



FCC PART 15 SUBPART C TEST REPORT

FCC PART 15.247

Report Reference No.....: WE10100010

FCC ID.....: X5QGEM0357

Compiled by

(position+printed name+signature)..: File administrators Wenliang Li

Wenliang Li

Supervised by

(position+printed name+signature)..: Test Engineer Eric Zhang

Eric Zhang

Approved by

(position+printed name+signature)..: Manager Jimmy Li

Jimmy Li

Date of issue.....: Nov 08, 2010

Testing Laboratory Name: Shenzhen Huatongwei International Inspection Co., Ltd

Address: Keji Nan No.12 Road, Hi-tech Park, Shenzhen, China

Applicant's name: Jetlun(ShenZhen)Corporation

Address: 1008A Skyworth Building Gao-xin RD South High-tech Park
Nanshan District Shenzhen China

Test specification:

Standard: FCC Part 15.247: Operation within the bands 920-928 MHz,
2400-2483.5 MHz and 5725-5850 MHz Direct Sequence System

TRF Originator: Shenzhen Huatongwei International Inspection CO., Ltd

Master TRF: Dated 2006-06

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Test item description: ZigBee Module

Trade Mark: /

Model/Type reference.....: GEM0357E

Listed Models: GEM0357F

Result.....: Positive

TEST REPORT

Test Report No. : WE10100010	Nov 08, 2010 Date of issue
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Equipment under Test : ZigBee Module

Model /Type : GEM0357E

Listed Models : GEM0357F

Applicant : **Jetlun(ShenZhen)Corporation**

Address : 1008A Skyworth Building Gao-xin RD South High-tech
Park Nanshan District Shenzhen China

Manufacturer **ZhuHai YueHua Electronic Co.,Ltd.**

Address : 13, Pingdong Road4, NanPing Science&Technology
Industrial Garden,Zhuhai,China

Test Result according to the standards on page 4:	Positive
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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.

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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 C63.4-2009: American National Standard for Methods of Measurement of Radio-Noise Emissions From Low Voltage Electrical and Electronic Equipment in the Range of 9kHz to 40GHz.

ANSI C63.10-2009: American National Standard for Testing Unlicensed Wireless Devices

2. SUMMARY

2.1. General Remarks

Date of receipt of test sample : Oct 19, 2010

Testing commenced on : Oct 19, 2010

Testing concluded on : Nov 08, 2010

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 3.3V

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

2.4GHz (ZigBee Module) For more details, refer to the user's manual of the EUT.

Serial number: Prototype

The GEM0357E contain antenna ANT3 and external connector J3 and switch SW4 for antenna transition and R33,R34 Q13,DS3 for external antenna indicate.

GEM0357F Only have the ceramic antenna ANT3. so remove external connector J3 and switch SW4 for antenna transition and R33,R34 Q13,DS3 for external antenna indicate.

GEM0357E	Internal PIFA Antenna	GAIN:0.5dBi
	External Dipole Antenna	GAIN:2.15dBi
GEM0357F	Internal PIFA Antenna	GAIN:0.5dBi

2.4. EUT operation mode

The EUT has been tested under typical operating condition. The Applicant provides AT command to control the EUT for staying in continuous transmitting and receiving mode for testing. There are sixteen channels of EUT, and the test carried out at the channel 11(lowest), channel 18(middle) and channel 26 (highest) channels.

Channel	Frequency	Channel	Frequency
11	2405 MHz	19	2445 MHz
12	2410 MHz	20	2450 MHz
13	2415 MHz	21	2455 MHz
14	2420 MHz	22	2460 MHz
15	2425 MHz	23	2465 MHz
16	2430 MHz	24	2470 MHz
17	2435 MHz	25	2475 MHz
18	2440 MHz	26	2480 MHz

2.5. EUT configuration

The following peripheral devices and interface cables were connected during the measurement:

● - supplied by the manufacturer

○ - supplied by the lab

○ Power Cable

Length (m) : /

Shield : /

Detachable : /

○ Multimeter

Manufacturer : /

Model No. : /

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

This submittal(s) (test report) is intended for **FCC ID: X5QGEM0357** 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 EUT is a an IEEE 802.15 ZigBee Standard type device, The functions of the EUT listed as below:

	Test Standards	Reference Report
Zigbee	FCC Part 15 Subpart C (Section 15.247)	WE10100010
Zigbee	MPE	WE10100011

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

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

3. The EUT provides one completed transmitter and receiver.

Modulation Mode	TX Function
Zigbee	1TX

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: August 02, 2007. Valid time is until March 29, 2012.

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 from Aug 24, 2005 to Oct 31, 2009.

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 July 01, 2009.

IC-Registration No.: 5377

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. 5377 on February 13th, 2011.

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 17025:2005 or equivalent. The laboratory also fulfils the conditions described in Nemko Document NLA-10, the Authorization is valid through April 25, 2009.

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.: R-2484. Date of Registration: December 20, 2006. Valid time is until December 19, 2009.

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: December 20, 2006. Valid time is until December 19, 2009.

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 24 Aug, 2013.

3.3. Environmental conditions

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

Temperature:	<u>15-35 ° C</u>
Humidity:	<u>30-60 %</u>
Atmospheric pressure:	<u>950-1050mbar</u>

3.4. Configuration of Tested System**Fig. 2-1 Configuration of Tested System****3.5. Test Description**

FCC PART 15		
FCC Part 15.207	AC Power Conducted Emission	PASS
FCC Part 15.247(a)(2)	6dB 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(e)	Power Spectral Density	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
FCC Part 1.1307 (b)	MPE Evaluation	PASS

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

Preliminary tests were performed in different data rate to find the worst radiated emission. The data rate shown in the table below is the worst-case rate with respect to the specific test item. Investigation has been done on all the possible configurations for searching the worst cases. The following table is a list of the test modes shown in this test report.

Test Items	Mode	Channel
Maximum Peak Conducted Output Power Power Spectral Density 6dB Spectrum Bandwidth Spurious RF conducted emissions	Zigbee	11/18/26
Radiated Emissions 9kHz~1GHz	Zigbee	11/18/26
Radiated Emissions 1GHz~10th Harmonic	Zigbee	11/18/26
Band Edge Emissions	Zigbee	11/26

3.6. 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	Range	Measurement Uncertainty	Notes
Radiated Emission	30~1000MHz	4.24 dB	(1)
Radiated Emission	1~18GHz	5.16 dB	(1)
Radiated Emission	18-40GHz	5.54 dB	(1)
Conducted Disturbance	0.15~30MHz	3.39 dB	(1)

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

3.7. Equipments Used during the Test

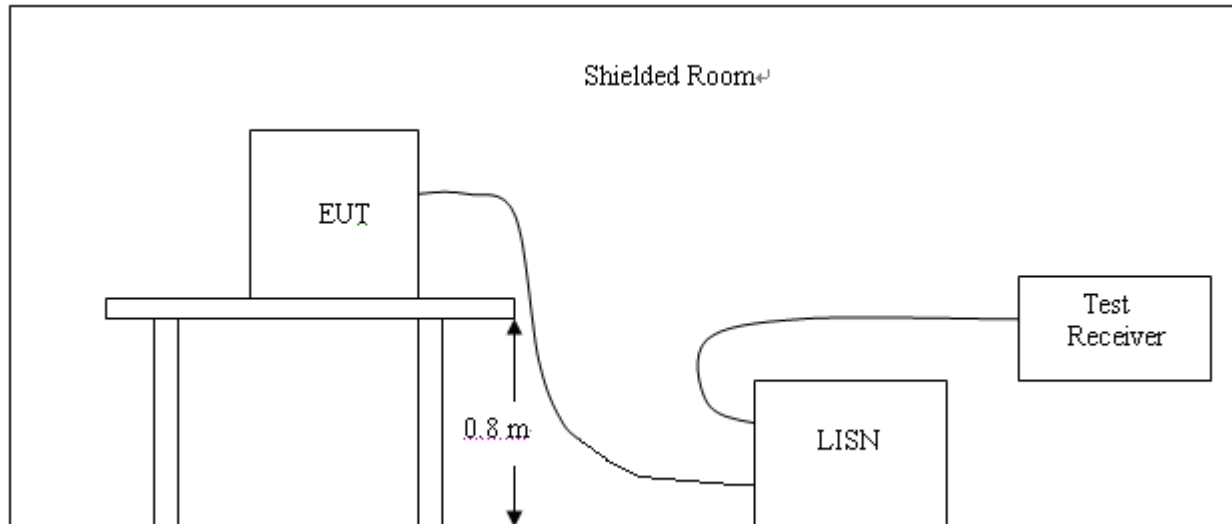
Radiated Emission					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1	ULTRA-BROADBAND ANTENNA	ROHDE & SCHWARZ	HL562	100015	2010/05
2	EMI TEST RECEIVER	ROHDE & SCHWARZ	ESI 26	100009	2009/11
3	RF TEST PANEL	ROHDE & SCHWARZ	TS / RSP	335015/ 0017	2009/11
4	TURNTABLE	ETS	2088	2149	2009/11
5	ANTENNA MAST	ETS	2075	2346	2009/11
6	EMI TEST SOFTWARE	ROHDE & SCHWARZ	ESK1	N/A	2009/11
7	HORN ANTENNA	ROHDE & SCHWARZ	HF906	100039	2009/11
8	Amplifier	Sonoma	310N	E009-13	2009/11
9	JS amplifier	ROHDE & SCHWARZ	JS4-00101800-28-5A	F201504	2009/11
10	High pass filter	Compliance Direction systems	BSU-6	34202	2010/03

Maximum Peak Output Power / Power Spectral Density / 6dB Bandwidth / Spurious RF Conducted Emission					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1	EMI TEST RECEIVER	ROHDE & SCHWARZ	ESI 26	100009	2009/11
2	Power Meter	Anritsu	ML2487A	6K00001568	2009/11
3	Power Meter Sensor	Anritsu	ML2491A	0630989	2009/11

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 C63.4-2009.
- 2 Support equipment, if needed, was placed as per ANSI C63.4-2009
- 3 All I/O cables were positioned to simulate typical actual usage as per ANSI C63.4-2009
- 4 The EUT received DC3.3V power from DC Source.
- 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

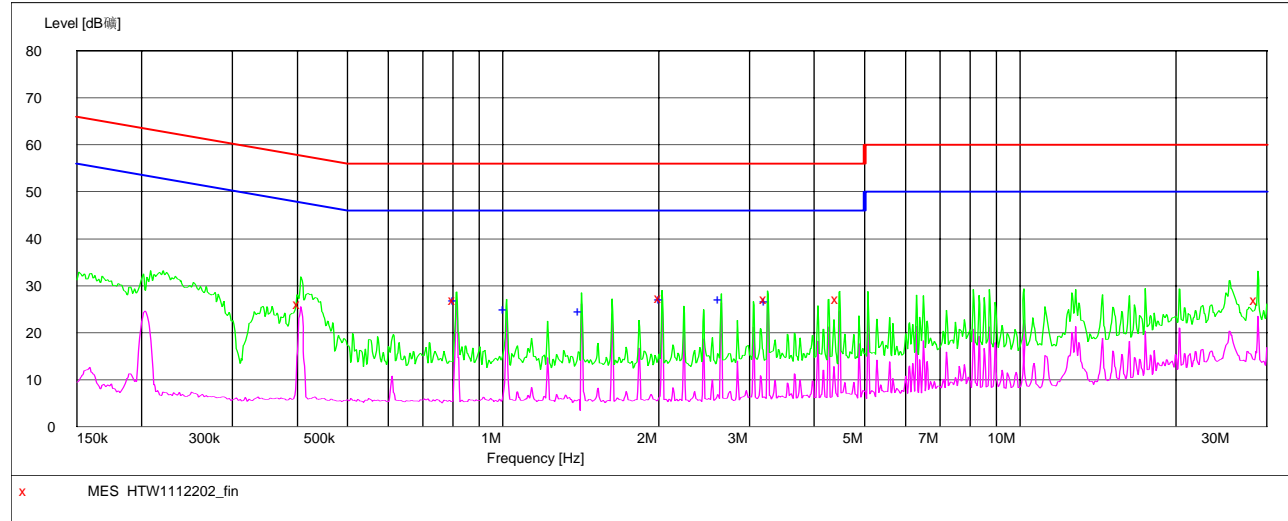
For intentional device, according to § 15.207(a) AC Power Conducted Emission Limits is as following :

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*Internal antenna***SCAN TABLE: "Voltage (9K-30M)FIN"**

Short Description: 150K-30M Voltage

**MEASUREMENT RESULT: "HTW1112202_fin"**

11/12/2010 11:00AM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.406119	26.10	10.2	58	31.6	QP	N	GND
0.812308	26.90	10.2	56	29.1	QP	N	GND
2.030878	27.50	10.2	56	28.5	QP	N	GND
3.249792	27.10	10.3	56	28.9	QP	N	GND
4.469694	27.10	10.3	56	28.9	QP	N	GND
28.843130	26.90	10.9	60	33.1	QP	N	GND

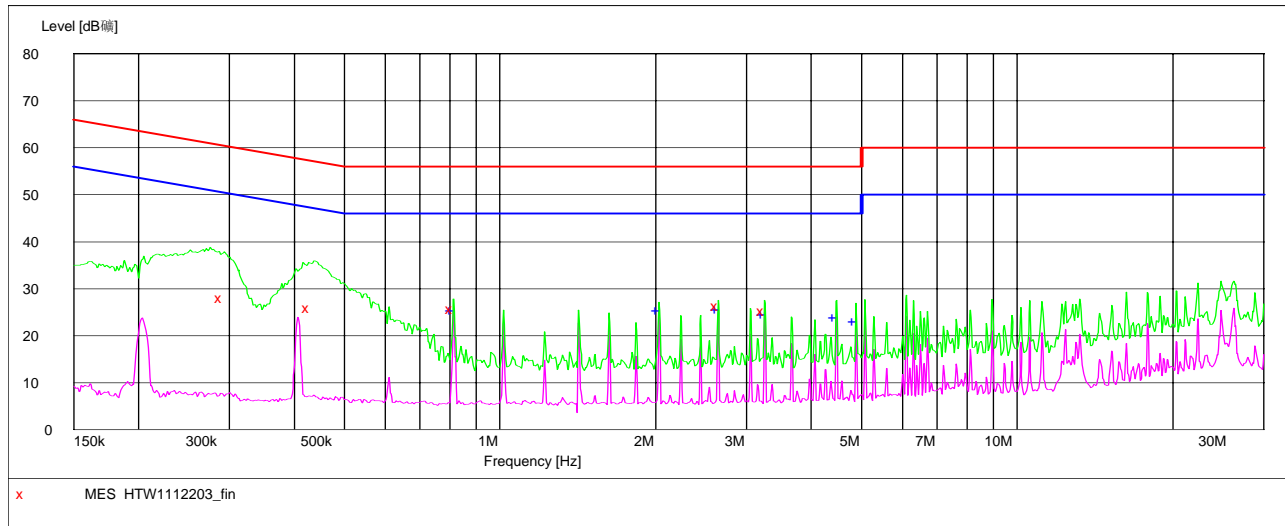
MEASUREMENT RESULT: "HTW1112202_fin2"

11/12/2010 11:00AM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.812308	26.90	10.2	46	19.1	AV	N	GND
1.015347	25.00	10.2	46	21.0	AV	N	GND
1.418922	24.60	10.2	46	21.4	AV	N	GND
2.030878	27.30	10.2	46	18.7	AV	N	GND
2.641695	27.30	10.3	46	18.7	AV	N	GND
3.249792	26.80	10.3	46	19.2	AV	N	GND

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

Short Description: 150K-30M Voltage

**MEASUREMENT RESULT: "HTW1112203_fin"**

11/12/2010 11:07AM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.290609	28.00	10.2	61	32.5	QP	L1	GND
0.429416	25.90	10.2	57	31.4	QP	L1	GND
0.812308	25.60	10.2	56	30.4	QP	L1	GND
2.641695	26.30	10.3	56	29.7	QP	L1	GND
3.249792	25.20	10.3	56	30.8	QP	L1	GND

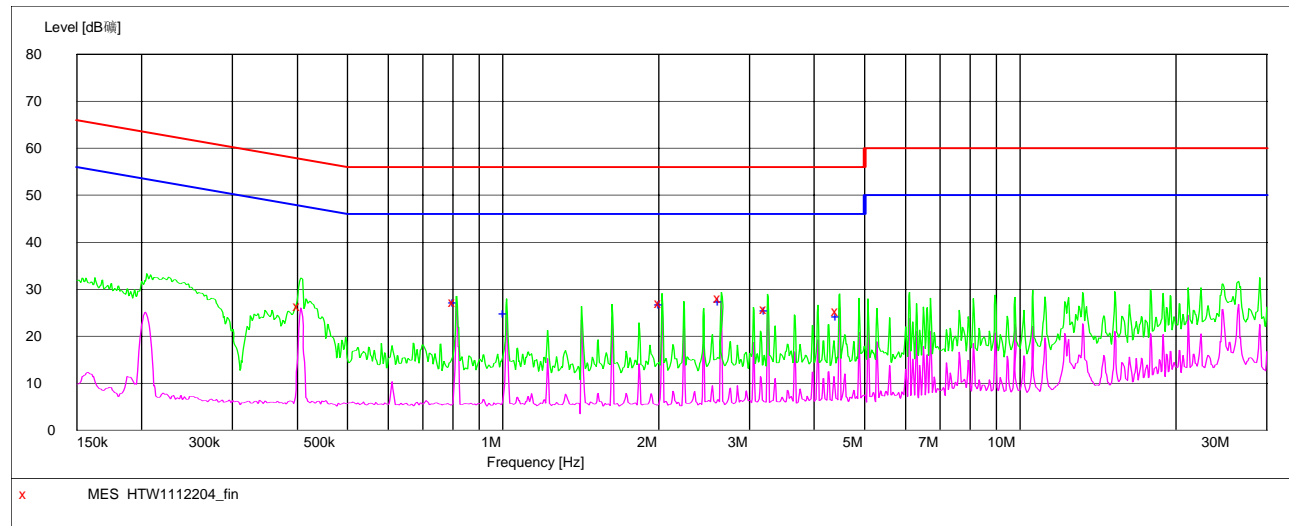
MEASUREMENT RESULT: "HTW1112203_fin2"

