TEST REPORT

Report No.:	**EM201300680-1**	**Application No.:**	**ZJ00034135**
Client:	QFO Labs Inc		
Address:	10149 Johnson Ave S Bloomtington.MN 55437-2442 USA		
Sample Description:	Mimix		
Model:	MX01		
Adding Model:	MX02, MX03, MX04		
FCC ID	2AAPNMX01		
Test Specification:	FCC Part 15,Subpart C:2012		
Test Date:	2013-09-13 to 2013-09-23		
Issue Date:	2013-09-23		
Test Result:	*Pass.*		

Prepared By:	**Reviewed By:**	**Approved By:**
Lynn Xiao / Test Engineer	Jane Cao / Test Engineer	Gavin Wu / Manager
Date:2013-09-23	Date:2013-09-23	Date:2013-09-23

Other Aspects:

/

Abbreviations: *ok / P = passed; fail / F = failed; n.a. / N = not applicable*

DIRECTIONS OF TEST

1. This station carries out test task according to the national regulation of verifications which can be traced to National Primary Standards and BIPM.

2. The test report merely corresponds to the test sample. It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

3. If there is any objection concerning the test, the client should inform the laboratory within 15 days from the date of receiving the test report.

Table of Contents

1. TEST RESULT SUMMARY

Section B of FCC Part 15.247:2012			
Standard	**Item**	**Limit / Severity**	**Result**
FCC Part 15,Subpart C (15.247)	Antenna Requirement	Section 15.247 (c)	PASS
	Occupied Bandwidth	Section 15.247 (a1)	PASS
	Carrier Frequencies Separated	Section 15.247(a)(1)	PASS
	Hopping Channel Number	Section 15.247(a)(1)(iii)	PASS
	Dwell Time	Section 15.247(a)(1)(iii)	PASS
	Maximum Peak Output Power	Section 15.247(b)(1)	PASS
	Conducted Emission	Section 15.207	N/A
	Conducted Spurious Emission (30MHz to 25GHz)	Section 15.209 &15.247(d)	PASS
	Radiated Spurious Emission (30MHz to 25GHz)	Section 15.209 &15.247(d)	PASS
	Band Edges Measurement	Section 15.247 (d) &15.205	PASS

2. GENERAL DESCRIPTION OF EUT

2.1 APPLICANT

Name:	QFO Labs Inc
Address:	10149 Johnson Ave S Bloomtington.MN 55437-2442 USA

2.2 MANUFACTURER

Name:	ZheJiang TianLe Audio Co.,Ltd
Address:	No.8 DaChen Rd.Economic Developing Zone, ShenZhou, ZheJiang Province, P.R.China

2.3 BASIC DESCRIPTION OF EQUIPMENT UNDER TEST

Equipment:	Mimix
Model No.:	MX01
Adding Model:	MX02, MX03, MX04
Trade Name:	QFO
Power supply	Battery DC 3.7V
Frequency Range	2410MHz~2480MHz
Type of Modulation	FSK
Channels:	Channels with 5MHz step
Antenna Type	PCB antenna

3. LABORATORY AND ACCREDITATIONS

3.1 LABORATORY

The tests and measurements refer to this report were performed by Guangzhou GRG Metrology and Test CO., LTD.

Add. : 163 Pingyun Rd, West of Huangpu Ave, Guangzhou, 510656, P. R. China

Telephone: +86-20-38699959, 38699960, 38699961

Fax : +86-20-38695185

3.2 ACCREDITATIONS

Our laboratories are accredited and approved by the following approval agencies according to ISO/IEC 17025.

USA	FCC Listed Lab (No. 688188)
China	CNAS （No.L0446）
China	DILAC (No.DL175)
Canada	Registration No.:8355A-1

3.3 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

Measurement		**Frequency**	**Uncertainty**
Radiated Emission	Horizontal	30MHz～1000MHz	4.2dB
		1GHz～26.5GHz	4.2dB
	Vertical	30MHz～1000MHz	4.4dB
		1GHz～26.5GHz	4.4dB
Conducted Emission		9kHz～30MHz	3.1 dB

This uncertainty represents an expanded uncertainty factor of *k*=2 and the Confidence Level is 95%.

3.4 LIST OF USED TEST EQUIPMENT AT GRGT

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
6 dB bandwidth/ carrier frequencies separated/ hopping channel number/ dwell time/ maximum peak output power/100kHz bandwidth of frequency band edge/ Spurious Emissions at Antenna Port/ Restricted Bands				
Receiver	R&S	ESU40	100106	2014-01-24
Conducted Emissions				
EMI Receiver	R&S	ESU40	100529	2014-01-24
L.I.S.N	SCHWARZBECK	NSLK 8127	8127450	2013-10-05
Radiated Spurious Emissions				
Receiver	R&S	ESU40	100106	2014-01-24
Loop antenna	R&S	HFH2-Z2	881058/58	2014-05-26
Biconical Log-periodic Antenna	ETS.LINDGREN	3142C	00075971	2014-05-26
Horn antenna	SCHWARZBECK	BBHA9120D	D752	2013-10-14
Horn antenna	SCHWARZBECK	BBHA 9170	411	2014-11-21
Pre-amplifier	SCHWARZBECK	9742	332	2014-09-20
Pre-amplifier	Decentest	DC7110EMA	001	2013-10-10

4. TEST RESULTS

4.1 E.U.T. TEST CONDITIONS

Type of antenna: **Integral**

Temperature: **22.0 °C**

Humidity: **54 % RH**

Atmospheric Pressure: **1011 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

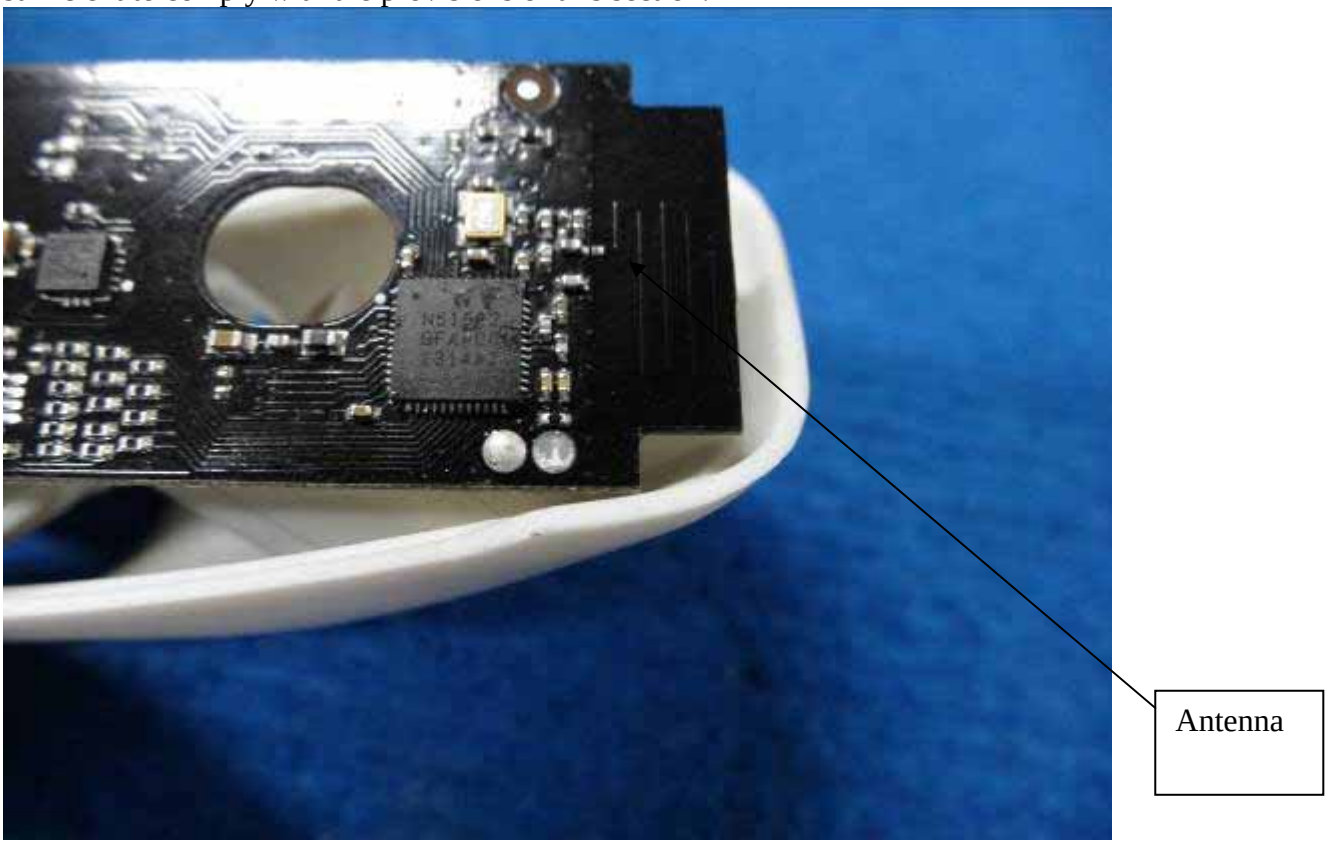
EUT channels and frequencies list:

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
10	2410	35	2435	60	2460
15	2415	40	2440	65	2465
20	2420	45	2445	70	2470
25	2425	50	2450	75	2475
30	2430	55	2455	80	2480

Totally, it has 15 channels.
Test frequency is the lowest channel: 10 channel: (2410MHz), middle channel: 40 channel (2440MHz) and highest channel: 80 channel (2480MHz).

4.2 ANTENNA REQUIREMENT

The EUT antenna is PCB antenna. Antenna gain is 0dBi .which accordance 15.203 is considered sufficient to comply with the provisions of this section.



4.3 OCCUPIED BANDWIDTH

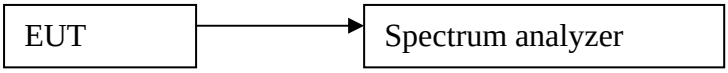
4.3.1 LIMITS

Frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

4.3.2 TEST PROCEDURES

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, centre on a hopping channel;
3. Set the spectrum analyzer: RBW >= 1% of the 20dB bandwidth (set 100 kHz). VBW >= RBW. Sweep = auto; Detector Function = Peak. Trace = Max Hold.
4. Mark the peak frequency and -20dB bandwidth.
5. Bandwidth value is OBW value.

4.3.3 TEST SETUP



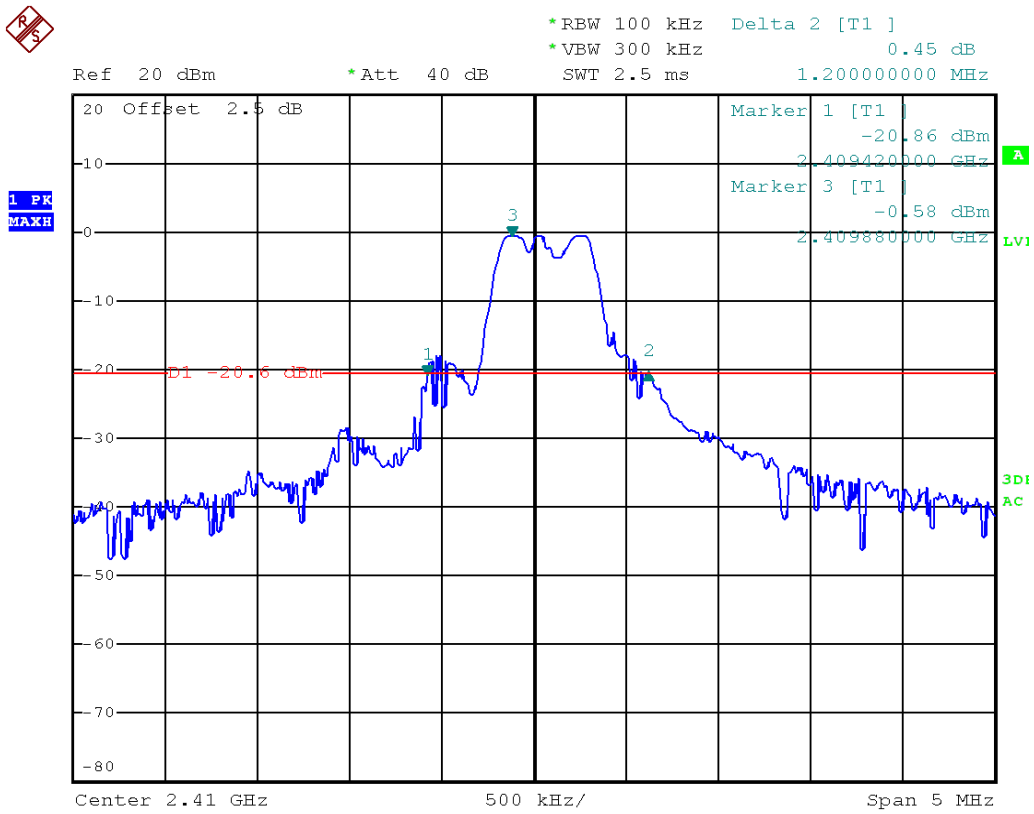
4.3.4 TEST RESULTS

For FSK

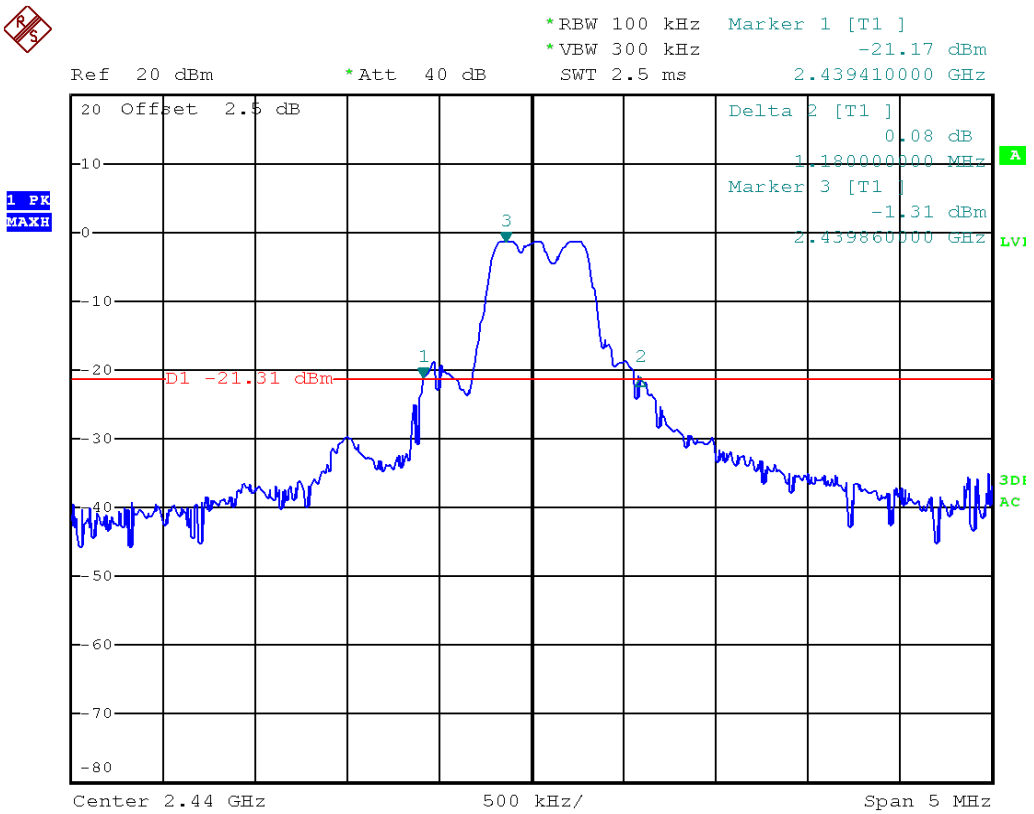
Frequency (GHz)	Test Channel	bandwidth
2.410	Lowest	1.20MHz
2.440	Middle	1.18MHz
2.480	Highest	1.25MHz

Result plot as follows:

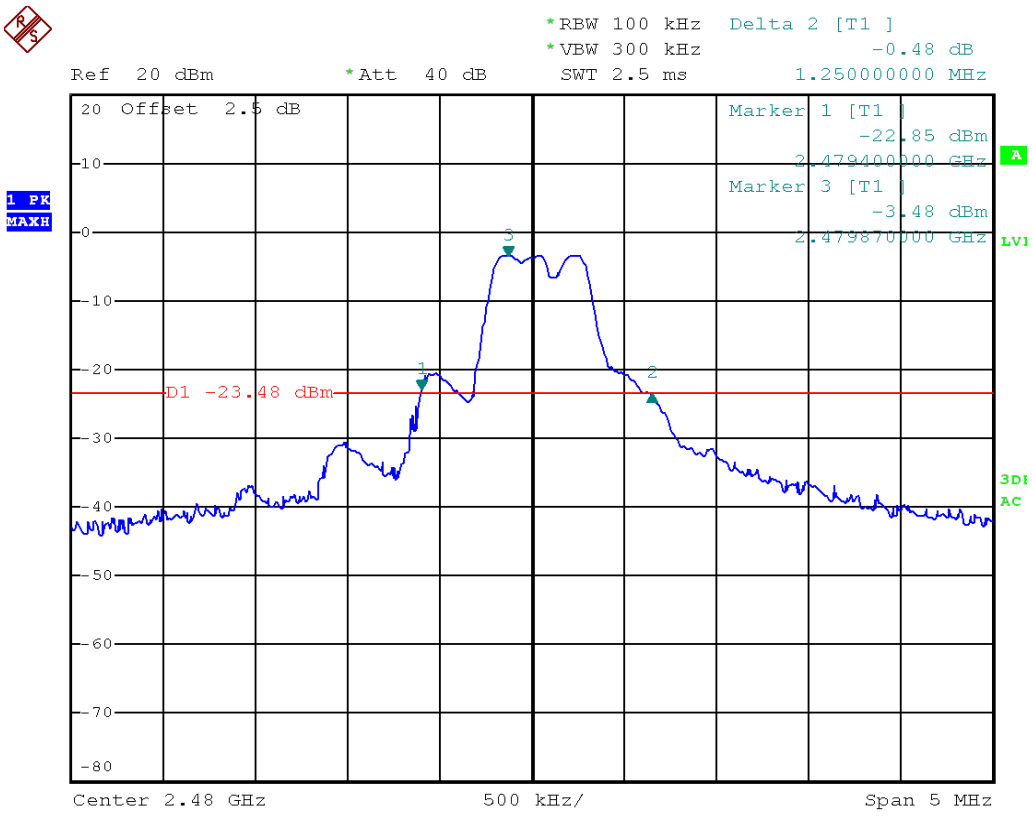
Lowest Channel：



Middle Channel：



Highest Channel：



4.4 CARRIER FREQUENCIES SEPARATED

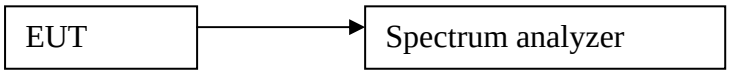
4.4.1 LIMITS

Frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

4.4.2 TEST PROCEDURES

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 >= 1% of the span (set 100 kHz). VBW >= RBW , Span = 3MHz. Sweep = auto; Detector Function = Peak. Trace = Max,hold.
3. Allow the trace to stabilize. Use the marker-delta function to determine the separation between the peaks of the adjacent channels. The limit is specified in one of the subparagraphs of this Section. Submit this plot.

4.4.3 TEST SETUP

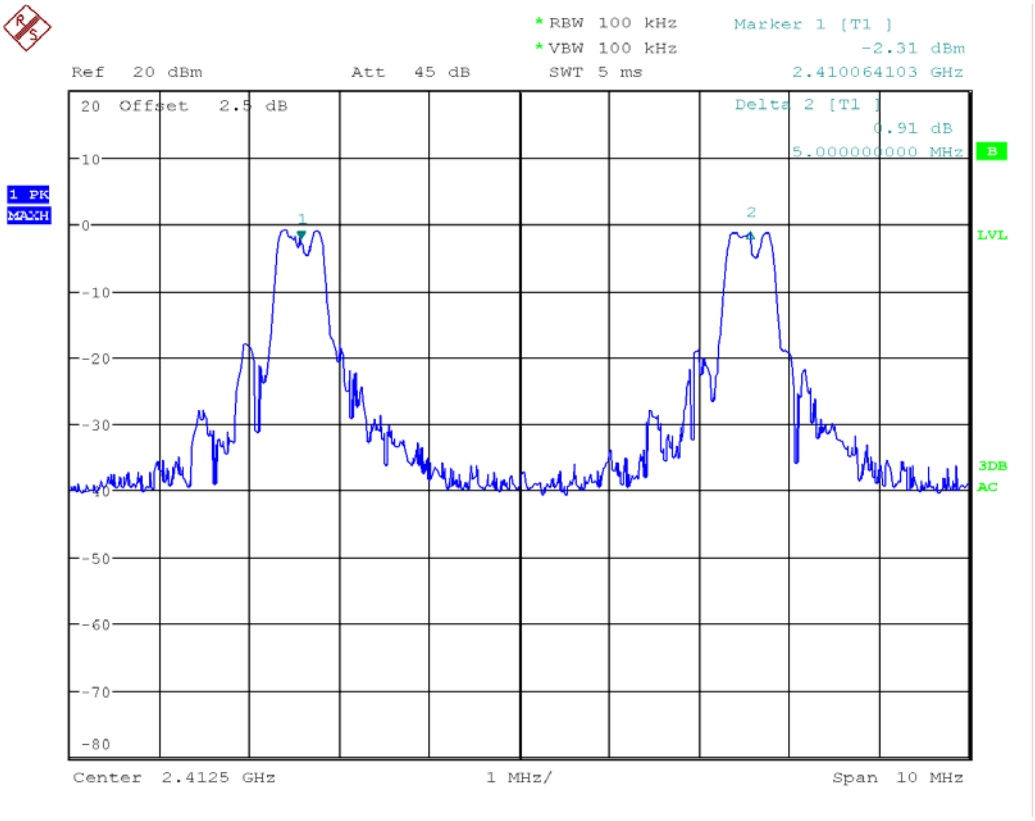


4.4.4 TEST RESULTS

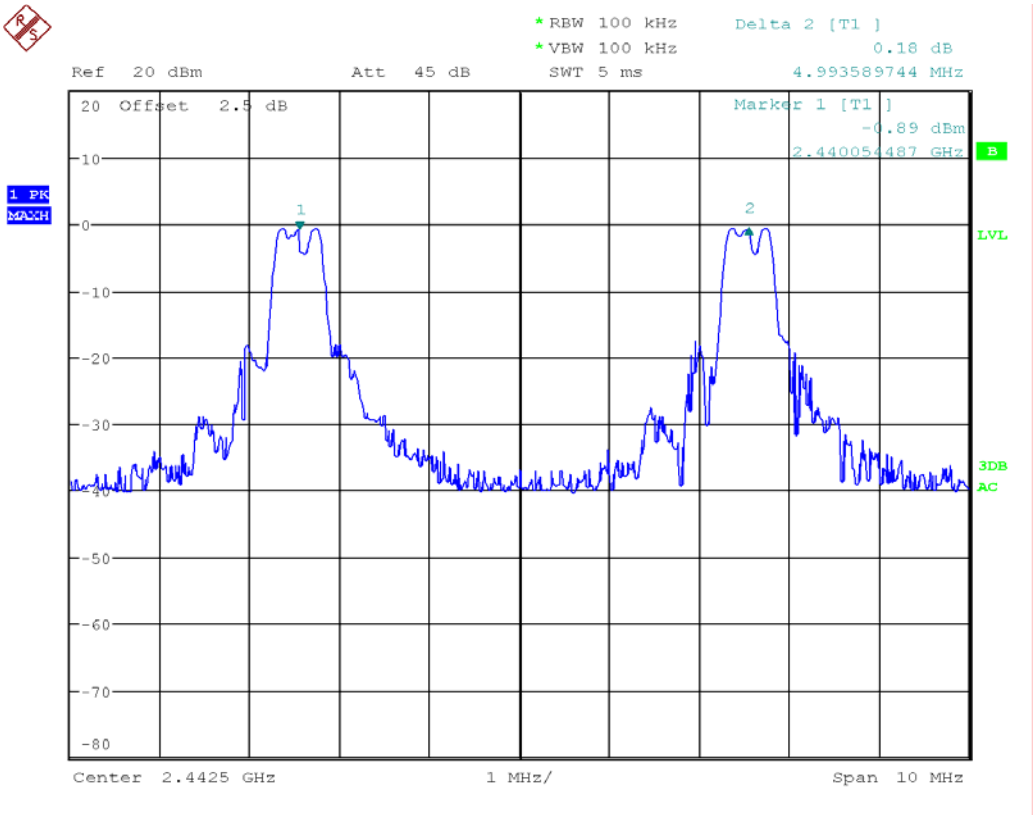
Mode	Test Channel	Carrier Frequencies Separated	2/3 20 dB bandwidth	PASS/FAIL
FSK	Lower Channels (channel 10 and channel 15)	5.00MHz	0.80MHz	Pass
	Middle Channels (channel 40 and channel 45)	4.99MHz	0.79MHz	Pass
	Upper Channels (channel 75 and channel 80)	5.00MHz	0.83MHz	Pass

Result plot as follows:

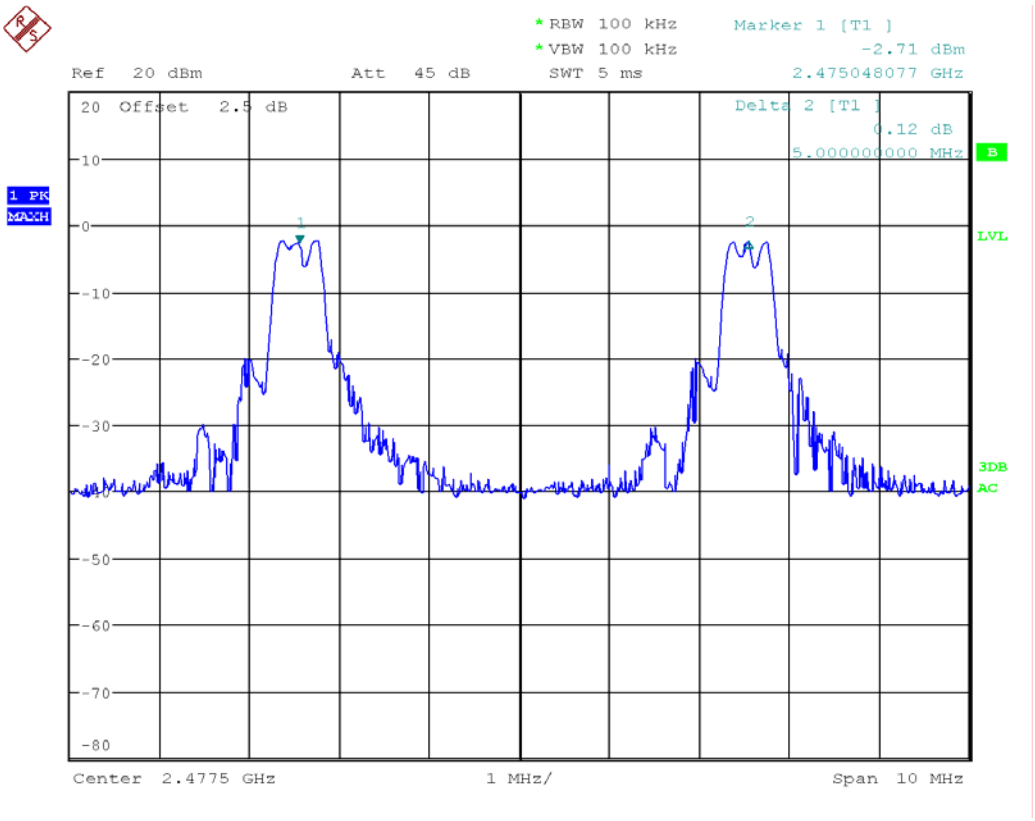
Lowest Channel:



Middle Channel:



Highest Channel:



Test result: The unit does meet the FCC requirements.

4.5 HOPPING CHANNEL NUMBER

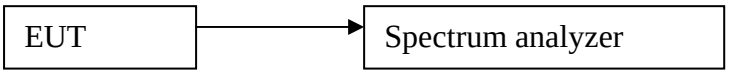
4.5.1 LIMITS

Regulation 15.247 (a) (1)(iii) Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels.

4.5.2 TEST PROCEDURES

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 = 100 kHz. VBW = 100 kHz. Sweep = auto; Detector Function = Peak. Trace = Max hold.
3. Allow the trace to stabilize. It may prove necessary to break the span up to sections. in order to clearly show all of the hopping frequencies. The limit is specified in one of the subparagraphs of this Section.
4. Set the spectrum analyzer: start frequency = 2400MHz. stop frequency = 2483.5MHz. Submit the test result graph.

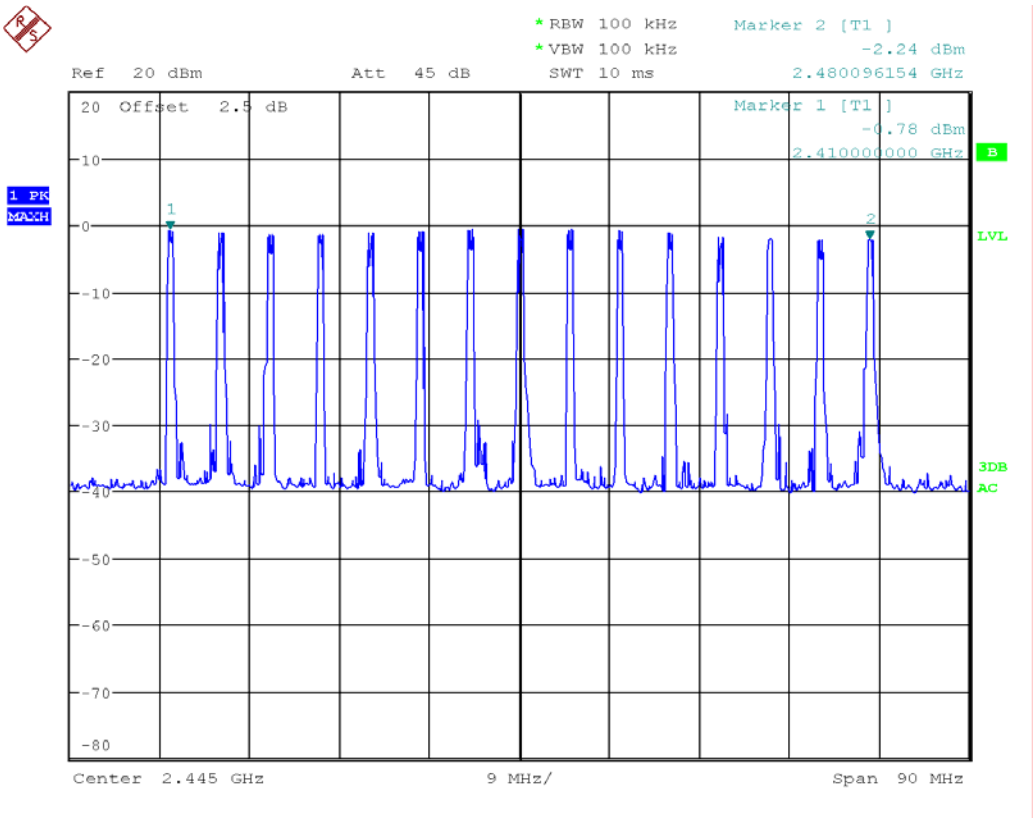
4.5.3 TEST SETUP



4.5.4 TEST RESULTS

Test result: Total channels are 15 channels.

Result plot as follows:



Test result: The unit does meet the FCC requirements.

4.6 DWELL TIME

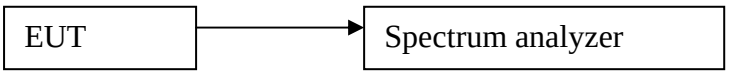
4.6.1 LIMITS

Regulation 15.247(a)(1)(iii) Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

4.6.2 TEST PROCEDURES

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
2. Set spectrum analyzer span = 0. centered on a hopping channel;
3. Set RBW = 1MHz and VBW = 3MHz.Sweep = as necessary to capture the entire dwell time per hopping channel. Detector Function = Peak. Trace = Max hold;
4. Use the marker-delta function to determine the dwell time. If this value varies with different modes of operation (e.g.. data rate. modulation format. etc.). repeat this test for each variation. The limit is specified in one of the subparagraphs of this Section. Submit this plot(s). An oscilloscope may be used instead of a spectrum analyzer.

