

FCC PART 15C TEST REPORT FOR CERTIFICATION  
On Behalf of

ION Audio, LLC

Speaker

Model Number: SHELSYS

Additional Model: iAS01、 iAS01 Compact Shelf System

FCC ID: 2AB3E-IAS01

Prepared for : ION Audio, LLC  
200 Scenic View Drive, Cumberland RI 02864 U.S.A.

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Santun(guantai Road), Houjie Town, DongGuan City,  
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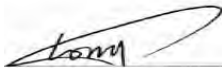

Report Number: ESTE-R1606062  
Date of Test : May 12,2016~ Jun 02, 2016  
Date of Report : Jun 08, 2016

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### Test Report Verification

<b>Applicant:</b>	ION Audio, LLC		
<b>Address:</b>	200 Scenic View Drive, Cumberland RI 02864 U.S.A.		
<b>Manufacturer</b>	ION Audio, LLC		
<b>Address:</b>	200 Scenic View Drive, Cumberland RI 02864 U.S.A.		
<b>E.U.T:</b>	Speaker		
<b>Model Number:</b>	SHELFSYS		
<b>Additional Model:</b>	iAS01、 iAS01 Compact Shelf System		
<b>Power Supply:</b>	AC 120V/60Hz		
<b>Test Voltage:</b>	AC 120V/60Hz		
<b>Trade Name:</b>	ION	Serial No.:	-----
<b>Date of Receipt:</b>	May 12,2016	<b>Date of Test:</b>	May 12,2016~ Jun 02, 2016
<b>Test Specification:</b>	FCC Rules and Regulations Part 15 Subpart C:2016 ANSI C63.10:2013		
<b>Test Result:</b>	<p>The device described above is tested by EST Technology Co., Ltd.. The measurement results were contained in this test report and EST Technology Co., Ltd. was assumed full responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT to be technically compliance with the FCC Rules and Regulations Part 15 Subpart C requirements.</p> <p style="text-align: right;">This report applies to above tested sample only and shall not be reproduced in part without written approval of EST Technology Co., Ltd. Date: Jun 08, 2016</p>		
Prepared by:	Tested by:	Approved by:	
			
_____ Ada / Assistant	_____ Tony.Tang/ Engineer	_____ IcemanHu / Manager	
<b>Other Aspects:</b>	None.		
<i>Abbreviations: OK/P=passed    fail/F=failed    n.a/N=not applicable    E.U.T=equipment under tested</i>			
<i>This test report is based on a single evaluation of one sample of above mentioned products ,It is not permitted to be duplicated in extracts without written approval of EST Technology Co., Ltd.</i>			



# 1. GENERAL INFORMATION

## 1.1. Description of Device (EUT)

Product Name	:	Speaker
FCC ID	:	2AB3E-IAS01
Model Number	:	SHELFSYS、iAS01、iAS01 Compact Shelf System (Note: The 3 models have the same technical construction including circuit diagram, PCB Layout, components and component layout, all electrical construction and mechanical construction, except the different model name、Trade name and color.)
Operation frequency	:	2402MHz~2480MHz
Number of channel	:	79
Antenna	:	Internal antenna, 0dBi gain
Modulation	:	Bluetooth 2.1+EDR (GFSK, $\pi/4$ -DQPSK, 8-DPSK)
Sample Type	:	Prototype production
Product Software Version:		CM1309_ION(SI4702.VER 32)
Product Hardware Version:		iAS01 Compact Shelf System MAIN.PCB VER:2

## 2. SUMMARY OF TEST

### 2.1. Summary of test result

Description of Test Item	Standard	Results
Maximum Peak Output Power	FCC Part 15: 15.247(b)(1)	PASS
20dB Bandwidth	FCC Part 15: 15.215	PASS
Carrier Frequency Separation	FCC Part 15: 15.247(a)(1)	PASS
Number Of Hopping Channel	FCC Part 15: 15.247(a)(1)(iii)	PASS
Dwell Time	FCC Part 15: 15.247(a)(1)(iii)	PASS
Radiated Emission	FCC Part 15: 15.209 FCC Part 15: 15.247(d) ANSI C63.10:2013	PASS
Band Edge Compliance	FCC Part 15: 15.247(d)	PASS
Power Line Conducted Emissions	FCC Part 15: 15.207 ANSI C63.10:2013	PASS
Antenna requirement	FCC Part 15: 15.203	PASS

## 2.2. Test Facilities

EMC Lab	:	Certificated by CNAL, CHINA Registration No.: L5288 Date of registration: December 07, 2015
		Certificated by FCC, USA Registration No.: 989591 Date of registration: November 20, 2013
		Certificated by Industry Canada Registration No.: 9405A-1 Date of registration: December 30, 2015
		Certificated by VCCI, Japan Registration No.: R-3663 & C-4103 Date of registration: July 25, 2011
		Certificated by TUV Rheinland, Germany Registration No.: UA 50195514 0001 Date of registration: January 07, 2011
		Certificated by TUV/PS, Shenzhen Registration No.: SCN1017 Date of registration: January 27, 2011
		Certificated by Intertek ETL SEMKO Registration No.: 2011-RTL-L1-18 Date of registration: April 28, 2011
		Certificated by Siemic, Inc. Registration No.: SLCN021 Date of registration: November 8, 2011
		Certificated by Nemko, Hong Kong Registration No.: 175193 Date of registration: May 4, 2011
Name of Firm	:	EST Technology Co., Ltd.
Site Location	:	San Tun Management Zone, Houjie Town, Dongguan, Guangdong, China

### 2.3. Measurement uncertainty

Test Item	Uncertainty
Uncertainty for Conduction emission test	2.54 dB
Uncertainty for Radiation Emission test (30MHz-1GHz)	3.62 dB
Uncertainty for Radiation Emission test (1GHz to 18GHz)	4.86 dB
Uncertainty for radio frequency	7×10-8
Uncertainty for conducted RF Power	0.20dB
Uncertainty for Power density test	0.26dB

Note: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

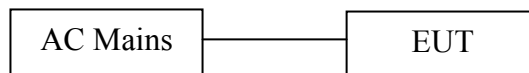
### 2.4. Assistant equipment used for test

#### 2.4.1. PC

Manufacturer : DELL  
 M/N : Latitude E6420  
 Adapter : M/N: DA90PM111  
 Input: AC 100-240V~50/60Hz 1.5A  
 Output: DC 19.5V/4.62A

### 2.5. Block Diagram

For radiated emissions test: EUT was placed on a turn table, which is 0.8 or 1.5 meter high above ground. EUT was be set into BT test mode by software before test.



(EUT: Speaker)



## 2.6. Test mode

The test software was used to control EUT work in Continuous TX mode, and select test channel, wireless mode

Mode	Channel	Frequency
GFSK	Low	2402MHz
	Middle	2441MHz
	High	2480MHz
8-DPSK	Low	2402MHz
	Middle	2441MHz
	High	2480MHz
Remark: The “GFSK” and “8-DPSK” is worst case, Will be recorded in the report.		

## 2.7. Channel List for Bluetooth

Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
1	2402	2	2403	3	2404	4	2405
5	2406	6	2407	7	2408	8	2409
9	2410	10	2411	11	2412	12	2413
13	2414	14	2415	15	2416	16	2417
17	2418	18	2419	19	2420	20	2421
21	2422	22	2423	23	2424	24	2425
25	2426	26	2427	27	2428	28	2429
29	2430	30	2431	31	2432	32	2433
33	2434	34	2435	35	2436	36	2437
37	2438	38	2439	39	2440	40	2441
41	2442	42	2443	43	2444	44	2445
45	2446	46	2447	47	2448	48	2449
49	2450	50	2451	51	2452	52	2453
53	2454	54	2455	55	2456	56	2457
57	2458	58	2459	59	2460	60	2461
61	2462	62	2463	63	2464	64	2465
65	2466	66	2467	67	2468	68	2469
69	2470	70	2471	71	2472	72	2473
73	2474	74	2475	75	2476	76	2477
77	2478	78	2479	79	2480	-	-

## 2.8. Test Equipment

### 2.8.1. For conducted emission test

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
EMI Test Receiver	Rohde & Schwarz	ESHS30	832354	June,28,15	1 Year
Artificial Mains Networ	Rohde & Schwarz	ENV216	101260	June,28,15	1 Year
Pulse Limiter	Rohde & Schwarz	ESSHELFSY S-Z2	101100	June,28,15	1 Year
RF Cable	Fujikura	3D-2W	844 Chamber No.1	June,28,15	1 Year

### 2.8.2. For radiated emission test(9 kHz-30MHz)

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
EMI Test Receiver	Rohde & Schwarz	ESCI	100435	June,28,15	1 Year
Loop Antenna	ETS-LINDGREN	6502	00071730	June,28,15	1 Year
RF Cable	MIYAZAKI	5D-2W	966 Chamber No.1	June,28,15	1 Year

### 2.8.3. For radiated emission test(30-1000MHz)

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
EMI Test Receiver	Rohde & Schwarz	ESVS10	100004	June,28,15	1 Year
Spectrum Analyzer	Agilent	E4411B	MY5014069 7	June,28,15	1 Year
Bilog Antenna	Teseq	CBL 6111D	27090	June,28,15	1 Year
Signal Amplifier	Agilent	310N	187037	June,28,15	1 Year
RF Cable	MIYAZAKI	5D-2W	966 Chamber No.1	June,28,15	1 Year

### 2.8.4. For radiated emission test(above 1GHz)

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
Horn Antenna	SCHWARZB ECK	BBHA 9120 D	BBHA9120D1 002	June,28,15	1 Year
Board-Band Horn Antenna	SCHWARZB ECK	BBHA 9170	9170-497	June,28,15	1 Year
Signal Amplifier	SCHWARZB ECK	BBV9718	9718-212	June,28,15	1 Year
Spectrum Analyzer	Agilent	E4408B	MY44211139	June,28,15	1 Year
Spectrum Analyzer	Rohde &Schwarz	FSV	103173	June,28,15	1 Year
RF Cable	Hubersuhner	RG 214/U	513423	June,28,15	1 Year

### 3. MAXIMUM PEAK OUTPUT POWER

#### 3.1. Limit

For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts, the e.i.r.p shall not exceed 4W

#### 3.2. Test Procedure

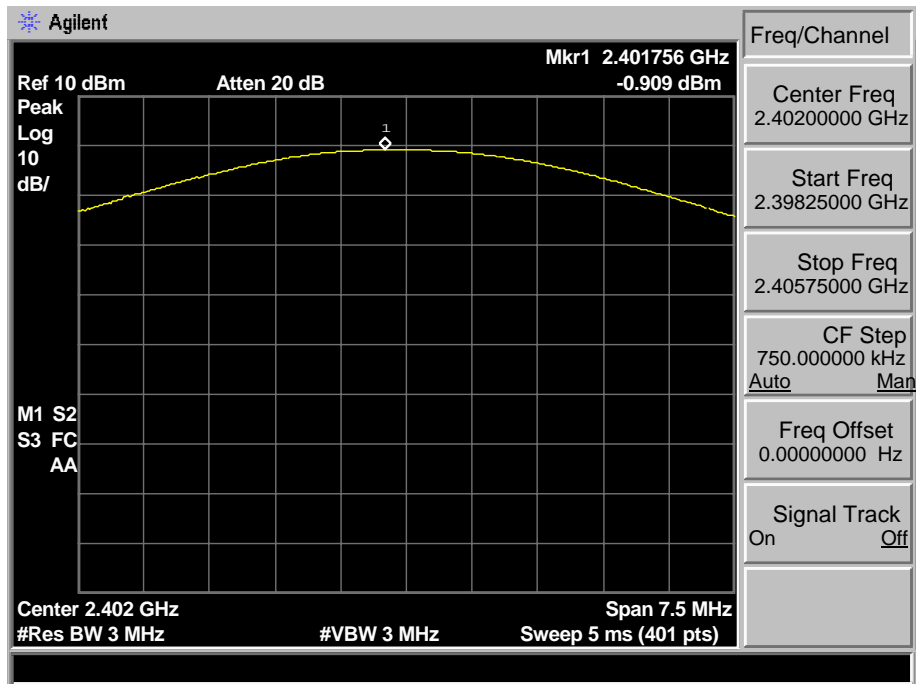
The transmitter output (antenna port) was connected to the spectrum analyzer. Connect EUT antenna terminal to the spectrum analyzer with a low loss SMA cable.

#### 3.3. Test Result

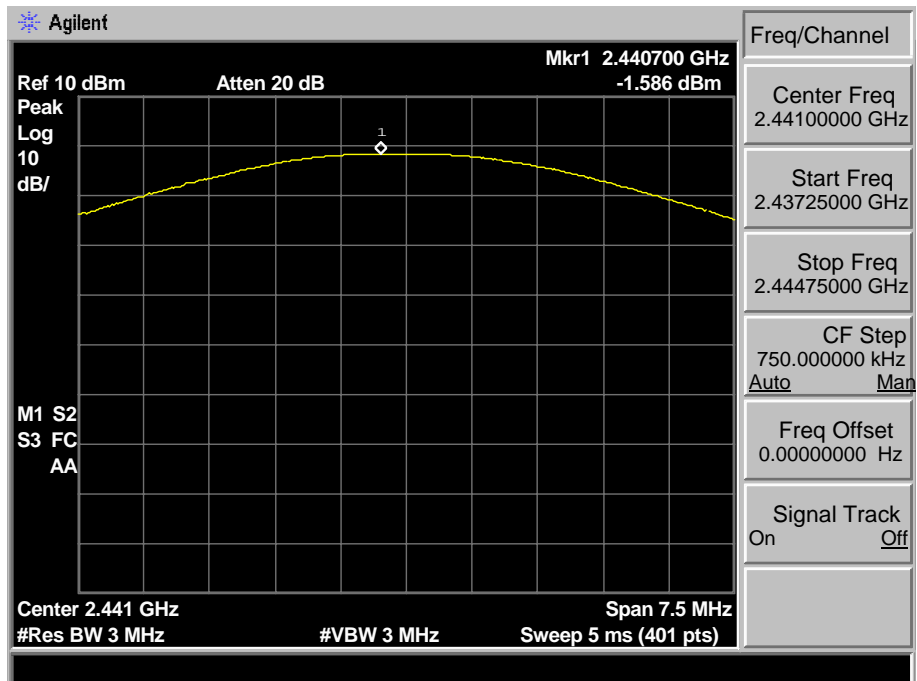
EUT: Speaker					
M/N: SHELFSYS					
Test date: 2016-05-15		Test site: RF site		Tested by: Tony Tang	
Mode	Freq (MHz)	Result Peak power (dBm)	Limit		Margin (dB)
			dBm	W	
GFSK	2402	-0.909	21.00	0.125	21.909
	2441	-1.586	21.00	0.125	22.586
	2480	-2.396	21.00	0.125	23.396
8-DPSK	2402	-1.253	21.00	0.125	22.253
	2441	-1.884	21.00	0.125	22.884
	2480	-2.660	21.00	0.125	23.660
Conclusion: PASS					

### 3.4. Test Data

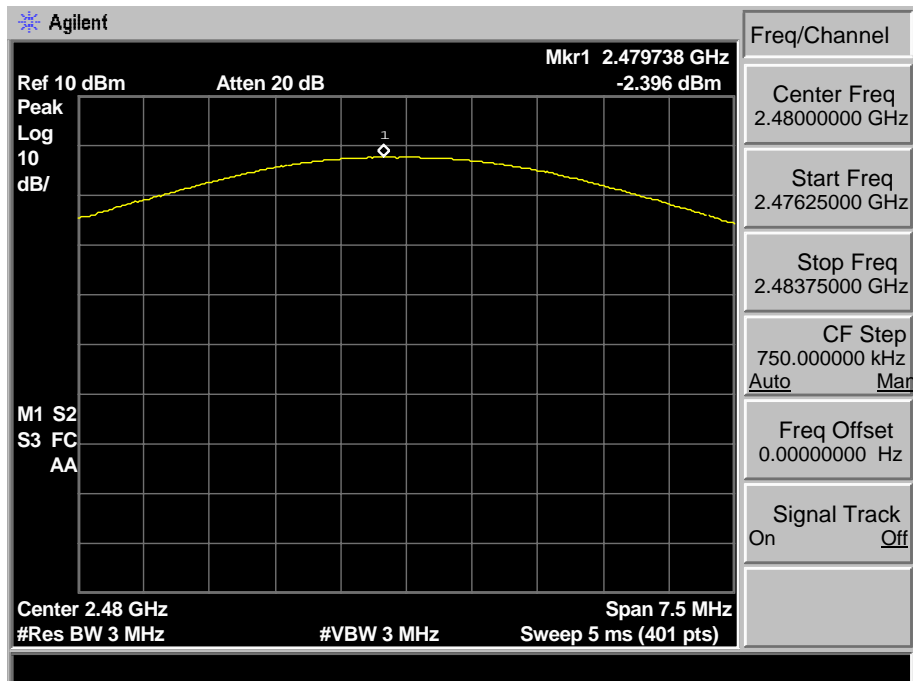
#### GFSK 2402 MHz



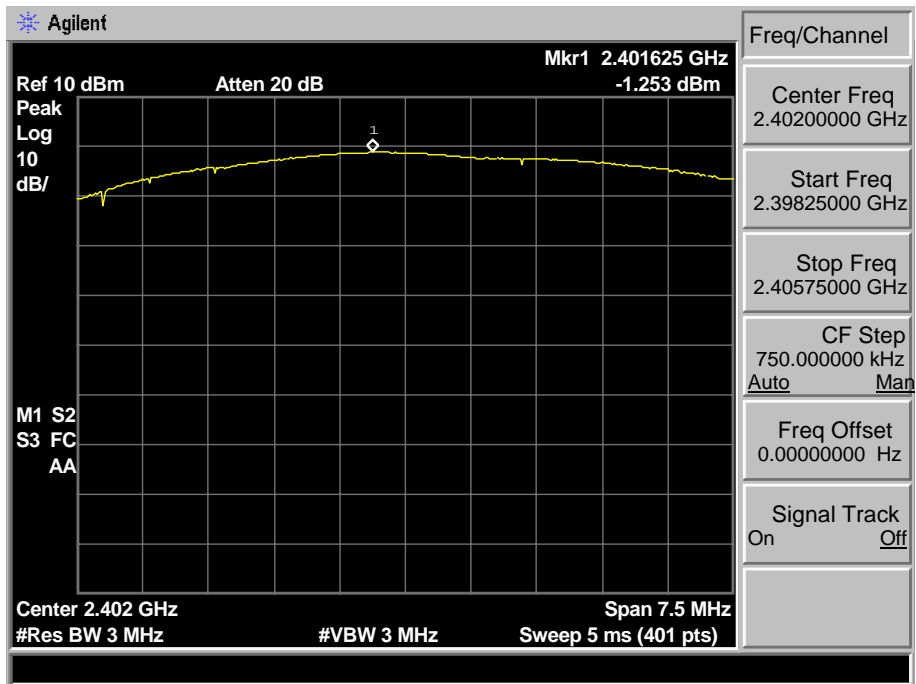
#### GFSK 2441 MHz



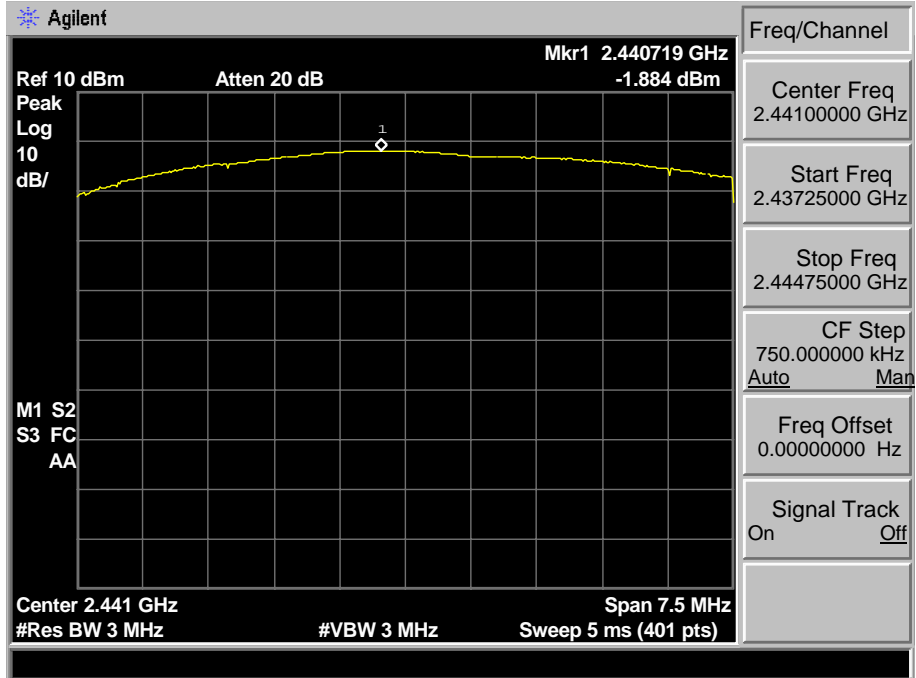
### GFSK 2480 MHz



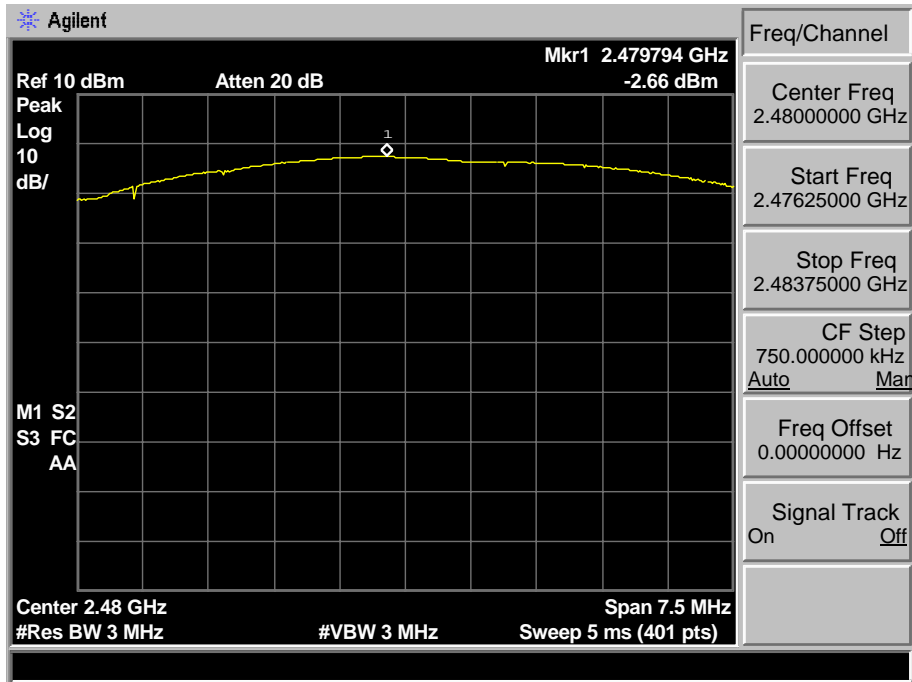
### 8-DPSK 2402 MHz



### 8-DPSK 2441 MHz



### 8-DPSK 2480 MHz



## 4. 20 DB BANDWIDTH

### 4.1. Limit

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§ 15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

### 4.2. Test Procedure

The transmitter output (antenna port) was connected to the spectrum analyzer. The bandwidth of the fundamental frequency was measured by spectrum analyzer with 30kHz RBW and 100kHz VBW. The 20dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20dB.

### 4.3. Test Result

EUT: Speaker				
M/N: SHELFSYS				
Test date: 2016-05-15		Test site: RF site		Tested by: Tony Tang
Mode	Freq (MHz)	20dB Bandwidth (MHz)	Limit (kHz)	Conclusion
GFSK	2402	0.980	/	PASS
	2441	1.016	/	PASS
	2480	1.040	/	PASS
8-DPSK	2402	1.346	/	PASS
	2441	1.356	/	PASS
	2480	1.357	/	PASS

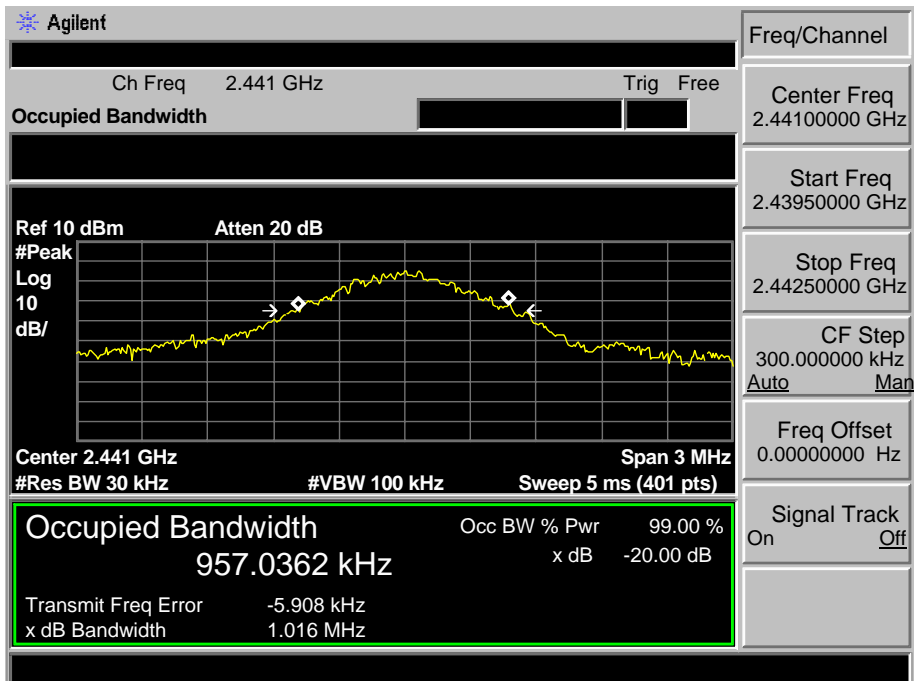


### 4.4. Test Data

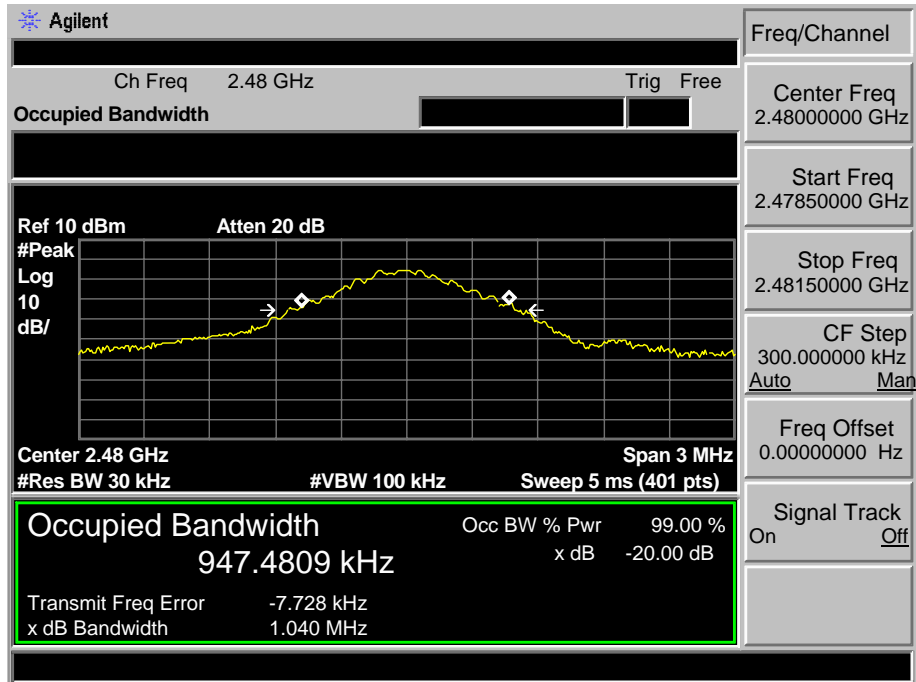
#### GFSK 2402MHz



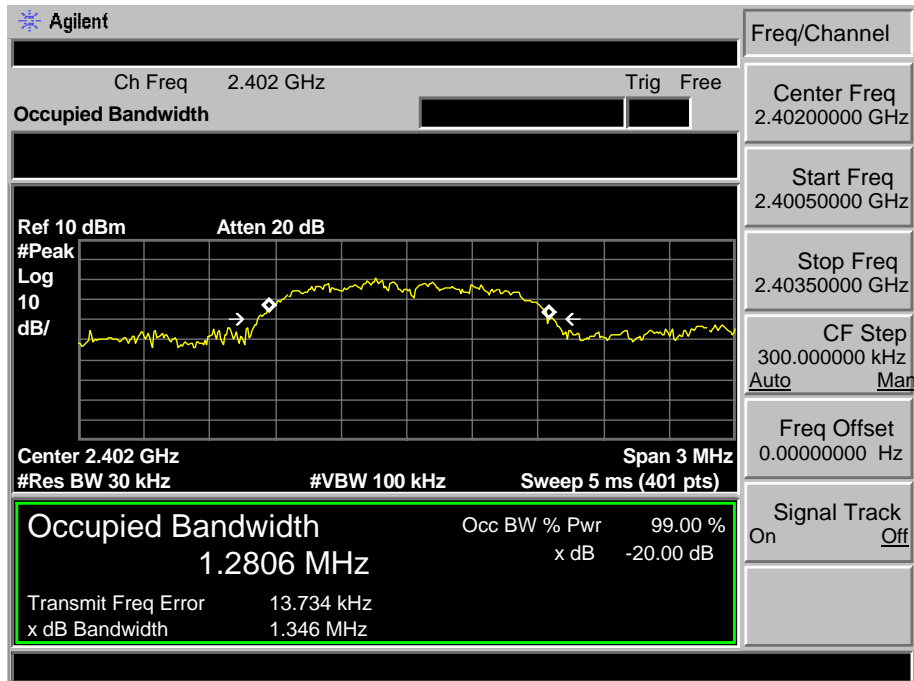
#### GFSK 2441MHz



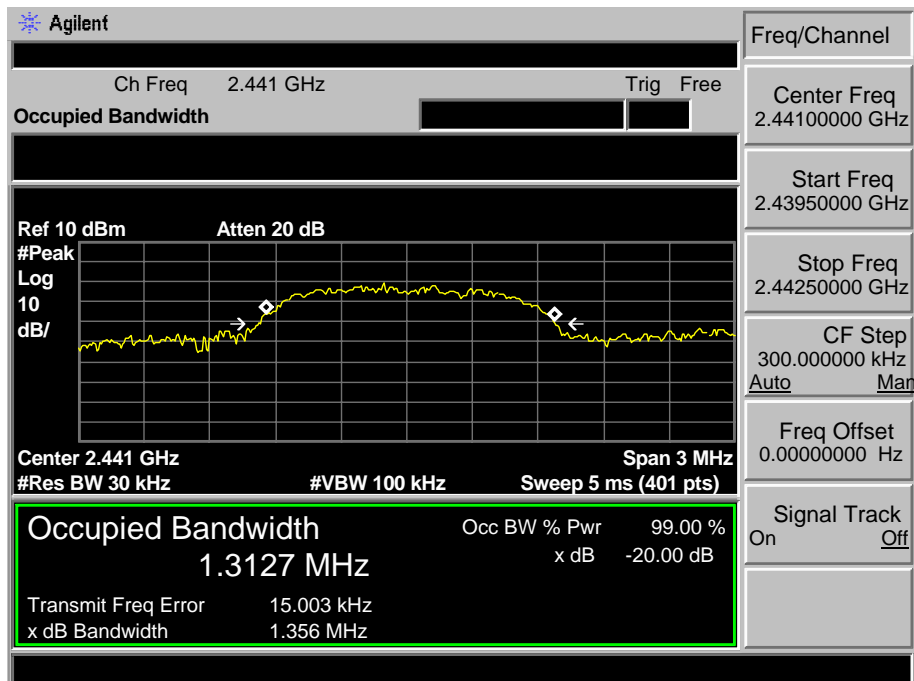
**GFSK 2480MHz**



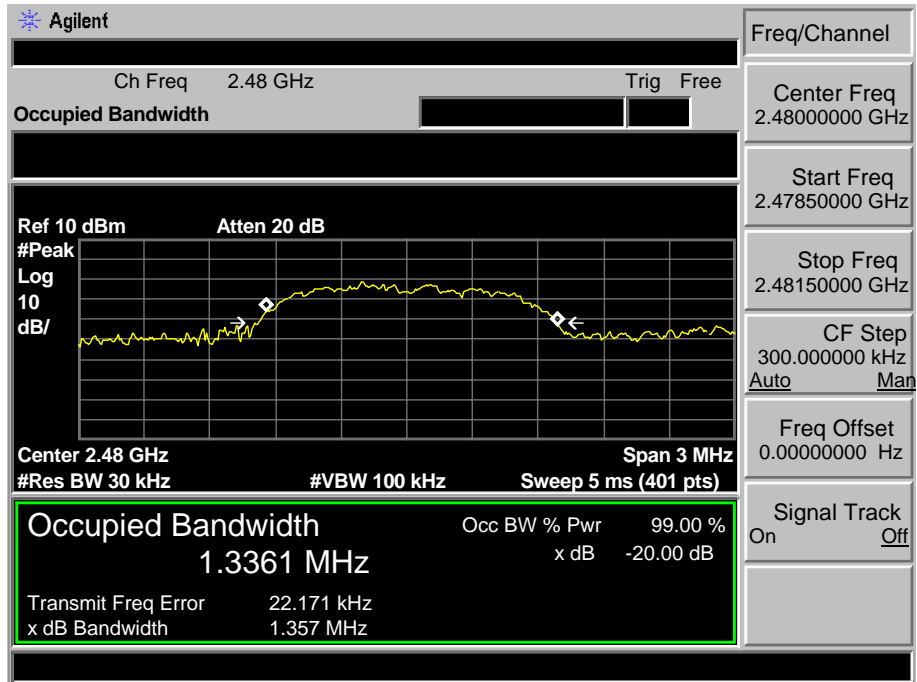
8-DPSK 2402MHz



8-DPSK 2441MHz



8-DPSK 2480MHz



## 5. CARRIER FREQUENCY SEPARATION

### 5.1. Limit

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

### 5.2. Test Procedure

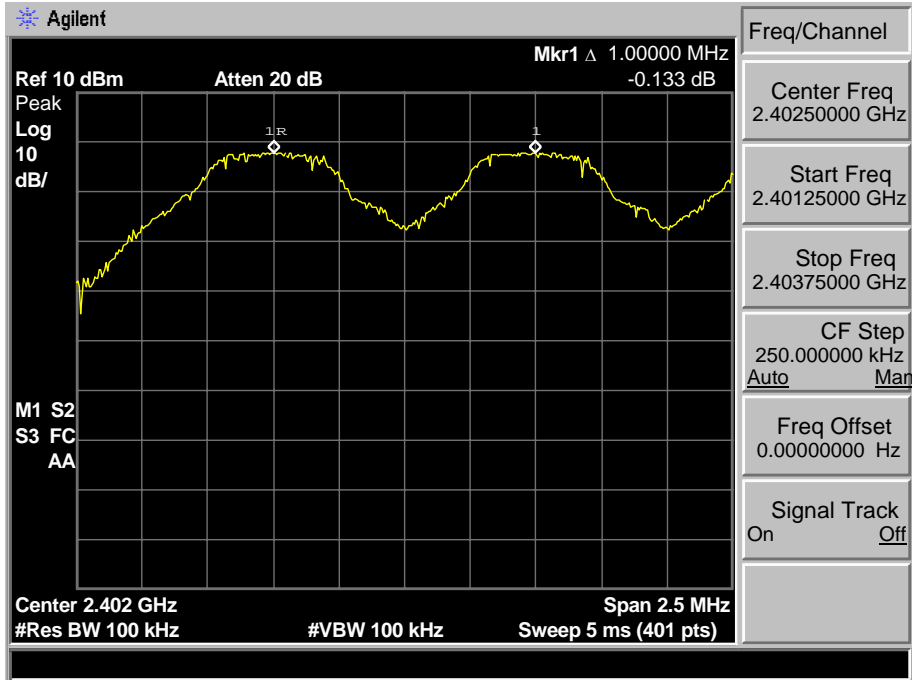
The transmitter output (antenna port) was connected to the spectrum analyzer. The carrier frequency was measured by spectrum analyzer with 100kHz RBW and 100kHz VBW.

