



## FCC PART 15 SUBPART C TEST REPORT

### FCC PART 15.247

Report Reference No.: TRE1212005501 R/C:23996

FCC ID: X5QRD71316

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Date of issue: Jan 16, 2012

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 902-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz

TRF Originator: Shenzhen Huatongwei International Inspection CO., Ltd

Master TRF: Dated 2006-06

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Test item description: Appliance Module Plus

Trade Mark: /

Model/Type reference: RD71316

Listed Models: RD77716

Operation Frequency: From 2400MHz to 2483.5MHz

Result: Positive

**T E S T   R E P O R T**

<b>Test Report No. :</b>	<b>TRE1212005501</b>	Jan 16, 2013
		Date of issue

Equipment under Test : Appliance Module Plus

Model /Type : RD71316

Listed Models : RD77716

**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, No.4 PINGDONG ROAD, NANPING TECHNOLOGY  
DISTRICT, ZHUHAI, GUANGDONG, CHINA

<b>Test Result</b> according to the standards on page 4:	<b>Positive</b>
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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 C63.10:** American National Standard for Testing Unlicensed Wireless Devices

**KDB558074:** DTS Meas Guidance v01 of Measurement Procedure

## 2. SUMMARY

### 2.1. General Remarks

Date of receipt of test sample	:	Dec 15, 2012
Testing commenced on	:	Dec 15, 2012
Testing concluded on	:	Jan 16, 2012

### 2.2. Equipment Under Test

#### Power supply system utilised

Power supply voltage	:	<input checked="" type="radio"/> 120V / 60 Hz	<input type="radio"/> 115V / 60Hz
		<input type="radio"/> 12 V DC	<input type="radio"/> 24 V DC
		<input type="radio"/> Other (specified in blank below)	

/

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

2.4GHz (Appliance Module Plus (RD71316))

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. The Applicant provides Bluetooth tools software to control the EUT for staying in continuous transmitting and receiving mode for testing. There are 16 channels of EUT, and the test carried out at the lowest channel, middle channel and highest channel.

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: X5QRD71316** 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 Appliance Module Plus, The functions of the EUT listed as below:

	Test Standards	Reference Report
Zigbee	FCC Part 15 Subpart C (Section15.247)	TRE1212005501
MPE REPORT	FCC Per 47 CFR 2.1091(b)	TRE1212005502

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 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 June 01, 2015.

##### **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 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 17025:2005 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.: R-2484. Date of Registration: December 20, 2012. Valid time is until December 19, 2015.

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, 2012. Valid time is until December 19, 2015.

**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.

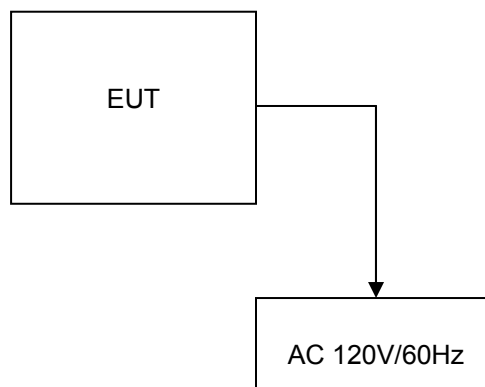
**3.3. Environmental conditions**

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

Temperature: 15-35 ° C

Humidity: 30-60 %

Atmospheric pressure: 950-1050mbar

**3.4. Configuration of Tested System**

**Equipment Used in Tested System**

**3.5. Test Description**

<b>FCC PART 15</b>		
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	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.



### 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 Items	Measurement Uncertainty	Notes
Frequency stability	25 Hz	(1)
Transmitter power conducted	0.57 dB	(1)
Transmitter power Radiated	2.20 dB	(1)
Conducted spurious emission 9KHz-12.75 GHz	1.60 dB	(1)
Radiated spurious emission 9KHz-12.75 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)
Emission Mask	-----	(1)
Modulation Characteristic	-----	(1)
Transmitter Frequency Behavior	-----	(1)

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

### 3.7. Equipments Used during the Test

AC Power Conducted Emission					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1	Artificial Mains	Rohde&Schwarz	ESH2-Z5	100028	2012/10/27
2	EMI Test Receiver	Rohde&Schwarz	ESCS 30	100038	2012/10/27
3	Pulse Limiter	Rohde&Schwarz	ESHSZ2	100044	2012/10/27
4	EMI Test Software	Rohde&Schwarz	ES-K1 V1.71	N/A	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 SOFTWARE	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	Horn Antenna	SCHWARZBECK	BBHA9170	25841	2012/10/27
12	Amplifier	Compliance Direction systems	PAP-1G-40	48	2012/10/27
13	Loop Antenna	Rohde&Schwarz	HFH2-Z2	100020	2012/10/27

Maximum Peak Output Power / Power Spectral Density / 6dB Bandwidth / Band Edge Compliance of RF Emission / Spurious RF Conducted Emission

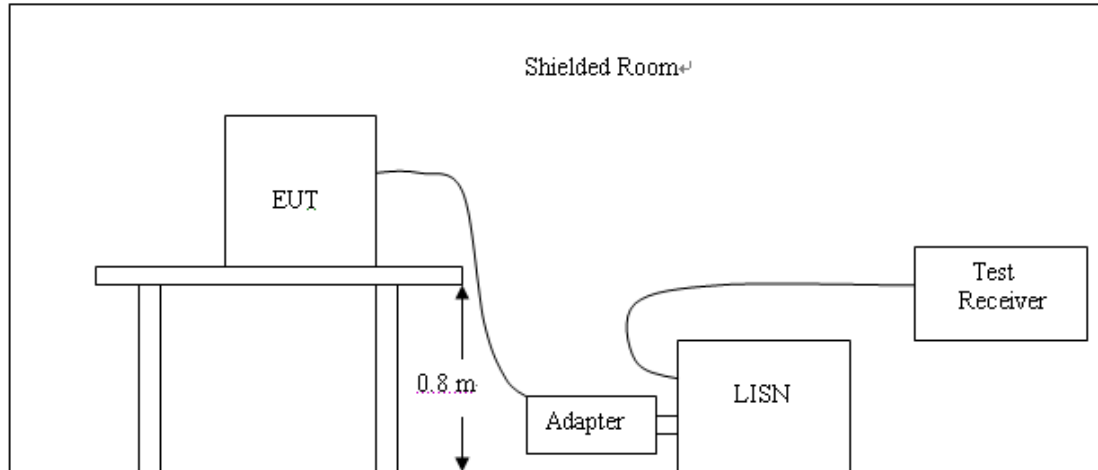
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1	EMI TEST RECEIVER	Rohde&Schwarz	ESI 26	100009	2012/10/27
2	Power Meter	Anritsu	ML2487A	6K00001568	2012/10/27
3	Power Meter Sensor	Anritsu	ML2491A	0630989	2012/10/27
4	Spectrum Analyzer	Rohde&Schwarz	FSP40	1164.4391.40	2012/10/27

The calibration interval was one year.

## 4. TEST CONDITIONS AND RESULTS

### 4.1. AC Power Conducted Emission

#### TEST CONFIGURATION



#### TEST PROCEDURE

- 1 The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. The EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.4-2009.
- 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 DC12V power from the adapter, the adapter received AC120V/60Hz power through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.
- 5 All support equipments received AC power from a second LISN, if any.
- 6 The EUT test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
- 7 Analyzer / Receiver scanned from 150 KHz to 30MHz for emissions in each of the test modes.
- 8 During the above scans, the emissions were maximized by cable manipulation.

#### AC Power Conducted Emission Limit

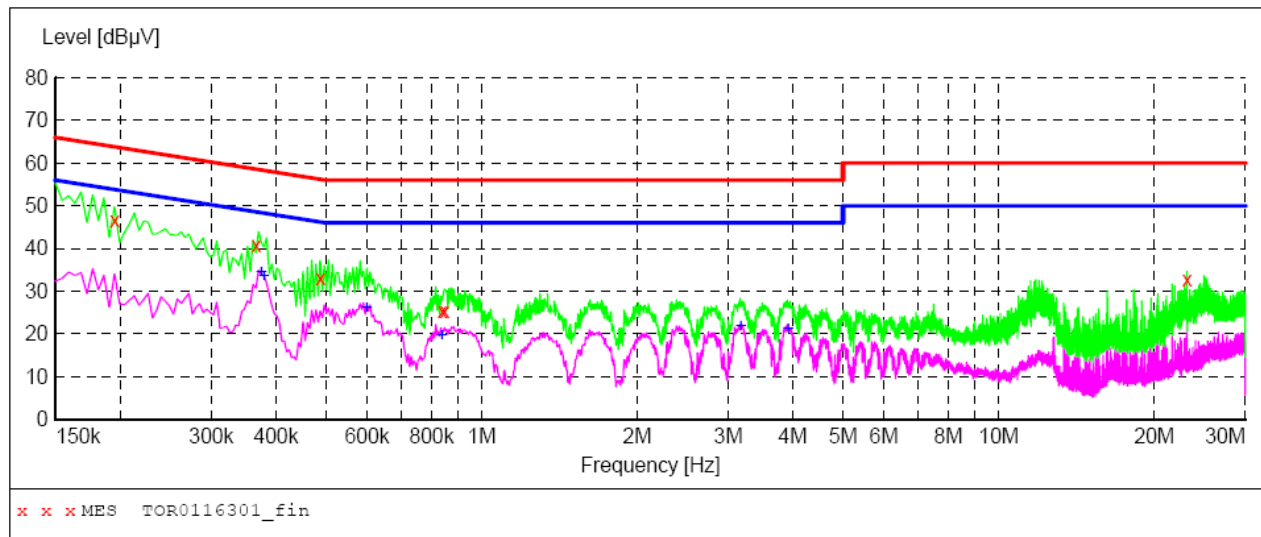
For intentional device, according to § 15.207(a) AC Power Conducted Emission Limits is as following :

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

\* Decreasing linearly with the logarithm of the frequency

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

Short Description: 150K-30M Voltage

**MEASUREMENT RESULT: "TOR0116301\_fin"**

1/16/2013 5:05PM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.195000	46.60	10.2	64	17.2	QP	L1	GND
0.366000	40.60	10.2	59	18.0	QP	L1	GND
0.487500	33.00	10.2	56	23.2	QP	L1	GND
0.838500	25.40	10.2	56	30.6	QP	L1	GND
0.847500	25.40	10.2	56	30.6	QP	L1	GND
23.127000	32.70	11.1	60	27.3	QP	L1	GND

