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Report No.: SHEM130900182403
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1 Cover Page

RF TEST REPORT for DTS

Application No.:	SHEM1309001824RF
Applicant:	Hansong (Nanjing) Technology Ltd.
FCC ID:	XCO-SOUNDBAR2
IC ID:	7765A-SOUNDBAR2
Equipment Under Test (EUT):	
NOTE: The following sample(s) submitted was/were identified on behalf of the client as	
Product Name:	Soundtrack 2 System
Model No.(EUT):	Soundtrack 2
Standards:	FCC PART 15 Subpart C: 2012 RSS-210 Issue 8 (December 2010) RSS-Gen Issue 3 (December 2010)
Date of Receipt:	September 12, 2013
Date of Test:	September 13, 2013 to September 26, 2013
Date of Issue:	October 11, 2013
Test Result:	Pass*

*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	/	October 11, 2013	/	Original

Authorized for issue by:				
Engineer		Eddy Zong		<i>Eddy Zong</i>
		Print Name		
Clerk		Susie Liu		<i>Susie Liu</i>
		Print Name		
Reviewer		Keny Xu		<i>Keny. xu</i>
		Print Name		



3 Test Summary

Test Item	Test Requirement	IC REFERANCE	Test method	Result
Antenna Requirement	FCC Part 15, Subpart C Section 15.203/15.247 (c)	RSS-Gen 7.1.2	---	PASS
AC Power Line Conducted Emission	FCC Part 15, Subpart C Section 15.207	RSS-Gen Issue 8 Clause 7.2.4	ANSI C63.10 (2009) Section 6.2	PASS
Minimum 6dB Bandwidth	FCC Part 15, Subpart C Section 15.247 (a)(2)	RSS-210 Issue 8 Annex 8	ANSI C63.10 (2009) Section 6.9.1	PASS
Conducted Peak Output Power	FCC Part 15, Subpart C Section 15.247 (b)(3)	RSS-210 Issue 8 Annex 8	ANSI C63.10 (2009) Section 6.10.2	PASS
Power Spectrum Density	FCC Part 15, Subpart C Section 15.247 (e)	RSS-210 Issue 8 Annex 8	ANSI C63.10 (2009) Section 6.11.2	PASS
RF Conducted Spurious Emissions	FCC Part 15, Subpart C Section 15.247(d)	RSS-210 Issue 8 Annex 8.5	ANSI C63.10 (2009) Section 7.7.10	PASS
Band-edge for RF Conducted Emissions	FCC Part 15, Subpart C Section 15.247(d)	RSS-210 Issue 8 Annex 8.5	ANSI C63.10 (2009) Section 7.7.10	PASS
Radiated Spurious emissions	FCC Part 15, Subpart C Section 15.209 and Section 15.205	RSS-210 Issue 8 Annex 8.5	ANSI C63.10 (2009) Section 6.12	PASS
Radiated Band-edge	FCC Part 15, Subpart C Section 15.205 and Section 15.209	RSS-210 Issue 8 Annex 8.5	ANSI C63.10 (2009) Section 6.5	PASS
Occupied bandwidth	---	RSS-Gen Issue 3 Clause 4.6.1	RSS-Gen Issue 3 Clause 4.6.1	PASS

Remark: N/A

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5 General Information

5.1 Client Information

Applicant: Hansong (Nanjing) Technology Ltd.
Address of Applicant: 8th Kangping Road, Jiangning Economy and Technology Development Zone, Nanjing, 211106, China
Manufacturer: Not supplied by the client.
Address of Manufacturer: Not supplied by the client.
Factory: Not supplied by the client.
Address of Factory: Not supplied by the client.

5.2 General Description of E.U.T.

Product Name: Soundtrack 2 System
Model No.(EUT): Soundtrack 2
Product Description: Portable Product

5.3 Details of E.U.T.

Operation Frequency: 2412MHz~2464MHz
Modulation Technique: QPSK
Number of Channel: 3 channel(Low:2412MHz; Middle:2438MHz; High:2464MHz)
Antenna Type: Integral (he RF modular contains two antennas, but the two antennas couldn't simultaneous working.)
Antenna Gain: 1.5 dBi
Adapter: Manufacturer: GOLDEN PROFIT ELECTRONICS LTD.
Model No.: GPE060D-200250D
Rated Input: 100-240V AC 50/60Hz, 1.5A
Rated Output: 20V DC 2500mA
Cable length: AC port: About 150cm Length
DC port: About 170cm Length
Transmitting Mode: Keep EUT working in continuous transmitting, and select channel and modulation type

5.4 Description of Support Units

The EUT has been tested with associated equipment below.

Description	Manufacturer	Model No.	Serial No.	Supplied by
iPhone	Apple	A1332	DX3JM2ZJDPMW	SGS



Test Channel:

Channel	Frequency
The Low channel	2412MHz
The Middle channel	2438MHz
The High channel	2464MHz

5.5 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

5.6 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

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Due date
1	Spectrum Analyzer	Rohde & Schwarz	FSP-30	2705121009	2014-2-22
2	EMI test receiver	Rohde & Schwarz	ESU40	100109	2014-02-22
3	Horn Antenna (1GHz to 18GHz)	SCHWARZBECK	BBHA9120D	9120D-679	2014-03-06
4	Horn Antenna (14GHz to 40GHz)	SCHWARZBECK	BBHA 9170	BBHA9170373	2014-03-06
5	ANTENNA (25MHz to 2GHz)	SCHWARZBECK	VULB9168	9168-313	2014-03-06
6	Ultra broadband antenna (30MHz to 3GHz)	Rohde & Schwarz	HL562	100227	2013-10-08
7	Horn Antenna (1GHz to 18GHz)	Rohde & Schwarz	HF906	100284	2014-06-01
8	Active Loop Antenna (9kHz to 30MHz)	Rohde & Schwarz	FMZB 1519	1519-034	2014-07-27
9	High-low temperature cabinet	Suzhou Zhihe	TL-40	50110050	2014-4-12
10	Tunable Notch Filter	Wainwright instruments GmbH	WRCT800.0/ 880.0-0.2/40- 5SSK	9	2014-06-01
11	High pass Filter	FSCW	HP 12/2800- 5AA2	19A45-02	2014-06-01
12	Low noise amplifier	TESEQ	LNA6900	70133	2014-02-22
13	Attenuator	HUAXIANG	TS2-6dB	11051002	/
14	Attenuator	HUAXIANG	TS2-6dB	11051001	/
15	AC power stabilizer	WOCEN	6100	51122	2014-06-01
16	DC power	QJE	QJ30003SII	611145	2014-06-01

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

Test frequencies: According to the 15.31(m) Measurements on intentional radiators or receivers, other than TV broadcast receivers, shall be performed and, if required, reported for each band in which the device can be operated with the device operating at the number of frequencies in each band specified in the following table:

Frequency range over which device operates	Number of frequencies	Location in the range of operation
1 MHz or less	1	Middle
1 to 10 MHz	2	1 near top and 1 near bottom
More than 10 MHz	3	1 near top, 1 near middle and 1 near bottom

Pursuant to Part 15.31(c) For swept frequency equipment, measurements shall be made with the frequency sweep stopped at those frequencies chosen for the measurements to be reported.

Test frequency is the lowest channel: 2412MHz, middle channel: 2438MHz and highest channel: 2464MHz with fixed at channel.

7.2 Antenna Requirement

Standard requirement

15.203 requirement:

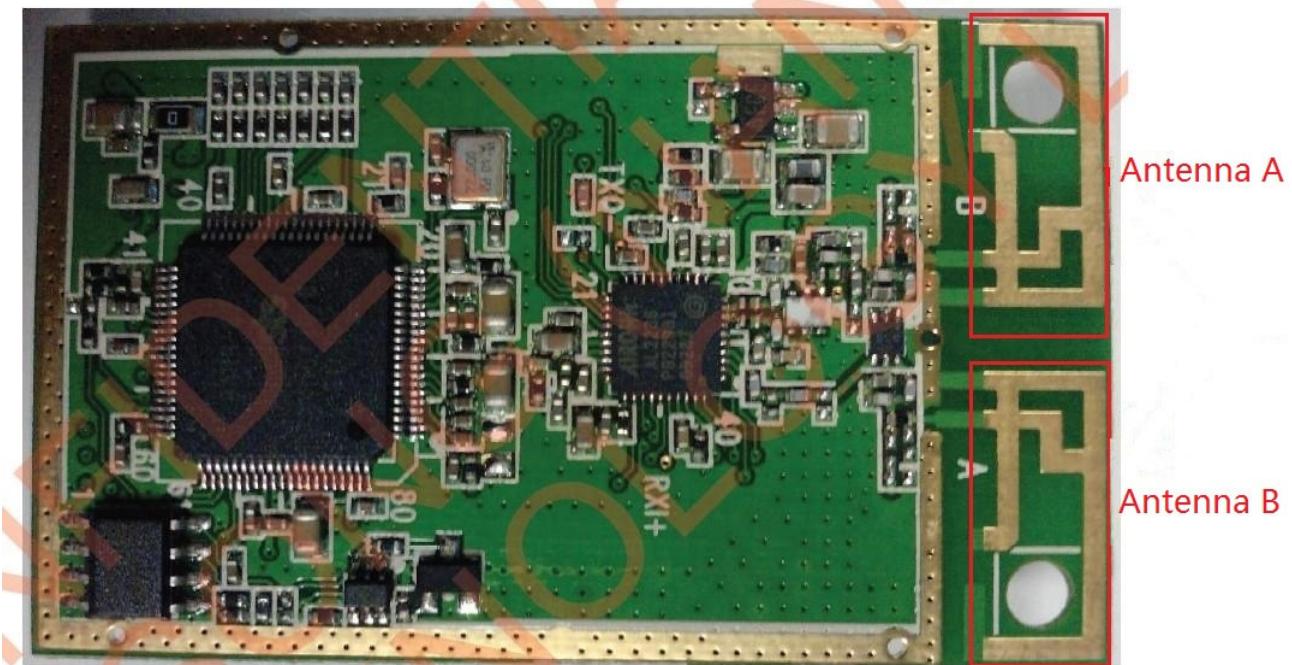
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit 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 1.5 dBi.



7.3 Conducted Emissions on Mains Terminals

Test Requirement: FCC Part 15C, Section 15.207
RSS-Gen Issue 8 Clause 7.2.4

Test Method: ANSI C63.10:2009 Section 6.2

Test Result: Pass

Test Voltage: AC 120V 60Hz

Frequency Range: 150 KHz to 30 MHz

Class/Severity: Class B

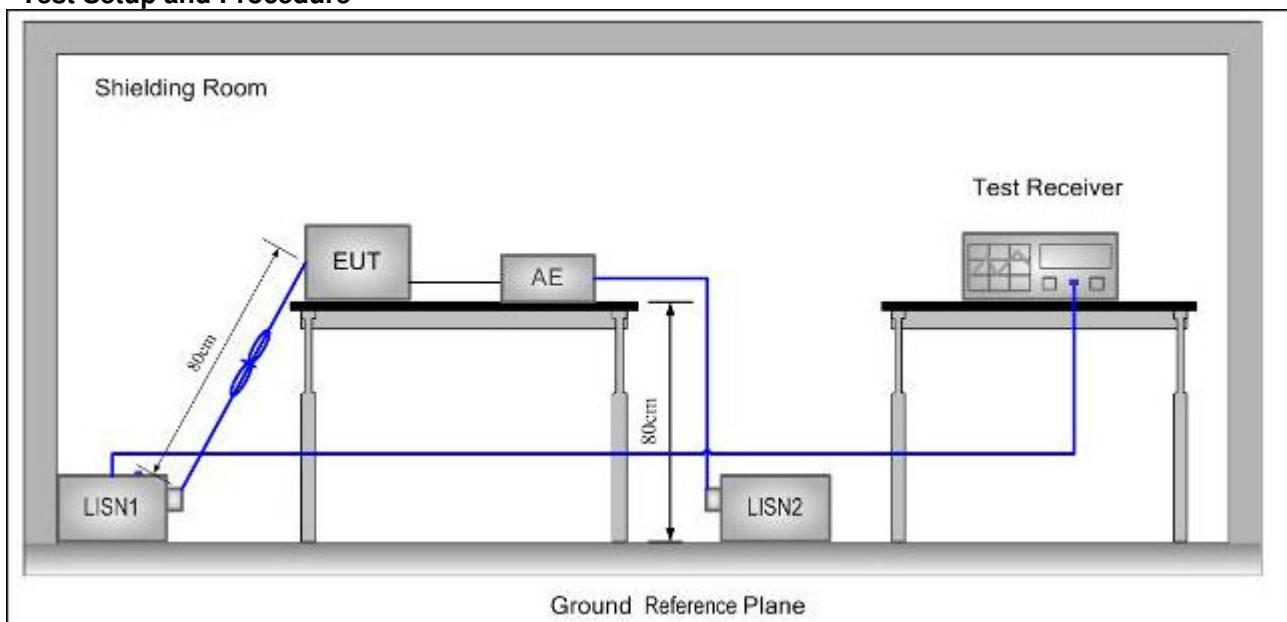
Test mode: Transmitting mode

Limit:

Frequency range MHz	Class B Limits dB (μ V)	
	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)

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which provides $50\Omega/50\mu\text{H} + 5\Omega$ linear impedance. The power cable 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.

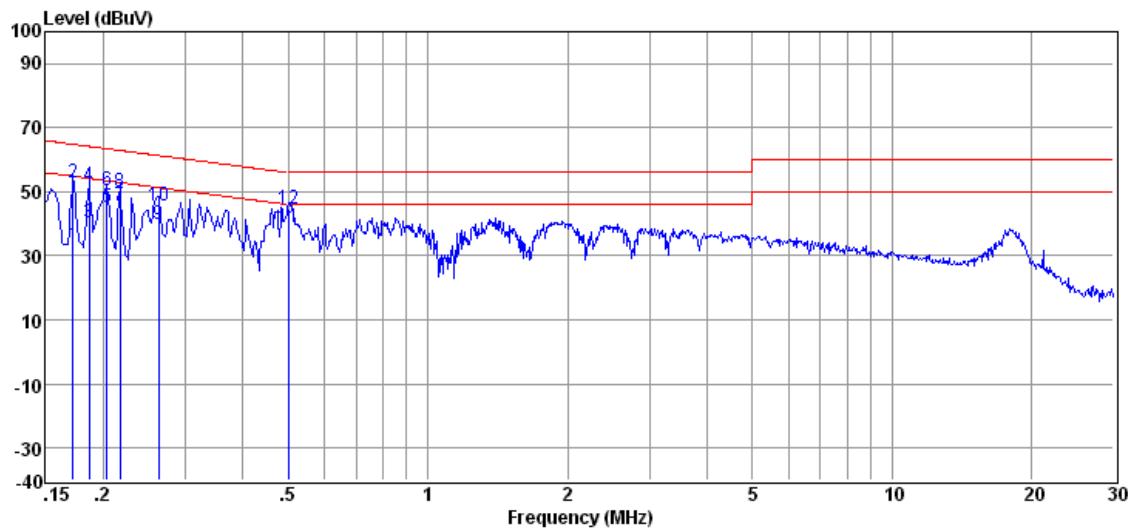
Measurement Data

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.

