Shenzhen Global Test Service Co.,Ltd.
1F, Building No. 13A, Zhonghaixin Science and Technology City, No.12,6 Road, Ganli Industrial Park, Buji Street, Longgang District, Shenzhen, Guangdong

FCC PART 15 SUBPART C TEST REPORT

FCC PART 15.247

Report Reference No.....:	**GTSR17032017-01**
FCC ID..... :	**2ACH9EL2IN1-1102T**
Compiled by (position+printed name+signature)..:	File administrators Jimmy Wang
Supervised by (position+printed name+signature)..:	Test Engineer Peter Xiao
Approved by (position+printed name+signature)..:	Manager Sam Wang
Date of issue.....:	Mar. 26, 2017
Representative Laboratory Name .:	**Shenzhen Global Test Service Co.,Ltd.**
Address .....:	1F, Building No. 13A, Zhonghaixin Science and Technology City, No.12,6 Road, Ganli Industrial Park, Buji Street, Longgang District, Shenzhen, Guangdong
Applicant's name.....:	**WeiHeng Digital Company Limited**
Address .....:	Rm732, 3rd session, Build B, Mingyou Industrial Products Exhibition and Purchasing Center, Baoyuan Road, Bao'an District, Shenzhen, China
Test specification .....:	
Standard .....:	**FCC Part 15.247-2015: Operation within the bands 902-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz**
TRF Originator.....:	Shenzhen Global Test Service Co.,Ltd.
Master TRF.....:	Dated 2014-12

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Test item description .....:	**Laptop**
Trade Mark .....:	TEQNIO
Manufacturer .....:	WeiHeng Digital Company Limited
Model/Type reference.....:	EL2IN1-1102T
Listed Models .....:	/
Modulation Type .....:	GFSK
Operation Frequency.....:	From 2402MHz to 2480MHz
EUT Type .....:	Production Unit
Hardware Version .....:	Y116C REV:2.1
Software Version .....:	V1.0
Rating .....:	DC 3.80V
Result.....:	**PASS**

T E S T R E P O R T

Test Report No. : GTSR17032017-01	Mar. 26, 2017 Date of issue

Equipment under Test	:	Laptop
Model /Type	:	EL2IN1-1102T
Listed Models	:	/
Applicant	:	**WeiHeng Digital Company Limited**
Address	:	Rm732, 3rd session, Build B, Mingyou Industrial Products Exhibition and Purchasing Center, Baoyuan Road, Bao'an District, Shenzhen, China
Manufacturer	:	**WeiHeng Digital Company Limited**
Address	:	Rm732, 3rd session, Build B, Mingyou Industrial Products Exhibition and Purchasing Center, Baoyuan Road, Bao'an District, Shenzhen, China

Test Result:	**PASS**

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
KDB558074 D01 V03r05: Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247.

2. SUMMARY

2.1. General Remarks

Date of receipt of test sample	:	Mar. 01, 2017
Testing commenced on	:	Mar. 01, 2017
Testing concluded on	:	Mar. 26, 2017

2.2. Product Description

Name of EUT	Laptop
Trade Mark	TEQNIO
Model Number	EL2IN1-1102T
List Model	/
FCC ID	2ACH9EL2IN1-1102T
Power supply	Battery DC 3.8V
Adapter Information	Model: B118-050300-AdU Input: 100-240V～50/60Hz 0.8A Output:DC5V/3A
Antenna Type	Internal Antenna
Bluetooth FCC Operation frequency	2402MHz-2480MHz
Bluetooth Modulation	GFSK
Bluetooth	Supported BT4.0
Antenna gain	-0.65dBi

2.3. Equipment Under Test

Power supply system utilised

Power supply voltage	:	○	230V / 50 Hz	○	120V / 60Hz
		○	12 V DC	○	24 V DC
		●	Other (specified in blank below)		

DC 3.80V

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

This is a Laptop.

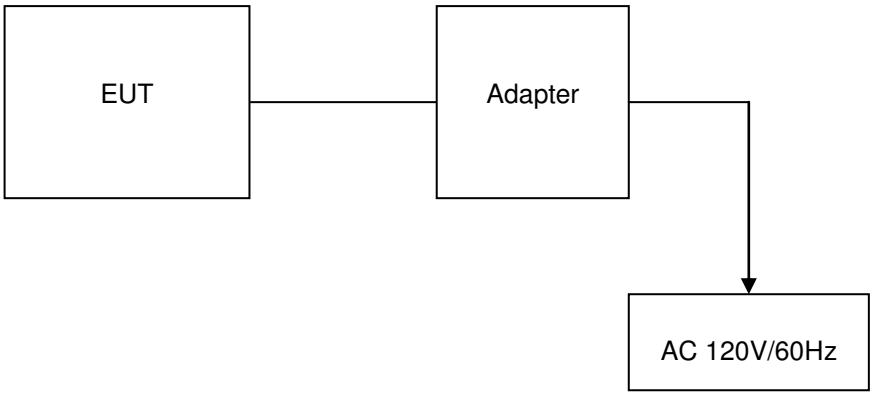
For more details, refer to the user's manual of the EUT.

2.5. EUT operation mode

The Applicant provides communication tools software to control the EUT for staying in continuous transmitting (Duty Cycle more than 98%) and receiving mode for testing .There are 40 channels provided to the EUT. Channel 00/19/39 was selected to test.

Channel	Frequency(MHz)	Channel	Frequency(MHz)
0	**2402**	20	2442
1	2404	21	2444
2	2406	22	2446
3	2408	23	2448
4	2410	24	2450
5	2412	25	2452
6	2414	26	2454
7	2416	27	2456
8	2418	28	2458
9	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**

2.6. Block Diagram of Test Setup



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

This submittal(s) (test report) is intended for **FCC ID: 2ACH9EL2IN1-1102T** filing to comply with Section 15.247 of the FCC Part 15, Subpart C Rules.

2.8. EUT configuration

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

● - supplied by the manufacturer

○ - Supplied by the lab

○	Adapter	M/N:	
		Manufacturer:	

2.9. Modifications

No modifications were implemented to meet testing criteria.

