TIMCO ENGINEERING, Inc.

849 NW State Road 45
Newberry, FL 32669 USA
Ph.: 888.472.2424 or 352.472.5500
Fax: 352.472.2030
Email: info@timcoengr.com
Website: www.timcoengr.com

FCC PART 15.247 & IC RSS-247

2.4 GHz FHSS

TEST REPORT

Applicant	**AUDIO-TECHNICA CORPORATION**
Address	**2-46-1 Nishi-Naruse**
	Machida
	Tokyo 194-8666 JAPAN
FCC ID	**JFZDSR9BT**
IC Certification Number	**1752B-DSR9BT**
Model Number	ATH-DSR9BT
Product Description	Bluetooth In-Ear Headphones
Date Sample Received	11/18/2016
Final Test Date	12/12/2016
Tested By	Franklin Rose
Approved By	Cory Leverett

Report Number	Version Number	Description	Issue Date
2320AUT16TestReport.docx	Rev1	Initial Issue	12/19/2016

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GENERAL REMARKS

The attached report shall not be reproduced except in full without the written permission of Timco Engineering Inc.

Summary

The device under test does:

☒ Fulfill the general approval requirements as identified in this test report and was selected by the customer.

☐ Not fulfill the general approval requirements as identified in this test report

Attestations

This equipment has been tested in accordance with the standards identified in this test report. To the best of my knowledge and belief, these tests were performed using the measurement procedures described in this report.

All instrumentation and accessories used to test products for compliance to the indicated standards are calibrated regularly in accordance with ISO 17025 requirements.

I attest that the necessary measurements were made at:

Timco Engineering Inc.
849 NW State Road 45
Newberry, FL 32669

Tested by:
Name and Title: Franklin Rose, Testing Technician

Date: 12/12/2016

Reviewed and approved by:
Name and Title: Cory Leverett, Project Manager

Date:12/19/2016

GENERAL INFORMATION

EUT Specification

Regulatory Standards	FCC Title 47 CFR Part 15.247 IC RSS-247 Issue 1 & RSS-GEN Issue 4		
FCC ID	**JFZDSR9BT**		
IC Certification Number	**1752B-DSR9BT**		
Model	ATH-DSR9BT		
EUT Description	Bluetooth In-Ear Headphones		
Modulation Types	Mode 1:BT 3.0 BDR DH5		
	Mode 2: BT 3.0 EDR 2-DH5		
	Mode 3: BT 3.0 EDR 3-DH5		
Operating Frequency	TX: 2402 – 2480 MHz	RX: 2402 – 2480 MHz	
EUT Power Source	☐ 110–120Vac/50– 60Hz		
	☐ DC Power		
	☒ Battery Operated Exclusively		
Test Item	☐ Prototype	☐ Pre-Production	☒ Production
Type of Equipment	☐ Fixed	☐ Mobile	☒ Portable
Antenna Connector	None (Temporary Connector Provided for Testing)		
Antenna	Chip Antenna		
Test Facility	**Timco Engineering Inc. located at 849 NW State Road 45 Newberry, FL 32669 USA.**		
Test Conditions	Temperature: 24-26ºC Relative humidity: 50-65%		
Measurement Standard	ANSI C63.10-2013 ANSI C63.4-2014 FCC DA 00-705		
Test Exercise	Engineering Software was used to enable the modes of operation, all modes of modulation were tested.		

Test Supporting Equipment

Device	Manufacturer	Model	Supplied By	Used For
USB UArt			Applicant	Configure EUT
Test Software	CSR	Blue Test 3	Applicant	Configure EUT

RESULTS SUMMARY

FCC Rule Part No.	IC Standard Ref.	Requirement	Test Item	Result
15.215 (c)	RSS-GEN 6.6	Occupied Bandwidth	99% Bandwidth	Pass
			20 dB Bandwidth	Pass
15.247(a,1)	RSS-247 § 5.1	FHSS Requirements	Channel Separation	Pass
			Hopping Sequence	Pass
			System Receiver Bandwidth	Pass
			Number of Hopping Channels	Pass
			Hopping Channel Occupancy Time	Pass
15.247(b,1) & (b,4)	RSS-247 § 5.4.2	Peak Power Output	Peak Power Output (ERP)	Pass
			Antenna Gain (EIRP)	Pass
15.247(d)	RSS-247 § 5.5	Unwanted Emissions	Bandedge	Pass
			Radiated Spurious	Pass

Notes:

PEAK POWER OUTPUT

Rules Part No.: FCC 15.247(b) (1) (4), IC RSS 247 § 5.4.2

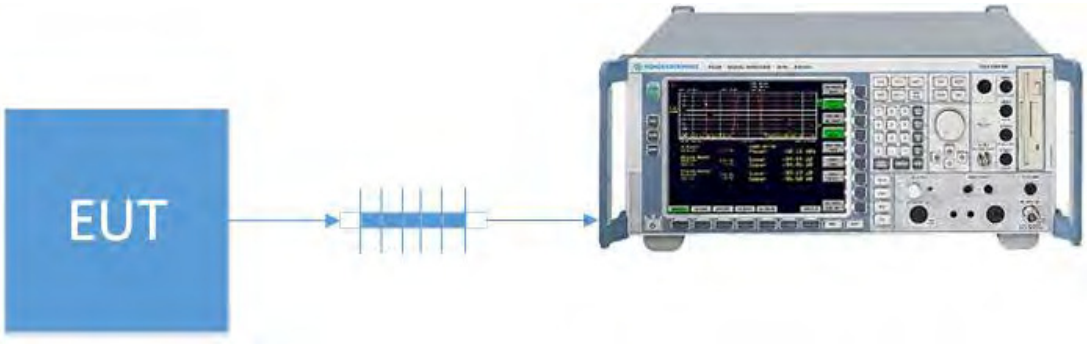
Requirements:

FHSS Using Hopset ≥ 75 Channels

For FHSs operating in the band 2400-2483.5 MHz, the maximum peak conducted output power shall not exceed 1.0 W and the e.i.r.p. shall not exceed 4 W if the hopset uses 75 or more hopping channels.

Test Method: ANSI C63.10 § 7.8.5 Output Power test procedure for FHSS

Setup:



PEAK POWER OUTPUT

Test Data: **Mode 1 Peak Power Output Measurement Table**

Peak Conducted Power Output Measurement				
Tuned Frequency (MHz)	PConducted (dBm)	PConducted (W)	Limit (W)	Margin (W)
2402	7.32	0.0054	1	0.9946
2441	8.13	0.0065	1	0.9935
2480	8.35	0.0068	1	0.9932

Peak EIRP Power Output Calculation				
Tuned Frequency (MHz)	PConducted (dBm)	EIRP (W)	Limit (W)	Margin (W)
2402	7.32	0.0089	4	3.991
2441	8.13	0.0107	4	3.989
2480	8.35	0.0112	4	3.989

Test Data: **Mode 2 Peak Power Output Measurement Table**

Peak Conducted Power Output Measurement				
Tuned Frequency (MHz)	PConducted (dBm)	PConducted (W)	Limit (W)	Margin (W)
2402	5.94	0.0039	1	0.9961
2441	6.94	0.0049	1	0.9951
2480	7.29	0.0054	1	0.9946

Peak EIRP Power Output Calculation				
Tuned Frequency (MHz)	PConducted (dBm)	EIRP (W)	Limit (W)	Margin (W)
2402	5.94	0.0064	4	3.994
2441	6.94	0.0081	4	3.992
2480	7.29	0.0088	4	3.991

RESULTS: Meets Requirements

PEAK POWER OUTPUT

Test Data: **Mode 3 Peak Power Output Measurement Table**

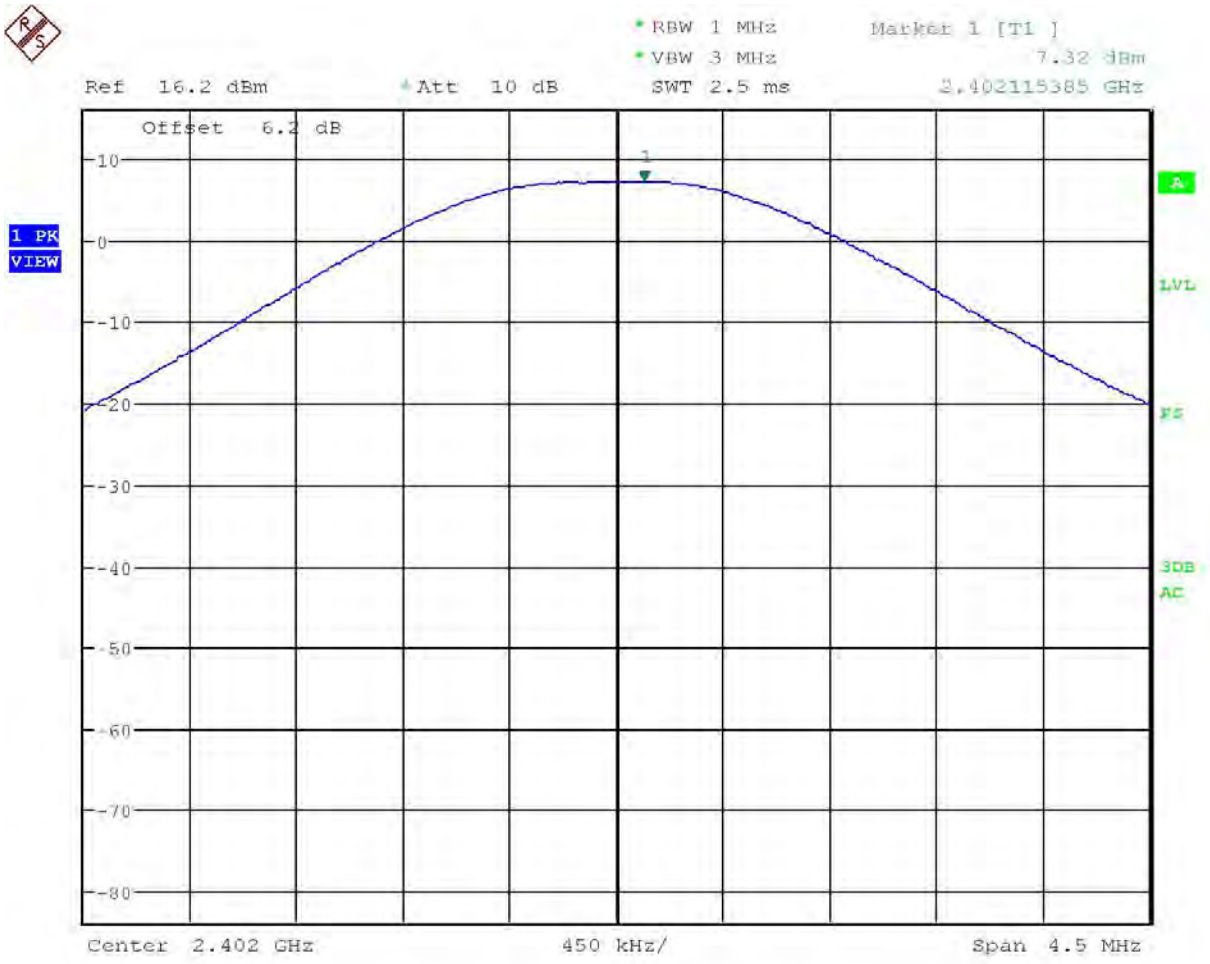
Peak Conducted Power Output Measurement				
Tuned Frequency (MHz)	PConducted (dBm)	PConducted (W)	Limit (W)	Margin (W)
2402	6.06	0.0040	1	0.9960
2441	7.04	0.0051	1	0.9949
2480	7.39	0.0055	1	0.9945

Peak EIRP Power Output Calculation				
Tuned Frequency (MHz)	PConducted (dBm)	EIRP (W)	Limit (W)	Margin (W)
2402	6.06	0.0066	4	3.993
2441	7.04	0.0083	4	3.992
2480	7.39	0.0090	4	3.991

RESULTS: Meets Requirements

PEAK POWER OUTPUT

Test Data: **Mode 1 Low End of Band Peak Conducted Power Plot**

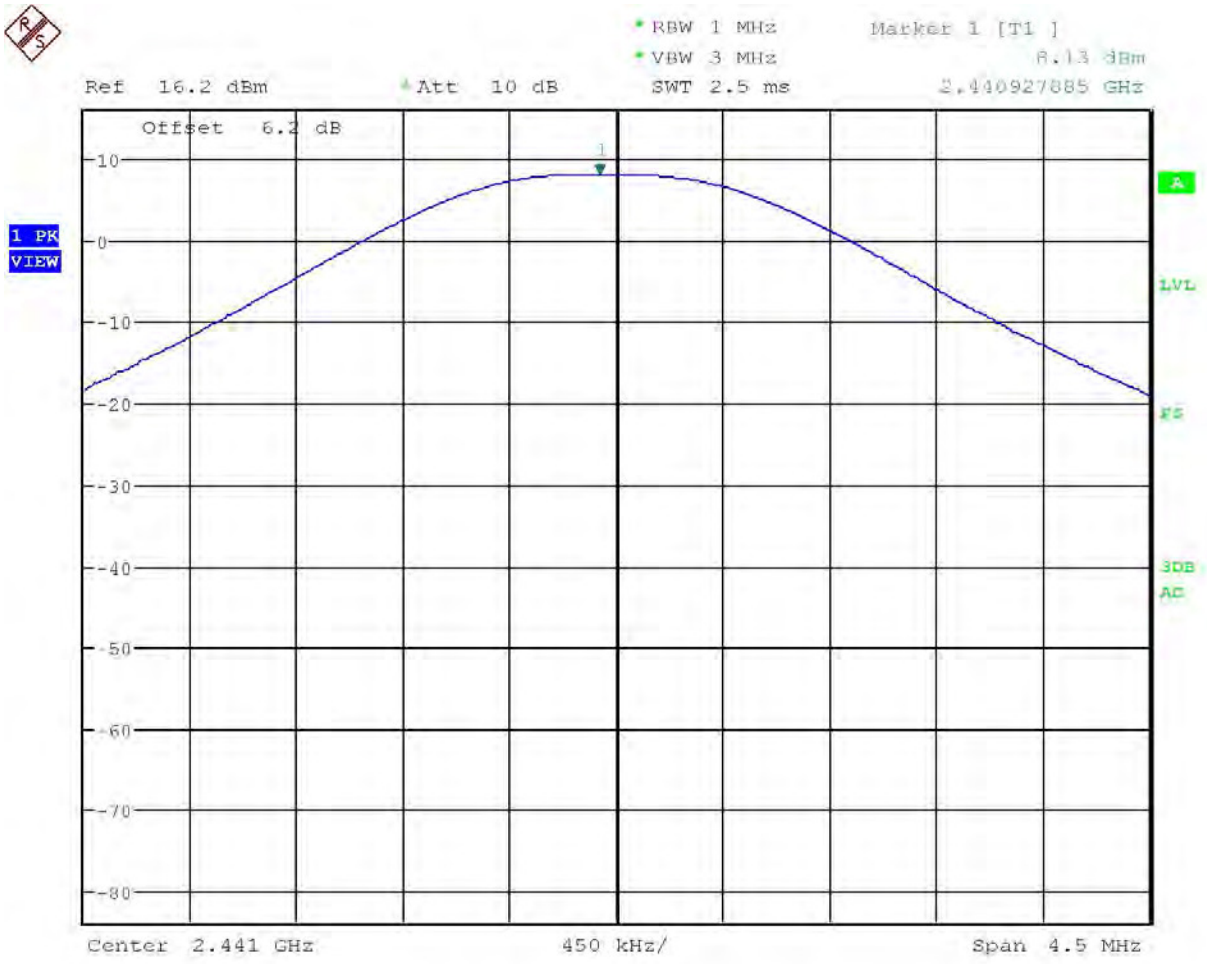


Date: 2.DEC.2016 21:43:07

RESULTS: Meets Requirements

PEAK POWER OUTPUT

Test Data: **Mode 1 Middle of Band Peak Conducted Power Plot**

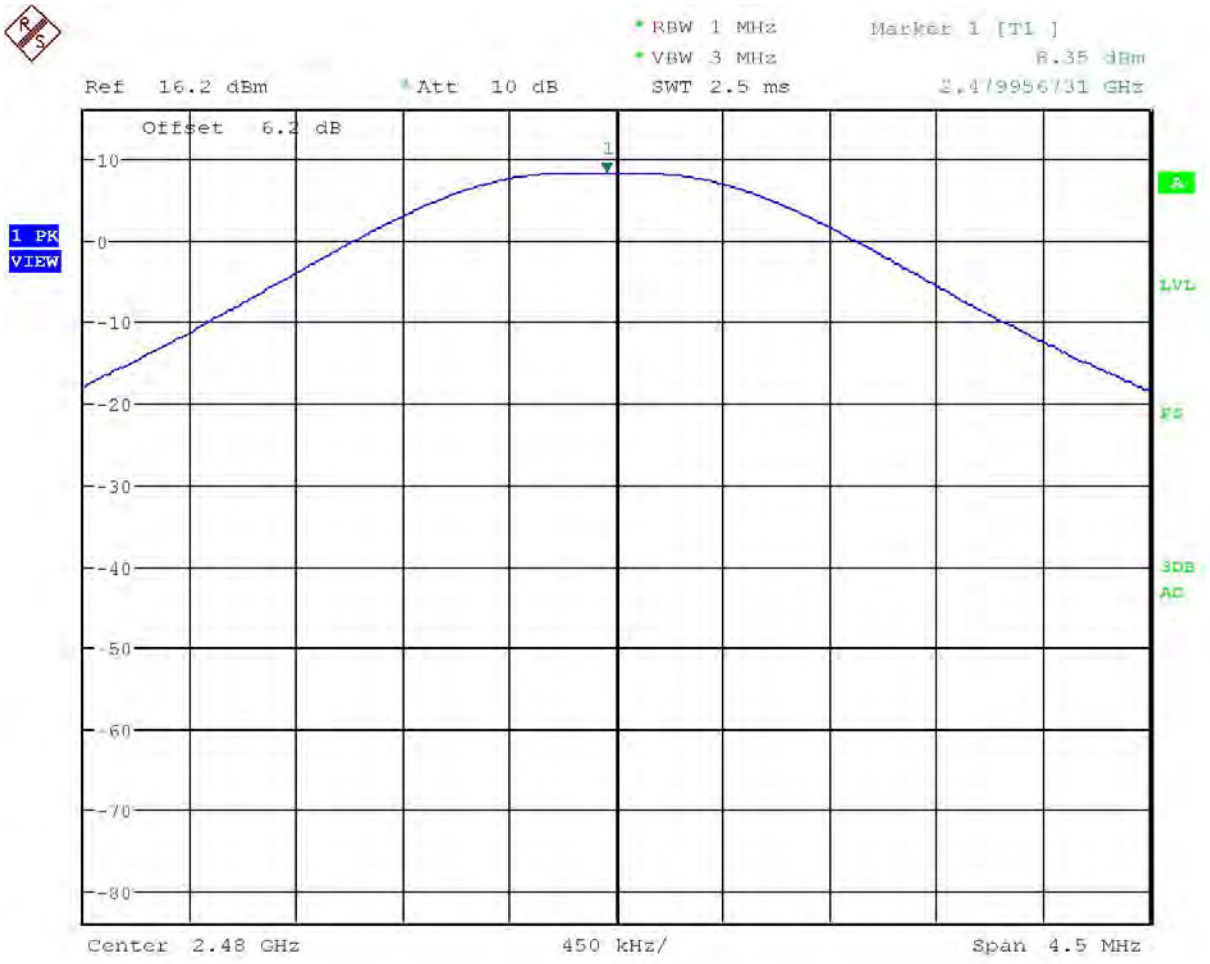


Date: 2.DEC.2016 21:43:51

RESULTS: Meets Requirements

PEAK POWER OUTPUT

Test Data: **Mode 1 High End of Band Peak Conducted Power Plot**

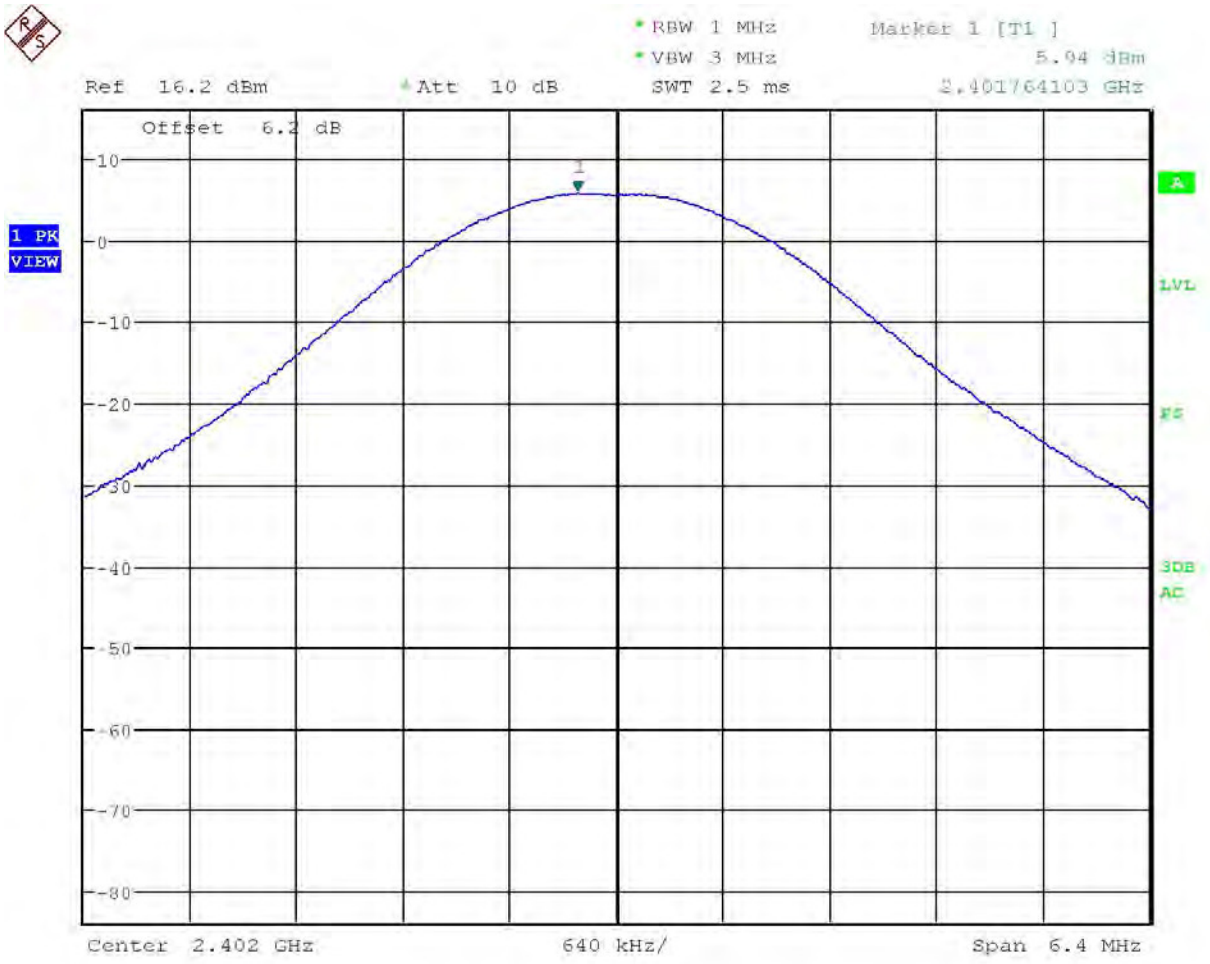


Date: 2.DEC.2016 21:44:26

RESULTS: Meets Requirements

PEAK POWER OUTPUT

Test Data: **Mode 2 Low End of Band Peak Conducted Power Plot**



Date: 2.DEC.2016 23:02:19

RESULTS: Meets Requirements

PEAK POWER OUTPUT

Test Data: **Mode 2 Middle of Band Peak Conducted Power Plot**

Date: 2.DEC.2016 23:03:38

RESULTS: Meets Requirements

PEAK POWER OUTPUT

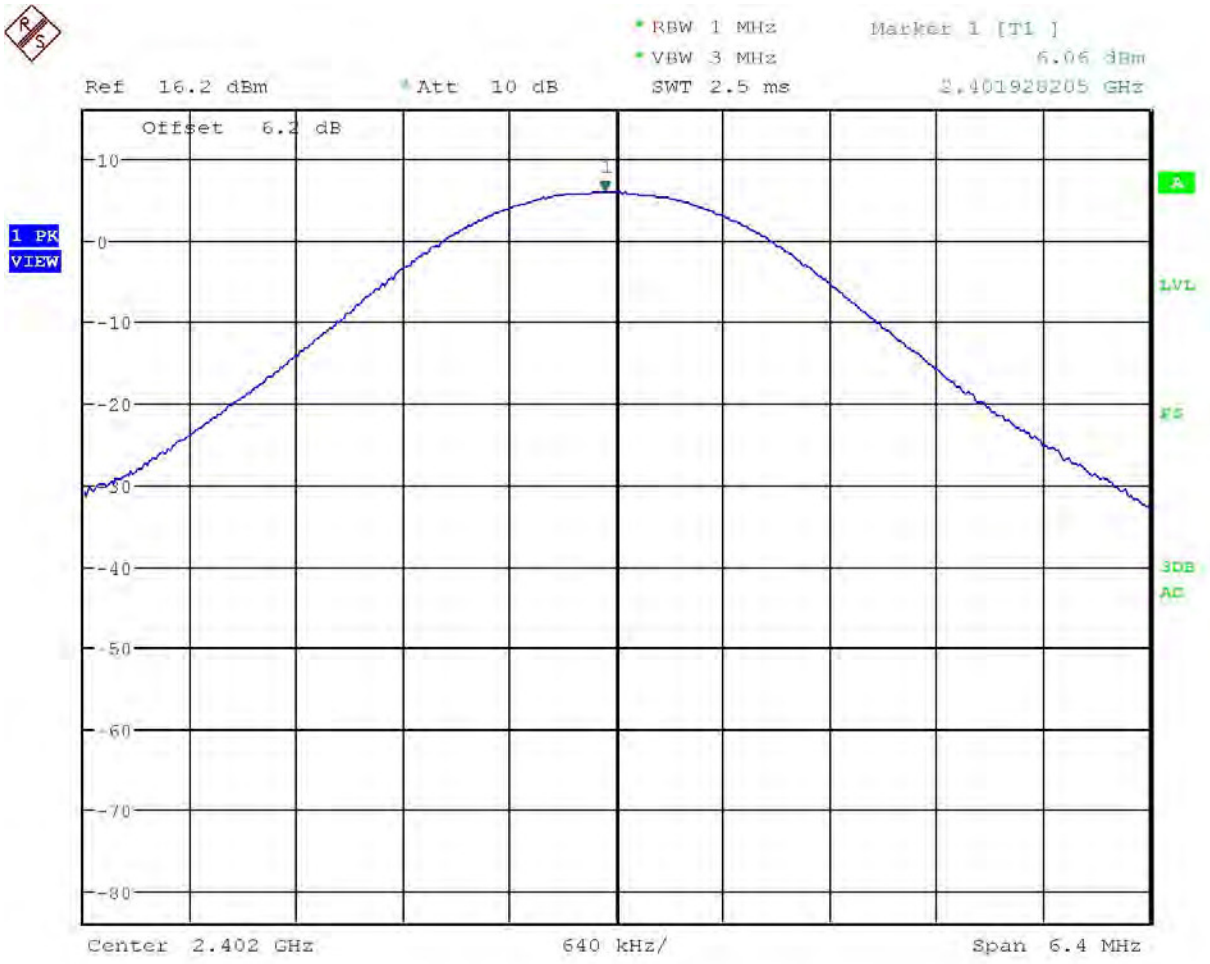
Test Data: **Mode 2 High End of Band Peak Conducted Power Plot**

Date: 2.DEC.2016 23:04:29

RESULTS: Meets Requirements

PEAK POWER OUTPUT

Test Data: **Mode 3 Low End of Band Peak Conducted Power Plot**



RESULTS: Meets Requirements

PEAK POWER OUTPUT

Test Data: **Mode 3 Middle of Band Peak Conducted Power Plot**

Date: 2.DEC.2016 23:19:13

RESULTS: Meets Requirements

PEAK POWER OUTPUT

Test Data: **Mode 3 High End of Band Peak Conducted Power Plot**

Date: 2.DEC.2016 23:20:30

RESULTS: Meets Requirements

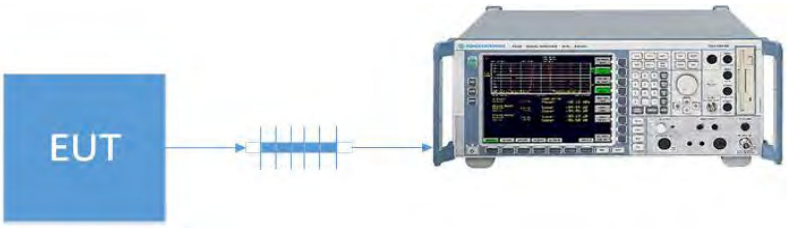
OCCUPIED BANDWIDTH

Rules Part No.: FCC 15.215(C), IC RSS 247 § 5.1.1

IC/ FCC Requirements: 20 dB and 99% emission bandwidth reporting only, measurement is also used to determine limits for other requirements of FHSS transmitters.

