



## SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd.

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Report No.: SHEM130800173801  
Page 1 of 45

### 1 Cover Page

# FCC Part 15C TEST REPORT

Application No. :	SHEM1308001738RF
Applicant:	Atmel Norway AS
FCC ID:	VW4A091887
Equipment Under Test (EUT): <b>NOTE:</b> The following sample(s) submitted was/were identified on behalf of the client as	
Product Name:	ATREB233-XPRO
Brand Name:	N/A
Model:	REB233-XPRO
Added Model:	N/A
Standards:	FCC PART 15 SUBPART C, Section 15.247:2012
Date of Receipt:	August 30, 2013
Date of Test:	September 10, 2013 to September 12, 2013
Date of Issue:	September 16, 2013
Test Result:	<b>PASS *</b>

\*In the configuration tested, the EUT detailed in this report complied with the standards specified above.

Tony Wu

E&E Section Manager

SGS-CSTC (Shanghai) Co., Ltd.

The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards.




The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government. All test results in this report can be traceable to National or International Standards.

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## 2 Version

Revision Record				
Version	Chapter	Date	Modifier	Remark
00	/	September 16, 2013	/	Original

Authorized for issue by:				
Engineer		Eddy Zong _____ Print Name		 _____ 
Clerk		Susie Liu _____ Print Name		 _____ 
Reviewer		Keny Xu _____ Print Name		 _____ 



### 3 Test Summary

Test Item	FCC Reference	IC Reference	Test Procedure	RE Sult
Power line conducted emission	15.207	RSS-Gen Issue 8 Clause 7.2.4	ANSI C63.10,2009 Clause 6.2	Pass
Radiated emission	15.205 & 15.209	RSS-Gen Issue 8 Clause 7.2.5	ANSI C63.10,2009 Clause 6.4	Pass
Minimum 6dB Bandwidth	15.247(a)(2)	RSS-210 Issue 8 Annex 8	ANSI C63.10,2009 Clause 6.9	Pass
Maximum peak output power	15.247(b)	RSS-210 Issue 8 Annex 8	ANSI C63.10,2009 Clause 6.10.2	Pass
Power spectrum density	15.247(e)	RSS-210 Issue 8 Annex 8	ANSI C63.10,2009 Clause 6.11	Pass
RF Conducted Spurious Emissions	15.247(d)	RSS-210 Issue 8 Annex 8	ANSI C63.10 2009 Clause 6.9	Pass
Radiated Emission BandEdge	15.247(d)	RSS-210 Issue 8 Annex 8	ANSI C63.10,2009 Clause 6.9	Pass
Emission outside the Frequency band	15.247(d)	RSS-210 Issue 8 Annex 8	ANSI C63.4,2003 Clause 6.12	Pass
99% Occupied bandwidth	---	RSS-Gen Issue 3 Clause 4.6.1	RSS-Gen Issue 3 Clause 4.6.1	Pass



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## 5 General Information

### 5.1 Client Information

<b>Applicant:</b>	Atmel Norway AS
<b>Address of Applicant:</b>	Vestre Rosten 79, 7075 Tiller, Norway
<b>Manufacturer:</b>	Atmel R&D India Pvt Ltd
<b>Address of Manufacturer:</b>	10 <sup>th</sup> Floor, Campus 2, RMZ Millienia Business Park, 143, Dr. M.G.R Road, Perungudi, Chennai – 600 096. India
<b>Factory:</b>	Escatec Electronics Sdn, Bhd
<b>Address of Factory:</b>	Free Industrial Zone III, 11900, Penang, Malaysia

### 5.2 General Description of E.U.T.

<b>Product Name</b>	ATREB233-XPRO
<b>Brand Name:</b>	N/A
<b>Model No:</b>	REB233-XPRO
<b>Added Model:</b>	N/A
<b>Product Description:</b>	Module

### 5.3 Technical Specifications:

<b>Operation Frequency:</b>	2405MHz-2480MHz
<b>Modulation Technique:</b>	DSSS
<b>Number of Channel:</b>	16
<b>Power Supply:</b>	DC 5V Supply by PC
<b>Antenna Type</b>	Integral
<b>Antenna Gain</b>	0dBi

### 5.4 Support equipments for Testing

Description	Manufacturer	Model No.	Serial No.	Supplied By
Switch board	Atmel R&D India Pvt Ltd	N/A	N/A	Atmel R&D India Pvt Ltd
PC	Lenovo	L430	N/A	SGS

Software name	Manufacturer	Supplied By
Atmel Studio 6.1	Atmel R&D India Pvt Ltd	Client



## 5.5 Details of Test Mode

Test Mode	Description of Test Mode
Engineering mode:	Using test software to control EUT Working in continuous transmitting, and select channel and modulation type.

### Test Channel:

Channel	Frequency
The Lowest channel	2405MHz
The Middle channel	2440MHz
The Highest channel	2480MHz



## 5.6 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd.  
No.588 West Jindu Road, Songjiang District, Shanghai, China.201612.

Tel: +86 21 6191 5666 Fax: +86 21 6191 5678

## 5.7 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

- **CNAS (No. CNAS L0599)**

CNAS has accredited SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing. Date of expiry: 2014-07-26.

- **FCC – Registration No.: 402683**

SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. has been registered and fully described in a report filed with the Federal Communications Commission (FCC). The acceptance letter from the FCC is maintained in our files. Registration No.: 402683, Expiry Date: 2015-02-22.

- **Industry Canada (IC) – IC Assigned Code: 8617A**

The 3m Semi-anechoic chamber of SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 8617A. Expiry Date: 2014-09-20.

- **VCCI (Member No.: 3061)**

The 3m Semi-anechoic chamber and Shielded Room of SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-3868 and C-4336 respectively. Date of Registration: 2012-05-29. Date of Expiry: 2015-05-28.



## 6 Equipments Used during Test

☒ **Conducted Emission**

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Cal.Due date
1	EMI test receiver	Rohde & Schwarz	ESCS30	100086	2013-02-23	2014-02-22
2	Line impedance stabilization network	SCHWARZBEC K	NSLK8127	8127-490	2013-02-23	2014-02-22
3	Line impedance stabilization network	ETS	3816/2	00034161	2013-02-23	2014-02-22

☒ **RF Conducted Test**

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due date
1	EMI test receiver	Rohde & Schwarz	ESU40	100109	2013-02-23	2014-02-22
2	Horn Antenna	SCHWARZBECK	BBHA9120 D	9120D-679	2013-03-07	2014-03-06
3	Horn Antenna	Rohde & Schwarz	HF906	100284	2013-06-03	2014-06-02
4	ANTENNA	SCHWARZBECK	VULB9168	9168-313	2013-03-07	2014-03-06
5	Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170 373	2013-03-07	2014-03-06
6	Ultra broadband antenna	Rohde & Schwarz	HL562	100227	2013-10-08	2014-10-07
7	Atmosphere pressure meter	Shanghai ZhongXuan Electronic Co;Ltd	BY 2009P	--	2013-10-08	2014-10-07
8	CLAMP METER	FLUKE	316	86080010	2013-06-03	2014-06-02
9	Thermo-Hygrometer	ZHICHEN	ZC1-2	01050033	2013-10-08	2014-10-07





11	High-low temperature cabinet	Shanghai YuanZhen	GW2050	--	2013-06-03	2014-06-02
12	Tunable Notch Filter	Wainwright instruments Gmbh	WRCT180 0.0/2000.0-0.2/40-5SSK	11	2013-06-03	2014-06-02
13	Tunable Notch Filter	Wainwright instruments Gmbh	WRCT800. 0/880.0-0.2/40-5SSK	9	2013-06-03	2014-06-02
14	High pass Filter	FSCW	HP 12/2800-5AA2	19A45-02	2013-06-03	2014-06-02
15	Low noise amplifier	TESEQ	LNA6900	70133	2013-02-23	2014-02-22
16	EMI test receiver	Rohde & Schwarz	ESCS30	100086	2013-02-23	2014-02-22
17	Line impedance stabilization network	SCHWARZBECK	NSLK8127	8127-490	2013-02-23	2014-02-22
18	Active Loop Antenna	SCHWARZBECK	FMZB 1519	1519-034	2013-07-28	2014-07-27



## 7 Test Results

### 7.1 E.U.T. test conditions

**Test Power:** AC 120V, 60Hz

**Requirements:** 15.31(e) For intentional radiators, measurements of the variation of the input power or the radiated signal level of the fundamental frequency component of the emission, as appropriate, shall be performed with the supply voltage varied between 85% and 115% of the nominal rated supply voltage. For battery operated equipment, the equipment tests shall be performed using a new battery.

**Operating Environment:**

**Temperature:** 20.0 -25.0 °C

**Humidity:** 35-75 % RH

**Atmospheric Pressure:** 992 -1020 mbar

### 7.2 Antenna Requirement

#### Standard requirement

15.203 requirement:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

15.247(b) (4) requirement:

The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

#### EUT Antenna

The antenna is integrated on the main PCB and no consideration of replacement. The gain of the antenna is less than 0 dBi.

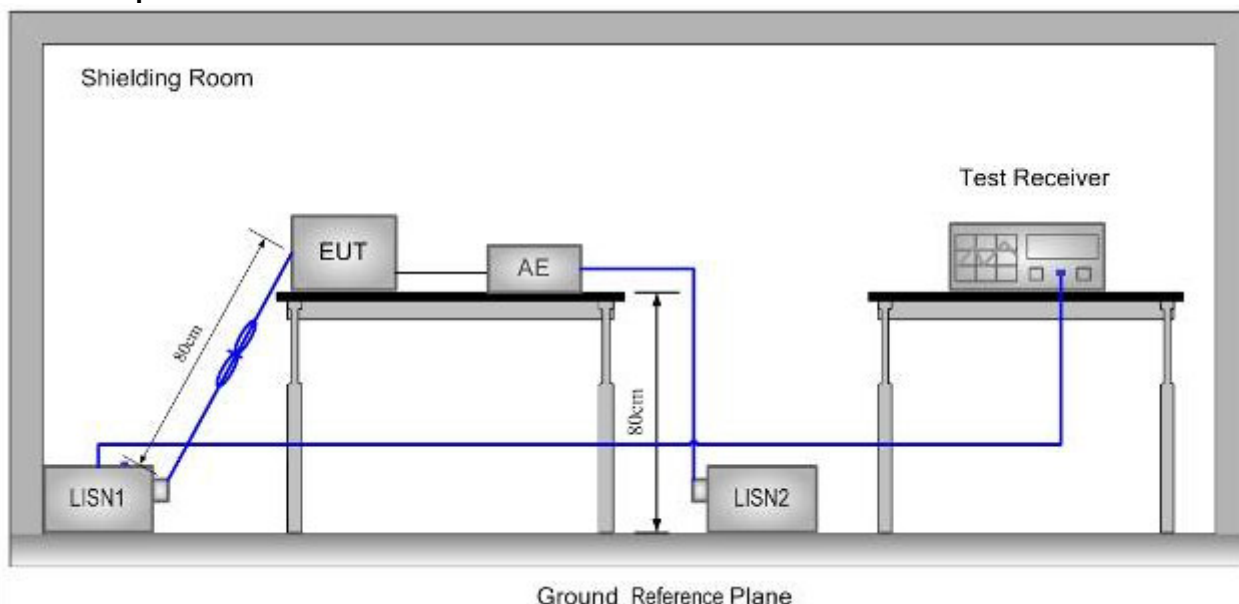
### 7.3 Conducted Emissions on Mains Terminals

<b>Test Requirement:</b>	FCC Part 15C, Section 15.207 RSS-Gen Issue 8 Clause 7.2.4
<b>Test Method:</b>	ANSI C63.10:2009 Section 6.2
<b>Test Result:</b>	Pass
<b>Test Voltage:</b>	AC 120V 60Hz
<b>Frequency Range:</b>	150 KHz to 30 MHz
<b>Class/Severity:</b>	Class B
<b>Test mode:</b>	Engineering mode
<b>Limit:</b>	

Frequency range MHz	Class B Limits dB (μV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50

Note1: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50MHz.  
Note2: The lower limit is applicable at the transition frequency.

