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

09-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: Venu 2

	Información (Information)
Tipo de equipo (Equipment type)	Portable Digital Transceiver
Marca (Brand)	Garmin GARMIN
Modelo (Model)	A03948
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 0.6 dBi / 802.15.1 0.6 dBi / 802.15.1 0.6 dBi / BLE 0.6 dBi / 802.11b/g/n 0.6 dBi
P.i.r.e. (E.I R P.)	-61.12 dBm, 0.00 mW /-7.57 dBm, 0.17 mW / -7.96 dBm, 0.16 mW /8.12 dBm, 6.48 mW / -8.72 dBm, 0.13 mW / 16.50 dBm, 44.66 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 Serial Number:	**45461625 R2.0**
Test Report Date:	**11 February 2021**
Project Number:	**1510**

EMC Test Report - New Certification

Applicant:

Garmin International Inc.
1200 East 151 St
Olathe, KS, 66062
USA

FCC ID:	IC Registration Number
IPH-03948	**1792A-03948**
Product Model Number / HVIN	Product Marketing Name / PMN
A03948	**A03948**

In Accordance With:

CFR Title 47, Part 15 Subpart C (§15.247), Part 15 Subpart B

Digital Transmission System (DTS)

RSS-Gen, RSS-247 Issue 2

Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices

Approved By:

Ben Hewson, President
Celltech Labs Inc.
21-364 Lougheed Rd.
Kelowna, BC, V1X 7R8
Canada

Test Lab Certificate: 2470.01 **IC Registration 3874A-1** **FCC Registration: CA3874**

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1.0 DOCUMENT CONTROL

Revision History					
Samples Tested By:		Art Voss, P.Eng.	Date(s) of Evaluation:		18 Nov - 4 Dec, 2020
Report Prepared By:		Art Voss, P.Eng.	Report Reviewed By:		Ben Hewson
Report Revision	Description of Revision		Revised Section	Revised By	Revision Date
0.1	Initial Draft Release		n/a	Art Voss	4 December 2020
0.2	Corrected Table 7.1, Plot 8.10		7.0, 8.0	Art Voss	21 December 2020
1.0	Initial Release		n/a	Art Voss	10 February 2021
2.0	Revised Section 20.0		20	Art Voss	11 February 2021

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2.0 CLIENT AND DUT INFORMATION

Client Information		
Applicant Name	Garmin International Inc.	
Applicant Address	1200 East 151 St	
	Olathe, KS, 66062	
	USA	
DUT Information		
Device Identifier(s):	FCC ID:	IPH-03948
	ISED ID:	1792A-03948
Device Model(s) / HVIN:	A03948	
Test Sample Serial No.:	3326988634 - Conducted, 3326988670 - OTA/SAR	
Device Type:	Extremity Worn Digital Transceiver	
FCC Equipment Class:	WiFi - Digital Transmission System (DTS)	
	BlueTooth - Spread Spectrum Transmitter (DSS)	
	BlueTooth LE/ANT - Low Power Communication Device Transmitter (DXX)	
	NFC - Low Power Communication Device Transmitter (DXX)	
ISED Equipment Class:	WiFi: Wi-Fi Device	
	BlueTooth: Spread Spectrum/Digital Device (2400-2483.5MHz)	
	BlueTooth LE/ANT - Low Power Device (2400-2483.5MHz)	
	NFC - RFID Device	
Transmit Frequency Range:	WiFi (DTS): 2412-2462MHz	
	BT/BLE/ANT: 2402-2480MHz	
	NFC: 13.56MHz	
Manuf. Max. Rated Output Power:	WiFi - Digital Transmission System (DTS): 17.52dBm	
	BlueTooth - Spread Spectrum Transmitter (DSS): 9.42dBm	
	BLE/ANT - Low Power Communication Device Transmitter (DXX): 4dBm	
	NFC - Low Power Communication Device Transmitter (DXX): -36dBm	
Antenna Type and Gain:	0.6dBi Max*	
Modulation:	WiFi: DSSS, OFDM, CCK, MCS0-7	
Modulation:	BT BR: GFSK	
Modulation:	BT EDR 2Mb: Pi/4-DQPSK, BT EDR 3Mb: 8-DPSK	
Modulation:	BLE: GMSK	
Modulation:	ANT: GFSK	
Modulation:	NFC:	
DUT Power Source:	3VDC Rechargeable Li-Ion	
DUT Dimensions [LxWxH]	H x W x D: 50mm x 45mm x 18mm	
Deviation(s) from standard/procedure:	None	
Modification of DUT:	None	

* Information regarding antenna type and gain provided by applicant.

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3.0 SCOPE

Preface:

This Certification Report was prepared on behalf of:

Garmin International Inc.

,(the '*Applicant*''), in accordance with the applicable Federal Communications Commission (FCC) CFR 47 and Innovation, Scientific and Economic Development (ISED) Canada rules parts and regulations (the '*Rules*'). The scope of this investigation was limited to only the equipment, devices and accessories (the '*Equipment*') supplied by the *Applicant*. The tests and measurements performed on this *Equipment* were only those set forth in the applicable *Rules* and/or the Test and Measurement Standards they reference. The *Rules* applied and the Test and Measurement Standards used during this evaluation appear in the Normative References section of this report. The limits set forth in the technical requirements of the applicable *Rules* were applied to the measurement results obtained during this evaluation and ,unless otherwise noted, these limits were used as the Pass/Fail criteria. The Pass/Fail statements made in this report apply to only the tests and measurements performed on only the *Equipment* tested during this evaluation. Where applicable and permissible, information including test and measurement data and/or results from previous evaluations of same or similar equipment, devices and/or accessories may be cited in this report.

Device:

The Garmin Model/HVIN: A03948 is an extremity worn digital transceiver device consisting of a WiFi, BlueTooth (BT), BlueTooth Low Energy (BLE), Adaptive Network Topology (ANT) and Near Field Communication (NFC) transceivers. The WiFi and BT/BLE/ANT transceivers share the same antenna and cannot simultaneously transmit.

Requirement:

The transceivers of this *equipment* are subject to emissions evaluation in accordance with FCC: 47 CFR 2, 15C, ISED: RSS-Gen, RSS-210 and RSS-247. As per FCC 47 CFR §2.1093 and Health Canada Safety Code 6, an RF Exposure (SAR) evaluation is required for this *Equipment* and the results of the RF Exposure (SAR) evaluation appear in a separate report.

Application:

This is an application for a New Certification.

Scope:

The scope of this investigation is limited to the evaluation and reporting of the wanted and spurious emissions in accordance with the rule parts cited in Normative References section of this report.

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4.0 TEST SUMMARY

TEST SUMMARY						
Section	**Description of Test**	**Procedure Reference**	**Applicable Rule Part(s) FCC**	**Applicable Rule Part(s) ISED**	**Test Date**	**Result**
7.0	Occupied Bandwidth	ANSI C63.10-2013 KDB 558074 D01v05	§2.1049	RSS-Gen (6.7)	18 Nov 2020	Pass
8.0	DTS Bandwidth	ANSI C63.10-2013 KDB 558074 D01v05	§15.247(a)(2)	RSS-Gen (6.7) RSS-247 (5.2)(a)	19 Nov 2020	Pass
9.0	Duty Cycle and Transmission Duration	ANSI C63.10-2013 KDB 558074 D01v05	n/a	n/a	19, 30 Nov 2020	n/a
10.0	Conducted Power (Fundamental)	ANSI C63.10-2013 KDB 558074 D01v05	§2.1046 §15.247(b)(3)	RSS-Gen (6.12) RSS-247 (5.4)(d)	19 Nov 2020	Pass
11.0	Conducted Power (Fundamental)	ANSI C63.10-2013 KDB 558074 D01v05	§2.1046 §15.247(b)(1)	RSS-Gen (6.12) RSS-247 (5.4)(b)	30 Nov 2020	Pass
12.0	Power Spectral Density	ANSI C63.10-2013 KDB 558074 D01v05	§15.247(e)	RSS-247 (5.2)(b)	19, 30 Nov 2020	Pass
13.0	FHSS Hopping Channels	ANSI C63.4-2014 KDB 558074 D01v05	§15.247(a)(1)(iii)	RSS-247 (5.1)(d)	1 Dec 2020	Pass
14.0	FHSS Channel Separation	ANSI C63.4-2014 KDB 558074 D01v05	§15.247(a)(1)	RSS-247 (5.1)(b)	1 Dec 2020	Pass
15.0	FHSS Time of Occupancy	ANSI C63.4-2014 KDB 558074 D01v05	§15.247(a)(1)(iii)	RSS-247 (5.1)(d)	1 Dec 2020	Pass
16.0	Conducted Tx Spurious Emissions Band Edge	ANSI C63.10-2013 KDB 558074 D01v05	§2.1051 §15.247(d)	RSS-Gen (6.13) RSS-247 (5.5)	19, 30 Nov 2020	Pass
17.0	Conducted Tx Spurious Emissions	ANSI C63.10-2013 KDB 558074 D01v05	§2.1051 §15.247(d)	RSS-Gen (6.13) RSS-247 (5.5)	19, 30 Nov 2020	Pass
18.0	Radiated Tx Spurious Emissions And Restricted Band	ANSI C63.4-2014 KDB 558074 D01v05	§15.109 §15.247(d)	RSS-Gen (6.13)	20, 23 Nov 2020	Pass
19.0	Radiated Rx Spurious Emissions	ANSI C63.4-2014 KDB 558074 D01v05	§15.109	RSS-Gen (7.4) ICES-003(6.2)	20, 23 Nov 2020	Pass
20.0	Power Line Conducted Emissions	ANSI C63.4-2014	§15.107	ICES-003(6.1)	3 Feb 2021	Pass

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Test Station Day Log					
Date	**Ambient Temp (°C)**	**Relative Humidity (%)**	**Barometric Pressure (kPa)**	**Test Station**	**Tests Performed Section(s)**
18 Nov 2020	24.0	15	100.3	**EMC**	**8**
19 Nov 2020	22.5	16	101.8	**EMC**	**7,9,10,11,12,13**
20 Nov 2020	4.0	75	103.0	**OATS**	**15,16**
23 Nov 2020	2.0	87	101.5	**OATS**	**15,16**
30 Nov 2020	23.0	16	101.6	**EMC**	**7,10,11,12,13**
3 Dec 2020	24.0	15	103.1	**TC**	**17**
18 Dec 2020	22.8	16	101.3	**SAC**	**18**
22 Dec 2020	20.8	17	101.3	**ESD**	**19**
3 Feb 2021	20.2	15	102.4	**LISN**	**20**

EMC - EMC Test Bench
OATS - Open Area Test Site
LISN - LISN Test Area
IMM - Immunity Test Area
SAC - Semi-Anechoic Chamber
TC - Temperature Chamber
ESD - ESD Test Bench
RI - Radiated Immunity Chamber

I attest that the data reported herein is true and accurate within the tolerance of the Measurement Instrument Uncertainty; that all tests and measurements were performed in accordance with accepted practices or procedures; and that all tests and measurements were performed by me or by trained personnel under my direct supervision. The results of this investigation are based solely on the test sample(s) provided by the client which were not adjusted, modified or altered in any manner whatsoever, except as required to carry out specific tests or measurements. This test report has been completed in accordance with ISO/IEC 17025.

Art Voss, P.Eng.
Technical Manager
Celltech Labs Inc.

10 February 2021
Date

PROFESSIONAL ENGINEER — PROVINCE OF BRITISH COLUMBIA — A. F. VOSS # 31327

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5.0 NORMATIVE REFERENCES

Normative References	
ISO/IEC 17025:2017	General requirements for the competence of testing and calibration laboratories
ANSI C63.10-2013	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices
CFR Title 47: Part 2:	Code of Federal Regulations Telecommunication Frequency Allocations and Radio Treaty Matters; General Rules and Regulations
CFR Title 47: Part 15: Sub Part C (15.247)	Code of Federal Regulations Telecommunication Radio Frequency Devices Intentional Radiators
CFR Title 47: Part 15: Subpart B:	Code of Federal Regulations Telecommunication Radio Frequency Devices Unintentional Radiators
FCC KDB 558074 D01v05r02	OET Major Guidance Publications, Knowledge Data Base Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under Section 15.247
ISED RSS-Gen Issue 5: Amendment 1: March 2019	Innovation, Science and Economic Development Canada Spectrum Management and Telecommunications Radio Standards Specification General Requirements and Information for the Certification of Radiocommunication Equipment
ISED RSS-247 Issue 2: February 2017	Innovation, Science and Economic Development Canada Spectrum Management and Telecommunications Radio Standards Specification Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licensed-Exempt Local Area Network (LE_LAN) Devices

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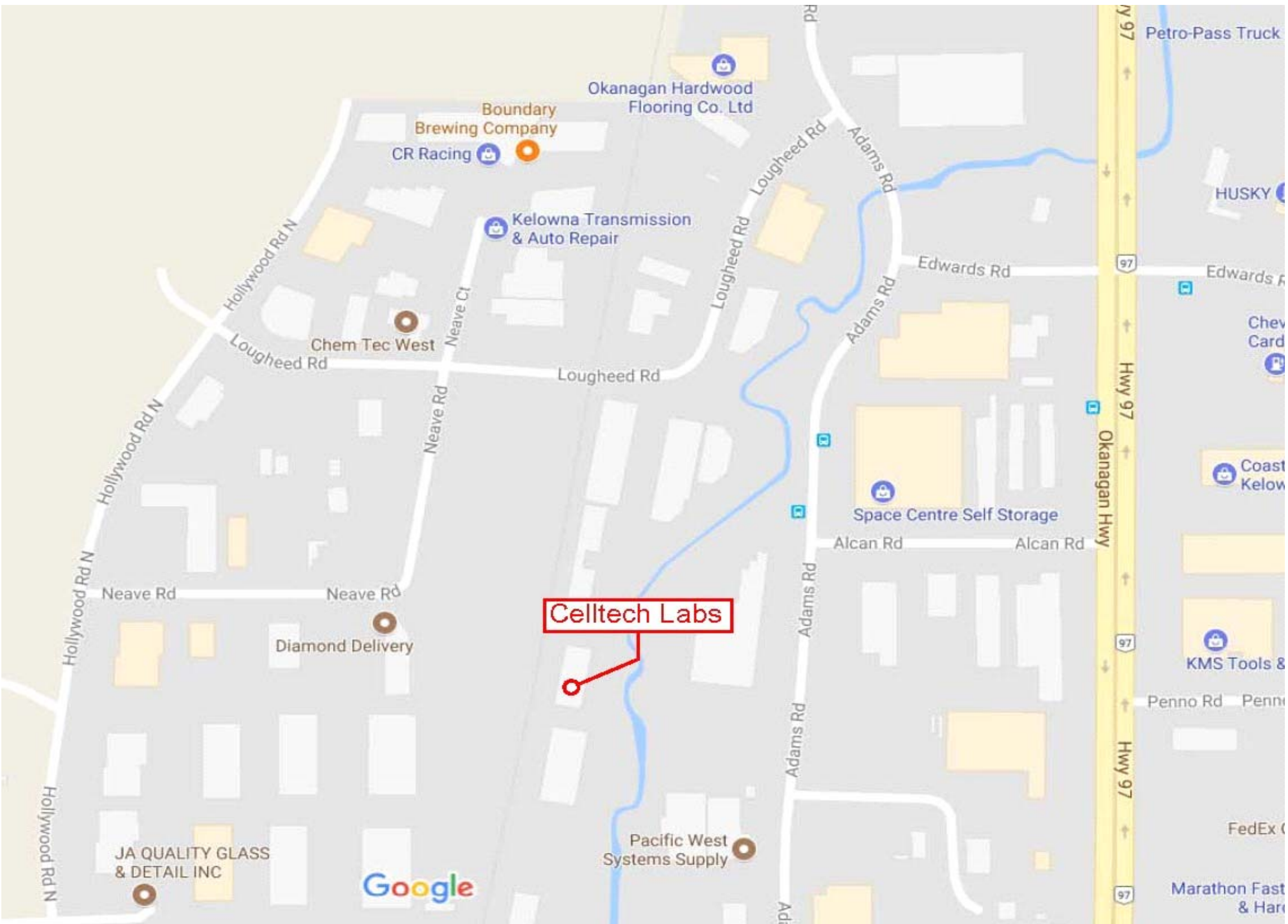
6.0 FACILITIES AND ACCREDITATIONS

Facility and Accreditation:

The facilities used to evaluate this device outlined in this report are located at 21-364 Lougheed Road, Kelowna, British Columbia, Canada V1X 7R8. The radiated emissions site (OATS) conforms to the requirements set forth in ANSI C63.4 and is filed and listed with the FCC under Test Firm Registration Number CA3874 and Innovation, Science and Economic Development Canada under Test Site File Number ISED 3874A-1. Celltech is accredited to ISO 17025, through accrediting body A2LA and with certificate 2470.01.



7.0 OCCUPIED BANDWIDTH

Test Procedure	
Normative Reference	**FCC 47 CFR §2.1046, §15.247(b)(3), RSS-Gen (6.1.2), RSS-247 (5.4)(d), KDB 558074 (8.3.2.1), ANSI C63.10 (6.9.3)**

General Procedure	
KDB 558074 (8.3.2.1)	**8.3.2.1 General** Section 15.247 permits the maximum conducted (average) output power to be measured as an alternative to the maximum peak conducted output power for demonstrating compliance to the limit. When this option is exercised, the measured power is to be referenced to the OBW rather than the DTS bandwidth.
C63.10 (6.9.3)	**6.9.3 Occupied bandwidth—power bandwidth (99%) measurement procedure** The occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers are each equal to 0.5% of the total mean power of the given emission. The following procedure shall be used for measuring 99% power bandwidth: a) The instrument center frequency is set to the nominal EUT channel center frequency. The frequency span for the spectrum analyzer shall be between 1.5 times and 5.0 times the OBW. b) The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW, and VBW shall be approximately three times the RBW, unless otherwise specified by the applicable requirement. c) Set the reference level of the instrument as required, keeping the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope shall be more than [10 log (OBW/RBW)] below the reference level. Specific guidance is given in 4.1.5.2. d) Step a) through step c) might require iteration to adjust within the specified range. e) Video averaging is not permitted. Where practical, a sample detection and single sweep mode shall be used. Otherwise, peak detection and max hold mode (until the trace stabilizes) shall be used. f) Use the 99% power bandwidth function of the instrument (if available) and report the measured bandwidth.

Test Setup	Appendix A - Figure A.1

Measurement Procedure
The DUT was connected to a Spectrum Analyzer (SA) via a 30dB attenuator connected to the DUT's antenna port. The SA was configured as described above using the 99% Occupied Bandwidth function. The output power of the DUT was set to the manufacturer's highest output power setting at the Low, Mid and High frequency channels as permitted by the device. The DUT was set to transmit at its maximum Duty Cycle. The 99% Occupied Bandwidth was measured and recorded and used for the basis for measuring the Conducted Output Power (See Section 10.0) and Power Spectral Density (See Section 11.0).

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Table 7.1 – Summary of Occupied Bandwidth Measurements (DTS)

See Appendix D for Measurement Plots

Occupied Bandwidth Measurement Results (DTS)						
Frequency (MHz)	Modulation	Data Rate (Mbps)	Measured Occupied Bandwidth (MHz)	Minimum Authorized Bandwidth (MHz)	Margin (MHz)	Emission Designator
2412	CCK	1	14.1	0.5	13.6	14M1D1D
2417	CCK	1	14.1		13.6	14M1D1D
2437	CCK	1	14.2		13.7	14M2D1D
2457	CCK	1	14.2		13.7	14M2D1D
2462	CCK	1	14.0		13.5	14M0D1D
2417	CCK	2	14.0		13.5	14M0D1D
2437	CCK	2	14.2		13.7	14M2D1D
2457	CCK	2	14.2		13.7	14M2D1D
2417	DSSS	5.5	13.7		13.2	13M7D1D
2437	DSSS	5.5	13.9		13.4	13M9D1D
2457	DSSS	5.5	13.8		13.3	13M8D1D
2417	DSSS	11	13.8		13.3	13M8D1D
2437	DSSS	11	14.0		13.5	14M0D1D
2457	DSSS	11	13.9		13.4	13M9D1D
2417	OFDM	6	16.8		16.3	16M8D1D
2437	OFDM	6	17.0		16.5	17M0D1D
2457	OFDM	6	16.8		16.3	16M8D1D
2417	OFDM	9	16.8		16.3	16M8D1D
2437	OFDM	9	17.0		16.5	17M0D1D
2457	OFDM	9	16.8		16.3	16M8D1D
2437	OFDM	12	16.9		16.4	16M9D1D
2437	OFDM	18	16.9		16.4	16M9D1D
2437	OFDM	24	16.8		16.3	16M8D1D
2437	OFDM	36	16.8		16.3	16M8D1D
2437	OFDM	48	16.8		16.3	16M8D1D
2437	OFDM	54	16.8		16.3	16M8D1D
2437	MCS0	-	17.9		17.4	17M9D1D
2437	MCS1	-	17.8		17.3	17M8D1D
2437	MCS3	-	17.9		17.4	17M9D1D
2437	MCS7	-	17.9		17.4	17M9D1D
						Complies

Margin = Measured BW - Minimum Authorized BW

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Table 7.2 – Summary of Occupied Bandwidth Measurements (DSS)

See Appendix D for Measurement Plots

Occupied Bandwidth Measurement Results (DSS)						
Frequency (MHz)	Modulation	Data Rate (Mbps)	Measured Occupied Bandwidth (MHz)	Minimum Authorized Bandwidth (MHz)	Margin (kHz)	Emission Designator
2402	Pi/4-DQPSK	2	1.3	0.5	0.8	1M32D1D
2442	Pi/4-DQPSK	2	1.3		0.8	1M33D1D
2480	Pi/4-DQPSK	2	1.3		0.8	1M30D1D
2402	8-DPSK	3	1.3		0.8	1M31D1D
2442	8-DPSK	3	1.3		0.8	1M33D1D
2480	8-DPSK	3	1.3		0.8	1M30D1D
						Complies

Margin = Measured BW - Minimum Authorized BW

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8.0 DTS BANDWIDTH

Test Procedure	
Normative Reference	**FCC 47 CFR §2.1049, §15.247(a)(2), RSS-Gen (6.7), RSS-247 (5.2)(a),** **KDB 558074 (8.2), ANSI C63.10 (11.8.2)**

Limits	
47 CFR §15.247(a)(2)	(a) Operation under the provisions of this Section is limited to frequency hopping and digitally modulated intentional radiators that comply with the following provisions: (2) Systems using digital modulation techniques may operate in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.
RSS-247 (5.2)(a)	5.2 Digital transmission systems DTSs include systems that employ digital modulation techniques resulting in spectral characteristics similar to direct sequence systems. The following applies to the bands 902-928 MHz and 2400 - 2483.5 MHz: a) The minimum 6 dB bandwidth shall be 500 kHz.
KDB 558074 (8.2) C63.10 (11.8.2)	**8.2 Option 2** The automatic bandwidth measurement capability of an instrument may be employed using the X dB bandwidth mode with X set to 6 dB, if the functionality described above (i.e., RBW = 100 kHz, VBW ≥ 3 X RBW, peak detector with maximum hold) is implemented by the instrumentation function. When using this capability, care shall be taken so that the bandwidth measurement is not influenced by any intermediate power nulls in the fundamental emission that might be ≥ 6 dB.
Test Setup	**Appendix A** **Figure A.1**

Measurement Procedure
The DUT was connected to a Spectrum Analyzer (SA) via a 30dB attenuator connected to the DUT's antenna port. The SA was configured as above using the Automatic 6dB Cursor Bandwidth measurement. The output power of the DUT was set to the manufacturer's highest output power setting at the Low, Mid and High frequency channels as permitted by the device. The DUT was set to transmit at 100% Duty Cycle.

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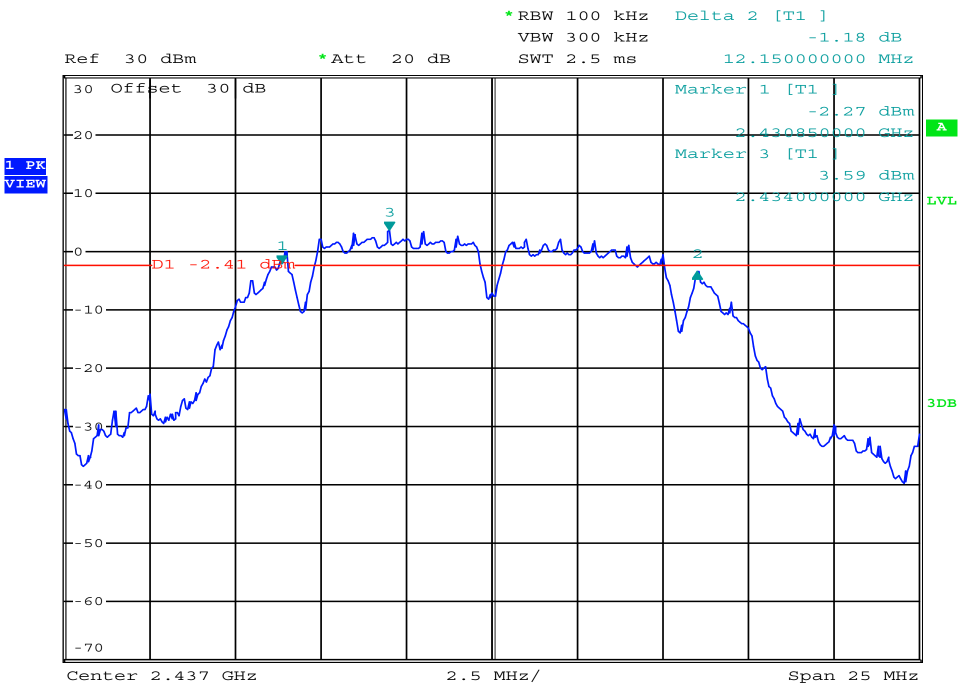
Plot 8.1 – 6dB DTS Bandwidth 802.11b

DTS Bandwidth



Date: 2.DEC.2020 10:55:50

Channel Frequency:		
2437.00 MHz		
DUT Modulation: **DSSS**	Data Rate: **1** Mbps	Measured DTS Bandwidth: **12.15** MHz

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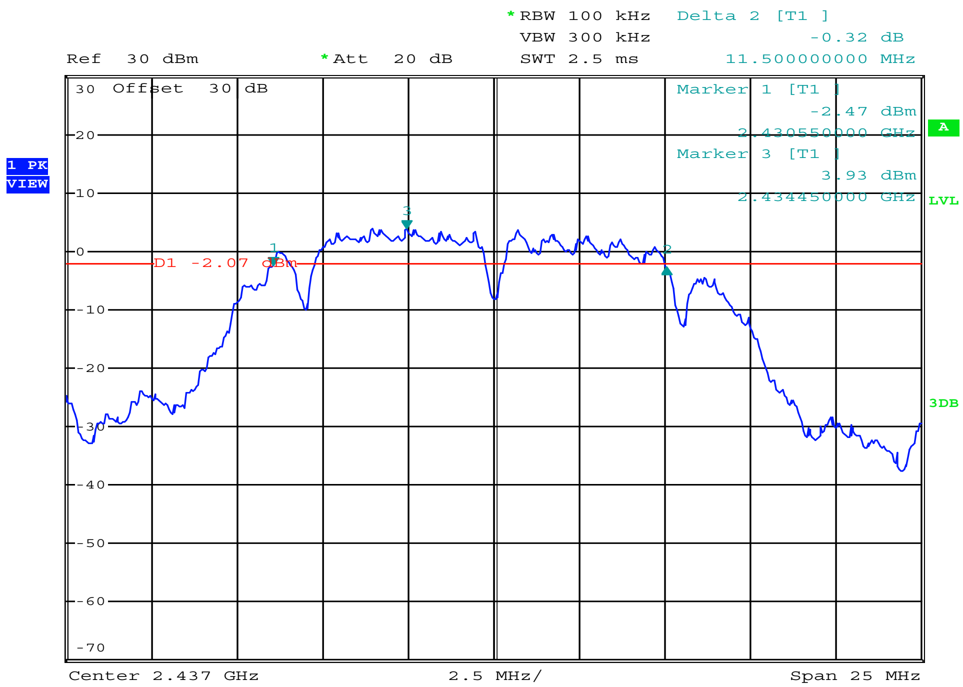
Plot 8.2 – 6dB DTS Bandwidth 802.11b

DTS Bandwidth



Date: 2.DEC.2020 10:54:08

Channel Frequency: **2437.00** MHz		
DUT Modulation: **DSSS**	Data Rate: **2.0** Mbps	Measured DTS Bandwidth: **11.50** MHz

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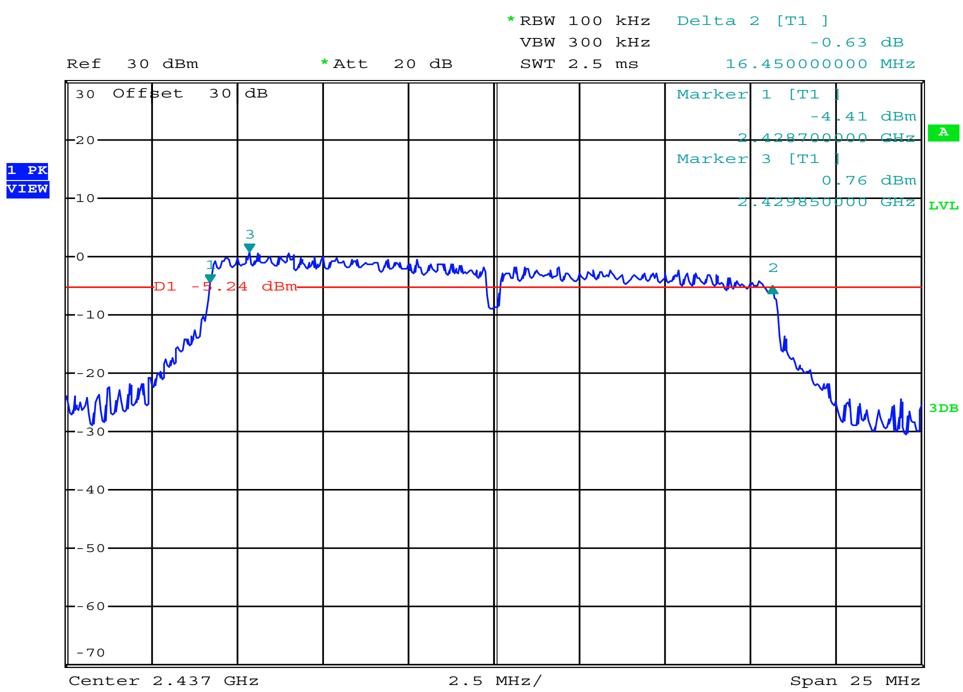
Plot 8.3 – 6dB DTS Bandwidth 802.11g

DTS Bandwidth



Date: 2.DEC.2020 10:57:55

Channel Frequency:		
2437.00 MHz		
DUT Modulation:	Data Rate:	Measured DTS Bandwidth:
OFDM	**9** Mbps	**16.45** MHz

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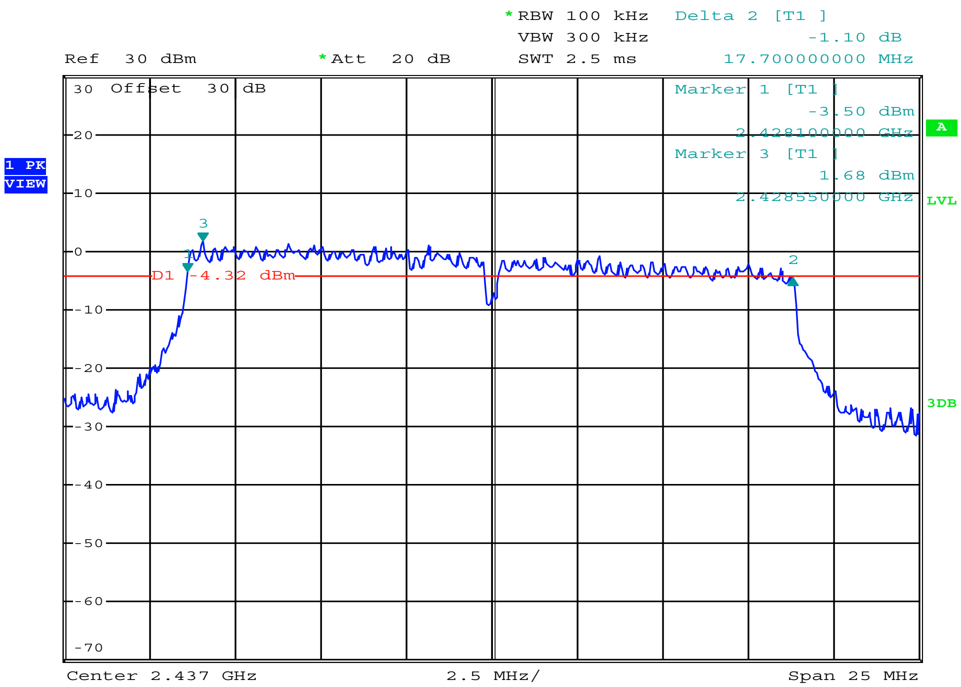
Plot 8.4 – 6dB DTS Bandwidth 802.11n

DTS Bandwidth



Date: 2.DEC.2020 11:00:41

Channel Frequency: **2437.00** MHz		
DUT Modulation: **MCS0**	Data Rate: **-** Mbps	Measured DTS Bandwidth: **17.70** MHz

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Table 8.1 – Summary of 6dB DTS Bandwidth Measurements, (WiFi)

DTS Bandwidth Measurement Results (DTS)			
Frequency (MHz)	Modulation	Data Rate (Mbps)	Measured Occupied Bandwidth (MHz)
2437	DSSS	1	12.2
2437	DSSS	2	11.5
2437	OFDM	9	16.5
2437	MCS0	-	17.7
			Complies

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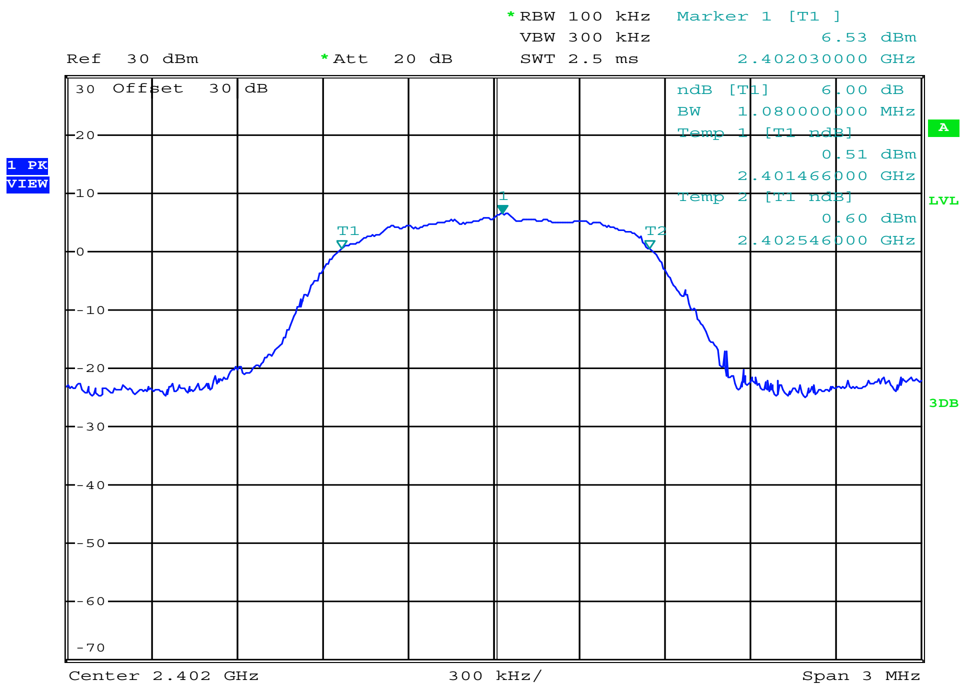
Plot 8.5 – 6dB DTS Bandwidth BT EDR 2MB, 2402MHz

DTS Bandwidth

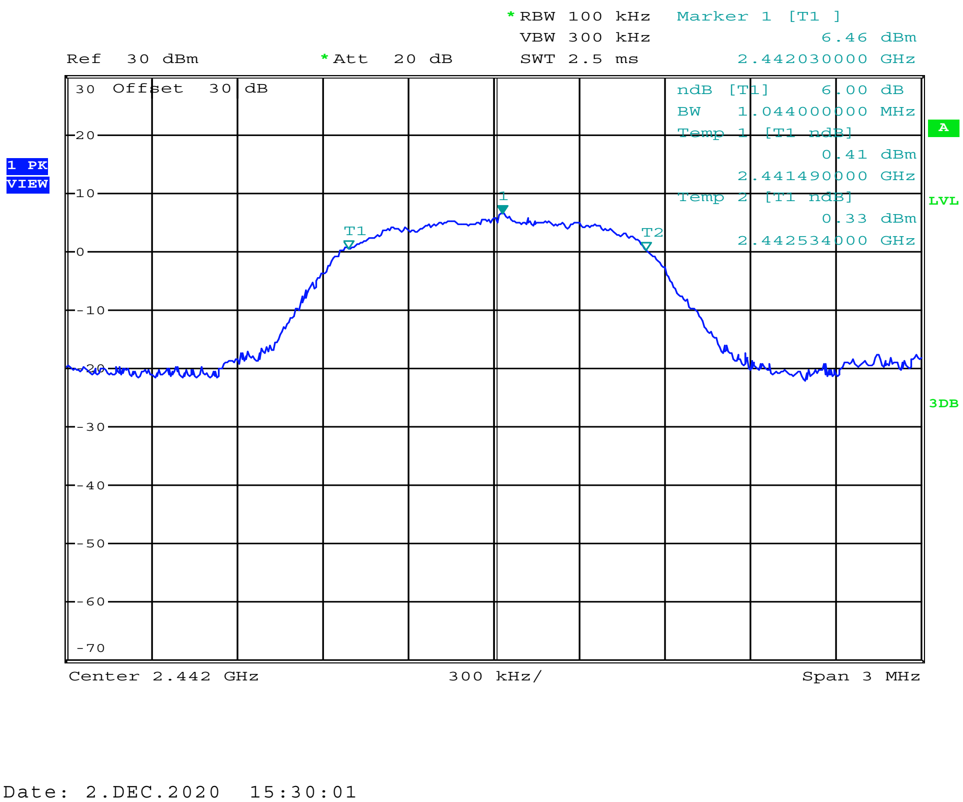


Date: 2.DEC.2020 15:31:11

Channel Frequency:		
2402.00 MHz		
DUT Modulation:	Data Rate:	Measured Occupied Bandwidth:
Pi/4-DQPSK	**2** Mbps	**1.08** MHz

Plot 8.6 – 6dB DTS Bandwidth BT EDR 2MB, 2442MHz

DTS Bandwidth



Channel Frequency:
2442.00 MHz

DUT Modulation:	Data Rate:	Measured Occupied Bandwidth:
Pi/4-DQPSK	**2** Mbps	**1.04** MHz

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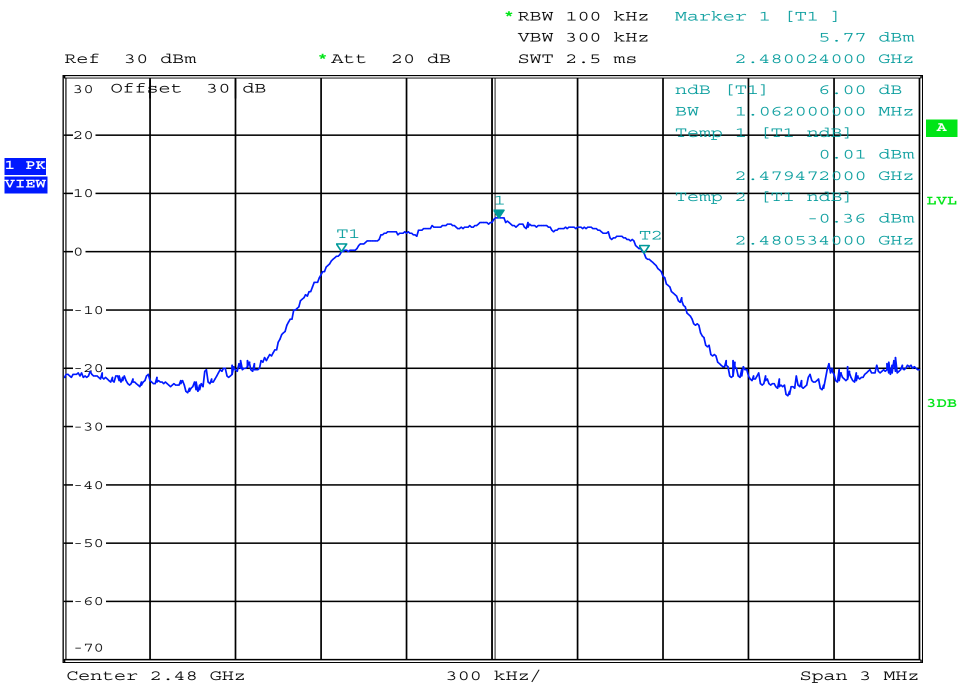
Plot 8.7 – 6dB DTS Bandwidth BT EDR 2MB, 2480MHz

DTS Bandwidth



Date: 2.DEC.2020 15:32:20

Channel Frequency:		
2480.00 MHz		
DUT Modulation: **Pi/4-DQPSK**	Data Rate: **2** Mbps	Measured Occupied Bandwidth: **1.06** MHz

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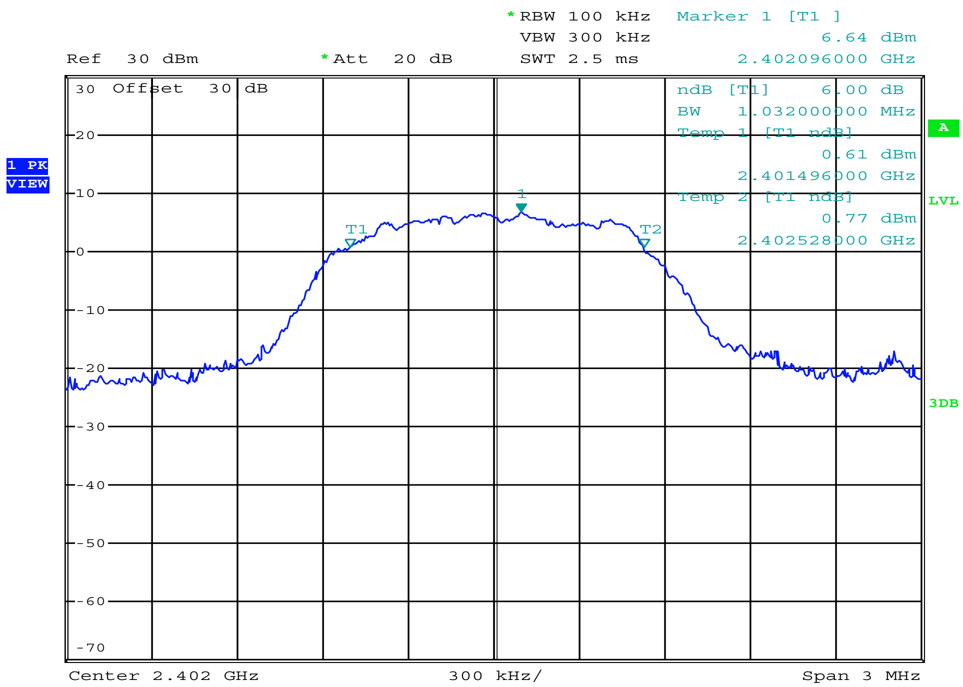
Plot 8.8 – 6dB DTS Bandwidth BT EDR 3MB, 2402MHz

DTS Bandwidth



Date: 2.DEC.2020 15:27:55

Channel Frequency:		
2402.00 MHz		
DUT Modulation:	Data Rate:	Measured Occupied Bandwidth:
8-DPSK	3 Mbps	1.03 MHz

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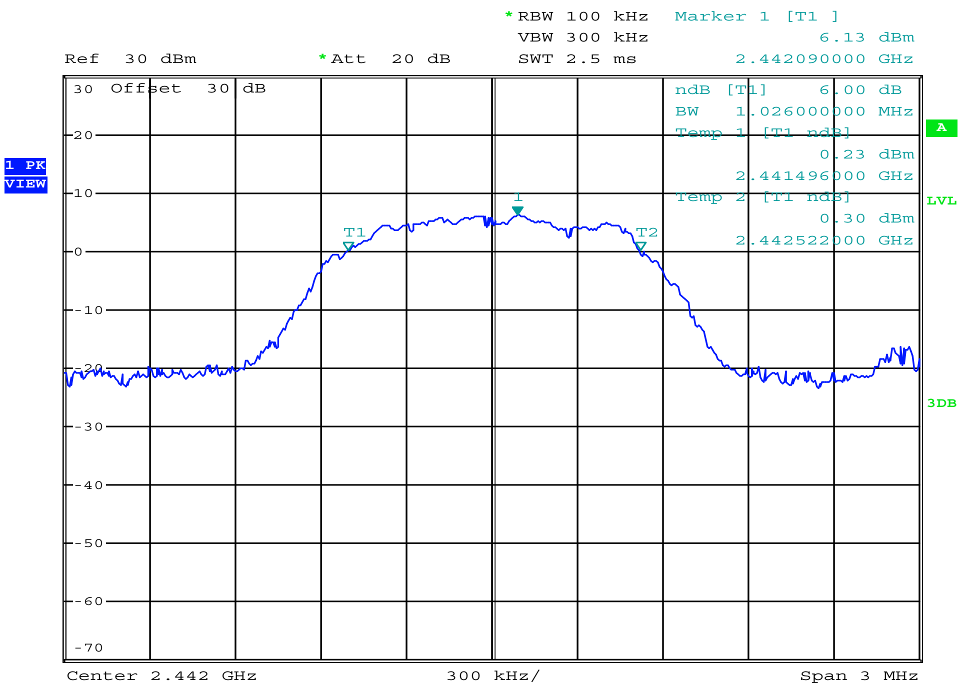
Plot 8.9 – 6dB DTS Bandwidth BT EDR 3MB, 2442MHz

DTS Bandwidth

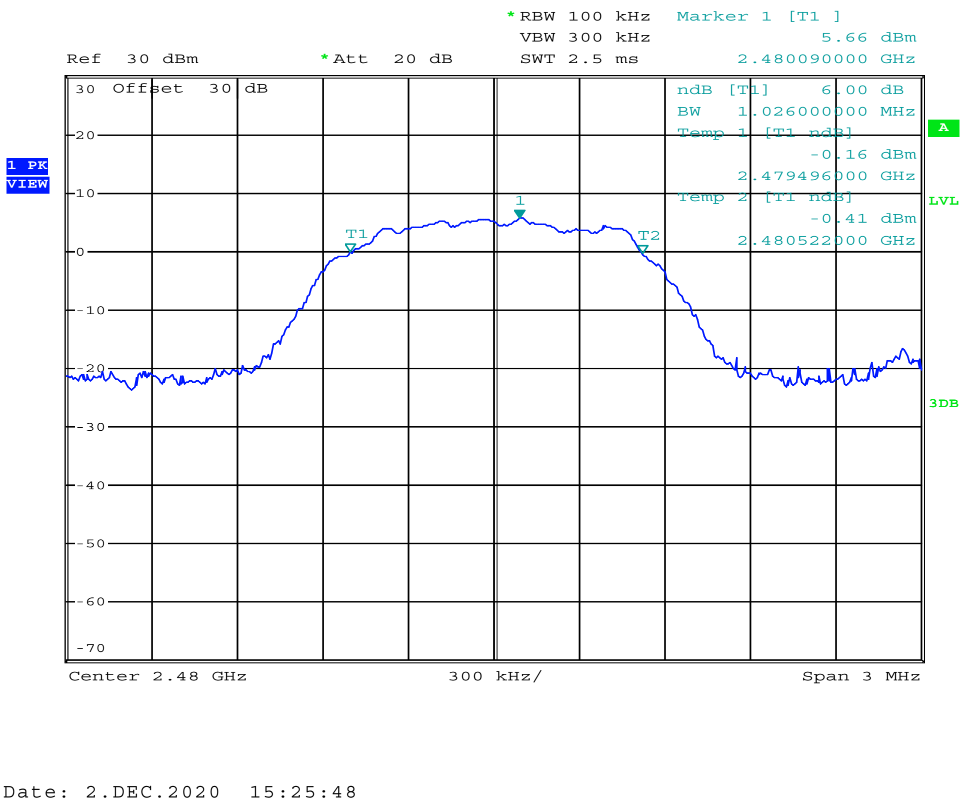


Date: 2.DEC.2020 15:29:19

Channel Frequency:		
2442.00 MHz		
DUT Modulation: **8-DPSK**	Data Rate: **3** Mbps	Measured Occupied Bandwidth: **1.03** MHz

Plot 8.10 – 6dB DTS Bandwidth BT EDR 3MB, 2480MHz

DTS Bandwidth



Channel Frequency:		
2480.00 MHz		
DUT Modulation:	Data Rate:	Measured Occupied Bandwidth:
8-DPSK	**3** Mbps	**1.03** MHz

Table 8.2 – Summary of 6dB DTS Bandwidth Measurements, (BlueTooth)

DTS Bandwidth Measurement Results (DSS)			
Frequency (MHz)	Modulation	Data Rate (Mbps)	Measured DTS Bandwidth (MHz)
2402	Pi/4-DQPSK	2	1.08
2442	Pi/4-DQPSK	2	1.04
2480	Pi/4-DQPSK	2	1.06
2402	8-DPSK	3	1.03
2442	8-DPSK	3	1.03
2480	8-DPSK	3	1.03
			Complies

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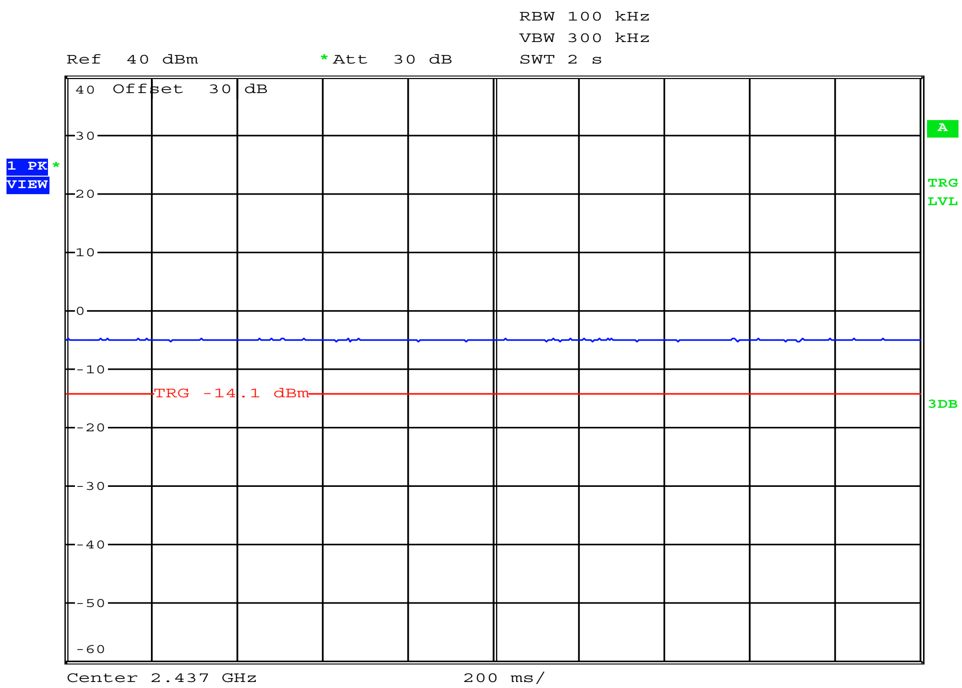
9.0 DUTY CYCLE AND TRANSMISSION DURATION

Plot 9.1 – Duty Cycle – WiFi - DSSS

Transmit Duty Cycle



Date: 19.NOV.2020 11:51:27

Channel Frequency:	Modulation:	Measured Duty Cycle:
2437.00 MHz	**DSSS**	**100.0** %

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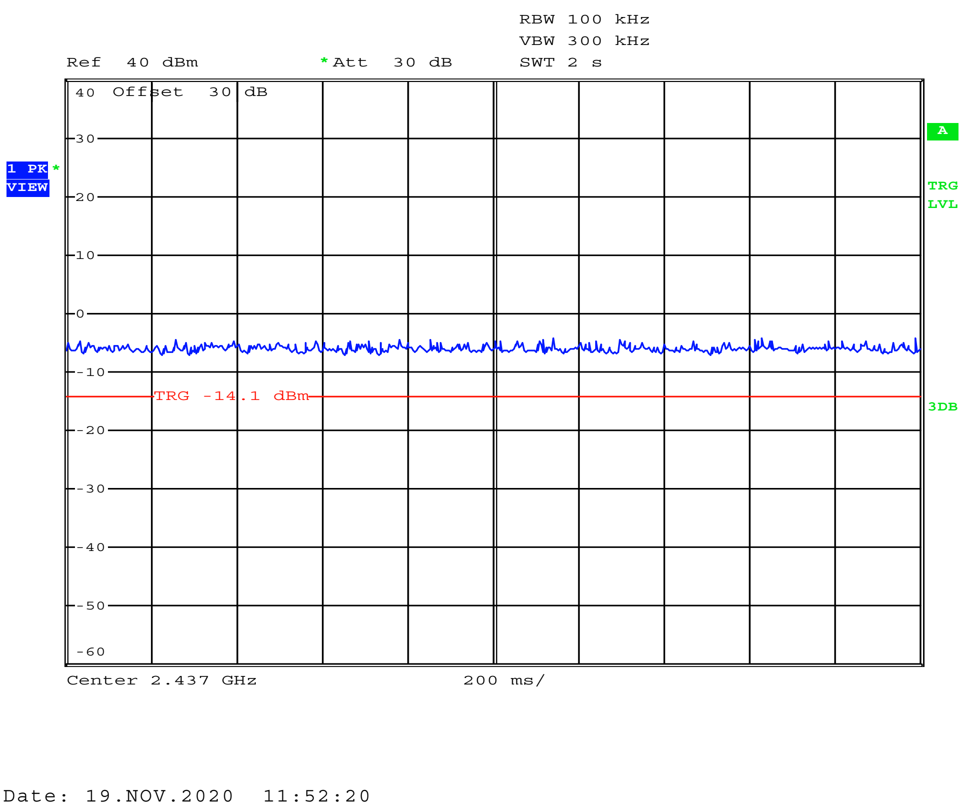
Plot 9.2 – Duty Cycle – WiFi - OFDM

Transmit Duty Cycle



Channel Frequency:	Modulation:	Measured Duty Cycle:
2437.00 MHz	**OFDM**	**100.0** %

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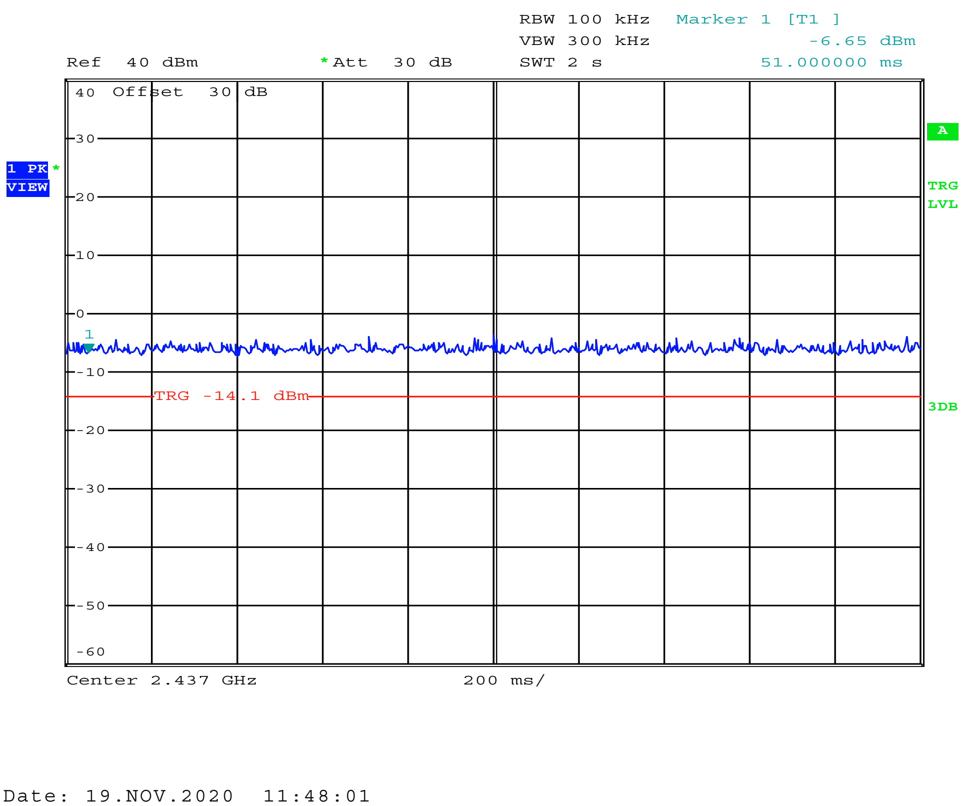
Plot 9.3 – Duty Cycle – WiFi – MCS0

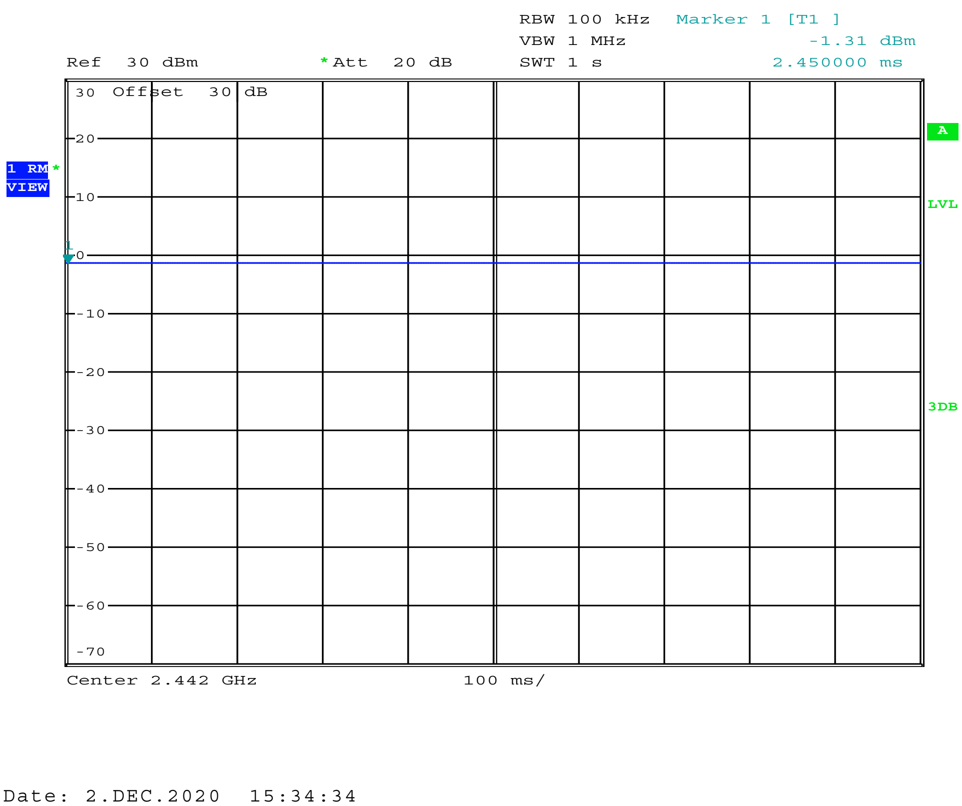
Transmit Duty Cycle



Channel Frequency:	Modulation:	Measured Duty Cycle:
2437.00 MHz	**MCS0**	**100.0** %

Plot 9.4 – Duty Cycle – BT – EDR 2MB

Transmit Duty Cycle



Channel Frequency:	Modulation:	Measured Duty Cycle:
2442.00 MHz	**Pi/4-DQPSK**	**100.0** %

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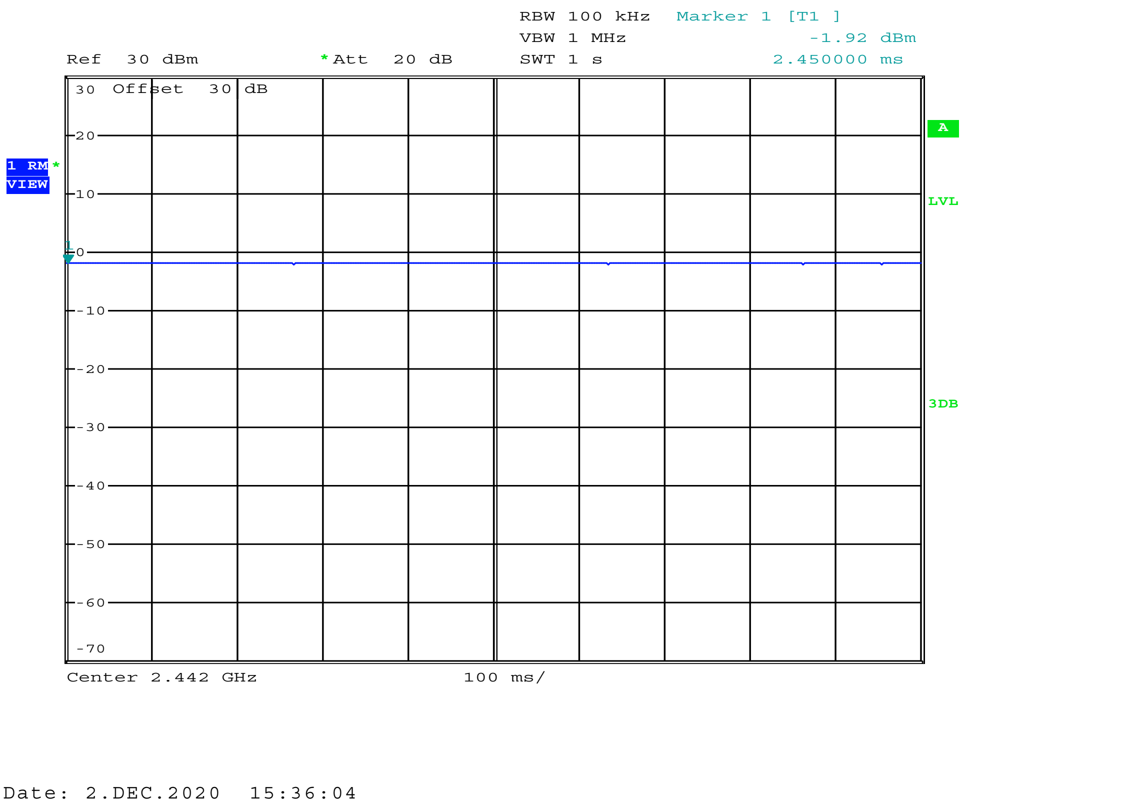
Plot 9.5 – Duty Cycle – BT – EDR 3MB

Transmit Duty Cycle



Channel Frequency:	Modulation:	Measured Duty Cycle:
2442.00 MHz	**8-DPSK**	**100.0** %

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Table 9.2 – Summary Duty Cycle Measurement - WiFi

Transmit Duty Cycle Results DTS		
Frequency (MHz)	Modulation	Measured Duty Cycle Cycle (%)
2437.00	DSSS	100.0
2437.00	OFDM	100.0
2437.00	MCS0	100.0

Transmit Duty Cycle = 100%. Duty Cycle Correction not Required

Transmit Duty Cycle Results DSS		
Frequency (MHz)	Modulation	Measured Duty Cycle Cycle (%)
2442.00	Pi/4-DQPSK	100.0
2442.00	8-DPSK	100.0

Transmit Duty Cycle = 100%. Duty Cycle Correction not Required

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10.0 ANTENNA PORT CONDUCTED POWER, (DTS)

Test Procedure	
Normative Reference	FCC 47 CFR §2.1046, §15.247(b)(3), RSS-Gen (6.1.2), RSS-247 (5.4)(d), KDB 558074 (8.3.2), ANSI C63.10 (11.9.2.2.2)

Limits	
47 CFR §15.247(b)(3)	(b) The maximum peak conducted output power of the intentional radiator shall not exceed the following: (3) For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power.
RSS-247 (5.4)(d)	**5.4 Transmitter output power and equivalent isotropically radiated power (e.i.r.p.)** Devices shall comply with the following requirements, where applicable: d) For DTSs employing digital modulation techniques operating in the bands 902-928 MHz and 2400-2483.5 MHz, the maximum peak conducted output power shall not exceed 1W. The e.i.r.p. shall not exceed 4 W, except as provided in section 5.4(e). As an alternative to a peak power measurement, compliance can be based on a measurement of the maximum conducted output power.

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Table 10.1 – Summary of Conducted Power Measurements, (DTS)

See Appendix E for Measurement Plots

Conducted Power Measurement Results - DTS										
Frequency (MHz)	Modulation	Bit Rate (Mbps)	Measured Power [P_{Meas}] (dBm)	Conducted Limit [P_{Lim}] (dBm)	Conducted Margin (dB)	Antenna Gain* (dBi)	EIRP [E_{Meas}] (dBm)	EIRP Limit [E_{Lim}] (dBm)	EIRP Margin (dB)	Result
2412.00	CCK	1.0	12.22	30	17.780	0.6	12.82	36	23.180	Complies
2417.00	CCK	1.0	15.48	30	14.520	0.6	16.08	36	19.920	Complies
2437.00	CCK	1.0	14.54	30	15.460	0.6	15.14	36	20.860	Complies
2457.00	CCK	1.0	14.56	30	15.440	0.6	15.16	36	20.840	Complies
2462.00	CCK	1.0	13.05	30	16.950	0.6	13.65	36	22.350	Complies
2417.00	CCK	2.0	15.70	30	14.300	0.6	16.30	36	19.700	Complies
2437.00	CCK	2.0	14.79	30	15.210	0.6	15.39	36	20.610	Complies
2457.00	CCK	2.0	14.67	30	15.330	0.6	15.27	36	20.730	Complies
2417.00	DSSS	5.5	15.90	30	14.100	0.6	16.50	36	19.500	Complies
2437.00	DSSS	5.5	14.97	30	15.030	0.6	15.57	36	20.430	Complies
2457.00	DSSS	5.5	14.95	30	15.050	0.6	15.55	36	20.450	Complies
2417.00	DSSS	11.0	15.87	30	14.130	0.6	16.47	36	19.530	Complies
2437.00	DSSS	11.0	15.00	30	15.000	0.6	15.60	36	20.400	Complies
2457.00	DSSS	11.0	14.92	30	15.080	0.6	15.52	36	20.480	Complies

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Table 10.1 – Summary of Conducted Power Measurements, (DTS) Cont.

See Appendix E for Measurement Plots

Conducted Power Measurement Results - DTS										
Frequency (MHz)	Modulation	Bit Rate (Mbps)	Measured Power [P_{Meas}] (dBm)	Conducted Limit [P_{Lim}] (dBm)	Conducted Margin (dB)	Antenna Gain* (dBi)	EIRP [E_{Meas}] (dBm)	EIRP Limit [E_{Lim}] (dBm)	EIRP Margin (dB)	Result
2417.00	OFDM	6.0	14.24	30	15.760	0.6	14.84	36	21.160	Complies
2417.00	OFDM	9.0	14.31	30	15.690	0.6	14.91	36	21.090	Complies
2417.00	OFDM	12.0	14.36	30	15.640	0.6	14.96	36	21.040	Complies
2417.00	OFDM	18.0	14.33	30	15.670	0.6	14.93	36	21.070	Complies
2417.00	OFDM	24.0	14.33	30	15.670	0.6	14.93	36	21.070	Complies
2417.00	OFDM	36.0	14.29	30	15.710	0.6	14.89	36	21.110	Complies
2417.00	OFDM	48.0	14.29	30	15.710	0.6	14.89	36	21.110	Complies
2417.00	OFDM	54.0	14.24	30	15.760	0.6	14.84	36	21.160	Complies
2417.00	MCS0	-	14.10	30	15.900	0.6	14.70	36	21.300	Complies
2417.00	MCS3	-	14.12	30	15.880	0.6	14.72	36	21.280	Complies
2417.00	MCS7	-	14.16	30	15.840	0.6	14.76	36	21.240	Complies

Conducted Margin = P_{Limit} - P_{Meas}

EIRP Margin = E_{Limit} - E_{Meas}

* Antenna Gain information provided by applicant.

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12.0 ANTENNA PORT CONDUCTED POWER, (DSS)

Test Procedure	
Normative Reference	FCC 47 CFR §2.1046, §15.247(b)(3), RSS-Gen (6.1.2), RSS-247 (5.4)(d),
	KDB 558074 (8.3.2), ANSI C63.10 (11.9.2.2.2)

Limits	
47 CFR §15.247(b)(3)	(b) The maximum peak conducted output power of the intentional radiator shall not exceed the following: (3) For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power.
RSS-247 (5.4)(d)	**5.4 Transmitter output power and equivalent isotropically radiated power (e.i.r.p.)** Devices shall comply with the following requirements, where applicable: d) For DTSs employing digital modulation techniques operating in the bands 902-928 MHz and 2400-2483.5 MHz, the maximum peak conducted output power shall not exceed 1W. The e.i.r.p. shall not exceed 4 W, except as provided in section 5.4(e). As an alternative to a peak power measurement, compliance can be based on a measurement of the maximum conducted output power.

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Table 11.1 – Summary of Conducted Power Measurements, (DSS)

See Appendix F for Measurement Plots

Conducted Power Measurement Results - DSS										
Frequency (MHz)	Modulation	Bit Rate (Mbps)	Measured Power [P_{Meas}] (dBm)	Conducted Limit [P_{Lim}] (dBm)	Conducted Margin (dB)	Antenna Gain* (dBi)	EIRP [E_{Meas}] (dBm)	EIRP Limit [E_{Lim}] (dBm)	EIRP Margin (dB)	Result
2402.00	P1/4-DQPSK	2.0	7.51	30	22.490	0.6	8.11	36	27.890	Complies
2442.00	P1/4-DQPSK	2.0	7.23	30	22.770	0.6	7.83	36	28.170	Complies
2480.00	P1/4-DQPSK	2.0	6.51	30	23.490	0.6	7.11	36	28.890	Complies
2402.00	8-DPSK	3.0	7.52	30	22.480	0.6	8.12	36	27.880	Complies
2442.00	8-DPSK	3.0	7.24	30	22.760	0.6	7.84	36	28.160	Complies
2480.00	8-DPSK	3.0	6.49	30	23.510	0.6	7.09	36	28.910	Complies

Conducted Margin = P_{Limit} - P_{Meas}

EIRP Margin = E_{Limit} - E_{Meas}

* Antenna Gain information provided by applicant.

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12.0 POWER SPECTRAL DENSITY

Test Procedure	
Normative Reference	FCC 47 CFR §15.247(e), RSS-247 (5.2)(b),
	KDB 558074 (10.3), ANSI C63.10 (11.10.3)

Limits	
47 CFR §15.247(e)	(e) For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.
RSS-247 (5.2)(b)	b) The transmitter 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. This power spectral density shall be determined in accordance with the provisions of section 5.4(d), (i.e. the power spectral density shall be determined using the same method as is used to determine the conducted output power).
KDB 558074 (10.3) C63.10 (11.10.3)	**Method AVGPSD-1** (trace averaging with EUT transmitting at full power throughout each sweep) This procedure may be used when the maximum (average) conducted output power was used to demonstrate compliance to the output power limit. This is the baseline method for determining the maximum (average) conducted PSD level. If the instrument has an RMS power averaging detector, it must be used; otherwise, use the sample detector. The EUT must be configured to transmit continuously (duty cycle ≥ 98 %); otherwise sweep triggering/signal gating must be implemented to ensure that measurements are made only when the EUT is transmitting at its maximum power control level (no transmitter off time is to be considered). a) Set instrument center frequency to DTS channel center frequency. b) Set span to at least 1.5 X OBW. c) Set RBW to: 3 kHz ≤ RBW ≤ 100 kHz. . d) Set VBW ≥ 3 X RBW. e) Detector = RMS f) Ensure that the number of measurement points in the sweep ≥ 2 X span/RBW. g) Sweep time = auto couple. h) Employ trace averaging (RMS) mode over a minimum of 100 traces. i) Use the peak marker function to determine the maximum amplitude level. j) If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat (note that this may require zooming in on the emission of interest and reducing the span in order to meet the minimum measurement point requirement as the RBW is reduced).
Test Setup	**Appendix A** **Figure A.1**

Measurement Procedure
The DUT was connected to a Spectrum Analyzer (SA) via a 30dB attenuator connected to the DUT's antenna port. The SA was configured as described above. Number of Sweep Points ≥ 2 X Span / RBW = 2 X (1.5MHz / 3kHz) = 1000, the SA was configured for 1001 Points. The output power of the DUT was set to the manufacturer's highest output power setting at the Low, Mid and High frequency channels as permitted by the device. The DUT was set to transmit at 100% Duty Cycle. The Power Spectral Density was measured and recorded.

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Table 12.1 – Summary of Power Spectral Density Measurements, (DTS)

See Appendix G for Power Density Measurement Plots

Power Spectral Density Measurement Results - DTS					
Frequency (MHz)	Modulation	Bit Rate (Mbps)	Measured PSD [P_{Meas}] (dBm)	PSD Limit [P_{Lim}] (dBm)	Margin (dB)
2417.00	DSSS	5.5	1.18	8	6.820
2417.00	OFDM	12.0	-6.24	8	14.240
2417.00	MCS7	-	-6.52	8	14.520
				RESULT:	Complies

Margin = P_{Limit} - P_{Meas}

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Table 12.2 – Summary of Power Spectral Density Measurements, (DSS)

See Appendix G for Power Density Measurement Plots

Power Spectral Density Measurement Results - DSS					
Frequency (MHz)	Modulation	Bit Rate (Mbps)	Measured PSD [P_{Meas}] (dBm)	PSD Limit [P_{Lim}] (dBm)	Margin (dB)
2402.00	Pi/4-DQPSK	2.0	-1.13	8	9.130
2442.00	Pi/4-DQPSK	2.0	-1.52	8	9.520
2480.00	Pi/4-DQPSK	2.0	-2.10	8	10.100
2402.00	8-DPSK	3.0	-1.26	8	9.260
2442.00	8-DPSK	3.0	-1.85	8	9.850
2480.00	8-DPSK	3.0	-2.52	8	10.520
				Result:	Complies

Margin = $P_{Limit} - P_{Meas}$

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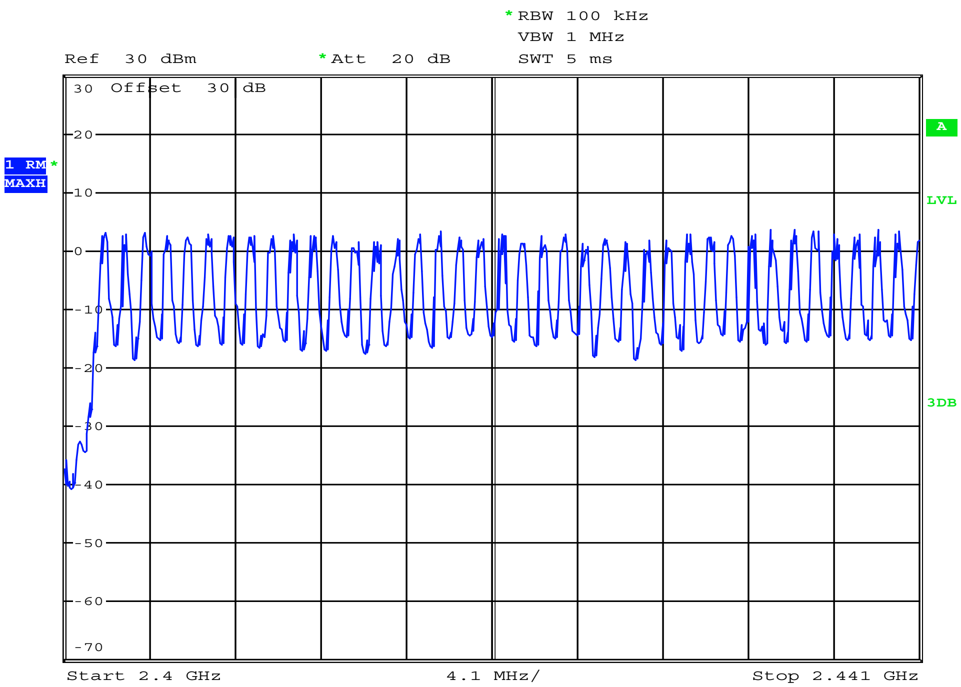
13.0 FHSS NUMBER OF HOPPING CHANNELS

Test Procedure	
Normative Reference	FCC 47 CFR §15.247, RSS-247
	KDB 558074, ANSI C63.10

Limits	
47 CFR §15.247(a)(1)	(iii) Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels. 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. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.
RSS-247 (5.1)(d)	**5.1 Frequency hopping systems (FHS)** The following applies to FHSs in each of the three bands: FHSs operating in the band 2400-2483.5 MHz shall use at least 15 hopping channels. 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. Transmissions on particular hopping frequencies may be avoided or suppressed provided that at least 15 hopping channels are used.

Plot 13.1 – Number of Hopping Channels, EDR 2MB, 2400-2441MHz

Number of Hopping Channels



Date: 2.DEC.2020 17:05:52

Frequency Range:	Modulation Setting:	Number of Hopping Channels:
2400-2441 MHz	**Pi/4-DQPSK**	**40**

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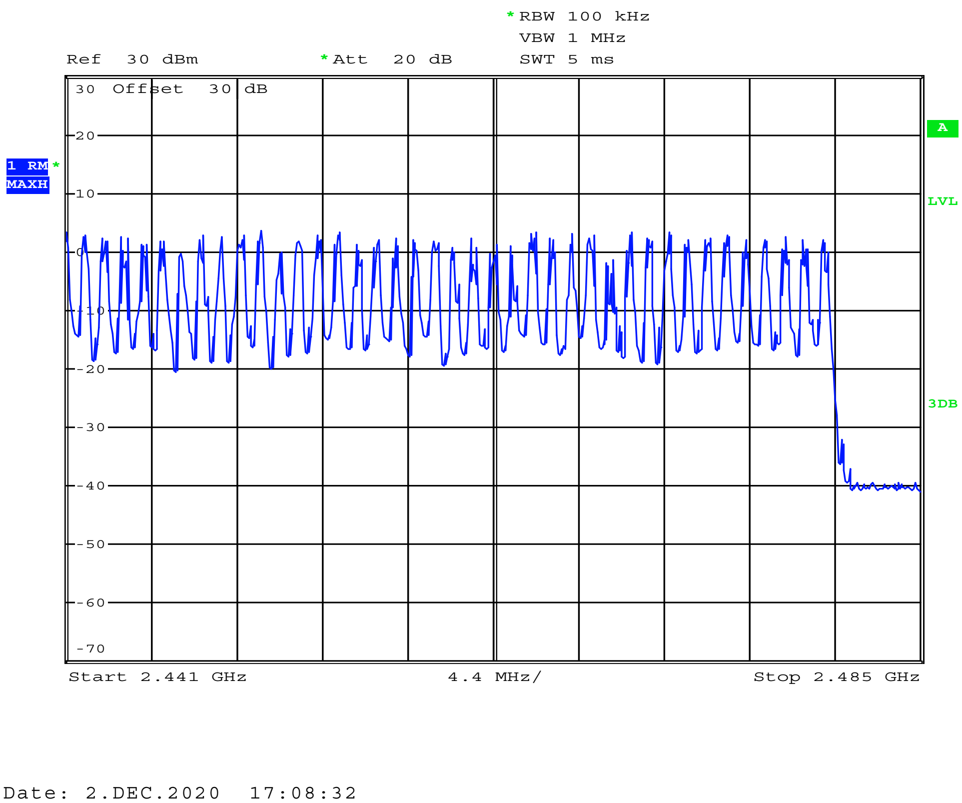
Plot 13.2 – Number of Hopping Channels, EDR 2MB, 2441-2485MHz

Number of Hopping Channels



Frequency Range:	Modulation Setting:	Number of Hopping Channels:
2441-2485 MHz	**Pi/4-DQPSK**	**39**

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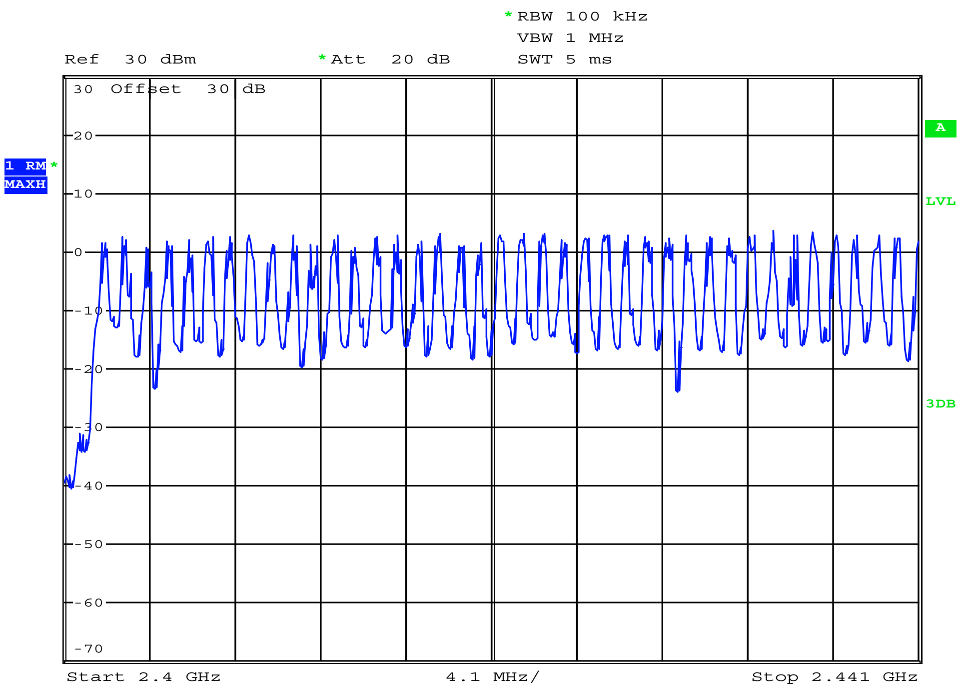
Plot 13.3 – Number of Hopping Channels, EDR 3MB, 2400 - 2441MHz

Number of Hopping Channels



Date: 2.DEC.2020 17:15:49

Frequency Range:	Modulation Setting:	Number of Hopping Channels:
2400-2441 MHz	**8-DPSK**	**40**

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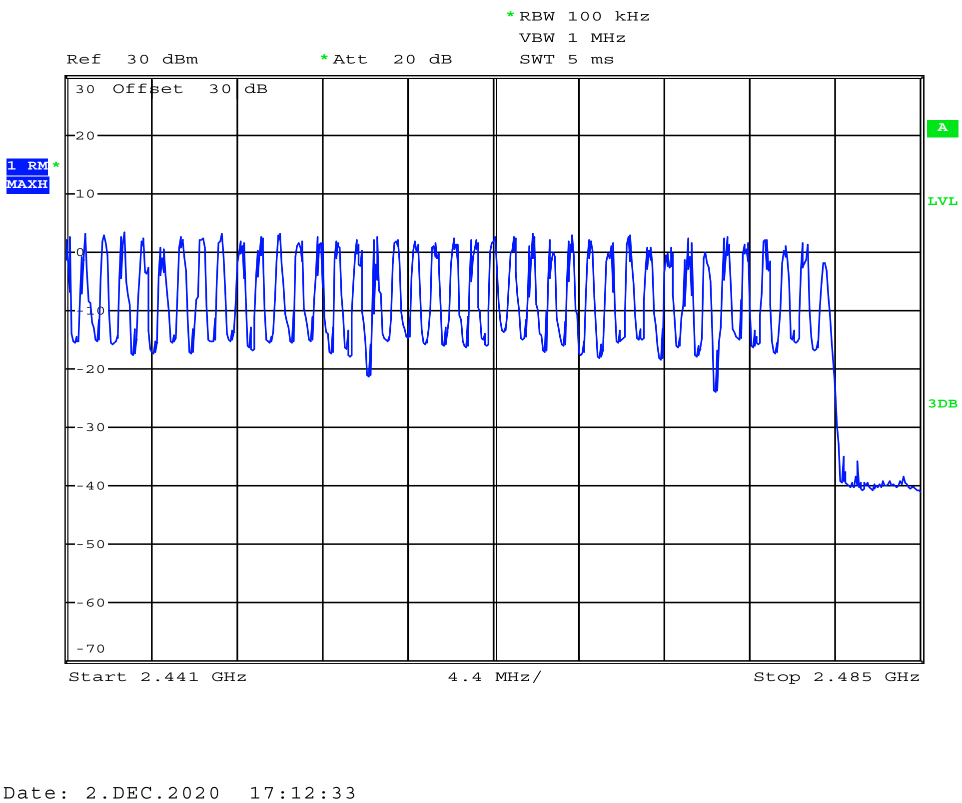
Plot 13.4 – Number of Hopping Channels, EDR 3MB, 2441 - 2485MHz

Number of Hopping Channels



Frequency Range:	Modulation Setting:	Number of Hopping Channels:
2441-2485 MHz	**8-DPSK**	**39**

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Table 13.2 – Summary of FHSS Number of Hopping Channels

Hopping Channel Results DSS		
Frequency Range (MHz)	**Modulation**	**Number of Hopping Channels**
2400-2441	Pi/4-DQPSK	40
2441-2485	Pi/4-DQPSK	39
	Total:	79
2400-2441	8-DPSK	40
2441-2485	8-DPSK	39
	Total:	79
	Result:	**Complies**

14.0 FHSS CHANNEL SEPARATION

Test Procedure	
Normative Reference	**FCC 47 CFR §15.247, RSS-247**
	KDB 558074, ANSI C63.10

Limits	
47 CFR §15.247(a)(1)	(1) Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping 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.
RSS-247 (5.1)(db)	**5.1 Frequency hopping systems (FHS)** The following applies to FHSs in each of the three bands: FHSs shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, FHSs operating in the band 2400-2483.5 MHz 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 that the systems operate with an output power no greater than 0.125 W.

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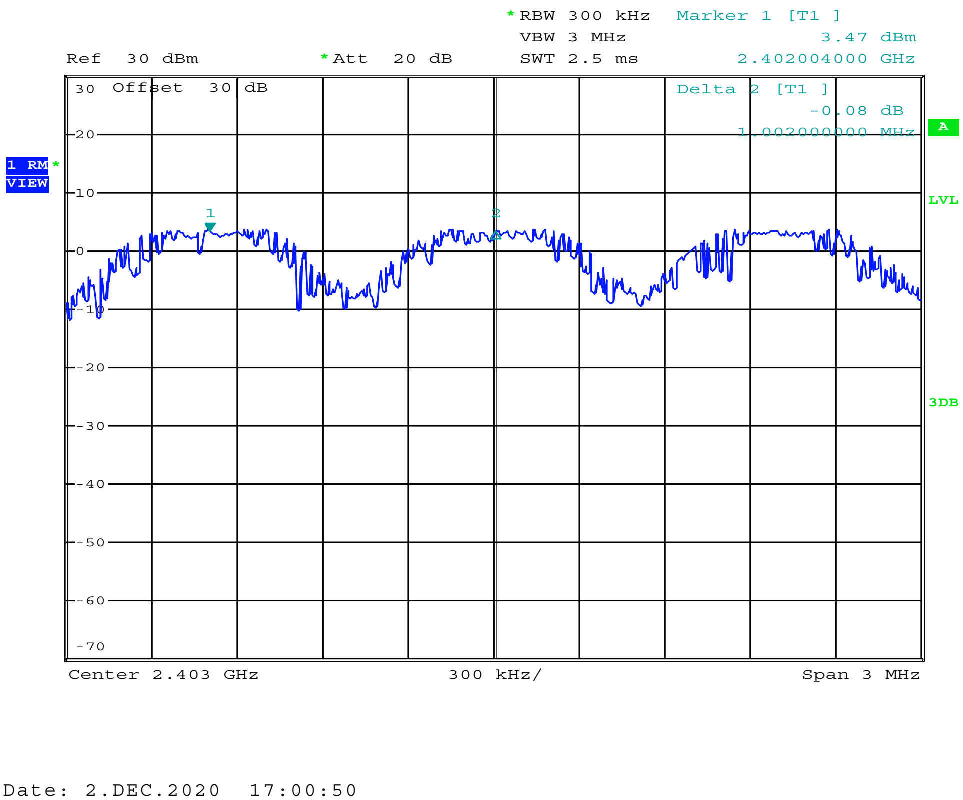
Plot 14.1 – Channel Separation, BT EDR 2MB, 2403MHz

Channel Separation



Channel Frequency:	Modulation Setting:	Channel Separation:
2403.00 MHz	**Pi/4-DQPSK**	**1.000** MHz

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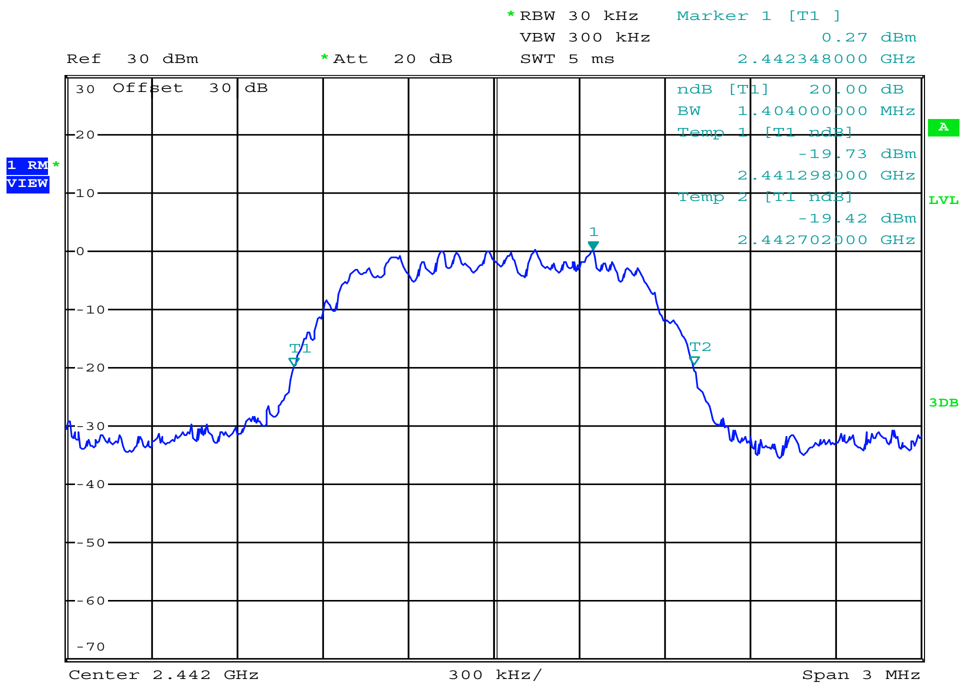
Plot 14.2 – BT ERD 2MB 20dB BW

20dB Bandwidth



Date: 2.DEC.2020 16:45:01

Channel Frequency:	Modulation Setting:	Channel Bandwidth:
2442.00 MHz	**Pi/4-DQPSK**	**1.400** MHz

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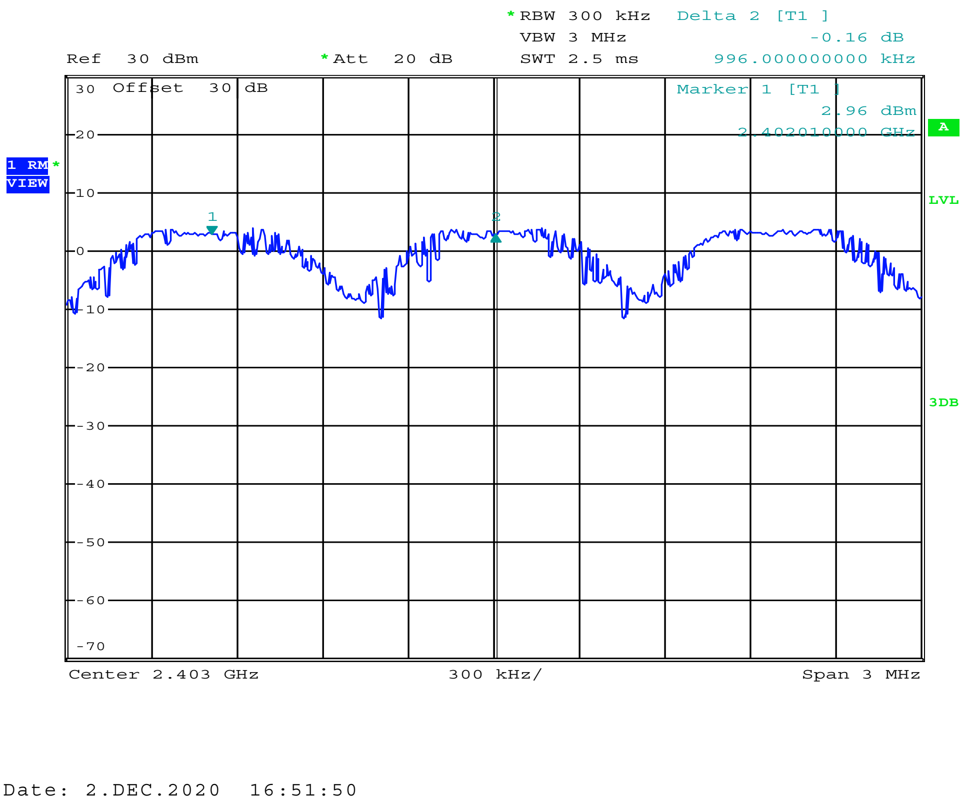
Plot 14.3 – Channel Separation, BT EDR 3MB, 2403MHz

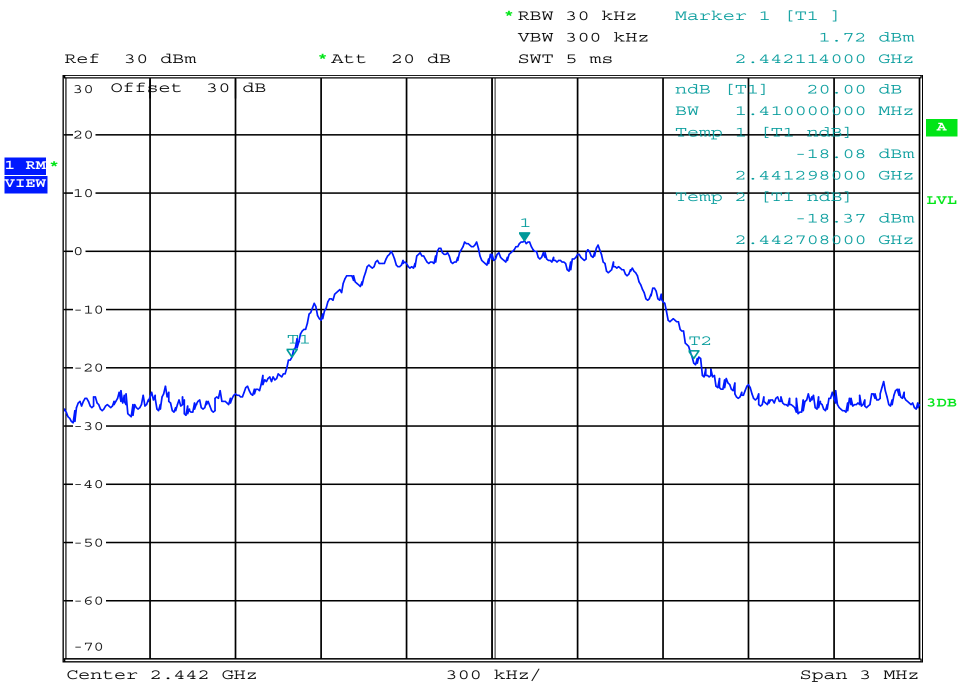
Channel Separation



Channel Frequency:	Modulation Setting:	Channel Separation:
2403.00 MHz	**Pi/4-DQPSK**	**0.996** MHz

Plot 14.4 – BT EDR 3MB 20dB BW

20dB Bandwidth



Date: 2.DEC.2020 16:46:18

Channel Frequency:	Modulation Setting:	Channel Bandwidth:
2442.00 MHz	**Pi/4-DQPSK**	**1.410** MHz

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Table 14.1 – Summary of FHSS Channel Separation

Hopping Channel Separation Results DSS					
Channel Frequency (MHz)	Modulation	Channel Separation (MHz)	20dB BW (MHz)	Minimum Bandwidth (MHz)	Margin (MHz)
2403.00	Pi/4-DQPSK	1.000	1.400	0.933	0.067
2403.00	8-DPSK	0.996	1.410	0.940	0.056
				Result:	Complies

Minimum Bandwidth = 20dB BW X 2/3

Margin = Channel Separation - Minimum Bandwidth

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15.0 FHSS TIME OF OCCUPANCY

Test Procedure	
Normative Reference	**FCC 47 CFR §15.247, RSS-247**
	KDB 558074, ANSI C63.10

Limits	
47 CFR §15.247(a)(1)	(iii) Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels. 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. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.
RSS-247 (5.1)(d)	**5.1 Frequency hopping systems (FHS)** FHSs operating in the band 2400-2483.5 MHz shall use at least 15 hopping channels. 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. Transmissions on particular hopping frequencies may be avoided or suppressed provided that at least 15 hopping channels are used.

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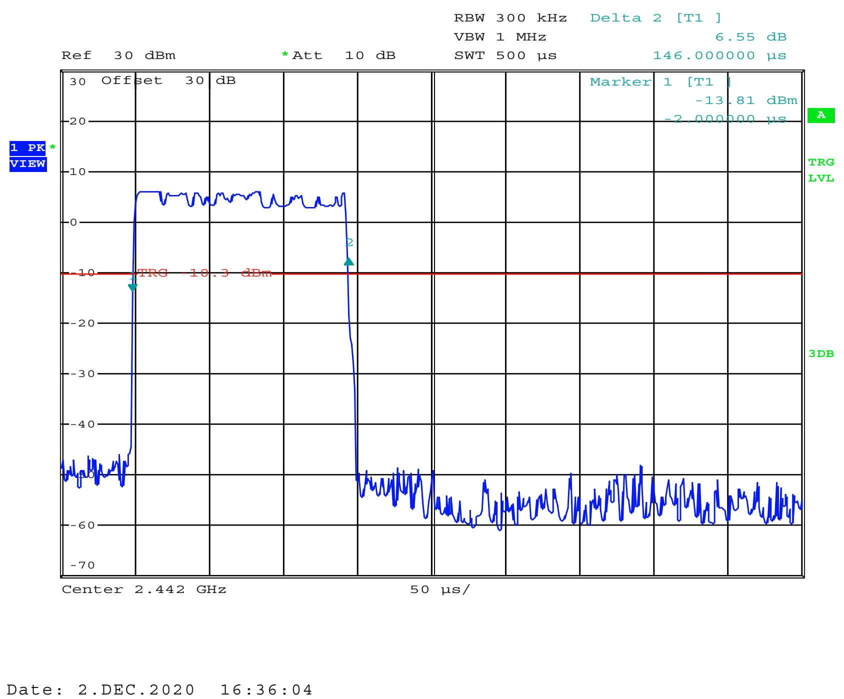
Plot 15.1 – Time of Occupancy, BT EDR 2MB

Time of Occupancy



Channel Frequency:	Modulation Setting:	Channel On Time:
2442.00 MHz	**Pi/4-DQPSK**	**146.0** uSec

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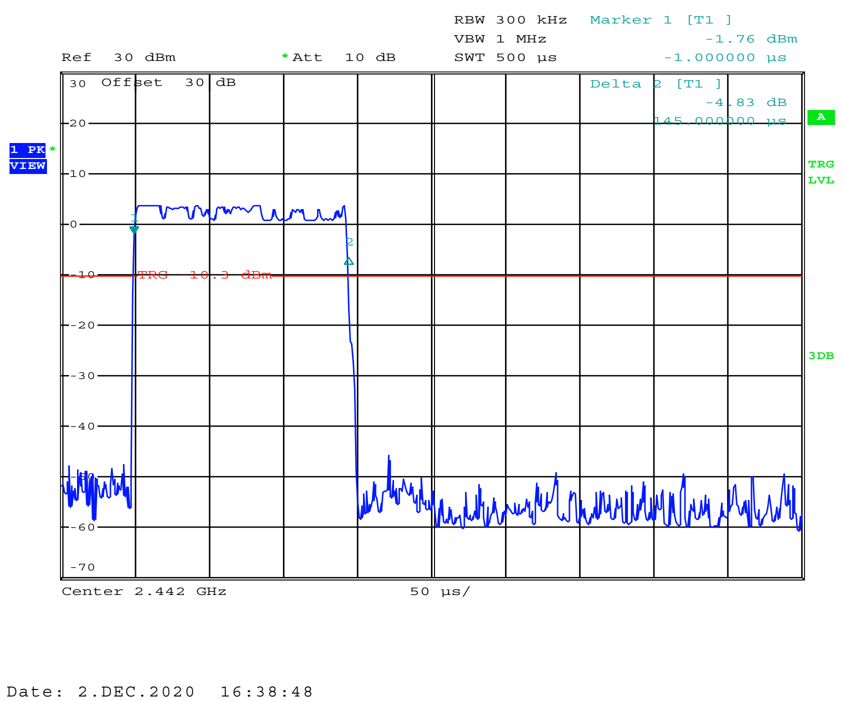
Plot 15.2 – Time of Occupancy, BT EDR 3MB

Time of Occupancy



Channel Frequency:	Modulation Setting:	Channel On Time:
2442.00 MHz	**8-DPSK**	**145.0** uSec

Table 15.1 – Summary of FHSS Time of Occupancy

Hopping Channel Time of Occupancy DSS								
Channel Frequency (MHz)	Modulation	Channel On Time [t_{on}] (uSec)	Average Number Occupancy [N_{Occ}]	Total Num of Hopping Channels [N_{Tot}]	Total Period [T_{Period}] (Sec)	Total Time of Occupancy [T_{Occ}] (Sec)	Limit [Limit] (Sec)	Margin (Sec)
2442.00	Pi/4-DQPSK	146.0	1000	79	32	0.146	0.4	0.254
2442.00	8-DPSK	145.0	1000	79	32	0.145	0.4	0.255
							Result:	Complies

$T_{Period} = N_{Tot}$ X 0.4Sec

$T_{Occ} = T_{on}$ X N_{Occ}

Margin = Limit - T_{Occ}

Where:

- Total Period = 0.4 Seconds X Total Number of Hopping Channels (From Section 13.0)
- Average Number of Occupancy = the observed number times the transmitter occupied the channel within the Total Period
- Total Time of Occupancy = Channel On Time X Average Number of Occupancy

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16.0 CONDUCTED SPURIOUS EMISSIONS -BAND EDGE

Test Procedure	
Normative Reference	FCC 47 CFR §2.1051, §15.247(d), RSS-Gen (6.13), RSS-247 (5.5), KDB 558074 (11.3), ANSI C63.10 (11.11.3)

Limits	
47 CFR §15.247(d)	(d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required.
RSS-247 (5.5)	**5.5 Unwanted emissions** In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under section 5.4(d), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required. d) For DTSs employing digital modulation techniques operating in the bands 902-928 MHz and 2400-2483.5 MHz, the maximum peak conducted output power shall not exceed 1W. The e.i.r.p. shall not exceed 4 W, except as provided in section 5.4(e). As an alternative to a peak power measurement, compliance can be based on a measurement of the maximum conducted output power.
KDB 558074 (11.3) C63.10 (11.11.3)	**11.1 General** The DTS rules specify that in any 100 kHz bandwidth outside of the authorized frequency band, the power shall be attenuated according to the following conditions: b) If maximum conducted (average) output power was used to demonstrate compliance as described in 9.2, then the peak power in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 30 dB relative to the maximum in-band peak PSD level in 100 kHz (i.e., 30 dBc). **11.2 Reference level measurement** a) Set instrument center frequency to DTS channel center frequency. b) Set the span to ≥ 1.5 X *DTS bandwidth.* c) Set the RBW = 100 kHz. d) Set the VBW ≥ 3 X RBW. e) Detector = peak. f) Sweep time = auto couple. g) Trace mode = max hold. h) Allow trace to fully stabilize. i) Use the peak marker function to determine the maximum PSD level. Note that the channel found to contain the maximum PSD level can be used to establish the reference

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Table 16.1 – Summary of Reference Level Measurements, (DTS)

See Appendix H for Measurement Plots

Conducted Spurious Emissions - Reference Measurement					
Frequency (MHz)	Modulation	Bit Rate (Mbps)	Measured PSD [P_{Meas}] (dBm)	Required Attenuation [A_R] (dB)	Limit Line [A_L] (dBm)
2412.00	DSSS	5.5	6.05	30	-23.950
2412.00	OFDM	12	0.98	30	-29.020
2412.00	MCS7	-	-1.02	30	-31.020

Table 16.2 – Summary of Spurious Emission Measurements – Band Edge, (DTS)

Emission Level Measurement - Band Edge						
Channel Frequency (MHz)	Modulation	Bit Rate (mbps)	Measured Emission [E_{Meas}] (dBm)	Emission Frequency (MHz)	Limit Line [A_L] (dBm)	Margin (dB)
2412	DSSS	5.5	-35.50	2.399	-23.95	**11.55**
2412	OFDM	12	-33.35	2.399		**9.40**
2412	MCS7	-	-33.04	2.399		**9.09**
2462	DSSS	5.5	-41.09	2.483		**17.14**
2462	OFDM	12	-38.79	2.483		**14.84**
2462	MCS7	-	-37.89	2.483		**13.94**
Results:					**Complies**	

Margin = A_L - E_{MEAS}

Limit Line = Measured PSD - Required Attenuation

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Table 16.3 – Summary of Reference Level Measurements, BT EDR 2MB

See Appendix H for Measurement Plots

Conducted Spurious Emissions - Reference Measurement					
Frequency (MHz)	Modulation	Bit Rate (Mbps)	Measured PSD [P_{Meas}] (dBm)	Required Attenuation [A_R] (dB)	Limit Line [A_L] (dBm)
2402.00	Pi/4-DQPSK	2	6.82	30	-23.18
2442.00			6.62	30	-23.38
2480.00			5.73	30	-24.27

Limit Line = Measured PSD - Required Attenuation

Table 16.4 – Summary of Spurious Emission Measurements – Band Edge, BT EDR 2MB

Emission Level Measurement - Band Edge						
Channel Frequency (MHz)	Modulation	Bit Rate (mbps)	Measured Emission [E_{Meas}] (dBm)	Emission Frequency (MHz)	Limit Line [A_L] (dBm)	Margin (dB)
2402	Pi/4-DQPSK	2	-28.22	2.399	-23.18	**5.04**
2480	Pi/4-DQPSK	2	-34.31	2.483		**11.13**
Results:					**Complies**	

Margin = A_L - E_{MEAS}

Table 16.5 – Summary of Reference Level Measurements, BT EDR 3MB

See Appendix H for Measurement Plots

Conducted Spurious Emissions - Reference Measurement					
Frequency (MHz)	Modulation	Bit Rate (Mbps)	Measured PSD [P_{Meas}] (dBm)	Required Attenuation [A_R] (dB)	Limit Line [A_L] (dBm)
2402.00	8-DPSK	3	6.75	30	-23.25
2442.00			6.50	30	-23.50
2480.00			5.94	30	-24.06

Limit Line = Measured PSD - Required Attenuation

Table 16.6 – Summary of Spurious Emission Measurements – Band Edge, BT EDR 3MB

Emission Level Measurement - Band Edge						
Channel Frequency (MHz)	Modulation	Bit Rate (mbps)	Measured Emission [E_{Meas}] (dBm)	Emission Frequency (MHz)	Limit Line [A_L] (dBm)	Margin (dB)
2402	8-DPSK	3	-26.41	2.399	-23.25	**3.16**
2480	8-DPSK	3	-34.98	2.483		**11.73**
Results:					**Complies**	

Margin = A_L - E_{MEAS}

17.0 CONDUCTED SPURIOUS EMISSIONS

Test Procedure	
Normative Reference	FCC 47 CFR §2.1051, §15.247(d), RSS-Gen (6.13), RSS-247 (5.5), KDB 558074 (11.3), ANSI C63.10 (11.11.3)

Limits	
47 CFR §15.247(d)	(d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required.
RSS-247 (5.5)	**5.5 Unwanted emissions** In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under section 5.4(d), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required. d) For DTSs employing digital modulation techniques operating in the bands 902-928 MHz and 2400-2483.5 MHz, the maximum peak conducted output power shall not exceed 1W. The e.i.r.p. shall not exceed 4 W, except as provided in section 5.4(e). As an alternative to a peak power measurement, compliance can be based on a measurement of the maximum conducted output power.
KDB 558074 (11.3) C63.10 (11.11.3)	**11.1 General** The DTS rules specify that in any 100 kHz bandwidth outside of the authorized frequency band, the power shall be attenuated according to the following conditions: b) If maximum conducted (average) output power was used to demonstrate compliance as described in 9.2, then the peak power in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 30 dB relative to the maximum in-band peak PSD level in 100 kHz (i.e., 30 dBc). **11.2 Reference level measurement** a) Set instrument center frequency to DTS channel center frequency. b) Set the span to ≥ 1.5 X *DTS bandwidth.* c) Set the RBW = 100 kHz. d) Set the VBW ≥ 3 X RBW. e) Detector = peak. f) Sweep time = auto couple. g) Trace mode = max hold. h) Allow trace to fully stabilize. i) Use the peak marker function to determine the maximum PSD level. Note that the channel found to contain the maximum PSD level can be used to establish the reference

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Table 17.1 – Summary of Conducted Spurious Emissions, (DTS)

See Appendix I for Band Edge Measurement Plots
Reference Section 16.0 for Reference Level Measurement

Emission Level Measurement					
Frequency Range (GHz)	Bit Rate (mbps)	Modulation	Measured Emission [E_{Meas}] (dBm)	Limit Line [A_L] (dBm)	Margin (dB)
to 3GHz	5.5	DSSS	-44.28	-23.95	**20.33**
3-13.6			-32.68		**8.73**
13.6-18			-32.07		**8.12**
18-25			-32.48		**8.53**
			Results:	**Complies**	

Margin = A_L - E_{MEAS}

Table 17.2 – Summary of Conducted Spurious Emissions, BT EDR 2MB

See Appendix I for Band Edge Measurement Plots
Reference Section 16.0 for Reference Level Measurement

Emission Level Measurement					
Frequency Range (GHz)	Bit Rate (mbps)	Modulation	Measured Emission [E_{Meas}] (dBm)	Limit Line [A_L] (dBm)	Margin (dB)
to 3GHz	2	Pi/4-DQPSK	-37.30	-23.18	**14.12**
3-10			-33.38		**10.20**
10-13.6			-33.95		**10.77**
13.6-25			-32.12		**8.94**
			Results:	**Complies**	

Margin = A_L - E_{MEAS}

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Table 17.3 – Summary of Conducted Spurious Emissions, BT EDR 3MB

See Appendix I for Band Edge Measurement Plots
Reference Section 16.0 for Reference Level Measurement

Emission Level Measurement					
Frequency Range (GHz)	**Bit Rate (mbps)**	**Modulation**	**Measured Emission [E_{Meas}] (dBm)**	**Limit Line [A_L] (dBm)**	**Margin (dB)**
to 3GHz	3	8-DPSK	-36.80	-23.25	**13.55**
3-10			-33.43		**10.18**
10-13.6			-33.62		**10.37**
13.6-25			-37.03		**13.78**
			Results:	**Complies**	

Margin = A_L - E_{MEAS}

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18.0 RADIATED TX SPURIOUS EMISSIONS, RESTRICTED BAND

Test Procedure	
Normative Reference	FCC 47 CFR §2.1051, §15.247(d), §15.205(a), §15.205(c), §15.209(a)
	KDB 558074 (8.6), ANSI C63.10 (11.12)

Limits

47 CFR §15.247(d)	(d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).
47 CFR §15.209(a)	**§15.209 Radiated emission limits; general requirements.** (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:

Frequency (MHz)	Field Strength (microvolts/meter)
0.009 - 0.490	2400/F (kHz) @300m
0.490 - 1.705	24000/F (kHz) @30m
1.705 - 30	30 @ 30m
30 - 88	100 @3m
88 - 216	150 @3m
216 - 960	200 @3m
Above 960	500 @3m

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Table 18.1 – Summary of Radiated Tx Spurious Emissions, Restricted Band, (DTS)

See Appendix J Radiated Tx Spurious Measurement Plots

Summary of Radiated Tx Emissions (Restricted Band)

Measured Frequency Range (MHz)	Channel Frequency	Antenna Polarization	Emission Frequency	Measured Emission [E_{Meas}] (dBuV)		Antenna ACF [ACF] (dB)	Cable Loss [L_C] (dB)	Amplifier Gain [G_A] (dB)		Corrected Emission [E_{Corr}] (dBuV/m)		Limit (dBuV)	Margin (dB)
9kHz - 30MHz	2412.0	Front	ND	ND	(1)	0.00	0.00	0.00	(3)	ND	(2)	n/a	**n/a**
9kHz - 30MHz	2412.0	Side	ND	ND	(1)	0.00	0.00	0.00	(3)	ND	(2)	n/a	**n/a**
30-1000MHz	2412.0	Horizontal	745.2MHz	40.38		0.00	0.00	0.00	(3)	40.38	(2)	46.0	**5.6**
30-1000MHz	2412.0	Vertical	867.20	40.18		0.00	0.00	0.00	(3)	40.18	(2)	43.5	**3.3**
1 - 3GHz	2412.0	Horizontal	ND	ND	(1)	27.40	4.58	0.00	(3)	ND		54.0	**n/a**
1 - 3GHz	2412.0	Vertical	ND	ND	(1)	27.40	4.58	0.00	(3)	ND		54.0	**n/a**
3-13GHz	2412.0	Horizontal	ND	ND	(1)	36.76	9.86	0.00	(3)	ND		54.0	**n/a**
3-13GHz	2412.0	Vertical	ND	ND	(1)	36.76	9.86	0.00	(3)	ND		54.0	**n/a**
13-18GHz	2412.0	Horizontal	ND	ND	(1)	38.75	16.54	0.00	(3)	ND		54.0	**n/a**
13-18GHz	2412.0	Vertical	ND	ND	(1)	38.75	16.54	0.00	(3)	ND		54.0	**n/a**
18-26GHz	2412.0	Horizontal	ND	ND	(1)	43.50	21.86	26.00		ND		54.0	**n/a**
18-26GHz	2412.0	Vertical	ND	ND	(1)	43.50	21.86	26.00		ND		54.0	**n/a**
											Results:	**Complies**	

(1) No Emissions Detected (ND) above ambient or within 20dB of the limit
(2) Antenna ACF, Cable Loss and Amplifier Gain corrected in Spectrum Analyzer Transducer Factor
(3) External Amplier not used

$E_{Corr} = E_{Meas} + ACF + L_C - G_A$

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Table 18.2 – Summary of Radiated Tx Spurious Emissions, Restricted Band, (BlueTooth)

See Appendix J Radiated Tx Spurious Measurement Plots

Summary of Radiated Tx Emissions (Restricted Band)										
Measured Frequency Range (MHz)	Channel Frequency	Antenna Polarization	Emission Frequency	Measured Emission [E_{Meas}] (dBuV)	Antenna ACF [ACF] (dB)	Cable Loss [L_C] (dB)	Amplifier Gain [G_A] (dB)	Corrected Emission [E_{Corr}] (dBuV/m)	Limit (dBuV)	Margin (dB)
9kHz - 30MHz	2442.0	Front	ND	ND (1)	0.00	0.00	0.00 (3)	ND (2)	n/a	**n/a**
9kHz - 30MHz	2442.0	Side	ND	ND (1)	0.00	0.00	0.00 (3)	ND (2)	n/a	**n/a**
30-1000MHz	2442.0	Horizontal	745.2MHz	37.88	0.00	0.00	0.00 (3)	37.88 (2)	46.0	**8.1**
30-1000MHz	2442.0	Vertical	955.9MHz	39.24	0.00	0.00	0.00 (3)	39.24 (2)	46.0	**6.8**
1 - 3GHz	2442.0	Horizontal	ND	ND (1)	27.40	4.58	0.00 (3)	ND	54.0	**n/a**
1 - 3GHz	2442.0	Vertical	ND	ND (1)	27.40	4.58	0.00 (3)	ND	54.0	**n/a**
3-13GHz	2442.0	Horizontal	ND	ND (1)	36.76	9.86	0.00 (3)	ND	54.0	**n/a**
3-13GHz	2442.0	Vertical	ND	ND (1)	36.76	9.86	0.00 (3)	ND	54.0	**n/a**
13-18GHz	2442.0	Horizontal	ND	ND (1)	38.75	16.54	0.00 (3)	ND	54.0	**n/a**
13-18GHz	2442.0	Vertical	ND	ND (1)	38.75	16.54	0.00 (3)	ND	54.0	**n/a**
18-26GHz	2442.0	Horizontal	ND	ND (1)	43.50	21.86	26.00	ND	54.0	**n/a**
18-26GHz	2442.0	Vertical	ND	ND (1)	43.50	21.86	26.00	ND	54.0	**n/a**
								Results:	**Complies**	

(1) No Emissions Detected (ND) above ambient or within 20dB of the limit
(2) Antenna ACF, Cable Loss and Amplifier Gain corrected in Spectrum Analyzer Transducer Factor
(3) External Amplier not used

$E_{Corr} = E_{Meas} + ACF + L_C - G_A$

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19.0 RADIATED RX SPURIOUS EMISSIONS

Test Procedure	
Normative Reference	**FCC 47 CFR §15.109, ICES-003(6.2)** **ANSI C63.4:2014**

Limits	
47 CFR §15.109	(a) Except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values: 30-88MHz: 40dBuV/m 88-216MHz: 43.5dBuV/m 216-960MHz: 46dBuV/m > 960MHz: 54dBuV/m
ICES-003(6.2.1)	6.2.1 - Radiated Emissions Limits Below 1 GHz Class B: ITE that does not meet the conditions for Class A operation shall comply with the Class B radiated limits set out in Table 5 determined at a distance of 3 metres. 30-88MHz: 40dBuV/m 88-216MHz: 43.5dBuV/m 216-960MHz: 46dBuV/m > 960MHz: 54dBuV/m

Test Setup	Appendix A	Figure A.2

Measurement Procedure

The DUT was set up as per ANSI C63.4:2014. Emissions were scanned between 30MHz and 1000MHz. The turntable was rotated 360 degrees and the antenna was elevated to 4m to optimize the measured emissions.

