Test Report Serial Number:	45461472 R2.0
Test Report Date:	22 November 2018
Project Number:	1426

EMC Test Report - New Filing

Applicant:

BossPac Engineering and Technology Inc

Bay 8, 1450 28 Ave NE
Calgary, Alberta, T2A7W6
Canada

Bay 8, 1450 28 Steet NE
Calgary, AB, T2A 7W6
Canada

FCC ID:	IC Registration Number
ZI8EA45	9648A-EA45
Product Model Number / HVIN	**Product Name / PMN**
EA000045	WASP

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)

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:**	22 -30 November 2018	
Report Prepared By:	Art Voss, P.Eng.		**Report Reviewed By:**	Ben Hewson	
Report Revision	**Description of Revision**		**Revised Section**	**Revised By**	**Revision Date**
1.0	Initial Release		n/a	Art Voss	4 January 2019
2.0	Revised Scope to Change Limited Split to Limited Single Modular Approval		3.0	Art Voss	17 January 2019

2.0 - CLIENT AND DUT INFORMATION

Client Information	
Applicant Name	**BossPac Engineering and Technology Inc**
Applicant Address (FCC)	Bay 8, 1450 28 Ave NE
	Calgary, Alberta, T2A7W6
	Canada
Applicant Address (ISED)	Bay 8, 1450 28 Street NE
	Calgary, AB, T2A 7W6
	Canada
DUT Information	
Device Identifier(s):	**FCC ID:** **ZI8EA45**
	ISED ID: **9648A-EA45**
Device Type:	Digital Transceiver Module
Type of Equipment:	Digital QPSK Transceiver Module, 802.15.4
Device Model(s) / HVIN:	**EA000045**
Device Marketing Name / PMN:	WASP
Firmware Version ID Number / FVIN:	-
Host 1 Marketing Name / HMN:	WASP2
Host 1 Model Number / HVIN:	EA000230
Host 2 Marketing Name / HMN:	NEST2
Host 2 Model Number / HVIN:	EA000144
Host 3 Marketing Name / HMN:	WASP2-P
Host 3 Model Number / HVIN:	EA000240
Test Sample Serial No.:	T/A Sample - Identical Prototype
Transmit Frequency Range:	2405 - 2480 MHz
Test Channels:	16 Channel Programmable
Manuf. Max. Rated Output Power:	17.6 dBm, 0.058W
Manuf. Max. Rated BW/Data Rate:	2Mbps
Antenna Make and Model:	Johanson Technology, 2450AT42B100E
Antenna Type and Gain:	Chip, 0dBi
Antenna Make and Model:	Nearson Inc., SG102N
Antenna Type and Gain:	Omni Directional, 6dBi
Antenna Make and Model:	Nearson Inc., SG1013NF-2450
Antenna Type and Gain:	Omni Directional, 3dBi
Antenna Make and Model:	PulseLarson Antennas, R02 408NF
Antenna Type and Gain:	Omni Directional, 8dBi
Antenna Make and Model:	MRO Electronics, M2425
Antenna Type and Gain:	Omni Directional, 3dBi
Modulation:	O-QPSK
Emission Designator:	2M28G1D
DUT Power Source:	5VDC, Provided by Host
DUT Dimensions [HxWxL] (mm)	H x W x L: 3mm x 18mm x 27mm
Deviation(s) from standard/procedure:	None
Modification of DUT:	None

3.0 - SCOPE

This Certification Report was prepared on behalf of:

BossPac Engineering and Technology 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 CFR 47 Part §2.1091 and §2.1093 and Health Canada Safety Code 6, an RF Exposure evaluation report is required for this *Equipment* and the results of the RF Exposure evaluation appear in a separate exhibit from this report.

This *Equipment* is subject to FCC Declaration of Conformity (DoC). DoC evaluations were performed on this *Equipment* and the results of the DoC evaluation appear in a separate exhibit from this report.

Application:

This application is for a new certification of a modular transmitter, as per FCC 47 CFR §15.212(a)(1) and ISED RSP-100 (5.3.2), as a **Limited Single Modular Approval**. The associated modular transmitter checklists accompany this report as a separate exhibit. The transmitter module does not have a regulated power source and must receive regulated power from the host device. In addition, the module does not have buffered inputs, shielding and cannot be tested in a standalone configuration.

The module, Model/HVIN: EA000045, was evaluated in two different host configurations and the hosts are identified as Host 1 and Host 2 throughout this report. A third host, Host 3, is identical Host 1 in all aspects with the exception of the type of sensor input.

Host 1, Model/HVIN: EA000123, "WASP2", is a temperature/vibration sensor end device.

Host 2, Model/HVIN: EA000144, "NEST2", is a network controller device.

Host 3, Model/HVIN: EA000240, "WASP2-P", is a pressure sensor end device and is identical to Host 1.

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	Duty Cycle and Transmission Duration	ANSI C63.10-2013 KDB 558074 D01v05	n/a	n/a	23 Nov 2018	n/a
8.0	Occupied Bandwidth	ANSI C63.10-2013 KDB 558074 D01v05	§2.1049 n/a	RSS-Gen RSS-247 (5.2)(a)	23 Nov 2018	Pass
9.0	6dB Bandwidth	ANSI C63.10-2013 KDB 558074 D01v05	n/a §15.247(a)(2)	RSS-Gen RSS-247 (5.2)(a)	23 Nov 2018	Pass
10.0	Conducted Power (Fundamental)	ANSI C63.10-2013 KDB 558074 D01v05	§2.1046 §15.247(b)(3)	RSS-Gen RSS-247 (5.4)(d)	23 Nov 2018	Pass
11.0	Power Spectral Density	ANSI C63.10-2013 KDB 558074 D01v05	§15.247(e)	RSS-247 (5.2)(b)	23 Nov 2018	Pass
12.0	Conducted TX Spurious Emissions	ANSI C63.10-2013 KDB 558074 D01v05	§2.1051 §15.247(d)	RSS-Gen RSS-247 (5.5)	23 Nov 2018	Pass
13.0	Conducted TX Spurious Emissions Band Edge	ANSI C63.10-2013 KDB 558074 D01v05	§2.1051 §15.247(d)	RSS-Gen RSS-247 (5.5)	23 Nov 2018	Pass
14.0	Conducted TX Spurious Emissions Restricted Bands	ANSI C63.10-2013 KDB 558074 D01v05	§15.205, 15.209 §15.247(d)	n/a	28 Nov 2018	Pass
15.0	Radiated RX Spurious Emissions	ANSI C63.4-2014 KDB 558074 D01v05	§15.109 §15.247(d)	ICES-003(6.2)	28 Nov 2018	Pass

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.

8 November 2018
Date

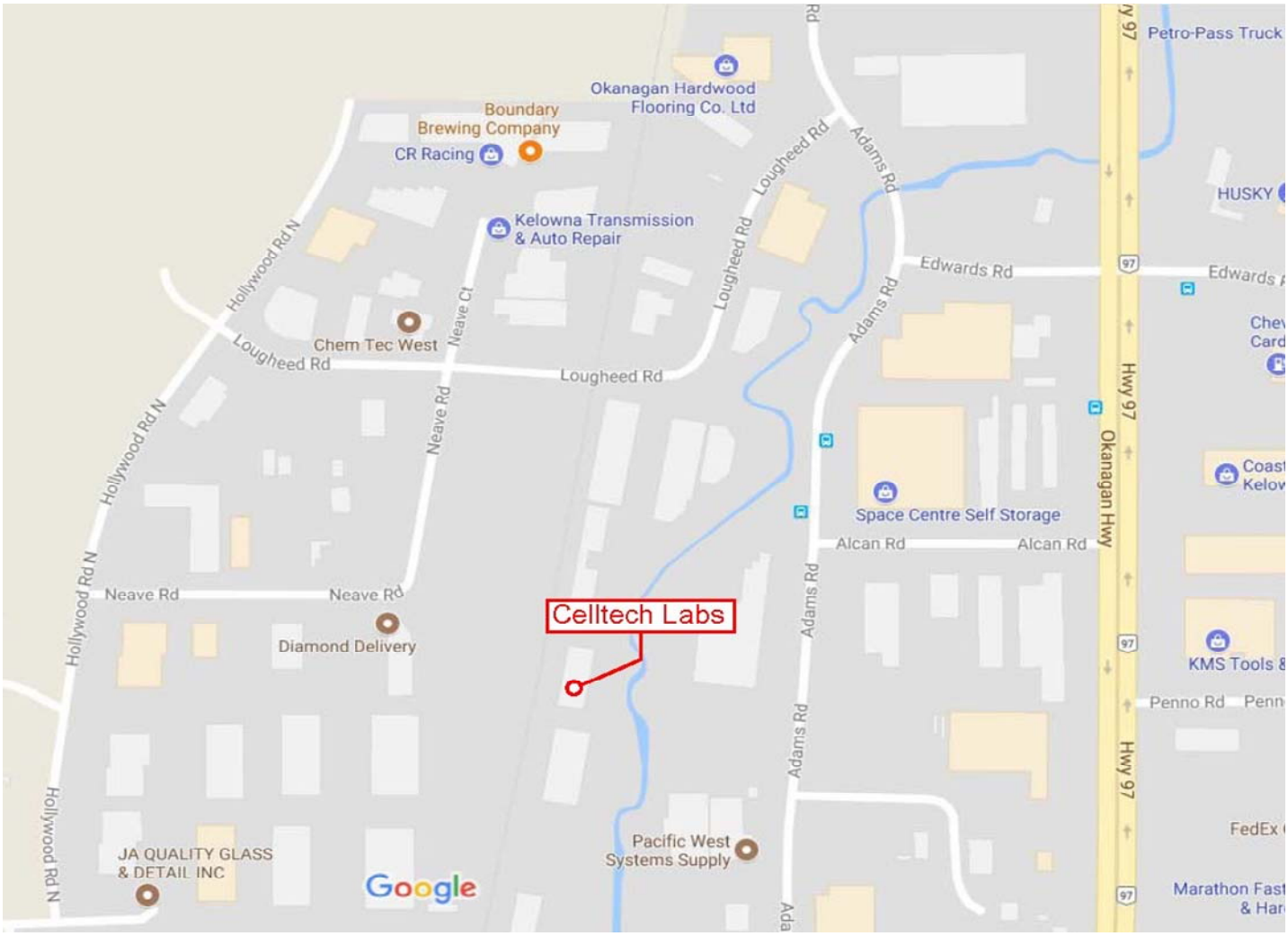
5.0 - NORMATIVE REFERENCES

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
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-247 Issue 2:	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
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

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 - DUTY CYCLE EVALUATION

Test Procedure	
Normative Reference	KDB 558074 (6.0), ANSI C63.10 (11.6)

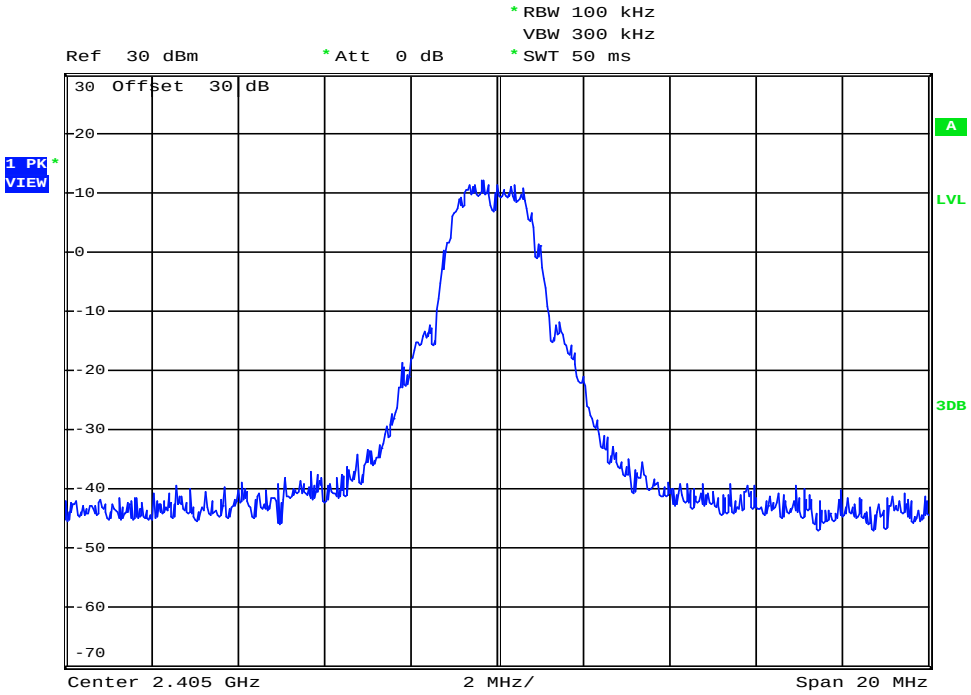
General Procedure	
KDB 558074 (6.0) C63.10 (11.6)	**6.0 Duty cycle, transmission duration and maximum power control level** b) The zero-span mode on a spectrum analyzer or EMI receiver if the response time and spacing between bins on the sweep are sufficient to permit accurate measurements of the on- and off-times of the transmitted signal. 1) Set the center frequency of the instrument to the center frequency of the transmission. 2) Set RBW ≥ OBW if possible; otherwise, set RBW to the largest available value. 3) Set detector = peak or average. 4) The zero-span measurement method shall not be used unless both RBW and VBW are > 50/T and the number of sweep points across duration T exceeds 100.

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. Since the device transmits at 100% duty cycle, the SA was configured as a Peak Detector, 100kHz RBW and a Span of 20MHz. 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.

Plot 7.1 – Transmit Duty Cycle - 2405 MHz - Host 1

Transmit Duty Cycle

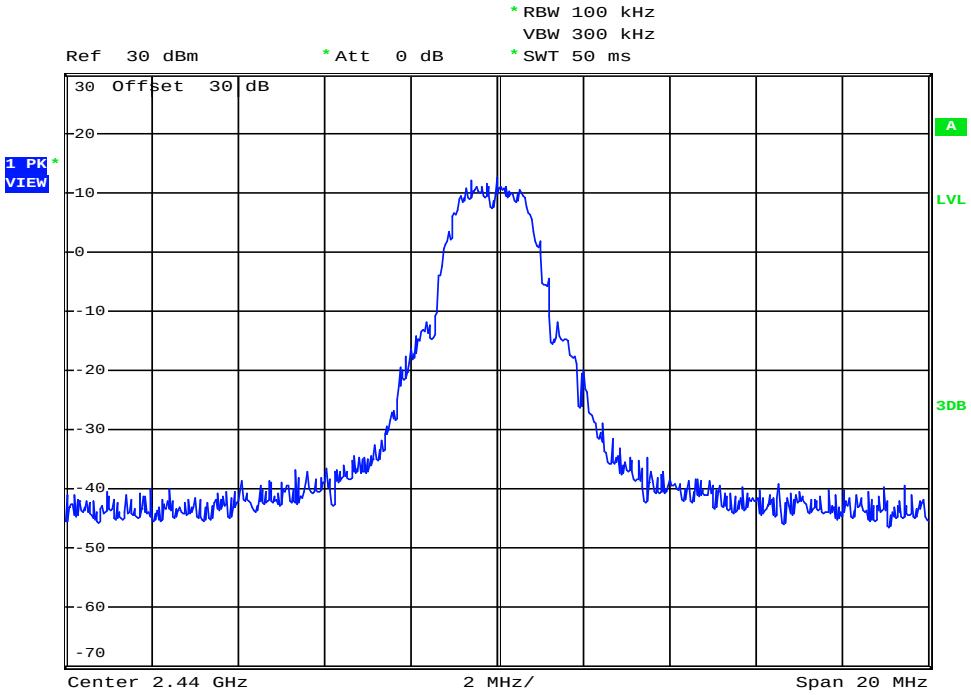


Date: 23.NOV.2018 09:55:21

Channel Frequency:	Channel Bandwidth:	Transmit Duty Cycle:
2405.00 MHz	**Max** kHz	**100** %
Modulation Setting:	**Channel Power Setting:**	**Nominal Input Voltage:**
O-QPSK	**Max** dBm	**5.0** VDC
		Measured Duty Cycle:
		100 %

Plot 7.2 – Transmit Duty Cycle - 2440 MHz - Host 1

Transmit Duty Cycle

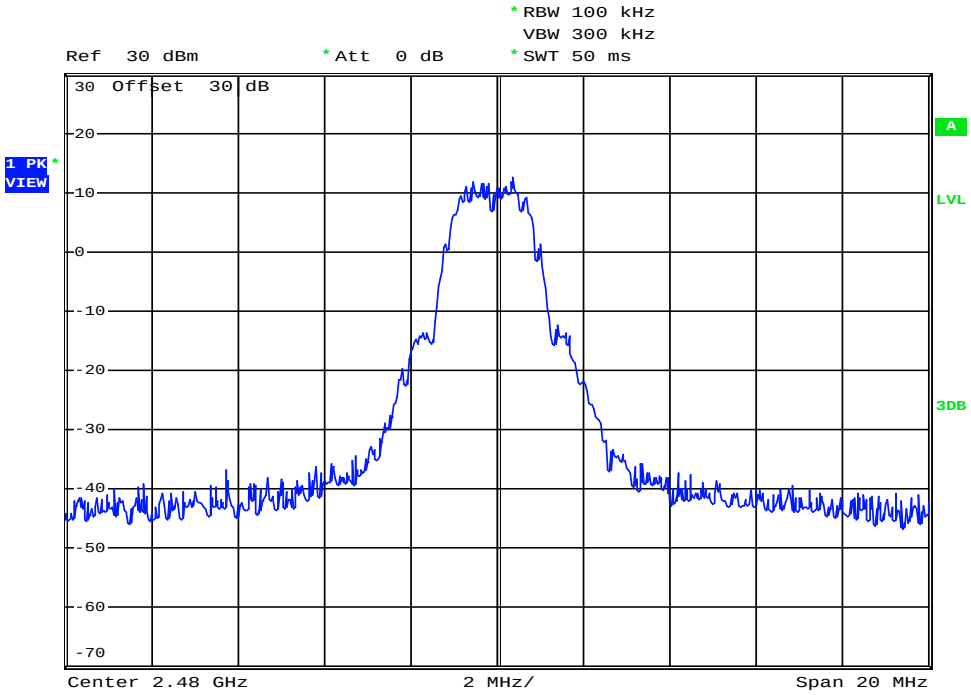


Date: 23.NOV.2018 09:56:06

Channel Frequency: **2440.00** MHz	Channel Bandwidth: **Max** kHz	Transmit Duty Cycle: **100** %
Modulation Setting: **O-QPSK**	Channel Power Setting: **Max** dBm	Nominal Input Voltage: **5.0** VDC
		Measured Duty Cycle: **100** %

Plot 7.3 – Transmit Duty Cycle - 2480 MHz - Host 1

Transmit Duty Cycle



Date: 23.NOV.2018 09:57:01

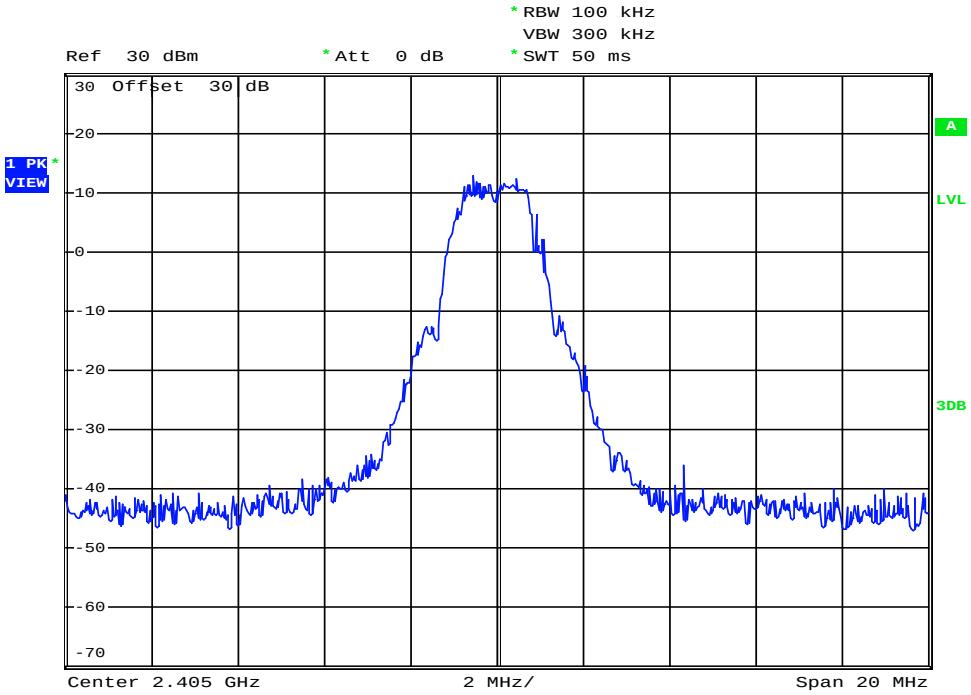
Channel Frequency:	Channel Bandwidth:	Transmit Duty Cycle:
2480.00 MHz	**Max** kHz	**100** %
Modulation Setting:	**Channel Power Setting:**	**Nominal Input Voltage:**
O-QPSK	**Max** dBm	**5.0** VDC
		Measured Duty Cycle:
		100 %

Table 7.1 – Summary of Duty Cycle Evaluation - Host 1

Transmit Duty Cycle Results				
Frequency (MHz)	Bandwidth Setting (kHz)	Modulation	Supply Voltage (VDC)	Measured Duty Cycle Cycle (%)
2405.00	Max	O-QPSK	5.0	100
2440.00				100
2480.00				100

Plot 7.4 – Transmit Duty Cycle - 2405 MHz - Host 2

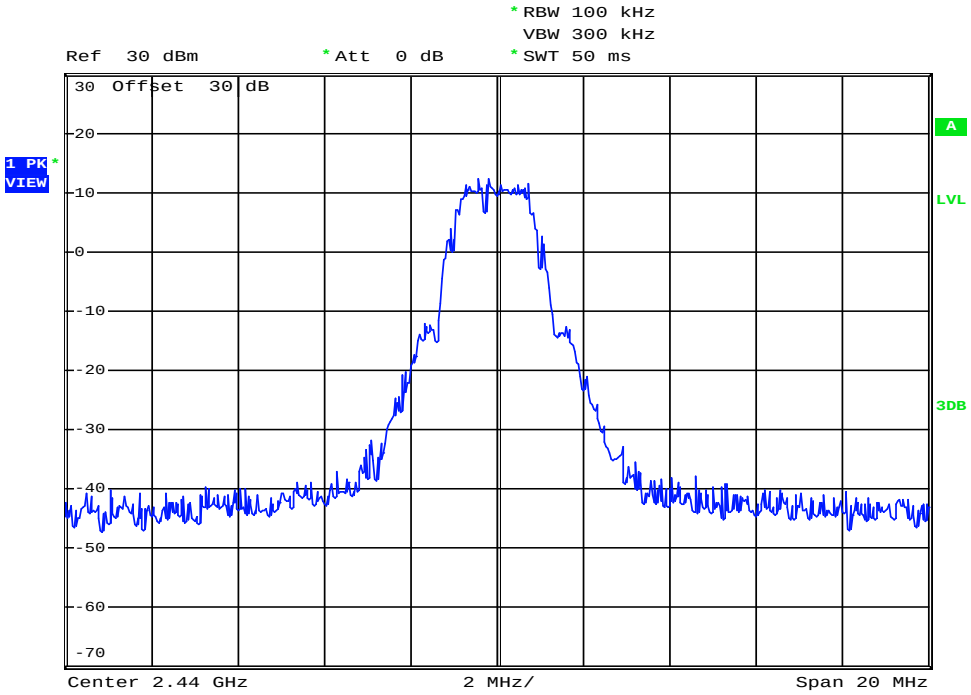
Transmit Duty Cycle



Channel Frequency: **2405.00** MHz	Channel Bandwidth: **Max** kHz	Transmit Duty Cycle: **100** %
Modulation Setting: **O-QPSK**	Channel Power Setting: **Max** dBm	Nominal Input Voltage: **5.0** VDC
		Measured Duty Cycle: **100** %

Plot 7.5 – Transmit Duty Cycle - 2440 MHz - Host 2

Transmit Duty Cycle

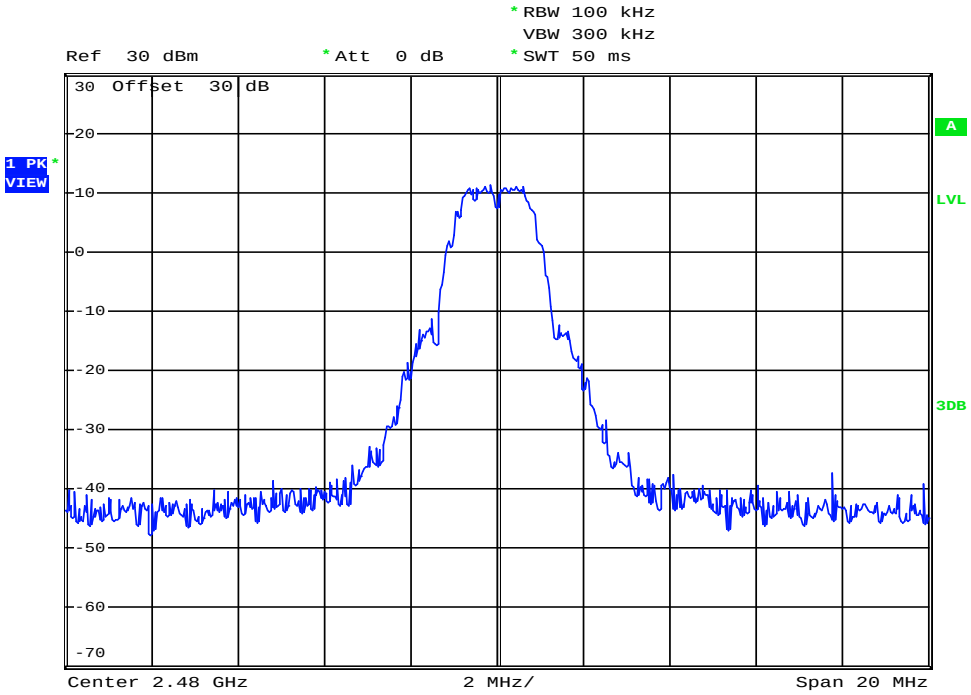


Date: 23.NOV.2018 09:49:41

Channel Frequency:	Channel Bandwidth:	Transmit Duty Cycle:
2440.00 MHz	**Max** kHz	**100** %
Modulation Setting:	**Channel Power Setting:**	**Nominal Input Voltage:**
O-QPSK	**Max** dBm	**5.0** VDC
		Measured Duty Cycle:
		100 %

Plot 7.6 – Transmit Duty Cycle - 2480 MHz - Host 2

Transmit Duty Cycle



Channel Frequency: **2480.00** MHz	Channel Bandwidth: **Max** kHz	Transmit Duty Cycle: **100** %
Modulation Setting: **O-QPSK**	Channel Power Setting: **Max** dBm	Nominal Input Voltage: **5.0** VDC
		Measured Duty Cycle: **100** %

Table 7.2 – Summary of Duty Cycle Evaluation - Host 2

Transmit Duty Cycle Results				
Frequency (MHz)	Bandwidth Setting (kHz)	Modulation	Supply Voltage (VDC)	Measured Duty Cycle Cycle (%)
2405.00	Max	O-QPSK	5.0	100
2440.00				100
2480.00				100

8.0 - 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)

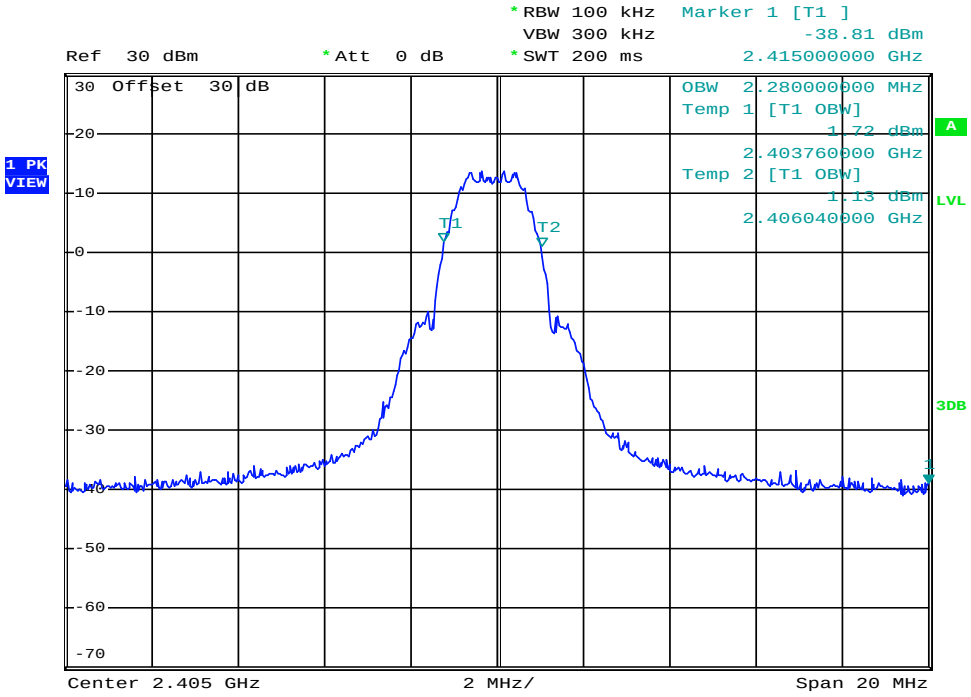
General Procedure	
KDB 558074 (8.3.2.1)	**8.3.2.1 General** Section 15.247 permits the maximum conducted (average) output power to be measured as an alternative to the maximum peak conducted output power for demonstrating compliance to the limit. When this option is exercised, the measured power is to 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).

