

# RF TEST REPORT



Report No.: 17021567-FCC-R1  
Supersede Report No.: N/A

Applicant	Shenzhen Shuaixian Electronic Equipment Co., Ltd.	
Product Name	Bluetooth Earphones	
Model No.	SX-808	
Serial No.	N/A	
Test Standard	FCC Part 15.247: 2017, ANSI C63.10: 2013	
Test Date	November 20 to November 23, 2017	
Issue Date	November 23, 2017	
Test Result	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail	
Equipment complied with the specification	<input checked="" type="checkbox"/>	
Equipment did not comply with the specification	<input type="checkbox"/>	
<i>Trety Lu</i>	<i>Deon Dai</i>	
Trety Lu Test Engineer	Deon Dai Engineer Reviewer	
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Issued by:  
**SIEMIC (Nanjing-China) Laboratories**  
2-1 Longcang Avenue Yuhua Economic and  
Technology Development Park, Nanjing, China  
Tel: +86(25)86730128/86730129 Fax: +86(25)86730127 Email: China@siemic.com.cn

## Laboratories Introduction

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### Accreditations for Conformity Assessment

Country/Region	Scope
USA	EMC, RF/Wireless, SAR, Telecom
Canada	EMC, RF/Wireless, SAR, Telecom
Taiwan	EMC, RF, Telecom, SAR, Safety
Hong Kong	RF/Wireless, SAR, Telecom
Australia	EMC, RF, Telecom, SAR, Safety
Korea	EMI, EMS, RF, SAR, Telecom, Safety
Japan	EMI, RF/Wireless, SAR, Telecom
Singapore	EMC, RF, SAR, Telecom
Europe	EMC, RF, SAR, Telecom, Safety

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## 1. Report Revision History

Report No.	Report Version	Description	Issue Date
17021567-FCC-R1	NONE	Original	November 23, 2017

## 2. Customer information

Applicant Name	Shenzhen Shuaixian Electronic Equipment Co., Ltd.
Applicant Add	No.10 Lane 3, Longxing Rd., Dakang Long Village, Henggang Town, Longgang Dist., Shenzhen, China
Manufacturer	Shenzhen Shuaixian Electronic Equipment Co., Ltd.
Manufacturer Add	No.10 Lane 3, Longxing Rd., Dakang Long Village, Henggang Town, Longgang Dist., Shenzhen, China

## 3. Test site information

Lab performing tests	SIEMIC (Nanjing-China) Laboratories
Lab Address	2-1 Longcang Avenue Yuhua Economic and Technology Development Park, Nanjing, China
FCC Test Site No.	694825
IC Test Site No.	4842B-1
Test Software	EZ_EMG

#### 4. Equipment under Test (EUT) Information

Description of EUT:	Bluetooth Earphones
Main Model:	SX-808
Serial Model:	N/A
Date EUT received:	November 20, 2017
Test Date(s):	November 20 to November 23, 2017
Antenna Gain:	Bluetooth: 2 dBi
Type of Modulation:	Bluetooth: GFSK, $\pi/4$ -DQPSK, 8DPSK
RF Operating Frequency (ies):	Bluetooth: 2402-2480 MHz
Max. Output Power:	7.345dBm
Number of Channels:	Bluetooth: 79CH
Port:	Power Port
Power:	Input Power: DC5V Battery: 3.7V 500mAh 1.85Wh
Trade Name :	N/A
FCC ID:	UHB-SX-808

**Operating Channel list**

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
00	2402	17	2419	34	2436	51	2453	68	2470
01	2403	18	2420	35	2437	52	2454	69	2471
02	2404	19	2421	36	2438	53	2455	70	2472
03	2405	20	2422	37	2439	54	2456	71	2473
04	2406	21	2423	38	2440	55	2457	72	2474
05	2407	22	2424	39	2441	56	2458	73	2475
06	2408	23	2425	40	2442	57	2459	74	2476
07	2409	24	2426	41	2443	58	2460	75	2477
08	2410	25	2427	42	2444	59	2461	76	2478
09	2411	26	2428	43	2445	60	2462	77	2479
10	2412	27	2429	44	2446	61	2463	78	2480
11	2413	28	2430	45	2447	62	2464		
12	2414	29	2431	46	2448	63	2465		
13	2415	30	2432	47	2449	64	2466		
14	2416	31	2433	48	2450	65	2467		
15	2417	32	2434	49	2451	66	2468		
16	2418	33	2435	50	2452	67	2469		

## 5. Test Summary

The product was tested in accordance with the following specifications.  
All testing has been performed according to below product classification:

FCC Rules	Description of Test	Result
§15.203	Antenna Requirement	Compliance
§15.247(a)(1)	Channel Separation	Compliance
§15.247(a)(1)	20 dB Bandwidth	Compliance
§15.247(b)(1)	Peak Output Power	Compliance
§15.247(a)(1)(iii)	Number of Hopping Channel	Compliance
§15.247(a)(1)(iii)	Time of Occupancy (Dwell Time)	Compliance
§15.247(d)	Band Edge	Compliance
§15.207(a)	AC Line Conducted Emissions	Compliance
§15.205, §15.209, §15.247(d)	Radiated Emissions	Compliance

### Measurement Uncertainty

Emissions		
Test Item	Description	Uncertainty
Band Edge and Radiated Spurious Emissions	Confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2 (for EUTs < 0.5m X 0.5m X 0.5m)	+5.6dB/-4.5dB
-	-	-



## **6. Measurements, Examination And Derived Results**

### **6.1 Antenna Requirement**

#### **Applicable Standard**

According to § 15.203, 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 shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the user of a standard antenna jack or electrical connector is prohibited. The structure and application of the EUT were analyzed to determine compliance with section §15.203 of the rules. §15.203 state that the subject device must meet the following criteria:

- a. Antenna must be permanently attached to the unit.
- b. Antenna must use a unique type of connector to attach to the EUT.

Unit must be professionally installed, and installer shall be responsible for verifying that the correct antenna is employed with the unit. And according to FCC 47 CFR section 15.247 (b), if the transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

#### **Antenna Connector Construction**

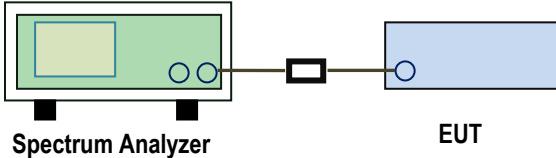
**Antenna must be permanently attached to the unit, it meets up with the ANTENNA REQUIREMENT.**

**Result:** Compliant.

## 6.2 Channel Separation

Temperature	23°C
Relative Humidity	51%
Atmospheric Pressure	1018mbar
Test date :	November 22, 2017
Tested By :	Trety Lu

### Requirement(s):

Spec	Item	Requirement	Applicable
§ 15.247(a)(1)	a)	Channel Separation < 20dB BW and 20dB BW < 25KHz ; Channel Separation Limit=25KHz Chanel Separation < 20dB BW and 20dB BW > 25kHz ; Channel Separation Limit=2/3 20dB BW	<input checked="" type="checkbox"/>
Test Setup	 <p style="text-align: center;">Spectrum Analyzer                      EUT</p>		
Test Procedure	<p>The test follows FCC Public Notice DA 00-705 Measurement Guidelines. <u>Use the following spectrum analyzer settings:</u></p> <ul style="list-style-type: none"> <li>- The EUT must have its hopping function enabled</li> <li>- Span = wide enough to capture the peaks of two adjacent channels</li> <li>- Resolution (or IF) Bandwidth (RBW) ≥1% of the span</li> <li>- Video (or Average) Bandwidth (VBW) ≥RBW</li> <li>- Sweep = auto</li> <li>- Detector function = peak</li> <li>- Trace = max hold</li> <li>- 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.</li> </ul>		
Remark			
Result	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail		

Test Data     Yes                       N/A  
 Test Plot     Yes (See below)                       N/A

### Channel Separation measurement result

Type/ Modulation	CH	CH Freq (MHz)	CH Separation (MHz)	Limit (MHz)	Result
CH Separation GFSK	Low Channel	2402	1.008	0.9237	Pass
	Adjacency Channel	2403			
	Mid Channel	2441	1.002	0.9253	Pass
	Adjacency Channel	2440			
	High Channel	2480	1.005	0.9229	Pass
	Adjacency Channel	2479			
CH Separation $\pi/4$ -DQPSK	Low Channel	2402	1.008	0.841	Pass
	Adjacency Channel	2403			
	Mid Channel	2441	1.002	0.822	Pass
	Adjacency Channel	2440			
	High Channel	2480	1.002	0.823	Pass
	Adjacency Channel	2479			
CH Separation 8DPSK	Low Channel	2402	1.002	0.850	Pass
	Adjacency Channel	2403			
	Mid Channel	2441	1.002	0.843	Pass
	Adjacency Channel	2440			
	High Channel	2480	1.014	0.843	Pass
	Adjacency Channel	2479			

### Test Plots Channel Separation measurement result





8DPSK - Low Channel



8DPSK - Middle Channel



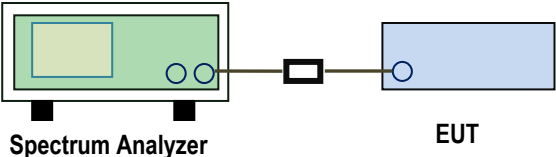
8DPSK - High Channel

### 6.3 20dB Bandwidth

Temperature	23°C
Relative Humidity	51%
Atmospheric Pressure	1018mbar
Test date :	November 22 , 2017
Tested By :	Trety Lu

#### Requirement(s):

Spec	Item	Requirement	Applicable
§15.247(a) (1)	a)	Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.	<input checked="" type="checkbox"/>

Test Setup	 <p style="text-align: center;">Spectrum Analyzer                      EUT</p>
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Test Procedure	<p>The test follows FCC Public Notice DA 00-705 Measurement Guidelines.  <u>Use the following spectrum analyzer settings:</u></p> <ul style="list-style-type: none"> <li>- Span = approximately 2 to 3 times the 20 dB bandwidth, centered on a hopping channel</li> <li>- RBW <math>\geq</math> 1% of the 20 dB bandwidth</li> <li>- VBW <math>\geq</math> RBW</li> <li>- Sweep = auto</li> <li>- Detector function = peak</li> <li>- Trace = max hold.</li> <li>- The EUT should be transmitting at its maximum data rate. Allow the trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. Use the marker-delta function to measure 20 dB down one side of the emission. Reset the marker-delta function, and move the marker to the other side of the emission, until it is (as close as possible to) even with the reference marker level. The marker-delta reading at this point is the 20 dB bandwidth of the emission. 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).</li> </ul>
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Remark	
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Result	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail
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Test Data     Yes                       N/A

Test Plot     Yes (See below)                       N/A

**Measurement result**

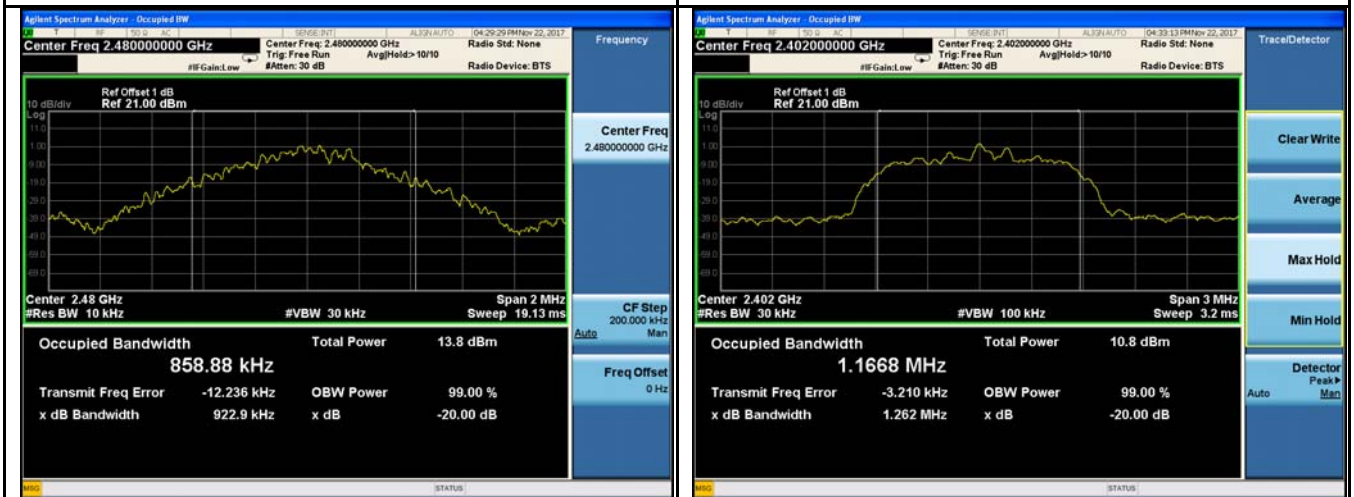
Modulation	CH	CH Freq (MHz)	20dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
GFSK	Low	2402	0.9237	0.8512
	Mid	2441	0.9253	0.8577
	High	2480	0.9229	0.8589
$\pi/4$ -DQPSK	Low	2402	1.262	1.1668
	Mid	2441	1.233	1.1796
	High	2480	1.235	1.1868
8DPSK	Low	2402	1.275	1.1597
	Mid	2441	1.265	1.1750
	High	2480	1.264	1.1848

### Test Plots 20dB Bandwidth measurement result



GFSK - Low Channel

GFSK - Middle Channel



GFSK - High Channel

π/4-DQPSK - Low Channel



π/4-DQPSK - Middle Channel

π/4-DQPSK - High Channel

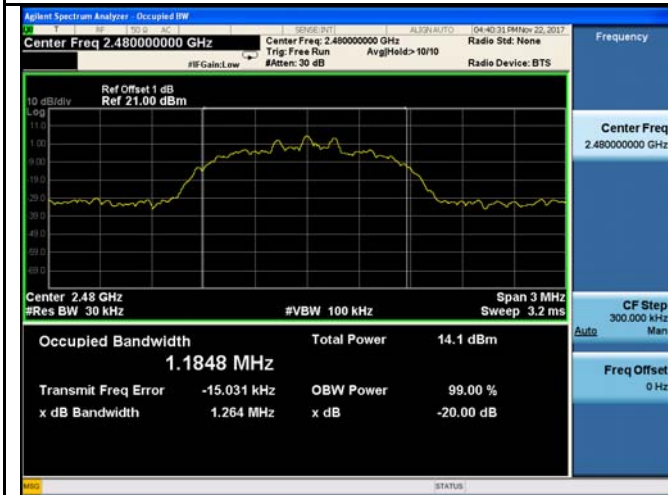




8DPSK - Low Channel



8DPSK - Middle Channel



8DPSK - High Channel

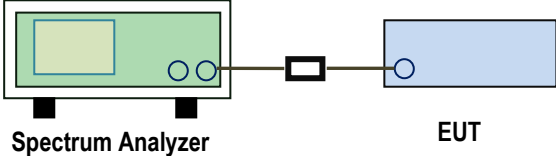


## 6.4 Peak Output Power

Temperature	23°C
Relative Humidity	51%
Atmospheric Pressure	1018mbar
Test date :	November 22 , 2017
Tested By :	Trety Lu

### Requirement(s):

Spec	Item	Requirement	Applicable
§15.247(b) (2)	a)	FHSS in 2400-2483.5MHz with $\geq 75$ channels: $\leq 1$ Watt	<input checked="" type="checkbox"/>
	b)	FHSS in 5725-5850MHz: $\leq 1$ Watt	<input type="checkbox"/>
	c)	For all other FHSS in the 2400-2483.5MHz band: $\leq 0.125$ Watt.	<input checked="" type="checkbox"/>
	d)	FHSS in 902-928MHz with $\geq 50$ channels: $\leq 1$ Watt	<input type="checkbox"/>
	e)	FHSS in 902-928MHz with $\geq 25$ & $< 50$ channels: $\leq 0.25$ Watt	<input type="checkbox"/>
	f)	DSSS in 902-928MHz, 2400-2483.5MHz, 5725-5850MHz: $\leq 1$ Watt	<input type="checkbox"/>

Test Setup	 <p style="text-align: center;">Spectrum Analyzer                      EUT</p>
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Test Procedure	<p>The test follows FCC Public Notice DA 00-705 Measurement Guidelines. Use the following spectrum analyzer settings:</p> <ul style="list-style-type: none"> <li>- Span = approximately 5 times the 20 dB bandwidth, centered on a hopping channel</li> <li>- RBW &gt; the 20 dB bandwidth of the emission being measured</li> <li>- VBW <math>\geq</math> RBW</li> <li>- Sweep = auto</li> <li>- Detector function = peak</li> <li>- Trace = max hold</li> <li>- Allow the trace to stabilize.</li> <li>- Use the marker-to-peak function to set the marker to the peak of the emission. The indicated level is the peak output power (see the note above regarding external attenuation and cable loss). The limit is specified in one of the subparagraphs of this Section. Submit this plot. A peak responding power meter may be used instead of a spectrum analyzer.</li> </ul>
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Remark	
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Result	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail
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Test Data     Yes                       N/A

Test Plot     Yes (See below)                       N/A

**Peak Output Power measurement result**

Type	Modulation	CH	Freq (MHz)	Conducted Power (dBm)	Limit (mW)	Result
Output power	GFSK	Low	2402	6.215	1000	Pass
		Mid	2441	7.345	1000	Pass
		High	2480	7.128	1000	Pass
	$\pi/4$ -DQPSK	Low	2402	4.562	125	Pass
		Mid	2441	6.616	125	Pass
		High	2480	6.515	125	Pass
	8DPSK	Low	2402	4.866	125	Pass
		Mid	2441	6.753	125	Pass
		High	2480	6.647	125	Pass

### Test Plots Output Power measurement result



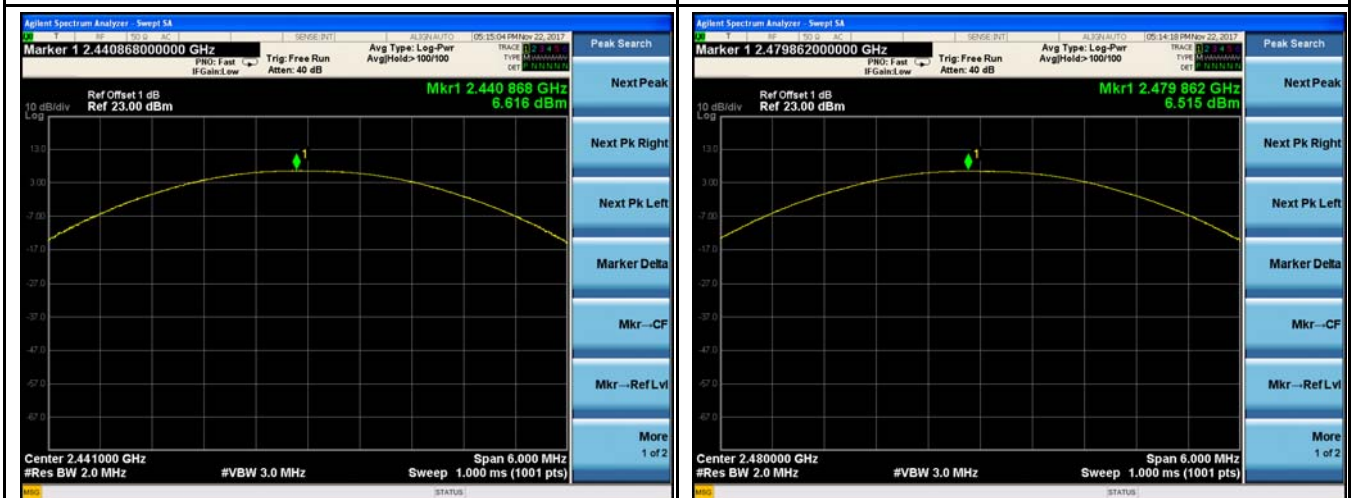
GFSK Output power - Low CH 2402

GFSK Output power - Mid CH 2441



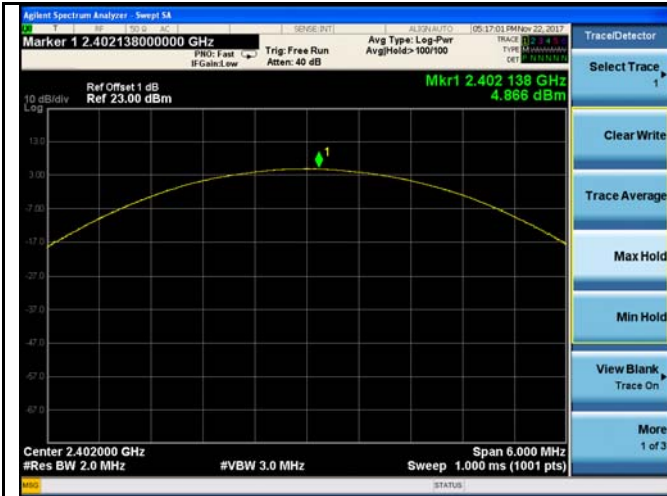
GFSK Output power - High CH 2480

$\pi/4$ -DQPSK Output power - Low CH 2402



$\pi/4$ -DQPSK Output power - Mid CH 2441

$\pi/4$ -DQPSK Output power - High CH 2480



8DPSK Output power - Low CH 2402



8DPSK Output power - Mid CH 2441

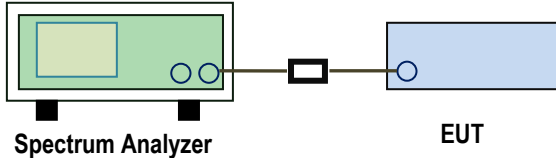


8DPSK Output power - High CH 2480

### 6.5 Number of Hopping Channel

Temperature	23°C
Relative Humidity	51%
Atmospheric Pressure	1018mbar
Test date :	November 22, 2017
Tested By :	Trety Lu

#### Requirement(s):

Spec	Item	Requirement	Applicable
§15.247(a) (1)(iii)	a)	FHSS in 2400-2483.5MHz $\geq$ 15 channels	<input checked="" type="checkbox"/>
Test Setup	 <p style="text-align: center;">Spectrum Analyzer                      EUT</p>		
Test Procedure	<p>The test follows FCC Public Notice DA 00-705 Measurement Guidelines.  <u>Use the following spectrum analyzer settings:</u>            The EUT must have its hopping function enabled.</p> <ul style="list-style-type: none"> <li>- Span = the frequency band of operation</li> <li>- RBW <math>\geq</math> 1% of the span</li> <li>- VBW <math>\geq</math> RBW</li> <li>- Sweep = auto</li> <li>- Detector function = peak</li> <li>- Trace = max hold</li> <li>- Allow trace to fully stabilize.</li> <li>- 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. Submit this plot(s).</li> </ul>		
Remark			
Result	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail		