3. TEST ENVIRONMENT

3.1. Address of the test laboratory

Shenzhen Global Test Service Co.,Ltd.
1F, Building No. 13A, Zhonghaixin Science and Technology City, No.12,6 Road, Ganli Industrial Park, Buji Street, Longgang District, Shenzhen, Guangdong

Shenzhen CTL Testing Technology Co., Ltd.
1/F.-A, Baisha Technology Park, No.3011, Shahexi Road, Nanshan District, Shenzhen, Guangdong, China

3.2. Test Facility

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

FCC-Registration No.: 964637

Shenzhen Global Test Service 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 964637, Jul 24, 2015.

CNAS-Lab Code: L8169

Shenzhen Global Test Service 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: Dec. 11, 2015. Valid time is until Dec. 10, 2018.

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. Test Description

Test Specification clause	Test case	Test Mode	Test Channel	Recorded In Report		Pass	Fail	NA	NP	Remark
§15.247(b)(4)	Antenna gain	GFSK	☒ Lowest ☒ Middle ☒ Highest	GFSK	☒ Lowest ☒ Middle ☒ Highest	☒	☐	☐	☐	See remark 3
§15.247(e)	Power spectral density	GFSK	☒ Lowest ☒ Middle ☒ Highest	GFSK	☒ Lowest ☒ Middle ☒ Highest	☒	☐	☐	☐	See remark 3
§15.247(a)(2)	Spectrum bandwidth – 6 dB bandwidth	GFSK	☒ Lowest ☒ Middle ☒ Highest	GFSK	☒ Lowest ☒ Middle ☒ Highest	☒ ☒	☐	☐	☐	See remark 3
§15.247(b)(1)	Maximum output power	GFSK	☒ Lowest ☒ Middle ☒ Highest	GFSK	☒ Lowest ☒ Middle ☒ Highest	☒ ☒ ☒	☐	☐	☐	See remark 3
§15.247(d)	Band edge compliance conducted	GFSK	☒ Lowest ☒ Highest	GFSK	☒ Lowest ☒ Highest	☒ ☒	☐	☐	☐	See remark 3
§15.205	Band edge compliance radiated	GFSK	☒ Lowest ☒ Highest	GFSK	☒ Lowest ☒ Highest	☒	☐	☐	☐	See remark 4
§15.247(d)	TX spurious emissions conducted	GFSK	☒ Lowest ☒ Middle ☒ Highest	GFSK	☒ Lowest ☒ Middle ☒ Highest	☒ ☒	☐	☐	☐	See remark 3
§15.247(d)	TX spurious emissions radiated	GFSK	☒ Lowest ☒ Middle ☒ Highest	GFSK	☒ Lowest ☒ Middle ☒ Highest	☒	☐	☐	☐	See remark 4
§15.109	RX spurious emissions radiated	-/-	-/-	-/-	-/-	☐	☐	☒	☐	--
§15.209(a)	TX spurious Emissions radiated < 30 MHz	GFSK	-/-	GFSK	-/-	☒	☐	☐	☐	See remark 4
§15.107(a) §15.207	Conducted Emissions < 30 MHz	GFSK	-/-	GFSK	-/-	☒	☐	☐	☐	See remark 3

Remark:
1. The measurement uncertainty is not included in the test result.
2. NA = Not Applicable; NP = Not Performed
3. Test size: Shenzhen Global Test Service Co.,Ltd.
4. Test size: Shenzhen CTL Testing Technology Co., Ltd.

3.5. Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16 - 4 „Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements“ and is documented in the Shenzhen Global Test Service 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 GTS laboratory is reported:

Test	Range	Measurement Uncertainty	Notes
Radiated Emission	30~1000MHz	4.10 dB	(1)
Radiated Emission	1~18GHz	4.32 dB	(1)
Radiated Emission	18-40GHz	5.54 dB	(1)
Conducted Disturbance	0.15~30MHz	3.12 dB	(1)

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

3.6. Equipments Used during the Test

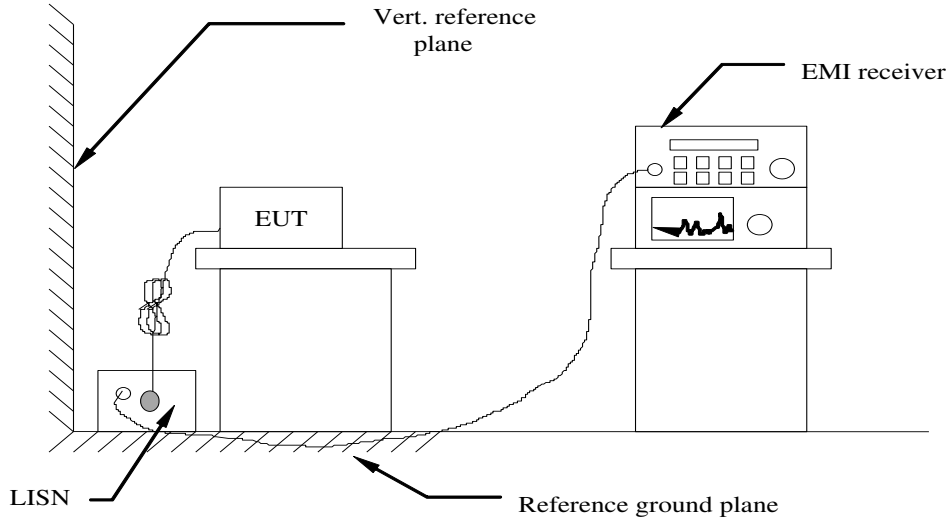
Test Equipment	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Due Date
LISN	R&S	ENV216	3560.6550.08	2016/05/28	2017/05/27
LISN	R&S	ESH2-Z5	893606/008	2016/05/27	2017/05/26
Bilog Antenna	Sunol Sciences Corp.	JB1	A061713	2016/06/02	2017/06/01
EMI Test Receiver	R&S	ESCI	101102	2016/06/26	2017/06/25
Spectrum Analyzer	Agilent	N9020A	MY48010425	2016/06/17	2017/06/16
Controller	EM Electronics	Controller EM 1000	N/A	2016/05/21	2017/05/20
Horn Antenna	Sunol Sciences Corp.	DRH-118	A062013	2016/05/19	2017/05/18
Active Loop Antenna	SCHWARZBECK	FMZB1519	1519-037	2016/05/19	2017/05/18
Amplifier	Agilent	8349B	3008A02306	2016/05/19	2017/05/18
Amplifier	Agilent	8447D	2944A10176	2016/05/19	2017/05/18
Temperature/Humidity Meter	Gangxing	CTH-608	02	2016/05/20	2017/05/19
High-Pass Filter	K&L	9SH10-2700/X12750-O/O	N/A	2016/05/20	2017/05/19
High-Pass Filter	K&L	41H10-1375/U12750-O/O	N/A	2016/05/20	2017/05/19
RF Cable	HUBER+SUHNER	RG214	N/A	2016/05/20	2017/05/19
Data acquisition card	Agilent	U2531A	TW53323507	2016/05/20	2017/05/19
Power Sensor	Agilent	U2021XA	MY5365004	2016/05/20	2017/05/19