Test Method: ANSI C63.10 § 6.9.2 Occupied bandwidth-20dB Relative procedure

Setup:



Test Data: **20 dB Occupied Bandwidth Measurement Table**

Tuned Frequency (MHz)	Mode 1 20 dB BW (KHz)	Mode 2 20 dB BW (KHz)	Mode 3 20 dB BW (KHz)
2402	900.3	1244.9	1272.7
2441	900.3	1256.0	1272.7
2480	900.3	1244.9	1283.8

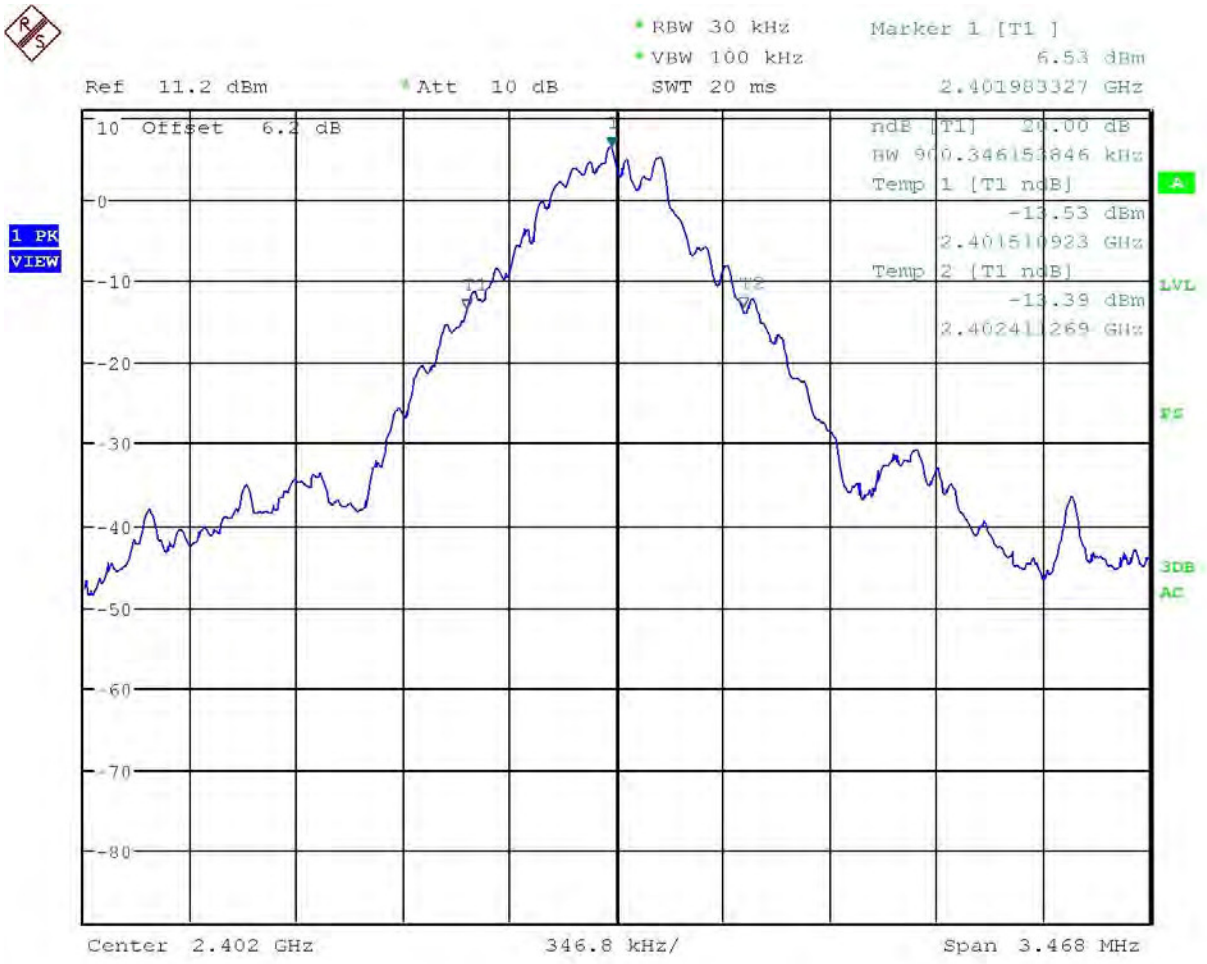
Test Data: **99% Occupied Bandwidth Measurement Table**

Tuned Frequency (MHz)	Mode 1 99% BW (KHz)	Mode 2 99% BW (KHz)	Mode 3 99% BW (KHz)
2402	878.1	1172.6	1161.5
2441	872.6	1172.6	1167.1
2480	883.7	1183.7	1178.2