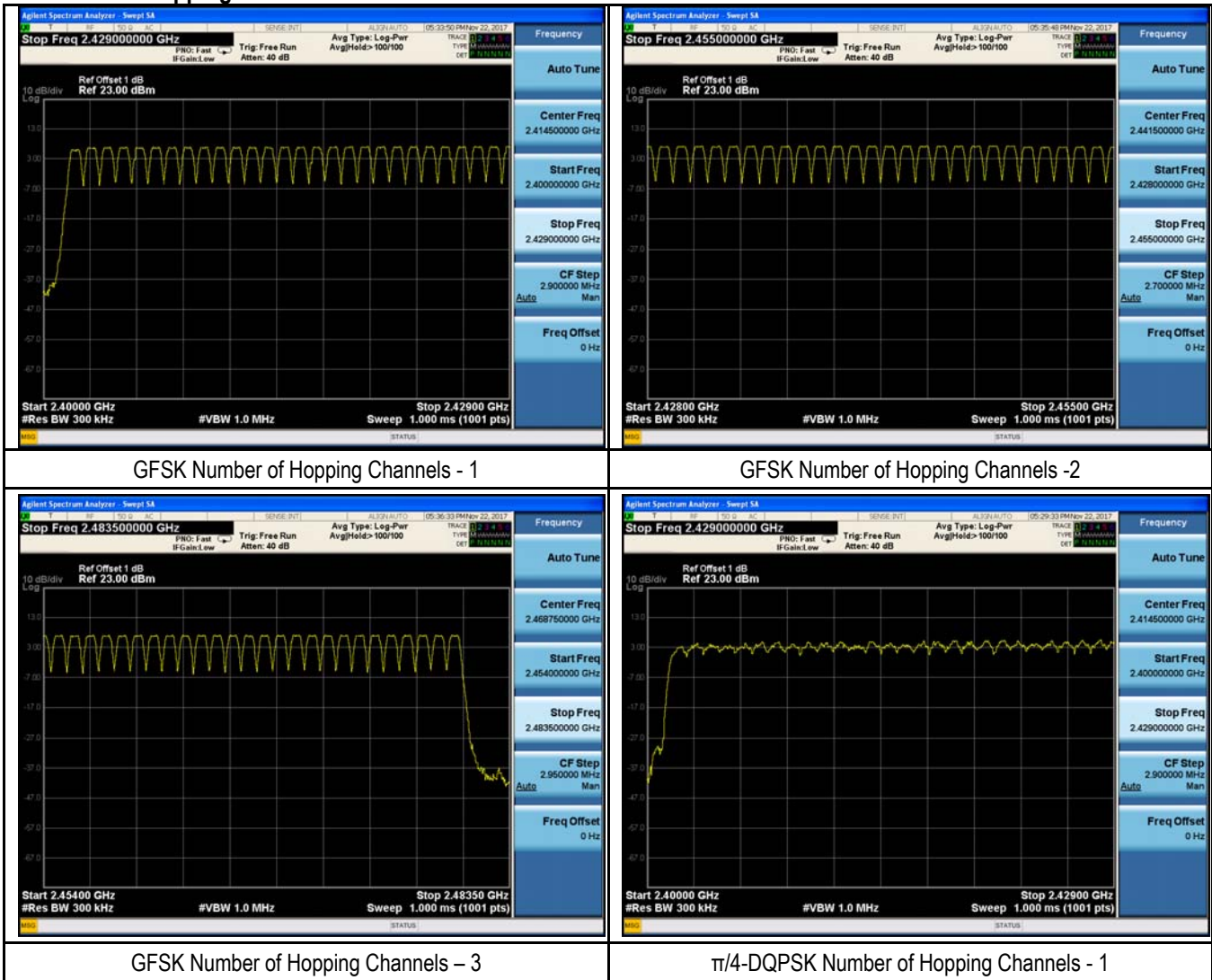
**Test Data**     Yes                       N/A  
**Test Plot**     Yes (See below)                       N/A

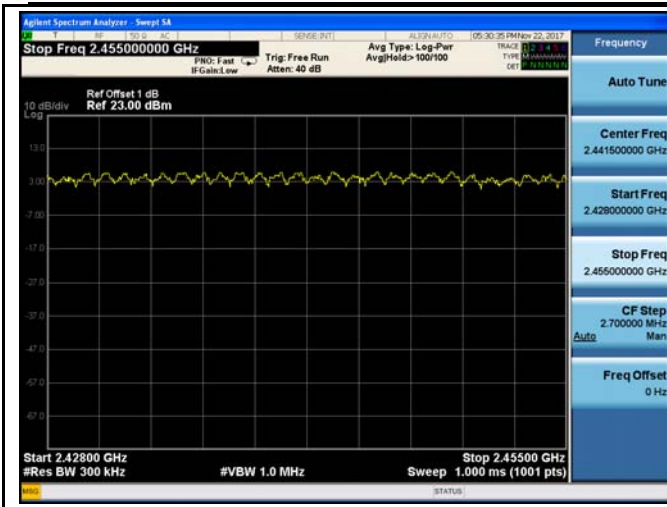
### Number of Hopping Channel measurement result

Type	Modulation	Frequency Range	Number of Hopping Channel	Limit
Number of Hopping Channel	GFSK	2400-2483.5	79	15
	$\pi/4$ -DQPSK	2400-2483.5	79	15
	8DPSK	2400-2483.5	79	15

### Test Plots

#### Number of Hopping Channels measurement result

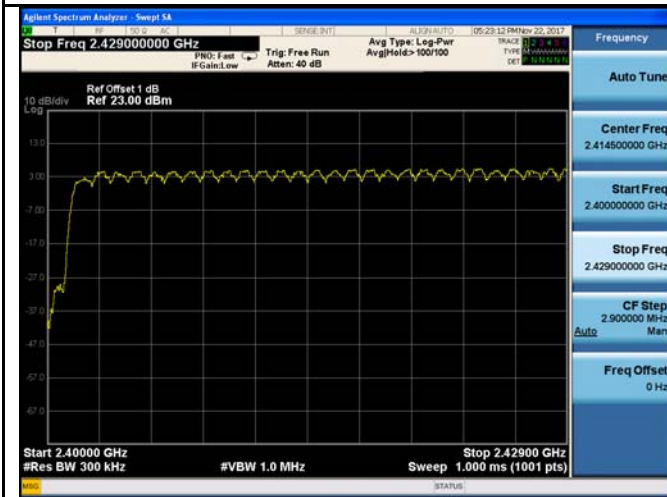




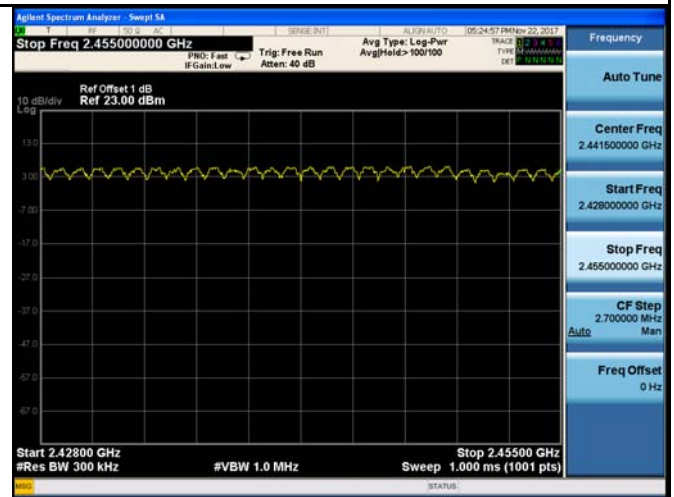
π/4-DQPSK Number of Hopping Channels - 2



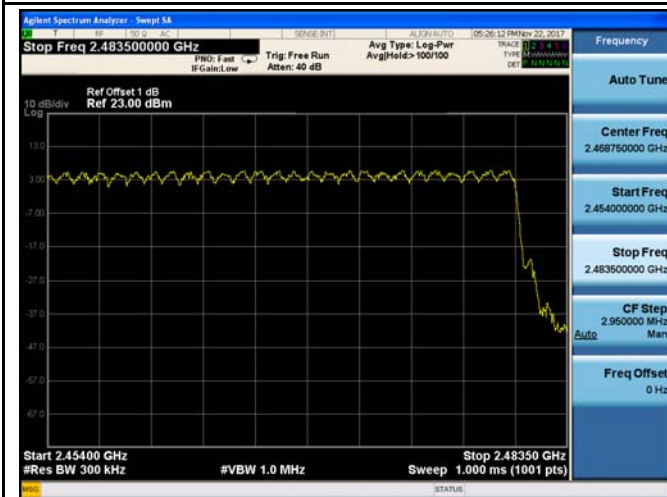
π/4-DQPSK Number of Hopping Channels - 3



8DPSK Number of Hopping Channels - 1



8DPSK Number of Hopping Channels - 2



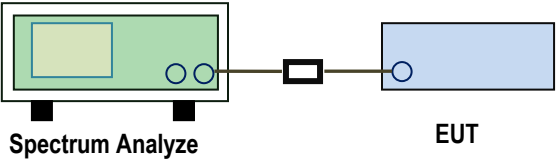
8DPSK Number of Hopping Channels - 3



### 6.6 Time of Occupancy (Dwell Time)

Temperature	23°C
Relative Humidity	51%
Atmospheric Pressure	1018mbar
Test date :	November 23, 2017
Tested By :	Trety Lu

#### Requirement(s):

Spec	Item	Requirement	Applicable
§15.247(a) (1)(iii)	a)	Dwell Time < 0.4s	<input checked="" type="checkbox"/>
Test Setup	 <p style="text-align: center;">Spectrum Analyzer                      EUT</p>		
Test Procedure	<p>The test follows FCC Public Notice DA 00-705 Measurement Guidelines.  <u>Use the following spectrum analyzer</u></p> <ul style="list-style-type: none"> <li>- Span = zero span, centered on a hopping channel</li> <li>- RBW = 1 MHz</li> <li>- VBW ≥ RBW</li> <li>- Sweep = as necessary to capture the entire dwell time per hopping channel</li> <li>- Detector function = peak</li> <li>- Trace = max hold</li> <li>- use the marker-delta function to determine the dwell time</li> </ul>		
Remark			
Result	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail		

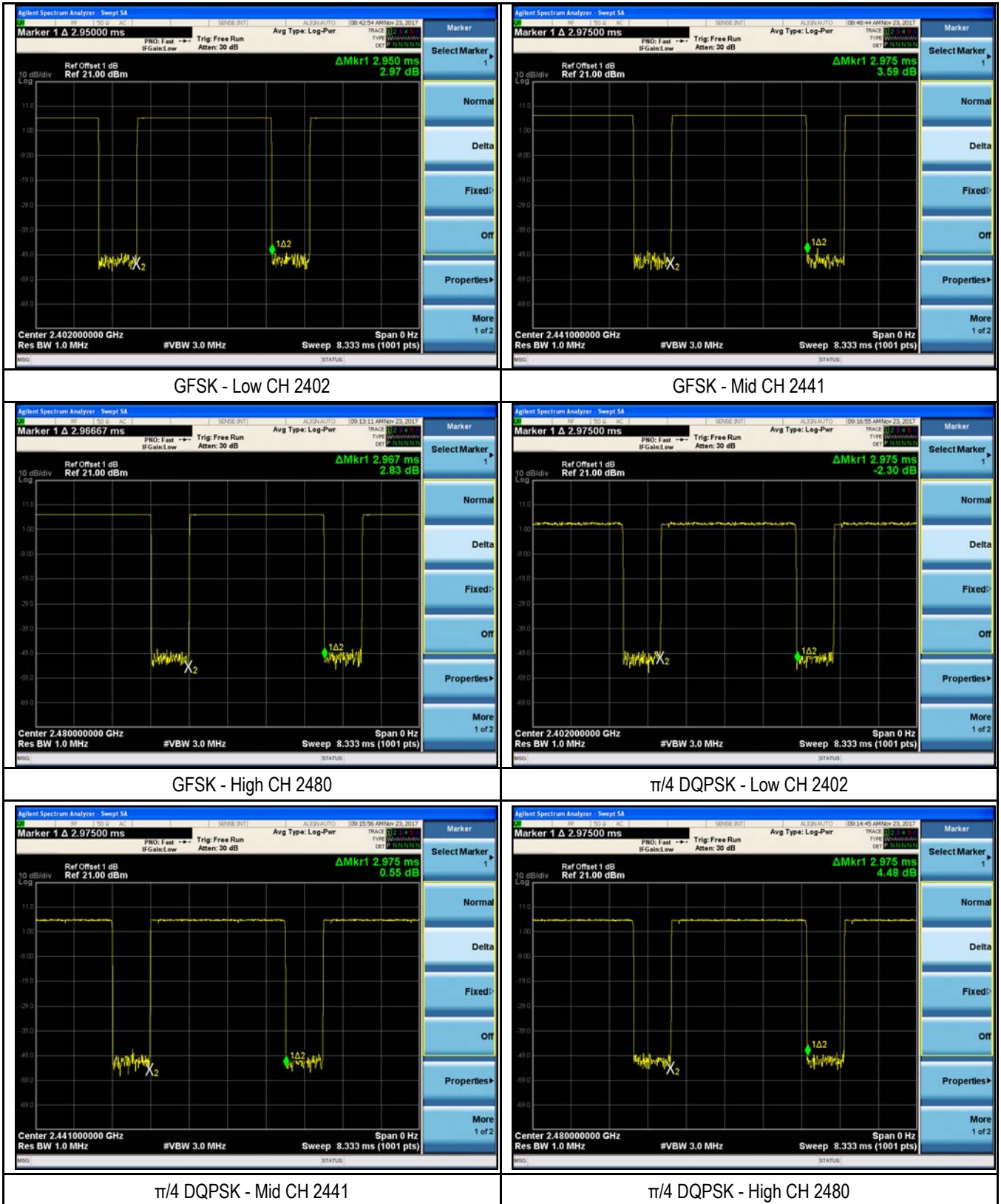
Test Data     Yes                       N/A  
 Test Plot     Yes (See below)                       N/A

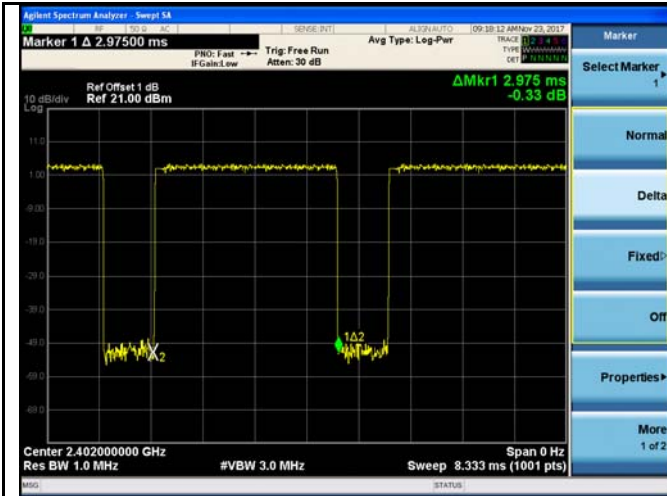
**Dwell Time measurement result**

Type	Modulation	CH	Pulse Width (ms)	Dwell Time (ms)	Limit (ms)	Result
Dwell Time	GFSK	Low	2.950	314.67	400	Pass
		Mid	2.975	317.33	400	Pass
		High	2.967	316.48	400	Pass
	π/4-DQPSK	Low	2.975	317.33	400	Pass
		Mid	2.975	317.33	400	Pass
		High	2.975	317.33	400	Pass
	8DPSK	Low	2.975	317.33	400	Pass
		Mid	2.975	317.33	400	Pass
		High	2.975	317.33	400	Pass
Note: Dwell time=Pulse Time (ms) × (1600 ÷ 6 ÷ 79) ×31.6						

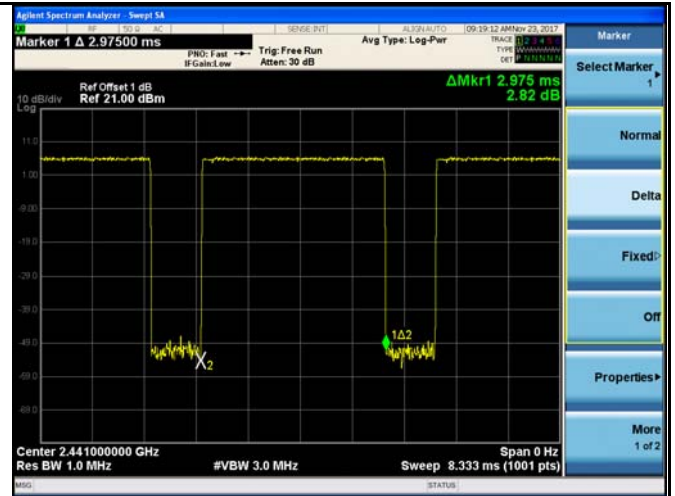
Note : All packet have been tested ( DH1、DH2、DH3 ) ,but only worst ( DH5 ) case is the reported.

### Test Plots Dwell Time measurement result

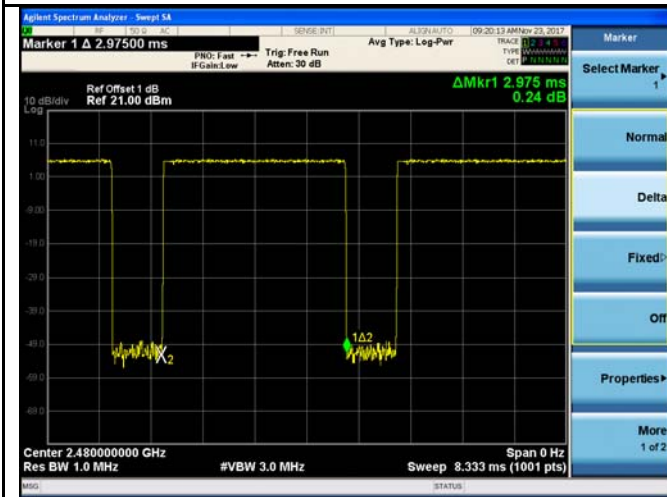




8DPSK - Low CH 2402



8DPSK - Mid CH 2441



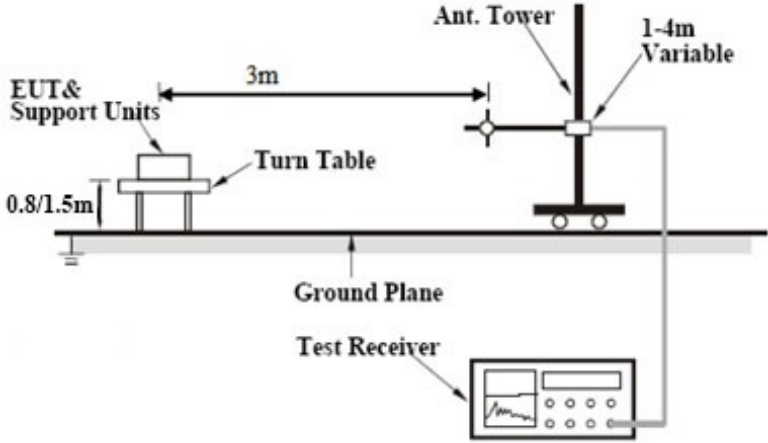
8DPSK - High CH 2480

## 6.7 Band Edge

Temperature	23°C
Relative Humidity	51%
Atmospheric Pressure	1018mbar
Test date :	November 20 to November 22, 2017
Tested By :	Trety Lu

### Requirement(s):

Spec	Item	Requirement	Applicable
§15.247(a) (1)(iii)	a)	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.	☒

Test Setup	
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Test Procedure	<p>The test follows FCC Public Notice DA 00-705 Measurement Guidelines. Radiated Method Only</p> <ul style="list-style-type: none"> <li>- 1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.</li> <li>- 2. Position the EUT without connection to measurement instrument. Put it on the Rotated table and turn on the EUT and make it operate in transmitting mode. Then set it to Low Channel and High Channel within its operating range, and make sure the instrument is operated in its linear range.</li> <li>- 3. First, set both RBW and VBW of spectrum analyzer to 100 kHz with a convenient frequency span including 100kHz bandwidth from band edge, check the emission of EUT, if pass then set Spectrum Analyzer as below:             <ul style="list-style-type: none"> <li>a. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi Peak detection at frequency below 1GHz.</li> <li>b. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz with Peak detection for Peak measurement at frequency above 1GHz.</li> <li>c. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 10Hz with Peak detection for Average Measurement as below at frequency above 1GHz.</li> </ul> </li> <li>- 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.</li> <li>- 5. Repeat above procedures until all measured frequencies were complete.</li> </ul>
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Remark	
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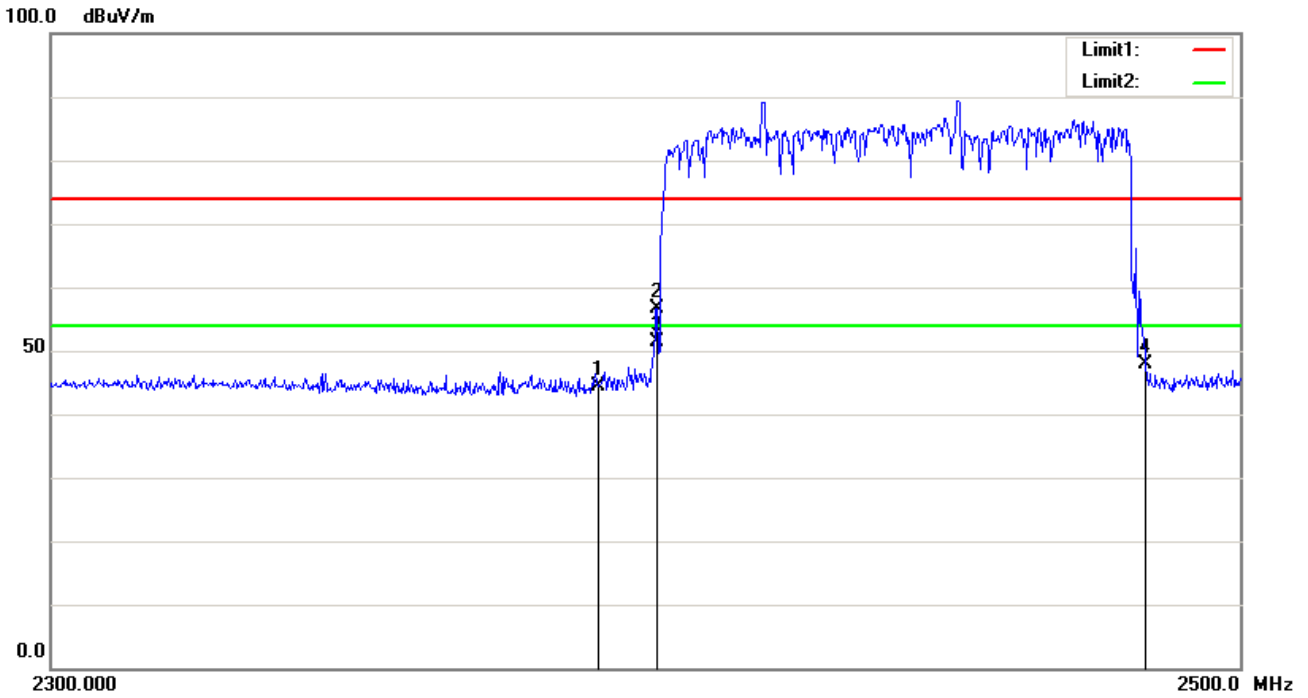
Result	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail
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Test Data  Yes  N/A