11/12/2010 11:07AM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.812308	25.40	10.2	46	20.6	AV	L1	GND
2.030878	25.50	10.2	46	20.5	AV	L1	GND
2.641695	25.60	10.3	46	20.4	AV	L1	GND
3.249792	24.60	10.3	46	21.4	AV	L1	GND
4.469694	24.00	10.3	46	22.0	AV	L1	GND
4.879143	23.20	10.4	46	22.8	AV	L1	GND

External antenna**SCAN TABLE: "Voltage (9K-30M)FIN"**

Short Description: 150K-30M Voltage

**MEASUREMENT RESULT: "HTW1112204_fin"**

11/12/2010 11:13AM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.406119	26.40	10.2	58	31.3	QP	N	GND
0.812308	27.20	10.2	56	28.8	QP	N	GND
2.030878	27.10	10.2	56	28.9	QP	N	GND
2.641695	28.00	10.3	56	28.0	QP	N	GND
3.249792	25.90	10.3	56	30.1	QP	N	GND
4.469694	25.40	10.3	56	30.6	QP	N	GND

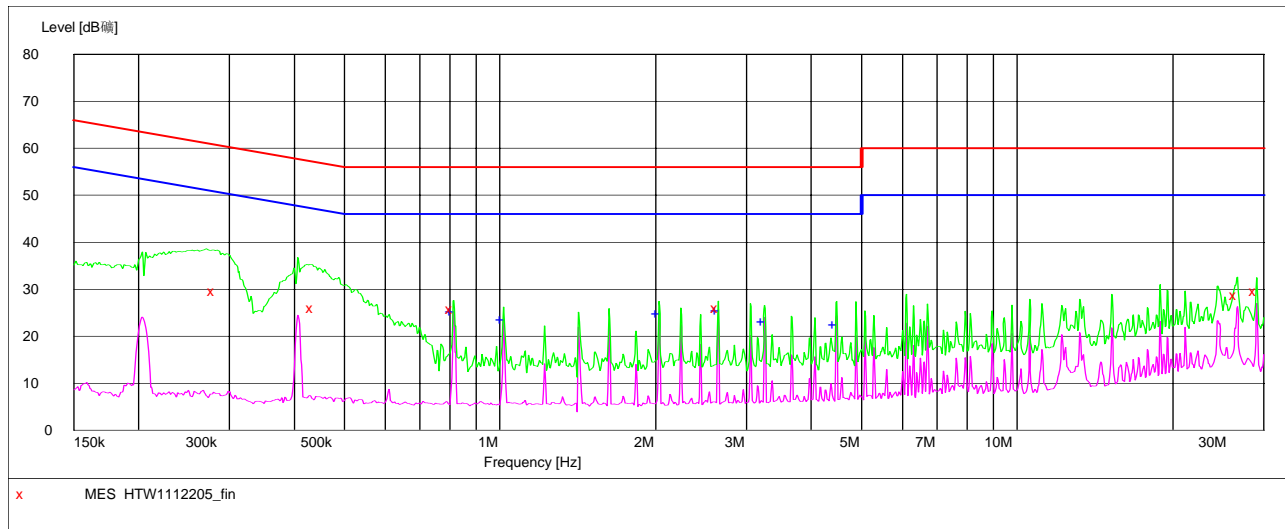
MEASUREMENT RESULT: "HTW1112204_fin2"

11/12/2010 11:13AM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.812308	27.20	10.2	46	18.8	AV	N	GND
1.015347	25.00	10.2	46	21.0	AV	N	GND
2.030878	26.80	10.2	46	19.2	AV	N	GND
2.641695	27.40	10.3	46	18.6	AV	N	GND
3.249792	25.50	10.3	46	20.5	AV	N	GND
4.469694	24.20	10.3	46	21.8	AV	N	GND

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

Short Description: 150K-30M Voltage

**MEASUREMENT RESULT: "HTW1112205_fin"**

11/12/2010 11:20AM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.281487	29.70	10.2	61	31.1	QP	L1	GND
0.436313	26.10	10.2	57	31.0	QP	L1	GND
0.812308	25.90	10.2	56	30.1	QP	L1	GND
2.641695	26.00	10.3	56	30.0	QP	L1	GND
26.634040	28.70	10.8	60	31.3	QP	L1	GND
29.073870	29.60	10.9	60	30.4	QP	L1	GND

MEASUREMENT RESULT: "HTW1112205_fin2"

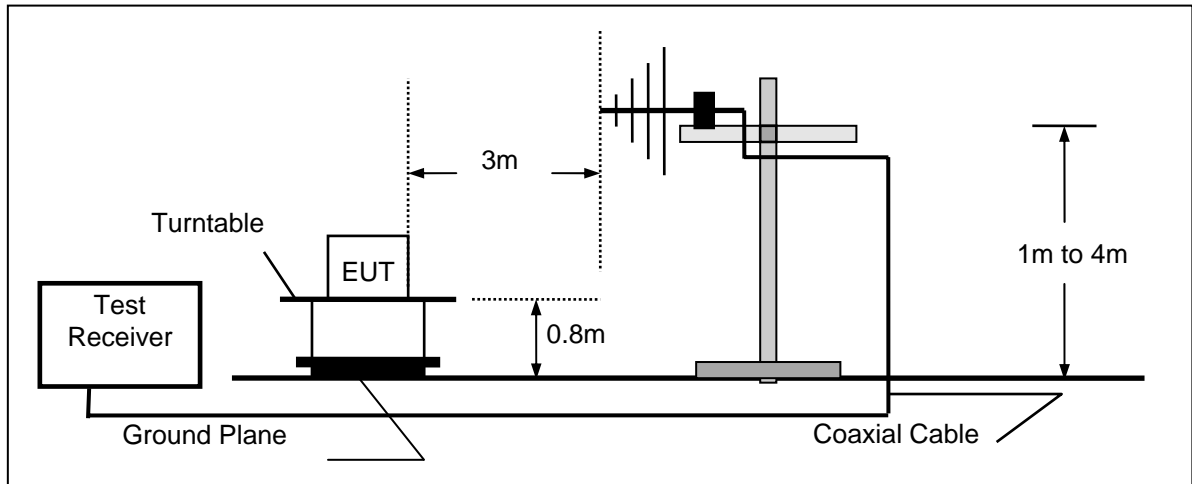
11/12/2010 11:20AM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.812308	25.40	10.2	46	20.6	AV	L1	GND
1.015347	23.60	10.2	46	22.4	AV	L1	GND
2.030878	24.90	10.2	46	21.1	AV	L1	GND
2.641695	25.60	10.3	46	20.4	AV	L1	GND
3.249792	23.30	10.3	46	22.7	AV	L1	GND
4.469694	22.50	10.3	46	23.5	AV	L1	GND

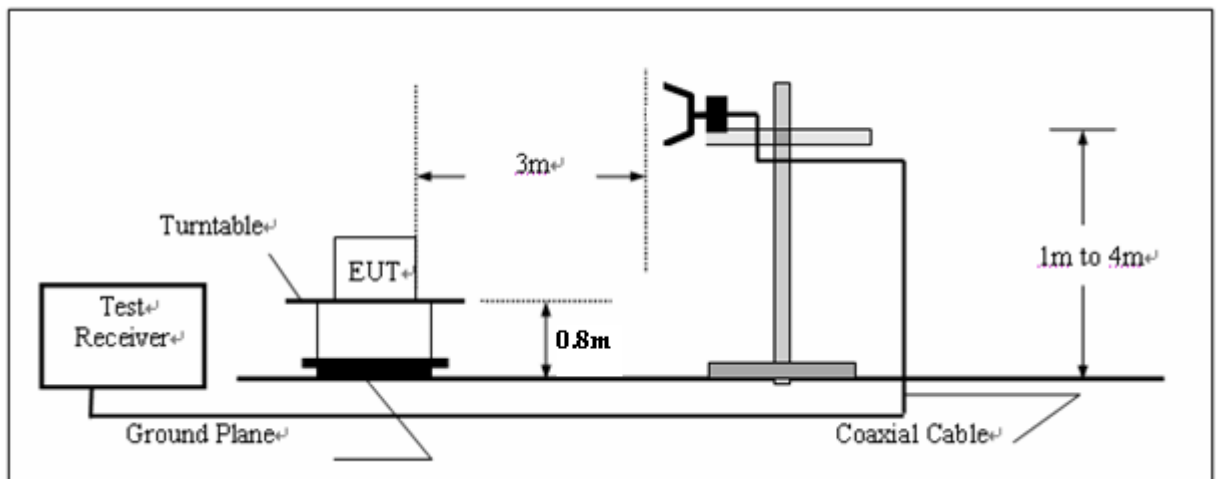
4.2. Radiated Emission

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.

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	

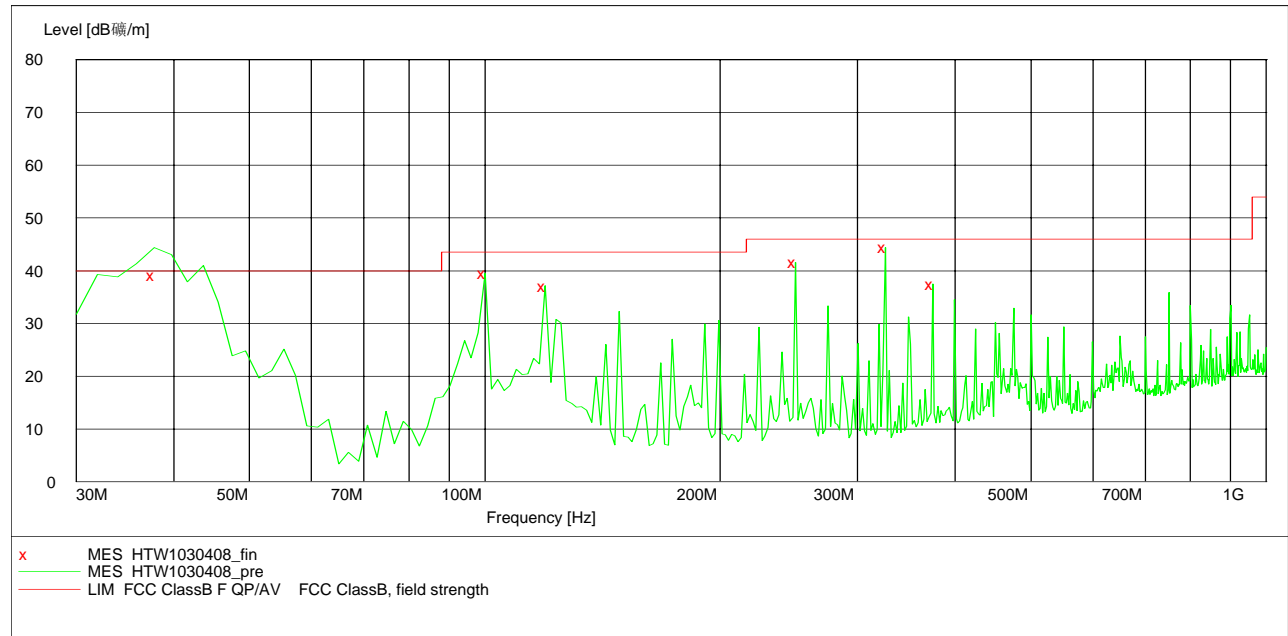
RADIATION LIMIT

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 the 100kHz 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

TEST RESULTS**For External antenna 30MHz to 1000MHz****SCAN TABLE: "test Field(30M-1G)QP"**

Short Description:			Field Strength(30M-1G)			
Start	Stop	Step	Detector	Meas.	IF	Transducer
Frequency	Frequency	Width		Time	Bandw.	
30.0 MHz	1.0 GHz	60.0 kHz	QuasiPeak	1.0 s	120 kHz	HL562 09

**MEASUREMENT RESULT: "HTW1030408_fin"**

11/1/2010 3:58PM

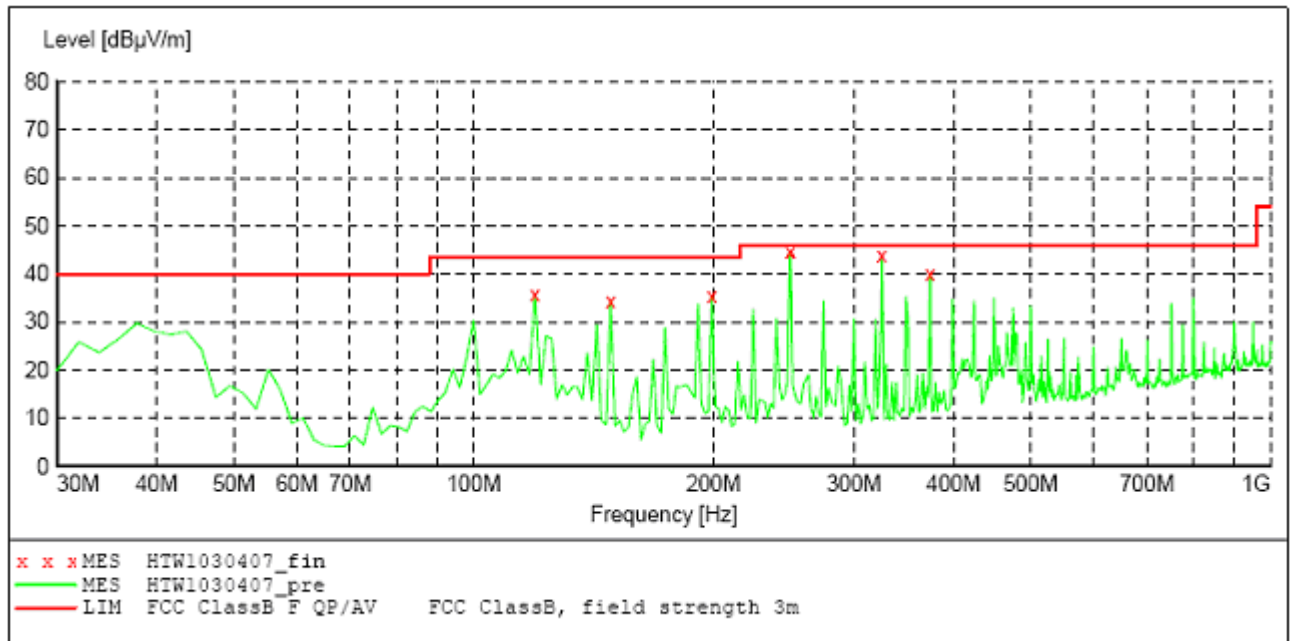
Frequency MHz	Level dBμV/m	Transd dB	Limit dBμV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
37.775551	39.10	-14.4	40.0	0.9	QP	100.0	344.00	VERTICAL
99.979960	39.50	-19.7	43.5	4.0	QP	100.0	79.00	VERTICAL
119.418838	37.10	-18.3	43.5	6.4	QP	100.0	126.00	VERTICAL
249.659319	41.60	-19.8	46.0	4.4	QP	100.0	72.00	VERTICAL
325.470942	44.40	-17.5	46.0	1.6	QP	100.0	325.00	VERTICAL
374.068136	37.50	-15.8	46.0	8.5	QP	100.0	210.00	VERTICAL

REMARKS :

- *Undetectable
- The IF bandwidth of EMI Test Receiver was 120KHz for measuring from 30 MHz to 1 GHz and 1 MHz for measuring above 1 GHz
- The Transd=Cabel loss +Antenna factor +pre-amplifier factor
- The pre-test have done for the EUT antennas at both polarization and found the worst emission at Vertical.The worst case data is recorded in the report.