#### Test Setup and Procedure:



1. The mains terminal disturbance voltage was measured with the EUT in a shielded room.
2. The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a 50Ω/50μH + 5Ω linear impedance. The power cables of all other units of the EUT was connected to a second LISN, which was bonded to the ground reference plane in the

- same way as the LISN for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded
3. The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane, but separated from metallic contact with the ground reference plane by 0.1m of insulation.
  4. The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISN mounted on top of the ground reference plane. This distance was between the closest points of the LISN and the EUT. The mains lead of EUT excess 0.8m was folded back and forth parallel to the lead so as to form a horizontal bundle with a length between 0.3m and 0.4m. All other units of the EUT and associated equipment was at least 0,8 m from the LISN.



## Measurement Data

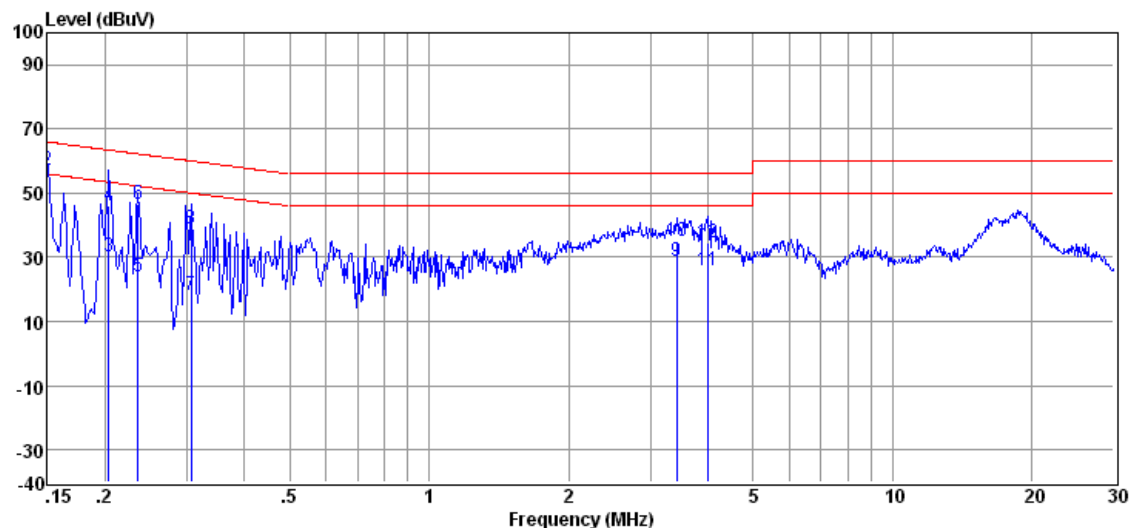
Pre-scan was performed with peak detected on all ports, Quasi-peak & average measurements were performed at the frequencies at which maximum peak emission level were detected.

Please see the attached Quasi-peak and Average test results.

Level = Read Level + LISN/ISN Factor + Cable Loss.

**Test Mode:** Engineering mode

**Test Port:** AC Live Line

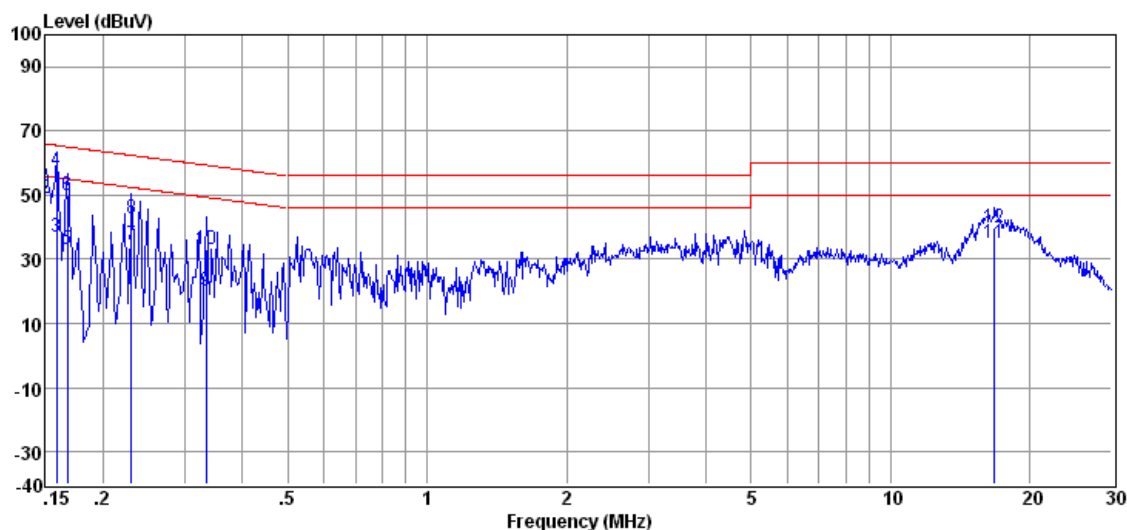


Freq (MHz)	Read Level (dBμV)	LISN Factor (dB)	Cable Loss (dB)	Level (dBμV)	Limit Line (dBμV)	Over Limit (dB)	Detector	Phase
0.150	37.44	0.20	0.10	37.74	56.00	-18.26	Average	Live
0.150	56.81	0.20	0.10	57.11	66.00	-8.89	QP	Live
0.204	29.97	0.10	0.10	30.17	53.45	-23.28	Average	Live
0.204	45.91	0.10	0.10	46.11	63.45	-17.34	QP	Live
0.235	23.56	0.11	0.10	23.77	52.26	-28.49	Average	Live
0.235	46.32	0.11	0.10	46.53	62.26	-15.73	QP	Live
0.307	17.97	0.14	0.10	18.21	50.06	-31.85	Average	Live
0.307	38.79	0.14	0.10	39.03	60.06	-21.03	QP	Live
3.417	28.53	0.30	0.15	28.98	46.00	-17.02	Average	Live
3.417	34.72	0.30	0.15	35.17	56.00	-20.83	QP	Live
3.985	25.55	0.30	0.17	26.02	46.00	-19.98	Average	Live
3.985	34.12	0.30	0.17	34.59	56.00	-21.41	QP	Live



**Test Mode:** Engineering mode

**Test Port:** AC Neutral Line



Freq (MHz)	Read Level (dBμV)	LISN Factor (dB)	Cable Loss (dB)	Level (dBμV)	Limit Line (dBμV)	Over Limit (dB)	Detector	Phase
0.150	42.21	0.20	0.10	42.51	56.00	-13.49	Average	Neutral
0.150	48.48	0.20	0.10	48.78	66.00	-17.22	QP	Neutral
0.159	36.55	0.18	0.10	36.83	55.52	-18.69	Average	Neutral
0.159	57.32	0.18	0.10	57.60	65.52	-7.92	QP	Neutral
0.168	32.95	0.16	0.10	33.21	55.08	-21.87	Average	Neutral
0.168	49.82	0.16	0.10	50.08	65.08	-15.00	QP	Neutral
0.230	34.20	0.10	0.10	34.40	52.44	-18.04	Average	Neutral
0.230	42.32	0.10	0.10	42.52	62.44	-19.92	QP	Neutral
0.334	19.82	0.10	0.10	20.02	49.35	-29.33	Average	Neutral
0.334	32.77	0.10	0.10	32.97	59.35	-26.38	QP	Neutral
16.750	34.45	0.54	0.13	35.12	50.00	-14.88	Average	Neutral
16.750	39.09	0.54	0.13	39.76	60.00	-20.24	QP	Neutral



## 7.4 6dB Occupied Bandwidth

**Test Requirement:** FCC Part 15 C Section 15.247 (a)(2)  
RSS-210 Issue 8 Annex 8

**Test Method:** ANSI C63.10 2009 Section 6.2

**Test Result:** Pass

**Final Test Mode:** Engineering mode

**Limit:**  $\geq 500$  kHz

**Test Procedure:**

1. Place the EUT on the table and set it in Engineering mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set the spectrum analyzer as RBW=100KHz, VBW =3\* RBW, Span=10MHz, Sweep=auto
4. Mark the peak frequency and -6dB (upper and lower) frequency.
5. Repeat above procedures until all frequency measured was complete.

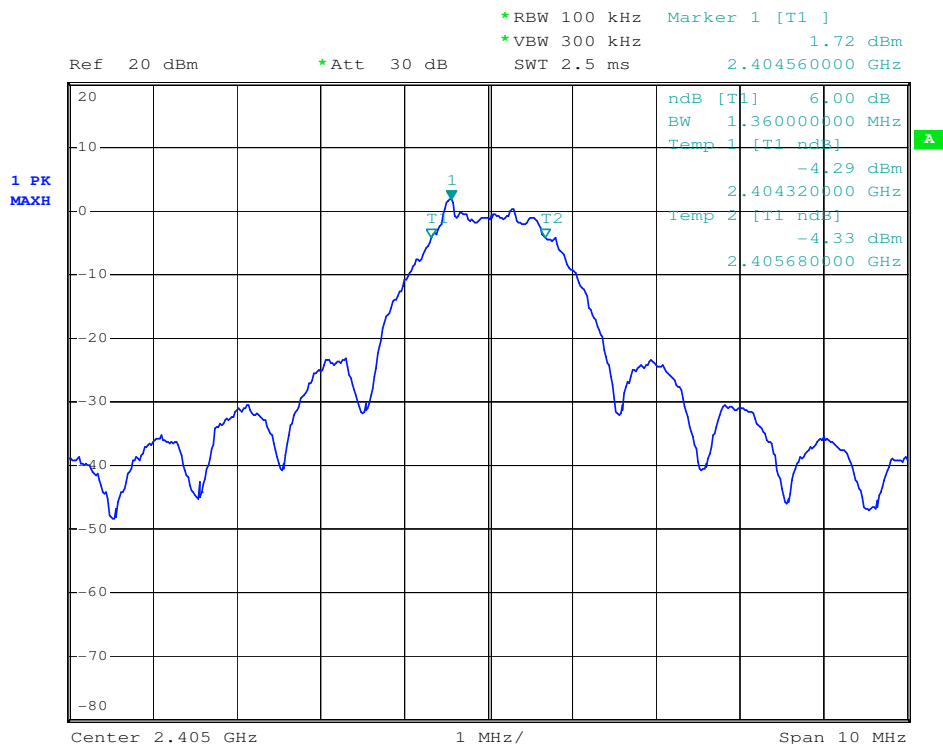
**Test date:**

Test Channel	6dB Occupy Bandwidth (MHz)	Limit (kHz)	Results
Low	1.36	500	Pass
Middle	1.52	500	Pass
High	1.52	500	Pass

