



## **TEST REPORT**

**Date:** 2014-03-26

**Report No.:** 68.870.13.180.01F

**Applicant:**

YUSAN INDUSTRIES LTD

Unit 8-9, 8/F, Honour Industrial Centre, 6 Sun Yip Street, Chai Wan, Hong Kong

**Description of Samples:**

Model name: BLUETOOTH Wireless Speaker  
Brand name: JVC  
Model no.: SP-ABT30  
FCC ID: VTASPABT30  
IC: 7649A-SPABT30

**Date of Samples Received:**

2014-03-20

**Date of Tested:**

2014-03-20 to 2014-03-26

**Standards Requested:**

FCC Part 15 Subpart C, Section 15.247  
RSS-210 Issue 8  
RSS-102 Issue 3  
RSS-Gen Issue 4

**Conclusions:**

The submitted product COMPLIED with the requirements of Federal Communications Commission [FCC] Rules and Regulations Part 15 and RSS-210, RSS-102 and RSS-Gen. The tests were performed in accordance with the standards described above and on Section 2.2 in this Test Report.

**Remarks:**

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Checked by:

Approved by:

Jim Huang  
Project Engineer

John Zhi  
Project Manager

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**1.0 General Details**

**1.1 Test Laboratory**

Global United Technology Services Co., Ltd.  
Address: 2nd Floor, Block No.2, Laodong Industrial Zone,  
Xixiang Road Baoan District, Shenzhen, China  
EMC Laboratory registered by FCC with  
FCC Registration Number: 600491

**1.2 Applicant Details**  
**Applicant**

**YUSAN INDUSTRIES LTD.**  
Unit 8-9, 8/F, Honour Industrial Centre, 6 Sun Yip  
Street, Chai Wan, Hong Kong

**Manufacturer**

**YUSAN INDUSTRIES LTD.**  
Unit 8-9, 8/F, Honour Industrial Centre, 6 Sun Yip  
Street, Chai Wan, Hong Kong

### **1.3 Equipment Under Test [EUT]**

#### **Description of EUT**

Product Description:	BLUETOOTH Wireless Speaker
Model No.:	SP-ABT30
Brand Name:	JVC
FCC ID:	VTASPABT30
IC:	7649A-SPABT30
Rating:	DC 13V, 2.3A powered by AC/DC power adaptor (Internal 7.4V Li-ion Battery)
Operated Frequency:	2402 -2480 MHz
No. of Operated Channel:	79
Modulation:	GFSK
Accessories and Auxiliary Equipments:	AC/DC power adaptor.

Antenna Type:	Integral
Manufacture of Antenna:	SUSAN
Antenna Gain:	1dBi
Antenna Model:	N/A

#### **General Operation of EUT**

The Equipment Under Test (EUT) is a BLUETOOTH Wireless Speaker System operated at 2.4 GHz ISM band. NFC is a passive receiver only.

Remark: All modes have been tested ,only the worse case results were recorded in report.

#### **FHSS Operation Principle:**

This module is controlled by microchip to generate Pseudorandom Frequency Hopping Sequence, this module support 79 hopping channels. Refer to section 4.5 of this report to have more detail of Pseudorandom Hopping Algorithm.

### **1.4 Related Submittal(s) Grants**

This is a signal application subjected to Certificate Authorization.

**2.0     Technical Details****2.1     Investigations Requested**

Perform ElectroMagnetic Interference measurement in accordance with FCC 47CFR [Codes of Federal Regulations] Part 15: 2009 and ANSI C63.4: 2003 for FCC Verification and RSS-210 Issue 8 Annex 1 and RSS-102 Issue 3.

**2.2     Test Standards and Results Summary Tables**

Test Condition	Test Requirement	Test Result	
		Pass	N/A
Number of Frequency Hopping	Section 15.247 ( a1 ) RSS-210 Issue 8 Annex 8 (A8.1)	<input checked="" type="checkbox"/>	<input type="checkbox"/>
20dB Bandwidth Measurement	Section 15.247 ( a1 ) RSS-210 Issue 8 Annex 8 (A8.1)	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Hopping Channel Carrier Frequency Separation	Section 15.247 ( a1 ) RSS-210 Issue 8 Annex 8 (A8.1)	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Average Time of Occupancy	Section 15.247 ( a1 ) RSS-210 Issue 8 Annex 8 (A8.1)	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Pseudorandom Hopping Algorithm	Section 15.247 ( a1 ) RSS-210 Issue 8 Annex 8 (A8.1)	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Band Edge Measurement	Section 15.247 RSS-210 Issue 8 Annex 8	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Maximum Output Power	Section 15.247 ( b1 ) RSS-210 Issue 8 Annex 8 (A8.4)	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Out of Band Emission	Section 15.247 ( d ) RSS-210 Issue 8 Annex 8 (A8.5)	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Radiated Emission in Restricted Band	Section 15.247 ( d ) RSS-210 Issue 8 Annex 8 (A8.5)	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Conducted Emission on AC Mains	Section 15.207 RSS-Gen Issue 4 section 7.2.4	<input checked="" type="checkbox"/>	<input type="checkbox"/>
RF Exposure	Section 15.247 ( i ) RSS-102 Issue 3 section 2.5.2	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Antenna Requirement	Section 15.203	<input checked="" type="checkbox"/> See note 1	<input type="checkbox"/>

Note 1 : The EUT uses a permanently attached antenna, which in accordance to Section 15.203, is considered sufficient to comply with the provisions of this section.

Remark: N/A - Not Applicable

### **3.0 Test Methodology**

#### **3.1 Radiated Emission**

The sample was placed 0.8m above the ground plane on a standard emission test site \*. Measurements in both horizontal and vertical polarities were performed. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, rotating turntable, varying antenna height from 1m to 4m in both horizontal and vertical polarizations. The emissions worst-case are shown in Test Results of the following pages.

\*On a standard emission test site with a metal ground plane filed with the FCC pursuant to section 2.948 of the FCC rules, with Registration Number: 600491

#### **3.2 Field Strength Calculation**

The field strength at 3 m was established by adding the meter reading of the spectrum analyzer to the factors associated with antenna correction factor, cable loss, preamplifiers and filter attenuation.

The equation is expressed as follow:

$$FS = R + \text{System Factor}$$
$$\text{System Factor} = AF + CF + FA - PA$$

Where FS = Net Field Strength in dBuV/m at 3 meters.

R = Reading of Spectrum Analyzer / Test Receiver in dBuV.

AF = Antenna Factor in dB.

CF = Cable Attenuation Factor in dB.

FA = Filter Attenuation Factor in dB.

PA = Preamplifier Factor in dB.

FA and PA are only be used for the measuring frequency above 1 GHz.

#### **3.3 Conducted Emissions**

The test was performed in accordance with ANSI C63.4: 2003, with the following: initial measurements were performed in peak and average detection modes on the live line of personal computer, any emissions recorded within 30dB of the relevant limit lines were re-measured using quasi-peak and average detection on the live and neutral lines with the worst case recorded in the table of results.

#### 4.0 Test Results

##### 4.1 Number of Hopping Frequency

Test Requirement:	FCC part 15 section 15.247 (a1)(iii)& RSS-210 Issue 8 Annex 8 (A8.1d)
Test Date:	2014-03-22
Mode of Operation:	Transmitting mode.
Detector Function:	Max Hold

**Result: PASS**

##### Measured Result :

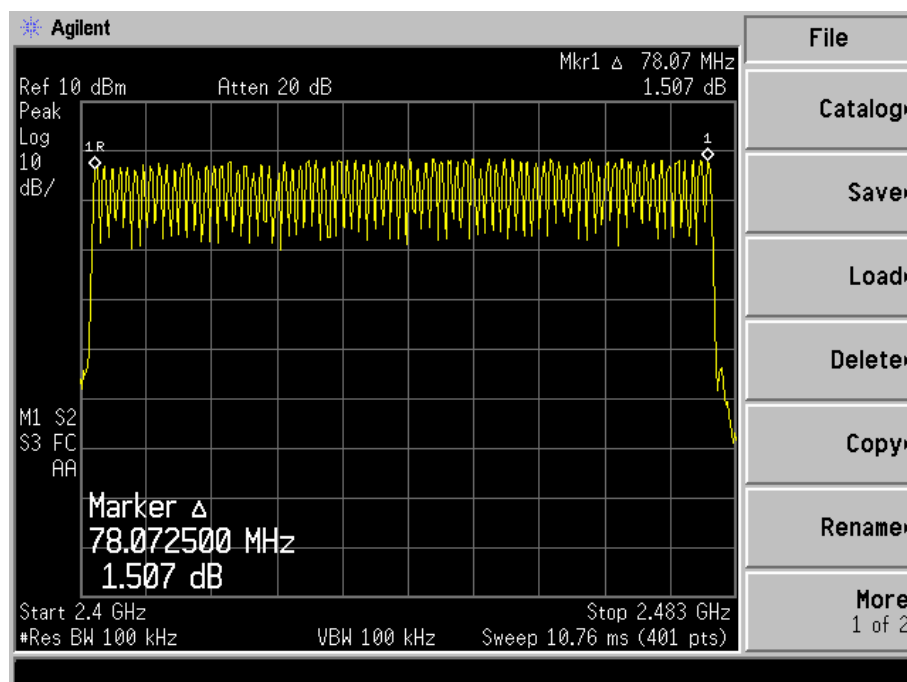
Operating Channel Frequency in sequence (MHz): 79 Channels

2402 ; 2403 ; 2404 ; 2405 ; 2406 ; 2407 ; 2408 ; 2409 ; 2410 ; 2411 ; 2412 ; 2413 ; 2414 ; 2415 ;  
2416 ; 2417 ; 2418 ; 2419 ; 2420 ; 2421 ; 2422 ; 2423 ; 2424 ; 2425 ; 2426 ; 2427 ; 2428 ; 2429 ;  
2430 ; 2431 ; 2432 ; 2433 ; 2434 ; 2435 ; 2436 ; 2437 ; 2438 ; 2439 ; 2440 ; 2441 ; 2442 ; 2443 ;  
2444 ; 2445 ; 2446 ; 2447 ; 2448 ; 2449 ; 2450 ; 2451 ; 2452 ; 2453 ; 2454 ; 2455 ; 2456 ; 2457 ;  
2458 ; 2459 ; 2460 ; 2461 ; 2462 ; 2463 ; 2464 ; 2465 ; 2466 ; 2467 ; 2468 ; 2469 ; 2470 ; 2471 ;  
2472 ; 2473 ; 2474 ; 2475 ; 2476 ; 2477 ; 2478 ; 2479 ; 2480

##### Limit for Number of Hopping Channel [ Section 15.247 (a1)(iii) ]

At least 15 non-overlapping channels for 2400-2483.5MHz.

Result data graph shows the number of operation channels:



#### 4.2 20dB and 99% Bandwidth Measurement

Test Requirement: FCC part 15 section 15.247 (a1)& RSS-210 Issue 8 Annex 8 (A8.1b)  
 Test Date: 2014-03-22  
 Mode of Operation: Transmitting mode.  
 Detector Function: Max Hold

#### Test Setup:

The bandwidth is measured at an amplitude level reduced from the reference level by a specified ratio. The reference level is the level of the highest amplitude signal observed from the transmitter at the fundamental frequency. Once the reference level is established, the equipment is conditioned with typical modulating signal to produce the worst-case (i.e. the widest) bandwidth.

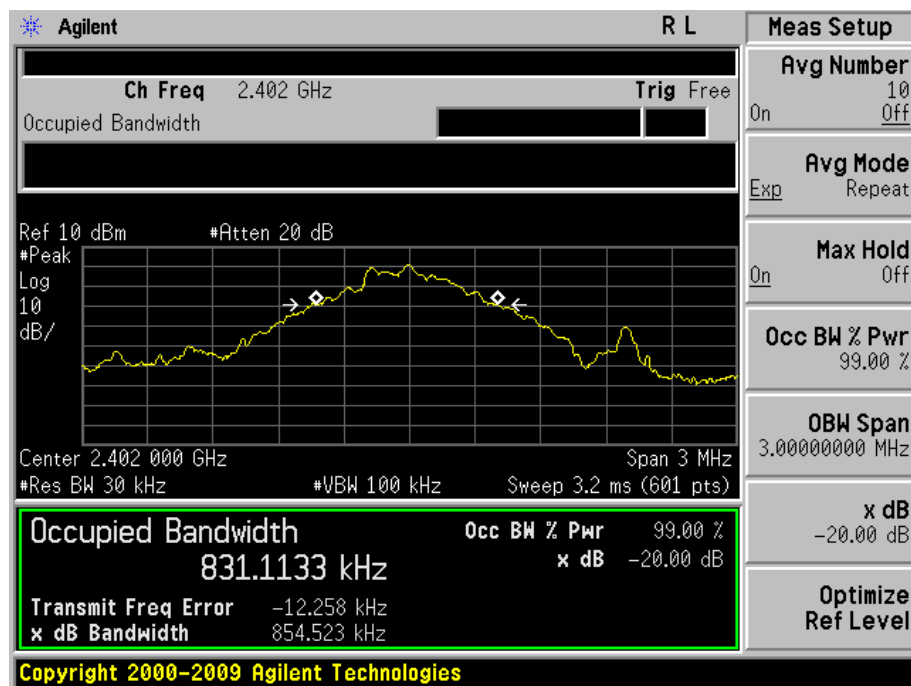
Channel	20 dB Bandwidth kHz	99% Bandwidth kHz
Lowest	855	831
Middle	838	823
Highest	838	825

This result is used for checking the hopping channel carrier frequencies separation.

