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## FCC PART 15 SUBPART C TEST REPORT

### FCC Part 15.247

**Report Reference No.**.....: **CTL1601070062-WF**

Compiled by

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*Jacky Chen*

Name of the organization performing the tests

Test Engineer Tracy Qi

*Tracy Qi*

( position+printed name+signature)...:

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( position+printed name+signature)...: Manager Tracy Qi

*Tracy Qi*

Date of issue.....: Jan. 18, 2016

**Test Firm**.....: **Shenzhen CTL Testing Technology Co., Ltd.**

Address.....: Floor 1-A, Baisha Technology Park, No.3011, Shahexi Road, Nanshan District, Shenzhen, China 518055

**Applicant's name**.....: **Shanghai Heartbook Technology Development CO. LTD.**

Address.....: 12G, NO.508, YISHAN RD, XUHUI DIST, SHANGHAI, CHINA

#### Test specification:

Standard .....: FCC Part 15.247: Operation within the bands 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz.

Master TRF.....: Dated 2011-01

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**Test item description** .....: S-MCT

**FCC ID**.....: 2AHAG-H1

Trade Mark .....: heartbook

Model/Type reference.....: H1

Work frequency .....: 2402~2480MHz

Version.....: V4.0

Type of modulation .....: GFSK

Antenna Gain .....: 0 dBi

Antenna type .....: Internal

Result.....: **Positive**

**TEST REPORT**

<b>Test Report No. :</b>	<b>CTL1601070062-WF</b>	Jan. 18, 2016
		Date of issue

Equipment under Test : S-MCT

Model /Type : H1

**Applicant** : **Shanghai Heartbook Technology Development CO. LTD.**

Address : 12G, NO.508, YISHAN RD, XUHUI DIST, SHANGHAI, CHINA

**Manufacturer** : **Shanghai Heartbook Technology Development CO. LTD.**

Address : 12G, NO.508, YISHAN RD, XUHUI DIST, SHANGHAI, CHINA

<b>Test Result</b> according to the standards on page 5:	<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 C63.10-2013:** American National Standard for Testing Unlicensed Wireless Devices

**KDB Publication No. KDB 558074 D01 v03r03 Guidance on Measurements for Digital Transmission Systems**

**ANSI C63.4-2014**



## 2. SUMMARY

### 2.1. General Remarks

Date of receipt of test sample	:	Jan. 07, 2016
Testing commenced on	:	Jan. 07, 2016
Testing concluded on	:	Jan. 18, 2016

### 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 checked="" type="radio"/> Other (specified in blank below)	

DC 3.7V from battery

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

S-MCT with Bluetooth 4.0LE function.

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 communication tools software to control the EUT for staying in continuous transmitting and receiving mode for testing. There are 40 channels of EUT, and the test carried out at the lowest channel, middle channel and highest channel.

Frequency Range:	2402-2480MHz
Channel number:	40 channels
Modulation type:	GFSK
Antenna:	internal

Test Channel	Test Frequency
Low Channel	2402 MHz
Middle Channel	2440 MHz
High Channel	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

● Notebook PC(FCC DOC Approval)	Manufacturer :	DELL
	Model No. :	PP18L

## 2.6. Configuration of Tested System

Fig. 2-1 Configuration of Tested System



## 2.7. Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for **FCC ID: 2AHAG-H1** filing to comply with Section 15.247 of the FCC Part 15, Subpart C Rules.

## 2.8. Modifications

No modifications were implemented to meet testing criteria.

## 2.9. NOTE

- The EUT have Bluetooth 4.0LE function, The functions of the EUT listed as below:

	Test Standards	Reference Report
BT 4.0LE	FCC Part 15 Subpart C (Section15.247)	CTL1601070062-WF

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

Frequency Band(MHz)	2400-2483.5	5150-5350	5470-5725	5725-5850
BT 4.0LE	√	—	—	—

- The EUT provides one completed transmitter and receiver.

Modulation Mode	TX Function
BT 4.0LE	1TX

## 2.10. Channel list

Channel	Frequency (MHz)	Channel	Frequency (MHz)
00	2402	20	2442
01	2404	21	2444
02	2406	22	2446
03	2408	23	2448
04	2410	24	2450
05	2412	25	2452
06	2414	26	2454
07	2416	27	2456
08	2418	28	2458
09	2420	29	2460
10	2422	30	2462
11	2424	31	2464
12	2426	32	2466
13	2428	33	2468
14	2430	34	2470
15	2432	35	2472
16	2434	36	2474
17	2436	37	2476
18	2438	38	2478
19	2440	39	2480

## 2.11. Mode of Operation

1. The EUT has been tested under normal operating condition.
  2. Test program used to control the EUT for staying in continuous transmitting and receiving mode is programmed.
- Channel low (2402MHz), mid (2440MHz) and high (2480MHz) with highest data rate are chosen for full testing.

### **3. TEST ENVIRONMENT**

#### **3.1. Address of the test laboratory**

Shenzhen CTL Testing Technology Co., Ltd.

Floor 1-A, Baisha Technology Park, No.3011, Shahexi Road, Nanshan District, Shenzhen, China 518055

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.10 (2013) and CISPR Publication 22.

#### **3.2. Test Facility**

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

##### **IC Registration No.: 9618B**

The 3m alternate test site of Shenzhen CTL Testing Technology Co., Ltd. EMC Laboratory has been registered by Certification and Engineer Bureau of Industry Canada for the performance of with Registration No.: 9618B on November 13, 2013.

##### **FCC-Registration No.: 970318**

Shenzhen CTL Testing Technology 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 970318, December 19, 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. 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 CTL Testing Technology 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 CTL laboratory is reported:

Test	Range	Measurement Uncertainty	Notes
Radiated Emission	30~1000MHz	4.10dB	(1)
Radiated Emission	Above 1GHz	4.32dB	(1)
Conducted Disturbance	0.15~30MHz	3.20dB	(1)

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



### 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 Per 47 CFR 2.1091(b)	MPE Evaluation	PASS

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



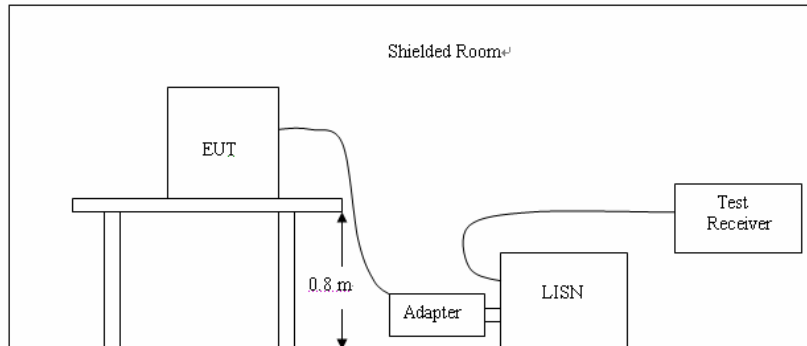
### 3.6. Equipments Used during the Test

