of UL LLC

LINE 2 RESULTS



Range 2: Line-L2 .15 - 30MHz										
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN VDF (dB)	Cbl/Limiter (dB)	Corrected Reading dBuV	QP Limit (dBuV)	Margin (dB)	Average Limit (dBuV)	Margin (dB)
13	.156	29.34	Pk	.2	9.8	39.34	65.67	-26.33	-	-
14	.153	9.86	Av	.2	9.8	19.86	-	-	55.84	-35.98
15	.615	39.22	Pk	0	9.8	49.02	56	-6.98	-	-
16	.612	21.38	Av	0	9.8	31.18	-	-	46	-14.82
17	1.23	27.27	Pk	0	9.8	37.07	56	-18.93	-	-
18	1.224	7.57	Av	0	9.8	17.37	-	-	46	-28.63
19	3.672	25.1	Pk	0	9.9	35	56	-21	-	-
20	3.672	6.74	Av	0	9.9	16.64	-	-	46	-29.36
21	5.748	20.41	Pk	.1	9.9	30.41	60	-29.59	-	-
22	5.721	2.97	Av	.1	9.9	12.97	-	-	50	-37.03

Pk - Peak detector
Av - Average detection

This report shall not be reproduced except in full, without the written approval of UL LLC

12. SETUP PHOTOS

Please refer to R15607055-EP1 for setup photos.

END OF TEST REPORT

UL LLC
12 Laboratory Drive, Research Triangle Park, NC 27709; USA TEL:(919)549-1400

This report shall not be reproduced except in full, without the written approval of UL LLC

SAR EVALUATION REPORT

IEEE Std 1528-2013

For
Extremity Worn Digital Transceiver

FCC ID: IPH-04909
Model Name: A04909

Report Number: R15607055-S1
Issue Date: 2025-01-27

Prepared for
Garmin International Inc.
1200 E 151st St
Olathe, KS 66062-3426, USA

Prepared by
UL LLC
12 LABORATORY DR
RTP, NC 27709, U.S.A.
TEL: (919) 549-1400

ACCREDITED
CERT #0751.06

Revision History

Rev.	Date	Revisions	Revised By
V1	2025-01-27	Initial Issue	--

This report shall not be reproduced without the written approval of UL LLC

Table of Contents

This report shall not be reproduced without the written approval of UL LLC

1. Attestation of Test Results

Applicant Name	Garmin International Inc.		
FCC ID	IPH-04909		
Model Name	A04909		
Applicable Standards	Published RF exposure KDB procedures IEEE Std 1528-2013		
Exposure Category	SAR Limits (W/Kg)		
	Extremities (hands, wrists, ankles, etc.) (10g of tissue)		
General population / Uncontrolled exposure	4.0		
RF Exposure Conditions	Equipment Class - Highest Reported SAR (W/kg)		
	DTS	DSS	DXX
Extremity	0.209	0.134	0.000
Date Tested	2024-12-19 to 2025-01-14		
Test Results	Pass		

UL LLC tested the above equipment in accordance with the requirements set forth in the above standards. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

This report contains data provided by the customer which can impact the validity of results. UL LLC is only responsible for the validity of results after the integration of the data provided by the customer.

The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. All samples tested were in good operating condition throughout the entire test program. Measurement Uncertainties are published for informational purposes only and were not taken into account unless noted otherwise.

This document may not be altered or revised in any way unless done so by UL LLC and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL LLC will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by A2LA, NIST, or any agency of the U.S. Government.

Approved & Released By:	Prepared By:
	
Devin Chang Senior Test Engineer UL Verification Services Inc.	Lindsay Ryan Engineer UL LLC

This report shall not be reproduced without the written approval of UL LLC

2. Test Specification, Methods and Procedures

The tests documented in this report were performed in accordance with FCC 47 CFR § 2.1093, IEEE Std 1528-2013the following FCC Published RF exposure KDB procedures:

- 248227 D01 802.11 Wi-Fi SAR v02r02
- 447498 D01 General RF Exposure Guidance v06
- 447498 D03 Supplement C Cross-Reference v01
- 865664 D01 SAR measurement 100 MHz to 6 GHz v01r04
- 865664 D02 RF Exposure Reporting v01r02

In addition to the above, the following information was used:

- TCB Workshop October 2016; RF Exposure Procedures (Bluetooth Duty Factor)
- TCB Workshop October 2016; RF Exposure Procedures (DUT Holder Perturbations)
- TCB Workshop April 2019; RF Exposure Procedures (Tissue Simulating Liquids (TSL))

3. Facilities and Accreditation

UL LLC is accredited by A2LA, cert. # 0751.06 for all testing performed within the scope of this report. Testing was performed at the locations noted below.

The test sites and measurement facilities used to collect data are located at 2800 Perimeter Park Dr, Morrisville, NC, USA.

- SAR Lab 1A
- SAR Lab 2B

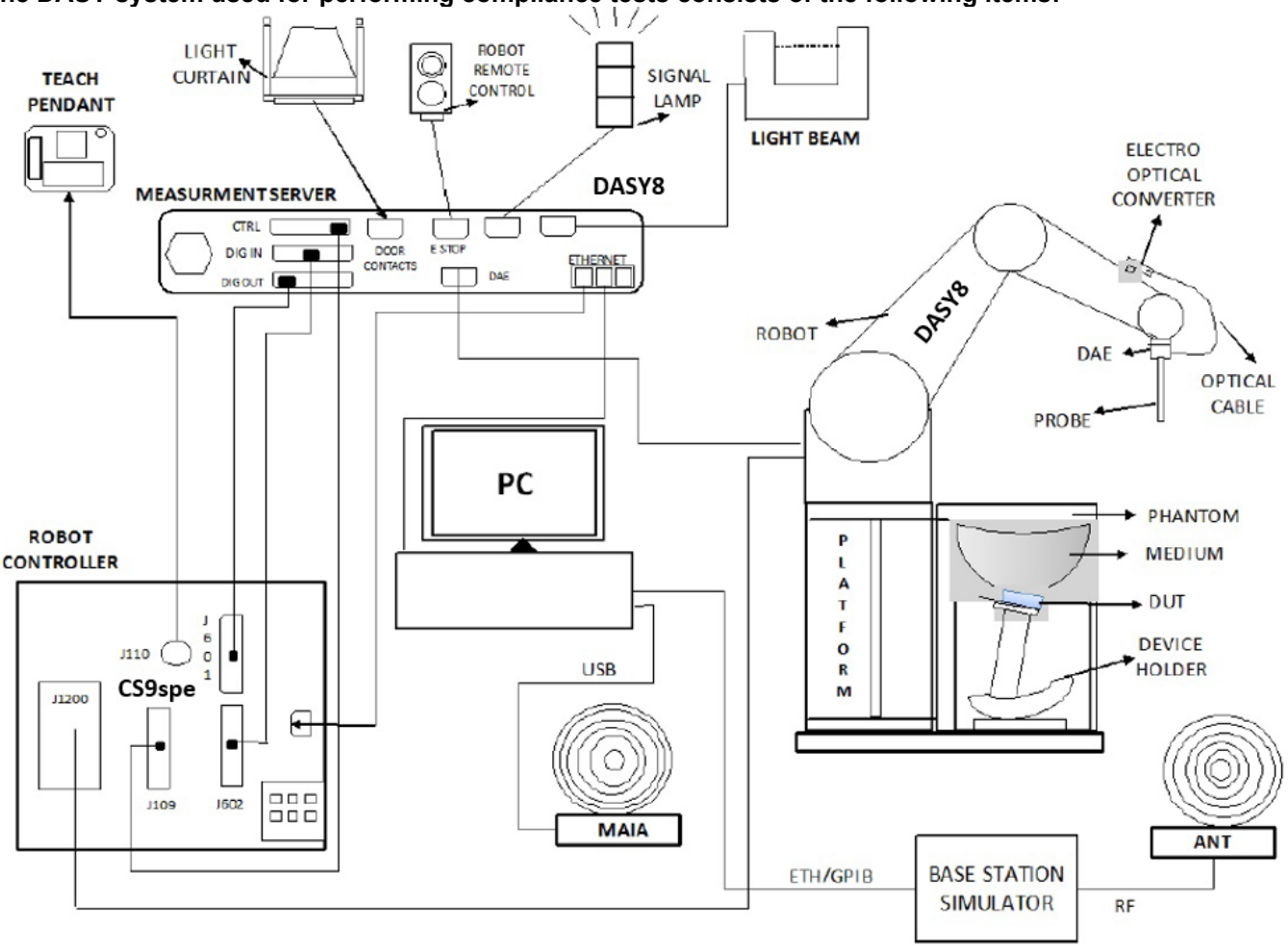
	Address	ISED CABID	ISED Company Number	FCC Registration
☐	Building: 12 Laboratory Dr RTP, NC 27709, U.S.A	US0067	2180C	825374
☒	Building: 2800 Perimeter Park Dr. Suite B Morrisville, NC 27560, U.S.A	US0067	27265	825374

This report shall not be reproduced without the written approval of UL LLC

4. SAR Measurement System & Test Equipment

4.1. SAR Measurement System

The DASY system used for performing compliance tests consists of the following items:



- A standard high precision 6-axis robot with controller, teach pendant and software. An arm extension for accommodating the data acquisition electronics (DAE).
- An isotropic Field probe optimized and calibrated for the targeted measurement.
- A data acquisition electronics (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.
- The Electro-optical converter (EOC) performs the conversion from optical to electrical signals for the digital communication to the DAE. To use optical surface detection, a special version of the EOC is required. The EOC signal is transmitted to the measurement server.
- The function of the measurement server is to perform the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.
- The Light Beam used is for probe alignment. This improves the (absolute) accuracy of the probe positioning.
- A computer running Win10 and the DASY8[1] software.
- Remote control and teach pendant as well as additional circuitry for robot safety such as warning lamps, etc.
- The phantom, the device holder and other accessories according to the targeted measurement.

[1] DASY8 software used: DASY16.4.0.5005 and older generations.

This report shall not be reproduced without the written approval of UL LLC

4.2. SAR Scan Procedures

Step 1: Power Reference Measurement

The Power Reference Measurement and Power Drift Measurements are for monitoring the power drift of the device under test in the batch process. The minimum distance of probe sensors to surface determines the closest measurement point to phantom surface. The minimum distance of probe sensors to surface is 2.1 mm. This distance cannot be smaller than the distance of sensor calibration points to probe tip as defined in the probe properties.

Step 2: Area Scan

The Area Scan is used as a fast scan in two dimensions to find the area of high field values, before doing a fine measurement around the hot spot. The sophisticated interpolation routines implemented in DASY software can find the maximum locations even in relatively coarse grids. When an Area Scan has measured all reachable points, it computes the field maximal found in the scanned area, within a range of the global maximum. The range (in dB) is specified in the standards for compliance testing. For example, a 2 dB range is required in IEC/IEEE 62209-1528, whereby 3 dB is a requirement when compliance is assessed in accordance with the ARIB standard (Japan). If only one Zoom Scan follows the Area Scan, then only the absolute maximum will be taken as reference. For cases where multiple maximums are detected, the number of Zoom Scans has to be increased accordingly.

Area Scan Parameters extracted from KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz

	≤ 3 GHz	> 3 GHz
Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface	5 ± 1 mm	½·δ·ln(2) ± 0.5 mm
Maximum probe angle from probe axis to phantom surface normal at the measurement location	30° ± 1°	20° ± 1°
Maximum area scan spatial resolution: Δx_{Area}, Δy_{Area}	≤ 2 GHz: ≤ 15 mm 2 – 3 GHz: ≤ 12 mm	3 – 4 GHz: ≤ 12 mm 4 – 6 GHz: ≤ 10 mm
	When the x or y dimension of the test device, in the measurement plane orientation, is smaller than the above, the measurement resolution must be ≤ the corresponding x or y dimension of the test device with at least one measurement point on the test device.	

This report shall not be reproduced without the written approval of UL LLC

Step 3: Zoom Scan

Zoom Scans are used to assess the peak spatial SAR values within a cubic averaging volume containing 1 g and 10 g of simulated tissue. The Zoom Scan measures points (refer to table below) within a cube whose base faces are centered on the maxima found in a preceding area scan job within the same procedure. When the measurement is done, the Zoom Scan evaluates the averaged SAR for 1 g and 10 g and displays these values next to the job's label.

Zoom Scan Parameters extracted from KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz

			≤ 3 GHz	> 3 GHz
Maximum zoom scan spatial resolution: Δx_{Zoom}, Δy_{Zoom}			≤ 2 GHz: ≤ 8 mm 2 – 3 GHz: ≤ 5 mm*	3 – 4 GHz: ≤ 5 mm* 4 – 6 GHz: ≤ 4 mm*
Maximum zoom scan spatial resolution, normal to phantom surface	uniform grid: $\Delta z_{Zoom}(n)$		≤ 5 mm	3 – 4 GHz: ≤ 4 mm 4 – 5 GHz: ≤ 3 mm 5 – 6 GHz: ≤ 2 mm
	graded grid	$\Delta z_{Zoom}(1)$: between 1st two points closest to phantom surface	≤ 4 mm	3 – 4 GHz: ≤ 3 mm 4 – 5 GHz: ≤ 2.5 mm 5 – 6 GHz: ≤ 2 mm
		$\Delta z_{Zoom}(n>1)$: between subsequent points	≤ 1.5·$\Delta z_{Zoom}(n-1)$	
Minimum zoom scan volume	x, y, z		≥ 30 mm	3 – 4 GHz: ≥ 28 mm 4 – 5 GHz: ≥ 25 mm 5 – 6 GHz: ≥ 22 mm

Note: δ is the penetration depth of a plane-wave at normal incidence to the tissue medium; see draft standard IEEE P1528-2011 for details.

* When zoom scan is required and the *reported* SAR from the *area scan based 1-g SAR estimation* procedures of KDB 447498 is ≤ 1.4 W/kg, ≤ 8 mm, ≤ 7 mm and ≤ 5 mm zoom scan resolution may be applied, respectively, for 2 GHz to 3 GHz, 3 GHz to 4 GHz and 4 GHz to 6 GHz.

Step 4: Power drift measurement

The Power Drift Measurement measures the field at the same location as the most recent power reference measurement within the same procedure, and with the same settings. The Power Drift Measurement gives the field difference in dB from the reading conducted within the last Power Reference Measurement. This allows a user to monitor the power drift of the device under test within a batch process. The measurement procedure is the same as Step 1.

This report shall not be reproduced without the written approval of UL LLC

4.3. Test Equipment

The measuring equipment used to perform the tests documented in this report has been calibrated in accordance with the manufacturers' recommendations, and is traceable to recognized national standards.

Dielectric Property Measurements

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Date	Cal. Due Date
Network Analyzer	Keysight	E5063A	MY54100681	2024-07-31	2025-07-31
Dielectric Probe	SPEAG	DAKS-3.5	1147	2024-03-11	2025-03-11
Shorting Block	SPEAG	DAK-3.5 Short	SM DAK 200 DB	2024-03-11	2025-03-11
Dielectric Probe	SPEAG	DAKS-12	1037	2024-03-11	2025-03-11
Shorting Block	SPEAG	DAK-12 Short	2044	2024-03-11	2025-03-11
Thermometer	Fisher Scientific	15-078-181	1817705017	2023-03-30	2025-03-30

System Check

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Date	Cal. Due Date
Signal Generator	Keysight	N5181A	MY50140788	2024-08-01	2025-08-01
3-Path Diode Power Sensor	Rohde & Schwarz	NRP8S	112236	2024-07-12	2025-07-12
3-Path Diode Power Sensor	Rohde & Schwarz	NRP8S	112237	2024-07-12	2025-07-12
RF Power Meter	Keysight	N1912A	MY55136012	2024-08-02	2025-08-02
RF Power Sensor	Keysight	N1921A	MY55090025	2024-08-16	2025-08-16
RF Power Sensor	Keysight	N1921A	MY55090030	2024-07-09	2025-07-09
Amplifier	Mini-Circuits	ZVA-183WA-S+	S C484802241	N/A	N/A
Directional Coupler	Mini-Circuits	ZUDC10-183+	2214	NA	NA
Dual Directional Coupler	Werlatone	C5100-10	92249	N/A	N/A
DC Power Supply	Miteq	PS 15V1	1990186	N/A	N/A

Lab Equipment

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Date	Cal. Due Date
E-Field Probe	SPEAG	EX3DV4	7709	2024-11-11	2025-11-11
Data Acquisition Electronics	SPEAG	DAE4	1714	2024-11-06	2025-11-06
System Validation Dipole	SPEAG	CLA13	1017	2024-03-07	2025-03-07
System Validation Dipole	SPEAG	D2450V2	963	2024-10-11	2025-10-11
Environmental Indicator	Fisher Scientific	Traceable	240072452	2024-01-24	2026-01-24

Other

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Date	Cal. Due Date
RF Power Meter	Boonton Electronics	RTP5000	211058	2024-08-01	2025-08-01

5. Measurement Uncertainty

Per KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz, when the highest measured 1-g SAR within a frequency band is < 1.5 W/kg and the measured 10-g SAR within a frequency band is < 3.75 W/kg. The expanded SAR measurement uncertainty must be ≤ 30%, for a confidence interval of k = 2. If these conditions are met, extensive SAR measurement uncertainty analysis described in IEEE Std 1528-2013 is not required in SAR reports submitted for equipment approval.

Therefore, the measurement uncertainty is not required.

This report shall not be reproduced without the written approval of UL LLC

6. Device Under Test (DUT) Information

6.1. DUT Description

Device Dimension	This is an extremity wrist-worn wearable device.
Back Cover	The Back Cover is not removable
Battery Options	The rechargeable battery is not user accessible.
Test sample information	**S/N** / **Notes** 3493238982 / Conducted Sample #1 3493239044 / Radiated Sample #1
Hardware Version	Rev V3
Software Version	Ver 3.51

6.2. Wireless Technologies

Wireless technologies	Frequency bands	Operating mode	Duty Cycle used for SAR testing
Wi-Fi	2.4 GHz	802.11b 802.11g 802.11n (HT20)	100.0% (802.11b) [1]
Bluetooth	2.4 GHz	BR, EDR, LE	N/A[2]
ANT/ANT+	2.4 GHz	GFSK	N/A[2]
NFC	13.56 MHz	Type A, B, F	98% (Type A)[1]

Notes:

1. Duty cycle for Wi-Fi and NFC is referenced from §9.
2. Measured Duty Cycle is not required due to SAR test exemption

This report shall not be reproduced without the written approval of UL LLC

7. RF Exposure Conditions (Test Configurations)

Wireless technologies	RF Exposure Conditions	DUT-to-User Separation	Test Position	Antenna-to-edge/surface	SAR Required
WLAN	Extremity (Hand/Wrist)	0	Back	N/A	Yes
BT	Extremity (Hand/Wrist)	0	Back	N/A	No[1]
ANT/ANT+	Extremity (Hand/Wrist)	0	Back	N/A	No[1]
NFC	Extremity (Hand/Wrist)	0	Back	N/A	Yes

Note(s):

1. Exempt from SAR testing

SAR Test Exclusion Calculations for WLAN

Antennas < 50mm to adjacent edges

Tx Interface	Frequency (MHz)	Output Power		Separation Distances (mm)	Calculated Threshold Value
		dBm	mW	Back	Back
Bluetooth	2480	9.00	7.94	5	2.5 -EXEMPT-
ANT/ANT+	2478	4.00	2.51	5	0.8 -EXEMPT-

Note(s):

According to KDB 447498, if the calculated threshold value is >7.5 then SAR testing is required.
When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion

This report shall not be reproduced without the written approval of UL LLC

8. Dielectric Property Measurements & System Check

8.1. Dielectric Property Measurements

The temperature of the tissue-equivalent medium used during measurement must also be within 18°C to 25°C and within ± 2°C of the temperature when the tissue parameters are characterized.
The dielectric parameters must be measured before the tissue-equivalent medium is used in a series of SAR measurements. The parameters should be re-measured after each 3 – 4 days of use; or earlier if the dielectric parameters can become out of tolerance; for example, when the parameters are marginal at the beginning of the measurement series.
Tissue dielectric parameters were measured at the low, middle and high frequency of each operating frequency range of the test device.
The dielectric constant (εr) and conductivity (σ) of typical tissue-equivalent media recipes are expected to be within ± 5% of the required target values; but for SAR measurement systems that have implemented the SAR error compensation algorithms documented in IEEE Std 1528-2013, to automatically compensate the measured SAR results for deviations between the measured and required tissue dielectric parameters, the tolerance for εr and σ may be relaxed to ± 10%. This is limited to frequencies ≤ 3 GHz.

Tissue Dielectric Parameters

FCC KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz

Target Frequency (MHz)	Head		Body	
	ε_r	σ (S/m)	ε_r	σ (S/m)
150	52.3	0.76	61.9	0.80
300	45.3	0.87	58.2	0.92
450	43.5	0.87	56.7	0.94
835	41.5	0.90	55.2	0.97
900	41.5	0.97	55.0	1.05
915	41.5	0.98	55.0	1.06
1450	40.5	1.20	54.0	1.30
1610	40.3	1.29	53.8	1.40
1800 – 2000	40.0	1.40	53.3	1.52
2450	39.2	1.80	52.7	1.95
3000	38.5	2.40	52.0	2.73
5000	36.2	4.45	49.3	5.07
5100	36.1	4.55	49.1	5.18
5200	36.0	4.66	49.0	5.30
5300	35.9	4.76	48.9	5.42
5400	35.8	4.86	48.7	5.53
5500	35.6	4.96	48.6	5.65
5600	35.5	5.07	48.5	5.77
5700	35.4	5.17	48.3	5.88
5800	35.3	5.27	48.2	6.00

Dielectric Property Results:

Liquid Check											
SAR Lab	Date	Tissue Type	Band (MHz)	Freq. (MHz)	Relative Permittivity (εr)			Conductivity (σ)			
					Measured	Target	Delta	Measured	Target	Delta	
SAR 1A	2025-01-14	Head	13	13	54.2	55.0	-1.47%	0.72	0.75	-4.67%	
				12	54.2	55.0	-1.45%	0.71	0.75	-4.68%	
				14	54.2	55.0	-1.53%	0.72	0.75	-4.65%	
SAR 2B	2025-01-02	Head	2450	2450	39.8	39.2	1.51%	1.80	1.80	-0.17%	
				2400	39.9	39.3	1.46%	1.76	1.75	0.19%	
				2500	39.7	39.1	1.44%	1.83	1.85	-1.14%	

This report shall not be reproduced without the written approval of UL LLC

8.2. System Check

SAR system verification is required to confirm measurement accuracy, according to the tissue dielectric media, probe calibration points and other system operating parameters required for measuring the SAR of a test device. The system verification must be performed for each frequency band and within the valid range of each probe calibration point required for testing the device. The same SAR probe(s) and tissue-equivalent media combinations used with each specific SAR system for system verification must be used for device testing. When multiple probe calibration points are required to cover substantially large transmission bands, independent system verifications are required for each probe calibration point. A system verification must be performed before each series of SAR measurements using the same probe calibration point and tissue-equivalent medium. Additional system verification should be considered according to the conditions of the tissue-equivalent medium and measured tissue dielectric parameters, typically every three to four days when the liquid parameters are re-measured or sooner when marginal liquid parameters are used at the beginning of a series of measurements.

System Performance Check Measurement Conditions:

- The measurements were performed in the flat section of the TWIN SAM or ELI phantom, shell thickness: 2.0 ±0.2 mm (bottom plate) filled with Body or Head simulating liquid of the following parameters.
- The depth of tissue-equivalent liquid in a phantom must be ≥ 15.0 cm for SAR measurements ≤ 3 GHz and ≥ 10.0 cm for measurements > 3 GHz.
- The DASY system with an E-Field Probe was used for the measurements.
- The dipole was mounted on the small tripod so that the dipole feed point was positioned below the center marking of the flat phantom section and the dipole was oriented parallel to the body axis (the long side of the phantom). The standard measuring distance was 10 mm (above 1 GHz) and 15 mm (below 1 GHz) from dipole center to the simulating liquid surface.
- The coarse grid with a grid spacing of 15 mm was aligned with the dipole.
  For 5 GHz band - The coarse grid with a grid spacing of 10 mm was aligned with the dipole.
- Special 7x7x7 (below 3 GHz) and/or 8x8x7 (above 3 GHz) fine cube was chosen for the cube.
- Distance between probe sensors and phantom surface was set to 3 mm.
  For 5 GHz band - Distance between probe sensors and phantom surface was set to 2.5 mm
- The dipole input power (forward power) was recorded and the results are normalized to 1 W input power.

System Check Results

The 1-g and 10-g SAR measured with a reference dipole, using the required tissue-equivalent medium at the test frequency, must be within ±10% of the manufacturer calibrated dipole SAR target. Refer to Appendix B for the SAR System Check Plots.

System Check													
SAR Lab	Date	Dipole Type & Serial Number	Dipole Cal. Due Date	Input Power (dBm)	Measured results for 1-g SAR				Measured results for 10-g SAR				Plot No.
					Meas. Zoom Scan	Normalize to 1 W	Target (Ref. Value)	Delta ±10%	Meas. Zoom Scan	Normalize to 1 W	Target (Ref. Value)	Delta ±10%	
SAR 1A	2025-01-14	CLA13 SN: 1017	2025-03-07	16.0	0.021	0.527	0.551	-4.27%	0.013	0.327	0.344	-5.07%	1
SAR 2B	2025-01-02	D2450V2 SN: 963	2025-10-11	17.0	2.620	52.276	52.600	-0.62%	1.230	24.542	24.400	0.58%	2

This report shall not be reproduced without the written approval of UL LLC

9. Conducted Output Power Measurements

Tune-Up Power Limits provided by the manufacturer are used to scale measured SAR values.