Note: The Cal.Interval was one year.

4. TEST CONDITIONS AND RESULTS

4.1. AC Power Conducted Emission

TEST CONFIGURATION



TEST PROCEDURE

1 The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. The EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.10-2013.
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 DC 5V power from adapter, the adapter received AC120V/60Hz and AC 240V/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 range (MHz)	Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50
* Decreases with the logarithm of the frequency.		

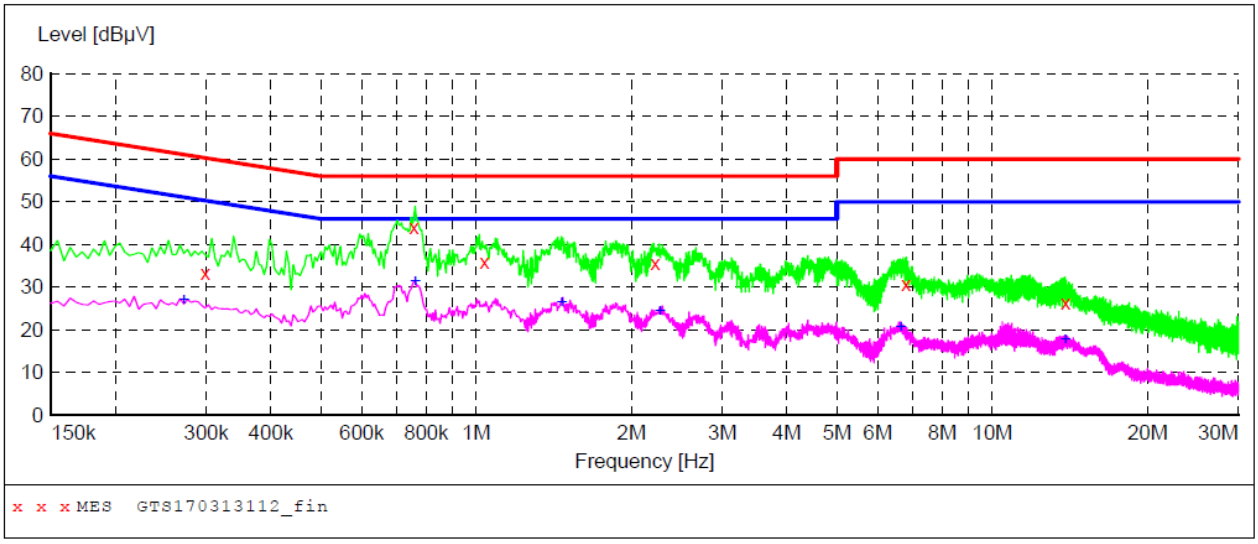
TEST RESULTS

Remark:We tested three positions in AC 120V/60Hz and AC 240V/60Hz, the worst case was recorded.

Power supply:	DC 5V from Adapter AC 120V/60Hz	Polarization	L

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

Short Description: 150K-30M Voltage



MEASUREMENT RESULT: "GTS170313112_fin"

3/13/2017 11:00AM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.298500	33.30	9.9	60	27.0	QP	L1	GND
0.757500	43.90	9.7	56	12.1	QP	L1	GND
1.036500	35.80	9.6	56	20.2	QP	L1	GND
2.220000	35.60	9.5	56	20.4	QP	L1	GND
6.801000	30.80	9.1	60	29.2	QP	L1	GND
13.879500	26.20	8.3	60	33.8	QP	L1	GND

MEASUREMENT RESULT: "GTS170313112_fin2"

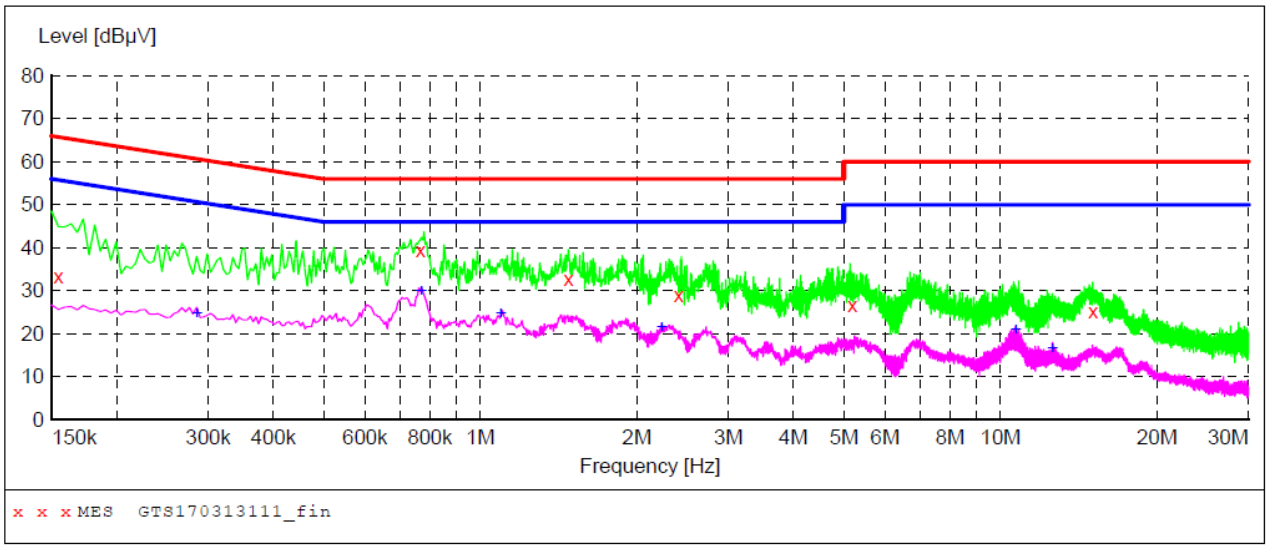
3/13/2017 11:00AM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.271500	26.90	9.9	51	24.2	AV	L1	GND
0.762000	31.40	9.7	46	14.6	AV	L1	GND
1.464000	26.30	9.6	46	19.7	AV	L1	GND
2.269500	24.40	9.5	46	21.6	AV	L1	GND
6.652500	20.60	9.2	50	29.4	AV	L1	GND
13.875000	17.50	8.3	50	32.5	AV	L1	GND