Test Equipment	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Due Date
ULTRA-ROADBAND ANTENNA	Sunol Sciences Corp.	JB1	A061713	2015/06/02	2016/06/01
EMI Test Receiver	R&S	ESCI	103710	2015/06/02	2016/06/01
Spectrum Analyzer	Agilent	E4407B	MY41440676	2015/05/21	2016/05/20
Controller	EM Electronics	Controller EM 1000	N/A	2015/05/21	2016/05/20
Horn Antenna	Sunol Sciences Corp.	DRH-118	A062013	2015/05/19	2016/05/18
Active Loop Antenna	Daze	ZN30900A	N/A	2015/05/19	2016/05/18
LISN	R&S	ENV216	3560.6550.12	2015/06/02	2016/06/01
LISN	R&S	ESH2-Z5	860014/010	2015/06/02	2016/06/01
ISN	FCC	F-071115-1057-1-09	11229	2015/05/19	2016/05/18
Amplifier	Agilent	8349B	3008A02306	2015/05/19	2016/05/18
Amplifier	Agilent	8447D	2944A10176	2015/05/19	2016/05/18
Transient Limiter	SCHWARZCECK	VTSD 9561F	9666	2015/06/02	2016/06/01
Radio Communication Tester	R&S	CMU200	115419	2015/05/22	2016/05/21
Temperature/Humidity Meter	Gangxing	CTH-608	02	2015/05/20	2016/05/19
SIGNAL GENERATOR	Agilent	E4421B	US40051744	2015/05/20	2016/05/19
Wideband Peak Power Meter	Anritsu	ML2495A	220.23.35	2015/05/20	2016/05/19
Climate Chamber	ESPEC	EL-10KA	A20120523	2015/05/20	2016/05/19
High-Pass Filter	K&L	9SH10-2700/X12750-O/O	N/A	2015/05/20	2016/05/19
High-Pass Filter	K&L	41H10-1375/U12750-O/O	N/A	2015/05/20	2016/05/19
RF Cable	HUBER+SUHNER	RG214	N/A	2015/05/20	2016/05/19

## 4. TEST CONDITIONS AND RESULTS

### 4.1. AC Power Conducted Emission

#### TEST CONFIGURATION



#### TEST PROCEDURE

- 1 The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. The EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.10-2013.
- 2 Support equipment, if needed, was placed as per ANSI C63.10-2013
- 3 All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10-2013
- 4 The EUT received DC5V power from the adapter, the adapter received AC120V/60Hz power through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.
- 5 All support equipments received AC power from a second LISN, if any.
- 6 The EUT test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
- 7 Analyzer / Receiver scanned from 150 KHz to 30MHz for emissions in each of the test modes.
- 8 During the above scans, the emissions were maximized by cable manipulation.  
Conducted emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9kHz.

#### AC Power Conducted Emission Limit

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

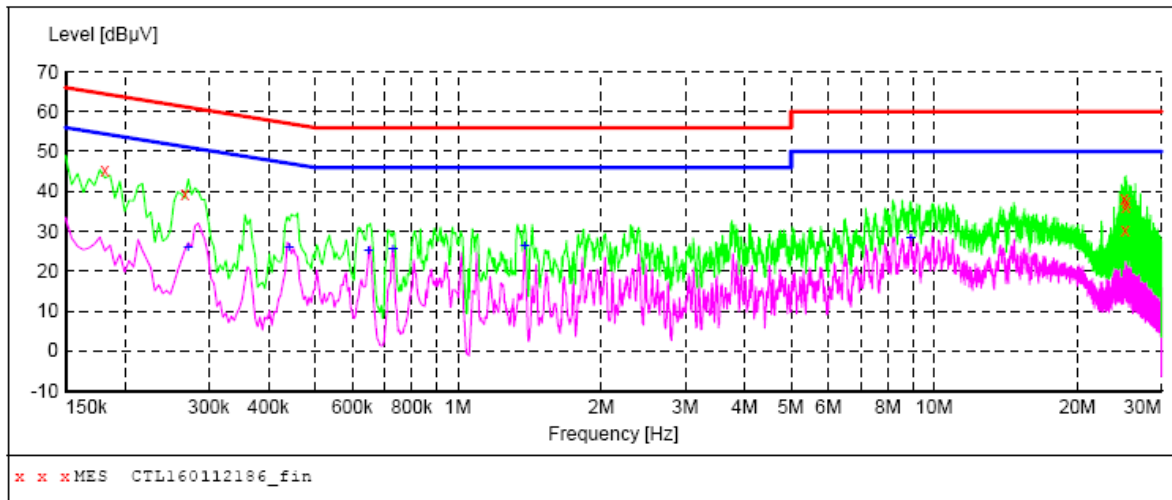
Frequency (MHz)	Maximum RF Line Voltage (dBμV)			
	CLASS A		CLASS B	
	Q.P.	Ave.	Q.P.	Ave.
0.15 - 0.50	79	66	66-56*	56-46*
0.50 - 5.00	73	60	56	46
5.00 - 30.0	73	60	60	50

\* Decreasing linearly with the logarithm of the frequency

#### TEST RESULTS

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

Short Description: 150K-30M Voltage

**MEASUREMENT RESULT: "CTL160112186\_fin"**

1/12/2016 1:54PM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.181501	45.30	10.2	64	19.1	QP	L1	GND
0.267001	39.20	10.2	61	22.0	QP	L1	GND
25.089001	38.30	11.1	60	21.7	QP	L1	GND
25.156501	30.20	11.1	60	29.8	QP	L1	GND
25.264501	36.20	11.1	60	23.8	QP	L1	GND
25.332001	37.20	11.1	60	22.8	QP	L1	GND