### 5.3. Test Result

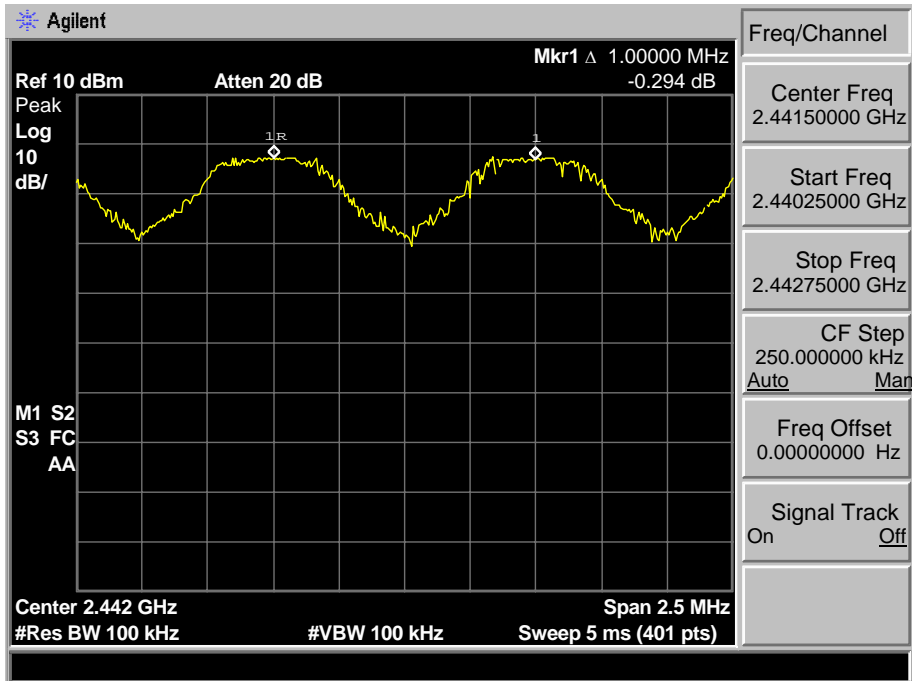
EUT: Speaker				
M/N: SHELF SYS				
Test date: 2016-05-15			Test site: RF site	Tested by: Tony Tang
Mode	Channel	Channel separation (MHz)	Limit	Conclusion
GFSK	Low CH	1.000	0.980 MHz	PASS
	Mid CH	1.000	1.016 MHz	PASS
	High CH	1.000	1.040 MHz	PASS
8-DPSK	Low CH	1.000	> 2/3 of the 20dB Bandwidth or 25[kHz]( whichever is greater)	PASS
	Mid CH	1.000		PASS
	High CH	1.000		PASS

5.4. Test Data

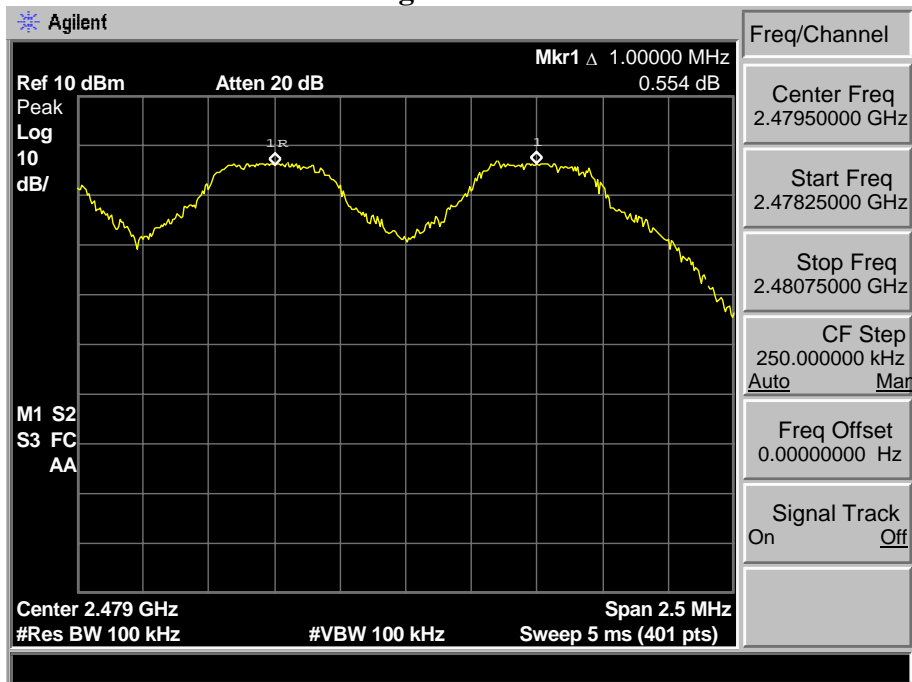
**GFSK  
Low Channel**



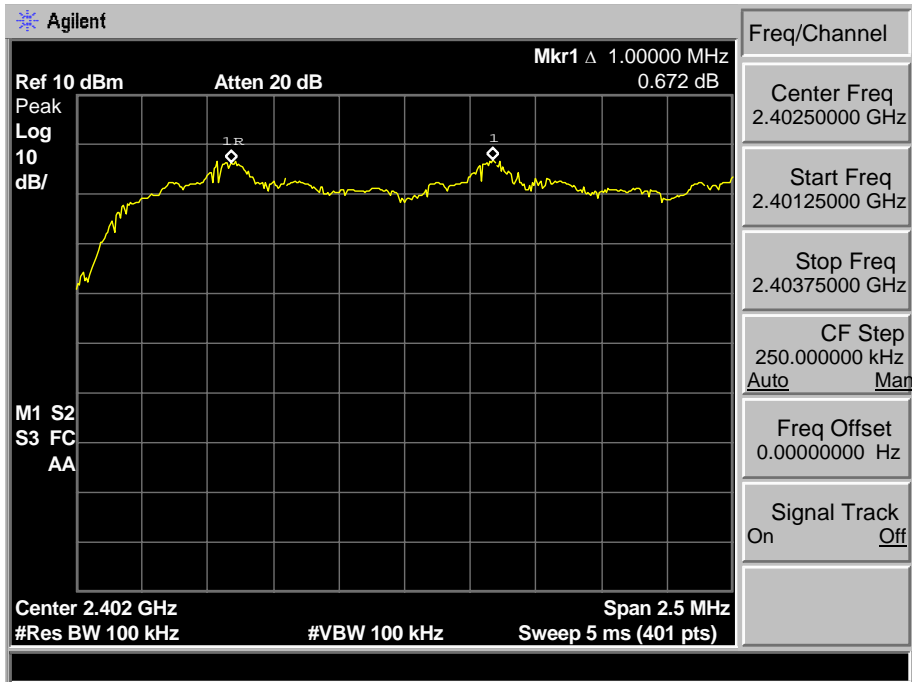
**Mid Channel**



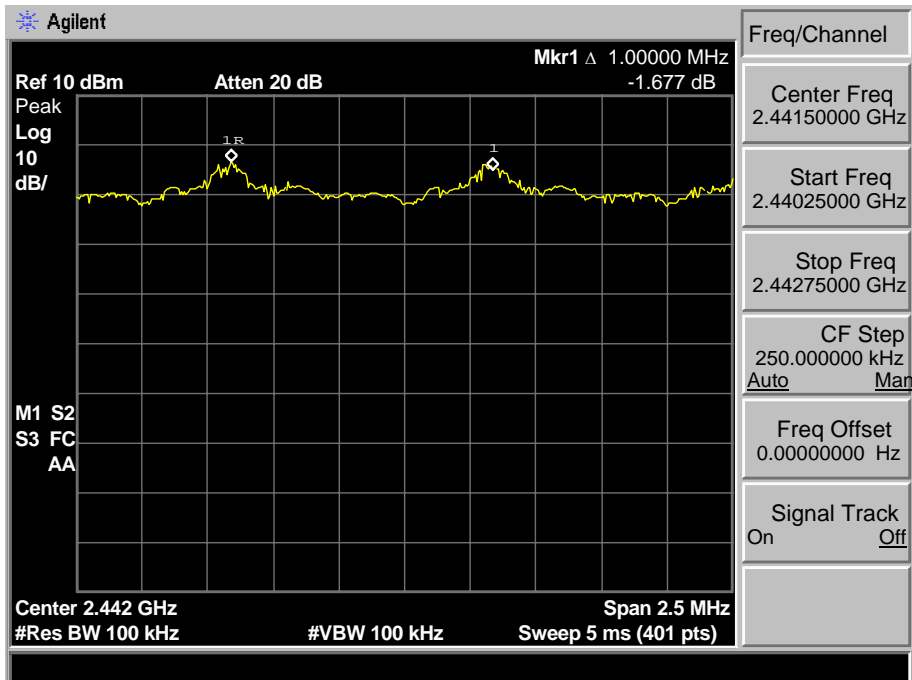
### High Channel



### 8-DPSK Low Channel

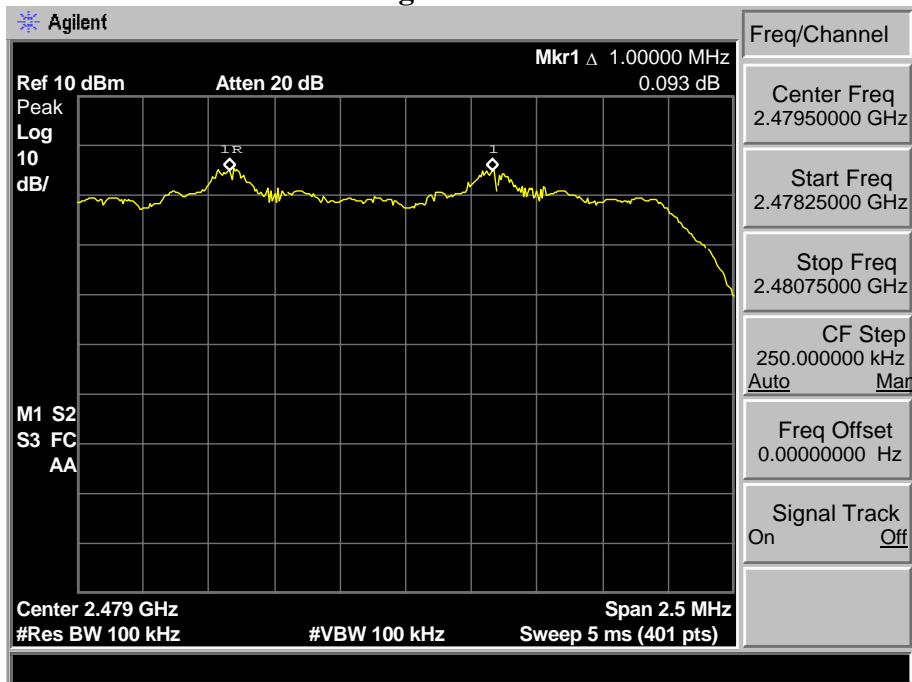


### Mid Channel





### High Channel



## 6. NUMBER OF HOPPING CHANNEL

### 6.1. Limit

Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels

### 6.2. Test Procedure

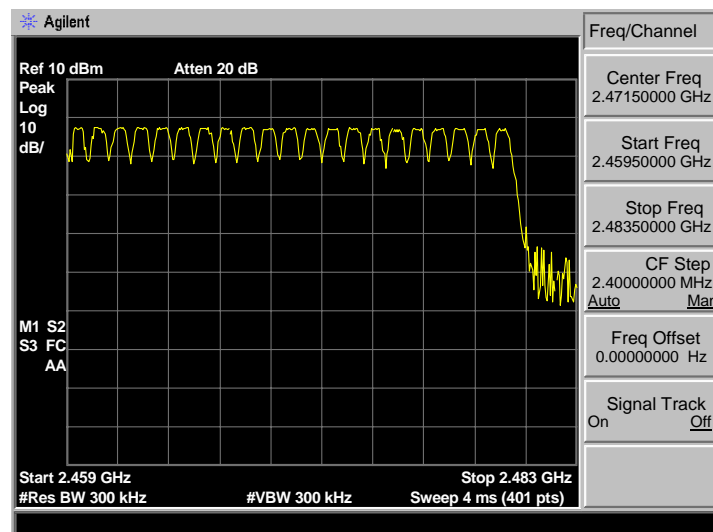
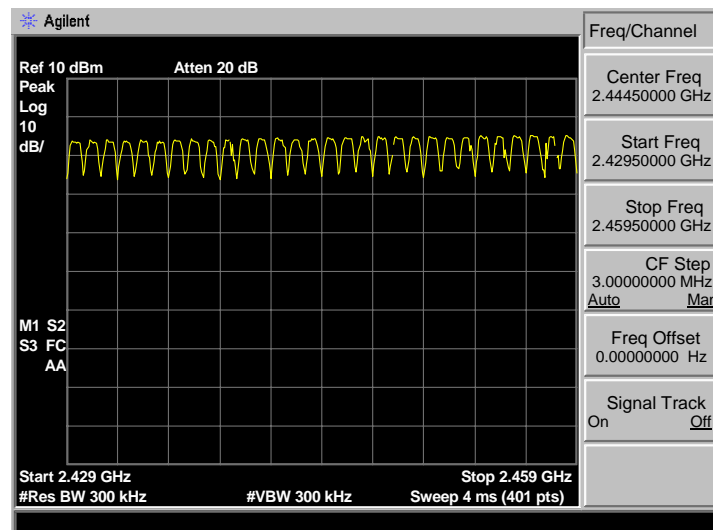
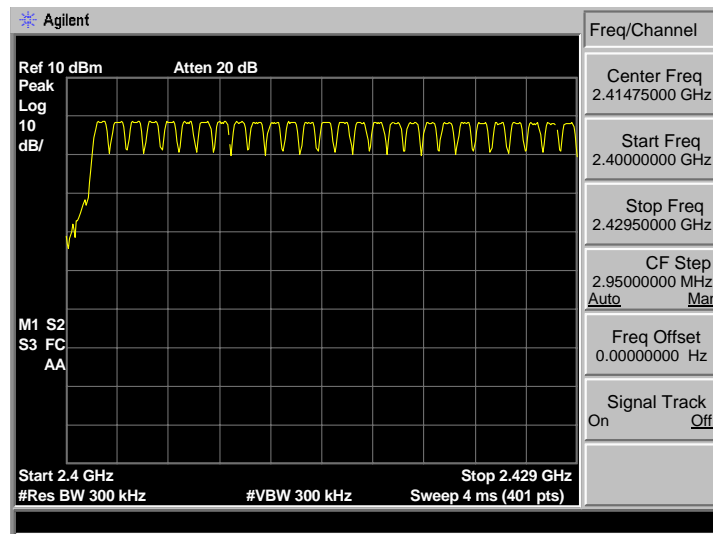
The transmitter output (antenna port) was connected to the spectrum analyzer. The number of hopping channel was measured by spectrum analyzer with 300kHz RBW and 300kHz VBW.

### 6.3. Test Result

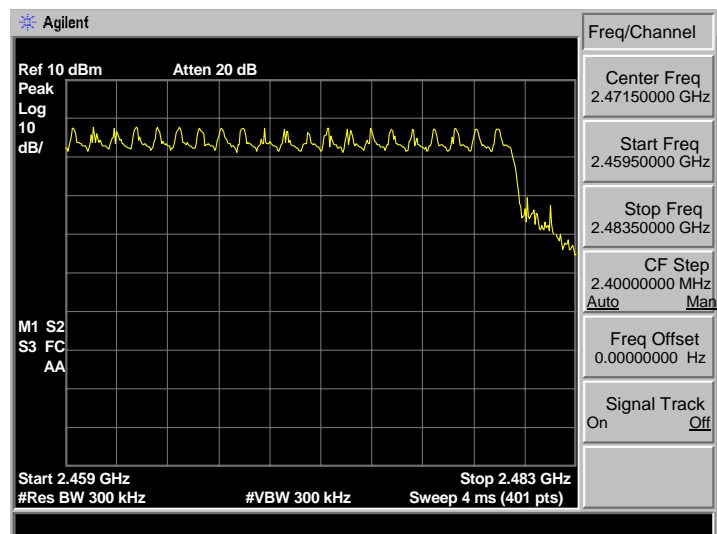
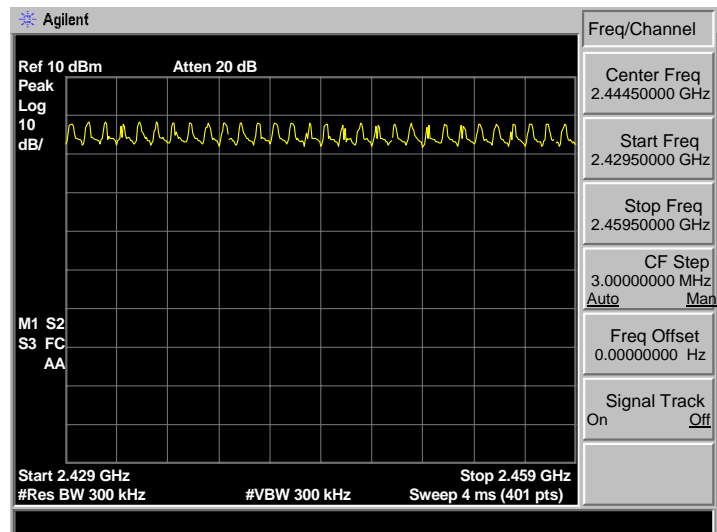
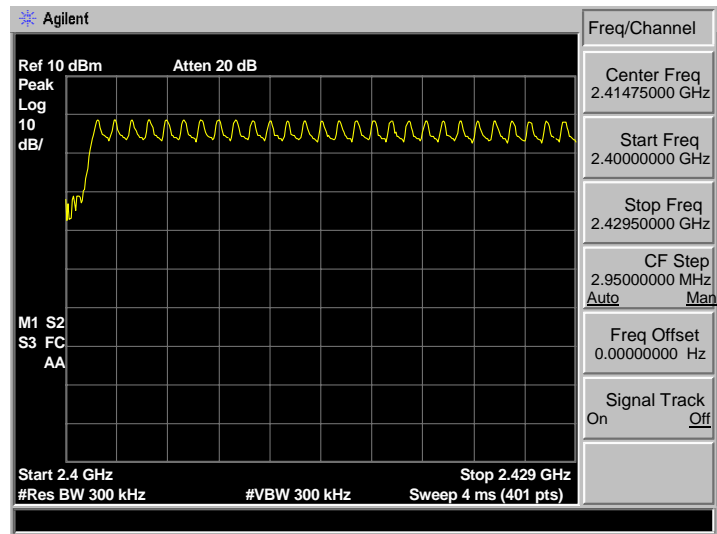
EUT: Speaker			
M/N: SHELF SYS			
Test date: 2016-05-15		Test site: RF site	Tested by: Tony.Tang
Mode	Number of hopping channel	Limit	Conclusion
GFSK	79	>15	PASS
8-DPSK	79	>15	PASS

## 6.4. Test Data

### GFSK



### 8-DPSK



## 7. DWELL TIME

### 7.1. Limit

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

### 7.2. Test Procedure

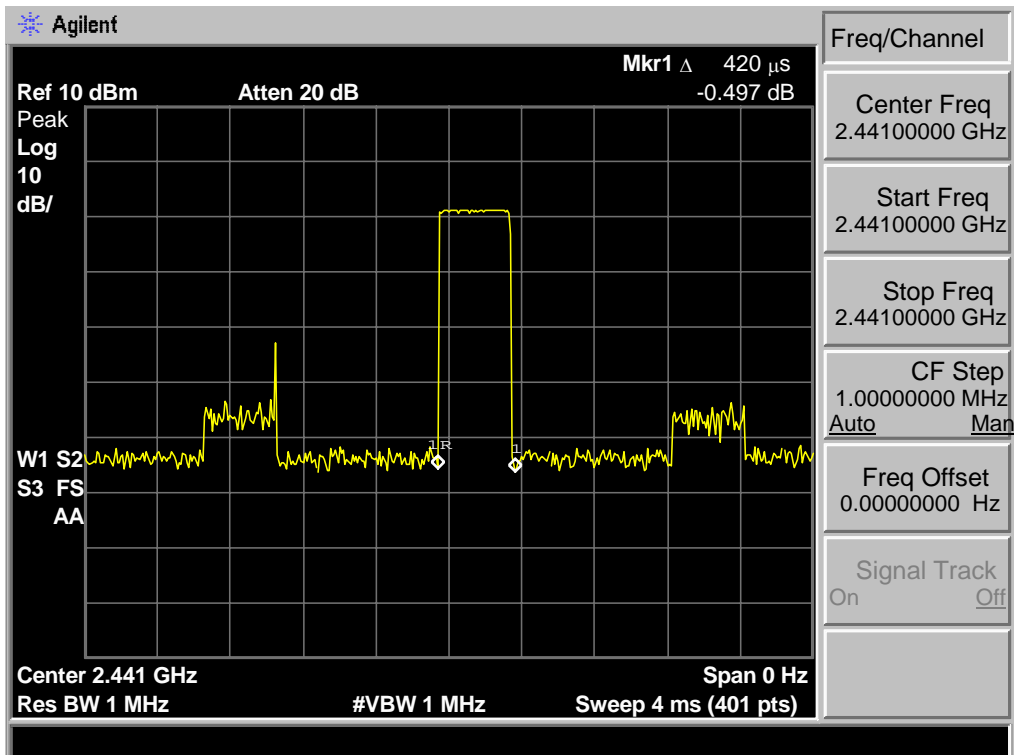
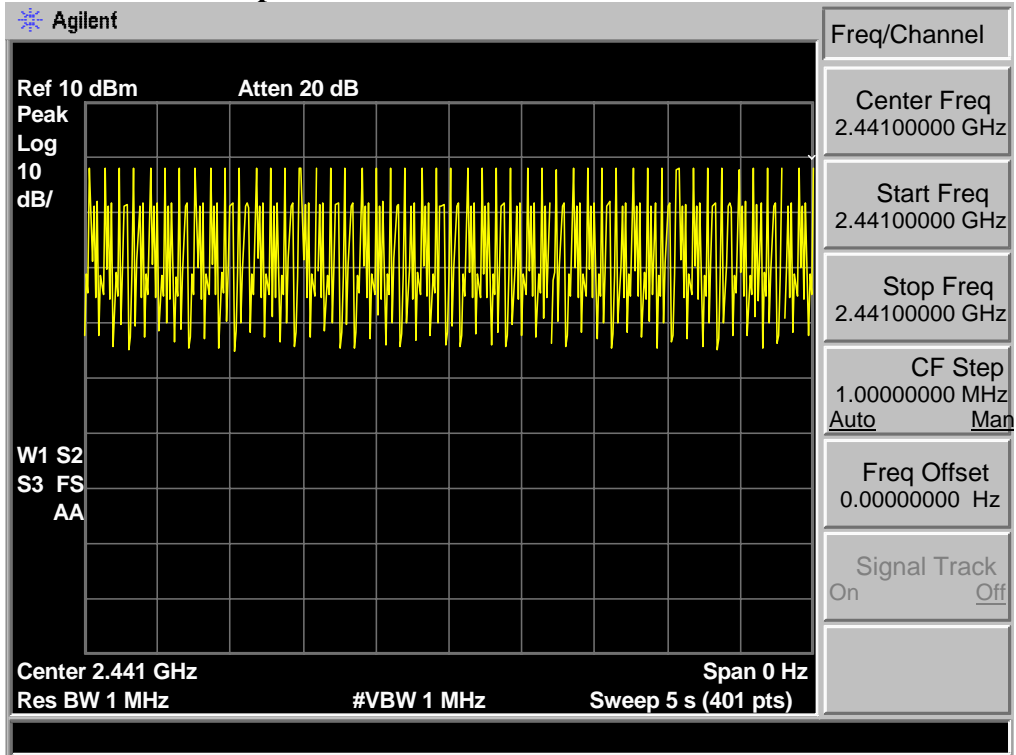
1. The transmitter output (antenna port) was connected to the spectrum analyzer. Connect EUT antenna terminal to the spectrum analyzer with a low loss SMA cable.
2. Set the EUT to proper test mode with relative test software and hardware.
3. Spectrum analyzer setting: Centered Frequency = measured channel, RBW = 1MHz, VBW= 1MHz, Frequency Span = 0 Hz.
4. Set sweep time properly to capture the entire dwell time per hopping channel.
5. Set detector type to Peak and trace mode to Max Hold and make the measurement.
6. Repeat step 3-5 until all channels measured were complete.

### 7.3. Test Result

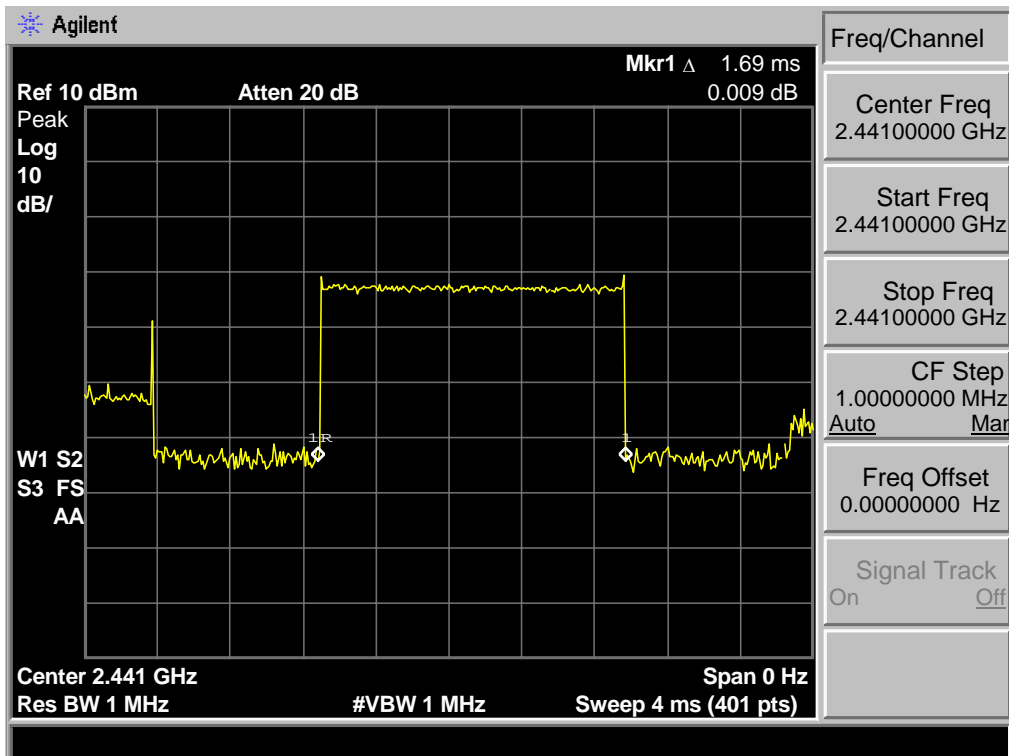
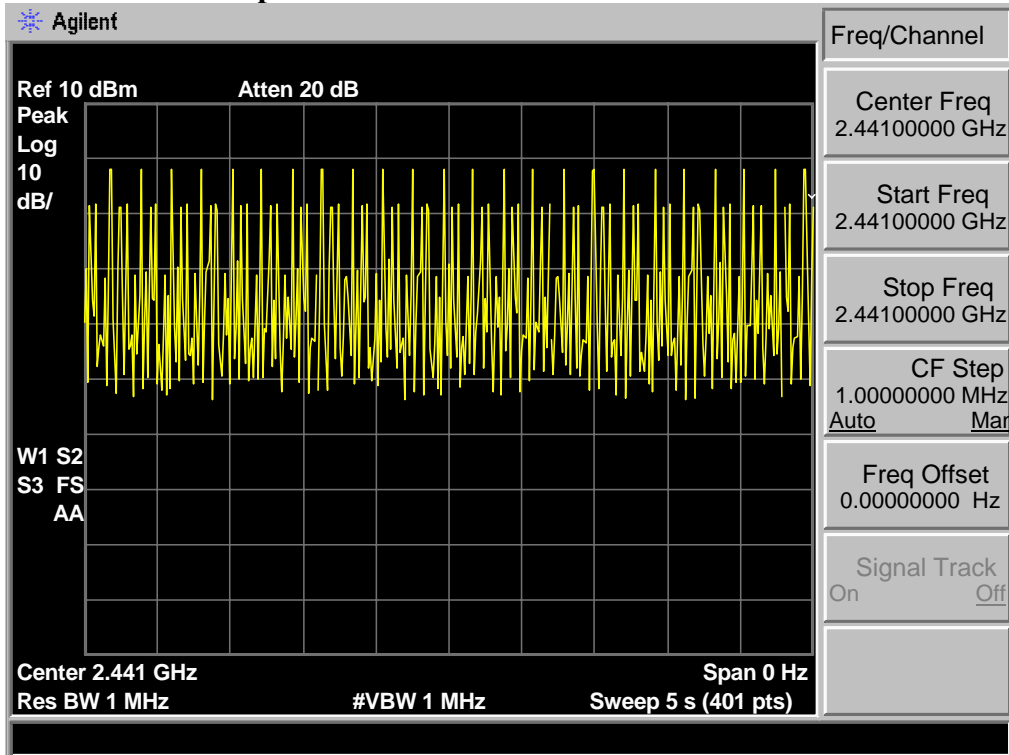
EUT: Speaker			
M/N: SHELFSYS			
Test date: 2016-05-15		Test site: RF site	Tested by: Tony Tang
Mode	Dwell time (ms)	Limit	Conclusion
GFSK DH1	130.1	<400ms	PASS
GFSK DH3	256.3	<400ms	PASS
GFSK DH5	305.1	<400ms	PASS
8-DPSK 3DH1	185.8	<400ms	PASS
8-DPSK 3DH3	260.9	<400ms	PASS
8-DPSK 3DH5	306.2	<400ms	PASS

7.4. Test Data

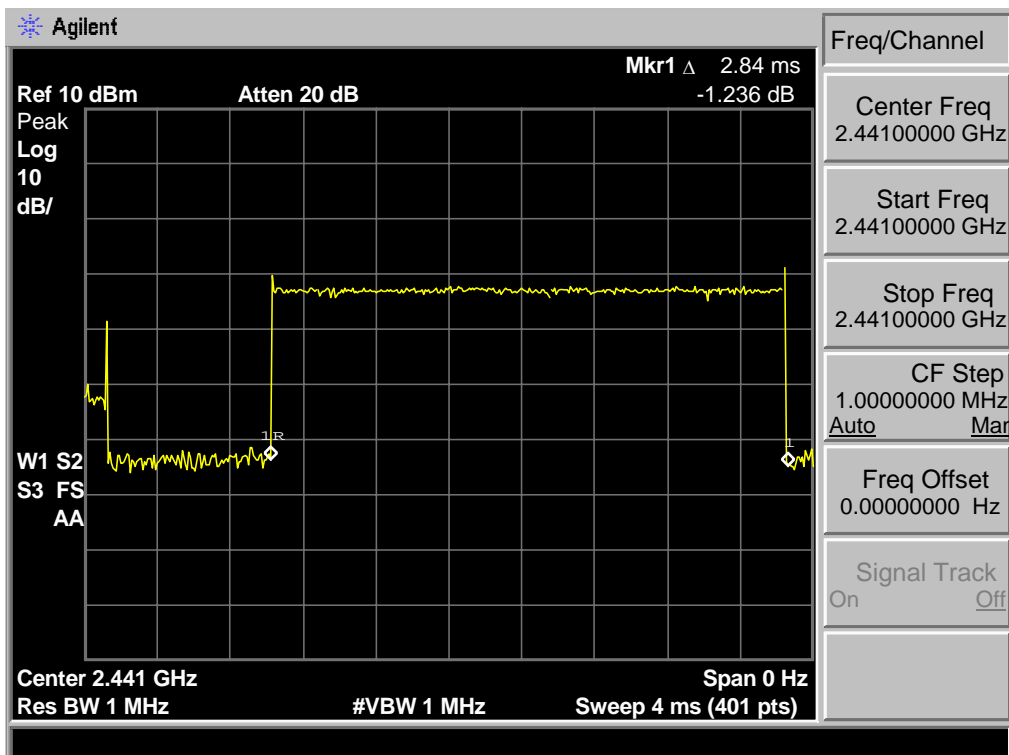
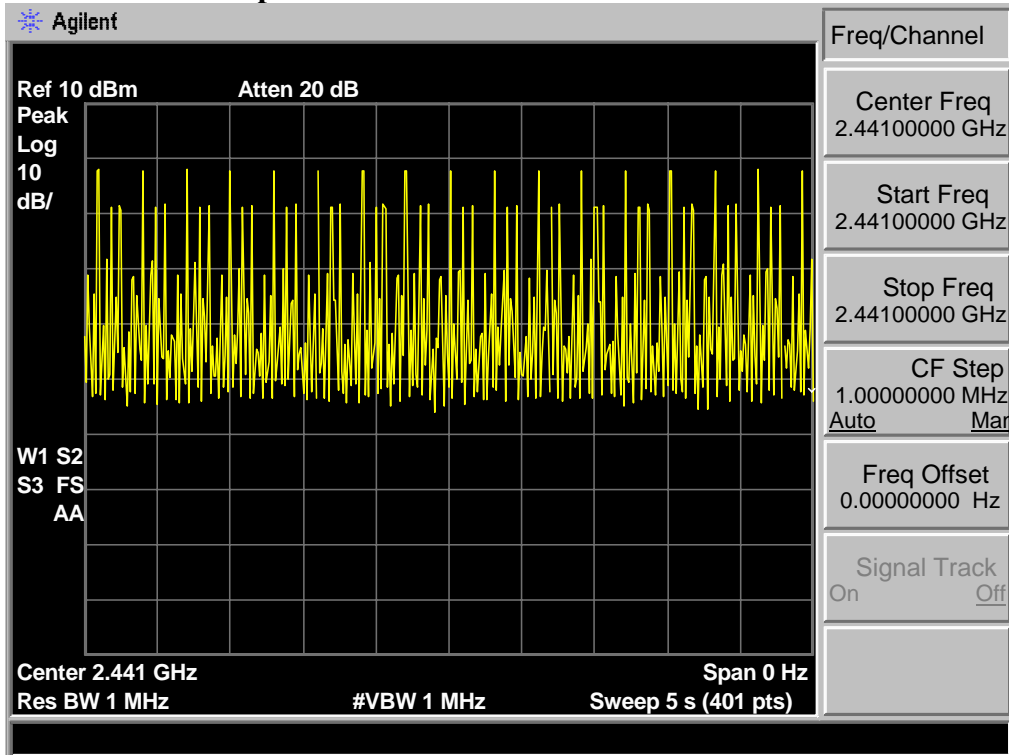
**GFSK DH1 : 49hop/5s \* 0.4 \* 79 \* 0.42ms = 130.1**



**GFSK DH3 : 24hop/5s \* 0.4 \* 79 \* 1.69ms= 256.3**

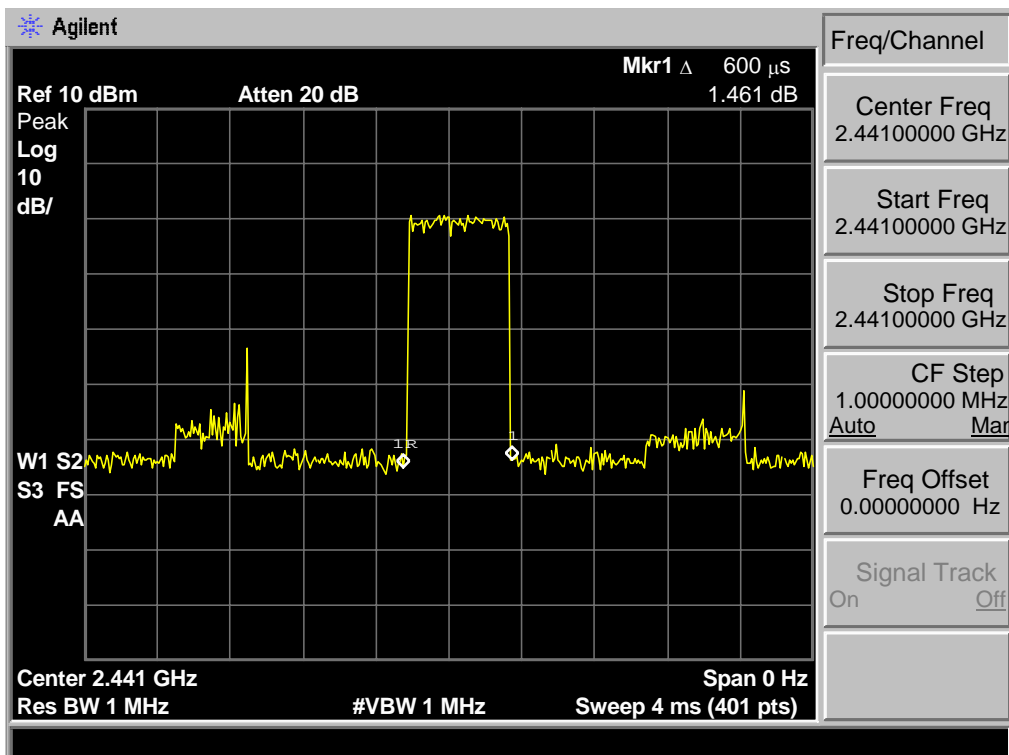
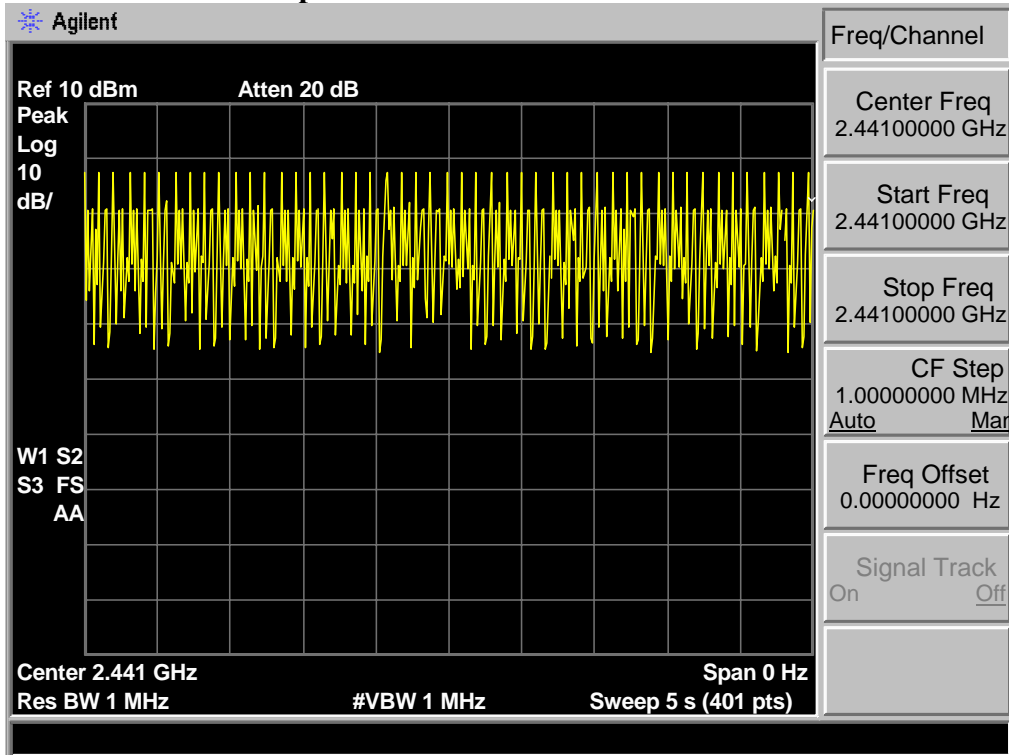


