TEST REPORT

FCC Applicant:	Shenzhen Sunricher Technology Limited
Address:	3rd Floor,B building,Jia'an Industrial Building, Liu Xian Third road,No.72 area, Xin'an Street, Baoan District, Shenzhen, China
IC Applicant:	Shenzhen Sunricher Technology Co.,Ltd
Address:	310, Longtaili building No.30,Avenue 4th,High Tech Sience Park, Shenzhen 518000 China
Manufacturer/Factory:	Shenzhen Sunricher Technology Limited
Address:	3rd Floor,B building,Jia'an Industrial Building, Liu Xian Third road,No.72 area, Xin'an Street, Baoan District, Shenzhen, China
Equipment Under Test (EUT)	
Product Name:	FOH Smart Switch
Model No.:	See section 5.1
FCC ID:	2AHST-SRZGP2801K4
IC:	20309-SRZGP2801K4
Applicable standards:	FCC CFR Title 47 Part 15 Subpart C Section 15.247 RSS-Gen Issue 5 RSS-247 Issue 2
Date of sample receipt:	July 14, 2020
Date of Test:	July 15, 2020-August 21, 2020
Date of report issued:	August 21, 2020
Test Result :	PASS *

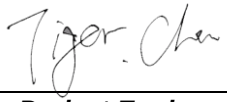
* In the configuration tested, the EUT complied with the standards specified above.

Authorized Signature:

Robinson Lo
Laboratory Manager

2 Version

Version No.	Date	Description
00	*August 21, 2020*	*Original*

Prepared By:  ***Date:*** *August 21, 2020*

Project Engineer

Check By:  ***Date:*** *August 21, 2020*

Reviewer

3 Contents

4 Test Summary

Test Item	Section	Result
Antenna requirement	FCC part 15.203/15.247 (c) RSS-Gen Section 6.8	Pass
AC Power Line Conducted Emission	FCC part 15.207 RSS-Gen Section 8.8	N/A
Conducted Peak Output Power	FCC part 15.247 (b)(3) RSS-247 Section 5.4(d)	Pass
Channel Bandwidth & 99% OCB	FCC part 15.247 (a)(2) RSS-247 Section 5.2(a) RSS-Gen Section 6.7	Pass
Power Spectral Density	FCC part 15.247 (e) RSS-247 Section 5.2(b)	Pass
Band Edge	FCC part 15.247(d) RSS-247 Section 5.5	Pass
Spurious Emission	FCC part 15.205/15.209 RSS-Gen Section 3.3 & 8.9 & 8.10	Pass
Frequency stability	RSS-Gen Section 6.11& Section 8.11	Pass

Pass: The EUT complies with the essential requirements in the standard.

Remark： Test according to ANSI C63.10:2013

4.1 Measurement Uncertainty

Test Item	Frequency Range	Measurement Uncertainty	Notes
Radiated Emission	30MHz-200MHz	3.8039dB	(1)
Radiated Emission	200MHz-1GHz	3.9679dB	(1)
Radiated Emission	1GHz-18GHz	4.29dB	(1)
Radiated Emission	18GHz-40GHz	3.30dB	(1)
AC Power Line Conducted Emission	0.15MHz ~ 30MHz	3.44dB	(1)
Note (1): The measurement uncertainty is for coverage factor of k=2 and a level of confidence of 95%.			

5 General Information

5.1 General Description of EUT

Product Info:	FOH Smart Switch
Test Model No.:	SR-ZGP2801K4-FOH(US)-E
FCC Series Model No.:	SR-ZGP2801K2-DIM(US)，SR-ZGP2801K2-DIM(US)-E， SR-ZGP2801K4-DIM(US)，SR-ZGP2801K4-DIM(US)-E， SR-ZGP2801K4-DIM-G2(US) SR-ZGP2801K4-DIM-G2(US)-E，SR-ZGP2801K4-S4(US) SR-ZGP2801K4-S4(US)-E，SR-ZGP2801K4-DIM-S2(US) SR-ZGP2801K4-DIM-S2(US)-E，SR-ZGP2801K4-FOH(US) SR-ZGP2801K4-CCT(US)，SR-ZGP2801K4-CCT(US)-E SR-ZGP2801K4-5C(US)，SR-ZGP2801K4-5C(US)-E SR-SBP2801K2-DIM(US)，SR-SBP2801K2-DIM(US)-E SR-SBP2801K4-DIM(US)，SR-SBP2801K4-DIM(US)-E SR-SBP2801K4-DIM-G2(US)，SR-SBP2801K4-DIM-G2(US)-E SR-SBP2801K4-S4(US) ，SR-SBP2801K4-S4(US)-E SR-SBP2801K4-DIM-S2(US)，SR-SBP2801K4-DIM-S2(US)-E SR-SBP2801K4-FOS(US)，SR-SBP2801K4-FOS(US)-E SR-SBP2801K4-CCT(US)，SR-SBP2801K4-CCT(US)-E SR-SBP2801K4-5C(US)，SR-SBP2801K4-5C(US)-E RFDE2801Z, RFDE2802Z, RFDE2801Z300, RFDE2801Z500, RFD2801Z RFD2802Z, RFD2801Z300, RFD2801Z500 SR-ZGP2801XX-YYYYYYYY-XXXXXXXX-ZZZ, YYYYYYYY, XXXXXXXX ZZZ indicates the customer code for market purpose, it could be alphanumeric characters or blank. SR-SBP2801XX-YYYYYYYY-XXXXXXXX-ZZZ, YYYYYYYY, XXXXXXXX ZZZ indicates the customer code for market purpose, it could be alphanumeric characters or blank. SR-BL2801XX-YYYYYYYY-XXXXXXXX-ZZZ, YYYYYYYY, XXXXXXXX, ZZZ indicates the customer code for market purpose, it could be alphanumeric characters or blank.
IC Series Model No.:	SR-ZGP2801K2-DIM(US)，SR-ZGP2801K2-DIM(US)-E, SR-ZGP2801K4-DIM(US), SR-ZGP2801K4-DIM(US)-E, SR-ZGP2801K4-DIM-G2(US), SR-ZGP2801K4-DIM-G2(US)-E, SR-ZGP2801K4-S4(US), SR-ZGP2801K4-S4(US)-E,

	SR-ZGP2801K4-DIM-S2(US), SR-ZGP2801K4-DIM-S2(US)-E, SR-ZGP2801K4-FOH(US), SR-ZGP2801K4-CCT(US), SR-ZGP2801K4-CCT(US)-E, SR-ZGP2801K4-5C(US), SR-ZGP2801K4-5C(US)-E, SR-SBP2801K2-DIM(US), SR-SBP2801K2-DIM(US)-E, SR-SBP2801K4-DIM(US), SR-SBP2801K4-DIM(US)-E, SR-SBP2801K4-DIM-G2(US), SR-SBP2801K4-DIM-G2(US)-E, SR-SBP2801K4-S4(US), SR-SBP2801K4-S4(US)-E, SR-SBP2801K4-DIM-S2(US), SR-SBP2801K4-DIM-S2(US)-E, SR-SBP2801K4-FOS(US), SR-SBP2801K4-FOS(US)-E, SR-SBP2801K4-CCT(US), SR-SBP2801K4-CCT(US)-E, SR-SBP2801K4-5C(US), SR-SBP2801K4-5C(US)-E ,RFDE2801Z, RFDE2802Z, RFDE2801Z300, RFDE2801Z500, RFD2801Z, RFD2802Z, RFD2801Z300, RFD2801Z500
Remark:All above models are identical in the same PCB layout, interior structure and electrical circuits. The differences are appearance color and model name for commercial purpose.	
Serial No.:	N/A
Hardware version:	V1.0
Software version:	V1.0
Test sample(s) ID:	GTS202007000130-1
Sample(s) Status	Engineer sample
Operation Frequency:	2405MHz~2480MHz
Channel numbers:	16
Channel separation:	5MHz
Modulation type:	O-QPSK
Antenna Type:	PCB Antenna
Antenna gain:	0dBi (Declared by manufacturer)
Power supply:	DC 3V Lithium Cell CR2430

The New battery was used during test.

Operation Frequency each of channel							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
11	2405MHz	15	2425MHz	19	2445MHz	23	2465MHz
12	2410MHz	16	2430MHz	20	2450MHz	24	2470MHz
13	2415MHz	17	2435MHz	21	2455MHz	25	2475MHz
14	2420MHz	18	2440MHz	22	2460MHz	26	2480MHz

Note:

In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

Channel	Frequency
The lowest channel	2405MHz
The middle channel	2440MHz
The Highest channel	2480MHz

5.2 Test mode

Transmitting mode	Keep the EUT in continuously transmitting mode.
Remark: New battery is used during all test	

5.3 Description of Support Units

None

5.4 Deviation from Standards

None.

5.5 Abnormalities from Standard Conditions

None.

5.6 Test Facility

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

● **FCC —Registration No.: 381383**

Global United Technology Services Co., Ltd., Shenzhen EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in files. Registration 381383.

● **IC —Registration No.: 9079A**

The 3m Semi-anechoic chamber of Global United Technology Services Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 9079A

● **NVLAP (LAB CODE:600179-0)**

Global United Technology Services Co., Ltd., is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP). LAB CODE:600179-0

5.7 Test Location

All tests were performed at:
Global United Technology Services Co., Ltd. Address: No. 123-128, Tower A, Jinyuan Business Building, No.2, Laodong Industrial Zone, Xixiang Road, Baoan District, Shenzhen, Guangdong, China 518102 Tel: 0755-27798480 Fax: 0755-27798960

5.8 Additional instructions

Test Software	Test command provide by manufacturer.
Power level setup	Default

6 Test Instruments list

Radiated Emission:						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal.Date (mm-dd-yy)**	**Cal.Due date (mm-dd-yy)**
1	3m Semi- Anechoic Chamber	ZhongYu Electron	9.2(L)*6.2(W)* 6.4(H)	GTS250	July. 02 2020	July. 01 2025
2	Control Room	ZhongYu Electron	6.2(L)*2.5(W)* 2.4(H)	GTS251	N/A	N/A
3	EMI Test Receiver	Rohde & Schwarz	ESU26	GTS203	June. 25 2020	June. 24 2021
4	BiConiLog Antenna	SCHWARZBECK MESS-ELEKTRONIK	VULB9163	GTS214	June. 25 2020	June. 24 2021
5	Double -ridged waveguide horn	SCHWARZBECK MESS-ELEKTRONIK	BBHA 9120 D	GTS208	June. 25 2020	June. 24 2021
6	Horn Antenna	ETS-LINDGREN	3160	GTS217	June. 25 2020	June. 24 2021
7	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
8	Coaxial Cable	GTS	N/A	GTS213	June. 25 2020	June. 24 2021
9	Coaxial Cable	GTS	N/A	GTS211	June. 25 2020	June. 24 2021
10	Coaxial cable	GTS	N/A	GTS210	June. 25 2020	June. 24 2021
11	Coaxial Cable	GTS	N/A	GTS212	June. 25 2020	June. 24 2021
12	Amplifier(100kHz-3GHz)	HP	8347A	GTS204	June. 25 2020	June. 24 2021
13	Amplifier(2GHz-20GHz)	HP	84722A	GTS206	June. 25 2020	June. 24 2021
14	Amplifier (18-26GHz)	Rohde & Schwarz	AFS33-18002 650-30-8P-44	GTS218	June. 25 2020	June. 24 2021
15	Band filter	Amindeon	82346	GTS219	June. 25 2020	June. 24 2021
16	Power Meter	Anritsu	ML2495A	GTS540	June. 25 2020	June. 24 2021
17	Power Sensor	Anritsu	MA2411B	GTS541	June. 25 2020	June. 24 2021
18	Wideband Radio Communication Tester	Rohde & Schwarz	CMW500	GTS575	June. 25 2020	June. 24 2021
19	Splitter	Agilent	11636B	GTS237	June. 25 2020	June. 24 2021
20	Loop Antenna	ZHINAN	ZN30900A	GTS534	June. 25 2020	June. 24 2021
21	Breitband hornantenne	SCHWARZBECK	BBHA 9170	GTS579	Oct. 19 2019	Oct. 18 2020
22	Amplifier	TDK	PA-02-02	GTS574	Oct. 19 2019	Oct. 18 2020
23	Amplifier	TDK	PA-02-03	GTS576	Oct. 19 2019	Oct. 18 2020
24	PSA Series Spectrum Analyzer	Rohde & Schwarz	FSP	GTS578	June. 25 2020	June. 24 2021

