Shenzhen Huatongwei International Inspection Co., Ltd.
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CNASL1225

FCC PART 15 SUBPART C TEST REPORT

FCC PART 15.247

Report Reference No.....:	**TRE1303008401 R/C:24854**
FCC ID .....:	**2AAEEEPA46B**
Compiled by (position+printed name+signature)..:	File administrators Eric Zhang
Supervised by (position+printed name+signature)..:	Test Engineer Tim Zhang
Approved by (position+printed name+signature)..:	Manager Wenliang Li
Date of issue.....:	Mar 31, 2013
Testing Laboratory Name .....:	**Shenzhen Huatongwei International Inspection Co., Ltd**
Address .....:	Keji Nan No.12 Road, Hi-tech Park, Shenzhen, China
Applicant's name.....:	**Shenzhen Belter Health Measurement and Analysis Technology Co.,Ltd**
Address .....:	702/704, Block C, Tsinghua Unis Science Park, No.13 Langshan Rd, Hi-Tech Industrial Park(north), Nanshan District, 518057 Shenzhen, People's Republic of China.
Test specification .....:	
Standard .....:	**FCC Part 15.247: Operation within the bands 902-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz Frequency hopping systems**
TRF Originator.....:	Shenzhen Huatongwei International Inspection CO., Ltd
Master TRF.....:	Dated 2006-06

Test item description .....:	sphygmomanometer
Trade Mark .....:	eBELTER 倍泰 www.belter.com.cn
Model/Type reference.....:	ePA-46B
Listed Models .....:	PA-46, PA-52, PA-54
Manufacturer .....:	**Dongguan Simple Industrial Co., Ltd**
Modulation .....:	GFSK
Operation Frequency.....:	From 2402MHz to 2480MHz
Ratings .....:	DC 6.00V
Result.....:	**PASS**

T E S T R E P O R T

Test Report No. :	TRE1303008401	Mar 31, 2013 Date of issue

Equipment under Test	:	sphygmomanometer
Model /Type	:	ePA-46B
Listed Models	:	PA-46; PA-52; PA-54
Applicant	:	**Shenzhen Belter Health Measurement and Analysis Technology Co.,Ltd**
Address	:	702/704, Block C, Tsinghua Unis Science Park, No.13 Langshan Rd, Hi-Tech Industrial Park(north), Nanshan District, 518057 Shenzhen, People's Republic of China.
Manufacturer	:	**Dongguan Simple Industrial Co., Ltd**
Address	:	No. 192，Shaxin Road, Science Message Park, Tangxia Town, Dongguan, Guangdong, China

Test Result:	**PASS**

Contents

1. TEST STANDARDS

The tests were performed according to following standards:

FCC Rules Part 15.247: Frequency Hopping, Direct Spread Spectrum and Hybrid Systems that are in operation within the bands of 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz.
ANSI C63.10-2009: American National Standard for Testing Unlicensed Wireless Devices

2 . SUMMARY

2.1. General Remarks

Date of receipt of test sample	:	Nov 15,2012
Testing commenced on	:	Nov 15,2012
Testing concluded on	:	Mar 31,2013

2.2. Equipment Under Test

Power supply system utilised

Power supply voltage	:	○	120V / 60 Hz	○	115V / 60Hz
		○	12 V DC	○	24 V DC
		●	Other (specified in blank below)		

DC 6.00V From battery/DC12.00V Adapter from AC 120V/60Hz

2.3. Short description of the Equipment under Test (EUT)

2.4GHz (sphygmomanometer (ePA-46B, PA-46; PA-52; PA-54)).

For more details, refer to the user's manual of the EUT

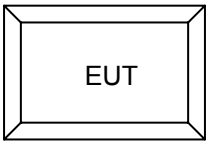
2.4. EUT operation mode

The EUT has been tested under typical operating condition. There is BDR (Basic Data Rate) mode with only DH1.The Applicant provides communication tools software to control the EUT for staying in continous transmitting and receiving mode for testing. There are 79 channels of EUT, and the test carried out at the lowest channel, middle channel and highest channel .

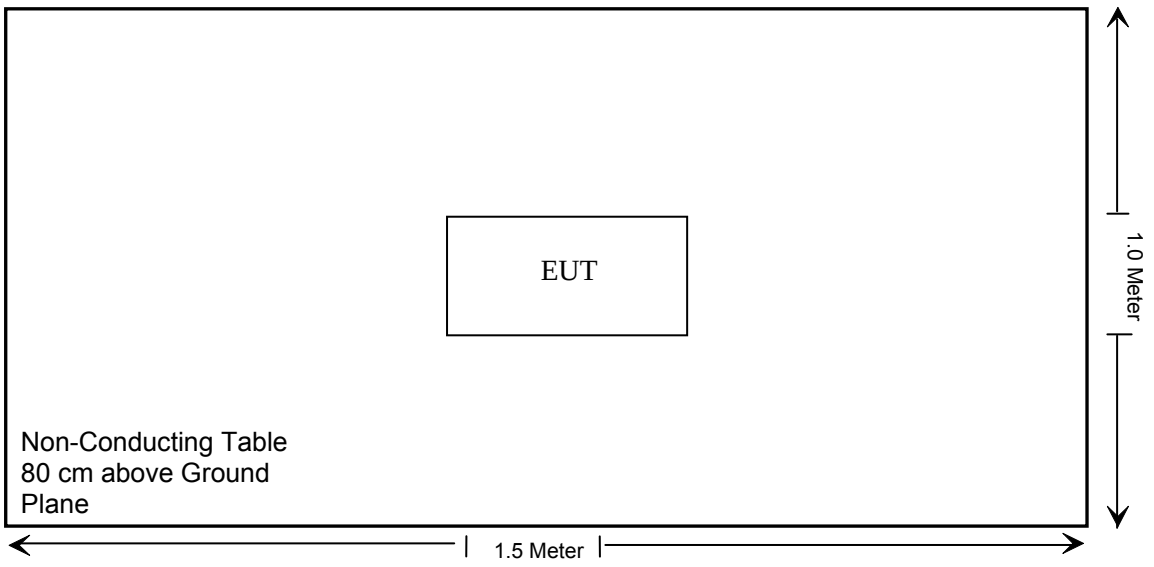
Channel	Frequency(MHz)	Channel	Frequency(MHz)
0	**2402**	40	2442
1	2403	41	2443
2	2404	42	2444
3	2405	43	2445
4	2406	44	2446
5	2407	45	2447
6	2408	46	2448
7	2409	47	2449
8	2410	48	2450
9	2411	49	2451
10	2412	50	2452
11	2413	51	2453
12	2414	52	2454
13	2415	53	2455
14	2416	54	2456
15	2417	55	2457
16	2418	56	2458
17	2419	57	2459
18	2420	58	2460
19	2421	59	2461
20	2422	60	2462
21	2423	61	2463
22	2424	62	2464
23	2425	63	2465

24	2426	64	2466
25	2427	65	2467
26	2428	66	2468
27	2429	67	2469
28	2430	68	2470
29	2431	69	2471
30	2432	70	2472
31	2433	71	2473
32	2434	72	2474
33	2435	73	2475
34	2436	74	2476
35	2437	75	2477
36	2438	76	2478
37	2439	77	2479
38	2440	**78**	**2480**
39	**2441**		

2.5. Configuration of Test System



Block Diagram of Test Setup



2.6. Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for **FCC ID: 2AAEEEPA46B** filing to comply with Section 15.247 of the FCC Part 15, Subpart C Rules.

2.7. Modifications

No modifications were implemented to meet testing criteria.

2.8. NOTE

1. The functions of the EUT with Bluetooth 2.0 function are listed as below:

	Test Standards	Reference Report
Bluetooth	FCC Part 15 Subpart C (Section15.247)	TRE1303008401
RF Exposure	§2.1093	TRE1303008402

2. The frequency bands used in this EUT are listed as follows:

Frequency Band(MHz)	2400-2483.5	5150-5350	5470-5725	5725-5850
EUT	√	—	—	—

3. TEST ENVIRONMENT

3.1. Address of the test laboratory

Shenzhen Huatongwei International Inspection Co., Ltd
Keji Nan No.12 Road, Hi-tech Park, Shenzhen, China
Phone: 86-755-26715686 Fax: 86-755-26748089

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 (2009) and CISPR Publication 22.

3.2. Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

CNAS-Lab Code: L1225

Shenzhen Huatongwei International Inspection Co., Ltd. has been assessed and proved to be in compliance with CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC 17025: 2005 General Requirements) for the Competence of Testing and Calibration Laboratories, Date of Registration: Mar. 01, 2012. Valid time is until Feb 28, 2015.

A2LA-Lab Cert. No. 2243.01

Shenzhen Huatongwei International Inspection Co., Ltd. EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing. Valid time is until Sept. 30, 2013.

FCC-Registration No.: 662850

Shenzhen Huatongwei International Inspection Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter from the FCC is maintained in our files. Registration 662850, Renewal date Jun. 01, 2012, valid time is until Jun. 01, 2015.

IC-Registration No.: 5377A

The 3m Alternate Test Site of Shenzhen Huatongwei International Inspection Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for the performance of radiated measurements with Registration No. 5377A on Jan. 25, 2011, valid time is until Jan. 24, 2014.

ACA

Shenzhen Huatongwei International Inspection Co., Ltd. EMC Laboratory can also perform testing for the Australian C-Tick mark as a result of our A2LA accreditation.

VCCI

The 3m Semi-anechoic chamber (12.2m×7.95m×6.7m) and Shielded Room (8m×4m×3m) of Shenzhen Huatongwei International Inspection Co., Ltd. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-292. Date of Registration: Dec. 24, 2010. Valid time is until Dec. 23, 2013.

Main Ports Conducted Interference Measurement of Shenzhen Huatongwei International Inspection Co., Ltd. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: C-2726. Date of Registration: Dec. 20, 2012. Valid time is until Dec. 19, 2015.

Telecommunication Ports Conducted Interference Measurement of Shenzhen Huatongwei International Inspection Co., Ltd. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: T-1837. Date of Registration: May 07, 2010. Valid time is until May 06, 2013.

DNV

Shenzhen Huatongwei International Inspection Co., Ltd. has been found to comply with the requirements of DNV towards subcontractor of EMC and safety testing services in conjunction with the EMC and Low voltage Directives and in the voluntary field. The acceptance is based on a formal quality Audit and follow-ups according to relevant parts of ISO/IEC Guide 17025 (2005), in accordance with the requirements of the DNV Laboratory Quality Manual towards subcontractors. Valid time is until Aug. 24, 2013.

3.3. Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature: 15-35 ° C

Humidity: 30-60 %

Atmospheric pressure: 950-1050mbar

3.4. Test Description

FCC PART 15 15.247		
FCC Part 15.207	AC Power Conducted Emission	PASS
FCC Part 15.247(a)(1)(i)	20dB Bandwidth	PASS
FCC Part 15.247(d)	Spurious RF Conducted Emission	PASS
FCC Part 15.247(b)	Maximum Peak Output Power	PASS
FCC Part 15.247(b)	Pseudorandom Frequency Hopping Sequence	PASS
FCC Part 15.247(a)(1)(iii)	Number of hopping frequency& Time of Occupancy	PASS
FCC Part 15.247(a)(1)	Frequency Separation	PASS
FCC Part 15.109/ 15.205/ 15.209	Radiated Emissions	PASS
FCC Part 15.247(d)	Band Edge Compliance of RF Emission	PASS
FCC Part 15.203/15.247 (b)	Antenna Requirement	PASS

Remark: The measurement uncertainty is not included in the test result.

3.5. Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16 - 4 „Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements“ and is documented in the Shenzhen Huatongwei International Inspection Co., Ltd quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for Shenzhen Huatongwei laboratory is reported:

Test Items	Measurement Uncertainty	Notes
Transmitter power conducted	0.57 dB	(1)
Transmitter power Radiated	2.20 dB	(1)
Conducted spurious emission 9KHz-40 GHz	1.60 dB	(1)
Radiated spurious emission 9KHz-40 GHz	2.20 dB	(1)
Conducted Emission 9KHz-30MHz	3.39 dB	(1)
Radiated Emission 30~1000MHz	4.65 dB	(1)
Radiated Emissio 1~18GHz	5.16 dB	(1)
Radiated Emissio 18-40GHz	5.54 dB	(1)
Occupied Bandwidth	---------	(1)

(1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=1.96.

3.6. Equipments Used during the Test

Maximum Peak Output Power / Frequency Separation / Band Edge Compliance of RF Emission / Spurious RF Conducted Emission/ Number of hopping frequency/ Time of Occupancy					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1	Spectrum Analyzer	Rohde&Schwarz	FSP	1164.4391.40	2012/10/27

Radiated Emission& Spurious Emissions					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1	ULTRA-BROADBAND ANTENNA	Rohde&Schwarz	HL562	100015	2012/10/27
2	EMI TEST RECEIVER	Rohde&Schwarz	ESI 26	100009	2012/10/27
3	RF TEST PANEL	Rohde&Schwarz	TS / RSP	335015/ 0017	N/A
4	TURNTABLE	ETS	2088	2149	N/A
5	ANTENNA MAST	ETS	2075	2346	N/A
6	EMI TEST Software	Rohde&Schwarz	ESK1	N/A	N/A
7	HORN ANTENNA	Rohde&Schwarz	HF906	100039	2012/10/27
8	Amplifer	Sonoma	310N	E009-13	2012/10/27
9	JS amplifer	Rohde&Schwarz	JS4-00101800-28-5A	F201504	2012/10/27
10	High pass filter	Compliance Direction systems	BSU-6	34202	2012/10/27
11	Broad-Band Horn Antenna	Schwarzbeck	BBHA9170	470	2012/10/27
12	Ultra-Broadband Antenna	ShwarzBeck	VULB9163	539	2012/10/27
13	HORN ANTENNA	ShwarzBeck	9120D	1011	2012/10/27
14	TURNTABLE	MATURO	TT2.0	----	N/A
15	ANTENNA MAST	MATURO	TAM-4.0-P	----	N/A
16	EMI TEST Software	Audix	E3	N/A	N/A

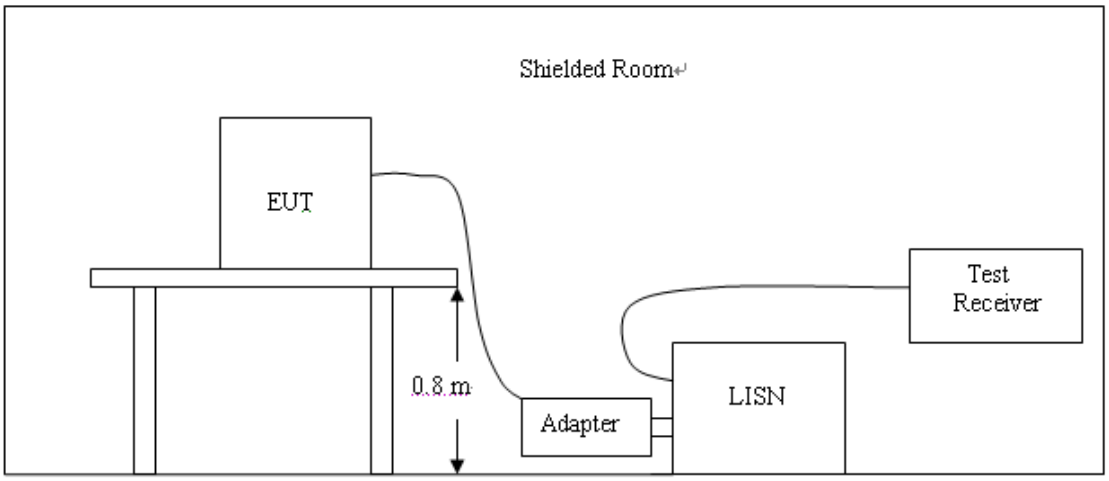
AC Power Conducted Emission					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1	Artificial Mains	Rohde&Schwarz	ESH2-Z5	100028	2012/10/27
2	EMI Test Receiver	Rohde&Schwarz	ESCI	100106	2012/10/27
3	Pulse Limiter	Rohde&Schwarz	ESHSZ2	100044	2012/10/27
4	EMI Test Software	Rohde&Schwarz	ES-K1 V1.71	N/A	N/A

The Calibration Interval was one year.

4. TEST CONDITIONS AND RESULTS

4.1. AC Power Conducted Emission

TEST CONFIGURATION



TEST PROCEDURE

1 The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. The EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.10-2009.
2 Support equipment, if needed, was placed as per ANSI C63.10-2009
3 All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10-2009
4 The EUT received DC12.00V power from the adapter, the adapter received AC120V/60Hz power through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.
5 All support equipments received AC power from a second LISN, if any.
6 The EUT test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
7 Analyzer / Receiver scanned from 150 KHz to 30MHz for emissions in each of the test modes.
8 During the above scans, the emissions were maximized by cable manipulation.

AC Power Conducted Emission Limit

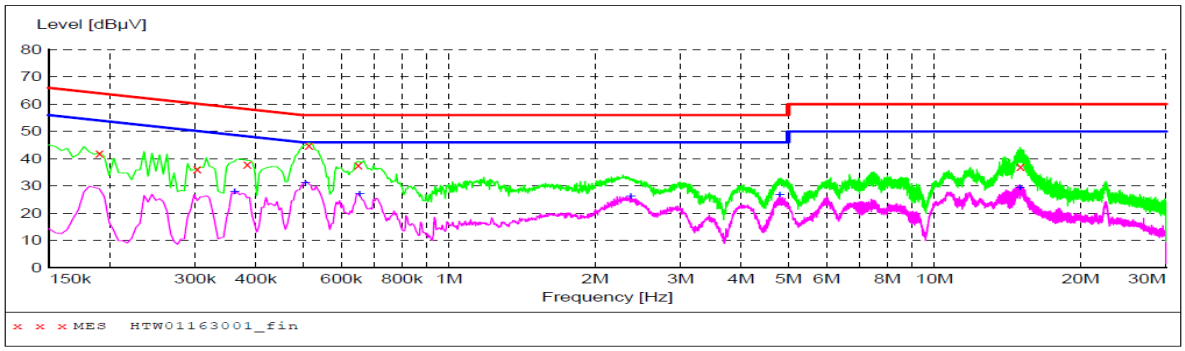
For intentional device, according to § 15.207(a) AC Power Conducted Emission Limits is as following：

Frequency (MHz)	Maximum RF Line Voltage (dBμV)			
	CLASS A		CLASS B	
	Q.P.	Ave.	Q.P.	Ave.
0.15 - 0.50	79	66	66-56*	56-46*
0.50 - 5.00	73	60	56	46
5.00 - 30.0	73	60	60	50

* Decreasing linearly with the logarithm of the frequency

TEST RESULTS

SCAN TABLE: "Voltage (9K-30M) FIN"
Short Description: 150K-30M Voltage



MEASUREMENT RESULT: "HTW01163001_fin"

1/16/2013 8:48AM

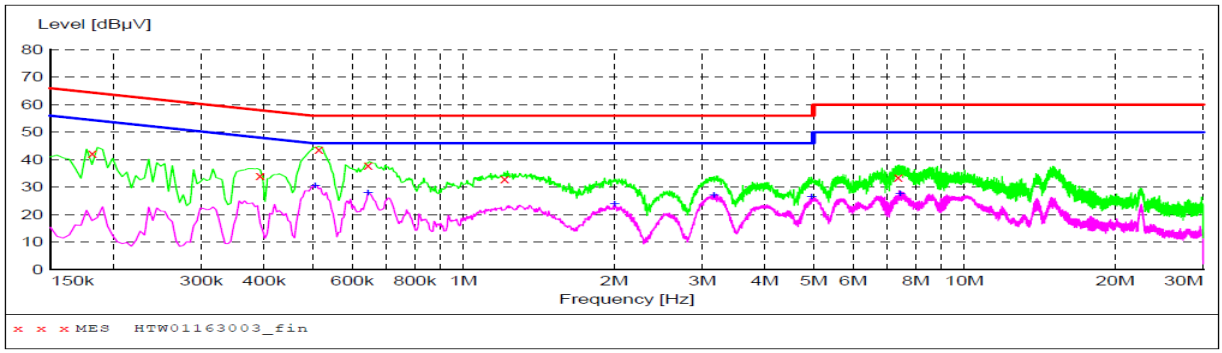
Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.190500	41.90	10.2	64	22.1	QP	L1	GND
0.303000	36.30	10.2	60	23.9	QP	L1	GND
0.384000	37.90	10.2	58	20.3	QP	L1	GND
0.514500	44.90	10.2	56	11.1	QP	L1	GND
0.649500	37.60	10.2	56	18.4	QP	L1	GND
15.049500	37.00	10.7	60	23.0	QP	L1	GND

