



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

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Report No.: SHEM180300172303  
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## 1 Cover Page

# RF TEST REPORT

Application No.:	SHEM1803001723CR
Applicant:	RAZOR USA LLC
FCC ID:	2AGU6004
IC:	21056-004
<b>Equipment Under Test (EUT):</b> <b>NOTE:</b> The following sample(s) submitted was/were identified on behalf of the client as	
Product Name:	Remote Control(RAZOR Electric Skateboard)
Model No.(EUT):	R004
Standards:	FCC PART 15 Subpart C RSS-210 Issue 9 RSS-Gen Issue 4
Date of Receipt:	2018-03-07
Date of Test:	2018-03-07 to 2018-03-28
Date of Issue:	2018-03-28
Test Result:	Pass*

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



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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Revision Record			
Version	Description	Date	Remark
00	Original	2018-03-28	/

<b>Authorized for issue by:</b>			
			
		<hr/>	
		<b>Vincent Zhu /Project Engineer</b>	
			
		<hr/>	
		<b>Parlam Zhan /Reviewer</b>	



## 2 Test Summary

Test Item	Test Requirement	IC Reference	Test method	Result
Antenna Requirement	FCC Part 15, Subpart C Section 15.203	RSS-Gen Section 8.1.3	---	PASS
AC Power Line Conducted Emission	FCC Part 15, Subpart C Section 15.207	RSS-Gen Issue 4 Section 7.2.4	ANSI C63.10 (2013) Section 6.2	N/A
Field Strength of the Fundamental Signal	FCC Part 15, Subpart C Section 15.249 (a)	RSS-210 Issue 9 Annex 2.9 (a)	ANSI C63.10 (2013) Section 6.11	PASS
Radiated Spurious Emissions	FCC Part 15, Subpart C Section 15.249 (a) &15.209&15.205	RSS-Gen Issue 4 Section 4.9 RSS-Gen Issue 4 Section 7.2.2	ANSI C63.10 (2013) Section 6.4&6.5&6.6&6.10	PASS
20dB Bandwidth	FCC Part 15, Subpart C Section 15.215 (c)	RSS-210 Issue 9 Annex 8	ANSI C63.10 (2013) Section 6.9	PASS
99% Occupied bandwidth	---	RSS-Gen Section 6.6	RSS-Gen section 6.6	PASS

N/A: Not Applicable. Please refer to Section 7.3 of this report for details.



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## 4 General Information

### 4.1 Client Information

Applicant: RAZOR USA LLC  
 Address of Applicant: P.O. Box 3610 Cerritos, CA 90703 United States  
 Manufacturer: RAZOR USA LLC  
 Address of Manufacturer: P.O. Box 3610 Cerritos, CA 90703 United States  
 Factory: Zhejiang Jinbang Sports Equipment Co.,Ltd  
 Address of Factory: No.255 Qingchuan Road, Huzhen Town, Jinyun Zhengjiang 321404  
 China

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

Product Description: Portable product with 2.4G function  
 Battery: DC 3V by 2\* AAA.R03P batteries for transmitter

### 4.3 Technical Specifications:

Operation Frequency:	2405MHz-2477MHz
Channel Number:	20
Channel List:	2405MHz, 2413MHz, 2415MHz, 2418MHz, 2425MHz, 2429MHz, 2439MHz, 2446MHz, 2450MHz, 2456MHz, 2461MHz, 2465MHz, 2473MHz, 2475MHz, 2477MHz
Modulation Technique:	GFSK
Antenna Type	PCB antenna
Antenna Gain	-1 dBi

### 4.4 Description of Support Units

The EUT has been tested independently.

### 4.5 Test Mode

Test Mode	Description of Test Mode
Engineering Mode	Keeps EUT working in continuous transmitting mode

#### **4.6 Test Location**

All tests were performed at:

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

588 West Jindu Road, Xinqiao, Songjiang, 201612 Shanghai, China.

Tel: +86 21 6191 5666

Fax: +86 21 6191 5678

#### **4.7 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.

- **NVLAP (Certificate No. 201034-0)**

SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP). Certificate No. 201034-0.

- **FCC –Designation Number: CN5033**

SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. has been recognized as an accredited testing laboratory.

Designation Number: CN5033. Test Firm Registration Number: 479755.

- **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-1.

- **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, C-4336, T-12221, G-10830 respectively.

#### 4.8 Measurement Uncertainty

No.	Parameter	Measurement Uncertainty
1	Radio Frequency	$< \pm 1 \times 10^{-5}$
2	Total RF power, conducted	$< \pm 1.5$ dB
3	RF power density, conducted	$< \pm 3$ dB
4	Spurious emissions, conducted	$< \pm 3$ dB
5	All emissions, radiated	$< \pm 6$ dB (Below 1GHz) $< \pm 6$ dB (Above 1GHz)
6	Temperature	$< \pm 1^{\circ}\text{C}$
7	Humidity	$< \pm 5$ %
8	DC and low frequency voltages	$< \pm 3$ %