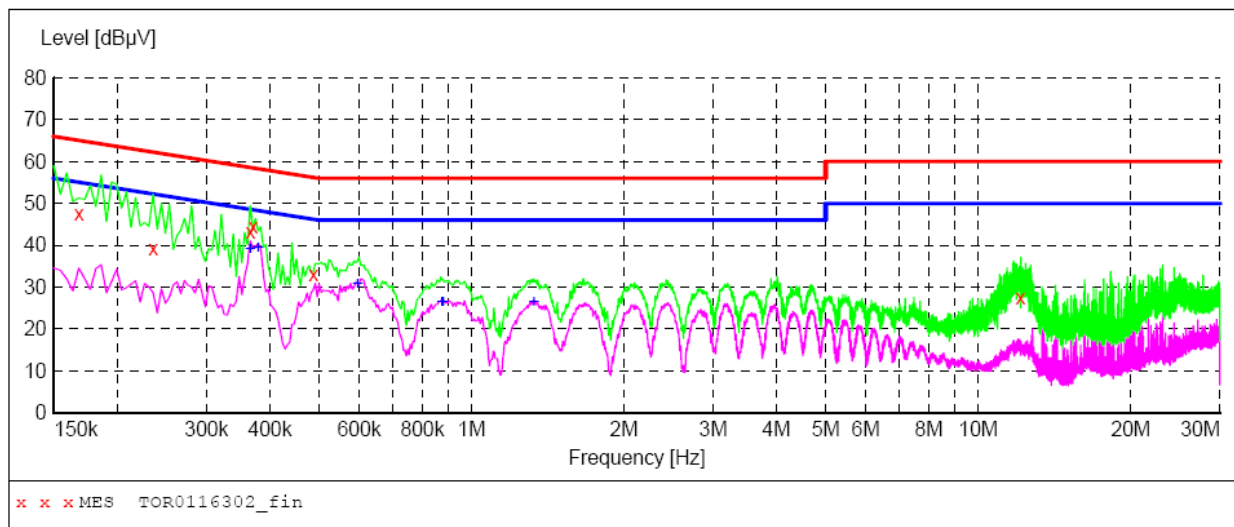
**MEASUREMENT RESULT: "TOR0116301\_fin2"**

1/16/2013 5:05PM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.375000	34.70	10.2	48	13.7	AV	L1	GND
0.379500	33.80	10.2	48	14.5	AV	L1	GND
0.600000	26.10	10.2	46	19.9	AV	L1	GND
0.838500	19.90	10.2	46	26.1	AV	L1	GND
3.174000	21.90	10.4	46	24.1	AV	L1	GND
3.921000	21.30	10.4	46	24.7	AV	L1	GND

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

Short Description: 150K-30M Voltage

**MEASUREMENT RESULT: "TOR0116302\_fin"**

1/16/2013 5:09PM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.168000	47.60	10.2	65	17.5	QP	N	GND
0.235500	39.30	10.2	62	23.0	QP	N	GND
0.366000	43.20	10.2	59	15.4	QP	N	GND
0.370500	44.50	10.2	59	14.0	QP	N	GND
0.487500	33.10	10.2	56	23.1	QP	N	GND
12.115500	27.60	10.6	60	32.4	QP	N	GND

**MEASUREMENT RESULT: "TOR0116302\_fin2"**

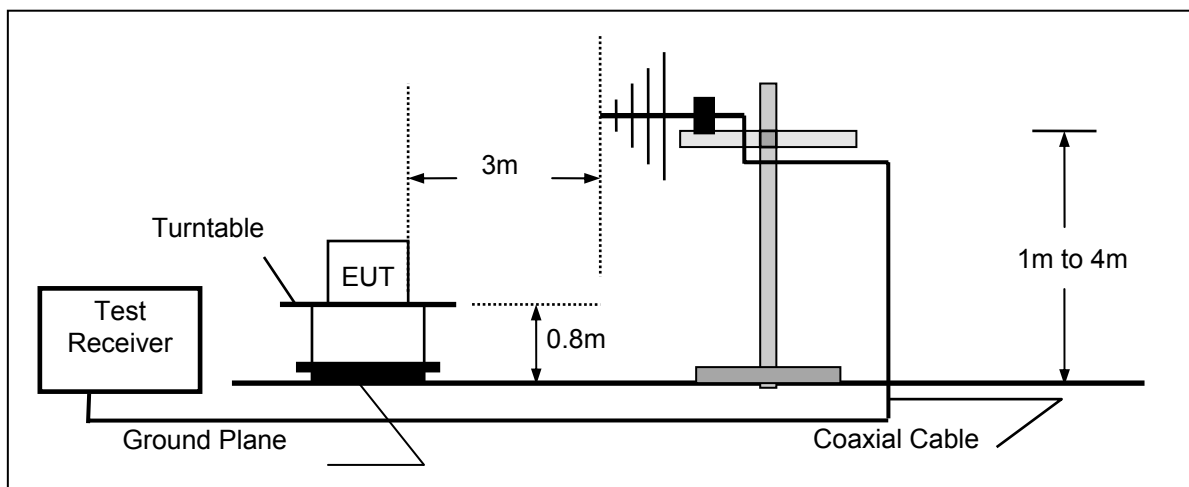
1/16/2013 5:09PM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.366000	39.20	10.2	49	9.4	AV	N	GND
0.379500	39.50	10.2	48	8.8	AV	N	GND
0.595500	31.00	10.2	46	15.0	AV	N	GND
0.874500	26.50	10.2	46	19.5	AV	N	GND
0.879000	26.60	10.2	46	19.4	AV	N	GND
1.329000	26.60	10.3	46	19.4	AV	N	GND

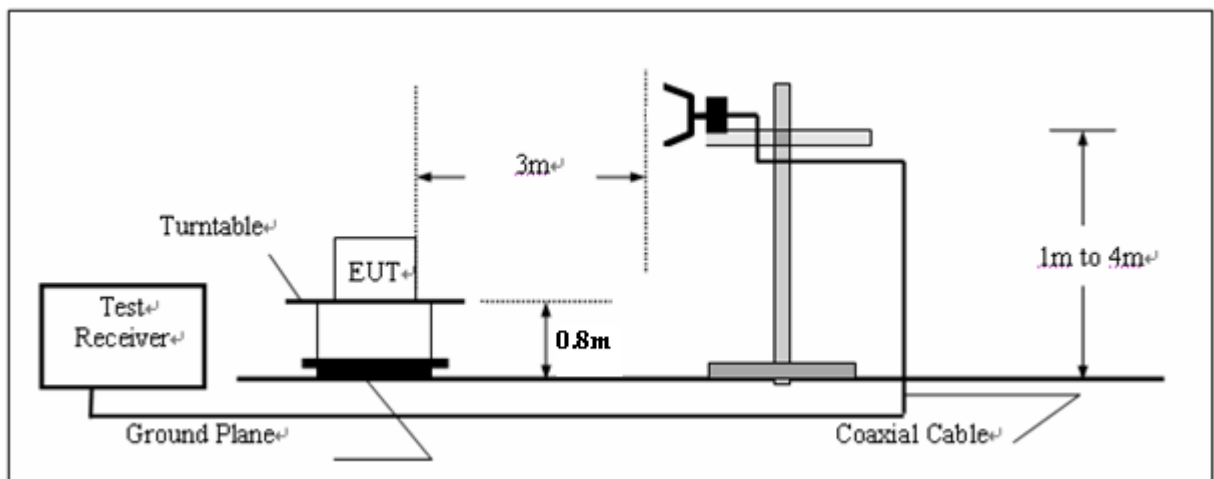
## 4.2. Radiated Emission

### 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 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.

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

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

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

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

**TEST RESULTS**

- Note: 1. The radiated measurement are performed the each channel (low/mid/high), the datum recorded below (the middle channel) is the worst case for all the channel.  
 2. ULTRA-BROADBAND ANTENNA for the radiation emission test below 1G.  
 3. HORN ANTENNA for the radiation emission test above 1G.

## For 9KHz to 30MHz

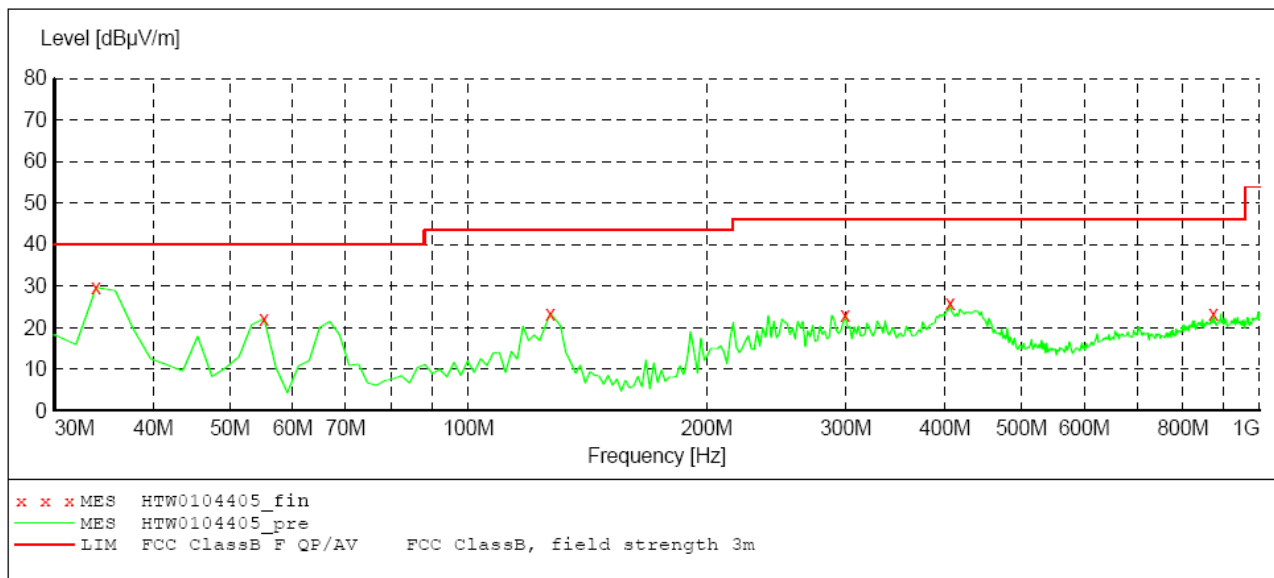
Frequency (MHz)	Corrected Reading (dBμV/m)@3m	FCC Limit (dBμV/m) @3m	Margin (dB)	Detector	Result
0.62	53.96	71.76	17.80	QP	Pass
1.20	43.85	66.02	22.17	QP	Pass
10.32	41.03	69.54	28.51	QP	Pass
22.32	46.22	69.54	23.32	QP	Pass

