FCC PART 15 SUBPART C TEST REPORT FCC PART 15.247 & IC TEST REPORT RSS-210

Report Reference No.....:	**TRE1211005501 R/C:55325**
FCC ID .....:	**NMTBP5000BT**
IC .....:	**3277A-BP5000BT**
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.....:	Dec 19, 2012
Testing Laboratory Name .....:	**Shenzhen Huatongwei International Inspection Co., Ltd**
Address .....:	Keji Nan No.12 Road, Hi-tech Park, Shenzhen, China
Applicant's name.....:	**IDT TECHNOLOGY LIMITED**
Address .....:	9/F, Phase I, Kaiser Estate, 41 Man Yue Street, Hunghom, Kowloon, Hong Kong.
Test specification:	
Standard .....:	**FCC Part 15.247: Operation within the bands 902-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz Direct Sequence System** **IC RSS-210** **IC RSS-Gen issue 3**
TRF Originator.....:	Shenzhen Huatongwei International Inspection CO., Ltd
Master TRF.....:	Dated 2006-06

Test item description .....:	Bosch Bluetooth blood pressure monitor
Trade Mark .....:	/
Model/Type reference.....:	BP5000 BT
Modulation .....:	GFSK
Listed Models .....:	/
Result.....:	**Positive**

T E S T R E P O R T

Test Report No. :	TRE1211005501	Dec 19, 2012 Date of issue

Equipment under Test	:	Bosch Bluetooth blood pressure monitor
Model /Type	:	BP5000 BT
Listed Models	:	/
Applicant	:	**IDT TECHNOLOGY LIMITED**
Address	:	9/F, Phase I, Kaiser Estate, 41 Man Yue Street, Hunghom, Kowloon, Hong Kong.
Manufacturer	:	**IDT TECHNOLOGY LIMITED**
Address	:	Chentian Industial Estate, Xixiang, Bao An,Shenzhen, PRC China

Test Result according to the standards on page 7:	**Positive**

The test report merely corresponds to the test sample.
It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

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
RSS-210 Issue 8 December 2010 : Licence-exempt Radio Apparatus (All Frequency Bands): Category I Equipment
RSS-Gen Issue 3 December 2010 :General Requirements and Information for the Certification of Radio Apparatus

2 . SUMMARY

2.1. General Remarks

Date of receipt of test sample	:	Nov 25,2012
Testing commenced on	:	Nov 25,2012
Testing concluded on	:	Dec 19, 2012

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 6.0V from battery

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

2.4GHz (Bosch Bluetooth blood pressure monitor (BP5000 BT)),

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

Serial number: Prototype

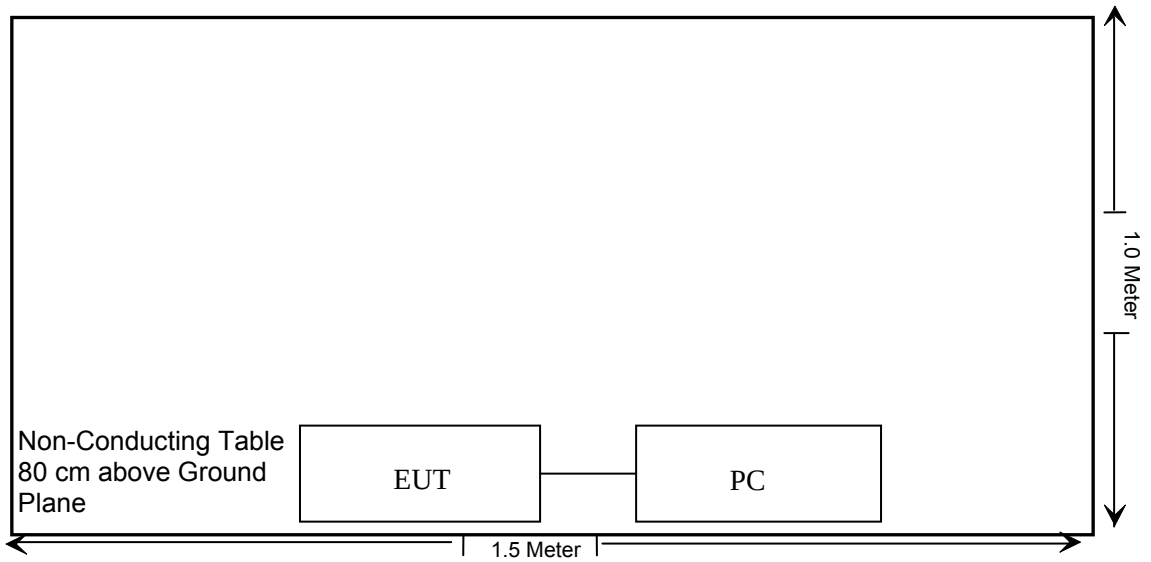
2.4. EUT operation mode

The EUT has been tested under typical operating condition. There is BDR (Basic Data Rate) mode.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 .

Frequency Range:	2400-2483.5MHz
Channel number:	79 channels
Modulation type:	Frequency Hopping Spread Spectrum
Antenna:	SMD Antenna

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: NMTBP5000BT** filing to comply with Section 15.247 of the FCC Part 15, Subpart C Rules and **IC: 3277A-BP5000BT** filing to comply with RSS-210.

2.7. Modifications

No modifications were implemented to meet testing criteria.

2.8. NOTE

1. The functions of the EUT are listed as below:

	Test Standards	Reference Report
Radio	FCC Part 15 Subpart C (Section15.247)& RSS-210	TRE1211005501
MPE	FCC OET 65 C & RSS-102	TRE1211005502

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. 30, 2009. 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.

NEMKO-Aut. No.: ELA125

Shenzhen Huatongwei International Inspection Co., Ltd has been assessed the quality assurance system, the testing facilities, qualifications and testing practices of the relevant parts of the organization. The quality assurance system of the Laboratory has been validated against ISO/IEC 17025 or equivalent. The laboratory also fulfils the conditions described in Nemko Document NLA-10, the authorization is valid through July 07, 2013

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 & RSS-210 & RSS-Gen			
FCC Part 15.207	RSS-GEN	AC Power Conducted Emission	PASS
FCC Part 15.247(a)(2)	RSS-210 8.1	20dB Bandwidth	PASS
FCC Part 15.247(d)	RSS-210 8.1	Spurious RF Conducted Emission	PASS
FCC Part 15.247(b)	RSS-210 8.4	Maximum Peak Output Power	PASS
FCC Part 15.247(a)(1)(iii)	RSS-210 8.1	Number of hopping frequency& Time of Occupancy	PASS
FCC Part 15.247(a)(1)	RSS-210 8.1	Frequency Separation	PASS
FCC Part 15.109/ 15.205/ 15.209	RSS-GEN	Radiated Emissions	PASS
FCC Part 15.247(d)	RSS-210 8.5	Band Edge Compliance of RF Emission	PASS
FCC Part 15.203/15.247 (b)	RSS-GEN	Antenna Requirement	PASS
FCC Part1.1307 (b)	RSS-102	MPE Evaluation	PASS
N/A	RSS-Gen	Receiver Spurious Emissions	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	4.24 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 / 20dB Bandwidth / 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	EMI TEST RECEIVER	Rohde&Schwarz	ESI 26	100009	2012/10/27
2	Power Meter	Anritsu	ML2487A	6K00001568	2012/10/27
3	Power Meter Sensor	Anritsu	ML2491A	0630989	2012/10/27
4	Spectrum Analyzer	Rohde&Schwarz	FSP	1164.4391.40	2012/10/27

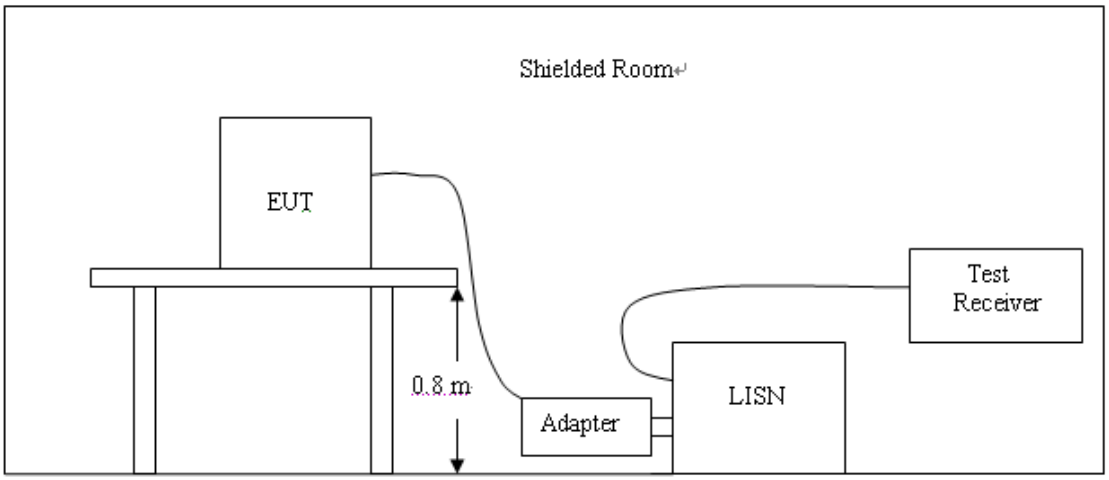
Radiated Emission					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1	ULTRA-BROADBAND ANTENNA	Rohde&Schwarz	HL562	100015	2012/10/27
2	EMI TEST RECEIVER	Rohde&Schwarz	ESI 26	100009	2012/10/27
3	RF TEST PANEL	Rohde&Schwarz	TS / RSP	335015/ 0017	2012/10/27
4	TURNTABLE	ETS	2088	2149	2012/10/27
5	ANTENNA MAST	ETS	2075	2346	2012/10/27
6	EMI TEST OFTWARE	Rohde&Schwarz	ESK1	N/A	2012/10/27
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	----	2012/10/27
15	ANTENNA MAST	MATURO	TAM-4.0-P	----	2012/10/27

The Calibration Interval was one year.

4. TEST CONDITIONS AND RESULTS

4.1. AC Power Conducted Emission(Not Applicable)

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 DC5V 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

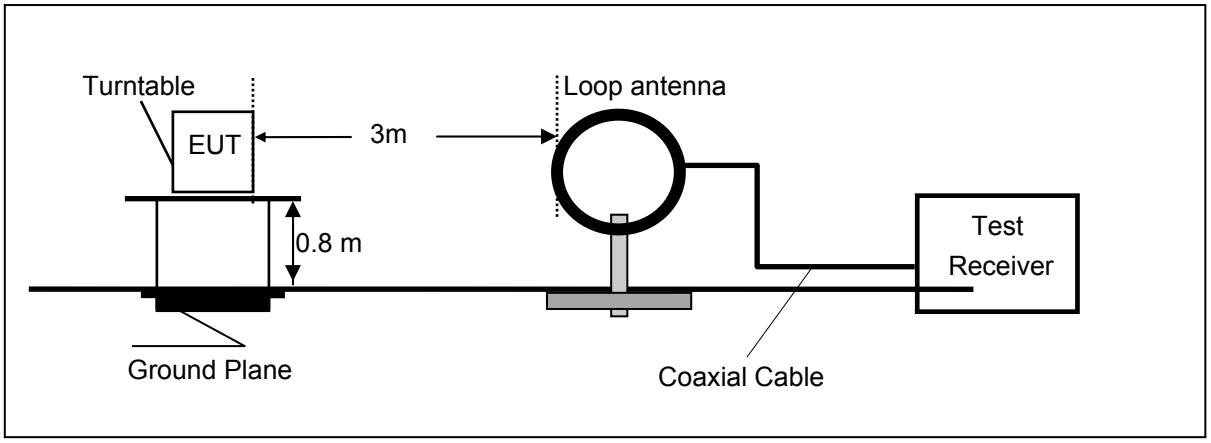
Not applicable to this device (The product was powered by battery).

