

FCC PART 15C TEST REPORT FOR CERTIFICATION
On Behalf of

Edco Electronics Inc.

Portable Bluetooth Wireless Speaker

Model Number: BTSPK21

FCC ID: 2AJMW-BTSPK21

Prepared for : Edco Electronics Inc.
8484 Avenue de l'Esplanade, Montréal, Québec

Prepared By : Dongguan Lepont Testing Service Co., Ltd.
No.117 Ting Shan Industrial Zone, Houjie Town,
Dongguan,Guangdong, P.R. China

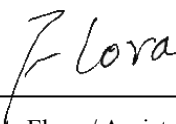


Report Number: LPE-FI16091301
Date of Test : August 23, 2016~ October 08,2016
Date of Report: October 10,2016

TABLE OF CONTENTS

Description	Page
TEST REPORT VERIFICATION.....	3
1. GENERAL INFORMATION.....	5
1.1. Description of Device (EUT).....	5
2. SUMMARY OF TEST.....	6
2.1. Summary of test result.....	6
2.2. Measurement uncertainty.....	7
2.3. Assistant equipment used for test.....	7
2.4. Block Diagram.....	7
2.5. Test mode.....	8
2.6. Channel List for Bluetooth.....	8
2.7. Test Equipment.....	9
3. MAXIMUM PEAK OUTPUT POWER.....	10
3.1. Limit.....	10
3.2. Test Procedure.....	10
3.3. Test Result.....	10
3.4. Test Data.....	11
4. 20 DB BANDWIDTH.....	14
4.1. Limit.....	14
4.2. Test Procedure.....	14
4.3. Test Result.....	14
4.4. Test Data.....	15
5. CARRIER FREQUENCY SEPARATION.....	18
5.1. Limit.....	18
5.2. Test Procedure.....	18
5.3. Test Result.....	18
5.4. Test Data.....	19
6. NUMBER OF HOPPING CHANNEL.....	22
6.1. Limit.....	22
6.2. Test Procedure.....	22
6.3. Test Result.....	22
6.4. Test Data.....	23
7. DWELL TIME.....	24
7.1. Limit.....	24
7.2. Test Procedure.....	24
7.3. Test Result.....	24
7.4. Test Data.....	25
8. RADIATED EMISSIONS.....	28
8.1. Limit.....	28
8.2. Block Diagram of Test setup.....	29
8.3. Test Procedure.....	30
8.4. Test Result.....	31
8.5. Test Data.....	32
9. BAND EDGE COMPLIANCE.....	36
9.1. Limit.....	36
9.2. Block Diagram of Test setup.....	36
9.3. Test Procedure.....	36

9.4. Test Result.....	37
9.5. Test Data.....	38
10. CONDUCTED SPURIOUS EMISSION.....	42
10.1. Limit.....	42
10.2. Test Procedure.....	42
10.3. Test Result.....	42
10.4. Test Data.....	43
11. POWER LINE CONDUCTED EMISSIONS.....	45
11.1. Limit.....	45
11.2. Test Procedure.....	45
12. ANTENNA REQUIREMENTS.....	48
12.1. Limit.....	48
12.2. Result.....	48

Test Report Verification

Applicant:	Edco Electronics Inc.		
Address:	8484 Avenue de l'Esplanade, Montréal, Québec		
Manufacturer Address:	SHENZHEN GXTSONIC TECHNOLOGY CO., LTD. 2-3F/B, Yingli Building, Tianxin Industrial Park, Gushu Village, Xixiang Town, Bao'an, Shenzhen.		
E.U.T:	Portable Bluetooth Wireless Speaker		
Model Number:	BTSPK21		
Power Supply:	DC 3.7V From Internal Battery DC 5V From USB for Charging		
Test Voltage:	AC 120V 60Hz(Adapter input), DC 3.7V battery Only the worst case was recorded in the report.		
Trade Name:	-----	Serial No.:	-----
Date of Receipt:	August 23, 2016	Date of Test:	Aug 24, 2016~ Oct 08,2016
Test Specification:	FCC Rules and Regulations Part 15 Subpart C:2015 ANSI C63.10:2013		
Test Result:	<p>The device described above is tested by Dongguan Lepont Testing Service Co., Ltd.. The measurement results were contained in this test report and Dongguan Lepont Testing Service 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>This report applies to above tested sample only and shall not be reproduced in part without written approval of Dongguan Lepont Testing Service Co., Ltd.</p>		
			Date: October 10,2016
Prepared by:	Tested by:	Approved by:	
			
Flora / Assistant	Frank Shen / Engineer	Allen Yang / Manager	
Other Aspects:	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 Dongguan Lepont Testing Service Co., Ltd.</i>			

1. GENERAL INFORMATION

1.1. Description of Device (EUT)

Product Name	:	Portable Bluetooth Wireless Speaker
Model Number	:	BTSPK21
FCC ID	:	2AJMW-BTSPK21
Operation frequency	:	2402MHz~2480MHz
Number of channel	:	79
Antenna	:	Internal antenna, 2.04 dBi gain
Modulation	:	Dula-mode Bluetooth 4.1 BT BDR: GFSK BT EDR: $\pi/4$ -DQPSK BT EDR: 8-DPSK
Sample Type	:	Prototype production

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: 15.247(a)(1)	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 Emissions	FCC Part 15: 15.209 FCC Part 15: 15.247(d)	PASS
Band Edge Compliance	FCC Part 15: 15.247(d)	PASS
Conducted Spurious Emissions	FCC Part 15: 15.209 FCC Part 15: 15.247(d)	PASS
Power Line Conducted Emissions	FCC Part 15: 15.207	PASS
Antenna requirement	FCC Part 15: 15.203	PASS

2.2. Measurement uncertainty

Test Item	Uncertainty
Uncertainty for Conduction emission test	1.38dB
Uncertainty for Radiation Emission test (30MHz-1GHz)	4.68
Uncertainty for Radiation Emission test (1GHz to 18GHz)	4.89
Uncertainty for radio frequency	7×10 ⁻⁸
Uncertainty for conducted RF Power	0.16dB
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.

2.3. Assistant equipment used for test

2.3.1. PC

Notebook PC

Manufacturer : ASUS
M/N : K42J

Adapter

Manufacturer : DELTA
M/N : ADP-75SB BB

Adapter

Model : DA90PM111
Input : AC 100-240V~50/60Hz 0.5A
Output : Output: DC 5V/2A

2.4. 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: Portable Bluetooth Wireless Speaker)

2.5. 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
$\pi/4$ -DQPSK	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.

2.6. 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	-	-

2.7. Test Equipment

2.7.1. For conducted emissions test

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
EMI Test Receiver	Rohde & Schwarz	ESHS30	8290501003	April,28,16	1 Year
Artificial Mains Networ	Rohde & Schwarz	ENV216	100873	April,28,16	1 Year
Pulse Limiter	Rohde & Schwarz	ESFSHNA-Z2	101100	April,28,16	1 Year
RF Cable	Fujikura	3D-2W	844Charmbr No1	April,28,16	1 Year

2.7.2. For radiated emissions test (30-1000MHz)

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
EMI Test Receiver	Rohde & Schwarz	ESR	101849	April,28,16	1 Year
Bilog Antenna	Schwarzbeck	VULB 9163	743	April,28,16	1 Year
Signal Amplifier	HP	8447D	1726A01222	April,28,16	1 Year

2.7.3. For radio & radiated emissions test (above 1GHz)

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
Horn Antenna	SCHWARZB ECK	BBHA 9120 D	BBHA9120D1 002	April,28,16	1 Year
Signal Amplifier	SCHWARZB ECK	BBV9718	9718-212	April,28,16	1 Year
Spectrum Analyzer	Rohde & Schwarz	FDU26	2004018	April,28,16	1 Year
RF Cable	Hubersuhner	RG 214/U	513423	April,28,16	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

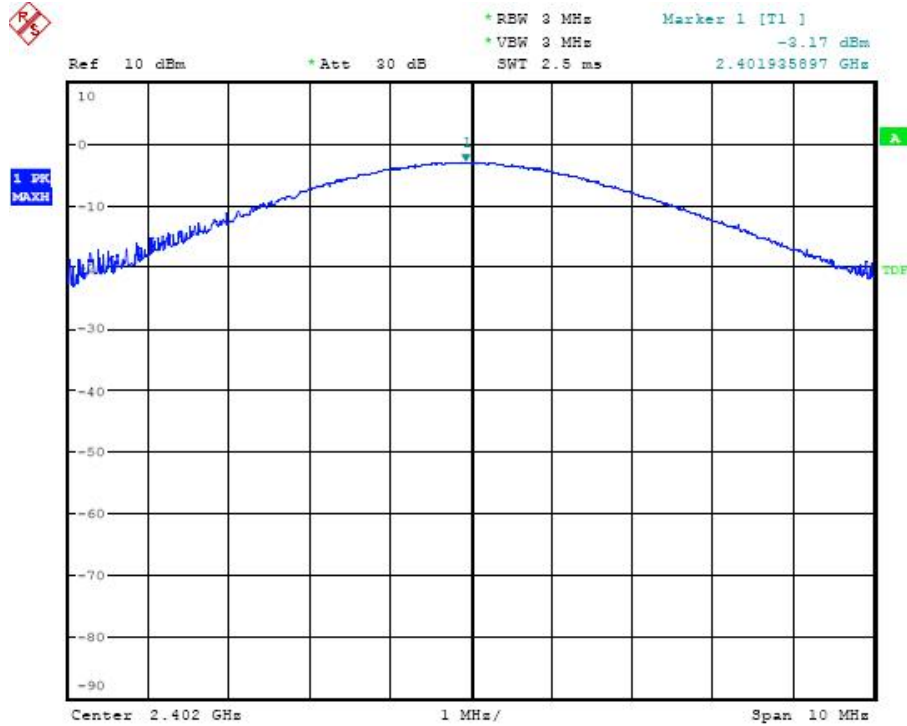
3.3. Test Result

Modulation:	GFSK, $\pi/4$ -DQPSK, 8-DPSK		
RBW :	3MHz	VBW:	3MHz
Test Date :	2016-09-27	Spectrum Detector:	PK
Temperature:	20°C	Relative Humidity:	54%
Pressure:	101.0KPa	Test by:	Frank
Test Result:	PASS		

Channel frequency (MHz)	Cable Loss dB	Peak Power Output (dBm)	Peak Power Output (mW)	Peak Power Limit		Result
				dBm	W	
GFSK						
2402.00	1.5	-3.17	0.48	21	0.125	PASS
2441.00	1.5	-3.80	0.42	21	0.125	PASS
2480.00	1.5	-4.39	0.36	21	0.125	PASS
8-DPSK						
2402.00	1.5	-3.16	0.48	21	0.125	PASS
2441.00	1.5	-3.88	0.41	21	0.125	PASS
2480.00	1.5	-4.42	0.36	21	0.125	PASS