## For 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



## MEASUREMENT RESULT: "HTW0104405\_fin"

1/4/2013 10:10AM

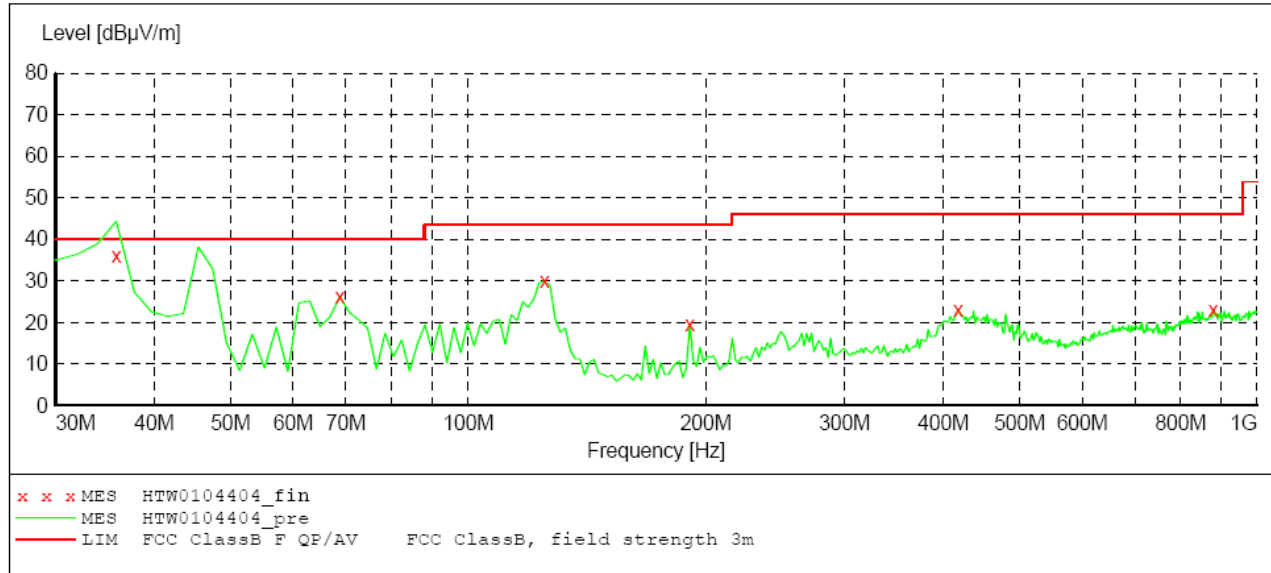
Frequency MHz	Level dBμV/m	Transd dB	Limit dBμV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
33.880000	29.70	-13.1	40.0	10.3	QP	100.0	232.00	HORIZONTAL
55.220000	22.20	-23.9	40.0	17.8	QP	100.0	167.00	HORIZONTAL
127.000000	23.50	-19.9	43.5	20.0	QP	100.0	172.00	HORIZONTAL
299.660000	23.10	-17.1	46.0	22.9	QP	100.0	113.00	HORIZONTAL
406.360000	26.00	-15.3	46.0	20.0	QP	100.0	90.00	HORIZONTAL
873.900000	23.40	-7.0	46.0	22.6	QP	100.0	209.00	HORIZONTAL



**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

**MEASUREMENT RESULT: "HTW0104404\_fin"**

1/4/2013 10:08AM

Frequency MHz	Level dBμV/m	Transd dB	Limit dBμV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
35.820000	36.30	-14.0	40.0	3.7	QP	100.0	244.00	VERTICAL
68.800000	26.20	-23.4	40.0	13.8	QP	100.0	250.00	VERTICAL
125.060000	29.90	-19.6	43.5	13.6	QP	100.0	203.00	VERTICAL
191.020000	19.40	-22.4	43.5	24.1	QP	100.0	131.00	VERTICAL
418.000000	23.20	-15.4	46.0	22.8	QP	100.0	167.00	VERTICAL
879.720000	22.90	-7.0	46.0	23.1	QP	100.0	125.00	VERTICAL

## Channel 11

**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 (dB)	Correction Factor (dB/m)
11	*2405.00	102.41	PK		1.00	210	105.81	28.3	4.90	36.6	-3.40
1	*2405.00	99.43	AV		1.00	210	102.83	28.3	4.90	36.6	-3.40
2	4810.00	60.21	PK	74.00	1.00	220	57.01	32.7	7.00	36.5	3.20
2	4810.00	43.19	AV	54.00	1.00	220	39.99	32.7	7.00	36.5	3.20
3	7215.00	57.35	PK	74.00	1.00	124	47.95	35.8	8.90	35.3	9.40
3	7215.00	42.35	AV	54.00	1.00	124	32.95	35.8	8.90	35.3	9.40
4	10243.21	57.55	PK	74.00	1.00	66	40.95	38.0	11.30	32.7	16.60
4	10243.21	40.26	AV	54.00	1.00	66	23.66	38.0	11.30	32.7	16.60

**ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M**

No.	Frequency (MHz)	Emssion Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
11	*2405.00	107.86	PK		1.00 V	330	111.26	28.3	4.90	36.6	-3.40
1	*2405.00	104.76	AV		1.00 V	330	108.16	28.3	4.90	36.6	-3.40
2	4810.00	58.53	PK	74.00	1.00 V	240	55.33	32.7	7.00	36.5	3.20
2	4810.00	41.56	AV	54.00	1.00 V	240	38.36	32.7	7.00	36.5	3.20
3	7215.00	55.85	PK	74.00	1.00 V	183	46.45	35.8	8.90	35.3	9.40
3	7215.00	41.02	AV	54.00	1.00 V	183	31.62	35.8	8.90	35.3	9.40
4	10243.21	55.60	PK	74.00	1.00	120	39.00	38.0	11.30	32.7	16.60
4	10243.21	38.57	AV	54.00	1.00 V	120	21.97	38.0	11.30	32.7	16.60

## Channel 18

**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 (dB)	Correction Factor (dB/m)
1	*2440.00	108.21	PK		1.00	120	111.41	28.3	5.10	36.6	-3.20
1	*2440.00	105.26	AV		1.00	120	108.46	28.3	5.10	36.6	-3.20
2	4880.00	60.02	PK	74.00	1.00	33	56.62	32.3	7.60	36.5	3.40
2	4880.00	42.63	AV	54.00	1.00	33	39.23	32.3	7.60	36.5	3.40
3	7320.00	56.58	PK	74.00	1.00	244	47.18	36.1	8.60	35.3	9.40
3	7320.00	43.23	AV	54.00	1.00	244	33.83	36.1	8.60	35.3	9.40
4	12200.00	57.58	PK	74.00	1.00	332	40.98	38.0	11.30	32.7	16.60
4	12200.00	40.03	AV	54.00	1.00	332	23.43	38.0	11.30	32.7	16.60

**ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M**

No.	Frequency (MHz)	Emssion Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
1	*2440.00	106.86	PK		1.00	95	110.06	28.3	5.10	36.6	-3.20
1	*2440.00	103.79	AV		1.00	95	106.99	28.3	5.10	36.6	-3.20
2	4880.00	58.34	PK	74.00	1.00	126	54.94	32.3	7.60	36.5	3.40
2	4880.00	41.00	AV	54.00	1.00	126	37.60	32.3	7.60	36.5	3.40
3	7320.00	55.08	PK	74.00	1.00	325	45.68	36.1	8.60	35.3	9.40
3	7320.00	41.90	AV	54.00	1.00	325	32.50	36.1	8.60	35.3	9.40
4	12200.00	55.63	PK	74.00	1.00	215	39.03	38.0	11.30	32.7	16.6
4	12200.00	38.34	AV	54.00	1.00	215	21.74	38.0	11.30	32.7	16.6

## Channel 26

**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	90.23	PK			1.00	65	93.53	28.2	5.10	36.6	-3.30
1	*2480.00	86.41	AV			1.00	65	89.71	28.2	5.10	36.6	-3.30
2	4960.00	56.55	PK	74.00	17.45	1.00	148	52.75	33.0	7.00	36.2	3.80
2	4960.00	45.44	AV	54.00	8.56	1.00	148	41.64	33.0	7.00	36.2	3.80
3	7340.00	50.65	PK	74.00	23.35	1.00	320	41.25	36.2	8.50	35.3	9.40
3	7340.00	--	AV	54.00	---	1.00	320	--	36.2	8.50	35.3	9.40
4	10535.10	53.57	PK	74.00	20.43	1.00	265	36.97	38.0	11.30	32.7	16.60
4	10535.10	---	AV	54.00	---	1.00	265	--	38.0	11.30	32.7	16.60

**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	*2480.00	88.88	PK			1.000 V	66	92.18	28.2	5.10	36.6	-3.30
1	*2480.00	84.94	AV			1.00 V	66	88.24	28.2	5.10	36.6	-3.30
2	4960.00	54.87	PK	74.00	19.13	1.00 V	251	51.07	36.2	8.50	35.3	3.80
2	4960.00	43.81	AV	54.00	10.19	1.00 V	251	40.01	36.2	8.50	35.3	3.80
3	7340.00	49.15	PK	74.00	24.85	1.00 V	326	39.75	37.4	10.10	34.8	9.40
3	7340.00	---	AV	54.00	---	1.00 V	326	---	37.4	10.10	34.8	9.40
4	10361.45	51.62	PK	74.00	22.38	1.00 V	147	35.02	38.0	11.30	32.7	16.60
4	10361.45	---	AV	54.00	--	1.00 V	147	--	38.0	11.30	32.7	16.60

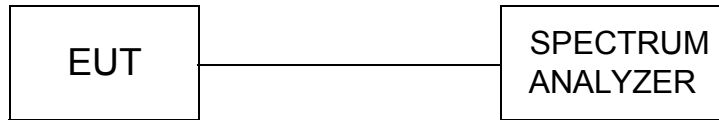
**Suprious emission in restricted band**

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	2390.00	51.54	PK	74.00	22.46	1.00 H	210	54.94	28.3	4.90	36.6	-3.40
1	2390.00	48.56	AV	54.00	5.44	1.00 H	210	51.96	28.3	4.90	36.6	-3.40
2	2390.00	50.19	PK	74.00	23.81	1.00 V	330	53.59	28.3	4.90	36.6	-3.40
2	2390.00	47.09	AV	54.00	6.91	1.00 V	330	50.49	28.3	4.90	36.6	-3.40
3	2483.90	53.95	PK	74.00	22.46	1.00 H	102	57.25	28.2	5.10	36.6	-3.30
3	2483.90	50.13	AV	54.00	5.44	1.00 H	102	53.43	28.2	5.10	36.6	-3.30
4	2483.90	52.60	PK	74.00	23.81	1.00 V	90	55.90	28.2	5.10	36.6	-3.30
4	2483.90	48.66	AV	54.00	6.91	1.00 V	90	51.96	28.2	5.10	36.6	-3.30

- 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

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

#### LIMIT

The Maximum Peak Output Power Measurement limit is 30dBm.