Test Plot  Yes (See below)  N/A

**Test Plots**  
**GFSK**

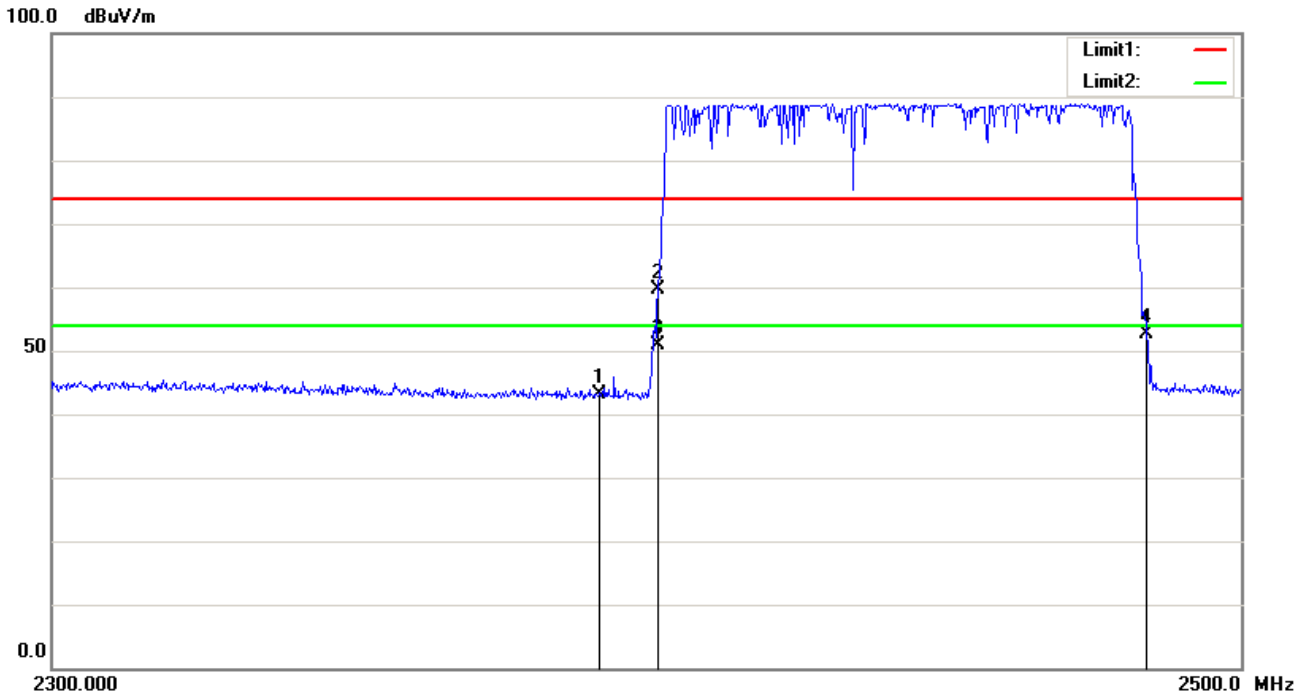
<b>Test Mode:</b>	<b>Hopping Mode</b>
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**Vertical**

No.	Frequency (MHz)	Reading (dBuV/m)	Detector	Ant_F (dB/m)	PA_G (dB)	Cab_L (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)
1	2390.000	61.48	peak	31.53	52.55	4.02	44.48	74.00	-29.52	100	172
2	2400.000	73.63	peak	31.54	52.56	4.01	56.62	74.00	-17.38	100	353
3	2400.000	68.50	AVG	31.54	52.56	4.01	51.49	54.00	-2.51	100	353
4	2483.500	64.75	peak	31.59	52.63	4.06	47.77	74.00	-26.23	100	51

<b>Test Mode:</b>	<b>Hopping Mode</b>
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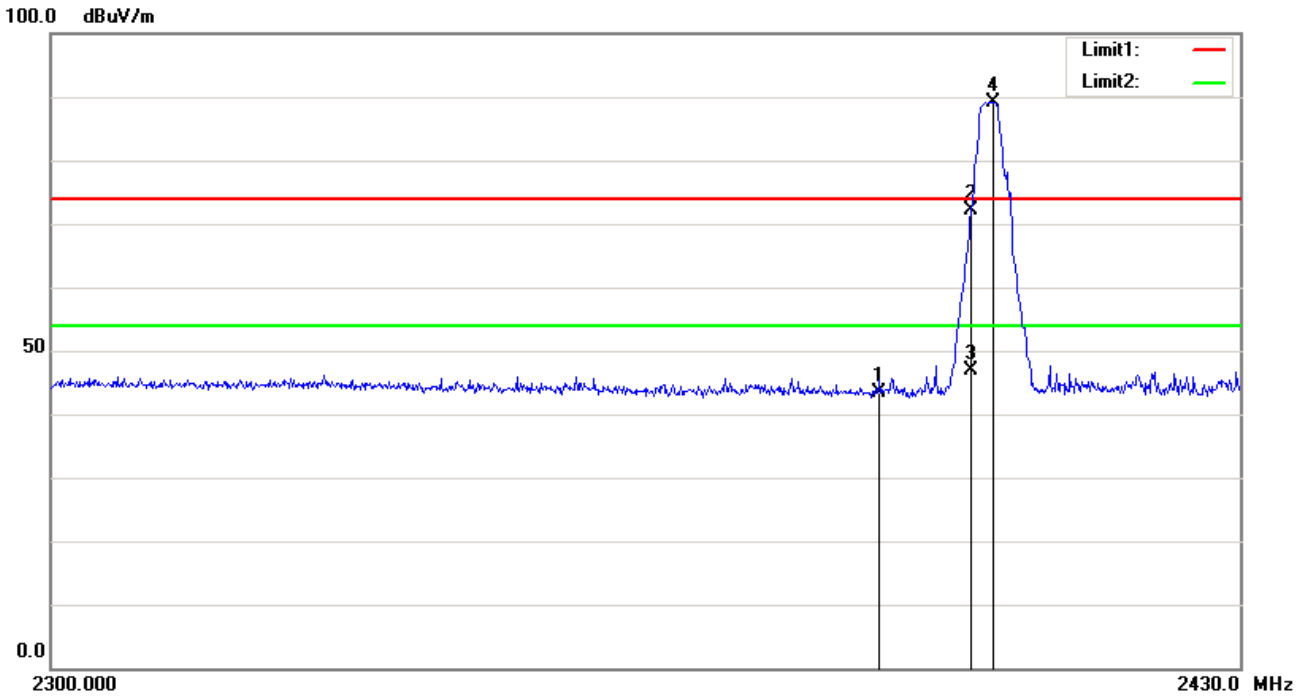


**Horizontal**

No.	Frequency (MHz)	Reading (dBuV/m)	Detector	Ant F (dB/m)	PA_G (dB)	Cab_L (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)
1	2390.000	60.06	peak	31.53	52.55	4.02	43.06	74.00	-30.94	100	223
2	2400.000	76.55	peak	31.54	52.56	4.01	59.54	74.00	-14.46	100	360
3	2400.000	67.88	AVG	31.54	52.56	4.01	50.87	54.00	-3.13	100	360
4	2483.500	69.53	peak	31.59	52.63	4.06	52.55	74.00	-21.45	100	139



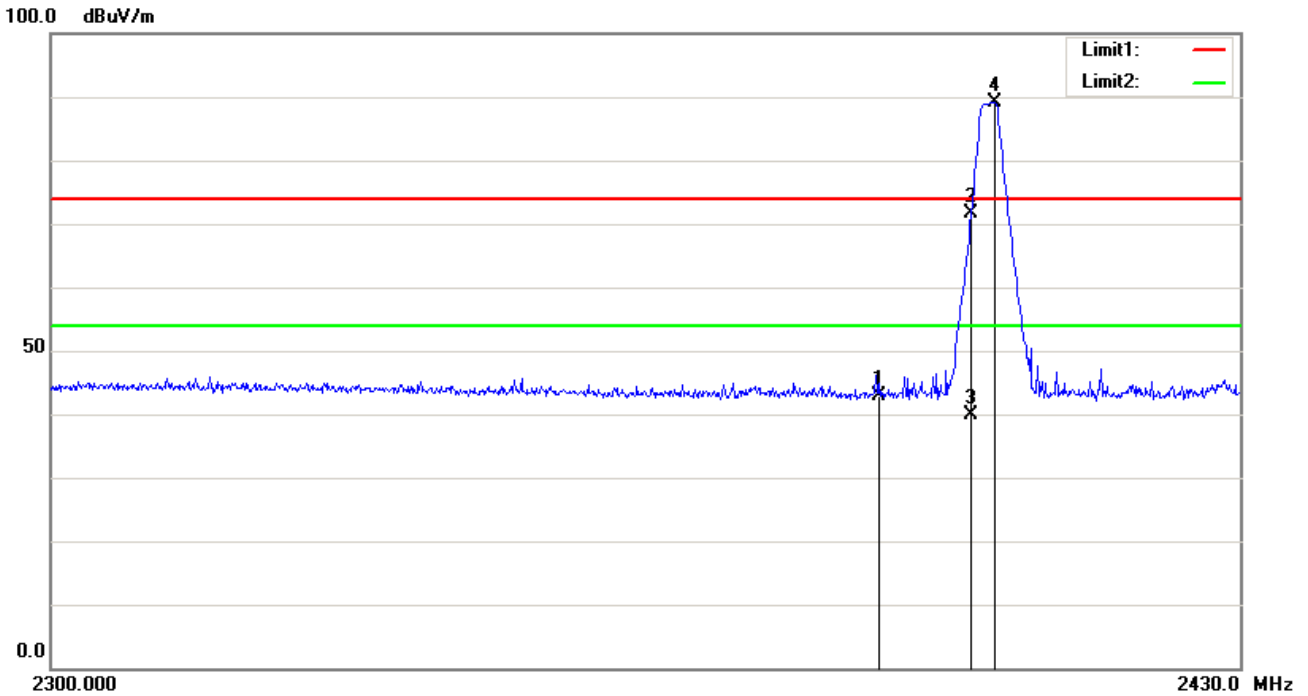
<b>Test Mode:</b>	<b>Low channel TX Mode</b>
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**Vertical**

No.	Frequency (MHz)	Reading (dBuV/m)	Detector	Ant_F (dB/m)	PA_G (dB)	Cab_L (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)
1	2390.000	60.46	peak	31.53	52.55	4.02	43.46	74.00	-30.54	100	328
2	2400.000	89.18	peak	31.54	52.56	4.01	72.17	74.00	-1.83	100	113
3	2400.000	63.81	AVG	31.54	52.56	4.01	46.80	54.00	-7.20	100	113
4	2402.440	106.20	peak	31.54	52.56	4.01	89.19	74.00	15.19	100	197

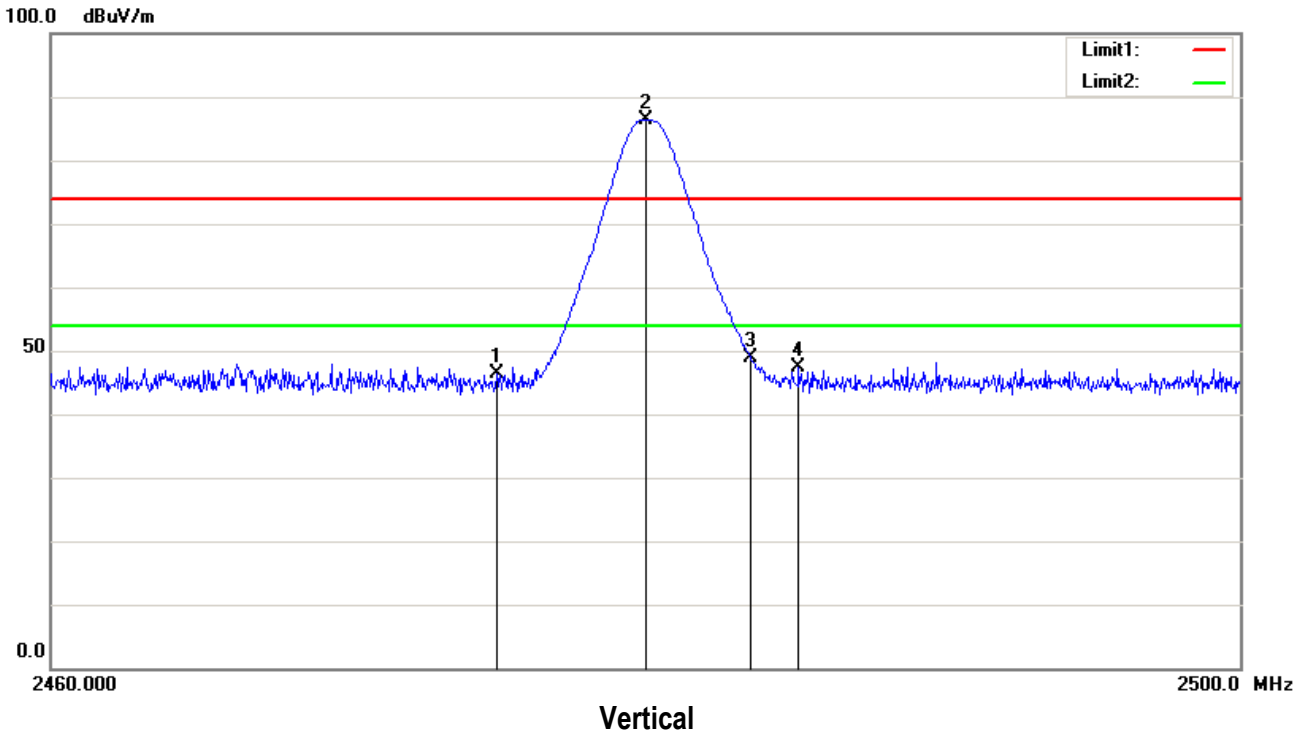
<b>Test Mode:</b>	<b>Low channel TX Mode</b>
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**Horizontal**

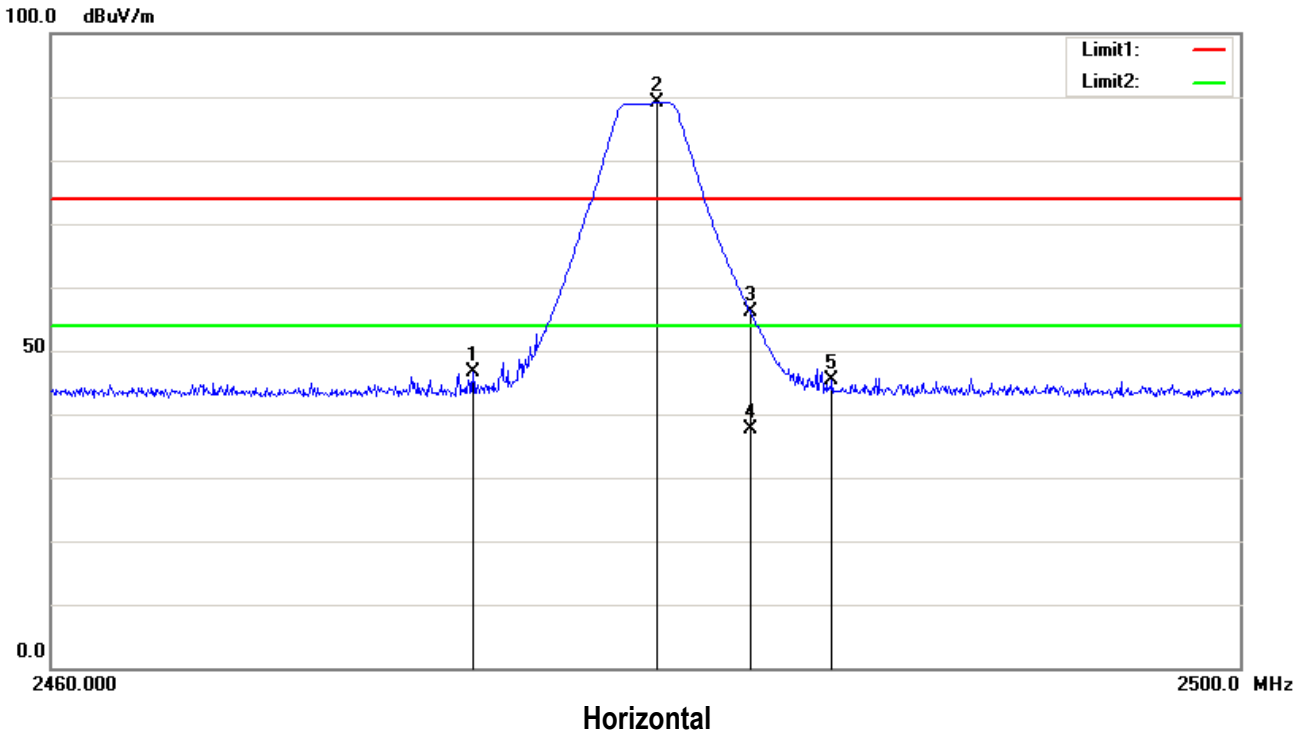
No.	Frequency (MHz)	Reading (dBuV/m)	Detector	Ant_F (dB/m)	PA_G (dB)	Cab_L (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)
1	2390.000	59.95	peak	31.53	52.55	4.02	42.95	74.00	-31.05	100	151
2	2400.000	88.52	peak	31.54	52.56	4.01	71.51	74.00	-2.49	100	127
3	2400.000	56.97	AVG	31.54	52.56	4.01	39.96	54.00	-14.04	100	127
4	2402.700	106.09	peak	31.54	52.56	4.01	89.08	74.00	15.08	100	115

<b>Test Mode:</b>	<b>High channel TX Mode</b>
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No.	Frequency (MHz)	Reading (dBuV/m)	Detector	Ant F (dB/m)	PA_G (dB)	Cab_L (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)
1	2474.960	63.46	peak	31.58	52.62	4.05	46.47	74.00	-27.53	100	148
2	2479.960	103.39	peak	31.59	52.62	4.06	86.42	74.00	12.42	100	29
3	2483.500	65.95	peak	31.59	52.63	4.06	48.97	74.00	-25.03	100	17

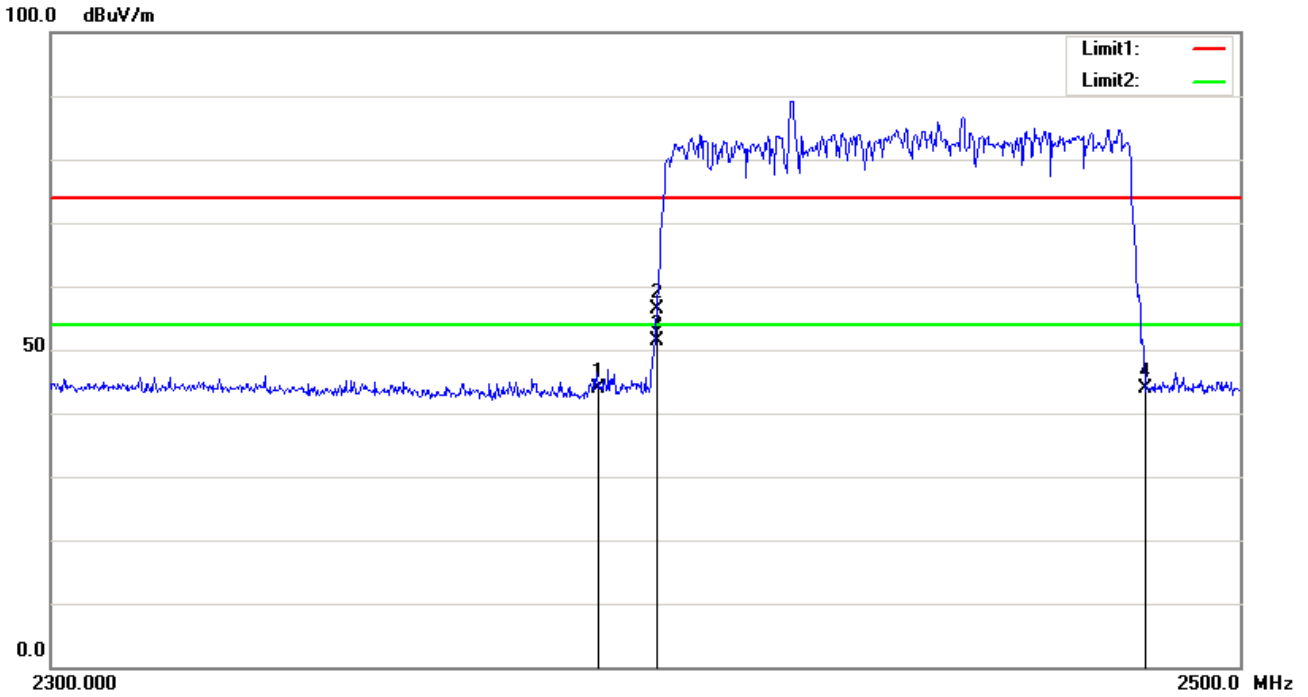
<b>Test Mode:</b>	<b>High channel TX Mode</b>
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No.	Frequency (MHz)	Reading (dBuV/m)	Detector	Ant F (dB/m)	PA_G (dB)	Cab_L (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)
1	2474.160	63.52	peak	31.58	52.62	4.05	46.53	74.00	-27.47	100	196
2	2480.320	106.06	peak	31.59	52.62	4.06	89.09	74.00	15.09	100	196
3	2483.500	73.16	peak	31.59	52.63	4.06	56.18	74.00	-17.82	100	64
4	2483.500	54.63	AVG	31.59	52.63	4.06	37.65	54.00	-16.35	100	53
5	2486.240	62.45	peak	31.59	52.63	4.06	45.47	74.00	-28.53	100	124

$\pi/4$ -DQPSK :

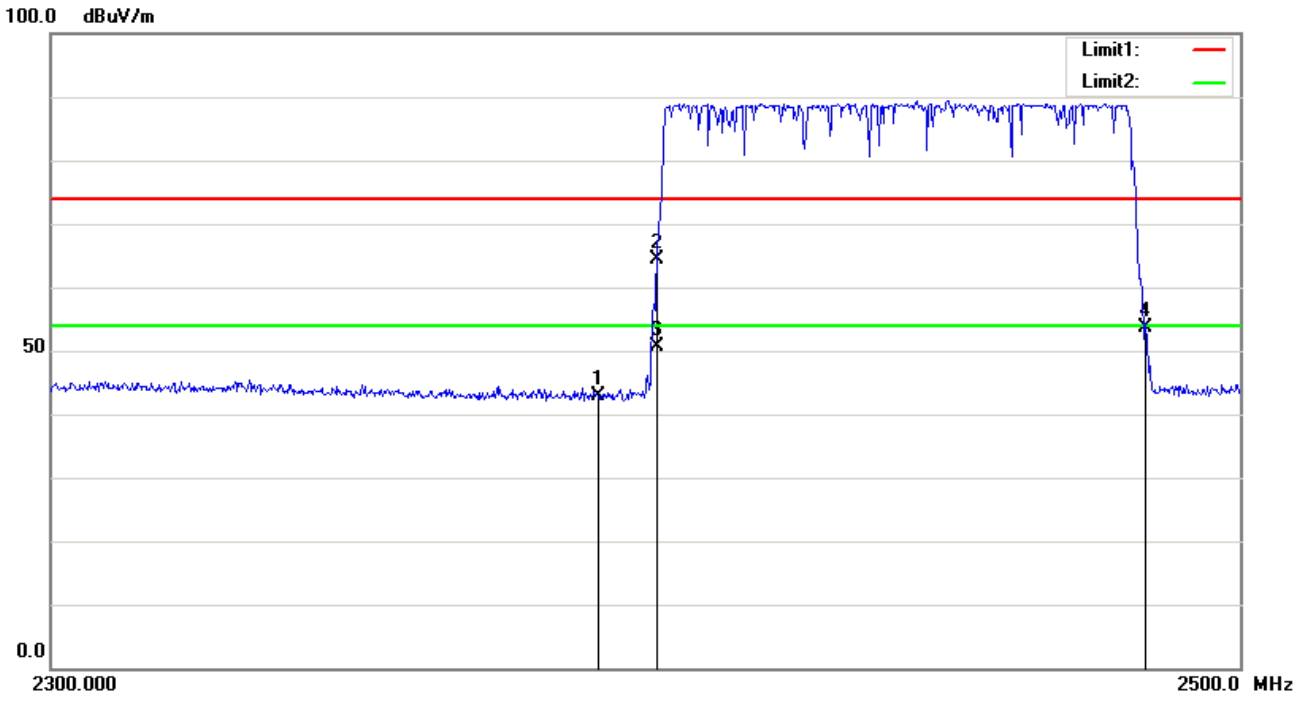
<b>Test Mode:</b>	Hopping Mode
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Vertical