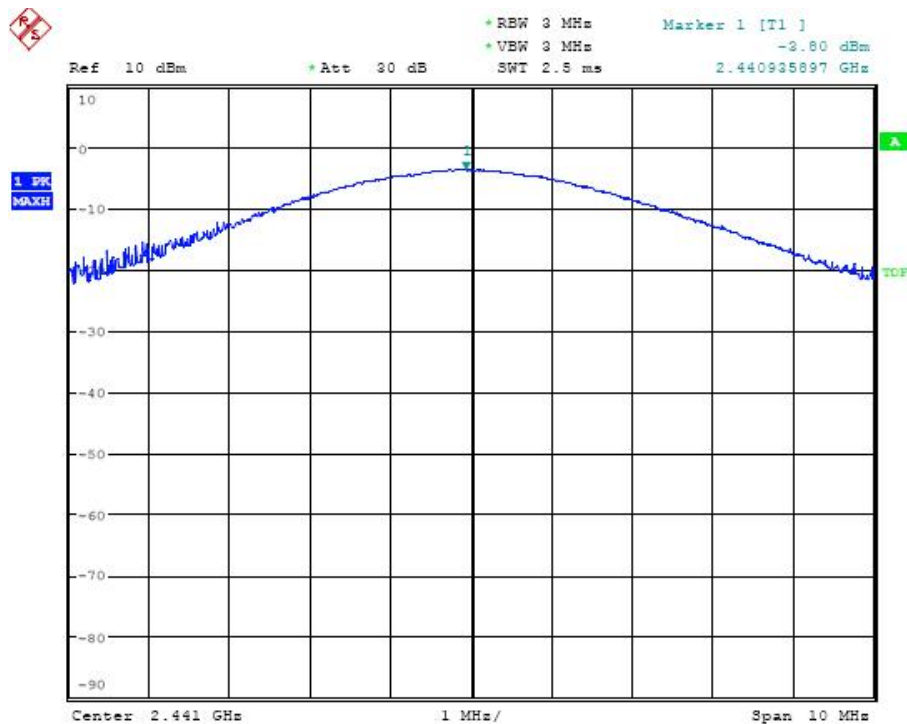
3.4. Test Data

GFSK Lowest Channel



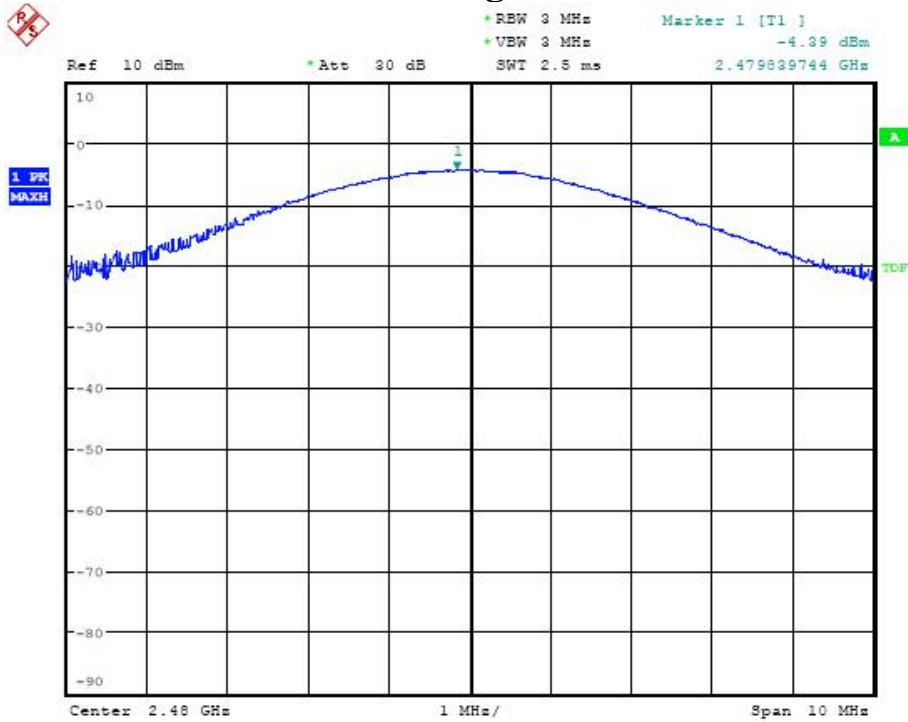
Date: 27.SEP.2016 18:38:01

GFSK Middle Channel



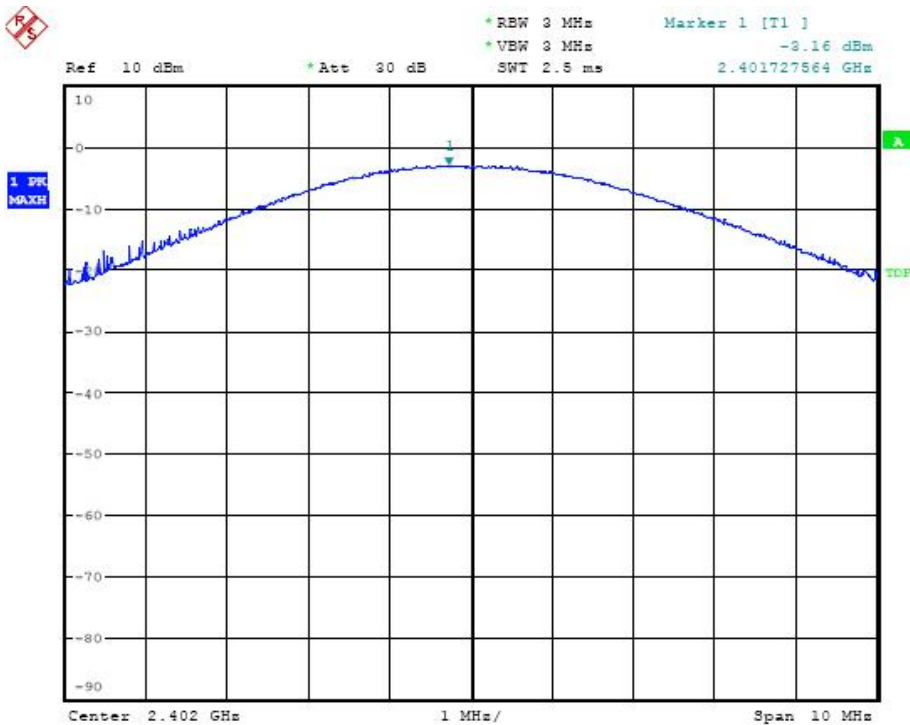
Date: 27.SEP.2016 18:38:37

GFSK Highest Channel



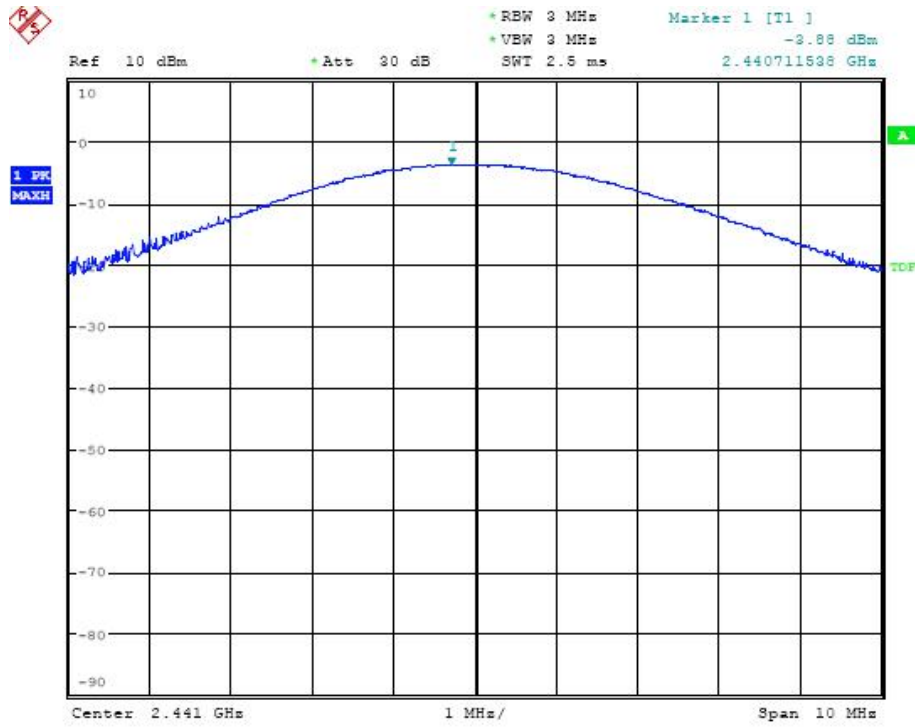
Date: 27.SEP.2016 18:36:58

8DPSK Lowest Channel



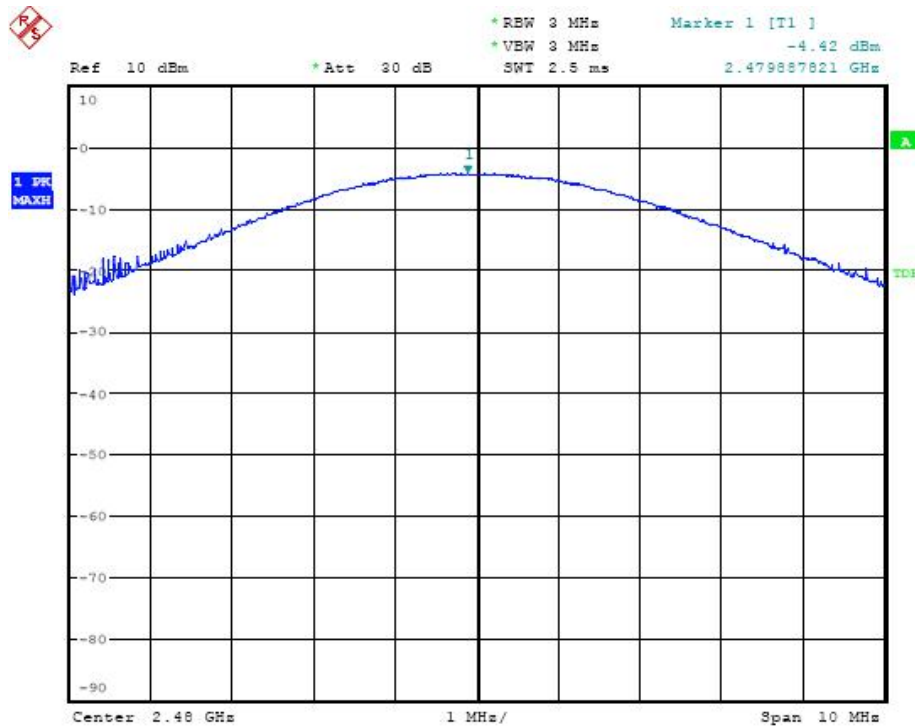
Date: 27.SEP.2016 18:42:06

8DPSK Middle Channel



Date: 27.SEP.2016 18:45:09

8DPSK Highest Channel



Date: 27.SEP.2016 18:46:24

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 was coupled to a spectrum analyzer via a antenna. 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.

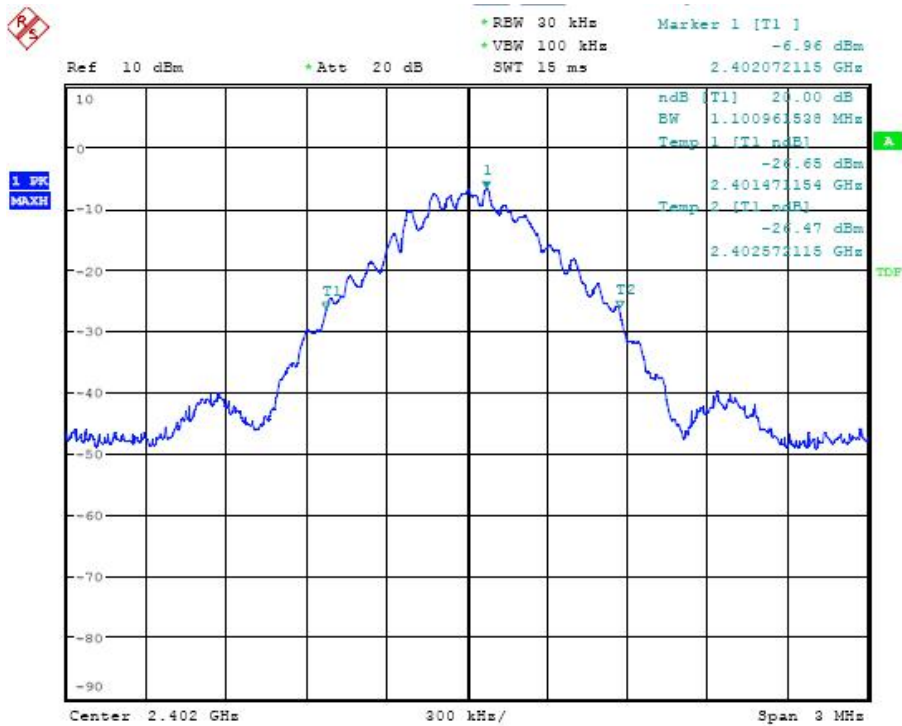
4.3. Test Result

Modulation:	GFSK, $\pi/4$ -DQPSK, 8-DPSK		
RBW :	30KHz	VBW:	100KHz
Packet:	DH5	Spectrum Detector:	PK
Test Date :	2016-09-27	Relative Humidity:	54%
Pressure:	101.0KPa	Temperature:	20°C
Test Result:	PASS	Test by:	Frank

Channel frequency (MHz)		20dB Down BW (kHz)
2402	GFSK	1101
2441		1072
2480		1067
2402	8-DPSK	1361
2441		1361
2480		1356