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Table 19.1 – Summary of Radiated Rx Spurious Emissions (DTS)

See Appendix K Radiated Rx Spurious Measurement Plots

Measurement Results								
Frequency Range	**Antenna Polarization**	**Bit Rate (Mbps)**	**Modulation**	**Power Setting(1) (dBm)**	**Transmit Duty Cycle (%)**	**Measured Emission [E_{Meas}] (dBm)**	**Worst Case Limit(4) [A_L] (dBuV @ 3m)**	**Margin (dB)**
9kHz - 30MHz	Front	n/a	n/a	n/a	n/a	ND	69.5	**n/a**
30-1000MHz	Horizontal					ND	40.0	**n/a**
1 - 3GHz						ND	54.0	**n/a**
3 - 13.6GHz						ND	54.0	**n/a**
13.6 - 18GHz						ND	54.0	**n/a**
9kHz - 30MHz	Side					ND	69.5	**n/a**
30-1000MHz	Vertical					ND	40.0	**n/a**
1 - 3GHz						ND	54.0	**n/a**
3 - 13.6GHz						ND	54.0	**n/a**
13.6 - 18GHz						ND	54.0	**n/a**
						Results:	**Complies**	

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Table 19.2 – Summary of Radiated Rx Spurious Emissions (DSS)

See Appendix K Radiated Rx Spurious Measurement Plots

Measurement Results

Frequency Range	Antenna Polarization	Bit Rate (Mbps)	Modulation	Power Setting(1) (dBm)	Transmit Duty Cycle (%)	Measured Emission [E_{Meas}] (dBm)	Worst Case Limit(4) [A_L] (dBuV @ 3m)	Margin (dB)
9kHz - 30MHz	Front	n/a	n/a	n/a	n/a	ND	69.5	**n/a**
30-1000MHz	Horizontal					ND	40.0	**n/a**
1 - 3GHz						ND	54.0	**n/a**
3 - 13.6GHz						ND	54.0	**n/a**
13.6 - 18GHz						ND	54.0	**n/a**
9kHz - 30MHz	Side					ND	69.5	**n/a**
30-1000MHz	Vertical					ND	40.0	**n/a**
1 - 3GHz						ND	54.0	**n/a**
3 - 13.6GHz						ND	54.0	**n/a**
13.6 - 18GHz						ND	54.0	**n/a**
						Results:	**Complies**	

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20.0 POWER LINE CONDUCTED EMISSIONS

Test Procedure	
Normative Reference	**FCC 47 CFR §15.107, ICES-003(6.1)** **ANSI C63.4-2014**

Limits	
47 CFR §15.107	(a) Except for Class A digital devices, for equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 μH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the band edges. 0.15-0.5MHz: 66-56 dBuV Quasi Peak, 56-46 dBuV Average, Decreases with the logrithm of the frequency 0.5 - 5.0 MHz: 56 dBuV Quasi Peak, 46 dBuV Average 5.0 - 30.0 MHz: 60 dBuV Quasi Peak, 50 dBuV Average
ICES-003(6.1)	6.1 - AC Power Line Conducted Emissions Limits Class B: ITE that does not meet the conditions for Class A operation shall comply with the Class B radiated limits set out in Table 2. 0.15-0.5MHz: 66-56 dBuV Quasi Peak, 56-46 dBuV Average, Decreases with the logrithm of the 0.5 - 5.0 MHz: 56 dBuV Quasi Peak, 46 dBuV Average 5.0 - 30.0 MHz: 60 dBuV Quasi Peak, 50 dBuV Average

Test Setup	**Appendix A**	**Figure A.7**

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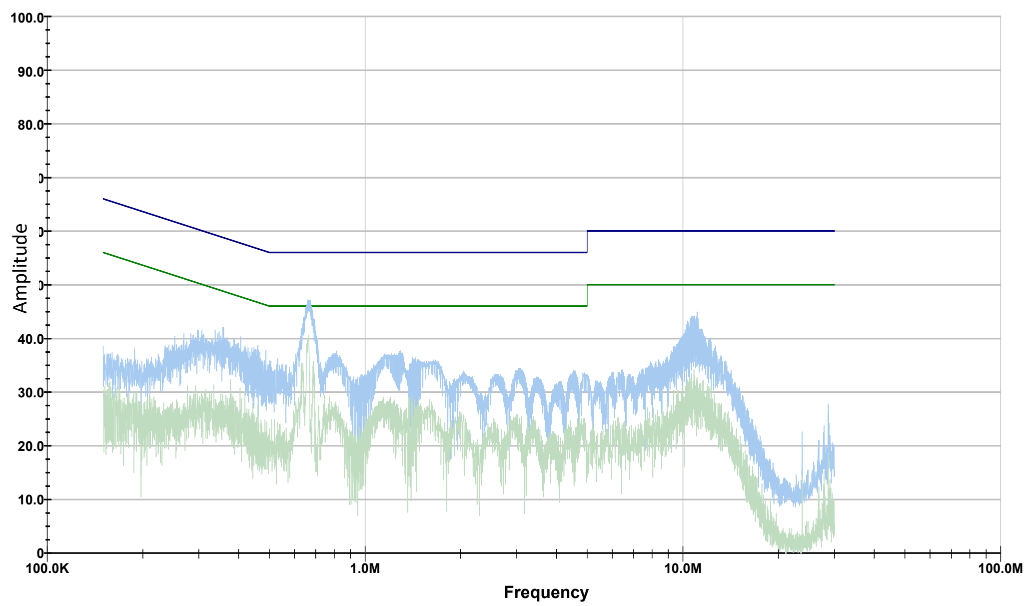
Plot 20.1 – Power Line Conducted Emissions, Line 1

Power Line Conducted Emissions - L1



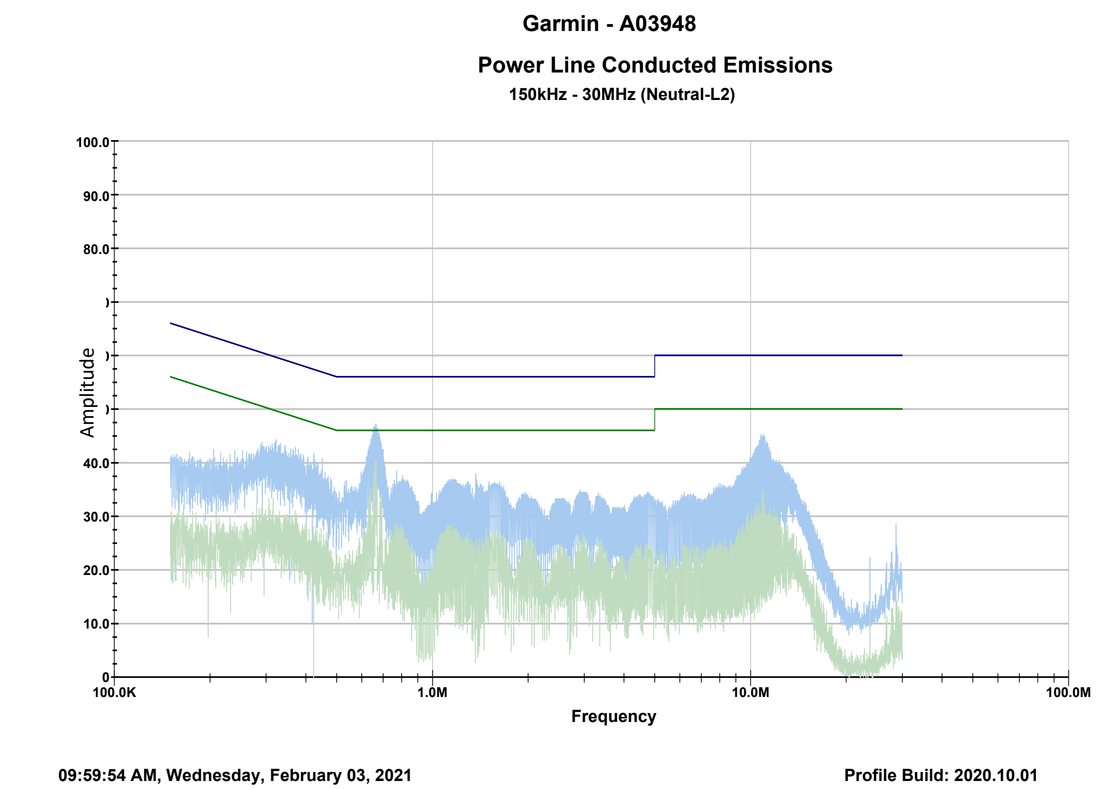
10:01:08 AM, Wednesday, February 03, 2021

Profile Build: 2020.10.01

Green Limit: **Quasi Peak**	Green Trace: **Peak**	Frequency Range: **0.15 - 30** MHz
Blue Limit: **Average**	Blue Trace: **RMS**	Measured Emission:

Plot 20.2 – Power Line Conducted Emissions, Line 2

Power Line Conducted Emissions - L2



Blue Limit: **Quasi Peak**	Blue Trace: **Peak**	Frequency Range: **0.15 - 30** MHz
Green Limit: **Average**	Green Trace: **RMS**	Measured Emission:

Table 20.1 – Summary of Power Line Conducted Emissions

Summary of Power Line Conducted Tx Emissions													
Measured Frequency Range (MHz)	Channel Frequency (MHz)	LISN Port	Emission Frequency [f_{Emm}]		Measured Emission [E_{Meas}] (dBuV)	Detector*	Insertion Loss [L_{LISN}] (dB)	Cable Loss [L_C] (dB)	Amplifier Gain [G_A] (dB)	Corrected Emission [E_{Corr}] (dBuV)		Limit (dBuV)	Margin (dB)
150kHz - 30MHz	2442.0	L1	658.90	kHz	45.95	Peak	0.40	0.25	0.00 (3)	46.6	(2)	56.0	**9.4**
			1.38	MHz	38.16		0.30	0.26		38.7	(2)	56.0	**17.3**
			10.74	MHz	44.73		0.30	0.26		45.3	(2)	60.0	**14.7**
			11.15	MHz	44.32		0.30	0.27		44.9	(2)	60.0	**15.1**
			663.10	kHz	38.71	Average	0.40	0.25		39.4	(2)	46.0	**6.6**
			1.40	MHz	28.66		0.30	0.26		29.2	(2)	46.0	**16.8**
			10.83	MHz	32.83		0.30	0.26		33.4	(2)	50.0	**16.6**
			11.10	MHz	33.42		0.30	0.27		34.0	(2)	50.0	**16.0**
											Results:	**Complies**	

* In accordance with FCC §15.35 and ANSI C63.4, a Peak detector may be used to demonstrate compliance to Quasi-Peak limits provided the Resolution Bandwidth (RBW) is equal to or greater than Quasi-Peak bandwidth. The Detector RBW employed was ≥ 9kHz.
(2) LISN Insertion Loss, Cable Loss and Amplifier Gain corrected in Spectrum Analyzer Transducer Factor
(3) External Amplier not used

$E_{Corr} = E_{Meas} + L_{LISN} + L_C - G_A$

Class B QP Limit = 56 - 20Log (f_{Emm}/500) for f_{Emm} = 150kHz to 500kHz

Class B Avg Limit = 46 - 20Log (f_{Emm}/500) for f_{Emm} = 150kHz to 500kHz

Class A QP Limit = 79dBuV for f_{Emm} = 150kHz to 500kHz

Class A Avg Limit = 66dBuV for f_{Emm} = 150kHz to 500kHz

Margin = Limit - E_{corr}

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Table 20.1 – Summary of Power Line Conducted Emissions (Cont)

Summary of Power Line Conducted Tx Emissions											
Measured Frequency Range (MHz)	Channel Frequency (MHz)	LISN Port	Emission Frequency [f_{Emm}]	Measured Emission [E_{Meas}] (dBuV)	Detector*	Insertion Loss [L_{LISN}] (dB)	Cable Loss [L_C] (dB)	Amplifier Gain [G_A] (dB)	Corrected Emission [E_{Corr}] (dBuV)	Limit (dBuV)	Margin (dB)
150kHz - 30MHz	2442.0	L2	652.80 kHz	45.18	Peak	0.40	0.25	0.00 (3)	45.8 (2)	56.0	**10.2**
			1.38 MHz	37.06		0.30	0.26		37.6 (2)	56.0	**18.4**
			10.72 MHz	45.03		0.30	0.26		45.6 (2)	60.0	**14.4**
			11.26 MHz	43.42		0.30	0.27		44.0 (2)	60.0	**16.0**
			662.04 kHz	38.99	Average	0.40	0.25		39.6 (2)	46.0	**6.4**
			1.38 MHz	28.56		0.30	0.26		29.1 (2)	46.0	**16.9**
			10.75 MHz	32.43		0.30	0.26		33.0 (2)	50.0	**17.0**
			11.06 MHz	34.02		0.30	0.27		34.6 (2)	50.0	**15.4**
									Results:	**Complies**	

* In accordance with FCC §15.35 and ANSI C63.4, a Peak detector may be used to demonstrate compliance to Quasi-Peak limits provided the Resolution Bandwidth (RBW) is equal to or greater than Quasi-Peak bandwidth. The Detector RBW employed was ≥ 9kHz.
(2) LISN Insertion Loss, Cable Loss and Amplifier Gain corrected in Spectrum Analyzer Transducer Factor
(3) External Amplier not used

$E_{Corr} = E_{Meas} + L_{LISN} + L_C - G_A$

Class B QP Limit = 56 - 20Log (f_{Emm}/500) for f_{Emm} = 150kHz to 500kHz

Class B Avg Limit = 46 - 20Log (f_{Emm}/500) for f_{Emm} = 150kHz to 500kHz

Class A QP Limit = 79dBuV for f_{Emm} = 150kHz to 500kHz

Class A Avg Limit = 66dBuV for f_{Emm} = 150kHz to 500kHz

Margin = Limit - E_{corr}

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APPENDIX A – TEST SETUP DRAWINGS

Table A.1 – Conducted Measurement Setup

Equipment List				
Asset Number	Manufacturer	Model Number	Serial Number	Description
00241	R&S	FSU40	100500	Spectrum Analyzer
00263	Koaxis	KP10-1.00M-TD	263	1m Armoured Cable

Figure A.1 – Test Setup – Conducted Measurements

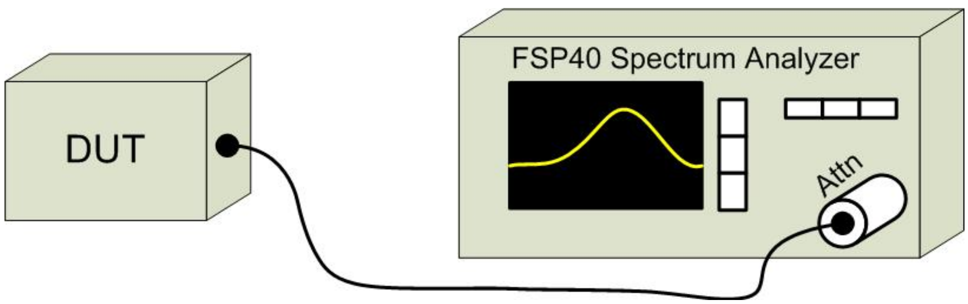

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Table A.2 – Radiated Emissions Measurement Equipment

Equipment List				
Asset Number	Manufacturer	Model Number	Serial Number	Description
00050	Chase	CBL-6111A	1607	Bilog Antenna
00034	ETS	3115	6267	Double Ridged Guide Horn
00035	ETS	3115	6276	Double Ridged Guide Horn
00085	EMCO	6502	9203-2724	Loop Antenna
00161	Waveline Inc.	889		Standard Gain Horn 18-26GHz
00162	Waveline Inc.	889		Standard Gain Horn 18-26GHz
00165	Waveline Inc.	801-KF		Waveguide Adapter 18-26GHz
00166	Waveline Inc.	801-KF		Waveguide Adapter 18-26GHz
00333	HP	85685A	3010A01095	RF Preselector
00049	HP	85650A	2043A00162	Quasi-peak Adapter
00051	HP	8566B	2747A05510	Spectrum Analyzer
00241	R&S	FSU40	100500	Spectrum Analyzer
00265	Miteq	JS32-00104000-58-5P	1939850	Microwave L/N Amplifier
00071	EMCO	2090	9912-1484	Multi-Device Controller
00072	EMCO	2075	0001-2277	Mini-mast
00073	EMCO	2080	0002-1002	Turn Table
00263	Koaxis	KP10-1.00M-TD	263	1m Armoured Cable
00263B	Koaxis	KP10-1.00M-TD	263B	1m Armoured Cable
00275	TMS	LMR400	n/a	25m Cable
00278	TILE	34G3	n/a	TILE Test Software

Figure A.2 – Test Setup Radiated Measurements 9kHzMHz – 30MHz

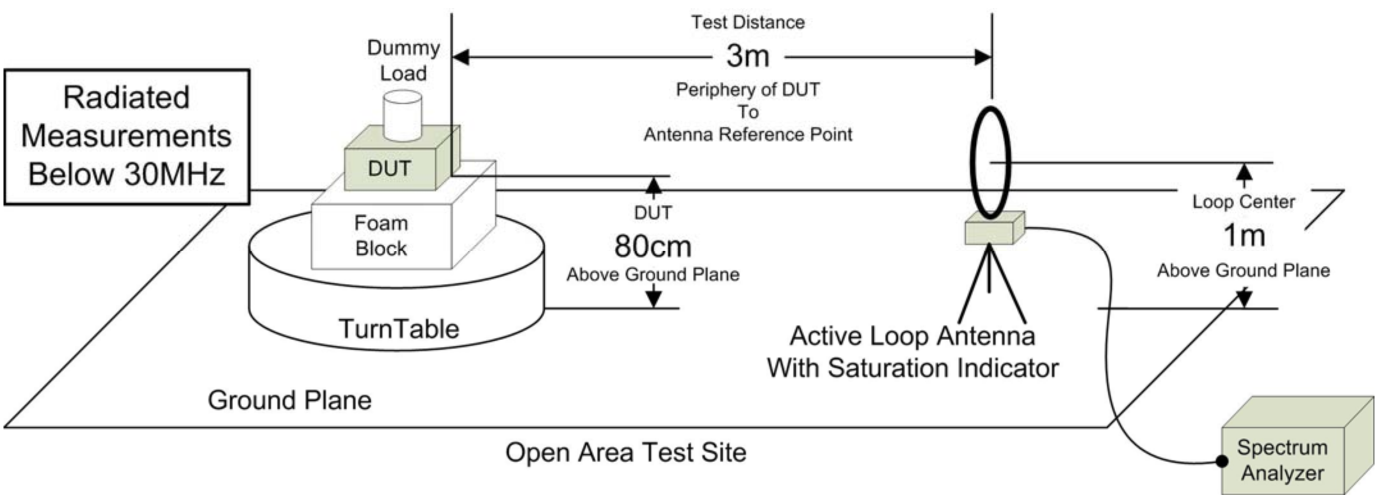

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Figure A.3 – Test Setup Radiated Measurements 30MHz – 1GHz

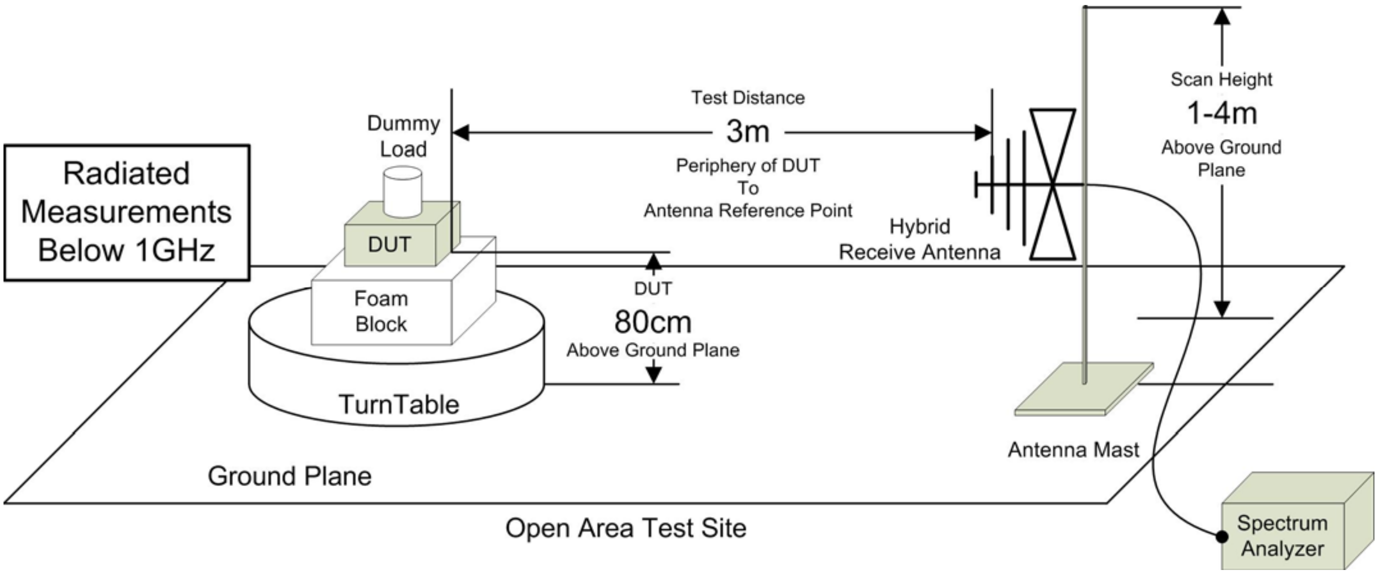

Figure A.4 – Test Setup Radiated Measurements 30MHz – 1GHz, Signal Substitution

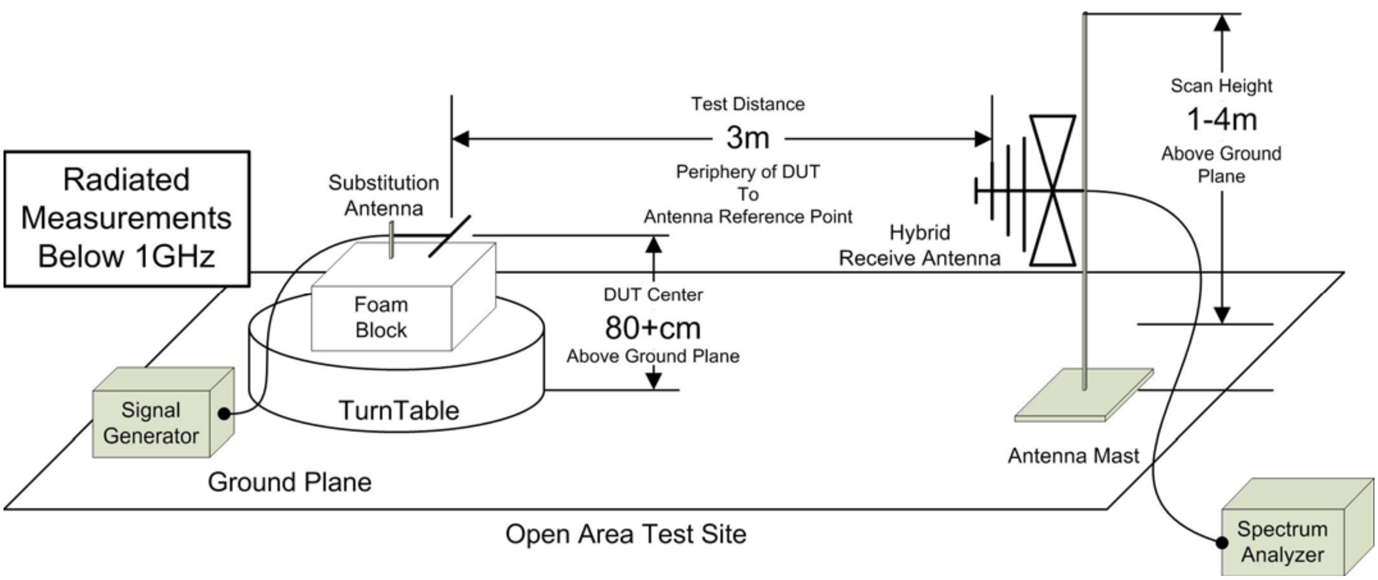

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Figure A.5 – Test Setup Radiated Measurements 1 – 18GHz,

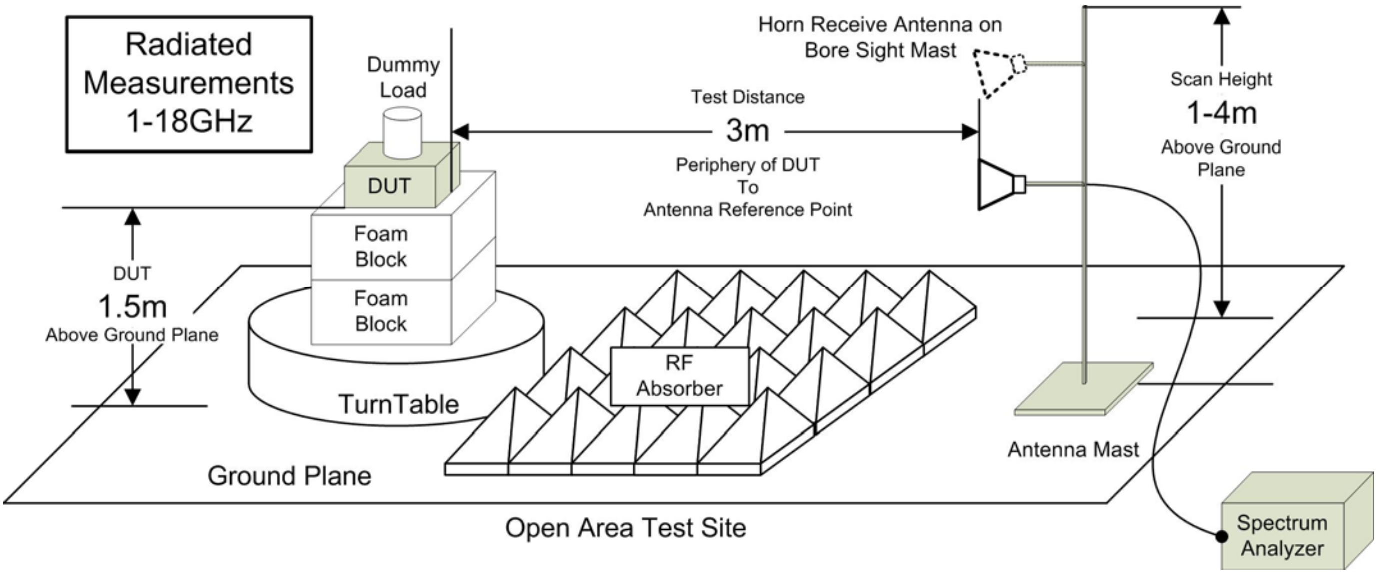

Figure A.6 – Test Setup Radiated Measurements 18 – 26.5GHz,

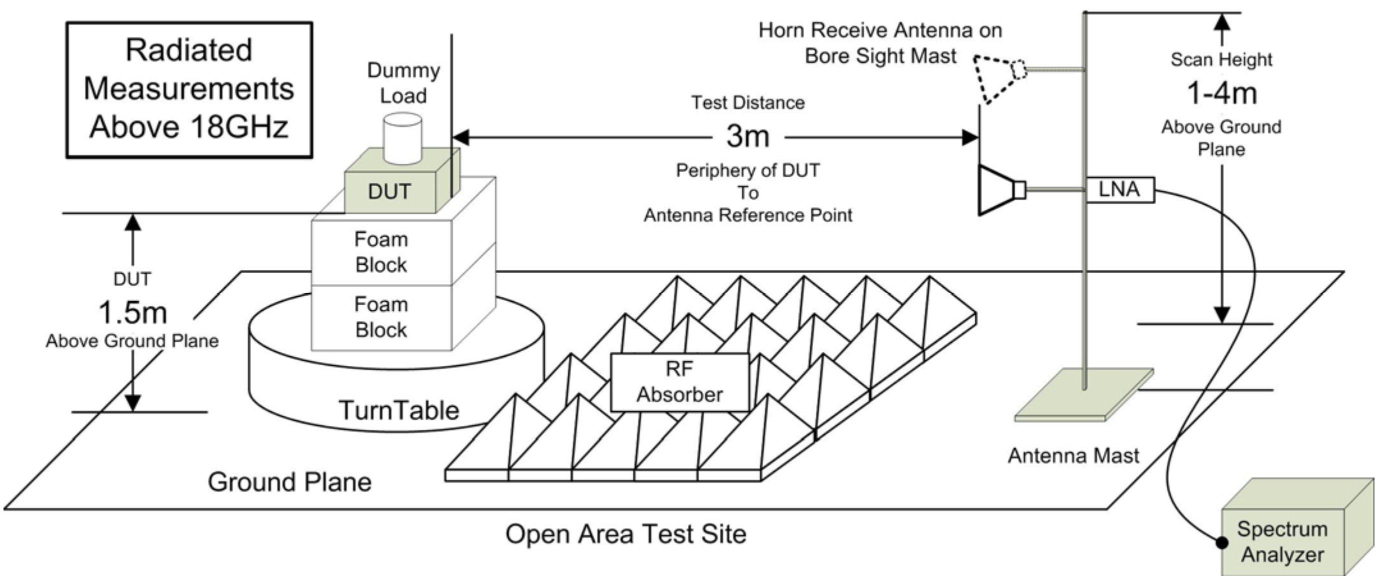

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Table A.3 – Setup – Conducted Emissions Equipment List

Equipment List				
Asset Number	Manufacturer	Model Number	Serial Number	Description
00333	HP	85685A	3010A01095	RF Preselector
00049	HP	85650A	2043A00162	Quasi-peak Adapter
00051	HP	8566B	2747A05510	Spectrum Analyzer
00223	HP	8901A	3749A07154	Modulation Analyzer
00257	Com-Power	LI-215A	191934	LISN
00276	TMS	LMR400	n/a	4m Cable

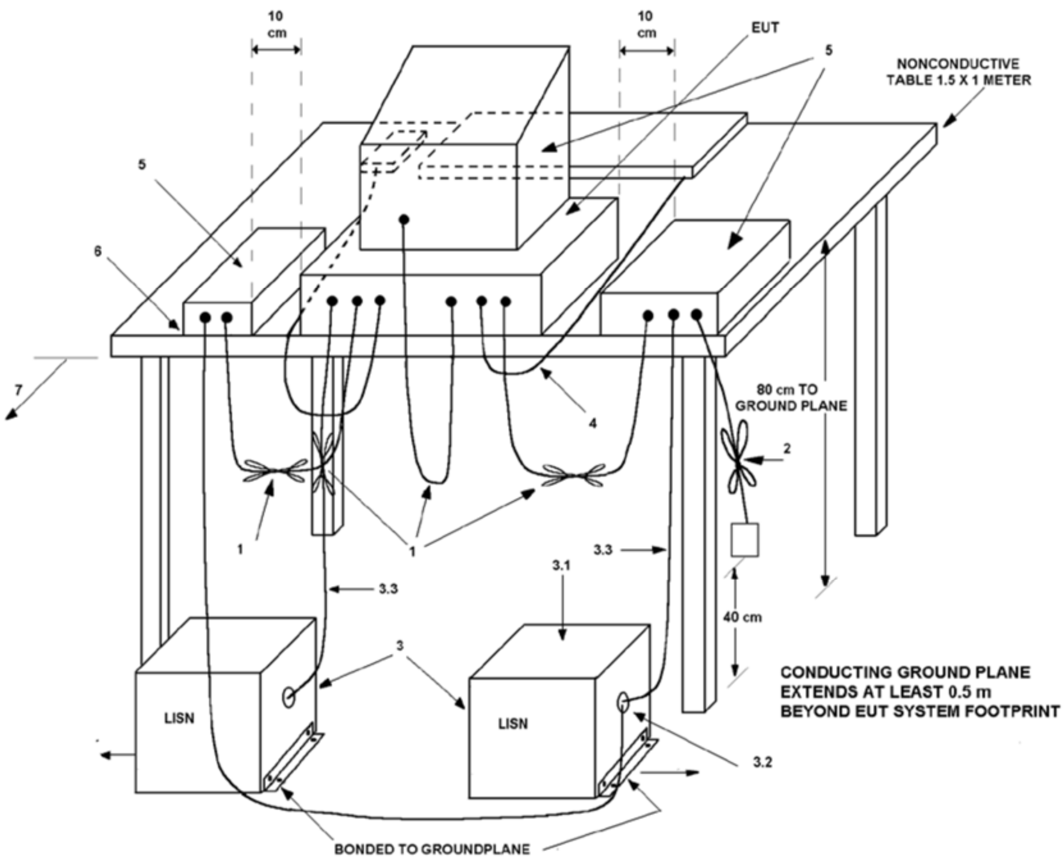

Figure A.7 – Test Setup Conducted Emissions Measurements

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APPENDIX B – EQUIPMENT LIST AND CALIBRATION

Equipment List							
Asset Number	Manufacturer	Model Number	Serial Number	Description	Last Calibrated	Calibration Interval	Calibration Due
00050	Chase	CBL-6111A	1607	Bilog Antenna	3 Jan 2019	Triennial	3 Jan 2022
00034	ETS	3115	6267	Double Ridged Guide Horn	26 Nov 2018	Triennial	26 Nov 2021
00035	ETS	3115	6276	Double Ridged Guide Horn	22 Mar 2019	Triennial	21 Mar 2022
00085	EMCO	6502	9203-2724	Loop Antenna	11 Jun 2019	Triennial	11 Jun 2022
00161	Waveline Inc.	889		Standard Gain Horn 18-26GHz	NCR	n/a	NCR
00162	Waveline Inc.	889		Standard Gain Horn 18-26GHz	NCR	n/a	NCR
00165	Waveline Inc.	801-KF		Waveguide Adapter 18-26GHz	NCR	n/a	NCR
00166	Waveline Inc.	801-KF		Waveguide Adapter 18-26GHz	NCR	n/a	NCR
00333	HP	85685A	3010A01095	RF Preselector	23 Jun 2020	Triennial	30 Jun 2023
00049	HP	85650A	2043A00162	Quasi-peak Adapter	23 Jun 2020	Triennial	23 Jun 2023
00051	HP	8566B	2747A05510	Spectrum Analyzer	23 Jun 2020	Triennial	23 Jun 2023
00241	R&S	FSU40	100500	Spectrum Analyzer	15 May 2018	Triennial	15 May 2021
00005	HP	8648D	3847A00611	Signal Generator	23 Jun 2020	Triennial	23 Jun 2023
00006	R&S	SMR20	100104	Signal Generator	29 May 2017	Triennial	29 May 2020
00257	Com-Power	LI-215A	191934	LISN	5 Jan 2018	Triennial	5 Mar 2021
00071	EMCO	2090	9912-1484	Multi-Device Controller	n/a	n/a	n/a
00072	EMCO	2075	0001-2277	Mini-mast	n/a	n/a	n/a
00073	EMCO	2080	0002-1002	Turn Table	n/a	n/a	n/a
00081	ESPEC	ECT-2	0510154-B	Environmental Chamber	NCR	n/a	CNR
00234	VWR	61161-378	140320430	Temp/Humidity Meter	New	Triennial	New
00263	Koaxis	KP10-1.00M-TD	263	1m Armoured Cable	COU	n/a	COU
00263B	Koaxis	KP10-1.00M-TD	263B	1m Armoured Cable	COU	n/a	COU
00275	TMS	LMR400	n/a	25m Cable	COU	n/a	COU
00278	TILE	34G3	n/a	TILE Test Software	NCR	n/a	NCR

NCR: No Calibration Required
COU: Calibrate On Use

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APPENDIX C – MEASUREMENT INSTRUMENT UNCERTAINTY

CISPR 16-4 Measurement Uncertainty (U_{LAB})	
This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence interval using a coverage factor of k=2	
30MHz - 200MHz	
U_{LAB} = 5.14dB U_{CISPR} = 6.3dB	
200MHz - 1000MHz	
U_{LAB} = 5.90dB U_{CISPR} = 6.3dB	
1GHz - 6GHz	
U_{LAB} = 4.80dB U_{CISPR} = 5.2dB	
6GHz - 18GHz	
U_{LAB} = 5.1dB U_{CISPR} = 5.5dB	
If the calculated uncertainty **U_{lab}** is **less** than **U_{CISPR}** then:	
1	Compliance is deemed to occur if **NO** measured disturbance exceeds the disturbance limit
2	Non-Compliance is deemed to occur if **ANY** measured disturbance **EXCEEDS** the disturbance limit
If the calculated uncertainty **U_{lab}** is **greater** than **U_{CISPR}** then:	
3	Compliance is deemed to occur if **NO** measured disturbance, increased by (**U_{lab} - U_{CISPR}**), exceeds the disturbance limit
4	Non-Compliance is deemed to occur if **ANY** measured disturbance, increased by (**U_{lab} - U_{CISPR}**), **EXCEEDS** the disturbance limit

END OF REPORT

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APPENDIX D – OCCUPIED BANDWIDTH MEASUREMENT PLOTS

APPENDIX E – ANTENNA PORT CONDUCTED POWER MEASUREMENT PLOTS

APPENDIX F – POWER SPECTRAL DENSITY MEASUREMENT PLOTS

APPENDIX G – CONDUCTED SPURIOUS EMISSIONS, BAND EDGE MEASUREMENT PLOTS

APPENDIX H – RADIATED TX SPURIOUS EMISSIONS, RESTRICTED BAND MEASUREMENT PLOTS

APPENDIX I – RADIATED RX SPURIOUS EMISSIONS MEASUREMENT PLOTS

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Test Report Serial Number:	**45461627 R2.0**
Test Report Date:	**16 February 2021**
Project Number:	**1510**

EMC Test Report - New Certification

Applicant:

Garmin International Inc.
1200 East 151 St
Olathe, KS, 66062
USA

FCC ID:	IC Registration Number
IPH-03948	**1792A-03948**
Product Model Number / HVIN	Product Marketing Name / PMN
A03948	**A03948**

In Accordance With:

CFR Title 47, Part 15 Subpart C (§15.225), (§15.249)

Part 15 Low Power Communication Device Transmitter (DXX)

RSS-Gen, RSS-210 Issue 10

Low Power Transmitter (2400-2483.5MHz)

Approved By:

Ben Hewson, President
Celltech Labs Inc.
21-364 Lougheed Rd.
Kelowna, BC, V1X 7R8
Canada

Test Lab Certificate: 2470.01 | **IC Registration 3874A-1** | **FCC Registration: CA3874**

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Table of Plots

See Appendix K thru P

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Table of Figures

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1.0 DOCUMENT CONTROL

Revision History					
Samples Tested By:		Art Voss, P.Eng.	Date(s) of Evaluation:		18 Nov - 16 Dec, 2020
Report Prepared By:		Art Voss, P.Eng.	Report Reviewed By:		Ben Hewson
Report Revision	Description of Revision		Revised Section	Revised By	Revision Date
0.1	Initial Draft Release		n/a	Art Voss	17 December 2020
0.2	Revised Table 12.3		12.0	Art Voss	21 December 2020
1.0	Initial Release		n/a	Art Voss	10 February 2021
2.0	Added Power Line Conducted Emissions		15.0	Art Voss	16 February 2021

2.0 CLIENT AND DUT INFORMATION

Client Information		
Applicant Name	Garmin International Inc.	
Applicant Address	1200 East 151 St	
	Olathe, KS, 66062	
	USA	
DUT Information		
Device Identifier(s):	FCC ID:	IPH-03948
	ISED ID:	1792A-03948
Device Model(s) / HVIN:	A03948	
Test Sample Serial No.:	3326988634 - Conducted, 3326988670 - OTA/SAR	
Device Type:	Extremity Worn Digital Transceiver	
FCC Equipment Class:	WiFi - Digital Transmission System (DTS)	
	BlueTooth - Spread Spectrum Transmitter (DSS)	
	BlueTooth LE/ANT - Low Power Communication Device Transmitter (DXX)	
	NFC - Low Power Communication Device Transmitter (DXX)	
ISED Equipment Class:	WiFi: Wi-Fi Device	
	BlueTooth: Spread Spectrum/Digital Device (2400-2483.5MHz)	
	BlueTooth LE/ANT - Low Power Device (2400-2483.5MHz)	
	NFC - RFID Device	
Transmit Frequency Range:	WiFi (DTS): 2412-2462MHz	
	BT/BLE/ANT: 2402-2480MHz	
	NFC: 13.56MHz	
Manuf. Max. Rated Output Power:	WiFi - Digital Transmission System (DTS): 17.52dBm	
	BlueTooth - Spread Spectrum Transmitter (DSS): 9.42dBm	
	BLE/ANT - Low Power Communication Device Transmitter (DXX): 4dBm	
	NFC - Low Power Communication Device Transmitter (DXX): -36dBm	
Antenna Type and Gain:	0.6dBi Max*	
Modulation:	WiFi: DSSS, OFDM, CCK, MCS0-7	
Modulation:	BT BR: GFSK	
Modulation:	BT EDR 2Mb: Pi/4-DQPSK, BT EDR 3Mb: 8-DPSK	
Modulation:	BLE: GMSK	
Modulation:	ANT: GFSK	
Modulation:	NFC:	
DUT Power Source:	3VDC Rechargeable Li-Ion	
DUT Dimensions [LxWxH]	H x W x D: 50mm x 45mm x 18mm	
Deviation(s) from standard/procedure:	None	
Modification of DUT:	None	

* Information regarding antenna type and gain provided by applicant.

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3.0 SCOPE

Preface:

This Certification Report was prepared on behalf of:

Garmin International Inc.

,(the '*Applicant*"), in accordance with the applicable Federal Communications Commission (FCC) CFR 47 and Innovation, Scientific and Economic Development (ISED) Canada rules parts and regulations (the '*Rules*'). The scope of this investigation was limited to only the equipment, devices and accessories (the '*Equipment*') supplied by the *Applicant*. The tests and measurements performed on this *Equipment* were only those set forth in the applicable *Rules* and/or the Test and Measurement Standards they reference. The *Rules* applied and the Test and Measurement Standards used during this evaluation appear in the Normative References section of this report. The limits set forth in the technical requirements of the applicable *Rules* were applied to the measurement results obtained during this evaluation and ,unless otherwise noted, these limits were used as the Pass/Fail criteria. The Pass/Fail statements made in this report apply to only the tests and measurements performed on only the *Equipment* tested during this evaluation. Where applicable and permissible, information including test and measurement data and/or results from previous evaluations of same or similar equipment, devices and/or accessories may be cited in this report.

Device:

The Garmin Model/HVIN: A03948 is an extremity worn digital transceiver device consisting of a WiFi, BlueTooth (BT), BlueTooth Low Energy (BLE), Adaptive Network Topology (ANT) and Near Field Communication (NFC) transceivers. The WiFi and BT/BLE/ANT transceivers share the same antenna and cannot simultaneously transmit.

Requirement:

The transceivers of this *equipment* are subject to emissions evaluation in accordance with FCC: 47 CFR 2, 15C, ISED: RSS-Gen, RSS-210 and RSS-247. As per FCC 47 CFR §2.1093 and Health Canada Safety Code 6, an RF Exposure (SAR) evaluation is required for this *Equipment* and the results of the RF Exposure (SAR) evaluation appear in a separate report.

Application:

This is an application for a New Certification.

Scope:

The scope of this investigation is limited to the evaluation and reporting of the wanted and spurious emissions in accordance with the rule parts cited in Normative References section of this report.

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4.0 TEST RESULT SUMMARY

TEST SUMMARY						
Section	**Description of Test**	**Procedure Reference**	**Applicable Rule Part(s) FCC**	**Applicable Rule Part(s) ISED**	**Test Date**	**Result**
7.0	Occupied Bandw idth	ANSI C63.10-2013 KDB 558074 D01v05	§2.1049	RSS-Gen (6.7)	15 Dec 2020	Pass
8.0	Field Strength (Fundamental)	ANSI C63.10-2013 KDB 558074 D01v05	§15.249(a)(e)	RSS-Gen (6.12) RSS-210 (B.10)	23 Nov 2020	Pass
9.0	20dB BW	ANSI C63.10-2013 KDB 558074 D01v05	§15.249(a)(e)	RSS-Gen (6.12) RSS-210 (B.10)	15 Dec 2020	Pass
10.0	Field Strength (NFC)	ANSI C63.10-2013 KDB 558074 D01v05	§15.225(a)	RSS-Gen (6.12) RSS-210 (B.10)	16 Dec 2020	Pass
11.0	Band Edge (NFC)	ANSI C63.10-2013 KDB 558074 D01v05	§15.225(a)(c)	RSS-Gen (6.12) RSS-210 (B.10)	16 Dec 2020	Pass
12.0	Restricted Bands	ANSI C63.10-2013 KDB 558074 D01v05	§15.249(d)(e) §15.209	RSS-Gen (8.10)	16 Dec 2020	Pass
13.0	Radiated Rx Emissions	ANSI C63.10-2013 KDB 558074 D01v05	§15.249(d)(e) §15.209	RSS-Gen (8.10)	23 Nov 2020	Pass
14.0	Frequency Stability	ANSI C63.10-2013 KDB 558074 D01v05	§15.225	RSS-G210 B.6	3 Dec 2020	Pass

Test Station Day Log					
Date	**Ambient Temp (^{o}C)**	**Relative Humidity (%)**	**Barometric Pressure (kPa)**	**Test Station**	**Tests Performed Section(s)**
23 Nov 2020	2.0	87	101.5	**OATS**	**8, 12, 13**
26 Nov 2020	5.0	73	102.6	**OATS**	**13**
3 Dec 2020	18.0	26	103.1	**TC**	**14**
15 Dec 2020	24.0	15	102.6	**EMC**	**7, 9**
16 Dec 2020	23.0	17	101.8	**EMC**	**11, 12**
16 Dec 2020	4.0	76	102.6	**OATS**	**10**

EMC - EMC Test Bench
OATS - Open Area Test Site
LISN - LISN Test Area
IMM - Immunity Test Area
SAC - Semi-Anechoic Chamber
TC - Temperature Chamber
ESD - ESD Test Bench
RI - Radiated Immunity Chamber

I attest that the data reported herein is true and accurate w ithin the tolerance of the Measurement Instrument Uncertainty; that all tests and measurements w ere performed in accordance w ith accepted practices or procedures; and that all tests and measurements w ere performed by me or by trained personnel under my direct supervision. The results of this investigation are based solely on the test sample(s) provided by the client w hich w ere not adjusted, modified or altered in any manner w hatsoever, except as required to carry out specific tests or measurements. This test report has been completed in accordance w ith ISO/IEC 17025.

Art Voss, P.Eng.
Technical Manager
Celltech Labs Inc.

12 May 2020
Date

PROFESSIONAL
PROVINCE OF
A. F. VOSS
31327
BRITISH COLUMBIA
ENGINEER

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5.0 NORMATIVE REFERENCES

Normative References	
ISO/IEC 17025:2017	General requirements for the competence of testing and calibration laboratories
ANSI C63.10-2013	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices
CFR Title 47: Part 2:	Code of Federal Regulations Telecommunication Frequency Allocations and Radio Treaty Matters; General Rules and Regulations
CFR Title 47: Part 15: Sub Part C (15.249)	Code of Federal Regulations Telecommunication Radio Frequency Devices Intentional Radiators
CFR Title 47: Part 15: Sub Part C (15.225)	Code of Federal Regulations Telecommunication Radio Frequency Devices Intentional Radiators
CFR Title 47: Part 15: Subpart B:	Code of Federal Regulations Telecommunication Radio Frequency Devices Unintentional Radiators
ISED RSS-Gen Issue 5:	Innovation, Science and Economic Development Canada Spectrum Management and Telecommunications Radio Standards Specification General Requirements and Information for the Certification of Radiocommunication Equipment
ISED RSS-210 Issue10:	Innovation, Science and Economic Development Canada Spectrum Management and Telecommunications Radio Standards Specification Licence-Exempt Radio Apparatus: Category I Equipment
FCC KDB 558074 D01v05	OET Major Guidance Publications, Knowledge Data Base Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under Section 15.247

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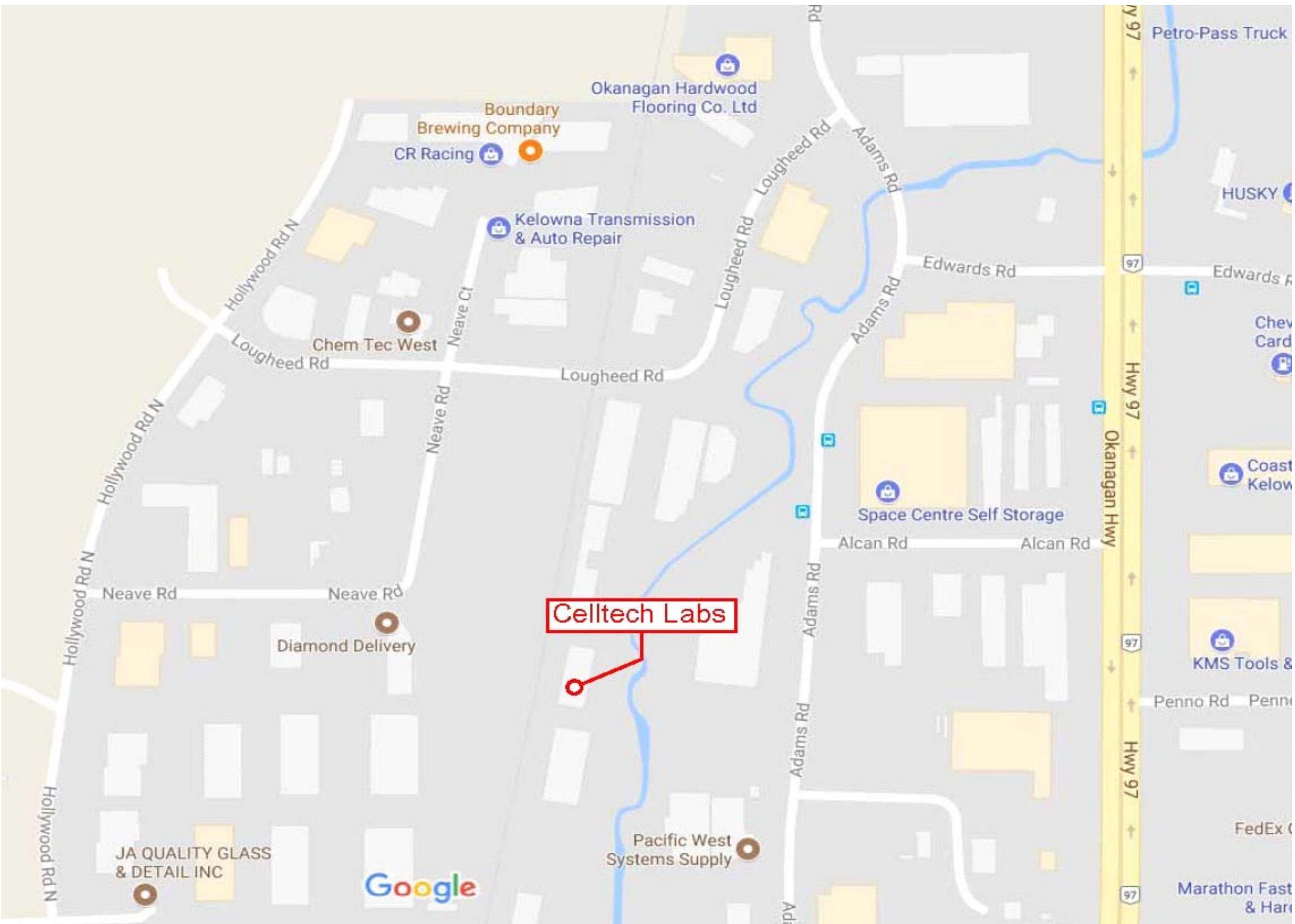
6.0 FACILITIES AND ACCREDITATIONS

Facility and Accreditation:

The facilities used to evaluate this device outlined in this report are located at 21-364 Lougheed Road, Kelowna, British Columbia, Canada V1X 7R8. The radiated emissions site (OATS) conforms to the requirements set forth in ANSI C63.4 and is filed and listed with the FCC under Test Firm Registration Number CA3874A-1 and Industry Canada under Test Site File Number IC 3874A-1. Celltech is accredited to ISO 17025, through accrediting body A2LA and with certificate 2470.01.



7.0 OCCUPIED BANDWIDTH

Test Procedure	
Normative Reference	FCC 47 CFR §2.1046, RSS-Gen (6.1.2), RSS-247 (5.4)(d), KDB 558074 (8.3.2.1), ANSI C63.10 (6.9.3)

General Procedure	
C63.10 (6.9.3)	**6.9.3 Occupied bandwidth—power bandwidth (99%) measurement procedure** The occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers are each equal to 0.5% of the total mean power of the given emission. The following procedure shall be used for measuring 99% power bandwidth: a) The instrument center frequency is set to the nominal EUT channel center frequency. The frequency span for the spectrum analyzer shall be between 1.5 times and 5.0 times the OBW. b) The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW, and VBW shall be approximately three times the RBW, unless otherwise specified by the applicable requirement. c) Set the reference level of the instrument as required, keeping the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope shall be more than [10 log (OBW/RBW)] below the reference level. Specific guidance is given in 4.1.5.2. d) Step a) through step c) might require iteration to adjust within the specified range. e) Video averaging is not permitted. Where practical, a sample detection and single sweep mode shall be used. Otherwise, peak detection and max hold mode (until the trace stabilizes) shall be used. f) Use the 99% power bandwidth function of the instrument (if available) and report the measured bandwidth.

Test Setup	Appendix A - Figure A.1

Measurement Procedure
The DUT was connected to a Spectrum Analyzer (SA) via a 30dB attenuator connected to the DUT's antenna port. The SA was configured as described above using the 99% Occupied Bandwidth function. The output power of the DUT was set to the manufacturer's highest output power setting at the Low, Mid and High frequency channels as permitted by the device. The DUT was set to transmit at its maximum Duty Cycle. The 99% Occupied Bandwidth was measured and recorded.

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Table 7.1 - Summary of Occupied Bandwidth Measurements (DXX)

See Appendix K for measurement plots

Occupied Bandwidth Measurement Results (DXX)						
Frequency (MHz)	Modulation	Mode	Measured Occupied Bandwidth (MHz)	Minimum Authorized Bandwidth (MHz)	Margin (MHz)	Emission Designator
2402	GFSK	BT BR	1.230	0.5	0.730	1M23F1D
2480	GFSK	BT BR	0.996		0.496	996KF1D
2402	GFSK	ANT	0.978		0.478	978KF1D
2480	GFSK	ANT	1.026		0.526	1M03F1D
2402	GMSK	BLE	1.146		0.646	1M15F1D
2480	GMSK	BLE	1.200		0.700	1M20F1D
						Complies

Margin = Measured BW - Minimum Authorized BW

Table 7.2 - Summary of Occupied Bandwidth Measurements (NFC)

See Appendix K for measurement plots

Occupied Bandwidth Measurement Results (NFC)				
Frequency (MHz)	Modulation	Mode	Measured Occupied Bandwidth (Hz)	Emission Designator
13.56	ASK	NFC	670.000	670HK1D
				Complies

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8.0 FIELD STRENGTH

Test Procedure	
Normative Reference	**FCC 47 CFR §2.1046, §15.249, RSS-210**
	KDB 558074 (8.3.2), ANSI C63.10 (11.9.2.2.6)

Limits	
§15.249(a)	**Operation within the bands 902-928 MHz, 2400-2483.5 MHz, 5725-5875 MHZ, and 24.0-24.25 GHz.** (a) Except as provided in paragraph (b) of this section, the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:
	2400-2483.5MHz, Fundamental Field Strength: 50mV/m, Harmonic: 500uV/m
RSS-210 B.10(a)	**Bands 902-928 MHz, 2400-2483.5 MHz, 5725-5875 MHz and 24-24.25 GHz** (a) The field strength of fundamental and harmonic emissions measured at 3 m shall not exceed the limits in table B2.
	2400-2483.5MHz, Fundamental Field Strength: 50mV/m, Harmonic: 500uV/m

General Procedure	
C63.10 (6.5.4)	**6.5.4 Final radiated emission tests** Using the orientation and equipment arrangement of the EUT, and based on the measurement results found during the exploratory measurement in 6.5.3, the EUT arrangement, appropriate modulation, and modes of operation that produce the emissions that have the highest amplitude relative to the limit shall be selected for the final measurement. The final measurement shall follow all the procedures in 6.3 with the EUT operating on frequencies per 5.6. For each mode selected, record the frequency and amplitude of the highest fundamental emission (if applicable) and the frequency and amplitude of the six highest spurious emissions relative to the limit; emissions more than 20 dB below the limit do not need to be reported. Measurements are performed with the EUT rotated from 0° to 360°, the antenna height scanned between 1 m and 4 m, and the antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations. Variations in cable or wire placement shall be explored to maximize the measured emissions.

Test Setup	Appendix A	Figure A.2

Measurement Procedure
The DUT place on a 80cm high turntable on an Open Area Test Site (OATS) at a distance of 3m from the measurement antenna. The DUT was set to transmit at maximum power and duty cycle. The DUT was rotated 360 degrees and scanned with the receive antenna elevated from 1 to 4m. The emissions were measured and recorded.

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Table 8.1 - Summary of Field Strength Measurements (ANT)

See Appendix L for Measurement Plots

FCC §15.249(a), RSS-210 Radiated Field Strength										
Frequency (MHz)	**Mode**	**Modulation**	**Detector**	**Antenna Polarization**	**Measured Field Strength [FS_{Meas}] (dBuV @ 3m)**	**Cable Loss [L_C] (dBm)**	**Receive Antenna [ACF] (dB)**	**Corrected Field Strength [FS_{Corr}] (dBuV @3m)**	**Limit (dBuV)**	**Margin (dB)**
2402.0	ANT	GFSK	RMS	Horizontal	52.06	4.6	28.3	84.96	94.0	**9.0**
2442.0					53.68			86.58		**7.4**
2480.0					54.76			87.66		**6.3**
2402.0				Vertical	45.21			78.11		**15.9**
2442.0					46.17			79.07		**14.9**
2480.0					43.80			76.70		**17.3**
2480.0			Peak	Horizontal	55.62			88.52	114.0	**25.5**
2442.0				Vertical	48.65			81.55		**32.5**
								Result:	**Complies**	

$FS_{Corr} = FS_{Meas} + ACF + L_C$

Margin = Limit - FS_{Corr}

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Table 8.2 - Summary of Field Strength Measurements (BLE)

See Appendix L for Measurement Plots

FCC §15.249(a), RSS-210 Radiated Field Strength										
Frequency (MHz)	Mode	Modulation	Detector	Antenna Polarization	Measured Field Strength [FS_{Meas}] (dBuV @ 3m)	Cable Loss [L_C] (dBm)	Receive Antenna [ACF] (dB)	Corrected Field Strength [FS_{Corr}] (dBuV @3m)	Limit (dBuV)	Margin (dB)
2402.0	BLE	GMSK	RMS	Horizontal	51.94	4.6	28.3	84.84	94.0	**9.2**
2442.0					52.82			85.72		**8.3**
2480.0					53.61			86.51		**7.5**
2402.0				Vertical	44.51			77.41		**16.6**
2442.0					44.70			77.60		**16.4**
2480.0					44.66			77.56		**16.4**
2480.0			Peak	Horizontal	53.99			86.89	114.0	**27.1**
2442.0				Vertical	50.09			82.99		**31.0**
								Result:	**Complies**	

$FS_{Corr} = FS_{Meas} + ACF + L_C$

$Margin = Limit - FS_{Corr}$

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Table 8.3 - Summary of Field Strength Measurements (BT BR)

See Appendix L for Measurement Plots

FCC §15.249(a), RSS-210 Radiated Field Strength										
Frequency (MHz)	**Mode**	**Modulation**	**Detector**	**Antenna Polarization**	**Measured Field Strength [FS_{Meas}] (dBuV @ 3m)**	**Cable Loss [L_C] (dBm)**	**Receive Antenna [ACF] (dB)**	**Corrected Field Strength [FS_{Corr}] (dBuV @3m)**	**Limit (dBuV)**	**Margin (dB)**
2402.0	BT BR	GFSK	RMS	Horizontal	54.00	4.6	28.3	86.90	94.0	**7.1**
2442.0					54.18			87.08		**6.9**
2480.0					54.37			87.27		**6.7**
2402.0				Vertical	42.04			74.94		**19.1**
2442.0					44.15			77.05		**17.0**
2480.0					40.41			73.31		**20.7**
2442.0			Peak	Horizontal	53.61			86.51	114.0	**27.5**
2442.0				Vertical	48.04			80.94		**33.1**
									Result:	**Complies**

$FS_{Corr} = FS_{Meas} + ACF + L_C$

$Margin = Limit - FS_{Corr}$

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9.0 20DB BW

Test Procedure	
Normative Reference	**FCC 47 CFR §2.1051, §15.215**
	ANSI C63.10 (6.10.3)

Limits	
§15.215(c)	**Additional provisions to the general radiated emission limitations.** (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.

General Procedure	
C63.10 (6.3.10)	**6.10.3 Unlicensed wireless device operational configuration** Set the EUT to operate at 100% duty cycle or equivalent “normal mode of operation.”[54] Testing shall be performed at the lowest frequency channel and highest frequency channel within the allowed operating band.[55] Testing shall be performed for each frequency with every applicable unlicensed wireless device configuration. If more than one power output level is available, then testing shall be done with the appropriate maximum power output for each antenna combination or modulation, as recorded in the unlicensed wireless device conducted power measurement results. The highest gain of each antenna type shall be used for this test.

[54] For unlicensed wireless devices unable to be configured for 100% duty cycle even in test mode, configure the system for the longest duration duty cycle supported.

[55] Some radios operating, for example, in the 2.4 GHz band, have hardware capability to operate at frequencies outside the band permitted by the regulatory authority. Testing shall only be done at the lowest and highest frequencies within the allowed frequency band (see Annex A for examples of regulatory requirements and frequency ranges).

Test Setup	Appendix A	Figure A.1

Measurement Procedure

The DUT was connected to a Spectrum Analyzer (SA) via a 30dB attenuator connected to the DUT’s antenna port. The SA was configured as described above. The output power of the DUT was set to the manufacturer’s highest output power setting at the Low and High frequency channels as permitted by the device. The unwanted band edge emissions were measured and recorded.

Table 9.1 - Summary of 20dB BW Measurements

See Appendix M for Measurement Plots

20dB BW Bandwidth Measurement Results (DXX)			
Frequency (MHz)	**Modulation**	**Mode**	**Measured 20dB Bandwidth (MHz)**
2402	GFSK	BT BR	1.140
2480	GFSK	BT BR	0.912
2402	GFSK	ANT	0.918
2480	GFSK	ANT	1.026
2402	GMSK	BLE	1.224
2480	GMSK	BLE	1.212
		Result:	**Complies**

Compliance to §15.215(c):
Largest Measured 20dB BW < 1.3MHz, 50% BW < 0.650MHz
LBE = 2402MHz - 0.650MHz = 2401.35MHz > 2400MHz
UBE = 2480 + 0.650MHz = 2480.65MHz < 2483.5MHz

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10.0 FIELD STRENGTH - NFC

Test Procedure	
Normative Reference	**FCC 47 CFR §2.1046, §15.225, RSS-210**
	KDB 558074 (8.3.2), ANSI C63.10 (11.9.2.2.6)
Limits	
§15.225	**Operation within the band 13.110-14.010 MHz.** (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 band shall not exceed the general radiated emission limits in §15.209.
RSS-210 B.10(6)	**Band 13.110-14.010 MHz** (a) the field strength of any emission shall not exceed the following limits: (i)15.848 mV/m (84 dBμV/m) at 30 m, within the band 13.553-13.567 MHz (ii)334 μV/m (50.5 dBμV/m) at 30 m, within the bands 13.410-13.553 MHz and13.567-13.710 MHz (iii)106 μV/m (40.5 dBμV/m) at 30 m, within the bands 13.110-13.410 MHz and13.710-14.010 MHz (iv)RSS-Gen general field strength limits for frequencies outside the band13.110-14.010 MHz
General Procedure	
C63.10 (6.5.4)	**6.5.4 Final radiated emission tests** Using the orientation and equipment arrangement of the EUT, and based on the measurement results found during the exploratory measurement in 6.5.3, the EUT arrangement, appropriate modulation, and modes of operation that produce the emissions that have the highest amplitude relative to the limit shall be selected for the final measurement. The final measurement shall follow all the procedures in 6.3 with the EUT operating on frequencies per 5.6. For each mode selected, record the frequency and amplitude of the highest fundamental emission (if applicable) and the frequency and amplitude of the six highest spurious emissions relative to the limit; emissions more than 20 dB below the limit do not need to be reported. Measurements are performed with the EUT rotated from 0° to 360°, the antenna height scanned between 1 m and 4 m, and the antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations. Variations in cable or wire placement shall be explored to maximize the measured emissions.
Test Setup	**Appendix A Figure A.2**

Measurement Procedure
The DUT place on a 80cm high turntable on an Open Area Test Site (OATS) at a distance of 3m from the measurement antenna. The DUT was set to transmit at maximum power and duty cycle. The DUT was rotated 360 degrees and scanned with the receive antenna elevated from 1 to 4m. The emissions were measured and recorded.

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Table 10.1 – Summary of Field Strength Measurements (NFC)

See Appendix N for Measurement Plots

FCC §15.225(a), RSS-210 Radiated Field Strength										
Frequency (MHz)	Mode	Modulation	Detector	Antenna Polarization	Measured Field Strength [FS_{Meas}] (dBuV @ 3m)	Cable Loss [L_C] (dBm)	Receive Antenna [ACF] (dB)	Corrected Field Strength [FS_{Corr}] (dBuV @3m)	Limit (dBuV)	Margin (dB)
13.56	NFC	ASK	RMS	Front	22.96	0.5	10.65	34.11	124.0	**89.9**
				Side	17.93			29.08		**94.9**
			Peak	Front	23.40			34.55	144.0	**109.5**
				Side	18.84			29.99		**114.0**
								Result:	**Complies**	

$FS_{Corr} = FS_{Meas} + ACF + L_C$

$Margin = Limit - FS_{Corr}$

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11.0 EMISSIONS MASK / 20 DB BW - NFC

Test Procedure	
Normative Reference	**FCC 47 CFR §2.1046, §15.225, RSS-210**
	KDB 558074 (8.3.2), ANSI C63.10 (11.9.2.2.6)

Limits	
§15.225	**Operation within the band 13.110-14.010 MHz.** (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 band shall not exceed the general radiated emission limits in §15.209.
RSS-210 B.10(6)	**Band 13.110-14.010 MHz** (a) the field strength of any emission shall not exceed the following limits: (i)15.848 mV/m (84 dBµV/m) at 30 m, within the band 13.553-13.567 MHz (ii)334 µV/m (50.5 dBµV/m) at 30 m, within the bands 13.410-13.553 MHz and13.567-13.710 MHz (iii)106 µV/m (40.5 dBµV/m) at 30 m, within the bands 13.110-13.410 MHz and13.710-14.010 MHz (iv)RSS-Gen general field strength limits for frequencies outside the band13.110-14.010 MHz

General Procedure	
C63.10 (6.5.4)	**6.5.4 Final radiated emission tests** Using the orientation and equipment arrangement of the EUT, and based on the measurement results found during the exploratory measurement in 6.5.3, the EUT arrangement, appropriate modulation, and modes of operation that produce the emissions that have the highest amplitude relative to the limit shall be selected for the final measurement. The final measurement shall follow all the procedures in 6.3 with the EUT operating on frequencies per 5.6. For each mode selected, record the frequency and amplitude of the highest fundamental emission (if applicable) and the frequency and amplitude of the six highest spurious emissions relative to the limit; emissions more than 20 dB below the limit do not need to be reported. Measurements are performed with the EUT rotated from 0° to 360°, the antenna height scanned between 1 m and 4 m, and the antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations. Variations in cable or wire placement shall be explored to maximize the measured emissions.

Test Setup	Appendix A	Figure A.2

Measurement Procedure

The DUT place on a 80cm high turntable on an Open Area Test Site (OATS) at a distance of 3m from the measurement antenna. The DUT was set to transmit at maximum power and duty cycle. The DUT was rotated 360 degrees and scanned with the receive antenna elevated from 1 to 4m. The emissions were measured and recorded.

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Table 11.2 – Summary of Band Edge Evaluation (NFC)

See Appendix N for Measurement Plots

20dB BW Bandwidth Measurement Results (NFC)			
Frequency (MHz)	Modulation	Mode	Measured 20dB Bandwidth (Hz)
13.56	ASK	NFC	780.0
		Result:	Complies

Compliance to §15.215(c):
See NFC Emissions Mask Plots

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12.0 RADIATED SPURIOUS EMISSIONS – RESTRICTED BANDS

Test Procedure	
Normative Reference	**FCC 47 CFR §2.1051, §15.247(d), §15.205(a), §15.205(c), §15.209(a)**
	KDB 558074 (8.6), ANSI C63.10 (11.12)

Limits	
47 CFR §15.247(d)	(d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).
47 CFR §15.209(a)	**§15.209 Radiated emission limits; general requirements.** (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:

Frequency (MHz)	Field Strength (microvolts/meter)
0.009 - 0.490	2400/F (kHz) @300m
0.490 - 1.705	24000/F (kHz) @30m
1.705 - 30	30 @ 30m
30 - 88	100 @3m
88 - 216	150 @3m
216 - 960	200 @3m
Above 960	500 @3m

Table 12.1 – Summary of Radiated Emissions, Restricted Band (DXX)

See Appendix O for Measurement Plots

Summary of Radiated Tx Emissions (Restricted Band)														
Measured Frequency Range (MHz)	Channel Frequency	Antenna Polarization	Emission Frequency	Measured Emission [E_{Meas}] (dBuV)		Antenna ACF [ACF] (dB)	Cable Loss [L_C] (dB)	Amplifier Gain [G_A] (dB)		Corrected Emission [E_{Corr}] (dBuV/m)		Limit (dBuV)	Margin (dB)
9kHz - 30MHz	2442.0	Front	ND	ND	(1)	0.00	0.00	0.00	(3)	ND	(2)	n/a	**n/a**
9kHz - 30MHz	2442.0	Side	ND	ND	(1)	0.00	0.00	0.00	(3)	ND	(2)	n/a	**n/a**
30-1000MHz	2442.0	Horizontal	745.2MHz	37.88		0.00	0.00	0.00	(3)	37.88	(2)	46.0	**8.1**
30-1000MHz	2442.0	Vertical	955.9MHz	39.24		0.00	0.00	0.00	(3)	39.24	(2)	46.0	**6.8**
1 - 3GHz	2442.0	Horizontal	ND	ND	(1)	27.40	4.58	0.00	(3)	ND		54.0	**n/a**
1 - 3GHz	2442.0	Vertical	ND	ND	(1)	27.40	4.58	0.00	(3)	ND		54.0	**n/a**
3-13GHz	2442.0	Horizontal	ND	ND	(1)	36.76	9.86	0.00	(3)	ND		54.0	**n/a**
3-13GHz	2442.0	Vertical	ND	ND	(1)	36.76	9.86	0.00	(3)	ND		54.0	**n/a**
13-18GHz	2442.0	Horizontal	ND	ND	(1)	38.75	16.54	0.00	(3)	ND		54.0	**n/a**
13-18GHz	2442.0	Vertical	ND	ND	(1)	38.75	16.54	0.00	(3)	ND		54.0	**n/a**
18-26GHz	2442.0	Horizontal	ND	ND	(1)	43.50	21.86	26.00		ND		54.0	**n/a**
18-26GHz	2442.0	Vertical	ND	ND	(1)	43.50	21.86	26.00		ND		54.0	**n/a**
											Results:	**Complies**	

(1) No Emissions Detected (ND) above ambient or within 20dB of the limit
(2) Antenna ACF, Cable Loss and Amplifier Gain corrected in Spectrum Analyzer Transducer Factor
(3) External Amplier not used

$E_{Corr} = E_{Meas} + ACF + L_C - G_A$

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Table 12.2 – Summary of Radiated Emissions, Restricted Band (NFC) 9kHz – 1000MHz

See Appendix O for Measurement Plots

Summary of Conducted Tx Emissions (Restricted Band)

Measured Frequency Range (MHz)	Channel Frequency	Emission Frequency		Antenna Gain [G_T]		Measured Emission [P_T] (dBm)	e.r.p. or e.i.r.p. (dB)	Ground Reflection [L_R] (dB)	Conversion dBm to dBuV/m [CF_R] (dB)	Distance Correction [L_D]	Corrected Emission [E_{Corr}] (dBuV/m)
9kHz - 30MHz	13.56	13.56*	MHz	-0.15	dBd	-70.57	-70.72	6.0	107.0	9.54	32.7
		487.8	MHz			-73.16	-73.31	4.7	107.0		28.9
		515.0	MHz			-74.91	-75.06	4.7	107.0		27.1
		610.1	MHz			-76.80	-76.95	4.7	107.0		25.2
											Results:

Ground Reflection Factor [CF_R] = 6dB for f < 30MHz, 4.7dB for 30MHz < f < 1000MHz, 0dB for f > 1000MHz

e.r.p. = P_T + G_T - L_C, where P_T = measured emission (dBm), $G_{T\,=}$ DUT antenna gain (dBd), L_C = loss between the DUT transmitter and DUT antenna (dB) = 0

e.i.r.p. = P_T + G_T - L_C, where P_T = measured emission (dBm), $G_{T\,=}$ DUT antenna gain (dBi), L_C = loss between the DUT transmitter and DUT antenna (dB) = 0

G_T(dBd) = G_T(dBi) - 2.15, e.r.p. = e.i.r.p - 2.15

G_T minimum = 2dBi, -0.15dBd

Distance Correction [L_D] = 20Log(D), where D would have been the measurement distance = 3m

Conversion dBm to dBuV/m [CF] = 107 for e.r.p. and G_T expressed as dBd, 104.85 for e.i.r.p. and G_T expressed as dBi

E_{Corr} = e.r.p - [L_D] + [CF] + [CF_R]

E_{Corr} = e.i.r.p - [L_D] + [CF] + [CF_R]

Margin = Limit - E_{Corr}

* Fundamental

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Table 12.3 – Summary of Radiated Emissions, Restricted Band (NFC) > 1000MHz

See Appendix O for Measurement Plots

Summary of Radiated Tx Emissions (Restricted Band)												
Measured Frequency Range (MHz)	**Channel Frequency**	**Antenna Polarization**	**Emission Frequency**	**Measured Emission [E_{Meas}] (dBuV)**		**Antenna ACF [ACF] (dB)**	**Cable Loss [L_C] (dB)**	**Amplifier Gain [G_A] (dB)**		**Corrected Emission [E_{Corr}] (dBuV/m)**	**Limit (dBuV)**	**Margin (dB)**
1 - 3GHz	13.56MHz	Horizontal	ND	ND	(1)	27.40	4.58	0.00	(3)	ND	54.0	**n/a**
1 - 3GHz		Vertical	ND	ND	(1)	27.40	4.58	0.00	(3)	ND	54.0	**n/a**
3-13GHz		Horizontal	ND	ND	(1)	36.76	9.86	0.00	(3)	ND	54.0	**n/a**
3-13GHz		Vertical	ND	ND	(1)	36.76	9.86	0.00	(3)	ND	54.0	**n/a**
13-18GHz		Horizontal	ND	ND	(1)	38.75	16.54	0.00	(3)	ND	54.0	**n/a**
13-18GHz		Vertical	ND	ND	(1)	38.75	16.54	0.00	(3)	ND	54.0	**n/a**
18-26GHz		Horizontal	ND	ND	(1)	43.50	21.86	26.00		ND	54.0	**n/a**
18-26GHz		Vertical	ND	ND	(1)	43.50	21.86	26.00		ND	54.0	**n/a**
										Results:	**Complies**	

(1) No Emissions Detected (ND) above ambient or within 20dB of the limit
(2) Antenna ACF, Cable Loss and Amplifier Gain corrected in Spectrum Analyzer Transducer Factor
(3) External Amplier not used

$E_{Corr} = E_{Meas} + ACF + L_C - G_A$

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13.0 RADIATED RX SPURIOUS EMISSIONS

Test Procedure	
Normative Reference	FCC 47 CFR §2.1046
	KDB 558074 (8.3.2), ANSI C63.10 (11.9.2.2.6)

General Procedure	
C63.10 (6.5.4)	**6.5.4 Final radiated emission tests** Using the orientation and equipment arrangement of the EUT, and based on the measurement results found during the exploratory measurement in 6.5.3, the EUT arrangement, appropriate modulation, and modes of operation that produce the emissions that have the highest amplitude relative to the limit shall be selected for the final measurement. The final measurement shall follow all the procedures in 6.3 with the EUT operating on frequencies per 5.6. For each mode selected, record the frequency and amplitude of the highest fundamental emission (if applicable) and the frequency and amplitude of the six highest spurious emissions relative to the limit; emissions more than 20 dB below the limit do not need to be reported. Measurements are performed with the EUT rotated from 0° to 360°, the antenna height scanned between 1 m and 4 m, and the antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations. Variations in cable or wire placement shall be explored to maximize the measured emissions.

Test Setup	Appendix A	Figure A.2

Measurement Procedure

The DUT place on a 80cm high turntable on an Open Area Test Site (OATS) at a distance of 3m from the measurement antenna. The DUT was set to transmit at maximum power and duty cycle. The DUT was rotated 360 degrees and scanned with the receive antenna elevated from 1 to 4m. The emissions were measured and recorded.

Table 13.1 – Summary of Radiated Rx Emissions

See Appendix P for Measurement Plots

Measurement Results								
Frequency Range	**Antenna Polarization**	**Bit Rate (Mbps)**	**Modulation**	**Power Setting(1) (dBm)**	**Transmit Duty Cycle (%)**	**Measured Emission [E_{Meas}] (dBm)**	**Worst Case Limit(4) [A_L] (dBuV @ 3m)**	**Margin (dB)**
9kHz - 30MHz	Front	n/a	n/a	n/a	n/a	ND	69.5	**n/a**
30-1000MHz	Horizontal					ND	40.0	**n/a**
1 - 3GHz						ND	54.0	**n/a**
3 - 13.6GHz						ND	54.0	**n/a**
13.6 - 18GHz						ND	54.0	**n/a**
9kHz - 30MHz	Side					ND	69.5	**n/a**
30-1000MHz	Vertical					ND	40.0	**n/a**
1 - 3GHz						ND	54.0	**n/a**
3 - 13.6GHz						ND	54.0	**n/a**
13.6 - 18GHz						ND	54.0	**n/a**
						Results:	**Complies**	

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14.0 FREQUENCY STABILITY (NFC)

Test Conditions	
Normative Reference	**FCC 47 CFR §2.1055, §15.225, RSS-Gen, RSS-210**

Limits	
47 CFR §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.
RSS-210 B.6	(b) the carrier frequency stability shall not exceed ±100 ppm

Measurement Procedure

47 CFR §2.1055 **Frequency Stability**

(a) The frequency stability shall be measured with variation of ambient temperature as follows:

(1) From -30° to +50° centigrade for all equipment except that specified in paragraphs (a) (2) and (3) of this section.

(b) Frequency measurements shall be made at the extremes of the specified temperature range and at intervals of not more than 10° centigrade through the range. A period of time sufficient to stabilize all of the components of the oscillator circuit at each temperature level shall be allowed prior to frequency measurement.

(d) The frequency stability shall be measured with variation of primary supply voltage as follows:

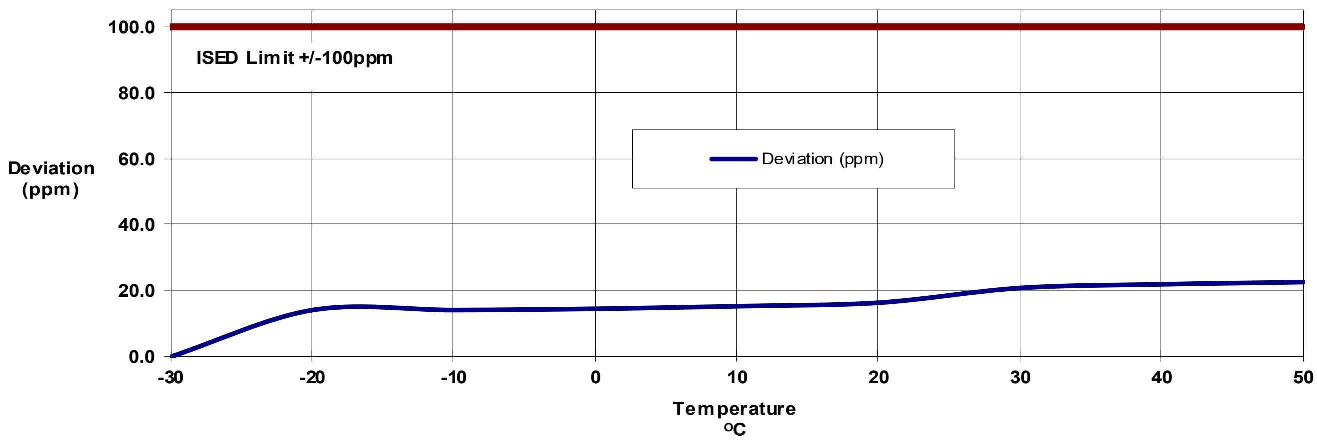
(1) Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment.

Test Setup	Appendix A	5

Table 14.1 – Summary of Frequency Stability Measurements

Frequency Stability

Nominal Frequency (MHz):	13.56
Nominal Channel BW (KHz):	CW
Nominal Voltage (VDC):	3
Nominal Temperature (°C):	20



Frequency Stability Measurements (Temperature)

Temp (°C)	Assigned Frequency (MHz)	Measured Frequency (MHz)	Deviation (Hz)	Deviation [Absolute] (ppm)
-20	13.560000	13.560190	190	14.01
-10		13.560190	190	14.01
0		13.560195	195	14.38
10		13.560206	206	15.19
20		13.560220	220	16.22
30		13.560280	280	20.65
40		13.560295	295	21.76
50		13.560304	304	22.42
			Maximum Deviation:	22.42
			Maximum Limit:	100.00
			Result:	Complies

Frequency Stability Measurements (Voltage)

Voltage (VDC)	Assigned Frequency (MHz)	Measured Frequency (MHz)	Deviation (Hz)	Deviation [Absolute] (ppm)
3%	13.560000	13.560220	220	16.22
			Maximum Deviation:	16.22
			Maximum Limit:	100.00
			Result:	Complies

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15.0 POWER LINE CONDUCTED EMISSIONS

Test Procedure	
Normative Reference	**FCC 47 CFR §15.107, ICES-003(6.1)** **ANSI C63.4-2014**

Limits	
47 CFR §15.107	(a) Except for Class A digital devices, for equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 µH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the band edges. 0.15-0.5MHz: 66-56 dBuV Quasi Peak, 56-46 dBuV Average, Decreases with the logrithm of the frequency 0.5 - 5.0 MHz: 56 dBuV Quasi Peak, 46 dBuV Average 5.0 - 30.0 MHz: 60 dBuV Quasi Peak, 50 dBuV Average
ICES-003(6.1)	6.1 - AC Power Line Conducted Emissions Limits Class B: ITE that does not meet the conditions for Class A operation shall comply with the Class B radiated limits set out in Table 2. 0.15-0.5MHz: 66-56 dBuV Quasi Peak, 56-46 dBuV Average, Decreases with the logrithm of the 0.5 - 5.0 MHz: 56 dBuV Quasi Peak, 46 dBuV Average 5.0 - 30.0 MHz: 60 dBuV Quasi Peak, 50 dBuV Average

Test Setup	Appendix A	Figure A.7

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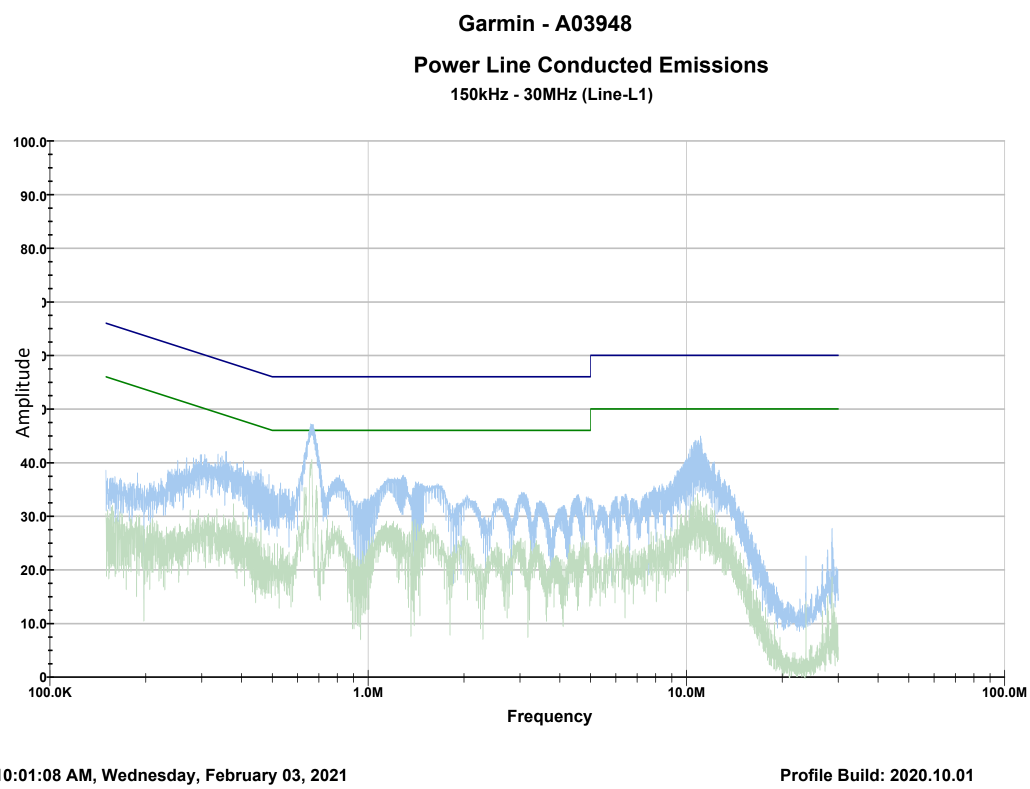
Plot 15.1 – Power Line Conducted Emissions, Line 1

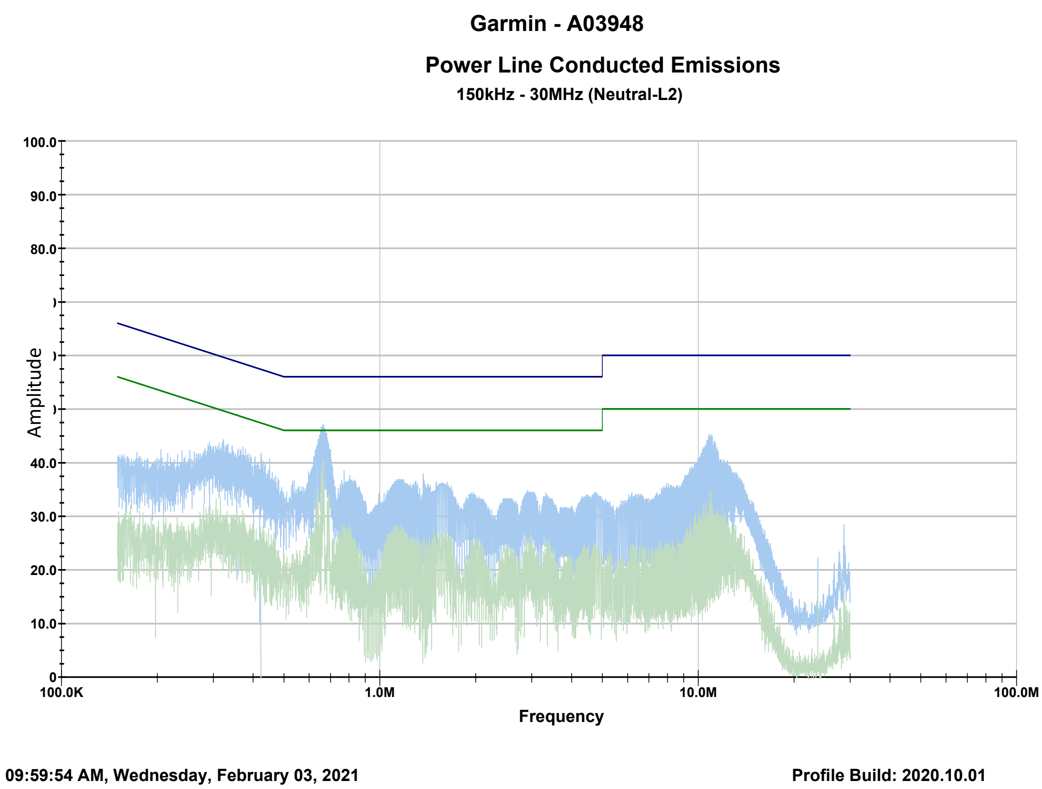
Power Line Conducted Emissions - L1



Green Limit: Quasi Peak	Green Trace: Peak	Frequency Range: 0.15 - 30 MHz
Blue Limit: Average	Blue Trace: RMS	Measured Emission:

Plot 15.2 – Power Line Conducted Emissions, Line 2

Power Line Conducted Emissions - L2



Blue Limit: Quasi Peak	Blue Trace: Peak	Frequency Range: 0.15 - 30 MHz
Green Limit: Average	Green Trace: RMS	Measured Emission:

Table 15.1 – Summary of Power Line Conducted Emissions

Summary of Power Line Conducted Tx Emissions														
Measured Frequency Range (MHz)	Channel Frequency (MHz)	LISN Port	Emission Frequency [f_{Emm}]		Measured Emission [E_{Meas}] (dBuV)	Detector*	Insertion Loss [L_{LISN}] (dB)	Cable Loss [L_C] (dB)	Amplifier Gain [G_A] (dB)		Corrected Emission [E_{Corr}] (dBuV)		Limit (dBuV)	Margin (dB)
150kHz - 30MHz	2442.0	L1	658.90	kHz	45.95	Peak	0.40	0.25	0.00	(3)	46.6	(2)	56.0	**9.4**
			1.38	MHz	38.16		0.30	0.26			38.7	(2)	56.0	**17.3**
			10.74	MHz	44.73		0.30	0.26			45.3	(2)	60.0	**14.7**
			11.15	MHz	44.32		0.30	0.27			44.9	(2)	60.0	**15.1**
			663.10	kHz	38.71	Average	0.40	0.25			39.4	(2)	46.0	**6.6**
			1.40	MHz	28.66		0.30	0.26			29.2	(2)	46.0	**16.8**
			10.83	MHz	32.83		0.30	0.26			33.4	(2)	50.0	**16.6**
			11.10	MHz	33.42		0.30	0.27			34.0	(2)	50.0	**16.0**
												Results:	**Complies**	

* In accordance with FCC §15.35 and ANSI C63.4, a Peak detector may be used to demonstrate compliance to Quasi-Peak limits provided the Resolution Bandwidth (RBW) is equal to or greater than Quasi-Peak bandwidth. The Detector RBW employed was ≥ 9kHz.
(2) LISN Insertion Loss, Cable Loss and Amplifier Gain corrected in Spectrum Analyzer Transducer Factor
(3) External Amplier not used

$E_{Corr} = E_{Meas} + L_{LISN} + L_C - G_A$

Class B QP Limit = 56 - 20Log (f_{Emm}/500) for f_{Emm} = 150kHz to 500kHz

Class B Avg Limit = 46 - 20Log (f_{Emm}/500) for f_{Emm} = 150kHz to 500kHz

Class A QP Limit = 79dBuV for f_{Emm} = 150kHz to 500kHz

Class A Avg Limit = 66dBuV for f_{Emm} = 150kHz to 500kHz

Margin = Limit - E_{corr}

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Table 15.1 – Summary of Power Line Conducted Emissions (Cont)

Summary of Power Line Conducted Tx Emissions											
Measured Frequency Range (MHz)	**Channel Frequency (MHz)**	**LISN Port**	**Emission Frequency [f_{Emm}]**	**Measured Emission [E_{Meas}] (dBuV)**	**Detector***	**Insertion Loss [L_{LISN}] (dB)**	**Cable Loss [L_C] (dB)**	**Amplifier Gain [G_A] (dB)**	**Corrected Emission [E_{Corr}] (dBuV)**	**Limit (dBuV)**	**Margin (dB)**
150kHz - 30MHz	2442.0	L2	652.80 kHz	45.18	Peak	0.40	0.25	0.00 (3)	45.8 (2)	56.0	**10.2**
			1.38 MHz	37.06		0.30	0.26		37.6 (2)	56.0	**18.4**
			10.72 MHz	45.03		0.30	0.26		45.6 (2)	60.0	**14.4**
			11.26 MHz	43.42		0.30	0.27		44.0 (2)	60.0	**16.0**
			662.04 kHz	38.99	Average	0.40	0.25		39.6 (2)	46.0	**6.4**
			1.38 MHz	28.56		0.30	0.26		29.1 (2)	46.0	**16.9**
			10.75 MHz	32.43		0.30	0.26		33.0 (2)	50.0	**17.0**
			11.06 MHz	34.02		0.30	0.27		34.6 (2)	50.0	**15.4**
									Results:	**Complies**	

* In accordance with FCC §15.35 and ANSI C63.4, a Peak detector may be used to demonstrate compliance to Quasi-Peak limits provided the Resolution Bandwidth (RBW) is equal to or greater than Quasi-Peak bandwidth. The Detector RBW employed was ≥ 9kHz.
(2) LISN Insertion Loss, Cable Loss and Amplifier Gain corrected in Spectrum Analyzer Transducer Factor
(3) External Amplier not used

$E_{Corr} = E_{Meas} + L_{LISN} + L_C - G_A$

Class B QP Limit = 56 - 20Log (f_{Emm}/500) for f_{Emm} = 150kHz to 500kHz

Class B Avg Limit = 46 - 20Log (f_{Emm}/500) for f_{Emm} = 150kHz to 500kHz

Class A QP Limit = 79dBuV for f_{Emm} = 150kHz to 500kHz

Class A Avg Limit = 66dBuV for f_{Emm} = 150kHz to 500kHz

Margin = Limit - E_{corr}

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APPENDIX A – TEST SETUP DRAWINGS AND EQUIPMENT

Table A.1 – Setup - Conducted Measurements Equipment List

Equipment List				
Asset Number	Manufacturer	Model Number	Serial Number	Description
00241	R&S	FSU40	100500	Spectrum Analyzer
00263	Koaxis	KP10-1.00M-TD	263	1m Armoured Cable

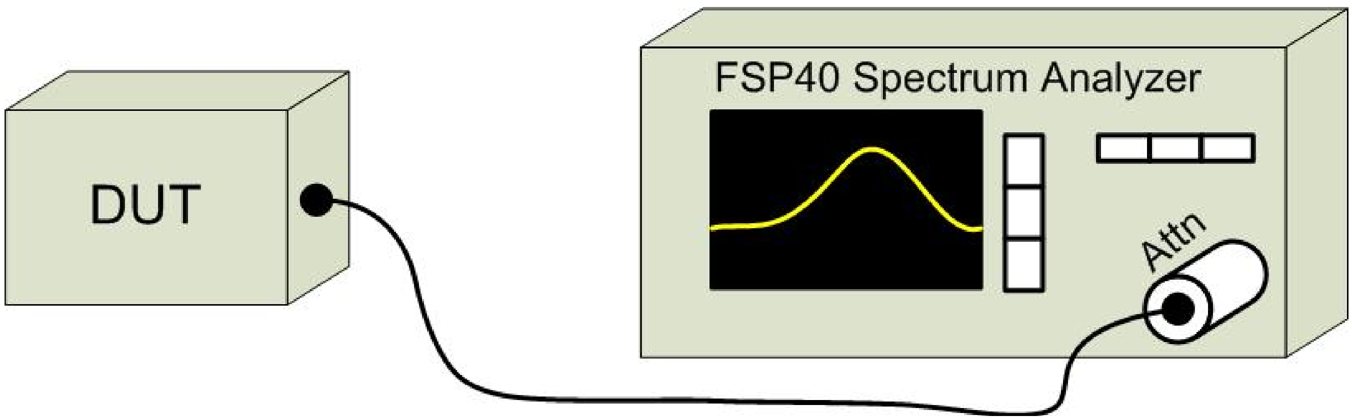

Figure A.1 – Test Setup Conducted Measurements

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Table A.2 – Setup - Radiated Emissions Equipment List

Equipment List				
Asset Number	**Manufacturer**	**Model Number**	**Serial Number**	**Description**
00050	Chase	CBL-6111A	1607	Bilog Antenna
00034	ETS	3115	6267	Double Ridged Guide Horn
00035	ETS	3115	6276	Double Ridged Guide Horn
00085	EMCO	6502	9203-2724	Loop Antenna
00161	Waveline Inc.	889		Standard Gain Horn 18-26GHz
00162	Waveline Inc.	889		Standard Gain Horn 18-26GHz
00165	Waveline Inc.	801-KF		Waveguide Adapter 18-26GHz
00166	Waveline Inc.	801-KF		Waveguide Adapter 18-26GHz
00333	HP	85685A	3010A01095	RF Preselector
00049	HP	85650A	2043A00162	Quasi-peak Adapter
00051	HP	8566B	2747A05510	Spectrum Analyzer
00241	R&S	FSU40	100500	Spectrum Analyzer
00265	Miteq	JS32-00104000-58-5P	1939850	Microwave L/N Amplifier
00071	EMCO	2090	9912-1484	Multi-Device Controller
00072	EMCO	2075	0001-2277	Mini-mast
00073	EMCO	2080	0002-1002	Turn Table
00263	Koaxis	KP10-1.00M-TD	263	1m Armoured Cable
00263B	Koaxis	KP10-1.00M-TD	263B	1m Armoured Cable
00275	TMS	LMR400	n/a	25m Cable
00278	TILE	34G3	n/a	TILE Test Software

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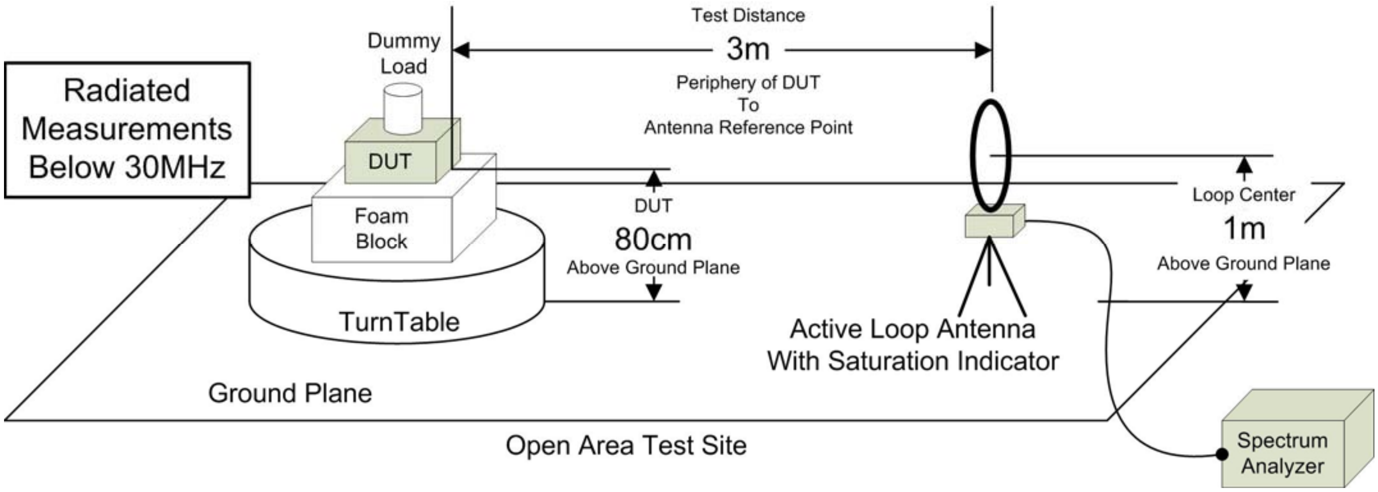

Figure A.2 – Test Setup Radiated Emissions Measurements Below 30MHz

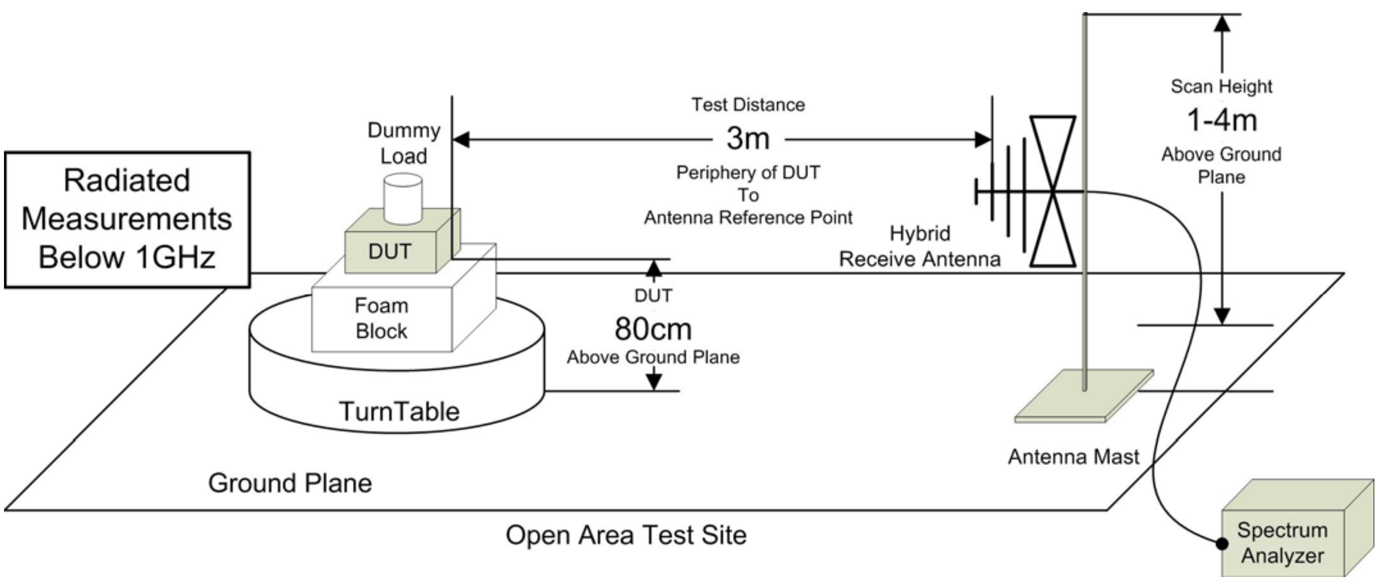

Figure A.3 – Test Setup Radiated Emissions Measurements 30 – 1000MHz

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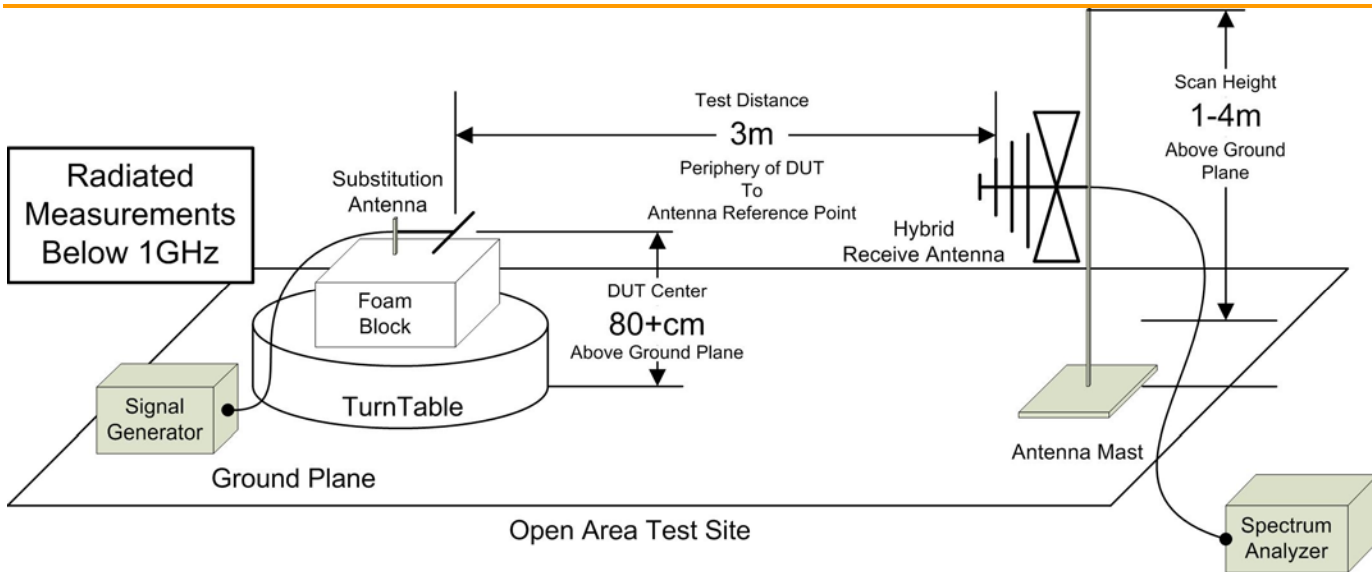

Figure A.4 – Test Setup Radiated Emissions Measurements 30 – 1000MHz Signal Substitution

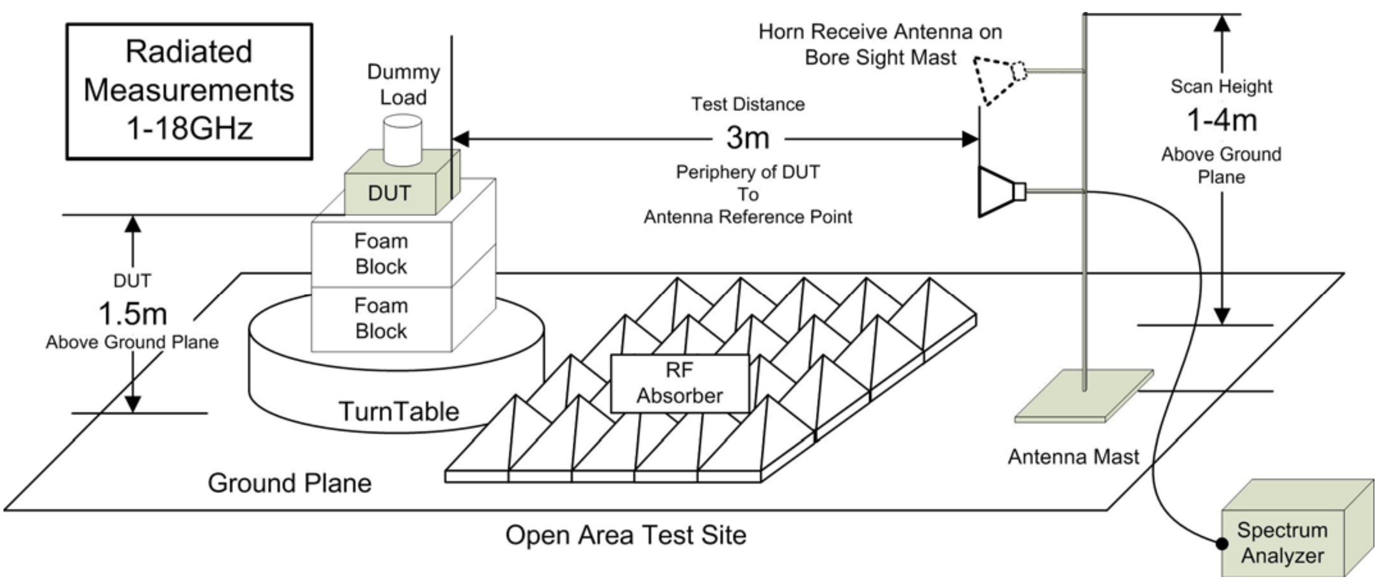

Figure A.5 – Test Setup Radiated Emissions Measurements 1 – 18GHz

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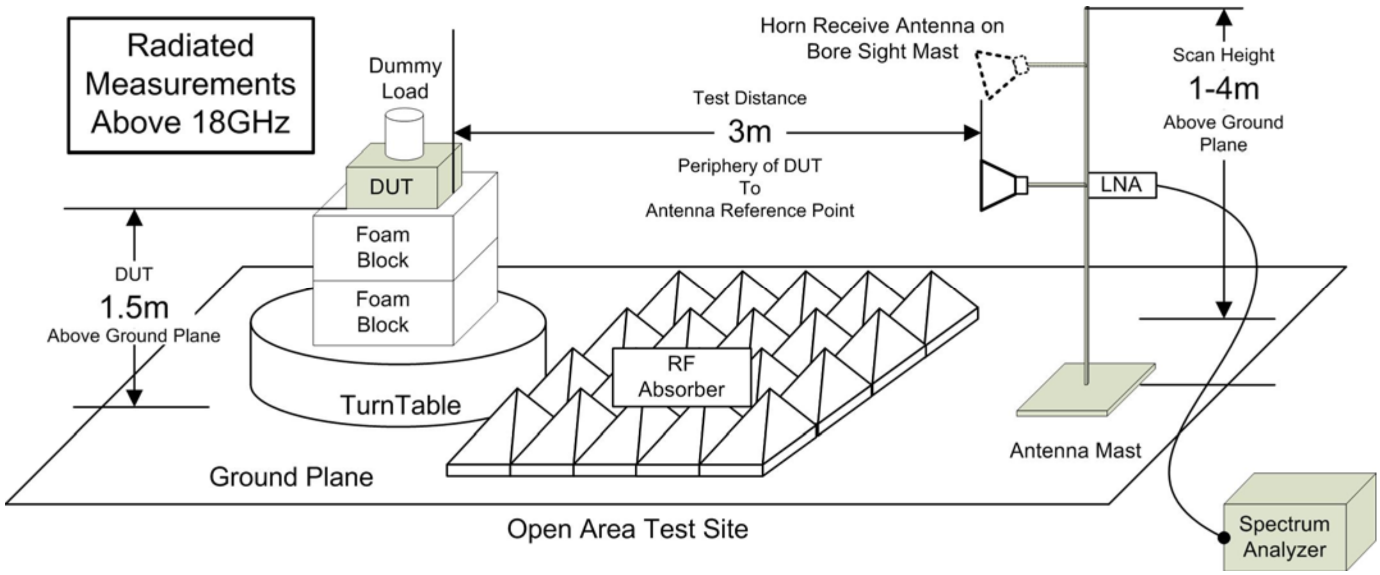

Figure A.6 – Test Setup Radiated Emissions Measurements Above 18 GHz

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Table A.3 – Setup – Frequency Stability Equipment List

Equipment List				
Asset Number	Manufacturer	Model Number	Serial Number	Description
00241	R&S	FSU40	100500	Spectrum Analyzer
00081	ESPEC	ECT-2	0510154-B	Environmental Chamber
00234	VWR	61161-378	140320430	Temp/Humidity Meter

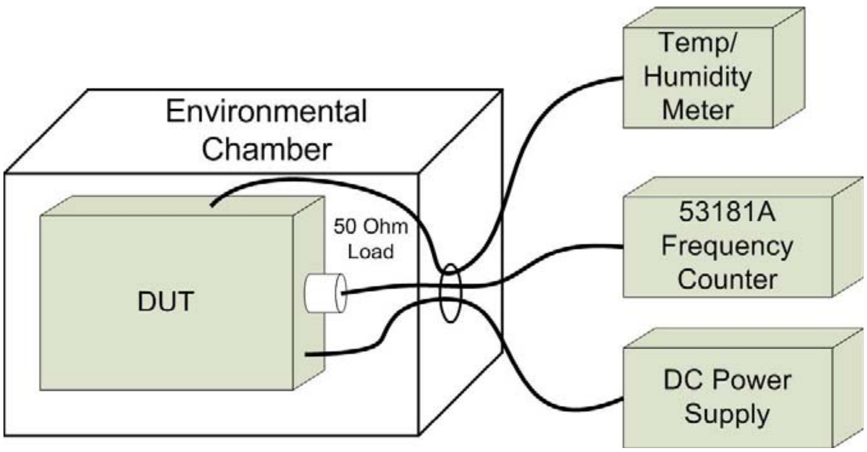

Figure A.7 – Frequency Stability

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APPENDIX B – EQUIPMENT LIST AND CALIBRATION

Equipment List				
Asset Number	Manufacturer	Model Number	Serial Number	Description
00050	Chase	CBL-6111A	1607	Bilog Antenna
00034	ETS	3115	6267	Double Ridged Guide Horn
00035	ETS	3115	6276	Double Ridged Guide Horn
00085	EMCO	6502	9203-2724	Loop Antenna
00161	Waveline Inc.	889		Standard Gain Horn 18-26GHz
00162	Waveline Inc.	889		Standard Gain Horn 18-26GHz
00165	Waveline Inc.	801-KF		Waveguide Adapter 18-26GHz
00166	Waveline Inc.	801-KF		Waveguide Adapter 18-26GHz
00333	HP	85685A	3010A01095	RF Preselector
00049	HP	85650A	2043A00162	Quasi-peak Adapter
00051	HP	8566B	2747A05510	Spectrum Analyzer
00241	R&S	FSU40	100500	Spectrum Analyzer
00265	Miteq	JS32-00104000-58-5P	1939850	Microwave L/N Amplifier
00071	EMCO	2090	9912-1484	Multi-Device Controller
00072	EMCO	2075	0001-2277	Mini-mast
00073	EMCO	2080	0002-1002	Turn Table
00081	ESPEC	ECT-2	0510154-B	Environmental Chamber
00234	VWR	61161-378	140320430	Temp/Humidity Meter
00263	Koaxis	KP10-1.00M-TD	263	1m Armoured Cable
00263B	Koaxis	KP10-1.00M-TD	263B	1m Armoured Cable
00275	TMS	LMR400	n/a	25m Cable
00278	TILE	34G3	n/a	TILE Test Software

NCR: No Calibration Required
COU: Calibrate On Use

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APPENDIX C – MEASUREMENT INSTRUMENT UNCERTAINTY

CISPR 16-4 Measurement Uncertainty (U_{LAB})	
This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence interval using a coverage factor of k=2	
30MHz - 200MHz	
U_{LAB} = 5.14dB U_{CISPR} = 6.3dB	
200MHz - 1000MHz	
U_{LAB} = 5.90dB U_{CISPR} = 6.3dB	
1GHz - 6GHz	
U_{LAB} = 4.80dB U_{CISPR} = 5.2dB	
6GHz - 18GHz	
U_{LAB} = 5.1dB U_{CISPR} = 5.5dB	
If the calculated uncertainty U_{lab} is **less** than U_{CISPR} then:	
1	Compliance is deemed to occur if **NO** measured disturbance exceeds the disturbance limit
2	Non-Compliance is deemed to occur if **ANY** measured disturbance **EXCEEDS** the disturbance limit
If the calculated uncertainty U_{lab} is **greater** than U_{CISPR} then:	
3	Compliance is deemed to occur if **NO** measured disturbance, increased by (U_{lab} - U_{CISPR}), exceeds the disturbance limit
4	Non-Compliance is deemed to occur if **ANY** measured disturbance, increased by (U_{lab} - U_{CISPR}), **EXCEEDS** the disturbance limit

END OF REPORT

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APPENDIX K – OCCUPIED BANDWIDTH MEASUREMENT PLOTS

APPENDIX L – FIELD STRENGTH MEASUREMENT PLOTS

APPENDIX M– 20DB BW (DXX) MEASUREMENT PLOTS

APPENDIX N– FIELD STRENGTH/20DB BW (NFC) MEASUREMENT PLOTS

APPENDIX O– RADIATED TX EMISSIONS MEASUREMENT PLOTS

APPENDIX P– RADIATED RX MEASUREMENT PLOTS

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Appendix D - Occupied Bandwidth Measurement Plots

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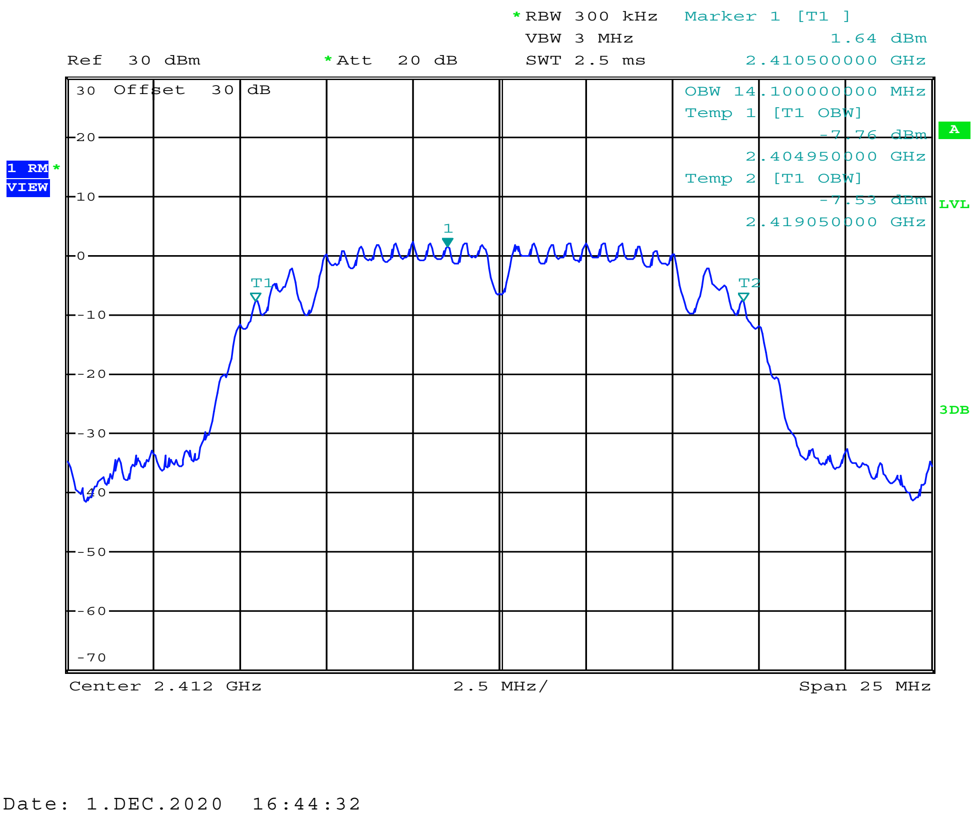
Occupied Bandwidth Measurement Results (DTS)						
Frequency (MHz)	Modulation	Data Rate (Mbps)	Measured Occupied Bandwidth (MHz)	Minimum Authorized Bandwidth (MHz)	Margin (MHz)	Emission Designator
2412	CCK	1	14.1	0.5	13.6	14M1D1D
2417	CCK	1	14.1		13.6	14M1D1D
2437	CCK	1	14.2		13.7	14M2D1D
2457	CCK	1	14.2		13.7	14M2D1D
2462	CCK	1	14.0		13.5	14M0D1D
2417	CCK	2	14.0		13.5	14M0D1D
2437	CCK	2	14.2		13.7	14M2D1D
2457	CCK	2	14.2		13.7	14M2D1D
2417	DSSS	5.5	13.7		13.2	13M7D1D
2437	DSSS	5.5	13.9		13.4	13M9D1D
2457	DSSS	5.5	13.8		13.3	13M8D1D
2417	DSSS	11	13.8		13.3	13M8D1D
2437	DSSS	11	14.0		13.5	14M0D1D
2457	DSSS	11	13.9		13.4	13M9D1D
2417	OFDM	6	16.8		16.3	16M8D1D
2437	OFDM	6	17.0		16.5	17M0D1D
2457	OFDM	6	16.8		16.3	16M8D1D
2417	OFDM	9	16.8		16.3	16M8D1D
2437	OFDM	9	17.0		16.5	17M0D1D
2457	OFDM	9	16.8		16.3	16M8D1D
2437	OFDM	12	16.9		16.4	16M9D1D
2437	OFDM	18	16.9		16.4	16M9D1D
2437	OFDM	24	16.8		16.3	16M8D1D
2437	OFDM	36	16.8		16.3	16M8D1D
2437	OFDM	48	16.8		16.3	16M8D1D
2437	OFDM	54	16.8		16.3	16M8D1D
2437	MCS0	-	17.9		17.4	17M9D1D
2437	MCS1	-	17.8		17.3	17M8D1D
2437	MCS3	-	17.9		17.4	17M9D1D
2437	MCS7	-	17.9		17.4	17M9D1D
						Complies

Margin = Measured BW - Minimum Authorized BW

Occupied Bandwidth



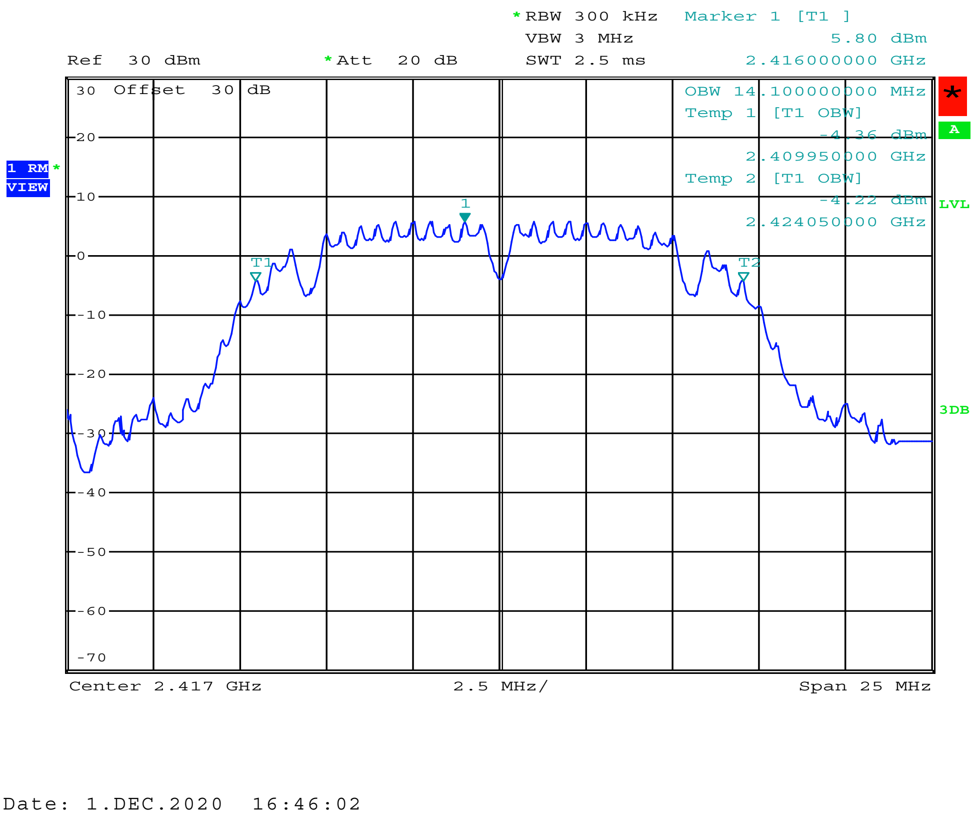
Channel Frequency: **2412.00** MHz

DUT Modulation: **CCK**

Data Rate: **1** Mbps

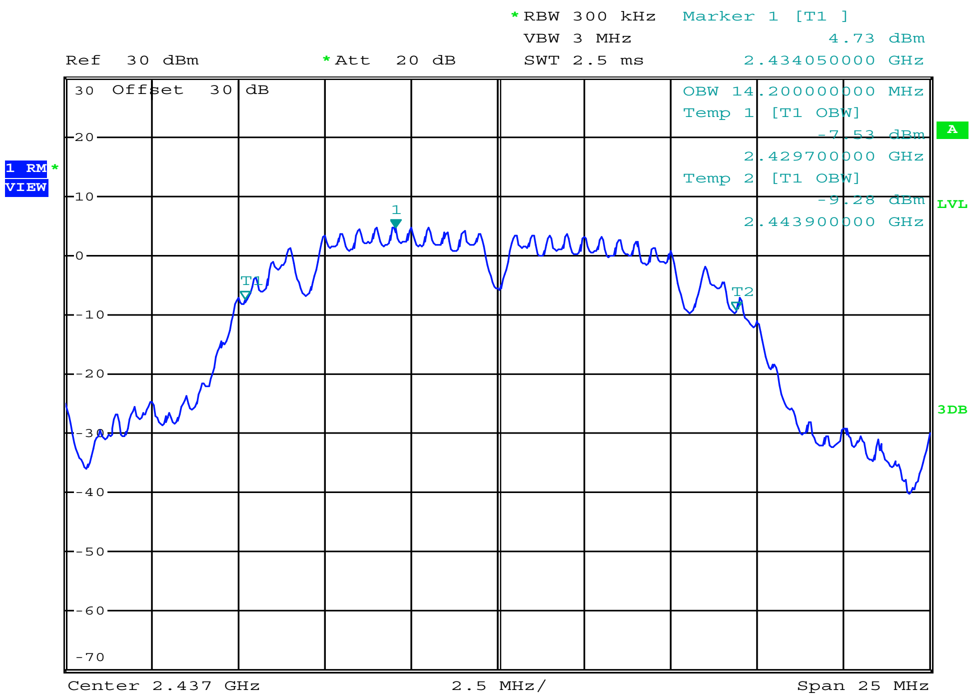
Measured Occupied Bandwidth: **14.10** MHz

Occupied Bandwidth



Channel Frequency:		
2417.00 MHz		
DUT Modulation:	Data Rate:	Measured Occupied Bandwidth:
CCK	**1** Mbps	**14.10** MHz