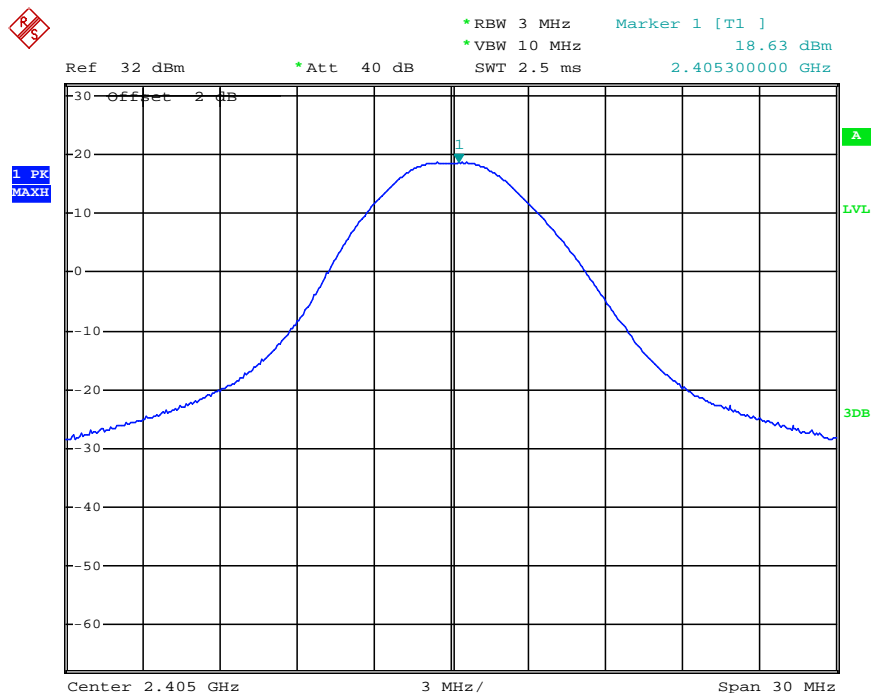
#### TEST RESULTS

Channel	Frequency (MHz)	Peak Power Output (dBm)	Peak Power Limit (dBm)	Pass / Fail
11	2405	18.63	30	PASS
18	2440	18.42	30	PASS
26	2480	2.92	30	PASS

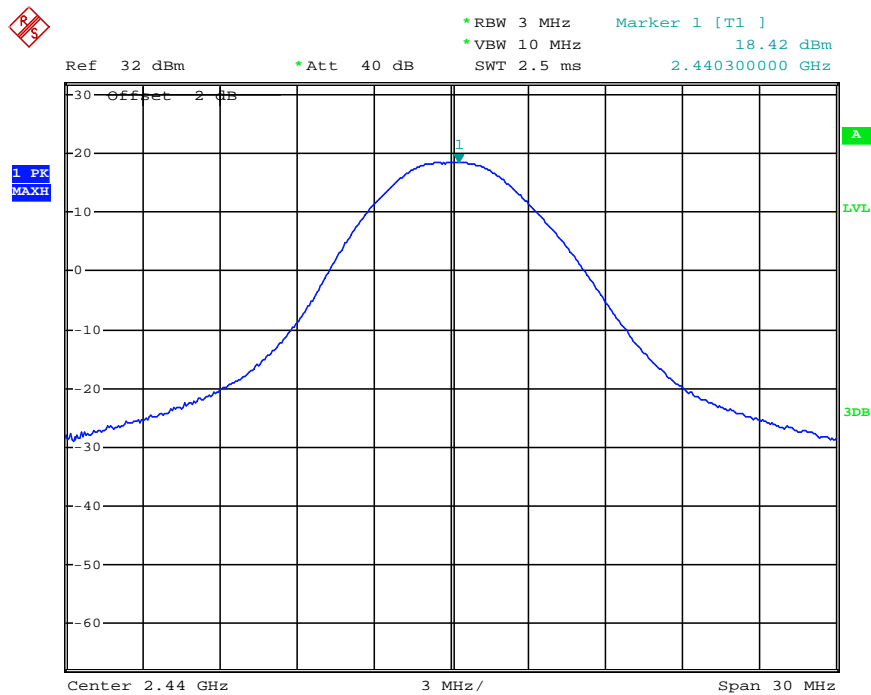
*Note: The test results including the cable lose.*

#### Photos of Maximum Peak Output Power

**Channel 11**

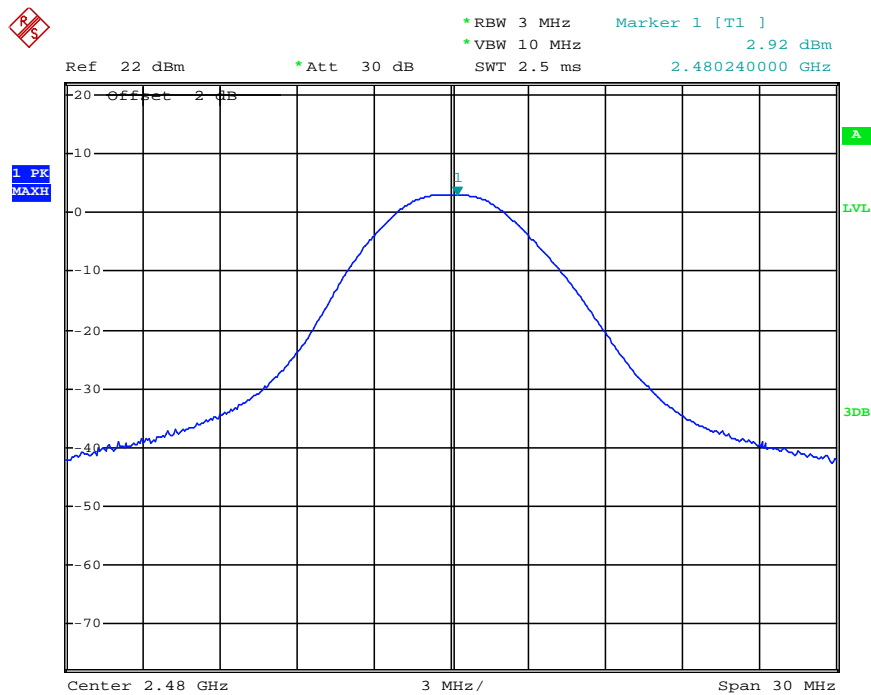


Channel 18



Date: 26.DEC.2012 15:30:27

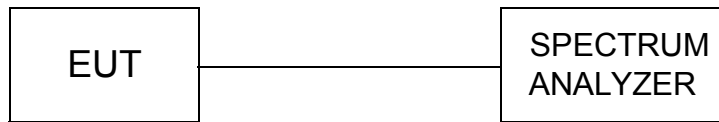
Channel 26



Date: 26.DEC.2012 15:31:21

#### 4.4. Power Spectral Density

##### TEST CONFIGURATION



##### TEST PROCEDURE

1. Use this procedure when the maximum peak conducted output power in the fundamental emission is used to demonstrate compliance.
  2. Set the RBW  $\geq 3$  kHz.
  3. Set the VBW  $\geq 3 \times$  RBW.
  4. Set the span to 1.5 times the DTS channel bandwidth.
  5. Detector = peak.
  6. Sweep time = auto couple.
  7. Trace mode = max hold.
  8. Allow trace to fully stabilize.
  9. Use the peak marker function to determine the maximum power level.
  10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.
  11. The resulting peak PSD level must be  $\leq 8$  dBm.
- Follow KDB 558074 D01 DTS Meas Guidance v02 of measurement procedure

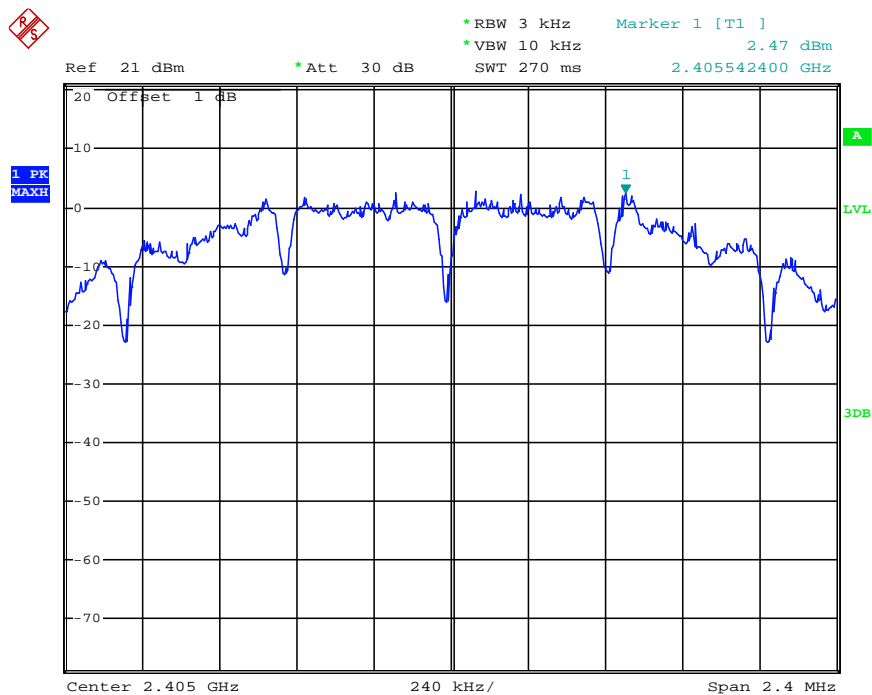
##### LIMIT

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.