RESULTS: Meets Requirements

OCCUPIED BANDWIDTH

Test Data: **Mode 1 Low End of Band20 dB Plot**

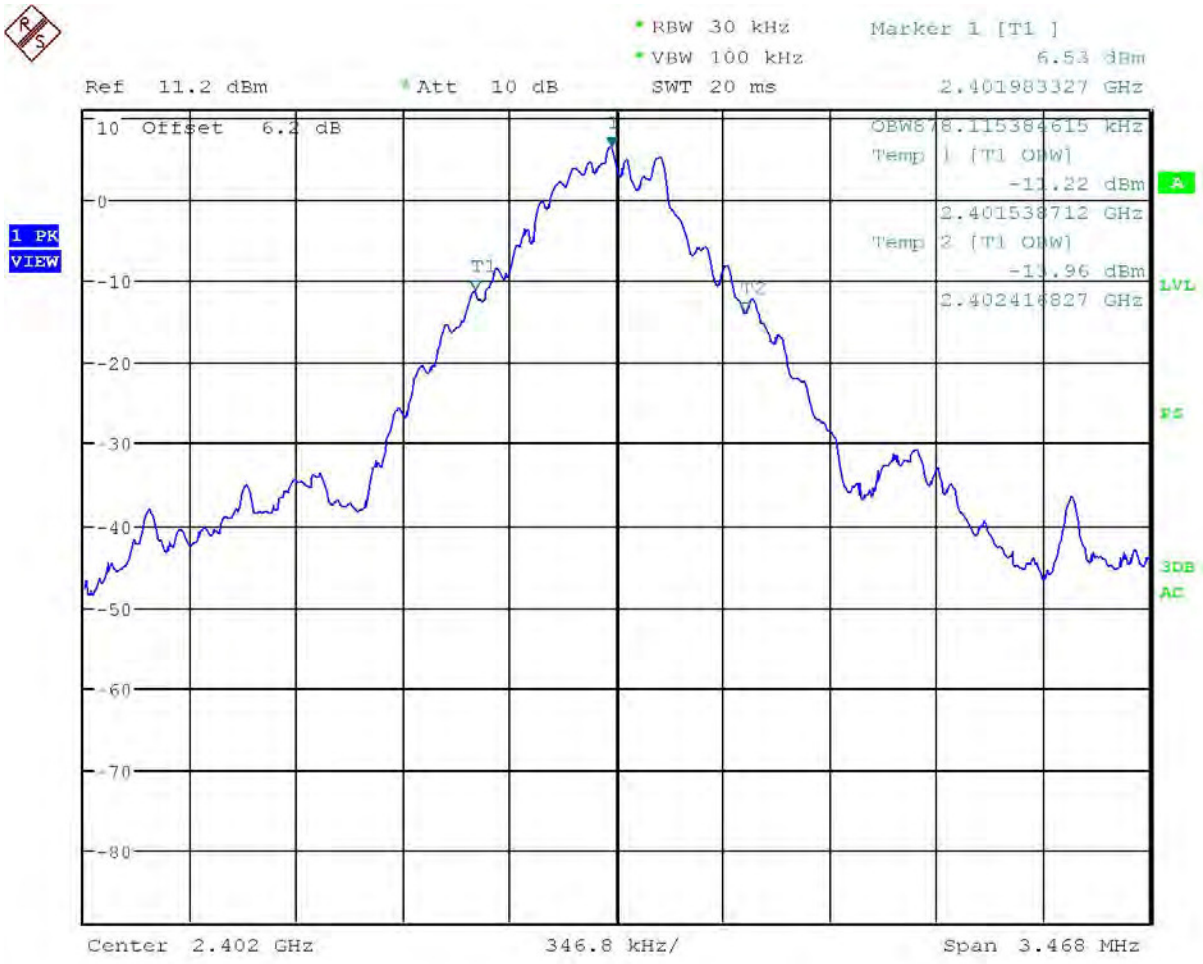


Date: 2.DEC.2016 21:23:56

RESULTS: Meets Requirements

OCCUPIED BANDWIDTH

Test Data: **Mode 1 Low End of Band 99% Plot**

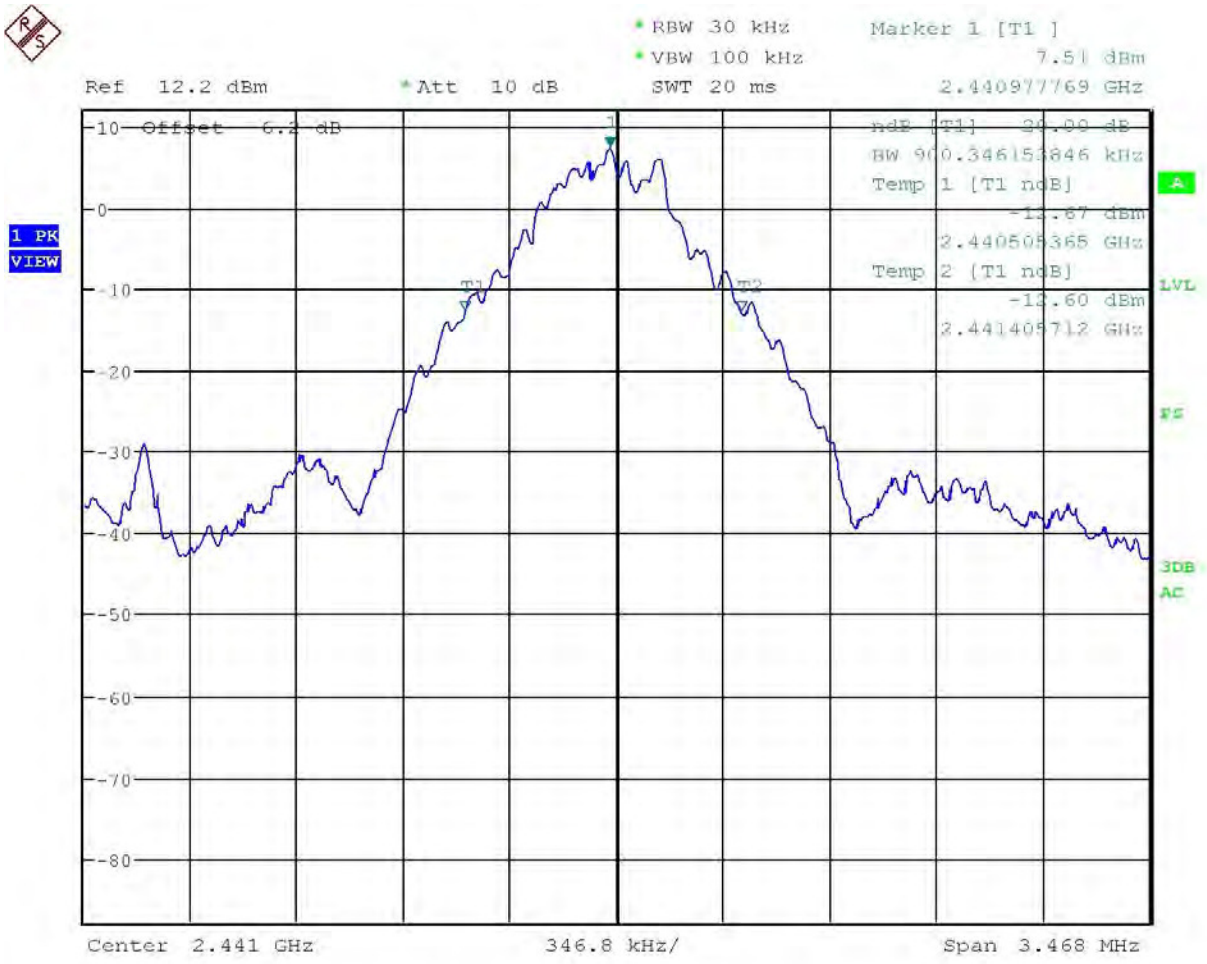


Date: 2.DEC.2016 21:23:32

RESULTS: Meets Requirements

OCCUPIED BANDWIDTH

Test Data: **Mode 1 Middle of Band 20 dB Plot**

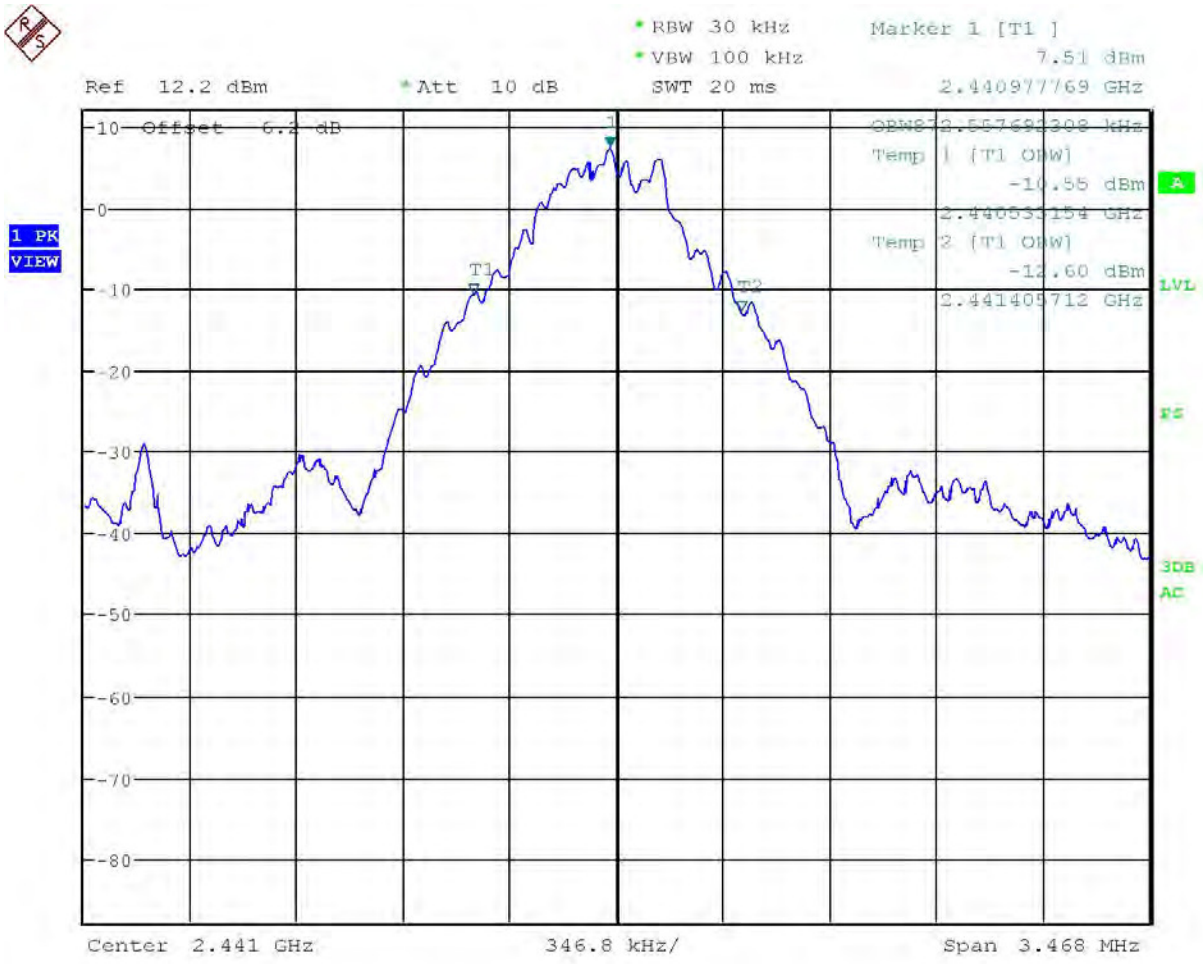


Date: 2.DEC.2016 21:25:35

RESULTS: Meets Requirements

OCCUPIED BANDWIDTH

Test Data: **Mode 1 Middle of Band 99% Plot**

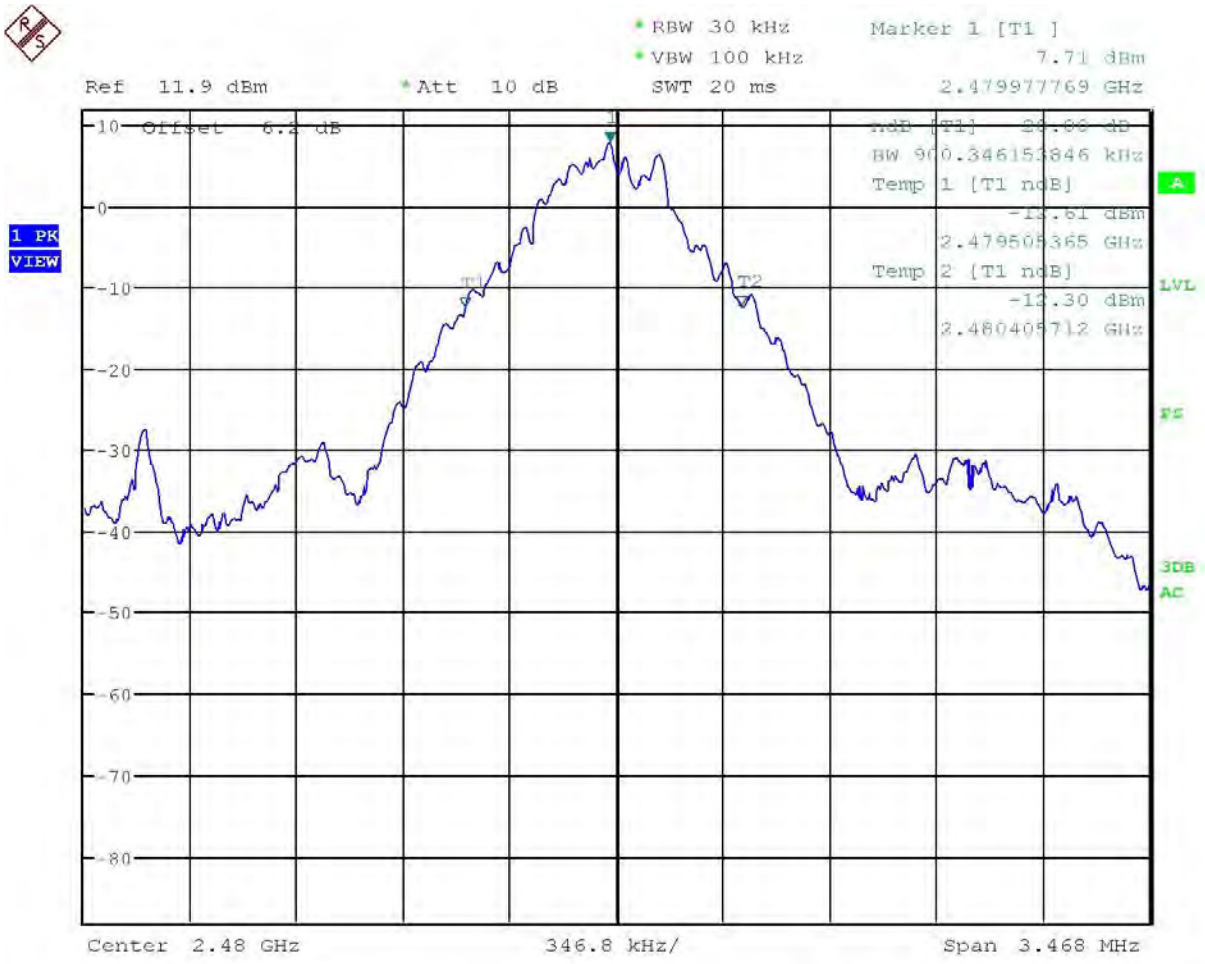


Date: 2.DEC.2016 21:25:08

RESULTS: Meets Requirements

OCCUPIED BANDWIDTH

Test Data: **Mode 1 High end of Band 20 dB Plot**

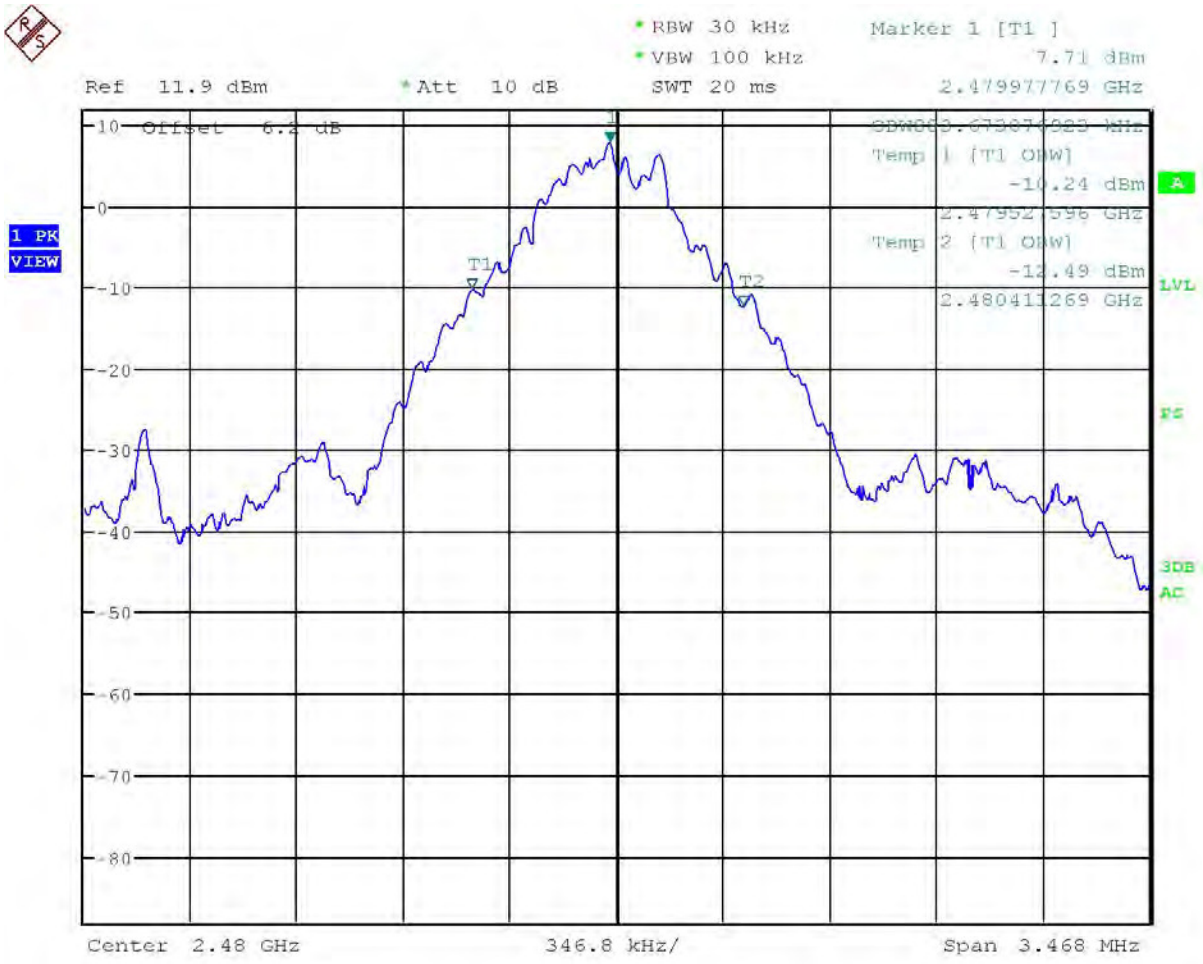


Date: 2.DEC.2016 21:27:21

RESULTS: Meets Requirements

OCCUPIED BANDWIDTH

Test Data: **Mode 1 High end of Band 99% Plot**

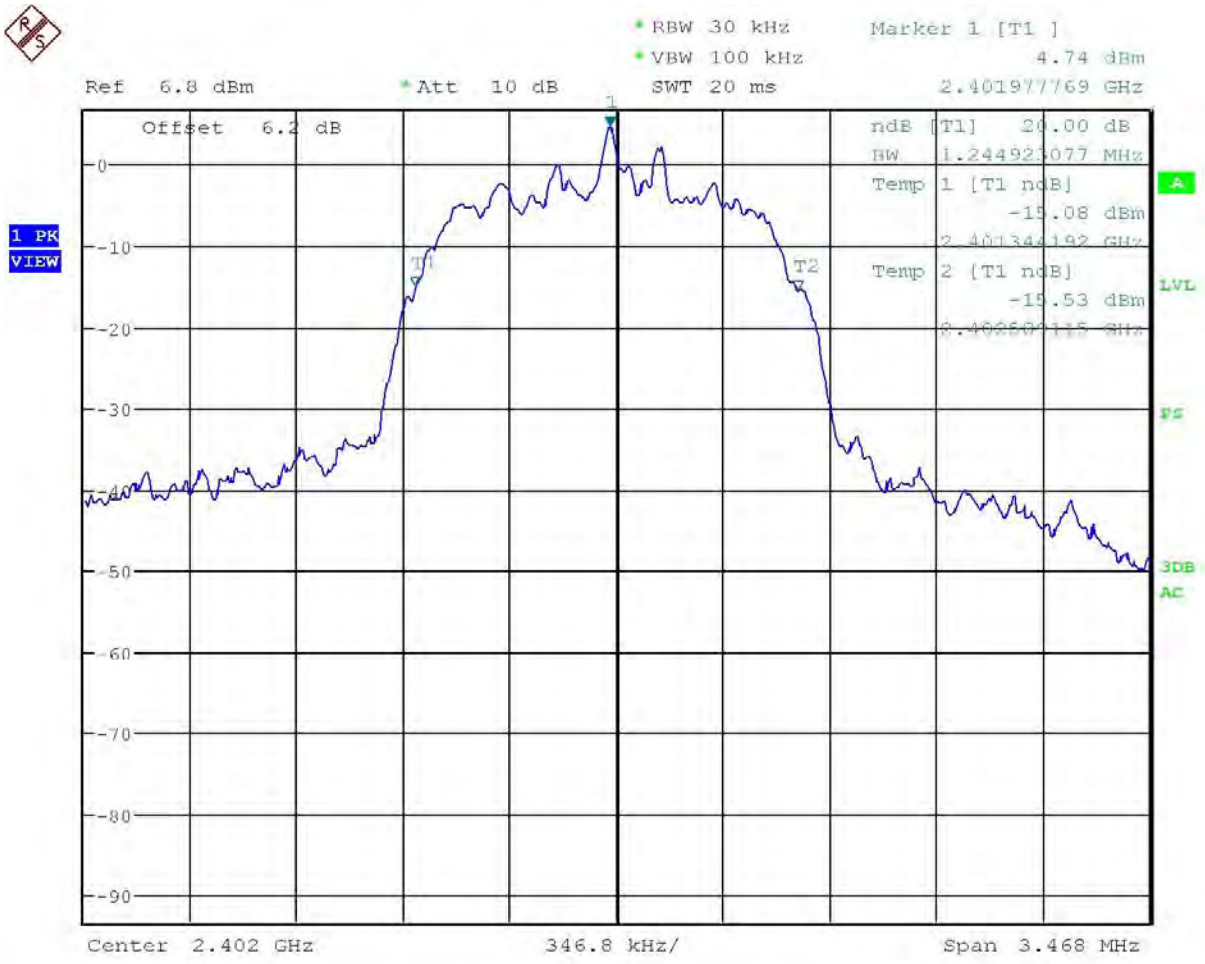


Date: 2.DEC.2016 21:26:49

RESULTS: Meets Requirements

OCCUPIED BANDWIDTH

Test Data: **Mode 2 Low End of Band20 dB Plot**

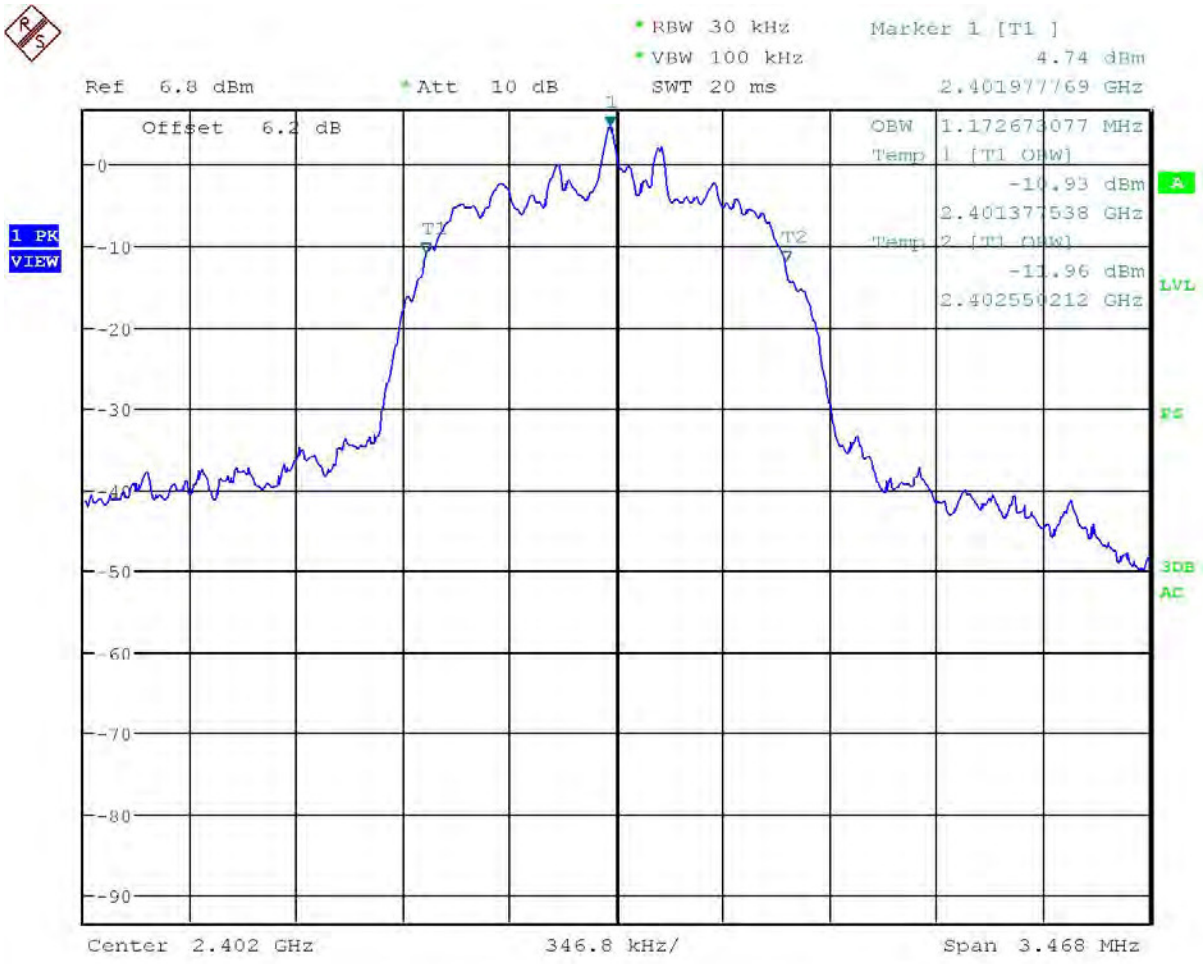


Date: 2.DEC.2016 21:29:12

RESULTS: Meets Requirements

OCCUPIED BANDWIDTH

Test Data: **Mode 2 Low End of Band 99% Plot**

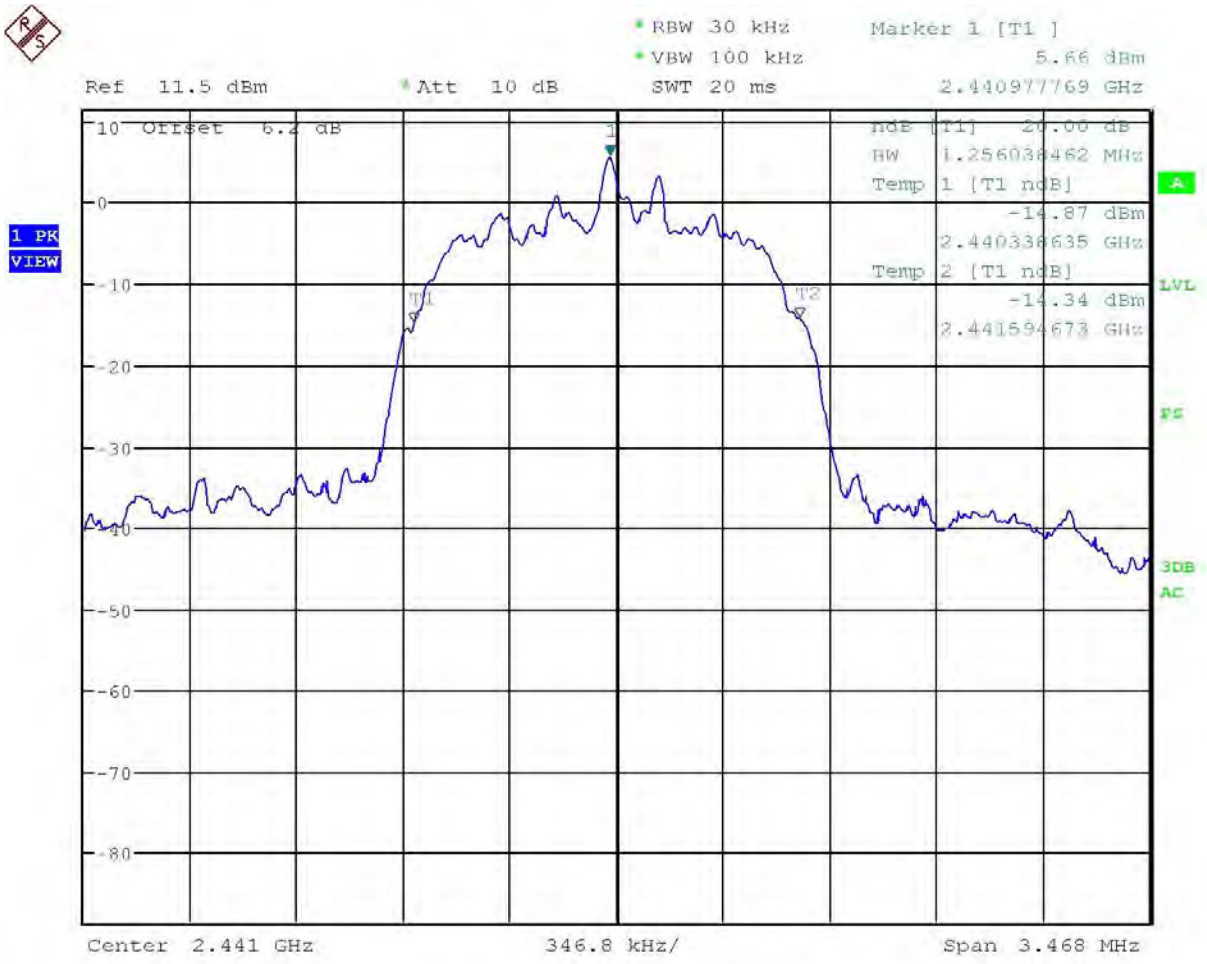


Date: 2.DEC.2016 21:28:35

RESULTS: Meets Requirements

OCCUPIED BANDWIDTH

Test Data: **Mode 2 Middle of Band 20 dB Plot**

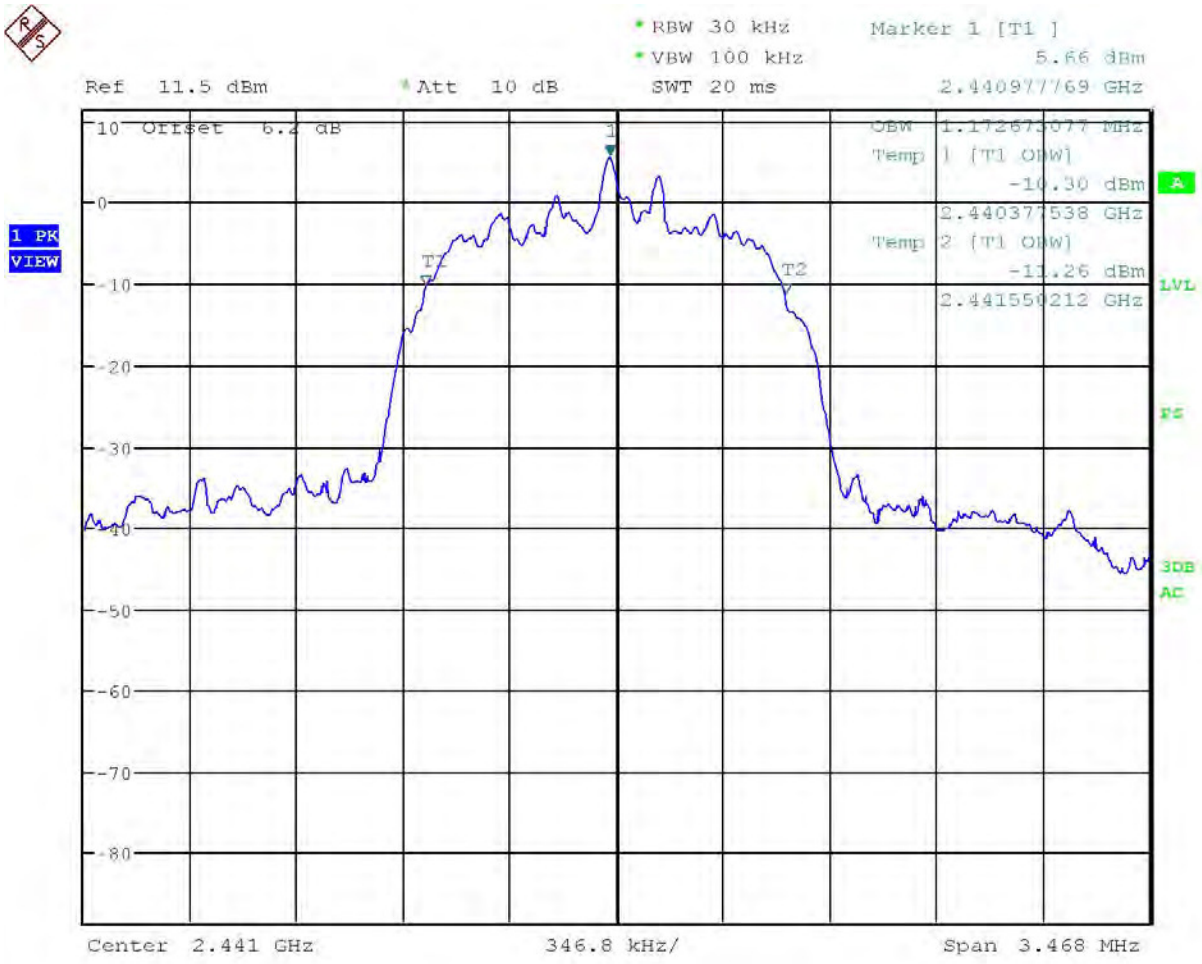


Date: 2.DEC.2016 21:30:16

RESULTS: Meets Requirements

OCCUPIED BANDWIDTH

Test Data: **Mode 2 Middle of Band 99% Plot**

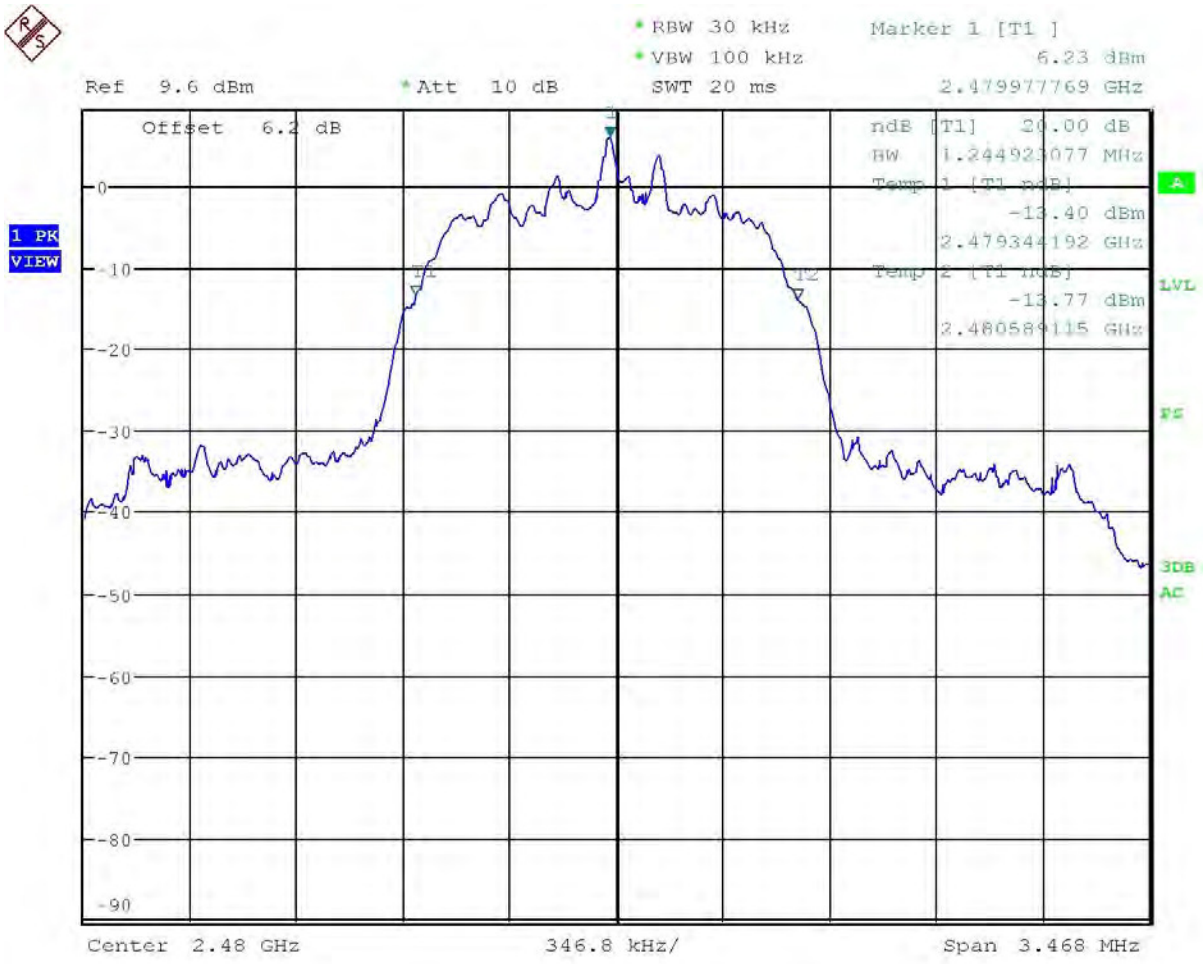


Date: 2.DEC.2016 21:30:03

RESULTS: Meets Requirements

OCCUPIED BANDWIDTH

Test Data: **Mode 2 High end of Band 20 dB Plot**

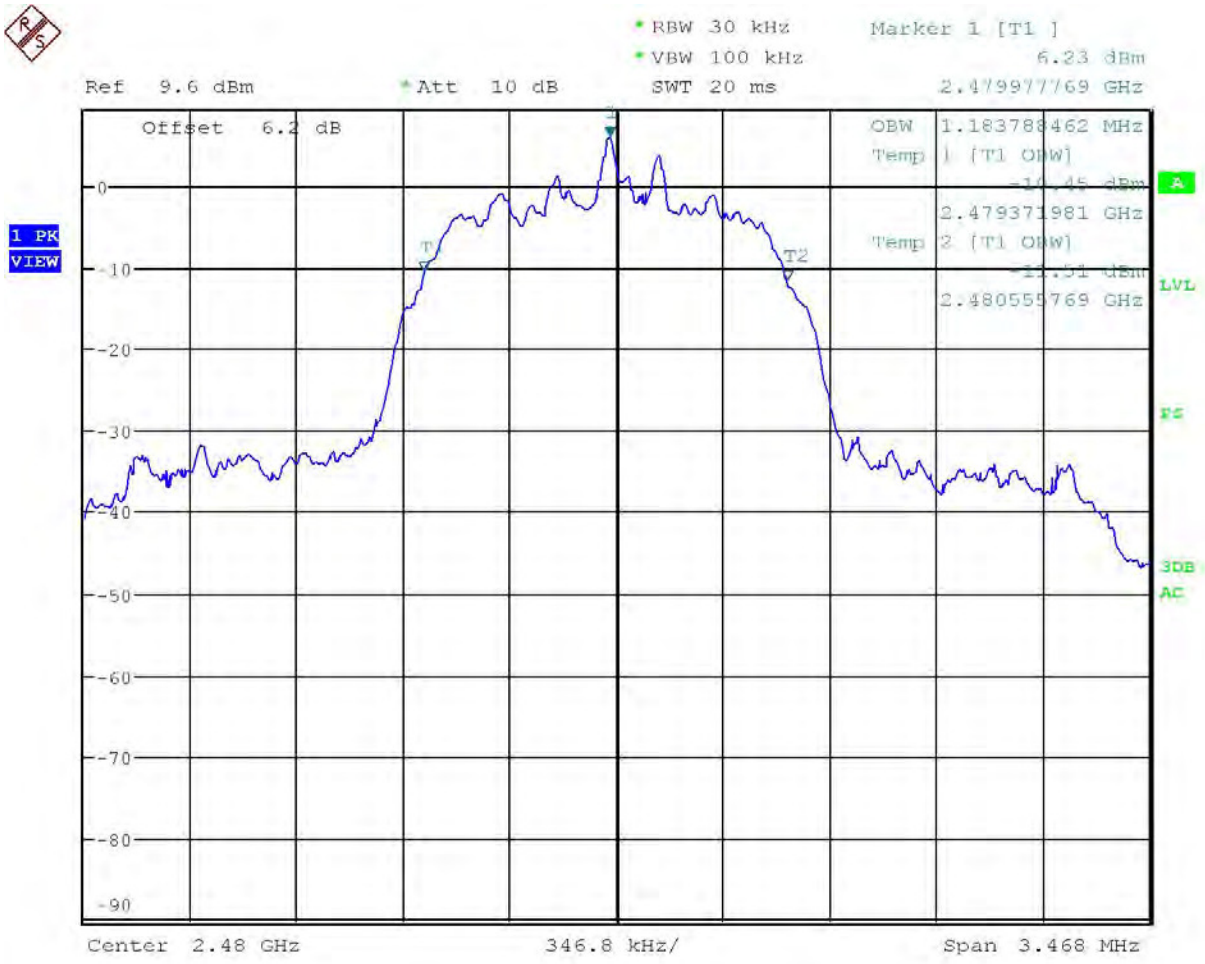


Date: 2.DEC.2016 21:31:34

RESULTS: Meets Requirements

OCCUPIED BANDWIDTH

Test Data: **Mode 2 High end of Band 99% Plot**

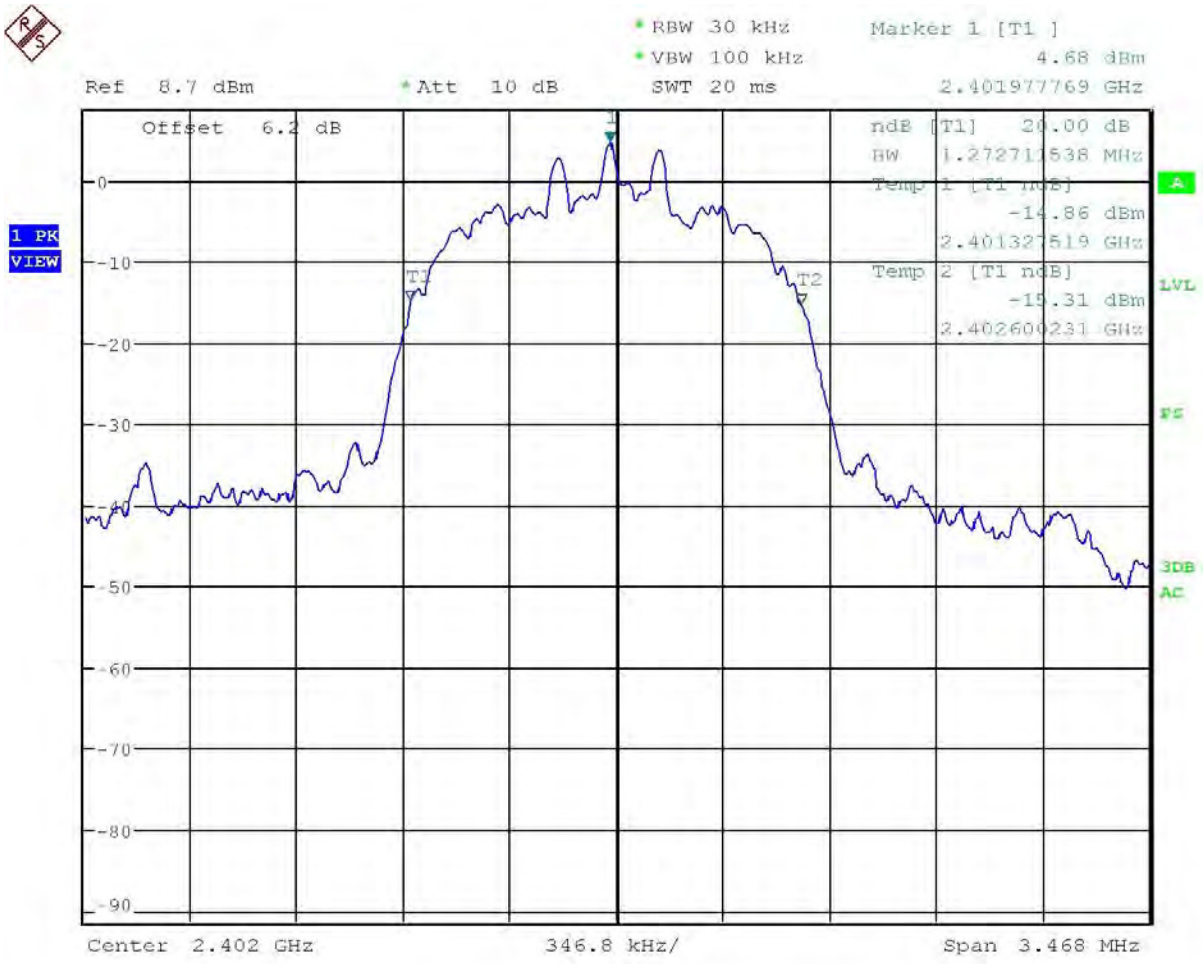


Date: 2.DEC.2016 21:31:12

RESULTS: Meets Requirements

OCCUPIED BANDWIDTH

Test Data: **Mode 3 Low End of Band20 dB Plot**

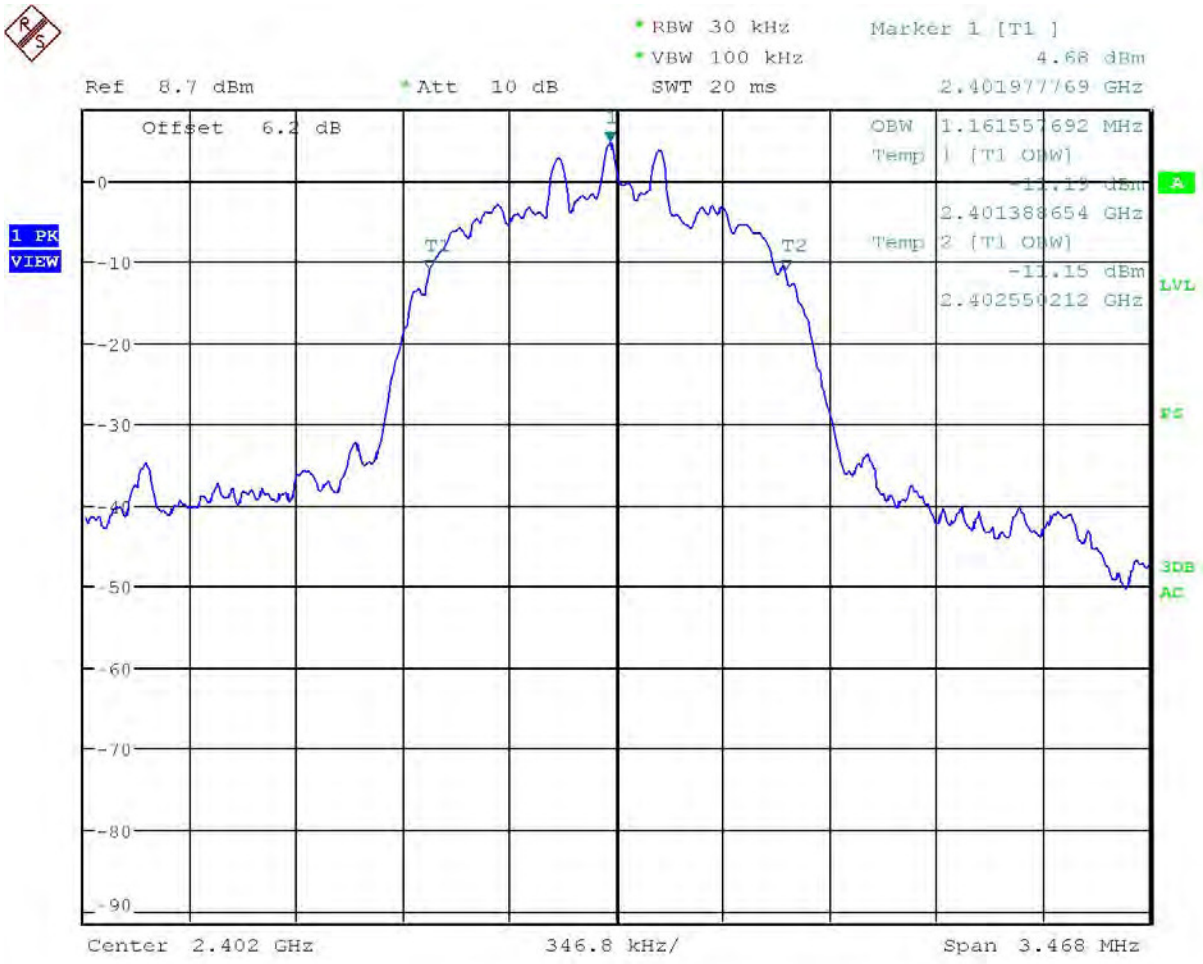


Date: 2.DEC.2016 21:32:51

RESULTS: Meets Requirements

OCCUPIED BANDWIDTH

Test Data: **Mode 3 Low End of Band 99% Plot**

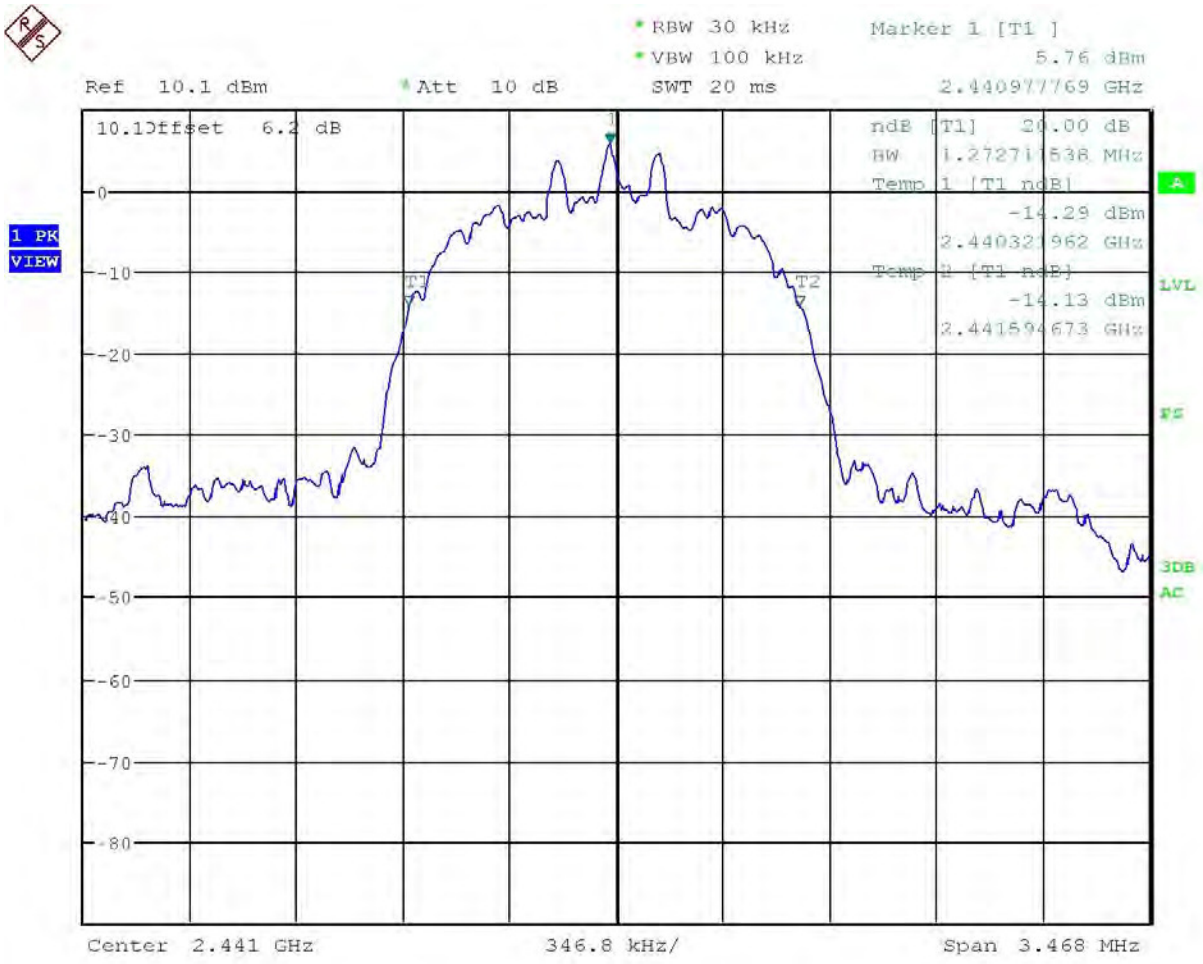


Date: 2.DEC.2016 21:32:35

RESULTS: Meets Requirements

OCCUPIED BANDWIDTH

Test Data: **Mode 3 Middle of Band 20 dB Plot**

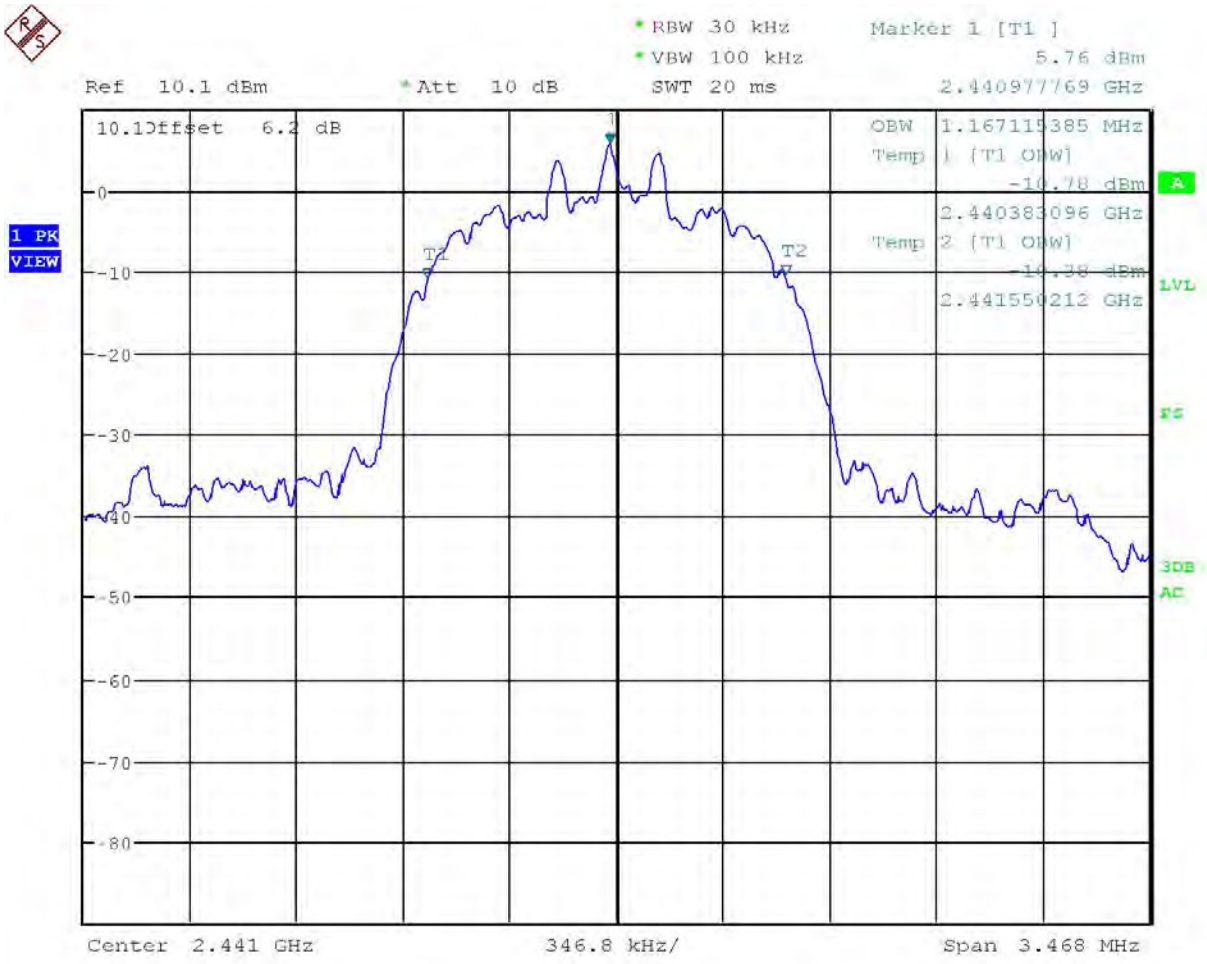


Date: 2.DEC.2016 21:34:01

RESULTS: Meets Requirements

OCCUPIED BANDWIDTH

Test Data: **Mode 3 Middle of Band 99% Plot**

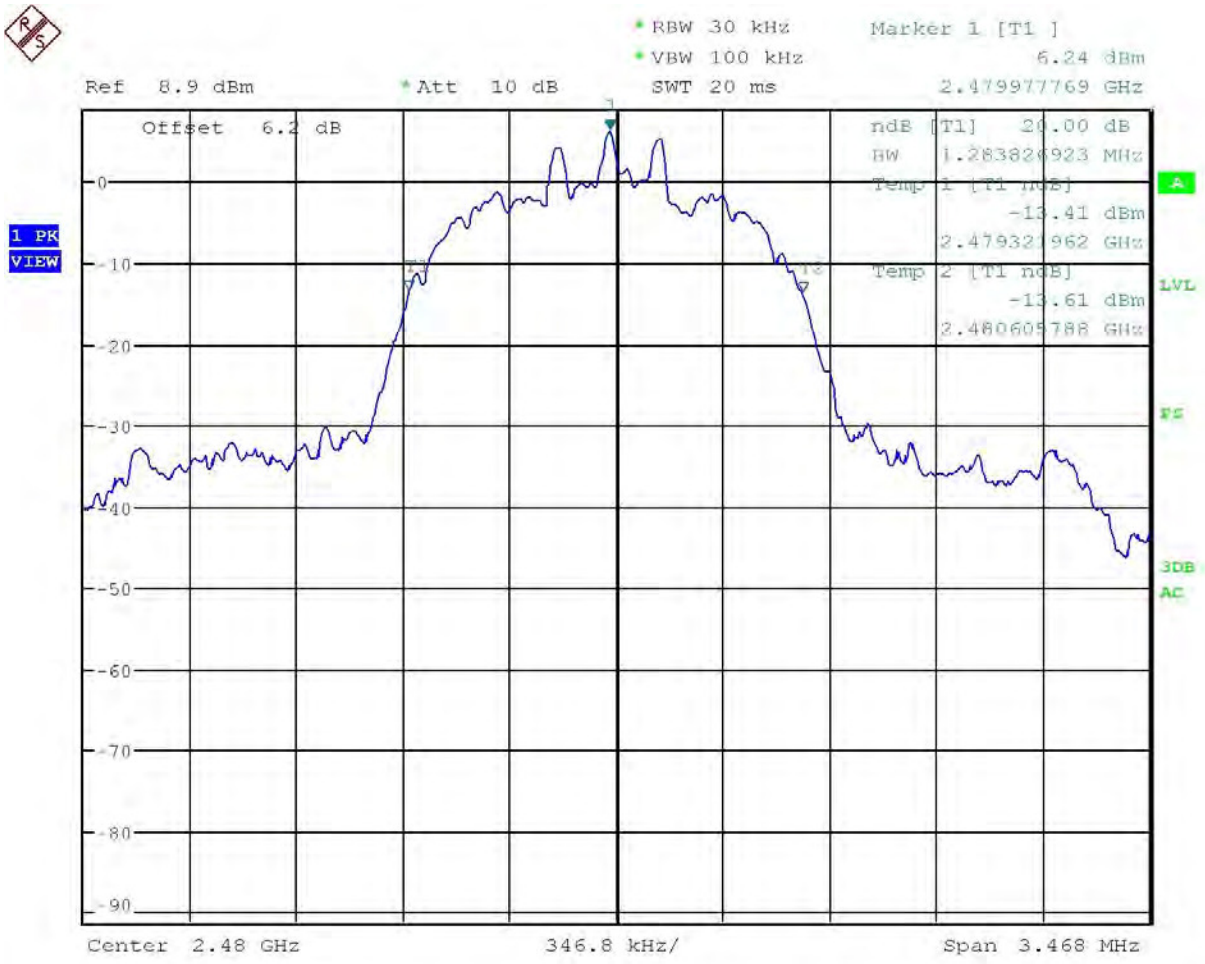


Date: 2.DEC.2016 21:33:43

RESULTS: Meets Requirements

OCCUPIED BANDWIDTH

Test Data: **Mode 3 High end of Band 20 dB Plot**

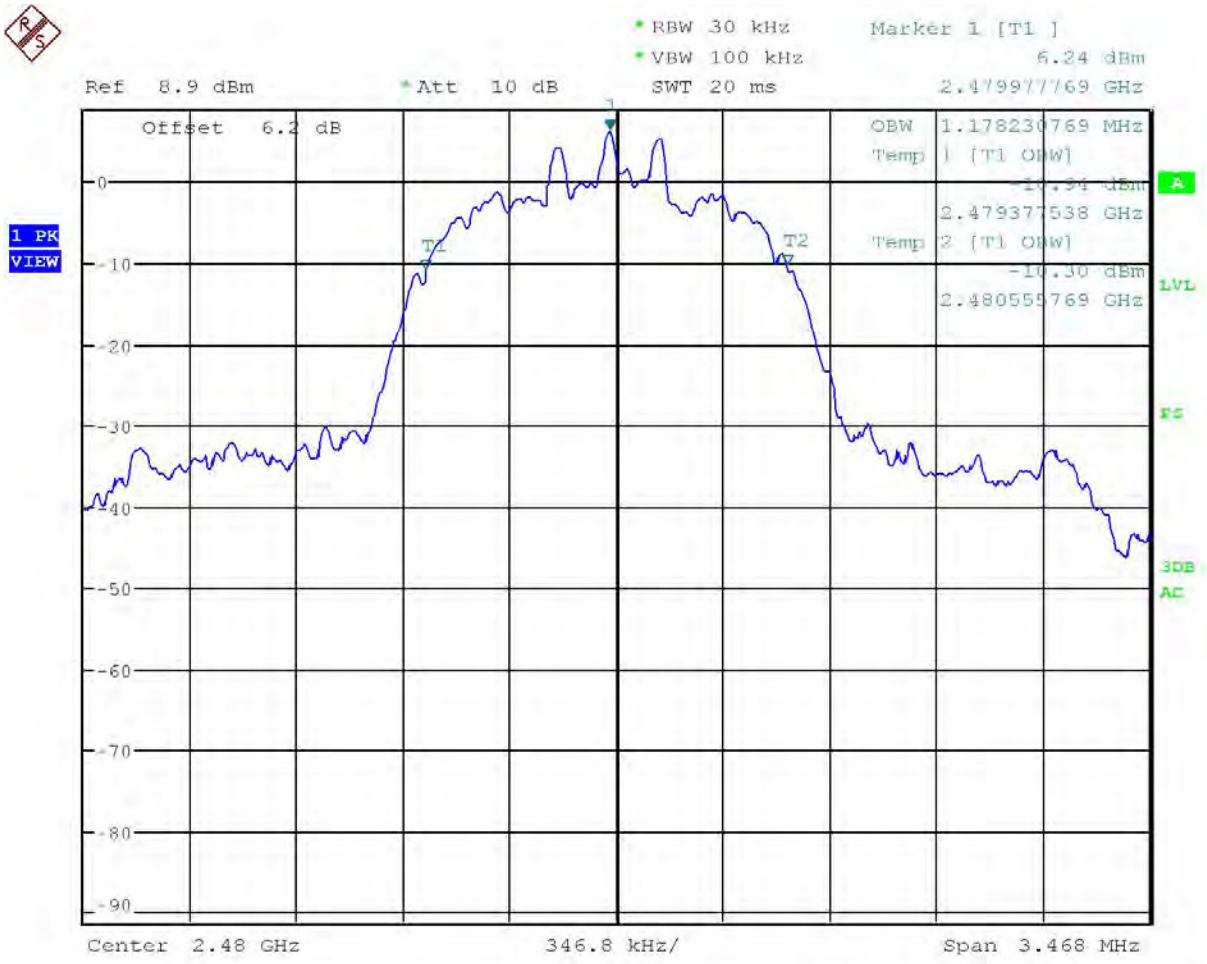


Date: 2.DEC.2016 21:35:16

RESULTS: Meets Requirements

OCCUPIED BANDWIDTH

Test Data: **Mode 3 High end of Band 99% Plot**



Date: 2.DEC.2016 21:35:00

RESULTS: Meets Requirements

FHSS REQUIREMENTS

Rules Part No.: FCC 15.247(a)(1), IC RSS 247 § 5.1.1, 5.1.2, 5.1.4