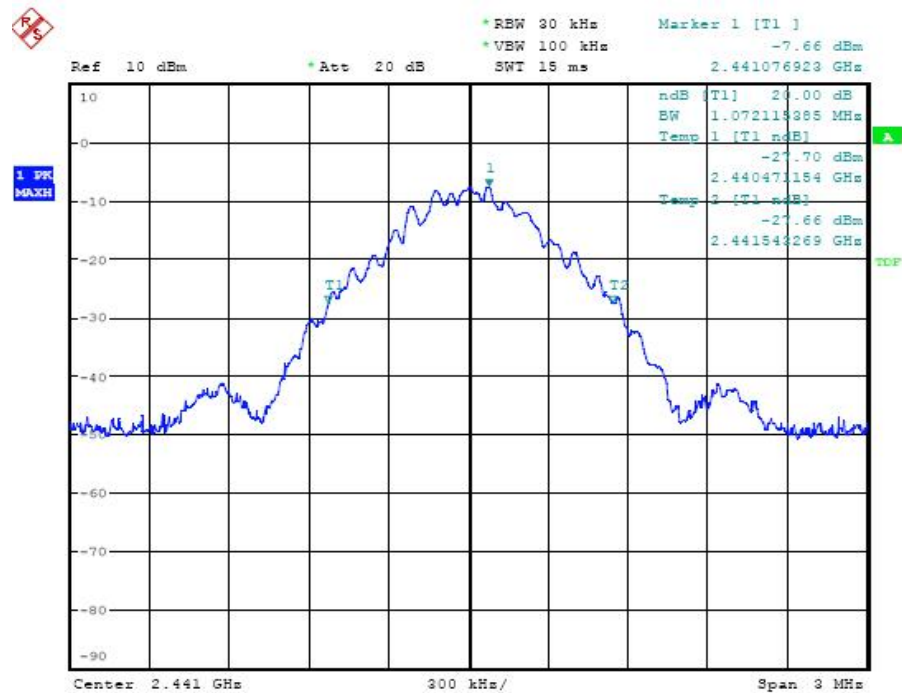
4.4. Test Data

20dB GFSK Lowest Channel



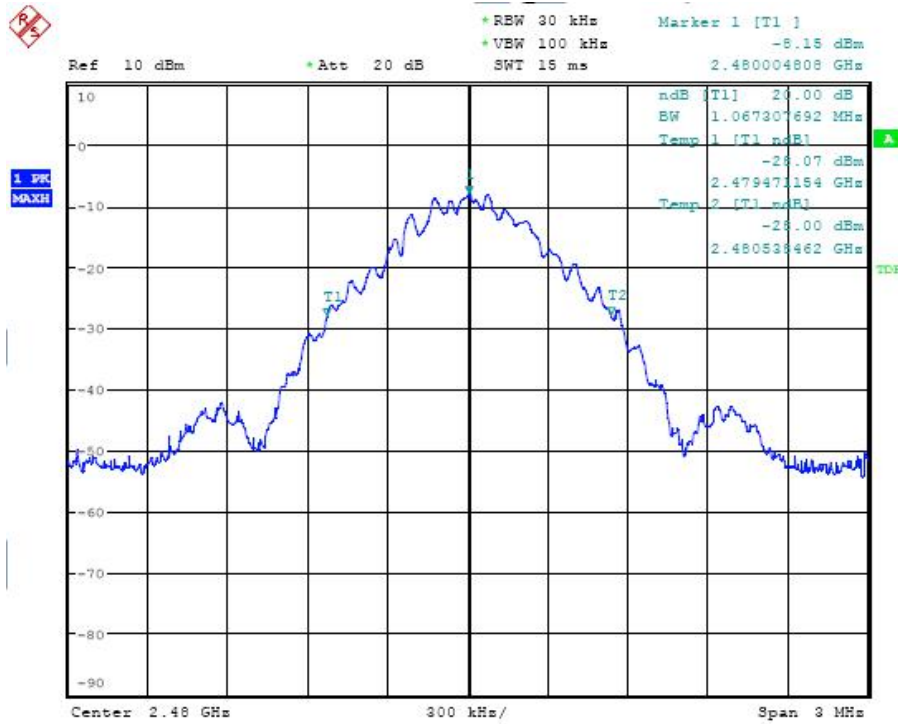
Date: 27.SEP.2016 19:08:37

20dB GFSK Middle Channel



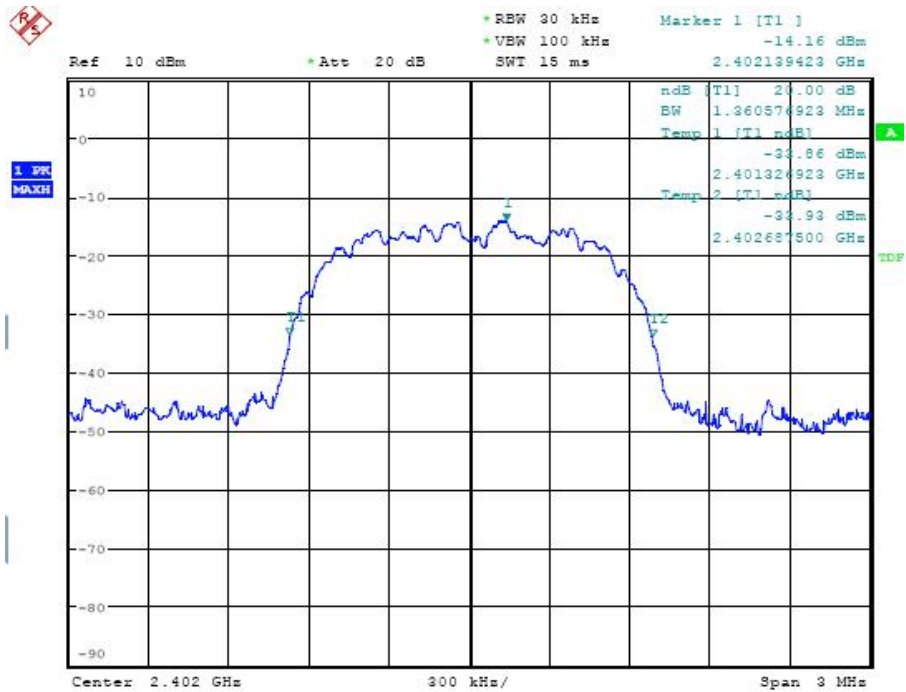
Date: 27.SEP.2016 19:09:45

20dB GFSK Highest Channel



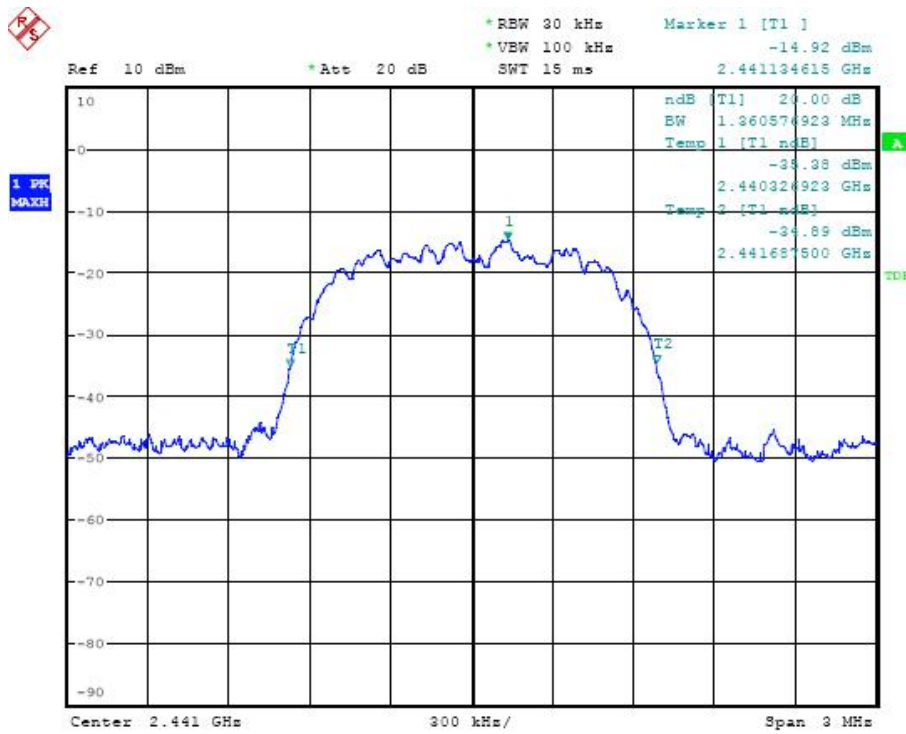
Date: 27.SEP.2016 19:10:29

20dB 8DPSK Lowest Channel



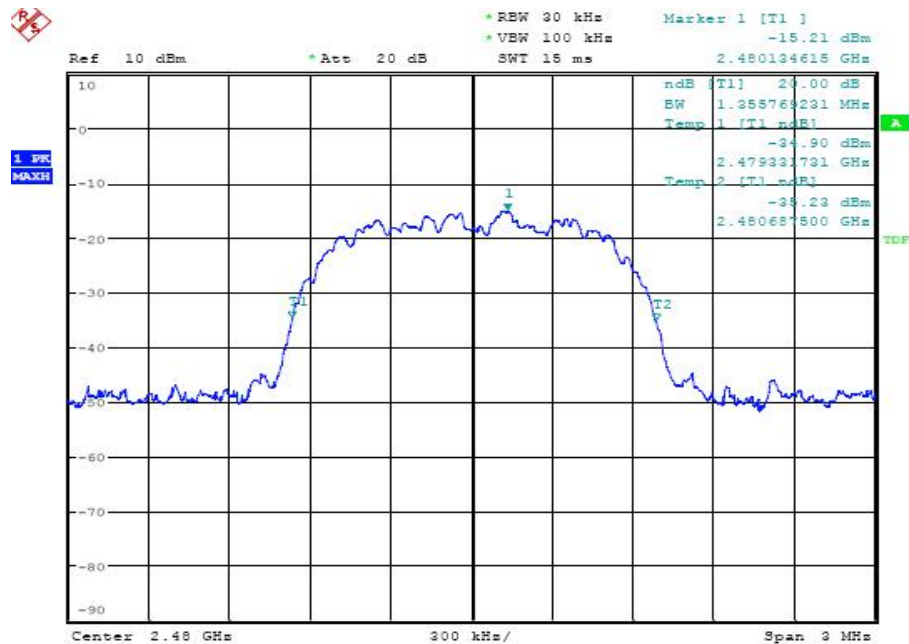
Date: 27.SEP.2016 19:14:17

20dB 8DPSK Middle Channel



Date: 27.SEP.2016 19:15:24

20dB 8DPSK Highest Channel



Date: 27.SEP.2016 19:16:40

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 was coupled to a spectrum analyzer via a antenna. The carrier frequency was measured by spectrum analyzer with 100kHz RBW and 300kHz VBW.

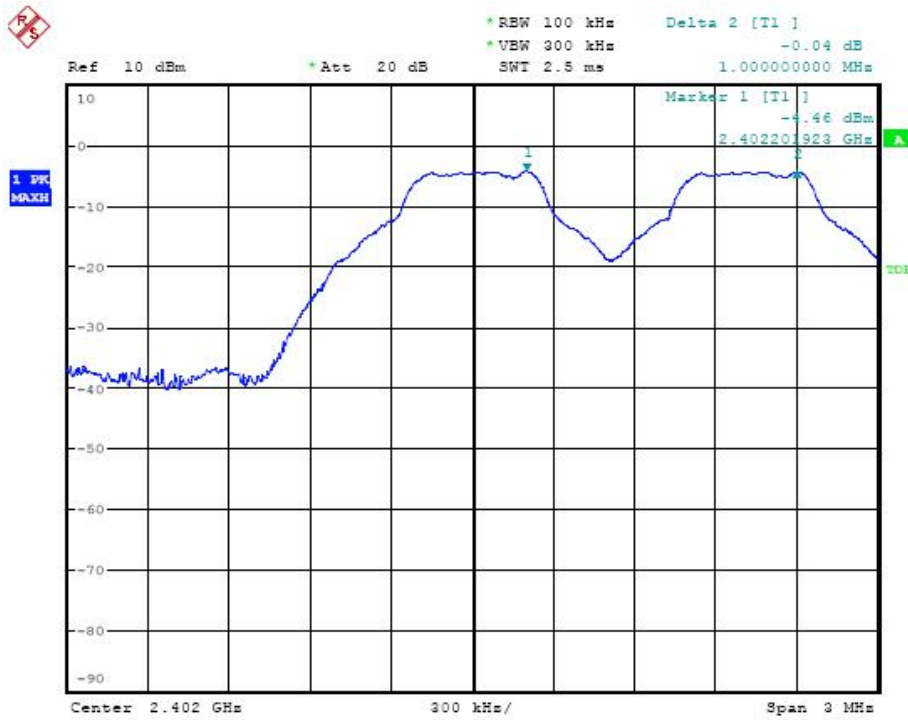
5.3. Test Result

Modulation:	GFSK, $\pi/4$ -DQPSK, 8-DPSK		
RBW :	30KHz	VBW:	100KHz
Packet:	DH5	Spectrum Detector:	PK
Test Date :	2016-09-27	Relative Humidity:	54%
Pressure:	101.0KPa	Temperature:	20°C
Test Result:	PASS	Test by:	Frank

Channel number	Channel frequency (MHz)	Separation Read Value (KHz)	Separation Limit (KHz)	Result
GFSK				
Lowest	2402	1000	>734.0	PASS
Middle	2441	1000	>714.7	PASS
Highest	2480	1000	>711.3	PASS
8-DPSK				
Lowest	2402	1000	>2/3 of the 20dB Bandwidth or 25[kHz](whichever is greater)	PASS
Middle	2441	1000		PASS
Highest	2480	1000		PASS

5.4. Test Data

GFSK Lowest Channel



Date: 27.SEP.2016 19:19:24

GFSK Middle Channel



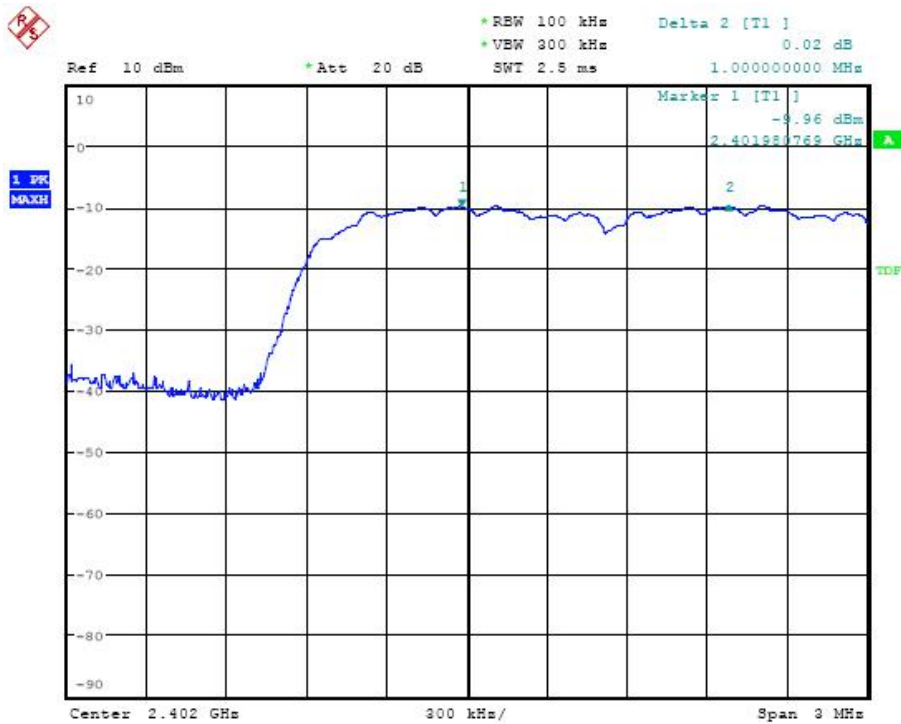
Date: 27.SEP.2016 19:20:13

GFSK Highest Channel



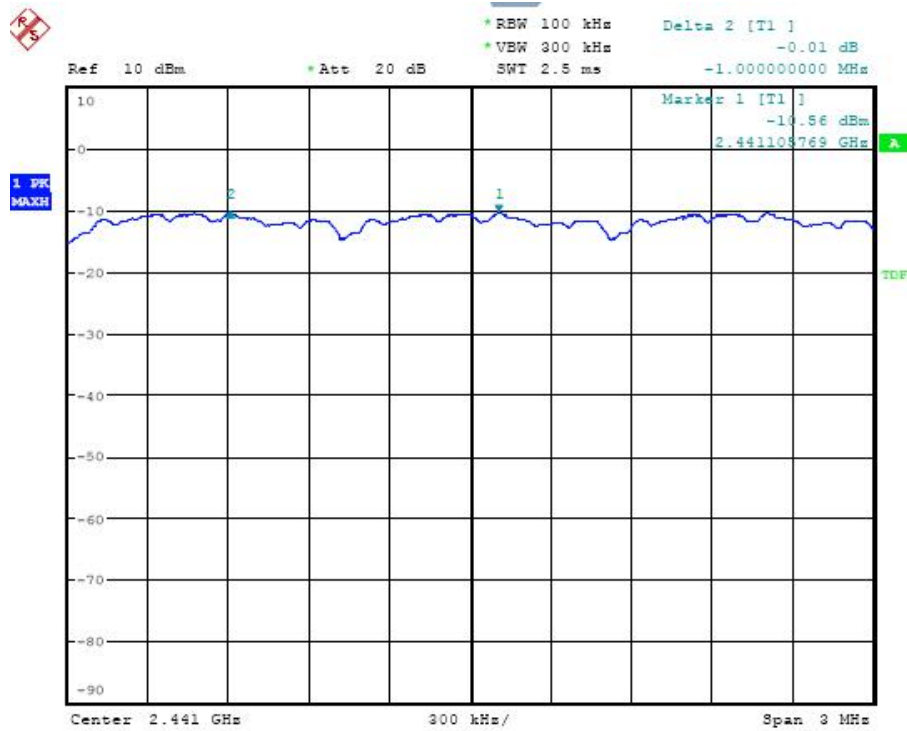
Date: 27.SEP.2016 19:20:53

8DPSK Lowest Channel



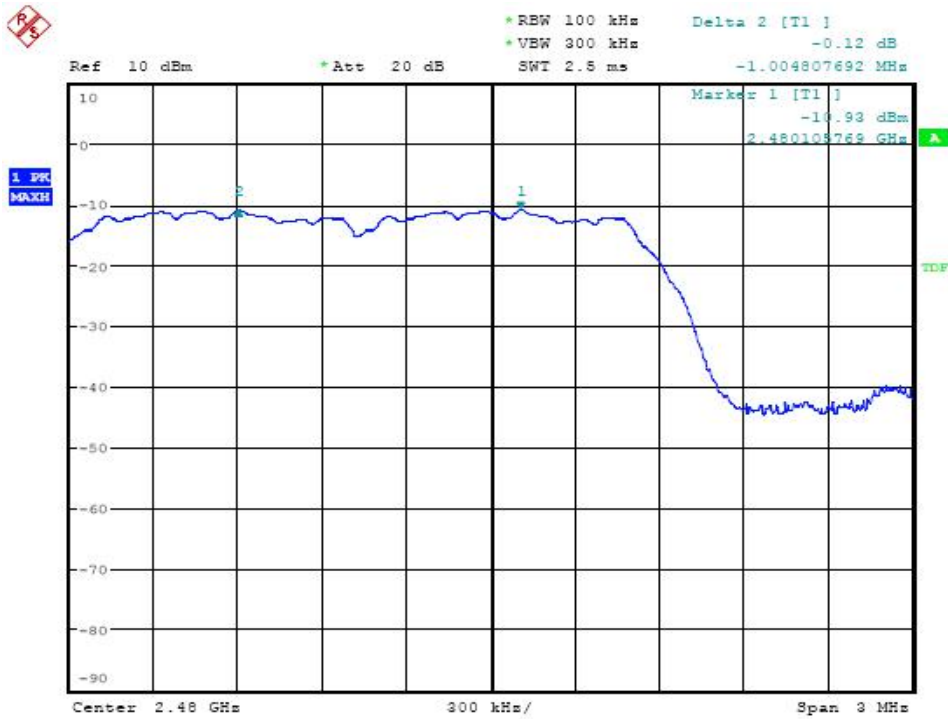
Date: 27.SEP.2016 19:26:38

8DPSK Middle Channel



Date: 27.SEP.2016 19:28:40

8DPSK Highest Channel



Date: 27.SEP.2016 19:29:59

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 was coupled to a spectrum analyzer via an antenna. The number of hopping channel was measured by spectrum analyzer with 300kHz RBW and 300kHz VBW.