**GSFK DH5 : 17hop/5s \* 0.4 \* 79 \* 2.84ms = 305.1**

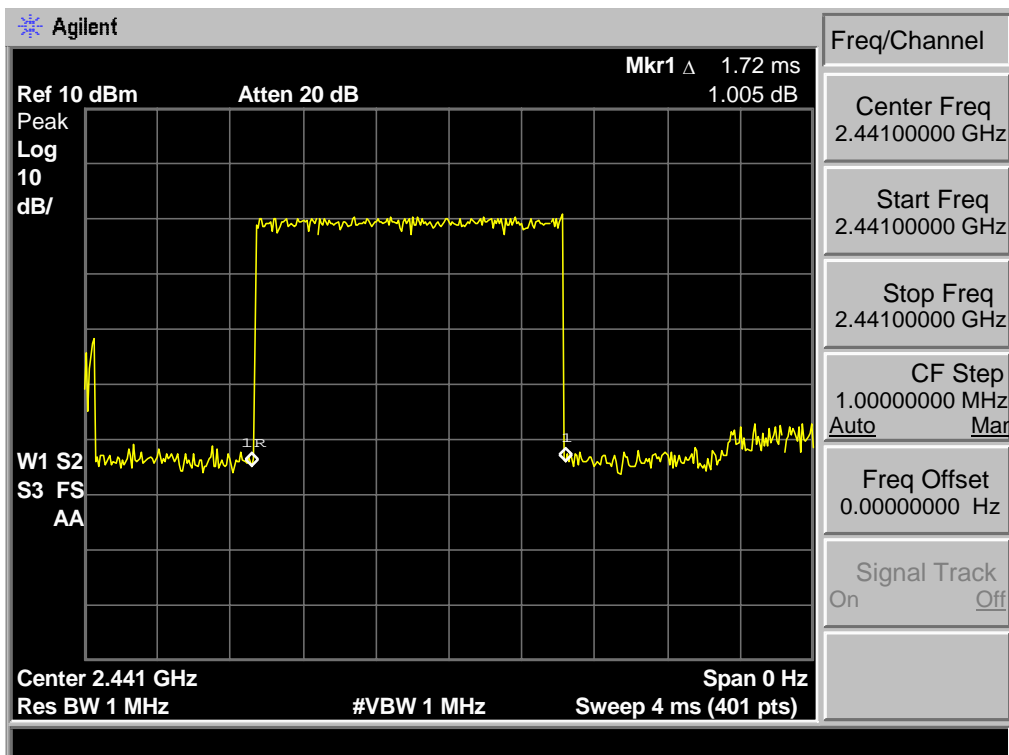
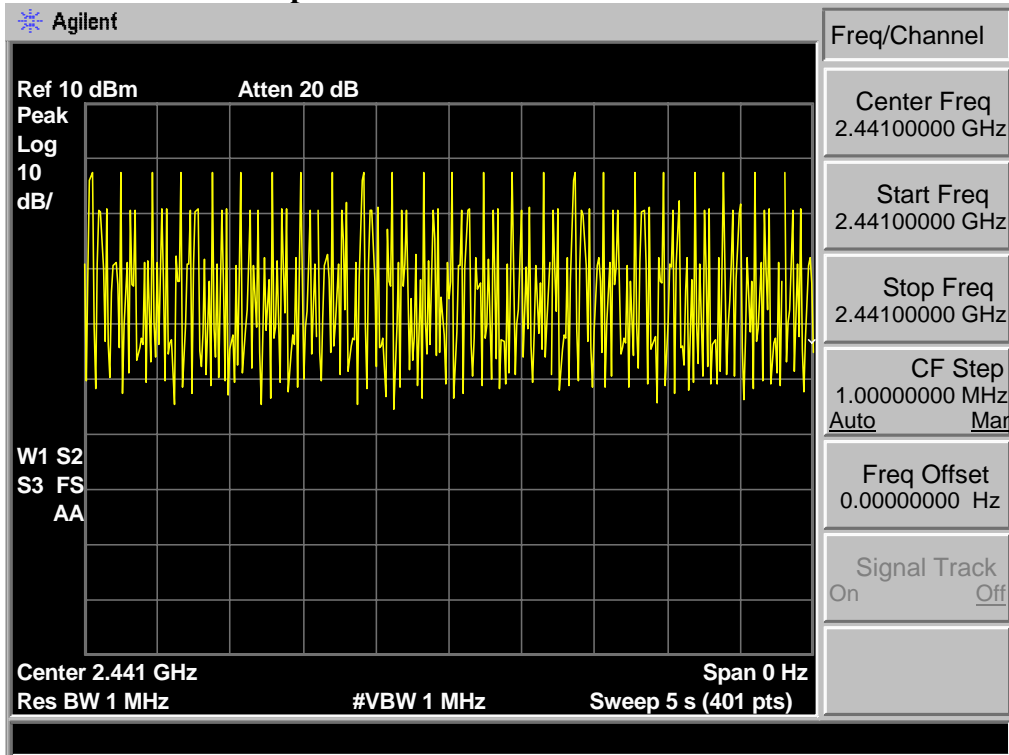




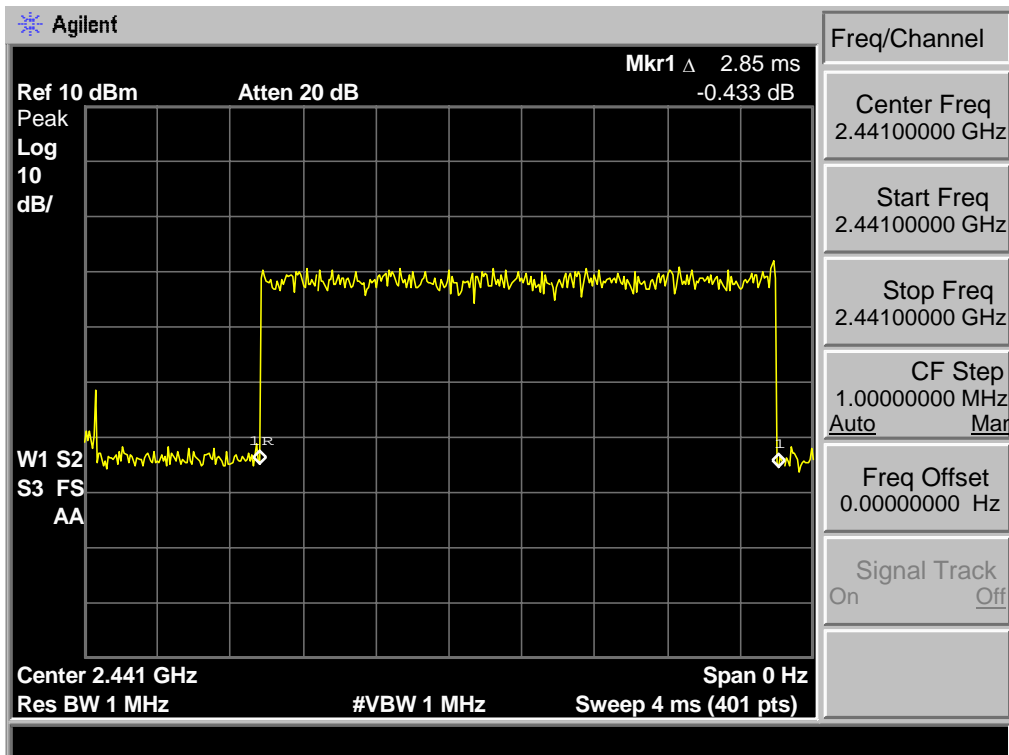
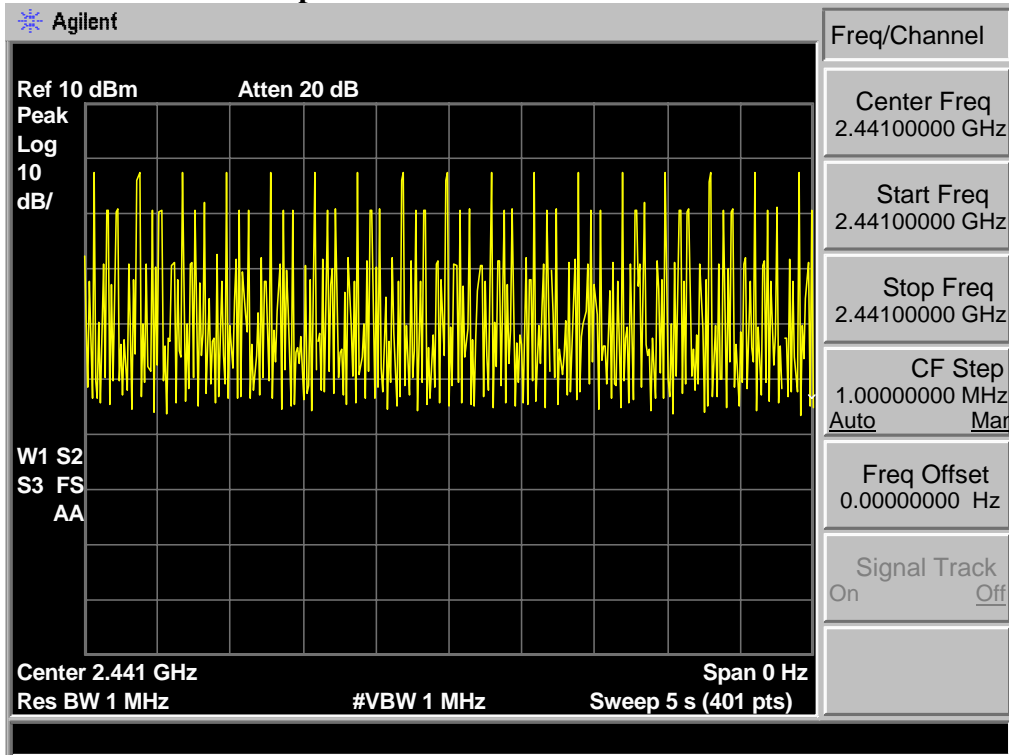
8-DPSK 3DH1 : 49hop/5s \* 0.4\* 79 \*0.6ms = 185.8



8-DPSK 3DH3: 24hop/5s \* 0.4 \* 79 \* 1.72ms = 260.9



8-DPSK 3DH5 : 17hop/5s \* 0.4 \* 79 \* 2.85ms = 306.2



## 8. RADIATED EMISSIONS

### 8.1. Limit

All the emissions appearing within 15.205 restricted frequency bands shall not exceed the limits shown in 15.209, all the other emissions shall be at least 20dB below the fundamental emissions, or comply with 15.209 limits.

#### 15.205 Restricted frequency band

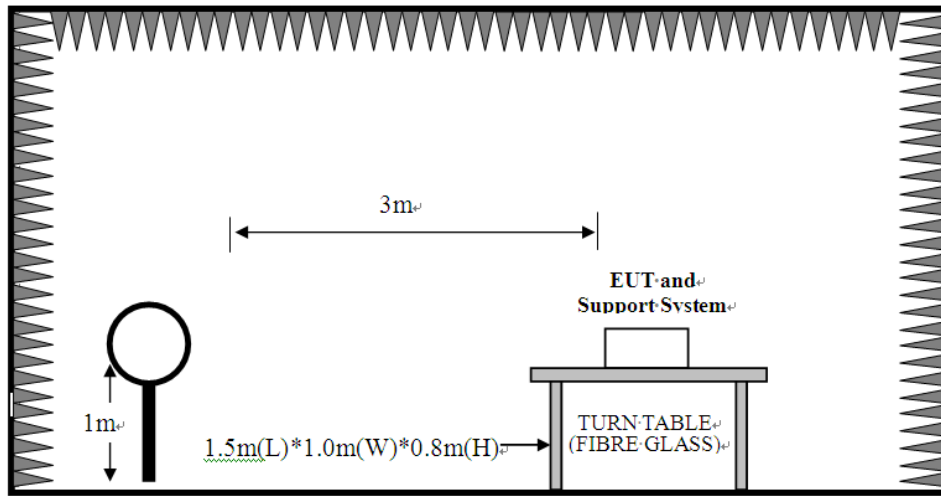
MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
<sup>1</sup> 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2690 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	( <sup>2</sup> )

#### 15.209 Limit

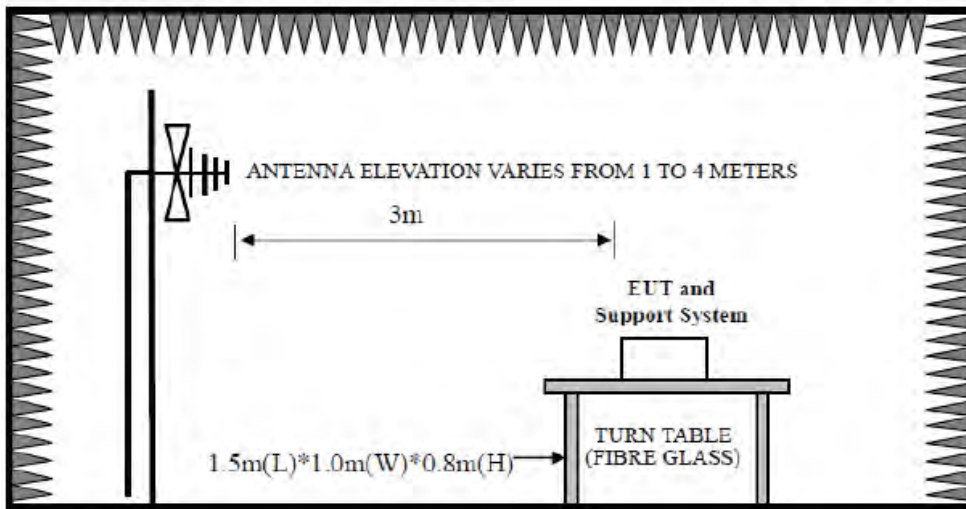
FREQUENCY MHz	DISTANCE Meters	FIELD STRENGTHS LIMIT	
		μV/m	dB(μV)/m
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46.0
960 ~ 1000	3	500	54.0
Above 1000	3	74.0 dB(μV)/m (Peak) 54.0 dB(μV)/m (Average)	

## 8.2. Block Diagram of Test setup

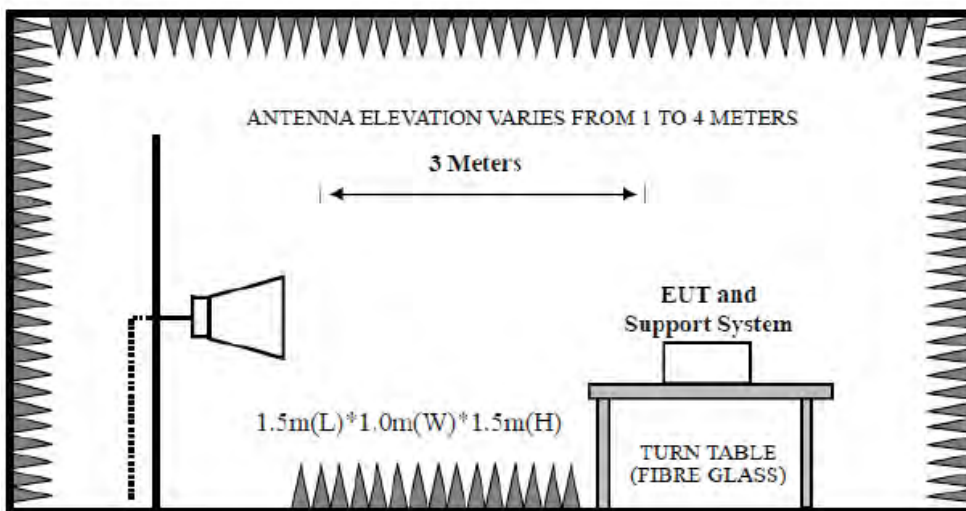
9kHz~30MHz



30~1000MHz



Above 1GHz



### 8.3. Test Procedure

EUT was placed on a turn table, which is 0.8 meter high above ground for 30~1000MHz test, and which is 1.5 meter high above ground for above 1GHz test. The turn table can rotate 360 degrees to determine the position of the maximum emission level. Power on the EUT and let it working in test mode, then test it. EUT is set 3 meters away from the receiving antenna, which is mounted on an antenna tower. The antenna can be moved up and down between 1 meter and 4 meters to find out the maximum emission level. Both horizontal and vertical polarization of the antenna are set on test.

For the radiated emission test above 1GHz:

Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.

The bandwidth of the EMI test receiver (R&S ESVS10) is set at 120kHz for frequency range from 30MHz to 1000 MHz.

The bandwidth of the Spectrum's VBW is set at 1MHz and RBW is set at 1MHz for peak emissions measurement above 1GHz and 1MHz RBW, 10Hz VBW for average emissions measure above 1GHz

PEAK detector, 1MHz/1MHz for PAEK measurement,

PEAK detector, 1MHz/10Hz for Average measurement

The frequency range from 30MHz to 10th harmonic (25GHz) are checked.

### 8.4. Test Result

30MHz—25GHz Radiated emission Test result
EUT: Speaker
M/N: SHELF SYS
Power: AC 120V/60Hz
Test date: 2016-05-16~2016-05-21 Test site: 3m Chamber Tested by: Tony Tang
Test mode: Tx Mode
Pass

Note: 1、 For emissions above 1GHz, if peak level comply with average limit, then the average level is deemed to comply with average limit.

2、 The frequency 2402MHz 、 2441MHz and 2480MHz is fundamental frequency which no limit, the limit on plots is automatically generated by the software, it's not fundamental limit, we can't remove it.

## 8.5. Test Data

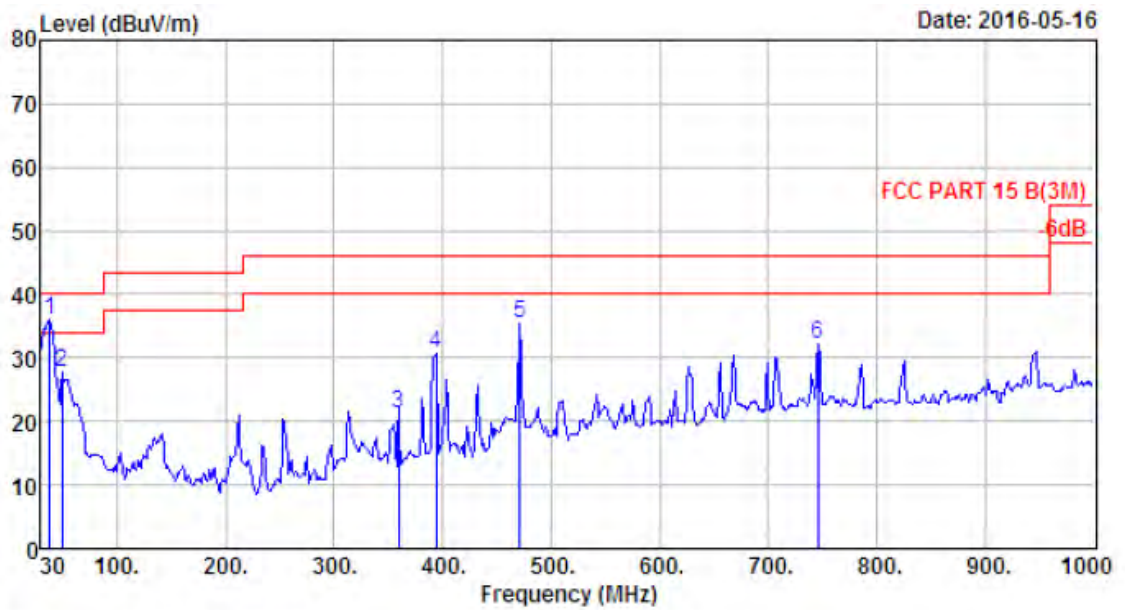
9 kHz – 30 MHz

Pass

Note: The amplitude of spurious emission that is attenuated by more than 20dB below the permissible limit has no need to be reported.

### 8.6. Test Data

30 MHz – 1000 MHz

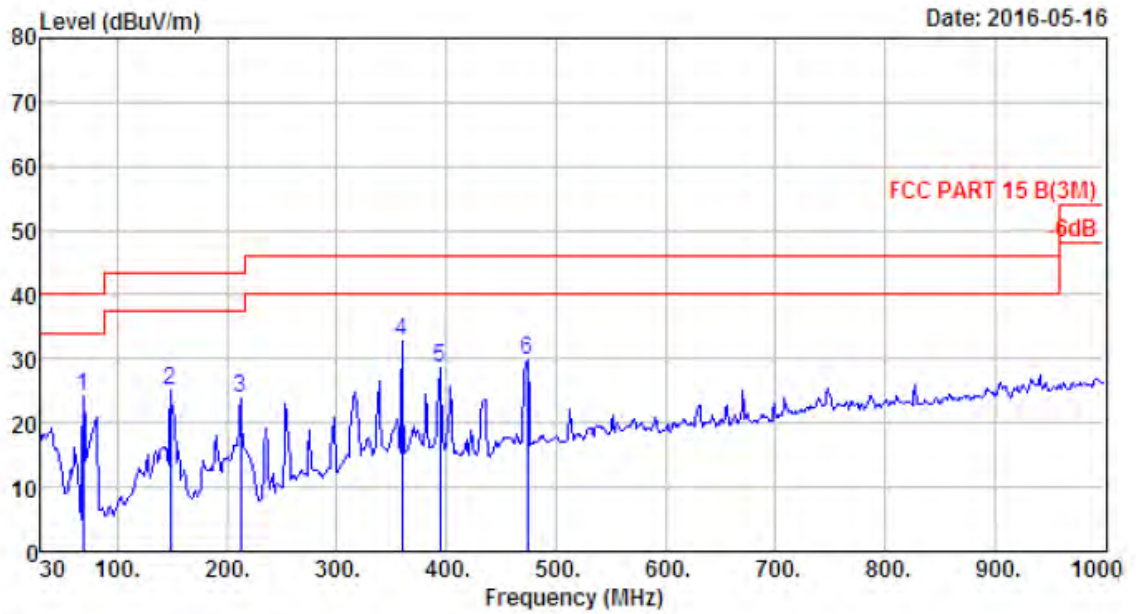


```

Site no.       : 966 1# chamber           Data no.   : 41
Dis. / Ant.    : 3m 27137                 Ant. pol.  : VERTICAL
Limit          : FCC PART 15 B(3M)
Env. / Ins.    : Temp:23.6';Humi:56%;Press:101.52kPa
Engineer      : Tony
EUI           : Speaker
Power         : AC 120V/60Hz
M/N           : SHELFSYS
Test Mode     : GFSK TX 2402MHz
    
```

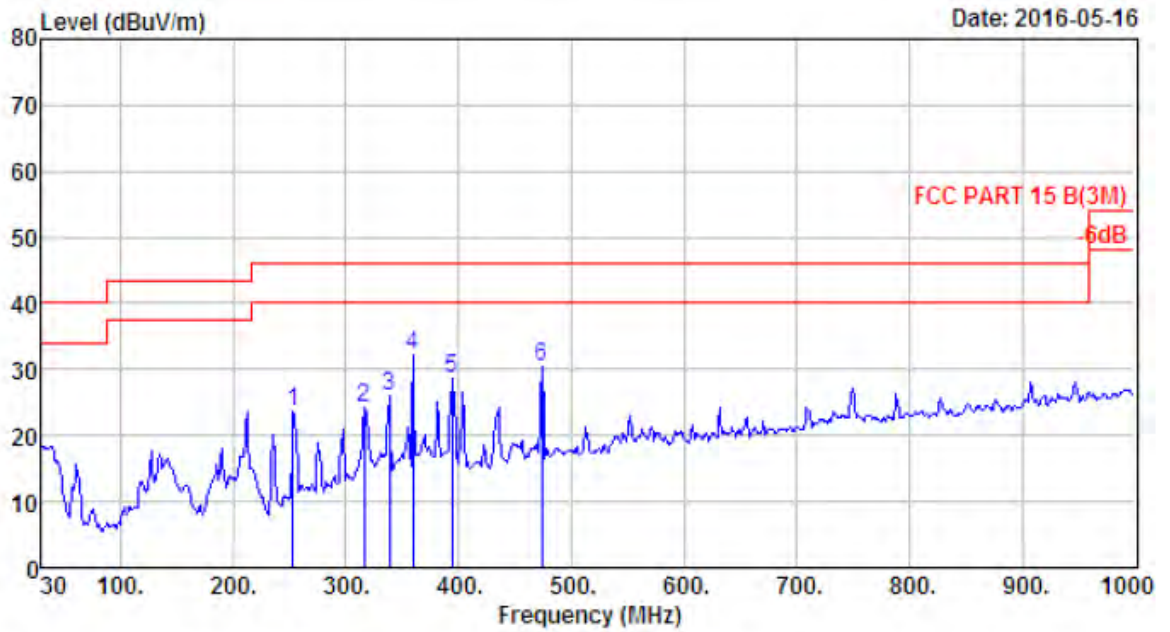
	Freq. (MHz)	ANT Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	37.76	14.05	0.79	21.29	36.13	40.00	3.87	QP
2	49.40	7.90	0.95	19.01	27.86	40.00	12.14	QP
3	359.80	14.45	2.59	4.32	21.36	46.00	24.64	QP
4	393.75	15.78	2.58	12.26	30.62	46.00	15.38	QP
5	471.35	17.23	3.11	14.97	35.31	46.00	10.69	QP
6	745.86	22.26	3.90	6.12	32.28	46.00	13.72	QP





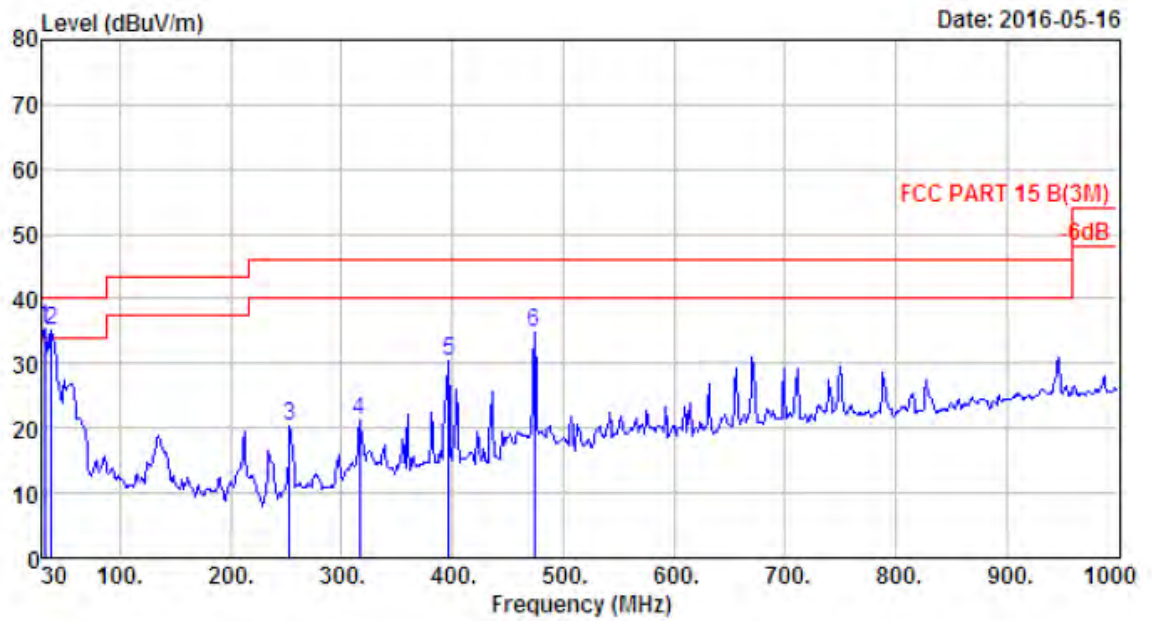
Site no. : site Data no. : 42  
 Dis. / Ant. : 3m 27137 Ant. pol. : HORIZONTAL  
 Limit : FCC PART 15 B(3M)  
 Env. / Ins. : Temp:23.6';Humi:56%;Press:101.52kPa  
 Engineer : Tony  
 EUT : Speaker  
 Power : AC 120V/60Hz  
 M/N : SHELF SYS  
 Test Mode : GFSK TX 2402MHz

	Freq. (MHz)	ANT Factor (dB/m)	Cable Loss (dB)	Reading (dBUV)	Emission Level (dBUV/m)	Limit (dBUV/m)	Margin (dB)	Remark
1	68.80	5.51	1.10	17.73	24.34	40.00	15.66	QP
2	148.34	11.00	1.69	12.50	25.19	43.50	18.31	QP
3	212.36	8.56	1.91	13.51	23.98	43.50	19.52	QP
4	359.80	14.45	2.59	15.71	32.75	46.00	13.25	QP
5	393.75	15.78	2.58	10.31	28.67	46.00	17.33	QP
6	474.26	17.31	3.02	9.45	29.78	46.00	16.22	QP



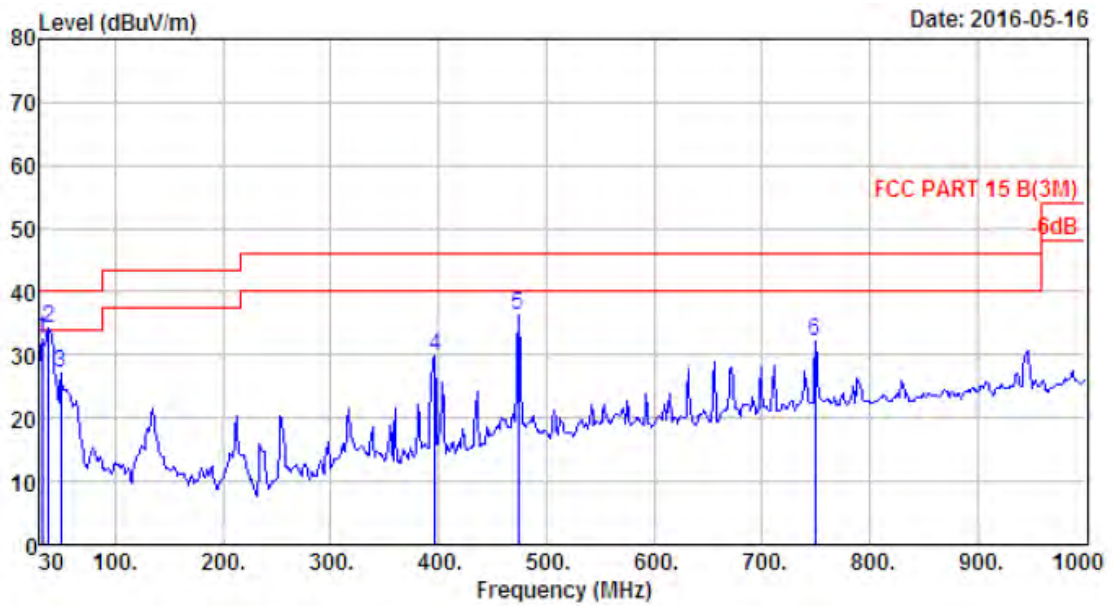
Site no. : 966 1# chamber                      Data no. : 43  
 Dis. / Ant. : 3m 27137                      Ant. pol. : HORIZONTAL  
 Limit : FCC PART 15 B(3M)  
 Env. / Ins. : Temp:23.6';Humi:56%;Press:101.52kPa  
 Engineer : Tony  
 EUT : Speaker  
 Power : AC 120V/60Hz  
 M/N : SHELFSYS  
 Test Mode : GFSK TX 2441MHz

	Freq. (MHz)	ANT Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	253.10	12.17	2.17	9.40	23.74	46.00	22.26	QP
2	316.15	13.42	2.41	8.33	24.16	46.00	21.84	QP
3	338.46	14.10	2.50	9.46	26.06	46.00	19.94	QP
4	359.80	14.45	2.59	15.23	32.27	46.00	13.73	QP
5	393.75	15.78	2.58	10.26	28.62	46.00	17.38	QP
6	474.26	17.31	3.02	9.99	30.32	46.00	15.68	QP



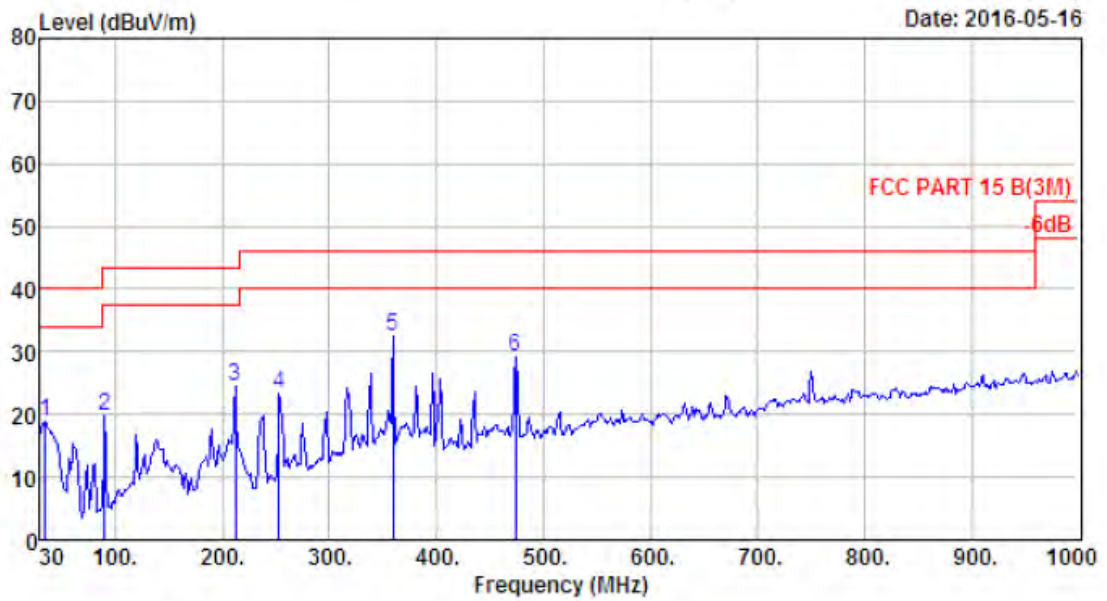
Site no. : 966 1# chamber Data no. : 44  
 Dis. / Ant. : 3m 27137 Ant. pol. : VERTICAL  
 Limit : FCC PART 15 B(3M)  
 Env. / Ins. : Temp:23.6';Humi:56%;Press:101.52kPa  
 Engineer : Tony  
 EUT : Speaker  
 Power : AC 120V/60Hz  
 M/N : SHELFSYS  
 Test Mode : GFSK TX 2441MHz

	Freq. (MHz)	ANT Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	31.94	17.14	0.69	17.51	35.34	40.00	4.66	QP
2	37.76	14.05	0.79	20.34	35.18	40.00	4.82	QP
3	253.10	12.17	2.17	5.89	20.23	46.00	25.77	QP
4	316.15	13.42	2.41	5.50	21.33	46.00	24.67	QP
5	396.66	15.91	2.63	11.90	30.44	46.00	15.56	QP
6	474.26	17.31	3.02	14.54	34.87	46.00	11.13	QP