Plot 8.1 – Occupied Bandwidth - 2405MHz - Host 1

Occupied Bandwidth

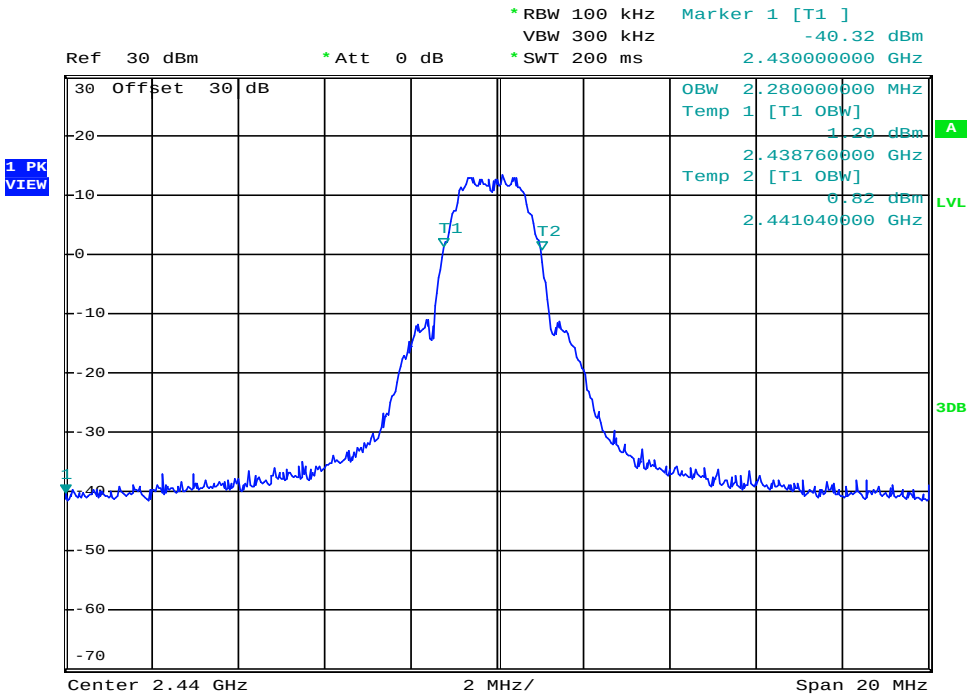


Date: 23.NOV.2018 10:22:48

Channel Frequency:	Channel Bandwidth Setting:	Transmit Duty Cycle:
2405.00 MHz	**Max** kHz	**100** %
Modulation Setting:	**Channel Power Setting:**	**Measured OBW:**
O-QPSK	**Max** dBm	**2.28** MHz

Plot 8.2 – Occupied Bandwidth - 2440MHz - Host 1

Occupied Bandwidth

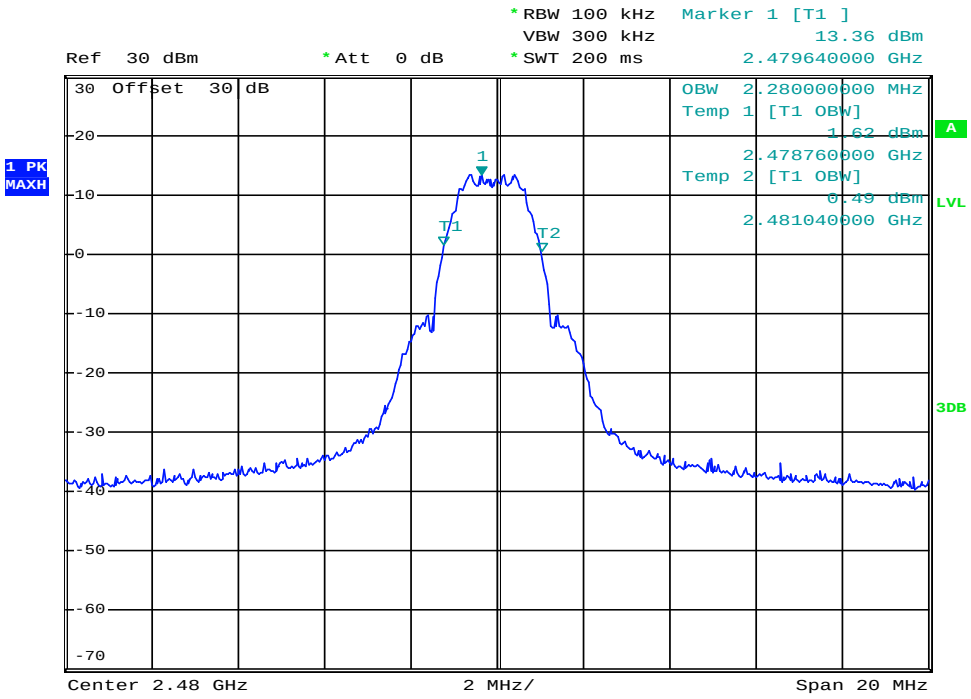


Date: 23.NOV.2018 10:23:51

Channel Frequency:	Channel Bandwidth Setting:	Transmit Duty Cycle:
2440.00 MHz	**Max** kHz	**100** %
Modulation Setting:	**Channel Power Setting:**	**Measured OBW:**
O-QPSK	**Max** dBm	**2.28** MHz

Plot 8.3 – Occupied Bandwidth - 2480MHz - Host 1

Occupied Bandwidth



Date: 23.NOV.2018 10:00:06

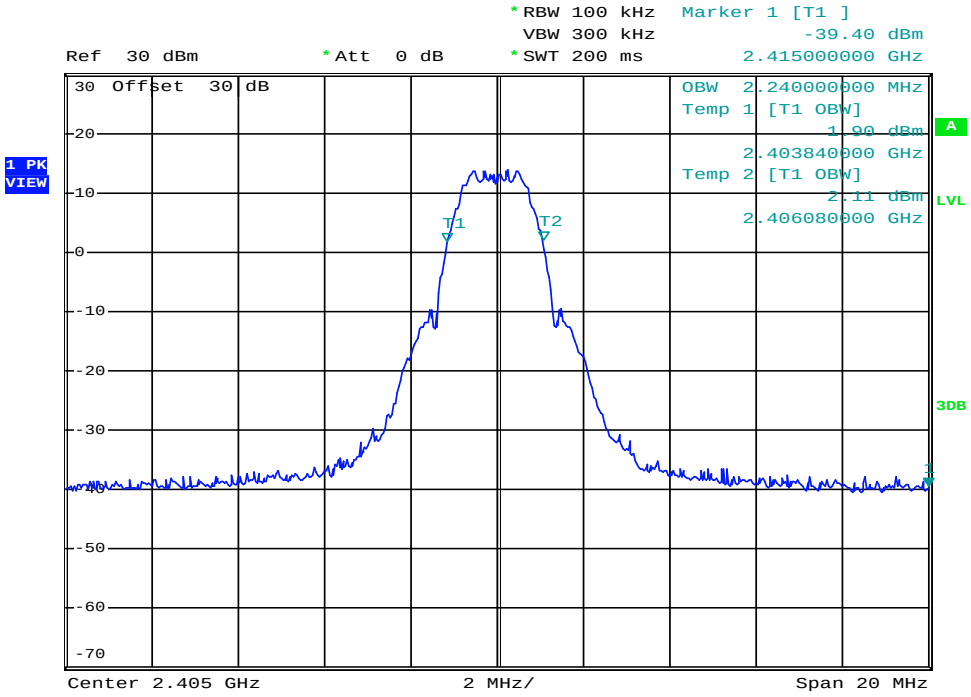
Channel Frequency:	Channel Bandwidth Setting:	Transmit Duty Cycle:
2480.00 MHz	**Max** kHz	**100** %
Modulation Setting:	**Channel Power Setting:**	**Measured OBW:**
O-QPSK	**Max** dBm	**2.28** MHz

Table 8.1 – Summary of Occupied Bandwidth Measurements - Host 1

Occupied Bandwidth Measurements				
Frequency (MHz)	**Bandwidth Setting (MHz)**	**Modulation**	**Measured OBW (MHz)**	**Emission Designator**
2405.00	Max	O-QPSK	2.28	2M28G1D
2440.00			2.28	2M28G1D
2480.00			2.28	2M28G1D

Plot 8.4 – Occupied Bandwidth - 2405MHz - Host 2

Occupied Bandwidth

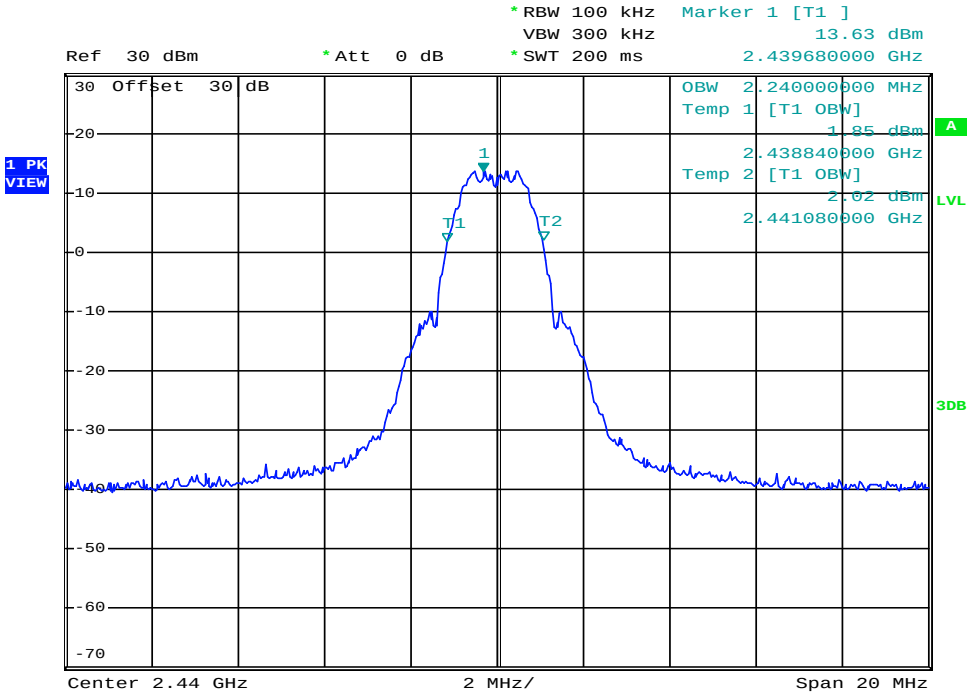


Date: 19.NOV.2018 15:57:26

Channel Frequency:	Channel Bandwidth Setting:	Transmit Duty Cycle:
2405.00 MHz	**Max** kHz	**100** %
Modulation Setting:	**Channel Power Setting:**	**Measured OBW:**
O-QPSK	**Max** dBm	**2.24** MHz

Plot 8.5 – Occupied Bandwidth - 2440MHz - Host 2

Occupied Bandwidth

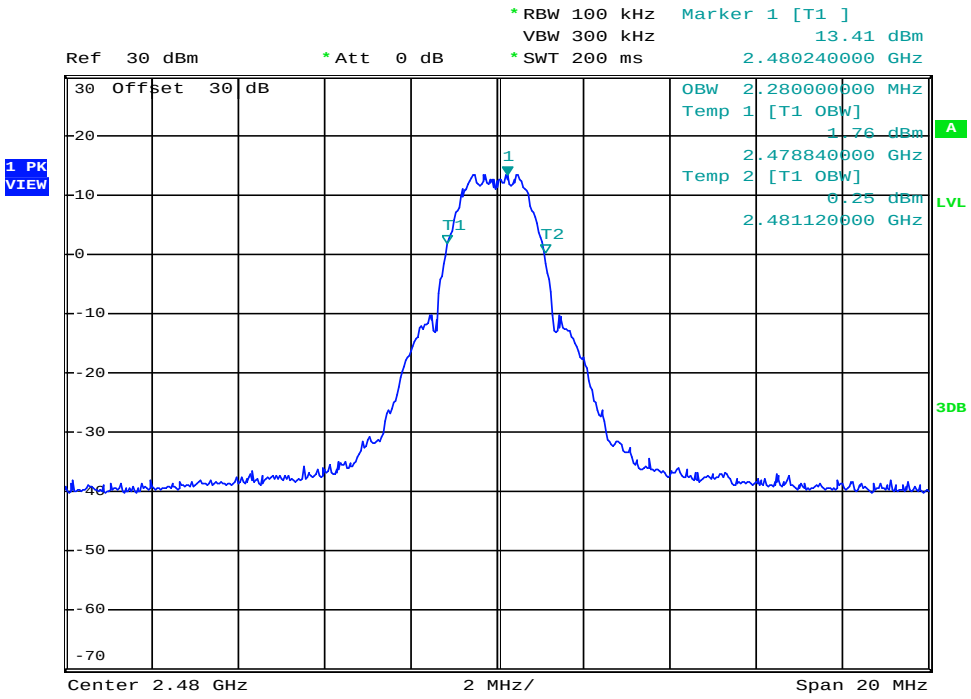


Date: 19.NOV.2018 15:56:05

Channel Frequency:	Channel Bandwidth Setting:	Transmit Duty Cycle:
2440.00 MHz	**Max** kHz	**100** %
Modulation Setting:	Channel Power Setting:	Measured OBW:
O-QPSK	**Max** dBm	**2.24** MHz

Plot 8.6 – Occupied Bandwidth - 2480MHz - Host 2

Occupied Bandwidth



Date: 19.NOV.2018 15:58:59

Channel Frequency:	Channel Bandwidth Setting:	Transmit Duty Cycle:
2480.00 MHz	**Max** kHz	**100** %
Modulation Setting:	**Channel Power Setting:**	**Measured OBW:**
O-QPSK	**Max** dBm	**2.28** MHz

Table 8.2 – Summary of Occupied Bandwidth Measurements - Host 2

Occupied Bandwidth Measurements				
Frequency (MHz)	**Bandwidth Setting (MHz)**	**Modulation**	**Measured OBW (MHz)**	**Emission Designator**
2405.00	Max	O-QPSK	2.24	2M24G1D
2440.00			2.24	2M24G1D
2480.00			2.28	2M28G1D

9.0 - 6DB 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.

General Procedure	
KDB 558074 (8.2) C63.10 (11.8.2)	**11.8.2 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.

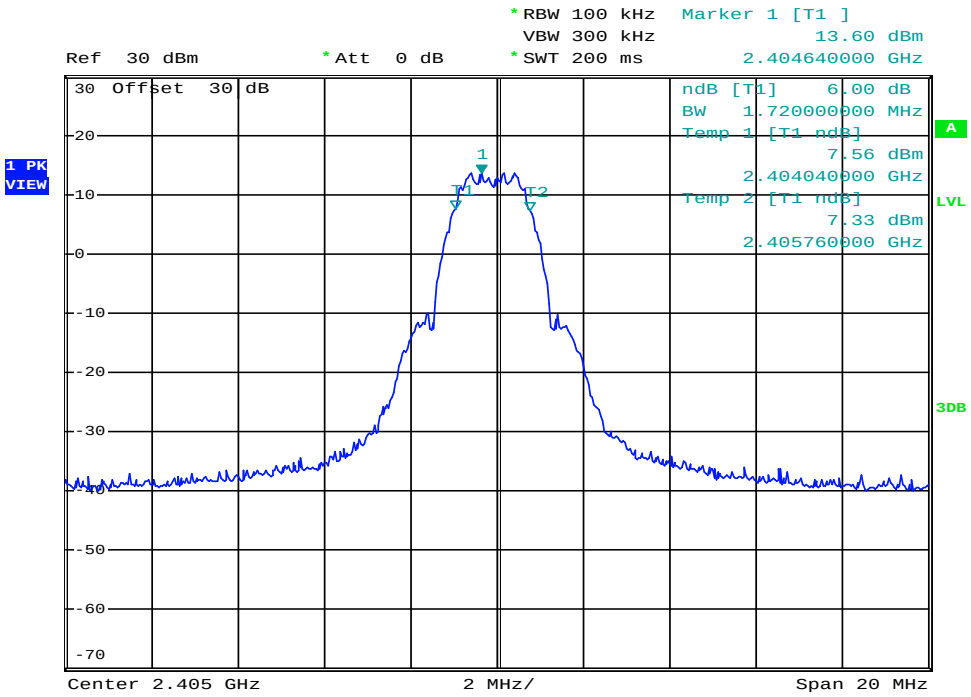
Test Setup	Appendix A - Figure A.1

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 its maximum Duty Cycle.

Plot 9.1 – 6dB DTS Bandwidth - 2405MHz - Host 1

6dB *DTS* Bandwidth

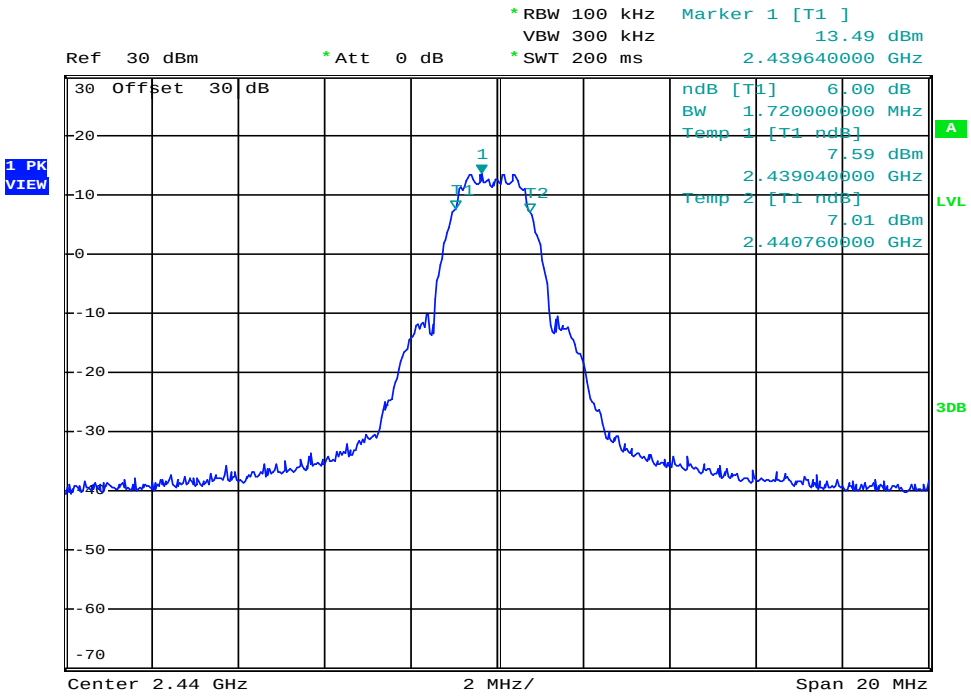


Date: 23.NOV.2018 10:26:14

Channel Frequency:	Channel Bandwidth:	Transmit Duty Cycle:
2405.00 MHz	**Max** kHz	**100** %
Modulation Setting:	**Channel Power Setting:**	**Nominal Input Voltage:**
O-QPSK	**Max** dBm	**5.0** VDC
		Measured DTS Bandwidth:
		1.72 MHz

Plot 9.2 – 6dB DTS Bandwidth - 2440MHz - Host 1

6dB *DTS* Bandwidth

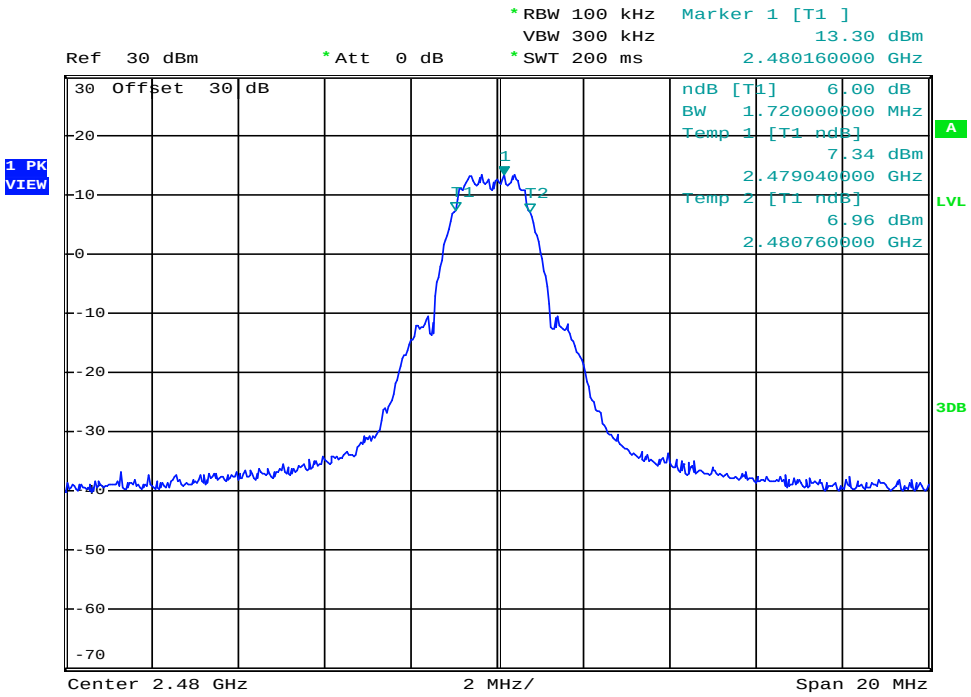


Date: 23.NOV.2018 10:27:56

Channel Frequency:	Channel Bandwidth:	Transmit Duty Cycle:
2440.00 MHz	**Max** kHz	**100** %
Modulation Setting:	**Channel Power Setting:**	**Nominal Input Voltage:**
O-QPSK	**Max** dBm	**5.0** VDC
		Measured DTS Bandwidth:
		1.72 MHz

Plot 9.3 – 6dB DTS Bandwidth - 2480MHz - Host 1

6dB *DTS* Bandwidth



Date: 23.NOV.2018 10:28:49

Channel Frequency:	Channel Bandwidth:	Transmit Duty Cycle:
2480.00 MHz	**Max** kHz	**100** %
Modulation Setting:	**Channel Power Setting:**	**Nominal Input Voltage:**
O-QPSK	**Max** dBm	**5.0** VDC
		Measured DTS Bandwidth:
		1.72 MHz

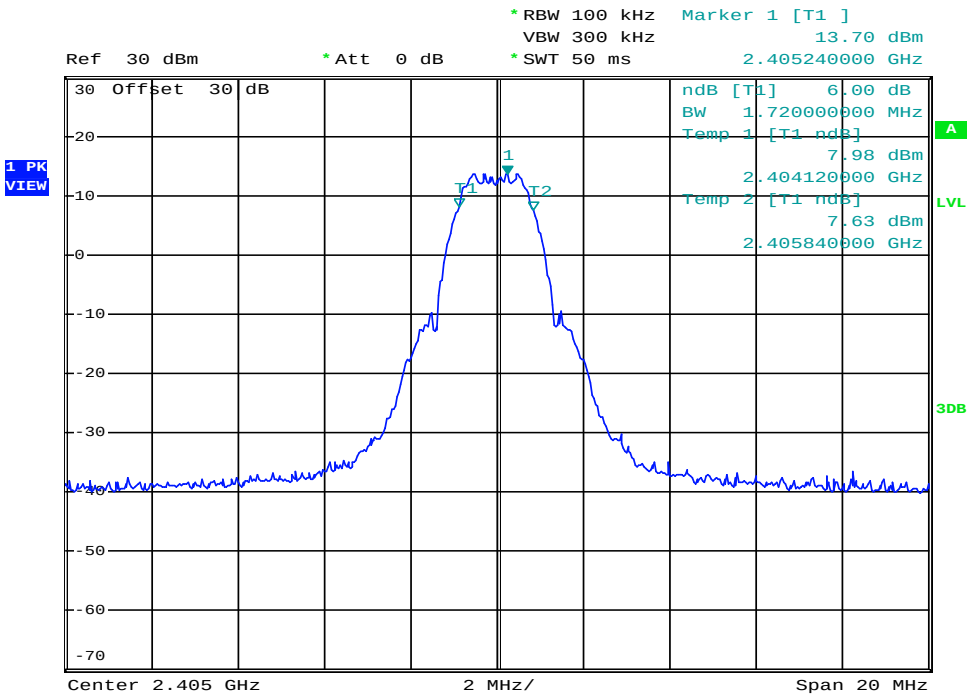
Table 9.1 – Summary of 6dB DTS Bandwidth Measurements - Host 1

6dB *DTS* Bandwidth Measurement Results						
Frequency (MHz)	Bandwidth Setting (kHz)	Modulation	Supply Voltage (VDC)	Measured 6dB BW [BW] (MHz)	Minimum 6dB BW [MBW] (kHz)	Margin (kHz)
2405.00	Max	O-QPSK	5.0	1.72	500	**1220.00**
2440.00				1.72		**1220.00**
2480.00				1.72		**1220.00**
					Result:	**Complies**

Margin = BW - MBW

Plot 9.4 – 6dB DTS Bandwidth - 2405MHz - Host 2

6dB *DTS* Bandwidth

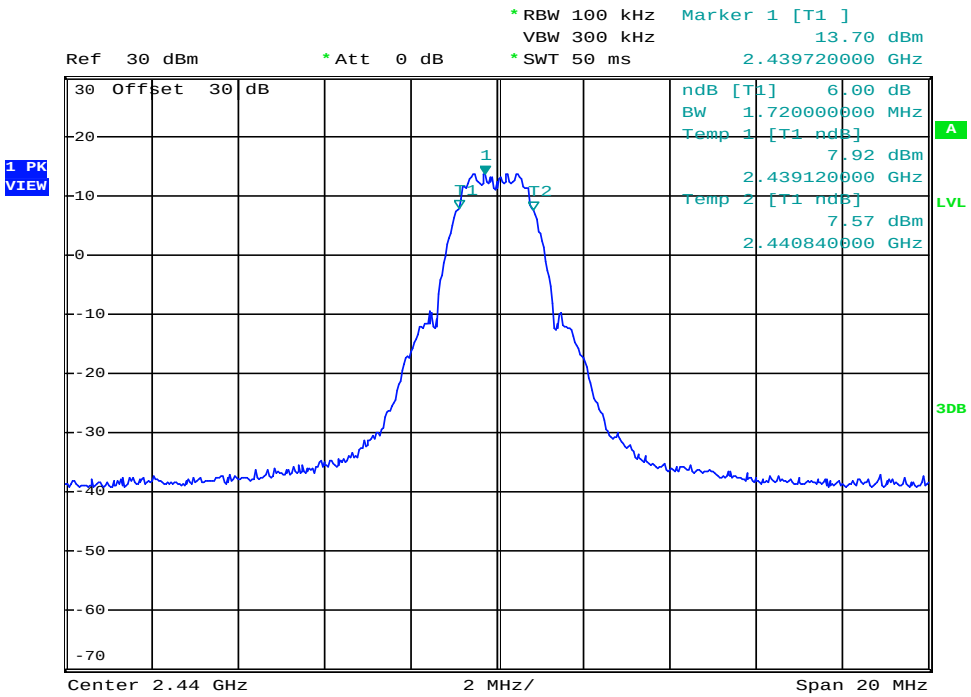


Date: 19.NOV.2018 15:28:38

Channel Frequency:	Channel Bandwidth:	Transmit Duty Cycle:
2405.00 MHz	**Max** kHz	**100** %
Modulation Setting:	**Channel Power Setting:**	**Nominal Input Voltage:**
O-QPSK	**Max** dBm	**5.0** VDC
		Measured DTS Bandwidth:
		1.72 MHz

Plot 9.5 – 6dB DTS Bandwidth - 2440MHz - Host 2

6dB *DTS* Bandwidth

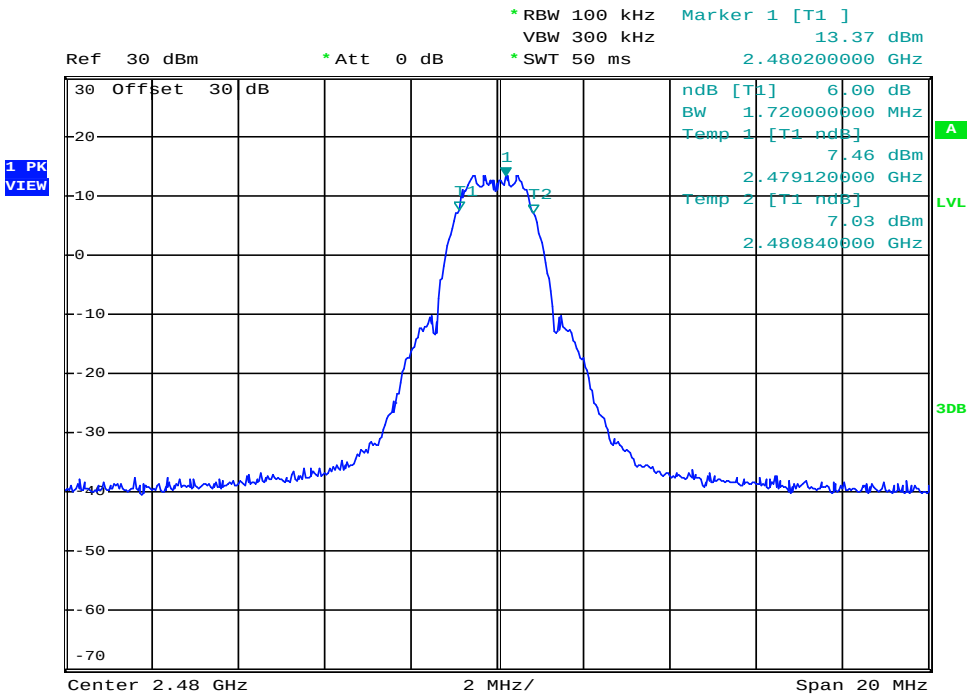


Date: 19.NOV.2018 15:37:07

Channel Frequency: **2440.00** MHz	Channel Bandwidth: **Max** kHz	Transmit Duty Cycle: **100** %
Modulation Setting: **O-QPSK**	Channel Power Setting: **Max** dBm	Nominal Input Voltage: **5.0** VDC
		Measured DTS Bandwidth: **1.72** MHz

Plot 9.6 – 6dB DTS Bandwidth - 2480MHz - Host 2

6dB *DTS* Bandwidth



Date: 19.NOV.2018 15:38:35

Channel Frequency:	Channel Bandwidth:	Transmit Duty Cycle:
2480.00 MHz	**Max** kHz	**100** %
Modulation Setting:	**Channel Power Setting:**	**Nominal Input Voltage:**
O-QPSK	**Max** dBm	**5.0** VDC
		Measured DTS Bandwidth:
		1.72 MHz

Table 9.2 – Summary of 6dB DTS Bandwidth Measurements - Host 2

6dB *DTS* Bandwidth Measurement Results						
Frequency (MHz)	Bandwidth Setting (kHz)	Modulation	Supply Voltage (VDC)	Measured 6dB BW [BW] (MHz)	Minimum 6dB BW [MBW] (kHz)	Margin (kHz)
2405.00	Max	O-QPSK	5.0	1.72	500	**1220.00**
2440.00				1.72		**1220.00**
2480.00				1.72		**1220.00**
					Result:	**Complies**

Margin = BW - MBW

10.0 - CONDUCTED FUNDAMENTAL POWER

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.

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 (11.9.2.2.2)	**Method AVGSA-1** (trace averaging with the EUT transmitting at full power throughout each a) Set span to at least 1.5 X OBW. b) Set RBW = 1 % to 5 % of the OBW, not to exceed 1 MHz. c) Set VBW ≥ 3 X RBW. d) Number of points in sweep ≥ 2 X span / RBW. e) Sweep time = auto. f) Detector = RMS g) If the EUT transmits continuously (i.e., with no off intervals) or at duty cycle ≥ 98 %, and if each transmission is entirely at the maximum power control level, then the trigger shall be set to “free run”. h) Trace average at least 100 traces in power averaging i) Compute power by integrating the spectrum across the OBW of the signal using the instrument’s band power measurement function, with band limits set equal to the OBW band edges.

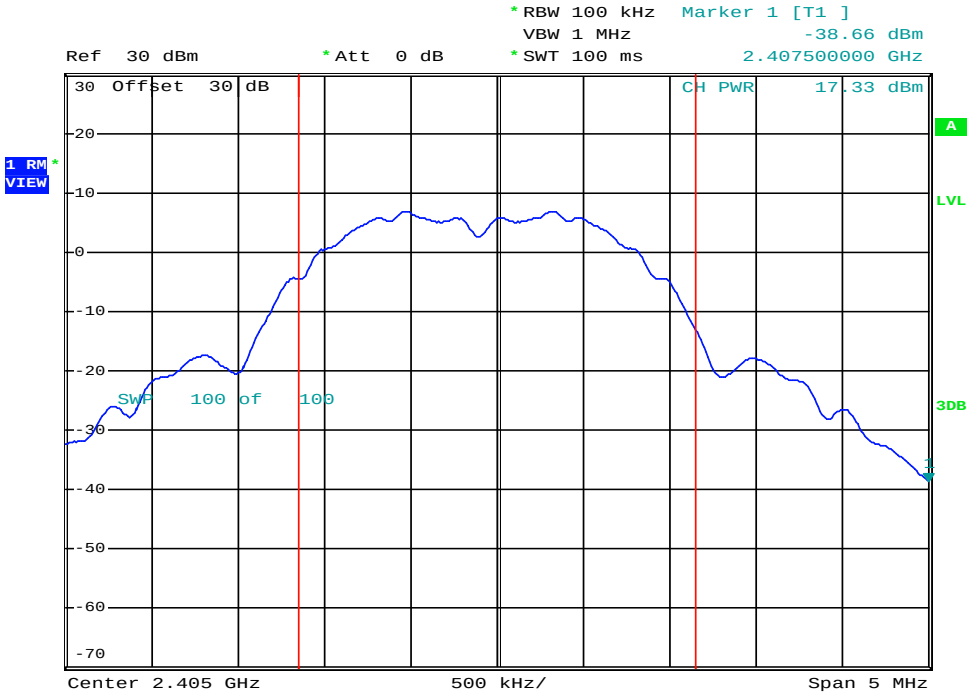
Test Setup	Appendix A - Figure A.1

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 (1.2MHz / 3kHz) = 800, 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 Channel Bandwidth was set to the measured 99% Occupied Bandwidth (See Section 9.0). The Band Channel Power was measured and recorded.

Plot 10.1 – Maximum Conducted Power - 2405MHz - Host 1

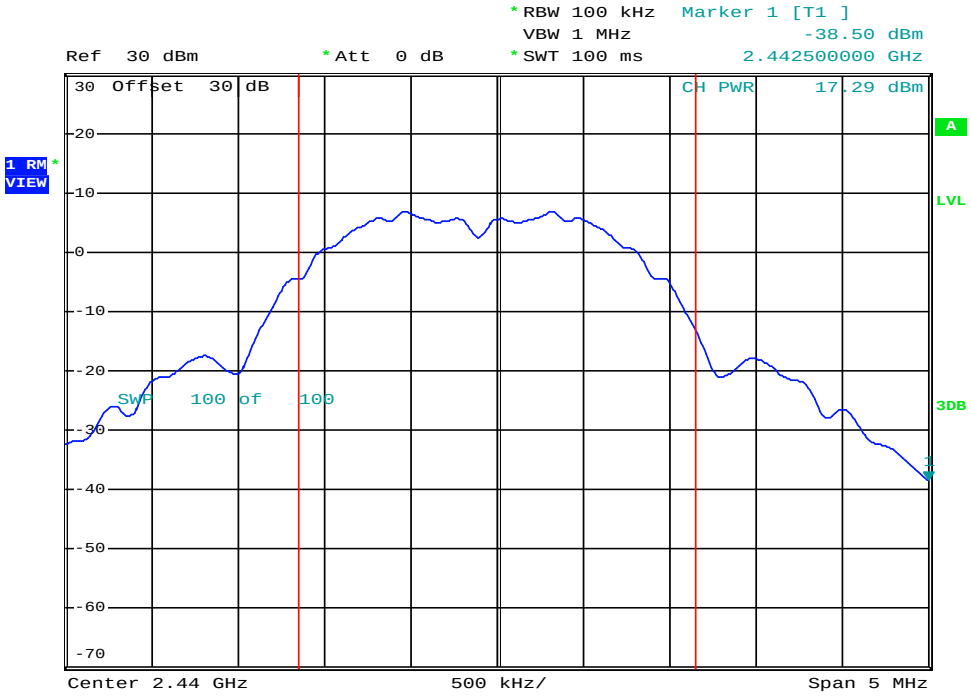
Conducted Power (RMS)



Channel Frequency:	Channel Bandwidth:	Transmit Duty Cycle:
2405.00 MHz	**3.00** MHz	**100** %
Modulation Setting:	**Channel Power Setting:**	**Measured Channel Power:**
O-QPSK	**Max** dBm	**17.33** dBm

Plot 10.2 – Maximum Conducted Power – 2440MHz - Host 1

Conducted Power (RMS)

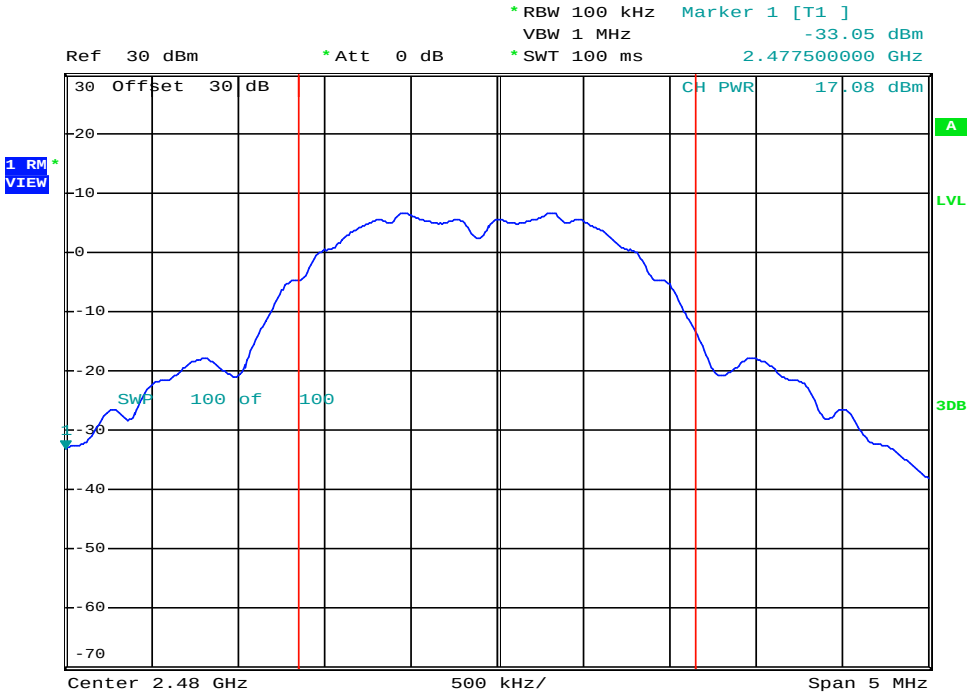


Date: 23.NOV.2018 10:44:47

Channel Frequency:	Channel Bandwidth:	Transmit Duty Cycle:
2440.00 MHz	**3.00** MHz	**100** %
Modulation Setting:	**Channel Power Setting:**	**Measured Channel Power:**
O-QPSK	**Max** dBm	**17.29** dBm

Plot 10.3 – Maximum Conducted Power – 2480MHz - Host 1

Conducted Power (RMS)



Channel Frequency:	Channel Bandwidth:	Transmit Duty Cycle:
2480.00 MHz	**3.00** MHz	**100** %
Modulation Setting:	**Channel Power Setting:**	**Measured Channel Power:**
O-QPSK	**Max** dBm	**17.08** dBm

Table 10.1 – Summary of Maximum Conducted Power Measurements - Host 1

§15.247(b)(3), RSS-247 (5.4)(d) Channel Output Power (RMS)							
Frequency (MHz)	BW (MHz)	Modulation	Power Setting[(1)] (dBm)	Measured Power [E_{Meas}] (dBm)	Measured Power [E_{Meas}] (W)	Limit (W)	Margin (dB)
2405.0	3	O-QPSK	Max	17.33	0.054	1.0	**12.7**
2440.0				17.29	0.054		**12.7**
2480.0				17.08	0.051		**12.9**
						Results:	**Complies**

(1) The output power is factory set to maximum
Margin = 10*Log(Limit / E_{meas})

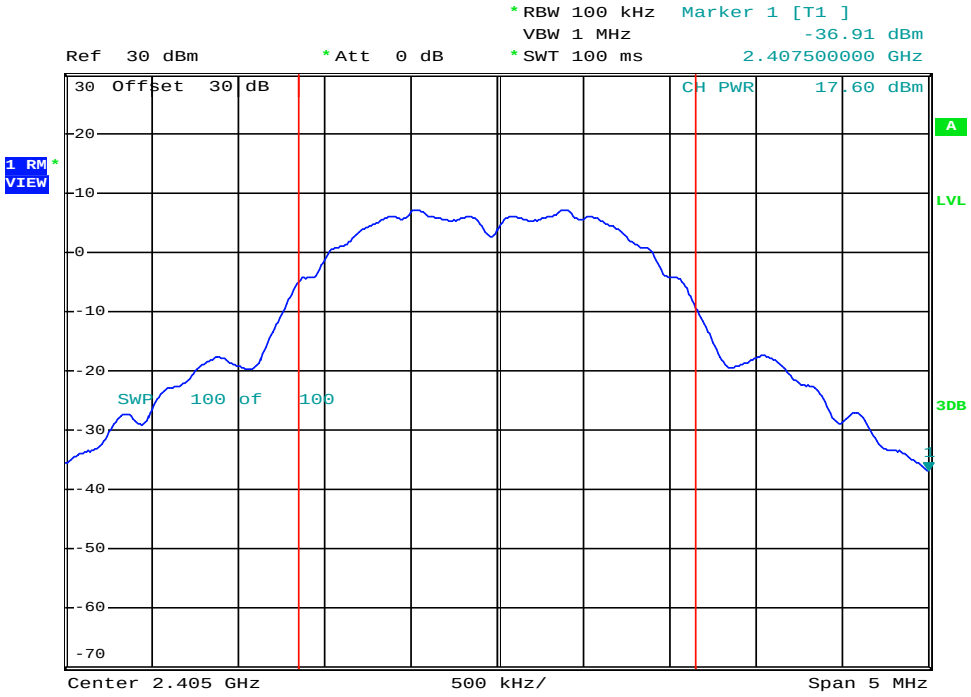
RSS-247 (5.4)(d) Channel EIRP (RMS)										
Frequency (MHz)	BW (MHz)	Modulation	Power Setting[(1)] (dBm)	Measured Power [E_{Meas}] (dBm)	Antenna Gain[(2)] [G_T] (dBi)	Cable Loss [L_C] (dB)	EIRP (dBm)	EIRP (W)	Limit (W)	Margin (dB)
2405.0	3	O-QPSK	Max	17.33	8	0.5	25.83	0.383	4.0	**10.2**
2440.0				17.29			25.79	0.379		**10.2**
2480.0				17.08			25.58	0.361		**10.4**
								Results:		**Complies**

EIRP (dBm) = E_{Meas} + G_T + L_C
Margin = Limit - EIRP in dB
(1) The output power is factory set to maximum

(2) The antennas employed by this transmitter are omnidirectional and used in a point to multipoint system.