#### 20dB and 99% Bandwidth

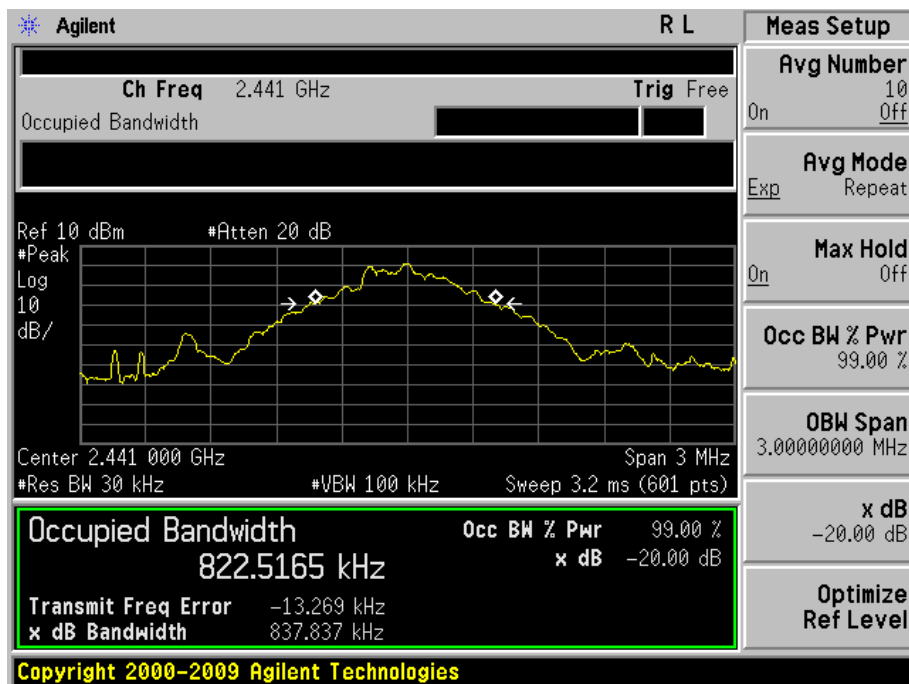
DH5 Mode

CH Low:

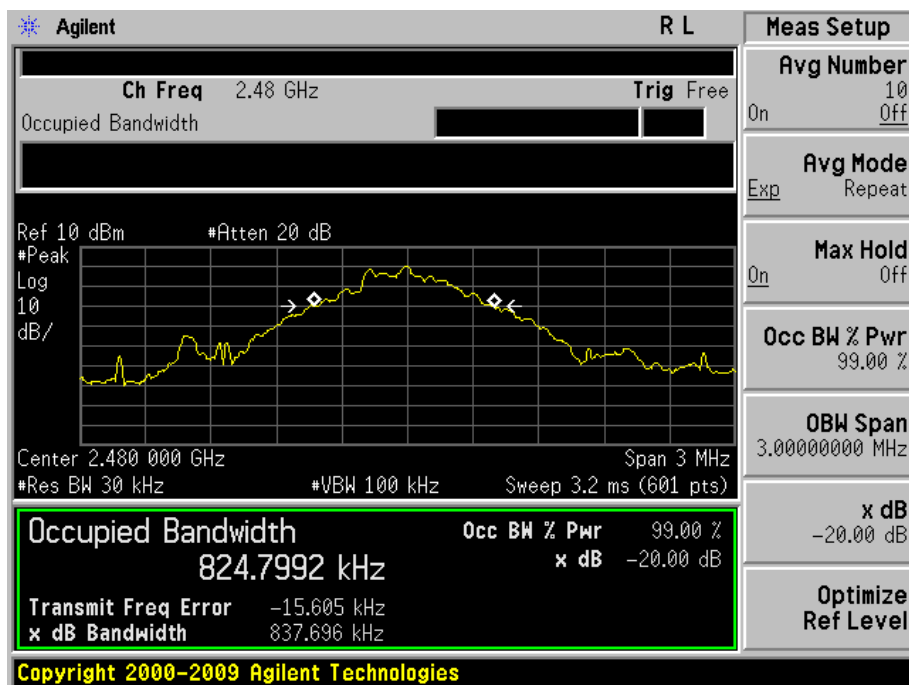




CH Mid:



CH High:



#### 4.3 Hopping Channel Carrier Frequency Separation

Test Requirement:	FCC part 15 section 15.247 (a1)& RSS-210 Issue 8 Annex 8 (A8.1b)
Test Date:	2014-03-23
Mode of Operation:	Transmitting mode.
Detector Function:	Max Hold

**Result: PASS**

##### Measured Result :

The frequency separation between two adjacent channels is 1 MHz, the requirement of channel separated by a two-third of the 20dB bandwidth of the hopping channel is applied.

According to the test result shown in section 4.2, the maximum 20dB bandwidth is 838 kHz, so the hopping channel separation of this EUT is found to comply with the requirement.

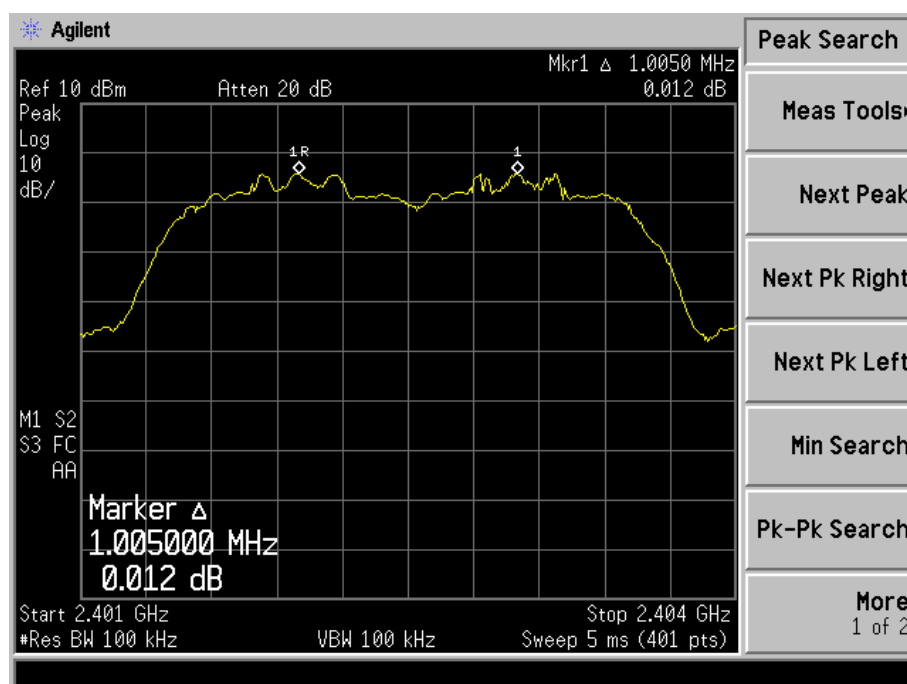
##### Limits for Hopping Channel Separation [ Section 15.247 (a1) ] &[ Annex 8.1 (b) ]::

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25kHz or the 20dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5MHz band may have hopping channel carrier frequencies that are separated by 25KHz or two-thirds of the 20dB bandwidth of the hopping channel, whichever is greater.

**Figure 5 – Result data graph shows the channel separation:**

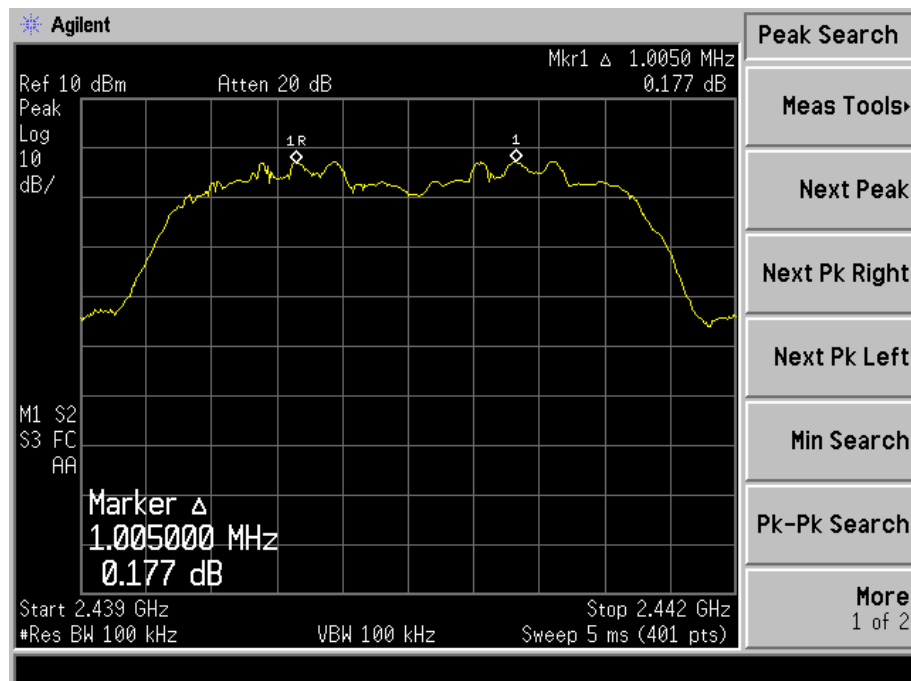
Test mode: 3DH5

Channel Spacing (Low CH=1MHz)

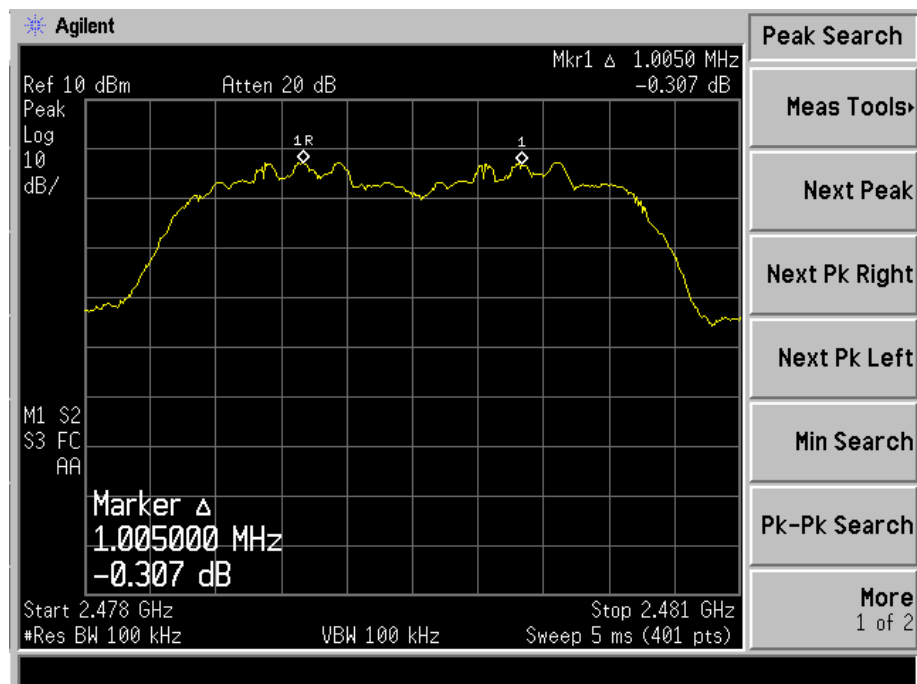


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Channel Spacing (Middle CH=1MHz)



Channel Spacing (High CH=1MHz)



**4.4 Average Time of Channel Occupancy**

Test Requirement:	FCC part 15 section 15.247 (a1)(iii) RSS-210 Issue 8 Annex 8 (A8.1d)
Test Date:	2014-03-22
Mode of Operation:	Transmitting mode.
Detector Function:	Zero span, Sweep time 1s

**Result : PASS**

**Measured Result :**

79 channels will be used.

The test period:  $T = 0.4 \text{ Second} \times 79 \text{ Channel} = 31.6 \text{ s}$

Dwell time = time slot length  $\times$  (Hopping rate / Number of hopping channels)  $\times$  Period

DH1 dwell time =  $0.420 \text{ (ms)} \times (1600/(2 \times 79)) \times 31.6 = 134 \text{ ms}$

DH3 dwell time =  $1.687 \text{ (ms)} \times (1600/(4 \times 79)) \times 31.6 = 270 \text{ ms}$

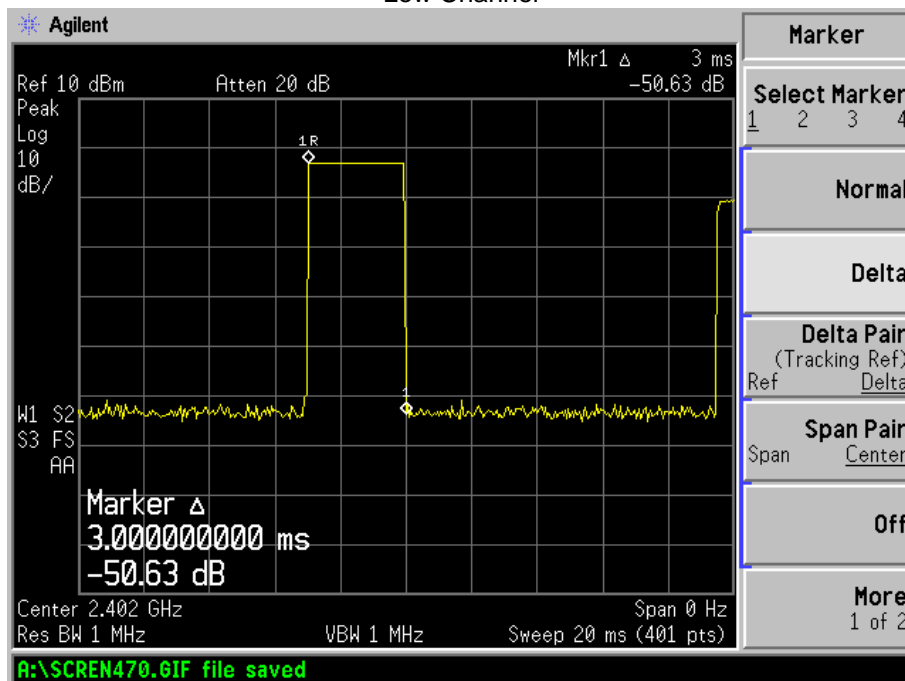
DH5 dwell time =  $3.000 \text{ (ms)} \times (1600/(6 \times 79)) \times 31.6 = 320 \text{ ms}$

Only the worst case test data exhibited below (the packet length of DH5 mode).