6.3. Test Result

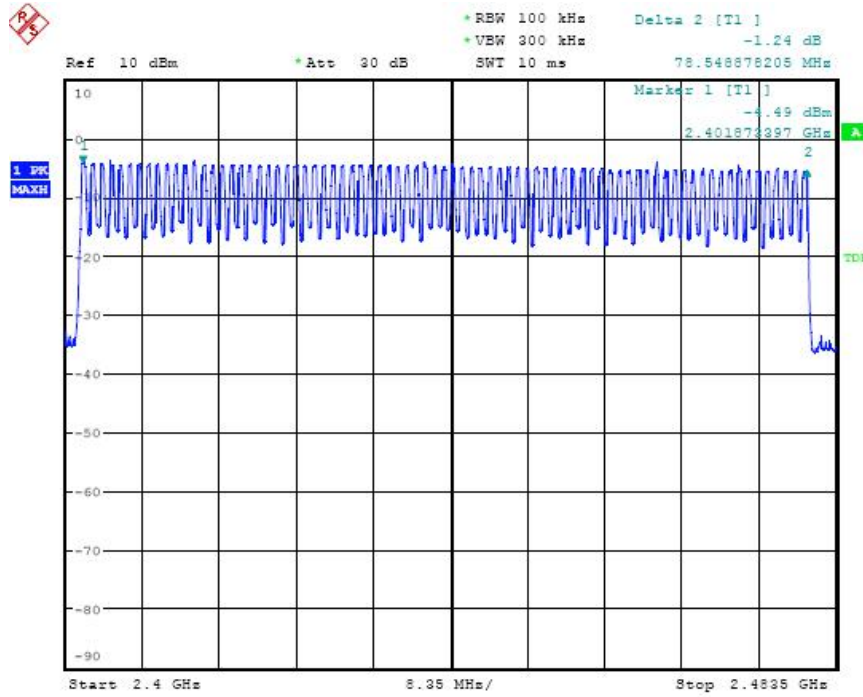
Modulation:	GFSK, $\pi/4$ -DQPSK, 8-DPSK		
RBW :	100KHz	VBW:	300KHz
Packet:	DH5	Spectrum Detector:	PK
Test Date :	2016-09-27	Relative Humidity:	54%
Pressure:	101.0KPa	Temperature:	20 °C
Test Result:	PASS		

Hopping Channel Frequency Range	Number of Hopping Channels	Limit
2402-2480	79	> 15

The worst case:8-DPSK

6.4. Test Data

8-DPSK



Date: 27.SEP.2016 21:15:50

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. Connect the antenna port of the EUT to the spectrum analyzer by a low loss 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.

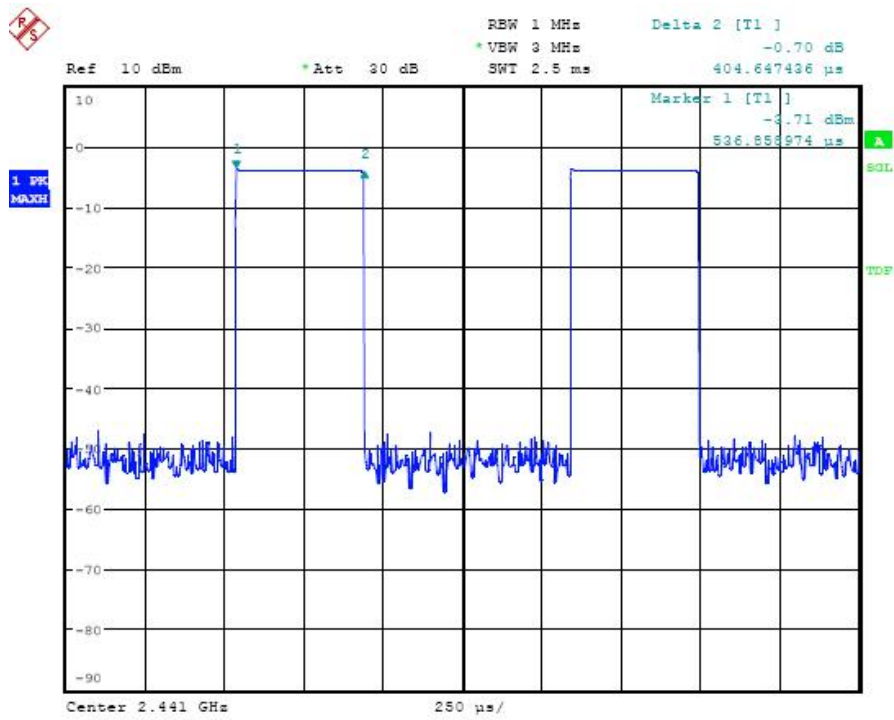
7.3. Test Result

Modulation:	GFSK, $\pi/4$ -DQPSK, 8-DPSK		
RBW :	1MHz	VBW:	3MHz
Test Date :	2016-09-27	Spectrum Detector:	PK
Pressure:	101.0KPa	Relative Humidity:	54%
Temperature:	20°C	Test by:	Frank
Test Result:	PASS		

Packet	Frequency (MHz)	Result (msec)	Limit (msec)
DH1	2441	$0.405 \text{ (ms)} * (1600 / (2 * 79)) * 31.6 = 129.6$	<400ms
DH3	2441	$1.691 \text{ (ms)} * (1600 / (4 * 79)) * 31.6 = 270.6$	<400ms
DH5	2441	$2.977 \text{ (ms)} * (1600 / (6 * 79)) * 31.6 = 317.5$	<400ms
2-DH1	2441	$0.429 \text{ (ms)} * (1600 / (2 * 79)) * 31.6 = 137.3$	<400ms
2-DH3	2441	$1.707 \text{ (ms)} * (1600 / (4 * 79)) * 31.6 = 273.1$	<400ms
2-DH5	2441	$2.945 \text{ (ms)} * (1600 / (6 * 79)) * 31.6 = 314.1$	<400ms
3-DH1	2441	$2.945 \text{ (ms)} * (1600 / (6 * 79)) * 31.6 = 314.1$	<400ms
3-DH3	2441	$1.675 \text{ (ms)} * (1600 / (4 * 79)) * 31.6 = 268.0$	<400ms
3-DH5	2441	$2.937 \text{ (ms)} * (1600 / (6 * 79)) * 31.6 = 313.3$	<400ms