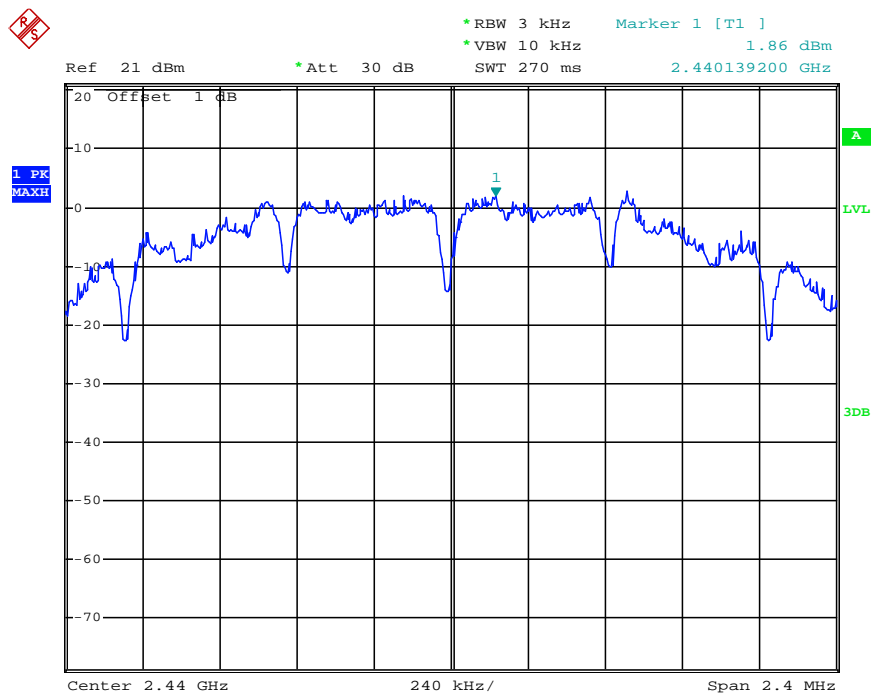
##### TEST RESULTS

CHANNEL NUMBER	FREQUENCY (MHz )	PSD (dBm)	LIMIT (dBm)	PASS/FAIL
11	2405	2.47	8	PASS
18	2440	1.86	8	PASS
26	2480	-3.50	8	PASS

*Note: The test results including the cable loss.*

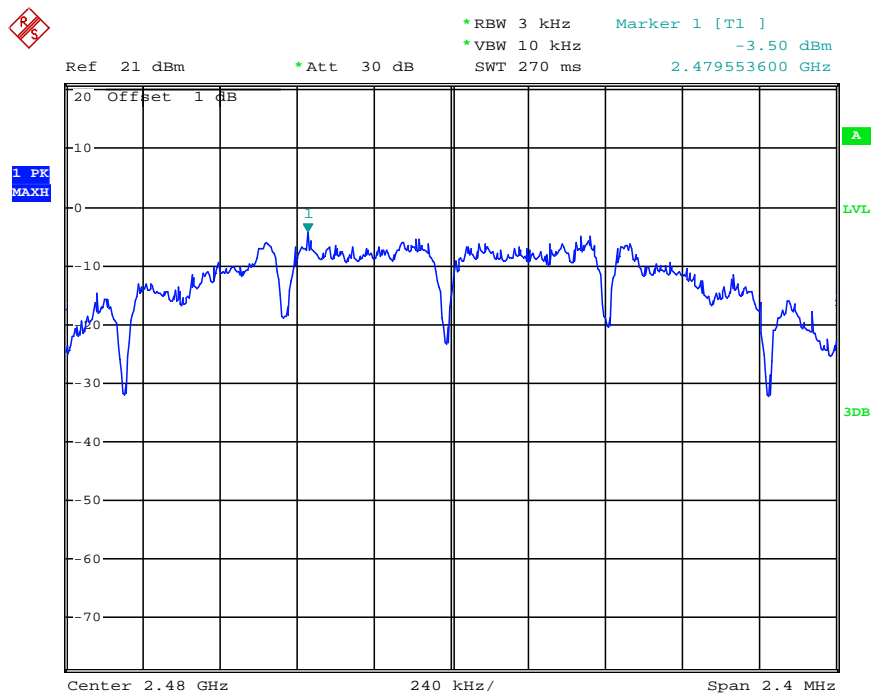
**Photos of Power Spectral Density Measurement****Channel 11**

Date: 11.JAN.2013 10:09:17

**Channel 18**

Date: 11.JAN.2013 10:10:23

Channel 26



Date: 11.JAN.2013 10:12:35



## 4.5. Band Edge Compliance of RF Emission

### 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 for peak detector and RBW=1MHz, VBW=10Hz for average detector.
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.

### 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(see Section 15.205(c)).

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

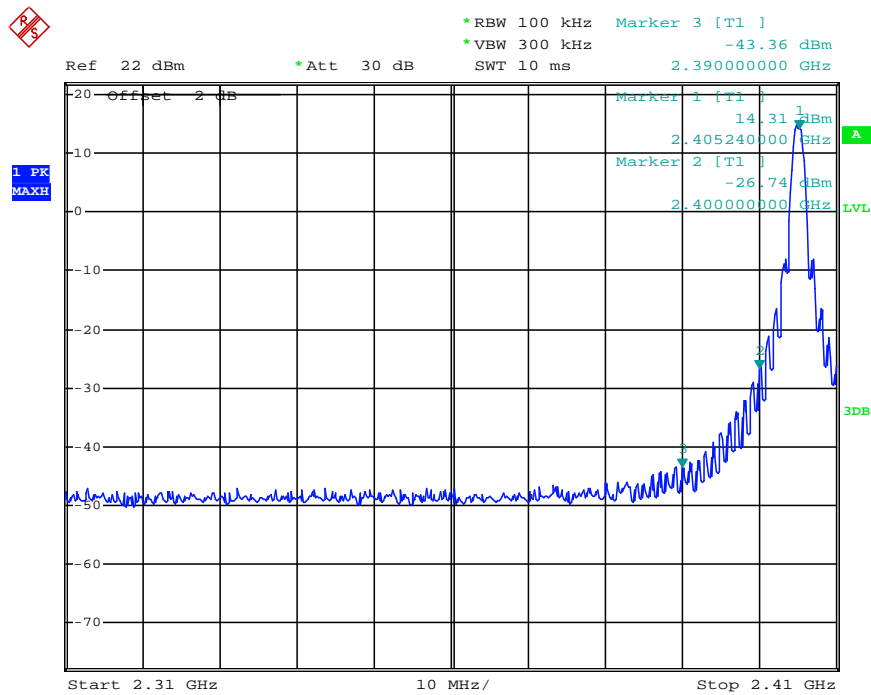
### TEST RESULTS

**Suprious emission in restricted band please see page 17**

### Photos of Conducted Band Edge Measurement

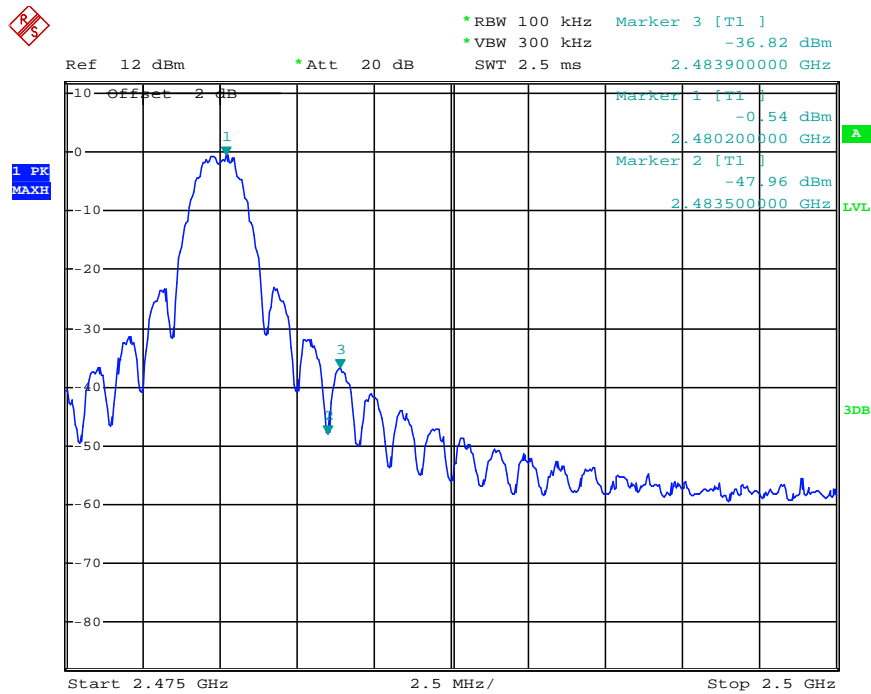
Channel	Frequency	Delta peak to band emission	Limit(dBc)
11	2390.0MHz	57.67	20
26	2483.9MHz	36.28	20

Channel 11



Date: 26.DEC.2012 15:20:18

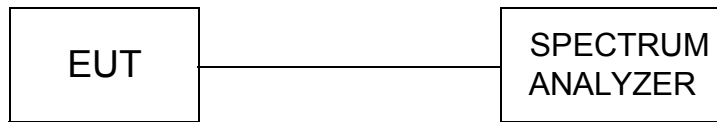
Channel 26



Date: 26.DEC.2012 15:34:28

## 4.6. Spurious RF Conducted Emission

### TEST CONFIGURATION



### TEST PROCEDURE

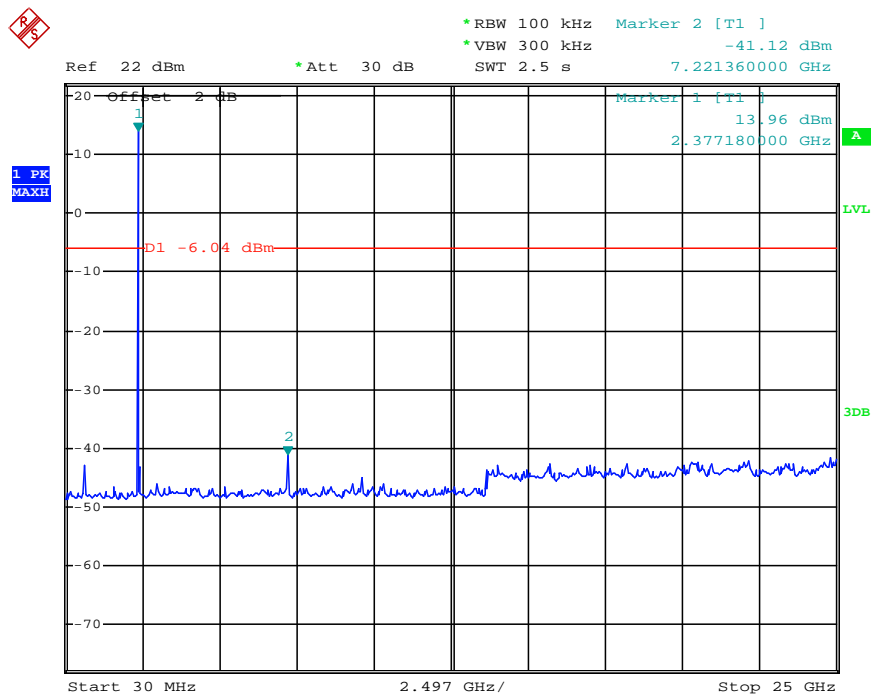
The Spurious RF conducted emissions compliance of RF radiated emission should be measured by following the guidance in ANSI C63.10-2009 with respect to maximizing the emission by rotating the EUT, measuring the emission while the EUT is situated in three orthogonal planes (if appropriate), adjusting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