4.2. Radiated Emission

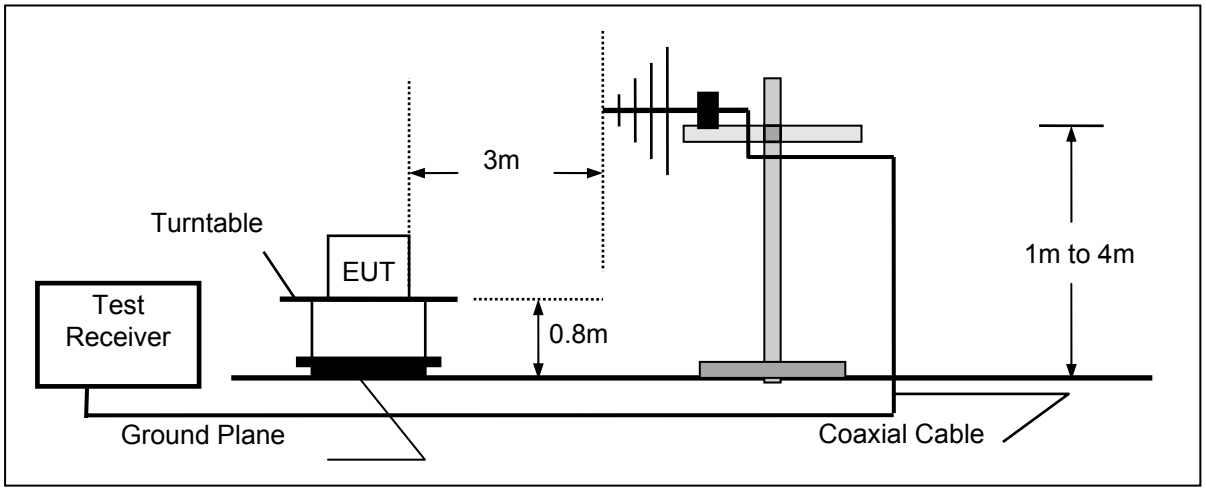
TEST CONFIGURATION

Radiated Emission Test Set-Up

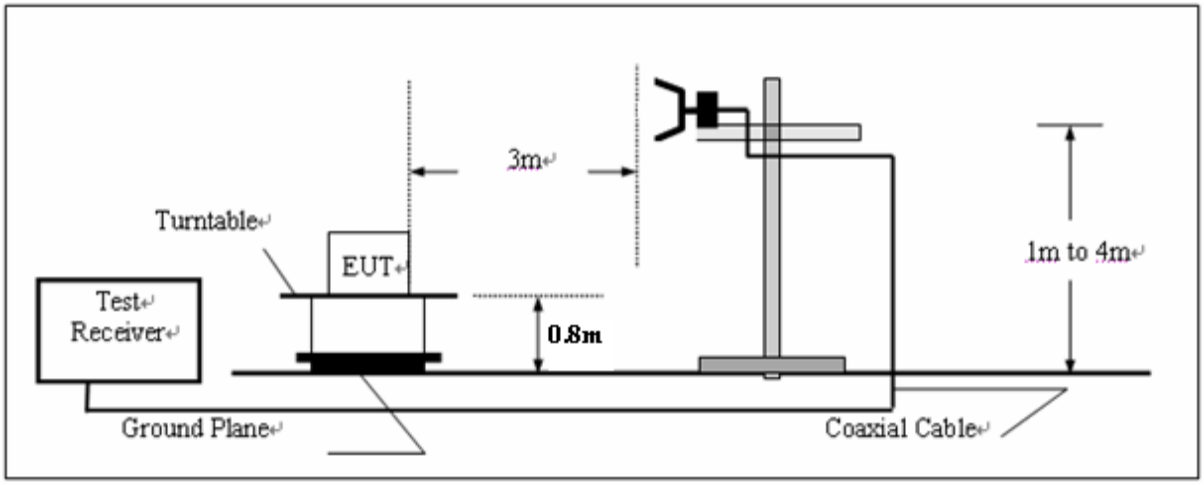
Frequency range 9KHz – 30MHz



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 fundamental frequency is 2400-2483.5MHz and the minimum crystal was 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.

Frequency (MHz)	Distance (Meters)	Radiated (dBμV/m)	Radiated (μV/m)
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 9KHz to 30MHz

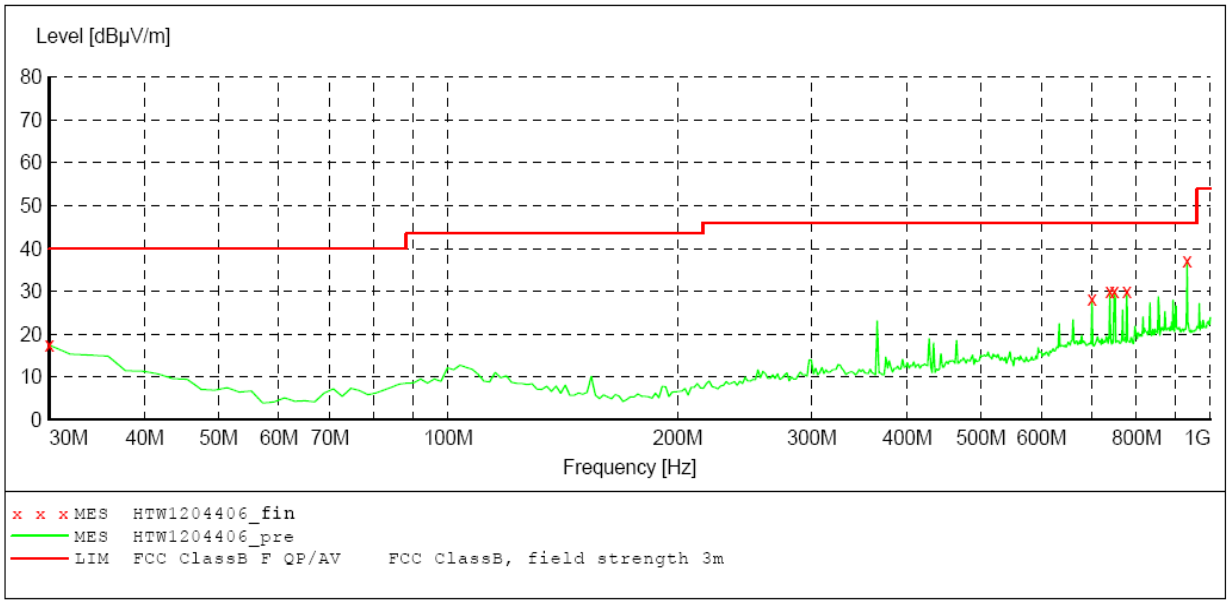
Frequency (MHz)	Corrected Reading (dBμV/m)@3m	FCC Limit (dBμV/m) @3m	Margin (dB)	Detector	Result
0.51	47.16	73.11	25.95	QP	Pass
1.32	43.61	65.87	22.26	QP	Pass
16.05	41.96	69.54	27.58	QP	Pass
21.36	45.78	69.54	23.76	QP	Pass

TEST RESULTS

For 30MHz to 1000MHz（BDR 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



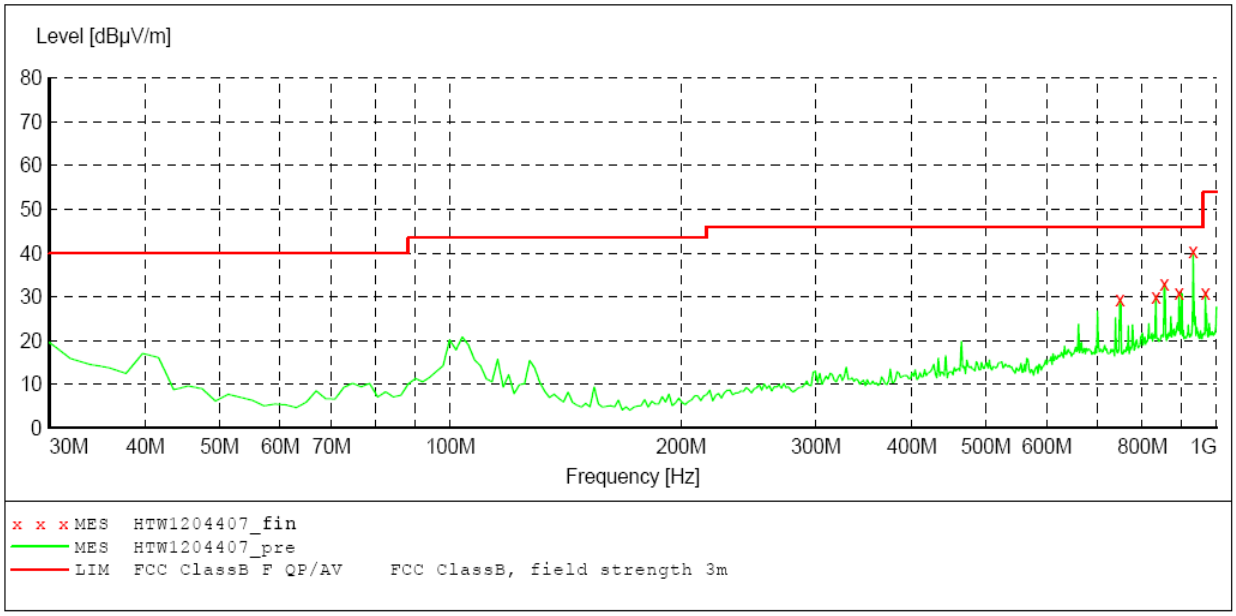
MEASUREMENT RESULT: "HTW1204406_fin"

12/4/2012 9:30AM

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
30.000000	17.50	-11.1	40.0	22.5	QP	300.0	38.00	HORIZONTAL
699.300000	28.20	-10.0	46.0	17.8	QP	100.0	231.00	HORIZONTAL
738.100000	30.20	-9.9	46.0	15.8	QP	100.0	198.00	HORIZONTAL
747.800000	30.10	-10.2	46.0	15.9	QP	100.0	204.00	HORIZONTAL
776.900000	30.20	-9.5	46.0	15.8	QP	100.0	178.00	HORIZONTAL
932.100000	37.10	-7.3	46.0	8.9	QP	100.0	242.00	HORIZONTAL

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: "HTW1204407_fin"

12/4/2012 9:34AM

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
747.800000	29.40	-10.2	46.0	16.6	QP	100.0	354.00	VERTICAL
833.160000	30.20	-7.7	46.0	15.8	QP	100.0	360.00	VERTICAL
854.500000	33.00	-7.5	46.0	13.0	QP	100.0	196.00	VERTICAL
893.300000	31.00	-6.9	46.0	15.0	QP	100.0	170.00	VERTICAL
932.100000	40.40	-7.3	46.0	5.6	QP	100.0	360.00	VERTICAL
967.020000	31.00	-7.0	46.0	15.0	QP	100.0	357.00	VERTICAL

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.

BDR (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)
11	*2402.00	115.36	PK			1.00	175	118.76	28.3	4.90	36.6	-3.40
1	*2402.00	108.02	AV			1.00	175	111.42	28.3	4.90	36.6	-3.40
2	4804.00	58.56	PK	74.00	15.44	1.00	256	55.36	32.7	7.00	36.5	3.20
2	4804.00	51.56	AV	54.00	2.44	1.00	256	48.36	32.7	7.00	36.5	3.20
3	7206.00	58.62	PK	74.00	15.38	1.00	136	49.22	35.8	8.90	35.3	9.40
3	7206.00	50.37	AV	54.00	3.63	1.00	136	40.97	35.8	8.90	35.3	9.40
4	10721.72	47.75	PK	74.00	26.25	1.00	215	31.15	38.0	11.30	32.7	16.6
4	10721.72	40.59	AV	54.00	13.41	1.00	215	23.99	38.0	11.30	32.7	16.6

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)
11	*2402.00	110.59	PK			1.00	124	113.99	28.3	4.90	36.6	-3.40
1	*2402.00	102.88	AV			1.00	124	106.28	28.3	4.90	36.6	-3.40
2	4804.00	58.93	PK	74.00	15.07	1.00	339	55.73	32.7	7.00	36.5	3.20
2	4804.00	50.18	AV	54.00	3.82	1.00	339	46.98	32.7	7.00	36.5	3.20
3	7206.00	55.82	PK	74.00	18.18	1.00	340	46.42	35.8	8.90	35.3	9.40
3	7206.00	48.54	AV	54.00	5.46	1.00	340	39.14	35.8	8.90	35.3	9.40
4	10721.72	49.63	PK	74.00	24.37	1.00	20	33.03	38.0	11.30	32.7	16.6
4	10721.72	42.37	AV	54.00	11.63	1.00	20	25.77	38.0	11.30	32.7	16.6

BDR (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	*2441.00	112.15	PK			1.00	153	115.35	28.3	5.10	36.6	-3.20
1	*2441.00	104.06	AV			1.00	153	107.26	28.3	5.10	36.6	-3.20
2	4882.00	59.47	PK	74.00	14.53	1.00	202	56.07	32.3	7.60	36.5	3.40
2	4882.00	52.19	AV	54.00	1.81	1.00	202	48.79	32.3	7.60	36.5	3.40
3	7323.00	53.06	PK	74.00	20.94	1.00	355	43.66	36.1	8.60	35.3	9.40
3	7323.00	46.02	AV	54.00	7.98	1.00	355	36.62	36.1	8.60	35.3	9.40
4	10721.72	50.70	PK	74.00	23.3	1.00	28	34.1	38.0	11.30	32.7	16.6
4	10721.72	43.28	AV	54.00	10.72	1.00	28	26.68	38.0	11.30	32.7	16.6

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	*2441.00	107.66	PK			1.00	121	110.86	28.3	5.10	36.6	-3.20
1	*2441.00	99.74	AV			1.00	121	102.94	28.3	5.10	36.6	-3.20
2	4882.00	57.89	PK	74.00	16.11	1.00	97	54.49	32.3	7.60	36.5	3.40
2	4882.00	50.16	AV	54.00	3.84	1.00	97	46.76	32.3	7.60	36.5	3.40
3	7323.00	53.63	PK	74.00	20.37	1.00	288	44.23	36.1	8.60	35.3	9.40
3	7323.00	47.38	AV	54.00	6.62	1.00	288	37.98	36.1	8.60	35.3	9.40
4	10721.72	50.63	PK	74.00	23.37	1.00	89	34.03	38.0	11.30	32.7	16.6
4	10721.72	44.20	AV	54.00	9.8	1.00	89	27.60	38.0	11.30	32.7	16.6

BDR (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	*2480.00	112.15	PK			1.00	156	115.45	28.2	5.10	36.6	-3.30
1	*2480.00	104.79	AV			1.00	156	108.09	28.2	5.10	36.6	-3.30
2	4960.00	59.68	PK	74.00	14.32	1.00	198	55.88	33.0	7.00	36.2	3.80
2	4960.00	52.19	AV	54.00	1.81	1.00	198	48.39	33.0	7.00	36.2	3.80
3	7340.00	53.66	PK	74.00	20.34	1.00	90	44.26	36.2	8.50	35.3	9.40
3	7340.00	47.95	AV	54.00	6.05	1.00	90	38.55	36.2	8.50	35.3	9.40
4	10721.72	47.86	PK	74.00	26.14	1.00	124	31.26	38.0	11.30	32.7	16.6
4	10721.72	41.19	AV	54.00	12.81	1.00	124	24.59	38.0	11.30	32.7	16.6