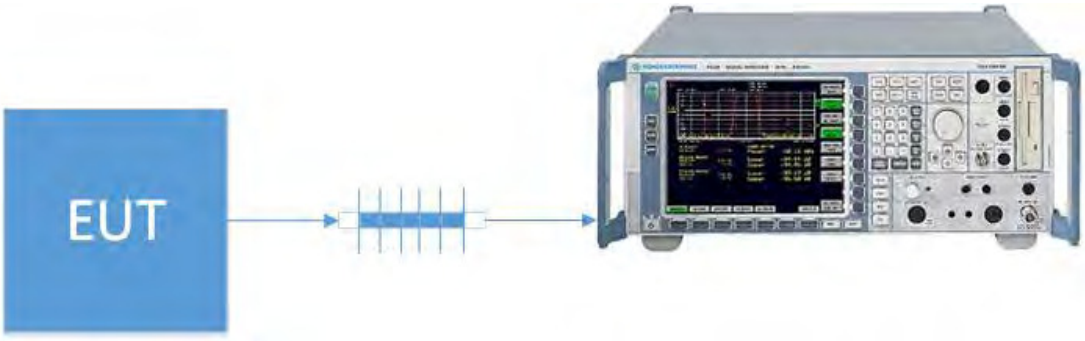
Requirements:

Channel Separation
FHSs operating in the band 2400-2483.5 MHz may have hopping channel carrier frequencies that are separated by 25 kHz or two thirds of the -20 dB bandwidth of the hopping channel, whichever is greater, provided that the systems operate with an output power no greater than 0.125 W.

Dwell Time and Number of Hopping Channels
FHSs operating in the band 2400-2483.5 MHz shall use at least 15 hopping channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds, multiplied by the number of hopping channels employed. Transmissions on particular hopping frequencies may be avoided or suppressed provided that at least 15 hopping channels are used.

Test Method:
ANSI C63.10 § 7.8.2 Carrier frequency separation
ANSI C63.10 § 7.8.3 Number of hopping frequencies
ANSI C63.10 § 7.8.3 Time of Occupancy
DA 00-705 § Pseudorandom Frequency Hopping Sequence
DA 00-705 § Equal Hopping Frequency Use
DA 00-705 § System Receiver Input Bandwidth

Setup:



FHSS REQUIREMENTS

Test Data: **Channel Separation Measurement Table**

Mode	Separation (KHz)	(2/3 of 20 dBBW) Limit (KHz)	Pass / Fail
1	1000	> 599.6	Pass
2	1000	> 839.2	Pass
3	1000	> 852.5	Pass

Test Data: **Number of Hopping Channels Measurement Table**

Mode	Number of channels	Limit	Pass / Fail
1	79	≥ 15	Pass
2	79	≥ 15	Pass
3	79	≥ 15	Pass

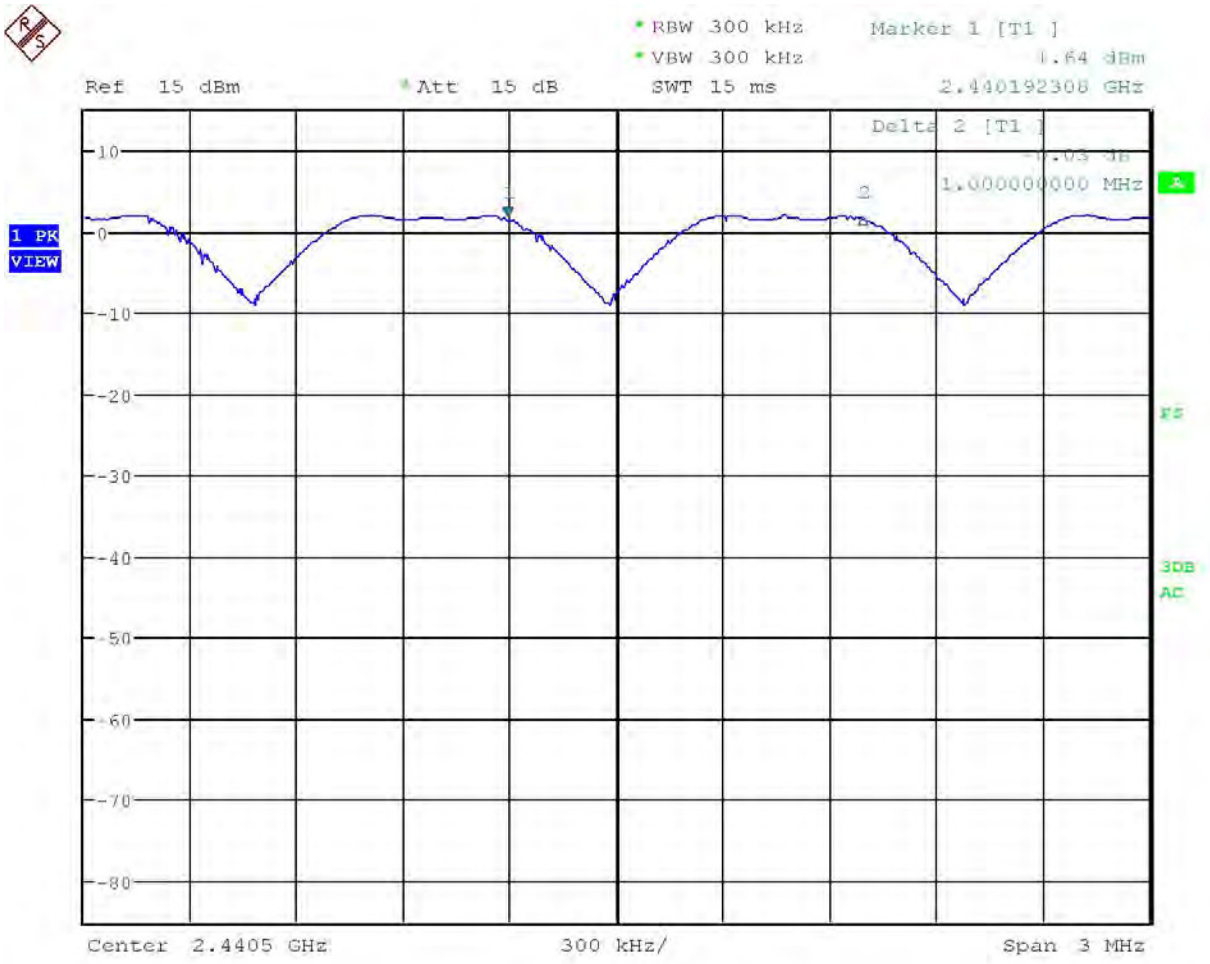
Test Data: **Hopping Channel Occupancy Time Measurement Table**

Mode	Hops over Occupancy Time	Packet Transfer Time (ms)	Dwell Time (s)	Limit (s)	Pass / Fail
1	106.67	2.89	.31	≤ 0.4	Pass
2	106.67	2.89	.31	≤ 0.4	Pass
3	106.67	2.89	.31	≤ 0.4	Pass

RESULTS: Meets Requirements

FHSS REQUIREMENTS

Test Data: **Channel Separation Plot**



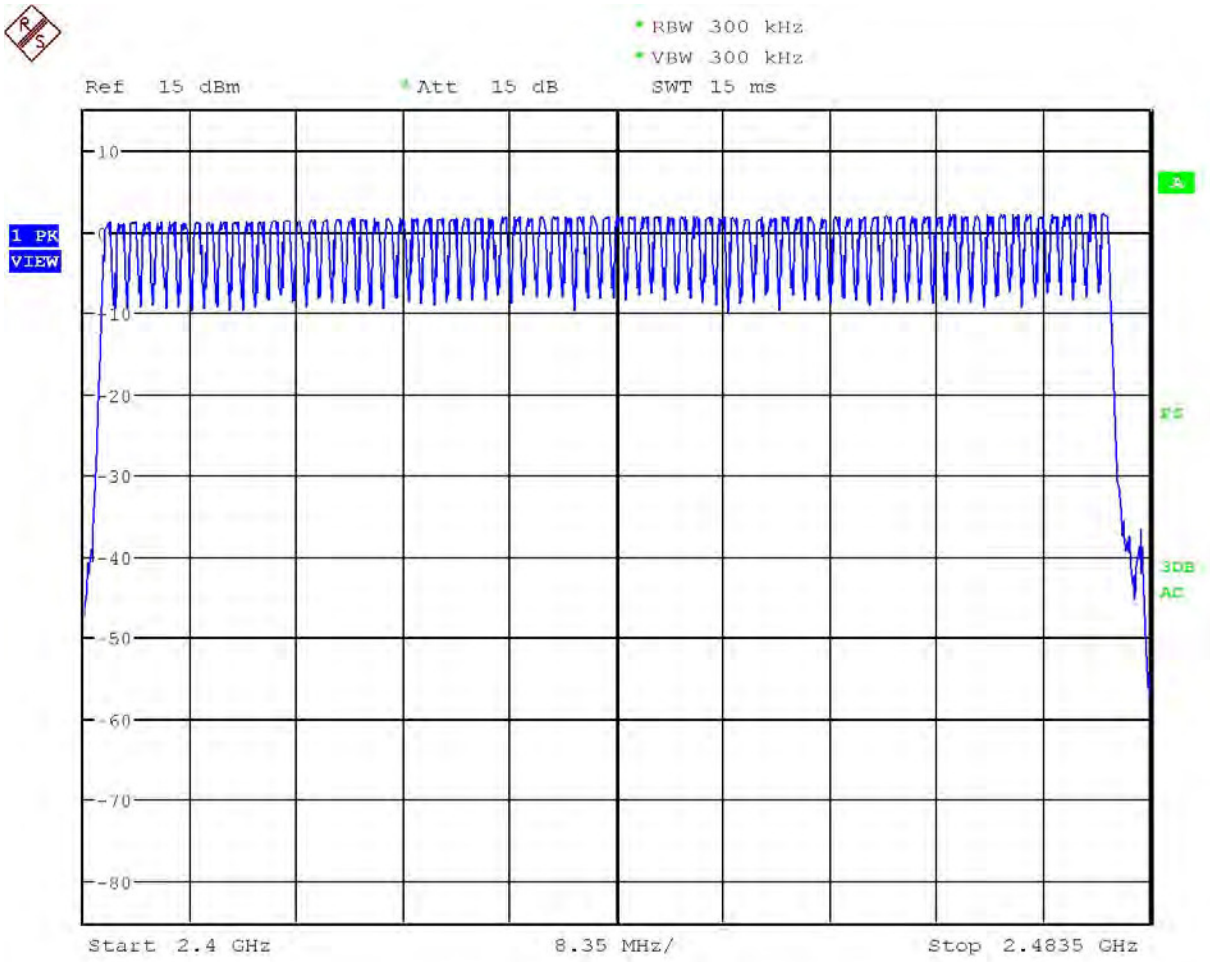
Date: 7.DEC.2016 16:21:50

Note: Only Mode 1 plots are reported because there is no change between the modulation types

RESULTS: Meets Requirements

FHSS REQUIREMENTS

Test Data: **Number of Hopping Channels Plot**



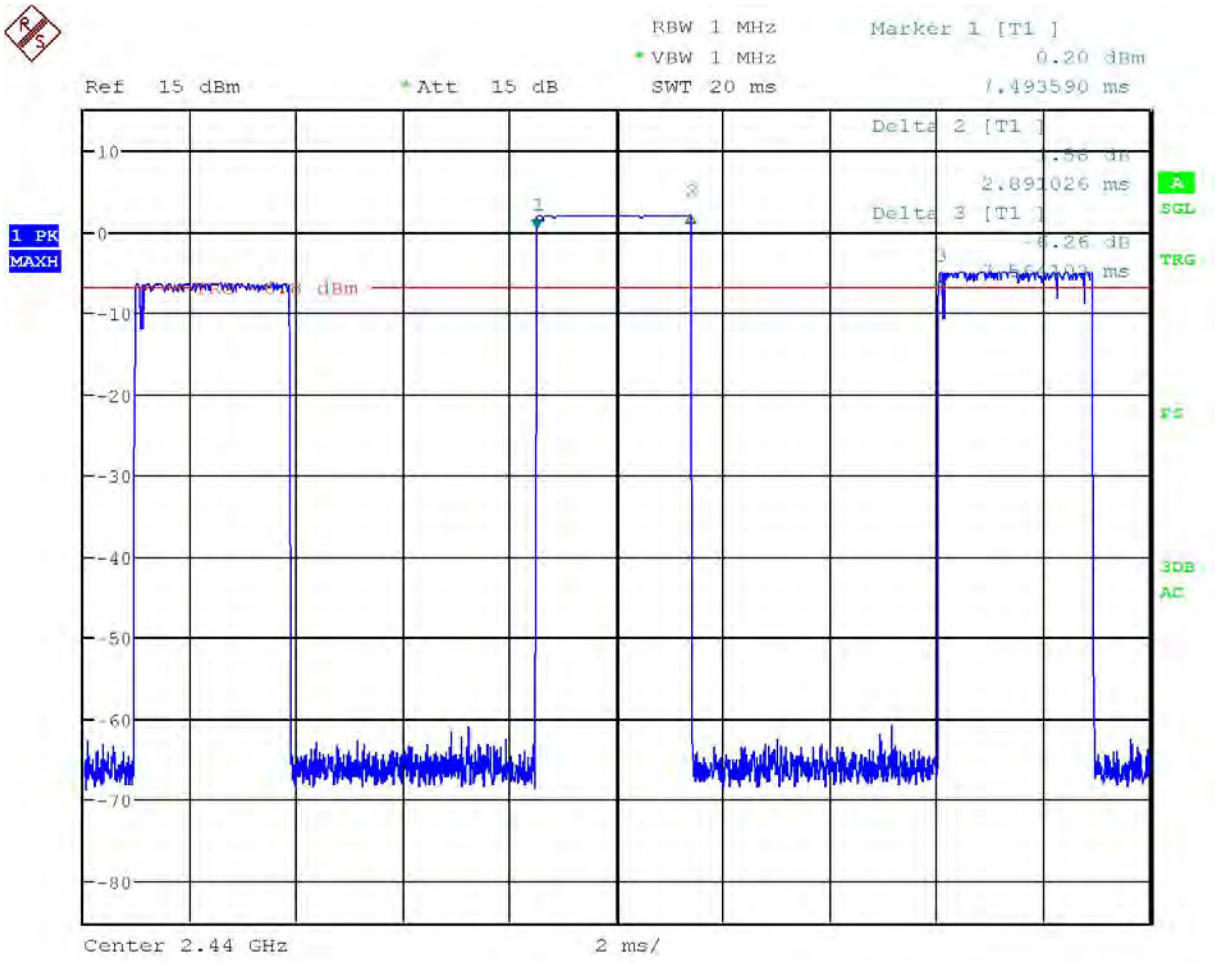
Date: 7.DEC.2016 16:25:12

Note: Only Mode 1 plots are reported because there is no change between the modulation types

RESULTS: Meets Requirements

FHSS REQUIREMENTS

Test Data: **DH5 Packet Transfer Time Plot Time Plot**



Date: 7.DEC.2016 16:16:31

Notes: Only Mode 1 plots are reported because there is no change between the modulation types

Hopping rate is 1600 hops/s using 6 slots and 79 channels. The channel hopping rate (1600/6/79) multiplied by the occupancy time limit (0.4 s x 79), gives the amount of hops during the occupancy time limit; (1600/6/79) x (0.4 x 79) = 106.67 hops

RESULTS: Meets Requirements

FHSS REQUIREMENTS

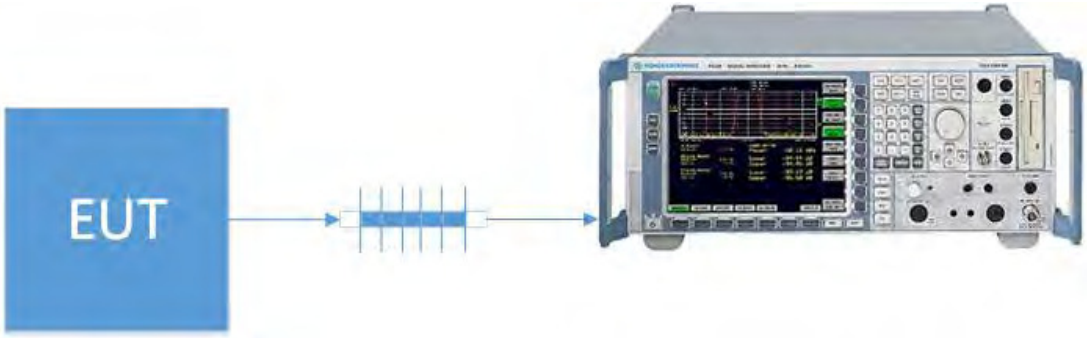
BANDEDGE

Rule Part No.: FCC 15.247(d), IC RSS 247 § 5.5

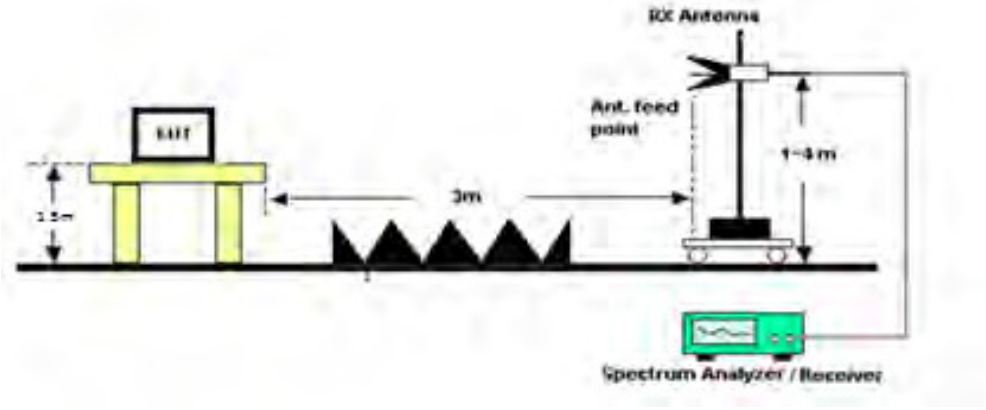
Requirements: Emissions must be at least 20dB down from the highest emission level Within the authorized band as measured with a 100 kHz RBW. Emissions found in restricted bands the levels must comply with the general limits found in FCC part 15.209