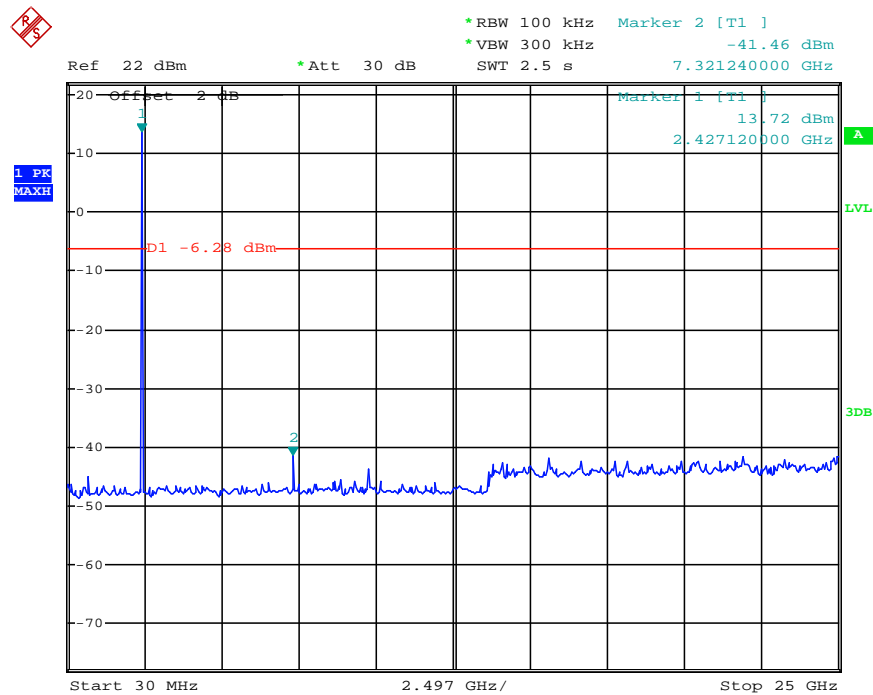
### TEST RESULTS

#### Channel 11



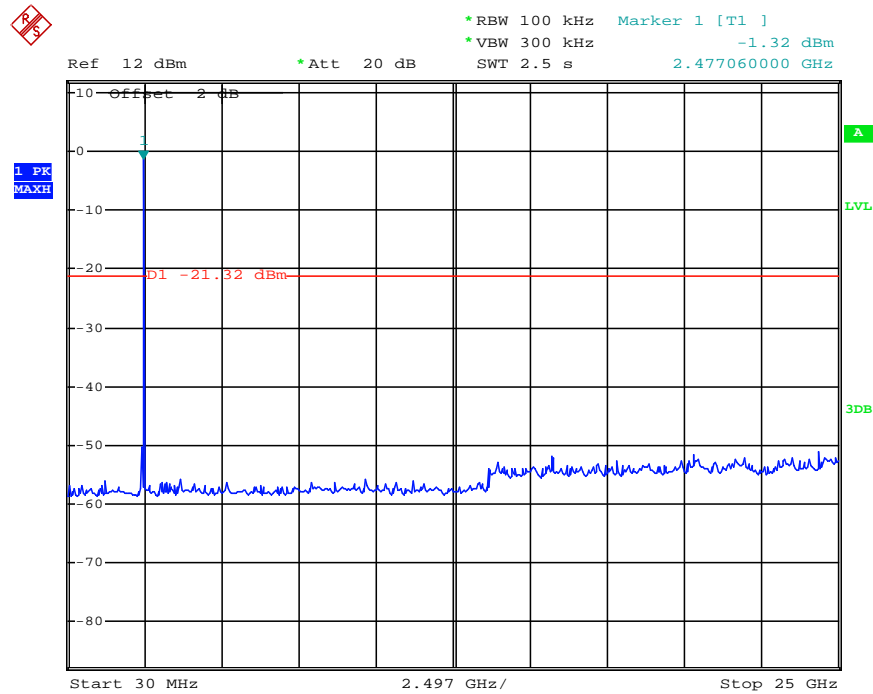
Date: 26.DEC.2012 15:25:25

Channel 18



Date: 26.DEC.2012 15:29:06

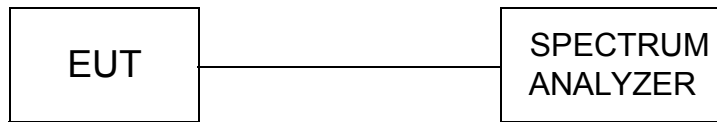
Channel 26



Date: 26.DEC.2012 15:33:18

## 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

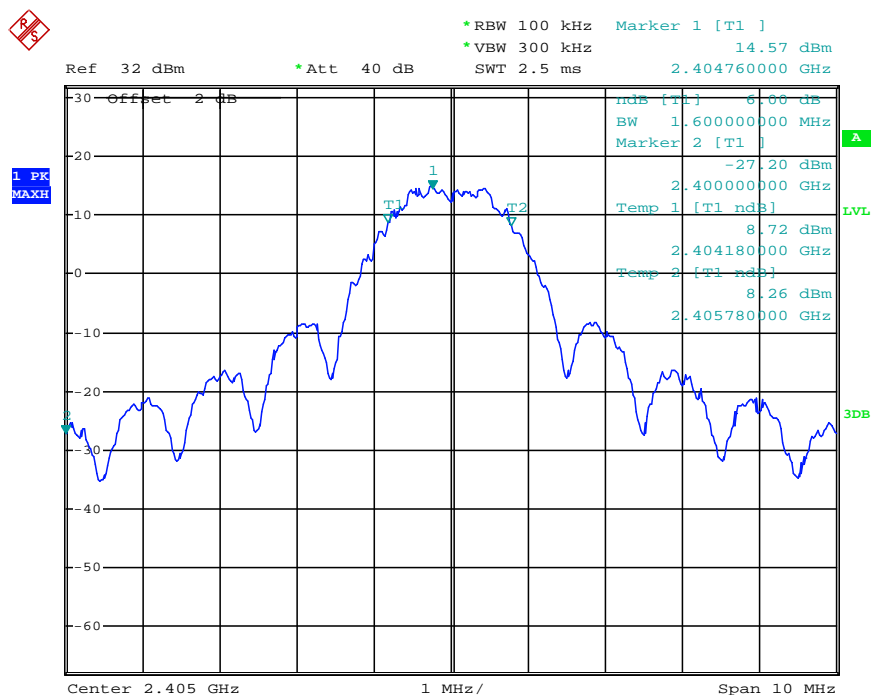
For digital modulation systems, the minimum 6 dB bandwidth shall be at least 500 kHz.

### TEST RESULTS

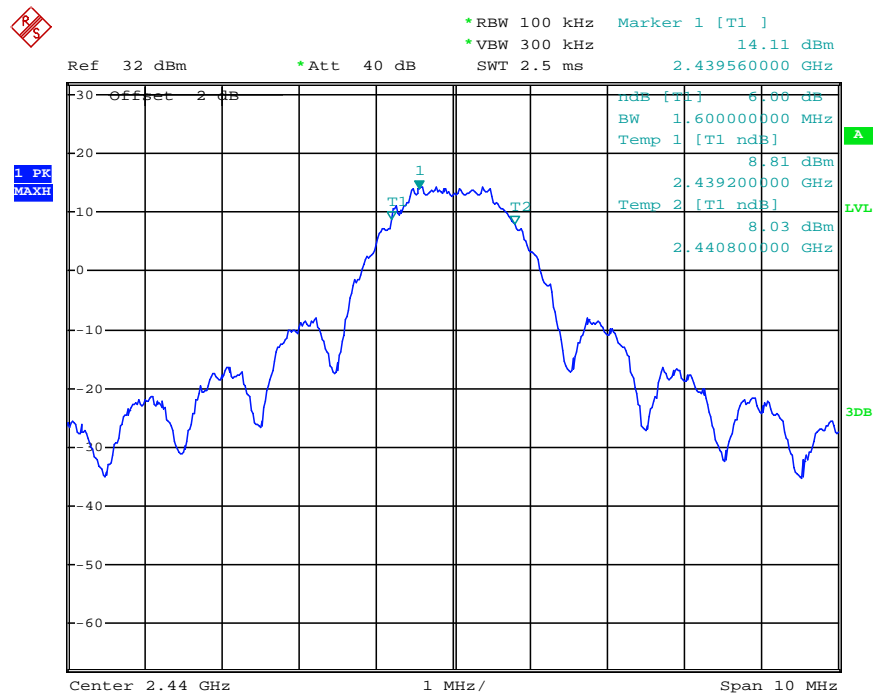
CHANNEL	FREQUENCY (MHz)	6 dB BANDWIDTH (MHz)	MINIMUM LIMIT(MHz)	PASS/FAIL
11	2405	1.600	0.5	PASS
18	2440	1.600	0.5	PASS
26	2480	1.600	0.5	PASS