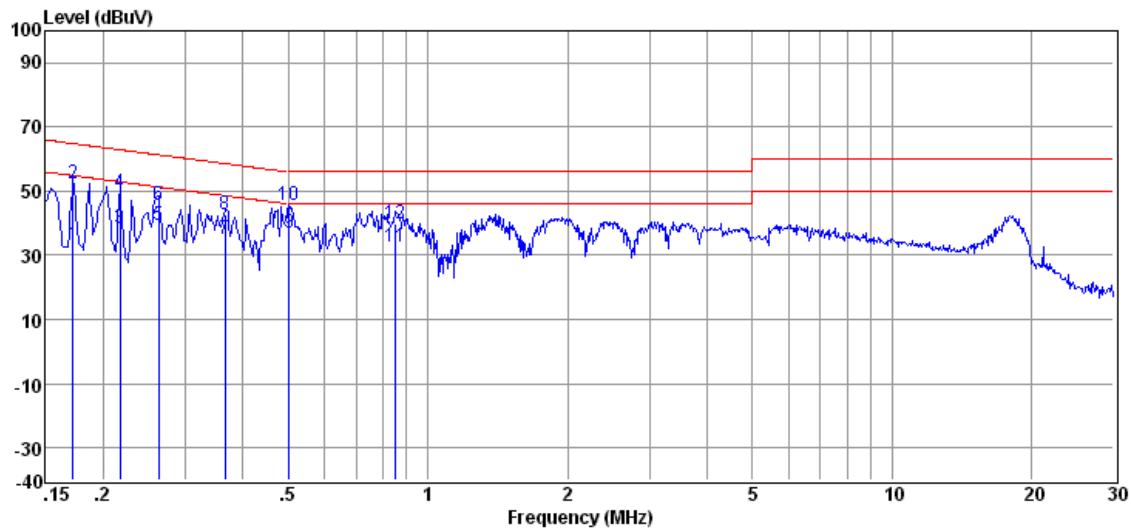
Level = Read Level + LISN/ISN Factor + Cable Loss.

Test Port: AC Live Line



Freq (MHz)	Read Level (dB μ V)	LISN Factor (dB)	Cable Loss (dB)	Level (dB μ V)	Limit Line (dB μ V)	Over Limit (dB)	Detector	Phase
0.172	32.69	0.16	0.10	32.95	54.86	-21.91	Average	LINE
0.172	52.75	0.16	0.10	53.01	64.86	-11.85	QP	LINE
0.186	40.25	0.13	0.10	40.48	54.20	-13.72	Average	LINE
0.186	51.69	0.13	0.10	51.92	64.20	-12.28	QP	LINE
0.204	45.07	0.10	0.10	45.27	53.45	-8.18	Average	LINE
0.204	50.37	0.10	0.10	50.57	63.45	-12.88	QP	LINE
0.217	45.67	0.11	0.10	45.88	52.92	-7.04	Average	LINE
0.217	49.90	0.11	0.10	50.11	62.92	-12.81	QP	LINE
0.263	39.41	0.12	0.10	39.63	51.34	-11.71	Average	LINE
0.263	45.59	0.12	0.10	45.81	61.34	-15.53	QP	LINE
0.502	38.82	0.20	0.10	39.12	46.00	-6.88	Average	LINE
0.502	44.38	0.20	0.10	44.68	56.00	-11.32	QP	LINE

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Test Port: AC Neutral Line

Freq (MHz)	Read Level (dB μ V)	LISN Factor (dB)	Cable Loss (dB)	Level (dB μ V)	Limit Line (dB μ V)	Over Limit (dB)	Detector	Phase
0.172	33.00	0.16	0.10	33.26	54.86	-21.60	Average	NEUTRAL
0.172	51.97	0.16	0.10	52.23	64.86	-12.63	QP	NEUTRAL
0.217	38.12	0.11	0.10	38.33	52.92	-14.59	Average	NEUTRAL
0.217	49.09	0.11	0.10	49.30	62.92	-13.62	QP	NEUTRAL
0.263	39.11	0.12	0.10	39.33	51.34	-12.01	Average	NEUTRAL
0.263	45.26	0.12	0.10	45.48	61.34	-15.86	QP	NEUTRAL
0.365	34.87	0.16	0.10	35.13	48.61	-13.48	Average	NEUTRAL
0.365	42.35	0.16	0.10	42.61	58.61	-16.00	QP	NEUTRAL
0.502	36.61	0.20	0.10	36.91	46.00	-9.09	Average	NEUTRAL
0.502	45.21	0.20	0.10	45.51	56.00	-10.49	QP	NEUTRAL
0.848	32.46	0.20	0.10	32.76	46.00	-13.24	Average	NEUTRAL
0.848	39.60	0.20	0.10	39.90	56.00	-16.10	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 6.9.1

Test Result: Pass

Test Mode: Transmitting mode

Final Test Mode: The EUT fixed on Low channel, Middle Channel and High Channel.

Limit: ≥ 500 kHz

Test Procedure:

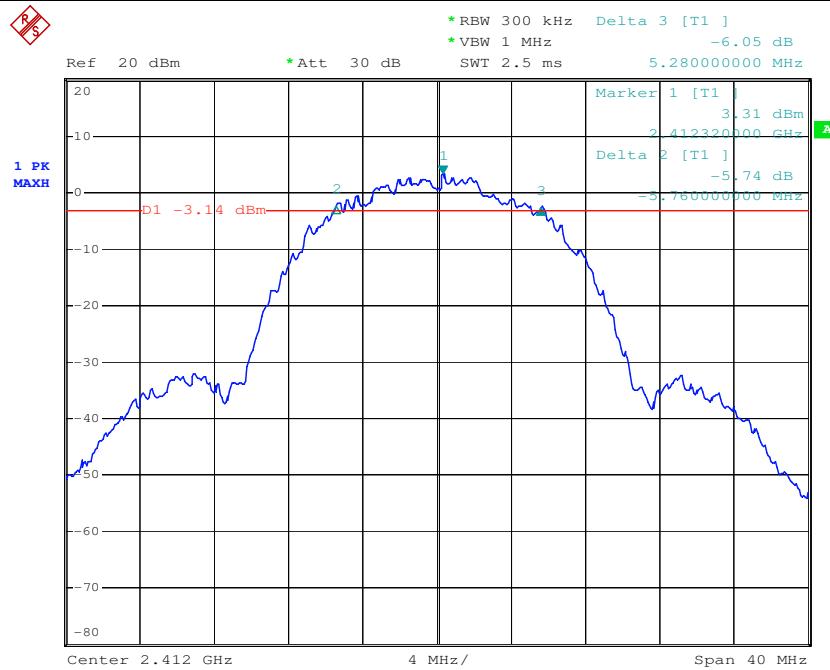
1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set the spectrum analyzer as RBW=300KHz, VBW =3* RBW, Span=30/50MHz, Sweep=auto
4. Mark the peak frequency and -6dB (upper and lower) frequency.
5. Repeat above procedures until all frequency measured was complete.

Test date

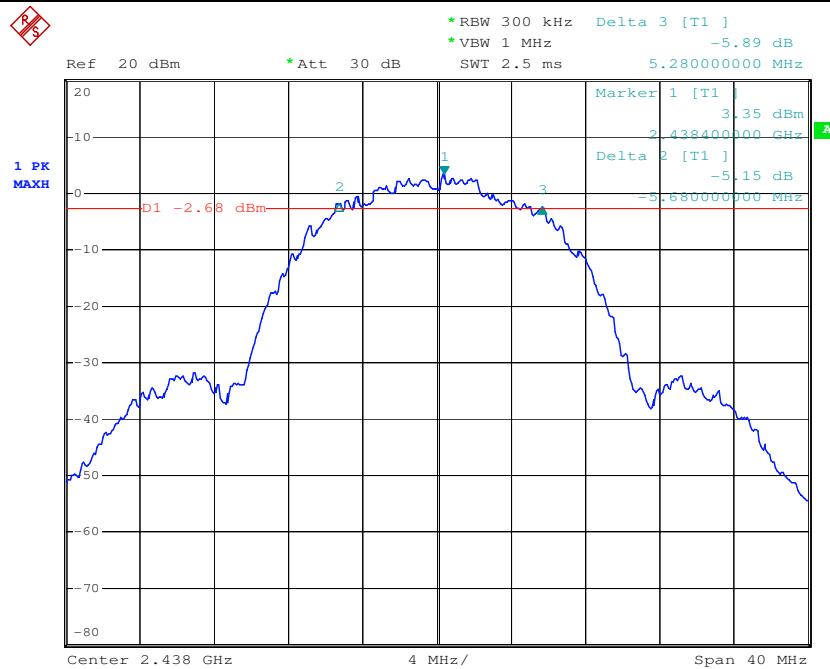
EUT Mode	Test Channel	6dB Occupy Bandwidth (MHz)	Limit (kHz)	Results
Antenna A	Low	11.04	500	Pass
	Middle	10.96	500	Pass
	High	11.04	500	Pass
Antenna B	Low	10.96	500	Pass
	Middle	10.96	500	Pass
	High	11.20	500	Pass

Test plot as follows:

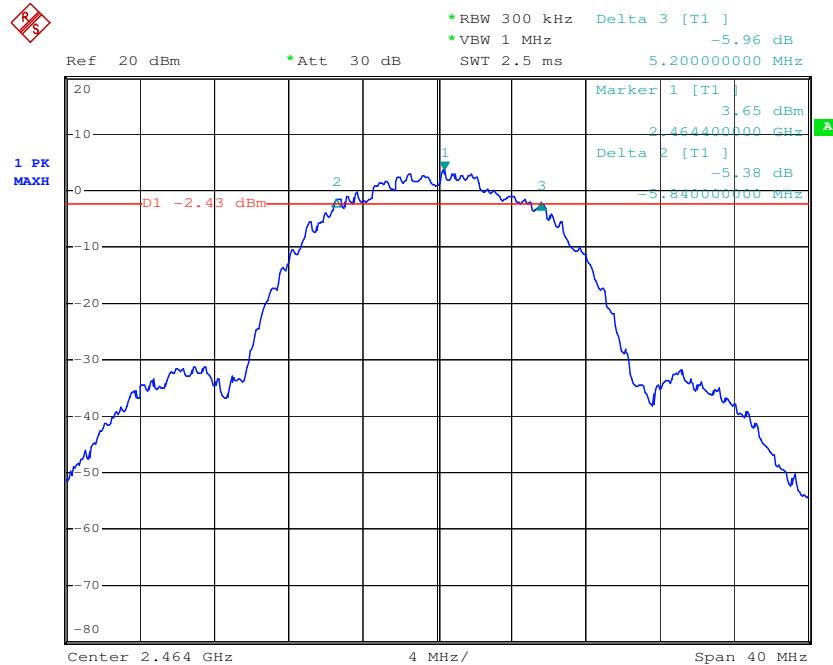
Test mode:	Antenna A	Test channel:	Low
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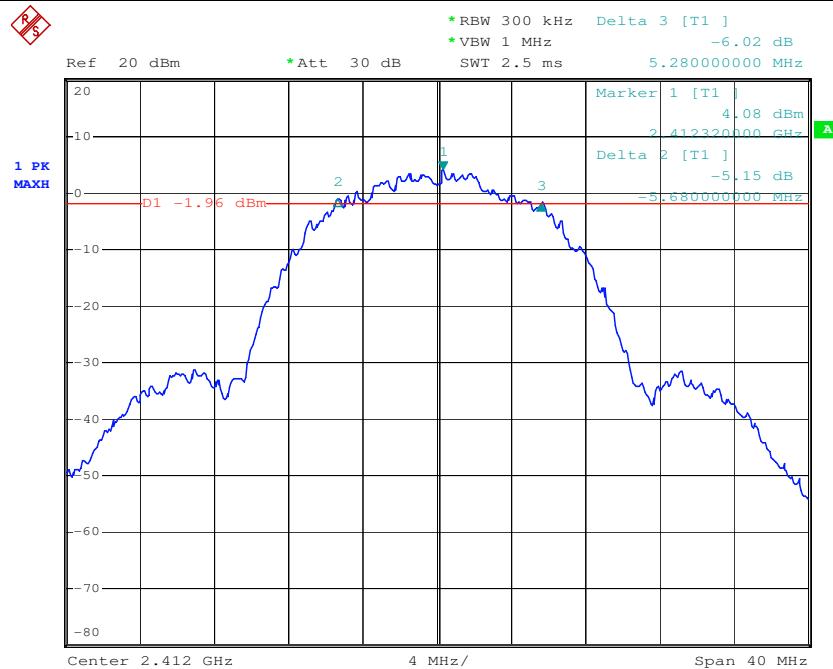
Test mode:	Antenna A	Test channel:	Middle
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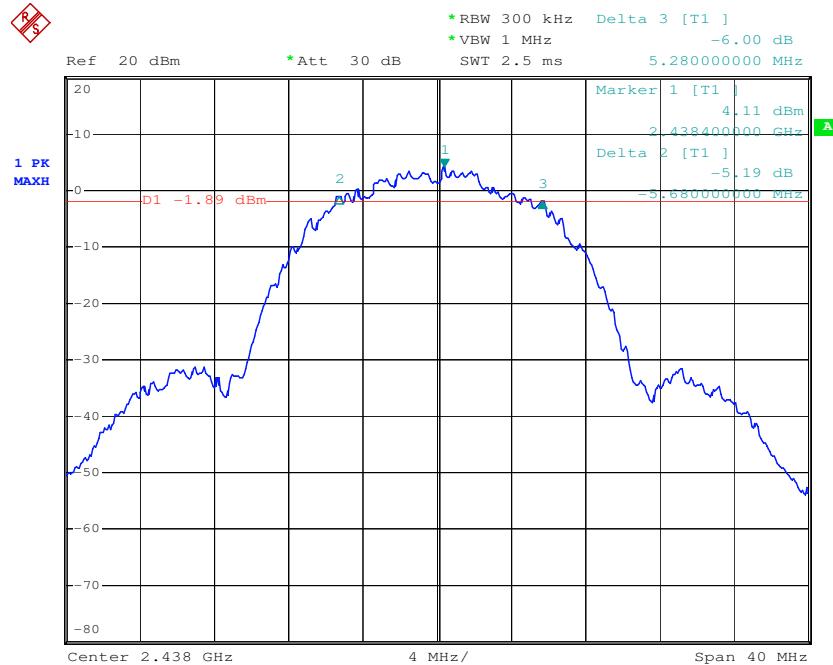
Test mode:	Antenna A	Test channel:	High
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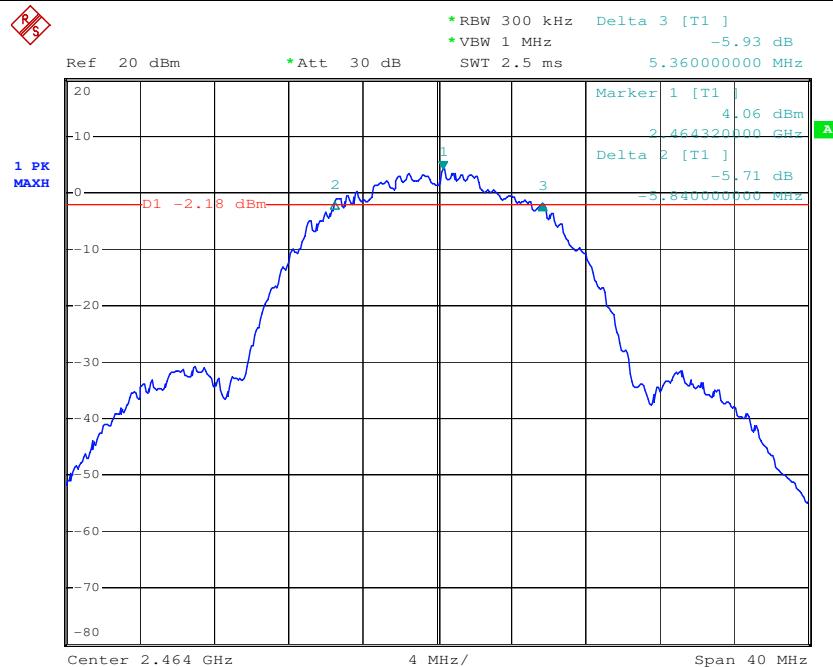
Test mode:	Antenna B	Test channel:	Low
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Test mode:	Antenna B	Test channel:	Middle
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Test mode:	Antenna B	Test channel:	High
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7.5 Conducted Peak Output 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 6.10.2