## 5 Equipments Used during Test

Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
<b>Conducted Emission at AC Power Line</b>					
EMI test receiver	R&S	ESR7	SHEM162-1	2017-12-20	2018-12-19
LISN	Schwarzbeck	NSLK8127	SHEM061-1	2017-12-20	2018-12-19
LISN	EMCO	3816/2	SHEM019-1	2017-12-20	2018-12-19
Pulse limiter	R&S	ESH3-Z2	SHEM029-1	2017-12-20	2018-12-19
CE test Cable	/	CE01	/	2017-12-26	2018-12-25
<b>Conducted Test</b>					
Spectrum Analyzer	R&S	FSP-30	SHEM002-1	2017-12-20	2018-12-19
Spectrum Analyzer	Agilent	N9020A	SHEM181-1	2017-09-26	2018-09-25
Power meter	R&S	NRP	SHEM057-1	2017-12-26	2018-12-25
Power Sensor	R&S	NRP-Z22	SHEM136-1	2017-07-22	2018-07-21
Power Sensor	R&S	NRP-Z91	SHEM057-2	2017-12-26	2018-12-25
Signal Generator	R&S	SMR40	SHEM058-1	2017-07-03	2018-07-02
Signal Generator	Agilent	N5182A	SHEM182-1	2017-09-26	2018-09-25
Communication Tester	R&S	CMW270	SHEM183-1	2017-10-22	2018-10-21
Switcher	Tonscend	JS0806	SHEM184-1	2017-09-26	2018-09-25
Splitter	Anritsu	MA1612A	SHEM185-1	/	/
Coupler	e-meca	803-S-1	SHEM186-1	/	/
High-low Temp Cabinet	Suzhou Zhihe	TL-40	SHEM087-1	2017-09-26	2018-09-25
AC Power Stabilizer	WOCEN	6100	SHEM045-1	2017-12-26	2018-12-25
DC Power Supply	QJE	QJ30003SII	SHEM046-1	2017-12-26	2018-12-25
Conducted test Cable	/	RF01, RF 02	/	2017-12-26	2018-12-25
<b>Radiated Test</b>					
EMI test receiver	R&S	ESU40	SHEM051-1	2017-12-20	2018-12-19
Spectrum Analyzer	R&S	FSP-30	SHEM002-1	2017-12-20	2018-12-19
Loop Antenna (9kHz-30MHz)	Schwarzbeck	FMZB1519	SHEM135-1	2017-04-10	2020-04-09
Antenna (25MHz-2GHz)	Schwarzbeck	VULB9168	SHEM048-1	2017-02-28	2020-02-27
Antenna (25MHz-3GHz)	Schwarzbeck	HL562	SHEM010-1	2017-02-28	2020-02-27
Horn Antenna (1-8GHz)	Schwarzbeck	HF906	SHEM009-1	2017-10-24	2020-10-23
Horn Antenna (1-18GHz)	Schwarzbeck	BBHA9120D	SHEM050-1	2017-01-14	2020-01-13
Horn Antenna (14-40GHz)	Schwarzbeck	BBHA 9170	SHEM049-1	2017-12-03	2020-12-02
Pre-amplifier (9KHz-2GHz)	CLAVIIO	BDLNA-0001-412010	SHEM164-1	2017-08-22	2018-08-21
Pre-amplifier (1-18GHz)	CLAVIIO	BDLNA-0118-352810	SHEM050-2	2017-08-22	2018-08-21
High-amplifier (14-40GHz)	Schwarzbeck	10001	SHEM049-2	2017-12-20	2018-12-19
Band filter	LORCH	9BRX-875/X150-SR	SHEM156-1	/	/
Band filter	LORCH	13BRX-1950/X500-SR	SHEM083-2	/	/
Band filter	LORCH	5BRX-2400/X200-SR	SHEM155-1	/	/
Band filter	LORCH	5BRX-5500/X1000-SR	SHEM157-2	/	/
High pass Filter	Wainwright	WHK3.0/18G-100SS	SHEM157-1	/	/
High pass Filter	Wainwright	WHKS1700-3SS	SHEM157-3	/	/
Semi/Fully Anechoic	ST	11*6*6M	SHEM078-2	2017-07-22	2020-07-21
RE test Cable	/	RE01, RE02, RE06	/	2017-12-26	2018-12-25



## 6 Test Results

### 6.1 E.U.T. test conditions

**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.

<b>Operating Environment:</b>	Temperature:	20.0 -25.0 °C
	Humidity:	35-75 % RH
	Atmospheric Pressure:	99.2 -102kPa

**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 2405MHz, 2439MHz, 2477MHz

## 6.2 Antenna Requirement

### Standard requirement:

15.203 requirement:

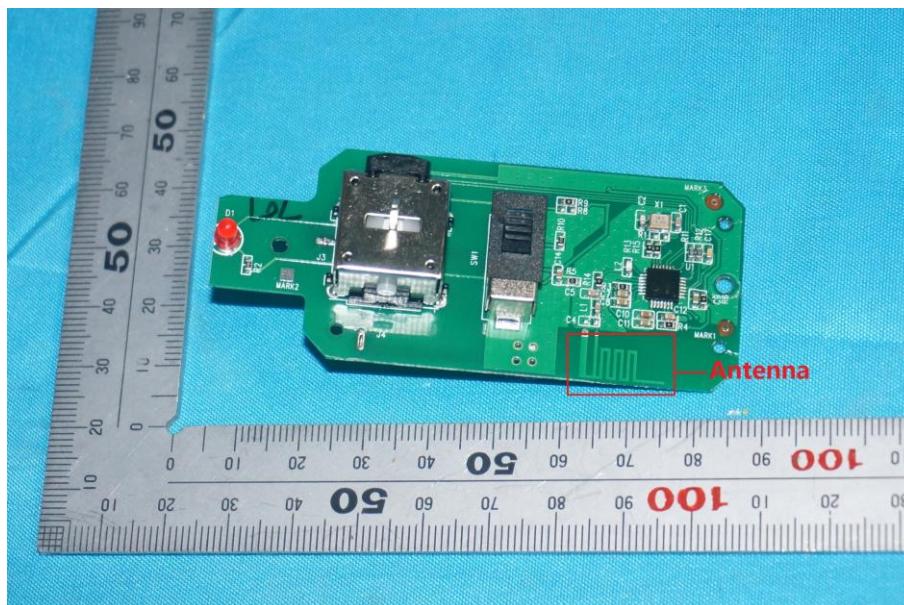
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit 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 PCB antenna. The gain of the antenna is less than -1 dBi.



### 6.3 Conducted Emissions on Mains Terminals

**Frequency Range:** 150 KHz to 30 MHz

**Class/Severity:** Class B

**Limit:**

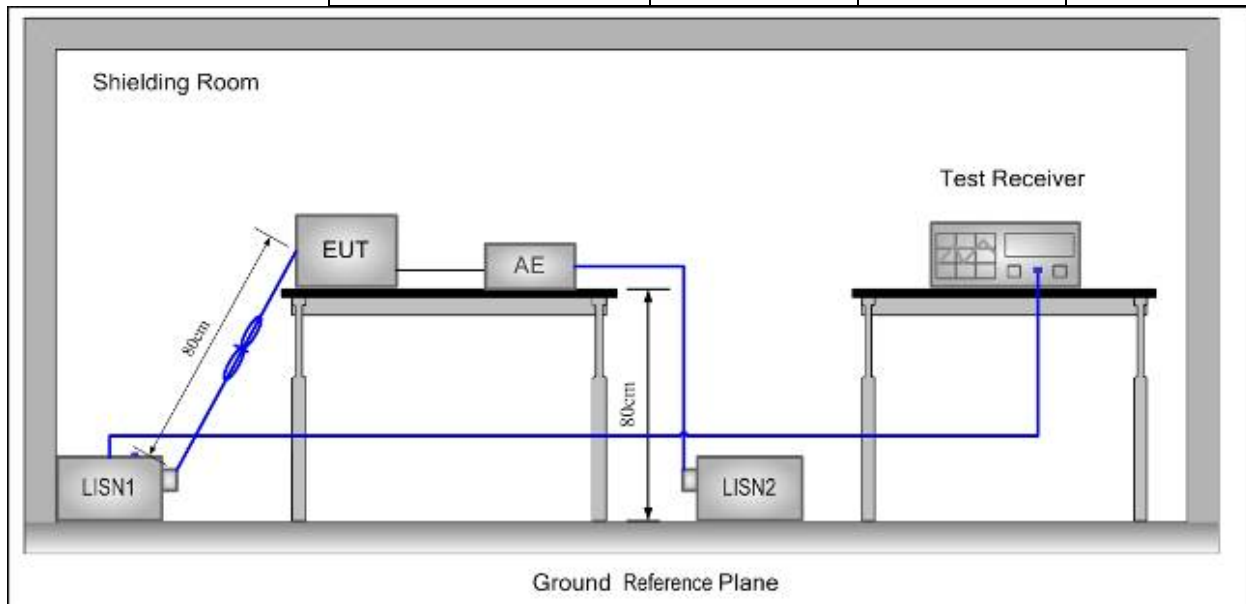
Frequency range MHz	Class B Limits: dB (µV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50

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 site/setup:** Test instrumentation set-up:

Frequency Range	Detector	RBW	VBW
9KHz to 150Hz	Quasi-peak	200Hz	500Hz
150KHz to 30MHz	Quasi-peak	9kHz	30kHz



#### Test 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 50Ω/50µH + 5Ω linear impedance. The power cables of all other units of the EUT were 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 were at least 0.8 m from the LISN.