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	*2480.00	105.92	PK			1.00	125	109.22	28.2	5.10	36.6	-3.30
1	*2480.00	99.53	AV			1.00	125	102.83	28.2	5.10	36.6	-3.30
2	4960.00	56.53	PK	74.00	17.47	1.00	96	52.73	36.2	8.50	35.3	3.80
2	4960.00	50.92	AV	54.00	3.08	1.00	96	47.12	36.2	8.50	35.3	3.80
3	7340.00	54.28	PK	74.00	19.72	1.00	35	44.88	37.4	10.10	34.8	9.40
3	7340.00	48.67	AV	54.00	5.33	1.00	35	39.27	37.4	10.10	34.8	9.40
4	10721.72	50.84	PK	74.00	23.16	1.00	37	34.24	38.0	11.30	32.7	16.6
4	10721.72	43.24	AV	54.00	10.76	1.00	37	26.64	38.0	11.30	32.7	16.6

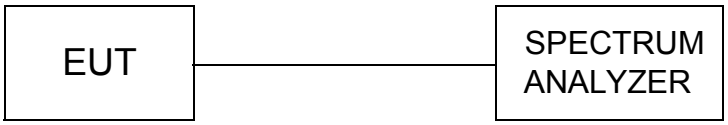
Suprious emission in restricted band（BDR）

Indicated		Detector	Table Angle Degree	Antenna		Correction Factor			FCC Part 15.247/15.209/15.205			
Frequency (MHz)	Receiver Reading (dBμV)			Height (m)	Polar (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp. Gain (dB)	Cord. Amp. (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Comment
2483.50	54.27	AV	15	1.2	V	28.2	5.10	36.6	50.97	54	3.03	spurious
2483.50	56.13	AV	0	1.5	H	28.2	5.10	36.6	52.83	54	1.17	spurious
2390.00	49.08	AV	360	1.5	V	28.3	4.90	36.6	45.68	54	8.32	spurious
2390.00	50.69	AV	120	1.2	H	28.3	4.90	36.6	47.29	54	6.71	spurious
2483.50	61.24	PK	15	1.2	V	28.2	5.10	36.6	57.94	74	16.06	spurious
2483.50	63.67	PK	0	1.5	H	28.2	5.10	36.6	60.37	74	13.63	spurious
2390.00	55.06	PK	120	1.2	V	28.3	4.90	36.6	51.66	74	22.34	spurious
2390.00	58.25	PK	360	15	H	28.3	4.90	36.6	54.85	74	19.15	spurious

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. " * " : Fundamental frequency
7. 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

For frequency hopping systems operating in the 2400–2483.5 MHz band employing at least 75 non-overlapping hopping channels was 1 watt (30dBm).

TEST RESULTS

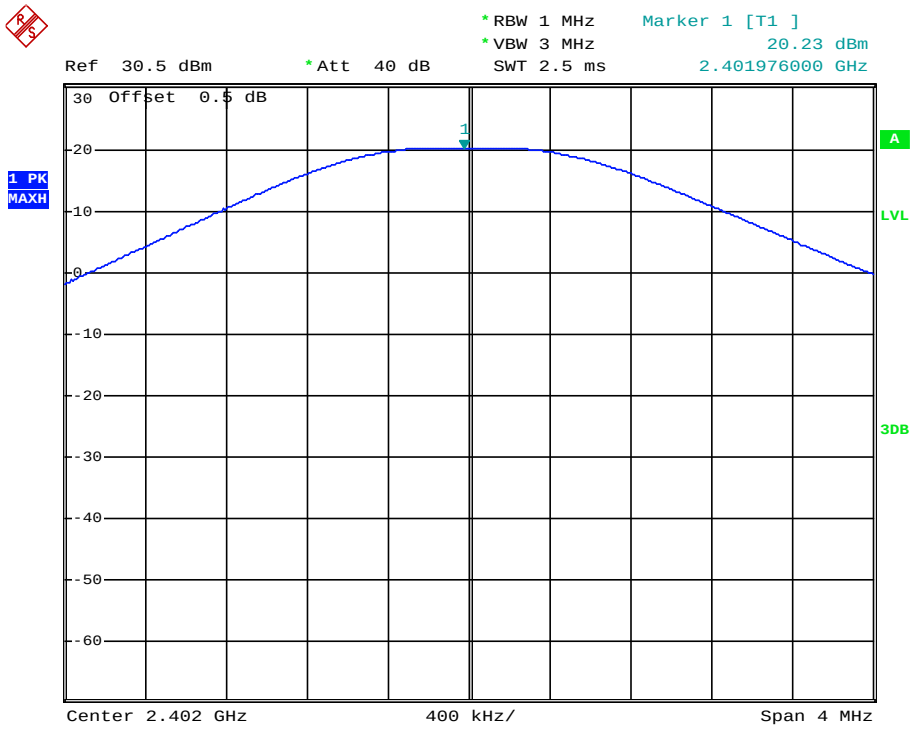
BDR Mode:

Channel Frequency (MHz)	Peak Power Output (dBm)	Peak Power Limit (dBm)	Pass / Fail
2402	20.23	30	PASS
2441	19.80	30	PASS
2480	19.93	30	PASS

Note: The test results including the cable lose.

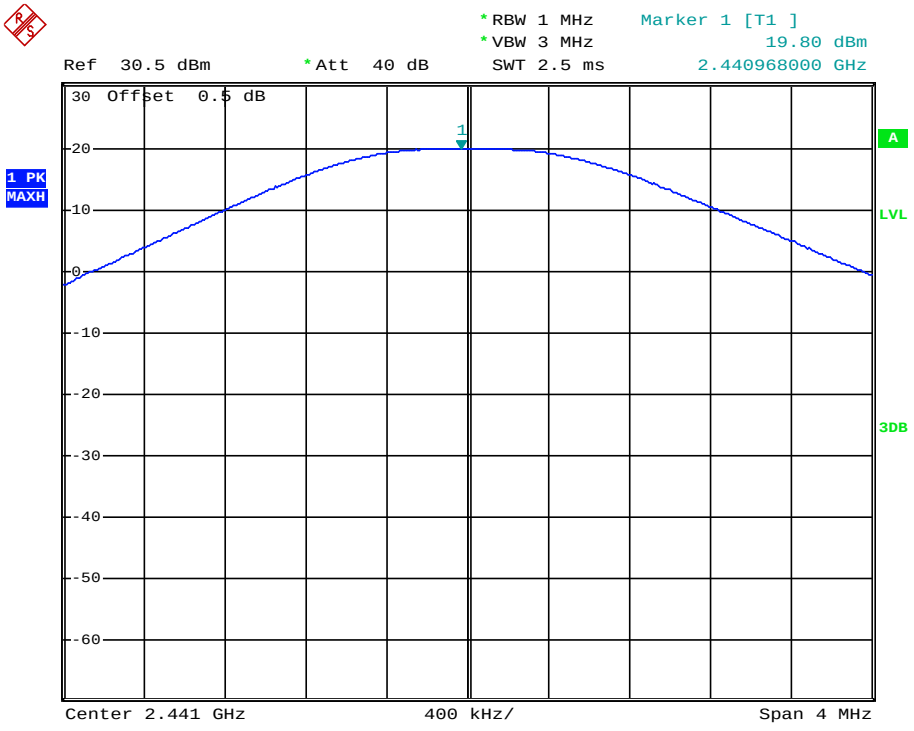
BDR Mode:

Low channel



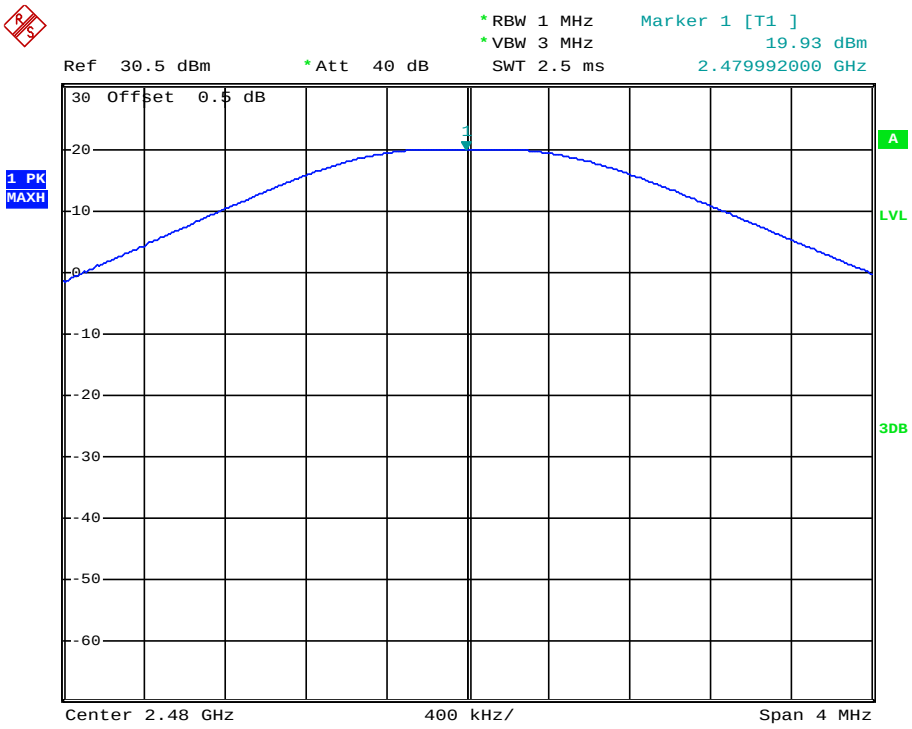
Date: 28.NOV.2012 17:07:09

Middle channel



Date: 28.NOV.2012 17:07:46

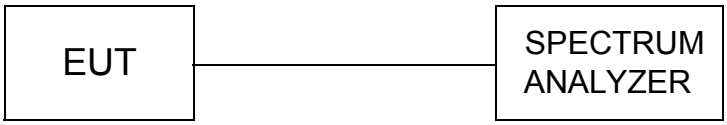
High channel



Date: 28.NOV.2012 17:09:33

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 30 KHz RBW and 100KHz VBW.

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.

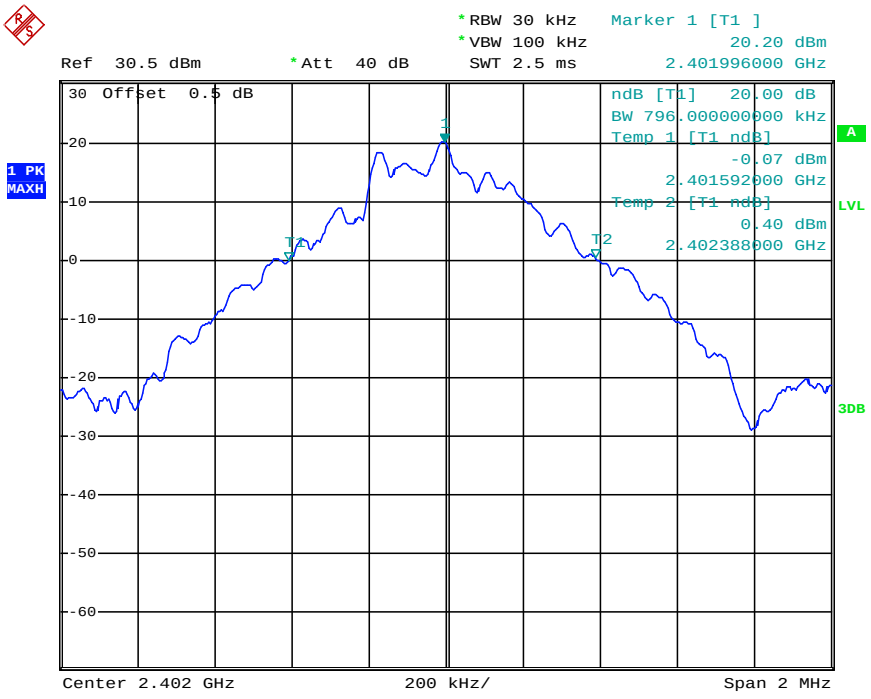
TEST RESULTS

BDR Mode:

CHANNEL FREQUENCY (MHz)	20dB BANDWIDTH (MHz)	LIMIT (MHz)	PASS/FAIL
2402	0.796	/	PASS
2441	0.796	/	PASS
2480	0.796	/	PASS

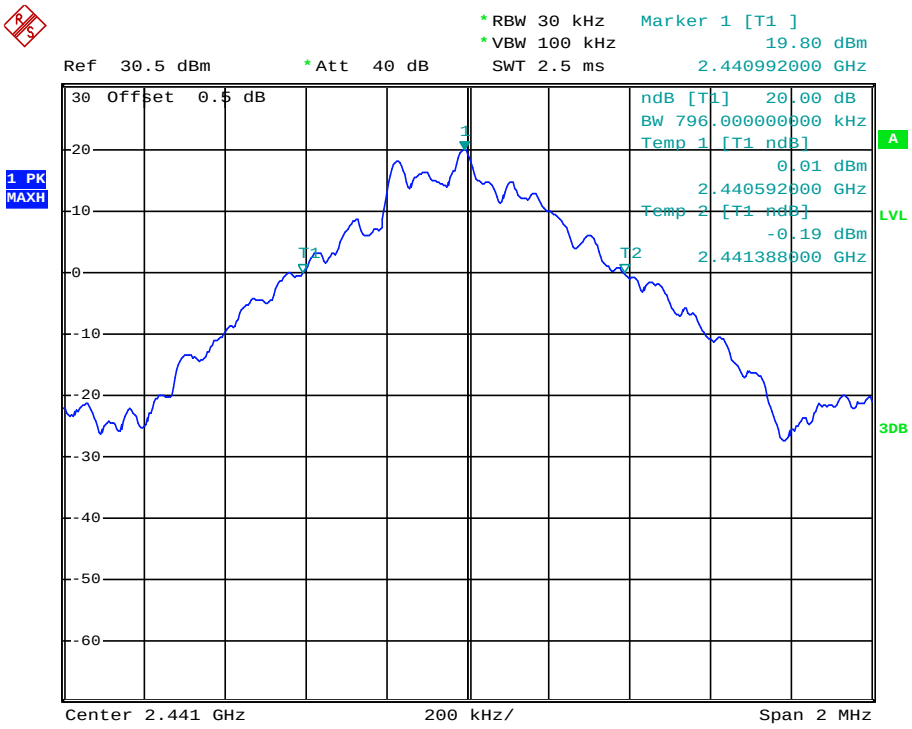
Photos of 20dB Bandwidth Measurement(BDR Mode)