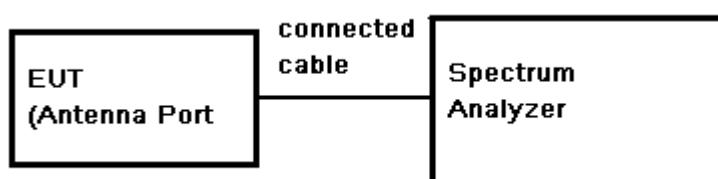
Test Result: Pass

Test Limit: 30dBm

Test Mode: Transmitting mode

Final Test Mode: The EUT fixed on Low channel, Middle Channel and High Channel.

Test Configuration:



Test Procedure:

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum.
3. Set the occur band to the entire emission 26dB bandwidth of the signal.
4. Record the max. Power channel reading.

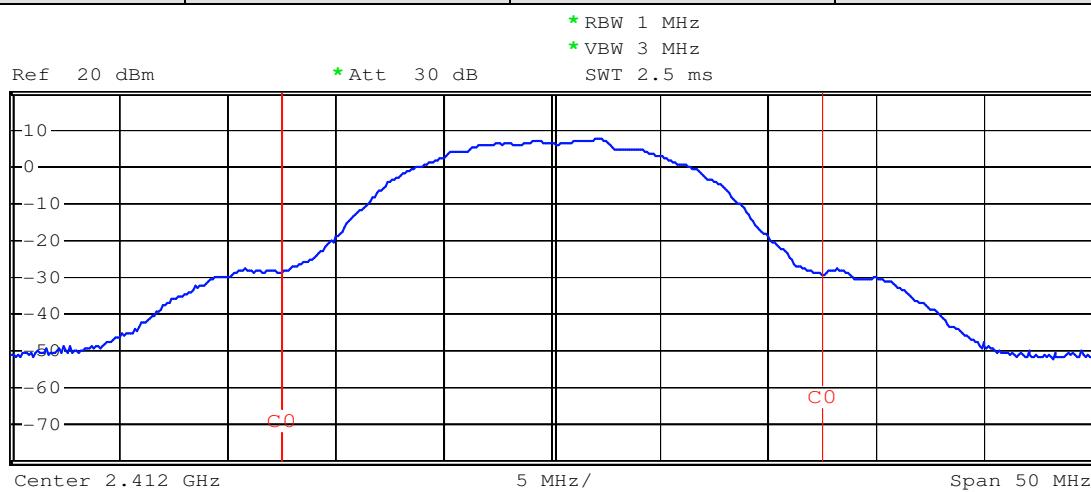
Repeat above procedures until all the frequency measured were complete.

Test Results record:

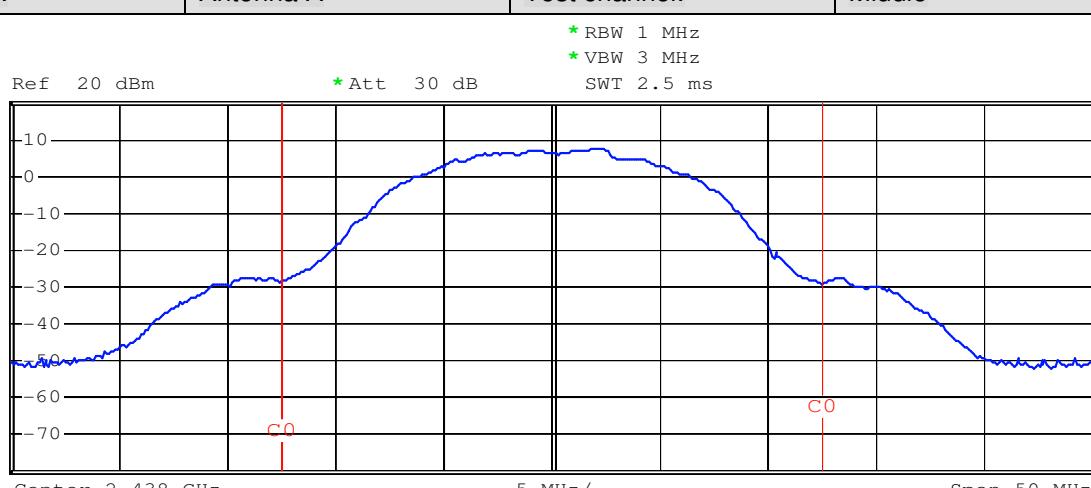
Test mode	Channel	Reading Peak Power (dBm)	Cable Loss (dB)	Output Peak Power (dBm)	Output Peak Power (mW)	Peak Power Limit (dBm)	Result
Antenna A	Low	15.69	0.5	16.19	41.59	30	PASS
	Mid	15.85	0.5	16.35	43.15	30	PASS
	High	16.02	0.5	16.52	44.87	30	PASS
Antenna B	Low	16.47	0.5	16.97	49.77	30	PASS
	Mid	16.54	0.5	17.04	50.58	30	PASS
	High	16.69	0.5	17.19	52.36	30	PASS

Test result plot as follows:

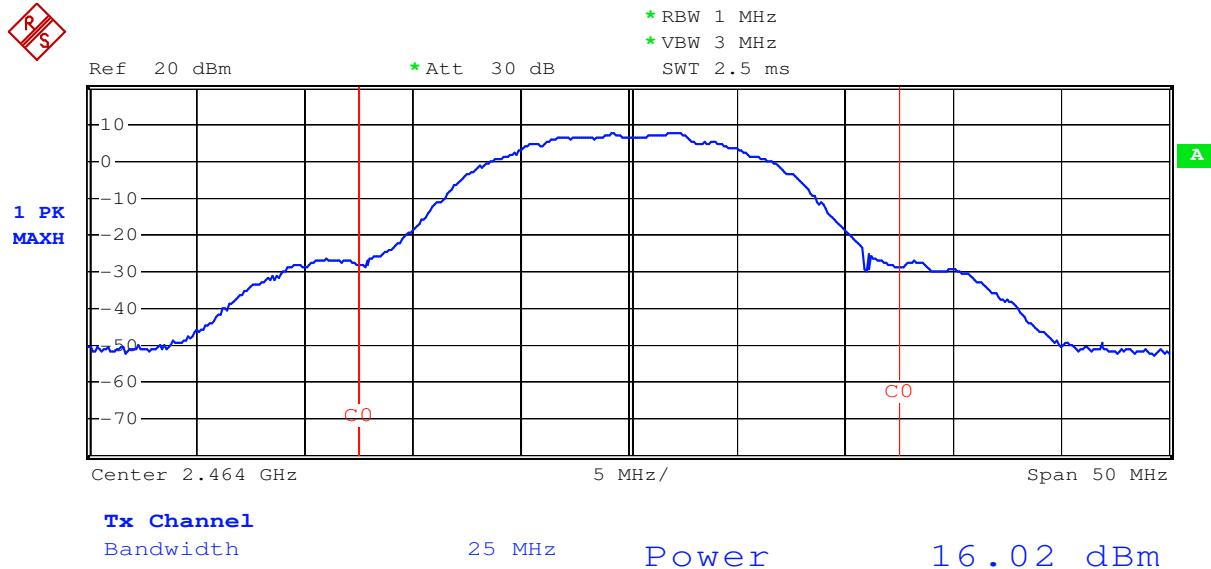
Test mode:	Antenna A	Test channel:	Low
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Test mode:	Antenna A	Test channel:	Middle
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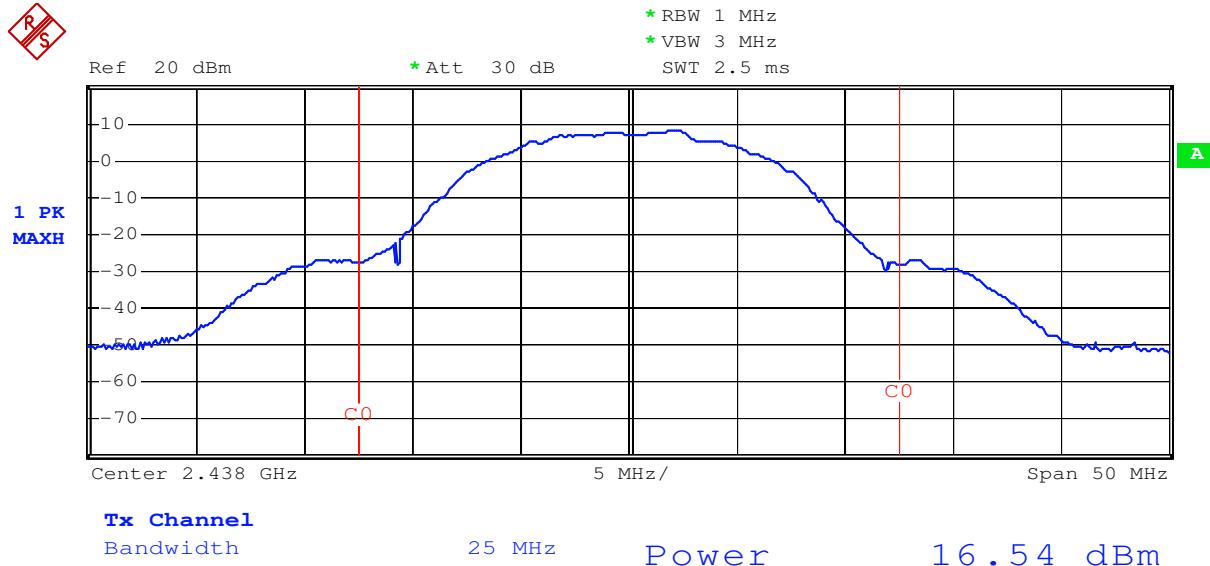
Test mode:	Antenna A	Test channel:	High
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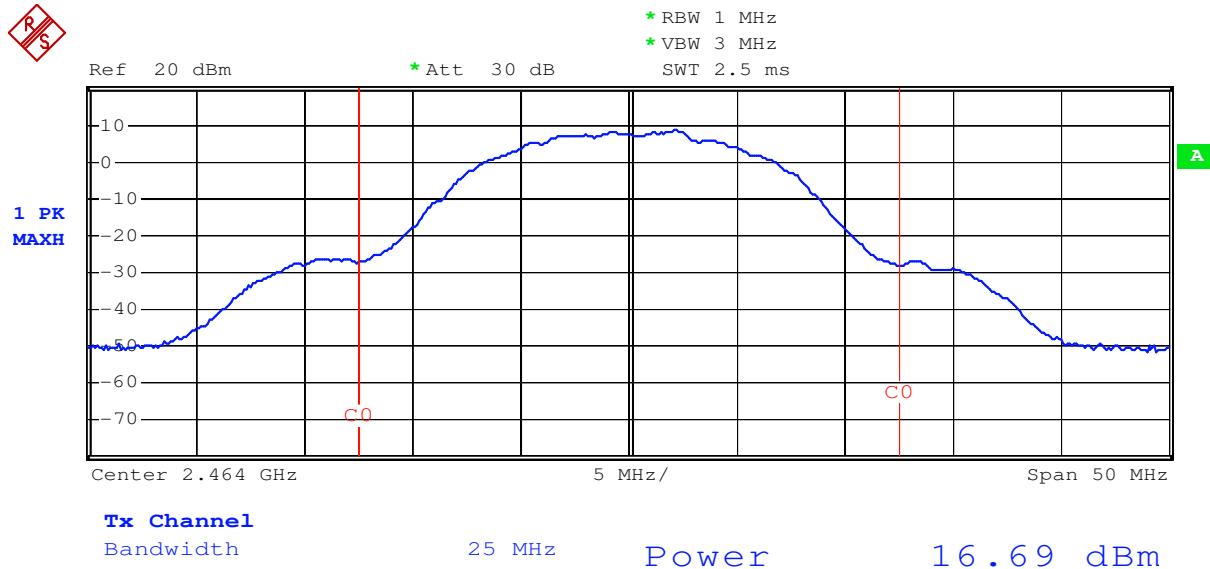
Test mode:	Antenna B	Test channel:	Low
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Test mode:	Antenna B	Test channel:	Middle
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Test mode:	Antenna B	Test channel:	High
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7.6 Peak Power Spectral 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

Test Mode: Transmitting mode

Final Test Mode: The EUT fixed on Low channel, Middle Channel and High Channel.