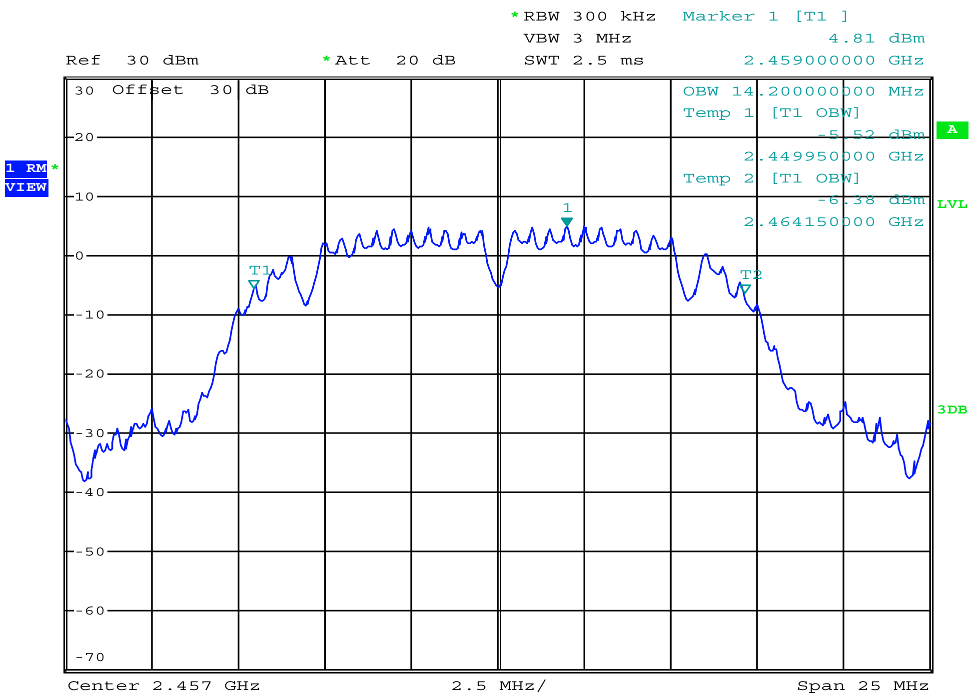
Occupied Bandwidth



Date: 1.DEC.2020 16:47:18

Channel Frequency: **2437.00** MHz		
DUT Modulation: **CCK**	Data Rate: **1** Mbps	Measured Occupied Bandwidth: **14.20** MHz

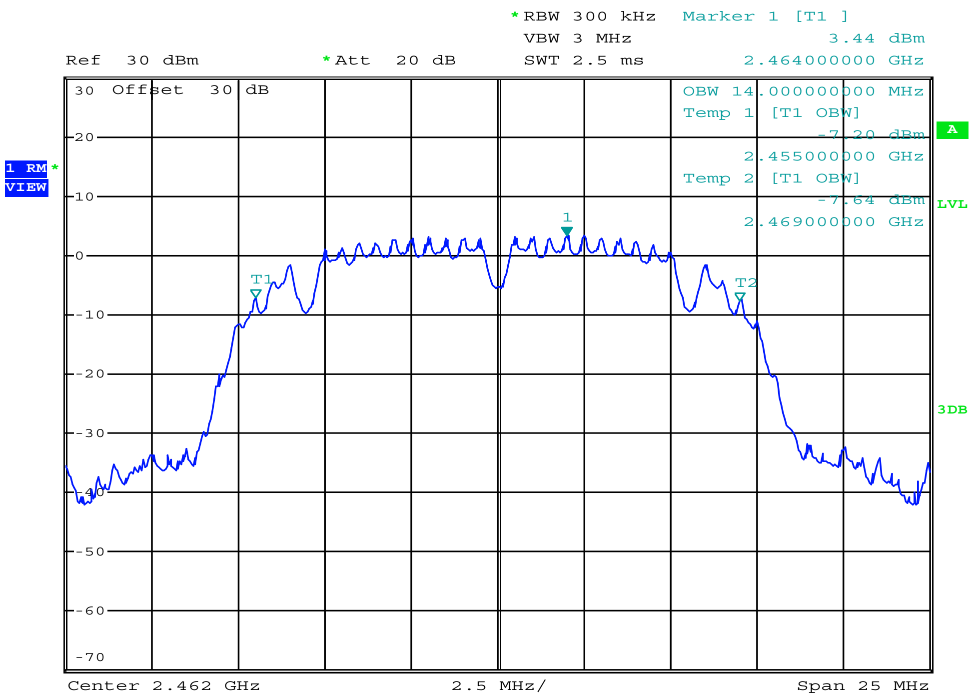
Occupied Bandwidth



Date: 1.DEC.2020 16:48:08

Channel Frequency: **2457.00** MHz		
DUT Modulation: **CCK**	Data Rate: **1** Mbps	Measured Occupied Bandwidth: **14.20** MHz

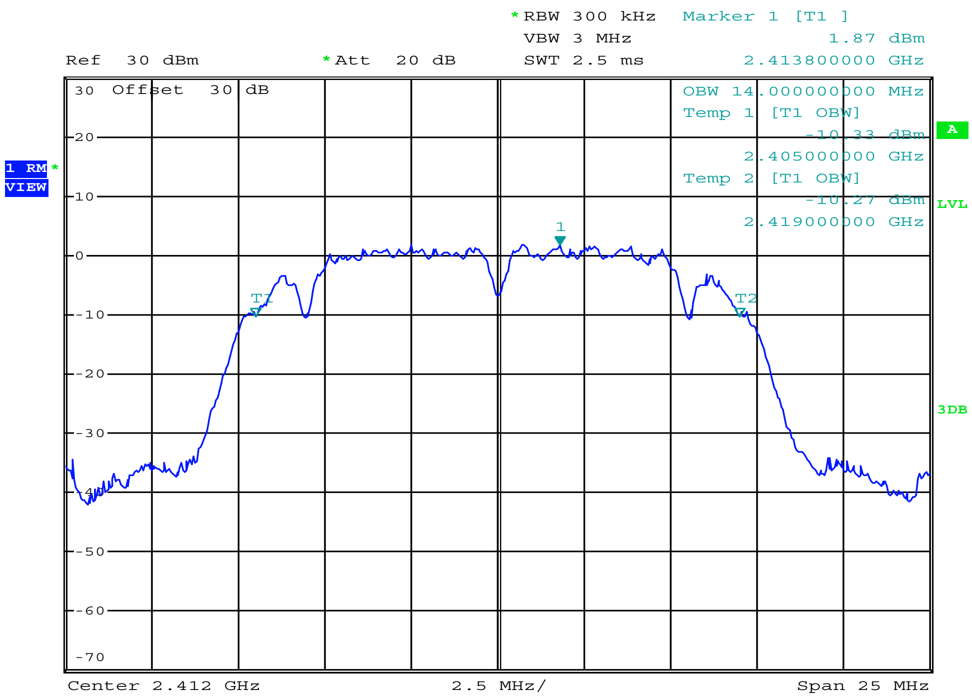
Occupied Bandwidth



Date: 1.DEC.2020 16:48:45

Channel Frequency: **2462.00** MHz		
DUT Modulation: **CCK**	Data Rate: **1** Mbps	Measured Occupied Bandwidth: **14.00** MHz

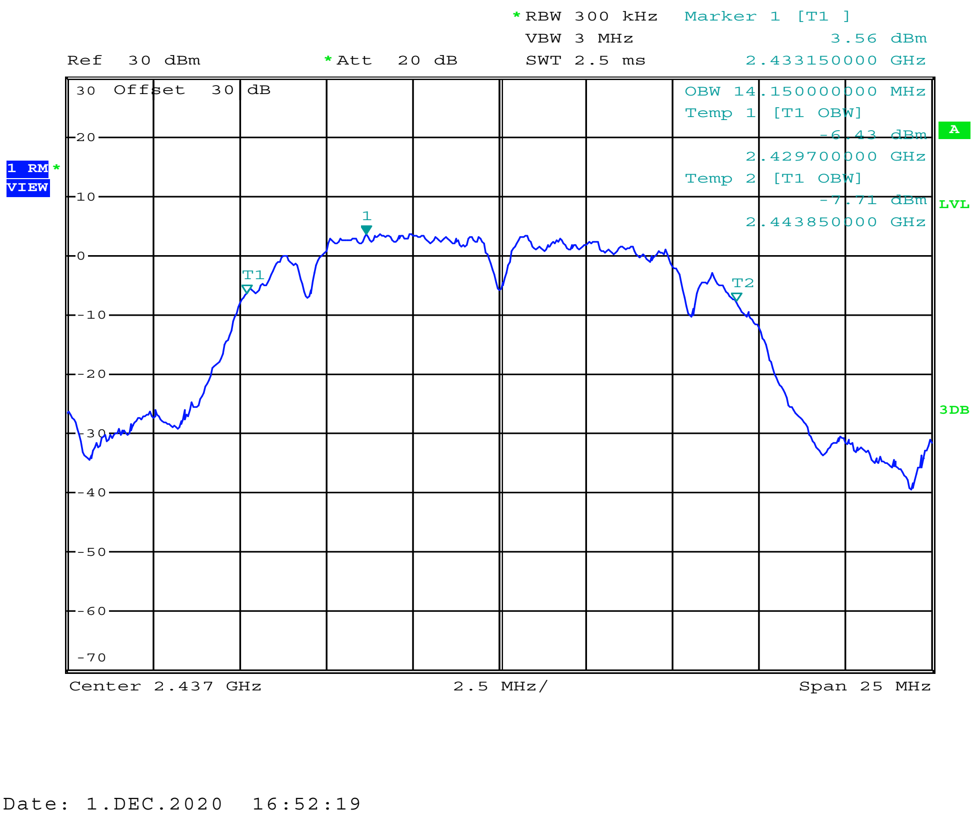
Occupied Bandwidth



Date: 1.DEC.2020 16:53:39

Channel Frequency:		
2417.00 MHz		
DUT Modulation: **CCK**	Data Rate: **2** Mbps	Measured Occupied Bandwidth: **14.00** MHz

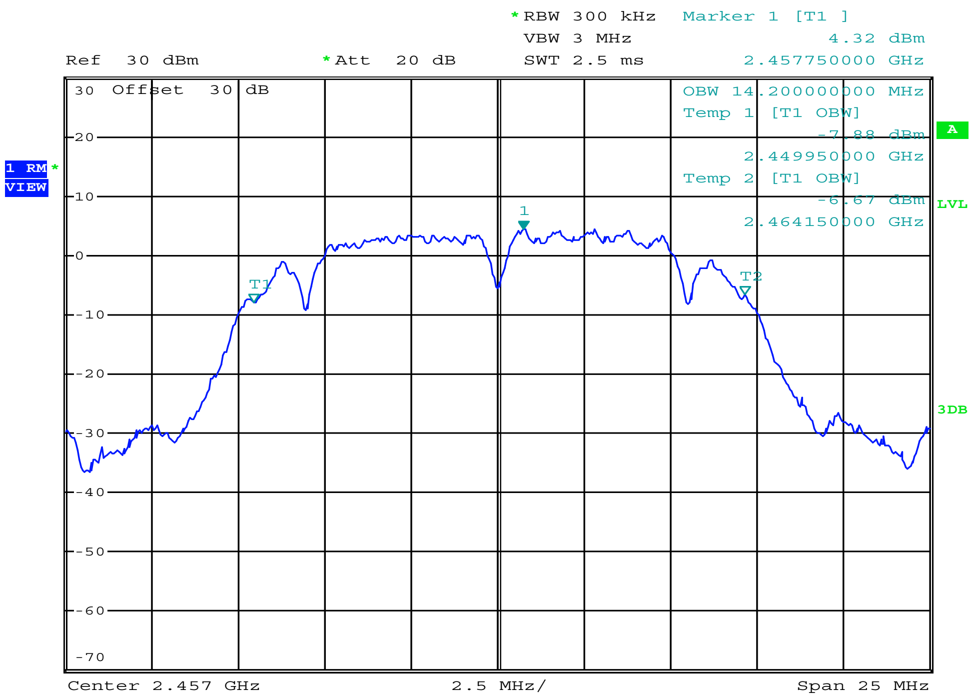
Occupied Bandwidth



Channel Frequency:
2437.00 MHz

DUT Modulation:	Data Rate:	Measured Occupied Bandwidth:
CCK	**2** Mbps	**14.15** MHz

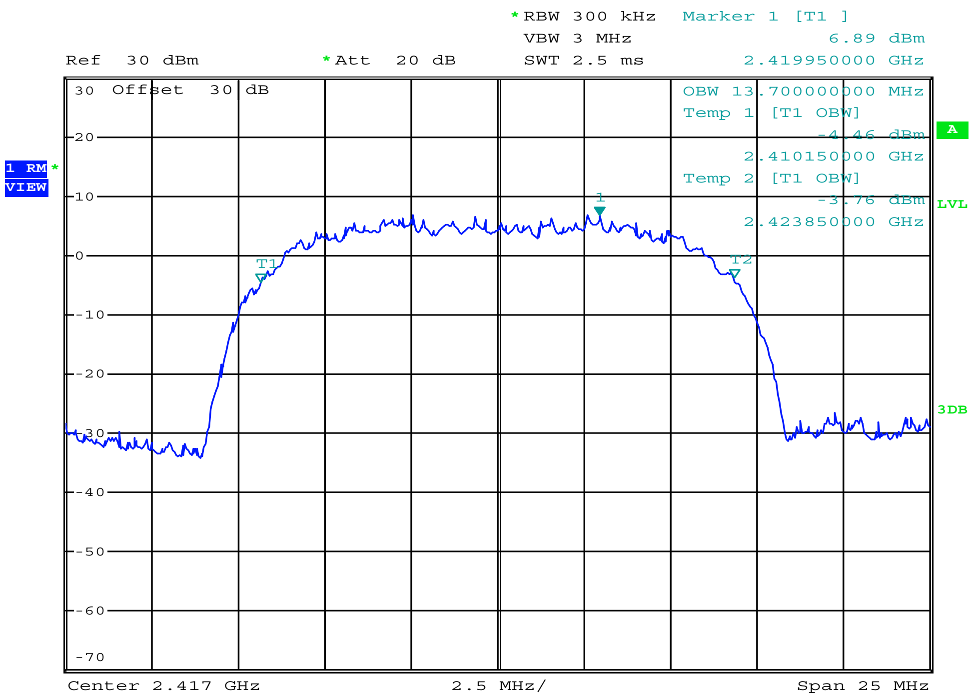
Occupied Bandwidth



Date: 1.DEC.2020 16:51:39

Channel Frequency: **2457.00** MHz		
DUT Modulation: **CCK**	Data Rate: **2** Mbps	Measured Occupied Bandwidth: **14.20** MHz

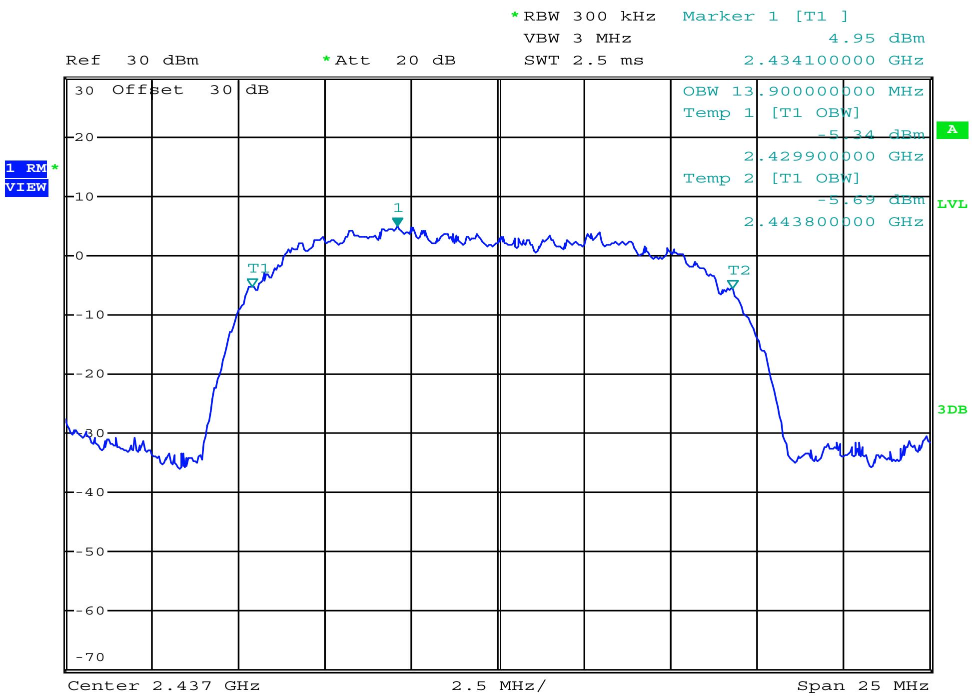
Occupied Bandwidth



Date: 1.DEC.2020 16:55:26

Channel Frequency:		
2417.00 MHz		
DUT Modulation:	Data Rate:	Measured Occupied Bandwidth:
DSSS	**5.5** Mbps	**13.70** MHz

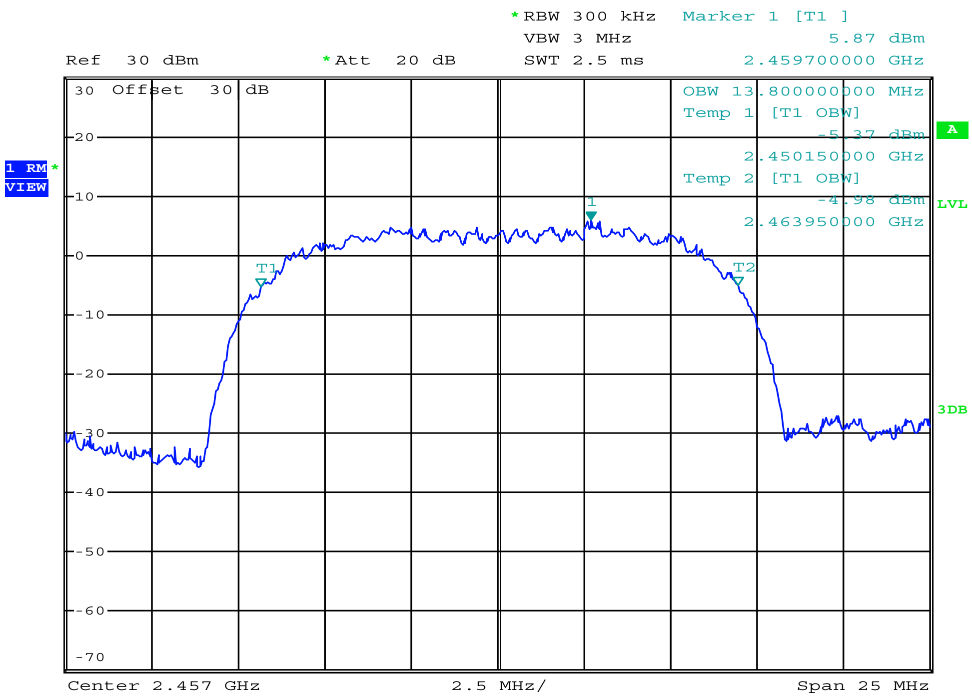
Occupied Bandwidth



Date: 1.DEC.2020 16:56:07

Channel Frequency: **2437.00** MHz		
DUT Modulation: **DSSS**	Data Rate: **5.5** Mbps	Measured Occupied Bandwidth: **13.90** MHz

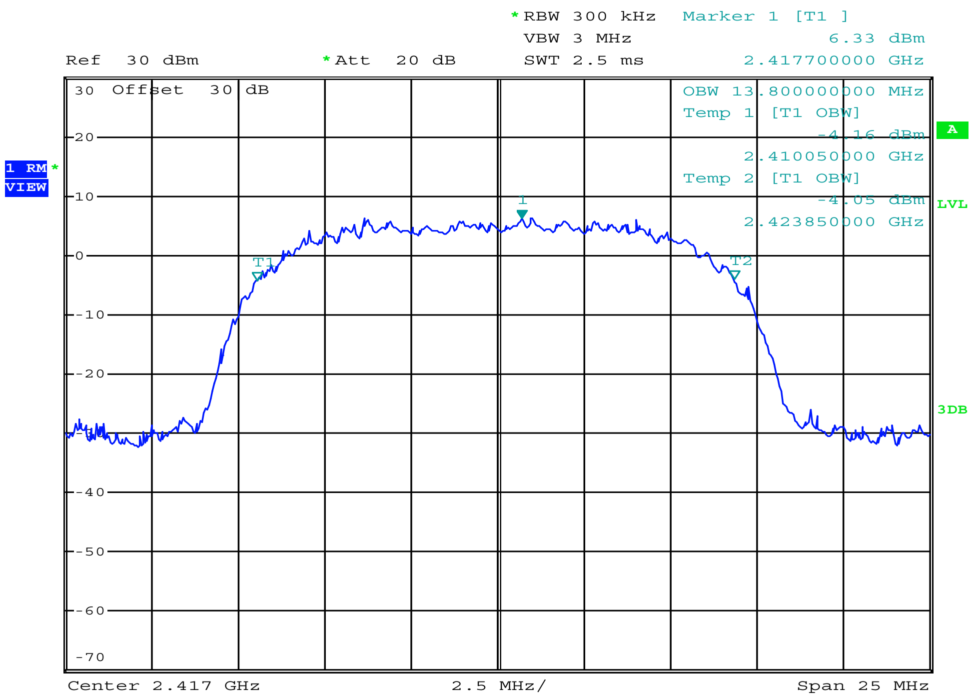
Occupied Bandwidth



Date: 1.DEC.2020 16:56:55

Channel Frequency:		
2457.00 MHz		
DUT Modulation: **DSSS**	Data Rate: **5.5** Mbps	Measured Occupied Bandwidth: **13.80** MHz

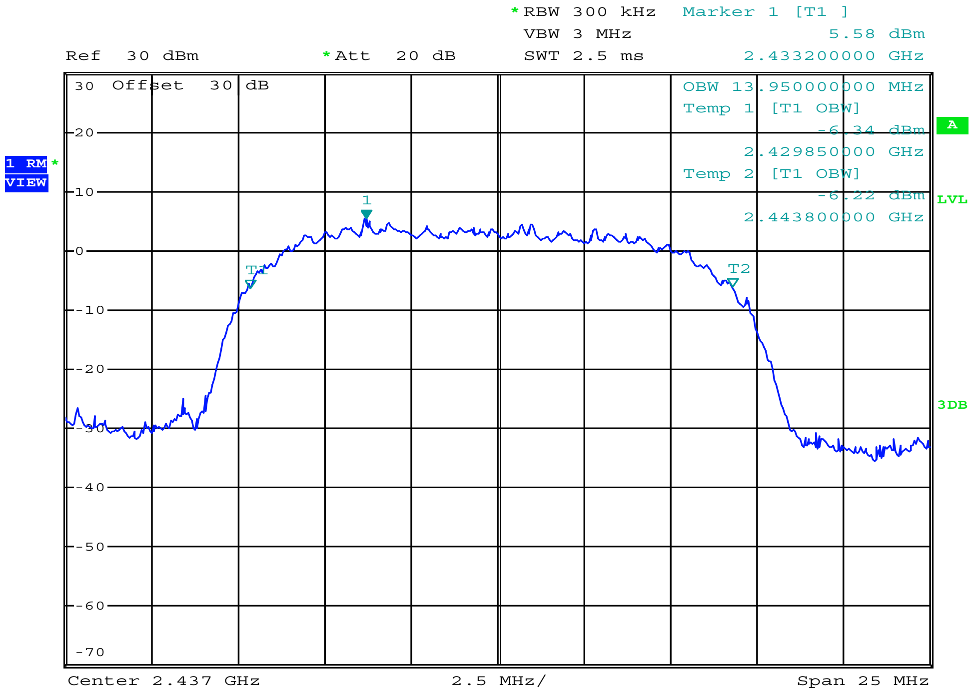
Occupied Bandwidth



Date: 1.DEC.2020 17:02:06

Channel Frequency: **2417.00** MHz		
DUT Modulation: **DSSS**	Data Rate: **11** Mbps	Measured Occupied Bandwidth: **13.80** MHz

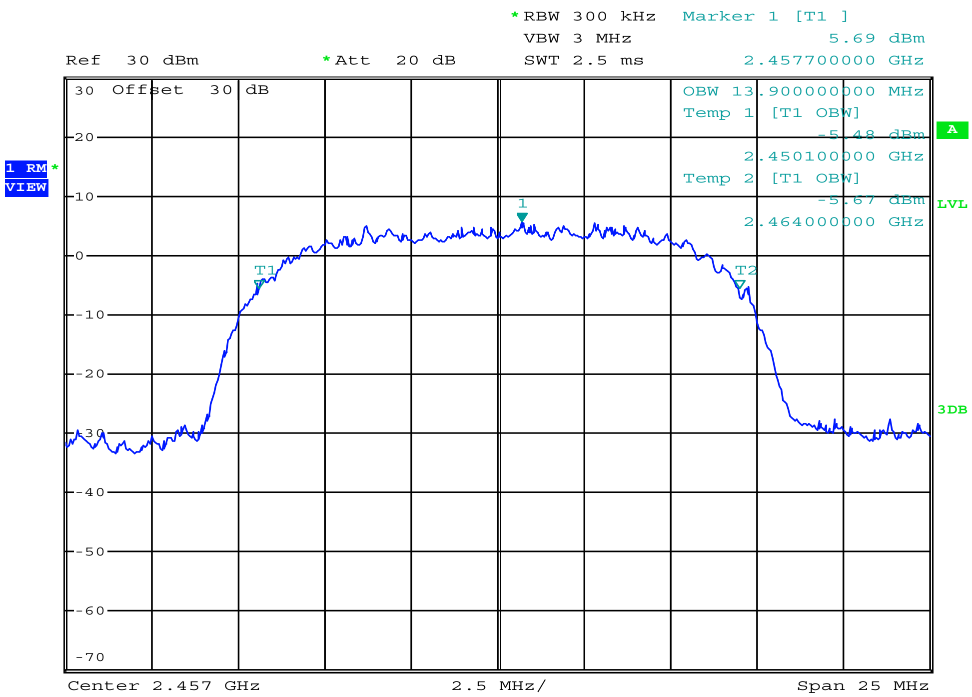
Occupied Bandwidth



Date: 1.DEC.2020 17:01:24

Channel Frequency: **2437.00** MHz		
DUT Modulation: **DSSS**	Data Rate: **11** Mbps	Measured Occupied Bandwidth: **13.95** MHz

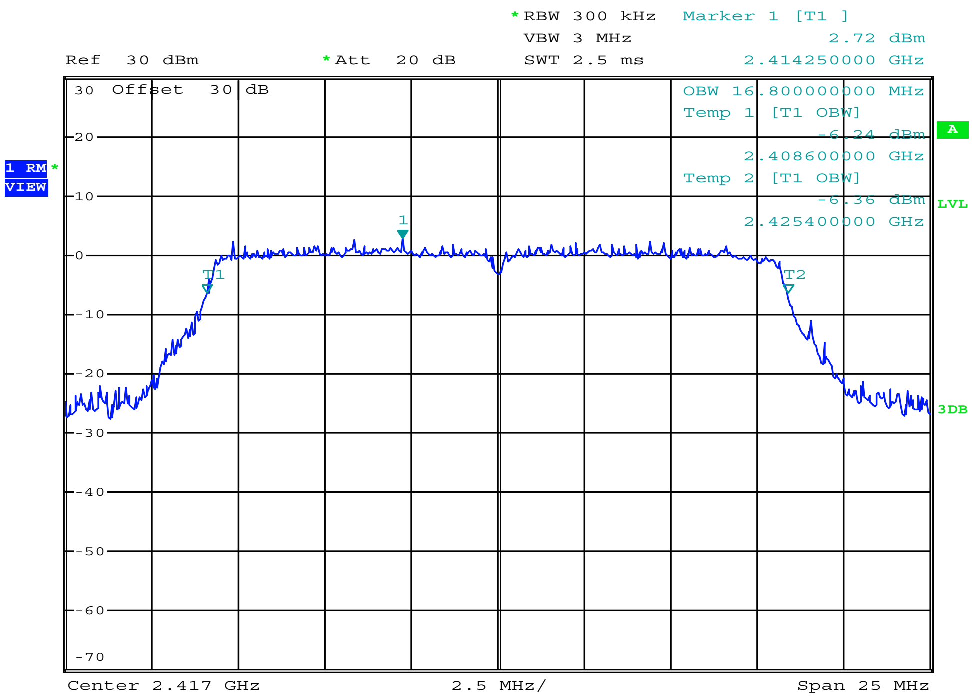
Occupied Bandwidth



Date: 1.DEC.2020 17:00:40

Channel Frequency:		
2457.00 MHz		
DUT Modulation:	Data Rate:	Measured Occupied Bandwidth:
DSSS	**11** Mbps	**13.90** MHz

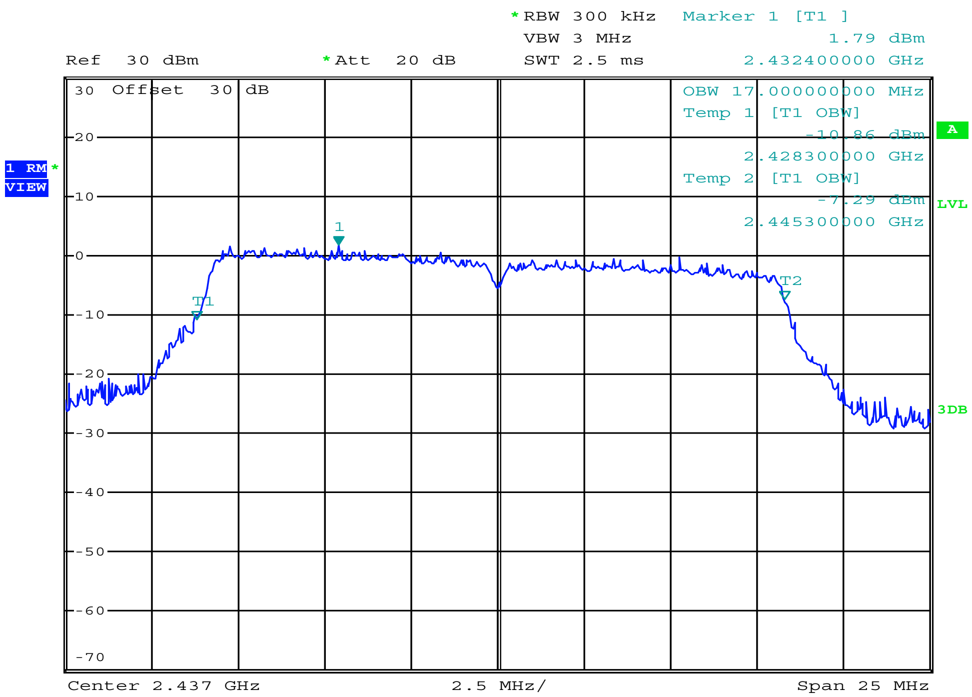
Occupied Bandwidth



Date: 1.DEC.2020 17:03:49

Channel Frequency:		
2417.00 MHz		
DUT Modulation: **OFDM**	Data Rate: **6** Mbps	Measured Occupied Bandwidth: **16.80** MHz

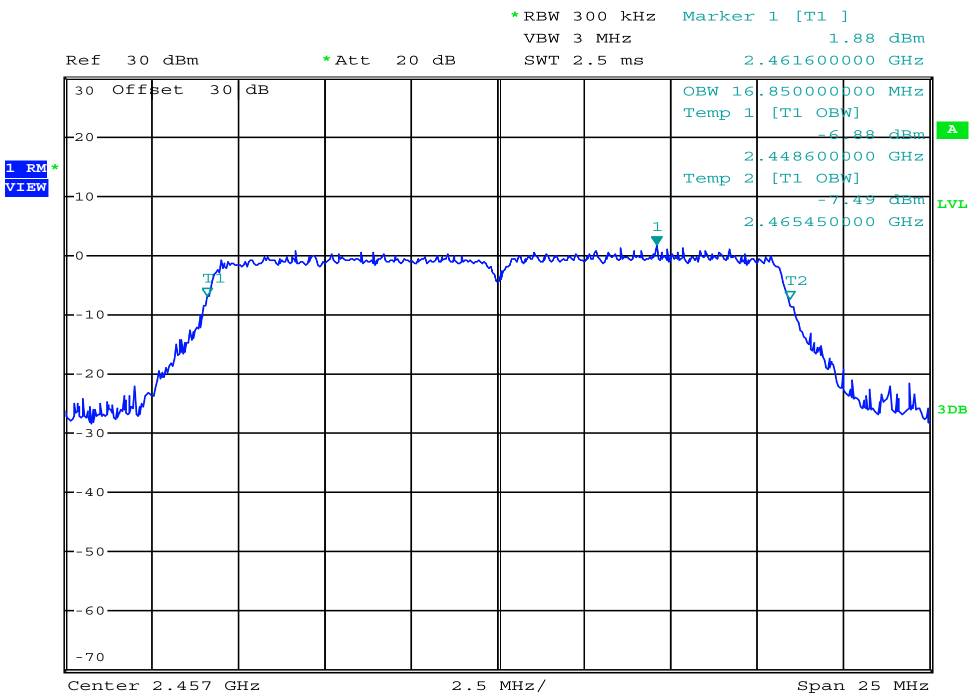
Occupied Bandwidth



Date: 1.DEC.2020 17:05:43

Channel Frequency: **2437.00** MHz		
DUT Modulation: **OFDM**	Data Rate: **6** Mbps	Measured Occupied Bandwidth: **17.00** MHz

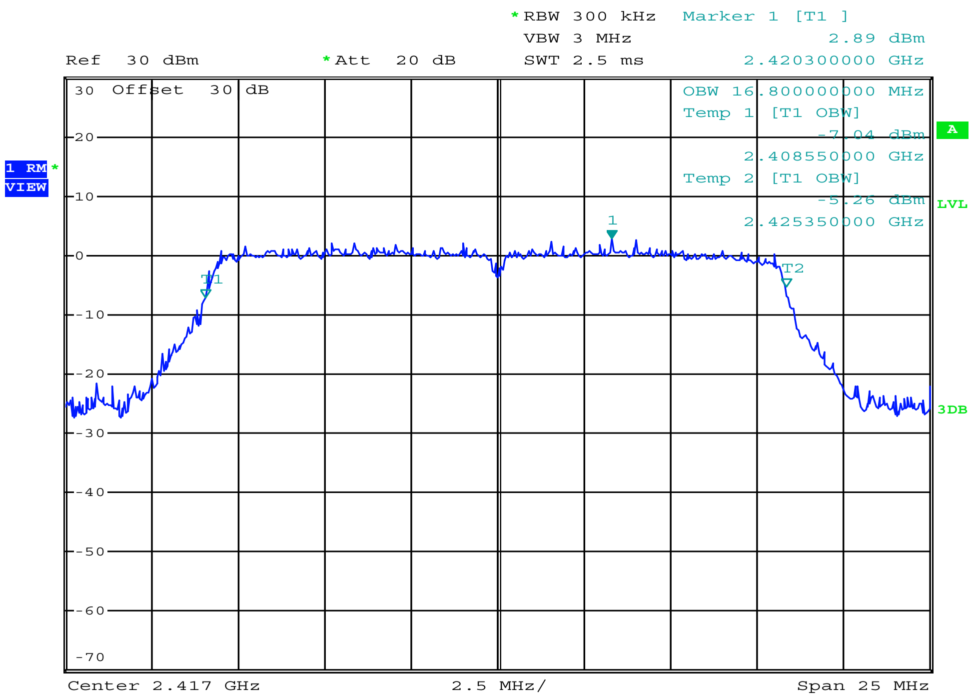
Occupied Bandwidth



Date: 1.DEC.2020 17:06:23

Channel Frequency:		
2457.00 MHz		
DUT Modulation:	Data Rate:	Measured Occupied Bandwidth:
OFDM	**6** Mbps	**16.85** MHz

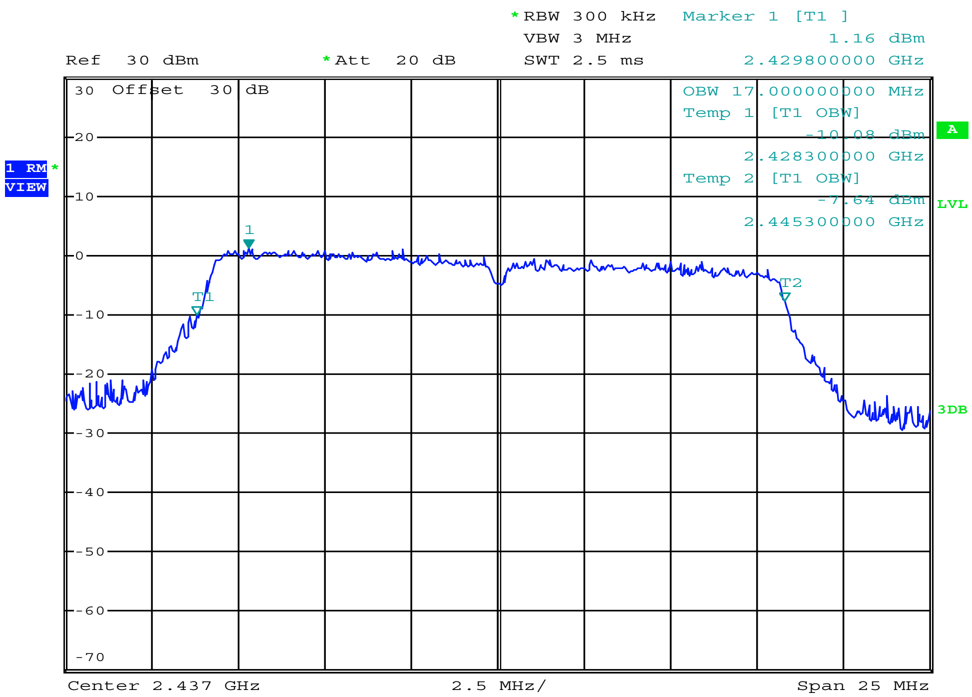
Occupied Bandwidth



Date: 1.DEC.2020 17:10:11

Channel Frequency:		
2417.00 MHz		
DUT Modulation:	Data Rate:	Measured Occupied Bandwidth:
OFDM	**9** Mbps	**16.80** MHz

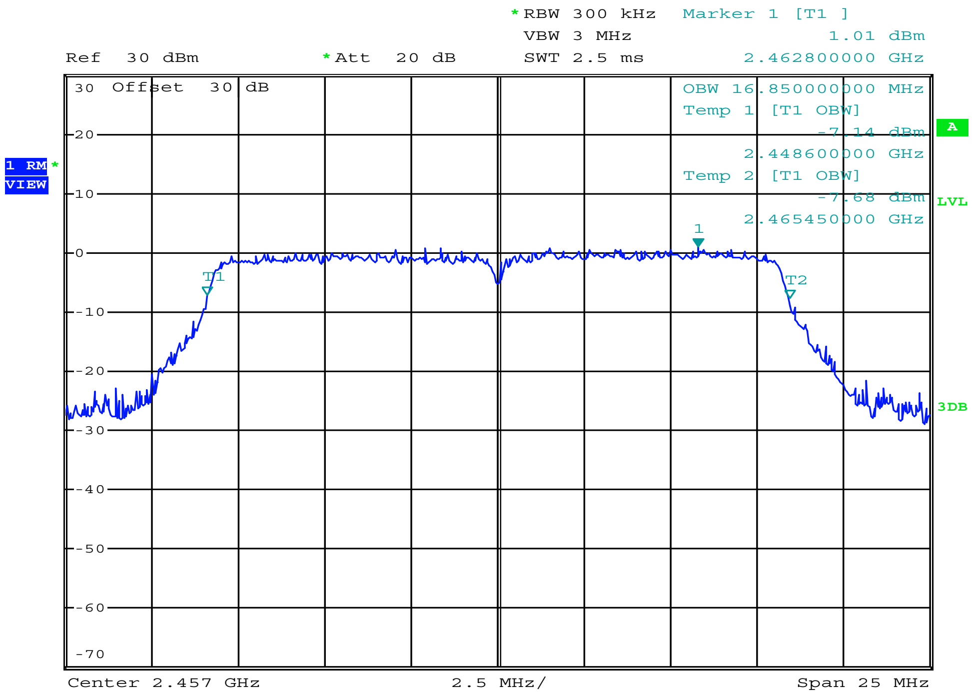
Occupied Bandwidth



Date: 1.DEC.2020 17:09:35

Channel Frequency:		
2437.00 MHz		
DUT Modulation: **OFDM**	Data Rate: **9** Mbps	Measured Occupied Bandwidth: **17.00** MHz

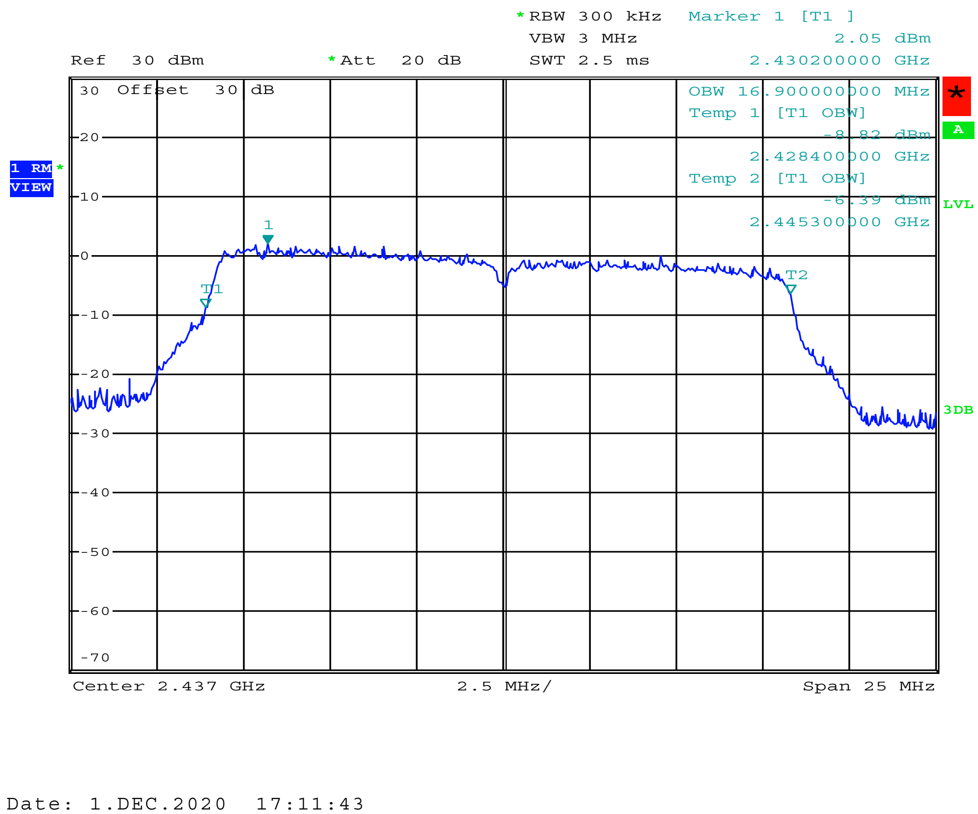
Occupied Bandwidth



Date: 1.DEC.2020 17:08:57

Channel Frequency:		
2457.00 MHz		
DUT Modulation:	Data Rate:	Measured Occupied Bandwidth:
OFDM	**9** Mbps	**16.85** MHz

Occupied Bandwidth



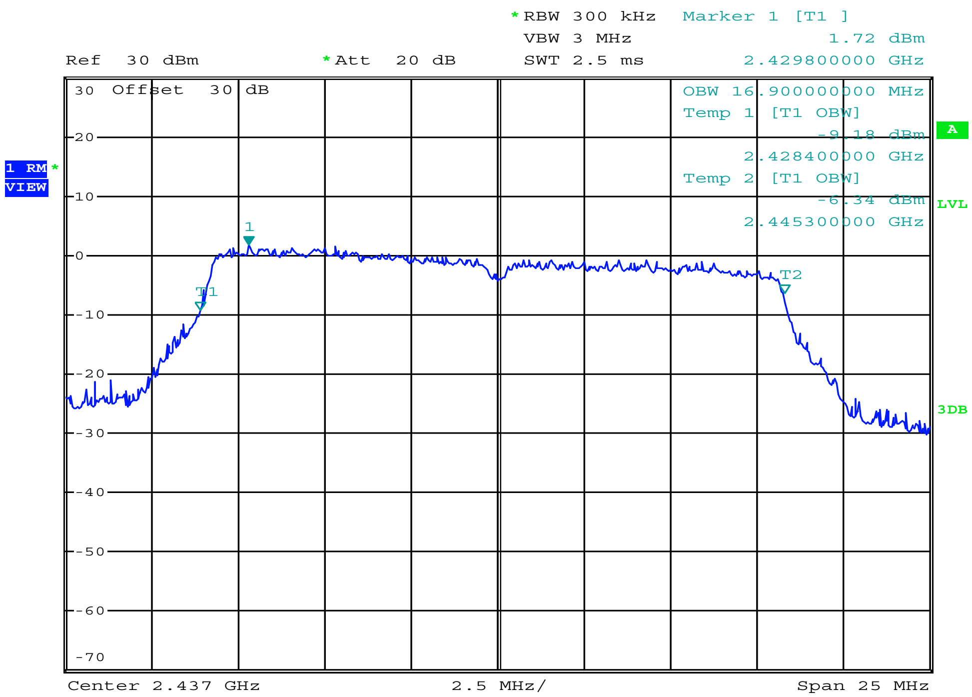
Channel Frequency: **2437.00** MHz

DUT Modulation: **OFDM**

Data Rate: **12** Mbps

Measured Occupied Bandwidth: **16.90** MHz

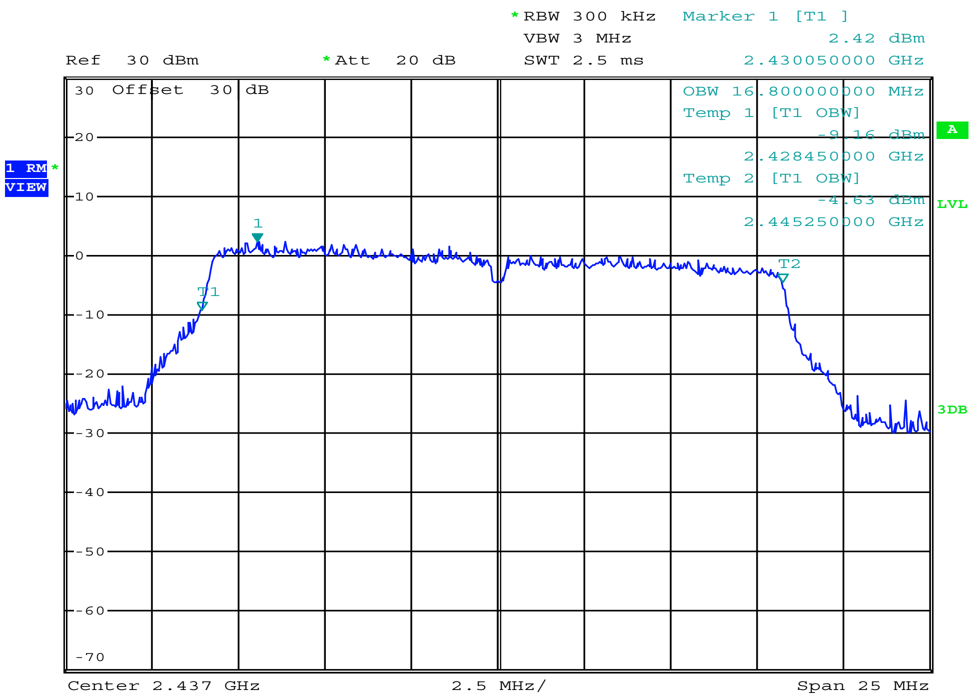
Occupied Bandwidth



Date: 1.DEC.2020 17:12:39

Channel Frequency: **2437.00** MHz		
DUT Modulation: **OFDM**	Data Rate: **18** Mbps	Measured Occupied Bandwidth: **16.90** MHz

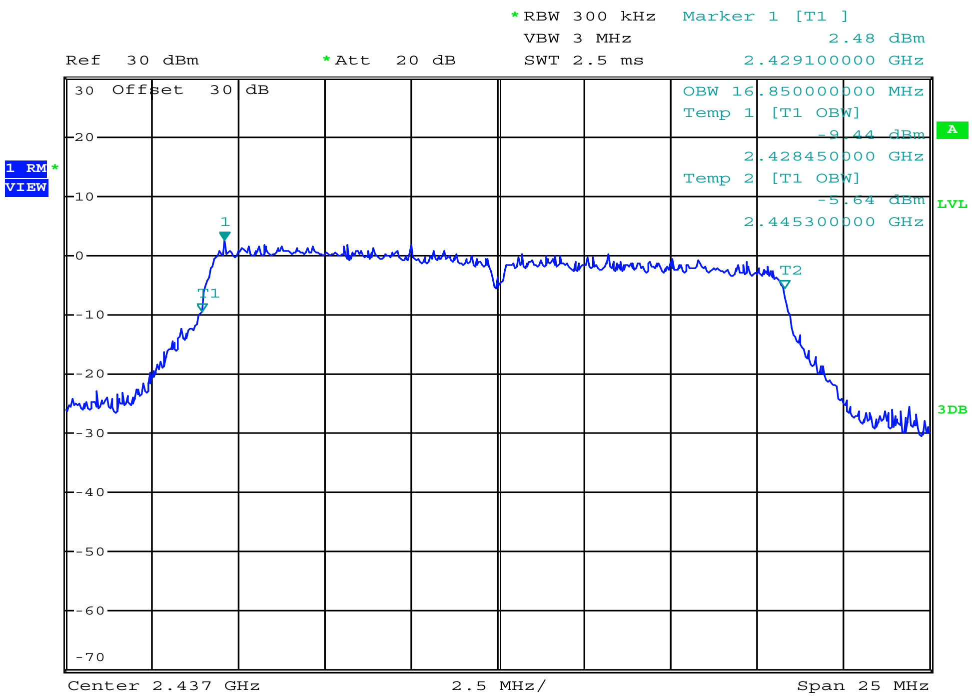
Occupied Bandwidth



Date: 1.DEC.2020 17:13:14

Channel Frequency:		
2437.00 MHz		
DUT Modulation:	Data Rate:	Measured Occupied Bandwidth:
OFDM	**24** Mbps	**16.80** MHz

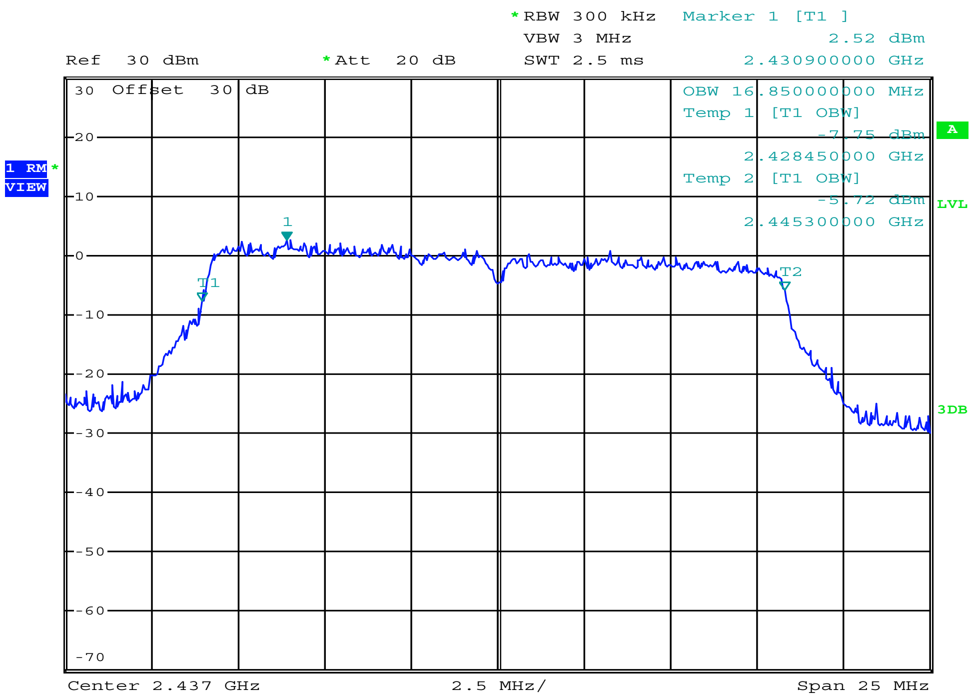
Occupied Bandwidth



Date: 1.DEC.2020 17:13:53

Channel Frequency:		
2437.00 MHz		
DUT Modulation: **OFDM**	Data Rate: **36** Mbps	Measured Occupied Bandwidth: **16.85** MHz

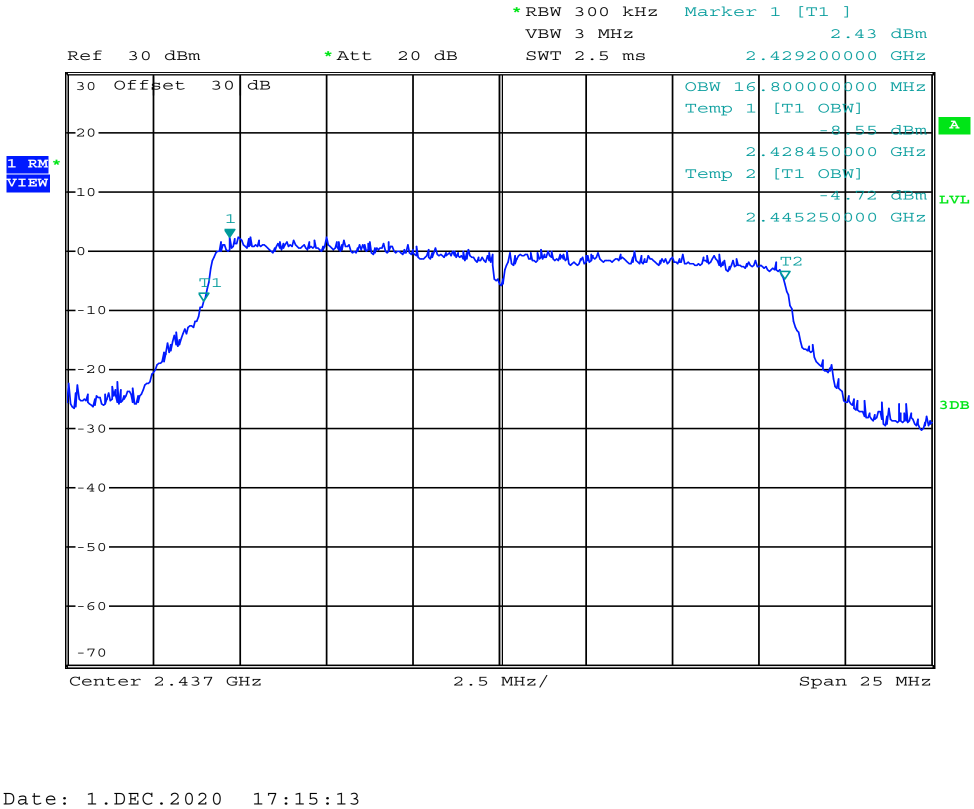
Occupied Bandwidth



Date: 1.DEC.2020 17:14:35

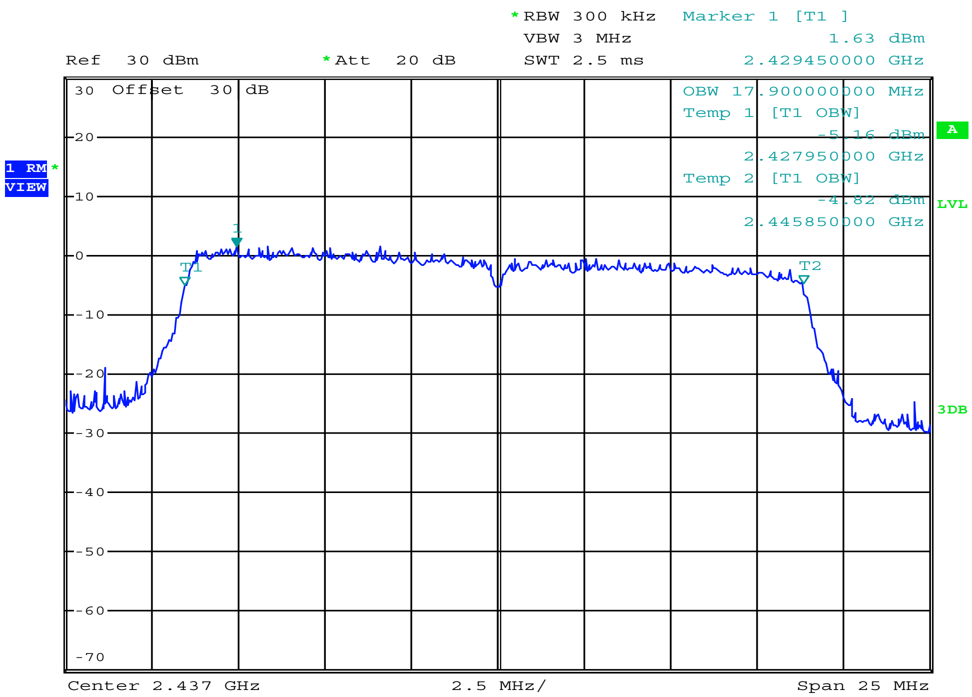
Channel Frequency:		
2437.00 MHz		
DUT Modulation: **OFDM**	Data Rate: **48** Mbps	Measured Occupied Bandwidth: **16.85** MHz

Occupied Bandwidth



Channel Frequency: **2437.00** MHz		
DUT Modulation: **OFDM**	Data Rate: **54** Mbps	Measured Occupied Bandwidth: **16.80** MHz

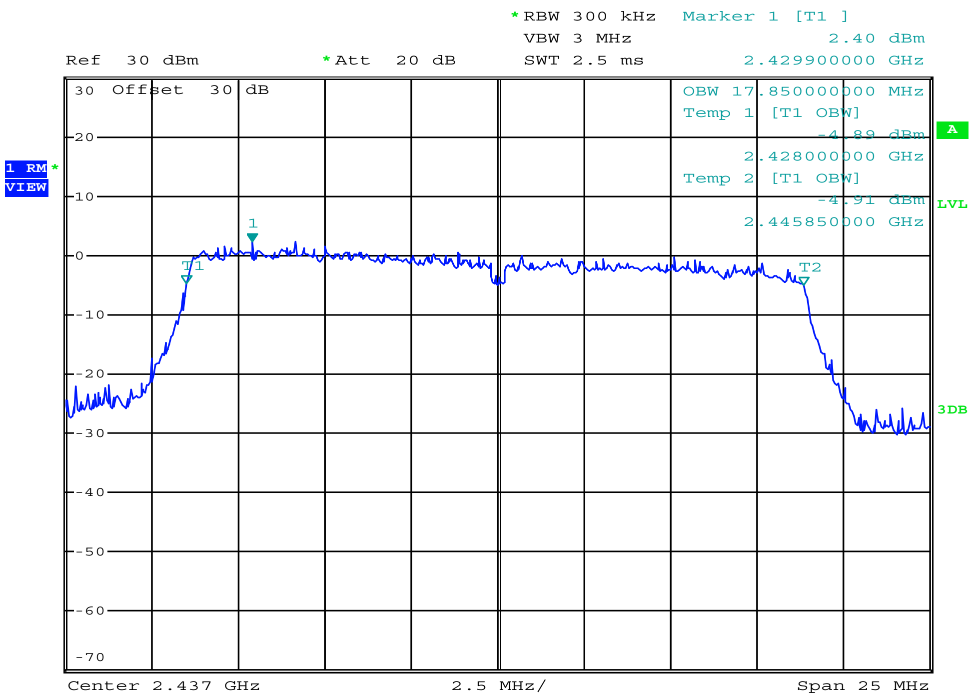
Occupied Bandwidth



Date: 1.DEC.2020 17:17:20

Channel Frequency:		
2437.00 MHz		
DUT Modulation: **MCS0**	Data Rate: **-** Mbps	Measured Occupied Bandwidth: **17.90** MHz

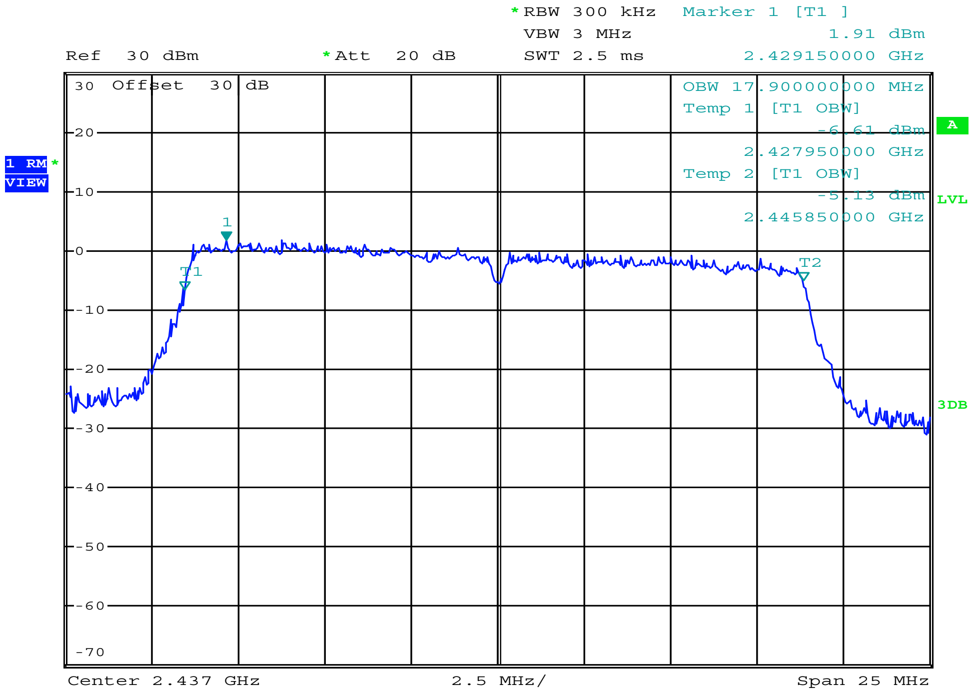
Occupied Bandwidth



Date: 1.DEC.2020 17:18:00

Channel Frequency: **2437.00** MHz		
DUT Modulation: **MCS1**	Data Rate: **-** Mbps	Measured Occupied Bandwidth: **17.85** MHz

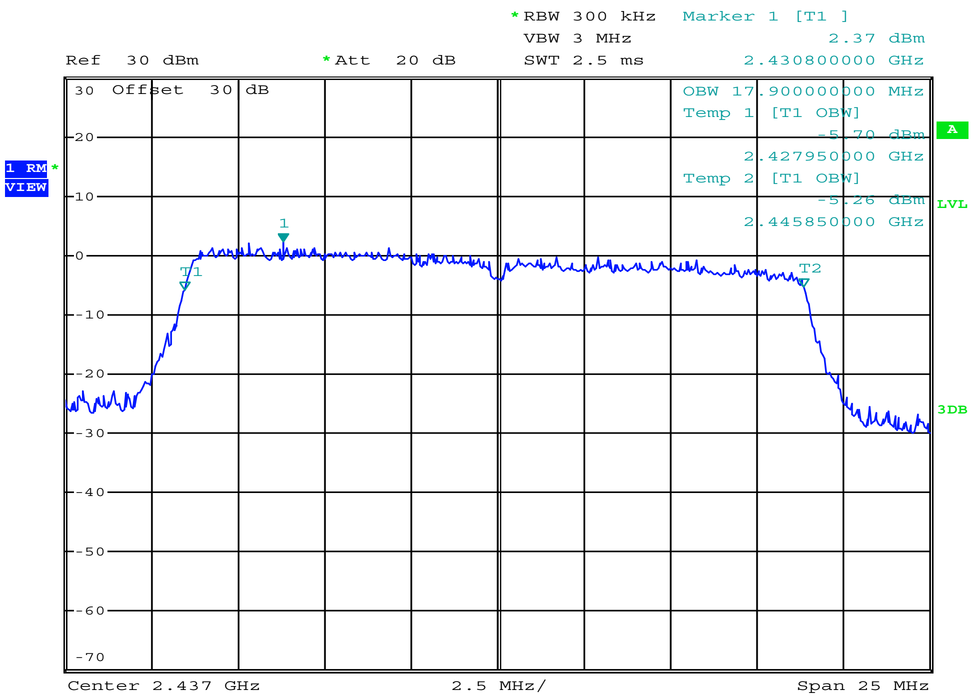
Occupied Bandwidth



Date: 1.DEC.2020 17:18:37

Channel Frequency:		
2437.00 MHz		
DUT Modulation: **MCS3**	Data Rate: **-** Mbps	Measured Occupied Bandwidth: **17.90** MHz

Occupied Bandwidth



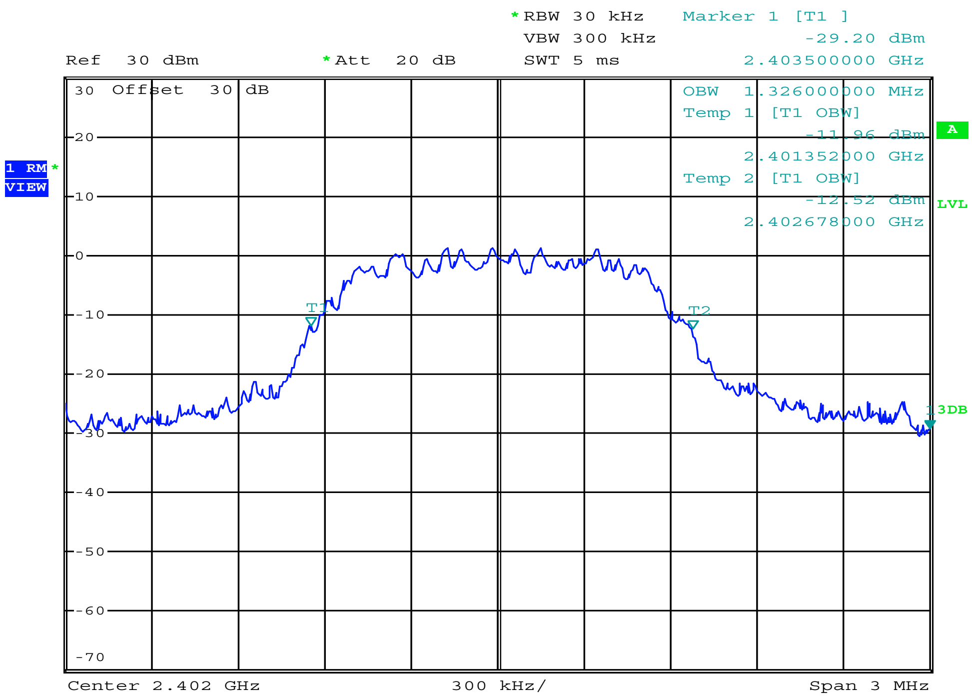
Date: 1.DEC.2020 17:19:15

Channel Frequency:		
2437.00 MHz		
DUT Modulation: **MCS7**	Data Rate: **-** Mbps	Measured Occupied Bandwidth: **17.90** MHz

Occupied Bandwidth Measurement Results (DSS)						
Frequency (MHz)	Modulation	Data Rate (Mbps)	Measured Occupied Bandwidth (MHz)	Minimum Authorized Bandwidth (MHz)	Margin (kHz)	Emission Designator
2402	Pi/4-DQPSK	2	1.3	0.5	0.8	1M32D1D
2442	Pi/4-DQPSK	2	1.3		0.8	1M33D1D
2480	Pi/4-DQPSK	2	1.3		0.8	1M30D1D
2402	8-DPSK	3	1.3		0.8	1M31D1D
2442	8-DPSK	3	1.3		0.8	1M33D1D
2480	8-DPSK	3	1.3		0.8	1M30D1D
						Complies

Margin = Measured BW - Minimum Authorized BW

Occupied Bandwidth

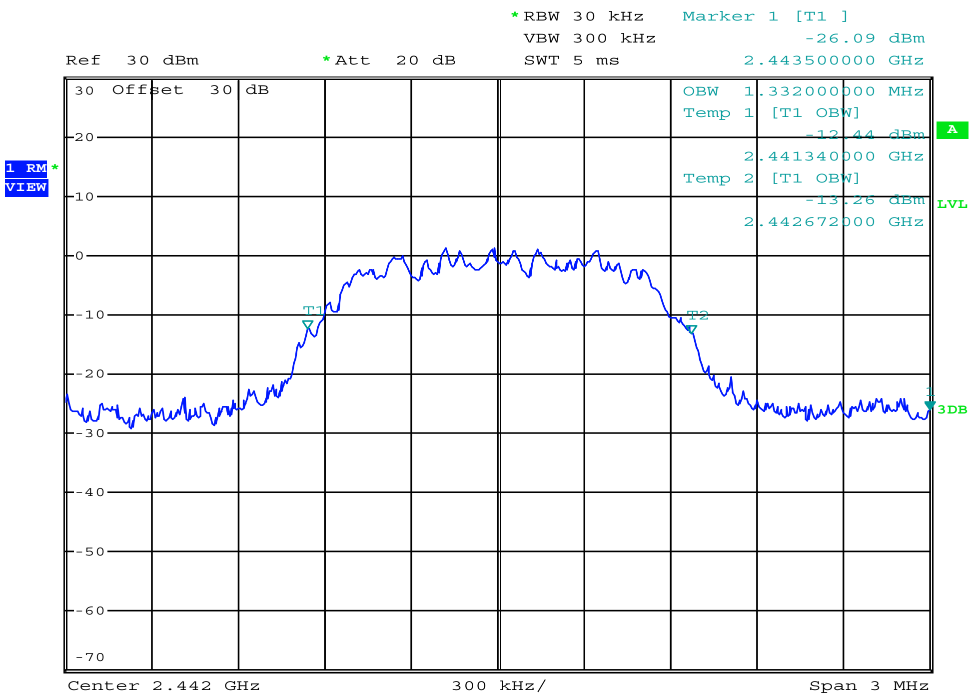


Date: 2.DEC.2020 15:15:24

Channel Frequency:
2402.00 MHz

DUT Modulation:	Data Rate:	Measured Occupied Bandwidth:
Pi/4-DQPSK	**2** Mbps	**1.32** MHz

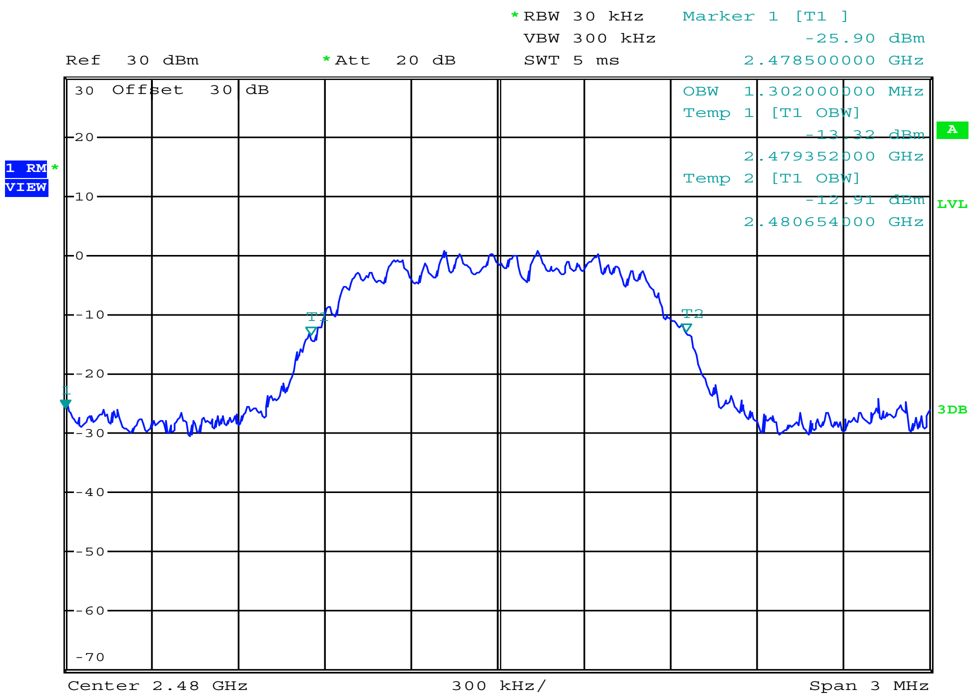
Occupied Bandwidth



Date: 2.DEC.2020 15:17:22

Channel Frequency: **2442.00** MHz		
DUT Modulation: **Pi/4-DQPSK**	Data Rate: **2** Mbps	Measured Occupied Bandwidth: **1.33** MHz

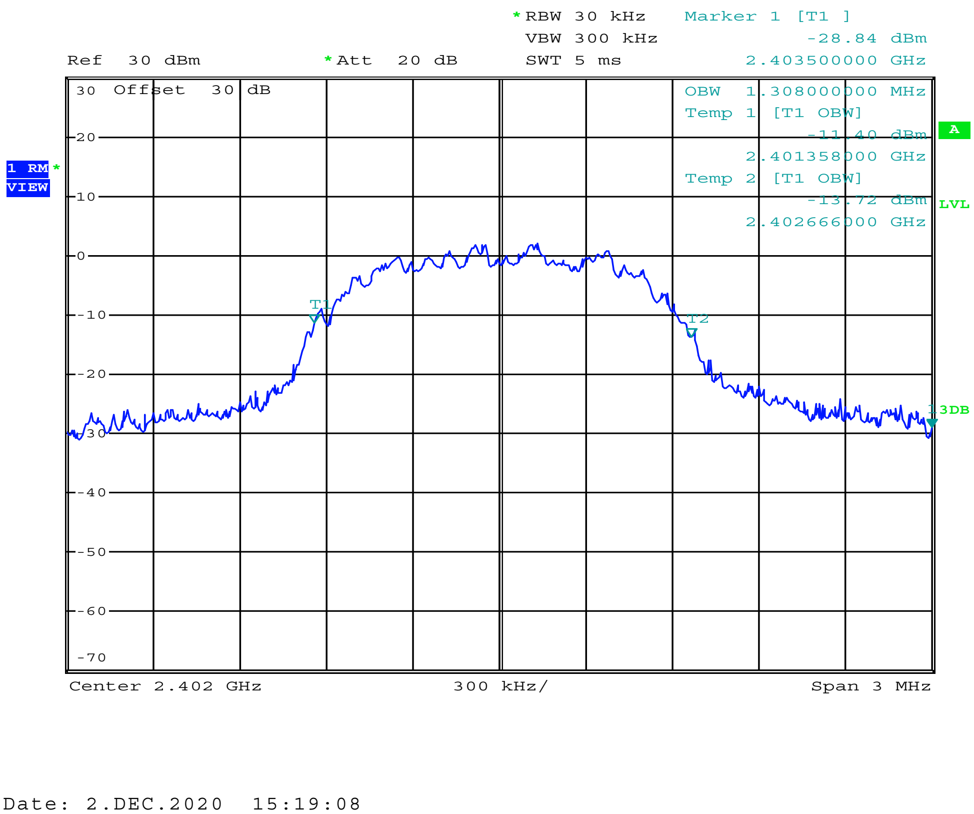
Occupied Bandwidth



Date: 2.DEC.2020 15:16:21

Channel Frequency:		
2480.00 MHz		
DUT Modulation: **Pi/4-DQPSK**	Data Rate: **2** Mbps	Measured Occupied Bandwidth: **1.30** MHz

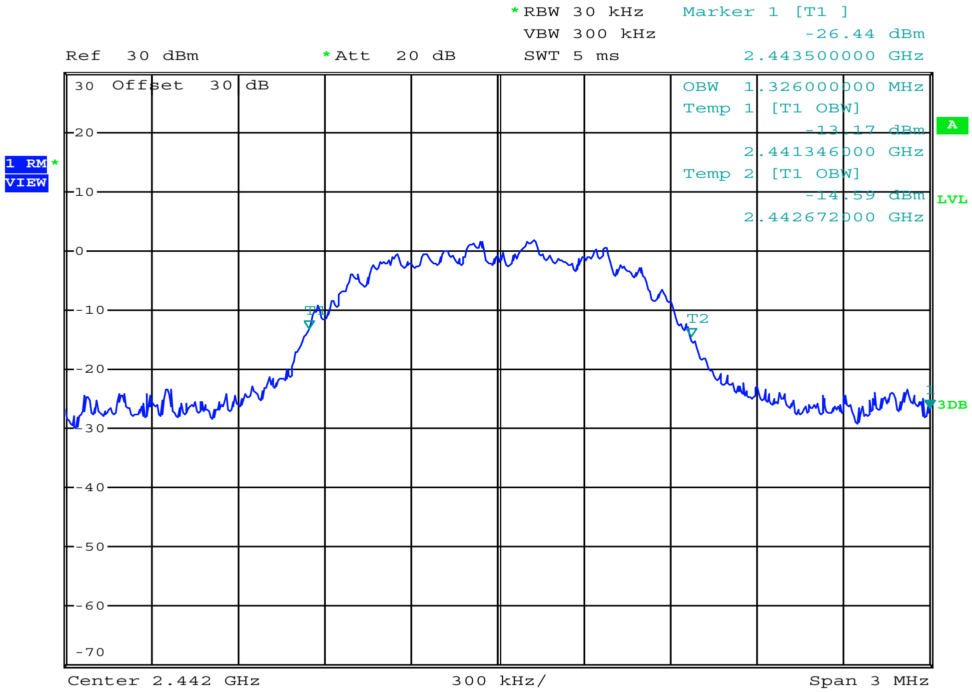
Occupied Bandwidth



Channel Frequency:
2402.00 MHz

DUT Modulation:	Data Rate:	Measured Occupied Bandwidth:
8-DPSK	**3** Mbps	**1.31** MHz

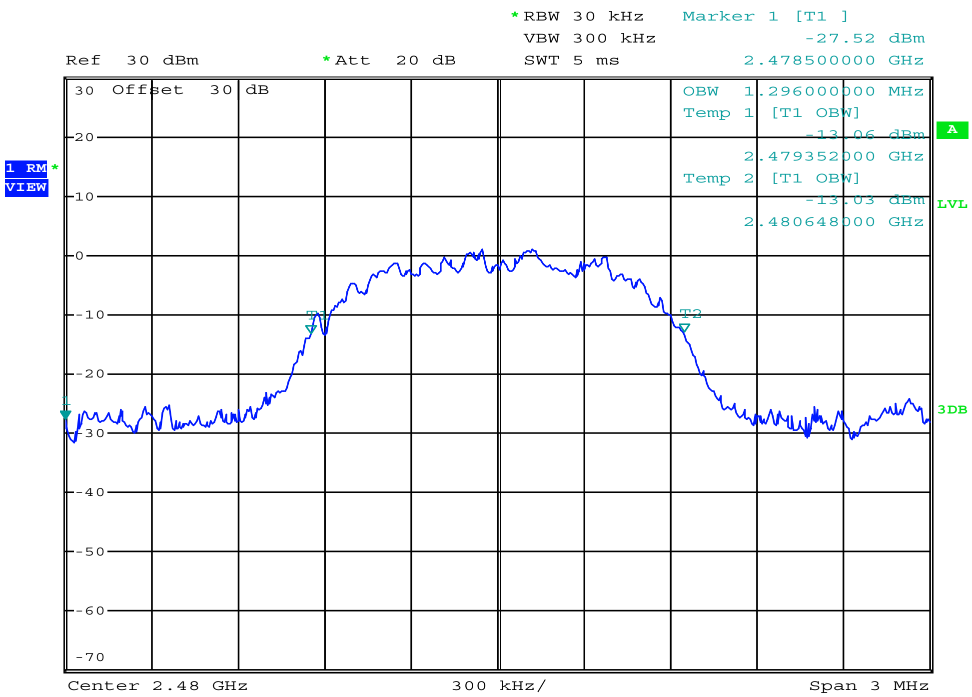
Occupied Bandwidth



Date: 2.DEC.2020 15:18:25

Channel Frequency: **2442.00** MHz		
DUT Modulation: **8-DPSK**	Data Rate: **3** Mbps	Measured Occupied Bandwidth: **1.33** MHz

Occupied Bandwidth



Date: 2.DEC.2020 15:20:05

Channel Frequency:		
2480.00 MHz		
DUT Modulation: **8-DPSK**	Data Rate: **3** Mbps	Measured Occupied Bandwidth: **1.30** MHz

Test Report Serial Number:	**45461626 R1.0**
Test Report Date:	**4 December 2020**
Project Number:	**1510**

Appendix E - Conducted Power Measurement Plots (DTS)

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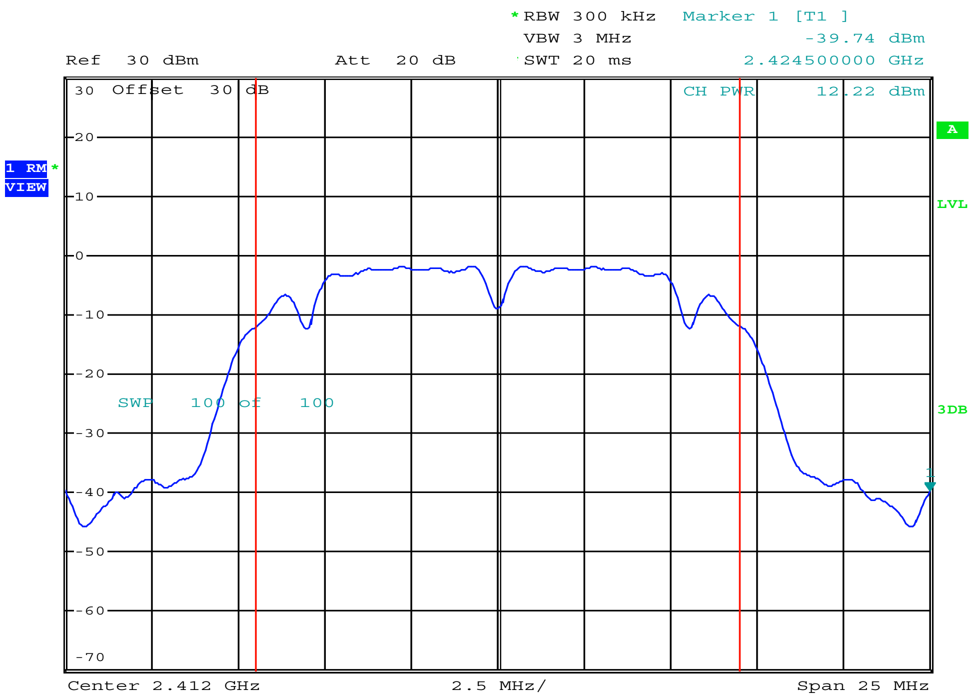
Conducted Power Measurement Results - DTS										
Frequency (MHz)	Modulation	Bit Rate (Mbps)	Measured Power [P_{Meas}] (dBm)	Conducted Limit [P_{Lim}] (dBm)	Conducted Margin (dB)	Antenna Gain* (dBi)	EIRP [E_{Meas}] (dBm)	EIRP Limit [E_{Lim}] (dBm)	EIRP Margin (dB)	Result
2412.00	CCK	1.0	12.22	30	17.780	0.6	12.82	36	23.180	Complies
2417.00	CCK	1.0	15.48	30	14.520	0.6	16.08	36	19.920	Complies
2437.00	CCK	1.0	14.54	30	15.460	0.6	15.14	36	20.860	Complies
2457.00	CCK	1.0	14.56	30	15.440	0.6	15.16	36	20.840	Complies
2462.00	CCK	1.0	13.05	30	16.950	0.6	13.65	36	22.350	Complies
2417.00	CCK	2.0	15.70	30	14.300	0.6	16.30	36	19.700	Complies
2437.00	CCK	2.0	14.79	30	15.210	0.6	15.39	36	20.610	Complies
2457.00	CCK	2.0	14.67	30	15.330	0.6	15.27	36	20.730	Complies
2417.00	DSSS	5.5	15.90	30	14.100	0.6	16.50	36	19.500	Complies
2437.00	DSSS	5.5	14.97	30	15.030	0.6	15.57	36	20.430	Complies
2457.00	DSSS	5.5	14.95	30	15.050	0.6	15.55	36	20.450	Complies
2417.00	DSSS	11.0	15.87	30	14.130	0.6	16.47	36	19.530	Complies
2437.00	DSSS	11.0	15.00	30	15.000	0.6	15.60	36	20.400	Complies
2457.00	DSSS	11.0	14.92	30	15.080	0.6	15.52	36	20.480	Complies
2417.00	OFDM	6.0	14.24	30	15.760	0.6	14.84	36	21.160	Complies
2417.00	OFDM	9.0	14.31	30	15.690	0.6	14.91	36	21.090	Complies
2417.00	OFDM	12.0	14.36	30	15.640	0.6	14.96	36	21.040	Complies
2417.00	OFDM	18.0	14.33	30	15.670	0.6	14.93	36	21.070	Complies
2417.00	OFDM	24.0	14.33	30	15.670	0.6	14.93	36	21.070	Complies
2417.00	OFDM	36.0	14.29	30	15.710	0.6	14.89	36	21.110	Complies
2417.00	OFDM	48.0	14.29	30	15.710	0.6	14.89	36	21.110	Complies
2417.00	OFDM	54.0	14.24	30	15.760	0.6	14.84	36	21.160	Complies
2417.00	MCS0	-	14.10	30	15.900	0.6	14.70	36	21.300	Complies
2417.00	MCS3	-	14.12	30	15.880	0.6	14.72	36	21.280	Complies
2417.00	MCS7	-	14.16	30	15.840	0.6	14.76	36	21.240	Complies

Conducted Margin = P_{Limit} - P_{Meas}

EIRP Margin = E_{Limit} - E_{Meas}

* Antenna Gain information provided by applicant.

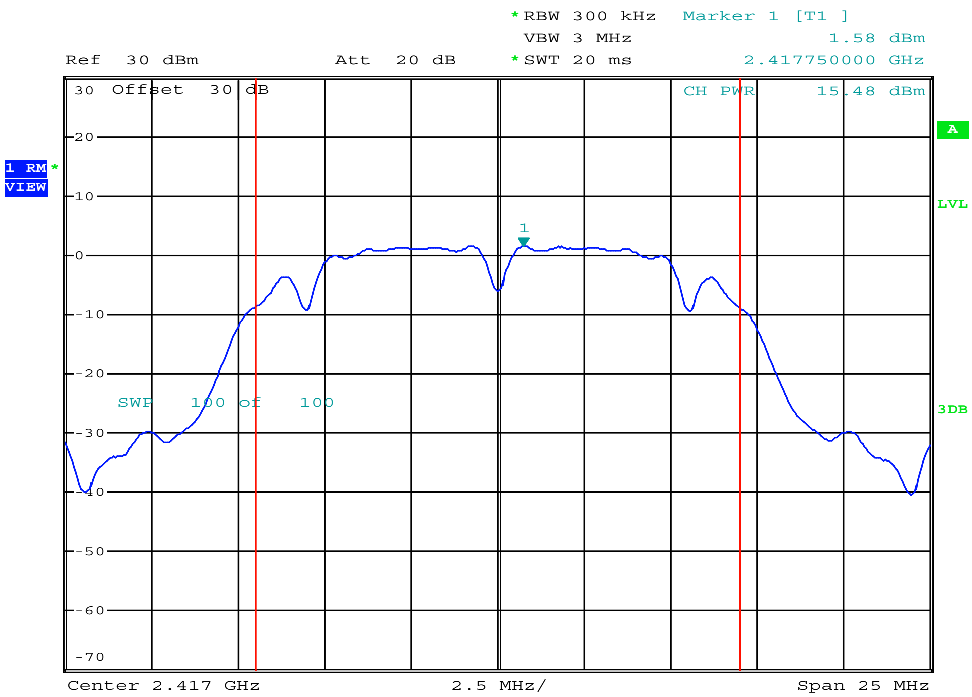
Conducted Power



Date: 2.DEC.2020 11:19:59

Channel Frequency:		
2412.00 MHz		
DUT Modulation:	Data Rate:	Measured Conducted Power:
CCK	**1** Mbps	**12.22** dBm

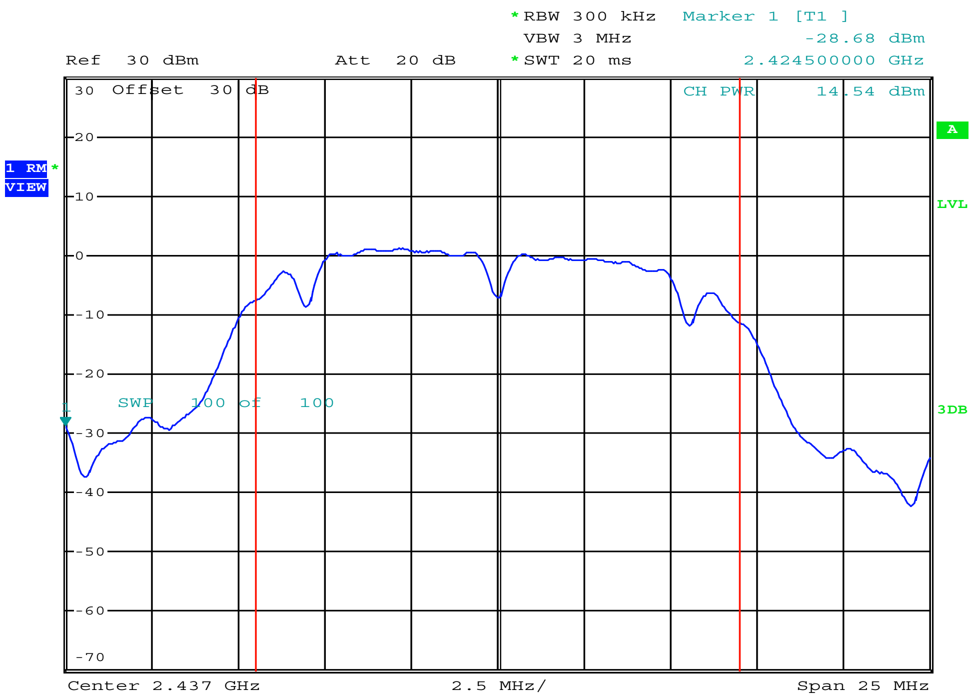
Conducted Power



Date: 2.DEC.2020 11:22:00

Channel Frequency:		
2417.00 MHz		
DUT Modulation:	Data Rate:	Measured Conducted Power:
CCK	**1** Mbps	**15.48** dBm

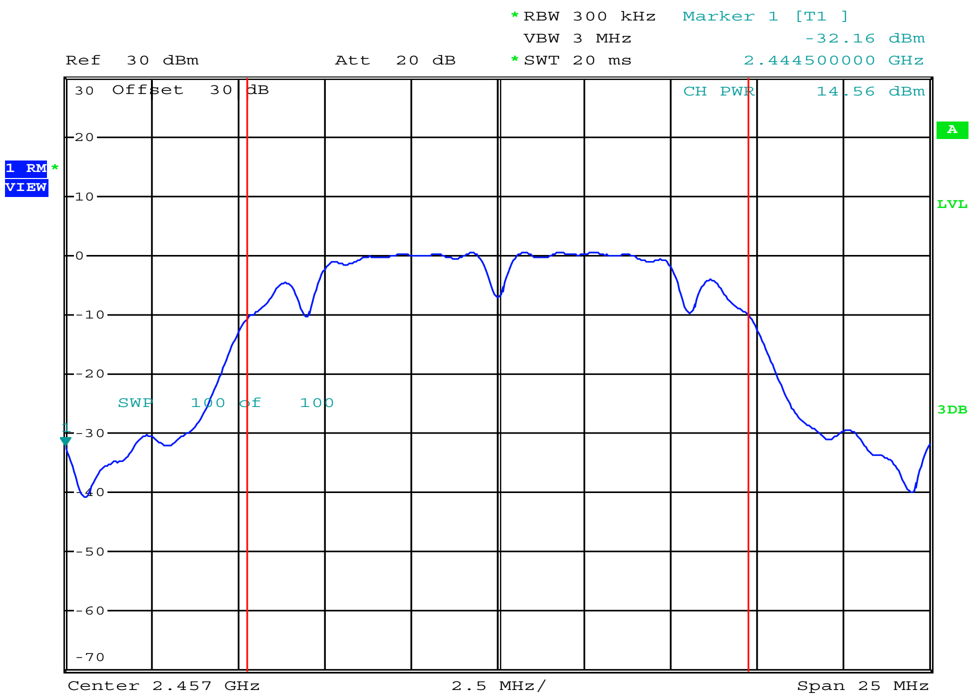
Conducted Power



Date: 2.DEC.2020 11:23:25

Channel Frequency: **2437.00** MHz		
DUT Modulation: **CCK**	Data Rate: **1** Mbps	Measured Conducted Power: **14.54** dBm

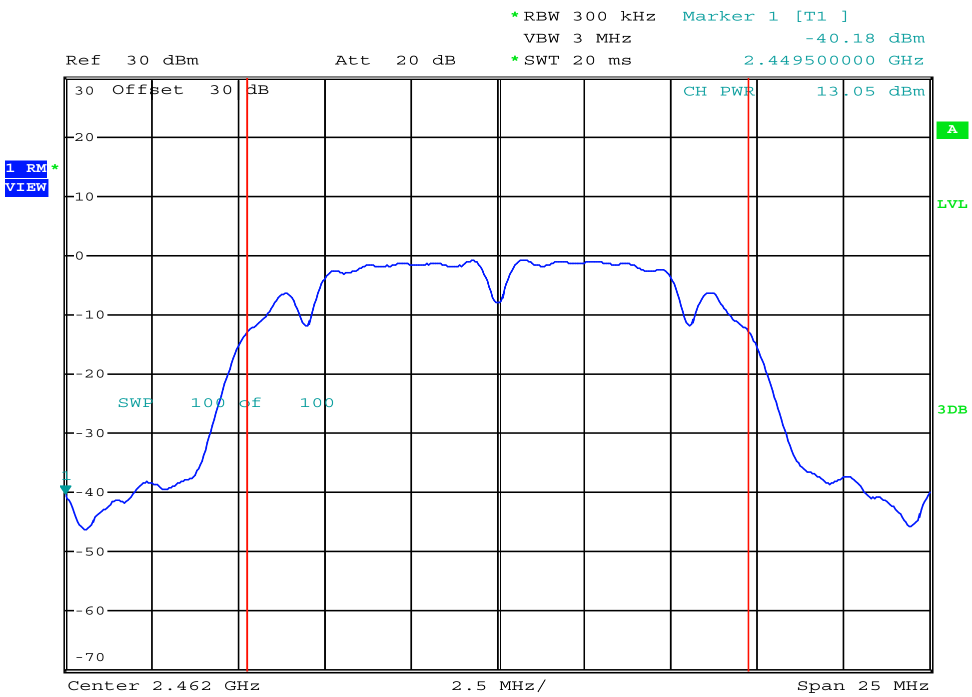
Conducted Power



Date: 2.DEC.2020 11:24:39

Channel Frequency:		
2457.00 MHz		
DUT Modulation:	Data Rate:	Measured Conducted Power:
CCK	**1** Mbps	**14.56** dBm

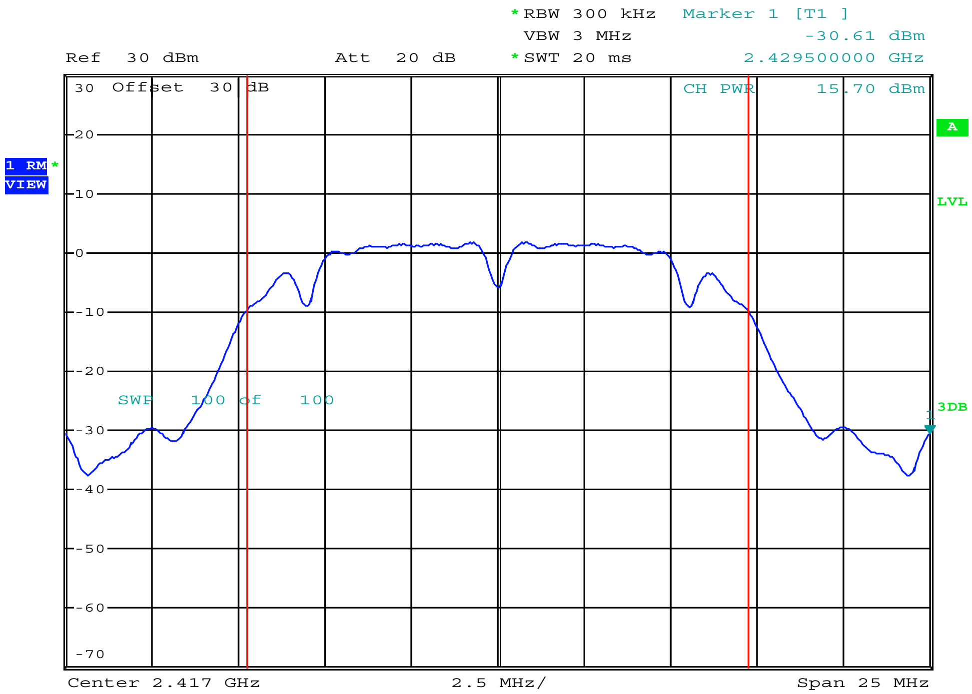
Conducted Power



Date: 2.DEC.2020 11:25:26

Channel Frequency:		
2462.00 MHz		
DUT Modulation:	Data Rate:	Measured Conducted Power:
CCK	**1** Mbps	**13.05** dBm

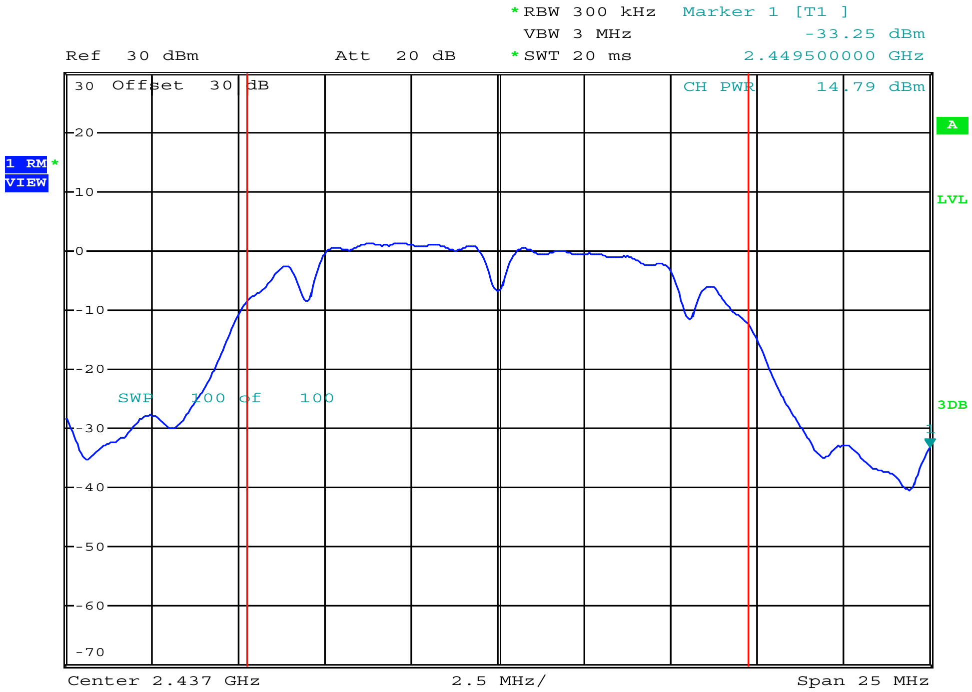
Conducted Power



Date: 2.DEC.2020 11:29:45

Channel Frequency:		
2417.00 MHz		
DUT Modulation:	Data Rate:	Measured Conducted Power:
CCK	**2** Mbps	**15.70** dBm

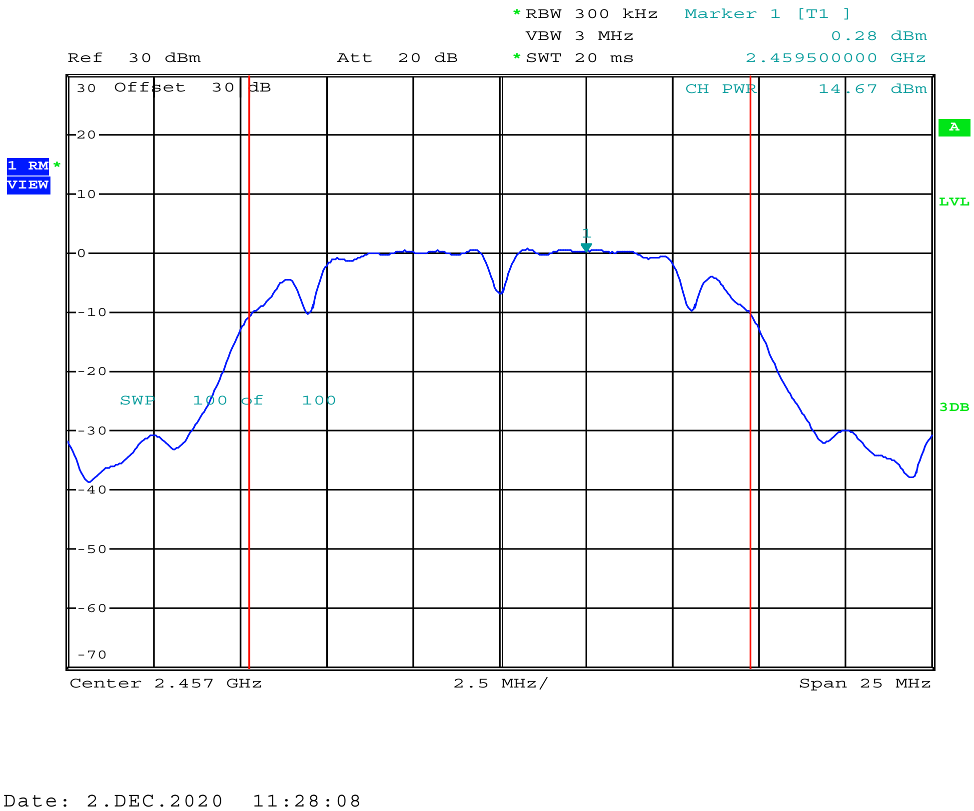
Conducted Power



Date: 2.DEC.2020 11:28:46

Channel Frequency:		
2437.00 MHz		
DUT Modulation:	Data Rate:	Measured Conducted Power:
CCK	**2** Mbps	**14.79** dBm

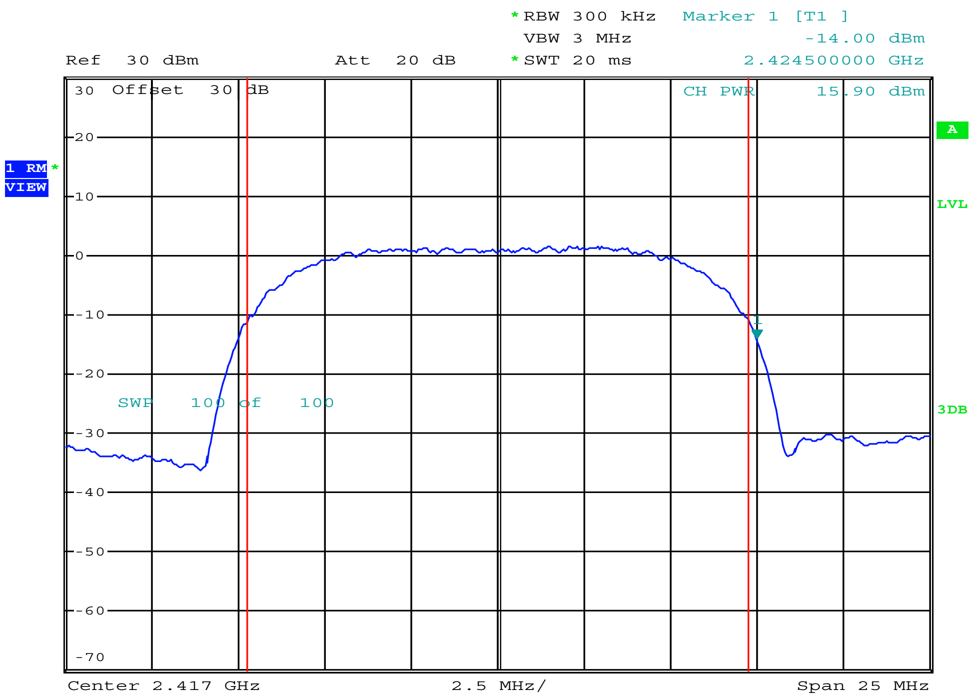
Conducted Power



Channel Frequency:
2457.00 MHz

DUT Modulation:	Data Rate:	Measured Conducted Power:
CCK	**2** Mbps	**14.67** dBm

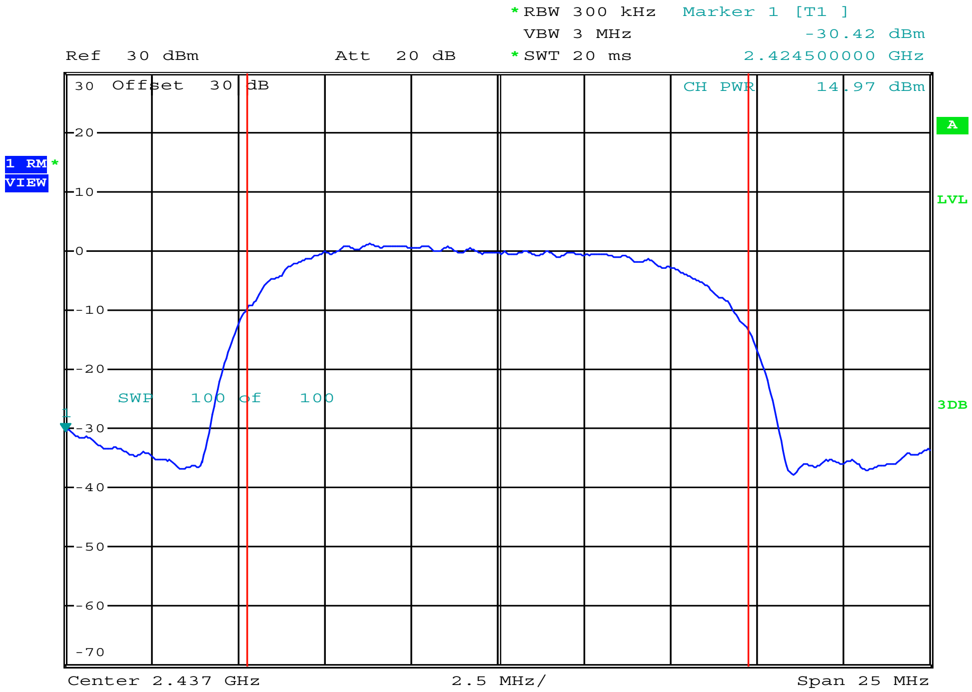
Conducted Power



Date: 2.DEC.2020 11:32:18

Channel Frequency:		
2417.00 MHz		
DUT Modulation:	Data Rate:	Measured Conducted Power:
DSSS	**5.5** Mbps	**15.90** dBm

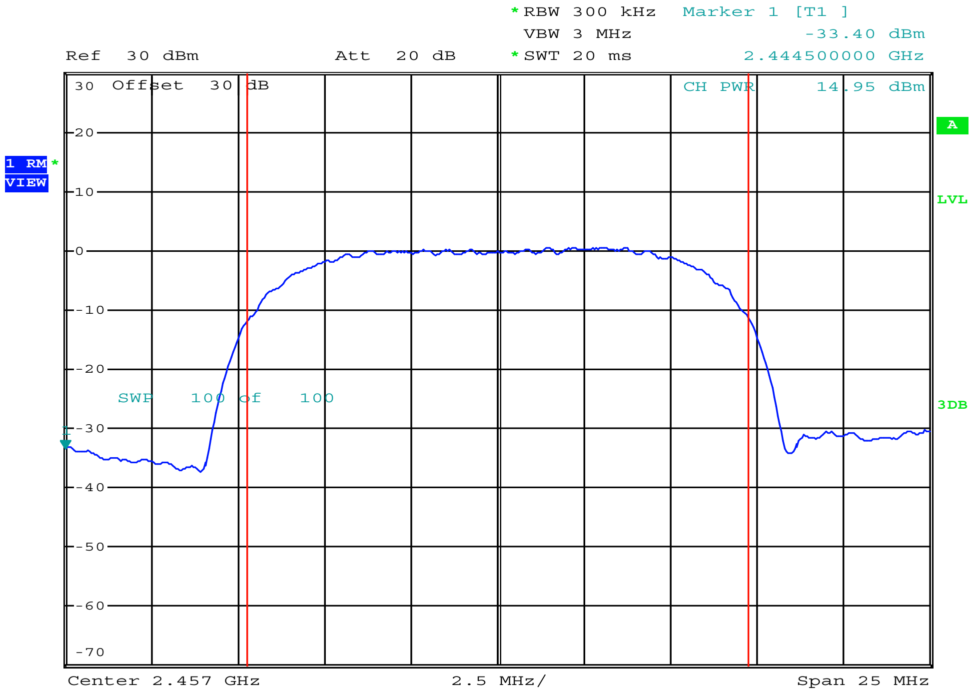
Conducted Power



Date: 2.DEC.2020 11:33:04

Channel Frequency:		
2437.00 MHz		
DUT Modulation:	Data Rate:	Measured Conducted Power:
DSSS	**5.5** Mbps	**14.97** dBm

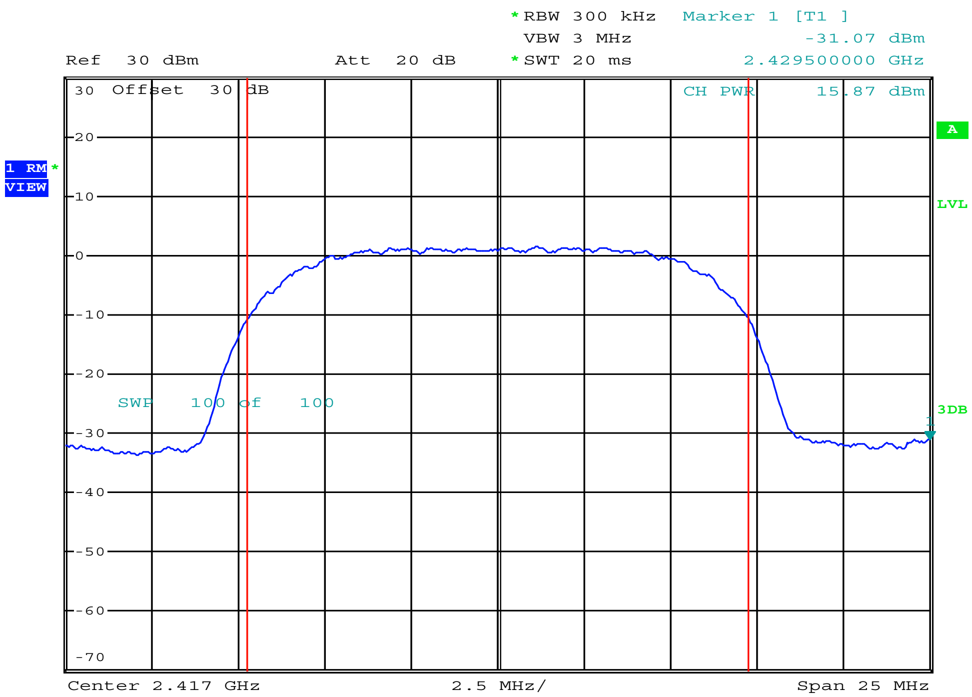
Conducted Power



Date: 2.DEC.2020 11:33:46

Channel Frequency:		
2457.00 MHz		
DUT Modulation:	Data Rate:	Measured Conducted Power:
DSSS	**5.5** Mbps	**14.95** dBm

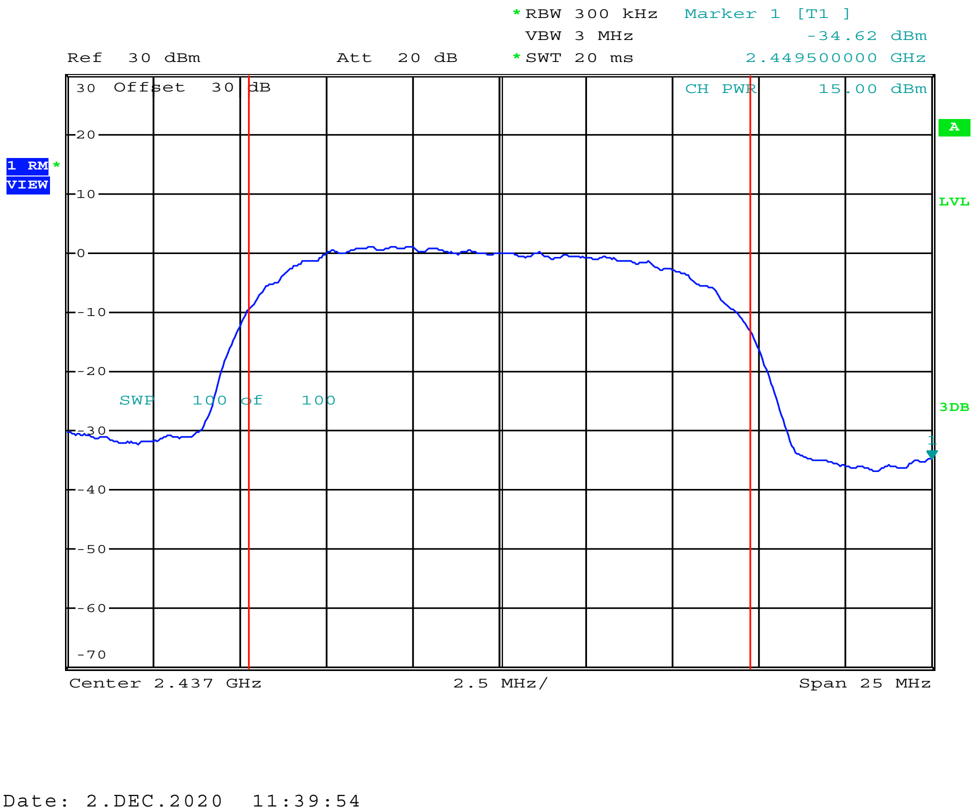
Conducted Power



Date: 2.DEC.2020 11:41:13

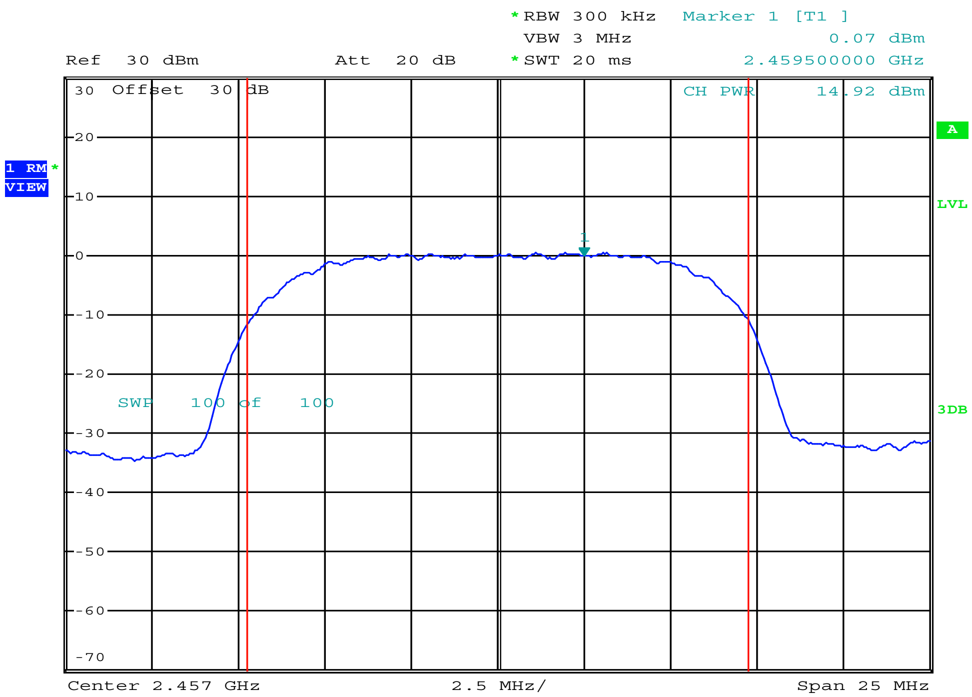
Channel Frequency: **2417.00** MHz		
DUT Modulation: **DSSS**	Data Rate: **11** Mbps	Measured Conducted Power: **15.87** dBm

Conducted Power



Channel Frequency:		
2437.00 MHz		
DUT Modulation: **DSSS**	Data Rate: **11** Mbps	Measured Conducted Power: **15.00** dBm

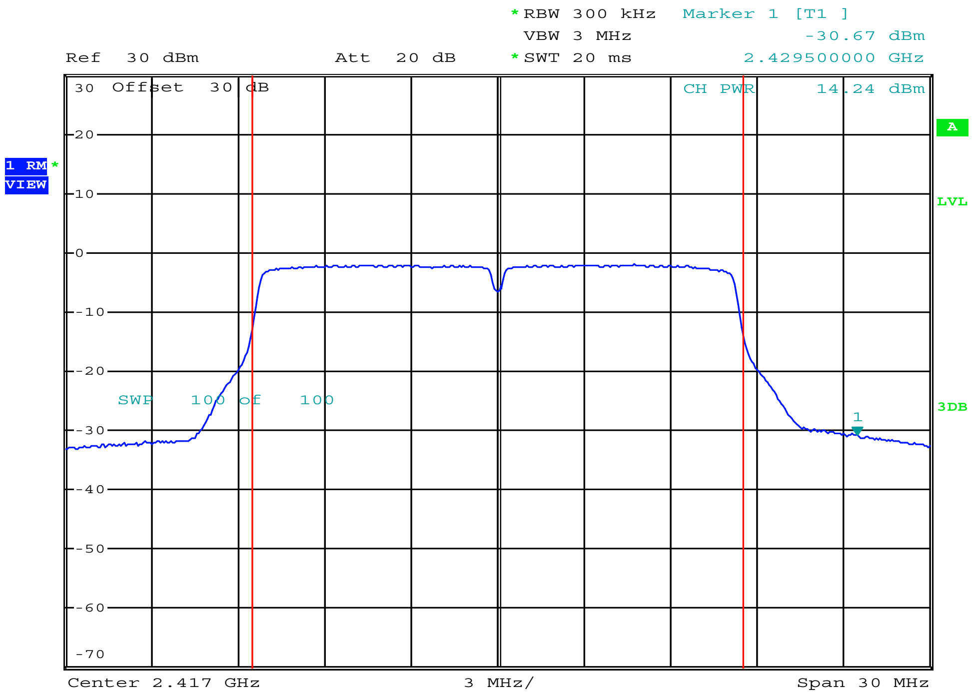
Conducted Power



Date: 2.DEC.2020 11:38:03

Channel Frequency: **2457.00** MHz		
DUT Modulation: **DSSS**	Data Rate: **11** Mbps	Measured Conducted Power: **14.92** dBm

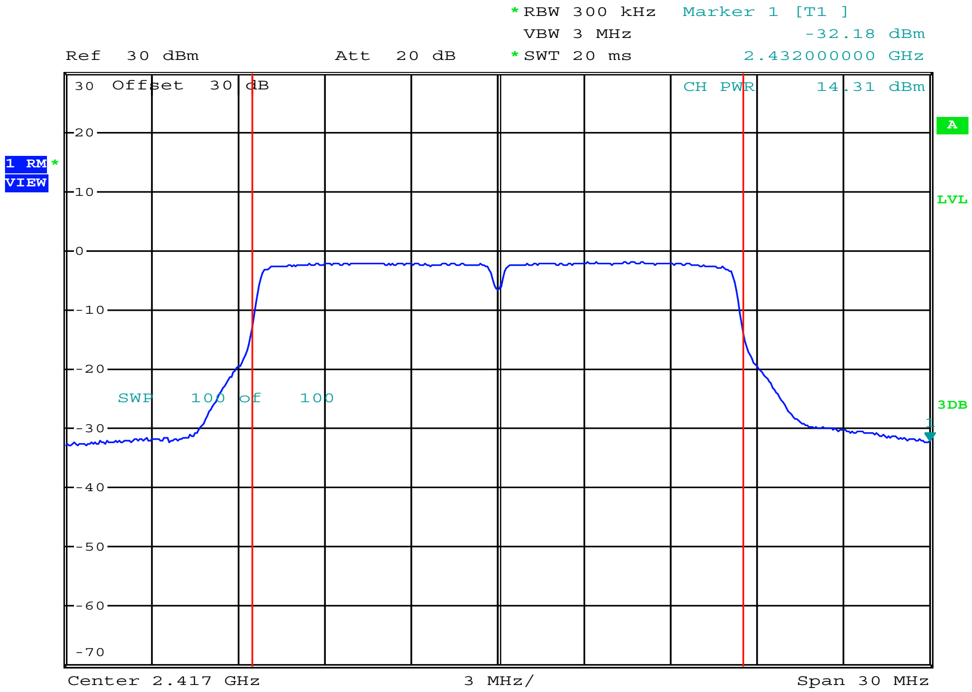
Conducted Power



Date: 2.DEC.2020 11:45:47

Channel Frequency: **2417.00** MHz		
DUT Modulation: **OFDM**	Data Rate: **6** Mbps	Measured Conducted Power: **14.24** dBm