MEASUREMENT RESULT: "HTW01163001_fin2"

1/16/2013 8:48AM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.361500	27.70	10.2	49	21.0	AV	L1	GND
0.505500	31.10	10.2	46	14.9	AV	L1	GND
0.654000	26.90	10.2	46	19.1	AV	L1	GND
2.368500	26.10	10.4	46	19.9	AV	L1	GND
4.798500	26.50	10.4	46	19.5	AV	L1	GND
14.991000	29.20	10.7	50	20.8	AV	L1	GND

SCAN TABLE: "Voltage (9K-30M) FIN"
Short Description: 150K-30M Voltage



MEASUREMENT RESULT: "HTW01163003_fin"

1/16/2013 8:54AM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.181500	42.40	10.2	64	22.0	QP	N	GND
0.393000	34.10	10.2	58	23.9	QP	N	GND
0.514500	43.80	10.2	56	12.2	QP	N	GND
0.645000	37.90	10.2	56	18.1	QP	N	GND
1.207500	33.00	10.3	56	23.0	QP	N	GND
7.377000	33.50	10.5	60	26.5	QP	N	GND

MEASUREMENT RESULT: "HTW01163003_fin2"

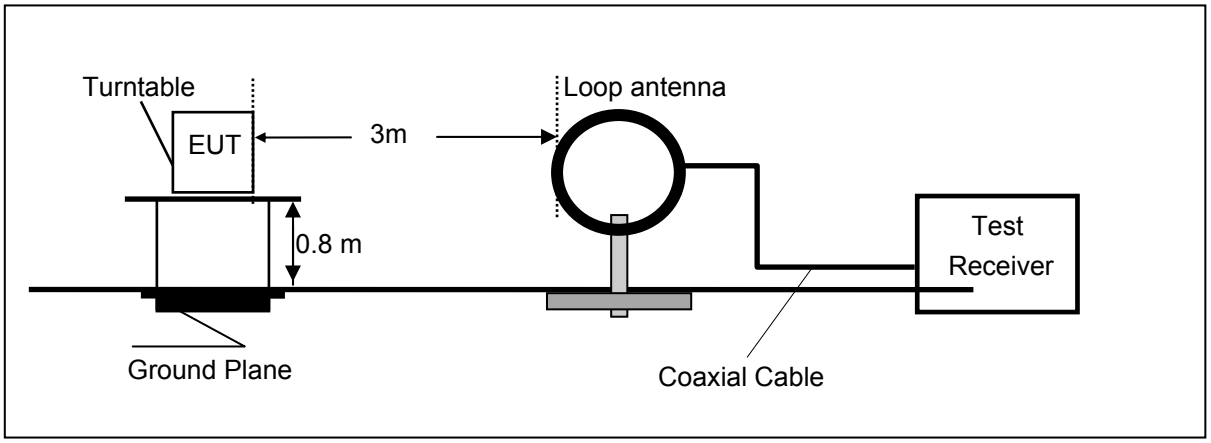
1/16/2013 8:54AM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.505500	30.30	10.2	46	15.7	AV	N	GND
0.645000	27.70	10.2	46	18.3	AV	N	GND
2.004000	23.70	10.4	46	22.3	AV	N	GND
3.160500	26.90	10.4	46	19.1	AV	N	GND
4.951500	26.20	10.4	46	19.8	AV	N	GND
7.444500	27.50	10.5	50	22.5	AV	N	GND

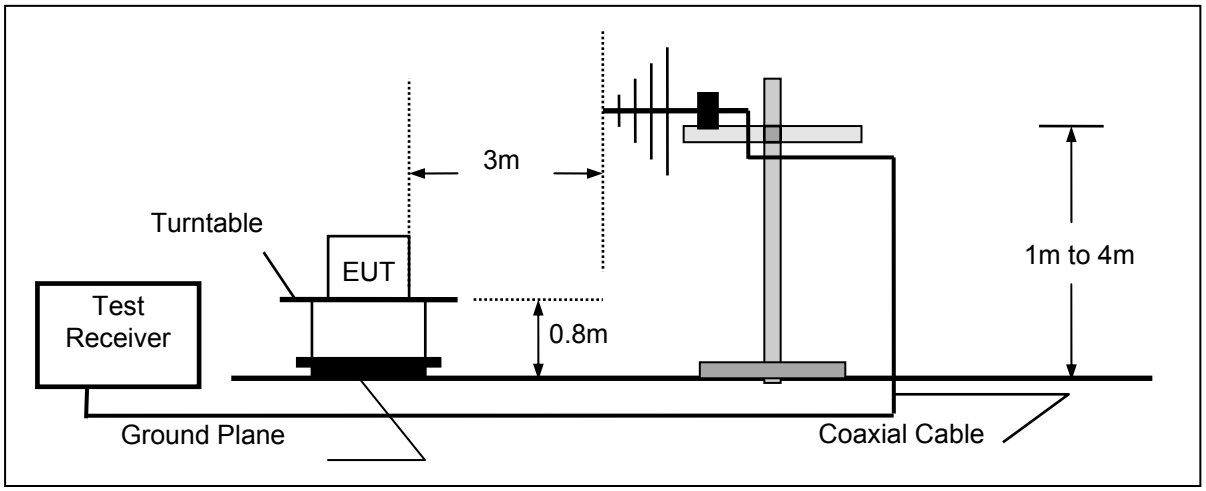
4.2. Radiated Emission

TEST CONFIGURATION

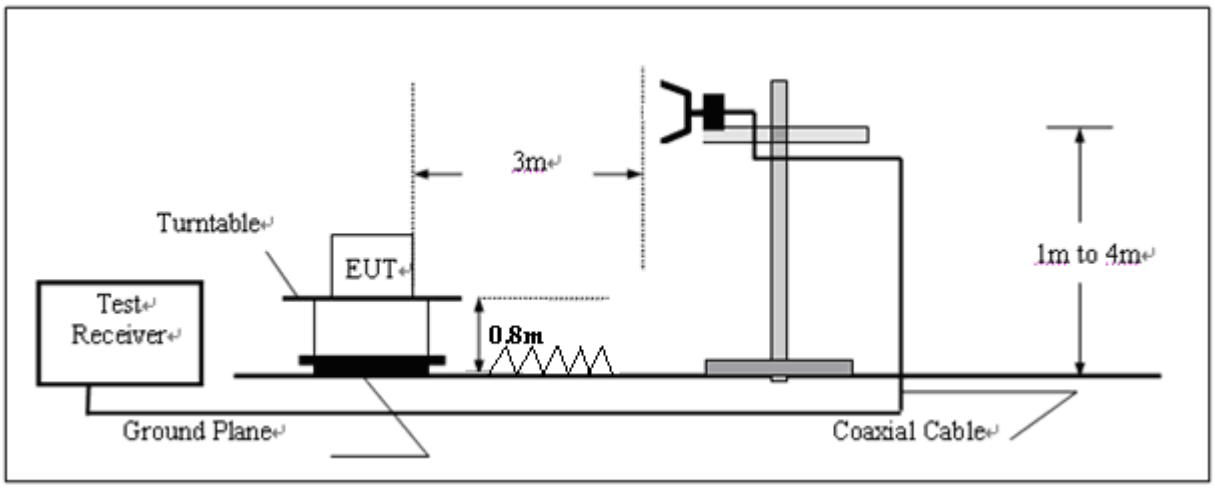
Frequency range 9KHz – 30MHz



Frequency range 30MHz – 1000MHz



Frequency range above 1GHz-25GHz



TEST PROCEDURE

1 The EUT was placed on a turn table which is 0.8m above ground plane.
2 Maximum procedure was performed by raising the receiving antenna from 1m to 4m and rotating the turn table from 0℃ to 360℃ to acquire the highest emissions from EUT

3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4. Repeat above procedures until all frequency measurements have been completed.
5. the lowest crystal frequency is 32.768KHz, So the radiation emissions frequency range were tested from 9KHz to 25GHz.

Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor(if any) from the measured reading. The basic equation with a sample calculation is as follows:

FS = RA + AF + CL – AG

Where FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
RA = Reading Amplitude	AG = Amplifier Gain
AF = Antenna Factor	

For example

Frequency (MHz)	FS (dBμV/m)	RA (dBμV/m)	AF (dB)	CL (dB)	AG (dB)	Transd (dB)
300.00	40	58.1	12.2	1.6	31.90	-18.1

Transd=AF +CL-AG

RADIATION LIMIT

For intentional device, according to § 15.209(a), the general requirement of field strength of radiated emission from intentional radiators at a distance of 3 meters shall not exceed the following table. According to § 15.247(d), in any 100kHz bandwidth outside the frequency band in which the EUT is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the100kHz bandwidth within the band that contains the highest level of desired power.

The frequency spectrum above 1 GHz for Transmitter was investigated. All emission not reported are much lower than the prescribed limits. Set the RBW=1MHz,VBW=3MHz for Peak Detector while the RBW=1MHz,VBW=10Hz for Average Detector,Readings are both peak and average values.

Frequency (MHz)	Distance (Meters)	Radiated (dBμV/m)	Radiated (μV/m)
0.009-0.49	300	20log(2400/F(KHz))	2400/F(KHz)
0.49-1.705	30	20log(24000/F(KHz))	24000/F(KHz)
1.705-30	30	20log(30)	30
30-88	3	40.0	100
88-216	3	43.5	150
216-960	3	46.0	200
Above 960	3	54.0	500

For intentional device, according to § 15.209(a), the general requirement of field strength of radiated emissions from intentional radiators at a distance of 3 meters shall not exceed the following table.

Frequency (MHz)	Distance (Meters)	Radiated (dBμV/m)
0.009-0.49	3	20log(2400/F(KHz))+40log(300/3)
0.49-1.705	3	20log(24000/F(KHz))+ 40log(30/3)
1.705-30	3	20log(30)+ 40log(30/3)
30-88	3	40.0
88-216	3	43.5
216-960	3	46.0
Above 960	3	54.0

TEST RESULTS

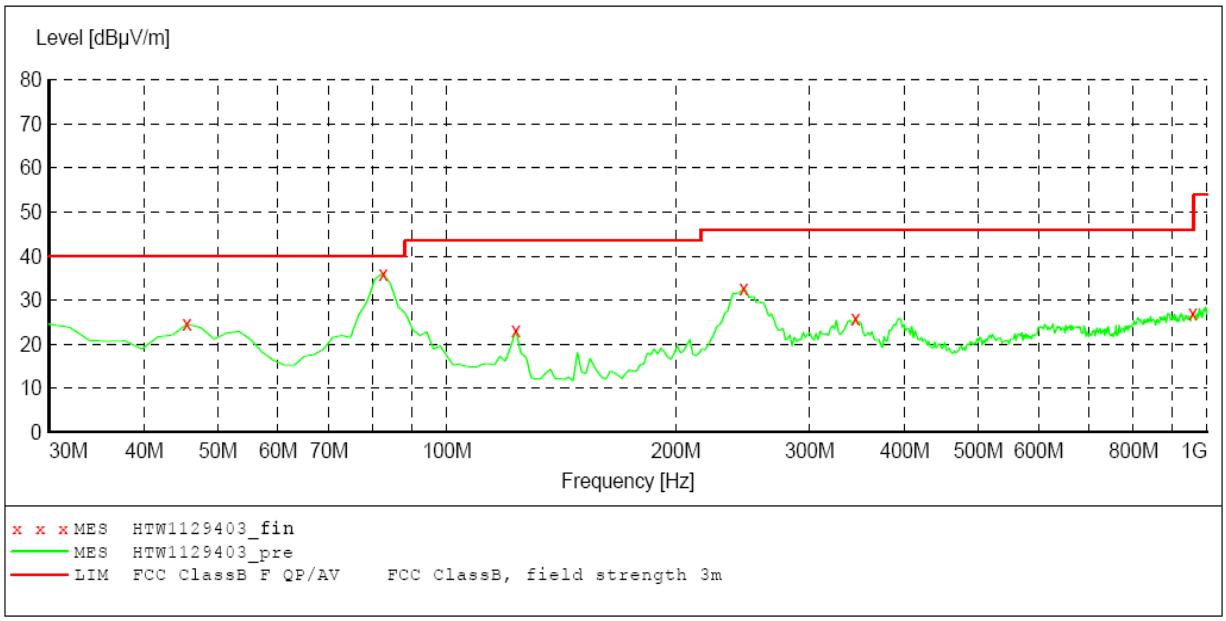
For 9KHz to 30MHz

Frequency (MHz)	Corrected Reading (dBμV/m)@3m	FCC Limit (dBμV/m) @3m	Margin (dB)	Detector	Result
0.51	47.16	73.11	25.95	QP	PASS
1.32	43.61	65.87	22.26	QP	PASS
16.05	41.96	69.54	27.58	QP	PASS
21.36	45.78	69.54	23.76	QP	PASS

For 30MHz to 1000MHz (GFSK mode)

SWEEP TABLE: "test (30M-1G)"

Short Description:			Field Strength		
Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
30.0 MHz	1.0 GHz	MaxPeak	Coupled	120 kHz	HL562



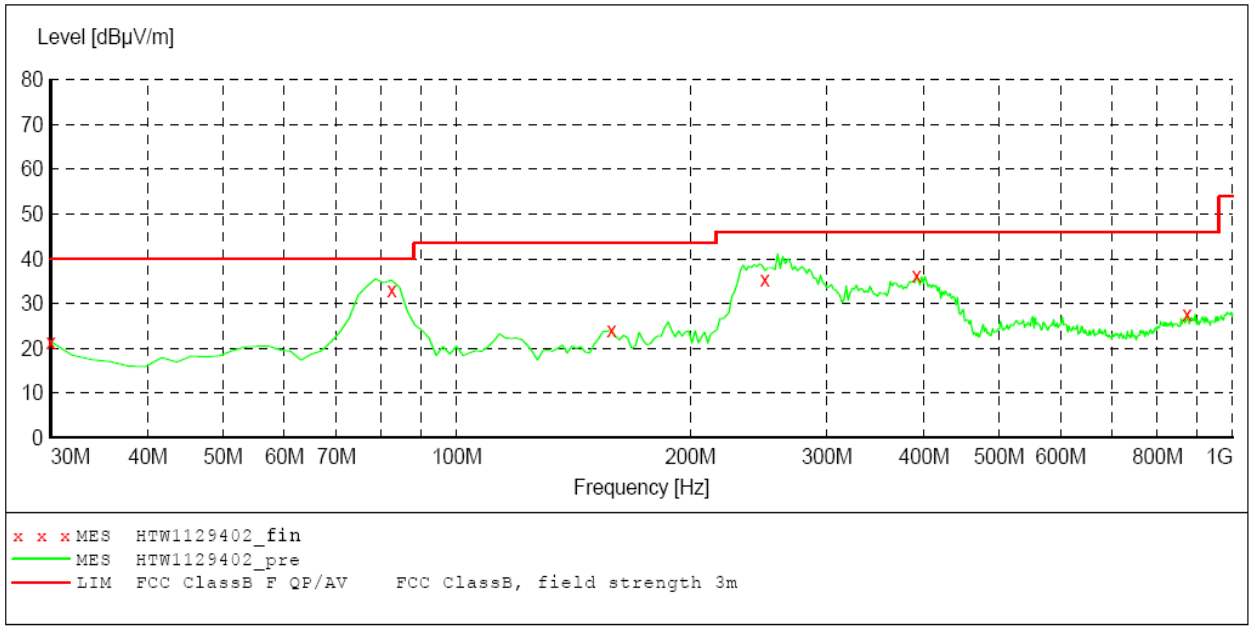
MEASUREMENT RESULT: "HTW1129403_fin"

11/29/2012 10:04AM

Frequency MHz	Level dBμV/m	Transd dB	Limit dBμV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
45.551102	24.60	-19.6	40.0	15.4	QP	100.0	40.00	VERTICAL
82.484970	36.10	-21.7	40.0	3.9	QP	100.0	304.00	VERTICAL
123.306613	23.20	-19.5	43.5	20.3	QP	100.0	109.00	VERTICAL
245.771543	32.80	-18.8	46.0	13.2	QP	100.0	126.00	VERTICAL
344.909820	26.00	-16.8	46.0	20.0	QP	100.0	57.00	VERTICAL
957.234469	27.00	-7.2	46.0	19.0	QP	100.0	209.00	VERTICAL

SWEEP TABLE: "test (30M-1G)"

Short Description:			Field Strength		
Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
30.0 MHz	1.0 GHz	MaxPeak	Coupled	120 kHz	HL562



MEASUREMENT RESULT: "HTW1129402_fin"

11/30/2012 9:29AM

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
30.000000	21.50	-11.1	40.0	18.5	QP	100.0	179.00	HORIZONTAL
82.484970	33.20	-21.7	40.0	6.8	QP	300.0	208.00	HORIZONTAL
158.296593	24.00	-22.9	43.5	19.5	QP	300.0	182.00	HORIZONTAL
249.659319	35.40	-18.6	46.0	10.6	QP	100.0	209.00	HORIZONTAL
391.563126	36.30	-15.8	46.0	9.7	QP	100.0	57.00	HORIZONTAL
873.647295	27.70	-7.0	46.0	18.3	QP	100.0	262.00	HORIZONTAL

Above 1G

The frequency spectrum above 1 GHz for Transmitter was investigated. All emission not reported are much lower than the prescribed limits. Set the RBW=1MHz,VBW=3MHz for Peak Detector while the RBW=1MHz,VBW=10Hz for Average Detector,Readings are both peak and average values. The pre-test have done for the EUT in three axes and found the worst emission at position shown in test setup photos.

Low channel

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M												
No.	Frequency (MHz)	Emssion Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier	Correction Factor (dB/m)
1	4804.00	53.56	PK	74.00	20.44	1.00	256	51.48	31.58	7.00	36.5	2.08
2	7206.00	43.62	PK	74.00	30.38	1.00	136	32.96	37.06	8.90	35.3	10.66

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M												
No.	Frequency (MHz)	Emssion Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier	Correction Factor (dB/m)
1	4804.00	53.78	PK	74.00	20.22	1.00 V	339	51.70	31.58	7.00	36.5	2.08
2	7206.00	45.82	PK	74.00	28.18	1.00 V	340	35.16	37.06	8.90	35.3	10.66

Middle channel

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M												
No.	Frequency (MHz)	Emssion Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier	Correction Factor (dB/m)
1	4882.00	53.47	PK	74.00	20.53	1.00	202	51.33	31.04	7.60	36.5	2.14
2	7323.00	43.06	PK	74.00	30.94	1.00	355	31.92	37.84	8.60	35.3	11.14

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M												
No.	Frequency (MHz)	Emssion Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier	Correction Factor (dB/m)
1	4882.00	53.89	PK	74.00	20.11	1.00	97	51.75	31.04	7.60	36.5	2.14
2	7323.00	45.63	PK	74.00	28.37	1.00	288	34.49	37.84	8.60	35.3	11.14

High channel

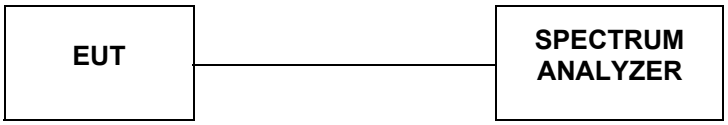
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M												
No.	Frequency (MHz)	Emssion Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier	Correction Factor (dB/m)
1	4960.00	52.68	PK	74.00	25.32	1.00	198	50.25	31.63	7.00	36.2	2.43
2	7340.00	47.66	PK	74.00	30.34	1.00	90	36.06	38.40	8.50	35.3	11.60

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M												
No.	Frequency (MHz)	Emssion Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier	Correction Factor (dB/m)
2	4960.00	50.53	PK	74.00	27.47	1.00 V	96	48.10	31.63	7.00	36.2	2.43
3	7340.00	49.28	PK	74.00	27.72	1.00 V	35	37.68	38.40	8.50	35.3	11.60

REMARKS: 1. Emission level (dBuV/m) =Raw Value (dBuV)+Correction Factor (dB/m)
2. Correction Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor
3. The other emission levels were very low against the limit.
4. Margin value = Limit value- Emission level.
5. The limit value is defined as per 15.247
6. The average measurement was not performed when the peak measured data under the limit of average detection.