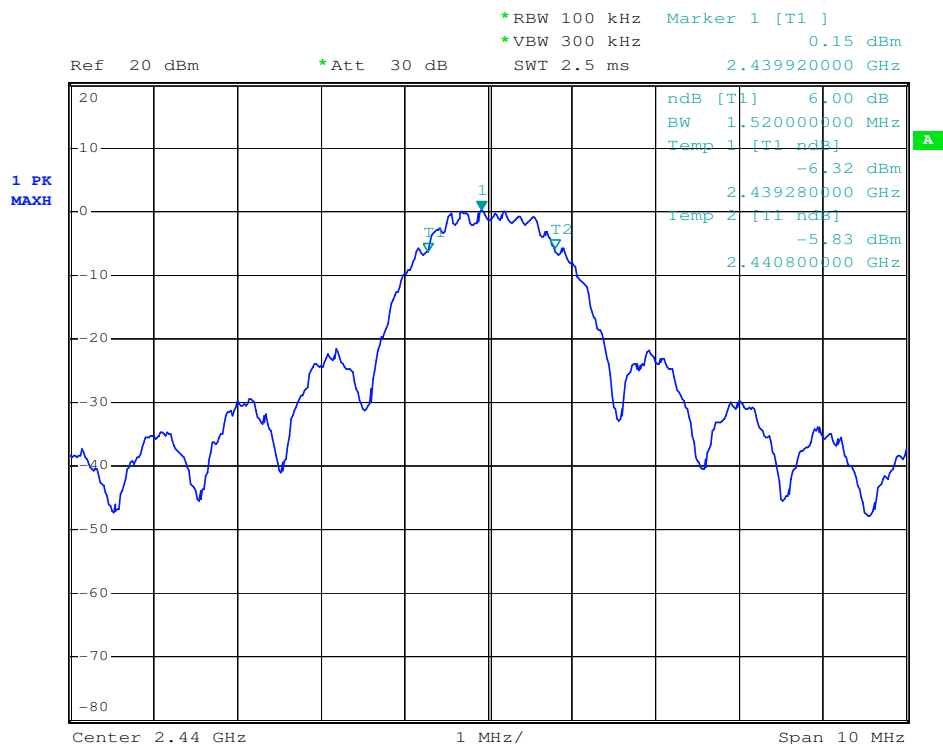


Test plot as follows:

Test channel:	Lowest
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Test channel:	Middle
---------------	--------



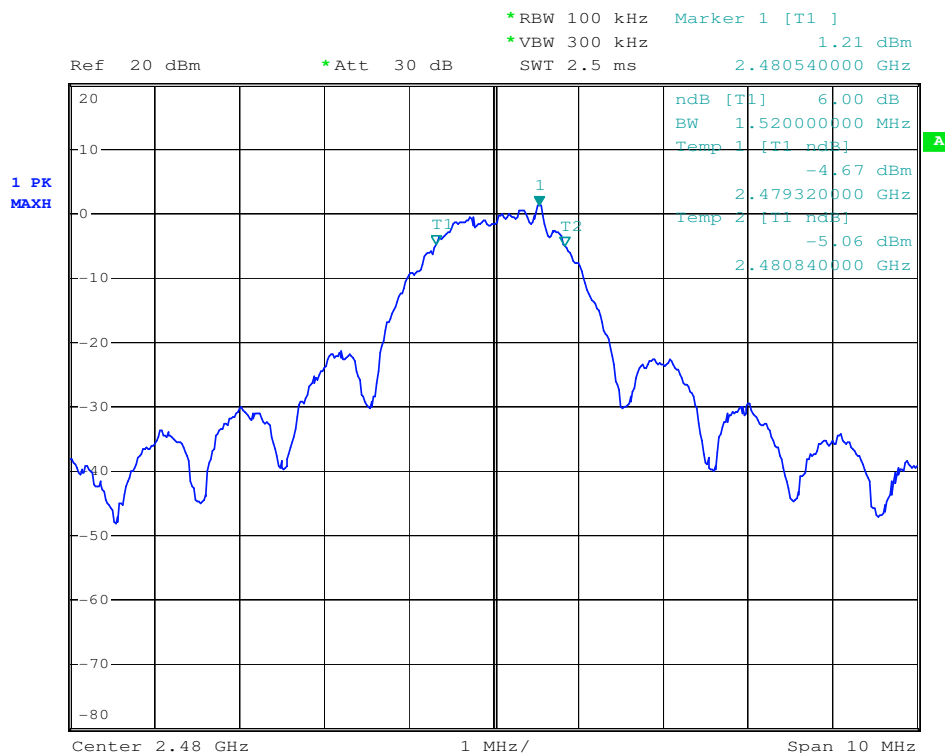
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Test channel:

Highest



## 7.5 Conducted Peak Output Power

**Test Requirement:** FCC Part 15.247 Section 15.247(b)(3)  
RSS-210 Issue 8 Annex 8

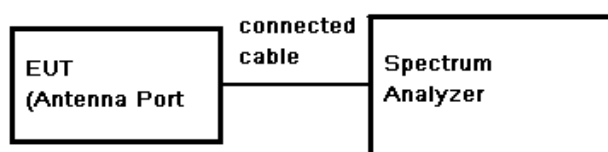
**Test Method:** ANSI C63.10 2009 Section 6.10

**Test Result:** Pass

**Test Limit:** 30dBm

**Final Test Mode:** Engineering mode

**Test Configuration:**



### Test Procedure:

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
2. Set the spectrum analyzer: RBW = 3 MHz. VBW = 3 MHz. Span= fully encompass the bandwidth, Sweep = auto; Detector Function = Peak Trace mode=max hold
3. Use the spectrum analyzer's channel power measurement function with the band limits set equal to the bandwidth edges.
4. Keep the EUT in transmitting at lowest, middle and highest channel individually. Record the max value.

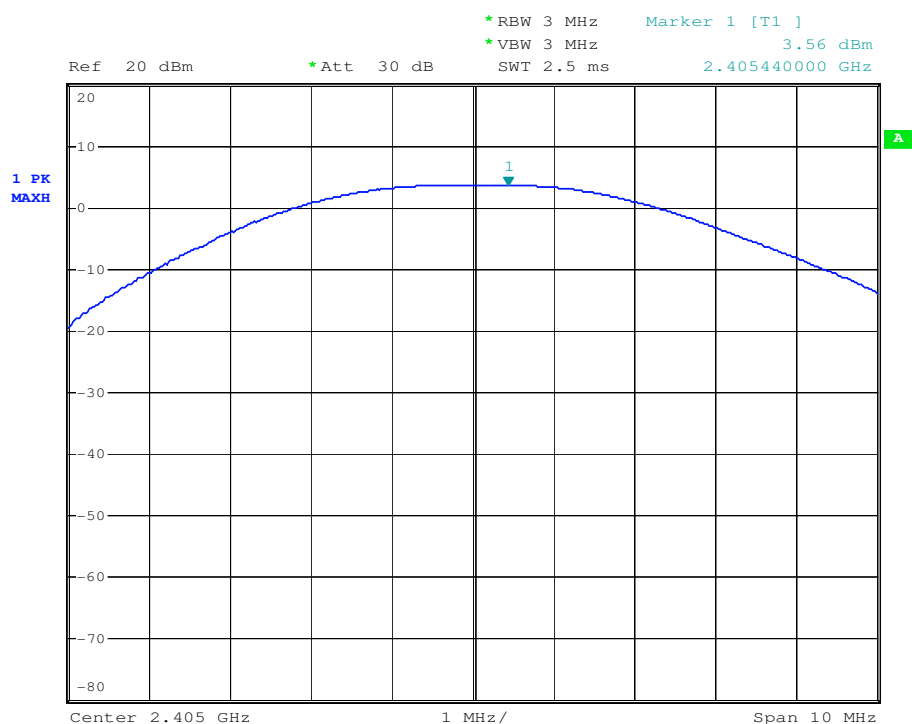
### Test Results record:

Channel	Reading Peak Power (dBm)	Cable Loss (dB)	Output Peak Power (dBm)	Output Peak Power (mW)	Peak Power Limit (dBm)	Result
Low	3.56	0.3	3.86	2.43	30	PASS
Mid	3.51	0.3	3.81	2.40	30	PASS
High	3.62	0.3	3.92	2.47	30	PASS

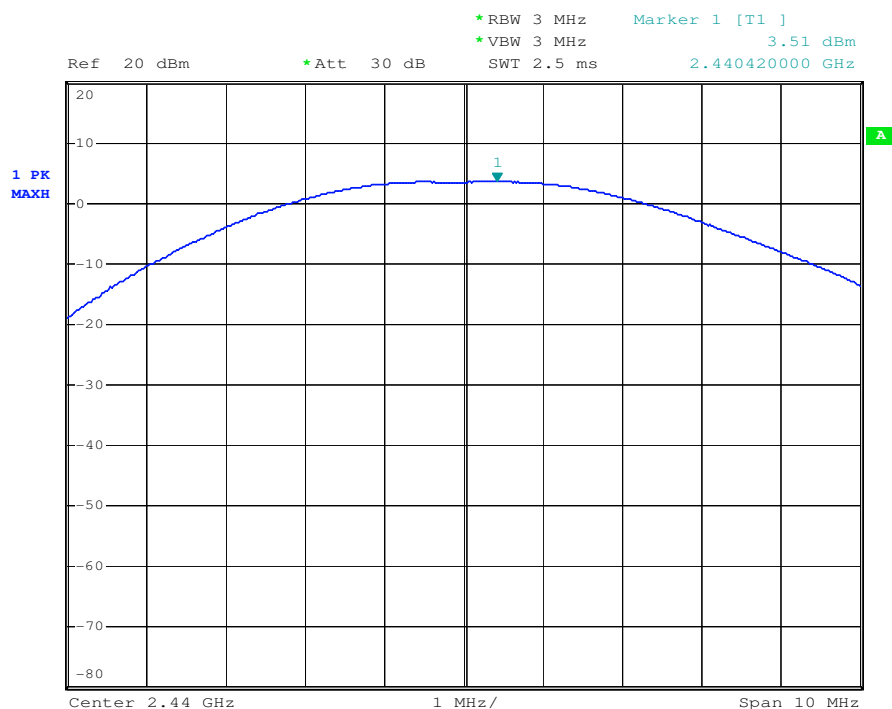


Test result plot as follows:

Test channel:	Lowest
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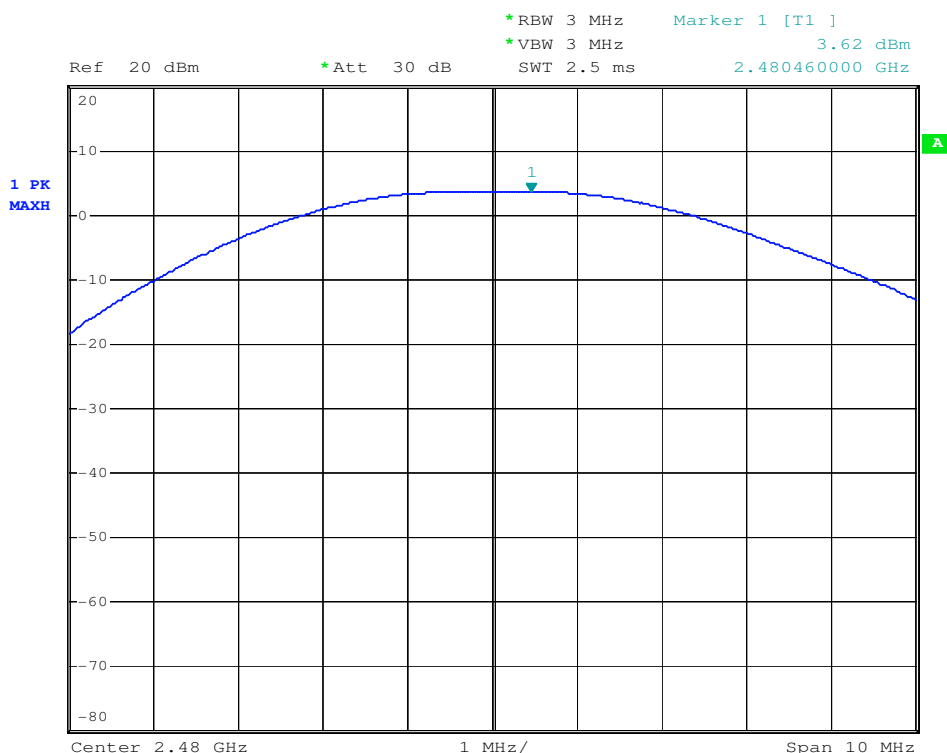
Test channel:	Middle
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Test channel: Highest





## 7.6 Peak Power Spectral Density

- Test Requirement:** FCC Part 15, Subpart C Section 15.247 (e)  
RSS-210 Issue 8 Annex 8
- Test Method:** ANSI C63.10,2009 Section 6.11.2
- Test Result:** Pass
- Test Limit:** 8dBm/3kHz
- Final Test Mode:** Engineering mode
- Measurement Procedure:**
1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
  2. Set the spectrum analyzer: Center Frequency= Channel Frequency, RBW = 3 kHz VBW = 10 kHz. Span= fully encompass the bandwidth, Sweep = auto; Detector Function = Peak Trace mode=max hold,
  3. Set MKR=Center Frequency, Trace=Clear Write.
  4. Adjust the Span = 300 kHz, Sweep Time=100s, Trace=Max hold, MKR=Peak Search.
  5. Record the marker level for the particular mode.
  6. Repeat these steps for other channel and device modes.