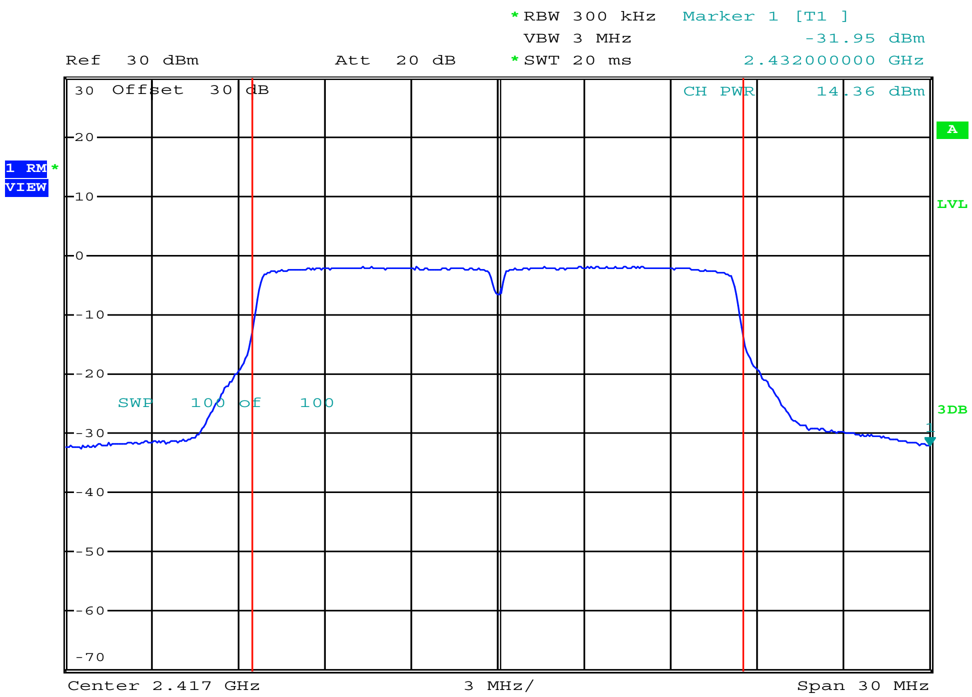
Conducted Power



Date: 2.DEC.2020 12:12:37

Channel Frequency:		
2417.00 MHz		
DUT Modulation:	Data Rate:	Measured Conducted Power:
OFDM	**9** Mbps	**14.31** dBm

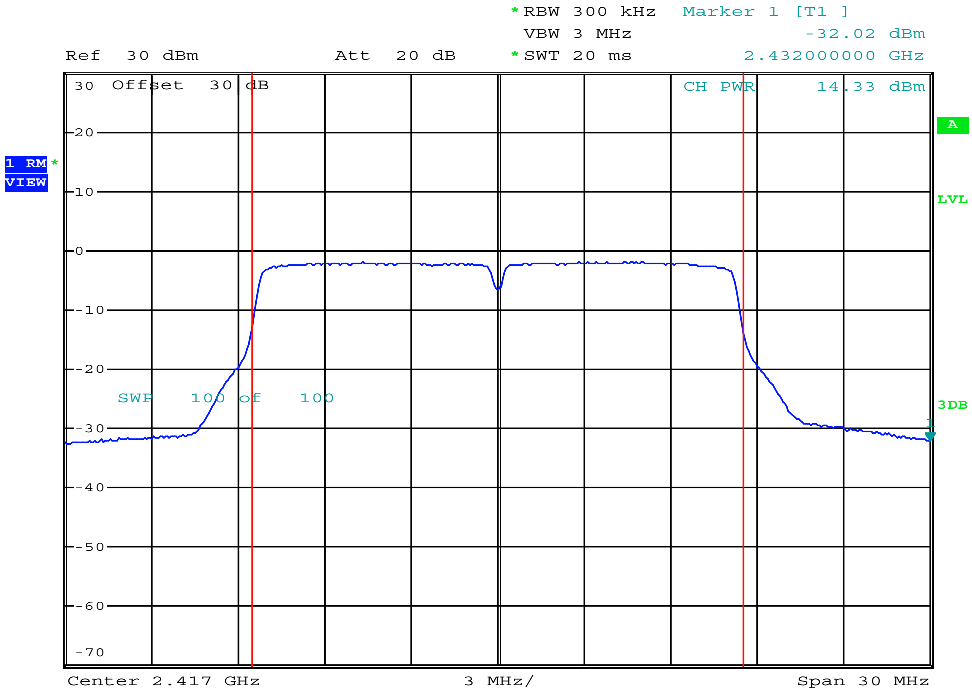
Conducted Power



Date: 2.DEC.2020 12:14:56

Channel Frequency:		
2417.00 MHz		
DUT Modulation:	Data Rate:	Measured Conducted Power:
OFDM	**12** Mbps	**14.36** dBm

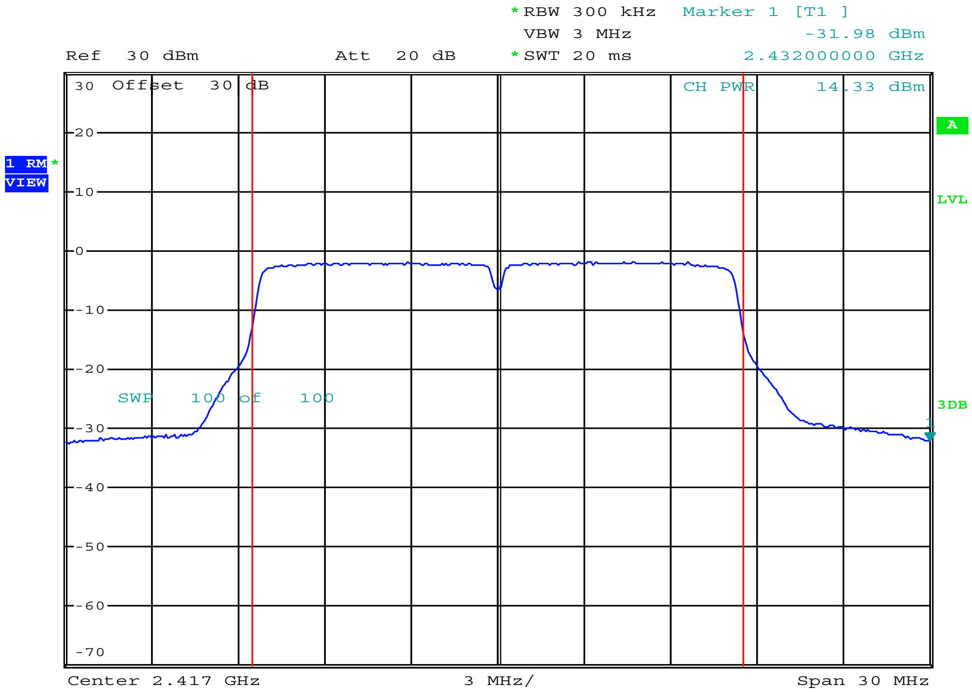
Conducted Power



Date: 2.DEC.2020 12:16:01

Channel Frequency:		
2417.00 MHz		
DUT Modulation: **OFDM**	Data Rate: **18** Mbps	Measured Conducted Power: **14.33** dBm

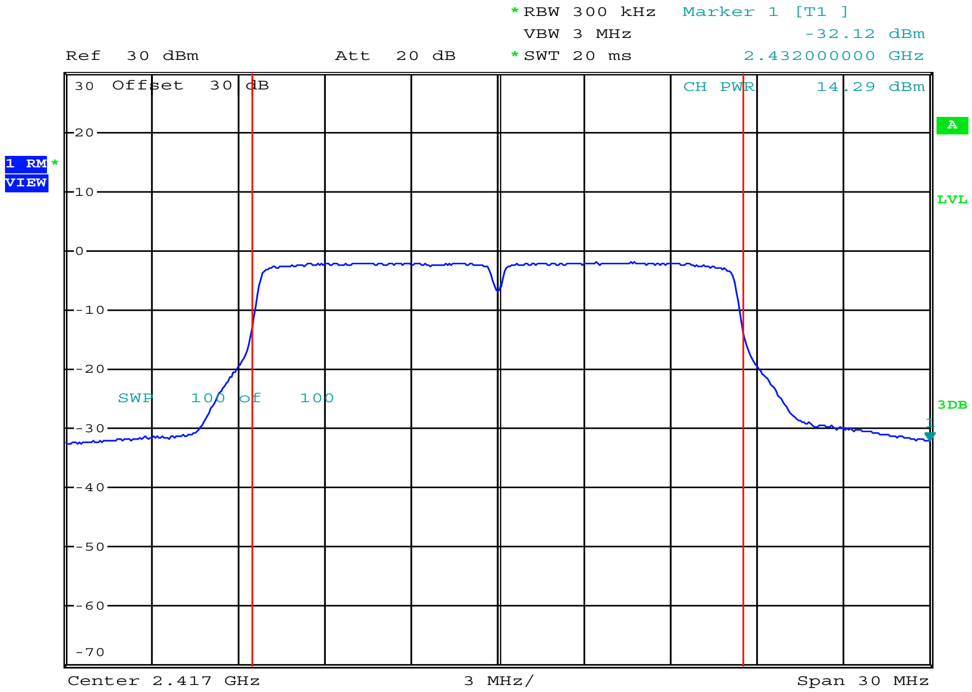
Conducted Power



Date: 2.DEC.2020 12:17:46

Channel Frequency:		
2417.00 MHz		
DUT Modulation:	Data Rate:	Measured Conducted Power:
OFDM	24 Mbps	14.33 dBm

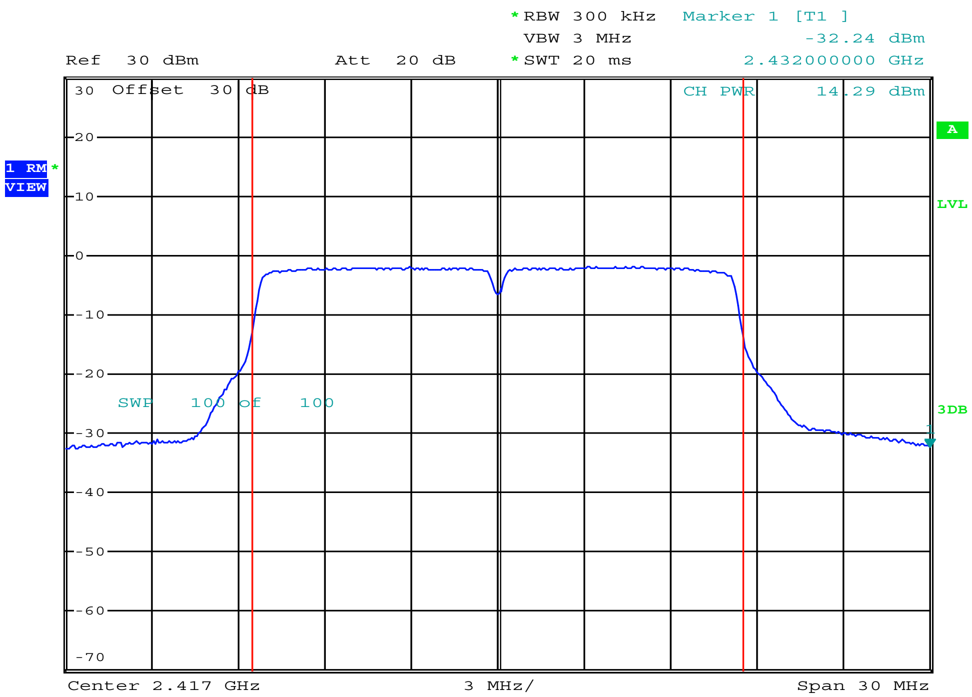
Conducted Power



Date: 2.DEC.2020 12:18:26

Channel Frequency:		
2417.00 MHz		
DUT Modulation: **OFDM**	Data Rate: **36** Mbps	Measured Conducted Power: **14.29** dBm

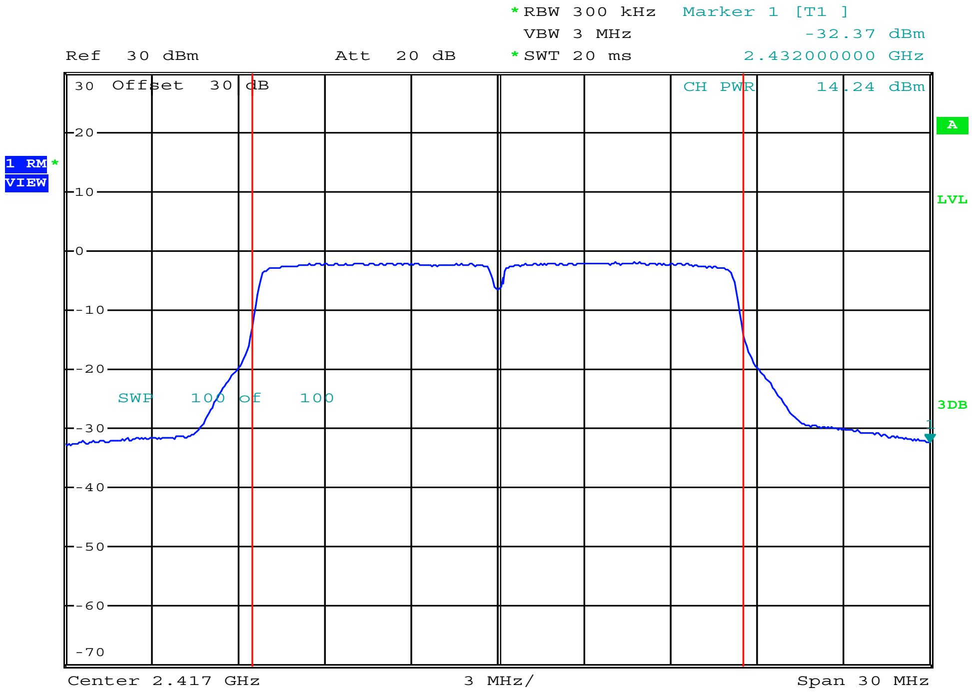
Conducted Power



Date: 2.DEC.2020 12:19:02

Channel Frequency: **2417.00** MHz		
DUT Modulation: **OFDM**	Data Rate: **48** Mbps	Measured Conducted Power: **14.29** dBm

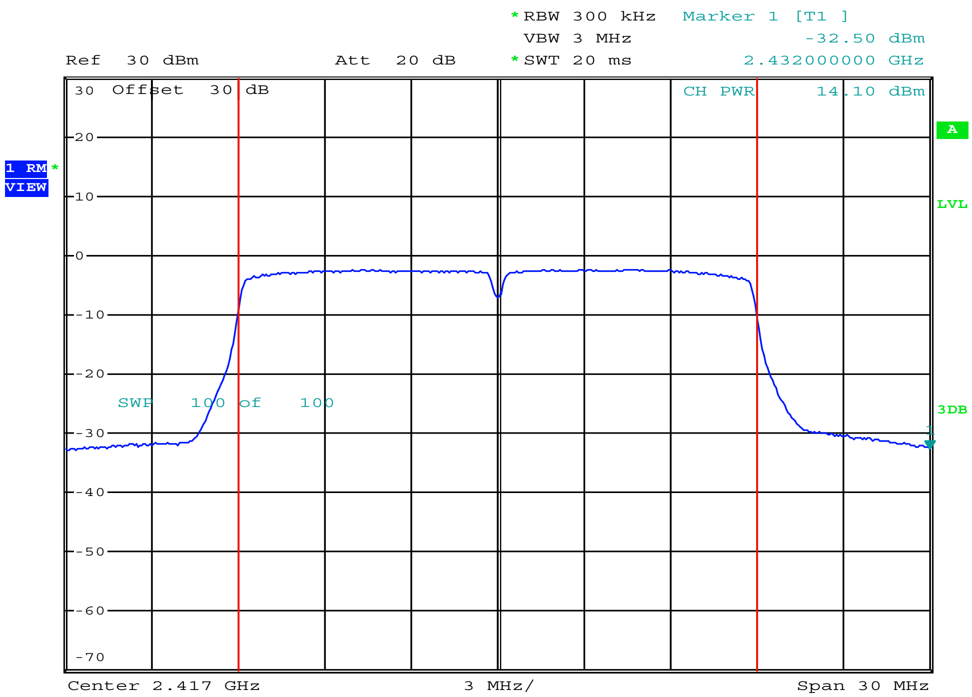
Conducted Power



Date: 2.DEC.2020 12:19:39

Channel Frequency:		
2417.00 MHz		
DUT Modulation: **OFDM**	Data Rate: **54** Mbps	Measured Conducted Power: **14.24** dBm

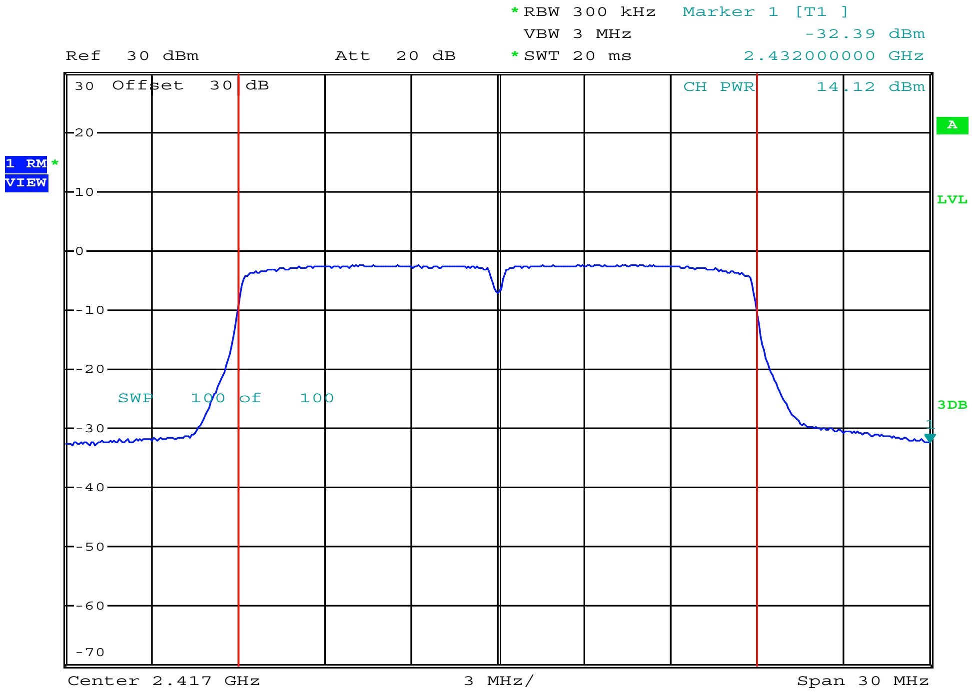
Conducted Power



Date: 2.DEC.2020 12:45:46

Channel Frequency:		
2417.00 MHz		
DUT Modulation: **MCS0**	Data Rate: **-** Mbps	Measured Conducted Power: **14.10** dBm

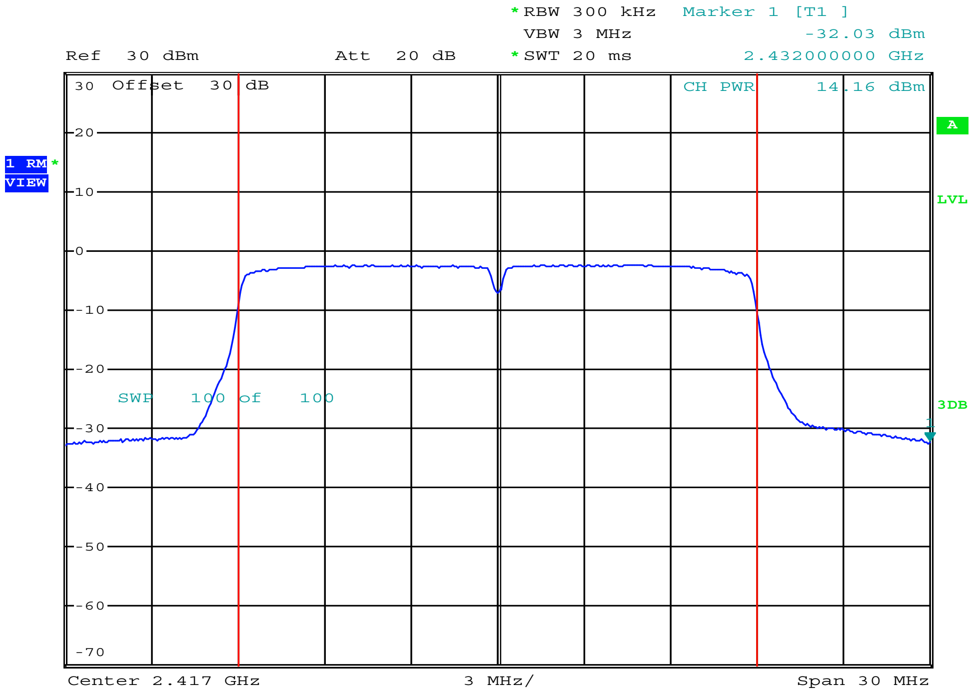
Conducted Power



Date: 2.DEC.2020 12:46:24

Channel Frequency: **2417.00** MHz		
DUT Modulation: **MCS3**	Data Rate: **-** Mbps	Measured Conducted Power: **14.12** dBm

Conducted Power



Date: 2.DEC.2020 12:47:04

Channel Frequency:		
2417.00 MHz		
DUT Modulation:	Data Rate:	Measured Conducted Power:
MCS7	**-** Mbps	**14.16** dBm

Appendix F - Conducted Power Measurement Plots (DSS)

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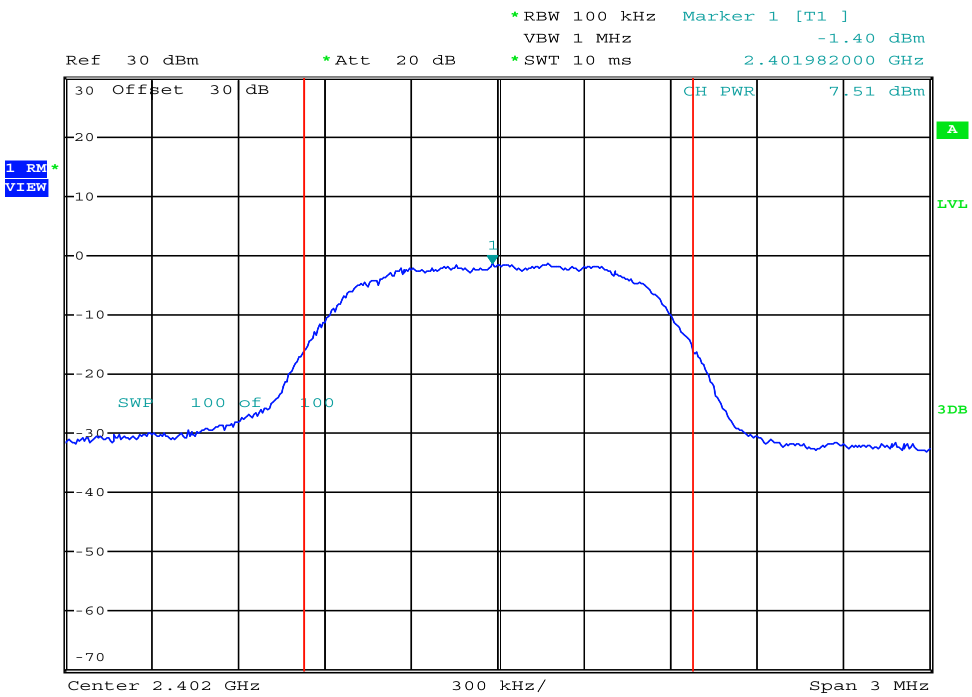
Conducted Power Measurement Results - DSS										
Frequency (MHz)	Modulation	Bit Rate (Mbps)	Measured Power [P_{Meas}] (dBm)	Conducted Limit [P_{Lim}] (dBm)	Conducted Margin (dB)	Antenna Gain* (dBi)	EIRP [E_{Meas}] (dBm)	EIRP Limit [E_{Lim}] (dBm)	EIRP Margin (dB)	Result
2402.00	P1/4-DQPSK	2.0	7.51	30	22.490	0.6	8.11	36	27.890	Complies
2442.00	P1/4-DQPSK	2.0	7.23	30	22.770	0.6	7.83	36	28.170	Complies
2480.00	P1/4-DQPSK	2.0	6.51	30	23.490	0.6	7.11	36	28.890	Complies
2402.00	8-DPSK	3.0	7.52	30	22.480	0.6	8.12	36	27.880	Complies
2442.00	8-DPSK	3.0	7.24	30	22.760	0.6	7.84	36	28.160	Complies
2480.00	8-DPSK	3.0	6.49	30	23.510	0.6	7.09	36	28.910	Complies

Conducted Margin = P_{Limit} - P_{Meas}

EIRP Margin = E_{Limit} - E_{Meas}

* Antenna Gain information provided by applicant.

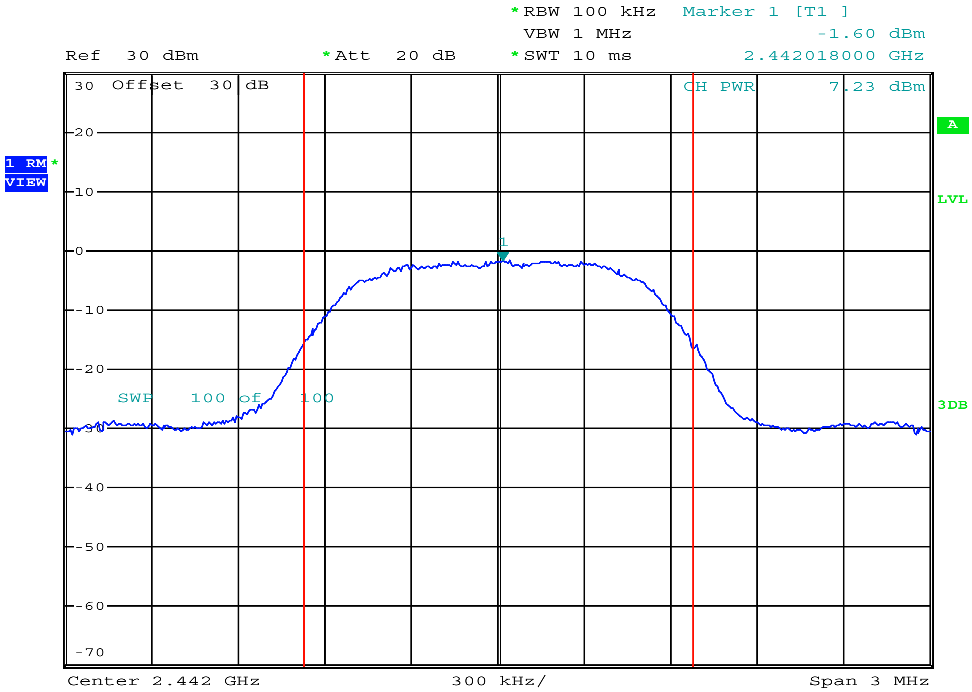
Conducted Power



Date: 2.DEC.2020 15:45:19

Channel Frequency:		
2402.00 MHz		
DUT Modulation:	Data Rate:	Measured Conducted Power:
P1/4-DQPSK	**2** Mbps	**7.51** dBm

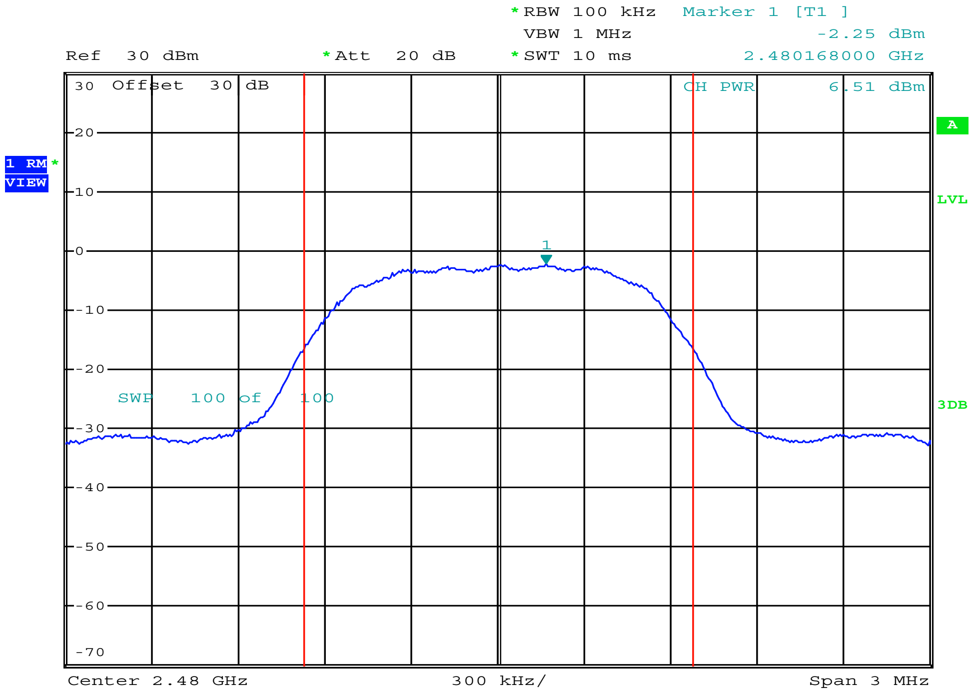
Conducted Power



Date: 2.DEC.2020 15:44:18

Channel Frequency:		
2442.00 MHz		
DUT Modulation:	Data Rate:	Measured Conducted Power:
P1/4-DQPSK	**2** Mbps	**7.23** dBm

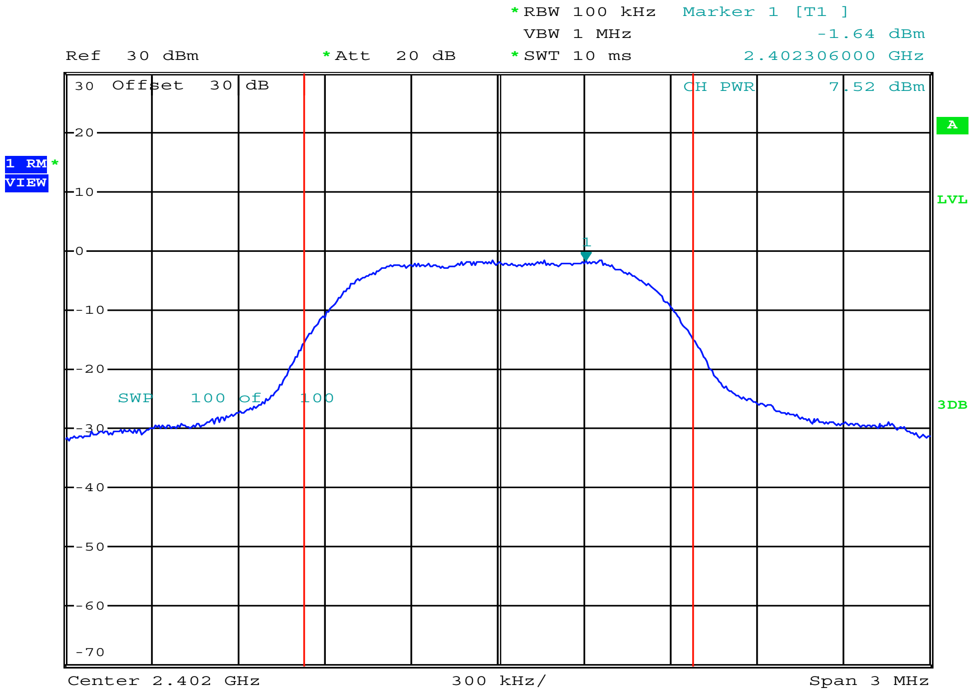
Conducted Power



Date: 2.DEC.2020 15:43:15

Channel Frequency:		
2480.00 MHz		
DUT Modulation:	Data Rate:	Measured Conducted Power:
P1/4-DQPSK	**2** Mbps	**6.51** dBm

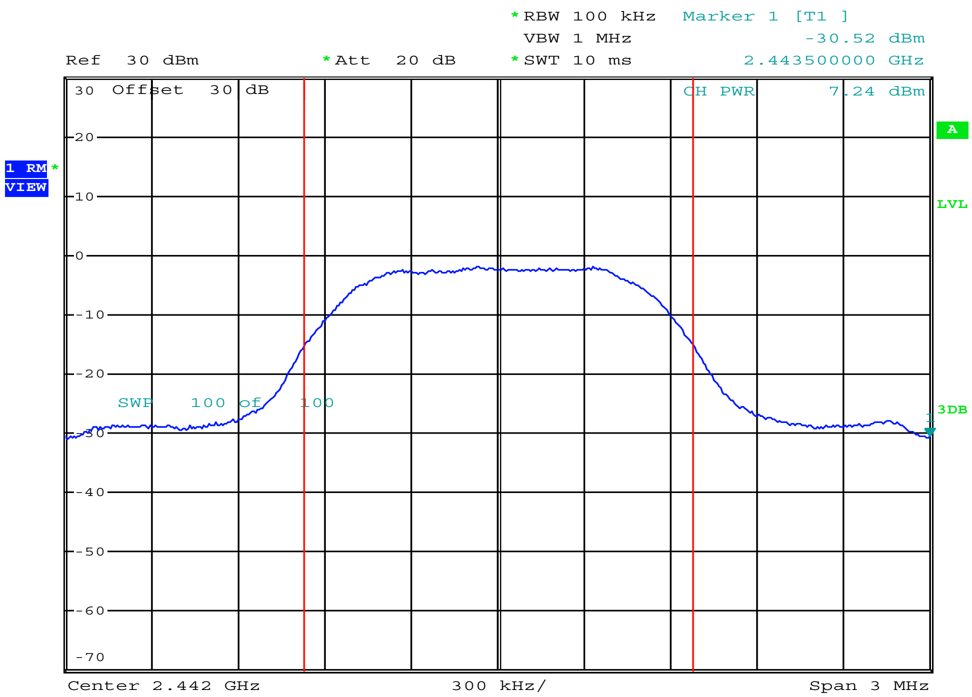
Conducted Power



Date: 2.DEC.2020 15:41:45

Channel Frequency:		
2402.00 MHz		
DUT Modulation:	Data Rate:	Measured Conducted Power:
8-DPSK	**3** Mbps	**7.52** dBm

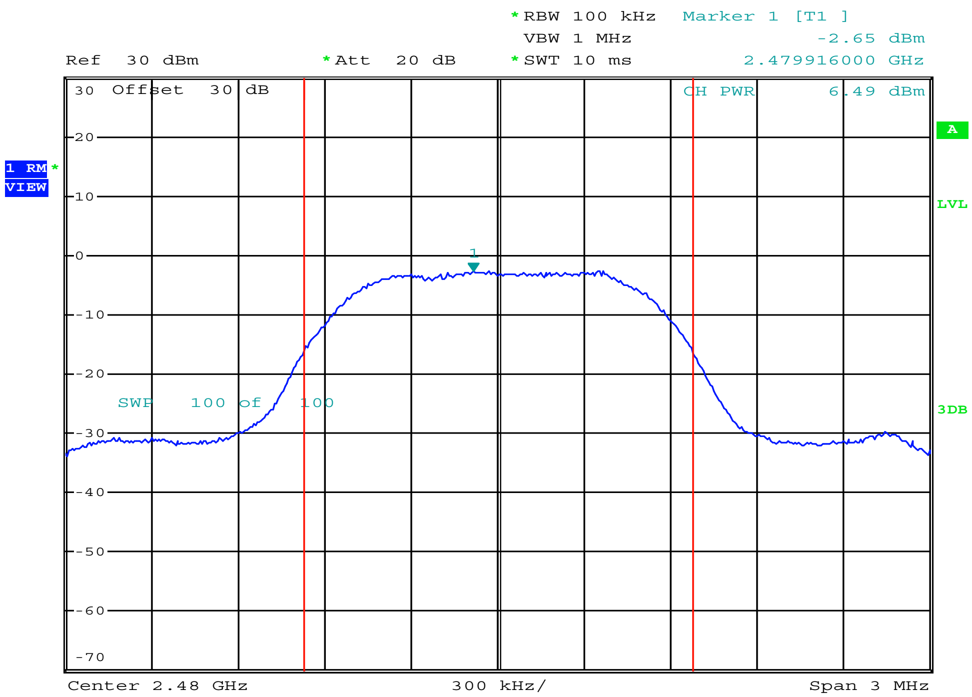
Conducted Power



Date: 2.DEC.2020 15:40:51

Channel Frequency:		
2442.00 MHz		
DUT Modulation:	Data Rate:	Measured Conducted Power:
8-DPSK	**3** Mbps	**7.24** dBm

Conducted Power



Date: 2.DEC.2020 15:42:25

Channel Frequency: **2480.00** MHz		
DUT Modulation: **8-DPSK**	Data Rate: **3** Mbps	Measured Conducted Power: **6.49** dBm

Appendix G - Conducted Power Density Measurement Plots

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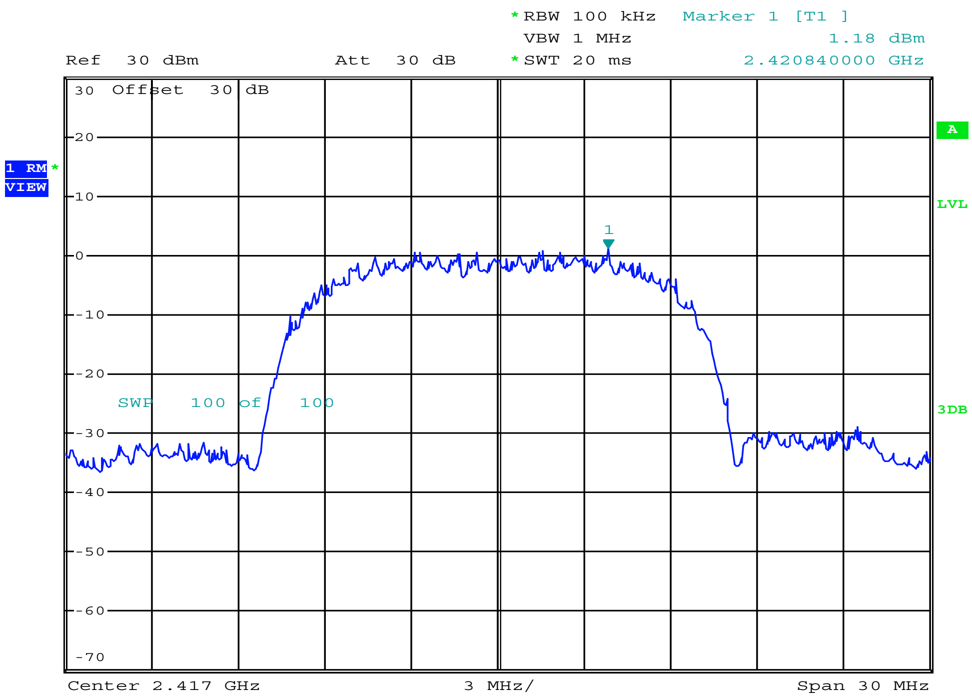
Power Spectral Density Measurement Results - DTS					
Frequency (MHz)	**Modulation**	**Bit Rate (Mbps)**	**Measured PSD [P_{Meas}] (dBm)**	**PSD Limit [P_{Lim}] (dBm)**	**Margin (dB)**
2417.00	DSSS	5.5	1.18	8	6.820
2417.00	OFDM	12.0	-6.24	8	14.240
2417.00	MCS7	-	-6.52	8	14.520
				RESULT:	**Complies**

Margin = P_{Limit} - P_{Meas}

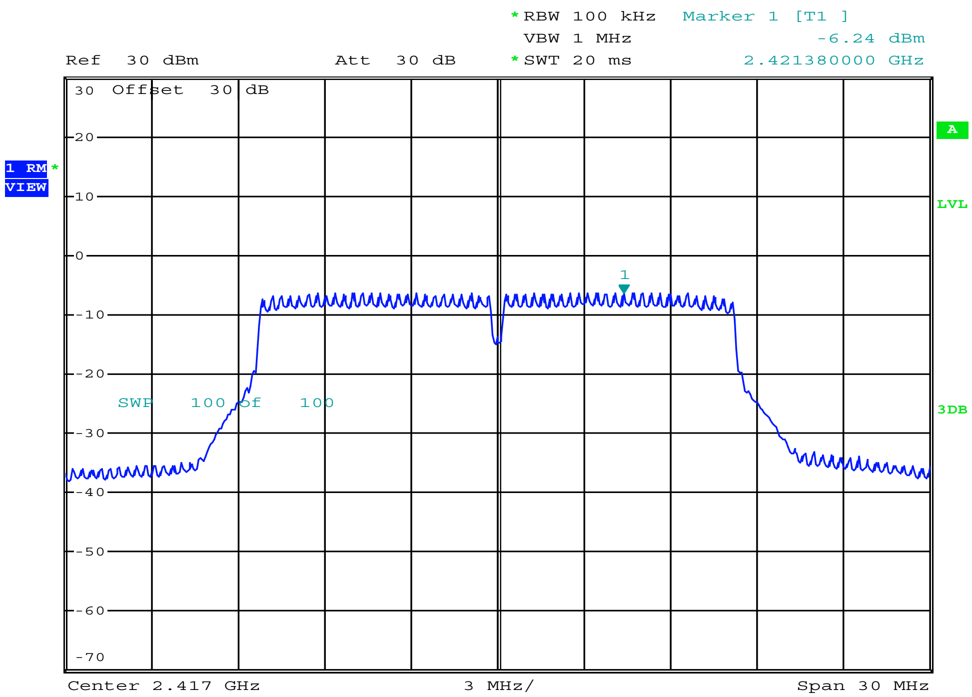
Power Spectral Density



Date: 2.DEC.2020 12:56:08

Channel Frequency:		
2417.00 MHz		
DUT Modulation: **DSSS**	Data Rate: **5.5** Mbps	Measured PSD: **1.18** dBm

Power Spectral Density



Date: 2.DEC.2020 12:54:57

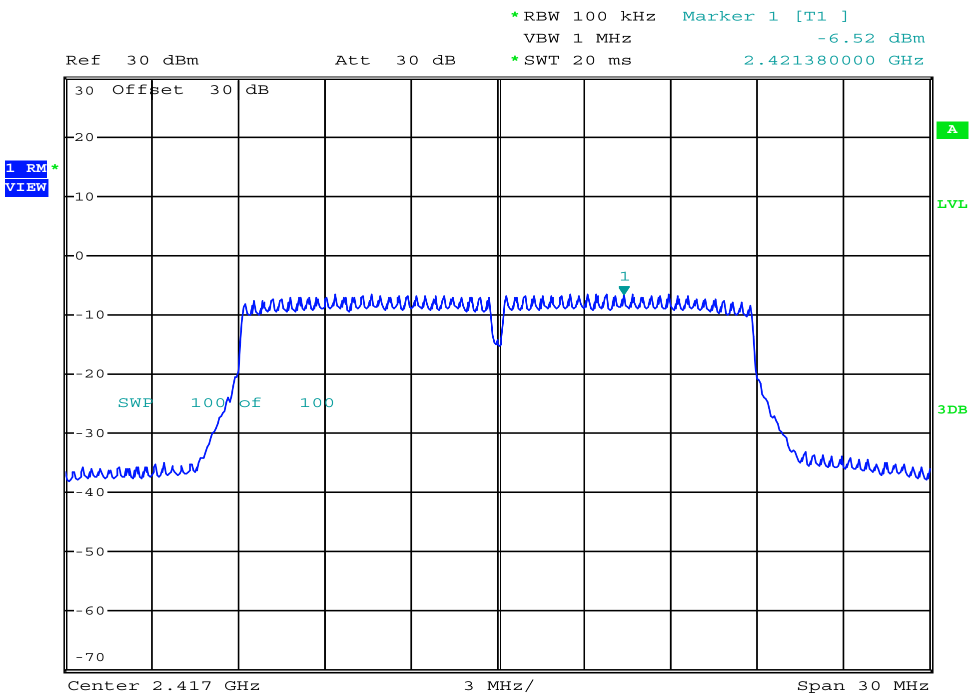
Channel Frequency: **2417.00** MHz

DUT Modulation: **OFDM**

Data Rate: **12** Mbps

Measured PSD: **-6.24** dBm

Power Spectral Density



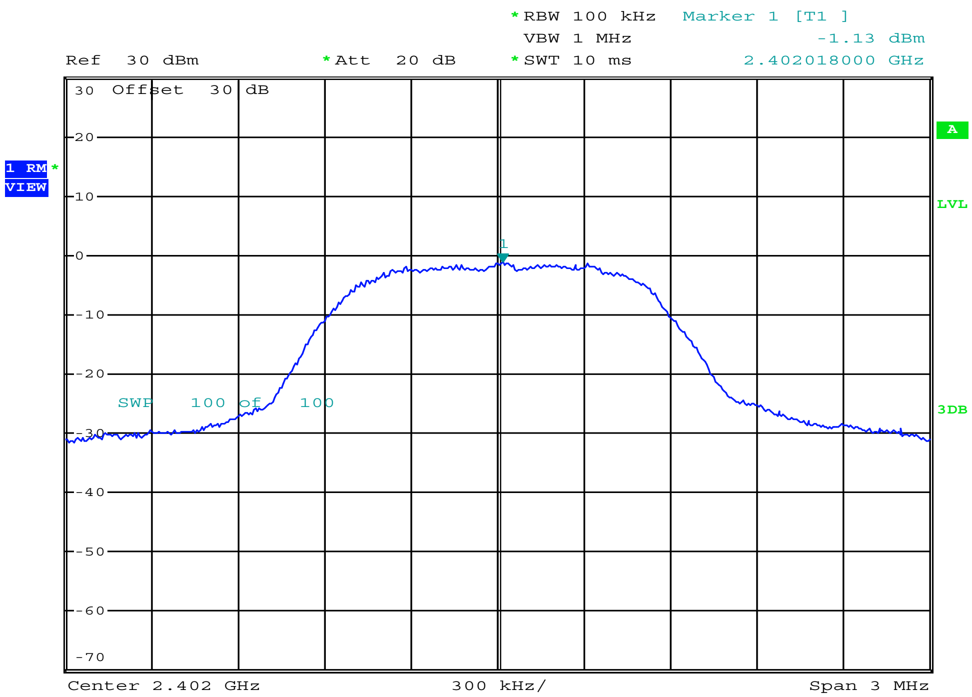
Date: 2.DEC.2020 12:53:41

Channel Frequency: **2417.00** MHz		
DUT Modulation: **MCS7**	Data Rate: **-** Mbps	Measured PSD: **-6.52** dBm

Power Spectral Density Measurement Results - DSS					
Frequency (MHz)	Modulation	Bit Rate (Mbps)	Measured PSD [P_{Meas}] (dBm)	PSD Limit [P_{Lim}] (dBm)	Margin (dB)
2402.00	Pi/4-DQPSK	2.0	-1.13	8	9.130
2442.00	Pi/4-DQPSK	2.0	-1.52	8	9.520
2480.00	Pi/4-DQPSK	2.0	-2.10	8	10.100
2402.00	8-DPSK	3.0	-1.26	8	9.260
2442.00	8-DPSK	3.0	-1.85	8	9.850
2480.00	8-DPSK	3.0	-2.52	8	10.520
				Result:	Complies

Margin = P_{Limit} - P_{Meas}

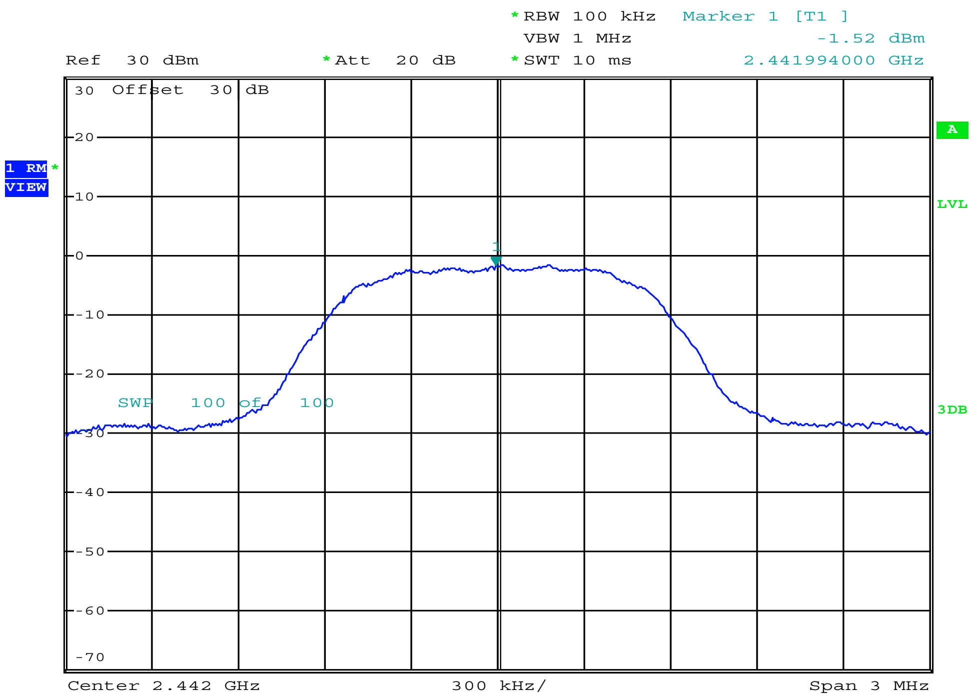
Power Spectral Density



Date: 2.DEC.2020 15:48:42

Channel Frequency: **2402.00** MHz		
DUT Modulation: **Pi/4-DQPSK**	Data Rate: **2** Mbps	Measured PSD: **-1.13** dBm

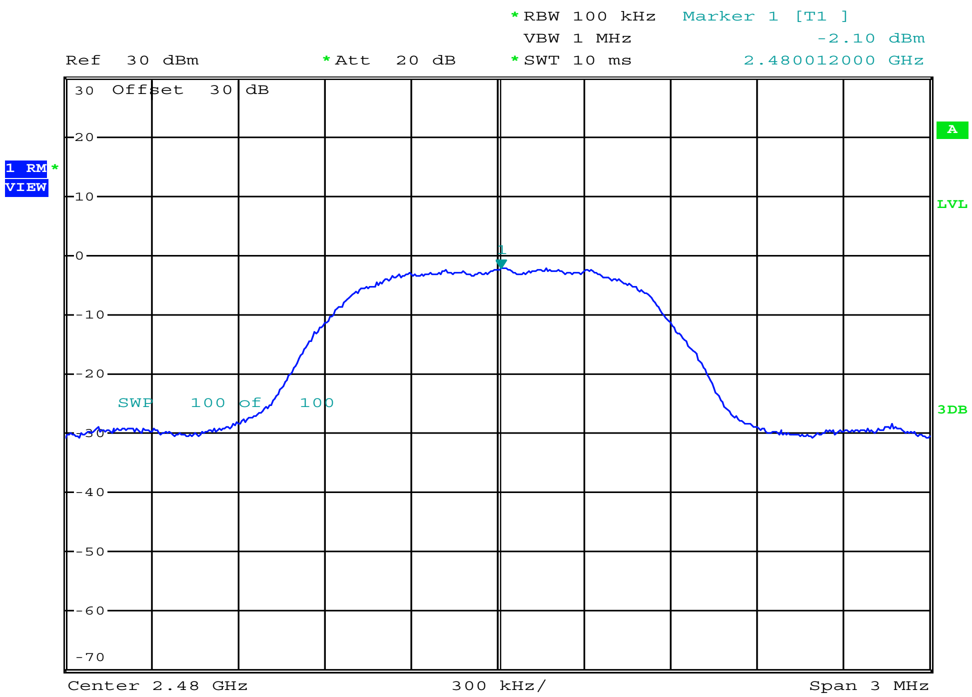
Power Spectral Density



Date: 2.DEC.2020 15:50:15

Channel Frequency:		
2442.00 MHz		
DUT Modulation:	Data Rate:	Measured PSD:
Pi/4-DQPSK	**2** Mbps	**-1.52** dBm

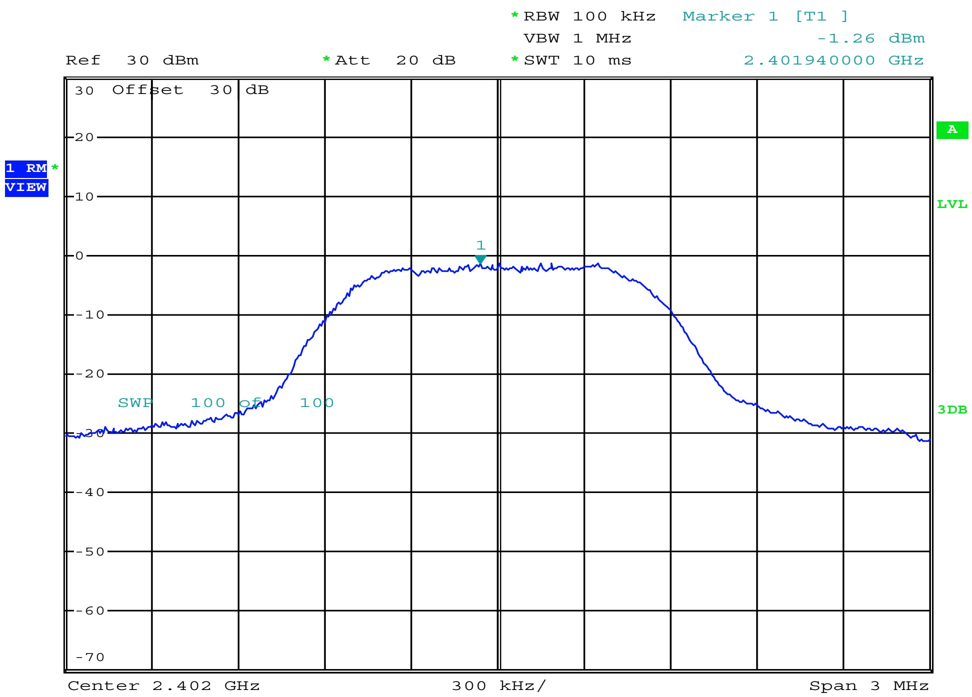
Power Spectral Density



Date: 2.DEC.2020 15:49:18

Channel Frequency:		
2480.00 MHz		
DUT Modulation:	Data Rate:	Measured PSD:
Pi/4-DQPSK	**2** Mbps	**-2.10** dBm

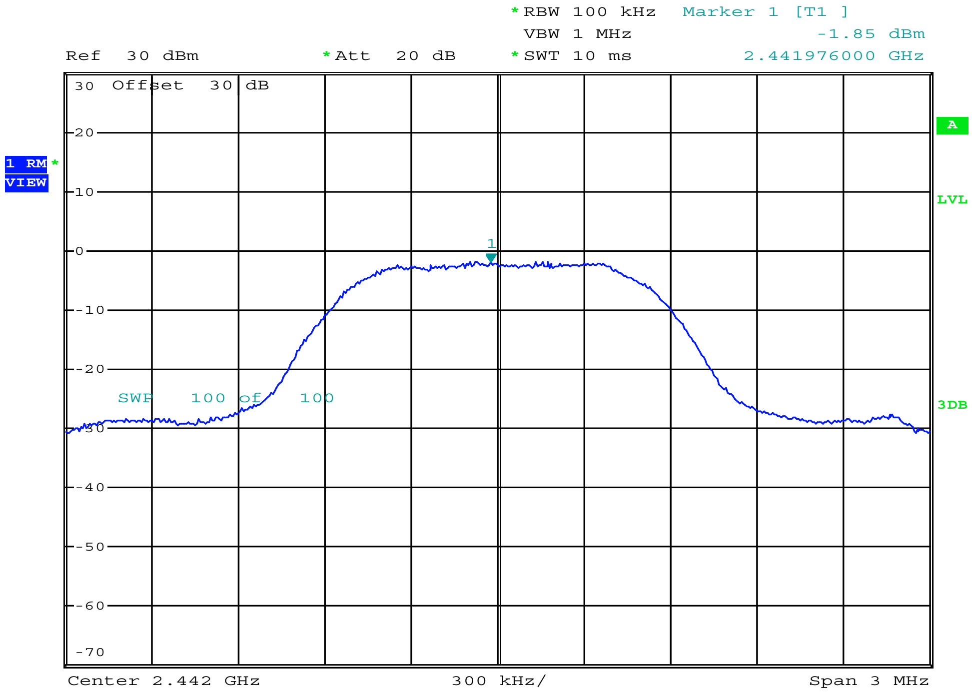
Power Spectral Density



Date: 2.DEC.2020 15:52:08

Channel Frequency:		
2402.00 MHz		
DUT Modulation:	Data Rate:	Measured PSD:
8-DPSK	**3** Mbps	**-1.26** dBm

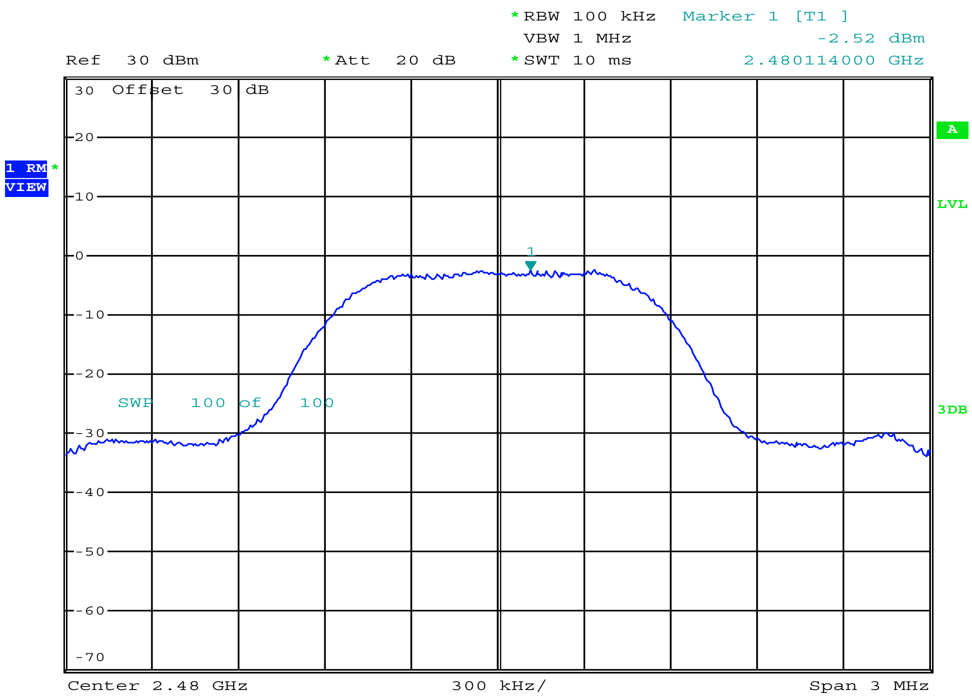
Power Spectral Density



Date: 2.DEC.2020 15:50:55

Channel Frequency: **2442.00** MHz		
DUT Modulation: **8-DPSK**	Data Rate: **3** Mbps	Measured PSD: **-1.85** dBm

Power Spectral Density



Date: 2.DEC.2020 15:52:50

Channel Frequency:		
2480.00 MHz		
DUT Modulation:	Data Rate:	Measured PSD:
8-DPSK	**3** Mbps	**-2.52** dBm

Test Report Serial Number:	**45461626 R1.0**
Test Report Date:	**4 December 2020**
Project Number:	**1510**

Appendix H - Conducted Tx Spurious Emissions Measurement Plots

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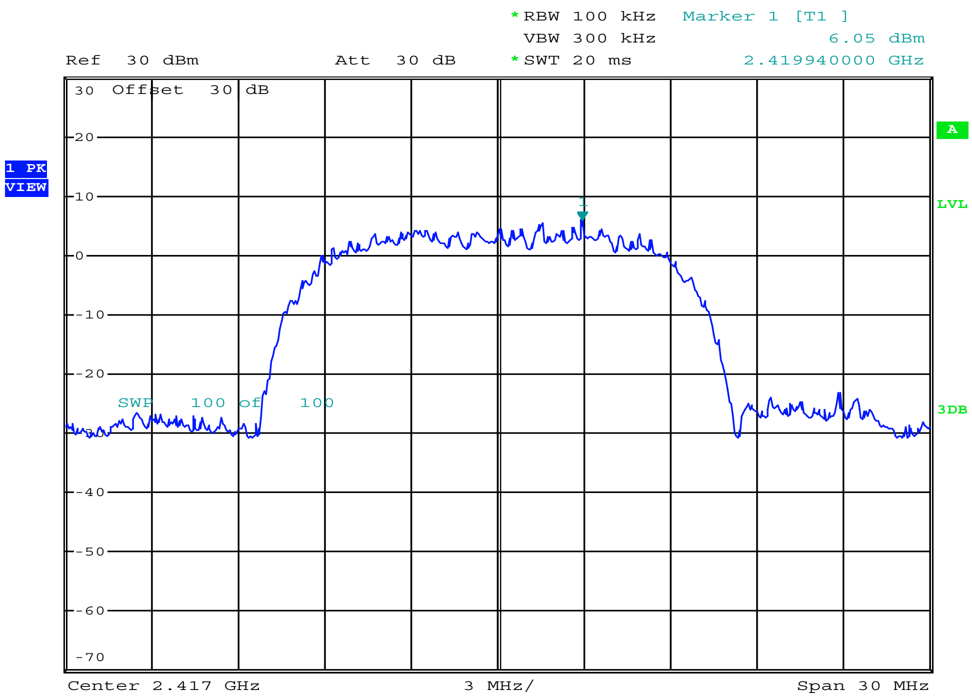
Conducted Spurious Emissions - Reference Measurement					
Frequency (MHz)	Modulation	Bit Rate (Mbps)	Measured PSD [P_{Meas}] (dBm)	Required Attenuation [A_R] (dB)	Limit Line [A_L] (dBm)
2412.00	DSSS	5.5	6.05	30	-23.950
2412.00	OFDM	12	0.98	30	-29.020
2412.00	MCS7	-	-1.02	30	-31.020

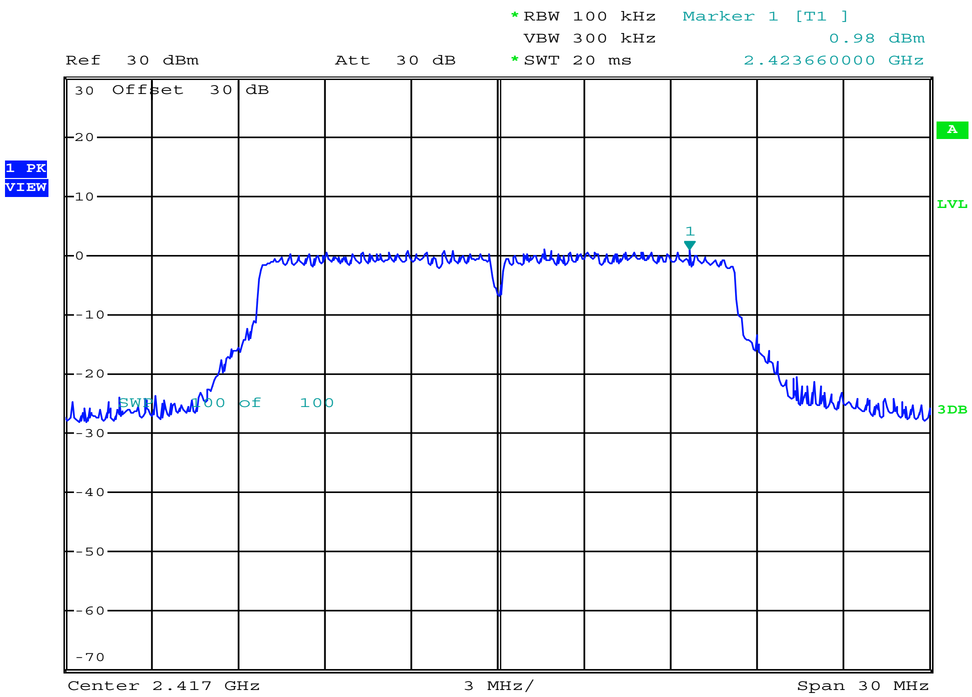
Power Spectral Density



Date: 2.DEC.2020 13:29:33

Channel Frequency: **2417.00** MHz		
DUT Modulation: **DSSS**	Data Rate: **5.5** Mbps	Measured PSD: **6.05** dBm

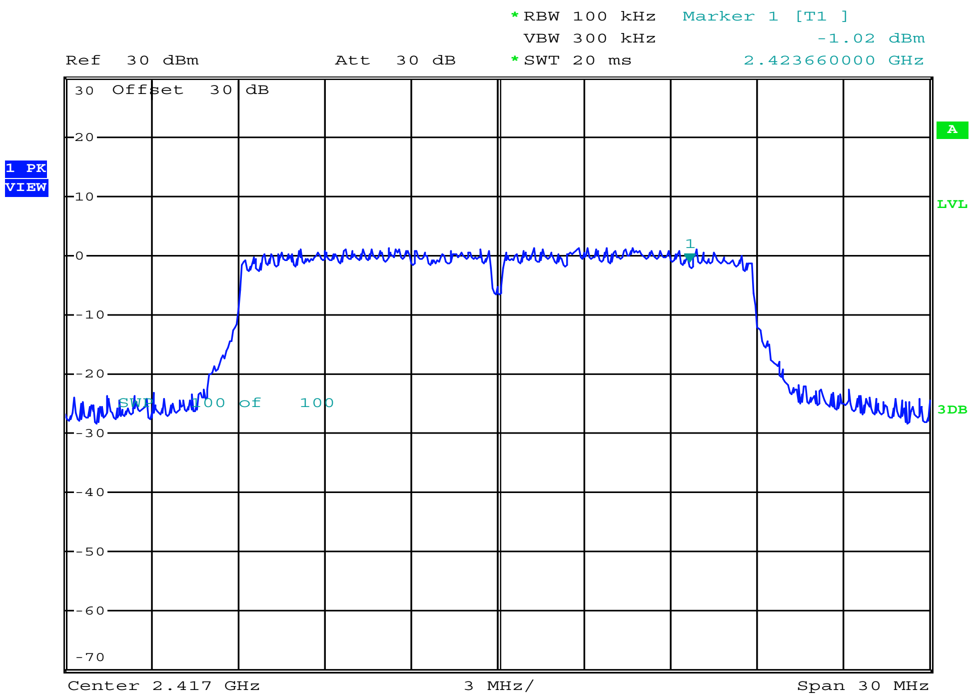
Power Spectral Density



Date: 2.DEC.2020 13:31:48

Channel Frequency:		
2417.00 MHz		
DUT Modulation: **OFDM**	Data Rate: **12** Mbps	Measured PSD: **0.98** dBm

Power Spectral Density



Date: 2.DEC.2020 13:33:11

Channel Frequency:		
2417.00 MHz		
DUT Modulation:	Data Rate:	Measured PSD:
MCS7	**-** Mbps	**-1.02** dBm

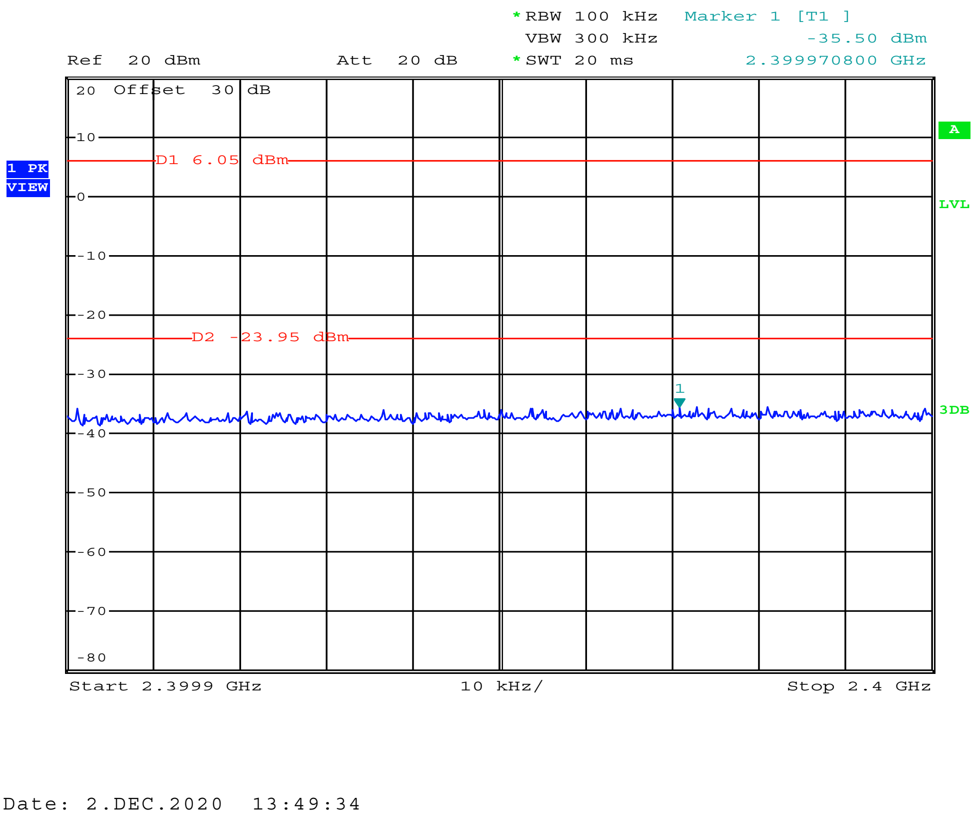
Emission Level Measurement - Band Edge

Channel Frequency (MHz)	Modulation	Bit Rate (mbps)	Measured Emission [E_{Meas}] (dBm)	Emission Frequency (MHz)	Limit Line [A_L] (dBm)	Margin (dB)
2412	DSSS	5.5	-35.50	2.399	-23.95	**11.55**
2412	OFDM	12	-33.35	2.399		**9.40**
2412	MCS7	-	-33.04	2.399		**9.09**
2462	DSSS	5.5	-41.09	2.483		**17.14**
2462	OFDM	12	-38.79	2.483		**14.84**
2462	MCS7	-	-37.89	2.483		**13.94**
Results:					**Complies**	

Margin = A_L - E_{MEAS}

Limit Line = Measured PSD - Required Attenuation

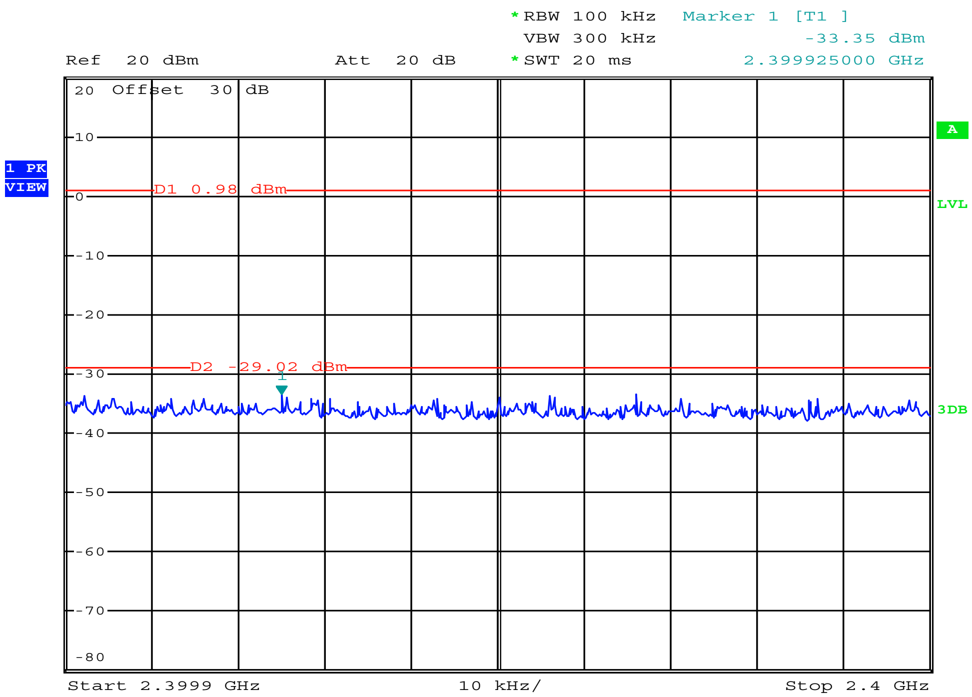
Conducted Spurious Emissions - Lower Band Edge



Channel Frequency:	Data Rate:	Emission Frequency:
2412.00 MHz	**5.5** Mbps	**2.399** MHz

DUT Modulation:	Measured Emission:
DSSS	**-35.50** dBm

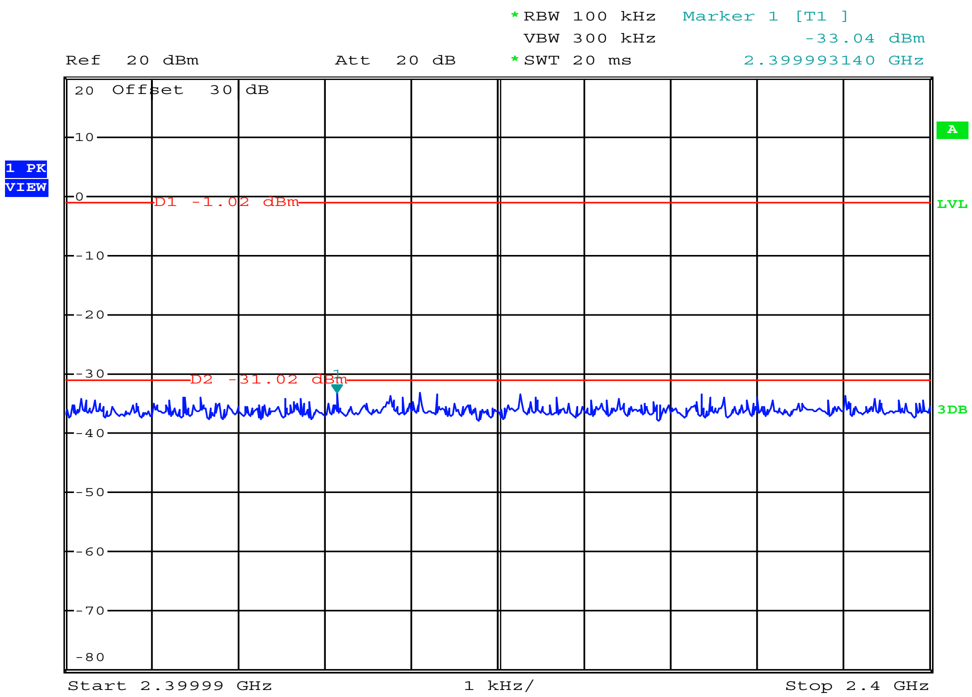
Conducted Spurious Emissions - Lower Band Edge



Date: 2.DEC.2020 13:48:02

Channel Frequency:	Data Rate:	Emission Frequency:
2412.00 MHz		**2.399** MHz
DUT Modulation: **OFDM**	**12** Mbps	Measured Emission: **-33.35** dBm

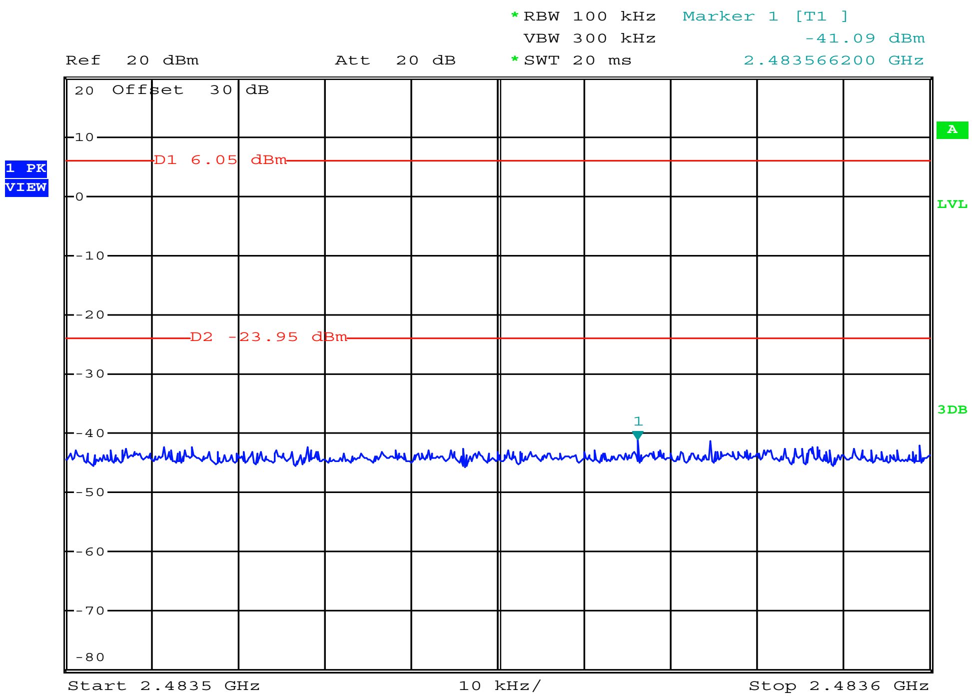
Conducted Spurious Emissions - Lower Band Edge



Date: 2.DEC.2020 13:42:05

Channel Frequency:	Data Rate:	Emission Frequency:
2412.00 MHz		**2.399** MHz
DUT Modulation: **MCS7**	**-** Mbps	Measured Emission: **-33.04** dBm

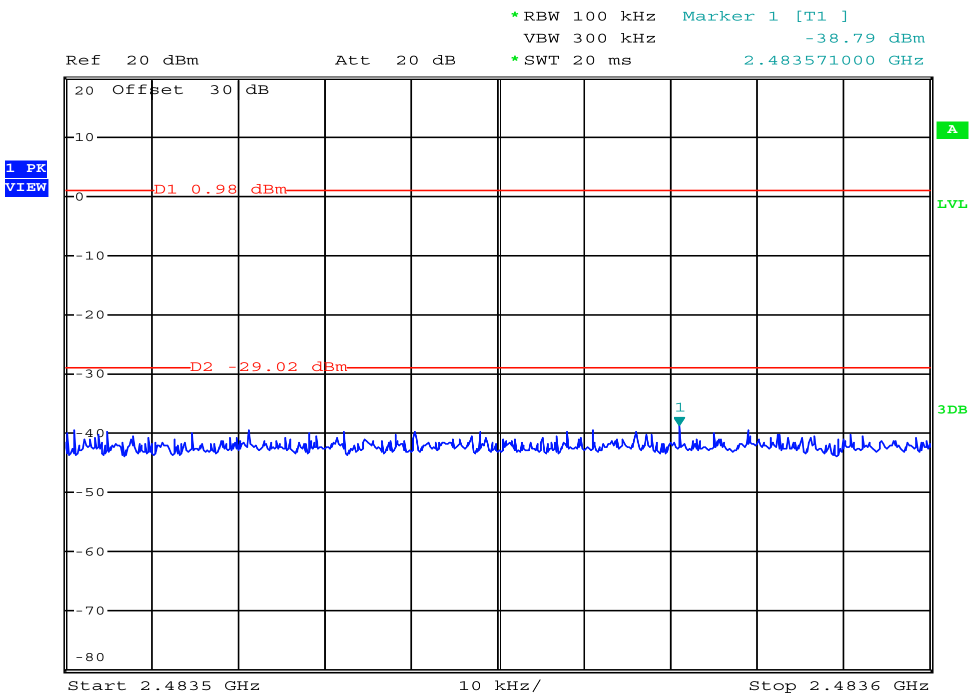
Conducted Spurious Emissions - Upper Band Edge



Date: 2.DEC.2020 13:51:16

Channel Frequency: **2462.00** MHz		Emission Frequency: **2.483** MHz
DUT Modulation: **DSSS**	Data Rate: **5.5** Mbps	Measured Emission: **-41.09** dBm

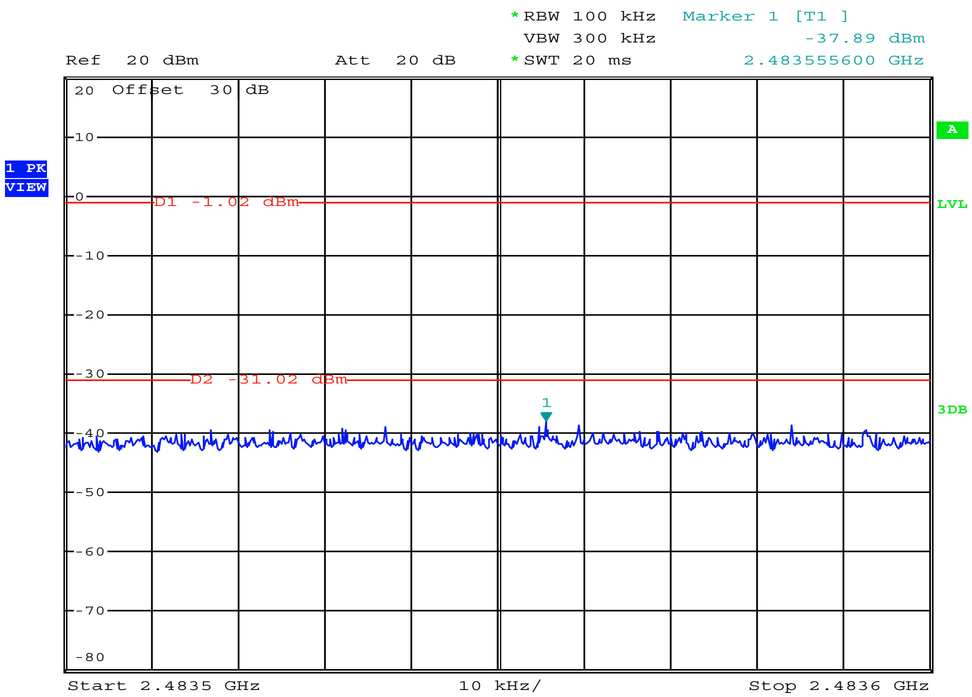
Conducted Spurious Emissions - Upper Band Edge



Date: 2.DEC.2020 13:46:59

Channel Frequency: **2462.00** MHz		Emission Frequency: **2.483** MHz
DUT Modulation: **OFDM**	Data Rate: **12** Mbps	Measured Emission: **-38.79** dBm

Conducted Spurious Emissions - Upper Band Edge



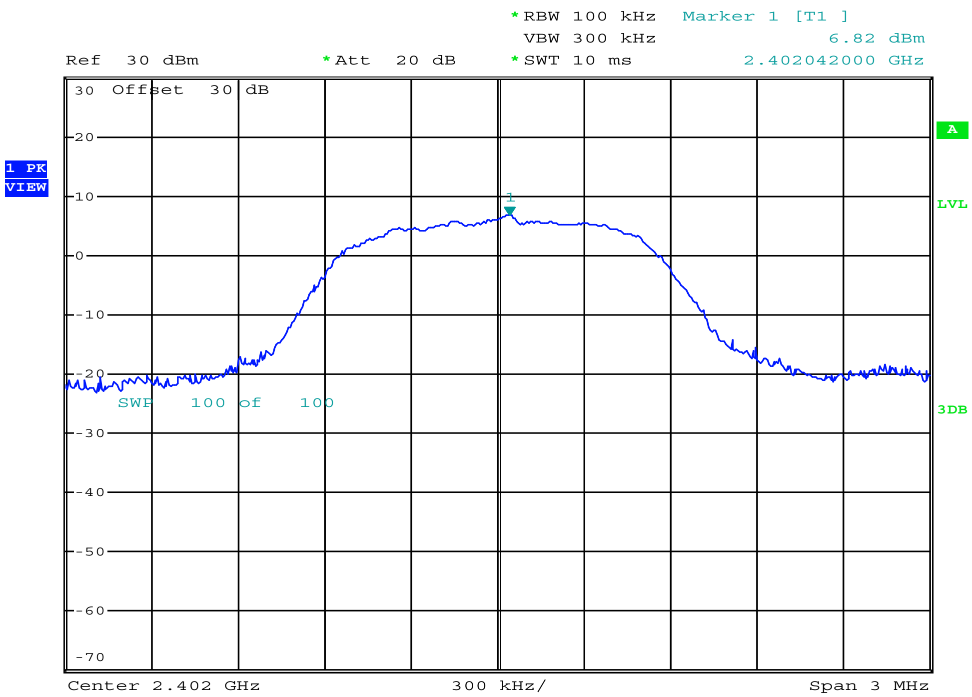
Date: 2.DEC.2020 13:44:34

Channel Frequency: **2462.00** MHz		Emission Frequency: **2.483** MHz
DUT Modulation: **MCS7**	Data Rate: **-** Mbps	Measured Emission: **-37.89** dBm

Conducted Spurious Emissions - Reference Measurement					
Frequency (MHz)	Modulation	Bit Rate (Mbps)	Measured PSD [P_{Meas}] (dBm)	Required Attenulation [A_R] (dB)	Limit Line [A_L] (dBm)
2402.00	Pi/4-DQPSK	2	6.82	30	-23.18
2442.00			6.62	30	-23.38
2480.00			5.73	30	-24.27

Limit Line = Measured PSD - Required Attenuation

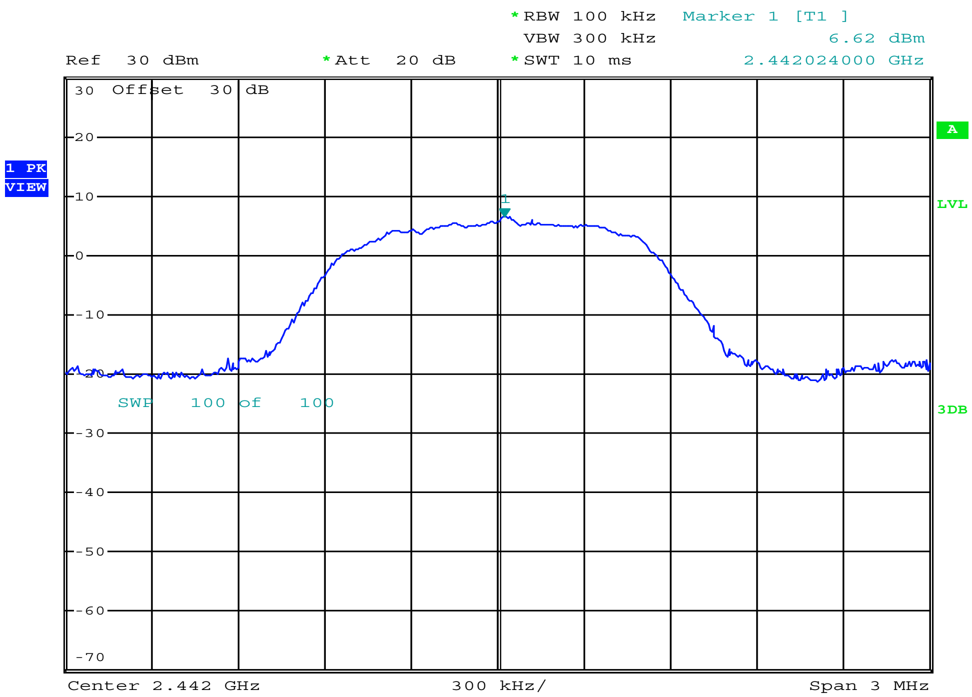
Power Spectral Density



Date: 2.DEC.2020 16:01:01

Channel Frequency:		
2402.00 MHz		
DUT Modulation:	Data Rate:	Measured PSD:
Pi/4-DQPSK	**2** Mbps	**6.82** dBm

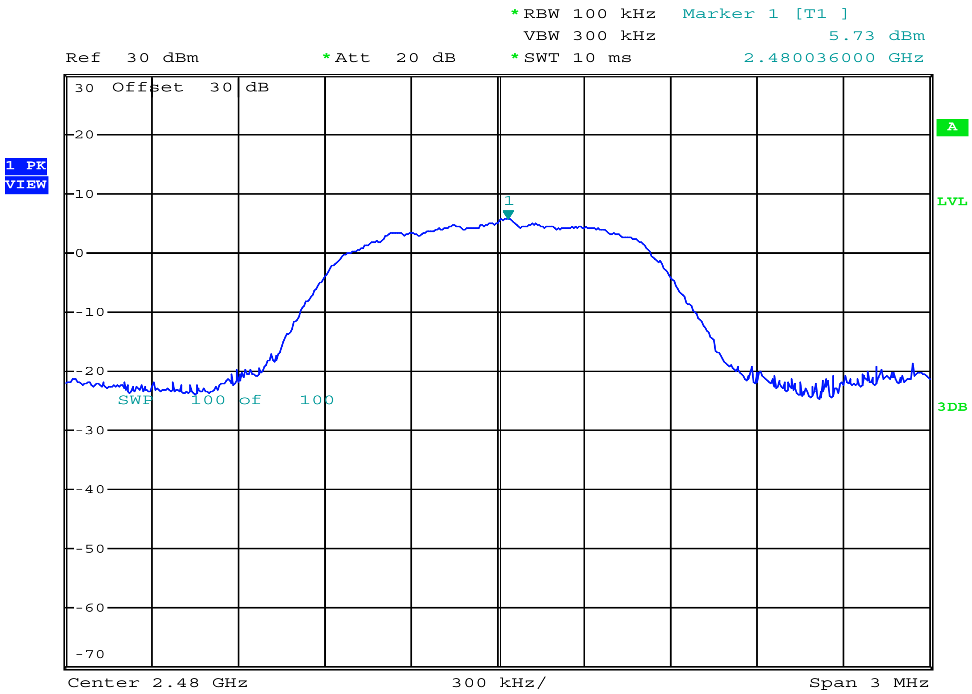
Power Spectral Density



Date: 2.DEC.2020 16:02:45

Channel Frequency:		
2442.00 MHz		
DUT Modulation: **Pi/4-DQPSK**	Data Rate: **2** Mbps	Measured PSD: **6.62** dBm

Power Spectral Density



Date: 2.DEC.2020 16:01:46

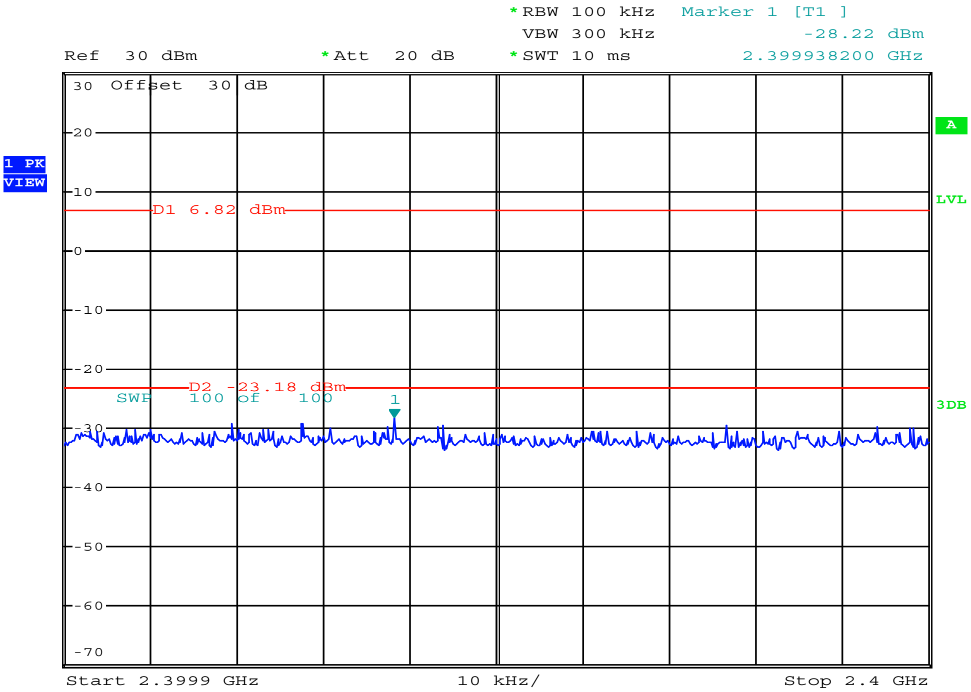
Channel Frequency: **2408.00** MHz		
DUT Modulation: **Pi/4-DQPSK**	Data Rate: **2** Mbps	Measured PSD: **5.73** dBm

Emission Level Measurement - Band Edge

Channel Frequency (MHz)	Modulation	Bit Rate (mbps)	Measured Emission $[E_{Meas}]$ (dBm)	Emission Frequency (MHz)	Limit Line $[A_L]$ (dBm)	Margin (dB)
2402	Pi/4-DQPSK	2	-28.22	2.399	-23.18	**5.04**
2480	Pi/4-DQPSK	2	-34.31	2.483		**11.13**
				Results:	**Complies**	

Margin = A_L - E_{MEAS}

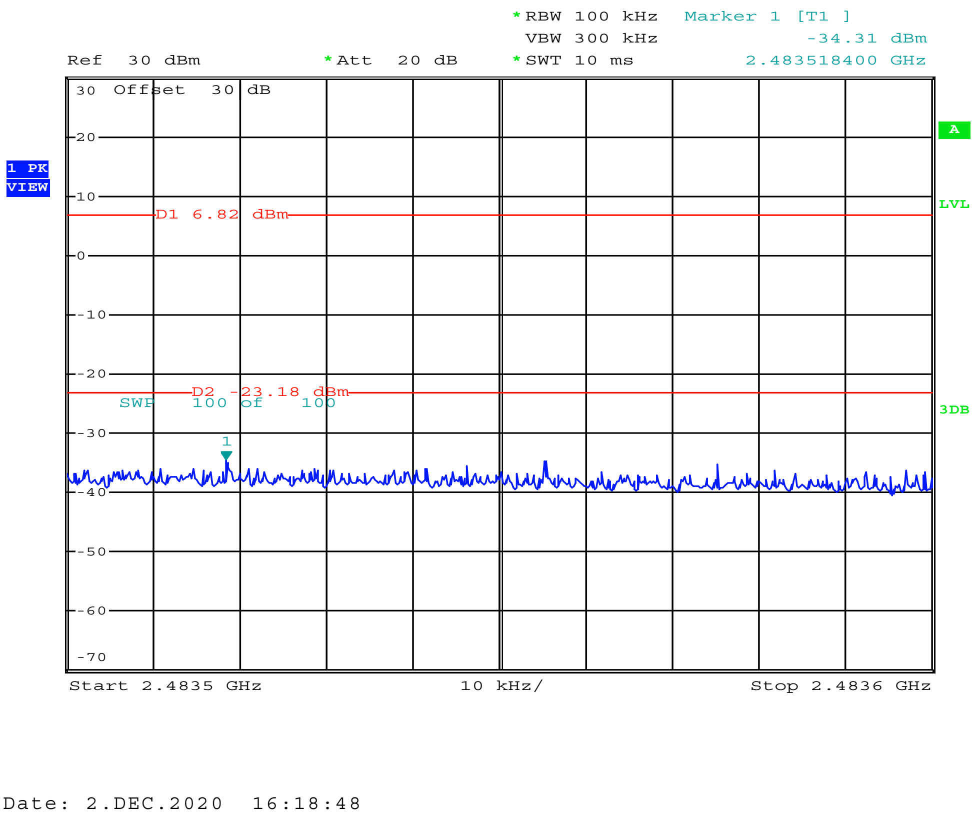
Conducted Spurious Emissions - Lower Band Edge



Date: 2.DEC.2020 16:17:45

Channel Frequency: **2402.00** MHz		Emission Frequency: **2.399** MHz
DUT Modulation: **Pi/4-DQPSK**	Data Rate: **2** Mbps	Measured Emission: **-28.22** dBm

Conducted Spurious Emissions - Upper Band Edge



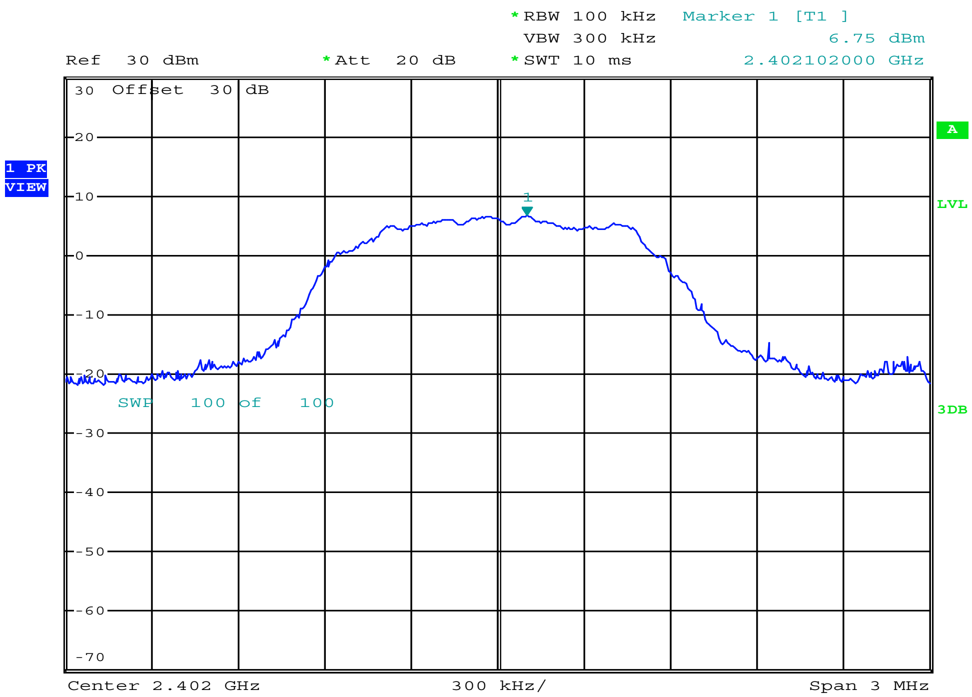
Channel Frequency:	Emission Frequency:
2480.00 MHz	**2.483** MHz

DUT Modulation:	Data Rate:	Measured Emission:
Pi/4-DQPSK	**2** Mbps	**-34.31** dBm

Conducted Spurious Emissions - Reference Measurement					
Frequency (MHz)	Modulation	Bit Rate (Mbps)	Measured PSD [P_{Meas}] (dBm)	Required Attenuation [A_R] (dB)	Limit Line [A_L] (dBm)
2402.00	8-DPSK	3	6.75	30	-23.25
2442.00			6.50	30	-23.50
2480.00			5.94	30	-24.06

Limit Line = Measured PSD - Required Attenuation

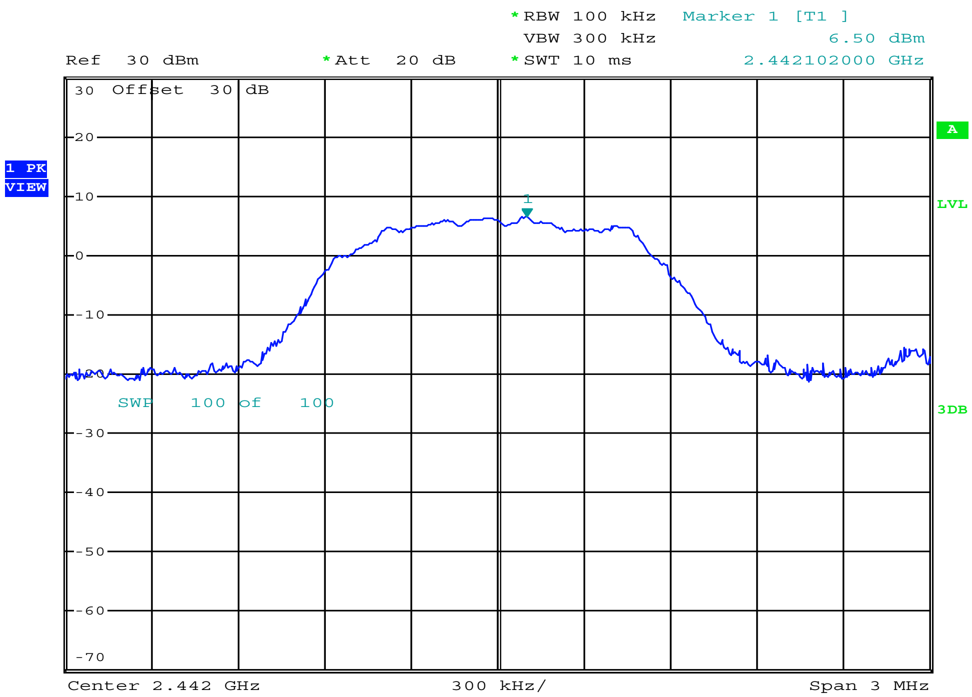
Power Spectral Density



Date: 2.DEC.2020 15:59:25

Channel Frequency: **2402.00** MHz		
DUT Modulation: **8-DPSK**	Data Rate: **3** Mbps	Measured PSD: **6.75** dBm

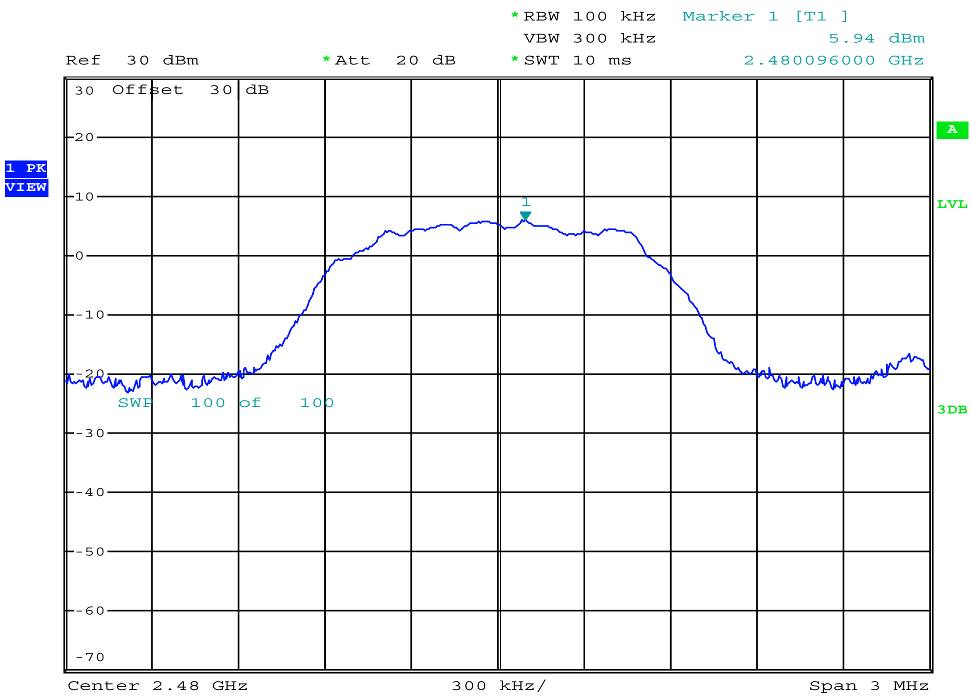
Power Spectral Density



Date: 2.DEC.2020 15:58:32

Channel Frequency:		
2442.00 MHz		
DUT Modulation:	Data Rate:	Measured PSD:
8-DPSK	**3** Mbps	**6.50** dBm

Power Spectral Density



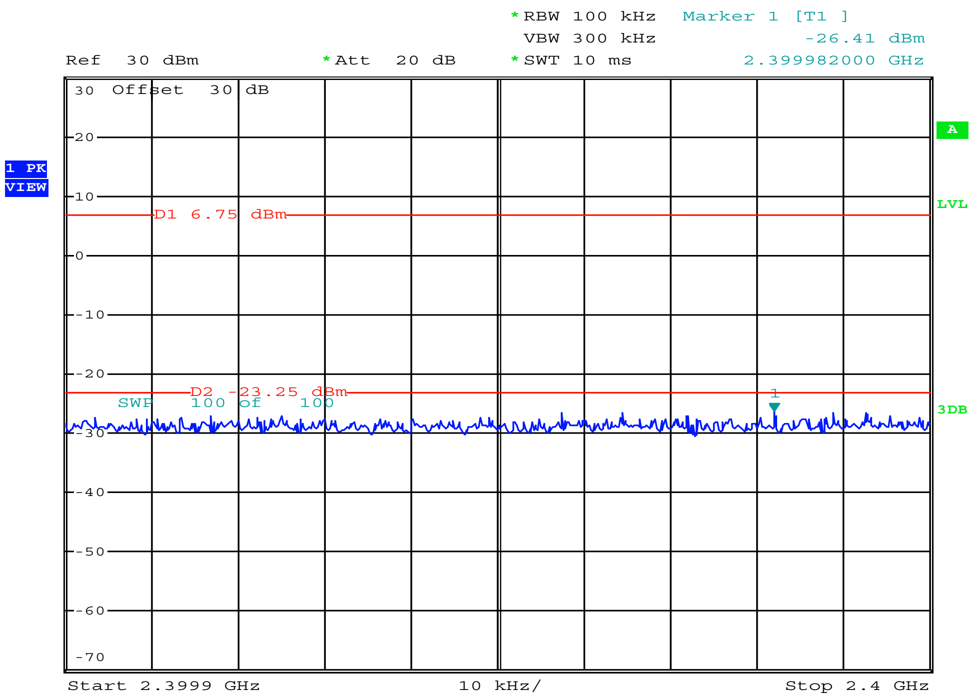
Date: 2.DEC.2020 15:58:00

Channel Frequency:		
2480.00 MHz		
DUT Modulation: **8-DPSK**	Data Rate: **3** Mbps	Measured PSD: **5.94** dBm

Emission Level Measurement - Band Edge						
Channel Frequency (MHz)	Modulation	Bit Rate (mbps)	Measured Emission [E_{Meas}] (dBm)	Emission Frequency (MHz)	Limit Line [A_L] (dBm)	Margin (dB)
2402	8-DPSK	3	-26.41	2.399	-23.25	**3.16**
2480	8-DPSK	3	-34.98	2.483		**11.73**
				Results:	**Complies**	

Margin = A_L - E_{MEAS}

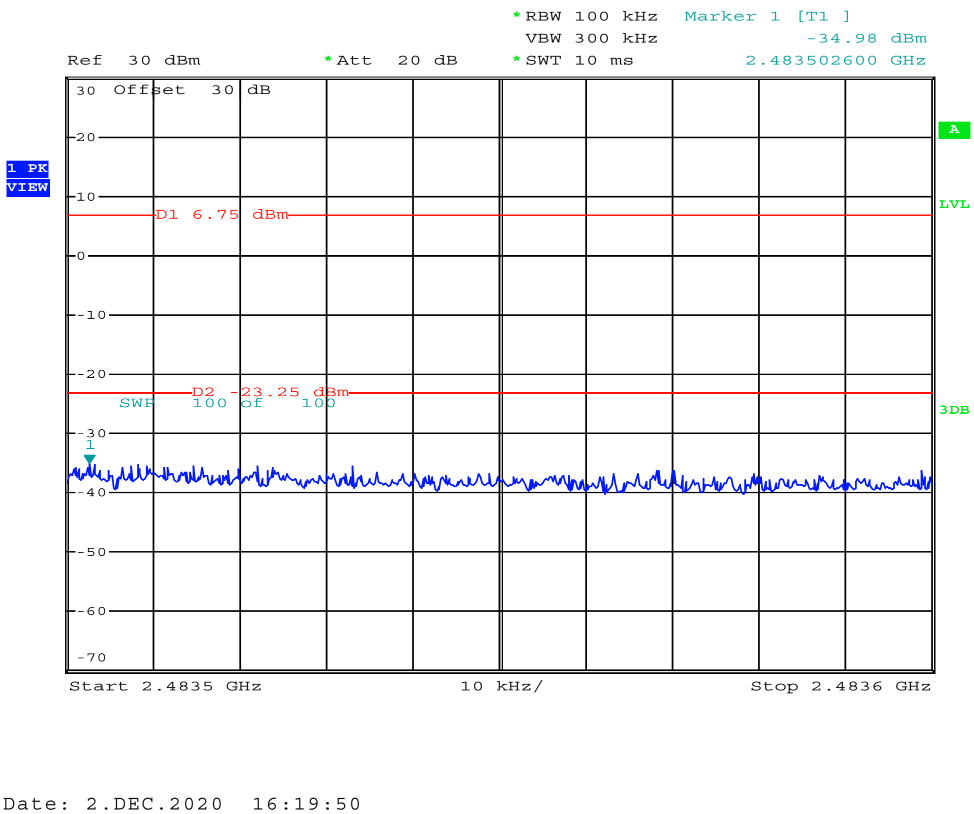
Conducted Spurious Emissions - Lower Band Edge



Date: 2.DEC.2020 16:20:57

Channel Frequency:	DUT Modulation:	Data Rate:	Emission Frequency:	Measured Emission:
2402.00 MHz	**8-DPSK**	**3** Mbps	**2.399** MHz	**-26.41** dBm

Conducted Spurious Emissions - Upper Band Edge



Channel Frequency: **2480.00** MHz		Emission Frequency: **2.483** MHz
DUT Modulation: **8-DPSK**	Data Rate: **3** Mbps	Measured Emission: **-34.98** dBm

Test Report Serial Number:	**45461626 R1.0**
Test Report Date:	**4 December 2020**
Project Number:	**1510**

Appendix I - Conducted Tx Spurious Emissions Measurement Plots

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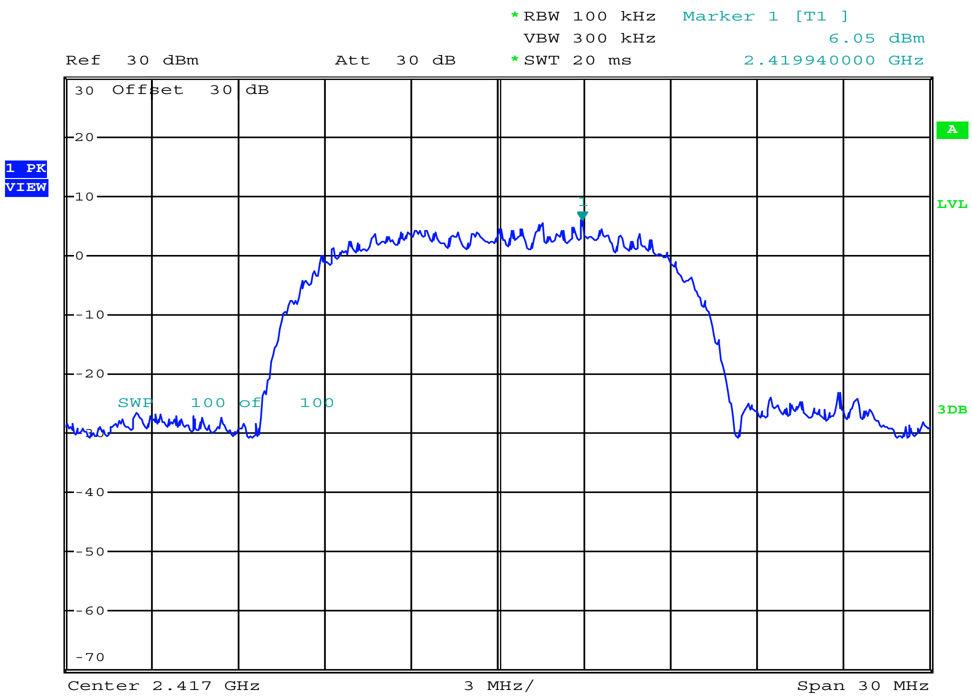
Conducted Spurious Emissions - Reference Measurement					
Frequency (MHz)	Modulation	Bit Rate (Mbps)	Measured PSD [P_{Meas}] (dBm)	Required Attenulation [A_R] (dB)	Limit Line [A_L] (dBm)
2417.00	DSSS	5.5	6.05	30	-23.950
2417.00	OFDM	12	0.98	30	-29.020
2417.00	MCS7	-	-1.02	30	-31.020

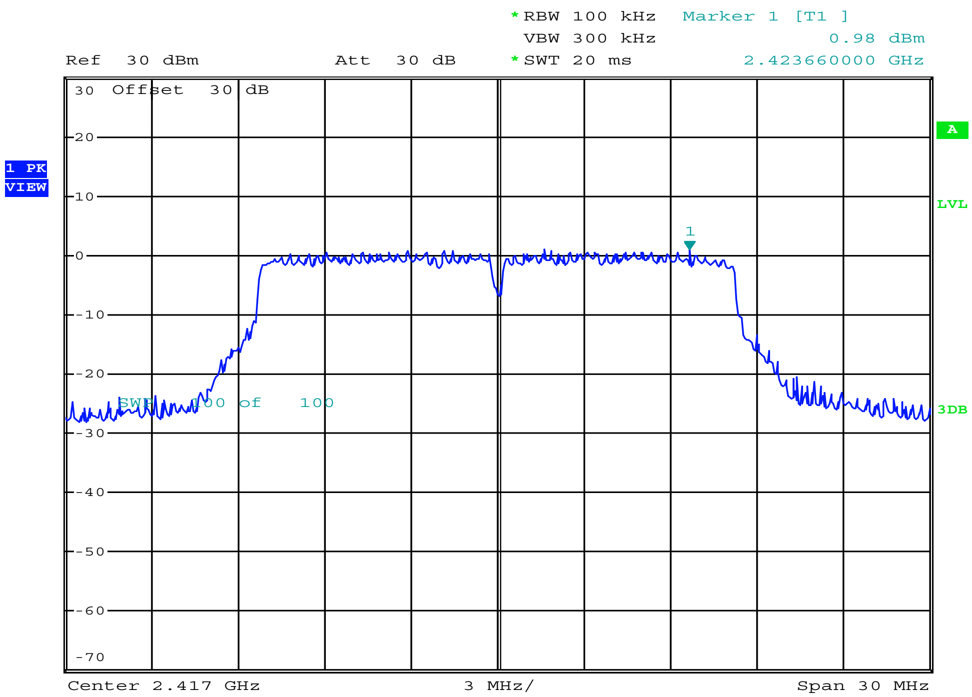
Power Spectral Density



Date: 2.DEC.2020 13:29:33

Channel Frequency:		
2417.00 MHz		
DUT Modulation:	Data Rate:	Measured PSD:
DSSS	**5.5** Mbps	**6.05** dBm

Power Spectral Density



Date: 2.DEC.2020 13:31:48

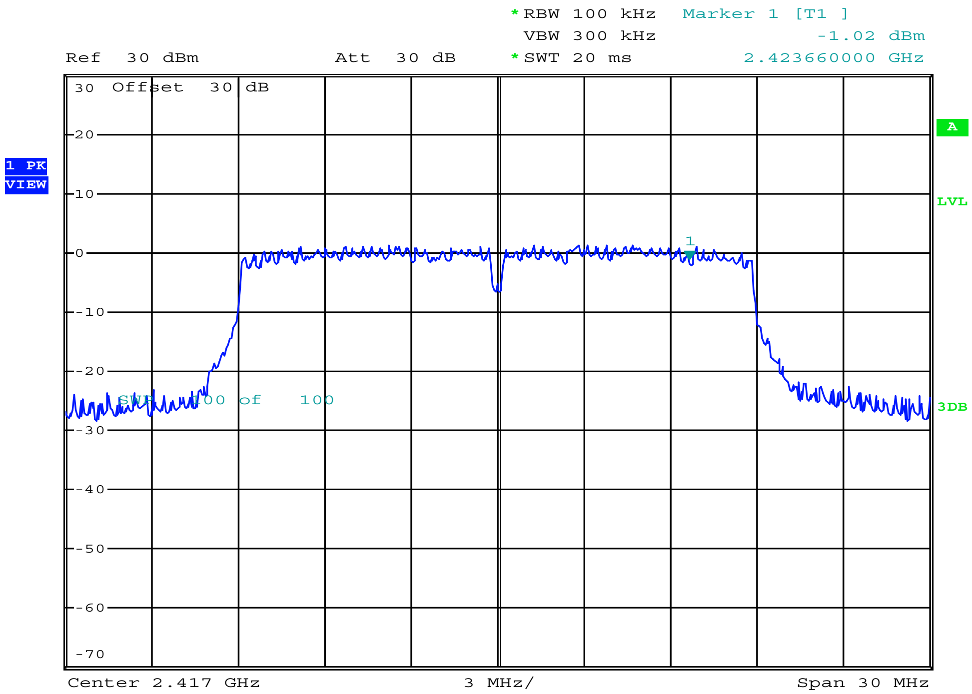
Channel Frequency: **2417.00** MHz

DUT Modulation: **OFDM**

Data Rate: **12** Mbps

Measured PSD: **0.98** dBm

Power Spectral Density



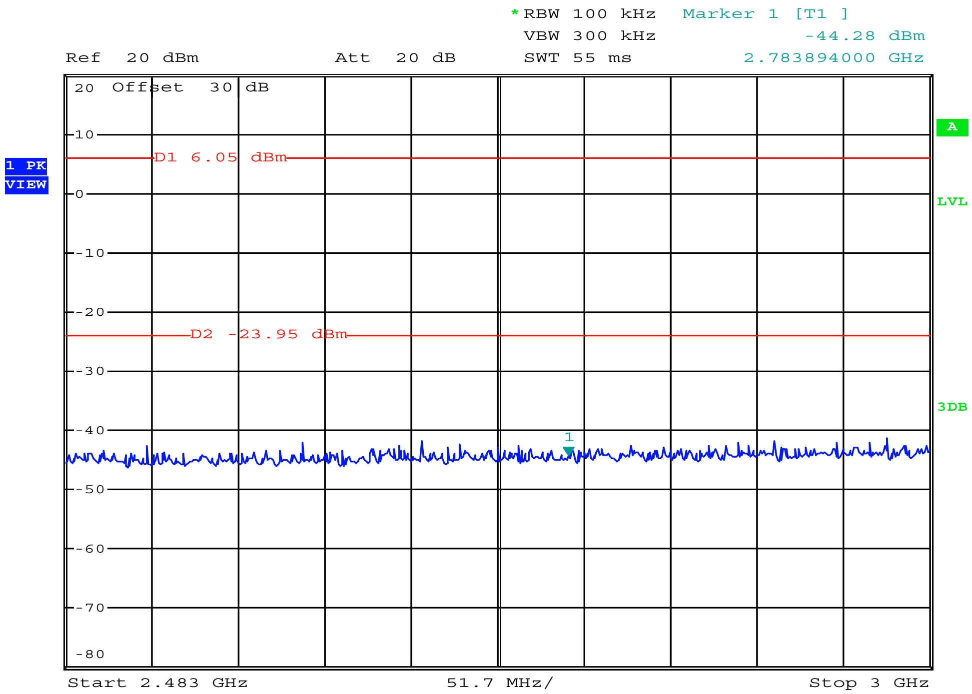
Date: 2.DEC.2020 13:33:11

Channel Frequency:		
2417.00 MHz		
DUT Modulation:	Data Rate:	Measured PSD:
MCS7	**-** Mbps	**-1.02** dBm

Emission Level Measurement					
Frequency Range (GHz)	**Bit Rate (mbps)**	**Modulation**	**Measured Emission [E_{Meas}] (dBm)**	**Limit Line [A_L] (dBm)**	**Margin (dB)**
to 3GHz	5.5	DSSS	-44.28	-23.95	**20.33**
3-13.6			-32.68		**8.73**
13.6-18			-32.07		**8.12**
18-25			-32.48		**8.53**
			Results:	**Complies**	

Margin = A_L - E_{MEAS}

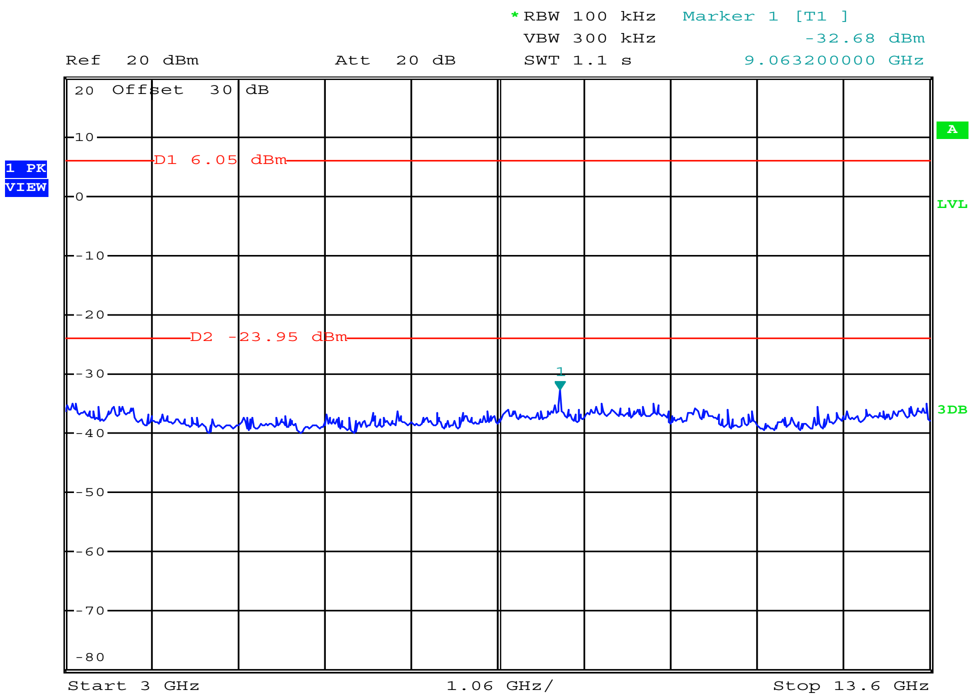
Conducted Spurious Emissions



Date: 2.DEC.2020 13:53:44

Channel Frequency:		
2417.00 MHz		
DUT Modulation:	Data Rate:	Measured Emission:
DSSS	**5.5** Mbps	**-44.28** dBm

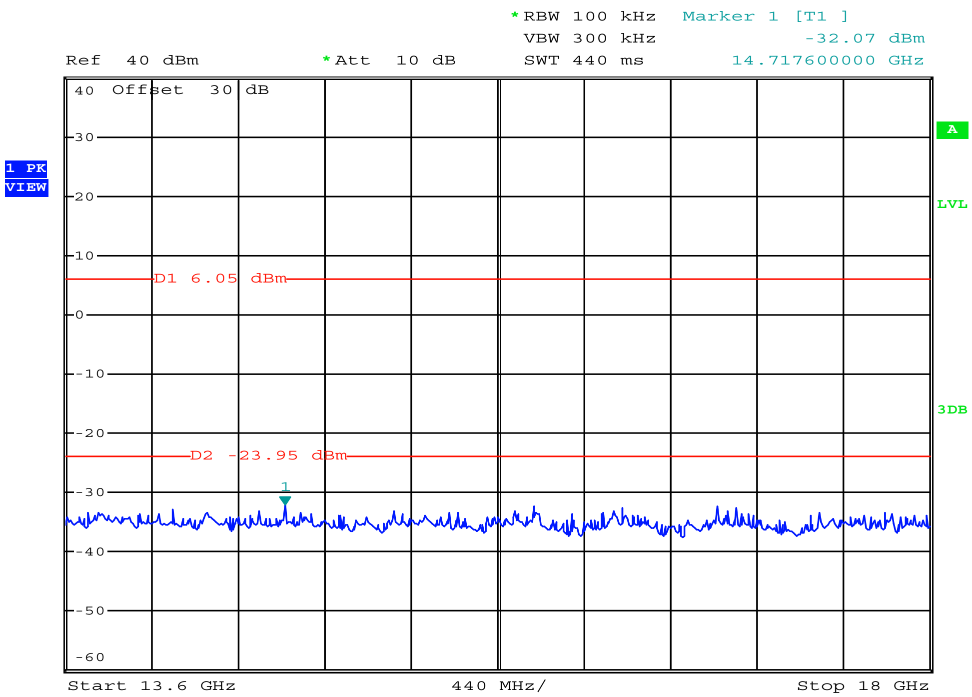
Conducted Spurious Emissions



Date: 2.DEC.2020 13:54:17

Channel Frequency:		
2417.00 MHz		
DUT Modulation:	Data Rate:	Measured Emission:
DSSS	**5.5** Mbps	**-32.68** dBm