4.3. Maximum Peak Output Power

TEST CONFIGURATION



TEST PROCEDURE

Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum.

LIMIT

The Maximum Peak Output Power Measurement is 30dBm.

TEST RESULTS

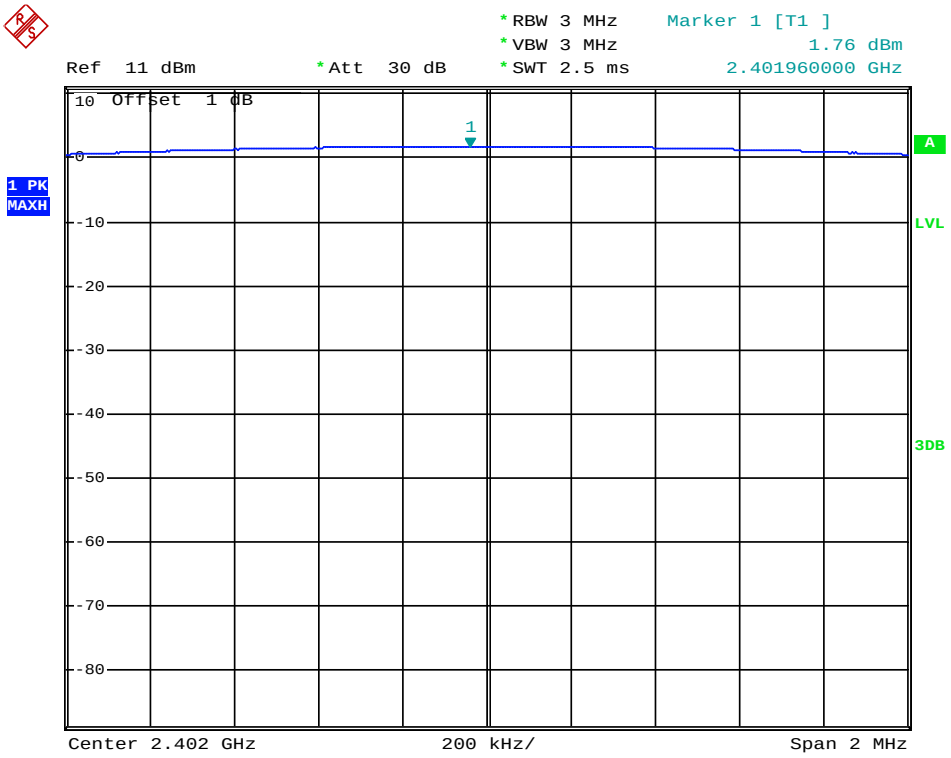
4.3.1 GFSK Test Mode

A. Test Verdict

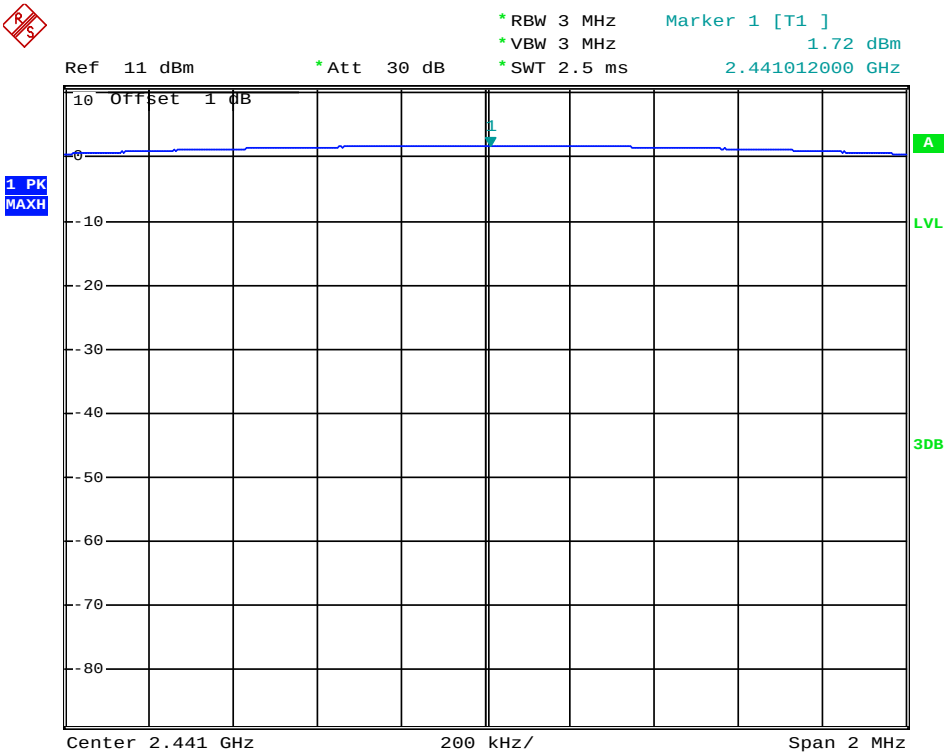
Channel	Frequency (MHz)	Measured Output Peak Power (dBm)	Refer to Plot	Limits (dBm)	Verdict
00	2402	1.76	Plot 4.3.1 A	30	PASS
39	2441	1.72	Plot 4.3.1 B	30	PASS
78	2480	1.24	Plot 4.3.1 C	30	PASS

Note: The test results including the cable lose.

B. Test Plots

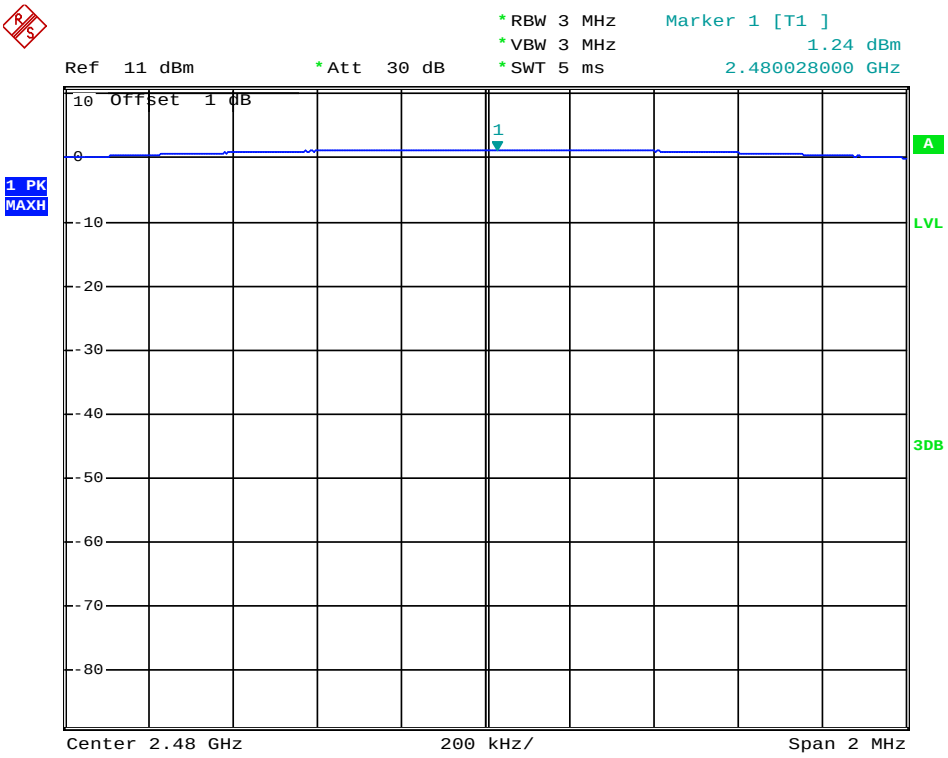


(Plot 4.3.1 A: Channel 00: 2402MHz @ GFSK)



Date: 26.MAR.2013 14:57:13

(Plot 4.3.1 B: Channel 39: 2441MHz @ GFSK)

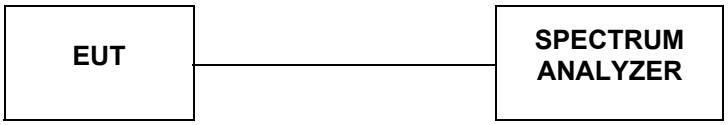


Date: 26.MAR.2013 15:02:29

(Plot 4.3.1 C: Channel 78: 2480MHz @ GFSK)

4.4. 20dB Bandwidth

TEST CONFIGURATION



TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with RBW=30 KHz and VBW=100KHz.
The 20dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20dB.

LIMIT

For frequency hopping systems operating in the 2400MHz-2483.5MHz no limit for 20dB bandwith.

TEST RESULTS

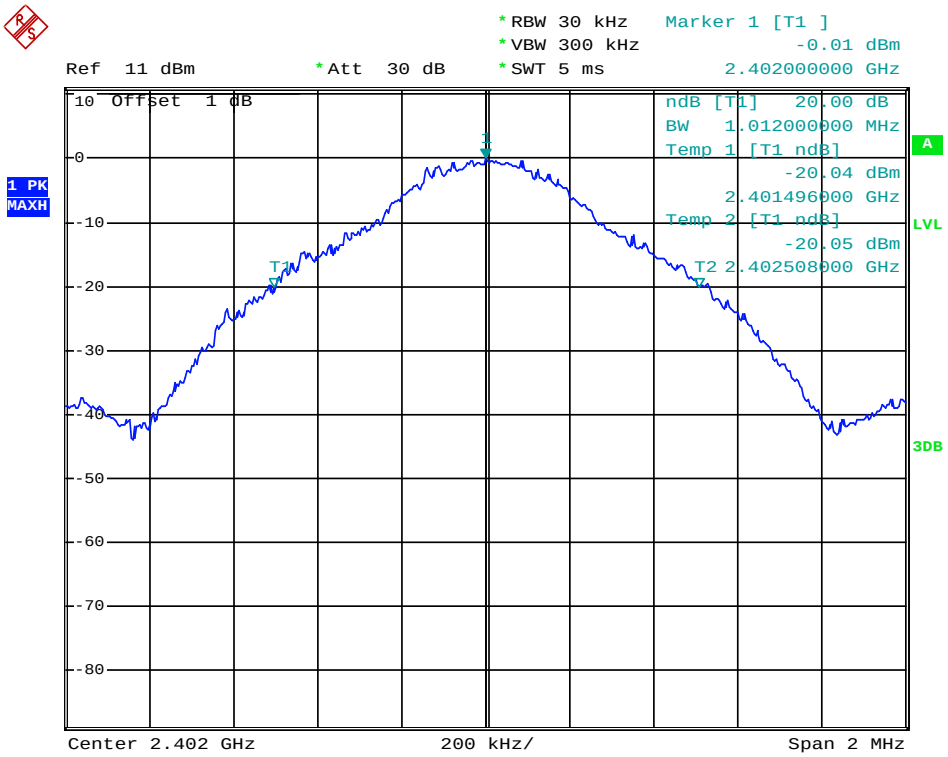
4.4.1 GFSK Test Mode

A. Test Verdict

Channel	Frequency (MHz)	20dB Bandwidth (MHz)	Refer to Plot	Limits (MHz)	Verdict
00	2402	1.012	Plot 4.4.1 A	/	PASS
39	2441	1.020	Plot 4.4.1 B	/	PASS
78	2480	1.064	Plot 4.4.1 C	/	PASS

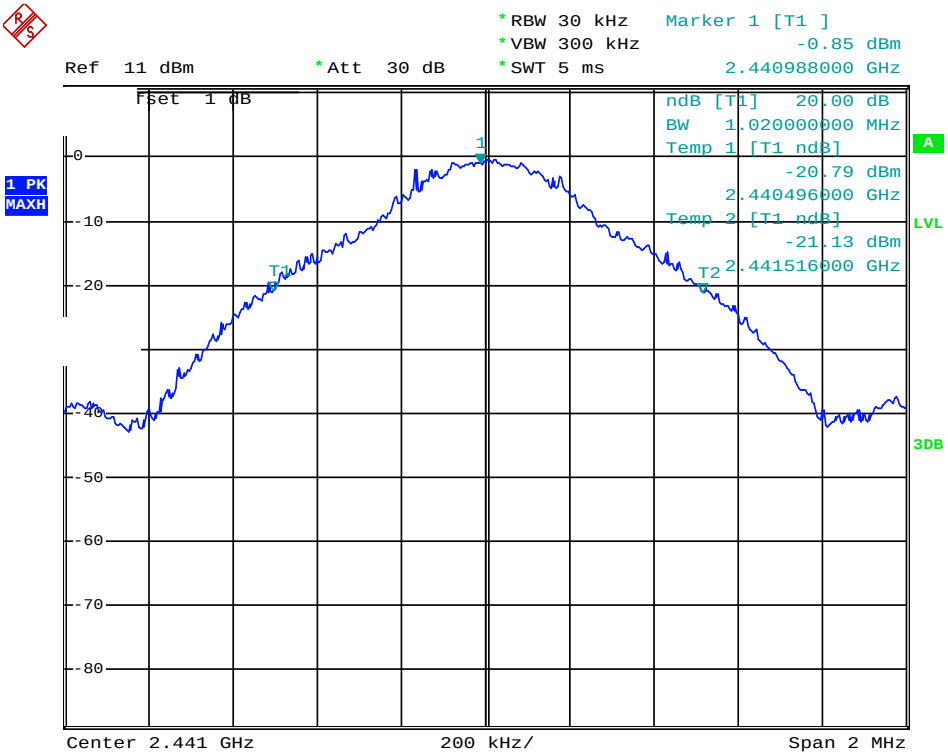
Note: 1.The test results including the cable lose.

B. Test Plots



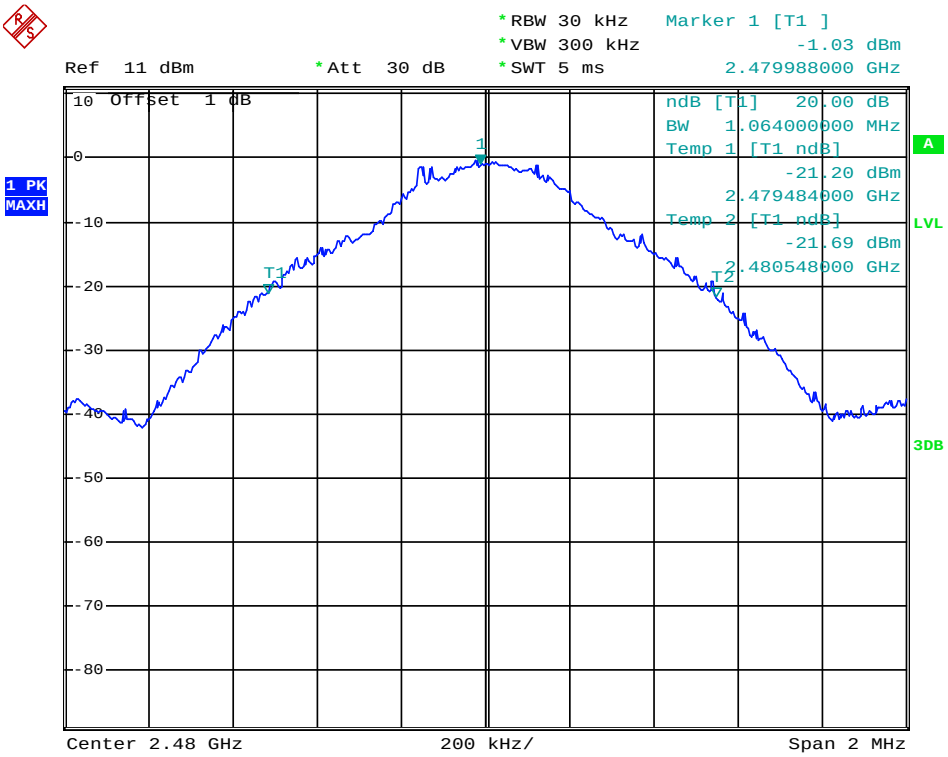
Date: 26.MAR.2013 15:12:10

(Plot 4.4.1 A: Channel 00: 2402MHz @ GFSK)



Date: 26.MAR.2013 15:10:51

(Plot 4.4.1 B: Channel 39: 2441MHz @ GFSK)



Date: 26.MAR.2013 15:09:49

(Plot 4.4.1 C: Channel 78: 2480MHz @ GFSK)

4.5. Band Edge Compliance of RF Emission

APPLICABLE STANAARD

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

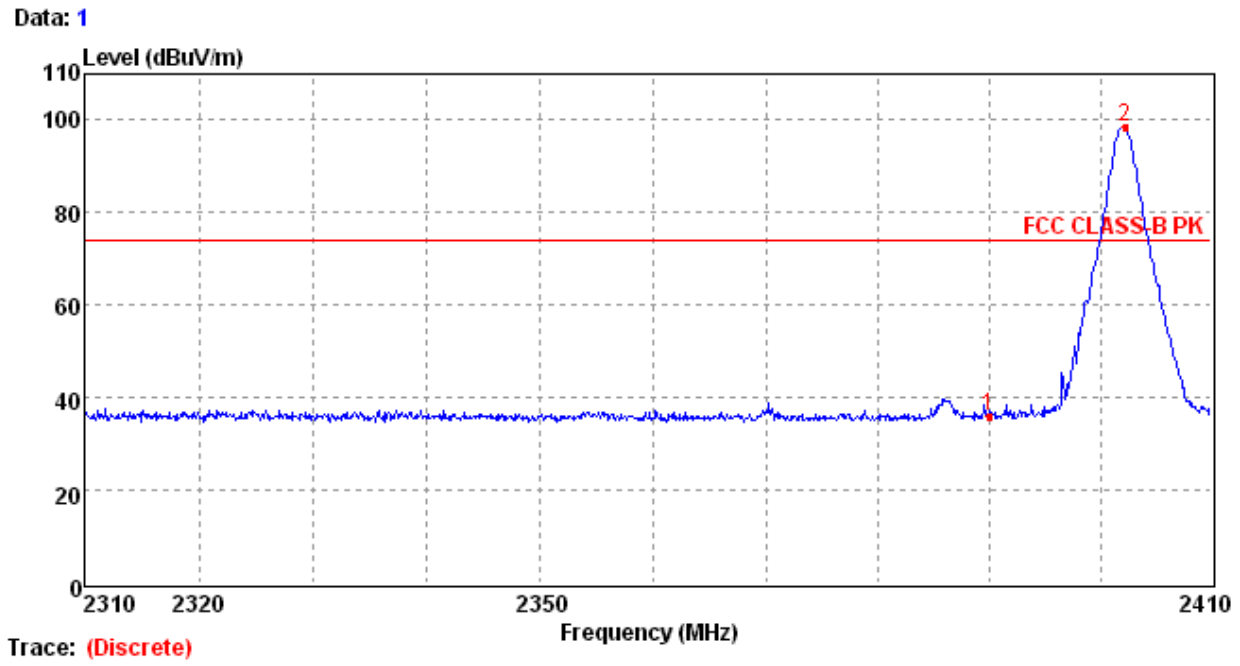
TEST PROCEDURE

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Remove the antenna from the EUT and then connect to a low loss RF cable from the antenna port to a EMI test receiver, then turn on the EUT and make it operate in transmitting mode. Then set it to Low Channel and High Channel within its operating range, and make sure the instrument is operated in its linear range.
3. Set both RBW and VBW of spectrum analyzer to 100 kHz with a convenient frequency span including 100kHz bandwidth from band edge, for Radiated emissions restricted band RBW=1MHz, VBW=3MHz.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.