Remark: 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.

**Test Result:** N/A

Test Data:

Note: This EUT is powered by battery only; therefore the AC Conducted Emission test is not applicable.

### 6.4 Field Strength of the Fundamental Signal

Test Site: Measurement Distance: 3m

Receiver Setup:	Frequency	Detector	RBW	VBW	Remark
	Above 1GHz	Peak	1MHz	3MHz	Peak
		Peak	1MHz	10Hz	Average

Limit:	Frequency	Limit (dBuV/m)	Remark
	2400-2483.5 MHz	114	Peak
		94	Average

Test Setup:

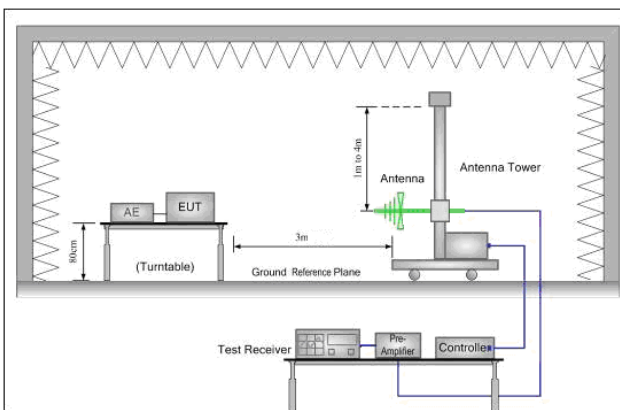


Figure 1. 30MHz to 1GHz

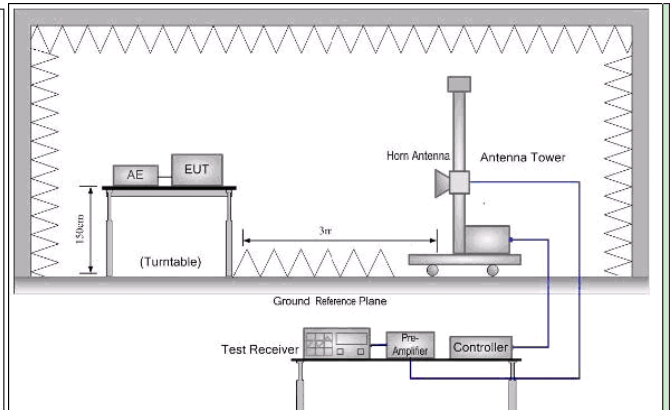


Figure 2. Above 1 GHz

- Test Procedure:
- The EUT was placed on the top of a rotating table above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
  - The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
  - The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
  - For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
  - The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
  - If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
  - Repeat above procedures until all frequencies measured was complete.

Test Results: Pass



Measurement Data

Peak value:

Frequency (MHz)	Read Level (dBUV)	Factor (dB/m)	Level (dBUV/m)	Limit Line (dBUV/m)	Over Limit (dB)	Detector	Polarization
2405	85.12	-3.92	81.2	94	-12.8	Peak	Horizontal
	76.1	-3.93	72.17	94	-21.83	Peak	Vertical
2439	86.89	-3.96	82.93	94	-11.07	Peak	Horizontal
	77.88	-3.96	73.92	94	-20.08	Peak	Vertical
2477	86.56	-4.01	82.55	94	-11.45	Peak	Horizontal
	75.81	-4.01	71.8	94	-22.2	Peak	Vertical

Remark:

1) The basic equation with a sample calculation is as follows: Level = Read Level + Factor.

(The Factor is calculated by adding the Antenna Factor, Cable Loss and Preamp Factor)

If the Peak value below the AV Limit, the AV test doesn't perform for this submission.

## 6.5 Radiated Spurious Emissions

**Frequency Range:** 9KHz to 25GHz

**Test site/setup:** Measurement Distance: 3m  
Test instrumentation set-up:

Frequency Range	Detector	RBW	VBW
0.009MHz-0.090MHz	Peak	10kHz	30kHz
0.009MHz-0.090MHz	Average	10kHz	30kHz
0.090MHz-0.110MHz	Quasi-peak	10kHz	30kHz
0.110MHz-0.490MHz	Peak	10kHz	30kHz
0.110MHz-0.490MHz	Average	10kHz	30kHz
0.490MHz -30MHz	Quasi-peak	10kHz	30kHz
30MHz-1GHz	Quasi-peak	100kHz	300kHz
Above 1GHz	Peak	RBW=1MHz	VBW≥RBW
	Average		VBW=10Hz