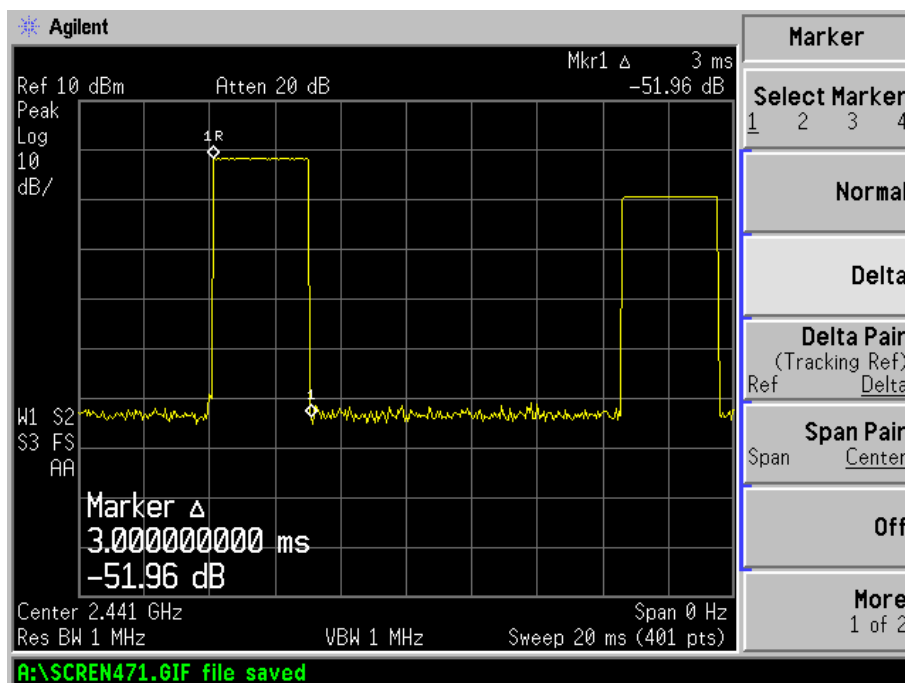
**Limits for Average Time of Occupancy [ Section 15.247 (a1)(iii) ] & [ Annex 8.1 (d) ]:**

The average time of occupancy on any channel shall not be greater than 0.4 second within a period of 0.4 seconds multiplied by the number of hopping channels employed.

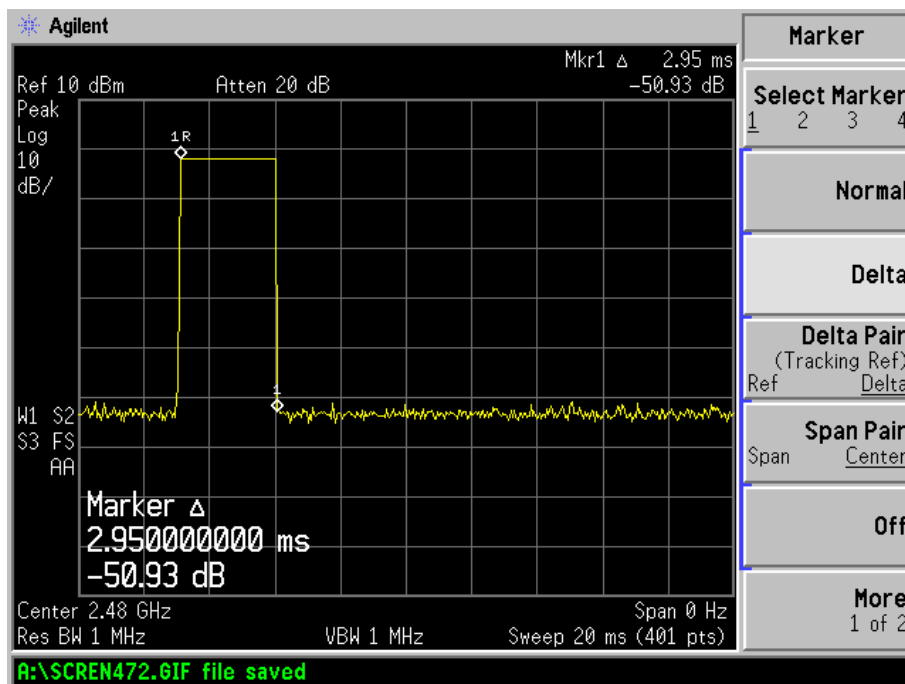
DH5 Mode  
Low Channel



Middle Channel



High Channel



#### **4.5 Pseudorandom Hopping Algorithm**

##### **Pseudorandom Frequency Hopping**

The EUT use Bluetooth technology version 3.0, which shall fulfill below requirements;

##### **Requirement for Pseudorandom Hopping Algorithm [Section 15.247 (a1) ]& [ Annex 8.1 ]::**

The channel frequencies shall be selected from a pseudorandom ordered list of hopping frequencies. Each frequency must be used equally on average by the transmitter.

#### 4.6 Band Edge Measurement

Test Requirement:	FCC part 15 section 15.247 & RSS-210 Issue 8 Annex 8
Test Date:	2014-03-23
Mode of Operation:	Transmitting mode.
Detector Function:	Max Hold

**Result: PASS**

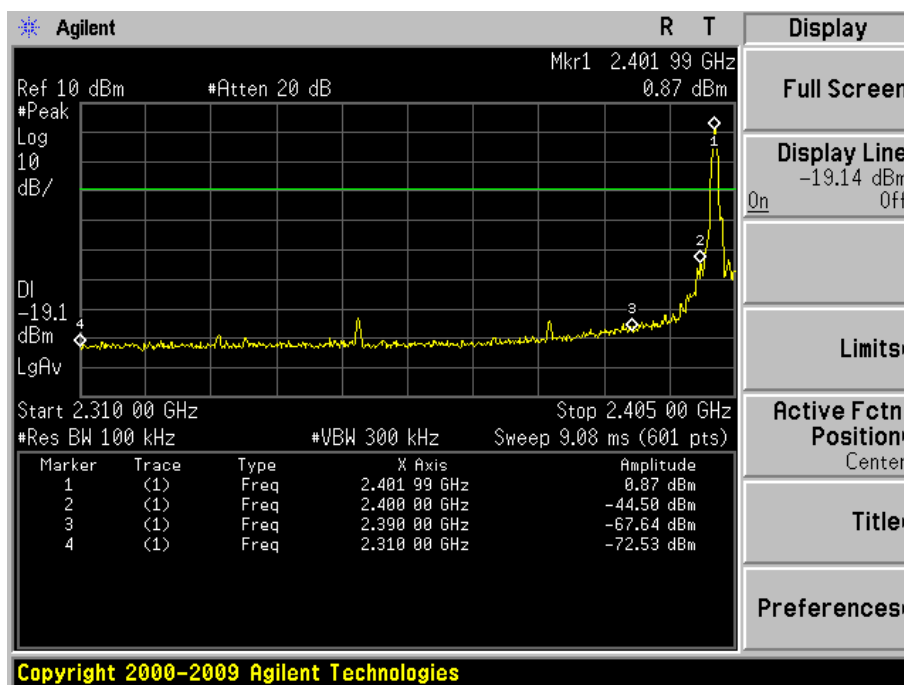
#### Measured Result :

Refer to the following diagram it shows the frequency of lower band edge and upper band edge

#### Limits of Band Edge for Carrier Frequencies Operated within the Bands [ Section 15.247 ]:

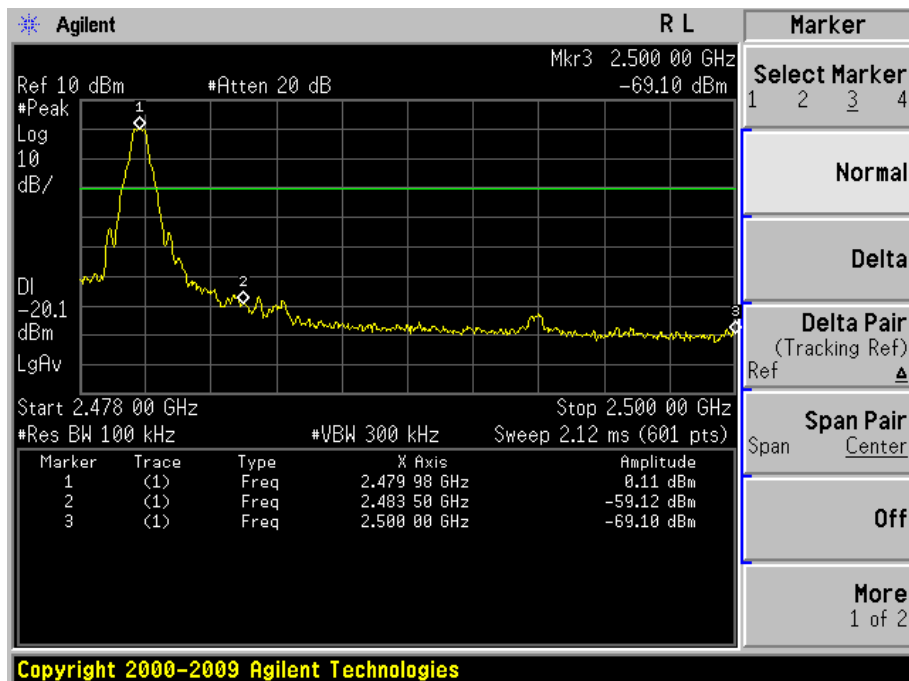
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power.

Result data graph shows the frequency of lower band edge:





Result data graph shows the frequency of upper band edge



**4.7 Maximum Output Power**

Test Requirement:	FCC part 15 section 15.247 (a1)& RSS-210 Issue 8 Annex 8 (A8.4)
Test Method:	ANSI C63.4:2003& RSS-Gen Issue 4 section 4.8
Test Date:	2014-03-23
Mode of Operation:	Transmitting mode.
Detector Function:	Peak
Measurement BW:	RBW 1MHz ; VBW 1MHz

**Test Setup:**

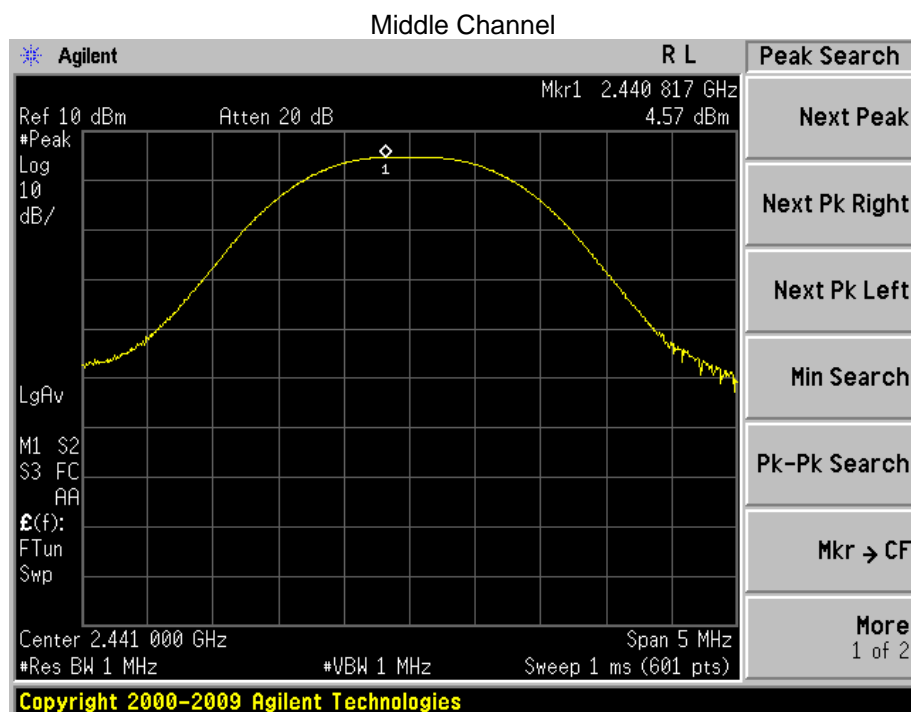
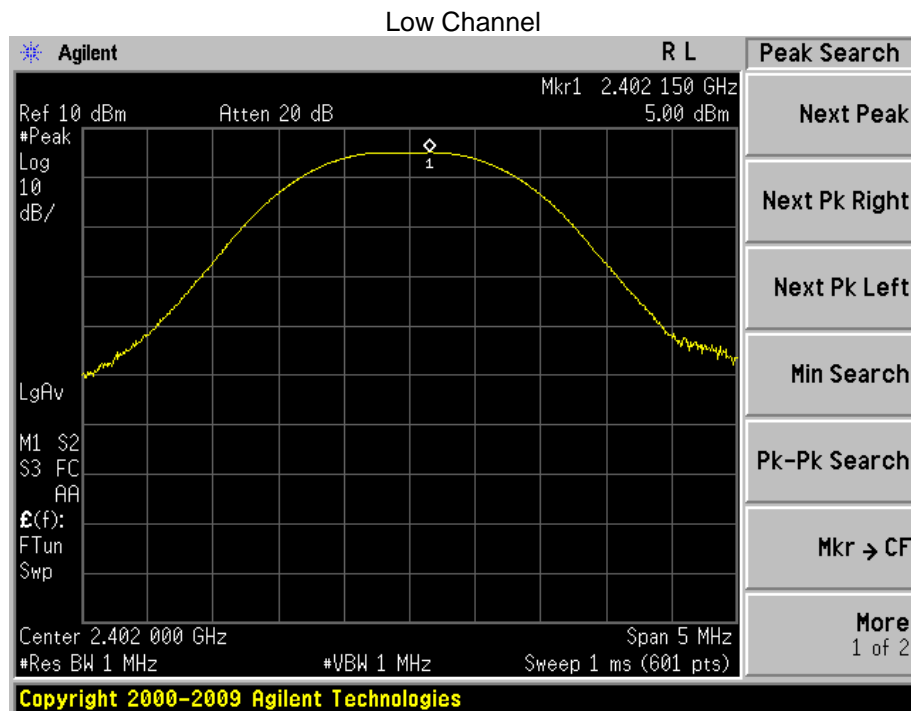
Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer. All the trace to stabilize, use the marker-to-peak function to set the marker to the peak of the emission, the indicated level is the peak output power (the external attenuation and cable loss shall be considered).