RF Conducted Test:						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Serial No.**	**Cal.Date (mm-dd-yy)**	**Cal.Due date (mm-dd-yy)**
1	MXA Signal Analyzer	Agilent	N9020A	GTS566	June. 25 2020	June. 24 2021
2	EMI Test Receiver	R&S	ESCI 7	GTS552	June. 25 2020	June. 24 2021
3	Spectrum Analyzer	Agilent	E4440A	GTS533	June. 25 2020	June. 24 2021
4	MXG vector Signal Generator	Agilent	N5182A	GTS567	June. 25 2020	June. 24 2021
5	ESG Analog Signal Generator	Agilent	E4428C	GTS568	June. 25 2020	June. 24 2021
6	USB RF Power Sensor	DARE	RPR3006W	GTS569	June. 25 2020	June. 24 2021
7	RF Switch Box	Shongyi	RFSW3003328	GTS571	June. 25 2020	June. 24 2021
8	Programmable Constant Temp & Humi Test Chamber	WEWON	WHTH-150L-40-880	GTS572	June. 25 2020	June. 24 2021

General used equipment:						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal.Date (mm-dd-yy)**	**Cal.Due date (mm-dd-yy)**
1	Humidity/ Temperature Indicator	KTJ	TA328	GTS243	June. 25 2020	June. 24 2021
2	Barometer	ChangChun	DYM3	GTS255	June. 25 2020	June. 24 2021

7 Test results and Measurement Data

7.1 Antenna requirement

Standard requirement:	FCC Part15 C Section 15.203 /247(c)

FCC Part 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(c) (1)(i) requirement:

(i) Systems operating in the 2400-2483.5 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6dBi.

RSS-Gen 6.8

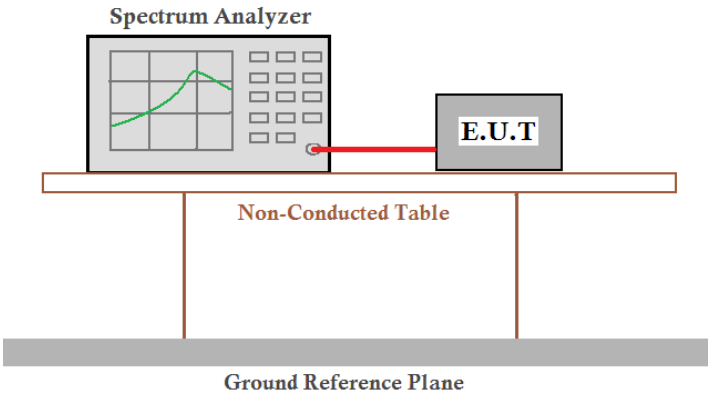
The applicant for equipment certification shall provide a list of all antenna types that may be used with the transmitter, where applicable (i.e. for transmitters with detachable antenna), indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna. The test report shall demonstrate the compliance of the transmitter with the limit for maximum equivalent isotropically radiated power (e.i.r.p.) specified in the applicable RSS, when the transmitter is equipped with any antenna type, selected from this list.

For expediting the testing, measurements may be performed using only the antenna with highest gain of each combination of transmitter and antenna type, with the transmitter output power set at the maximum level. However, the transmitter shall comply with the applicable requirements under all operational conditions and when in combination with any type of antenna from the list provided in the test report (and in the notice to be included in the user manual, provided below).

EUT Antenna:

The antenna is PCB antenna, the best case gain of the antenna is 0dBi, Reference to the appendix II for details.

7.2 Conducted Peak Output Power

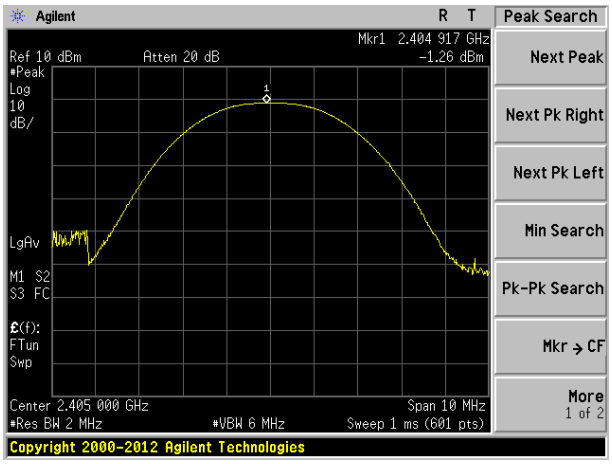
Test Requirement:	FCC Part15 C Section 15.247 (b)(3) RSS-247 Clause 5.4(d)
Test Method:	ANSI C63.10:2013 and KDB558074 D01 DTS Meas Guidance v05or02
Limit:	30dBm (36dBm e.i.r.p for IC requirement)
Test setup:	
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Measurement Data

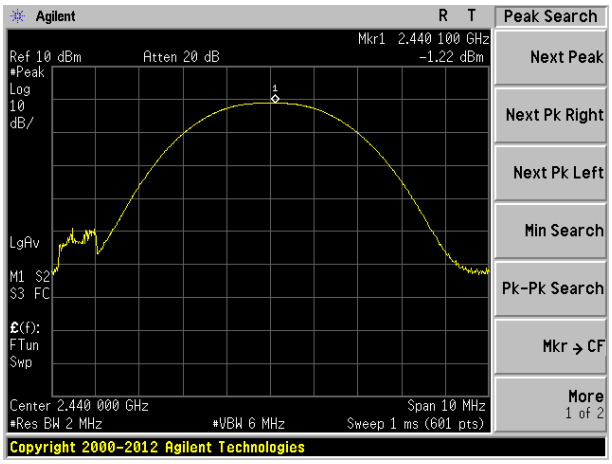
Frequency (MHz)	Peak Output Power (dBm)	Limit(dBm)	Result
2405	-1.26	30	PASS
2440	-1.22		
2480	-1.58		

Frequency (MHz)	E.I.R.P(dBm)	Limit(dBm)	Result
2405	-1.26	36	PASS
2440	-1.22		
2480	-1.58		

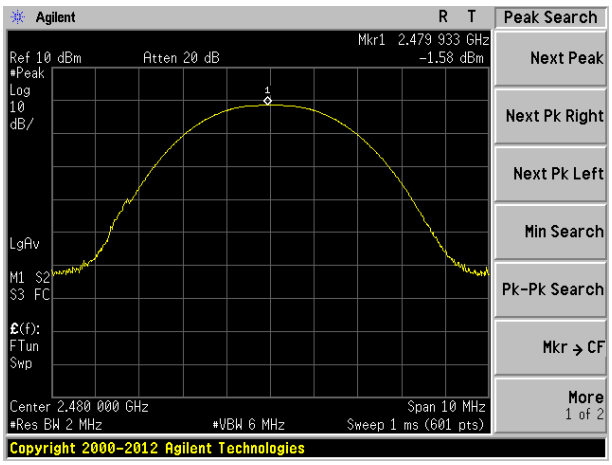
Test plot as follows:



2405MHz

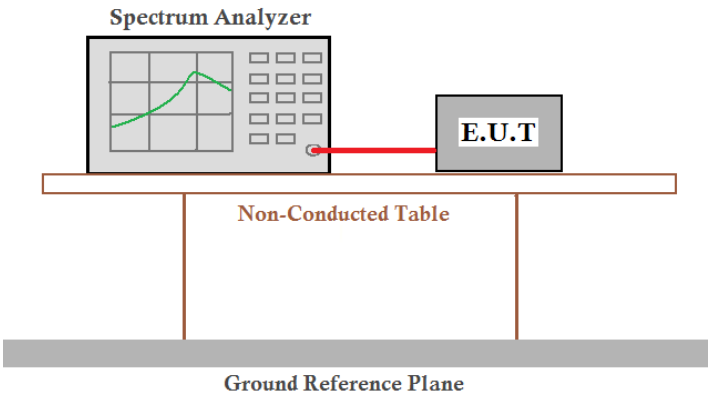


2440MHz



2480MHz

7.3 Channel Bandwidth & 99% Occupy Bandwidth

Test Requirement:	FCC Part15 C Section 15.247 (a)(2) RSS-247 Clause 5.2(a)
Test Method:	ANSI C63.10:2013 and KDB558074 D01 DTS Meas Guidance v05or02
Limit:	>500KHz
Test setup:	
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

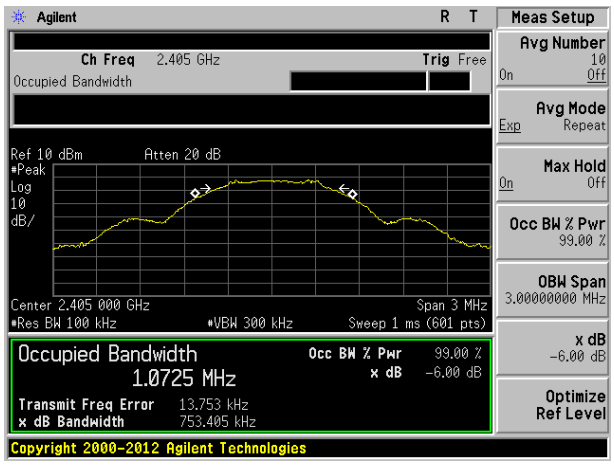
Measurement Data

Frequency (MHz)	Channel Bandwidth (MHz)	Limit(KHz)	Result
2405	0.753	>500	Pass
2440	0.720		
2480	0.723		

Frequency (MHz)	99% Occupy Bandwidth (MHz)	Result
2405	1.0539	Pass
2440	1.0672	
2480	1.0608	