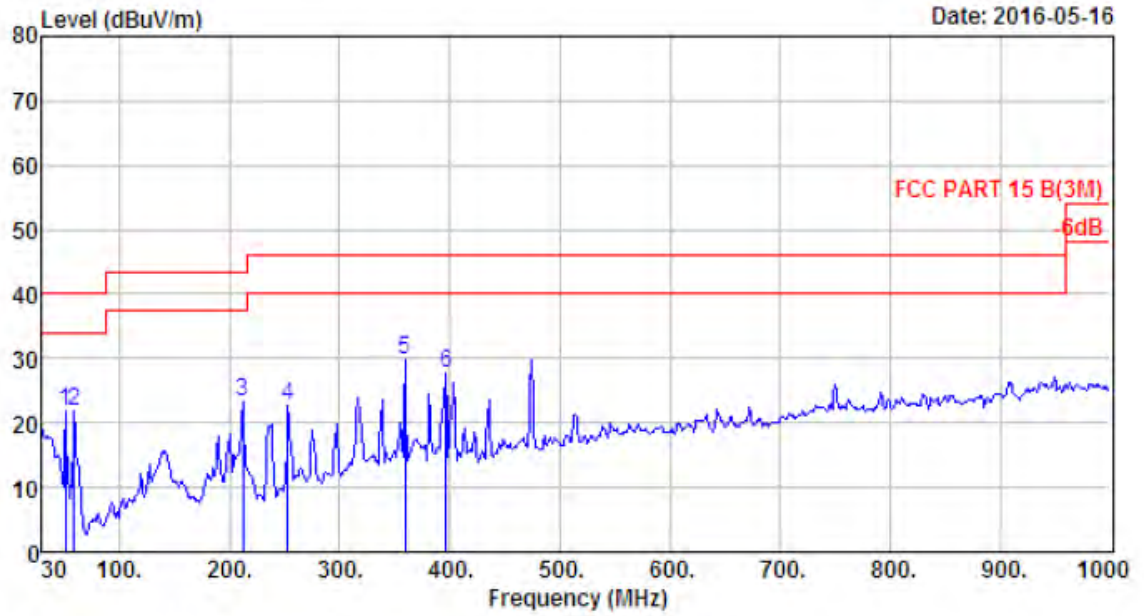
Site no. : 966 1# chamber Data no. : 45  
 Dis. / Ant. : 3m 27137 Ant. pol. : VERTICAL  
 Limit : FCC PART 15 B(3M)  
 Env. / Ins. : Temp:23.6';Humi:56%;Press:101.52kPa  
 Engineer : Tony  
 EUI : Speaker  
 Power : AC 120V/60Hz  
 M/N : SHELFSYS  
 Test Mode : GFSK IX 2480MHz

	Freq. (MHz)	ANT Factor (dB/m)	Cable Loss (dB)	Reading (dBUV)	Emission Level (dBUV/m)	Limit (dBUV/m)	Margin (dB)	Remark
1	31.94	17.14	0.69	14.65	32.48	40.00	7.52	QP
2	37.76	14.05	0.79	19.39	34.23	40.00	5.77	QP
3	49.40	7.90	0.95	18.18	27.03	40.00	12.97	QP
4	396.66	15.91	2.63	11.41	29.95	46.00	16.05	QP
5	474.26	17.31	3.02	16.01	36.34	46.00	9.66	QP
6	749.74	22.19	3.81	6.25	32.25	46.00	13.75	QP



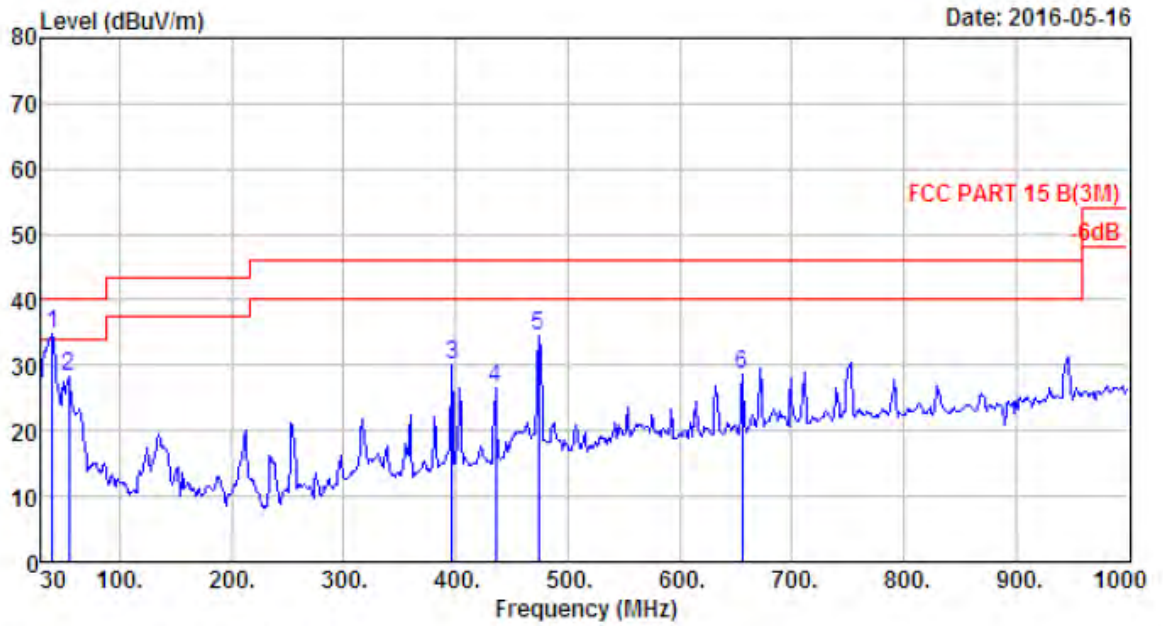
Site no. : 966 1# chamber                      Data no. : 46  
 Dis. / Ant. : 3m 27137                      Ant. pol. : HORIZONTAL  
 Limit : FCC PART 15 B(3M)  
 Env. / Ins. : Temp:23.6';Humi:56%;Press:101.52kPa  
 Engineer : Tony  
 EUT : Speaker  
 Power : AC 120V/60Hz  
 M/N : SHELFSYS  
 Test Mode : GFSK TX 2480MHz

	Freq. (MHz)	ANT Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	34.85	15.55	0.72	2.62	18.89	40.00	21.11	QP
2	90.14	8.38	1.33	10.05	19.76	43.50	23.74	QP
3	212.36	8.56	1.91	13.99	24.46	43.50	19.04	QP
4	253.10	12.17	2.17	8.91	23.25	46.00	22.75	QP
5	359.80	14.45	2.59	15.48	32.52	46.00	13.48	QP
6	474.26	17.31	3.02	8.86	29.19	46.00	16.81	QP



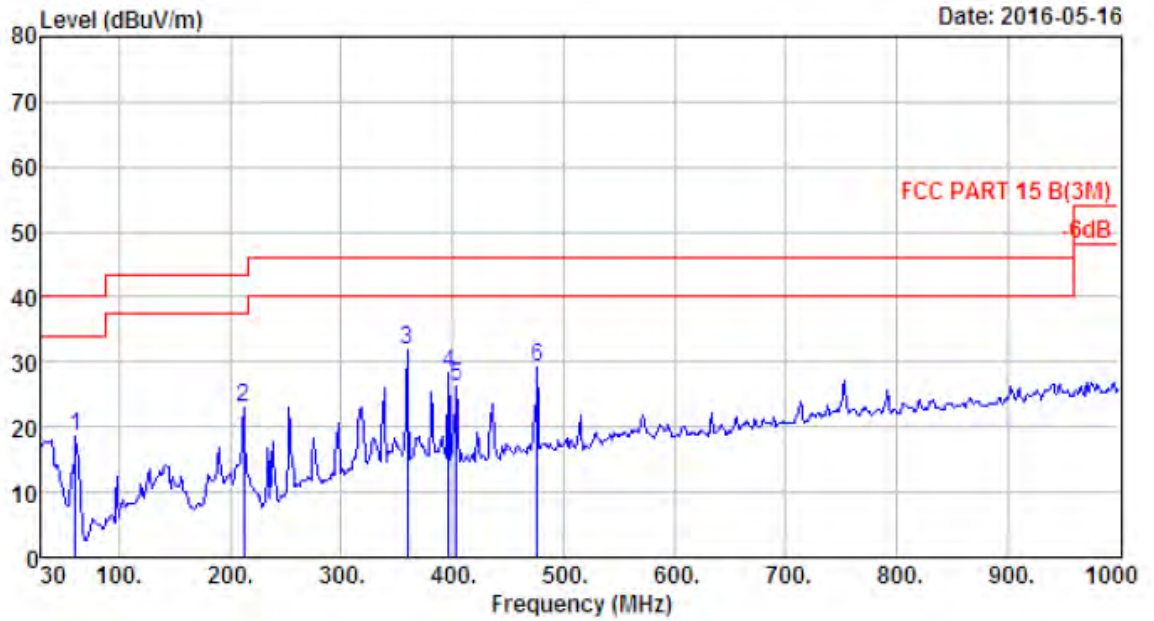
Site no. : 966 1# chamber                      Data no. : 47  
 Dis. / Ant. : 3m 27137                              Ant. pol. : HORIZONTAL  
 Limit : FCC PART 15 B(3M)  
 Env. / Ins. : Temp:23.6';Humi:56%;Press:101.52kPa  
 Engineer : Tony  
 EUT : Speaker  
 Power : AC 120V/60Hz  
 M/N : SHELFSYS  
 Test Mode : 8-DPSK TX 2402MHz

	Freq. (MHz)	ANT Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	51.34	6.92	0.89	13.90	21.71	40.00	18.29	QP
2	59.10	4.80	1.00	16.01	21.81	40.00	18.19	QP
3	212.36	8.56	1.91	12.91	23.38	43.50	20.12	QP
4	253.10	12.17	2.17	8.53	22.87	46.00	23.13	QP
5	359.80	14.45	2.59	12.73	29.77	46.00	16.23	QP
6	396.66	15.91	2.63	9.09	27.63	46.00	18.37	QP



Site no. : 966 1# chamber                      Data no. : 48  
 Dis. / Ant. : 3m 27137                      Ant. pol. : VERTICAL  
 Limit : FCC PART 15 B(3M)  
 Env. / Ins. : Temp:23.6';Humi:56%;Press:101.52kPa  
 Engineer : Tony  
 EUI : Speaker  
 Power : AC 120V/60Hz  
 M/N : SHELFSYS  
 Test Mode : B-DPSK TX 2402MHz

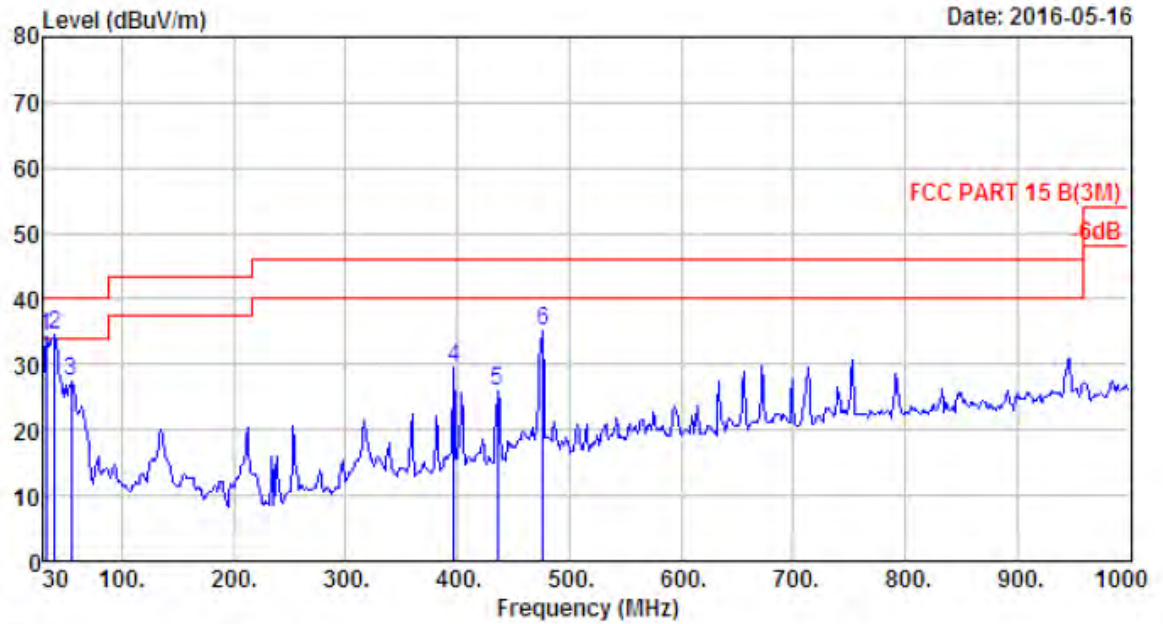
	Freq. (MHz)	ANT Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	39.70	12.90	0.81	21.17	34.88	40.00	5.12	QP
2	54.25	5.82	0.93	21.65	28.40	40.00	11.60	QP
3	396.66	15.91	2.63	11.60	30.14	46.00	15.86	QP
4	435.46	16.16	2.82	7.56	26.54	46.00	19.46	QP
5	474.26	17.31	3.02	14.33	34.66	46.00	11.34	QP
6	655.65	20.08	3.61	4.99	28.68	46.00	17.32	QP



Site no. : 966 1# chamber Data no. : 49  
 Dis. / Ant. : 3m 27137 Ant. pol. : HORIZONTAL  
 Limit : FCC PART 15 B(3M)  
 Env. / Ins. : Temp:23.6';Humi:56%;Press:101.52kPa  
 Engineer : Tony  
 EUT : Speaker  
 Power : AC 120V/60Hz  
 M/N : SHELFSYS  
 Test Mode : 8-DPSK TX 2441MHz

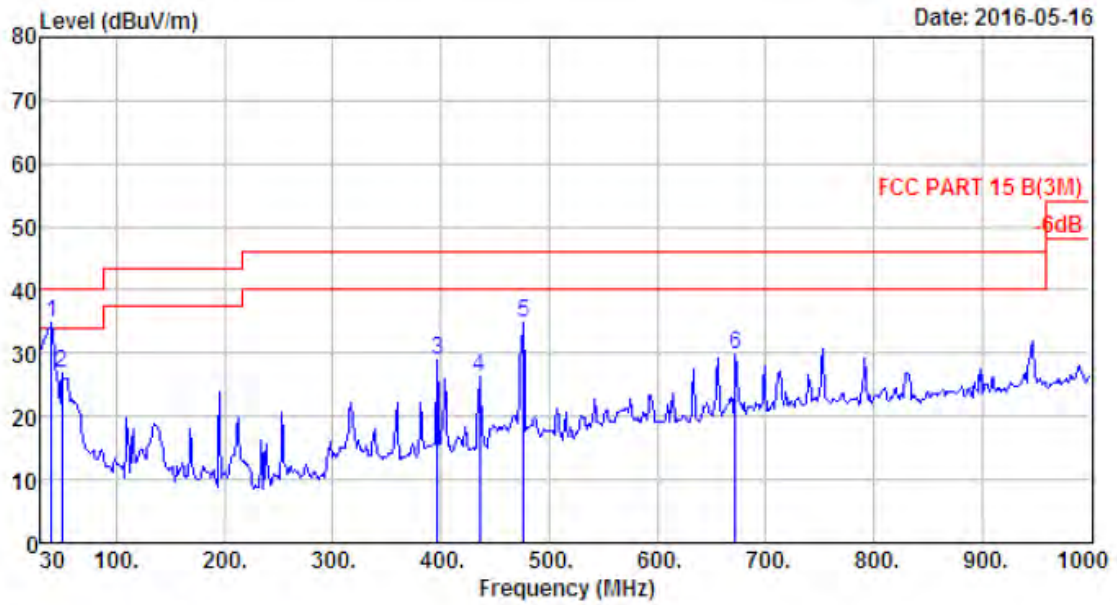
	Freq. (MHz)	ANT Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	61.04	4.74	0.94	12.79	18.47	40.00	21.53	QP
2	212.36	8.56	1.91	12.66	23.13	43.50	20.37	QP
3	359.80	14.45	2.59	14.83	31.87	46.00	14.13	QP
4	396.66	15.91	2.63	9.81	28.35	46.00	17.65	QP
5	403.45	16.14	2.69	7.59	26.42	46.00	19.58	QP
6	476.20	17.35	3.01	8.84	29.20	46.00	16.80	QP





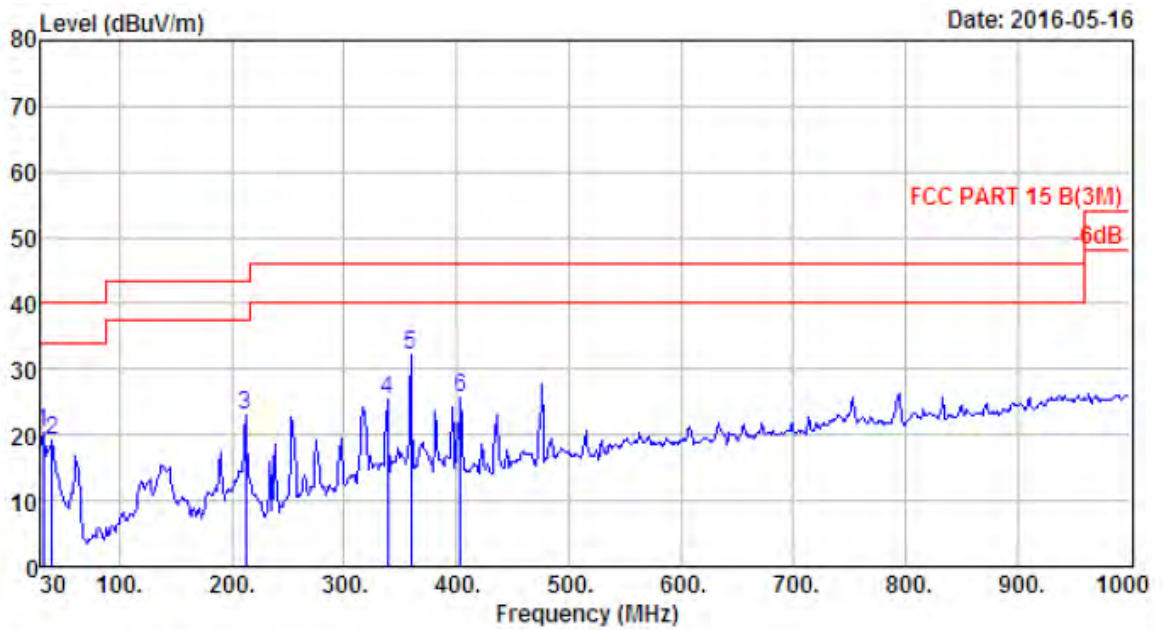
Site no. : 966 1# chamber                      Data no. : 50  
 Dis. / Ant. : 3m 27137                      Ant. pol. : VERTICAL  
 Limit : FCC PART 15 B(3M)  
 Env. / Ins. : Temp:23.6';Humi:56%;Press:101.52kPa  
 Engineer : Tony  
 EUT : Speaker  
 Power : AC 120V/60Hz  
 M/N : SHELFSYS  
 Test Mode : 8-DPSK TX 2441MHz

	Freq. (MHz)	ANT Factor (dB/m)	Cable Loss (dB)	Reading (dBUV)	Emission Level (dBUV/m)	Limit (dBUV/m)	Margin (dB)	Remark
1	31.94	17.14	0.69	16.39	34.22	40.00	5.78	QP
2	39.70	12.90	0.81	20.88	34.59	40.00	5.41	QP
3	54.25	5.82	0.93	20.70	27.45	40.00	12.55	QP
4	396.66	15.91	2.63	11.08	29.62	46.00	16.38	QP
5	435.46	16.16	2.82	6.92	25.90	46.00	20.10	QP
6	476.20	17.35	3.01	14.82	35.18	46.00	10.82	QP



Site no. : 966 1# chamber                      Data no. : 51  
 Dis. / Ant. : 3m 27137                              Ant. pol. : VERTICAL  
 Limit : FCC PART 15 B(3M)  
 Env. / Ins. : Temp:23.6';Humi:56%;Press:101.52kPa  
 Engineer : Tony  
 EUT : Speaker  
 Power : AC 120V/60Hz  
 M/N : SHELFSYS  
 Test Mode : 8-DPSK IX 2480MHz

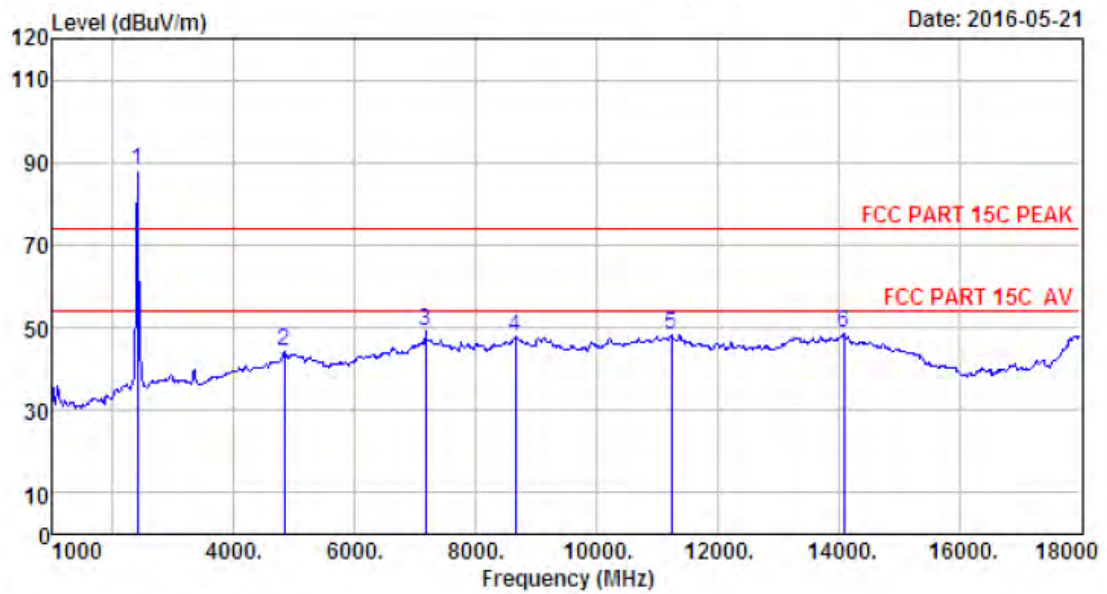
	Freq. (MHz)	ANT Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	39.70	12.90	0.81	21.08	34.79	40.00	5.21	QP
2	49.40	7.90	0.95	17.90	26.75	40.00	13.25	QP
3	396.66	15.91	2.63	10.33	28.87	46.00	17.13	QP
4	435.46	16.16	2.82	7.37	26.35	46.00	19.65	QP
5	476.20	17.35	3.01	14.52	34.88	46.00	11.12	QP
6	672.14	20.23	3.62	5.83	29.68	46.00	16.32	QP



Site no. : 966 1# chamber                      Data no. : 52  
 Dis. / Ant. : 3m 27137                              Ant. pol. : HORIZONTAL  
 Limit : FCC PART 15 B(3M)  
 Env. / Ins. : Temp:23.6';Humi:56%;Press:101.52kPa  
 Engineer : Tony  
 EUI : Speaker  
 Power : AC 120V/60Hz  
 M/N : SHELSYS  
 Test Mode : 8-DPSK TX 2480MHz

	Freq. (MHz)	ANT Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	31.94	17.14	0.69	2.52	20.35	40.00	19.65	QP
2	39.70	12.90	0.81	5.61	19.32	40.00	20.68	QP
3	212.36	8.56	1.91	12.63	23.10	43.50	20.40	QP
4	338.46	14.10	2.50	8.71	25.31	46.00	20.69	QP
5	359.80	14.45	2.59	15.28	32.32	46.00	13.68	QP
6	403.45	16.14	2.69	6.95	25.78	46.00	20.22	QP

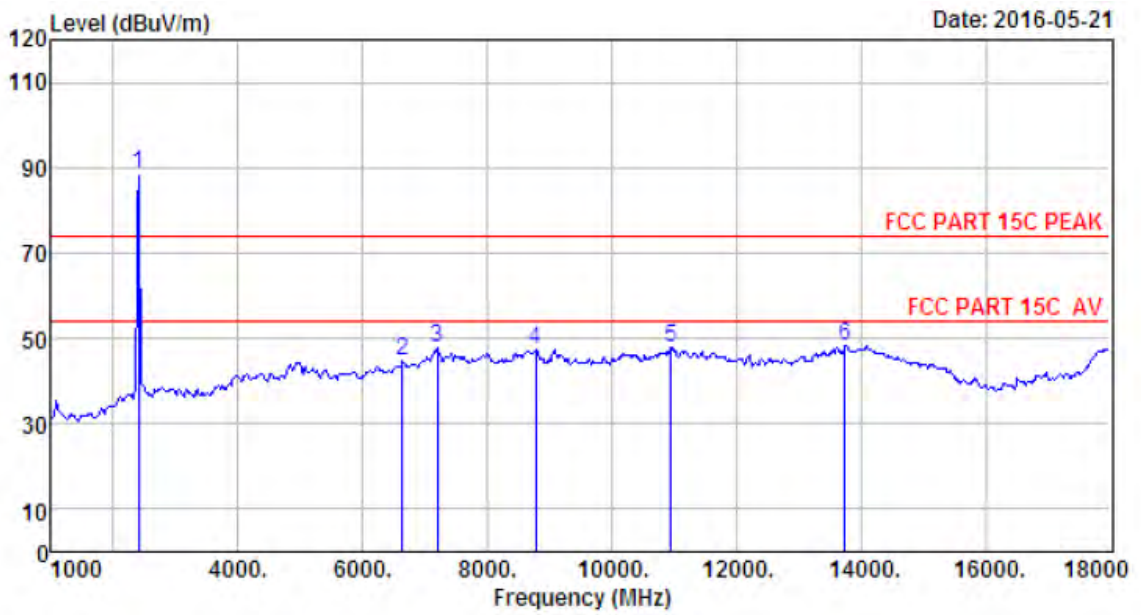
1000 MHz – 18000MHz



Site no. : 966 1# chamber Data no. : 1  
 Dis. / Ant. : 3m ANI 1-18G Ant. pol. : VERTICAL  
 Limit : FCC PART 15C PEAK  
 Env. / Ins. : Temp:23.6';Humi:56%;Press:101.52kPa  
 Engineer : Tony  
 EUT : Speaker  
 Power : AC 120V/60Hz  
 M/N : SHELF SYS  
 Test Mode : GFSK TX 2402MHz

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBUV)	Emission Level (dBUV/m)	Limite (dBUV/m)	Margin (dB)	Remark
1	2402.00	27.61	6.62	34.18	87.90	87.95	74.00	-13.95	Peak
2	4825.00	31.28	11.84	31.83	32.93	44.22	74.00	29.78	Peak
3	7171.00	36.34	11.53	32.18	33.68	49.37	74.00	24.63	Peak
4	8650.00	37.27	11.45	32.35	31.56	47.93	74.00	26.07	Peak
5	11234.00	39.37	11.12	34.10	31.91	48.30	74.00	25.70	Peak
6	14090.00	41.54	10.91	33.69	29.91	48.67	74.00	25.33	Peak

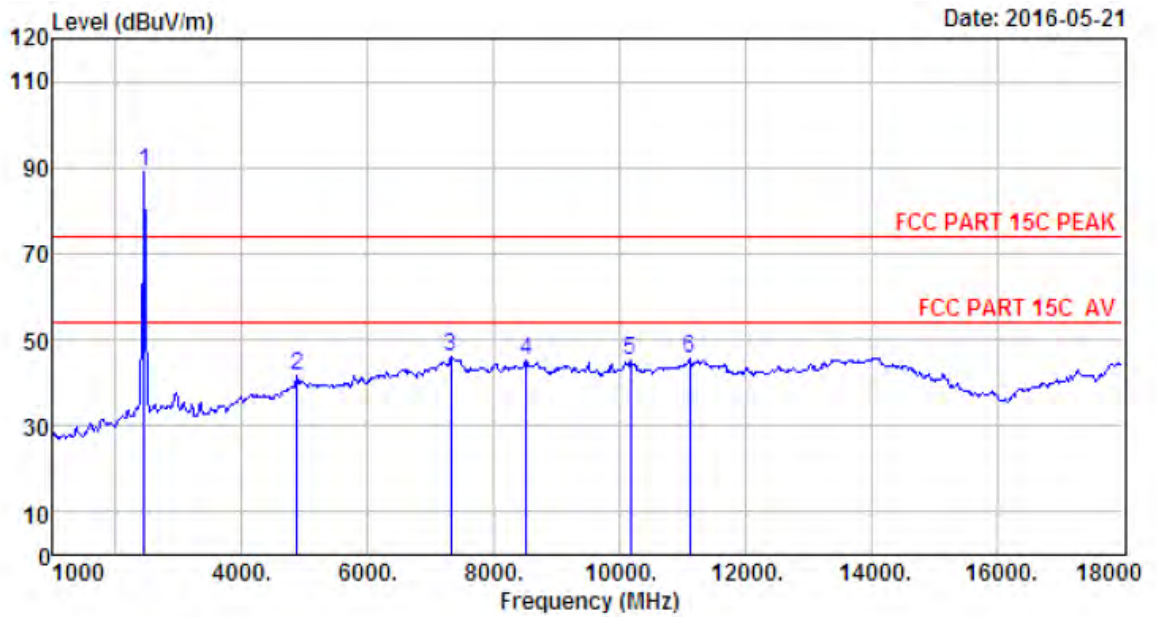
Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.  
 2. The emission levels that are 20dB below the official limit are not reported.



Site no. : 966 1# chamber Data no. : 2  
 Dis. / Ant. : 3m ANT 1-18G Ant. pol. : HORIZONTAL  
 Limit : FCC PART 15C PEAK  
 Env. / Ins. : Temp:23.6';Humi:56%;Press:101.52kPa  
 Engineer : Tony  
 EUI : Speaker  
 Power : AC 120V/60Hz  
 M/N : SHELF SYS  
 Test Mode : GFSK TX 2402MHz

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBUV)	Emission Level (dBUV/m)	Limits (dBUV/m)	Margin (dB)	Remark
1	2402.00	27.61	6.62	34.18	88.35	88.40	74.00	-14.40	Peak
2	6644.00	34.48	12.02	32.20	30.40	44.70	74.00	29.30	Peak
3	7205.00	36.52	11.54	32.11	31.85	47.80	74.00	26.20	Peak
4	8786.00	37.48	11.46	32.65	31.17	47.46	74.00	26.54	Peak
5	10945.00	39.46	11.29	33.55	30.59	47.79	74.00	26.21	Peak
6	13750.00	40.78	11.20	34.88	31.10	48.20	74.00	25.80	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.  
 2. The emission levels that are 20dB below the official limit are not reported.

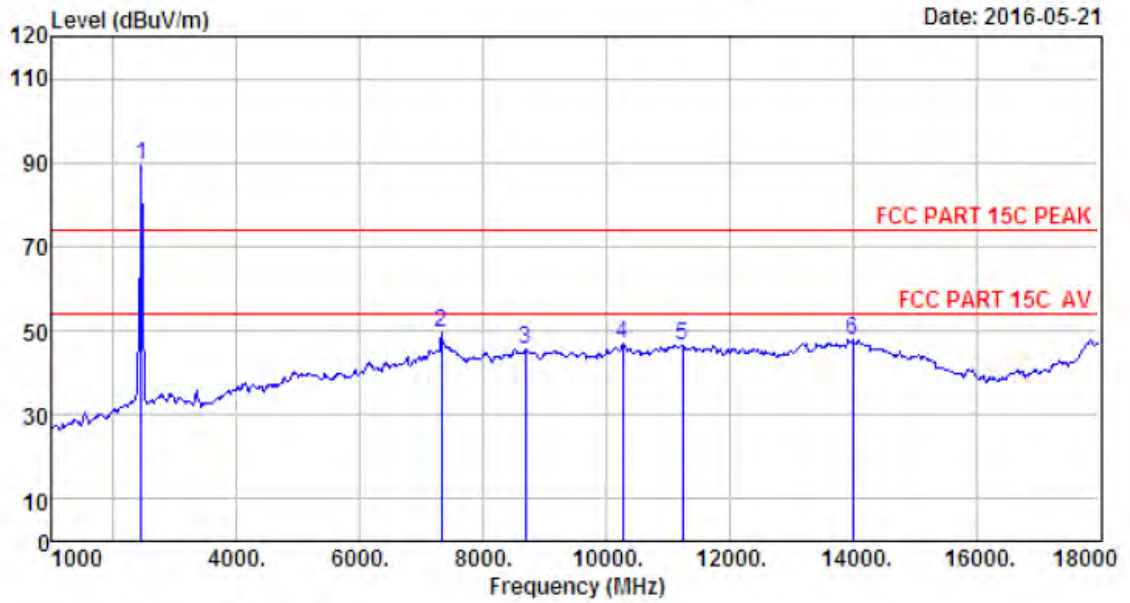


Date: 2016-05-21

Site no. : site Data no. : 5  
 Dis. / Ant. : 3m ANI 1-18G Ant. pol. : VERTICAL  
 Limit : FCC PART 15C PEAK  
 Env. / Ins. : Temp:23.6';Humi:56%;Press:101.52kPa  
 Engineer : Tony  
 EUT : Speaker  
 Power : AC 120V/60Hz  
 M/N : SHELF SYS  
 Test Mode : GFSK TX 2441MHz

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBUV)	Emission Level (dBUV/m)	Limits (dBUV/m)	Margin (dB)	Remark
1	2441.00	27.60	6.67	34.12	88.82	88.97	74.00	-14.97	Peak
2	4876.00	31.37	12.07	31.90	30.25	41.79	74.00	32.21	Peak
3	7324.00	36.55	11.57	31.99	30.04	46.17	74.00	27.83	Peak
4	8514.00	36.96	11.45	31.91	28.51	45.01	74.00	28.99	Peak
5	10180.00	38.42	11.49	32.11	27.20	45.00	74.00	29.00	Peak
6	11115.00	39.44	11.20	33.87	28.74	45.51	74.00	28.49	Peak

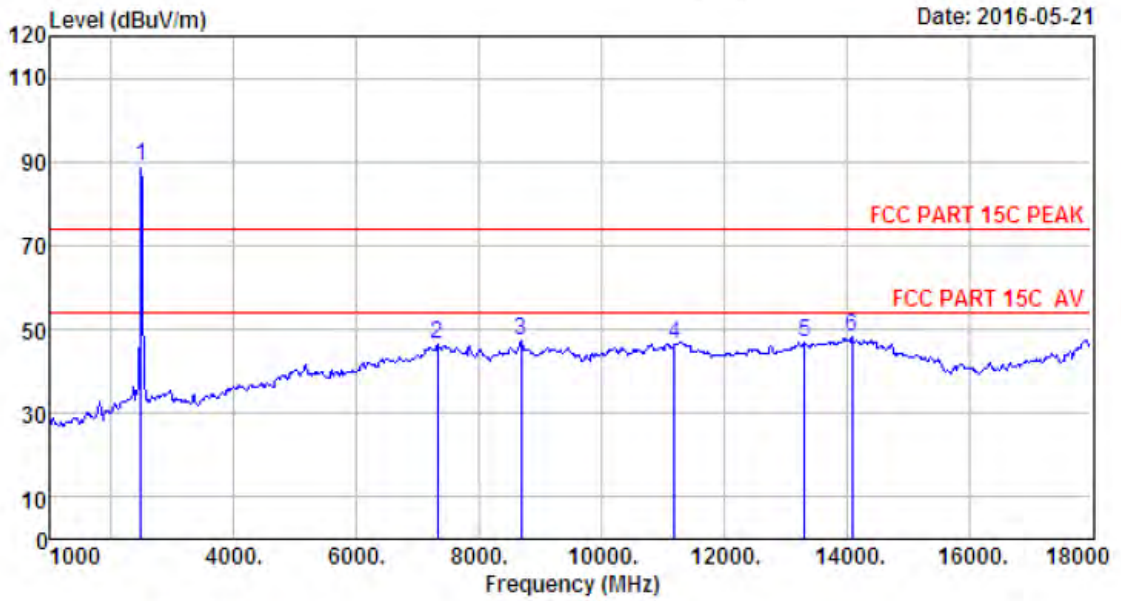
Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.  
 2. The emission levels that are 20dB below the official limit are not reported.