Plot 10.4 – Maximum Conducted Power - 2405MHz - Host 2

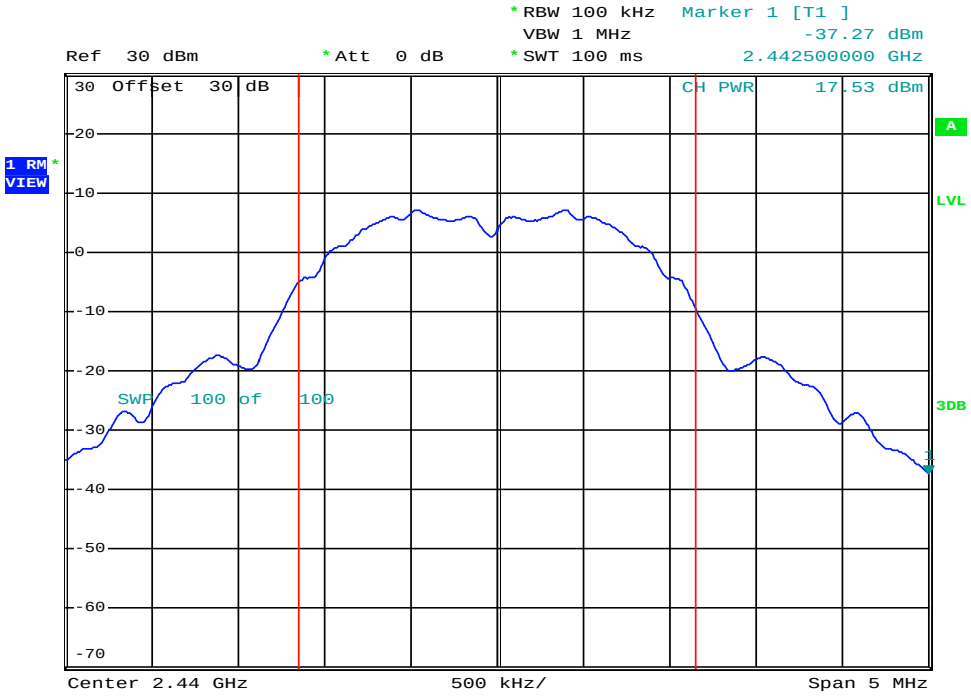
Conducted Power (RMS)



Channel Frequency:	Channel Bandwidth:	Transmit Duty Cycle:
2405.00 MHz	**3.00** MHz	**100** %
Modulation Setting:	**Channel Power Setting:**	**Measured Channel Power:**
O-QPSK	**Max** dBm	**17.60** dBm

Plot 10.5 – Maximum Conducted Power – 2440MHz - Host 2

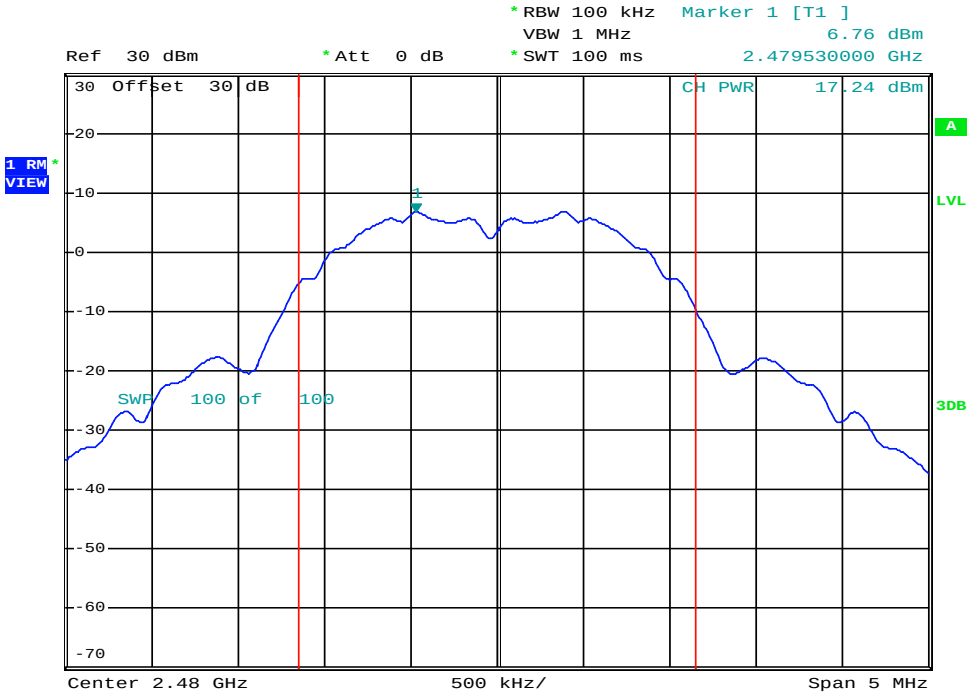
Conducted Power (RMS)



Channel Frequency:	Channel Bandwidth:	Transmit Duty Cycle:
2440.00 MHz	**3.00** MHz	**100** %
Modulation Setting:	**Channel Power Setting:**	**Measured Channel Power:**
O-QPSK	**Max** dBm	**17.53** dBm

Plot 10.6 – Maximum Conducted Power – 2480MHz - Host 2

Conducted Power (RMS)



Date: 19.NOV.2018 16:41:05

Channel Frequency:	Channel Bandwidth:	Transmit Duty Cycle:
2480.00 MHz	**3.00** MHz	**100** %
Modulation Setting:	**Channel Power Setting:**	**Measured Channel Power:**
O-QPSK	**Max** dBm	**17.24** dBm

Table 10.2 – Summary of Maximum Conducted Power Measurements - Host 2

§15.247(b)(3), RSS-247 (5.4)(d) Channel Output Power (RMS)							
Frequency (MHz)	BW (MHz)	Modulation	Power Setting[(1)] (dBm)	Measured Power [E_{Meas}] (dBm)	Measured Power [E_{Meas}] (W)	Limit (W)	Margin (dB)
2405.0	3	O-QPSK	Max	17.60	0.058	1.0	**12.4**
2440.0				17.53	0.057		**12.5**
2480.0				17.24	0.053		**12.8**
						Results:	**Complies**

(1) The output power is factory set to maximum
Margin = 10*Log(Limit / E_{meas})

RSS-247 (5.4)(d) Channel EIRP (RMS)										
Frequency (MHz)	BW (MHz)	Modulation	Power Setting[(1)] (dBm)	Measured Power [E_{Meas}] (dBm)	Antenna Gain[(2)] [G_T] (dBi)	Cable Loss [L_C] (dB)	EIRP (dBm)	EIRP (W)	Limit (W)	Margin (dB)
2405.0	3	O-QPSK	Max	17.60	8	0.5	26.10	0.407	4.0	**9.9**
2440.0				17.53			26.03	0.401		**10.0**
2480.0				17.24			25.74	0.375		**10.3**
								Results:		**Complies**

EIRP (dBm) = E_{Meas} + G_T + L_C
Margin = Limit - EIRP in dB
(1) The output power is factory set to maximum

(2) The antennas employed by this transmitter are omnidirectional and used in a point to multipoint system.

11.0 - POWER SPECTRAL DENSITY

Test Procedure	
Normative Reference	FCC 47 CFR §15.247(e), RSS-247 (5.2)(b), KDB 558074 (8.4), 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).

General Procedure	
C63.10 (11.10.3)	**Method AVGPSD-1** (trace averaging with EUT transmitting at full power throughout each 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).

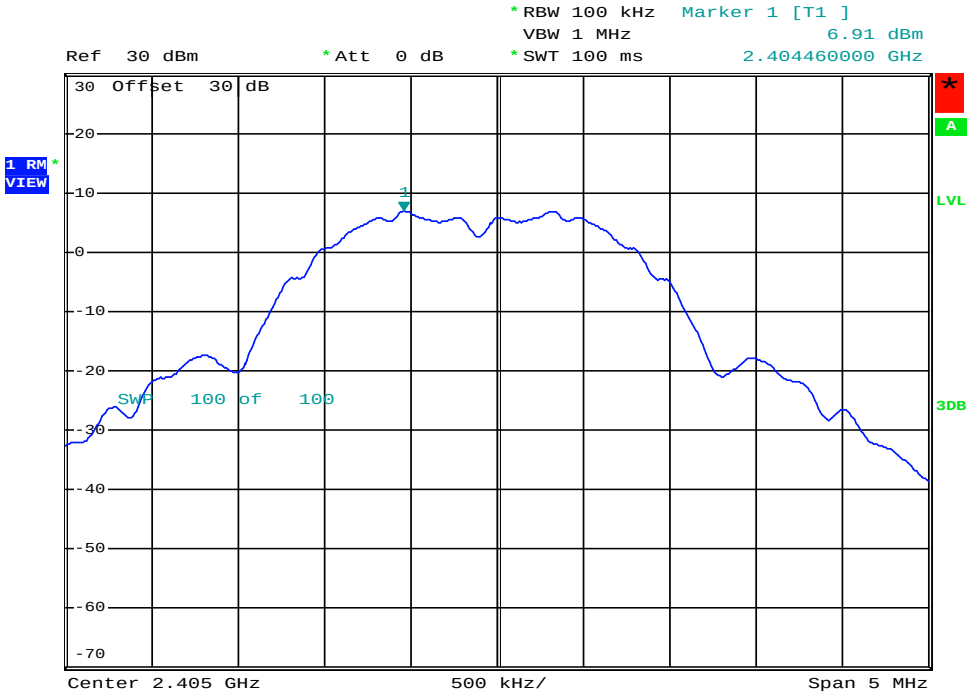
Test Setup	Appendix A - Figure A.1

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.

Plot 11.1 – Power Spectral Density – 2405MHz – Host 1

Power Spectral Density

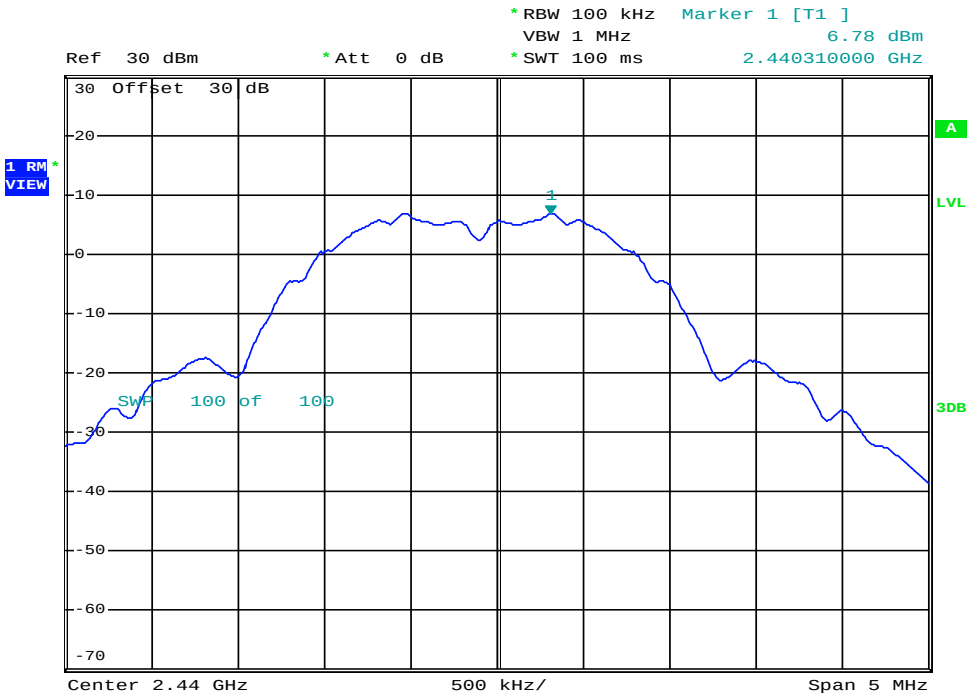


Date: 23.NOV.2018 10:49:03

Channel Frequency:	Channel Bandwidth:	Transmit Duty Cycle:
2405.00 MHz	**3.00** MHz	**100** %
Modulation Setting:	**Channel Power Setting:**	**Measured PSD:**
O-QPSK	**Max** dBm	**6.91** dBm

Plot 11.2 – Power Spectral Density – 2440MHz – Host 1

Power Spectral Density

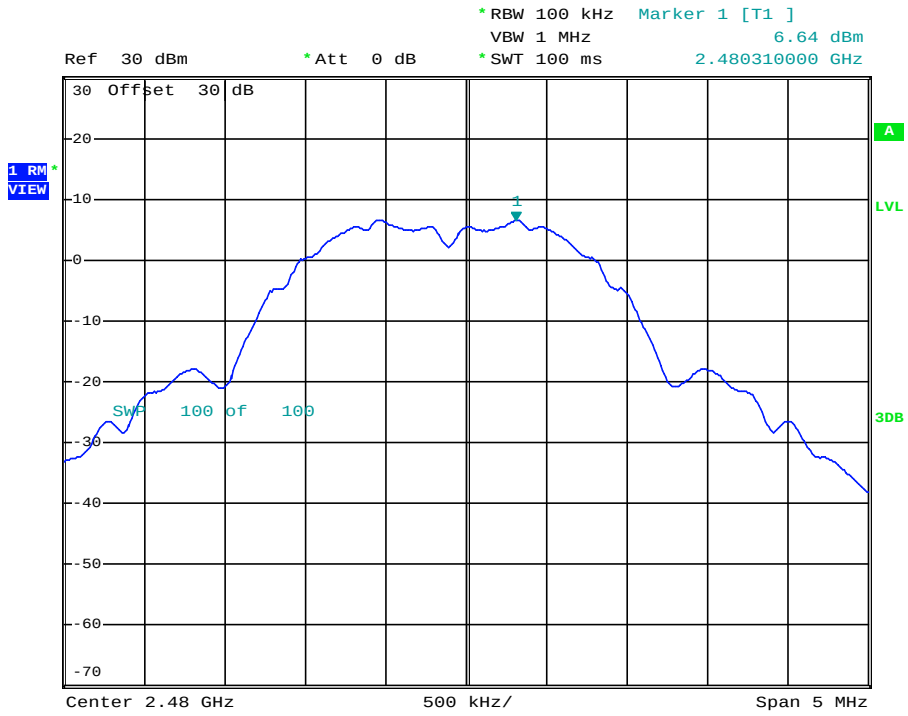


Date: 23.NOV.2018 10:50:31

Channel Frequency:	Channel Bandwidth:	Transmit Duty Cycle:
2440.00 MHz	**3.00** MHz	**100** %
Modulation Setting:	**Channel Power Setting:**	**Measured PSD:**
O-QPSK	**Max** dBm	**6.78** dBm

Plot 11.3 – Power Spectral Density - 2480MHz - Host 1

Power Spectral Density



Date: 23.NOV.2018 10:51:44

Channel Frequency:	Channel Bandwidth:	Transmit Duty Cycle:
2480.00 MHz	**3.00** MHz	**100** %
Modulation Setting:	**Channel Power Setting:**	**Measured PSD:**
O-QPSK	**Max** dBm	**6.64** dBm

Table 11.1 – Summary of Power Spectral Density Measurements - Host 1

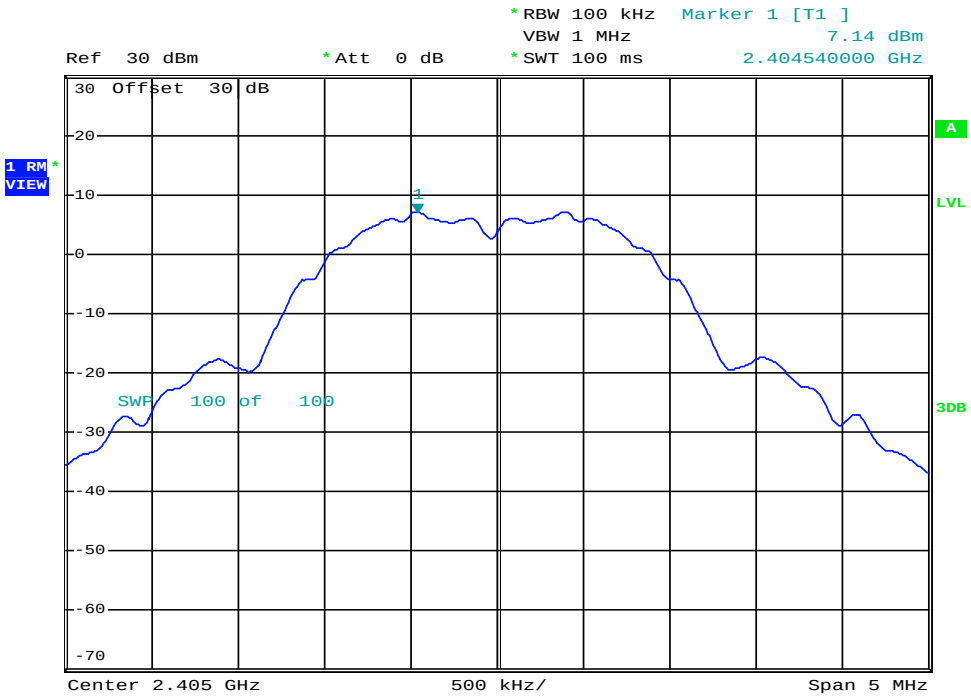
Power Spectral Density Measurement Results							
Frequency (MHz)	BW (MHz)	Modulation	Power Setting(1) (dBm)	Transmit Duty Cycle (%)	Measured PSD [$PSD_{Meas.}$] (dBm)	Limit (dBm)	Margin (dB)
2405.0	3	O-QPSK	Max	100	6.91	8.0	**1.1**
2440.0					6.78		**1.2**
2480.0					6.64		**1.4**
					Results:		**Complies**

(1) The output power is factory set to maximum

Margin = Limit - PSD_{meas}

Plot 11.4 – Power Spectral Density – 2405MHz – Host 2

Power Spectral Density

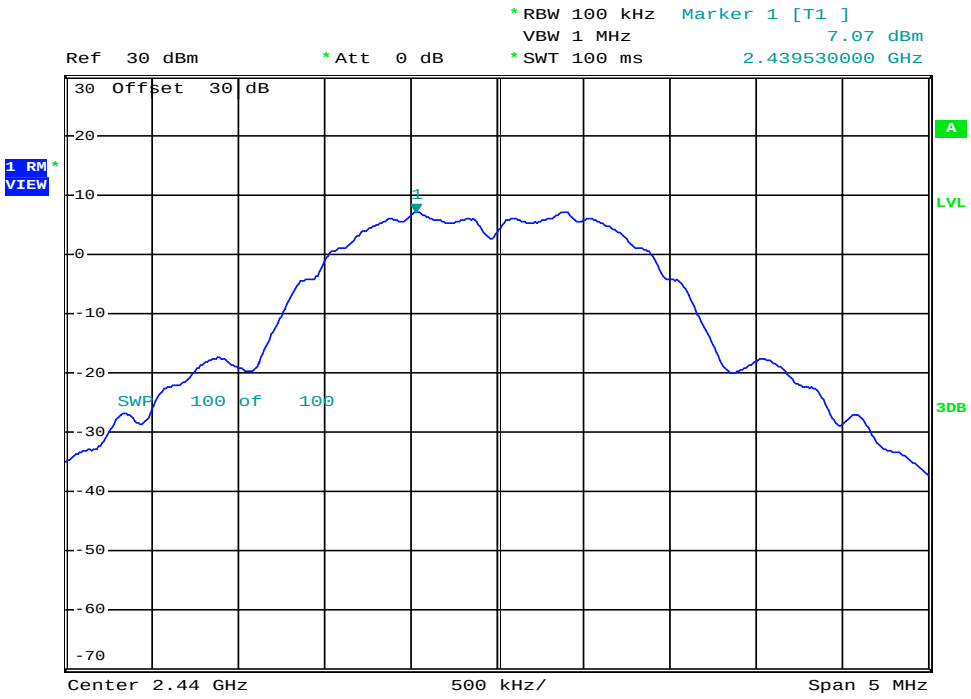


Date: 19.NOV.2018 17:10:34

Channel Frequency:	Channel Bandwidth:	Transmit Duty Cycle:
2405.00 MHz	**3.00** MHz	**100** %
Modulation Setting:	**Channel Power Setting:**	**Measured PSD:**
O-QPSK	**Max** dBm	**7.14** dBm

Plot 11.5 – Power Spectral Density – 2440MHz – Host 2

Power Spectral Density

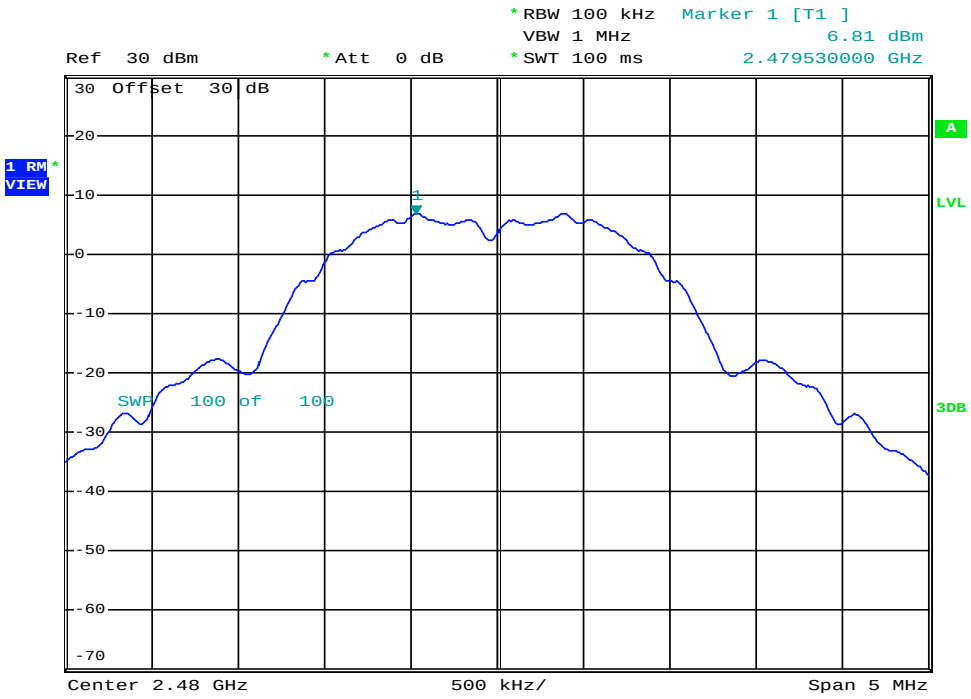


Date: 19.NOV.2018 17:12:02

Channel Frequency:	Channel Bandwidth:	Transmit Duty Cycle:
2440.00 MHz	**3.00** MHz	**100** %
Modulation Setting:	**Channel Power Setting:**	**Measured PSD:**
O-QPSK	**Max** dBm	**7.07** dBm

Plot 11.6 – Power Spectral Density - 2480MHz - Host 2

Power Spectral Density



Date: 19.NOV.2018 17:13:06

Channel Frequency:	Channel Bandwidth:	Transmit Duty Cycle:
2480.00 MHz	**3.00** MHz	**100** %
Modulation Setting:	**Channel Power Setting:**	**Measured PSD:**
O-QPSK	**Max** dBm	**6.81** dBm

Table 11.2 – Summary of Power Spectral Density Measurements - Host 2

Power Spectral Density Measurement Results							
Frequency (MHz)	BW (MHz)	Modulation	Power Setting(1) (dBm)	Transmit Duty Cycle (%)	Measured PSD [PSD_{Meas}] (dBm)	Limit (dBm)	Margin (dB)
2405.0	3	O-QPSK	Max	100	7.14	8.0	**0.9**
2440.0					7.07		**0.9**
2480.0					6.81		**1.2**
					Results:		**Complies**

(1) The output power is factory set to maximum

Margin = Limit - PSD_{meas}

12.0 - 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 (8.5), 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.

Test Procedure (Cont.)	
Normative Reference	FCC 47 CFR §2.1051, §15.247(d), RSS-Gen (6.13), RSS-247 (5.5), KDB 558074 (8.5), ANSI C63.10 (11.11.3)

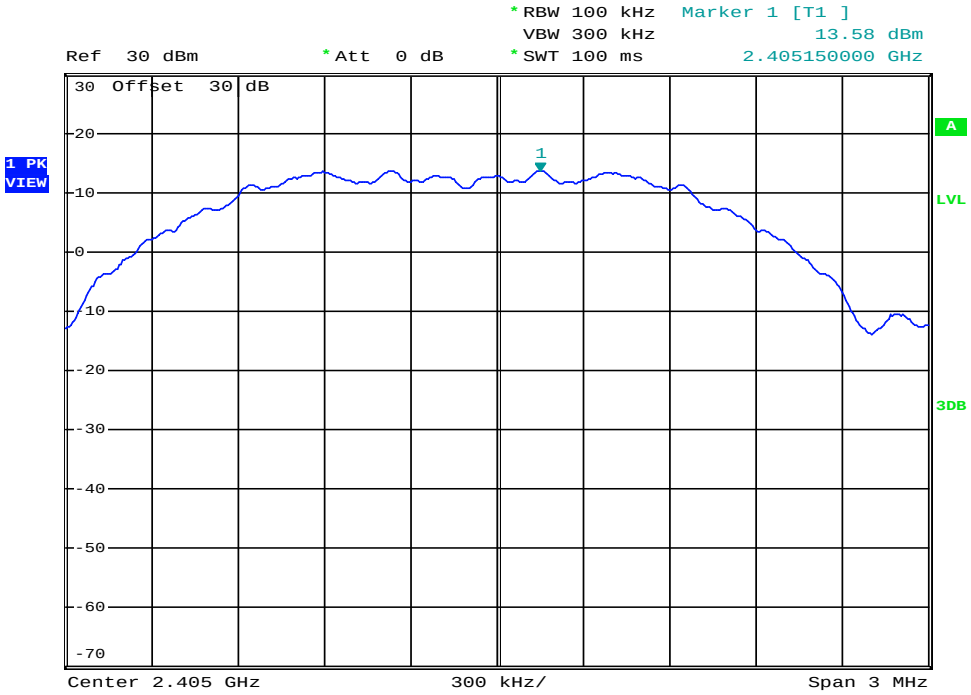
General Procedure	
C63.10 (11.11.3)	**11.1 General** The DTS rules specify that in any 100 kHz bandwidth outside of the authorized frequency band, the power shall be attenuated according to the following conditions: b) If maximum conducted (average) output power was used to demonstrate compliance as 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
C63.10 (11.11.3)	**11.3 Emission level measurement** a) Set the center frequency and span to encompass frequency range to be measured. b) Set the RBW = 100 kHz. c) Set the VBW ≥ 3 X RBW. d) Detector = peak. e) Sweep time = auto couple. f) Trace mode = max hold. g) Allow trace to fully stabilize. h) Use the peak marker function to determine the maximum amplitude level.

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 Reference Level Measurement was 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 unwanted emissions were measured and recorded. The highest Reference Level Measurement was to determine the attenuation of the unwanted emissions.