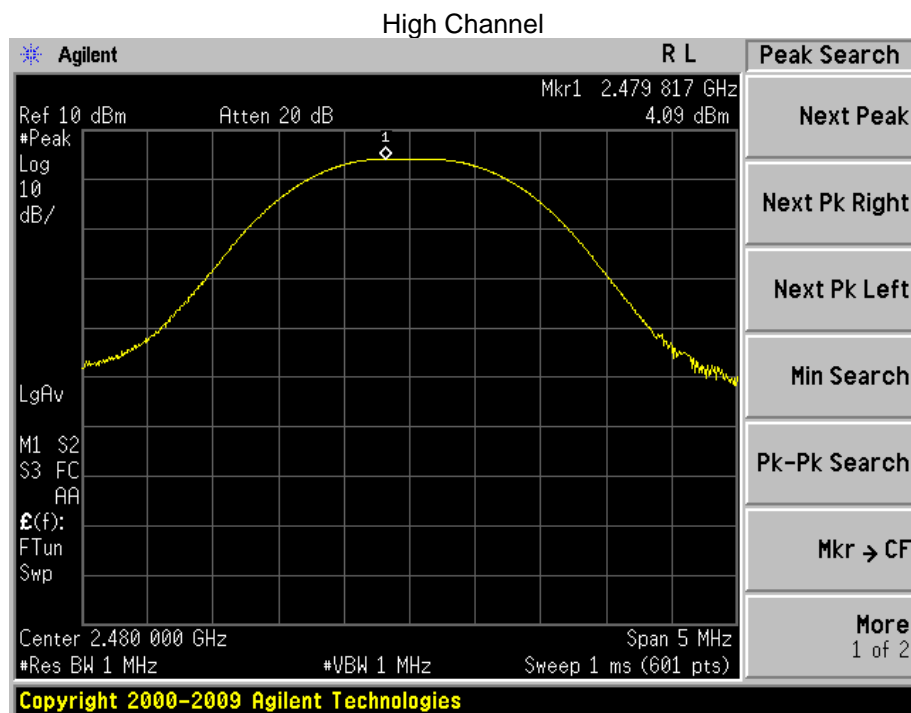
Channel	Frequency MHz	Measured Value dBm	Output Power mW	Limit mW
Low Channel	2402	5.00	3.16	125
Middle Channel	2441	4.57	2.86	125
High Channel	2480	4.09	2.56	125

**Result : PASS**

**Limits for Maximum Output Power [ Section 15.247 (a1)(iii) ]& [Annex 8.4 ]::**

For frequency hopping systems employing at least 75 hopping channels: 1 Watt  
For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 Watts

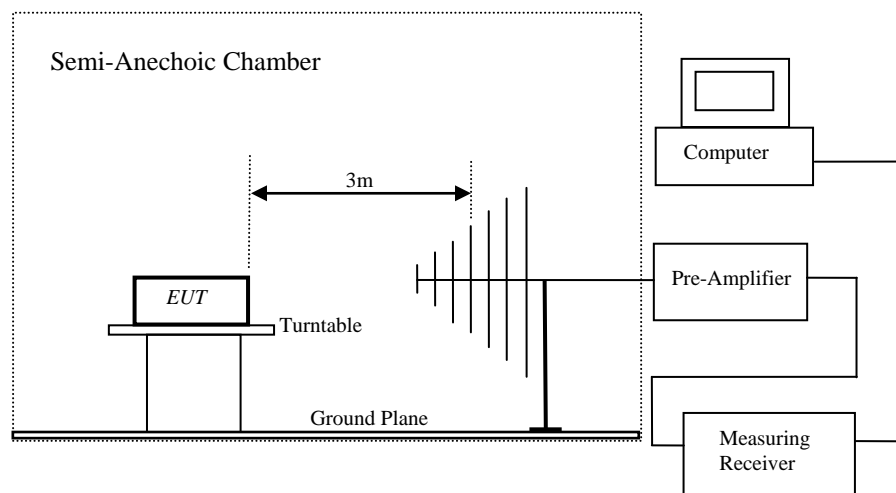




#### 4.8 Out of Band Emissions and Emissions in Restricted Bands

Test Requirement:	FCC part 15 section 15.247 (d )
Test Method:	ANSI C63.4:2003
Test Date:	2014-03-23
Mode of Operation:	Transmitting mode.
Detector Function:	Peak, AV
Measurement BW:	RBW 1MHz,VBW 3MHz Peak detector for PK value and RBW 1MHz ; VBW 10Hz Peak detector for AV value

#### Test Setup:



**Result : PASS**

**Out of Frequency Band Emissions:**

For out of band emissions that are close to or exceed 20dB attenuation requirement, and emission falls into restricted band, radiated emission was performed in order to show compliance with the general radiated emission requirement.

**Result Summary:**

Refer to Figure 10 to 11 for the emission data graph, result shows that the significant emissions detected are with more than 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power.

**Limits for Out of Frequency Band Emission [ Section 15.247 (d) ]:**

In any 100kHz 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 100kHz bandwidth within the band that contains the highest level of the desired power. Attenuation below the general limits specified in Section 15.209(a) is not required.

**Limit for Radiated Emission Falling in Restricted Bands [ Section 15.209 ]:**

Frequency (MHz)	Field Strength [ $\mu\text{V/m}$ ]	Field Strength [dB $\mu\text{V/m}$ ]
30-88	100	40.0
88-216	150	43.5
216-960	200	46.0
Above 960	500	54.0

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.

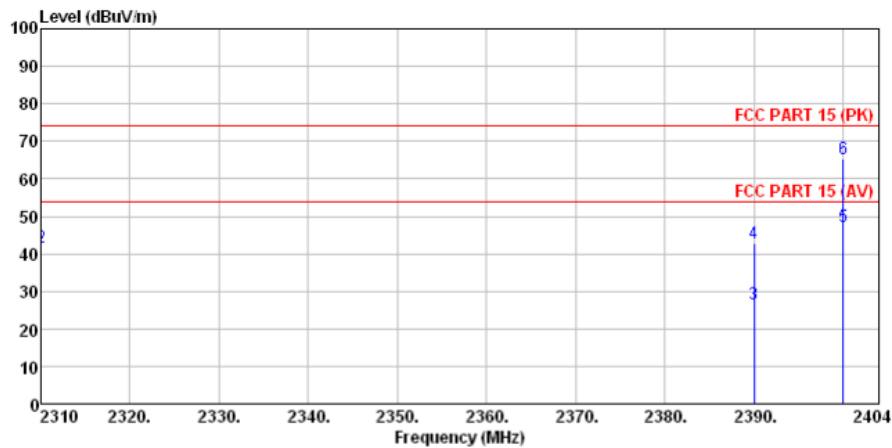
The emission limits shown in the above table are based on measurement employing a CISPR quasi-peak detector and above 1000MHz are based on measurements employing an average detector.

**Result : PASS**

**All Emission and Emissions Fall into Restricted Band were recorded as below:**

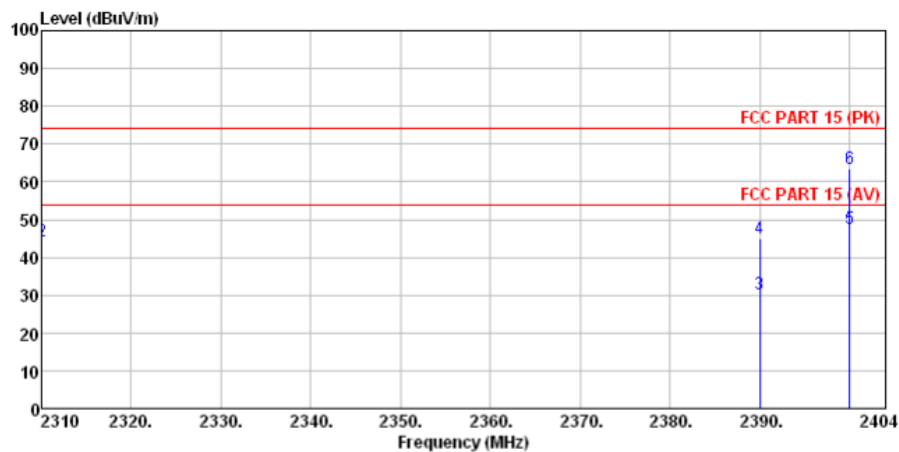
## Report No.: 68.870.13.180.01F

For 2402 MHz Channel



Site : 3m chamber  
Condition : FCC PART 15 (PK) 3m BBHA9120D ANT(>1GHZ) VERTICAL  
Job No. :  
Test Mode : Band Edge  
Test Engineer: Yang  
Remark : GFSK 2402

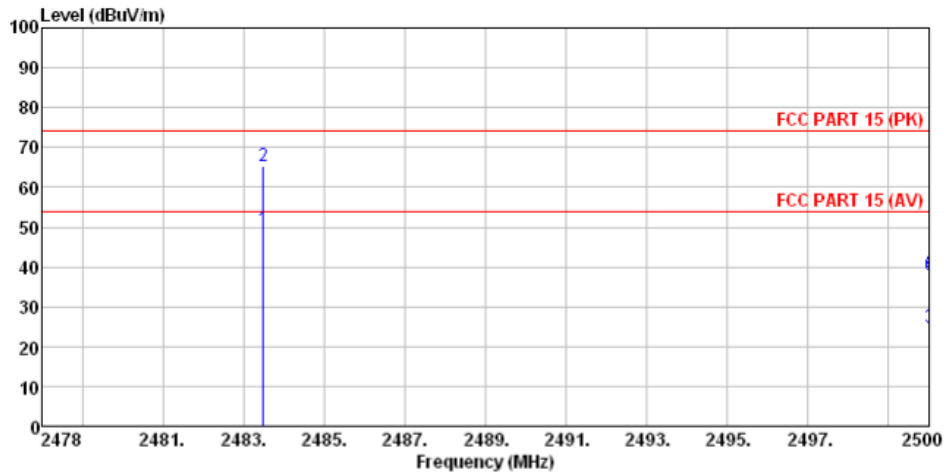
Mark	RedAntenna			Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	Freq	Level	Factor						
	MHz	dBuV	dB/m						
1	2310.000	29.13	27.91	5.30	34.11	28.23	54.00	-25.77	Average
2	2310.000	42.52	27.91	5.30	34.11	41.62	74.00	-32.38	Peak
3	2390.000	27.54	27.59	5.38	34.01	26.50	54.00	-27.50	Average
4	2390.000	43.88	27.59	5.38	34.01	42.84	74.00	-31.16	Peak
5	2400.000	48.45	27.58	5.39	34.01	47.41	54.00	-6.59	Average
6	2400.000	66.28	27.58	5.39	34.01	65.24	74.00	-8.76	Peak



Site : 3m chamber  
Condition : FCC PART 15 (PK) 3m BBHA9120D ANT(>1GHZ) HORIZONTAL  
Job No. :  
Test Mode : Band Edge  
Test Engineer: Yang  
Remark : GFSK 2402