Site no. : 966 1# chamber                      Data no. : 6  
 Dis. / Ant. : 3m ANT 1-18G                      Ant. pol. : HORIZONTAL  
 Limit : FCC PART 15C PEAK  
 Env. / Ins. : Temp:23.6';Humi:56%;Press:101.52kPa  
 Engineer : Tony  
 EUT : Speaker  
 Power : AC 120V/60Hz  
 M/N : SHELSYS  
 Test Mode : GFSK IX 2441MHz

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2441.00	27.60	6.67	34.12	89.23	89.38	74.00	-15.38	Peak
2	7324.00	36.55	11.57	31.99	33.41	49.54	74.00	24.46	Peak
3	8684.00	37.32	11.45	32.43	29.47	45.81	74.00	28.19	Peak
4	10265.00	38.56	11.44	32.27	29.02	46.75	74.00	27.25	Peak
5	11234.00	39.37	11.12	34.10	30.32	46.71	74.00	27.29	Peak
6	14005.00	41.46	10.90	33.95	29.24	47.65	74.00	26.35	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.  
 2. The emission levels that are 20dB below the official limit are not reported.

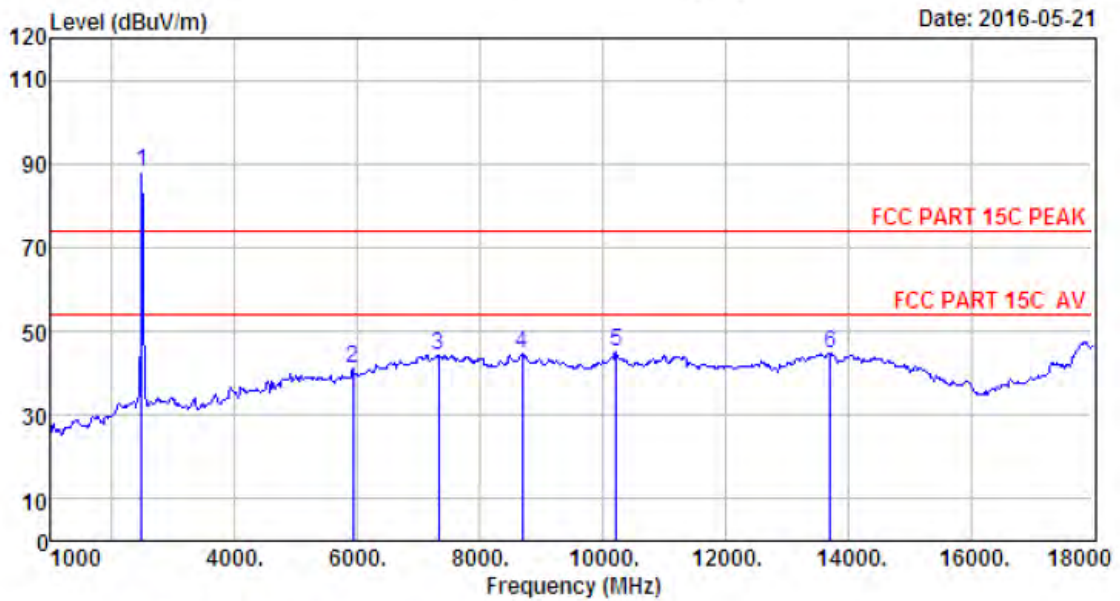


Site no. : 966 1# chamber                      Data no. : 7  
 Dis. / Ant. : 3m ANT 1-18G                      Ant. pol. : HORIZONTAL  
 Limit : FCC PART 15C PEAK  
 Env. / Ins. : Temp:23.6%;Humi:56%;Press:101.52kPa  
 Engineer : Tony  
 EUI : Speaker  
 Power : AC 120V/60Hz  
 M/N : SHELFSYS  
 Test Mode : GFSK TX 2480MHz

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2480.00	27.58	6.71	34.03	88.91	89.17	74.00	-15.17	Peak
2	7324.00	36.55	11.57	31.99	30.21	46.34	74.00	27.66	Peak
3	8684.00	37.32	11.45	32.43	30.84	47.18	74.00	26.82	Peak
4	11200.00	39.39	11.14	34.03	30.20	46.70	74.00	27.30	Peak
5	13325.00	39.66	11.48	34.89	30.51	46.76	74.00	27.24	Peak
6	14090.00	41.54	10.91	33.69	29.37	48.13	74.00	25.87	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.  
 2. The emission levels that are 20dB below the official limit are not reported.

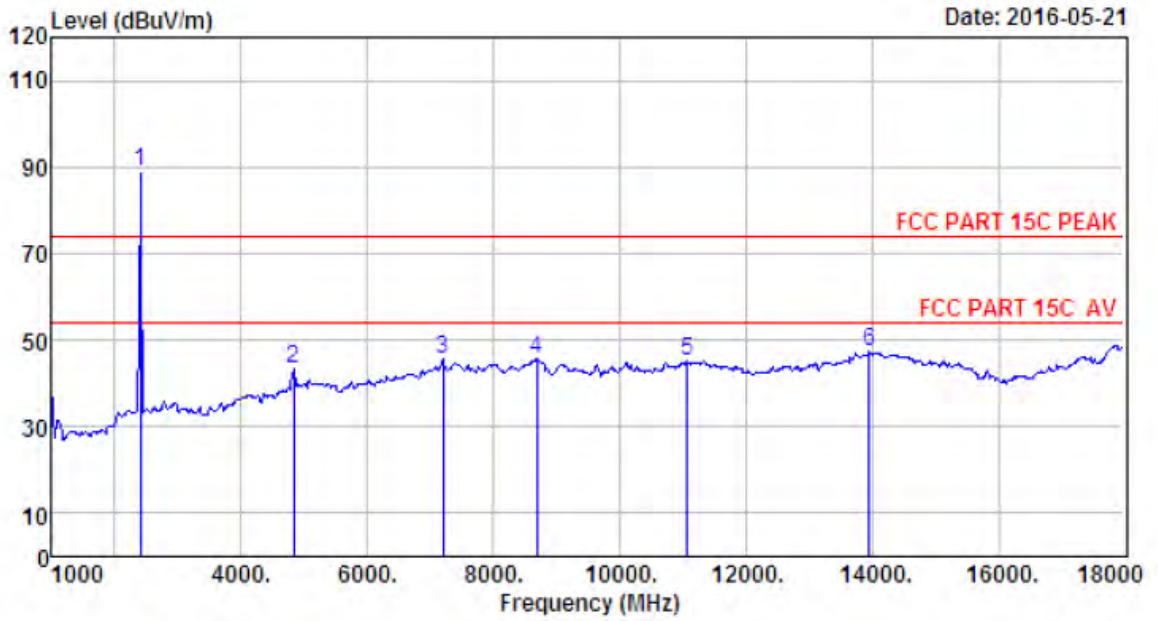




Site no. : 966 1# chamber                      Data no. : 8  
 Dis. / Ant. : 3m ANT 1-18G                      Ant. pol. : VERTICAL  
 Limit : FCC PART 15C PEAK  
 Env. / Ins. : Temp:23.6';Humi:56%;Press:101.52kPa  
 Engineer : Tony  
 EUT : Speaker  
 Power : AC 120V/60Hz  
 M/N : SHELF SYS  
 Test Mode : GFSK TX 2480MHz

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2480.00	27.58	6.71	34.03	87.68	87.94	74.00	-13.94	Peak
2	5930.00	32.63	12.10	32.31	28.75	41.17	74.00	32.83	Peak
3	7324.00	36.55	11.57	31.99	28.36	44.49	74.00	29.51	Peak
4	8684.00	37.32	11.45	32.43	28.36	44.70	74.00	29.30	Peak
5	10214.00	38.48	11.47	32.17	27.18	44.96	74.00	29.04	Peak
6	13716.00	40.69	11.24	35.01	28.00	44.92	74.00	29.08	Peak

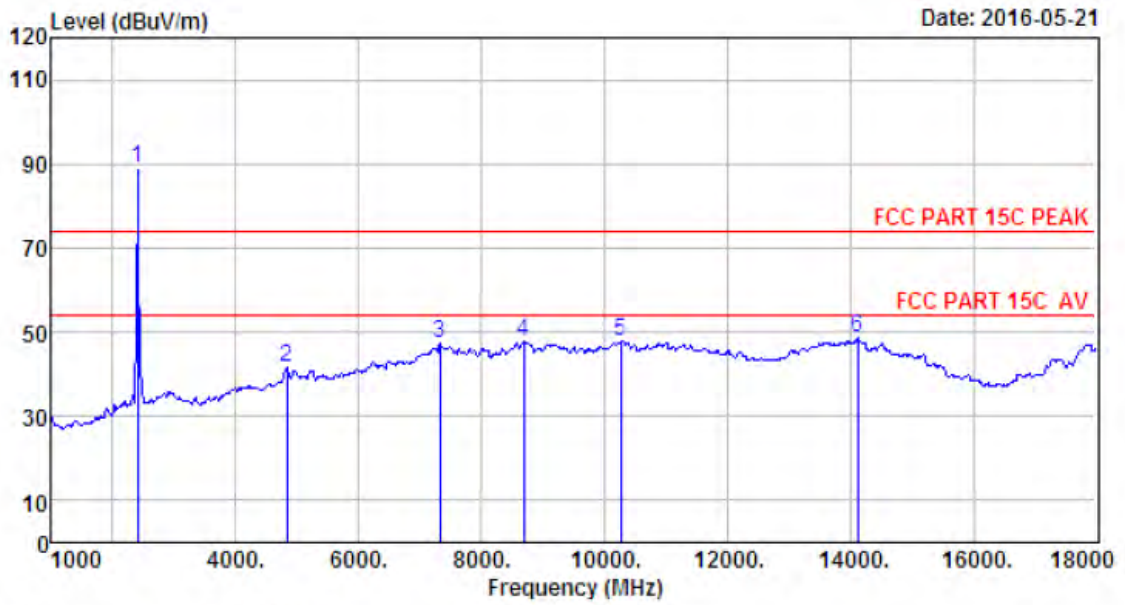
Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.  
 2. The emission levels that are 20dB below the official limit are not reported.



Site no. : 966 1# chamber Data no. : 11  
 Dis. / Ant. : 3m ANT 1-18G Ant. pol. : HORIZONTAL  
 Limit : FCC PART 15C PEAK  
 Env. / Ins. : Temp:23.6';Humi:56%;Press:101.52kPa  
 Engineer : Tony  
 EUT : Speaker  
 Power : AC 120V/60Hz  
 M/N : SHELFSYS  
 Test Mode : 8-DPSK TX 2402MHz

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2402.00	27.61	6.62	34.18	88.75	88.80	74.00	-14.80	Peak
2	4825.00	31.28	11.84	31.83	32.05	43.34	74.00	30.66	Peak
3	7205.00	36.52	11.54	32.11	29.70	45.65	74.00	28.35	Peak
4	8684.00	37.32	11.45	32.43	29.44	45.78	74.00	28.22	Peak
5	11064.00	39.48	11.24	33.78	28.06	45.00	74.00	29.00	Peak
6	13954.00	41.35	10.96	34.13	29.03	47.21	74.00	26.79	Peak

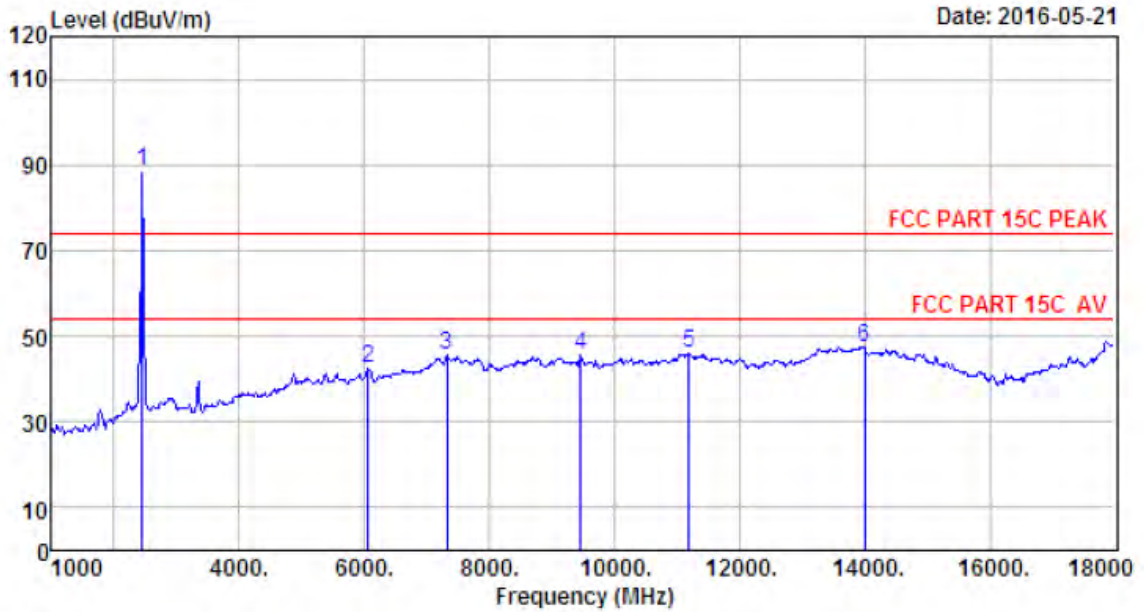
Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.  
 2. The emission levels that are 20dB below the official limit are not reported.



Site no. : 966 1# chamber                      Data no. : 12  
 Dis. / Ant. : 3m ANI 1-18G                      Ant. pol. : VERTICAL  
 Limit : FCC PART 15C PEAK  
 Env. / Ins. : Temp:23.6';Humi:56%;Press:101.52kPa  
 Engineer : Tony  
 EUT : Speaker  
 Power : AC 120V/60Hz  
 M/N : SHELFSYS  
 Test Mode : 8-DPSK TX 2402MHz

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2402.00	27.61	6.62	34.18	88.96	89.01	74.00	-15.01	Peak
2	4825.00	31.28	11.84	31.83	30.50	41.79	74.00	32.21	Peak
3	7324.00	36.55	11.57	31.99	31.19	47.32	74.00	26.68	Peak
4	8684.00	37.32	11.45	32.43	31.34	47.68	74.00	26.32	Peak
5	10265.00	38.56	11.44	32.27	30.02	47.75	74.00	26.25	Peak
6	14124.00	41.57	10.91	33.59	29.78	48.67	74.00	25.33	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.  
 2. The emission levels that are 20dB below the official limit are not reported.

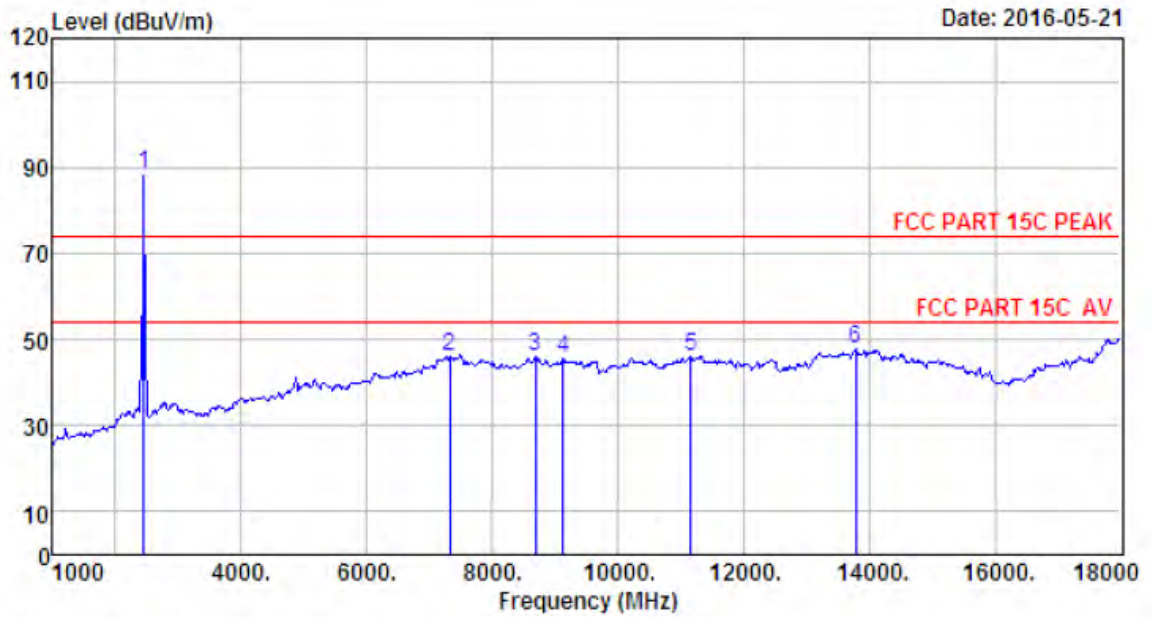


Date: 2016-05-21

Site no. : 966 1# chamber Data no. : 15  
 Dis. / Ant. : 3m ANI 1-18G Ant. pol. : HORIZONTAL  
 Limit : FCC PART 15C PEAK  
 Env. / Ins. : Temp:23.6';Humi:56%;Press:101.52kPa  
 Engineer : Tony  
 EUI : Speaker  
 Power : AC 120V/60Hz  
 M/N : SHELFSYS  
 Test Mode : 8-DPSK TX 2441MHz

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2441.00	27.60	6.67	34.12	88.61	88.76	74.00	-14.76	Peak
2	6066.00	32.92	12.13	32.21	29.62	42.46	74.00	31.54	Peak
3	7324.00	36.55	11.57	31.99	29.67	45.80	74.00	28.20	Peak
4	9466.00	38.02	11.69	31.95	27.74	45.50	74.00	28.50	Peak
5	11200.00	39.39	11.14	34.03	29.36	45.86	74.00	28.14	Peak
6	14005.00	41.46	10.90	33.95	29.16	47.57	74.00	26.43	Peak

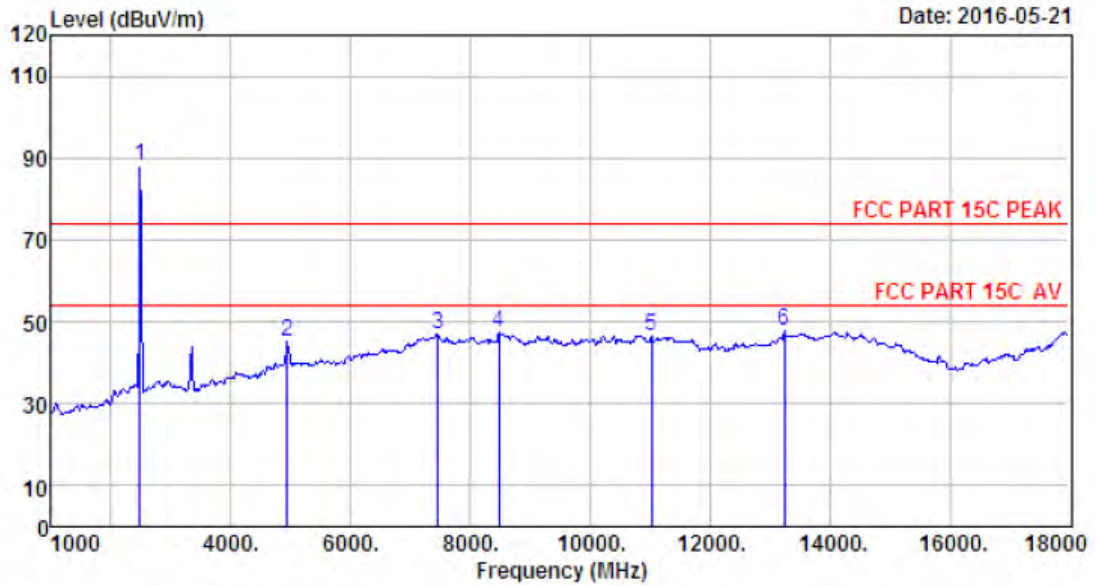
Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.  
 2. The emission levels that are 20dB below the official limit are not reported.



Site no. : 966 1# chamber Data no. : 16  
 Dis. / Ant. : 3m ANT 1-18G Ant. pol. : VERTICAL  
 Limit : FCC PART 15C PEAK  
 Env. / Ins. : Temp:23.6';Humi:56%;Press:101.52kPa  
 Engineer : Tony  
 EUT : Speaker  
 Power : AC 120V/60Hz  
 M/N : SHELF SYS  
 Test Mode : 8-DPSK TX 2441MHz

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2441.00	27.60	6.67	34.12	98.22	88.37	74.00	-14.37	Peak
2	7324.00	36.55	11.57	31.99	29.87	46.00	74.00	28.00	Peak
3	8684.00	37.32	11.45	32.43	29.67	46.01	74.00	27.99	Peak
4	9126.00	37.62	11.52	32.41	29.10	45.83	74.00	28.17	Peak
5	11166.00	39.41	11.17	33.97	29.56	46.17	74.00	27.83	Peak
6	13784.00	40.88	11.16	34.76	30.38	47.66	74.00	26.34	Peak

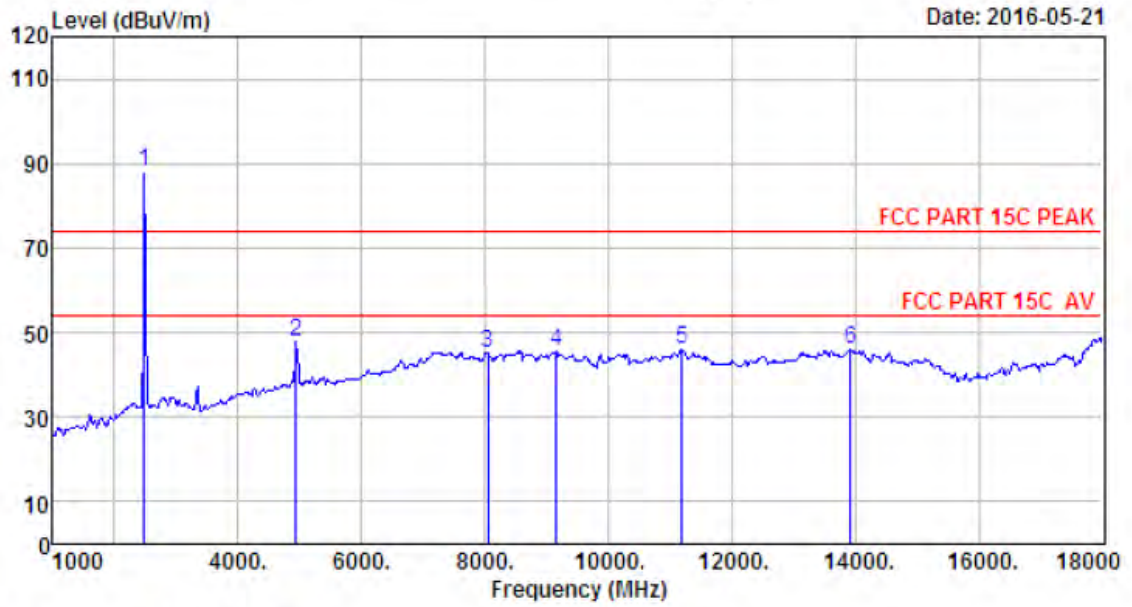
Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.  
 2. The emission levels that are 20dB below the official limit are not reported.



Site no. : 966 1# chamber Data no. : 17  
 Dis. / Ant. : 3m ANT 1-18G Ant. pol. : VERTICAL  
 Limit : FCC PART 15C PEAK  
 Env. / Ins. : Temp:23.6';Humi:56%;Press:101.52kPa  
 Engineer : Tony  
 EUT : Speaker  
 Power : AC 120V/60Hz  
 M/N : SHELSYS  
 Test Mode : 8-DPSK TX 2480MHz

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBUV)	Emission Level (dBUV/m)	Limits (dBUV/m)	Margin (dB)	Remark
1	2480.00	27.58	6.71	34.03	87.81	88.07	74.00	-14.07	Peak
2	4944.00	31.47	12.37	31.96	33.24	45.12	74.00	28.88	Peak
3	7460.00	36.52	11.61	31.91	30.68	46.90	74.00	27.10	Peak
4	8480.00	36.91	11.45	31.89	31.06	47.53	74.00	26.47	Peak
5	11030.00	39.50	11.27	33.71	29.34	46.40	74.00	27.60	Peak
6	13240.00	39.46	11.46	34.72	31.40	47.60	74.00	26.40	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.  
 2. The emission levels that are 20dB below the official limit are not reported.

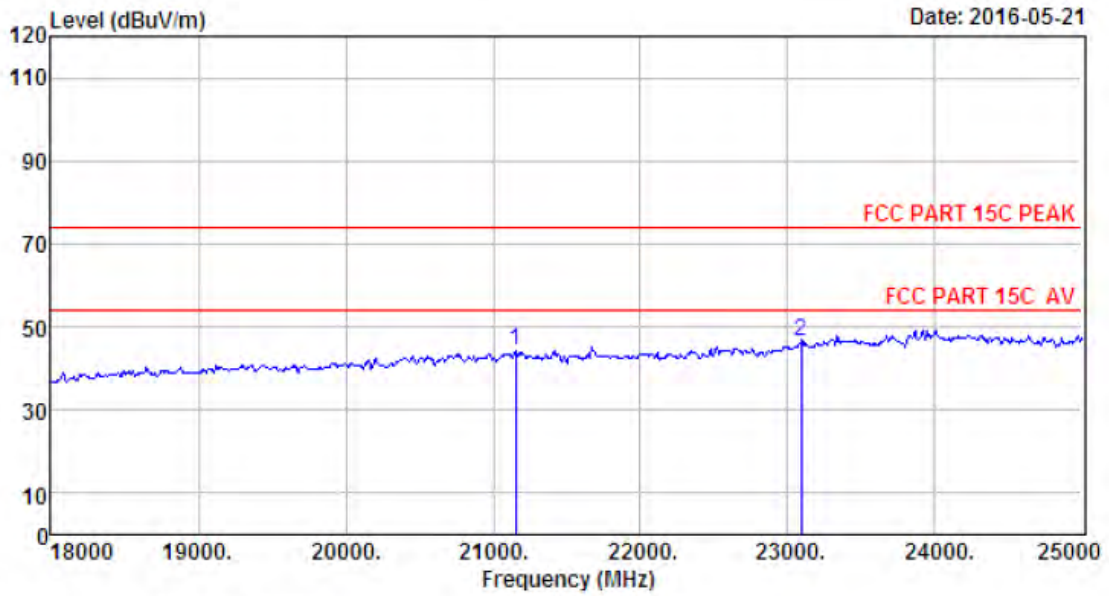


Site no. : 966 1# chamber                      Data no. : 18  
 Dis. / Ant. : 3m ANT 1-18G                      Ant. pol. : HORIZONTAL  
 Limit : FCC PART 15C PEAK  
 Env. / Ins. : Temp:23.6';Humi:56%;Press:101.52kPa  
 Engineer : Tony  
 EUT : Speaker  
 Power : AC 120V/60Hz  
 M/N : SHELFSYS  
 Test Mode : 8-DPSK IX 2480MHz

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2480.00	27.58	6.71	34.03	87.83	88.09	74.00	-14.09	Peak
2	4944.00	31.47	12.37	31.96	36.03	47.91	74.00	26.09	Peak
3	8055.00	36.91	11.41	31.31	28.27	45.28	74.00	28.72	Peak
4	9160.00	37.69	11.54	32.38	28.72	45.57	74.00	28.43	Peak
5	11200.00	39.39	11.14	34.03	29.59	46.09	74.00	27.91	Peak
6	13920.00	41.26	11.00	34.25	27.82	45.83	74.00	28.17	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.  
 2. The emission levels that are 20dB below the official limit are not reported.

18000MHz – 25000MHz

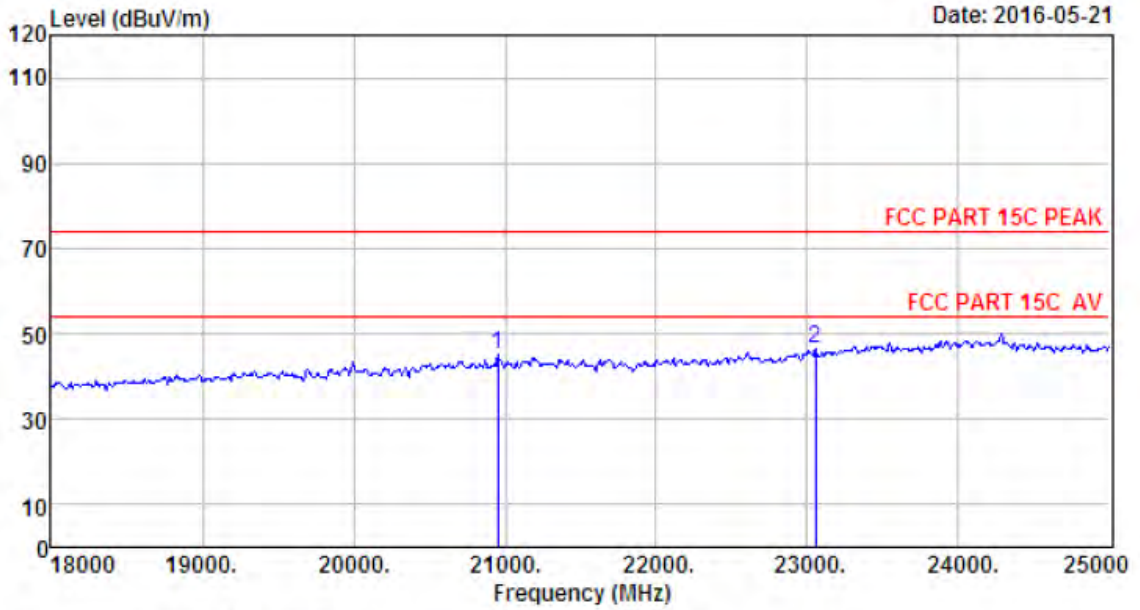


Site no. : 966 1# chamber Data no. : 29  
 Dis. / Ant. : 3m ANT ABOVE 18G Ant. pol. : VERTICAL  
 Limit : FCC PART 15C PEAK  
 Env. / Ins. : Temp:23.6';Humi:56%;Press:101.52kPa  
 Engineer : Tony  
 EUT : Speaker  
 Power : AC 120V/60Hz  
 M/N : SHELSYS  
 Test Mode : GFSK IX 2402MHz

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBUV)	Emission Level (dBUV/m)	Limits (dBUV/m)	Margin (dB)	Remark
1	21150.00	46.21	20.20	35.67	13.67	44.41	74.00	29.59	Peak
2	23089.00	45.62	21.22	33.74	13.27	46.37	74.00	27.63	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.  
 2. The emission levels that are 20dB below the official limit are not reported.

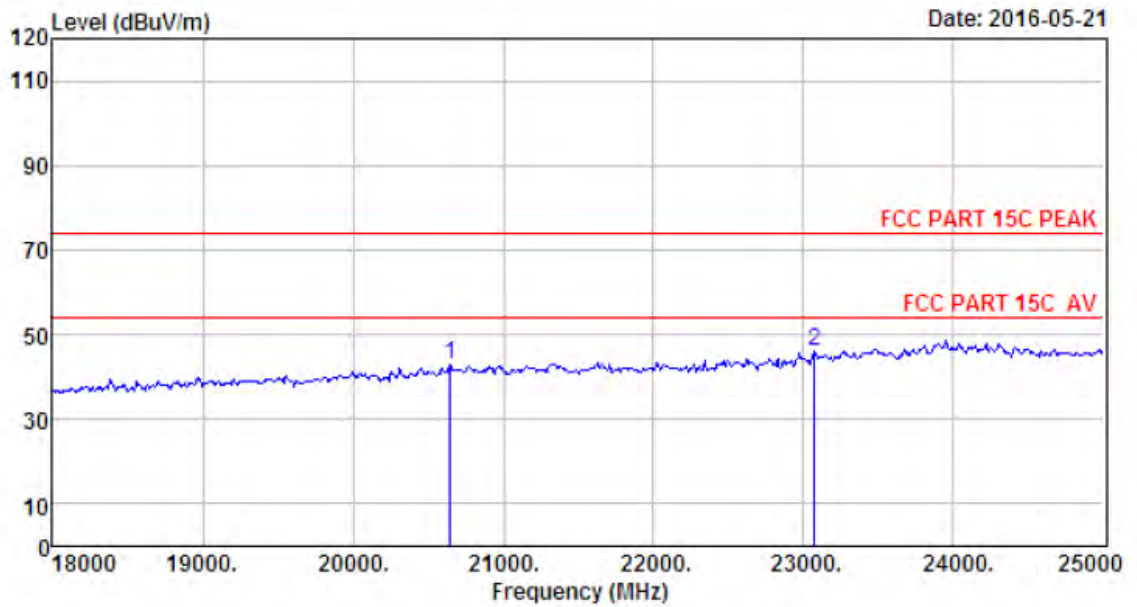




Site no. : 966 1# chamber                      Data no. : 30  
 Dis. / Ant. : 3m ANI ABVOE 18G                      Ant. pol. : HORIZONTAL  
 Limit : FCC PART 15C PEAK  
 Env. / Ins. : Temp:23.6';Humi:56%;Press:101.52kPa  
 Engineer : Tony  
 EUT : Speaker  
 Power : AC 120V/60Hz  
 M/N : SHELFSYS  
 Test Mode : GFSK TX 2402MHz

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	20954.00	46.27	20.11	35.85	14.44	44.97	74.00	29.03	Peak
2	23054.00	45.61	21.20	33.80	13.65	46.66	74.00	27.34	Peak

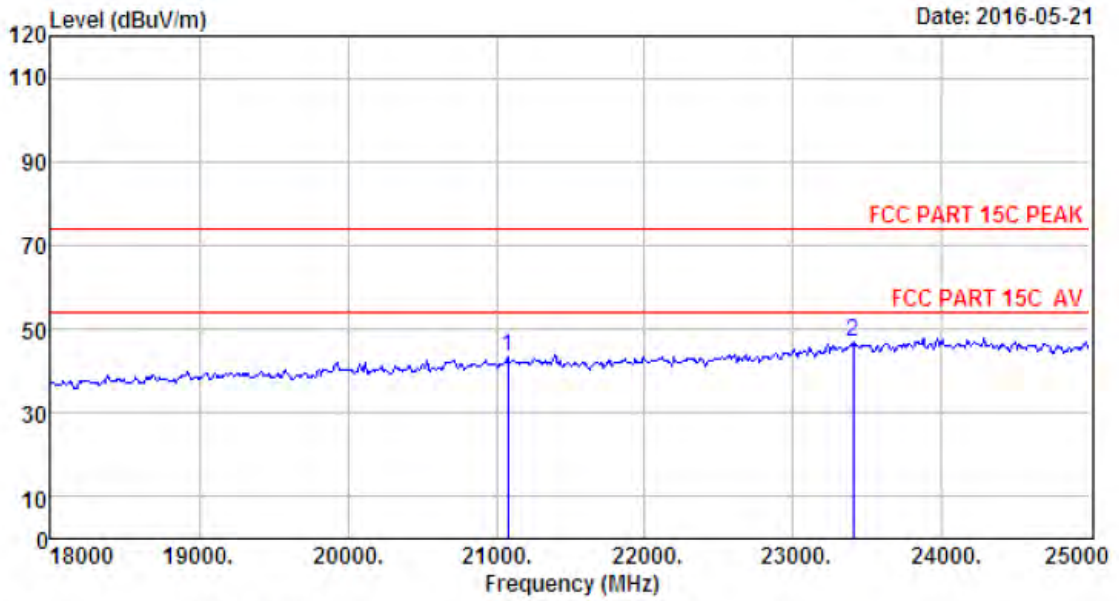
Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.  
 2. The emission levels that are 20dB below the official limit are not reported.



Site no. : 966 1# chamber                      Data no. : 31  
 Dis. / Ant. : 3m ANT ABVOE 18G                      Ant. pol. : HORIZONTAL  
 Limit : FCC PART 15C PEAK  
 Env. / Ins. : Temp:23.6';Humi:56%;Press:101.52kPa  
 Engineer : Tony  
 EUT : Speaker  
 Power : AC 120V/60Hz  
 M/N : SHELFSYS  
 Test Mode : GFSK TX 2441MHz

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	20646.00	46.08	19.97	36.12	13.15	43.08	74.00	30.92	Peak
2	23075.00	45.62	21.21	33.77	12.99	46.05	74.00	27.95	Peak

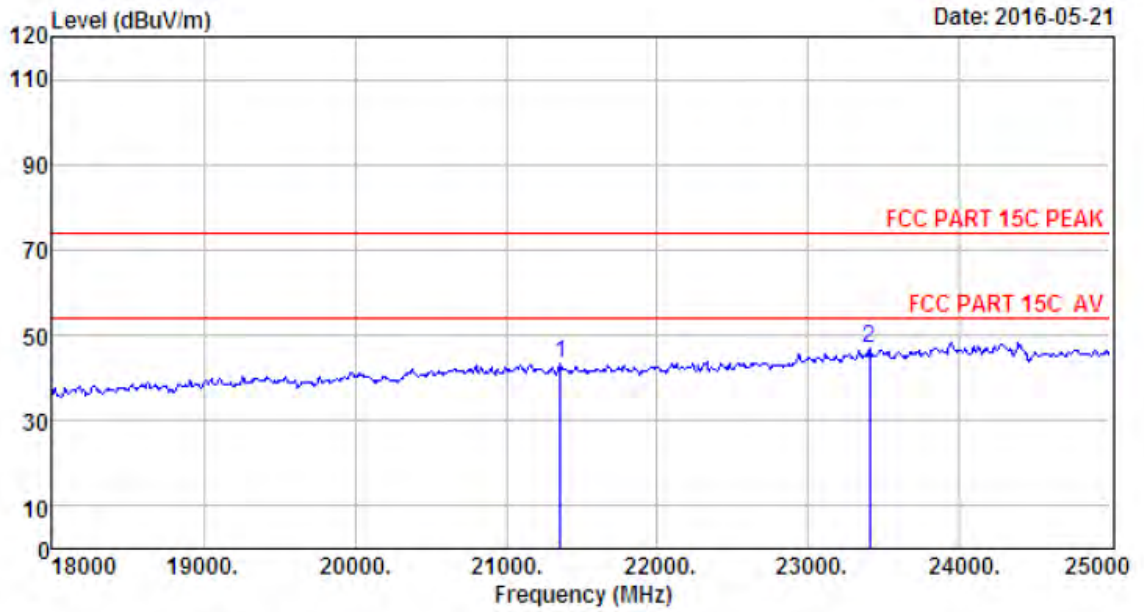
Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.  
 2. The emission levels that are 20dB below the official limit are not reported.