9.1. Wi-Fi 2.4GHz (DTS Band)

Maximum Output Power (Tune-up Limit) for Wi-Fi 2.4 GHz

The maximum output power specified for production units are determined for all applicable 802.11 transmission modes in each standalone and aggregated frequency band. Maximum output power is measured for the highest maximum output power configuration(s) in each frequency band according to the default power measurement procedures.

For “Not required”, SAR Test reduction was applied from KDB 248227 guidance, Sec. 2.1, b), 1) when the same maximum power is specified for multiple transmission modes in a frequency band, the largest channel bandwidth, lowest order modulation, lowest data rate and lowest order 802.11b/g/n mode is used for SAR measurement, on the highest measured output power channel in the initial test configuration, for each frequency band. Additional output power measurements were not deemed necessary.

SAR testing is not required for OFDM mode(s) when the highest reported SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and the adjusted SAR is ≤ 3 W/kg.

Mode	Bandwidth	Channel	Frequency (MHz)	Tune-up PowerLimit (dBm)
				Main Antenna
802.11b	20 MHz	1	2412	12.00
		2	2417	12.00
		3	2422	12.00
		4	2427	12.00
		5	2432	12.00
		6	2437	12.00
		7	2442	12.00
		8	2447	12.00
		9	2452	12.00
		10	2457	12.00
		11	2462	12.00
		12	2467	12.00
		13	2472	11.00
802.11g	20 MHz	1	2412	14.00
		2	2417	16.50
		3	2422	17.50
		4	2427	17.50
		5	2432	17.50
		6	2437	17.50
		7	2442	16.50
		8	2447	15.50
		9	2452	15.50
		10	2457	15.50
		11	2462	13.50
		12	2467	11.50
		13	2472	10.00
802.11n	20 MHz	1	2412	13.00
		2	2417	17.00
		3	2422	17.50
		4	2427	17.50
		5	2432	17.50
		6	2437	17.50
		7	2442	17.00
		8	2447	15.00
		9	2452	15.00
		10	2457	15.00
		11	2462	12.50
		12	2467	11.00
		13	2472	10.00

This report shall not be reproduced without the written approval of UL LLC

Wi-Fi 2.4GHz Measured Results

Band	Mode	Ch #	Freq. (MHz)	Main Antenna Average Power (dBm)		
				Meas Pwr	Tune-up	SAR Test (Yes/No)
OFDM 2.4 GHz	802.11g	1	2412	13.0	14.0	Yes
		3	2422	15.5	17.5	
		6	2437	15.5	17.5	
		7	2442	15.4	16.5	
		11	2462	13.0	13.5	

Duty Factor Measured Results

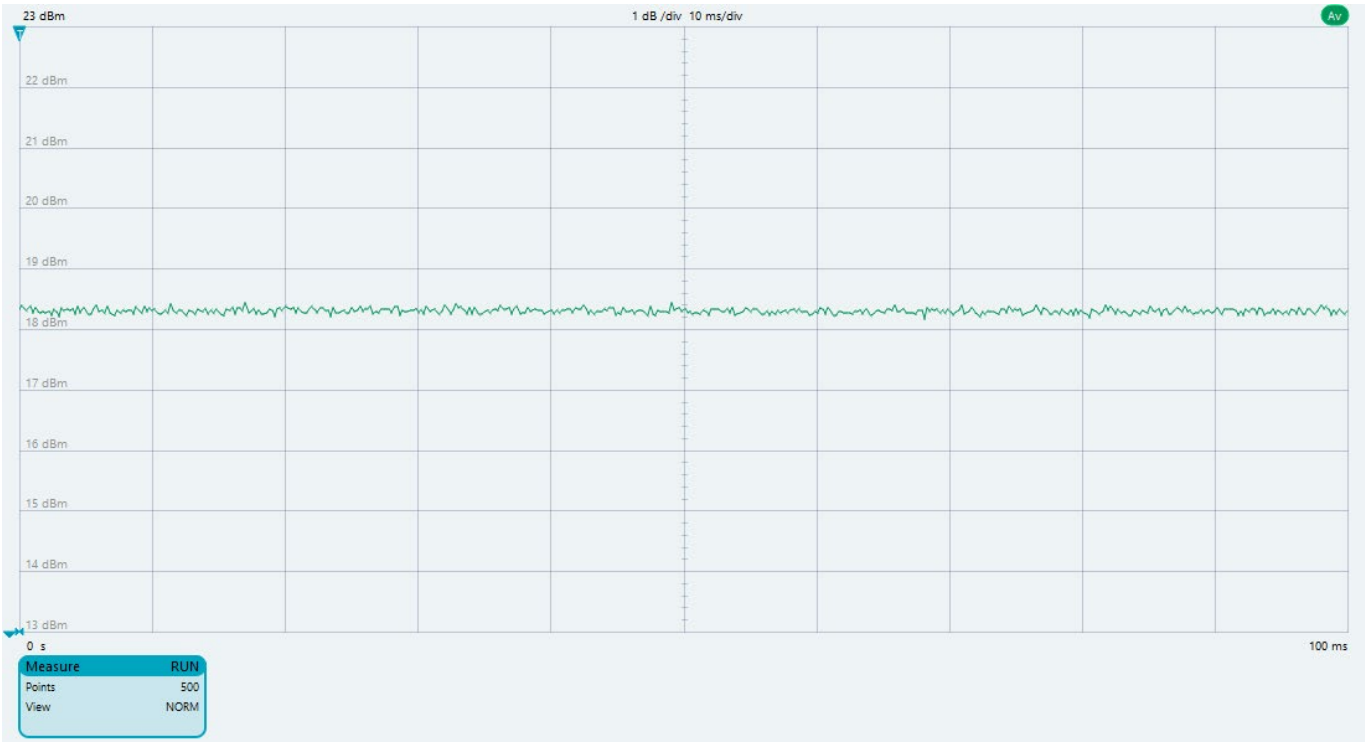
Mode	T on (ms)	Period (ms)	Duty Cycle	Crest Factor (1/duty cycle)
802.11b	100	100	100.0%	1.00

Note(s):

Duty Cycle = (T on / period) * 100%

Duty Cycle plots

802.11b



This report shall not be reproduced without the written approval of UL LLC

9.2. Bluetooth

Maximum Output Power (Tune-up Limit) for Bluetooth

Band	Mode	Channel	Frequency (MHz)	Tune-up PowerLimit (dBm)
				Main Antenna
Bluetooth 2.4 GHz	BR	0	2402	9.0
		39	2441	9.0
		78	2480	9.0
	EDR, π/4 DQPSK	0	2402	8.5
		39	2441	8.5
		78	2480	8.5
	EDR, 8-DPSK	0	2402	9.0
		39	2441	9.0
		78	2480	9.0
	LE	37	2402	-1.0
		0	2404	4.0
		17	2440	4.0
		35	2476	4.0
		36	2478	-1.0
		39	2480	-1.0

9.3. ANT/ANT+

Maximum Output Power (Tune-up Limit) for ANT/ANT+

Band	Mode	Frequency (MHz)	Tune-up PowerLimit (dBm)
			Main Antenna
ANT/ANT+	GFSK	2404	4.0
		2440	4.0
		2478	4.0

This report shall not be reproduced without the written approval of UL LLC

9.4. NFC

Conducted output power cannot be measured for NFC, therefore a 2 dB scaling factor shall be used to account for potential variations between samples.

Duty Factor Measured Results

Mode	T on (ms)	Period (ms)	Duty Cycle	Crest Factor (1/duty cycle)
Type A	16.952	17.300	98.0%	1.02

Note(s):

Duty Cycle = (T on / period) * 100%

Duty Cycle plots

Type A

This report shall not be reproduced without the written approval of UL LLC

10. Measured and Reported (Scaled) SAR Results

SAR Test Reduction criteria are as follows:

- Reported SAR(W/kg) for Wi-Fi = Measured SAR * Tune-up scaling factor * Duty Cycle scaling factor
- Duty Cycle scaling factor = 1 / Duty cycle (%)

KDB 447498 D01 General RF Exposure Guidance:

Testing of other required channels within the operating mode of a frequency band is not required when the reported 1-g or 10-g SAR for the mid-band or highest output power channel is:

- ≤ 0.8 W/kg or 2.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≤ 100 MHz
- ≤ 0.6 W/kg or 1.5 W/kg, for 1-g or 10-g respectively, when the transmission band is between 100 MHz and 200 MHz
- ≤ 0.4 W/kg or 1.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≥ 200 MHz

KDB 248227 D01 SAR meas for 802.11:

SAR test reduction for 802.11 Wi-Fi transmission mode configurations are considered separately for DSSS and OFDM. An initial test position is determined to reduce the number of tests required for certain exposure configurations with multiple test positions. An initial test configuration is determined for each frequency band and aggregated band according to maximum output power, channel bandwidth, wireless mode configurations and other operating parameters to streamline the measurement requirements. For 2.4 GHz DSSS, either the initial test position or DSSS procedure is applied to reduce the number of SAR tests; these are mutually exclusive. For OFDM, an initial test position is only applicable to next to the ear, UMPC mini-tablet and hotspot mode configurations, which is tested using the initial test configuration to facilitate test reduction. For other exposure conditions with a fixed test position, SAR test reduction is determined using only the initial test configuration.

The multiple test positions require SAR measurements in head, hotspot mode or UMPC mini-tablet configurations may be reduced according to the highest reported SAR determined using the *initial test position(s)* by applying the DSSS or OFDM SAR measurement procedures in the required wireless mode test configuration(s). The *initial test position(s)* is measured using the highest measured maximum output power channel in the required wireless mode test configuration(s). When the *reported* SAR for the *initial test position* is:

- ≤ 0.4 W/kg, further SAR measurement is not required for the other test positions in that exposure configuration and wireless mode combination within the frequency band or aggregated band. DSSS and OFDM configurations are considered separately according to the required SAR procedures.
- > 0.4 W/kg, SAR is repeated using the same wireless mode test configuration tested in the *initial test position* to measure the subsequent next closet/smallest test separation distance and maximum coupling test position, on the highest maximum output power channel, until the *reported* SAR is ≤ 0.8 W/kg or all required test positions are tested.
  - For subsequent test positions with equivalent test separation distance or when exposure is dominated by coupling conditions, the position for maximum coupling condition should be tested.
  - When it is unclear, all equivalent conditions must be tested.
- For all positions/configurations tested using the *initial test position* and subsequent test positions, when the *reported* SAR is > 0.8 W/kg, measure the SAR for these positions/configurations on the subsequent next highest measured output power channel(s) until the *reported* SAR is ≤ 1.2 W/kg or all required test channels are considered.
  - The additional power measurements required for this step should be limited to those necessary for identifying subsequent highest output power channels to apply the test reduction.
- When the specified maximum output power is the same for both UNII 1 and UNII 2A, begin SAR measurements in UNII 2A with the channel with the highest measured output power. If the reported SAR for UNII 2A is ≤ 1.2 W/kg, SAR is not required for UNII 1; otherwise treat the remaining bands separately and test them independently for SAR.
- When the specified maximum output power is different between UNII 1 and UNII 2A, begin SAR with the band that has the higher specified maximum output. If the highest reported SAR for the band with the highest specified power is ≤ 1.2 W/kg, testing for the band with the lower specified output power is not required; otherwise test the remaining bands independently for SAR.

To determine the *initial test position*, Area Scans were performed to determine the position with the *Maximum Value of SAR (measured)*. The position that produced the highest *Maximum Value of SAR* is considered the worst case position; thus used as the *initial test position*.

This report shall not be reproduced without the written approval of UL LLC

10.1. Wi-Fi (DTS Band)

RF Exposure Conditions	Mode	Power State	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Area Scan Max. SAR (10g W/kg)	Duty Cycle	Power (dBm)		10-g SAR (W/kg)		Plot No.
									Tune-up Limit	Meas.	Meas.	Scaled	
Extremity	802.11g	Default	0	Back	6	2437	0.128	100.0%	17.5	15.5	0.132	**0.209**	1

10.2. NFC

RF Exposure Conditions	Mode	Dist. (mm)	Freq. (MHz)	Duty Cycle	Tolerance Scaling[1] (dB)	Test Position	10-g SAR (W/kg)		Plot No.
							Meas.	Scaled	
Extremity	Type A	0	13.56	98%	2	Back	0.000	**0.000**	2

Note:

Conducted output power measurements for NFC are not practical, therefore a 2 dB scaling factor shall be used to account for potential variations between samples.

10.3. Standalone SAR Test Exclusion Considerations & Estimated SAR

The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:

[(max. power of channel, including tune-up tolerance, mW) / (min. test separation distance, mm)]·[√f(GHz)] ≤ 3.0, for 1-g SAR and ≤ 7.5 for 10-g extremity SAR, where

- $f_{(GHz)}$ is the RF channel transmit frequency in GHz
- Power and distance are rounded to the nearest mW and mm before calculation
- The result is rounded to one decimal place for comparison

The test exclusions are applicable only when the minimum test separation distance is ≤ 50 mm and for transmission frequencies between 100 MHz and 6 GHz. When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion.

RF Air interface	RF Exposure Conditions	Frequency (GHz)	Max. tune-up tolerance Power		Min. test separation distance (mm)	SAR test exclusion Result*	Estimated 10-g SAR (W/kg)
			(dBm)	(mW)			
Bluetooth	Extremity	2.480	9.00	8.00	5	2.5	0.134
ANT/ANT+	Extremity	2.478	2.00	2.51	5	0.9	0.042

Conclusion:

*: The computed value is ≤ 7.5; therefore, this qualifies for Standalone SAR test exclusion.

This report shall not be reproduced without the written approval of UL LLC

11. SAR Measurement Variability

In accordance with published RF Exposure KDB 865664 D01 SAR measurement 100 MHz to 6 GHz. These additional measurements are repeated after the completion of all measurements requiring the same head or body tissue-equivalent medium in a frequency band. The test device should be returned to ambient conditions (normal room temperature) with the battery fully charged before it is re-mounted on the device holder for the repeated measurement(s) to minimize any unexpected variations in the repeated results.

1) Repeated measurement is not required when the original highest measured SAR is < 0.8 or 2 W/kg (1-g or 10-g respectively); steps 2) through 4) do not apply.
2) When the original highest measured SAR is ≥ 0.8 or 2 W/kg (1-g or 10-g respectively), repeat that measurement once.
3) Perform a second repeated measurement only if the ratio of largest to smallest SAR for the original and first repeated measurements is > 1.20 or when the original or repeated measurement is ≥ 1.45 or 3.6 W/kg (~ 10% from the 1-g or 10-g respective SAR limit).
4) Perform a third repeated measurement only if the original, first, or second repeated measurement is ≥ 1.5 or 3.75 W/kg (1-g or 10-g respectively) and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20.

Note(s):

Repeated measurement is not required since the original highest measured SAR is <0.8 W/kg (1-g) or 2 W/kg (10-g) .

12. Simultaneous Transmission Conditions

Simultaneous Transmission is not supported.

This report shall not be reproduced without the written approval of UL LLC

Appendixes

Refer to separated files for the following appendixes.

Appendix A: SAR Setup Photos

Appendix B: SAR System Check Plots

Appendix C: SAR Highest Test Plots

Appendix D: SAR Tissue Ingredients

Appendix E: SAR Probe Certificates

Appendix F: SAR Dipole Certificates

END OF REPORT

This report shall not be reproduced without the written approval of UL LLC

2025-01-14 System Performance Check Report CLA-13 - SN1017

Summary

Dipole	CLA-13 - SN1017		
Frequency [MHz]	13.0		
Phantom Section | TSL	Flat | Head Simulating Liquid	**Dev. Peak [%]**	n/a
Power [dBm]	16.0	**Iso. Error [%]**	2.5

Exposure Conditions

Dipole Distance [mm]	0	**TSL Permittivity**	54.2
Conversion Factor	15.55	**TSL Conductivity [S/m]**	0.72

Hardware Setup

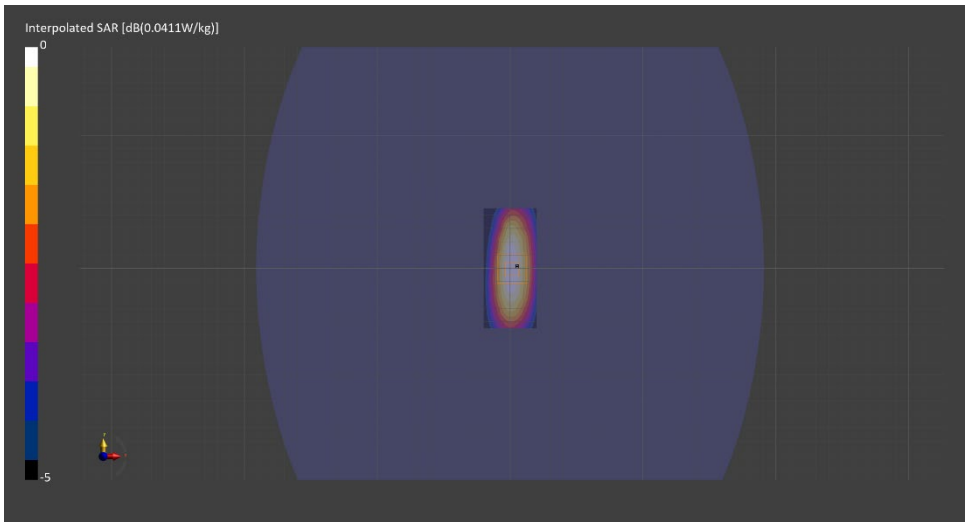
Probe | Calibration Date	EX3DV4 - SN7709 | 2024-11-11	**Phantom**	ELI V8.0 (20deg probe tilt) - SN2081
DAE | Calibration Date	DAE4 Sn1714 | 2024-11-06	**TSL | Meas. Date**	HBBL4-250V3 | 2025-01-14

Scans Setup

	Area Scan	Zoom Scan
Grid Extents [mm]	40.0 x 90.0	30.0 x 30.0 x 30.0
Grid Steps [mm]	10.0 x 15.0	6.0 x 6.0 x 1.5
Sensor Surface [mm]	3.0	1.4
Graded Grid	N/A	Yes
M2/M1 [%]		75.9
Dist 3dB Peak [mm]		15.6

Measurement Results

	Area Scan	Zoom Scan
psSAR1g [W/Kg]	0.022	**0.021**
psSAR10g [W/Kg]	0.018	**0.013**
Power Drift [dB]	N/A	-0.05



2025-01-02 System Performance Check Report D2450V2 - SN963

Summary

Dipole	D2450V2 - SN963		
Frequency [MHz]	2450.0		
Phantom Section | TSL	Flat | HSL	**Dev. Peak [%]**	-0.2
Power [dBm]	17.0	**Iso. Error [%]**	1.7

Exposure Conditions

Dipole Distance [mm]	10	**TSL Permittivity**	39.8
Conversion Factor	7.73	**TSL Conductivity [S/m]**	1.80

Hardware Setup

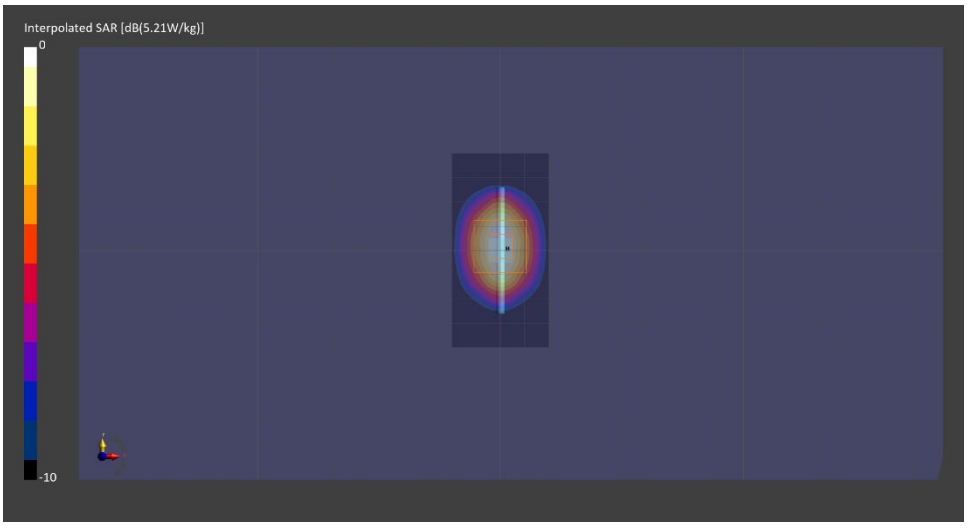
Probe | Calibration Date	EX3DV4 - SN7709 | 2024-11-11	**Phantom**	ELI V5.0 (20deg probe tilt) - SN1196
DAE | Calibration Date	DAE4 Sn1714 | 2024-11-06	**TSL | Meas. Date**	HBBL-600-10000 | 2025-Jan-02

Scans Setup

	Area Scan	Zoom Scan
Grid Extents [mm]	40.0 x 80.0	30.0 x 30.0 x 30.0
Grid Steps [mm]	10.0 x 10.0	5.0 x 5.0 x 1.5
Sensor Surface [mm]	3.0	1.4
Graded Grid	N/A	Yes
M2/M1 [%]		82.3
Dist 3dB Peak [mm]		9.0

Measurement Results

	Area Scan	Zoom Scan
psSAR1g [W/Kg]	2.68	**2.62**
psSAR10g [W/Kg]	1.24	**1.23**
Power Drift [dB]	0.00	0.01



Measurement Report for WLAN 2.4GHz, BACK

Exposure Conditions

Band	WLAN 2.4GHz	**TSL Permittivity**	39.8
Frequency [MHz] | Channel Number	2437.000 | 6	**TSL Conductivity [S/m]**	1.79
Group | UID	WLAN | 10418-AAA	**Phantom Section | TSL**	Flat | HSL
Conversion Factor	7.73	**Test Distance [mm]**	0.00
Communication Configuration	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 6 Mbps, 99pc duty cycle)		

Hardware Setup

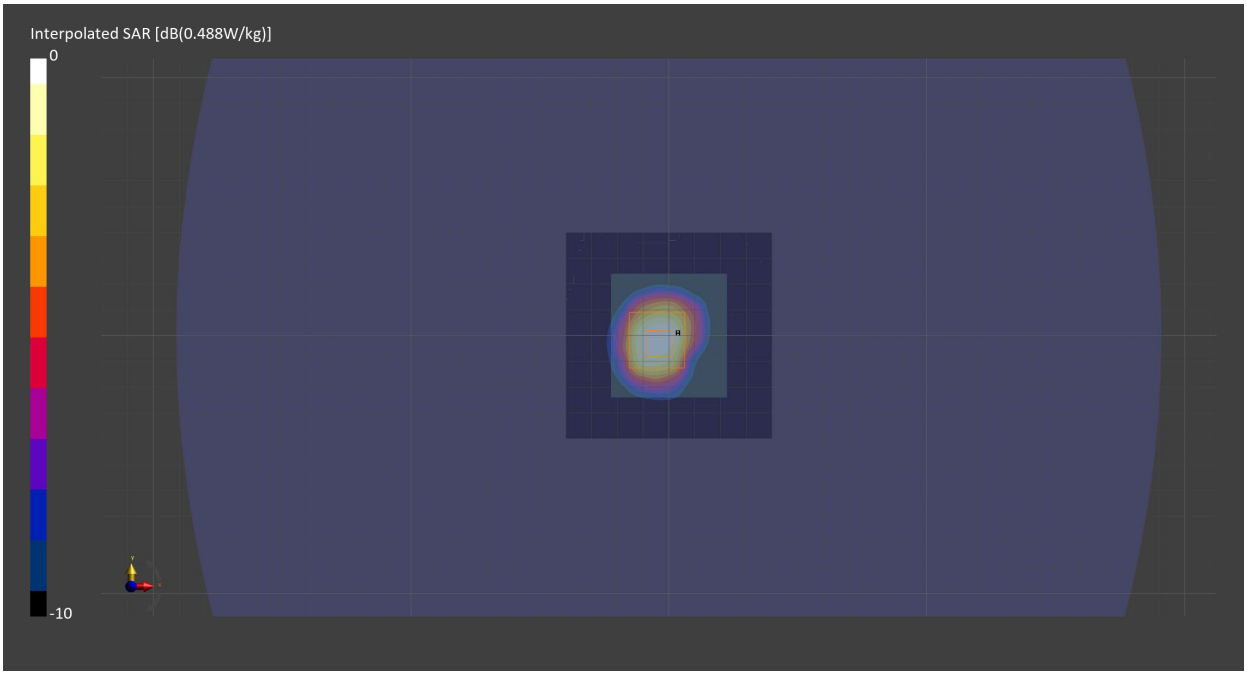
Probe | Calibration Date	EX3DV4 - SN7709 | 2024-11-11	**Phantom**	ELI V5.0 (20deg probe tilt) - SN1196
DAE | Calibration Date	DAE4 Sn1714 | 2024-11-06	**TSL**	HBBL-600-10000

Scans Setup

	Area Scan	Zoom Scan
Grid Extents [mm]	80.0 x 80.0	30.0 x 30.0 x 30.0
Grid Steps [mm]	10.0 x 10.0	5.0 x 5.0 x 1.5
Sensor Surface [mm]	3.0	1.4
Graded Grid	N/A	Yes
M2/M1 [%]		85.9
Dist 3dB Peak [mm]		9.5

Measurement Results

	Area Scan	Zoom Scan
psSAR1g [W/Kg]	0.275	**0.283**
psSAR10g [W/Kg]	0.128	**0.132**
Power Drift [dB]	-0.01	-0.05



Measurement Report for Custom Band, BACK, NFC

Exposure Conditions

Band	Custom Band	**TSL Permittivity**	54.2
Frequency [MHz] | Channel Number	13.600 | 13600	**TSL Conductivity [S/m]**	0.715
Group | UID	CW | 0--	**Phantom Section | TSL**	Flat | Head Simulating Liquid
Conversion Factor	15.55	**Test Distance [mm]**	0.00
Communication Configuration			CW