Power supply:	DC 5V from Adapter AC 120V/60Hz	Polarization	N

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

Short Description: 150K-30M Voltage



MEASUREMENT RESULT: "GTS170313111_fin"

3/13/2017 10:52AM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.154500	33.20	10.1	66	32.6	QP	N	GND
0.766500	39.40	9.7	56	16.6	QP	N	GND
1.477500	32.60	9.6	56	23.4	QP	N	GND
2.404500	28.90	9.5	56	27.1	QP	N	GND
5.185500	26.70	9.3	60	33.3	QP	N	GND
15.063000	25.10	8.2	60	34.9	QP	N	GND

MEASUREMENT RESULT: "GTS170313111_fin2"

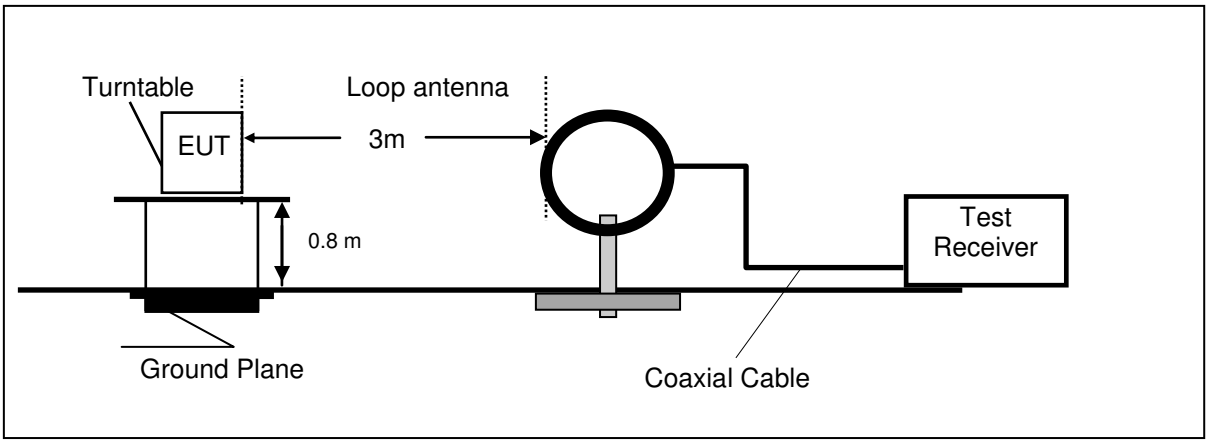
3/13/2017 10:52AM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.285000	24.70	9.9	51	26.0	AV	N	GND
0.771000	29.70	9.7	46	16.3	AV	N	GND
1.095000	24.50	9.6	46	21.5	AV	N	GND
2.233500	21.30	9.5	46	24.7	AV	N	GND
10.707000	20.90	8.8	50	29.1	AV	N	GND
12.606000	16.40	8.5	50	33.6	AV	N	GND