Measurement Procedure:

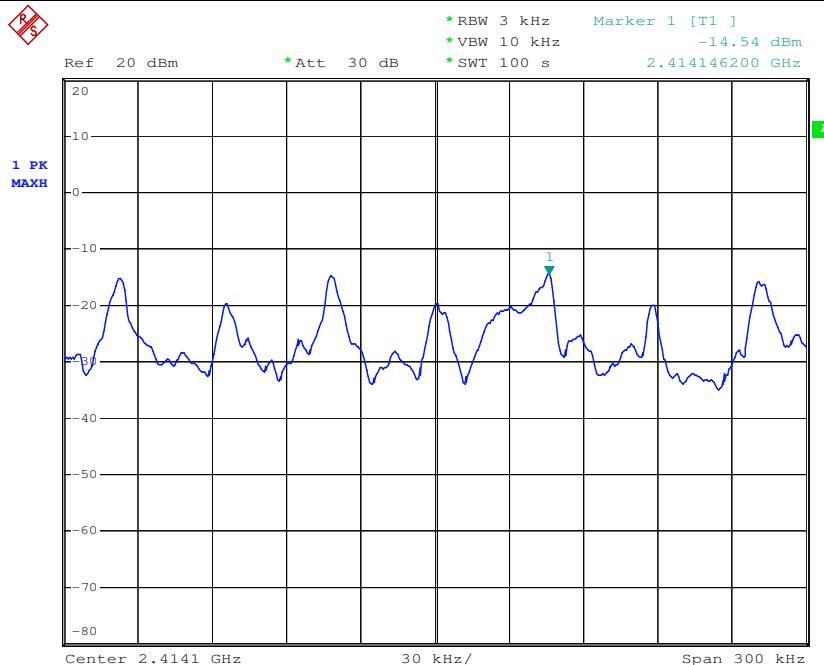
1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
2. Set the spectrum analyzer: Center Frequency= Channel Frequency, RBW = 3 kHz VBW = 10 kHz. Span= fully encompass the bandwidth, Sweep = auto; Detector Function = Peak Trace mode=max hold,
3. Set 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:

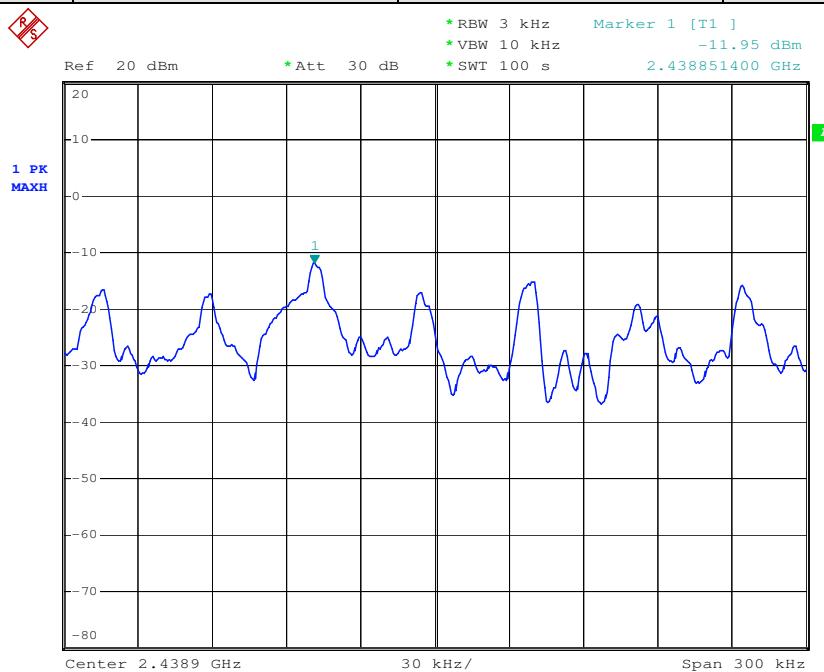
Test mode	Channel	Reading (dBm)	Cable Loss (dB)	RF Power Density (dBm)	Peak Power Limit (dBm/3kHz)	Result
Antenna A	Low	-14.54	0.5	-14.04	8	PASS
	Mid	-11.95	0.5	-11.45	8	PASS
	High	-14.22	0.5	-13.72	8	PASS
Antenna B	Low	-13.54	0.5	-13.04	8	PASS
	Mid	-13.62	0.5	-13.12	8	PASS
	High	-13.31	0.5	-12.81	8	PASS

Test plot as follows:

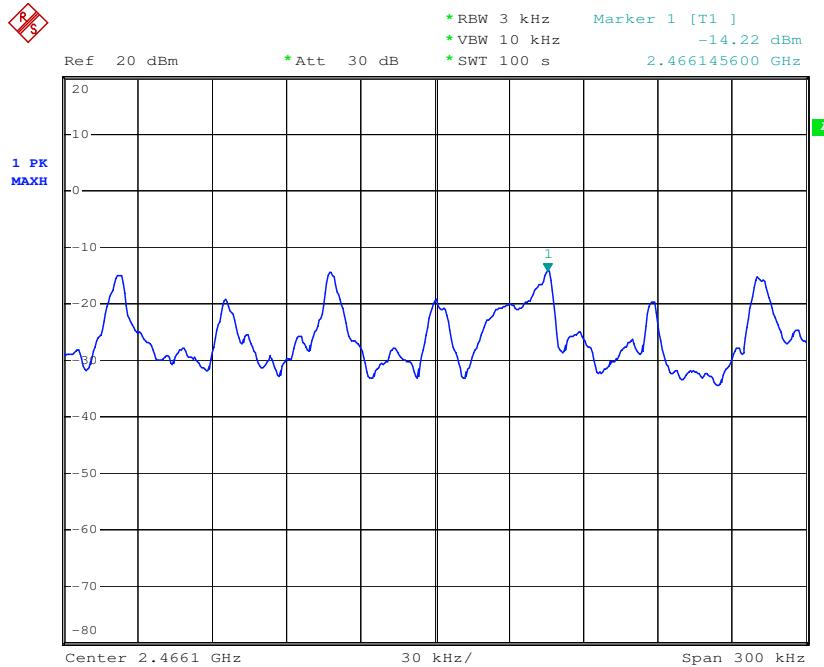
Test mode:	Antenna A	Test channel:	Low
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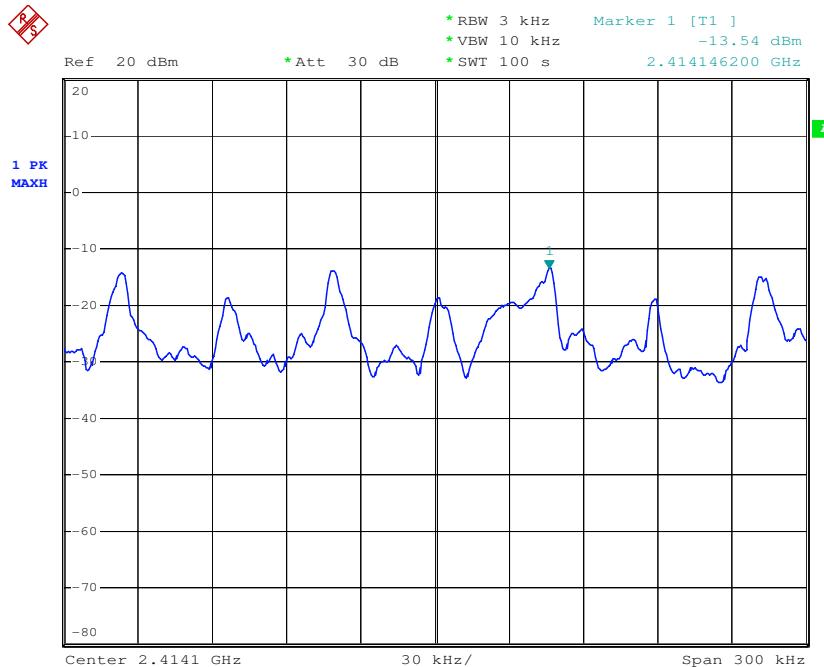
Test mode:	Antenna A	Test channel:	Middle
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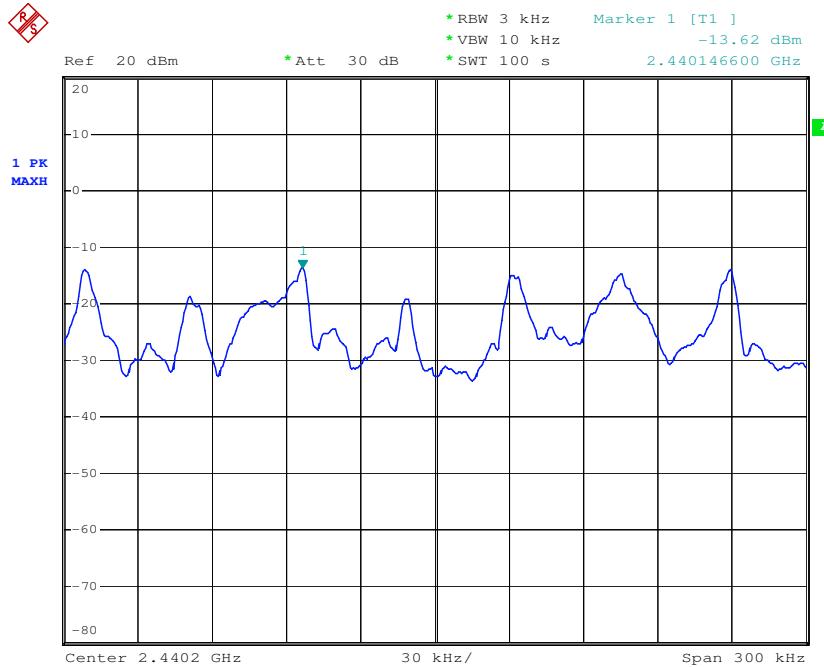
Test mode:	Antenna A	Test channel:	High
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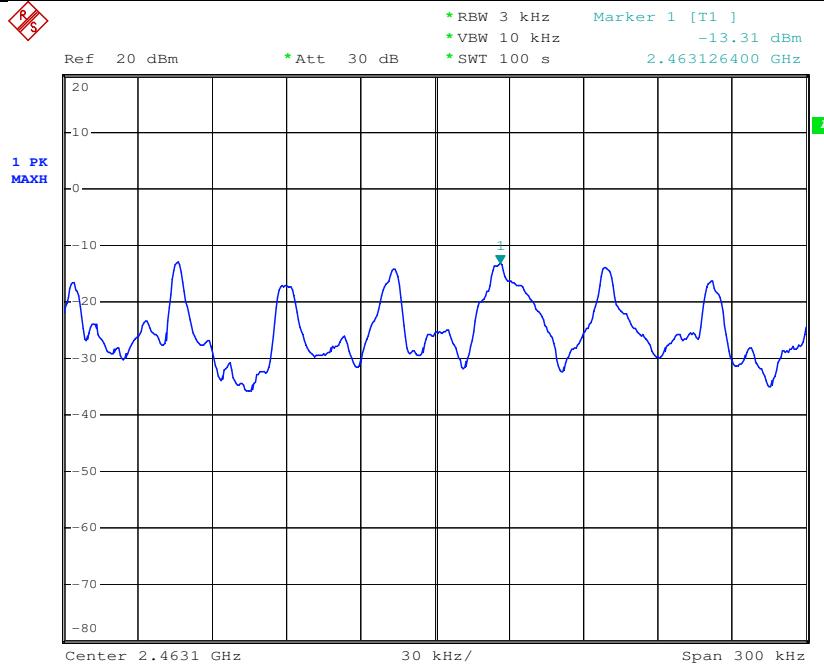
Test mode:	Antenna B	Test channel:	Low
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Test mode:	Antenna B	Test channel:	Middle
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Test mode:	Antenna B	Test channel:	High
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7.7 Conducted Spurious Emissions

Test Requirement: FCC Part 15 Section 15.247(d)
RSS-210 Issue 8 Annex 8.5

Test Method: ANSI C63.10:2009 Clause 7.7.10

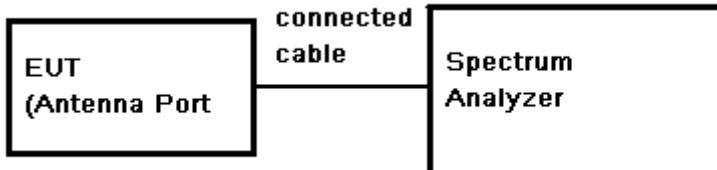
Test Result: Pass

Limit: (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 High 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.

Test Mode: Transmitting mode

Final Test Mode: The EUT fixed on Low channel, Middle Channel and High Channel.