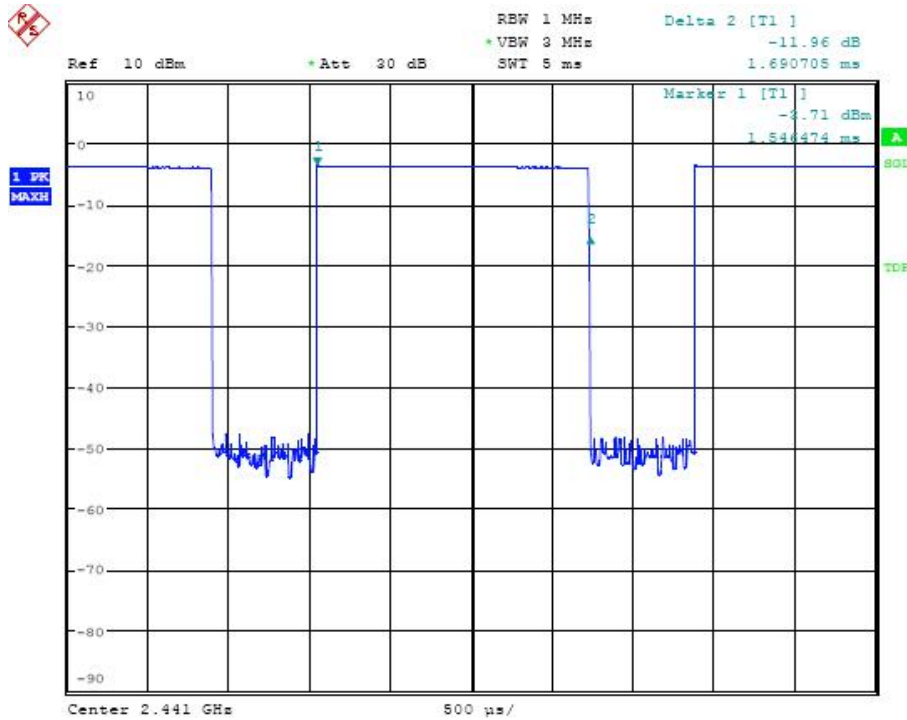
7.4. Test Data

GFSK DH1



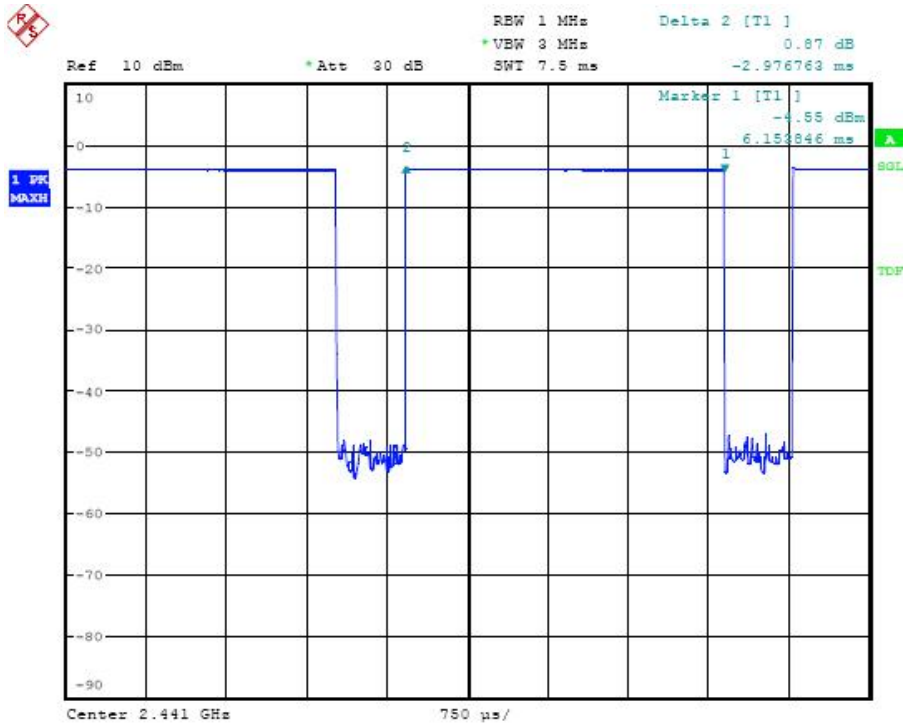
Date: 27.SEP.2016 19:38:48

GFSK DH3



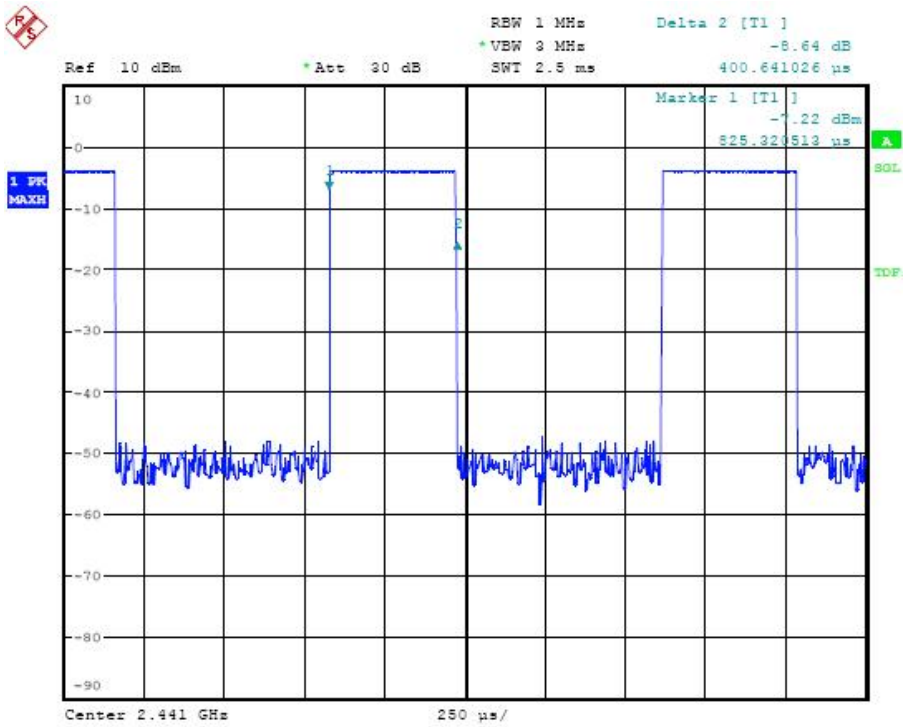
Date: 27.SEP.2016 19:39:33

GSFK DH5



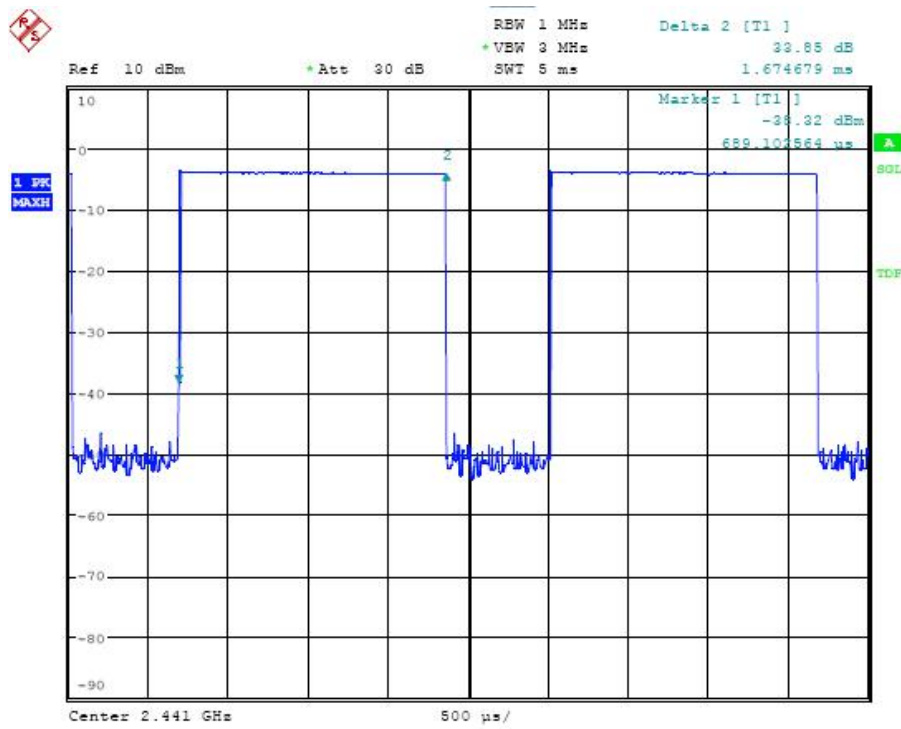
Date: 27.SEP.2016 19:40:53

8-DPSK 3DH1



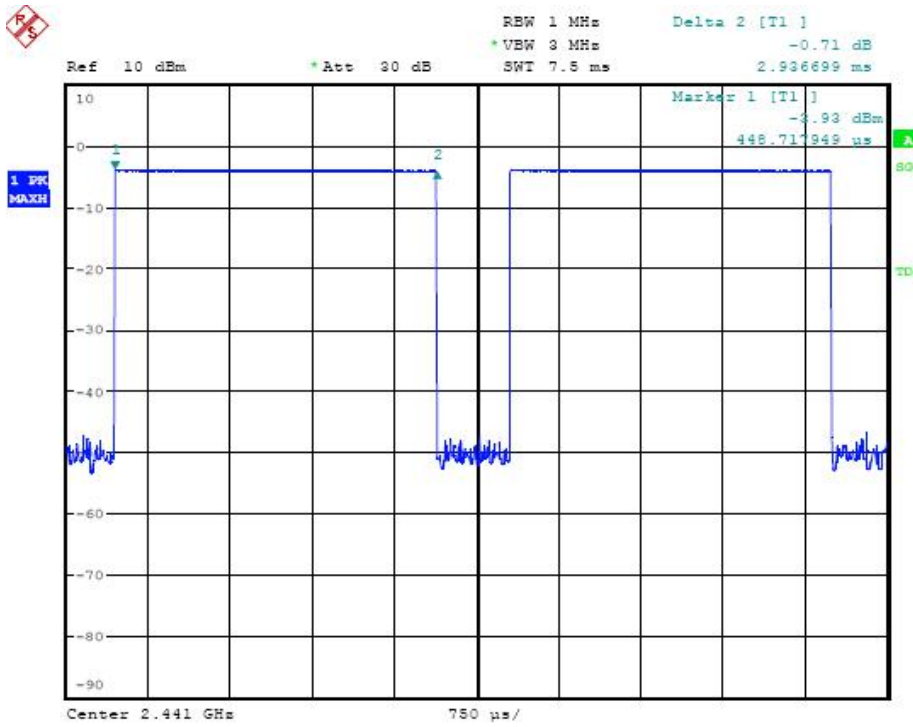
Date: 27.SEP.2016 19:48:50

8-DPSK 3DH3



Date: 27.SEP.2016 19:49:45

8-DPSK 3DH5



Date: 27.SEP.2016 19:52:48

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

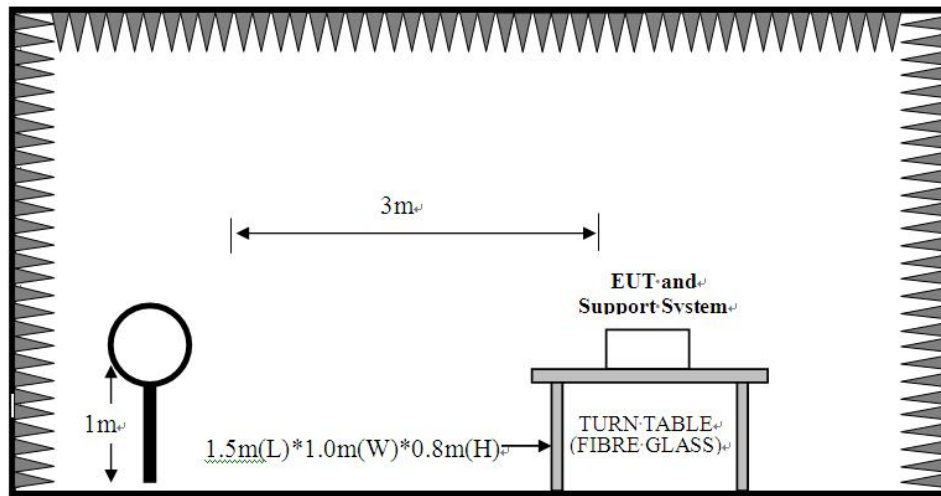
MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
¹ 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 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	(²)

15.209 Limit

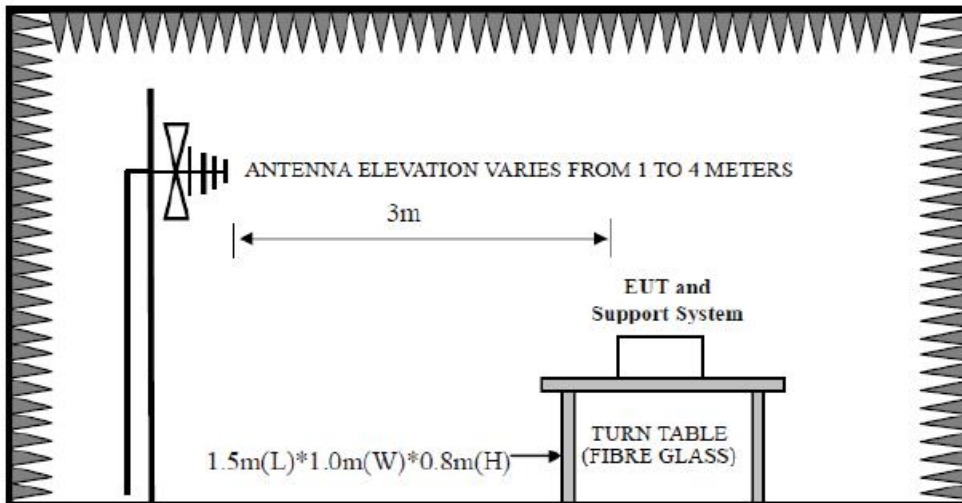
Frequency (MHz)	Field strength (μV/m)	Distance (m)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

8.2. Block Diagram of Test setup

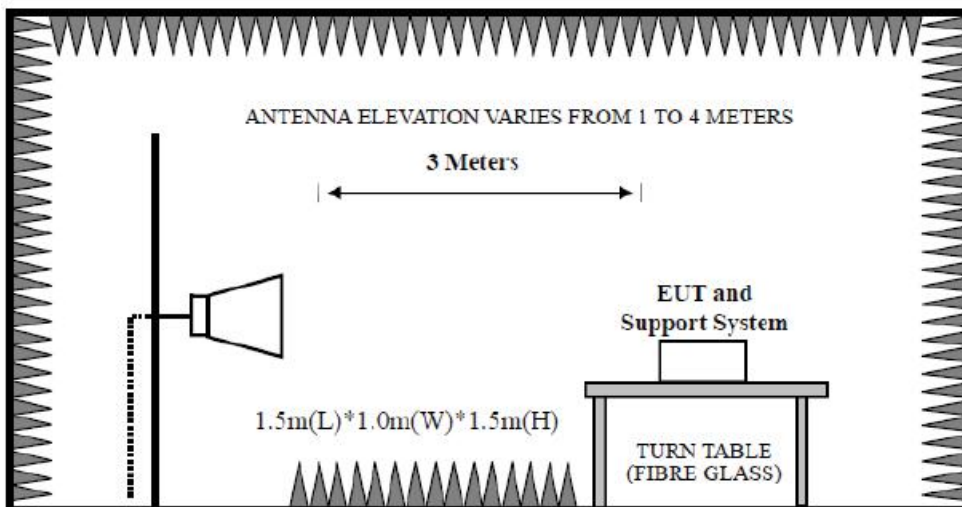
9kHz~30MHz



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 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.

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 test frequency analyzer system was set to Peak Detect (300Hz RBW in 9kHz to 150kHz and 10kHz RBW in 150kHz to 30MHz) Function and Specified Bandwidth with Maximum Hold Mode

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

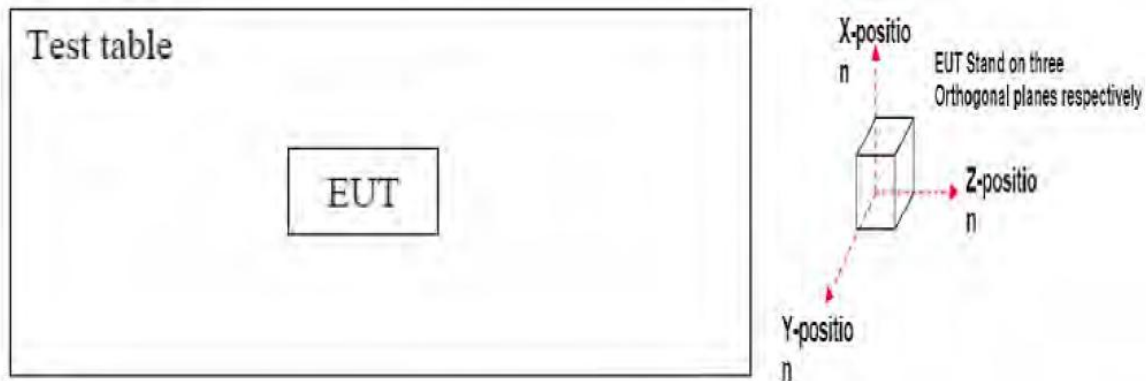
The bandwidth of the Spectrum's VBW is set at 1MHz and RBW is set at 1MHz for peak emissions measurement above 1GHz and 1MHz RBW, 10Hz VBW for average emissions measure above 1GHz

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.

We test X-axis, Y-axis, and Z-axis,. The Y-axis is the worst mode, so only the worst mode test data was included in the report.



8.4. Test Result

30MHz—25GHz Radiated emission Test result
EUT: Portable Bluetooth Wireless Speaker M/N:BTSPK21
Power: DC 3.7V
Test date: 2016-09-27 Test site: 3m Chamber Tested by: Frank
Test mode: Charging+BT 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