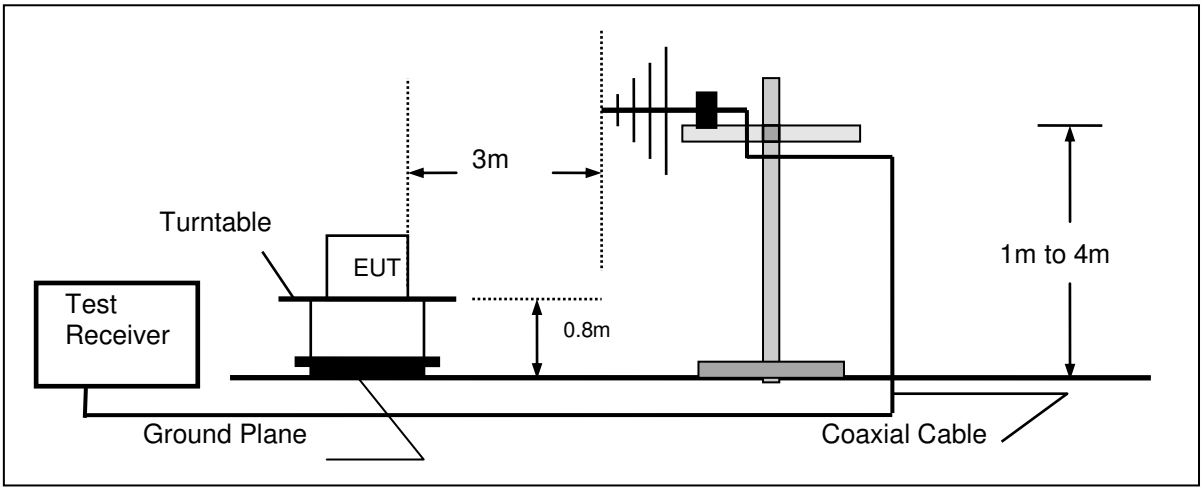
4.2. Radiated Emission

TEST CONFIGURATION

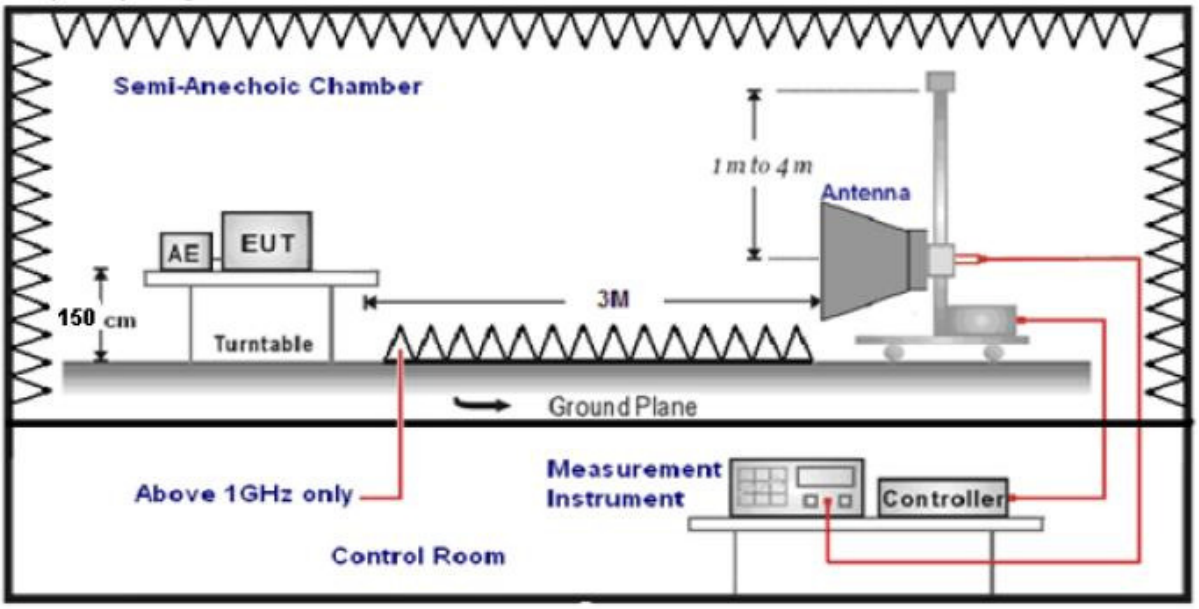
Frequency range 9 KHz – 30MHz



Frequency range 30MHz – 1000MHz



Frequency range above 1GHz-25GHz



TEST PROCEDURE

1. The EUT was placed on a turn table which is 0.8m above ground plane when testing frequency range 9 KHz –1GHz;the EUT was placed on a turn table which is 1.5m above ground plane when testing frequency range 1GHz – 25GHz.
2. Maximum procedure was performed by raising the receiving antenna from 1m to 4m and rotating the turn table from 0° to 360° to acquire the highest emissions from EUT.
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4. Repeat above procedures until all frequency measurements have been completed.
5. The EUT minimum operation frequency was 26MHz and maximum operation frequency was 2480MHz. So radiated emission test frequency band from 9KHz to 25GHz.
6. The distance between test antenna and EUT as following table states:

Test Frequency range	Test Antenna Type	Test Distance
9KHz-30MHz	Active Loop Antenna	3
30MHz-1GHz	Ultra-Broadband Antenna	3
1GHz-18GHz	Double Ridged Horn Antenna	3
18GHz-25GHz	Horn Anternna	1

7. Setting test receiver/spectrum as following table states:

Test Frequency range	Test Receiver/Spectrum Setting	Detector
9KHz-150KHz	RBW=200Hz/VBW=3KHz,Sweep time=Auto	QP
150KHz-30MHz	RBW=9KHz/VBW=100KHz,Sweep time=Auto	QP
30MHz-1GHz	RBW=120KHz/VBW=1000KHz,Sweep time=Auto	QP
1GHz-40GHz	Peak Value: RBW=1MHz/VBW=3MHz, Sweep time=Auto Average Value: RBW=1MHz/VBW=10Hz, Sweep time=Auto	Peak

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	

Transd=AF +CL-AG

RADIATION LIMIT

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

The pre-test have done for the EUT in three axes and found the worst emission at position shown in test setup photos.

Frequency (MHz)	Distance (Meters)	Radiated (dBµV/m)	Radiated (µV/m)
0.009-0.49	3	20log(2400/F(KHz))+40log(300/3)	2400/F(KHz)
0.49-1.705	3	20log(24000/F(KHz))+ 40log(30/3)	24000/F(KHz)
1.705-30	3	20log(30)+ 40log(30/3)	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

TEST RESULTS

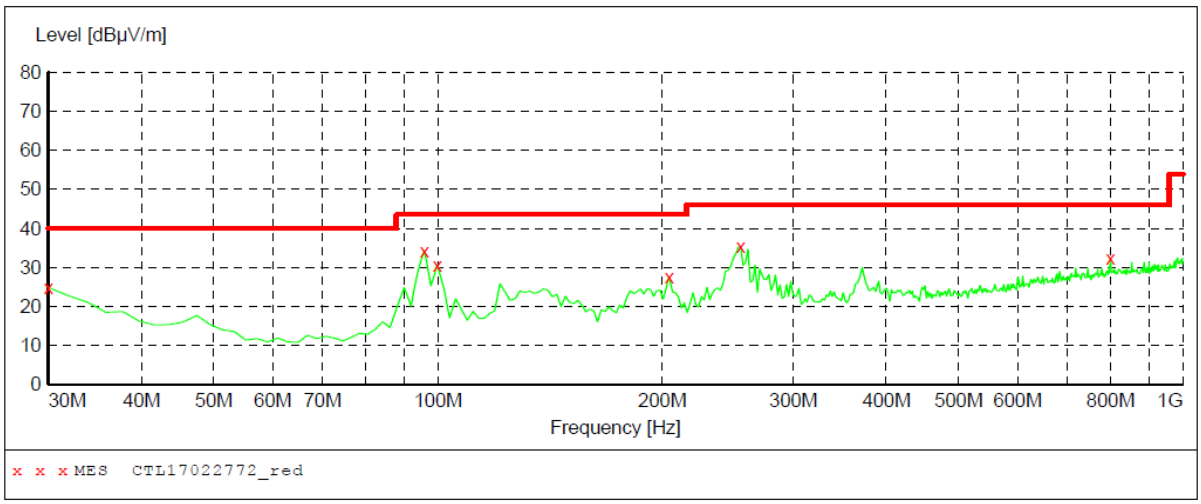
Remark: We measured Radiated Emission at three positions in AC 120V/60Hz and AC 240V/60Hz from 9 KHz to 25GHz, the worst case was recorded.
Test site: Shenzhen CTL Testing Technology Co., Ltd.