Test Method: ANSI C63.10 § 6.10.4 Authorized band-edge relative method (non-restricted)
ANSI C63.10 § 6.10.6 Marker Delta Method (restricted band edge)
ANSI C63.4 § Annex D Validation of radiated emissions standard test sites
ANSI C63.10 § 6.3 Common requirements radiated emissions
ANSI C63.10 § 6.6 Emissions above 1 GHz

Setup:



Conducted Measurement



Radiated Measurement

BANDEDGE

Test Data: **Mode 1 Radiated Measurement Table**

Tuned Freq MHz	Emission Freq MHz	Detector Type PK/AV	Meter Reading dBu V	Antenna Polarity	Coax Loss dB	Corr Factor dB/M	Field Strength dBu V/M	Limit dBu V/M	Margin dB
HOPPING	2310.64	PK	14.8	V	5.6	32.0	52.3	74.0	21.7
HOPPING	2310.64	AV	1.1	V	5.6	32.0	38.6	54.0	15.4
HOPPING	2486.26	PK	12.6	H	5.8	32.7	51.0	74.0	23.0
HOPPING	2486.26	AV	0.2	H	5.8	32.7	38.6	54.0	15.4
2402	2342.17	PK	14.2	V	5.6	32.1	51.9	74.0	22.1
2402	2342.17	AV	0.6	V	5.6	32.1	38.3	54.0	15.7
2480	2480	PK	65.6	H	5.8	32.6	104.0	N/A	-
2480	2480	AV	62.7	H	5.8	32.6	101.1	N/A	-
2480	2486.91	PK	12.9	V	5.8	32.7	51.4	74.0	22.6
2480	2486.91	AV	0.2	V	5.8	32.7	38.6	54.0	15.4

Test Data: **Mode 2 Radiated Measurement Table**

Tuned Freq MHz	Emission Freq MHz	Detector Type PK/AV	Meter Reading dBu V	Antenna Polarity	Coax Loss dB	Corr Factor dB/M	Field Strength dBu V/M	Limit dBu V/M	Margin dB
HOPPING	2314.48	PK	13.5	H	5.6	32.0	51.1	74.0	22.9
HOPPING	2314.48	AV	0.5	H	5.6	32.0	38.1	54.0	15.9
HOPPING	2486.42	PK	12.8	V	5.8	32.7	51.2	74.0	22.8
HOPPING	2486.42	AV	0.2	V	5.8	32.7	38.7	54.0	15.3
2402	2354.74	PK	14.2	V	5.6	32.2	52.0	74.0	22.0
2402	2354.74	AV	0.5	V	5.6	32.2	38.3	54.0	15.7
2480	2480	PK	62.6	H	5.8	32.6	101.0	N/A	-
2480	2480	AV	57.0	H	5.8	32.6	95.4	N/A	-
2480	2486.47	PK	12.1	H	5.8	32.7	50.6	74.0	23.4
2480	2486.47	AV	0.3	H	5.8	32.7	38.7	54.0	15.3

Note: The fundamental field strength is measured and used for the conducted band edge marker delta method, there is no limit applied to fundamental field strength

BANDEDGE

Test Data: **Mode 3 Radiated Measurement Table**

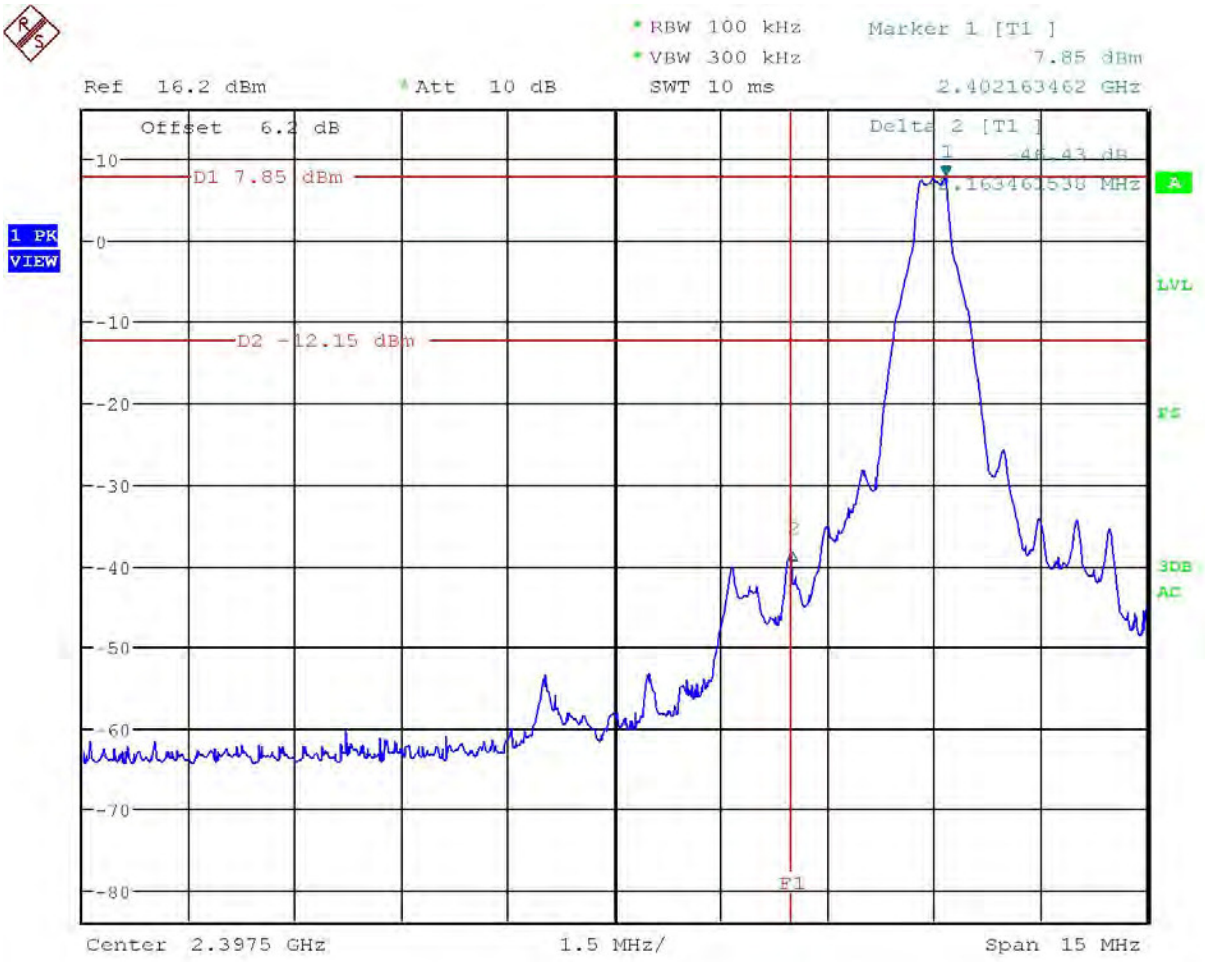
Tuned Freq MHz	Emission Freq MHz	Detector Type PK/AV	Meter Reading dBu V	Antenna Polarity	Coax Loss dB	Corr Factor dB/M	Field Strength dBu V/M	Limit dBu V/M	Margin dB
HOPPING	2314.74	PK	14.04	V	5.58	31.97	51.59	74.00	22.41
HOPPING	2314.74	AV	0.64	V	5.58	31.97	38.19	54.00	15.81
HOPPING	2486.35	PK	12.94	V	5.78	32.66	51.38	74.00	22.62
HOPPING	2486.35	AV	0.29	V	5.78	32.66	38.73	54.00	15.27
2402	2370.89	PK	13.54	V	5.65	32.25	51.44	74.00	22.56
2402	2370.89	AV	0.53	V	5.65	32.25	38.43	54.00	15.57
2480	2480	PK	62.94	H	5.78	32.64	101.36	N/A	-
2480	2480	AV	56.69	H	5.78	32.64	95.11	N/A	-
2480	2485.94	PK	13.65	V	5.78	32.66	52.09	74.00	21.91
2480	2485.94	AV	0.19	V	5.78	32.66	38.63	54.00	15.37

Note: The fundamental field strength is measured and used for the conducted band edge marker delta method, there is no limit applied to fundamental field strength

RESULTS: Meets Requirements

BANDEDGE

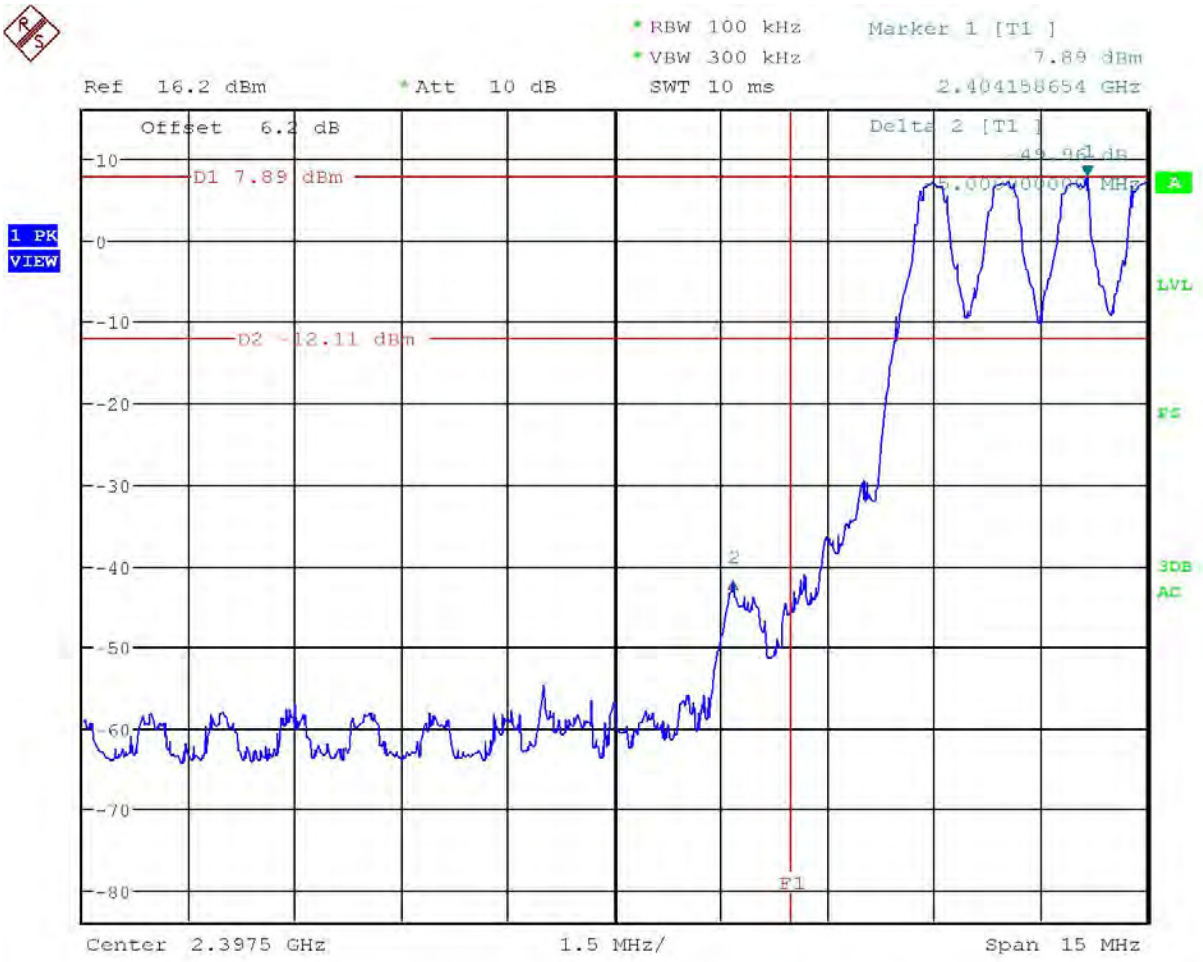
Test Data: **Mode 1 Conducted Lower Band Edge Stopped Plot**



RESULTS: Meets Requirements

BANDEDGE

Test Data: **Mode 1 Conducted Lower Band Edge Hopping Plot**



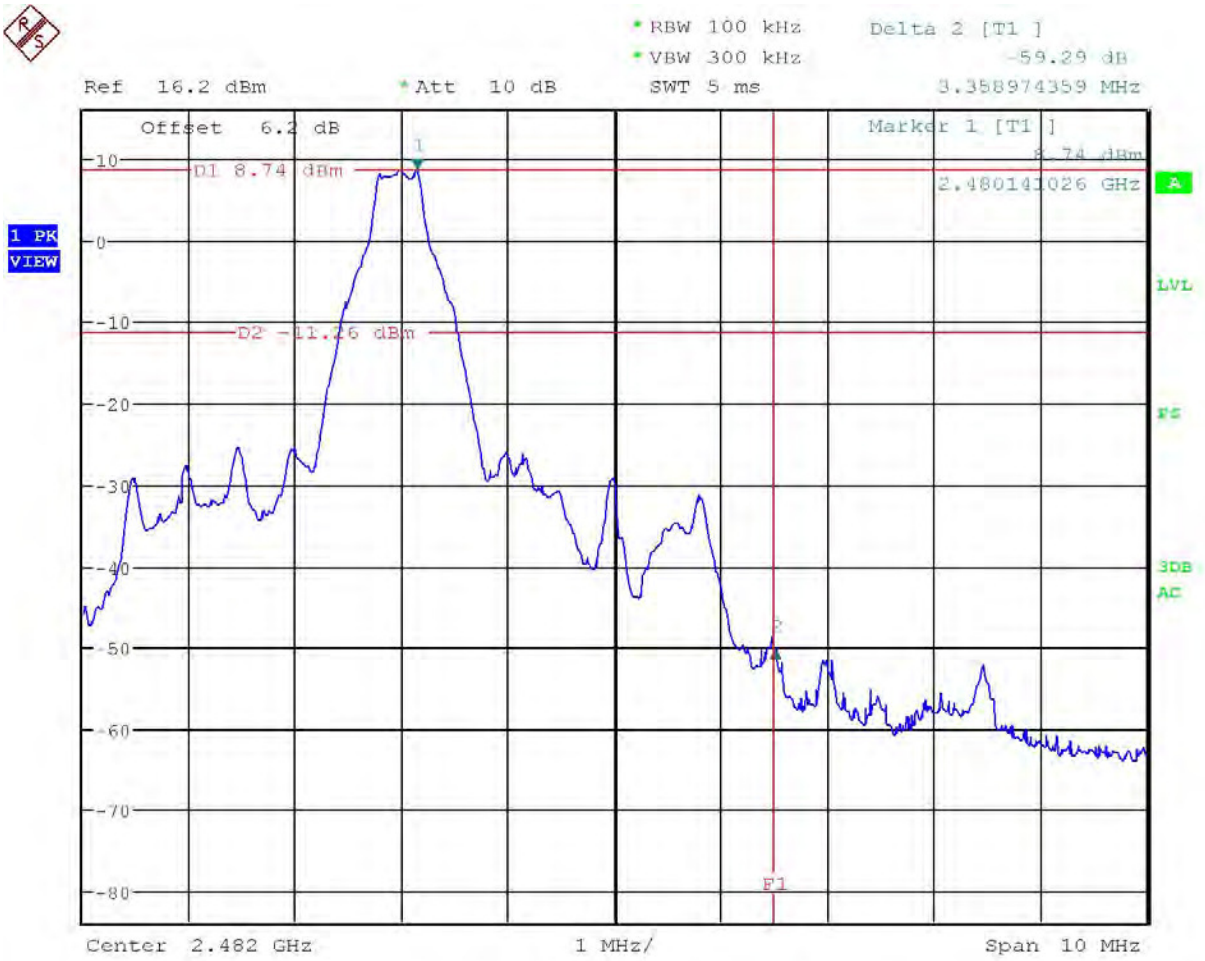
Date: 2.DEC.2016 22:13:55

RESULTS: Meets Requirements

BANDEDGE

Test Data: **Mode 1 Conducted Upper Band Edge Stopped Plot**

Tuned Freq MHz	Detector Type PK/AV	Fund FS dBu V/M	Emission Freq MHz	Meter Reading dBc	Field Strengh dBu V/M	Limit dBu V/M	Margin dB
2480.0	AV	101.1	2483.5	59.3	41.8	54.0	12.2
2480.0	PK	104.0	2483.5	59.3	44.7	74.0	29.3



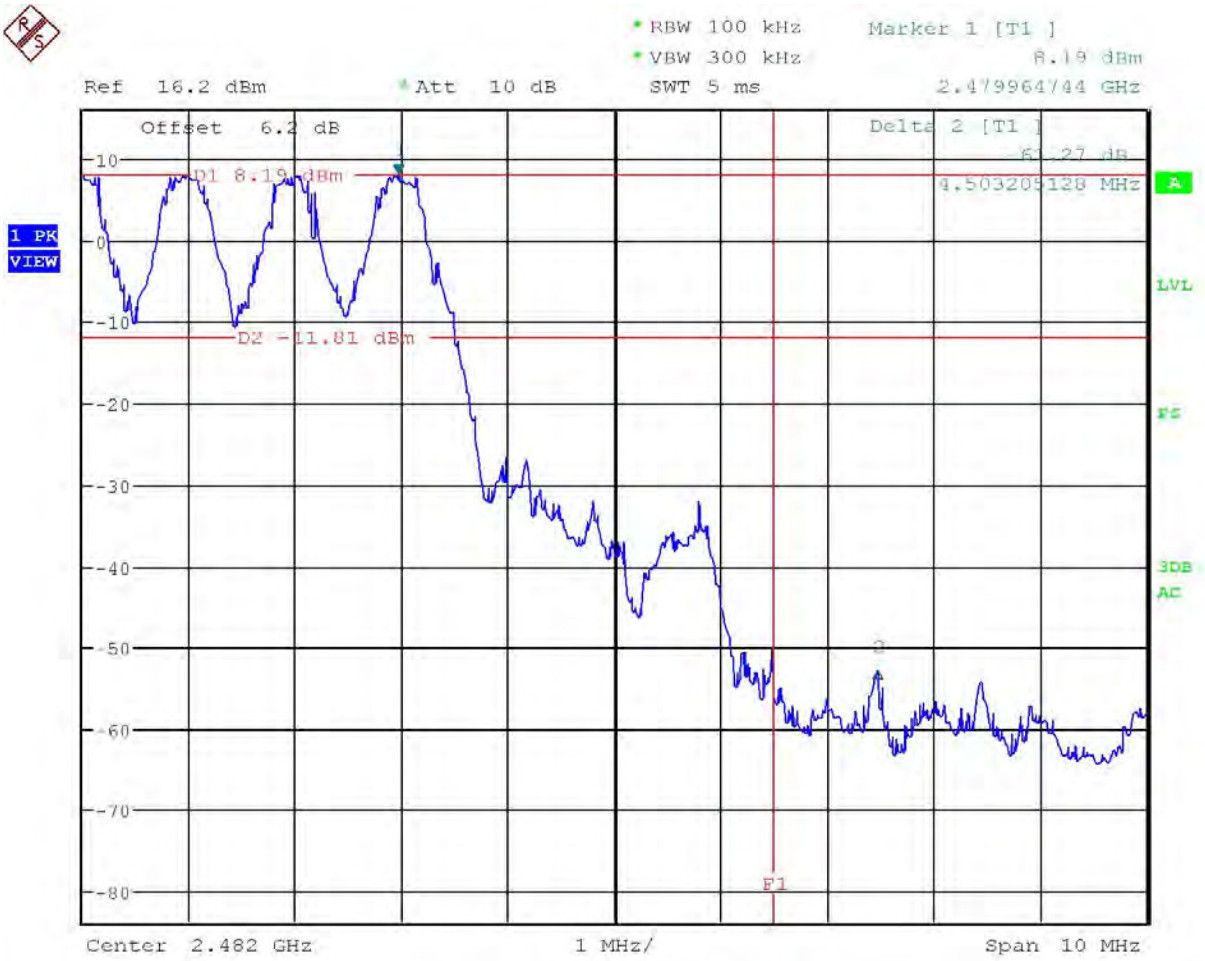
Date: 2.DEC.2016 22:35:34

RESULTS: Meets Requirements

BANDEDGE

Test Data: **Mode 1 Conducted Upper Band Edge Hopping Plot**

Tuned Freq MHz	Detector Type PK/AV	Fund FS dBu V/M	Emission Freq MHz	Meter Reading dBc	Field Strengh dBu V/M	Limit dBu V/M	Margin dB
2480.0	AV	101.1	2484.5	61.3	39.8	54.0	14.2
2480.0	PK	104.0	2484.5	61.3	42.7	74.0	31.3

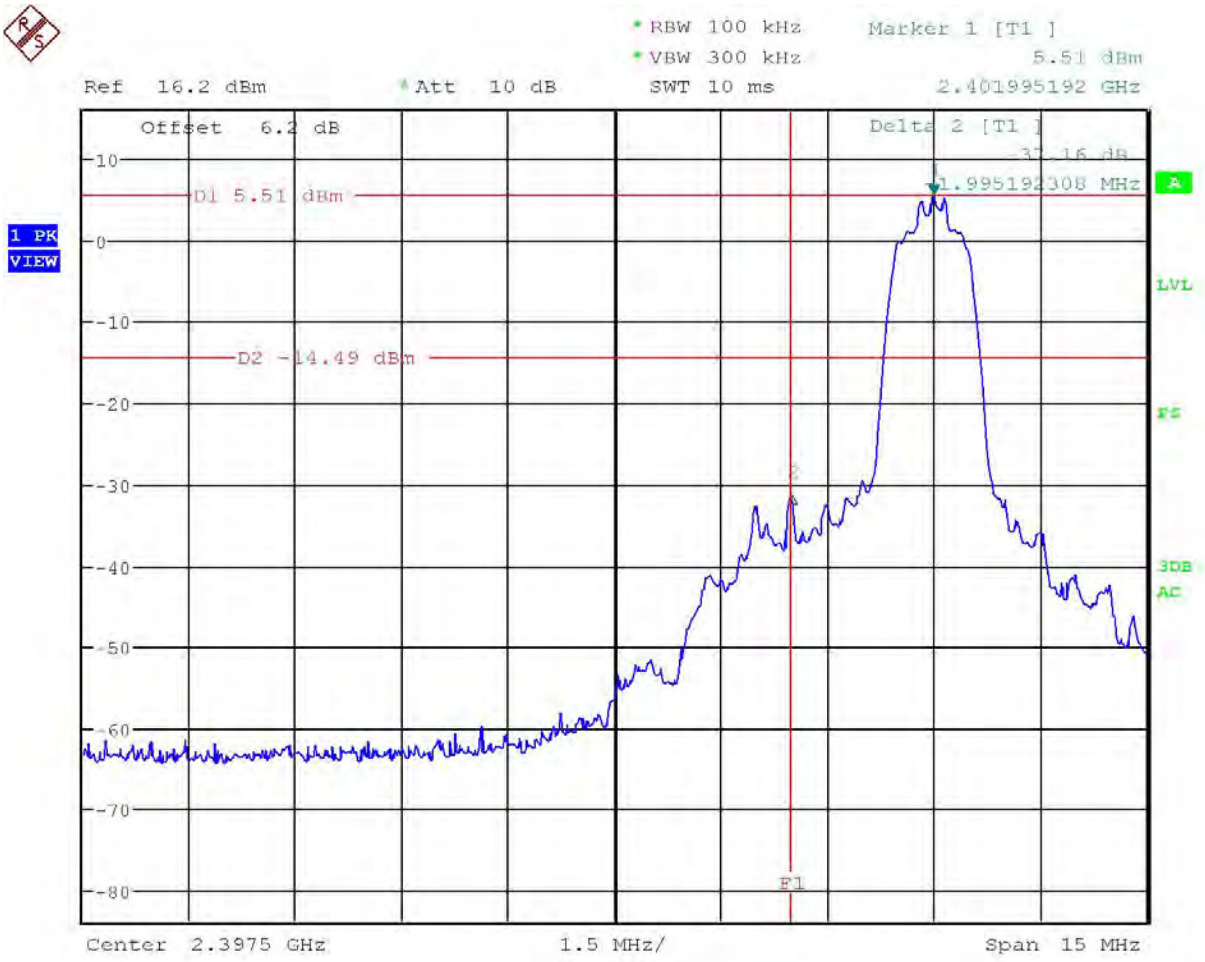


Date: 2.DEC.2016 22:37:30

RESULTS: Meets Requirements

BANDEDGE

Test Data: **Mode 2 Conducted Lower Band Edge Stopped Plot**

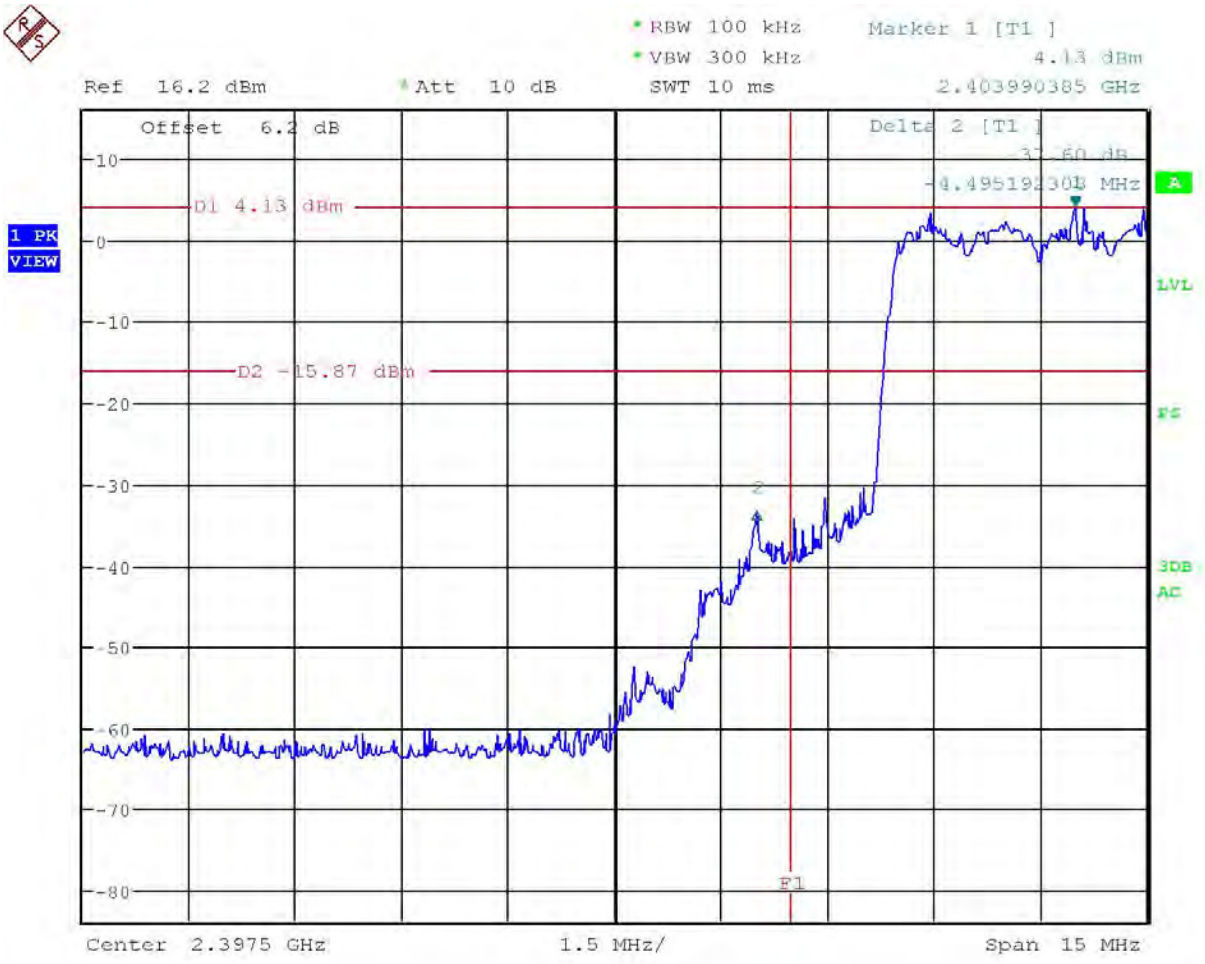


Date: 2.DEC.2016 22:16:42

RESULTS: Meets Requirements

BANDEDGE

Test Data: **Mode 2 Conducted Lower Band Edge Hopping Plot**

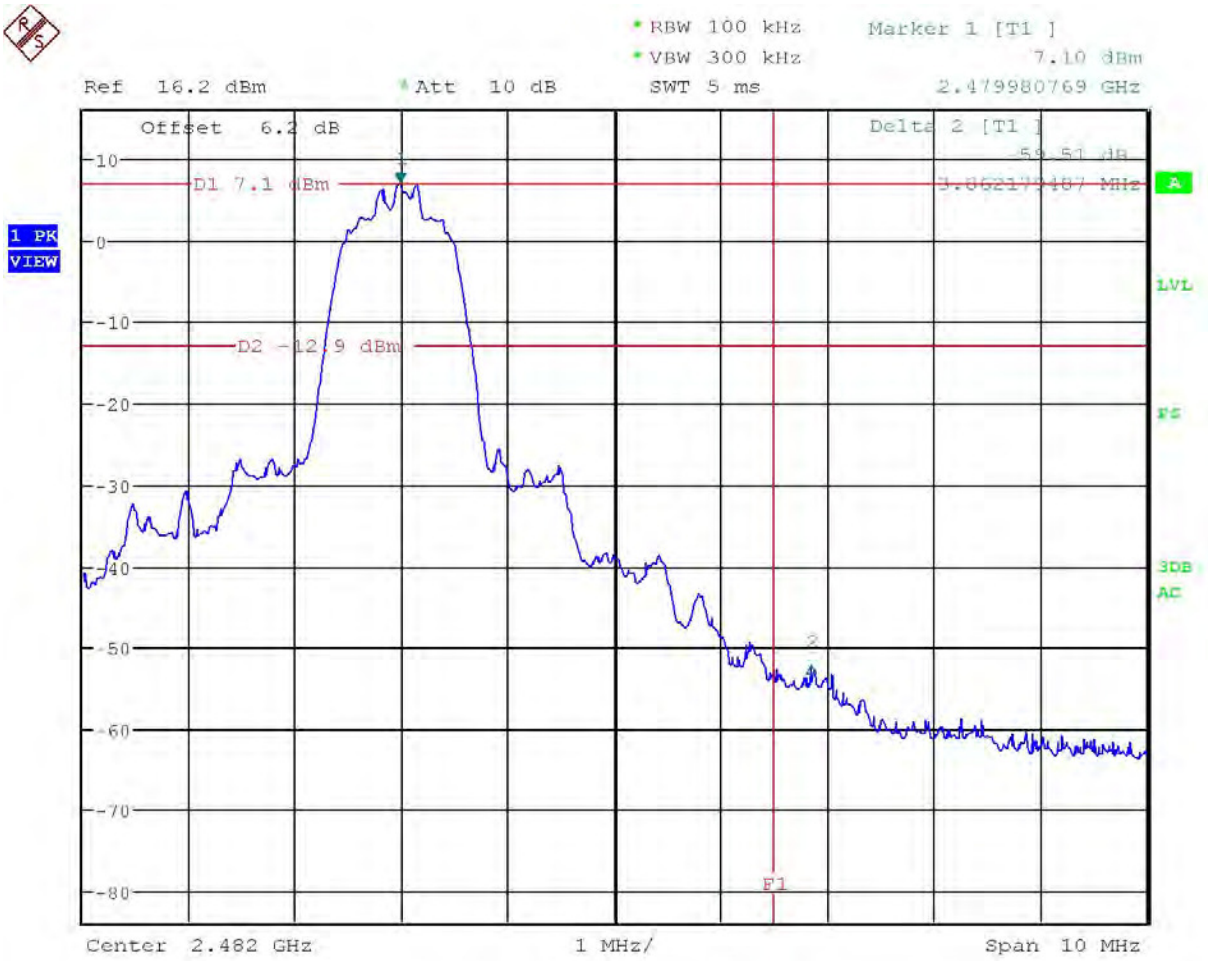


RESULTS: Meets Requirements

BANDEDGE

Test Data: **Mode 2 Conducted Upper Band Edge Stopped Plot**

Tuned Freq MHz	Detector Type PK/AV	Fund FS dBu V/M	Emission Freq MHz	Meter Reading dBc	Field Strengh dBu V/M	Limit dBu V/M	Margin dB
2480.0	AV	95.4	2483.8	59.5	35.9	54.0	18.1
2480.0	PK	101.0	2483.8	59.5	41.5	74.0	32.5