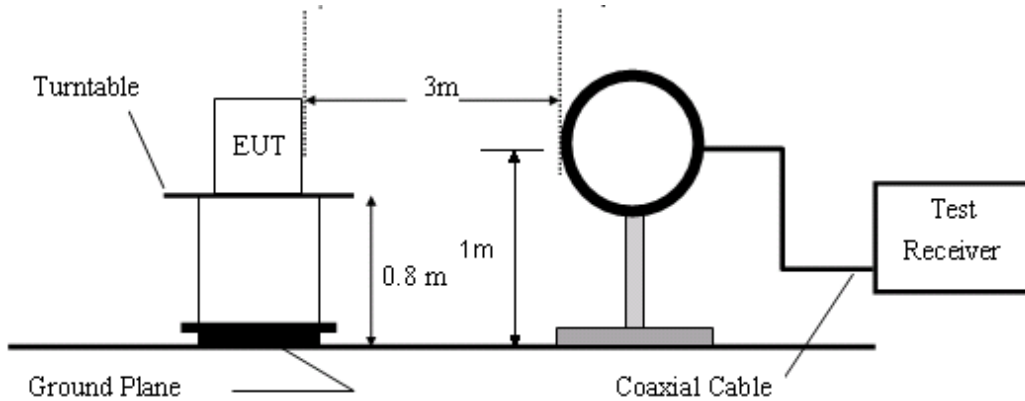
Sweep=Auto

**15.209 Limit:**

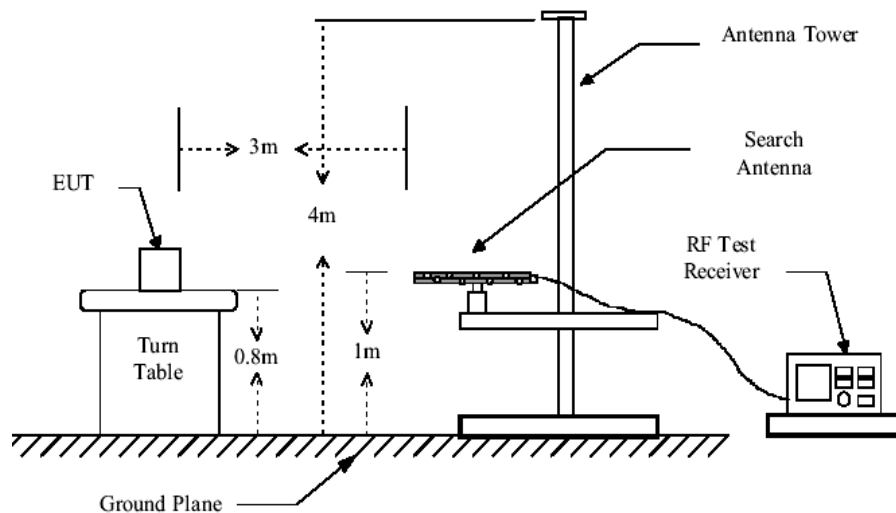
Frequency	Field strength (microvolt/meter)	Limit (dBuV/m)
0.009MHz-0.490MHz	2400/F(KHz)	128.5 ~ 93.8
0.490MHz-1.705MHz	24000/F(KHz)	73.8 ~63.0
1.705MHz-30MHz	30	69.5
30MHz-88MHz	100	40.0
88MHz-216MHz	150	43.5
216MHz-960MHz	200	46.0
960MHz-1GHz	500	54.0
Above 1GHz	500	54.0

Note: 15.35(b), Unless otherwise specified, the limit on peak radio frequency emissions is 20dB above the maximum permitted average emission limit applicable to the equipment under test. This peak limit applies to the total peak emission level radiated by the device.

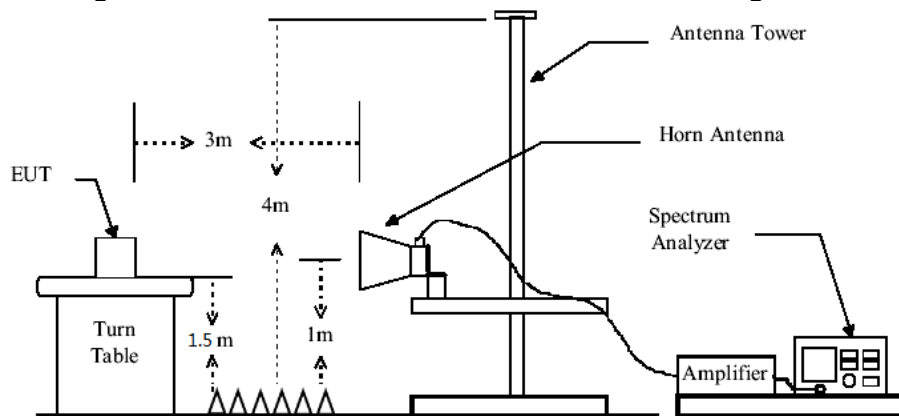
**Test Configuration:** Receive antenna scan height 1 m - 4 m. polarization Vertical / Horizontal



**Figure1. Blow 30MHz radiated emissions test configuration**



**Figure2. 30MHz to 1GHz radiated emissions test configuration**



**Figure3. Above 1GHz radiated emissions test configuration**



**Test Procedure:** The procedure used was ANSI Standard C63.10:2013. 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.

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.

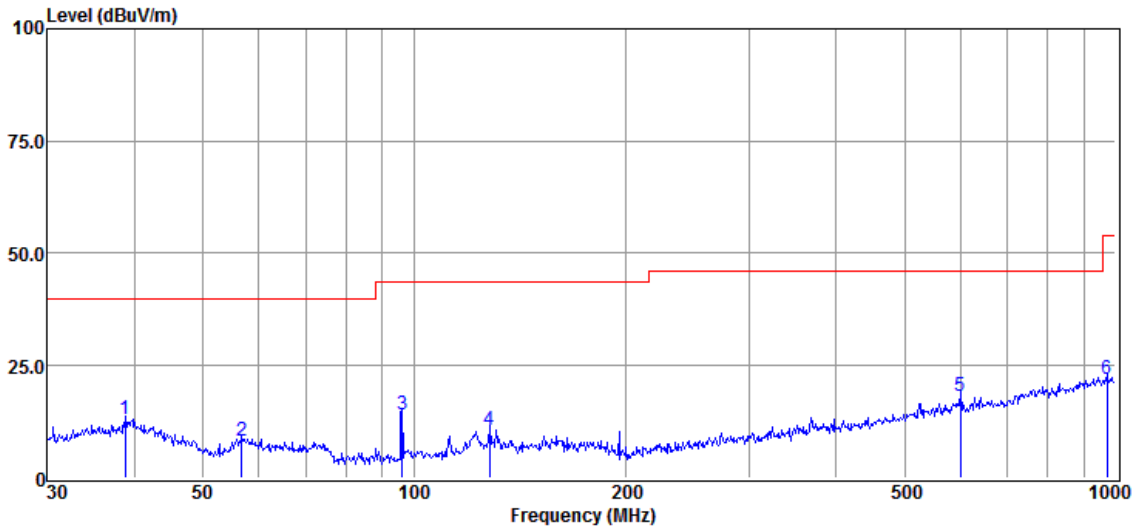
- 1) For this intentional radiator operates below 25 GHz. the spectrum shall be investigated to the tenth harmonic of the highest fundamental frequency. And above the third harmonic of this intentional radiator, the disturbance is very low. So the test result only displays to 5rd harmonic.
- 2) As shown in Section, for frequencies above 1000MHz. 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:** Pass

### 6.5.1 Radiated Spurious Emissions

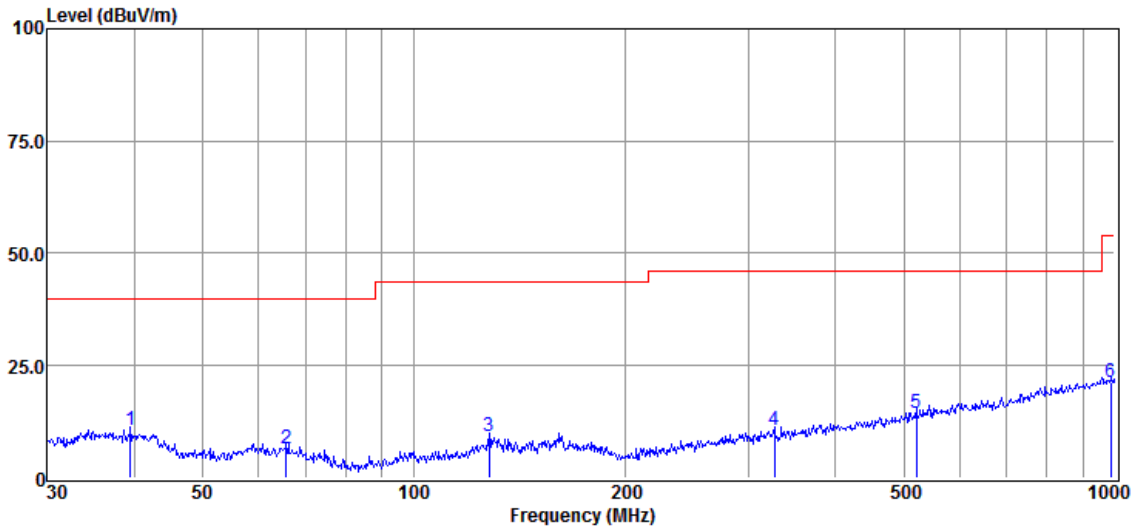
30MHz-1GHz:

Vertical:



Item	Freq.	Read Level	Antenna Factor	Preamp Factor	Cable Loss	Result Level	Limit Line	Over Limit	Detector
(Mark)	(MHz)	(dB $\mu$ V)	(dB/m)	(dB)	(dB)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)	
1	38.75	39.12	16.19	42.62	0.22	12.91	40.00	-27.09	QP
2	56.79	38.69	11.98	42.65	0.29	8.31	40.00	-31.69	QP
3	96.10	47.26	8.99	42.69	0.44	14.00	43.50	-29.50	QP
4	128.11	40.59	12.31	42.66	0.57	10.81	43.50	-32.69	QP
5	601.43	39.72	19.42	42.19	1.38	18.33	46.00	-27.67	QP
6	972.34	37.07	23.51	41.40	2.69	21.87	54.00	-32.13	QP

Horizontal:



Item	Freq.	Read Level	Antenna Factor	Preamp Factor	Cable Loss	Result Level	Limit Line	Over Limit	Detector
(Mark)	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
1	39.44	36.66	16.25	42.62	0.22	10.51	40.00	-29.49	QP
2	65.80	37.07	11.89	42.66	0.32	6.62	40.00	-33.38	QP
3	128.11	38.91	12.31	42.66	0.57	9.13	43.50	-34.37	QP
4	326.74	38.17	13.76	42.31	0.89	10.51	46.00	-35.49	QP
5	520.89	37.54	17.71	42.15	1.22	14.32	46.00	-31.68	QP
6	986.07	36.34	23.65	41.30	2.76	21.45	54.00	-32.55	QP



Above 1GHz:

**Channel: 2405MHz**

Mark	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Emission (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Polarization
1	4810	39.34	6.25	45.59	54	-8.41	peak	Horizontal
2	7215	36.03	10.67	46.7	54	-7.3	peak	Horizontal
3	9620	35.35	14.37	49.72	54	-4.28	peak	Horizontal
4	4810	38.29	6.25	44.54	54	-9.46	peak	Vertical
5	7215	37.23	10.67	47.9	54	-6.1	peak	Vertical
6	9620	36.14	14.37	50.51	54	-3.49	peak	Vertical

**Channel: 2439MHz**

Mark	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Emission (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Polarization
1	4878	37.05	6.96	44.01	54	-9.99	peak	Horizontal
2	7317	35.72	11.11	46.83	54	-7.17	peak	Horizontal
3	9756	35.28	14.35	49.63	54	-4.37	peak	Horizontal
4	4878	37.28	6.96	44.24	54	-9.76	peak	Vertical
5	7317	35.7	11.11	46.81	54	-7.19	peak	Vertical
6	9756	35.45	14.35	49.8	54	-4.2	peak	Vertical

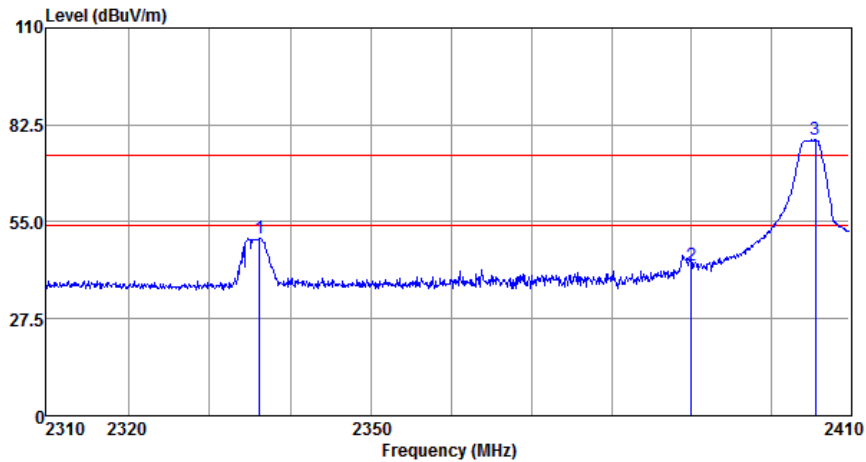
**Channel: 2477MHz**

Mark	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Emission (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Polarization
1	4954	39.58	7.47	47.05	54	-6.95	peak	Horizontal
2	7431	36.18	11.6	47.78	54	-6.22	peak	Horizontal
3	9908	33.68	14.39	48.07	54	-5.93	peak	Horizontal
4	4954	40.49	7.47	47.96	54	-6.04	peak	Vertical
5	7431	36.54	11.6	48.14	54	-5.86	peak	Vertical
6	9908	35.56	14.39	49.95	54	-4.05	peak	Vertical

- Remark: 1. Test Level = Receiver Reading + Antenna Factor + Cable Loss- Preamplifier Factor  
2. No any other emission which falls in restricted bands can be detected and be reported.  
3. If the Peak value below the AV Limit, the AV test doesn't perform for this submission.

### 6.5.2 Radiated Band edge

Mode:a; Polarization:Horizontal;Channel:Low

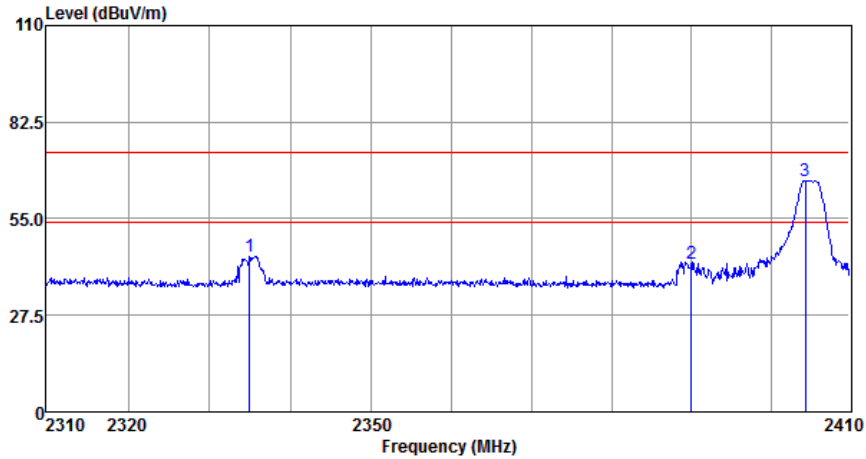


Antenna Polarity :HORIZONTAL

Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
MHz	dBuv	dB/m	dB	dB	dBuv/m	dBuv/m	dB	
1 2336.19	55.22	25.96	6.40	37.37	50.21	74.00	-23.79	Peak
2 2390.00	47.57	26.03	6.47	37.36	42.71	74.00	-31.29	Peak
3 2405.71	83.04	26.06	6.50	37.35	78.25	74.00	4.25	Peak