For 9KHz to 30MHz

Frequency (MHz)	Corrected Reading (dBuV/m)@3m	FCC Limit (dBuV/m) @3m	Margin (dB)	Detector	Result
0.23	49.19	100.37	51.18	QP	PASS
1.58	39.01	63.63	24.62	QP	PASS
10.27	40.20	69.54	29.34	QP	PASS
24.32	40.79	69.54	28.75	QP	PASS

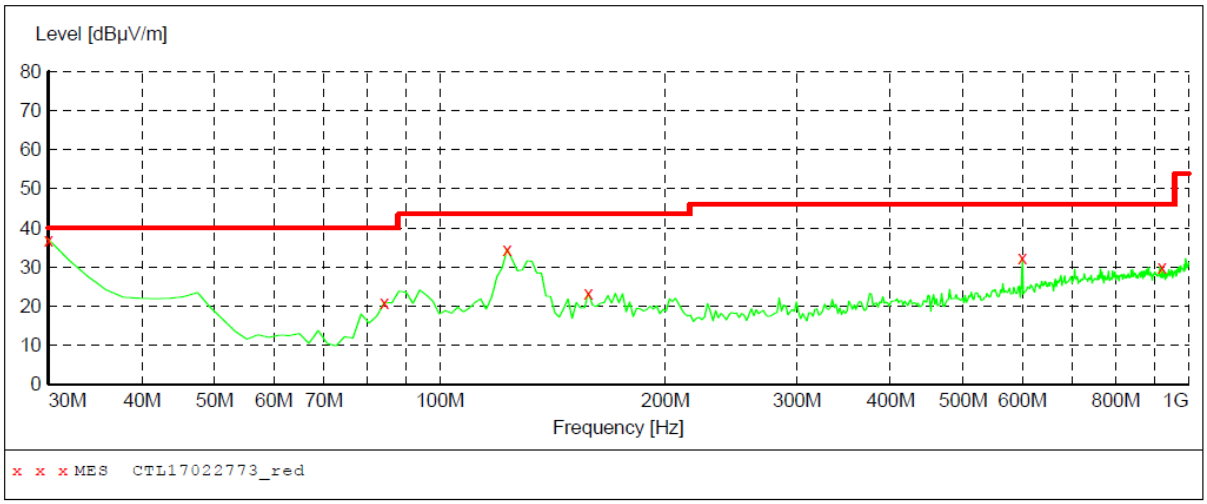
For 30MHz to 1000MHz

Horizontal



Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
30.000000	24.90	20.8	40.0	15.1	PK	100	79.0	HORIZONTAL
95.960000	34.30	10.2	43.5	9.2	PK	100	72.0	HORIZONTAL
99.840000	30.50	11.1	43.5	13.0	PK	100	81.0	HORIZONTAL
204.600000	27.60	14.1	43.5	15.9	PK	100	126.0	HORIZONTAL
255.040000	35.20	14.3	46.0	10.8	PK	200	172.0	HORIZONTAL
800.180000	32.30	24.7	46.0	13.7	PK	200	159.0	HORIZONTAL

Vertical



Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
30.000000	37.00	20.8	40.0	3.0	PK	100	78.0	VERTICAL
84.320000	20.90	8.8	40.0	19.1	PK	100	26.0	VERTICAL
123.120000	34.60	14.6	43.5	8.9	PK	100	57.0	VERTICAL
158.040000	23.40	13.7	43.5	20.1	PK	100	172.0	VERTICAL
600.360000	32.30	21.8	46.0	13.7	PK	100	138.0	VERTICAL
922.400000	30.00	26.2	46.0	16.0	PK	100	148.0	VERTICAL

For 1GHz to 25GHz

Frequency(MHz):				**2402**			**Polarity:**			**HORIZONTAL**		
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	4804.00	47.62	PK	74.00	26.38	1.00 H	72	45.72	31.42	6.98	36.5	1.90
1	4804.00	38.51	AV	54.00	15.49	1.00 H	72	36.61	31.42	6.98	36.5	1.90
2	7206.00	40.17	PK	74.00	33.83	1.00 H	179	29.57	37.03	8.87	35.3	10.60
2	7206.00	--	AV	--	--	--	--	--	--	--	--	--

Frequency(MHz):				**2402**			**Polarity:**			**VERTICAL**		
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	4804.00	46.86	PK	74.00	27.14	1.00 V	111	44.96	31.42	6.98	36.5	1.90
1	4804.00	37.79	AV	54.00	16.21	1.00 V	111	35.89	31.42	6.98	36.5	1.90
2	7206.00	38.26	PK	74.00	35.74	1.00 V	207	27.66	37.03	8.87	35.3	10.60
2	7206.00	--	AV	--	--	--	--	--	--	--	--	--

Frequency(MHz):				**2440**			**Polarity:**			**HORIZONTAL**		
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	4880.00	46.40	PK	74.00	27.60	1.00 H	82	44.34	30.98	7.58	36.5	2.06
1	4880.00	35.47	AV	54.00	18.53	1.00 H	82	33.41	30.98	7.58	36.5	2.06
2	7320.00	39.09	PK	74.00	34.91	1.00 H	173	28.17	37.66	8.56	35.3	10.92
2	7320.00	--	AV	--	--	--	--	--	--	--	--	--