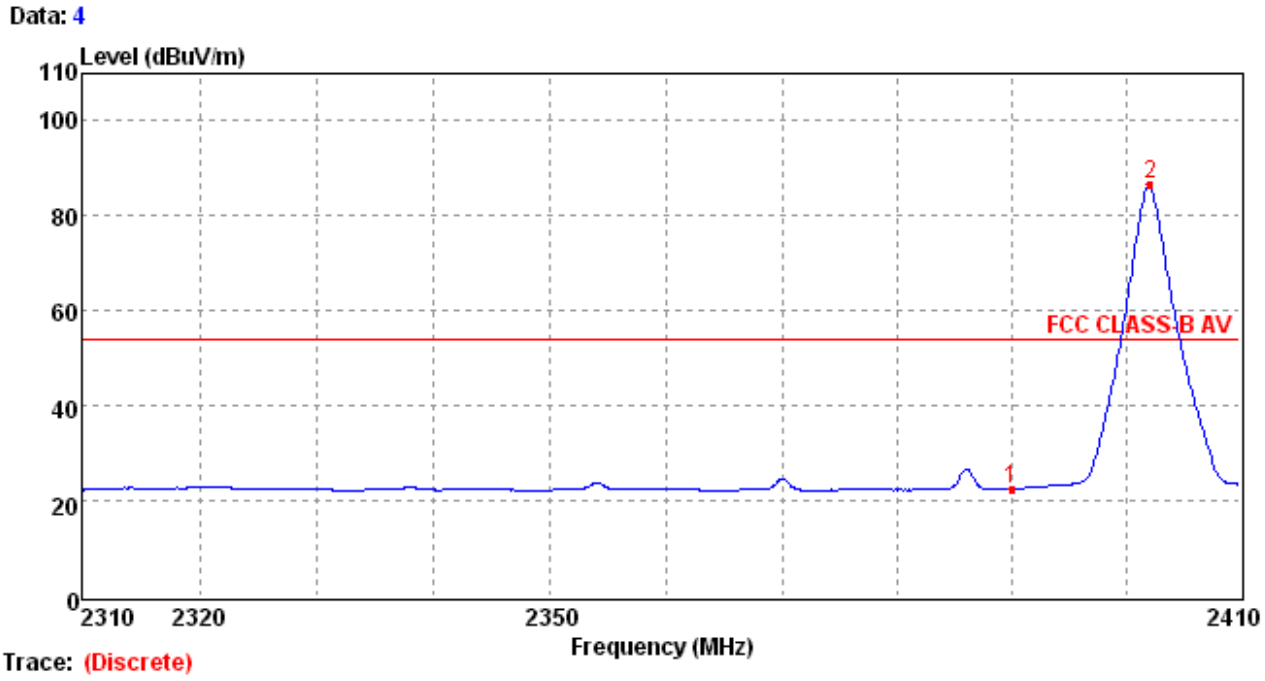
TEST RESULTS

4.5.1 For Radiated Bandedge Measurement

4.5.1.1 GFSK Test Mode

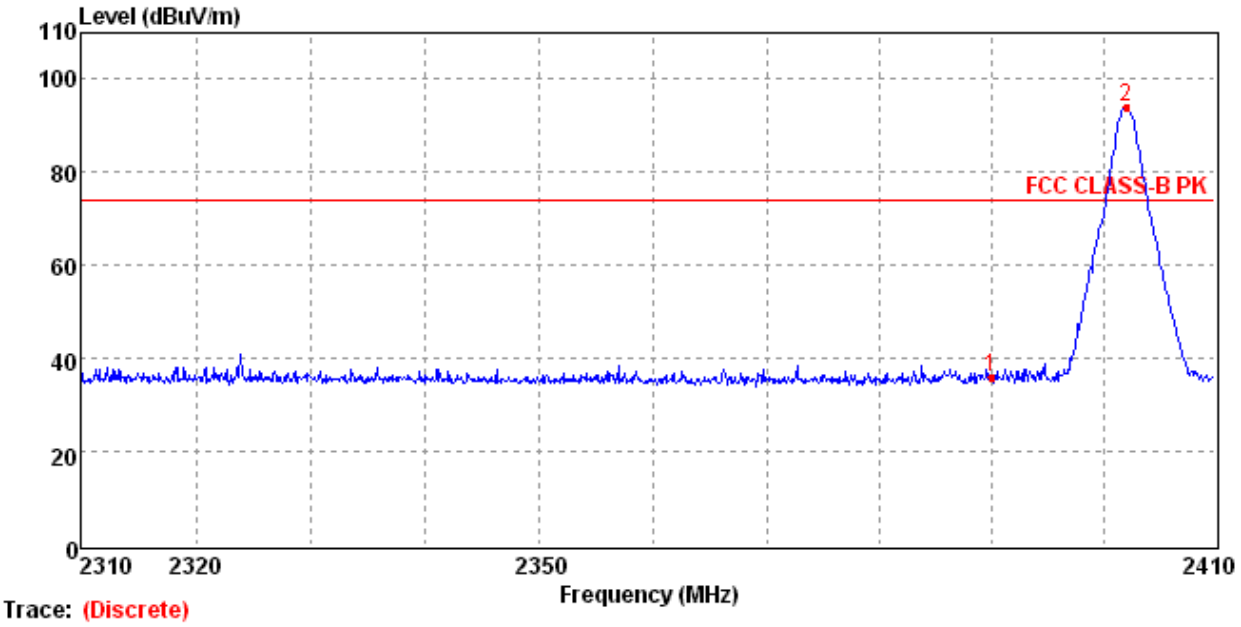


Mark	Frequency (MHz)	Level (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Preamp Factor (dB)	Reading Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Polarization	Detector
1	2390.00	36.12	3.32	27.49	36.12	41.43	74.00	23.55	Hor	Peak
2	**2402.25**	**98.99**	**3.32**	**27.49**	**36.12**	**104.30**	**74.00**	**-24.99**	**Hor**	**Peak**



Mark	Frequency (MHz)	Level (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Preamp Factor (dB)	Reading Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Polarization	Detector
1	2390.00	22.66	3.32	27.49	36.12	27.67	54.00	-31.34	Hor	Average
2	**2402.25**	**86.57**	**3.32**	**27.49**	**36.12**	**91.88**	**54.00**	**-32.57**	**Hor**	Average

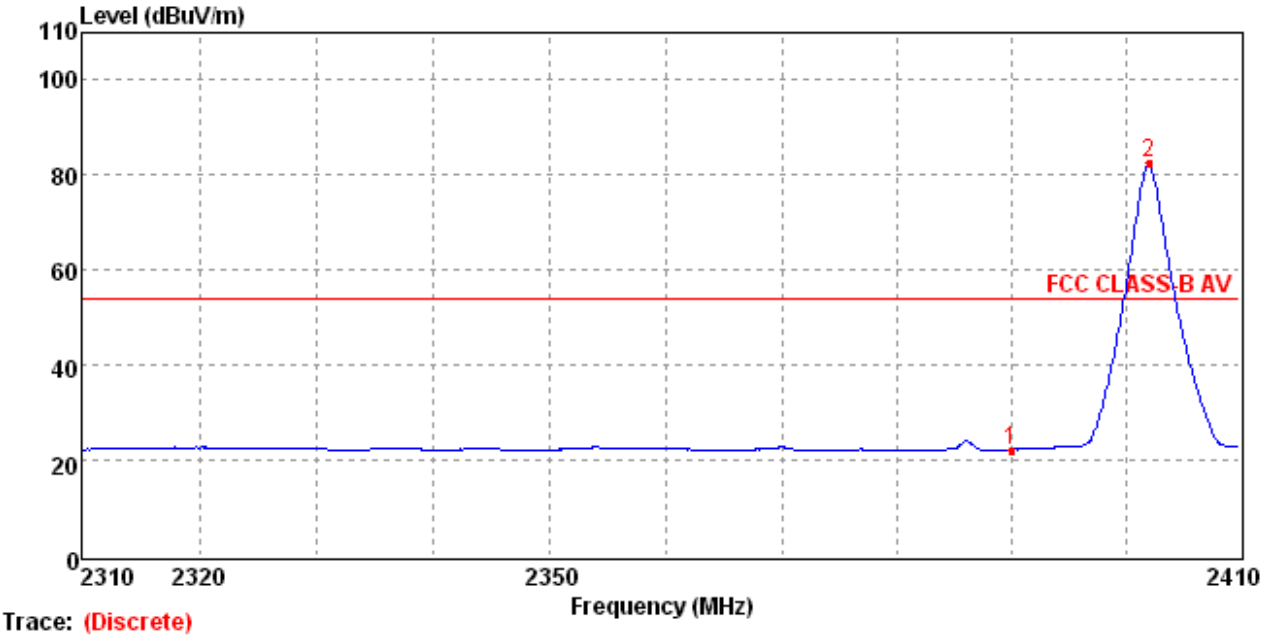
Data: 5



Trace: (Discrete)

Mark	Frequency (MHz)	Level (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Preamp Factor (dB)	Reading Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Polarization	Detector
1	2390.00	35.97	3.32	27.49	36.12	41.28	74.00	38.03	Ver	Peak
2	**2402.25**	**93.96**	**3.32**	**27.49**	**36.12**	**99.27**	**74.00**	**-19.96**	**Ver**	**Peak**

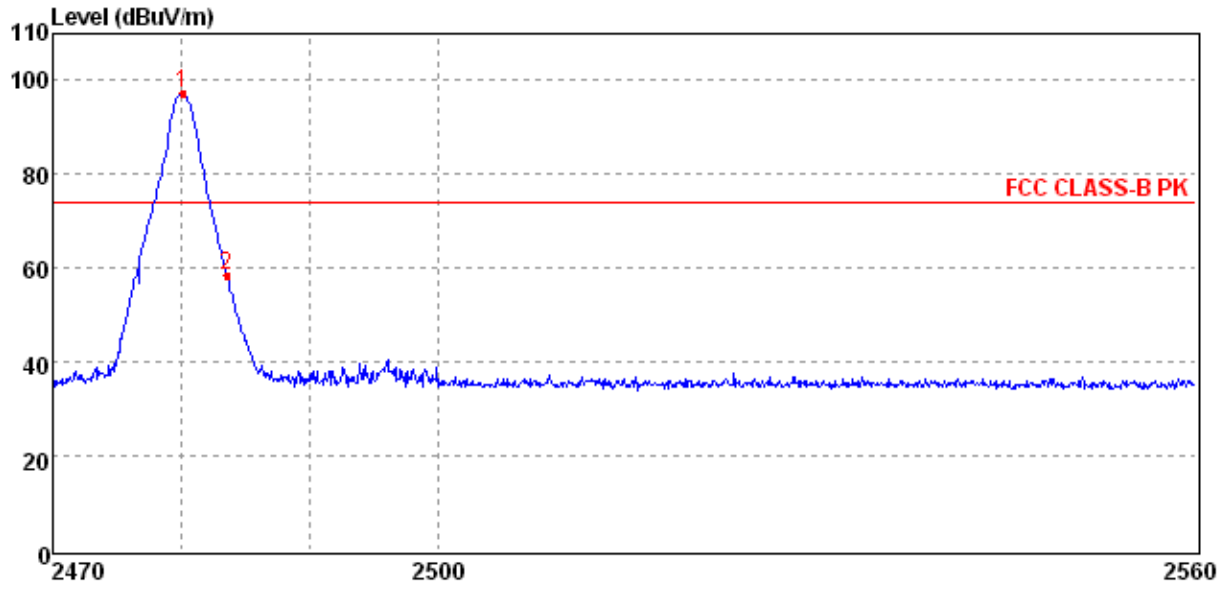
Data: 6



Trace: (Discrete)

Mark	Frequency (MHz)	Level (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Preamp Factor (dB)	Reading Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Polarization	Detector
1	2390.00	22.37	3.32	27.49	36.12	27.68	54.00	31.63	Ver	Average
2	**2402.25**	**82.85**	**3.32**	**27.49**	**36.12**	**88.16**	**54.00**	**-28.85**	**Ver**	Average

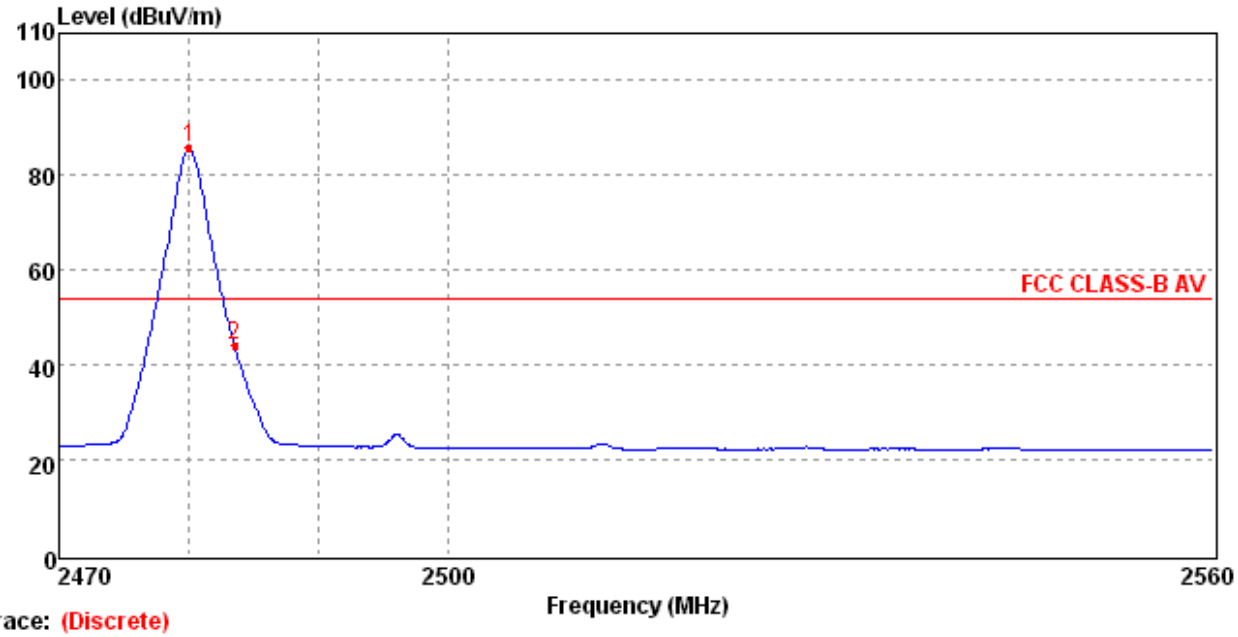
Data: 17



Trace: (Discrete)

Mark	Frequency (MHz)	Level (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Preamp Factor (dB)	Reading Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Polarization	Detector
1	**2480.10**	**97.55**	**3.88**	**27.45**	**36.55**	**102.77**	**74.00**	**-23.55**	**Hor**	**Peak**
2	2483.50	58.91	3.88	27.45	36.55	64.13	74.00	15.09	Hor	Peak

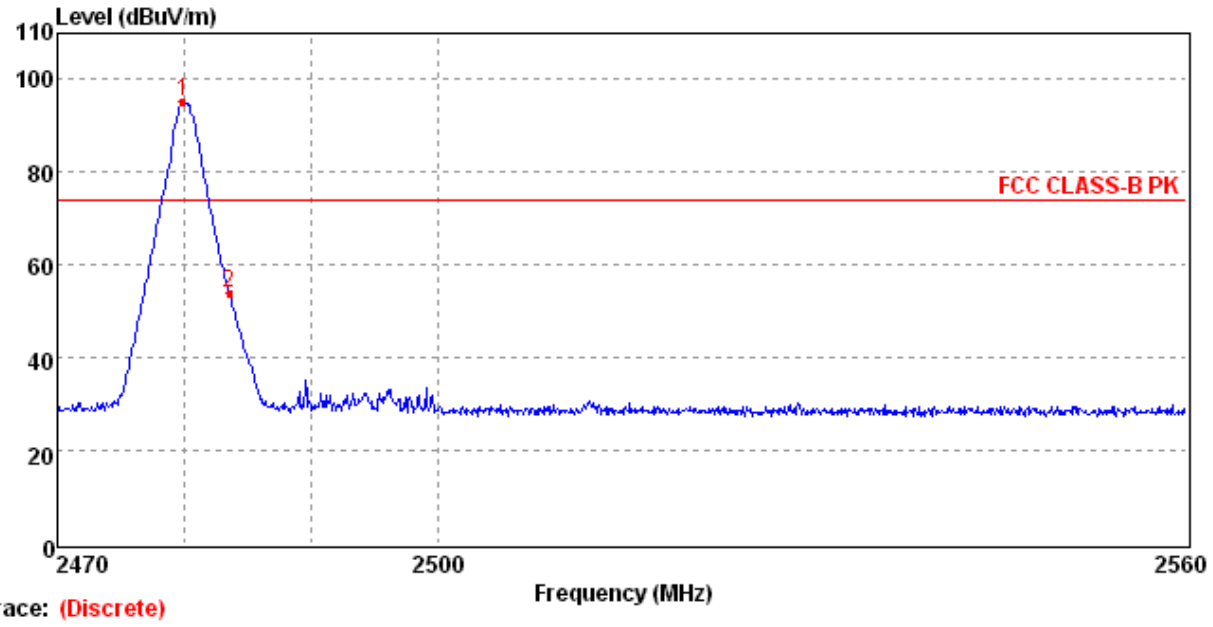
Data: 18



Trace: (Discrete)

Mark	Frequency (MHz)	Level (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Preamp Factor (dB)	Reading Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Polarization	Detector
1	**2480.10**	**85.97**	**3.88**	**27.45**	**36.55**	**91.19**	**54.00**	**-31.97**	**Hor**	**Average**
2	2483.50	44.52	3.88	27.45	36.55	49.84	54.00	9.48	Hor	Average

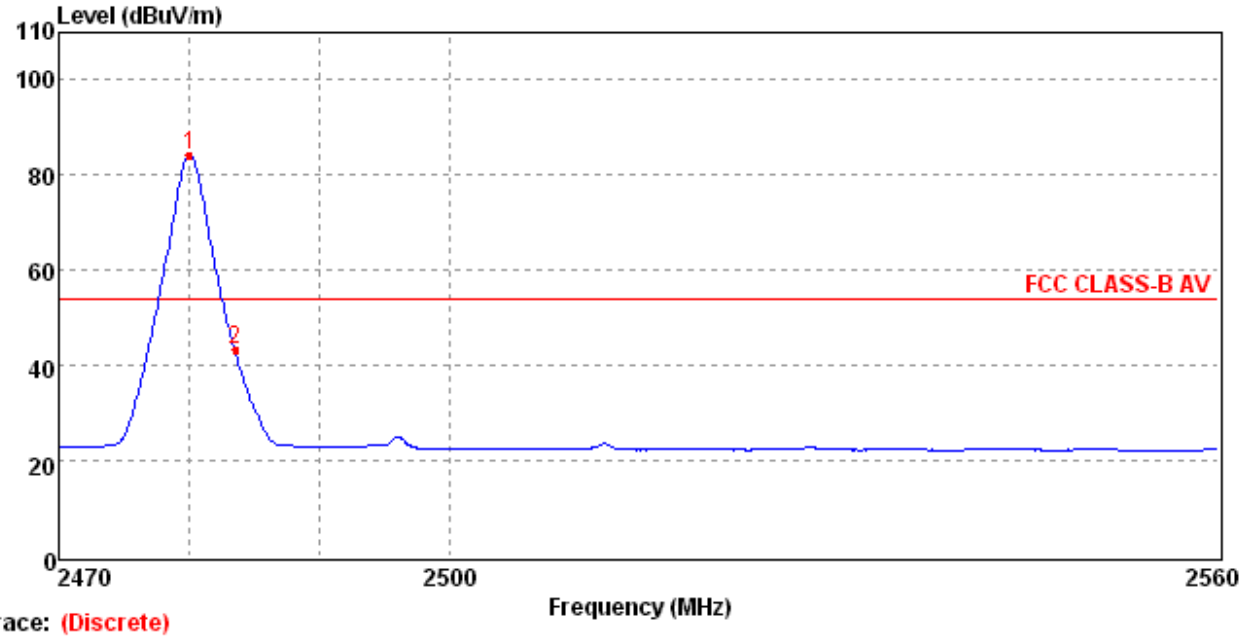
Data: 15



Trace: (Discrete)