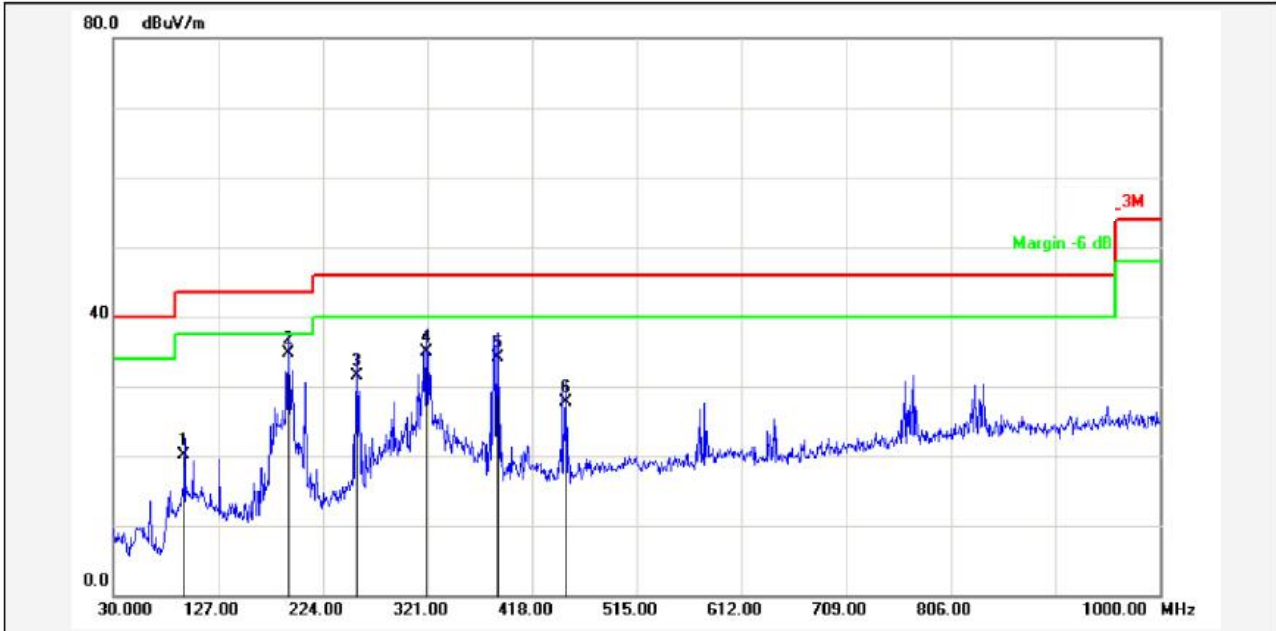
9 kHz – 30 MHz

Pass

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

30 MHz – 1000 MHz

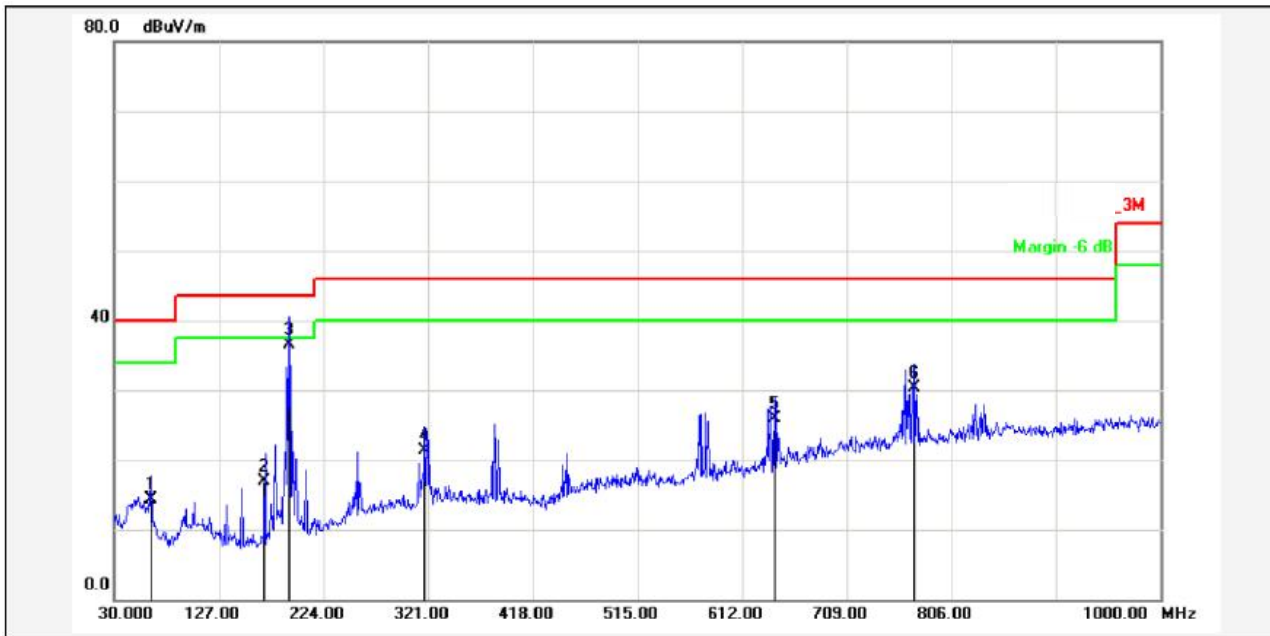
EUT:	Portable Bluetooth Wireless Speaker	Model Name. :	BTSPK21
Temperature:	25 °C	Relative Humidity:	54%
Pressure:	101.0KPa	Test Date :	2016-09-26
Test Mode:	BT Mode	Polarization:	HORIZONTAL
Test Voltage :	DC 3.7V		



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	95.9599	-12.65	32.78	20.13	43.50	-23.37	QP			P	
2	191.9900	-13.51	48.18	34.67	43.50	-8.83	QP			P	
3	256.0099	-11.54	43.09	31.55	46.00	-14.45	QP			P	
4	320.0298	-9.93	44.89	34.96	46.00	-11.04	QP			P	
5	385.9900	-9.17	43.27	34.10	46.00	-11.90	QP			P	
6	450.0099	-7.95	35.59	27.64	46.00	-18.36	QP			P	

Note: Below 30MHz, the emissions are lower than 20dB below the allowable limit.

EUT:	Portable Bluetooth Wireless Speaker	Model Name. :	BTSPK21
Temperature:	25 °C	Relative Humidity:	54%
Pressure:	101.0KPa	Test Date :	2016-09-26
Test Mode:	BT Mode	Polarization:	VERTICAL
Test Voltage :	DC 3.7V		



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	63.9500	-15.30	29.52	14.22	40.00	-25.78	QP			P	
2	169.6799	-17.81	34.71	16.90	43.50	-26.60	QP			P	
3	191.9900	-16.51	52.92	36.41	43.50	-7.09	QP			P	
4	318.0899	-11.98	33.31	21.33	46.00	-24.67	QP			P	
5	642.0700	-6.05	32.02	25.97	46.00	-20.03	QP			P	
6	772.0499	-2.30	32.58	30.28	46.00	-15.72	QP			P	

Note: Below 30MHz, the emissions are lower than 20dB below the allowable limit.

Modulation:	GFSK(the worst case)		
Frequency Range:	1-25G		
Test Date :	2016-09-26	Relative Humidity:	54%
Pressure:	101.0KPa	Measured Distance:	3m
Test By:	PASS		

Freq (MHz)	Ant.Pol (H/V)	Reading Level (dBuV)		Factor (dB/m)	Emission Level (dBuV)		Limit 3m (dBuV)		Margin (dB)	
		PK	AV		PK	AV	PK	AV	PK	AV
Operation Mode:TX Mode(Low)										
4804	V	48.61	36.89	14.05	62.66	50.94	74.00	54.00	-11.34	-3.06
7206	V	37.84	26.11	18.81	56.65	44.92	74.00	54.00	-17.35	-9.08

4804	H	47.24	36.71	14.05	61.29	50.76	74.00	54.00	-12.71	-3.24
7206	H	38.84	25.97	18.18	56.65	44.15	74.00	54.00	-17.75	-9.8

Operation Mode:TX Mode(Mid)										
4882	V	46.40	35.89	14.41	60.81	50.30	74.00	54.00	-13.19	-3.70
7323	V	39.50	26.96	18.36	57.41	45.32	74.00	54.00	-16.59	-8.68

4882	H	45.26	34.82	14.41	59.67	49.23	74.00	54.00	-14.33	-4.77
7323	H	39.04	27.04	18.36	57.40	45.40	74.00	54.00	-16.60	-8.60

Operation Mode:TX Mode(High)										
4960	V	45.59	34.32	14.76	60.35	49.08	74.00	54.00	-13.65	-4.92
7440	V	38.27	26.63	18.55	56.82	45.18	74.00	54.00	-17.18	-8.82

4960	H	45.68	35.01	14.76	60.44	49.77	74.00	54.00	-13.56	-4.23
7440	H	38.77	26.56	18.55	57.32	45.11	74.00	54.00	-16.68	-8.89

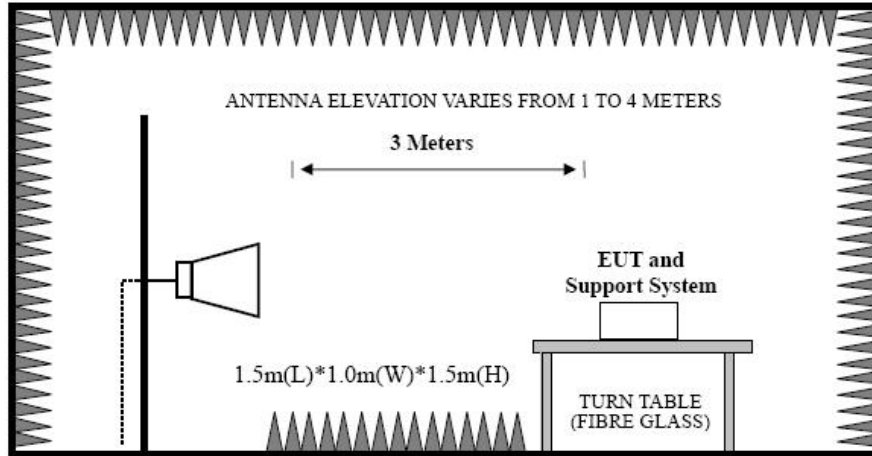
- Note: (1) All Readings are Peak Value and AV.
 (2) Emission Level= Reading Level + Factor
 (3) Factor= Antenna Gain + Cable Loss - Amplifier Gain
 (4) Data of measurement within this frequency range shown “ --- ” in the table above means the reading of emissions are attenuated more than 10dB below the permissible limits.
 (5) Horn antenna used for the emission over 1000MHz.

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

Modulation:	8DPSK(the worst case)		
Test Date :	2016-09-26	Relative Humidity:	54%
Pressure:	101.0KPa	Test by:	Frank
Test By:	PASS		

Please see below test table and plots.

For Radiated Emission

The worst case: 8DPSK

Hopping-on mode Please see below test table and plots.

For Radiated Emission

The worst case: 8DPSK

Hopping-on mode

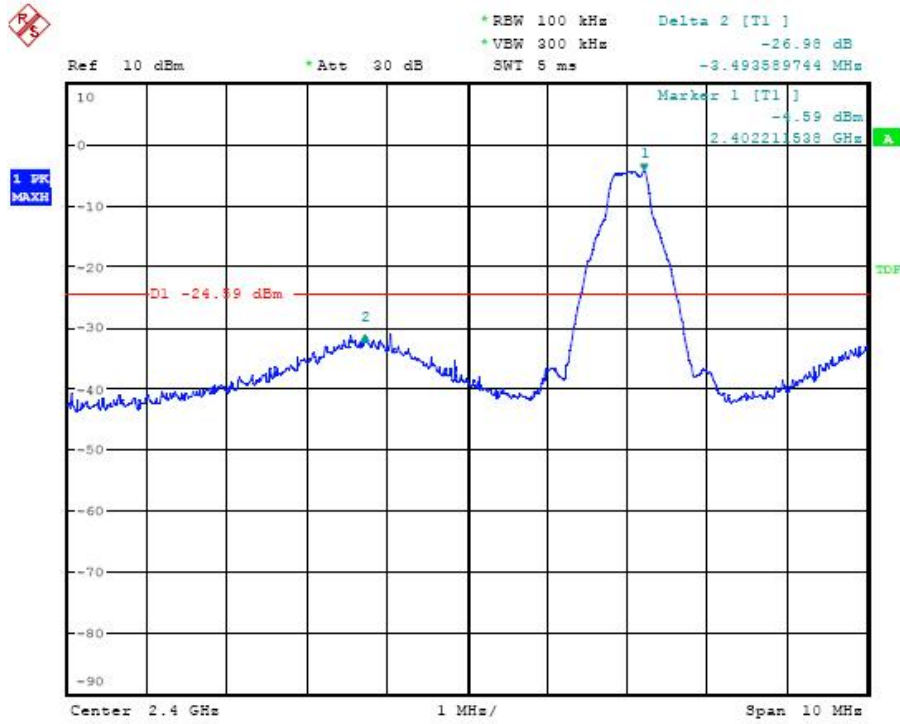
Freq (MHz)	Ant.P ol (H/V)	Reading Level (dBuV)		Factor (dB/m)	Emission Level (dBuV)		Limit 3m (dBuV)		Margin (dB)	
		PK	AV		PK	AV	PK	AV	PK	AV
8-DPSK										
2390.000	H	51.23	39.53	8.09	59.32	47.62	74.00	54.00	-14.68	-6.38
2390.000	V	48.39	37.49	8.09	56.48	45.58	74.00	54.00	-17.52	-8.42

2483.500	H	49.97	40.03	8.36	58.11	48.39	74.00	54.00	-15.89	-5.61
2483.500	H	51.37	41.25	8.36	59.73	49.61	74.00	54.00	-14.27	-4.39

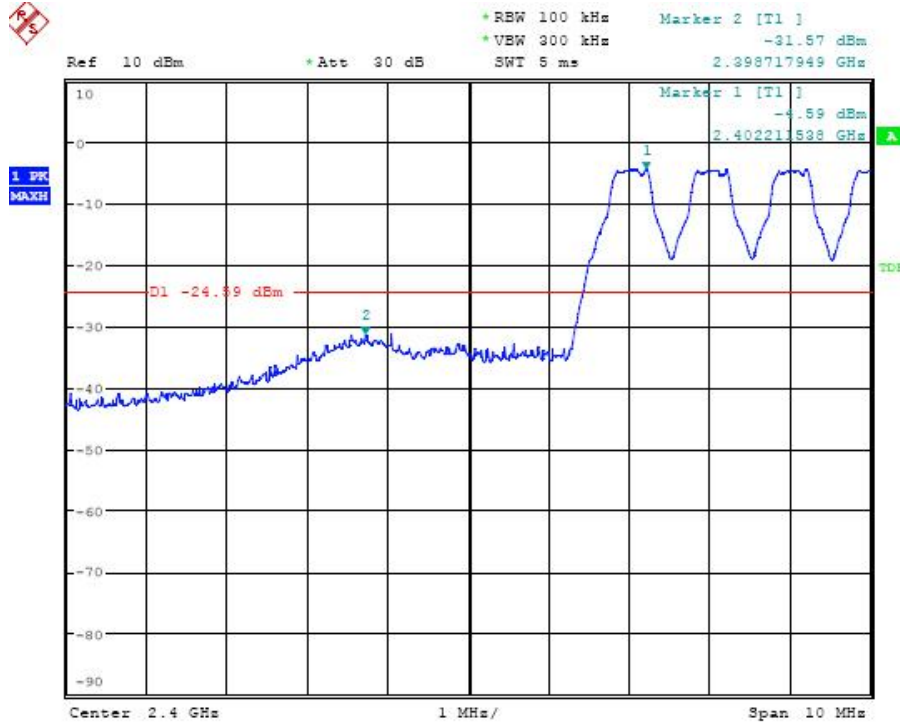
- Note: (1) Emission Level= Reading Level + Factor
 (2) Factor= Antenna Gain + Cable Loss – Amplifier Gain
 (3) Horn antenna used for the emission over 1000MHz.