4.6.3 TEST SETUP



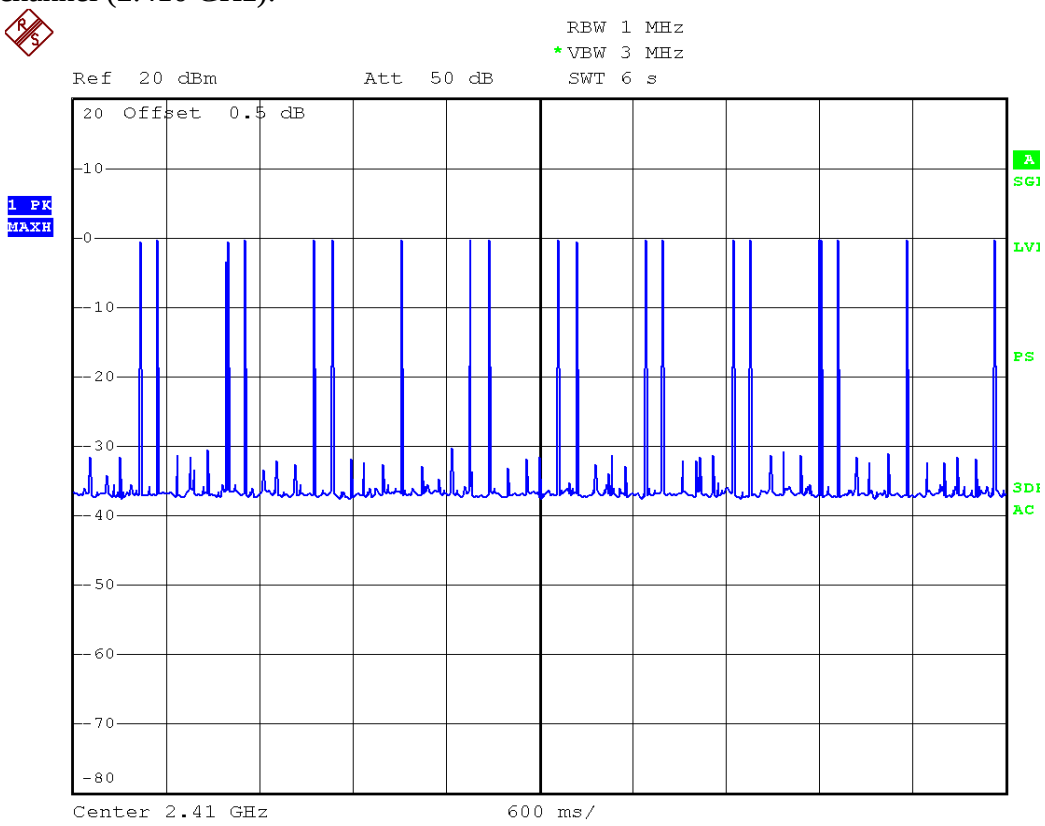
4.6.4 TEST RESULTS

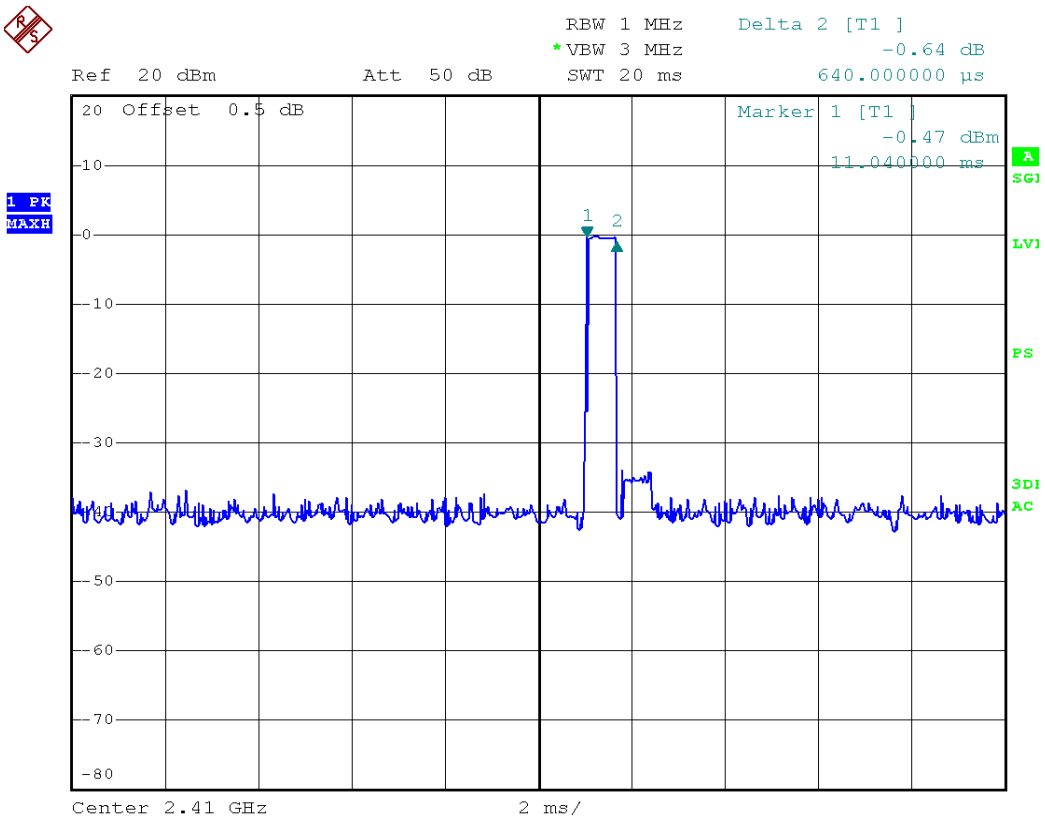
The test period: T= 0.4 Second/Channel x 15 Channel = 6.0 s

Lowest (2410MHz)	time slot=	0.64	(ms)*	19	=	12.16	ms
Middel (2440MHz)	time slot=	0.68	(ms)*	19	=	12.92	ms
Highest (2480MHz)	time slot=	0.592	(ms)*	19	=	11.248	ms

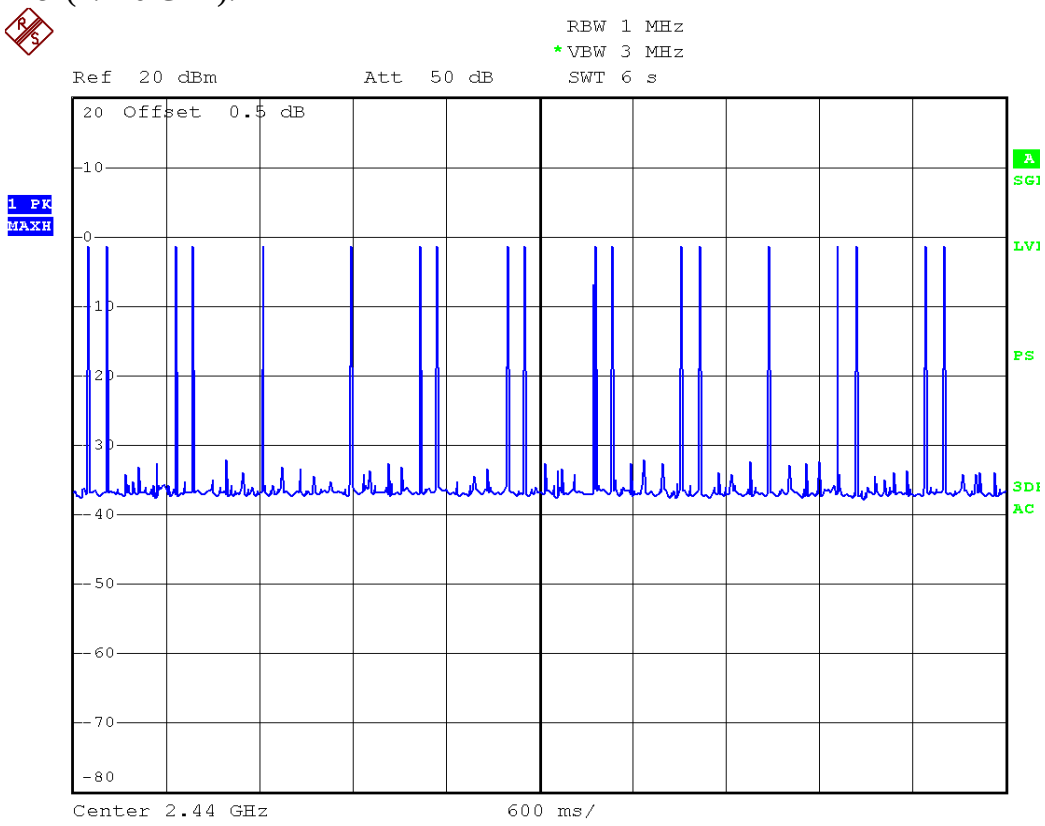
The results are not greater than 0.4 seconds.
The unit does meet the requirements.
Please refer the graph as below:

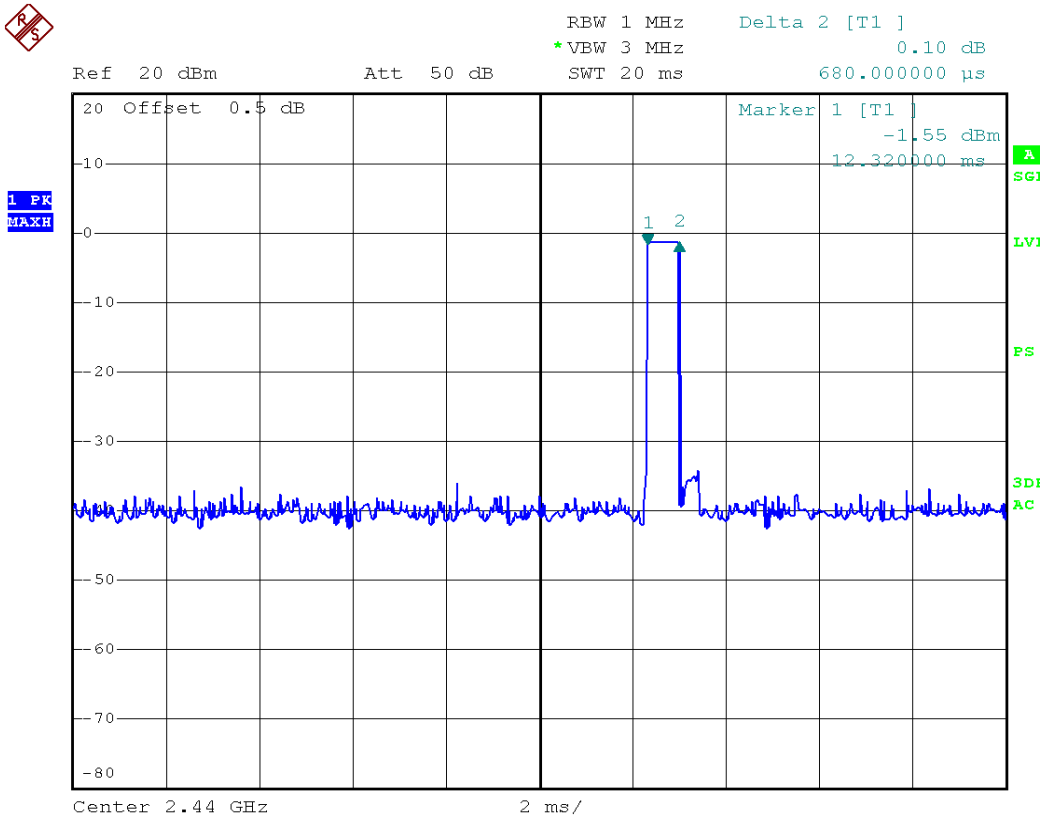
Lowest channel (2.410 GHz):



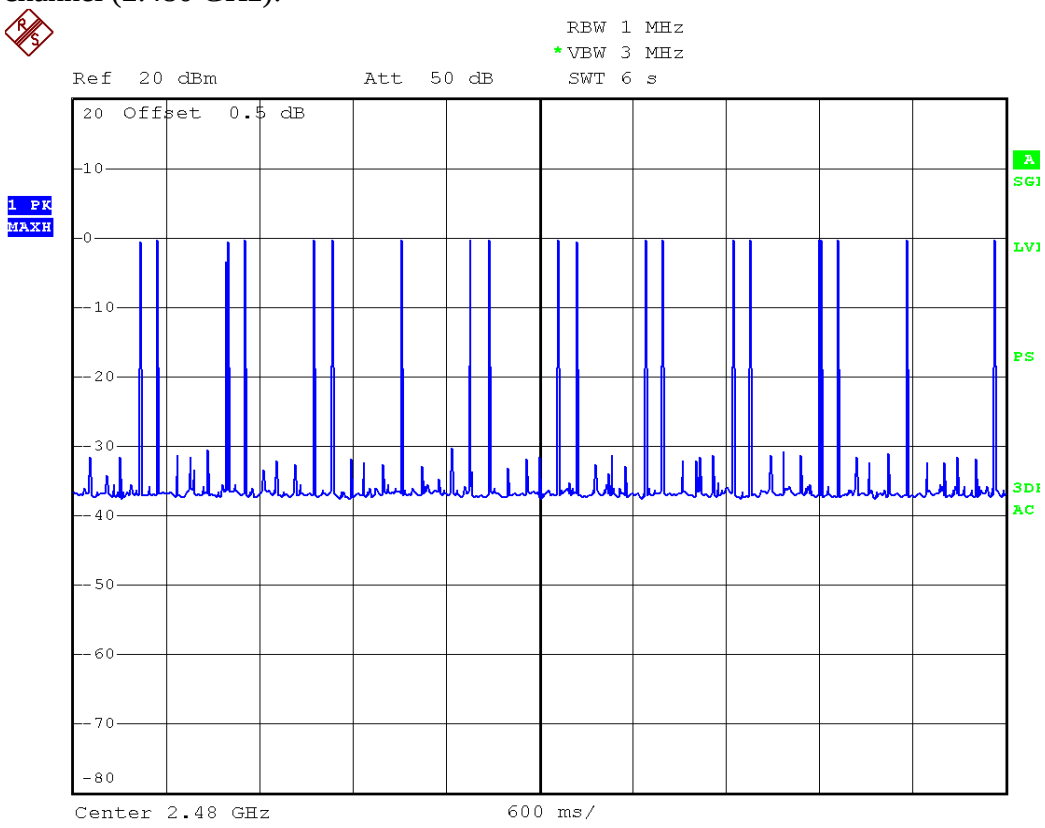


Mid channel (2.440 GHz):