Test Configuration:

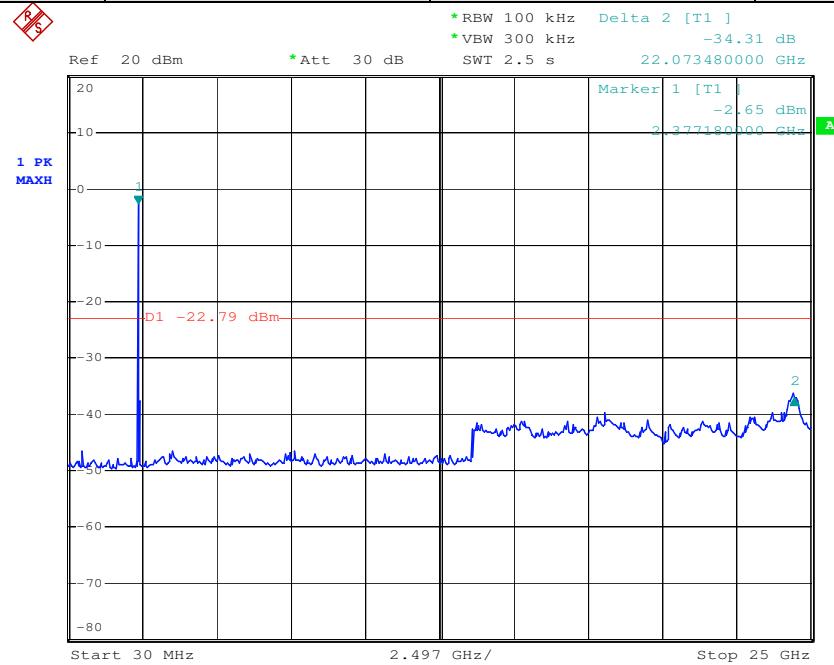


Test Procedure:

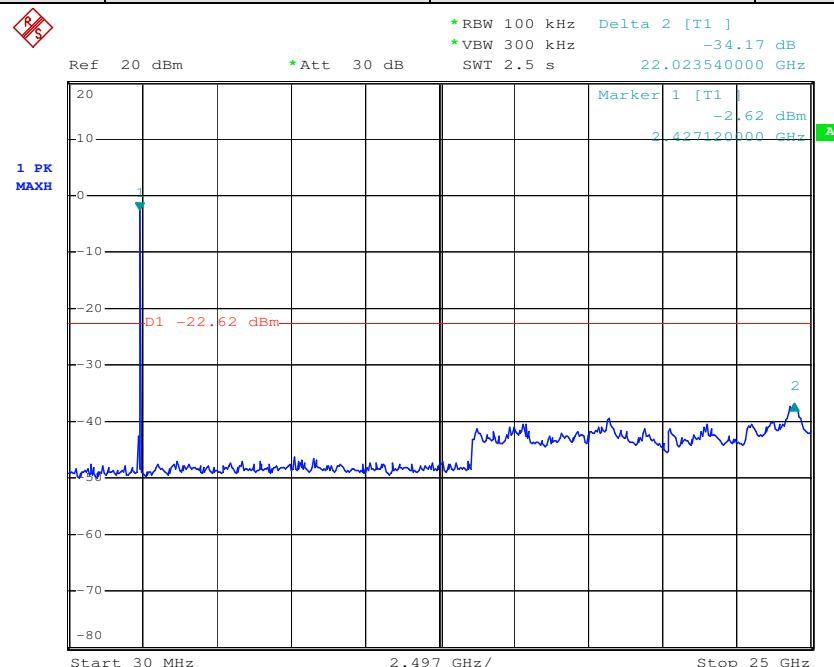
1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
2. Set the spectrum analyzer: RBW = 100KHz. VBW >= RBW. Sweep = auto; Detector Function = Peak (Max. hold).

Test plot as follows:

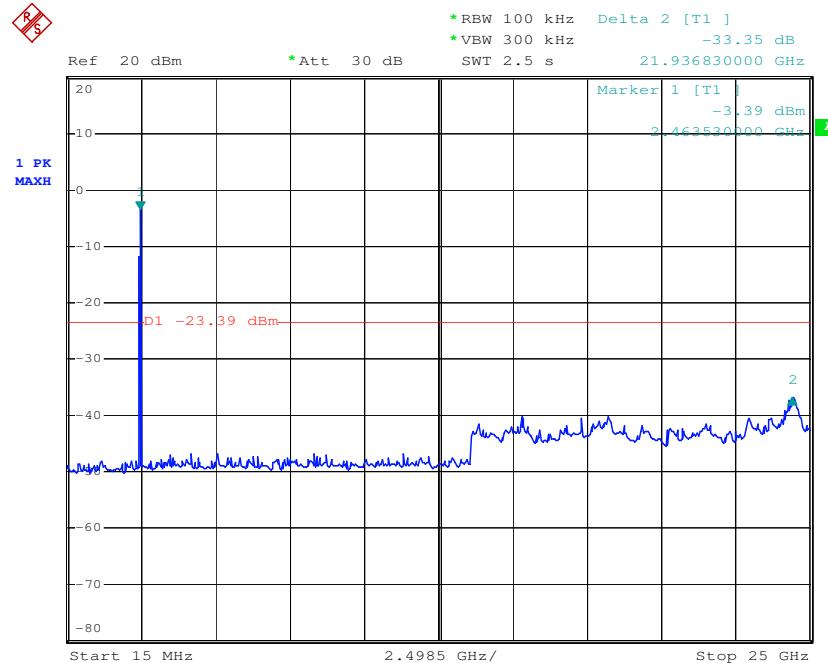
Test mode:	Antenna A	Test channel:	Low
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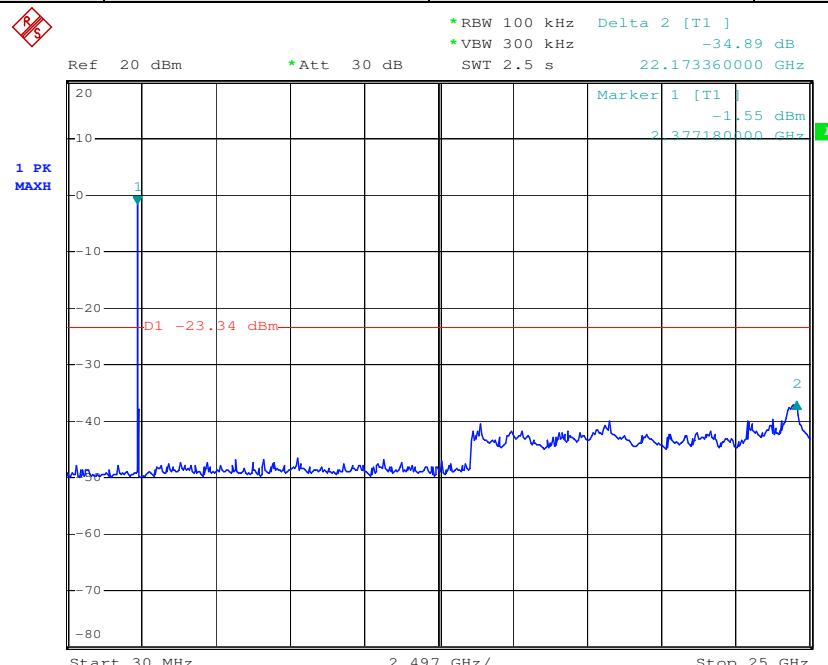
Test mode:	Antenna A	Test channel:	Middle
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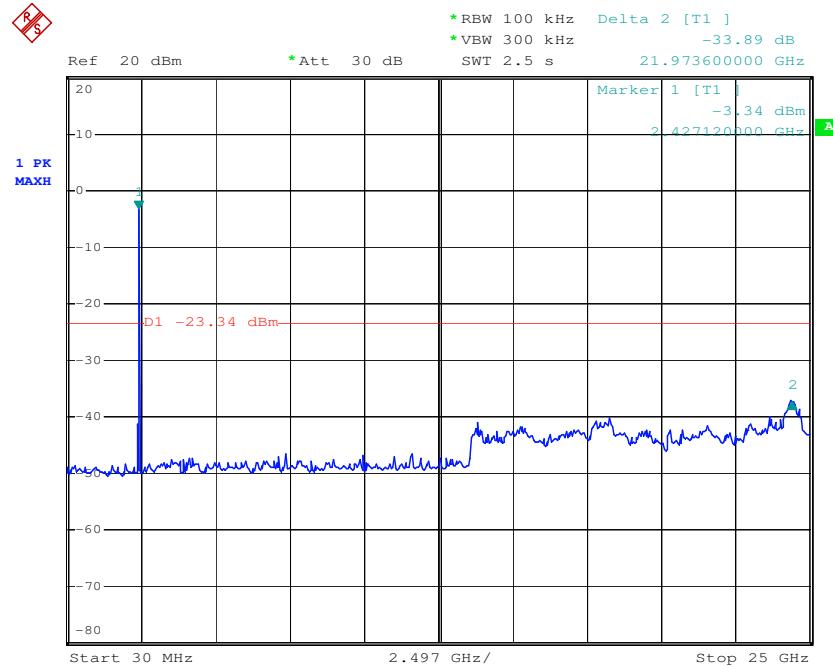
Test mode:	Antenna A	Test channel:	High
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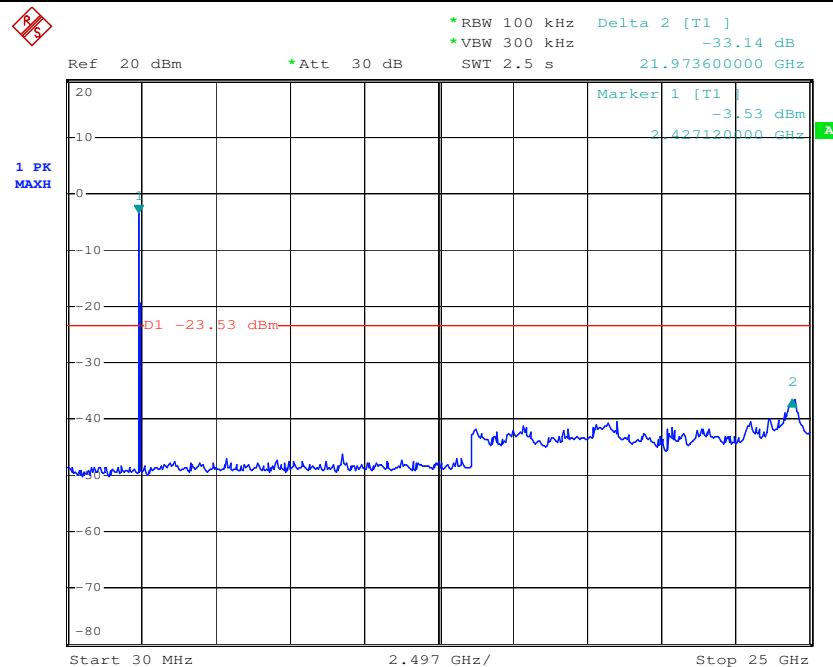
Test mode:	Antenna B	Test channel:	Low
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Test mode:	Antenna B	Test channel:	Middle
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Test mode:	Antenna B	Test channel:	High
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7.8 Conducted Band-edge

Test Requirement: FCC Part 15 Section 15.247(d)
RSS-210 Issue 8 Annex 8.5

Test Method: ANSI C63.10:2009 Clause 7.7.10

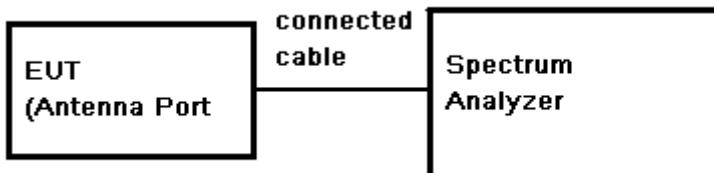
Test Result: Pass

Limit: (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 High 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.

Test Mode: Transmitting mode

Final Test Mode: The EUT fixed on Low channel and High Channel.

Test Configuration:

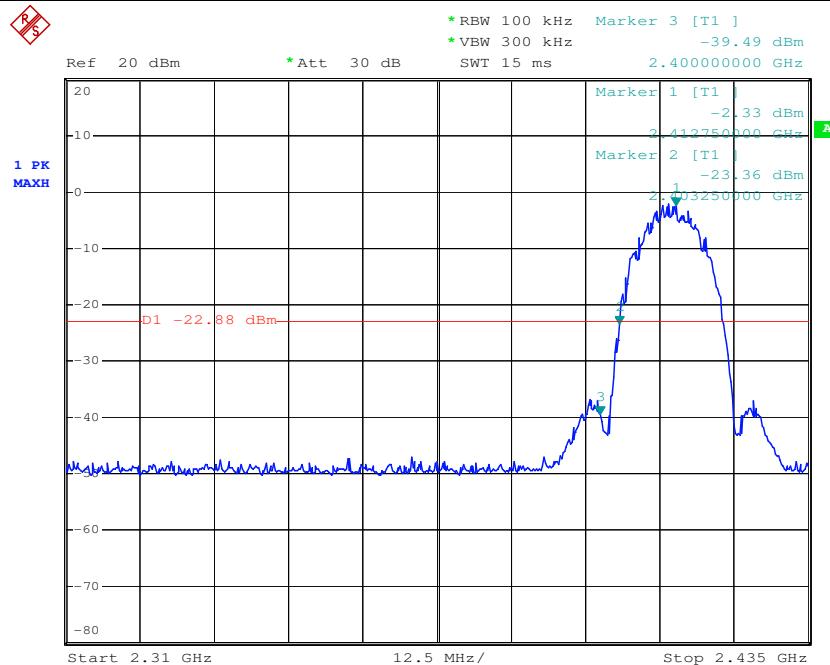


Test Procedure:

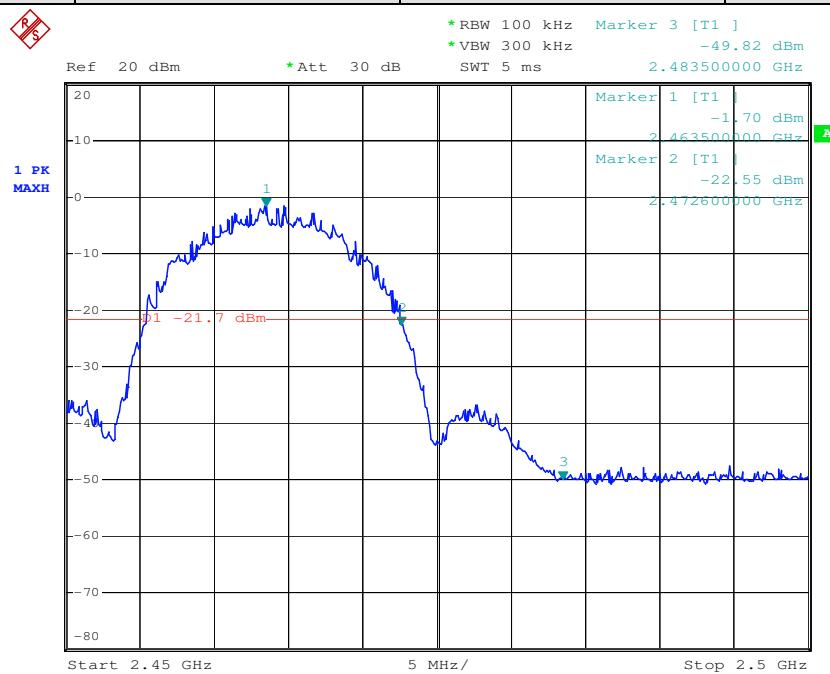
1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
2. Set the spectrum analyzer: RBW = 100KHz. VBW >= RBW. Sweep = auto; Detector Function = Peak (Max. hold).