SCAN TABLE: "test Field(30M-1G)QP"

Short Description: Field Strength(30M-1G)
 Start Stop Step Detector Meas. IF Transducer
 Frequency Frequency Width Time Bandw.
 30.0 MHz 1.0 GHz 60.0 kHz QuasiPeak 1.0 s 120 kHz HL562 09

**MEASUREMENT RESULT: "HTW1030407_fin"**

10/31/2010 10:05AM

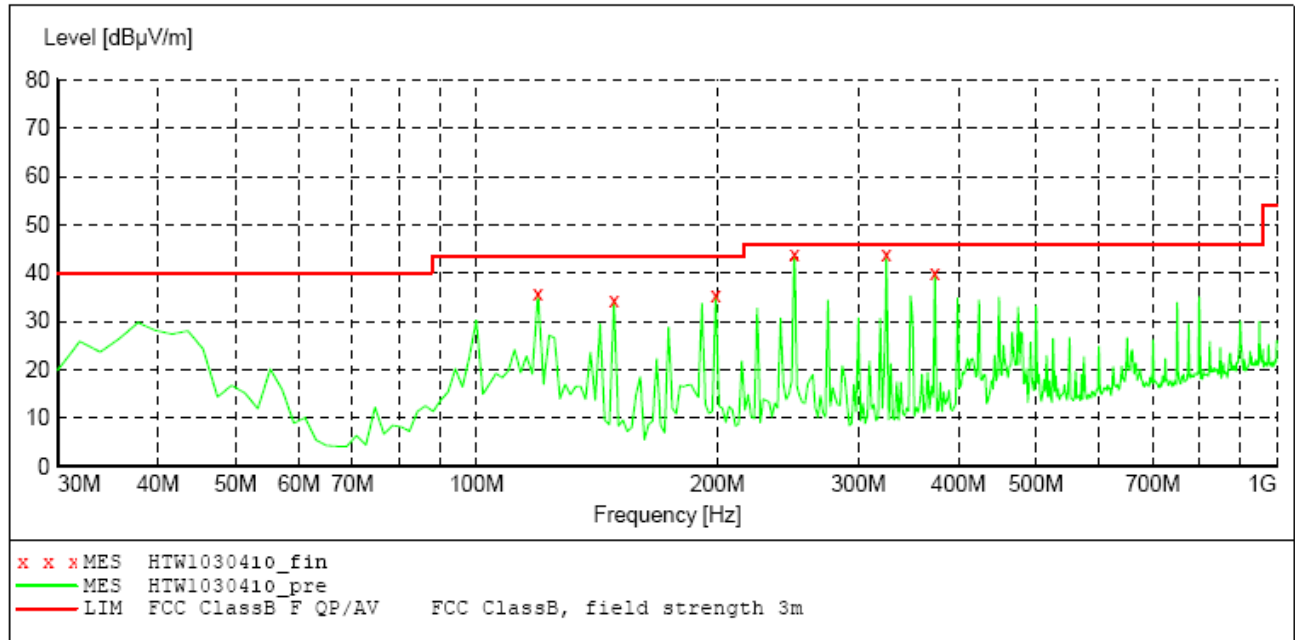
Frequency MHz	Level dBμV/m	Transd dB	Limit dBμV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
119.418838	35.80	-18.3	43.5	7.7	QP	100.0	275.00	HORIZONTAL
148.577154	34.40	-22.0	43.5	9.1	QP	100.0	298.00	HORIZONTAL
199.118236	35.40	-21.2	43.5	8.1	QP	100.0	278.00	HORIZONTAL
249.659319	45.80	-19.8	46.0	0.2	QP	100.0	298.00	HORIZONTAL
325.470942	44.10	-17.5	46.0	1.9	QP	100.0	285.00	HORIZONTAL
374.068136	40.20	-15.8	46.0	5.8	QP	100.0	231.00	HORIZONTAL

REMARKS :

1. *Undetectable
2. The IF bandwidth of EMI Test Receiver was 120KHz for measuring from 30 MHz to 1 GHz and 1 MHz for measuring above 1 GHz
3. The Transd=Cabel loss +Antenna factor +pre-amplifier factor
4. The pre-test have done for the EUT antennas at both polarization and found the worst emission at Vertical. The worst case data is recorded in the report.

Internal antenna**SCAN TABLE: "test Field(30M-1G)QP"**

Short Description:			Field Strength(30M-1G)			
Start	Stop	Step	Detector	Meas.	IF	Transducer
Frequency	Frequency	Width		Time	Bandw.	
30.0 MHz	1.0 GHz	60.0 kHz	QuasiPeak	1.0 s	120 kHz	HL562 09

**MEASUREMENT RESULT: "HTW1030410_fin"**

11/1/2010 3:58PM

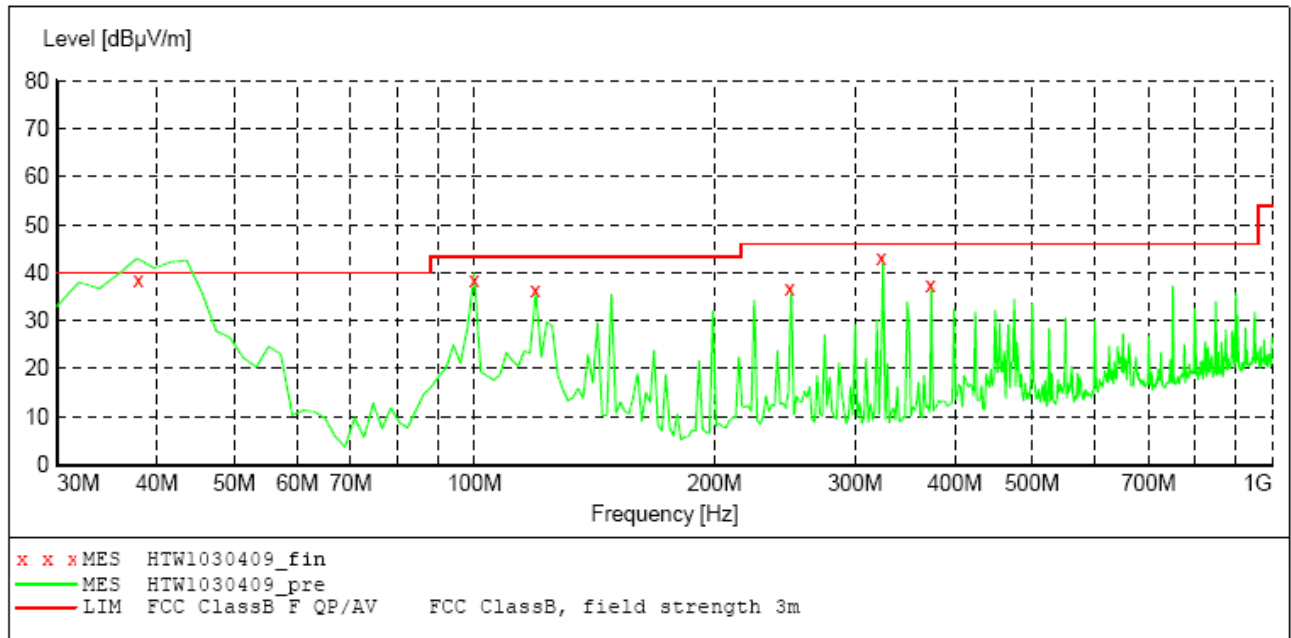
Frequency MHz	Level dBμV/m	Transd dB	Limit dBμV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
119.418838	34.30	-18.3	43.5	9.2	QP	100.0	344.00	HORIZONTAL
148.577154	33.50	-22.0	43.5	10.0	QP	100.0	179.00	HORIZONTAL
199.118236	33.50	-18.3	43.5	10.0	QP	100.0	126.00	HORIZONTAL
249.659319	43.60	-21.2	46.0	2.4	QP	100.0	272.00	HORIZONTAL
325.470942	44.00	-17.5	46.0	2.0	QP	100.0	325.00	HORIZONTAL
374.068136	38.50	-15.8	46.0	7.5	QP	100.0	210.00	HORIZONTAL

REMARKS :

- * Undetectable
- The IF bandwidth of EMI Test Receiver was 120KHz for measuring from 30 MHz to 1 GHz and 1 MHz for measuring above 1 GHz
- The Transd=Cabel loss +Antenna factor +pre-amplifier factor

SCAN TABLE: "test Field(30M-1G)QP"

Short Description:			Field Strength(30M-1G)			
Start	Stop	Step	Detector	Meas.	IF	Transducer
Frequency	Frequency	Width		Time	Bandw.	
30.0 MHz	1.0 GHz	60.0 kHz	QuasiPeak	1.0 s	120 kHz	HL562 09

**MEASUREMENT RESULT: "HTW1030409_fin"**

11/1/2010 3:58PM

Frequency MHz	Level dBμV/m	Transd dB	Limit dBμV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
37.775551	38.20	-14.4	40.0	1.8	QP	100.0	344.00	VERTICAL
99.979960	39.10	-19.7	43.5	4.4	QP	100.0	79.00	VERTICAL
119.418838	36.50	-18.3	43.5	7.0	QP	100.0	126.00	VERTICAL
249.659319	36.70	-19.8	46.0	9.3	QP	100.0	72.00	VERTICAL
325.470942	44.10	-17.5	46.0	1.9	QP	100.0	325.00	VERTICAL
374.068136	37.30	-15.8	46.0	8.7	QP	100.0	210.00	VERTICAL

REMARKS :

1. *Undetectable
2. The IF bandwidth of EMI Test Receiver was 120KHz for measuring from 30 MHz to 1 GHz and 1 MHz for measuring above 1 GHz
3. The Transd=Cabel loss +Antenna factor +pre-amplifier factor

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 antennas at both polarization and found the worst emission at Vertical.The worst case data is recorded in the report.

External Antenna

Company	Jetlun(ShenZhen)Corporation	Test Date	11/07/2010
Test Mode	Channel 11	Detector Function	Peak(PK)/Average(AV)
Product Name	ZigBee Module	Test By	Eric Zhang
Model Name	GEM0357	TEMP&Humidity	25°C, 55%

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

No.	Frequency (MHz)	Emission 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 (dB)	Correction Factor (dB/m)
1	*2405.00	100.11	PK			1.00	360	103.51	28.3	4.90	-36.6	-3.40
1	*2405.00	98.12	AV			1.00	360	101.52	28.3	4.90	-36.6	-3.40
2	4810.00	52.12	PK	74.00	21.88	1.00	359	48.92	32.7	7.00	-36.5	3.20
2	4810.00	43.15	AV	54.00	10.85	1.00	359	39.95	32.7	7.00	-36.5	3.20
3	7215.00	58.07	PK	74.00	15.93	1.00	152	48.67	35.8	8.90	-35.3	9.40
3	7215.00	48.26	AV	54.00	5.74	1.00	152	38.86	35.8	8.90	-35.3	9.40
4	9620.00	61.52	PK	74.00	12.48	1.00	140	48.92	37.2	10.20	-34.8	12.60
4	9620.00	50.25	AV	54.00	3.75	1.00	140	37.65	37.2	10.20	-34.8	12.60

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

No.	Frequency (MHz)	Emission 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 (dB)	Correction Factor (dB/m)
1	*2405.00	103.20	PK			1.0	124	106.60	28.3	4.90	-36.6	-3.40
1	*2405.00	100.01	AV			1.0	124	103.41	28.3	4.90	-36.6	-3.40
2	4810.00	57.85	PK	74.00	16.15	1.0	339	54.65	32.7	7.00	-36.5	3.20
2	4810.00	45.45	AV	54.00	8.55	1.0	339	42.25	32.7	7.00	-36.5	3.20
3	7215.00	63.59	PK	74.00	10.41	1.0	340	54.19	35.8	8.90	-35.3	9.40
3	7215.00	49.52	AV	54.00	4.48	1.0	340	40.12	35.8	8.90	-35.3	9.40
4	9620.00	64.79	PK	74.00	9.21	1.0	20	52.19	37.2	10.20	-34.8	12.60
4	9620.00	52.26	AV	54.00	1.74	1.0	20	39.66	37.2	10.20	-34.8	12.60

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. “* “: Fundamental frequency

Company	Jetlun(ShenZhen)Corporation	Test Date	11/07/2010
Test Mode	Channel 18	Detector Function	Peak(PK)/Average(AV)
Product Name	ZigBee Module	Test By	Eric Zhang
Model Name	GEM0357	TEMP&Humidity	25°C, 55%

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

No.	Frequency (MHz)	Emission 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 (dB)	Correction Factor (dB/m)
1	*2440.00	104.59	PK			1.00 H	153	107.79	28.3	5.10	-36.6	-3.20
1	*2440.00	101.05	AV			1.00 H	153	104.25	28.3	5.10	-36.6	-3.20
2	4880.00	56.88	PK	74.00	17.12	1.00 H	202	53.48	32.3	7.60	-36.5	3.40
2	4880.00	45.15	AV	54.00	8.85	1.00 H	202	41.75	32.3	7.60	-36.5	3.40
3	7320.00	63.04	PK	74.00	10.96	1.00 H	355	53.64	36.1	8.60	-35.3	9.40
3	7320.00	49.85	AV	54.00	4.15	1.00 H	355	40.45	36.1	8.60	-35.3	9.40
4	9760.00	65.47	PK	74.00	8.53	1.00 H	28	52.87	37.2	10.20	-34.8	12.60
4	9760.00	52.45	AV	54.00	1.55	1.00 H	28	39.85	37.2	10.20	-34.8	12.60

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

No.	Frequency (MHz)	Emission 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 (dB)	Correction Factor (dB/m)
1	*2440.00	106.59	PK			1.00 V	121	109.79	28.3	5.10	-36.6	-3.20
1	*2440.00	101.85	AV			1.00 V	121	105.05	28.3	5.10	-36.6	-3.20
2	4880.00	60.22	PK	74.00	13.78	1.00 V	97	56.82	32.3	7.60	-36.5	3.40
2	4880.00	47.52	AV	54.00	6.48	1.00 V	97	44.12	32.3	7.60	-36.5	3.40
3	7320.00	63.97	PK	74.00	10.03	1.00 V	288	54.57	36.1	8.60	-35.3	9.40
3	7320.00	49.96	AV	54.00	4.04	1.00 V	288	40.56	36.1	8.60	-35.3	9.40
4	9760.00	63.98	PK	74.00	10.02	1.00 V	89	51.38	37.2	10.20	-34.8	12.60
4	9760.00	49.96	AV	54.00	4.04	1.00 V	89	37.36	37.2	10.20	-34.8	12.60

- 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. “* “: Fundamental frequency

Company	Jetlun(ShenZhen)Corporation	Test Date	11/07/2010
Test Mode	Channel 26	Detector Function	Peak(PK)/Average(AV)
Product Name	ZigBee Module	Test By	Eric Zhang
Model Name	GEM0357	TEMP&Humidity	25°C, 55%

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

No.	Frequency (MHz)	Emission 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 (dB)	Correction Factor (dB/m)
1	*2480.00	95.85	PK		1.00 H	156	99.15	28.2	5.10	-36.6	-3.30
1	*2480.00	87.15	AV		1.00 H	156	90.45	28.2	5.10	-36.6	-3.30
2	4960.00	43.15	PK	74.00	1.00 H	198	39.35	33.0	7.00	-36.2	3.80
2	4960.00	38.52	AV	54.00	1.00 H	198	34.72	33.0	7.00	-36.2	3.80
3	7340.00	48.96	PK	74.00	1.00 H	90	39.56	36.2	8.50	-35.3	9.40
3	7340.00	40.52	AV	54.00	1.00 H	90	31.12	36.2	8.50	-35.3	9.40
4	9920.00	59.26	PK	74.00	1.00 H	124	46.56	37.4	10.10	-34.8	12.70
4	9420.00	47.28	AV	54.00	1.00 H	124	34.58	37.4	10.10	-34.8	12.70

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

No.	Frequency (MHz)	Emission 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 (dB)	Correction Factor (dB/m)
1	*2480.00	96.66	PK		1.0	125	99.96	28.2	5.10	-36.6	-3.30
1	*2480.00	87.85	AV		1.0	125	91.15	28.2	5.10	-36.6	-3.30
2	4960.00	45.81	PK	74.00	1.0	96	42.01	36.2	8.50	-35.3	3.80
2	4960.00	37.14	AV	54.00	1.0	96	33.34	36.2	8.50	-35.3	3.80
3	7340.00	51.50	PK	74.00	1.0	35	42.10	37.4	10.10	-34.8	9.40
3	7340.00	41.63	AV	54.00	1.0	35	32.23	37.4	10.10	-34.8	9.40
4	9920.00	56.84	PK	74.00	1.0	37	44.14	28.2	5.10	-36.6	12.70
4	9420.00	47.89	AV	54.00	1.0	37	35.19	28.2	5.10	-36.6	12.70

- 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

Internal Antenna

Company	Jetlun(ShenZhen)Corporation	Test Date	11/07/2010
Test Mode	Channel 11	Detector Function	Peak(PK)/Average(AV)
Product Name	ZigBee Module	Test By	Eric Zhang
Model Name	GEM0357	TEMP&Humidity	25°C, 55%

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

No.	Frequency (MHz)	Emission 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 (dB)	Correction Factor (dB/m)
1	*2405.00	97.85	PK			1.00	360	101.25	28.3	4.90	-36.6	-3.40
1	*2405.00	96.85	AV			1.00	360	100.25	28.3	4.90	-36.6	-3.40
2	4810.00	52.41	PK	74.00	21.59	1.00	359	49.21	32.7	7.00	-36.5	3.20
2	4810.00	43.62	AV	54.00	10.38	1.00	359	40.42	32.7	7.00	-36.5	3.20
3	7215.00	57.21	PK	74.00	16.79	1.00	152	47.81	35.8	8.90	-35.3	9.40
3	7215.00	46.85	AV	54.00	7.15	1.00	152	37.45	35.8	8.90	-35.3	9.40
4	9620.00	60.02	PK	74.00	13.98	1.00	140	47.42	37.2	10.20	-34.8	12.60
4	9620.00	49.85	AV	54.00	4.15	1.00	140	37.25	37.2	10.20	-34.8	12.60

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

No.	Frequency (MHz)	Emission 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 (dB)	Correction Factor (dB/m)
1	*2405.00	98.48	PK			1.0	124	101.88	28.3	4.90	-36.6	-3.40
1	*2405.00	97.15	AV			1.0	124	100.55	28.3	4.90	-36.6	-3.40
2	4810.00	56.10	PK	74.00	17.9	1.0	339	52.9	32.7	7.00	-36.5	3.20
2	4810.00	44.58	AV	54.00	9.42	1.0	339	41.38	32.7	7.00	-36.5	3.20
3	7215.00	60.75	PK	74.00	13.25	1.0	340	51.35	35.8	8.90	-35.3	9.40
3	7215.00	46.05	AV	54.00	7.95	1.0	340	36.65	35.8	8.90	-35.3	9.40
4	9620.00	59.58	PK	74.00	14.42	1.0	20	46.98	37.2	10.20	-34.8	12.60
4	9620.00	48.59	AV	54.00	5.41	1.0	20	35.99	37.2	10.20	-34.8	12.60

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. "** ": Fundamental frequency

Company	Jetlun(ShenZhen)Corporation	Test Date	11/07/2010
Test Mode	Channel 18	Detector Function	Peak(PK)/Average(AV)
Product Name	ZigBee Module	Test By	Eric Zhang
Model Name	GEM0357	TEMP&Humidity	25°C, 55%