Plot 12.1 – Reference Level Measurement – 2405MHz – Host 1

Reference Level Measurement

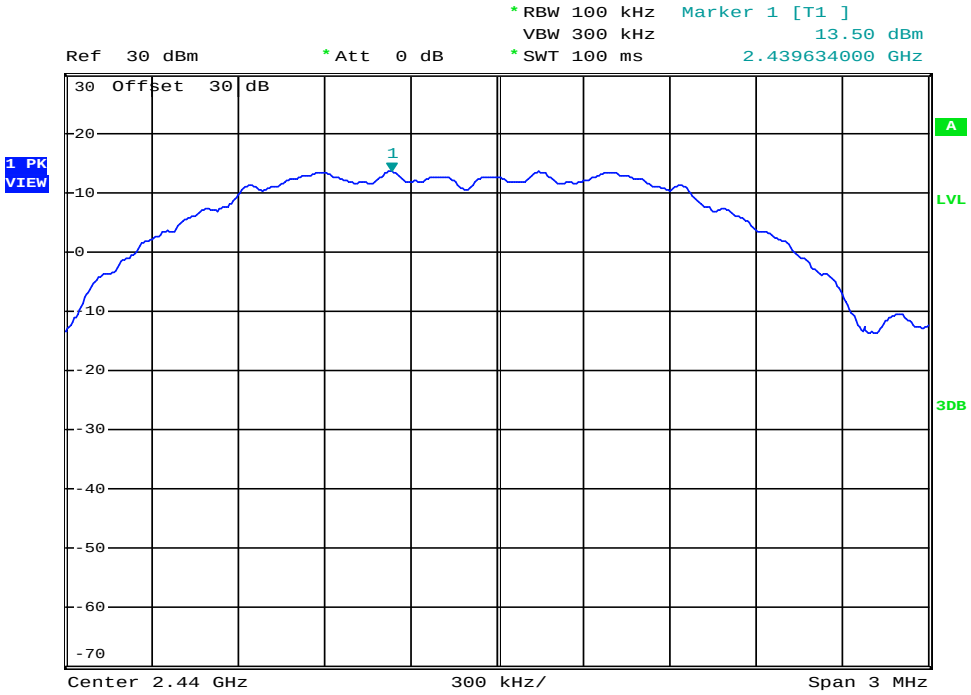


Date: 23.NOV.2018 10:56:53

Channel Frequency:	Channel Bandwidth:	Transmit Duty Cycle:
2405.00 MHz	**3.00** MHz	**100** %
Modulation Setting:	**Channel Power Setting:**	**Measured PSD:**
O-QPSK	**Max** dBm	**13.58** dBm

Plot 12.2 – Reference Level Measurement – 2440MHz – Host 1

Reference Level Measurement

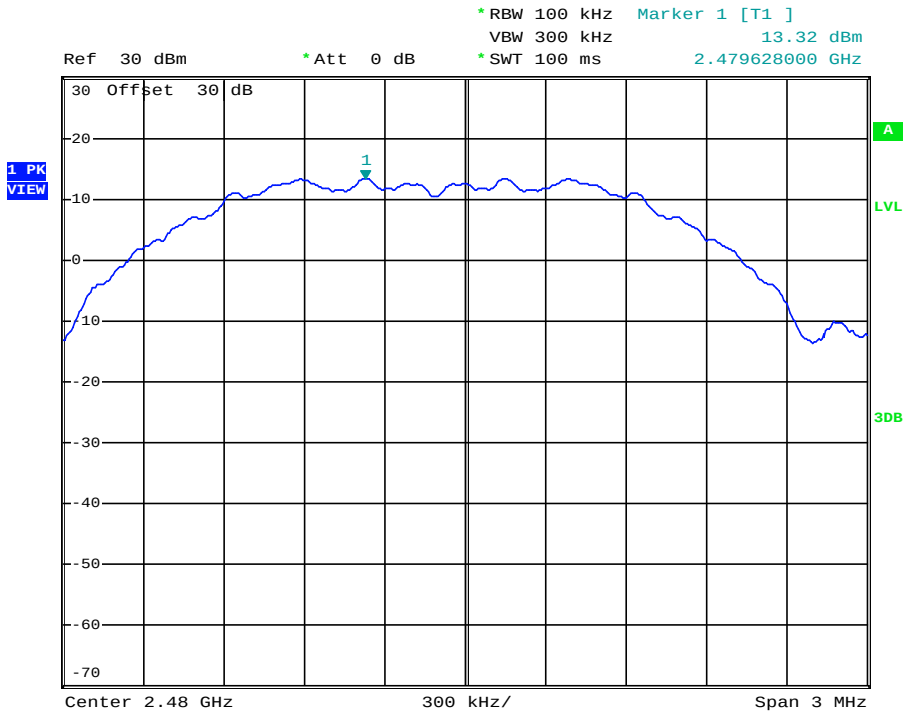


Date: 23.NOV.2018 10:55:54

Channel Frequency:	Channel Bandwidth:	Transmit Duty Cycle:
2440.00 MHz	**3.00** MHz	**100** %
Modulation Setting:	**Channel Power Setting:**	**Measured PSD:**
O-QPSK	**Max** dBm	**13.50** dBm

Plot 12.3 – Reference Level Measurement – 2480MHz – Host 1

Reference Level Measurement



Channel Frequency:	Channel Bandwidth:	Transmit Duty Cycle:
2480.00 MHz	**3.00** MHz	**100** %
Modulation Setting:	**Channel Power Setting:**	**Measured PSD:**
O-QPSK	**Max** dBm	**13.32** dBm

Table 12.1 – Summary of Reference Level Measurements – Host 1

Reference Level Measurement							
Frequency (MHz)	BW (MHz)	Modulation	Power Setting(1) (dBm)	Transmit Duty Cycle (%)	Measured PSD [PSD_{Meas}] (dBm)	Required Attenuation(2) [A_A] (dBc)	Limit Line [A_L] (dBm)
2405.0	3	O-QPSK	Max	100	13.58	30.00	-16.86
2440.0					13.50		
2480.0					13.32		

(1) The output power is factory set to maximum

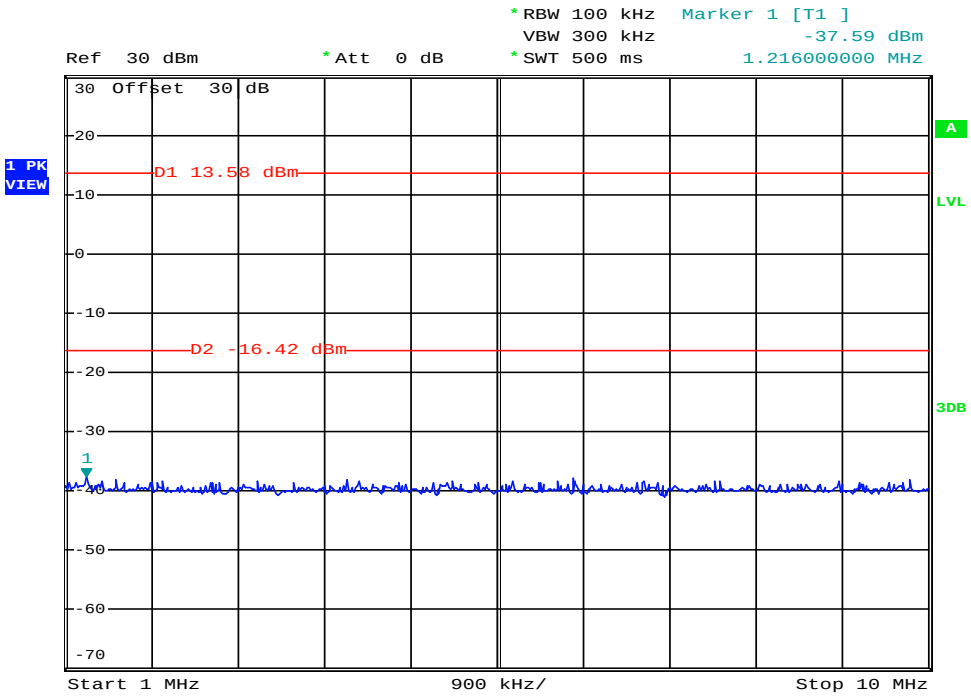
(2) The Maximum Conducted (average) output power was used for compliance therefore the required attenuation is 30dBc.

* The highest 100kHz PSD is used to demonstrate compliance.

Limit Line (A_L) = A_A - PSD_{meas}

Plot 12.4 – Conducted Spurious Emissions – 1MHz - 10MHz – Host 1

Emissions 1 - 10MHz

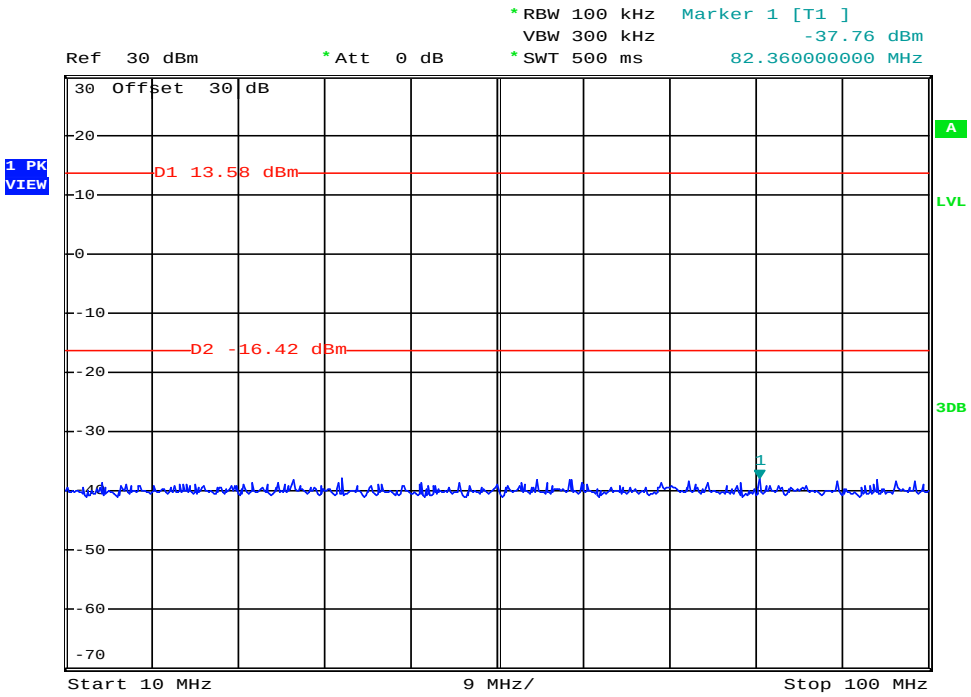


Date: 23.NOV.2018 11:02:55

Channel Frequency:	Channel Bandwidth:	Transmit Duty Cycle:
2405.00 MHz	**3.00** MHz	**100** %
Modulation Setting:	**Channel Power Setting:**	**Nominal Input Voltage:**
O-QPSK	**Max** dBm	**5.0** VDC
		Measured Emission Level:
		-37.59 dBm

Plot 12.5 – Conducted Spurious Emissions – 10MHz - 100MHz – Host 1

Emissions 10 - 100MHz

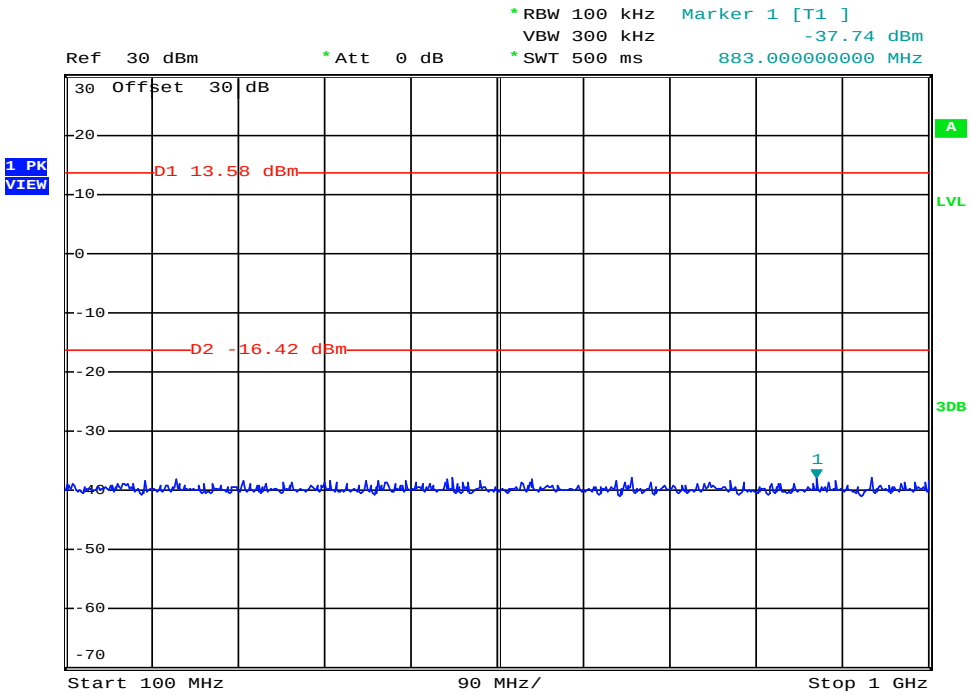


Date: 23.NOV.2018 11:04:02

Channel Frequency:	Channel Bandwidth:	Transmit Duty Cycle:
2405.00 MHz	**3.00** MHz	**100** %
Modulation Setting:	**Channel Power Setting:**	**Nominal Input Voltage:**
O-QPSK	**Max** dBm	**5.0** VDC
		Measured Emission Level:
		-37.76 dBm

Plot 12.6 – Conducted Spurious Emissions – 100MHz - 1000MHz – Host 1

Emissions 100 - 1000MHz

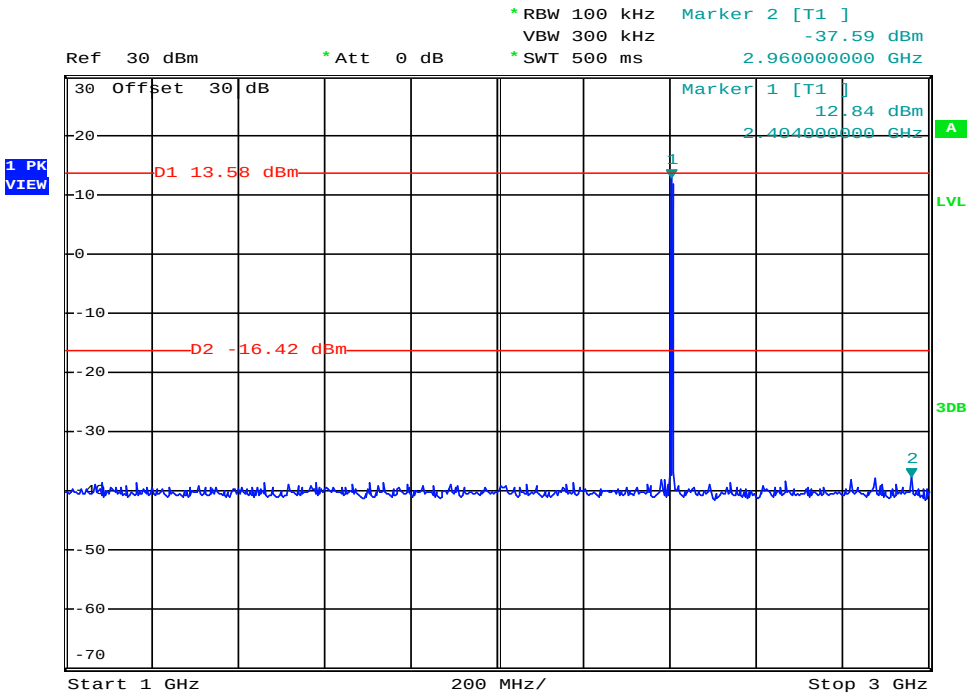


Date: 23.NOV.2018 11:06:41

Channel Frequency:	Channel Bandwidth:	Transmit Duty Cycle:
2405.00 MHz	**3.00** MHz	**100** %
Modulation Setting:	**Channel Power Setting:**	**Nominal Input Voltage:**
O-QPSK	**Max** dBm	**5.0** VDC
		Measured Emission Level: **-37.74** dBm

Plot 12.7 – Conducted Spurious Emissions – 1GHz – 3GHz – Host 1

Emissions 1 - 3GHz



Date: 23.NOV.2018 11:08:35

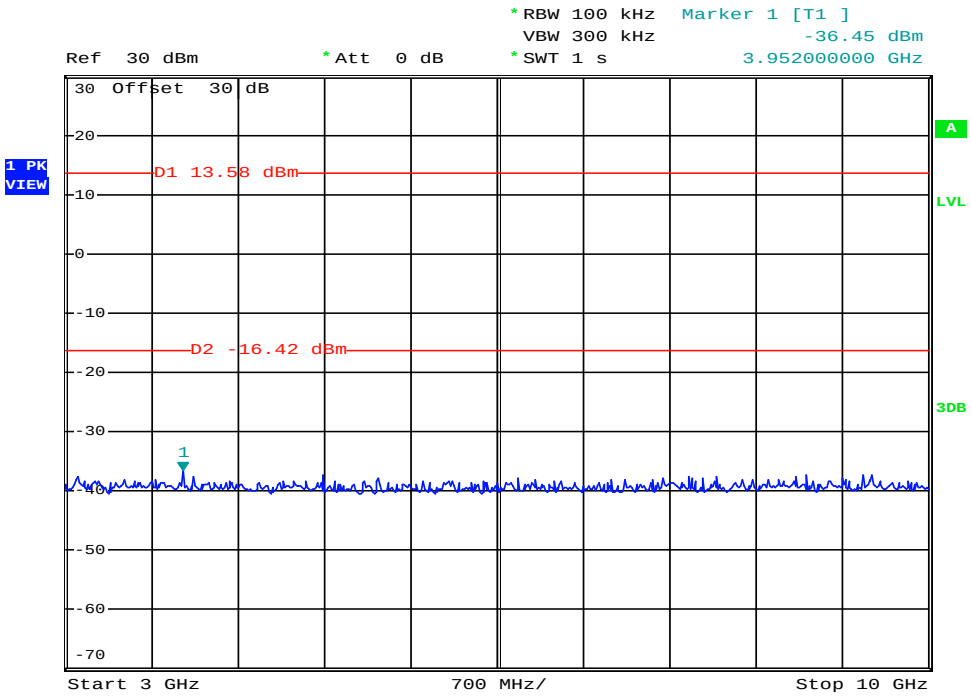
Channel Frequency:	Channel Bandwidth:	Transmit Duty Cycle:
2405.00 MHz	**3.00** MHz	**100** %
Modulation Setting:	**Channel Power Setting:**	**Nominal Input Voltage:**
O-QPSK	**Max** dBm	**5.0** VDC

Marker 1 = Fundemental

Measured Emission Level: **-37.59** dBm

Plot 12.8 – Conducted Spurious Emissions – 3GHz – 10GHz – Host 1

Emissions 3 - 10GHz

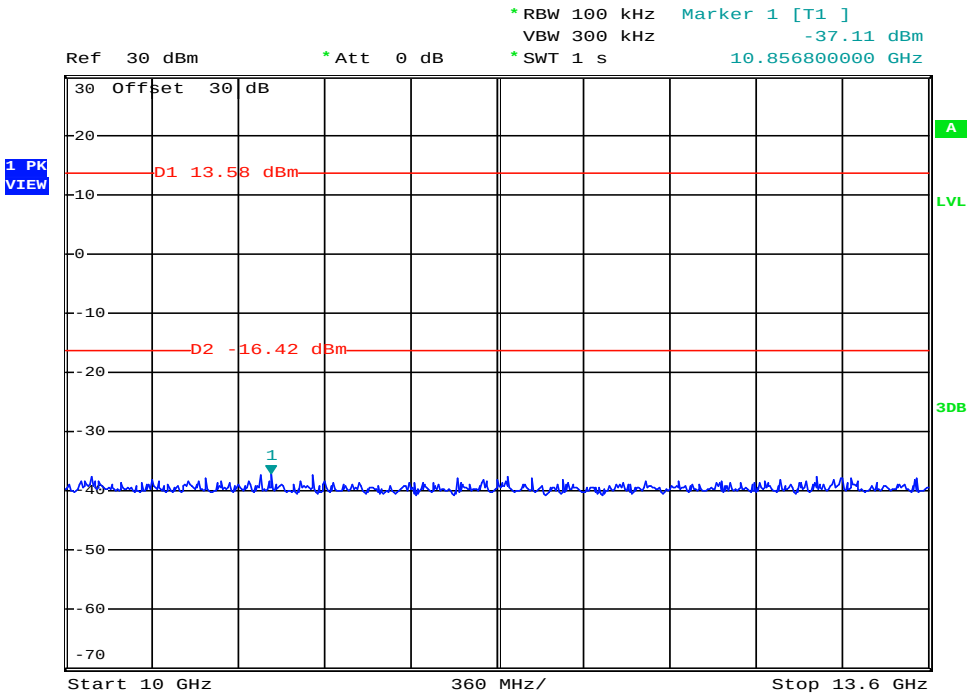


Date: 23.NOV.2018 11:11:09

Channel Frequency:	Channel Bandwidth:	Transmit Duty Cycle:
2405.00 MHz	**3.00** MHz	**100** %
Modulation Setting:	**Channel Power Setting:**	**Nominal Input Voltage:**
O-QPSK	**Max** dBm	**5.0** VDC
		Measured Emission Level:
		-36.45 dBm

Plot 12.9 – Conducted Spurious Emissions – 10GHz – 13.6GHz – Host 1

Emissions 10 - 13.6GHz

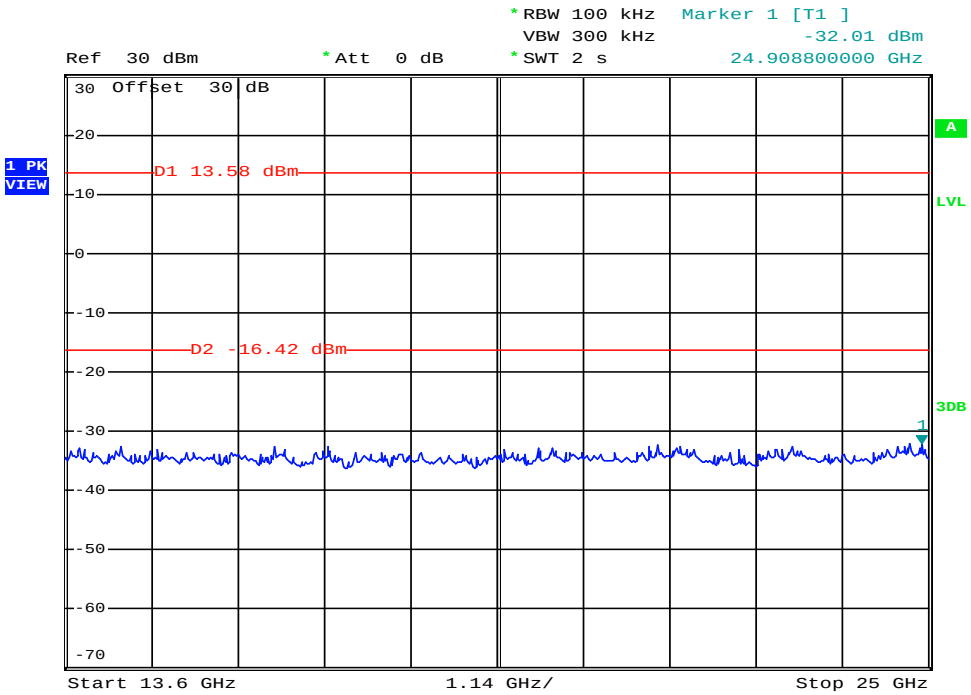


Date: 23.NOV.2018 11:12:14

Channel Frequency:	Channel Bandwidth:	Transmit Duty Cycle:
2405.00 MHz	**3.00** MHz	**100** %
Modulation Setting:	**Channel Power Setting:**	**Nominal Input Voltage:**
O-QPSK	**Max** dBm	**5.0** VDC
		Measured Emission Level:
		-37.11 dBm

Plot 12.10 – Conducted Spurious Emissions – 13.6GHz – 25GHz – Host 1

Emissions 13.6 - 25GHz



Date: 23.NOV.2018 11:13:27

Channel Frequency:	Channel Bandwidth:	Transmit Duty Cycle:
2405.00 MHz	**3.00** MHz	**100** %
Modulation Setting:	**Channel Power Setting:**	**Nominal Input Voltage:**
O-QPSK	**Max** dBm	**5.0** VDC
		Measured Emission Level: **-32.01** dBm

Table 12.2 – Summary of Conducted Spurious Emissions Measurements – Host 1

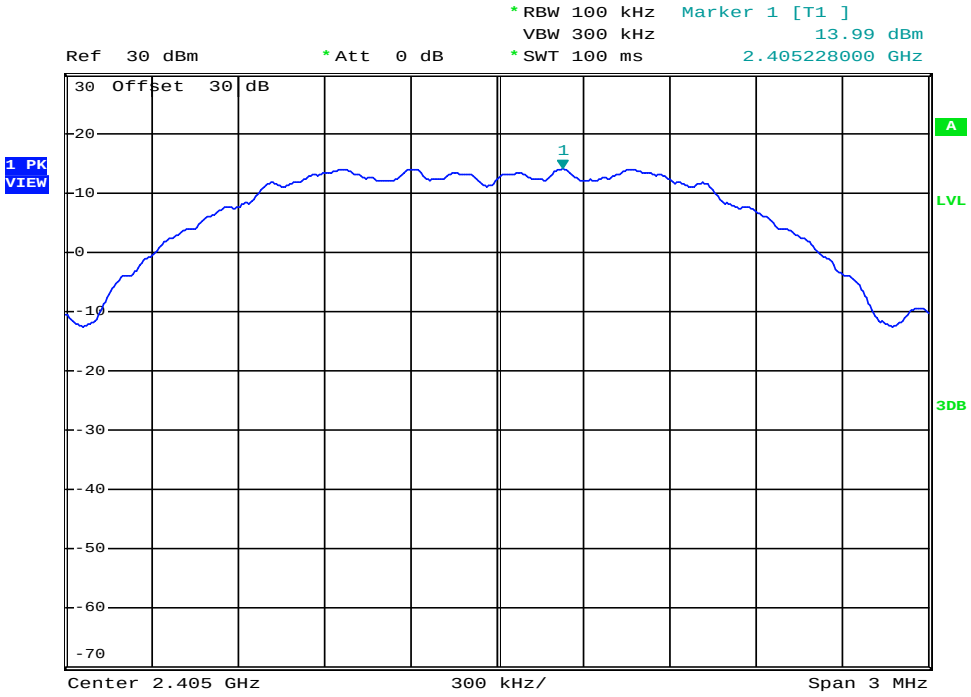
Emission Level Measurement								
Frequency Range	BW (MHz)	Modulation	Power Setting(1) (dBm)	Supply Voltage (VDC)	Transmit Duty Cycle (%)	Measured Emission [E_{Meas}] (dBm)	Limit Line [A_L] (dBm)	Margin (dB)
1 - 10MHz	3	O-QPSK	Max	5.0	100	-37.59	-16.86	**20.73**
10 - 100MHz						-37.76		**20.90**
100 - 1000MHz						-37.74		**20.88**
1 - 3GHz						-37.59		**20.73**
3 - 10GHz						-36.45		**19.59**
10 - 13.6GHz						-37.11		**20.25**
13.6 - 25GHz						-32.01		**15.15**
						Result:	**Complies**	

(1) The output power is factory set to maximum

Margin = A_L - E_{MEAS}

Plot 12.11 – Reference Level Measurement – 2405MHz – Host 2

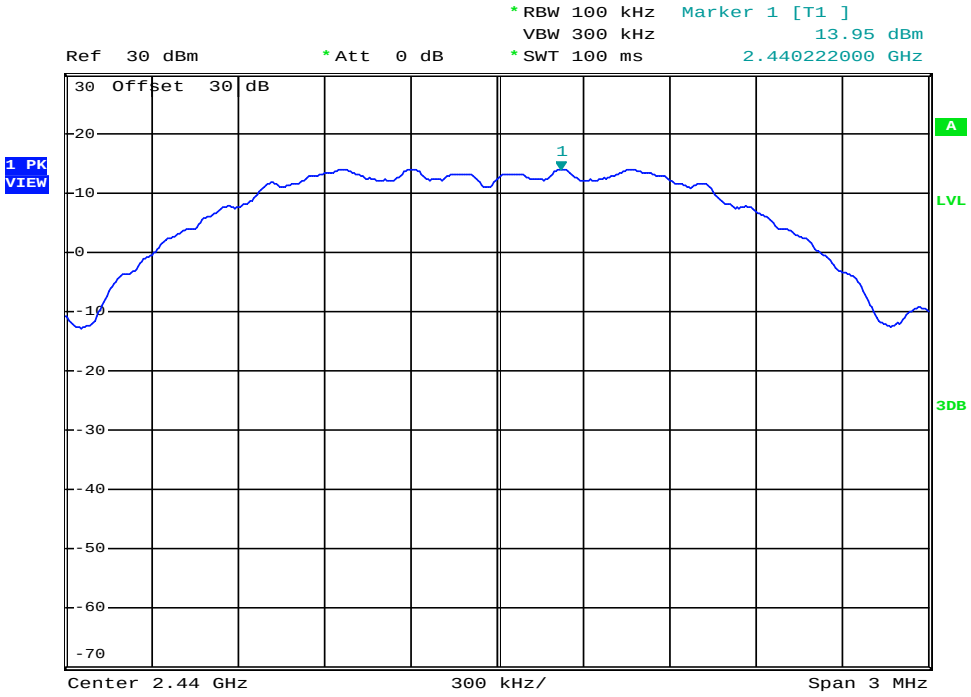
Reference Level Measurement



Channel Frequency:	Channel Bandwidth:	Transmit Duty Cycle:
2405.00 MHz	**3.00** MHz	**100** %
Modulation Setting:	**Channel Power Setting:**	**Measured PSD:**
O-QPSK	**Max** dBm	**13.99** dBm

Plot 12.12 – Reference Level Measurement – 2440MHz – Host 2

Reference Level Measurement

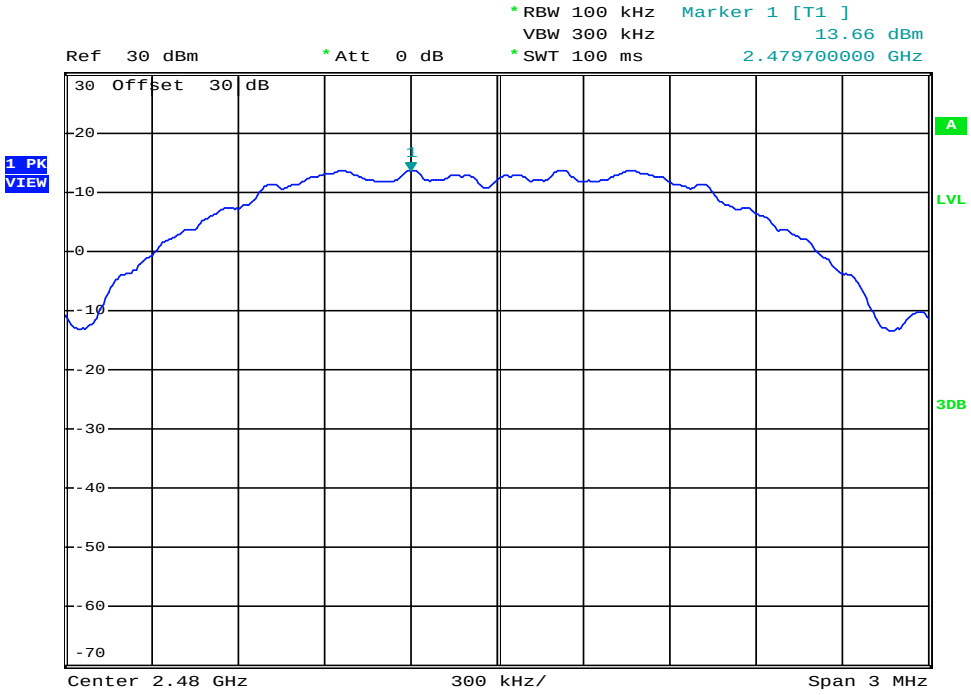


Date: 22.NOV.2018 10:09:16

Channel Frequency:	Channel Bandwidth:	Transmit Duty Cycle:
2440.00 MHz	**3.00** MHz	**100** %
Modulation Setting:	**Channel Power Setting:**	**Measured PSD:**
O-QPSK	**Max** dBm	**13.95** dBm

Plot 12.13 – Reference Level Measurement – 2480MHz – Host 2

Reference Level Measurement



Date: 22.NOV.2018 10:12:37

Channel Frequency:	Channel Bandwidth:	Transmit Duty Cycle:
2480.00 MHz	**3.00** MHz	**100** %
Modulation Setting:	**Channel Power Setting:**	**Measured PSD:**
O-QPSK	**Max** dBm	**13.66** dBm

Table 12.3 – Summary of Reference Level Measurements – Host 2

Reference Level Measurement							
Frequency (MHz)	BW (MHz)	Modulation	Power Setting(1) (dBm)	Transmit Duty Cycle (%)	Measured PSD [PSD_{Meas}] (dBm)	Required Attenuation(2) [A_A] (dBc)	Limit Line [A_L] (dBm)
2405.0	3	O-QPSK	Max	100	13.99	30.00	-16.86
2440.0					13.95		
2480.0					13.66		

(1) The output power is factory set to maximum

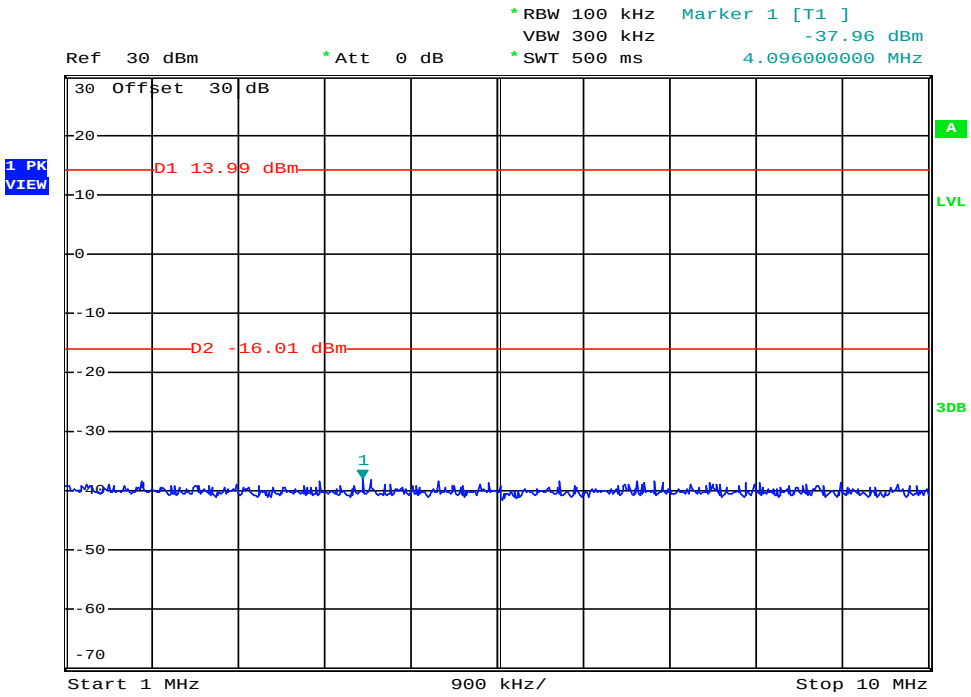
(2) The Maximum Conducted (average) output power was used for compliance therefore the required attenuation is 30dBc.

* The highest 100kHz PSD is used to demonstrate compliance.