Low Channel



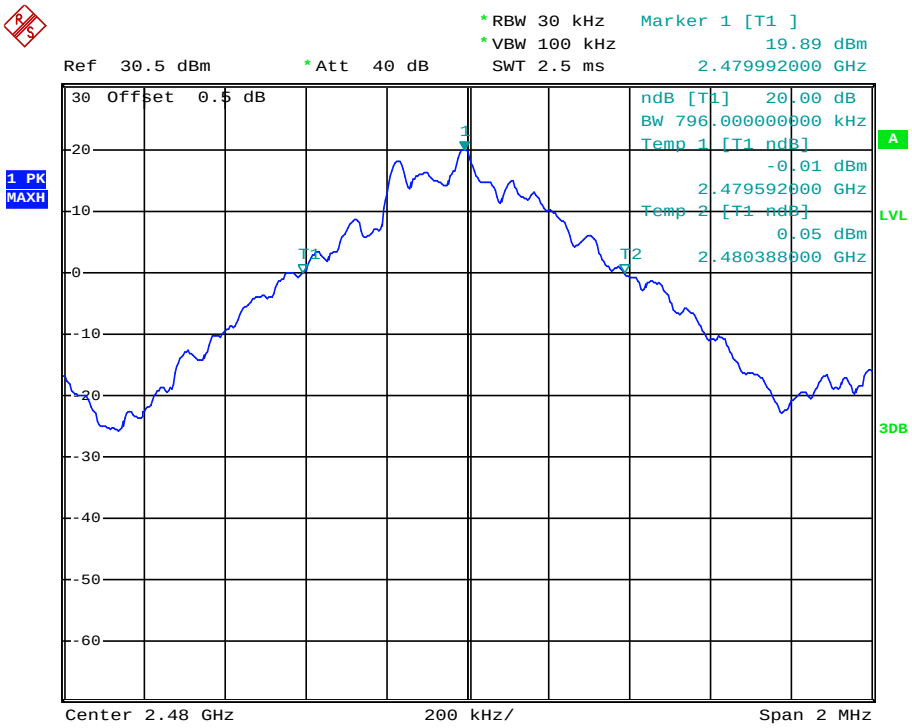
Date: 28.NOV.2012 16:49:18

Middle Channel



Date: 28.NOV.2012 16:48:21

High Channel



Date: 28.NOV.2012 16:47:19

4.5. Band Edge

Applicable Standard

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

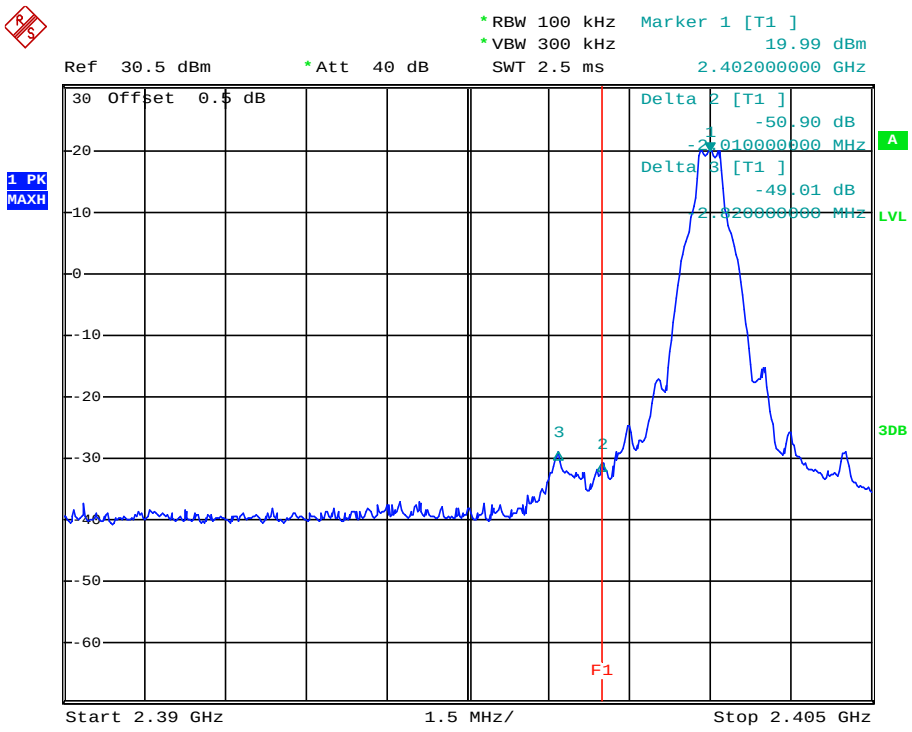
1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Remove the antenna from the EUT and then connect to a low loss RF cable from the antenna port to a EMI test receiver, then turn on the EUT and make it operate in transmitting 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

Photos of Band Edge Measurement（BDR Mode）

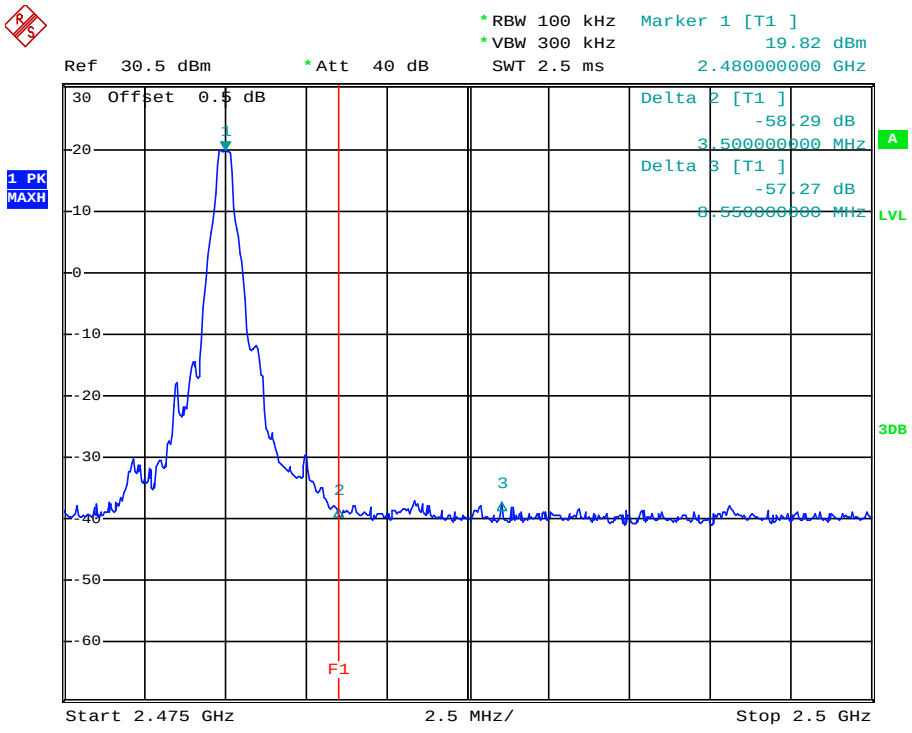
Frequency	Delta peak to band emission	Limit(dBc)
2400.0MHz	50.90	20
2483.5MHz	58.29	20

Band Edge: Left Side（BDR）



Date: 28.NOV.2012 16:50:58

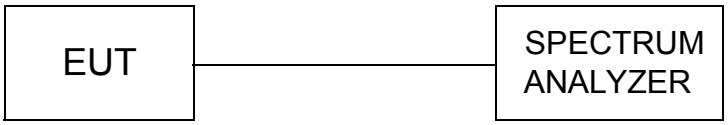
Band Edge: Right Side（BDR）



Date: 28.NOV.2012 16:52:26

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 with30 KHz RBW and 100KHz VBW.

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.

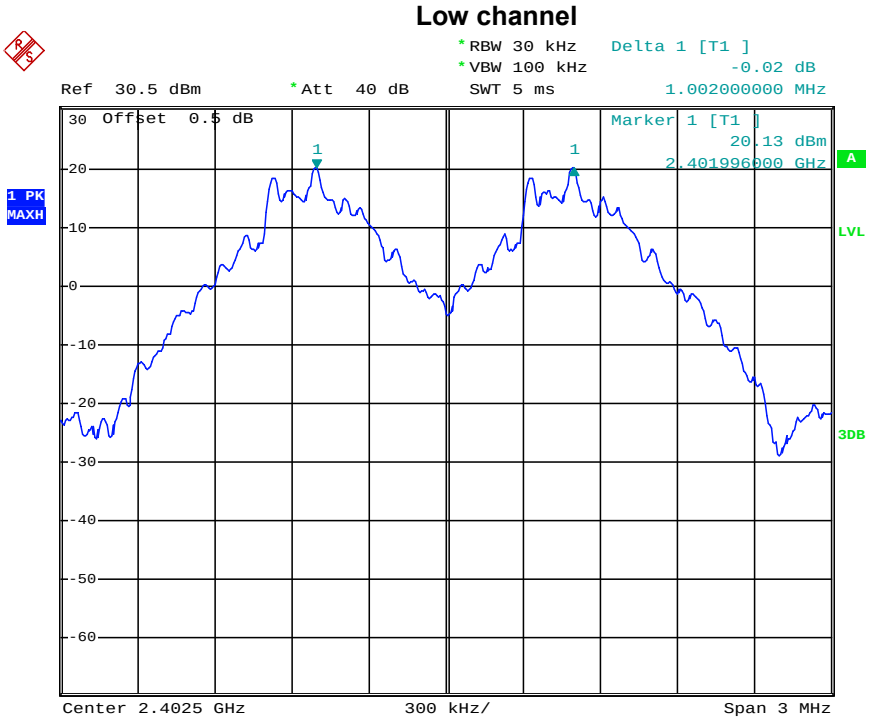
TEST RESULTS

BDR Mode:

Channel	Channel Frequency (MHz)	Channel Separation (MHz)	Limit (MHz)	Result
Low Channel	2402	1.002	25KHz or 2/3*20dB bandwidth(0.531MHz)	Pass
Adjacency Channel	2403			
Mid Channel	2441	1.002	25KHz or 2/3*20dB bandwidth(0.531MHz)	Pass
Adjacency Channel	2440			
High Channel	2480	1.002	25KHz or 2/3*20dB bandwidth(0.531MHz)	Pass
Adjacency Channel	2479			

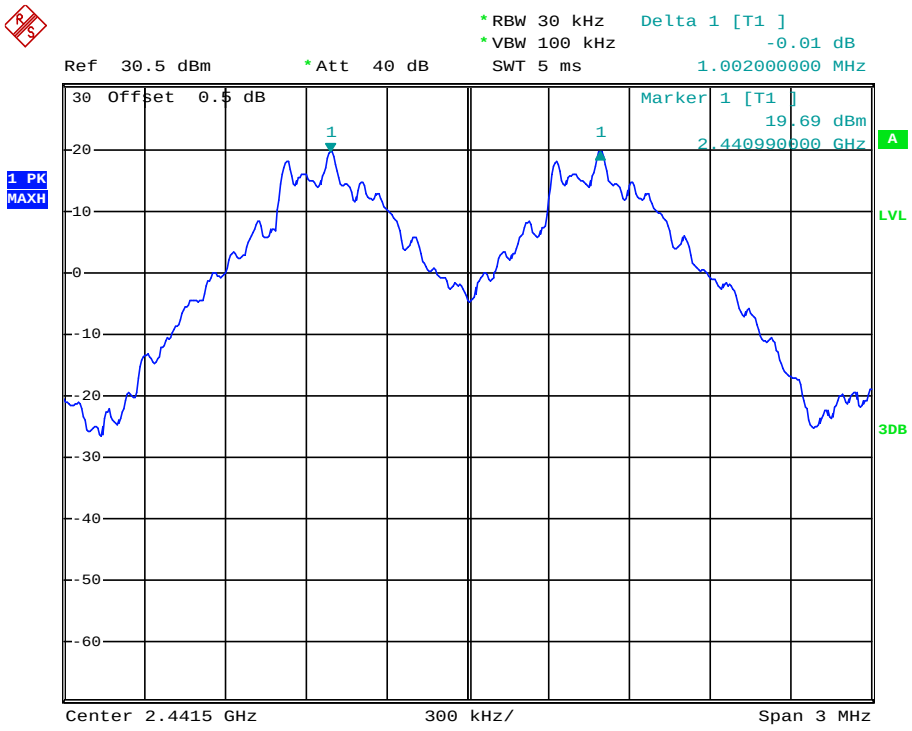
Photos of Frequency separation Measurement(BDR Mode)