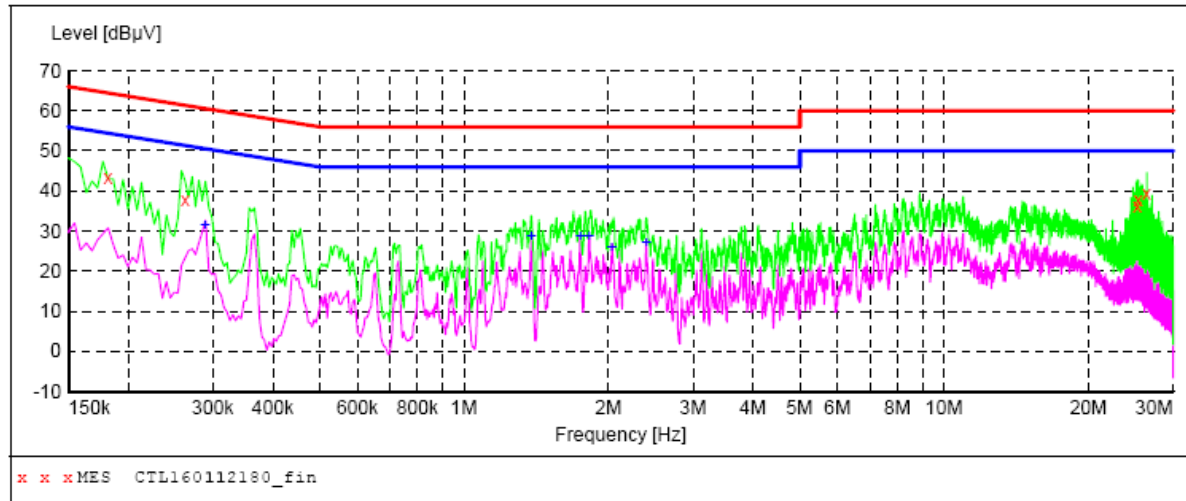
**MEASUREMENT RESULT: "CTL160112186\_fin2"**

1/12/2016 1:54PM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.271501	25.90	10.2	51	25.2	AV	L1	GND
0.442501	26.00	10.2	47	21.0	AV	L1	GND
0.649501	25.20	10.2	46	20.8	AV	L1	GND
0.730501	25.50	10.2	46	20.5	AV	L1	GND
1.383001	26.10	10.3	46	19.9	AV	L1	GND
8.925001	28.30	10.6	50	21.7	AV	L1	GND

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

Short Description: 150K-30M Voltage

**MEASUREMENT RESULT: "CTL160112180\_fin"**

1/12/2016 1:50PM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	FE
0.181501	43.20	10.2	64	21.2	QP	N	GND
0.262501	37.60	10.2	61	23.8	QP	N	GND
25.264501	36.00	11.1	60	24.0	QP	N	GND
25.390501	37.80	11.1	60	22.2	QP	N	GND
26.412001	39.30	11.2	60	20.7	QP	N	GND

**MEASUREMENT RESULT: "CTL160112180\_fin2"**

1/12/2016 1:50PM

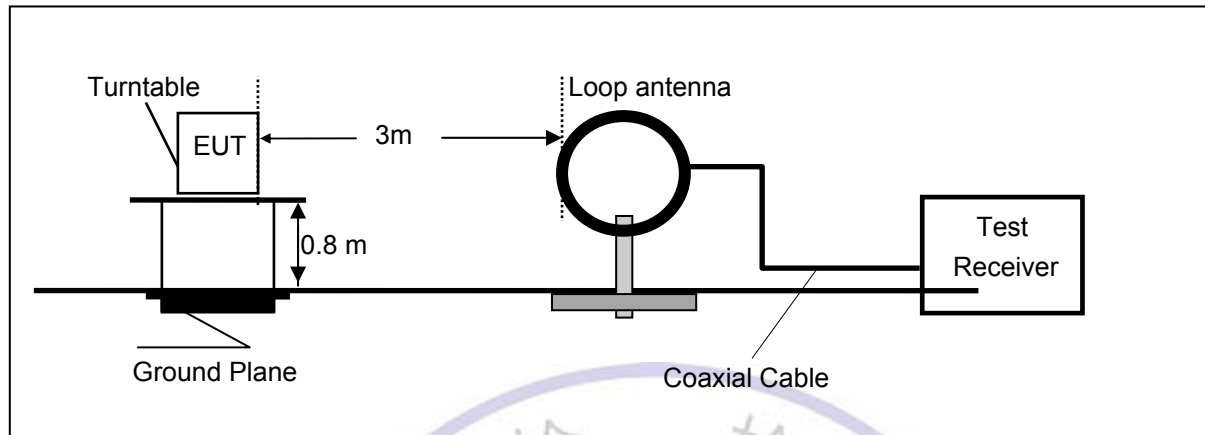
Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	FE
0.289501	31.40	10.2	51	19.1	AV	N	GND
1.383001	28.60	10.3	46	17.4	AV	N	GND
1.747501	28.70	10.3	46	17.3	AV	N	GND
1.824001	28.70	10.3	46	17.3	AV	N	GND
2.031001	25.90	10.4	46	20.1	AV	N	GND
2.400001	27.00	10.4	46	19.0	AV	N	GND