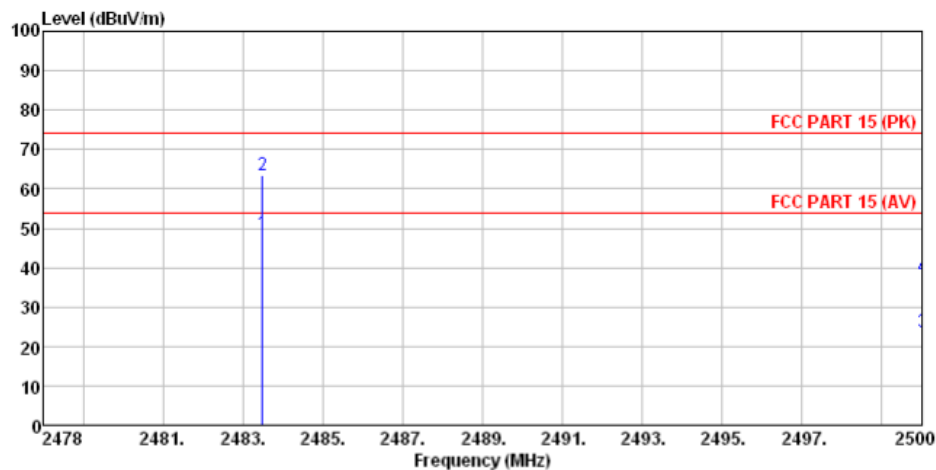
Remark	ReadAntenna		Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	Freq	Level Factor						
	MHz	dBuV dB/m						
1	2310.000	32.57	27.91	5.30	34.11	31.67	54.00	-22.33 Average
2	2310.000	45.36	27.91	5.30	34.11	44.46	74.00	-29.54 Peak
3	2390.000	31.46	27.59	5.38	34.01	30.42	54.00	-23.58 Average
4	2390.000	45.99	27.59	5.38	34.01	44.95	74.00	-29.05 Peak
5	2400.000	48.46	27.58	5.39	34.01	47.42	54.00	-6.58 Average
6	2400.000	64.69	27.58	5.39	34.01	63.65	74.00	-10.35 Peak

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Site : 3m chamber  
Condition : FCC PART 15 (PK) 3m BBHA9120D ANT(>1GHZ) HORIZONTAL  
Job No. :  
Test Mode : Band Edge  
Test Engineer: Yang  
Remark : GFSK 2480

	Freq	ReadAntenna	Cable Preamp	Limit	Over	
		Level Factor	Loss Factor	Line	Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m
1	2483.500	50.42	27.53	5.47	33.92	49.50
2	2483.500	66.28	27.53	5.47	33.92	65.36
3	2500.000	25.47	27.55	5.49	33.90	24.61
4	2500.000	39.01	27.55	5.49	33.90	38.15



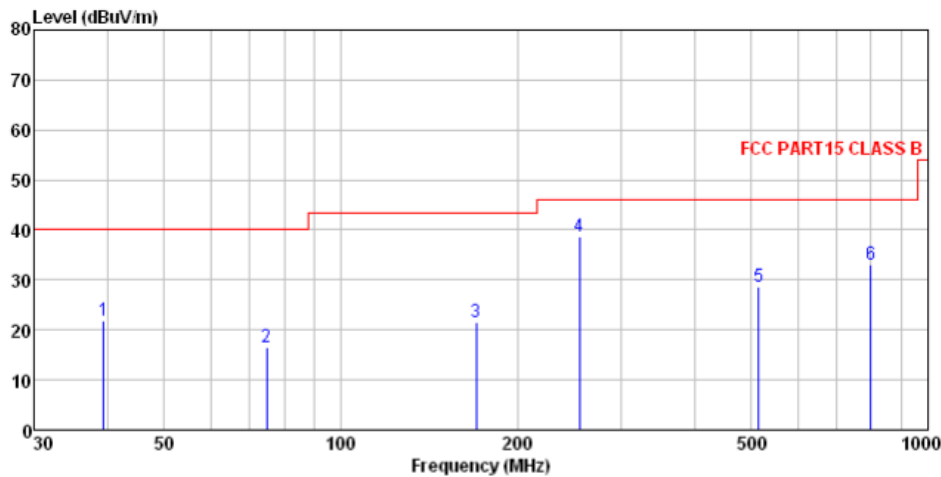
Site : 3m chamber  
Condition : FCC PART 15 (PK) 3m BBHA9120D ANT(>1GHZ) VERTICAL  
Job No. :  
Test Mode : Band Edge  
Test Engineer: Yang  
Remark : GFSK 2480

	Freq	ReadAntenna	Cable Preamp	Limit	Over	
		Level Factor	Loss Factor	Line	Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m
1	2483.500	49.47	27.53	5.47	33.92	48.55
2	2483.500	64.25	27.53	5.47	33.92	63.33
3	2500.000	24.47	27.55	5.49	33.90	23.61
4	2500.000	38.46	27.55	5.49	33.90	37.60



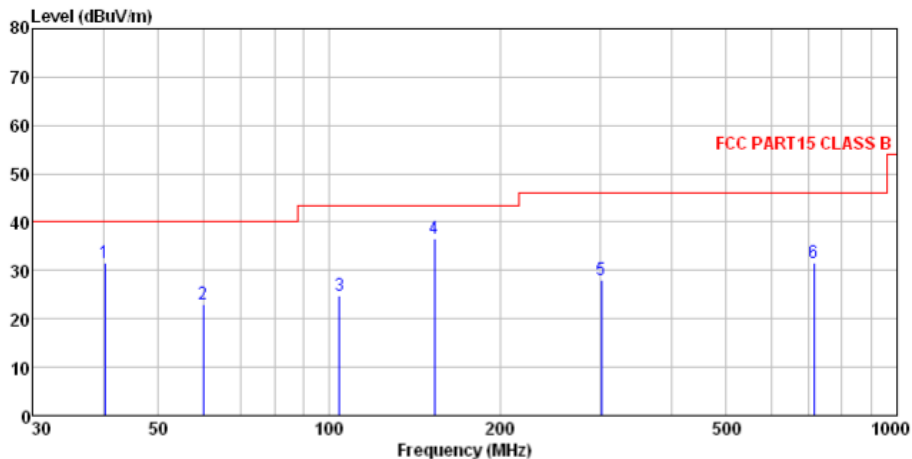
## Report No.: 68.870.13.180.01F

For below 1GHz emissions



Site : 3m chamber  
Condition : FCC PART15 CLASS B 3m VULB9163-2013M HORIZONTAL  
Job NO. :  
Test Mode : TX on mode  
Test Engineer: Sam  
Remark : GFSK 2402

	Freq	ReadAntenna	Cable Preamp	Level	Limit	Over	Remark
	MHz	Level	Loss Factor	dB	Line	Limit	
	MHz	dBuV	dB/m	dB	dBuV/m	dBuV/m	dB
1	39.437	37.76	15.44	0.65	32.06	21.79	40.00 -18.21 QP
2	74.657	37.69	9.80	0.98	31.82	16.65	40.00 -23.35 QP
3	170.195	40.92	10.97	1.69	32.05	21.53	43.50 -21.97 QP
4	254.728	54.56	14.06	2.15	32.16	38.61	46.00 -7.39 QP
5	515.437	37.72	18.89	3.37	31.48	28.50	46.00 -17.50 QP
6	798.980	37.99	22.06	4.45	31.32	33.18	46.00 -12.82 QP

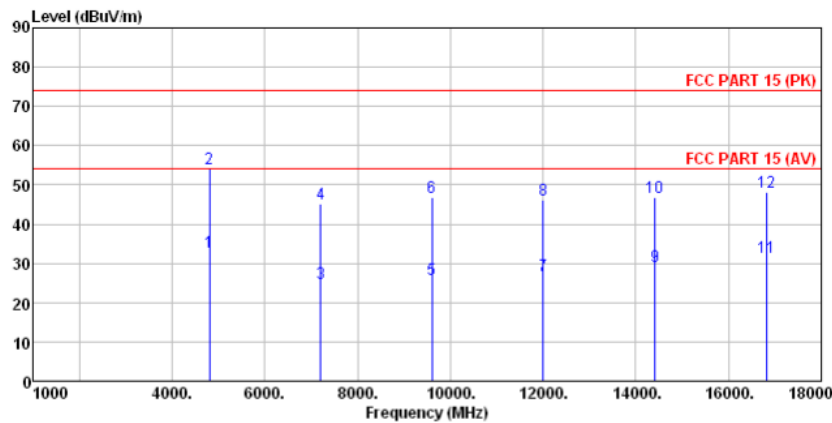


Site : 3m chamber  
Condition : FCC PART15 CLASS B 3m VULB9163-2013M VERTICAL  
Job NO. :  
Test Mode : TX on mode  
Test Engineer: Sam  
Remark : GFSK 2402

	Freq	ReadAntenna	Cable Preamp	Level	Limit	Over	Remark
	MHz	Level	Loss Factor	dB	Line	Limit	
	MHz	dBuV	dB/m	dB	dBuV/m	dBuV/m	dB
1	40.276	47.26	15.58	0.66	32.06	31.44	40.00 -8.56 QP
2	60.069	39.39	14.69	0.86	31.94	23.00	40.00 -17.00 QP
3	104.170	40.68	14.78	1.23	31.78	24.91	43.50 -18.59 QP
4	153.200	56.71	10.39	1.59	31.99	36.70	43.50 -6.80 QP
5	301.422	42.70	15.08	2.37	32.17	27.98	46.00 -18.02 QP
6	714.173	37.72	21.00	4.14	31.21	31.65	46.00 -14.35 QP

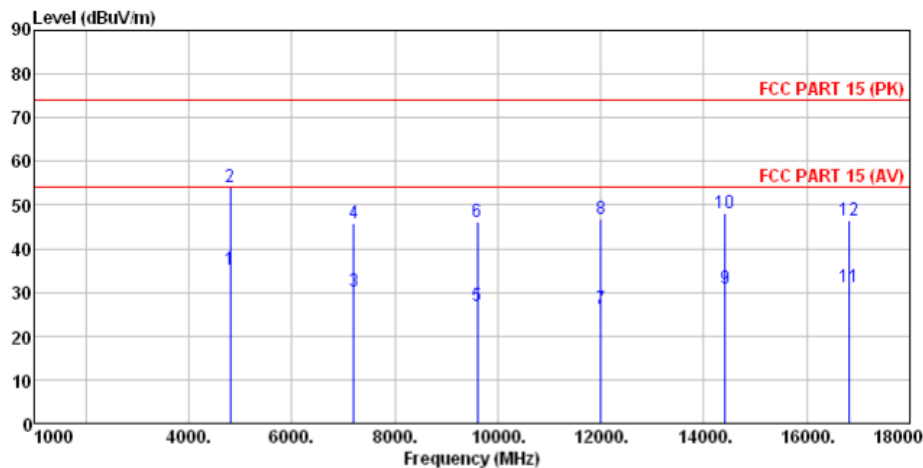
## Report No.: 68.870.13.180.01F

For above 1GHz emissions



Site : 3m chamber  
Condition : FCC PART 15 (PK) 3m BBHA9120D ANT(>1GHZ) VERTICAL  
Job NO. :  
Test Mode : TX on mode  
Test Engineer: Sam  
Remark : GFSK 2402

	Freq	ReadAntenna	Cable Preamp	Limit	Over	
	Level	Factor	Loss	Factor	Line	Limit
	Level					
	MHz	dBuV	dB/m	dB	dB	dBuV/m
1	4804.000	24.65	31.78	8.60	32.09	32.94
2	4804.000	46.00	31.78	8.60	32.09	54.29
3	7206.000	9.09	36.15	11.65	32.00	24.89
4	7206.000	29.45	36.15	11.65	32.00	45.25
5	9608.000	5.47	37.95	14.14	31.62	25.94
6	9608.000	26.46	37.95	14.14	31.62	46.93
7	12010.000	8.14	39.08	15.03	35.51	26.74
8	12010.000	27.46	39.08	15.03	35.51	46.06
9	14412.000	2.95	42.41	17.15	33.34	29.17
10	14412.000	20.66	42.41	17.15	33.34	46.88
11	16814.000	4.88	41.78	18.77	33.82	31.61
12	16814.000	21.56	41.78	18.77	33.82	48.29

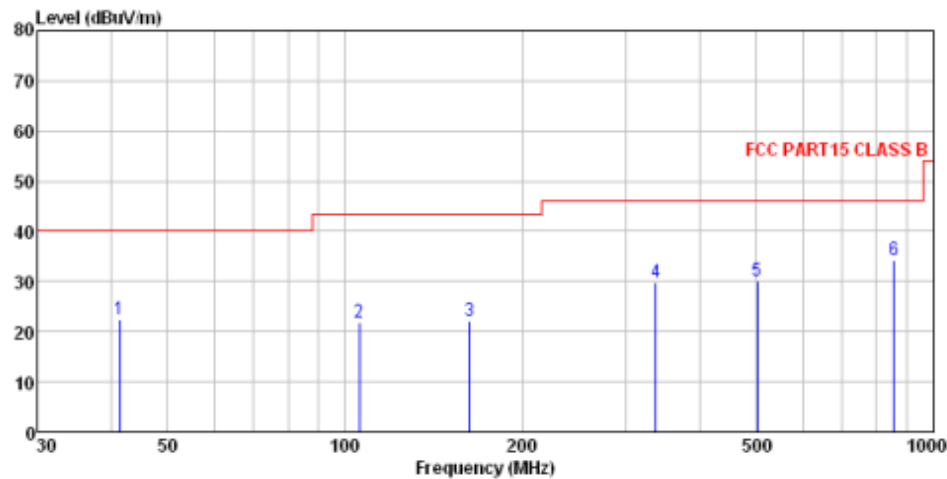


Site : 3m chamber  
Condition : FCC PART 15 (PK) 3m BBHA9120D ANT(>1GHZ) HORIZONTAL  
Job NO. :  
Test Mode : TX on mode  
Test Engineer: Sam  
Remark : GFSK 2402