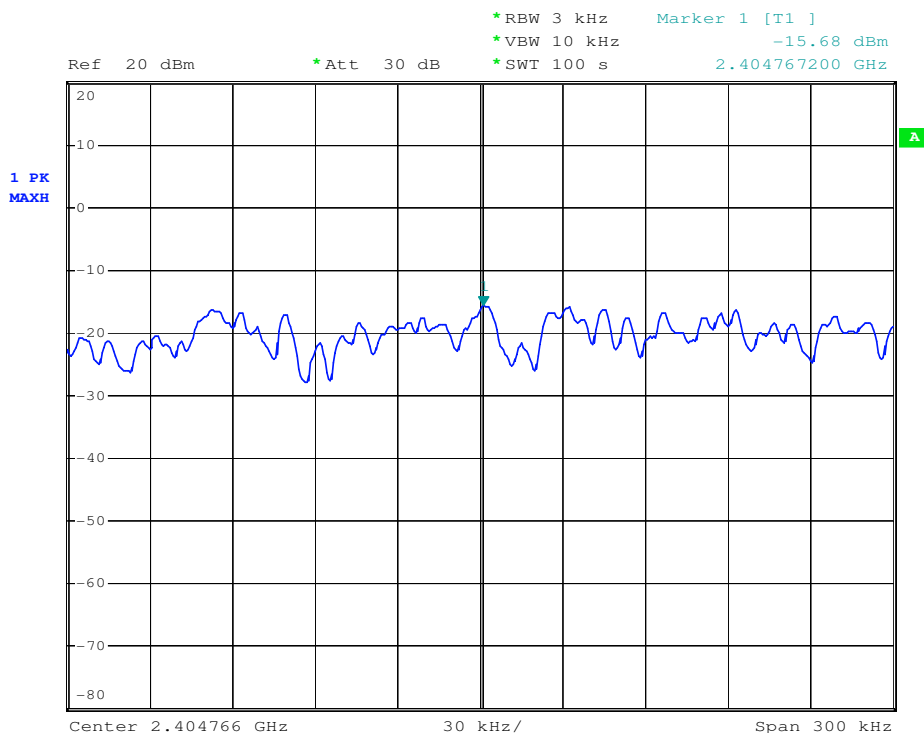
### Test Results record:

Channel	Reading (dBm)	Cable Loss (dB)	RF Power Density (dBm)	Peak Power Limit (dBm)	Result
Low	-15.68	0.3	-15.38	8	PASS
Mid	-14.20	0.3	-13.90	8	PASS
High	-14.07	0.3	-13.77	8	PASS

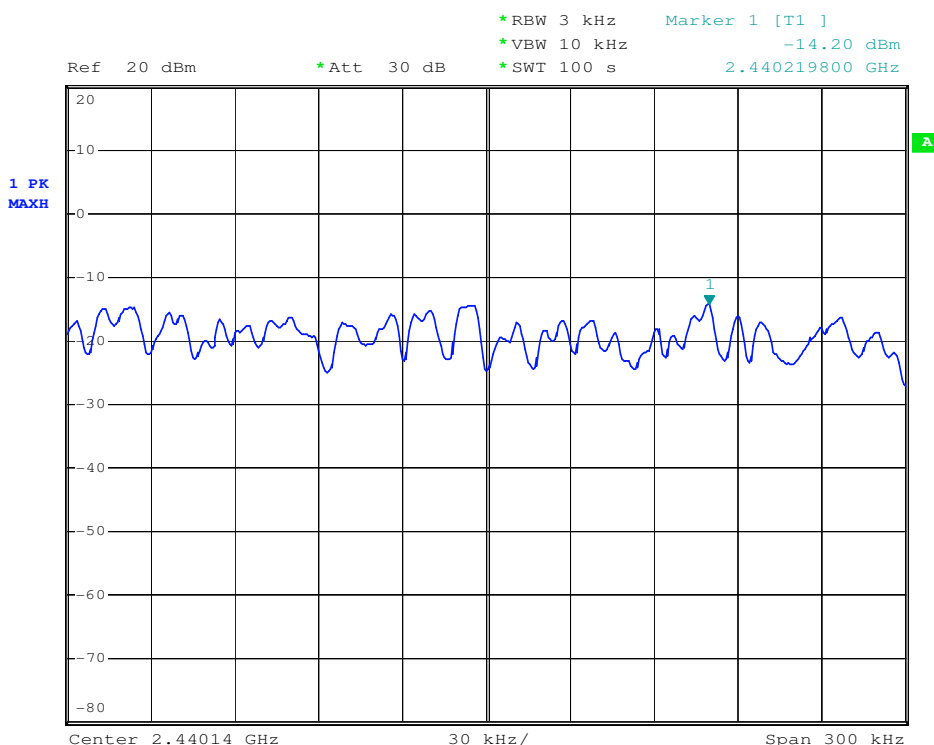


Test plot as follows:

Test channel: Lowest



Test channel: Middle

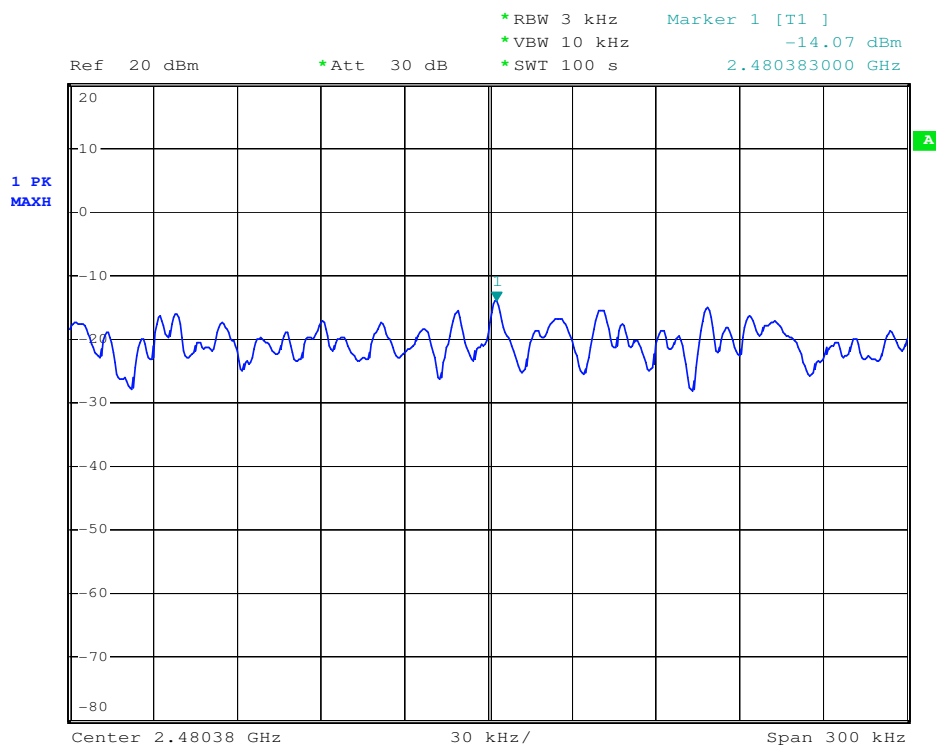


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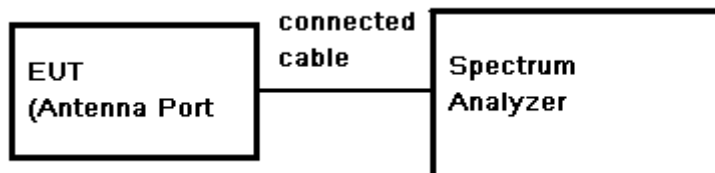
Test channel:

Highest



## 7.7 Conducted Spurious Emissions

<b>Test Requirement:</b>	FCC Part 15 Section 15.247(d) RSS-210 Issue 8 Annex 8
<b>Test Method:</b>	ANSI C63.10:2009 Clause 7.7.10
<b>Test Result:</b>	Pass
<b>Limit:</b>	(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.
<b>Final Test Mode:</b>	Engineering mode
<b>Test Configuration:</b>	



<b>Test Procedure:</b>	<ol style="list-style-type: none"><li>1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.</li><li>2. Set the spectrum analyzer: RBW = 100KHz. VBW &gt;= RBW. Sweep = auto; Detector Function = Peak (Max. hold).</li></ol>
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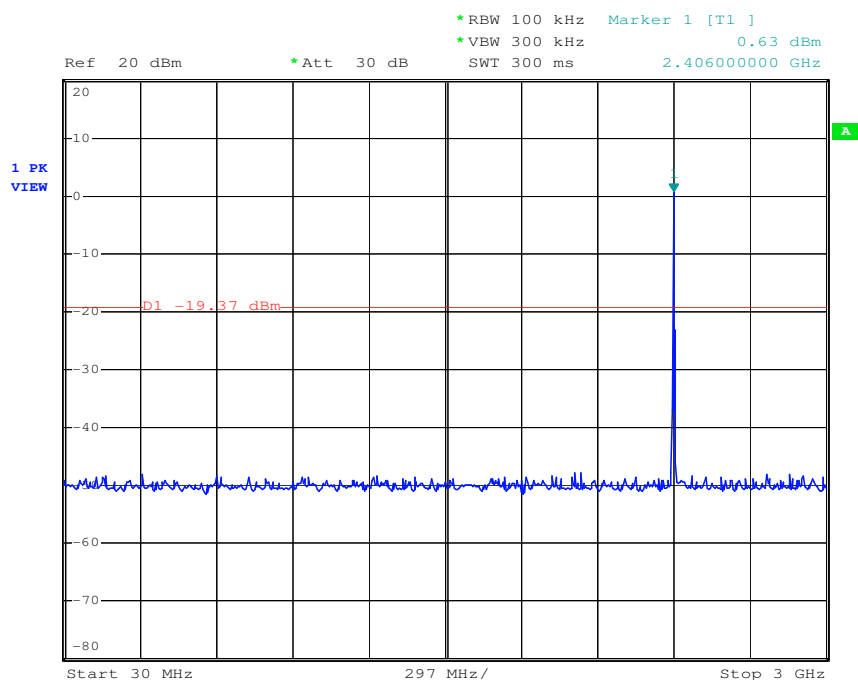