Hardware Setup

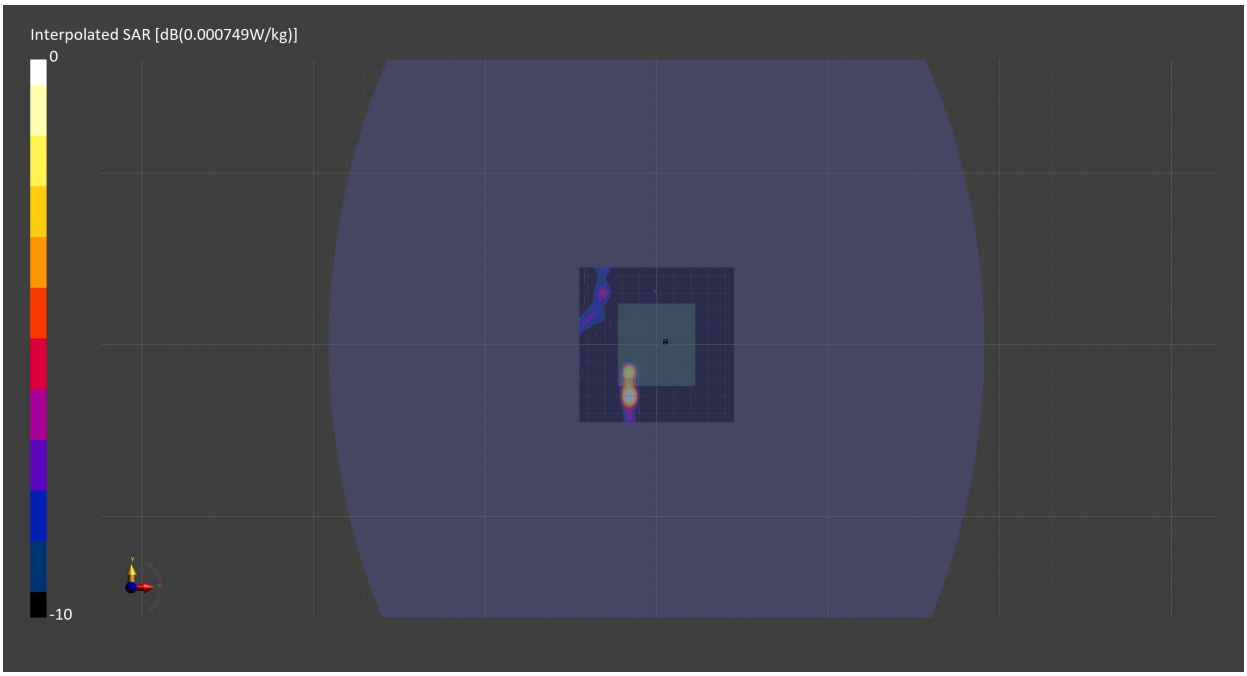
Probe | Calibration Date	EX3DV4 - SN7709 | 2024-11-11	**Phantom**	ELI V8.0 (20deg probe tilt) - SN2081
DAE | Calibration Date	DAE4 Sn1714 | 2024-11-06	**TSL**	HBBL4-250V3

Scans Setup

	Area Scan	**Zoom Scan**
Grid Extents [mm]	90.0 x 90.0	30.6 x 30.6 x 31.2
Grid Steps [mm]	15.0 x 15.0	1.8 x 1.8 x 1.2
Sensor Surface [mm]	3.0	1.4
Graded Grid	N/A	Yes
M2/M1 [%]		
Dist 3dB Peak [mm]		

Measurement Results

	Area Scan	**Zoom Scan**
psSAR1g [W/Kg]	0	**0**
psSAR10g [W/Kg]	0	**0**
Power Drift [dB]	N/A	N/A



Head Tissue Simulating Liquids

Application	Specific absorption rate according to standards (e.g., IEC 62209-x, IEEE 1528)		
Packaging	Plastic container of 10 liters with nozzle		
Life Time	Life time and stability of the liquid depend on usage, storage, and handling of tissue simulating liquid		
Options	Tissue simulating liquids for frequencies outside the below listed ranges are available upon request (please contact info@speag.swiss)		
Head Tissue	Parameters according to IEEE 1528 / IEC 62209-1/ IEC 62209-2 / FCC KDB 865664		
Narrow-Band Solutions (±5% Tolerance)	**Product** HSL300V2 HSL450V2 HSL750V2 HSL900V2	**Test Frequency (MHz)** 300 450 750 835, 900	**Main Ingredients** Water, Sugar Water, Sugar Water, Sugar Water, Sugar
Broad-Band Solutions (±5% Tolerance)	**Product** HBBL1350-1850V3 HBBL1550-1950V3 HBBL1900-3800V3 HBBL3500-5800V5	**Test Frequency (MHz)** 1450 – 1800 1750 – 1850 1950 – 3000 3500 – 5800	**Main Ingredients** Water, Tween Water, Tween Water, Tween Water, Oil
Broad-Band Solutions (±10% Tolerance)	**Product** HBBL4-250V3 HBBL1350-1850V3 HBBL1550-1950V3 HBBL1900-3800V3 HBBL600-10000V6	**Test Frequency (MHz)** 4 – 250 1300 – 1850 1550 – 1950 1900 – 3800 600 – 10000	**Main Ingredients** Water, Tween Water, Tween Water, Tween Water, Tween Water, Oil

Schmid & Partner Engineering AG

Zeughausstrasse 43, 8004 Zurich, Switzerland
Phone +41 44 245 9700, Fax +41 44 245 9779
info@speag.com, http://www.speag.com

Measurement Certificate / Material Test

Item Name	**Head Tissue Simulating Liquid (HBBL600-10000V6)**
Product No.	SL AAH U16 BD (Batch: 180208-1)
Manufacturer	SPEAG

Measurement Method

TSL dielectric parameters measured using calibrated DAK probe.

Target Parameters

Target parameters as defined in the IEEE 1528 and IEC 62209 compliance standards.

Test Condition

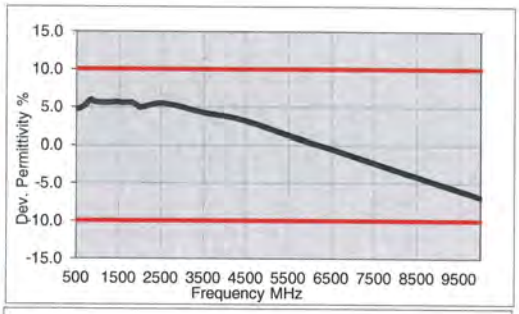
Ambient Condition	22°C ; 30% humidity
TSL Temperature	22°C
Test Date	8-Feb-18
Operator	WM

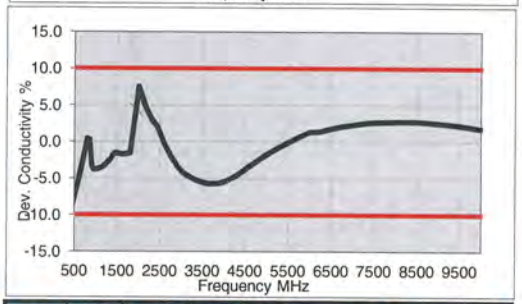
Additional Information

TSL Density
TSL Heat-capacity

Results

	Measured			Target		Diff.to Target [%]	
f [MHz]	e'	e''	sigma	eps	sigma	Δ-eps	Δ-sigma
800	44.1	20.3	0.90	41.7	0.90	5.8	0.3
825	44.1	19.9	0.91	41.6	0.91	6.0	0.4
835	44.1	19.7	0.92	41.5	0.91	6.1	0.9
850	44.0	19.4	0.92	41.5	0.92	6.0	0.4
900	43.9	18.7	0.94	41.5	0.97	5.8	-3.1
1400	42.9	14.9	1.16	40.6	1.18	5.7	-1.6
1450	42.8	14.7	1.18	40.5	1.20	5.7	-1.7
1600	42.6	14.2	1.26	40.3	1.28	5.7	-1.9
1625	42.6	14.1	1.28	40.3	1.30	5.8	-1.4
1640	42.6	14.1	1.29	40.3	1.31	5.8	-1.2
1650	42.5	14.1	1.29	40.2	1.31	5.6	-1.8
1700	42.4	14.0	1.32	40.2	1.34	5.6	-1.6
1750	42.3	13.9	1.35	40.1	1.37	5.5	-1.5
1800	42.3	13.8	1.38	40.0	1.40	5.7	-1.4
1810	42.3	13.8	1.39	40.0	1.40	5.7	-0.7
1825	42.3	13.7	1.40	40.0	1.40	5.7	0.0
1850	42.2	13.7	1.41	40.0	1.40	5.5	0.7
1900	42.1	13.6	1.44	40.0	1.40	5.3	2.9
1950	42.0	13.6	1.47	40.0	1.40	5.0	5.0
2000	42.0	13.5	1.51	40.0	1.40	5.0	7.9
2050	41.9	13.5	1.54	39.9	1.44	5.0	6.6
2100	41.8	13.5	1.57	39.8	1.49	5.0	5.4
2150	41.8	13.5	1.61	39.7	1.53	5.2	5.0
2200	41.7	13.4	1.64	39.6	1.58	5.2	3.9
2250	41.6	13.4	1.68	39.6	1.62	5.2	3.6
2300	41.6	13.4	1.72	39.5	1.67	5.4	3.2
2350	41.5	13.4	1.76	39.4	1.71	5.4	2.9
2400	41.4	13.5	1.80	39.3	1.76	5.4	2.5
2450	41.4	13.5	1.84	39.2	1.80	5.6	2.2
2500	41.3	13.5	1.88	39.1	1.85	5.5	1.4
2550	41.2	13.5	1.92	39.1	1.91	5.4	0.6
2600	41.1	13.6	1.96	39.0	1.96	5.4	-0.2
3500	39.6	14.1	2.75	37.9	2.91	4.3	-5.5
3700	39.2	14.3	2.94	37.7	3.12	4.1	-5.7





5200	36.7	15.9	4.61	36.0	4.66	1.9	-1.0
5250	36.6	16.0	4.67	35.9	4.71	1.8	-0.9
5300	36.5	16.0	4.72	35.9	4.76	1.7	-0.7
5500	36.1	16.2	4.96	35.6	4.96	1.3	-0.1
5600	35.9	16.3	5.08	35.5	5.07	1.1	0.2
5700	35.7	16.4	5.19	35.4	5.17	0.9	0.5
5800	35.6	16.5	5.31	35.3	5.27	0.8	0.8
6000	35.2	16.6	5.55	35.1	5.48	0.4	1.3
6500	34.3	17.1	6.18	34.5	6.07	-0.5	1.8
7000	33.4	17.5	6.81	33.9	6.65	-1.4	2.3
7500	32.5	17.8	7.43	33.3	7.24	-2.3	2.7
8000	31.7	18.1	8.06	32.7	7.84	-3.2	2.8
8500	30.8	18.4	8.68	32.1	8.45	-4.2	2.8
9000	30.0	18.6	9.31	31.5	9.08	-5.1	2.6
9500	29.1	18.8	9.93	31.0	9.71	-5.9	2.2
10000	28.3	19.0	10.55	30.4	10.36	-6.9	1.8

Schmid & Partner Engineering AG

Zeughausstrasse 43, 8004 Zurich, Switzerland
Phone +41 44 245 9700, Fax +41 44 245 9779
www.speag.swiss, info@speag.swiss

Measurement Certificate / Material Test

Item Name	**Head Tissue Simulating Liquid (HBBL4-250V3)**
Product No.	SL AAH 005 AD (Batch: 211221-1)
Manufacturer	SPEAG

Measurement Method

TSL dielectric parameters measured using calibrated DAK probe.

Setup Validation

Validation results were within ± 2.5% towards the target values of Methanol.

Target Parameters

Target parameters as defined in the IEEE 1528 and IEC 62209 compliance standards.

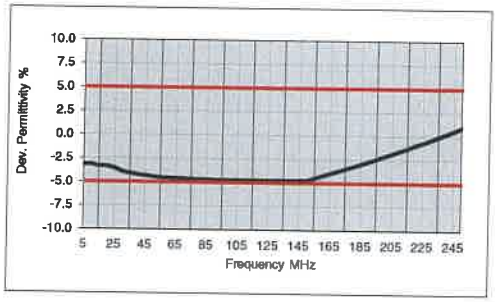
Test Condition

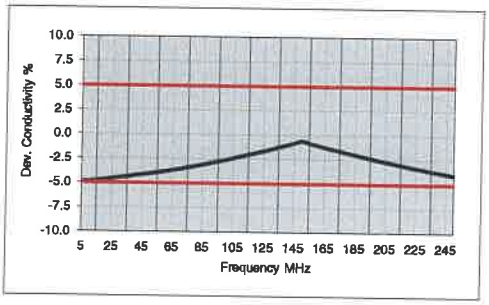
Ambient	Environment temperatur (22 ± 3)°C and humidity < 70%.
TSL Temperature	22°C
Test Date	7-Jan-22
Operator	JML

Additional Information

TSL Density	1.042 g/cm3
TSL Heat-capacity	3.574 kJ/(kg*K)

	Measured			Target		Diff.to Target [%]	
f [MHz]	ε'	ε''	sigma	eps	sigma	Δ-eps	Δ-sigma
5	53.7	2584.30	0.71	55.5	0.75	-3.2	-4.9
10	53.7	1282.57	0.71	55.5	0.75	-3.2	-4.9
15	53.5	855.85	0.71	55.3	0.75	-3.4	-4.8
20	53.3	642.50	0.71	55.1	0.75	-3.3	-4.7
25	53.1	514.52	0.72	55.0	0.75	-3.5	-4.6
30	52.9	429.24	0.72	55.0	0.75	-3.9	-4.5
35	52.7	368.36	0.72	54.9	0.75	-4.1	-4.4
40	52.5	322.73	0.72	54.8	0.75	-4.2	-4.2
45	52.3	287.27	0.72	54.7	0.75	-4.3	-4.1
50	52.1	258.93	0.72	54.6	0.75	-4.4	-4.0
55	52.0	235.78	0.72	54.4	0.75	-4.5	-3.9
60	51.8	216.52	0.72	54.3	0.75	-4.6	-3.8
65	51.7	200.24	0.72	54.2	0.75	-4.6	-3.7
70	51.6	186.31	0.73	54.1	0.75	-4.6	-3.6
75	51.5	174.24	0.73	54.0	0.75	-4.7	-3.4
80	51.4	163.70	0.73	53.9	0.75	-4.7	-3.3
85	51.2	154.40	0.73	53.8	0.75	-4.7	-3.1
90	51.1	146.15	0.73	53.7	0.75	-4.7	-2.9
95	51.0	138.77	0.73	53.5	0.75	-4.7	-2.8
100	50.9	132.14	0.74	53.4	0.75	-4.7	-2.6
105	50.8	126.15	0.74	53.3	0.76	-4.7	-2.4
110	50.7	120.71	0.74	53.2	0.76	-4.7	-2.2
115	50.6	115.75	0.74	53.1	0.76	-4.7	-2.1
120	50.5	111.21	0.74	53.0	0.76	-4.7	-1.9
125	50.4	107.03	0.74	52.9	0.76	-4.7	-1.7
130	50.3	103.18	0.75	52.8	0.76	-4.7	-1.5
135	50.1	99.62	0.75	52.6	0.76	-4.7	-1.3
140	50.0	96.32	0.75	52.5	0.76	-4.7	-1.1
145	49.9	93.24	0.75	52.4	0.76	-4.7	-0.8
150	49.8	90.38	0.75	52.3	0.76	-4.7	-0.6
155	49.7	87.70	0.76	52.1	0.76	-4.5	-0.8
160	49.6	85.20	0.76	51.8	0.77	-4.2	-1.0
165	49.5	82.84	0.76	51.6	0.77	-4.0	-1.2
170	49.4	80.63	0.76	51.4	0.77	-3.7	-1.4
175	49.4	78.55	0.76	51.1	0.78	-3.5	-1.6
180	49.3	76.58	0.77	50.9	0.78	-3.2	-1.8
185	49.2	74.72	0.77	50.7	0.78	-3.0	-2.0
190	49.1	72.96	0.77	50.4	0.79	-2.7	-2.2
195	49.0	71.29	0.77	50.2	0.79	-2.4	-2.3
200	48.9	69.71	0.78	50.0	0.80	-2.1	-2.5
205	48.8	68.20	0.78	49.7	0.80	-1.9	-2.7
210	48.7	66.77	0.78	49.5	0.80	-1.6	-2.8
215	48.6	65.41	0.78	49.3	0.81	-1.3	-3.0
220	48.6	64.10	0.78	49.0	0.81	-1.0	-3.2
225	48.5	62.86	0.79	48.8	0.81	-0.7	-3.3
230	48.4	61.67	0.79	48.6	0.82	-0.4	-3.5
235	48.3	60.54	0.79	48.3	0.82	0.0	-3.6
240	48.2	59.45	0.79	48.1	0.82	0.3	-3.8
245	48.1	58.41	0.80	47.9	0.83	0.6	-3.9
250	48.1	57.41	0.80	47.6	0.83	0.9	-4.1





Calibration Laboratory of
Schmid & Partner
Engineering AG
Zeughausstrasse 43, 8004 Zurich, Switzerland

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
S Servizio svizzero di taratura
S Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)
The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 0108

Client	**UL** **Research Triangle Park, USA**	**Certificate No.**	**EX-7709_Nov24**

CALIBRATION CERTIFICATE

Object	EX3DV4 - SN:7709
Calibration procedure(s)	QA CAL-01.v10, QA CAL-12.v10, QA CAL-14.v7, QA CAL-23.v6, QA CAL-25.v8 Calibration procedure for dosimetric E-field probes
Calibration date	November 11, 2024

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI). The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3) °C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP2	SN: 104778	26-Mar-24 (No. 217-04036/04037)	Mar-25
Power sensor NRP-Z91	SN: 103244	26-Mar-24 (No. 217-04036)	Mar-25
OCP DAK-3.5 (weighted)	SN: 1249	23-Sep-24 (OCP-DAK3.5-1249_Sep24)	Sep-25
OCP DAK-12	SN: 1016	24-Sep-24 (OCP-DAK12-1016_Sep24)	Sep-25
Reference 20 dB Attenuator	SN: CC2552 (20x)	26-Mar-24 (No. 217-04046)	Mar-25
DAE4	SN: 660	23-Feb-24 (No. DAE4-660_Feb24)	Feb-25
Reference Probe EX3DV4	SN: 7349	03-Jun-24 (No. EX3-7349_Jun24)	Jun-25

Secondary Standards	ID	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: GB41293874	06-Apr-16 (in house check Jun-24)	In house check: Jun-26
Power sensor E4412A	SN: MY41498087	06-Apr-16 (in house check Jun-24)	In house check: Jun-26
Power sensor E4412A	SN: 000110210	06-Apr-16 (in house check Jun-24)	In house check: Jun-26
RF generator HP 8648C	SN: US3642U01700	04-Aug-99 (in house check Jun-24)	In house check: Jun-26
Network Analyzer E8358A	SN: US41080477	31-Mar-14 (in house check Sep-24)	In house check: Sep-26

	Name	Function	Signature
Calibrated by	Krešimir Franjić	Laboratory Technician	
Approved by	Sven Kühn	Technical Manager	

Issued: November 11, 2024

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.

Glossary

TSL	tissue simulating liquid
NORMx,y,z	sensitivity in free space
ConvF	sensitivity in TSL / NORMx,y,z
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A, B, C, D	modulation dependent linearization parameters
Polarization φ	φ rotation around probe axis
Polarization ϑ	ϑ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., $\vartheta = 0$ is normal to probe axis
Connector Angle	information used in DASY system to align probe sensor X to the robot coordinate system

Calibration is Performed According to the Following Standards:

a) IEC/IEEE 62209-1528, "Measurement Procedure For The Assessment Of Specific Absorption Rate Of Human Exposure To Radio Frequency Fields From Hand-Held And Body-Worn Wireless Communication Devices – Part 1528: Human Models, Instrumentation And Procedures (Frequency Range of 4 MHz to 10 GHz)", October 2020.
b) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Methods Applied and Interpretation of Parameters:

- *NORMx,y,z*: Assessed for E-field polarization $\vartheta = 0$ ($f \le 900$ MHz in TEM-cell; $f > 1800$ MHz: R22 waveguide). NORMx,y,z are only intermediate values, i.e., the uncertainties of NORMx,y,z does not affect the E^2-field uncertainty inside TSL (see below *ConvF*).
- *NORM(f)x,y,z = NORMx,y,z * frequency_response* (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of ConvF.
- *DCPx,y,z*: DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal. DCP does not depend on frequency nor media.
- *PAR*: PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics
- *Ax,y,z; Bx,y,z; Cx,y,z; Dx,y,z; VRx,y,z: A, B, C, D* are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. VR is the maximum calibration range expressed in RMS voltage across the diode.
- *ConvF and Boundary Effect Parameters*: Assessed in flat phantom using E-field (or Temperature Transfer Standard for $f \le 800$ MHz) and inside waveguide using analytical field distributions based on power measurements for $f > 800$ MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to *NORMx,y,z * ConvF* whereby the uncertainty corresponds to that given for *ConvF*. A frequency dependent *ConvF* is used in DASY version 4.4 and higher which allows extending the validity from ±50 MHz to ±100 MHz.
- *Spherical isotropy (3D deviation from isotropy)*: in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- *Sensor Offset*: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.
- *Connector Angle*: The angle is assessed using the information gained by determining the *NORMx* (no uncertainty required).

Parameters of Probe: EX3DV4 - SN:7709

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc ($k = 2$)
Norm ($\mu V/(V/m)^2$) [A]	0.67	0.76	0.65	±10.1%
DCP (mV) [B]	101.9	103.6	104.5	±4.7%

Calibration Results for Modulation Response

UID	Communication System Name		A dB	B $dB\sqrt{\mu V}$	C	D dB	VR mV	Max dev.	Max Unc[E] $k = 2$
0	CW	X	0.00	0.00	1.00	0.00	130.4	±1.8%	±4.7%
		Y	0.00	0.00	1.00		126.8		
		Z	0.00	0.00	1.00		123.0		
10352	Pulse Waveform (200Hz, 10%)	X	1.62	61.12	6.78	10.00	60.0	±3.2%	±9.6%
		Y	1.63	61.10	6.59		60.0		
		Z	1.57	60.79	6.57		60.0		
10353	Pulse Waveform (200Hz, 20%)	X	0.76	60.00	5.02	6.99	80.0	±2.1%	±9.6%
		Y	0.82	60.00	4.94		80.0		
		Z	46.00	80.00	11.00		80.0		
10354	Pulse Waveform (200Hz, 40%)	X	0.11	133.32	0.70	3.98	95.0	±2.2%	±9.6%
		Y	24.00	72.00	7.00		95.0		
		Z	0.08	129.98	0.71		95.0		
10355	Pulse Waveform (200Hz, 60%)	X	8.93	158.89	27.35	2.22	120.0	±1.7%	±9.6%
		Y	11.82	153.13	10.97		120.0		
		Z	9.65	157.53	24.90		120.0		
10387	QPSK Waveform, 1 MHz	X	0.71	64.37	12.72	1.00	150.0	±3.8%	±9.6%
		Y	0.72	63.79	11.95		150.0		
		Z	0.58	62.31	11.36		150.0		
10388	QPSK Waveform, 10 MHz	X	1.46	65.59	14.06	0.00	150.0	±1.3%	±9.6%
		Y	1.42	64.91	13.55		150.0		
		Z	1.32	64.49	13.22		150.0		
10396	64-QAM Waveform, 100 kHz	X	1.56	63.00	15.42	3.01	150.0	±1.4%	±9.6%
		Y	1.72	64.37	15.62		150.0		
		Z	1.57	63.11	15.15		150.0		
10399	64-QAM Waveform, 40 MHz	X	2.93	66.08	15.07	0.00	150.0	±1.8%	±9.6%
		Y	2.91	65.87	14.80		150.0		
		Z	2.81	65.63	14.68		150.0		
10414	WLAN CCDF, 64-QAM, 40 MHz	X	3.97	65.66	15.24	0.00	150.0	±3.4%	±9.6%
		Y	4.01	65.58	15.09		150.0		
		Z	3.83	65.37	14.93		150.0		

Note: For details on UID parameters see Appendix

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

[A] The uncertainties of Norm X,Y,Z do not affect the E^2-field uncertainty inside TSL (see Pages 5 and 6).
[B] Linearization parameter uncertainty for maximum specified field strength.
[E] Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

Parameters of Probe: EX3DV4 - SN:7709

Sensor Model Parameters

	C1 fF	C2 fF	α V^{-1}	T1 $ms\,V^{-2}$	T2 $ms\,V^{-1}$	T3 ms	T4 V^{-2}	T5 V^{-1}	T6
x	12.1	88.65	34.31	0.92	0.00	4.90	0.00	0.00	1.00
y	13.2	95.01	33.20	3.59	0.00	4.90	0.53	0.00	1.00
z	11.2	80.95	33.20	1.65	0.00	4.90	0.19	0.00	1.00

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle	77.1°
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	9 mm
Tip Diameter	2.5 mm
Probe Tip to Sensor X Calibration Point	1 mm
Probe Tip to Sensor Y Calibration Point	1 mm
Probe Tip to Sensor Z Calibration Point	1 mm
Recommended Measurement Distance from Surface	1.4 mm

Note: Measurement distance from surface can be increased to 3–4 mm for an *Area Scan* job.