Limit Line (A_L) = A_A - PSD_{meas}

Plot 12.14 – Conducted Spurious Emissions – 1MHz - 10MHz – Host 2

Emissions 1 - 10MHz

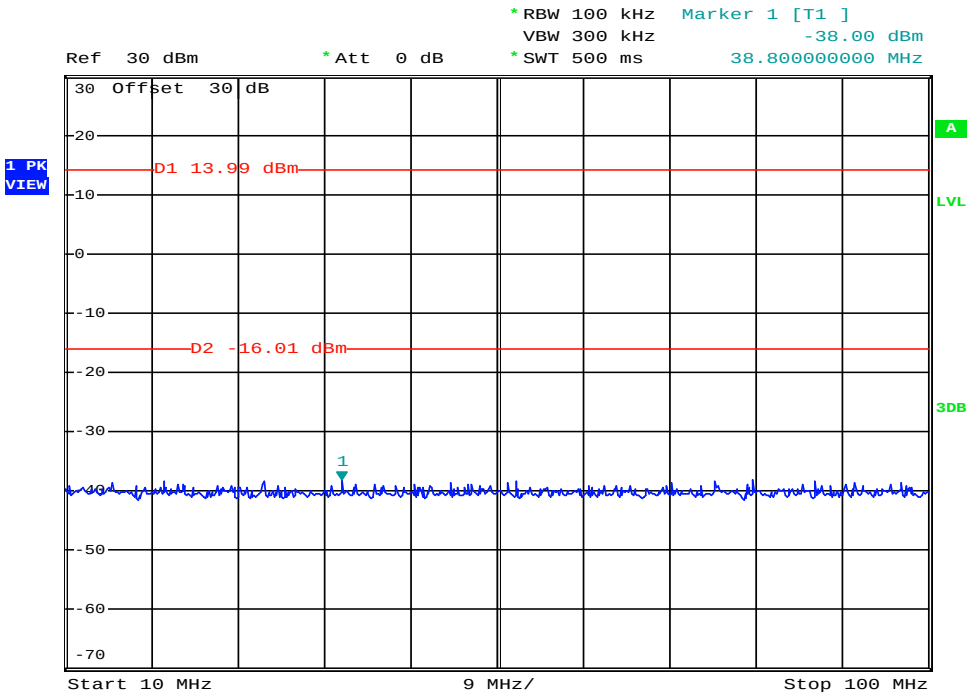


Date: 22.NOV.2018 12:19:22

Channel Frequency:	Channel Bandwidth:	Transmit Duty Cycle:
2405.00 MHz	**3.00** MHz	**100** %
Modulation Setting:	**Channel Power Setting:**	**Nominal Input Voltage:**
O-QPSK	**Max** dBm	**5.0** VDC
		Measured Emission Level:
		-37.96 dBm

Plot 12.15 – Conducted Spurious Emissions – 10MHz - 100MHz – Host 2

Emissions 10 - 100MHz

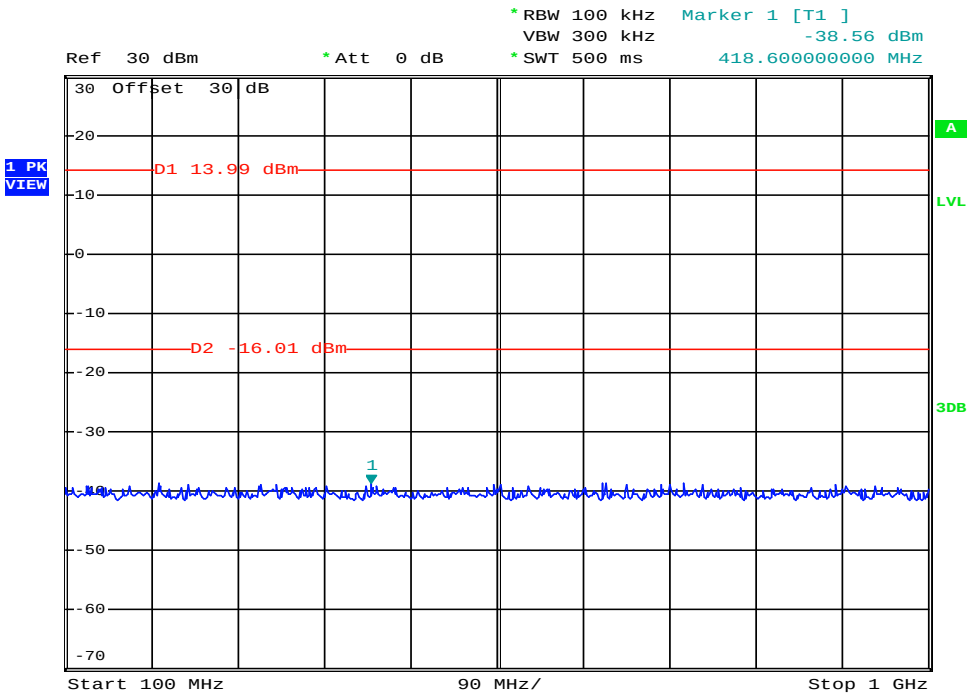


Date: 22.NOV.2018 12:20:14

Channel Frequency: **2405.00** MHz	Channel Bandwidth: **3.00** MHz	Transmit Duty Cycle: **100** %
Modulation Setting: **O-QPSK**	Channel Power Setting: **Max** dBm	Nominal Input Voltage: **5.0** VDC
		Measured Emission Level: **-38.00** dBm

Plot 12.16 – Conducted Spurious Emissions – 100MHz - 1000MHz – Host 2

Emissions 100 - 1000MHz

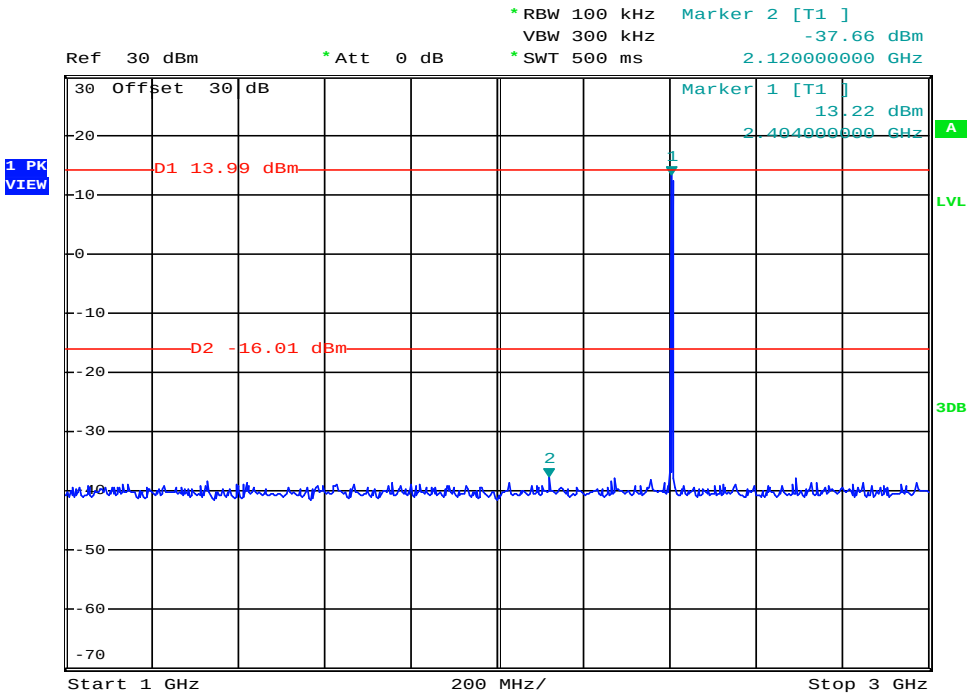


Date: 22.NOV.2018 12:21:15

Channel Frequency:	Channel Bandwidth:	Transmit Duty Cycle:
2405.00 MHz	**3.00** MHz	**100** %
Modulation Setting:	**Channel Power Setting:**	**Nominal Input Voltage:**
O-QPSK	**Max** dBm	**5.0** VDC
		Measured Emission Level: **-38.56** dBm

Plot 12.17 – Conducted Spurious Emissions – 1GHz – 3GHz – Host 2

Emissions 1 - 3GHz



Date: 22.NOV.2018 12:23:04

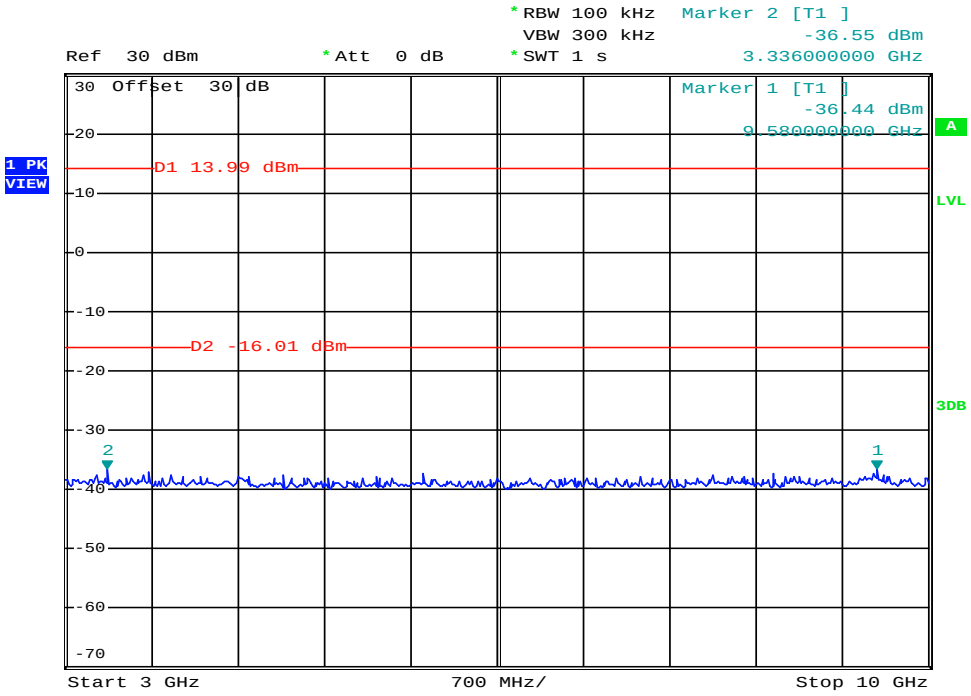
Channel Frequency:	Channel Bandwidth:	Transmit Duty Cycle:
2405.00 MHz	**3.00** MHz	**35** %
Modulation Setting:	**Channel Power Setting:**	**Nominal Input Voltage:**
O-QPSK	**Max** dBm	**5.0** VDC

Marker 1 = Fundemental

Measured Emission Level: **-37.66** dBm

Plot 12.18 – Conducted Spurious Emissions – 3GHz – 10GHz – Host 2

Emissions 3 - 10GHz

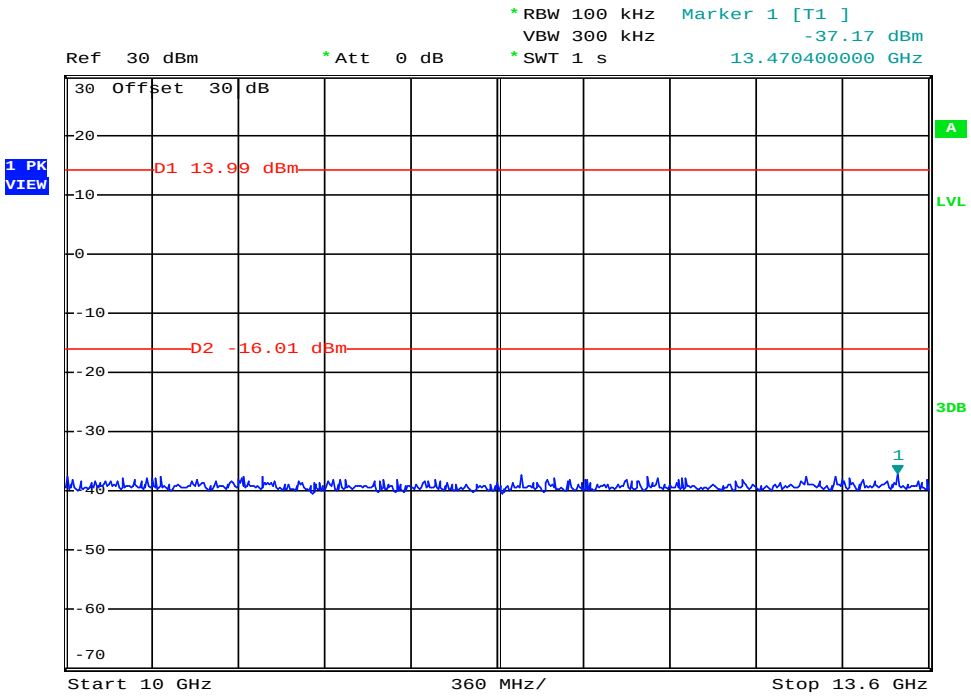


Date: 22.NOV.2018 12:25:26

Channel Frequency: **2405.00** MHz	Channel Bandwidth: **3.00** MHz	Transmit Duty Cycle: **100** %
Modulation Setting: **O-QPSK**	Channel Power Setting: **Max** dBm	Nominal Input Voltage: **5.0** VDC
		Measured Emission Level: **-36.44** dBm

Plot 12.19 – Conducted Spurious Emissions – 10GHz – 13.6GHz – Host 2

Emissions 10 - 13.6GHz

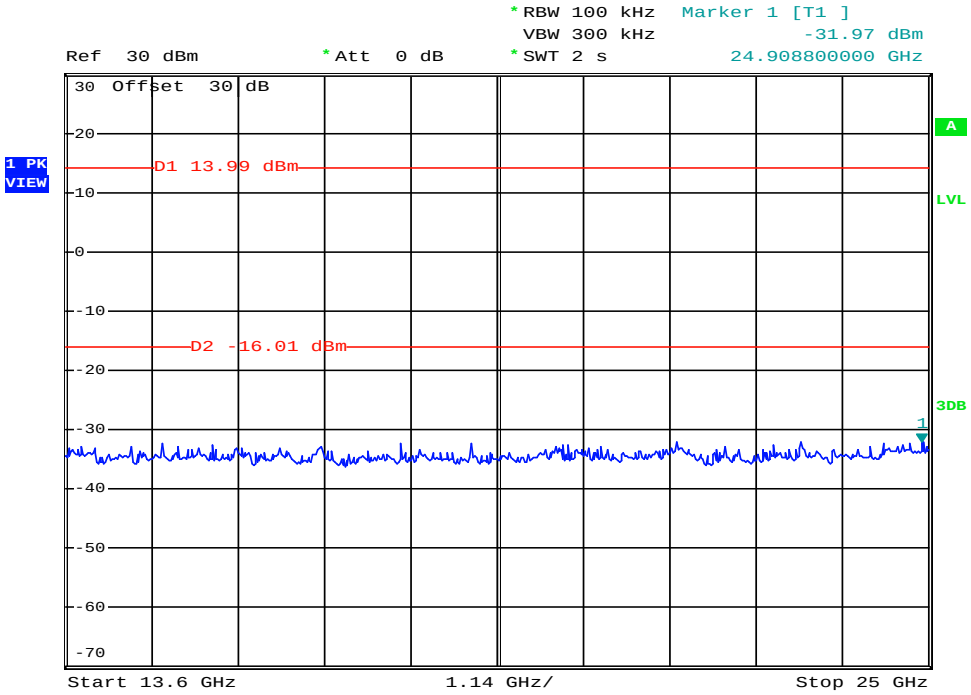


Date: 22.NOV.2018 12:27:15

Channel Frequency:	Channel Bandwidth:	Transmit Duty Cycle:
2405.00 MHz	**3.00** MHz	**100** %
Modulation Setting:	**Channel Power Setting:**	**Nominal Input Voltage:**
O-QPSK	**Max** dBm	**5.0** VDC
		Measured Emission Level:
		-37.17 dBm

Plot 12.20 – Conducted Spurious Emissions – 13.6GHz – 25GHz – Host 2

Emissions 13.6 - 25GHz

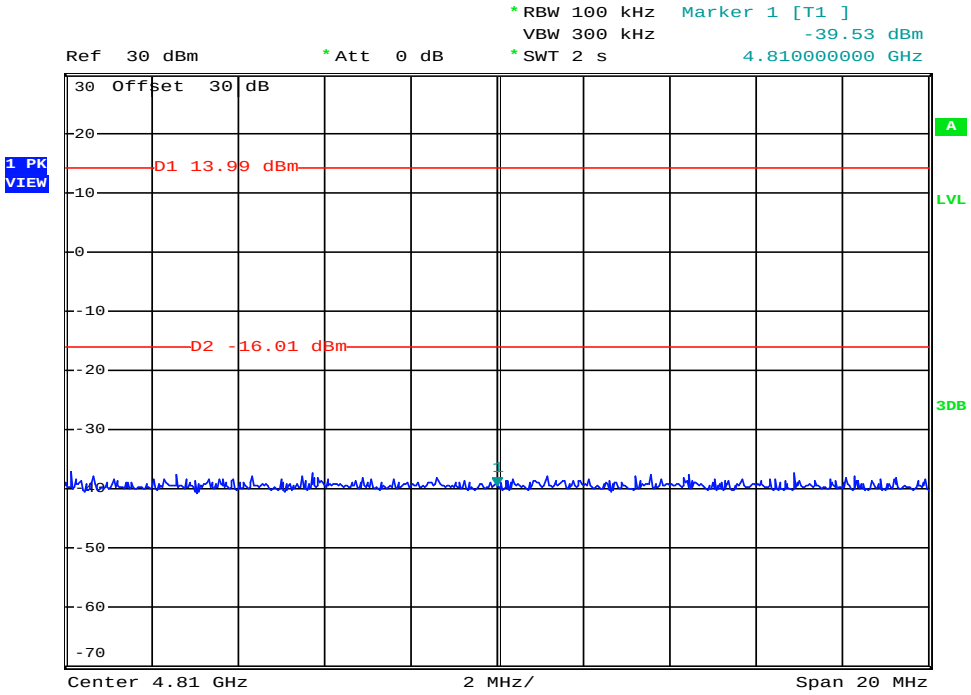


Date: 22.NOV.2018 12:29:02

Channel Frequency:	Channel Bandwidth:	Transmit Duty Cycle:
2405.00 MHz	**3.00** MHz	**100** %
Modulation Setting:	**Channel Power Setting:**	**Nominal Input Voltage:**
O-QPSK	**Max** dBm	**5.0** VDC
		Measured Emission Level:
		-31.97 dBm

Plot 12.21 – Conducted Spurious Emissions – 4.81GHz – Host 2

Emissions @ 4.81GHz (2nd Harmonic)

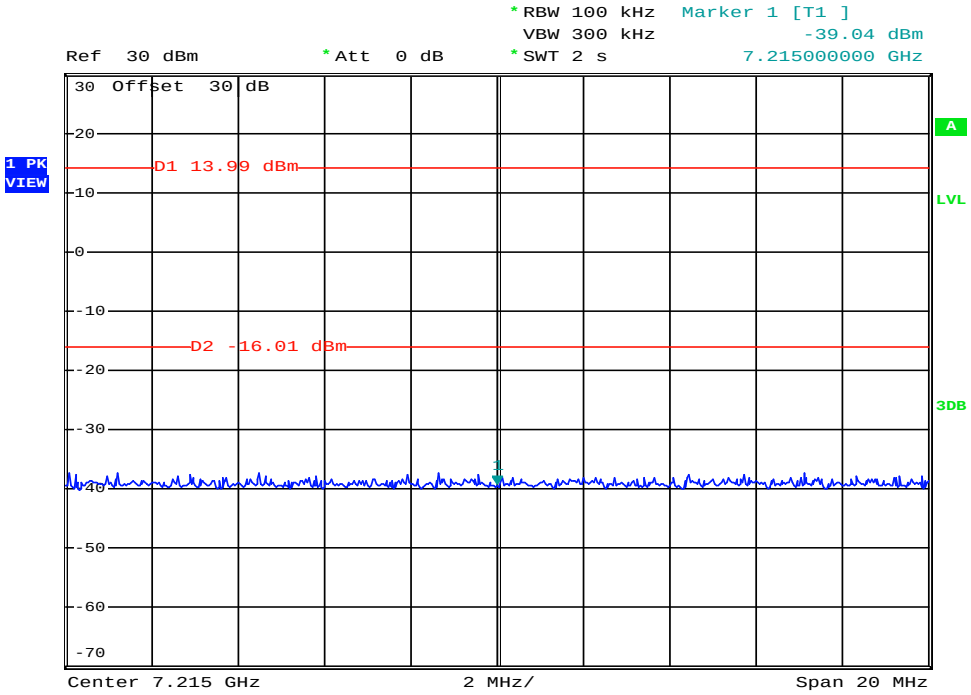


Date: 22.NOV.2018 12:31:01

Channel Frequency:	Channel Bandwidth:	Transmit Duty Cycle:
2405.00 MHz	**3.00** MHz	**100** %
Modulation Setting:	**Channel Power Setting:**	**Nominal Input Voltage:**
O-QPSK	**Max** dBm	**5.0** VDC
		Measured Emission Level:
		-39.53 dBm

Plot 12.22 – Conducted Spurious Emissions – 7.215GHz – Host 2

Emissions @ 7.215GHz (3rd Harmonic)



Date: 22.NOV.2018 12:31:58

Channel Frequency:	Channel Bandwidth:	Transmit Duty Cycle:
2405.00 MHz	**3.00** MHz	**100** %
Modulation Setting:	**Channel Power Setting:**	**Nominal Input Voltage:**
O-QPSK	**Max** dBm	**5.0** VDC
		Measured Emission Level:
		-39.04 dBm

Table 12.4 – Summary of Conducted Spurious Emissions Measurements – Host 2

Emission Level Measurement								
Frequency Range	BW (MHz)	Modulation	Power Setting[1] (dBm)	Supply Voltage (VDC)	Transmit Duty Cycle (%)	Measured Emission [E_{Meas}] (dBm)	Limit Line [A_L] (dBm)	Margin (dB)
1 - 10MHz	3	O-QPSK	Max	5.0	100	-37.96	-16.86	**21.10**
10 - 100MHz						-38.00		**21.14**
100 - 1000MHz						-38.56		**21.70**
1 - 3GHz						-37.66		**20.80**
3 - 10GHz						-36.44		**19.58**
10 - 13.6GHz						-37.17		**20.31**
13.6 - 25GHz						-31.97		**15.11**
4.81GHz						-39.53		**22.67**
7.215GHz						-39.04		**22.18**
						Result:	**Complies**	

(1) The output power is factory set to maximum

Margin = A_L - E_{MEAS}

13.0 - BAND EDGE

Test Procedure	
Normative Reference	FCC 47 CFR §2.1051, §15.247(d), RSS-Gen (6.13), RSS-247 (5.5), KDB 558074 (8.7), ANSI C63.10 (11.13.3.3)

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.

General Procedure	
C63.10 (11.13.1)	**11.13.1 General** Emissions within a restricted band and within 2 MHz of an authorized band edge may be measured using either the marker-delta method or the integration method, which is described in 11.13.3, provided that the DTS bandwidth (or EBW) edge falls within 2 MHz of the band edge. Otherwise, all unwanted emissions measurements shall be performed using the standard methods.
C63.10 (11.13.3) C63.10 (11.13.3.1)	**11.13.3 Integration method** **11.13.3.1 General** The following procedures may be used to determine the peak or average field strength or power of an unwanted emission that is within 2 MHz of the authorized band edge. If a peak detector is used, then use the procedure described in 11.13.3.2. Use the procedure described in 11.13.3.3 when using an average detector and the EUT can be configured to transmit continuously (i.e., D ≥ 98%). Use the procedure described in 11.13.3.4 when using an average detector and the EUT cannot be configured to transmit continuously but the duty cycle is constant (i.e., duty cycle variations are less than ±2%). Use the procedure described in 11.13.3.5 when using an average detector for those cases where the EUT cannot be configured to transmit continuously and the duty cycle is not constant (duty cycle variations equal or exceed 2%).

Test Procedure (Cont.)	
Normative Reference	FCC 47 CFR §2.1051, §15.247(d), RSS-Gen (6.13), RSS-247 (5.5),
	KDB 558074 (8.7), ANSI C63.10 (11.13.3.3)

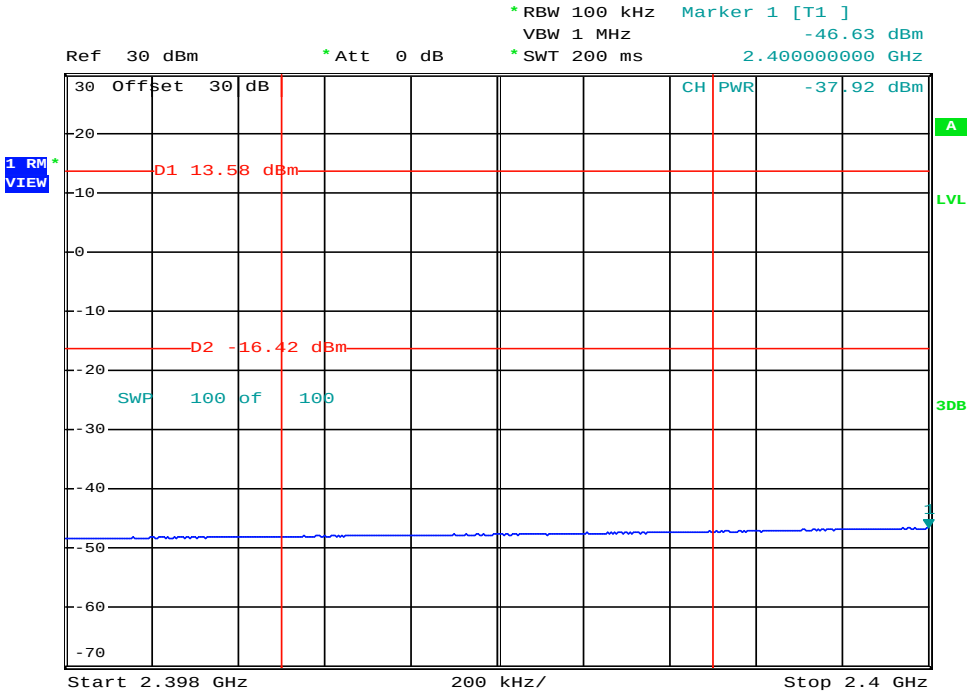
General Procedure	
C63.10 (11.13.3.3)	**11.13.3.3 Trace averaging with continuous EUT transmission at full power** a) Set instrument center frequency to the frequency of the emission to be measured (must be within 2 MHz of the authorized band edge). b) Set span to 2 MHz. c) RBW = 100 kHz. d) VBW ≥ [3 × RBW]. e) Detector = RMS (power averaging), if [span / (# of points in sweep)] ≤ (RBW / 2). f) Averaging type = power (i.e., rms): g) Sweep time = auto. h) Perform a trace average of at least 100 traces. i) Compute the power by integrating the spectrum over 1 MHz using the analyzer's band power measurement function with band limits set equal to the emission frequency ($f_{emission}$) ± 0.5 MHz. If the instrument does not have a band power function, then sum the amplitude levels (in power units) at 100 kHz intervals extending across the 1 MHz spectrum defined by $f_{emission}$ ± 0.5 MHz.

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 Reference Level Measurement was 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. The highest Reference Level Measurement from Section 12 was to determine the attenuation of the unwanted band edge emissions. The measured Duty Cycle was 35%, reference Section 7. The limit line was reduced by a factor of 10Log(1/.35) = 4.6dB.

Plot 13.1 – Lower Band Edge – 2405MHz – Host 1

Lower Band Edge

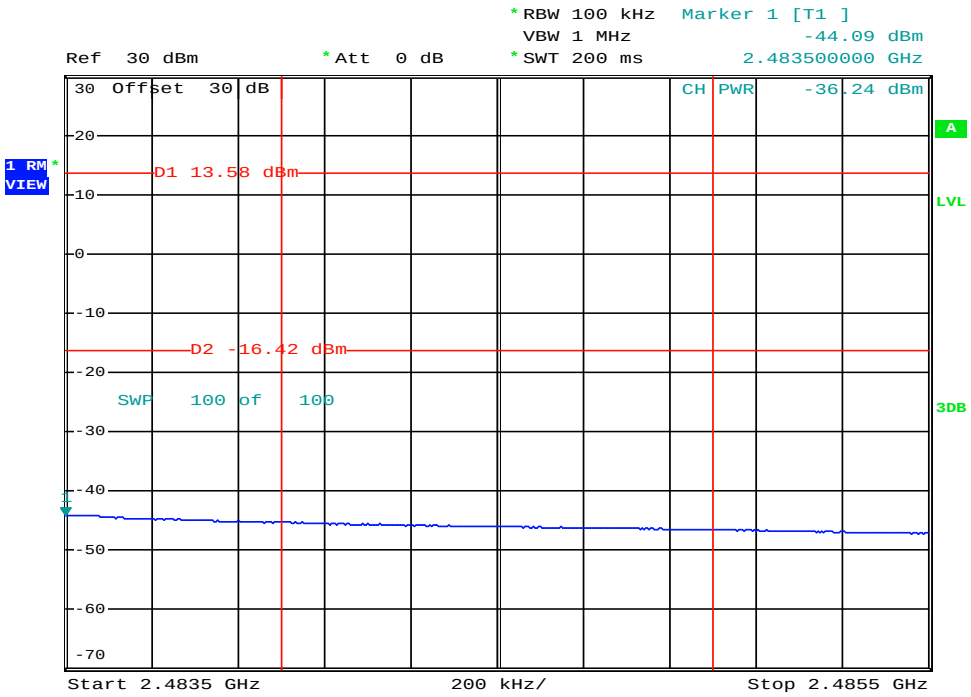


Date: 23.NOV.2018 11:22:38

Channel Frequency:	Channel Bandwidth:	Transmit Duty Cycle:
2405.00 MHz	**3.00** MHz	**100** %
Modulation Setting:	**Channel Power Setting:**	**Nominal Input Voltage:**
O-QPSK	**Max** dBm	**5.0** VDC
		Measured Emission Level: **-37.92** dBm

Plot 13.2 – Upper Band Edge – 2480MHz – Host 1

Upper Band Edge



Date: 23.NOV.2018 11:25:26

Channel Frequency: **2480.00** MHz	Channel Bandwidth: **3.00** MHz	Transmit Duty Cycle: **100** %
Modulation Setting: **O-QPSK**	Channel Power Setting: **Max** dBm	Nominal Input Voltage: **5.0** VDC
		Measured Emission Level: **-36.24** dBm

Table 13.1 – Summary of Band Edge Measurements – Host 1

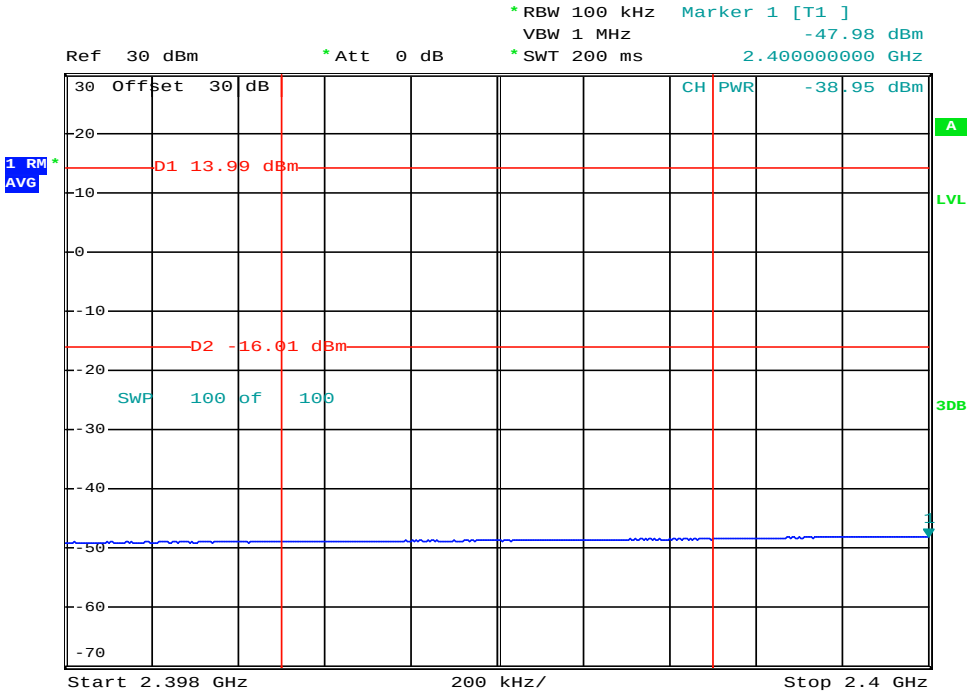
Band Edge Emission Measurement								
Frequency Range (MHz)	BW (MHz)	Modulation	Power Setting(1) (dBm)	Supply Voltage (VDC)	Transmit Duty Cycle (%)	Measured Emission [E_{Meas}] (dBm)	Limit Line [A_L] (dBm)	Margin (dB)
2398 - 2400	3	O-QPSK	Max	5.0	100	-37.92	-21.46	**16.46**
2483.5 - 2485.5						-36.24		**14.78**
						Result:		**Complies**

(1) The output power is factory set to maximum

Margin = A_L - E_{MEAS}

Plot 13.3 – Lower Band Edge – 2405MHz – Host 2

Lower Band Edge

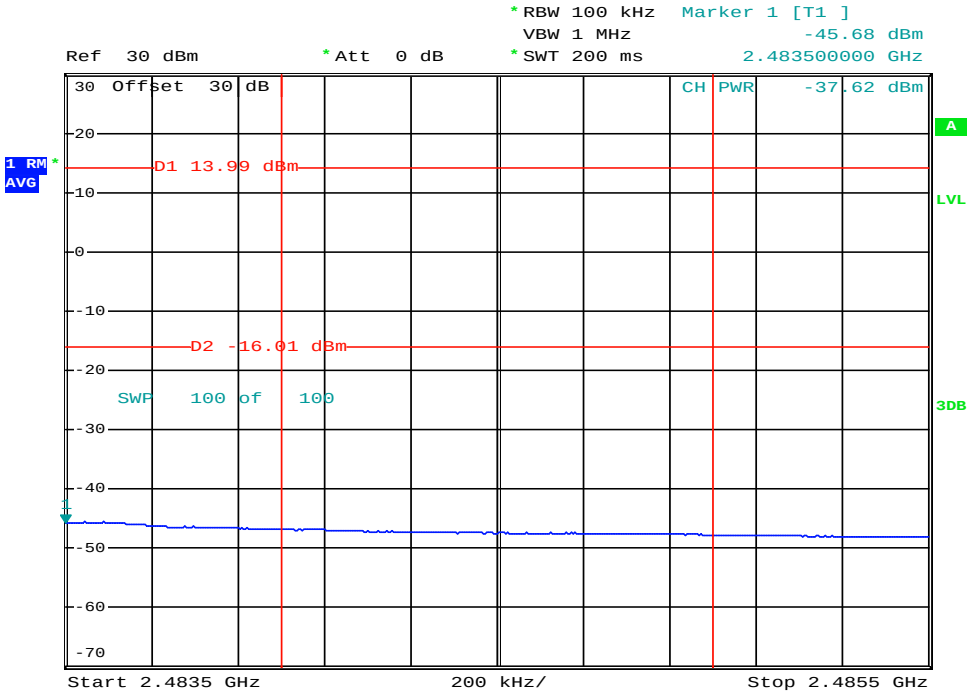


Date: 22.NOV.2018 12:47:11

Channel Frequency:	Channel Bandwidth:	Transmit Duty Cycle:
2405.00 MHz	**3.00** MHz	**100** %
Modulation Setting:	**Channel Power Setting:**	**Nominal Input Voltage:**
O-QPSK	**Max** dBm	**5.0** VDC
		Measured Emission Level:
		-38.95 dBm

Plot 13.4 – Upper Band Edge – 2480MHz – Host 2

Upper Band Edge



Date: 22.NOV.2018 12:51:00

Channel Frequency: **2480.00** MHz	Channel Bandwidth: **3.00** MHz	Transmit Duty Cycle: **100** %
Modulation Setting: **O-QPSK**	Channel Power Setting: **Max** dBm	Nominal Input Voltage: **5.0** VDC
		Measured Emission Level: **-37.62** dBm

Table 13.2 – Summary of Band Edge Measurements – Host 2

Band Edge Emission Measurement								
Frequency Range (MHz)	BW (MHz)	Modulation	Power Setting[1] (dBm)	Supply Voltage (VDC)	Transmit Duty Cycle (%)	Measured Emission [E_{Meas}] (dBm)	Limit Line [A_L] (dBm)	Margin (dB)
2398 - 2400	3	O-QPSK	Max	5.0	100	-38.95	-21.46	**17.49**
2483.5 - 2485.5						-37.62		**16.16**
						Result:		**Complies**

(1) The output power is factory set to maximum

Margin = A_L - E_{MEAS}

14.0 - 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

Test Procedure (Cont.)	
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)

General Procedure	
C63.10 (11.12)	**11.12.0 Emissions in restricted frequency bands** The DTS rules specify that emissions which fall into restricted frequency bands shall comply with the general radiated emission limits.
C63.10 (11.12.2)	**11.12.2 Antenna-port conducted measurements** **11.12.2.1 General** Antenna-port conducted measurements may also be used as an alternative to radiated measurements for demonstrating compliance in the restricted frequency bands. If conducted measurements are performed, then proper impedance matching must be ensured and an additional radiated test for cabinet/case spurious emissions is required. **111.12.2.2 General Procedure for conducted measurements in restricted bands** a) Measure the conducted output power (in dBm) using the detector specified (see 12.2.2, 12.2.3, and 12.2.4 for guidance regarding measurement procedures for determining quasi-peak, peak, and b) Add the maximum transmit antenna gain (in dBi) to the measured output power level to determine the EIRP level (see 12.2.5 for guidance on determining the applicable antenna gain) c) Add the appropriate maximum ground reflection factor to the EIRP level (6 dB for frequencies ≤ 30 MHz, 4.7 dB for frequencies between 30 MHz and 1000 MHz, inclusive and 0 dB for frequencies > 1000 MHz). e) Convert the resultant EIRP level to an equivalent electric field strength using the following relationship: $E = EIRP - 20\log D + 104.8$ where: E = electric field strength in dBµV/m, EIRP = equivalent isotropic radiated power in dBm D = specified measurement distance in meters. f) Compare the resultant electric field strength level to the applicable f) Compare the resultant electric field strength level to the applicable g) Perform radiated spurious emission test

Test Procedure (Cont.)