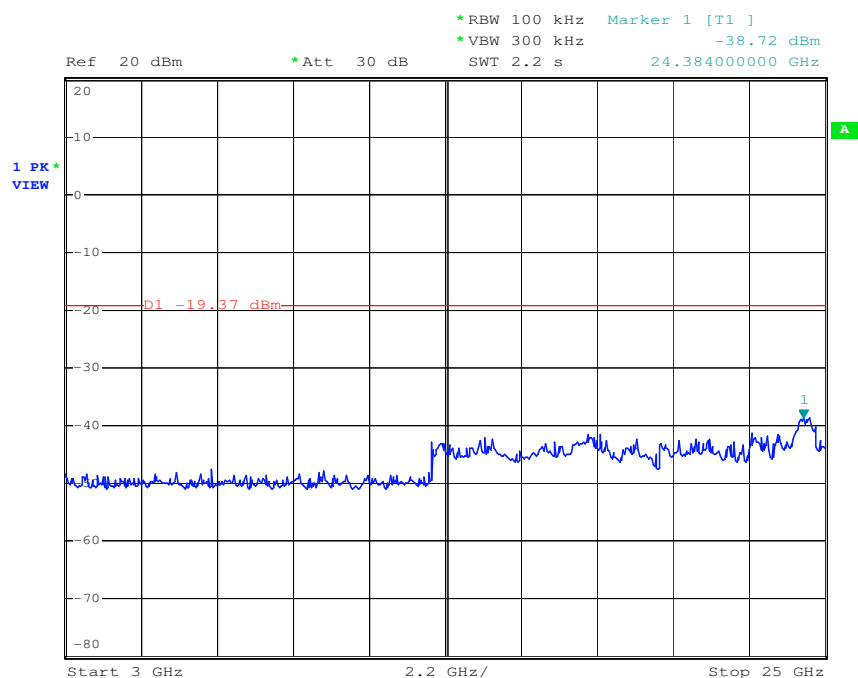
Test plot as follows:

Test channel:	Lowest
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30MHz-3GHz



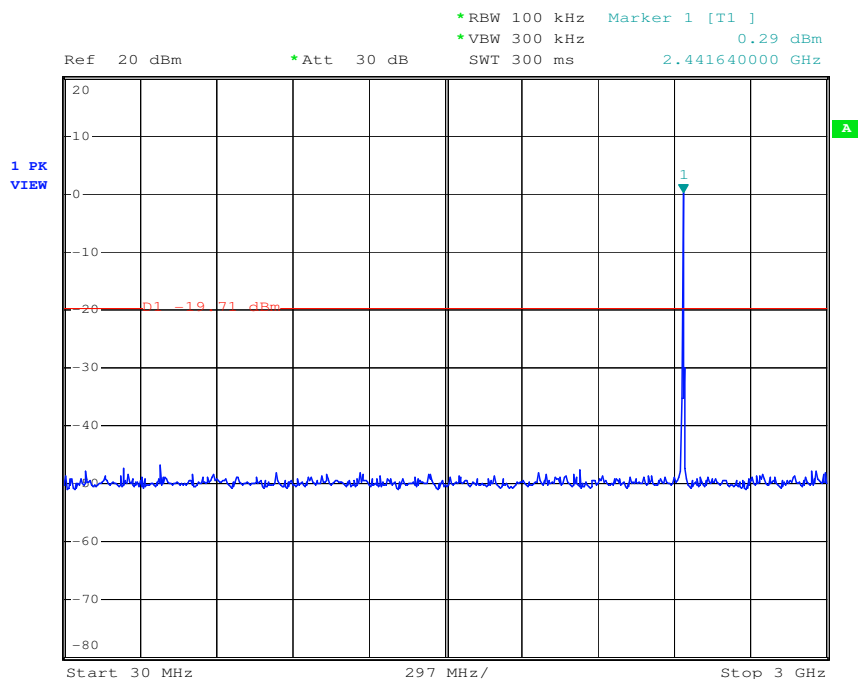
3GHz-25GHz



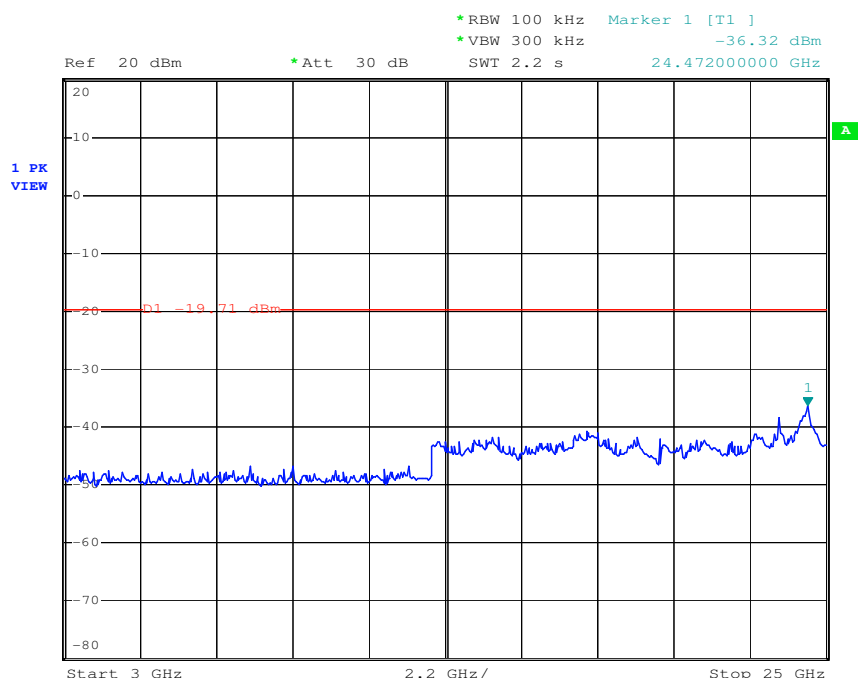


Test channel: Middle

30MHz-3GHz



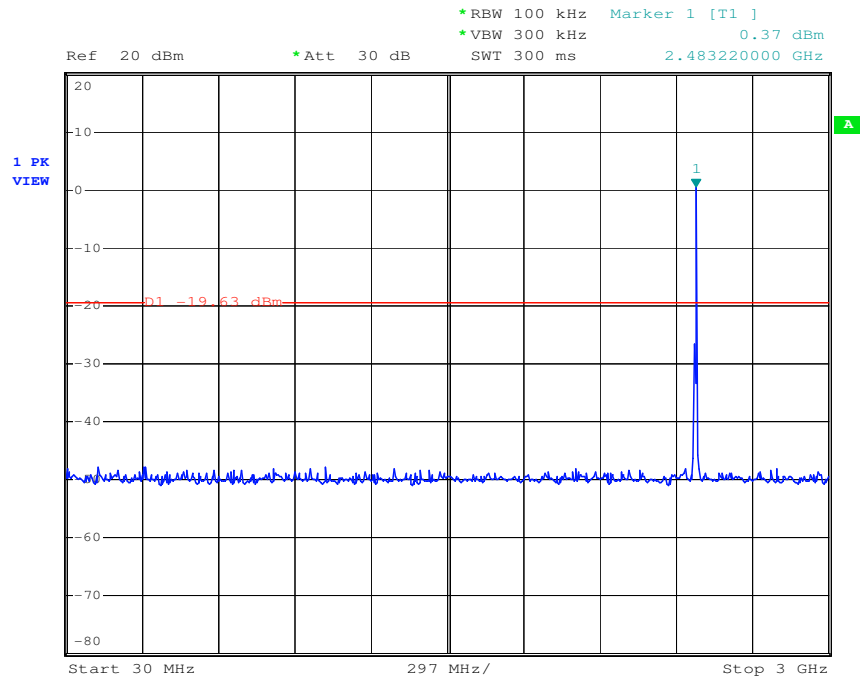
3GHz-25GHz



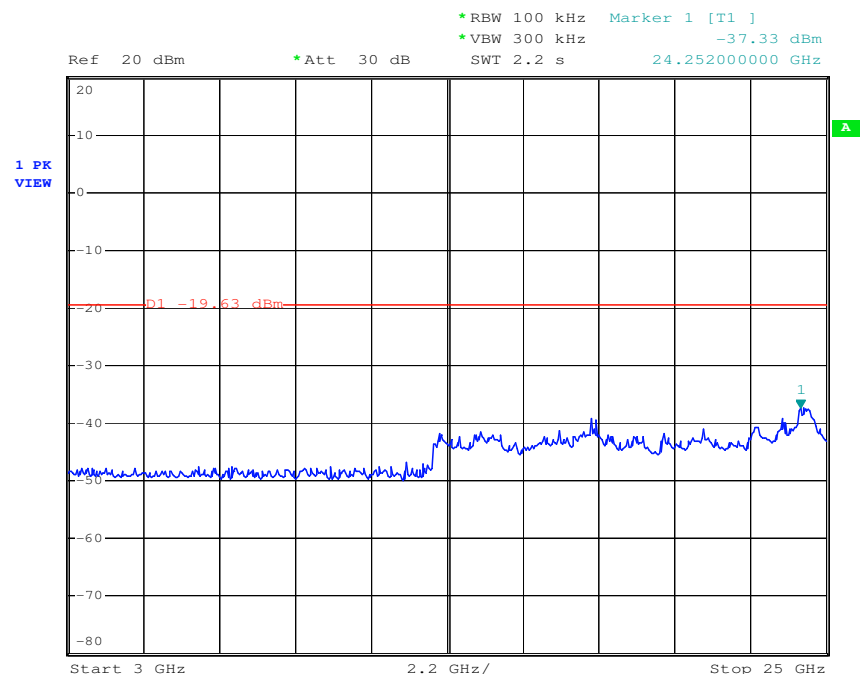


Test channel: Highest

30MHz-3GHz

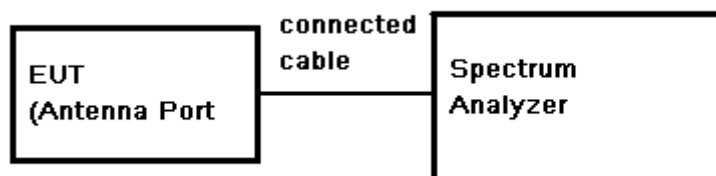


3GHz-25GHz



## 7.8 Conducted Band-edge

<b>Test Requirement:</b>	FCC Part 15 Section 15.247(d) RSS-210 Issue 8 Annex 8
<b>Test Method:</b>	ANSI C63.10:2009 Clause 7.7.10
<b>Test Result:</b>	Pass
<b>Limit:</b>	(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.
<b>Final Test Mode:</b>	Engineering mode
<b>Test Configuration:</b>	