Parameters of Probe: EX3DV4 - SN:7709

Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz)[C]	Relative Permittivity[F]	Conductivity[F] (S/m)	ConvF X	ConvF Y	ConvF Z	Alpha[G]	Depth[G] (mm)	Unc[H] ($k = 2$)
13	55.0	0.75	15.55	16.83	15.88	0.00	1.25	±13.3%
450	43.5	0.87	11.94	11.94	11.94	0.16	1.30	±13.3%
750	41.9	0.89	10.11	9.78	9.88	0.34	1.27	±11.0%
900	41.5	0.97	9.47	9.16	9.25	0.34	1.27	±11.0%
1750	40.1	1.37	8.63	8.35	8.44	0.34	1.27	±11.0%
1900	40.0	1.40	8.34	8.07	8.15	0.34	1.27	±11.0%
2100	39.8	1.49	8.42	8.15	8.23	0.34	1.27	±11.0%
2300	39.5	1.67	8.03	7.77	7.85	0.35	1.27	±11.0%
2450	39.2	1.80	7.73	7.48	7.56	0.35	1.27	±11.0%
2600	39.0	1.96	7.81	7.56	7.63	0.35	1.27	±11.0%
3300	38.2	2.71	7.16	6.93	7.00	0.35	1.27	±13.1%
3500	37.9	2.91	7.11	6.88	6.95	0.35	1.27	±13.1%
3700	37.7	3.12	7.13	6.90	6.97	0.35	1.27	±13.1%
3900	37.5	3.32	6.98	6.75	6.82	0.35	1.27	±13.1%
4100	37.2	3.53	6.86	6.63	6.70	0.36	1.27	±13.1%
4200	37.1	3.63	6.81	6.58	6.65	0.36	1.27	±13.1%
4400	36.9	3.84	6.69	6.47	6.54	0.36	1.27	±13.1%
4600	36.7	4.04	6.54	6.32	6.39	0.36	1.27	±13.1%
4800	36.4	4.25	6.55	6.34	6.41	0.36	1.27	±13.1%
4950	36.3	4.40	6.45	6.24	6.30	0.35	1.27	±13.1%
5250	35.9	4.71	6.23	6.03	6.09	0.32	1.27	±13.1%
5400	35.8	4.86	5.91	5.72	5.78	0.30	1.27	±13.1%
5600	35.5	5.07	5.75	5.56	5.62	0.28	1.27	±13.1%
5750	35.4	5.22	5.72	5.54	5.60	0.27	1.27	±13.1%
5850	35.2	5.32	5.77	5.59	5.64	0.26	1.27	±13.1%

[C] Frequency validity above 300 MHz of ±100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ±50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ±10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Validity of ConvF assessed at 6 MHz is 4–9 MHz, and ConvF assessed at 13 MHz is 9–19 MHz. Above 5 GHz frequency validity can be extended to ±110 MHz.

[F] The probes are calibrated using tissue simulating liquids (TSL) that deviate for ε and σ by less than ±5% from the target values (typically better than ±3%) and are valid for TSL with deviations of up to ±10% if SAR correction is applied.

[G] Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ±1% for frequencies below 3 GHz and below ±2% for frequencies between 3–6 GHz at any distance larger than half the probe tip diameter from the boundary.

[H] The stated uncertainty is the total calibration uncertainty ($k = 2$) of Norm·ConvF. This is equivalent to the uncertainty component with the symbol CF in Table 9 of IEC/IEEE 62209-1528:2020.

Parameters of Probe: EX3DV4 - SN:7709

Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz)[C]	Relative Permittivity[F]	Conductivity[F] (S/m)	ConvF X	ConvF Y	ConvF Z	Alpha[G]	Depth[G] (mm)	Unc[H] ($k = 2$)
6500	34.5	6.07	5.69	5.50	5.56	0.20	1.27	±18.6%

[C] Frequency validity at 6.5 GHz is −600/+700 MHz, and ±700 MHz at or above 7 GHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

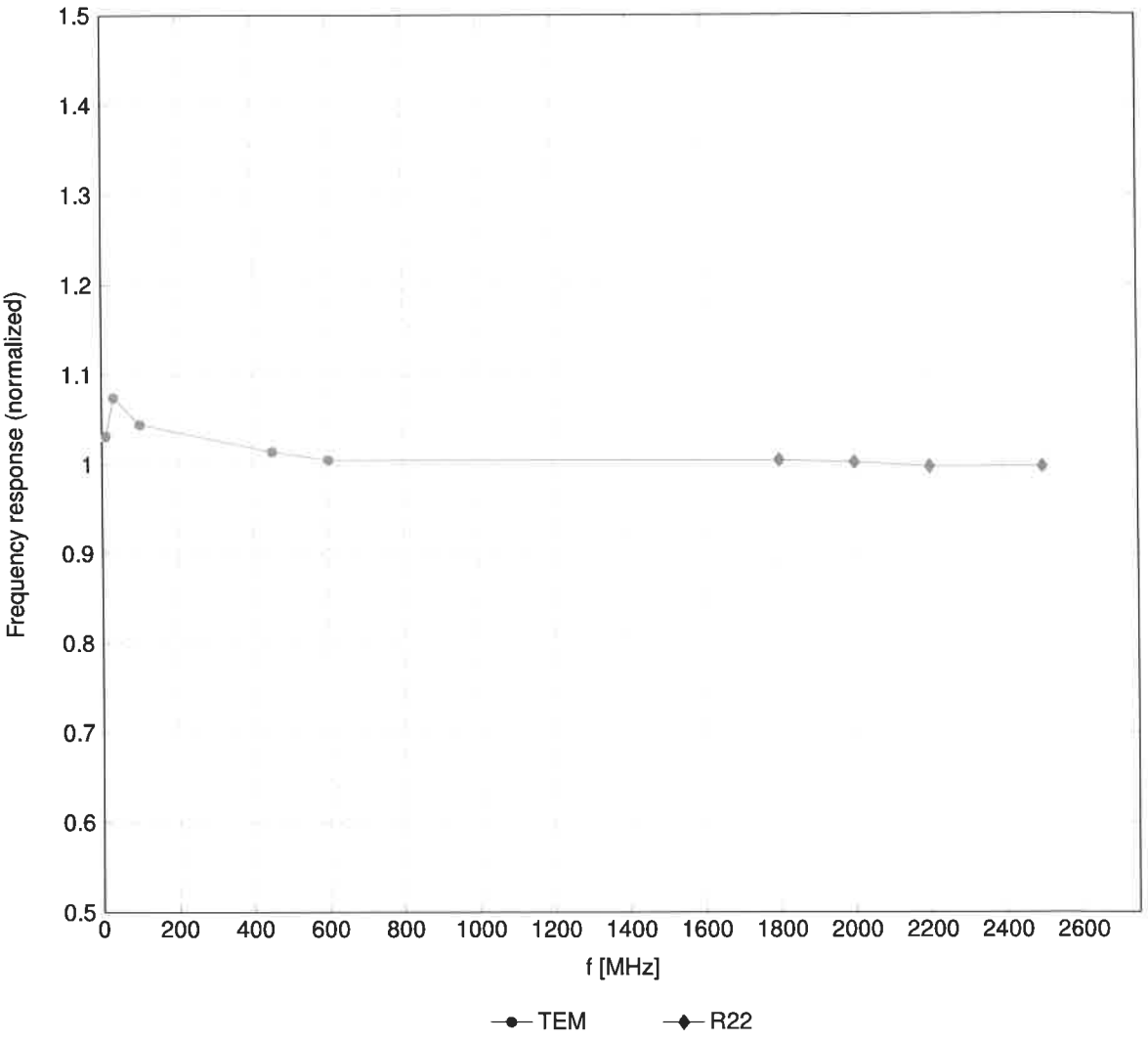
[F] The probes are calibrated using tissue simulating liquids (TSL) that deviate for ε and σ by less than ±10% from the target values (typically better than ±6%) and are valid for TSL with deviations of up to ±10%.

[G] Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ±1% for frequencies below 3 GHz; below ±2% for frequencies between 3–6 GHz; and below ±4% for frequencies between 6–10 GHz at any distance larger than half the probe tip diameter from the boundary.

[H] The stated uncertainty is the total calibration uncertainty ($k = 2$) of Norm·ConvF. This is equivalent to the uncertainty component with the symbol CF in Table 9 of IEC/IEEE 62209-1528:2020.

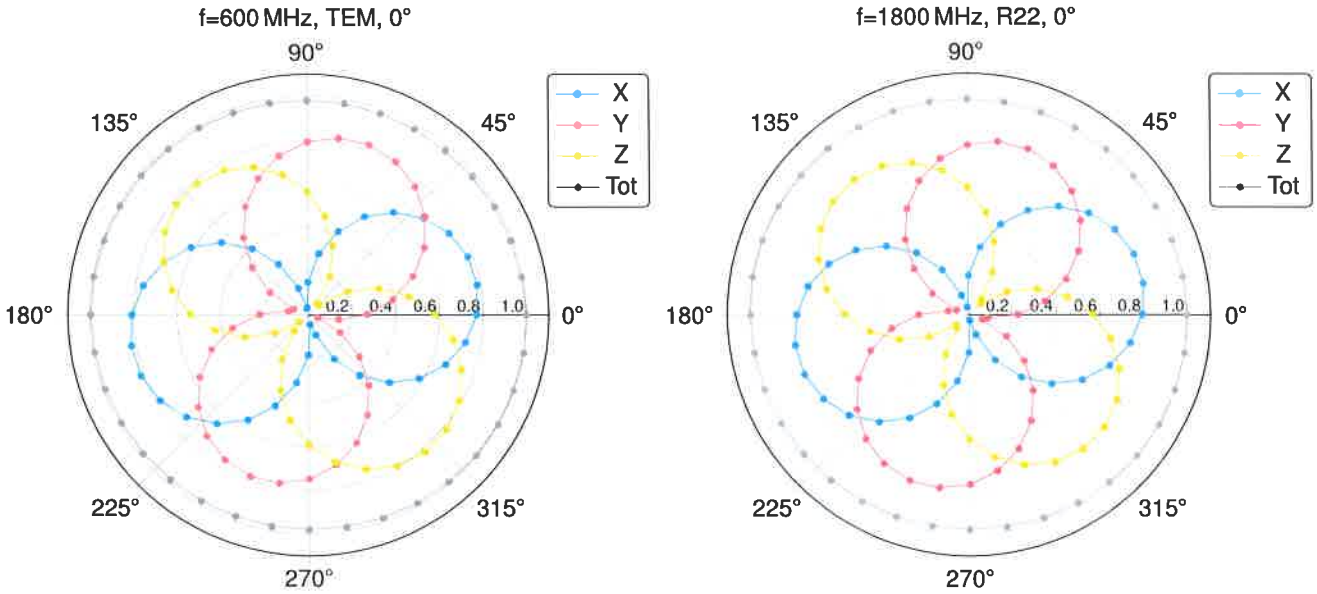
Frequency Response of E-Field

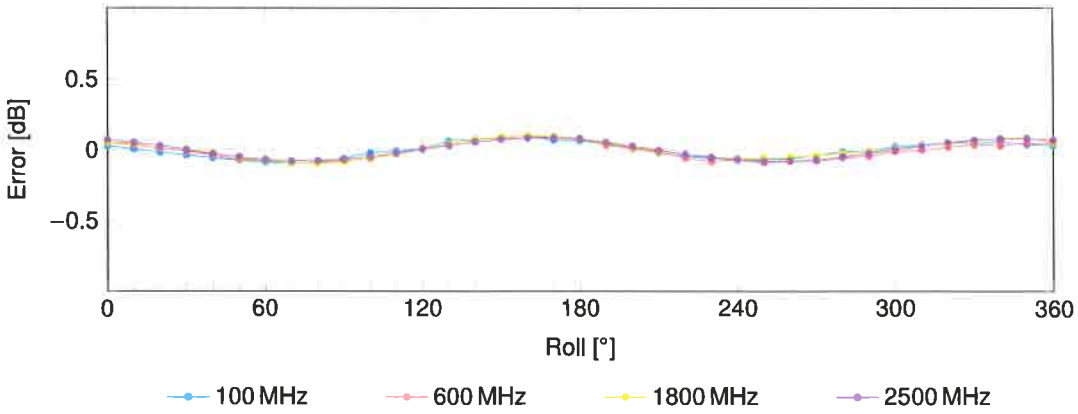
(TEM-Cell:ifi110 EXX, Waveguide:R22)



Uncertainty of Frequency Response of E-field: ±6.3% (k=2)

Receiving Pattern (ϕ), $\vartheta = 0°$

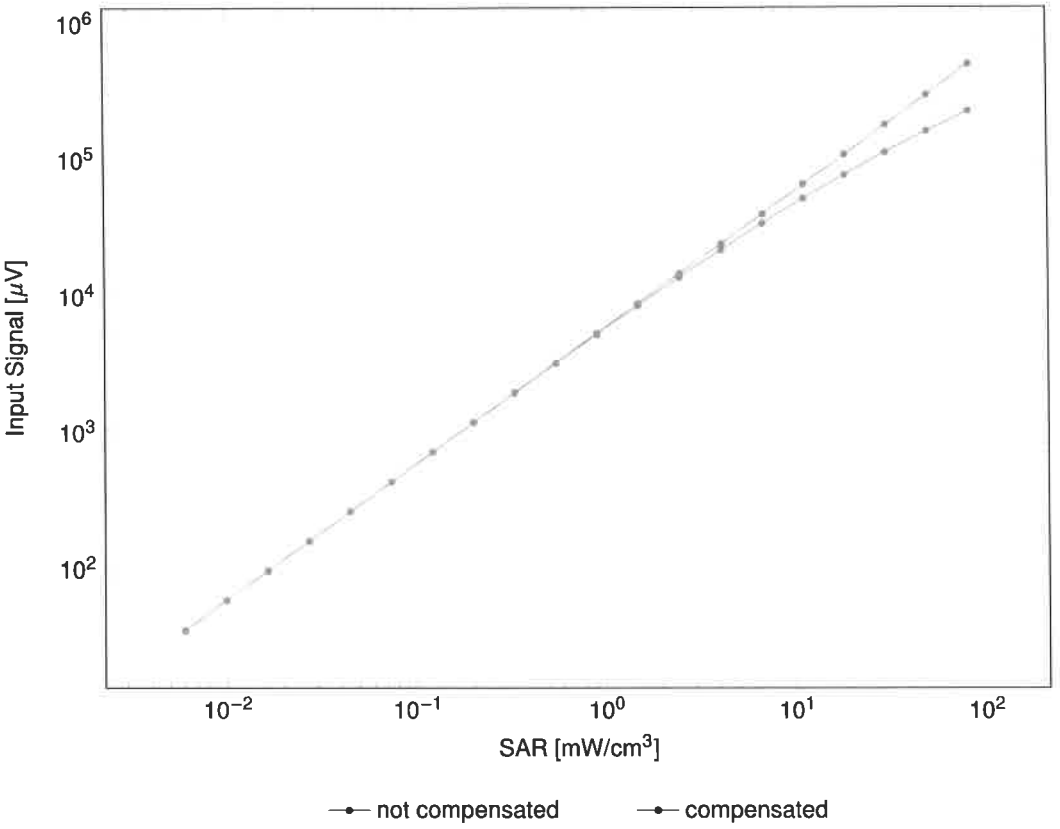


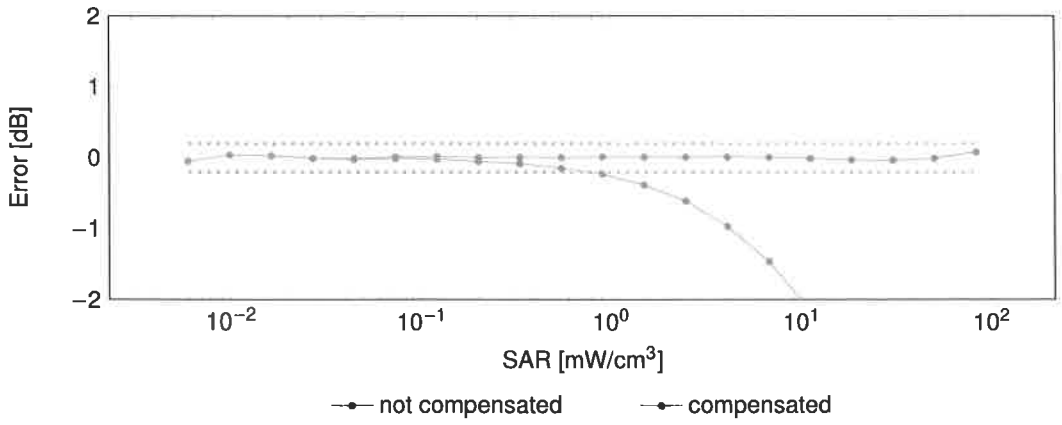


Uncertainty of Axial Isotropy Assessment: ±0.5% (k=2)

Dynamic Range f(SAR_{head})

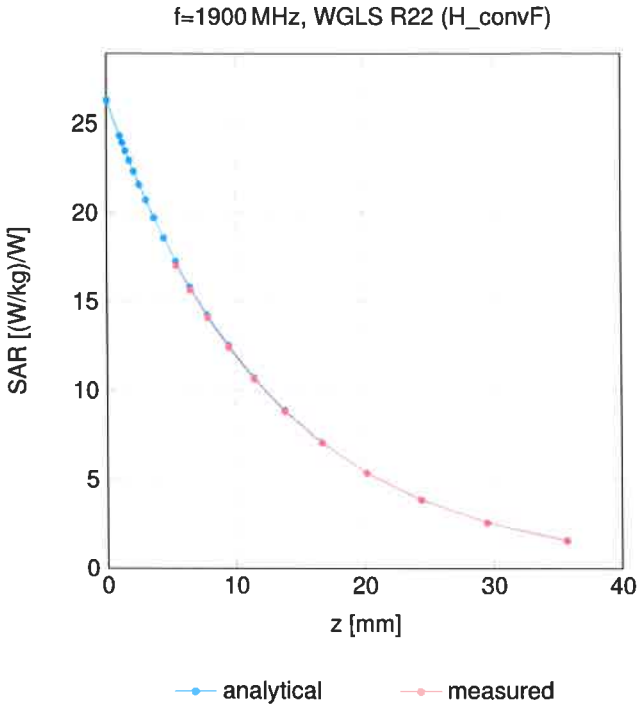
(TEM cell, f_{eval} = 1900 MHz)





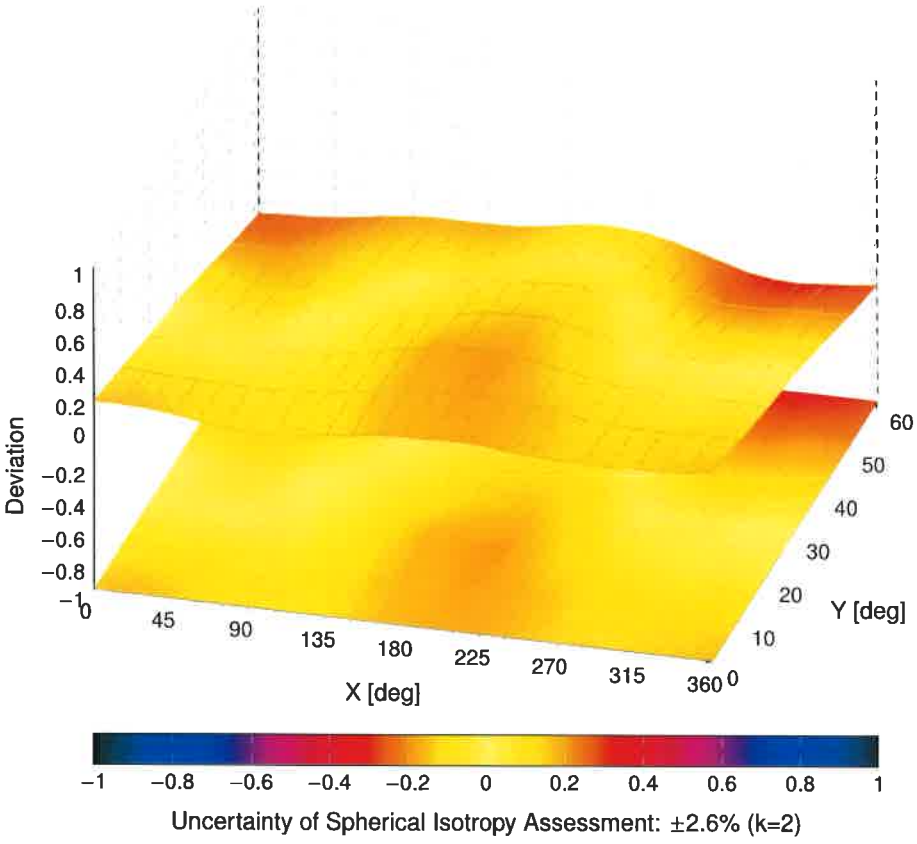
Uncertainty of Linearity Assessment: ±0.6% (k=2)

Conversion Factor Assessment



Deviation from Isotropy in Liquid

Error (ϕ,θ), f = 900 MHz



Uncertainty of Spherical Isotropy Assessment: ±2.6% (k=2)

Appendix: Modulation Calibration Parameters

UID	Rev	Communication System Name	Group	PAR (dB)	Unc^E $k = 2$
0		CW	CW	0.00	±4.7
10010	CAB	SAR Validation (Square, 100 ms, 10 ms)	Test	10.00	±9.6
10011	CAC	UMTS-FDD (WCDMA)	WCDMA	2.91	±9.6
10012	CAB	IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps)	WLAN	1.87	±9.6
10013	CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 6 Mbps)	WLAN	9.46	±9.6
10021	DAC	GSM-FDD (TDMA, GMSK)	GSM	9.39	±9.6
10023	DAC	GPRS-FDD (TDMA, GMSK, TN 0)	GSM	9.57	±9.6
10024	DAC	GPRS-FDD (TDMA, GMSK, TN 0-1)	GSM	6.56	±9.6
10025	DAC	EDGE-FDD (TDMA, 8PSK, TN 0)	GSM	12.62	±9.6
10026	DAC	EDGE-FDD (TDMA, 8PSK, TN 0-1)	GSM	9.55	±9.6
10027	DAC	GPRS-FDD (TDMA, GMSK, TN 0-1-2)	GSM	4.80	±9.6
10028	DAC	GPRS-FDD (TDMA, GMSK, TN 0-1-2-3)	GSM	3.55	±9.6
10029	DAC	EDGE-FDD (TDMA, 8PSK, TN 0-1-2)	GSM	7.78	±9.6
10030	CAA	IEEE 802.15.1 Bluetooth (GFSK, DH1)	Bluetooth	5.30	±9.6
10031	CAA	IEEE 802.15.1 Bluetooth (GFSK, DH3)	Bluetooth	1.87	±9.6
10032	CAA	IEEE 802.15.1 Bluetooth (GFSK, DH5)	Bluetooth	1.16	±9.6
10033	CAA	IEEE 802.15.1 Bluetooth (PI/4-DQPSK, DH1)	Bluetooth	7.74	±9.6
10034	CAA	IEEE 802.15.1 Bluetooth (PI/4-DQPSK, DH3)	Bluetooth	4.53	±9.6
10035	CAA	IEEE 802.15.1 Bluetooth (PI/4-DQPSK, DH5)	Bluetooth	3.83	±9.6
10036	CAA	IEEE 802.15.1 Bluetooth (8-DPSK, DH1)	Bluetooth	8.01	±9.6
10037	CAA	IEEE 802.15.1 Bluetooth (8-DPSK, DH3)	Bluetooth	4.77	±9.6
10038	CAA	IEEE 802.15.1 Bluetooth (8-DPSK, DH5)	Bluetooth	4.10	±9.6
10039	CAB	CDMA2000 (1xRTT, RC1)	CDMA2000	4.57	±9.6
10042	CAB	IS-54 / IS-136 FDD (TDMA/FDM, PI/4-DQPSK, Halfrate)	AMPS	7.78	±9.6
10044	CAA	IS-91/EIA/TIA-553 FDD (FDMA, FM)	AMPS	0.00	±9.6
10048	CAA	DECT (TDD, TDMA/FDM, GFSK, Full Slot, 24)	DECT	13.80	±9.6
10049	CAA	DECT (TDD, TDMA/FDM, GFSK, Double Slot, 12)	DECT	10.79	±9.6
10056	CAA	UMTS-TDD (TD-SCDMA, 1.28 Mcps)	TD-SCDMA	11.01	±9.6
10058	DAC	EDGE-FDD (TDMA, 8PSK, TN 0-1-2-3)	GSM	6.52	±9.6
10059	CAB	IEEE 802.11b WiFi 2.4 GHz (DSSS, 2 Mbps)	WLAN	2.12	±9.6
10060	CAB	IEEE 802.11b WiFi 2.4 GHz (DSSS, 5.5 Mbps)	WLAN	2.83	±9.6
10061	CAB	IEEE 802.11b WiFi 2.4 GHz (DSSS, 11 Mbps)	WLAN	3.60	±9.6
10062	CAE	IEEE 802.11a/h WiFi 5 GHz (OFDM, 6 Mbps)	WLAN	8.68	±9.6
10063	CAE	IEEE 802.11a/h WiFi 5 GHz (OFDM, 9 Mbps)	WLAN	8.63	±9.6
10064	CAE	IEEE 802.11a/h WiFi 5 GHz (OFDM, 12 Mbps)	WLAN	9.09	±9.6
10065	CAE	IEEE 802.11a/h WiFi 5 GHz (OFDM, 18 Mbps)	WLAN	9.00	±9.6
10066	CAE	IEEE 802.11a/h WiFi 5 GHz (OFDM, 24 Mbps)	WLAN	9.38	±9.6
10067	CAE	IEEE 802.11a/h WiFi 5 GHz (OFDM, 36 Mbps)	WLAN	10.12	±9.6
10068	CAE	IEEE 802.11a/h WiFi 5 GHz (OFDM, 48 Mbps)	WLAN	10.24	±9.6
10069	CAE	IEEE 802.11a/h WiFi 5 GHz (OFDM, 54 Mbps)	WLAN	10.56	±9.6
10071	CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 9 Mbps)	WLAN	9.83	±9.6
10072	CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 12 Mbps)	WLAN	9.62	±9.6
10073	CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 18 Mbps)	WLAN	9.94	±9.6
10074	CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 24 Mbps)	WLAN	10.30	±9.6
10075	CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 36 Mbps)	WLAN	10.77	±9.6
10076	CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 48 Mbps)	WLAN	10.94	±9.6
10077	CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 54 Mbps)	WLAN	11.00	±9.6
10081	CAB	CDMA2000 (1xRTT, RC3)	CDMA2000	3.97	±9.6
10082	CAB	IS-54 / IS-136 FDD (TDMA/FDM, PI/4-DQPSK, Fullrate)	AMPS	4.77	±9.6
10090	DAC	GPRS-FDD (TDMA, GMSK, TN 0-4)	GSM	6.56	±9.6
10097	CAC	UMTS-FDD (HSDPA)	WCDMA	3.98	±9.6
10098	CAC	UMTS-FDD (HSUPA, Subtest 2)	WCDMA	3.98	±9.6
10099	DAC	EDGE-FDD (TDMA, 8PSK, TN 0-4)	GSM	9.55	±9.6
10100	CAF	LTE-FDD (SC-FDMA, 100% RB, 20 MHz, QPSK)	LTE-FDD	5.67	±9.6
10101	CAF	LTE-FDD (SC-FDMA, 100% RB, 20 MHz, 16-QAM)	LTE-FDD	6.42	±9.6
10102	CAF	LTE-FDD (SC-FDMA, 100% RB, 20 MHz, 64-QAM)	LTE-FDD	6.60	±9.6
10103	CAH	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, QPSK)	LTE-TDD	9.29	±9.6
10104	CAH	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, 16-QAM)	LTE-TDD	9.97	±9.6
10105	CAH	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, 64-QAM)	LTE-TDD	10.01	±9.6
10108	CAH	LTE-FDD (SC-FDMA, 100% RB, 10 MHz, QPSK)	LTE-FDD	5.80	±9.6
10109	CAH	LTE-FDD (SC-FDMA, 100% RB, 10 MHz, 16-QAM)	LTE-FDD	6.43	±9.6
10110	CAH	LTE-FDD (SC-FDMA, 100% RB, 5 MHz, QPSK)	LTE-FDD	5.75	±9.6
10111	CAH	LTE-FDD (SC-FDMA, 100% RB, 5 MHz, 16-QAM)	LTE-FDD	6.44	±9.6