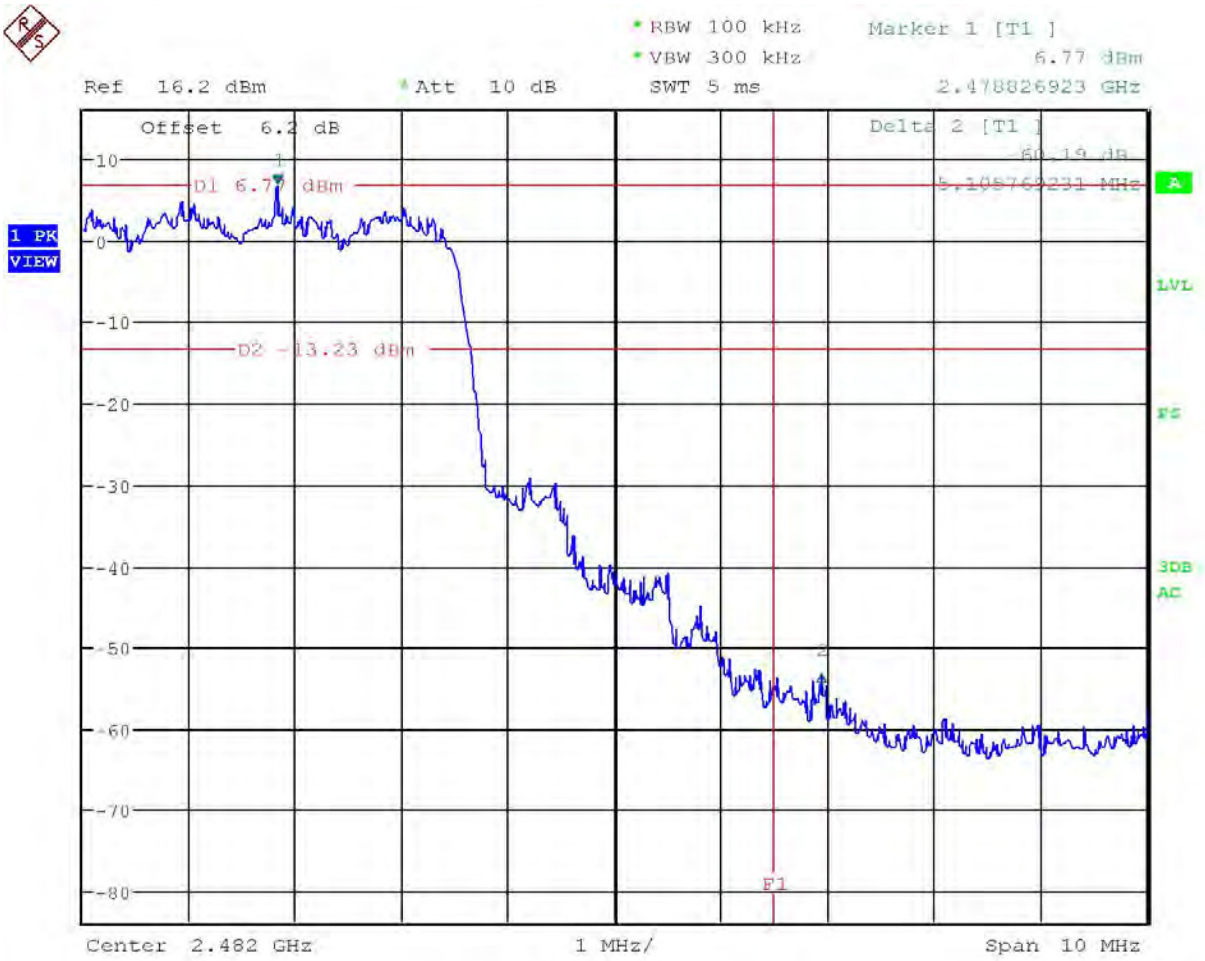
Date: 2.DEC.2016 22:42:14

RESULTS: Meets Requirements

BANDEDGE

Test Data: **Mode 2 Conducted Upper Band Edge Hopping Plot**

Tuned Freq MHz	Detector Type PK/AV	Fund FS dBu V/M	Emission Freq MHz	Meter Reading dBc	Field Strengh dBu V/M	Limit dBu V/M	Margin dB
2480.0	AV	95.4	2483.9	60.2	35.2	54.0	18.8
2480.0	PK	101.0	2483.9	60.2	40.8	74.0	33.2

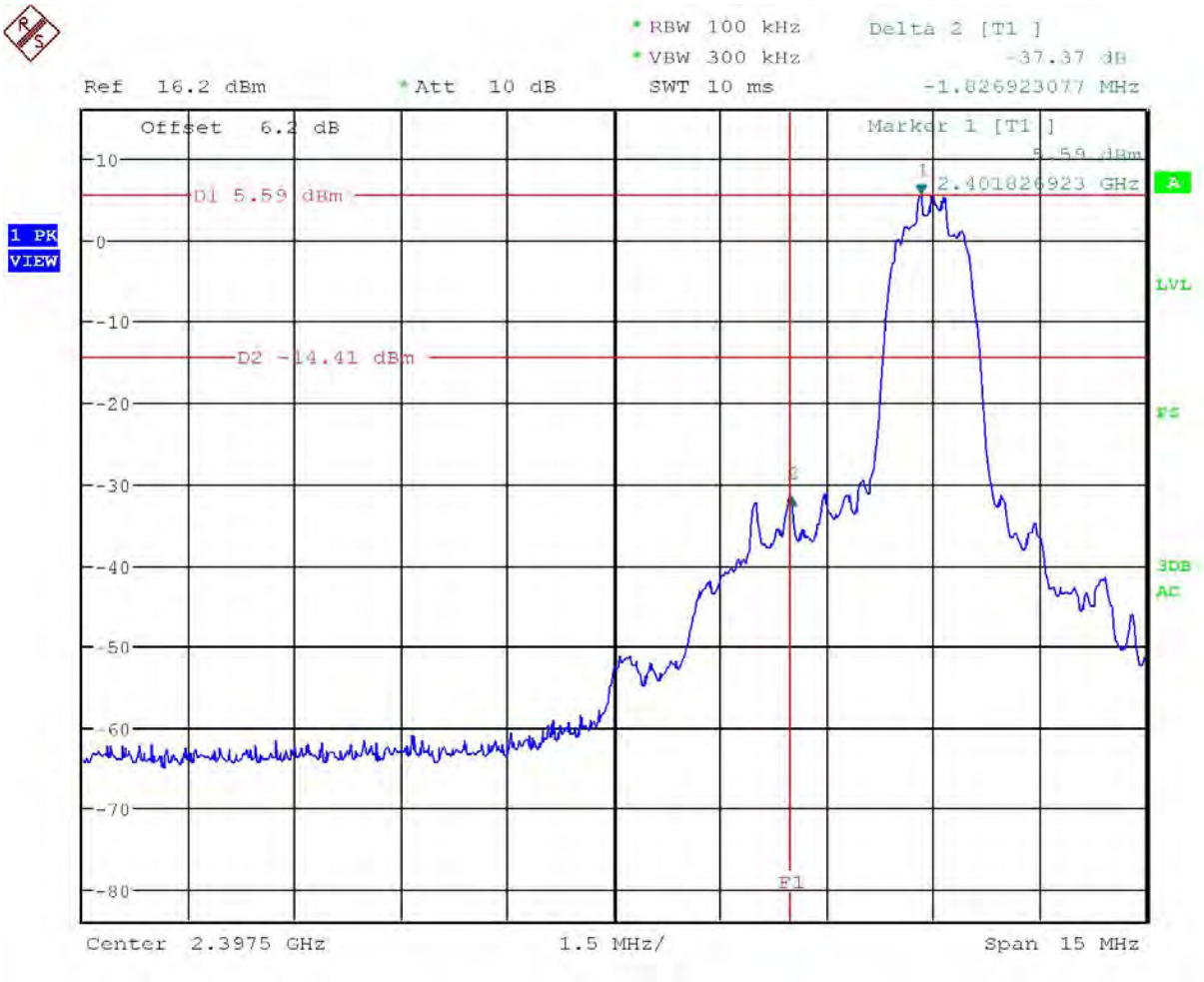


Date: 2.DEC.2016 22:44:39

RESULTS: Meets Requirements

BANDEDGE

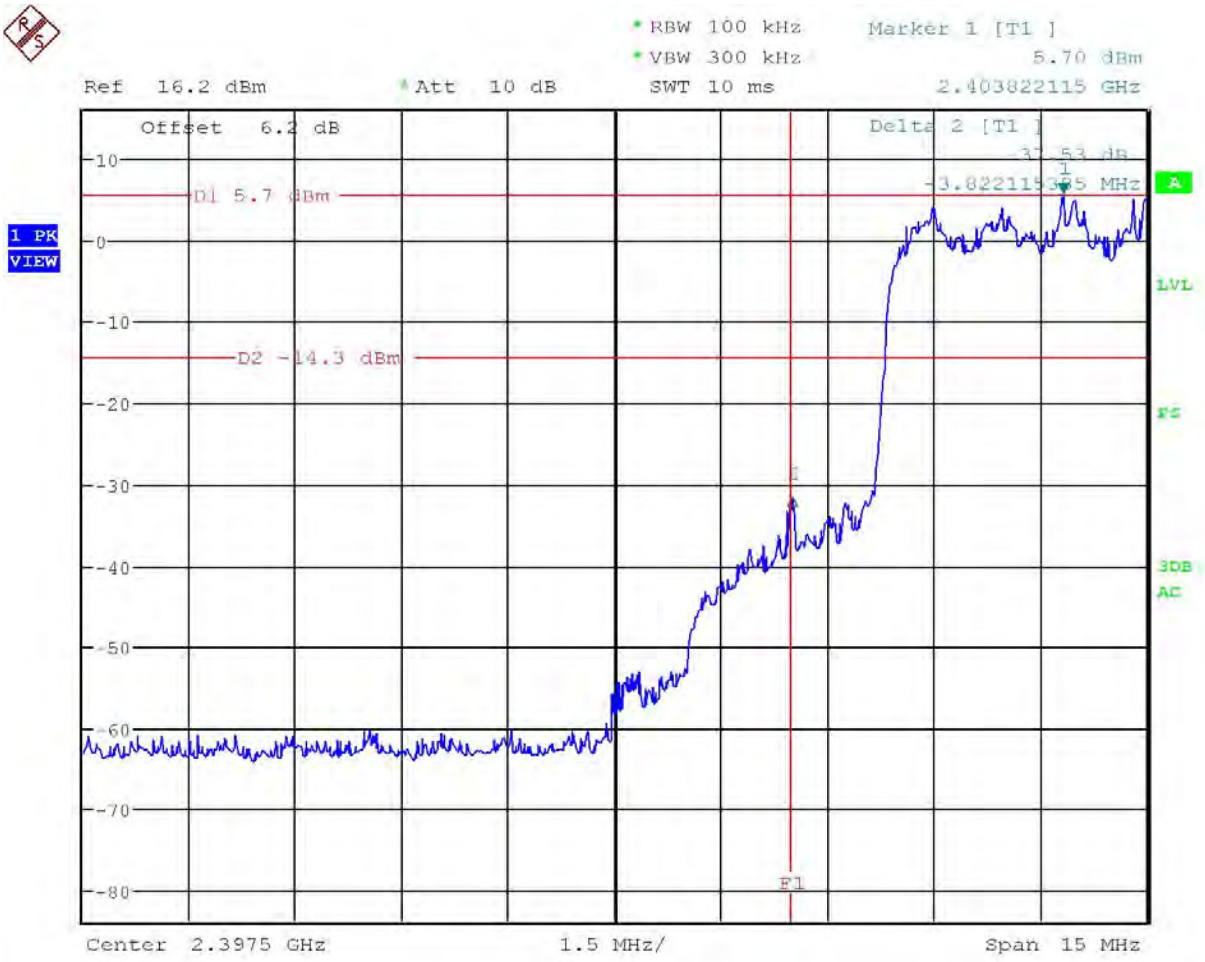
Test Data: **Mode 3 Conducted Lower Band Edge Stopped Plot**



RESULTS: Meets Requirements

BANDEDGE

Test Data: **Mode 3 Conducted Lower Band Edge Hopping Plot**



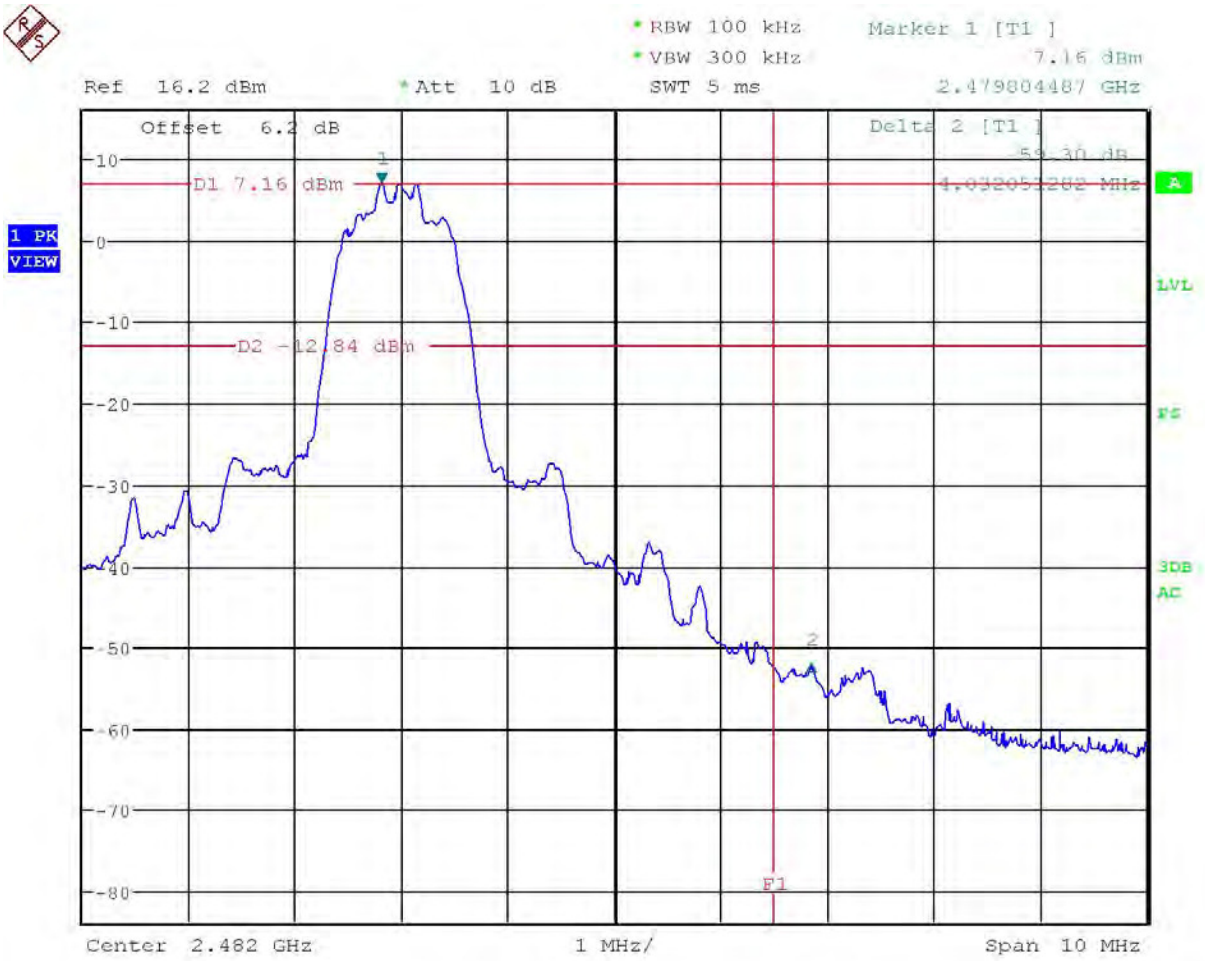
Date: 2.DEC.2016 22:31:12

RESULTS: Meets Requirements

BANDEDGE

Test Data: **Mode 3 Conducted Upper Band Edge Stopped Plot**

Tuned Freq MHz	Detector Type PK/AV	Fund FS dBu V/M	Emission Freq MHz	Meter Reading dBc	Field Strengh dBu V/M	Limit dBu V/M	Margin dB
2480.0	AV	95.1	2483.8	59.3	35.8	54.0	18.2
2480.0	PK	101.4	2483.8	59.3	42.1	74.0	31.9



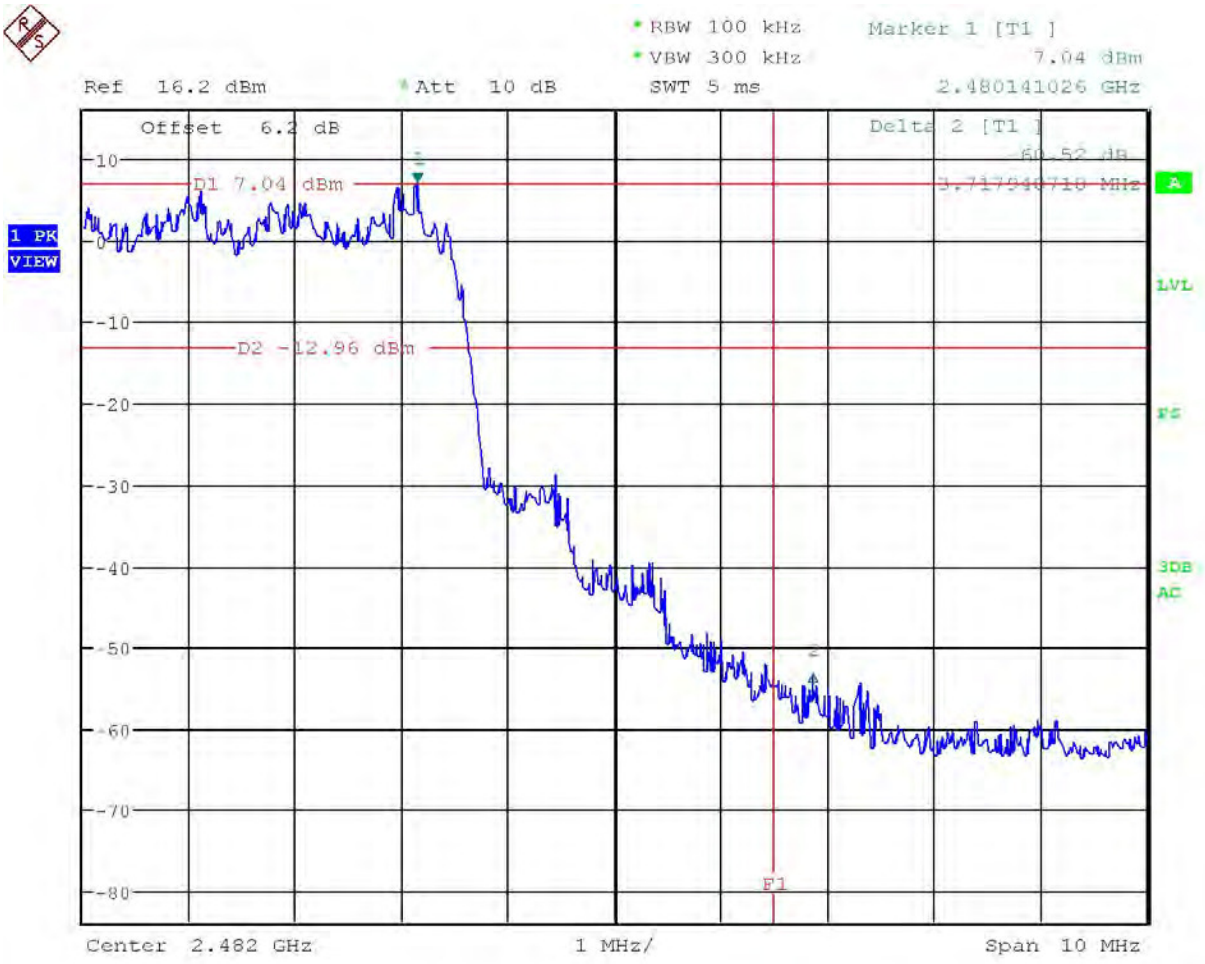
Date: 2.DEC.2016 22:46:53

RESULTS: Meets Requirements

BANDEDGE

Test Data: **Mode 3 Conducted Upper Band Edge Hopping Plot**

Tuned Freq MHz	Detector Type PK/AV	Fund FS dBu V/M	Emission Freq MHz	Meter Reading dBc	Field Strengh dBu V/M	Limit dBu V/M	Margin dB
2480.0	AV	95.1	2483.9	60.5	34.6	54.0	19.4
2480.0	PK	101.4	2483.9	60.5	40.8	74.0	33.2



RESULTS: Meets Requirements

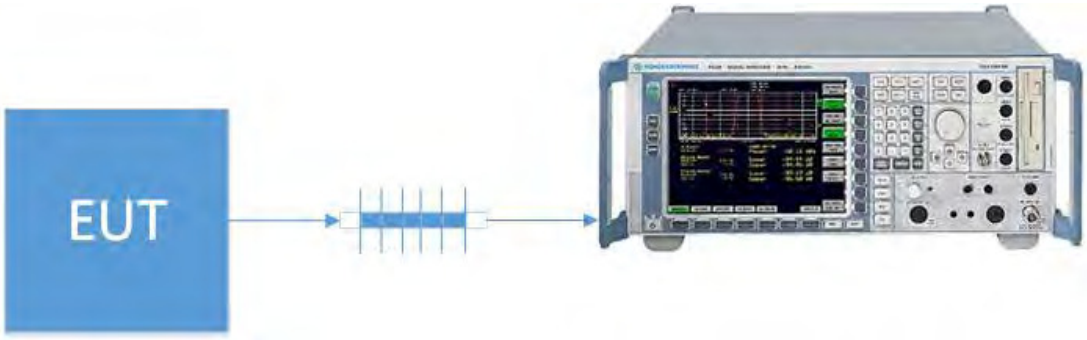
ANTENNA CONDUCTED SPURIOUS EMISSIONS

Rules Part No.: FCC part 15.247 (d) & 15.209, IC RSS 247 § 5.5 & RSS GEN § 8.9

Requirements: 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

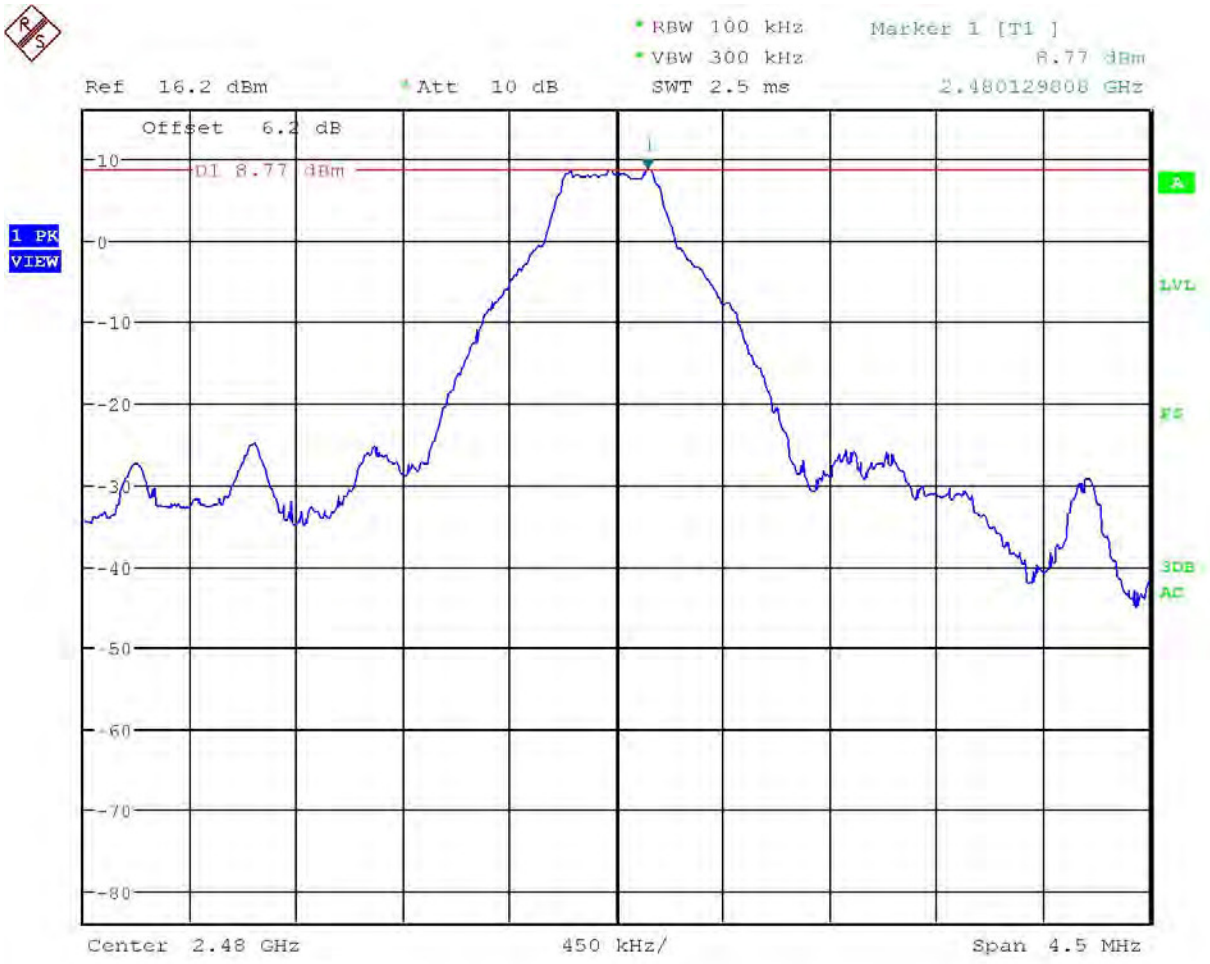
Test Method: ANSI C63.10 § 11.11.1 General Information
ANSI C63.10 § 11.11.2 Reference level measurement
ANSI C63.10 § 11.11.3 Emission level measurement