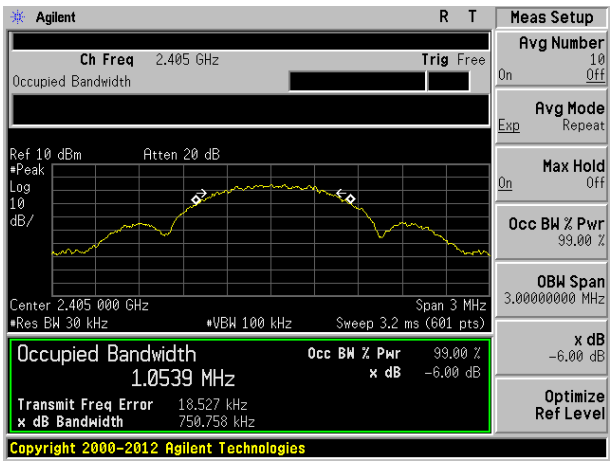
Test plot as follows:

-6dB bandwidth

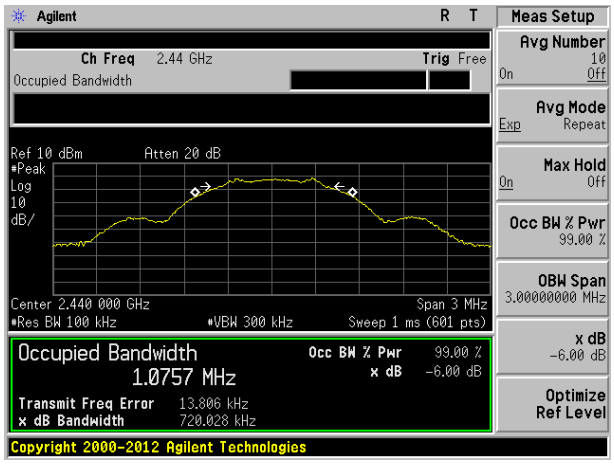


2405MHz

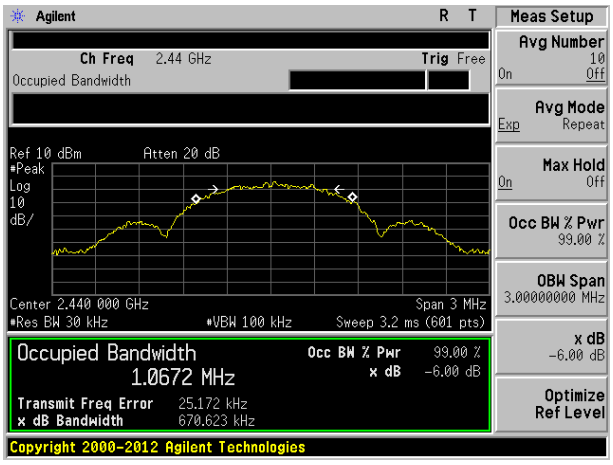
99% bandwidth



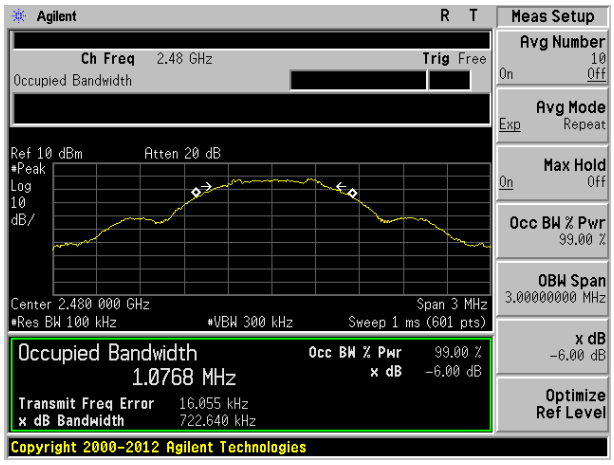
2405MHz



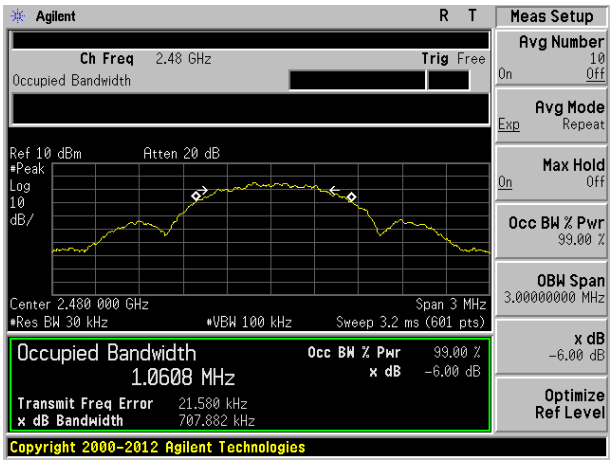
2440MHz



2440MHz

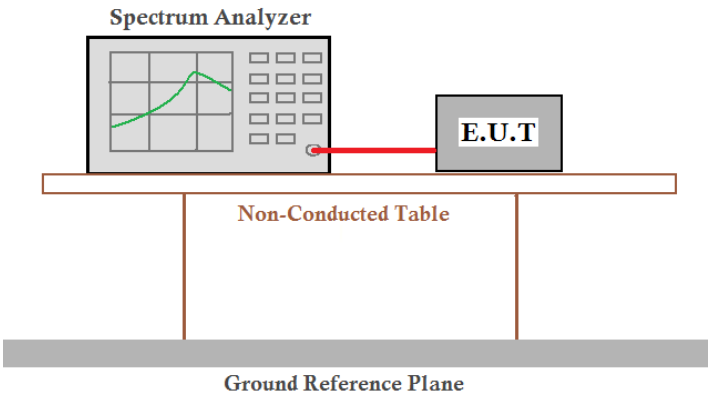


2480MHz



2480MHz

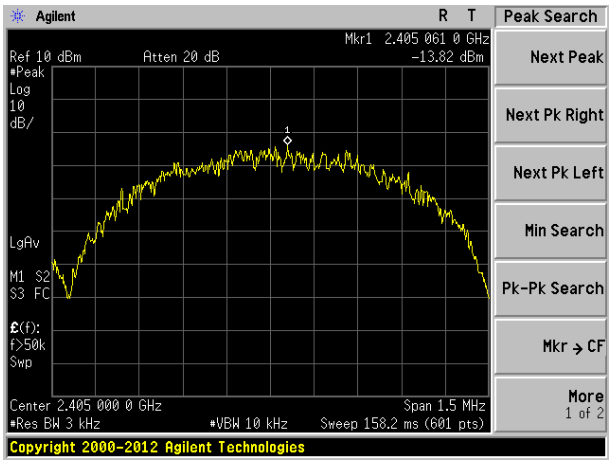
7.4 Power Spectral Density

Test Requirement:	FCC Part15 C Section 15.247 (e) RSS-247 Clause 5.2(b)
Test Method:	ANSI C63.10:2013 and KDB558074 D01 DTS Meas Guidance v05or02
Limit:	8dBm/3kHz
Test setup:	
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

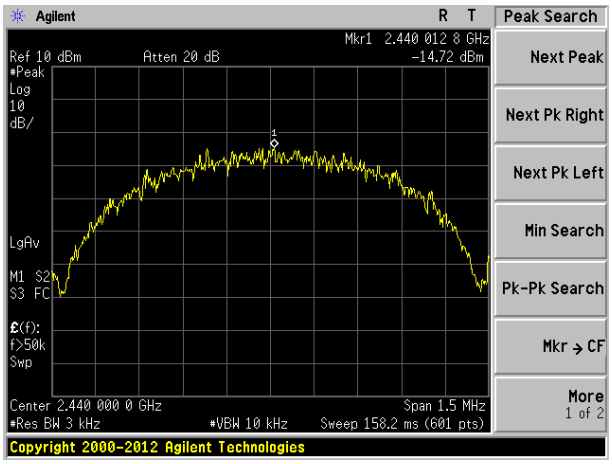
Measurement Data

Frequency (MHz)	Power Spectral Density (dBm)	Limit (dBm/3kHz)	Result
2405	-13.82	8.00	Pass
2440	-14.72		
2480	-15.03		

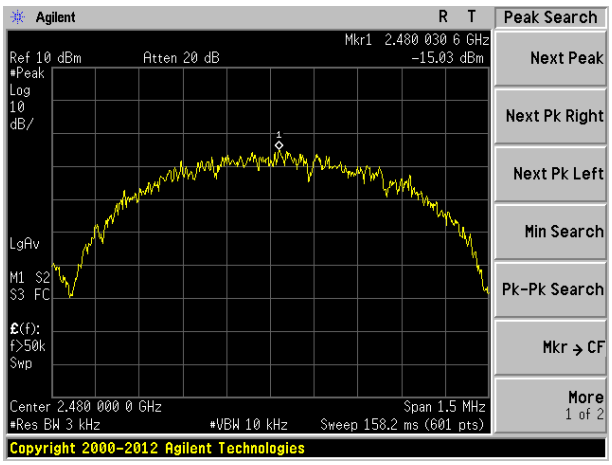
Test plot as follows:



2405MHz



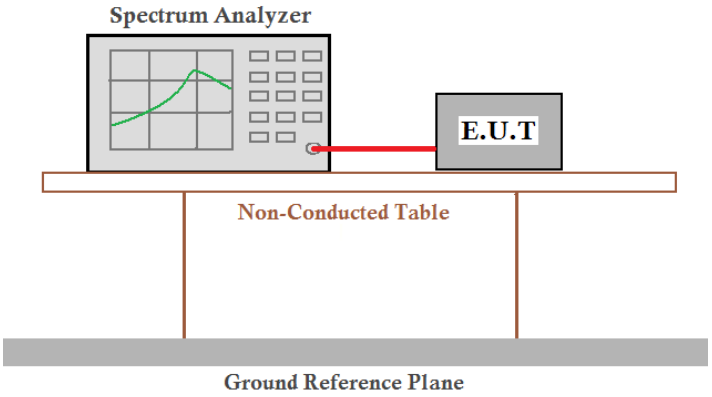
2440MHz



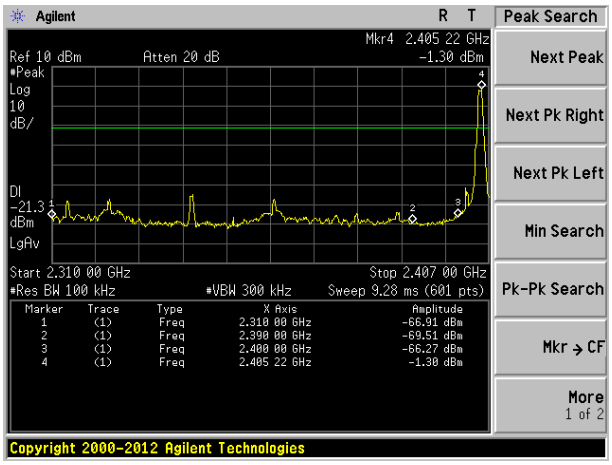
2480MHz

7.5 Band edges

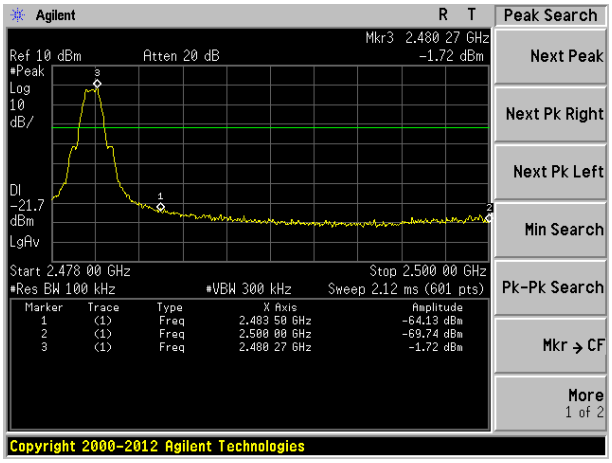
7.5.1 Conducted Emission Method

Test Requirement:	FCC Part15 C Section 15.247 (d) RSS-247 Clause 5.5 & RSS-Gen 8.9
Test Method:	ANSI C63.10:2013 and KDB558074 D01 DTS Meas Guidance v05or02
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum 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.
Test setup:	
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Test plot as follows:

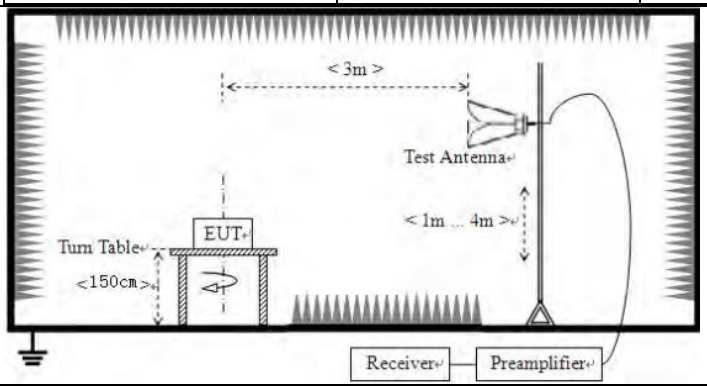


Lowest channel



Highest channe

7.5.2 Radiated Emission Method

<table>
<tr><td>Test Requirement:</td><td>FCC Part15 C Section 15.209 and 15.205
RSS-Gen Clause 8.9&8.10</td></tr>
<tr><td>Test Method:</td><td>ANSI C63.10:2013 and RSS-Gen</td></tr>
<tr><td>Test Frequency Range:</td><td>All of the restrict bands were tested, only the worst band’s (2310MHz to 2500MHz) data was showed.</td></tr>
<tr><td>Test site:</td><td>Measurement Distance: 3m</td></tr>
<tr><td>Receiver setup:</td><td>
<table>
<tr><td>Frequency</td><td>Detector</td><td>RBW</td><td>VBW</td><td>Value</td></tr>
<tr><td rowspan="2">Above 1GHz</td><td>Peak</td><td>1MHz</td><td>3MHz</td><td>Peak</td></tr>
<tr><td>RMS</td><td>1MHz</td><td>3MHz</td><td>Average</td></tr>
</table>
</td></tr>
<tr><td>Limit:</td><td>
<table>
<tr><td>Frequency</td><td>Limit (dBuV/m @3m)</td><td>Value</td></tr>
<tr><td rowspan="2">Above 1GHz</td><td>54.00</td><td>Average</td></tr>
<tr><td>74.00</td><td>Peak</td></tr>
</table>
</td></tr>
<tr><td>Test setup:</td><td> 
</td></tr>
<tr><td>Test Procedure:</td><td>1. The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation.
2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
3. 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.
4. 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 and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading.
5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
6. 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.
7. The radiation measurements are performed in X, Y, Z axis positioning. And found the Y axis positioning which it is worse case, only the test worst case mode is recorded in the report.</td></tr>
<tr><td>Test Instruments:</td><td>Refer to section 6.0 for details</td></tr>
</table>

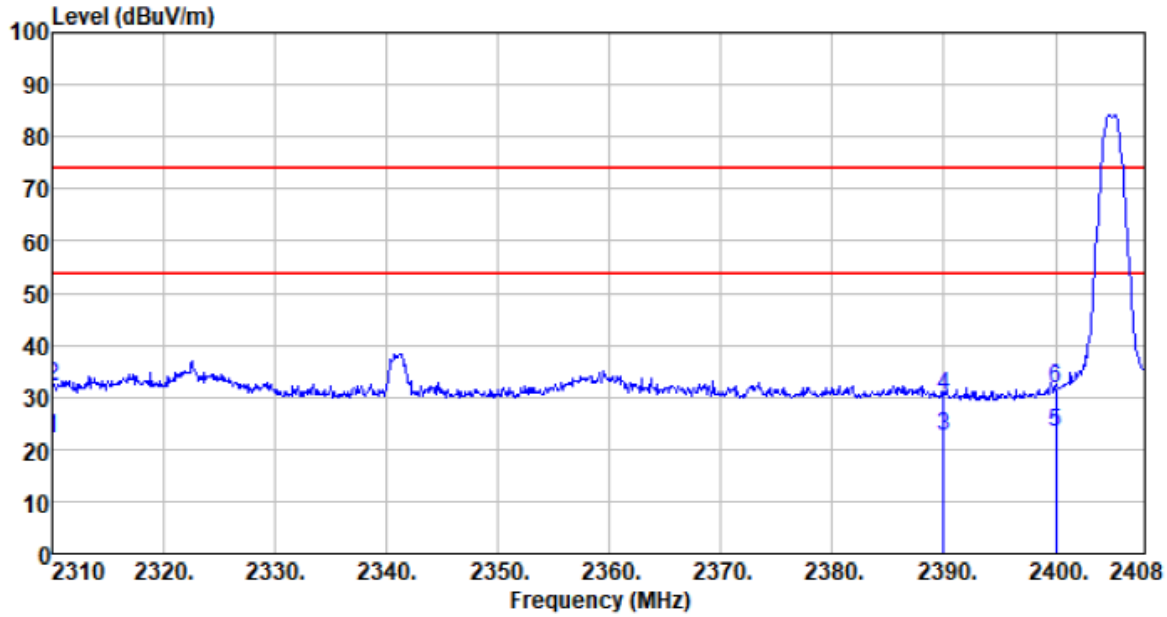
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Measurement data:

Remark: The pre-test were performed on lowest, middle and highest frequencies, only the worst case's (lowest and highest frequencies) data was showed.

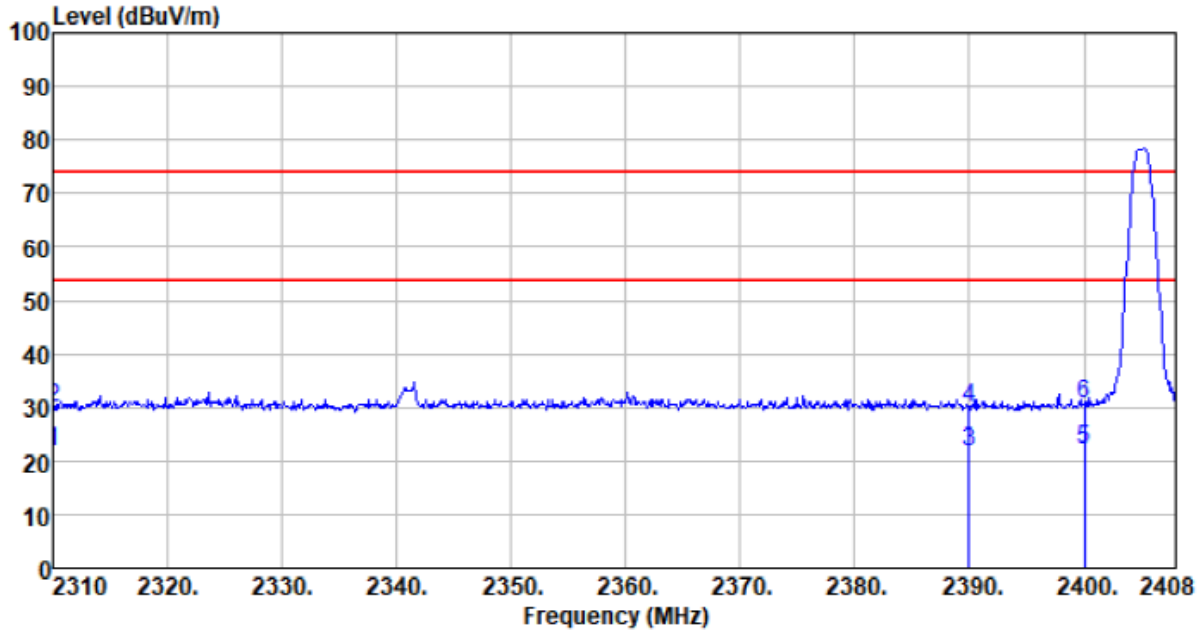
Test channel:	2405MHz

Horizontal:



Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
2310.000	29.04	27.14	2.81	36.79	22.20	54.00	-31.80	Average
2310.000	38.81	27.14	2.81	36.79	31.97	74.00	-42.03	Peak
2390.000	28.91	27.37	2.91	36.85	22.34	54.00	-31.66	Average
2390.000	36.99	27.37	2.91	36.85	30.42	74.00	-43.58	Peak
2400.000	29.85	27.41	2.91	36.86	23.31	54.00	-30.69	Average
2400.000	38.38	27.41	2.91	36.86	31.84	74.00	-42.16	Peak

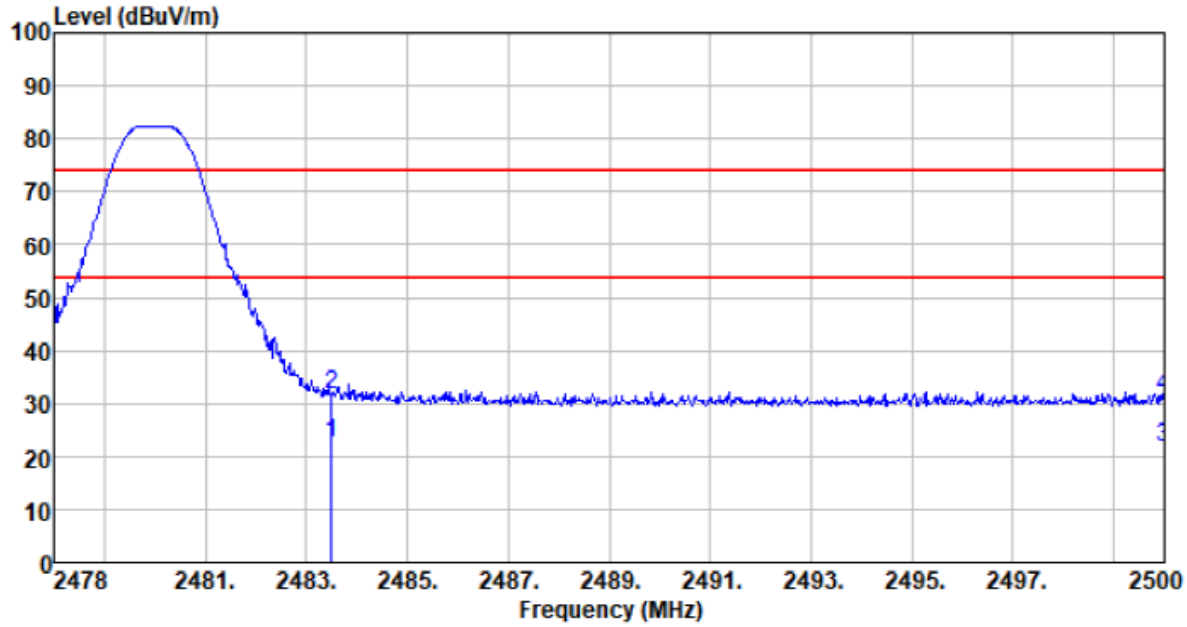
Vertical:



Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
2310.000	28.75	27.14	2.81	36.79	21.91	54.00	-32.09	Average
2310.000	36.78	27.14	2.81	36.79	29.94	74.00	-44.06	Peak
2390.000	28.27	27.37	2.91	36.85	21.70	54.00	-32.30	Average
2390.000	36.53	27.37	2.91	36.85	29.96	74.00	-44.04	Peak
2400.000	28.76	27.41	2.91	36.86	22.22	54.00	-31.78	Average
2400.000	37.07	27.41	2.91	36.86	30.53	74.00	-43.47	Peak

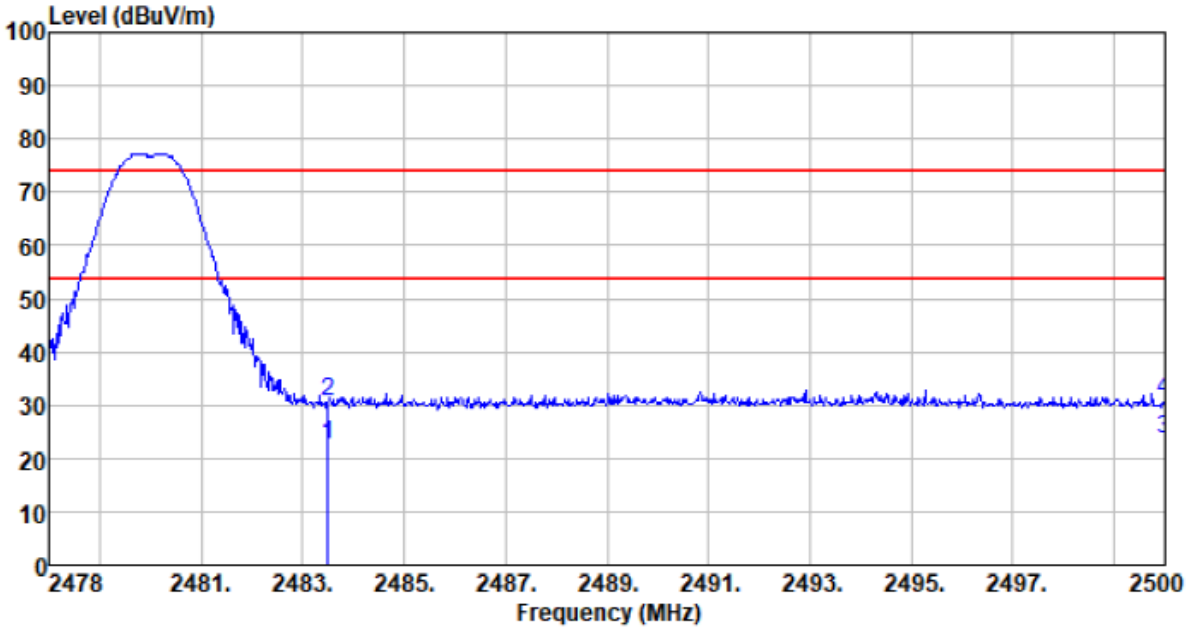
Test channel:	2480MHz

Horizontal:



Freq	Reading level	Antenna factor	Cable loss	Preamp factor	level	Limit level	Over limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
2483.500	28.80	27.66	2.99	36.93	22.52	54.00	-31.48	Average
2483.500	38.08	27.66	2.99	36.93	31.80	74.00	-42.20	Peak
2500.000	27.97	27.70	3.01	36.94	21.74	54.00	-32.26	Average
2500.000	37.50	27.70	3.01	36.94	31.27	74.00	-42.73	Peak

Vertical:



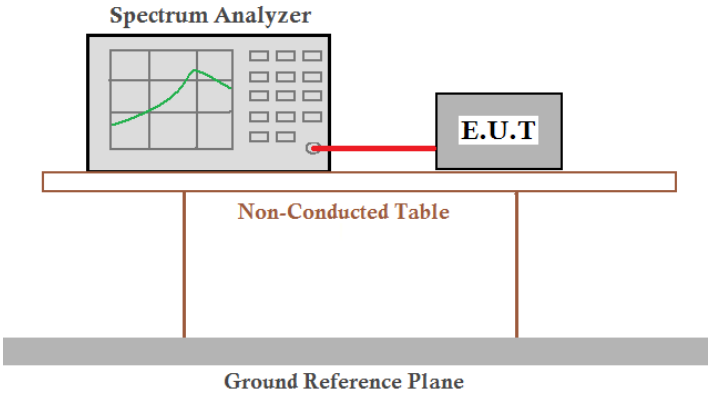
Freq	Reading level	Antenna factor	Cable loss	Preamp factor	level	Limit level	Over limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
2483.500	28.94	27.66	2.99	36.93	22.66	54.00	-31.34	Average
2483.500	37.00	27.66	2.99	36.93	30.72	74.00	-43.28	Peak
2500.000	29.69	27.70	3.01	36.94	23.46	54.00	-30.54	Average
2500.000	37.17	27.70	3.01	36.94	30.94	74.00	-43.06	Peak

Remark:

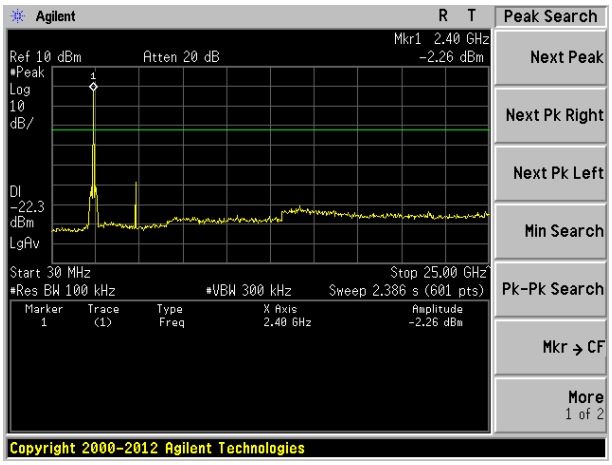
1. *Final Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor*
2. *The emission levels of other frequencies are very lower than the limit and not show in test report.*

7.6 Spurious Emission

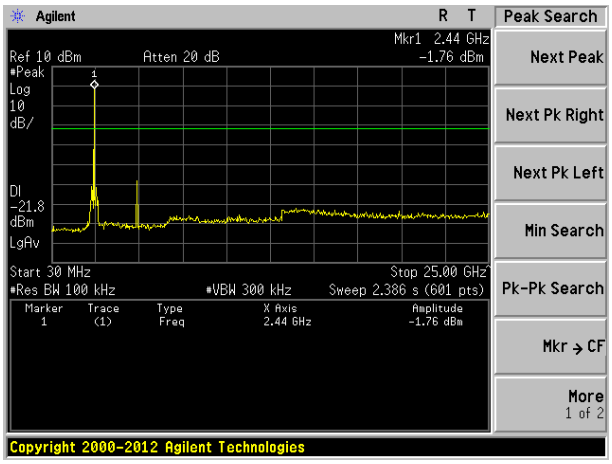
7.6.1 Conducted Emission Method

Test Requirement:	FCC Part15 C Section 15.247 (d) RSS-247 Clause 5.5
Test Method:	ANSI C63.10:2013 and KDB558074 D01 DTS Meas Guidance v05or02
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum 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.
Test setup:	
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

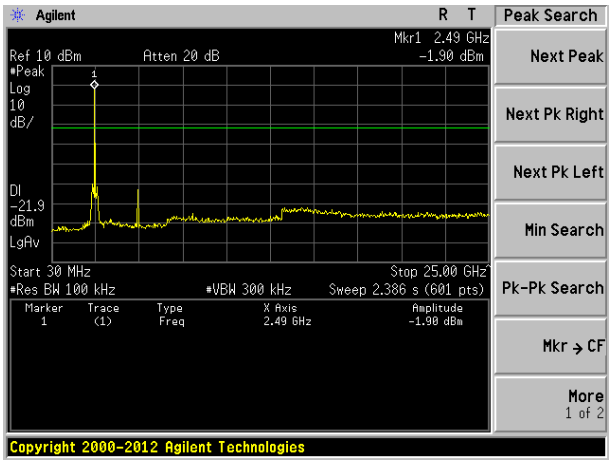
Test plot as follows:



Lowest channel



Middle channel

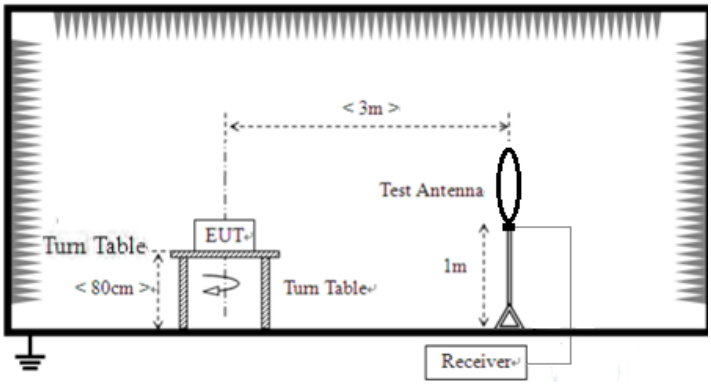
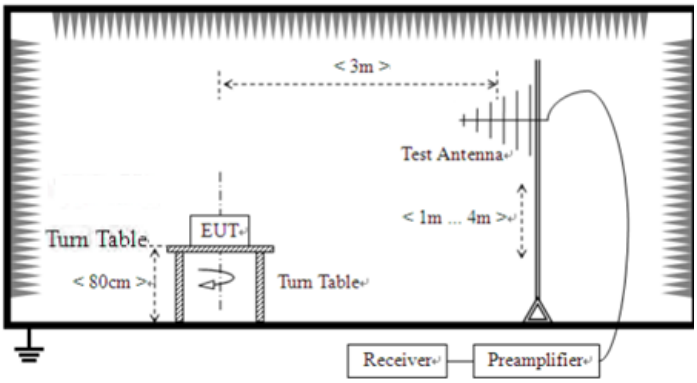
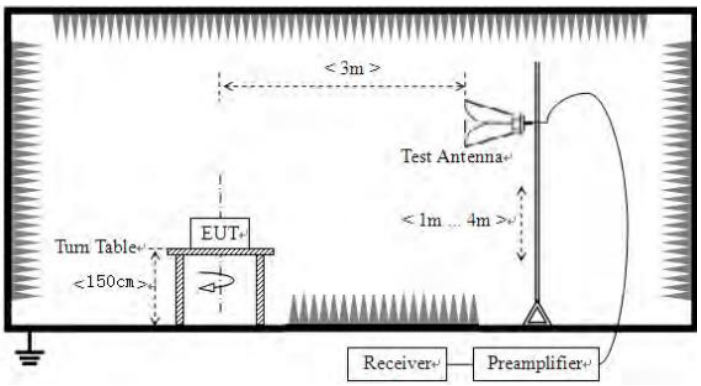