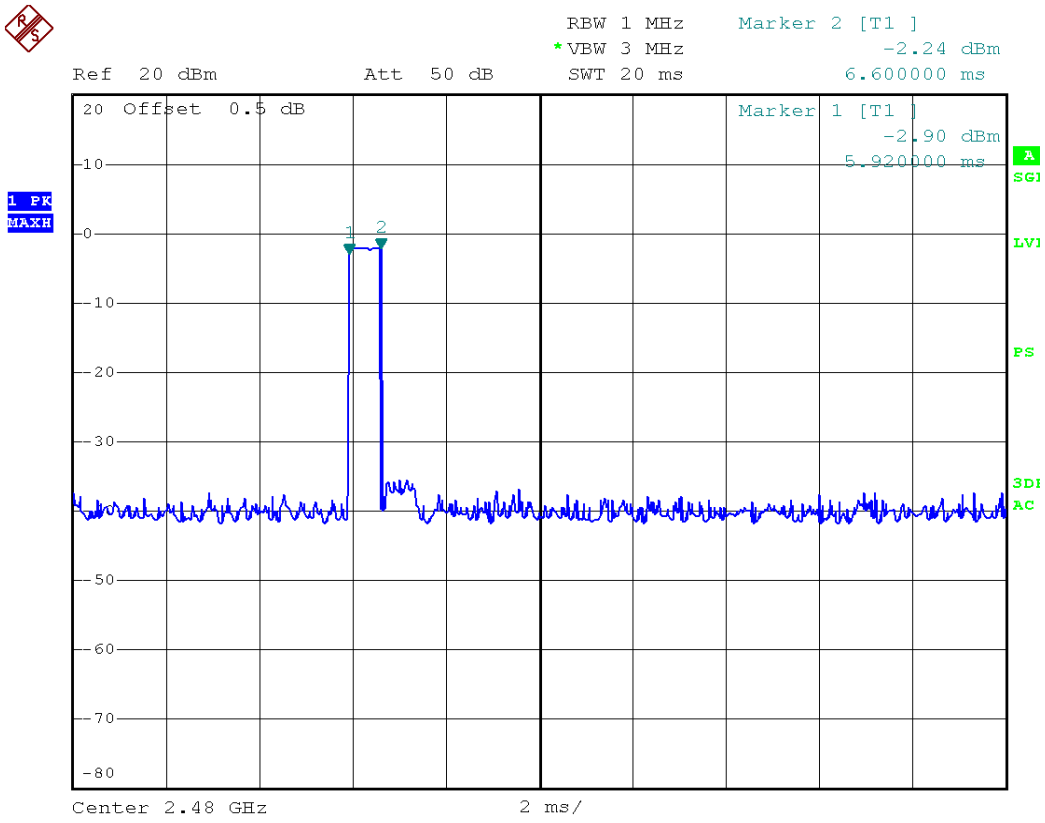




Highest channel (2.480 GHz):



Highest channel (2.480 GHz):



4.7 CONDUCTED EMISSION MEASUREMENT

4.7.1 LIMITS

Frequency range	Limits (dBμV)	
	Quasi-peak	Average
150kHz ～ 0.5MHz	66～56	56～46
0.5 MHz ～ 5 MHz	56	46
5 MHz ～ 30 MHz	60	50

4.7.2 TEST PROCEDURES

Procedure of Preliminary Test

For measurement of the disturbance voltage the equipment under test (EUT) is connected to the power supply mains and any other extended network via one or more artificial network(s). An EUT, whether intended to be grounded or not, and which is to be used on a table is configured as follows:

– Either the bottom or the rear of the EUT shall be at a controlled distance of 40 cm from a reference ground plane. This ground plane is normally the wall or floor of a shielded room. It may also be a grounded metal plane of at least 2 m by 2 m. This is physically accomplished as follows:

1) place the EUT on a table of non-conducting material which is at least 80 cm high. Place the EUT so that it is 40 cm from the wall of the shielded room, or

2) place the EUT on a table of non-conducting material which is 40 cm high so that the bottom of the EUT is 40 cm above the ground plane;

– All other conductive surfaces of the EUT shall be at least 80 cm from the reference ground plane;

– The EUT are placed on the floor that one side of the housings is 40 cm from the vertical reference ground plane and other metallic parts;

– Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth forming a bundle 30 cm to 40 cm long, hanging approximately in the middle between the ground plane and the table.

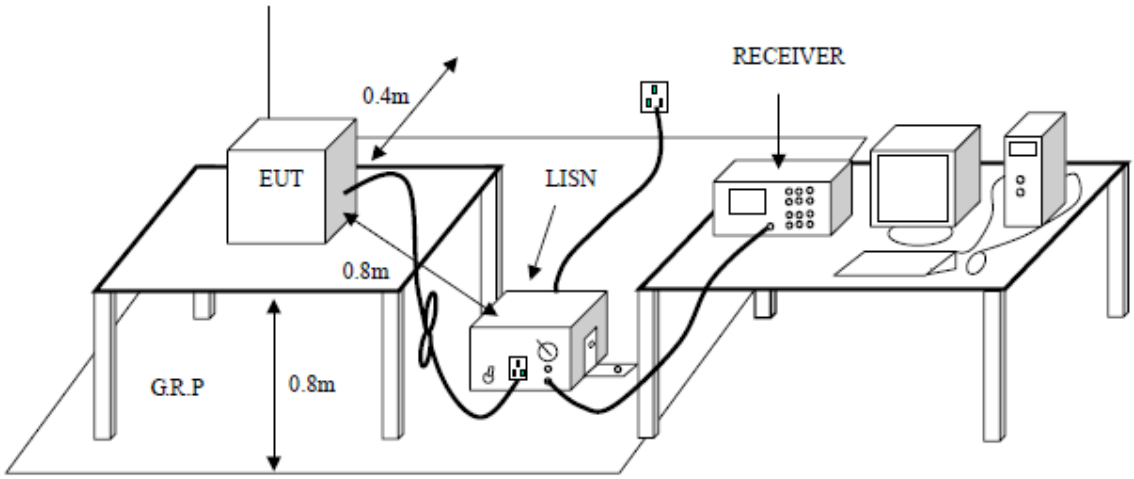
– I/O cables that are connected to a peripheral shall be bundled in the centre. The end of the cable may be terminated if required using correct terminating impedance. The total length shall not exceed 1 m.

The test mode(s) described in Item 2.4 were scanned during the preliminary test. After the preliminary scan, we found the test mode described in Item 2.4 producing the highest emission level. The EUT configuration and cable configuration of the above highest emission levels were recorded for reference of the final test.

Procedure of Final Test

EUT and support equipment were set up on the test bench as per the configuration with highest emission level in the preliminary test. A scan was taken on both power lines, recording at least the six highest emissions. Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit. The test data of the worst-case condition(s) was recorded.

4.7.3 TEST SETUP



4.7.4 TEST RESULTS

The EUT’s power is battery DC 3.7V. This item is not applicable.

4.8 MAXIMUM PEAK OUTPUT POWER

4.8.1 LIMITS

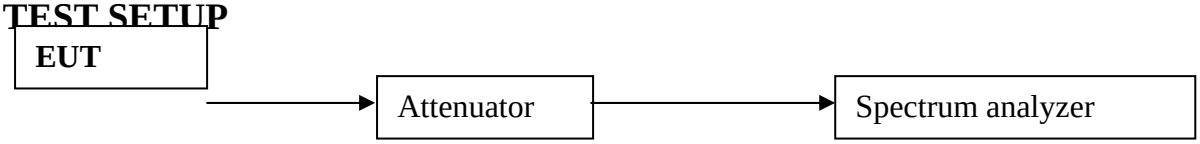
Regulation 15.247 (b)(1)For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts. Refer to the result “Hopping channel number” of this document. The 1 watt (30.0dBm) limit applies.

4.8.2 TEST PROCEDURES

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
2. Set the spectrum analyzer: RBW = 3 MHz. VBW = 3 MHz. Sweep = auto; Detector Function = Peak.
3. Keep the EUT in transmitting at lowest, medium and highest channel individually. Record the max value.

Remark:
Cable loss = 2.5dB，the receiver offset loss 2.5dB

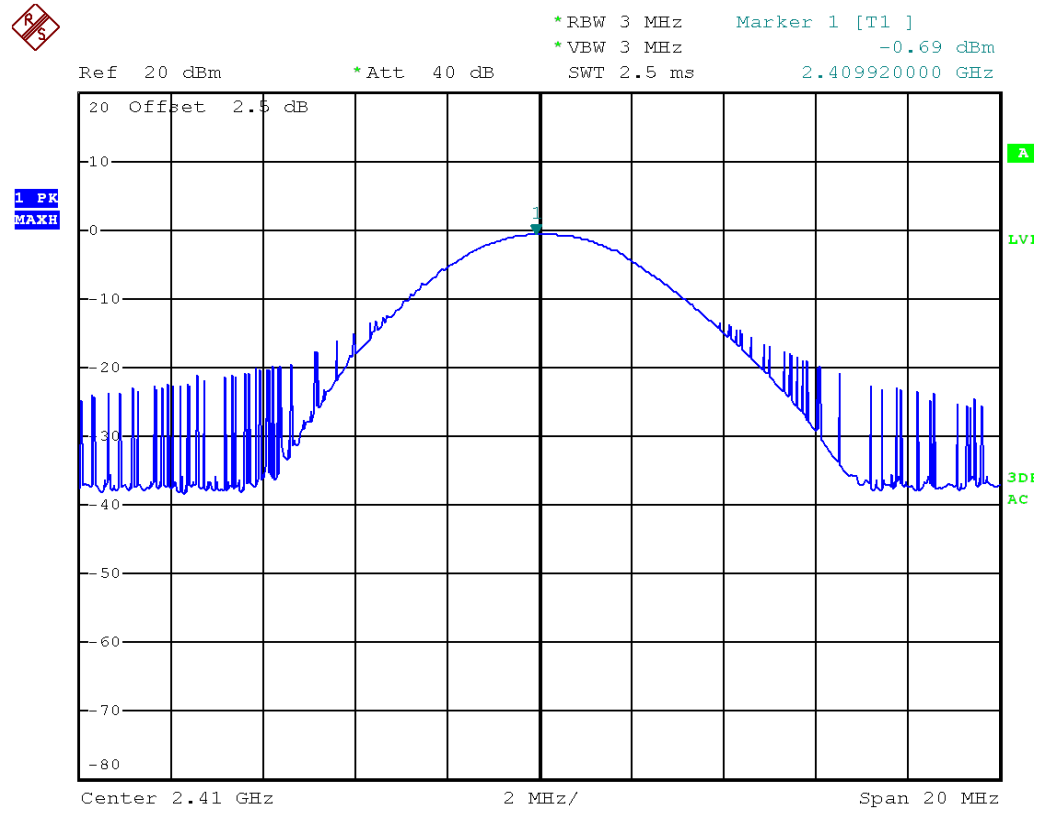
4.8.3 TEST SETUP



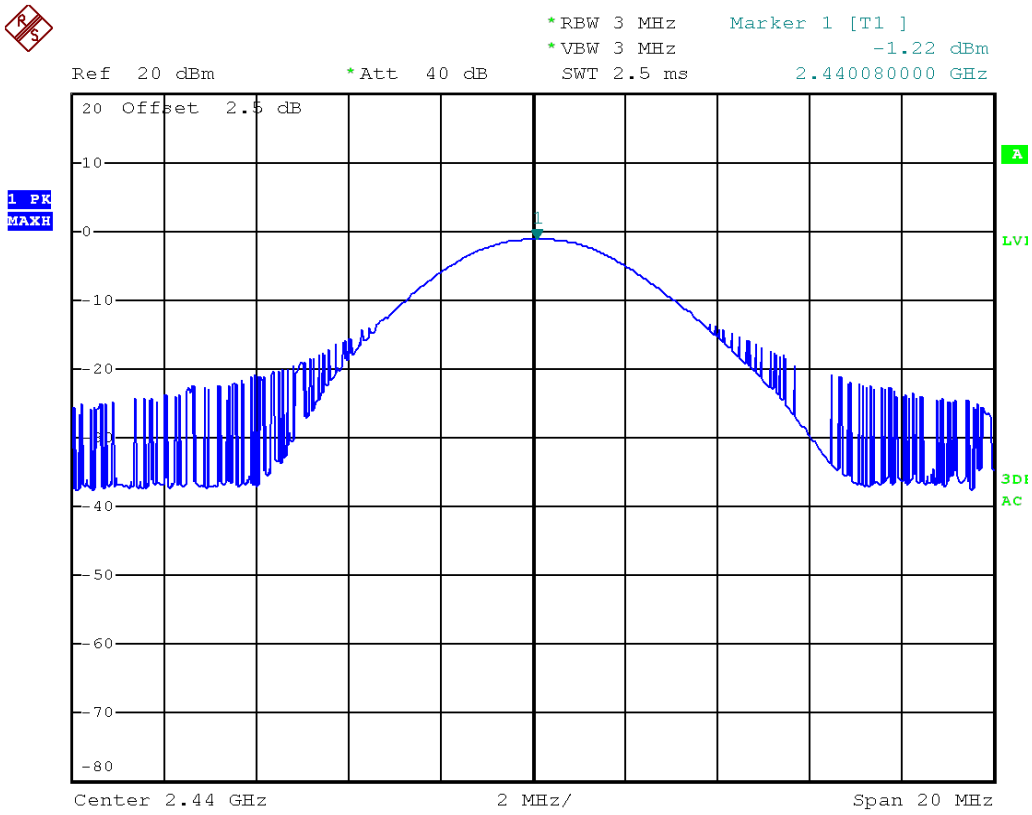
4.8.4 TEST RESULTS

Test Channel	Fundamental Frequency (GHz)	Max Output Power(dBm)	Limit (dBm)	Pass/Fail
Lowest	2.410	-0.69	21.0	**Pass**
Middle	2.440	-1.22	21.0	**Pass**
Highest	2.480	-3.23	21.0	**Pass**

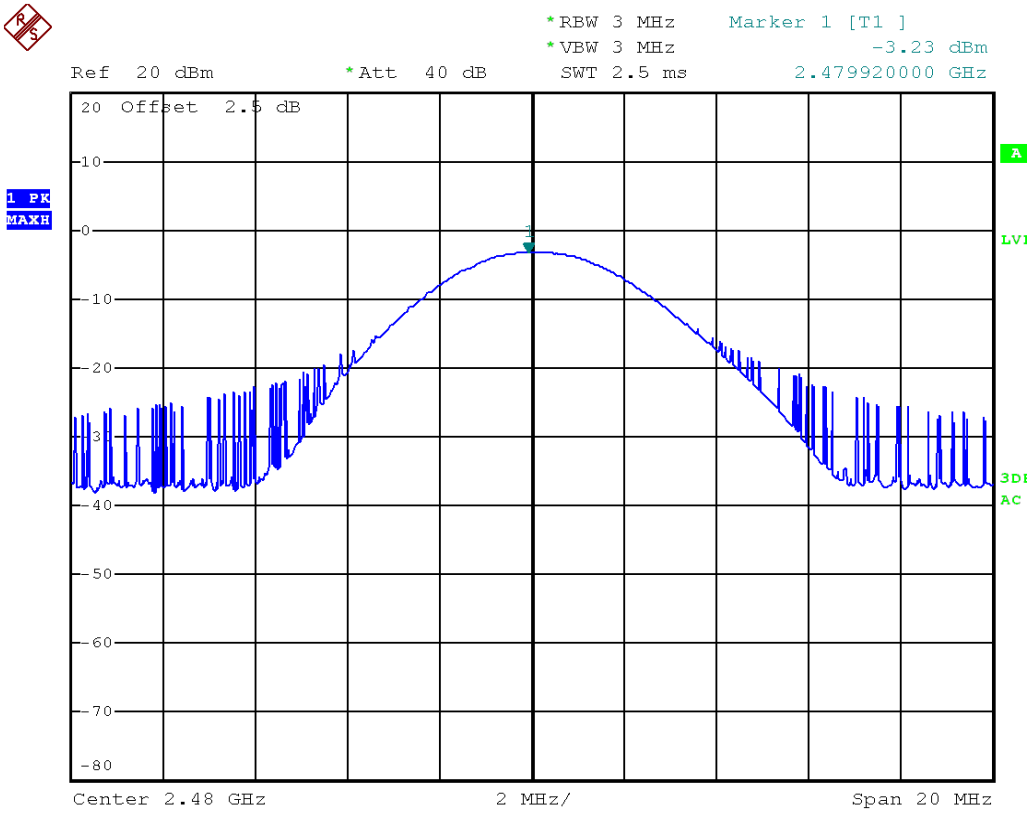
Test result: The unit does meet the FCC requirements.
Test result plot as follows:
Lowest Channel:



Middle Channel:



Highest Channel:



4.9 CONDUCTED SPURIOUS EMISSIONS

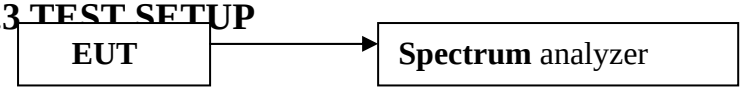
4.9.1 LIMITS

(d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating. The radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power. based on either an RF conducted or a radiated measurement. Provided the transmitter demonstrates compliance with the peak conducted power limits.

4.9.2 TEST PROCEDURES

Remove the antenna from the EUT and then connect a low attenuation cable from the antenna port to the spectrum.
Below 1GHz Set the spectrum analyzer: RBW =100KHz VBW >= RBW, Span = enough to catch the trace. Sweep = auto; Detector Function = Peak. Trace = Max, hold.
Above 1GHz Set the spectrum analyzer: RBW =1MHz VBW >= RBW, Span = enough to catch the trace. Sweep = auto; Detector Function = Peak. Trace = Max, hold.