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor

Mode:a; Polarization:Vertical;Channel:Low

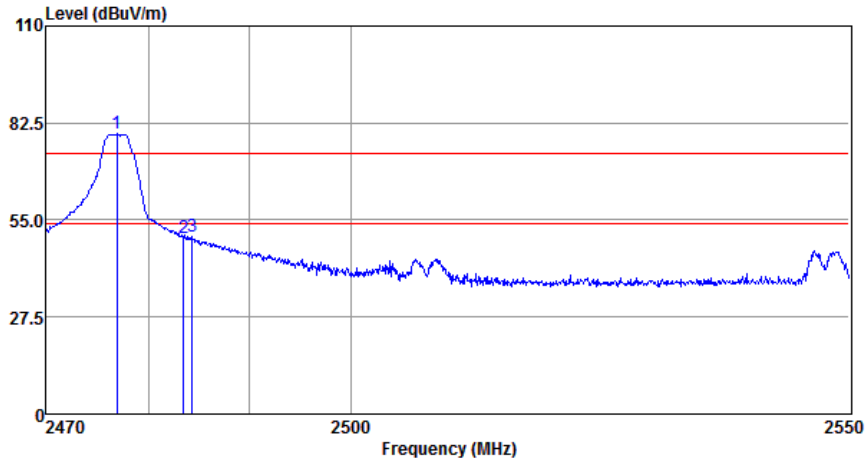


Antenna Polarity :VERTICAL

Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
-----	-----	-----	-----	-----	-----	-----	-----	-----
MHz	dBuv	dB/m	dB	dB	dBuv/m	dBuv/m	dB	
1 2334.90	49.41	25.95	6.37	37.37	44.36	74.00	-29.64	Peak
2 2390.00	47.11	26.03	6.47	37.36	42.25	74.00	-31.75	Peak
3 2404.39	70.67	26.06	6.50	37.35	65.88	74.00	-8.12	Peak

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor

Mode:a; Polarization: Horizontal; Channel:Hight

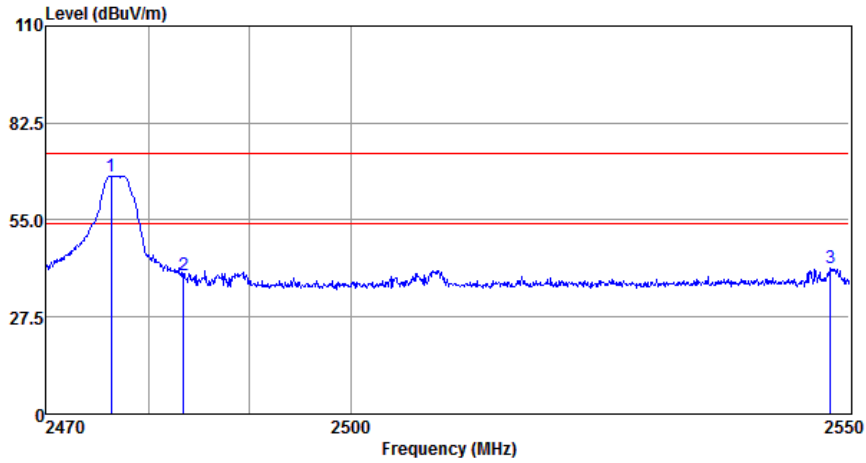


Antenna Polarity :HORIZONTAL

Read	Antenna	Cable	Preamp	Emission	Limit	Over		
Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Remark
-----	-----	-----	-----	-----	-----	-----	-----	-----
MHz	dBuv	dB/m	dB	dB	dBuv/m	dBuv/m	dB	
1 2476.94	83.95	26.17	6.74	37.49	79.37	74.00	5.37	Peak
2 2483.50	54.57	26.18	6.80	37.51	50.04	74.00	-23.96	Peak
3 2484.37	54.71	26.18	6.80	37.51	50.18	74.00	-23.82	Peak

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor

Mode:a; Polarization: Vertical; Channel:High



Antenna Polarity :VERTICAL

	Read	Antenna	Cable	Preamp	Emission	Limit	Over	
Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Remark
-----	-----	-----	-----	-----	-----	-----	-----	-----
MHz	dBuv	dB/m	dB	dB	dBuv/m	dBuv/m	dB	
1 2476.39	72.16	26.17	6.74	37.49	67.58	74.00	-6.42	Peak
2 2483.50	43.75	26.18	6.80	37.51	39.22	74.00	-34.78	Peak
3 2548.05	45.79	26.36	7.01	37.60	41.56	74.00	-32.44	Peak

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor





All frequencies within the “Restricted bands” have been evaluated to compliance. Except as shown in paragraph of this section, only spurious emissions are permitted in any of the frequency bands listed below:

a. FCC Part 15, Subpart C Section 15.205 Restricted bands of operation.

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
10.495 - 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	10.5 - 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 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	
13.36 - 13.41			

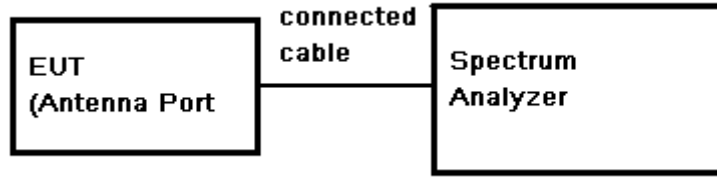


RSS-Gen section 7.2.2 Restricted bands of operation

MHz	MHz	GHz
0.090-0.110	240-285	9.0-9.2
2.1735-2.1905	322-335.4	9.3-9.5
3.020-3.026	399.9-410	10.6-12.7
4.125-4.128	608-614	13.25-13.4
4.17725-4.17775	960-1427	14.47-14.5
4.20725-4.20775	1435-1626.5	15.35-16.2
5.677-5.683	1645.5-1646.5	17.7-21.4
6.215-6.218	1660-1710	22.01-23.12
6.26775-6.26825	1718.8-1722.2	23.6-24.0
6.31175-6.31225	2200-2300	31.2-31.8
8.291-8.294	2310-2390	36.43-36.5
8.362-8.366	2655-2900	Above 38.6
8.37625-8.38675	3260-3267	
8.41425-8.41475	3332-3339	
12.29-12.293	3345.8-3358	
12.51975-12.52025	3500-4400	
12.57675-12.57725	4500-5150	
13.36-13.41	5350-5460	
16.42-16.423	7250-7750	
16.69475-16.69525	8025-8500	
16.80425-16.80475		

## 6.6 20dB Bandwidth

Test Configuration:



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 = approximately 1 % to 5 % of the OBW (set 30 kHz), VBW = 3\* RBW, Span=5MHz, Sweep=auto
4. Mark the peak frequency and -20dB (upper and lower) frequency.
5. Repeat above procedures until all frequency measured was complete.