Mark	Frequency (MHz)	Level (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Preamp Factor (dB)	Reading Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Polarization	Detector
1	**2479.83**	**95.44**	**3.88**	**27.45**	**36.55**	**100.66**	**74.00**	**-21.44**	**Ver**	**Peak**
2	2483.50	54.27	3.88	27.45	36.55	59.49	74.00	19.73	Ver	Peak

Data: 16



Trace: (Discrete)

Mark	Frequency (MHz)	Level (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Preamp Factor (dB)	Reading Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Polarization	Detector
1	**2480.01**	**84.65**	**3.88**	**27.45**	**36.55**	**89.97**	**54.00**	**-30.65**	**Ver**	**Average**
2	2483.50	44.38	3.88	27.45	36.55	49.60	54.00	9.62	Ver	Average

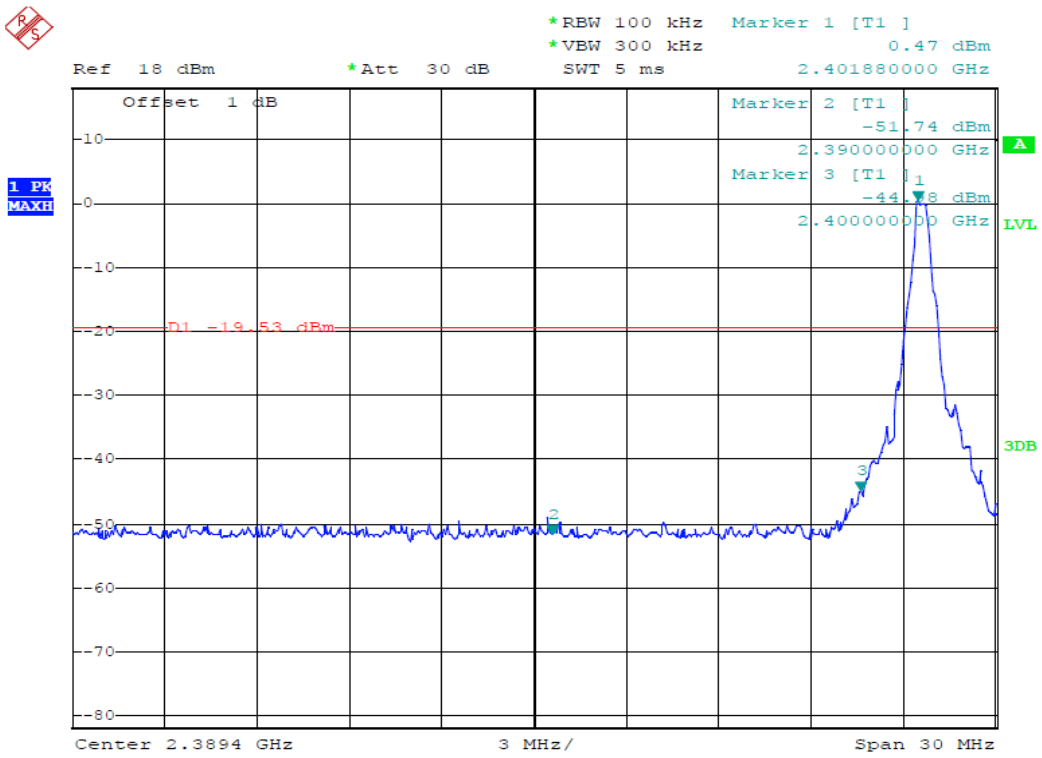
4.5.2 For Conducted Bandedge Measurement

4.5.2.1 GFSK Test Mode

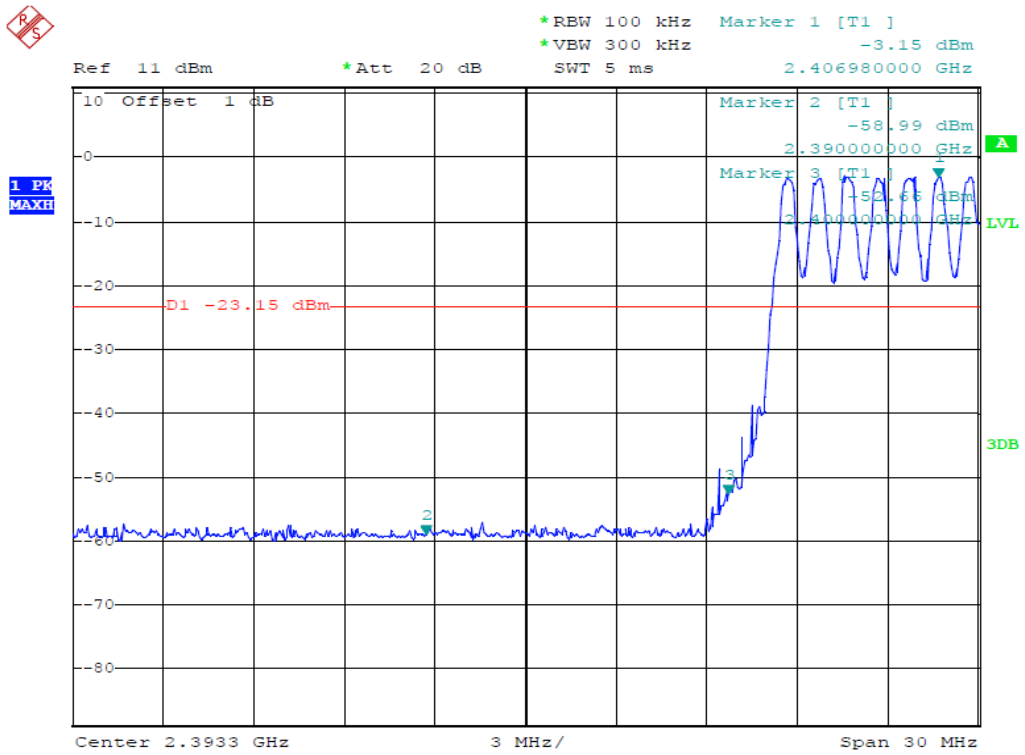
A. Test Verdict

Frequency (MHz)	Delta Peak to Band emission (dBc)	Hoping Mode	Detector	Limit (dBc)	Refer to Plot	Verdict
2400.00	45.05	OFF	Peak	20	Plot 4.5.2.1 A	PASS
2400.00	55.84	ON	Peak	20	Plot 4.5.2.1 B	PASS
2483.50	51.22	OFF	Peak	20	Plot 4.5.2.1 C	PASS
2483.50	56.40	ON	Peak	20	Plot 4.5.2.1 D	PASS

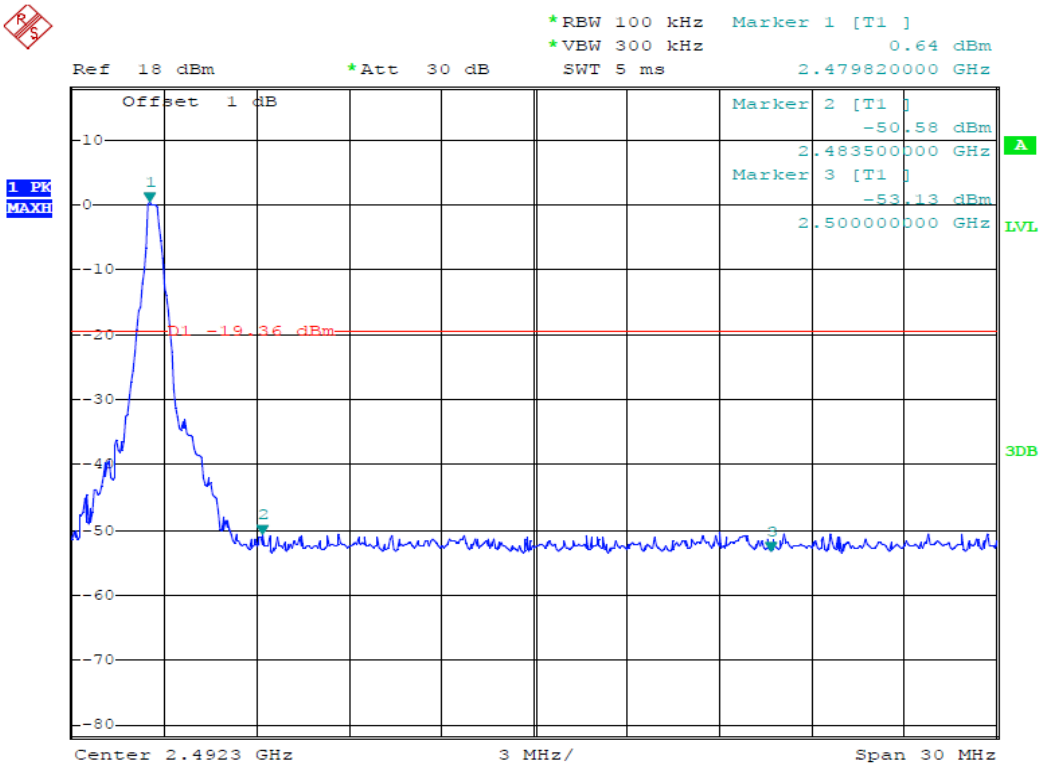
B. Test Plots



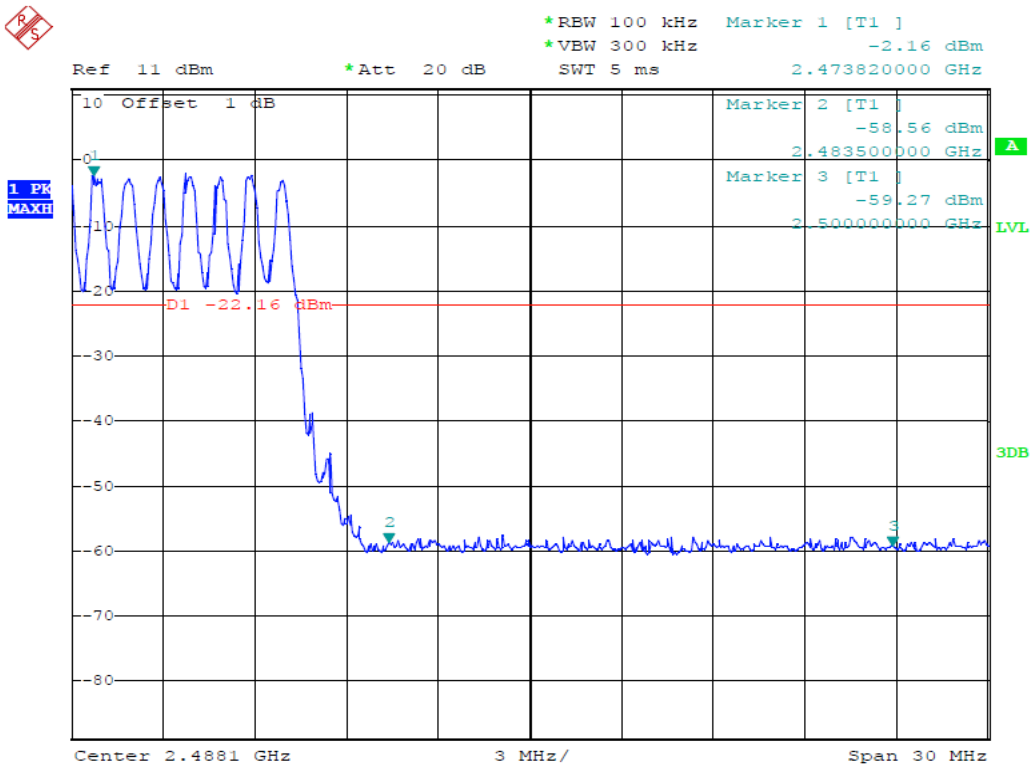
(Plot 4.5.2.1 A: Channel 00: 2402MHz @ GFSK)



(Plot 4.5.2.1 B: Hopping Mode @ GFSK)



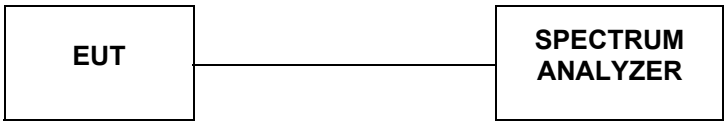
(Plot 4.5.2.1 C: Channel 78: 2480MHz @ GFSK)



(Plot 4.5.2.1 D: Hopping Mode @ GFSK)

4.6. Frequency Separation

TEST CONFIGURATION



TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with RBW=30 KHz and VBW=100KHz.

LIMIT

According to 15.247(a)(1),frequency hopping systems shall have hopping channel carrier frequencies separated by minimum of 25KHz or the 2/3*20dB bandwidth of the hopping channel, whichever is greater.

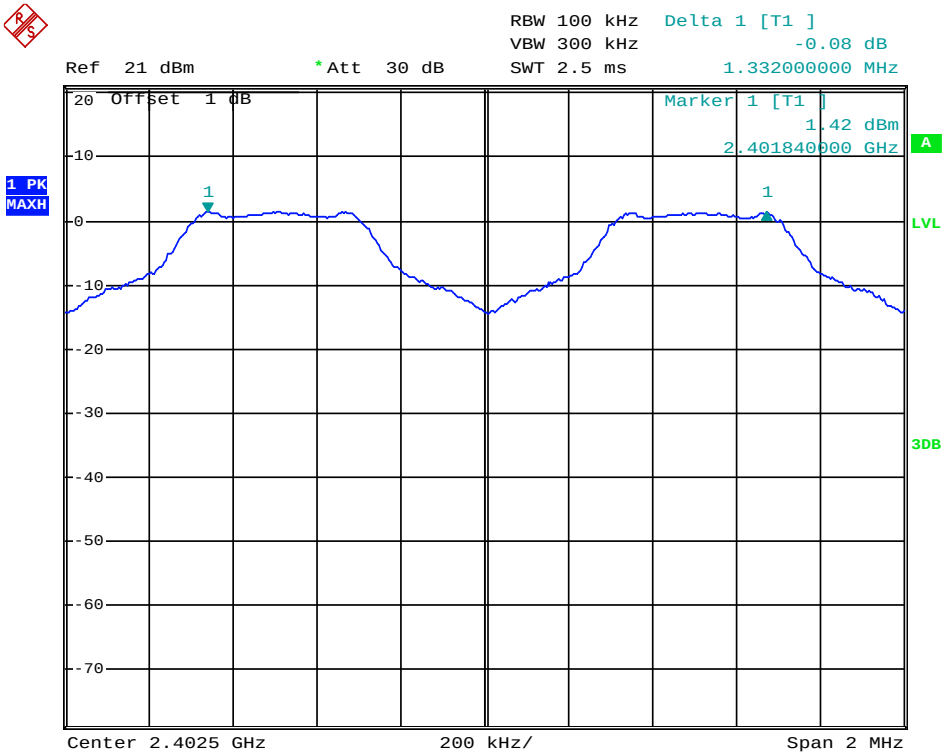
TEST RESULTS

4.6.1 GFSK Test Mode

A. Test Verdict

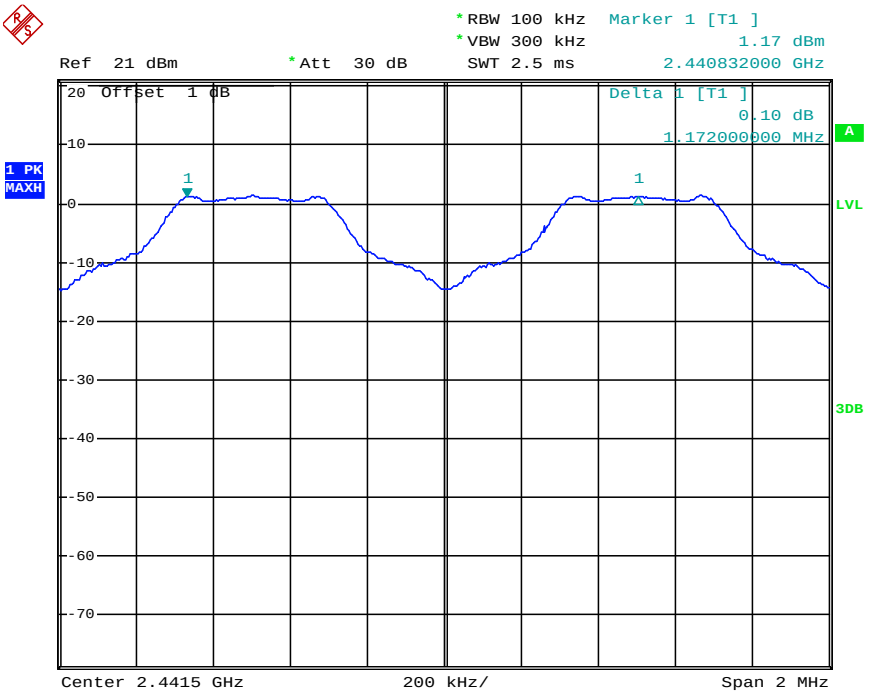
Channel	Frequency (MHz)	Channel Separation (MHz)	Refer to Plot	Limits (MHz)	Verdict
00	2402	1.332	Plot 4.6.1 A	25KHz or 2/3*20dB bandwidth	PASS
01	2403				
38	2440	1.172	Plot 4.6.1 B	25KHz or 2/3*20dB bandwidth	PASS
39	2441				
77	2479	1.324	Plot 4.6.1 C	25KHz or 2/3*20dB bandwidth	PASS
78	2480				

B. Test Plots



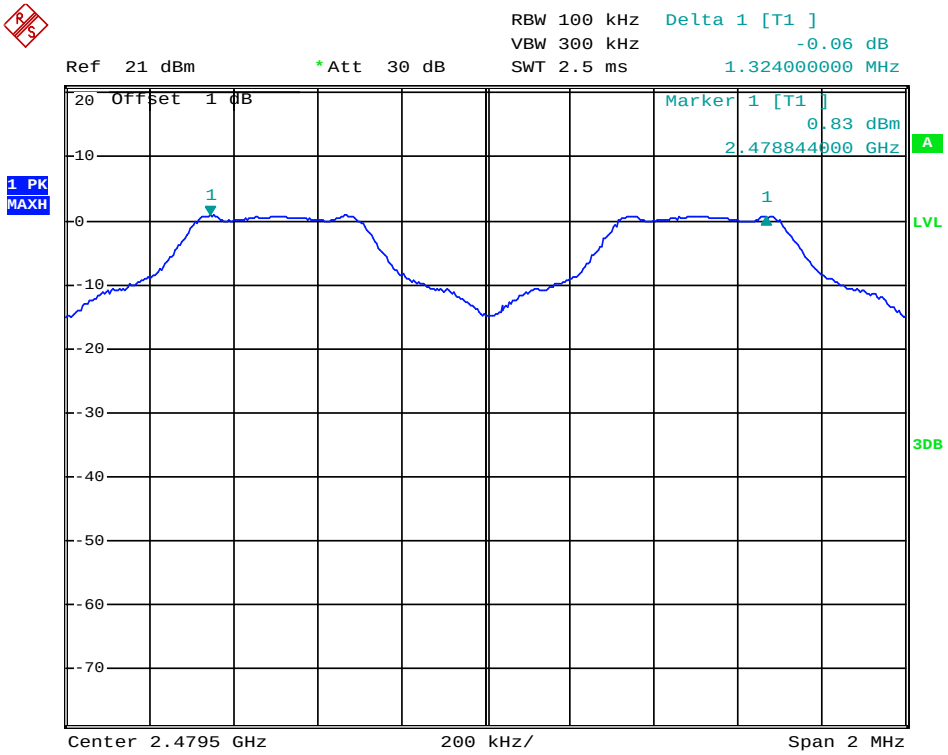
Date: 26.MAR.2013 15:31:53

(Plot 4.6.1 A: Channel 00: 2402MHz @ GFSK)



Date: 26.MAR.2013 15:54:35

(Plot 4.6.1 B: Channel 39: 2441MHz @ GFSK)

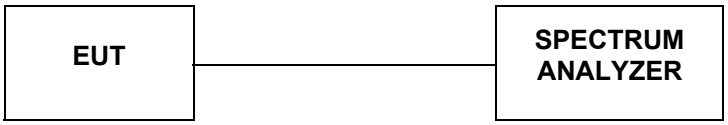


Date: 26.MAR.2013 15:46:47

(Plot 4.6.1 C: Channel 78: 2480MHz @ GFSK)

4.7. Number of hopping frequency

TEST CONFIGURATION



TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer through an attenuator.Set spectrum analyzer start 2400MHz to 2483.5MHz with RBW=30 KHz and VBW=100KHz.