Site no. : 966 1# chamber                      Data no. : 32  
 Dis. / Ant. : 3m ANT ABOVE 18G                      Ant. pol. : VERTICAL  
 Limit : FCC PART 15C PEAK  
 Env. / Ins. : Temp:23.6';Humi:56%;Press:101.52kPa  
 Engineer : Tony  
 EUI : Speaker  
 Power : AC 120V/60Hz  
 M/N : SHELFSYS  
 Test Mode : GFSK IX 2441MHz

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	21080.00	46.25	20.16	35.73	12.51	43.19	74.00	30.81	Peak
2	23404.00	45.68	21.51	33.43	13.23	46.99	74.00	27.01	Peak

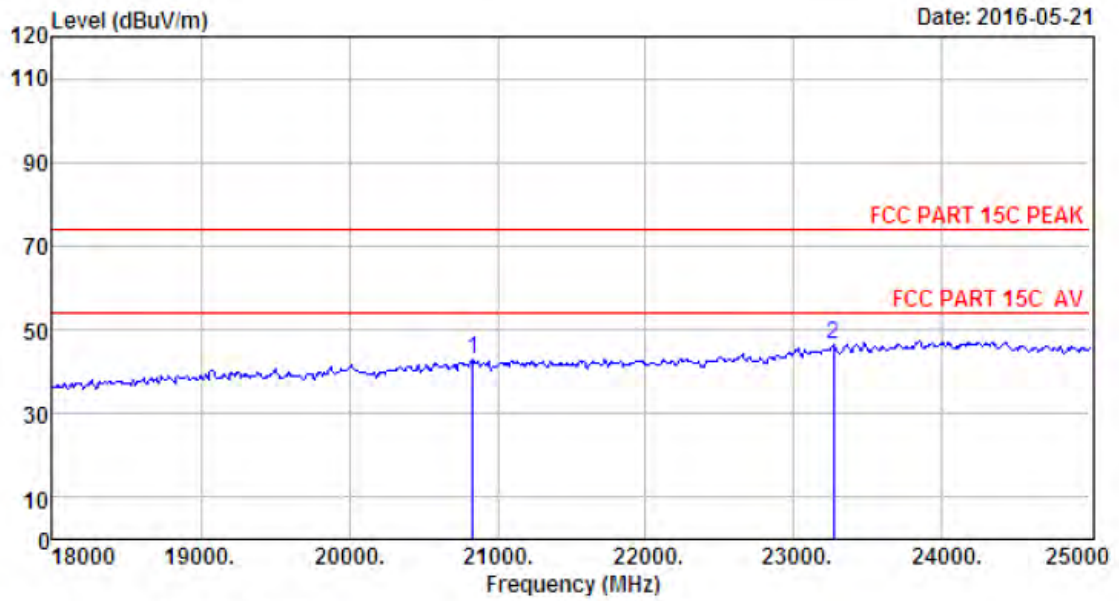
Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.  
 2. The emission levels that are 20dB below the official limit are not reported.



Site no. : 966 1# chamber                      Data no. : 33  
 Dis. / Ant. : 3m ANT ABOVE 18G                      Ant. pol. : VERTICAL  
 Limit : FCC PART 15C PEAK  
 Env. / Ins. : Temp:23.6';Humi:56%;Press:101.52kPa  
 Engineer : Tony  
 EUI : Speaker  
 Power : AC 120V/60Hz  
 M/N : SHELF SYS  
 Test Mode : GFSK TX 2480MHz

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBUV)	Emission Level (dBUV/m)	Limits (dBUV/m)	Margin (dB)	Remark
1	21360.00	46.08	20.28	35.49	12.62	43.49	74.00	30.51	Peak
2	23404.00	45.68	21.51	33.43	13.03	46.79	74.00	27.21	Peak

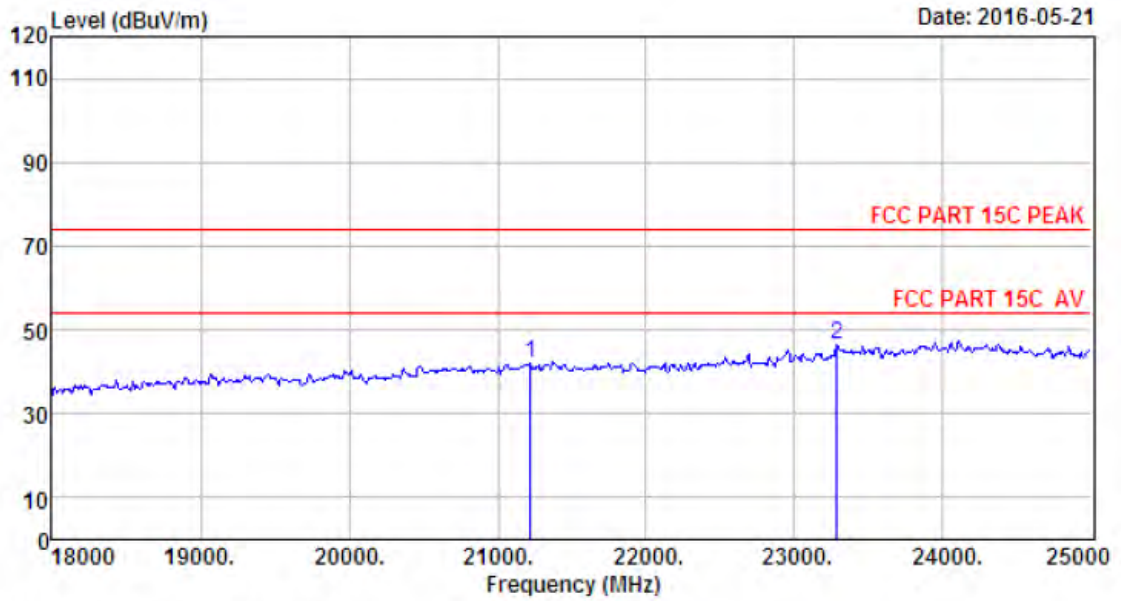
Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.  
 2. The emission levels that are 20dB below the official limit are not reported.



Site no. : 966 1# chamber                      Data no. : 34  
 Dis. / Ant. : 3m ANI ABOVE 18G              Ant. pol. : HORIZONTAL  
 Limit : FCC PART 15C PEAK  
 Env. / Ins. : Temp:23.6';Humi:56%;Press:101.52kPa  
 Engineer : Tony  
 EUT : Speaker  
 Power : AC 120V/60Hz  
 M/N : SHELFSYS  
 Test Mode : GFSK TX 2480MHz

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	20835.00	46.20	20.06	35.96	12.68	42.98	74.00	31.02	Peak
2	23264.00	45.65	21.39	33.56	12.88	46.36	74.00	27.64	Peak

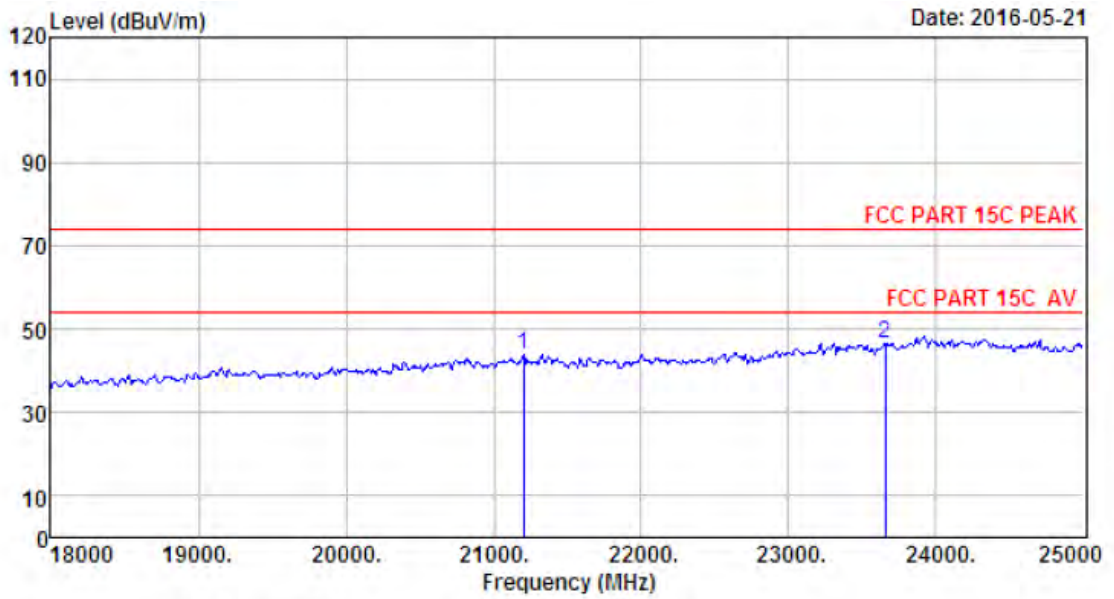
Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.  
 2. The emission levels that are 20dB below the official limit are not reported.



Site no. : 966 1# chamber                      Data no. : 35  
 Dis. / Ant. : 3m ANT ABOVE 18G              Ant. pol. : HORIZONTAL  
 Limit : FCC PART 15C PEAK  
 Env. / Ins. : Temp:23.6';Humi:56%;Press:101.52kPa  
 Engineer : Tony  
 EUT : Speaker  
 Power : AC 120V/60Hz  
 M/N : SHELFSYS  
 Test Mode : 8-DPSK TX 2402MHz

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	21220.00	46.17	20.23	35.60	11.23	42.03	74.00	31.97	Peak
2	23285.00	45.66	21.40	33.56	12.82	46.32	74.00	27.68	Peak

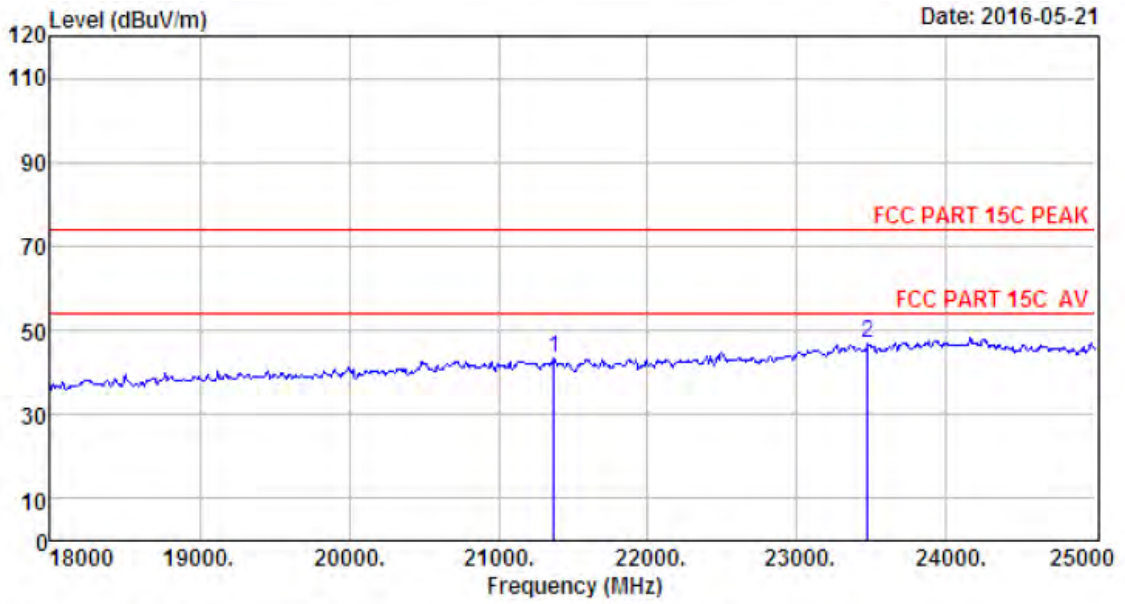
Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.  
 2. The emission levels that are 20dB below the official limit are not reported.



Site no. : 966 1# chamber                      Data no. : 36  
 Dis. / Ant. : 3m ANI ABOVE 18G              Ant. pol. : VERTICAL  
 Limit : FCC PART 15C PEAK  
 Env. / Ins. : Temp:23.6';Humi:56%;Press:101.52kPa  
 Engineer : Tony  
 EUT : Speaker  
 Power : AC 120V/60Hz  
 M/N : SHELF SYS  
 Test Mode : Q-DPSK TX 2402MHz

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBUV)	Emission Level (dBUV/m)	Limits (dBUV/m)	Margin (dB)	Remark
1	21206.00	46.17	20.22	35.62	12.88	43.65	74.00	30.35	Peak
2	23656.00	45.67	21.73	33.17	12.37	46.60	74.00	27.40	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.  
 2. The emission levels that are 20dB below the official limit are not reported.

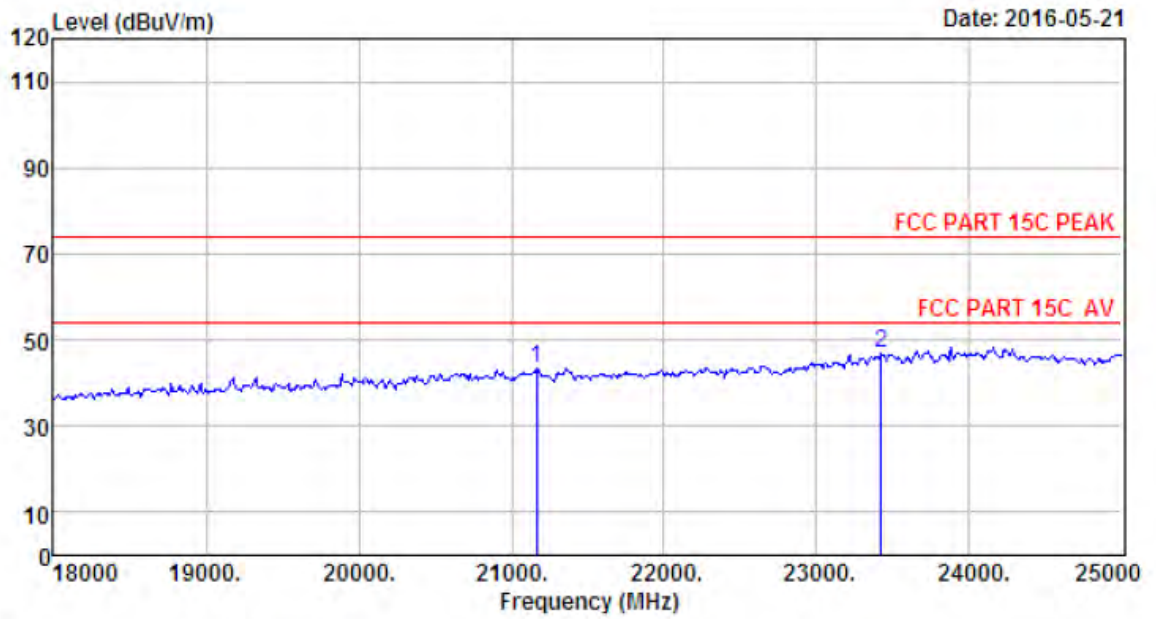


Site no. : 966 1# chamber                      Data no. : 37  
 Dis. / Ant. : 3m ANT ABOVE 18G                      Ant. pol. : VERTICAL  
 Limit : FCC PART 15C PEAK  
 Env. / Ins. : Temp:23.6';Humi:56%;Press:101.52kPa  
 Engineer : Tony  
 EUT : Speaker  
 Power : AC 120V/60Hz  
 M/N : SHELFSYS  
 Test Mode : 8-DPSK TX 2441MHz

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	21374.00	46.08	20.29	35.46	12.28	43.19	74.00	30.81	Peak
2	23474.00	45.70	21.57	33.35	13.02	46.94	74.00	27.06	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.  
 2. The emission levels that are 20dB below the official limit are not reported.

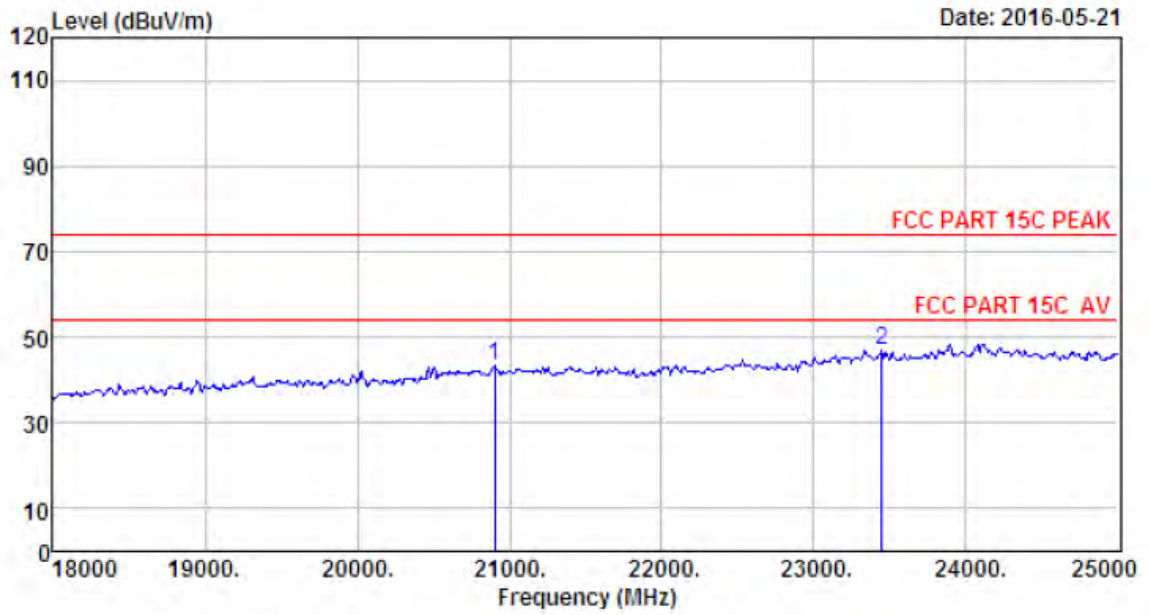




Site no. : 966 1# chamber                      Data no. : 38  
 Dis. / Ant. : 3m ANI ABOVE 18G                      Ant. pol. : HORIZONTAL  
 Limit : FCC PART 15C PEAK  
 Env. / Ins. : Temp:23.6';Humi:56%;Press:101.52kPa  
 Engineer : Tony  
 EUT : Speaker  
 Power : AC 120V/60Hz  
 M/N : SHELFSYS  
 Test Mode : 8-DPSK TX 2441MHz

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	21164.00	46.20	20.20	35.64	12.62	43.38	74.00	30.62	Peak
2	23425.00	45.69	21.53	33.40	13.02	46.84	74.00	27.16	Peak

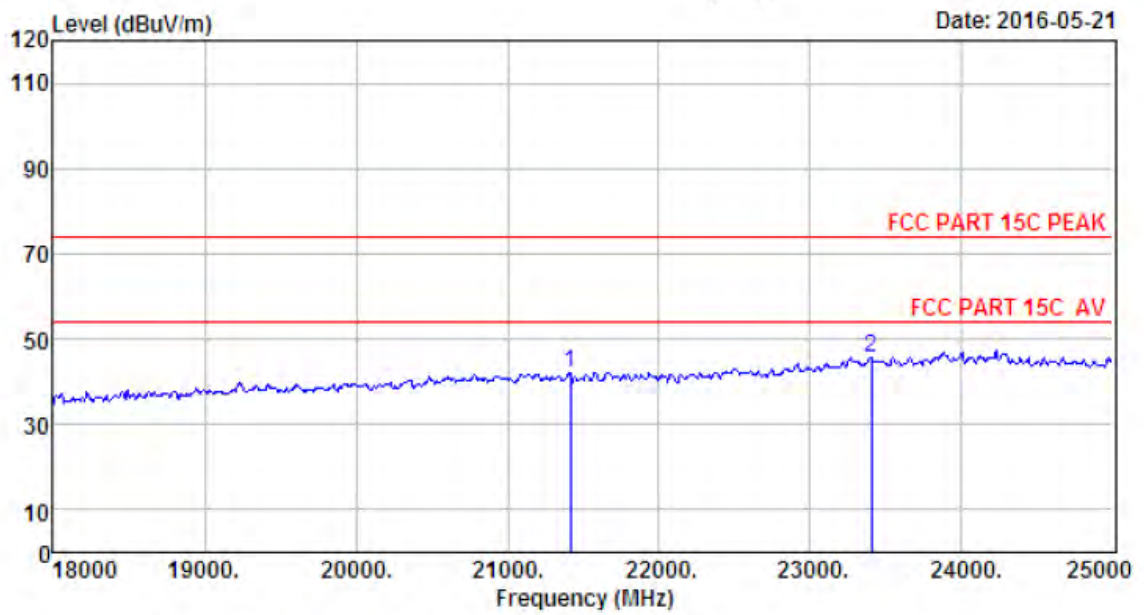
Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.  
 2. The emission levels that are 20dB below the official limit are not reported.



Site no. : 966 1# chamber                      Data no. : 39  
 Dis. / Ant. : 3m ANT ABVOE 18G              Ant. pol. : HORIZONTAL  
 Limit : FCC PART 15C PEAK  
 Env. / Ins. : Temp:23.6';Humi:56%;Press:101.52kPa  
 Engineer : Tony  
 EUI : Speaker  
 Power : AC 120V/60Hz  
 M/N : SHELFSYS  
 Test Mode : 8-DPSK TX 2480MHz

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBUV)	Emission Level (dBUV/m)	Limits (dBUV/m)	Margin (dB)	Remark
1	20905.00	46.25	20.09	35.89	12.78	43.23	74.00	30.77	Peak
2	23446.00	45.69	21.55	33.38	13.19	47.05	74.00	26.95	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.  
 2. The emission levels that are 20dB below the official limit are not reported.



```

Site no.      : 966 1# chamber          Data no.   : 40
Dis. / Ant.   : 3m ANI ABOVE 18G      Ant. pol.  : VERTICAL
Limit        : FCC PART 15C PEAK
Env. / Ins.   : Temp:23.6';Humi:56%;Press:101.52kPa
Engineer     : Tony
EUT          : Speaker
Power        : AC 120V/60Hz
M/N          : SHELF SYS
Test Mode    : 8-DPSK TX 2480MHz
    
```

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBUV)	Emission Level (dBUV/m)	Limits (dBUV/m)	Margin (dB)	Remark
1	21416.00	46.05	20.31	35.42	11.14	42.08	74.00	31.92	Peak
2	23404.00	45.68	21.51	33.43	11.97	45.73	74.00	28.27	Peak

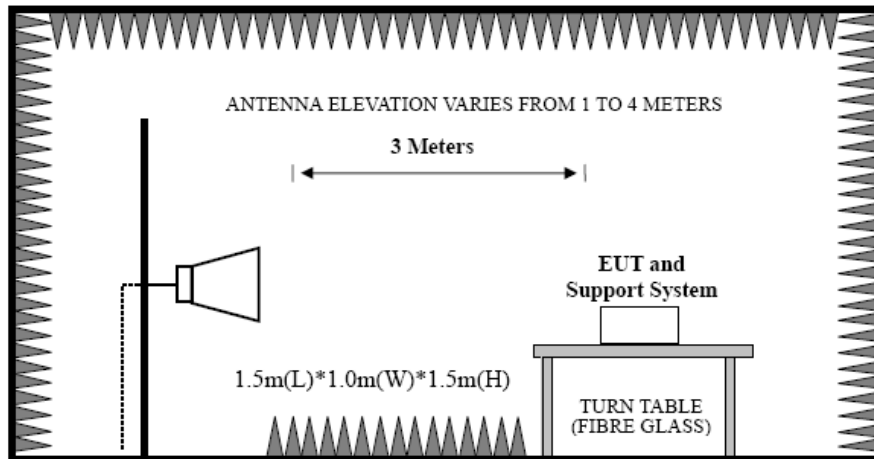
Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.  
 2. The emission levels that are 20dB below the official limit are not reported.

## 9. BAND EDGE COMPLIANCE

### 9.1. Limit

All the lower and upper band-edges emissions appearing within 2310MHz to 2390MHz and 2483.5MHz to 2500MHz restricted frequency bands shall not exceed the limits shown in 15.209, all the other emissions outside operation frequency band 2400MHz to 2483.5MHz shall be at least 20dB below the fundamental emissions, or comply with 15.209 limits.

### 9.2. Block Diagram of Test setup



### 9.3. Test Procedure

EUT was placed on a turn table, which is 1.5 m high above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. Power on the EUT and let it working in test mode, then test it. EUT is set 3 meters away from the receiving antenna, which is mounted on a antenna tower. The antenna can be moved up and down between 1 meter and 4 meters to find out the maximum emission level. Both horizontal and vertical polarization of the antenna are set on test.

Set the spectrum analyzer in the following setting in order to capture the lower and upper band-edges of emissions

Peak : RBW = 1MHz, VBW = 1MHz, Detector=PEAK detector, Sweep time = auto.

AV : RBW = 1MHz, VBW = 10Hz, Detector=PEAK detector, Sweep time = auto.

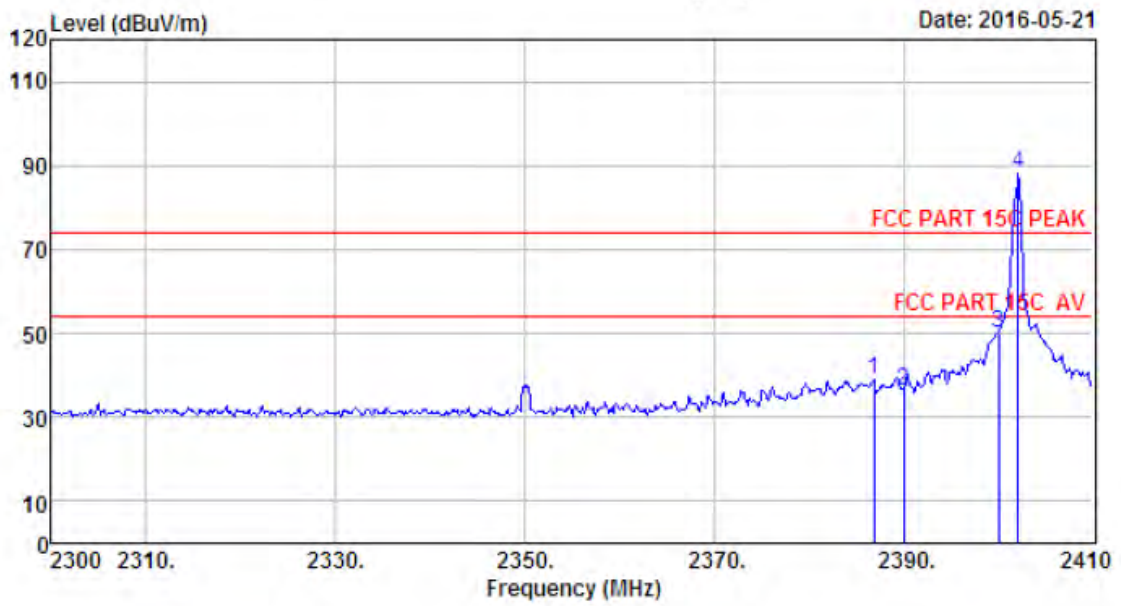
### 9.4. Test Result

EUT: Speaker
M/N: SHELFSYS
Power: AC 120V/60Hz
Test date: 2016-05-21    Test site: 3m Chamber    Tested by: Tony Tang
Test mode: Tx Mode (Hopping On & No Hopping)
Pass

Note: 1、 For emissions above 1GHz, if peak level comply with average limit, then the average level is deemed to comply with average limit.

2、 The frequency 2402MHz 、2441MHz and 2480MHz is fundamental frequency which no limit, the limit on plots is automatically generated by the software, it's not fundamental limit, we can't remove it.

### 9.5. Test Data

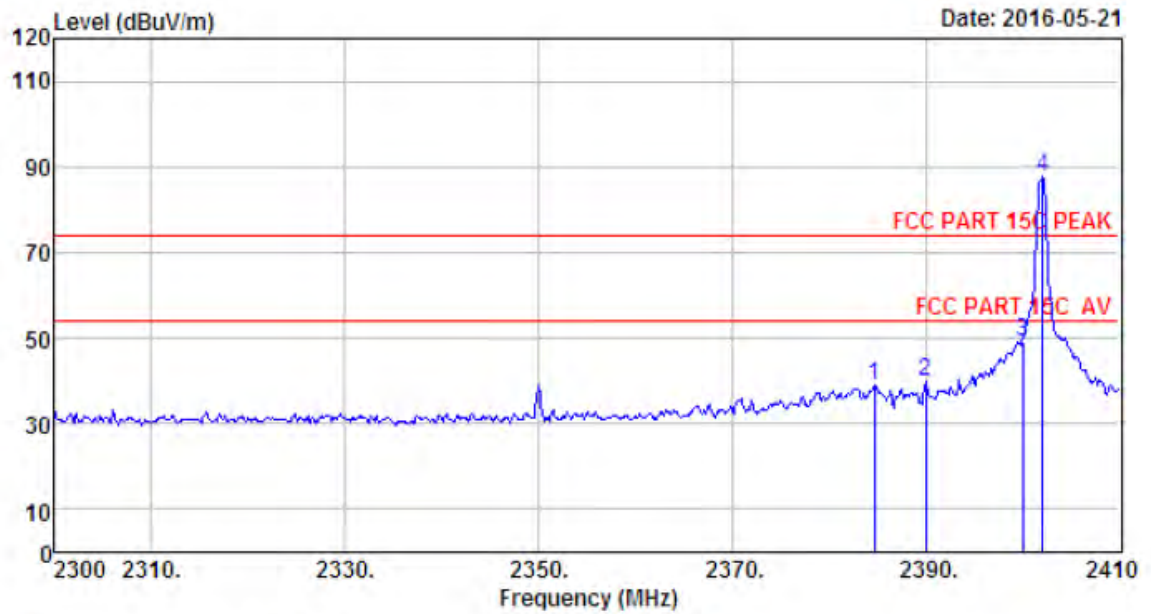


```

Site no.       : site                               Data no.  : 3
Dis. / Ant.   : 3m ANT 1-18G                       Ant. pol. : HORIZONTAL
Limit         : FCC PART 15C PEAK
Env. / Ins.   : Temp:23.6';Humi:56%;Press:101.52kPa
Engineer      : Tony
EUT           : Speaker
Power         : AC 120V/60Hz
M/N           : SHELFSYS
Test Mode     : GFSK TX 2402MHz(No Hopping)
    
```

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBUV)	Emission Level (dBUV/m)	Limits (dBUV/m)	Margin (dB)	Remark
1	2386.90	27.64	6.62	34.19	38.90	38.97	74.00	35.03	Peak
2	2390.00	27.64	6.62	34.19	36.22	36.29	74.00	37.71	Peak
3	2400.00	27.61	6.62	34.18	50.19	50.24	74.00	23.76	Peak
4	2402.08	27.61	6.62	34.18	88.11	88.16	74.00	-14.16	Peak

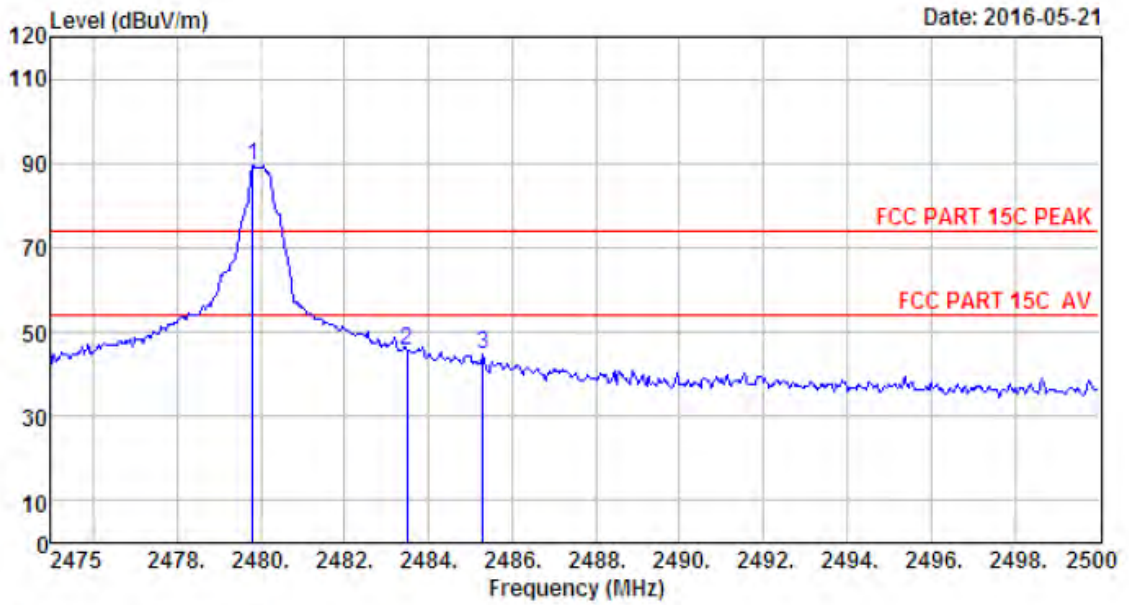
Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.  
 2. The emission levels that are 20dB below the official limit are not reported.



Site no. : 966 1# chamber                      Data no. : 4  
 Dis. / Ant. : 3m ANT 1-18G                      Ant. pol. : VERTICAL  
 Limit : FCC PART 15C PEAK  
 Env. / Ins. : Temp:23.6';Humi:56%;Press:101.52kPa  
 Engineer : Tony  
 EUT : Speaker  
 Power : AC 120V/60Hz  
 M/N : SHELFSYS  
 Test Mode : GFSK TX 2402MHz(No Hopping)

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2384.70	27.64	6.60	34.19	39.03	39.08	74.00	34.92	Peak
2	2390.00	27.64	6.62	34.19	39.64	39.71	74.00	34.29	Peak
3	2400.00	27.61	6.62	34.18	49.10	49.15	74.00	24.85	Peak
4	2402.08	27.61	6.62	34.18	87.80	87.85	74.00	-13.85	Peak

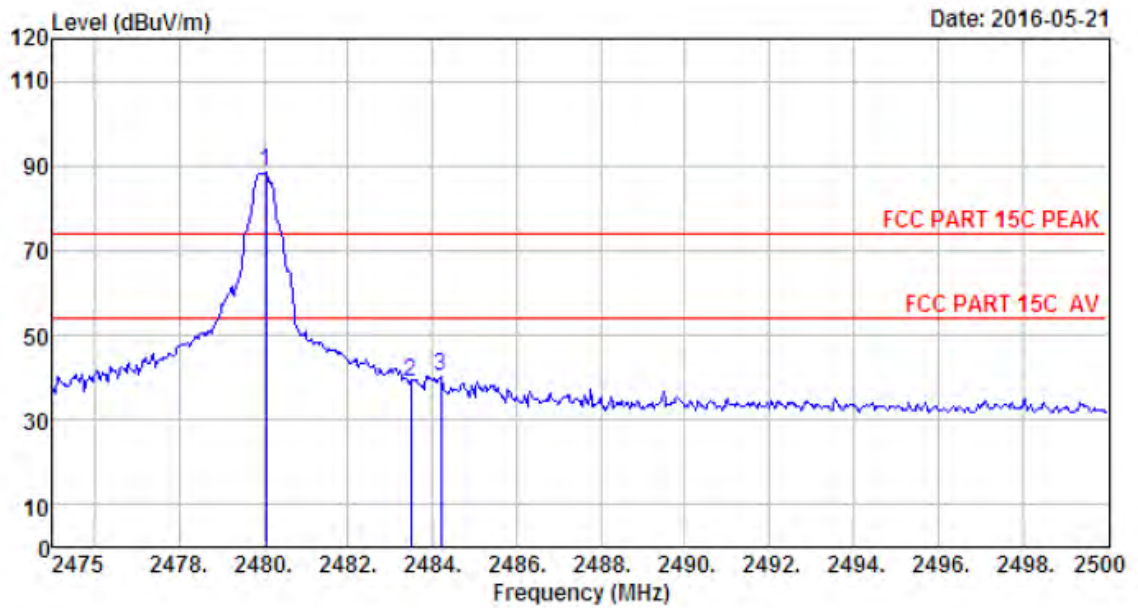
Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.  
 2. The emission levels that are 20dB below the official limit are not reported.