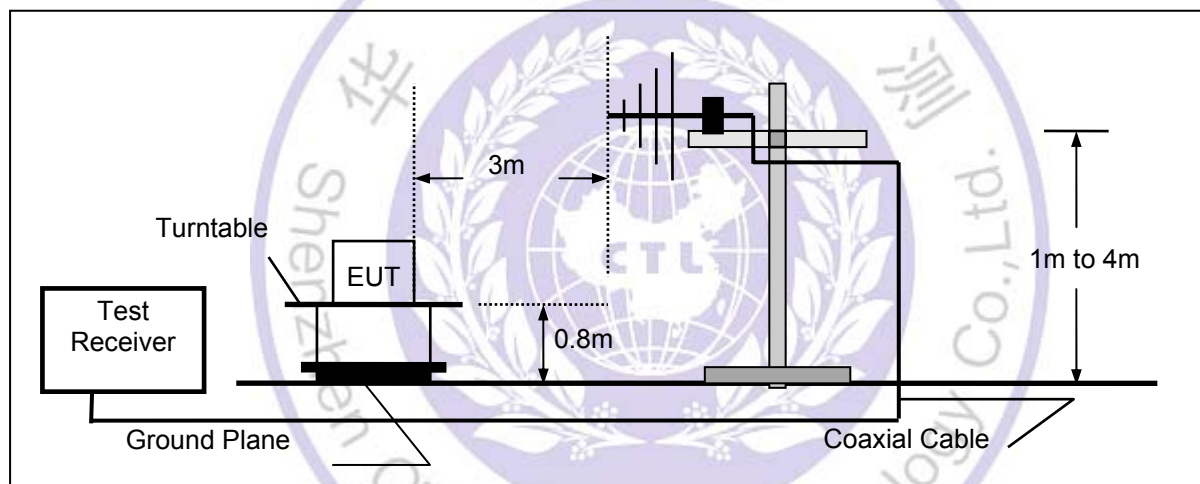
## 4.2. Radiated Emission and band edge

### TEST CONFIGURATION

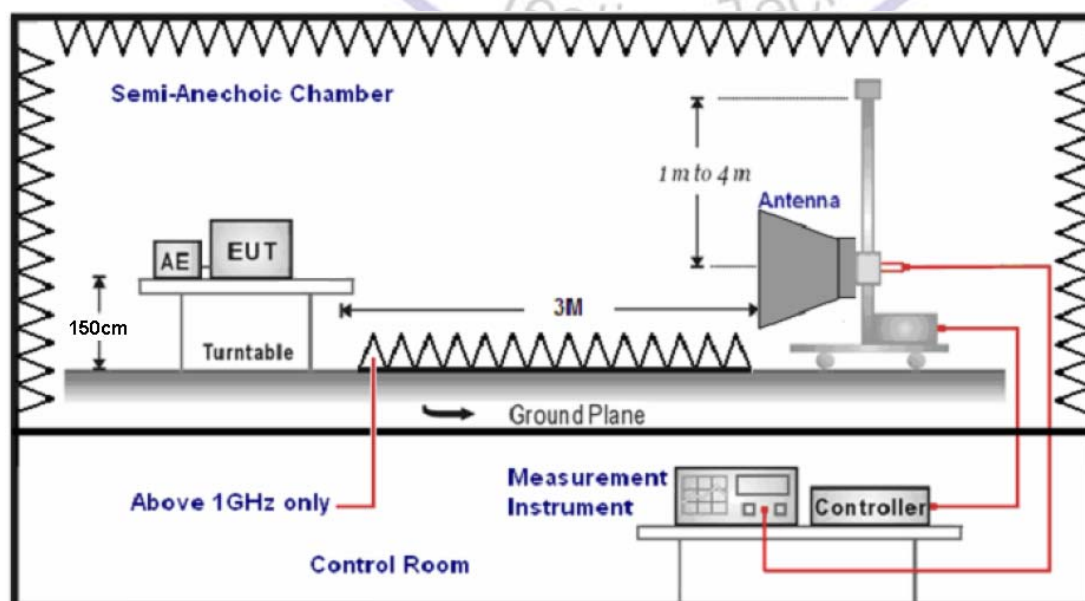
Radiated Emission Test Set-Up  
Frequency range 9KHz – 30MHz



Frequency range 30MHz – 1000MHz



Frequency range above 1GHz-25GHz



**TEST PROCEDURE**

- 1 The EUT is placed on a turntable, which is 0.8m above ground plane below 1GHz and 1.5m above ground plane above 1GHz.
- 2 Maximum procedure was performed by raising the receiving antenna from 1m to 4m and rotating the turntable from 0° to 360° to acquire the highest emissions from EUT
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4. Repeat above procedures until all frequency measurements have been completed.
5. the fundamental frequency is 2400-2483.5MHz, So the radiation emissions frequency range were tested from 9KHz to 25GHz.

**Field Strength Calculation**

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

$$FS = RA + AF + CL - AG$$

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

For example

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

$$\text{Transd} = \text{AF} + \text{CL} - \text{AG}$$

**RADIATION LIMIT**

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

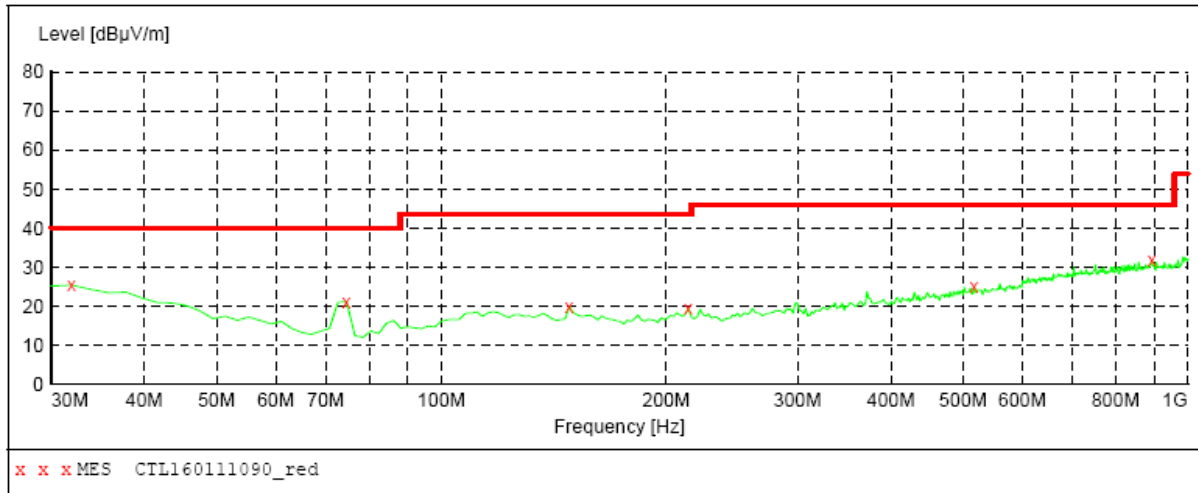
Frequency (MHz)	Distance (Meters)	Radiated (dBμV/m)	Radiated (μV/m)
30-88	3	40.0	100
88-216	3	43.5	150
216-960	3	46.0	200
Above 960	3	54.0	500

**TEST RESULTS****Below 1GHz:**

The radiated measurement are performed the each test mode and channel (low/mid/high), the datum recorded below is the worst case for all the test mode and channel.