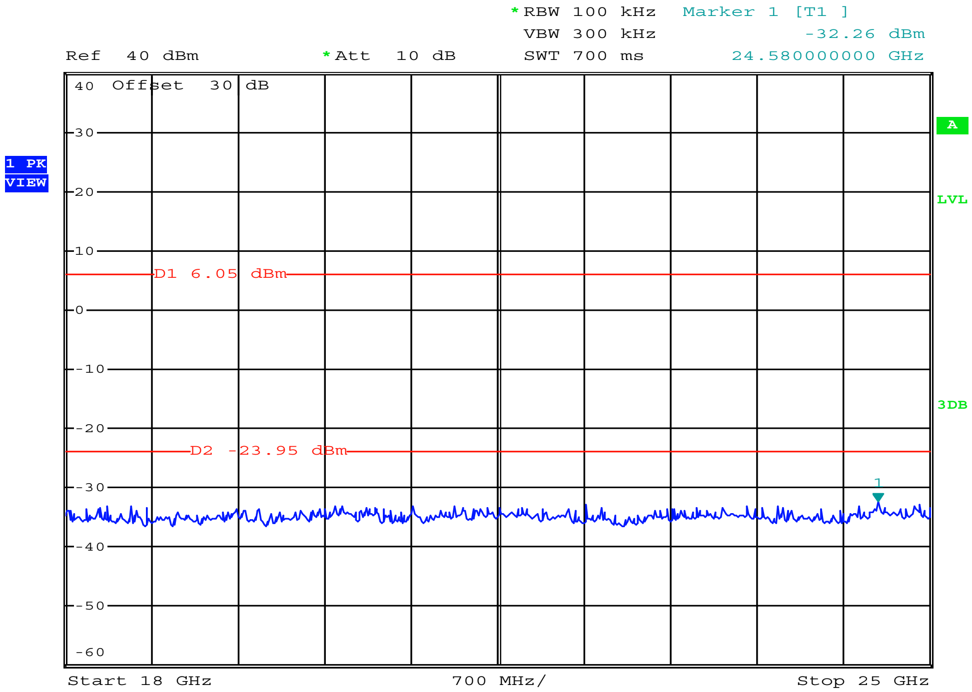
Conducted Spurious Emissions



Date: 2.DEC.2020 13:57:24

Channel Frequency:		
2417.00 MHz		
DUT Modulation:	Data Rate:	Measured Emission:
DSSS	**5.5** Mbps	**-32.07** dBm

Conducted Spurious Emissions



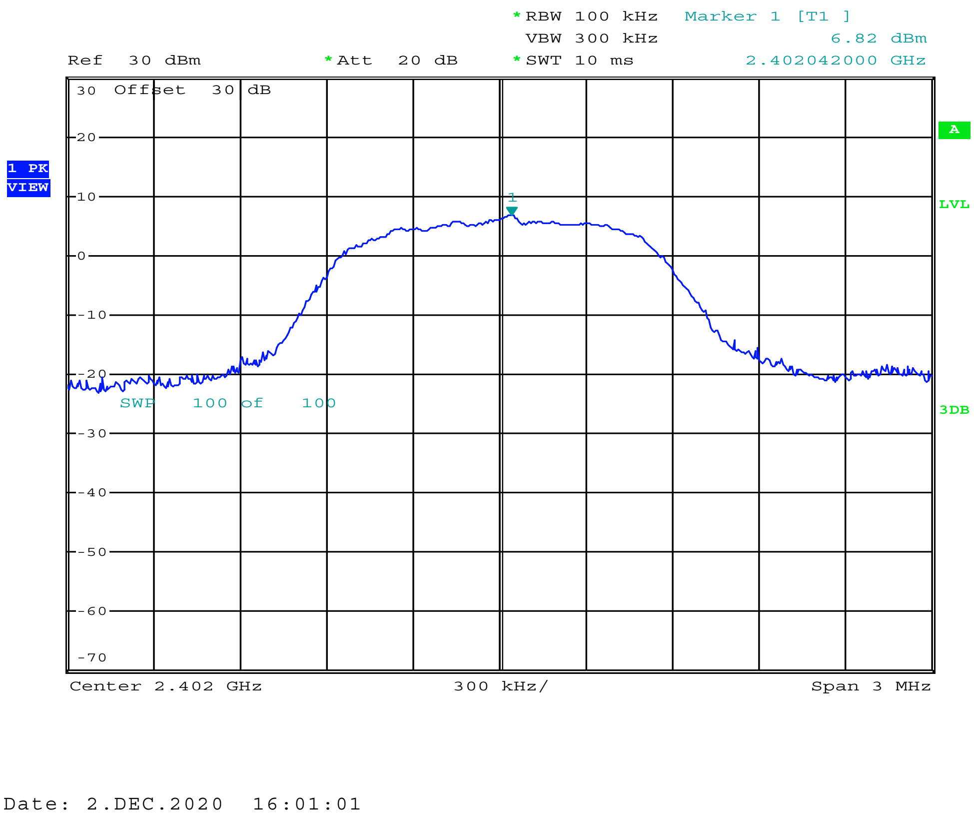
Date: 2.DEC.2020 13:57:45

Channel Frequency:		
2417.00 MHz		
DUT Modulation:	Data Rate:	Measured Emission:
DSSS	**5.5** Mbps	**-32.84** dBm

Conducted Spurious Emissions - Reference Measurement					
Frequency (MHz)	Modulation	Bit Rate (Mbps)	Measured PSD $[P_{Meas}]$ (dBm)	Required Attenuation $[A_R]$ (dB)	Limit Line $[A_L]$ (dBm)
2402.00	Pi/4-DQPSK	2	6.82	30	-23.18
2442.00			6.62	30	-23.38
2480.00			5.73	30	-24.27

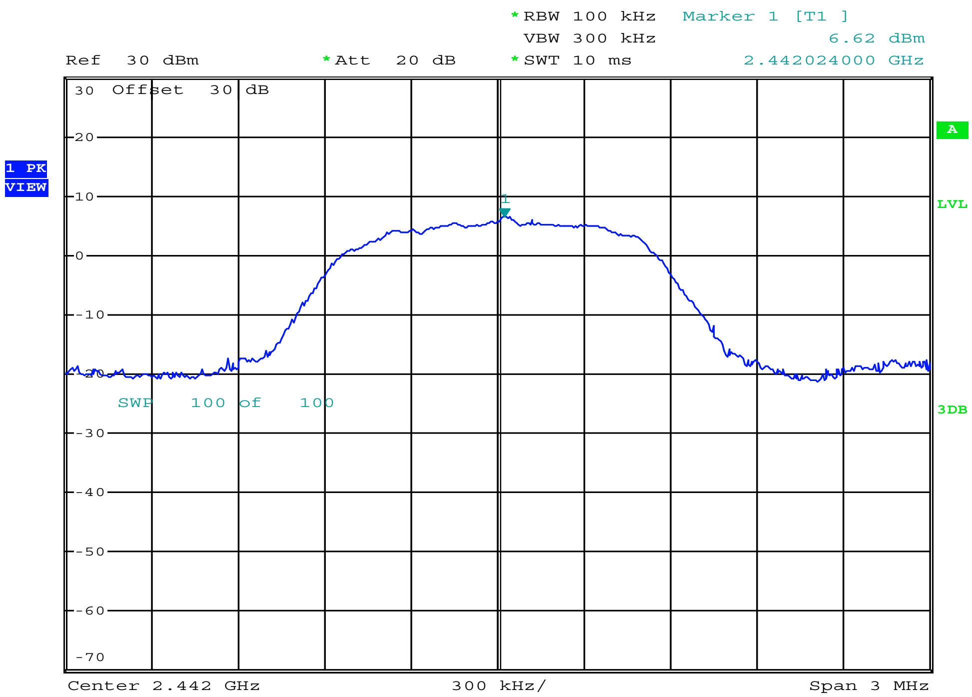
Limit Line = Measured PSD - Required Attenuation

Power Spectral Density



Channel Frequency: **2402.00** MHz		
DUT Modulation: **Pi/4-DQPSK**	Data Rate: **2** Mbps	Measured PSD: **6.82** dBm

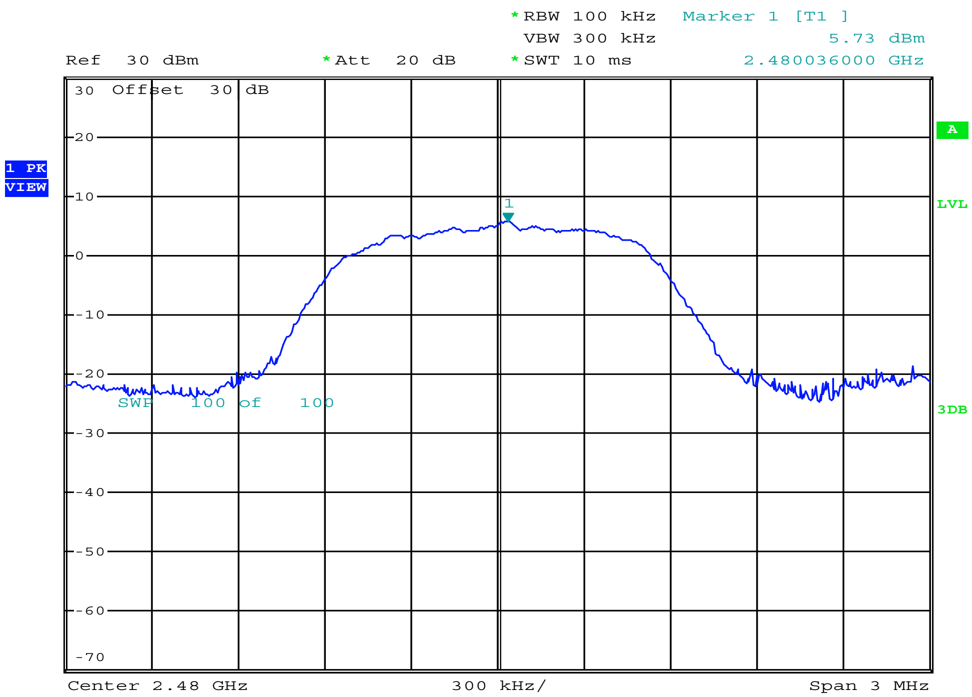
Power Spectral Density



Date: 2.DEC.2020 16:02:45

Channel Frequency:		
2442.00 MHz		
DUT Modulation:	Data Rate:	Measured PSD:
Pi/4-DQPSK	**2** Mbps	**6.62** dBm

Power Spectral Density



Date: 2.DEC.2020 16:01:46

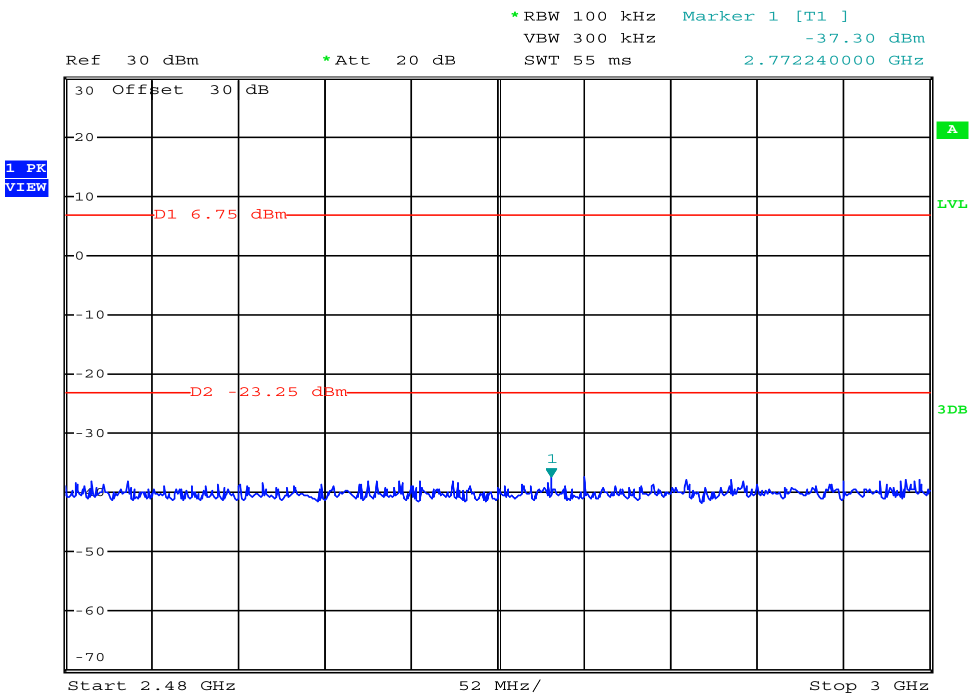
Channel Frequency:
2408.00 MHz

DUT Modulation:	Data Rate:	Measured PSD:
Pi/4-DQPSK	**2** Mbps	**5.73** dBm

Emission Level Measurement					
Frequency Range (GHz)	**Bit Rate (mbps)**	**Modulation**	**Measured Emission [E_{Meas}] (dBm)**	**Limit Line [A_L] (dBm)**	**Margin (dB)**
to 3GHz	2	Pi/4-DQPSK	-37.30	-23.18	**14.12**
3-10			-33.38		**10.20**
10-13.6			-33.95		**10.77**
13.6-25			-32.12		**8.94**
			Results:	**Complies**	

Margin = A_L - E_{MEAS}

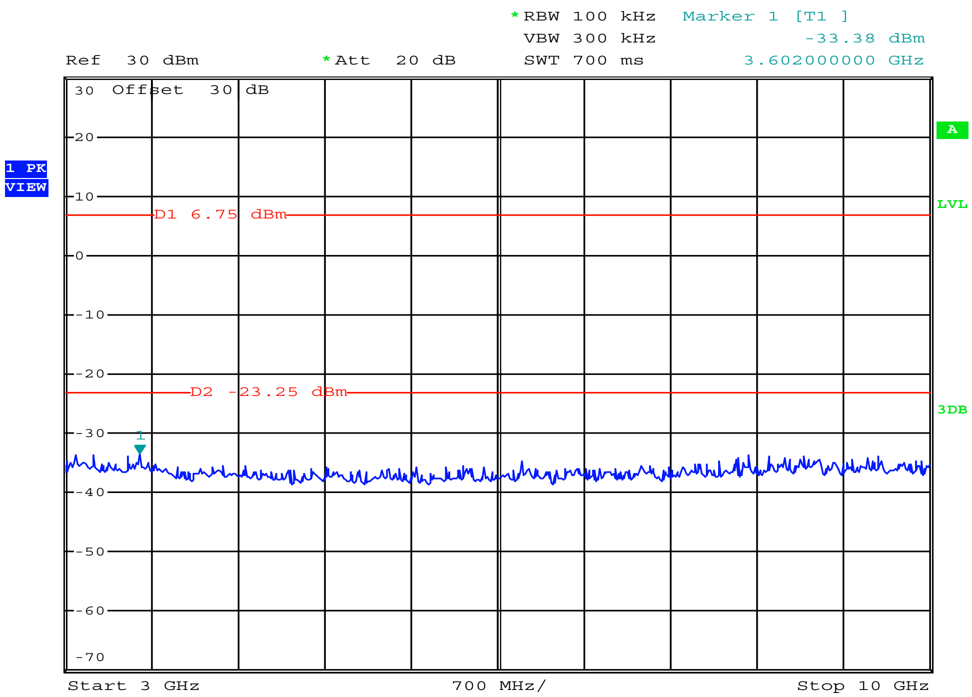
Conducted Spurious Emissions



Date: 2.DEC.2020 16:28:49

Channel Frequency: **2417.00** MHz		
DUT Modulation: **Pi/4-DQPSK**	Data Rate: **2** Mbps	Measured Emission: **-37.30** dBm

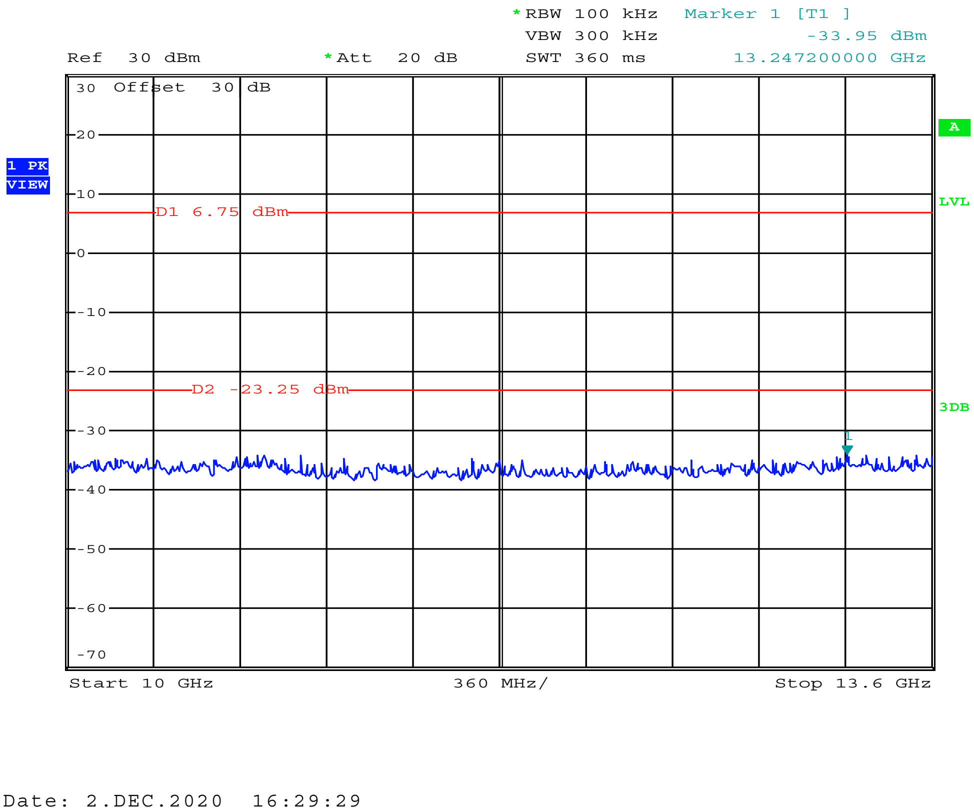
Conducted Spurious Emissions



Date: 2.DEC.2020 16:29:09

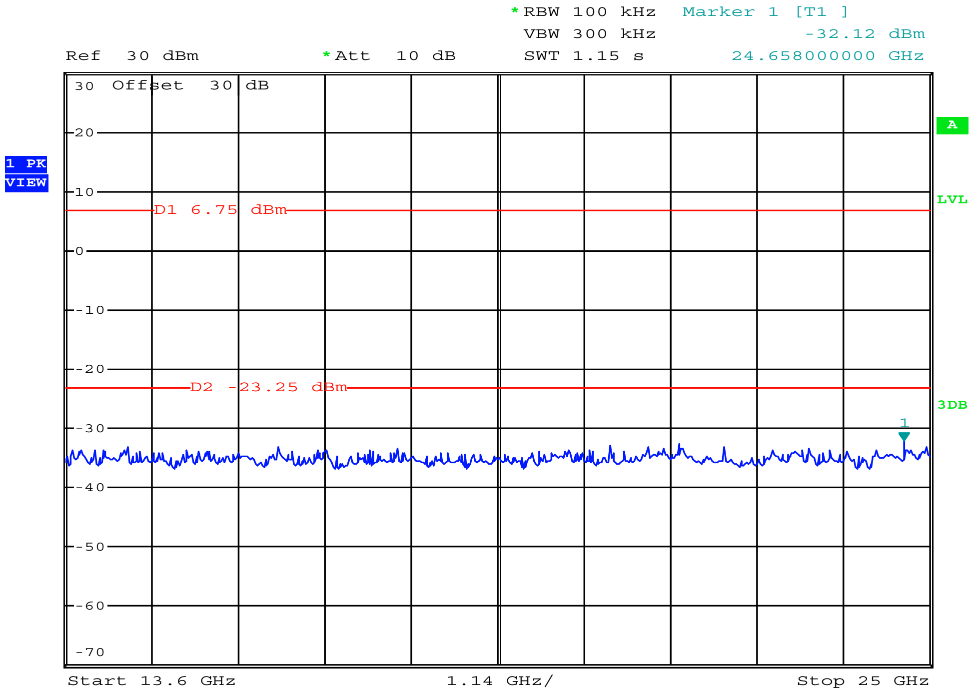
Channel Frequency:		
2417.00 MHz		
DUT Modulation:	Data Rate:	Measured Emission:
Pi/4-DQPSK	**2** Mbps	**-33.38** dBm

Conducted Spurious Emissions



Channel Frequency:		
2417.00 MHz		
DUT Modulation:	Data Rate:	Measured Emission:
Pi/4-DQPSK	2 Mbps	-33.95 dBm

Conducted Spurious Emissions



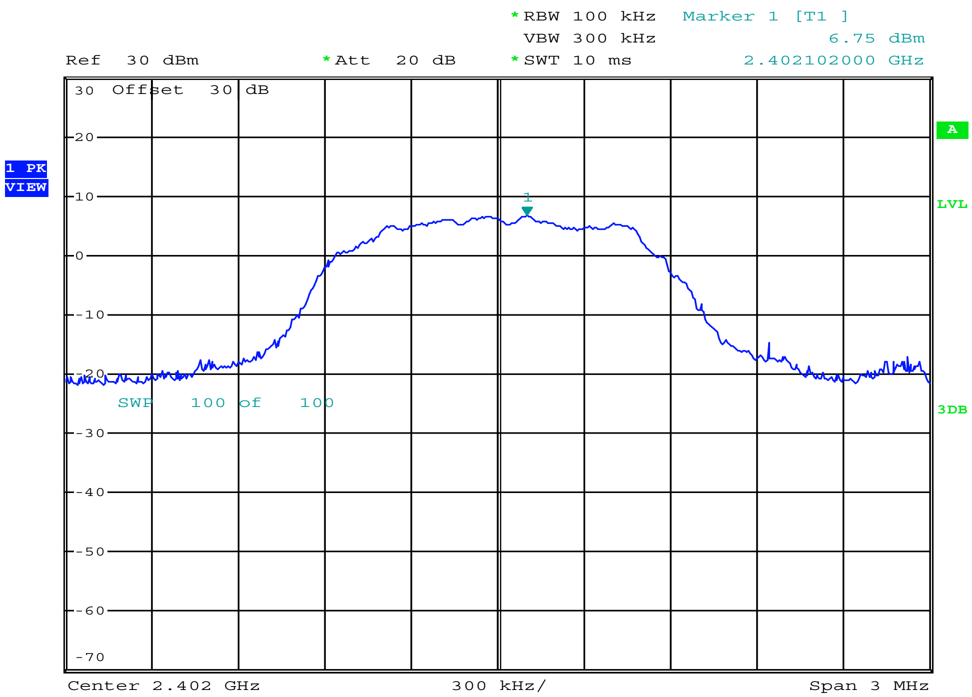
Date: 2.DEC.2020 16:30:33

Channel Frequency:		
2417.00 MHz		
DUT Modulation:	Data Rate:	Measured Emission:
Pi/4-DQPSK	**2** Mbps	**-32.12** dBm

Conducted Spurious Emissions - Reference Measurement					
Frequency (MHz)	Modulation	Bit Rate (Mbps)	Measured PSD $[P_{Meas}]$ (dBm)	Required Attenuation $[A_R]$ (dB)	Limit Line $[A_L]$ (dBm)
2402.00	8-DPSK	3	6.75	30	-23.25
2442.00			6.50	30	-23.50
2480.00			5.94	30	-24.06

Limit Line = Measured PSD - Required Attenuation

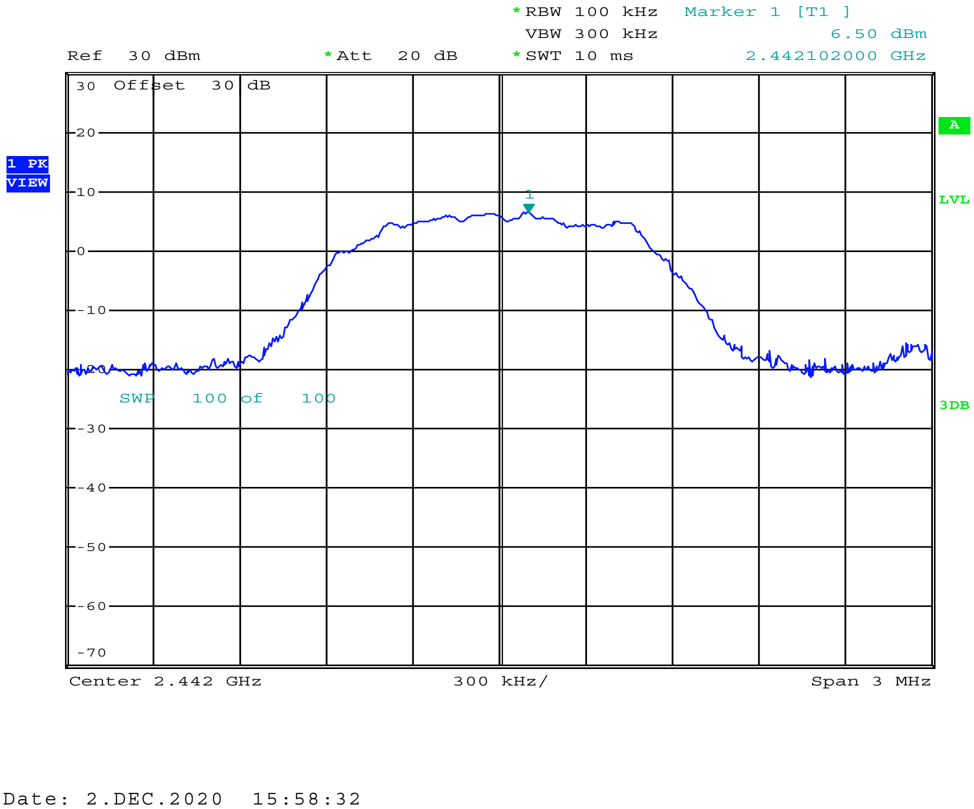
Power Spectral Density



Date: 2.DEC.2020 15:59:25

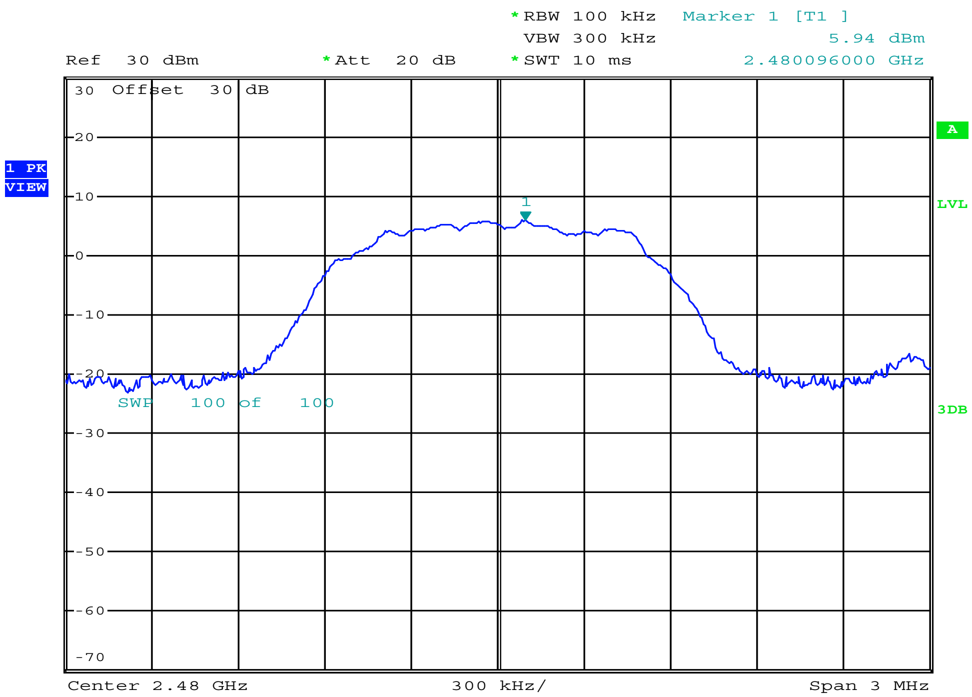
Channel Frequency: **2402.00** MHz		
DUT Modulation: **8-DPSK**	Data Rate: **3** Mbps	Measured PSD: **6.75** dBm

Power Spectral Density



Channel Frequency: **2442.00** MHz		
DUT Modulation: **8-DPSK**	Data Rate: **3** Mbps	Measured PSD: **6.50** dBm

Power Spectral Density



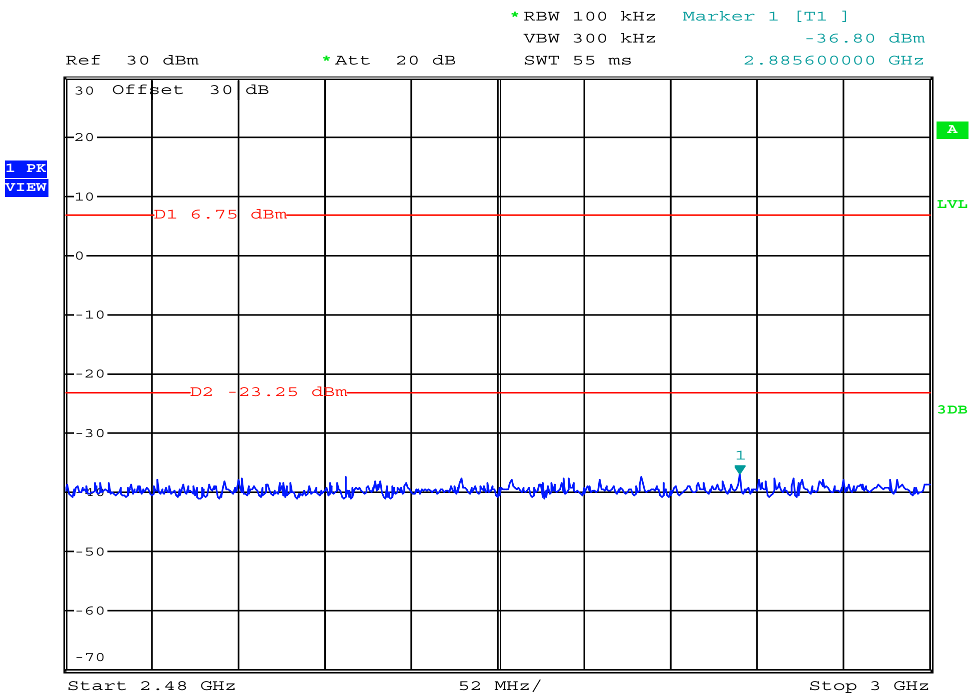
Date: 2.DEC.2020 15:58:00

Channel Frequency:		
2480.00 MHz		
DUT Modulation:	Data Rate:	Measured PSD:
8-DPSK	**3** Mbps	**5.94** dBm

Emission Level Measurement					
Frequency Range (GHz)	**Bit Rate (mbps)**	**Modulation**	**Measured Emission [E_{Meas}] (dBm)**	**Limit Line [A_L] (dBm)**	**Margin (dB)**
to 3GHz	3	8-DPSK	-36.80	-23.25	**13.55**
3-10			-33.43		**10.18**
10-13.6			-33.62		**10.37**
13.6-25			-37.03		**13.78**
			Results:	**Complies**	

Margin = A_L - E_{MEAS}

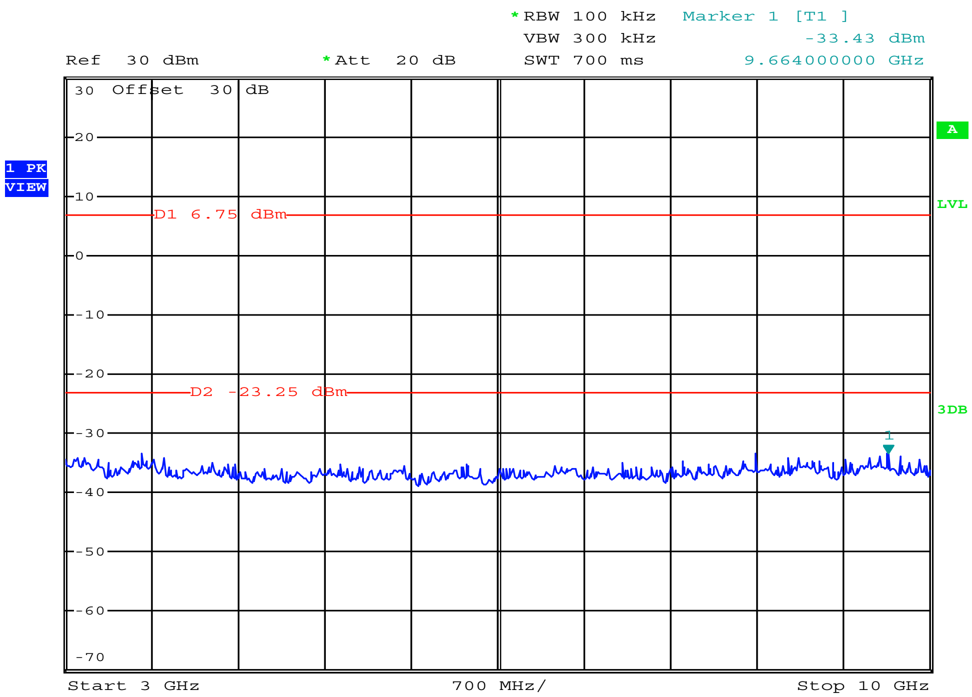
Conducted Spurious Emissions



Date: 2.DEC.2020 16:24:55

Channel Frequency:		
2417.00 MHz		
DUT Modulation:	Data Rate:	Measured Emission:
8-DPSK	**3** Mbps	**-36.80** dBm

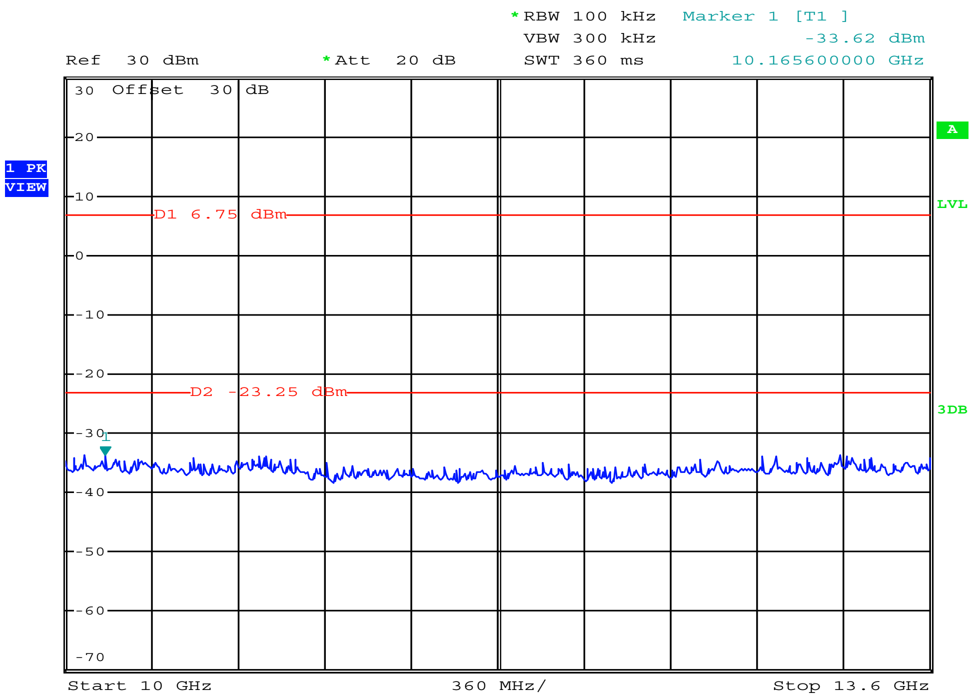
Conducted Spurious Emissions



Date: 2.DEC.2020 16:25:30

Channel Frequency:		
2417.00 MHz		
DUT Modulation:	Data Rate:	Measured Emission:
8-DPSK	**3** Mbps	**-33.43** dBm

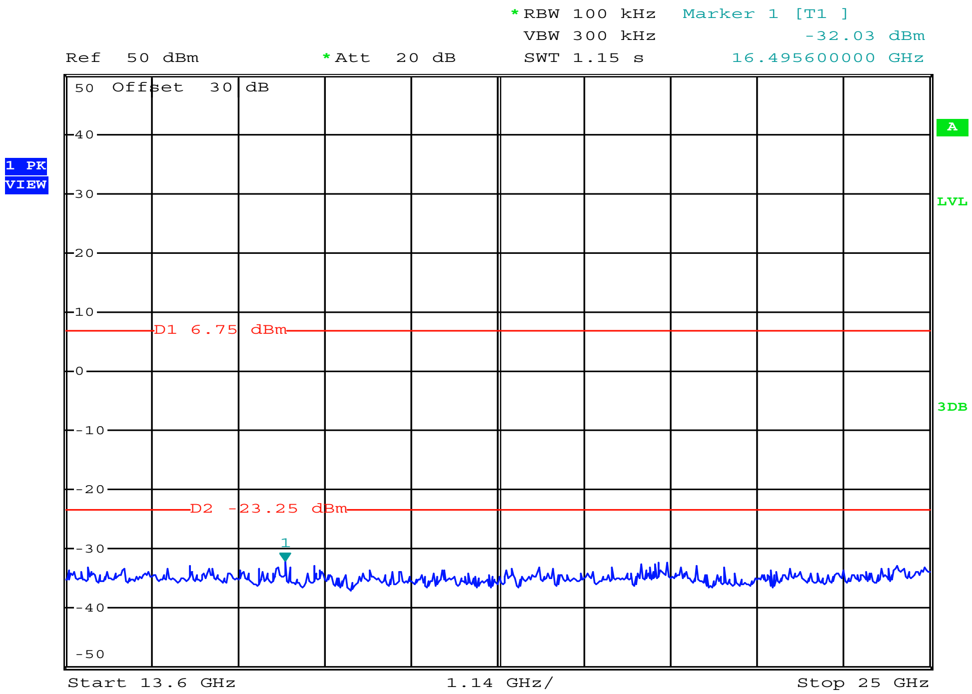
Conducted Spurious Emissions



Date: 2.DEC.2020 16:26:01

Channel Frequency: **2417.00** MHz		
DUT Modulation: **8-DPSK**	Data Rate: **3** Mbps	Measured Emission: **-33.62** dBm

Conducted Spurious Emissions



Date: 2.DEC.2020 16:27:11

Channel Frequency:		
2417.00 MHz		
DUT Modulation: **8-DPSK**	Data Rate: **3** Mbps	Measured Emission: **-32.03** dBm

Test Report Serial Number:	**45461626 R1.0**
Test Report Date:	**4 December 2020**
Project Number:	**1510**

Appendix J - Radiated Tx Spurious Emissions Measurement Plots

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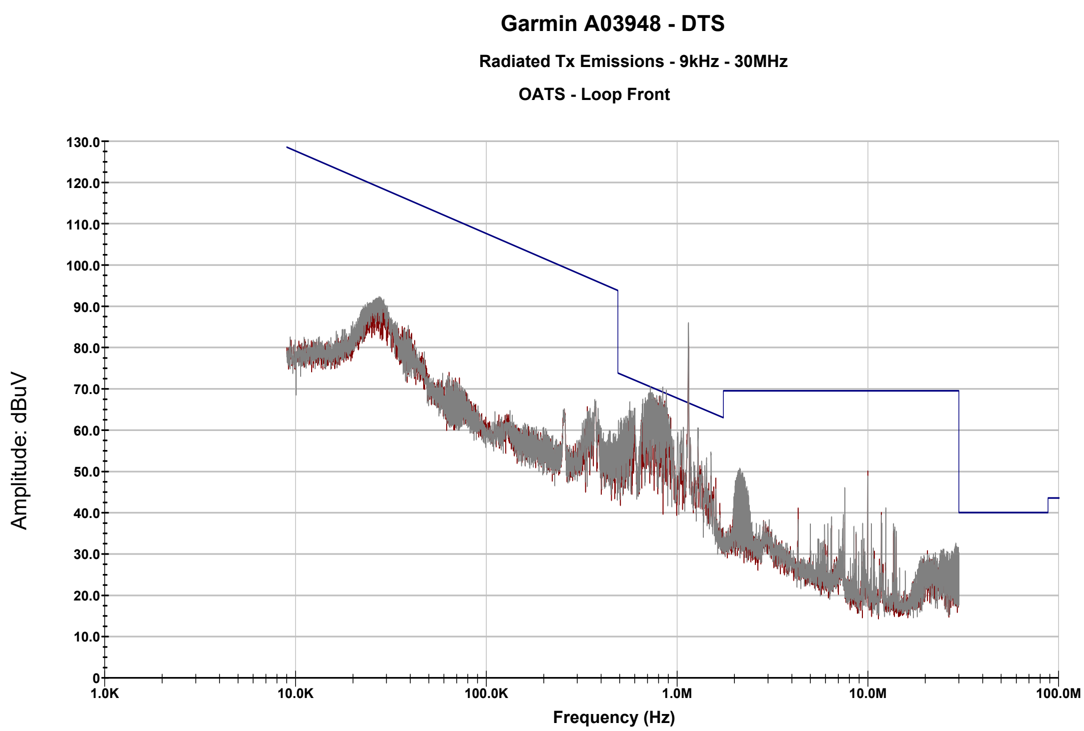
Summary of Radiated Tx Emissions (Restricted Band)

Measured Frequency Range (MHz)	Channel Frequency	Antenna Polarization	Emission Frequency	Measured Emission [E_{Meas}] (dBuV)		Antenna ACF [ACF] (dB)	Cable Loss [L_C] (dB)	Amplifier Gain [G_A] (dB)		Corrected Emission [E_{Corr}] (dBuV/m)		Limit (dBuV)	Margin (dB)
9kHz - 30MHz	2412.0	Front	ND	ND	(1)	0.00	0.00	0.00	(3)	ND	(2)	n/a	**n/a**
9kHz - 30MHz	2412.0	Side	ND	ND	(1)	0.00	0.00	0.00	(3)	ND	(2)	n/a	**n/a**
30-1000MHz	2412.0	Horizontal	745.2MHz	40.38		0.00	0.00	0.00	(3)	40.38	(2)	46.0	**5.6**
30-1000MHz	2412.0	Vertical	867.20	40.18		0.00	0.00	0.00	(3)	40.18	(2)	43.5	**3.3**
1 - 3GHz	2412.0	Horizontal	ND	ND	(1)	27.40	4.58	0.00	(3)	ND		54.0	**n/a**
1 - 3GHz	2412.0	Vertical	ND	ND	(1)	27.40	4.58	0.00	(3)	ND		54.0	**n/a**
3-13GHz	2412.0	Horizontal	ND	ND	(1)	36.76	9.86	0.00	(3)	ND		54.0	**n/a**
3-13GHz	2412.0	Vertical	ND	ND	(1)	36.76	9.86	0.00	(3)	ND		54.0	**n/a**
13-18GHz	2412.0	Horizontal	ND	ND	(1)	38.75	16.54	0.00	(3)	ND		54.0	**n/a**
13-18GHz	2412.0	Vertical	ND	ND	(1)	38.75	16.54	0.00	(3)	ND		54.0	**n/a**
18-26GHz	2412.0	Horizontal	ND	ND	(1)	43.50	21.86	26.00		ND		54.0	**n/a**
18-26GHz	2412.0	Vertical	ND	ND	(1)	43.50	21.86	26.00		ND		54.0	**n/a**
											Results:	**Complies**	

(1) No Emissions Detected (ND) above ambient or within 20dB of the limit
(2) Antenna ACF, Cable Loss and Amplifier Gain corrected in Spectrum Analyzer Transducer Factor
(3) External Amplier not used

$E_{Corr} = E_{Meas} + ACF + L_C - G_A$

Radiated Emissions - Restricted Band



03:57:48 PM, Thursday, December 10, 2020

Profile Build: 2020.10.19

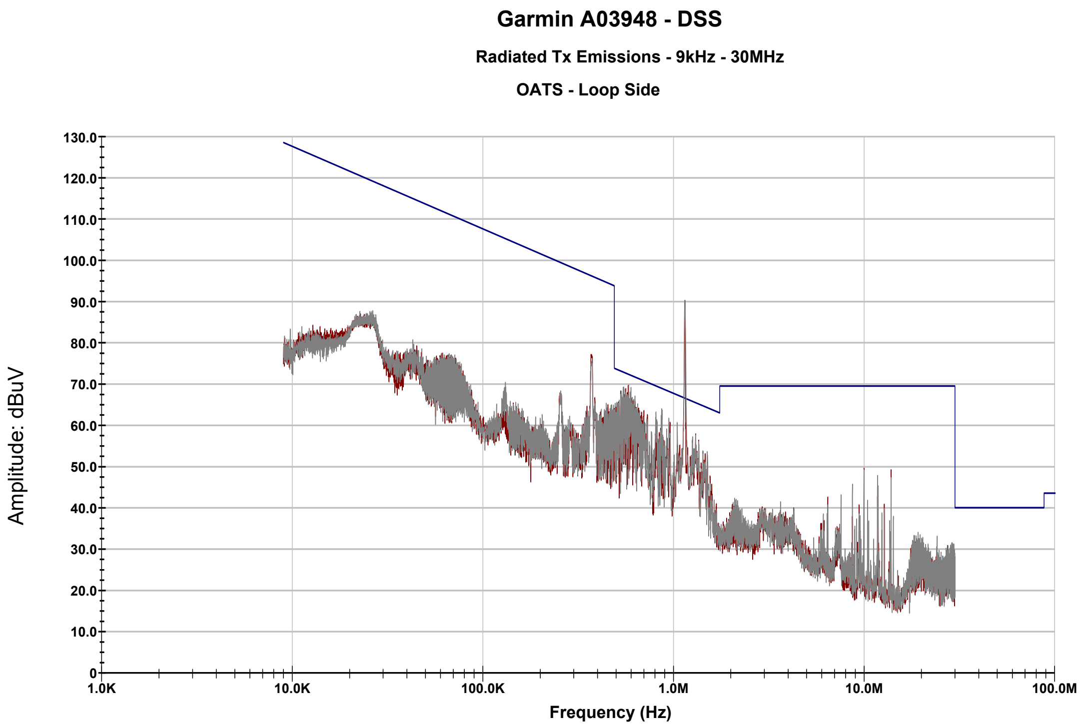
Trace 1
Trace 2

Frequency Range:	Antenna Polarization:	Emission Frequency:
9kHz - 30MHz	**Front**	**ND**
Channel Frequency:	Modulation:	Measured Emission:
2412.00 MHz	**DSSS**	**ND** dBuV

Trace 1: Ambient

Trace 2: Ambient + DUT

Radiated Emissions - Restricted Band



03:57:42 PM, Thursday, December 10, 2020

Profile Build: 2020.10.19

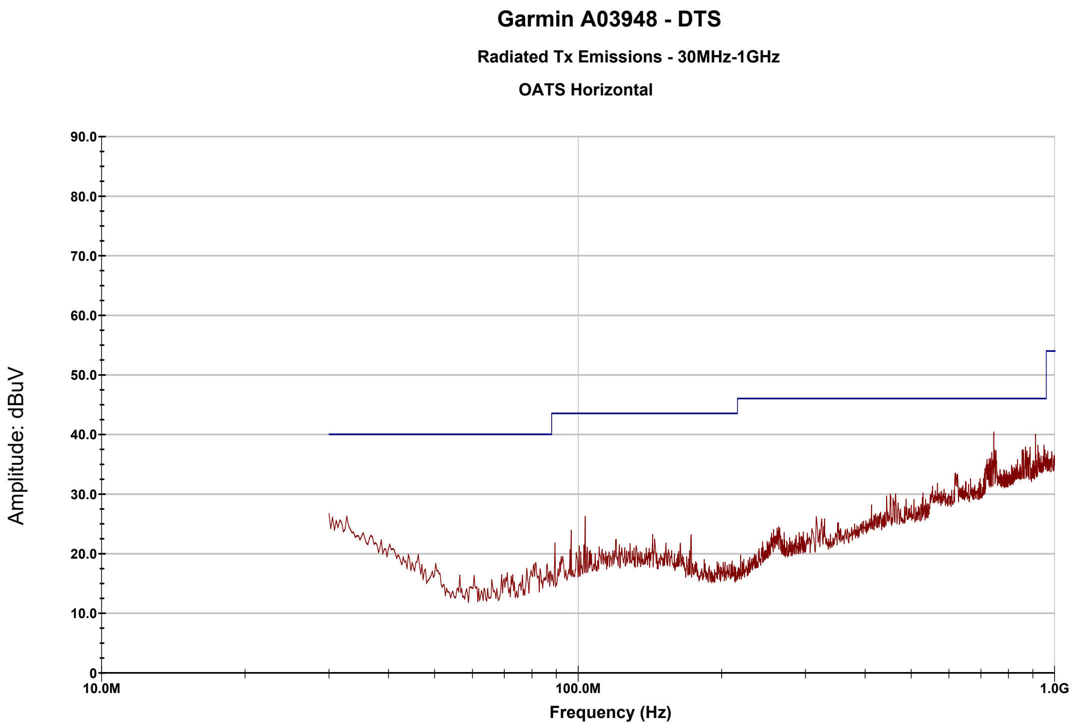
Trace 1	
Trace 2	

Frequency Range:	Antenna Polarization:	Emission Frequency:
9kHz - 30MHz	**Side**	**ND**
Channel Frequency:	Modulation:	Measured Emission:
2412.00 MHz	**DSSS**	**ND** dBuV

Trace 1: Ambient

Trace 2: Ambient + DUT

Radiated Emissions - Restricted Band

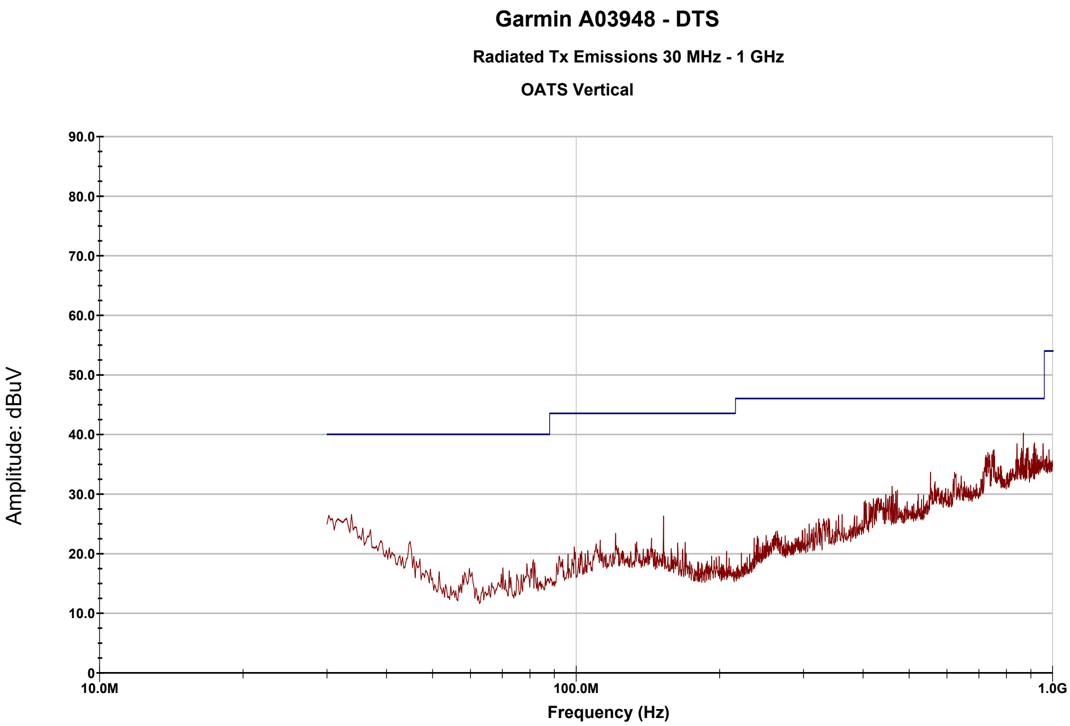


03:36:42 PM, Thursday, December 10, 2020

Profile Build: 2020.10.19

Frequency Range:	Antenna Polarization:	Emission Frequency:
30-1000MHz	**Horizontal**	**745.2MHz**
Channel Frequency:	Modulation:	Measured Emission:
2412.00 MHz	**DSSS**	**40.38** dBuV

Radiated Emissions - Restricted Band

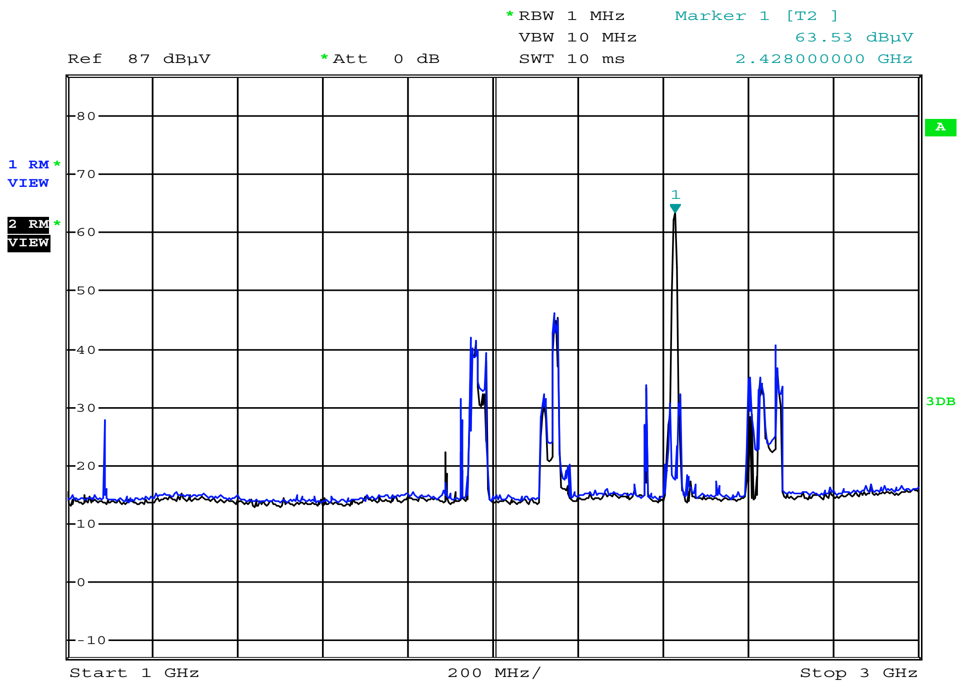


03:36:42 PM, Thursday, December 10, 2020

Profile Build: 2020.10.19

Frequency Range:	Antenna Polarization:	Emission Frequency:
30-1000MHz	**Vertical**	**867.2MHz**
Channel Frequency:	Modulation:	Measured Emission:
2412.00 MHz	**DSSS**	**40.18** dBuV

Radiated Emissions - Restricted Band



Date: 23.NOV.2020 14:58:31

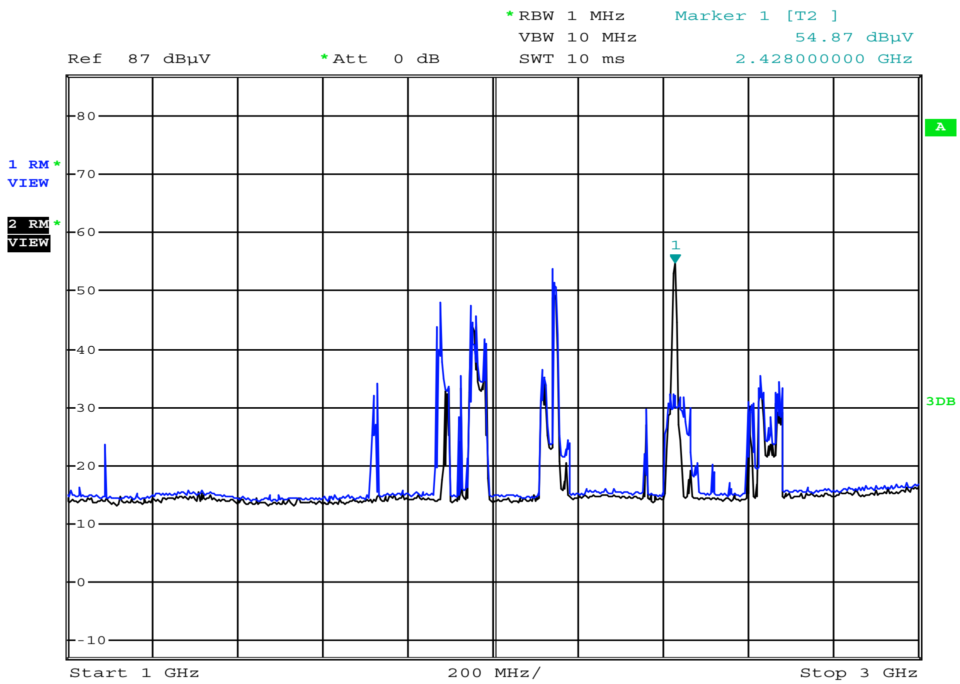
Frequency Range:	Antenna Polarization:	Emission Frequency:
1 - 3GHz	**Horizontal**	**ND**
Channel Frequency:	Modulation:	Measured Emission:
2412.00 MHz	**DSSS**	**ND** dBuV

Trace 1: Ambient

Trace 2: Ambient + DUT

Marker 1: Fundamental

Radiated Emissions - Restricted Band



Date: 23.NOV.2020 14:52:23

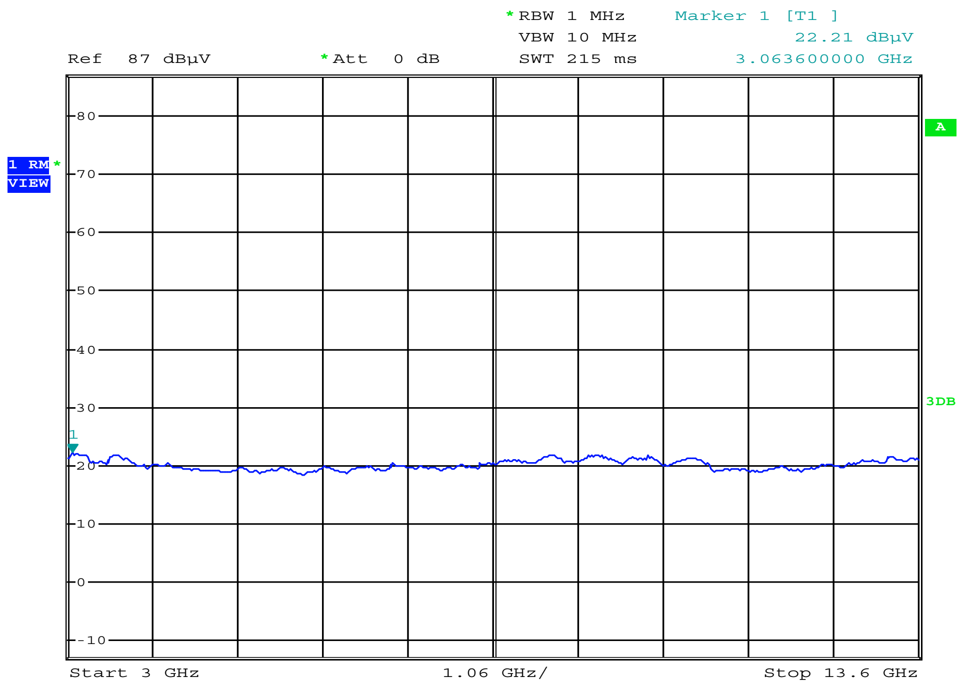
Frequency Range:	Antenna Polarization:	Emission Frequency:
1 - 3GHz	**Vertical**	**ND**
Channel Frequency:	Modulation:	Measured Emission:
2412.00 MHz	**DSSS**	**ND** dBuV

Trace 1: Ambient

Trace 2: Ambient + DUT

Marker 1: Fundamental

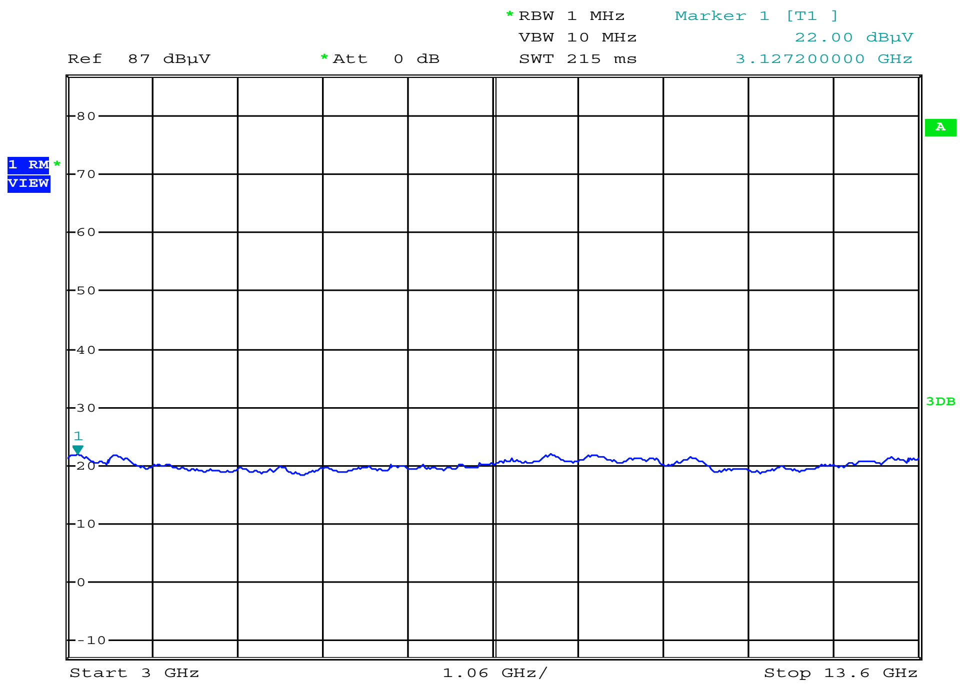
Radiated Emissions - Restricted Band



Date: 23.NOV.2020 14:59:11

Frequency Range:	Antenna Polarization:	Emission Frequency:
3-13GHz	**Horizontal**	**ND**
Channel Frequency:	Modulation:	Measured Emission:
2412.00 MHz	**DSSS**	**ND** dBuV

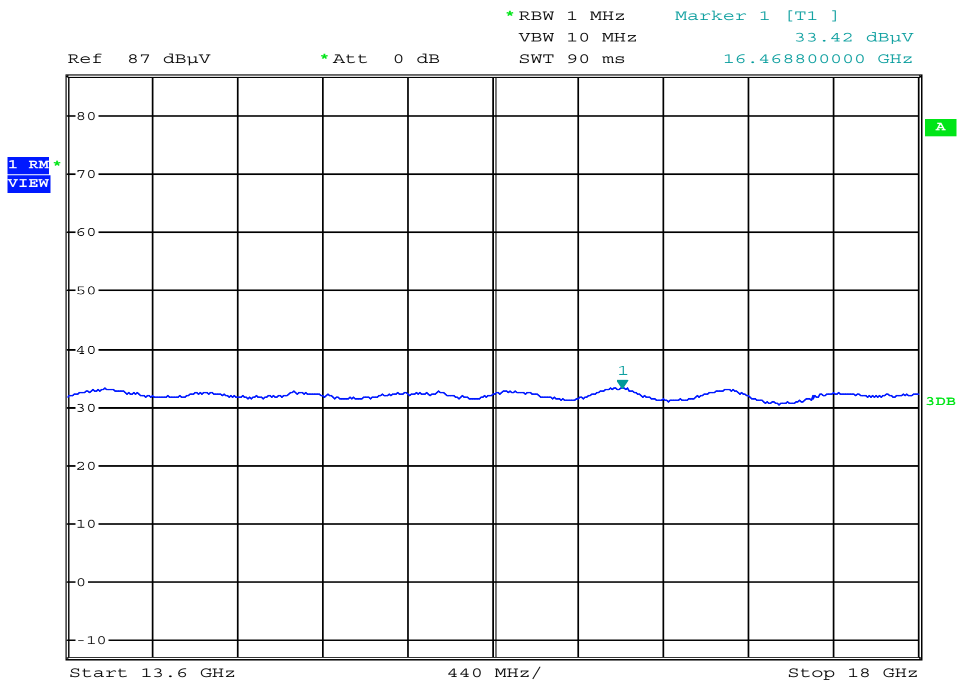
Radiated Emissions - Restricted Band



Date: 23.NOV.2020 14:53:10

Frequency Range: **3-13GHz**	Antenna Polarization: **Vertical**	Emission Frequency: **ND**
Channel Frequency: **2412.00** MHz	Modulation: **DSSS**	Measured Emission: **ND** dBuV

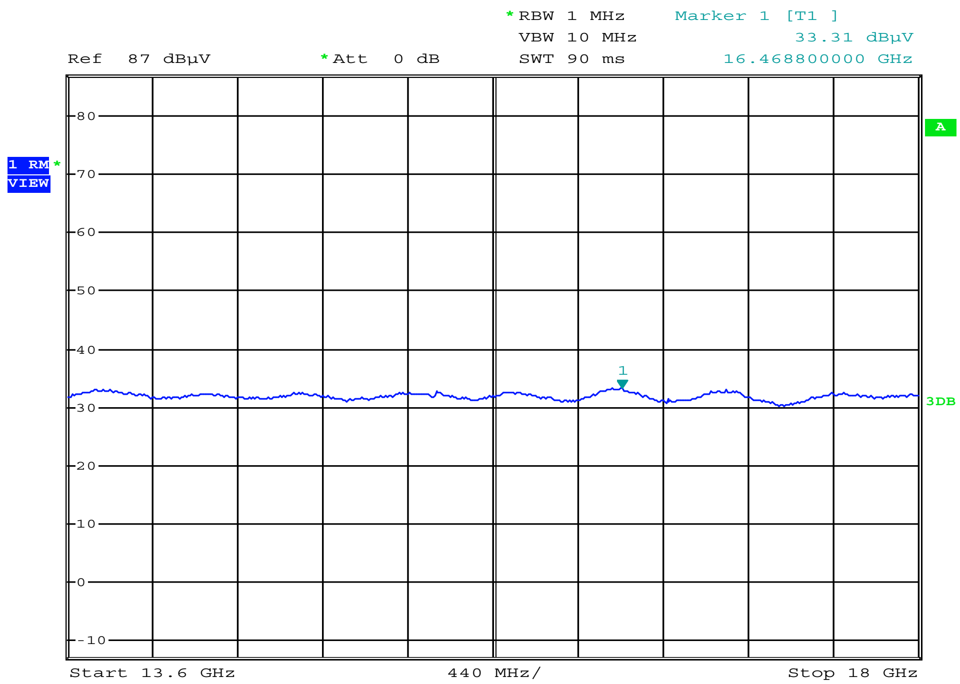
Radiated Emissions - Restricted Band



Date: 23.NOV.2020 14:59:51

Frequency Range:	Antenna Polarization:	Emission Frequency:
13-18GHz	**Horizontal**	**ND**
Channel Frequency:	Modulation:	Measured Emission:
2412.00 MHz	**DSSS**	**ND** dBuV

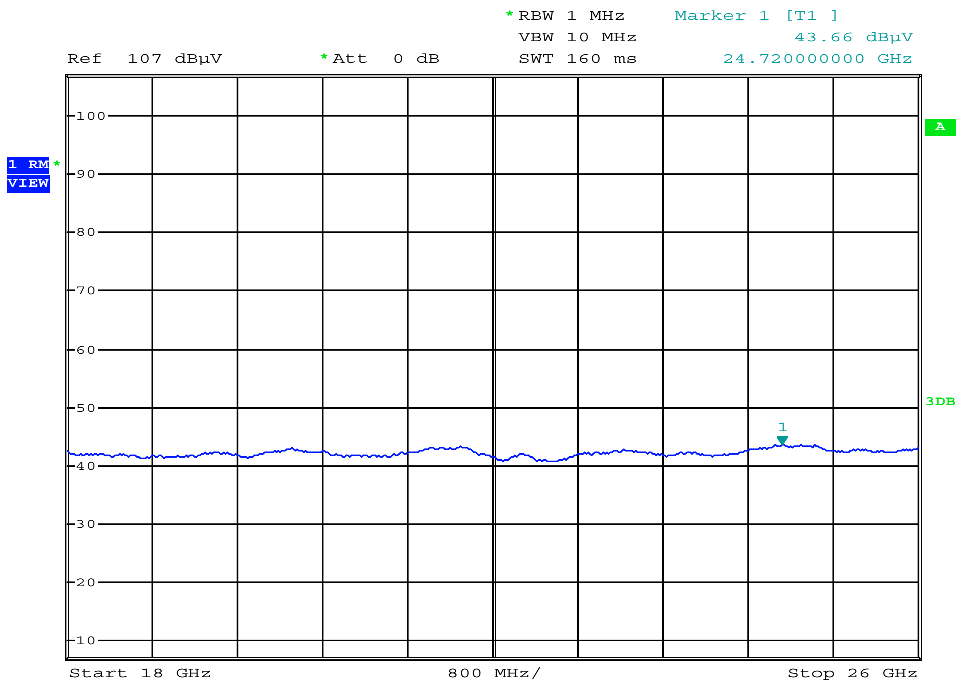
Radiated Emissions - Restricted Band



Date: 23.NOV.2020 14:53:42

Frequency Range:	Antenna Polarization:	Emission Frequency:
13-18GHz	**Vertical**	**ND**
Channel Frequency:	Modulation:	Measured Emission:
2412.00 MHz	**DSSS**	**ND** dBuV

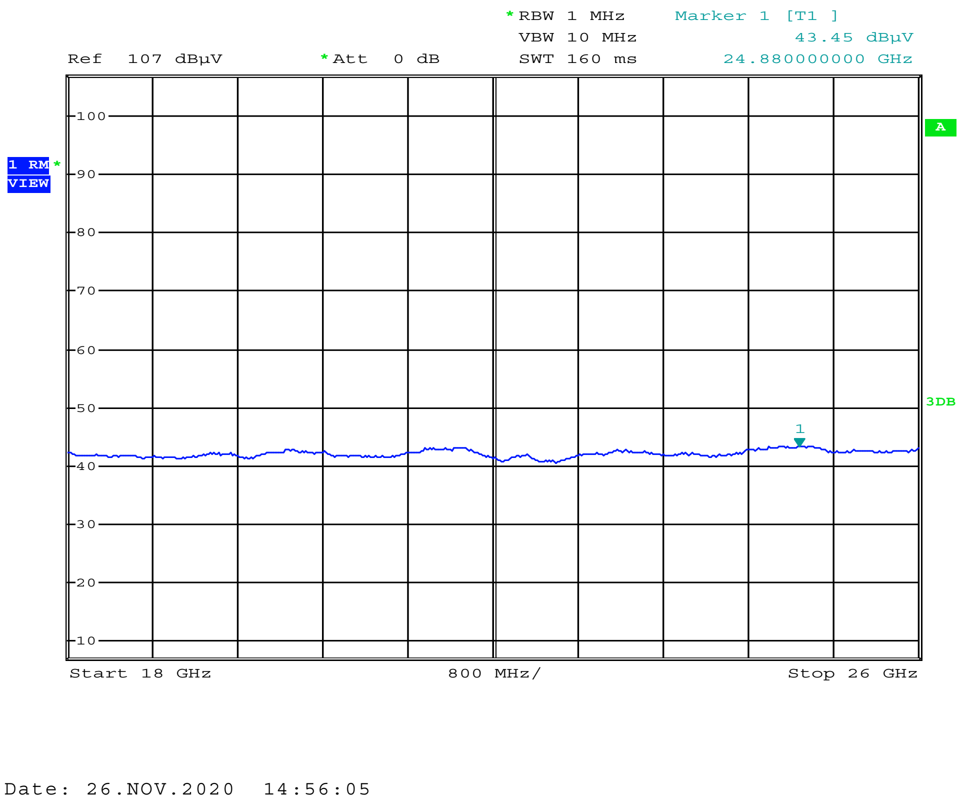
Radiated Emissions - Restricted Band



Date: 26.NOV.2020 14:57:11

Frequency Range:	Antenna Polarization:	Emission Frequency:
18-26GHz	**Horizontal**	**ND**
Channel Frequency:	Modulation:	Measured Emission:
2412.00 MHz	**DSSS**	**ND** dBuV

Radiated Emissions - Restricted Band



Frequency Range:	Antenna Polarization:	Emission Frequency:
18-26GHz	**Vertical**	**ND**
Channel Frequency:	Modulation:	Measured Emission:
2412.00 MHz	**DSSS**	**ND** dBuV

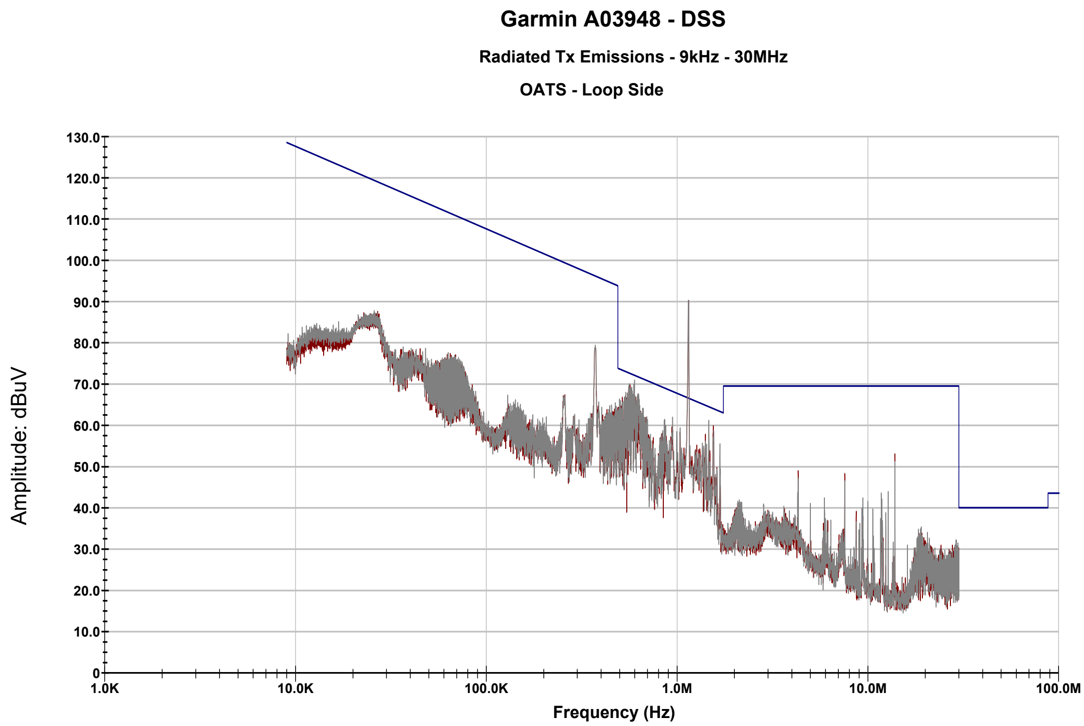
Summary of Radiated Tx Emissions (Restricted Band)

Measured Frequency Range (MHz)	Channel Frequency	Antenna Polarization	Emission Frequency	Measured Emission [E_{Meas}] (dBuV)		Antenna ACF [ACF] (dB)	Cable Loss [L_C] (dB)	Amplifier Gain [G_A] (dB)		Corrected Emission [E_{Corr}] (dBuV/m)		Limit (dBuV)	Margin (dB)
9kHz - 30MHz	2442.0	Front	ND	ND	(1)	0.00	0.00	0.00	(3)	ND	(2)	n/a	**n/a**
9kHz - 30MHz	2442.0	Side	ND	ND	(1)	0.00	0.00	0.00	(3)	ND	(2)	n/a	**n/a**
30-1000MHz	2442.0	Horizontal	745.2MHz	37.88		0.00	0.00	0.00	(3)	37.88	(2)	46.0	**8.1**
30-1000MHz	2442.0	Vertical	955.9MHz	39.24		0.00	0.00	0.00	(3)	39.24	(2)	46.0	**6.8**
1 - 3GHz	2442.0	Horizontal	ND	ND	(1)	27.40	4.58	0.00	(3)	ND		54.0	**n/a**
1 - 3GHz	2442.0	Vertical	ND	ND	(1)	27.40	4.58	0.00	(3)	ND		54.0	**n/a**
3-13GHz	2442.0	Horizontal	ND	ND	(1)	36.76	9.86	0.00	(3)	ND		54.0	**n/a**
3-13GHz	2442.0	Vertical	ND	ND	(1)	36.76	9.86	0.00	(3)	ND		54.0	**n/a**
13-18GHz	2442.0	Horizontal	ND	ND	(1)	38.75	16.54	0.00	(3)	ND		54.0	**n/a**
13-18GHz	2442.0	Vertical	ND	ND	(1)	38.75	16.54	0.00	(3)	ND		54.0	**n/a**
18-26GHz	2442.0	Horizontal	ND	ND	(1)	43.50	21.86	26.00		ND		54.0	**n/a**
18-26GHz	2442.0	Vertical	ND	ND	(1)	43.50	21.86	26.00		ND		54.0	**n/a**
											Results:	**Complies**	

(1) No Emissions Detected (ND) above ambient or within 20dB of the limit
(2) Antenna ACF, Cable Loss and Amplifier Gain corrected in Spectrum Analyzer Transducer Factor
(3) External Amplier not used

$E_{Corr} = E_{Meas} + ACF + L_C - G_A$

Radiated Emissions - Restricted Band



03:50:37 PM, Thursday, December 10, 2020

Profile Build: 2020.10.19

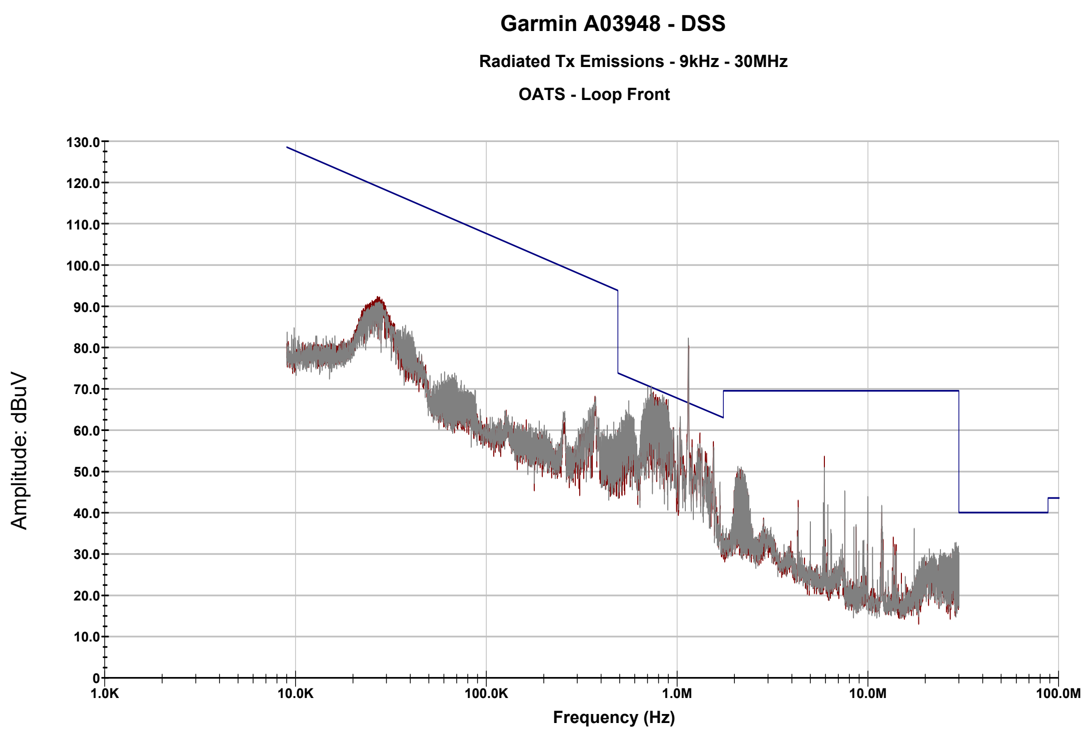
Trace 1	
Trace 2	

Frequency Range:	Antenna Polarization:	Emission Frequency:
9kHz - 30MHz	**Front**	**ND**
Channel Frequency:	Modulation:	Measured Emission:
2442.00 MHz	**8-DPSK**	**ND** dBuV

Trace 1: Ambient

Trace 2: Ambient + DUT

Radiated Emissions - Restricted Band



03:47:31 PM, Thursday, December 10, 2020

Profile Build: 2020.10.19

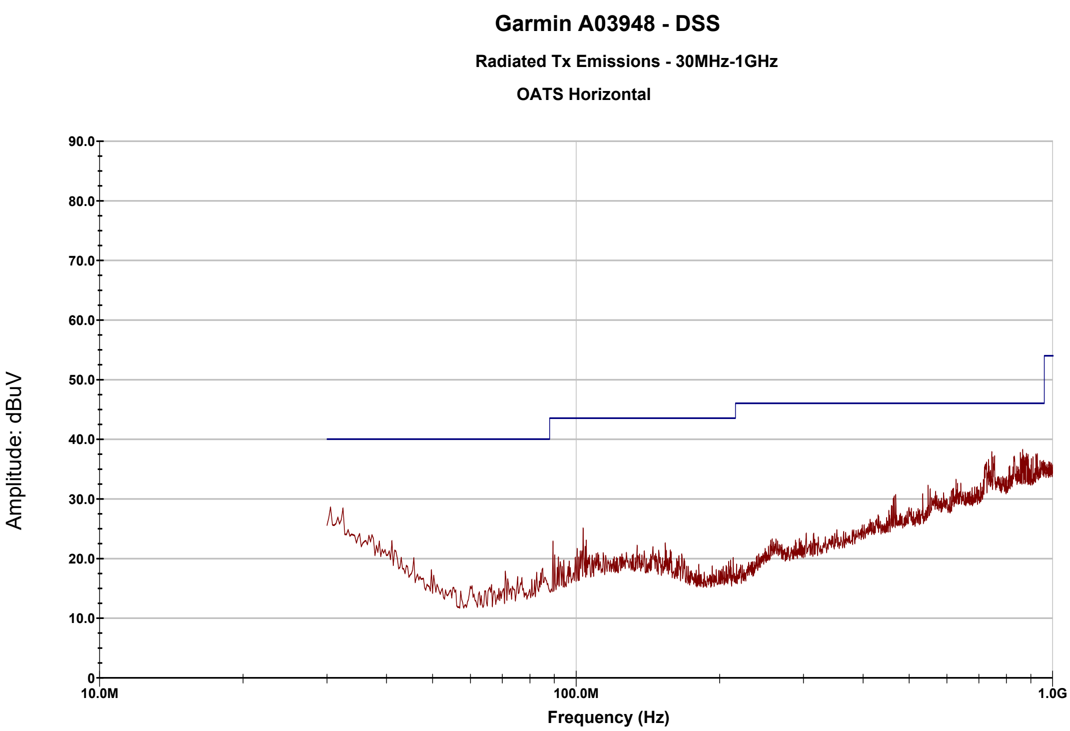
Trace 1	
Trace 2	

Frequency Range: **9kHz - 30MHz**	Antenna Polarization: **Side**	Emission Frequency: **ND**
Channel Frequency: **2442.00** MHz	Modulation: **8-DPSK**	Measured Emission: **ND** dBuV

Trace 1: Ambient

Trace 2: Ambient + DUT

Radiated Emissions - Restricted Band

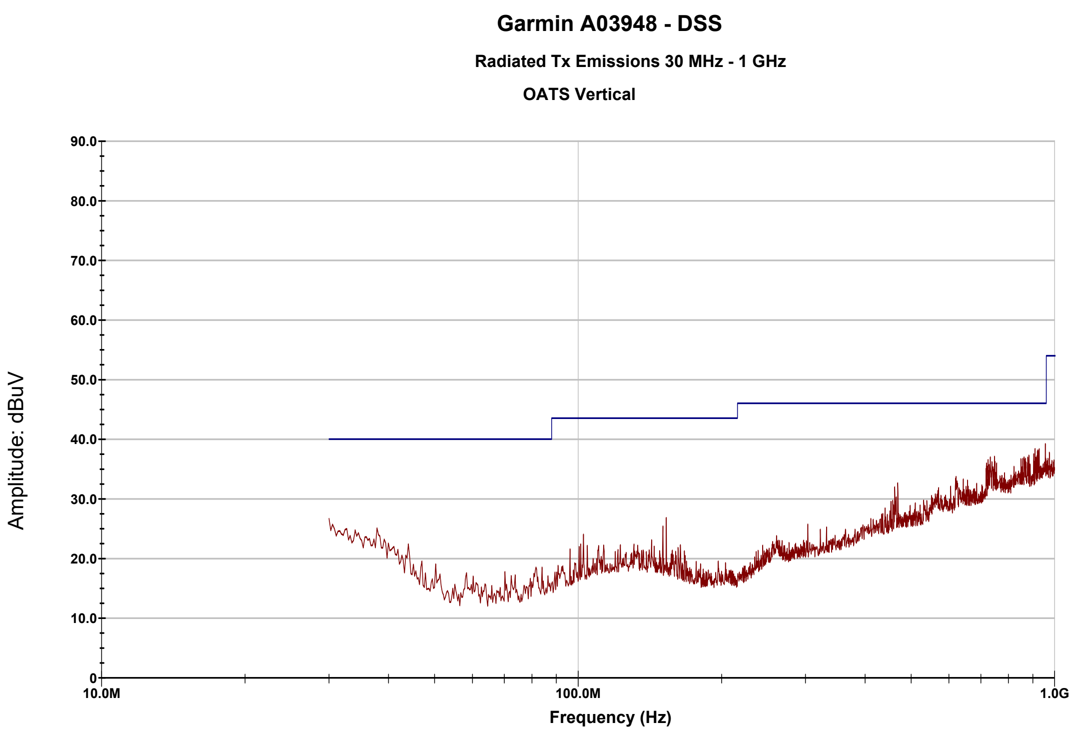


03:41:46 PM, Thursday, December 10, 2020

Profile Build: 2020.10.19

Frequency Range:	Antenna Polarization:	Emission Frequency:
30-1000MHz	**Horizontal**	**745.2MHz**
Channel Frequency:	Modulation:	Measured Emission:
2442.00 MHz	**8-DPSK**	**37.88** dBuV

Radiated Emissions - Restricted Band

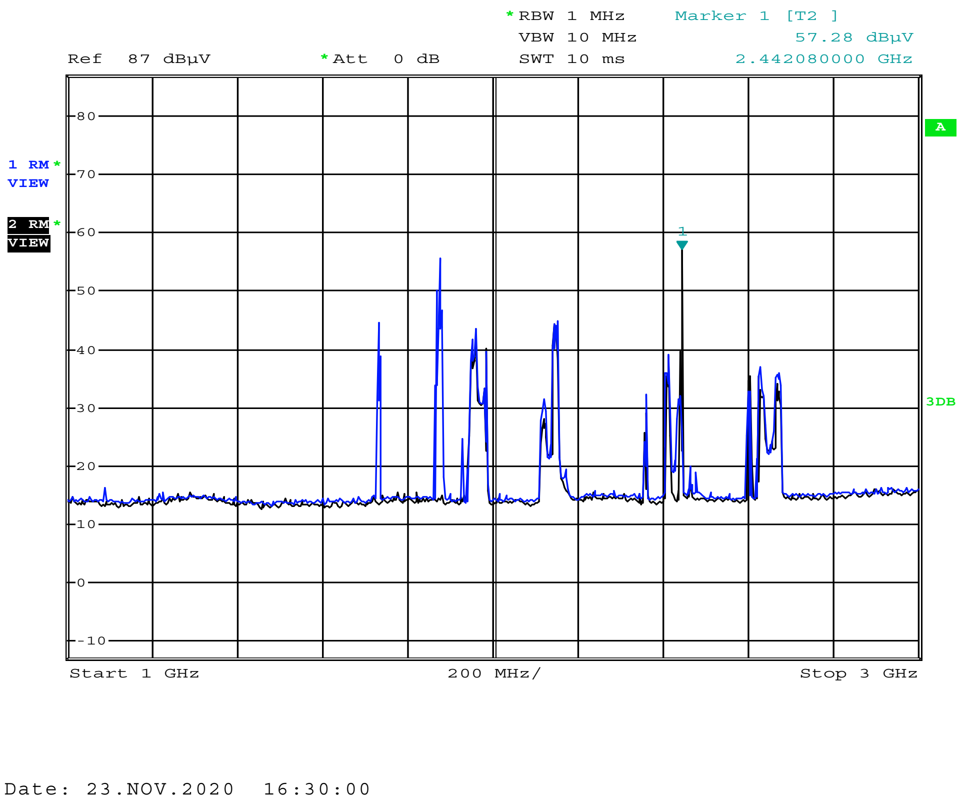


03:41:46 PM, Thursday, December 10, 2020

Profile Build: 2020.10.19

Frequency Range: **30-1000MHz**	Antenna Polarization: **Vertical**	Emission Frequency: **955.9MHz**
Channel Frequency: **2442.00** MHz	Modulation: **8-DPSK**	Measured Emission: **39.24** dBuV

Radiated Emissions - Restricted Band



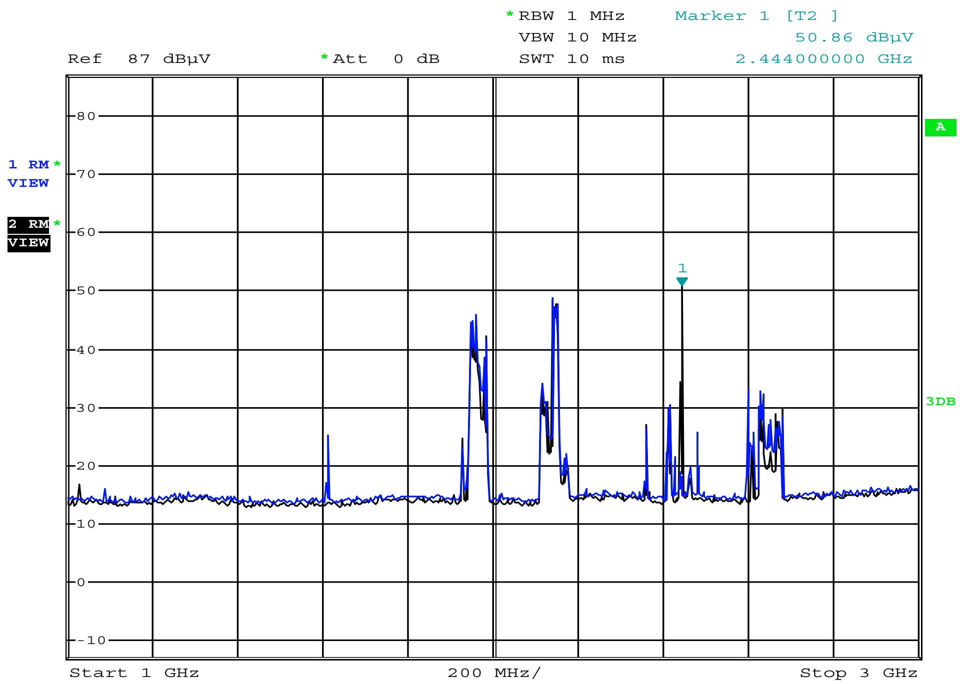
Frequency Range:	Antenna Polarization:	Emission Frequency:
1 - 3GHz	**Horizontal**	**ND**
Channel Frequency:	Modulation:	Measured Emission:
2442.00 MHz	**8-DPSK**	**ND** dBuV

Trace 1: Ambient

Trace 2: Ambient + DUT

Marker 1: Fundamental

Radiated Emissions - Restricted Band



Date: 23.NOV.2020 16:36:48

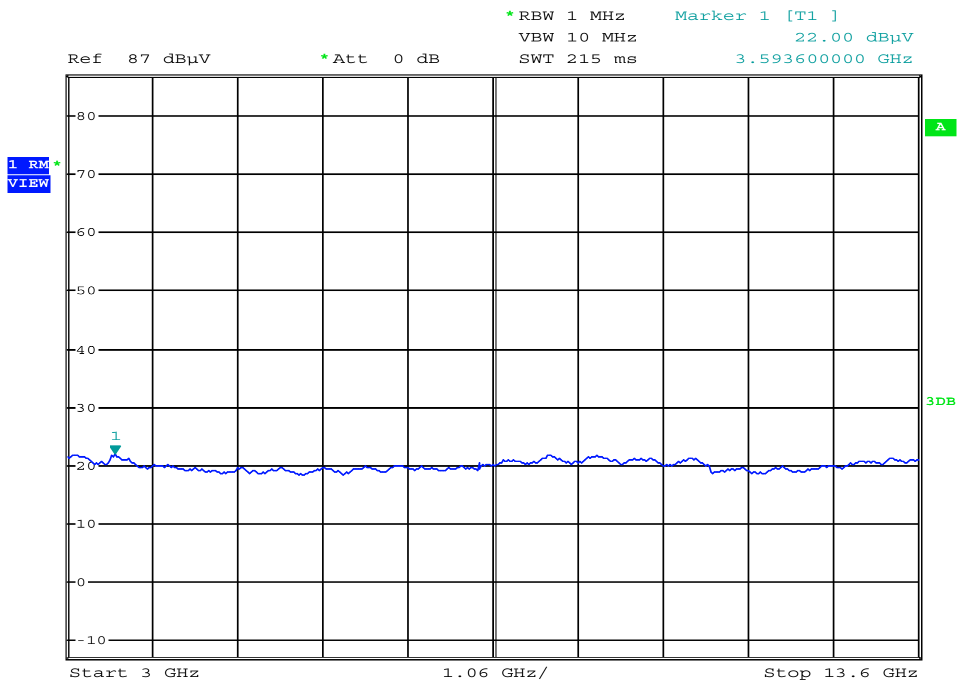
Frequency Range:	Antenna Polarization:	Emission Frequency:
1 - 3GHz	**Vertical**	**ND**
Channel Frequency:	Modulation:	Measured Emission:
2442.00 MHz	**8-DPSK**	**ND** dBuV

Trace 1: Ambient

Trace 2: Ambient + DUT

Marker 1: Fundamental

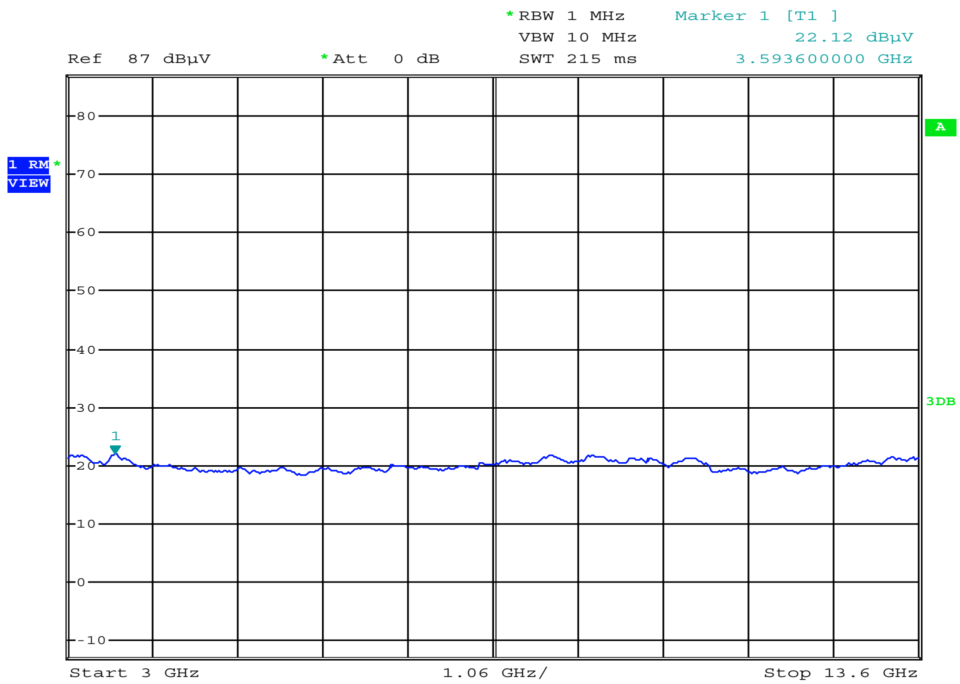
Radiated Emissions - Restricted Band



Date: 23.NOV.2020 16:31:16

Frequency Range: **3-13GHz**	Antenna Polarization: **Horizontal**	Emission Frequency: **ND**
Channel Frequency: **2442.00** MHz	Modulation: **8-DPSK**	Measured Emission: **ND** dBuV

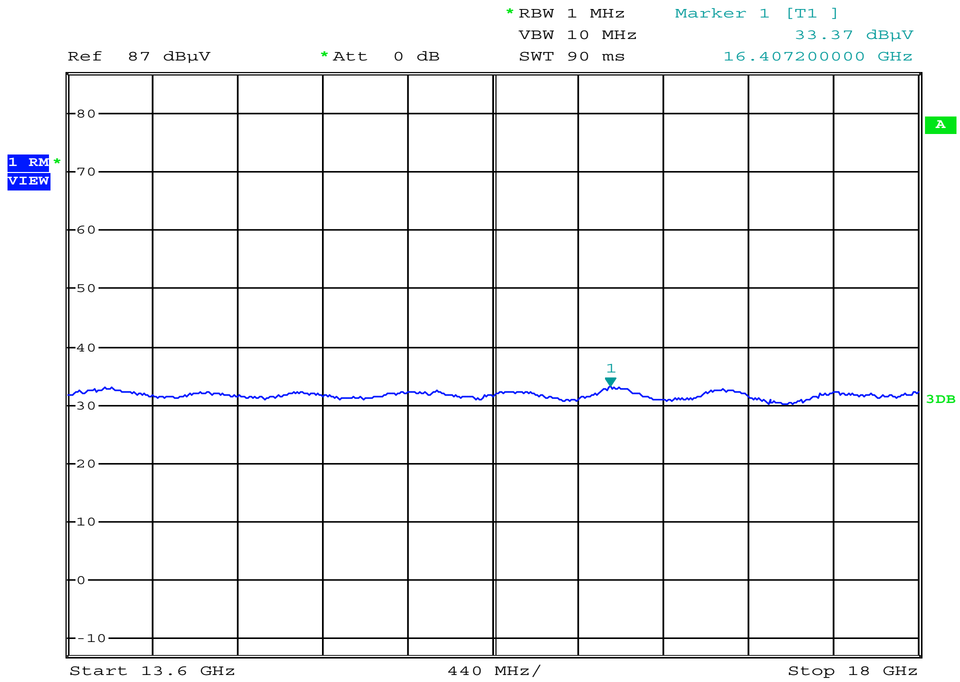
Radiated Emissions - Restricted Band



Date: 23.NOV.2020 16:33:31

Frequency Range:	Antenna Polarization:	Emission Frequency:
3-13GHz	**Vertical**	**ND**
Channel Frequency:	Modulation:	Measured Emission:
2442.00 MHz	**8-DPSK**	**ND** dBuV

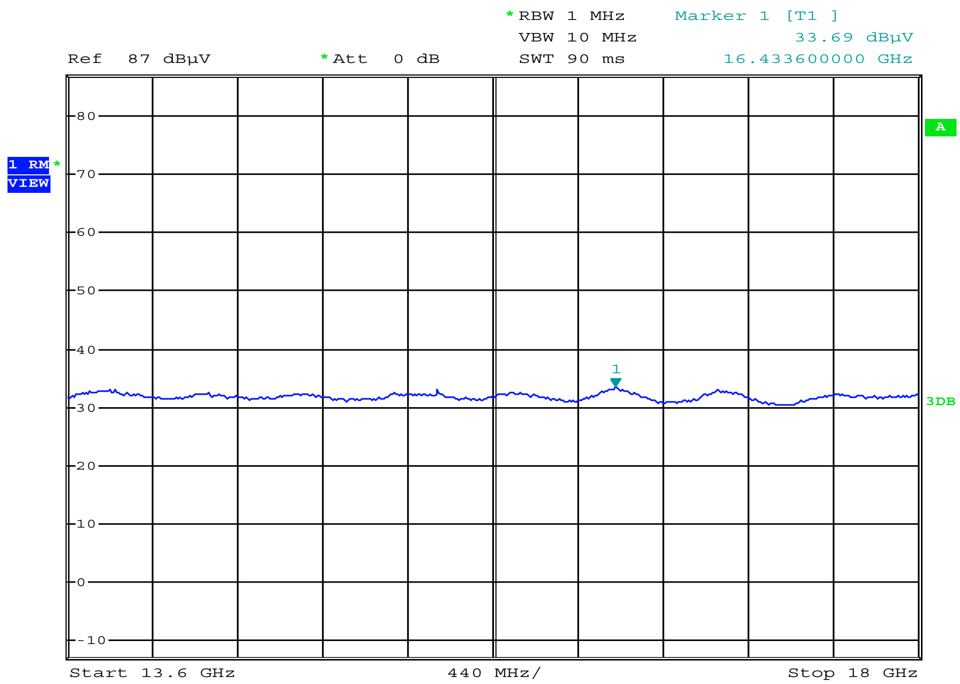
Radiated Emissions - Restricted Band



Date: 23.NOV.2020 16:31:39

Frequency Range:	Antenna Polarization:	Emission Frequency:
13-18GHz	**Horizontal**	**ND**
Channel Frequency:	Modulation:	Measured Emission:
2442.00 MHz	**8-DPSK**	**ND** dBuV

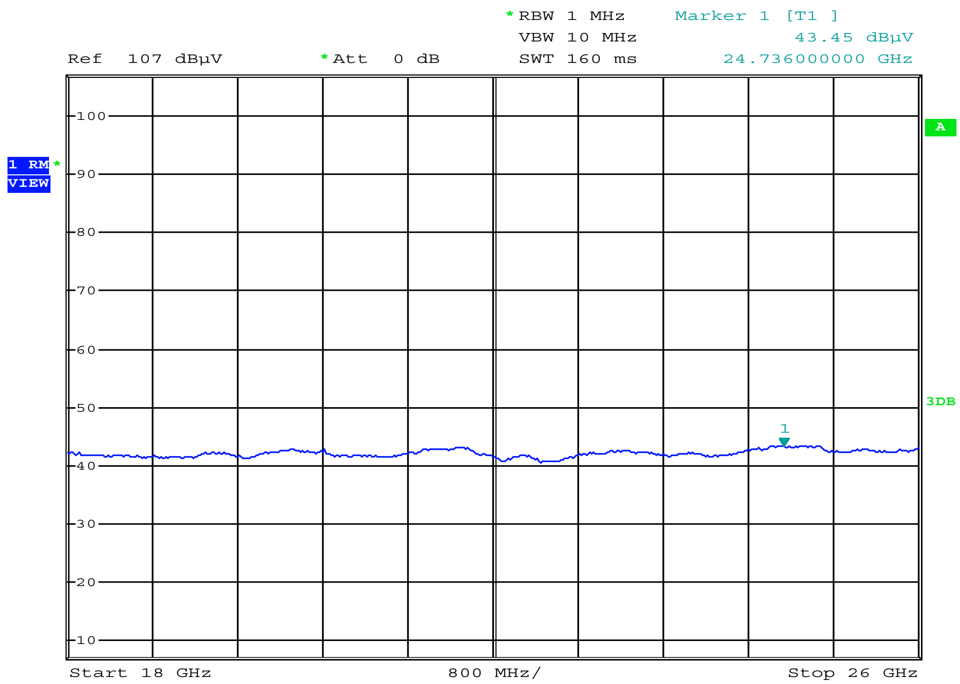
Radiated Emissions - Restricted Band



Date: 23.NOV.2020 16:32:58

Frequency Range:	Antenna Polarization:	Emission Frequency:
13-18GHz	Vertical	ND
Channel Frequency:	Modulation:	Measured Emission:
2442.00 MHz	8-DPSK	ND dBuV

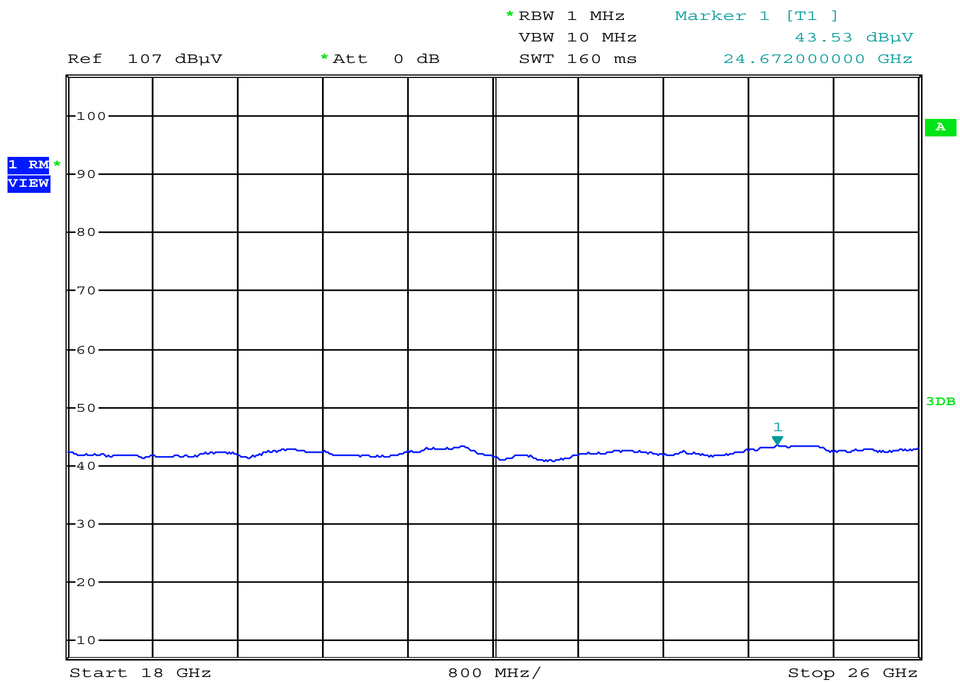
Radiated Emissions - Restricted Band



Date: 26.NOV.2020 14:44:03

Frequency Range:	Antenna Polarization:	Emission Frequency:
18-26GHz	**Horizontal**	**ND**
Channel Frequency:	Modulation:	Measured Emission:
2442.00 MHz	**8-DPSK**	**ND** dBuV

Radiated Emissions - Restricted Band



Date: 26.NOV.2020 14:59:07

Frequency Range:	Antenna Polarization:	Emission Frequency:
18-26GHz	**Vertical**	**ND**
Channel Frequency:	Modulation:	Measured Emission:
2442.00 MHz	**8-DPSK**	**ND** dBuV

Test Report Serial Number:	**45461627 R1.0**
Test Report Date:	**4 December 2020**
Project Number:	**1511**

Appendix K - Occupied Bandwidth Measurement Plots

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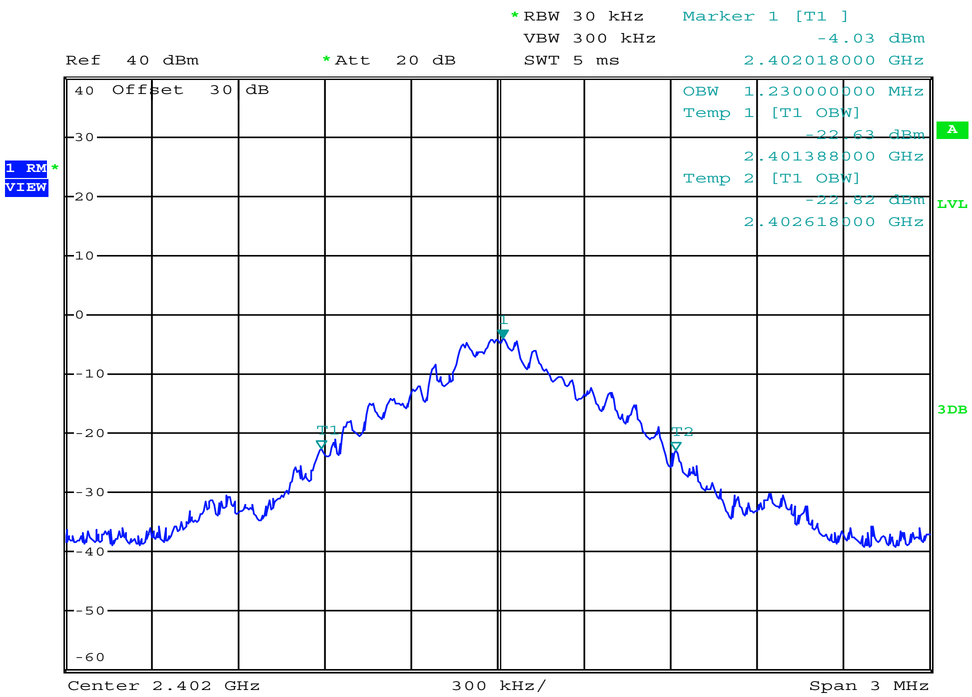
Occupied Bandwidth Measurement Results (DXX)						
Frequency (MHz)	**Modulation**	**Mode**	**Measured Occupied Bandwidth (MHz)**	**Minimum Authorized Bandwidth (MHz)**	**Margin (MHz)**	**Emission Designator**
2402	GFSK	BT BR	1.230	0.5	0.730	1M23F1D
2480	GFSK	BT BR	0.996		0.496	996KF1D
2402	GFSK	ANT	0.978		0.478	978KF1D
2480	GFSK	ANT	1.026		0.526	1M03F1D
2402	GMSK	BLE	1.146		0.646	1M15F1D
2480	GMSK	BLE	1.200		0.700	1M20F1D
						Complies

Margin = Measured BW - Minimum Authorized BW

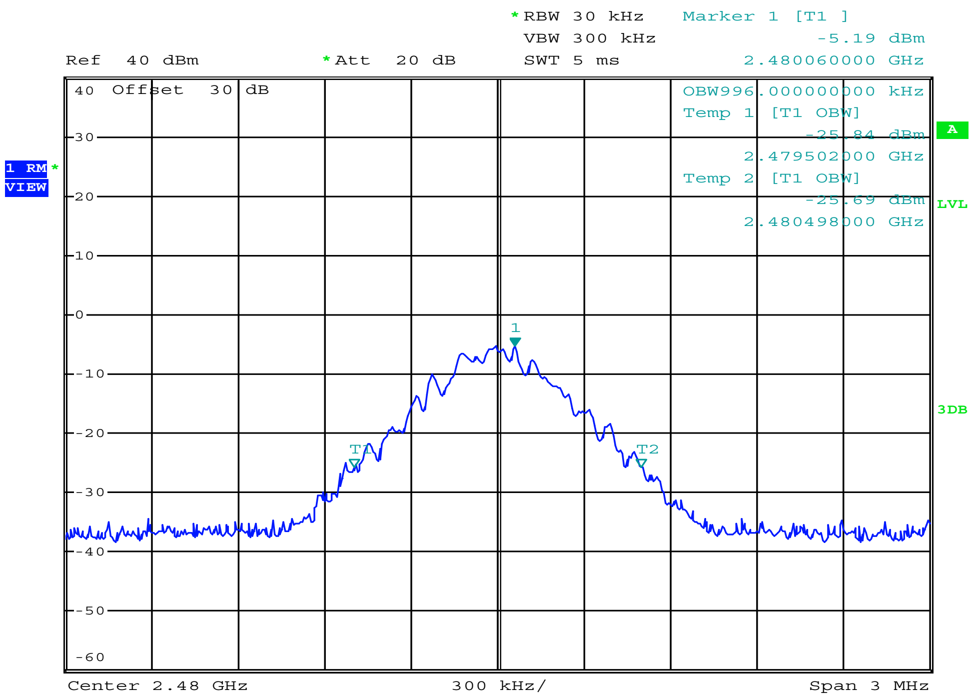
Occupied Bandwidth



Date: 3.DEC.2020 15:24:57

Channel Frequency:		
2402.00 MHz		
DUT Modulation: **GFSK**	Mode: **BT BR**	Measured Occupied Bandwidth: **1.230** MHz

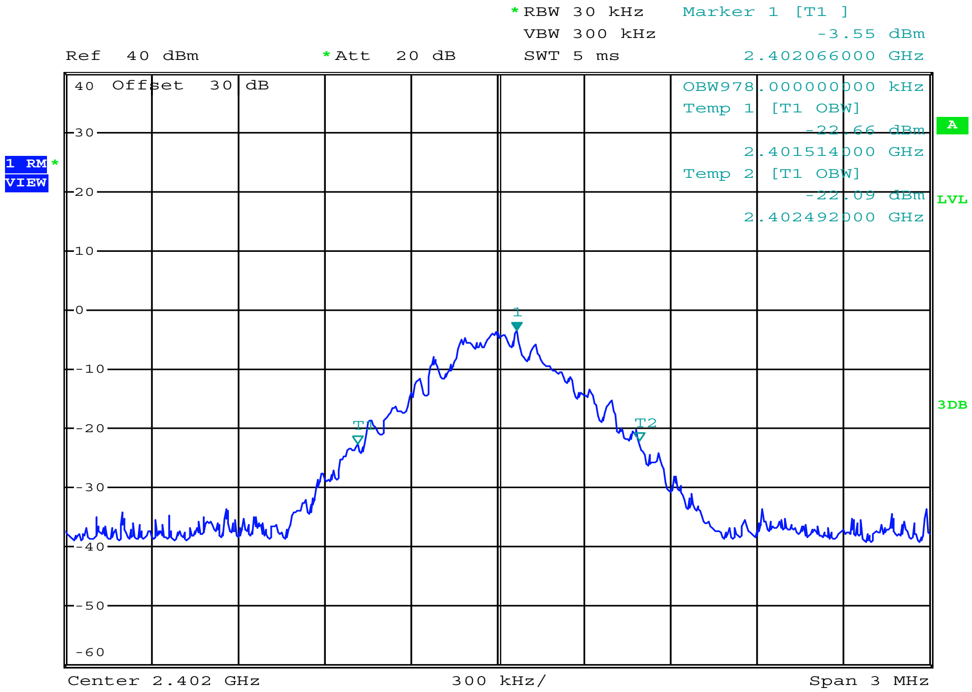
Occupied Bandwidth



Date: 3.DEC.2020 15:24:10

Channel Frequency:		
2480.00 MHz		
DUT Modulation: **GFSK**	Mode: **BT BR**	Measured Occupied Bandwidth: **0.996** MHz

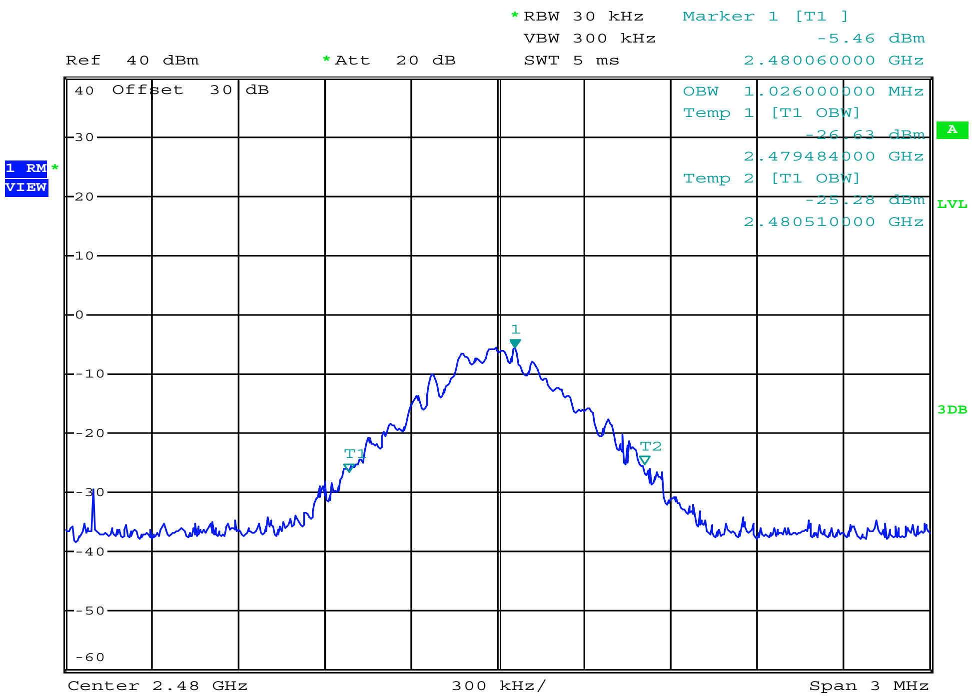
Occupied Bandwidth



Date: 3.DEC.2020 15:28:48

Channel Frequency: **2402.00** MHz		
DUT Modulation: **GFSK**	Mode: **ANT**	Measured Occupied Bandwidth: **0.978** MHz

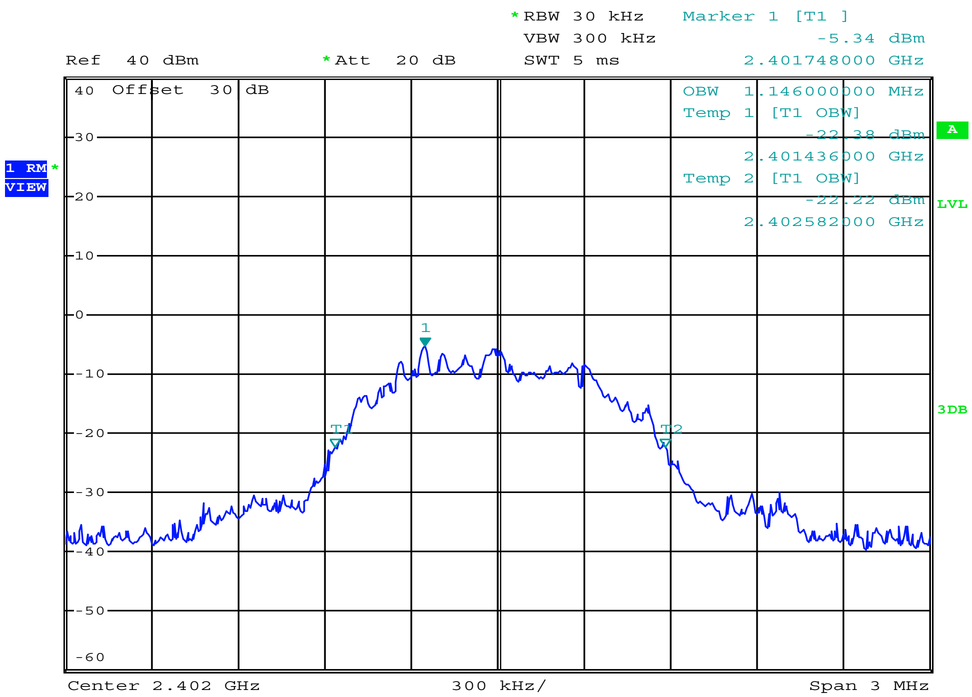
Occupied Bandwidth



Date: 3.DEC.2020 15:28:13

Channel Frequency:		
2480.00 MHz		
DUT Modulation:	Mode:	Measured Occupied Bandwidth:
GFSK	**ANT**	**1.026** MHz

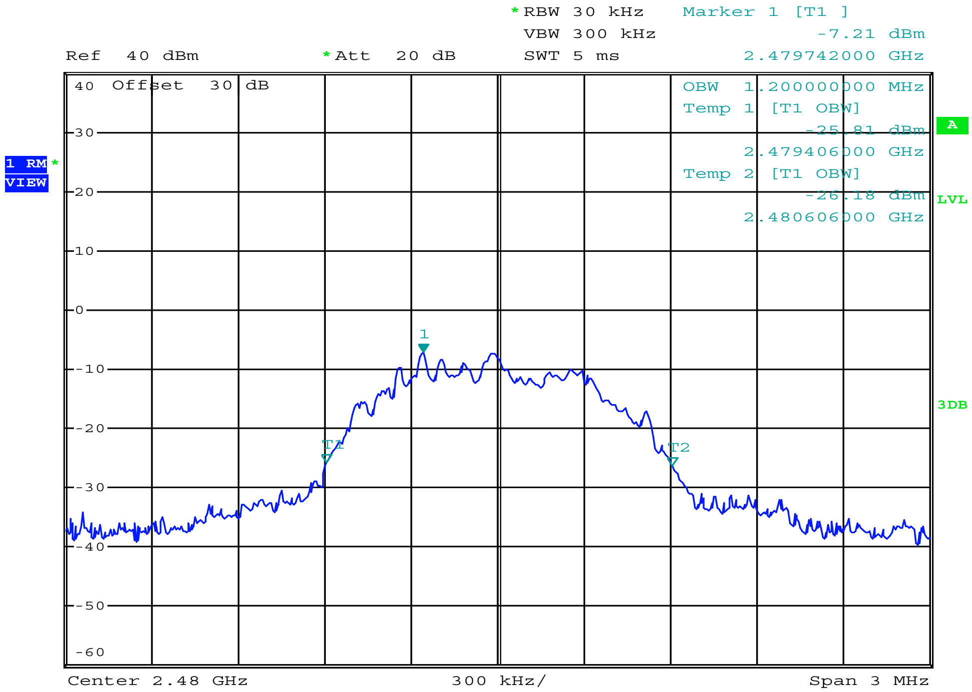
Occupied Bandwidth



Date: 3.DEC.2020 15:26:24

Channel Frequency: **2402.00** MHz		
DUT Modulation: **GMSK**	Mode: **BLE**	Measured Occupied Bandwidth: **1.146** MHz