### Photos of 6dB Bandwidth Measurement

#### Channel 11

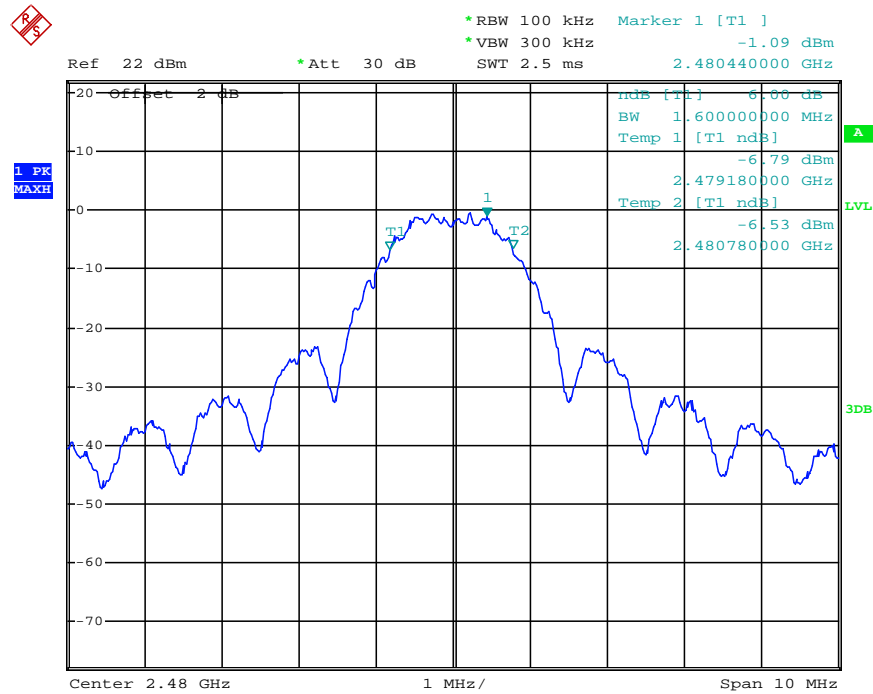


Channel 18



Date: 26.DEC.2012 15:27:31

Channel 26



Date: 26.DEC.2012 15:32:01

## 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.

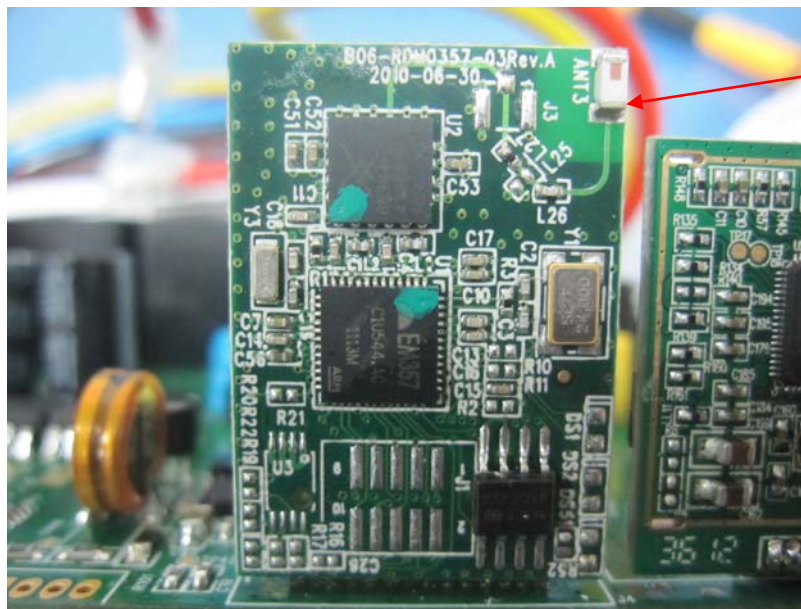
And according to FCC 47 CFR Section 15.247 (c), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

### 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.

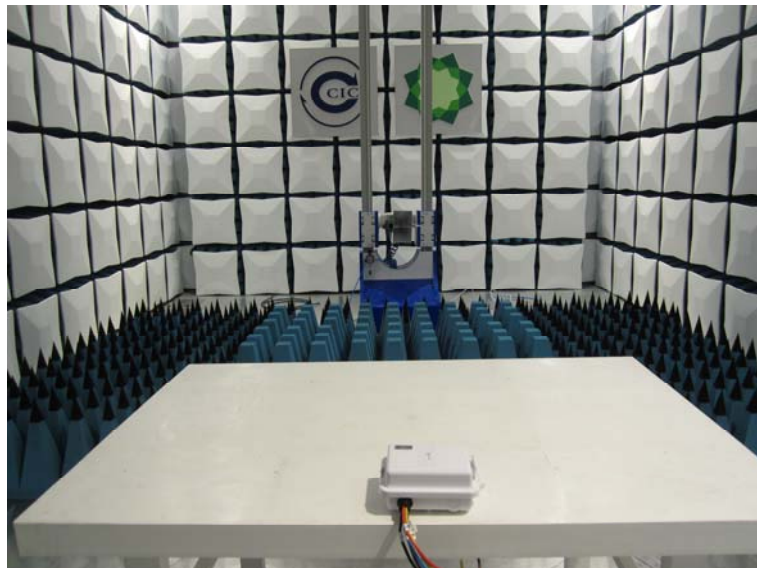
### Antenna Connected Construction

The Gain of the antenna is 3.0dBi.



Internal  
Antenna

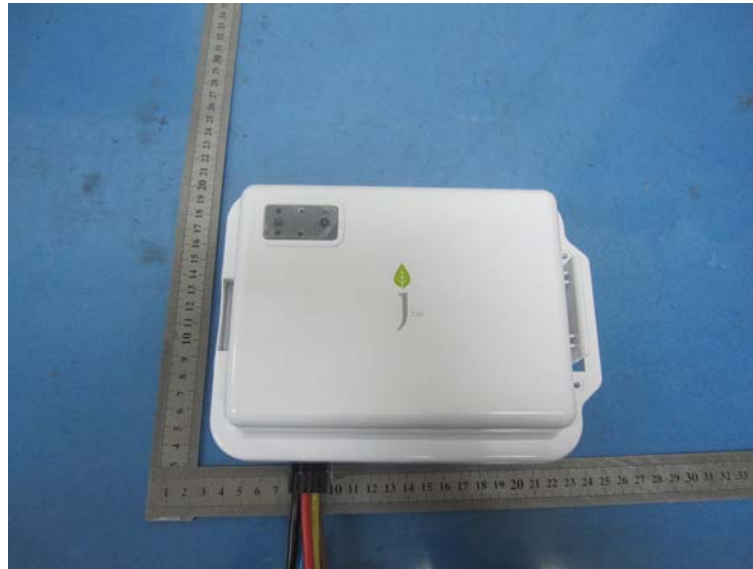
## 5. Test Setup Photos of the EUT



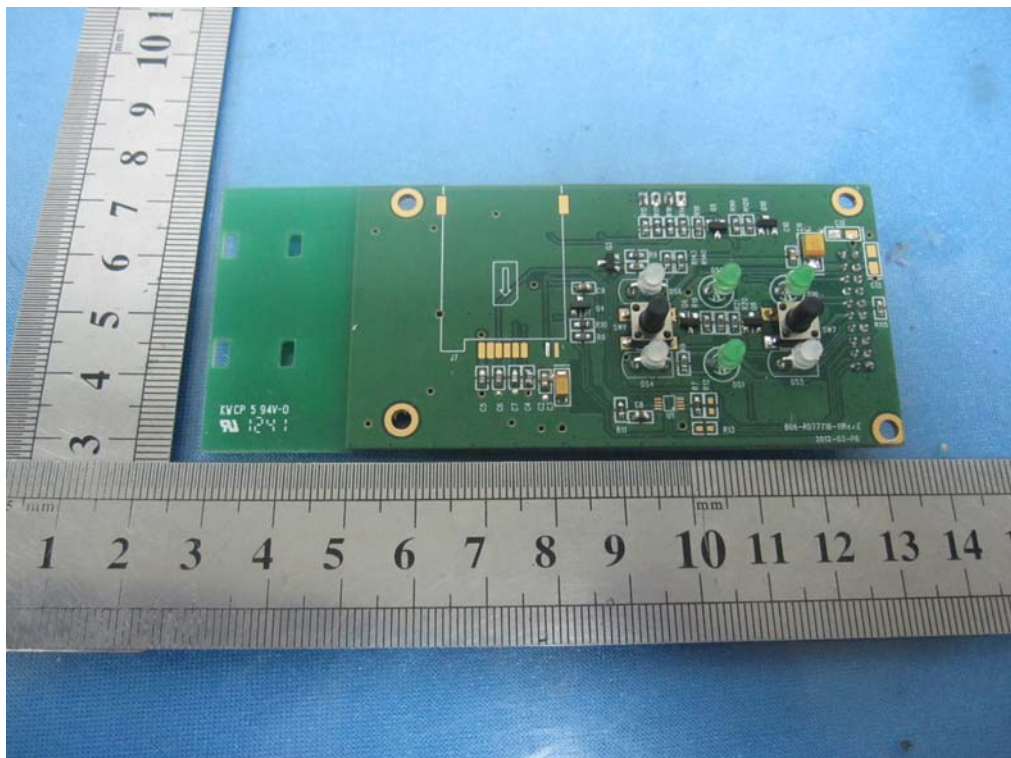
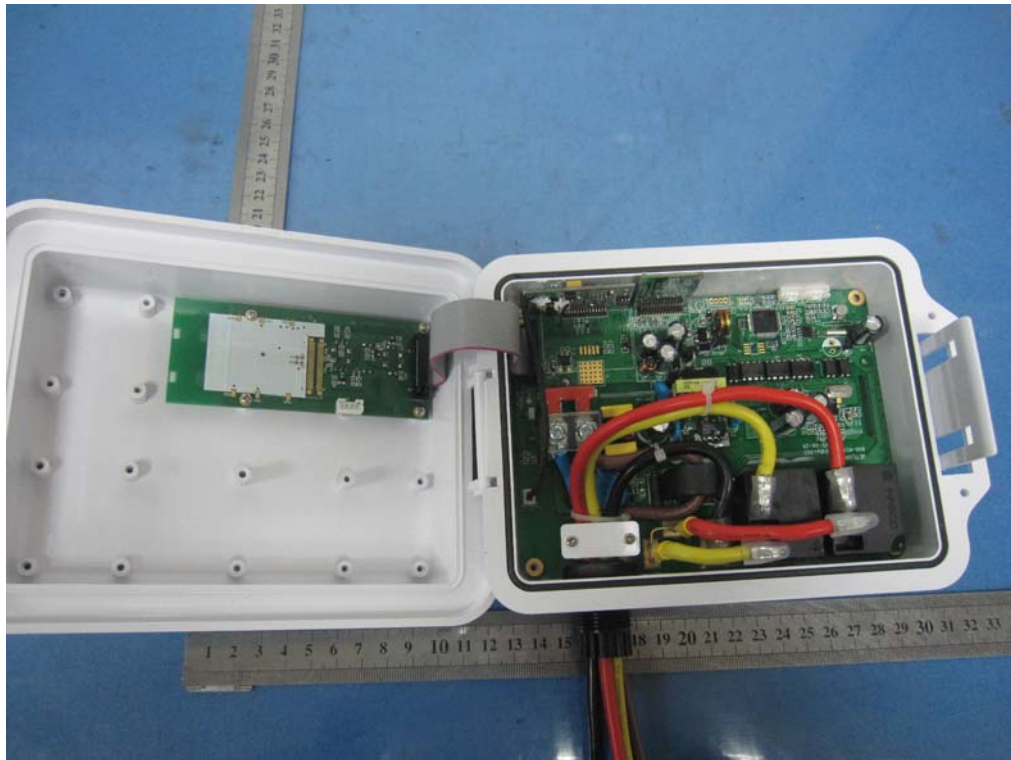