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

Short Description:		Field Strength			
Start	Stop	Detector	Meas.	IF	Transducer
Frequency	Frequency		Time	Bandw.	
30.0 MHz	1.0 GHz	MaxPeak	300.0 ms	120 kHz	JB1

***MEASUREMENT RESULT: "CTL160111090\_red"***

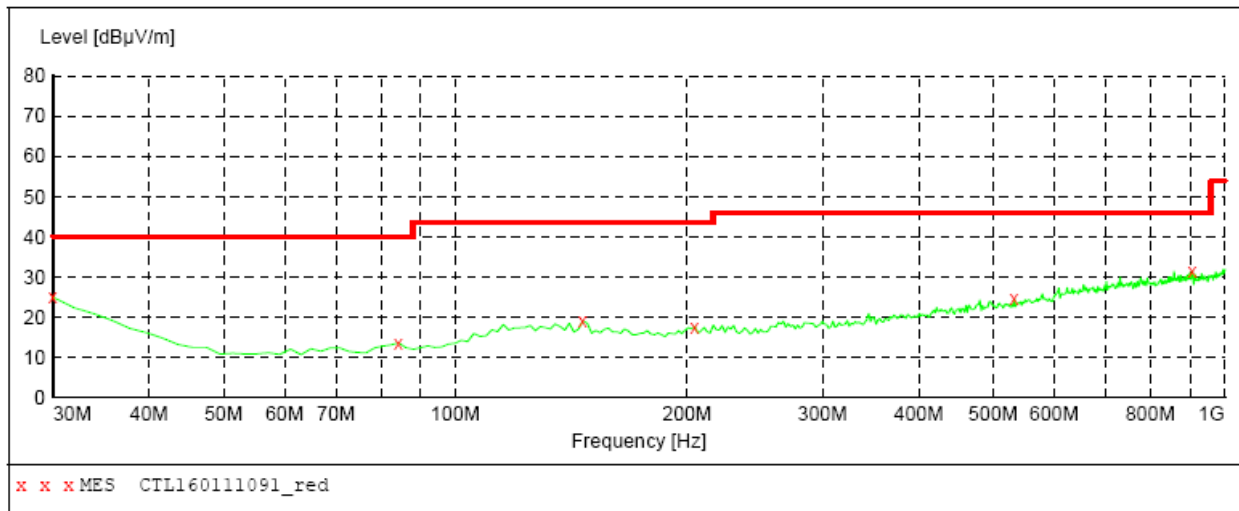
1/11/2016 9:27AM

Frequency MHz	Level dBμV/m	Transd dB	Limit dBμV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
31.940000	25.30	19.2	40.0	14.7	---	0.0	0.00	VERTICAL
74.620000	21.10	8.3	40.0	18.9	---	0.0	0.00	VERTICAL
148.340000	19.80	13.8	43.5	23.7	---	0.0	0.00	VERTICAL
214.300000	19.30	14.0	43.5	24.2	---	0.0	0.00	VERTICAL
516.940000	24.90	20.3	46.0	21.1	---	0.0	0.00	VERTICAL
895.240000	31.80	25.9	46.0	14.2	---	0.0	0.00	VERTICAL



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

Short Description:		Field Strength			
Start	Stop	Detector	Meas.	IF	Transducer
Frequency	Frequency		Time	Bandw.	
30.0 MHz	1.0 GHz	MaxPeak	300.0 ms	120 kHz	JB1

***MEASUREMENT RESULT: "CTL160111091\_red"***

1/11/2016 9:29AM

Frequency MHz	Level dBuV/m	Transd dB	Limit dBuV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
30.000000	24.90	20.8	40.0	15.1	---	0.0	0.00	HORIZONTAL
84.320000	13.50	8.8	40.0	26.5	---	0.0	0.00	HORIZONTAL
146.400000	19.00	14.0	43.5	24.5	---	0.0	0.00	HORIZONTAL
204.600000	17.60	14.1	43.5	25.9	---	0.0	0.00	HORIZONTAL
532.460000	24.50	20.5	46.0	21.5	---	0.0	0.00	HORIZONTAL
906.880000	31.50	26.1	46.0	14.5	---	0.0	0.00	HORIZONTAL



CH	Antenna	Frequency (MHz)	Reading Level (dBuV/m)	Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
0	V	2402	60.6	29.1	89.7	Fundamental	/	PK
	V	3200	11.0	31.1	42.1	54(note3)	11.9	PK
	V	2390	35.2	32.2	67.4	74	6.6	PK
	V	2390	13.9	32.2	46.1	54	7.9	AV
	V	2400	37.1	32.1	69.2	74	4.8	PK
	V	2400	15.4	32.1	47.5	54	6.5	AV
	V	4804	4.7	42.6	47.3	54(note3)	6.7	PK
	V	7206	19.3	46.5	65.8	74	8.2	PK
	V	7206	-1.1	46.5	45.4	54	8.6	AV
	H	24000	11.7	38.9	50.6	54	3.4	PK
19	V	2440	57.4	30.7	88.1	Fundamental	/	PK
	V	3200	9.7	31.1	40.8	54(note3)	13.2	PK
	V	4880	15.8	32.8	48.6	54(note3)	5.4	PK
	V	7320	21.3	46.8	68.1	74	5.9	PK
	V	7320	1.3	46.1	47.4	54	6.6	AV
	H	24000	11.7	38.9	50.6	54	3.4	PK
39	V	2480	57.7	29.5	87.2	Fundamental	/	PK
	V	3200	13.0	31.1	44.1	54(note3)	9.9	PK
	V	2483.5	33.7	30.2	63.9	74	10.1	PK
	V	2483.5	15.0	30.2	45.2	54	8.8	AV
	V	4960	10.7	32.5	43.2	54(note3)	10.8	PK
	V	7440	20.1	46.3	66.4	74	7.6	PK
	V	7440	0.3	46.3	46.6	54	7.4	AV
	H	24000	11.7	38.9	50.6	54	3.4	PK

Note: 1. Measure Level = Reading Level + Factor.

2. The test results which are attenuated more than 20 dB below the permissible value limit (the test frequency range: 9kHz~30MHz, 18GHz~25GHz), therefore no data appear in the report.

3. This limit applies for using average detector, if the test result on peak is lower than average limit, then average measurement needn't be performed.

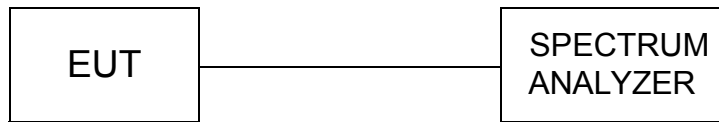
Remark: RBW 1MHz VBW 3MHz peak detector for PK value, RMS detector for AV value

4. H and V polarity all have been tested ,only worse case is reported.



### 4.3. Maximum Peak Output Power

#### TEST CONFIGURATION



#### TEST PROCEDURE

According to ANSI 63.10 -2013 and KDB 558074 D01 v03r03, The EUT was directly connected to the power meter / spectrum analyzer and antenna output port as show in the block diagram as TEST CONFIGURATION shows.