LIMIT

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

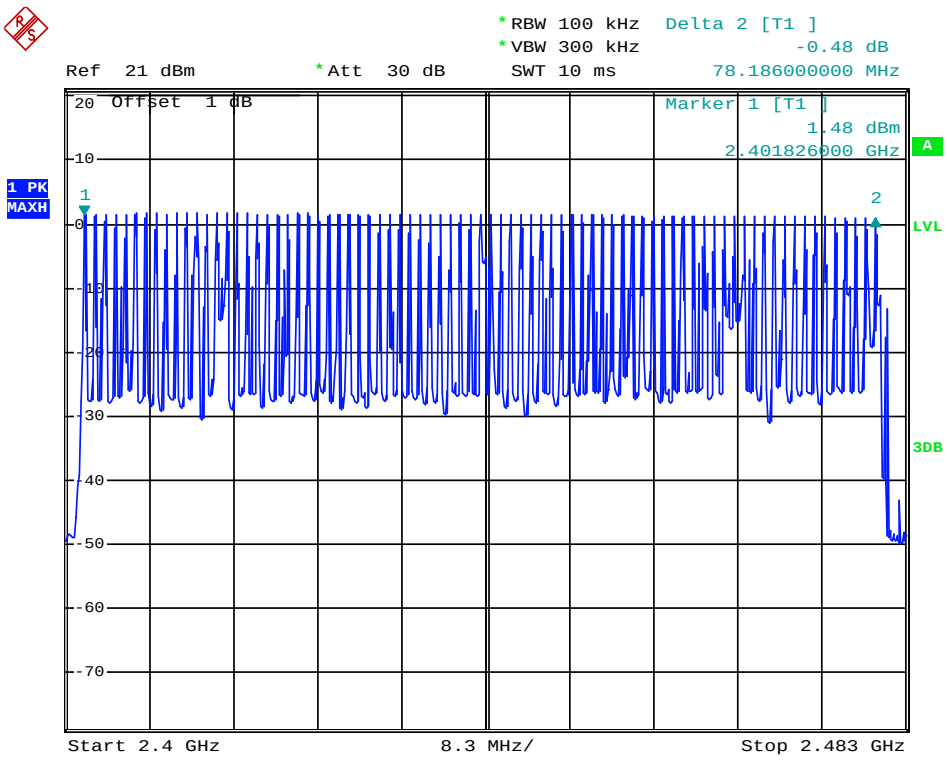
TEST RESULTS

GFSK Test Mode

A. Test Verdict

Hopping Channel Frequency Range (MHz)	Number of Hopping Channel	Refer to Plot	Limit	Verdict
2400-2483.5	79	Plot 4.7.1 A	≥15	PASS

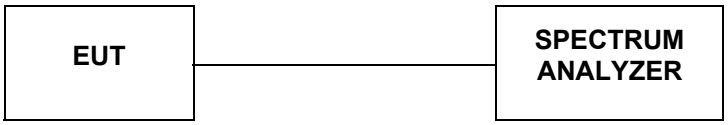
B. Test Plots



(Plot 4.7.1 A: @ GFSK)

4.8. Time Of Occupancy(Dwell Time)

TEST CONFIGURATION



TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer through an attenuator. Set center frequency of spectrum analyzer=operating frequency with RBW=1MHz and VBW=3MHz,Span=0Hz.

LIMIT

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

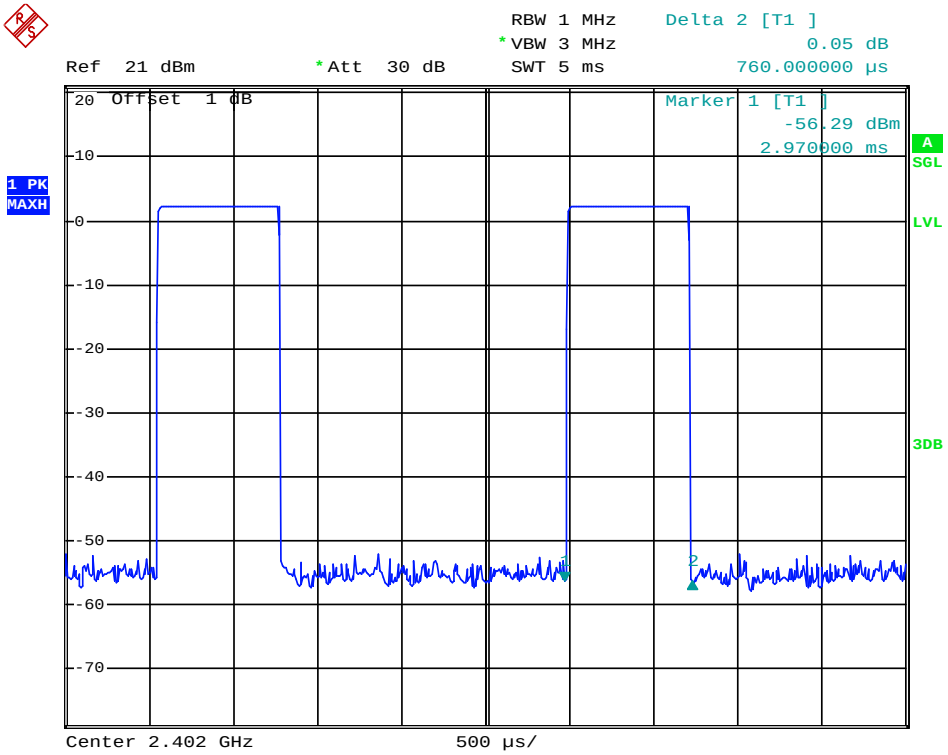
TEST RESULTS

4.8.1 GFSK Test Mode

A. Test Verdict

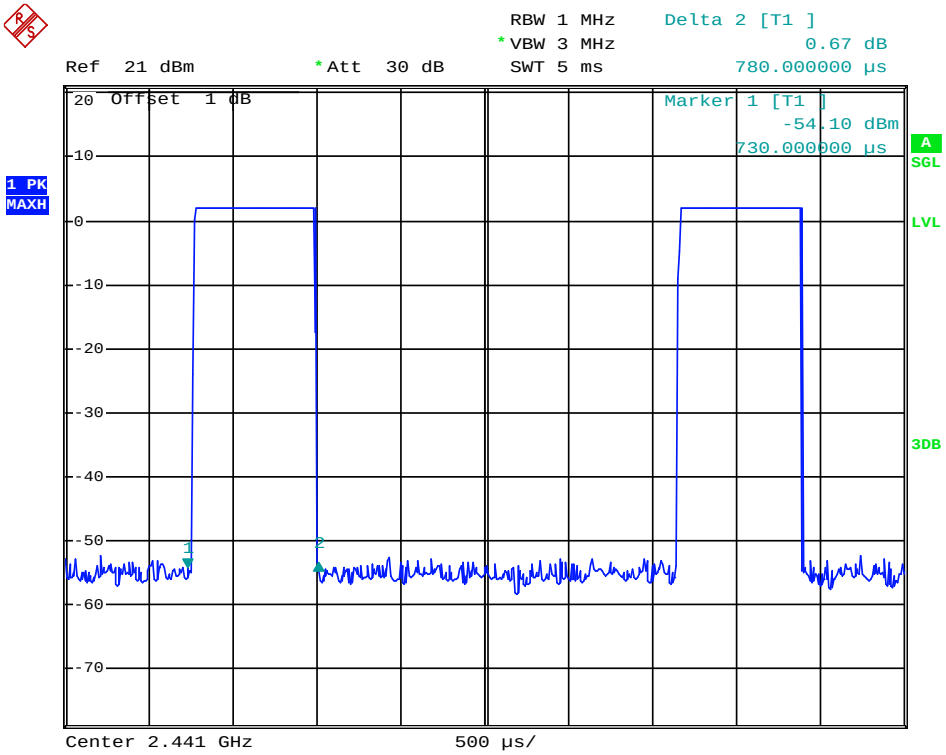
Mode	Frequency (MHz)	Pulse Width (ms)	Dwell Time (S)	Limit (S)	Refer to Plot	Verdict
DH 1	2402	0.780	0.2496	0.4	Plot 4.8.1 A1	PASS
	2441	0.780	0.2496	0.4	Plot 4.8.1 A2	PASS
	2480	0.780	0.2496	0.4	Plot 4.8.1 A3	PASS
	Note: Dwell time=Pulse time (ms) × (1600 ÷ 2 ÷ 79) ×31.6 Second					

B. Test Plots



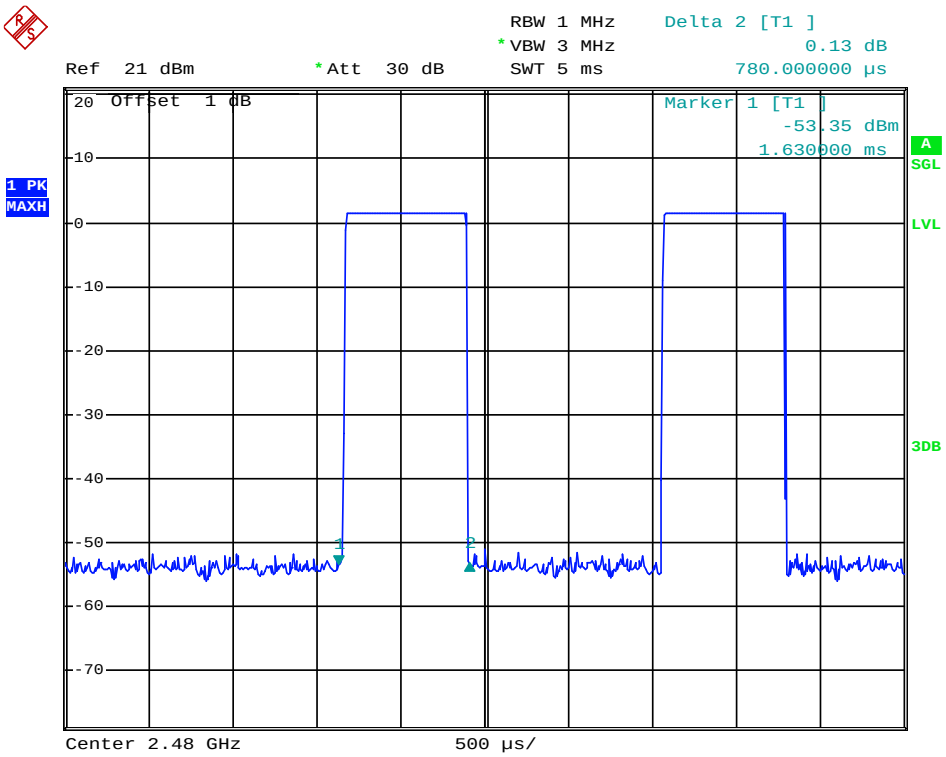
Date: 26.MAR.2013 16:12:21

(Plot 4.8.1.A1: Channel 00: 2402MHz @ GFSK @ DH1)



Date: 26.MAR.2013 16:21:46

(Plot 4.8.1.A2: Channel 39: 2441MHz @ GFSK @ DH1)

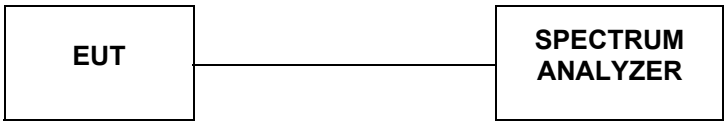


Date: 26.MAR.2013 16:23:26

(Plot 4.8.1.A3: Channel 78: 2480MHz @ GFSK @ DH1)

4.9. Spurious RF Conducted Emission

TEST CONFIGURATION



TEST PROCEDURE

The Spurious RF conducted emissions compliance of RF radiated emission should be measured by following the guidance in ANSI C63.10-2009 with respect to maximizing the emission by rotating the EUT, measuring the emission while the EUT is situated in three orthogonal planes (if appropriate), adjusting the measurement antenna height and polarization etc. Set RBW=100kHz and VBM= 300KHz to measure the peak field strength , and measurement frequeny range from 30MHz to 26.5GHz.

LIMIT

1. Below -20dB of the highest emission level in operating band.
2. Fall in the restricted bands listed in section 15.205. The maximum permitted average field strength is listed in section 15.209.

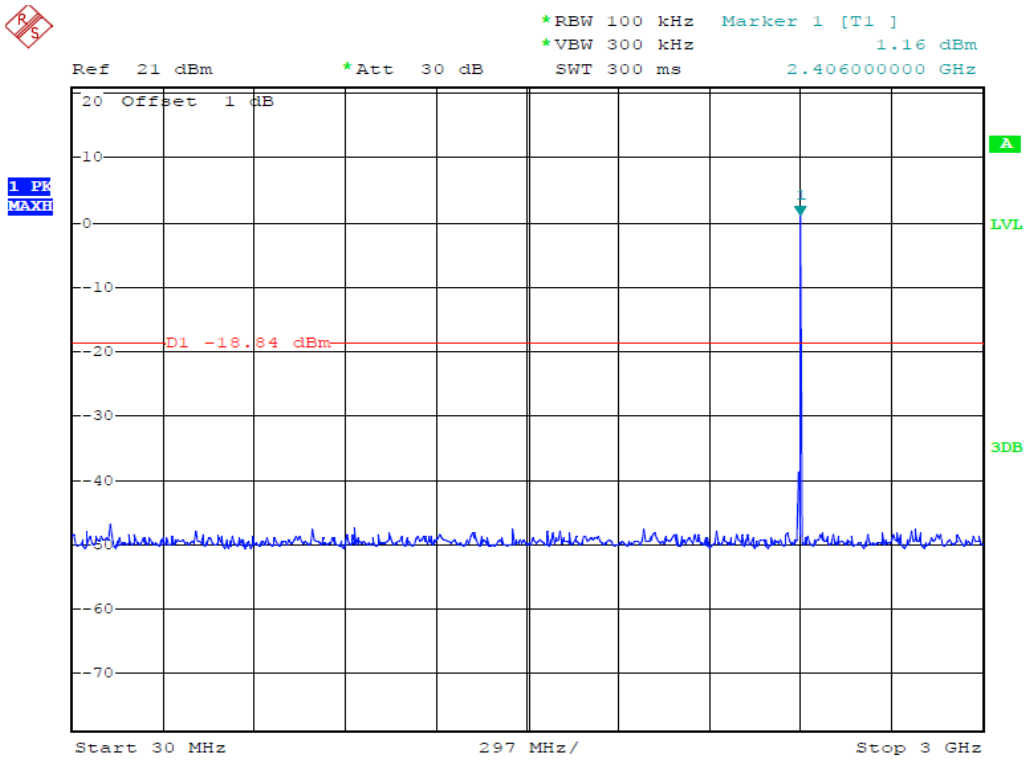
TEST RESULTS

4.9.1 GFSK Test Mode

A. Test Verdict

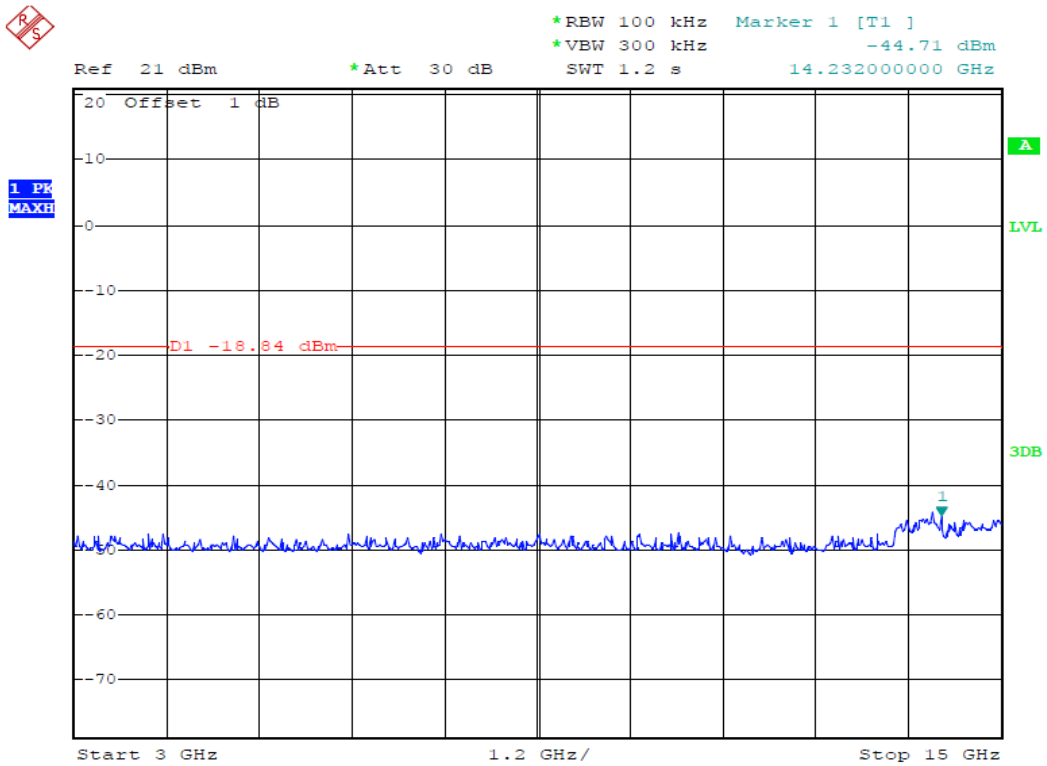
Channel	Frequency (MHz)	Frequency Range	Limit (dBc)	Refer to Plot	Verdict
00	2402	30MHz-3GHz	-20	Plot 4.9.1 A1	PASS
		3GHz-15GHz	-20	Plot 4.9.1 A2	PASS
		15GHz-25GHz	-20	Plot 4.9.1 A3	PASS
39	2441	30MHz-3GHz	-20	Plot 4.9.1 B1	PASS
		3GHz-15GHz	-20	Plot 4.9.1 B2	PASS
		15GHz-25GHz	-20	Plot 4.9.1 B3	PASS
78	2480	30MHz-3GHz	-20	Plot 4.9.1 C1	PASS
		3GHz-15GHz	-20	Plot 4.9.1 C2	PASS
		15GHz-25GHz	-20	Plot 4.9.1 C3	PASS