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 (11.12.2.5.1)

General Procedure

C63.10 (11.12.2.4)

11.12.2.4 Peak power measurement procedure

a) RBW = as specified in Table 1.

b) VBW ≥ 3 X RBW.

c) Detector = Peak.

d) Sweep time = auto.

e) Trace mode = max hold.

f) Allow sweeps to continue until the trace stabilizes.

Table 1 - RBW as a Function of Frequency

Frequency	RBW
9 - 150kHz	200 - 300Hz
0.15 - 30MHz	9 - 10kHz
30 - 1000	100 - 120kHz
> 1000	1MHz

If the peak-detected amplitude can be shown to comply with the average limit, then it is not necessary to perform a separate average measurement.

C63.10 (11.12.2.5.1)

11.12.2.5.1 Trace averaging with continuous EUT transmission at full power

a) RBW = 1 MHz (unless otherwise specified).

b) VBW ≥ [3 × RBW].

c) Detector = RMS, if span/(# of points in sweep) ≤ (RBW/2). Satisfying this condition may require increasing the number of points in the sweep or reducing the span. If this condition cannot be satisfied, then the detector mode shall be set to peak.

d) Averaging type = power (i.e., RMS).

e) Sweep time = auto.

f) Perform a trace average of at least 100 traces.

Test Setup

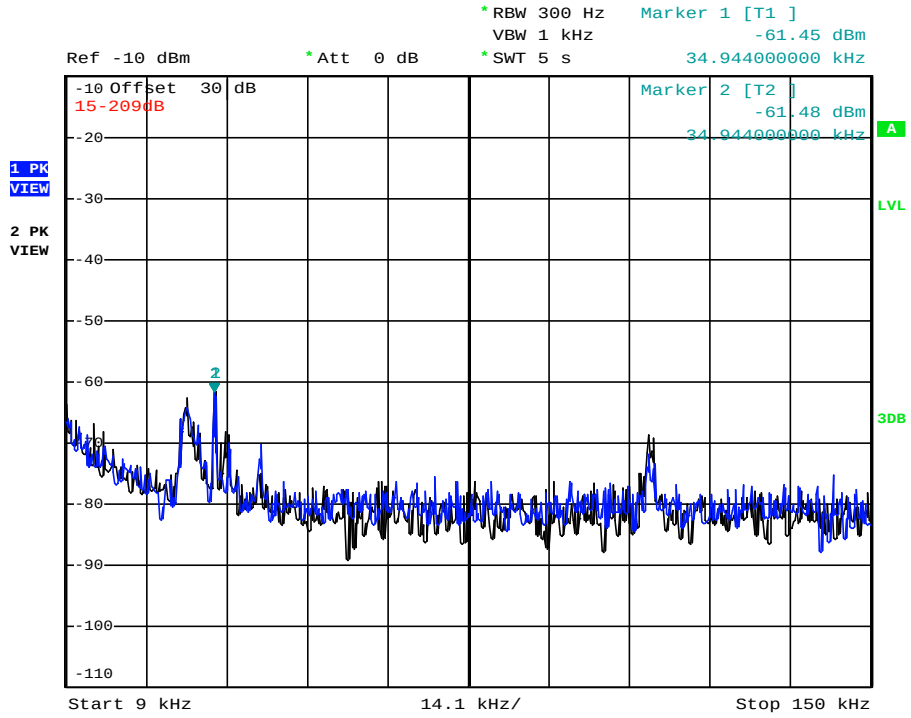
Appendix A - Figure A.1

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 frequency channel as permitted by the device. The unwanted emissions were measured and recorded and compare to the limits converted to dBuV/m @3m.

Plot 14.1 – Restricted Band – 9kHz – 150kHz – Host 1

Restricted Band Emissions



Date: 23.NOV.2018 11:34:42

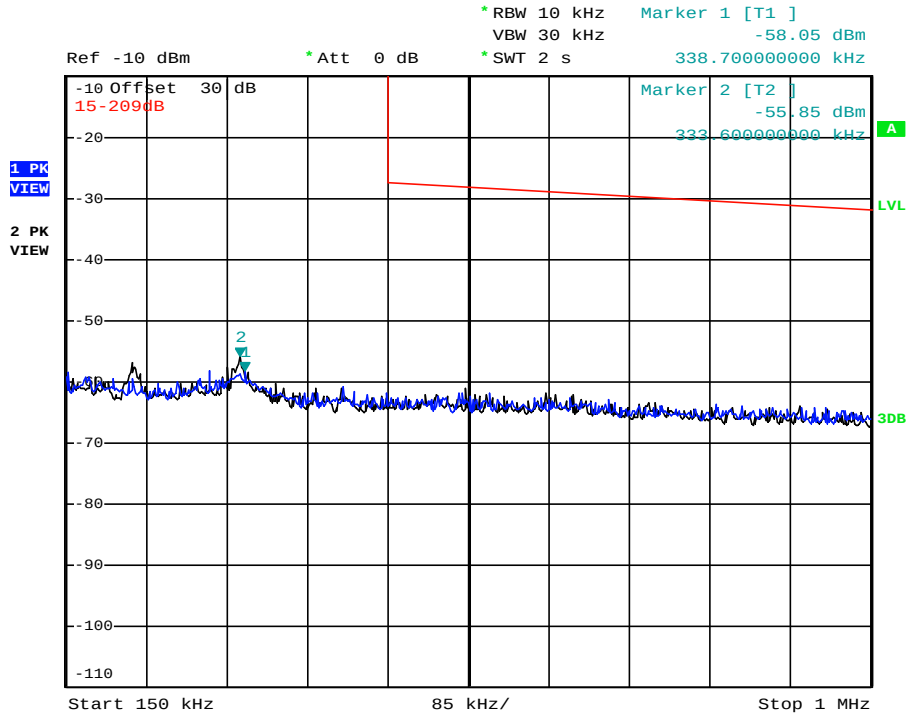
Channel Frequency:	Frequency Range:	Channel Bandwidth:
2405.00 MHz	**9kHz - 150kHz**	**3.00** MHz
Transmit Duty Cycle:	**Modulation Setting:**	**Channel Power Setting:**
100 %	**O_QPSK**	**Max** dBm

Trace 1: Ambient, Trace 2: DUT

Measured Emission: **-61.48** dBm

Plot 14.2 – Restricted Band – 150kHz – 1MHz – Host 1

Restricted Band Emissions



Date: 23.NOV.2018 11:39:18

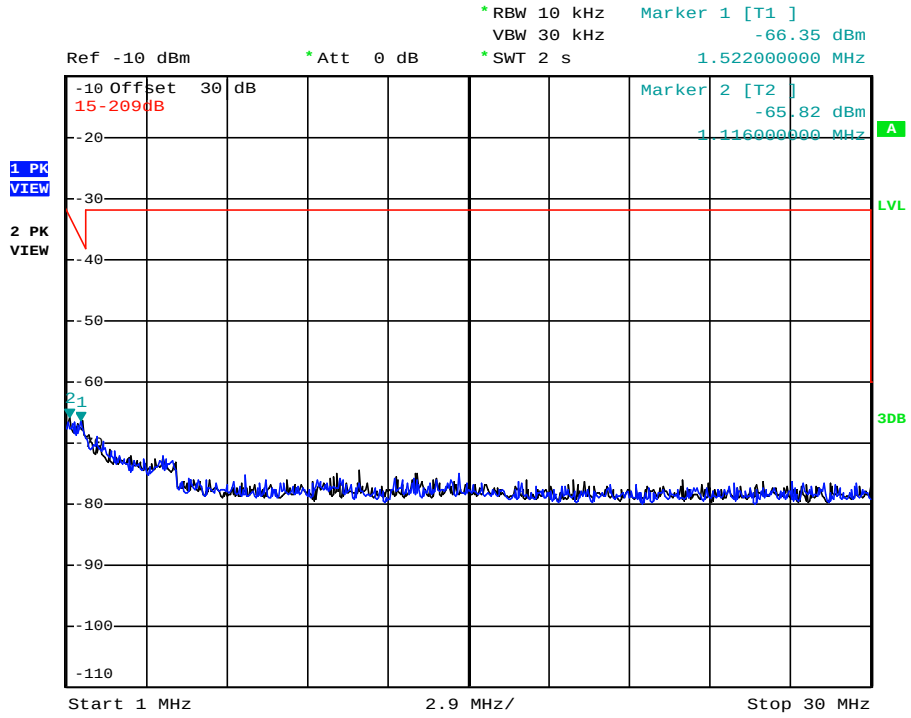
Channel Frequency:	Frequency Range:	Channel Bandwidth:
2405.00 MHz	**150kHz - 1MHz**	**3.00** MHz
Transmit Duty Cycle:	**Modulation Setting:**	**Channel Power Setting:**
100 %	**O_QPSK**	**Max** dBm

Trace 1: Ambient, Trace 2: DUT

Measured Emission: **-55.85** dBm

Plot 14.3 – Restricted Band – 1MHz – 30MHz – Host 1

Restricted Band Emissions



Date: 23.NOV.2018 11:41:26

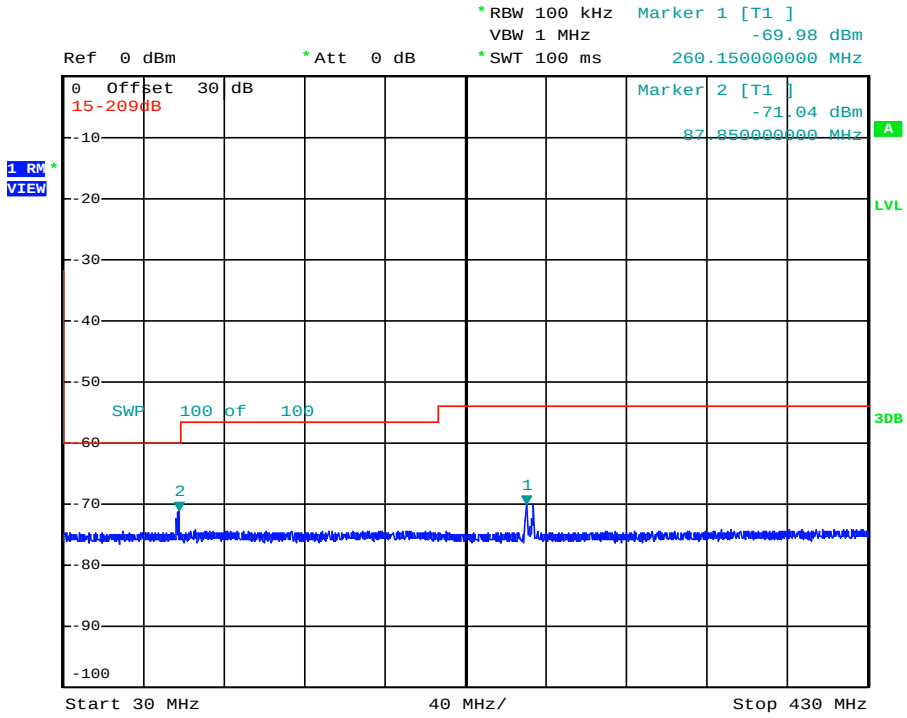
Channel Frequency:	Frequency Range:	Channel Bandwidth:
2405.00 MHz	**1 - 30 MHz**	**3.00** MHz
Transmit Duty Cycle:	**Modulation Setting:**	**Channel Power Setting:**
100 %	**O_QPSK**	**Max** dBm

Trace 1: Ambient, Trace 2: DUT

Measured Emission: **-65.82** dBm

Plot 14.4 – Restricted Band – 30MHz – 430MHz – Host 1

Restricted Band Emissions



Date: 23.NOV.2018 12:05:53

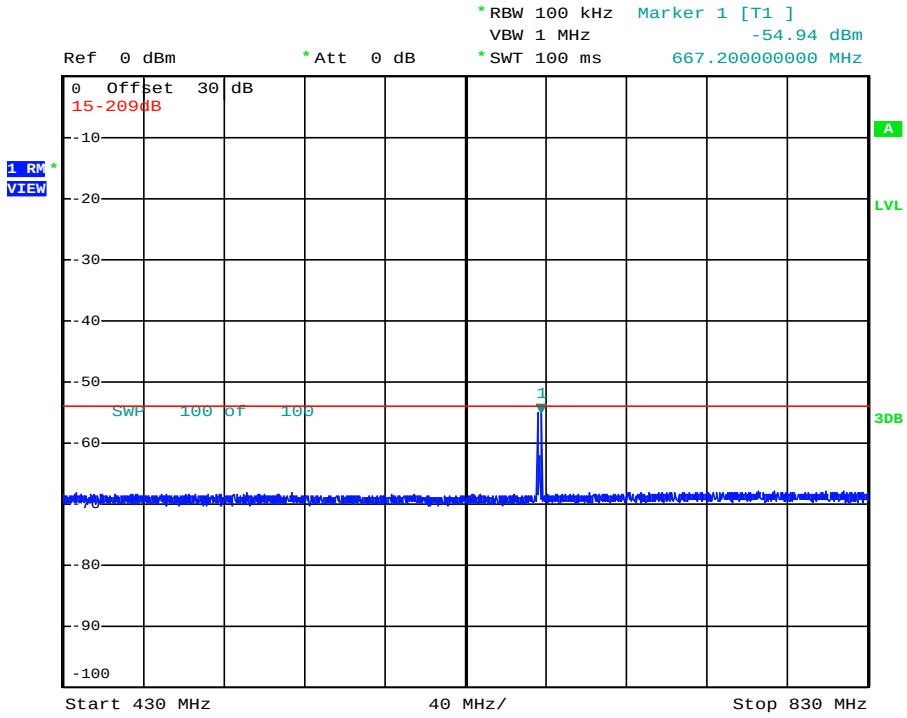
Channel Frequency:	Frequency Range:	Channel Bandwidth:
2405.00 MHz	**30 - 430MHz**	**3.00** MHz
Transmit Duty Cycle:	**Modulation Setting:**	**Channel Power Setting:**
100 %	**O_QPSK**	**Max** dBm

See Radiated Measurement at 87MHz and 260MHz

Measured Emission: **-69.98** dBm

Plot 14.5 – Restricted Band – 430MHz – 830MHz – Host 1

Restricted Band Emissions



Date: 23.NOV.2018 12:04:14

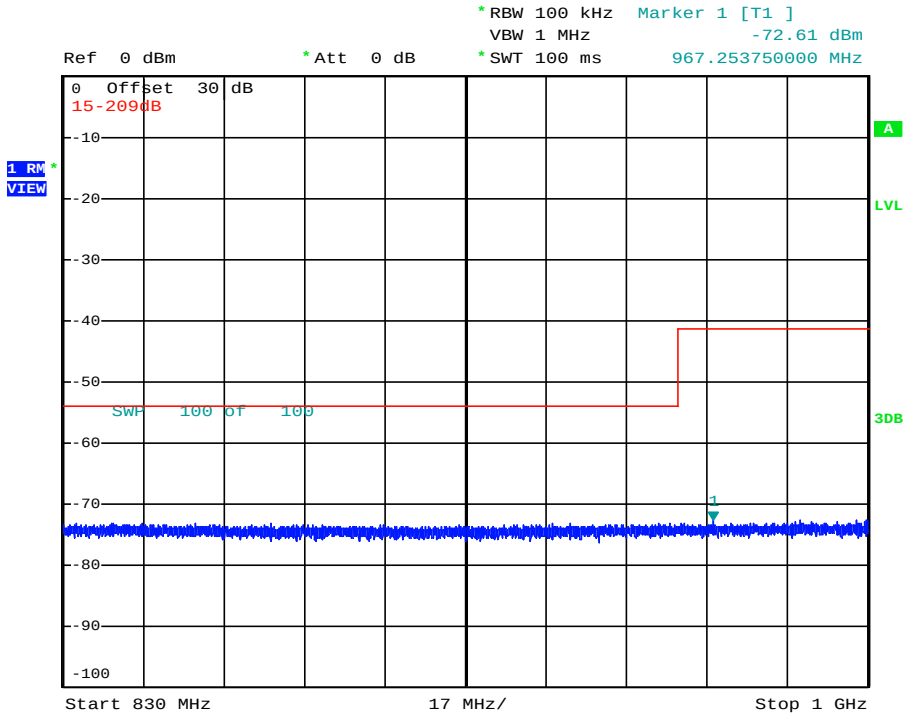
Channel Frequency:	Frequency Range:	Channel Bandwidth:
2405.00 MHz	**430 - 830MHz**	**3.00** MHz
Transmit Duty Cycle:	**Modulation Setting:**	**Channel Power Setting:**
100 %	**O_QPSK**	**Max** dBm

See Radiated Measurement at 667MHz

Measured Emission: **-54.94** dBm

Plot 14.6 – Restricted Band – 830MHz – 1000MHz – Host 1

Restricted Band Emissions

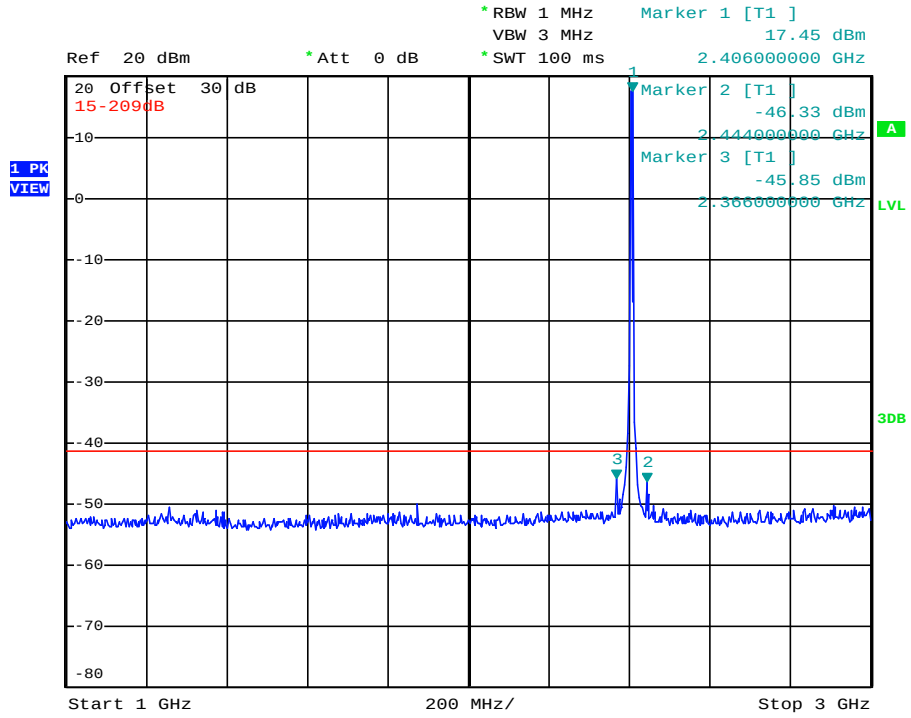


Date: 23.NOV.2018 12:07:02

Channel Frequency:	Frequency Range:	Channel Bandwidth:
2405.00 MHz	**830MHz-1GHz**	**3.00** MHz
Transmit Duty Cycle:	**Modulation Setting:**	**Channel Power Setting:**
100 %	**O_QPSK**	**Max** dBm
		Measured Emission:
		-72.61 dBm

Plot 14.7 – Restricted Band – 1GHz – 3GHz – Host 1

Restricted Band Emissions



Date: 23.NOV.2018 12:10:16

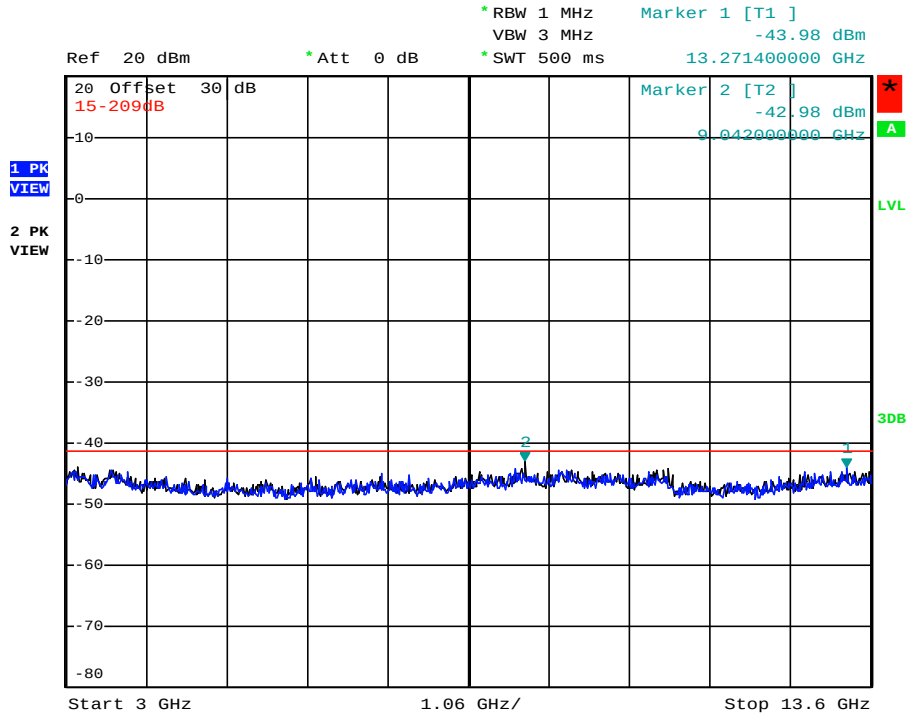
Channel Frequency:	Frequency Range:	Channel Bandwidth:
2405.00 MHz	**1 - 3 GHz**	**3.00** MHz
Transmit Duty Cycle:	**Modulation Setting:**	**Channel Power Setting:**
100 %	**O_QPSK**	**Max** dBm

Marker 1 = Fundamental

Measured Emission: **-46.33** dBm

Plot 14.8 – Restricted Band – 3GHz – 13.6GHz – Host 1

Restricted Band Emissions



Date: 23.NOV.2018 12:15:28

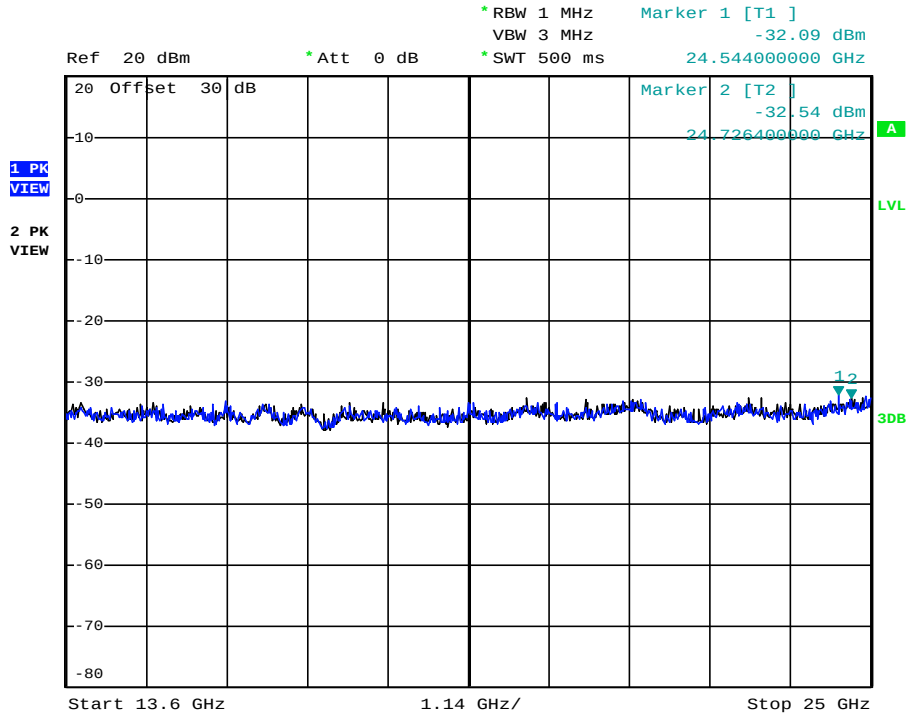
Channel Frequency:	Frequency Range:	Channel Bandwidth:
2405.00 MHz	**3 - 13.6 GHz**	**3.00** MHz
Transmit Duty Cycle:	**Modulation Setting:**	**Channel Power Setting:**
100 %	**O_QPSK**	**Max** dBm

Trace 1: Ambient, Trace 2: DUT

Measured Emission:
None Detected (ND) dBm

Plot 14.9 – Restricted Band – 13.6GHz – 25GHz – Host 1

Restricted Band Emissions



Date: 23.NOV.2018 12:17:14

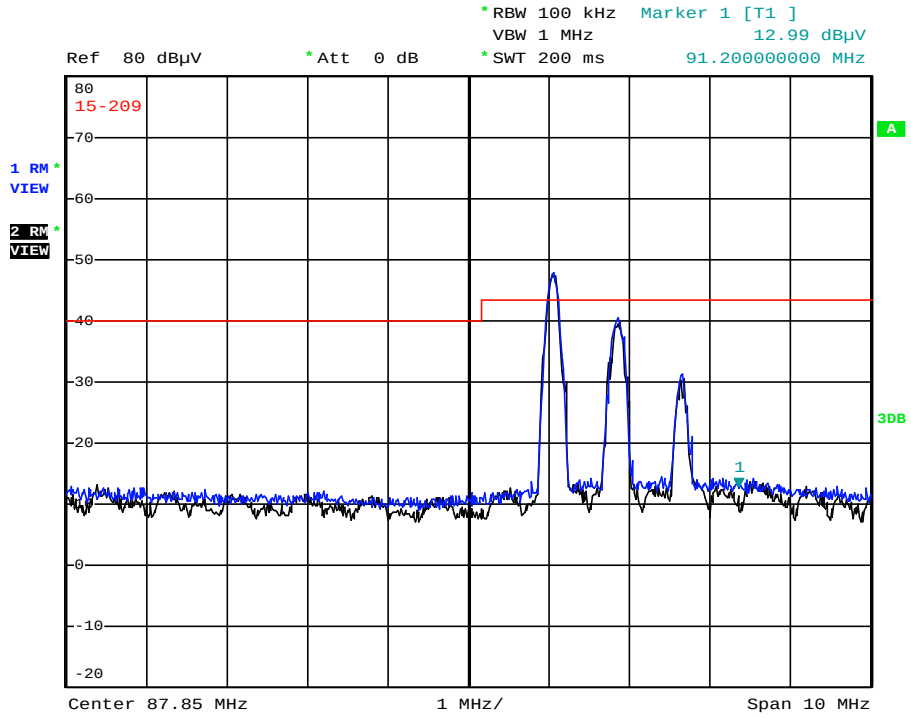
Channel Frequency:	Frequency Range:	Channel Bandwidth:
2405.00 MHz	**13.6 - 25 GHz**	**3.00** MHz
Transmit Duty Cycle:	**Modulation Setting:**	**Channel Power Setting:**
100 %	**O_QPSK**	**Max** dBm

Trace 1: Ambient, Trace 2: DUT

Measured Emission:
None Detected (ND) dBm

Plot 14.10 – Restricted Band – 87.85MHz – Horizontal - Host 1

Restricted Band Emissions

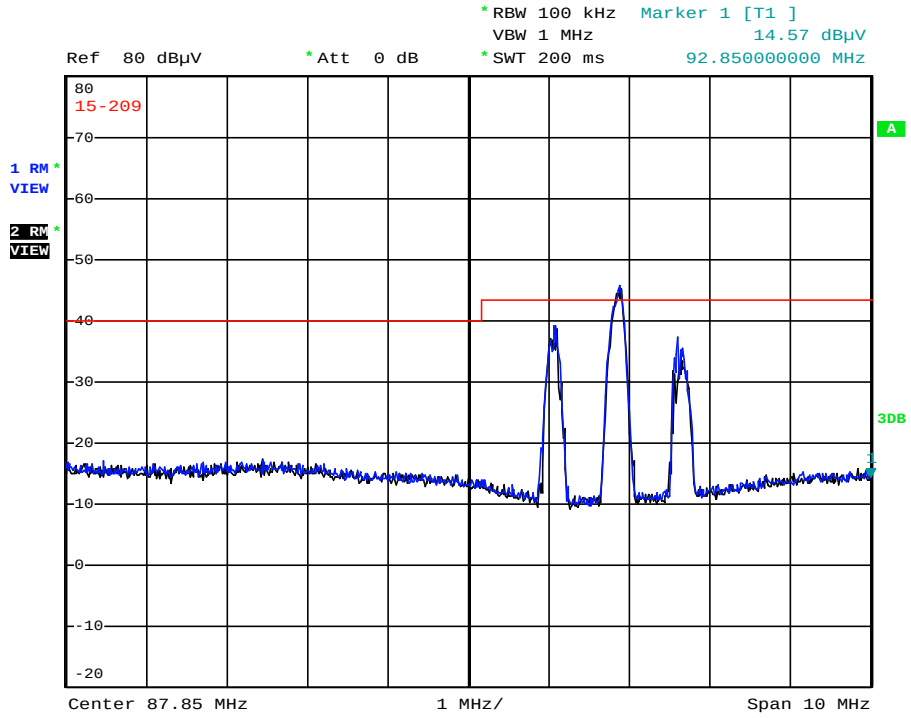


Date: 28.NOV.2018 16:37:08

Channel Frequency: **2405.00** MHz	Frequency Range: **87.85 MHz**	Channel Bandwidth: **3.00** MHz
Transmit Duty Cycle: **100** %	Modulation Setting: **O_QPSK**	Channel Power Setting: **Max** dBm
Antenna Polarization: **Horizontal**	Trace 1: Ambient Trace 2: DUT	Measured Emission: **None Detected (ND)** dBuV

Plot 14.11 – Restricted Band – 87.85MHz – Vertical - Host 1

Restricted Band Emissions

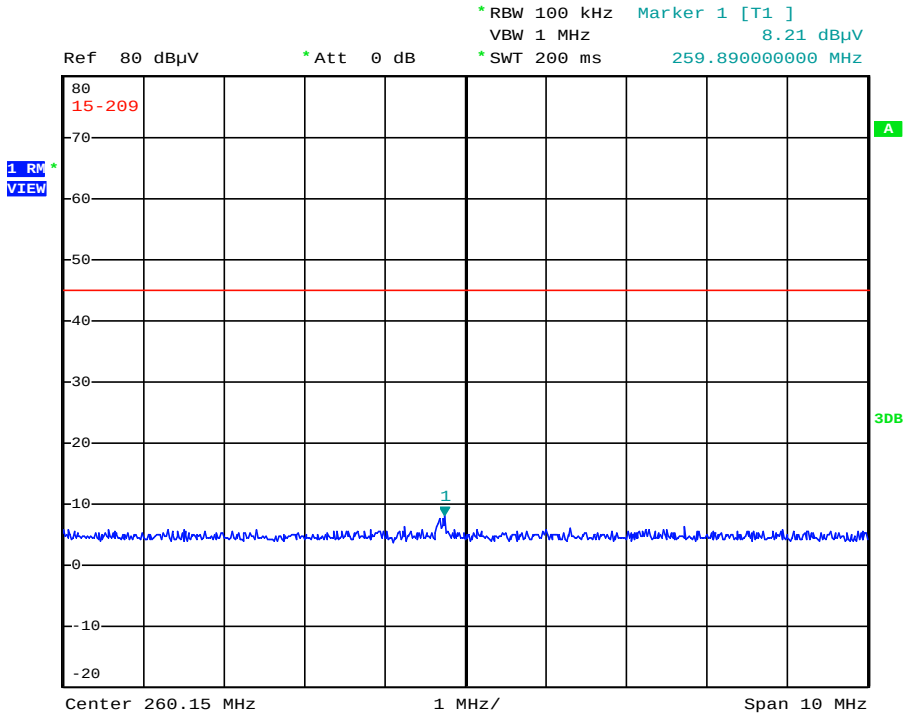


Date: 28.NOV.2018 16:42:09

Channel Frequency:	Frequency Range:	Channel Bandwidth:
2405.00 MHz	**87.85 MHz**	**3.00** MHz
Transmit Duty Cycle:	**Modulation Setting:**	**Channel Power Setting:**
100 %	**O_QPSK**	**Max** dBm
Antenna Polarization:	Trace 1: Ambient	**Measured Emission:**
Vertical	Trace 2: DUT	**None Detected (ND)** dBuV