Use the wideband power meter to test peak power and record the result.

#### LIMIT

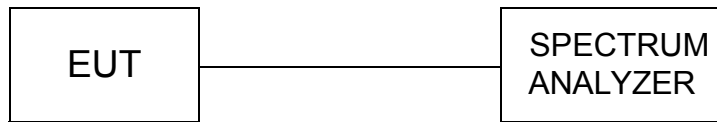
The Maximum Peak Output Power Measurement limit is 30dBm.

#### TEST RESULTS

Channel No.	Frequency (MHz)	Measurement Power Output (dBm)	Limit (dBm)	Result
0	2402	-6.526	30.00	Pass
19	2440	-6.802	30.00	Pass
39	2480	-8.611	30.00	Pass

#### 4.4. 6dB Bandwidth

##### TEST CONFIGURATION



##### TEST PROCEDURE

1. The testing follows FCC KDB Publication No. 558074 D01 v03r03 (Measurement Guidelines of DTS).
2. The RF output of EUT was connected to the spectrum analyzer by a low loss cable.
3. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. In order to make an accurate measurement, set the span greater than RBW. The 6 dB bandwidth must be greater than 500 kHz.
4. The marker-delta reading at this point is the 6 dB bandwidth of the emission.

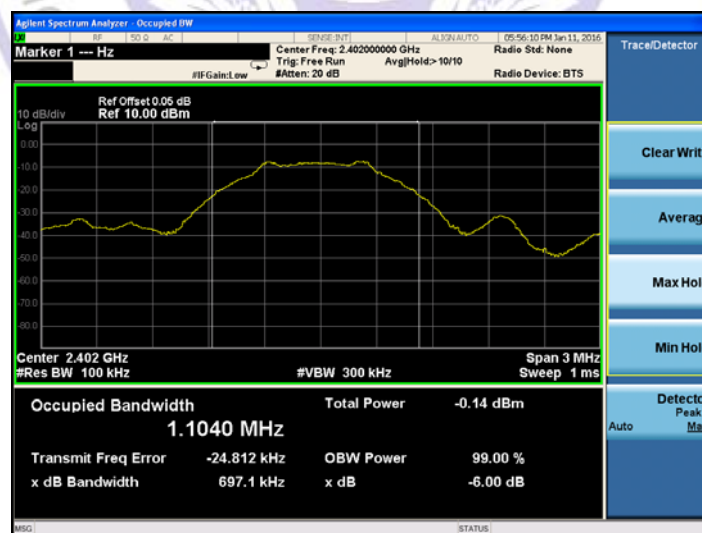
##### LIMIT

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

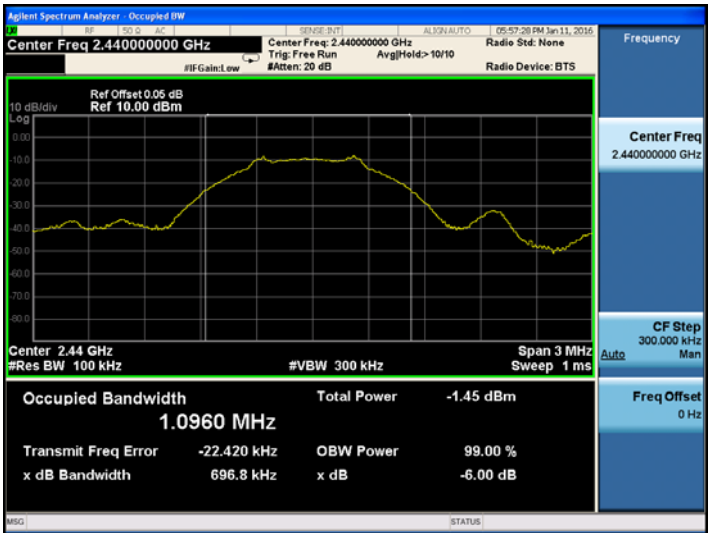
##### TEST RESULTS

CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (KHz)	LIMIT (KHz)	PASS/FAIL
2402	697.1	500	PASS
2440	696.8	500	PASS
2480	687.3	500	PASS

##### Low Channel



Middle Channel

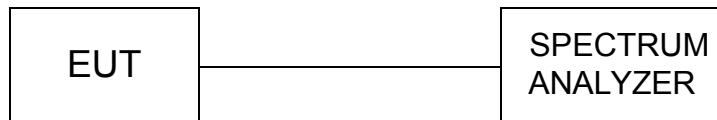


High Channel



## 4.5. Power Spectral Density Measurement

### TEST CONFIGURATION



### TEST PROCEDURE

The EUT was tested according to KDB 558074 D01 v03r03 for compliance to FCC 47CFR 15.247 requirements.

Set RBW= 3 kHz, VBW $\geq$ 10KHz, SPAN to 1.5 times greater than the EBW,.

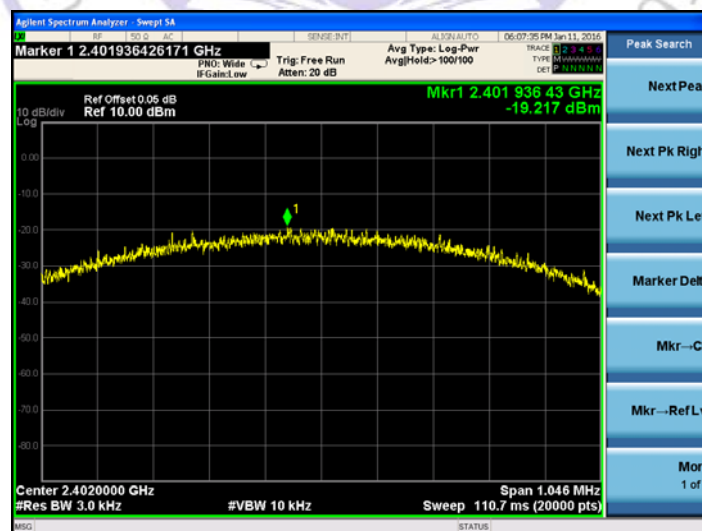
### LIMIT

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.