Limit:

N/A

Test Result:

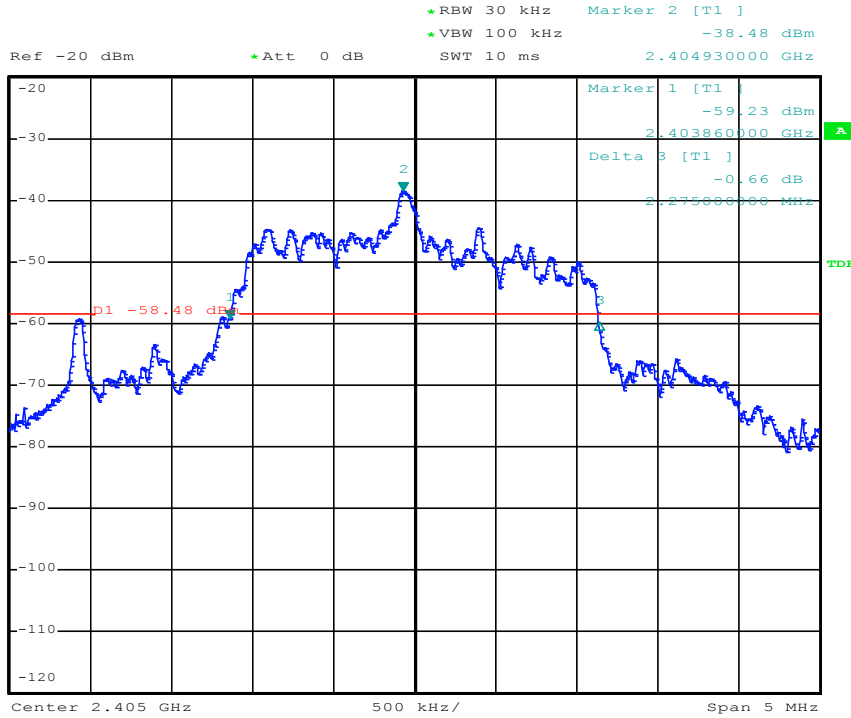
Pass

Test Data:

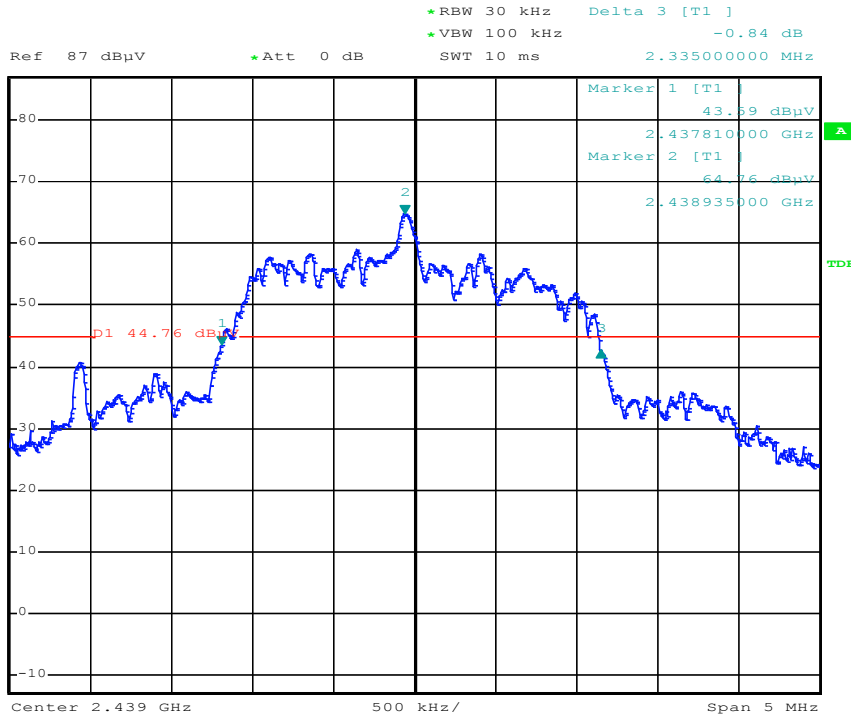
Frequency (MHz)	Bandwidth (MHz)	Result
2405	2.275	PASS
2439	2.335	PASS
2477	2.3	PASS

Test plot as follows:

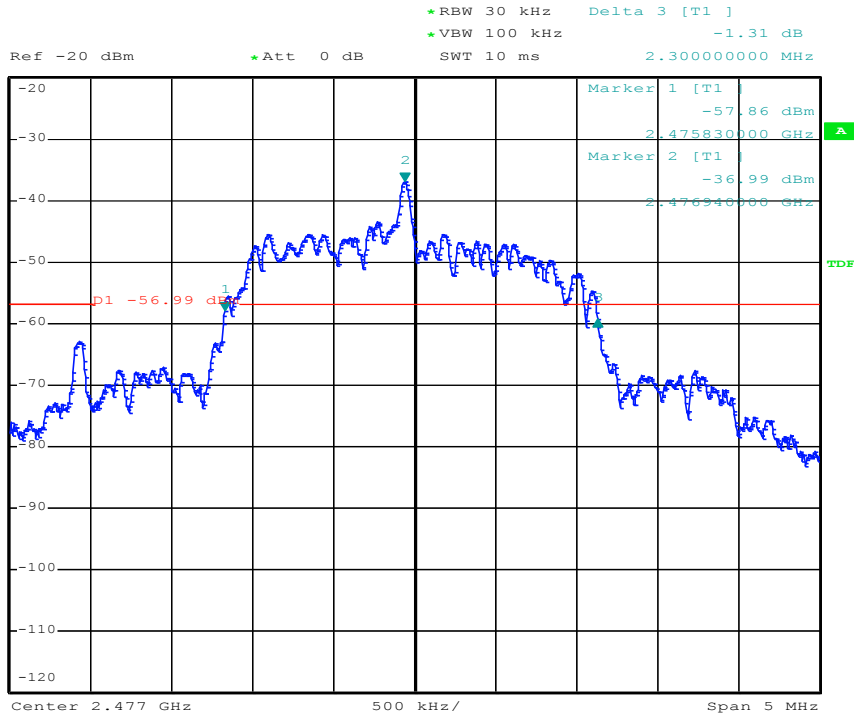
Channel: 2405MHz



Channel: 2439MHz

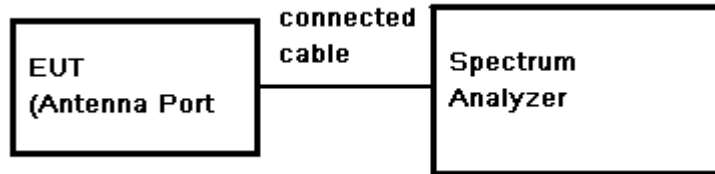


Channel: 2477MHz



## 6.7 99% Occupied Bandwidth

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: Span = approximately 2 to 3 times the 20dB bandwidth, centred on the hopping channel;
3. Set the spectrum analyzer: RBW = approximately 1 % to 5 % of the OBW (set 100 kHz), VBW >= RBW. Sweep = auto; Detector Function = Peak. Trace = Max Hold.
4. Mark the peak frequency and using the 99% OBW function measure the bandwidth.