No.	Frequency (MHz)	Reading (dBuV/m)	Detector	Ant_F (dB/m)	PA_G (dB)	Cab_L (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)
1	2390.000	60.85	peak	31.53	52.55	4.02	43.85	74.00	-30.15	100	150
2	2400.000	73.47	peak	31.54	52.56	4.01	56.46	74.00	-17.54	100	235
3	2400.000	68.32	AVG	31.54	52.56	4.01	51.31	54.00	-2.69	100	235
4	2483.500	60.93	peak	31.59	52.63	4.06	43.95	74.00	-30.05	100	296

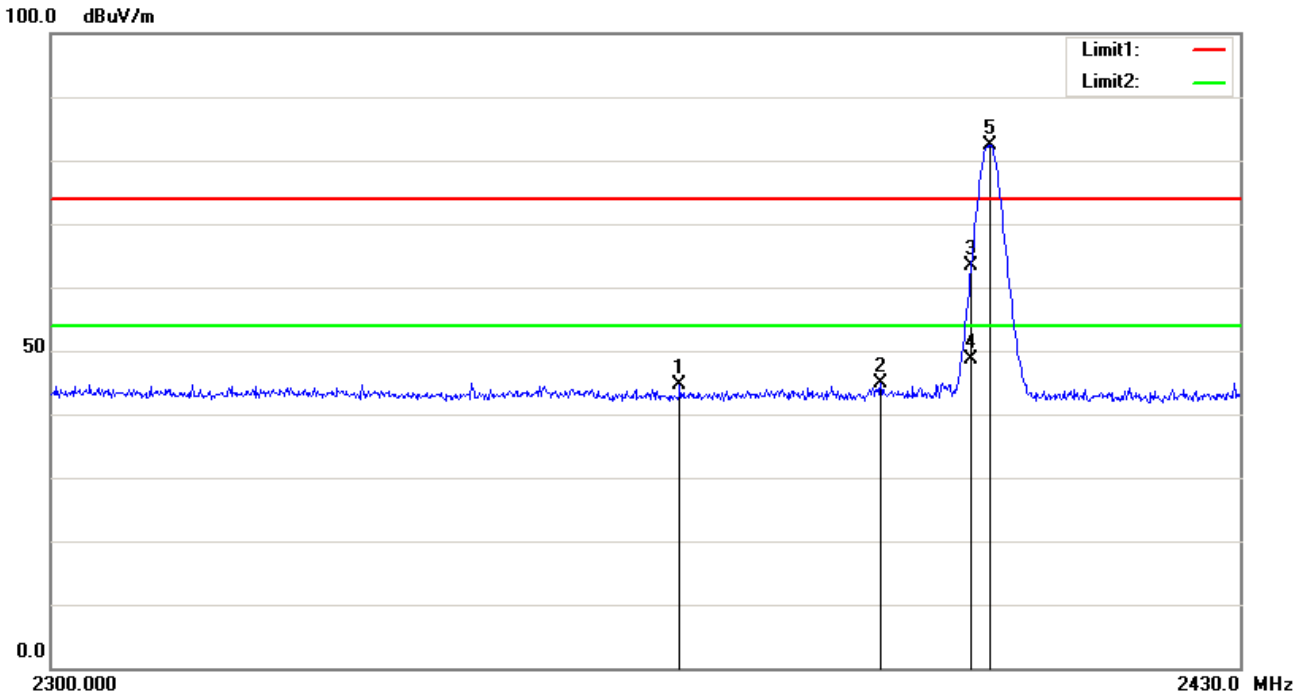
<b>Test Mode:</b>	<b>Hopping Mode</b>
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**Horizontal**

No.	Frequency (MHz)	Reading (dBuV/m)	Detector	Ant F (dB/m)	PA_G (dB)	Cab_L (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)
1	2390.000	59.93	peak	31.53	52.55	4.02	42.93	74.00	-31.07	100	160
2	2400.000	81.44	peak	31.54	52.56	4.01	64.43	74.00	-9.57	100	172
3	2400.000	67.63	AVG	31.54	52.56	4.01	50.62	54.00	-3.38	100	172
4	2483.500	70.67	peak	31.59	52.63	4.06	53.69	74.00	-20.31	100	148

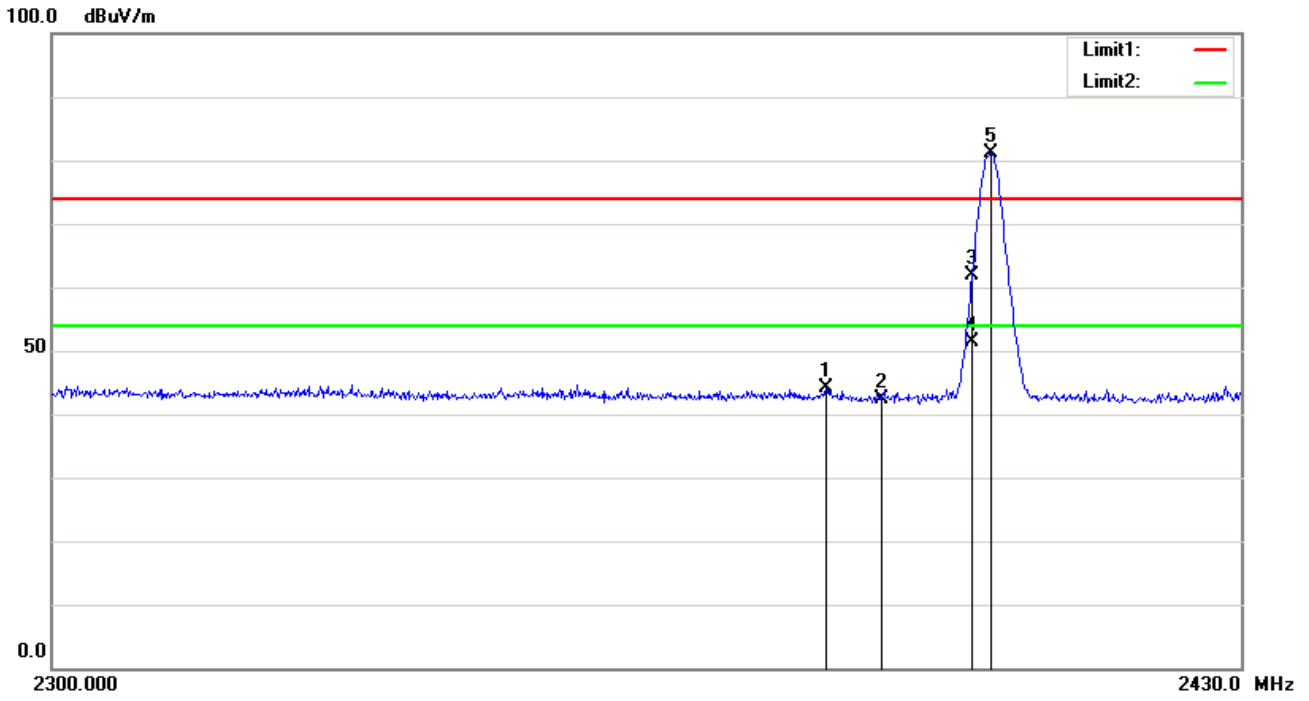
<b>Test Mode:</b>	<b>Low channel TX Mode</b>
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**Vertical**

No.	Frequency (MHz)	Reading (dBuV/m)	Detector	Ant_F (dB/m)	PA_G (dB)	Cab_L (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)
1	2367.990	61.50	peak	31.52	52.53	4.04	44.53	74.00	-29.47	100	185
2	2390.000	61.76	peak	31.53	52.55	4.02	44.76	74.00	-29.24	100	185
3	2400.000	80.32	peak	31.54	52.56	4.01	63.31	74.00	-10.69	100	360
4	2400.000	65.53	AVG	31.54	52.56	4.01	48.52	54.00	-5.48	100	360
5	2402.180	99.43	peak	31.54	52.56	4.01	82.42	74.00	8.42	100	360

<b>Test Mode:</b>	<b>Low channel TX Mode</b>
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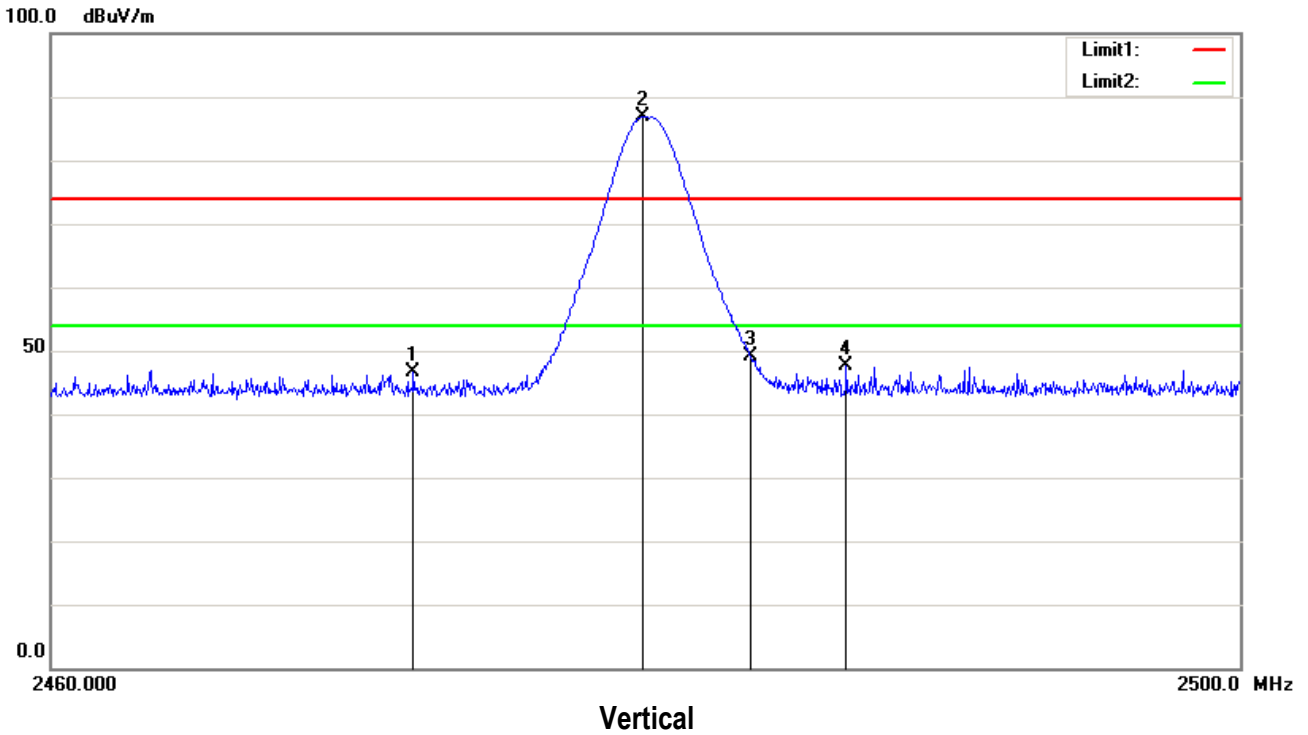


**Horizontal**

No.	Frequency (MHz)	Reading (dBuV/m)	Detector	Ant_F (dB/m)	PA_G (dB)	Cab_L (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)
1	2383.850	61.24	peak	31.53	52.55	4.03	44.25	74.00	-29.75	100	90
2	2390.000	59.49	peak	31.53	52.55	4.02	42.49	74.00	-31.51	100	272
3	2400.000	78.78	peak	31.54	52.56	4.01	61.77	74.00	-12.23	100	114
4	2400.000	68.49	AVG	31.54	52.56	4.01	51.48	54.00	-2.52	100	114
5	2402.180	98.12	peak	31.54	52.56	4.01	81.11	74.00	7.11	100	127

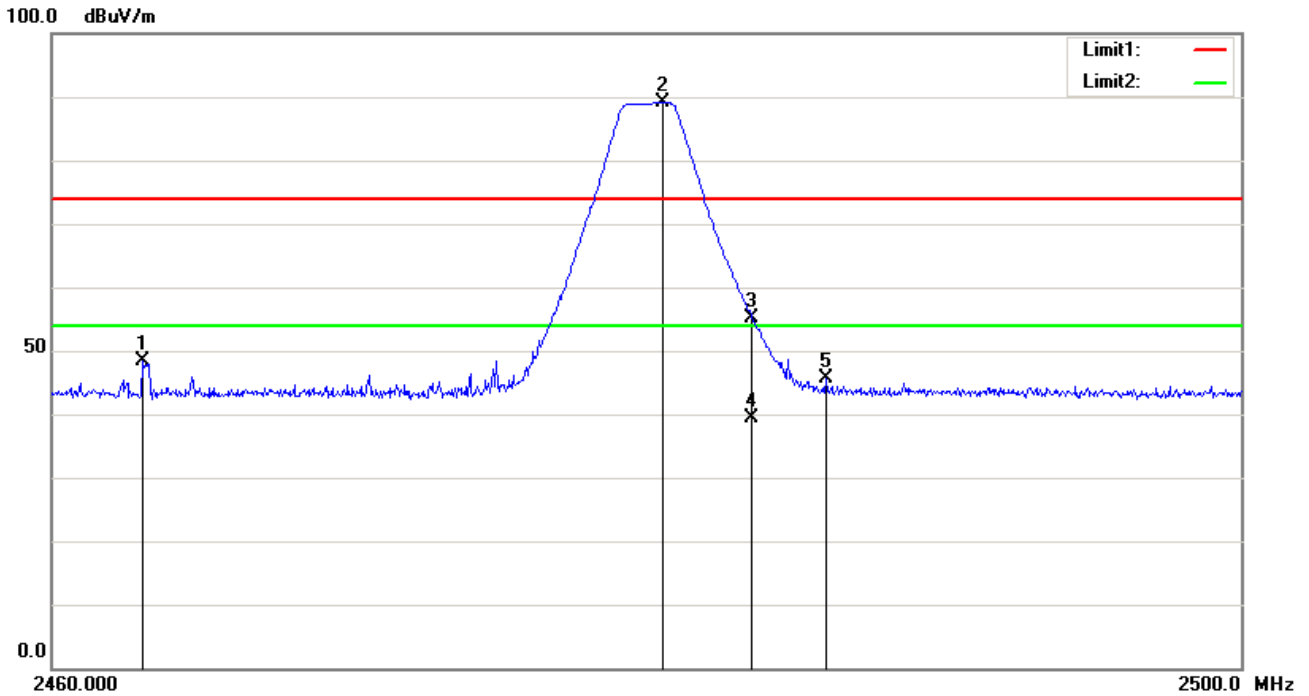


<b>Test Mode:</b>	High channel TX Mode
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No.	Frequency (MHz)	Reading (dBuV/m)	Detector	Ant F (dB/m)	PA_G (dB)	Cab_L (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)
1	2472.160	63.60	peak	31.58	52.62	4.05	46.61	74.00	-27.39	100	163
2	2479.840	103.80	peak	31.59	52.62	4.06	86.83	74.00	12.83	100	32
3	2483.500	66.04	peak	31.59	52.63	4.06	49.06	74.00	-24.94	100	32
4	2486.720	64.65	peak	31.59	52.63	4.06	47.67	74.00	-26.33	100	163

<b>Test Mode:</b>	<b>High channel TX Mode</b>
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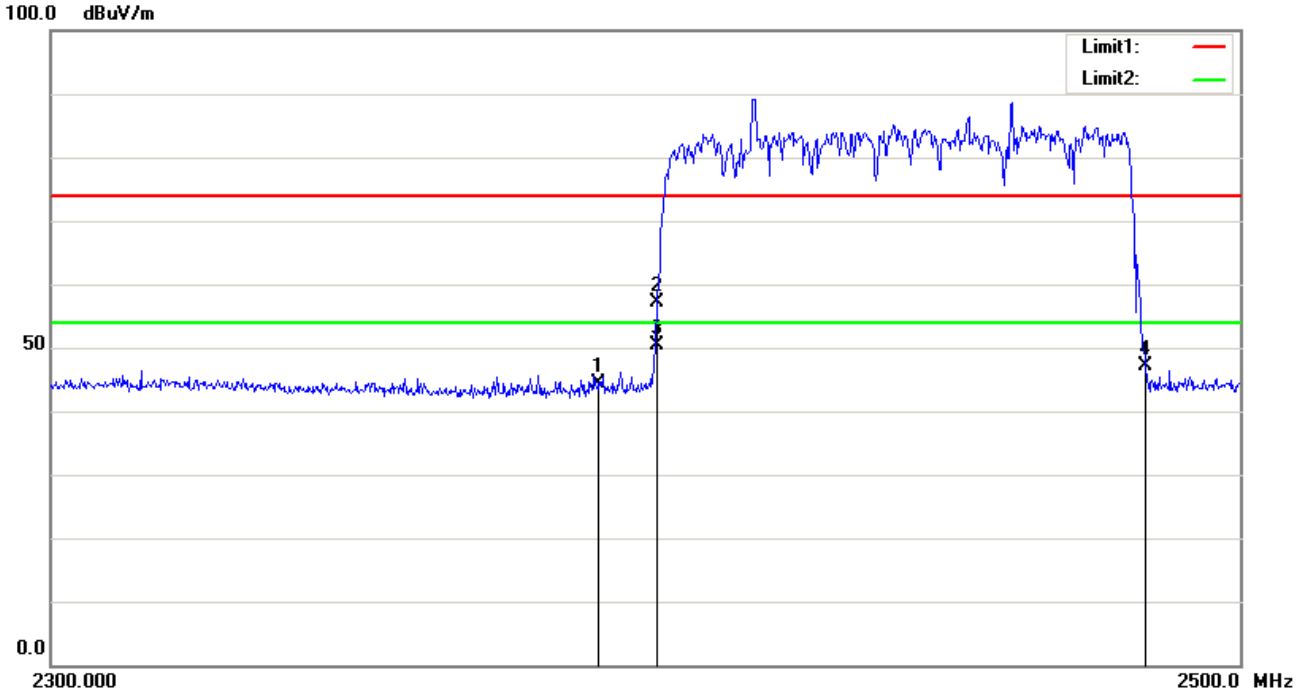


**Horizontal**

No.	Frequency (MHz)	Reading (dBuV/m)	Detector	Ant_F (dB/m)	PA_G (dB)	Cab_L (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)
1	2463.040	65.35	peak	31.58	52.61	4.05	48.37	74.00	-25.63	100	185
2	2480.480	106.06	peak	31.59	52.62	4.06	89.09	74.00	15.09	100	125
3	2483.500	72.10	peak	31.59	52.63	4.06	55.12	74.00	-18.88	100	113
4	2483.500	56.45	AVG	31.59	52.63	4.06	39.47	54.00	-14.53	100	113
5	2486.000	62.73	peak	31.59	52.63	4.06	45.75	74.00	-28.25	100	197

8DPSK Mode:

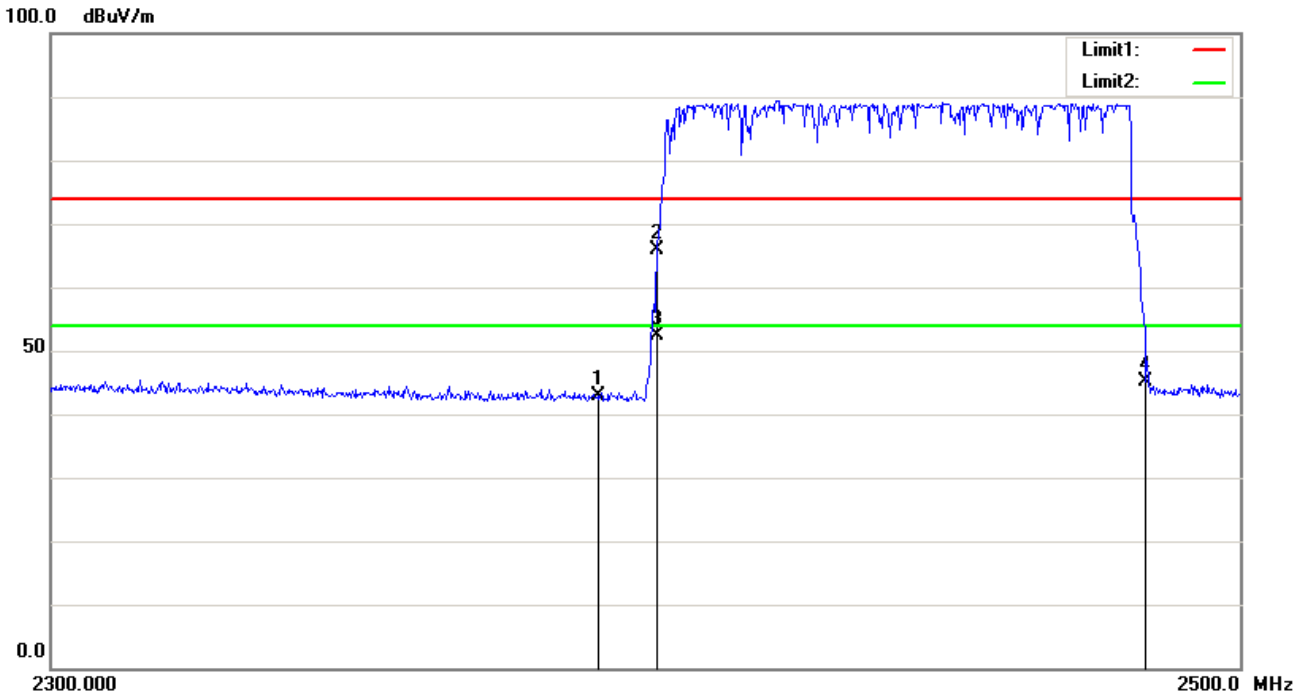
Test Mode:	Hopping Mode
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Vertical

No.	Frequency (MHz)	Reading (dBuV/m)	Detector	Ant_F (dB/m)	PA_G (dB)	Cab_L (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)
1	2390.000	61.27	peak	31.53	52.55	4.02	44.27	74.00	-29.73	100	172
2	2400.000	74.06	peak	31.54	52.56	4.01	57.05	74.00	-16.95	100	76
3	2400.000	67.49	AVG	31.54	52.56	4.01	50.48	54.00	-3.52	100	76
4	2483.500	64.10	peak	31.59	52.63	4.06	47.12	74.00	-26.88	100	124