Setup:



ANTENNA CONDUCTED SPURIOUS EMISSIONS

Test Data: **Mode 1 100 KHz Reference Level Plot**

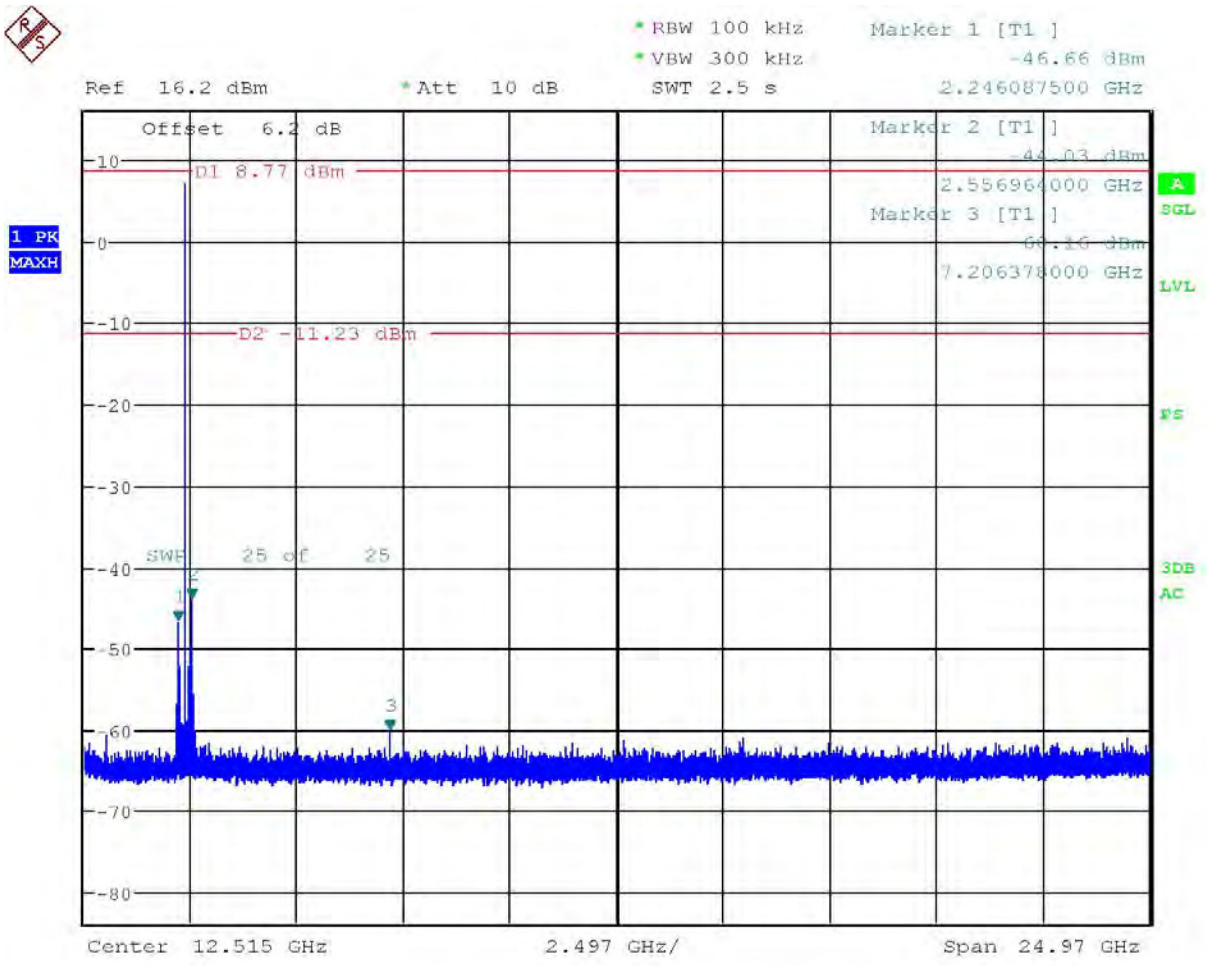


Date: 2.DEC.2016 23:26:30

RESULTS: Meets Requirements

ANTENNA CONDUCTED SPURIOUS EMISSIONS

Test Data: **Mode 1 Low End of Band 30 MHz – 25 GHz Plot**

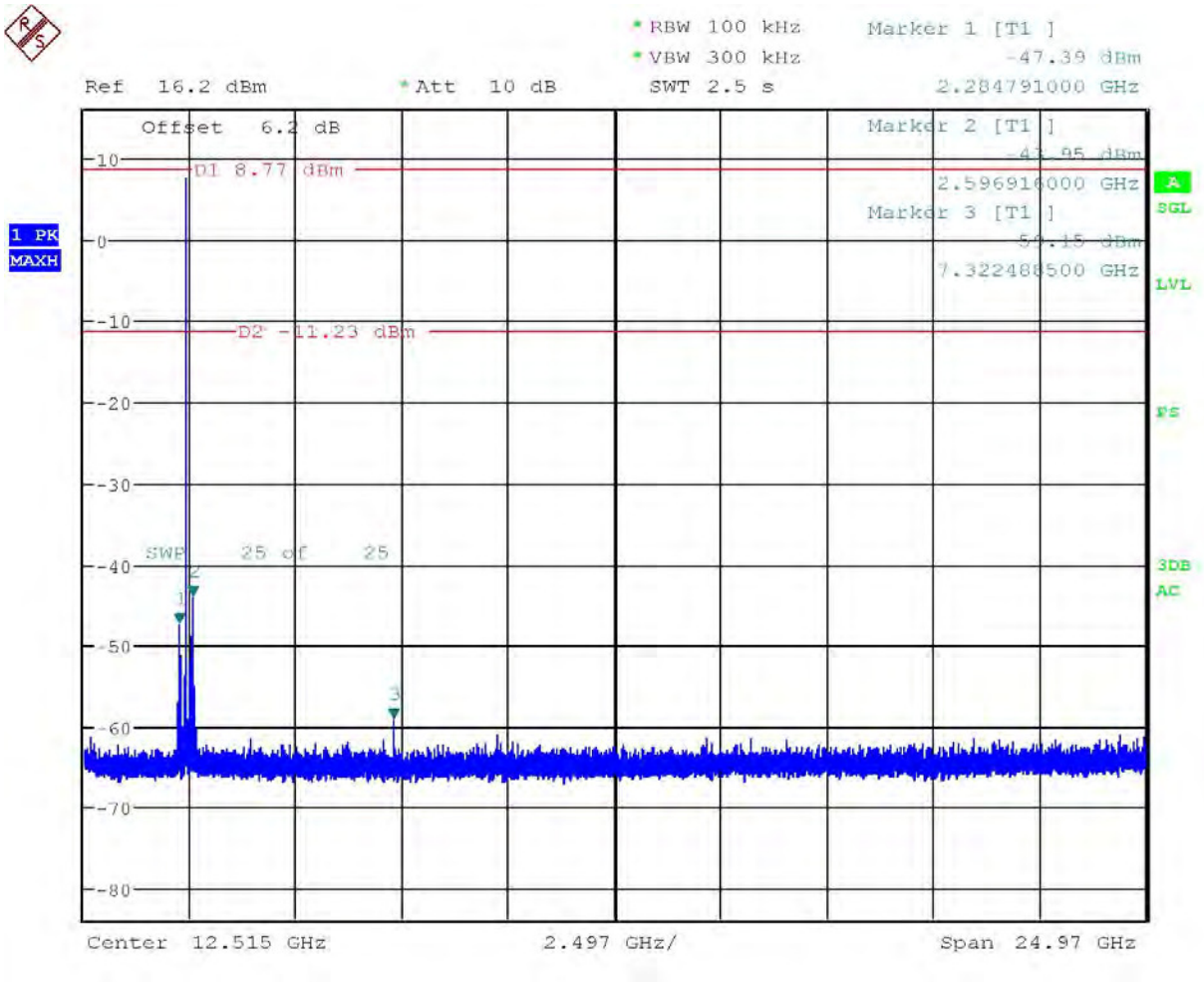


Date: 2.DEC.2016 23:33:24

RESULTS: Meets Requirements

ANTENNA CONDUCTED SPURIOUS EMISSIONS

Test Data: **Mode 1 Middle of Band 30 MHz – 25 GHz Plot**

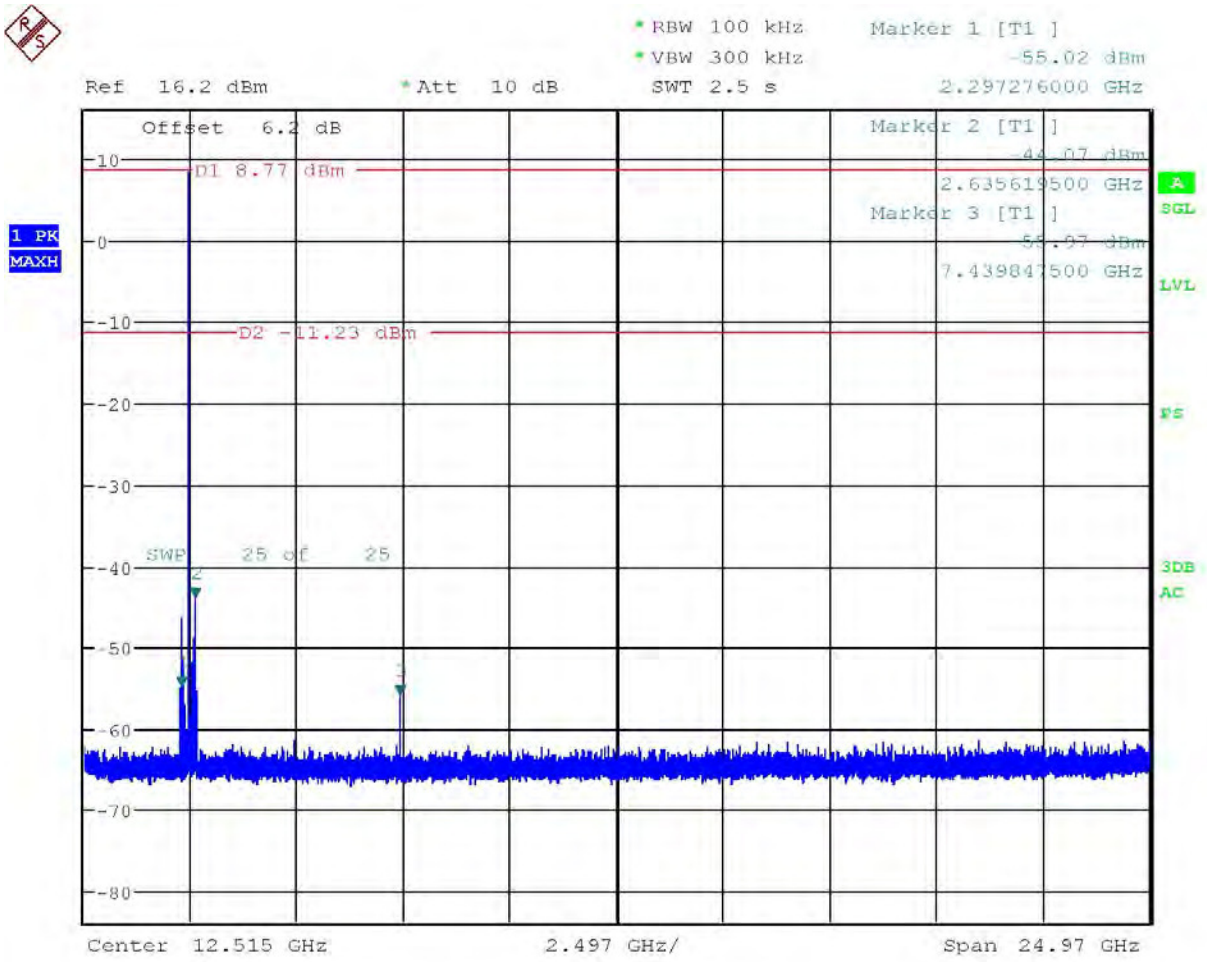


Date: 5.DEC.2016 14:57:57

RESULTS: Meets Requirements

ANTENNA CONDUCTED SPURIOUS EMISSIONS

Test Data: **Mode 1 High End of Band 30 MHz – 25 GHz Plot**

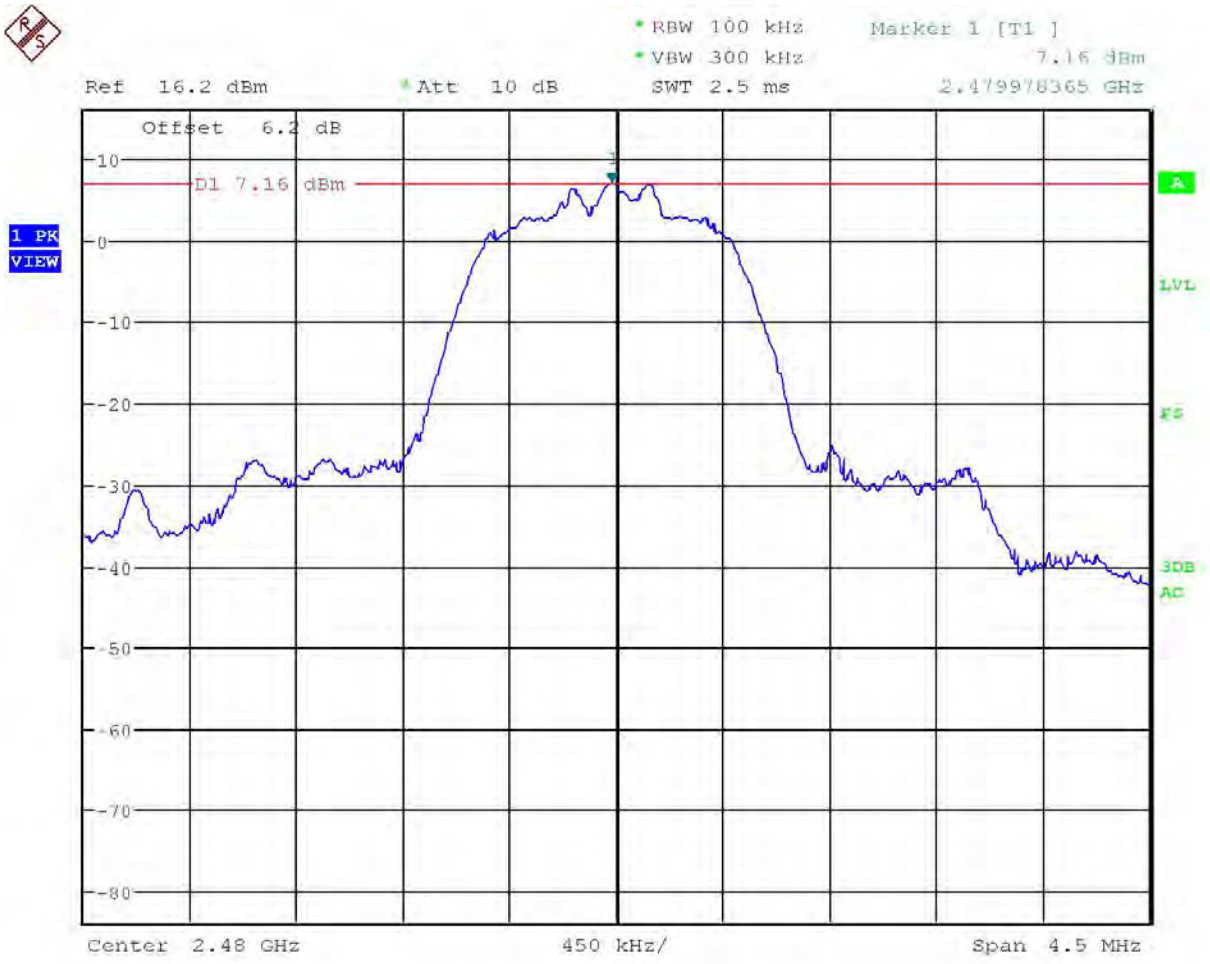


Date: 5.DEC.2016 15:00:15

RESULTS: Meets Requirements

ANTENNA CONDUCTED SPURIOUS EMISSIONS

Test Data: **Mode 2 100 KHz Reference Level Plot**

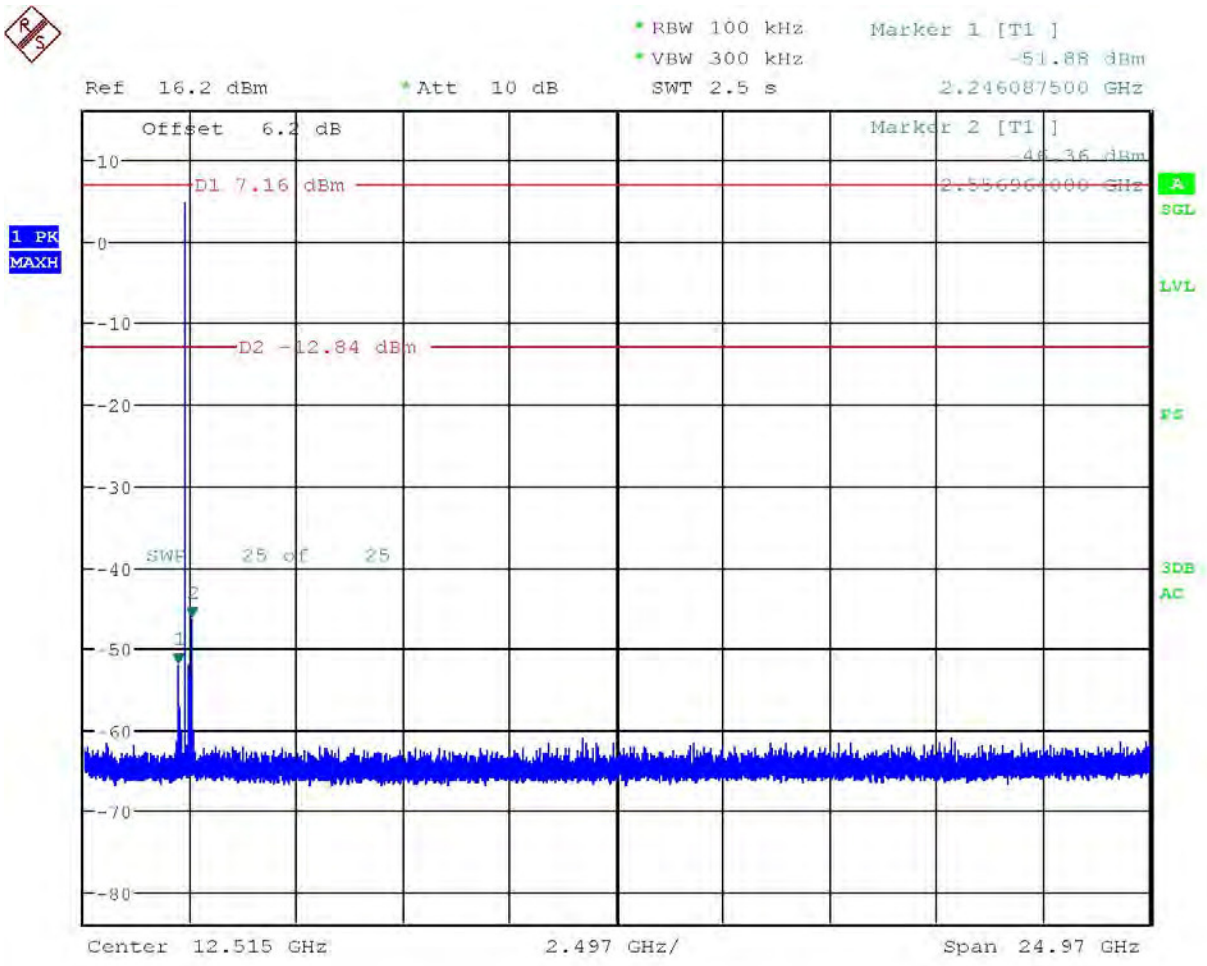


Date: 2.DEC.2016 23:27:51

RESULTS: Meets Requirements

ANTENNA CONDUCTED SPURIOUS EMISSIONS

Test Data: **Mode 2 Low End of Band 30 MHz – 25 GHz Plot**

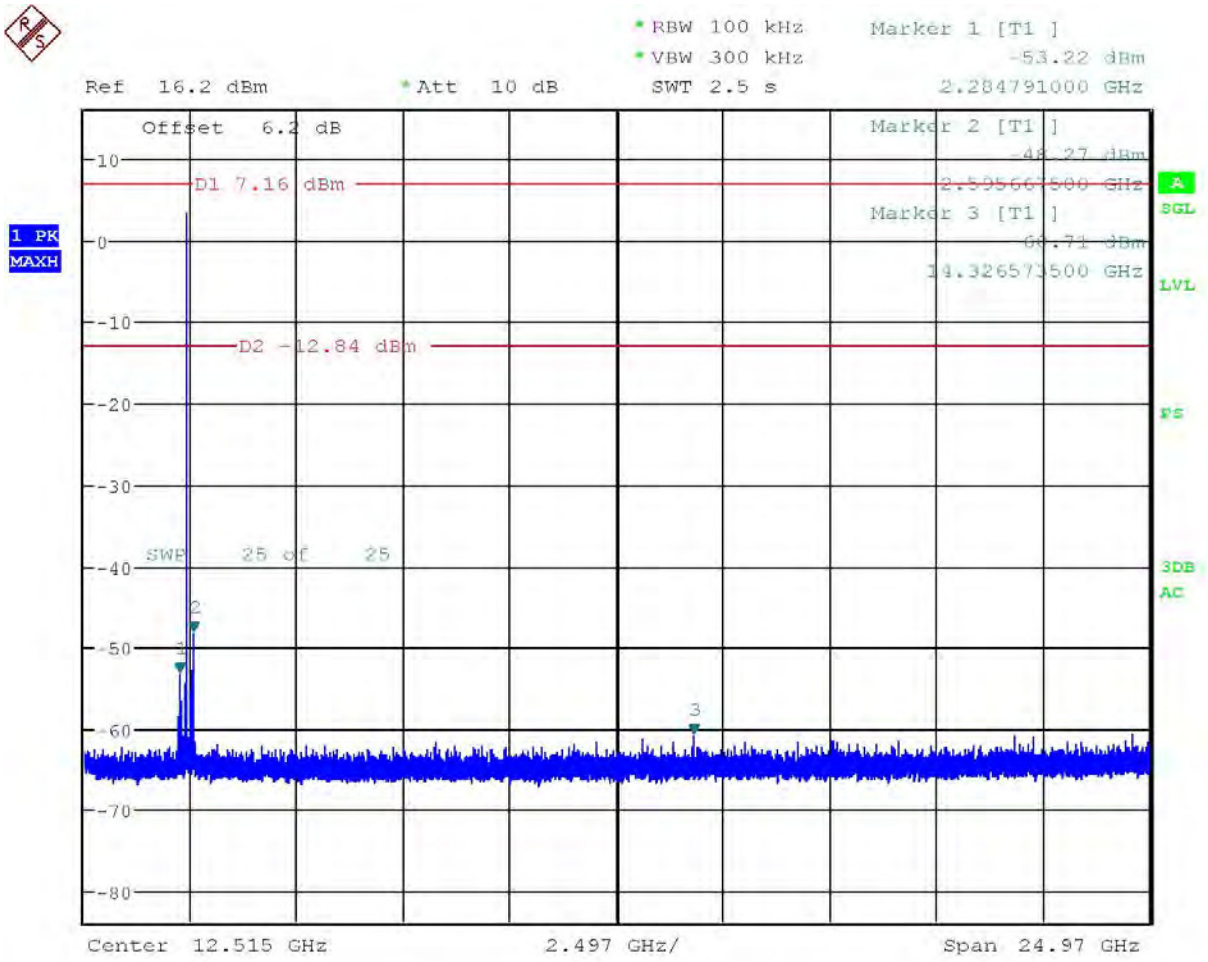


Date: 5.DEC.2016 15:05:14

RESULTS: Meets Requirements

ANTENNA CONDUCTED SPURIOUS EMISSIONS

Test Data: **Mode 2 Middle of Band 30 MHz – 25 GHz Plot**

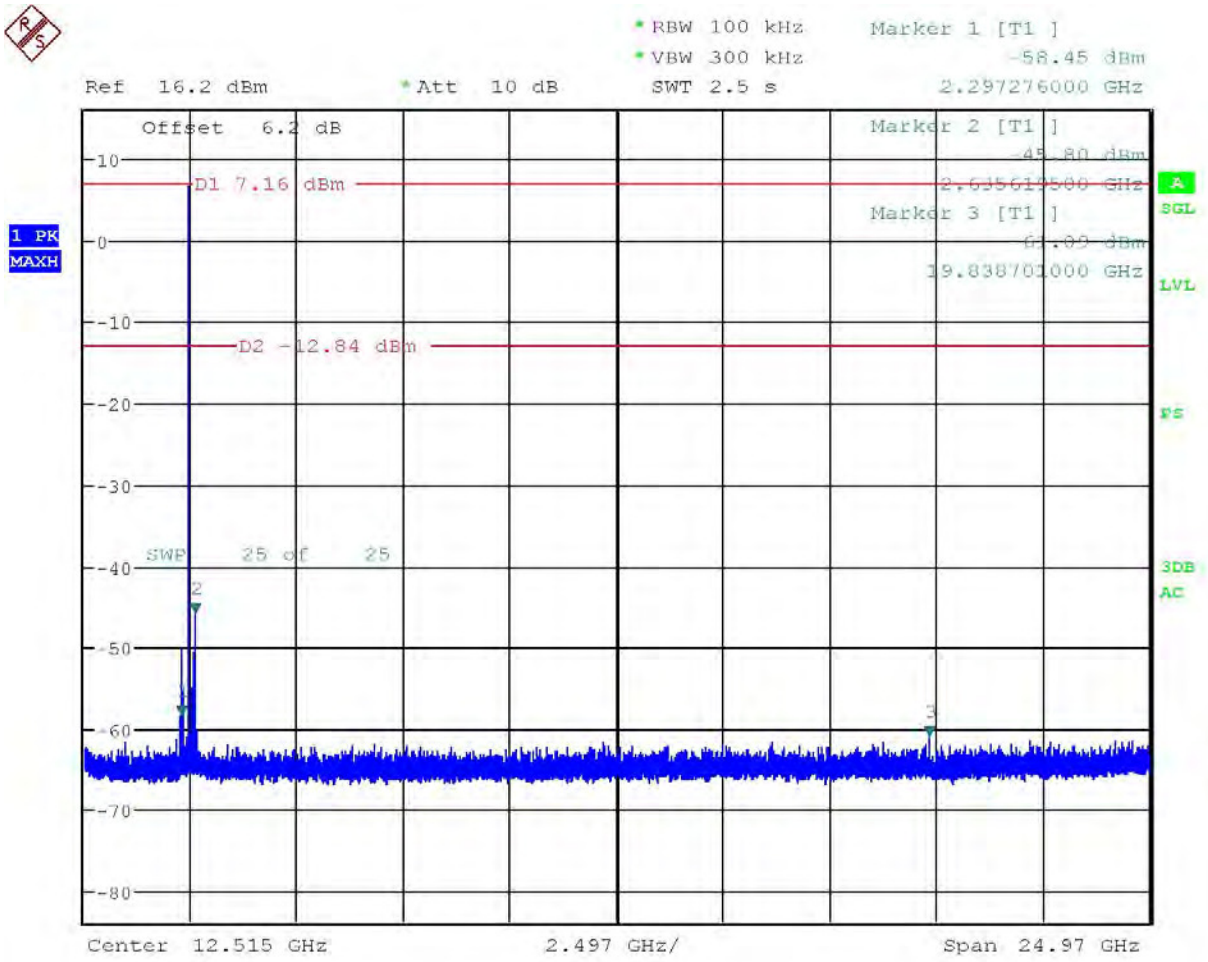


Date: 5.DEC.2016 15:07:46

RESULTS: Meets Requirements

ANTENNA CONDUCTED SPURIOUS EMISSIONS

Test Data: **Mode 2 High End of Band 30 MHz – 25 GHz Plot**

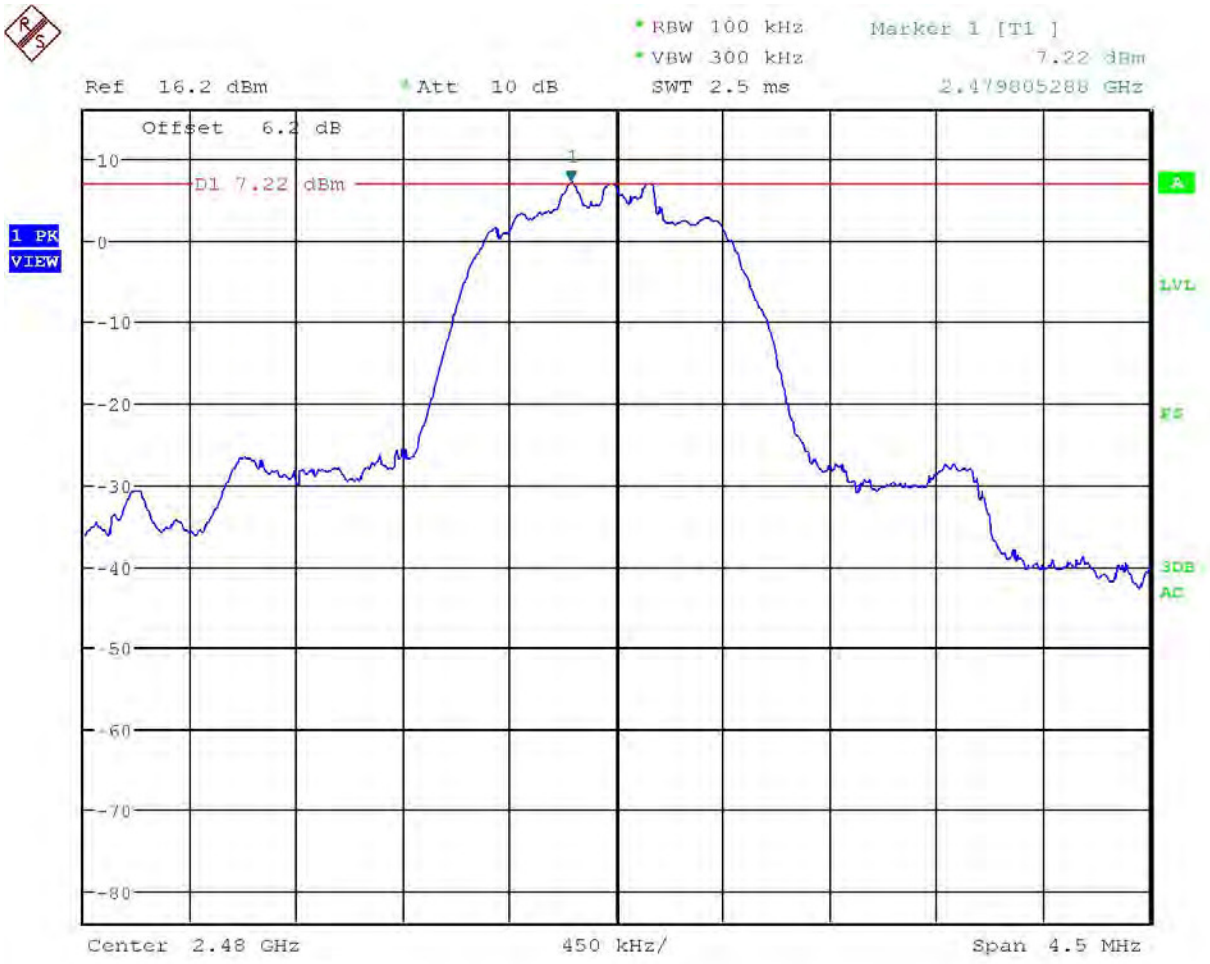


Date: 5.DEC.2016 15:10:03

RESULTS: Meets Requirements

ANTENNA CONDUCTED SPURIOUS EMISSIONS

Test Data: **Mode 3 100 KHz Reference Level Plot**

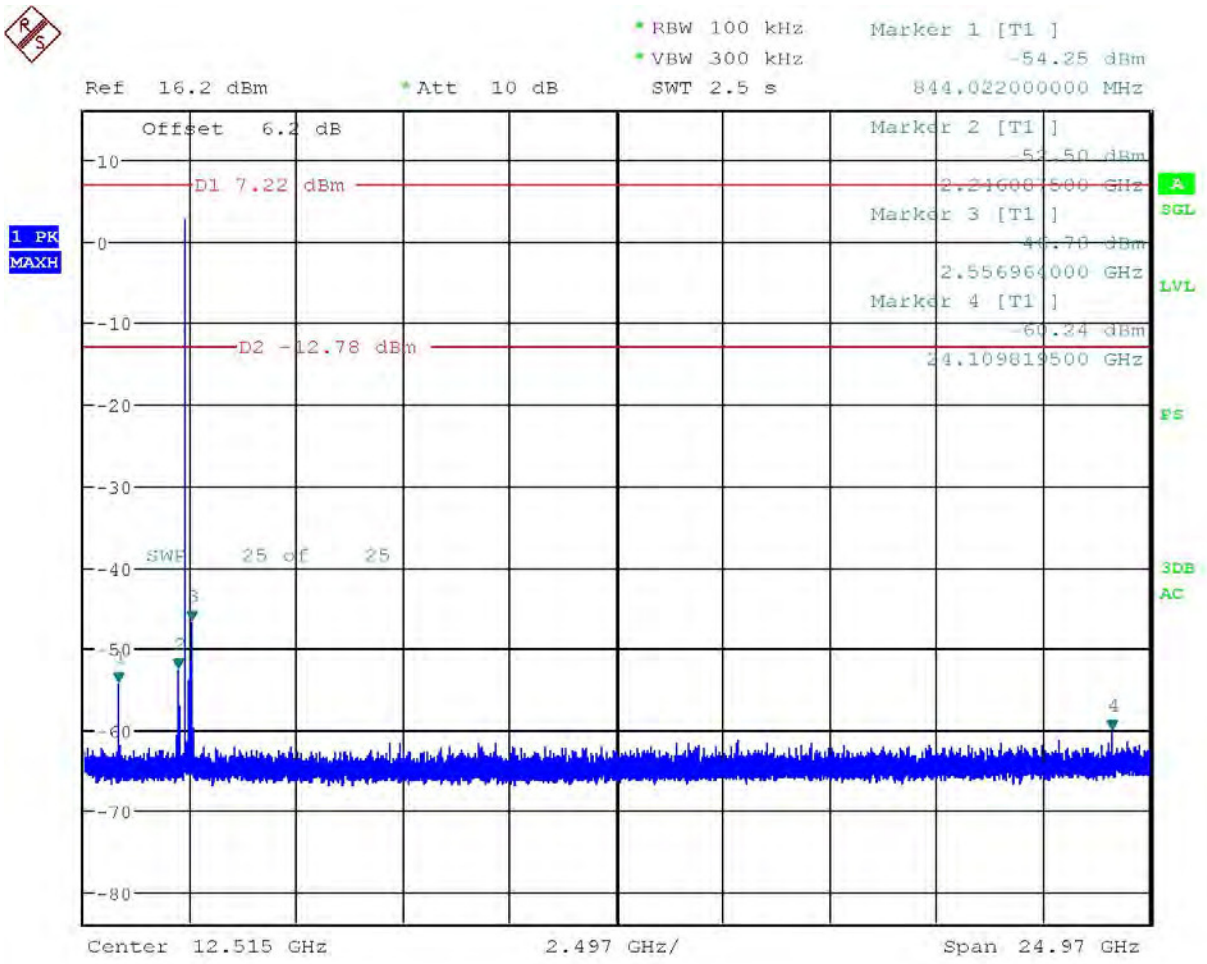


Date: 2.DEC.2016 23:29:02

RESULTS: Meets Requirements

ANTENNA CONDUCTED SPURIOUS EMISSIONS

Test Data: **Mode 3 Low End of Band 30 MHz – 25 GHz Plot**

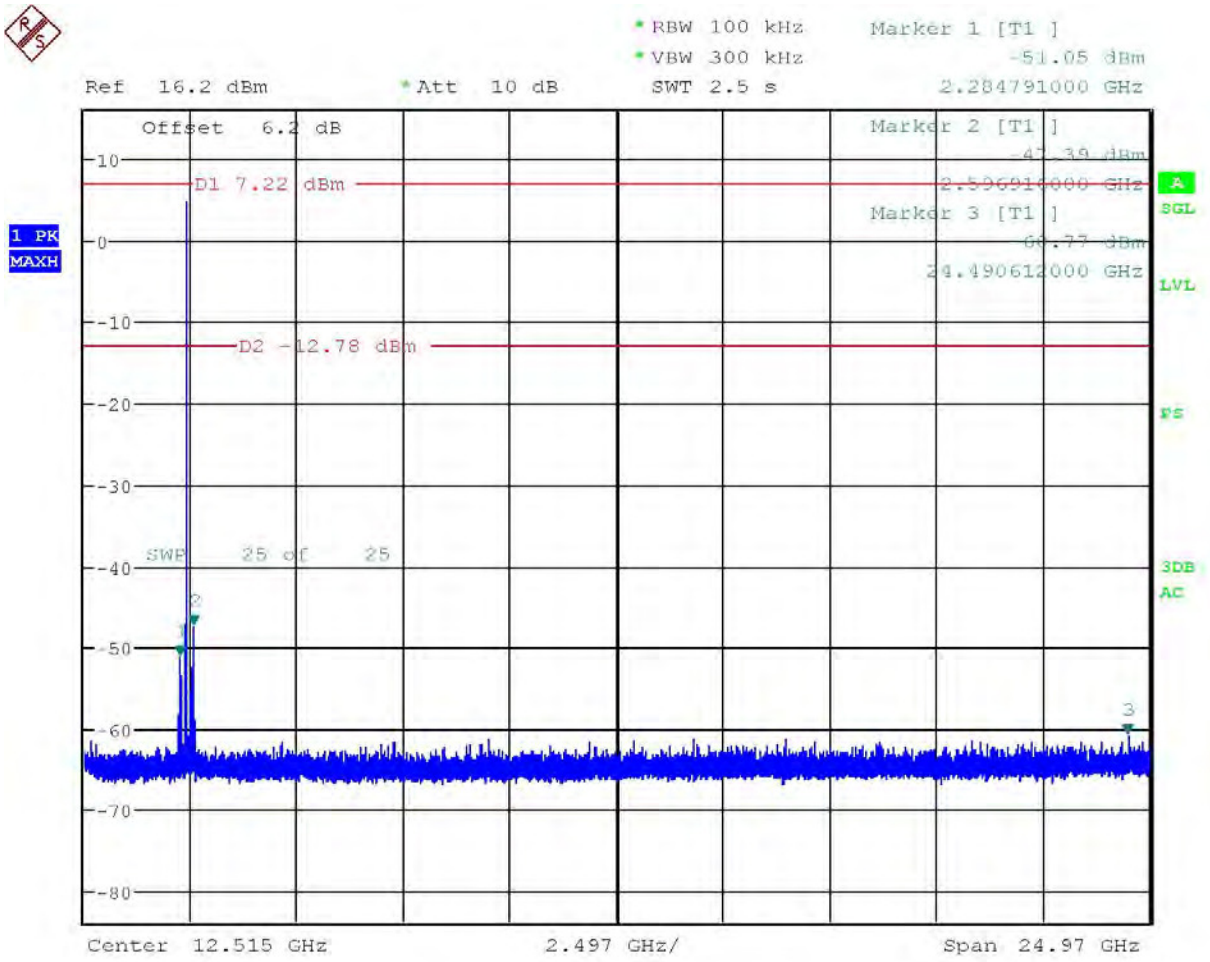


Date: 5.DEC.2016 15:13:12

RESULTS: Meets Requirements

ANTENNA CONDUCTED SPURIOUS EMISSIONS

Test Data: **Mode 3 Middle of Band 30 MHz – 25 GHz Plot**

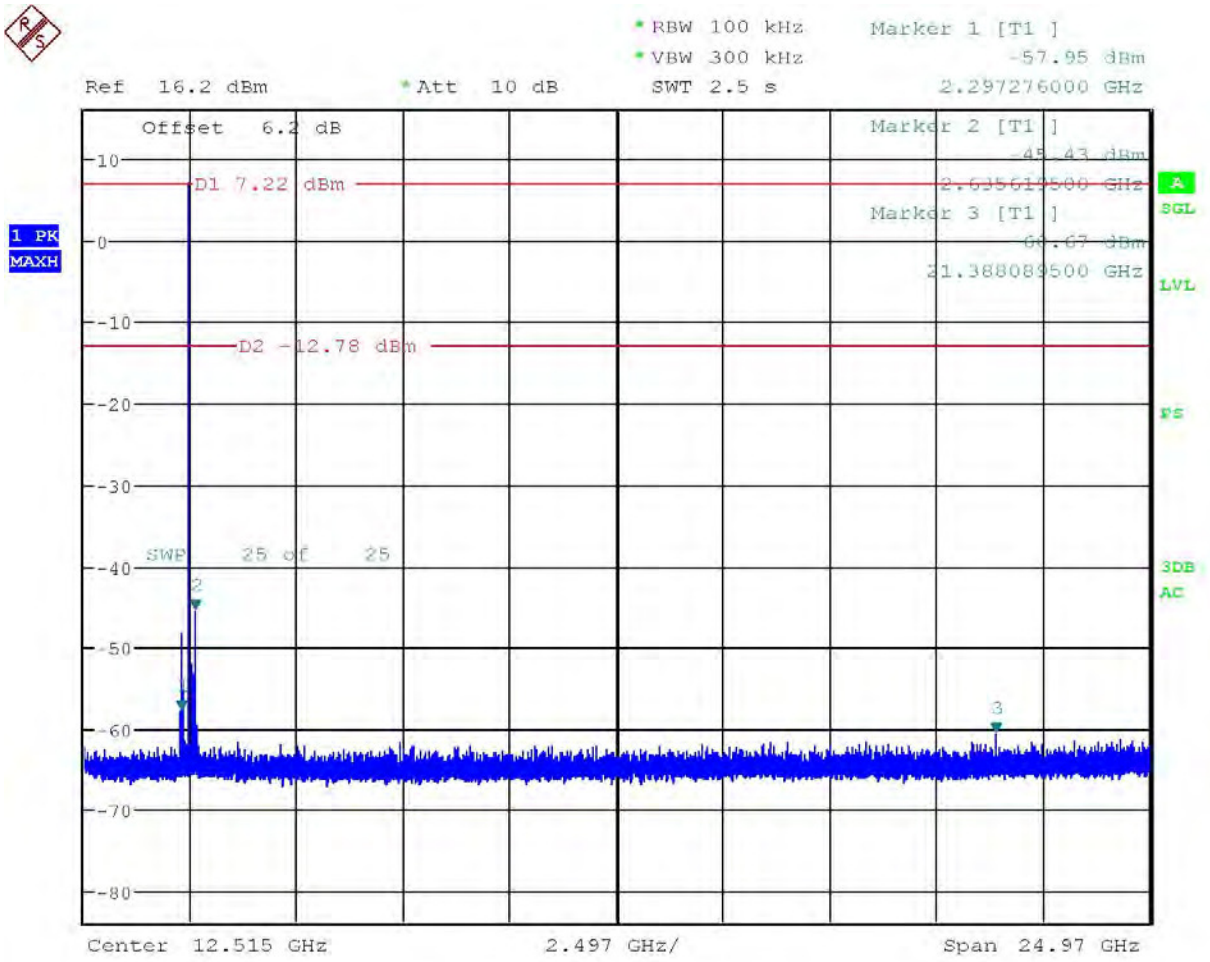


Date: 5.DEC.2016 15:15:20

RESULTS: Meets Requirements

ANTENNA CONDUCTED SPURIOUS EMISSIONS

Test Data: **Mode 3 High End of Band 30 MHz – 25 GHz Plot**



Date: 5.DEC.2016 15:17:22

RESULTS: Meets Requirements

RADIATED SPURIOUS EMISSIONS

Rules Part No.: FCC part 15.247 (d) & 15.209, IC RSS 247 § 5.5 & RSS GEN § 8.9

Requirements: Emissions found in restricted bands the levels must comply with the general limits found in FCC part 15.209

Frequency	Limits
FCC Part 15.209, IC RSS-GEN 8.9	
9 to 490 kHz	2400/F (kHz) µV/m @ 300 meters
490 to 1705 kHz	24000/F (kHz) µV/m @ 30 meters
1705 kHz to 30 MHz	29.54 dBµV/m @ 30 meters
30 – 88	40.0 dBµV/m @ 3 meters
80 – 216	43.5 dBµV/m @ 3 meters
216 – 960	46.0 dBµV/m @ 3 meters
Above 960	54.0 dBµV/m @ 3 meters

Test Method: ANSI C63.4 § Annex D Validation of radiated emissions standard test sites
ANSI C63.10 § 6.3 Common requirements radiated emissions
ANSI C63.10 § 6.4 Emissions below 30 MHz
ANSI C63.10 § 6.5 Emissions between 30 & 1000 MHz
ANSI C63.10 § 6.6 Emissions above 1 GHz

Field Strength Calculation:

The field strength at 3m was established by adding the meter reading of the spectrum analyzer (which is set to read in units of dBµV) to the antenna correction factor supplied by the antenna manufacturer plus the coax loss. The antenna correction factors are stated in terms of dB. The gain of the preselector was accounted for in the spectrum analyzer meter reading.

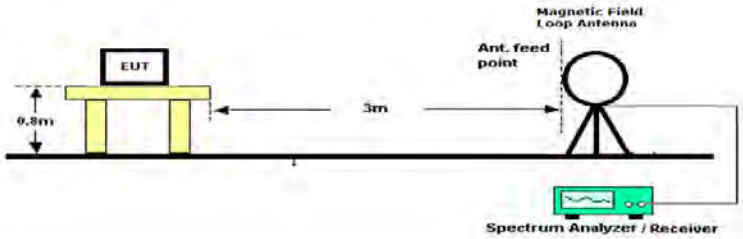