Test Result:

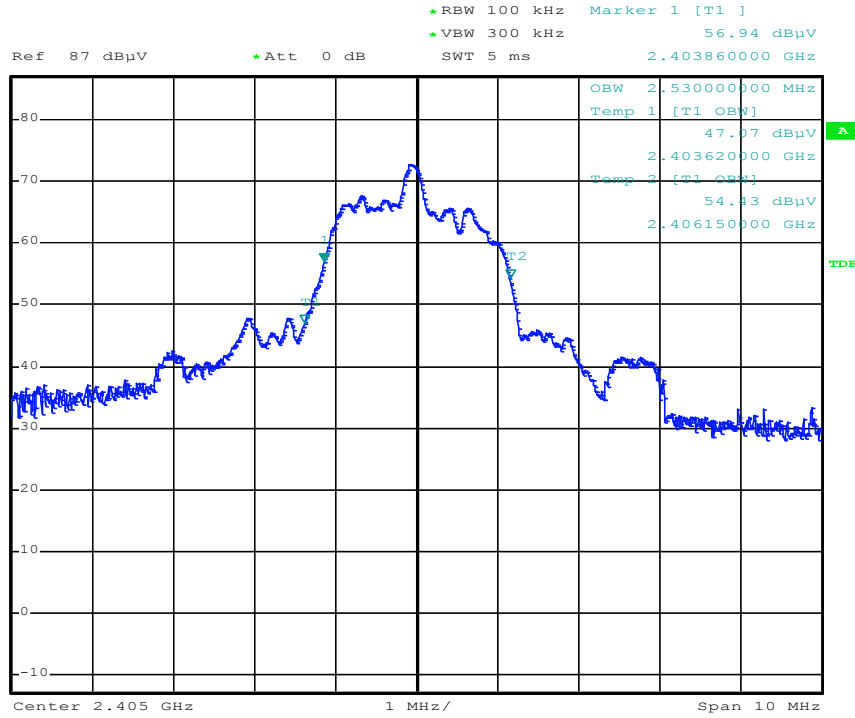
Pass

Test Date:

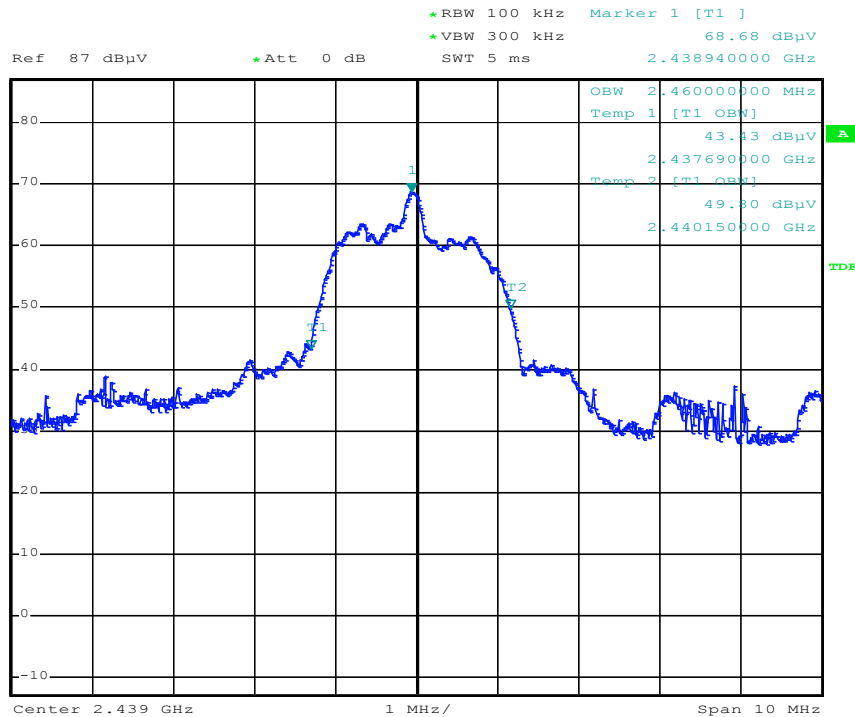
Frequency (MHz)	Bandwidth (MHz)	Result
2405	2.53	PASS
2439	2.46	PASS
2477	2.28	PASS

Test plot as follows:

Channel: 2405MHz



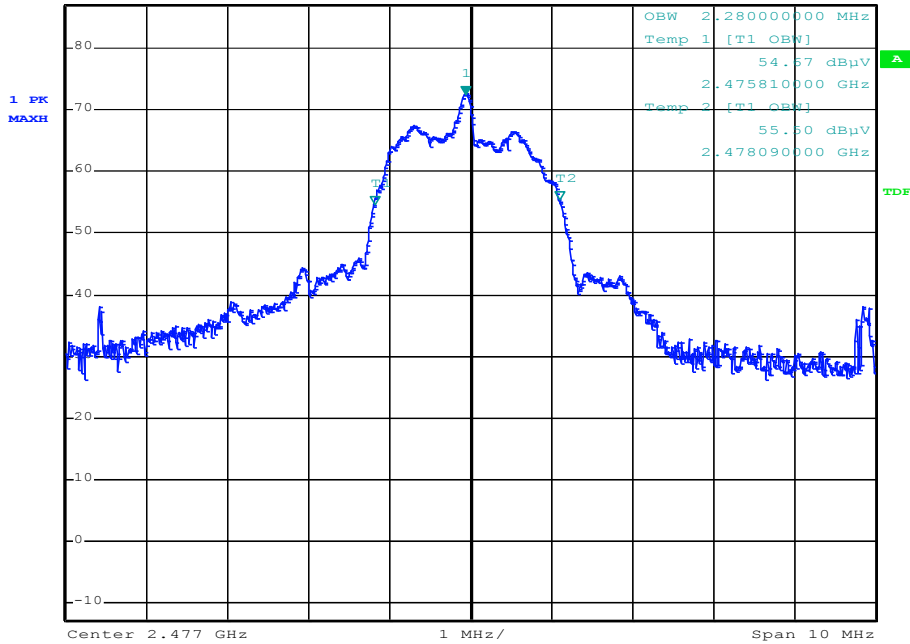
Channel: 2439MHz



Channel: 2477MHz



\*RBW 100 kHz Marker 1 [T1 ]  
\*VBW 300 kHz 72.55 dBμV  
Ref 87 dBμV \*Att 0 dB SWT 5 ms 2.476930000 GHz







## **7 Test Setup Photographs**

Refer to the < Test Setup photos-FCC>.

## **8 EUT Constructional Details**

Refer to the < External Photos > & < Internal Photos>.

**--End of the Report--**