Frequency(MHz):				2440			Polarity:			VERTICAL		
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	4880.00	48.53	PK	74.00	25.47	1.00 V	159	46.47	30.98	7.58	36.5	2.06
1	4880.00	38.38	AV	54.00	15.62	1.00 V	159	36.32	30.98	7.58	36.5	2.06
2	7320.00	42.30	PK	74.00	31.70	1.00 V	218	31.38	37.66	8.56	35.3	10.92
2	7320.00	--	AV	--	--	--	--	--	--	--	--	--

Frequency(MHz):				2480			Polarity:			HORIZONTAL		
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	4960.00	48.41	PK	74.00	25.59	1.00 H	171	45.34	31.47	7.80	36.2	3.07
1	4960.00	38.94	AV	54.00	15.06	1.00 H	171	35.87	31.47	7.80	36.2	3.07
2	7440.00	41.39	PK	74.00	32.61	1.00 H	258	29.65	38.32	8.72	35.3	11.74
2	7440.00	--	AV	--	--	--	--	--	--	--	--	--

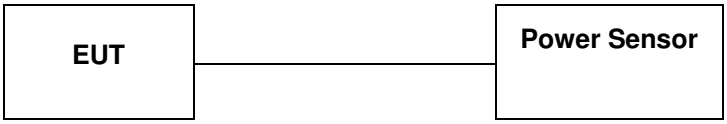
Frequency(MHz):				2480			Polarity:			VERTICAL		
No.	Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier(dB)	Correction Factor (dB/m)
1	4960.00	47.69	PK	74.00	26.31	1.00 V	89	44.62	31.47	7.80	36.2	3.07
1	4960.00	36.57	AV	54.00	17.43	1.00 V	89	33.50	31.47	7.80	36.2	3.07
2	7440.00	39.69	PK	74.00	34.31	1.00 V	169	27.95	38.32	8.72	35.3	11.74
2	7440.00	--	AV	--	--	--	--	--	--	--	--	--

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. Margin value = Limit value- Emission level.
4. -- Mean the PK detector measured value is below average limit.
5. The other emission levels were very low against the limit.

4.3. Maximum Peak Output Power

TEST CONFIGURATION



TEST PROCEDURE

According to KDB558074 D01 DTS Measurement Guidance Section 9.1 Maximum peak conducted output power,9.1.2. and Average conducted output power, 9.2.3.1.

The maximum peak conducted output power may be measured using a broadband peak RF power meter. The power meter shall have a video bandwidth that is greater than or equal to the DTS bandwidth and shall utilize a fast-responding diode detector.

The maximum Average conducted output power may be measured using a wideband RF power meter with a thermocouple derector or equivalent. The power meter shall have a video bandwidth that is greater than or equal to the DTS bandwidth and shall utilize a fast-responding diode detector.

LIMIT

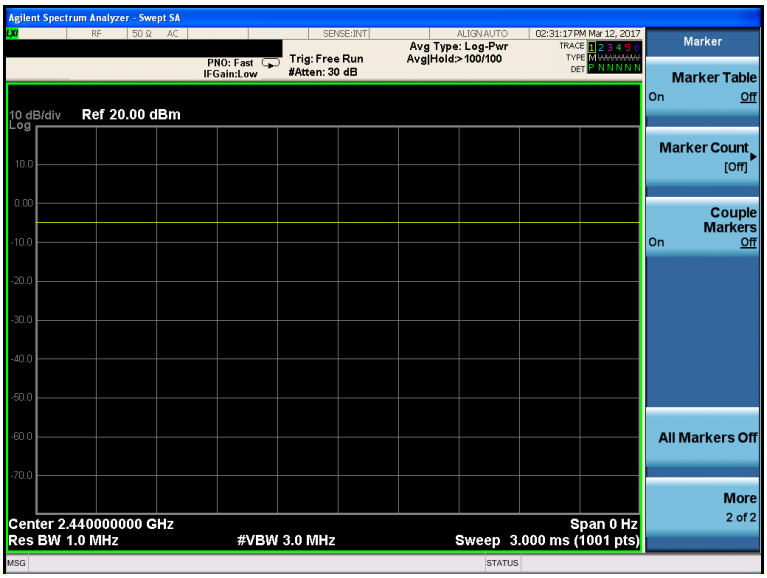
The Maximum Peak Output Power Measurement is 30dBm.

TEST RESULTS

Type	Channel	Peak Output power (dBm)	Average Output power (dBm)	Limit (dBm)	Result
GFSK	0	-5.26	-6.78	30	Pass
	19	-5.36	-6.88		
	39	-4.85	-6.38		

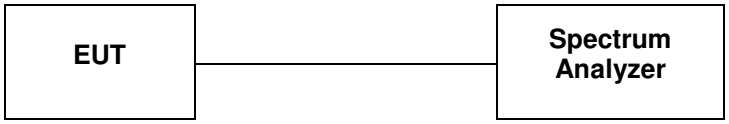
Note: The test results including the cable lose.

Duty cycle used in all test items: 100%



4.4. Power Spectral Density

TEST CONFIGURATION



TEST PROCEDURE

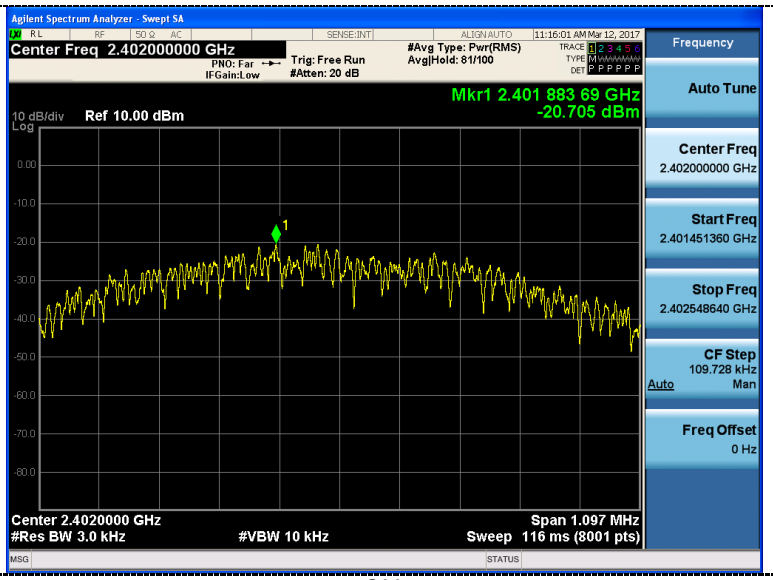
1.Use this procedure when the maximum peak conducted output power in the fundamental emission is used to demonstrate compliance.
2.Set the RBW =3 kHz.
3.Set the VBW =10 KHz.
4.Set the span to 1.5 times the DTS channel bandwidth.
5.Detector = peak.
6.Sweep time = auto couple.
7.Trace mode = max hold.
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 8 dBm.