Low channel



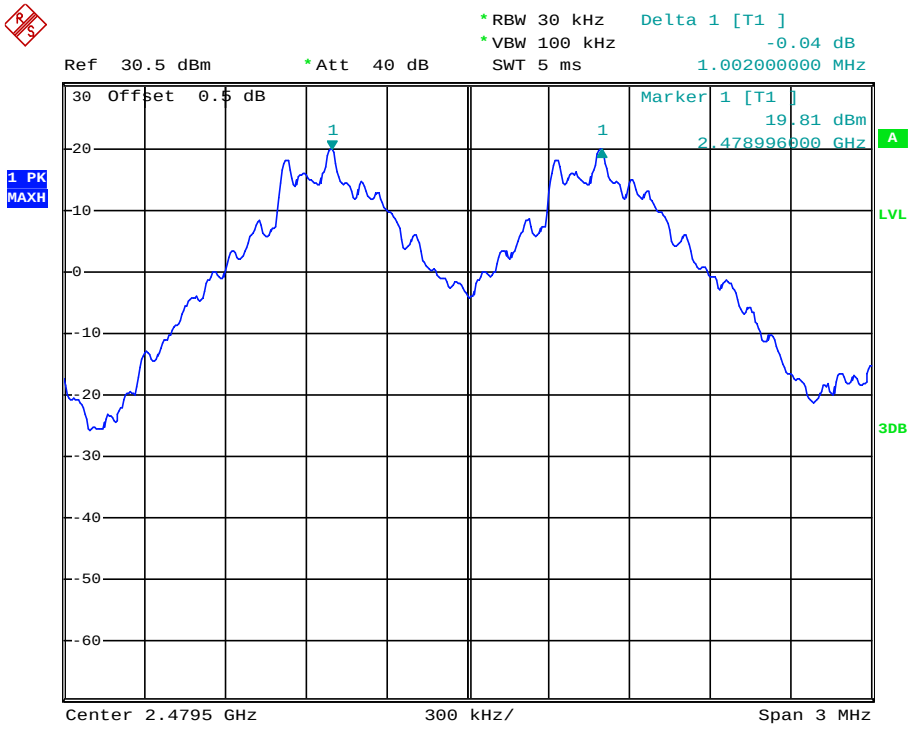
Date: 28.NOV.2012 16:56:01

Middle channel



Date: 28.NOV.2012 16:55:11

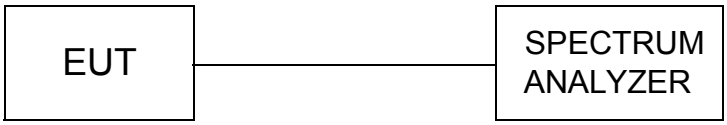
High channel



Date: 28.NOV.2012 16:53:54

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 30 KHz RBW and 100KHz VBW.

LIMIT

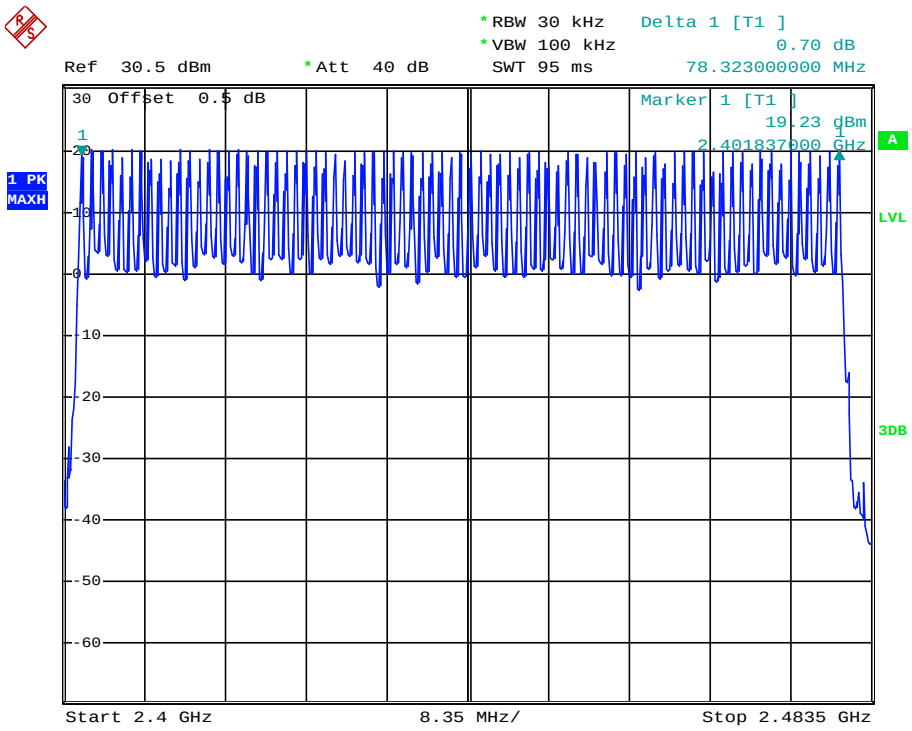
Frequency hopping systems in the 2400–2483.5 MHz band shall use at least 15 channels.

TEST RESULTS

BDR Mode:

Hopping Channel Frequency Range (MHz)	Number of Hopping Channel	Limit
2400-2483.5	79	≥15

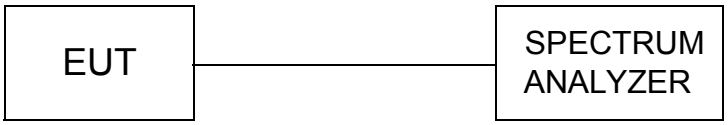
Photos of Number of hopping channel Measurement(BDR Mode)



Date: 28.NOV.2012 17:05:18

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 1MHz RBW and 3MHz VBW,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.

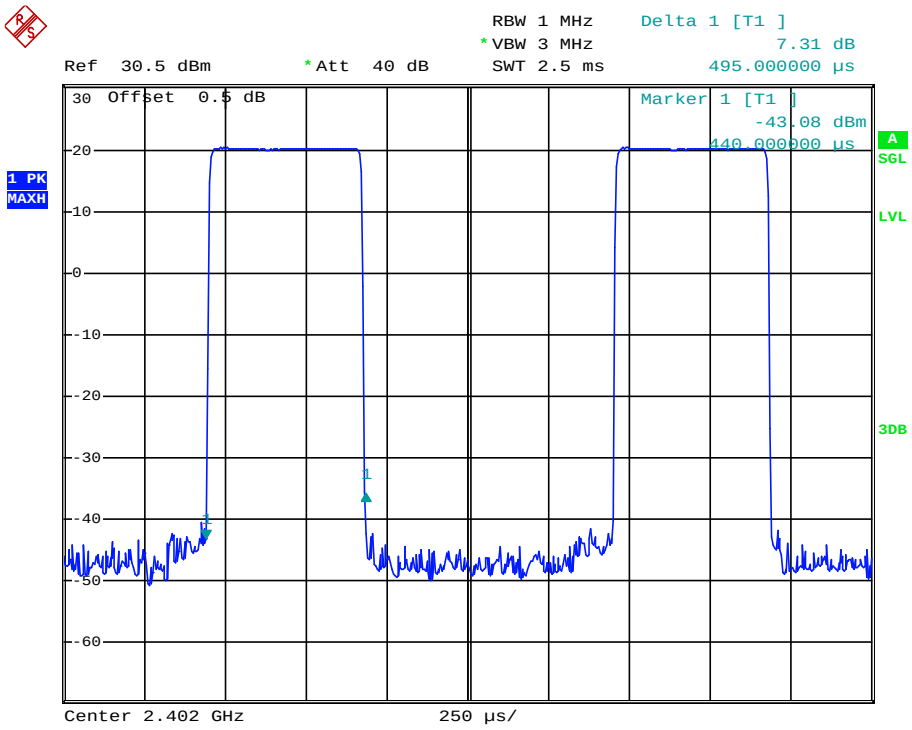
TEST RESULTS

BDR Mode:

Mode	Channel	Pulse Width (ms)	Dwell Time (S)	Limit (S)	Result
DH 1	Low	0.495	0.1584	0.4	Pass
	Middle	0.500	0.1600	0.4	Pass
	High	0.495	0.1584	0.4	Pass
	Note: Dwell time=Pulse time (ms) × (1600 ÷ 2 ÷ 79) ×31.6 Second				
DH 3	Low	1.760	0.2816	0.4	Pass
	Middle	1.760	0.2816	0.4	Pass
	High	1.760	0.2816	0.4	Pass
	Note: Dwell time=Pulse time (ms) × (1600 ÷ 4 ÷ 79) ×31.6 Second				
DH 5	Low	3.020	0.3221	0.4	Pass
	Middle	3.046	0.3249	0.4	Pass
	High	3.027	0.3229	0.4	Pass
	Note: Dwell time=Pulse Time (ms) × (1600 ÷ 6 ÷ 79) ×31.6 Second				

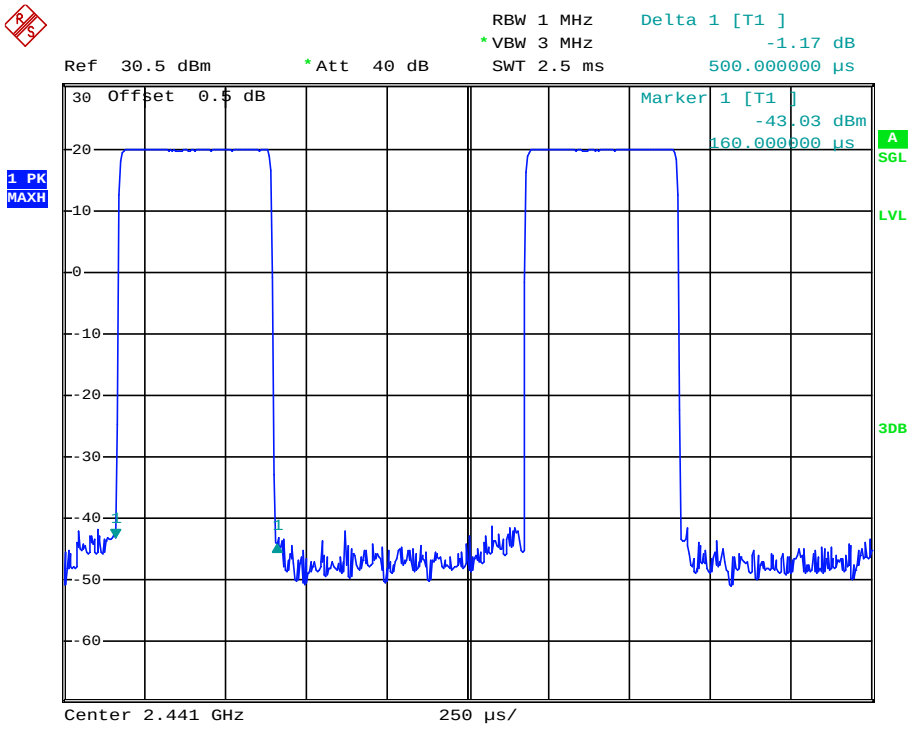
Photos of Dwel time Measurement(BDR)