Occupied Bandwidth

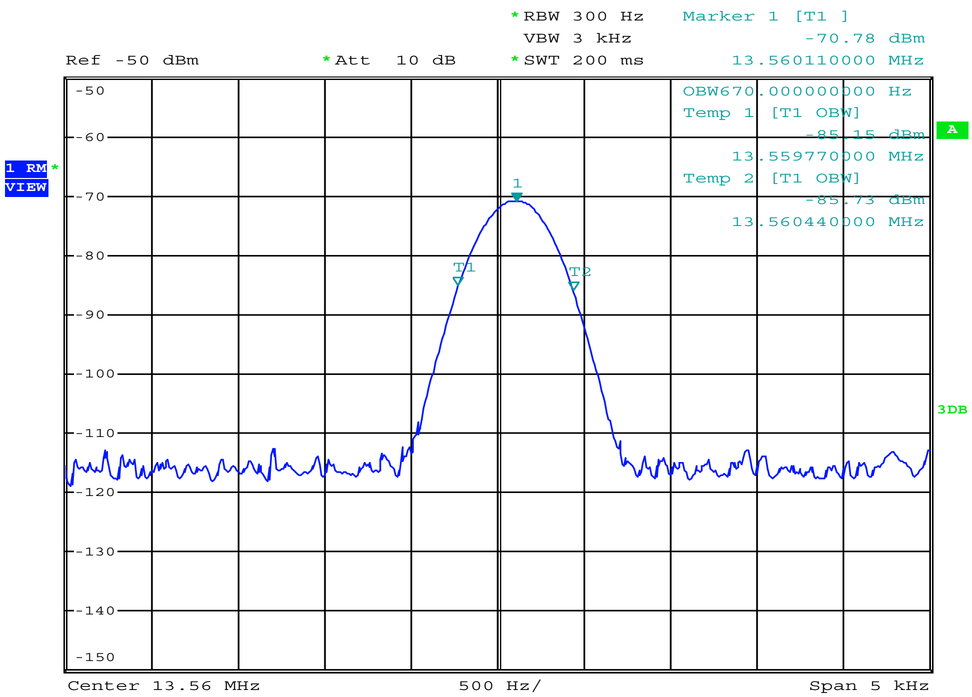


Date: 3.DEC.2020 15:26:58

Channel Frequency: **2480.00** MHz		
DUT Modulation: **GMSK**	Mode: **BLE**	Measured Occupied Bandwidth: **1.200** MHz

Occupied Bandwidth Measurement Results (NFC)				
Frequency (MHz)	Modulation	Mode	Measured Occupied Bandwidth (Hz)	Emission Designator
13.56	ASK	NFC	670.000	670HK1D
				Complies

Occupied Bandwidth



Date: 15.DEC.2020 13:29:37

Channel Frequency:		
13.56 MHz		
DUT Modulation:	Mode:	Measured Occupied Bandwidth:
ASK	**NFC**	**670.0** Hz

Test Report Serial Number:	**45461627 R1.0**
Test Report Date:	**4 December 2020**
Project Number:	**1511**

Appendix L - Field Strength Measurement Plots

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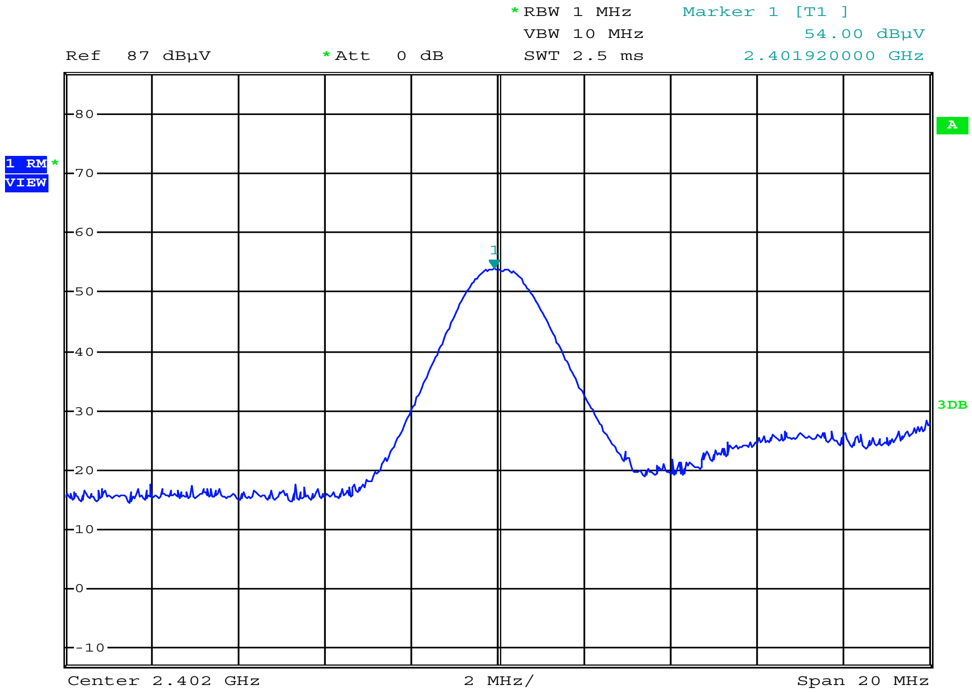
FCC §15.249(a), RSS-210 Radiated Field Strength										
Frequency (MHz)	Mode	Modulation	Detector	Antenna Polarization	Measured Field Strength [FS_{Meas}] (dBuV @ 3m)	Cable Loss [L_C] (dBm)	Receive Antenna [ACF] (dB)	Corrected Field Strength [FS_{Corr}] (dBuV @3m)	Limit (dBuV)	Margin (dB)
2402.0	BT BR	GFSK	RMS	Horizontal	54.00	4.6	28.3	86.90	94.0	**7.1**
2442.0					54.18			87.08		**6.9**
2480.0					54.37			87.27		**6.7**
2402.0				Vertical	42.04			74.94		**19.1**
2442.0					44.15			77.05		**17.0**
2480.0					40.41			73.31		**20.7**
2442.0			Peak	Horizontal	53.61			86.51	114.0	**27.5**
2442.0				Vertical	48.04			80.94		**33.1**
									Result:	**Complies**

$FS_{Corr} = FS_{Meas} + ACF + L_C$

$Margin = Limit - FS_{Corr}$

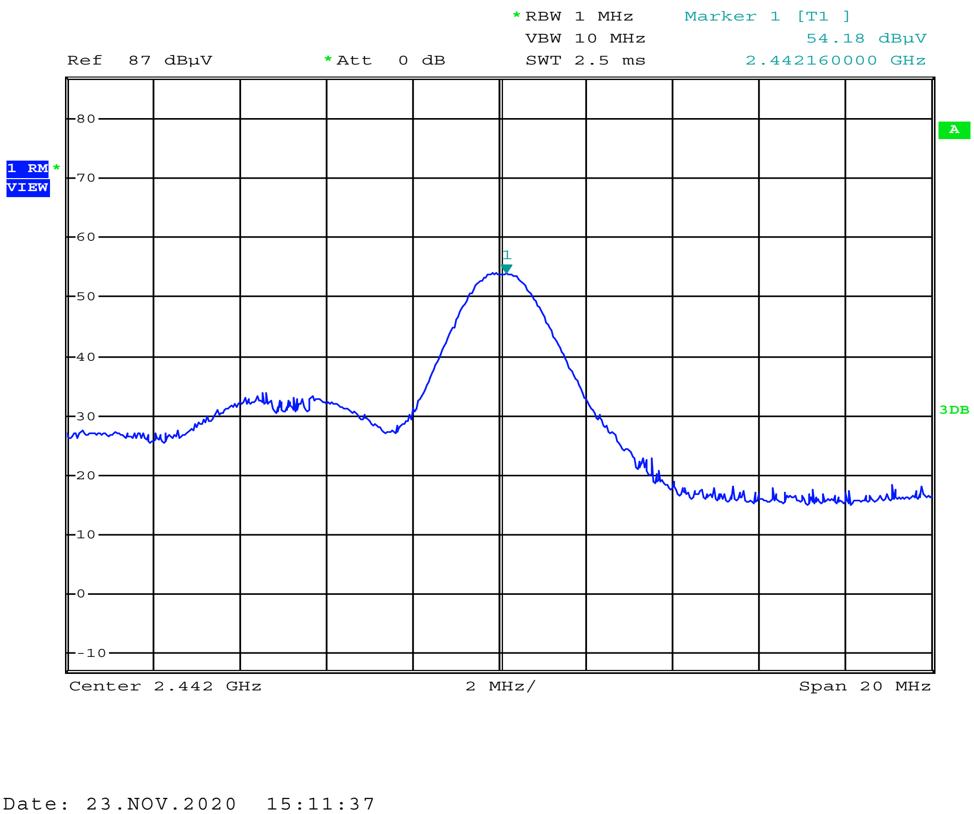
Field Strength (Average)



Date: 23.NOV.2020 15:04:33

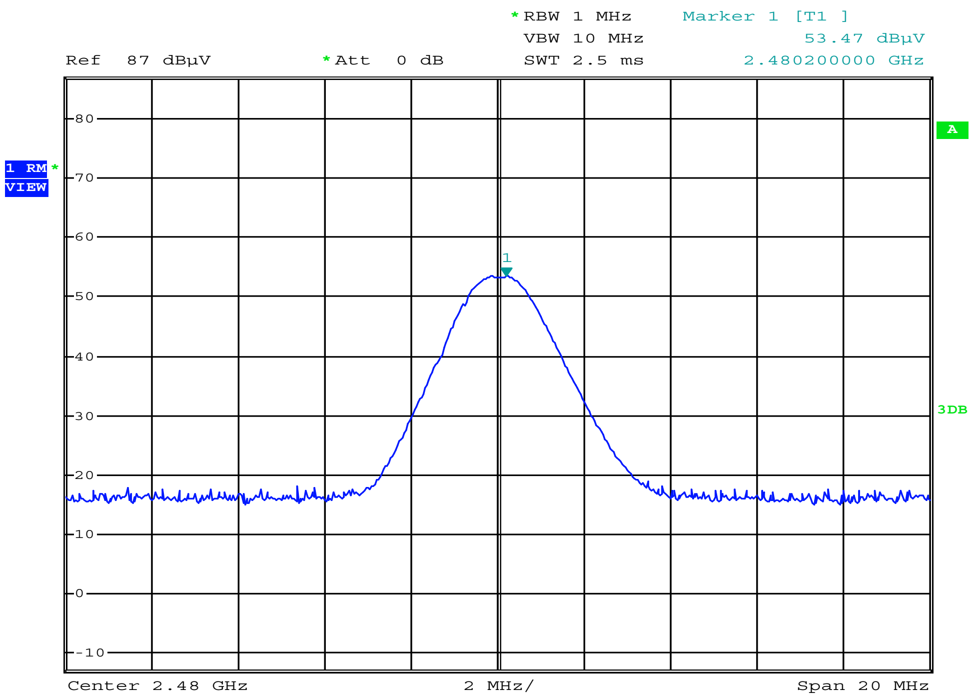
Channel Frequency: **2402.00** MHz	Detector: **RMS**	Antenna Polarization: **Horizontal**
Modulation Setting: **GFSK**	Protocol: **BT BR**	Measured Field Strength: **54.00** dBuV

Field Strength (Average)



Channel Frequency:	Detector:	Antenna Polarization:
2442.00 MHz	**RMS**	**Horizontal**
Modulation Setting:	Protocol:	Measured Field Strength:
GFSK	**BT BR**	**54.18** dBuV

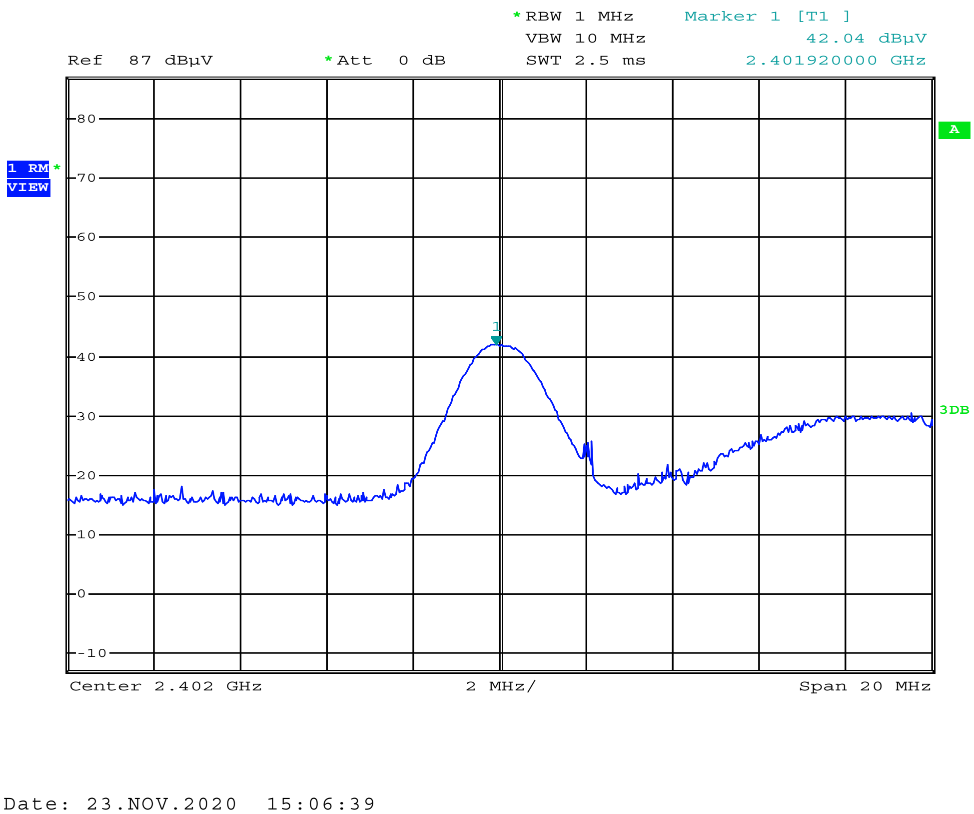
Field Strength (Average)



Date: 23.NOV.2020 15:13:48

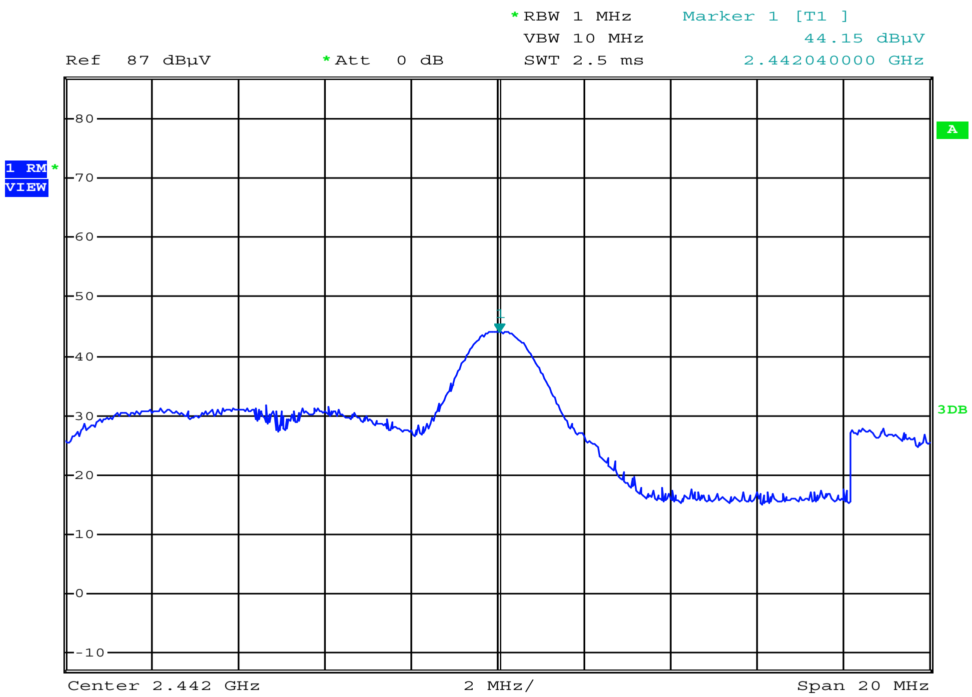
Channel Frequency:	Detector:	Antenna Polarization:
2480.00 MHz	**RMS**	**Horizontal**
Modulation Setting:	Protocol:	Measured Field Strength:
GFSK	**BT BR**	**53.47** dBuV

Field Strength (Average)



Channel Frequency: **2402.00** MHz	Detector: **RMS**	Antenna Polarization: **Vertical**
Modulation Setting: **GFSK**	Protocol: **BT BR**	Measured Field Strength: **42.04** dBuV

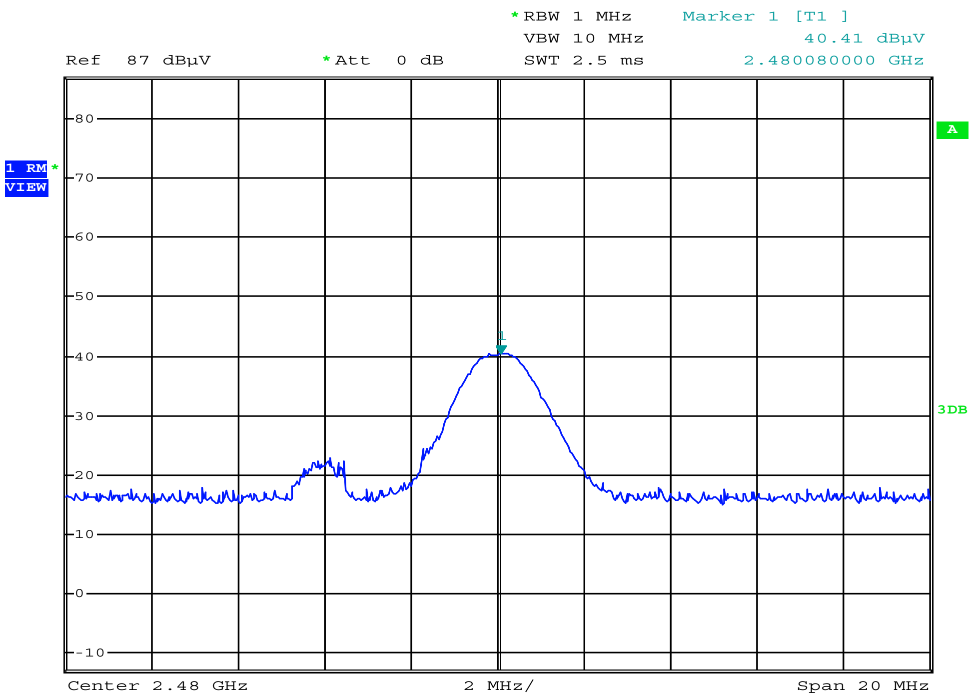
Field Strength (Average)



Date: 23.NOV.2020 15:10:21

Channel Frequency: **2442.00** MHz	Detector: **RMS**	Antenna Polarization: **Vertical**
Modulation Setting: **GFSK**	Protocol: **BT BR**	Measured Field Strength: **44.15** dBuV

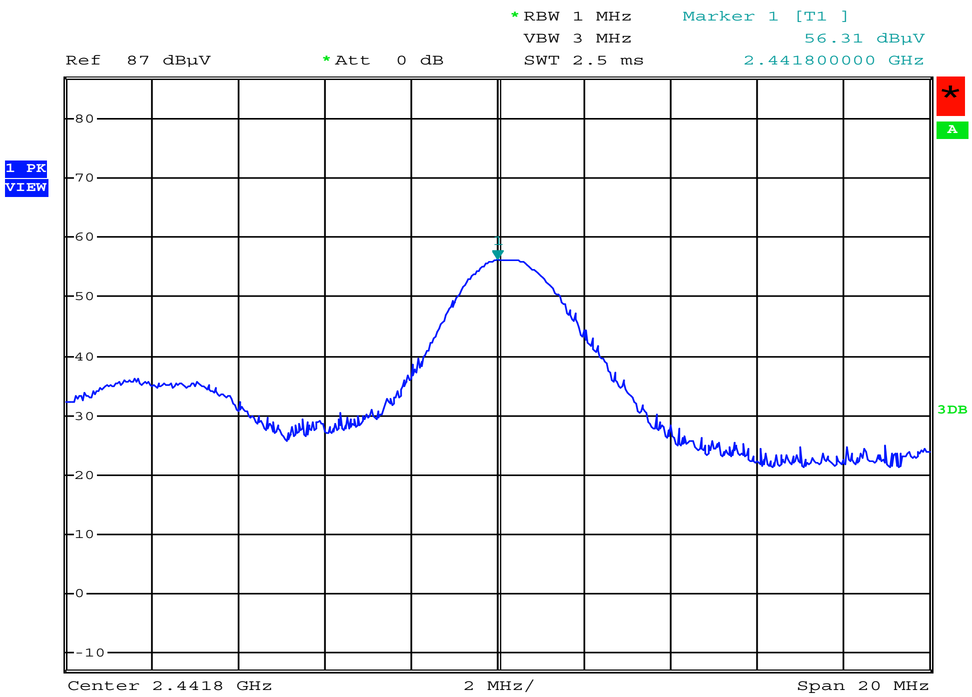
Field Strength (Average)



Date: 23.NOV.2020 15:15:16

Channel Frequency:	Detector:	Antenna Polarization:
2480.00 MHz	**RMS**	**Vertical**
Modulation Setting:	Protocol:	Measured Field Strength:
GFSK	**BT BR**	**40.41** dBuV

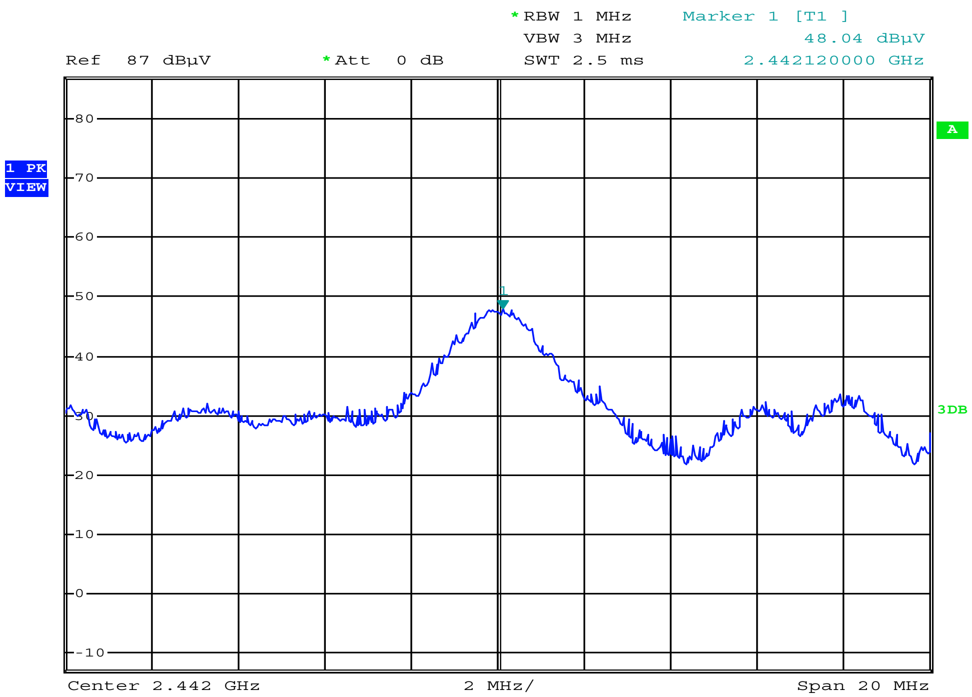
Field Strength (Peak)



Date: 23.NOV.2020 16:23:14

Channel Frequency: **2442.00** MHz	Detector: **Peak**	Antenna Polarization: **Horizontal**
Modulation Setting: **GFSK**	Protocol: **BT BR**	Measured Field Strength: **53.61** dBuV

Field Strength (Peak)



Date: 23.NOV.2020 16:20:55

Channel Frequency: **2442.00** MHz	Detector: **Peak**	Antenna Polarization: **Vertical**
Modulation Setting: **GFSK**	Protocol: **BT BR**	Measured Field Strength: **48.04** dBuV

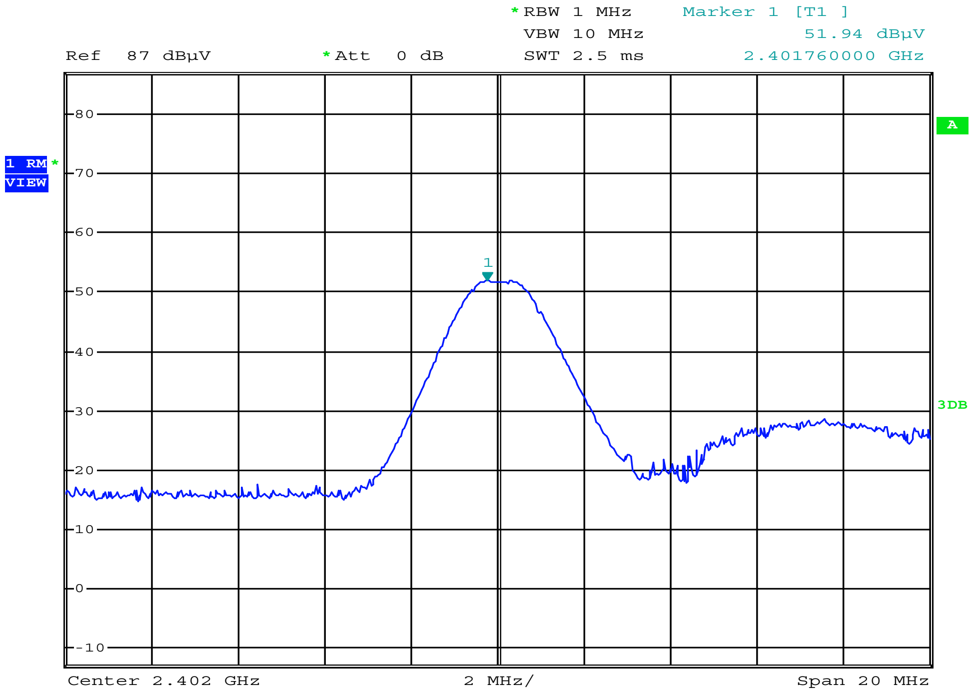
FCC §15.249(a), RSS-210 Radiated Field Strength

Frequency (MHz)	Mode	Modulation	Detector	Antenna Polarization	Measured Field Strength [FS_{Meas}] (dBuV @ 3m)	Cable Loss [L_C] (dBm)	Receive Antenna [ACF] (dB)	Corrected Field Strength [FS_{Corr}] (dBuV @3m)	Limit (dBuV)	Margin (dB)
2402.0	BLE	GMSK	RMS	Horizontal	51.94	4.6	28.3	84.84	94.0	**9.2**
2442.0					52.82			85.72		**8.3**
2480.0					53.61			86.51		**7.5**
2402.0				Vertical	44.51			77.41		**16.6**
2442.0					44.70			77.60		**16.4**
2480.0					44.66			77.56		**16.4**
2480.0			Peak	Horizontal	53.99			86.89	114.0	**27.1**
2442.0				Vertical	50.09			82.99		**31.0**
								Result:	**Complies**	

$FS_{Corr} = FS_{Meas} + ACF + L_C$

$Margin = Limit - FS_{Corr}$

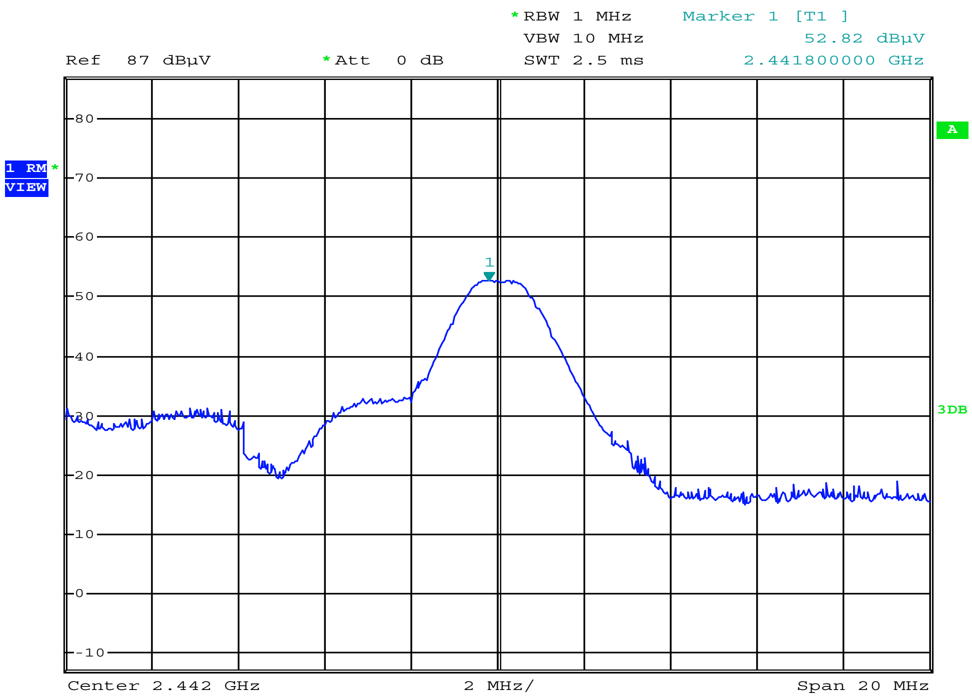
Field Strength (Average)



Date: 23.NOV.2020 15:41:58

Channel Frequency: **2402.00** MHz	Detector: **RMS**	Antenna Polarization: **Horizontal**
Modulation Setting: **GMSK**	Protocol: **BLE**	Measured Field Strength: **51.94** dBuV

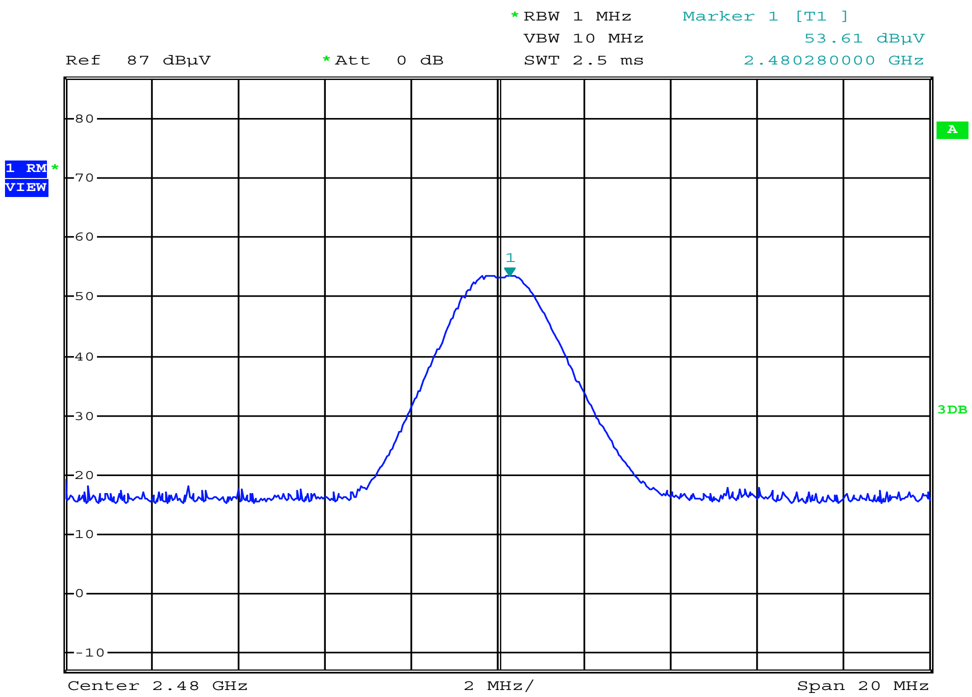
Field Strength (Average)



Date: 23.NOV.2020 15:50:21

Channel Frequency: **2442.00** MHz	Detector: **RMS**	Antenna Polarization: **Horizontal**
Modulation Setting: **GMSK**	Protocol: **BLE**	Measured Field Strength: **52.82** dBuV

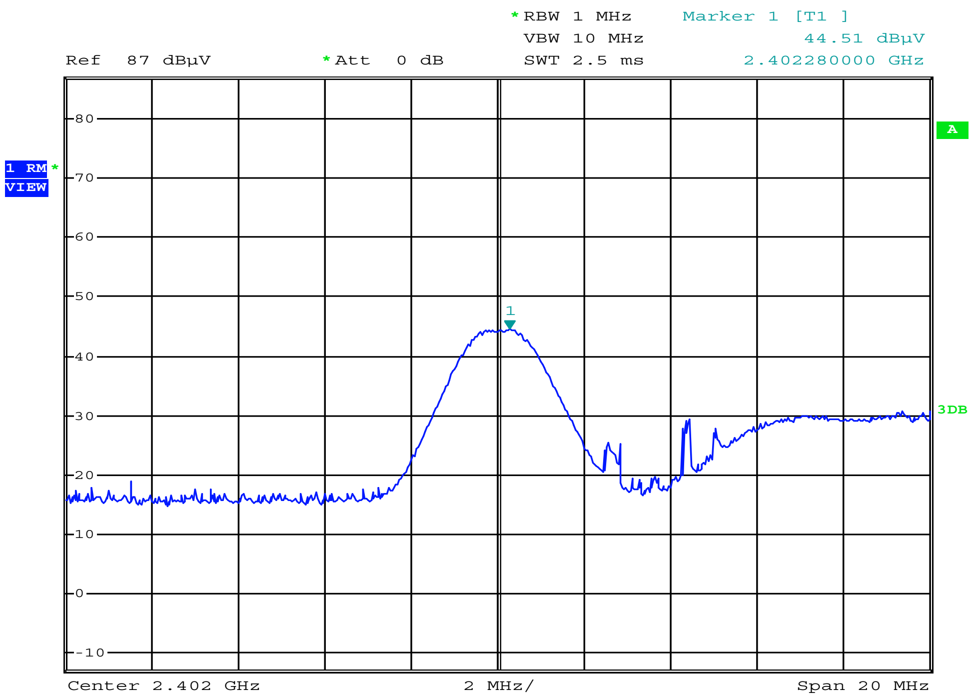
Field Strength (Average)



Date: 23.NOV.2020 15:43:44

Channel Frequency: **2480.00** MHz	Detector: **RMS**	Antenna Polarization: **Horizontal**
Modulation Setting: **GMSK**	Protocol: **BLE**	Measured Field Strength: **53.61** dBuV

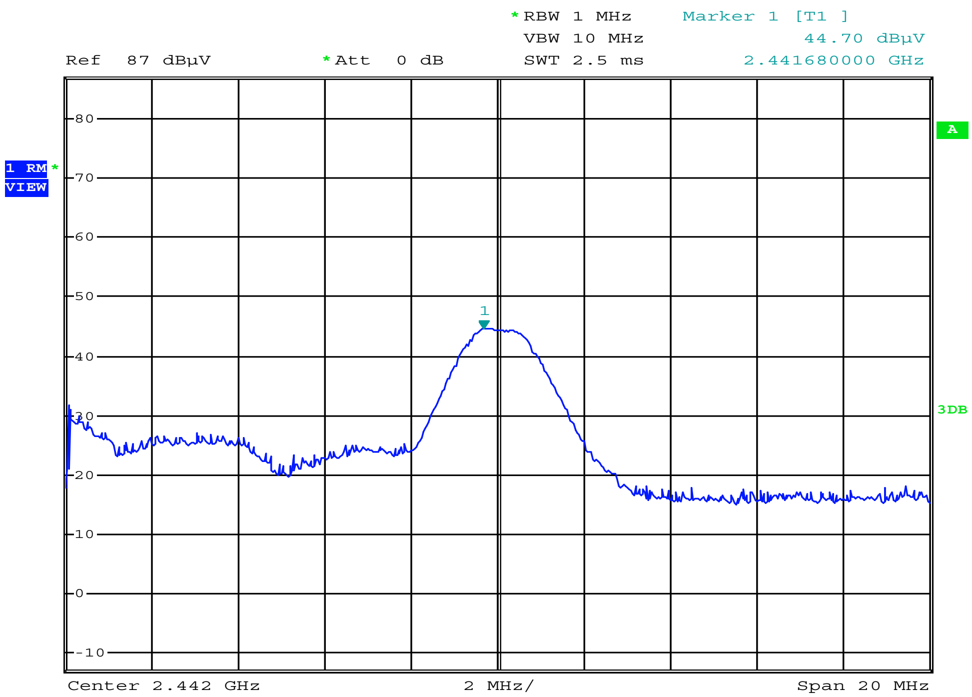
Field Strength (Average)



Date: 23.NOV.2020 15:40:35

Channel Frequency: **2402.00** MHz	Detector: **RMS**	Antenna Polarization: **Vertical**
Modulation Setting: **GMSK**	Protocol: **BLE**	Measured Field Strength: **44.51** dBuV

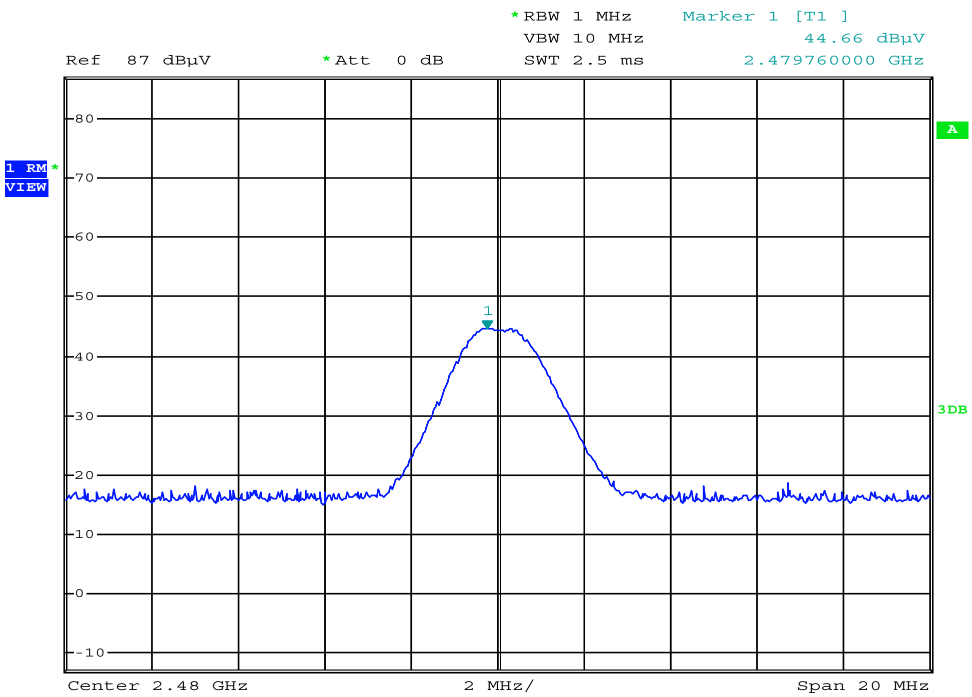
Field Strength (Average)



Date: 23.NOV.2020 15:48:37

Channel Frequency: **2442.00** MHz	Detector: **RMS**	Antenna Polarization: **Vertical**
Modulation Setting: **GMSK**	Protocol: **BLE**	Measured Field Strength: **44.70** dBuV

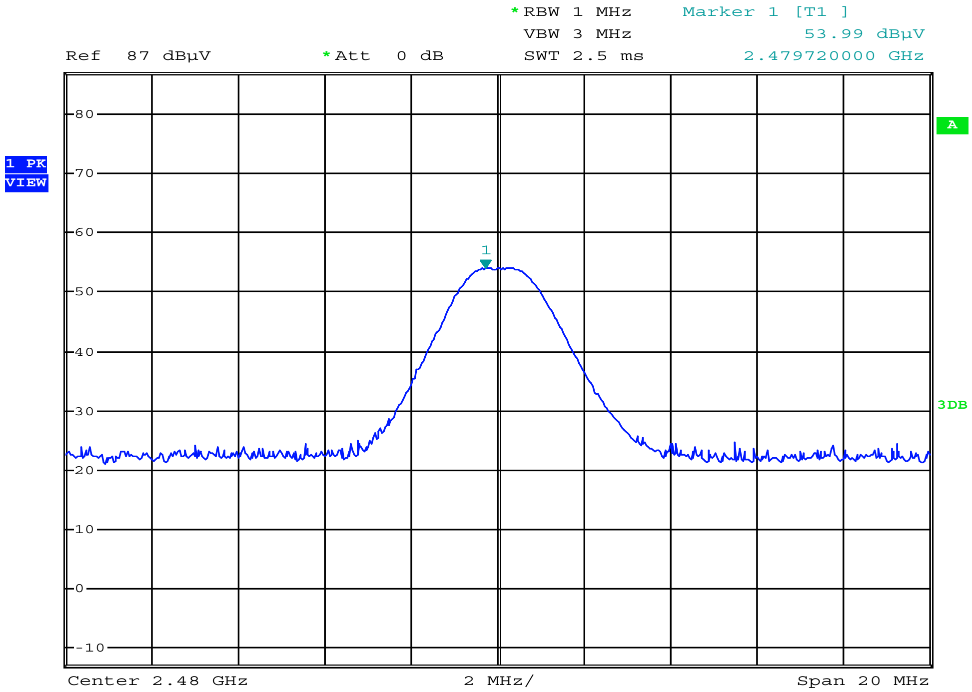
Field Strength (Average)



Date: 23.NOV.2020 15:46:50

Channel Frequency: **2480.00** MHz	Detector: **RMS**	Antenna Polarization: **Vertical**
Modulation Setting: **GMSK**	Protocol: **BLE**	Measured Field Strength: **44.66** dBuV

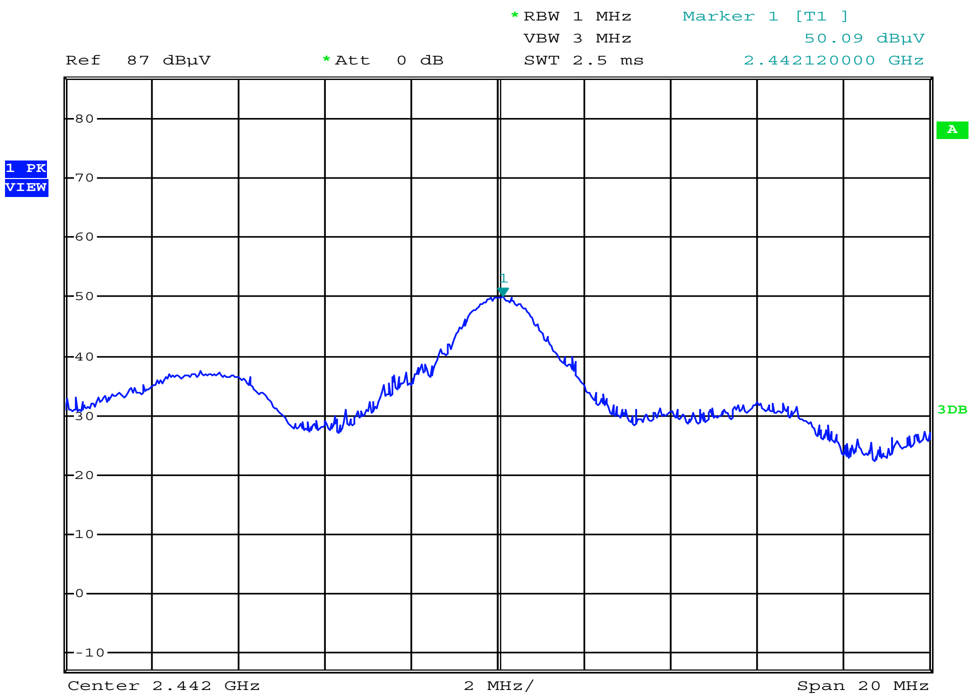
Field Strength (Peak)



Date: 23.NOV.2020 16:17:24

Channel Frequency:	Detector:	Antenna Polarization:
2480.00 MHz	**Peak**	**Horizontal**
Modulation Setting:	Protocol:	Measured Field Strength:
GMSK	**BLE**	**53.99** dBuV

Field Strength (Peak)



Date: 23.NOV.2020 11:52:23

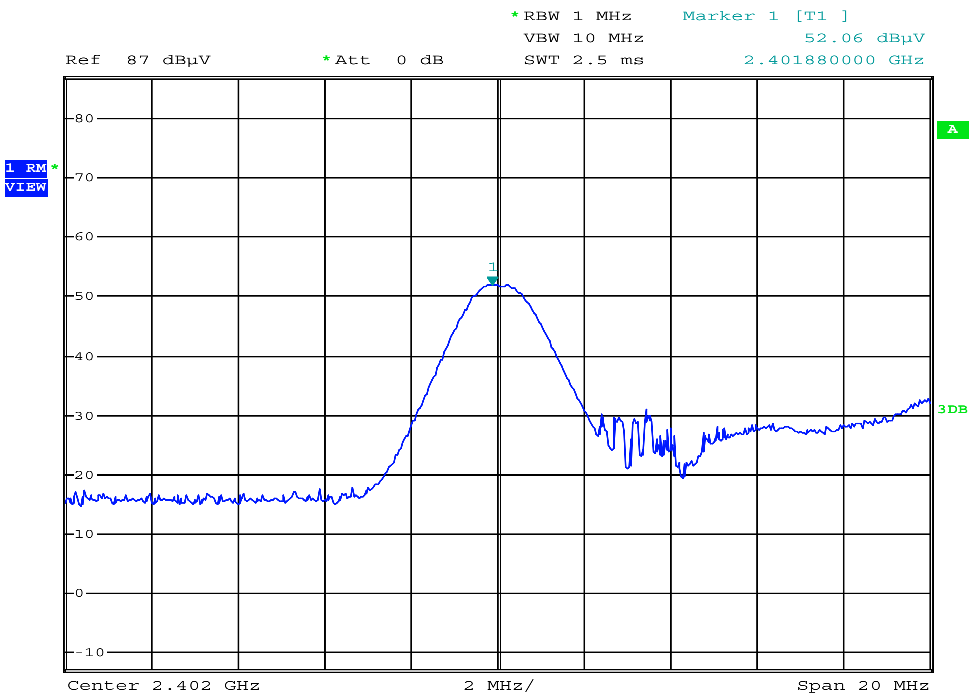
Channel Frequency:	Detector:	Antenna Polarization:
2442.00 MHz	**Peak**	**Vertical**
Modulation Setting:	Protocol:	Measured Field Strength:
GMSK	**BLE**	**50.09** dBuV

FCC §15.249(a), RSS-210 Radiated Field Strength										
Frequency (MHz)	**Mode**	**Modulation**	**Detector**	**Antenna Polarization**	**Measured Field Strength [FS_{Meas}] (dBuV @ 3m)**	**Cable Loss [L_C] (dBm)**	**Receive Antenna [ACF] (dB)**	**Corrected Field Strength [FS_{Corr}] (dBuV @3m)**	**Limit (dBuV)**	**Margin (dB)**
2402.0	ANT	GFSK	RMS	Horizontal	52.06	4.6	28.3	84.96	94.0	**9.0**
2442.0					53.68			86.58		**7.4**
2480.0					54.76			87.66		**6.3**
2402.0				Vertical	45.21			78.11		**15.9**
2442.0					46.17			79.07		**14.9**
2480.0					43.80			76.70		**17.3**
2480.0			Peak	Horizontal	55.62			88.52	114.0	**25.5**
2442.0				Vertical	48.65			81.55		**32.5**
								Result:	**Complies**	

$FS_{Corr} = FS_{Meas} + ACF + L_C$

Margin = Limit - FS_{Corr}

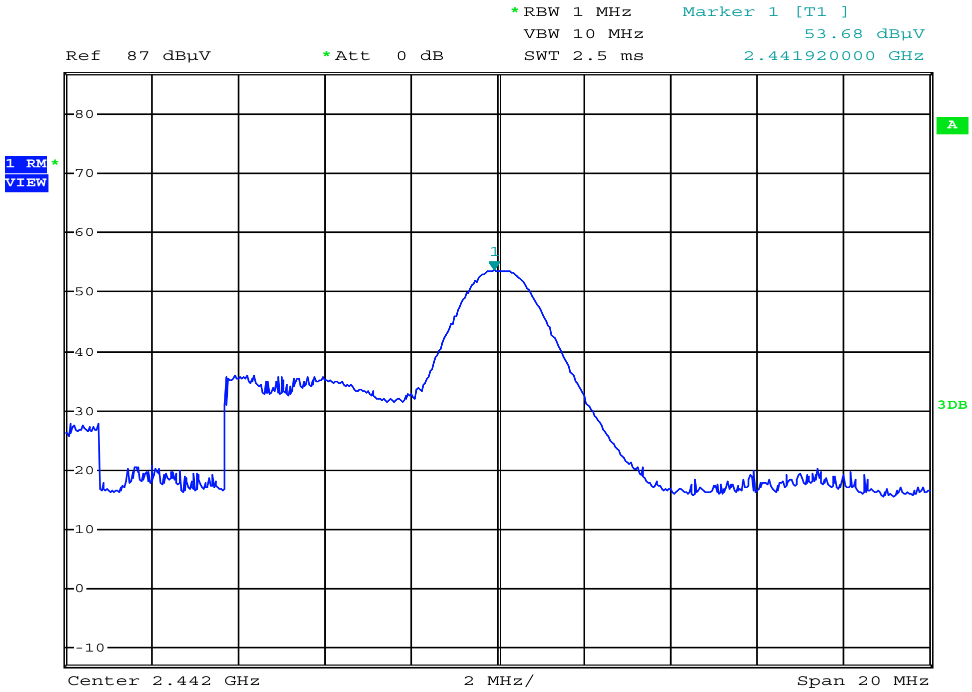
Field Strength (Average)



Date: 23.NOV.2020 16:02:42

Channel Frequency: **2402.00** MHz	Detector: **RMS**	Antenna Polarization: **Horizontal**
Modulation Setting: **GFSK**	Protocol: **ANT**	Measured Field Strength: **52.06** dBuV

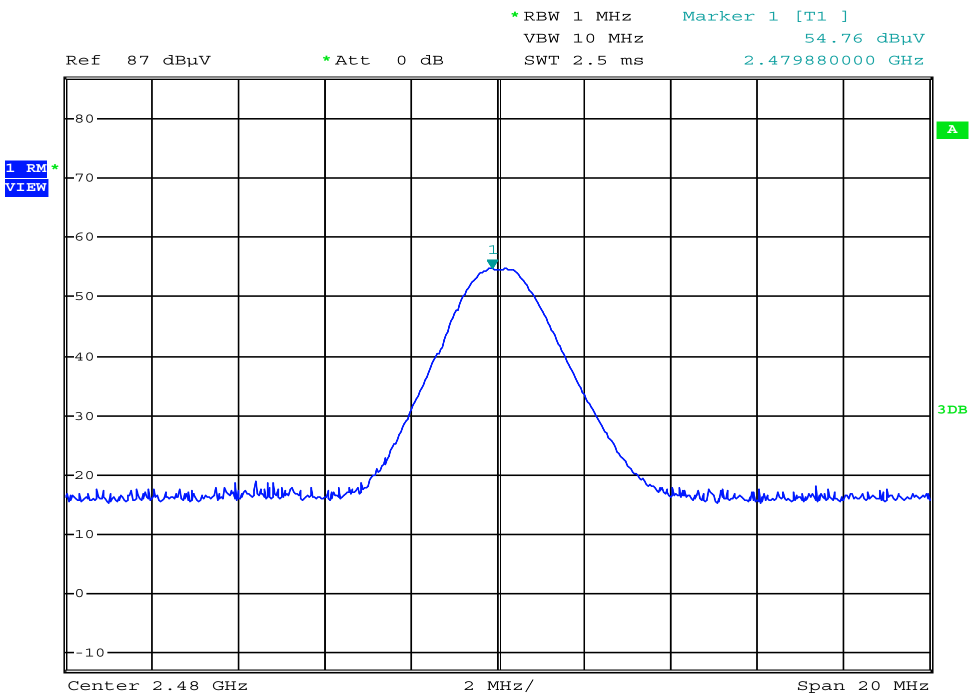
Field Strength (Average)



Date: 23.NOV.2020 15:57:30

Channel Frequency: **2442.00** MHz	Detector: **RMS**	Antenna Polarization: **Horizontal**
Modulation Setting: **GFSK**	Protocol: **ANT**	Measured Field Strength: **53.68** dBuV

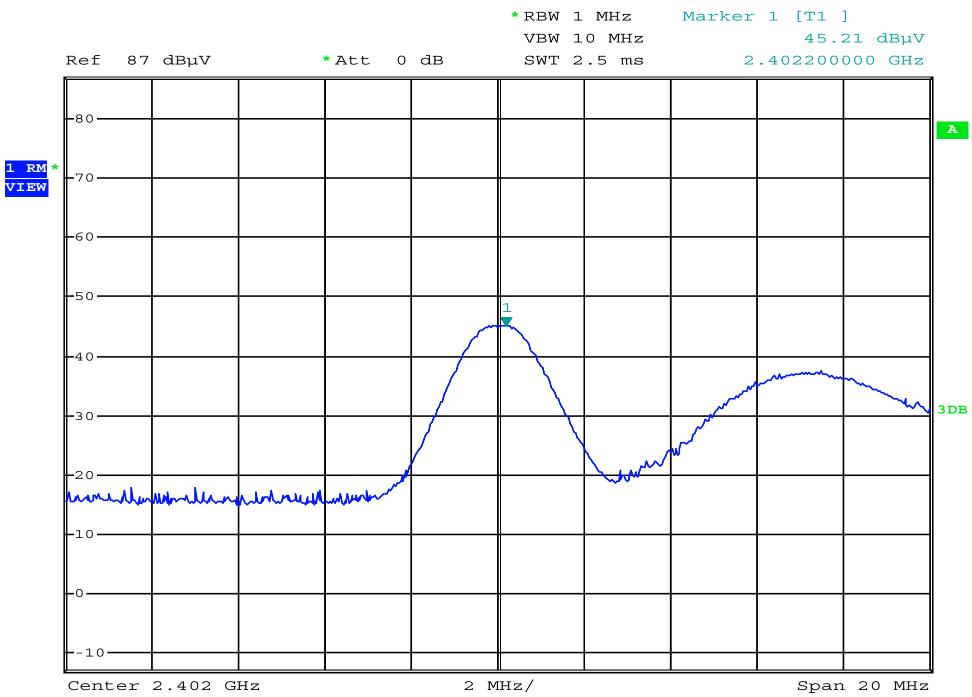
Field Strength (Average)



Date: 23.NOV.2020 16:04:22

Channel Frequency:	Detector:	Antenna Polarization:
2480.00 MHz	**RMS**	**Horizontal**
Modulation Setting: **GFSK**	Protocol: **ANT**	Measured Field Strength: **54.76** dBuV

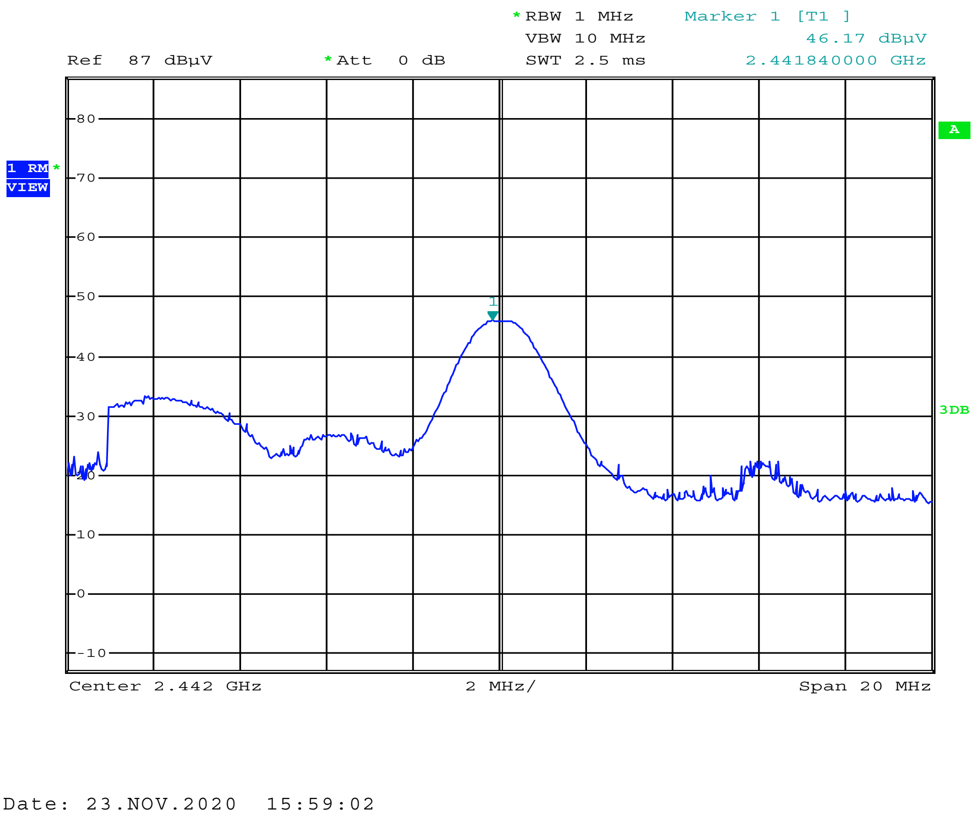
Field Strength (Average)



Date: 23.NOV.2020 16:01:15

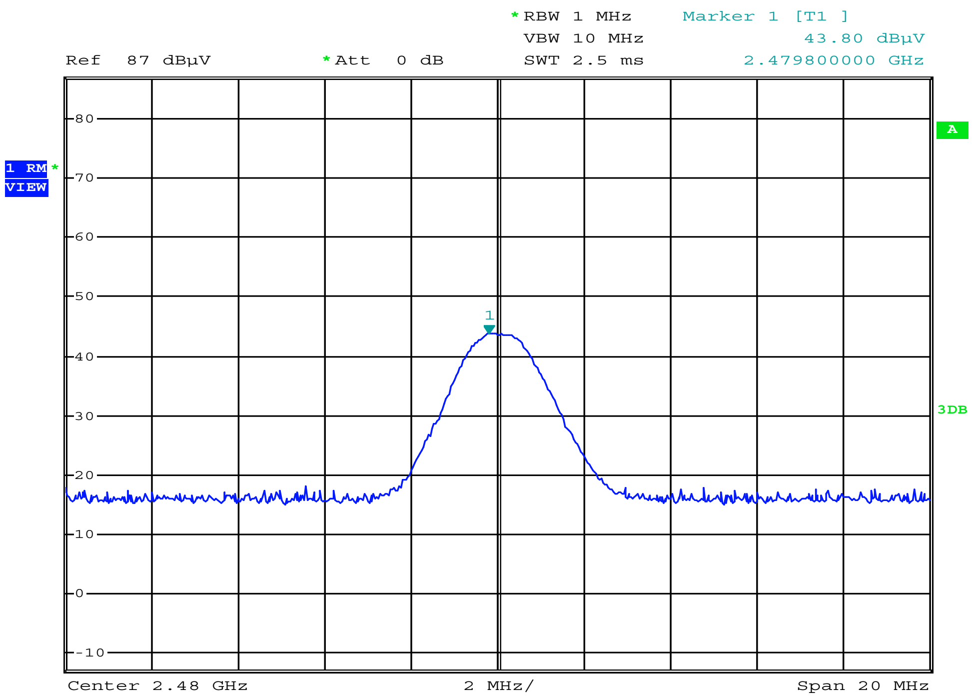
Channel Frequency:	Detector:	Antenna Polarization:
2402.00 MHz	**RMS**	**Vertical**
Modulation Setting:	Protocol:	Measured Field Strength:
GFSK	**ANT**	**45.21** dBuV

Field Strength (Average)



Channel Frequency:	Detector:	Antenna Polarization:
2442.00 MHz	**RMS**	**Vertical**
Modulation Setting:	Protocol:	Measured Field Strength:
GFSK	**ANT**	**46.17** dBuV

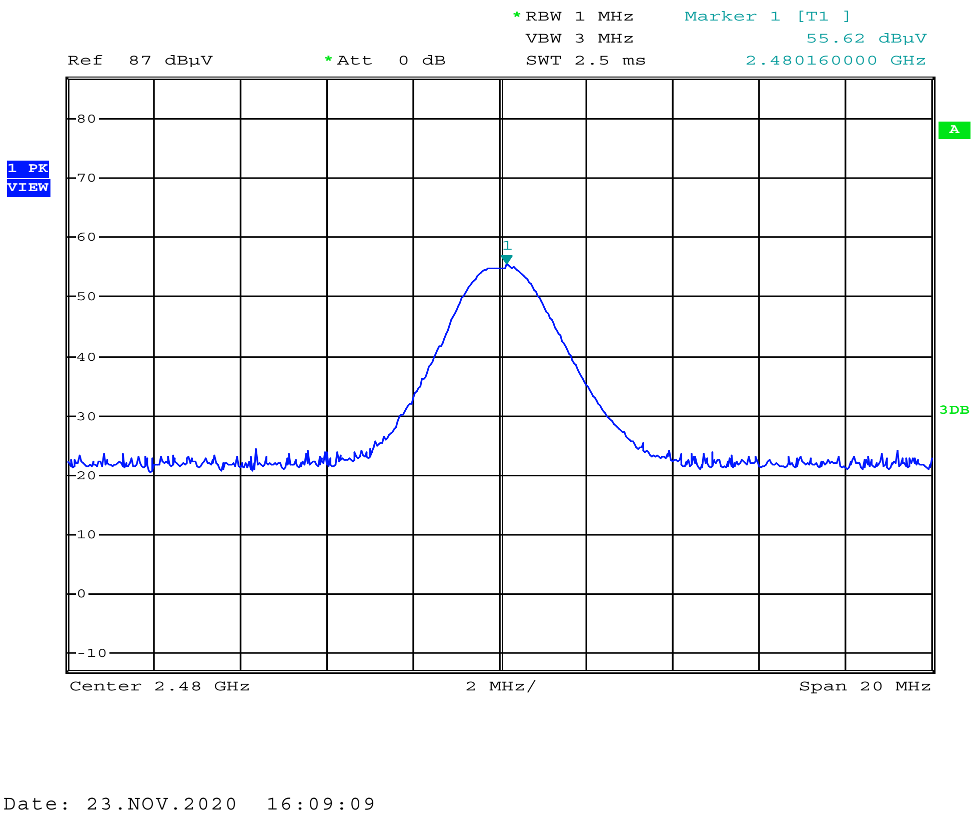
Field Strength (Average)



Date: 23.NOV.2020 16:05:50

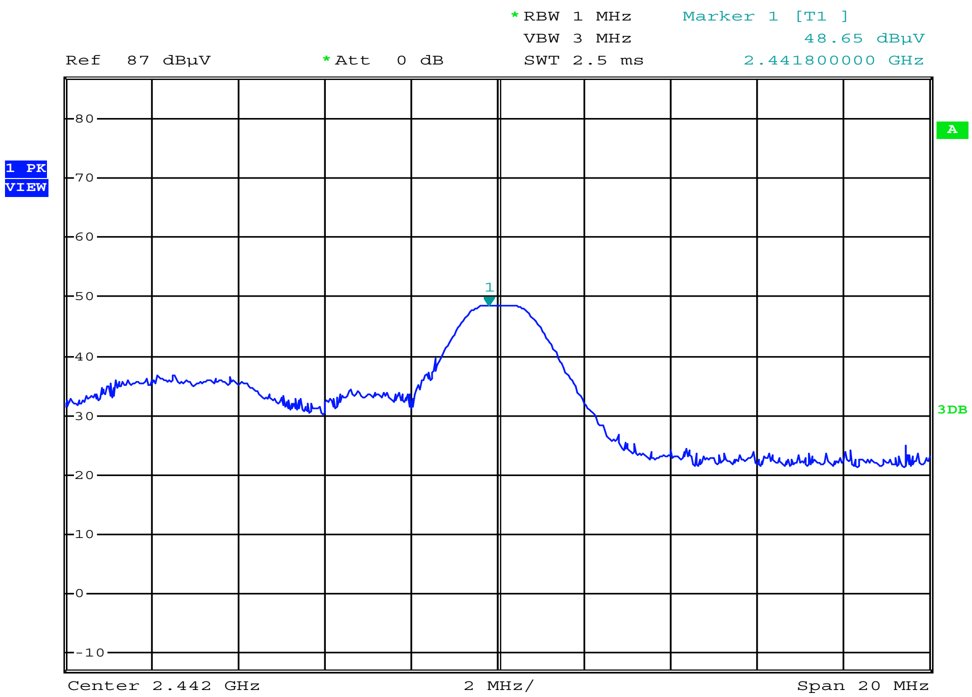
Channel Frequency: **2480.00** MHz	Detector: **RMS**	Antenna Polarization: **Vertical**
Modulation Setting: **GFSK**	Protocol: **ANT**	Measured Field Strength: **43.80** dBuV

Field Strength (Peak)



Channel Frequency: **2480.00** MHz	Detector: **Peak**	Antenna Polarization: **Horizontal**
Modulation Setting: **GFSK**	Protocol: **ANT**	Measured Field Strength: **55.62** dBuV

Field Strength (Peak)



Date: 23.NOV.2020 12:02:25

Channel Frequency: **2442.00** MHz	Detector: **Peak**	Antenna Polarization: **Vertical**
Modulation Setting: **GFSK**	Protocol: **ANT**	Measured Field Strength: **48.65** dBuV

Test Report Serial Number:	**45461627 R1.0**
Test Report Date:	**4 December 2020**
Project Number:	**1510**

Appendix M - 20dB BW Measurement Plots (DXX)

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20dB BW Bandwidth Measurement Results (DXX)			
Frequency (MHz)	Modulation	Mode	Measured 20dB Bandwidth (MHz)
2402	GFSK	BT BR	1.140
2480	GFSK	BT BR	0.912
2402	GFSK	ANT	0.918
2480	GFSK	ANT	1.026
2402	GMSK	BLE	1.224
2480	GMSK	BLE	1.212
		Result:	Complies

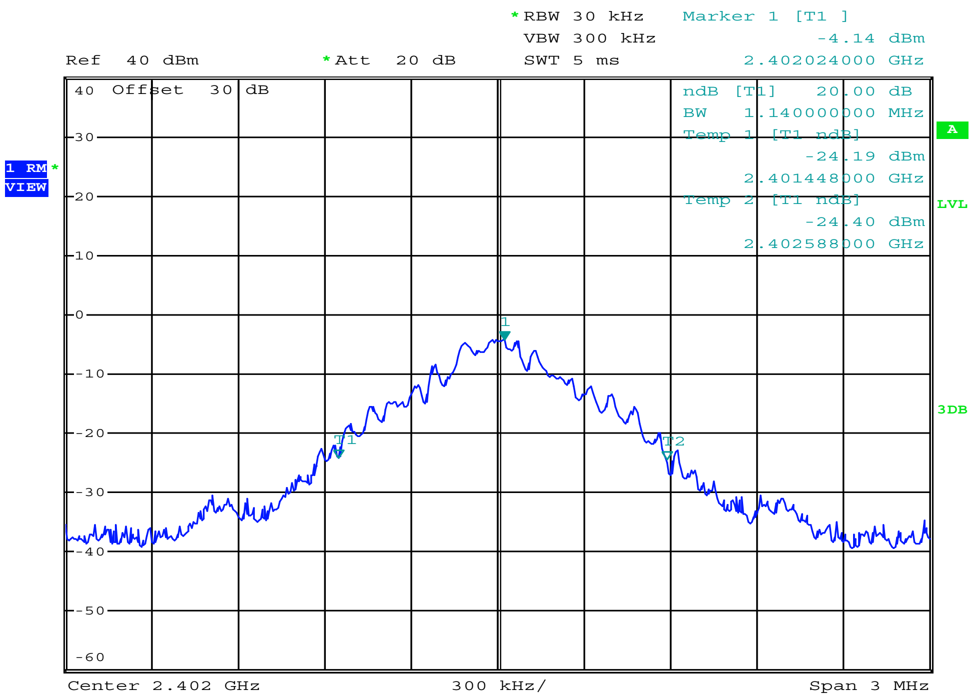
Compliance to §15.215(c):

Largest Measured 20dB BW < 1.3MHz, 50% BW < 0.650MHz

LBE = 2402MHz - 0.650MHz = 2401.35MHz > 2400MHz

UBE = 2480 + 0.650MHz = 2480.65MHz < 2483.5MHz

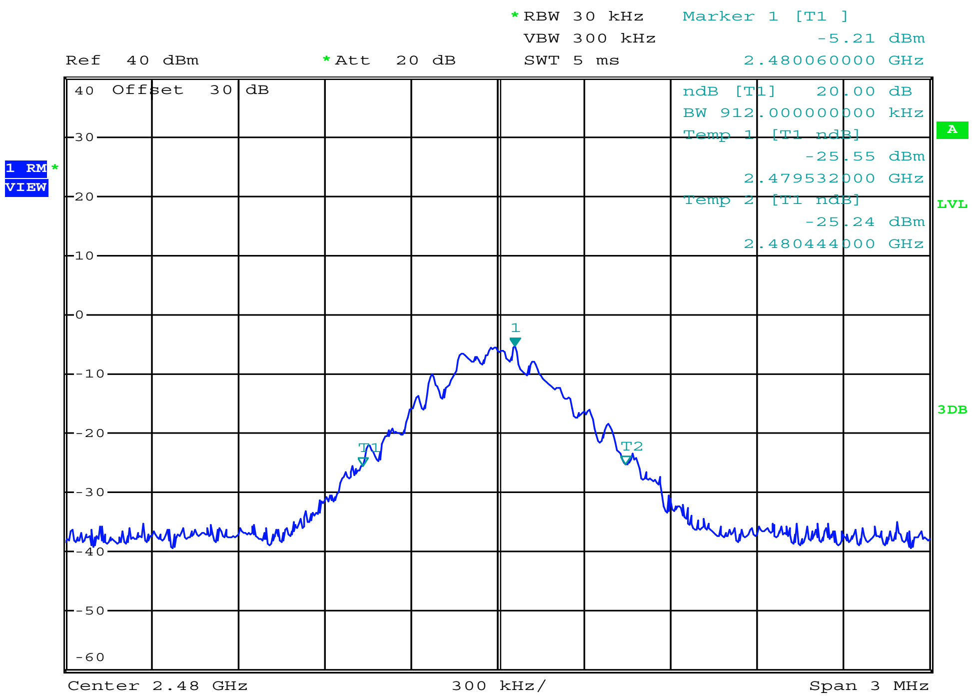
20dB Bandwidth



Date: 3.DEC.2020 15:22:14

Channel Frequency:		
2402.00 MHz		
DUT Modulation: **GFSK**	Mode: **BT BR**	Measured 20dB Bandwidth: **1.140** MHz

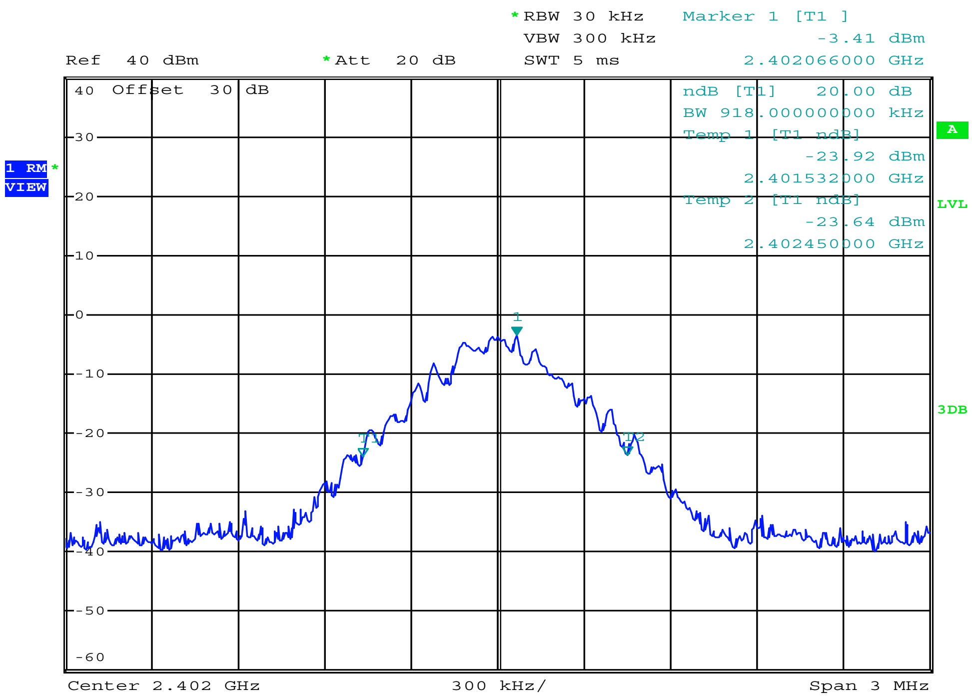
20dB Bandwidth



Date: 3.DEC.2020 15:22:52

Channel Frequency:		
2480.00 MHz		
DUT Modulation:	Mode:	Measured 20dB Bandwidth:
GFSK	**BT BR**	**0.912** MHz

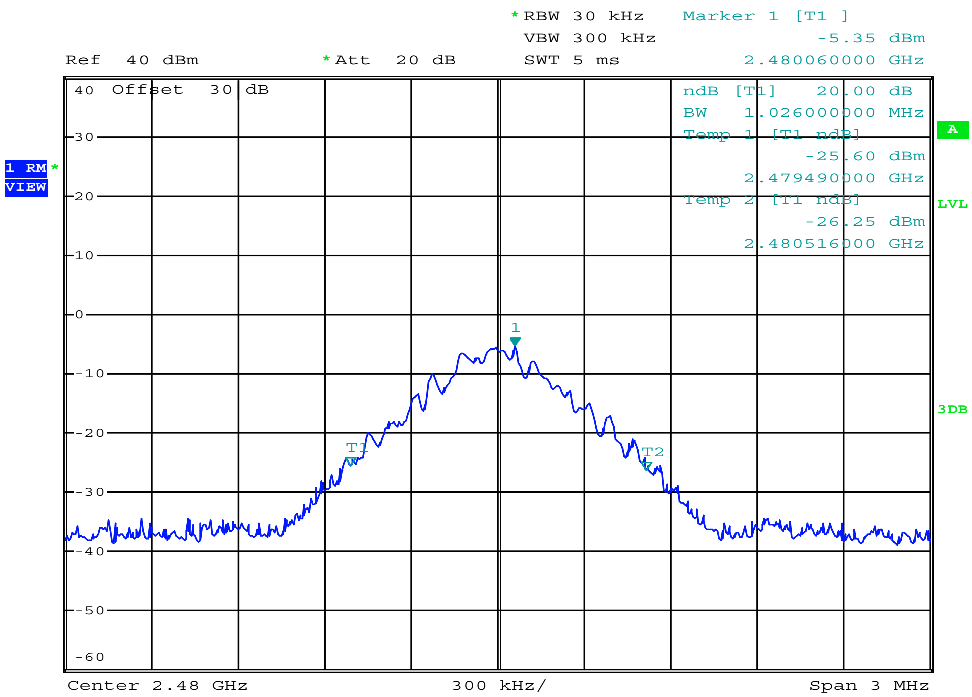
20dB Bandwidth



Date: 3.DEC.2020 15:21:28

Channel Frequency:		
2402.00 MHz		
DUT Modulation:	Mode:	Measured 20dB Bandwidth:
GFSK	**ANT**	**0.918** MHz

20dB Bandwidth

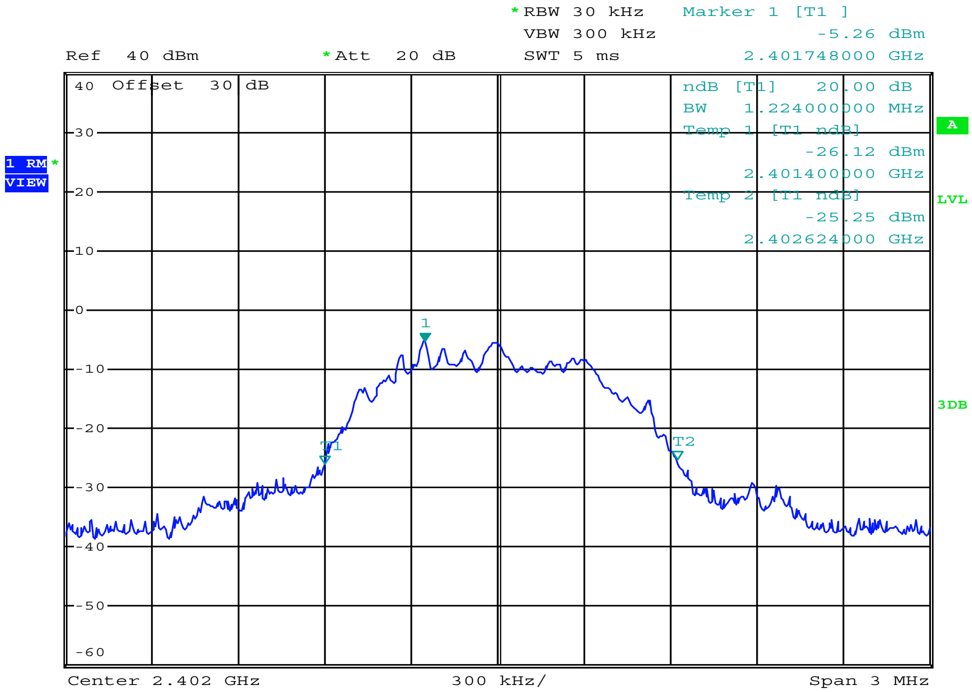


Date: 3.DEC.2020 15:20:53

Channel Frequency:
2480.00 MHz

DUT Modulation:	Mode:	Measured 20dB Bandwidth:
GFSK	**ANT**	**1.026** MHz

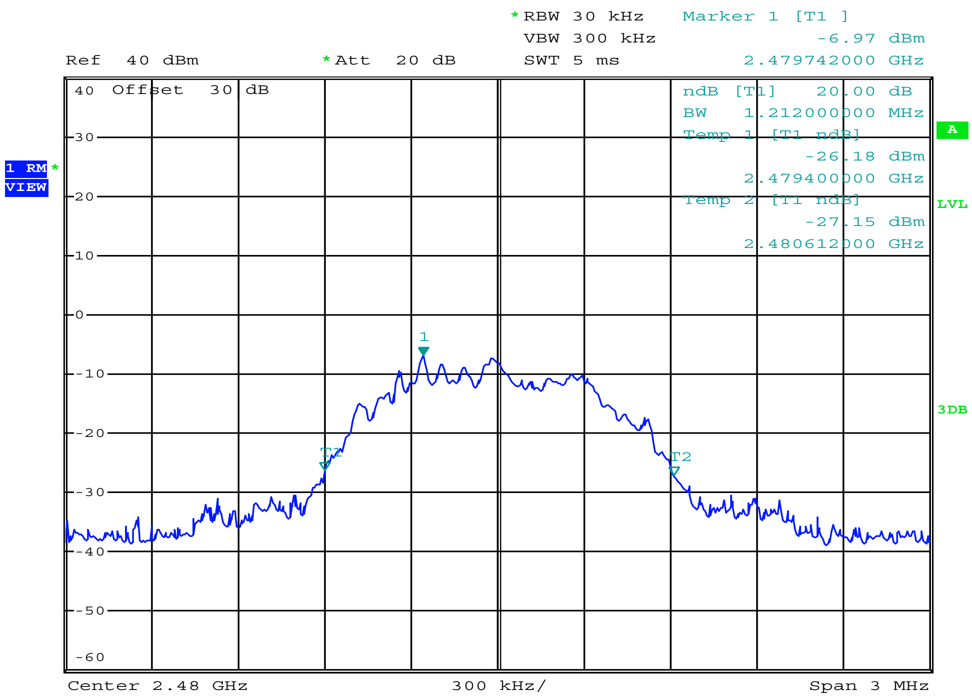
20dB Bandwidth



Date: 3.DEC.2020 15:13:58

Channel Frequency:		
2402.00 MHz		
DUT Modulation:	Mode:	Measured 20dB Bandwidth:
GMSK	**BLE**	**1.224** MHz

20dB Bandwidth



Date: 3.DEC.2020 15:19:48

Channel Frequency: **2480.00** MHz		
DUT Modulation: **GMSK**	Mode: **BLE**	Measured 20dB Bandwidth: **1.212** MHz

Appendix N - 20dB BW/Field Strength Measurement Plots (NFC)

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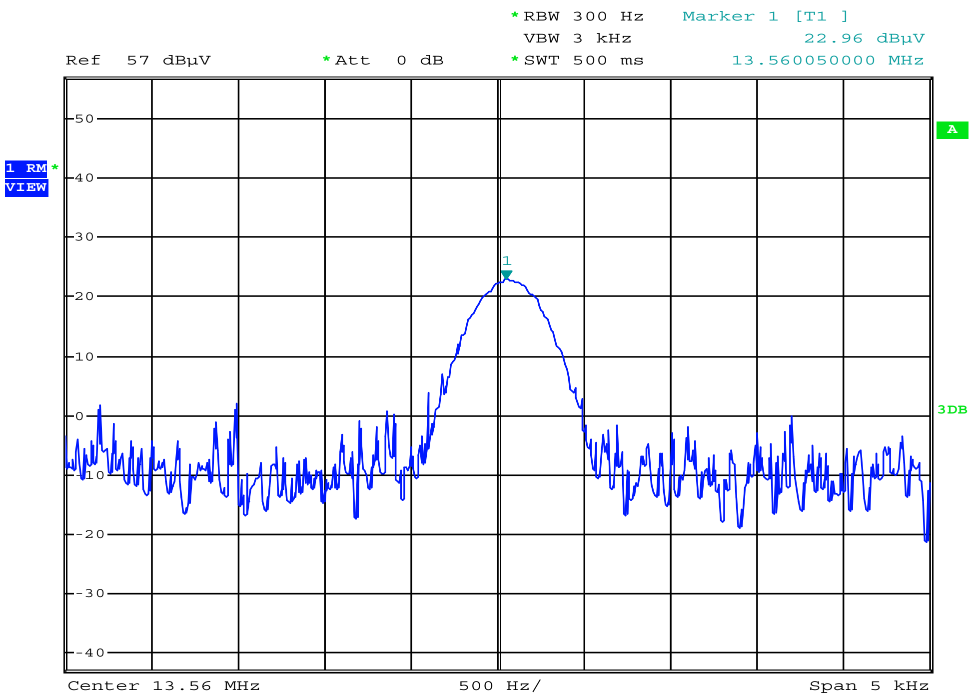
FCC §15.225(a), RSS-210 Radiated Field Strength										
Frequency (MHz)	**Mode**	**Modulation**	**Detector**	**Antenna Polarization**	**Measured Field Strength [FS_{Meas}] (dBuV @ 3m)**	**Cable Loss [L_C] (dBm)**	**Receive Antenna [ACF] (dB)**	**Corrected Field Strength [FS_{Corr}] (dBuV @3m)**	**Limit (dBuV)**	**Margin (dB)**
13.56	NFC	ASK	RMS	Front	22.96	0.5	10.65	34.11	124.0	**89.9**
				Side	17.93			29.08		**94.9**
			Peak	Front	23.40			34.55	144.0	**109.5**
				Side	18.84			29.99		**114.0**
								Result:	**Complies**	

$FS_{Corr} = FS_{Meas} + ACF + L_C$

$Margin = Limit - FS_{Corr}$

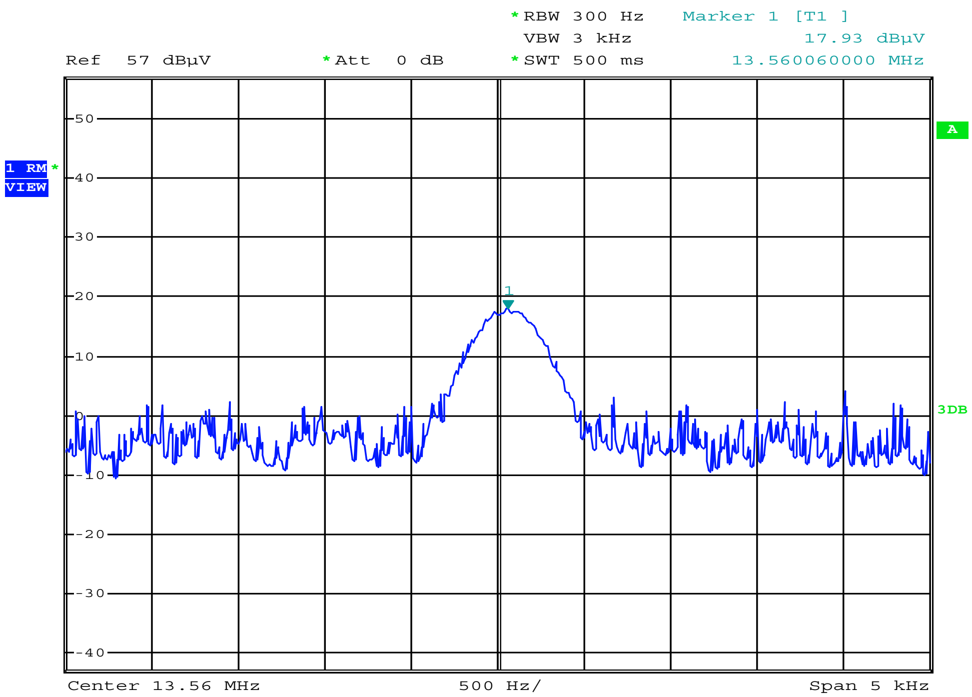
Field Strength (Average)



Date: 16.DEC.2020 11:33:11

Channel Frequency:	Detector:	Antenna Polarization:
13.56 MHz	**RMS**	**Front**
Modulation Setting:	Protocol:	Measured Field Strength:
ASK	**NFC**	**22.96** dBuV

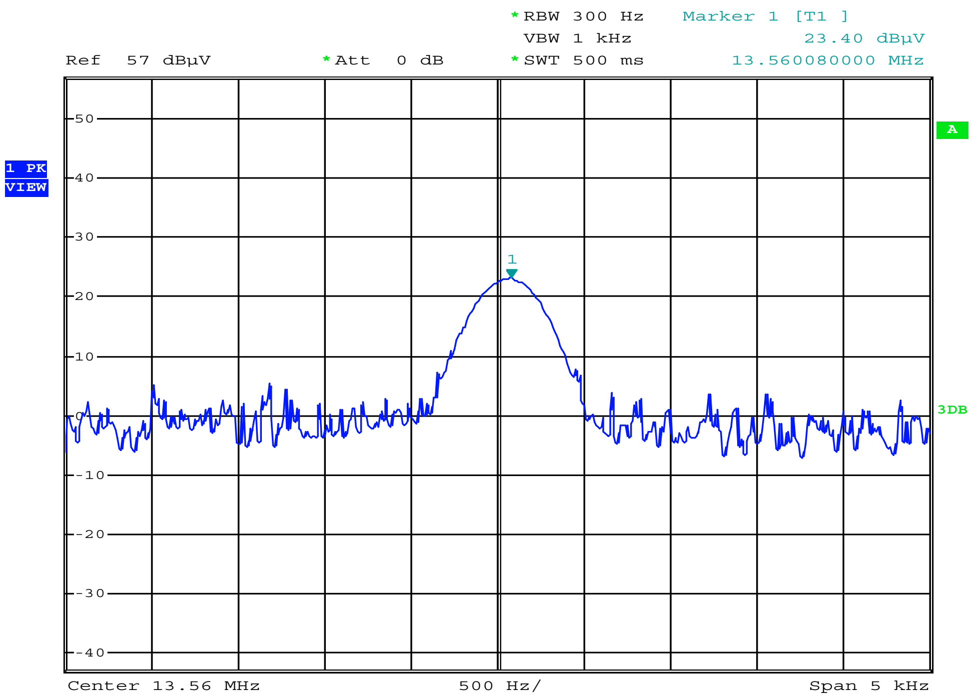
Field Strength (Average)



Date: 16.DEC.2020 11:35:48

Channel Frequency: **13.56** MHz	Detector: **RMS**	Antenna Polarization: **Side**
Modulation Setting: **ASK**	Protocol: **NFC**	Measured Field Strength: **17.93** dBuV

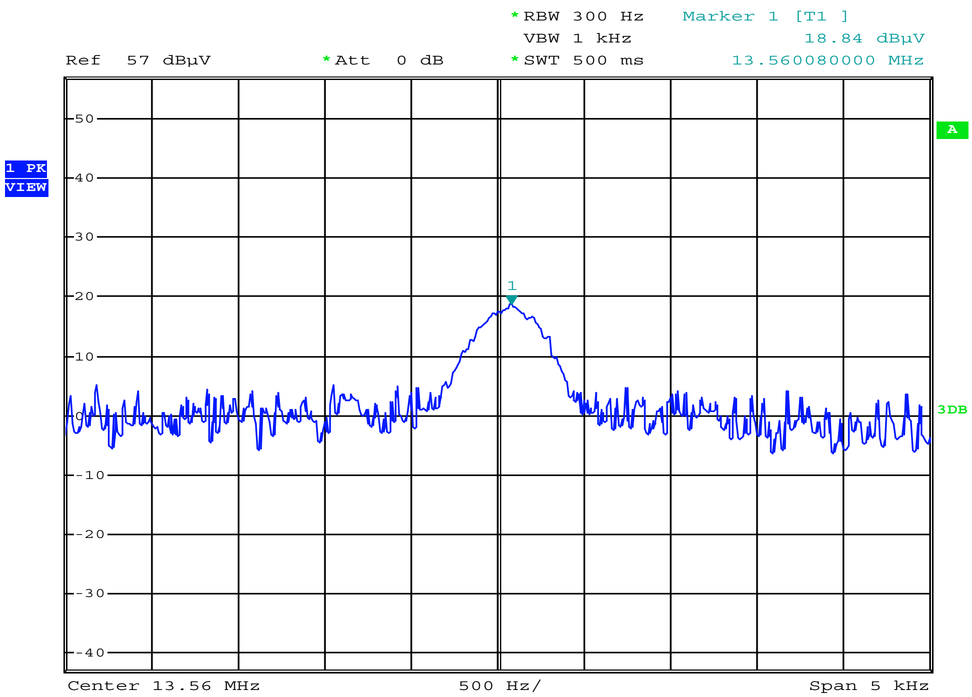
Field Strength (Peak)



Date: 16.DEC.2020 11:32:28

Channel Frequency: **13.56** MHz	Detector: **Peak**	Antenna Polarization: **Front**
Modulation Setting: **ASK**	Protocol: **NFC**	Measured Field Strength: **23.40** dBuV

Field Strength (Peak)



Date: 16.DEC.2020 11:35:16

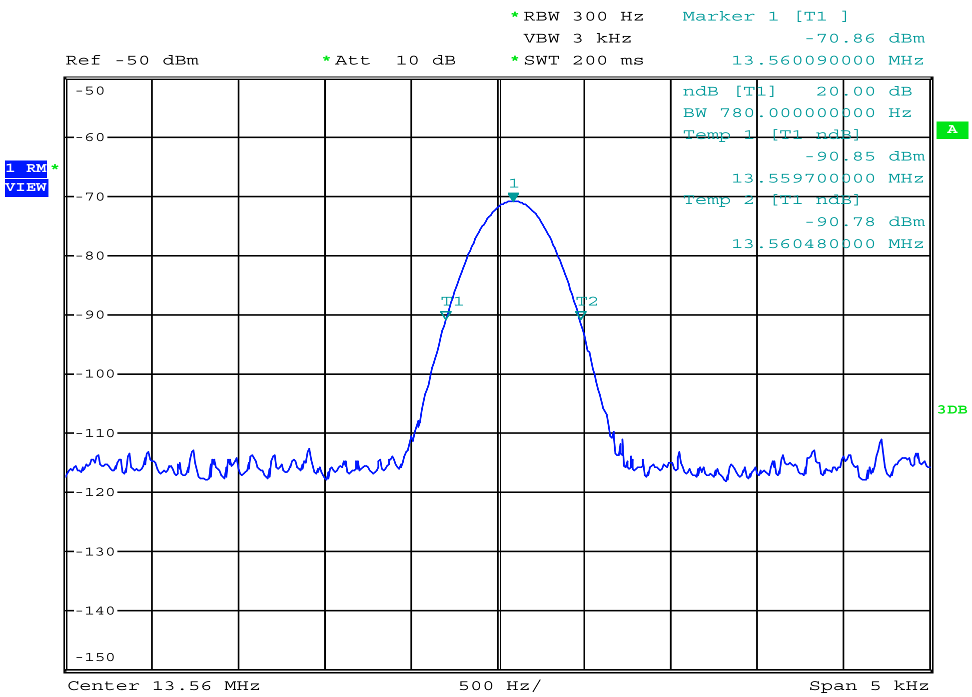
Channel Frequency: **13.56** MHz	Detector: **Peak**	Antenna Polarization: **Side**
Modulation Setting: **ASK**	Protocol: **NFC**	Measured Field Strength: **18.84** dBuV

20dB BW Bandwidth Measurement Results (NFC)			
Frequency (MHz)	Modulation	Mode	Measured 20dB Bandwidth (Hz)
13.56	ASK	NFC	780.0
		Result:	Complies

Compliance to §15.215(c):

See NFC Emissions Mask Plots

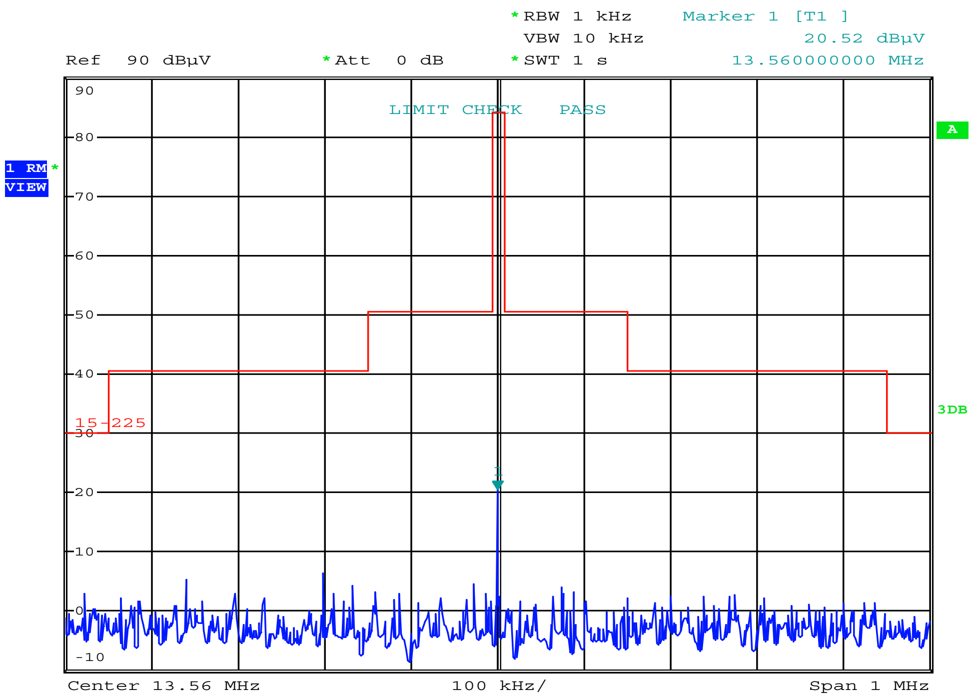
20dB Bandwidth



Date: 15.DEC.2020 13:31:18

Channel Frequency:		
13.56 MHz		
DUT Modulation: **ASK**	Mode: **NFC**	Measured 20dB Bandwidth: **780.000** Hz

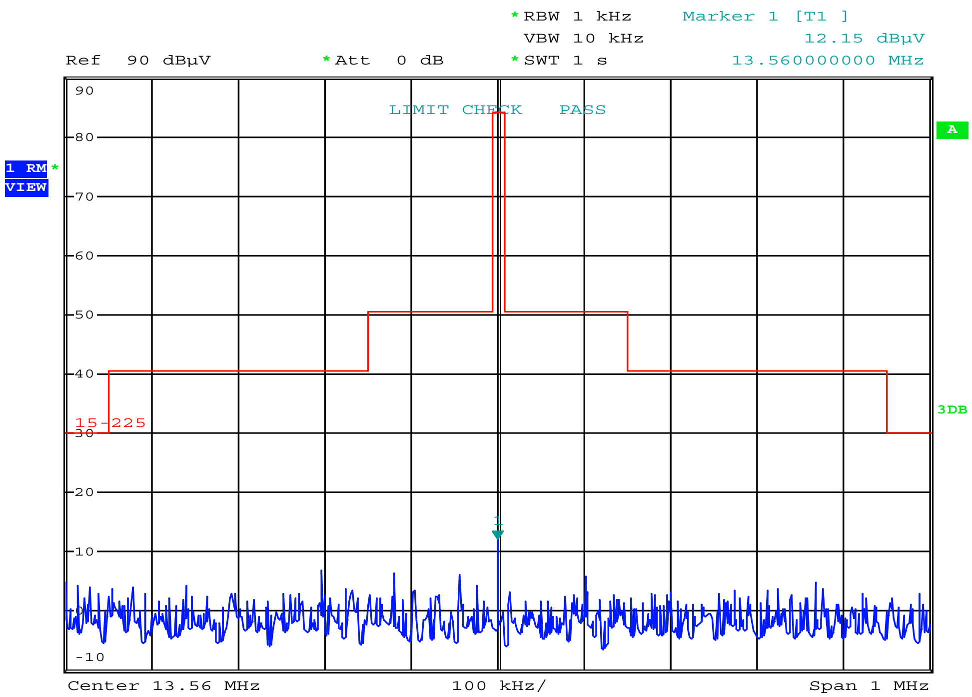
NFC Emissions Mask



Date: 16.DEC.2020 12:13:15

Channel Frequency:	Antenna Polarization:	Detector:
13.56 MHz	**Front**	**RMS**
DUT Modulation:	Mode:	Emissions Mask:
ASK	**NFC**	**PASS**

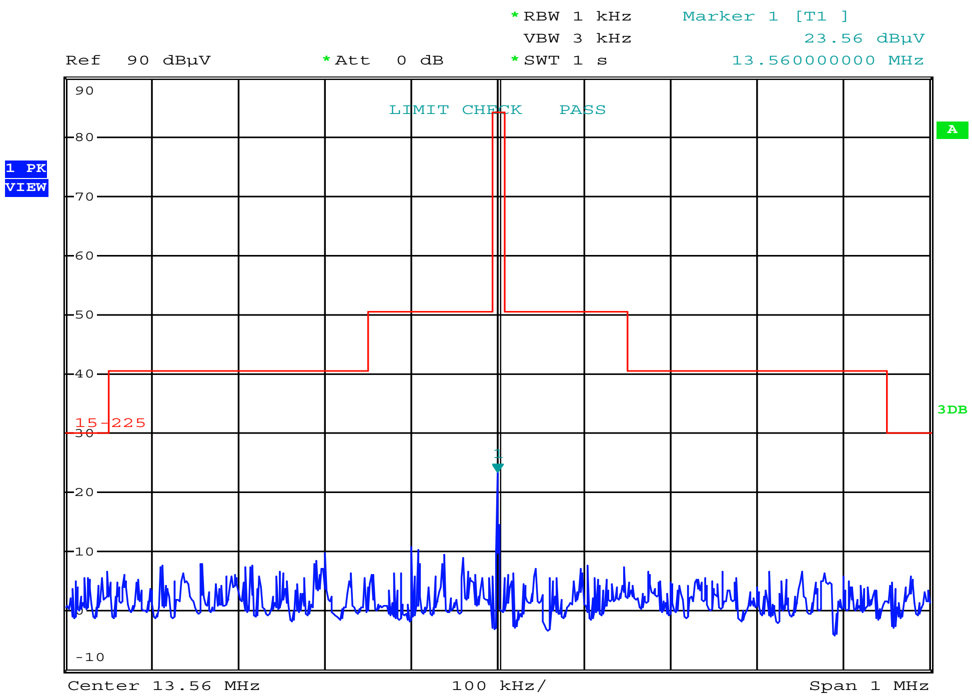
NFC Emissions Mask



Date: 16.DEC.2020 12:11:38

Channel Frequency:	Antenna Polarization:	Detector:
13.56 MHz	**Side**	**RMS**
DUT Modulation:	Mode:	Emissions Mask:
ASK	**NFC**	**PASS**

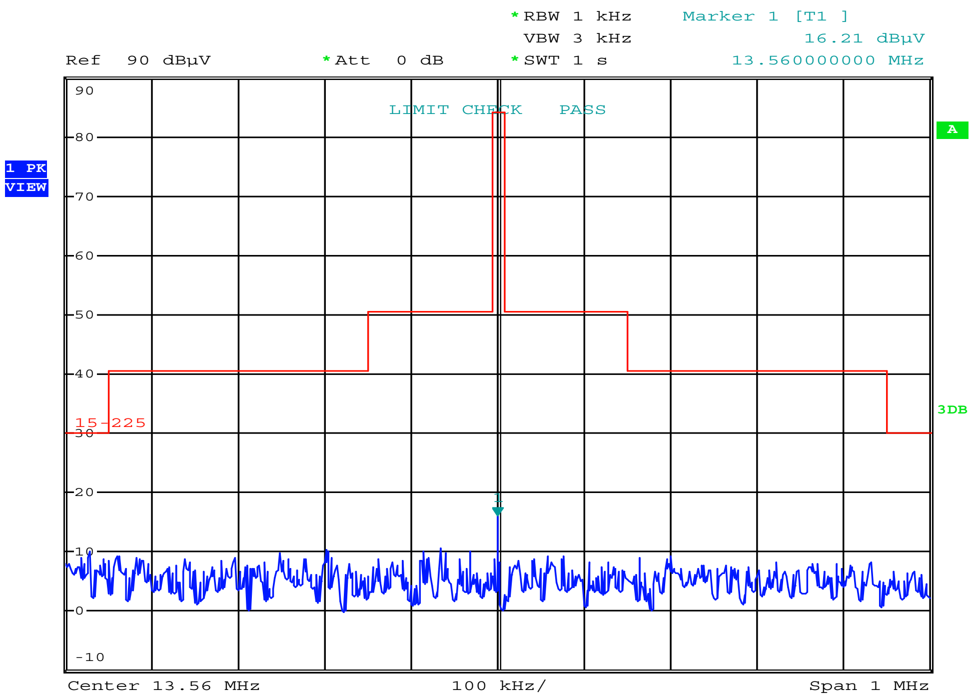
NFC Emissions Mask



Date: 16.DEC.2020 12:12:33

Channel Frequency: **13.56** MHz	Antenna Polarization: **Front**	Detector: **Peak**
DUT Modulation: **ASK**	Mode: **NFC**	Emissions Mask: **PASS**

NFC Emissions Mask



Date: 16.DEC.2020 12:11:05

Channel Frequency: **13.56** MHz	Antenna Polarization: **Side**	Detector: **Peak**
DUT Modulation: **ASK**	Mode: **NFC**	Emissions Mask: **PASS**

Test Report Serial Number:	**45461627 R1.0**
Test Report Date:	**4 December 2020**
Project Number:	**1510**

Appendix O - Radiated Tx Spurious Emissions Measurement Plots

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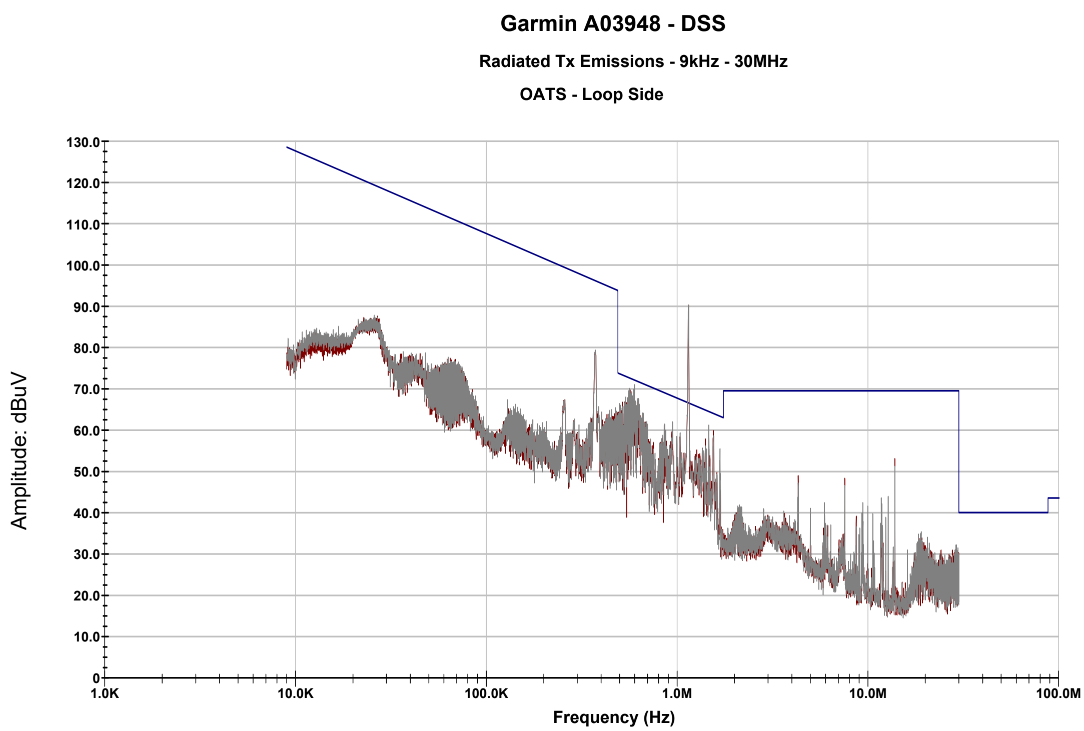
Summary of Radiated Tx Emissions (Restricted Band)														
Measured Frequency Range (MHz)	Channel Frequency	Antenna Polarization	Emission Frequency	Measured Emission [E_{Meas}] (dBuV)		Antenna ACF [ACF] (dB)	Cable Loss [L_C] (dB)	Amplifier Gain [G_A] (dB)		Corrected Emission [E_{Corr}] (dBuV/m)		Limit (dBuV)	Margin (dB)
9kHz - 30MHz	2442.0	Front	ND	ND	(1)	0.00	0.00	0.00	(3)	ND	(2)	n/a	**n/a**
9kHz - 30MHz	2442.0	Side	ND	ND	(1)	0.00	0.00	0.00	(3)	ND	(2)	n/a	**n/a**
30-1000MHz	2442.0	Horizontal	745.2MHz	37.88		0.00	0.00	0.00	(3)	37.88	(2)	46.0	**8.1**
30-1000MHz	2442.0	Vertical	955.9MHz	39.24		0.00	0.00	0.00	(3)	39.24	(2)	46.0	**6.8**
1 - 3GHz	2442.0	Horizontal	ND	ND	(1)	27.40	4.58	0.00	(3)	ND		54.0	**n/a**
1 - 3GHz	2442.0	Vertical	ND	ND	(1)	27.40	4.58	0.00	(3)	ND		54.0	**n/a**
3-13GHz	2442.0	Horizontal	ND	ND	(1)	36.76	9.86	0.00	(3)	ND		54.0	**n/a**
3-13GHz	2442.0	Vertical	ND	ND	(1)	36.76	9.86	0.00	(3)	ND		54.0	**n/a**
13-18GHz	2442.0	Horizontal	ND	ND	(1)	38.75	16.54	0.00	(3)	ND		54.0	**n/a**
13-18GHz	2442.0	Vertical	ND	ND	(1)	38.75	16.54	0.00	(3)	ND		54.0	**n/a**
18-26GHz	2442.0	Horizontal	ND	ND	(1)	43.50	21.86	26.00		ND		54.0	**n/a**
18-26GHz	2442.0	Vertical	ND	ND	(1)	43.50	21.86	26.00		ND		54.0	**n/a**
											Results:	**Complies**	

(1) No Emissions Detected (ND) above ambient or within 20dB of the limit
(2) Antenna ACF, Cable Loss and Amplifier Gain corrected in Spectrum Analyzer Transducer Factor
(3) External Amplier not used

$E_{Corr} = E_{Meas} + ACF + L_C - G_A$

Radiated Emissions - Restricted Band



03:50:37 PM, Thursday, December 10, 2020

Profile Build: 2020.10.19

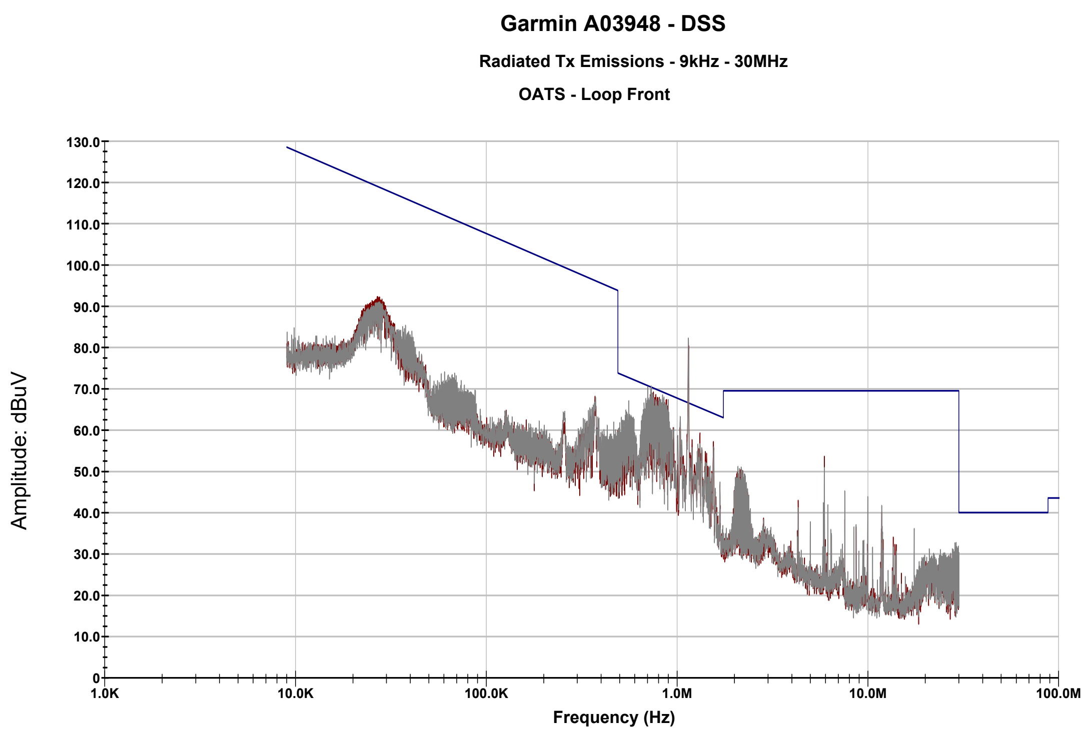
Trace 1
Trace 2

Frequency Range:	Antenna Polarization:	Emission Frequency:
9kHz - 30MHz	**Front**	**ND**
Channel Frequency:	Modulation:	Measured Emission:
2442.00 MHz	**8-DPSK**	**ND** dBuV

Trace 1: Ambient

Trace 2: Ambient + DUT

Radiated Emissions - Restricted Band



03:47:31 PM, Thursday, December 10, 2020

Profile Build: 2020.10.19

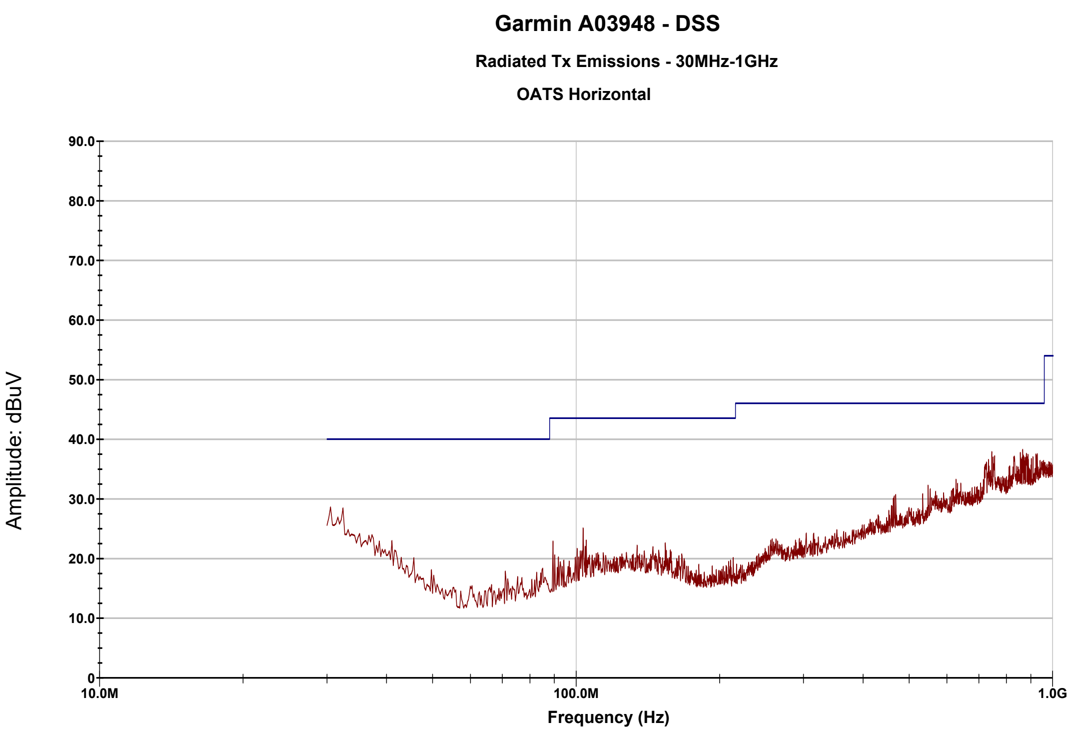
Trace 1
Trace 2

Frequency Range:	Antenna Polarization:	Emission Frequency:
9kHz - 30MHz	**Side**	**ND**
Channel Frequency:	Modulation:	Measured Emission:
2442.00 MHz	**8-DPSK**	**ND** dBuV

Trace 1: Ambient

Trace 2: Ambient + DUT

Radiated Emissions - Restricted Band

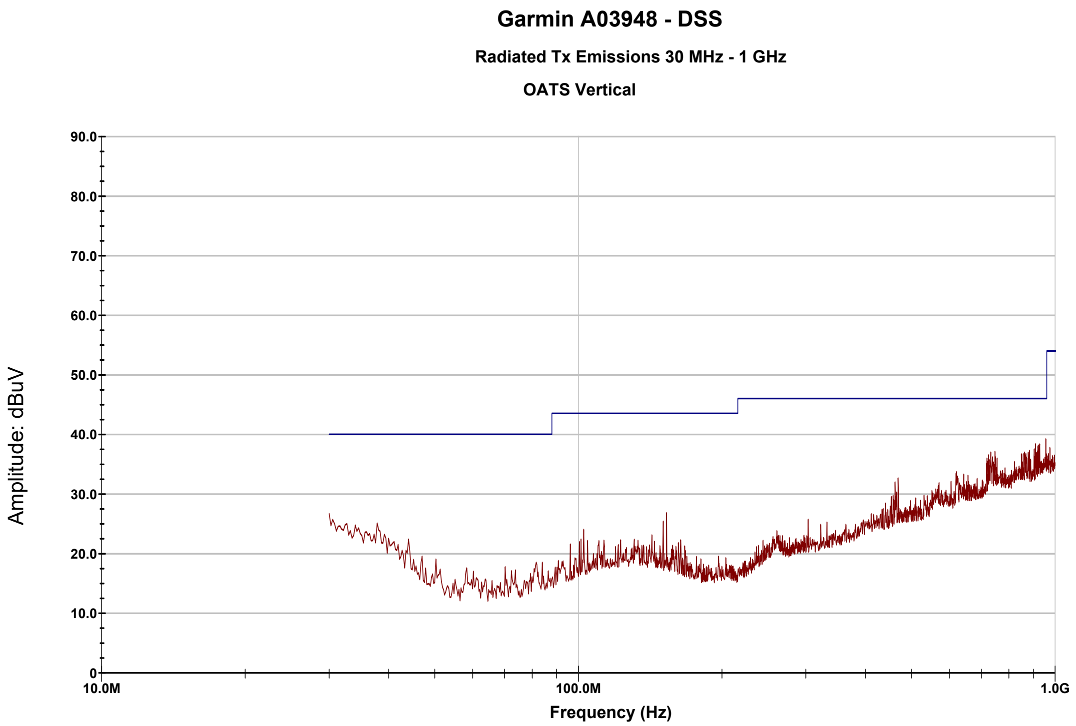


03:41:46 PM, Thursday, December 10, 2020

Profile Build: 2020.10.19

Frequency Range: **30-1000MHz**	Antenna Polarization: **Horizontal**	Emission Frequency: **745.2MHz**
Channel Frequency: **2442.00** MHz	Modulation: **8-DPSK**	Measured Emission: **37.88** dBuV

Radiated Emissions - Restricted Band

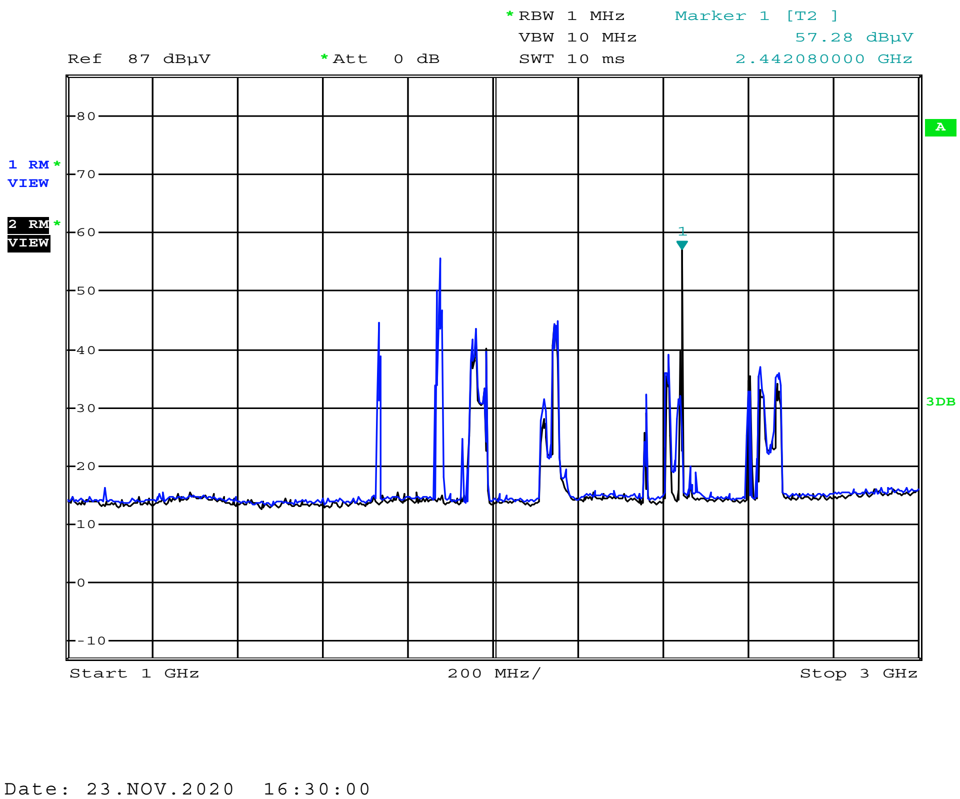


03:41:46 PM, Thursday, December 10, 2020

Profile Build: 2020.10.19

Frequency Range:	Antenna Polarization:	Emission Frequency:
30-1000MHz	**Vertical**	**955.9MHz**
Channel Frequency:	Modulation:	Measured Emission:
2442.00 MHz	**8-DPSK**	**39.24** dBuV

Radiated Emissions - Restricted Band



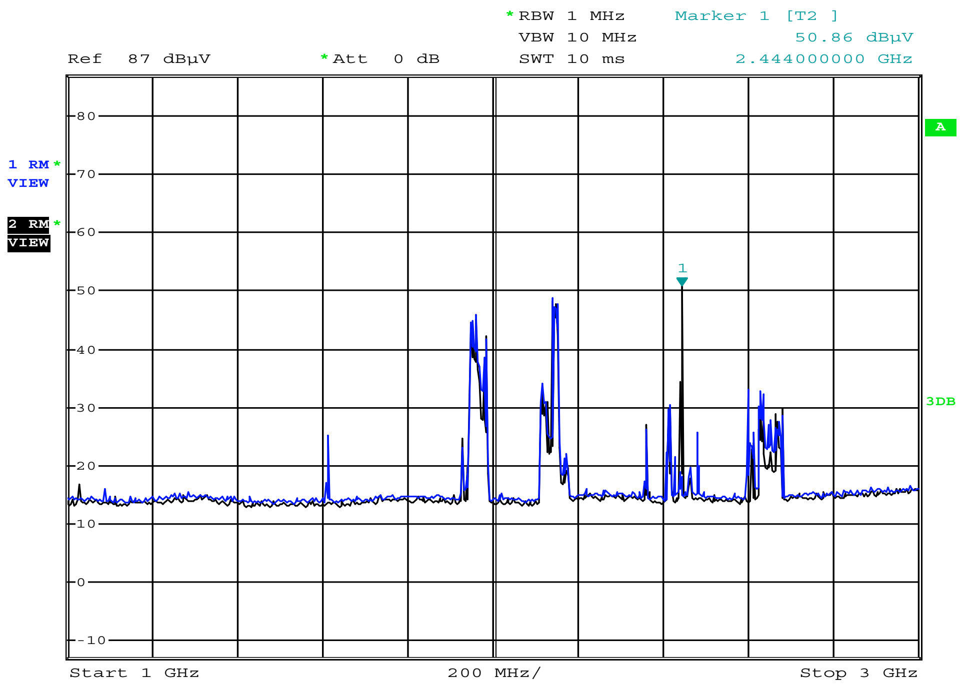
Frequency Range:	Antenna Polarization:	Emission Frequency:
1 - 3GHz	**Horizontal**	**ND**
Channel Frequency: **2442.00** MHz	Modulation: **8-DPSK**	Measured Emission: **ND** dBuV