Highest channe

7.6.2 Radiated Emission Method

<table>
<tr><td>Test Requirement:</td><td>FCC Part15 C Section 15.209
RSS-Gen Clause 8.9&8.10</td></tr>
<tr><td>Test Method:</td><td>ANSI C63.10:2013 and RSS-Gen</td></tr>
<tr><td>Test Frequency Range:</td><td>9kHz to 25GHz</td></tr>
<tr><td>Test site:</td><td>Measurement Distance: 3m</td></tr>
<tr><td>Receiver setup:</td><td>
<table>
<tr><th>Frequency</th><th>Detector</th><th>RBW</th><th>VBW</th><th>Value</th></tr>
<tr><td>9KHz-150KHz</td><td>Quasi-peak</td><td>200Hz</td><td>600Hz</td><td>Quasi-peak</td></tr>
<tr><td>150KHz-30MHz</td><td>Quasi-peak</td><td>9KHz</td><td>30KHz</td><td>Quasi-peak</td></tr>
<tr><td>30MHz-1GHz</td><td>Quasi-peak</td><td>120KHz</td><td>300KHz</td><td>Quasi-peak</td></tr>
<tr><td rowspan="2">Above 1GHz</td><td>Peak</td><td>1MHz</td><td>3MHz</td><td>Peak</td></tr>
<tr><td>Peak</td><td>1MHz</td><td>10Hz</td><td>Average</td></tr>
</table>
</td></tr>
<tr><td>FCC Limit:</td><td>
<table>
<tr><th>Frequency (MHz)</th><th>Field strength (microvolts/meter)</th><th>Measurement distance (meters)</th></tr>
<tr><td>0.009-0.490</td><td>2400/F(kHz)</td><td>300</td></tr>
<tr><td>0.490-1.705</td><td>24000/F(kHz)</td><td>30</td></tr>
<tr><td>1.705-30.0</td><td>30</td><td>30</td></tr>
<tr><td>30-88</td><td>100**</td><td>3</td></tr>
<tr><td>88-216</td><td>150**</td><td>3</td></tr>
<tr><td>216-960</td><td>200**</td><td>3</td></tr>
<tr><td>Above 960</td><td>500</td><td>3</td></tr>
</table>

The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.
</td></tr>
<tr><td>IC Limit:</td><td>
Table 5 – General field strength limits at frequencies above 30 MHz
<table>
<tr><th>Frequency
(MHz)</th><th>Field strength
(µV/m at 3 m)</th></tr>
<tr><td>30 – 88</td><td>100</td></tr>
<tr><td>88 – 216</td><td>150</td></tr>
<tr><td>216 – 960</td><td>200</td></tr>
<tr><td>Above 960</td><td>500</td></tr>
</table>
Table 6 – General field strength limits at frequencies below 30 MHz
<table>
<tr><th>Frequency</th><th>Magnetic field strength (H-Field)
(µA/m)</th><th>Measurement distance
(m)</th></tr>
<tr><td>9 - 490 kHz [1]</td><td>6.37/F (F in kHz)</td><td>300</td></tr>
<tr><td>490 - 1705 kHz</td><td>63.7/F (F in kHz)</td><td>30</td></tr>
<tr><td>1.705 - 30 MHz</td><td>0.08</td><td>30</td></tr>
</table>
Note 1: The emission limits for the ranges 9-90 kHz and 110-490 kHz are based on measurements employing a linear average detector.
</td></tr>
</table>

Test setup:	Below 30MHz  Below 1GHz  Above 1GHz 
Test Procedure:	1. The EUT was placed on the top of a rotating table (0.8m for below 1G and 1.5m for above 1G) above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation. 2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

	3. 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. 4. 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 and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading. 5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. 6. 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.					
Test Instruments:	Refer to section 6.0 for details					
Test mode:	Refer to section 5.2 for details					
Test environment:	Temp.:	25 °C	Humid.:	52%	Press.:	1012mbar
Test voltage:	DC 3V					
Test results:	Pass					

Measurement data:

■ Below 30MHz

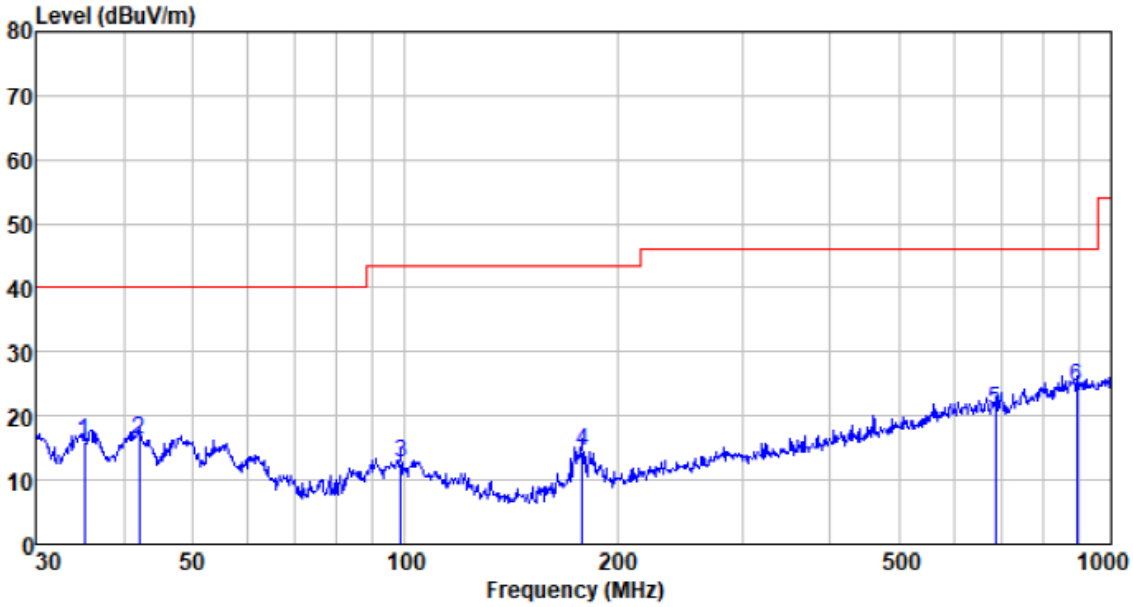
The emission from 9 kHz to 30MHz was pre-tested and found the result was 20dB lower than the limit, and according to 15.31(o), the test result no need to reported.

Remark:

Pre-scan all kind of the place mode (X-axis, Y-axis, Z-axis), and found the Y-axis which it is worse case.

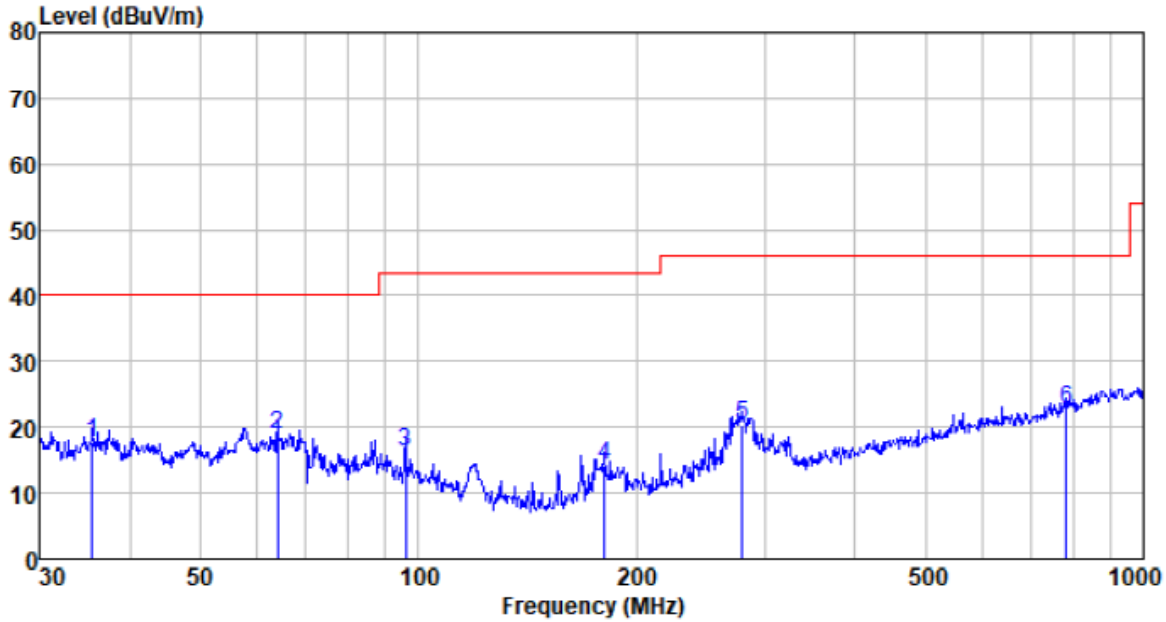
■ **Below 1GHz**

Horizontal:



Freq	Reading level	Antenna factor	Cable loss	Preamp factor	level	Limit level	Over limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
35.128	39.32	11.33	0.61	35.36	15.90	40.00	-24.10	QP
42.007	39.19	12.22	0.69	35.78	16.32	40.00	-23.68	QP
98.833	36.11	12.06	1.18	36.71	12.64	43.50	-30.86	QP
178.133	41.14	8.83	1.73	37.23	14.47	43.50	-29.03	QP
684.745	35.01	19.58	4.04	37.62	21.01	46.00	-24.99	QP
893.857	34.93	22.23	4.83	37.60	24.39	46.00	-21.61	QP

Vertical:

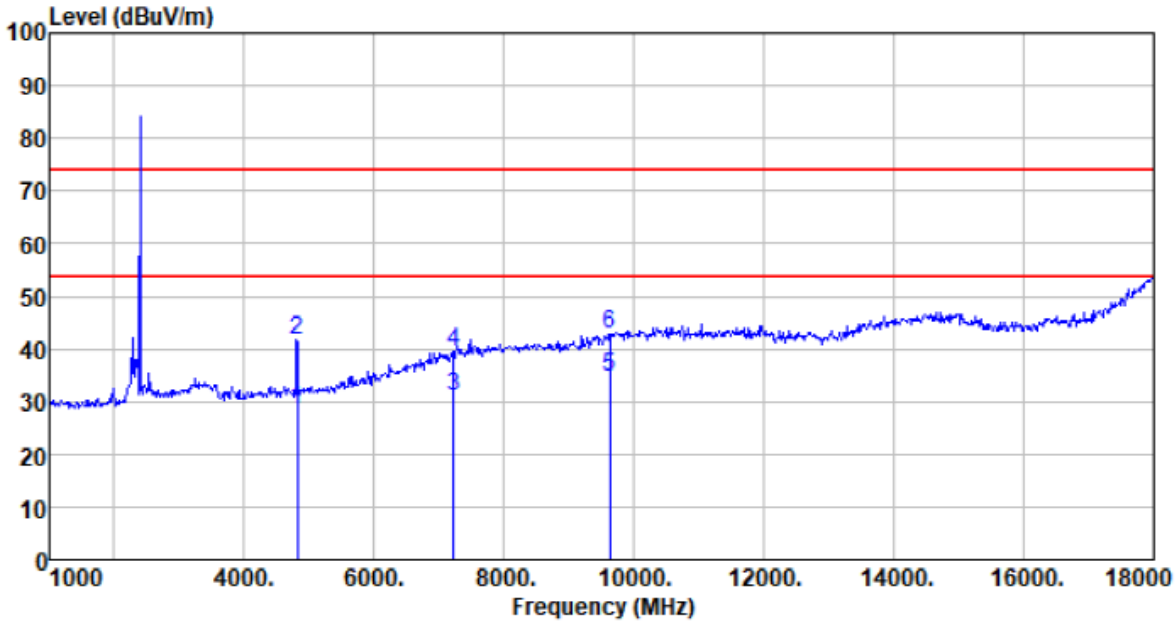


Freq	Reading level	Antenna factor	Cable loss	Preamp factor	level	Limit level	Over limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
35.499	41.05	11.42	0.61	35.39	17.69	40.00	-22.31	QP
63.983	44.65	9.80	0.89	36.37	18.97	40.00	-21.03	QP
96.099	40.20	11.65	1.16	36.69	16.32	43.50	-27.18	QP
180.649	40.78	8.98	1.74	37.24	14.26	43.50	-29.24	QP
280.024	42.41	13.05	2.27	37.40	20.33	46.00	-25.67	QP
782.345	34.75	21.09	4.40	37.62	22.62	46.00	-23.38	QP

■ **Above 1GHz**

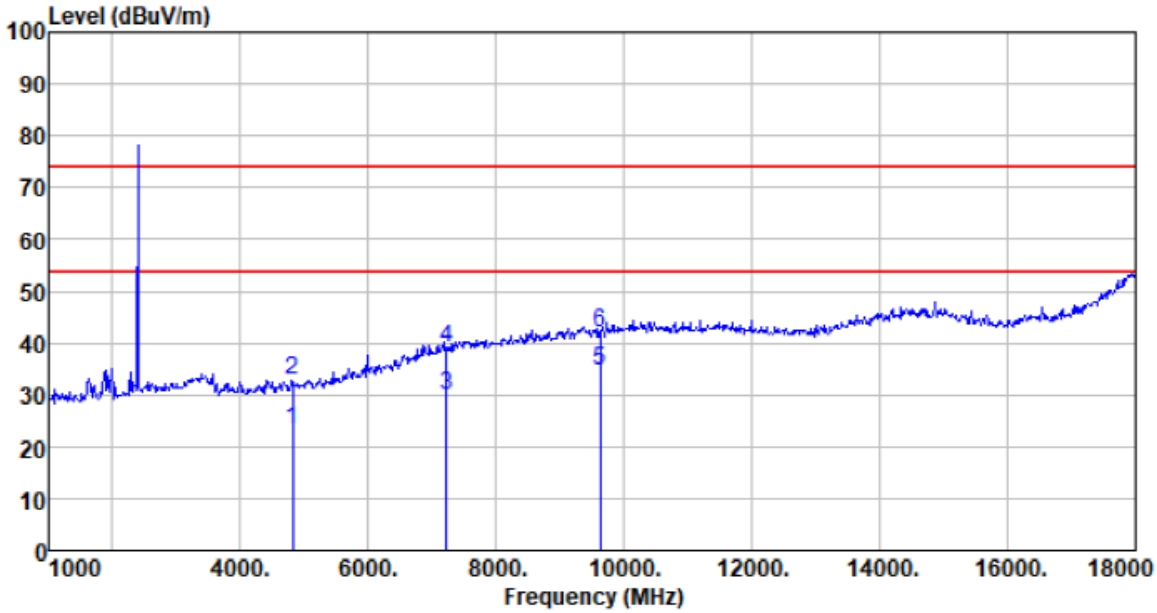
Test channel:	Lowest

Horizontal:



Freq	Reading level	Antenna factor	Cable loss	Preamp factor	level	Limit level	Over limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
4810.000	30.44	31.20	4.61	37.73	28.52	54.00	-25.48	Average
4810.000	43.54	31.20	4.61	37.73	41.62	74.00	-32.38	Peak
7215.000	23.78	36.20	6.50	35.63	30.85	54.00	-23.15	Average
7215.000	32.49	36.20	6.50	35.63	39.56	74.00	-34.44	Peak
9620.000	23.63	37.93	7.98	34.94	34.60	54.00	-19.40	Average
9620.000	31.77	37.93	7.98	34.94	42.74	74.00	-31.26	Peak

Vertical:



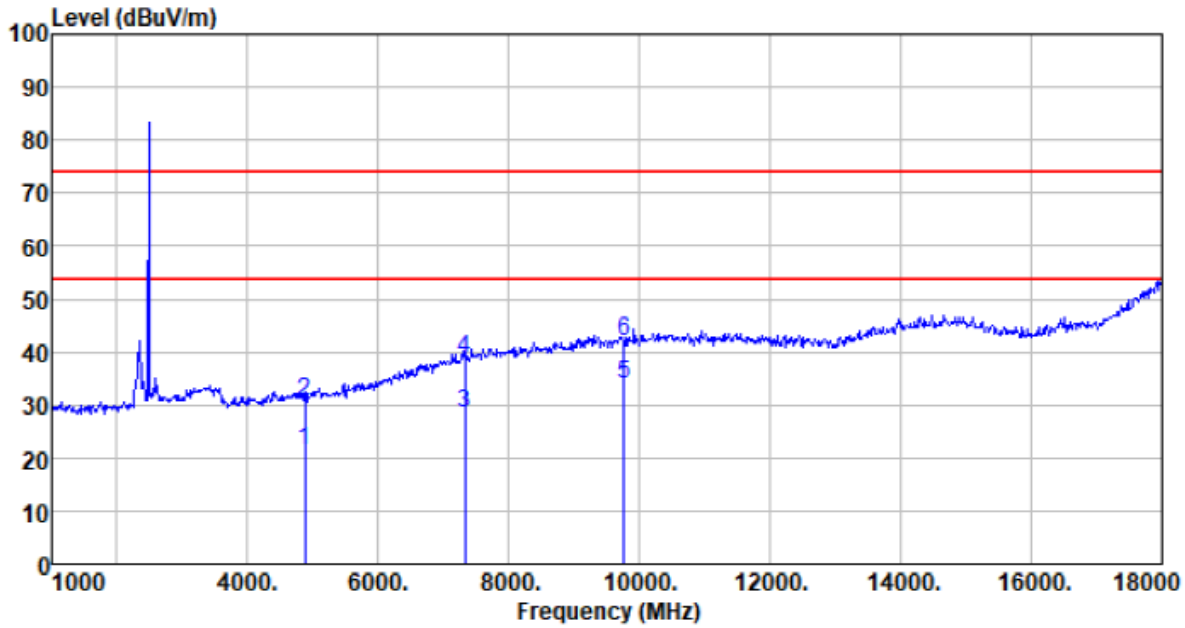
Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
4810.000	25.08	31.20	4.61	37.73	23.16	54.00	-30.84	Average
4810.000	34.71	31.20	4.61	37.73	32.79	74.00	-41.21	Peak
7215.000	22.75	36.20	6.50	35.63	29.82	54.00	-24.18	Average
7215.000	32.18	36.20	6.50	35.63	39.25	74.00	-34.75	Peak
9620.000	23.58	37.93	7.98	34.94	34.55	54.00	-19.45	Average
9620.000	31.26	37.93	7.98	34.94	42.23	74.00	-31.77	Peak

Remark:

1. *Final Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor*
2. *No emission found in frequency above 18GHz.*

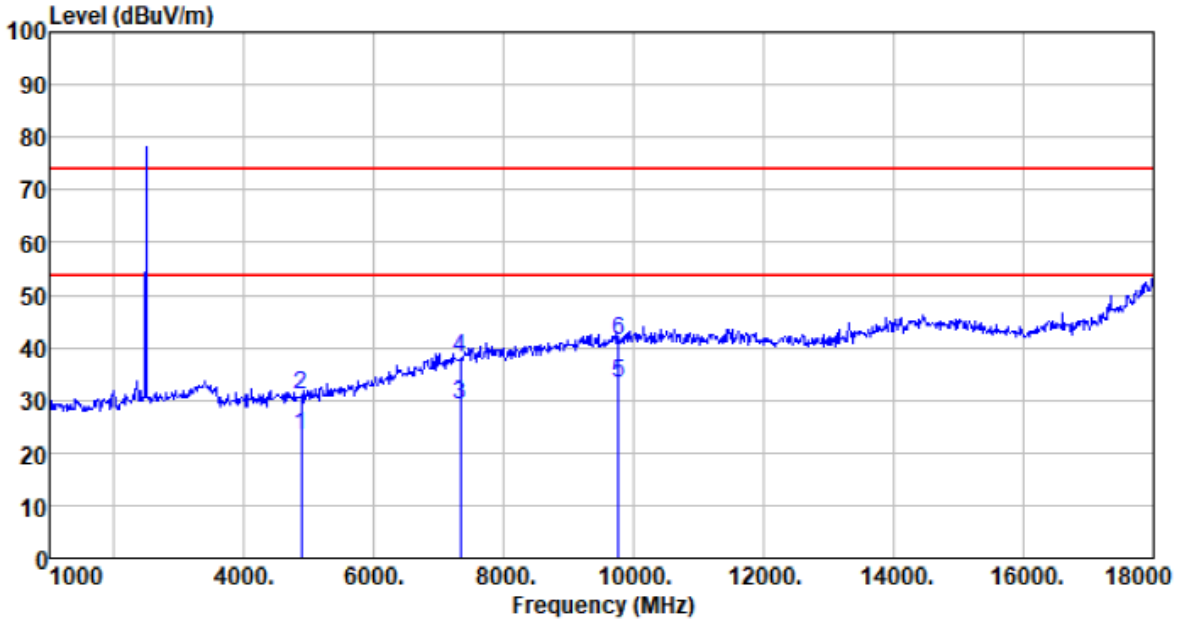
Test channel:	Middle

Horizontal:



Freq	Reading level	Antenna factor	Cable loss	Preamp factor	level	Limit level	Over limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
4880.000	23.24	31.31	4.69	37.75	21.49	54.00	-32.51	Average
4880.000	32.42	31.31	4.69	37.75	30.67	74.00	-43.33	Peak
7320.000	20.90	36.43	6.63	35.60	28.36	54.00	-25.64	Average
7320.000	31.19	36.43	6.63	35.60	38.65	74.00	-35.35	Peak
9760.000	22.78	38.10	8.03	35.03	33.88	54.00	-20.12	Average
9760.000	30.98	38.10	8.03	35.03	42.08	74.00	-31.92	Peak

Vertical:



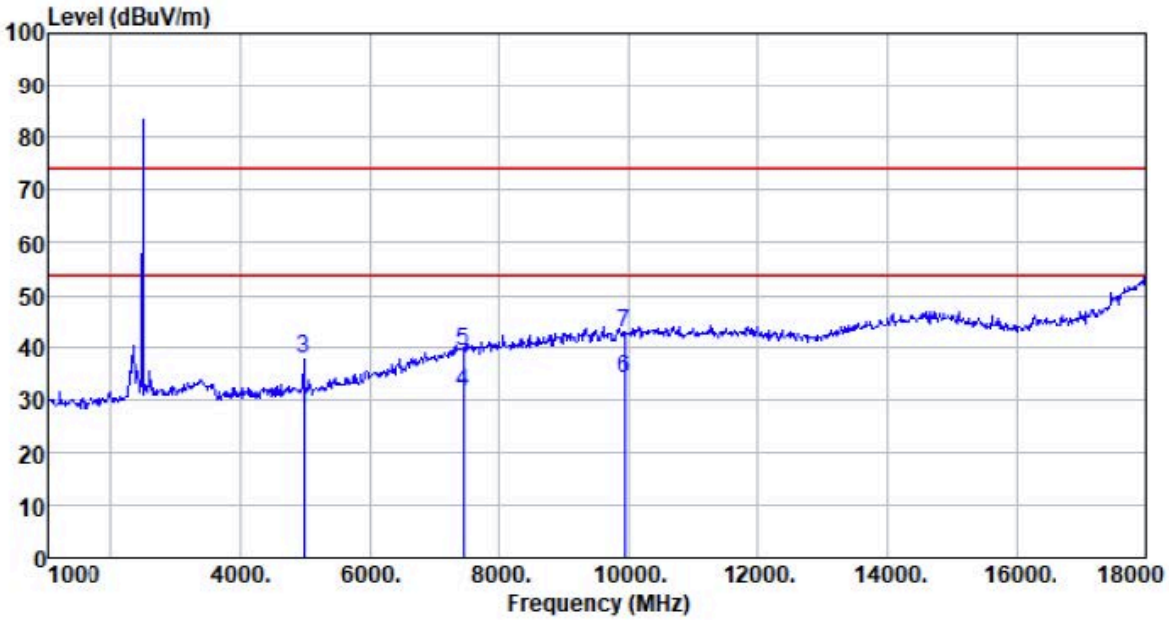
Freq	Reading level	Antenna factor	Cable loss	Preamp factor	level	Limit level	Over limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
4880.000	24.97	31.31	4.69	37.75	23.22	54.00	-30.78	Average
4880.000	32.69	31.31	4.69	37.75	30.94	74.00	-43.06	Peak
7320.000	21.82	36.43	6.63	35.60	29.28	54.00	-24.72	Average
7320.000	30.69	36.43	6.63	35.60	38.15	74.00	-35.85	Peak
9760.000	22.07	38.10	8.03	35.03	33.17	54.00	-20.83	Average
9760.000	30.11	38.10	8.03	35.03	41.21	74.00	-32.79	Peak

Remark:

1. *Final Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor*
2. *No emission found in frequency above 18GHz.*

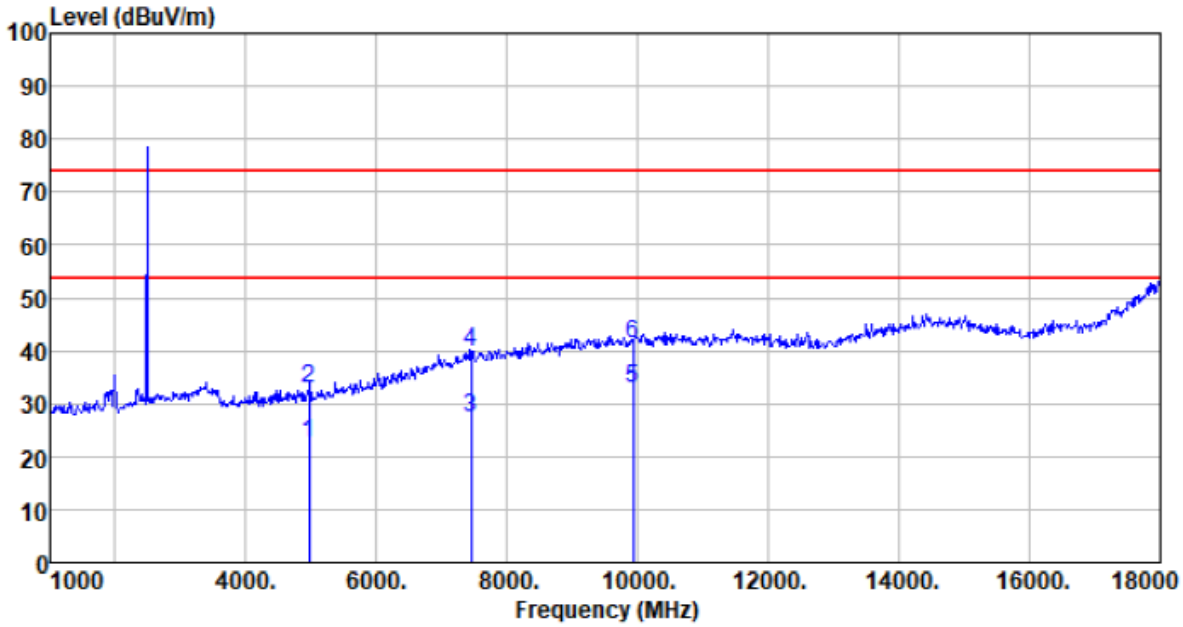
Test channel:	Highest

Horizontal:



Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Renark
4960.000	29.47	31.44	4.79	37.78	27.92	54.00	-26.08	Average
4960.000	39.14	31.44	4.79	37.78	37.59	74.00	-36.41	Peak
7440.000	23.41	36.66	6.77	35.56	31.28	54.00	-22.72	Average
7440.000	31.24	36.66	6.77	35.56	39.11	74.00	-34.89	Peak
9920.000	22.85	38.30	8.09	35.14	34.10	54.00	-19.90	Average
9920.000	31.39	38.30	8.09	35.14	42.64	74.00	-31.36	Peak

Vertical::

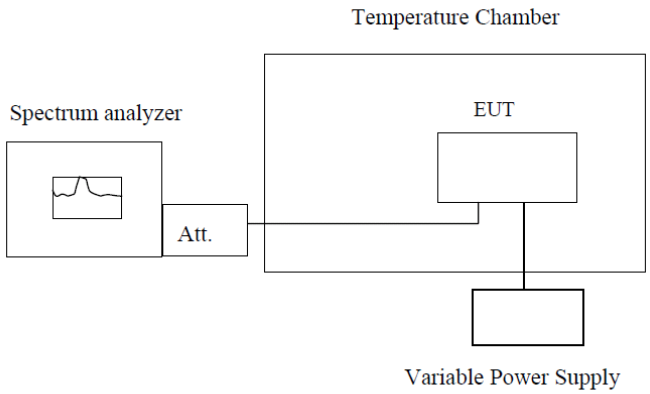


Freq	Reading level	Antenna factor	Cable loss	Preamp factor	level	Limit level	Over limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
4960.000	24.00	31.44	4.79	37.78	22.45	54.00	-31.55	Average
4960.000	34.29	31.44	4.79	37.78	32.74	74.00	-41.26	Peak
7440.000	19.54	36.66	6.77	35.56	27.41	54.00	-26.59	Average
7440.000	32.15	36.66	6.77	35.56	40.02	74.00	-33.98	Peak
9920.000	21.56	38.30	8.09	35.14	32.81	54.00	-21.19	Average
9920.000	29.96	38.30	8.09	35.14	41.21	74.00	-32.79	Peak

Remark:

1. *Final Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor*
2. *No emission found in frequency above 18GHz.*

7.7 Frequency stability

Test Requirement:	RSS-Gen Section 6.11& Section 8.11
Test Method:	ANSI C63.10: 2013 & RSS-Gen
Limit:	Manufactures of devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified
Test Procedure:	The EUT was setup to ANSI C63.10, 2013; tested to 2.1055 for compliance to RSS-Gen requirements.
Test setup:	 **Note :** Measurement setup for testing on Antenna connector
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Remark: Set the EUT transmits at un-modulation mode to test frequency stability.

Measurement data:

Frequency stability versus Temp.						
Power Supply: DC 3V						
Temp. (°C)	Operating Frequency (MHz)	0 minute Measured Frequency (MHz)	2 minute Measured Frequency (MHz)	5 minute Measured Frequency (MHz)	10 minute Measured Frequency (MHz)	Pass /Fail
-30	2405	2405.458	2405.961	2405.761	2405.876	Pass
	2440	2440.358	2440.960	2440.442	2440.641	Pass
	2480	2480.292	2480.834	2480.491	2480.395	Pass
-20	2405	2405.186	2405.039	2405.948	2405.865	Pass
	2440	2440.023	2440.047	2440.996	2440.136	Pass
	2480	2480.596	2480.420	2480.080	2480.577	Pass
-10	2405	2405.763	2405.019	2405.267	2405.243	Pass
	2440	2440.609	2440.086	2440.598	2440.576	Pass
	2480	2480.761	2480.211	2480.192	2480.889	Pass
0	2405	2405.942	2405.976	2405.848	2405.064	Pass
	2440	2440.599	2440.176	2440.936	2440.397	Pass
	2480	2480.921	2480.275	2480.502	2480.067	Pass
10	2405	2405.315	2405.334	2405.824	2405.082	Pass
	2440	2440.101	2440.736	2440.584	2440.067	Pass
	2480	2480.447	2480.098	2480.382	2480.720	Pass
20	2405	2405.813	2405.324	2405.444	2405.791	Pass
	2440	2440.801	2440.585	2440.006	2440.862	Pass
	2480	2480.365	2480.769	2480.410	2480.877	Pass
30	2405	2405.330	2405.149	2405.321	2405.656	Pass
	2440	2440.093	2440.400	2440.421	2440.342	Pass
	2480	2480.260	2480.618	2480.184	2480.002	Pass
40	2405	2405.095	2405.428	2405.721	2405.698	Pass
	2440	2440.509	2440.911	2440.317	2440.831	Pass
	2480	2480.296	2480.723	2480.602	2480.329	Pass
50	2405	2405.976	2405.949	2405.973	2405.142	Pass
	2440	2440.381	2440.023	2440.996	2440.238	Pass
	2480	2480.269	2480.766	2480.687	2480.709	Pass

Frequency stability versus Voltage						
Temperature: 25°C						
Power Supply (VDC)	Operating Frequency (MHz)	0 minute	2 minute	5 minute	10 minute	Pass /Fail
		Measured Frequency (MHz)	Measured Frequency (MHz)	Measured Frequency (MHz)	Measured Frequency (MHz)	
3.3	2405	2405.341	2405.704	2405.239	2405.694	Pass
	2440	2440.046	2440.877	2440.416	2440.570	Pass
	2480	2480.507	2480.812	2480.897	2480.639	Pass
2.7	2405	2405.123	2405.149	2405.808	2405.345	Pass
	2440	2440.791	2440.534	2440.520	2440.016	Pass
	2480	2480.131	2480.360	2480.326	2480.931	Pass

8 Test Setup Photo

Reference to the **appendix I** for details.

9 EUT Constructional Details

Reference to the **appendix II** for details.

------End------