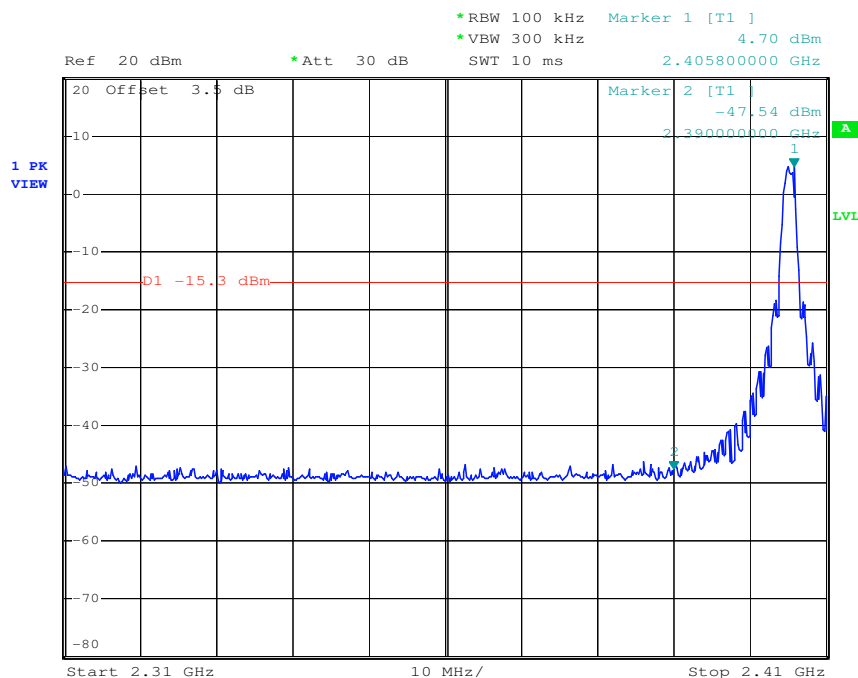


<b>Test Procedure:</b>	<ol style="list-style-type: none"> <li>1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.</li> <li>2. Set the spectrum analyzer: RBW = 100KHz. VBW &gt;= RBW. Sweep = auto; Detector Function = Peak (Max. hold).</li> </ol>
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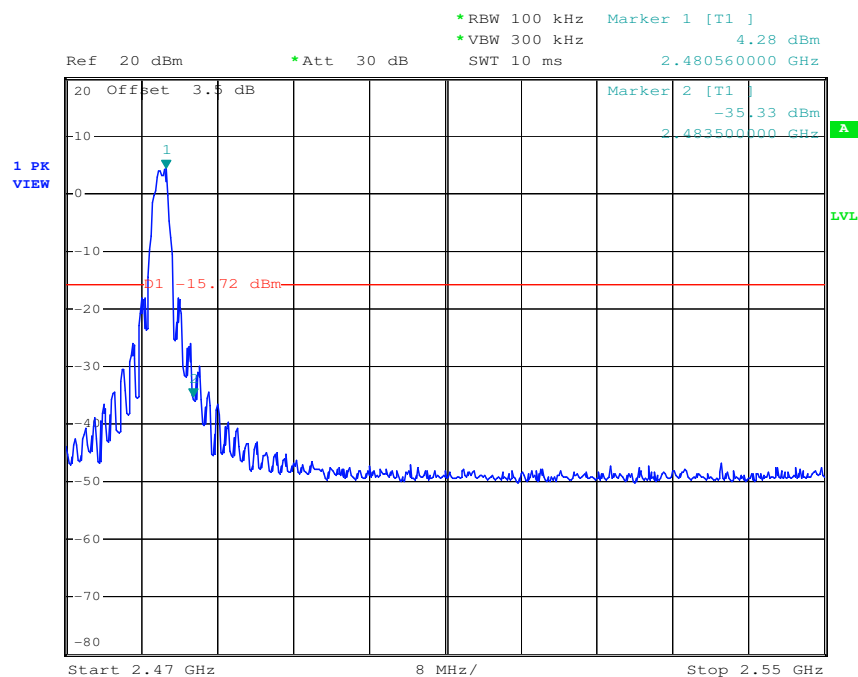


Test plot as follows:

Test channel:	Lowest
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Test channel:	Highest
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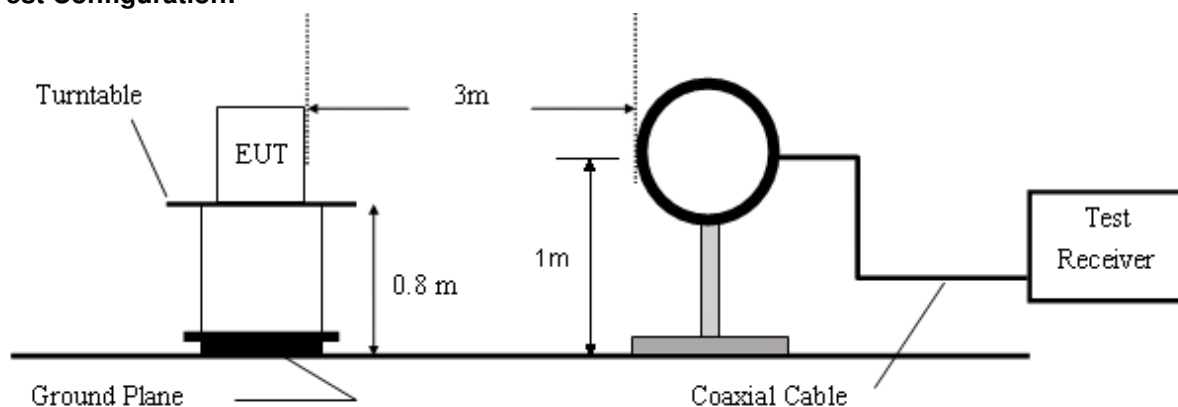




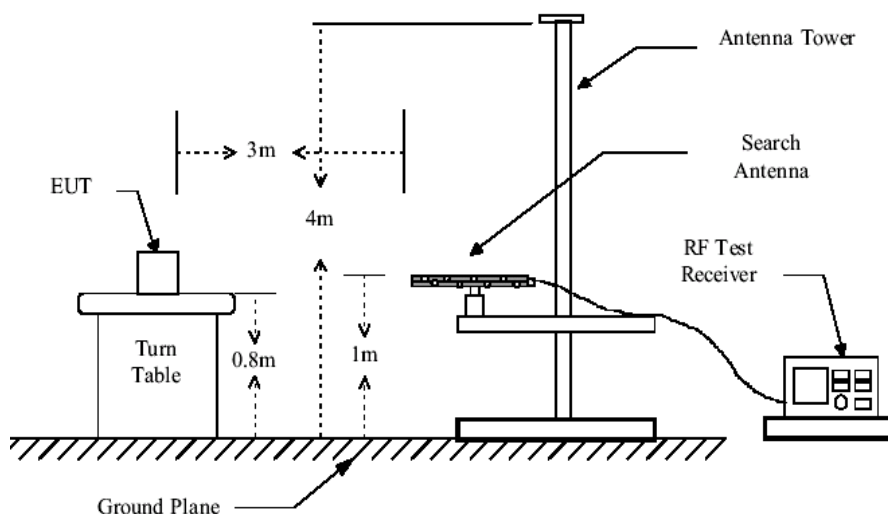
## 7.9 Radiated Spurious Emissions

<b>Test Requirement:</b>	FCC Part 15 Section 15.209 and Section 15.205 RSS-210 Issue 8 Annex 8
<b>Test Method:</b>	ANSI C63.10:2009 Clause 6.12
<b>Test Result:</b>	Pass
<b>Final Test Mode:</b>	Engineering mode
<b>Test site/setup:</b>	Measurement Distance: 3m (Semi-Anechoic Chamber)  Test instrumentation resolution bandwidth 200 Hz and Quasi-Peak detector applies (9 KHz – 150 KHz).  Test instrumentation resolution bandwidth 9 KHz and Quasi-Peak detector applies (150 KHz - 30 MHz).  Test instrumentation resolution bandwidth 120 kHz and Quasi-Peak detector applies (30 MHz - 1000 MHz).  For PK value: RBW = 1 MHz for $f \geq 1$ GHz; VBW $\geq$ RBW; Sweep = auto Detector function = peak Trace = max hold  For AV value: RBW = 1 MHz for $f \geq 1$ GHz VBW = 10Hz; Sweep = auto Detector function = peak Trace = max hold  Receive antenna scan height 1 m - 4 m. polarization Vertical / Horizontal
<b>15.209 Limit:</b>	40.0 dB $\mu$ V/m between 30MHz & 88MHz 43.5 dB $\mu$ V/m between 88MHz & 216MHz 46.0 dB $\mu$ V/m between 216MHz & 960MHz 54.0 dB $\mu$ V/m above 960MHz

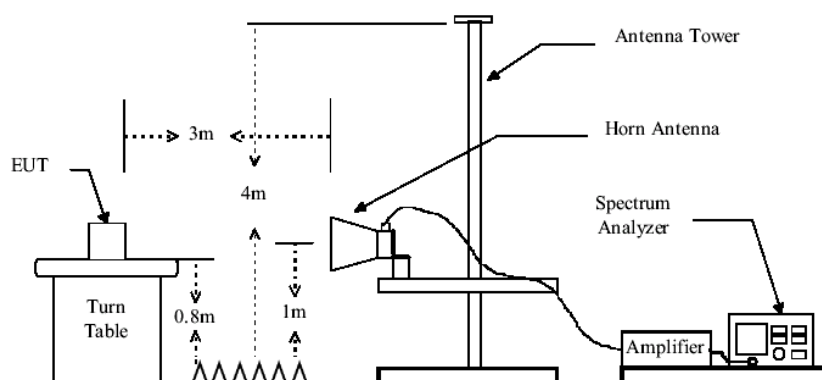
**Test Configuration:**



**Figure 1. 30MHz to 1GHz radiated emissions test configuration**



**Figure 2. 30MHz to 1GHz radiated emissions test configuration**



**Figure 3. Above 1GHz radiated emissions test configuration**



**Test Procedure:**

The procedure used was ANSI Standard C63.10:2009. The receiver was scanned from 9KHz to 25GHz. When an emission was found, the table was rotated to produce the maximum signal strength. An initial pre-scan was performed for in peak detection mode using the receiver. The EUT was measured for both the Horizontal and Vertical polarities and performed a pre-test three orthogonal planes. For intentional radiators, measurements of the variation of the input power or the radiated signal level of the fundamental frequency component of the emission, as appropriate, shall be performed with the supply voltage varied between 85% and 115% of the nominal rated supply voltage. The worst case emissions were reported.

Low noise amplifier was used below 1GHz, High pass Filter was used above 3GHz.  
Between 1G and 3GHz, we did not use any amplifier or filter.

1) For this intentional radiator operates below 25 GHz. the spectrum shall be investigated to the tenth harmonic of the highest fundamental frequency. And above the third harmonic of this intentional radiator, the disturbance is very low. So the test result only displays to 5rd harmonic.

As shown in Section, for frequencies above 1000 MHz. the above field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.

The test only perform the EUT in transmitting status since the test frequencies were over 1GHz only required transmitting status.





1GHz-12GHz:

**Test Antenna: Horizontal**

**Test Channel: Low**

Mark	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Emission (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	4842.25	37.75	8.60	46.35	74	-27.65	peak
2	7227.50	37.42	10.69	48.11	74	-25.89	peak
3	9589.25	38.70	14.23	52.93	74	-21.07	peak

**Test Antenna: Vertical**

**Test Channel: Low**

Mark	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Emission (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	4842.25	38.17	8.60	46.77	74	-27.23	peak
2	7227.50	37.96	10.69	48.65	74	-25.35	peak
3	9589.25	35.69	14.23	49.92	74	-24.08	peak

**Test Antenna: Horizontal**

**Test Channel: Middle**

Mark	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Emission (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	4865.75	36.05	8.76	44.81	74	-29.19	peak
2	7333.25	40.21	10.93	51.14	74	-22.86	peak
3	9777.25	35.89	14.45	50.34	74	-23.66	peak

**Test Antenna: Vertical**

**Test Channel: Middle**

Mark	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Emission (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	4865.75	36.97	8.76	45.73	74	-28.27	peak
2	7333.25	38.65	10.93	49.58	74	-24.42	peak
3	9777.25	36.06	14.45	50.51	74	-23.49	peak



**Test Antenna: Horizontal**

**Test Channel: High**

Mark	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Emission (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	4983.25	38.57	8.94	47.51	74	-26.49	peak
2	7403.75	39.53	11.08	50.61	74	-23.39	peak
3	9953.50	35.58	14.75	50.33	74	-23.67	peak

**Test Antenna: Vertical**

**Test Channel: High**

Mark	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Emission (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	4983.25	39.23	8.94	48.17	74	-25.83	peak
2	7403.75	37.83	11.08	48.91	74	-25.09	peak
3	9953.50	35.9	14.75	50.65	74	-23.35	peak

Test Level = Receiver Reading + Antenna Factor + Cable Loss – Preamplifier Factor.