B. Test Plots



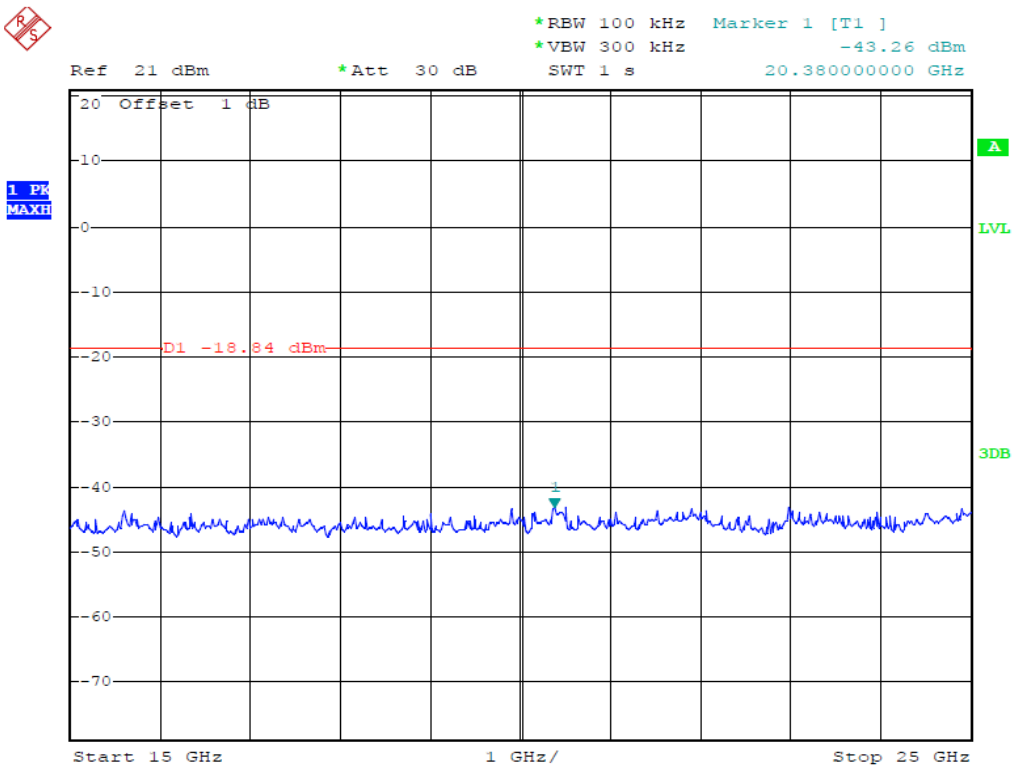
Date: 26.MAR.2013 20:42:01

(Plot 4.9.1.A1: Channel 00: 2402MHz @ GFSK)



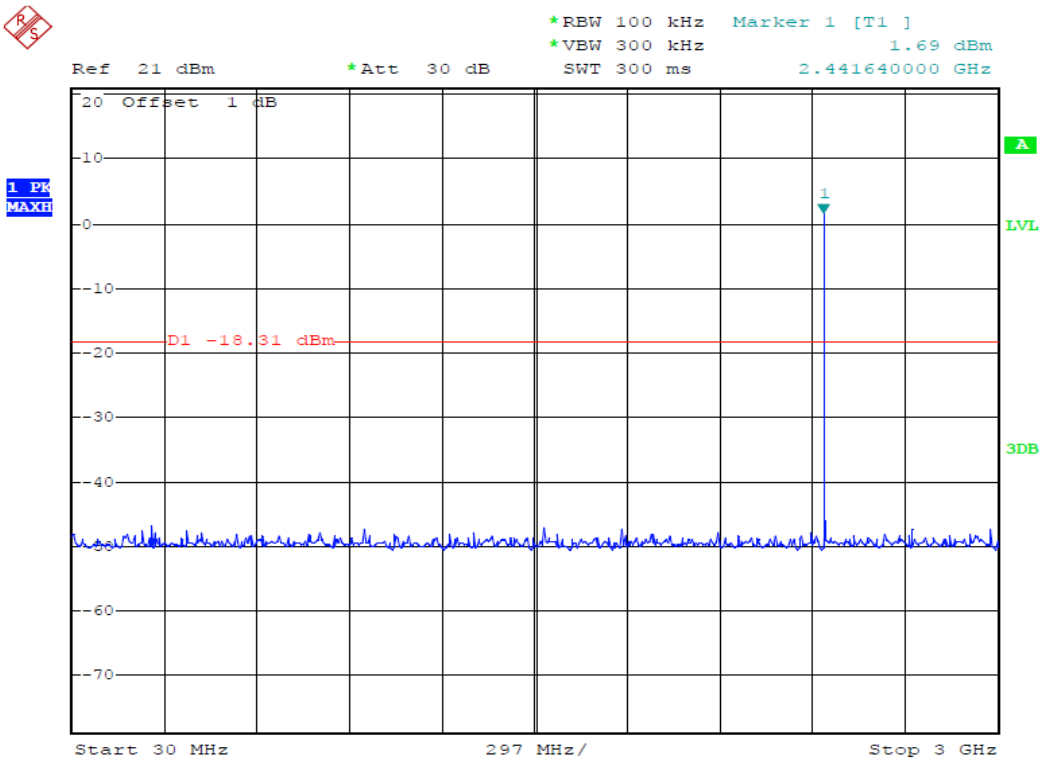
Date: 26.MAR.2013 20:42:18

(Plot 4.9.1.A2: Channel 00: 2402MHz @ GFSK)



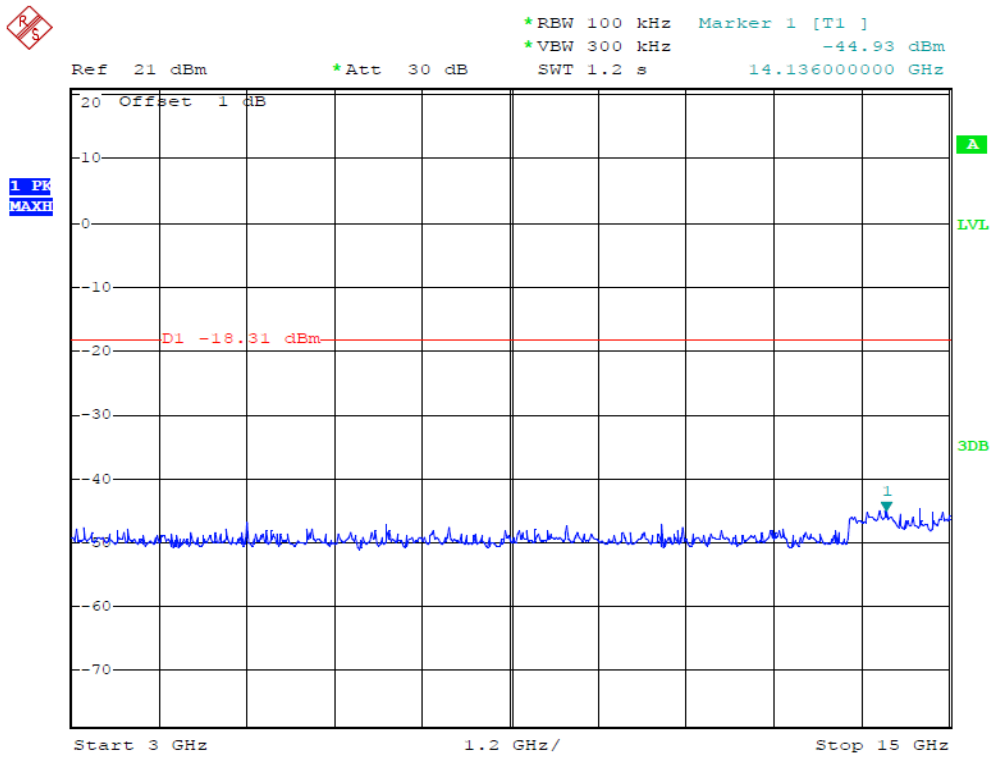
Date: 26.MAR.2013 20:42:33

(Plot 4.9.1.A3: Channel 00: 2402MHz @ GFSK)

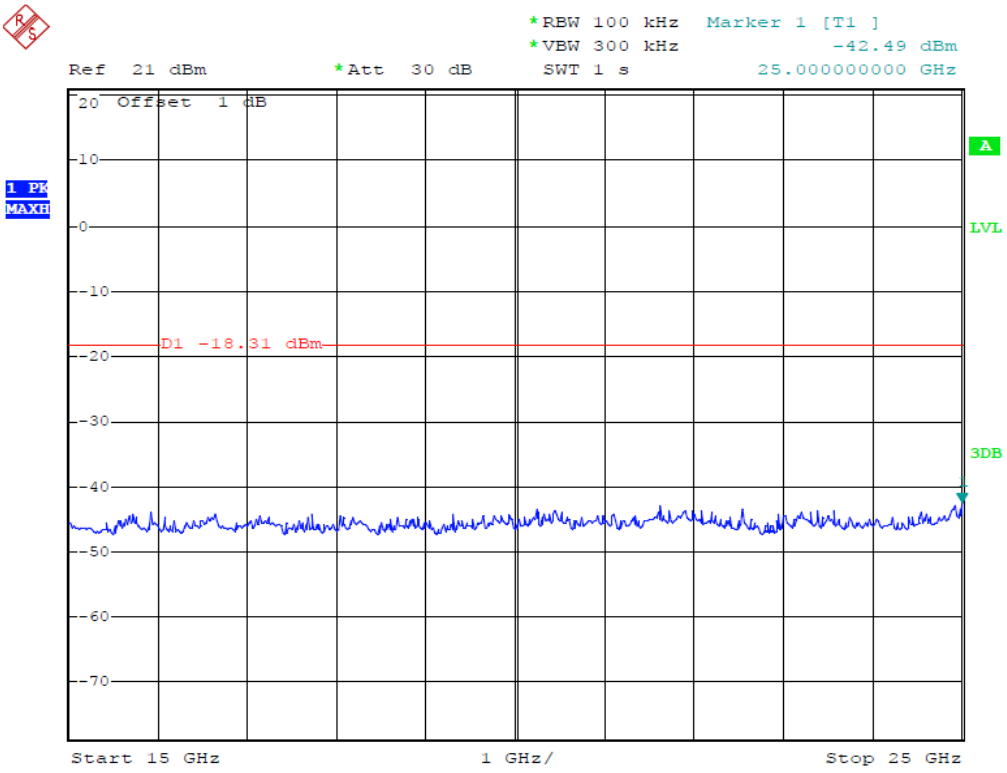


Date: 26.MAR.2013 20:43:06

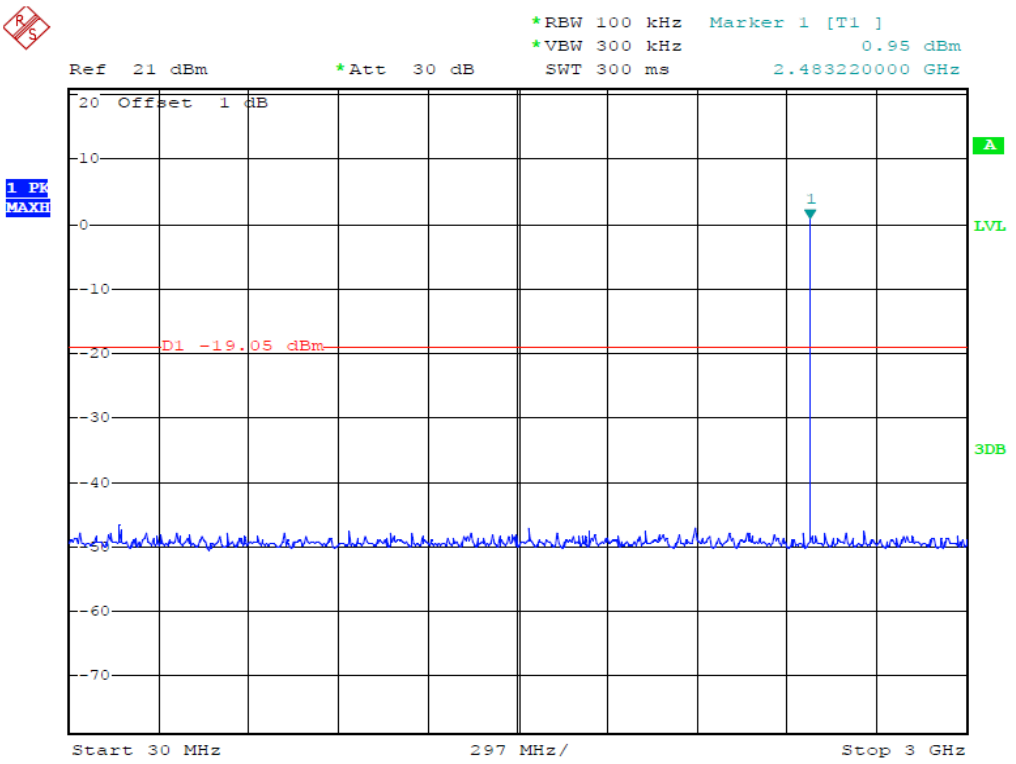
(Plot 4.9.1.B1: Channel 39: 2441MHz @ GFSK)



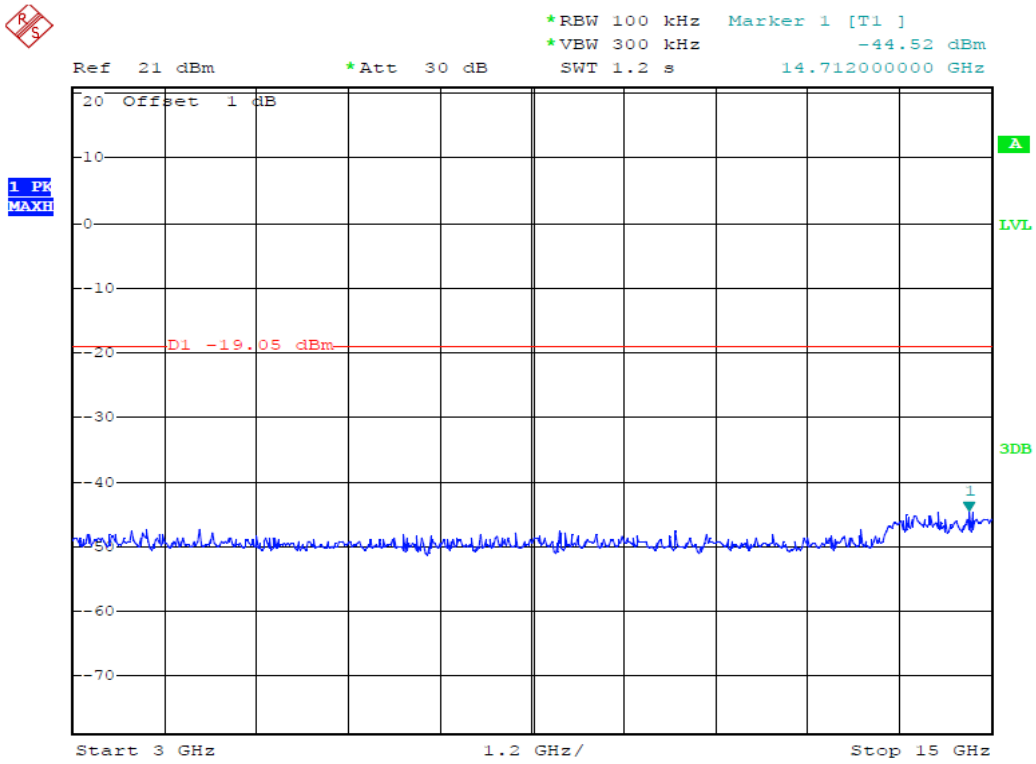
(Plot 4.9.1.B2: Channel 39: 2441MHz @ GFSK)



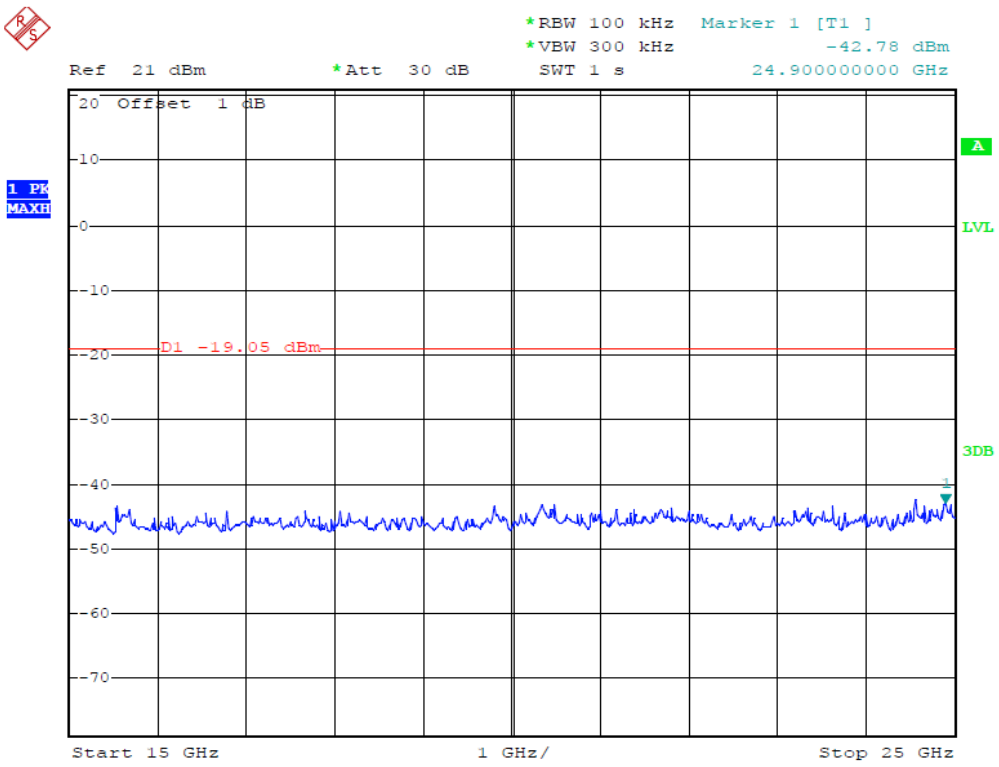
(Plot 4.9.1.B3: Channel 39: 2441MHz @ GFSK)



(Plot 4.9.1.C1: Channel 78: 2480MHz @ GFSK)



(Plot 4.9.1.C2: Channel 78: 2480MHz @ GFSK)



(Plot 4.9.1.C3: Channel 78: 2480MHz @ GFSK)

4.10. Pseudorandom Frequency Hopping Sequence

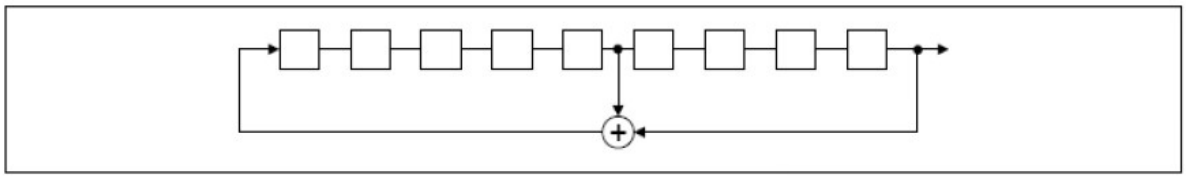
TEST APPLICABLE

For 47 CFR Part 15C section 15.247 (a)(1) requirement:
Frequency hopping systems shall have hopping channel carrier fre-quencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hop-ping channel, whichever is greater. Al-ternatively, frequency hopping systems operating in the 2400–2483.5 MHz band may have hopping channel carrier fre-quencies 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. The system shall hop to chan-nel frequencies that are selected at the system hopping rate from a pseudo ran-domly ordered list of hopping fre-quencies. Each frequency must be used equally on the average by each trans-mitter. The system receivers shall have input bandwidths that match the hop-ping channel bandwidths of their cor-responding transmitters and shall shift frequencies in synchronization with the transmitted signals.

EUT Pseudorandom Frequency Hopping Sequence Requirement

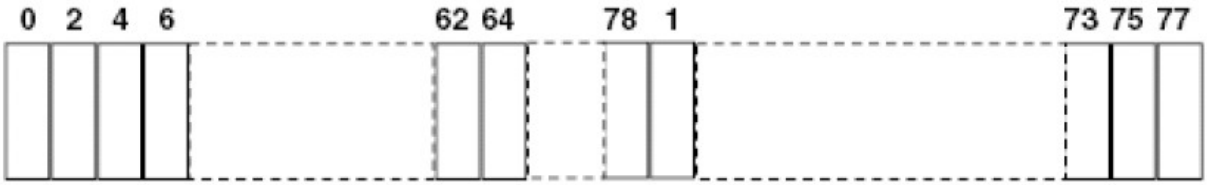
The pseudorandom frequency hopping sequence may be generated in a nice-stage shift register whose 5th and 9th stage outputs are added in a modulo-two addition stage.And the result is fed back to the input of the frist stage.The sequence begins with the frist one of 9 consecutive ones,for example:the shift register is initialized with nine ones.