Trace 1: Ambient

Trace 2: Ambient + DUT

Marker 1: Fundamental

Radiated Emissions - Restricted Band



Date: 23.NOV.2020 16:36:48

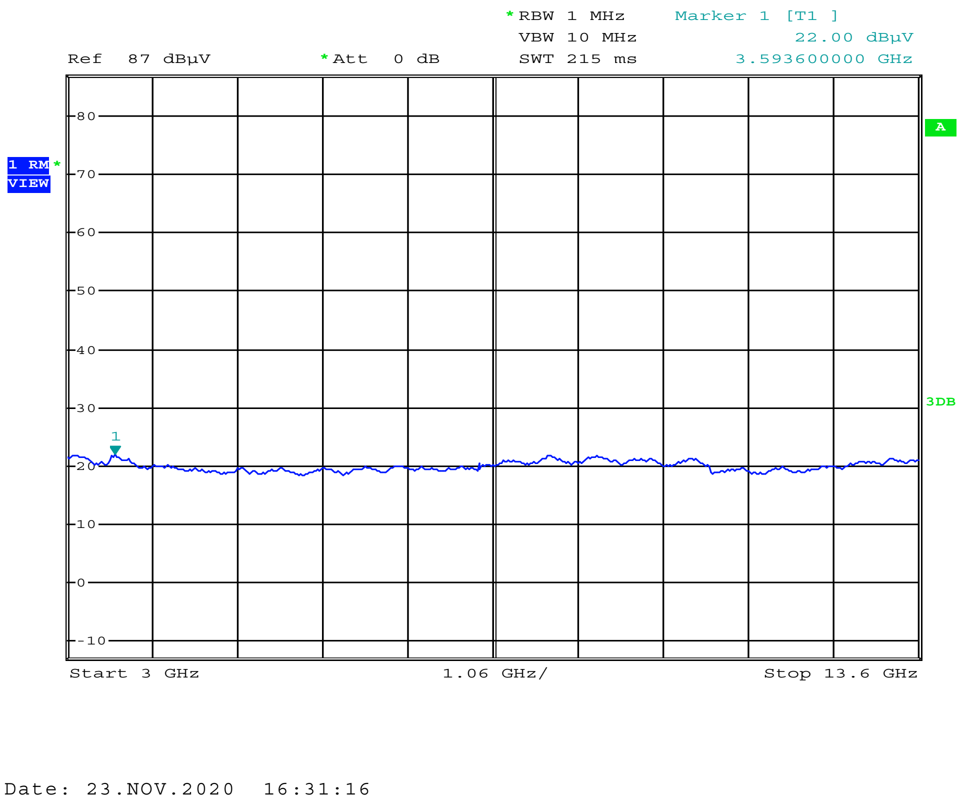
Frequency Range:	Antenna Polarization:	Emission Frequency:
1 - 3GHz	**Vertical**	**ND**
Channel Frequency:	Modulation:	Measured Emission:
2442.00 MHz	**8-DPSK**	**ND** dBuV

Trace 1: Ambient

Trace 2: Ambient + DUT

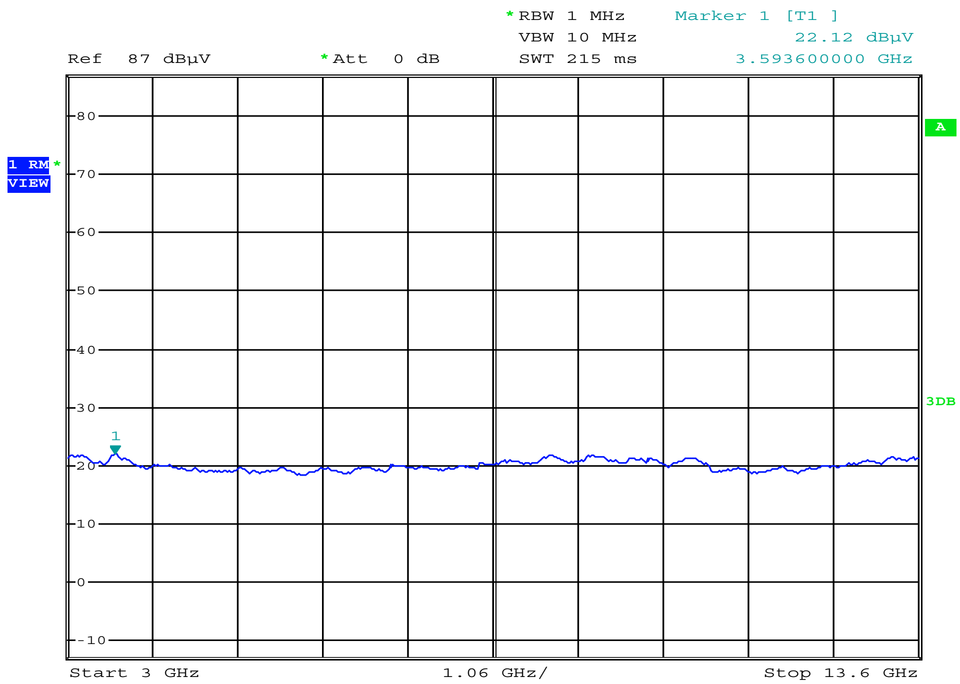
Marker 1: Fundamental

Radiated Emissions - Restricted Band



Frequency Range:	Antenna Polarization:	Emission Frequency:
3-13GHz	**Horizontal**	**ND**
Channel Frequency:	Modulation:	Measured Emission:
2442.00 MHz	**8-DPSK**	**ND** dBuV

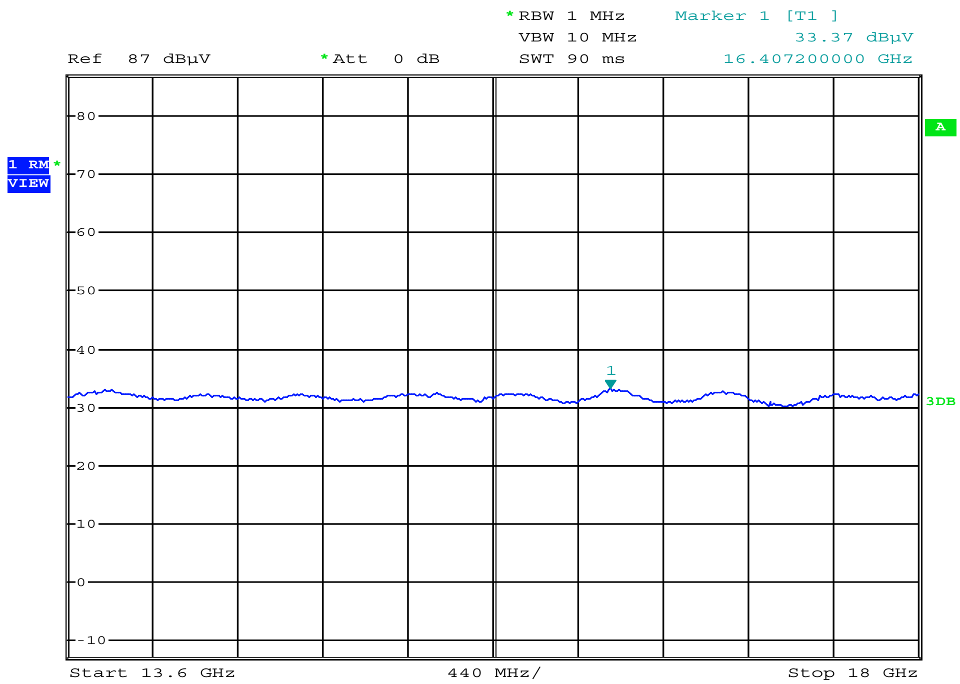
Radiated Emissions - Restricted Band



Date: 23.NOV.2020 16:33:31

Frequency Range:	Antenna Polarization:	Emission Frequency:
3-13GHz	**Vertical**	**ND**
Channel Frequency:	Modulation:	Measured Emission:
2442.00 MHz	**8-DPSK**	**ND** dBuV

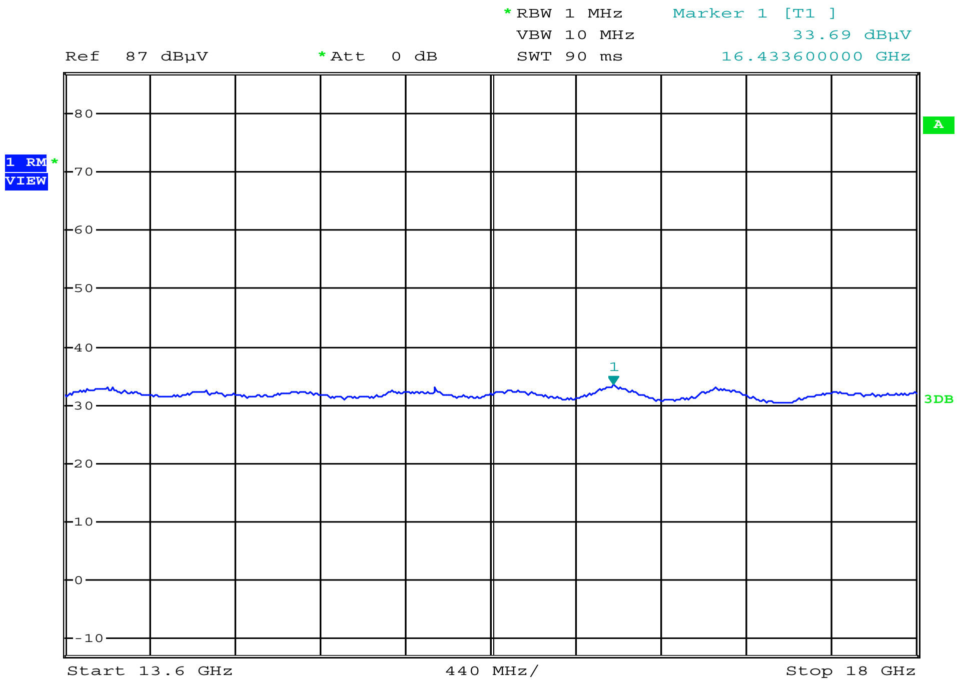
Radiated Emissions - Restricted Band



Date: 23.NOV.2020 16:31:39

Frequency Range:	Antenna Polarization:	Emission Frequency:
13-18GHz	**Horizontal**	**ND**
Channel Frequency:	Modulation:	Measured Emission:
2442.00 MHz	**8-DPSK**	**ND** dBuV

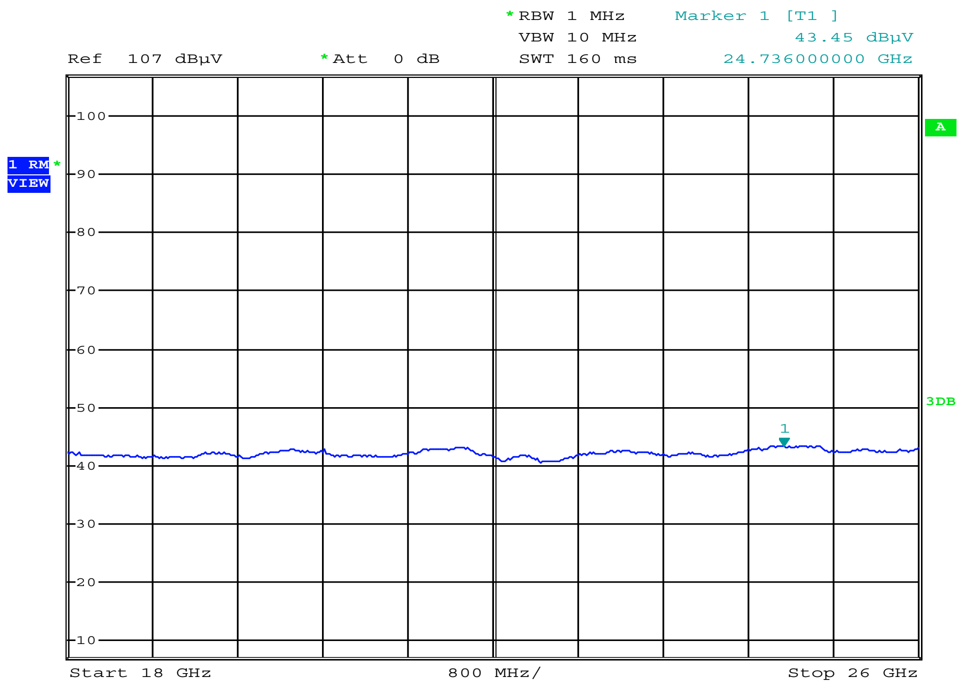
Radiated Emissions - Restricted Band



Date: 23.NOV.2020 16:32:58

Frequency Range:	Antenna Polarization:	Emission Frequency:
13-18GHz	**Vertical**	**ND**
Channel Frequency:	Modulation:	Measured Emission:
2442.00 MHz	**8-DPSK**	**ND** dBuV

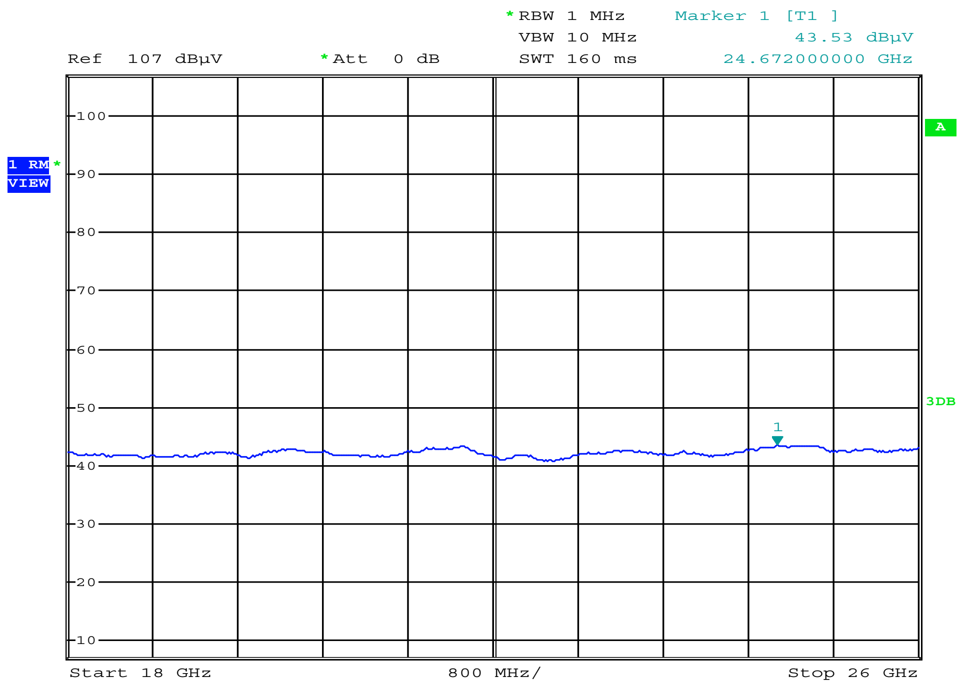
Radiated Emissions - Restricted Band



Date: 26.NOV.2020 14:44:03

Frequency Range:	Antenna Polarization:	Emission Frequency:
18-26GHz	**Horizontal**	**ND**
Channel Frequency:	Modulation:	Measured Emission:
2442.00 MHz	**8-DPSK**	**ND** dBuV

Radiated Emissions - Restricted Band



Date: 26.NOV.2020 14:59:07

Frequency Range:	Antenna Polarization:	Emission Frequency:
18-26GHz	**Vertical**	**ND**
Channel Frequency:	Modulation:	Measured Emission:
2442.00 MHz	**8-DPSK**	**ND** dBuV

Summary of Conducted Tx Emissions (Restricted Band)											
Measured Frequency Range (MHz)	**Channel Frequency**	**Emission Frequency**	**Antenna Gain [G_T]**	**Measured Emission [P_T] (dBm)**	**e.r.p. or e.i.r.p. (dB)**	**Ground Reflection [L_R] (dB)**	**Conversion dBm to dBuV/m [CF_R] (dB)**	**Distance Correction [L_D]**	**Corrected Emission [E_{Corr}] (dBuV/m)**	**Limit (dBuV)**	**Margin (dB)**
9kHz - 30MHz	13.56	13.56* MHz	-0.15 dBd	-70.57	-70.72	6.0	107.0	9.54	32.7	69.5	**36.8**
		487.8 MHz		-73.16	-73.31	4.7	107.0		28.9	46.0	**17.2**
		515.0 MHz		-74.91	-75.06	4.7	107.0		27.1	46.0	**18.9**
		610.1 MHz		-76.80	-76.95	4.7	107.0		25.2	46.0	**20.8**
									Results:	**Complies**	

Ground Reflection Factor [CF_R] = 6dB for f < 30MHz, 4.7dB for 30MHz < f < 1000MHz, 0dB for f > 1000MHz

e.r.p. = P_T + G_T - L_C, where P_T = measured emission (dBm), G_T = DUT antenna gain (dBd), L_C = loss between the DUT transmitter and DUT antenna (dB) = 0

e.i.r.p. = P_T + G_T - L_C, where P_T = measured emission (dBm), G_T = DUT antenna gain (dBi), L_C = loss between the DUT transmitter and DUT antenna (dB) = 0

G_T(dBd) = G_T(dBi) - 2.15, e.r.p. = e.i.r.p - 2.15

G_T minimum = 2dBi, -0.15dBd

Distance Correction [L_D] = 20Log(D), where D would have been the measurement distance = 3m

Conversion dBm to dBuV/m [CF] = 107 for e.r.p. and G_T expressed as dBd, 104.85 for e.i.r.p. and G_T expressed as dBi

E_{Corr} = e.r.p - [L_D] + [CF] + [CF_R]

E_{Corr} = e.i.r.p - [L_D] + [CF] + [CF_R]

Margin = Limit - E_{Corr}

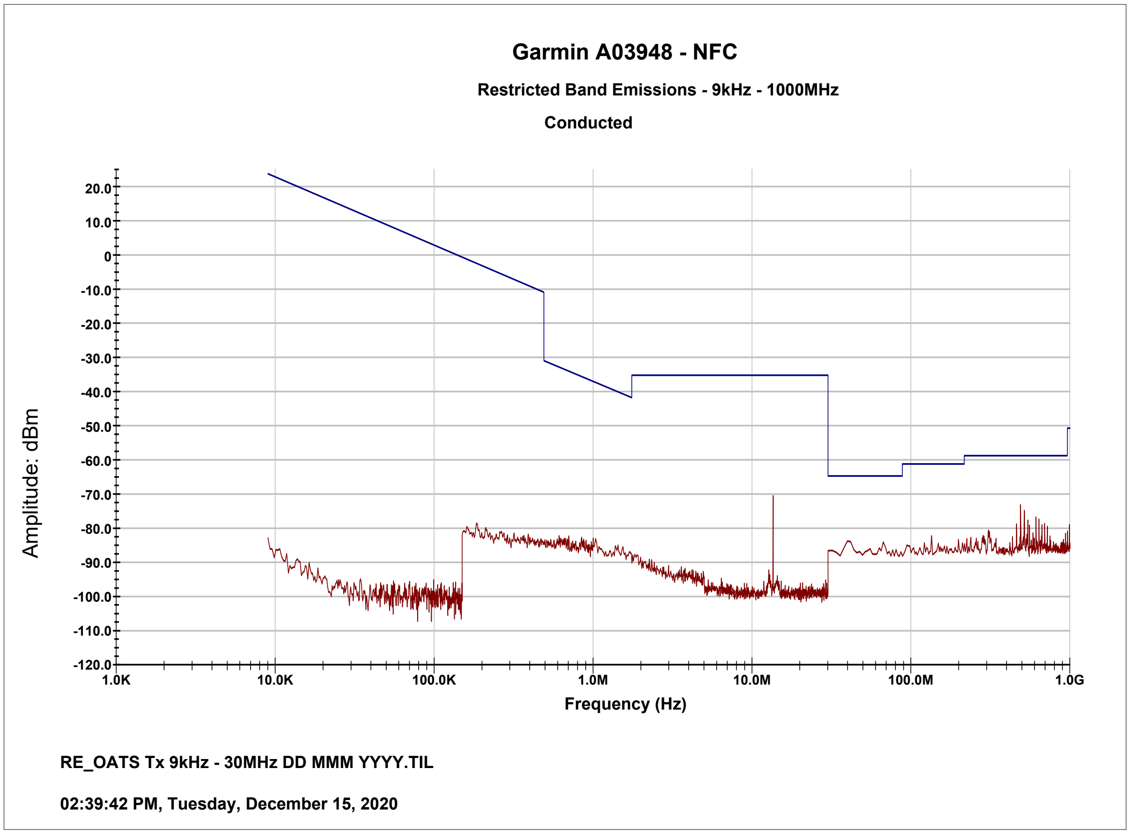
* Fundamental

Summary of Radiated Tx Emissions (Restricted Band)												
Measured Frequency Range (MHz)	**Channel Frequency**	**Antenna Polarization**	**Emission Frequency**	**Measured Emission [E_{Meas}] (dBuV)**		**Antenna ACF [ACF] (dB)**	**Cable Loss [L_C] (dB)**	**Amplifier Gain [G_A] (dB)**		**Corrected Emission [E_{Corr}] (dBuV/m)**	**Limit (dBuV)**	**Margin (dB)**
1 - 3GHz	13.56MHz	Horizontal	ND	ND	(1)	27.40	4.58	0.00	(3)	ND	54.0	**n/a**
1 - 3GHz		Vertical	ND	ND	(1)	27.40	4.58	0.00	(3)	ND	54.0	**n/a**
3-13GHz		Horizontal	ND	ND	(1)	36.76	9.86	0.00	(3)	ND	54.0	**n/a**
3-13GHz		Vertical	ND	ND	(1)	36.76	9.86	0.00	(3)	ND	54.0	**n/a**
13-18GHz		Horizontal	ND	ND	(1)	38.75	16.54	0.00	(3)	ND	54.0	**n/a**
13-18GHz		Vertical	ND	ND	(1)	38.75	16.54	0.00	(3)	ND	54.0	**n/a**
18-26GHz		Horizontal	ND	ND	(1)	43.50	21.86	26.00		ND	54.0	**n/a**
18-26GHz		Vertical	ND	ND	(1)	43.50	21.86	26.00		ND	54.0	**n/a**
										Results:	**Complies**	

(1) No Emissions Detected (ND) above ambient or within 20dB of the limit
(2) Antenna ACF, Cable Loss and Amplifier Gain corrected in Spectrum Analyzer Transducer Factor
(3) External Amplier not used

$E_{Corr} = E_{Meas} + ACF + L_C - G_A$

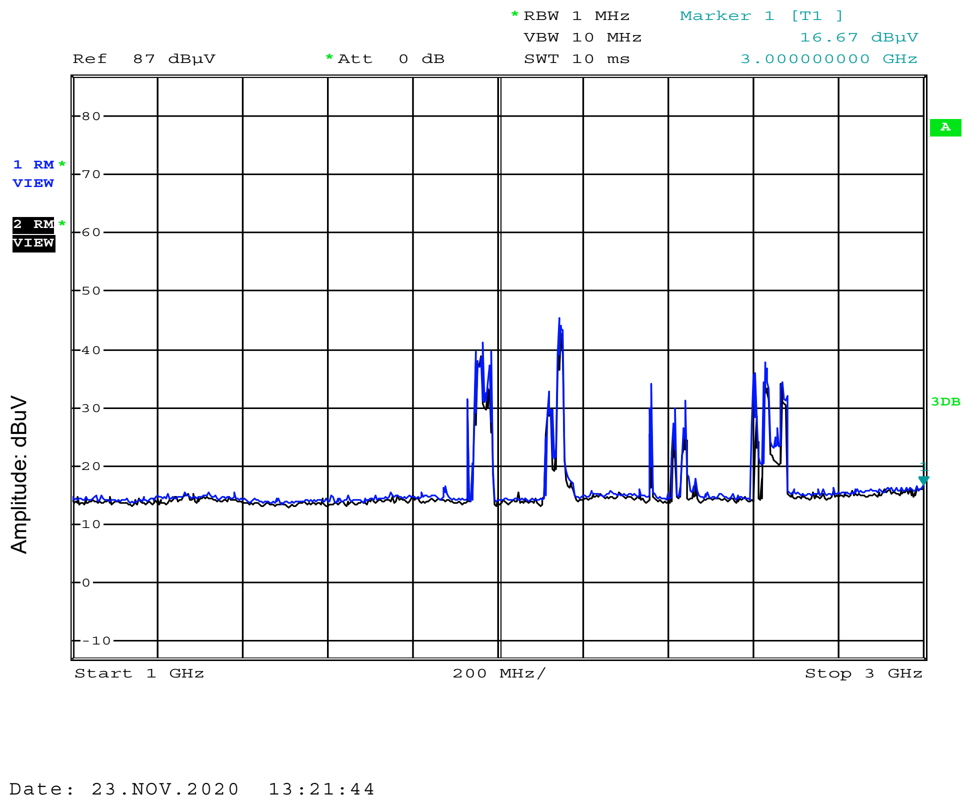
Conducted Emissions - Restricted Band



Frequency Range:	Antenna Polarization:	Emission Frequency:
9kHz - 30MHz	**Conducted**	**-**
Channel Frequency:	Modulation:	Measured Emission:
13.56 MHz	**ASK**	**-** dBuV

Limit Line Converted to dBm

Radiated Emissions - Restricted Band

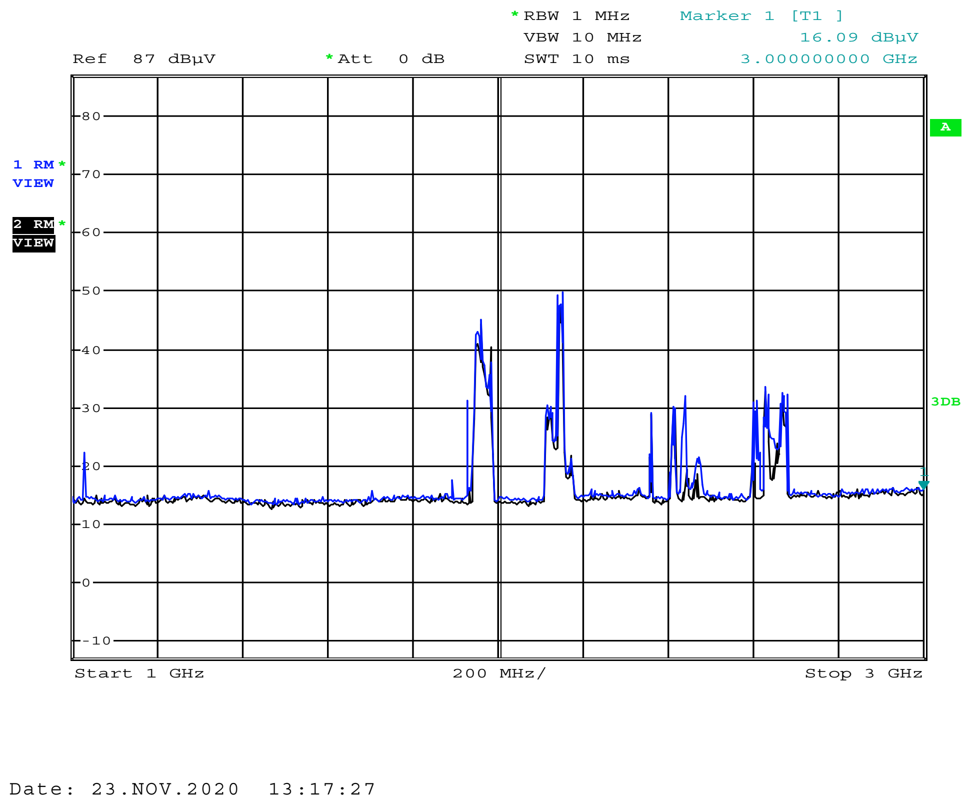


Frequency Range:	Antenna Polarization:	Emission Frequency:
1 - 3GHz	**Horizontal**	**ND**
Channel Frequency:	Modulation:	Measured Emission:
13.56 MHz	**ASK**	**ND** dBuV

Trace 1: Ambient

Trace 2: Ambient + DUT

Radiated Emissions - Restricted Band



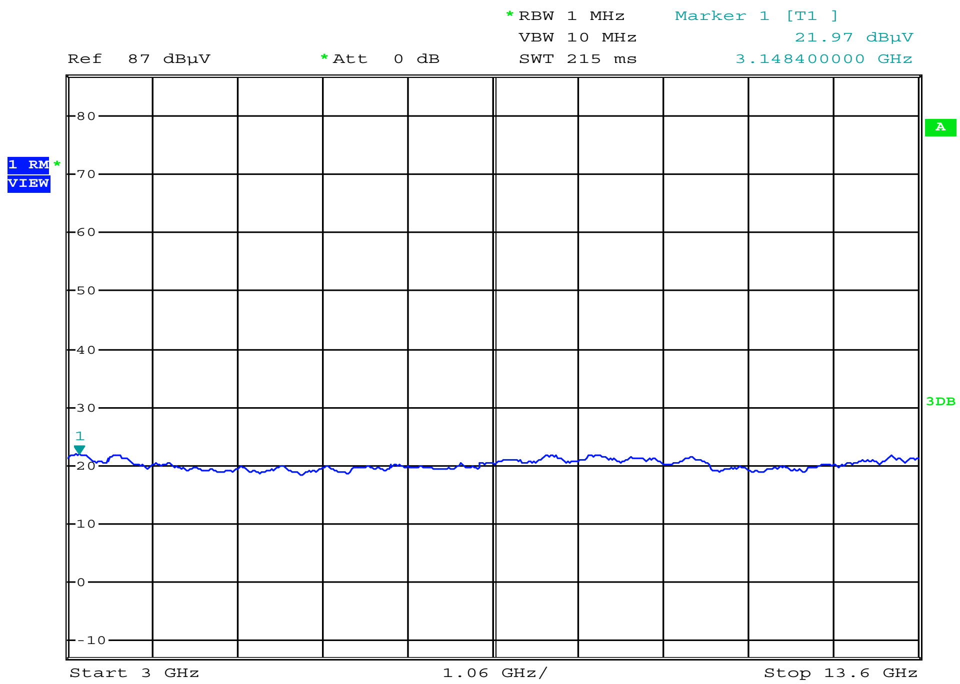
Frequency Range:	Antenna Polarization:	Emission Frequency:
1 - 3GHz	**Vertical**	**ND**
Channel Frequency:	Modulation:	Measured Emission:
13.56 MHz	**ASK**	**ND** dBuV

Trace 1: Ambient

Trace 2: Ambient + DUT

Marker 1: Fundamental

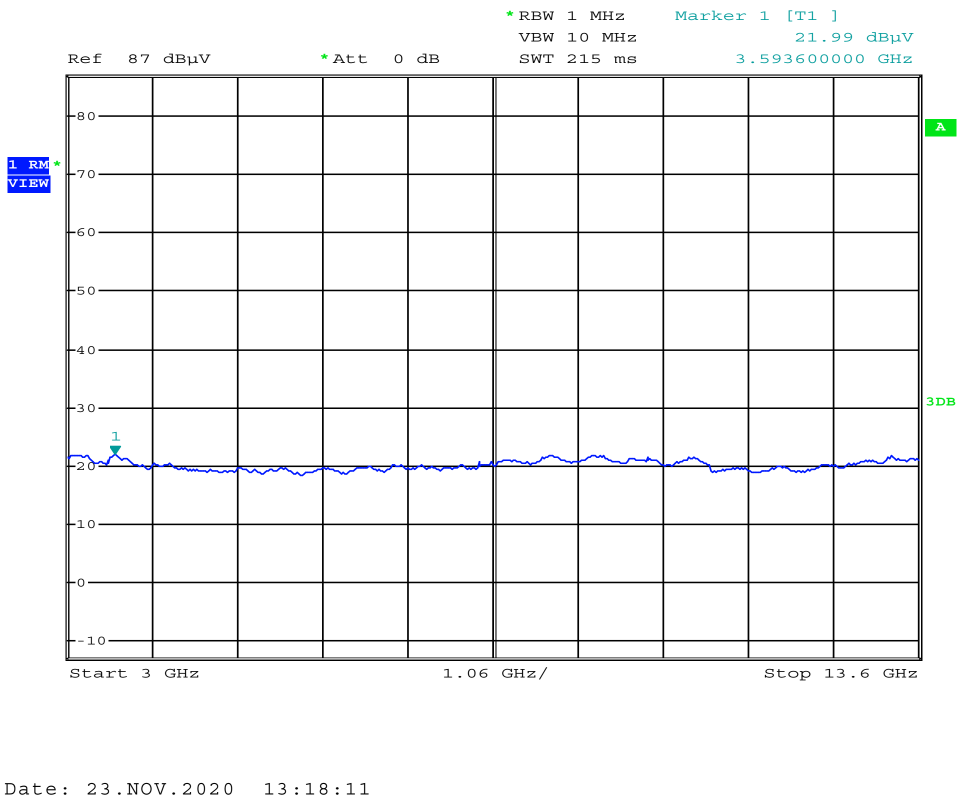
Radiated Emissions - Restricted Band



Date: 23.NOV.2020 13:20:40

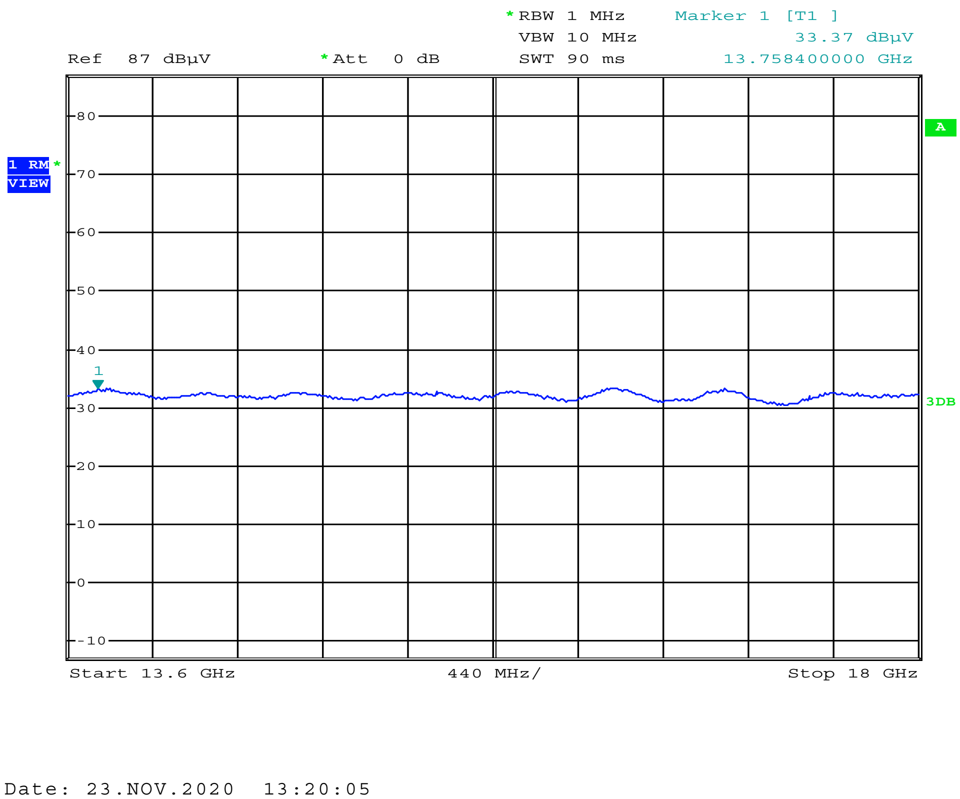
Frequency Range:	Antenna Polarization:	Emission Frequency:
3-13GHz	**Horizontal**	**ND**
Channel Frequency:	Modulation:	Measured Emission:
13.56 MHz	**ASK**	**ND** dBuV

Radiated Emissions - Restricted Band



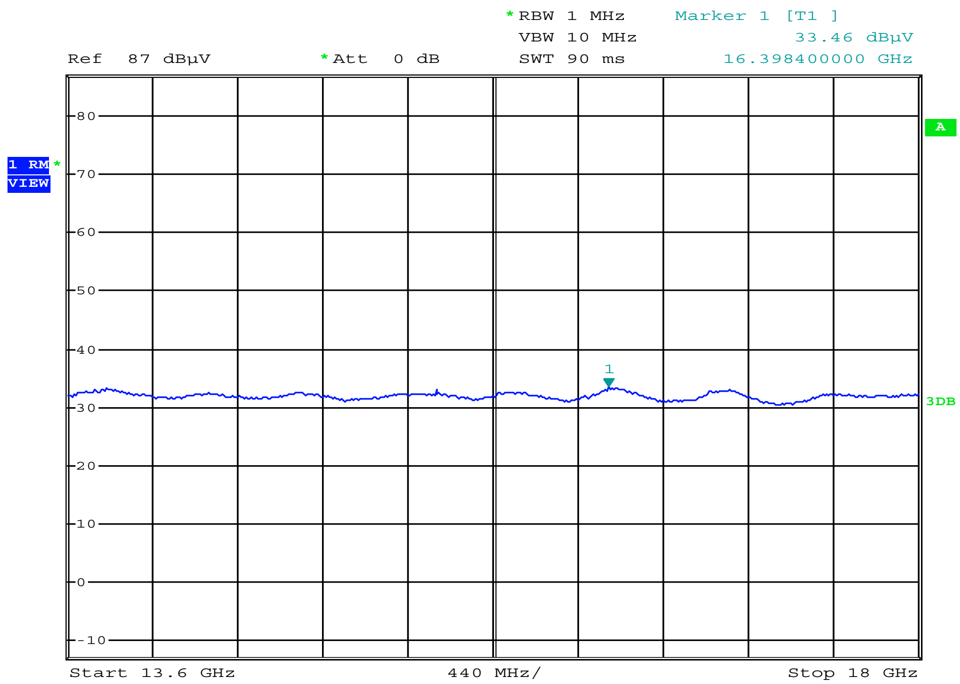
Frequency Range:	Antenna Polarization:	Emission Frequency:
3-13GHz	**Vertical**	**ND**
Channel Frequency:	Modulation:	Measured Emission:
13.56 MHz	**ASK**	**ND** dBuV

Radiated Emissions - Restricted Band



Frequency Range: **13-18GHz**	Antenna Polarization: **Horizontal**	Emission Frequency: **ND**
Channel Frequency: **13.56** MHz	Modulation: **ASK**	Measured Emission: **ND** dBuV

Radiated Emissions - Restricted Band



Date: 23.NOV.2020 13:18:38

Frequency Range:	Antenna Polarization:	Emission Frequency:
13-18GHz	**Vertical**	**ND**
Channel Frequency:	Modulation:	Measured Emission:
2442.00 MHz	**8-DPSK**	**ND** dBuV

Test Report Serial Number:	**45461620 R1.0**
Test Report Date:	**10 February 2021**
Project Number:	**1510**

SAR Test Report - New Certification

Applicant:

Garmin International Inc.
1200 East 151 St.
Olathe, KS, 66062
USA

Maximum Reported 10g SAR			
FCC	**Extremity DTS**	**0.40**	**W/kg**
ISED	**Extremity DTS**	**0.55**	
General Pop. Limit:		**4.00**	

FCC ID:	ISED Registration Number
IPH-03948	**1792A-03948**
Product Model Number / HVIN	Product Name / PMN
A03948	**A03948**

In Accordance With:

FCC 47 CFR §2.1093
Radiofrequency Radiation Exposure Evaluation: Portable Devices

IC RSS-102 Issue 5
Radio Frequency Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands)

Approved By:

Ben Hewson, President
Celltech Labs Inc.
21-364 Lougheed Rd.
Kelowna, BC, V1X 7R8
Canada

Test Lab Certificate: 2470.01 **IC Registration 3874A-1** **FCC Registration: CA3874**

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Table of Contents

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1.0 DOCUMENT CONTROL

Revision History					
Samples Tested By:		Trevor Whillock	Date(s) of Evaluation:		23 Oct - 28th Oct, 2020
Report Prepared By:		Trevor Whillock	Report Reviewed By:		Art Voss
Report Revision	Description of Revision		Revised Section	Revised By	Revision Date
0.1	Draft Release		n/a	Trevor Whillock	01 December, 2020
1.0	Initial Release		n/a	Art Voss	10 February 2021

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2.0 CLIENT AND DEVICE INFORMATION

Client Information		
Applicant Name	Garmin International Inc.	
Applicant Address	1200 East 151 St.	
	Olathe, KS,66062	
	USA	
DUT Information		
Device Identifier(s):	FCC ID:	IPH-03948
	IC:	1792A-03948
Type of Equipment:	Digital Transmission System (DTS) FCC Part 15, RSS 247	
	Low Power Communication Device Transmitter (DXX) FCC Part 15	
Device Model(s) / HVIN:	A03948	
Device Marketing Name / PMN:	A03948	
Test Sample Serial No.:	T/A Sample - Identical Prototype	
Transmit Frequency Range:	WiFi: 2412 - 2462 MHz	
	BT/BLE/ANT: 2402 - 2480 MHz	
	NFC: 13.56 MHz	
Number of Channels:	See Section 8.0	
Manuf. Max. Avg Rated Output Power:	WiFi 2.4GHz: 802.11b: 16.97 dBm Avg./ 802.11g: 15.51 dBm Avg. / 802.11n: 15.31dBm avg.	
	BT:GFSK: -0.16 dBm Avg./ PI/4-DQPSK: 8.34 dBm Avg./ 8-DPSK: 8.63 dBm Avg.	
	BLE: GMSK: -0.07 dBm Avg.	
	ANT: GFSK: -0.10 dBm Avg.	
Modulation:	WiFi 802.11b/g/n: DSSS, CCK, OFDM, MCS0-7	
	BT: GFSK, PI/4-DQPSK, 8-DPSK	
	BLE:GMSK	
	ANT:GFSK	
Duty Cycle:	WiFi: 100% / BT: 100%	
DUT Power Source:	5V USB, Internal Li-ion battery	
Deviation(s) from standard/procedure:	None	
Modification of DUT:	None	

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3.0 SCOPE OF EVALUATION

This Certification Report was prepared on behalf of:

Garmin International Inc.

,(the '*Applicant*"), in accordance with the applicable Federal Communications Commission (FCC) CFR 47 and Innovation, Scientific and Economic Development (ISED) Canada rules parts and regulations (the '*Rules*'). The scope of this investigation was limited to only the equipment, devices and accessories (the '*Equipment*') supplied by the *Applicant*. The tests and measurements performed on this *Equipment* were only those set forth in the applicable *Rules* and/or the Test and Measurement Standards they reference. The *Rules* applied and the Test and Measurement Standards used during this evaluation appear in the Normative References section of this report. The limits set forth in the technical requirements of the applicable *Rules* were applied to the measurement results obtained during this evaluation and ,unless otherwise noted, these limits were used as the Pass/Fail criteria. The Pass/Fail statements made in this report apply to only the tests and measurements performed on only the *Equipment* tested during this evaluation. Where applicable and permissible, information including test and measurement data and/or results from previous evaluations of same or similar equipment, devices and/or accessories may be cited in this report.

As per FCC 47 CFR Part §2.1091 and §2.1093, an RF Exposure evaluation report is required for this *Equipment* and the results of the RF Exposure evaluation appear in this report.

The A03948, FCC ID: IPH-03948, ISED ID: 1792A-03948 P/N:010-03948-XX , is a wrist-worn transceiver that is capable of operating in the 2.4GHz WiFi and Bluetooth frequency bands and has an additional NFC feature that operates at a fixed transmit frequency of 13.56MHz . The device is not capable of simultaneous transmission between transmitters. The device is intended for General Population Use. The product operates from an internal proprietary Li-ion rechargeable battery which can be connected to a compliant USB interface port, AC or DC adapter for charging. Test samples provided by the manufacturer were capable of transmitting at select frequencies and modulations preset by the manufacturer. An additional antenna modification was prepared for one sample allowing the ability to connect test equipment for antenna port conducted power analysis.

Application:

This is an application for a new device certification.

Scope:

Due to the nature of the device, the scope of this evaluation is to evaluate the SAR for intended use applications. It will include evaluation of the 2.4 GHz transmitter for all required RF exposure configurations and accessories types. The analysis of the Standalone Transmission SAR is found in Section 11.0 of this report.

The Test Plan developed for this evaluation is based on the required test channels and configurations which produced the highest worst case SAR and where applicable, SAR test reduction and/or SAR test exclusion may be utilized. The DUT was evaluated for SAR at the maximum tune up tolerance and conducted output power level, preset by the manufacturer and in accordance with the procedures described in IEEE 1528, IEC 62209-2, FCC KDB 865646, 447498, and RSS 102.

4.0 NORMATIVE REFERENCES

Normative References*	
ANSI / ISO 17025:2017	General Requirements for competence of testing and calibration laboratories
FCC CFR Title 47 Part 2 Title 47: Part 2.1093:	Code of Federal Regulations Telecommunication Radiofrequency Radiation Exposure Evaluation: Portable Devices
Health Canada Safety Code 6 (2015)	 Limits of Human Exposure to Radiofrequency Electromagnetic Energy in the Frequency Range from 3kHz to 300GHz
Industry Canada Spectrum Management & Telecommunications Policy RSS-102 Issue 5:	 Radio Frequency Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands)
IEEE International Committee on Electromagnetic Safety IEEE 1528-2013:	 IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques
IEC International Standard IEC 62209-2 2010	 Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices - Part 2
FCC KDB KDB 865664 D01v01r04	 SAR Measurement Requirements for 100MHz to 6GHz
FCC KDB KDB 447498 D01v06	 Mobile and Portable Devices RF Exposure Procedures and Equipment Authorization Policies
FCC KDB KDB 248227 D01v02r02	 SAR Test Guidane for IEEE 802.11 (WiFI) Transmitters
* When the issue number or issue date is omitted, the latest version is assumed.	

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5.0 STATEMENT OF COMPLIANCE

This measurement report demonstrates that samples of the product model(s) were evaluated for Specific Absorption Rate (SAR) on the date(s) shown, in accordance with the Measurement Procedures cited and were found to comply with the Standard(s) Applied based on the Exposure Limits of the Use Group indicated for which the product is intended to be used.

Applicant:	Model / HVIN:	
Garmin International Inc.	**A03948**	
Standard(s) Applied:	**Measurement Procedure(s):**	
FCC 47 CFR §2.1093 **Health Canada's Safety Code 6**	**FCC KDB 865664, FCC KDB 447498, FCC KDB248227** **Industry Canada RSS-102 Issue 5** **IEEE Standard 1528-2013, IEC 62209-2**	
Reason For Issue:	**Use Group:**	**Limits Applied:**
[x] **New Certification** [ ] **Class I Permissive Change** [ ] **Class II Permissive Change**	[x] **General Population / Uncontrolled** [ ] **Occupational / Controlled**	[ ] **1.6W/kg - 1g Volume** [ ] **8.0W/kg - 1g Volume** [x] **4.0W/kg - 10g Volume**
Reason for Change:		**Date(s) Evaluated:**
Original Filing		**Oct 23rd-Oct 28th, 2020**

The results of this investigation are based solely on the test sample(s) provided by the applicant which was not adjusted, modified or altered in any manner whatsoever except as required to carry out specific tests or measurements. A description of the device, operating configuration, detailed summary of the test results, methodologies and procedures used during this evaluation, the equipment used and the various provisions of the rules are included in this test report.

I attest that the data reported herein is true and accurate within the tolerance of the Measurement Instrument Uncertainty; that all tests and measurements were performed in accordance with accepted practices or procedures; and that all tests and measurements were performed by me or by trained personnel under my direct supervision. The results of this investigation are based solely on the test sample(s) provided by the client which were not adjusted, modified or altered in any manner whatsoever, except as required to carry out specific tests or measurements. This test report has been completed in accordance with ISO/IEC 17025.	Trevor Whillock Test Lab Engineer Celltech Labs Inc. 3 December 2020 Date

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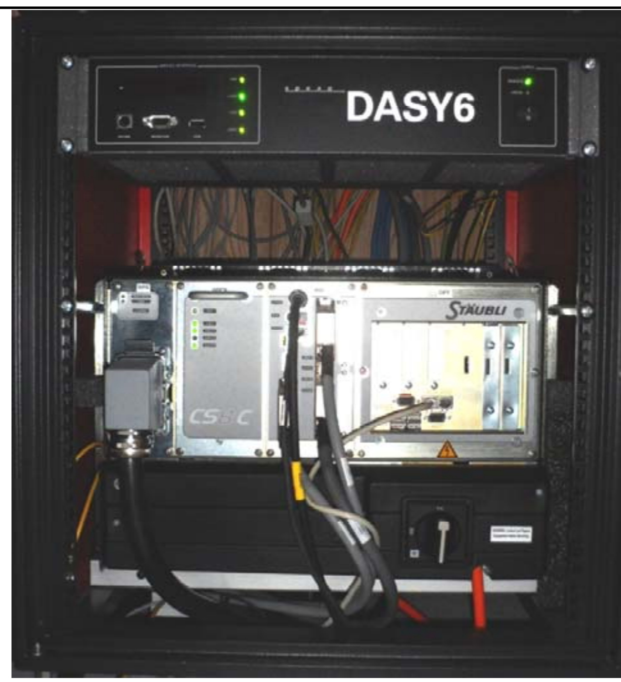
6.0 SAR MEASUREMENT SYSTEM

SAR Measurement System

Celltech Labs Inc. SAR measurement facility employs a Dosimetric Assessment System (DASY™) manufactured by Schmid & Partner Engineering AG (SPEAG™) of Zurich, Switzerland. The DASY6 measurement system is comprised of the measurement server, a robot controller, a computer, a near-field probe, a probe alignment sensor, an Elliptical Planar Phantom (ELI) phantom and a specific anthropomorphic mannequin (SAM) phantom for Head and/or Body SAR evaluations. The robot is a six-axis industrial robot performing precise movements to position the probe to the location (points) of maximum electromagnetic field (EMF). A cell controller system contains the power supply, robot controller and a teach pendant (Joystick) to control the robot's servo motors. The Staubli robot is connected to the cell controller to allow software manipulation of the robot. A data acquisition electronic (DAE) circuit performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. is connected to the Electro-optical coupler (EOC). The EOC performs the conversion from the optical form the DAE to digital electronic signal and transfers data to the DASY6 measurement server. The DAE4 utilizes a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain-switching multiplexer, a fast 16-bit AD-converter, a command decoder and a control logic unit. Transmission to the DASY6 measurement server is accomplished through an optical downlink for data and status information and an optical uplink for commands and clock lines. The mechanical probe-mounting device includes two different sensor systems for frontal and sidewise probe contacts. The sensor systems are also used for mechanical surface detection and probe collision detection. The robot utilizes a controller with built in VME-bus computer.

DASY 6 SAR System with SAM Phantom



DASY 6 Measurement Controller

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7.0 RF CONDUCTED POWER MEASUREMENT

Table 7.0 Conducted Power Measurements

A03948-Conducted Power Measurements-Average									
Channel	Frequency (MHz)	Measured Power (dBm)	Rated Power (dBm)	Rated Power (W)	Delta (dB)	SAR Test Channel (Y/N)	Mode	Modulation	
1	2412	14.88	16.71	0.05	-1.83	-	WLAN 2.4G	CCK-1Mbps	802.11b
2	2417	15.87	16.71	0.05	-0.84	-		CCK-1Mbps	
3	2422	16.54	16.71	0.05	-0.17	-		CCK-1Mbps	
4	2427	16.71	16.71	0.05	0.00	-		CCK-1Mbps	
5	2432	16.25	16.71	0.05	-0.46	-		CCK-1Mbps	
6	2437	15.26	16.71	0.05	-1.45	-		CCK-1Mbps	
7	2442	14.46	16.71	0.05	-2.25	-		CCK-1Mbps	
8	2447	14.13	16.71	0.05	-2.58	-		CCK-1Mbps	
9	2452	14.30	16.71	0.05	-2.41	-		CCK-1Mbps	
10	2457	15.03	16.71	0.05	-1.68	-		CCK-1Mbps	
11	2462	13.75	16.71	0.05	-2.96	-		CCK-1Mbps	
4	2427	16.96	16.96	0.05	0.00	-		CCK-2Mbps	
		16.97	16.97	0.05	0.00	Y		DSSS-5.5Mbps	
		16.91	16.91	0.05	0.00	-		DSSS-11Mbps	
		14.94	14.94	0.03	0.00	-		OFDM-6Mbps	802.11g
		15.51	15.51	0.04	0.00	-		OFDM-54Mbps	
		15.31	15.31	0.03	0.00	-		MCS-0	802.11n
		15.30	15.3	0.03	0.00	-		MCS-7	
6	2437	15.55	16.96	0.05	-1.41	-		CCK-2Mbps	802.11b
		15.60	16.97	0.05	-1.37	Y		DSSS-5.5Mbps	
		15.52	16.91	0.05	-1.39	-		DSSS-11Mbps	
		14.24	14.94	0.03	-0.70	-		OFDM-6Mbps	802.11g
		14.39	15.51	0.04	-1.12	-		OFDM-54Mbps	
		14.25	15.31	0.03	-1.06	-		MCS-0	802.11n
		14.28	15.3	0.03	-1.02	-		MCS-7	
10	2457	15.03	16.96	0.05	-1.93	-		CCK-2Mbps	802.11b
		15.38	16.97	0.05	-1.59	Y		DSSS-5.5Mbps	
		15.36	16.91	0.05	-1.55	-		DSSS-11Mbps	
		13.72	14.94	0.03	-1.22	-		OFDM-6Mbps	802.11g
		14.03	15.51	0.04	-1.48	-		OFDM-54Mbps	
		13.92	15.31	0.03	-1.39	-		MCS-0	802.11n
		13.90	15.3	0.03	-1.40	-		MCS-7	

Table 7.1 Conducted Power Measurements

A03948-Conducted Power Measurements-Average								
Channel	Frequency *(MHz)*	Measured Power *(dBm)*	Rated Power *(dBm)*	Rated Power *(W)*	Delta *(dB)*	SAR Test Channel *(Y/N)*	Mode	Modulation
2	2402	-0.16	-0.16	0.001	0.00	-	BT/BLE/ANT	BT(GFSK)
41	2441	-1.21	-0.16	0.001	-1.05	-		
80	2480	-2.03	-0.16	0.001	-1.87	-		
2	2402	8.34	8.34	0.007	0.00	-		BT(PI/4-DQPSK)
		8.63	8.63	0.007	0.00	Y		BT(8-DPSK)
		-0.07	-0.07	0.001	0.00	-		BLE(GMSK)
		-0.10	-0.10	0.001	0.00	-		ANT(GFSK)

The rated power and tolerance are stated for typical transmission modes and data rates. Some modes and data rates may produce lower than rated conducted power levels. Power measurements taken across the various channels, modes and data rates did not produce levels in excess of the Rated Power plus Tolerance. SAR was evaluated using the power level setting and duty cycle specified by the manufacturer to be the max output power and produce the most conservative SAR. SAR was evaluated at the ***maximum average*** tune up tolerance. See section 2.0 Client and Device Information for details. The ***reported*** SAR was not scaled down.

8.0 NUMBER OF TEST CHANNELS (*Nc*)

WiFi SAR Evaluation:

SAR was evaluated in DSSS mode with a sample rate of 5.5Mbps at a 100% duty cycle. The power level setting selected was specified by the manufacturer to be the max output power and produce the most conservative SAR.

As per FCC KDB 24827, the required 802.11 test channels are Ch 4, Ch 6 and Ch 10.
When applicable, SAR test reduction methods may be utilized.

802.11b DSSS SAR test reduction is determined according to the following:

a) When the *reported* SAR of the highest measured maximum output power channel is ≤ to 0.8 W/kg, no further SAR testing is required for 802.11b DSSS in that exposure configuration.

b) When the *reported* SAR is > 0.8 W/kg, SAR is required for that exposure configuration using the next highest output power channel. When any *reported* SAR is > 1.2 W/Kg, SAR is required for the third channel.

While 1-g SAR thresholds are specified in the procedures for SAR test reduction and exclusion, these thresholds should be multiplied by 2.5 when 10-g extremity SAR is considered.

Therefore; Channel 6 and 10 was not required for evaluation in any exposure configuration.

2.4 GHz 802.11g/n OFDM SAR Test Exclusion Requirements

a) When KDB Publication 447498 SAR test exclusion applies to the OFDM configuration.

b) 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 ≤ 1.2 W/kg.

See 13.1 for details.

BT/BLE/ANT SAR Test Evaluation:

Bluetooth was evaluated for SAR at a transmit duty cycle of 100 % in the worst-case configuration from the WiFi test evaluation.
The duty cycle cannot be altered in test mode or by the user.

General SAR Test Reduction Considerations:

As per KDB 447498D01 4.4.1,

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:

c) ≤ 0.4W/kg or 1.0W/kg, for 1-g or 10-g respectively, when the transmission band is ≥200Mh

BLE/ANT was not evaluated for SAR.

Per FCC KDB 447498 4.3.1 the BLE/ANT transmitter meets the standalone SAR test exclusion criteria. See section 11.0 for details.

NOTE: This device is not capable of simultaneous transmission between the BT/BLE/ANT and WiFi transmitters.
Due to the nature of this device, WiFi and Bluetooth were evaluated for standalone SAR only.

NFC:

The RFID transmitter is a low power communication device transmitter and does not require standalone SAR evaluation.
Simultaneous transmission evaluation with it and the 802.11b/g/n or BT 802.15 is not required

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9.0 ACCESSORIES EVALUATED

Table 9.0 Accessories Evaluated

Manufacturer's Accessory List				
Test Report ID Number	**Manufacturer's Part Number**	**Description**	**SAR Evaluated**	**SAR Tested**
B1	010-12901-00	Silicone Band	**Y**	**Y**
B2	010-12496-20	Metal Band	**Y**	**Y**
B3	010-12740-02	Titanium Band	**Y**	**Y**
P1	362-00087-00	AC Adapter, 5.0V, 1.0A, USB-A Receptacle	**n/a**	**n/a**
P2	320-01069-20	USB Charging Cable	**n/a**	**n/a**

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10.0 SAR MEASUREMENT SUMMARY

Table 10.0: Measured Results

Measured SAR Results (10g) - BODY (FCC/ISED)																
Date	Plot ID #	Test Type	DUT P/N	DUT Model	DUT Type	Test Freq.	Modulation	Accessories				DUT Spacing		Meas. Cond. Power	Measured SAR	SAR Drift
								Antenna P/N	Battery Type	Body P/N	Audio P/N	DUT	Antenna		10g	
						(MHz)						(mm)	(mm)	(dBm)	(W/kg)	(dB)
Extremity SAR WiFi & BT 2.4 GHz																
23 Oct 2020	*B1	Extremity-Back Side	012-03948-XX	A03948	Wrist-worn Transmitter	2427	DSSS-5.5Mbps	n/a	Li-Ion	010-12901-00 (Silicone)	n/a	0	0	16.97	0.394	-1.300
26 Oct 2020	B2	Extremity-Back Side	012-03948-XX	A03948	Wrist-worn Transmitter	2427	DSSS-5.5Mbps	n/a	Li-Ion	010-12496-20 (Metal)	n/a	0	0	16.97	0.342	-1.370
26 Oct 2020	B3	Extremity-Back Side	012-03948-XX	A03948	Wrist-worn Transmitter	2427	DSSS-5.5Mbps	n/a	Li-Ion	010-12740-02 (Titanium)	n/a	0	0	16.97	0.337	-1.160
27 Oct 2020	**B4	Extremity-Back Side	012-03948-XX	A03948	Wrist-worn Transmitter	2402	8-DPSK	n/a	Li-Ion	010-12901-00 (Silicone)	n/a	0	0	8.34	0.044	0.170
FCC 47 CFR 2.1093						Health Canada Safety Code 6			Extremity	10g Average		4.0 W/kg		General Population		

Reference Section 8.0 for details

*Per KDB 248227 D01 5.2.1(a); Testing of other required test channels is not required when the reported 1-g or 10g 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.

**Per KDB 447498D01 4.4.1(c)
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:
≤ 0.4W/kg or 1.0W/kg, for 1-g or 10-g respectively, when the transmission band is ≥200Mh

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11.0 SCALING OF MAXIMUM MEASURED SAR

Table 11.0 SAR Scaling

Plot ID	Configuration	Freq (MHz)	Measured Fluid Deviation Permittivity	Measured Fluid Deviation Conductivity	Measured Conducted Power (dBm)	Measured Drift (dB)	Measured SAR (10g) (W/kg)
B1	Extremity-Back Side	2427	-5.45%	5.46%	16.97	-1.300	0.394

Step 1

Fluid Sensitivity Adjustment

Plot ID	Scale Factor (%)	x	Measured SAR (W/kg)	=	Step 1 Adjusted SAR (10g) (W/kg)
B1	2.303%	x	0.394	=	0.403

Step 2

Manufacturer's Tune-Up Tolerance

Plot ID	Measured Conducted Power (dBm)	Rated Power (dBm)	Delta (dB)	+	Step 1 Adjusted SAR (W/kg)	=	Step 2 Adjusted SAR (10g) (W/kg)
B1	16.97	16.97	0.00	+	0.403	=	0.403

Step 3 (ISED)

Drift Adjustment

Plot ID	Measured Drift (dB)	+	Step 2 Adjusted SAR (W/kg)	=	Step 3 Adjusted SAR (10g) (W/kg)
B1	-1.300	+	**0.403**	=	**0.549**

Step 4 (FCC)

Simultaneous Transmission - Bluetooth and/or WiFi

Plot ID	Rated Output Power (Pmax) (mW)	Freq (MHz)	Separation Distance (mm)	Estimated SAR (W/kg)	+	Step 2 Adjusted SAR (W/kg)	=	Step 4 Adjusted SAR (10g) (W/kg)
B1	n/a	n/a	0	n/a	+	0.403	=	0.403

Step 5

Reported SAR

Plot ID	FCC From Steps 1 and 2 1g SAR (W/kg)	ISED From Steps 1 through 3 1g SAR (W/kg)
B8	**0.403**	**0.549**

The SAR test exclusion threshold for the BLE/ANT transmitter as per FCC KDB 447498 4.3.1 is as follows:

[(*max. power of channel, including tune-up tolerance, mW*) / (*min. test separation distance, mm*)] X [√f(GHz)] ≤ 7.5 for 10-g SAR
[1.41)/(5)] X [√2.402] = 0.437≤ 7.5

Where:
max. power of channel, including tune-up tolerance, mW = 1.41 mW
min. test separation distance, mm = 5mm
f(GHz) = 2.402 GHz

Therefore; the BLE/ANT Transmitter meets the SAR test exclusion criteria.

NOTE: This device is not capable of simultaneous transmission between the BT/BLE/ANT and WiFi transmitters.
Due to the nature of this device, WiFi and Bluetooth were evaluated for standalone SAR only.

The RFID transmitter is a low power communication device transmitter and does not require standalone SAR evaluation.
Simultaneous transmission evaluation with it and the 802.11b/g/n or BT 802.15 is not required

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NOTES to Table 11.0
(1) Scaling of the Maximum Measured SAR is based on the highest, 100% duty cycle, Face, Body and/or Head SAR measured of ALL test channels, configurations and accessories used during THIS evaluation. The Measured Fluid Deviation parameters apply only to deviation of the tissue equivalent fluids used at the frequencies which produced the highest measured SAR. The Measured Conducted Power applies to the Conducted Power measured at the frequencies producing the highest Face and Body SAR. The Measured Drift is the SAR drift associated with that specific SAR measurement. The Reported SAR is the accumulation of all SAR Adjustments from the applicable Steps 1 through 4. The Plot ID is for indentification of the SAR Measurement Plots in Annex A of this report. NOTE: Some of the scaling factors in Steps 1 through 4 may not apply and are identified by light gray text.
Step 1
Per IEC-62209-1 and FCC KDB 865664. Scaling required only when Measured Fluid Deviation is greater than 5%. If the Measured Fluid Deviation is greater than 5%, Table 9.1 will be shown and will indicate the SAR scaling factor in percent (%). SAR is MULTIPLIED by this scaling factor only when the scaling factor is positive (+).
Step 2
Per KDB 447498. Scaling required only when the difference (Delta) between the Measured Conducted Power and the Manufacturer's Rated Conducted Power is (-) Negative. The absolute value of Delta is ADDED to the SAR.
Step 3
Per IEC 62209-1. Scaling required only when Measured Drift is (-) Negative. The absolute value of Measured Drift is added to Reported or Simultaneous Reported SAR.
Step 4
Per KDB 447498 4.3.2. The SAR, either measured or calculated, of ANY and ALL simultaneous transmitters must be added together and includes all contributors.
Step 5
The Reported SAR is the Maximum Final Adjusted Cumulative SAR from the applicable Steps 1 through 4 and are reported on Page 1 of this report.

Table 11.1 Fluid Sensitivity Calculation (10g)

Fluid Sensitivity Calculation (10g)	
Delta SAR = Ce * Delta Er + C(sigma)*Delta Sigma	
Frequency (GHz)	**Plot ID**
2.422	**B1**
Ce	-0.1581
Cσ	0.2647
Δ E	-5.0500
Δσ	5.1900
ΔSAR	2.1723
Scale Factor Is Positive. Scaling Required	

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12.0 SAR EXPOSURE LIMITS

Table 12.0 Exposure Limits

<table>
<tr><th colspan="4">SAR RF EXPOSURE LIMITS</th></tr>
<tr><th>FCC 47 CFR§2.1093</th><th>Health Canada Safety Code 6</th><th>General Population / Uncontrolled Exposure(4)</th><th>Occupational / Controlled Exposure(5)</th></tr>
<tr><td colspan="2">Spatial Average(1)
(averaged over the whole body)</td><td>0.08 W/kg</td><td>0.4 W/kg</td></tr>
<tr><td colspan="2">Spatial Peak(2)
(Head and Trunk averaged over any 1 g of tissue)</td><td>1.6 W/kg</td><td>8.0 W/kg</td></tr>
<tr><td colspan="2">Spatial Peak(3)
(Hands/Wrists/Feet/Ankles averaged over 10 g)</td><td>4.0 W/kg</td><td>20.0 W/kg</td></tr>
<tr><td colspan="4">(1) The Spatial Average value of the SAR averaged over the whole body.</td></tr>
<tr><td colspan="4">(2) The Spatial Peak value of the SAR averaged over any 1 gram of tissue, defined as a tissue volume in the shape of a cube and over the appropriate averaging time.</td></tr>
<tr><td colspan="4">(3) The Spatial Peak value of the SAR averaged over any 10 grams of tissue, defined as a tissue volume in the shape of a cube and over the appropriate averaging time.</td></tr>
<tr><td colspan="4">(4) Uncontrolled environments are defined as locations where there is potential exposure to individuals who have no knowledge or control of their potential exposure.</td></tr>
<tr><td colspan="4">(5) Controlled environments are defined as locations where there is potential exposure to individuals who have knowledge of their potential exposure and can exercise control over their exposure.</td></tr>
</table>

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13.0 DETAILS OF SAR EVALUATION

13.0 Day Log

DAY LOG								
Date	Ambient Temp (°C)	Fluid Temp (°C)	Relative Humidity (%)	Barometric Pressure (kPa)	Fluid Dielectric	SPC	Test	Task
23 Oct 2020	22	22.6	35%	101.6	X	X	X	2450H Fluids and SPC, NASAR Eval*
26 Oct 2020	23.5	22.4	26%	103.1			X	2450H NASAR Eval
27 Oct 2020	22	22.3	24%	102.3			X	2450H NASAR Eval
28 Oct 2020	22	22.1	28%	102.1	X			2450H Fluids per IEEE 1528**

*Per IEEE1528 Test series was started within 24 hours of Fluid Parameter Measurement
**Per IEEE 1528 Fluid Parameters were measured at end of test series

13.1 DUT Setup and Configuration

DUT Setup and Configuration	
1	This device is a wrist-worn device and was evaluated for extremity SAR. The intended use is to be wrist-worn with the back side of the device in contact with the human skin. The device was evaluated at a separation distance of 0mm between the back side of the device and the phantom .The DUT evaluated in combination with accessory P/N: 010-12901-00 was found to be the worst case setup configuration and produced the highest SAR. The DUT was evaluated for SAR in accordance with the procedures described in IEEE 1528, FCC KDB 865646, 248277 and RSS-102.
2	2.4GHz 802.11g/n OFDM SAR Test Exclusion As Per KDB 248277 D01v02r02 - 5.2.2, b) 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 ≤ 3W/kg. Maximum 802.11g/n OFDM specified power(POFDM)= 15.51 dBm Maximum 802.11b DSSS specified power (PDSSS)= 16.97 dBm Ratio OFDM/DSSS power = -1.46 dBm (71.4%) Highest reported* SAR (SARMAX)= 1.13 W/kg POFDM/PDSSS X SARMAX = 0.806W/kg ≤ 3.0 W/kg Since the ratio of the ODFM/DSSS specified power is less than one (0dB), the reported SAR would not exceed 3.0 W/kg *The reported SAR in this case is the measured SAR adjusted for fluid sensitivity.
3	The Device was capable of transmitting at various modulations, data rates and duty cycles. The Conducted Power was highest when measured in DSS Mode-5.5 Mbps at 100% Duty cycle than any other configuration in the 2.4GHz Band. The DUT was evaluated for SAR at the maximum conducted output power level, preset by the manufacturer.
4	Bluetooth was evaluated for SAR in BT-8-DPSK mode with a transmit duty cycle of 100% in the worst-case configuration from the WiFi test evaluation.The Duty cycle could not be altered in test mode or by the user. The DUT was evaluated for SAR at the maximum conducted output power level, preset by the manufacturer.
5	Each SAR evaluation was performed with a fully charged battery.

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13.2 DUT Positioning

DUT Positioning
Positioning
The DUT Positioner was securely fastened to the Phantom Platform. Registration marks were placed on the DUT and the Positioner to ensure consistent positioning of the DUT for each test evaluation.
FACE Configuration
This device is not intended to be held to the face and was not tested in the FACE configuration.
BODY Configuration
The DUT was securely clamped into the device holder with the surface of the DUT normally in contact with the body in direct contact with the bottom of the phantom, or 0mm separation from the DUT's accessory to the phantom surface.
HEAD Configuration
This device is not intended to be held to the ear and was not tested in the HEAD configuration.
Limb Worn Configuration
The DUT was positioned with the back side directly against the phantom surface with the strap opened to allow direct contact or 0mm of the DUT and watch band to the phantom surface.

13.3 General Procedures and Report

General Procedures and Reporting
General Procedures
The fluid dielectric parameters of the Active Tissue Simulating Liquid (TSL) were measured as described in this Section, recorded and entered into the DASY Measurement Server. Active meaning the TSL used during the SAR evaluation of the DUT. The temperature of the Active TSL was measured and recorded prior to performing a System Performance Check (SPC). An SPC was performed with the Active TSL prior to the start of the test series. The temperature of the Active TSL was measured throughout the day and the Active TSL temperature was maintained to ± 0.5°C. The Active TSL temperature was maintained to within ±2.0°C throughout the test series. The liquid parameters shall be measured within 24 hours before the start of a test series and if it takes longer than 48 hours, the liquid parameters shall also be measured at the end of the test series. An Area Scan exceeding the length and width of the DUT projection was performed and the locations of all maximas within 2dB of the Peak SAR recorded. A Zoom Scan centered over the Peak SAR location(s) was performed and the 1g and 10g SAR values recorded. The resolutions of the Area Scan and Zoom Scan are described in the Scan Resolution table(s) in this Section. A Power Reference Measurement was taken at the phantom reference point immediately prior to the Area Scan. A Power Drift measurement was taken at the phantom reference point immediately following the Zoom Scan to determine the power drift. A Z-Scan from the *Maximum Distance to Phantom Surface* to the fluid surface was performed following the power drift measurement.
Reporting
The 1g SAR, 10g SAR and power drift measurements are recorded in the SAR Measurement Summary tables in the SAR Measurement Summary Section of this report. The SAR values shown in the 100% DC (Duty Cycle) column are the SAR values reported by the SAR Measurement Server with the DUT operating at 100% transmit duty cycle. These tables also include other information such as transmit channel and frequency, modulation, accessories tested and DUT-phantom separation distance. In the Scaling of Maximum Measured SAR Section of this report, the highest measured SAR in the BODY configuration, within the entire scope of this assessment, are, when applicable, scaled for Fluid Sensitivity, Manufacturer's Tune-Up Tolerance, Simultaneous Transmission and Drift. With the exception of Duty Cycle correction/compensation, SAR values are ONLY scaled up, not down. The final results of this scaling is the *reported SAR* which appears on the Cover Page of this report.

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13.4 Fluid Dielectric and Systems Performance Check

Fluid Dielectric and Systems Performance Check

Fluid Dielectric Measurement Procedure

The fluid dielectric parameters of the Tissue Simulating Liquid (TSL) are measured using the Open-Ended Coax Method connected to an Agilent 8753ET Network Analyzer connected to a measurement server running Aprel Dielectric Property Measurement System. A frequency range of ± 100MHz for frequencies > 300MHz and ± 50MHz for frequencies ≤ 300MHz with frequency step size of 10MHz is used. The center frequency is centered around the SAR measurement probe's calibration point for that TSL frequency range. A calibration of the setup is performed using a short-open-deionized water (at 23°C in a 300ml beaker) method. A sample of the TSL is placed in a 300ml beaker and the open-ended coax is submerged approximately 8mm below the fluid surface in the approximate center of the beaker. A check of the setup is made to ensure no air is trapped under the open-ended coax. The sample of TSL is measured and compared to the FCC KDB 865664 targets for HEAD or BODY for the entire fluid measurement range. Fluid adjustment are made if the dielectric parameters are > 5% in range that the DUT is to be tested. If the adjustments fail to bring the parameters to ≤ 5% but are < 10%, the SAR Fluid Sensitivity as per IEC 62201-1 and FCC KDB 865664 are applied to the highest measured SAR. A TSL with dielectric parameters > 10% in the DUT test frequency range are not used.

Systems Performance Check

The fluid dielectric parameters of the Active TSL are entered into the DASY Measurement Server at each of the 10MHz step size intervals. Active meaning the TSL used during the SAR evaluation of the DUT. The DASY Measurement System will automatically interpolate the dielectric parameters for DUT test frequencies that fall between the 10MHz step intervals.

A Systems Performance Check (SPC) is performed in accordance with IEEE 1528 "System Check" and FCC KDB 865664 "System Verification". A validation source, dipole or Confined Loop Antenna (CLA), is placed under the geometric center of the phantom and separated from the phantom in accordance to the validation source's Calibration Certificate data. A CW signal set to the frequency of the validate source's and SAR measurement probe's calibration frequency with a forward power set to the validation source's Calibration Certificate data power setting is applied to the validation source. An Area Scan is centered over the projection of the validation source's feed point and an Area Scan is taken. A Zoom Scan centered over the Peak SAR measurement of the Area Scan and the 1g and 10g SAR is measured. The measured 1g and 10g SAR is compared to the 1g and 10g SAR measurements from the validation source's Calibration Certificate. When required, the measured SAR is normalized to 1.0W and compared to the normalized SAR indicated on the validation source's Calibration Certificate. The SPC is considered valid when the measured and normalized SAR is ≤ 10% of the measured and normalize SAR of the validation source's Calibration Certificate.

The fluid dielectric parameters of the Active TSL and SPC are repeated when the Active TSL has been in use for greater than 84 hours or if the Active TSL temperature has exceed ± 1°C of the initial fluid analysis.

13.5 Scan Resolution 100MHz to 2GHz

Scan Resolution 100MHz to 2GHz	
Maximum distance from the closest measurement point to phantom surface: (Geometric Center of Probe Center)	**4 ± 1 mm**
Maximum probe angle normal to phantom surface. (Flat Section ELI Phantom)	**5° ± 1°**
Area Scan Spatial Resolution ΔX, ΔY	**15 mm**
Zoom Scan Spatial Resolution ΔX, ΔY	**7.5 mm**
Zoom Scan Spatial Resolution ΔZ (Uniform Grid)	**5 mm**
Zoom Scan Volume X, Y, Z	**30 mm**
Phantom	**ELI**
Fluid Depth	**150 ± 5 mm**
An Area Scan with an area extending beyond the device was used to locate the candidate maximas within 2dB of the global maxima.	
A Zoom Scan centered over the peak SAR location(s) determined by the Area Scan was used to determine the 1-gram and 10-gram peak spatial-average SAR	

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13.6 Scan Resolution 2GHz to 3GHz

Scan Resolution 2GHz to 3GHz	
Maximum distance from the closest measurement point to phantom surface: (Geometric Center of Probe Center)	**4 ± 1 mm**
Maximum probe angle normal to phantom surface. (Flat Section ELI Phantom)	**5° ± 1°**
Area Scan Spatial Resolution ΔX, ΔY	**12 mm**
Zoom Scan Spatial Resolution ΔX, ΔY	**5 mm**
Zoom Scan Spatial Resolution ΔZ (Uniform Grid)	**5 mm**
Zoom Scan Volume X, Y, Z	**30 mm**
Phantom	**ELI**
Fluid Depth	**150 ± 5 mm**
An Area Scan with an area extending beyond the device was used to locate the candidate maximas within 2dB of the global maxima.	
A Zoom Scan centered over the peak SAR location(s) determined by the Area Scan was used to determine the 1-gram and 10-gram peak spatial-average SAR	

13.7 Scan Resolution 5GHz to 6GHz

Scan Resolution 5GHz to 6GHz	
Maximum distance from the closest measurement point to phantom surface: (Geometric Center of Probe Center)	**4 ± 1 mm**
Maximum probe angle normal to phantom surface. (Flat Section ELI Phantom)	**5° ± 1°**
Area Scan Spatial Resolution ΔX, ΔY	**10 mm**
Zoom Scan Spatial Resolution ΔX, ΔY	**4 mm**
Zoom Scan Spatial Resolution ΔZ (Uniform Grid)	**2 mm**
Zoom Scan Volume X, Y, Z	**22 mm**
Phantom	**ELI**
Fluid Depth	**100 ± 5 mm**
An Area Scan with an area extending beyond the device was used to locate the candidate maximas within 2dB of the global maxima.	
A Zoom Scan centered over the peak SAR location(s) determined by the Area Scan was used to determine the 1-gram and 10-gram peak spatial-average SAR	

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14.0 MEASUREMENT UNCERTAINTIES

Table 14.0 Measurement Uncertainty

UNCERTAINTY BUDGET FOR DEVICE EVALUATION (IEEE 1528-2013 Table 9)									
Source of Uncertainty	**IEEE 1528 Section**	**Toler ±%**	**Prob Dist**	**Div**	**c_i**	**c_i**	**Stand Unct ±%**	**Stand Unct ±%**	**V_i or V_{eff}**
Measurement System					(1g)	(10g)	(1g)	(10g)	
EX3DV4 Probe Calibration** (*k*=1)	E.2.1	6.7	N	1	1	1	6.7	6.7	∞
Axial Isotropy** (*k*=1)	E.2.2	0.6	R	√3	0.7	0.7	0.2	0.2	∞
Hemispherical Isotropy** (*k*=1)	E.2.2	3.2	R	√3	0.7	0.7	1.3	1.3	∞
Boundary Effect*	E.2.3	1.0	R	√3	1	1	0.6	0.6	∞
Linearity** (*k*=1)	E.2.4	0.5	R	√3	1	1	0.3	0.3	∞
System Detection Limits*	E.2.4	1.0	R	√3	1	1	0.6	0.6	∞
Modulation Response** (*k*=1)	E.2.5	8.3	R	√3	1	1	4.8	4.8	∞
Readout Electronics*	E.2.6	0.3	N	1	1	1	0.3	0.3	∞
Response Time*	E.2.7	0.8	R	√3	1	1	0.5	0.5	∞
Integration Time*	E.2.8	2.6	R	√3	1	1	1.5	1.5	∞
RF Ambient Conditions - Noise	E.6.1	0.0	R	√3	1	1	0.0	0.0	10
RF Ambient Conditions - Reflection	E.6.1	0.0	R	√3	1	1	0.0	0.0	10
Probe Positioner Mechanical Tolerance*	E.6.2	0.0	R	√3	1	1	0.0	0.0	∞
Probe Positioning wrt Phantom Shell*	E.6.3	0.4	R	√3	1	1	0.2	0.2	∞
Post-processing*	E.5	2.0	R	√3	1	1	1.2	1.2	∞
Test Sample Related									
Test Sample Positioning	E.4.2	2.2	N	1	1	1	2.2	2.2	5
Device Holder Uncertainty*	E.4.1	3.6	N	1	1	1	3.6	3.6	∞
SAR Drift Measurement(2)	E.2.9	0.0	R	√3	1	1	0.0	0.0	∞
SAR Power Scaling(3)	E.6.5	0.0	R	√3	1	1	0.0	0.0	∞
Phantom and Tissue Parameters									
Phantom Uncertainty*	E.3.1	6.1	R	√3	1	1	3.5	3.5	∞
SAR Correction Uncertainty	E.3.2	1.6	N	1	1	0.84	1.6	1.3	∞
Liquid Conductivity (measurement)	E.3.3	5.0	N	1	0.78	0.71	3.9	3.6	10
Liquid Permittivity (measurement)	E.3.3	5.0	N	1	0.23	0.26	1.2	1.3	10
Liquid Conductivity (Temperature)	E.3.2	0.4	R	√3	0.78	0.71	0.2	0.2	10
Liquid Permittivity Temperature)	E.3.2	0.2	R	√3	0.23	0.26	0.0	0.0	10
Effective Degrees of Freedom(1)								**V_{eff} =**	**1141**
Combined Standard Uncertainty			RSS				11.1	11.0	
Expanded Uncertainty (95% Confidence Interval)			k=2				22.2	21.9	
Measurement Uncertainty Table in accordance with IEEE Standard 1528-2003									

(1) The Effective Degrees of Freedom is > 30

Therefore a coverage factor of k=2 represents an approximate confidence level of 95%.

(2) The SAR Value is compensated for Drift

(3) SAR Power Scaling not Required

* Provided by SPEAG for DASY

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Table 14.1 Calculation of Degrees of Freedom

Calculation of the Degrees and Effective Degrees of Freedom	
$v_i = n - 1$	$v_{eff} = \dfrac{u_c^4}{\sum_{i=1}^{m} \dfrac{c_i^4 u_i^4}{v_i}}$

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15.0 FLUID DIELECTRIC PARAMETERS

Table 15.0 Fluid Dielectric Parameters 2450MHz HEAD TSL

****
Aprel Laboratory
Test Result for UIM Dielectric Parameter
Fri 23/Oct/2020 18:36:14
Freq Frequency(GHz)
FCC_eH FCC OET 65 Supplement C (June 2001) Limits for Head Epsilon
FCC_sH FCC OET 65 Supplement C (June 2001) Limits for Head Sigma
Test_e Epsilon of UIM
Test_s Sigma of UIM
****

Freq	FCC_eH	FCC_sH	Test_e	Test_s
2.3500	39.38	1.71	37.50	1.78
2.3600	39.36	1.72	37.55	1.81
2.3700	39.34	1.73	37.41	1.81
2.3800	39.32	1.74	37.33	1.80
2.3900	39.31	1.75	37.42	1.80
2.4000	39.29	1.76	37.22	1.83
2.4100	39.27	1.76	37.15	1.84
2.4200	39.25	1.77	37.33	1.86
2.4300	39.24	1.78	37.01	1.88
2.4400	39.22	1.79	36.87	1.90
2.4500	39.20	1.80	37.17	1.89
2.4600	39.19	1.81	36.93	1.90
2.4700	39.17	1.82	37.02	1.93
2.4800	39.16	1.83	37.11	1.95
2.4900	39.15	1.84	36.92	1.95
2.5000	39.14	1.85	36.81	1.95
2.5100	39.12	1.87	36.80	1.97
2.5200	39.11	1.88	36.94	1.99
2.5300	39.10	1.89	36.74	1.98
2.5400	39.09	1.90	36.84	1.99
2.5500	39.07	1.91	36.68	2.01

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FLUID DIELECTRIC PARAMETERS							
Date:	23 Oct 2020	Fluid Temp:	22.6	Frequency:	2450MHz	Tissue:	Head
Freq (MHz)		Test_e	Test_s	Target_e	Target_s	Deviation Permittivity	Deviation Conductivity
2350.0000		37.5000	1.7800	39.3800	1.71	-4.77%	4.09%
2360.0000		37.5500	1.8100	39.3600	1.72	-4.60%	5.23%
2370.0000		37.4100	1.8100	39.3400	1.73	-4.91%	4.62%
2380.0000		37.3300	1.8000	39.3200	1.74	-5.06%	3.45%
2390.0000		37.4200	1.8000	39.3100	1.75	-4.81%	2.86%
2400.0000		37.2200	1.8300	39.2900	1.76	-5.27%	3.98%
2402.0000	*	37.2060	1.8320	39.2860	1.76	-5.29%	4.09%
2410.0000		37.1500	1.8400	39.2700	1.76	-5.40%	4.55%
2420.0000		37.3300	1.8600	39.2500	1.77	-4.89%	5.08%
2427.0000	*	37.1060	1.8740	39.2430	1.78	-5.45%	5.46%
2430.0000		37.0100	1.8800	39.2400	1.78	-5.68%	5.62%
2437.0000	*	36.9120	1.8940	39.2260	1.79	-5.90%	5.99%
2440.0000		36.8700	1.9000	39.2200	1.79	-5.99%	6.15%
2450.0000		37.1700	1.8900	39.2000	1.80	-5.18%	5.00%
2457.0000	*	37.0020	1.8970	39.1930	1.81	-5.59%	4.98%
2460.0000		36.9300	1.9000	39.1900	1.81	-5.77%	4.97%
2467.0000		36.9930	1.9210	39.1760	1.82	-5.57%	5.72%
2470.0000		37.0200	1.9300	39.1700	1.82	-5.49%	6.04%
2480.0000		37.1100	1.9500	39.1600	1.83	-5.23%	6.56%
2490.0000		36.9200	1.9500	39.1500	1.84	-5.70%	5.98%
2500.0000		36.8100	1.9500	39.1400	1.85	-5.95%	5.41%
2510.0000		36.8000	1.9700	39.1200	1.87	-5.93%	5.35%
2520.0000		36.9400	1.9900	39.1100	1.88	-5.55%	5.85%
2530.0000		36.7400	1.9800	39.1000	1.89	-6.04%	4.76%
2540.0000		36.8400	1.9900	39.0900	1.90	-5.76%	4.74%
2550.0000		36.6800	2.0100	39.0700	1.91	-6.12%	5.24%

*Channel Frequency Tested

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Table 15.1 Fluid Dielectric Parameters 2450MHz HEAD TSL

****
Aprel Laboratory
Test Result for UIM Dielectric Parameter
Wed 28/Oct/2020 18:04:31
Freq Frequency(GHz)
FCC_eH FCC OET 65 Supplement C (June 2001) Limits for Head Epsilon
FCC_sH FCC OET 65 Supplement C (June 2001) Limits for Head Sigma
Test_e Epsilon of UIM
Test_s Sigma of UIM
****

Freq	FCC_eH	FCC_sH	Test_e	Test_s
2.3500	39.38	1.71	39.05	1.85
2.3600	39.36	1.72	39.06	1.88
2.3700	39.34	1.73	39.28	1.88
2.3800	39.32	1.74	39.13	1.87
2.3900	39.31	1.75	38.88	1.88
2.4000	39.29	1.76	39.07	1.86
2.4100	39.27	1.76	38.90	1.91
2.4200	39.25	1.77	38.81	1.90
2.4300	39.24	1.78	38.71	1.92
2.4400	39.22	1.79	38.65	1.95
2.4500	39.20	1.80	38.53	1.97
2.4600	39.19	1.81	38.61	1.96
2.4700	39.17	1.82	38.56	1.97
2.4800	39.16	1.83	38.44	1.99
2.4900	39.15	1.84	38.45	2.01
2.5000	39.14	1.85	38.47	2.01
2.5100	39.12	1.87	38.47	2.02
2.5200	39.11	1.88	38.38	2.03
2.5300	39.10	1.89	38.18	2.06
2.5400	39.09	1.90	38.35	2.06
2.5500	39.07	1.91	38.13	2.07

**Per IEEE 1528 Fluid Parameters were measured at end of test series

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FLUID DIELECTRIC PARAMETERS

Date:	28 Oct 2020	Fluid Temp:	22.1	Frequency:	2450MHz	Tissue:	Head
Freq (MHz)		Test_e	Test_s	Target_e	Target_s	Deviation Permittivity	Deviation Conductivity
2350.0000		39.0500	1.8500	39.3800	1.71	-0.84%	8.19%
2360.0000		39.0600	1.8800	39.3600	1.72	-0.76%	9.30%
2370.0000		39.2800	1.8800	39.3400	1.73	-0.15%	8.67%
2380.0000		39.1300	1.8700	39.3200	1.74	-0.48%	7.47%
2390.0000		38.8800	1.8800	39.3100	1.75	-1.09%	7.43%
2400.0000		39.0700	1.8600	39.2900	1.76	-0.56%	5.68%
2402.0000	*	39.0360	1.8700	39.2860	1.76	-0.64%	6.25%
2410.0000		38.9000	1.9100	39.2700	1.76	-0.94%	8.52%
2420.0000		38.8100	1.9000	39.2500	1.77	-1.12%	7.34%
2427.0000	*	38.7400	1.9140	39.2430	1.78	-1.28%	7.71%
2430.0000		38.7100	1.9200	39.2400	1.78	-1.35%	7.87%
2437.0000	*	38.6680	1.9410	39.2260	1.79	-1.42%	8.62%
2440.0000		38.6500	1.9500	39.2200	1.79	-1.45%	8.94%
2450.0000		38.5300	1.9700	39.2000	1.80	-1.71%	9.44%
2457.0000	*	38.5860	1.9630	39.1930	1.81	-1.55%	8.63%
2460.0000		38.6100	1.9600	39.1900	1.81	-1.48%	8.29%
2467.0000		38.5750	1.9670	39.1760	1.82	-1.53%	8.26%
2470.0000		38.5600	1.9700	39.1700	1.82	-1.56%	8.24%
2480.0000		38.4400	1.9900	39.1600	1.83	-1.84%	8.74%
2490.0000		38.4500	2.0100	39.1500	1.84	-1.79%	9.24%
2500.0000		38.4700	2.0100	39.1400	1.85	-1.71%	8.65%
2510.0000		38.4700	2.0200	39.1200	1.87	-1.66%	8.02%
2520.0000		38.3800	2.0300	39.1100	1.88	-1.87%	7.98%
2530.0000		38.1800	2.0600	39.1000	1.89	-2.35%	8.99%
2540.0000		38.3500	2.0600	39.0900	1.90	-1.89%	8.42%
2550.0000		38.1300	2.0700	39.0700	1.91	-2.41%	8.38%

*Channel Frequency Tested

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16.0 SYSTEM VERIFICATION TEST RESULTS

Table 16.0 System Verification Results 2450MHz Head TSL

System Verification Test Results					
Date		Frequency (MHz)	Validation Source		
			P/N		S/N
23 Oct 2020		2450	D2450V2		825
Fluid Type	Fluid Temp °C	Ambient Temp °C	Ambient Humidity (%)	Forward Power (mW)	Source Spacing (mm)
Head	22.6	22	35%	250	10
Fluid Parameters					
Permittivity			Conductivity		
Measured	Target	Deviation	Measured	Target	Deviation
37.17	39.20	-5.18%	1.89	1.80	5.00%
Measured SAR					
1 gram			10 gram		
Measured	Target	Deviation	Measured	Target	Deviation
14.20	13.30	6.77%	6.39	6.16	3.73%
Measured SAR Normalized to 1.0W					
1 gram			10 gram		
Normalized	Target	Deviation	Normalized	Target	Deviation
56.80	52.10	9.02%	25.56	24.30	5.19%

Prior to the SAR evaluations, system checks were performed on the planar section of the phantom and a SPEAG validation dipole in accordance with the procedures described in IEEE 1528-2013, FCC KDB 846224 and IEC 62209-1.

The dielectric parameters of the simulated tissue mixture were measured prior to the system performance check using a Dielectric Probe Kit and a Network Analyzer.

The forward power was applied to the dipole and the system was verified to a tolerance of +10% from the system manufacturer's dipole calibration target SAR value.

The forward power applied was same forward power applied by the calibration lab during the calibration of this validation source.

Note: Per KDB 865664, Dipoles are evaluated annually for return loss and impedance. The dipole's SAR target can only be assessed by the SAR equipment manufacturer and remains the target until the dipole is recalibrated by the manufacturer. The dipole's SAR is evaluated and compared to this target during each and every System Verification which is performed prior to and/or during each DUT SAR evaluation. The results of these verifications are shown in Section 16.0

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17.0 SYSTEM VALIDATION SUMMARY

Table 17.0 System Validation Summary

System Validation Summary											
Frequency (MHz)	Validation Date	Probe Model	Probe S/N	Validation Source	Source S/N	Tissue	Tissue Dielectrics		Validation Results		
							Permitivity	Conductivity	Sensitivity	Linearity	Isotropy
30	31-May-19	EX3DV4	3600	CLA-30	1005	Head	52.40	0.75	Pass	Pass	Pass
150	20-May-20	EX3DV4	3600	CLA-150	4007	Head	52.59	0.76	Pass	Pass	Pass
450	12-Aug-20	EX3DV4	3600	D450V3	1068	Head	43.64	0.84	Pass	Pass	Pass
750	20-Jun-19	EX3DV4	3600	D750V3	1061	Head	44.27	0.83	Pass	Pass	Pass
835	17-Aug-20	EX3DV4	3600	D835V2	4d075	Head	40.60	0.87	Pass	Pass	Pass
900	20-Aug-20	EX3DV4	3600	D900V2	045	Head	39.09	0.94	Pass	Pass	Pass
1640	05-Jul-18	EX3DV4	3600	1620-S-2	207-00102	Head	39.87	1.27	Pass	Pass	Pass
1800	18-Jun-19	EX3DV4	3600	D1800V2	247	Head	54.77	1.53	Pass	Pass	Pass
2450	27-May-20	EX3DV4	3600	D2450V2	825	Head	37.21	1.95	Pass	Pass	Pass
5250	29-May-20	EX3DV4	3600	D5GHzV2	1031	Head	34.44	5.07	Pass	Pass	Pass
5750	28-May-20	EX3DV4	3600	D5GHzV2	1031	Head	35.16	5.56	Pass	Pass	Pass

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18.0 MEASUREMENT SYSTEM SPECIFICATIONS

Table 18.0 Measurement System Specifications

Measurement System Specification	
Specifications	
Positioner	Stäubli Unimation Corp. Robot Model: TX90XL
Repeatability	+/- 0.035 mm
No. of axis	6.0
Data Acquisition Electronic (DAE) System	
Cell Controller	
Processor	Intel(R) Core(TM) i7-7700
Clock Speed	3.60 GHz
Operating System	Windows 10 Professional
Data Converter	
Features	Signal Amplifier, multiplexer, A/D converter, and control logic
Software	Measurement Software: DASY6, V 6.4.0.12171 / DASY52 V10.2(1504)
	Postprocessing Software: SEMCAD X, V14.6.12(7470)
Connecting Lines	Optical downlink for data and status info., Optical uplink for commands and clock
DASY Measurement Server	
Function	Real-time data evaluation for field measurements and surface detection
Hardware	Intel ULV Celeron CPU 400 MHz; 128 MB chip disk; 128 MB RAM
Connections	COM1, COM2, DAE, Robot, Ethernet, Service Interface
E-Field Probe	
Model	EX3DV4
Serial No.	3600
Construction	Triangular core fiber optic detection system
Frequency	10 MHz to 6 GHz
Linearity	±0.2 dB (30 MHz to 3 GHz)
Phantom	
Type	ELI Elliptical Planar Phantom
Shell Material	Fiberglass
Thickness	2mm +/- .2mm
Volume	> 30 Liter

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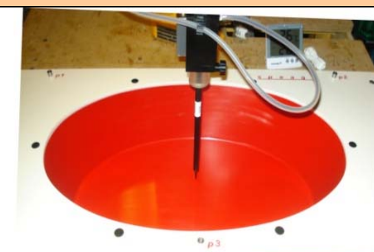
Table 18.1

Measurement System Specification (Continued)

Probe Specification

Construction:	Symmetrical design with triangular core; Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, glycol)	
Calibration:	In air from 10 MHz to 2.5 GHz In head simulating tissue at frequencies of 900 MHz and 1.8 GHz (accuracy ± 8%)	
Frequency:	10 MHz to > 6 GHz; Linearity: ± 0.2 dB (30 MHz to 3 GHz)	
Directivity:	± 0.2 dB in head tissue (rotation around probe axis) ± 0.4 dB in head tissue (rotation normal to probe axis)	
Dynamic Range:	5 µW/g to > 100 mW/g; Linearity: ± 0.2 dB	
Surface Detect:	± 0.2 mm repeatability in air and clear liquids over diffuse reflecting surfaces	
Dimensions:	Overall length: 330 mm; Tip length: 16 mm; Body diameter: 12 mm; Tip diameter: 6.8 mm Distance from probe tip to dipole centers: 2.7 mm	
Application:	General dosimetry up to 3 GHz; Compliance tests of mobile phone	**EX3DV4 E-Field Probe**

Phantom Specification

The ELI V5.0 phantom is an elliptical planar fiberglass shell phantom with a shell thickness of 2.0mm +/- .2mm at the planar area. This phantom conforms to OET Bulletin 65, Supplement C, IEEE 1528-2013, IEC 62209-1 and IEC 62209-2.	 **ELI Phantom**

Device Positioner Specification

The DASY device positioner has two scales for device rotation (with respect to the body axis) and the device inclination (with respect to the line between the ear openings). The plane between the ear openings and the mouth tip has a rotation angle of 65^{O}. The bottom plate contains three pair of bolts for locking the device holder. The device holder positions are adjusted to the standard measurement positions in the three sections.	 **Device Positioner**

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19.0 TEST EQUIPMENT LIST

Table 19.0 Equipment List and Calibration

Test Equipment List				
DESCRIPTION	ASSET NO.	SERIAL NO.	DATE CALIBRATED	CALIBRATION DUE
Schmid & Partner DASY 6 System	-	-	-	-
-DASY Measurement Server	00158	1078	CNR	CNR
-Robot	00046	599396-01	CNR	CNR
-DAE4	00019	353	17-Mar-20	17-Mar-23
-EX3DV4 E-Field Probe	00213	3600	25-Mar-20	25-Mar-23
-CLA 30 Validation Dipole	00300	1005	18-Mar-20	18-Mar-23
-CLA150 Validation Dipole	00251	4007	18-Mar-20	18-Mar-23
-D450V3 Validation Dipole	00221	1068	23-Apr-18	23-Apr-21
-D750V3 Validation Dipole	00238	1061	21-Mar-19	21-Mar-22
-D835V2 Validation Dipole	00217	4D075	20-Apr-18	20-Apr-21
-D900V2 Validation Dipole	00020	54	16-Mar-20	16-Mar-23
-D2450V2 Validation Dipole**	00219	825	24-Apr-18	24-Apr-21
-D5GHzV2 Validation Dipole	00126	1031	26-Apr-18	26-Apr-21
ELI Phantom	00247	1234	CNR	CNR
SAM Phantom	00154	1033	CNR	CNR
HP 85070C Dielectric Probe Kit	00033	none	CNR	CNR
Gigatronics 8652A Power Meter	00007	1835801	26-Mar-19	26-Mar-22
Gigatronics 80701A Power Sensor	00186	1837002	COU	COU
Gigatronics 80334A Power Sensor	00237	1837001	26-Mar-19	26-Mar-22
HP 8753ET Network Analyzer	00134	US39170292	29-Dec-17	29-Dec-20
Rohde & Schwarz SMR20 Signal Generator	00006	100104	11-Aug-20	11-Aug-23
Amplifier Research 10W1000C Power Amplifier	00041	27887	CNR	CNR
Amplifier Research 5S1G4 Power Amplifier	00106	26235	CNR	CNR
Narda Directional Coupler 3020A	00064	-	CNR	CNR
Traceable VWR Thermometer	00334	192385455	6-Aug-19	6-Aug-21
Kangaroo VWR Humidity/Thermometer	00334	192385455	5-Aug-19	6-Aug-22
Bipolar Power Supply 6299A	00086	1144A02155	CNR	CNR
DC-18G 10W 30db Attenuator	00102	-	COU	COU
R&S FSP40 Spectrum Analyzer	00241	100500	15-May-18	15-May-21
RF Cable-SMA	00311	-	CNR	CNR
HP Calibration Kit	00145	-	CNR	CNR

CNR = Calibration Not Required
SB=Stand By
COU = Calibrate on Use
*Verifed and Extended
* *Per KDB 865664 3.2.2; Supporting documentation is included in the report for validation dipoles exceeding the recommended anual calibration cycle.
When applicable, reference Appendix F

Note: Per KDB 865664, Dipoles are evaluated annually for return loss and impedance. The dipole's SAR target can only be assessed by the SAR equipment manufacturer and remains the target until the dipole is recalibrated by the manufacturer. The dipole's SAR is evaluated and compared to this target during each and every System Verification which is performed prior to and/or during each DUT SAR evaluation. The results of these verifications are shown in Section 16.0

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20.0 FLUID COMPOSITION

Note: Effective February 19, 2019 TCB Workshop: FCC has permitted the use of single head-tissue simulating liquid specified in IEC 62209-1 for all SAR tests.

Table 20.0 Fluid Composition 2450MHz HEAD TSL

Table 20.0			2450MHz Head	
Tissue Simulating Liquid (TSL) Composition				
Component by Percent Weight				
Water	Glycol	Salt(1)	HEC(2)	Bacteriacide(3)
52.0	48.0	0.0	0.0	0.0

(1) Non-Iodinized

(2) **H**ydroxy**E**thyl-**C**ellulose: Sigma-Aldrich P/N 54290-500g

(3) Dow Chemical Dowicil 75 Antimicrobial Perservative

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APPENDIX A – SYSTEM VERIFICATION PLOTS

Date/Time: 10/23/2020 7:44:49 PM

Test Laboratory: Celltech Labs

SPC-2450H Oct 23 2020

DUT: Dipole 2450 MHz D2450V2; Type: D2450V2; Serial: D2450V2 - SN:825

Communication System: UID 0, CW (0); Communication System Band: FullSpan (0.0 - 6000.0 MHz); Frequency: 2450 MHz;Communication System PAR: 0 dB; PMF: 1
Medium parameters used: f = 2450 MHz; σ = 1.89 S/m; ε_r = 37.17; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY Configuration:

- Probe: EX3DV4 - SN3600; ConvF(6.45, 6.45, 6.45) @ 2450 MHz; Calibrated: 3/25/2020
    - Modulation Compensation:
- Sensor-Surface: 4mm (Mechanical Surface Detection), z = -1.5, 31.0, 151.0
- Electronics: DAE4 Sn353; Calibrated: 3/17/2020
- Phantom: ELI V5.0 (20deg probe tilt); Type: QD OVA 002 Ax; Serial: 1234
- DASY52 52.10.3(1513); SEMCAD X 14.6.13(7474)

SPC/SPC 2450H Input=250mw, Target=[14.63][13.3][11.97]W/kg/Area Scan (4x9x1): Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (measured) = 13.2 W/kg

SPC/SPC 2450H Input=250mw, Target=[14.63][13.3][11.97]W/kg/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 91.80 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 31.2 W/kg
SAR(1 g) = 14.2 W/kg; SAR(10 g) = 6.39 W/kg
Smallest distance from peaks to all points 3 dB below = 10 mm
Ratio of SAR at M2 to SAR at M1 = 46.8%
Maximum value of SAR (measured) = 16.2 W/kg

SPC/SPC 2450H Input=250mw, Target=[14.63][13.3][11.97]W/kg/Z Scan (1x1x22): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Penetration depth = 6.995 (6.493, 6.996) [mm]
Maximum value of SAR (interpolated) = 27.5 W/kg

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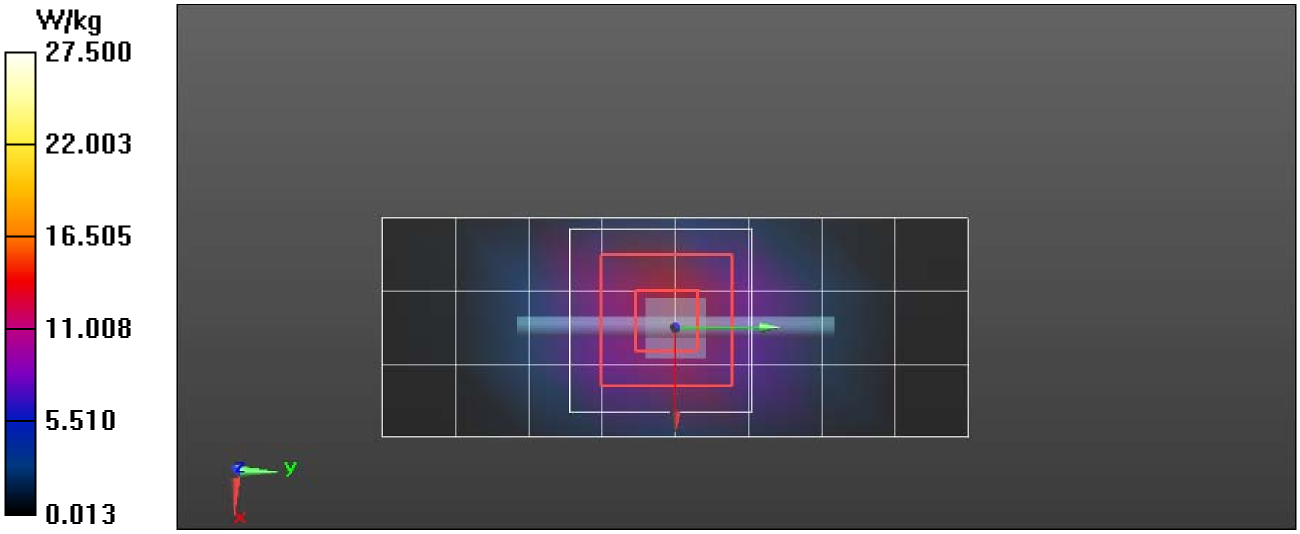
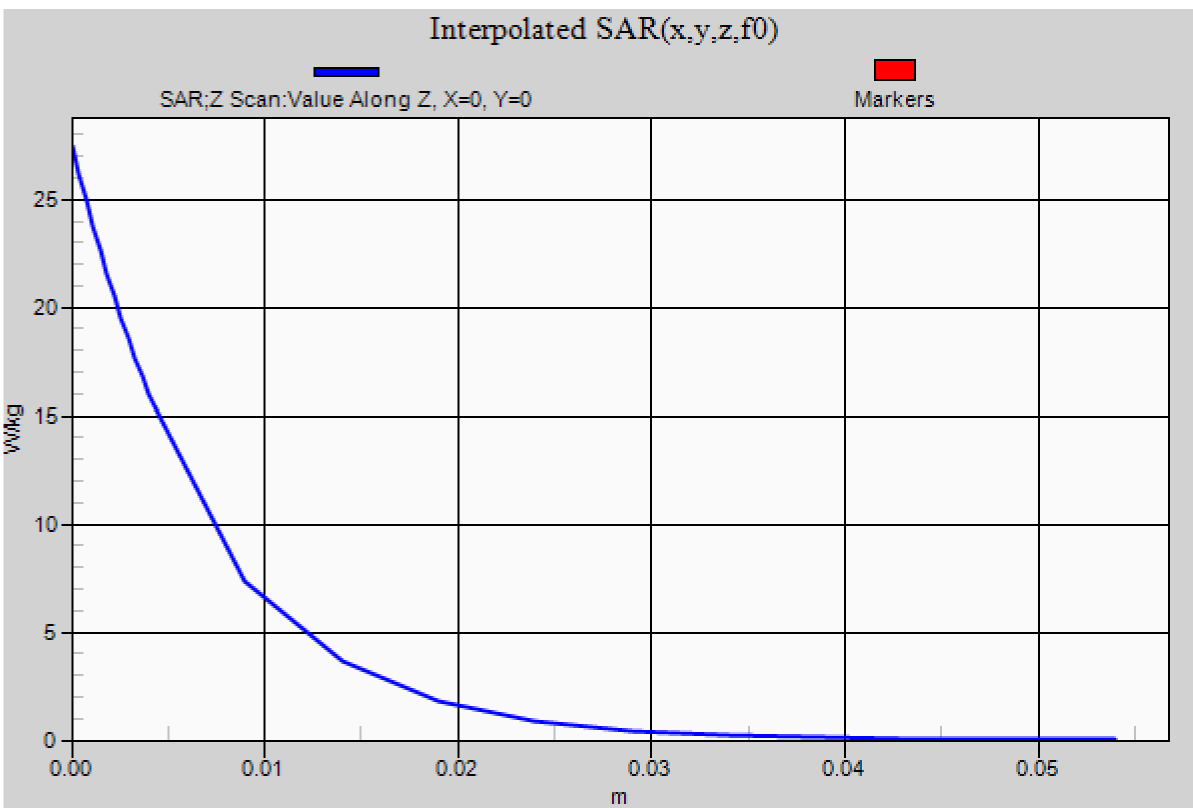

W/kg
27.500
22.003
16.505
11.008
5.510
0.013
y
x


Interpolated SAR(x,y,z,f0)
SAR;Z Scan:Value Along Z, X=0, Y=0
Markers
W/kg
25
20
15
10
5
0
0.00
0.01
0.02
0.03
0.04
0.05
m

APPENDIX B – MEASUREMENT PLOTS OF MAXIMUMUM MEASURED SAR

Plot B1

Date/Time: 10/23/2020 8:44:51 PM

Test Laboratory: Celltech Labs

Garmin-A03948-2450H Oct 23 2020

DUT: A03948; Type: Body Worn Transmitter;

Communication System: UID 10060 - CAB, IEEE 802.11b WiFi 2.4 GHz (DSSS, 5.5 Mbps); Communication System Band: WLAN 2.4GHz (2412.0 - 2484.0 MHz); Frequency: 2427 MHz;Communication System PAR: 2.83 dB; PMF: 1.16547
Medium parameters used (interpolated): f = 2427 MHz; σ = 1.874 S/m; ε_r = 37.106; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY Configuration:

- Probe: EX3DV4 - SN3600; ConvF(6.45, 6.45, 6.45) @ 2427 MHz; Calibrated: 3/25/2020
  - Modulation Compensation: PMR for UID 10060 - CAB, Calibrated: 3/25/2020
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 4mm (Mechanical Surface Detection), z = -1.5, 31.0, 101.0
- Electronics: DAE4 Sn353; Calibrated: 3/17/2020
- Phantom: ELI V5.0 (20deg probe tilt); Type: QD OVA 002 Ax; Serial: 1234
- DASY52 52.10.3(1513); SEMCAD X 14.6.13(7474)

2450H/B1-A03948,Body-Back Side, 2427 MHz, Silcone Band-WIFI/Area Scan (8x7x1): Measurement grid: dx=12mm, dy=12mm

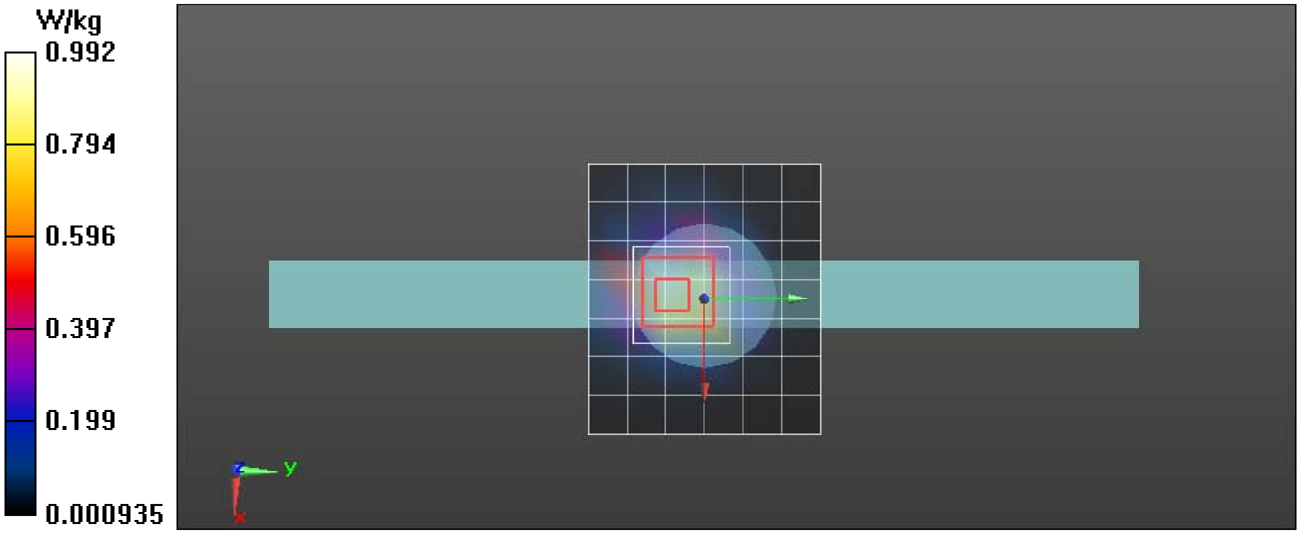
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.976 W/kg

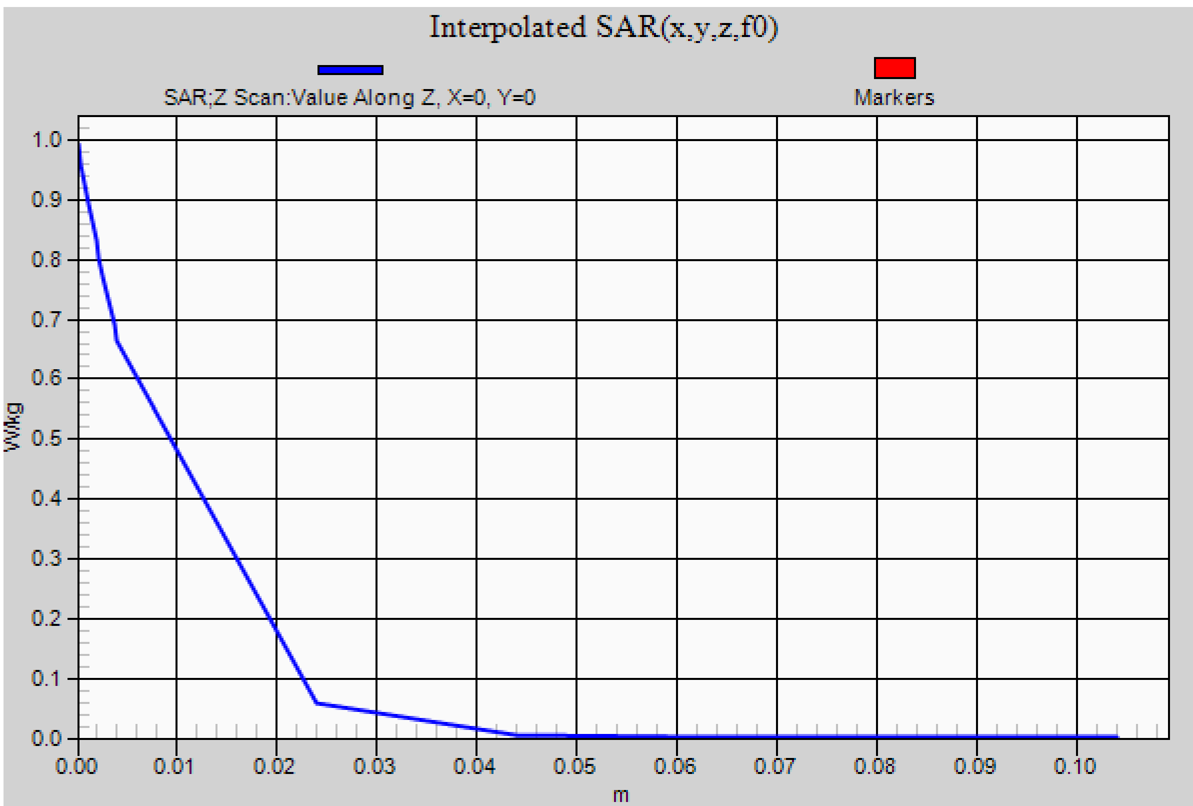
2450H/B1-A03948,Body-Back Side, 2427 MHz, Silcone Band-WIFI/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 22.34 V/m; Power Drift = -1.30 dB
Peak SAR (extrapolated) = 1.69 W/kg
SAR(1 g) = 0.838 W/kg; SAR(10 g) = 0.394 W/kg
Smallest distance from peaks to all points 3 dB below = 9.4 mm
Ratio of SAR at M2 to SAR at M1 = 51%

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.955 W/kg

2450H/B1-A03948,Body-Back Side, 2427 MHz, Silcone Band-WIFI/Z Scan (1x1x17): Measurement grid: dx=20mm, dy=20mm, dz=20mm

Info: Interpolated medium parameters used for SAR evaluation.
Penetration depth = n/a (n/a, 8.307) [mm]
Maximum value of SAR (interpolated) = 0.992 W/kg





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Plot B4

Date/Time: 10/27/2020 5:46:22 PM

Test Laboratory: Celltech Labs

Garmin-A03948-2450H Oct 27 2020

DUT: A03948; Type: Body Worn Transmitter;

Communication System: UID 10036 - CAA, IEEE 802.15.1 Bluetooth (8-DPSK, DH1); Communication System Band: ISM 2.4 GHz Band (2400.0 - 2483.5 MHz); Frequency: 2402 MHz;Communication System PAR: 8.014 dB; PMF: 1.8281
Medium parameters used (interpolated): f = 2402 MHz; σ = 1.832 S/m; ε_r = 37.206; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY Configuration:

- Probe: EX3DV4 - SN3600; ConvF(6.45, 6.45, 6.45) @ 2402 MHz; Calibrated: 3/25/2020
  - Modulation Compensation: PMR for UID 10036 - CAA, Calibrated: 3/25/2020
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 4mm (Mechanical Surface Detection), z = -1.5, 31.0, 101.0
- Electronics: DAE4 Sn353; Calibrated: 3/17/2020
- Phantom: ELI V5.0 (20deg probe tilt); Type: QD OVA 002 Ax; Serial: 1234
- DASY52 52.10.3(1513); SEMCAD X 14.6.13(7474)

2450H/B4-A03948,Extremity-Back Side, 2402 MHz, Silcone Band-BT/Area Scan (8x7x1): Measurement grid: dx=12mm, dy=12mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.0981 W/kg

2450H/B4-A03948,Extremity-Back Side, 2402 MHz, Silcone Band-BT/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 6.910 V/m; Power Drift = 0.17 dB
Peak SAR (extrapolated) = 0.183 W/kg
SAR(1 g) = 0.094 W/kg; SAR(10 g) = 0.044 W/kg
Smallest distance from peaks to all points 3 dB below = 10 mm
Ratio of SAR at M2 to SAR at M1 = 56.2%

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.106 W/kg

2450H/B4-A03948,Extremity-Back Side, 2402 MHz, Silcone Band-BT/Z Scan (1x1x17): Measurement grid: dx=20mm, dy=20mm, dz=20mm

Info: Interpolated medium parameters used for SAR evaluation.
Penetration depth = n/a (n/a, 8.549) [mm]
Maximum value of SAR (interpolated) = 0.124 W/kg

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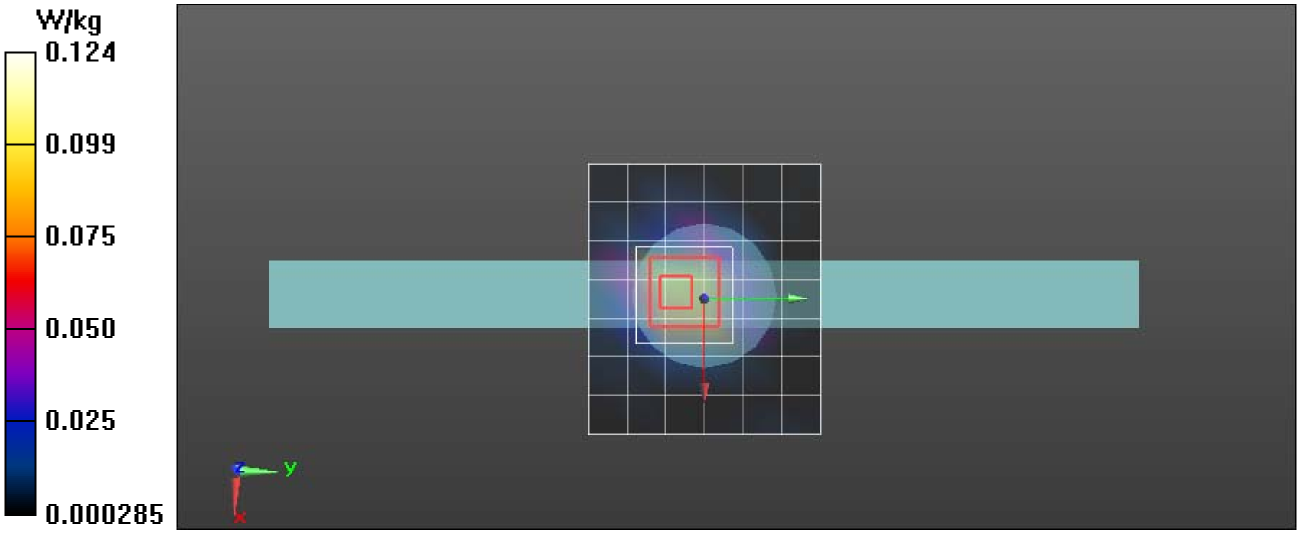

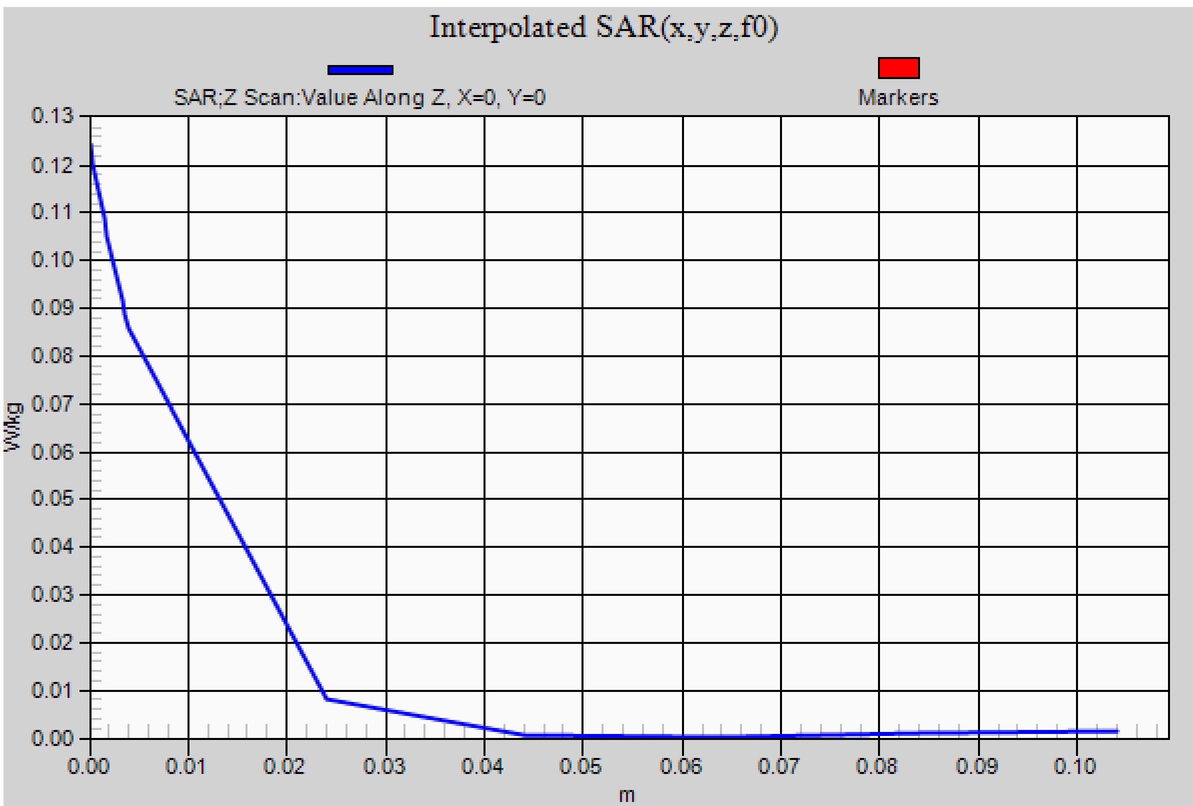

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APPENDIX E – PROBE CALIBRATION

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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 **Celltech**

Certificate No: EX3-3600_Mar20

CALIBRATION CERTIFICATE

Object	EX3DV4 - SN:3600
Calibration procedure(s)	QA CAL-01.v9, QA CAL-12.v9, QA CAL-14.v5, QA CAL-23.v5, QA CAL-25.v7 Calibration procedure for dosimetric E-field probes
Calibration date:	March 25, 2020

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 NRP	SN: 104778	03-Apr-19 (No. 217-02892/02893)	Apr-20
Power sensor NRP-Z91	SN: 103244	03-Apr-19 (No. 217-02892)	Apr-20
Power sensor NRP-Z91	SN: 103245	03-Apr-19 (No. 217-02893)	Apr-20
Reference 20 dB Attenuator	SN: S5277 (20x)	04-Apr-19 (No. 217-02894)	Apr-20
DAE4	SN: 660	27-Dec-19 (No. DAE4-660_Dec19)	Dec-20
Reference Probe ES3DV2	SN: 3013	31-Dec-19 (No. ES3-3013_Dec19)	Dec-20
Secondary Standards	ID	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: GB41293874	06-Apr-16 (in house check Jun-18)	In house check: Jun-20
Power sensor E4412A	SN: MY41498087	06-Apr-16 (in house check Jun-18)	In house check: Jun-20
Power sensor E4412A	SN: 000110210	06-Apr-16 (in house check Jun-18)	In house check: Jun-20
RF generator HP 8648C	SN: US3642U01700	04-Aug-99 (in house check Jun-18)	In house check: Jun-20
Network Analyzer E8358A	SN: US41080477	31-Mar-14 (in house check Oct-19)	In house check: Oct-20

	Name	Function	Signature
Calibrated by:	Claudio Leubler	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: March 27, 2020

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., ϑ = 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) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
b) IEC 62209-1, ", "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016
c) IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
d) 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 ϑ = 0 (f ≤ 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 (no uncertainty required). 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 ≤ 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).