Remark: No any other emissions level which are attenuated less than 20dB below the limit.

According to 15.31(o), The amplitude of spurious emissions from intentional radiators and emissions from unintentional radiators which are attenuated more than 20 dB below the permissible value need not be reported unless specifically required elsewhere in this Part. Hence there no other emissions have been reported.

## 7.10 Band edge (Radiated Emission)

<b>Test Requirement:</b>	Section 15.247(d) In addition, radiated emissions which fall in the restricted bands. as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c).
<b>Test Method:</b>	ANSI 63.10:2009 Clause 6.12
<b>Test Result:</b>	Pass
<b>Measurement Distance:</b>	3m (Semi-Anechoic Chamber)
<b>Limit:</b>	40.0 dB $\mu$ V/m between 30MHz & 88MHz; 43.5 dB $\mu$ V/m between 88MHz & 216MHz; 46.0 dB $\mu$ V/m between 216MHz & 960MHz; 54.0 dB $\mu$ V/m above 960MHz.
<b>Detector:</b>	For PK value: RBW = 1 MHz for $f \geq 1$ GHz VBW $\geq$ RBW; Sweep = auto Detector function = peak Trace = max hold For AV value: RBW = 1 MHz for $f \geq 1$ GHz VBW =10Hz; Sweep = auto Detector function = peak Trace = max hold

According to section 15.35(b) for frequencies above 1000 MHz. the above field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.

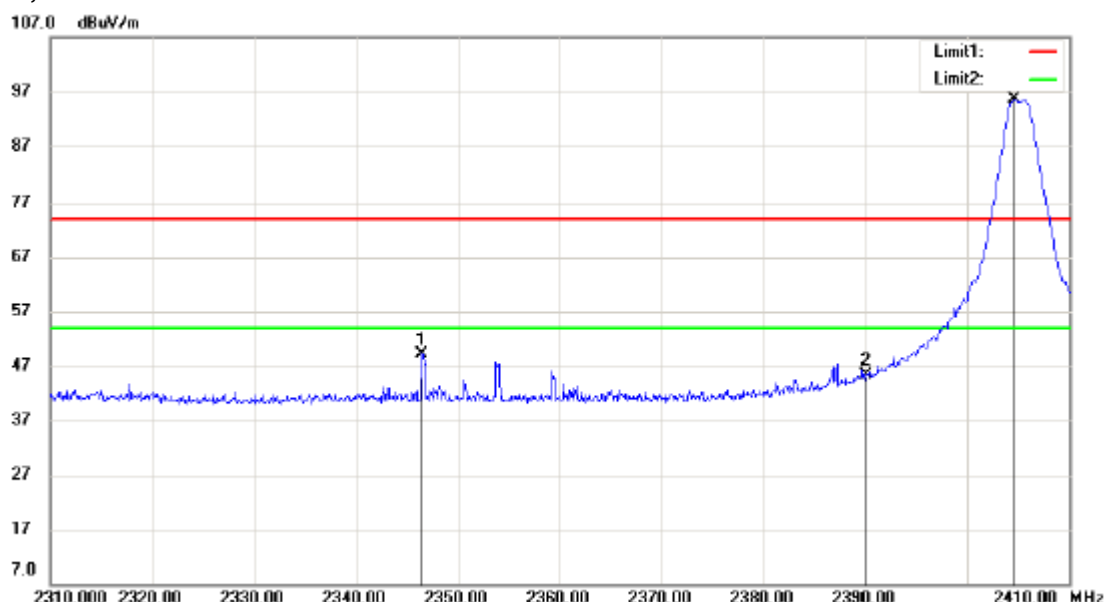
**Test Result:** The EUT does meet the FCC requirements.



Measurement Result:

Test channel:	Lowest
---------------	--------

Horizontal, Peak Detector:

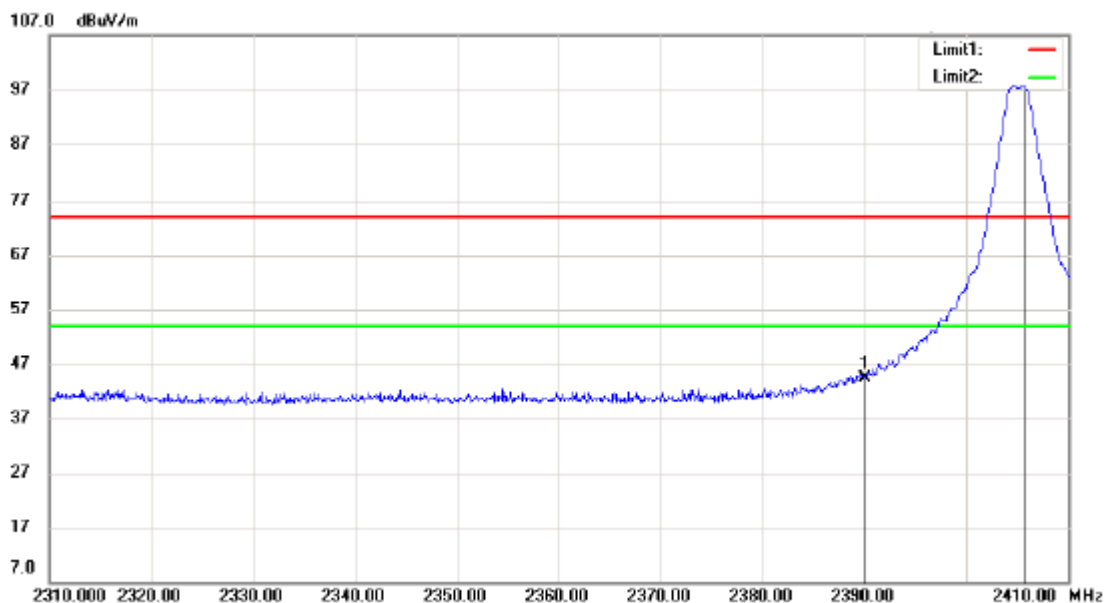


Mk.	Frequency (MHz)	Reading (dBuV/m)	Detector	Corrected factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
	2346.500	49.60	peak	-0.35	49.25	74.00	-24.75
	2390.000	45.89	peak	-0.56	45.33	74.00	-28.67
*	2404.600	96.29	peak	-0.63	95.66	74.00	21.66



Test channel:	Lowest
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Vertical, Peak Detector:

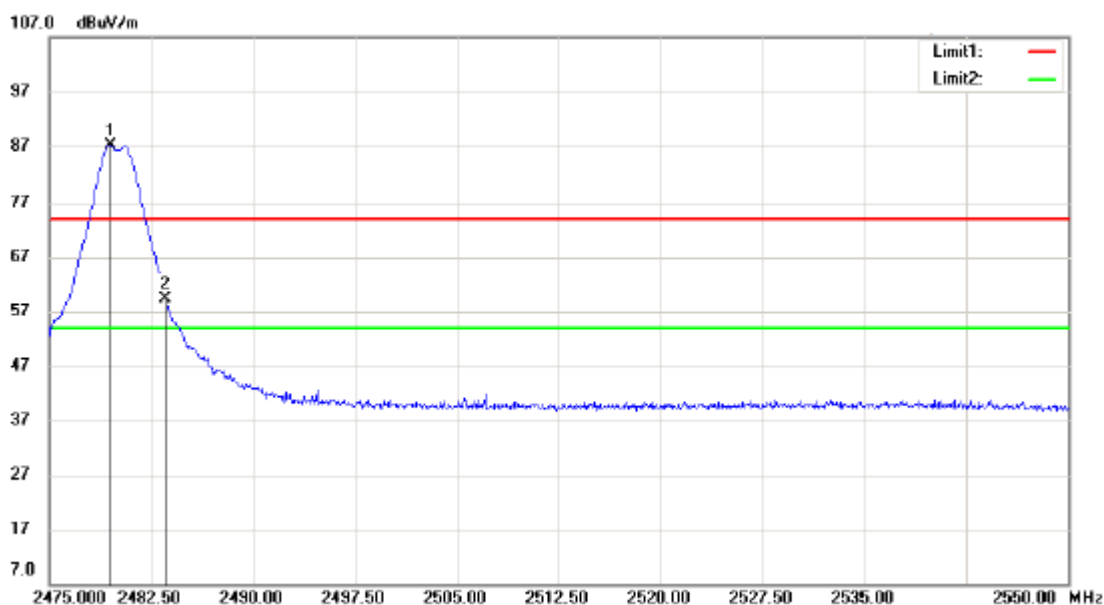


Mk.	Frequency (MHz)	Reading (dBuV/m)	Detector	Corrected factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
	2390.000	44.83	peak	-0.56	44.27	74.00	-29.73
*	2405.600	98.53	peak	-0.64	97.89	74.00	23.89



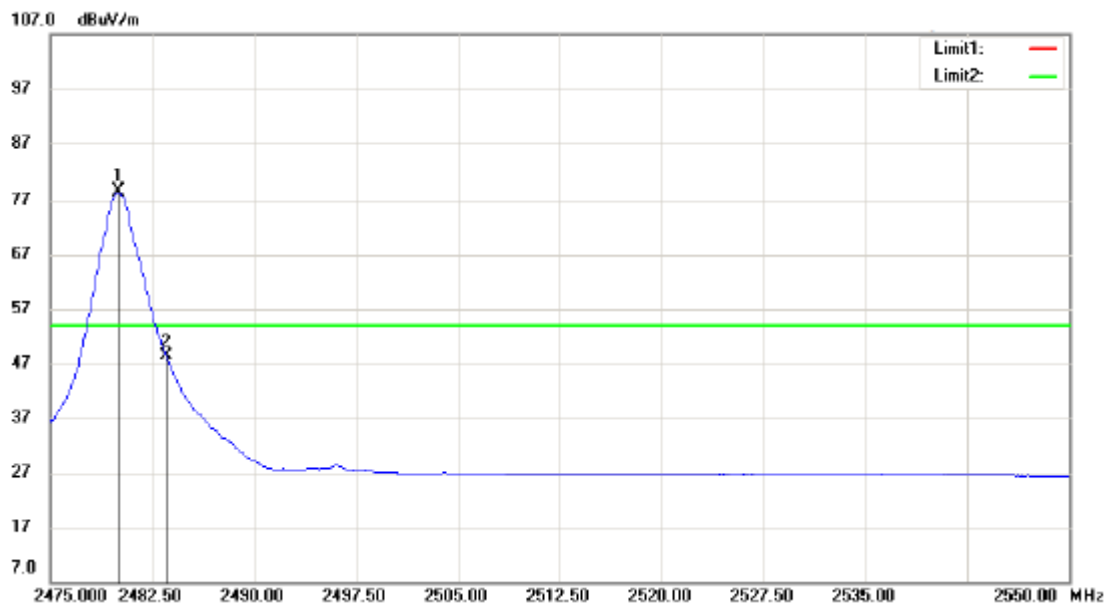
Test channel:	Highest
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Horizontal, Peak Detector:



Mk.	Frequency (MHz)	Reading (dBuV/m)	Detector	Corrected factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
*	2479.500	88.11	peak	-0.99	87.12	74.00	13.12
	2483.500	60.43	peak	-1.01	59.42	74.00	-14.58