UID	Rev	Communication System Name	Group	PAR (dB)	Unc^E $k = 2$
10112	CAH	LTE-FDD (SC-FDMA, 100% RB, 10 MHz, 64-QAM)	LTE-FDD	6.59	±9.6
10113	CAH	LTE-FDD (SC-FDMA, 100% RB, 5 MHz, 64-QAM)	LTE-FDD	6.62	±9.6
10114	CAE	IEEE 802.11n (HT Greenfield, 13.5 Mbps, BPSK)	WLAN	8.10	±9.6
10115	CAE	IEEE 802.11n (HT Greenfield, 81 Mbps, 16-QAM)	WLAN	8.46	±9.6
10116	CAE	IEEE 802.11n (HT Greenfield, 135 Mbps, 64-QAM)	WLAN	8.15	±9.6
10117	CAE	IEEE 802.11n (HT Mixed, 13.5 Mbps, BPSK)	WLAN	8.07	±9.6
10118	CAE	IEEE 802.11n (HT Mixed, 81 Mbps, 16-QAM)	WLAN	8.59	±9.6
10119	CAE	IEEE 802.11n (HT Mixed, 135 Mbps, 64-QAM)	WLAN	8.13	±9.6
10140	CAF	LTE-FDD (SC-FDMA, 100% RB, 15 MHz, 16-QAM)	LTE-FDD	6.49	±9.6
10141	CAF	LTE-FDD (SC-FDMA, 100% RB, 15 MHz, 64-QAM)	LTE-FDD	6.53	±9.6
10142	CAF	LTE-FDD (SC-FDMA, 100% RB, 3 MHz, QPSK)	LTE-FDD	5.73	±9.6
10143	CAF	LTE-FDD (SC-FDMA, 100% RB, 3 MHz, 16-QAM)	LTE-FDD	6.35	±9.6
10144	CAF	LTE-FDD (SC-FDMA, 100% RB, 3 MHz, 64-QAM)	LTE-FDD	6.65	±9.6
10145	CAG	LTE-FDD (SC-FDMA, 100% RB, 1.4 MHz, QPSK)	LTE-FDD	5.76	±9.6
10146	CAG	LTE-FDD (SC-FDMA, 100% RB, 1.4 MHz, 16-QAM)	LTE-FDD	6.41	±9.6
10147	CAG	LTE-FDD (SC-FDMA, 100% RB, 1.4 MHz, 64-QAM)	LTE-FDD	6.72	±9.6
10149	CAF	LTE-FDD (SC-FDMA, 50% RB, 20 MHz, 16-QAM)	LTE-FDD	6.42	±9.6
10150	CAF	LTE-FDD (SC-FDMA, 50% RB, 20 MHz, 64-QAM)	LTE-FDD	6.60	±9.6
10151	CAH	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, QPSK)	LTE-TDD	9.28	±9.6
10152	CAH	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, 16-QAM)	LTE-TDD	9.92	±9.6
10153	CAH	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, 64-QAM)	LTE-TDD	10.05	±9.6
10154	CAH	LTE-FDD (SC-FDMA, 50% RB, 10 MHz, QPSK)	LTE-FDD	5.75	±9.6
10155	CAH	LTE-FDD (SC-FDMA, 50% RB, 10 MHz, 16-QAM)	LTE-FDD	6.43	±9.6
10156	CAH	LTE-FDD (SC-FDMA, 50% RB, 5 MHz, QPSK)	LTE-FDD	5.79	±9.6
10157	CAH	LTE-FDD (SC-FDMA, 50% RB, 5 MHz, 16-QAM)	LTE-FDD	6.49	±9.6
10158	CAH	LTE-FDD (SC-FDMA, 50% RB, 10 MHz, 64-QAM)	LTE-FDD	6.62	±9.6
10159	CAH	LTE-FDD (SC-FDMA, 50% RB, 5 MHz, 64-QAM)	LTE-FDD	6.56	±9.6
10160	CAF	LTE-FDD (SC-FDMA, 50% RB, 15 MHz, QPSK)	LTE-FDD	5.82	±9.6
10161	CAF	LTE-FDD (SC-FDMA, 50% RB, 15 MHz, 16-QAM)	LTE-FDD	6.43	±9.6
10162	CAF	LTE-FDD (SC-FDMA, 50% RB, 15 MHz, 64-QAM)	LTE-FDD	6.58	±9.6
10166	CAG	LTE-FDD (SC-FDMA, 50% RB, 1.4 MHz, QPSK)	LTE-FDD	5.46	±9.6
10167	CAG	LTE-FDD (SC-FDMA, 50% RB, 1.4 MHz, 16-QAM)	LTE-FDD	6.21	±9.6
10168	CAG	LTE-FDD (SC-FDMA, 50% RB, 1.4 MHz, 64-QAM)	LTE-FDD	6.79	±9.6
10169	CAF	LTE-FDD (SC-FDMA, 1 RB, 20 MHz, QPSK)	LTE-FDD	5.73	±9.6
10170	CAF	LTE-FDD (SC-FDMA, 1 RB, 20 MHz, 16-QAM)	LTE-FDD	6.52	±9.6
10171	AAF	LTE-FDD (SC-FDMA, 1 RB, 20 MHz, 64-QAM)	LTE-FDD	6.49	±9.6
10172	CAH	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, QPSK)	LTE-TDD	9.21	±9.6
10173	CAH	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 16-QAM)	LTE-TDD	9.48	±9.6
10174	CAH	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 64-QAM)	LTE-TDD	10.25	±9.6
10175	CAH	LTE-FDD (SC-FDMA, 1 RB, 10 MHz, QPSK)	LTE-FDD	5.72	±9.6
10176	CAH	LTE-FDD (SC-FDMA, 1 RB, 10 MHz, 16-QAM)	LTE-FDD	6.52	±9.6
10177	CAJ	LTE-FDD (SC-FDMA, 1 RB, 5 MHz, QPSK)	LTE-FDD	5.73	±9.6
10178	CAH	LTE-FDD (SC-FDMA, 1 RB, 5 MHz, 16-QAM)	LTE-FDD	6.52	±9.6
10179	CAH	LTE-FDD (SC-FDMA, 1 RB, 10 MHz, 64-QAM)	LTE-FDD	6.50	±9.6
10180	CAH	LTE-FDD (SC-FDMA, 1 RB, 5 MHz, 64-QAM)	LTE-FDD	6.50	±9.6
10181	CAF	LTE-FDD (SC-FDMA, 1 RB, 15 MHz, QPSK)	LTE-FDD	5.72	±9.6
10182	CAF	LTE-FDD (SC-FDMA, 1 RB, 15 MHz, 16-QAM)	LTE-FDD	6.52	±9.6
10183	AAE	LTE-FDD (SC-FDMA, 1 RB, 15 MHz, 64-QAM)	LTE-FDD	6.50	±9.6
10184	CAF	LTE-FDD (SC-FDMA, 1 RB, 3 MHz, QPSK)	LTE-FDD	5.73	±9.6
10185	CAF	LTE-FDD (SC-FDMA, 1 RB, 3 MHz, 16-QAM)	LTE-FDD	6.51	±9.6
10186	AAF	LTE-FDD (SC-FDMA, 1 RB, 3 MHz, 64-QAM)	LTE-FDD	6.50	±9.6
10187	CAG	LTE-FDD (SC-FDMA, 1 RB, 1.4 MHz, QPSK)	LTE-FDD	5.73	±9.6
10188	CAG	LTE-FDD (SC-FDMA, 1 RB, 1.4 MHz, 16-QAM)	LTE-FDD	6.52	±9.6
10189	AAG	LTE-FDD (SC-FDMA, 1 RB, 1.4 MHz, 64-QAM)	LTE-FDD	6.50	±9.6
10193	CAE	IEEE 802.11n (HT Greenfield, 6.5 Mbps, BPSK)	WLAN	8.09	±9.6
10194	CAE	IEEE 802.11n (HT Greenfield, 39 Mbps, 16-QAM)	WLAN	8.12	±9.6
10195	CAE	IEEE 802.11n (HT Greenfield, 65 Mbps, 64-QAM)	WLAN	8.21	±9.6
10196	CAE	IEEE 802.11n (HT Mixed, 6.5 Mbps, BPSK)	WLAN	8.10	±9.6
10197	CAE	IEEE 802.11n (HT Mixed, 39 Mbps, 16-QAM)	WLAN	8.13	±9.6
10198	CAE	IEEE 802.11n (HT Mixed, 65 Mbps, 64-QAM)	WLAN	8.27	±9.6
10219	CAE	IEEE 802.11n (HT Mixed, 7.2 Mbps, BPSK)	WLAN	8.03	±9.6
10220	CAE	IEEE 802.11n (HT Mixed, 43.3 Mbps, 16-QAM)	WLAN	8.13	±9.6
10221	CAE	IEEE 802.11n (HT Mixed, 72.2 Mbps, 64-QAM)	WLAN	8.27	±9.6
10222	CAE	IEEE 802.11n (HT Mixed, 15 Mbps, BPSK)	WLAN	8.06	±9.6
10223	CAE	IEEE 802.11n (HT Mixed, 90 Mbps, 16-QAM)	WLAN	8.48	±9.6
10224	CAE	IEEE 802.11n (HT Mixed, 150 Mbps, 64-QAM)	WLAN	8.08	±9.6

UID	Rev	Communication System Name	Group	PAR (dB)	Unc^E $k = 2$
10225	CAC	UMTS-FDD (HSPA+)	WCDMA	5.97	±9.6
10226	CAC	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, 16-QAM)	LTE-TDD	9.49	±9.6
10227	CAC	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, 64-QAM)	LTE-TDD	10.26	±9.6
10228	CAC	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, QPSK)	LTE-TDD	9.22	±9.6
10229	CAE	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, 16-QAM)	LTE-TDD	9.48	±9.6
10230	CAE	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, 64-QAM)	LTE-TDD	10.25	±9.6
10231	CAE	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, QPSK)	LTE-TDD	9.19	±9.6
10232	CAH	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, 16-QAM)	LTE-TDD	9.48	±9.6
10233	CAH	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, 64-QAM)	LTE-TDD	10.25	±9.6
10234	CAH	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, QPSK)	LTE-TDD	9.21	±9.6
10235	CAH	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, 16-QAM)	LTE-TDD	9.48	±9.6
10236	CAH	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, 64-QAM)	LTE-TDD	10.25	±9.6
10237	CAH	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, QPSK)	LTE-TDD	9.21	±9.6
10238	CAG	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, 16-QAM)	LTE-TDD	9.48	±9.6
10239	CAG	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, 64-QAM)	LTE-TDD	10.25	±9.6
10240	CAG	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, QPSK)	LTE-TDD	9.21	±9.6
10241	CAC	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, 16-QAM)	LTE-TDD	9.82	±9.6
10242	CAC	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, 64-QAM)	LTE-TDD	9.86	±9.6
10243	CAC	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, QPSK)	LTE-TDD	9.46	±9.6
10244	CAE	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, 16-QAM)	LTE-TDD	10.06	±9.6
10245	CAE	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, 64-QAM)	LTE-TDD	10.06	±9.6
10246	CAE	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, QPSK)	LTE-TDD	9.30	±9.6
10247	CAH	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, 16-QAM)	LTE-TDD	9.91	±9.6
10248	CAH	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, 64-QAM)	LTE-TDD	10.09	±9.6
10249	CAH	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, QPSK)	LTE-TDD	9.29	±9.6
10250	CAH	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, 16-QAM)	LTE-TDD	9.81	±9.6
10251	CAH	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, 64-QAM)	LTE-TDD	10.17	±9.6
10252	CAH	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, QPSK)	LTE-TDD	9.24	±9.6
10253	CAG	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, 16-QAM)	LTE-TDD	9.90	±9.6
10254	CAG	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, 64-QAM)	LTE-TDD	10.14	±9.6
10255	CAG	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, QPSK)	LTE-TDD	9.20	±9.6
10256	CAC	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, 16-QAM)	LTE-TDD	9.96	±9.6
10257	CAC	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, 64-QAM)	LTE-TDD	10.08	±9.6
10258	CAC	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, QPSK)	LTE-TDD	9.34	±9.6
10259	CAE	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, 16-QAM)	LTE-TDD	9.98	±9.6
10260	CAE	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, 64-QAM)	LTE-TDD	9.97	±9.6
10261	CAE	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, QPSK)	LTE-TDD	9.24	±9.6
10262	CAH	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, 16-QAM)	LTE-TDD	9.83	±9.6
10263	CAH	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, 64-QAM)	LTE-TDD	10.16	±9.6
10264	CAH	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, QPSK)	LTE-TDD	9.23	±9.6
10265	CAH	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, 16-QAM)	LTE-TDD	9.92	±9.6
10266	CAH	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, 64-QAM)	LTE-TDD	10.07	±9.6
10267	CAH	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, QPSK)	LTE-TDD	9.30	±9.6
10268	CAG	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, 16-QAM)	LTE-TDD	10.06	±9.6
10269	CAG	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, 64-QAM)	LTE-TDD	10.13	±9.6
10270	CAG	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, QPSK)	LTE-TDD	9.58	±9.6
10274	CAC	UMTS-FDD (HSUPA, Subtest 5, 3GPP Rel8.10)	WCDMA	4.87	±9.6
10275	CAC	UMTS-FDD (HSUPA, Subtest 5, 3GPP Rel8.4)	WCDMA	3.96	±9.6
10277	CAA	PHS (QPSK)	PHS	11.81	±9.6
10278	CAA	PHS (QPSK, BW 884 MHz, Rolloff 0.5)	PHS	11.81	±9.6
10279	CAA	PHS (QPSK, BW 884 MHz, Rolloff 0.38)	PHS	12.18	±9.6
10290	AAB	CDMA2000, RC1, SO55, Full Rate	CDMA2000	3.91	±9.6
10291	AAB	CDMA2000, RC3, SO55, Full Rate	CDMA2000	3.46	±9.6
10292	AAB	CDMA2000, RC3, SO32, Full Rate	CDMA2000	3.39	±9.6
10293	AAB	CDMA2000, RC3, SO3, Full Rate	CDMA2000	3.50	±9.6
10295	AAB	CDMA2000, RC1, SO3, 1/8th Rate 25 fr.	CDMA2000	12.49	±9.6
10297	AAE	LTE-FDD (SC-FDMA, 50% RB, 20 MHz, QPSK)	LTE-FDD	5.81	±9.6
10298	AAE	LTE-FDD (SC-FDMA, 50% RB, 3 MHz, QPSK)	LTE-FDD	5.72	±9.6
10299	AAE	LTE-FDD (SC-FDMA, 50% RB, 3 MHz, 16-QAM)	LTE-FDD	6.39	±9.6
10300	AAE	LTE-FDD (SC-FDMA, 50% RB, 3 MHz, 64-QAM)	LTE-FDD	6.60	±9.6
10301	AAA	IEEE 802.16e WiMAX (29:18, 5 ms, 10 MHz, QPSK, PUSC)	WiMAX	12.03	±9.6
10302	AAA	IEEE 802.16e WiMAX (29:18, 5 ms, 10 MHz, QPSK, PUSC, 3 CTRL symbols)	WiMAX	12.57	±9.6
10303	AAA	IEEE 802.16e WiMAX (31:15, 5 ms, 10 MHz, 64QAM, PUSC)	WiMAX	12.52	±9.6
10304	AAA	IEEE 802.16e WiMAX (29:18, 5 ms, 10 MHz, 64QAM, PUSC)	WiMAX	11.86	±9.6
10305	AAA	IEEE 802.16e WiMAX (31:15, 10 ms, 10 MHz, 64QAM, PUSC, 15 symbols)	WiMAX	15.24	±9.6
10306	AAA	IEEE 802.16e WiMAX (29:18, 10 ms, 10 MHz, 64QAM, PUSC, 18 symbols)	WiMAX	14.67	±9.6

UID	Rev	Communication System Name	Group	PAR (dB)	Unc^E $k = 2$
10307	AAA	IEEE 802.16e WiMAX (29:18, 10 ms, 10 MHz, QPSK, PUSC, 18 symbols)	WiMAX	14.49	±9.6
10308	AAA	IEEE 802.16e WiMAX (29:18, 10 ms, 10 MHz, 16QAM, PUSC)	WiMAX	14.46	±9.6
10309	AAA	IEEE 802.16e WiMAX (29:18, 10 ms, 10 MHz, 16QAM, AMC 2x3, 18 symbols)	WiMAX	14.58	±9.6
10310	AAA	IEEE 802.16e WiMAX (29:18, 10 ms, 10 MHz, QPSK, AMC 2x3, 18 symbols)	WiMAX	14.57	±9.6
10311	AAE	LTE-FDD (SC-FDMA, 100% RB, 15 MHz, QPSK)	LTE-FDD	6.06	±9.6
10313	AAA	iDEN 1:3	iDEN	10.51	±9.6
10314	AAA	iDEN 1:6	iDEN	13.48	±9.6
10315	AAB	IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps, 96pc duty cycle)	WLAN	1.71	±9.6
10316	AAB	IEEE 802.11g WiFi 2.4 GHz (ERP-OFDM, 6 Mbps, 96pc duty cycle)	WLAN	8.36	±9.6
10317	AAE	IEEE 802.11a WiFi 5 GHz (OFDM, 6 Mbps, 96pc duty cycle)	WLAN	8.36	±9.6
10352	AAA	Pulse Waveform (200Hz, 10%)	Generic	10.00	±9.6
10353	AAA	Pulse Waveform (200Hz, 20%)	Generic	6.99	±9.6
10354	AAA	Pulse Waveform (200Hz, 40%)	Generic	3.98	±9.6
10355	AAA	Pulse Waveform (200Hz, 60%)	Generic	2.22	±9.6
10356	AAA	Pulse Waveform (200Hz, 80%)	Generic	0.97	±9.6
10387	AAA	QPSK Waveform, 1 MHz	Generic	5.10	±9.6
10388	AAA	QPSK Waveform, 10 MHz	Generic	5.22	±9.6
10396	AAA	64-QAM Waveform, 100 kHz	Generic	6.27	±9.6
10399	AAA	64-QAM Waveform, 40 MHz	Generic	6.27	±9.6
10400	AAF	IEEE 802.11ac WiFi (20 MHz, 64-QAM, 99pc duty cycle)	WLAN	8.37	±9.6
10401	AAF	IEEE 802.11ac WiFi (40 MHz, 64-QAM, 99pc duty cycle)	WLAN	8.60	±9.6
10402	AAF	IEEE 802.11ac WiFi (80 MHz, 64-QAM, 99pc duty cycle)	WLAN	8.53	±9.6
10403	AAB	CDMA2000 (1xEV-DO, Rev. 0)	CDMA2000	3.76	±9.6
10404	AAB	CDMA2000 (1xEV-DO, Rev. A)	CDMA2000	3.77	±9.6
10406	AAB	CDMA2000, RC3, SO32, SCH0, Full Rate	CDMA2000	5.22	±9.6
10410	AAH	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, QPSK, UL Subframe=2,3,4,7,8,9, Subframe Conf=4)	LTE-TDD	7.82	±9.6
10414	AAA	WLAN CCDF, 64-QAM, 40 MHz	Generic	8.54	±9.6
10415	AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps, 99pc duty cycle)	WLAN	1.54	±9.6
10416	AAA	IEEE 802.11g WiFi 2.4 GHz (ERP-OFDM, 6 Mbps, 99pc duty cycle)	WLAN	8.23	±9.6
10417	AAD	IEEE 802.11a/h WiFi 5 GHz (OFDM, 6 Mbps, 99pc duty cycle)	WLAN	8.23	±9.6
10418	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 6 Mbps, 99pc duty cycle, Long preambule)	WLAN	8.14	±9.6
10419	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 6 Mbps, 99pc duty cycle, Short preambule)	WLAN	8.19	±9.6
10422	AAD	IEEE 802.11n (HT Greenfield, 7.2 Mbps, BPSK)	WLAN	8.32	±9.6
10423	AAD	IEEE 802.11n (HT Greenfield, 43.3 Mbps, 16-QAM)	WLAN	8.47	±9.6
10424	AAD	IEEE 802.11n (HT Greenfield, 72.2 Mbps, 64-QAM)	WLAN	8.40	±9.6
10425	AAD	IEEE 802.11n (HT Greenfield, 15 Mbps, BPSK)	WLAN	8.41	±9.6
10426	AAD	IEEE 802.11n (HT Greenfield, 90 Mbps, 16-QAM)	WLAN	8.45	±9.6
10427	AAD	IEEE 802.11n (HT Greenfield, 150 Mbps, 64-QAM)	WLAN	8.41	±9.6
10430	AAE	LTE-FDD (OFDMA, 5 MHz, E-TM 3.1)	LTE-FDD	8.28	±9.6
10431	AAE	LTE-FDD (OFDMA, 10 MHz, E-TM 3.1)	LTE-FDD	8.38	±9.6
10432	AAD	LTE-FDD (OFDMA, 15 MHz, E-TM 3.1)	LTE-FDD	8.34	±9.6
10433	AAD	LTE-FDD (OFDMA, 20 MHz, E-TM 3.1)	LTE-FDD	8.34	±9.6
10434	AAB	W-CDMA (BS Test Model 1, 64 DPCH)	WCDMA	8.60	±9.6
10435	AAG	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	LTE-TDD	7.82	±9.6
10447	AAE	LTE-FDD (OFDMA, 5 MHz, E-TM 3.1, Clipping 44%)	LTE-FDD	7.56	±9.6
10448	AAE	LTE-FDD (OFDMA, 10 MHz, E-TM 3.1, Clippin 44%)	LTE-FDD	7.53	±9.6
10449	AAD	LTE-FDD (OFDMA, 15 MHz, E-TM 3.1, Cliping 44%)	LTE-FDD	7.51	±9.6
10450	AAD	LTE-FDD (OFDMA, 20 MHz, E-TM 3.1, Clipping 44%)	LTE-FDD	7.48	±9.6
10451	AAB	W-CDMA (BS Test Model 1, 64 DPCH, Clipping 44%)	WCDMA	7.59	±9.6
10453	AAE	Validation (Square, 10 ms, 1 ms)	Test	10.00	±9.6
10456	AAD	IEEE 802.11ac WiFi (160 MHz, 64-QAM, 99pc duty cycle)	WLAN	8.63	±9.6
10457	AAB	UMTS-FDD (DC-HSDPA)	WCDMA	6.62	±9.6
10458	AAA	CDMA2000 (1xEV-DO, Rev. B, 2 carriers)	CDMA2000	6.55	±9.6
10459	AAA	CDMA2000 (1xEV-DO, Rev. B, 3 carriers)	CDMA2000	8.25	±9.6
10460	AAB	UMTS-FDD (WCDMA, AMR)	WCDMA	2.39	±9.6
10461	AAC	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	LTE-TDD	7.82	±9.6
10462	AAC	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.30	±9.6
10463	AAC	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.56	±9.6
10464	AAD	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	LTE-TDD	7.82	±9.6
10465	AAD	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.32	±9.6
10466	AAD	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.57	±9.6
10467	AAG	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	LTE-TDD	7.82	±9.6
10468	AAG	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.32	±9.6
10469	AAG	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.56	±9.6
10470	AAG	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	LTE-TDD	7.82	±9.6
10471	AAG	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.32	±9.6