DH1-Low channel



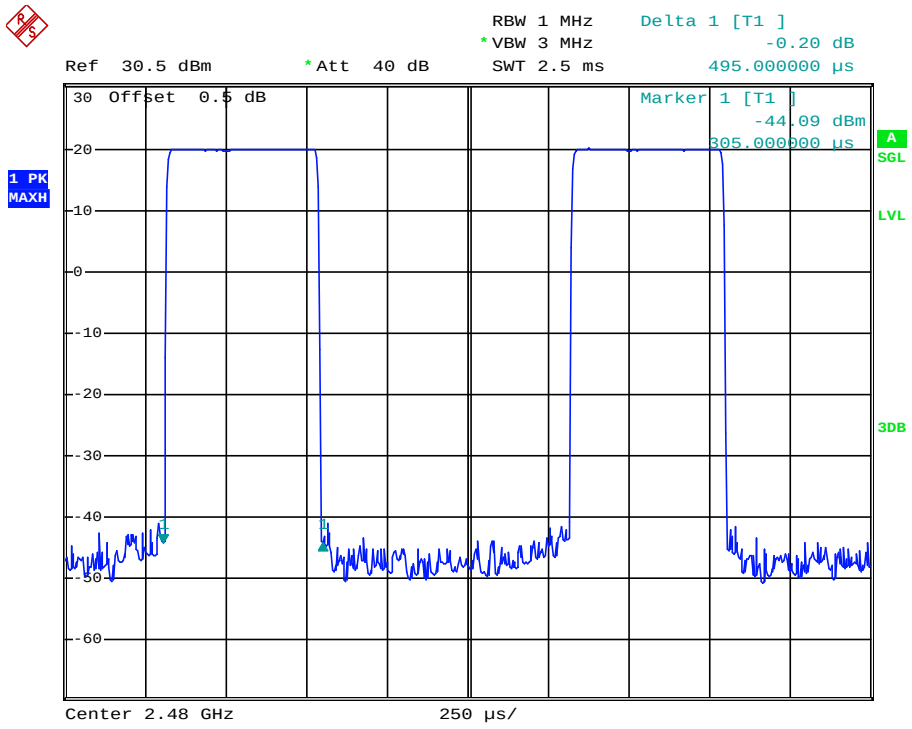
Date: 28.NOV.2012 15:56:42

DH1-Middle channel



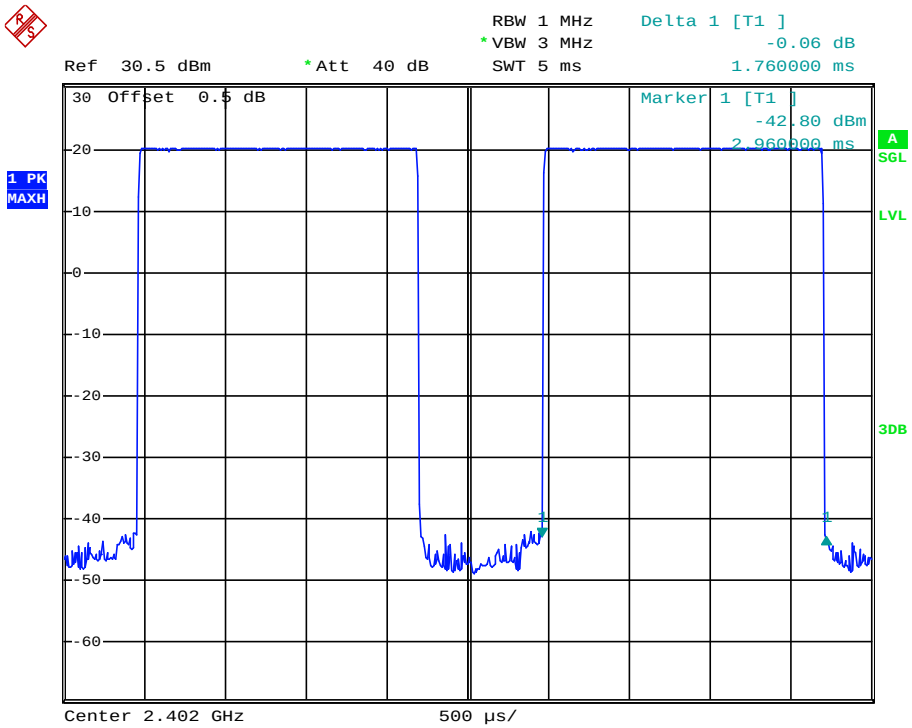
Date: 28.NOV.2012 15:55:06

DH1-High channel



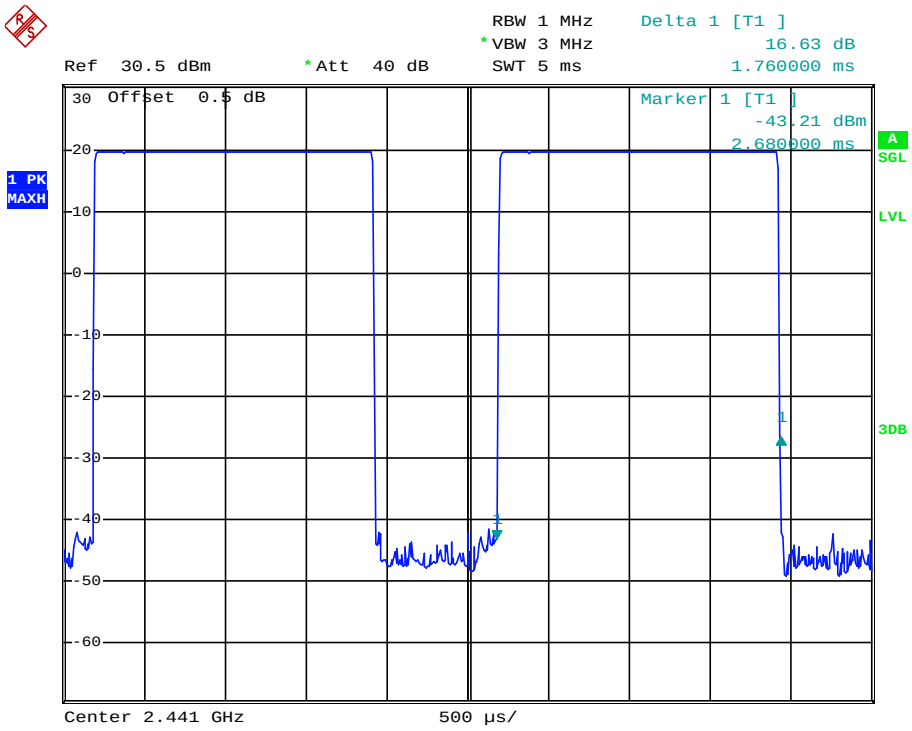
Date: 28.NOV.2012 15:57:36

DH3-Low channel



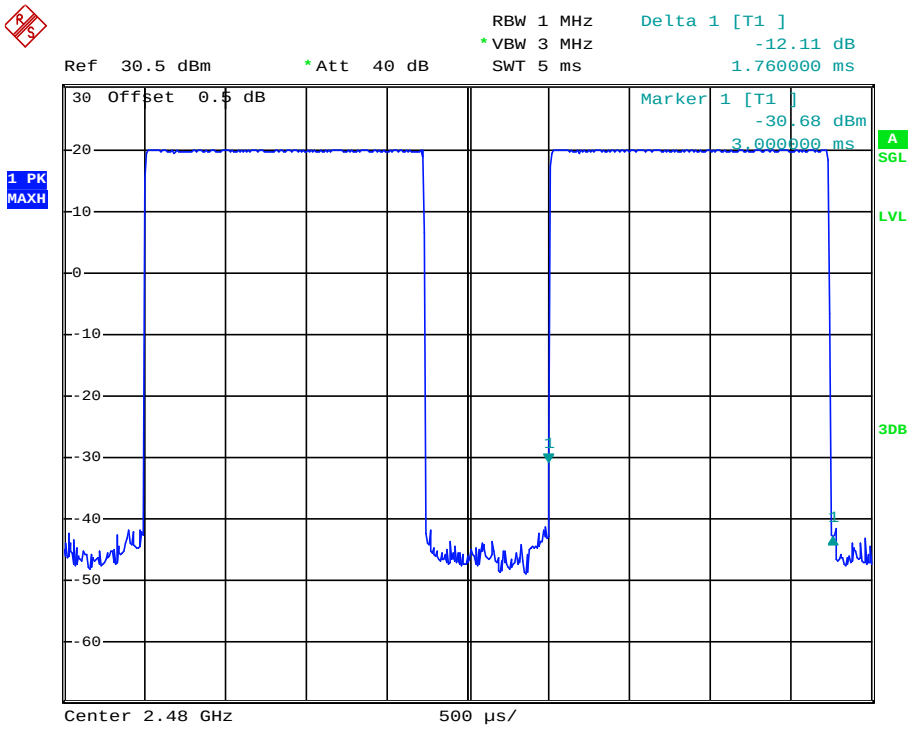
Date: 28.NOV.2012 16:38:03

DH3-Middle channel



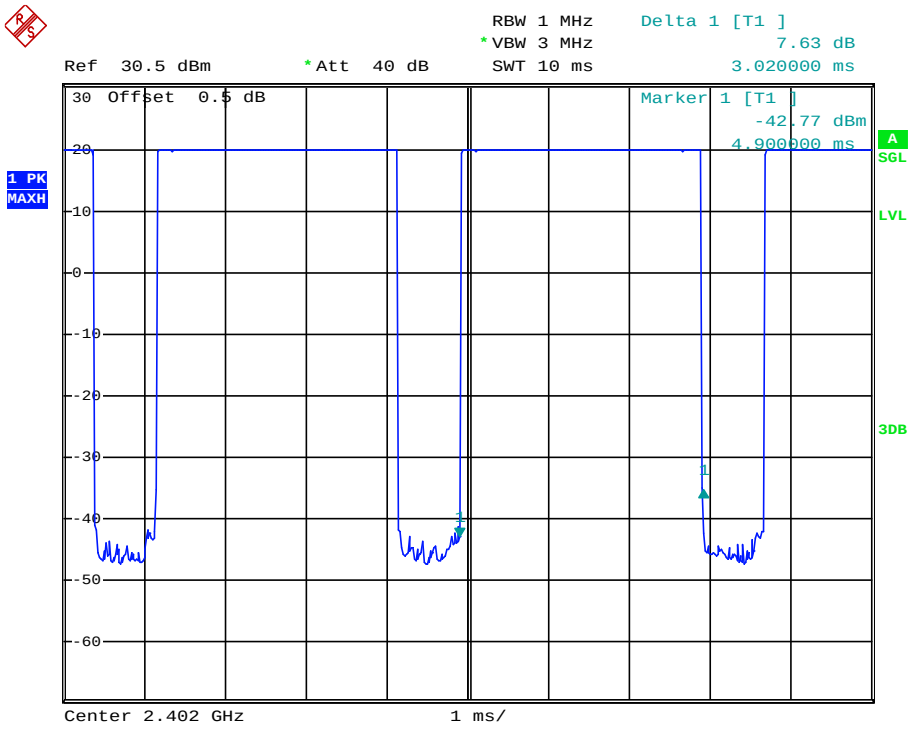
Date: 28.NOV.2012 16:00:13

DH3-High channel



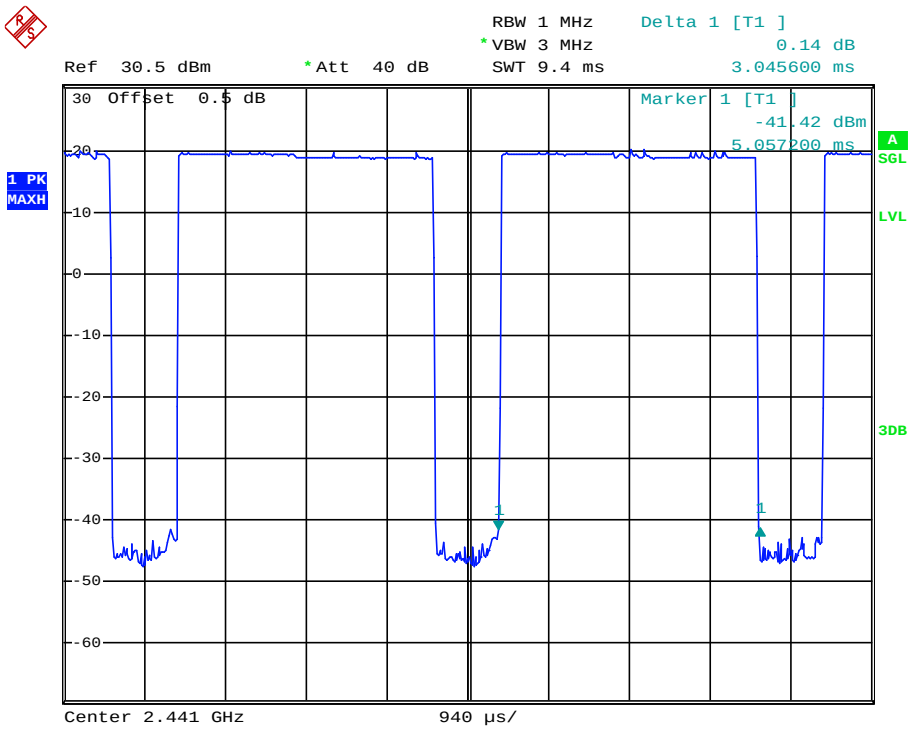
Date: 28.NOV.2012 15:59:32

DH5-Low channel



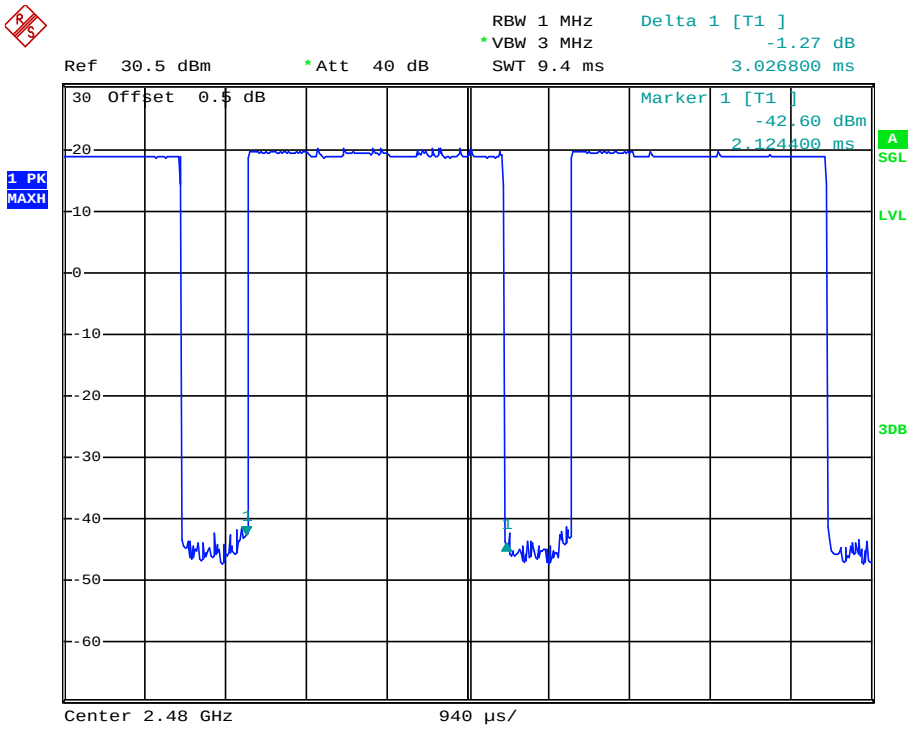
Date: 28.NOV.2012 16:39:06

DH5-Middle channel



Date: 28.NOV.2012 16:40:00

DH5-High channel



Date: 28.NOV.2012 16:40:45

4.9. Receiver spurious Emissions*(Not For FCC Review)*

TEST APPLICABLE

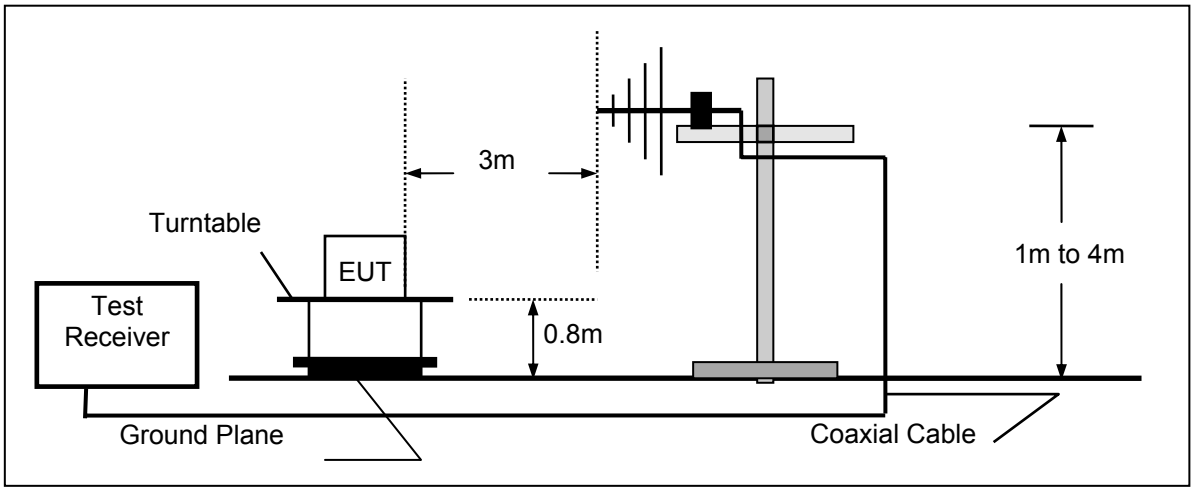
The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor (if any) from the measured reading. The basic equation with a sample calculation is as follows:

FS = RA + AF + CL - AG

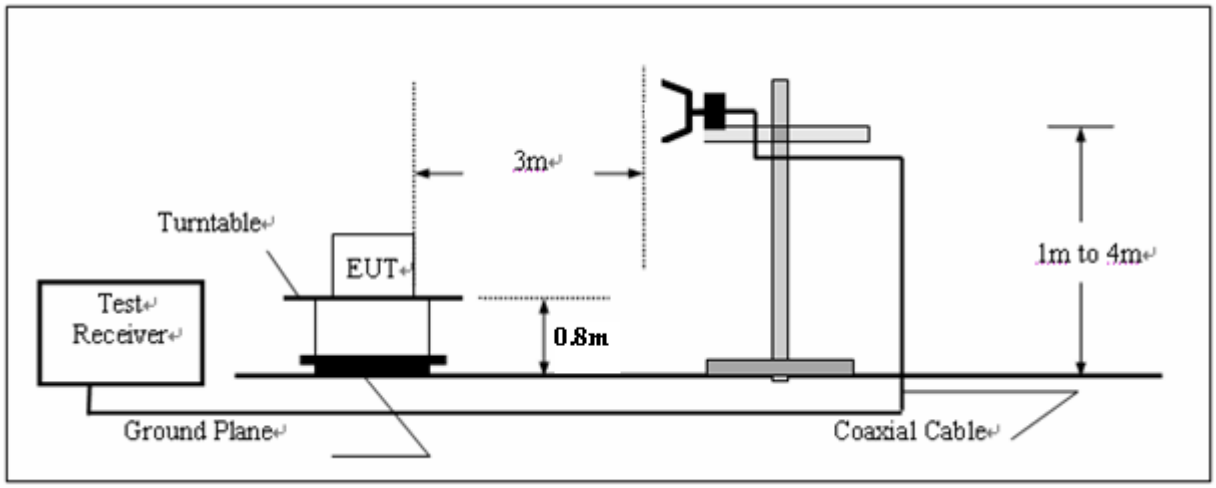
Where FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
RA = Reading Amplitude	AG = Amplifier Gain
AF = Antenna Factor	

TEST CONFIGURATION

(A) Radiated Emission Test Set-Up, Frequency below 1000MHz



(B) Radiated Emission Test Set-Up, Frequency above 1000MHz



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.

RECEIVER RADIATED SPOUIOUS LIMIT

For unintentional device, according to § 15.109(a) and RSS-Gen, except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values：

Frequency (MHz)	Distance (Meters)	Radiated (dBμV/m)	Radiated (μV/m)
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 above table.

TEST RESULTS

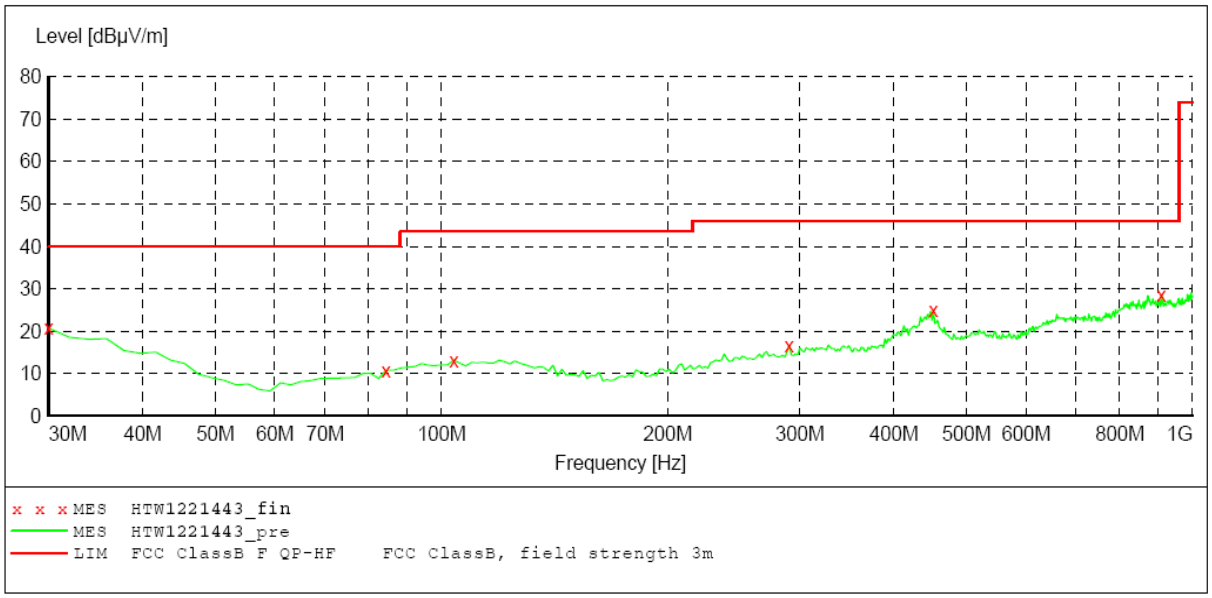
The Radiated Measurement are performed to the three channels (the high channel, the middle channel and the low channel), the datum recorded below is the worst case for each channel separation;and the EUT shall be scanned from 30 MHz to the 5th harmonic of the highest oscillator frequency in the digital devices or 1 GHz whichever is higher.

TEST RESULTS

Below 1GHz

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	QP	Coupled	120 kHz	HL562



MEASUREMENT RESULT: "HTW1221443_fin"

12/02/2012 3:25PM

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
30.000000	20.80	-11.1	40.0	19.2	QP	100.0	74.00	HORIZONTAL
84.428858	10.80	-21.3	40.0	29.2	QP	300.0	9.00	HORIZONTAL
103.867735	13.20	-19.6	43.5	30.3	QP	100.0	82.00	HORIZONTAL
290.480962	16.70	-17.7	46.0	29.3	QP	100.0	142.00	HORIZONTAL
451.823647	24.90	-14.6	46.0	21.1	QP	100.0	253.00	HORIZONTAL
908.637275	28.50	-7.3	46.0	17.5	QP	300.0	354.00	HORIZONTAL

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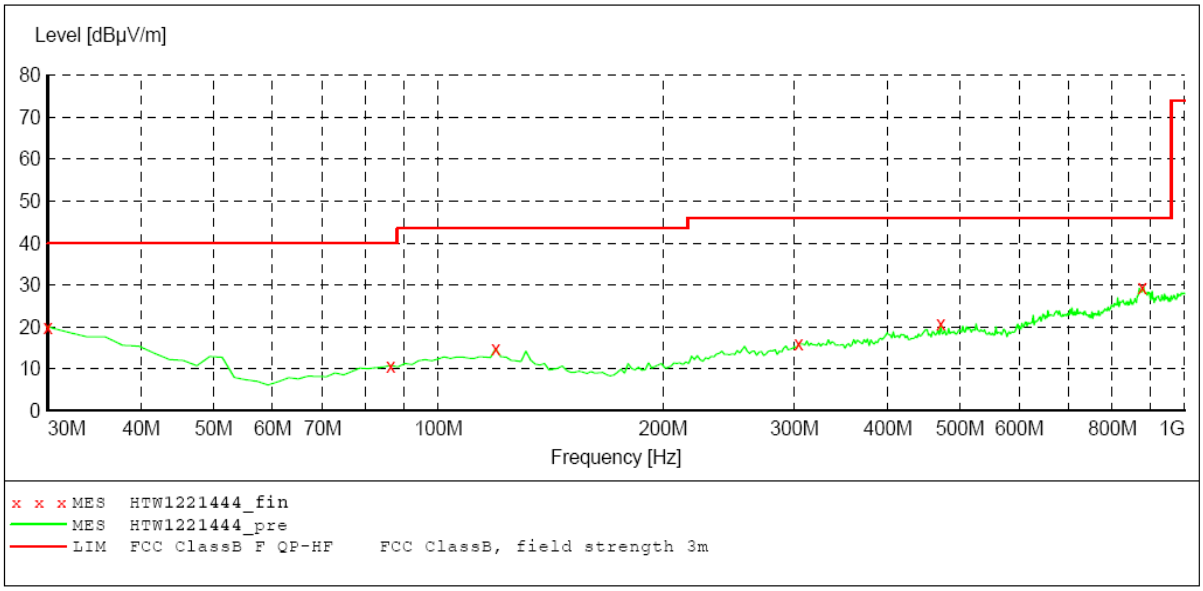
SWEEP TABLE: "test (30M-1G)"

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



MEASUREMENT RESULT: "HTW1221444_fin"

12/02/2012 4:22PM

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
30.000000	20.00	-11.1	40.0	20.0	QP	300.0	48.00	VERTICAL
86.372745	10.90	-20.9	40.0	29.1	QP	100.0	286.00	VERTICAL
119.418838	14.90	-19.2	43.5	28.6	QP	300.0	142.00	VERTICAL
304.088176	16.10	-16.9	46.0	29.9	QP	100.0	312.00	VERTICAL
471.262525	20.80	-14.1	46.0	25.2	QP	100.0	211.00	VERTICAL
877.535070	29.60	-7.0	46.0	16.4	QP	100.0	178.00	VERTICAL

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*Within measurement uncertainty.

Above 1GHz (Test Mode: BDR Receiving mode):

Frequency (MHz)	Corrected Reading (dBμV/m)@3m	IC Limit (dBμV/m) @3m	Margin (dB)	Detector	Polari-zation
3274.55	44.50	74	29.5	PK	Horizontal
3274.55	34.10	54	19.9	AV	Horizontal
4046.09	45.70	74	28.3	PK	Horizontal
4046.09	35.30	54	18.7	AV	Horizontal
3194.39	43.80	74	30.2	PK	Vertical
3194.39	34.20	54	19.8	AV	Vertical
4186.37	44.70	74	29.3	PK	Vertical
4186.37	34.60	54	19.4	AV	Vertical

*Within measurement uncertainty.

4.10. 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.

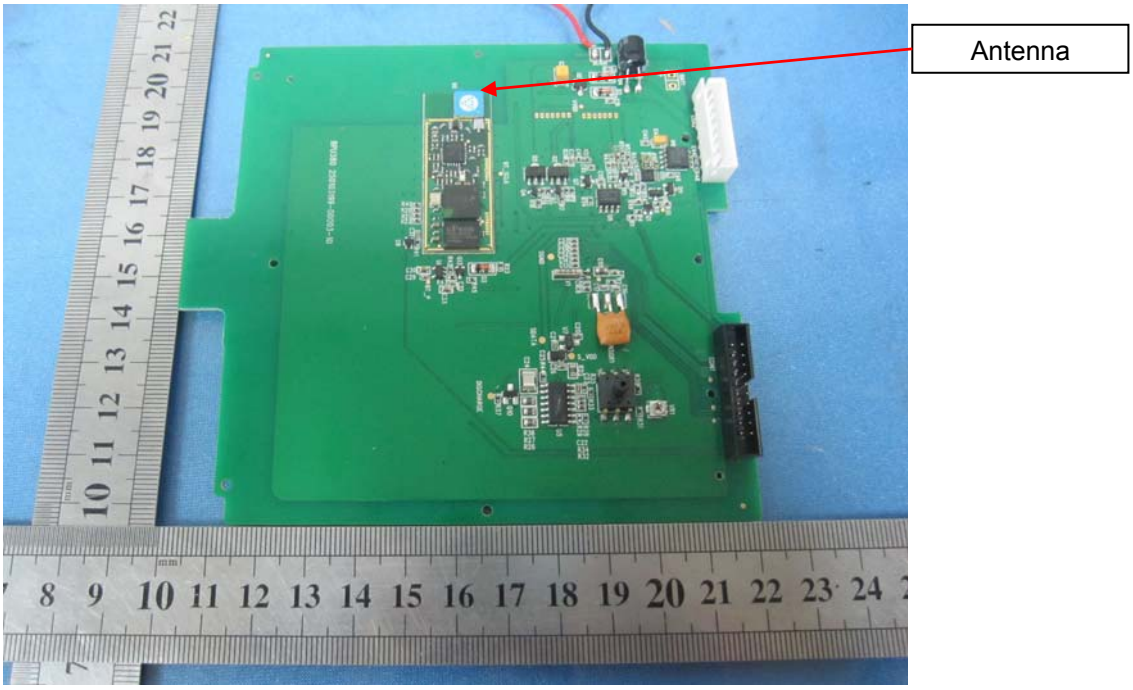
And according to FCC 47 CFR Section 15.247 (c), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

Refer to statement below for compliance.