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

No.	Frequency (MHz)	Emission 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 (dB)	Correction Factor (dB/m)
1	*2440.00	102.51	PK		1.00 H	153	105.71	28.3	5.10	-36.6	-3.20
1	*2440.00	97.85	AV		1.00 H	153	101.05	28.3	5.10	-36.6	-3.20
2	4880.00	54.84	PK	74.00	1.00 H	202	51.44	32.3	7.60	-36.5	3.40
2	4880.00	43.22	AV	54.00	1.00 H	202	39.82	32.3	7.60	-36.5	3.40
3	7320.00	61.58	PK	74.00	1.00 H	355	52.18	36.1	8.60	-35.3	9.40
3	7320.00	47.85	AV	54.00	1.00 H	355	38.45	36.1	8.60	-35.3	9.40
4	9760.00	63.58	PK	74.00	1.00 H	28	50.98	37.2	10.20	-34.8	12.60
4	9760.00	50.04	AV	54.00	1.00 H	28	37.44	37.2	10.20	-34.8	12.60

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

No.	Frequency (MHz)	Emission 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 (dB)	Correction Factor (dB/m)
1	*2440.00	103.02	PK		1.00 V	121	106.22	28.3	5.10	-36.6	-3.20
1	*2440.00	98.56	AV		1.00 V	121	101.76	28.3	5.10	-36.6	-3.20
2	4880.00	58.62	PK	74.00	1.00 V	97	55.22	32.3	7.60	-36.5	3.40
2	4880.00	46.52	AV	54.00	1.00 V	97	43.12	32.3	7.60	-36.5	3.40
3	7320.00	61.65	PK	74.00	1.00 V	288	52.25	36.1	8.60	-35.3	9.40
3	7320.00	47.56	AV	54.00	1.00 V	288	38.16	36.1	8.60	-35.3	9.40
4	9760.00	62.36	PK	74.00	1.00 V	89	49.76	37.2	10.20	-34.8	12.60
4	9760.00	49.41	AV	54.00	1.00 V	89	36.81	37.2	10.20	-34.8	12.60

- 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. “* “: Fundamental frequency

Company	Jetlun(ShenZhen)Corporation	Test Date	11/07/2010
Test Mode	Channel 26	Detector Function	Peak(PK)/Average(AV)
Product Name	ZigBee Module	Test By	Eric Zhang
Model Name	GEM0357	TEMP&Humidity	25°C, 55%

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

No.	Frequency (MHz)	Emission 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 (dB)	Correction Factor (dB/m)
1	*2480.00	89.45	PK		1.00 H	156	92.75	28.2	5.10	-36.6	-3.30
1	*2480.00	87.52	AV		1.00 H	156	90.82	28.2	5.10	-36.6	-3.30
2	4960.00	42.89	PK	74.00	1.00 H	198	39.09	33.0	7.00	-36.2	3.80
2	4960.00	38.26	AV	54.00	1.00 H	198	34.46	33.0	7.00	-36.2	3.80
3	7340.00	48.70	PK	74.00	1.00 H	90	39.30	36.2	8.50	-35.3	9.40
3	7340.00	40.26	AV	54.00	1.00 H	90	30.86	36.2	8.50	-35.3	9.40
4	9920.00	59.00	PK	74.00	1.00 H	124	46.30	37.4	10.10	-34.8	12.70
4	9420.00	47.02	AV	54.00	1.00 H	124	34.32	37.4	10.10	-34.8	12.70

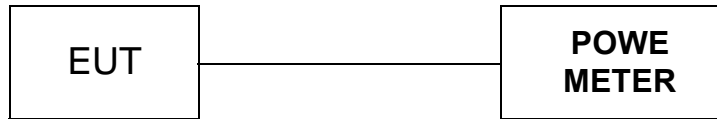
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

No.	Frequency (MHz)	Emission 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 (dB)	Correction Factor (dB/m)
1	*2480.00	90.26	PK		1.0	125	93.56	28.2	5.10	-36.6	-3.30
1	*2480.00	89.34	AV		1.0	125	92.64	28.2	5.10	-36.6	-3.30
2	4960.00	45.48	PK	74.00	1.0	96	41.68	36.2	8.50	-35.3	3.80
2	4960.00	36.81	AV	54.00	1.0	96	33.01	36.2	8.50	-35.3	3.80
3	7340.00	51.17	PK	74.00	1.0	35	41.77	37.4	10.10	-34.8	9.40
3	7340.00	41.30	AV	54.00	1.0	35	31.90	37.4	10.10	-34.8	9.40
4	9920.00	56.51	PK	74.00	1.0	37	43.81	28.2	5.10	-36.6	12.70
4	9420.00	47.56	AV	54.00	1.0	37	34.86	28.2	5.10	-36.6	12.70

- 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

4.3. Maximum Peak Output Power

TEST CONFIGURATION



TEST PROCEDURE

The EUT was directly connected to the power meter and antenna output port as show in the block diagram as TEST CONFIGURATION shows.

LIMIT

The Maximum Peak Output Power Measurement is 30dBm.

TEST RESULTS

Company	Jetlun(ShenZhen)Corporation	Test Date	11/07/2010
Product Name	ZigBee Module	Test By	Eric Zhang
Model Name	GEM0357	TEMP&Humidity	25°C, 55%

External

Channel Number	Channel Frequency (MHz)	Peak Power Output (dBm)	Peak Power Limit (dBm)	Pass / Fail
11	2405	17.55	30	PASS
18	2440	18.27	30	PASS
26	2480	0.83	30	PASS

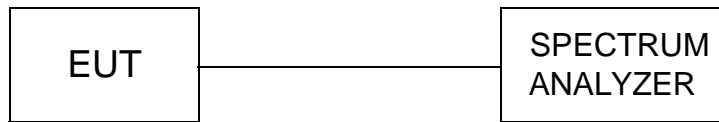
Internal

Channel Number	Channel Frequency (MHz)	Peak Power Output (dBm)	Peak Power Limit (dBm)	Pass / Fail
11	2405	17.25	30	PASS
18	2440	18.06	30	PASS
26	2480	0.71	30	PASS

Note: The test results including the cable lose.

4.4. Power Spectral Density

TEST CONFIGURATION



TEST PROCEDURE

1. Set CENTER FREQUENCY = Frequency from Power Spectral Density Test Matrix
2. Set SPAN = 20 MHz (For devices with a nominal 40 MHz BW, 50 MHz span will be needed)
3. Set REFERENCE LEVEL = 20 dBm
4. Set ATTENUATION = 0 dB (add attenuation, if necessary)
5. Set SWEEP TIME = Coupled
6. Set RBW = 3 kHz
7. Set VBW = 10 kHz
8. Set DETECTOR = Peak
9. Set MKR = Center Frequency
10. Set TRACE = CLEAR WRITE

Place the radio in continuous transmit mode. Set the TRACE to MAX HOLD, and after the trace stabilizes, the TRACE to VIEW. Set the marker on the peak of the signal and then adjust the center frequency of the spectrum analyzer to the marker frequency. After viewing the EUT waveform on the spectrum analyzer, perform the following spectrum analyzer functions to capture the trace:

11. Set SPAN = 300 kHz
12. Set SWEEP TIME = 100 s
13. Set TRACE = MAX HOLD
14. Set MKR = PEAK SEARCH
15. Record the marker level for the particular mode. Repeat these steps for other device modes.

LIMIT

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

TEST RESULTS

Company	Jetlun(ShenZhen)Corporation	Test Date	11/07/2010
Product Name	ZigBee Module	Test By	Eric Zhang
Model Name	GEM0357	TEMP&Humidity	25°C, 55%

External

CHANNEL NUMBER	CHANNEL FREQUENCY (MHz)	RF POWER LEVEL IN 3 KHz BW (dBm)	MAXIMUM LIMIT (dBm)	PASS/FAIL
11	2405	3.52	8	PASS
18	2440	3.90	8	PASS
26	2480	-14.12	8	PASS

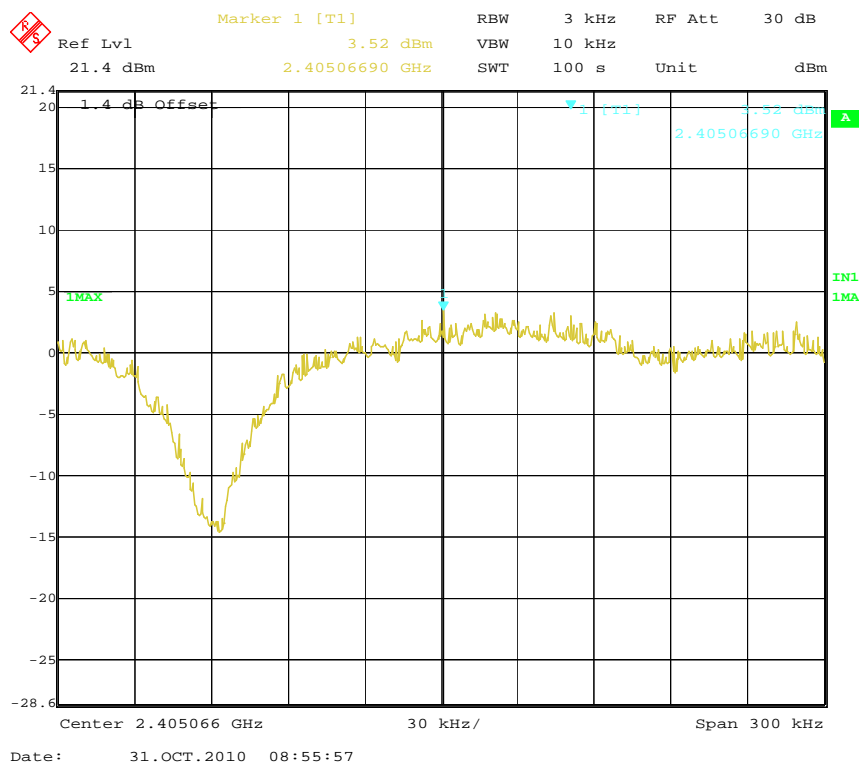
Internal

CHANNEL NUMBER	CHANNEL FREQUENCY (MHz)	RF POWER LEVEL IN 3 KHz BW (dBm)	MAXIMUM LIMIT (dBm)	PASS/FAIL
11	2405	2.75	8	PASS
18	2440	3.59	8	PASS
26	2480	-14.48	8	PASS

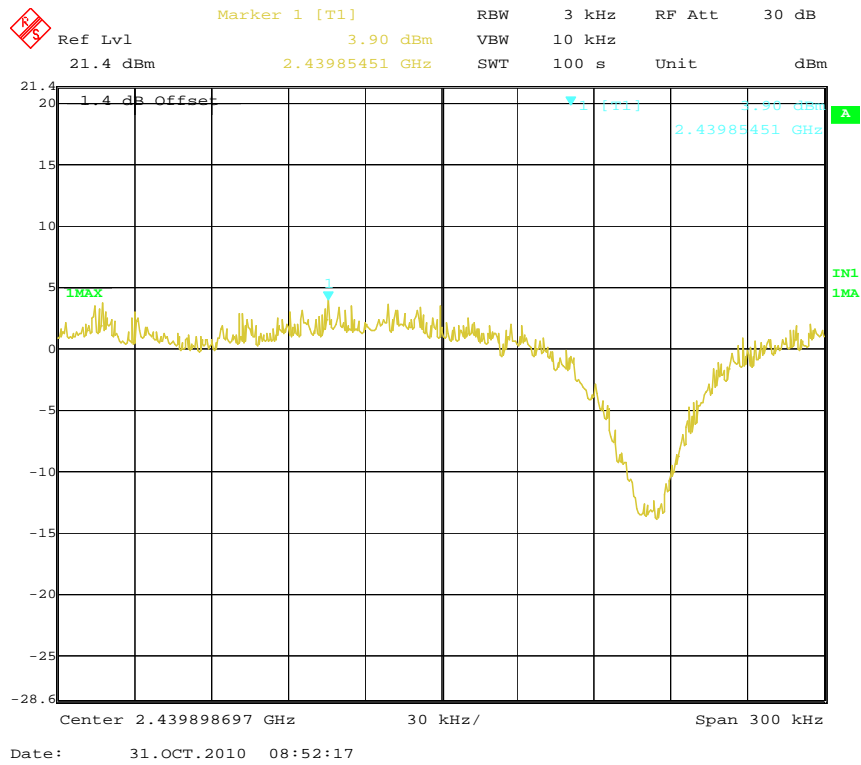
Note: The test results including the cable lose.