UID	Rev	Communication System Name	Group	PAR (dB)	Unc^E $k = 2$
10472	AAG	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.57	±9.6
10473	AAF	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	LTE-TDD	7.82	±9.6
10474	AAF	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.32	±9.6
10475	AAF	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.57	±9.6
10477	AAG	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.32	±9.6
10478	AAG	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.57	±9.6
10479	AAC	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	LTE-TDD	7.74	±9.6
10480	AAC	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.18	±9.6
10481	AAC	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.45	±9.6
10482	AAD	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	LTE-TDD	7.71	±9.6
10483	AAD	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.39	±9.6
10484	AAD	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.47	±9.6
10485	AAG	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	LTE-TDD	7.59	±9.6
10486	AAG	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.38	±9.6
10487	AAG	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.60	±9.6
10488	AAG	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	LTE-TDD	7.70	±9.6
10489	AAG	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.31	±9.6
10490	AAG	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.54	±9.6
10491	AAF	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	LTE-TDD	7.74	±9.6
10492	AAF	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.41	±9.6
10493	AAF	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.55	±9.6
10494	AAG	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	LTE-TDD	7.74	±9.6
10495	AAG	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.37	±9.6
10496	AAG	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.54	±9.6
10497	AAC	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	LTE-TDD	7.67	±9.6
10498	AAC	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.40	±9.6
10499	AAC	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.68	±9.6
10500	AAD	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	LTE-TDD	7.67	±9.6
10501	AAD	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.44	±9.6
10502	AAD	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.52	±9.6
10503	AAG	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	LTE-TDD	7.72	±9.6
10504	AAG	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.31	±9.6
10505	AAG	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.54	±9.6
10506	AAG	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	LTE-TDD	7.74	±9.6
10507	AAG	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.36	±9.6
10508	AAG	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.55	±9.6
10509	AAF	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	LTE-TDD	7.99	±9.6
10510	AAF	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.49	±9.6
10511	AAF	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.51	±9.6
10512	AAG	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	LTE-TDD	7.74	±9.6
10513	AAG	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.42	±9.6
10514	AAG	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.45	±9.6
10515	AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 2 Mbps, 99pc duty cycle)	WLAN	1.58	±9.6
10516	AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 5.5 Mbps, 99pc duty cycle)	WLAN	1.57	±9.6
10517	AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 11 Mbps, 99pc duty cycle)	WLAN	1.58	±9.6
10518	AAD	IEEE 802.11a/h WiFi 5 GHz (OFDM, 9 Mbps, 99pc duty cycle)	WLAN	8.23	±9.6
10519	AAD	IEEE 802.11a/h WiFi 5 GHz (OFDM, 12 Mbps, 99pc duty cycle)	WLAN	8.39	±9.6
10520	AAD	IEEE 802.11a/h WiFi 5 GHz (OFDM, 18 Mbps, 99pc duty cycle)	WLAN	8.12	±9.6
10521	AAD	IEEE 802.11a/h WiFi 5 GHz (OFDM, 24 Mbps, 99pc duty cycle)	WLAN	7.97	±9.6
10522	AAD	IEEE 802.11a/h WiFi 5 GHz (OFDM, 36 Mbps, 99pc duty cycle)	WLAN	8.45	±9.6
10523	AAD	IEEE 802.11a/h WiFi 5 GHz (OFDM, 48 Mbps, 99pc duty cycle)	WLAN	8.08	±9.6
10524	AAD	IEEE 802.11a/h WiFi 5 GHz (OFDM, 54 Mbps, 99pc duty cycle)	WLAN	8.27	±9.6
10525	AAD	IEEE 802.11ac WiFi (20 MHz, MCS0, 99pc duty cycle)	WLAN	8.36	±9.6
10526	AAD	IEEE 802.11ac WiFi (20 MHz, MCS1, 99pc duty cycle)	WLAN	8.42	±9.6
10527	AAD	IEEE 802.11ac WiFi (20 MHz, MCS2, 99pc duty cycle)	WLAN	8.21	±9.6
10528	AAD	IEEE 802.11ac WiFi (20 MHz, MCS3, 99pc duty cycle)	WLAN	8.36	±9.6
10529	AAD	IEEE 802.11ac WiFi (20 MHz, MCS4, 99pc duty cycle)	WLAN	8.36	±9.6
10531	AAD	IEEE 802.11ac WiFi (20 MHz, MCS6, 99pc duty cycle)	WLAN	8.43	±9.6
10532	AAD	IEEE 802.11ac WiFi (20 MHz, MCS7, 99pc duty cycle)	WLAN	8.29	±9.6
10533	AAD	IEEE 802.11ac WiFi (20 MHz, MCS8, 99pc duty cycle)	WLAN	8.38	±9.6
10534	AAD	IEEE 802.11ac WiFi (40 MHz, MCS0, 99pc duty cycle)	WLAN	8.45	±9.6
10535	AAD	IEEE 802.11ac WiFi (40 MHz, MCS1, 99pc duty cycle)	WLAN	8.45	±9.6
10536	AAD	IEEE 802.11ac WiFi (40 MHz, MCS2, 99pc duty cycle)	WLAN	8.32	±9.6
10537	AAD	IEEE 802.11ac WiFi (40 MHz, MCS3, 99pc duty cycle)	WLAN	8.44	±9.6
10538	AAD	IEEE 802.11ac WiFi (40 MHz, MCS4, 99pc duty cycle)	WLAN	8.54	±9.6
10540	AAD	IEEE 802.11ac WiFi (40 MHz, MCS6, 99pc duty cycle)	WLAN	8.39	±9.6

UID	Rev	Communication System Name	Group	PAR (dB)	Unc^E $k = 2$
10541	AAD	IEEE 802.11ac WiFi (40 MHz, MCS7, 99pc duty cycle)	WLAN	8.46	±9.6
10542	AAD	IEEE 802.11ac WiFi (40 MHz, MCS8, 99pc duty cycle)	WLAN	8.65	±9.6
10543	AAD	IEEE 802.11ac WiFi (40 MHz, MCS9, 99pc duty cycle)	WLAN	8.65	±9.6
10544	AAD	IEEE 802.11ac WiFi (80 MHz, MCS0, 99pc duty cycle)	WLAN	8.47	±9.6
10545	AAD	IEEE 802.11ac WiFi (80 MHz, MCS1, 99pc duty cycle)	WLAN	8.55	±9.6
10546	AAD	IEEE 802.11ac WiFi (80 MHz, MCS2, 99pc duty cycle)	WLAN	8.35	±9.6
10547	AAD	IEEE 802.11ac WiFi (80 MHz, MCS3, 99pc duty cycle)	WLAN	8.49	±9.6
10548	AAD	IEEE 802.11ac WiFi (80 MHz, MCS4, 99pc duty cycle)	WLAN	8.37	±9.6
10550	AAD	IEEE 802.11ac WiFi (80 MHz, MCS6, 99pc duty cycle)	WLAN	8.38	±9.6
10551	AAD	IEEE 802.11ac WiFi (80 MHz, MCS7, 99pc duty cycle)	WLAN	8.50	±9.6
10552	AAD	IEEE 802.11ac WiFi (80 MHz, MCS8, 99pc duty cycle)	WLAN	8.42	±9.6
10553	AAD	IEEE 802.11ac WiFi (80 MHz, MCS9, 99pc duty cycle)	WLAN	8.45	±9.6
10554	AAE	IEEE 802.11ac WiFi (160 MHz, MCS0, 99pc duty cycle)	WLAN	8.48	±9.6
10555	AAE	IEEE 802.11ac WiFi (160 MHz, MCS1, 99pc duty cycle)	WLAN	8.47	±9.6
10556	AAE	IEEE 802.11ac WiFi (160 MHz, MCS2, 99pc duty cycle)	WLAN	8.50	±9.6
10557	AAE	IEEE 802.11ac WiFi (160 MHz, MCS3, 99pc duty cycle)	WLAN	8.52	±9.6
10558	AAE	IEEE 802.11ac WiFi (160 MHz, MCS4, 99pc duty cycle)	WLAN	8.61	±9.6
10560	AAE	IEEE 802.11ac WiFi (160 MHz, MCS6, 99pc duty cycle)	WLAN	8.73	±9.6
10561	AAE	IEEE 802.11ac WiFi (160 MHz, MCS7, 99pc duty cycle)	WLAN	8.56	±9.6
10562	AAE	IEEE 802.11ac WiFi (160 MHz, MCS8, 99pc duty cycle)	WLAN	8.69	±9.6
10563	AAE	IEEE 802.11ac WiFi (160 MHz, MCS9, 99pc duty cycle)	WLAN	8.77	±9.6
10564	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 9 Mbps, 99pc duty cycle)	WLAN	8.25	±9.6
10565	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 12 Mbps, 99pc duty cycle)	WLAN	8.45	±9.6
10566	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 18 Mbps, 99pc duty cycle)	WLAN	8.13	±9.6
10567	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 24 Mbps, 99pc duty cycle)	WLAN	8.00	±9.6
10568	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 36 Mbps, 99pc duty cycle)	WLAN	8.37	±9.6
10569	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 48 Mbps, 99pc duty cycle)	WLAN	8.10	±9.6
10570	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 54 Mbps, 99pc duty cycle)	WLAN	8.30	±9.6
10571	AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps, 90pc duty cycle)	WLAN	1.99	±9.6
10572	AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 2 Mbps, 90pc duty cycle)	WLAN	1.99	±9.6
10573	AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 5.5 Mbps, 90pc duty cycle)	WLAN	1.98	±9.6
10574	AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 11 Mbps, 90pc duty cycle)	WLAN	1.98	±9.6
10575	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 6 Mbps, 90pc duty cycle)	WLAN	8.59	±9.6
10576	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 9 Mbps, 90pc duty cycle)	WLAN	8.60	±9.6
10577	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 12 Mbps, 90pc duty cycle)	WLAN	8.70	±9.6
10578	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 18 Mbps, 90pc duty cycle)	WLAN	8.49	±9.6
10579	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 24 Mbps, 90pc duty cycle)	WLAN	8.36	±9.6
10580	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 36 Mbps, 90pc duty cycle)	WLAN	8.76	±9.6
10581	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 48 Mbps, 90pc duty cycle)	WLAN	8.35	±9.6
10582	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 54 Mbps, 90pc duty cycle)	WLAN	8.67	±9.6
10583	AAD	IEEE 802.11a/h WiFi 5 GHz (OFDM, 6 Mbps, 90pc duty cycle)	WLAN	8.59	±9.6
10584	AAD	IEEE 802.11a/h WiFi 5 GHz (OFDM, 9 Mbps, 90pc duty cycle)	WLAN	8.60	±9.6
10585	AAD	IEEE 802.11a/h WiFi 5 GHz (OFDM, 12 Mbps, 90pc duty cycle)	WLAN	8.70	±9.6
10586	AAD	IEEE 802.11a/h WiFi 5 GHz (OFDM, 18 Mbps, 90pc duty cycle)	WLAN	8.49	±9.6
10587	AAD	IEEE 802.11a/h WiFi 5 GHz (OFDM, 24 Mbps, 90pc duty cycle)	WLAN	8.36	±9.6
10588	AAD	IEEE 802.11a/h WiFi 5 GHz (OFDM, 36 Mbps, 90pc duty cycle)	WLAN	8.76	±9.6
10589	AAD	IEEE 802.11a/h WiFi 5 GHz (OFDM, 48 Mbps, 90pc duty cycle)	WLAN	8.35	±9.6
10590	AAD	IEEE 802.11a/h WiFi 5 GHz (OFDM, 54 Mbps, 90pc duty cycle)	WLAN	8.67	±9.6
10591	AAD	IEEE 802.11n (HT Mixed, 20 MHz, MCS0, 90pc duty cycle)	WLAN	8.63	±9.6
10592	AAD	IEEE 802.11n (HT Mixed, 20 MHz, MCS1, 90pc duty cycle)	WLAN	8.79	±9.6
10593	AAD	IEEE 802.11n (HT Mixed, 20 MHz, MCS2, 90pc duty cycle)	WLAN	8.64	±9.6
10594	AAD	IEEE 802.11n (HT Mixed, 20 MHz, MCS3, 90pc duty cycle)	WLAN	8.74	±9.6
10595	AAD	IEEE 802.11n (HT Mixed, 20 MHz, MCS4, 90pc duty cycle)	WLAN	8.74	±9.6
10596	AAD	IEEE 802.11n (HT Mixed, 20 MHz, MCS5, 90pc duty cycle)	WLAN	8.71	±9.6
10597	AAD	IEEE 802.11n (HT Mixed, 20 MHz, MCS6, 90pc duty cycle)	WLAN	8.72	±9.6
10598	AAD	IEEE 802.11n (HT Mixed, 20 MHz, MCS7, 90pc duty cycle)	WLAN	8.50	±9.6
10599	AAD	IEEE 802.11n (HT Mixed, 40 MHz, MCS0, 90pc duty cycle)	WLAN	8.79	±9.6
10600	AAD	IEEE 802.11n (HT Mixed, 40 MHz, MCS1, 90pc duty cycle)	WLAN	8.88	±9.6
10601	AAD	IEEE 802.11n (HT Mixed, 40 MHz, MCS2, 90pc duty cycle)	WLAN	8.82	±9.6
10602	AAD	IEEE 802.11n (HT Mixed, 40 MHz, MCS3, 90pc duty cycle)	WLAN	8.94	±9.6
10603	AAD	IEEE 802.11n (HT Mixed, 40 MHz, MCS4, 90pc duty cycle)	WLAN	9.03	±9.6
10604	AAD	IEEE 802.11n (HT Mixed, 40 MHz, MCS5, 90pc duty cycle)	WLAN	8.76	±9.6
10605	AAD	IEEE 802.11n (HT Mixed, 40 MHz, MCS6, 90pc duty cycle)	WLAN	8.97	±9.6
10606	AAD	IEEE 802.11n (HT Mixed, 40 MHz, MCS7, 90pc duty cycle)	WLAN	8.82	±9.6
10607	AAD	IEEE 802.11ac WiFi (20 MHz, MCS0, 90pc duty cycle)	WLAN	8.64	±9.6
10608	AAD	IEEE 802.11ac WiFi (20 MHz, MCS1, 90pc duty cycle)	WLAN	8.77	±9.6

UID	Rev	Communication System Name	Group	PAR (dB)	Unc^E $k = 2$
10609	AAD	IEEE 802.11ac WiFi (20 MHz, MCS2, 90pc duty cycle)	WLAN	8.57	±9.6
10610	AAD	IEEE 802.11ac WiFi (20 MHz, MCS3, 90pc duty cycle)	WLAN	8.78	±9.6
10611	AAD	IEEE 802.11ac WiFi (20 MHz, MCS4, 90pc duty cycle)	WLAN	8.70	±9.6
10612	AAD	IEEE 802.11ac WiFi (20 MHz, MCS5, 90pc duty cycle)	WLAN	8.77	±9.6
10613	AAD	IEEE 802.11ac WiFi (20 MHz, MCS6, 90pc duty cycle)	WLAN	8.94	±9.6
10614	AAD	IEEE 802.11ac WiFi (20 MHz, MCS7, 90pc duty cycle)	WLAN	8.59	±9.6
10615	AAD	IEEE 802.11ac WiFi (20 MHz, MCS8, 90pc duty cycle)	WLAN	8.82	±9.6
10616	AAD	IEEE 802.11ac WiFi (40 MHz, MCS0, 90pc duty cycle)	WLAN	8.82	±9.6
10617	AAD	IEEE 802.11ac WiFi (40 MHz, MCS1, 90pc duty cycle)	WLAN	8.81	±9.6
10618	AAD	IEEE 802.11ac WiFi (40 MHz, MCS2, 90pc duty cycle)	WLAN	8.58	±9.6
10619	AAD	IEEE 802.11ac WiFi (40 MHz, MCS3, 90pc duty cycle)	WLAN	8.86	±9.6
10620	AAD	IEEE 802.11ac WiFi (40 MHz, MCS4, 90pc duty cycle)	WLAN	8.87	±9.6
10621	AAD	IEEE 802.11ac WiFi (40 MHz, MCS5, 90pc duty cycle)	WLAN	8.77	±9.6
10622	AAD	IEEE 802.11ac WiFi (40 MHz, MCS6, 90pc duty cycle)	WLAN	8.68	±9.6
10623	AAD	IEEE 802.11ac WiFi (40 MHz, MCS7, 90pc duty cycle)	WLAN	8.82	±9.6
10624	AAD	IEEE 802.11ac WiFi (40 MHz, MCS8, 90pc duty cycle)	WLAN	8.96	±9.6
10625	AAD	IEEE 802.11ac WiFi (40 MHz, MCS9, 90pc duty cycle)	WLAN	8.96	±9.6
10626	AAD	IEEE 802.11ac WiFi (80 MHz, MCS0, 90pc duty cycle)	WLAN	8.83	±9.6
10627	AAD	IEEE 802.11ac WiFi (80 MHz, MCS1, 90pc duty cycle)	WLAN	8.88	±9.6
10628	AAD	IEEE 802.11ac WiFi (80 MHz, MCS2, 90pc duty cycle)	WLAN	8.71	±9.6
10629	AAD	IEEE 802.11ac WiFi (80 MHz, MCS3, 90pc duty cycle)	WLAN	8.85	±9.6
10630	AAD	IEEE 802.11ac WiFi (80 MHz, MCS4, 90pc duty cycle)	WLAN	8.72	±9.6
10631	AAD	IEEE 802.11ac WiFi (80 MHz, MCS5, 90pc duty cycle)	WLAN	8.81	±9.6
10632	AAD	IEEE 802.11ac WiFi (80 MHz, MCS6, 90pc duty cycle)	WLAN	8.74	±9.6
10633	AAD	IEEE 802.11ac WiFi (80 MHz, MCS7, 90pc duty cycle)	WLAN	8.83	±9.6
10634	AAD	IEEE 802.11ac WiFi (80 MHz, MCS8, 90pc duty cycle)	WLAN	8.80	±9.6
10635	AAD	IEEE 802.11ac WiFi (80 MHz, MCS9, 90pc duty cycle)	WLAN	8.81	±9.6
10636	AAE	IEEE 802.11ac WiFi (160 MHz, MCS0, 90pc duty cycle)	WLAN	8.83	±9.6
10637	AAE	IEEE 802.11ac WiFi (160 MHz, MCS1, 90pc duty cycle)	WLAN	8.79	±9.6
10638	AAE	IEEE 802.11ac WiFi (160 MHz, MCS2, 90pc duty cycle)	WLAN	8.86	±9.6
10639	AAE	IEEE 802.11ac WiFi (160 MHz, MCS3, 90pc duty cycle)	WLAN	8.85	±9.6
10640	AAE	IEEE 802.11ac WiFi (160 MHz, MCS4, 90pc duty cycle)	WLAN	8.98	±9.6
10641	AAE	IEEE 802.11ac WiFi (160 MHz, MCS5, 90pc duty cycle)	WLAN	9.06	±9.6
10642	AAE	IEEE 802.11ac WiFi (160 MHz, MCS6, 90pc duty cycle)	WLAN	9.06	±9.6
10643	AAE	IEEE 802.11ac WiFi (160 MHz, MCS7, 90pc duty cycle)	WLAN	8.89	±9.6
10644	AAE	IEEE 802.11ac WiFi (160 MHz, MCS8, 90pc duty cycle)	WLAN	9.05	±9.6
10645	AAE	IEEE 802.11ac WiFi (160 MHz, MCS9, 90pc duty cycle)	WLAN	9.11	±9.6
10646	AAH	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, QPSK, UL Subframe=2,7)	LTE-TDD	11.96	±9.6
10647	AAG	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, QPSK, UL Subframe=2,7)	LTE-TDD	11.96	±9.6
10648	AAA	CDMA2000 (1x Advanced)	CDMA2000	3.45	±9.6
10652	AAF	LTE-TDD (OFDMA, 5 MHz, E-TM 3.1, Clipping 44%)	LTE-TDD	6.91	±9.6
10653	AAF	LTE-TDD (OFDMA, 10 MHz, E-TM 3.1, Clipping 44%)	LTE-TDD	7.42	±9.6
10654	AAE	LTE-TDD (OFDMA, 15 MHz, E-TM 3.1, Clipping 44%)	LTE-TDD	6.96	±9.6
10655	AAF	LTE-TDD (OFDMA, 20 MHz, E-TM 3.1, Clipping 44%)	LTE-TDD	7.21	±9.6
10658	AAB	Pulse Waveform (200Hz, 10%)	Test	10.00	±9.6
10659	AAB	Pulse Waveform (200Hz, 20%)	Test	6.99	±9.6
10660	AAB	Pulse Waveform (200Hz, 40%)	Test	3.98	±9.6
10661	AAB	Pulse Waveform (200Hz, 60%)	Test	2.22	±9.6
10662	AAB	Pulse Waveform (200Hz, 80%)	Test	0.97	±9.6
10670	AAA	Bluetooth Low Energy	Bluetooth	2.19	±9.6
10671	AAC	IEEE 802.11ax (20 MHz, MCS0, 90pc duty cycle)	WLAN	9.09	±9.6
10672	AAC	IEEE 802.11ax (20 MHz, MCS1, 90pc duty cycle)	WLAN	8.57	±9.6
10673	AAC	IEEE 802.11ax (20 MHz, MCS2, 90pc duty cycle)	WLAN	8.78	±9.6
10674	AAC	IEEE 802.11ax (20 MHz, MCS3, 90pc duty cycle)	WLAN	8.74	±9.6
10675	AAC	IEEE 802.11ax (20 MHz, MCS4, 90pc duty cycle)	WLAN	8.90	±9.6
10676	AAC	IEEE 802.11ax (20 MHz, MCS5, 90pc duty cycle)	WLAN	8.77	±9.6
10677	AAC	IEEE 802.11ax (20 MHz, MCS6, 90pc duty cycle)	WLAN	8.73	±9.6
10678	AAC	IEEE 802.11ax (20 MHz, MCS7, 90pc duty cycle)	WLAN	8.78	±9.6
10679	AAC	IEEE 802.11ax (20 MHz, MCS8, 90pc duty cycle)	WLAN	8.89	±9.6
10680	AAC	IEEE 802.11ax (20 MHz, MCS9, 90pc duty cycle)	WLAN	8.80	±9.6
10681	AAC	IEEE 802.11ax (20 MHz, MCS10, 90pc duty cycle)	WLAN	8.62	±9.6
10682	AAC	IEEE 802.11ax (20 MHz, MCS11, 90pc duty cycle)	WLAN	8.83	±9.6
10683	AAC	IEEE 802.11ax (20 MHz, MCS0, 99pc duty cycle)	WLAN	8.42	±9.6
10684	AAC	IEEE 802.11ax (20 MHz, MCS1, 99pc duty cycle)	WLAN	8.26	±9.6
10685	AAC	IEEE 802.11ax (20 MHz, MCS2, 99pc duty cycle)	WLAN	8.33	±9.6
10686	AAC	IEEE 802.11ax (20 MHz, MCS3, 99pc duty cycle)	WLAN	8.28	±9.6