Test plot as follows:

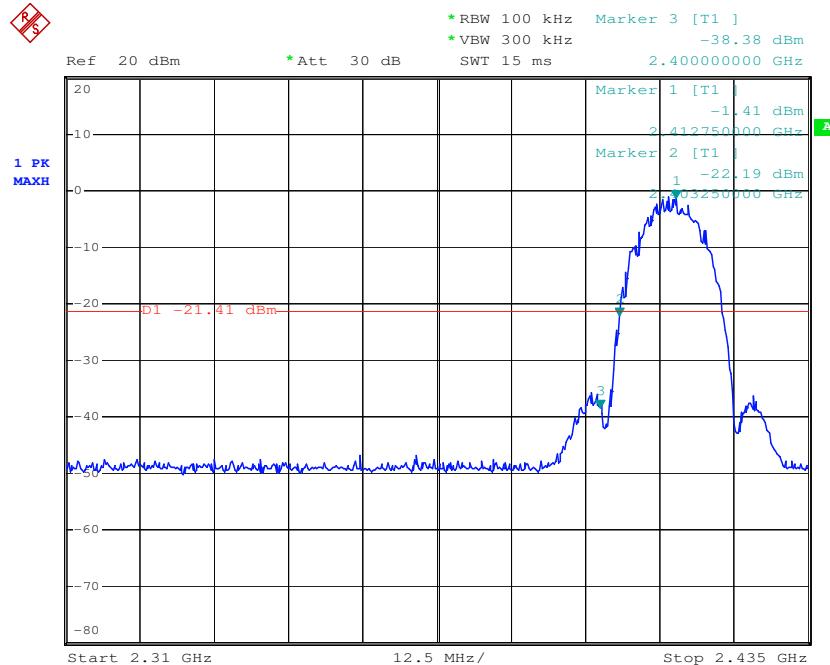
Test mode:	Antenna A	Test channel:	Low
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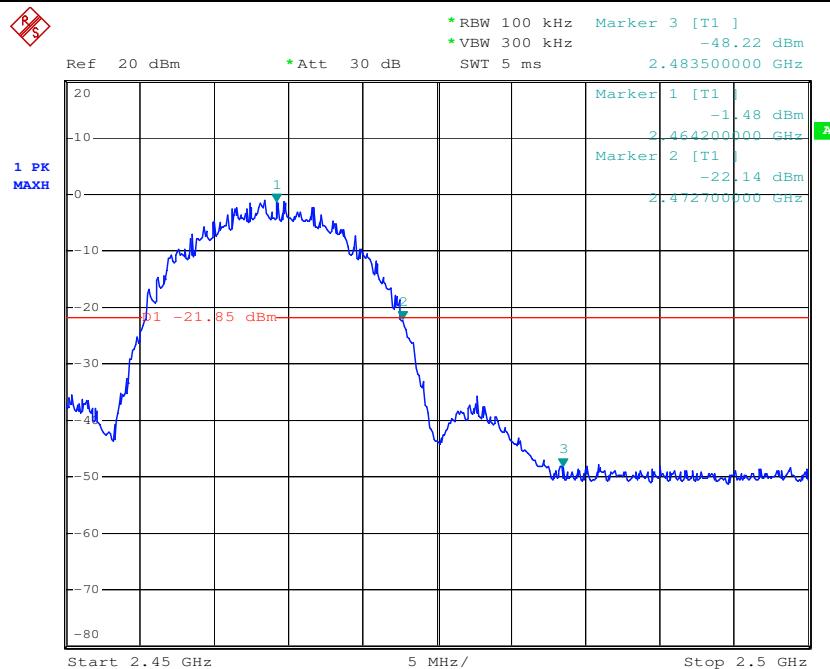
Test mode:	Antenna A	Test channel:	High
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Test mode:	Antenna B	Test channel:	Low
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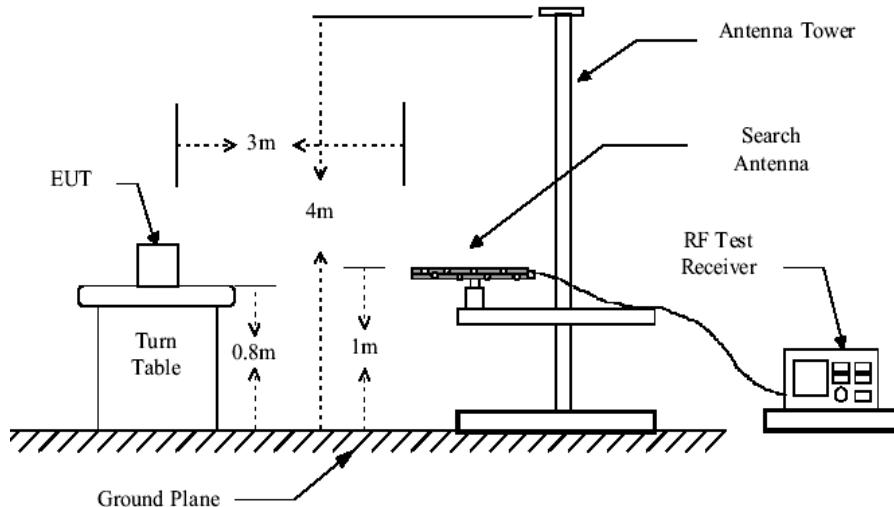
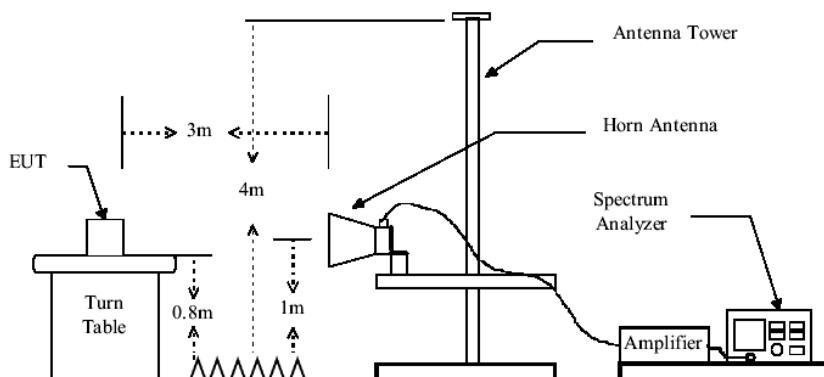


Test mode:	Antenna B	Test channel:	High
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7.9 Radiated Spurious Emissions

Test Requirement:	FCC Part 15 Section 15.209 and Section 15.205 RSS-210 Issue 8 Annex 8.5
Test Method:	ANSI C63.10:2009 Clause 6.12
Test Result:	Pass
Test Mode:	Transmitting mode
Final Test Mode:	The EUT fixed on Low channel, middle channel and High channel.
Test site/setup:	Measurement Distance: 3m (Semi-Anechoic Chamber) 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
15.209 Limit:	40.0 dB μ V/m between 30MHz & 88MHz 43.5 dB μ V/m between 88MHz & 216MHz 46.0 dB μ V/m between 216MHz & 960MHz 54.0 dB μ V/m above 960MHz

Test Configuration:**Figure 1. 30MHz to 1GHz radiated emissions test configuration****Figure 2. Above 1GHz radiated emissions test configuration****Test Procedure:**

The procedure used was ANSI Standard C63.10:2009. The receiver was scanned from 30MHz 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.



Pre-test was performed on Antenna A and Antenna B mode, Compliance test was performed on worse case (Antenna A mode).

Test were performed for their spatial orthogonal(X, Y, Z), the worst test data (X orthogonal) was submitted.

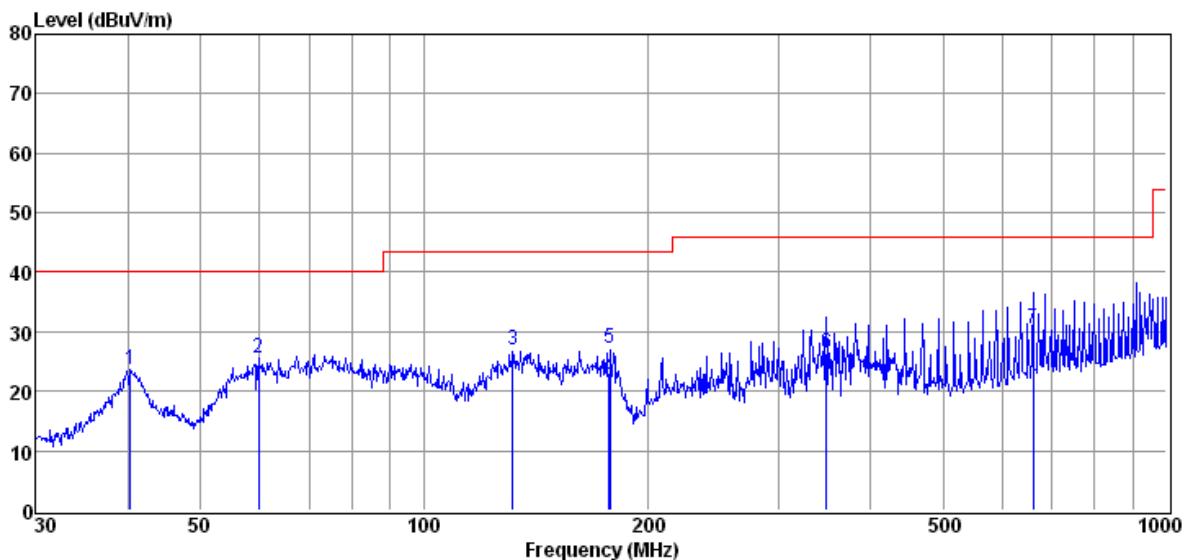
1) For this intentional radiator operates below 25 GHz. the spectrum shall be investigated to the tenth harmonic of the High fundamental frequency. And above the third harmonic of this intentional radiator, the disturbance is very low. So the test result only displays to 5rd harmonic.

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.

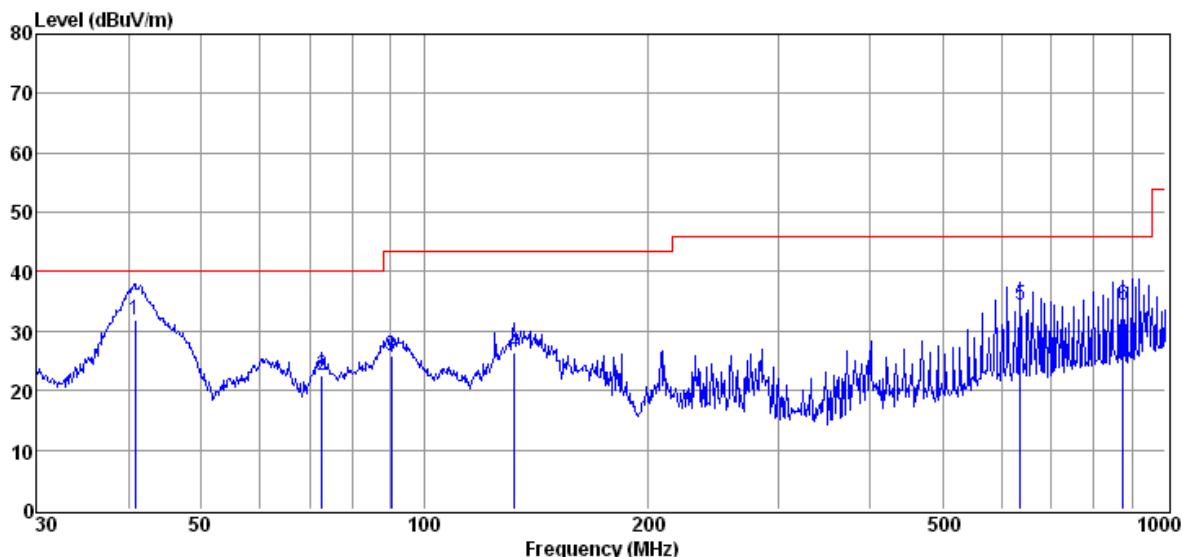
Test data as follows:

30MHz~1GHz Spurious Emission,Quasi-Peak Measurement

Horizontal

Freq. (MHz)	Read Level (dB μ V)	Antenna Factor (dB/m)	Preamp Factor (dB)	Cable Loss (dB)	Result Level (dB μ V/m)	Limit Line (dB μ V/m)	Over Limit (dB)	Detect or	Polarization
40.28	34.36	13.29	24.70	0.56	23.51	40.00	-16.49	QP	HORIZONTAL
59.86	37.20	12.21	24.70	0.73	25.44	40.00	-14.56	QP	HORIZONTAL
131.76	38.77	11.69	24.70	1.19	26.95	43.50	-16.55	QP	HORIZONTAL
177.51	34.13	11.40	24.60	1.40	22.33	43.50	-21.17	QP	HORIZONTAL
178.13	39.12	11.32	24.60	1.40	27.24	43.50	-16.26	QP	HORIZONTAL
348.03	35.24	13.56	24.50	2.11	26.41	46.00	-19.59	QP	HORIZONTAL

30MHz~1GHz Spurious Emission,Quasi-Peak Measurement

Vertical

Freq. (MHz)	Read Level (dB μ V)	Antenna Factor (dB/m)	Preamp Factor (dB)	Cable Loss (dB)	Result Level (dB μ V/m)	Limit Line (dB μ V/m)	Over Limit (dB)	Detector	Polarization
40.70	42.83	13.27	24.70	0.57	31.97	40.00	-8.03	QP	VERTICAL
72.85	36.09	10.23	24.70	0.82	22.44	40.00	-17.56	QP	VERTICAL
90.22	41.15	8.52	24.70	0.95	25.92	43.50	-17.58	QP	VERTICAL
132.22	38.85	10.93	24.70	1.19	26.27	43.50	-17.23	QP	VERTICAL
636.13	35.70	19.79	24.18	3.00	34.31	46.00	-11.69	QP	VERTICAL
875.25	32.04	22.70	23.90	3.60	34.44	46.00	-11.56	QP	VERTICAL



1~25 GHz Harmonics & Spurious Emissions, Peak & Average Measurement

Test in **Channel Low** in transmitting status- **Horizontal** polarization

Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB/m)	Preamp Factor (dB)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Remark
4824.0	1.2	31.5	43.4	57.48	46.78	74	-27.22	Peak
4824.0	1.2	31.5	43.4	48.97	38.27	54	-15.73	Average
7236.0	1.7	36.1	43.1	46.38	41.08	74	-32.92	Peak
7236.0	1.7	36.1	43.1	36.42	31.12	54	-22.88	Average
9648.0	2.1	38.6	43.3	48.85	46.25	74	-27.75	Peak
9648.0	2.1	38.6	43.3	37.80	35.20	54	-18.80	Average

Remark: No other radiation has been found.