	Freq	ReadAntenna	Cable Preamp	Limit	Over	
	Level	Factor	Loss	Factor	Line	Limit
	Level					
	MHz	dBuV	dB/m	dB	dB	dBuV/m
1	4804.314	26.87	31.78	8.60	32.09	35.16
2	4804.314	46.00	31.78	8.60	32.09	54.29
3	7206.000	14.46	36.15	11.65	32.00	30.26
4	7206.000	30.13	36.15	11.65	32.00	45.93
5	9608.000	6.47	37.95	14.14	31.62	26.94
6	9608.000	25.60	37.95	14.14	31.62	46.07
7	12010.000	7.80	39.08	15.03	35.51	26.40
8	12010.000	28.13	39.08	15.03	35.51	46.73
9	14412.000	4.62	42.41	17.15	33.34	30.84
10	14412.000	21.89	42.41	17.15	33.34	48.11
11	16814.000	4.60	41.78	18.77	33.82	31.33
12	16814.000	19.80	41.78	18.77	33.82	46.53

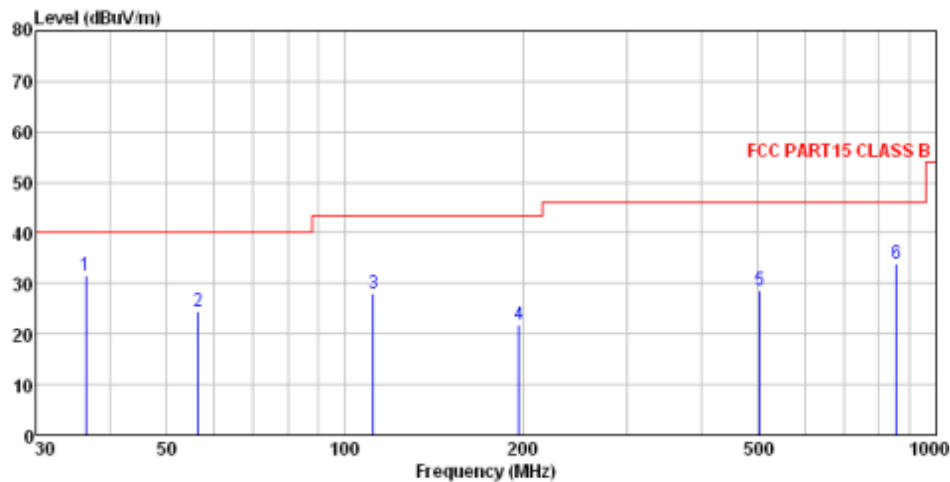
## Report No.: 68.870.13.180.01F

For 2441 MHz Channel



Site : 3m chamber  
Condition : FCC PART15 CLASS B 3m VULB9163-2013M HORIZONTAL  
Job NO. :  
Test Mode : TX on node  
Test Engineer: Sam  
Remark : GFSK 2441

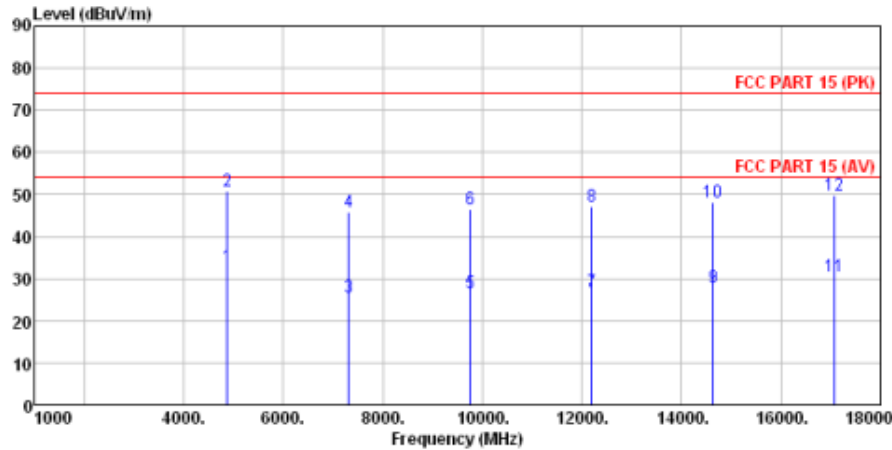
	Freq	ReadAntenna	Cable Preamp	Limit	Over	
	MHz	Level	Factor	Loss	Factor	Level
	MHz	dBuV	dB/m	dB	dB	dBuV/m
1	41.422	38.20	15.57	0.68	32.04	22.41
2	105.642	37.86	14.63	1.24	31.79	21.94
3	162.611	41.72	10.74	1.65	32.03	22.08
4	337.216	43.14	16.05	2.56	32.06	29.69
5	501.179	39.63	18.63	3.31	31.56	30.01
6	857.025	38.07	22.64	4.68	31.24	34.15



Site : 3m chamber  
Condition : FCC PART15 CLASS B 3m VULB9163-2013M VERTICAL  
Job NO. :  
Test Mode : TX on node  
Test Engineer: Sam  
Remark : GFSK 2441

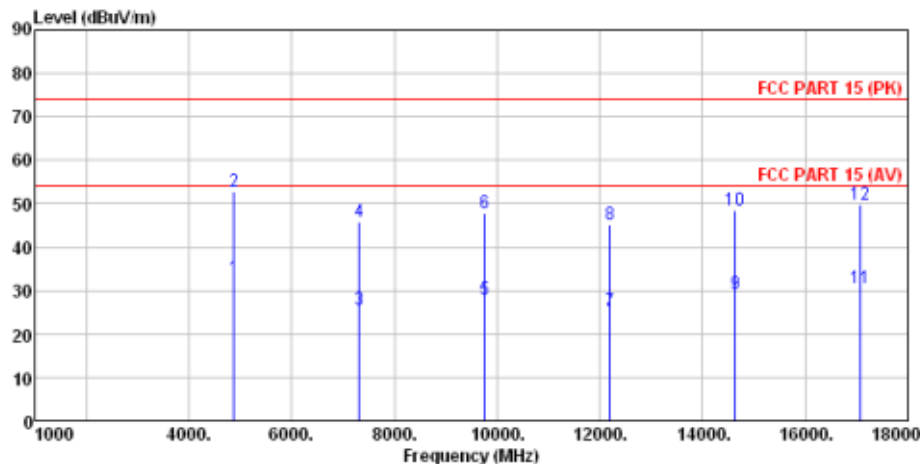
	Freq	ReadAntenna	Cable Preamp	Limit	Over	
	MHz	Level	Factor	Loss	Factor	Level
	MHz	dBuV	dB/m	dB	dB	dBuV/m
1	36.509	48.24	14.73	0.62	32.06	31.53
2	56.395	40.56	14.93	0.83	31.95	24.37
3	111.738	44.66	13.94	1.29	31.82	28.07
4	197.200	39.68	12.57	1.82	32.13	21.94
5	502.940	38.20	18.63	3.32	31.54	28.61
6	857.025	37.83	22.64	4.68	31.24	33.91

# Report No.: 68.870.13.180.01F



Site : 3m chamber  
Condition : FCC PART 15 (PK) 3m BBHA9120D ANT(>1GHZ) VERTICAL  
Job NO. :  
Test Mode : TX on mode  
Test Engineer: Sam  
Remark : GFSK 2441

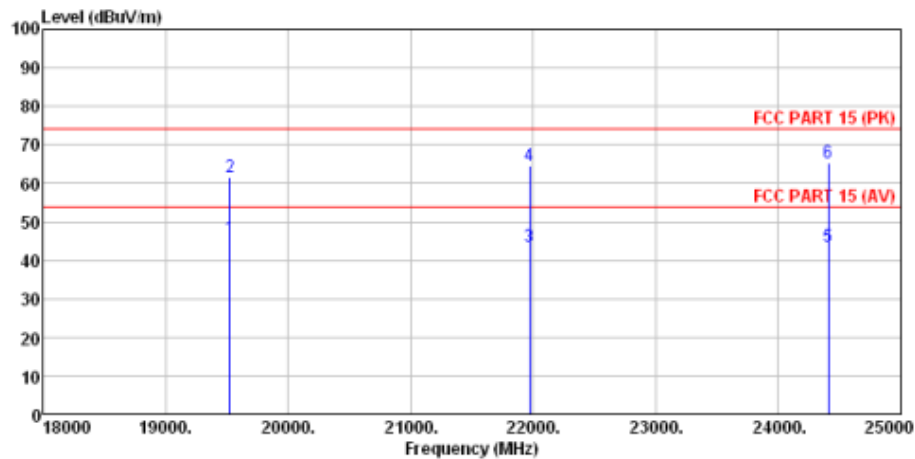
		ReadAntenna		Cable	Preamp		Limit	Over	
	Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	4882.000	24.46	31.85	8.67	32.12	32.86	54.00	-21.14	Average
2	4882.000	42.45	31.85	8.67	32.12	50.85	74.00	-23.15	Peak
3	7323.000	9.43	36.37	11.72	31.89	25.63	54.00	-28.37	Average
4	7323.000	29.46	36.37	11.72	31.89	45.66	74.00	-28.34	Peak
5	9764.000	5.65	38.35	14.25	31.62	26.63	54.00	-27.37	Average
6	9764.000	25.65	38.35	14.25	31.62	46.63	74.00	-27.37	Peak
7	12205.000	8.59	38.92	15.16	35.65	27.02	54.00	-26.98	Average
8	12205.000	28.64	38.92	15.16	35.65	47.07	74.00	-26.93	Peak
9	14646.000	2.64	42.21	17.28	34.39	27.74	54.00	-26.26	Average
10	14646.000	22.98	42.21	17.28	34.39	48.08	74.00	-25.92	Peak
11	17087.000	0.46	44.30	18.99	33.31	30.44	54.00	-23.56	Average
12	17087.000	19.76	44.30	18.99	33.31	49.74	74.00	-24.26	Peak



Site : 3m chamber  
Condition : FCC PART 15 (PK) 3m BBHA9120D ANT(>1GHZ) HORIZONTAL  
Job NO. :  
Test Mode : TX on mode  
Test Engineer: Sam  
Remark : GFSK 2441

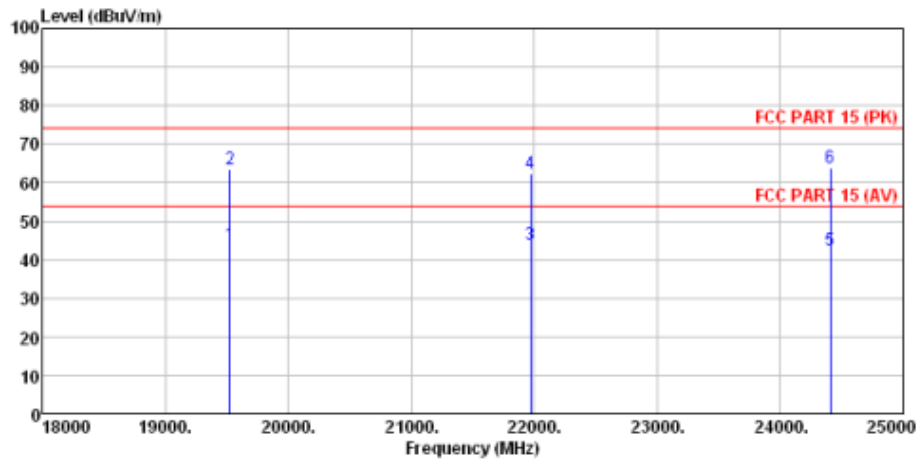
	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	4882.000	24.46	31.85	8.67	32.12	32.86	54.00	-21.14	Average
2	4882.000	44.39	31.85	8.67	32.12	52.79	74.00	-21.21	Peak
3	7323.000	9.47	36.37	11.72	31.89	25.67	54.00	-28.33	Average
4	7323.000	29.68	36.37	11.72	31.89	45.88	74.00	-28.12	Peak
5	9764.000	6.79	38.35	14.25	31.62	27.77	54.00	-26.23	Average
6	9764.000	26.76	38.35	14.25	31.62	47.74	74.00	-26.26	Peak
7	12205.000	6.95	38.92	15.16	35.65	25.38	54.00	-28.62	Average
8	12205.000	26.59	38.92	15.16	35.65	45.02	74.00	-28.98	Peak
9	14646.000	3.98	42.21	17.28	34.39	29.08	54.00	-24.92	Average
10	14646.000	23.46	42.21	17.28	34.39	48.56	74.00	-25.44	Peak
11	17087.000	0.46	44.30	18.99	33.31	30.44	54.00	-23.56	Average
12	17087.000	19.76	44.30	18.99	33.31	49.74	74.00	-24.26	Peak

# Report No.: 68.870.13.180.01F



Site : 3m chamber  
Condition : FCC PART 15 (PK) 3m 18G-25G-V VERTICAL  
Job No. :  
Test mode : IX on node  
Test engineer: Sam  
Remark : GFSK 2441

	Freq	ReadAntenna	Cable Preamp	Level	Limit	Over	
	MHz	Level Factor	Loss Factor	dB	dBuV/m	Limit	Remark
	MHz	dBuV	dB/m	dB	dBuV/m	dB	
1	19528.000	3.55	50.40	18.84	27.20	45.59	54.00 -8.41 Average
2	19528.000	19.55	50.40	18.84	27.20	61.59	74.00 -12.41 Peak
3	21969.000	0.55	51.23	19.24	27.44	43.58	54.00 -10.42 Average
4	21969.000	21.47	51.23	19.24	27.44	64.50	74.00 -9.50 Peak
5	24410.000	-1.51	51.77	20.85	27.75	43.36	54.00 -10.64 Average
6	24410.000	20.33	51.77	20.85	27.75	65.20	74.00 -8.80 Peak