**Horizontal, Average Detector:**

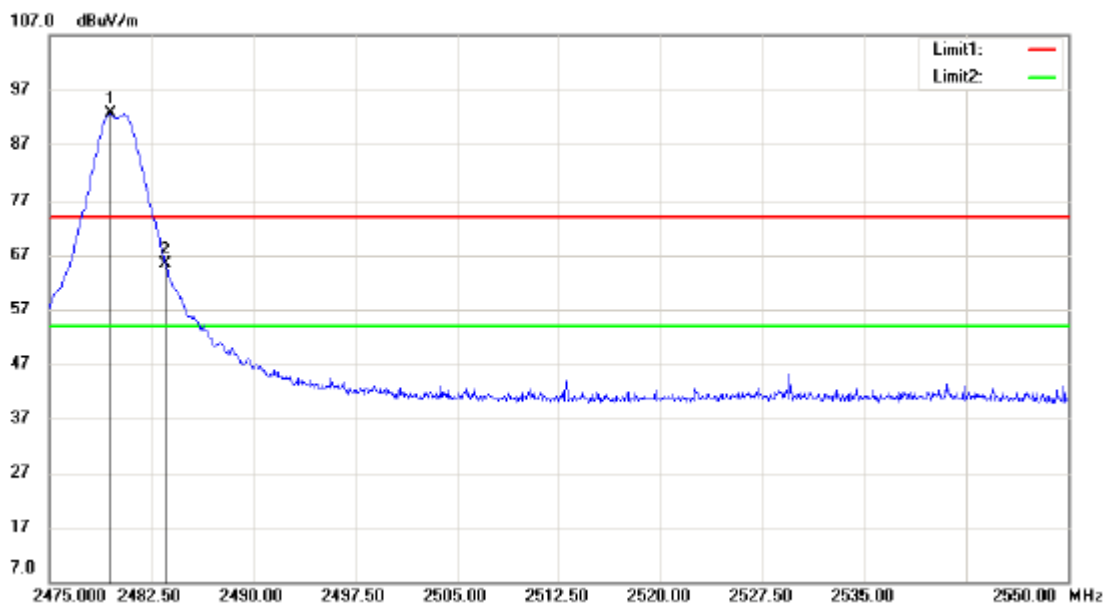


Mk.	Frequency (MHz)	Reading (dBuV/m)	Detector	Corrected factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
*	2480.025	79.42	peak	-0.99	78.43	54.00	24.43
	2483.500	49.32	peak	-1.01	48.31	54.00	-5.69



Test channel:	Highest
---------------	---------

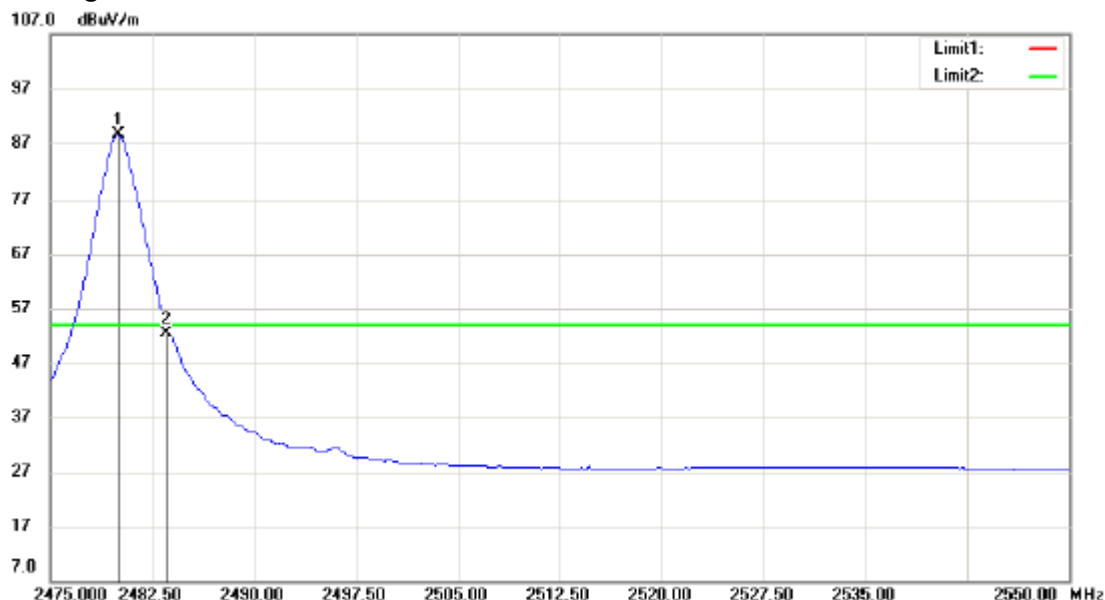
Vertical, Peak Detector:



Mk.	Frequency (MHz)	Reading (dBuV/m)	Detector	Corrected factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
*	2479.500	93.61	peak	-0.99	92.62	74.00	18.62
	2483.500	66.29	peak	-1.01	65.28	74.00	-8.72



**Vertical, Average Detector:**



Mk.	Frequency (MHz)	Reading (dBuV/m)	Detector	Corrected factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
*	2480.025	89.51	peak	-0.99	88.52	54.00	34.52
*	2483.500	55.68	peak	-1.01	53.33	54.00	-0.67

Remark: No any other emissions which fall in restricted bands can be detected and be reported.

Test Level = Receiver Reading + Antenna Factor + Cable Loss- Preamplifier Factor

All frequencies within the “Restricted bands” have been evaluated to compliance. Section 15.205

Restricted bands of operation.



## 7.11 Occupied Bandwidth Test

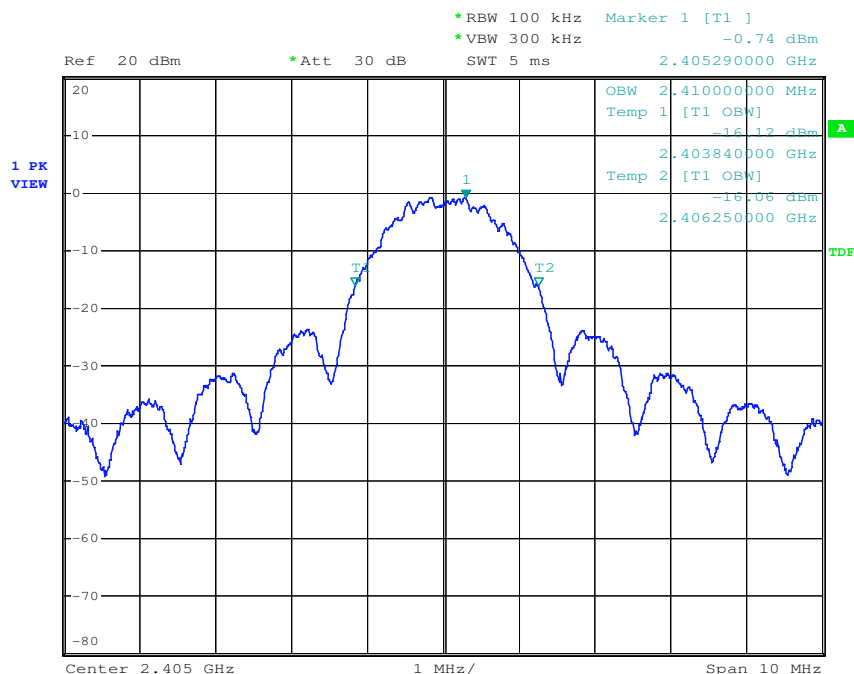
**Test Requirement:** RSS-Gen Issue 3 Clause 4.6.1  
**Standard Applicable** According to the section RSS-Gen Issue 3 Clause 4.6.1  
**EUT Setup** The occupied bandwidth per RSS-Gen Issue 3 Clause 4.6.1 was measured using the Spectrum Analyzer with the resolutions set at 100kHz, the video bandwidth set at 300kHz.

**Measurement Result:**  
**For 2405-2480MHz Band**

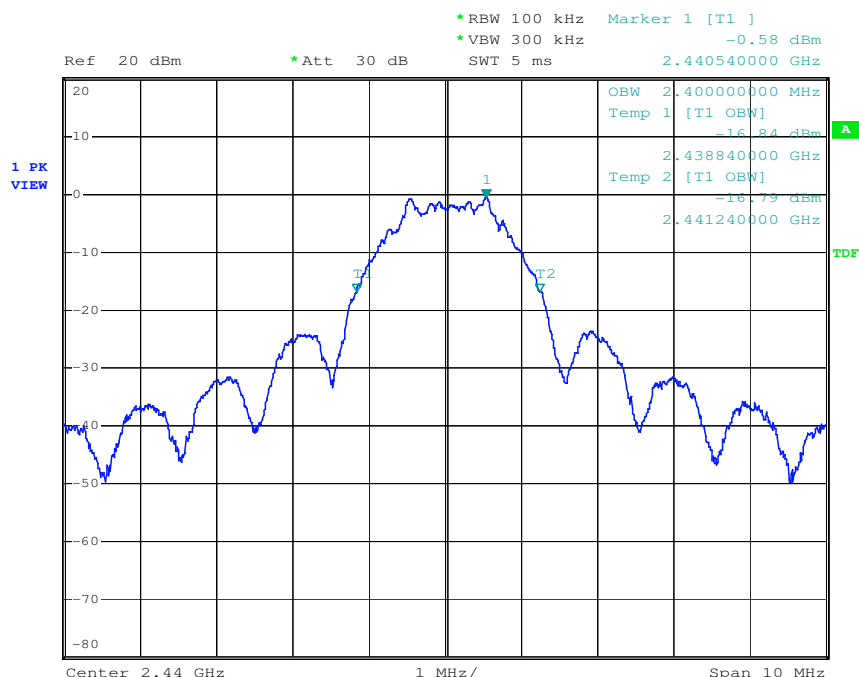
Channel	Frequency (MHz)	Bandwidth (MHz)
Low	2405	2.41
Middle	2440	2.40
High	2480	2.46



Test channel: Low



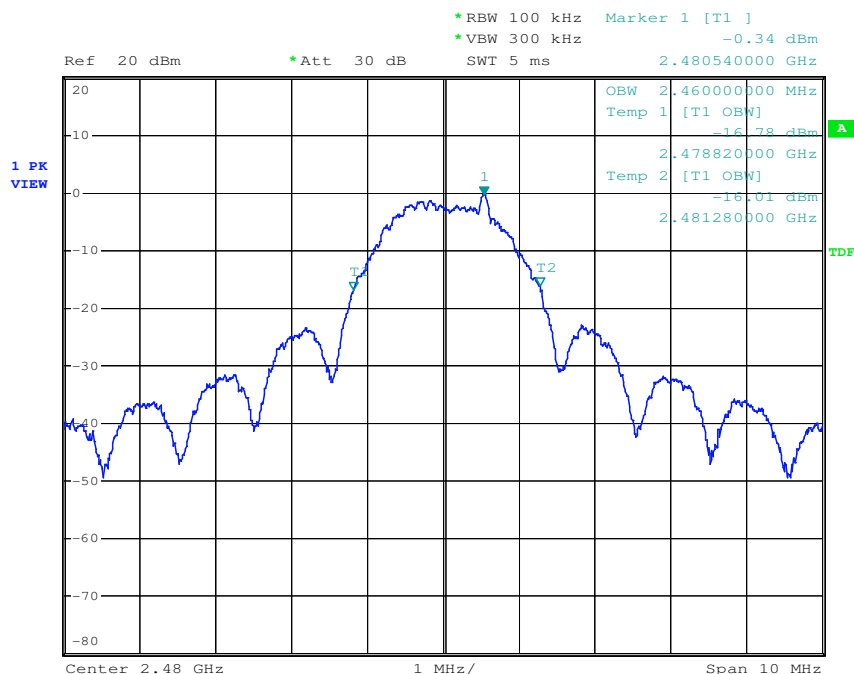
Test channel: Middle





Test channel:

High





## **8 Test Setup Photographs**

Refer to the < REB233-XPRO\_Test Setup photos>.

## **9 EUT Constructional Details**

Refer to the < REB233-XPRO\_EUT Photos >.

***End of Report***