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3600

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm (µV/(V/m)^2)[A]	0.49	0.49	0.38	± 10.1 %
DCP (mV)[B]	103.5	100.2	104.2	

Calibration Results for Modulation Response

UID	Communication System Name		A dB	B dB√µV	C	D dB	VR mV	Max dev.	Max Unc[E] (k=2)
0	CW	X	0.00	0.00	1.00	0.00	219.7	± 3.5 %	± 4.7 %
		Y	0.00	0.00	1.00		199.0		
		Z	0.00	0.00	1.00		197.7		
10352-AAA	Pulse Waveform (200Hz, 10%)	X	20.00	93.51	22.62	10.00	60.0	± 2.6 %	± 9.6 %
		Y	20.00	91.15	21.54		60.0		
		Z	20.00	92.98	22.55		60.0		
10353-AAA	Pulse Waveform (200Hz, 20%)	X	20.00	94.96	22.19	6.99	80.0	± 1.3 %	± 9.6 %
		Y	20.00	91.24	20.19		80.0		
		Z	20.00	93.01	21.37		80.0		
10354-AAA	Pulse Waveform (200Hz, 40%)	X	20.00	98.14	22.27	3.98	95.0	± 1.1 %	± 9.6 %
		Y	20.00	91.34	18.60		95.0		
		Z	20.00	96.35	21.55		95.0		
10355-AAA	Pulse Waveform (200Hz, 60%)	X	20.00	103.28	23.30	2.22	120.0	± 1.1 %	± 9.6 %
		Y	20.00	89.34	16.19		120.0		
		Z	20.00	100.98	22.32		120.0		
10387-AAA	QPSK Waveform, 1 MHz	X	1.69	66.59	15.34	1.00	150.0	± 2.9 %	± 9.6 %
		Y	1.49	64.97	14.00		150.0		
		Z	1.76	67.76	15.85		150.0		
10388-AAA	QPSK Waveform, 10 MHz	X	2.26	68.45	16.05	0.00	150.0	± 1.3 %	± 9.6 %
		Y	2.02	66.74	14.92		150.0		
		Z	2.37	69.56	16.58		150.0		
10396-AAA	64-QAM Waveform, 100 kHz	X	4.05	75.43	20.84	3.01	150.0	± 0.7 %	± 9.6 %
		Y	2.97	69.15	18.02		150.0		
		Z	3.51	73.05	19.77		150.0		
10399-AAA	64-QAM Waveform, 40 MHz	X	3.51	67.23	15.89	0.00	150.0	± 2.3 %	± 9.6 %
		Y	3.38	66.53	15.43		150.0		
		Z	3.59	67.81	16.19		150.0		
10414-AAA	WLAN CCDF, 64-QAM, 40MHz	X	4.83	65.60	15.55	0.00	150.0	± 4.3 %	± 9.6 %
		Y	4.77	65.35	15.41		150.0		
		Z	4.91	66.05	15.80		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 Page 5).
[B] Numerical linearization parameter: uncertainty not required.
[E] Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3600

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	45.7	339.12	35.28	16.48	0.53	5.09	1.75	0.31	1.01
Y	44.0	339.46	37.52	15.70	0.93	5.07	0.00	0.66	1.01
Z	43.7	324.16	35.18	19.30	0.73	5.08	1.32	0.36	1.01

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	57.3
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

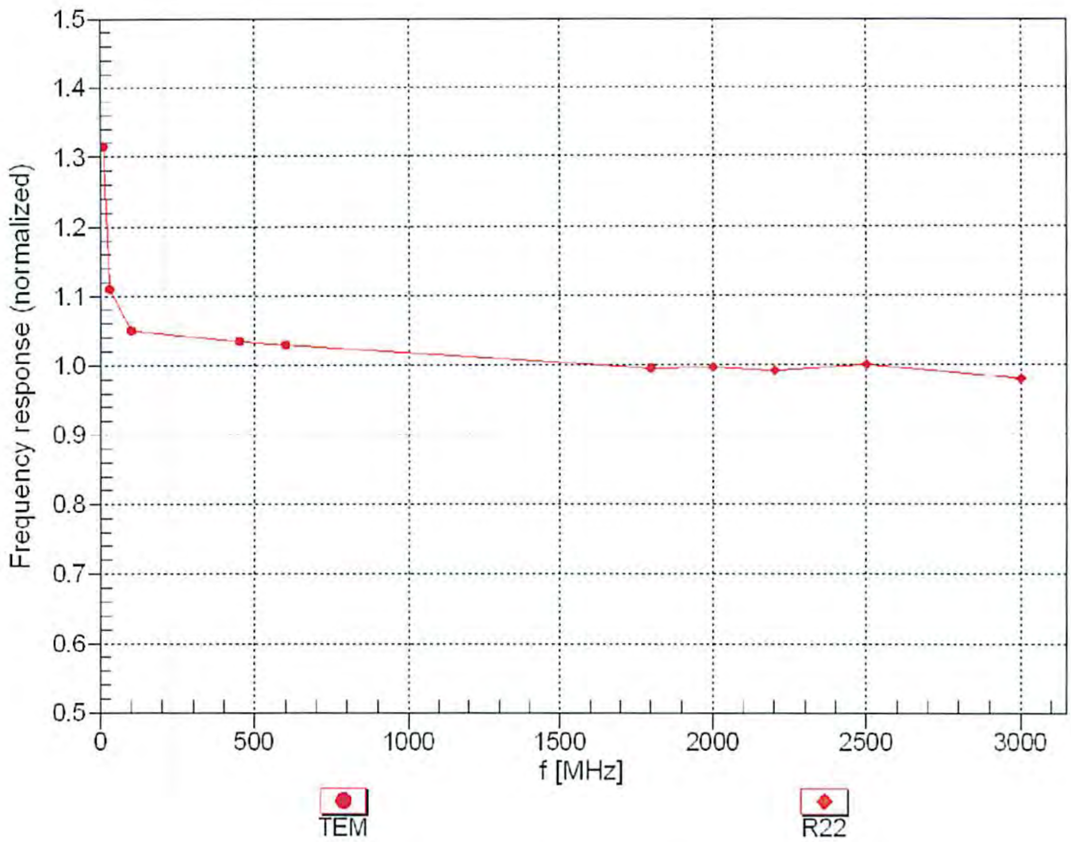
DASY/EASY - Parameters of Probe: EX3DV4 - SN:3600

Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha [G]	Depth [G] (mm)	Unc (k=2)
30	55.0	0.75	12.00	12.00	12.00	0.00	1.00	± 13.3 %
150	52.3	0.76	9.59	9.59	9.59	0.00	1.00	± 13.3 %
450	43.5	0.87	8.84	8.84	8.84	0.09	1.05	± 13.3 %
750	41.9	0.89	8.28	8.28	8.28	0.40	0.80	± 12.0 %
835	41.5	0.90	8.17	8.17	8.17	0.40	0.80	± 12.0 %
900	41.5	0.97	8.08	8.08	8.08	0.30	0.80	± 12.0 %
1640	40.2	1.31	7.42	7.42	7.42	0.30	0.85	± 12.0 %
1810	40.0	1.40	7.32	7.32	7.32	0.38	0.85	± 12.0 %
1900	40.0	1.40	7.20	7.20	7.20	0.30	0.85	± 12.0 %
2300	39.5	1.67	6.65	6.65	6.65	0.28	0.90	± 12.0 %
2450	39.2	1.80	6.45	6.45	6.45	0.30	0.90	± 12.0 %
2600	39.0	1.96	6.39	6.39	6.39	0.35	0.90	± 12.0 %
5250	35.9	4.71	4.47	4.47	4.47	0.40	1.80	± 13.1 %
5600	35.5	5.07	4.13	4.13	4.13	0.40	1.80	± 13.1 %
5750	35.4	5.22	4.12	4.12	4.12	0.40	1.80	± 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] At frequencies below 3 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ε and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.
[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.

Frequency Response of E-Field
(TEM-Cell:ifi110 EXX, Waveguide: R22)

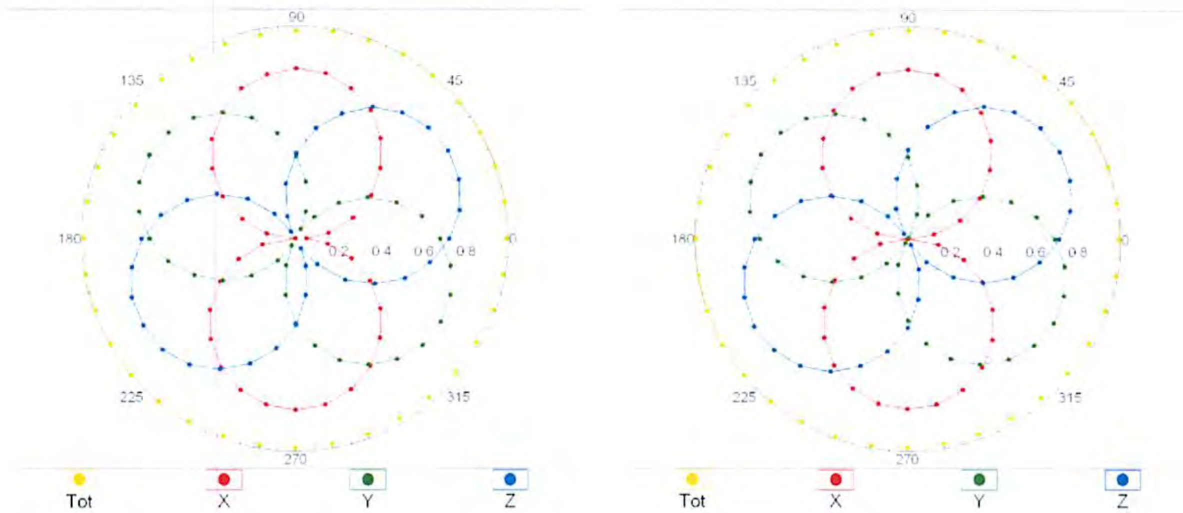


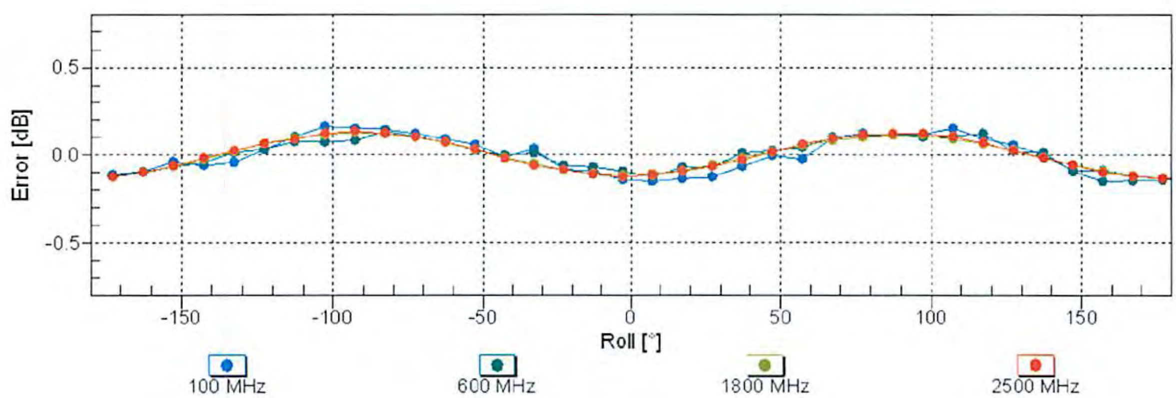
Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

Receiving Pattern (ϕ), ϑ = 0°

f=600 MHz,TEM

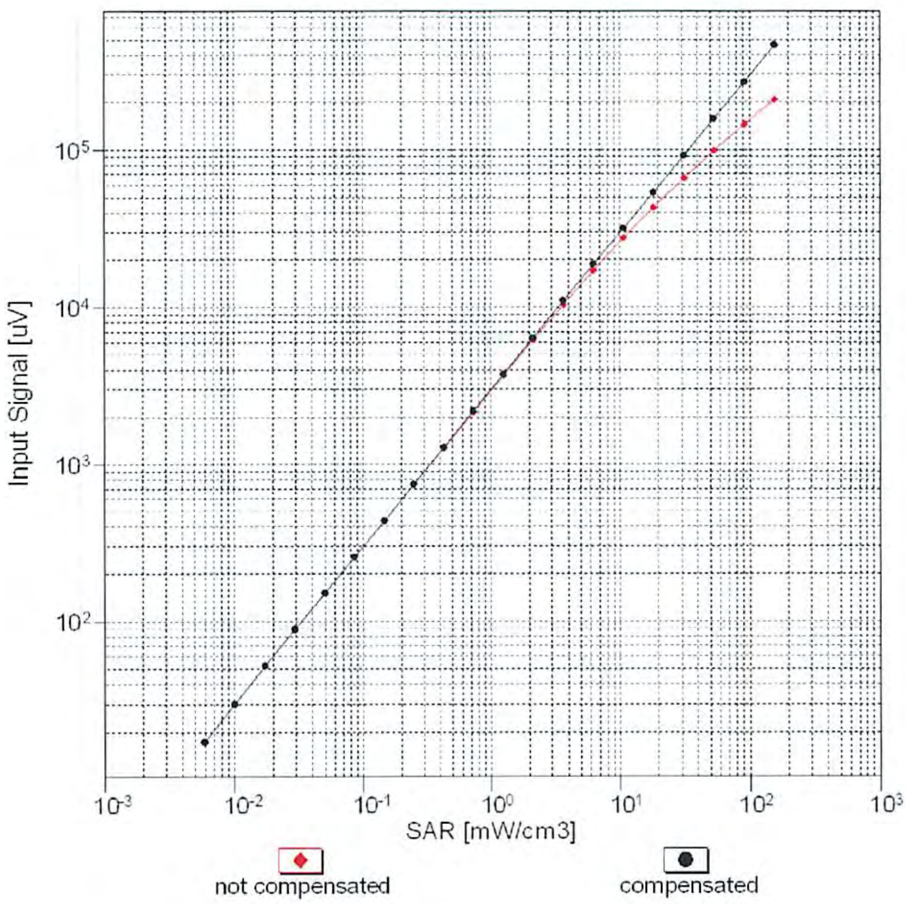
f=1800 MHz,R22

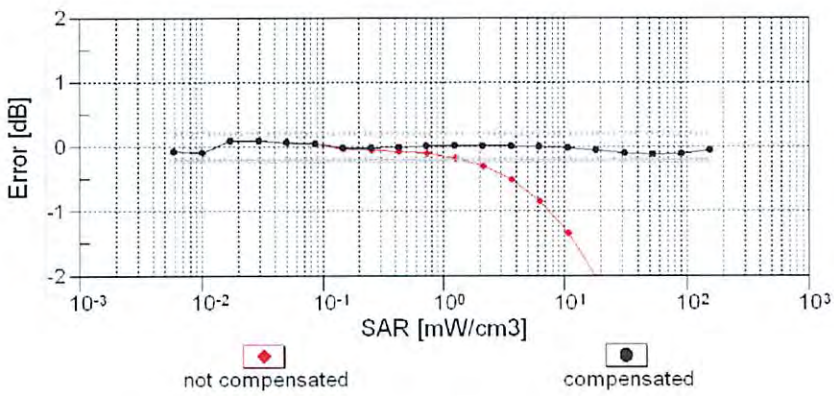




Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

Dynamic Range f(SAR_{head})
(TEM cell , f_{eval}= 1900 MHz)

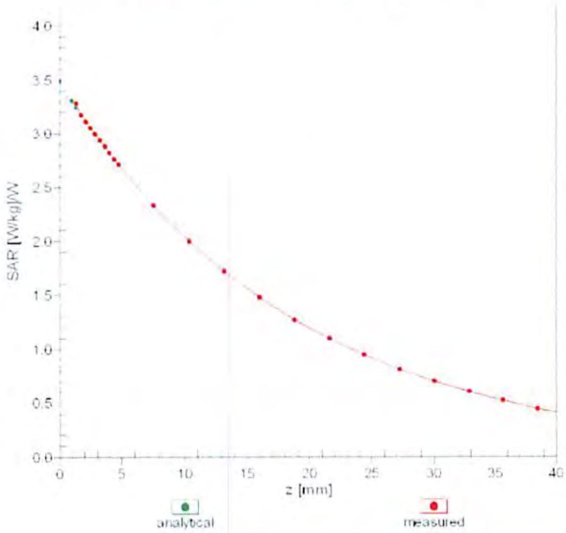




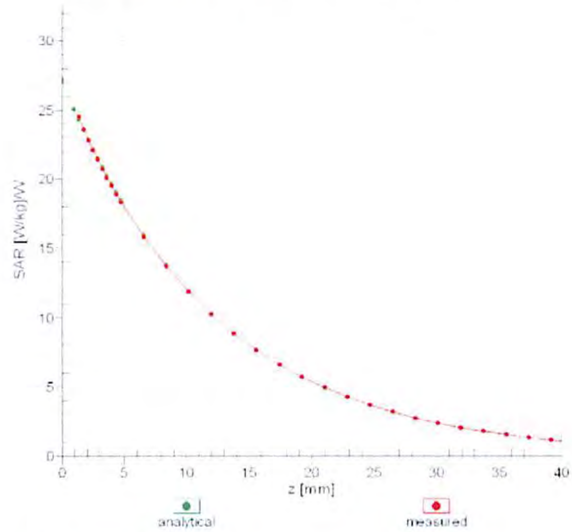
Uncertainty of Linearity Assessment: ± 0.6% (k=2)

Conversion Factor Assessment

f = 900 MHz,WGLS R9 (H_convF)

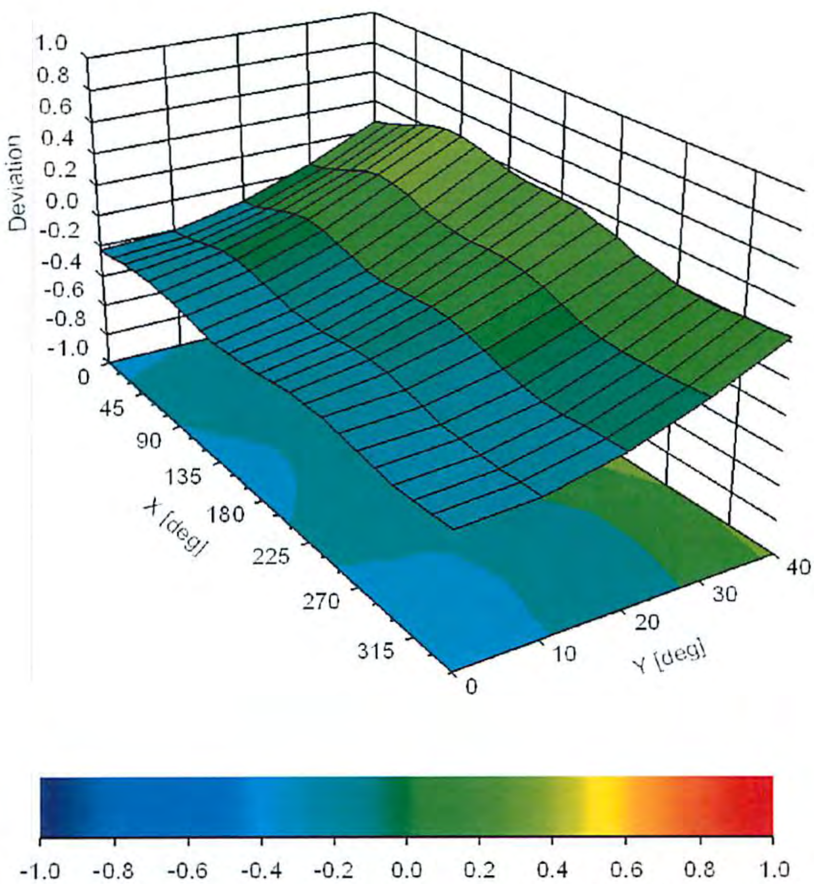


f = 1810 MHz,WGLS R22 (H_convF)



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	CAA	SAR Validation (Square, 100ms, 10ms)	Test	10.00	± 9.6 %
10011	CAB	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	CAC	IEEE 802.11a/h WiFi 5 GHz (OFDM, 6 Mbps)	WLAN	8.68	± 9.6 %
10063	CAC	IEEE 802.11a/h WiFi 5 GHz (OFDM, 9 Mbps)	WLAN	8.63	± 9.6 %
10064	CAC	IEEE 802.11a/h WiFi 5 GHz (OFDM, 12 Mbps)	WLAN	9.09	± 9.6 %
10065	CAC	IEEE 802.11a/h WiFi 5 GHz (OFDM, 18 Mbps)	WLAN	9.00	± 9.6 %
10066	CAC	IEEE 802.11a/h WiFi 5 GHz (OFDM, 24 Mbps)	WLAN	9.38	± 9.6 %
10067	CAC	IEEE 802.11a/h WiFi 5 GHz (OFDM, 36 Mbps)	WLAN	10.12	± 9.6 %
10068	CAC	IEEE 802.11a/h WiFi 5 GHz (OFDM, 48 Mbps)	WLAN	10.24	± 9.6 %
10069	CAC	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	CAB	UMTS-FDD (HSDPA)	WCDMA	3.98	± 9.6 %
10098	CAB	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	CAE	LTE-FDD (SC-FDMA, 100% RB, 20 MHz, QPSK)	LTE-FDD	5.67	± 9.6 %
10101	CAE	LTE-FDD (SC-FDMA, 100% RB, 20 MHz, 16-QAM)	LTE-FDD	6.42	± 9.6 %
10102	CAE	LTE-FDD (SC-FDMA, 100% RB, 20 MHz, 64-QAM)	LTE-FDD	6.60	± 9.6 %
10103	CAG	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, QPSK)	LTE-TDD	9.29	± 9.6 %
10104	CAG	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, 16-QAM)	LTE-TDD	9.97	± 9.6 %
10105	CAG	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, 64-QAM)	LTE-TDD	10.01	± 9.6 %
10108	CAG	LTE-FDD (SC-FDMA, 100% RB, 10 MHz, QPSK)	LTE-FDD	5.80	± 9.6 %

10109	CAG	LTE-FDD (SC-FDMA, 100% RB, 10 MHz, 16-QAM)	LTE-FDD	6.43	± 9.6 %
10110	CAG	LTE-FDD (SC-FDMA, 100% RB, 5 MHz, QPSK)	LTE-FDD	5.75	± 9.6 %
10111	CAG	LTE-FDD (SC-FDMA, 100% RB, 5 MHz, 16-QAM)	LTE-FDD	6.44	± 9.6 %
10112	CAG	LTE-FDD (SC-FDMA, 100% RB, 10 MHz, 64-QAM)	LTE-FDD	6.59	± 9.6 %
10113	CAG	LTE-FDD (SC-FDMA, 100% RB, 5 MHz, 64-QAM)	LTE-FDD	6.62	± 9.6 %
10114	CAC	IEEE 802.11n (HT Greenfield, 13.5 Mbps, BPSK)	WLAN	8.10	± 9.6 %
10115	CAC	IEEE 802.11n (HT Greenfield, 81 Mbps, 16-QAM)	WLAN	8.46	± 9.6 %
10116	CAC	IEEE 802.11n (HT Greenfield, 135 Mbps, 64-QAM)	WLAN	8.15	± 9.6 %
10117	CAC	IEEE 802.11n (HT Mixed, 13.5 Mbps, BPSK)	WLAN	8.07	± 9.6 %
10118	CAC	IEEE 802.11n (HT Mixed, 81 Mbps, 16-QAM)	WLAN	8.59	± 9.6 %
10119	CAC	IEEE 802.11n (HT Mixed, 135 Mbps, 64-QAM)	WLAN	8.13	± 9.6 %
10140	CAE	LTE-FDD (SC-FDMA, 100% RB, 15 MHz, 16-QAM)	LTE-FDD	6.49	± 9.6 %
10141	CAE	LTE-FDD (SC-FDMA, 100% RB, 15 MHz, 64-QAM)	LTE-FDD	6.53	± 9.6 %
10142	CAE	LTE-FDD (SC-FDMA, 100% RB, 3 MHz, QPSK)	LTE-FDD	5.73	± 9.6 %
10143	CAE	LTE-FDD (SC-FDMA, 100% RB, 3 MHz, 16-QAM)	LTE-FDD	6.35	± 9.6 %
10144	CAE	LTE-FDD (SC-FDMA, 100% RB, 3 MHz, 64-QAM)	LTE-FDD	6.65	± 9.6 %
10145	CAF	LTE-FDD (SC-FDMA, 100% RB, 1.4 MHz, QPSK)	LTE-FDD	5.76	± 9.6 %
10146	CAF	LTE-FDD (SC-FDMA, 100% RB, 1.4 MHz, 16-QAM)	LTE-FDD	6.41	± 9.6 %
10147	CAF	LTE-FDD (SC-FDMA, 100% RB, 1.4 MHz, 64-QAM)	LTE-FDD	6.72	± 9.6 %
10149	CAE	LTE-FDD (SC-FDMA, 50% RB, 20 MHz, 16-QAM)	LTE-FDD	6.42	± 9.6 %
10150	CAE	LTE-FDD (SC-FDMA, 50% RB, 20 MHz, 64-QAM)	LTE-FDD	6.60	± 9.6 %
10151	CAG	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, QPSK)	LTE-TDD	9.28	± 9.6 %
10152	CAG	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, 16-QAM)	LTE-TDD	9.92	± 9.6 %
10153	CAG	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, 64-QAM)	LTE-TDD	10.05	± 9.6 %
10154	CAG	LTE-FDD (SC-FDMA, 50% RB, 10 MHz, QPSK)	LTE-FDD	5.75	± 9.6 %
10155	CAG	LTE-FDD (SC-FDMA, 50% RB, 10 MHz, 16-QAM)	LTE-FDD	6.43	± 9.6 %
10156	CAG	LTE-FDD (SC-FDMA, 50% RB, 5 MHz, QPSK)	LTE-FDD	5.79	± 9.6 %
10157	CAG	LTE-FDD (SC-FDMA, 50% RB, 5 MHz, 16-QAM)	LTE-FDD	6.49	± 9.6 %
10158	CAG	LTE-FDD (SC-FDMA, 50% RB, 10 MHz, 64-QAM)	LTE-FDD	6.62	± 9.6 %
10159	CAG	LTE-FDD (SC-FDMA, 50% RB, 5 MHz, 64-QAM)	LTE-FDD	6.56	± 9.6 %
10160	CAE	LTE-FDD (SC-FDMA, 50% RB, 15 MHz, QPSK)	LTE-FDD	5.82	± 9.6 %
10161	CAE	LTE-FDD (SC-FDMA, 50% RB, 15 MHz, 16-QAM)	LTE-FDD	6.43	± 9.6 %
10162	CAE	LTE-FDD (SC-FDMA, 50% RB, 15 MHz, 64-QAM)	LTE-FDD	6.58	± 9.6 %
10166	CAF	LTE-FDD (SC-FDMA, 50% RB, 1.4 MHz, QPSK)	LTE-FDD	5.46	± 9.6 %
10167	CAF	LTE-FDD (SC-FDMA, 50% RB, 1.4 MHz, 16-QAM)	LTE-FDD	6.21	± 9.6 %
10168	CAF	LTE-FDD (SC-FDMA, 50% RB, 1.4 MHz, 64-QAM)	LTE-FDD	6.79	± 9.6 %
10169	CAE	LTE-FDD (SC-FDMA, 1 RB, 20 MHz, QPSK)	LTE-FDD	5.73	± 9.6 %
10170	CAE	LTE-FDD (SC-FDMA, 1 RB, 20 MHz, 16-QAM)	LTE-FDD	6.52	± 9.6 %
10171	AAE	LTE-FDD (SC-FDMA, 1 RB, 20 MHz, 64-QAM)	LTE-FDD	6.49	± 9.6 %
10172	CAG	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, QPSK)	LTE-TDD	9.21	± 9.6 %
10173	CAG	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 16-QAM)	LTE-TDD	9.48	± 9.6 %
10174	CAG	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 64-QAM)	LTE-TDD	10.25	± 9.6 %
10175	CAG	LTE-FDD (SC-FDMA, 1 RB, 10 MHz, QPSK)	LTE-FDD	5.72	± 9.6 %
10176	CAG	LTE-FDD (SC-FDMA, 1 RB, 10 MHz, 16-QAM)	LTE-FDD	6.52	± 9.6 %
10177	CAI	LTE-FDD (SC-FDMA, 1 RB, 5 MHz, QPSK)	LTE-FDD	5.73	± 9.6 %
10178	CAG	LTE-FDD (SC-FDMA, 1 RB, 5 MHz, 16-QAM)	LTE-FDD	6.52	± 9.6 %
10179	CAG	LTE-FDD (SC-FDMA, 1 RB, 10 MHz, 64-QAM)	LTE-FDD	6.50	± 9.6 %
10180	CAG	LTE-FDD (SC-FDMA, 1 RB, 5 MHz, 64-QAM)	LTE-FDD	6.50	± 9.6 %
10181	CAE	LTE-FDD (SC-FDMA, 1 RB, 15 MHz, QPSK)	LTE-FDD	5.72	± 9.6 %
10182	CAE	LTE-FDD (SC-FDMA, 1 RB, 15 MHz, 16-QAM)	LTE-FDD	6.52	± 9.6 %
10183	AAD	LTE-FDD (SC-FDMA, 1 RB, 15 MHz, 64-QAM)	LTE-FDD	6.50	± 9.6 %
10184	CAE	LTE-FDD (SC-FDMA, 1 RB, 3 MHz, QPSK)	LTE-FDD	5.73	± 9.6 %
10185	CAE	LTE-FDD (SC-FDMA, 1 RB, 3 MHz, 16-QAM)	LTE-FDD	6.51	± 9.6 %
10186	AAE	LTE-FDD (SC-FDMA, 1 RB, 3 MHz, 64-QAM)	LTE-FDD	6.50	± 9.6 %
10187	CAF	LTE-FDD (SC-FDMA, 1 RB, 1.4 MHz, QPSK)	LTE-FDD	5.73	± 9.6 %
10188	CAF	LTE-FDD (SC-FDMA, 1 RB, 1.4 MHz, 16-QAM)	LTE-FDD	6.52	± 9.6 %
10189	AAF	LTE-FDD (SC-FDMA, 1 RB, 1.4 MHz, 64-QAM)	LTE-FDD	6.50	± 9.6 %
10193	CAC	IEEE 802.11n (HT Greenfield, 6.5 Mbps, BPSK)	WLAN	8.09	± 9.6 %
10194	CAC	IEEE 802.11n (HT Greenfield, 39 Mbps, 16-QAM)	WLAN	8.12	± 9.6 %
10195	CAC	IEEE 802.11n (HT Greenfield, 65 Mbps, 64-QAM)	WLAN	8.21	± 9.6 %
10196	CAC	IEEE 802.11n (HT Mixed, 6.5 Mbps, BPSK)	WLAN	8.10	± 9.6 %
10197	CAC	IEEE 802.11n (HT Mixed, 39 Mbps, 16-QAM)	WLAN	8.13	± 9.6 %
10198	CAC	IEEE 802.11n (HT Mixed, 65 Mbps, 64-QAM)	WLAN	8.27	± 9.6 %
10219	CAC	IEEE 802.11n (HT Mixed, 7.2 Mbps, BPSK)	WLAN	8.03	± 9.6 %

10220	CAC	IEEE 802.11n (HT Mixed, 43.3 Mbps, 16-QAM)	WLAN	8.13	± 9.6 %
10221	CAC	IEEE 802.11n (HT Mixed, 72.2 Mbps, 64-QAM)	WLAN	8.27	± 9.6 %
10222	CAC	IEEE 802.11n (HT Mixed, 15 Mbps, BPSK)	WLAN	8.06	± 9.6 %
10223	CAC	IEEE 802.11n (HT Mixed, 90 Mbps, 16-QAM)	WLAN	8.48	± 9.6 %
10224	CAC	IEEE 802.11n (HT Mixed, 150 Mbps, 64-QAM)	WLAN	8.08	± 9.6 %
10225	CAB	UMTS-FDD (HSPA+)	WCDMA	5.97	± 9.6 %
10226	CAB	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, 16-QAM)	LTE-TDD	9.49	± 9.6 %
10227	CAB	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, 64-QAM)	LTE-TDD	10.26	± 9.6 %
10228	CAB	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, QPSK)	LTE-TDD	9.22	± 9.6 %
10229	CAD	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, 16-QAM)	LTE-TDD	9.48	± 9.6 %
10230	CAD	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, 64-QAM)	LTE-TDD	10.25	± 9.6 %
10231	CAD	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, QPSK)	LTE-TDD	9.19	± 9.6 %
10232	CAG	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, 16-QAM)	LTE-TDD	9.48	± 9.6 %
10233	CAG	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, 64-QAM)	LTE-TDD	10.25	± 9.6 %
10234	CAG	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, QPSK)	LTE-TDD	9.21	± 9.6 %
10235	CAG	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, 16-QAM)	LTE-TDD	9.48	± 9.6 %
10236	CAG	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, 64-QAM)	LTE-TDD	10.25	± 9.6 %
10237	CAG	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, QPSK)	LTE-TDD	9.21	± 9.6 %
10238	CAF	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, 16-QAM)	LTE-TDD	9.48	± 9.6 %
10239	CAF	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, 64-QAM)	LTE-TDD	10.25	± 9.6 %
10240	CAF	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, QPSK)	LTE-TDD	9.21	± 9.6 %
10241	CAB	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, 16-QAM)	LTE-TDD	9.82	± 9.6 %
10242	CAB	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, 64-QAM)	LTE-TDD	9.86	± 9.6 %
10243	CAB	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, QPSK)	LTE-TDD	9.46	± 9.6 %
10244	CAD	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, 16-QAM)	LTE-TDD	10.06	± 9.6 %
10245	CAD	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, 64-QAM)	LTE-TDD	10.06	± 9.6 %
10246	CAD	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, QPSK)	LTE-TDD	9.30	± 9.6 %
10247	CAG	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, 16-QAM)	LTE-TDD	9.91	± 9.6 %
10248	CAG	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, 64-QAM)	LTE-TDD	10.09	± 9.6 %
10249	CAG	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, QPSK)	LTE-TDD	9.29	± 9.6 %
10250	CAG	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, 16-QAM)	LTE-TDD	9.81	± 9.6 %
10251	CAG	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, 64-QAM)	LTE-TDD	10.17	± 9.6 %
10252	CAG	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, QPSK)	LTE-TDD	9.24	± 9.6 %
10253	CAF	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, 16-QAM)	LTE-TDD	9.90	± 9.6 %
10254	CAF	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, 64-QAM)	LTE-TDD	10.14	± 9.6 %
10255	CAF	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, QPSK)	LTE-TDD	9.20	± 9.6 %
10256	CAB	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, 16-QAM)	LTE-TDD	9.96	± 9.6 %
10257	CAB	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, 64-QAM)	LTE-TDD	10.08	± 9.6 %
10258	CAB	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, QPSK)	LTE-TDD	9.34	± 9.6 %
10259	CAD	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, 16-QAM)	LTE-TDD	9.98	± 9.6 %
10260	CAD	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, 64-QAM)	LTE-TDD	9.97	± 9.6 %
10261	CAD	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, QPSK)	LTE-TDD	9.24	± 9.6 %
10262	CAG	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, 16-QAM)	LTE-TDD	9.83	± 9.6 %
10263	CAG	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, 64-QAM)	LTE-TDD	10.16	± 9.6 %
10264	CAG	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, QPSK)	LTE-TDD	9.23	± 9.6 %
10265	CAG	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, 16-QAM)	LTE-TDD	9.92	± 9.6 %
10266	CAG	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, 64-QAM)	LTE-TDD	10.07	± 9.6 %
10267	CAG	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, QPSK)	LTE-TDD	9.30	± 9.6 %
10268	CAF	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, 16-QAM)	LTE-TDD	10.06	± 9.6 %
10269	CAF	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, 64-QAM)	LTE-TDD	10.13	± 9.6 %
10270	CAF	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, QPSK)	LTE-TDD	9.58	± 9.6 %
10274	CAB	UMTS-FDD (HSUPA, Subtest 5, 3GPP Rel8.10)	WCDMA	4.87	± 9.6 %
10275	CAB	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 884MHz, Rolloff 0.5)	PHS	11.81	± 9.6 %
10279	CAA	PHS (QPSK, BW 884MHz, 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	AAD	LTE-FDD (SC-FDMA, 50% RB, 20 MHz, QPSK)	LTE-FDD	5.81	± 9.6 %
10298	AAD	LTE-FDD (SC-FDMA, 50% RB, 3 MHz, QPSK)	LTE-FDD	5.72	± 9.6 %
10299	AAD	LTE-FDD (SC-FDMA, 50% RB, 3 MHz, 16-QAM)	LTE-FDD	6.39	± 9.6 %

10300	AAD	LTE-FDD (SC-FDMA, 50% RB, 3 MHz, 64-QAM)	LTE-FDD	6.60	± 9.6 %
10301	AAA	IEEE 802.16e WiMAX (29:18, 5ms, 10MHz, QPSK, PUSC)	WiMAX	12.03	± 9.6 %
10302	AAA	IEEE 802.16e WiMAX (29:18, 5ms, 10MHz, QPSK, PUSC, 3CTRL)	WiMAX	12.57	± 9.6 %
10303	AAA	IEEE 802.16e WiMAX (31:15, 5ms, 10MHz, 64QAM, PUSC)	WiMAX	12.52	± 9.6 %
10304	AAA	IEEE 802.16e WiMAX (29:18, 5ms, 10MHz, 64QAM, PUSC)	WiMAX	11.86	± 9.6 %
10305	AAA	IEEE 802.16e WiMAX (31:15, 10ms, 10MHz, 64QAM, PUSC)	WiMAX	15.24	± 9.6 %
10306	AAA	IEEE 802.16e WiMAX (29:18, 10ms, 10MHz, 64QAM, PUSC)	WiMAX	14.67	± 9.6 %
10307	AAA	IEEE 802.16e WiMAX (29:18, 10ms, 10MHz, QPSK, PUSC)	WiMAX	14.49	± 9.6 %
10308	AAA	IEEE 802.16e WiMAX (29:18, 10ms, 10MHz, 16QAM, PUSC)	WiMAX	14.46	± 9.6 %
10309	AAA	IEEE 802.16e WiMAX (29:18, 10ms, 10MHz, 16QAM,AMC 2x3)	WiMAX	14.58	± 9.6 %
10310	AAA	IEEE 802.16e WiMAX (29:18, 10ms, 10MHz, QPSK, AMC 2x3	WiMAX	14.57	± 9.6 %
10311	AAD	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 dc)	WLAN	1.71	± 9.6 %
10316	AAB	IEEE 802.11g WiFi 2.4 GHz (ERP-OFDM, 6 Mbps, 96pc dc)	WLAN	8.36	± 9.6 %
10317	AAC	IEEE 802.11a WiFi 5 GHz (OFDM, 6 Mbps, 96pc dc)	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	AAD	IEEE 802.11ac WiFi (20MHz, 64-QAM, 99pc dc)	WLAN	8.37	± 9.6 %
10401	AAD	IEEE 802.11ac WiFi (40MHz, 64-QAM, 99pc dc)	WLAN	8.60	± 9.6 %
10402	AAD	IEEE 802.11ac WiFi (80MHz, 64-QAM, 99pc dc)	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	AAG	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, QPSK, UL Sub=2,3,4,7,8,9)	LTE-TDD	7.82	± 9.6 %
10414	AAA	WLAN CCDF, 64-QAM, 40MHz	Generic	8.54	± 9.6 %
10415	AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps, 99pc dc)	WLAN	1.54	± 9.6 %
10416	AAA	IEEE 802.11g WiFi 2.4 GHz (ERP-OFDM, 6 Mbps, 99pc dc)	WLAN	8.23	± 9.6 %
10417	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 6 Mbps, 99pc dc)	WLAN	8.23	± 9.6 %
10418	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 6 Mbps, 99pc, Long)	WLAN	8.14	± 9.6 %
10419	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 6 Mbps, 99pc, Short)	WLAN	8.19	± 9.6 %
10422	AAB	IEEE 802.11n (HT Greenfield, 7.2 Mbps, BPSK)	WLAN	8.32	± 9.6 %
10423	AAB	IEEE 802.11n (HT Greenfield, 43.3 Mbps, 16-QAM)	WLAN	8.47	± 9.6 %
10424	AAB	IEEE 802.11n (HT Greenfield, 72.2 Mbps, 64-QAM)	WLAN	8.40	± 9.6 %
10425	AAB	IEEE 802.11n (HT Greenfield, 15 Mbps, BPSK)	WLAN	8.41	± 9.6 %
10426	AAB	IEEE 802.11n (HT Greenfield, 90 Mbps, 16-QAM)	WLAN	8.45	± 9.6 %
10427	AAB	IEEE 802.11n (HT Greenfield, 150 Mbps, 64-QAM)	WLAN	8.41	± 9.6 %
10430	AAD	LTE-FDD (OFDMA, 5 MHz, E-TM 3.1)	LTE-FDD	8.28	± 9.6 %
10431	AAD	LTE-FDD (OFDMA, 10 MHz, E-TM 3.1)	LTE-FDD	8.38	± 9.6 %
10432	AAC	LTE-FDD (OFDMA, 15 MHz, E-TM 3.1)	LTE-FDD	8.34	± 9.6 %
10433	AAC	LTE-FDD (OFDMA, 20 MHz, E-TM 3.1)	LTE-FDD	8.34	± 9.6 %
10434	AAA	W-CDMA (BS Test Model 1, 64 DPCH)	WCDMA	8.60	± 9.6 %
10435	AAF	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, QPSK, UL Sub)	LTE-TDD	7.82	± 9.6 %
10447	AAD	LTE-FDD (OFDMA, 5 MHz, E-TM 3.1, Clipping 44%)	LTE-FDD	7.56	± 9.6 %
10448	AAD	LTE-FDD (OFDMA, 10 MHz, E-TM 3.1, Clippin 44%)	LTE-FDD	7.53	± 9.6 %
10449	AAC	LTE-FDD (OFDMA, 15 MHz, E-TM 3.1, Cliping 44%)	LTE-FDD	7.51	± 9.6 %
10450	AAC	LTE-FDD (OFDMA, 20 MHz, E-TM 3.1, Clipping 44%)	LTE-FDD	7.48	± 9.6 %
10451	AAA	W-CDMA (BS Test Model 1, 64 DPCH, Clipping 44%)	WCDMA	7.59	± 9.6 %
10453	AAD	Validation (Square, 10ms, 1ms)	Test	10.00	± 9.6 %
10456	AAB	IEEE 802.11ac WiFi (160MHz, 64-QAM, 99pc dc)	WLAN	8.63	± 9.6 %
10457	AAA	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	AAA	UMTS-FDD (WCDMA, AMR)	WCDMA	2.39	± 9.6 %
10461	AAB	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, QPSK, UL Sub)	LTE-TDD	7.82	± 9.6 %
10462	AAB	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, 16-QAM, UL Sub)	LTE-TDD	8.30	± 9.6 %

10463	AAB	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, 64-QAM, UL Sub)	LTE-TDD	8.56	± 9.6 %
10464	AAC	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, QPSK, UL Sub)	LTE-TDD	7.82	± 9.6 %
10465	AAC	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, 16-QAM, UL Sub)	LTE-TDD	8.32	± 9.6 %
10466	AAC	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, 64-QAM, UL Sub)	LTE-TDD	8.57	± 9.6 %
10467	AAF	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, QPSK, UL Sub)	LTE-TDD	7.82	± 9.6 %
10468	AAF	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, 16-QAM, UL Sub)	LTE-TDD	8.32	± 9.6 %
10469	AAF	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, 64-QAM, UL Sub)	LTE-TDD	8.56	± 9.6 %
10470	AAF	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, QPSK, UL Sub)	LTE-TDD	7.82	± 9.6 %
10471	AAF	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, 16-QAM, UL Sub)	LTE-TDD	8.32	± 9.6 %
10472	AAF	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, 64-QAM, UL Sub)	LTE-TDD	8.57	± 9.6 %
10473	AAE	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, QPSK, UL Sub)	LTE-TDD	7.82	± 9.6 %
10474	AAE	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, 16-QAM, UL Sub)	LTE-TDD	8.32	± 9.6 %
10475	AAE	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, 64-QAM, UL Sub)	LTE-TDD	8.57	± 9.6 %
10477	AAF	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 16-QAM, UL Sub)	LTE-TDD	8.32	± 9.6 %
10478	AAF	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 64-QAM, UL Sub)	LTE-TDD	8.57	± 9.6 %
10479	AAB	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, QPSK, UL Sub)	LTE-TDD	7.74	± 9.6 %
10480	AAB	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, 16-QAM, UL Sub)	LTE-TDD	8.18	± 9.6 %
10481	AAB	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, 64-QAM, UL Sub)	LTE-TDD	8.45	± 9.6 %
10482	AAC	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, QPSK, UL Sub)	LTE-TDD	7.71	± 9.6 %
10483	AAC	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, 16-QAM, Sub)	LTE-TDD	8.39	± 9.6 %
10484	AAC	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, 64-QAM, UL Sub)	LTE-TDD	8.47	± 9.6 %
10485	AAF	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, QPSK, UL Sub)	LTE-TDD	7.59	± 9.6 %
10486	AAF	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, 16-QAM, UL Sub)	LTE-TDD	8.38	± 9.6 %
10487	AAF	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, 64-QAM, UL Sub)	LTE-TDD	8.60	± 9.6 %
10488	AAF	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, QPSK, UL Sub)	LTE-TDD	7.70	± 9.6 %
10489	AAF	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, 16-QAM, UL Sub)	LTE-TDD	8.31	± 9.6 %
10490	AAF	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, 64-QAM, UL Sub)	LTE-TDD	8.54	± 9.6 %
10491	AAE	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, QPSK, UL Sub)	LTE-TDD	7.74	± 9.6 %
10492	AAE	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, 16-QAM, UL Sub)	LTE-TDD	8.41	± 9.6 %
10493	AAE	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, 64-QAM, UL Sub)	LTE-TDD	8.55	± 9.6 %
10494	AAF	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, QPSK, UL Sub)	LTE-TDD	7.74	± 9.6 %
10495	AAF	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, 16-QAM, UL Sub)	LTE-TDD	8.37	± 9.6 %
10496	AAF	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, 64-QAM, UL Sub)	LTE-TDD	8.54	± 9.6 %
10497	AAB	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, QPSK, UL Sub)	LTE-TDD	7.67	± 9.6 %
10498	AAB	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, 16-QAM, UL Sub)	LTE-TDD	8.40	± 9.6 %
10499	AAB	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, 64-QAM, UL Sub)	LTE-TDD	8.68	± 9.6 %
10500	AAC	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, QPSK, UL Sub)	LTE-TDD	7.67	± 9.6 %
10501	AAC	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, 16-QAM, UL Sub)	LTE-TDD	8.44	± 9.6 %
10502	AAC	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, 64-QAM, UL Sub)	LTE-TDD	8.52	± 9.6 %
10503	AAF	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, QPSK, UL Sub)	LTE-TDD	7.72	± 9.6 %
10504	AAF	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, 16-QAM, UL Sub)	LTE-TDD	8.31	± 9.6 %
10505	AAF	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, 64-QAM, UL Sub)	LTE-TDD	8.54	± 9.6 %
10506	AAF	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, QPSK, UL Sub)	LTE-TDD	7.74	± 9.6 %
10507	AAF	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, 16-QAM, UL Sub)	LTE-TDD	8.36	± 9.6 %
10508	AAF	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, 64-QAM, UL Sub)	LTE-TDD	8.55	± 9.6 %
10509	AAE	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, QPSK, UL Sub)	LTE-TDD	7.99	± 9.6 %
10510	AAE	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, 16-QAM, UL Sub)	LTE-TDD	8.49	± 9.6 %
10511	AAE	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, 64-QAM, UL Sub)	LTE-TDD	8.51	± 9.6 %
10512	AAF	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, QPSK, UL Sub)	LTE-TDD	7.74	± 9.6 %
10513	AAF	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, 16-QAM, UL Sub)	LTE-TDD	8.42	± 9.6 %
10514	AAF	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, 64-QAM, UL Sub)	LTE-TDD	8.45	± 9.6 %
10515	AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 2 Mbps, 99pc dc)	WLAN	1.58	± 9.6 %
10516	AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 5.5 Mbps, 99pc dc)	WLAN	1.57	± 9.6 %
10517	AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 11 Mbps, 99pc dc)	WLAN	1.58	± 9.6 %
10518	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 9 Mbps, 99pc dc)	WLAN	8.23	± 9.6 %
10519	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 12 Mbps, 99pc dc)	WLAN	8.39	± 9.6 %
10520	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 18 Mbps, 99pc dc)	WLAN	8.12	± 9.6 %
10521	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 24 Mbps, 99pc dc)	WLAN	7.97	± 9.6 %
10522	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 36 Mbps, 99pc dc)	WLAN	8.45	± 9.6 %
10523	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 48 Mbps, 99pc dc)	WLAN	8.08	± 9.6 %
10524	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 54 Mbps, 99pc dc)	WLAN	8.27	± 9.6 %
10525	AAB	IEEE 802.11ac WiFi (20MHz, MCS0, 99pc dc)	WLAN	8.36	± 9.6 %
10526	AAB	IEEE 802.11ac WiFi (20MHz, MCS1, 99pc dc)	WLAN	8.42	± 9.6 %
10527	AAB	IEEE 802.11ac WiFi (20MHz, MCS2, 99pc dc)	WLAN	8.21	± 9.6 %

10528	AAB	IEEE 802.11ac WiFi (20MHz, MCS3, 99pc dc)	WLAN	8.36	± 9.6 %
10529	AAB	IEEE 802.11ac WiFi (20MHz, MCS4, 99pc dc)	WLAN	8.36	± 9.6 %
10531	AAB	IEEE 802.11ac WiFi (20MHz, MCS6, 99pc dc)	WLAN	8.43	± 9.6 %
10532	AAB	IEEE 802.11ac WiFi (20MHz, MCS7, 99pc dc)	WLAN	8.29	± 9.6 %
10533	AAB	IEEE 802.11ac WiFi (20MHz, MCS8, 99pc dc)	WLAN	8.38	± 9.6 %
10534	AAB	IEEE 802.11ac WiFi (40MHz, MCS0, 99pc dc)	WLAN	8.45	± 9.6 %
10535	AAB	IEEE 802.11ac WiFi (40MHz, MCS1, 99pc dc)	WLAN	8.45	± 9.6 %
10536	AAB	IEEE 802.11ac WiFi (40MHz, MCS2, 99pc dc)	WLAN	8.32	± 9.6 %
10537	AAB	IEEE 802.11ac WiFi (40MHz, MCS3, 99pc dc)	WLAN	8.44	± 9.6 %
10538	AAB	IEEE 802.11ac WiFi (40MHz, MCS4, 99pc dc)	WLAN	8.54	± 9.6 %
10540	AAB	IEEE 802.11ac WiFi (40MHz, MCS6, 99pc dc)	WLAN	8.39	± 9.6 %
10541	AAB	IEEE 802.11ac WiFi (40MHz, MCS7, 99pc dc)	WLAN	8.46	± 9.6 %
10542	AAB	IEEE 802.11ac WiFi (40MHz, MCS8, 99pc dc)	WLAN	8.65	± 9.6 %
10543	AAB	IEEE 802.11ac WiFi (40MHz, MCS9, 99pc dc)	WLAN	8.65	± 9.6 %
10544	AAB	IEEE 802.11ac WiFi (80MHz, MCS0, 99pc dc)	WLAN	8.47	± 9.6 %
10545	AAB	IEEE 802.11ac WiFi (80MHz, MCS1, 99pc dc)	WLAN	8.55	± 9.6 %
10546	AAB	IEEE 802.11ac WiFi (80MHz, MCS2, 99pc dc)	WLAN	8.35	± 9.6 %
10547	AAB	IEEE 802.11ac WiFi (80MHz, MCS3, 99pc dc)	WLAN	8.49	± 9.6 %
10548	AAB	IEEE 802.11ac WiFi (80MHz, MCS4, 99pc dc)	WLAN	8.37	± 9.6 %
10550	AAB	IEEE 802.11ac WiFi (80MHz, MCS6, 99pc dc)	WLAN	8.38	± 9.6 %
10551	AAB	IEEE 802.11ac WiFi (80MHz, MCS7, 99pc dc)	WLAN	8.50	± 9.6 %
10552	AAB	IEEE 802.11ac WiFi (80MHz, MCS8, 99pc dc)	WLAN	8.42	± 9.6 %
10553	AAB	IEEE 802.11ac WiFi (80MHz, MCS9, 99pc dc)	WLAN	8.45	± 9.6 %
10554	AAC	IEEE 802.11ac WiFi (160MHz, MCS0, 99pc dc)	WLAN	8.48	± 9.6 %
10555	AAC	IEEE 802.11ac WiFi (160MHz, MCS1, 99pc dc)	WLAN	8.47	± 9.6 %
10556	AAC	IEEE 802.11ac WiFi (160MHz, MCS2, 99pc dc)	WLAN	8.50	± 9.6 %
10557	AAC	IEEE 802.11ac WiFi (160MHz, MCS3, 99pc dc)	WLAN	8.52	± 9.6 %
10558	AAC	IEEE 802.11ac WiFi (160MHz, MCS4, 99pc dc)	WLAN	8.61	± 9.6 %
10560	AAC	IEEE 802.11ac WiFi (160MHz, MCS6, 99pc dc)	WLAN	8.73	± 9.6 %
10561	AAC	IEEE 802.11ac WiFi (160MHz, MCS7, 99pc dc)	WLAN	8.56	± 9.6 %
10562	AAC	IEEE 802.11ac WiFi (160MHz, MCS8, 99pc dc)	WLAN	8.69	± 9.6 %
10563	AAC	IEEE 802.11ac WiFi (160MHz, MCS9, 99pc dc)	WLAN	8.77	± 9.6 %
10564	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 9 Mbps, 99pc dc)	WLAN	8.25	± 9.6 %
10565	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 12 Mbps, 99pc dc)	WLAN	8.45	± 9.6 %
10566	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 18 Mbps, 99pc dc)	WLAN	8.13	± 9.6 %
10567	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 24 Mbps, 99pc dc)	WLAN	8.00	± 9.6 %
10568	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 36 Mbps, 99pc dc)	WLAN	8.37	± 9.6 %
10569	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 48 Mbps, 99pc dc)	WLAN	8.10	± 9.6 %
10570	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 54 Mbps, 99pc dc)	WLAN	8.30	± 9.6 %
10571	AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps, 90pc dc)	WLAN	1.99	± 9.6 %
10572	AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 2 Mbps, 90pc dc)	WLAN	1.99	± 9.6 %
10573	AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 5.5 Mbps, 90pc dc)	WLAN	1.98	± 9.6 %
10574	AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 11 Mbps, 90pc dc)	WLAN	1.98	± 9.6 %
10575	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 6 Mbps, 90pc dc)	WLAN	8.59	± 9.6 %
10576	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 9 Mbps, 90pc dc)	WLAN	8.60	± 9.6 %
10577	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 12 Mbps, 90pc dc)	WLAN	8.70	± 9.6 %
10578	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 18 Mbps, 90pc dc)	WLAN	8.49	± 9.6 %
10579	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 24 Mbps, 90pc dc)	WLAN	8.36	± 9.6 %
10580	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 36 Mbps, 90pc dc)	WLAN	8.76	± 9.6 %
10581	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 48 Mbps, 90pc dc)	WLAN	8.35	± 9.6 %
10582	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 54 Mbps, 90pc dc)	WLAN	8.67	± 9.6 %
10583	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 6 Mbps, 90pc dc)	WLAN	8.59	± 9.6 %
10584	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 9 Mbps, 90pc dc)	WLAN	8.60	± 9.6 %
10585	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 12 Mbps, 90pc dc)	WLAN	8.70	± 9.6 %
10586	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 18 Mbps, 90pc dc)	WLAN	8.49	± 9.6 %
10587	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 24 Mbps, 90pc dc)	WLAN	8.36	± 9.6 %
10588	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 36 Mbps, 90pc dc)	WLAN	8.76	± 9.6 %
10589	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 48 Mbps, 90pc dc)	WLAN	8.35	± 9.6 %
10590	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 54 Mbps, 90pc dc)	WLAN	8.67	± 9.6 %
10591	AAB	IEEE 802.11n (HT Mixed, 20MHz, MCS0, 90pc dc)	WLAN	8.63	± 9.6 %
10592	AAB	IEEE 802.11n (HT Mixed, 20MHz, MCS1, 90pc dc)	WLAN	8.79	± 9.6 %
10593	AAB	IEEE 802.11n (HT Mixed, 20MHz, MCS2, 90pc dc)	WLAN	8.64	± 9.6 %
10594	AAB	IEEE 802.11n (HT Mixed, 20MHz, MCS3, 90pc dc)	WLAN	8.74	± 9.6 %
10595	AAB	IEEE 802.11n (HT Mixed, 20MHz, MCS4, 90pc dc)	WLAN	8.74	± 9.6 %

10596	AAB	IEEE 802.11n (HT Mixed, 20MHz, MCS5, 90pc dc)	WLAN	8.71	± 9.6 %
10597	AAB	IEEE 802.11n (HT Mixed, 20MHz, MCS6, 90pc dc)	WLAN	8.72	± 9.6 %
10598	AAB	IEEE 802.11n (HT Mixed, 20MHz, MCS7, 90pc dc)	WLAN	8.50	± 9.6 %
10599	AAB	IEEE 802.11n (HT Mixed, 40MHz, MCS0, 90pc dc)	WLAN	8.79	± 9.6 %
10600	AAB	IEEE 802.11n (HT Mixed, 40MHz, MCS1, 90pc dc)	WLAN	8.88	± 9.6 %
10601	AAB	IEEE 802.11n (HT Mixed, 40MHz, MCS2, 90pc dc)	WLAN	8.82	± 9.6 %
10602	AAB	IEEE 802.11n (HT Mixed, 40MHz, MCS3, 90pc dc)	WLAN	8.94	± 9.6 %
10603	AAB	IEEE 802.11n (HT Mixed, 40MHz, MCS4, 90pc dc)	WLAN	9.03	± 9.6 %
10604	AAB	IEEE 802.11n (HT Mixed, 40MHz, MCS5, 90pc dc)	WLAN	8.76	± 9.6 %
10605	AAB	IEEE 802.11n (HT Mixed, 40MHz, MCS6, 90pc dc)	WLAN	8.97	± 9.6 %
10606	AAB	IEEE 802.11n (HT Mixed, 40MHz, MCS7, 90pc dc)	WLAN	8.82	± 9.6 %
10607	AAB	IEEE 802.11ac WiFi (20MHz, MCS0, 90pc dc)	WLAN	8.64	± 9.6 %
10608	AAB	IEEE 802.11ac WiFi (20MHz, MCS1, 90pc dc)	WLAN	8.77	± 9.6 %
10609	AAB	IEEE 802.11ac WiFi (20MHz, MCS2, 90pc dc)	WLAN	8.57	± 9.6 %
10610	AAB	IEEE 802.11ac WiFi (20MHz, MCS3, 90pc dc)	WLAN	8.78	± 9.6 %
10611	AAB	IEEE 802.11ac WiFi (20MHz, MCS4, 90pc dc)	WLAN	8.70	± 9.6 %
10612	AAB	IEEE 802.11ac WiFi (20MHz, MCS5, 90pc dc)	WLAN	8.77	± 9.6 %
10613	AAB	IEEE 802.11ac WiFi (20MHz, MCS6, 90pc dc)	WLAN	8.94	± 9.6 %
10614	AAB	IEEE 802.11ac WiFi (20MHz, MCS7, 90pc dc)	WLAN	8.59	± 9.6 %
10615	AAB	IEEE 802.11ac WiFi (20MHz, MCS8, 90pc dc)	WLAN	8.82	± 9.6 %
10616	AAB	IEEE 802.11ac WiFi (40MHz, MCS0, 90pc dc)	WLAN	8.82	± 9.6 %
10617	AAB	IEEE 802.11ac WiFi (40MHz, MCS1, 90pc dc)	WLAN	8.81	± 9.6 %
10618	AAB	IEEE 802.11ac WiFi (40MHz, MCS2, 90pc dc)	WLAN	8.58	± 9.6 %
10619	AAB	IEEE 802.11ac WiFi (40MHz, MCS3, 90pc dc)	WLAN	8.86	± 9.6 %
10620	AAB	IEEE 802.11ac WiFi (40MHz, MCS4, 90pc dc)	WLAN	8.87	± 9.6 %
10621	AAB	IEEE 802.11ac WiFi (40MHz, MCS5, 90pc dc)	WLAN	8.77	± 9.6 %
10622	AAB	IEEE 802.11ac WiFi (40MHz, MCS6, 90pc dc)	WLAN	8.68	± 9.6 %
10623	AAB	IEEE 802.11ac WiFi (40MHz, MCS7, 90pc dc)	WLAN	8.82	± 9.6 %
10624	AAB	IEEE 802.11ac WiFi (40MHz, MCS8, 90pc dc)	WLAN	8.96	± 9.6 %
10625	AAB	IEEE 802.11ac WiFi (40MHz, MCS9, 90pc dc)	WLAN	8.96	± 9.6 %
10626	AAB	IEEE 802.11ac WiFi (80MHz, MCS0, 90pc dc)	WLAN	8.83	± 9.6 %
10627	AAB	IEEE 802.11ac WiFi (80MHz, MCS1, 90pc dc)	WLAN	8.88	± 9.6 %
10628	AAB	IEEE 802.11ac WiFi (80MHz, MCS2, 90pc dc)	WLAN	8.71	± 9.6 %
10629	AAB	IEEE 802.11ac WiFi (80MHz, MCS3, 90pc dc)	WLAN	8.85	± 9.6 %
10630	AAB	IEEE 802.11ac WiFi (80MHz, MCS4, 90pc dc)	WLAN	8.72	± 9.6 %
10631	AAB	IEEE 802.11ac WiFi (80MHz, MCS5, 90pc dc)	WLAN	8.81	± 9.6 %
10632	AAB	IEEE 802.11ac WiFi (80MHz, MCS6, 90pc dc)	WLAN	8.74	± 9.6 %
10633	AAB	IEEE 802.11ac WiFi (80MHz, MCS7, 90pc dc)	WLAN	8.83	± 9.6 %
10634	AAB	IEEE 802.11ac WiFi (80MHz, MCS8, 90pc dc)	WLAN	8.80	± 9.6 %
10635	AAB	IEEE 802.11ac WiFi (80MHz, MCS9, 90pc dc)	WLAN	8.81	± 9.6 %
10636	AAC	IEEE 802.11ac WiFi (160MHz, MCS0, 90pc dc)	WLAN	8.83	± 9.6 %
10637	AAC	IEEE 802.11ac WiFi (160MHz, MCS1, 90pc dc)	WLAN	8.79	± 9.6 %
10638	AAC	IEEE 802.11ac WiFi (160MHz, MCS2, 90pc dc)	WLAN	8.86	± 9.6 %
10639	AAC	IEEE 802.11ac WiFi (160MHz, MCS3, 90pc dc)	WLAN	8.85	± 9.6 %
10640	AAC	IEEE 802.11ac WiFi (160MHz, MCS4, 90pc dc)	WLAN	8.98	± 9.6 %
10641	AAC	IEEE 802.11ac WiFi (160MHz, MCS5, 90pc dc)	WLAN	9.06	± 9.6 %
10642	AAC	IEEE 802.11ac WiFi (160MHz, MCS6, 90pc dc)	WLAN	9.06	± 9.6 %
10643	AAC	IEEE 802.11ac WiFi (160MHz, MCS7, 90pc dc)	WLAN	8.89	± 9.6 %
10644	AAC	IEEE 802.11ac WiFi (160MHz, MCS8, 90pc dc)	WLAN	9.05	± 9.6 %
10645	AAC	IEEE 802.11ac WiFi (160MHz, MCS9, 90pc dc)	WLAN	9.11	± 9.6 %
10646	AAG	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, QPSK, UL Sub=2,7)	LTE-TDD	11.96	± 9.6 %
10647	AAF	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, QPSK, UL Sub=2,7)	LTE-TDD	11.96	± 9.6 %
10648	AAA	CDMA2000 (1x Advanced)	CDMA2000	3.45	± 9.6 %
10652	AAE	LTE-TDD (OFDMA, 5 MHz, E-TM 3.1, Clipping 44%)	LTE-TDD	6.91	± 9.6 %
10653	AAE	LTE-TDD (OFDMA, 10 MHz, E-TM 3.1, Clipping 44%)	LTE-TDD	7.42	± 9.6 %
10654	AAD	LTE-TDD (OFDMA, 15 MHz, E-TM 3.1, Clipping 44%)	LTE-TDD	6.96	± 9.6 %
10655	AAE	LTE-TDD (OFDMA, 20 MHz, E-TM 3.1, Clipping 44%)	LTE-TDD	7.21	± 9.6 %
10658	AAA	Pulse Waveform (200Hz, 10%)	Test	10.00	± 9.6 %
10659	AAA	Pulse Waveform (200Hz, 20%)	Test	6.99	± 9.6 %
10660	AAA	Pulse Waveform (200Hz, 40%)	Test	3.98	± 9.6 %
10661	AAA	Pulse Waveform (200Hz, 60%)	Test	2.22	± 9.6 %
10662	AAA	Pulse Waveform (200Hz, 80%)	Test	0.97	± 9.6 %
10670	AAA	Bluetooth Low Energy	Bluetooth	2.19	± 9.6 %
10671	AAA	IEEE 802.11ax (20MHz, MCS0, 90pc dc)	WLAN	9.09	± 9.6 %

10672	AAA	IEEE 802.11ax (20MHz, MCS1, 90pc dc)	WLAN	8.57	± 9.6 %
10673	AAA	IEEE 802.11ax (20MHz, MCS2, 90pc dc)	WLAN	8.78	± 9.6 %
10674	AAA	IEEE 802.11ax (20MHz, MCS3, 90pc dc)	WLAN	8.74	± 9.6 %
10675	AAA	IEEE 802.11ax (20MHz, MCS4, 90pc dc)	WLAN	8.90	± 9.6 %
10676	AAA	IEEE 802.11ax (20MHz, MCS5, 90pc dc)	WLAN	8.77	± 9.6 %
10677	AAA	IEEE 802.11ax (20MHz, MCS6, 90pc dc)	WLAN	8.73	± 9.6 %
10678	AAA	IEEE 802.11ax (20MHz, MCS7, 90pc dc)	WLAN	8.78	± 9.6 %
10679	AAA	IEEE 802.11ax (20MHz, MCS8, 90pc dc)	WLAN	8.89	± 9.6 %
10680	AAA	IEEE 802.11ax (20MHz, MCS9, 90pc dc)	WLAN	8.80	± 9.6 %
10681	AAA	IEEE 802.11ax (20MHz, MCS10, 90pc dc)	WLAN	8.62	± 9.6 %
10682	AAA	IEEE 802.11ax (20MHz, MCS11, 90pc dc)	WLAN	8.83	± 9.6 %
10683	AAA	IEEE 802.11ax (20MHz, MCS0, 99pc dc)	WLAN	8.42	± 9.6 %
10684	AAA	IEEE 802.11ax (20MHz, MCS1, 99pc dc)	WLAN	8.26	± 9.6 %
10685	AAA	IEEE 802.11ax (20MHz, MCS2, 99pc dc)	WLAN	8.33	± 9.6 %
10686	AAA	IEEE 802.11ax (20MHz, MCS3, 99pc dc)	WLAN	8.28	± 9.6 %
10687	AAA	IEEE 802.11ax (20MHz, MCS4, 99pc dc)	WLAN	8.45	± 9.6 %
10688	AAA	IEEE 802.11ax (20MHz, MCS5, 99pc dc)	WLAN	8.29	± 9.6 %
10689	AAA	IEEE 802.11ax (20MHz, MCS6, 99pc dc)	WLAN	8.55	± 9.6 %
10690	AAA	IEEE 802.11ax (20MHz, MCS7, 99pc dc)	WLAN	8.29	± 9.6 %
10691	AAA	IEEE 802.11ax (20MHz, MCS8, 99pc dc)	WLAN	8.25	± 9.6 %
10692	AAA	IEEE 802.11ax (20MHz, MCS9, 99pc dc)	WLAN	8.29	± 9.6 %
10693	AAA	IEEE 802.11ax (20MHz, MCS10, 99pc dc)	WLAN	8.25	± 9.6 %
10694	AAA	IEEE 802.11ax (20MHz, MCS11, 99pc dc)	WLAN	8.57	± 9.6 %
10695	AAA	IEEE 802.11ax (40MHz, MCS0, 90pc dc)	WLAN	8.78	± 9.6 %
10696	AAA	IEEE 802.11ax (40MHz, MCS1, 90pc dc)	WLAN	8.91	± 9.6 %
10697	AAA	IEEE 802.11ax (40MHz, MCS2, 90pc dc)	WLAN	8.61	± 9.6 %
10698	AAA	IEEE 802.11ax (40MHz, MCS3, 90pc dc)	WLAN	8.89	± 9.6 %
10699	AAA	IEEE 802.11ax (40MHz, MCS4, 90pc dc)	WLAN	8.82	± 9.6 %
10700	AAA	IEEE 802.11ax (40MHz, MCS5, 90pc dc)	WLAN	8.73	± 9.6 %
10701	AAA	IEEE 802.11ax (40MHz, MCS6, 90pc dc)	WLAN	8.86	± 9.6 %
10702	AAA	IEEE 802.11ax (40MHz, MCS7, 90pc dc)	WLAN	8.70	± 9.6 %
10703	AAA	IEEE 802.11ax (40MHz, MCS8, 90pc dc)	WLAN	8.82	± 9.6 %
10704	AAA	IEEE 802.11ax (40MHz, MCS9, 90pc dc)	WLAN	8.56	± 9.6 %
10705	AAA	IEEE 802.11ax (40MHz, MCS10, 90pc dc)	WLAN	8.69	± 9.6 %
10706	AAA	IEEE 802.11ax (40MHz, MCS11, 90pc dc)	WLAN	8.66	± 9.6 %
10707	AAA	IEEE 802.11ax (40MHz, MCS0, 99pc dc)	WLAN	8.32	± 9.6 %
10708	AAA	IEEE 802.11ax (40MHz, MCS1, 99pc dc)	WLAN	8.55	± 9.6 %
10709	AAA	IEEE 802.11ax (40MHz, MCS2, 99pc dc)	WLAN	8.33	± 9.6 %
10710	AAA	IEEE 802.11ax (40MHz, MCS3, 99pc dc)	WLAN	8.29	± 9.6 %
10711	AAA	IEEE 802.11ax (40MHz, MCS4, 99pc dc)	WLAN	8.39	± 9.6 %
10712	AAA	IEEE 802.11ax (40MHz, MCS5, 99pc dc)	WLAN	8.67	± 9.6 %
10713	AAA	IEEE 802.11ax (40MHz, MCS6, 99pc dc)	WLAN	8.33	± 9.6 %
10714	AAA	IEEE 802.11ax (40MHz, MCS7, 99pc dc)	WLAN	8.26	± 9.6 %
10715	AAA	IEEE 802.11ax (40MHz, MCS8, 99pc dc)	WLAN	8.45	± 9.6 %
10716	AAA	IEEE 802.11ax (40MHz, MCS9, 99pc dc)	WLAN	8.30	± 9.6 %
10717	AAA	IEEE 802.11ax (40MHz, MCS10, 99pc dc)	WLAN	8.48	± 9.6 %
10718	AAA	IEEE 802.11ax (40MHz, MCS11, 99pc dc)	WLAN	8.24	± 9.6 %
10719	AAA	IEEE 802.11ax (80MHz, MCS0, 90pc dc)	WLAN	8.81	± 9.6 %
10720	AAA	IEEE 802.11ax (80MHz, MCS1, 90pc dc)	WLAN	8.87	± 9.6 %
10721	AAA	IEEE 802.11ax (80MHz, MCS2, 90pc dc)	WLAN	8.76	± 9.6 %
10722	AAA	IEEE 802.11ax (80MHz, MCS3, 90pc dc)	WLAN	8.55	± 9.6 %
10723	AAA	IEEE 802.11ax (80MHz, MCS4, 90pc dc)	WLAN	8.70	± 9.6 %
10724	AAA	IEEE 802.11ax (80MHz, MCS5, 90pc dc)	WLAN	8.90	± 9.6 %
10725	AAA	IEEE 802.11ax (80MHz, MCS6, 90pc dc)	WLAN	8.74	± 9.6 %
10726	AAA	IEEE 802.11ax (80MHz, MCS7, 90pc dc)	WLAN	8.72	± 9.6 %
10727	AAA	IEEE 802.11ax (80MHz, MCS8, 90pc dc)	WLAN	8.66	± 9.6 %
10728	AAA	IEEE 802.11ax (80MHz, MCS9, 90pc dc)	WLAN	8.65	± 9.6 %
10729	AAA	IEEE 802.11ax (80MHz, MCS10, 90pc dc)	WLAN	8.64	± 9.6 %
10730	AAA	IEEE 802.11ax (80MHz, MCS11, 90pc dc)	WLAN	8.67	± 9.6 %
10731	AAA	IEEE 802.11ax (80MHz, MCS0, 99pc dc)	WLAN	8.42	± 9.6 %
10732	AAA	IEEE 802.11ax (80MHz, MCS1, 99pc dc)	WLAN	8.46	± 9.6 %
10733	AAA	IEEE 802.11ax (80MHz, MCS2, 99pc dc)	WLAN	8.40	± 9.6 %
10734	AAA	IEEE 802.11ax (80MHz, MCS3, 99pc dc)	WLAN	8.25	± 9.6 %
10735	AAA	IEEE 802.11ax (80MHz, MCS4, 99pc dc)	WLAN	8.33	± 9.6 %

10736	AAA	IEEE 802.11ax (80MHz, MCS5, 99pc dc)	WLAN	8.27	± 9.6 %
10737	AAA	IEEE 802.11ax (80MHz, MCS6, 99pc dc)	WLAN	8.36	± 9.6 %
10738	AAA	IEEE 802.11ax (80MHz, MCS7, 99pc dc)	WLAN	8.42	± 9.6 %
10739	AAA	IEEE 802.11ax (80MHz, MCS8, 99pc dc)	WLAN	8.29	± 9.6 %
10740	AAA	IEEE 802.11ax (80MHz, MCS9, 99pc dc)	WLAN	8.48	± 9.6 %
10741	AAA	IEEE 802.11ax (80MHz, MCS10, 99pc dc)	WLAN	8.40	± 9.6 %
10742	AAA	IEEE 802.11ax (80MHz, MCS11, 99pc dc)	WLAN	8.43	± 9.6 %
10743	AAA	IEEE 802.11ax (160MHz, MCS0, 90pc dc)	WLAN	8.94	± 9.6 %
10744	AAA	IEEE 802.11ax (160MHz, MCS1, 90pc dc)	WLAN	9.16	± 9.6 %
10745	AAA	IEEE 802.11ax (160MHz, MCS2, 90pc dc)	WLAN	8.93	± 9.6 %
10746	AAA	IEEE 802.11ax (160MHz, MCS3, 90pc dc)	WLAN	9.11	± 9.6 %
10747	AAA	IEEE 802.11ax (160MHz, MCS4, 90pc dc)	WLAN	9.04	± 9.6 %
10748	AAA	IEEE 802.11ax (160MHz, MCS5, 90pc dc)	WLAN	8.93	± 9.6 %
10749	AAA	IEEE 802.11ax (160MHz, MCS6, 90pc dc)	WLAN	8.90	± 9.6 %
10750	AAA	IEEE 802.11ax (160MHz, MCS7, 90pc dc)	WLAN	8.79	± 9.6 %
10751	AAA	IEEE 802.11ax (160MHz, MCS8, 90pc dc)	WLAN	8.82	± 9.6 %
10752	AAA	IEEE 802.11ax (160MHz, MCS9, 90pc dc)	WLAN	8.81	± 9.6 %
10753	AAA	IEEE 802.11ax (160MHz, MCS10, 90pc dc)	WLAN	9.00	± 9.6 %
10754	AAA	IEEE 802.11ax (160MHz, MCS11, 90pc dc)	WLAN	8.94	± 9.6 %
10755	AAA	IEEE 802.11ax (160MHz, MCS0, 99pc dc)	WLAN	8.64	± 9.6 %
10756	AAA	IEEE 802.11ax (160MHz, MCS1, 99pc dc)	WLAN	8.77	± 9.6 %
10757	AAA	IEEE 802.11ax (160MHz, MCS2, 99pc dc)	WLAN	8.77	± 9.6 %
10758	AAA	IEEE 802.11ax (160MHz, MCS3, 99pc dc)	WLAN	8.69	± 9.6 %
10759	AAA	IEEE 802.11ax (160MHz, MCS4, 99pc dc)	WLAN	8.58	± 9.6 %
10760	AAA	IEEE 802.11ax (160MHz, MCS5, 99pc dc)	WLAN	8.49	± 9.6 %
10761	AAA	IEEE 802.11ax (160MHz, MCS6, 99pc dc)	WLAN	8.58	± 9.6 %
10762	AAA	IEEE 802.11ax (160MHz, MCS7, 99pc dc)	WLAN	8.49	± 9.6 %
10763	AAA	IEEE 802.11ax (160MHz, MCS8, 99pc dc)	WLAN	8.53	± 9.6 %
10764	AAA	IEEE 802.11ax (160MHz, MCS9, 99pc dc)	WLAN	8.54	± 9.6 %
10765	AAA	IEEE 802.11ax (160MHz, MCS10, 99pc dc)	WLAN	8.54	± 9.6 %
10766	AAA	IEEE 802.11ax (160MHz, MCS11, 99pc dc)	WLAN	8.51	± 9.6 %
10767	AAC	5G NR (CP-OFDM, 1 RB, 5 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	7.99	± 9.6 %
10768	AAC	5G NR (CP-OFDM, 1 RB, 10 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.01	± 9.6 %
10769	AAC	5G NR (CP-OFDM, 1 RB, 15 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.01	± 9.6 %
10770	AAC	5G NR (CP-OFDM, 1 RB, 20 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.02	± 9.6 %
10771	AAC	5G NR (CP-OFDM, 1 RB, 25 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.02	± 9.6 %
10772	AAC	5G NR (CP-OFDM, 1 RB, 30 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.23	± 9.6 %
10773	AAC	5G NR (CP-OFDM, 1 RB, 40 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.03	± 9.6 %
10774	AAC	5G NR (CP-OFDM, 1 RB, 50 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.02	± 9.6 %
10775	AAB	5G NR (CP-OFDM, 50% RB, 5 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.31	± 9.6 %
10776	AAC	5G NR (CP-OFDM, 50% RB, 10 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.30	± 9.6 %
10777	AAB	5G NR (CP-OFDM, 50% RB, 15 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.30	± 9.6 %
10778	AAC	5G NR (CP-OFDM, 50% RB, 20 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.34	± 9.6 %
10779	AAB	5G NR (CP-OFDM, 50% RB, 25 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.42	± 9.6 %
10780	AAC	5G NR (CP-OFDM, 50% RB, 30 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.38	± 9.6 %
10781	AAC	5G NR (CP-OFDM, 50% RB, 40 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.38	± 9.6 %
10782	AAC	5G NR (CP-OFDM, 50% RB, 50 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.43	± 9.6 %
10783	AAC	5G NR (CP-OFDM, 100% RB, 5 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.31	± 9.6 %
10784	AAC	5G NR (CP-OFDM, 100% RB, 10 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.29	± 9.6 %
10785	AAC	5G NR (CP-OFDM, 100% RB, 15 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.40	± 9.6 %
10786	AAC	5G NR (CP-OFDM, 100% RB, 20 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.35	± 9.6 %
10787	AAC	5G NR (CP-OFDM, 100% RB, 25 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.44	± 9.6 %
10788	AAC	5G NR (CP-OFDM, 100% RB, 30 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.39	± 9.6 %
10789	AAC	5G NR (CP-OFDM, 100% RB, 40 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.37	± 9.6 %
10790	AAC	5G NR (CP-OFDM, 100% RB, 50 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.39	± 9.6 %
10791	AAC	5G NR (CP-OFDM, 1 RB, 5 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	7.83	± 9.6 %
10792	AAC	5G NR (CP-OFDM, 1 RB, 10 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	7.92	± 9.6 %
10793	AAC	5G NR (CP-OFDM, 1 RB, 15 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	7.95	± 9.6 %
10794	AAC	5G NR (CP-OFDM, 1 RB, 20 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	7.82	± 9.6 %
10795	AAC	5G NR (CP-OFDM, 1 RB, 25 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	7.84	± 9.6 %
10796	AAC	5G NR (CP-OFDM, 1 RB, 30 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	7.82	± 9.6 %
10797	AAC	5G NR (CP-OFDM, 1 RB, 40 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.01	± 9.6 %
10798	AAC	5G NR (CP-OFDM, 1 RB, 50 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	7.89	± 9.6 %
10799	AAC	5G NR (CP-OFDM, 1 RB, 60 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	7.93	± 9.6 %

10801	AAC	5G NR (CP-OFDM, 1 RB, 80 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	7.89	± 9.6 %
10802	AAC	5G NR (CP-OFDM, 1 RB, 90 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	7.87	± 9.6 %
10803	AAC	5G NR (CP-OFDM, 1 RB, 100 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	7.93	± 9.6 %
10805	AAC	5G NR (CP-OFDM, 50% RB, 10 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.34	± 9.6 %
10806	AAC	5G NR (CP-OFDM, 50% RB, 15 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.37	± 9.6 %
10809	AAC	5G NR (CP-OFDM, 50% RB, 30 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.34	± 9.6 %
10810	AAC	5G NR (CP-OFDM, 50% RB, 40 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.34	± 9.6 %
10812	AAC	5G NR (CP-OFDM, 50% RB, 60 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.35	± 9.6 %
10817	AAC	5G NR (CP-OFDM, 100% RB, 5 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.35	± 9.6 %
10818	AAC	5G NR (CP-OFDM, 100% RB, 10 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.34	± 9.6 %
10819	AAC	5G NR (CP-OFDM, 100% RB, 15 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.33	± 9.6 %
10820	AAC	5G NR (CP-OFDM, 100% RB, 20 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.30	± 9.6 %
10821	AAC	5G NR (CP-OFDM, 100% RB, 25 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.41	± 9.6 %
10822	AAC	5G NR (CP-OFDM, 100% RB, 30 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.41	± 9.6 %
10823	AAC	5G NR (CP-OFDM, 100% RB, 40 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.36	± 9.6 %
10824	AAC	5G NR (CP-OFDM, 100% RB, 50 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.39	± 9.6 %
10825	AAC	5G NR (CP-OFDM, 100% RB, 60 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.41	± 9.6 %
10827	AAC	5G NR (CP-OFDM, 100% RB, 80 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.42	± 9.6 %
10828	AAC	5G NR (CP-OFDM, 100% RB, 90 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.43	± 9.6 %
10829	AAC	5G NR (CP-OFDM, 100% RB, 100 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.40	± 9.6 %
10830	AAC	5G NR (CP-OFDM, 1 RB, 10 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	7.63	± 9.6 %
10831	AAC	5G NR (CP-OFDM, 1 RB, 15 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	7.73	± 9.6 %
10832	AAC	5G NR (CP-OFDM, 1 RB, 20 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	7.74	± 9.6 %
10833	AAC	5G NR (CP-OFDM, 1 RB, 25 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	7.70	± 9.6 %
10834	AAC	5G NR (CP-OFDM, 1 RB, 30 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	7.75	± 9.6 %
10835	AAC	5G NR (CP-OFDM, 1 RB, 40 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	7.70	± 9.6 %
10836	AAC	5G NR (CP-OFDM, 1 RB, 50 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	7.66	± 9.6 %
10837	AAC	5G NR (CP-OFDM, 1 RB, 60 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	7.68	± 9.6 %
10839	AAC	5G NR (CP-OFDM, 1 RB, 80 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	7.70	± 9.6 %
10840	AAC	5G NR (CP-OFDM, 1 RB, 90 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	7.67	± 9.6 %
10841	AAC	5G NR (CP-OFDM, 1 RB, 100 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	7.71	± 9.6 %
10843	AAC	5G NR (CP-OFDM, 50% RB, 15 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.49	± 9.6 %
10844	AAC	5G NR (CP-OFDM, 50% RB, 20 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.34	± 9.6 %
10846	AAC	5G NR (CP-OFDM, 50% RB, 30 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.41	± 9.6 %
10854	AAC	5G NR (CP-OFDM, 100% RB, 10 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.34	± 9.6 %
10855	AAC	5G NR (CP-OFDM, 100% RB, 15 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.36	± 9.6 %
10856	AAC	5G NR (CP-OFDM, 100% RB, 20 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.37	± 9.6 %
10857	AAC	5G NR (CP-OFDM, 100% RB, 25 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.35	± 9.6 %
10858	AAC	5G NR (CP-OFDM, 100% RB, 30 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.36	± 9.6 %
10859	AAC	5G NR (CP-OFDM, 100% RB, 40 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.34	± 9.6 %
10860	AAC	5G NR (CP-OFDM, 100% RB, 50 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.41	± 9.6 %
10861	AAC	5G NR (CP-OFDM, 100% RB, 60 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.40	± 9.6 %
10863	AAC	5G NR (CP-OFDM, 100% RB, 80 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.41	± 9.6 %
10864	AAC	5G NR (CP-OFDM, 100% RB, 90 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.37	± 9.6 %
10865	AAC	5G NR (CP-OFDM, 100% RB, 100 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.41	± 9.6 %
10866	AAC	5G NR (DFT-s-OFDM, 1 RB, 100 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.68	± 9.6 %
10868	AAC	5G NR (DFT-s-OFDM, 100% RB, 100 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.89	± 9.6 %
10869	AAD	5G NR (DFT-s-OFDM, 1 RB, 100 MHz, QPSK, 120 kHz)	5G NR FR2 TDD	5.75	± 9.6 %
10870	AAD	5G NR (DFT-s-OFDM, 100% RB, 100 MHz, QPSK, 120 kHz)	5G NR FR2 TDD	5.86	± 9.6 %
10871	AAD	5G NR (DFT-s-OFDM, 1 RB, 100 MHz, 16QAM, 120 kHz)	5G NR FR2 TDD	5.75	± 9.6 %
10872	AAD	5G NR (DFT-s-OFDM, 100% RB, 100 MHz, 16QAM, 120 kHz)	5G NR FR2 TDD	6.52	± 9.6 %
10873	AAD	5G NR (DFT-s-OFDM, 1 RB, 100 MHz, 64QAM, 120 kHz)	5G NR FR2 TDD	6.61	± 9.6 %
10874	AAD	5G NR (DFT-s-OFDM, 100% RB, 100 MHz, 64QAM, 120 kHz)	5G NR FR2 TDD	6.65	± 9.6 %
10875	AAD	5G NR (CP-OFDM, 1 RB, 100 MHz, QPSK, 120 kHz)	5G NR FR2 TDD	7.78	± 9.6 %
10876	AAD	5G NR (CP-OFDM, 100% RB, 100 MHz, QPSK, 120 kHz)	5G NR FR2 TDD	8.39	± 9.6 %
10877	AAD	5G NR (CP-OFDM, 1 RB, 100 MHz, 16QAM, 120 kHz)	5G NR FR2 TDD	7.95	± 9.6 %
10878	AAD	5G NR (CP-OFDM, 100% RB, 100 MHz, 16QAM, 120 kHz)	5G NR FR2 TDD	8.41	± 9.6 %
10879	AAD	5G NR (CP-OFDM, 1 RB, 100 MHz, 64QAM, 120 kHz)	5G NR FR2 TDD	8.12	± 9.6 %
10880	AAD	5G NR (CP-OFDM, 100% RB, 100 MHz, 64QAM, 120 kHz)	5G NR FR2 TDD	8.38	± 9.6 %
10881	AAD	5G NR (DFT-s-OFDM, 1 RB, 50 MHz, QPSK, 120 kHz)	5G NR FR2 TDD	5.75	± 9.6 %
10882	AAD	5G NR (DFT-s-OFDM, 100% RB, 50 MHz, QPSK, 120 kHz)	5G NR FR2 TDD	5.96	± 9.6 %
10883	AAD	5G NR (DFT-s-OFDM, 1 RB, 50 MHz, 16QAM, 120 kHz)	5G NR FR2 TDD	6.57	± 9.6 %
10884	AAD	5G NR (DFT-s-OFDM, 100% RB, 50 MHz, 16QAM, 120 kHz)	5G NR FR2 TDD	6.53	± 9.6 %
10885	AAD	5G NR (DFT-s-OFDM, 1 RB, 50 MHz, 64QAM, 120 kHz)	5G NR FR2 TDD	6.61	± 9.6 %

10886	AAD	5G NR (DFT-s-OFDM, 100% RB, 50 MHz, 64QAM, 120 kHz)	5G NR FR2 TDD	6.65	± 9.6 %
10887	AAD	5G NR (CP-OFDM, 1 RB, 50 MHz, QPSK, 120 kHz)	5G NR FR2 TDD	7.78	± 9.6 %
10888	AAD	5G NR (CP-OFDM, 100% RB, 50 MHz, QPSK, 120 kHz)	5G NR FR2 TDD	8.35	± 9.6 %
10889	AAD	5G NR (CP-OFDM, 1 RB, 50 MHz, 16QAM, 120 kHz)	5G NR FR2 TDD	8.02	± 9.6 %
10890	AAD	5G NR (CP-OFDM, 100% RB, 50 MHz, 16QAM, 120 kHz)	5G NR FR2 TDD	8.40	± 9.6 %
10891	AAD	5G NR (CP-OFDM, 1 RB, 50 MHz, 64QAM, 120 kHz)	5G NR FR2 TDD	8.13	± 9.6 %
10892	AAD	5G NR (CP-OFDM, 100% RB, 50 MHz, 64QAM, 120 kHz)	5G NR FR2 TDD	8.41	± 9.6 %
10897	AAA	5G NR (DFT-s-OFDM, 1 RB, 5 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.66	± 9.6 %
10898	AAA	5G NR (DFT-s-OFDM, 1 RB, 10 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.67	± 9.6 %
10899	AAA	5G NR (DFT-s-OFDM, 1 RB, 15 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.67	± 9.6 %
10900	AAA	5G NR (DFT-s-OFDM, 1 RB, 20 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.68	± 9.6 %
10901	AAA	5G NR (DFT-s-OFDM, 1 RB, 25 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.68	± 9.6 %
10902	AAA	5G NR (DFT-s-OFDM, 1 RB, 30 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.68	± 9.6 %
10903	AAA	5G NR (DFT-s-OFDM, 1 RB, 40 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.68	± 9.6 %
10904	AAA	5G NR (DFT-s-OFDM, 1 RB, 50 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.68	± 9.6 %
10905	AAA	5G NR (DFT-s-OFDM, 1 RB, 60 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.68	± 9.6 %
10906	AAA	5G NR (DFT-s-OFDM, 1 RB, 80 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.68	± 9.6 %
10907	AAA	5G NR (DFT-s-OFDM, 50% RB, 5 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.78	± 9.6 %
10908	AAA	5G NR (DFT-s-OFDM, 50% RB, 10 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.93	± 9.6 %
10909	AAA	5G NR (DFT-s-OFDM, 50% RB, 15 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.96	± 9.6 %
10910	AAA	5G NR (DFT-s-OFDM, 50% RB, 20 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.83	± 9.6 %
10911	AAA	5G NR (DFT-s-OFDM, 50% RB, 25 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.93	± 9.6 %
10912	AAA	5G NR (DFT-s-OFDM, 50% RB, 30 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.84	± 9.6 %
10913	AAA	5G NR (DFT-s-OFDM, 50% RB, 40 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.84	± 9.6 %
10914	AAA	5G NR (DFT-s-OFDM, 50% RB, 50 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.85	± 9.6 %
10915	AAA	5G NR (DFT-s-OFDM, 50% RB, 60 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.83	± 9.6 %
10916	AAA	5G NR (DFT-s-OFDM, 50% RB, 80 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.87	± 9.6 %
10917	AAA	5G NR (DFT-s-OFDM, 50% RB, 100 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.94	± 9.6 %
10918	AAA	5G NR (DFT-s-OFDM, 100% RB, 5 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.86	± 9.6 %
10919	AAA	5G NR (DFT-s-OFDM, 100% RB, 10 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.86	± 9.6 %
10920	AAA	5G NR (DFT-s-OFDM, 100% RB, 15 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.87	± 9.6 %
10921	AAA	5G NR (DFT-s-OFDM, 100% RB, 20 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.84	± 9.6 %
10922	AAA	5G NR (DFT-s-OFDM, 100% RB, 25 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.82	± 9.6 %
10923	AAA	5G NR (DFT-s-OFDM, 100% RB, 30 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.84	± 9.6 %
10924	AAA	5G NR (DFT-s-OFDM, 100% RB, 40 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.84	± 9.6 %
10925	AAA	5G NR (DFT-s-OFDM, 100% RB, 50 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.95	± 9.6 %
10926	AAA	5G NR (DFT-s-OFDM, 100% RB, 60 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.84	± 9.6 %
10927	AAA	5G NR (DFT-s-OFDM, 100% RB, 80 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.94	± 9.6 %
10928	AAA	5G NR (DFT-s-OFDM, 1 RB, 5 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.52	± 9.6 %
10929	AAA	5G NR (DFT-s-OFDM, 1 RB, 10 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.52	± 9.6 %
10930	AAA	5G NR (DFT-s-OFDM, 1 RB, 15 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.52	± 9.6 %
10931	AAA	5G NR (DFT-s-OFDM, 1 RB, 20 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.51	± 9.6 %
10932	AAA	5G NR (DFT-s-OFDM, 1 RB, 25 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.51	± 9.6 %
10933	AAA	5G NR (DFT-s-OFDM, 1 RB, 30 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.51	± 9.6 %
10934	AAA	5G NR (DFT-s-OFDM, 1 RB, 40 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.51	± 9.6 %
10935	AAA	5G NR (DFT-s-OFDM, 1 RB, 50 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.51	± 9.6 %
10936	AAA	5G NR (DFT-s-OFDM, 50% RB, 5 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.90	± 9.6 %
10937	AAA	5G NR (DFT-s-OFDM, 50% RB, 10 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.77	± 9.6 %
10938	AAA	5G NR (DFT-s-OFDM, 50% RB, 15 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.90	± 9.6 %
10939	AAA	5G NR (DFT-s-OFDM, 50% RB, 20 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.82	± 9.6 %
10940	AAA	5G NR (DFT-s-OFDM, 50% RB, 25 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.89	± 9.6 %
10941	AAA	5G NR (DFT-s-OFDM, 50% RB, 30 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.83	± 9.6 %
10942	AAA	5G NR (DFT-s-OFDM, 50% RB, 40 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.85	± 9.6 %
10943	AAA	5G NR (DFT-s-OFDM, 50% RB, 50 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.95	± 9.6 %
10944	AAA	5G NR (DFT-s-OFDM, 100% RB, 5 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.81	± 9.6 %
10945	AAA	5G NR (DFT-s-OFDM, 100% RB, 10 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.85	± 9.6 %
10946	AAA	5G NR (DFT-s-OFDM, 100% RB, 15 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.83	± 9.6 %
10947	AAA	5G NR (DFT-s-OFDM, 100% RB, 20 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.87	± 9.6 %
10948	AAA	5G NR (DFT-s-OFDM, 100% RB, 25 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.94	± 9.6 %
10949	AAA	5G NR (DFT-s-OFDM, 100% RB, 30 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.87	± 9.6 %
10950	AAA	5G NR (DFT-s-OFDM, 100% RB, 40 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.94	± 9.6 %
10951	AAA	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	AAA	5G NR DL (CP-OFDM, TM 3.1, 5 MHz, 64-QAM, 15 kHz)	5G NR FR1 TDD	9.32	± 9.6 %
10961	AAA	5G NR DL (CP-OFDM, TM 3.1, 10 MHz, 64-QAM, 15 kHz)	5G NR FR1 TDD	9.36	± 9.6 %
10962	AAA	5G NR DL (CP-OFDM, TM 3.1, 15 MHz, 64-QAM, 15 kHz)	5G NR FR1 TDD	9.40	± 9.6 %
10963	AAA	5G NR DL (CP-OFDM, TM 3.1, 20 MHz, 64-QAM, 15 kHz)	5G NR FR1 TDD	9.55	± 9.6 %
10964	AAA	5G NR DL (CP-OFDM, TM 3.1, 5 MHz, 64-QAM, 30 kHz)	5G NR FR1 TDD	9.29	± 9.6 %
10965	AAA	5G NR DL (CP-OFDM, TM 3.1, 10 MHz, 64-QAM, 30 kHz)	5G NR FR1 TDD	9.37	± 9.6 %
10966	AAA	5G NR DL (CP-OFDM, TM 3.1, 15 MHz, 64-QAM, 30 kHz)	5G NR FR1 TDD	9.55	± 9.6 %
10967	AAA	5G NR DL (CP-OFDM, TM 3.1, 20 MHz, 64-QAM, 30 kHz)	5G NR FR1 TDD	9.42	± 9.6 %
10968	AAA	5G NR DL (CP-OFDM, TM 3.1, 100 MHz, 64-QAM, 30 kHz)	5G NR FR1 TDD	9.49	± 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.

APPENDIX F – DIPOLE CALIBRATION

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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

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Accreditation No.: SCS 0108

Client **Celltech**

Certificate No: D2450V2-825_Apr18

CALIBRATION CERTIFICATE

Object	D2450V2 - SN:825
Calibration procedure(s)	QA CAL-05.v10 Calibration procedure for dipole validation kits above 700 MHz
Calibration date:	April 24, 2018

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 NRP	SN: 104778	04-Apr-18 (No. 217-02672/02673)	Apr-19
Power sensor NRP-Z91	SN: 103244	04-Apr-18 (No. 217-02672)	Apr-19
Power sensor NRP-Z91	SN: 103245	04-Apr-18 (No. 217-02673)	Apr-19
Reference 20 dB Attenuator	SN: 5058 (20k)	04-Apr-18 (No. 217-02682)	Apr-19
Type-N mismatch combination	SN: 5047.2 / 06327	04-Apr-18 (No. 217-02683)	Apr-19
Reference Probe EX3DV4	SN: 7349	30-Dec-17 (No. EX3-7349_Dec17)	Dec-18
DAE4	SN: 601	26-Oct-17 (No. DAE4-601_Oct17)	Oct-18

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter EPM-442A	SN: GB37480704	07-Oct-15 (in house check Oct-16)	In house check: Oct-18
Power sensor HP 8481A	SN: US37292783	07-Oct-15 (in house check Oct-16)	In house check: Oct-18
Power sensor HP 8481A	SN: MY41092317	07-Oct-15 (in house check Oct-16)	In house check: Oct-18
RF generator R&S SMT-06	SN: 100972	15-Jun-15 (in house check Oct-16)	In house check: Oct-18
Network Analyzer HP 8753E	SN: US37390585	18-Oct-01 (in house check Oct-17)	In house check: Oct-18

	Name	Function	Signature
Calibrated by:	Jeton Kastrati	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: April 25, 2018

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.

Calibration Laboratory of
Schmid & Partner
Engineering AG
Zeughausstrasse 43, 8004 Zurich, Switzerland

S Schweizerischer Kalibrierdienst
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S Swiss Calibration Service

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Accreditation No.: SCS 0108

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) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
b) IEC 62209-1, "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016
c) IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
d) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

e) DASY4/5 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	DASY5	V52.10.0
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	2450 MHz ± 1 MHz	

Head TSL parameters

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	38.3 ± 6 %	1.86 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	13.3 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**52.1 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.16 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**24.3 W/kg ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Body TSL parameters	22.0 °C	52.7	1.95 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	52.5 ± 6 %	2.01 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	12.8 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**50.4 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.97 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**23.7 W/kg ± 16.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	53.5 Ω + 6.8 jΩ
Return Loss	- 22.7 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	48.9 Ω + 8.6 jΩ
Return Loss	- 21.2 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.158 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
Manufactured on	December 11, 2008

DASY5 Validation Report for Head TSL

Date: 24.04.2018

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:825

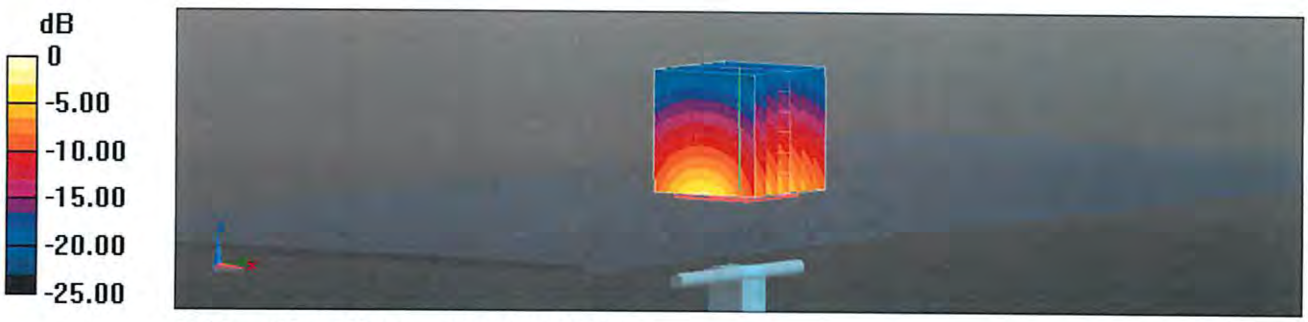
Communication System: UID 0 - CW; Frequency: 2450 MHz
Medium parameters used: f = 2450 MHz; $\sigma = 1.86$ S/m; $\varepsilon_r = 38.3$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(7.88, 7.88, 7.88); Calibrated: 30.12.2017;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 26.10.2017
- Phantom: Flat Phantom 5.0 (front); Type: QD 000 P50 AA; Serial: 1001
- DASY52 52.10.0(1446); SEMCAD X 14.6.10(7417)

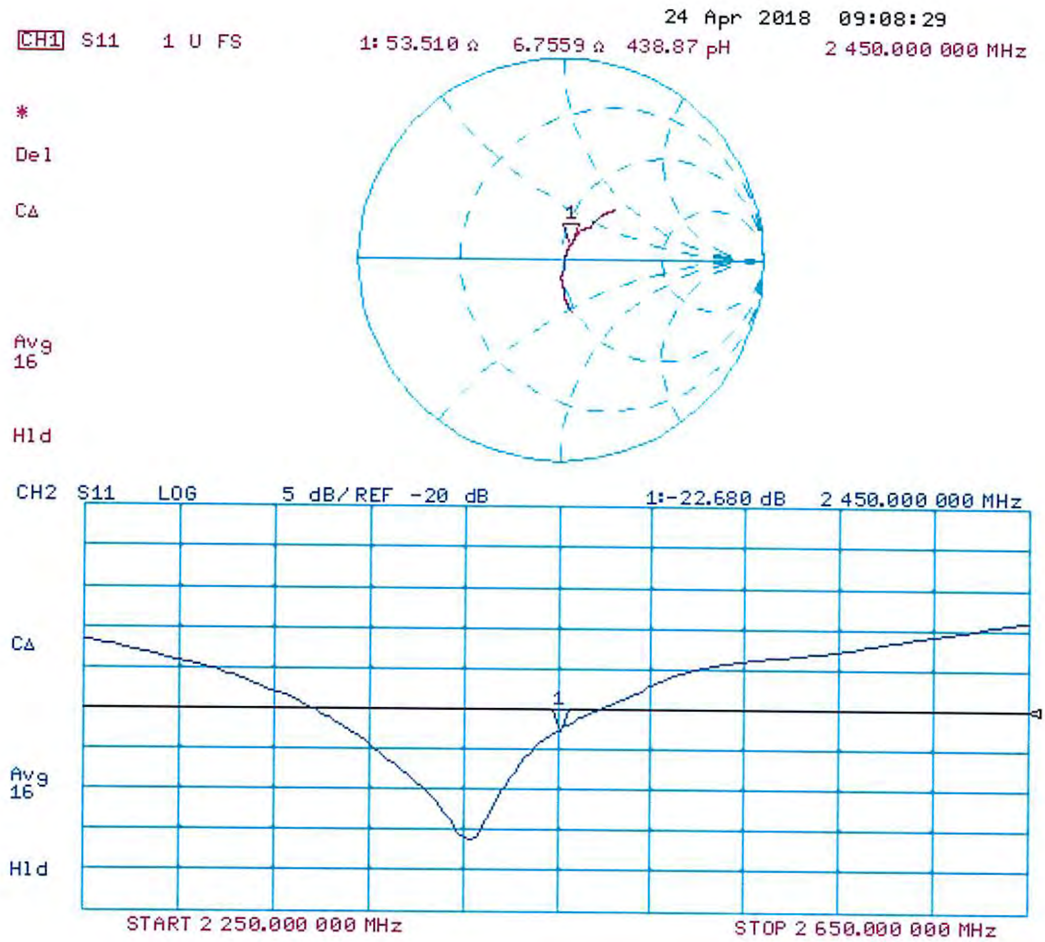
Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 116.5 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 26.6 W/kg
SAR(1 g) = 13.3 W/kg; SAR(10 g) = 6.16 W/kg
Maximum value of SAR (measured) = 22.0 W/kg



0 dB = 22.0 W/kg = 13.42 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 24.04.2018

Test Laboratory: SPEAG, Zurich, Switzerland

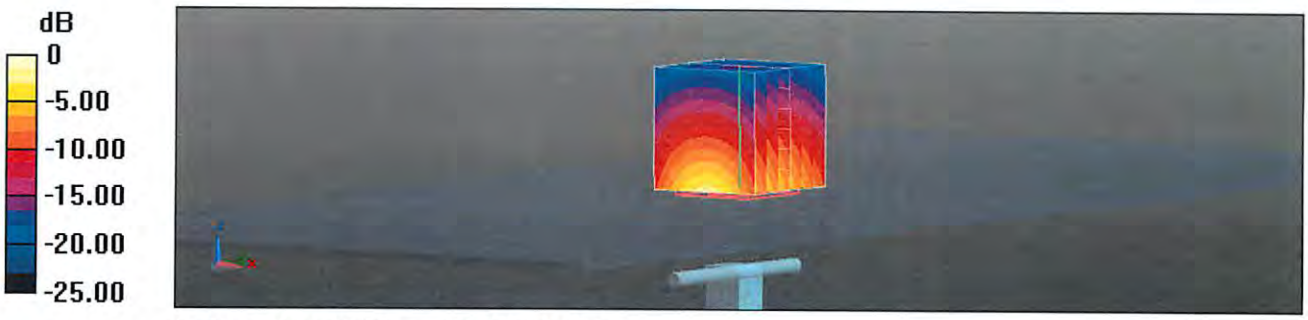
DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:825

Communication System: UID 0 - CW; Frequency: 2450 MHz
Medium parameters used: f = 2450 MHz; σ = 2.01 S/m; ε_r = 52.5; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

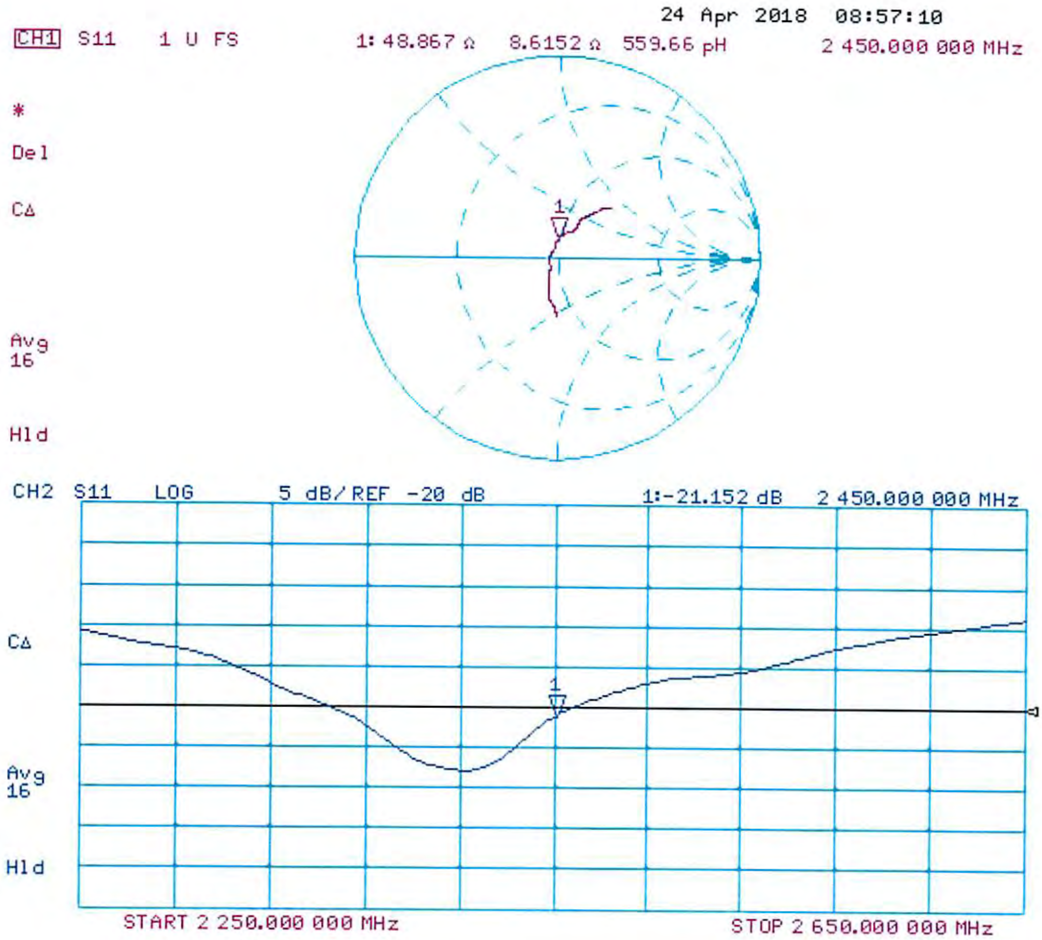
- Probe: EX3DV4 - SN7349; ConvF(8.01, 8.01, 8.01); Calibrated: 30.12.2017;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 26.10.2017
- Phantom: Flat Phantom 5.0 (back); Type: QD 000 P50 AA; Serial: 1002
- DASY52 52.10.0(1446); SEMCAD X 14.6.10(7417)

Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 108.0 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 25.3 W/kg
SAR(1 g) = 12.8 W/kg; SAR(10 g) = 5.97 W/kg
Maximum value of SAR (measured) = 21.0 W/kg



0 dB = 21.0 W/kg = 13.22 dBW/kg

Impedance Measurement Plot for Body TSL

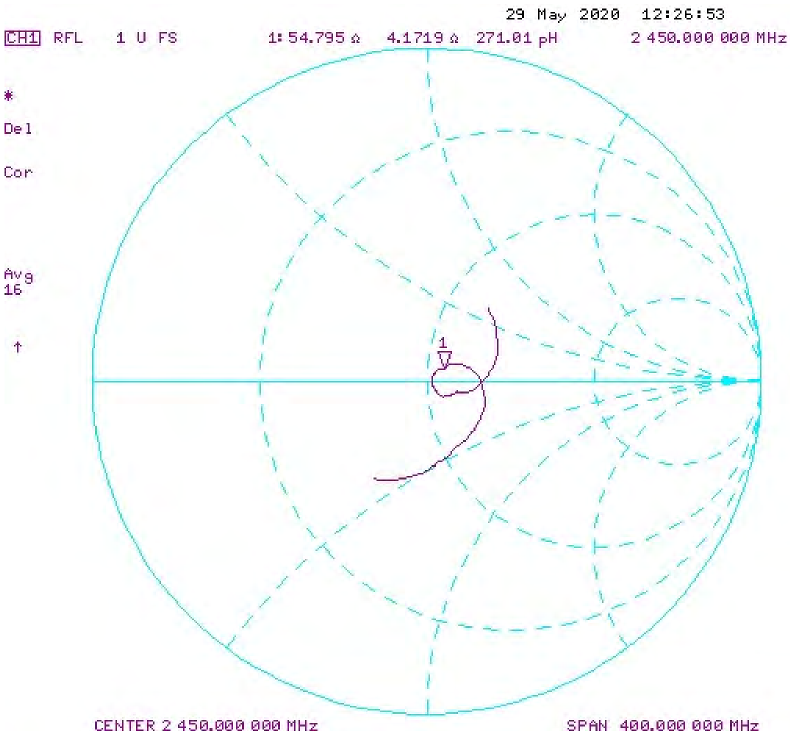


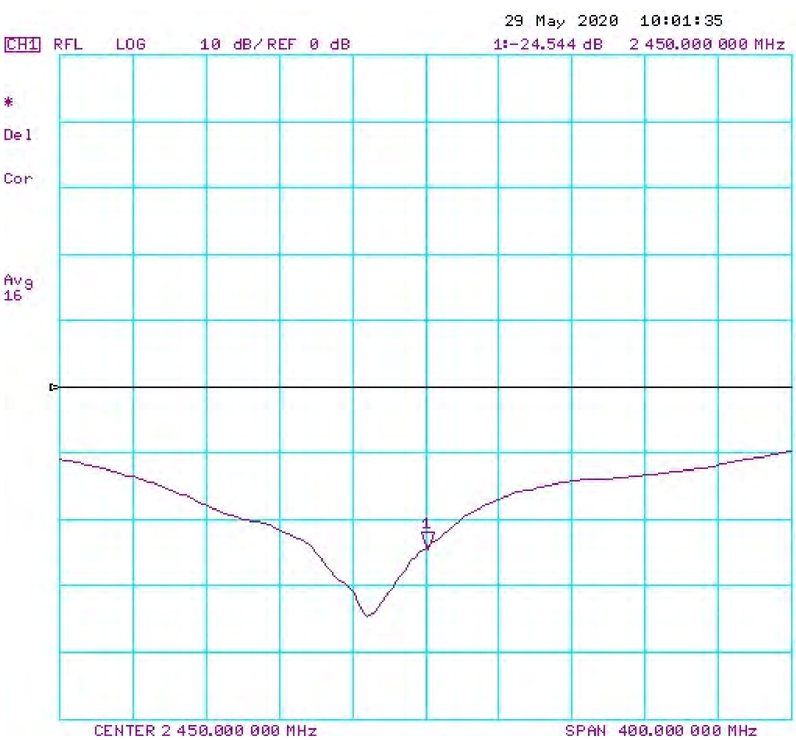
Dipole: D2450V2
Serial Number: 825
Last Calibrated: Apr. 24, 2018

Antenna Parameters with Head TSL						
	Impedance Real (ohms)	Deviation from cal(ohms)	Impedance Imaginary (ohms)	Deviation from cal (Ohms)	Return Loss (dB)	Deviation from Cal (%)
Last extended Cal May 08, 2019	51.76	-	+8.32	-	-21.10	-
Extended Cal May 29, 2020	54.80	+3.04	+4.17	-4.15	-24.5	13.9

Per KDB 865664 D01 3.2.2 §2 C, D

Antenna VSWR with Head TSL]





APPENDIX G - PHANTOM

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Certificate of Conformity / First Article Inspection

Item	Oval Flat Phantom ELI 5.0
Type No	QD OVA 002 A
Series No	1108 and higher
Manufacturer	Untersee Composites Knebelstrasse 8, CH-8268 Mannenbach, Switzerland

Tests
Complete tests were made on the prototype units QD OVA 001 A, pre-series units QD OVA 001 B as well as on some series units QD OVA 001 B. Some tests are made on all series units QD OVA 002 A.

Test	Requirement	Details	Units tested
Shape	Internal dimensions, depth and sagging are compatible with standards	Bottom elliptical 600 x 400 mm, Depth 190 mm, dimension compliant with [1] for f > 375 MHz	Prototypes
Material thickness	Bottom: 2.0mm +/- 0.2mm	dimension compliant with [3] for f > 800 MHz	all
Material parameters	rel. permittivity 2 – 5, loss tangent ≤ 0.05, at f ≤ 6 GHz	rel. permittivity 3.5 +/- 0.5 loss tangent ≤ 0.05	Material samples
Material resistivity	Compatibility with tissue simulating liquids .	Compatible with SPEAG liquids. **	Phantoms, Material sample
Sagging	Sagging of the flat section in tolerance when filled with tissue simulating liquid.	within tolerance for filling height up to 155 mm	Prototypes, samples

** Note: Compatibility restrictions apply certain liquid components mentioned in the standard, containing e.g. DGBE, DGMHE or Triton X-100. Observe technical note on material compatibility.

Standards
[1] OET Bulletin 65, Supplement C, "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields", Edition 01-01
[2] IEEE 1528-2003, "Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques, December 2003
[3] IEC 62209–1 ed1.0, "Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices - Human models, instrumentation, and procedures - Part 1: Procedure to determine the specific absorption rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", 2005-02-18
[4] IEC 62209–2 ed1.0, "Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices - Human models, instrumentation, and procedures - Part 2: Procedure to determine the specific absorption rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", 2010-03-30

Conformity
Based on the sample tests above, we certify that this item is in compliance with the uncertainty requirements of **body-worn** SAR measurements and system performance checks as specified in [1 – 4] and further standards.

Date 25.7.2011

Signature / Stamp

s p e a g
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