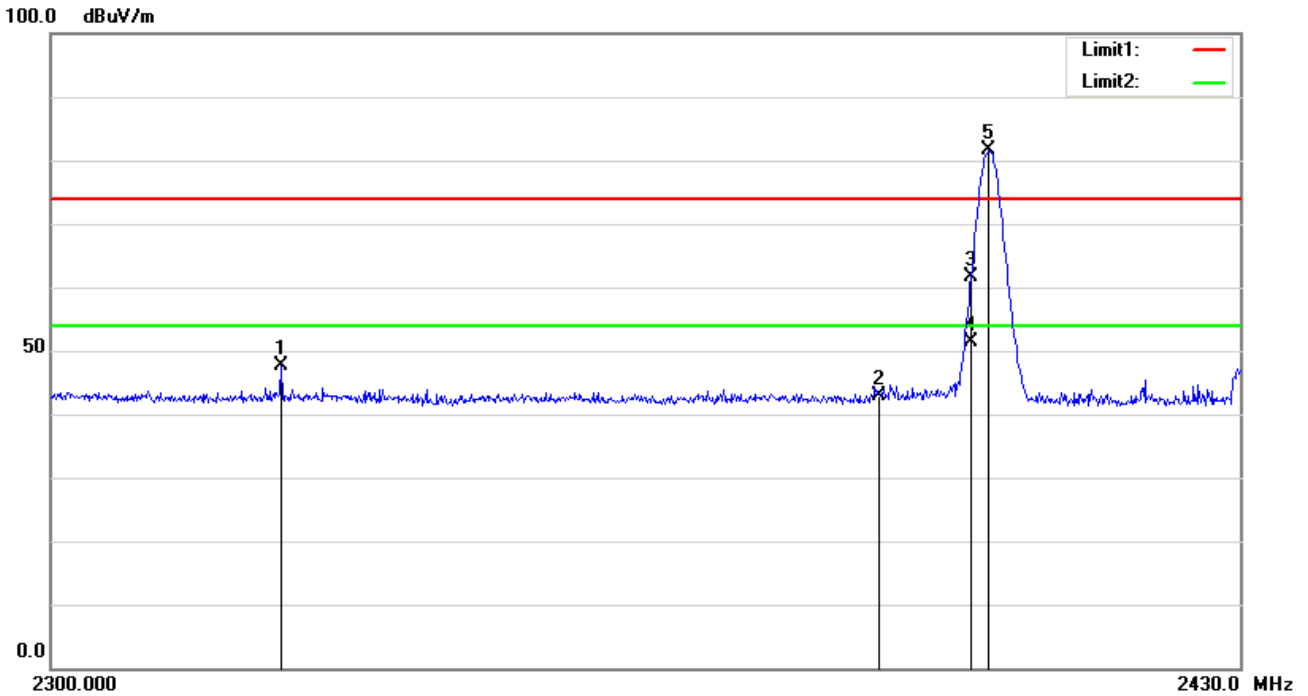
<b>Test Mode:</b>	<b>Hopping Mode</b>
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**Horizontal**

No.	Frequency (MHz)	Reading (dBuV/m)	Detector	Ant F (dB/m)	PA_G (dB)	Cab_L (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)
1	2390.000	59.79	peak	31.53	52.55	4.02	42.79	74.00	-31.21	100	126
2	2400.000	82.85	peak	31.54	52.56	4.01	65.84	74.00	-8.16	100	223
3	2400.000	69.48	AVG	31.54	52.56	4.01	52.47	54.00	-1.53	100	223
4	2483.500	62.00	peak	31.59	52.63	4.06	45.02	74.00	-28.98	100	360

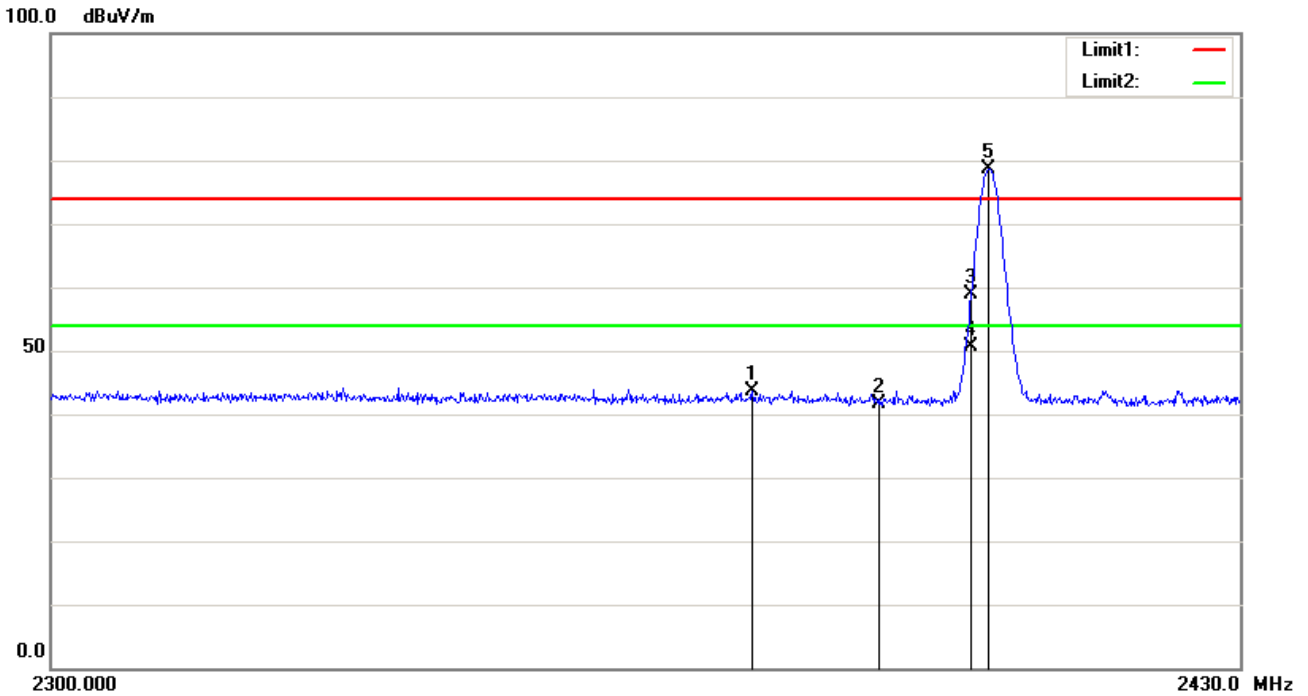
<b>Test Mode:</b>	<b>Low channel TX Mode</b>
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**Vertical**

No.	Frequency (MHz)	Reading (dBuV/m)	Detector	Ant_F (dB/m)	PA_G (dB)	Cab_L (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)
1	2324.700	64.43	peak	31.49	52.50	4.09	47.51	74.00	-26.49	100	281
2	2390.000	59.88	peak	31.53	52.55	4.02	42.88	74.00	-31.12	100	160
3	2400.000	78.68	peak	31.54	52.56	4.01	61.67	74.00	-12.33	100	353
4	2400.000	68.38	AVG	31.54	52.56	4.01	51.37	54.00	-2.63	100	353
5	2402.050	98.68	peak	31.54	52.56	4.01	81.67	74.00	7.67	100	353

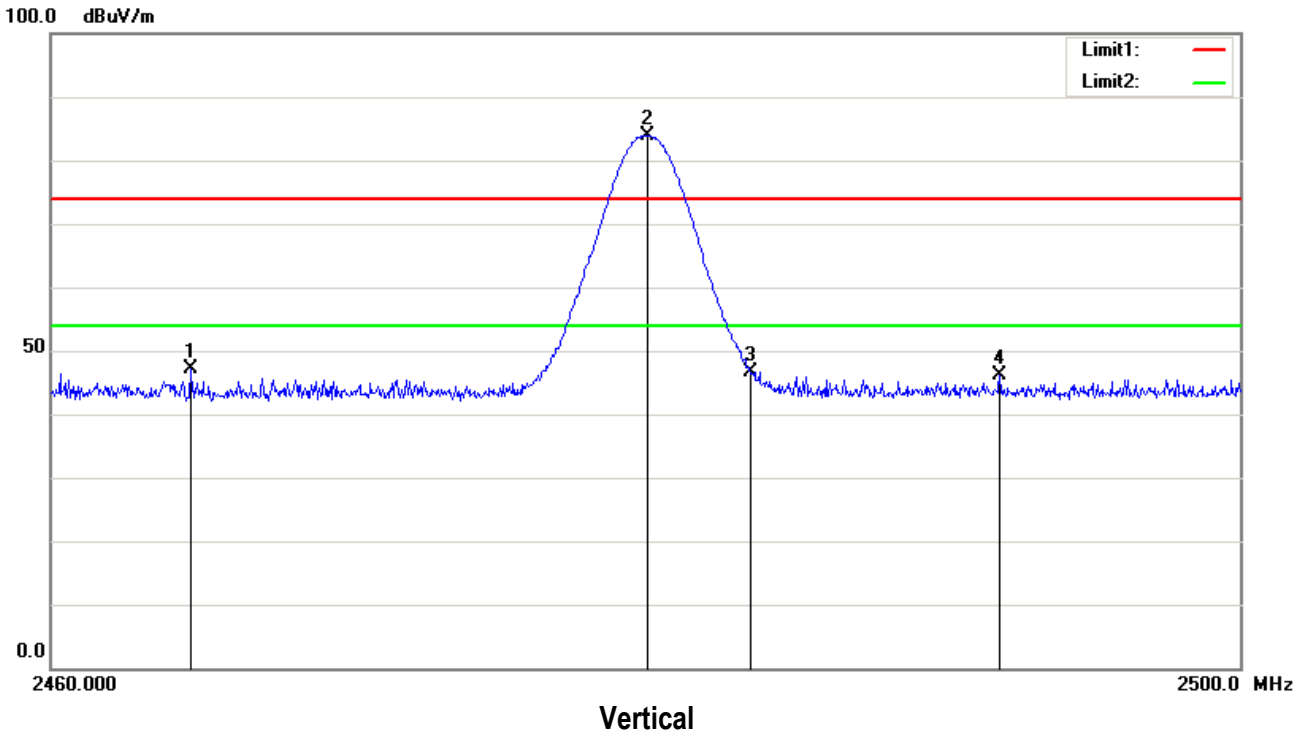
<b>Test Mode:</b>	<b>Low channel TX Mode</b>
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**Horizontal**

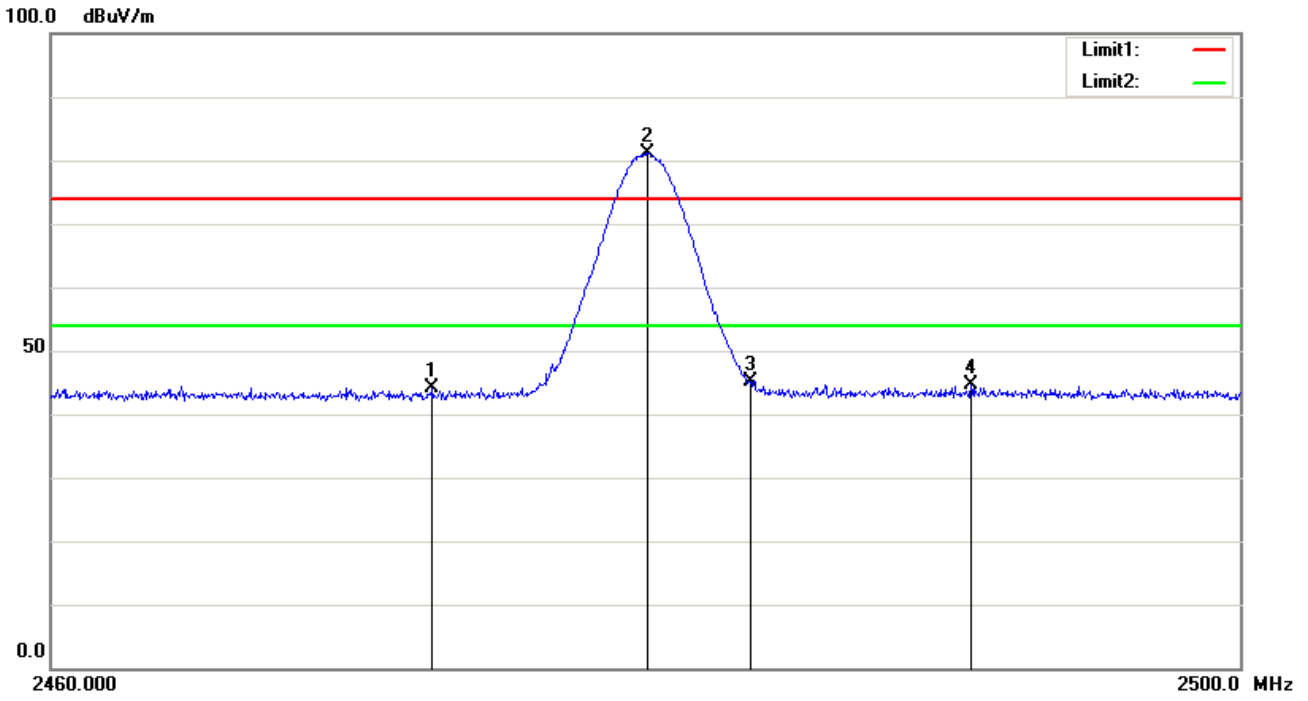
No.	Frequency (MHz)	Reading (dBuV/m)	Detector	Ant_F (dB/m)	PA_G (dB)	Cab_L (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)
1	2375.920	60.69	peak	31.53	52.54	4.03	43.71	74.00	-30.29	100	187
2	2390.000	58.63	peak	31.53	52.55	4.02	41.63	74.00	-32.37	100	18
3	2400.000	75.96	peak	31.54	52.56	4.01	58.95	74.00	-15.05	100	320
4	2400.000	67.62	AVG	31.54	52.56	4.01	50.61	54.00	-3.39	100	320
5	2401.920	95.68	peak	31.54	52.56	4.01	78.67	74.00	4.67	100	320

<b>Test Mode:</b>	<b>High channel TX Mode</b>
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No.	Frequency (MHz)	Reading (dBuV/m)	Detector	Ant F (dB/m)	PA_G (dB)	Cab_L (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)
1	2464.720	64.17	peak	31.58	52.61	4.05	47.19	74.00	-26.81	100	9
2	2480.000	100.95	peak	31.59	52.62	4.06	83.98	74.00	9.98	100	354
3	2483.500	63.51	peak	31.59	52.63	4.06	46.53	74.00	-27.47	100	354
4	2491.880	63.07	peak	31.60	52.63	4.07	46.11	74.00	-27.89	100	0

<b>Test Mode:</b>	<b>High channel TX Mode</b>
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**Horizontal**

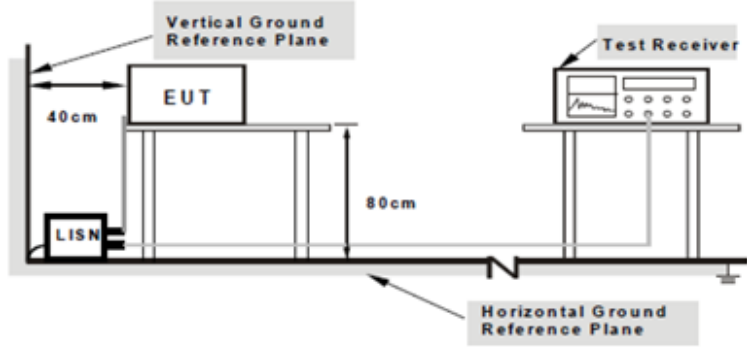
No.	Frequency (MHz)	Reading (dBuV/m)	Detector	Ant_F (dB/m)	PA_G (dB)	Cab_L (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)
1	2472.800	61.01	peak	31.58	52.62	4.05	44.02	74.00	-29.98	100	161
2	2480.000	98.03	peak	31.59	52.62	4.06	81.06	74.00	7.06	100	149
3	2483.500	62.06	peak	31.59	52.63	4.06	45.08	74.00	-28.92	100	149
4	2490.920	61.58	peak	31.59	52.63	4.06	44.60	74.00	-29.40	100	316



## 6.8 AC Power Line Conducted Emissions

Temperature	23°C
Relative Humidity	51%
Atmospheric Pressure	1018mbar
Test date :	November 21,2017
Tested By :	Trety Lu

### Requirement(s):

Spec	Item	Requirement	Applicable																									
47CFR§15.20 7, RSS210 (A8.1)	a)	<p>For Low-power radio-frequency devices that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 [μ]H/50 ohms line impedance stabilization network (LISN). The lower limit applies at the boundary between the frequencies ranges.</p> <p style="text-align: center;"><b>Class A Limit</b></p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th rowspan="2">Frequency ranges (MHz)</th> <th colspan="2">Limit (dBμV)</th> </tr> <tr> <th>QP</th> <th>Average</th> </tr> </thead> <tbody> <tr> <td>0.15 ~ 0.5</td> <td>79</td> <td>66</td> </tr> <tr> <td>0.5 ~ 30</td> <td>73</td> <td>60</td> </tr> </tbody> </table> <p style="text-align: center;"><b>Class B Limit</b></p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th rowspan="2">Frequency ranges (MHz)</th> <th colspan="2">Limit (dBμV)</th> </tr> <tr> <th>QP</th> <th>Average</th> </tr> </thead> <tbody> <tr> <td>0.15 ~ 0.5</td> <td>66 – 56</td> <td>56 – 46</td> </tr> <tr> <td>0.5 ~ 5</td> <td>56</td> <td>46</td> </tr> <tr> <td>5 ~ 30</td> <td>60</td> <td>50</td> </tr> </tbody> </table>	Frequency ranges (MHz)	Limit (dBμV)		QP	Average	0.15 ~ 0.5	79	66	0.5 ~ 30	73	60	Frequency ranges (MHz)	Limit (dBμV)		QP	Average	0.15 ~ 0.5	66 – 56	56 – 46	0.5 ~ 5	56	46	5 ~ 30	60	50	☒
Frequency ranges (MHz)	Limit (dBμV)																											
	QP	Average																										
0.15 ~ 0.5	79	66																										
0.5 ~ 30	73	60																										
Frequency ranges (MHz)	Limit (dBμV)																											
	QP	Average																										
0.15 ~ 0.5	66 – 56	56 – 46																										
0.5 ~ 5	56	46																										
5 ~ 30	60	50																										
Test Setup		 <p style="text-align: center;"> <b>Note: 1.Support units were connected to second LISN.</b>  <b>2.Both of LISNs (AMN) are 80cm from EUT and at least 80cm from other units and other metal planes support units.</b> </p>																										
Procedure		<ol style="list-style-type: none"> <li>The EUT and supporting equipment were set up in accordance with the requirements of the standard on top of a 1.5m x 1m x 0.8m high, non-metallic table.</li> <li>The power supply for the EUT was fed through a 50 [μ]H/50 EUT LISN, connected to filtered mains.</li> <li>The RF OUT of the EUT LISN was connected to the EMI test receiver via a low-loss coaxial cable.</li> <li>All other supporting equipment were powered separately from another main supply.</li> <li>The EUT was switched on and allowed to warm up to its normal operating condition.</li> <li>A scan was made on the NEUTRAL line (for AC mains) or Earth line (for DC power) over the required frequency range using an EMI test receiver.</li> <li>High peaks, relative to the limit line, The EMI test receiver was then tuned to the selected frequencies and the necessary measurements made with a receiver bandwidth setting of 10 kHz.</li> <li>Step 7 was then repeated for the LIVE line (for AC mains) or DC line (for DC power).</li> </ol>																										
Remark		We test 3 modulations, only show GFSK test data in the report.																										

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Result	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail
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Test Data  Yes  N/A

Test Plot  Yes (See below)  N/A

**Data sample**

No.	Frequency (MHz)	Reading (dBμV)	Detector	Lisn/Isn (dB)	Ps_Lmt (dB)	Cab_L (dB)	Result (dBμV)	Limit (dBμV)	Margin (dB)
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Frequency (MHz) = Emission frequency in MHz

Reading (dBμV) = Receiver Reading Value

Detector=Quasi Peak Detector or Average Detector

Lisn/ISN= Insertion loss of LISN

Ps\_Lmt= Insertion loss of transient limiter (The transient limiter included 10dB attenuation)

Cab\_L= cable loss

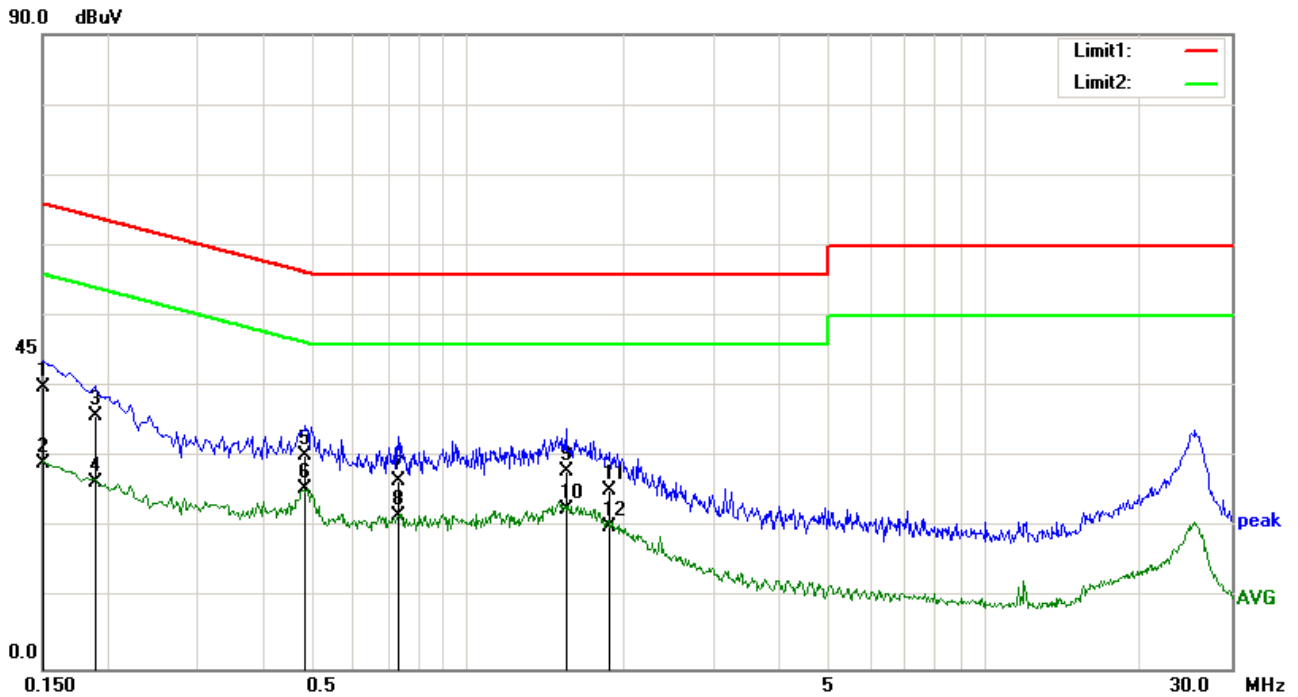
Result (dBμV) = Reading Value + Corrected Value

Limit (dBμV) = Limit stated in standard

**Calculation Formula:**

Margin (dB) = Result (dBμV) – limit (dBμV)

**Test Mode:** Transmitting BT Mode ( GFSK-Low Channel )



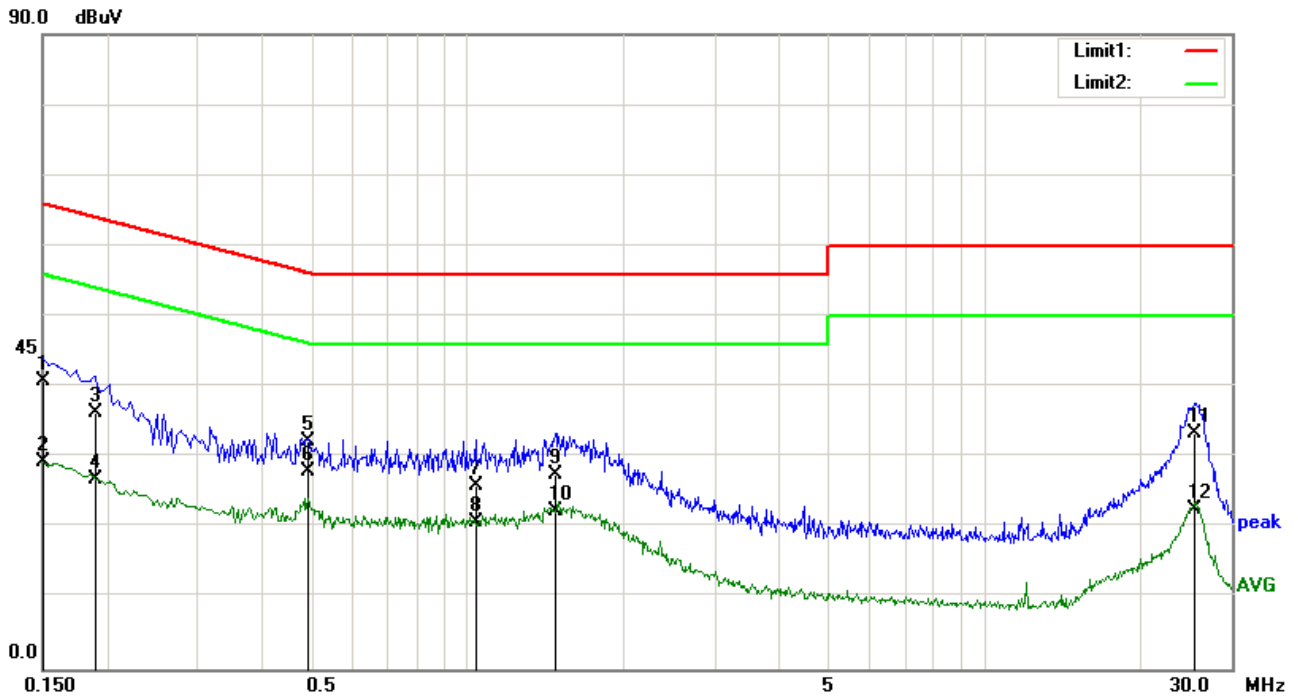
**Test Data**

**Phase Line Plot at 120Vac, 60Hz**

No.	Frequency (MHz)	Reading (dBuV)	Detector	Lisn/Isn (dB)	Ps_Lmt (dB)	Cab_L (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)
1	0.1500	29.46	QP	0.10	-10.00	0.36	39.92	66.00	-26.08
2	0.1500	18.70	AVG	0.10	-10.00	0.36	29.16	56.00	-26.84
3	0.1900	25.43	QP	0.10	-10.00	0.30	35.83	64.04	-28.21
4	0.1900	15.98	AVG	0.10	-10.00	0.30	26.38	54.04	-27.66
5	0.4860	19.85	QP	0.12	-10.00	0.21	30.18	56.24	-26.06
6	0.4860	15.20	AVG	0.12	-10.00	0.21	25.53	46.24	-20.71
7	0.7340	16.41	QP	0.13	-10.00	0.20	26.74	56.00	-29.26
8	0.7340	11.35	AVG	0.13	-10.00	0.20	21.68	46.00	-24.32
9	1.5500	17.58	QP	0.15	-10.00	0.20	27.93	56.00	-28.07
10	1.5500	12.25	AVG	0.15	-10.00	0.20	22.60	46.00	-23.40
11	1.8780	14.86	QP	0.16	-10.00	0.19	25.21	56.00	-30.79
12	1.8780	9.81	AVG	0.16	-10.00	0.19	20.16	46.00	-25.84

Note: We had tested different mode Low/Mid/High channel, and only show worse case (GFSK Low channel) in the report.