9.5. Test Data

GFSK Lowest Channel

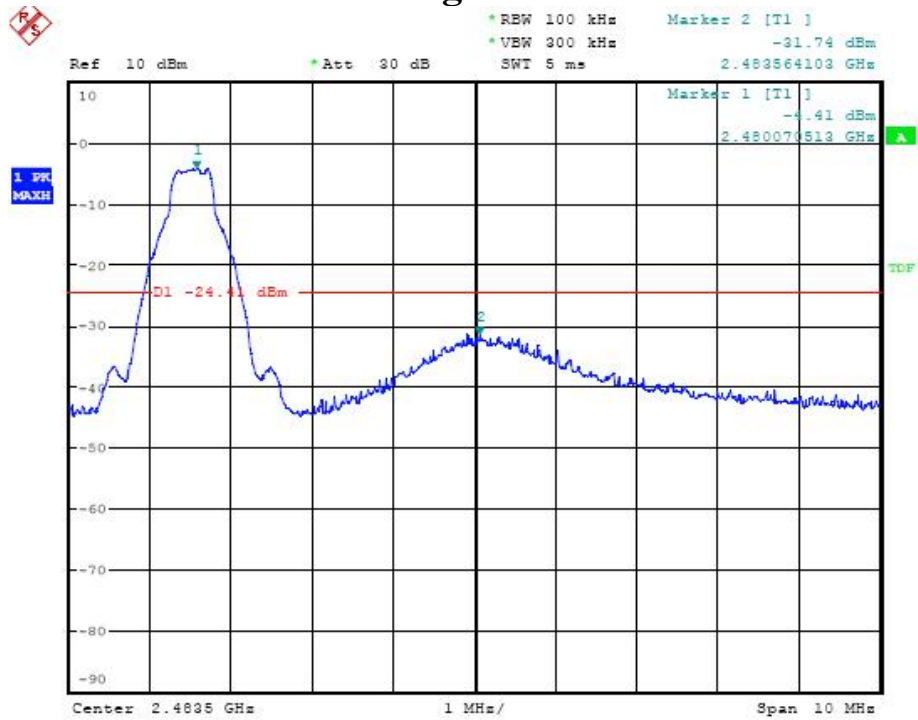


Date: 27.SEP.2016 19:58:32

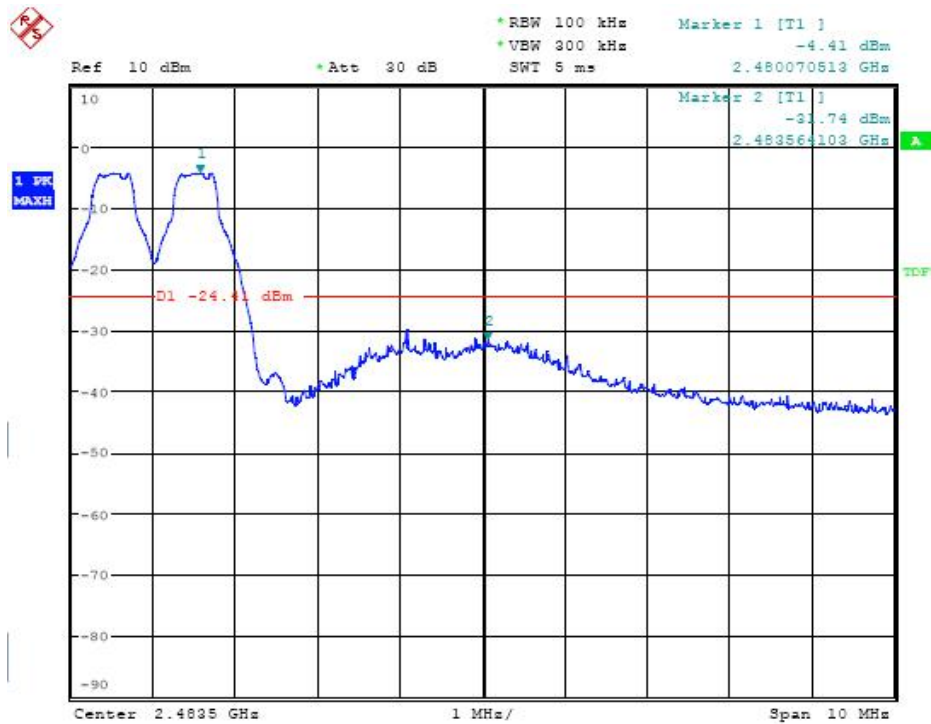


Date: 27.SEP.2016 19:59:54

GFSK Highest Channel

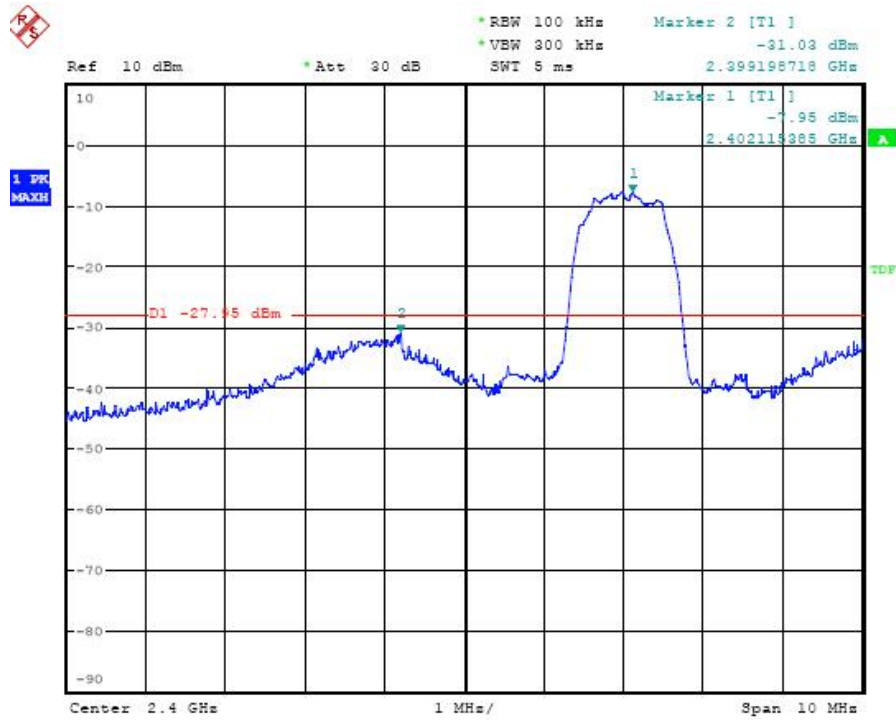


Date: 27.SEP.2016 20:02:53

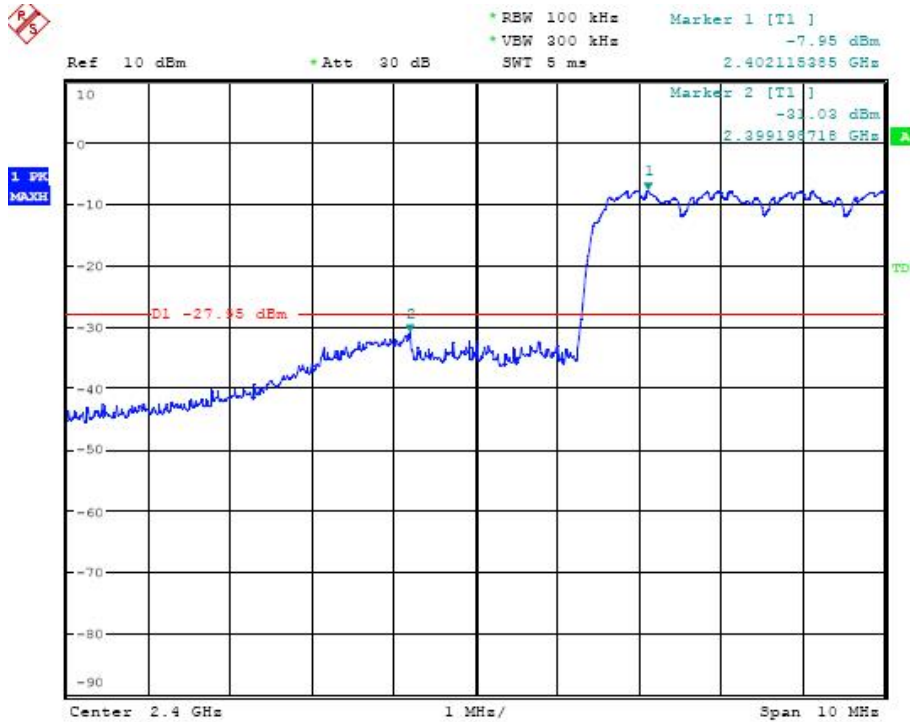


Date: 27.SEP.2016 20:03:12

8-DPSK Lowest Channel

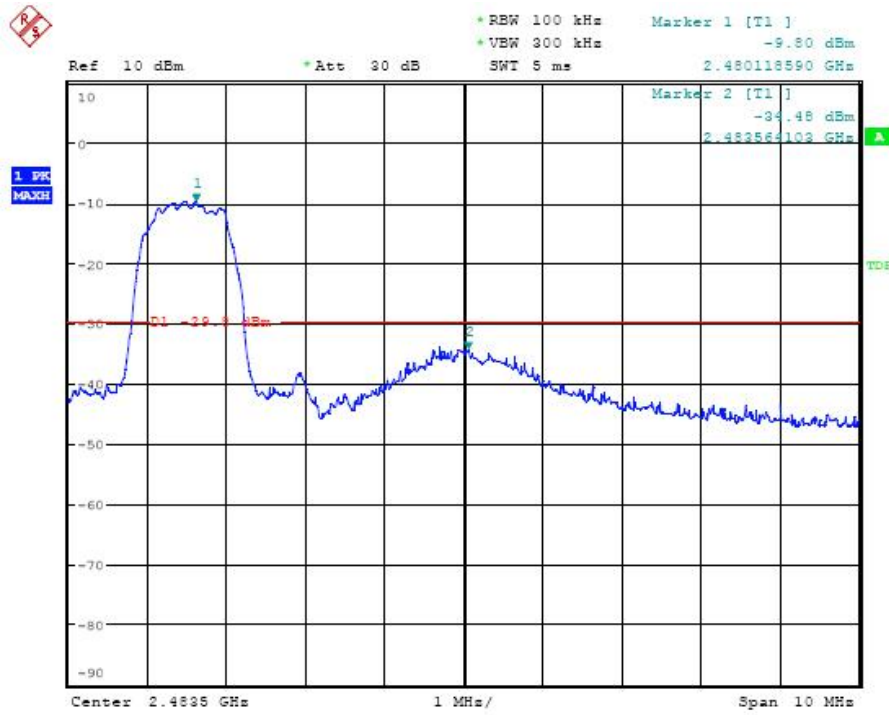


Date: 27.SEP.2016 20:19:46

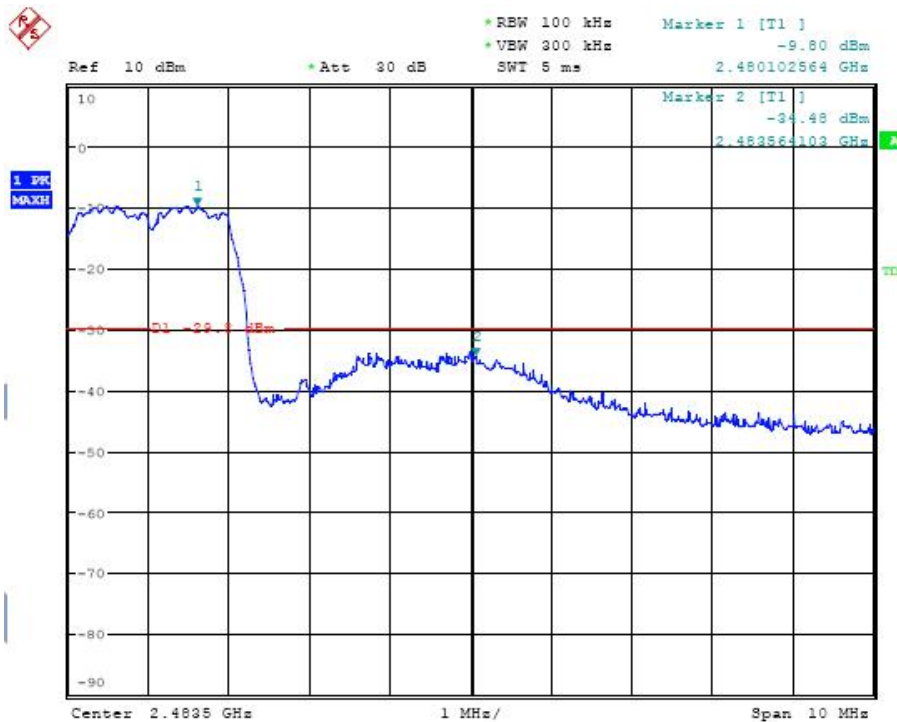


Date: 27.SEP.2016 20:20:34

8DPSK Highest Channel



Date: 27.SEP.2016 20:22:06



Date: 27.SEP.2016 20:23:55

10. CONDUCTED SPURIOUS EMISSION

10.1. Limit

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

10.2. Test Procedure

The transmitter output was connected to a spectrum analyzer, The resolution bandwidth is set to 100 kHz, The video bandwidth is set to 300 kHz for frequency range from 30MHz to 1000 MHz; The resolution bandwidth is set to 1 MHz, The video bandwidth is set to 3 MHz for frequency range from 1000MHz to 25000 MHz.

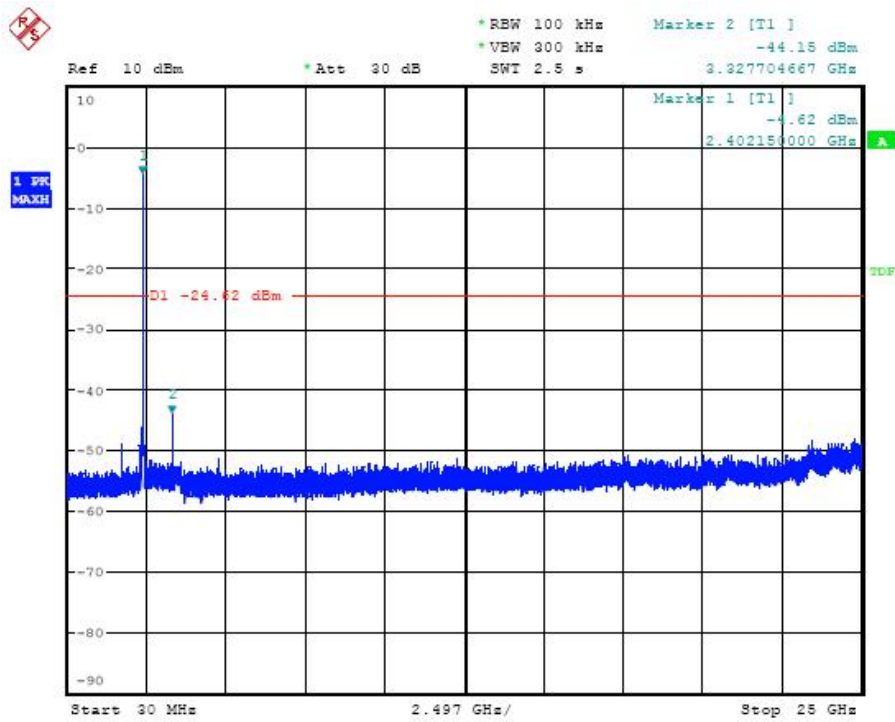
10.3. Test Result

PASS (The testing data was attached in the next pages.)