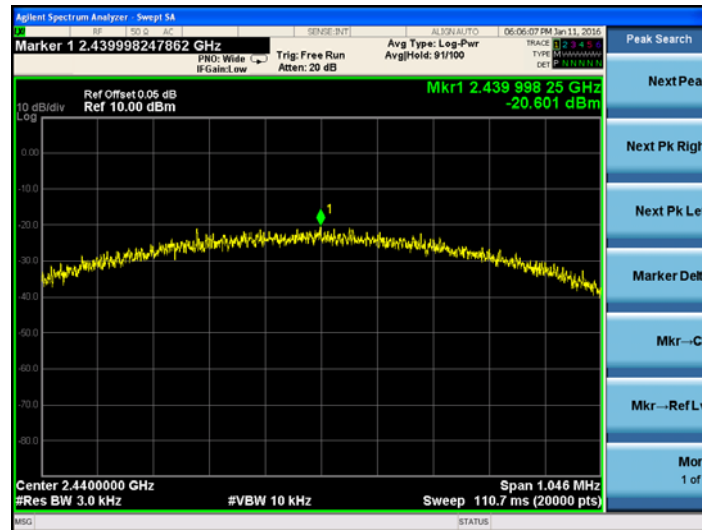
### TEST RESULTS

Modulation Mode	Channel	Channel Frequency (MHz)	PSD (dBm/3KHz)	Maximum limit (dBm/3KHz)	PASS / FAIL
GFSK	1	2402	-19.217	8	PASS
	19	2440	-20.601	8	PASS
	39	2480	-21.291	8	PASS

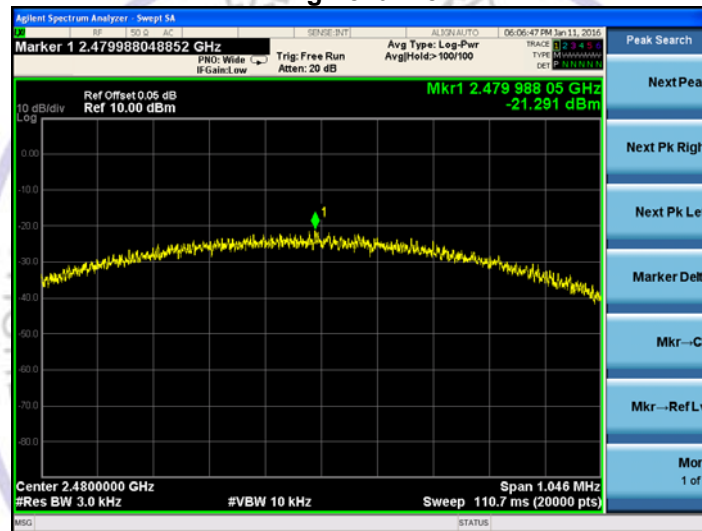
Low channel



## Middle channel



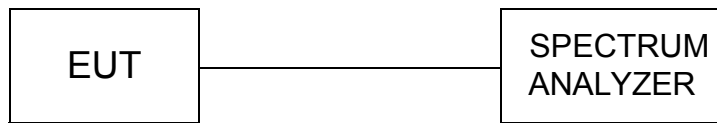
## High channel





## 4.6. Spurious RF Conducted Emission and band edge

### TEST CONFIGURATION



### TEST PROCEDURE

The EUT was tested according to KDB 558074 D01 v03r03 for compliance to FCC 47CFR 15.247 requirements.

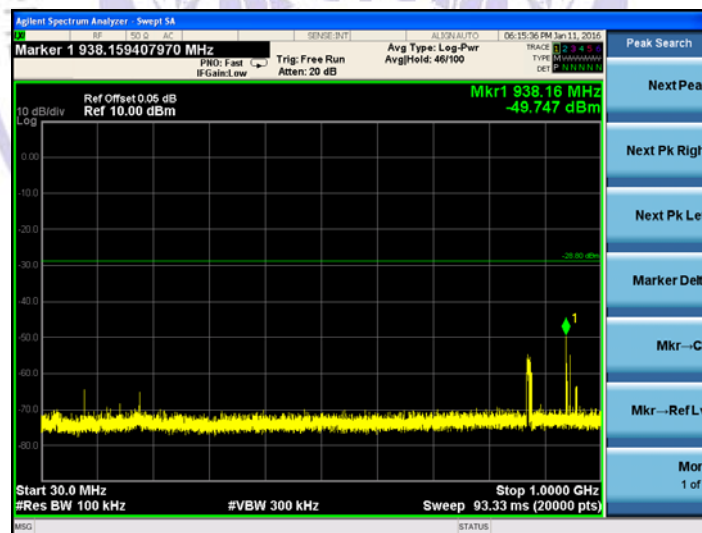
The Spurious RF conducted emissions compliance of RF radiated emission should be measured by following the guidance in ANSI C63.10-2013 with respect to maximizing the emission by rotating the EUT, measuring the emission while the EUT is situated in three orthogonal planes (if appropriate), adjusting 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.

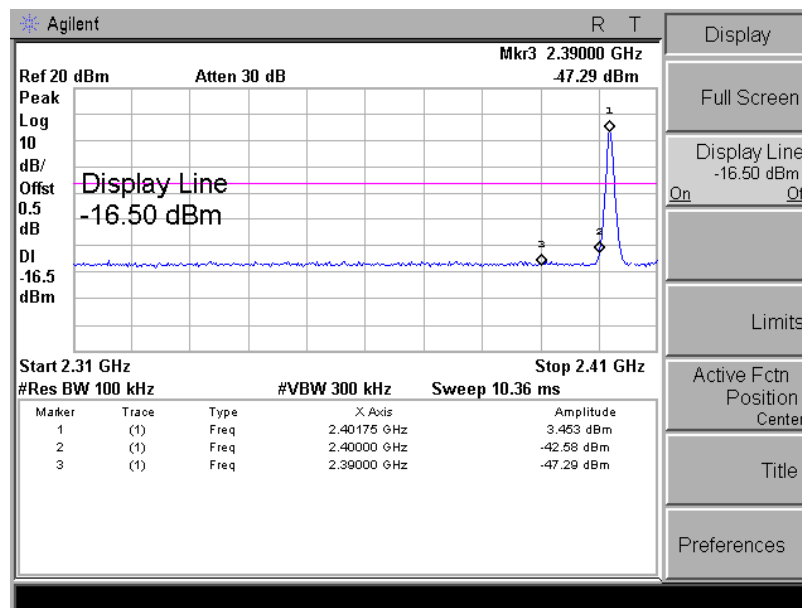
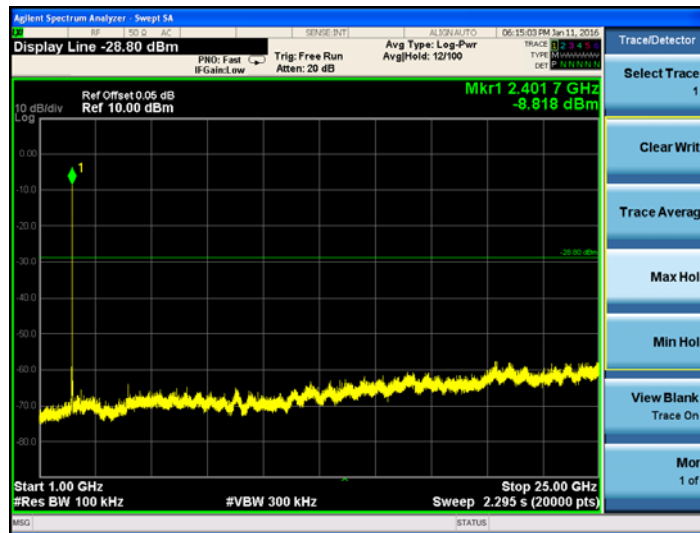
### LIMIT