4.9.3 TEST SETUP



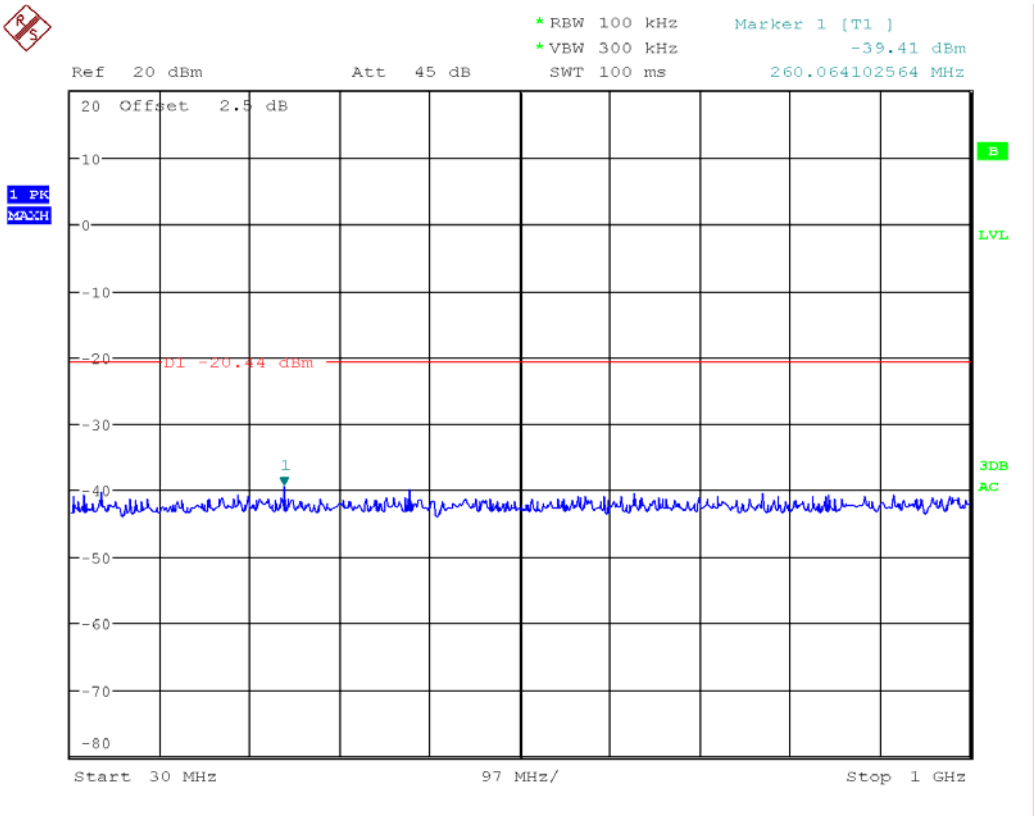
4.9.4 TEST RESULTS

The unit does meet the FCC requirements.

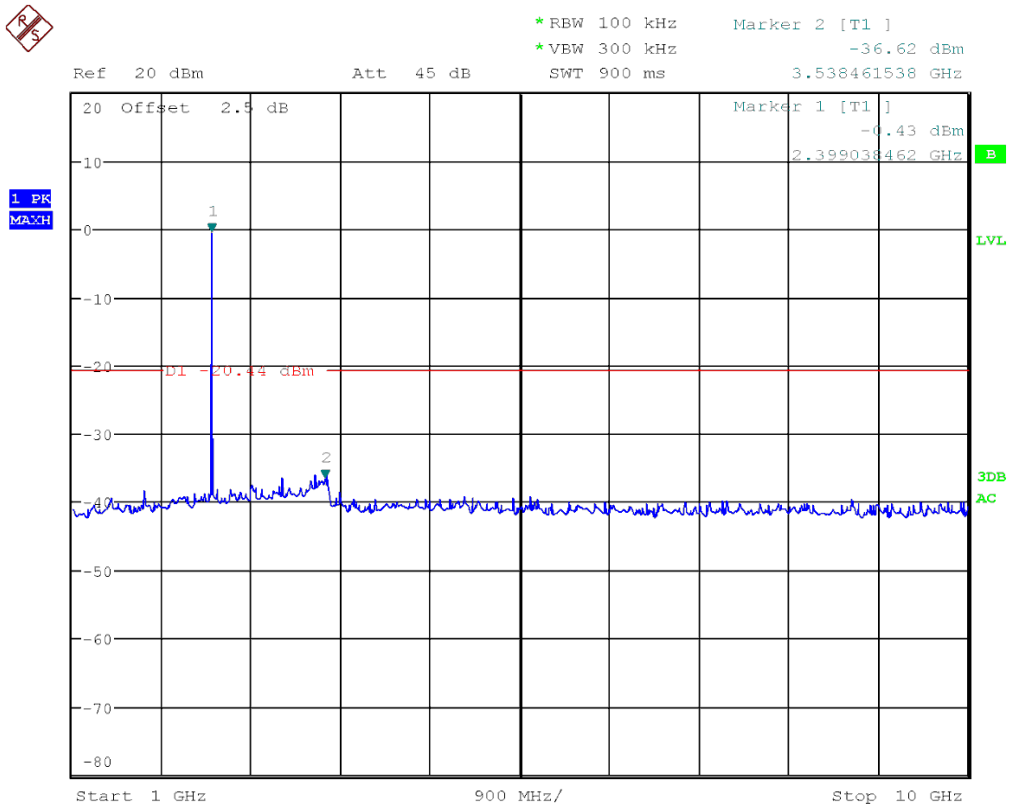
Test result plot as follows:

Lowest Channel:

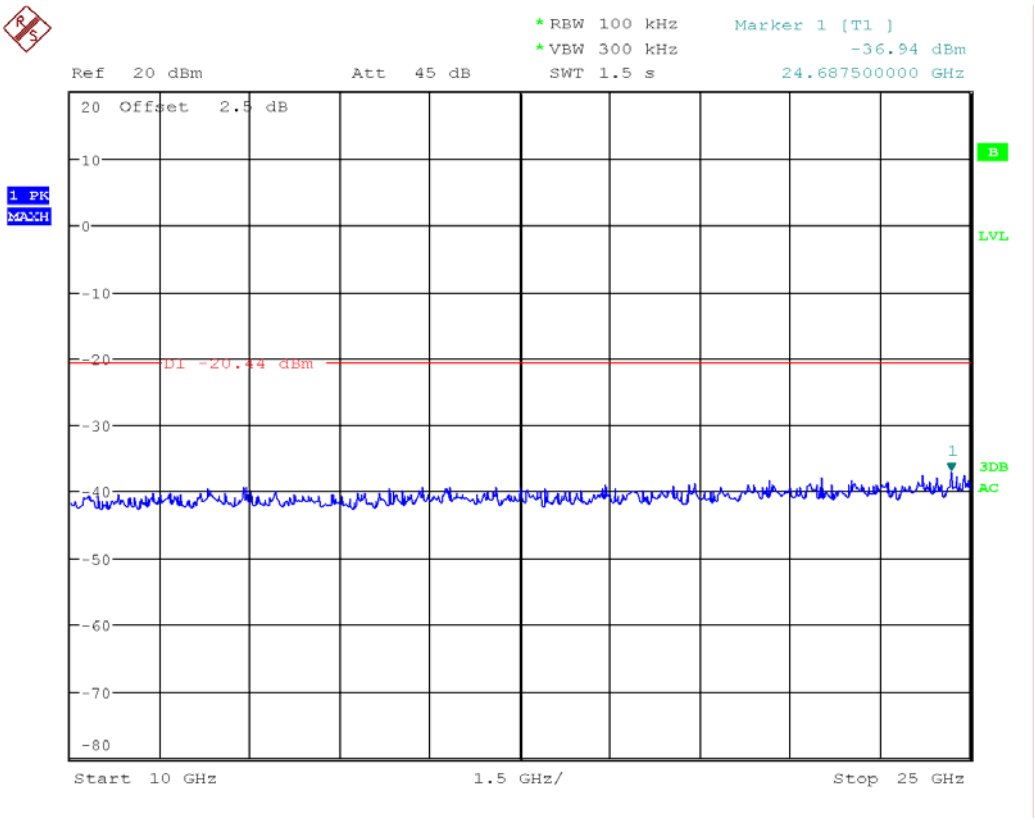
30M to 1GHz



1G to 10GHz

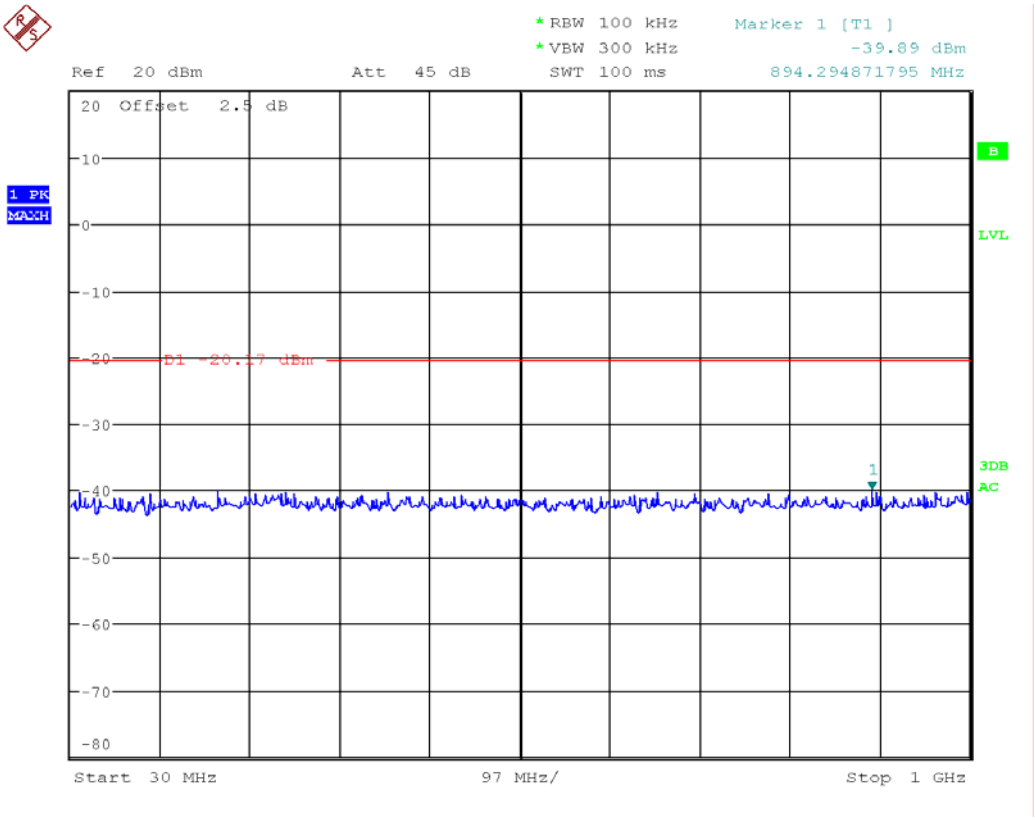


10G to 25GHz

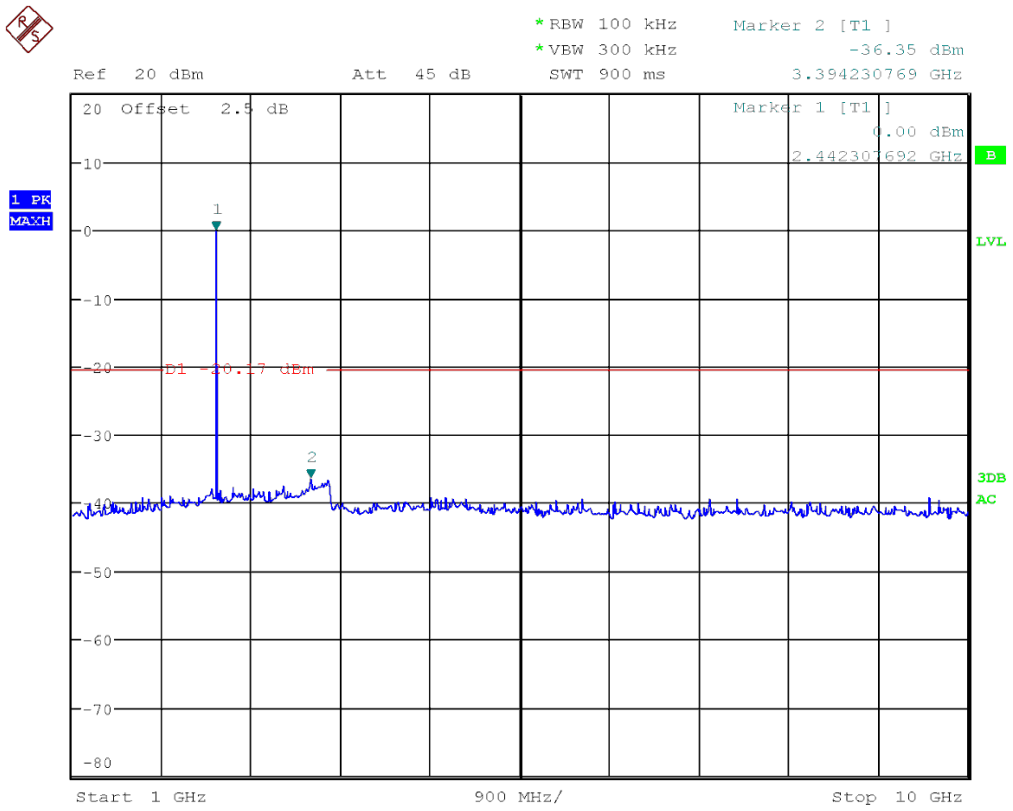


Middle Channel:

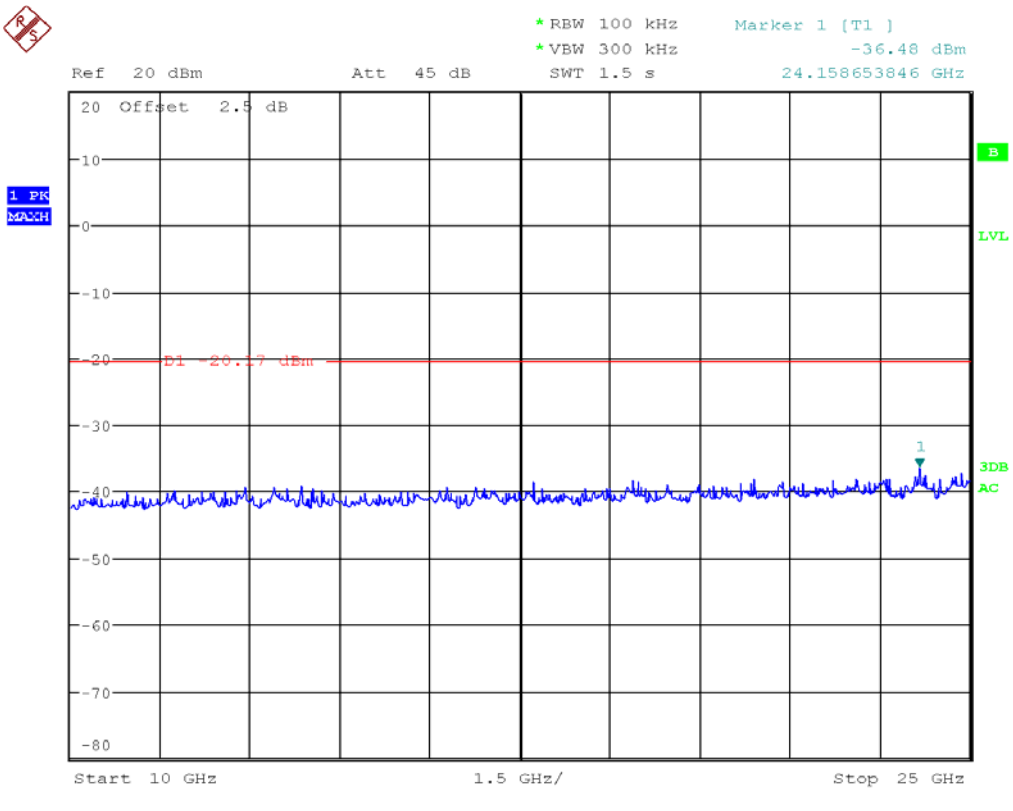
30M to 1GHz



1G to 10GHz

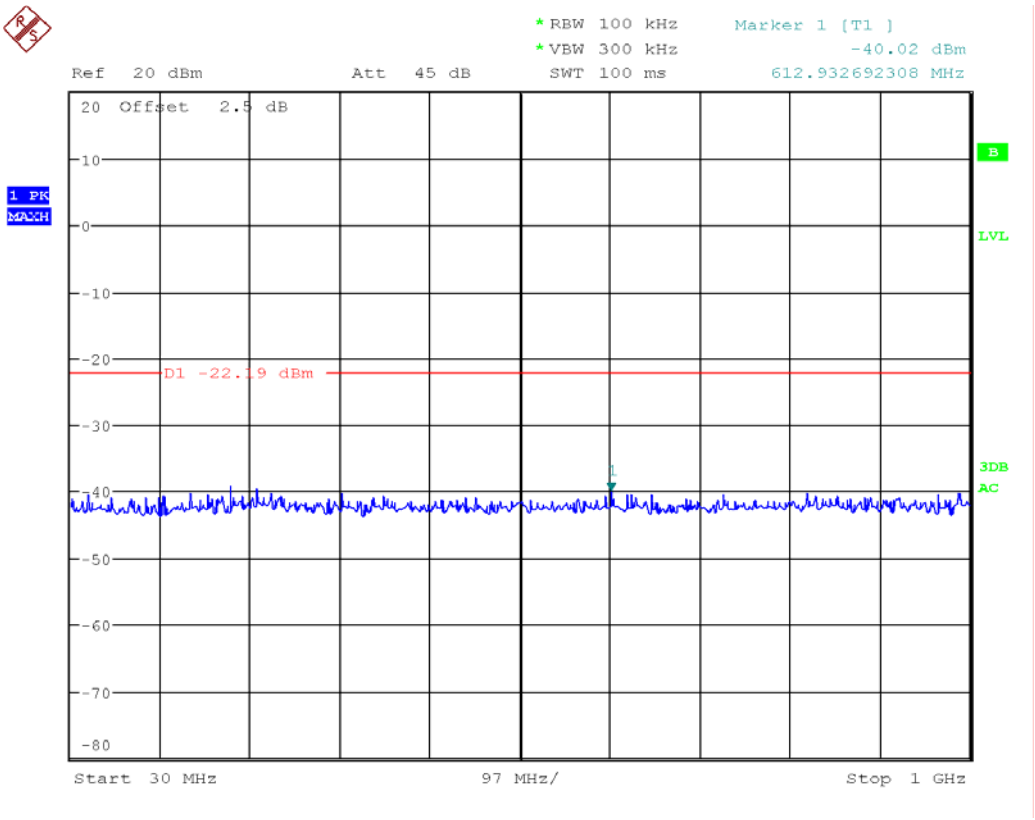


10G to 25GHz

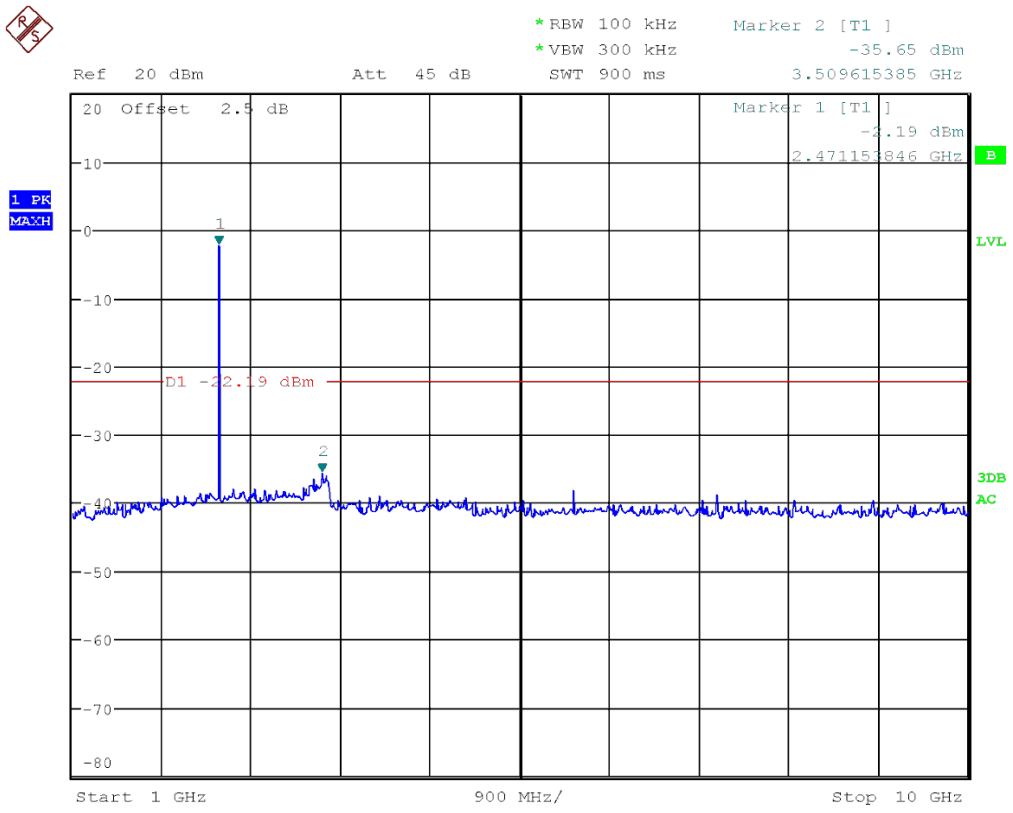


Highest Channel:

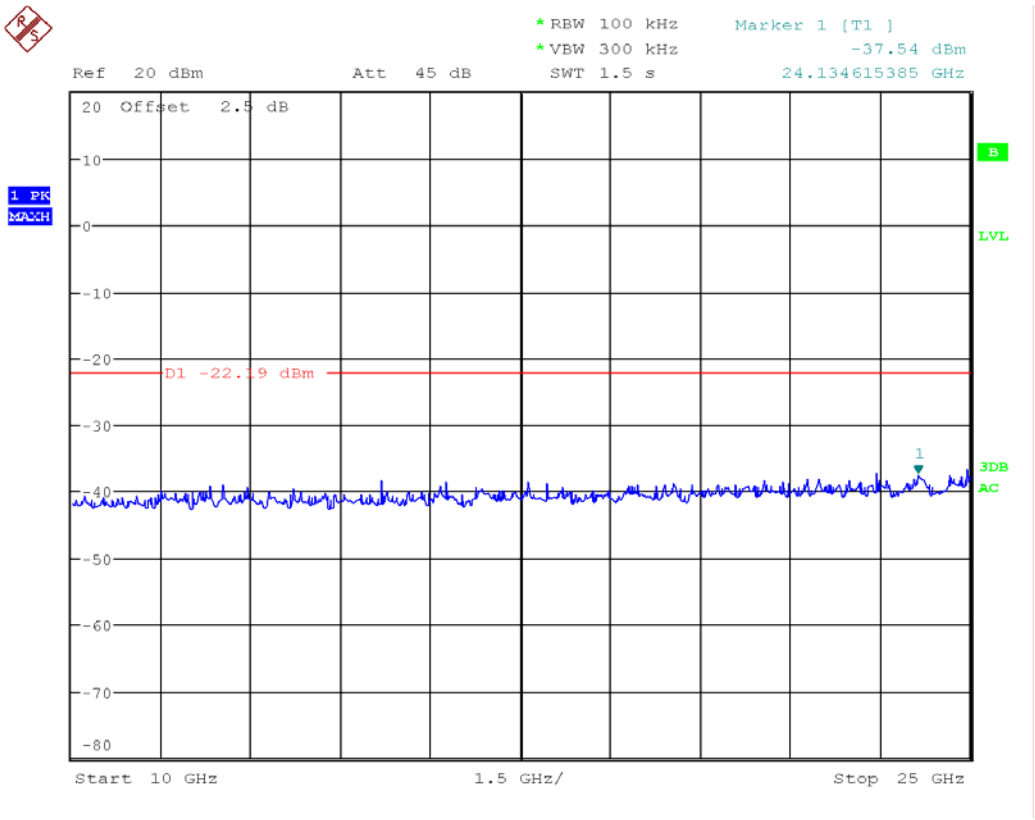
30M to 1GHz



1G to 10GHz



10G to 25GHz


RBW 100 kHz
VBW 300 kHz
SWT 1.5 s
Marker 1 [T1]
-37.54 dBm
24.134615385 GHz
Ref 20 dBm
Att 45 dB
20 Offset 2.5 dB
1 PK
MAXH
B
LVL
D1 -22.19 dBm
3DB
AC
Start 10 GHz
1.5 GHz/
Stop 25 GHz

4.10 RADIATED SPURIOUS EMISSIONS

4.10.1 LIMITS

Frequency (MHz)	Quasi-peak(μV/m)	Measurement distance(m)	Quasi-peak(dBμV/m)@distance 3m
0.009-0.490	2400/F(kHz)	300	53.8~88.5
0.490-1.705	24000/F(kHz)	30	43~53.8
1.705-30.0	30	30	49.5
30 ~ 88	100	3	40
88~216	150	3	43.5
216 ~ 960	200	3	46
Above 960	500	3	54

NOTE: (1) The lower limit shall apply at the transition frequencies.

Frequency (GHz)	Quasi-peak(dBμV/m)
1 ~ 26.5	74
1~ 26.5	54

4.10.2 TEST PROCEDURES

Procedure of Preliminary Test

According to ANSI C63.10:2009, a calibrated, linearly polarized antenna shall be positioned at the specified distance from the periphery of the EUT. The specified distance is the distance between the horizontal projection onto the ground plane of the closest periphery of the EUT and the projection onto the ground plane of the center of the axis of the elements of the receiving antenna.

Measurements shall be made with the antenna positioned in both the horizontal and vertical planes of polarization. The measurement antenna shall be varied in height above the reference ground plane to obtain the maximum signal strength. Unless otherwise specified, the measurement distance shall be 3 m. At any measurement distance, the antenna height shall be varied from 1 m to 4 m. These height scans apply for both horizontal and vertical polarizations, except that for vertical polarization, the minimum height of the center of the antenna shall be increased so that the lowest point of the bottom of the lowest antenna element clears the site reference ground plane by at least 25 cm. For a tuned dipole, the minimum heights as measured from the center of the antenna are those specified in the NSA measurement requirements.

For tabletop systems, cables or wires should be manipulated within the range of likely arrangements. For floor-standing equipment, the cables or wires should be located in the same manner as the user would install them and no further manipulation is made. For combination EUTs, the tabletop and floor-standing portions of the EUT shall follow the procedures for their respective setups and cable manipulation.

Table-top equipment is placed on a non-conductive set-up table with height 0, 8 m ± 0, 01 m, ANSI C63.10:2009 specifies the method to determine the impact of the non-conductive set-up table on test results. If the manner of cable installation is not known, or if it changes with each installation, cables or wires for floor-standing equipment shall be manipulated to the extent possible to produce the maximum level of emissions. For each mode of operation required to be tested, the frequency spectrum shall be monitored. Variations in antenna height between 1 m and 4 m, antenna polarization, EUT azimuth, and cable or wire placement shall be explored to produce the emission that has the highest amplitude relative to the limit.

Procedure of Final Test

EUT and support equipment were set up on the turntable as per the configuration with highest emission level in the preliminary test. The Analyzer / Receiver scanned from 30MHz to 1000MHz. Emissions were scanned and measured rotating the EUT to 360 degrees, varying cable placement and positioning the antenna 1 to 4 meters above the ground plane, in both the vertical and the horizontal polarization, to maximize the emission reading level. Record at least six highest emissions. Emission frequency, amplitude, antenna position, polarization and turntable position were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit and only QP reading is presented. The test data of the worst-case condition(s) was recorded.

Procedure of Final Test

EUT and support equipment were set up on the test bench as per the configuration with highest emission level in the preliminary test. A scan was taken on both power lines, recording at least the six highest emissions. Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit. The test data of the worst-case condition(s) was recorded.

Below 1GHz Set the spectrum analyzer: RBW =100KHz VBW >= RBW, Span = enough to catch the trace. Sweep = auto; Detector Function = Peak. Trace = Max,hold.

Above 1GHz Set the spectrum analyzer: RBW =1MHz VBW >= RBW, Span = enough to catch the trace. Sweep = auto; Detector Function = Peak. Trace = Max,hold.

Pre-test for EUT in three axes and find the X axe is the worst case. The worst case emissions were reported.