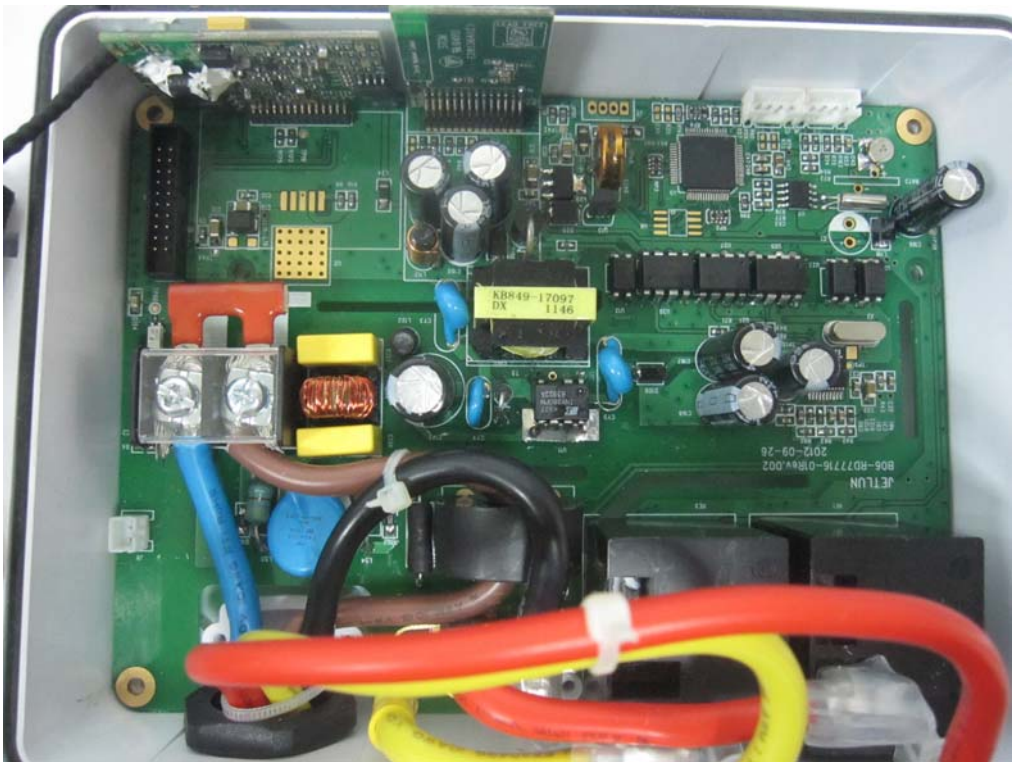
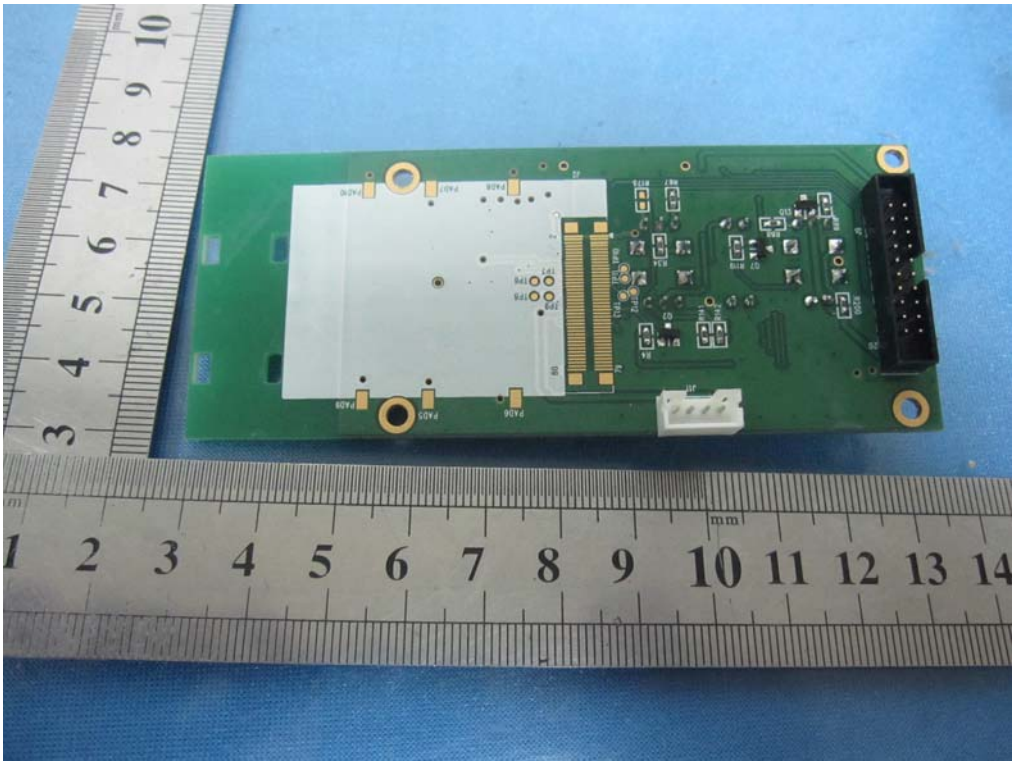
## 6. External and Internal Photos of the EUT

### External Photos



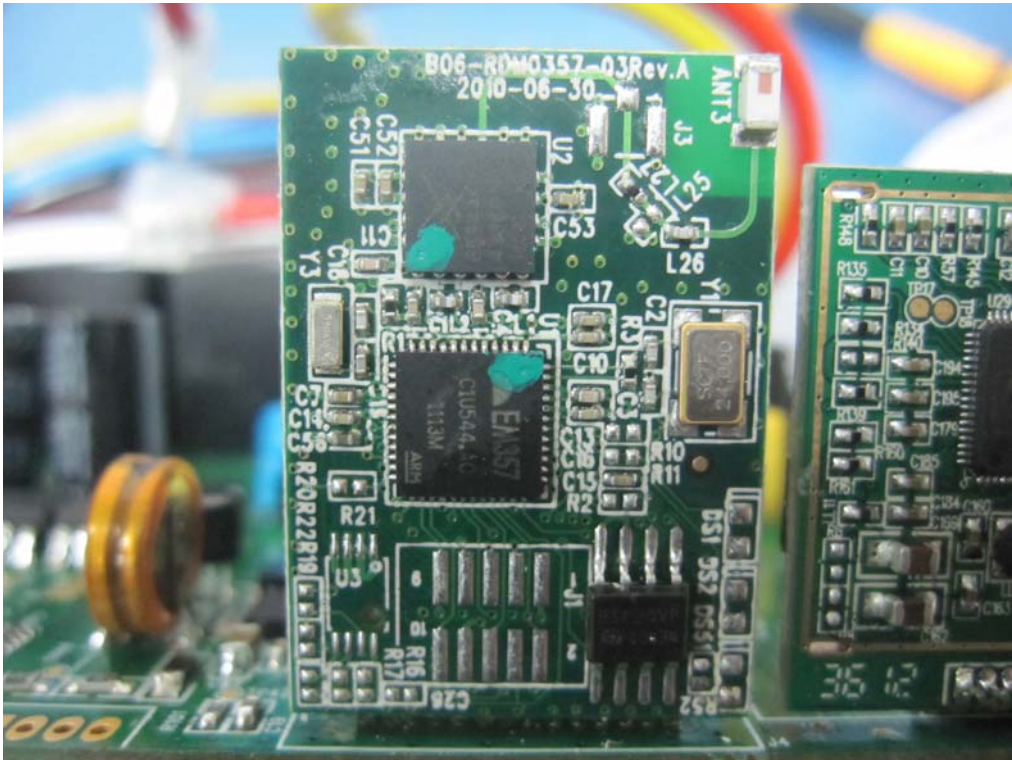
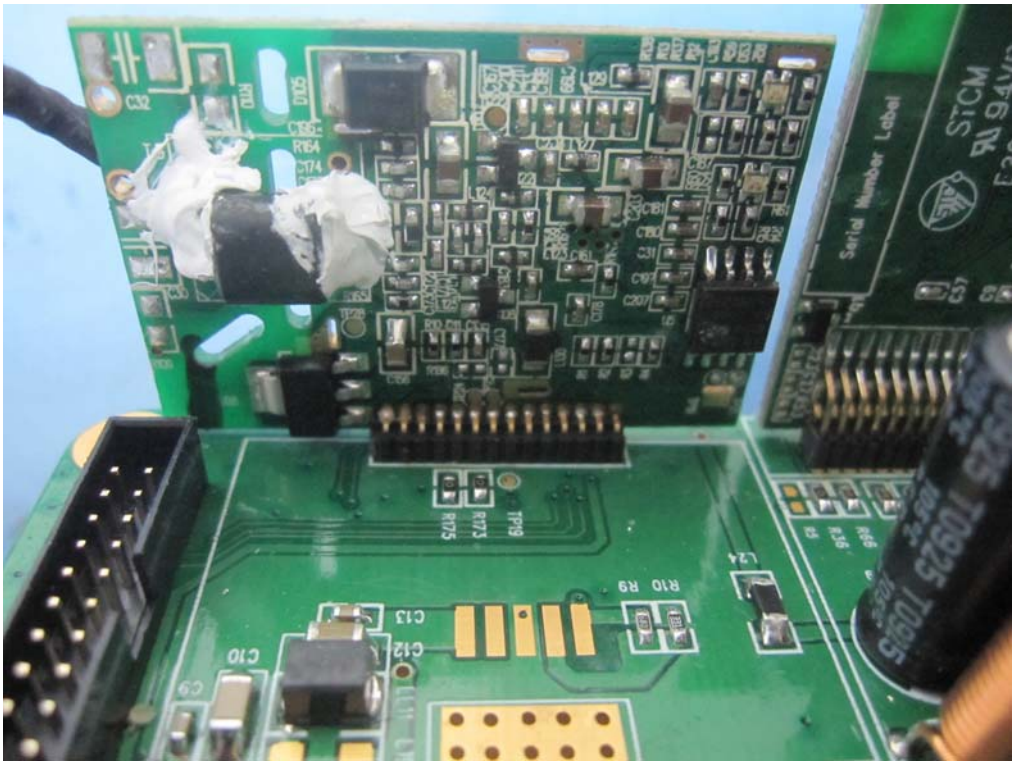
Internal Photos















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