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.

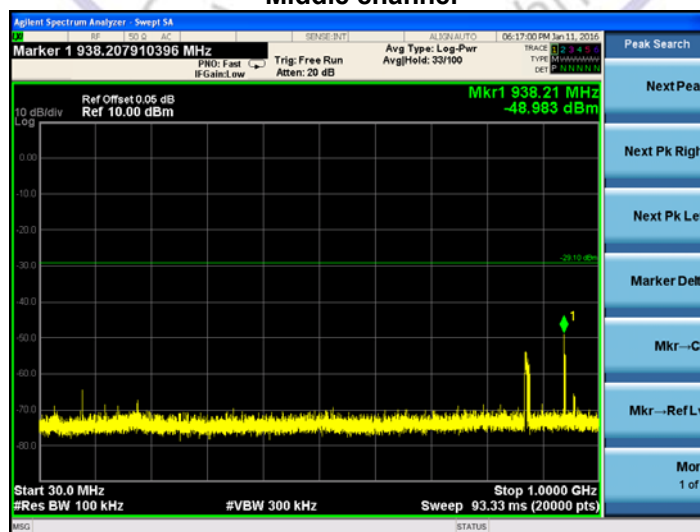
### TEST RESULTS

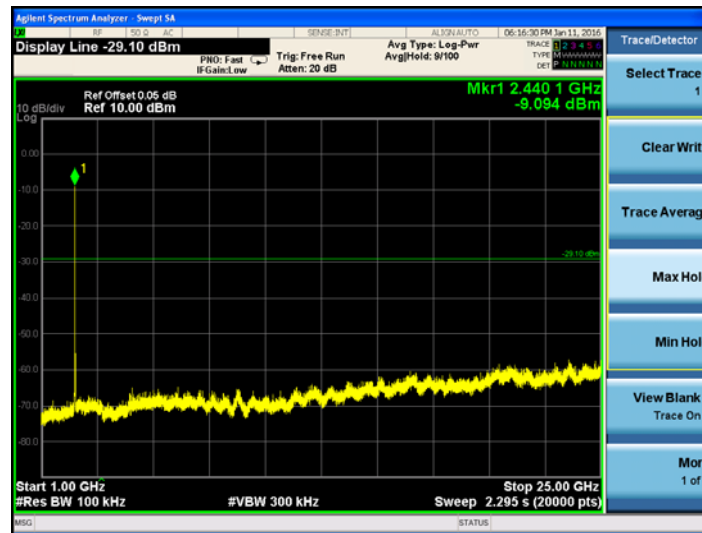
Low channel



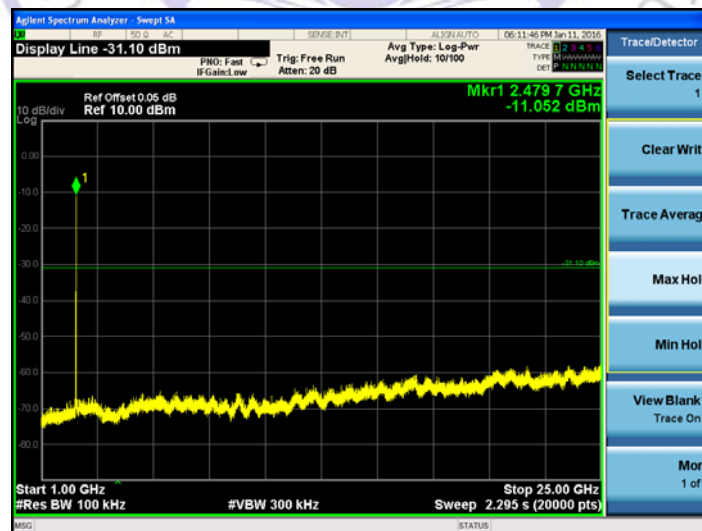
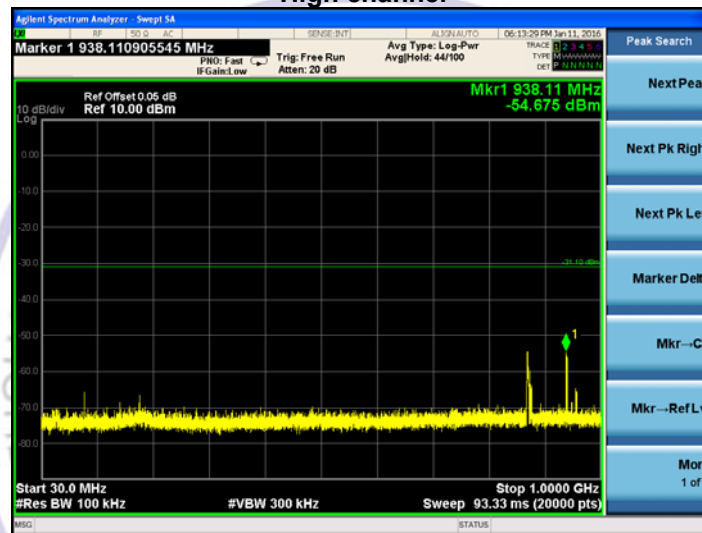


## Middle channel





## High channel





## 4.7. Antenna Requirement

### Standard Applicable

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

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

**Refer to statement below for compliance.**

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

### Antenna Connected Construction

The antenna used in this product is an internal Antenna, The directional gains of antenna used for transmitting is 0dBi.