4.10.3 TEST SETUP

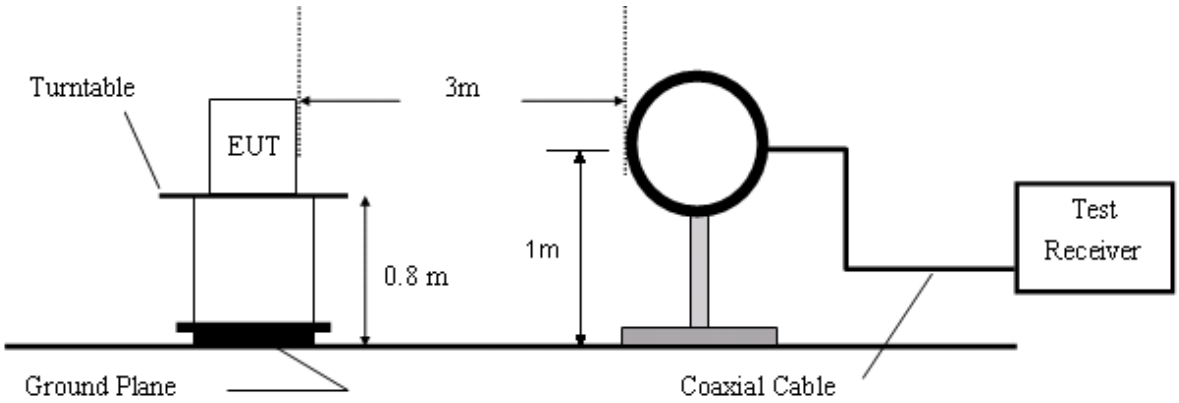


Figure 1. 9 KHz to 30MHz radiated emissions test configuration

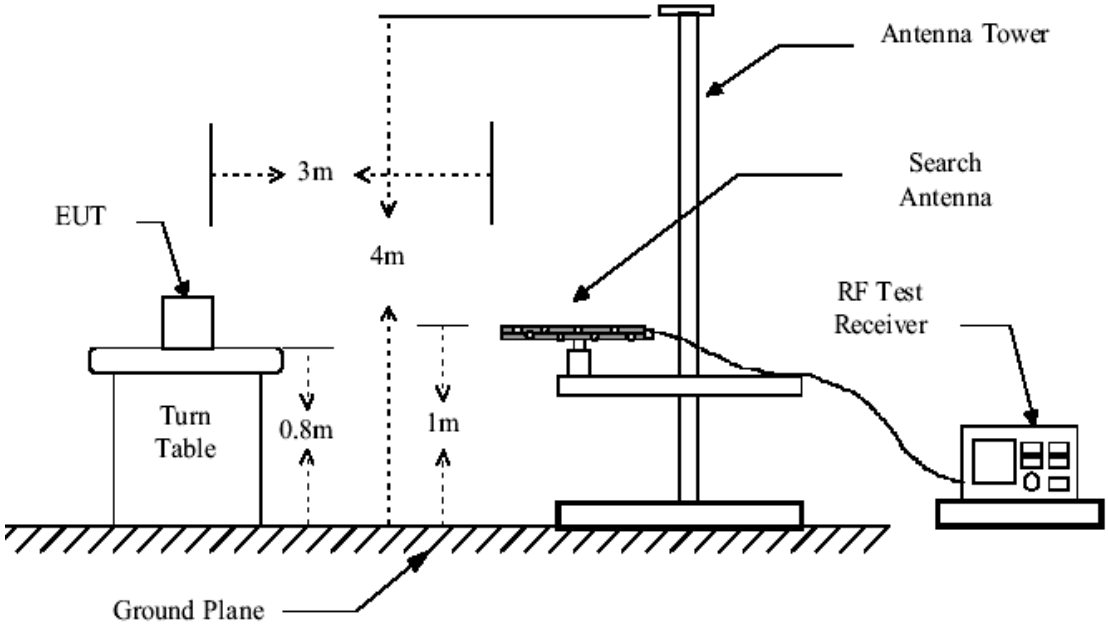


Figure 2. 30MHz to 1GHz radiated emissions test configuration

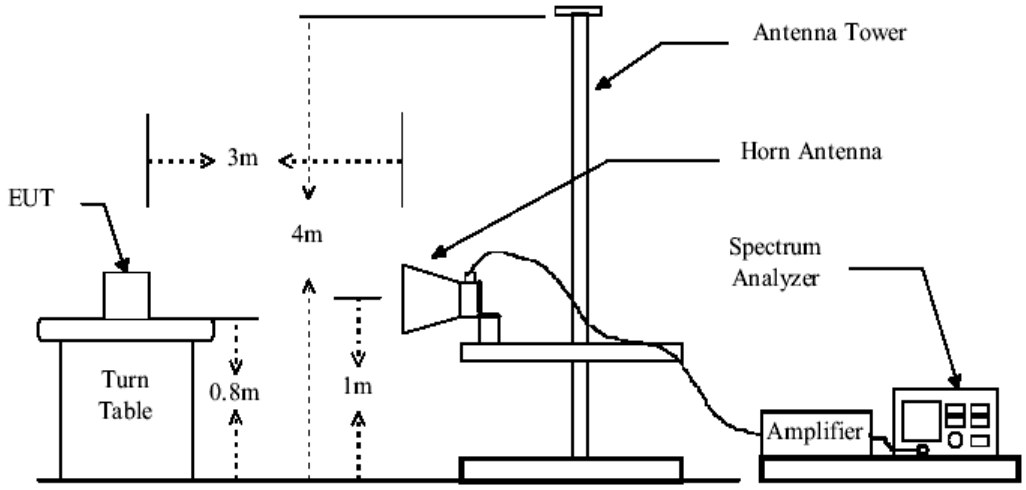


Figure 3. Above 1GHz radiated emissions test configuration

4.10.4 TEST RESULTS

1. Low Frequency 2410MHz

30MHz~1GHz Spurious Emissions .Quasi-Peak Measurement

No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Antenna polarization
1	39.0683	12.62	13.88	26.50	40.00	-13.50	Vertical
2	48.0977	15.08	10.42	25.50	40.00	-14.50	Vertical
3	72.0841	21.77	7.83	29.60	40.00	-10.40	Vertical
4	90.7614	19.15	9.65	28.80	43.50	-14.70	Vertical
5	195.9980	18.99	11.41	30.40	43.50	-13.10	Vertical
6	218.0828	15.42	12.38	27.80	46.00	-18.20	Vertical
7	72.0841	22.37	7.83	30.20	40.00	-9.80	Horizontal
8	178.1407	23.83	10.97	34.80	43.50	-8.70	Horizontal
9	203.8616	23.77	11.59	35.36	43.50	-8.14	Horizontal
10	212.0406	22.45	12.05	34.50	43.50	-9.00	Horizontal
11	288.8331	17.89	14.71	32.60	46.00	-13.40	Horizontal
12	384.6920	15.19	17.88	33.07	46.00	-12.93	Horizontal

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

Vertical:

No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Remark:
1	1959.223	28.45	3.84	32.29	74.00	-41.71	peak
2	1959.223	14.76	3.84	18.60	54.00	-35.40	AVG
3	2680.314	28.73	7.64	36.37	74.00	-37.63	peak
4	2680.314	16.06	7.64	23.70	54.00	-30.30	AVG
5	2942.459	29.61	10.95	40.56	74.00	-33.44	peak
6	2942.459	16.25	10.95	27.20	54.00	-26.80	AVG
7	8805.626	28.52	24.22	52.74	74.00	-21.26	peak
8	8805.626	16.48	24.22	40.70	54.00	-13.30	AVG
9	13624.165	28.46	29.13	57.59	74.00	-16.41	peak
10	13624.165	16.07	29.13	45.20	54.00	-8.80	AVG
11	16995.414	29.00	35.13	64.13	74.00	-9.87	peak
12	16995.414	14.37	35.13	49.50	54.00	-4.50	AVG

Horizontal:

No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Remark:
1	2117.030	28.06	4.27	32.33	74.00	-41.67	peak
2	2117.030	15.73	4.27	20.00	54.00	-34.00	AVG
3	2840.653	29.92	9.70	39.62	74.00	-34.38	peak
4	2840.653	15.70	9.70	25.40	54.00	-28.60	AVG
5	2942.459	29.79	10.95	40.74	74.00	-33.26	peak
6	2942.459	16.55	10.95	27.50	54.00	-26.50	AVG
7	8830.947	28.18	24.22	52.40	74.00	-21.60	peak
8	8830.947	16.08	24.22	40.30	54.00	-13.70	AVG
9	10135.964	28.28	25.40	53.68	74.00	-20.32	peak
10	10135.964	17.30	25.40	42.70	54.00	-11.30	AVG
11	17044.285	28.42	35.09	63.51	74.00	-10.49	peak
12	17044.285	14.31	35.09	49.40	54.00	-4.60	AVG

The field strength is calculated by adding the Antenna Factor. Correct Factor.

The basic equation with a sample calculation is as follows:
Final Test Level =Receiver Reading + Correct Factor

2. Middle Frequency 2440MHz

30MHz~1GHz Spurious Emissions .Quasi-Peak Measurement

No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Antenna polarization
1	38.4153	12.21	14.29	26.50	40.00	-13.50	Vertical
2	48.0977	14.98	10.42	25.40	40.00	-14.60	Vertical
3	72.0841	22.67	7.83	30.50	40.00	-9.50	Vertical
4	90.7614	17.75	9.65	27.40	43.50	-16.10	Vertical
5	172.2344	18.17	10.63	28.80	43.50	-14.70	Vertical
6	203.8616	15.81	11.59	27.40	43.50	-16.10	Vertical
7	72.0841	22.97	7.83	30.80	40.00	-9.20	Horizontal
8	155.6649	21.24	10.46	31.70	43.50	-11.80	Horizontal
9	200.4535	24.10	11.40	35.50	43.50	-8.00	Horizontal
10	216.8608	21.88	12.32	34.20	46.00	-11.80	Horizontal
11	300.4212	18.43	15.07	33.50	46.00	-12.50	Horizontal
12	384.6920	16.62	17.88	34.50	46.00	-11.50	Horizontal

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

Vertical:

No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Remark:
1	2124.498	27.92	4.29	32.21	74.00	-41.79	peak
2	2124.498	15.81	4.29	20.10	54.00	-33.90	AVG
3	2747.201	29.07	8.52	37.59	74.00	-36.41	peak
4	2747.201	15.88	8.52	24.40	54.00	-29.60	AVG
5	2937.283	29.33	10.88	40.21	74.00	-33.79	peak
6	2937.283	16.52	10.88	27.40	54.00	-26.60	AVG
7	10282.536	28.88	25.08	53.96	74.00	-20.04	peak
8	10282.536	17.22	25.08	42.30	54.00	-11.70	AVG
9	13900.779	28.17	29.73	57.90	74.00	-16.10	peak
10	13900.779	15.07	29.73	44.80	54.00	-9.20	AVG
11	17290.756	28.89	34.72	63.61	74.00	-10.39	peak
12	17290.756	15.58	34.72	50.30	54.00	-3.70	AVG

Horizontal:

No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Remark:
1	2352.903	28.38	5.13	33.51	74.00	-40.49	peak
2	2352.903	15.97	5.13	21.10	54.00	-32.90	AVG
3	2795.996	28.50	9.16	37.66	74.00	-36.34	peak
4	2795.996	15.44	9.16	24.60	54.00	-29.40	AVG
5	2937.283	30.31	10.88	41.19	74.00	-32.81	peak
6	2937.283	16.62	10.88	27.50	54.00	-26.50	AVG
7	11143.389	29.27	24.82	54.09	74.00	-19.91	peak
8	11143.389	15.48	24.82	40.30	54.00	-13.70	AVG
9	13546.148	28.76	28.94	57.70	74.00	-16.30	peak
10	13546.148	15.56	28.94	44.50	54.00	-9.50	AVG
11	16995.414	28.11	35.13	63.24	74.00	-10.76	peak
12	16995.414	15.07	35.13	50.20	54.00	-3.80	AVG

The field strength is calculated by adding the Antenna Factor. Correct Factor.

The basic equation with a sample calculation is as follows:
Final Test Level =Receiver Reading + Correct Factor

3. High Frequency 2480MHz

30MHz~1GHz Spurious Emissions .Quasi-Peak Measurement

No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Antenna polarization
1	48.0977	16.78	10.42	27.20	40.00	-12.80	Vertical
2	72.0841	22.37	7.83	30.20	40.00	-9.80	Vertical
3	90.7614	15.95	9.65	25.60	43.50	-17.90	Vertical
4	195.9980	16.39	11.41	27.80	43.50	-15.70	Vertical
5	212.0406	16.45	12.05	28.50	43.50	-15.00	Vertical
6	321.3783	11.29	16.31	27.60	46.00	-18.40	Vertical
7	72.0841	22.37	7.83	30.20	40.00	-9.80	Horizontal
8	105.0400	20.75	9.75	30.50	43.50	-13.00	Horizontal
9	192.7214	23.06	11.44	34.50	43.50	-9.00	Horizontal
10	218.0827	21.22	12.38	33.60	46.00	-12.40	Horizontal
11	288.8331	17.99	14.71	32.70	46.00	-13.30	Horizontal
12	336.1560	16.64	16.86	33.50	46.00	-12.50	Horizontal

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

Vertical:

No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Remark:
1	2348.764	28.65	5.10	33.75	74.00	-40.25	peak
2	2348.764	16.00	5.10	21.10	54.00	-32.90	AVG
3	2737.544	28.60	8.39	36.99	74.00	-37.01	peak
4	2737.544	15.81	8.39	24.20	54.00	-29.80	AVG
5	2937.283	29.06	10.88	39.94	74.00	-34.06	peak
6	2937.283	16.52	10.88	27.40	54.00	-26.60	AVG
7	13860.922	28.32	29.65	57.97	74.00	-16.03	peak
8	13860.922	17.55	29.65	47.20	54.00	-6.80	AVG
9	16185.724	29.51	32.97	62.48	74.00	-11.52	peak
10	16185.724	17.03	32.97	50.00	54.00	-4.00	AVG
11	16946.684	28.93	34.95	63.88	74.00	-10.12	peak
12	16946.684	15.25	34.95	50.20	54.00	-3.80	AVG

Horizontal:

No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Remark:
1	2357.049	28.64	5.14	33.78	74.00	-40.22	peak
2	2357.049	16.16	5.14	21.30	54.00	-32.70	AVG
3	2689.769	28.85	7.76	36.61	74.00	-37.39	peak
4	2689.769	14.84	7.76	22.60	54.00	-31.40	AVG
5	2937.283	30.66	10.88	41.54	74.00	-32.46	peak
6	2937.283	16.52	10.88	27.40	54.00	-26.60	AVG
7	8055.677	28.32	23.37	51.69	74.00	-22.31	peak
8	8055.677	16.43	23.37	39.80	54.00	-14.20	AVG
9	10077.922	28.64	25.53	54.17	74.00	-19.83	peak
10	10077.922	17.07	25.53	42.60	54.00	-11.40	AVG
11	16898.092	28.98	34.75	63.73	74.00	-10.27	peak
12	16898.092	16.95	34.75	51.70	54.00	-2.30	AVG

Remark:

1). 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.

2). 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.

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

Test result: The unit does meet the requirements.

4.11 BAND EDGES REQUIREMENT

4.11.1 LIMITS

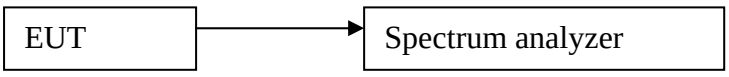
Section 15.247 (d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Section 15.209(a) is not required.

4.11.2 TEST PROCEDURES

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set RBW to 100 kHz and VBW of spectrum analyzer to 300 kHz with a convenient frequency span including 100 kHz bandwidth from band edge.
   Note: For Restricted Band
   RBW=100 kHz
   VBW=300 kHz
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.

   Repeat above procedures until all measured frequencies were complete.

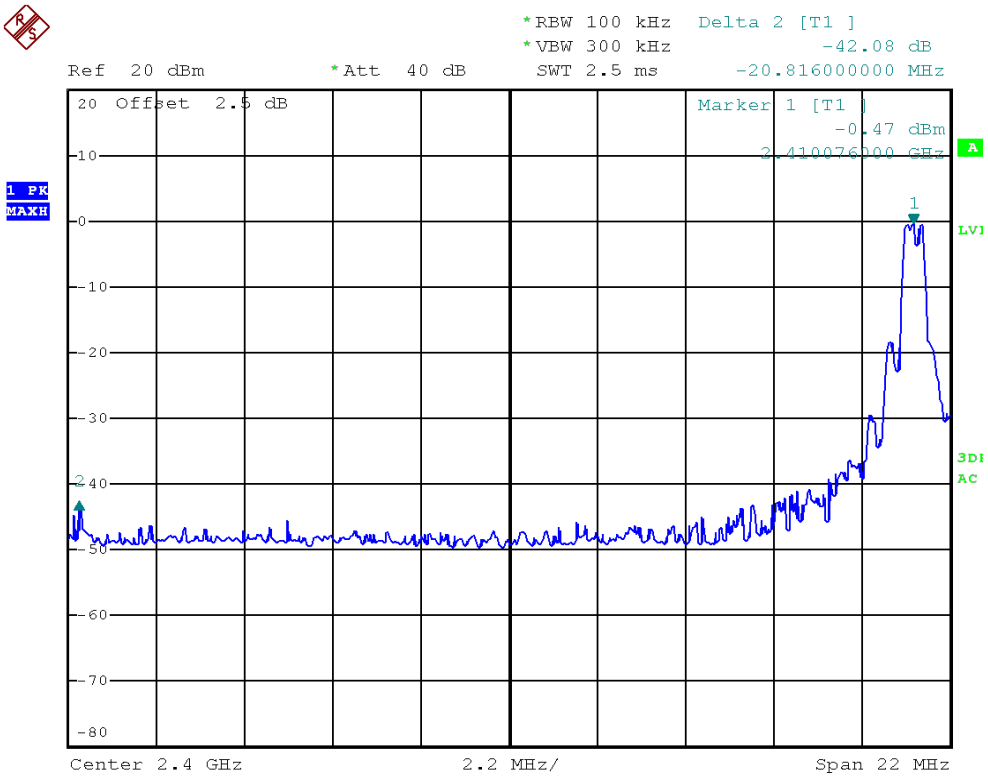
4.11.3 TEST SETUP



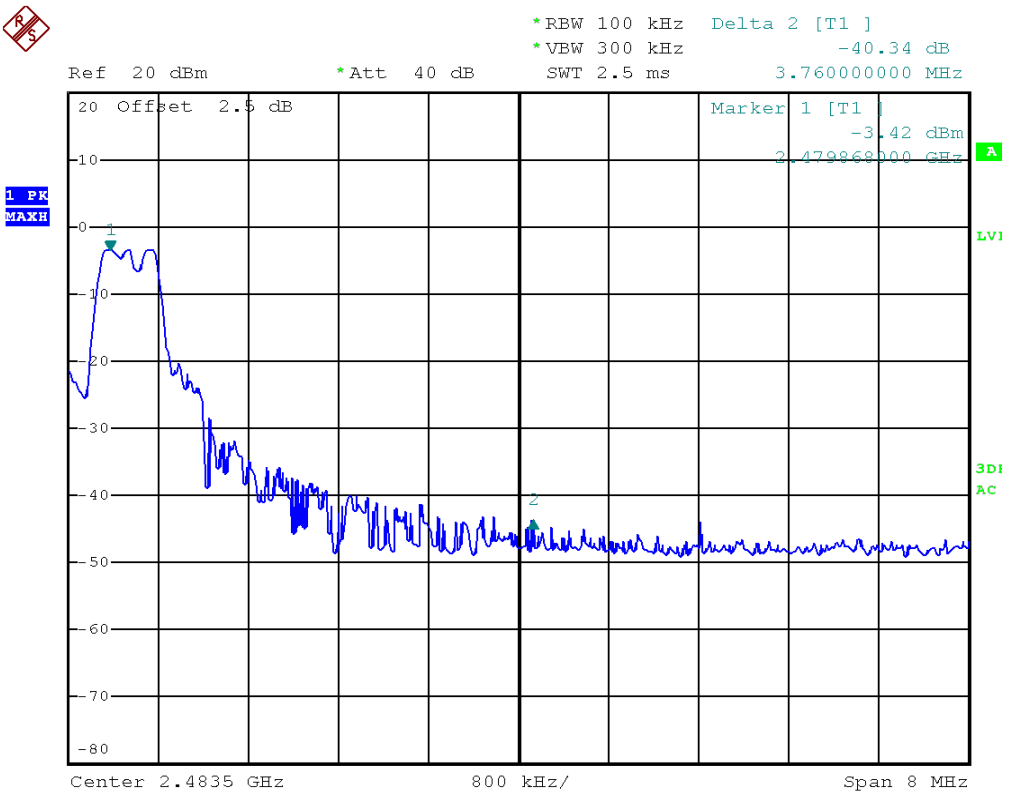
4.11.4 TEST RESULTS

Test result plot as follows:

Lowest Channel



Highest Channel



The unit does meet the FCC requirements.