Site no. : 966 1# chamber                      Data no. : 9  
 Dis. / Ant. : 3m ANT 1-18G                      Ant. pol. : VERTICAL  
 Limit : FCC PART 15C PEAK  
 Env. / Ins. : Temp:23.6';Humi:56%;Press:101.52kPa  
 Engineer : Tony  
 EUT : Speaker  
 Power : AC 120V/60Hz  
 M/N : SHELFSYS  
 Test Mode : GFSK TX 2480MHz(No Hopping)

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2479.80	27.58	6.71	34.03	89.23	89.49	74.00	-15.49	Peak
2	2483.50	27.58	6.71	34.03	45.47	45.73	74.00	28.27	Peak
3	2485.30	27.58	6.71	34.03	44.55	44.81	74.00	29.19	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.  
 2. The emission levels that are 20dB below the official limit are not reported.

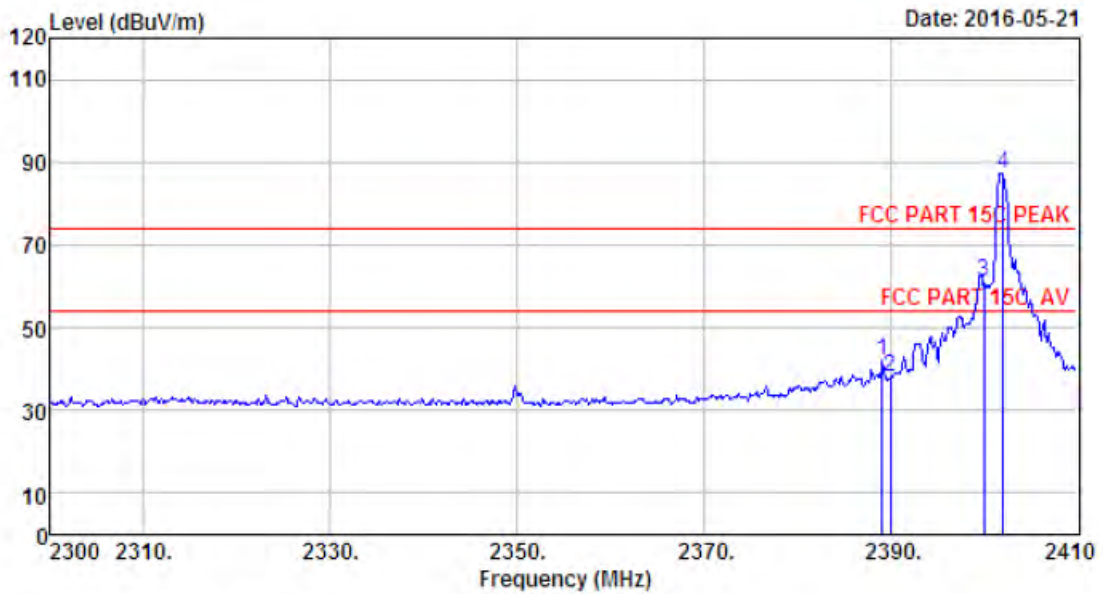


Site no. : 966 1# chamber                      Data no. : 10  
 Dis. / Ant. : 3m ANT 1-18G                      Ant. pol. : HORIZONTAL  
 Limit : FCC PART 15C PEAK  
 Env. / Ins. : Temp:23.6%;Humi:56%;Press:101.52kPa  
 Engineer : Tony  
 EUI : Speaker  
 Power : AC 120V/60Hz  
 M/N : SHELFSYS  
 Test Mode : GFSK TX 2480MHz(No Hopping)

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2480.05	27.58	6.71	34.03	88.10	88.36	74.00	-14.36	Peak
2	2483.50	27.58	6.71	34.03	38.92	39.18	74.00	34.82	Peak
3	2484.20	27.58	6.71	34.03	40.19	40.45	74.00	33.55	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.  
 2. The emission levels that are 20dB below the official limit are not reported.

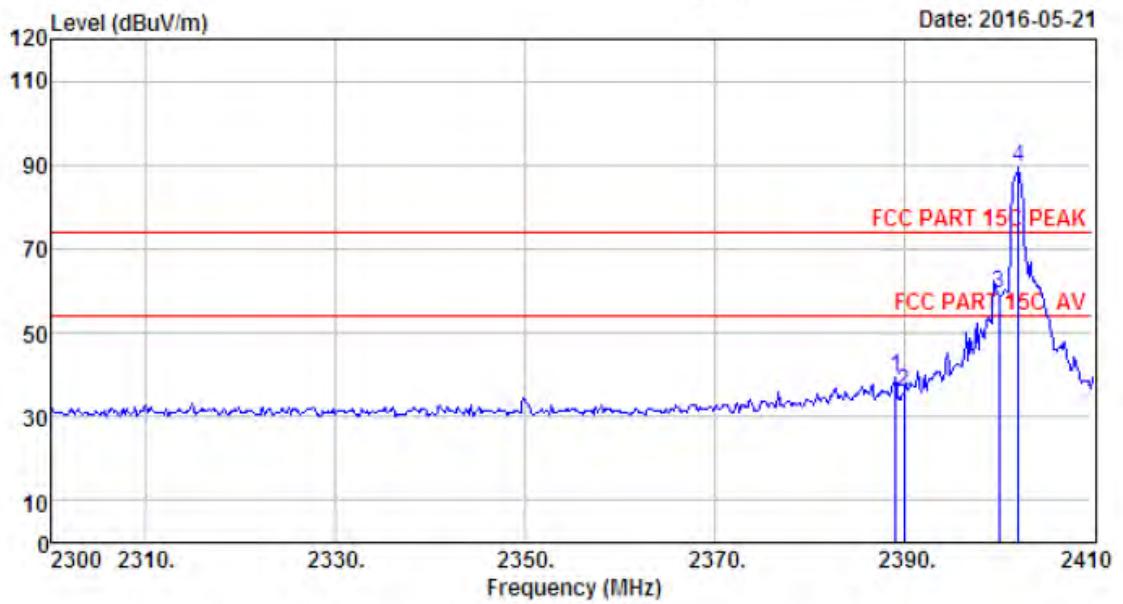




Site no. : 966 1# chamber                      Data no. : 13  
 Dis. / Ant. : 3m ANT 1-18G                      Ant. pol. : VERTICAL  
 Limit : FCC PART 15C PEAK  
 Env. / Ins. : Temp:23.6';Humi:56%;Press:101.52kPa  
 Engineer : Tony  
 EUT : Speaker  
 Power : AC 120V/60Hz  
 M/N : SHELFSYS  
 Test Mode : 8-DPSK TX 2402MHz(No Hopping)

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2389.10	27.64	6.62	34.19	41.85	41.92	74.00	32.08	Peak
2	2390.00	27.64	6.62	34.19	37.94	38.01	74.00	35.99	Peak
3	2400.00	27.61	6.62	34.18	60.88	60.93	74.00	13.07	Peak
4	2402.08	27.61	6.62	34.18	87.31	87.36	74.00	-13.36	Peak

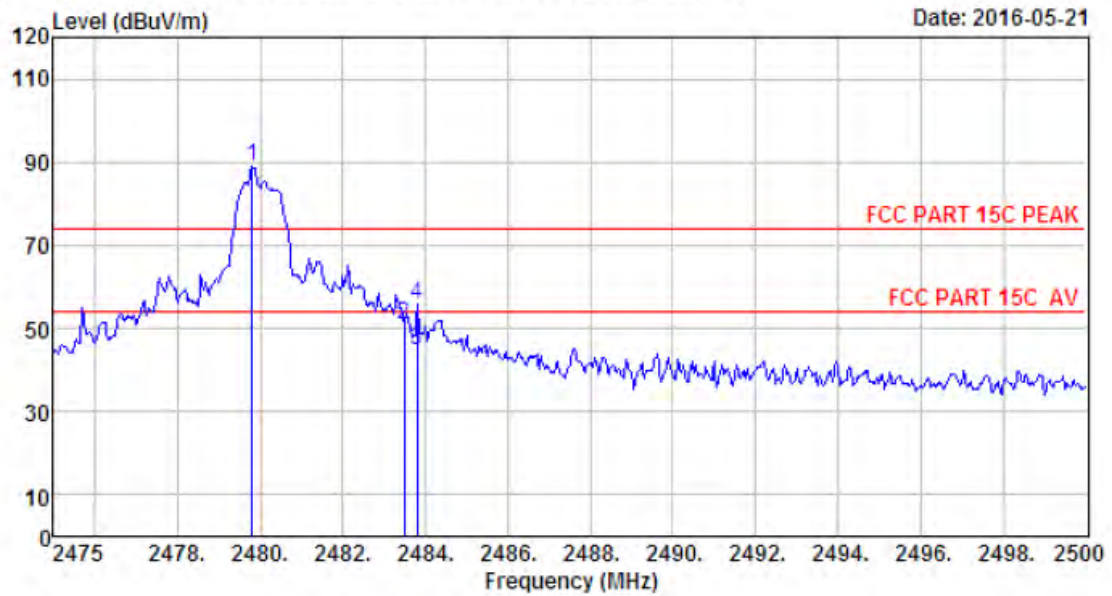
Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.  
 2. The emission levels that are 20dB below the official limit are not reported.



Site no. : 966 1# chamber                      Data no. : 14  
 Dis. / Ant. : 3m ANT 1-18G                      Ant. pol. : HORIZONTAL  
 Limit : FCC PART 15C PEAK  
 Env. / Ins. : Temp:23.6';Humi:56%;Press:101.52kPa  
 Engineer : Tony  
 EUT : Speaker  
 Power : AC 120V/60Hz  
 M/N : SHELFSYS  
 Test Mode : 8-DPSK IX 2402MHz(No Hopping)

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2389.10	27.64	6.62	34.19	39.25	39.32	74.00	34.68	Peak
2	2390.00	27.64	6.62	34.19	35.76	35.83	74.00	38.17	Peak
3	2400.00	27.61	6.62	34.18	59.31	59.36	74.00	14.64	Peak
4	2402.08	27.61	6.62	34.18	89.31	89.36	74.00	-15.36	Peak

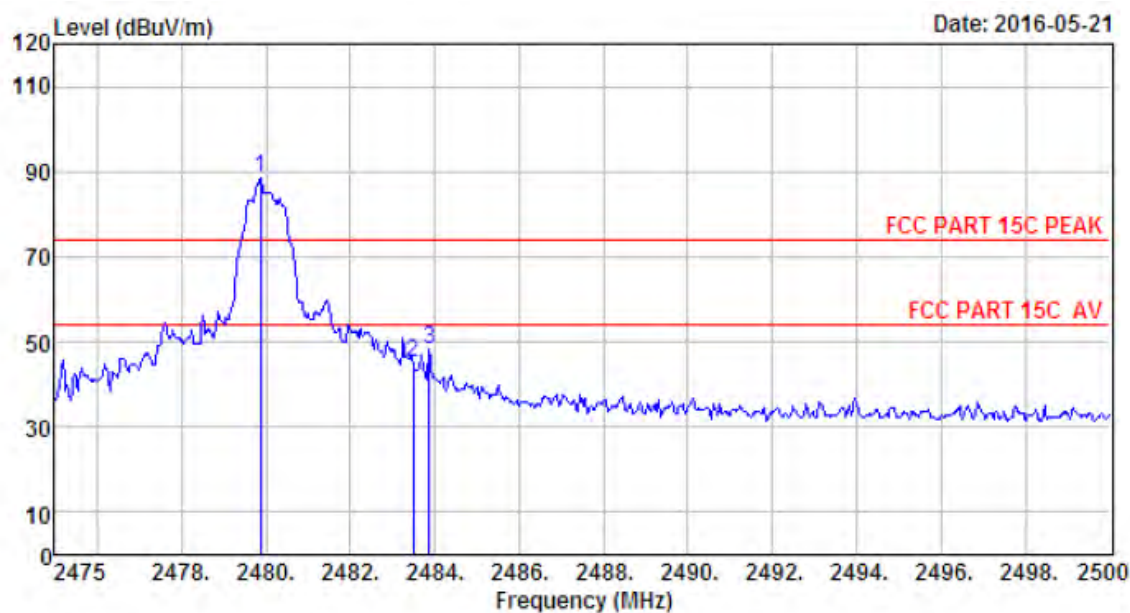
Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.  
 2. The emission levels that are 20dB below the official limit are not reported.



Site no. : 966 1# chamber Data no. : 19  
 Dis. / Ant. : 3m ANT 1-18G Ant. pol. : HORIZONTAL  
 Limit : FCC PART 15C PEAK  
 Env. / Ins. : Temp:23.6';Humi:56%;Press:101.52kPa  
 Engineer : Tony  
 EUT : Speaker  
 Power : AC 120V/60Hz  
 M/N : SHELFSYS  
 Test Mode : 8-DPSK TX 2480MHz (No Hopping)

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2479.80	27.58	6.71	34.03	88.58	88.84	74.00	-14.84	Peak
2	2483.50	27.58	6.71	34.03	50.74	51.00	74.00	23.00	Peak
3	2483.80	27.58	6.71	34.03	44.42	44.68	54.00	9.32	Average
4	2483.80	27.58	6.71	34.03	55.52	55.78	74.00	18.22	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.  
 2. The emission levels that are 20dB below the official limit are not reported.



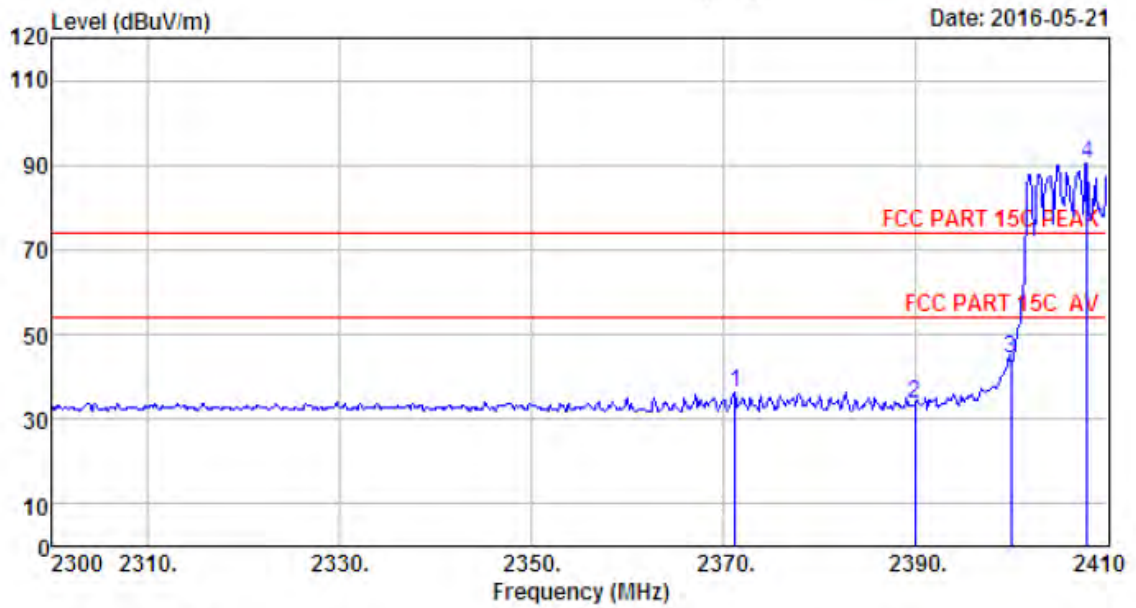
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Site no.      : 966 1# chamber      Data no.   : 20
Dis. / Ant.  : 3m ANI 1-18G       Ant. pol.  : VERTICAL
Limit        : FCC PART 15C PEAK
Env. / Ins.  : Temp:23.6';Humi:56%;Press:101.52kPa
Engineer     : Tony
EUI         : Speaker
Power        : AC 120V/60Hz
M/N         : SHELFSYS
Test Mode    : 8-DPSK TX 2480MHz(No Hopping)
  
```

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2479.88	27.58	6.71	34.03	88.40	88.66	74.00	-14.66	Peak
2	2483.50	27.58	6.71	34.03	44.69	44.95	74.00	29.05	Peak
3	2483.88	27.58	6.71	34.03	48.00	48.26	74.00	25.74	Peak

```

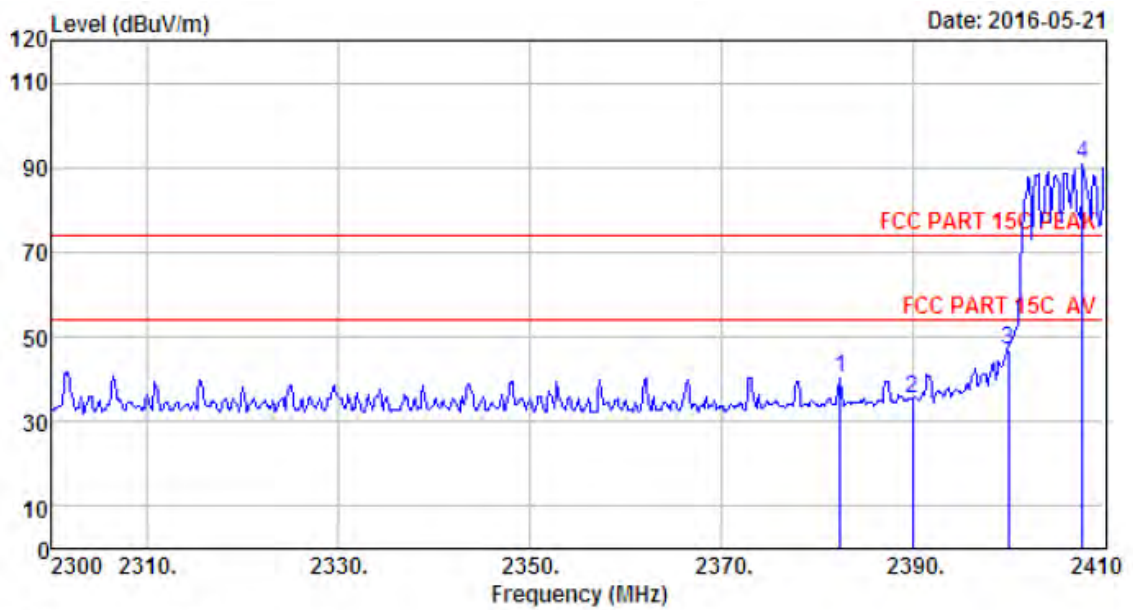
Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.
          2. The emission levels that are 20dB below the official
             limit are not reported.
  
```



Site no. : 966 1# chamber                      Data no. : 21  
 Dis. / Ant. : 3m ANT 1-18G                      Ant. pol. : VERTICAL  
 Limit : FCC PART 15C PEAK  
 Env. / Ins. : Temp:23.6';Humi:56%;Press:101.52kPa  
 Engineer : Tony  
 EUT : Speaker  
 Power : AC 120V/60Hz  
 M/N : SHELFSYS  
 Test Mode : GFSK TX 2402MHz (Hopping On)

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2371.28	27.67	6.60	34.20	36.23	36.30	74.00	37.70	Peak
2	2390.00	27.64	6.62	34.19	33.45	33.52	74.00	40.48	Peak
3	2400.00	27.61	6.62	34.18	44.22	44.27	74.00	29.73	Peak
4	2408.02	27.61	6.64	34.18	90.30	90.37	74.00	-16.37	Peak

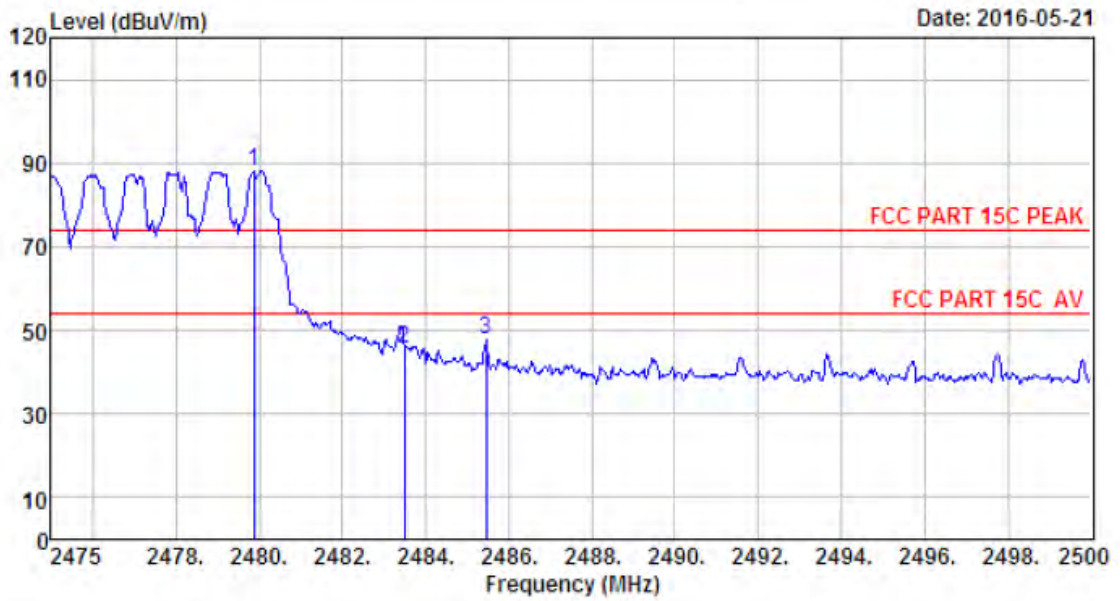
Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.  
 2. The emission levels that are 20dB below the official limit are not reported.



Site no. : 966 1# chamber                      Data no. : 22  
 Dis. / Ant. : 3m ANT 1-18G                      Ant. pol. : HORIZONTAL  
 Limit : FCC PART 15C PEAK  
 Env. / Ins. : Temp:23.6';Humi:56%;Press:101.52kPa  
 Engineer : Tony  
 EUT : Speaker  
 Power : AC 120V/60Hz  
 M/N : SHELFSYS  
 Test Mode : GFSK IX 2402MHz (Hopping On)

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2382.50	27.64	6.60	34.19	40.11	40.16	74.00	33.84	Peak
2	2390.00	27.64	6.62	34.19	35.15	35.22	74.00	38.78	Peak
3	2400.00	27.61	6.62	34.18	46.90	46.95	74.00	27.05	Peak
4	2407.80	27.61	6.64	34.18	90.90	90.97	74.00	-16.97	Peak

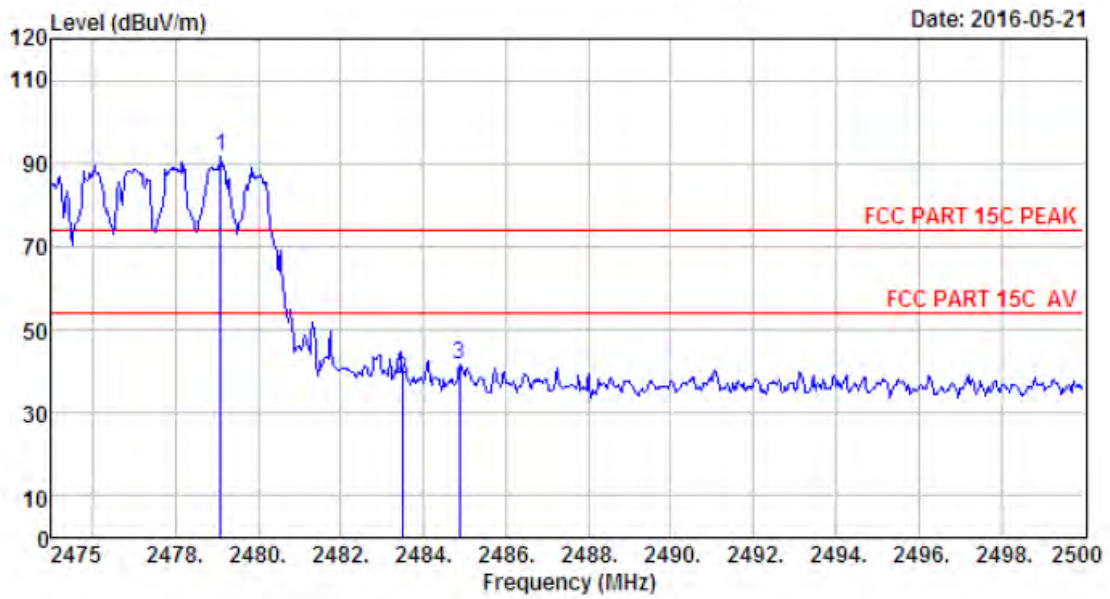
Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.  
 2. The emission levels that are 20dB below the official limit are not reported.



Site no. : 966 1# chamber                      Data no. : 23  
 Dis. / Ant. : 3m ANT 1-18G                      Ant. pol. : HORIZONTAL  
 Limit : FCC PART 15C PEAK  
 Env. / Ins. : Temp:23.6';Humi:56%;Press:101.52kPa  
 Engineer : Tony  
 EUT : Speaker  
 Power : AC 120V/60Hz  
 M/N : SHELF SYS  
 Test Mode : GFSK TX 2480MHz (Hopping On)

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2479.88	27.58	6.71	34.03	88.03	88.29	74.00	-14.29	Peak
2	2483.50	27.58	6.71	34.03	45.54	45.80	74.00	28.20	Peak
3	2485.45	27.58	6.71	34.03	47.36	47.62	74.00	26.38	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.  
 2. The emission levels that are 20dB below the official limit are not reported.

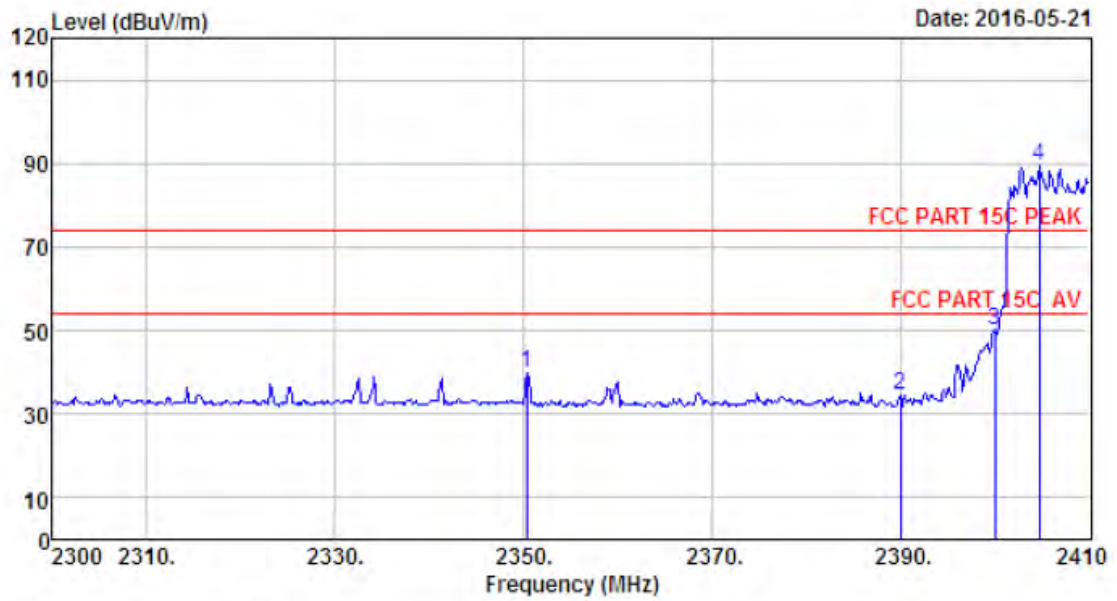


Site no. : 966 1# chamber                      Data no. : 24  
 Dis. / Ant. : 3m ANT 1-18G                      Ant. pol. : VERTICAL  
 Limit : FCC PART 15C PEAK  
 Env. / Ins. : Temp:23.6';Humi:56%;Press:101.52kPa  
 Engineer : Tony  
 EUT : Speaker  
 Power : AC 120V/60Hz  
 M/N : SHELF SYS  
 Test Mode : GFSK TX 2480MHz (Hopping On)

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2479.10	27.58	6.71	34.03	91.52	91.78	74.00	-17.78	Peak
2	2483.50	27.58	6.71	34.03	37.75	38.01	74.00	35.99	Peak
3	2484.88	27.58	6.71	34.03	41.25	41.51	74.00	32.49	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.  
 2. The emission levels that are 20dB below the official limit are not reported.

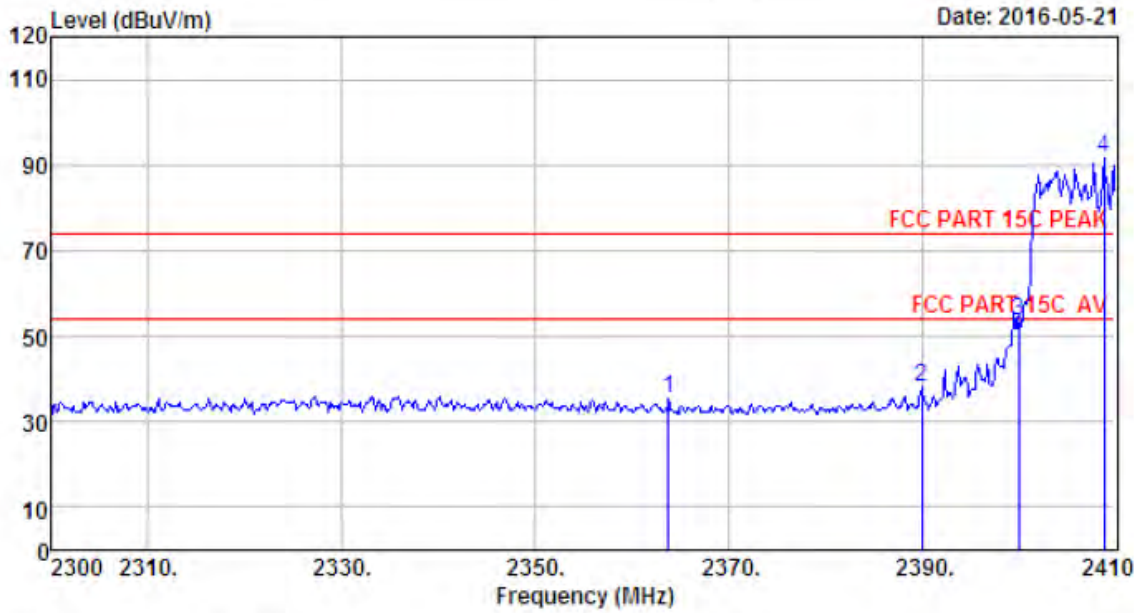




Site no. : 966 1# chamber                      Data no. : 25  
 Dis. / Ant. : 3m ANT 1-18G                      Ant. pol. : VERTICAL  
 Limit : FCC PART 15C PEAK  
 Env. / Ins. : Temp:23.6';Humi:56%;Press:101.52kPa  
 Engineer : Tony  
 EUT : Speaker  
 Power : AC 120V/60Hz  
 M/N : SHELFSYS  
 Test Mode : 8-DPSK TX 2402MHz (Hopping On)

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2350.38	27.70	6.56	34.22	39.63	39.67	74.00	34.33	Peak
2	2390.00	27.64	6.62	34.19	34.54	34.61	74.00	39.39	Peak
3	2400.00	27.61	6.62	34.18	50.17	50.22	74.00	23.78	Peak
4	2404.72	27.61	6.64	34.18	89.45	89.52	74.00	-15.52	Peak

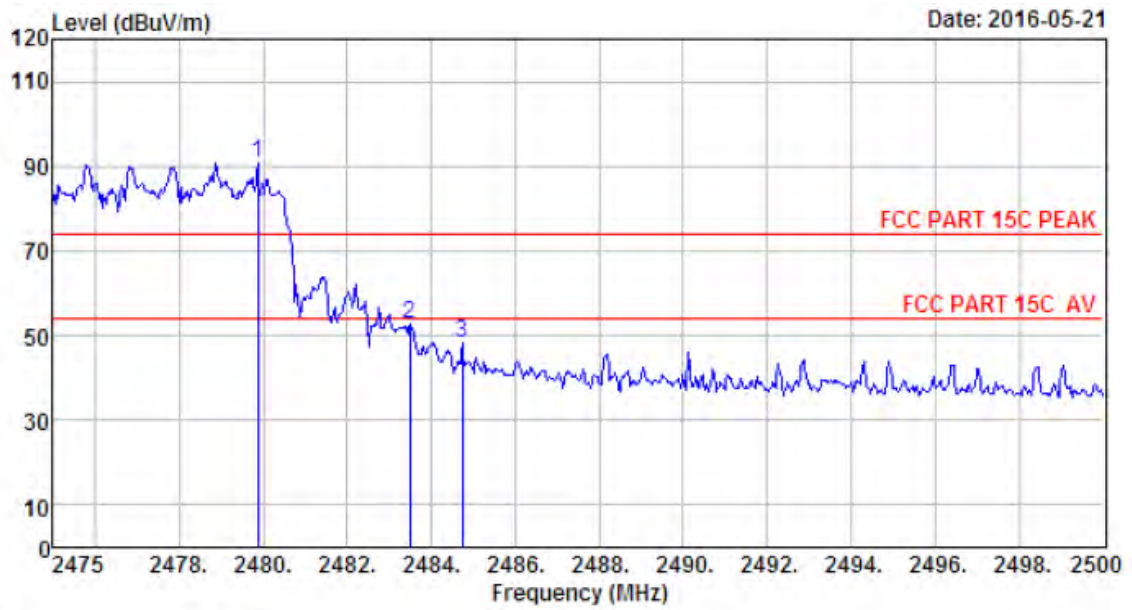
Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.  
 2. The emission levels that are 20dB below the official limit are not reported.



Site no. : 966 1# chamber Data no. : 26  
 Dis. / Ant. : 3m ANT 1-18G Ant. pol. : HORIZONTAL  
 Limit : FCC PART 15C PEAK  
 Env. / Ins. : Temp:23.6';Humi:56%;Press:101.52kPa  
 Engineer : Tony  
 EUT : Speaker  
 Power : AC 120V/60Hz  
 M/N : SHELFSYS  
 Test Mode : 8-DPSK TX 2402MHz (Hopping On)

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBUV)	Emission Level (dBUV/m)	Limits (dBUV/m)	Margin (dB)	Remark
1	2363.80	27.67	6.58	34.20	35.42	35.47	74.00	38.53	Peak
2	2390.00	27.64	6.62	34.19	37.93	38.00	74.00	36.00	Peak
3	2400.00	27.61	6.62	34.18	53.56	53.61	74.00	20.39	Peak
4	2408.90	27.60	6.64	34.15	91.40	91.49	74.00	-17.49	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.  
 2. The emission levels that are 20dB below the official limit are not reported.

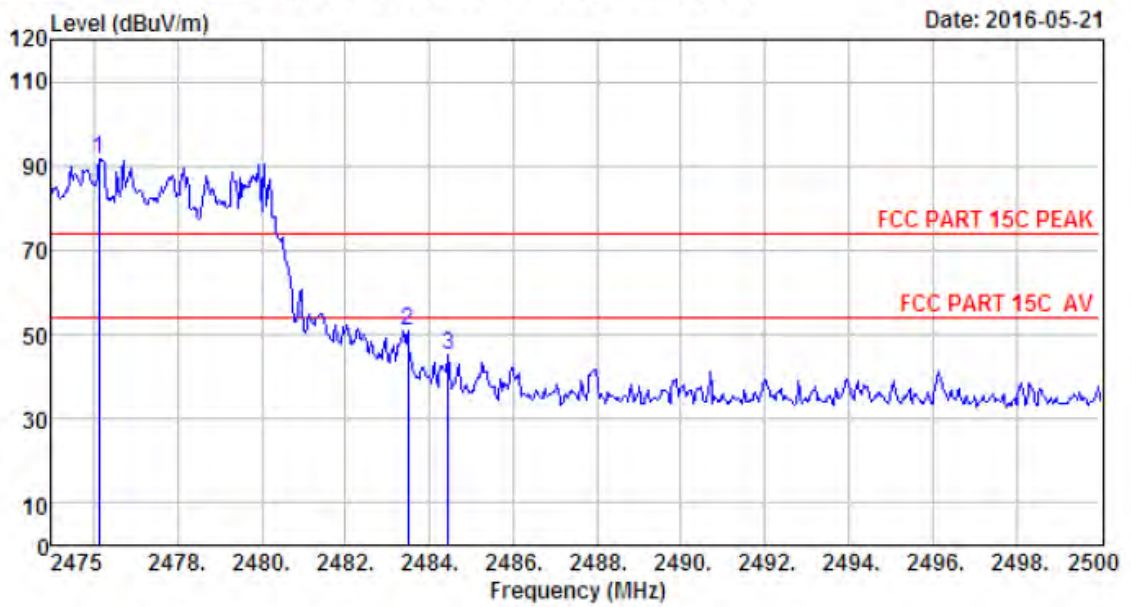