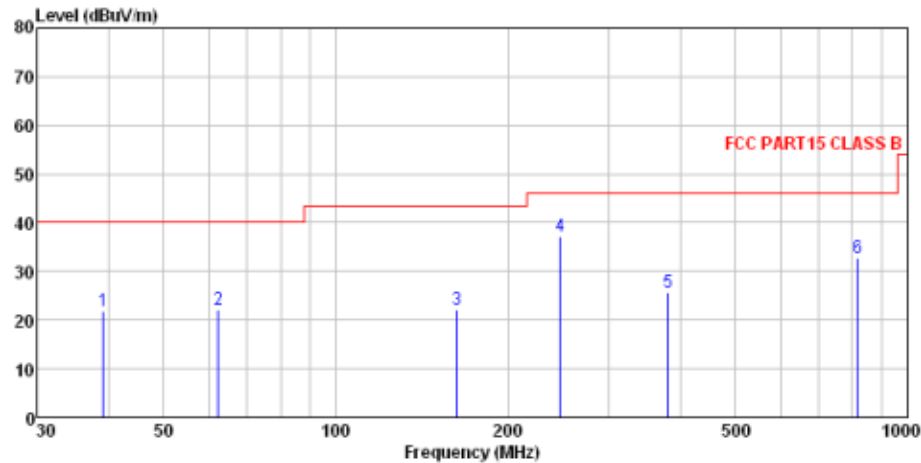


Site : 3m chamber  
Condition : FCC PART 15 (PK) 3m 18G-25G-H HORIZONTAL  
Job No. :  
Test mode : IX on node  
Test engineer: Sam  
Remark : GFSK 2441

	Freq	ReadAntenna	Cable Preamp	Level	Limit	Over	
	MHz	Level Factor	Loss Factor	dB	dBuV/m	Limit	Remark
	MHz	dBuV	dB/m	dB	dBuV/m	dB	
1	19528.000	1.47	50.77	18.84	27.20	43.88	54.00 -10.12 Average
2	19528.000	21.07	50.77	18.84	27.20	63.48	74.00 -10.52 Peak
3	21969.000	1.26	50.68	19.24	27.44	43.74	54.00 -10.26 Average
4	21969.000	19.77	50.68	19.24	27.44	62.25	74.00 -11.75 Peak
5	24410.000	-1.65	50.92	20.85	27.75	42.37	54.00 -11.63 Average
6	24410.000	19.66	50.92	20.85	27.75	63.68	74.00 -10.32 Peak

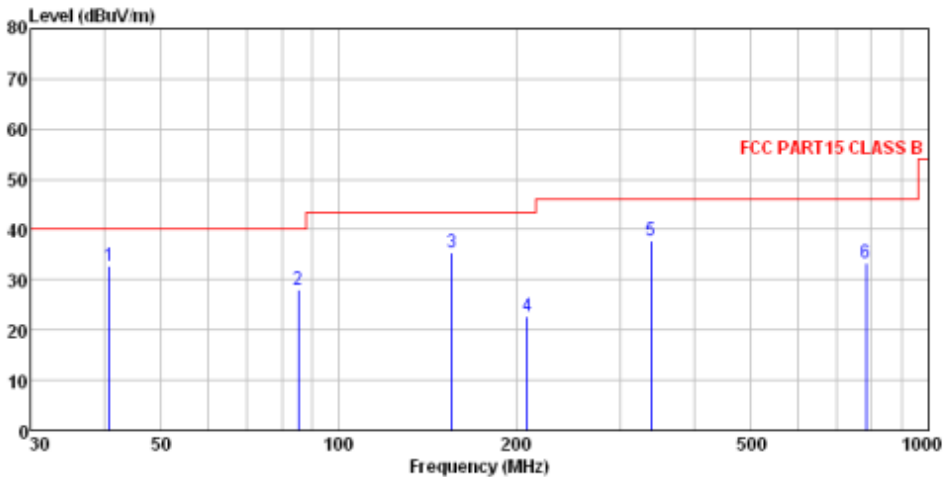
## Report No.: 68.870.13.180.01F

For 2480 MHz Channel



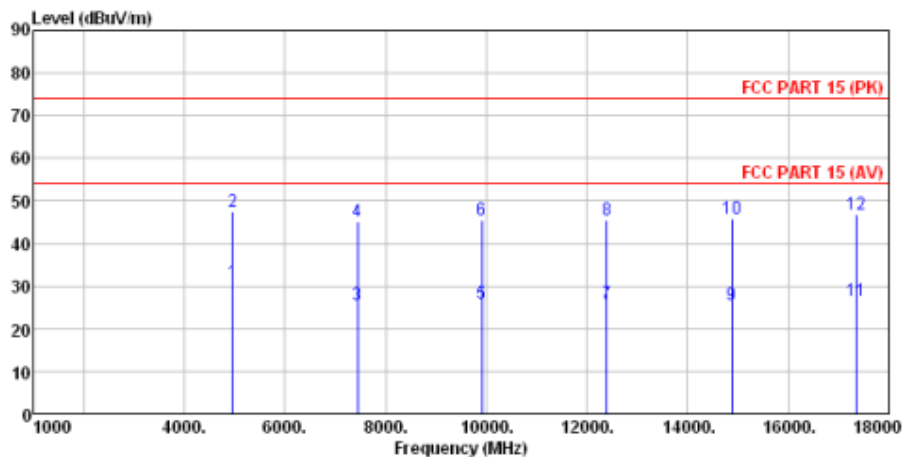
Site : 3m chamber  
Condition : FCC PART15 CLASS B 3m VULB9163-2013M HORIZONTAL  
Job NO. :  
Test Mode : TX on node  
Test Engineer: Sam  
Remark : GFSK 2480

	Freq	ReadAntenna	Cable Preamp	Level	Limit	Over	
	MHz	Level Factor	Loss Factor	dB	dBuV/m	Limit	Remark
	MHz	dBuV	dB/m	dB	dBuV/m	dBuV/m	dB
1	39.162	37.93	15.34	0.65	32.06	21.86	40.00 -18.14 QP
2	62.213	39.33	13.77	0.88	31.93	22.05	40.00 -17.95 QP
3	162.611	41.72	10.74	1.65	32.03	22.08	43.50 -21.42 QP
4	246.815	53.31	14.08	2.11	32.16	37.34	46.00 -8.66 QP
5	381.249	38.33	16.64	2.77	31.94	25.80	46.00 -20.20 QP
6	818.834	37.17	22.24	4.54	31.29	32.66	46.00 -13.34 QP



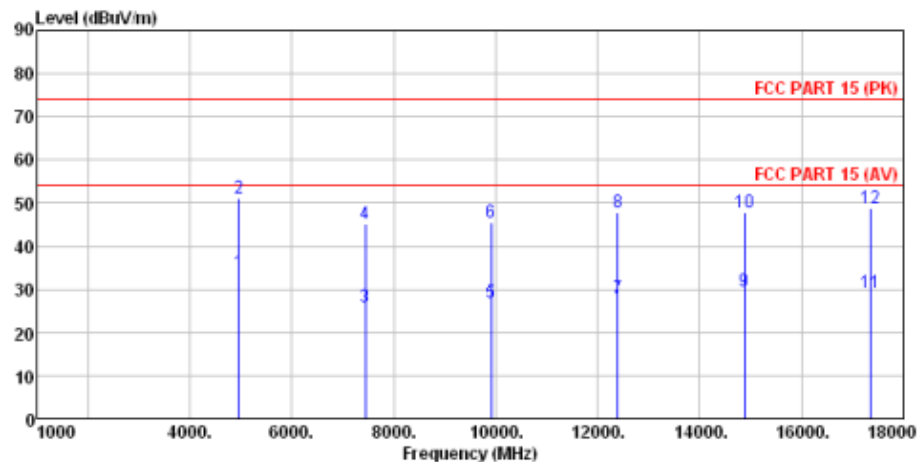
Site : 3m chamber  
Condition : FCC PART15 CLASS B 3m VULB9163-2013M VERTICAL  
Job NO. :  
Test Mode : TX on node  
Test Engineer: Sam  
Remark : GFSK 2480

	Freq	ReadAntenna	Cable Preamp	Level	Limit	Over	
	MHz	Level Factor	Loss Factor	dB	dBuV/m	Limit	Remark
	MHz	dBuV	dB/m	dB	dBuV/m	dBuV/m	dB
1	40.845	48.52	15.57	0.67	32.05	32.71	40.00 -7.29 QP
2	85.298	46.17	12.45	1.07	31.74	27.95	40.00 -12.05 QP
3	155.364	55.33	10.48	1.60	32.00	35.41	43.50 -8.09 QP
4	208.580	40.18	12.84	1.89	32.14	22.77	43.50 -20.73 QP
5	338.400	51.22	16.05	2.57	32.06	37.78	46.00 -8.22 QP
6	782.345	38.40	21.82	4.40	31.30	33.32	46.00 -12.68 QP



Site : 3m chamber  
 Condition : FCC PART 15 (PK) 3m BBHA9120D ANT(>1GHZ) VERTICAL  
 Job NO. :  
 Test Mode : IX on node  
 Test Engineer: Sam  
 Remark : GFSK 2480

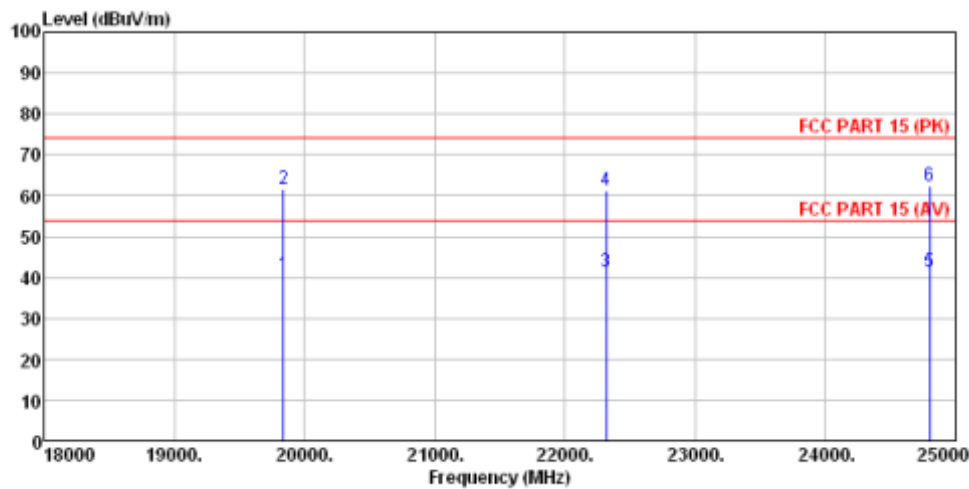
	Freq	ReadAntenna	Cable	Preamp		Limit	Over	
		Level	Factor	Loss	Factor	Level	Line	Limit Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/n	dB
1	4960.000	22.23	31.93	8.73	32.16	30.73	54.00	-23.27 Average
2	4960.000	39.11	31.93	8.73	32.16	47.61	74.00	-26.39 Peak
3	7440.000	9.13	36.59	11.79	31.78	25.73	54.00	-28.27 Average
4	7440.000	28.46	36.59	11.79	31.78	45.06	74.00	-28.94 Peak
5	9920.000	4.52	38.81	14.38	31.88	25.83	54.00	-28.17 Average
6	9920.000	24.31	38.81	14.38	31.88	45.62	74.00	-28.38 Peak
7	12400.000	7.13	38.76	15.27	35.27	25.89	54.00	-28.11 Average
8	12400.000	26.70	38.76	15.27	35.27	45.46	74.00	-28.54 Peak
9	14880.000	2.16	41.52	17.39	35.37	25.70	54.00	-28.30 Average
10	14880.000	22.14	41.52	17.39	35.37	45.68	74.00	-28.32 Peak
11	17360.000	-4.17	46.19	18.98	34.45	26.55	54.00	-27.45 Average
12	17360.000	16.13	46.19	18.98	34.45	46.85	74.00	-27.15 Peak



Site : 3m chamber  
 Condition : FCC PART 15 (PK) 3m BBHA9120D ANT(>1GHZ) HORIZONTAL  
 Job NO. :  
 Test Mode : IX on node  
 Test Engineer: Sam  
 Remark : GFSK 2480