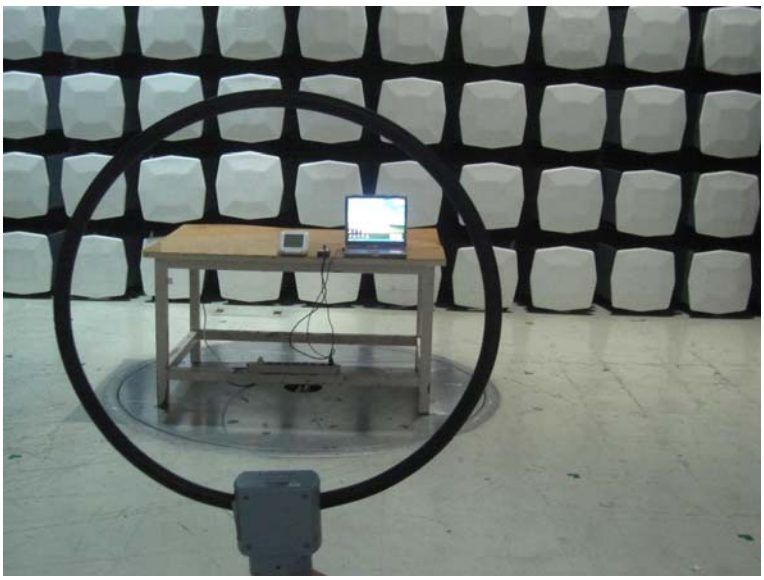
The manufacturer may design the unit so that the user can replace a broken antenna, but the use of a standard antenna jack or electrical connector is prohibited. Further, this requirement does not apply to intentional radiators that must be professionally installed.

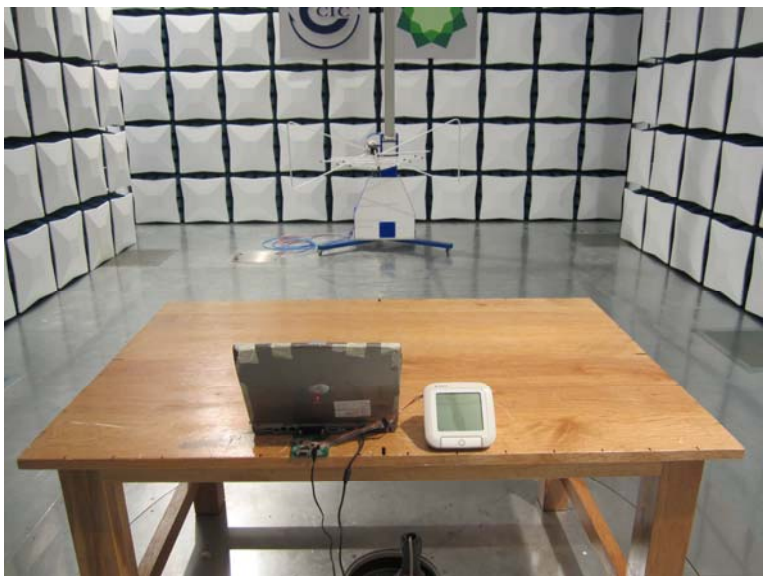
Antenna Connected Construction

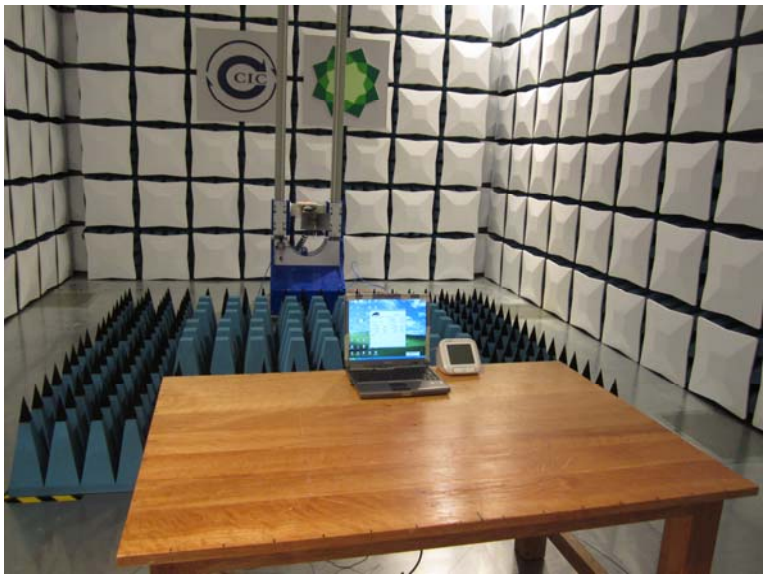
The antenna used in this product is a PCB Antenna .The maximum Gain of the antenna only 1.35dBi. Detail please see the photos as following:

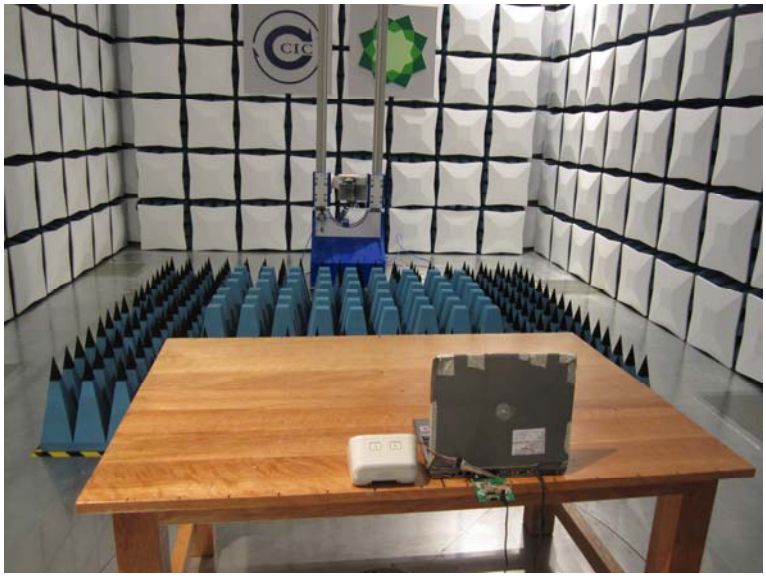


5. Test Setup Photos of the EUT









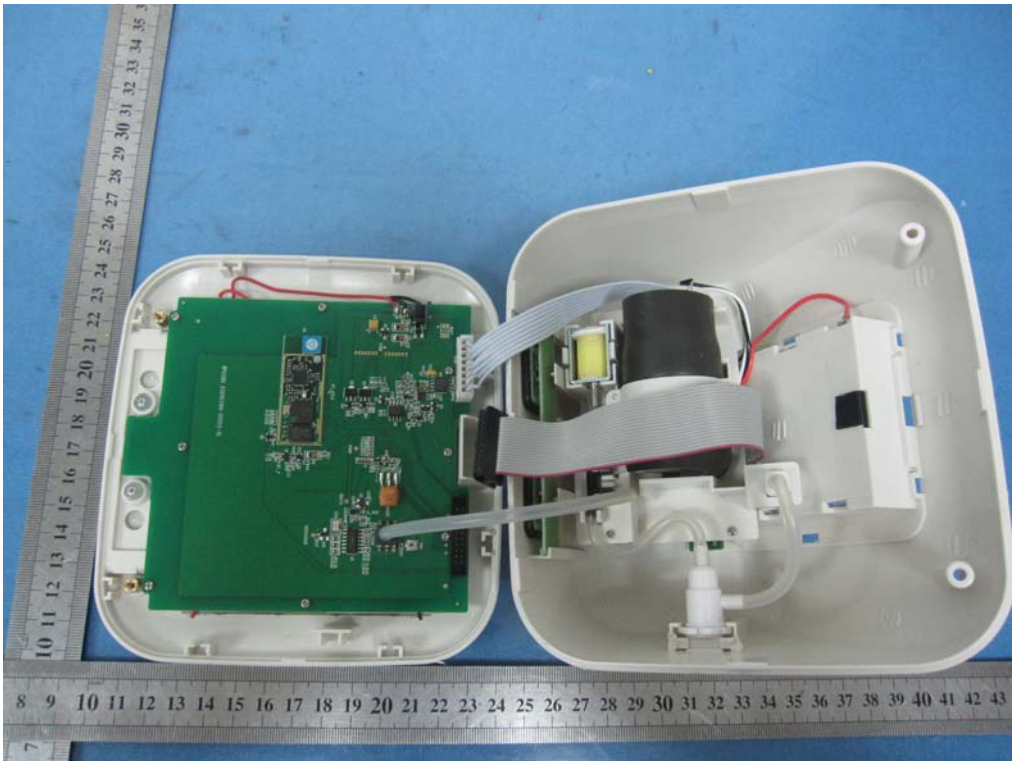
6. External and Internal Photos of the EUT

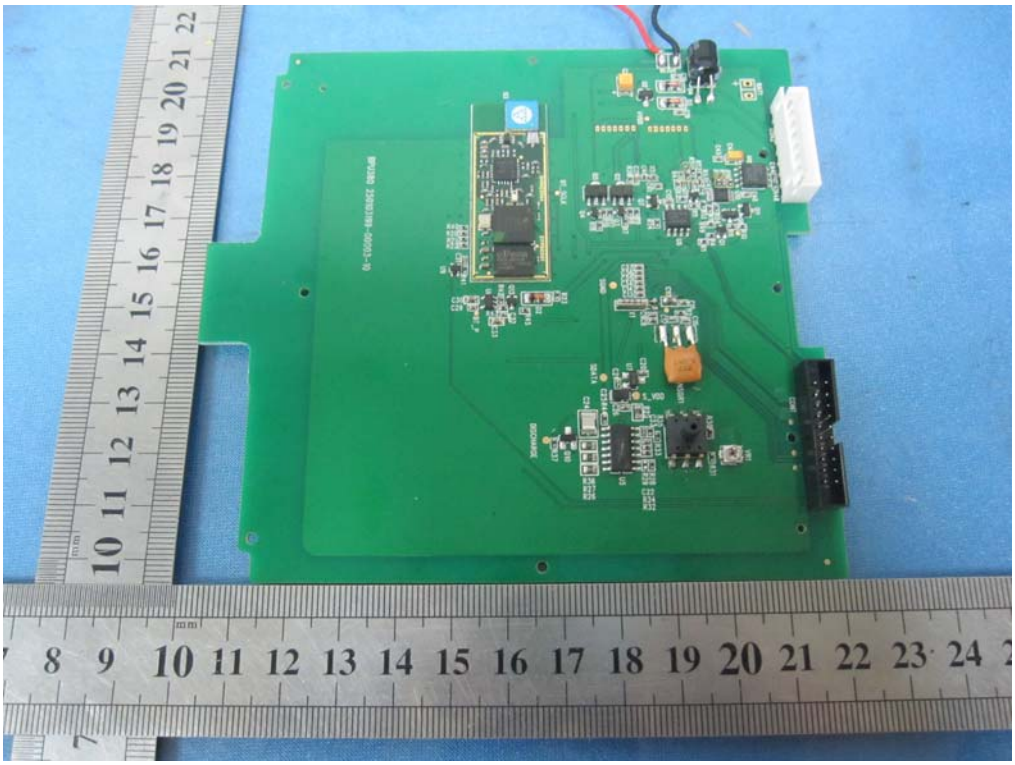
External Photos

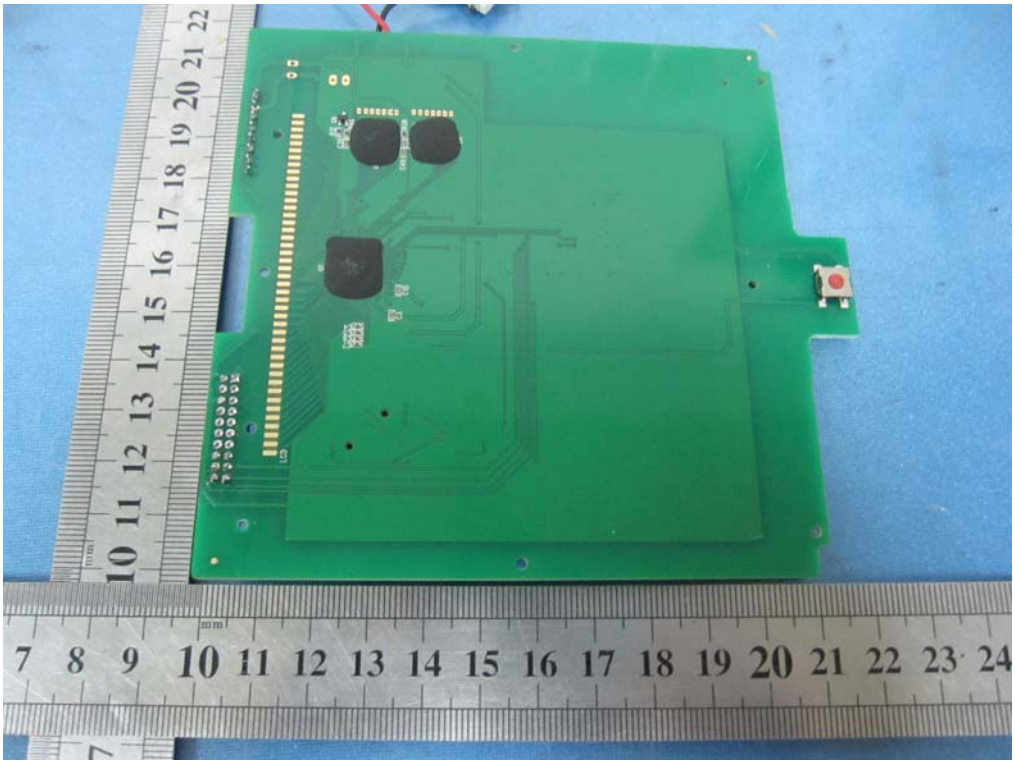

BOSCH


BOSCH

Internal Photos







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