Photos of Power Spectral Density Measurement

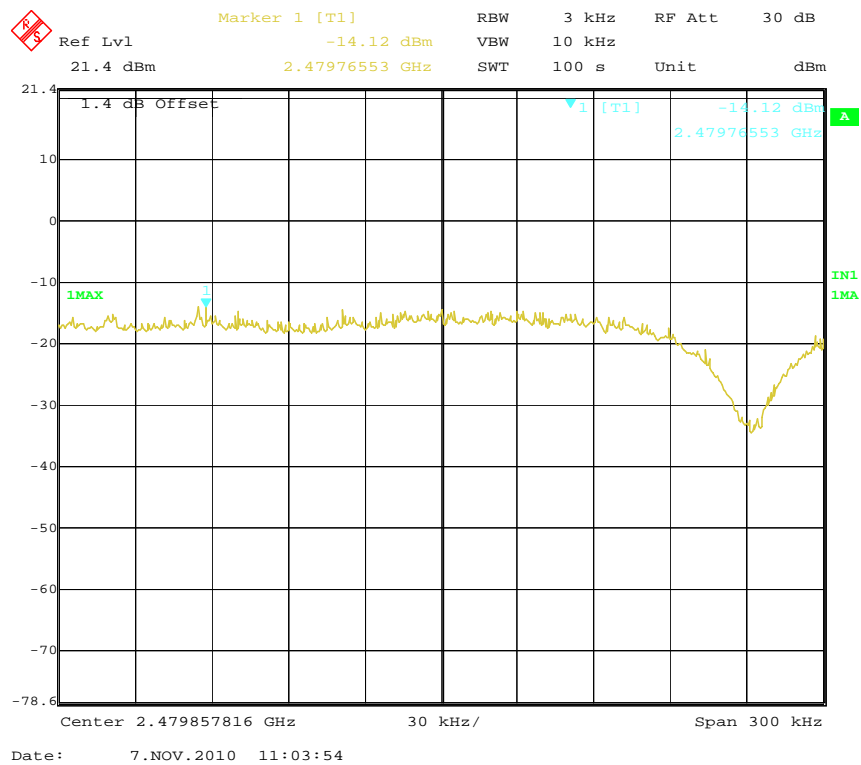
Exernal antenna Channel 11



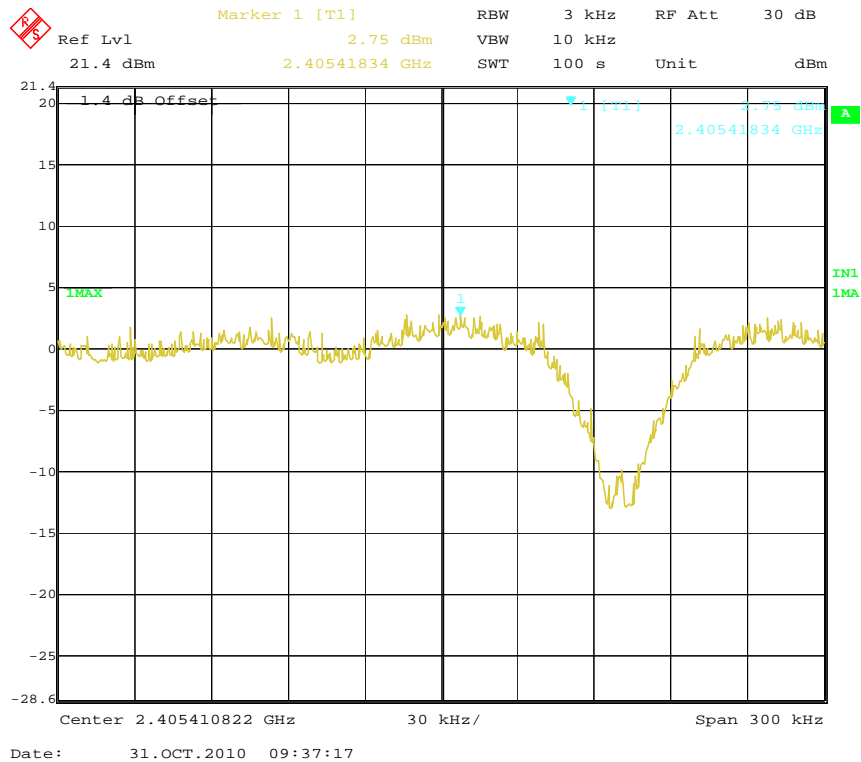
Channel 18



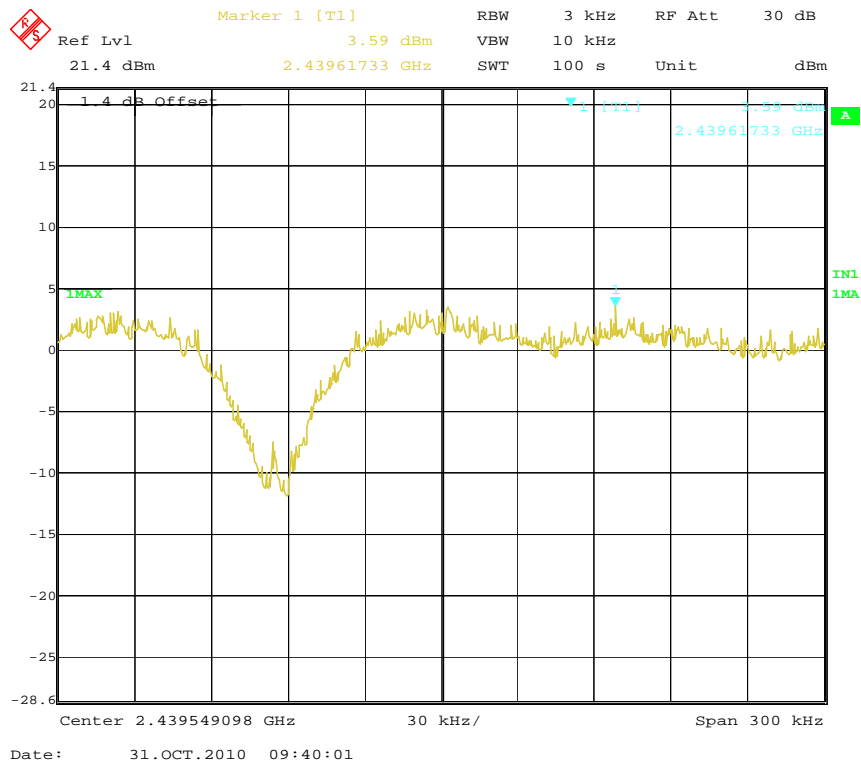
Channel 26



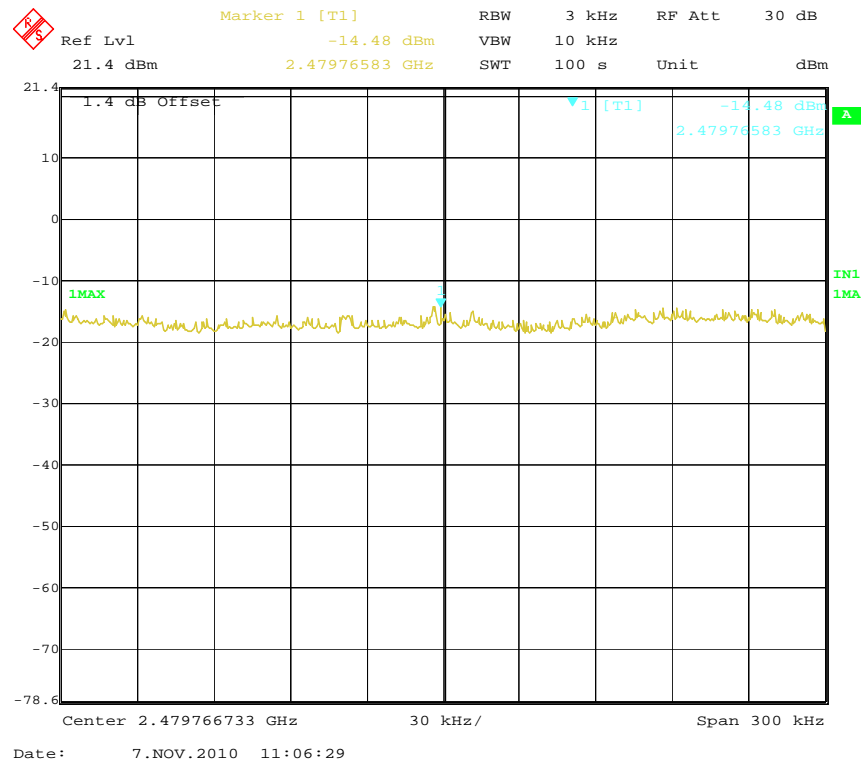
Internal antenna Channel 11



Channel 18

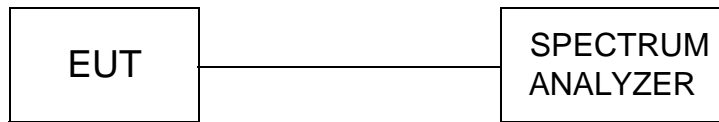


Channel 26



4.5. Band Edge Compliance of RF Emission

TEST CONFIGURATION



TEST PROCEDURE

The band edge compliance of RF radiated emission should be measured by following the guidance in ANSI C63.4:2009 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 set RBW to 1MHz and VBW to 10Hz to measure the average radiated field strength.

The conducted RF band edge was measured by using a spectrum analyzer. Set span wide enough to capture the highest in-band emission and the emission at the band edge. Set RBW and VBW to 100 kHz, to measure the conducted peak band edge.

LIMIT

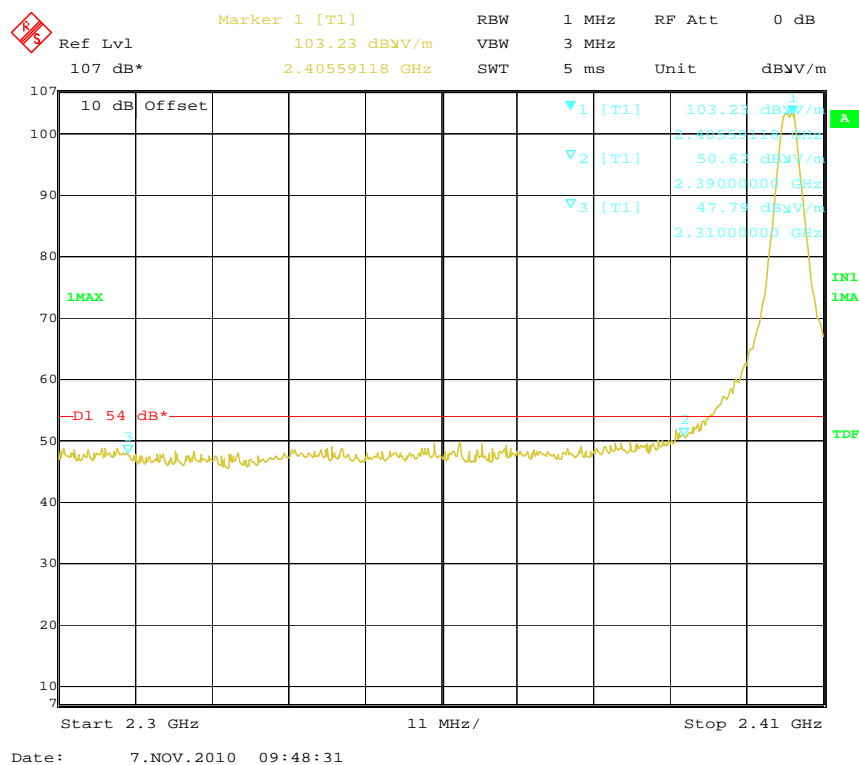
Fall in the restricted bands listed in section 15.205. The maximum permitted average field strength is listed in section 15.209(see Section 15.205(c)).

Frequency (MHz)	Limit Average (dBuV/m)	Limit Peak (dBuV/m)
Below 2390 or Above 2483.5	54	74

TEST RESULTS

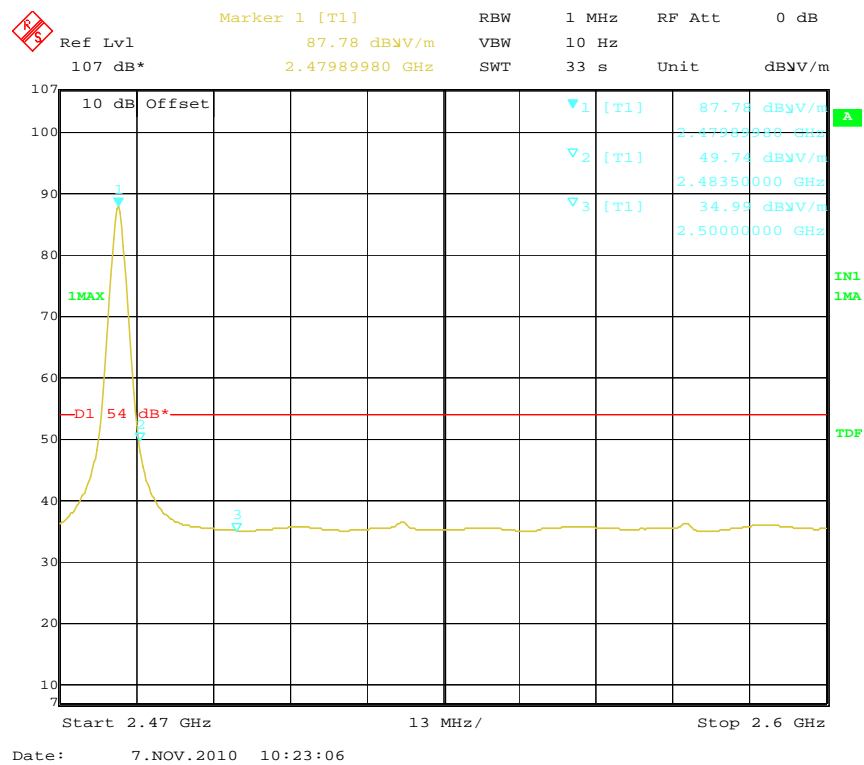
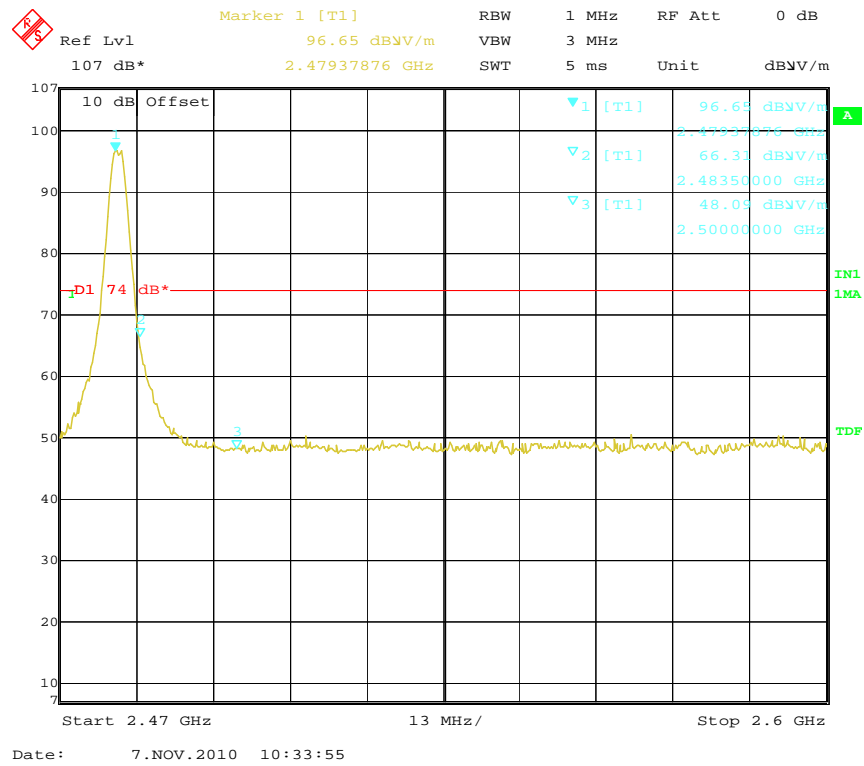
Photos of Band Edge Measurement External antenna

Channel 11 Worst case Polarity: Ver.



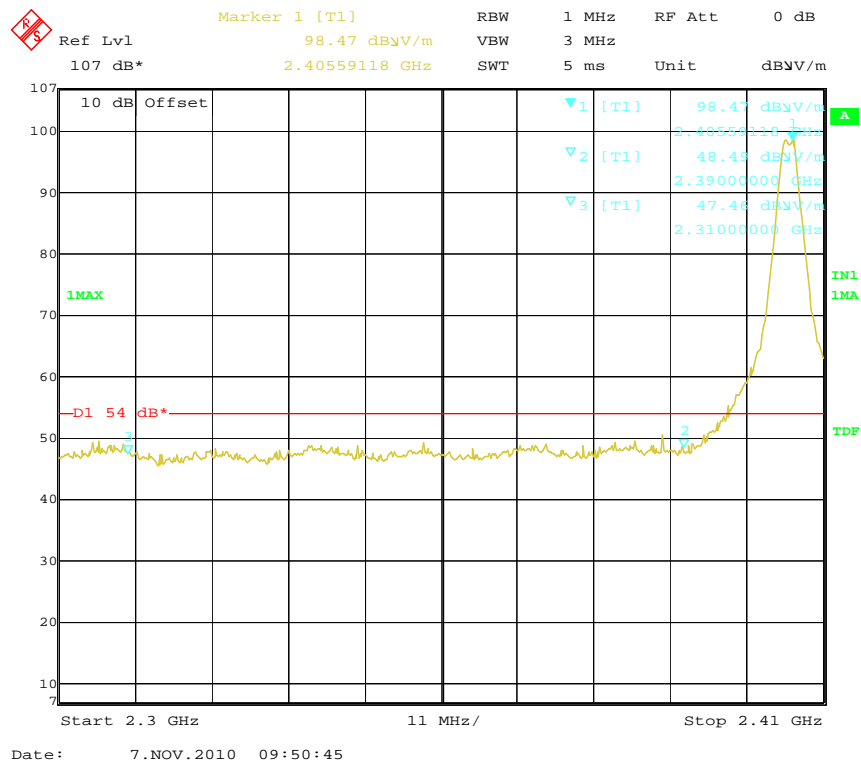
Note : The average measurement was not performed when the peak measured data under the limit of average detection.

Channel 26 Worst case Polarity: Ver.



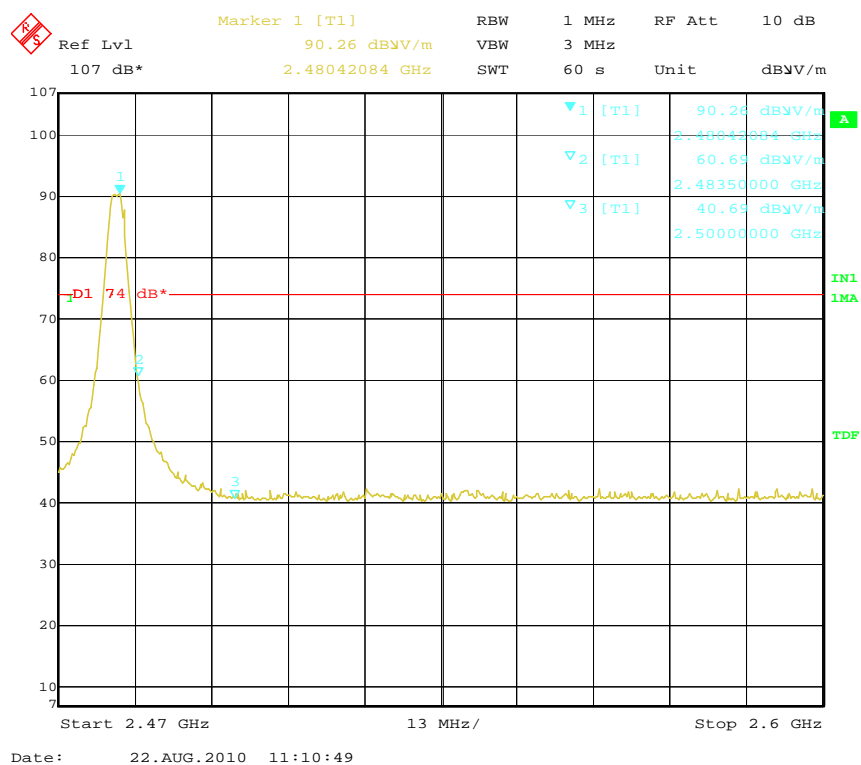
Internal antenna

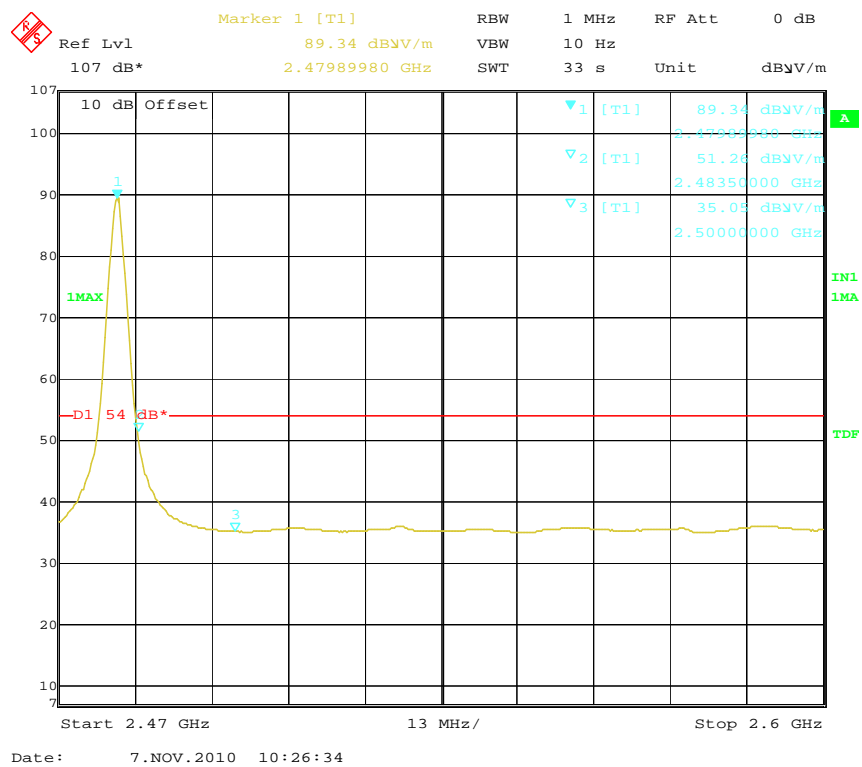
Channel 11 Worst case Polarity: Ver.



Note : The average measurement was not performed when the peak measured data under the limit of average detection.

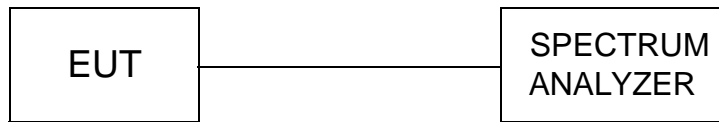
Channel 26 Worst case Polarity: Ver.