Please refer to following plots, the worst case (8DPSK) was shown.

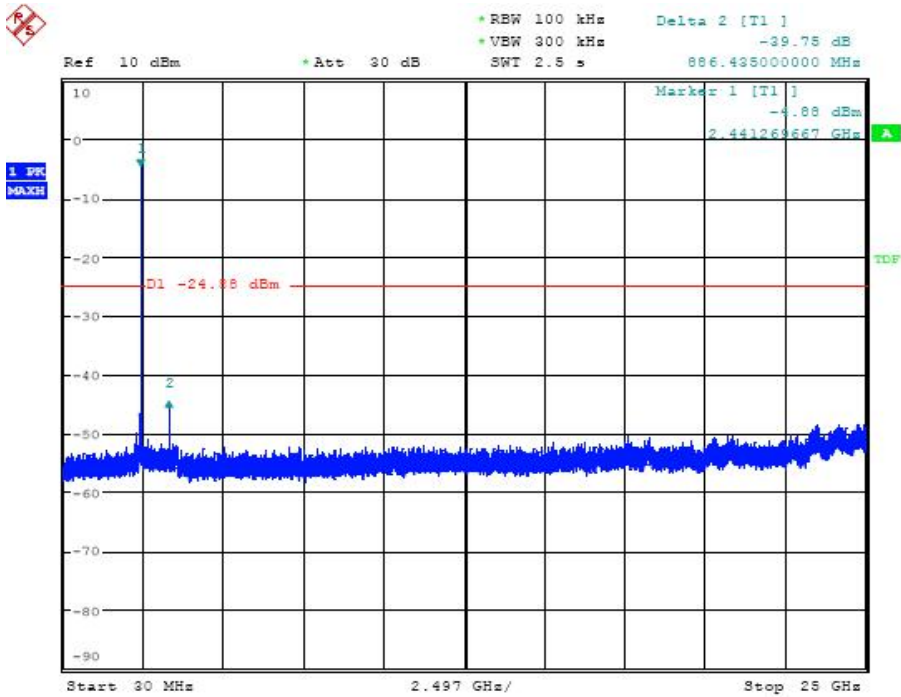
10.4. Test Data

Lowest Channel



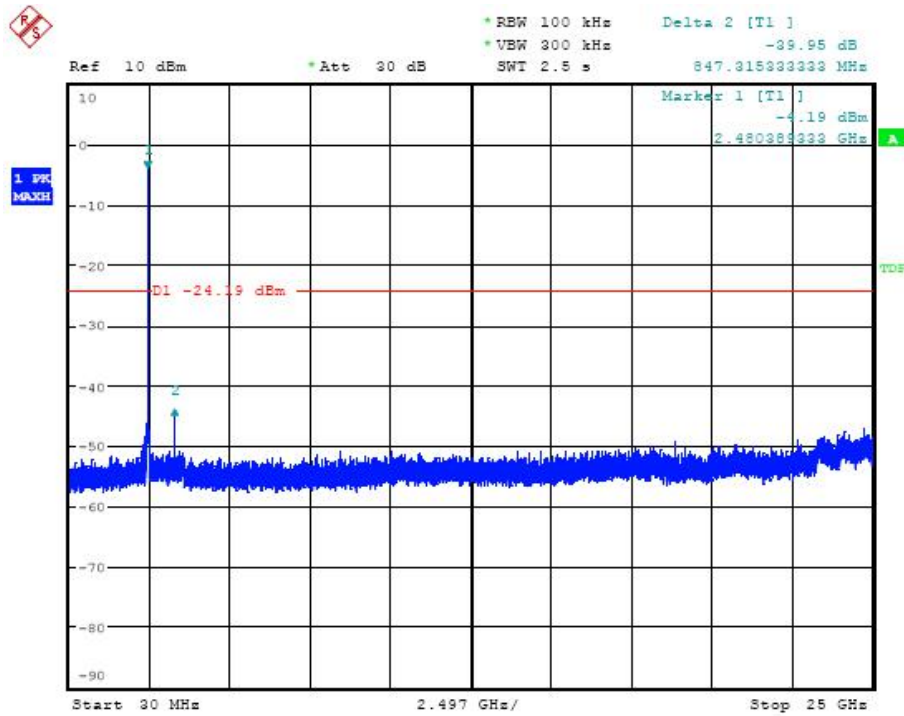
Date: 27.SEP.2016 20:26:41

Middle Channel



Date: 27.SEP.2016 20:28:37

Highest Channel



Date: 27.SEP.2016 20:32:12

Note: Sweep points=30001pts

11. POWER LINE CONDUCTED EMISSIONS

11.1. Limit

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

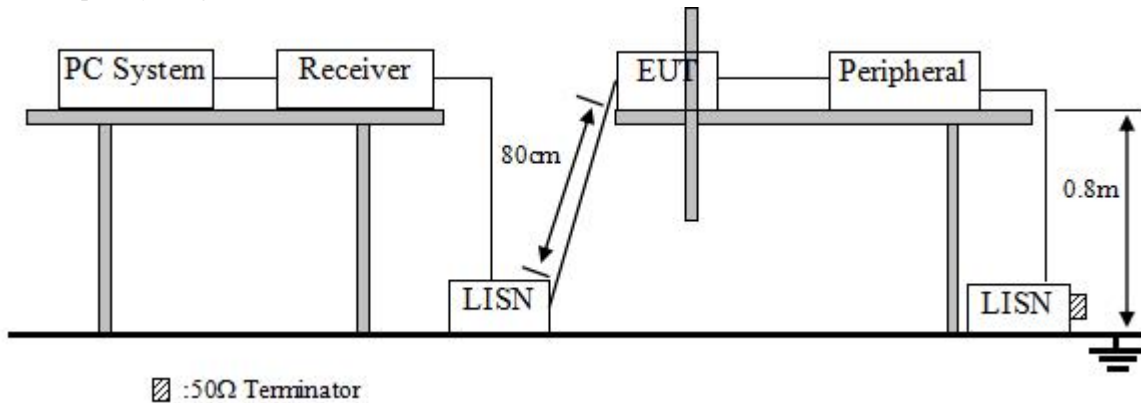
- Notes: 1. * Decreasing linearly with logarithm of frequency.
 2. The lower limit shall apply at the transition frequencies.

11.2. Test Procedure

The EUT was placed on a non-metallic table, 80cm above the ground plane. The EUT was charged from PC's USB port 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 C63.4: 2014 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.

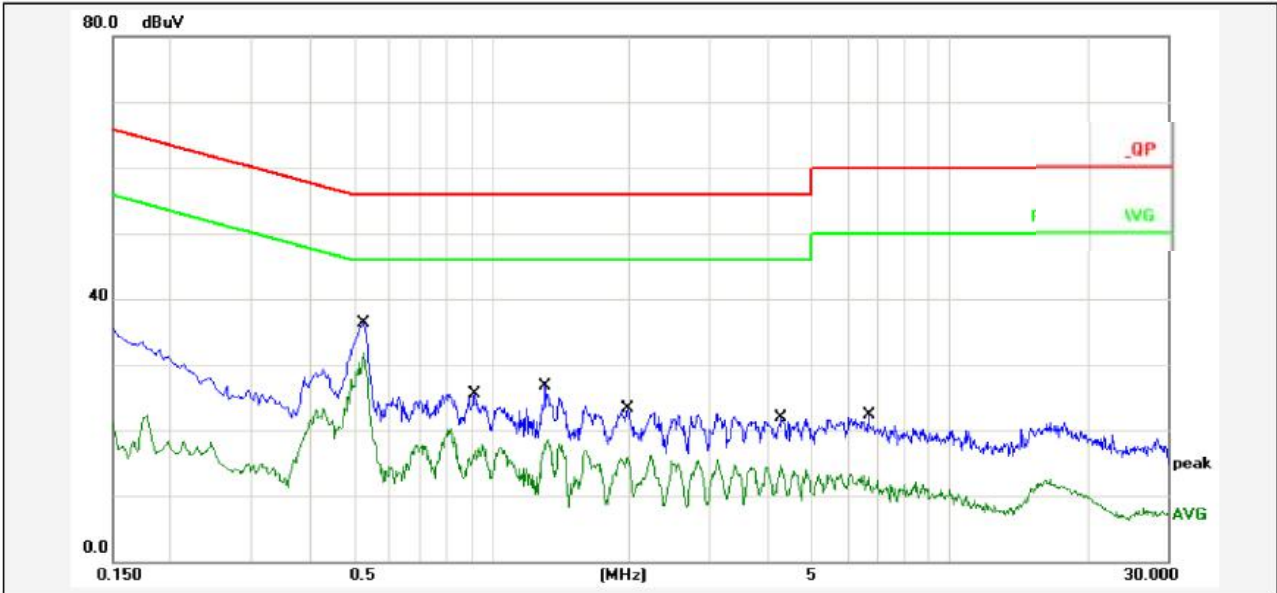


11.3. Test Result

PASS. (All emissions not reported below are too low against the prescribed limits.)

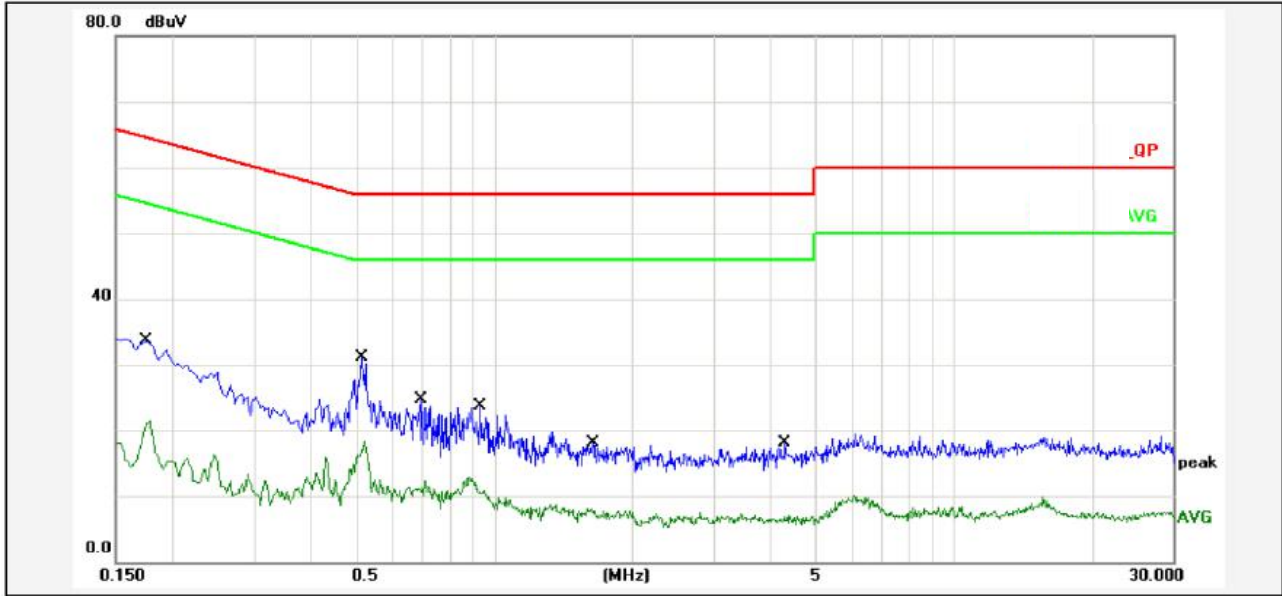
11.4. Test data

EUT:	Portable Bluetooth Wireless Speaker	Model Name. :	BTSPK21
Temperature:	25 °C	Relative Humidity:	54%
Pressure:	101.0KPa	Test Date :	2016-09-26
Test Mode:	Charger+BT Mode	Phase :	L
Test Voltage :	DC 5V From PC Input AC 120V/60Hz		



No.	Frequency (MHz)	Factor (dBuV)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.5260	10.80	23.50	34.30	56.00	-21.70	QP	P	
2	0.5260	10.80	18.80	29.60	46.00	-16.40	AVG	P	
3	0.9220	10.80	12.70	23.50	56.00	-32.50	QP	P	
4	0.9220	10.80	7.40	18.20	46.00	-27.80	AVG	P	
5	1.3140	10.80	13.90	24.70	56.00	-31.30	QP	P	
6	1.3140	10.80	5.50	16.30	46.00	-29.70	AVG	P	
7	1.9859	10.80	10.40	21.20	56.00	-34.80	QP	P	
8	1.9859	10.80	4.00	14.80	46.00	-31.20	AVG	P	
9	4.3059	10.80	9.10	19.90	56.00	-36.10	QP	P	
10	4.3059	10.80	1.80	12.60	46.00	-33.40	AVG	P	
11	6.6939	10.80	9.60	20.40	60.00	-39.60	QP	P	
12	6.6939	10.80	0.50	11.30	50.00	-38.70	AVG	P	

EUT:	Portable Bluetooth Wireless Speaker	Model Name. :	BTSPK21
Temperature:	25 °C	Relative Humidity:	54%
Pressure:	101.0KPa	Test Date :	2016-09-26
Test Mode:	Charger+BT Mode	Phase :	N
Test Voltage :	DC 5V From PC Input AC 120V/60Hz		



No.	Frequency (MHz)	Factor (dBuV)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.1740	10.80	20.80	31.60	64.76	-33.16	QP	P	
2	0.1740	10.80	8.60	19.40	54.76	-35.36	AVG	P	
3	0.5140	10.80	18.50	29.30	56.00	-26.70	QP	P	
4	0.5140	10.80	5.40	16.20	46.00	-29.80	AVG	P	
5	0.6900	10.80	11.70	22.50	56.00	-33.50	QP	P	
6	0.6900	10.80	-0.50	10.30	46.00	-35.70	AVG	P	
7	0.9340	10.80	10.90	21.70	56.00	-34.30	QP	P	
8	0.9340	10.80	0.10	10.90	46.00	-35.10	AVG	P	
9	1.6380	10.80	5.40	16.20	56.00	-39.80	QP	P	
10	1.6380	10.80	-4.20	6.60	46.00	-39.40	AVG	P	
11	4.3139	10.80	5.90	16.70	56.00	-39.30	QP	P	
12	4.3139	10.80	-5.70	5.10	46.00	-40.90	AVG	P	

12. ANTENNA REQUIREMENTS

12.1. 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.

12.2. Result

The antenna is PCB antenna and no consideration of replacement, and the best case gain of the antenna is 2.04dBi. So, the antenna is consider meet the requirement.

---END---