UID	Rev	Communication System Name	Group	PAR (dB)	Unc^E $k = 2$
10687	AAC	IEEE 802.11ax (20 MHz, MCS4, 99pc duty cycle)	WLAN	8.45	±9.6
10688	AAC	IEEE 802.11ax (20 MHz, MCS5, 99pc duty cycle)	WLAN	8.29	±9.6
10689	AAC	IEEE 802.11ax (20 MHz, MCS6, 99pc duty cycle)	WLAN	8.55	±9.6
10690	AAC	IEEE 802.11ax (20 MHz, MCS7, 99pc duty cycle)	WLAN	8.29	±9.6
10691	AAC	IEEE 802.11ax (20 MHz, MCS8, 99pc duty cycle)	WLAN	8.25	±9.6
10692	AAC	IEEE 802.11ax (20 MHz, MCS9, 99pc duty cycle)	WLAN	8.29	±9.6
10693	AAC	IEEE 802.11ax (20 MHz, MCS10, 99pc duty cycle)	WLAN	8.25	±9.6
10694	AAC	IEEE 802.11ax (20 MHz, MCS11, 99pc duty cycle)	WLAN	8.57	±9.6
10695	AAC	IEEE 802.11ax (40 MHz, MCS0, 90pc duty cycle)	WLAN	8.78	±9.6
10696	AAC	IEEE 802.11ax (40 MHz, MCS1, 90pc duty cycle)	WLAN	8.91	±9.6
10697	AAC	IEEE 802.11ax (40 MHz, MCS2, 90pc duty cycle)	WLAN	8.61	±9.6
10698	AAC	IEEE 802.11ax (40 MHz, MCS3, 90pc duty cycle)	WLAN	8.89	±9.6
10699	AAC	IEEE 802.11ax (40 MHz, MCS4, 90pc duty cycle)	WLAN	8.82	±9.6
10700	AAC	IEEE 802.11ax (40 MHz, MCS5, 90pc duty cycle)	WLAN	8.73	±9.6
10701	AAC	IEEE 802.11ax (40 MHz, MCS6, 90pc duty cycle)	WLAN	8.86	±9.6
10702	AAC	IEEE 802.11ax (40 MHz, MCS7, 90pc duty cycle)	WLAN	8.70	±9.6
10703	AAC	IEEE 802.11ax (40 MHz, MCS8, 90pc duty cycle)	WLAN	8.82	±9.6
10704	AAC	IEEE 802.11ax (40 MHz, MCS9, 90pc duty cycle)	WLAN	8.56	±9.6
10705	AAC	IEEE 802.11ax (40 MHz, MCS10, 90pc duty cycle)	WLAN	8.69	±9.6
10706	AAC	IEEE 802.11ax (40 MHz, MCS11, 90pc duty cycle)	WLAN	8.66	±9.6
10707	AAC	IEEE 802.11ax (40 MHz, MCS0, 99pc duty cycle)	WLAN	8.32	±9.6
10708	AAC	IEEE 802.11ax (40 MHz, MCS1, 99pc duty cycle)	WLAN	8.55	±9.6
10709	AAC	IEEE 802.11ax (40 MHz, MCS2, 99pc duty cycle)	WLAN	8.33	±9.6
10710	AAC	IEEE 802.11ax (40 MHz, MCS3, 99pc duty cycle)	WLAN	8.29	±9.6
10711	AAC	IEEE 802.11ax (40 MHz, MCS4, 99pc duty cycle)	WLAN	8.39	±9.6
10712	AAC	IEEE 802.11ax (40 MHz, MCS5, 99pc duty cycle)	WLAN	8.67	±9.6
10713	AAC	IEEE 802.11ax (40 MHz, MCS6, 99pc duty cycle)	WLAN	8.33	±9.6
10714	AAC	IEEE 802.11ax (40 MHz, MCS7, 99pc duty cycle)	WLAN	8.26	±9.6
10715	AAC	IEEE 802.11ax (40 MHz, MCS8, 99pc duty cycle)	WLAN	8.45	±9.6
10716	AAC	IEEE 802.11ax (40 MHz, MCS9, 99pc duty cycle)	WLAN	8.30	±9.6
10717	AAC	IEEE 802.11ax (40 MHz, MCS10, 99pc duty cycle)	WLAN	8.48	±9.6
10718	AAC	IEEE 802.11ax (40 MHz, MCS11, 99pc duty cycle)	WLAN	8.24	±9.6
10719	AAC	IEEE 802.11ax (80 MHz, MCS0, 90pc duty cycle)	WLAN	8.81	±9.6
10720	AAC	IEEE 802.11ax (80 MHz, MCS1, 90pc duty cycle)	WLAN	8.87	±9.6
10721	AAC	IEEE 802.11ax (80 MHz, MCS2, 90pc duty cycle)	WLAN	8.76	±9.6
10722	AAC	IEEE 802.11ax (80 MHz, MCS3, 90pc duty cycle)	WLAN	8.55	±9.6
10723	AAC	IEEE 802.11ax (80 MHz, MCS4, 90pc duty cycle)	WLAN	8.70	±9.6
10724	AAC	IEEE 802.11ax (80 MHz, MCS5, 90pc duty cycle)	WLAN	8.90	±9.6
10725	AAC	IEEE 802.11ax (80 MHz, MCS6, 90pc duty cycle)	WLAN	8.74	±9.6
10726	AAC	IEEE 802.11ax (80 MHz, MCS7, 90pc duty cycle)	WLAN	8.72	±9.6
10727	AAC	IEEE 802.11ax (80 MHz, MCS8, 90pc duty cycle)	WLAN	8.66	±9.6
10728	AAC	IEEE 802.11ax (80 MHz, MCS9, 90pc duty cycle)	WLAN	8.65	±9.6
10729	AAC	IEEE 802.11ax (80 MHz, MCS10, 90pc duty cycle)	WLAN	8.64	±9.6
10730	AAC	IEEE 802.11ax (80 MHz, MCS11, 90pc duty cycle)	WLAN	8.67	±9.6
10731	AAC	IEEE 802.11ax (80 MHz, MCS0, 99pc duty cycle)	WLAN	8.42	±9.6
10732	AAC	IEEE 802.11ax (80 MHz, MCS1, 99pc duty cycle)	WLAN	8.46	±9.6
10733	AAC	IEEE 802.11ax (80 MHz, MCS2, 99pc duty cycle)	WLAN	8.40	±9.6
10734	AAC	IEEE 802.11ax (80 MHz, MCS3, 99pc duty cycle)	WLAN	8.25	±9.6
10735	AAC	IEEE 802.11ax (80 MHz, MCS4, 99pc duty cycle)	WLAN	8.33	±9.6
10736	AAC	IEEE 802.11ax (80 MHz, MCS5, 99pc duty cycle)	WLAN	8.27	±9.6
10737	AAC	IEEE 802.11ax (80 MHz, MCS6, 99pc duty cycle)	WLAN	8.36	±9.6
10738	AAC	IEEE 802.11ax (80 MHz, MCS7, 99pc duty cycle)	WLAN	8.42	±9.6
10739	AAC	IEEE 802.11ax (80 MHz, MCS8, 99pc duty cycle)	WLAN	8.29	±9.6
10740	AAC	IEEE 802.11ax (80 MHz, MCS9, 99pc duty cycle)	WLAN	8.48	±9.6
10741	AAC	IEEE 802.11ax (80 MHz, MCS10, 99pc duty cycle)	WLAN	8.40	±9.6
10742	AAC	IEEE 802.11ax (80 MHz, MCS11, 99pc duty cycle)	WLAN	8.43	±9.6
10743	AAC	IEEE 802.11ax (160 MHz, MCS0, 90pc duty cycle)	WLAN	8.94	±9.6
10744	AAC	IEEE 802.11ax (160 MHz, MCS1, 90pc duty cycle)	WLAN	9.16	±9.6
10745	AAC	IEEE 802.11ax (160 MHz, MCS2, 90pc duty cycle)	WLAN	8.93	±9.6
10746	AAC	IEEE 802.11ax (160 MHz, MCS3, 90pc duty cycle)	WLAN	9.11	±9.6
10747	AAC	IEEE 802.11ax (160 MHz, MCS4, 90pc duty cycle)	WLAN	9.04	±9.6
10748	AAC	IEEE 802.11ax (160 MHz, MCS5, 90pc duty cycle)	WLAN	8.93	±9.6
10749	AAC	IEEE 802.11ax (160 MHz, MCS6, 90pc duty cycle)	WLAN	8.90	±9.6
10750	AAC	IEEE 802.11ax (160 MHz, MCS7, 90pc duty cycle)	WLAN	8.79	±9.6
10751	AAC	IEEE 802.11ax (160 MHz, MCS8, 90pc duty cycle)	WLAN	8.82	±9.6
10752	AAC	IEEE 802.11ax (160 MHz, MCS9, 90pc duty cycle)	WLAN	8.81	±9.6

UID	Rev	Communication System Name	Group	PAR (dB)	Unc^E $k = 2$
10753	AAC	IEEE 802.11ax (160 MHz, MCS10, 90pc duty cycle)	WLAN	9.00	±9.6
10754	AAC	IEEE 802.11ax (160 MHz, MCS11, 90pc duty cycle)	WLAN	8.94	±9.6
10755	AAC	IEEE 802.11ax (160 MHz, MCS0, 99pc duty cycle)	WLAN	8.64	±9.6
10756	AAC	IEEE 802.11ax (160 MHz, MCS1, 99pc duty cycle)	WLAN	8.77	±9.6
10757	AAC	IEEE 802.11ax (160 MHz, MCS2, 99pc duty cycle)	WLAN	8.77	±9.6
10758	AAC	IEEE 802.11ax (160 MHz, MCS3, 99pc duty cycle)	WLAN	8.69	±9.6
10759	AAC	IEEE 802.11ax (160 MHz, MCS4, 99pc duty cycle)	WLAN	8.58	±9.6
10760	AAC	IEEE 802.11ax (160 MHz, MCS5, 99pc duty cycle)	WLAN	8.49	±9.6
10761	AAC	IEEE 802.11ax (160 MHz, MCS6, 99pc duty cycle)	WLAN	8.58	±9.6
10762	AAC	IEEE 802.11ax (160 MHz, MCS7, 99pc duty cycle)	WLAN	8.49	±9.6
10763	AAC	IEEE 802.11ax (160 MHz, MCS8, 99pc duty cycle)	WLAN	8.53	±9.6
10764	AAC	IEEE 802.11ax (160 MHz, MCS9, 99pc duty cycle)	WLAN	8.54	±9.6
10765	AAC	IEEE 802.11ax (160 MHz, MCS10, 99pc duty cycle)	WLAN	8.54	±9.6
10766	AAC	IEEE 802.11ax (160 MHz, MCS11, 99pc duty cycle)	WLAN	8.51	±9.6
10767	AAG	5G NR (CP-OFDM, 1 RB, 5 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	7.99	±9.6
10768	AAE	5G NR (CP-OFDM, 1 RB, 10 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.01	±9.6
10769	AAD	5G NR (CP-OFDM, 1 RB, 15 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.01	±9.6
10770	AAE	5G NR (CP-OFDM, 1 RB, 20 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.02	±9.6
10771	AAD	5G NR (CP-OFDM, 1 RB, 25 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.02	±9.6
10772	AAE	5G NR (CP-OFDM, 1 RB, 30 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.23	±9.6
10773	AAF	5G NR (CP-OFDM, 1 RB, 40 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.03	±9.6
10774	AAE	5G NR (CP-OFDM, 1 RB, 50 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.02	±9.6
10775	AAF	5G NR (CP-OFDM, 50% RB, 5 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.31	±9.6
10776	AAE	5G NR (CP-OFDM, 50% RB, 10 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.30	±9.6
10777	AAC	5G NR (CP-OFDM, 50% RB, 15 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.30	±9.6
10778	AAE	5G NR (CP-OFDM, 50% RB, 20 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.34	±9.6
10779	AAC	5G NR (CP-OFDM, 50% RB, 25 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.42	±9.6
10780	AAE	5G NR (CP-OFDM, 50% RB, 30 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.38	±9.6
10781	AAF	5G NR (CP-OFDM, 50% RB, 40 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.38	±9.6
10782	AAE	5G NR (CP-OFDM, 50% RB, 50 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.43	±9.6
10783	AAG	5G NR (CP-OFDM, 100% RB, 5 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.31	±9.6
10784	AAE	5G NR (CP-OFDM, 100% RB, 10 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.29	±9.6
10785	AAD	5G NR (CP-OFDM, 100% RB, 15 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.40	±9.6
10786	AAE	5G NR (CP-OFDM, 100% RB, 20 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.35	±9.6
10787	AAD	5G NR (CP-OFDM, 100% RB, 25 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.44	±9.6
10788	AAE	5G NR (CP-OFDM, 100% RB, 30 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.39	±9.6
10789	AAF	5G NR (CP-OFDM, 100% RB, 40 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.37	±9.6
10790	AAE	5G NR (CP-OFDM, 100% RB, 50 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.39	±9.6
10791	AAG	5G NR (CP-OFDM, 1 RB, 5 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	7.83	±9.6
10792	AAE	5G NR (CP-OFDM, 1 RB, 10 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	7.92	±9.6
10793	AAD	5G NR (CP-OFDM, 1 RB, 15 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	7.95	±9.6
10794	AAE	5G NR (CP-OFDM, 1 RB, 20 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	7.82	±9.6
10795	AAD	5G NR (CP-OFDM, 1 RB, 25 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	7.84	±9.6
10796	AAE	5G NR (CP-OFDM, 1 RB, 30 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	7.82	±9.6
10797	AAF	5G NR (CP-OFDM, 1 RB, 40 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.01	±9.6
10798	AAE	5G NR (CP-OFDM, 1 RB, 50 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	7.89	±9.6
10799	AAF	5G NR (CP-OFDM, 1 RB, 60 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	7.93	±9.6
10801	AAF	5G NR (CP-OFDM, 1 RB, 80 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	7.89	±9.6
10802	AAE	5G NR (CP-OFDM, 1 RB, 90 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	7.87	±9.6
10803	AAF	5G NR (CP-OFDM, 1 RB, 100 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	7.93	±9.6
10805	AAE	5G NR (CP-OFDM, 50% RB, 10 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.34	±9.6
10806	AAD	5G NR (CP-OFDM, 50% RB, 15 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.37	±9.6
10809	AAE	5G NR (CP-OFDM, 50% RB, 30 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.34	±9.6
10810	AAF	5G NR (CP-OFDM, 50% RB, 40 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.34	±9.6
10812	AAF	5G NR (CP-OFDM, 50% RB, 60 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.35	±9.6
10817	AAG	5G NR (CP-OFDM, 100% RB, 5 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.35	±9.6
10818	AAE	5G NR (CP-OFDM, 100% RB, 10 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.34	±9.6
10819	AAD	5G NR (CP-OFDM, 100% RB, 15 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.33	±9.6
10820	AAE	5G NR (CP-OFDM, 100% RB, 20 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.30	±9.6
10821	AAD	5G NR (CP-OFDM, 100% RB, 25 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.41	±9.6
10822	AAE	5G NR (CP-OFDM, 100% RB, 30 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.41	±9.6
10823	AAF	5G NR (CP-OFDM, 100% RB, 40 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.36	±9.6
10824	AAE	5G NR (CP-OFDM, 100% RB, 50 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.39	±9.6
10825	AAF	5G NR (CP-OFDM, 100% RB, 60 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.41	±9.6
10827	AAF	5G NR (CP-OFDM, 100% RB, 80 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.42	±9.6
10828	AAE	5G NR (CP-OFDM, 100% RB, 90 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.43	±9.6

UID	Rev	Communication System Name	Group	PAR (dB)	Unc^E $k = 2$
10829	AAF	5G NR (CP-OFDM, 100% RB, 100 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.40	±9.6
10830	AAE	5G NR (CP-OFDM, 1 RB, 10 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	7.63	±9.6
10831	AAD	5G NR (CP-OFDM, 1 RB, 15 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	7.73	±9.6
10832	AAE	5G NR (CP-OFDM, 1 RB, 20 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	7.74	±9.6
10833	AAD	5G NR (CP-OFDM, 1 RB, 25 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	7.70	±9.6
10834	AAE	5G NR (CP-OFDM, 1 RB, 30 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	7.75	±9.6
10835	AAF	5G NR (CP-OFDM, 1 RB, 40 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	7.70	±9.6
10836	AAE	5G NR (CP-OFDM, 1 RB, 50 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	7.66	±9.6
10837	AAF	5G NR (CP-OFDM, 1 RB, 60 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	7.68	±9.6
10839	AAF	5G NR (CP-OFDM, 1 RB, 80 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	7.70	±9.6
10840	AAE	5G NR (CP-OFDM, 1 RB, 90 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	7.67	±9.6
10841	AAF	5G NR (CP-OFDM, 1 RB, 100 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	7.71	±9.6
10843	AAD	5G NR (CP-OFDM, 50% RB, 15 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.49	±9.6
10844	AAE	5G NR (CP-OFDM, 50% RB, 20 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.34	±9.6
10846	AAE	5G NR (CP-OFDM, 50% RB, 30 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.41	±9.6
10854	AAE	5G NR (CP-OFDM, 100% RB, 10 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.34	±9.6
10855	AAD	5G NR (CP-OFDM, 100% RB, 15 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.36	±9.6
10856	AAE	5G NR (CP-OFDM, 100% RB, 20 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.37	±9.6
10857	AAD	5G NR (CP-OFDM, 100% RB, 25 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.35	±9.6
10858	AAE	5G NR (CP-OFDM, 100% RB, 30 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.36	±9.6
10859	AAF	5G NR (CP-OFDM, 100% RB, 40 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.34	±9.6
10860	AAE	5G NR (CP-OFDM, 100% RB, 50 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.41	±9.6
10861	AAF	5G NR (CP-OFDM, 100% RB, 60 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.40	±9.6
10863	AAF	5G NR (CP-OFDM, 100% RB, 80 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.41	±9.6
10864	AAE	5G NR (CP-OFDM, 100% RB, 90 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.37	±9.6
10865	AAF	5G NR (CP-OFDM, 100% RB, 100 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.41	±9.6
10866	AAF	5G NR (DFT-s-OFDM, 1 RB, 100 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.68	±9.6
10868	AAF	5G NR (DFT-s-OFDM, 100% RB, 100 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.89	±9.6
10869	AAE	5G NR (DFT-s-OFDM, 1 RB, 100 MHz, QPSK, 120 kHz)	5G NR FR2 TDD	5.75	±9.6
10870	AAE	5G NR (DFT-s-OFDM, 100% RB, 100 MHz, QPSK, 120 kHz)	5G NR FR2 TDD	5.86	±9.6
10871	AAE	5G NR (DFT-s-OFDM, 1 RB, 100 MHz, 16QAM, 120 kHz)	5G NR FR2 TDD	5.75	±9.6
10872	AAE	5G NR (DFT-s-OFDM, 100% RB, 100 MHz, 16QAM, 120 kHz)	5G NR FR2 TDD	6.52	±9.6
10873	AAE	5G NR (DFT-s-OFDM, 1 RB, 100 MHz, 64QAM, 120 kHz)	5G NR FR2 TDD	6.61	±9.6
10874	AAE	5G NR (DFT-s-OFDM, 100% RB, 100 MHz, 64QAM, 120 kHz)	5G NR FR2 TDD	6.65	±9.6
10875	AAE	5G NR (CP-OFDM, 1 RB, 100 MHz, QPSK, 120 kHz)	5G NR FR2 TDD	7.78	±9.6
10876	AAE	5G NR (CP-OFDM, 100% RB, 100 MHz, QPSK, 120 kHz)	5G NR FR2 TDD	8.39	±9.6
10877	AAE	5G NR (CP-OFDM, 1 RB, 100 MHz, 16QAM, 120 kHz)	5G NR FR2 TDD	7.95	±9.6
10878	AAE	5G NR (CP-OFDM, 100% RB, 100 MHz, 16QAM, 120 kHz)	5G NR FR2 TDD	8.41	±9.6
10879	AAE	5G NR (CP-OFDM, 1 RB, 100 MHz, 64QAM, 120 kHz)	5G NR FR2 TDD	8.12	±9.6
10880	AAE	5G NR (CP-OFDM, 100% RB, 100 MHz, 64QAM, 120 kHz)	5G NR FR2 TDD	8.38	±9.6
10881	AAE	5G NR (DFT-s-OFDM, 1 RB, 50 MHz, QPSK, 120 kHz)	5G NR FR2 TDD	5.75	±9.6
10882	AAE	5G NR (DFT-s-OFDM, 100% RB, 50 MHz, QPSK, 120 kHz)	5G NR FR2 TDD	5.96	±9.6
10883	AAE	5G NR (DFT-s-OFDM, 1 RB, 50 MHz, 16QAM, 120 kHz)	5G NR FR2 TDD	6.57	±9.6
10884	AAE	5G NR (DFT-s-OFDM, 100% RB, 50 MHz, 16QAM, 120 kHz)	5G NR FR2 TDD	6.53	±9.6
10885	AAE	5G NR (DFT-s-OFDM, 1 RB, 50 MHz, 64QAM, 120 kHz)	5G NR FR2 TDD	6.61	±9.6
10886	AAE	5G NR (DFT-s-OFDM, 100% RB, 50 MHz, 64QAM, 120 kHz)	5G NR FR2 TDD	6.65	±9.6
10887	AAE	5G NR (CP-OFDM, 1 RB, 50 MHz, QPSK, 120 kHz)	5G NR FR2 TDD	7.78	±9.6
10888	AAE	5G NR (CP-OFDM, 100% RB, 50 MHz, QPSK, 120 kHz)	5G NR FR2 TDD	8.35	±9.6
10889	AAE	5G NR (CP-OFDM, 1 RB, 50 MHz, 16QAM, 120 kHz)	5G NR FR2 TDD	8.02	±9.6
10890	AAE	5G NR (CP-OFDM, 100% RB, 50 MHz, 16QAM, 120 kHz)	5G NR FR2 TDD	8.40	±9.6
10891	AAE	5G NR (CP-OFDM, 1 RB, 50 MHz, 64QAM, 120 kHz)	5G NR FR2 TDD	8.13	±9.6
10892	AAE	5G NR (CP-OFDM, 100% RB, 50 MHz, 64QAM, 120 kHz)	5G NR FR2 TDD	8.41	±9.6
10897	AAE	5G NR (DFT-s-OFDM, 1 RB, 5 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.66	±9.6
10898	AAC	5G NR (DFT-s-OFDM, 1 RB, 10 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.67	±9.6
10899	AAB	5G NR (DFT-s-OFDM, 1 RB, 15 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.67	±9.6
10900	AAC	5G NR (DFT-s-OFDM, 1 RB, 20 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.68	±9.6
10901	AAB	5G NR (DFT-s-OFDM, 1 RB, 25 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.68	±9.6
10902	AAC	5G NR (DFT-s-OFDM, 1 RB, 30 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.68	±9.6
10903	AAD	5G NR (DFT-s-OFDM, 1 RB, 40 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.68	±9.6
10904	AAC	5G NR (DFT-s-OFDM, 1 RB, 50 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.68	±9.6
10905	AAD	5G NR (DFT-s-OFDM, 1 RB, 60 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.68	±9.6
10906	AAD	5G NR (DFT-s-OFDM, 1 RB, 80 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.68	±9.6
10907	AAE	5G NR (DFT-s-OFDM, 50% RB, 5 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.78	±9.6
10908	AAC	5G NR (DFT-s-OFDM, 50% RB, 10 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.93	±9.6
10909	AAB	5G NR (DFT-s-OFDM, 50% RB, 15 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.96	±9.6
10910	AAC	5G NR (DFT-s-OFDM, 50% RB, 20 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.83	±9.6

UID	Rev	Communication System Name	Group	PAR (dB)	Unc^E $k = 2$
10911	AAB	5G NR (DFT-s-OFDM, 50% RB, 25 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.93	±9.6
10912	AAC	5G NR (DFT-s-OFDM, 50% RB, 30 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.84	±9.6
10913	AAD	5G NR (DFT-s-OFDM, 50% RB, 40 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.84	±9.6
10914	AAC	5G NR (DFT-s-OFDM, 50% RB, 50 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.85	±9.6
10915	AAD	5G NR (DFT-s-OFDM, 50% RB, 60 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.83	±9.6
10916	AAD	5G NR (DFT-s-OFDM, 50% RB, 80 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.87	±9.6
10917	AAD	5G NR (DFT-s-OFDM, 50% RB, 100 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.94	±9.6
10918	AAE	5G NR (DFT-s-OFDM, 100% RB, 5 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.86	±9.6
10919	AAC	5G NR (DFT-s-OFDM, 100% RB, 10 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.86	±9.6
10920	AAB	5G NR (DFT-s-OFDM, 100% RB, 15 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.87	±9.6
10921	AAC	5G NR (DFT-s-OFDM, 100% RB, 20 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.84	±9.6
10922	AAB	5G NR (DFT-s-OFDM, 100% RB, 25 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.82	±9.6
10923	AAC	5G NR (DFT-s-OFDM, 100% RB, 30 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.84	±9.6
10924	AAD	5G NR (DFT-s-OFDM, 100% RB, 40 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.84	±9.6
10925	AAC	5G NR (DFT-s-OFDM, 100% RB, 50 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.95	±9.6
10926	AAD	5G NR (DFT-s-OFDM, 100% RB, 60 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.84	±9.6
10927	AAD	5G NR (DFT-s-OFDM, 100% RB, 80 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.94	±9.6
10928	AAD	5G NR (DFT-s-OFDM, 1 RB, 5 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.52	±9.6
10929	AAD	5G NR (DFT-s-OFDM, 1 RB, 10 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.52	±9.6
10930	AAC	5G NR (DFT-s-OFDM, 1 RB, 15 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.52	±9.6
10931	AAC	5G NR (DFT-s-OFDM, 1 RB, 20 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.51	±9.6
10932	AAC	5G NR (DFT-s-OFDM, 1 RB, 25 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.51	±9.6
10933	AAC	5G NR (DFT-s-OFDM, 1 RB, 30 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.51	±9.6
10934	AAC	5G NR (DFT-s-OFDM, 1 RB, 40 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.51	±9.6
10935	AAD	5G NR (DFT-s-OFDM, 1 RB, 50 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.51	±9.6
10936	AAD	5G NR (DFT-s-OFDM, 50% RB, 5 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.90	±9.6
10937	AAD	5G NR (DFT-s-OFDM, 50% RB, 10 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.77	±9.6
10938	AAC	5G NR (DFT-s-OFDM, 50% RB, 15 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.90	±9.6
10939	AAC	5G NR (DFT-s-OFDM, 50% RB, 20 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.82	±9.6
10940	AAC	5G NR (DFT-s-OFDM, 50% RB, 25 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.89	±9.6
10941	AAC	5G NR (DFT-s-OFDM, 50% RB, 30 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.83	±9.6
10942	AAC	5G NR (DFT-s-OFDM, 50% RB, 40 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.85	±9.6
10943	AAD	5G NR (DFT-s-OFDM, 50% RB, 50 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.95	±9.6
10944	AAD	5G NR (DFT-s-OFDM, 100% RB, 5 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.81	±9.6
10945	AAD	5G NR (DFT-s-OFDM, 100% RB, 10 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.85	±9.6
10946	AAC	5G NR (DFT-s-OFDM, 100% RB, 15 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.83	±9.6
10947	AAC	5G NR (DFT-s-OFDM, 100% RB, 20 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.87	±9.6
10948	AAC	5G NR (DFT-s-OFDM, 100% RB, 25 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.94	±9.6
10949	AAC	5G NR (DFT-s-OFDM, 100% RB, 30 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.87	±9.6
10950	AAC	5G NR (DFT-s-OFDM, 100% RB, 40 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.94	±9.6
10951	AAD	5G NR (DFT-s-OFDM, 100% RB, 50 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.92	±9.6
10952	AAA	5G NR DL (CP-OFDM, TM 3.1, 5 MHz, 64-QAM, 15 kHz)	5G NR FR1 FDD	8.25	±9.6
10953	AAA	5G NR DL (CP-OFDM, TM 3.1, 10 MHz, 64-QAM, 15 kHz)	5G NR FR1 FDD	8.15	±9.6
10954	AAA	5G NR DL (CP-OFDM, TM 3.1, 15 MHz, 64-QAM, 15 kHz)	5G NR FR1 FDD	8.23	±9.6
10955	AAA	5G NR DL (CP-OFDM, TM 3.1, 20 MHz, 64-QAM, 15 kHz)	5G NR FR1 FDD	8.42	±9.6
10956	AAA	5G NR DL (CP-OFDM, TM 3.1, 5 MHz, 64-QAM, 30 kHz)	5G NR FR1 FDD	8.14	±9.6
10957	AAA	5G NR DL (CP-OFDM, TM 3.1, 10 MHz, 64-QAM, 30 kHz)	5G NR FR1 FDD	8.31	±9.6
10958	AAA	5G NR DL (CP-OFDM, TM 3.1, 15 MHz, 64-QAM, 30 kHz)	5G NR FR1 FDD	8.61	±9.6
10959	AAA	5G NR DL (CP-OFDM, TM 3.1, 20 MHz, 64-QAM, 30 kHz)	5G NR FR1 FDD	8.33	±9.6
10960	AAE	5G NR DL (CP-OFDM, TM 3.1, 5 MHz, 64-QAM, 15 kHz)	5G NR FR1 TDD	9.32	±9.6
10961	AAC	5G NR DL (CP-OFDM, TM 3.1, 10 MHz, 64-QAM, 15 kHz)	5G NR FR1 TDD	9.36	±9.6
10962	AAB	5G NR DL (CP-OFDM, TM 3.1, 15 MHz, 64-QAM, 15 kHz)	5G NR FR1 TDD	9.40	±9.6
10963	AAC	5G NR DL (CP-OFDM, TM 3.1, 20 MHz, 64-QAM, 15 kHz)	5G NR FR1 TDD	9.55	±9.6
10964	AAE	5G NR DL (CP-OFDM, TM 3.1, 5 MHz, 64-QAM, 30 kHz)	5G NR FR1 TDD	9.29	±9.6
10965	AAC	5G NR DL (CP-OFDM, TM 3.1, 10 MHz, 64-QAM, 30 kHz)	5G NR FR1 TDD	9.37	±9.6
10966	AAB	5G NR DL (CP-OFDM, TM 3.1, 15 MHz, 64-QAM, 30 kHz)	5G NR FR1 TDD	9.55	±9.6
10967	AAC	5G NR DL (CP-OFDM, TM 3.1, 20 MHz, 64-QAM, 30 kHz)	5G NR FR1 TDD	9.42	±9.6
10968	AAD	5G NR DL (CP-OFDM, TM 3.1, 100 MHz, 64-QAM, 30 kHz)	5G NR FR1 TDD	9.49	±9.6
10972	AAC	5G NR (CP-OFDM, 1 RB, 20 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	11.59	±9.6
10973	AAD	5G NR (DFT-s-OFDM, 1 RB, 100 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	9.06	±9.6
10974	AAD	5G NR (CP-OFDM, 100% RB, 100 MHz, 256-QAM, 30 kHz)	5G NR FR1 TDD	10.28	±9.6
10978	AAA	ULLA BDR	ULLA	1.16	±9.6
10979	AAA	ULLA HDR4	ULLA	8.58	±9.6
10980	AAA	ULLA HDR8	ULLA	10.32	±9.6
10981	AAA	ULLA HDRp4	ULLA	3.19	±9.6
10982	AAA	ULLA HDRp8	ULLA	3.43	±9.6