4.6. 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 C63.4-2009 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 measure frequency range from 30MHz to 26.5GHz.

LIMIT

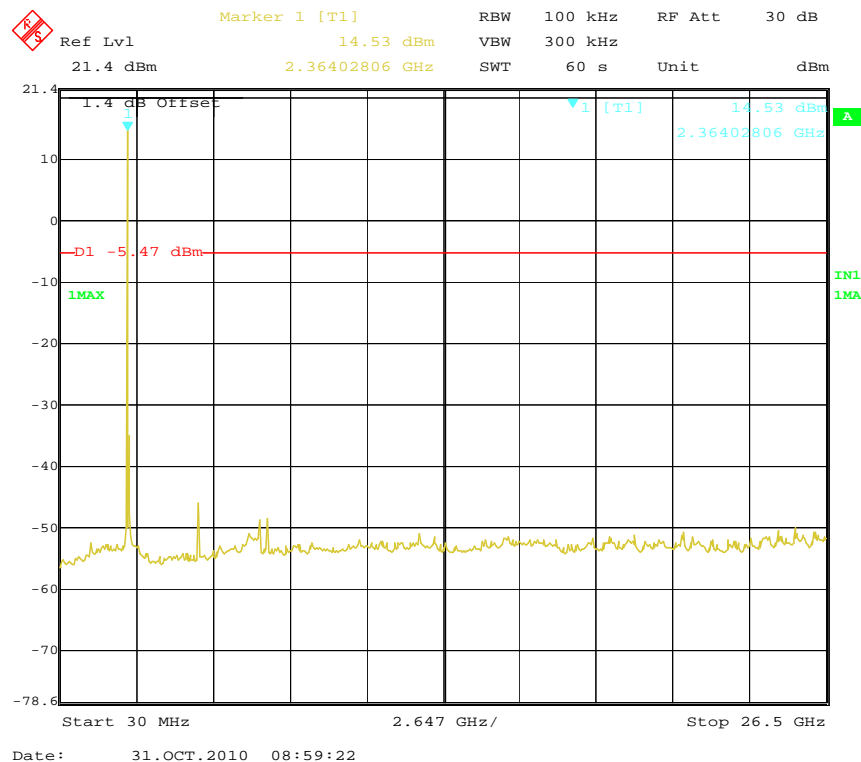
1. Below -20dB of the highest emission level in operating band.
2. Fall in the restricted bands listed in section 15.205. The maximum permitted average field strength is listed in section 15.209.

TEST RESULTS

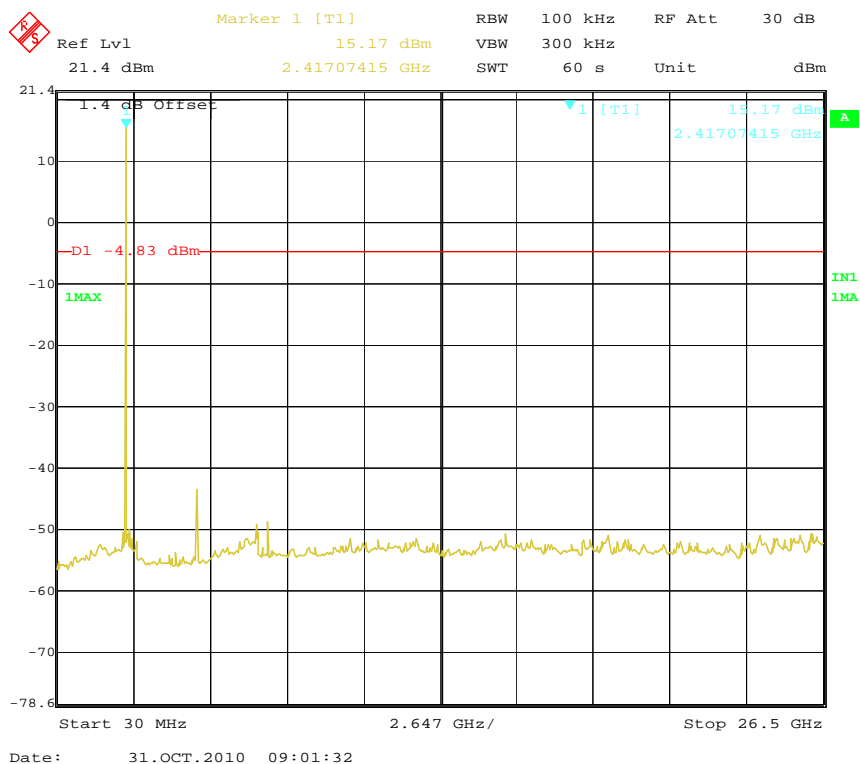
Photo of Spurious RF Conducted Emission Measurement

External antenna

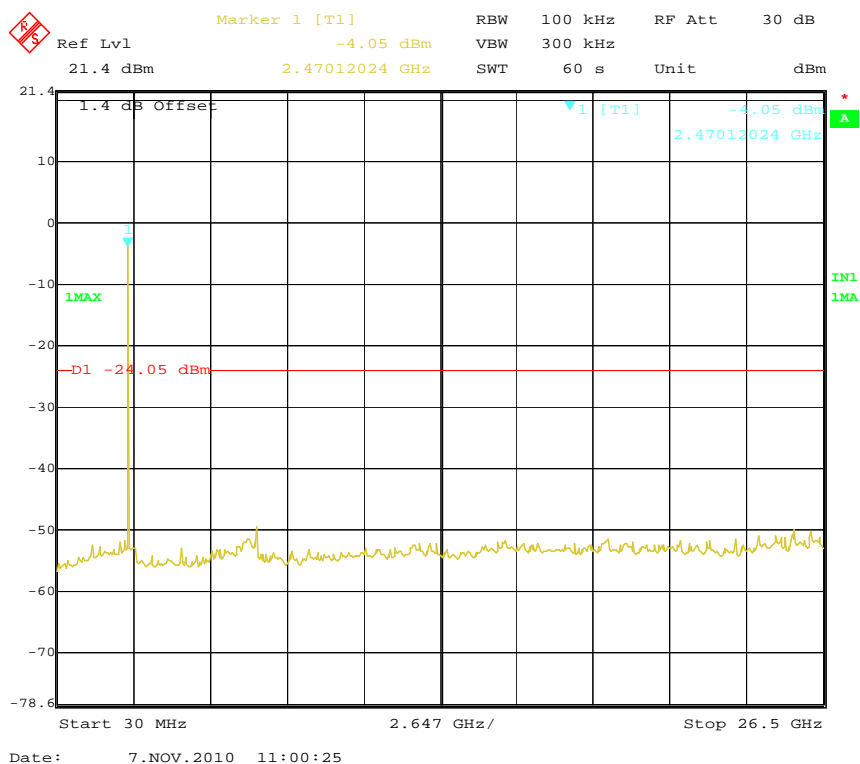
Channel 11



Channel 18

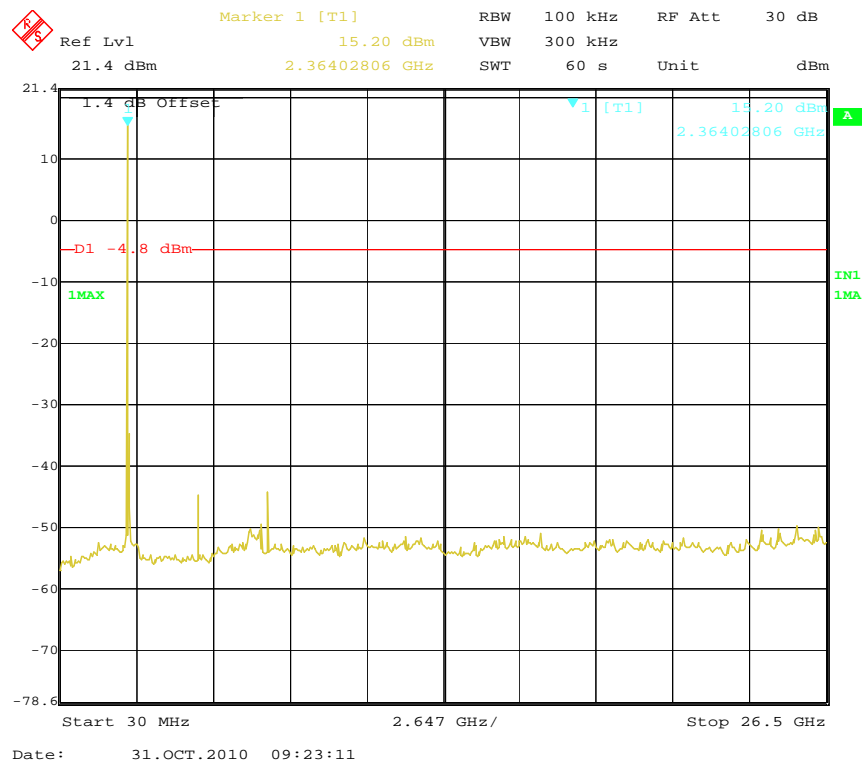


Channel 26

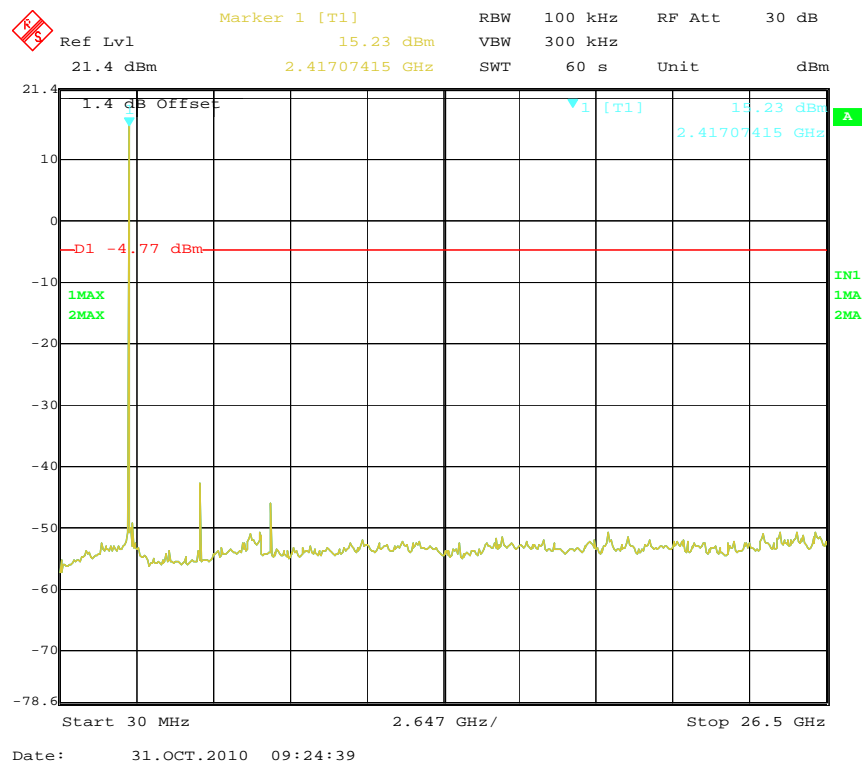


Internal antenna

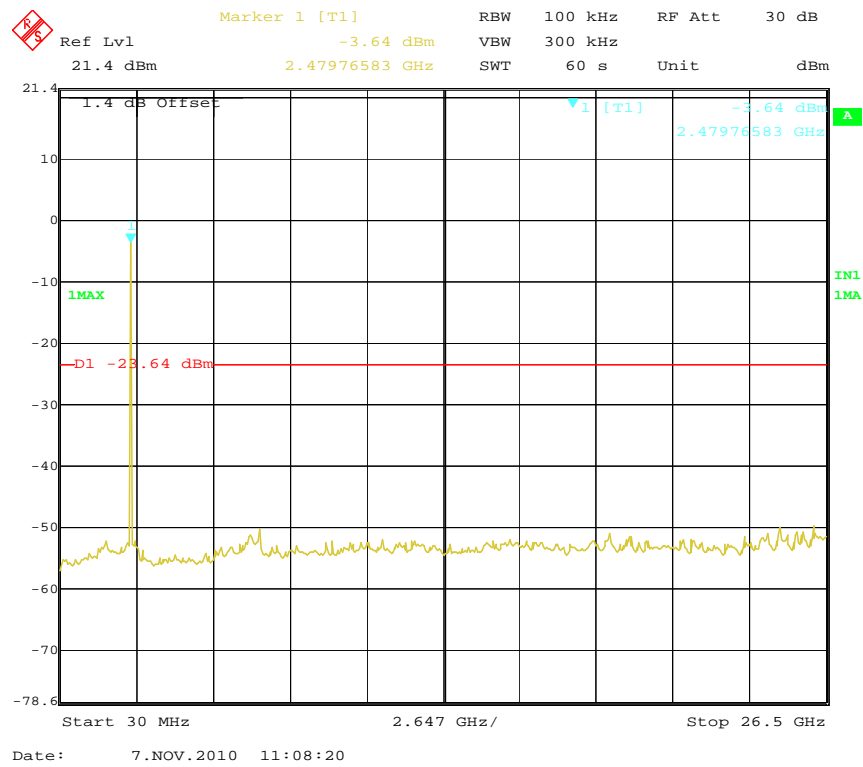
Channel 11



Channel 18

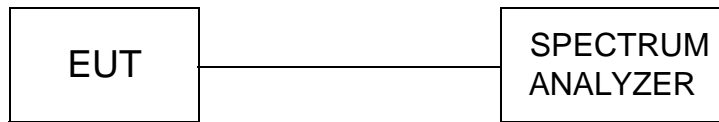


Channel 26



4.7. 6dB 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 100 KHz RBW and 300KHz VBW.

The 6dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 6dB.

LIMIT

For digital modulation systems, the minimum 6 dB bandwidth shall be at least 500 kHz.

TEST RESULTS

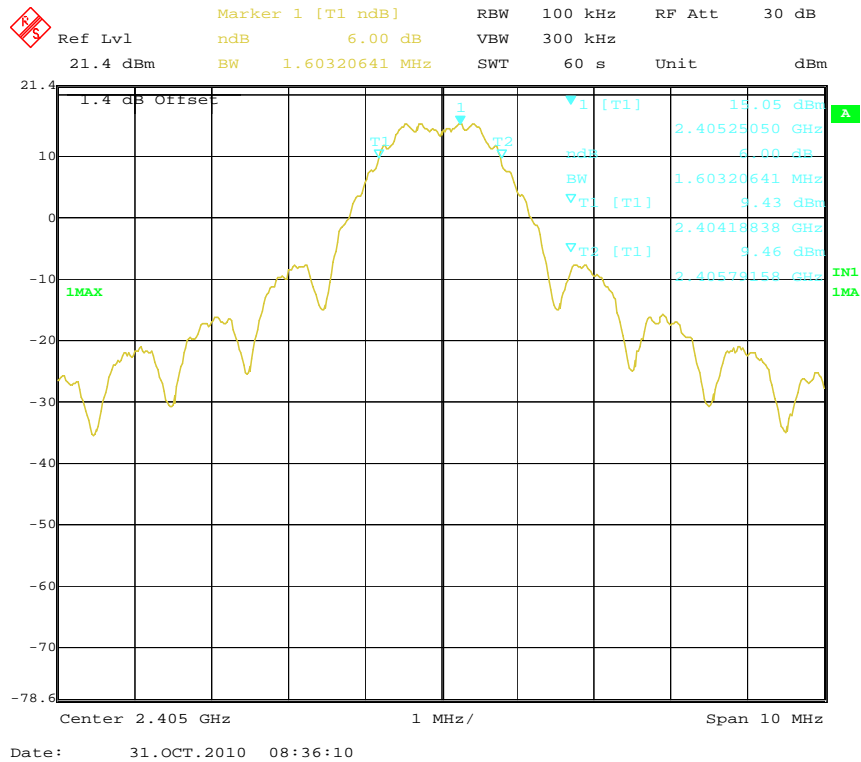
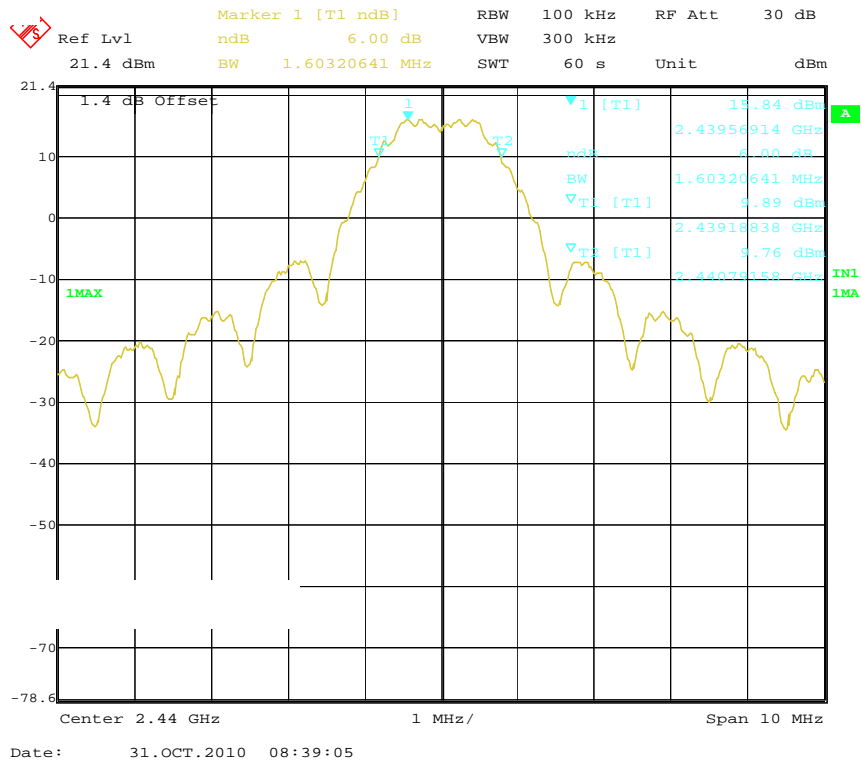
Company	Jetlun(ShenZhen)Corporation	Test Date	11/07/2010
Product Name	ZigBee Module	Test By	Eric Zhang
Model Name	GEM0357	TEMP&Humidity	25°C, 55%