- Number of shift register stages:9
- Length of pseudo-random sequence:29-1=511 bits
- Longest sequence of zeros:8(non-inverted signal)



Linear Feedback Shift Register for Generation of the PRBS sequence

An explame of pseudorandom frequency hopping sequence as follows:



Each frequency used equally one the average by each transmitter.
The system receiver have input bandwidths that match the hopping channel bandwidths of their corresponding transmitter and shift frequencies in synchronization with the transmitted signals.

4.11. Antenna Requirement

Standard Applicable

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.

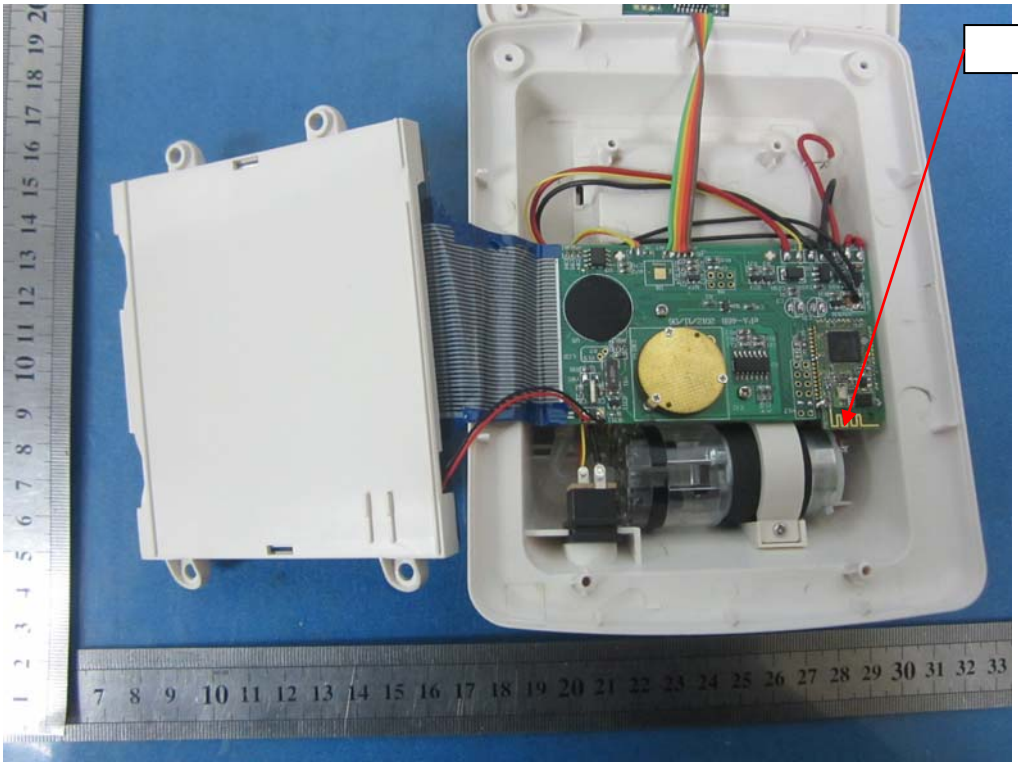
And according to FCC 47 CFR Section 15.247 (c), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

Refer to statement below for compliance.

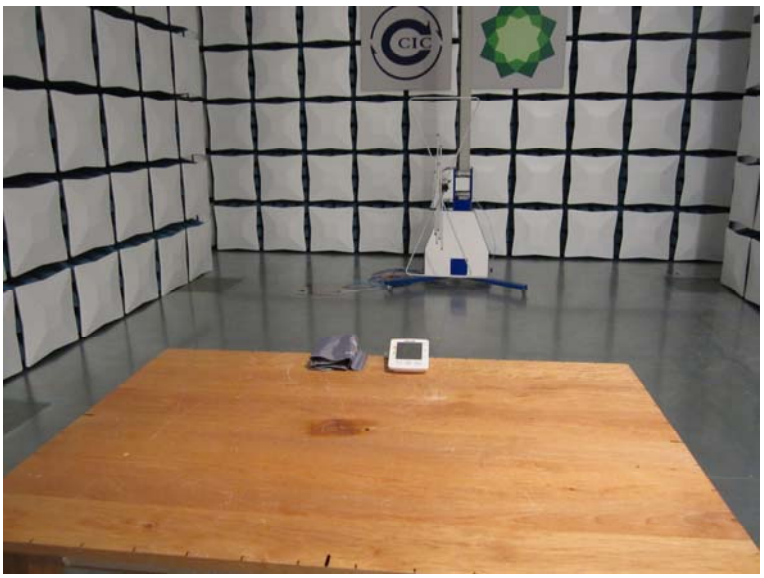
The manufacturer may design the unit so that the user can replace a broken antenna, but the use of a standard antenna jack or electrical connector is prohibited. Further, this requirement does not apply to intentional radiators that must be professionally installed.

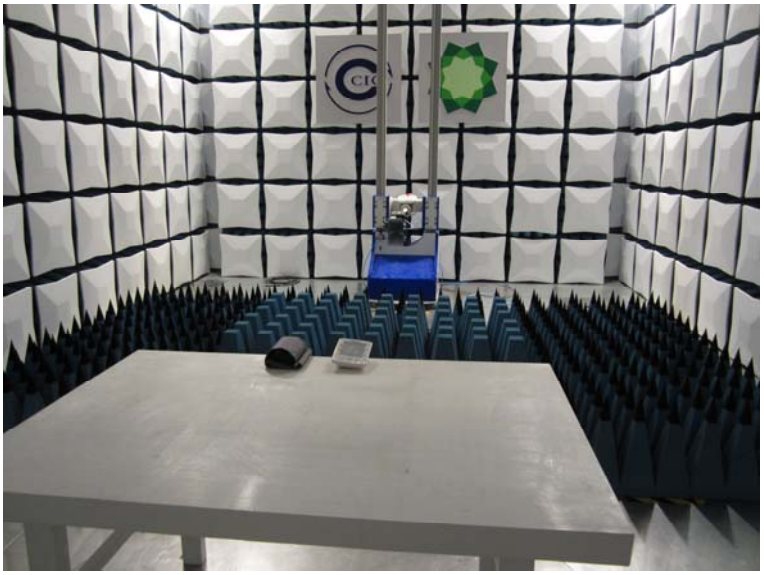
Antenna Connected Construction

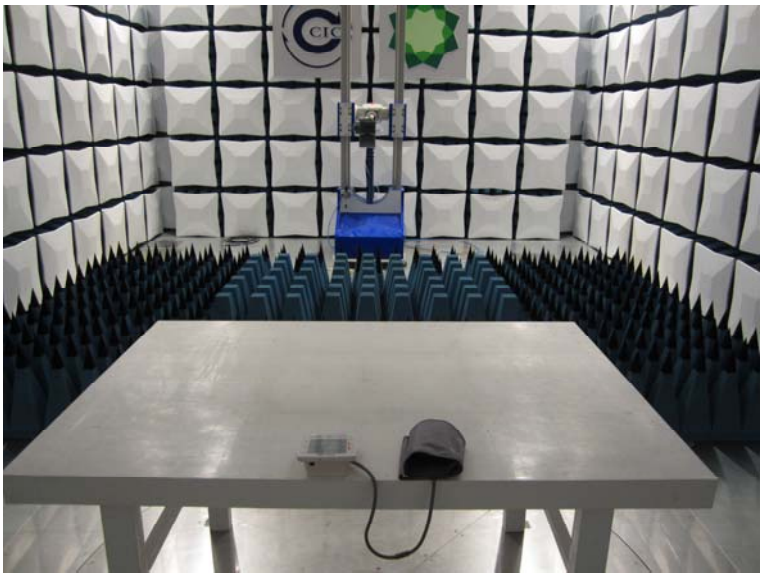
The antenna used in this product is a PCB Antenna .The maximum Gain of the antenna only 0dBi. For more detail, please see the photos as following:



5. Test Setup Photos of the EUT

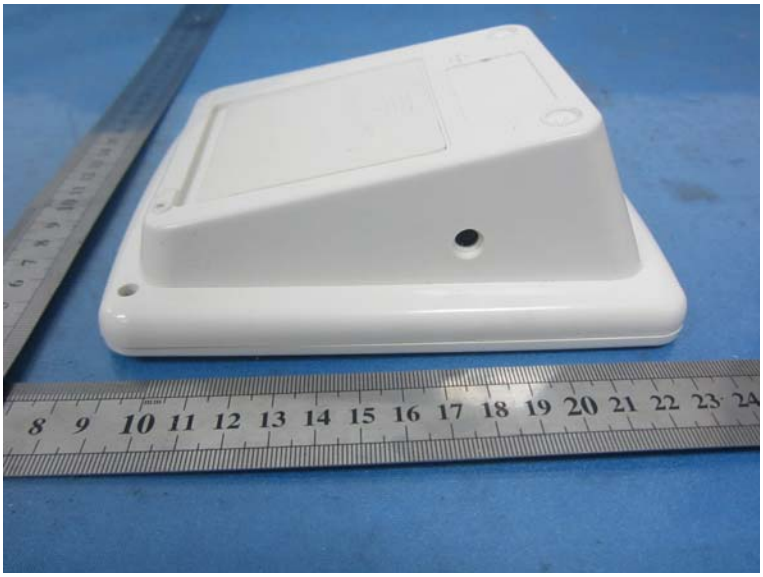




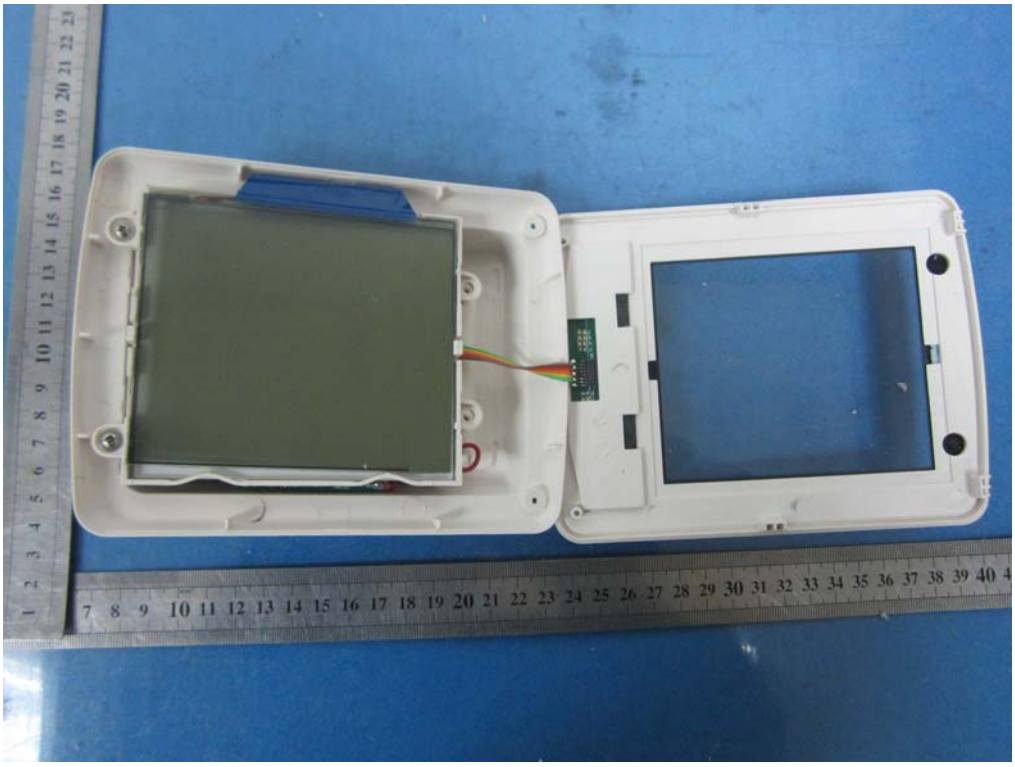


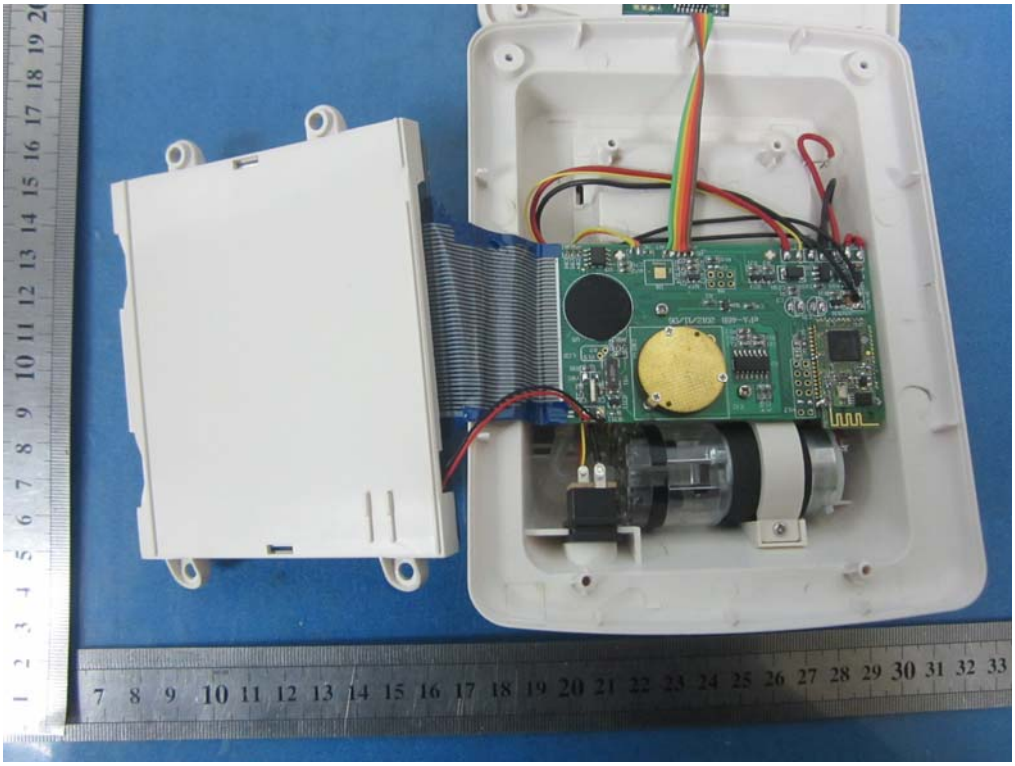
6. External and Internal Photos of the EUT

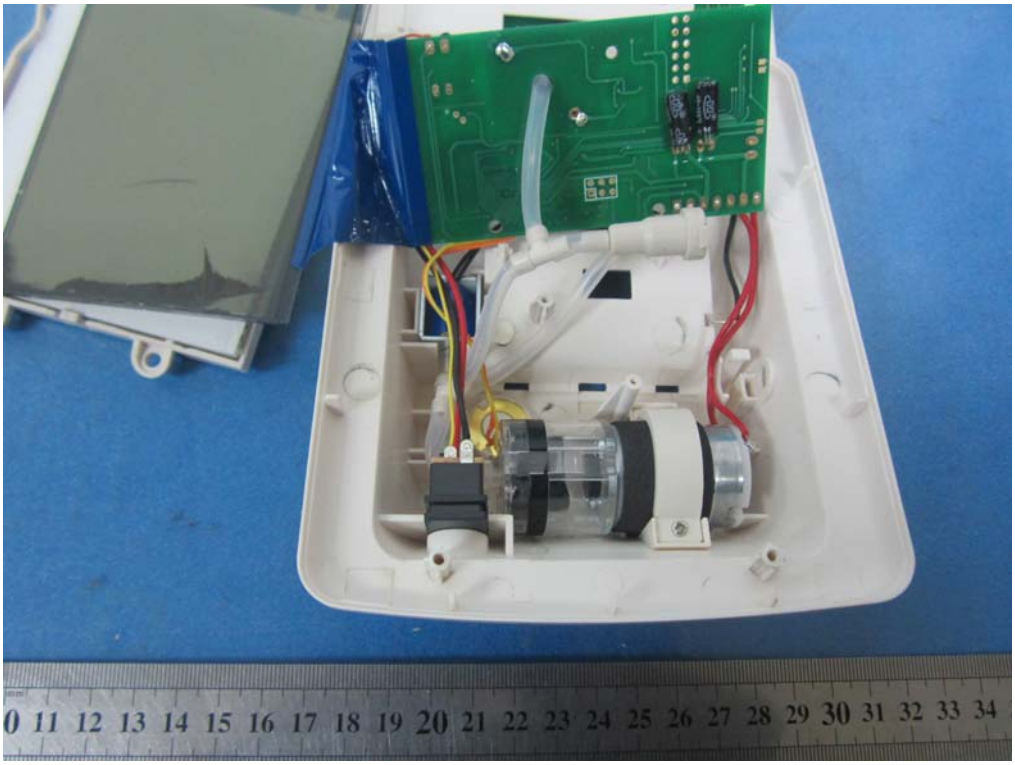
External Photos

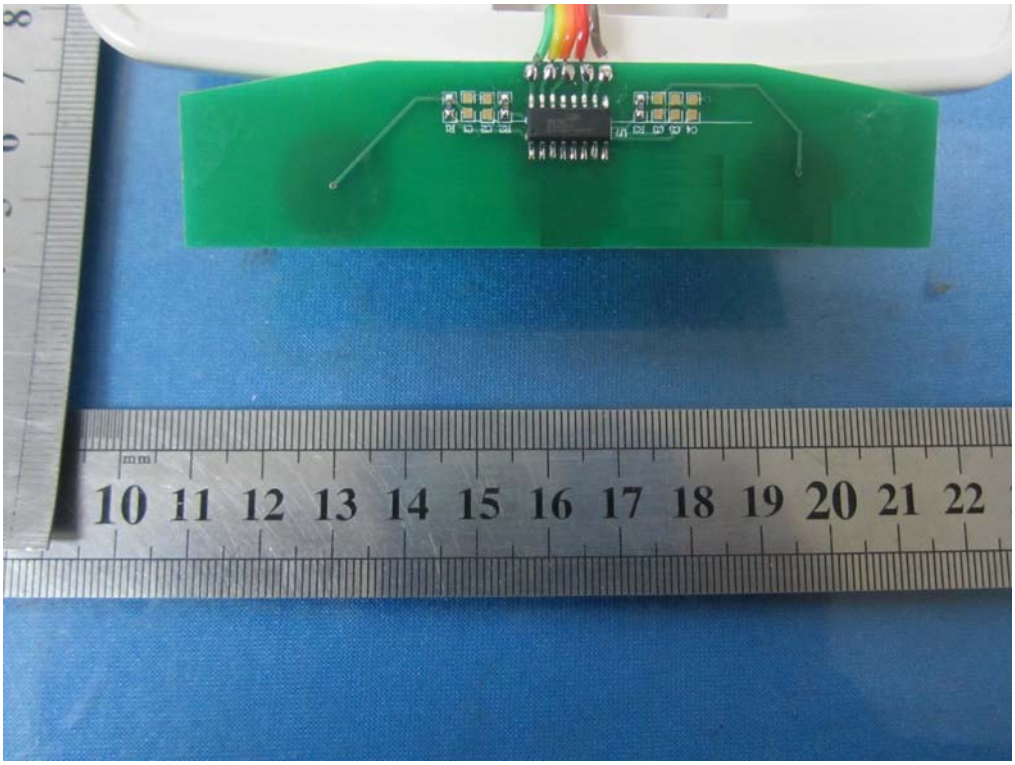


Internal Photos






0 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34


10 11 12 13 14 15 16 17 18 19 20 21 22

.....End of Report.....