Plot 14.12 – Restricted Band – 260.15MHz – Horizontal - Host 1

Restricted Band Emissions

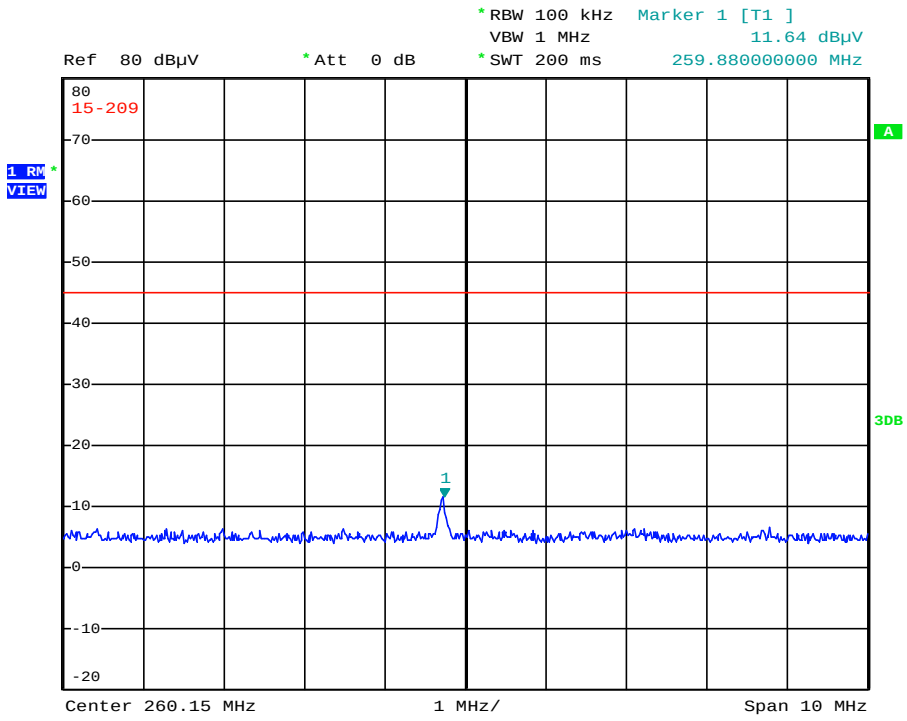


Date: 28.NOV.2018 16:38:05

Channel Frequency: **2405.00** MHz	Frequency Range: **260.15 MHz**	Channel Bandwidth: **3.00** MHz
Transmit Duty Cycle: **100** %	Modulation Setting: **O_QPSK**	Channel Power Setting: **Max** dBm
Antenna Polarization: **Horizontal**		Measured Emission: **8.21** dBuV

Plot 14.13 – Restricted Band – 260.15MHz – Vertical - Host 1

Restricted Band Emissions

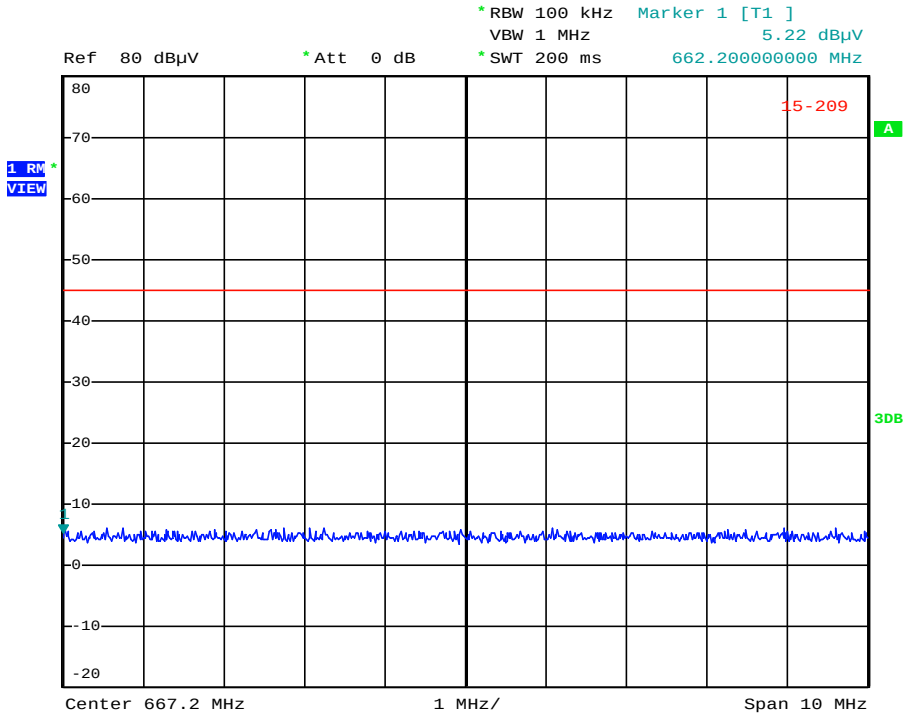


Date: 28.NOV.2018 16:41:13

Channel Frequency:	Frequency Range:	Channel Bandwidth:
2405.00 MHz	**260.15 MHz**	**3.00** MHz
Transmit Duty Cycle:	**Modulation Setting:**	**Channel Power Setting:**
100 %	**O_QPSK**	**Max** dBm
Antenna Polarization:		**Measured Emission:**
Vertical		**11.64** dBuV

Plot 14.14 – Restricted Band – 667.2MHz – Horizontal - Host 1

Restricted Band Emissions

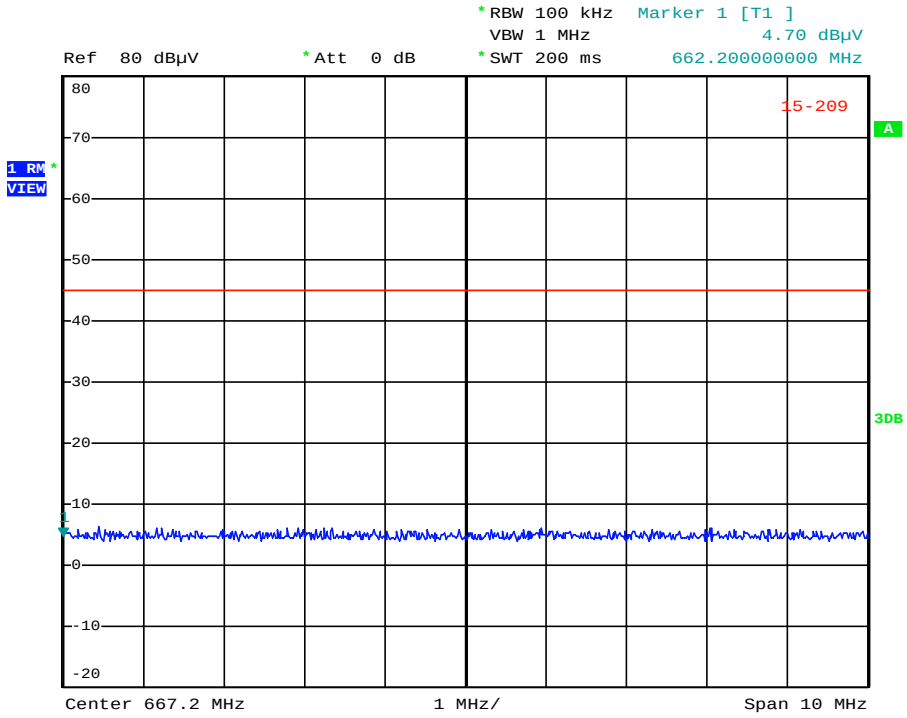


Date: 28.NOV.2018 16:38:41

Channel Frequency: **2405.00** MHz	Frequency Range: **667.2 MHz**	Channel Bandwidth: **3.00** MHz
Transmit Duty Cycle: **100** %	Modulation Setting: **O_QPSK**	Channel Power Setting: **Max** dBm
Antenna Polarization: **Horizontal**		Measured Emission: **None Detected (ND)** dBuV

Plot 14.15 – Restricted Band – 667.2MHz – Vertical - Host 1

Restricted Band Emissions



Date: 28.NOV.2018 16:40:30

Channel Frequency:	Frequency Range:	Channel Bandwidth:
2405.00 MHz	**667.2 MHz**	**3.00** MHz
Transmit Duty Cycle:	**Modulation Setting:**	**Channel Power Setting:**
100 %	**O_QPSK**	**Max** dBm
Antenna Polarization:		**Measured Emission:**
Vertical		**None Detected (ND)** dBuV

Table 14.1 – Summary of Restricted Band Measurements – Host 1

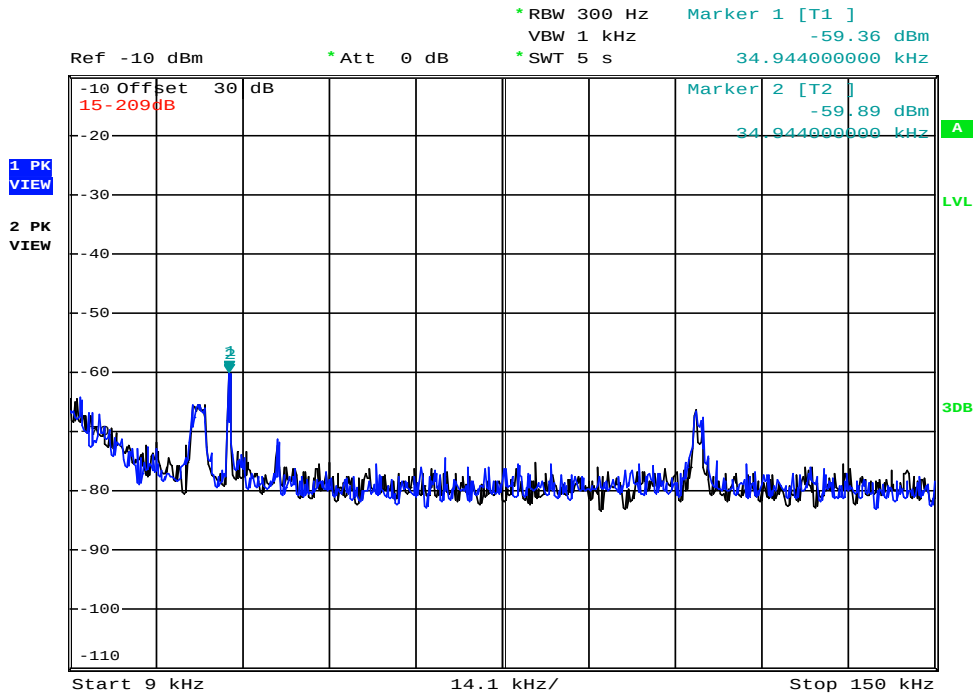
Emission Level Measurement Results										
Frequency Range	BW (MHz)	Modulatio	Power Setting[1] (dBm)	Transmit Duty Cycle (%)	Measured Emission [E_{Meas}] (dBm)	Antenna Gain [G_T] (dBi)	EIRP[2] [EIRP] (dBm)	Field Strength[3] [E] (dBuV/m @ 3m)	Worst Case Limit[4] [A_L] (dBuV @ 3m)	Margin (dB)
9kHz - 150kHz	3	O-QPSK	Max	100	-61.48	8.00	-59.89	35.37	93.8	**58.43**
150kHz - 1MHz					-55.85		-56.34	38.92	63.0	**24.08**
1 - 30MHz					-65.82		-67.20	28.06	69.5	**41.44**
30 - 430MHz					-69.98		**Reference Radiated Measurements**			
430 - 830MHz					-54.94					
830 - 1000MHz					-72.61					
1 - 3GHz					-46.33		**No Spurious Emissions Detected**			
3 - 13.6GHz					-42.98					
13.6 - 25GHz					-32.09					
Radiated Measurements										
87.5MHz Horiz	3	O-QPSK	Max	100		8.00	**None Detected**			
87.5MHz Vert										
260.15MHz Horiz								8.21	46.0	**37.79**
260.15MHz Vert								11.64	46.0	**34.36**
667.2MHz Horz							**None Detected**			
667.2MHz Vert										
Results:										**Complies**

Table 14.1 – Summary of Restricted Band Measurements – Host 1 (Cont.)

(1) The output power is factory set to maximum
(2) Calculated: EIRP = $E_{[MEAS]}$ + G_T + CF, CF = 6dB for F ≤ 30MHz, 4.7dB for 30MHz ≤ F ≤ 1000MHz, 0dB for F > 1000MHz
(3) Calculated: E = EIRP - 20Log(D) + 104.8, D=3m
(4) The lowest limit within the test frequency range applied.
Limit between 9kHz and 490kHz = 2400/F (kHz) @300m = 266uV/m to 4.89uV/m dBuV/m = 20Log (uV/m) = 48.5dBuV/m to 13.8dBuV/m Distance Corrected: = 128.5dBuV/m to 93.8dBuV/m
Limit between 490kHz and 1705kHz = 24000/F (kHz) @30m = 160uV/m to 14uV/m dBuV/m = 20Log (uV/m) = 44.1dBuV/m to 23dBuV/m Distance Corrected: = 88.1dBuV/m to 63dBuV/m
Limit Between 1705kHz and 30MHz = 30uV/m @30m dBuV/m = 20Log (uV/m) = 29.5dBuV/m Distance Corrected: = 69.5dBuV/m
Limit between 30MHz and 88MHz = 100uV/m @ 3m dBuV/m = 20Log (uV/m) = 40dBuV/m
Limit between 88MHz and 216MHz = 150uV/m @ 3m dBuV/m = 20Log (uV/m) = 43.5dBuV/m
Limit between 216MHz and 960MHz = 200uV/m @3m dBuV/m = 20Log (uV/m) = 46dBuV/m
Limit Above 960MHz = 500uV/m @3m dBuV/m = 20Log (uV/m) = 54.0dBuV/m
Distance Correction: $40Log(D_{LIM}/D_{MEAS})$ + Limit Below 30MHz Where D_{LIM} is the Limit Distance, D_{MEAS} is the Measurement Distance, Below = 80dB + Limit @300m = 40dB + Limit @30m
§15.31(f)(2) At frequencies below 30 MHz...when performing measurements at a closer distance than specified, the results shall be extrapolated to the specified distance by either making measurements at a minimum of two distances on at least one radial to determine the proper extrapolation factor or by using the square of an inverse linear distance extrapolation factor (40 dB/decade).

Plot 14.16 – Restricted Band – 9kHz – 150kHz – Host 2

Restricted Band Emissions

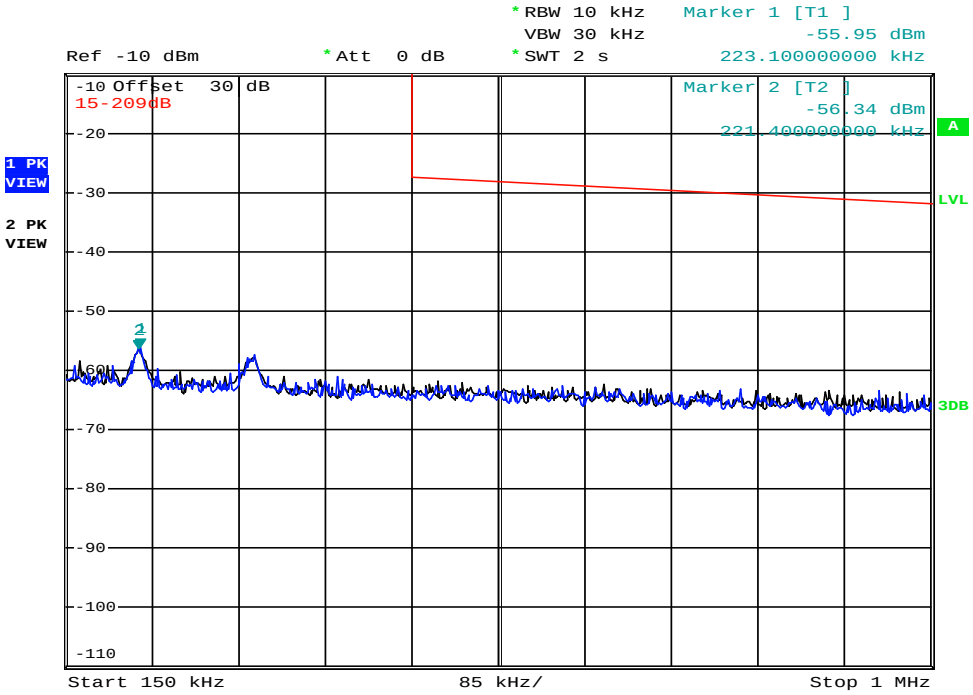


Date: 22.NOV.2018 14:27:29

Channel Frequency:	Frequency Range:	Channel Bandwidth:
2405.00 MHz	**9kHz - 150kHz**	**3.00** MHz
Transmit Duty Cycle:	**Modulation Setting:**	**Channel Power Setting:**
100 %	**O_QPSK**	**Max** dBm
		Measured Emission:
		-59.89 dBm

Plot 14.17 – Restricted Band – 150kHz – 1MHz – Host 2

Restricted Band Emissions

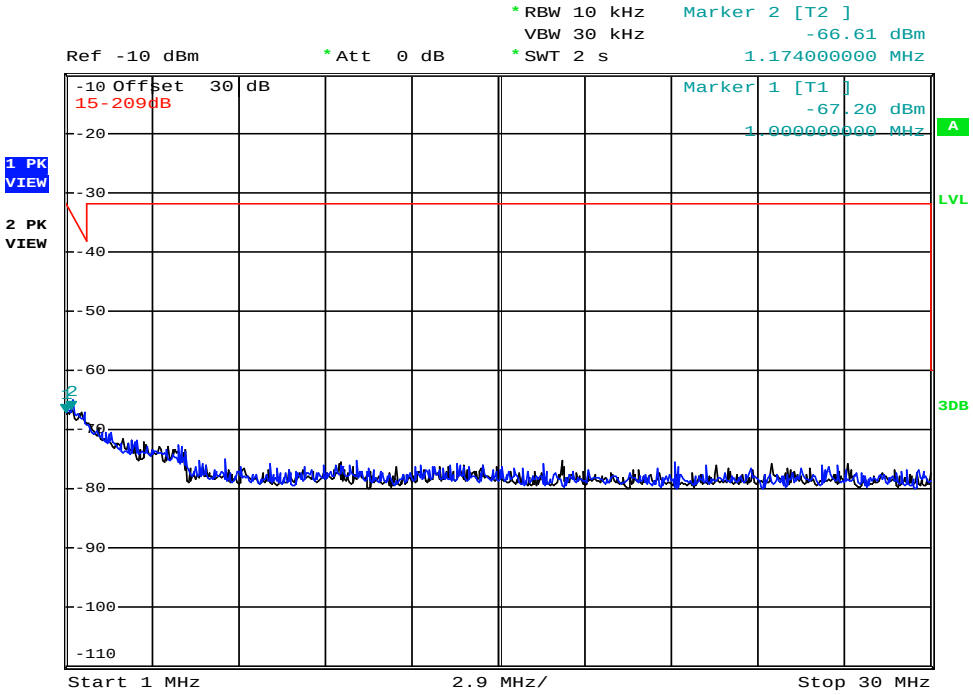


Date: 22.NOV.2018 14:36:28

Channel Frequency:	Frequency Range:	Channel Bandwidth:
2405.00 MHz	**150kHz - 1MHz**	**3.00** MHz
Transmit Duty Cycle:	**Modulation Setting:**	**Channel Power Setting:**
100 %	**O_QPSK**	**Max** dBm
		Measured Emission:
		-56.34 dBm

Plot 14.18 – Restricted Band – 1MHz – 30MHz – Host 2

Restricted Band Emissions

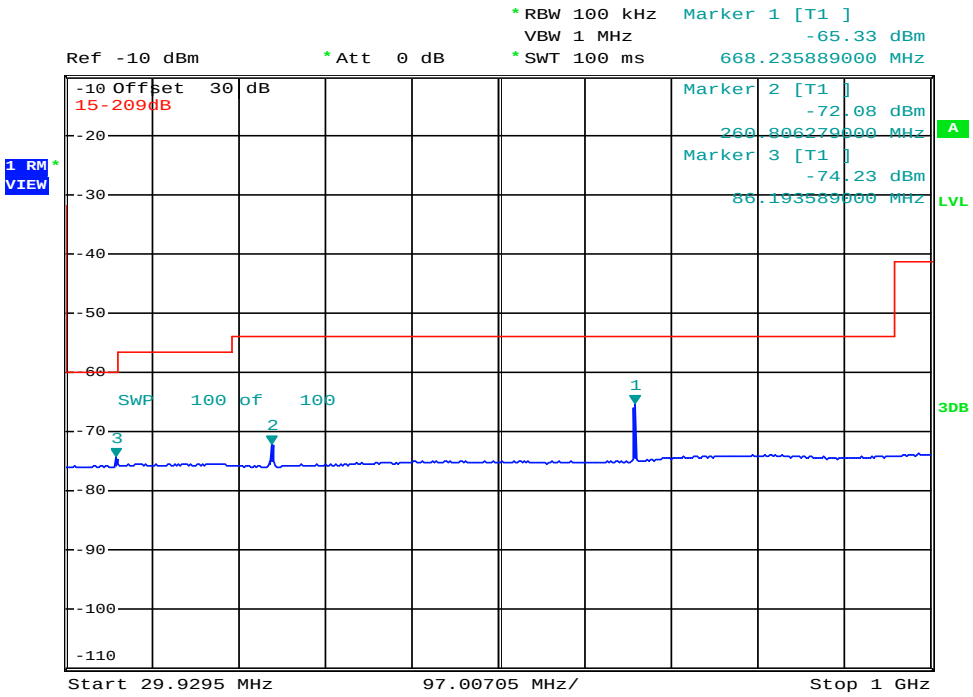


Date: 22.NOV.2018 14:40:46

Channel Frequency:	Frequency Range:	Channel Bandwidth:
2405.00 MHz	**1 - 30 MHz**	**3.00** MHz
Transmit Duty Cycle:	**Modulation Setting:**	**Channel Power Setting:**
100 %	**O_QPSK**	**Max** dBm
		Measured Emission:
		-67.20 dBm

Plot 14.19 – Restricted Band – 30MHz – 1000MHz – Host 2

Restricted Band Emissions



Date: 22.NOV.2018 15:04:40

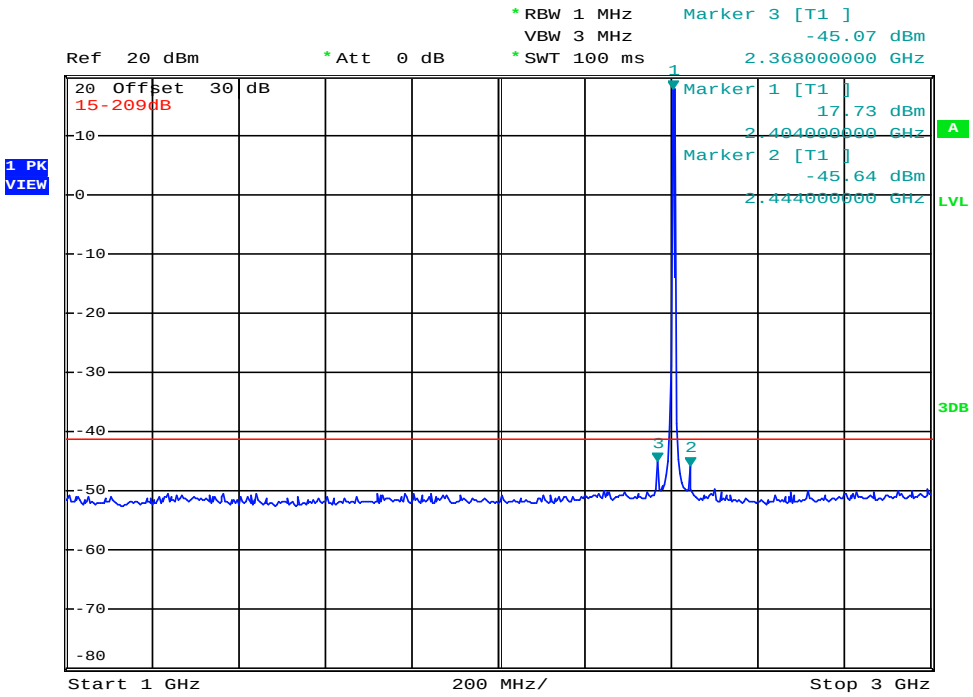
Channel Frequency:	Frequency Range:	Channel Bandwidth:
2405.00 MHz	**30 - 1000MHz**	**3.00** MHz
Transmit Duty Cycle:	**Modulation Setting:**	**Channel Power Setting:**
100 %	**O_QPSK**	**Max** dBm

See Radiated Measurement at 86MHz, 260MHz and 668MHz

Measured Emission: **-72.08** dBm

Plot 14.20 – Restricted Band – 1GHz – 3GHz – Host 2

Restricted Band Emissions

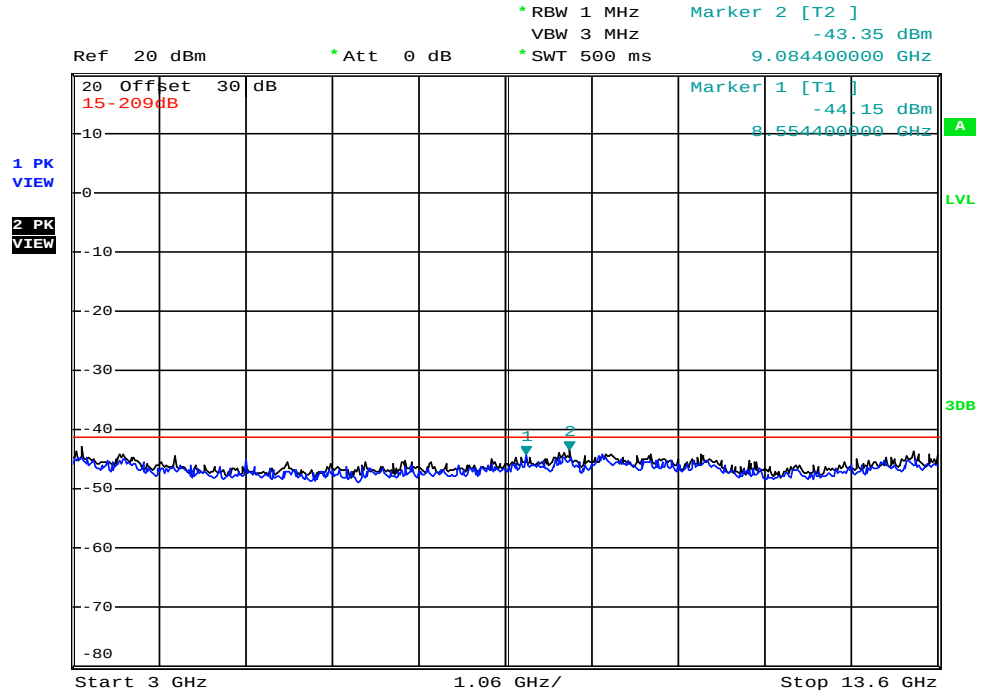


Date: 22.NOV.2018 15:09:58

Channel Frequency:	Frequency Range:	Channel Bandwidth:
2405.00 MHz	**1 - 3 GHz**	**3.00** MHz
Transmit Duty Cycle:	**Modulation Setting:**	**Channel Power Setting:**
100 %	**O_QPSK**	**Max** dBm
		Measured Emission:
		-45.64 dBm

Plot 14.21 – Restricted Band – 3GHz – 13.6GHz – Host 2

Restricted Band Emissions

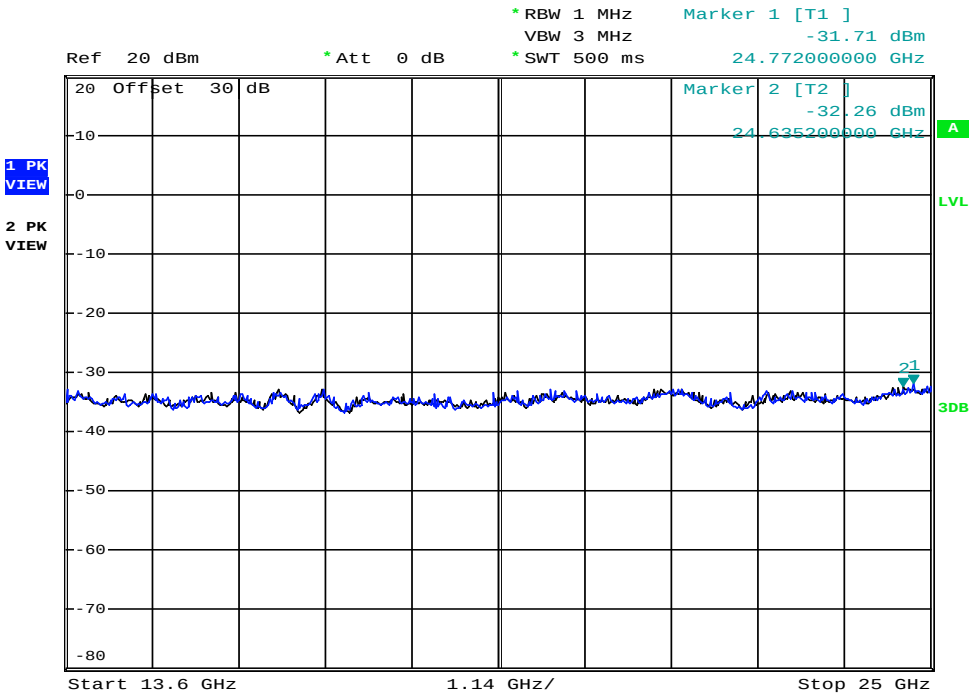


Date: 22.NOV.2018 15:15:33

Channel Frequency:	Frequency Range:	Channel Bandwidth:
2405.00 MHz	**3 - 13.6 GHz**	**3.00** MHz
Transmit Duty Cycle:	**Modulation Setting:**	**Channel Power Setting:**
100 %	**O_QPSK**	**Max** dBm
		Measured Emission:
		None Detected (ND) dBm

Plot 14.22 – Restricted Band – 13.6GHz – 25GHz – Host 2

Restricted Band Emissions

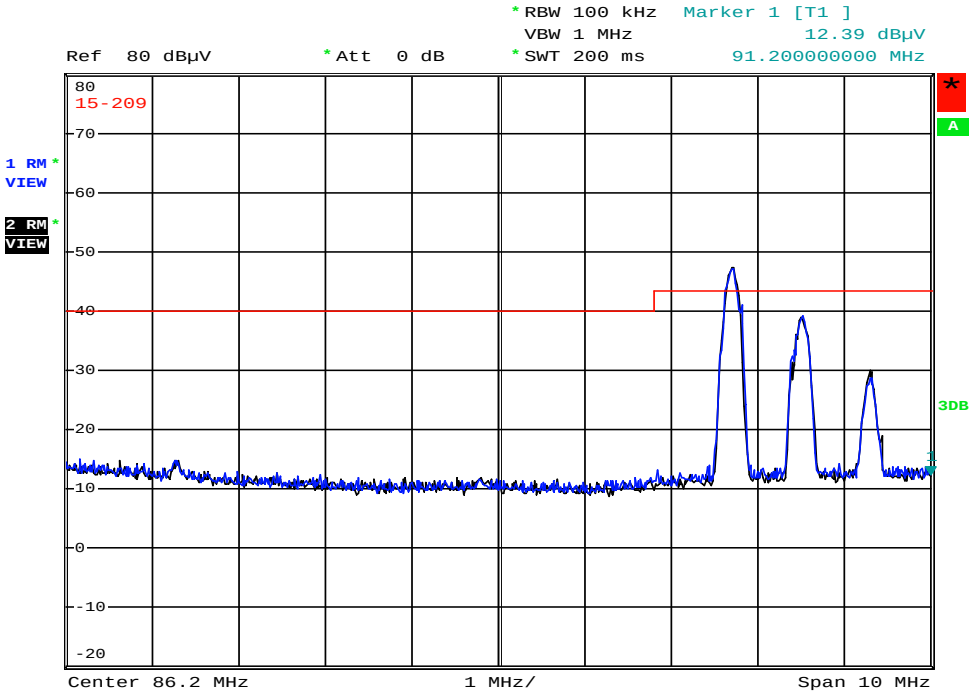


Date: 22.NOV.2018 15:18:04

Channel Frequency:	Frequency Range:	Channel Bandwidth:
2405.00 MHz	**13.6 - 25 GHz**	**3.00** MHz
Transmit Duty Cycle:	**Modulation Setting:**	**Channel Power Setting:**
100 %	**O_QPSK**	**Max** dBm
		Measured Emission:
		None Detected dBm

Plot 14.23 – Restricted Band – 86.2MHz – Horizontal - Host 2

Restricted Band Emissions

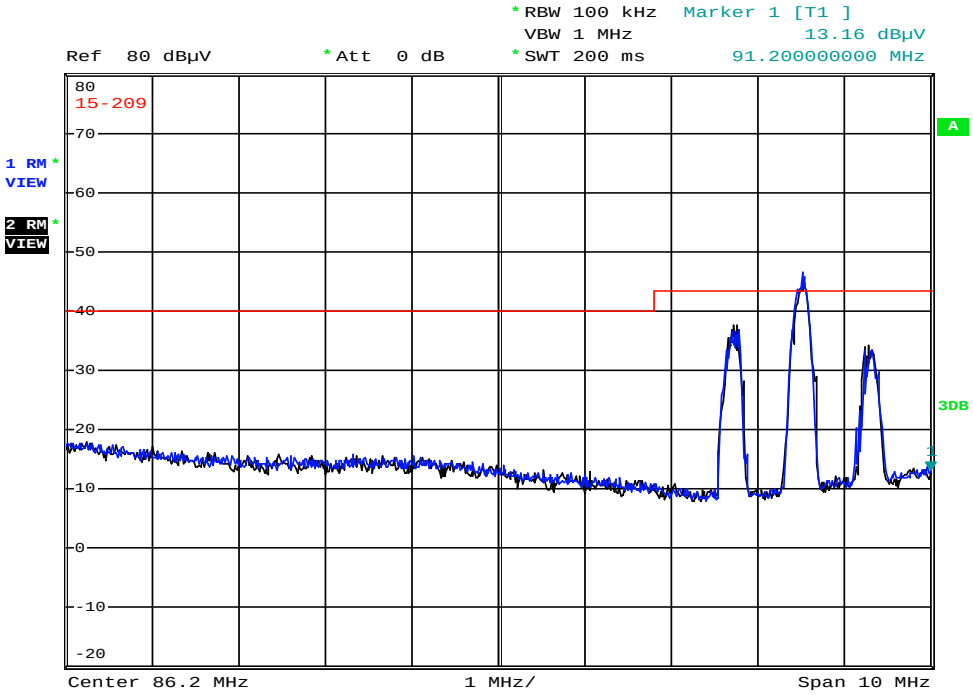


Date: 28.NOV.2018 16:14:27

Channel Frequency: **2405.00** MHz	Frequency Range: **86.2 MHz**	Channel Bandwidth: **3.00** MHz
Transmit Duty Cycle: **100** %	Modulation Setting: **O_QPSK**	Channel Power Setting: **Max** dBm
Antenna Polarization: **Horizontal**		Measured Emission: **None Detected (ND)** dBuV