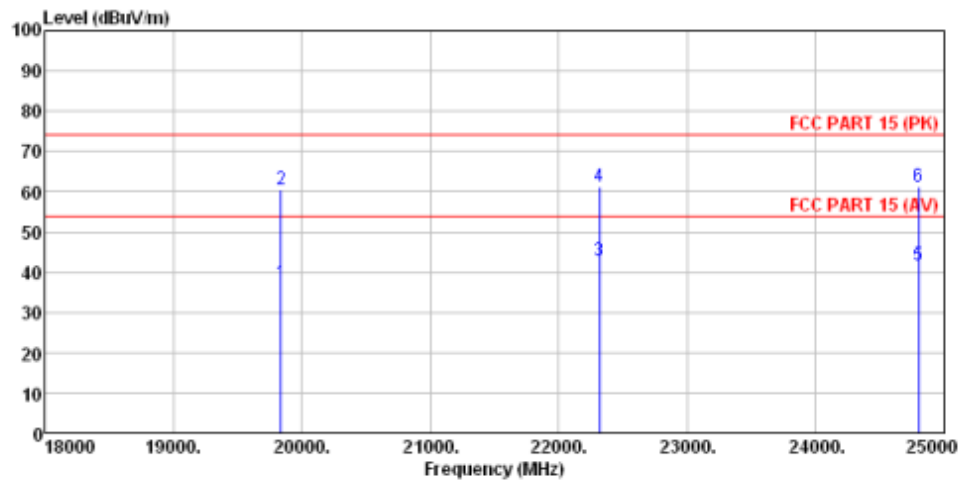
	Freq	RadAntenna Level Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB
1	4960.000	25.45	31.93	8.73	32.16	33.95	54.00	-20.05 Average
2	4960.000	42.59	31.93	8.73	32.16	51.09	74.00	-22.91 Peak
3	7440.000	9.46	36.59	11.79	31.78	26.06	54.00	-27.94 Average
4	7440.000	28.46	36.59	11.79	31.78	45.06	74.00	-28.94 Peak
5	9920.000	5.64	38.81	14.38	31.88	26.95	54.00	-27.05 Average
6	9920.000	24.13	38.81	14.38	31.88	45.44	74.00	-28.56 Peak
7	12400.000	9.02	38.76	15.27	35.27	27.78	54.00	-26.22 Average
8	12400.000	29.13	38.76	15.27	35.27	47.89	74.00	-26.11 Peak
9	14880.000	6.05	41.52	17.39	35.37	29.59	54.00	-24.41 Average
10	14880.000	24.13	41.52	17.39	35.37	47.67	74.00	-26.33 Peak
11	17360.000	-1.65	46.19	18.98	34.45	29.07	54.00	-24.93 Average
12	17360.000	18.02	46.19	18.98	34.45	48.74	74.00	-25.26 Peak

# Report No.: 68.870.13.180.01F



Site : 3m chamber  
Condition : FCC PART 15 (PK) 3m 18G-25G-V VERTICAL  
Job No. :  
Test mode : IX on node  
Test engineer: Sam  
Remark : GFSK 2480

	Freq	ReadAntenna	Cable	Preamp	Level	Limit	Over	
	MHz	Level	Loss	Factor	dB	Line	Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB
1	19840.000	-1.66	50.49	18.94	27.23	40.54	54.00	-13.46 Average
2	19840.000	19.44	50.49	18.94	27.23	61.64	74.00	-12.36 Peak
3	22320.000	-1.72	51.24	19.34	27.47	41.39	54.00	-12.61 Average
4	22320.000	18.02	51.24	19.34	27.47	61.13	74.00	-12.87 Peak
5	24800.000	-4.25	52.00	21.54	27.83	41.46	54.00	-12.54 Average
6	24800.000	16.54	52.00	21.54	27.83	62.25	74.00	-11.75 Peak



Site : 3m chamber  
Condition : FCC PART 15 (PK) 3m 18G-25G-H HORIZONTAL  
Job No. :  
Test mode : IX on node  
Test engineer: Sam  
Remark : GFSK 2480

	Freq	ReadAntenna	Cable	Preamp	Level	Limit	Over	
	MHz	Level	Loss	Factor	dB	Line	Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB
1	19840.000	-5.34	50.82	18.94	27.23	37.19	54.00	-16.81 Average
2	19840.000	18.00	50.82	18.94	27.23	60.53	74.00	-13.47 Peak
3	22320.000	0.28	50.76	19.34	27.47	42.91	54.00	-11.09 Average
4	22320.000	18.44	50.76	19.34	27.47	61.07	74.00	-12.93 Peak
5	24800.000	-3.52	51.43	21.54	27.83	41.62	54.00	-12.38 Average
6	24800.000	16.23	51.43	21.54	27.83	61.37	74.00	-12.63 Peak



**Result Summary:**

All other emissions are more than 20dB below the limits listed by FCC part 15.209 and RSS-GEN Table 2.

**Remarks:**

1. Emission level with more than 20dB below the FCC required limit is not recorded in table.  
From 18 GHz to 25 GHz, EUT have been tested and no emissions were found.
2. Delta to Limit = Field strength (dB $\mu$ V/m) – Limit (dB $\mu$ V/m).
3. Calculated measurement uncertainty: 9kHz -30MHz: 1.8dB.  
30MHz -1GHz: 5.2dB.  
1GHz -18GHz: 5.1dB.

**4.9 Conducted Emissions (0.15MHz to 30MHz)**

Test Requirement: FCC part 15 Section 15.207 Class B  
RSS-Gen Issue 4 section 7.2.4  
Test Method: ANSI C63.4:2003  
Test Date: 2011-03-25  
Mode of Operation: -Transmitting mode  
Detector Function: CISPR Quasi Peak and Average  
Measurement BW: 9 kHz  
Worst Case Channel: 1

**Results: PASS**

**- Refer Figure 14 for the result data graph.**

**Limits for Conducted Emission [ Section 15.207]& [ RSS-Gen Section 7.2.4]:**

Frequency Range [MHz]	Quasi-Peak Limit [dB $\mu$ V]	Average Limit [dB $\mu$ V]
0.15-0.5	66 to 56*	56 to 46*
0.5-5.0	56	46
5.0-30.0	60	50

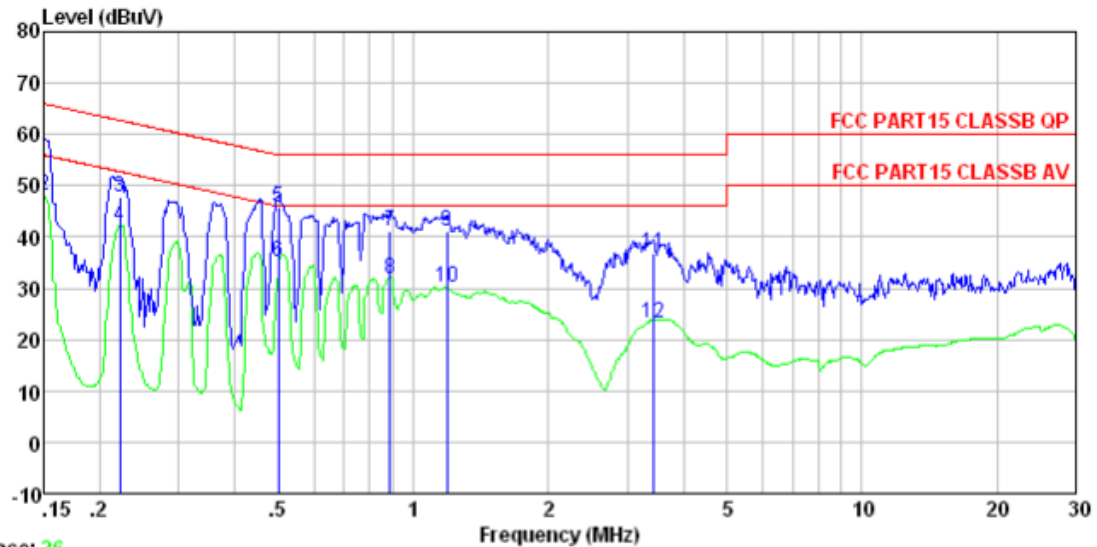
\* Decreases with the logarithm of the frequency.

Remarks:

Calculated measurement uncertainty:  $\pm 2.8$ dB

Result data graph shows the conducted emission (Line and Neutral).

For Line Port



Trace: 26

Condition : FCC PART15 CLASSB QP LISN-2013 LINE

EUT : Bluetooth

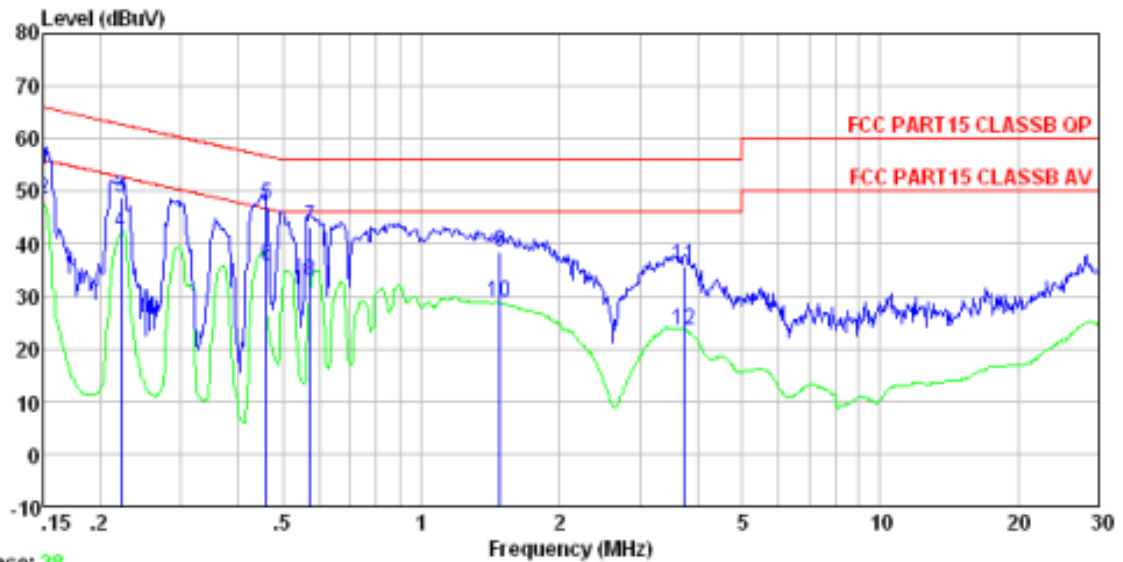
Test Mode : Bluetooth mode

Test Engineer: Sam

	Freq	Read Level	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	
1	0.150	56.13	0.12	56.40	66.00	-9.60	QP
2	0.150	47.92	0.12	48.19	56.00	-7.81	Average
3	0.222	47.70	0.12	47.95	62.74	-14.79	QP
4	0.222	41.94	0.12	42.19	52.74	-10.55	Average
5	0.499	45.56	0.11	45.79	56.01	-10.22	QP
6	0.499	35.01	0.11	35.24	46.01	-10.77	Average
7	0.885	40.87	0.13	41.14	56.00	-14.86	QP
8	0.885	31.61	0.13	31.88	46.00	-14.12	Average
9	1.191	41.02	0.13	41.28	56.00	-14.72	QP
10	1.191	29.78	0.13	30.04	46.00	-15.96	Average
11	3.436	36.47	0.15	36.80	56.00	-19.20	QP
12	3.436	23.00	0.15	23.33	46.00	-22.67	Average

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For Neutral Port



Condition : FCC PART15 CLASSB QP LISN-2013 NEUTRAL  
EUT : Bluetooth  
Test Mode : Bluetooth mode  
Test Engineer: Sam

	Freq	Read Level	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	
1	0.150	56.70	0.12	56.89	66.00	-9.11	QP
2	0.150	48.10	0.12	48.29	56.00	-7.71	Average
3	0.222	48.71	0.12	48.89	62.76	-13.87	QP
4	0.222	41.91	0.12	42.09	52.76	-10.67	Average
5	0.461	47.13	0.11	47.30	56.67	-9.37	QP
6	0.461	35.53	0.11	35.70	46.67	-10.97	Average
7	0.573	43.01	0.12	43.20	56.00	-12.80	QP
8	0.573	32.50	0.12	32.69	46.00	-13.31	Average
9	1.487	38.20	0.13	38.42	56.00	-17.58	QP
10	1.487	28.59	0.13	28.81	46.00	-17.19	Average
11	3.759	35.69	0.15	35.98	56.00	-20.02	QP
12	3.759	23.20	0.15	23.49	46.00	-22.51	Average

## 5.0 List of Measurement Equipment

### Radiated Emission

Manufacturer	Equipment	Model No.	Serial No.	Due Date
3m Semi- Anechoic Chamber	ZhongYu Electron	9.2(L)*6.2(W)* 6.4(H)	GTS250	Jul. 01 2014
Control Room	ZhongYu Electron	6.2(L)*2.5(W)* 2.4(H)	GTS251	Jul. 01 2014
EMI Test Receiver	Rohde & Schwarz	ESU26	GTS203	Jul. 01 2014
BiConiLog Antenna	SCHWARZBECK MESS-ELEKTRONIK	VULB9163	GTS214	Jul. 01 2014
Double -ridged waveguide horn	SCHWARZBECK MESS-ELEKTRONIK	9120D-829	GTS208	Jul. 01 2014
Horn Antenna	ETS-LINDGREN	3160	GTS217	Jul. 01 2014
Amplifier(100kHz-3GHz)	HP	8347A	GTS204	Jul. 01 2014
Amplifier(2GHz-20GHz)	HP	8349B	GTS206	Jul. 01 2014
Amplifier (18-26GHz)	Rohde & Schwarz	AFS33-18002 650-30-8P-44	GTS218	Jul. 01 2014

### Line Conducted

Manufacturer	Equipment	Model No.	Serial No.	Due Date
Shielding Room	ZhongYu Electron	7.0(L)x3.0(W)x3.0(H)	GTS264	Jul. 01 2014
EMI Test Receiver	Rohde & Schwarz	ESCS30	GTS223	Jul. 01 2014
10dB Pulse Limita	Rohde & Schwarz	N/A	GTS224	Jul. 01 2014
Coaxial Switch	ANRITSU CORP	MP59B	GTS225	Jul. 01 2014
LISN	Schwarzbeck Mess-Elektronik	NSLK 8127	GTS226	Jul. 01 2014

N/A: Not Applicable