Example:

Freq (MHz)	Meter Reading	+ ACF	+ CL = FS
33	20 dBµV	+ 10.36 dB	+ 0.5 = 30.86 dBµV/m @ 3m

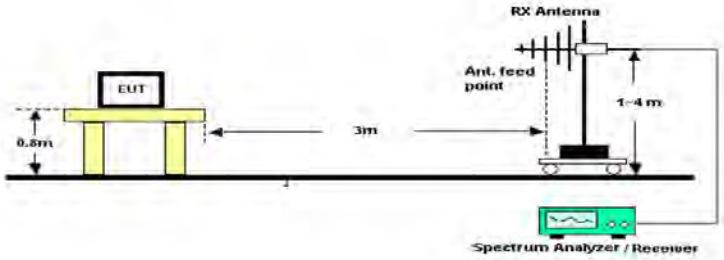
RADIATED SPURIOUS EMISSIONS

Setup:

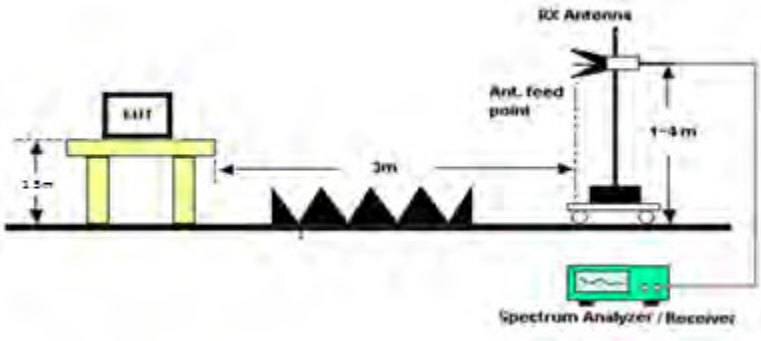
Emissions below 30 MHz



Emissions 30 – 1000 MHz



Emissions above 1 GHz



RADIATED SPURIOUS EMISSIONS

Notes: The EUT was checked in three orthogonal planes as required, a setup photo is provided to show the orientation of the worst case position.

Only the worst case data rate and Output Power which produced emissions within 20dB of the limit are reported.

The spectrum was measured from 9 KHz to 25 GHz

When necessary measurements were taken at distance closer than the limit distance, the readings were extrapolated back to be compared at the limit distance following FCC part 15.31 (f)(1)(2).

Test Data: **Mode 1 Measurement Table**

Tuned Freq MHz	Emission Frequency MHz	Detector Type QP/PK/AV	Meter Reading dBu V	Antenna Polarity	Coax Loss Db	Correction Factor dB/M	Field Strength dBu V/M	Limit dBu V/M	Margin
HOPPING	2272.91	PK	13.9	V	5.5	31.7	51.1	74	22.9
HOPPING	2272.91	AV	0.8	V	5.5	31.7	38.0	54	16.0
2402	4804	PK	9.6	V	8.1	34.0	51.7	54	2.3
2441	4882	PK	6.7	H	8.1	33.9	48.8	54	5.2
2480	4960	PK	6.0	H	8.2	34.0	48.2	54	5.8

Results Meet Requirements

EMC EQUIPMENT LIST

Device	Manufacturer	Model	Serial Number	Cal/Char Date	Due Date
Attenuator K 6dB 2W DC-40G	Narda	4768-6	1044-1	06/25/15	06/25/17
DC Power Supply	HP	6286A	1744A03842	n/a	n/a
Antenna: Biconical 1096 Chamber	Eaton	94455-1	1096	07/14/15	07/14/17
Antenna: Log-Periodic 1122	Electro-Metrics	LPA-25	1122	07/14/15	07/14/17
Antenna: Standard Gain Horn 18.0-26.3 GHz	Systron Donner	DBE-520-20	Not Serialized	n/a	n/a
Antenna: Standard Gain Horn 12.4-18.0 GHz	ATM	62-442-6	D262108-01	n/a	n/a
CHAMBER	Panashield	3M	N/A	04/25/16	12/31/17
Antenna: Double-Ridged Horn/ETS Horn 2	ETS-Lindgren Chamber	3117	00041534	02/25/15	02/25/17
Software: Field Strength Program	Timco	N/A	Version 4.0	n/a	n/a
Antenna: Active Loop	ETS-Lindgren	6502	00062529	11/18/15	11/18/17
Coaxial Cable #103 - KMKM-0180-01 Aqua	Micro-Coax	UFB142A-0-0720-200200	225363-002 (#103)	08/05/15	08/05/17
EMI Test Receiver R & S ESU 40 Chamber	Rohde & Schwarz	ESU 40	100320	04/01/16	04/01/18
Coaxial Cable - Chamber 3 cable set (Primary)	Micro-Coax	Chamber 3 cable set (Primary)	KMKM-0244-01; KMKM-0670-00; KFKF-0198-01	08/08/16	08/08/18
Band Reject Filter 2.4 GHz	Micro-Tronics	BRM50702-02	-G042	n/a	n/a
High Pass Filter 18GHz	Micro-Tronics	HPS18771	-002	n/a	n/a
Pre-amp	RF-LAMBDA	RLNA00M45GA	NA	01/04/16	01/04/18

***EMI RECEIVER SOFTWARE VERSION**

The receiver firmware used was version 4.43 Service Pack 3

Report Template Revision History

Document Name	Description of Change	Revision Date	Approved By
PT 15247 DSS RSS247 2.4GHz FHSS TempAntconn Rpt	Initial Issue	160229	SS Sanders
	Added Document History to Template	160920	G Greene
	Added setup photos, notes about distance corrections, radiated band edge table. Moved power output to top of tests in report	161202	C Leverett

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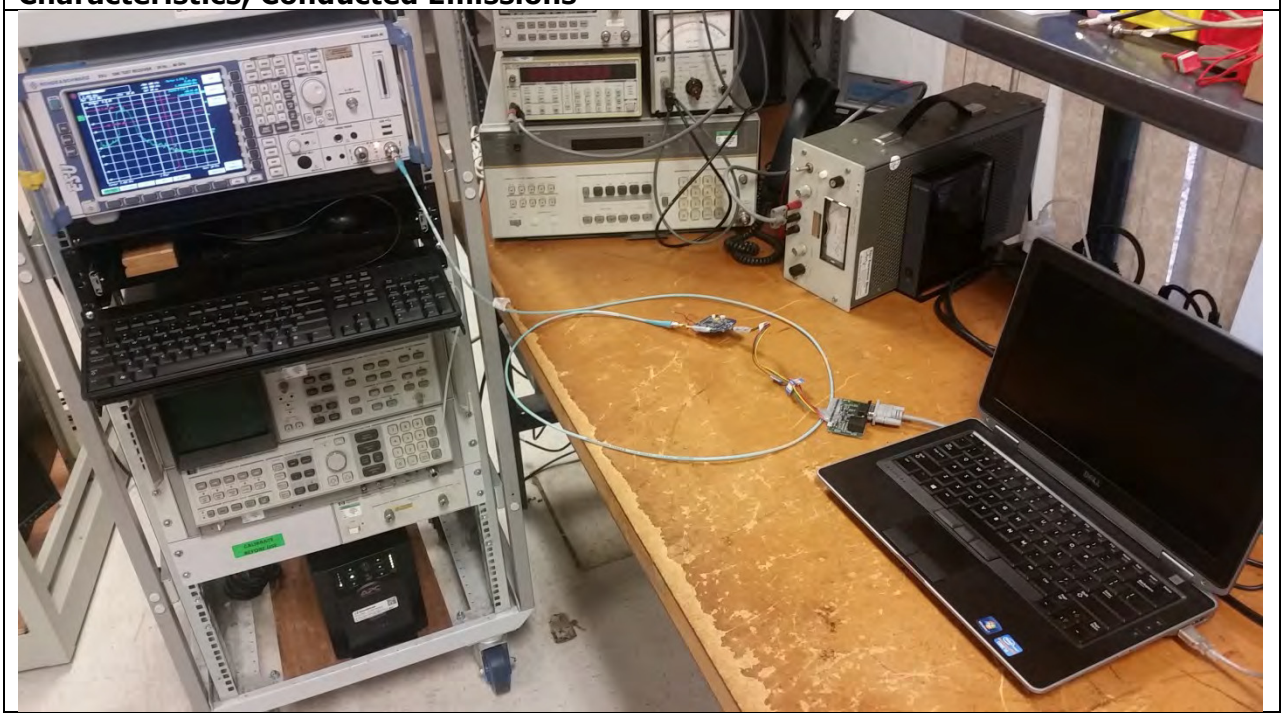
Test Setup Photos

Applicant: AUDIO-TECHNICA CORPORATION
FCC ID: JFZDSR9BT
IC: 1752B-DSR9BT

ANTENNA CONDUCTED TESTS: Power output, Occupied Bandwidth, FHSS Characteristics, Conducted Emissions

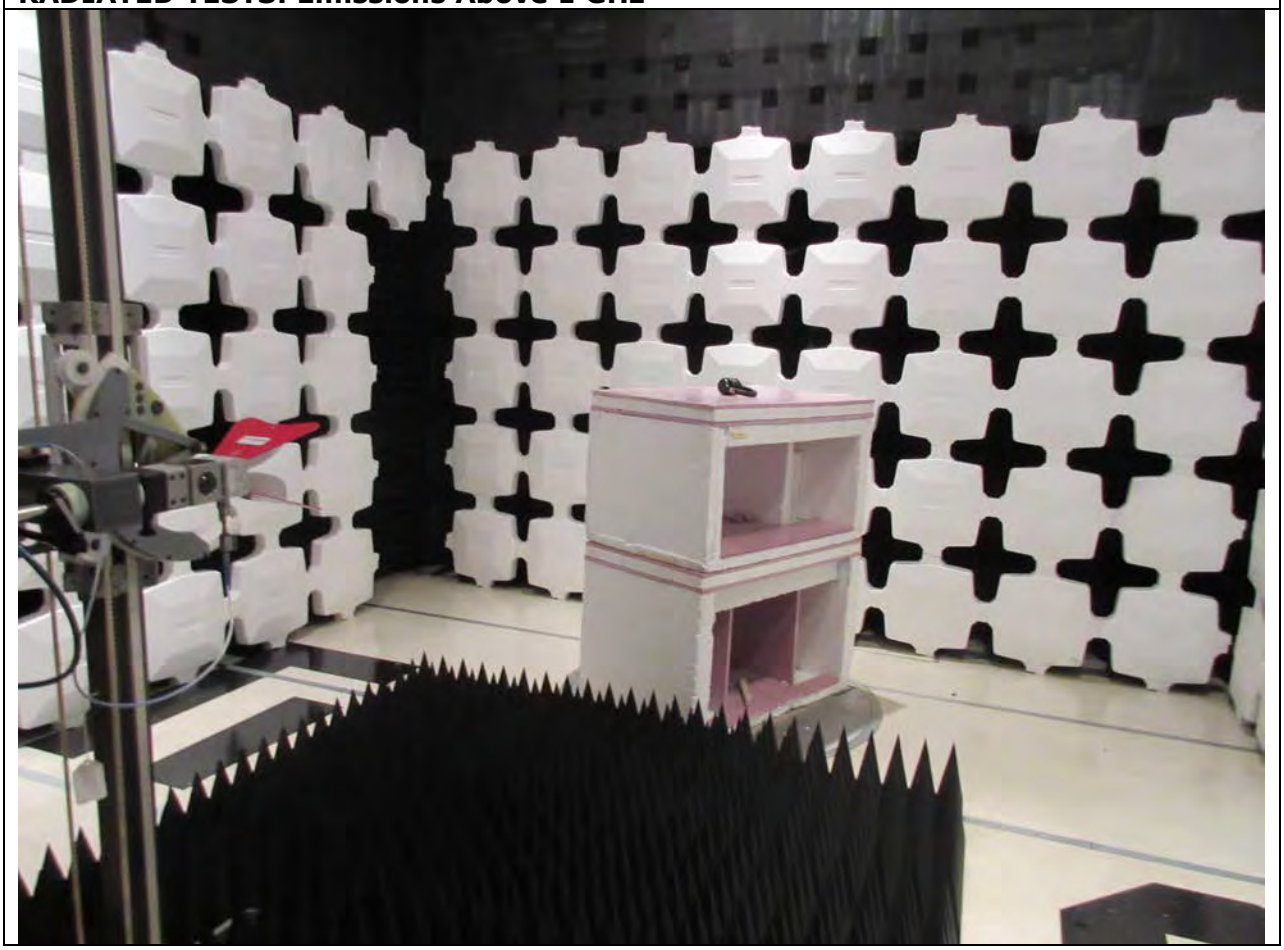


RADIATED TESTS: Final Setup Position

RADIATED TESTS: Emissions Below 30 MHz

RADIATED TESTS: Emissions Below 1 GHz

RADIATED TESTS: Emissions Above 1 GHz



RADIATED TESTS: Emissions Above 12.4 GHz