```

Site no.       : 966 1# chamber           Data no.  : 27
Dis. / Ant.    : 3m ANI 1-18G           Ant. pol. : HORIZONTAL
Limit         : FCC PART 15C PEAK
Env. / Ins.    : Temp:23.6';Humi:56%;Press:101.52kPa
Engineer      : Tony
EUT           : Speaker
Power         : AC 120V/60Hz
M/N           : SHELFSYS
Test Mode     : 8-DPSK IX 2480MHz (Hopping On)
    
```

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2479.88	27.58	6.71	34.03	90.65	90.91	74.00	-16.91	Peak
2	2483.50	27.58	6.71	34.03	52.46	52.72	74.00	21.28	Peak
3	2484.75	27.58	6.71	34.03	48.17	48.43	74.00	25.57	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.  
 2. The emission levels that are 20dB below the official limit are not reported.



Site no. : 966 1# chamber                      Data no. : 28  
 Dis. / Ant. : 3m ANT 1-18G                      Ant. pol. : VERTICAL  
 Limit : FCC PART 15C PEAK  
 Env. / Ins. : Temp:23.6';Humi:56%;Press:101.52kPa  
 Engineer : Tony  
 EUI : Speaker  
 Power : AC 120V/60Hz  
 M/N : SHELFSYS  
 Test Mode : 8-DPSK TX 2480MHz (Hopping On)

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2476.13	27.58	6.71	34.06	91.44	91.67	74.00	-17.67	Peak
2	2483.50	27.58	6.71	34.03	50.56	50.82	74.00	23.18	Peak
3	2484.45	27.58	6.71	34.03	45.04	45.30	74.00	28.70	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.  
 2. The emission levels that are 20dB below the official limit are not reported.

## 10. POWER LINE CONDUCTED EMISSIONS

### 10.1. Limit

Frequency	Maximum RF Line Voltage	
	Quasi-Peak Level dB(μV)	Average Level dB(μV)
150kHz ~ 500kHz	66 ~ 56*	56 ~ 46*
500kHz ~ 5MHz	56	46
5MHz ~ 30MHz	60	50

Notes: 1. \* Decreasing linearly with logarithm of frequency.  
 2. The lower limit shall apply at the transition frequencies.

### 10.2. Test Procedure

The EUT was placed on a non-metallic table, 80cm above the ground plane. which connected to the power mains through a line impedance stabilization network (L.I.S.N. 1#).. Both sides of AC line are checked to find out the maximum conducted emission. In order to find the maximum emission levels, the relative positions of equipment and all of the interface cables shall be changed according to ANSI C63.10: 2013 on Conducted Emission Test.

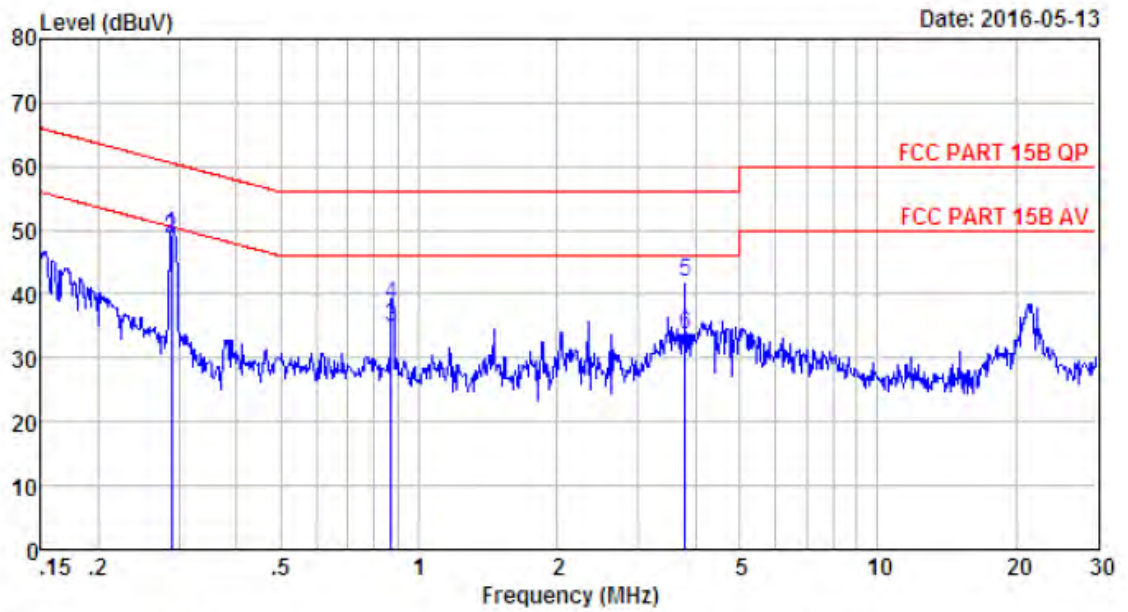
The bandwidth of test receiver (R & S ESHS30) is set at 10kHz.

The frequency range from 150kHz to 30MHz is checked.

### 10.3. Test Result

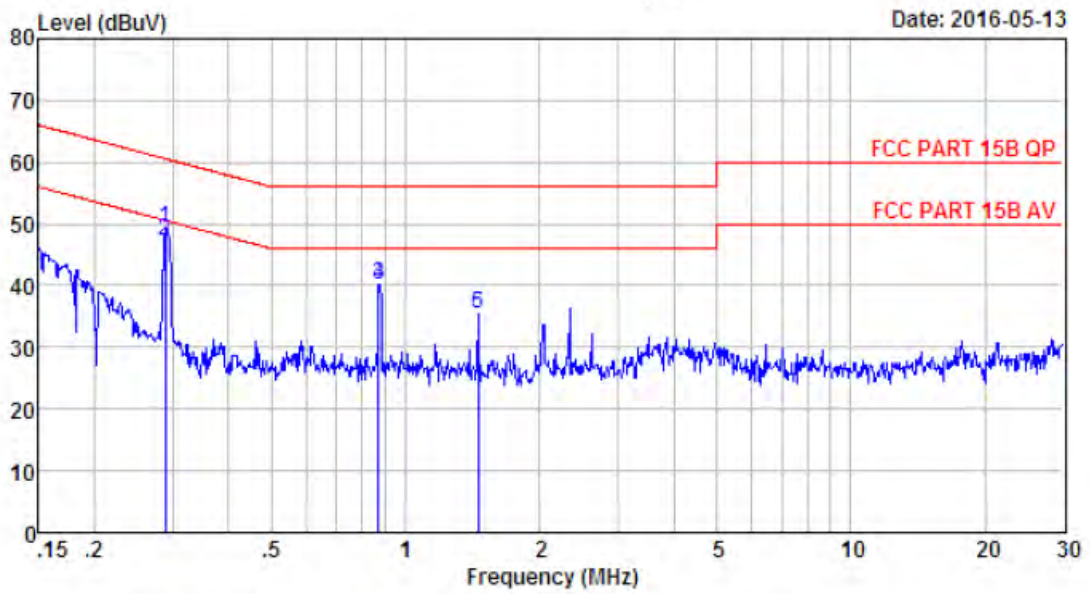
0.15MHz—30MHz Conducted emissison Test result	
EUT: Speaker	M/N: SHELFSYS
Power: AC 120V/60Hz ; AC 240V/60Hz	
Test date: 2016-05-13	Test site: 3m Chamber Tested by: Tony.Tang
Test mode: Tx Mode	
Pass	

### 10.4. Test data



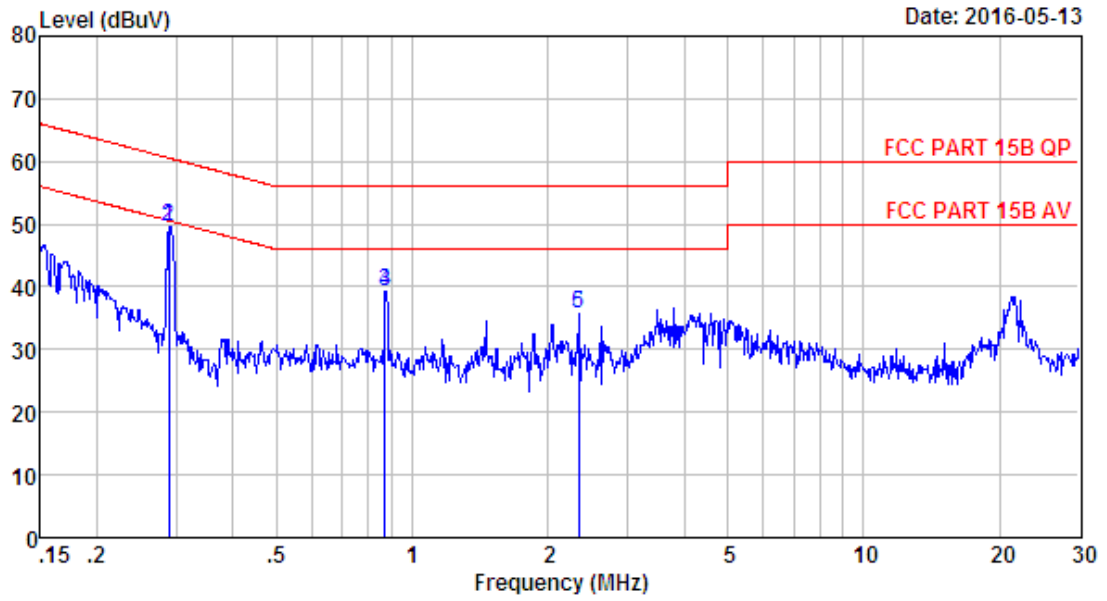
Site no : 844 Shield Room Data no. : 33  
 Env. / Ins. : Temp:24.3'C Humi:58% Press:101.50kPa LINE Phase : NEUTRAL  
 Limit : FCC PART 15B QP  
 Engineer : Tony  
 EUT : Speaker  
 Power : AC 120V/60Hz  
 M/N : SHELFSYS  
 Test Mode : IX Mode

	Freq. (MHz)	LISN Factor (dB)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV)	Limits (dBuV)	Margin (dB)	Remark
1	0.29	9.60	9.83	29.90	49.33	50.54	1.21	Average
2	0.29	9.60	9.83	29.19	48.62	60.54	11.92	QP
3	0.87	9.62	9.82	15.50	34.94	46.00	11.06	Average
4	0.87	9.62	9.82	18.79	38.23	56.00	17.77	QP
5	3.80	9.64	9.84	22.50	41.98	46.00	4.02	Average
6	3.80	9.64	9.84	14.08	33.56	56.00	22.44	QP



Site no : 844 Shield Room Data no. : 35  
 Env. / Ins. : Temp:24.3'C Humi:58% Press:101.50kPa LINE Phase : LINE  
 Limit : FCC PART 15B QP  
 Engineer : Tony  
 EUT : Speaker  
 Power : AC 120V/60Hz  
 M/N : SHELFSYS  
 Test Mode : IX Mode

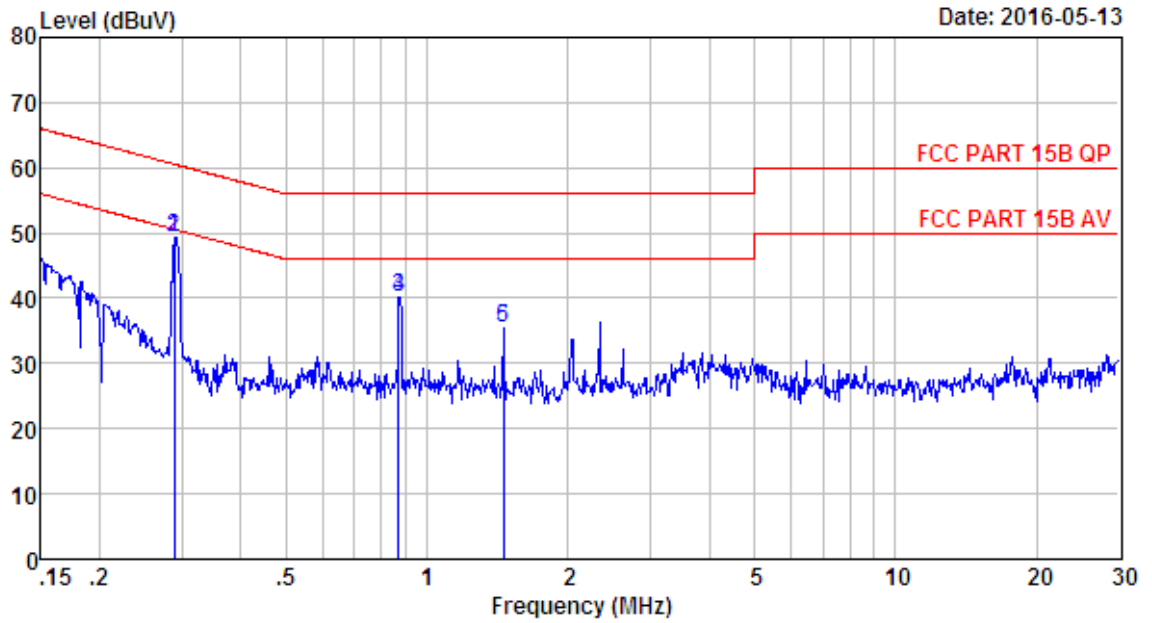
	Freq. (MHz)	LISN Factor (dB)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV)	Limits (dBuV)	Margin (dB)	Remark
1	0.29	9.61	9.83	29.80	49.24	50.54	1.30	Average
2	0.29	9.61	9.83	27.80	47.24	60.54	13.30	QP
3	0.87	9.62	9.82	20.64	40.08	46.00	5.92	Average
4	0.87	9.62	9.82	20.64	40.08	56.00	15.92	QP
5	1.46	9.62	9.83	15.98	35.43	46.00	10.57	Average
6	1.46	9.62	9.83	15.98	35.43	56.00	20.57	QP



Site no : 844 Shield Room Data no. : 37  
 Env. / Ins. : Temp:24.3'C Humi:58% Press:101.50kPa LINE Phase : NEUTRAL  
 Limit : FCC PART 15B QP  
 Engineer : Tony  
 EUT : Speaker  
 Power : AC 240V/60Hz  
 M/N : SHELFSYS  
 Test Mode : TX Mode

	Freq. (MHz)	LISN Factor (dB)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV)	Limits (dBuV)	Margin (dB)	Remark
1	0.29	9.60	9.83	30.19	49.62	50.54	0.92	Average
2	0.29	9.60	9.83	30.19	49.62	60.54	10.92	QP
3	0.87	9.62	9.82	19.79	39.23	46.00	6.77	Average
4	0.87	9.62	9.82	19.79	39.23	56.00	16.77	QP
5	2.33	9.63	9.84	16.17	35.64	46.00	10.36	Average
6	2.33	9.63	9.84	16.17	35.64	56.00	20.36	QP





Site no : 844 Shield Room Data no. : 39  
 Env. / Ins. : Temp:24.3'C Humi:58% Press:101.50kPa LINE Phase : LINE  
 Limit : FCC PART 15B QP  
 Engineer : Tony  
 EUT : Speaker  
 Power : AC 240V/60Hz  
 M/N : SHELFSYS  
 Test Mode : TX Mode

	Freq. (MHz)	LISN Factor (dB)	Cable Loss (dB)	Reading (dBUV)	Emission Level (dBUV)	Limits (dBUV)	Margin (dB)	Remark
1	0.29	9.61	9.83	29.80	49.24	50.54	1.30	Average
2	0.29	9.61	9.83	29.80	49.24	60.54	11.30	QP
3	0.87	9.62	9.82	20.64	40.08	46.00	5.92	Average
4	0.87	9.62	9.82	20.64	40.08	56.00	15.92	QP
5	1.46	9.62	9.83	15.98	35.43	46.00	10.57	Average
6	1.46	9.62	9.83	15.98	35.43	56.00	20.57	QP

## **11. ANTENNA REQUIREMENTS**

### **11.1. Limit**

For intentional device, according to FCC 47 CFR Section 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. And according to FCC 47 CFR Section 15.247 (b), if 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 6dBi.

### **11.2. Result**

The antennas used for this product are integral PCB Antenna and that no antenna other than that furnished by the responsible party shall be used with the device, the maximum peak gain of the transmit antenna is only 0dBi.

## 12. TEST SETUP PHOTO

Conducted Test



Radiated Test (30-1000 MHz)



Radiated Test (1000-25000 MHz)

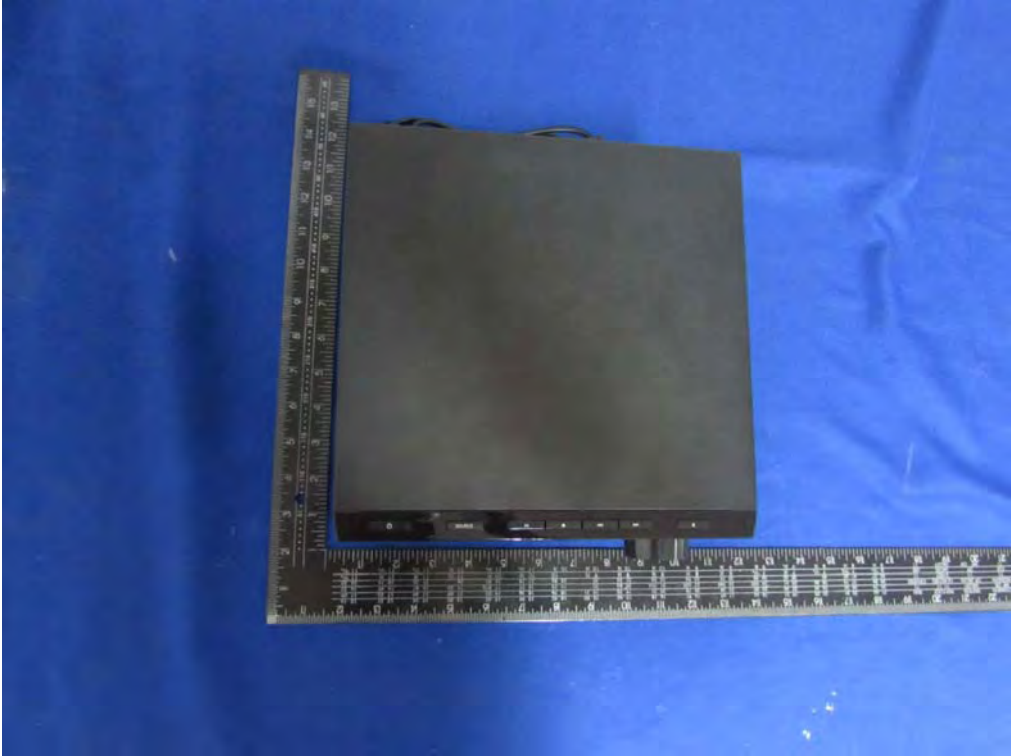


### 13. PHOTOS OF EUT

**External Photos**  
M/N: SHELFSYS



**External Photos**  
M/N: SHELFSYS



**External Photos**  
M/N: SHELFSYS

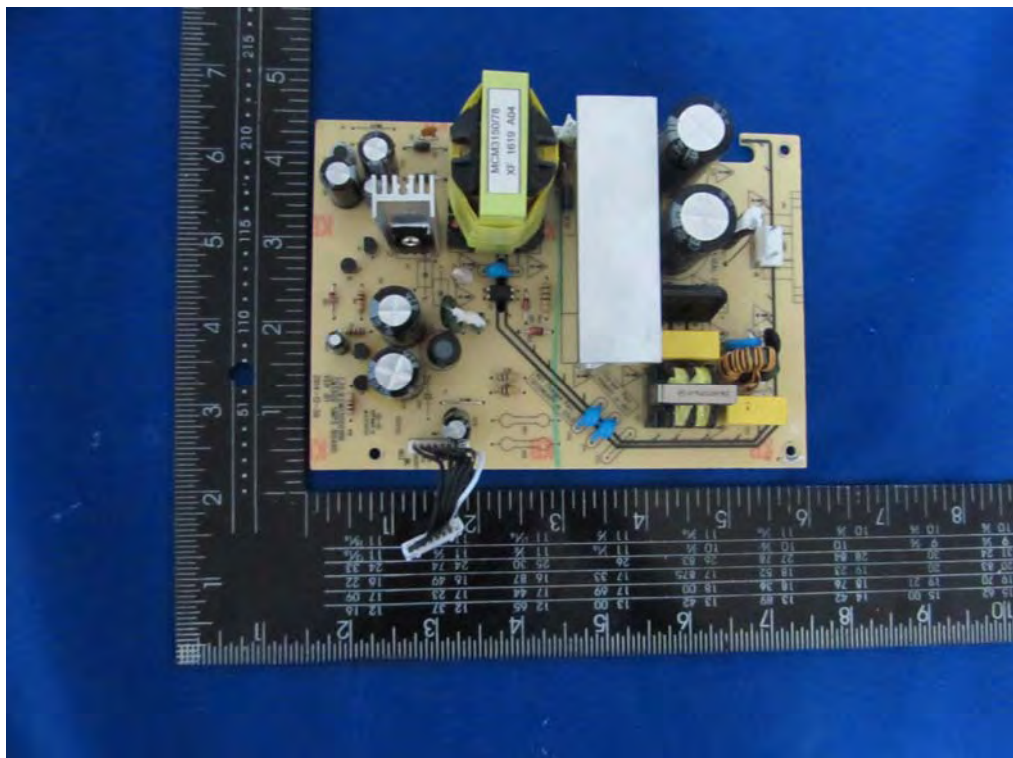


**External Photos**  
M/N: SHELFSYS

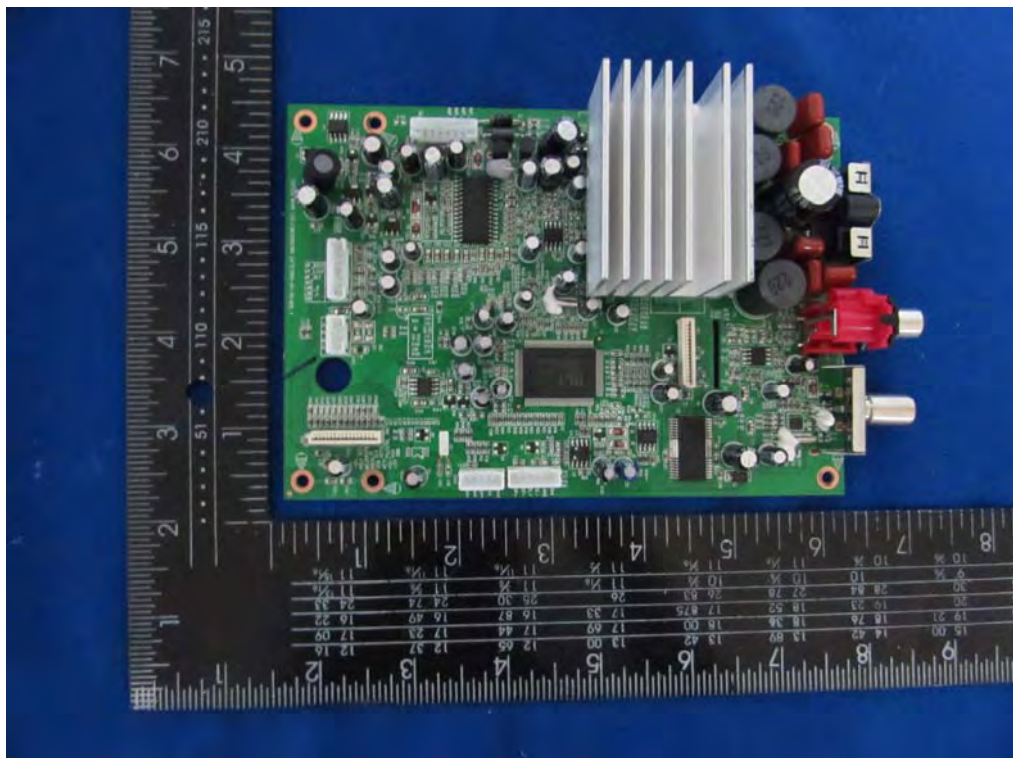
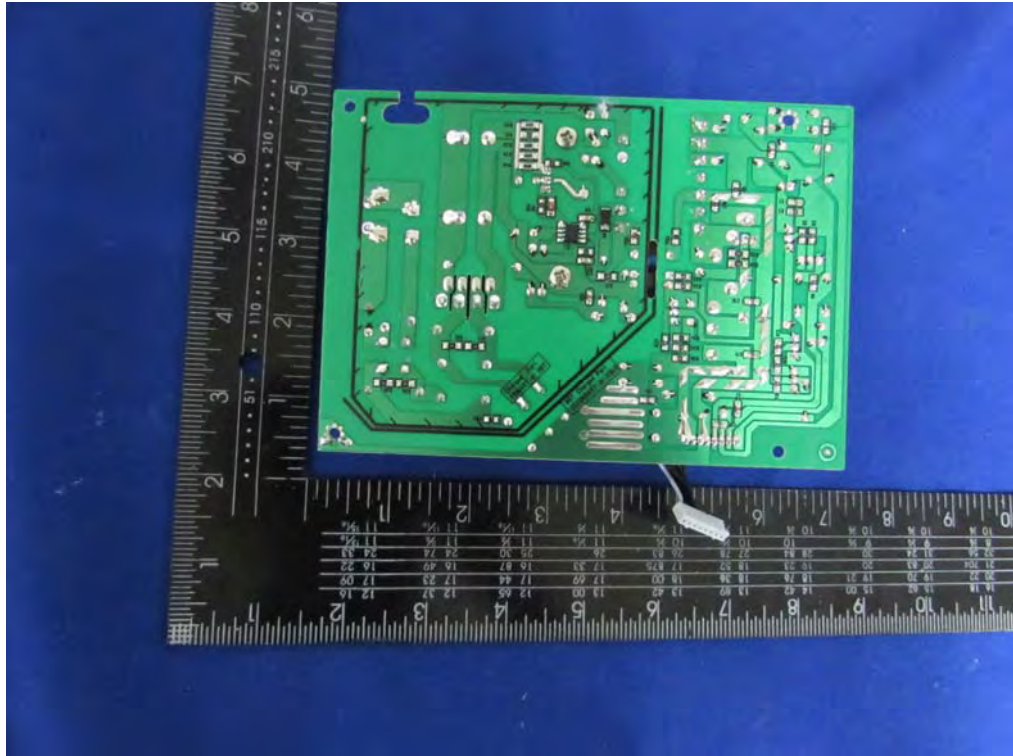




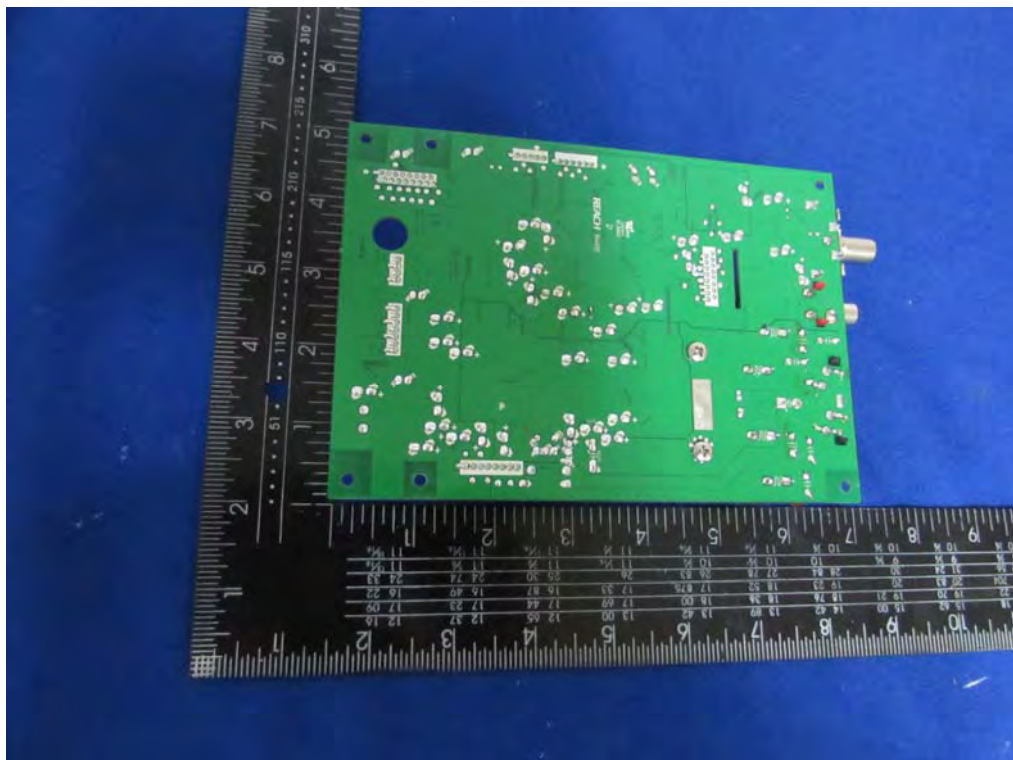
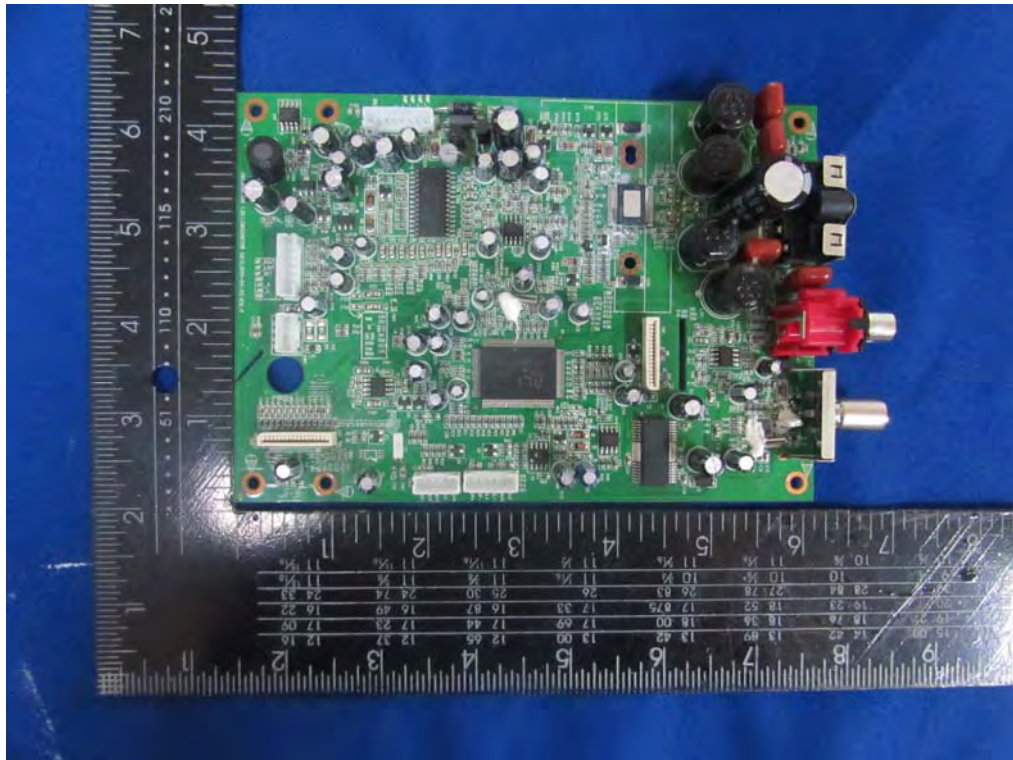
**Internal Photos**  
M/N: SHELFSYS



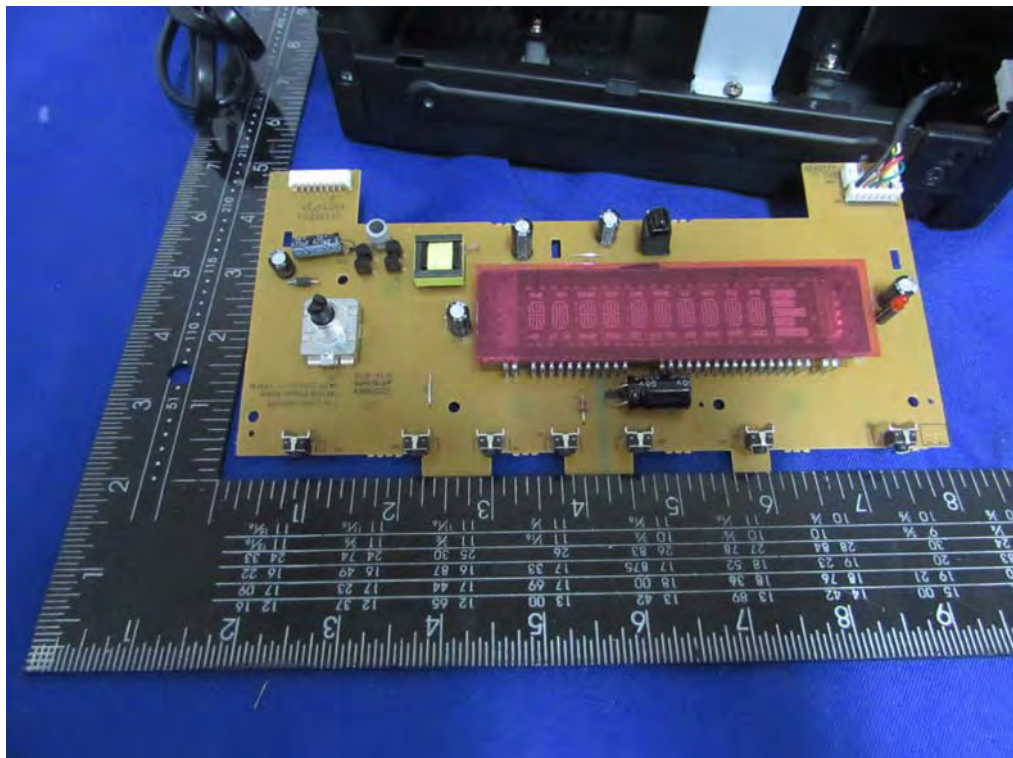
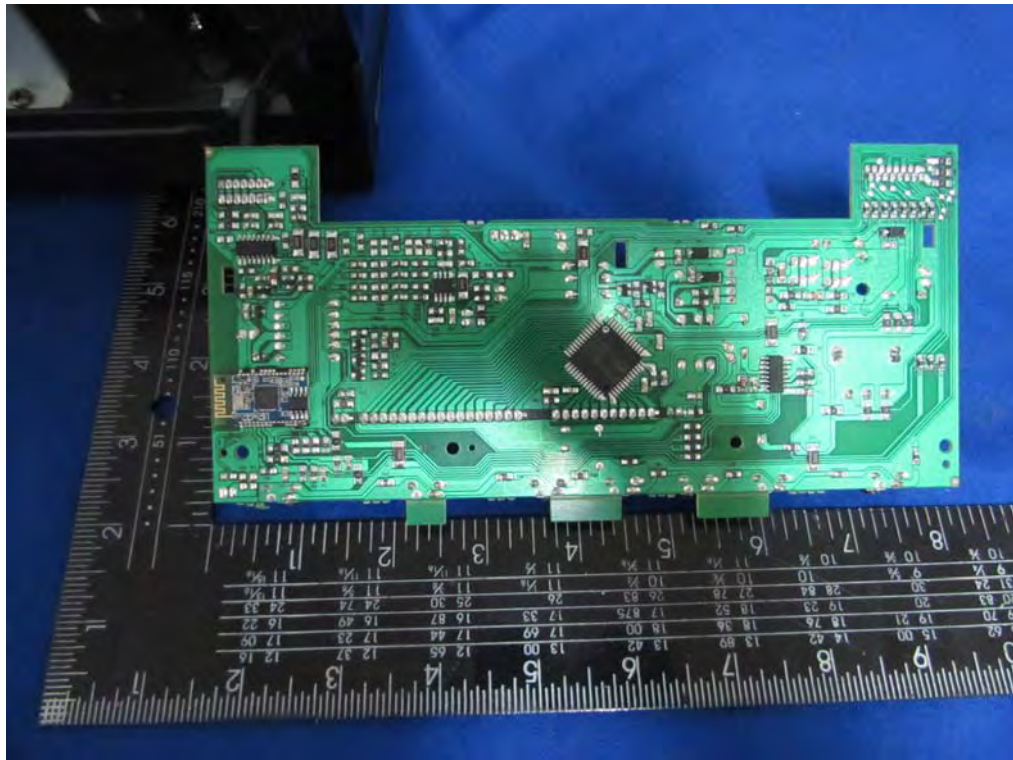
**Internal Photos**  
M/N: SHELFSYS



**Internal Photos**  
M/N: SHELSYS



**Internal Photos**  
M/N: SHELFSYS



**Internal Photos**  
M/N: SHELFSSYS

Bluetooth  
Antenna