**Test Mode:** Transmitting BT Mode ( GFSK-Low Channel )



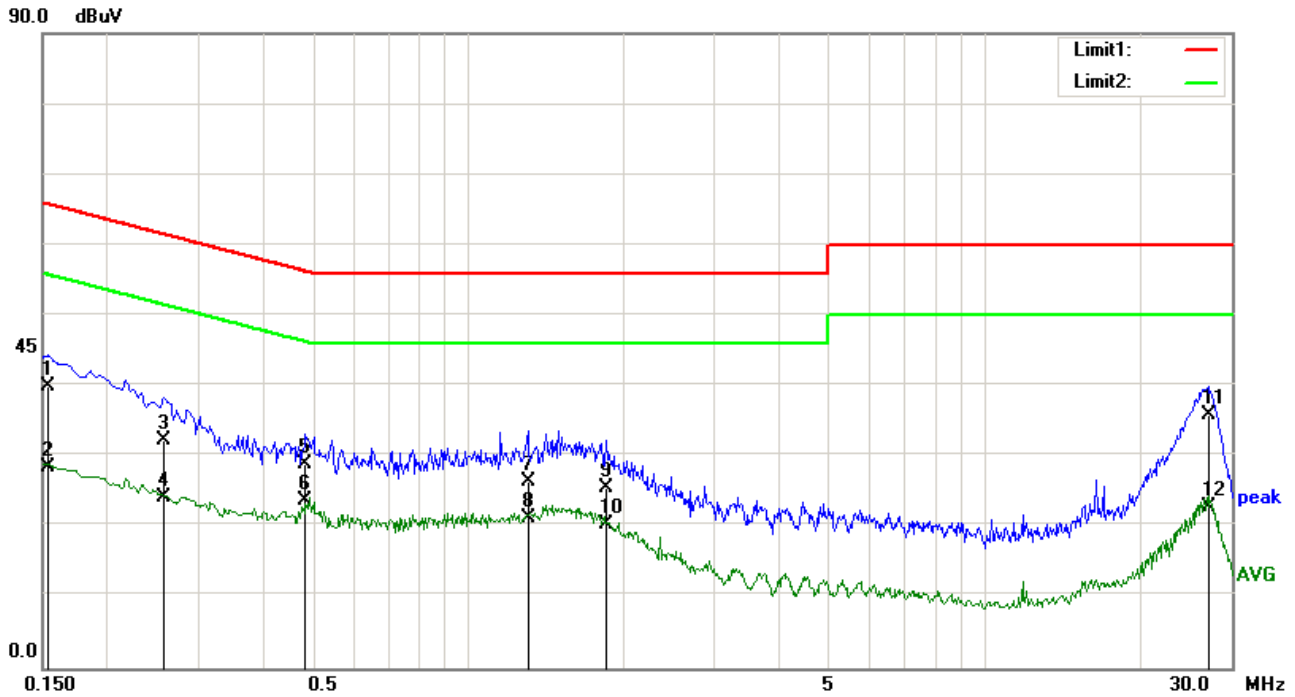
**Test Data**

**Phase Neutral Plot at 120Vac, 60Hz**

No.	Frequency (MHz)	Reading (dBuV)	Detector	Lisn/Isn (dB)	Ps_Lmt (dB)	Cab_L (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)
1	0.1500	30.30	QP	0.11	-10.00	0.36	40.77	66.00	-25.23
2	0.1500	18.96	AVG	0.11	-10.00	0.36	29.43	56.00	-26.57
3	0.1900	25.95	QP	0.10	-10.00	0.30	36.35	64.04	-27.69
4	0.1900	16.50	AVG	0.10	-10.00	0.30	26.90	54.04	-27.14
5	0.4900	21.95	QP	0.11	-10.00	0.21	32.27	56.17	-23.90
6	0.4900	17.79	AVG	0.11	-10.00	0.21	28.11	46.17	-18.06
7	1.0340	15.58	QP	0.13	-10.00	0.19	25.90	56.00	-30.10
8	1.0340	10.46	AVG	0.13	-10.00	0.19	20.78	46.00	-25.22
9	1.4740	17.27	QP	0.15	-10.00	0.20	27.62	56.00	-28.38
10	1.4740	12.03	AVG	0.15	-10.00	0.20	22.38	46.00	-23.62
11	25.4580	21.31	QP	1.42	-10.00	0.67	33.40	60.00	-26.60
12	25.4580	10.57	AVG	1.42	-10.00	0.67	22.66	50.00	-27.34

Note: We had tested different mode Low/Mid/High channel, and only show worse case (GFSK Low channel) in the report.

**Test Mode:** Transmitting BT Mode ( GFSK-Low Channel )



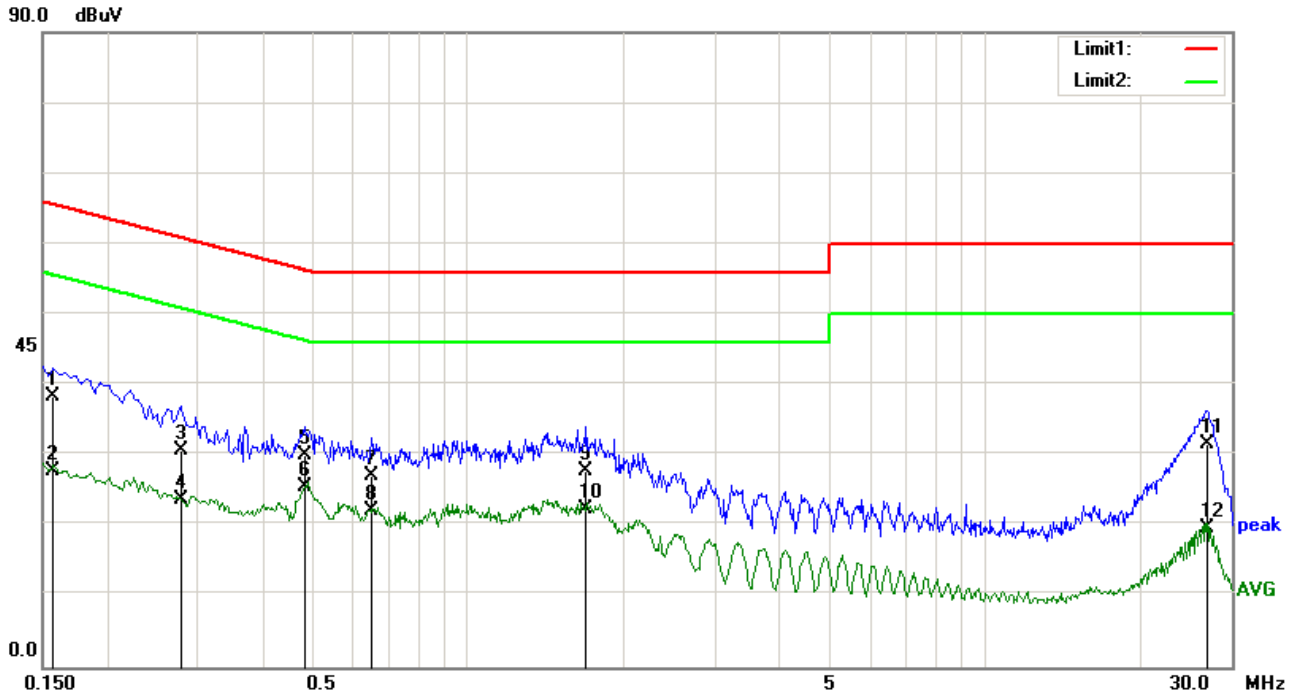
**Test Data**

**Phase Line Plot at 230Vac, 50Hz**

No.	Frequency (MHz)	Reading (dBuV)	Detector	Lisn/Isn (dB)	Ps_Lmt (dB)	Cab_L (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)
1	0.1540	29.43	QP	0.10	-10.00	0.35	39.88	65.78	-25.90
2	0.1540	17.92	AVG	0.10	-10.00	0.35	28.37	55.78	-27.41
3	0.2580	21.91	QP	0.10	-10.00	0.20	32.21	61.50	-29.29
4	0.2580	13.87	AVG	0.10	-10.00	0.20	24.17	51.50	-27.33
5	0.4860	18.48	QP	0.12	-10.00	0.21	28.81	56.24	-27.43
6	0.4860	13.44	AVG	0.12	-10.00	0.21	23.77	46.24	-22.47
7	1.3060	16.05	QP	0.15	-10.00	0.21	26.41	56.00	-29.59
8	1.3060	10.90	AVG	0.15	-10.00	0.21	21.26	46.00	-24.74
9	1.8580	15.15	QP	0.16	-10.00	0.20	25.51	56.00	-30.49
10	1.8580	10.03	AVG	0.16	-10.00	0.20	20.39	46.00	-25.61
11	26.9940	23.87	QP	1.27	-10.00	0.70	35.84	60.00	-24.16
12	26.9940	10.97	AVG	1.27	-10.00	0.70	22.94	50.00	-27.06

Note: We had tested different mode Low/Mid/High channel, and only show worse case (GFSK Low channel) in the report.

**Test Mode:** Transmitting BT Mode ( GFSK-Low Channel )



**Test Data**

**Phase Neutral Plot at 230Vac, 50Hz**

No.	Frequency (MHz)	Reading (dBuV)	Detector	Lisn/Isn (dB)	Ps_Lmt (dB)	Cab_L (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)
1	0.1580	27.86	QP	0.11	-10.00	0.35	38.32	65.57	-27.25
2	0.1580	17.28	AVG	0.11	-10.00	0.35	27.74	55.57	-27.83
3	0.2780	20.33	QP	0.10	-10.00	0.20	30.63	60.88	-30.25
4	0.2780	13.39	AVG	0.10	-10.00	0.20	23.69	50.88	-27.19
5	0.4820	19.64	QP	0.11	-10.00	0.21	29.96	56.30	-26.34
6	0.4820	15.23	AVG	0.11	-10.00	0.21	25.55	46.30	-20.75
7	0.6500	16.70	QP	0.12	-10.00	0.20	27.02	56.00	-28.98
8	0.6500	11.76	AVG	0.12	-10.00	0.20	22.08	46.00	-23.92
9	1.6980	17.32	QP	0.16	-10.00	0.21	27.69	56.00	-28.31
10	1.6980	12.09	AVG	0.16	-10.00	0.21	22.46	46.00	-23.54
11	26.8540	19.50	QP	1.41	-10.00	0.70	31.61	60.00	-28.39
12	26.8540	7.52	AVG	1.41	-10.00	0.70	19.63	50.00	-30.37

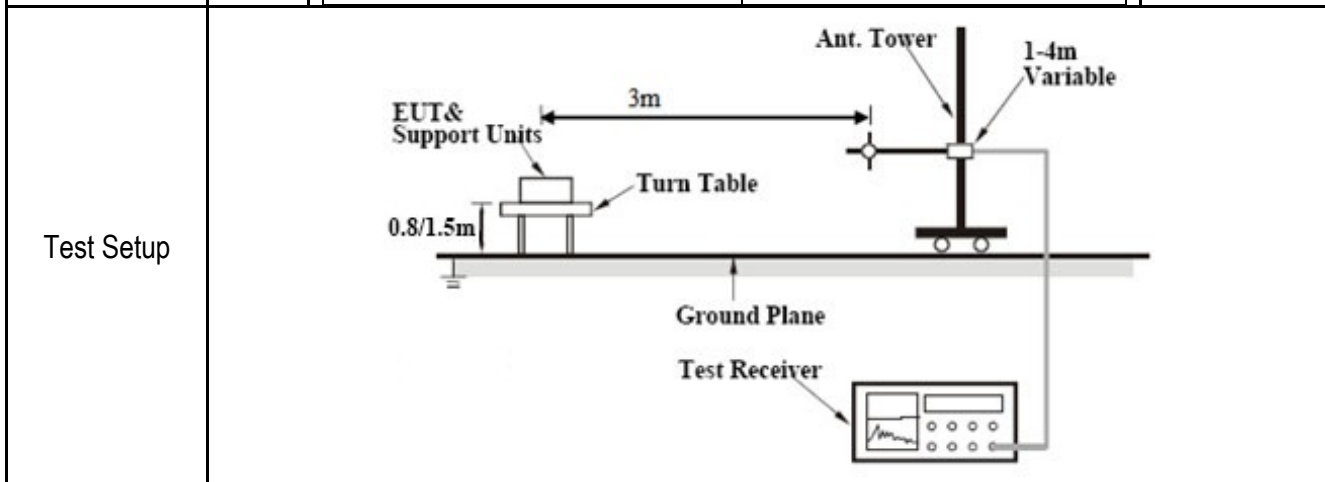
Note: We had tested different mode Low/Mid/High channel, and only show worse case (GFSK Low channel) in the report.

## 6.9 Radiated Emissions

Temperature	23°C
Relative Humidity	51%
Atmospheric Pressure	1018mbar
Test date :	November 21 to November 22, 2017
Tested By :	Trety Lu

### Requirement(s):

Spec	Item	Requirement	Applicable																				
47CFR§15.205, §15.209, §15.247(d)	a)	<p>Except higher limit as specified elsewhere in other section, the emissions from the low-power radio-frequency devices shall not exceed the field strength levels specified in the following table and the level of any unwanted emissions shall not exceed the level of the fundamental emission. The tighter limit applies at the band edges</p> <p style="text-align: center;"><b>Class A Limit</b></p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Frequency range (MHz)</th> <th>Field Strength (µV/m)</th> </tr> </thead> <tbody> <tr> <td>30 – 88</td> <td>90</td> </tr> <tr> <td>88 – 216</td> <td>150</td> </tr> <tr> <td>216 – 960</td> <td>210</td> </tr> <tr> <td>Above 960</td> <td>300</td> </tr> </tbody> </table> <p style="text-align: center;"><b>Class B Limit</b></p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Frequency range (MHz)</th> <th>Field Strength (µV/m)</th> </tr> </thead> <tbody> <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> </tbody> </table>	Frequency range (MHz)	Field Strength (µV/m)	30 – 88	90	88 – 216	150	216 – 960	210	Above 960	300	Frequency range (MHz)	Field Strength (µV/m)	30 – 88	100	88 – 216	150	216 – 960	200	Above 960	500	<input checked="" type="checkbox"/>
Frequency range (MHz)	Field Strength (µV/m)																						
30 – 88	90																						
88 – 216	150																						
216 – 960	210																						
Above 960	300																						
Frequency range (MHz)	Field Strength (µV/m)																						
30 – 88	100																						
88 – 216	150																						
216 – 960	200																						
Above 960	500																						



Procedure	<ol style="list-style-type: none"> <li>1. The EUT was switched on and allowed to warm up to its normal operating condition.</li> <li>2. The test was carried out at the selected frequency points obtained from the EUT characterization. Maximization of the emissions, was carried out by rotating the EUT, changing the antenna polarization, and adjusting the antenna height in the following manner:             <ol style="list-style-type: none"> <li>a. Vertical or horizontal polarization (whichever gave the higher emission level over a full rotation of the EUT) was chosen.</li> <li>b. The EUT was then rotated to the direction that gave the maximum emission.</li> <li>c. Finally, the antenna height was adjusted to the height that gave the maximum emission.</li> </ol> </li> <li>3. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi Peak detection at frequency below 1GHz.</li> <li>4. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz with Peak detection for Peak measurement at frequency above 1GHz. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 10Hz with Peak detection for Average Measurement as below at frequency above 1GHz.</li> <li>5. Steps 2 and 3 were repeated for the next frequency point, until all selected frequency points were measured.</li> </ol>
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Remark	We test 3 modulations, only show GFSK test data in the report.
Result	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail

Test Data  Yes  N/A  
 Test Plot  Yes (See below)  N/A

**Data sample**

No.	Frequency (MHz)	Reading (dB $\mu$ V/m)	Detector	Ant_F (dB/m)	PA_G (dB)	Cab_L (dB)	Result (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Height (cm)	Degree ( $^{\circ}$ )
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Frequency (MHz) = Emission frequency in MHz

Reading (dB $\mu$ V/m) = Receiver Reading Value

Detector= Peak Detector or Quasi Peak Detector

Ant\_F=Antenna Factor

PA\_G=Pre-Amplifier Gain

Cab\_L=Cable Loss

Result (dB $\mu$ V/m) = Reading Value + Corrected Value

Limit (dB $\mu$ V/m) = Limit stated in standard

Height (cm) = Height of Receiver antenna

Degree = Turn table degree

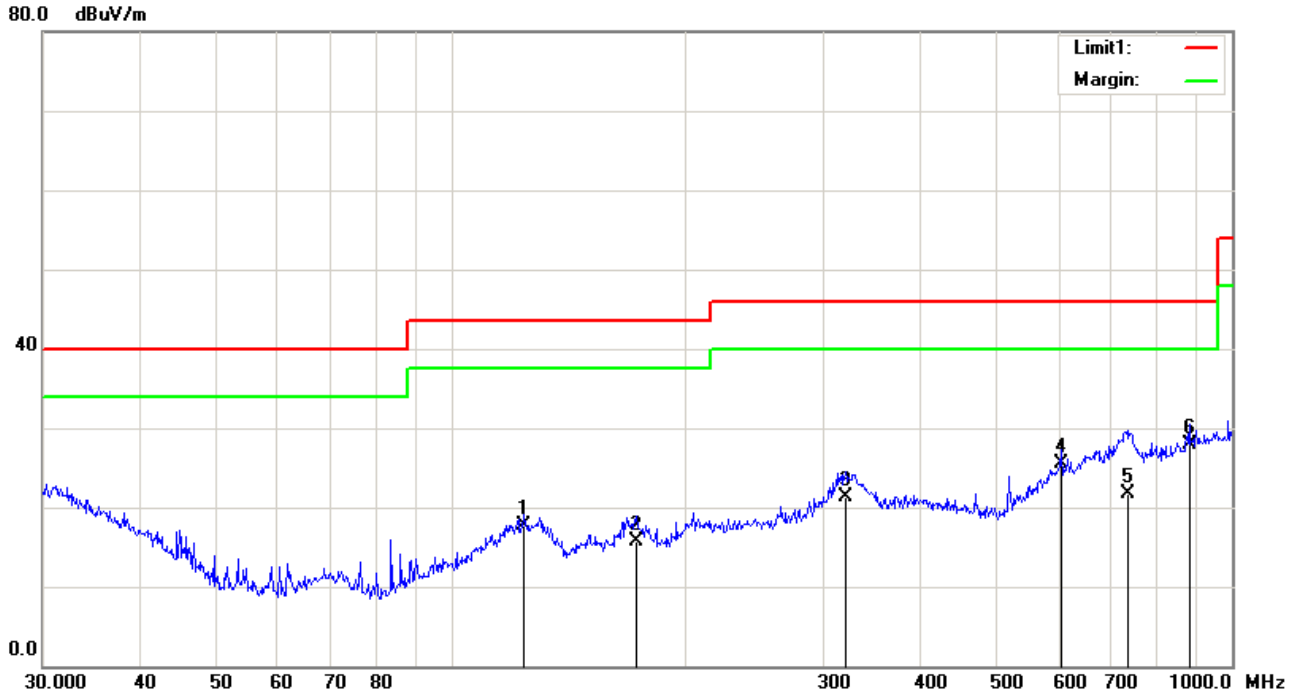
**Calculation Formula:**

Margin (dB) = Result (dB $\mu$ V/m) – limit (dB $\mu$ V/m)



<b>Test Mode:</b>	<b>Transmitting BT Mode ( GFSK-Low Channel )</b>
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**Below 1GHz**