4.11.5 RADIATED EMISSIONS WHICH FALL IN THE RESTRICTED BANDS

Test Requirement:	Section 15.247(d) In addition, radiated emissions which fall in the restricted bands. As defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

Section 15.205 Restricted bands of operation.

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

Pre-test for EUT in three axes and find the X axe is the worst case.
The field strength was measured with an EMI measuring receiver and 1 MHz RBW / VBW for peak and with 1MHz RBW / 10Hz VBW for average at a distance of 3m.

Test Result:

Channel Low

No.	Freq MHz	Reading dBuV	Factor dB	Level dBuV/m	Limit dBuV/m	Over Limit dB	Remark	Pol V/H
1	2310.000	26.62	10.63	37.25	74.00	-36.75	peak	VERTICAL
2	2400.000	41.81	11.07	52.88	74.00	-21.12	peak	VERTICAL
3	2310.000	15.39	10.63	26.02	54.00	-27.98	AVG	VERTICAL
4	2400.000	16.05	11.07	27.12	54.00	-26.88	AVG	VERTICAL
1	2310.000	27.28	10.63	37.91	74.00	-36.09	peak	HORIZONTAL
2	2400.000	38.32	11.07	49.39	74.00	-24.61	peak	HORIZONTAL
3	2310.000	15.19	10.63	25.82	54.00	-28.18	AVG	HORIZONTAL
4	2400.000	15.73	11.07	26.80	54.00	-27.20	AVG	HORIZONTAL

Channel High

No.	Freq MHz	Reading dBuV	Factor dB	Level dBuV/m	Limit dBuV/m	Over Limit dB	Remark	Pol V/H
1	2483.500	53.13	11.48	64.61	74.00	-9.39	peak	VERTICAL
2	2500.000	36.48	11.56	48.04	74.00	-25.96	peak	VERTICAL
3	2483.500	19.27	11.48	30.75	54.00	-23.25	AVG	VERTICAL
4	2500.000	15.55	11.56	27.11	54.00	-26.89	AVG	VERTICAL
1	2483.500	49.44	11.48	60.92	74.00	-13.08	peak	HORIZONTAL
2	2500.000	30.34	11.56	41.90	74.00	-32.10	peak	HORIZONTAL
3	2483.500	19.14	11.48	30.62	54.00	-23.38	AVG	HORIZONTAL
4	2500.000	15.42	11.56	26.98	54.00	-27.02	AVG	HORIZONTAL

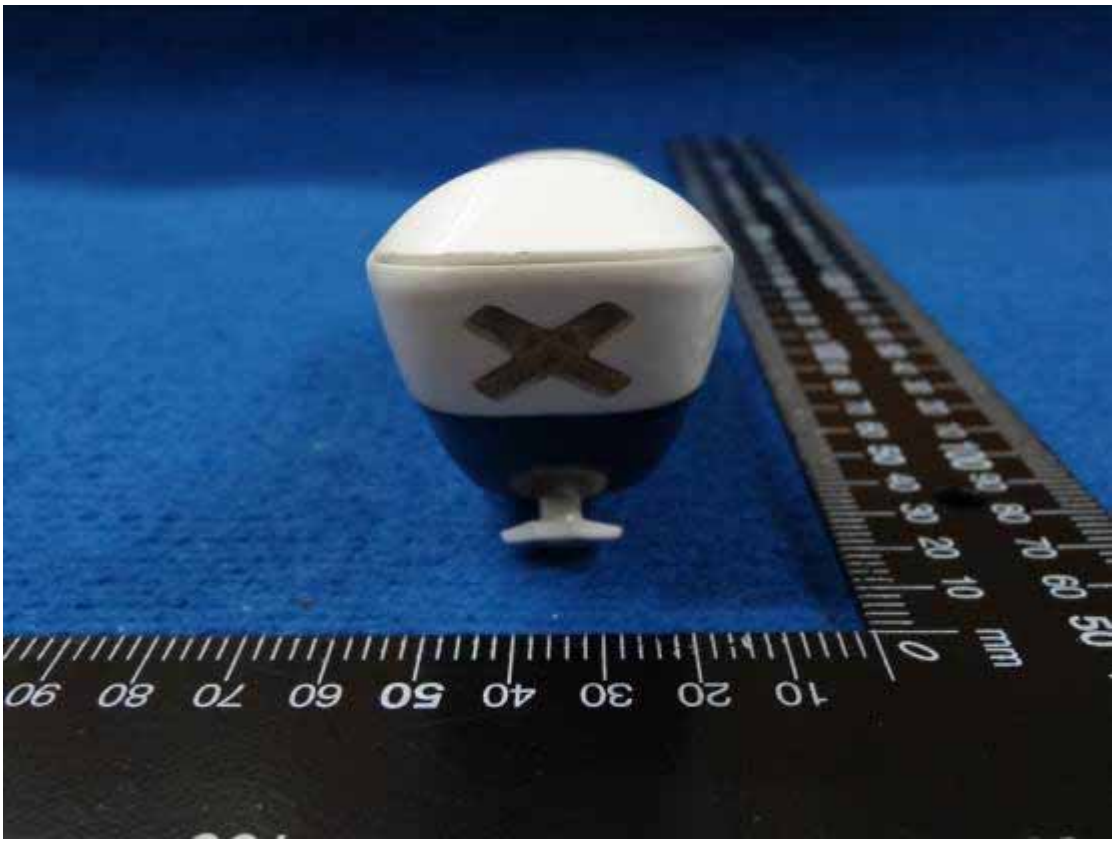
Remark: Max field strength in 3m distance. No any other emission which falls in restricted bands can be detected and be reported.

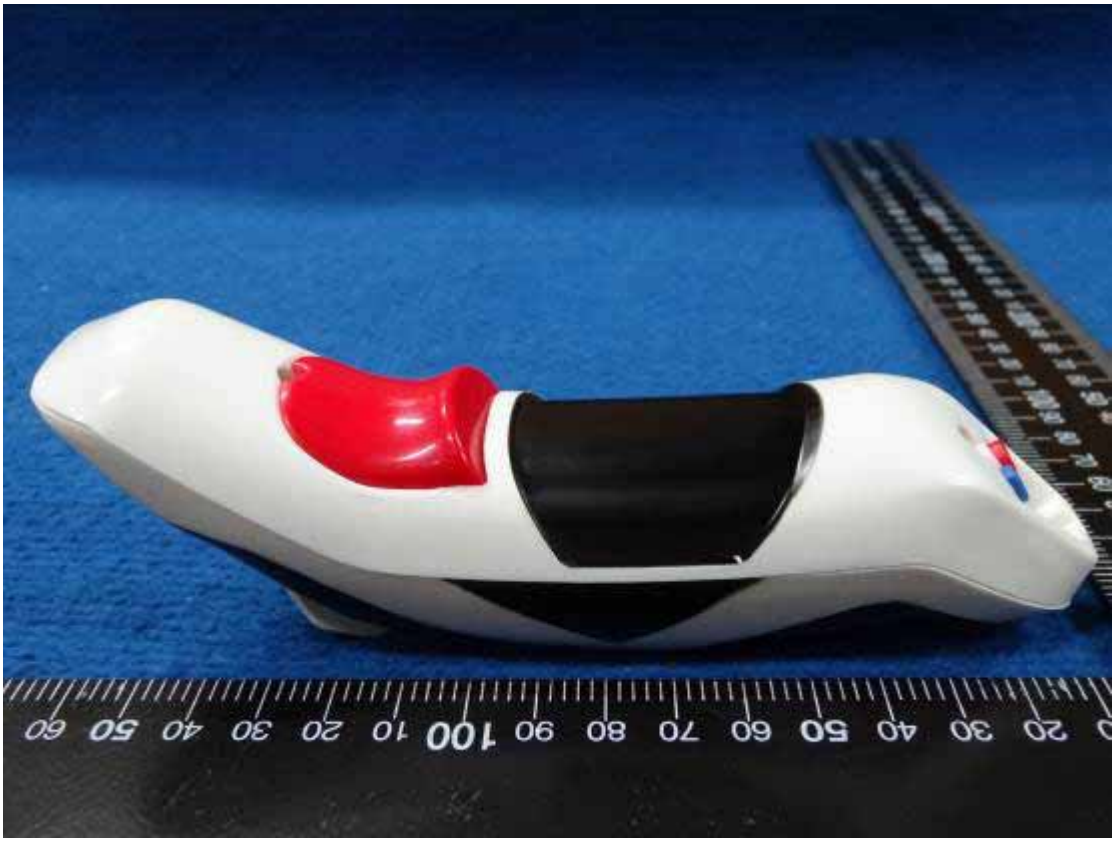
APPENDIX A: PHOTOGRAPH OF THE TEST ARRANGEMENT

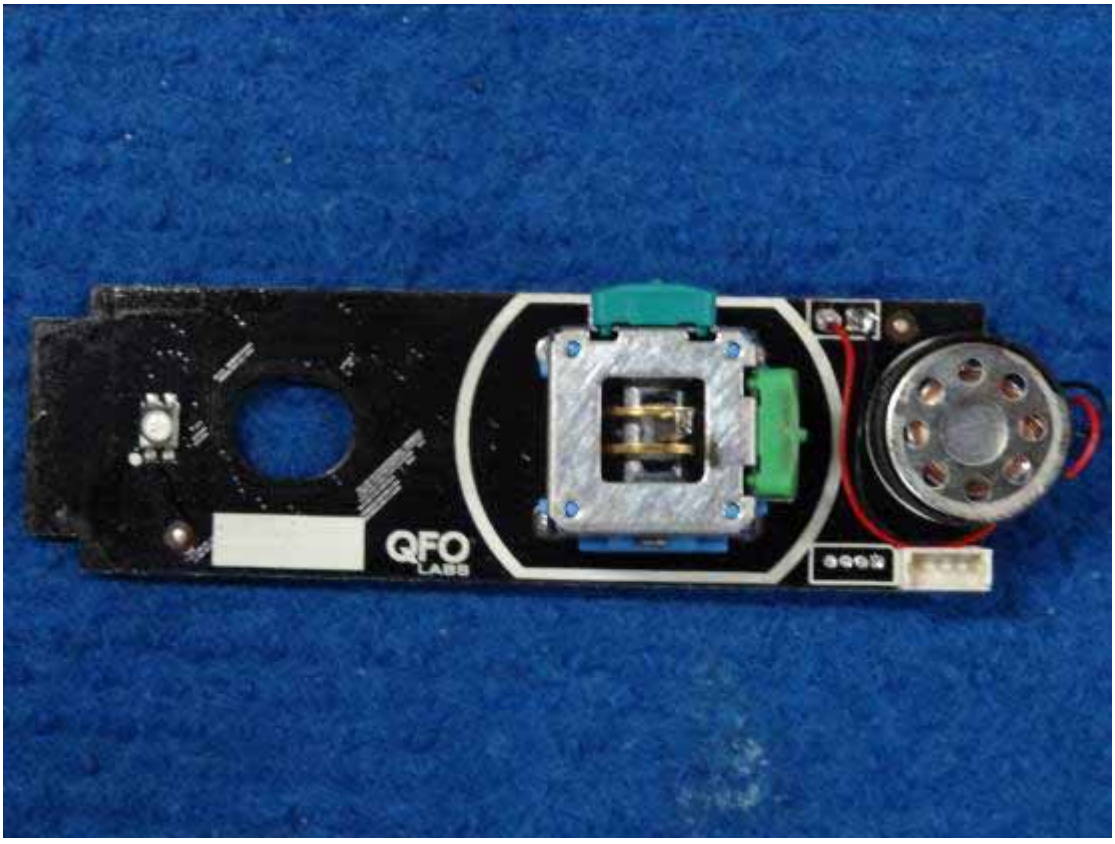
RSE（Below 1GHz）

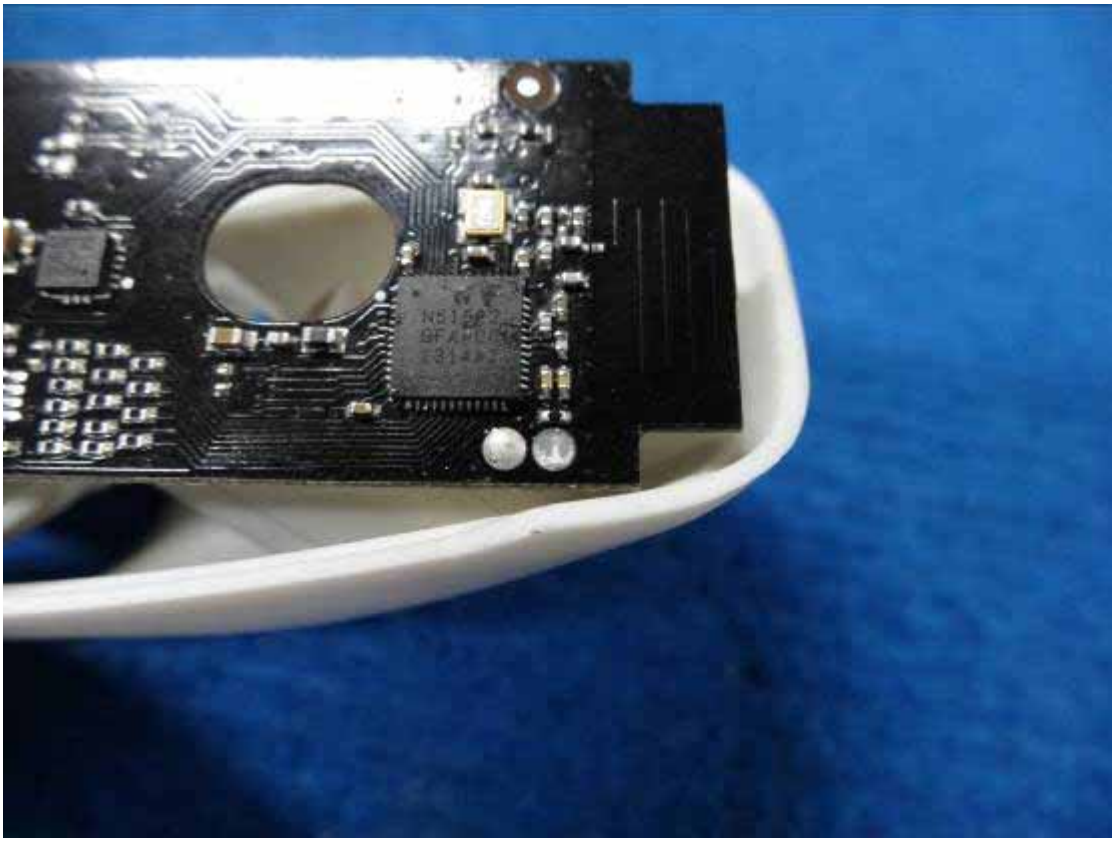
RSE（Above 1GHz）

APPENDIX B: PHOTOGRAPH OF THE EUT






QFO
LABS



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