Test in **Channel Low** in transmitting status- **Vertical** polarization

Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB/m)	Preamp Factor (dB)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Remark
4824.0	1.2	31.5	43.4	55.22	44.52	74	-29.48	Peak
4824.0	1.2	31.5	43.4	45.98	35.28	54	-18.72	Average
7236.0	1.7	36.1	43.1	46.44	41.14	74	-32.86	Peak
7236.0	1.7	36.1	43.1	36.65	31.35	54	-22.65	Average
9648.0	2.1	38.6	43.3	44.43	41.83	74	-32.17	Peak
9648.0	2.1	38.6	43.3	35.27	32.67	54	-21.33	Average

Remark: No other radiation has been found.

Test in **Channel Middle** in transmitting status- **Horizontal** polarization

Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB/m)	Preamp Factor (dB)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Remark
4876.0	1.3	31.6	43.5	52.36	41.76	74	-32.24	Peak
4876.0	1.3	31.6	43.5	46.10	35.50	54	-18.50	Average
7314.0	1.7	36.3	43.1	46.76	41.66	74	-32.34	Peak
7314.0	1.7	36.3	43.1	37.24	32.14	54	-21.86	Average
9752.0	2.1	38.7	43.0	47.26	45.06	74	-28.94	Peak
9752.0	2.1	38.7	43.0	37.34	35.14	54	-18.86	Average

Remark: No other radiation has been found.

Test in **Channel Middle** in transmitting status- **Vertical** polarization

Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB/m)	Preamp Factor (dB)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Remark
4876	1.3	31.6	43.5	56.27	45.67	74	-28.33	Peak
4876	1.3	31.6	43.5	49.32	38.72	54	-15.28	Average
7314	1.7	36.3	43.1	46.73	41.63	74	-32.37	Peak
7314	1.7	36.3	43.1	36.12	31.02	54	-22.98	Average
9752	2.1	38.7	43.0	48.45	46.25	74	-27.75	Peak
9752	2.1	38.7	43.0	37.52	35.32	54	-18.68	Average

Remark: No other radiation has been found.

Test in **Channel High** in transmitting status- **Vertical** polarization

Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB/m)	Preamp Factor (dB)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Remark
4928.0	1.4	31.9	43.9	53.06	42.46	74	-31.54	Peak
4928.0	1.4	31.9	43.9	47.54	36.94	54	-17.06	Average
7392.0	1.7	36.4	43.1	46.57	41.57	74	-32.43	Peak
7392.0	1.7	36.4	43.1	35.78	30.78	54	-23.22	Average
9856.0	2.2	38.9	42.8	46.22	44.52	74	-29.48	Peak
9856.0	2.2	38.9	42.8	35.94	34.24	54	-19.76	Average

Remark: No other radiation has been found.

Test in **Channel High** in transmitting status- **Horizontal** polarization

Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB/m)	Preamp Factor (dB)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Remark
4928.0	1.4	31.9	43.9	56.92	46.32	74	-27.68	Peak
4928.0	1.4	31.9	43.9	51.93	41.33	54	-12.67	Average
7392.0	1.7	36.4	43.1	49.56	44.56	74	-29.44	Peak
7392.0	1.7	36.4	43.1	37.65	32.65	54	-21.35	Average
9856.0	2.2	38.9	42.8	46.78	45.08	74	-28.92	Peak
9856.0	2.2	38.9	42.8	36.48	34.78	54	-19.22	Average

Remark: No other radiation has been found.

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)

Test Requirement:	FCC Part 15, Subpart C Section 15.205 and Section15.209 RSS-210 Issue 8 Annex 8.5
Test Method:	ANSI 63.10:2009 Clause 6.12
Test Result:	Pass
Measurement Distance:	3m (Semi-Anechoic Chamber)
Limit:	40.0 dB μ V/m between 30MHz & 88MHz; 43.5 dB μ V/m between 88MHz & 216MHz; 46.0 dB μ V/m between 216MHz & 960MHz; 54.0 dB μ V/m above 960MHz.
Detector:	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.

Pre-test were performed for there spatial orthogonal(X, Y, Z), the worst test data (X orthogonal) was submitted.

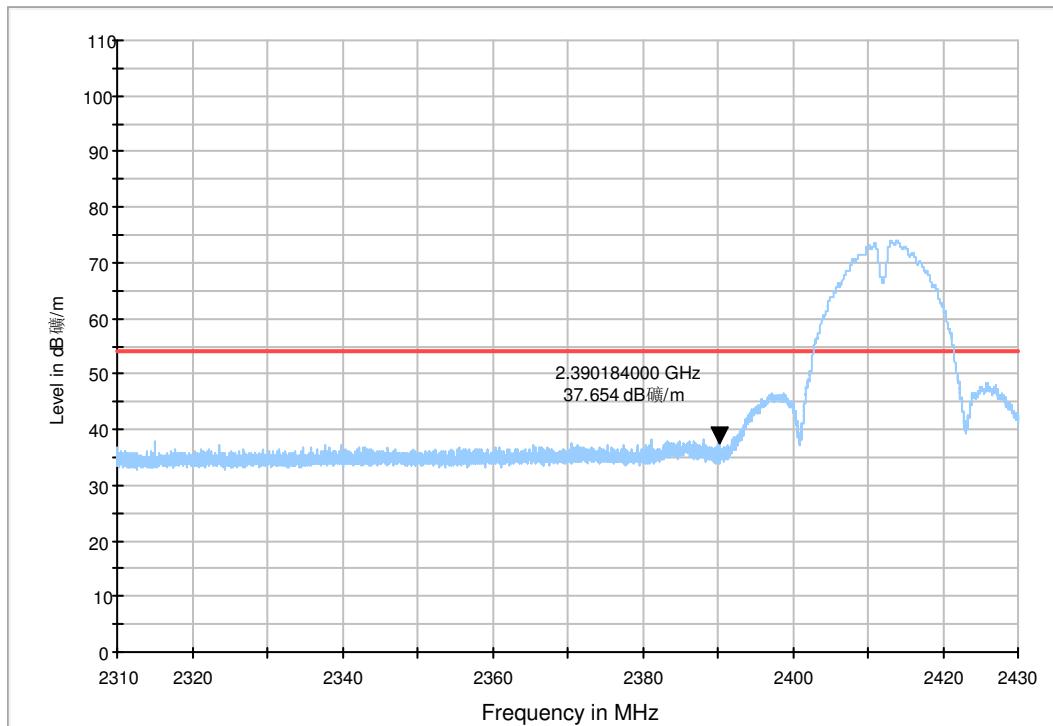
Test Result: The EUT does meet the FCC requirements.

Measurement Result:

Test mode:	Antenna A	Test channel:	Low
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Horizontal, Peak Detector:

CISPR22 RE 1GHz-6GHz PK

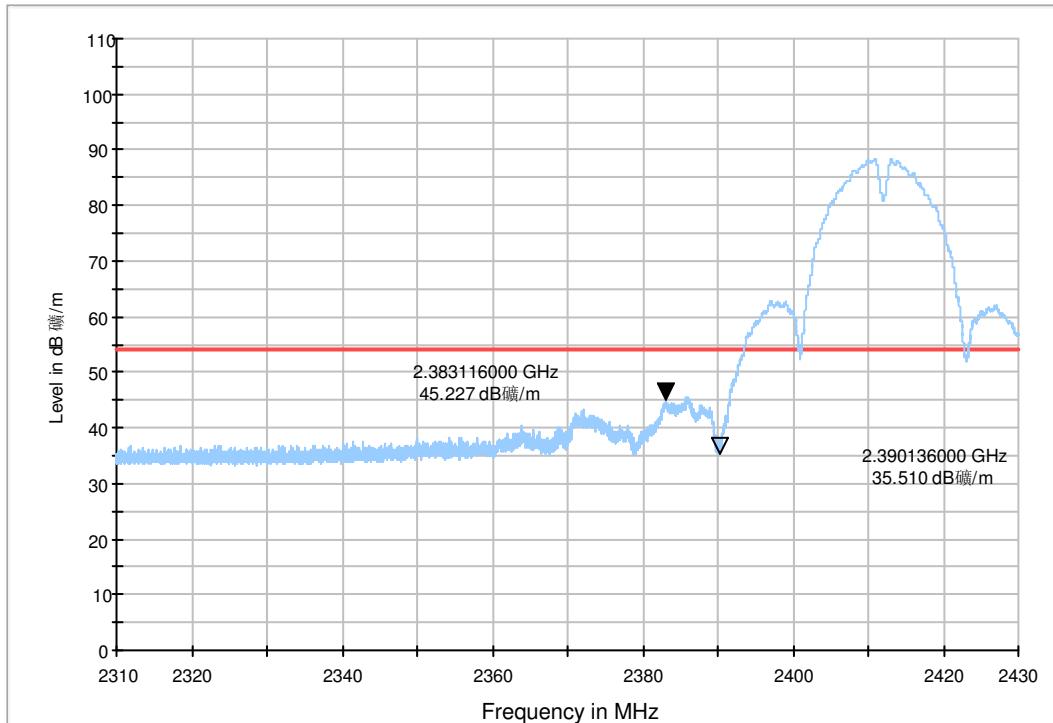


Frequency (MHz)	Peak Reading (dBuV)	Antenna Factor (dB/m)	PreAmp (dB)	Cable Loss (dB)	Peak Level (dBuV/m)	Peak Limit (dBuV/m)	Margin (dB)
2390.18	48.05	27.28	42.50	4.82	37.65	74.00	36.35

Test mode:	Antenna A	Test channel:	Low
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Vertical, Peak Detector:

CISPR22 RE 1GHz-6GHz PK

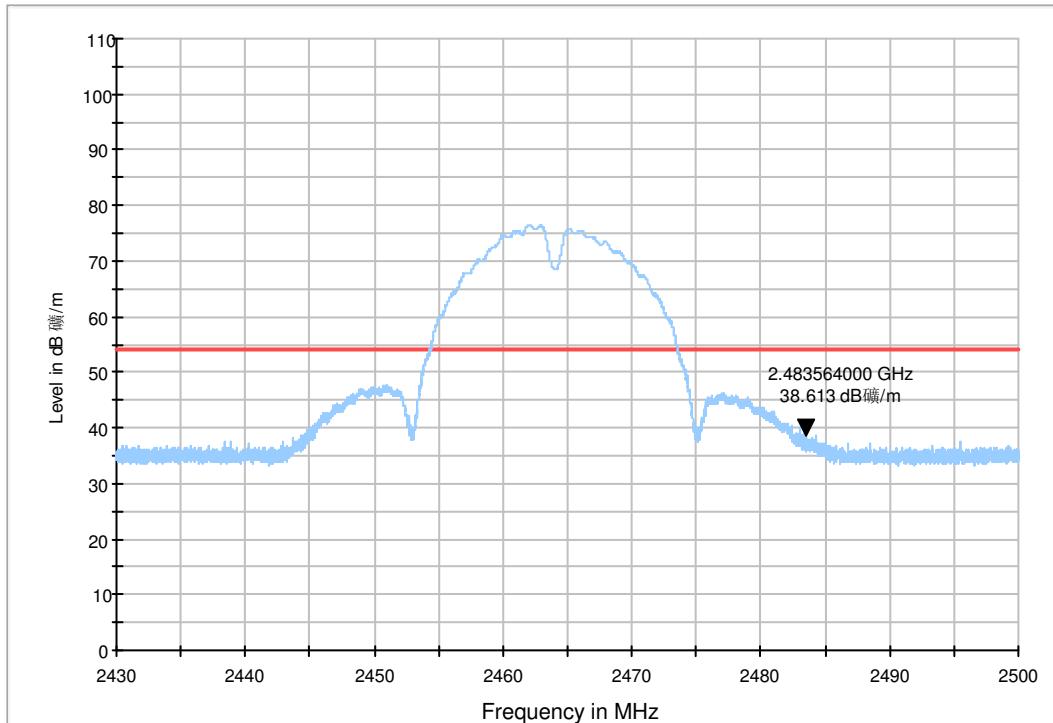


Frequency (MHz)	Peak Reading (dBuV)	Antenna Factor (dB/m)	PreAmp (dB)	Cable Loss (dB)	Peak Level (dBuV/m)	Peak Limit (dBuV/m)	Margin (dB)
2383.12	55.63	27.28	42.50	4.82	45.23	74.00	28.77

Test mode:	Antenna B	Test channel:	High
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Horizontal, Peak Detector:

CISPR22 RE 1GHz-6GHz PK

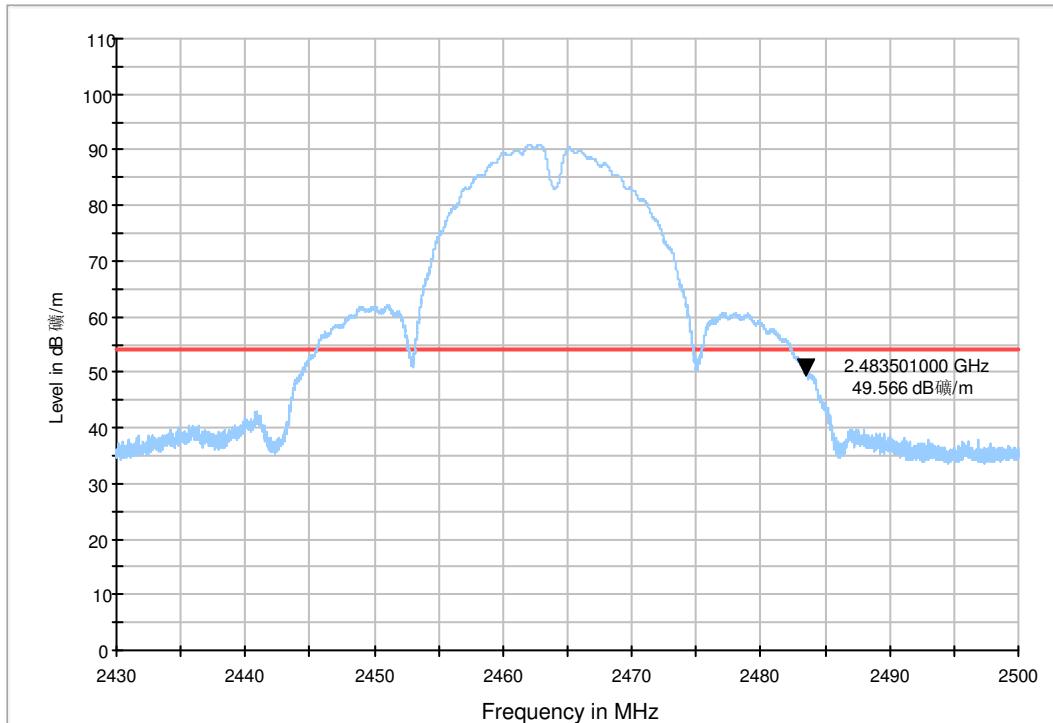


Frequency (MHz)	Peak Reading (dBuV)	Antenna Factor (dB/m)	PreAmp (dB)	Cable Loss (dB)	Peak Level (dBuV/m)	Peak Limit (dBuV/m)	Margin (dB)
2483.56	48.85	27.48	42.54	4.82	38.61	74.00	35.39

Test mode:	Antenna B	Test channel:	High
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Vertical, Peak Detector:

CISPR22 RE 1GHz-6GHz PK



Frequency (MHz)	Peak Reading (dBuV)	Antenna Factor (dB/m)	PreAmp (dB)	Cable Loss (dB)	Peak Level (dBuV/m)	Peak Limit (dBuV/m)	Margin (dB)
2483.50	59.81	27.48	42.54	4.82	49.57	74.00	24.43

Remark: 1. The Peak Level less than the AV limit, so the AV level is no greater than the AV limit.