External

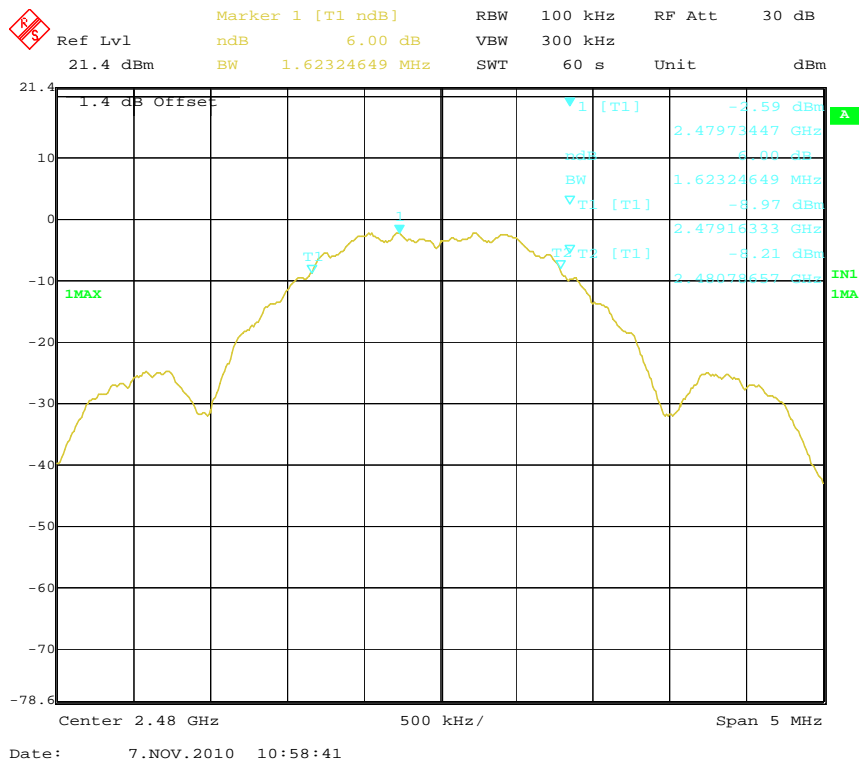
CHANNEL	CHANNEL FREQUENCY (MHz)	6 dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS/FAIL
11	2405	1.6032	0.5	PASS
18	2440	1.6032	0.5	PASS
26	2480	1.6232	0.5	PASS

Internal

CHANNEL	CHANNEL FREQUENCY (MHz)	6 dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS/FAIL
11	2405	1.6232	0.5	PASS
18	2440	1.6032	0.5	PASS
26	2480	1.6232	0.5	PASS

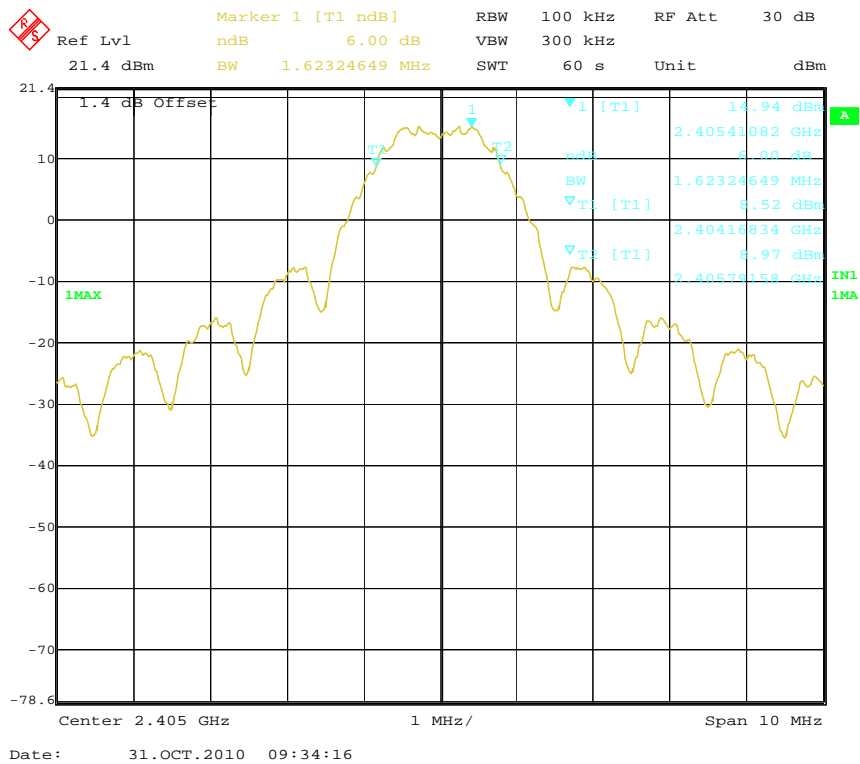
Photos of 6dB Bandwidth Measurement**External antenna
Channel 11****Channel 18**

Channel 26

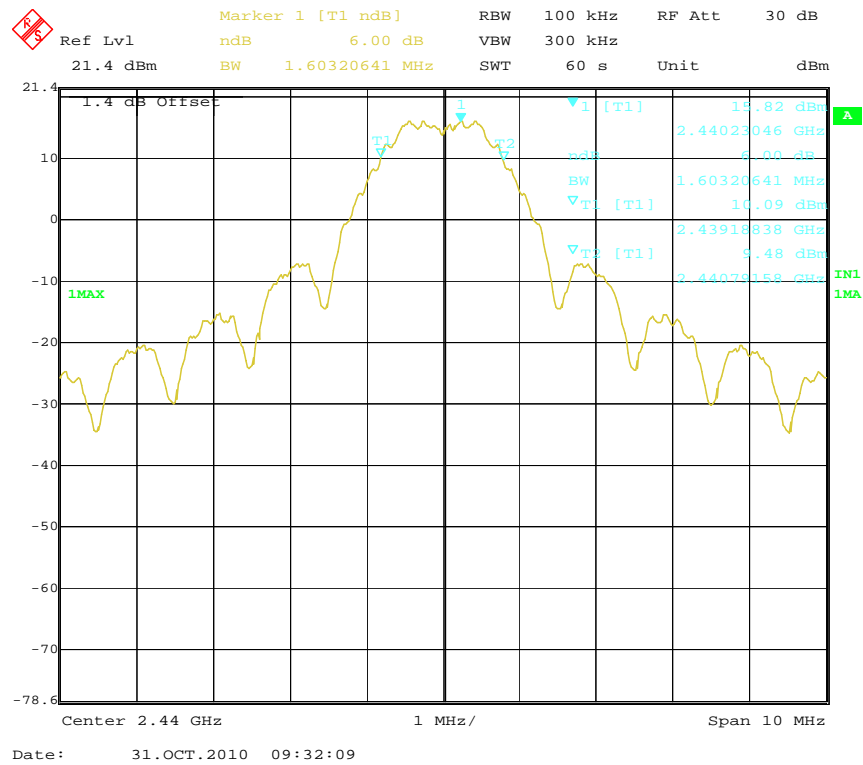


Internal antenna

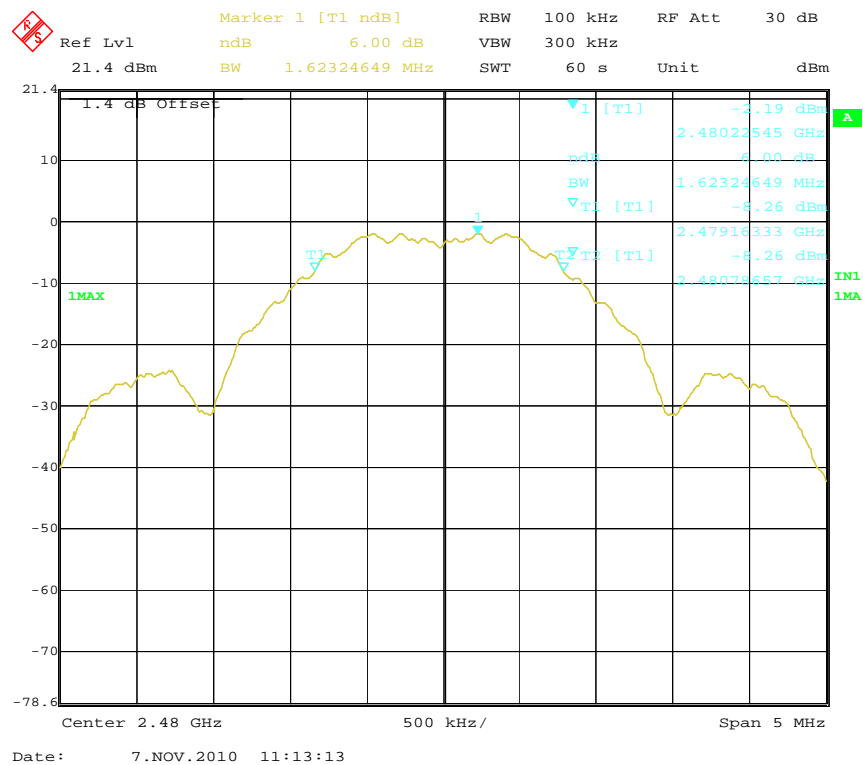
Channel 11



Channel 18



Channel 26



4.8. 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.

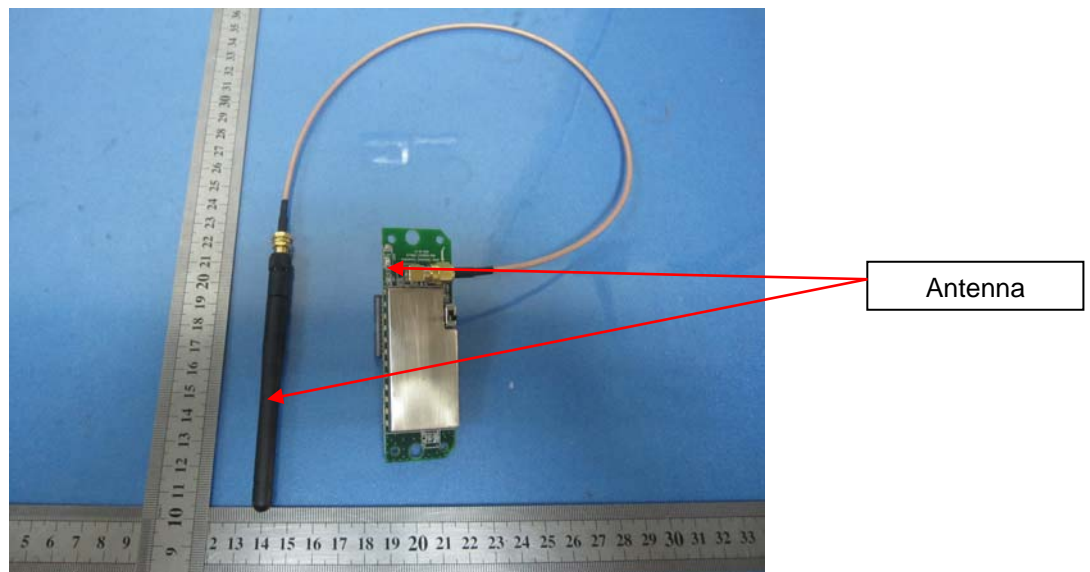
And according to FCC 47 CFR Section 15.247 (c), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

Refer to statement below for compliance.

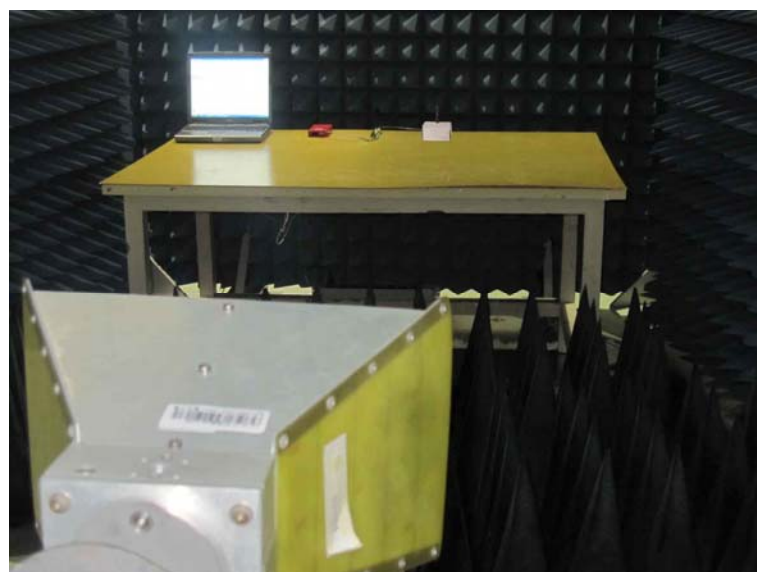
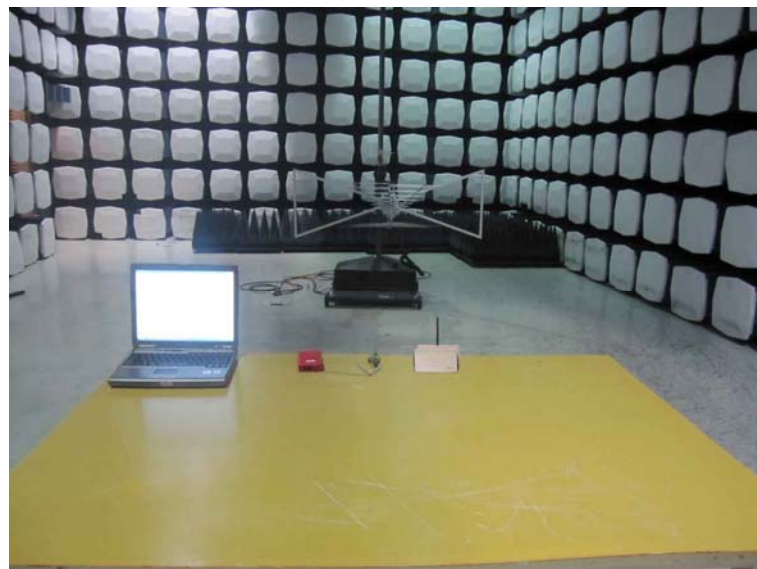
The manufacturer may design the unit so that the user can replace a broken antenna, but the use of a standard antenna jack or electrical connector is prohibited. Further, this requirement does not apply to intentional radiators that must be professionally installed.

Antenna Connected Construction

The antenna used in this product are two kind of antenna, one is PIFA Antenna the other is Dipole Antenna. The maximum Gain of the PIFA antenna 0.5dBi. The maximum Gain of the Dipole antenna 2.15dBi. Detail please see the photos as following:



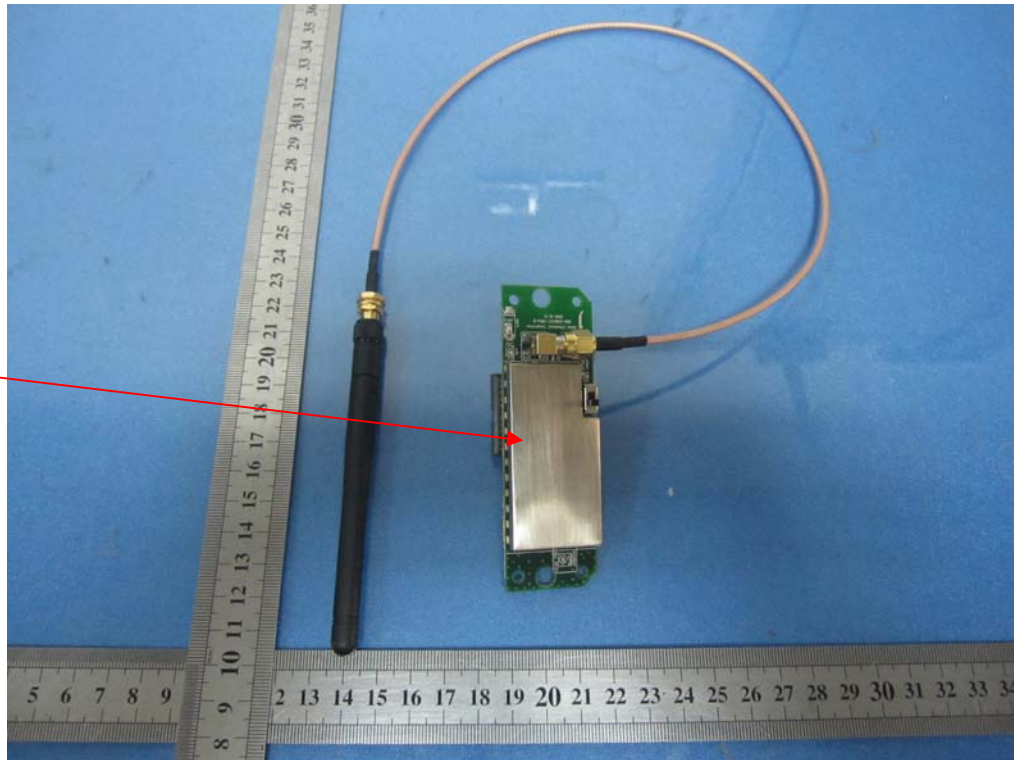
5. Test Setup Photos of the EUT



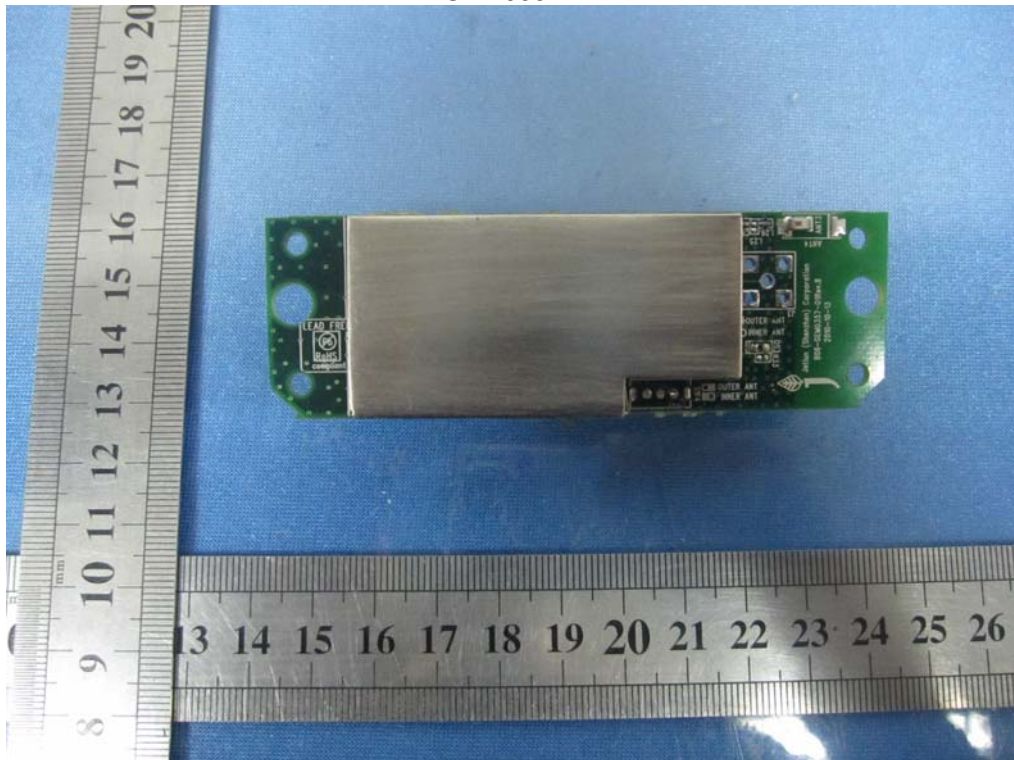
6. External and Photos of the EUT

External Photos

GEM0357E

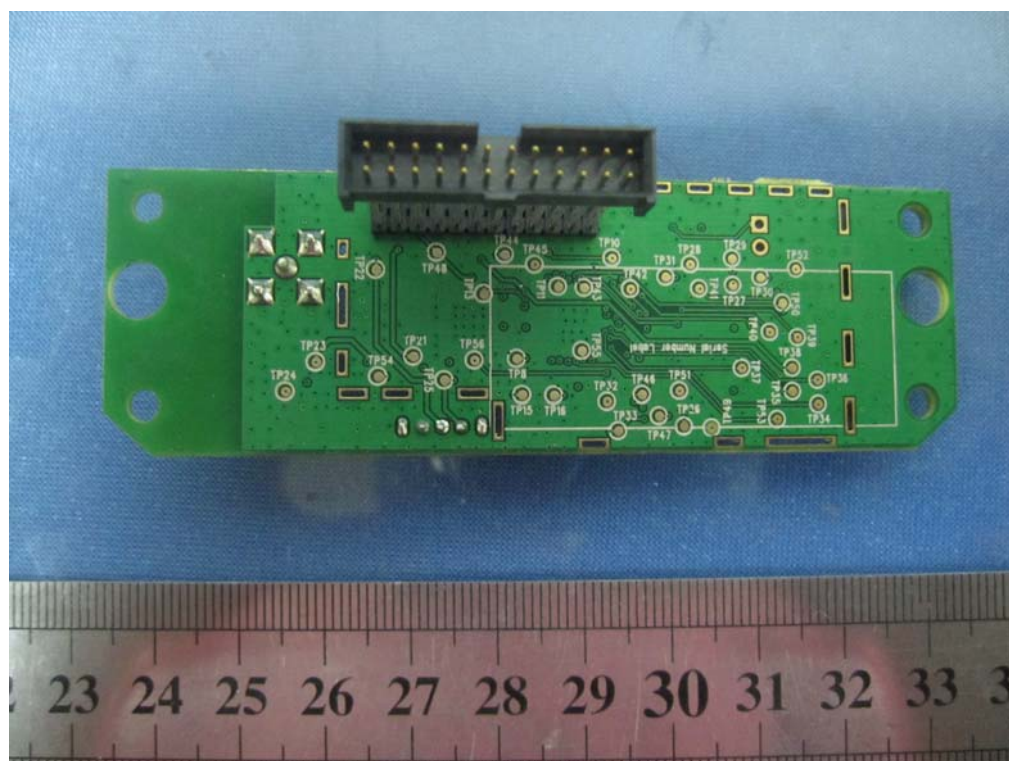
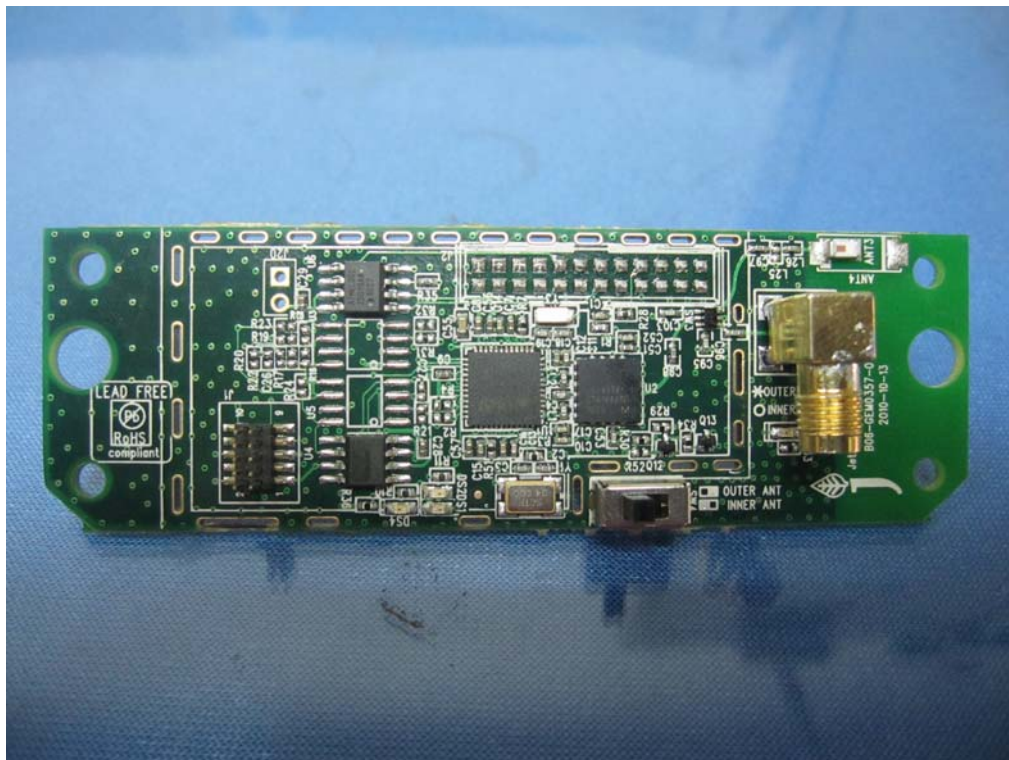


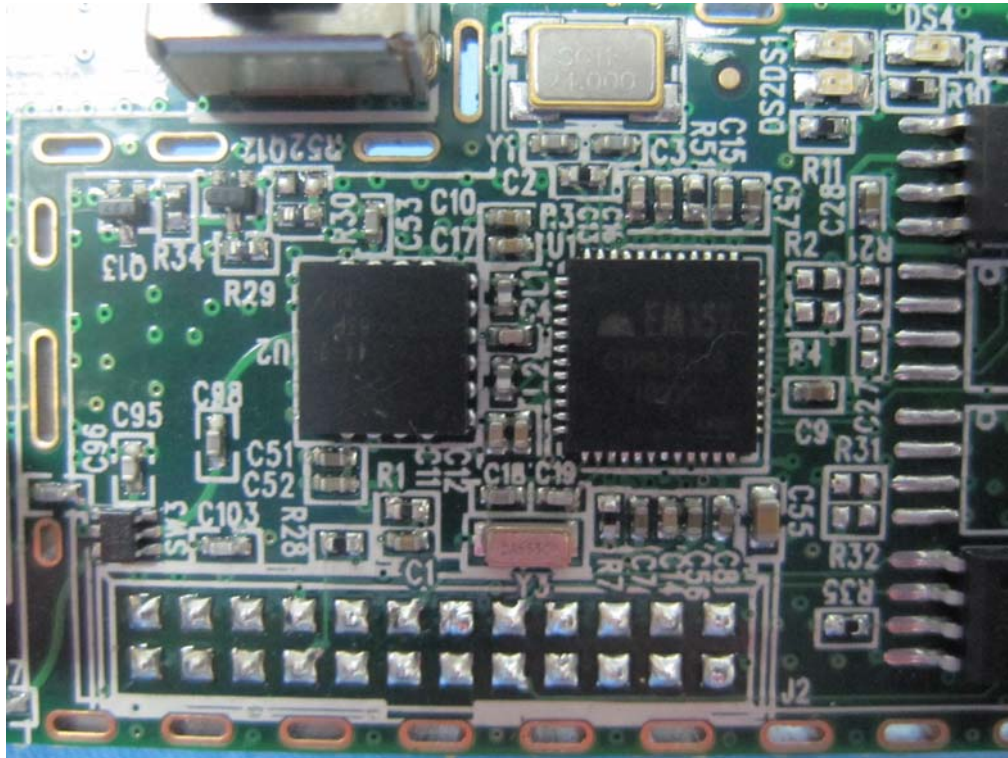
GEM0357F



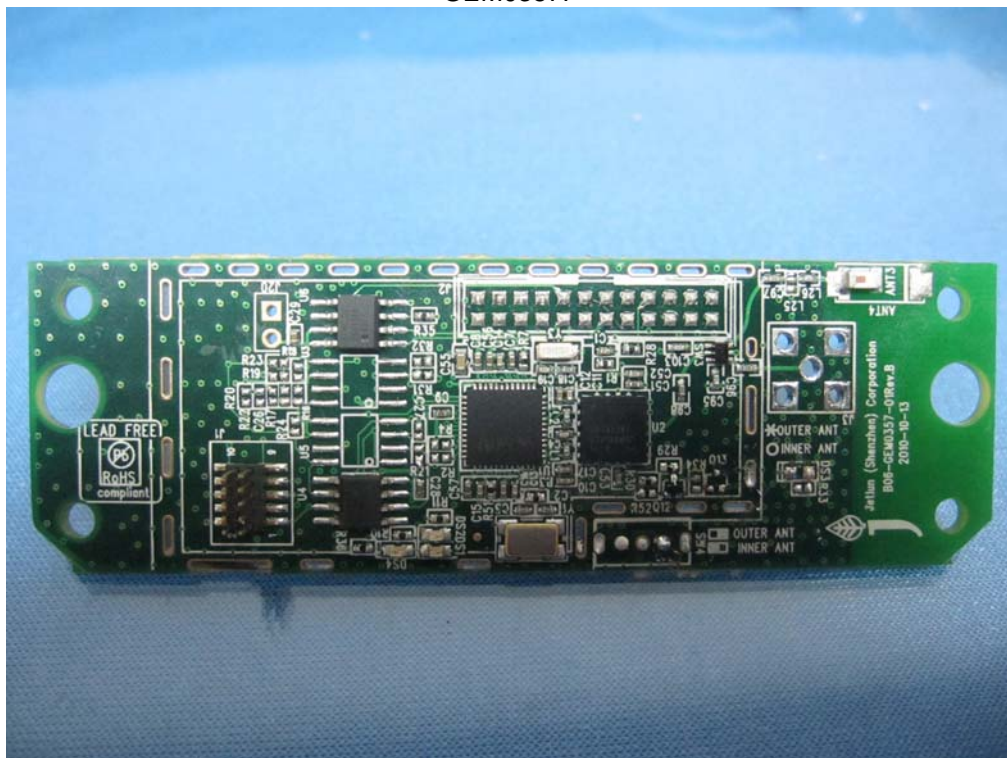
Internal Photos

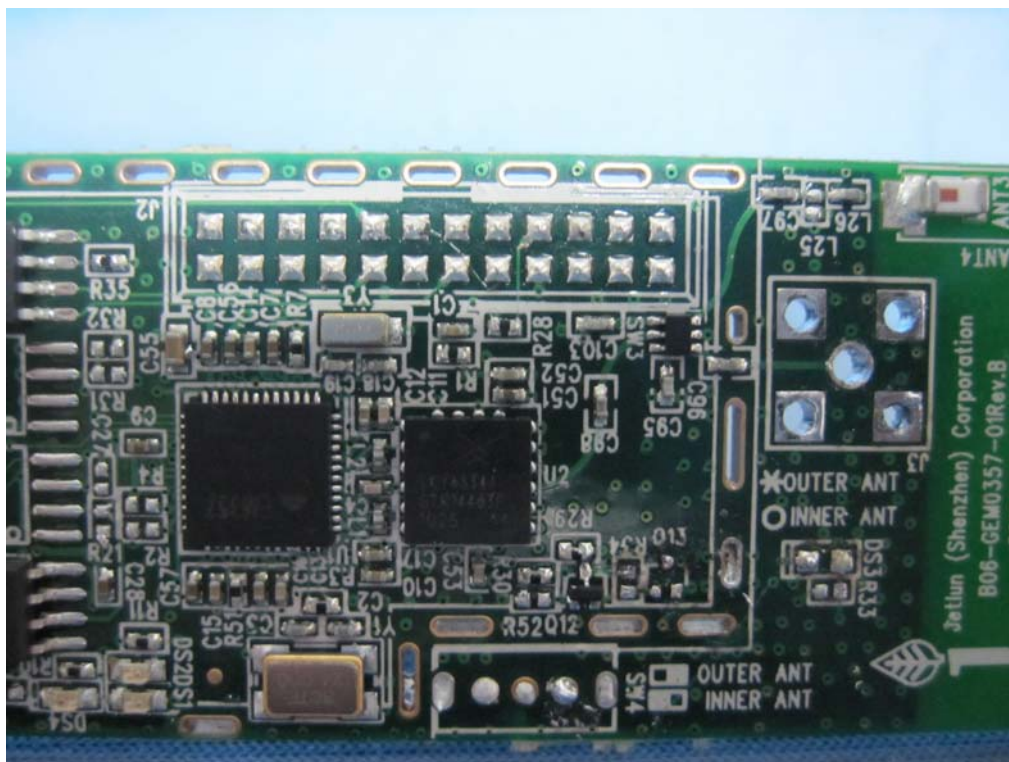
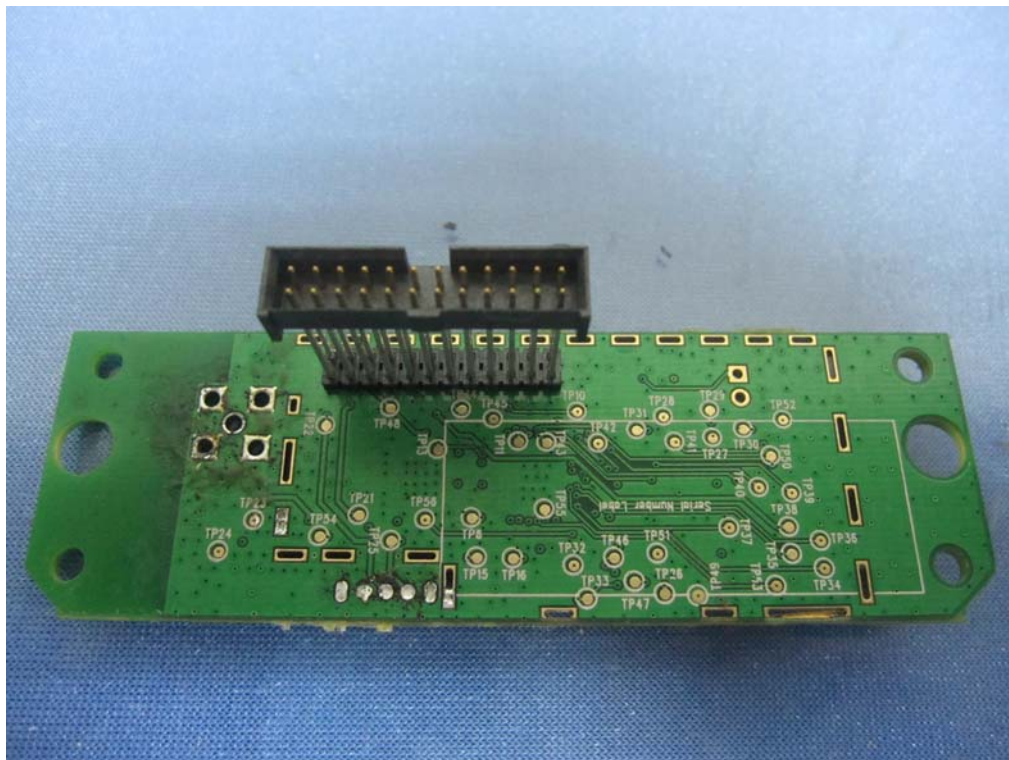
GEM0357E





GEM0357F





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