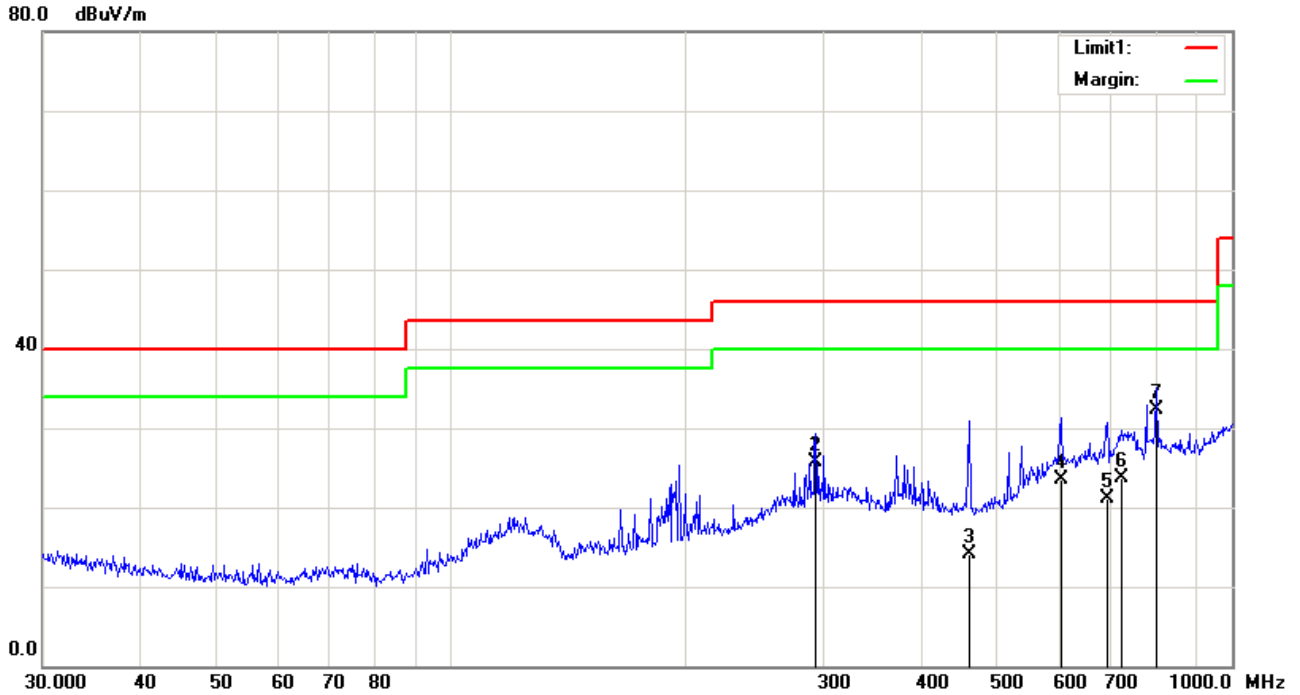
**Test Data**

**Vertical Polarity Plot @3m**

No.	Frequency (MHz)	Reading (dBuV/m)	Detector	Ant F (dB/m)	PA_G (dB)	Cab_L (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)
1	124.1330	46.62	QP	16.06	46.87	1.81	17.62	43.50	-25.88	100	213
2	172.5988	46.16	QP	13.85	46.44	2.11	15.68	43.50	-27.82	100	188
3	319.9370	51.77	QP	15.36	48.68	2.86	21.31	46.00	-24.69	200	196
4	603.5392	49.53	QP	20.34	48.39	3.94	25.42	46.00	-20.58	100	278
5	734.4913	40.35	QP	22.23	45.29	4.35	21.64	46.00	-24.36	100	104
6	881.4067	45.81	QP	23.28	45.95	4.80	27.94	46.00	-18.06	100	54

<b>Test Mode:</b>	<b>Transmitting BT Mode ( GFSK-Low Channel )</b>
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**Below 1GHz**

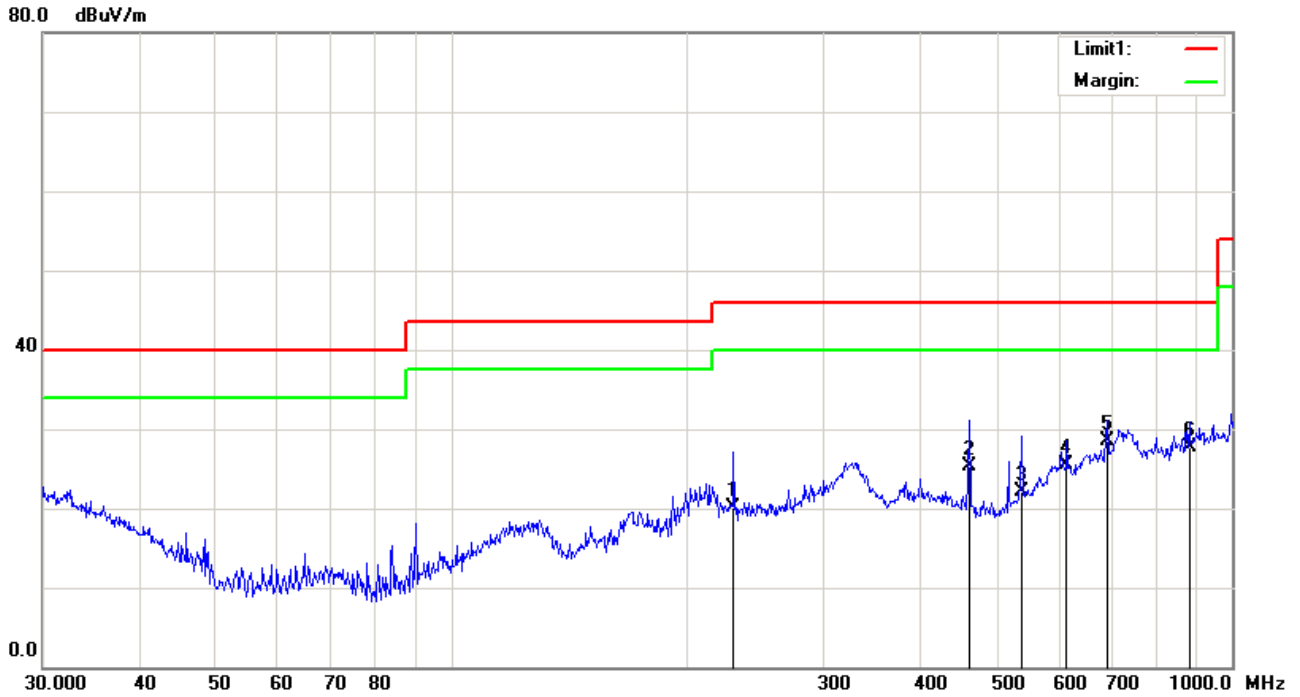


**Horizontal Polarity Plot @3m**

No.	Frequency (MHz)	Reading (dBuV/m)	Detector	Ant_F (dB/m)	PA_G (dB)	Cab_L (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)
1	293.0842	54.59	QP	16.66	48.34	2.73	25.64	46.00	-20.36	200	70
2	293.0842	54.59	QP	16.66	48.34	2.73	25.64	46.00	-20.36	200	70
3	460.7271	43.84	QP	16.00	49.17	3.43	14.10	46.00	-31.90	200	267
4	603.5392	46.75	QP	21.30	48.39	3.94	23.60	46.00	-22.40	200	88
5	691.9867	40.62	QP	22.31	45.96	4.23	21.20	46.00	-24.80	200	12
6	721.7259	42.57	QP	22.53	45.71	4.31	23.70	46.00	-22.30	300	233

<b>Test Mode:</b>	<b>Transmitting BT Mode ( GFSK-Middle Channel )</b>
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**Below 1GHz**



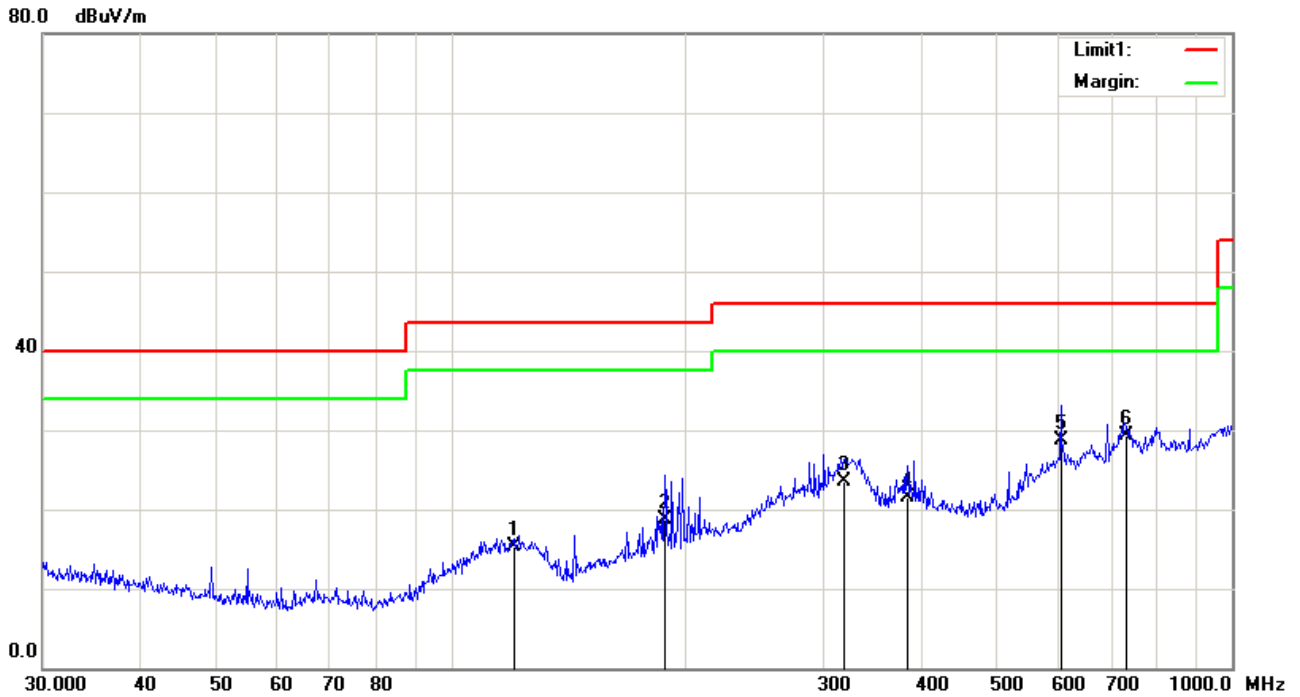
**Test Data**

**Vertical Polarity Plot @3m**

No.	Frequency (MHz)	Reading (dBuV/m)	Detector	Ant_F (dB/m)	PA_G (dB)	Cab_L (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)
1	230.0985	50.42	QP	14.88	47.57	2.41	20.14	46.00	-25.86	200	213
2	460.7271	55.13	QP	15.98	49.17	3.43	25.37	46.00	-20.63	100	318
3	537.5891	50.13	QP	17.18	48.82	3.70	22.19	46.00	-23.81	100	352
4	614.2142	48.39	QP	20.59	47.47	3.98	25.49	46.00	-20.51	100	346
5	691.9867	47.75	QP	22.40	45.96	4.23	28.42	46.00	-17.58	200	211
6	881.4067	45.52	QP	23.28	45.95	4.80	27.65	46.00	-18.35	100	102

<b>Test Mode:</b>	<b>Transmitting BT Mode ( GFSK-Middle Channel )</b>
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**Below 1GHz**

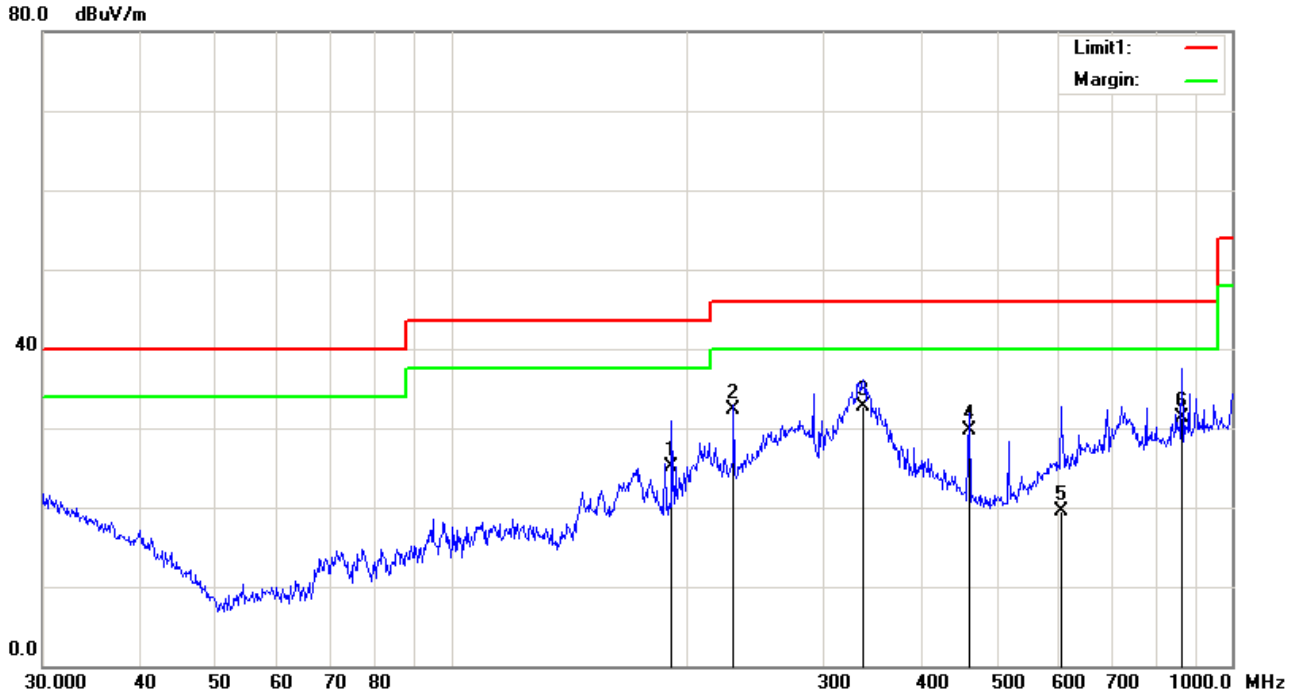


**Horizontal Polarity Plot @3m**

No.	Frequency (MHz)	Reading (dBuV/m)	Detector	Ant_F (dB/m)	PA_G (dB)	Cab_L (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)
1	120.6991	44.13	QP	16.00	46.61	1.79	15.31	43.50	-28.19	200	28
2	187.7530	50.46	QP	12.71	46.61	2.21	18.77	43.50	-24.73	200	12
3	318.8170	52.53	QP	16.73	48.66	2.86	23.46	46.00	-22.54	300	189
4	383.9318	51.07	QP	16.14	48.80	3.16	21.57	46.00	-24.43	300	51
5	603.5392	51.80	QP	21.30	48.39	3.94	28.65	46.00	-17.35	200	11
6	731.9203	47.81	QP	22.59	45.38	4.34	29.36	46.00	-16.64	200	249

<b>Test Mode:</b>	<b>Transmitting BT Mode ( GFSK-High Channel )</b>
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**Below 1GHz**



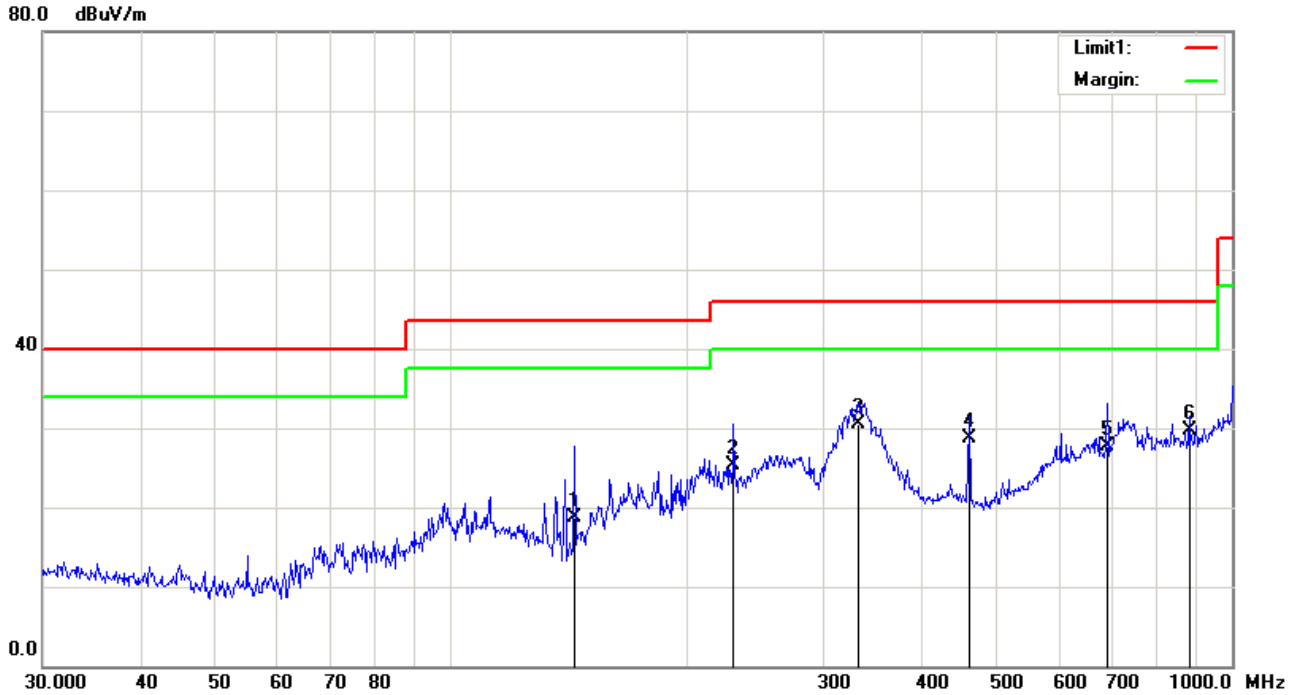
**Test Data**

**Vertical Polarity Plot @3m**

No.	Frequency (MHz)	Reading (dBuV/m)	Detector	Ant F (dB/m)	PA_G (dB)	Cab_L (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)
1	191.7450	56.90	QP	12.88	46.81	2.23	25.20	43.50	-18.30	195	360
2	230.0985	62.58	QP	14.88	47.57	2.41	32.30	46.00	-13.70	100	274
3	337.2155	63.03	QP	15.71	48.88	2.94	32.80	46.00	-13.20	100	155
4	460.7271	59.56	QP	15.98	49.17	3.43	29.80	46.00	-16.20	200	271
5	603.5392	43.71	QP	20.34	48.39	3.94	19.60	46.00	-26.40	200	354
6	863.0562	50.02	QP	22.89	46.25	4.74	31.40	46.00	-14.60	100	172

<b>Test Mode:</b>	<b>Transmitting BT Mode ( GFSK-High Channel )</b>
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**Below 1GHz**



**Horizontal Polarity Plot @3m**

No.	Frequency (MHz)	Reading (dBuV/m)	Detector	Ant_F (dB/m)	PA_G (dB)	Cab_L (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)
1	143.8295	51.57	QP	13.03	47.97	2.04	18.67	43.50	-24.83	202	56
2	230.0985	55.59	QP	14.88	47.57	2.41	25.31	46.00	-20.69	202	105
3	332.5187	60.86	QP	15.62	48.82	2.92	30.58	46.00	-15.42	300	159
4	460.7271	58.40	QP	15.98	49.17	3.43	28.64	46.00	-17.36	202	273
5	691.9867	46.99	QP	22.40	45.96	4.23	27.66	46.00	-18.34	300	110
6	881.4067	47.51	QP	23.28	45.95	4.80	29.64	46.00	-16.36	202	107

<b>Test Mode:</b>	<b>Transmitting BT Mode ( GFSK - Low Channel )</b>
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**Above 1GHz  
Vertical**

No.	Frequency (MHz)	Reading (dBuV/m)	Detector	Ant F (dB/m)	PA G (dB)	Cab L (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)
1	1867.000	69.46	peak	30.53	51.61	3.99	52.37	74.00	-21.63	200	228
2	2989.000	60.91	peak	31.55	52.81	4.43	44.08	74.00	-29.92	100	246
3	4808.000	59.95	peak	33.18	53.35	6.10	45.88	74.00	-28.12	200	250
4	8225.000	55.95	peak	35.48	54.29	8.09	45.23	74.00	-28.77	100	204
5	9823.000	54.77	peak	38.28	53.97	9.11	48.19	74.00	-25.81	200	330
6	11523.000	56.41	peak	38.60	53.18	10.09	51.92	74.00	-22.08	117	360

**Horizontal**

No.	Frequency (MHz)	Reading (dBuV/m)	Detector	Ant F (dB/m)	PA G (dB)	Cab L (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)
1	1867.000	51.34	AVG	30.53	51.61	3.99	34.25	54.00	-19.75	200	278
2	4808.000	62.14	peak	33.18	53.35	6.10	48.07	74.00	-25.93	200	143
3	7970.000	55.21	peak	36.51	54.74	7.82	44.80	74.00	-29.20	100	357
4	9602.000	54.66	peak	37.74	53.81	8.94	47.53	74.00	-26.47	100	42
5	11710.000	56.01	peak	38.56	53.51	10.02	51.08	74.00	-22.92	200	129
6	13019.000	54.45	peak	40.54	51.81	9.64	52.82	74.00	-21.18	200	69

<b>Test Mode:</b>	<b>Transmitting BT Mode ( GFSK - Mid Channel )</b>
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### Vertical

No.	Frequency (MHz)	Reading (dBuV/m)	Detector	Ant_F (dB/m)	PA_G (dB)	Cab_L (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)
1	1867.000	68.98	peak	30.53	51.61	3.99	51.89	74.00	-22.11	200	141
2	4876.000	64.47	peak	33.33	53.66	6.00	50.14	74.00	-23.86	200	306
3	8191.000	55.89	peak	35.65	54.36	8.06	45.24	74.00	-28.76	200	164
4	9857.000	55.06	peak	38.36	54.00	9.13	48.55	74.00	-25.45	100	321
5	11047.000	55.42	peak	38.42	53.22	9.56	50.18	74.00	-23.82	200	167
6	13070.000	54.18	peak	40.65	51.83	9.62	52.62	74.00	-21.38	200	303

### Horizontal

No.	Frequency (MHz)	Reading (dBuV/m)	Detector	Ant_F (dB/m)	PA_G (dB)	Cab_L (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)
1	1867.000	42.43	AVG	30.53	51.61	3.99	25.34	54.00	-28.66	100	179
2	4876.000	59.63	peak	33.33	53.66	6.00	45.30	74.00	-28.70	200	26
3	6406.000	55.70	peak	34.05	52.54	5.84	43.05	74.00	-30.95	200	359
4	9279.000	55.18	peak	36.75	54.21	8.49	46.21	74.00	-27.79	100	76
5	10469.000	54.37	peak	38.61	53.10	9.34	49.22	74.00	-24.78	200	315
6	11098.000	55.57	peak	38.44	53.21	9.62	50.42	74.00	-23.58	200	334



<b>Test Mode:</b>	<b>Transmitting BT Mode ( GFSK -High Channel )</b>
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### Vertical

No.	Frequency (MHz)	Reading (dBuV/m)	Detector	Ant_F (dB/m)	PA_G (dB)	Cab_L (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)
1	1765.000	70.83	peak	29.94	51.12	4.01	53.66	74.00	-20.34	200	35
2	4961.000	63.47	peak	33.51	54.04	5.88	48.82	74.00	-25.18	200	337
3	7443.000	59.75	peak	35.01	54.87	7.33	47.22	74.00	-26.78	100	349
4	9806.000	57.18	peak	38.23	53.96	9.09	50.54	74.00	-23.46	100	224
5	11013.000	56.62	peak	38.41	53.23	9.52	51.32	74.00	-22.68	200	314
6	13495.000	42.99	AVG	41.59	52.00	9.40	41.98	54.00	-12.02	200	18