Plot 14.24 – Restricted Band – 86.2MHz – Vertical - Host 2

Restricted Band Emissions

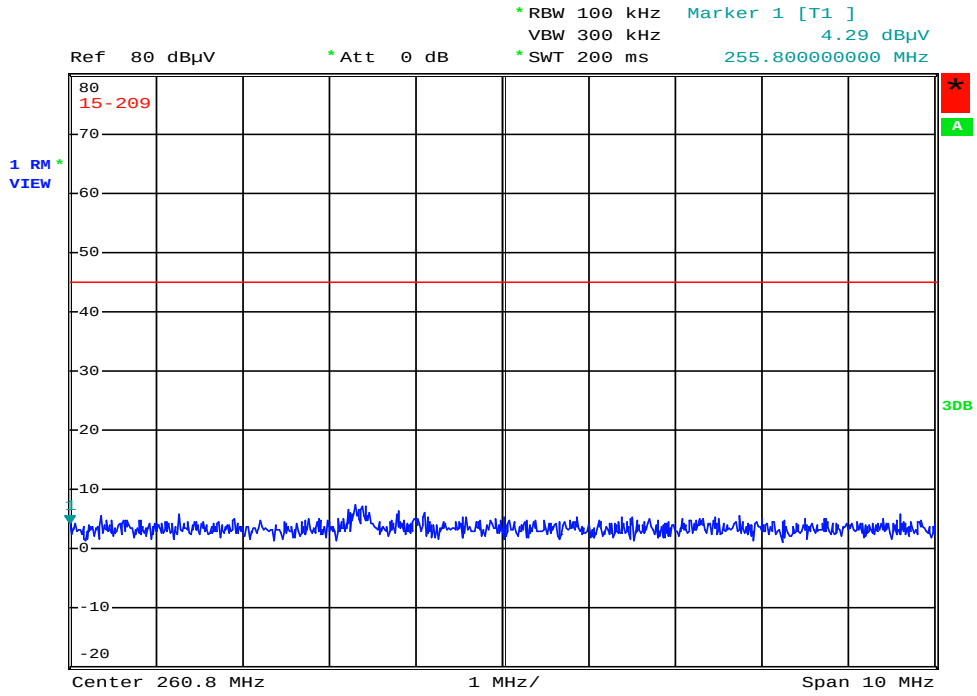


Date: 28.NOV.2018 16:21:35

Channel Frequency:	Frequency Range:	Channel Bandwidth:
2405.00 MHz	**86.2 MHz**	**3.00** MHz
Transmit Duty Cycle:	**Modulation Setting:**	**Channel Power Setting:**
100 %	**O_QPSK**	**Max** dBm
Antenna Polarization:		**Measured Emission:**
Vertical		**None Detected (ND)** dBuV

Plot 14.25 – Restricted Band – 260.8MHz – Horizontal - Host 2

Restricted Band Emissions

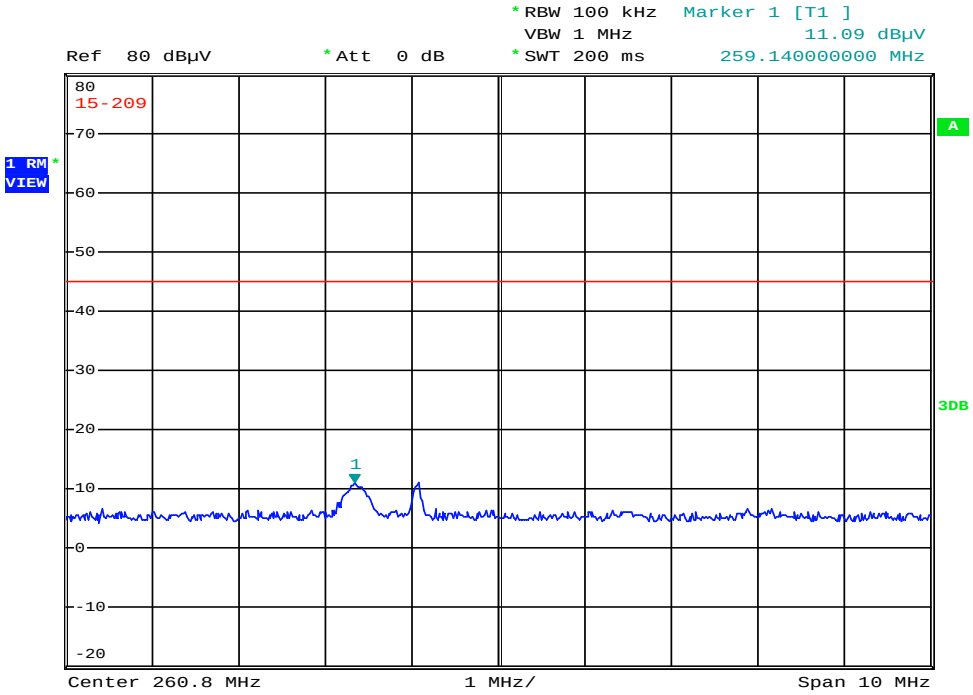


Date: 28.NOV.2018 16:15:39

Channel Frequency: **2405.00** MHz	Frequency Range: **260.8 MHz**	Channel Bandwidth: **3.00** MHz
Transmit Duty Cycle: **100** %	Modulation Setting: **O_QPSK**	Channel Power Setting: **Max** dBm
Antenna Polarization: **Horizontal**		Measured Emission: **8.00** dBuV

Plot 14.26 – Restricted Band – 260.8MHz – Vertical - Host 2

Restricted Band Emissions

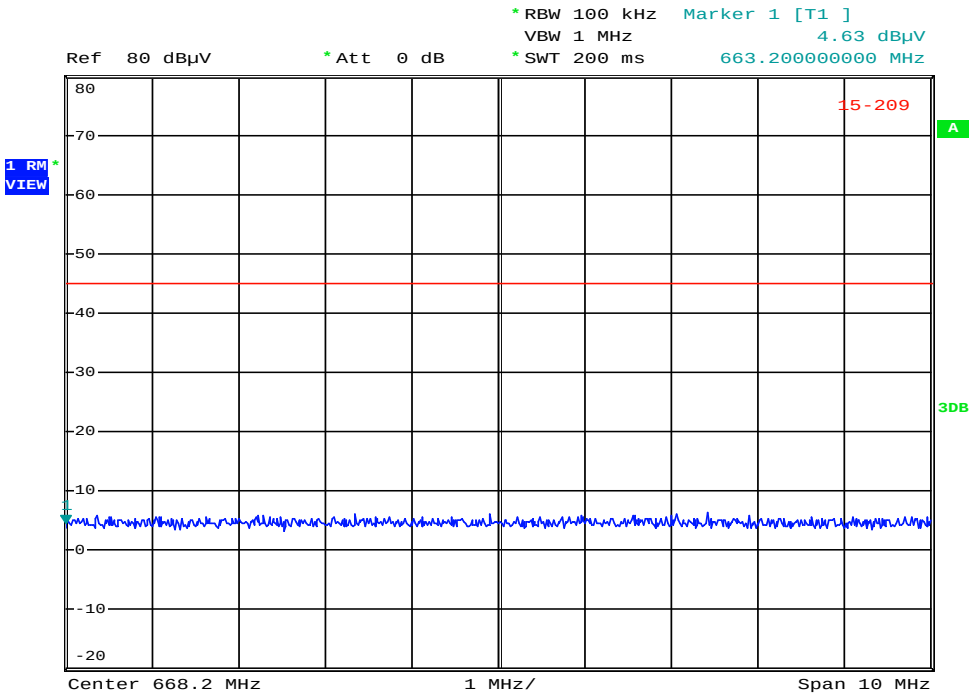


Date: 28.NOV.2018 16:20:43

Channel Frequency: **2405.00** MHz	Frequency Range: **260.8 MHz**	Channel Bandwidth: **3.00** MHz
Transmit Duty Cycle: **100** %	Modulation Setting: **O_QPSK**	Channel Power Setting: **Max** dBm
Antenna Polarization: **Vertical**		Measured Emission: **11.09** dBuV

Plot 14.27 – Restricted Band – 668.2MHz – Horizontal - Host 2

Restricted Band Emissions

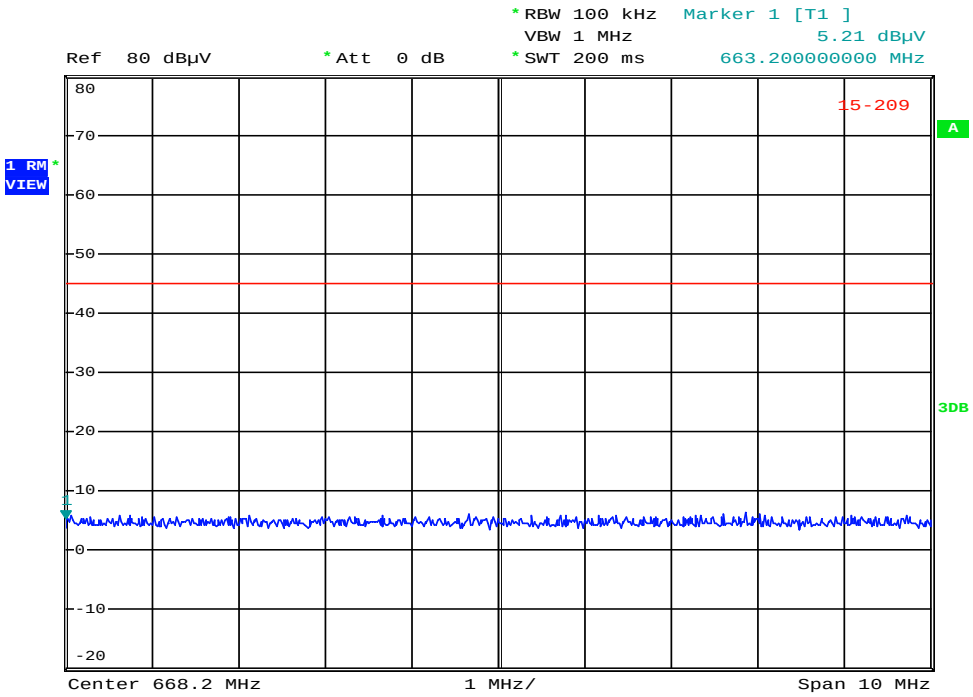


Date: 28.NOV.2018 16:17:06

Channel Frequency: **2405.00** MHz	Frequency Range: **668.2 MHz**	Channel Bandwidth: **3.00** MHz
Transmit Duty Cycle: **100** %	Modulation Setting: **O_QPSK**	Channel Power Setting: **Max** dBm
Antenna Polarization: **Horizontal**		Measured Emission: **None Detected (ND)** dBuV

Plot 14.28 – Restricted Band – 668.2MHz – Vertical - Host 2

Restricted Band Emissions



Date: 28.NOV.2018 16:19:58

Channel Frequency:	Frequency Range:	Channel Bandwidth:
2405.00 MHz	**668.2 MHz**	**3.00** MHz
Transmit Duty Cycle:	**Modulation Setting:**	**Channel Power Setting:**
100 %	**O_QPSK**	**Max** dBm
Antenna Polarization:		**Measured Emission:**
Vertical		**None Detected (ND)** dBuV

Table 14.2 – Summary of Restricted Band Measurements – Host 2

Emission Level Measurement Results										
Frequency Range	BW (MHz)	Modulation	Power Setting[1] (dBm)	Transmit Duty Cycle (%)	Measured Emission [E_{Meas}] (dBm)	Antenna Gain [G_T] (dBi)	EIRP[2] [EIRP] (dBm)	Field Strength[3] [E] (dBuV/m @ 3m)	Worst Case Limit[4] [A_L] (dBuV @ 3m)	Margin (dB)
9kHz - 150kHz	3	O-QPSK	Max	100	-61.48	8.00	-47.48	47.78	93.8	**46.02**
150kHz - 1MHz					-55.85		-41.85	53.41	63.0	**9.59**
1 - 30MHz					-65.82		-51.82	43.44	69.5	**26.06**
30 - 1000MHz					-69.98		**Reference Radiated Measurements**			
1 - 3GHz					-46.33		**No Spurious Emissions Detected**			
3 - 13.6GHz					-42.98					
13.6 - 25GHz					-32.09					
Radiated Measurements										
86.2MHz Horiz	3	O-QPSK	Max	100		8.00	**None Detected**			
876.2MHz Vert										
260.8MHz Horiz								8.00	46.0	**38.00**
260.8MHz Vert								11.09	46.0	**34.91**
668.2MHz Horz							**None Detected**			
668.2MHz Vert										
Results:										**Complies**

Table 14.2 – Summary of Restricted Band Measurements – Host 2 (Cont.)

(1) The output power is factory set to maximum	
(2) Calculated: EIRP = $E_{[MEAS]}$ + G_T + CF, CF = 6dB for F ≤ 30MHz, 4.7dB for 30MHz ≤ F ≤ 1000MHz, 0dB for F > 1000MHz	
(3) Calculated: E = EIRP - 20Log(D) + 104.8, D=3m	
(4) The lowest limit within the test frequency range applied.	
Limit between 9kHz and 490kHz = 2400/F (kHz) @300m = 266uV/m to 4.89uV/m dBuV/m = 20Log (uV/m) = 48.5dBuV/m to 13.8dBuV/m Distance Corrected: = 128.5dBuV/m to 93.8dBuV/m	
Limit between 490kHz and 1705kHz = 24000/F (kHz) @30m = 160uV/m to 14uV/m dBuV/m = 20Log (uV/m) = 44.1dBuV/m to 23dBuV/m Distance Corrected: = 88.1dBuV/m to 63dBuV/m	
Limit Between 1705kHz and 30MHz = 30uV/m @30m dBuV/m = 20Log (uV/m) = 29.5dBuV/m Distance Corrected: = 69.5dBuV/m	
Limit between 30MHz and 88MHz = 100uV/m @ 3m dBuV/m = 20Log (uV/m) = 40dBuV/m	
Limit between 88MHz and 216MHz = 150uV/m @ 3m dBuV/m = 20Log (uV/m) = 43.5dBuV/m	
Limit between 216MHz and 960MHz = 200uV/m @3m dBuV/m = 20Log (uV/m) = 46dBuV/m	
Limit Above 960MHz = 500uV/m @3m dBuV/m = 20Log (uV/m) = 54.0dBuV/m	
Distance Correction: Below 30MHz	40Log(D_{LIM}/D_{MEAS}) + Limit Where D_{LIM} is the Limit Distance, D_{MEAS} is the Measurement Distance, Below = 80dB + Limit @300m = 40dB + Limit @30m
§15.31(f)(2)	At frequencies below 30 MHz...when performing measurements at a closer distance than specified, the results shall be extrapolated to the specified distance by either making measurements at a minimum of two distances on at least one radial to determine the proper extrapolation factor or by using the square of an inverse linear distance extrapolation factor (40 dB/decade).

15.0 - RADIATED RX SPURIOUS EMISSIONS

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

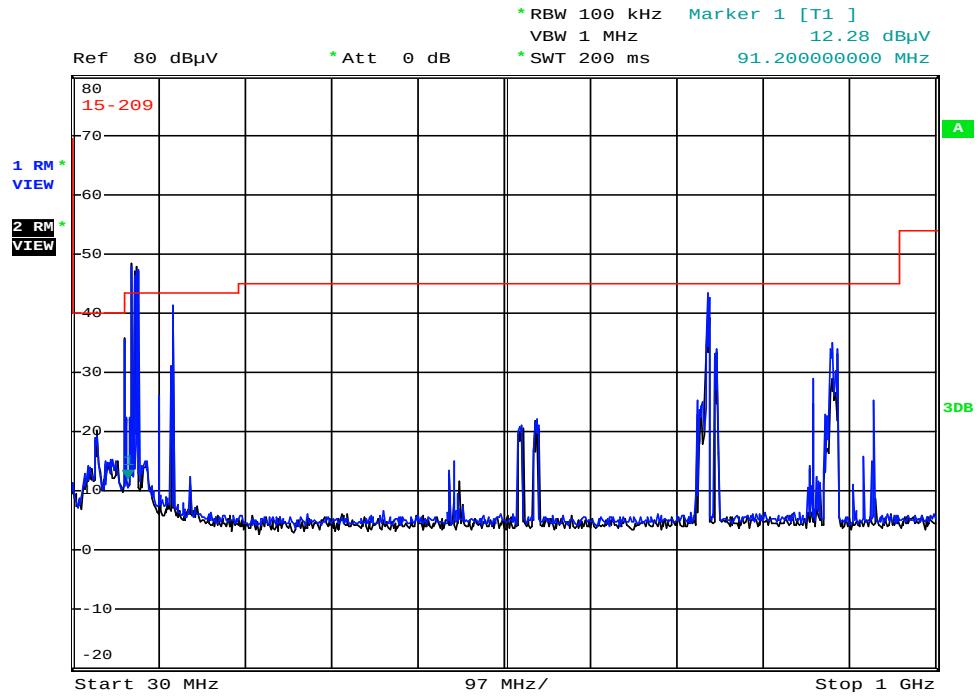
Limits	
47 CFR §15.109	(a) Except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values: 30-88MHz: 40dBuV/m 88-216MHz: 43.5dBuV/m 216-960MHz: 46dBuV/m > 960MHz: 54dBuV/m
ICES-003(6.2.1)	6.2.1 - 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.

Plot 15.1 – Radiated Emissions 30MHz – 1000MHz, Horizontal – Host 1

Radiated Emissions



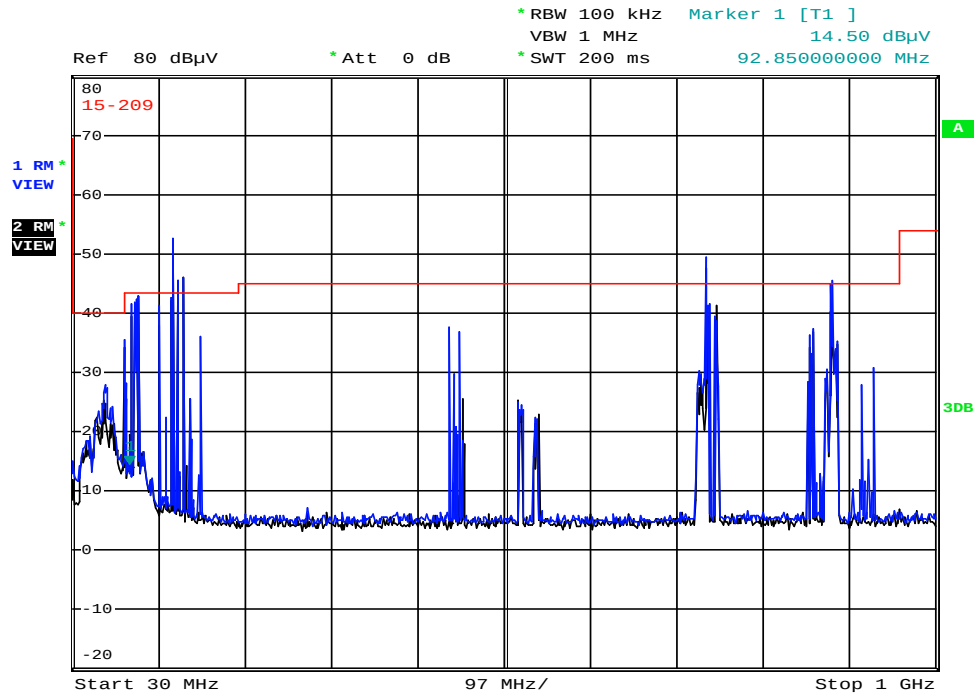
Date: 28.NOV.2018 16:35:28

Frequency Range:	Antenna Polarization:	Measured Emission:
30 - 1000 MHz	**Horizontal**	**None Detected**

Blue Trace:	Black Trance:
Ambient	**DUT + Ambient**

Plot 15.2 – Radiated Emissions 30MHz – 1000MHz, Vertical – Host 1

Radiated Emissions



Date: 28.NOV.2018 16:43:42

Frequency Range:	Antenna Polarization:	Measured Emission:
30 - 1000 MHz	**Vertical**	**None Detected**

Blue Trace:	Black Trance:
Ambient	**DUT + Ambient**

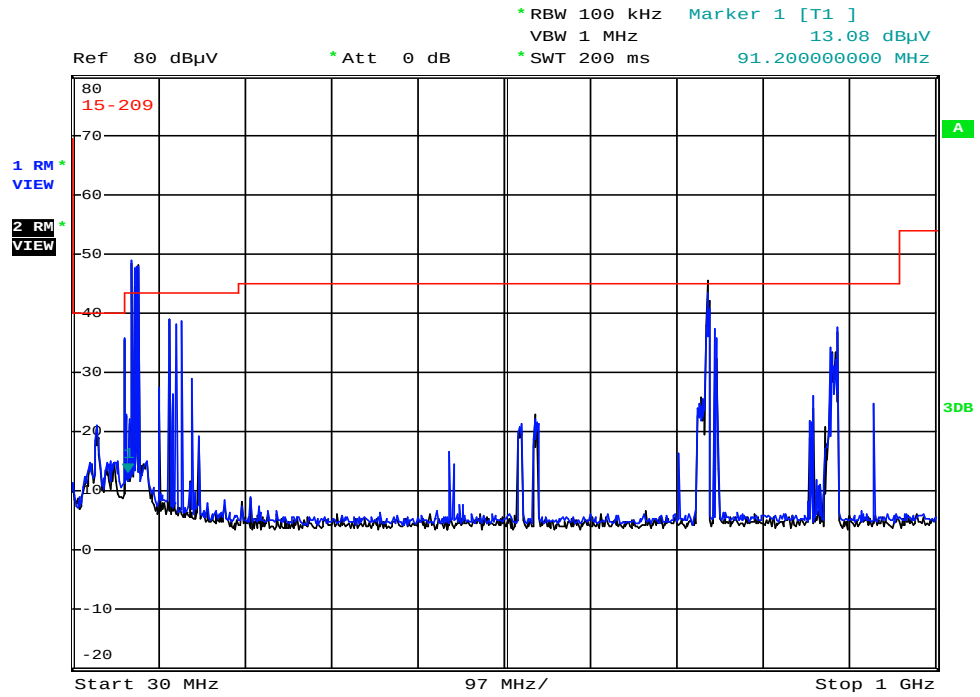
Table 15.1 – Summary of Radiated Rx Spurious Emissions – Host 1

§15.109, ICES-003 (6.2)					
Emission Frequency (MHz)	Antenna Polarization	Measured Emission [E_{Meas}] (dBuV)	Corrected Emission [E_{Corr}] (W)	Limit (W)	Margin (dB)
30-1000	Horizontal	n/a	n/a	-	-
30-1000	Vertical	n/a	n/a	-	-
				Results:	Complies

No emissions detected above ambient noise.

Plot 15.3 – Radiated Emissions 30MHz – 1000MHz, Horizontal – Host 2

Radiated Emissions



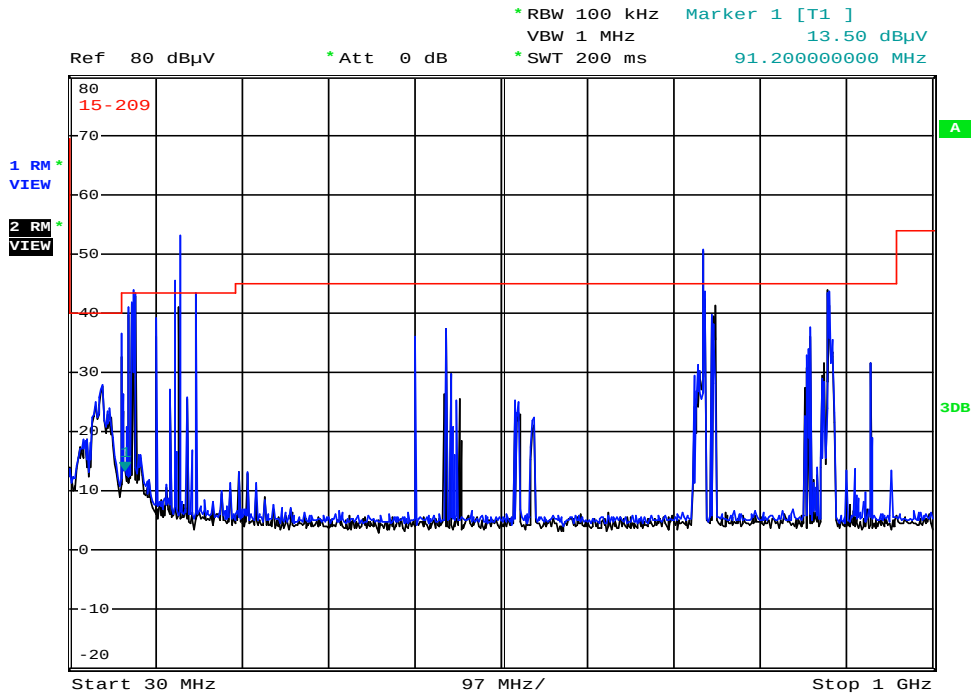
Date: 28.NOV.2018 16:25:50

Frequency Range:	Antenna Polarization:	Measured Emission:
30 - 1000 MHz	**Horizontal**	**None Detected**

Blue Trace:	Black Trance:
Ambient	**DUT + Ambient**

Plot 15.4 – Radiated Emissions 30MHz – 1000MHz, Vertical – Host 2

Radiated Emissions



Date: 28.NOV.2018 16:23:25

Frequency Range:	Antenna Polarization:	Measured Emission:
30 - 1000 MHz	**Vertical**	**None Detected**

Blue Trace:	Black Trance:
Ambient	**DUT + Ambient**

Table 15.2 – Summary of Radiated Rx Spurious Emissions – Host 2

§15.109, ICES-003 (6.2)					
Emission Frequency (MHz)	**Antenna Polarization**	**Measured Emission [E_{Meas}] (dBuV)**	**Corrected Emission [E_{Corr}] (W)**	**Limit (W)**	**Margin (dB)**
30-1000	Horizontal	n/a	n/a	-	-
30-1000	Vertical	n/a	n/a	-	-
				Results:	**Complies**

No emissions detected above ambient noise.

APPENDIX A - TEST SETUP DRAWINGS AND CONDITIONS

Table A.1 – Conducted Measurement Setup and Environmental

Environmental Conditions (Typical)	
Temperature	25°C
Humidity	<60%
Barometric Pressure	101 +/- 3kPa

Equipment List			
Asset Number	**Manufacturer**	**Model Number**	**Description**
00241	R&S	FSU40	Spectrum Analyzer

Figure A.1 – Test Setup – Conducted Measurements

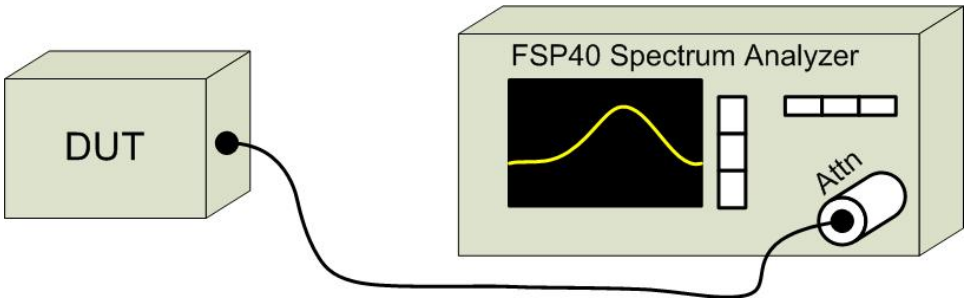


Table A.2 – Radiated Emissions Measurement Equipment and Environmental

Environmental Conditions (Typical)	
Temperature	25°C
Humidity	<60%
Barometric Pressure	101 +/- 3kPa

Equipment List

Asset Number	Manufacturer	Model Number	Description
00051	HP	8566B	Spectrum Analyzer
00049	HP	85650A	Quasi-peak Adapter
00047	HP	85685A	RF Preselector
00072	EMCO	2075	Mini-mast
00073	EMCO	2080	Turn Table
00071	EMCO	2090	Multi-Device Controller
00265	Miteq	JS32-00104000-58-5P	Microwave L/N Amplifier
00241	R&S	FSU40	Spectrum Analyzer
00050	Chase	CBL-6111A	Bilog Antenna
00275	Coaxis	LMR400	25m Cable
00276	Coaxis	LMR400	4m Cable
00278	TILE	34G3	TILE Test Software
00034	ETS	3115	Double Ridged Guide Horn
00085	EMCO	6502	Loop Antenna

Figure A.2 – Test Setup Radiated Measurements 30MHz – 1GHz

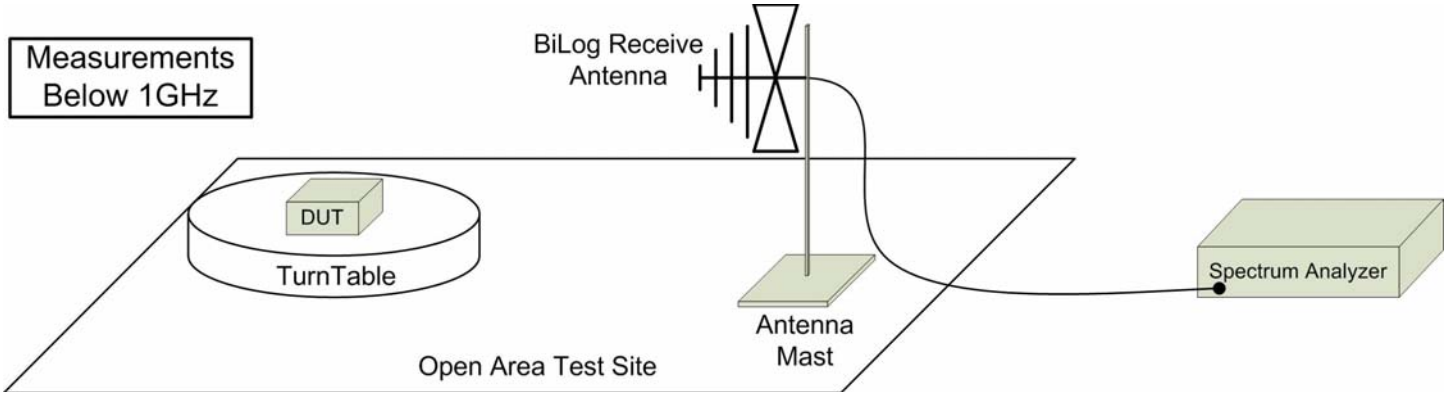


Table A.3 – Power Line Conducted Measurement Equipment and Environmental

Environmental Conditions (Typical)	
Temperature	25°C
Humidity	<60%
Barometric Pressure	101 +/- 3kPa

Equipment List			
Asset Number	Manufacturer	Model Number	Description
00051	HP	8566B	Spectrum Analyzer
00049	HP	85650A	Quasi-peak Adapter
00047	HP	85685A	RF Preselector
00275	Coaxis	LMR400	25m Cable
00276	Coaxis	LMR400	4m Cable
00278	TILE	34G3	TILE Test Software
00257	Comm Power	LI-215A	LISN

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	23 Jun 2017	Triennial	23 Jun 2020
*	00034	ETS	3115	6267	Double Ridged Guide Horn	2 Dec 2015	Triennial	2 Dec 2018
	00035	ETS	3115	6276	Double Ridged Guide Horn	2 Dec 2015	Triennial	2 Dec 2018
	00085	EMCO	6502	9203-2724	Loop Antenna	8 Jun 2016	Triennial	8 Jun 2019
*	00047	HP	85685A	2837A00826	RF Preselector	23 Jun 2017	Triennial	23 Jun 2020
*	00049	HP	85650A	2043A00162	Quasi-peak Adapter	23 Jun 2017	Triennial	23 Jun 2020
*	00051	HP	8566B	2747A05510	Spectrum Analyzer	23 Jun 2017	Triennial	23 Jun 2020
	00223	HP	8901A	3749A07154	Modulation Analyzer	27 Dec 2017	Triennial	27 Dec 2020
	00224	HP	8903B	3729A18691	Audio Analyzer	28 Dec 2017	Triennial	28 Dec 2020
*	00241	R&S	FSU40	100500	Spectrum Analyzer	23 Apr 2015	Triennial	23 Apr 2018
*	00005	HP	8648D	3847A00611	Signal Generator	21 Jun 2017	Triennial	21 Jun 2020
	00006	R&S	SMR20	100104	Signal Generator	29 May 2017	Triennial	29 May 2020
	00243	Rigol	DS1102E	DS1ET150502164	Oscilloscope	7 Nov 2017	Triennial	7 Nov 2020
	00254	LeCroy	WM8600A	532	Oscilloscope	NCR	n/a	NCR
	00110	Gigatronics	8652A	1875801	Power Meter	29 Feb 2016	Triennial	29 Feb 2019
	00237	Gigatronics	80334A	1837001	Power Sensor	23 Jun 2014	Triennial	23 Jun 2017
	00232	ETS Lindgren	HI-6005	91440	Isotropic E-Field Probe	18 Dec 2017	Triennial	18 Dec 2020
	00003	HP	53181A	3736A05175	Frequency Counter	21 Jun 2017	Triennial	21 Jun 2020
	00257	Com-Power	LI-215A	191934	LISN	5 Jan 2018	Triennial	5 Jan 2021
	00041	AR	10W1000C	27887	Power Amplifier	NCR	n/a	NCR
	00106	AR	5SIG4	26235	Power Amplifier	NCR	n/a	NCR
	00280	AR	25A250AM6	22702	Power Amplifier	NCR	n/a	NCR
	00265	Miteq	JS32-00104000-58-5P	1939850	Microwave L/N Amplifier	COU	n/a	COU
	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	CNR	n/a	CNR
	00234	VWR	61161-378	140320430	Temp/Humidity Meter	New	Triennial	New
	00236	Nokia	-	236	ESD Table	NCR	n/a	NCR
	00255	Expert ESD	A4001	A4001-155	ESD Target	COU	n/a	COU
	00064	NARDA	3020A	n/a	Bi-Directional Coupler	COU	n/a	COU
	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
*	00264	Koaxis	KP10-7.00M-TD	264	7m Armoured Cable	COU	n/a	COU
*	00275	TMS	LMR400	n/a	25m Cable	COU	n/a	COU
*	00276	TMS	LMR400	n/a	4m Cable	COU	n/a	COU
*	00277	TMS	LMR400	n/a	4m Cable	COU	n/a	COU
*	00278	TILE	34G3	n/a	TILE Test Software	NCR	n/a	NCR
Rented Equipment								

* Used during the course of this investigation
CNR: Calibration Not Required
COU: Calibrate On Use

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