2. No any other emission 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.



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

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Except as shown in paragraph of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
¹ 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 -	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.52525	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	156.7 - 156.9	3260 - 3267	23.6 - 24.0
12.29 - 12.293	162.0125 - 167.17	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	167.72 - 173.2	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	240 - 285	3600 - 4400	
13.36 - 13.41	322 - 335.4		

7.11 99% Occupied Bandwidth

Test Requirement: RSS-Gen section 4.6.1

Test Method: RSS-Gen section 4.6.1

Test Mode: Transmitting mode

Final Test Mode: The EUT fixed on Low channel, Middle Channel and High Channel.

Test Procedure:

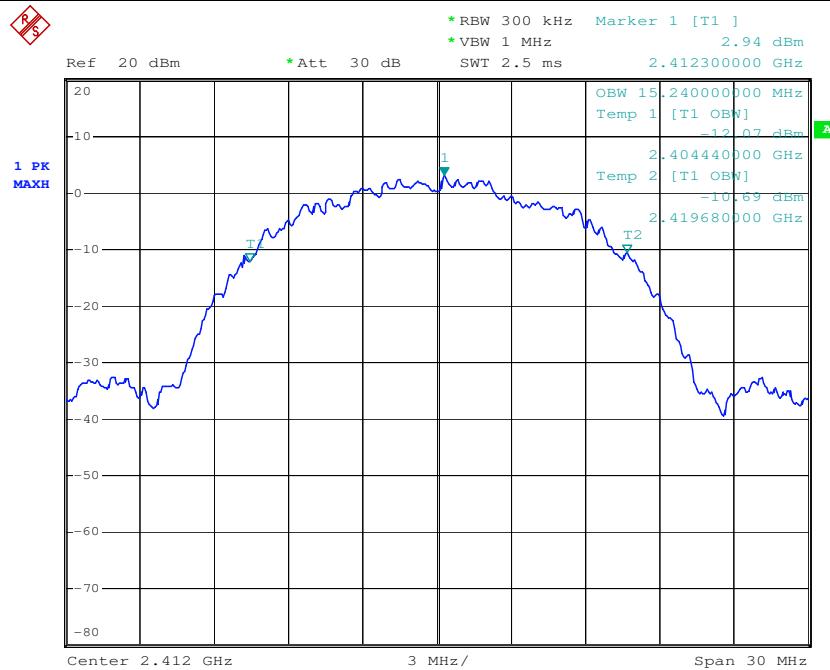
1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;
2. Set the spectrum analyzer: Span = approximately 2 to 3 times the 20dB bandwidth, centred on the hopping channel;
3. Set the spectrum analyzer: RBW \geq 1% of the 20dB bandwidth (set 300 kHz). VBW \geq RBW. Sweep = auto; Detector Function = Peak. Trace = Max Hold.
4. Mark the peak frequency and -20dB points.

Test date

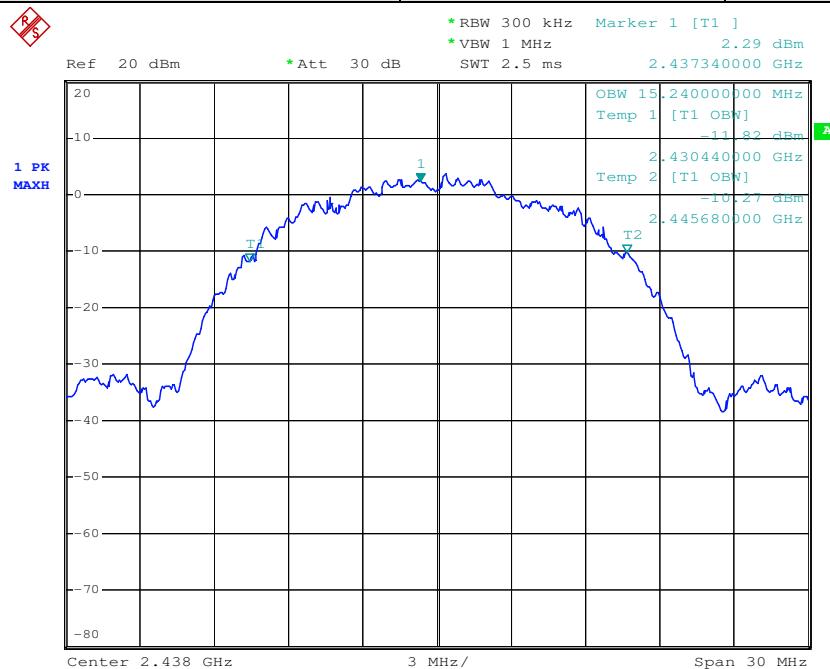
Test Mode	Test Channel	Channel Frequency (MHz)	Bandwidth(MHz)
Antenna A	Low	2412	16.22
Antenna A	Middle	2438	16.11
Antenna A	High	2464	16.11
Antenna B	Low	2412	16.22
Antenna B	Middle	2438	16.11
Antenna B	High	2464	16.11

Test plot as follows:

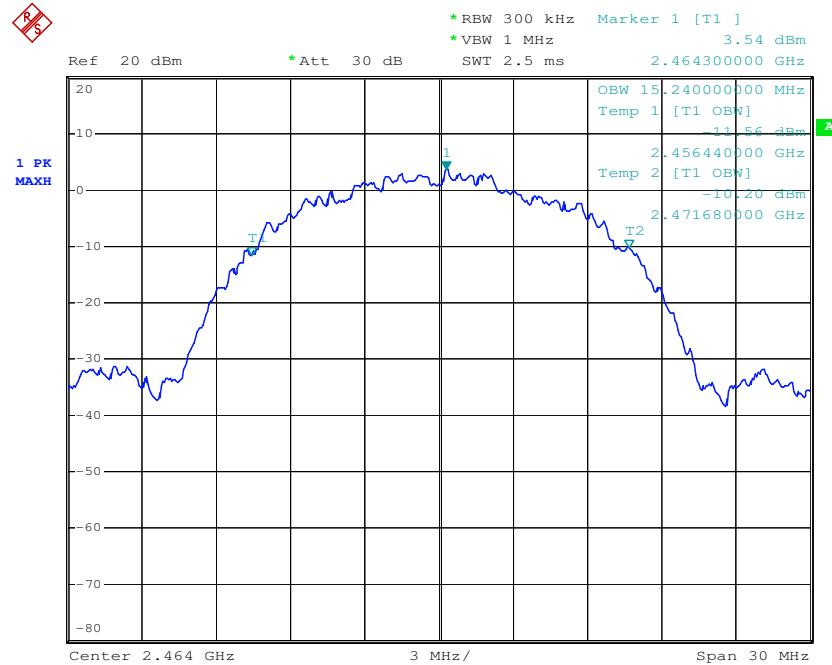
Test mode:	Antenna A	Test channel:	Lowest
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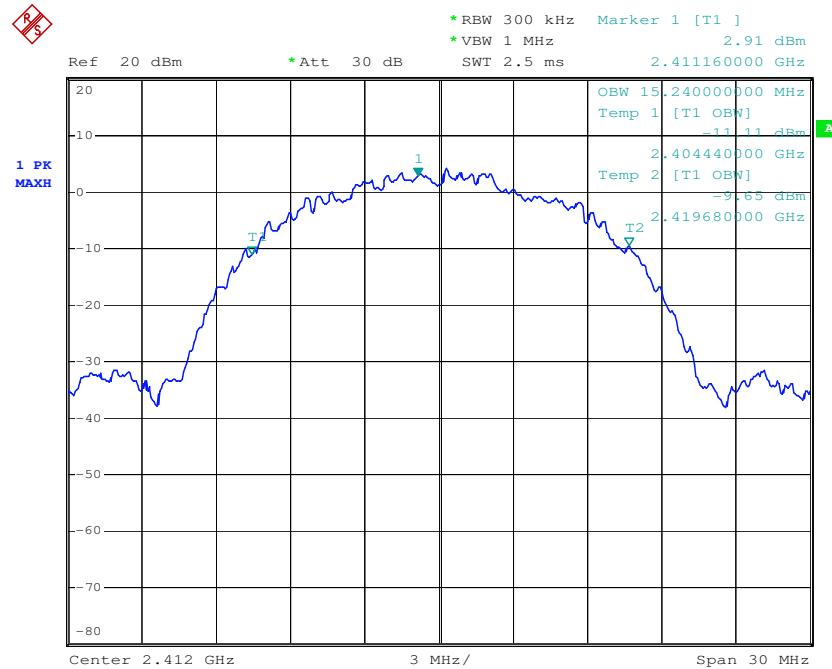
Test mode:	Antenna A	Test channel:	Middle
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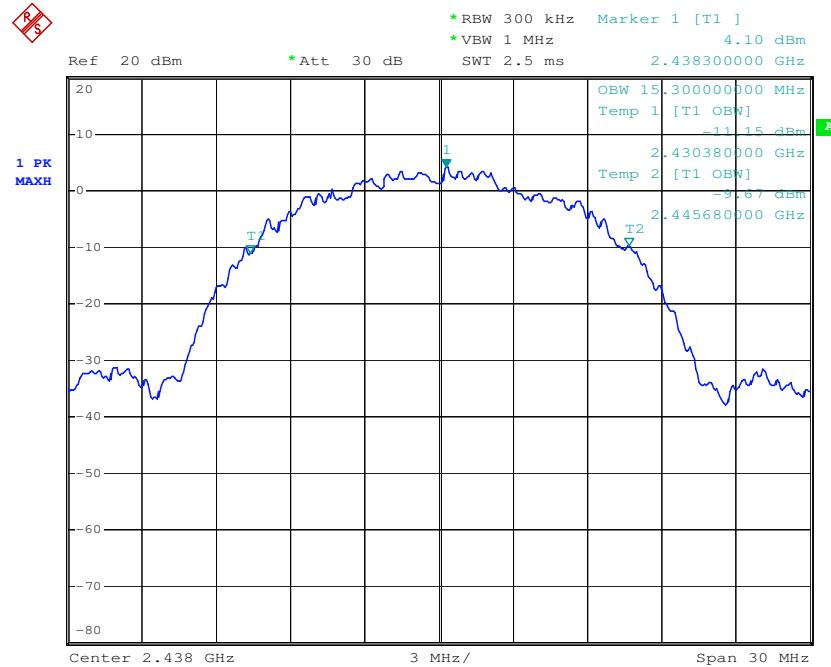
Test mode:	Antenna A	Test channel:	Highest
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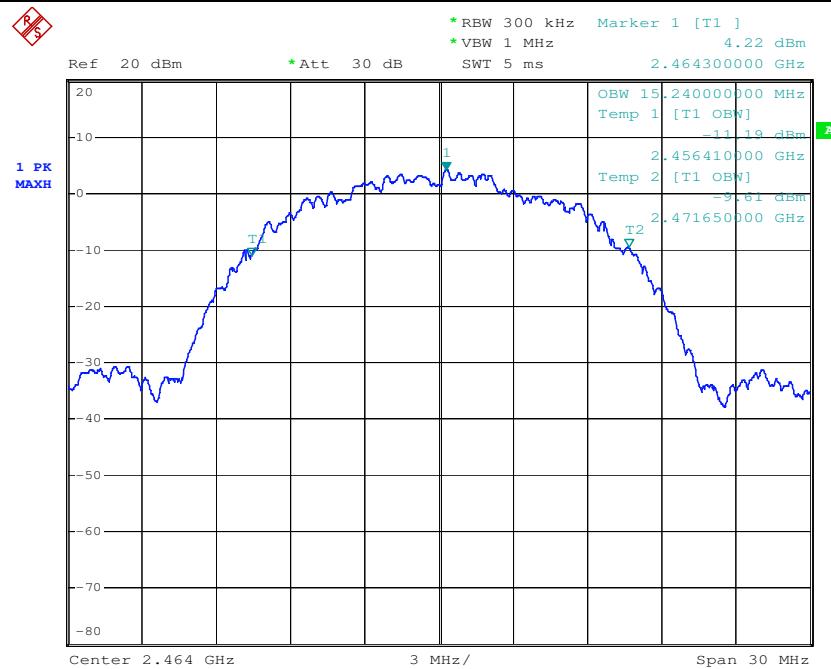
Test mode:	Antenna B	Test channel:	Lowest
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Test mode:	Antenna B	Test channel:	Middle
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Test mode:	Antenna B	Test channel:	Highest
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8 Test Setup Photographs

Refer to the < Soundtrack 2_Test Setup photos>.

9 EUT Constructional Details

Refer to the < Soundtrack 2_External Photos > & < Soundtrack 2_Internal Photos>.

--End of the Report--