### Horizontal

No.	Frequency (MHz)	Reading (dBuV/m)	Detector	Ant_F (dB/m)	PA_G (dB)	Cab_L (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)
1	1867.000	69.72	peak	30.53	51.61	3.99	52.63	74.00	-21.37	200	329
2	4961.000	60.97	peak	33.51	54.04	5.88	46.32	74.00	-27.68	200	218
3	6015.000	56.33	peak	33.42	51.33	5.85	44.27	74.00	-29.73	200	289
4	7443.000	58.80	peak	35.01	54.87	7.33	46.27	74.00	-27.73	200	156
5	9313.000	55.98	peak	36.86	54.14	8.55	47.25	74.00	-26.75	200	352
6	10401.000	55.72	peak	38.62	53.24	9.33	50.43	74.00	-23.57	200	108

## Annex A. TEST INSTRUMENT

Instrument	Model	Serial #	Cal Date	Cal Due	In use
<b>AC Line Conducted Emissions</b>					
R&S EMI Test Receiver	ESPI3	101216	05/03/2017	05/02/2018	<input checked="" type="checkbox"/>
V-LISN	ESH3-Z5	838979/005	03/30/2017	03/29/2018	<input checked="" type="checkbox"/>
Transient Limiter	LIT-153	531021	10/30/2017	10/29/2018	<input checked="" type="checkbox"/>
SIEMIC EZ_EMC Conducted Emissions software	Ver.ICP-03A1	N/A	N/A	N/A	<input checked="" type="checkbox"/>
<b>RF conducted test</b>					
R&S EMI Receiver	ESPI3	101216	05/03/2017	05/02/2018	<input checked="" type="checkbox"/>
Spectrum Analyzer	N9010A	MY47191130	03/30/2017	03/29/2018	<input checked="" type="checkbox"/>
<b>Radiated Emissions</b>					
Spectrum Analyzer	N9010A	MY47191130	05/03/2017	05/02/2018	<input checked="" type="checkbox"/>
R&S EMI Receiver	ESPI3	101216	05/03/2017	05/02/2018	<input checked="" type="checkbox"/>
Antenna (30MHz~6GHz)	JB6	A121411	10/31/2017	10/30/2018	<input checked="" type="checkbox"/>
EMCO Horn Antenna (1 ~18GHz)	3115	N/A	11/15/2017	11/14/2018	<input checked="" type="checkbox"/>
INFOMW Antenna (1 ~18GHz)	JXTXLB-10180	J2031081120092	10/07/2017	10/06/2018	<input checked="" type="checkbox"/>
Hp Pre-Amplifier	8447F	1937A01160	10/30/2017	10/29/2018	<input checked="" type="checkbox"/>
Agilent Pre-Amplifier	8447B	N/A	10/30/2017	10/29/2018	<input checked="" type="checkbox"/>
SIEMIC EZ_EMC Radiated Emissions software	Ver.ICP-03A1	N/A	N/A	N/A	<input checked="" type="checkbox"/>

**Annex B. EUT And Test Setup Photographs**

**Annex B.i. Photograph: EUT External Photo**



EUT - Top View



EUT - Bottom View



EUT - Front View



EUT - Rear View



EUT - Left View

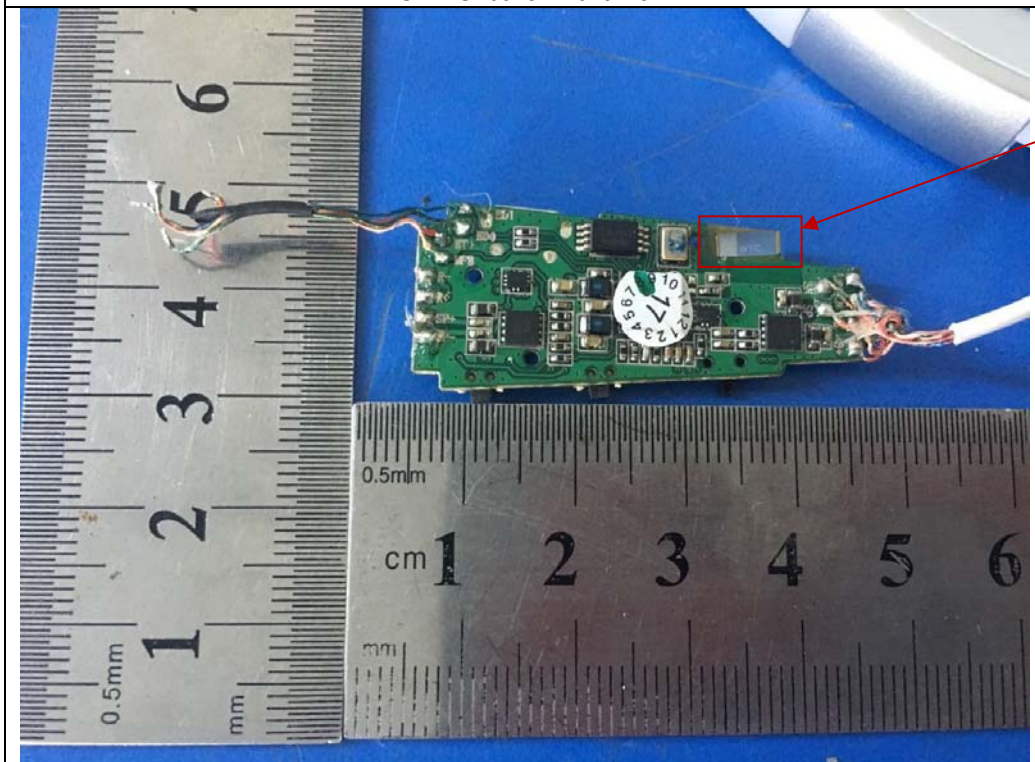


EUT - Right View

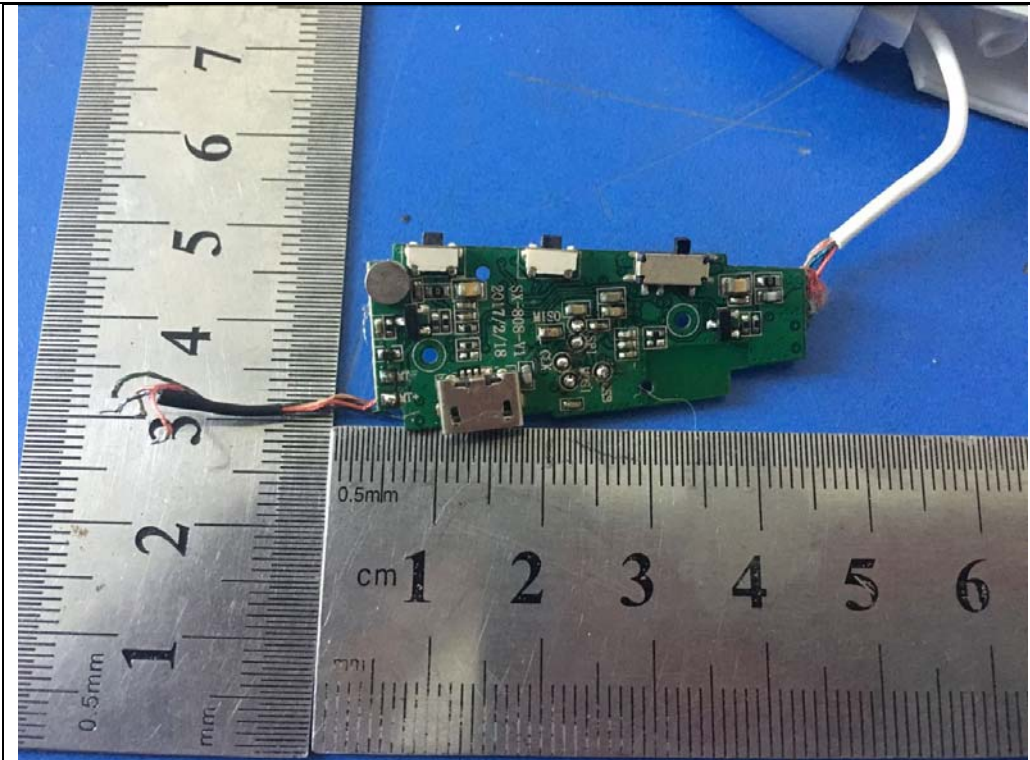
**Annex B.ii. Photograph: EUT Internal Photo**



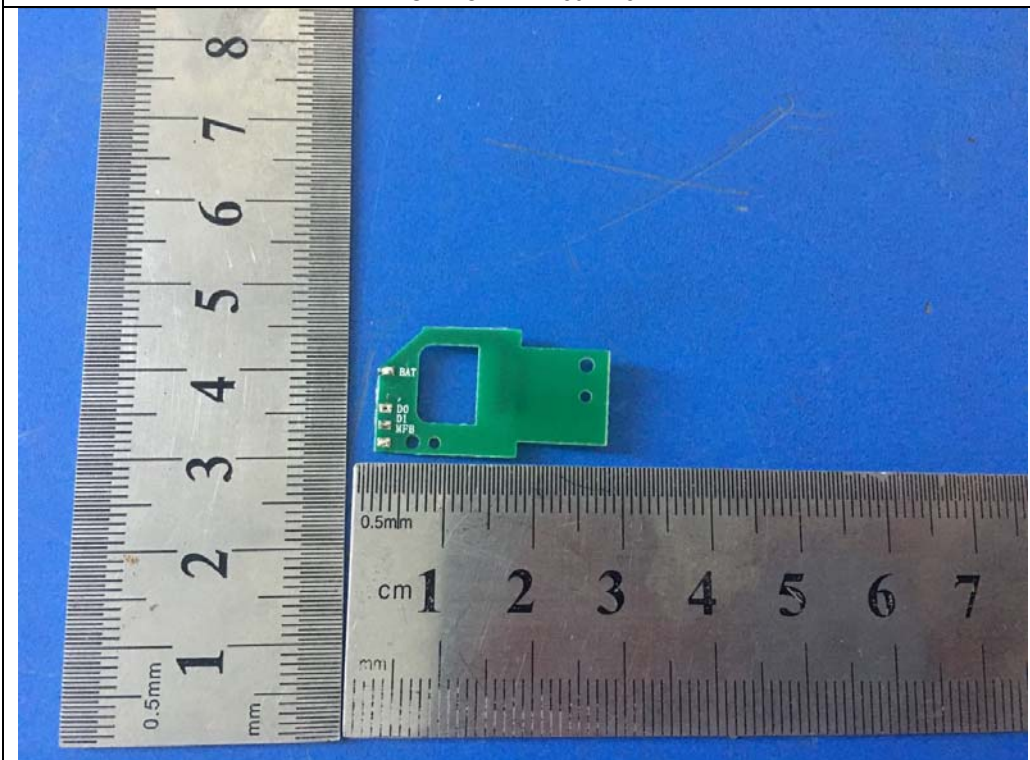
EUT – Uncover Front View



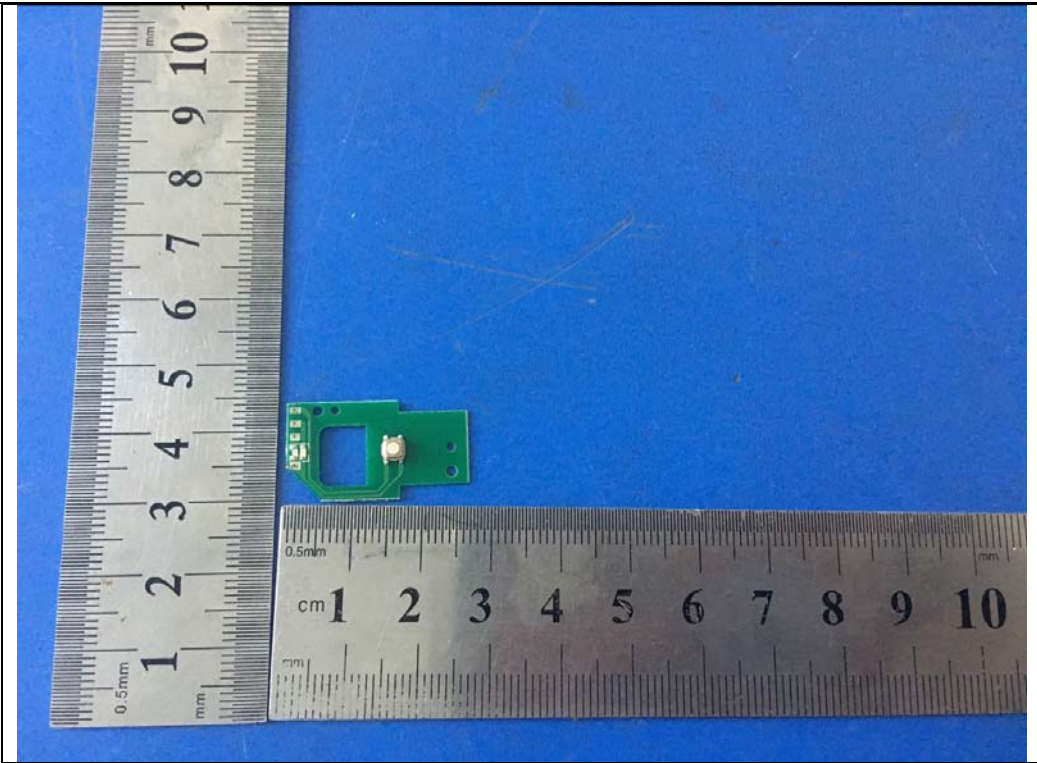
EUT PCB1 – Front View



EUT PCB1 – Rear View



EUT PCB2 – Front View



EUT PCB2 – Rear View



EUT Battery – Front View





EUT Battery – Rear View

**Annex B.iii. Photograph: Test Setup Photo**



Conducted Emissions Test Setup Front View



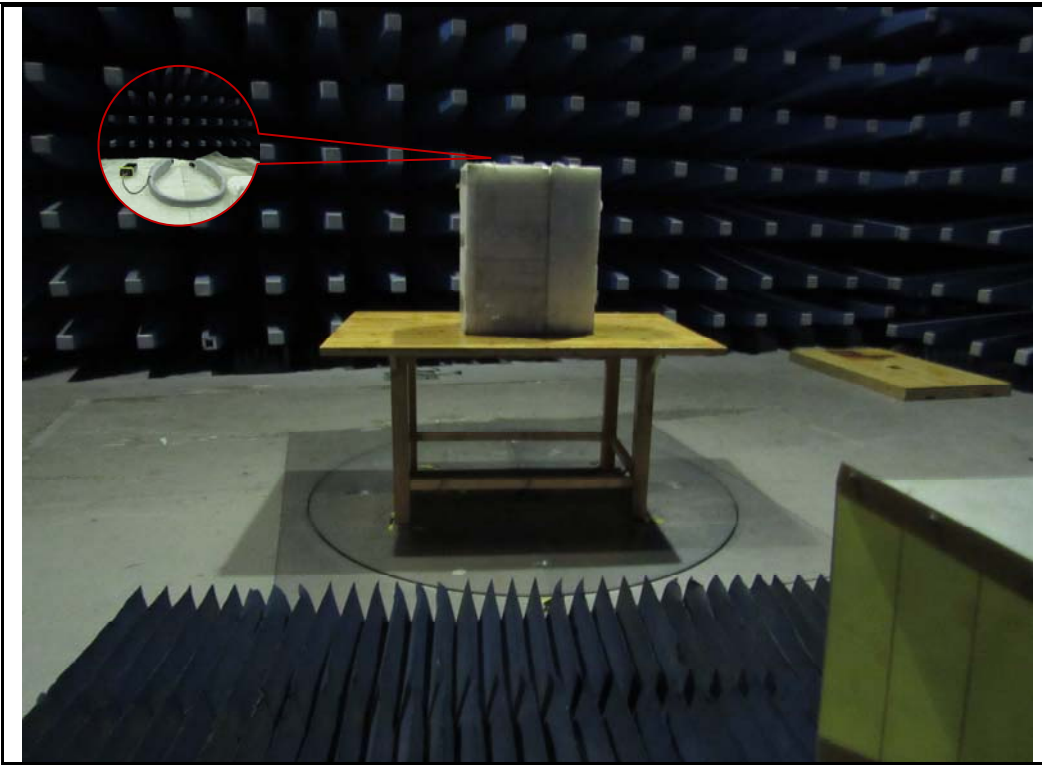
Conducted Emissions Test Setup Side View



Radiated Spurious Emissions Test Setup Below 1GHz Front View



Radiated Spurious Emissions Test Setup Below 1GHz Rear View

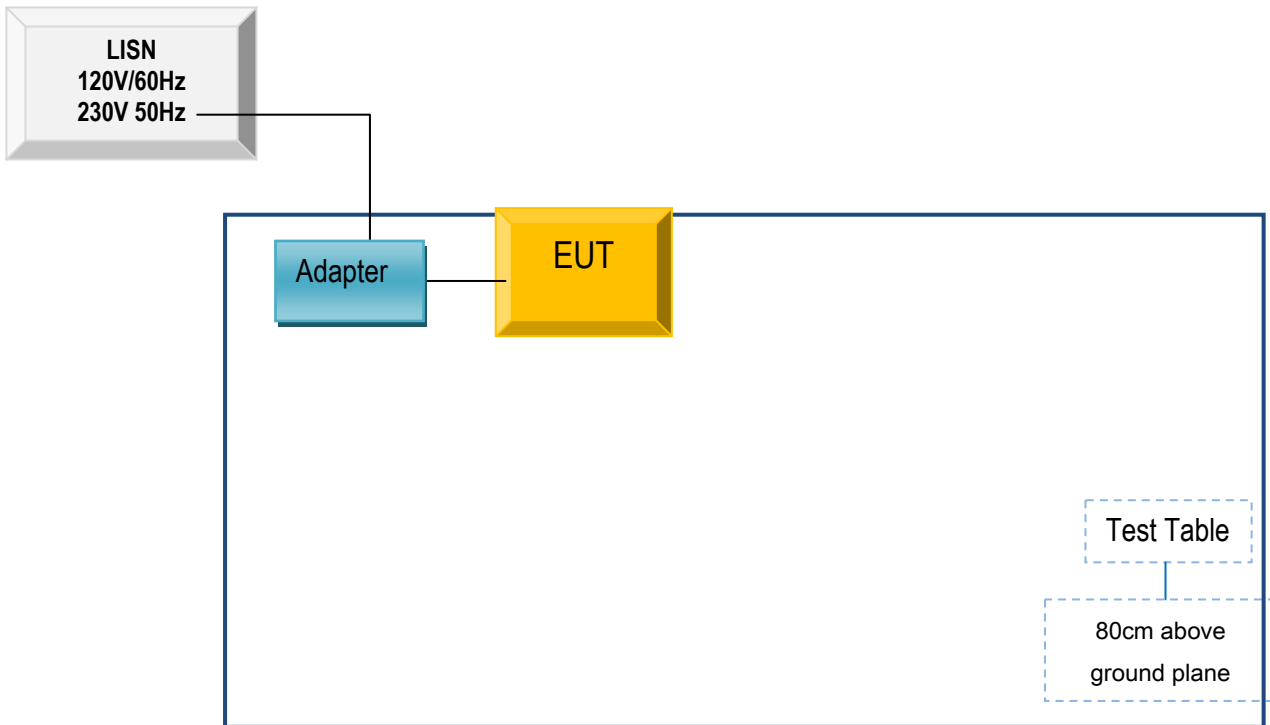


Radiated Spurious Emissions Test Setup Above 1GHz

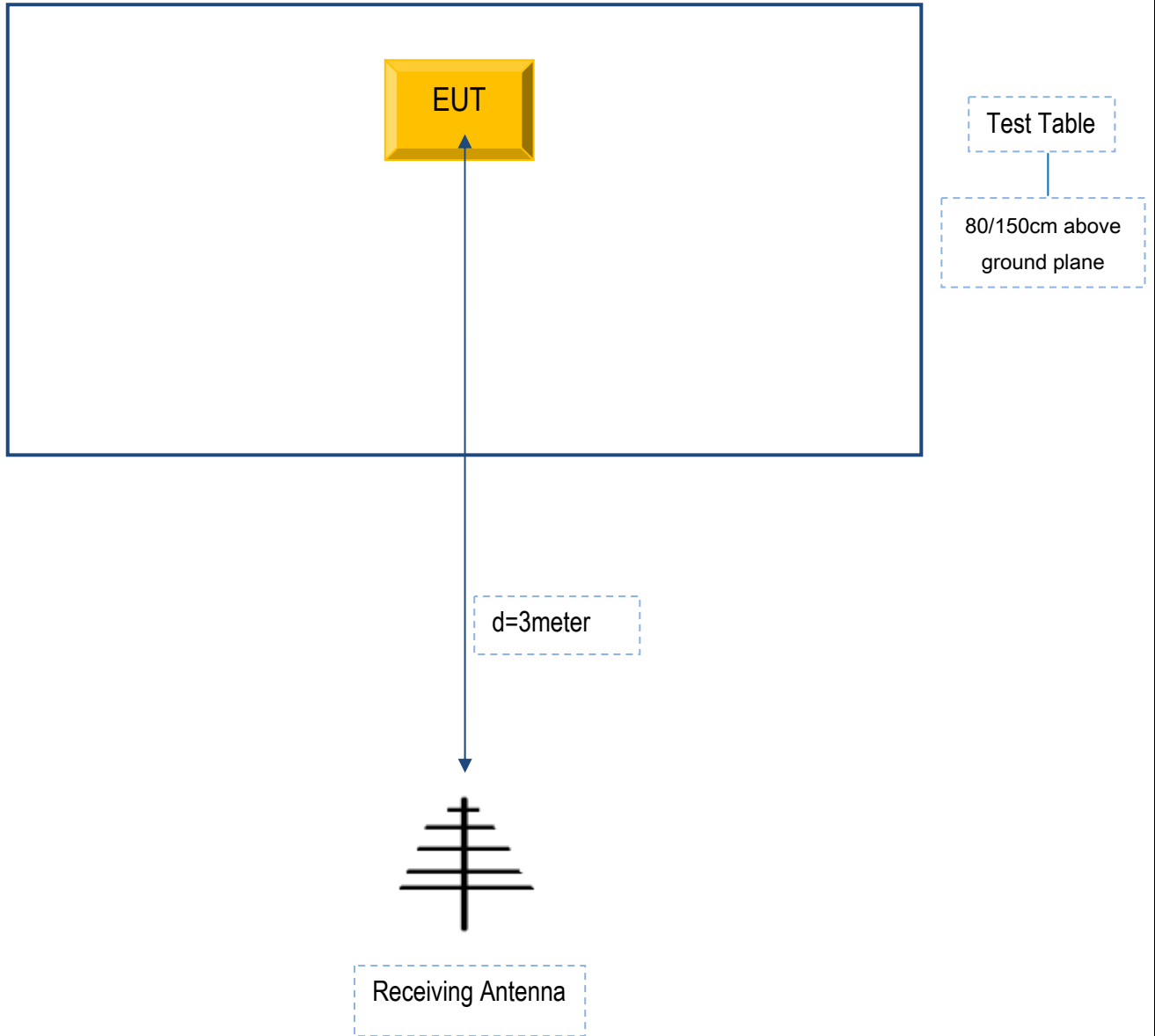
## Annex C. TEST SETUP AND SUPPORTING EQUIPMENT

### Annex C.ii. TEST SET UP BLOCK

#### Block Configuration Diagram for Conducted Emissions



### Block Configuration Diagram for Radiated Emissions



**Annex C. ii. SUPPORTING EQUIPMENT DESCRIPTION**

The following is a description of supporting equipment and details of cables used with the EUT.

<b>Manufacturer</b>	<b>Equipment Description</b>	<b>Model</b>	<b>Serial No</b>
XIAOMI	Adapter	CH-P002	N/A
DELL	Laptop	Inspiron 14-3443	N/A

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## **Annex D. User Manual / Block Diagram / Schematics / Partlist**

**Please see attachment**



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## Annex E. DECLARATION OF SIMILARITY

N/A