UID	Rev	Communication System Name	Group	PAR (dB)	Unc[E] k = 2
10983	AAC	5G NR DL (CP-OFDM, TM 3.1, 40 MHz, 64-QAM, 15 kHz)	5G NR FR1 TDD	9.31	±9.6
10984	AAB	5G NR DL (CP-OFDM, TM 3.1, 50 MHz, 64-QAM, 15 kHz)	5G NR FR1 TDD	9.42	±9.6
10985	AAC	5G NR DL (CP-OFDM, TM 3.1, 40 MHz, 64-QAM, 30 kHz)	5G NR FR1 TDD	9.54	±9.6
10986	AAB	5G NR DL (CP-OFDM, TM 3.1, 50 MHz, 64-QAM, 30 kHz)	5G NR FR1 TDD	9.50	±9.6
10987	AAC	5G NR DL (CP-OFDM, TM 3.1, 60 MHz, 64-QAM, 30 kHz)	5G NR FR1 TDD	9.53	±9.6
10988	AAB	5G NR DL (CP-OFDM, TM 3.1, 70 MHz, 64-QAM, 30 kHz)	5G NR FR1 TDD	9.38	±9.6
10989	AAC	5G NR DL (CP-OFDM, TM 3.1, 80 MHz, 64-QAM, 30 kHz)	5G NR FR1 TDD	9.33	±9.6
10990	AAB	5G NR DL (CP-OFDM, TM 3.1, 90 MHz, 64-QAM, 30 kHz)	5G NR FR1 TDD	9.52	±9.6
11003	AAA	5G NR DL (CP-OFDM, TM 3.1, 30 MHz, 64-QAM, 15 kHz)	5G NR FR1 TDD	10.24	±9.6
11004	AAA	5G NR DL (CP-OFDM, TM 3.1, 30 MHz, 64-QAM, 30 kHz)	5G NR FR1 TDD	10.73	±9.6
11005	AAA	5G NR DL (CP-OFDM, TM 3.1, 25 MHz, 64-QAM, 15 kHz)	5G NR FR1 FDD	8.70	±9.6
11006	AAA	5G NR DL (CP-OFDM, TM 3.1, 30 MHz, 64-QAM, 15 kHz)	5G NR FR1 FDD	8.55	±9.6
11007	AAA	5G NR DL (CP-OFDM, TM 3.1, 40 MHz, 64-QAM, 15 kHz)	5G NR FR1 FDD	8.46	±9.6
11008	AAA	5G NR DL (CP-OFDM, TM 3.1, 50 MHz, 64-QAM, 15 kHz)	5G NR FR1 FDD	8.51	±9.6
11009	AAA	5G NR DL (CP-OFDM, TM 3.1, 25 MHz, 64-QAM, 30 kHz)	5G NR FR1 FDD	8.76	±9.6
11010	AAA	5G NR DL (CP-OFDM, TM 3.1, 30 MHz, 64-QAM, 30 kHz)	5G NR FR1 FDD	8.95	±9.6
11011	AAA	5G NR DL (CP-OFDM, TM 3.1, 40 MHz, 64-QAM, 30 kHz)	5G NR FR1 FDD	8.96	±9.6
11012	AAA	5G NR DL (CP-OFDM, TM 3.1, 50 MHz, 64-QAM, 30 kHz)	5G NR FR1 FDD	8.68	±9.6
11013	AAB	IEEE 802.11be (320 MHz, MCS1, 99pc duty cycle)	WLAN	8.47	±9.6
11014	AAB	IEEE 802.11be (320 MHz, MCS2, 99pc duty cycle)	WLAN	8.45	±9.6
11015	AAB	IEEE 802.11be (320 MHz, MCS3, 99pc duty cycle)	WLAN	8.44	±9.6
11016	AAB	IEEE 802.11be (320 MHz, MCS4, 99pc duty cycle)	WLAN	8.44	±9.6
11017	AAB	IEEE 802.11be (320 MHz, MCS5, 99pc duty cycle)	WLAN	8.41	±9.6
11018	AAB	IEEE 802.11be (320 MHz, MCS6, 99pc duty cycle)	WLAN	8.40	±9.6
11019	AAB	IEEE 802.11be (320 MHz, MCS7, 99pc duty cycle)	WLAN	8.29	±9.6
11020	AAB	IEEE 802.11be (320 MHz, MCS8, 99pc duty cycle)	WLAN	8.27	±9.6
11021	AAB	IEEE 802.11be (320 MHz, MCS9, 99pc duty cycle)	WLAN	8.46	±9.6
11022	AAB	IEEE 802.11be (320 MHz, MCS10, 99pc duty cycle)	WLAN	8.36	±9.6
11023	AAB	IEEE 802.11be (320 MHz, MCS11, 99pc duty cycle)	WLAN	8.09	±9.6
11024	AAB	IEEE 802.11be (320 MHz, MCS12, 99pc duty cycle)	WLAN	8.42	±9.6
11025	AAB	IEEE 802.11be (320 MHz, MCS13, 99pc duty cycle)	WLAN	8.37	±9.6
11026	AAB	IEEE 802.11be (320 MHz, MCS0, 99pc duty cycle)	WLAN	8.39	±9.6

[E] Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

Calibration Laboratory of
Schmid & Partner
Engineering AG
Zeughausstrasse 43, 8004 Zurich, Switzerland

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
S Servizio svizzero di taratura
Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)
The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 0108

Client **UL**
Research Triangle Park, USA

Certificate No. **CLA13-1017_Mar24**

CALIBRATION CERTIFICATE

Object: CLA13 - SN: 1017

Calibration procedure(s): QA CAL-15.v11
Calibration Procedure for SAR Validation Sources below 700 MHz

Calibration date: March 07, 2024

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP2	SN: 104778	30-Mar-23 (No. 217-03804/03805)	Mar-24
Power sensor NRP-Z91	SN: 103244	30-Mar-23 (No. 217-03804)	Mar-24
Power sensor NRP-Z91	SN: 103245	30-Mar-23 (No. 217-03805)	Mar-24
Reference 20 dB Attenuator	SN: CC2552 (20x)	30-Mar-23 (No. 217-03809)	Mar-24
Type-N mismatch combination	SN: 310982 / 06327	30-Mar-23 (No. 217-03810)	Mar-24
Reference Probe EX3DV4	SN: 3877	10-Jan-24 (No. EX3-3877_Jan24)	Jan-25
DAE4	SN: 654	15-Jan-24 (No. DAE4-654_Jan24)	Jan-25

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter NRP2	SN: 107193	08-Nov-21 (in house check Dec-22)	In house check: Dec-24
Power sensor NRP-Z91	SN: 100922	15-Dec-09 (in house check Dec-22)	In house check: Dec-24
Power sensor NRP-Z91	SN: 100418	01-Jan-04 (in house check Dec-22)	In house check: Dec-24
RF generator HP 8648C	SN: US3642U01700	04-Aug-99 (in house check Jun-22)	In house check: Jun-24
Network Analyzer Agilent E8358A	SN: US41080477	31-Mar-14 (in house check Oct-22)	In house check: Oct-24

	Name	Function	Signature
Calibrated by:	Jeton Kastrati	Laboratory Technician	
Approved by:	Sven Kühn	Technical Manager	

Issued: March 8, 2024

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.

Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORM x,y,z
N/A	not applicable or not measured

Calibration is Performed According to the Following Standards:

a) IEC/IEEE 62209-1528, "Measurement Procedure For The Assessment Of Specific Absorption Rate Of Human Exposure To Radio Frequency Fields From Hand-Held And Body-Worn Wireless Communication Devices - Part 1528: Human Models, Instrumentation And Procedures (Frequency Range of 4 MHz to 10 GHz)", October 2020.
b) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

c) DASY System Handbook

Methods Applied and Interpretation of Parameters:

- *Measurement Conditions:* Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- *Antenna Parameters with TSL:* The source is mounted in a touch configuration below the center marking of the flat phantom.
- *Return Loss:* This parameter is measured with the source positioned under the liquid filled phantom (as described in the measurement condition clause). The Return Loss ensures low reflected power. No uncertainty required.
- *SAR measured:* SAR measured at the stated antenna input power.
- *SAR normalized:* SAR as measured, normalized to an input power of 1 W at the antenna connector.
- *SAR for nominal TSL parameters:* The measured TSL parameters are used to calculate the nominal SAR result.

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

Measurement Conditions

DASY system configuration, as far as not given on page 1.

DASY Version	DASY5	V52.10.4
Extrapolation	Advanced Extrapolation	
Phantom	ELI4 Flat Phantom	Shell thickness: 2 ± 0.2 mm
EUT Positioning	Touch Position	
Zoom Scan Resolution	dx, dy = 4.0 mm, dz = 1.4 mm	Graded Ratio = 1.4 (Z direction)
Frequency	13 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	55.0	0.75 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	53.5 ± 6 %	0.72 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	1 W input power	0.537 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**0.551 W/kg ± 18.4 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	1 W input power	0.335 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**0.344 W/kg ± 18.0 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	55.3 Ω + 6.7 jΩ
Return Loss	- 21.9 dB

Additional EUT Data

Manufactured by	SPEAG

Date: 07.03.2024

Test Laboratory: SPEAG, Zurich, Switzerland

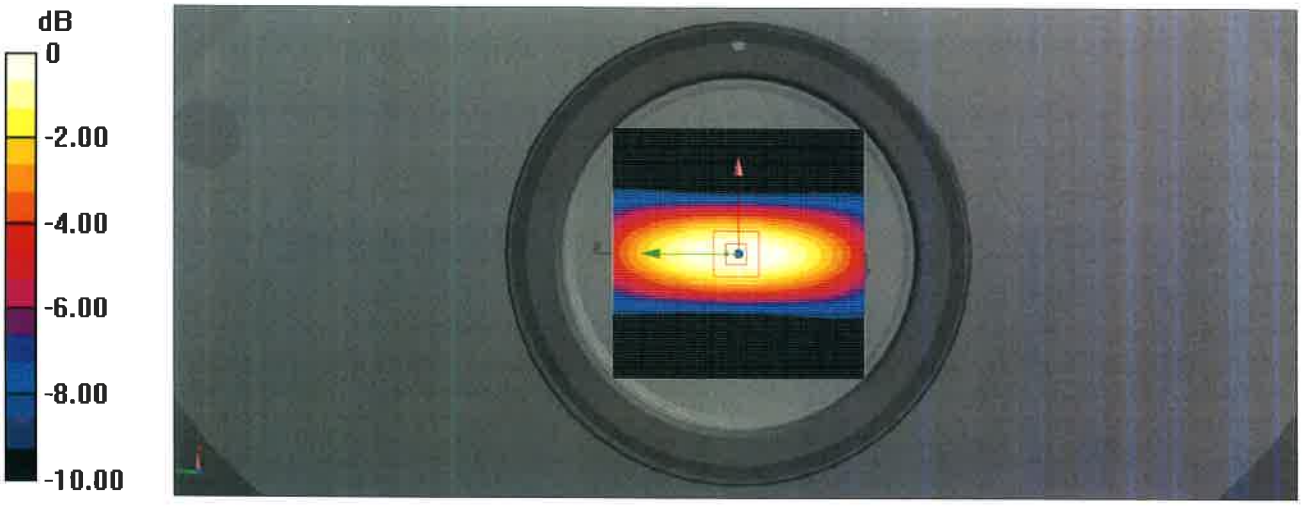
DUT: CLA13; Type: CLA13; Serial: CLA13 - SN: 1017

Communication System: UID 0 - CW; Frequency: 13 MHz
Medium parameters used: f = 13 MHz; σ = 0.72 S/m; ε_r = 53.5; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

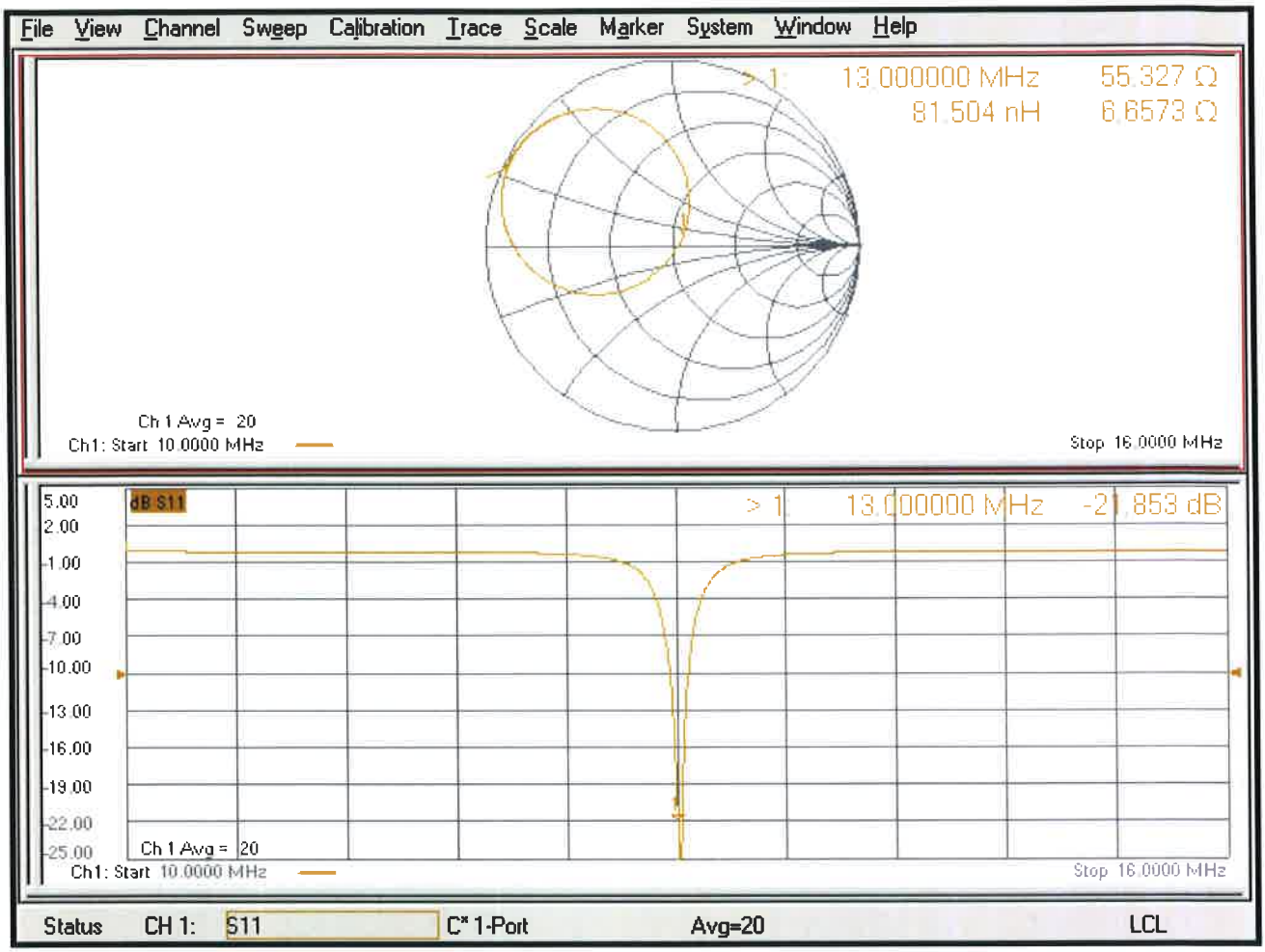
- Probe: EX3DV4 - SN3877; ConvF(15.33, 15.33, 15.33) @ 13 MHz; Calibrated: 10.01.2024
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn654; Calibrated: 15.01.2024
- Phantom: ELI v6.0; Type: QDOVA003AA; Serial: TP:2034
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7501)

CLA Calibration for HSL-LF Tissue/CLA-13, touch configuration, Pin=1W/Zoom Scan, dist=1.4mm (8x10x8)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 31.00 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 1.10 W/kg
SAR(1 g) = 0.537 W/kg; SAR(10 g) = 0.335 W/kg
Smallest distance from peaks to all points 3 dB below = 25.8 mm
Ratio of SAR at M2 to SAR at M1 = 77.8%
Maximum value of SAR (measured) = 0.790 W/kg



0 dB = 0.790 W/kg = -1.02 dBW/kg

Impedance Measurement Plot for Head TSL



Calibration Laboratory of
Schmid & Partner
Engineering AG
Zeughausstrasse 43, 8004 Zurich, Switzerland

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
C Servizio svizzero di taratura
S Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)
The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 0108

Client **UL**
Research Triangle Park, USA

Certificate No. **D2450V2-963_Oct24**

CALIBRATION CERTIFICATE

Object	D2450V2 - SN: 963
Calibration procedure(s)	QA CAL-05.v12 Calibration Procedure for SAR Validation Sources between 0.7 - 3 GHz
Calibration date	October 11, 2024

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI). The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID	Cal Date (Certificate No.)	Scheduled Cal
Power Sensor R&S NRP-33T	SN: 100967	28-Mar-24 (No. 217-04038)	Mar-25
Power Sensor R&S NRP18A	SN: 101859	22-Jul-24 (No. 4030A315008547)	Jul-25
Spectrum Analyzer R&S FSV40	SN: 101832	25-Jan-24 (No. 4030-315007551)	Jan-25
Mismatch; Short [S4188] Attenuator [S4423]	SN: 1152	28-Mar-24 (No. 217-04050)	Mar-25
OCP DAK-12	SN: 1016	24-Sep-24 (No. OCP-DAK12-1016_Sep24)	Sep-25
OCP DAK-3.5	SN: 1249	23-Sep-24 (No. OCP-DAK3.5-1249_Sep24)	Sep-25
Reference Probe EX3DV4	SN: 7349	03-Jun-24 (No. EX3-7349_Jun24)	Jun-25
DAE4ip	SN: 1836	10-Jan-24 (No. DAE4ip-1836_Jan24)	Jan-25

Secondary Standards	ID	Check Date (in house)	Scheduled Check
ACAD Source Box	SN: 1000	28-May-24 (No. 675-ACAD_Source_Box-240528)	May-25
Signal Generator R&S SMB100A	SN: 182081	28-May-24 (No. 675-CAL16-S4588-240528)	May-25
Mismatch; SMA	SN: 1102	22-May-24 (No. 675-Mismatch_SMA-240522)	May-25

	Name	Function	Signature
Calibrated by	Krešimir Franjić	Laboratory Technician	
Approved by	Sven Kühn	Technical Manager	

Issued: October 14, 2024

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.

Glossary

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORM x,y,z
N/A	not applicable or not measured

Calibration is Performed According to the Following Standards

- IEC/IEEE 62209-1528,"Measurement Procedure For The Assessment Of Specific Absorption Rate Of Human Exposure To Radio Frequency Fields From Hand-Held And Body-Worn Wireless Communication Devices - Part 1528: Human Models, Instrumentation And Procedures (Frequency Range of 4 MHz to 10 GHz)", October 2020.
- KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation

- DASY System Handbook

Methods Applied and Interpretation of Parameters

- *Measurement Conditions*: Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- *Antenna Parameters with TSL*: The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- *Feed Point Impedance and Return Loss*: These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- *Electrical Delay*: One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- *SAR measured*: SAR measured at the stated antenna input power.
- *SAR normalized*: SAR as measured, normalized to an input power of 1 W at the antenna connector.
- *SAR for nominal TSL parameters*: The measured TSL parameters are used to calculate the nominal SAR result.

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

Measurement Conditions

DASY system configuration, as far as not given on page 1.

DASY Version	DASY8 Module SAR	16.4.0
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with spacer
Zoom Scan Resolution	dx, dy = 5mm, dz = 1.5mm	Graded Ratio = 1.5 mm (Z direction)
Frequency	2450MHz ±1MHz	

Head TSL parameters at 2450 MHz

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	39.2	1.80 mho/m
Measured Head TSL parameters	(22.0 ±0.2)°C	37.7 ±6%	1.82 mho/m ±6%
Head TSL temperature change during test	< 0.5 °C		

SAR result with Head TSL at 2450 MHz

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR for nominal Head TSL parameters	24 dBm input power	13.2 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	52.6 W/kg ±17.0% (k = 2)

SAR averaged over 10 cm^3 (10 g) of Head TSL	Condition	
SAR for nominal Head TSL parameters	24 dBm input power	6.14 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	24.4 W/kg ±16.5% (k = 2)

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL at 2450 MHz

Impedance	55.2 Ω + 2.7 jΩ
Return Loss	-25.1 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.16 ns

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured. The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard. No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG

System Performance Check Report

Summary

Dipole	Frequency [MHz]	TSL	Power [dBm]
D2450V2 - SN963	2450	HSL	24

Exposure Conditions

Phantom Section, TSL	Test Distance [mm]	Band	Group, UID	Frequency [MHz], Channel Number	Conversion Factor	TSL Conductivity [S/m]	TSL Permittivity
Flat	10		CW, 0--	2450, 0	7.24	1.82	37.7

Hardware Setup

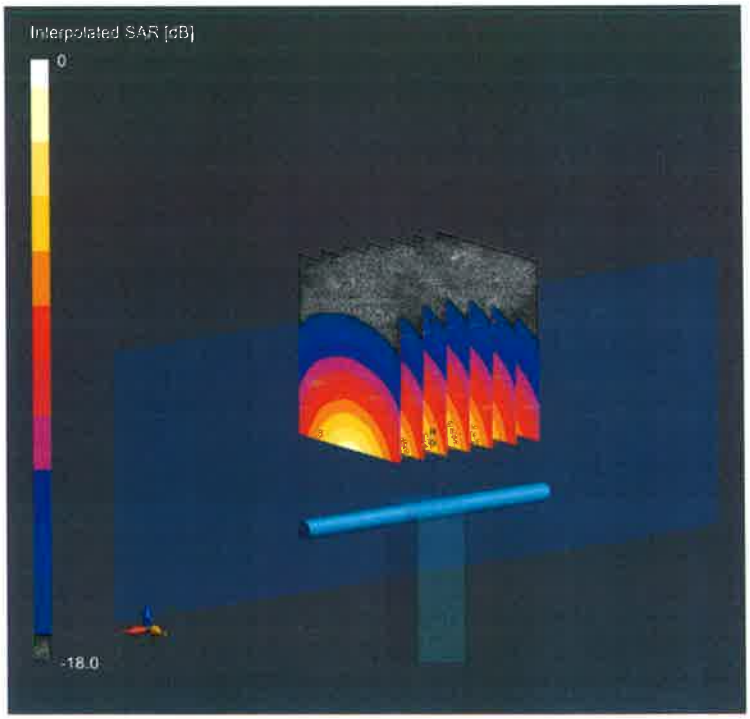
Phantom	TSL, Measured Date	Probe, Calibration Date	DAE, Calibration Date
MFP V8.0 Center	HSL, 2024-10-11	EX3DV4 - SN7349, 2024-06-03	DAE4ip Sn1836, 2024-01-10

Scans Setup

	Zoom Scan
Grid Extents [mm]	30 x 30 x 30
Grid Steps [mm]	5.0 x 5.0 x 1.5
Sensor Surface [mm]	1.4
Graded Grid	Yes
Grading Ratio	1.5
MAIA	N/A
Surface Detection	VMS + 6p
Scan Method	Measured

Measurement Results

	Zoom Scan
Date	2024-10-11
psSAR1g [W/Kg]	13.2
psSAR10g [W/Kg]	6.14
Power Drift [dB]	0.01
Power Scaling	Disabled
Scaling Factor [dB]	
TSL Correction	Positive / Negative



0 dB = 27.3 W/Kg

Impedance Measurement Plot for Head TSL