LIMIT

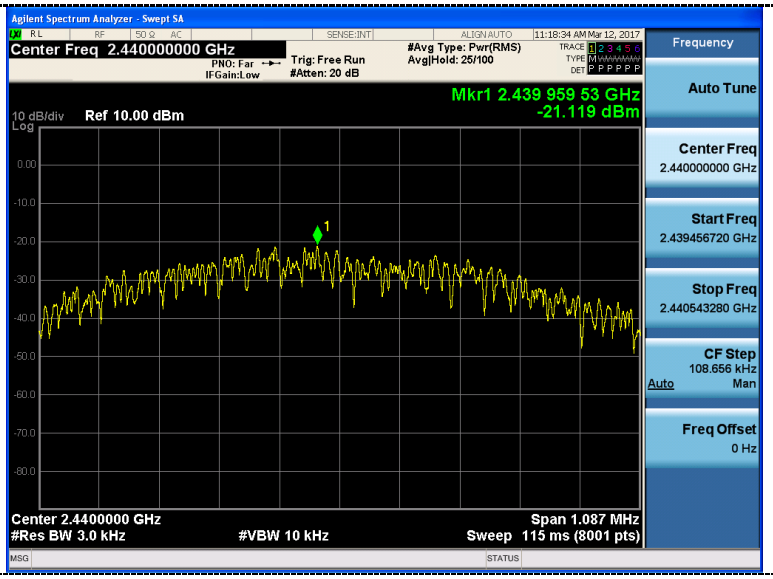
For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

TEST RESULTS

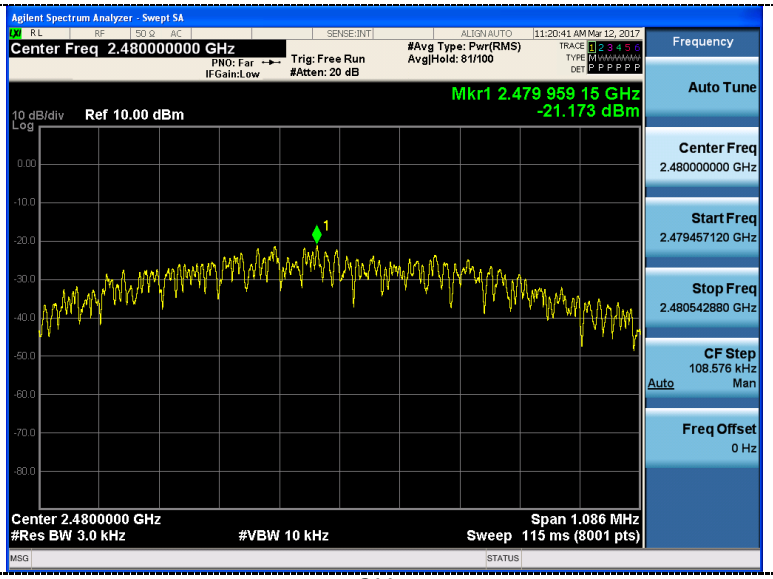
Type	Channel	Power Spectral Density (dBm/3KHz)	Limit (dBm/3KHz)	Result
GFSK	0	-20.705	8.00	Pass
	19	-21.119		
	39	-21.173		



CH0



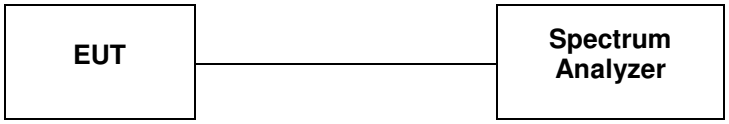
CH19



CH39

4.5. 6dB Bandwidth

TEST CONFIGURATION



TEST PROCEDURE

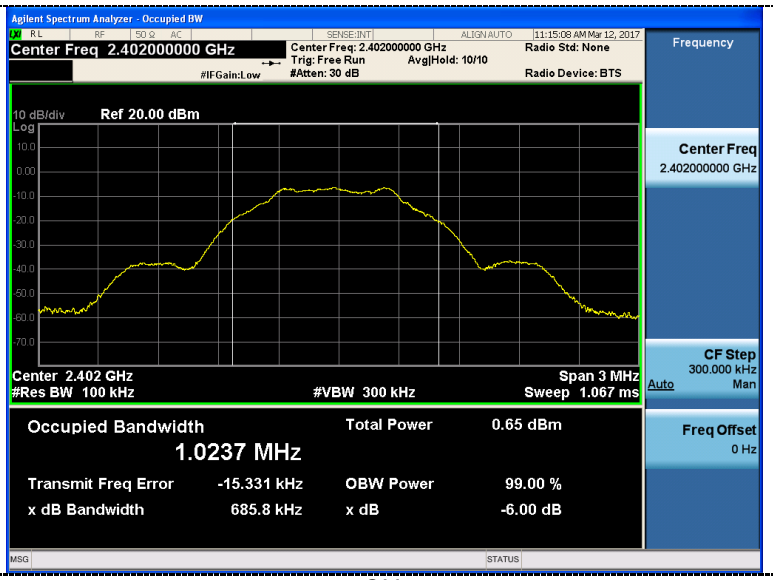
The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with RBW=100 KHz and VBW=300KHz.
The 6dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 6dB.
According to KDB558074 D01 V03 for one of the following procedures may be used to determine the modulated DTS device signal bandwidth.
1. Set RBW = 100 kHz.
2. Set the video bandwidth (VBW) ≥ 3 RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

LIMIT

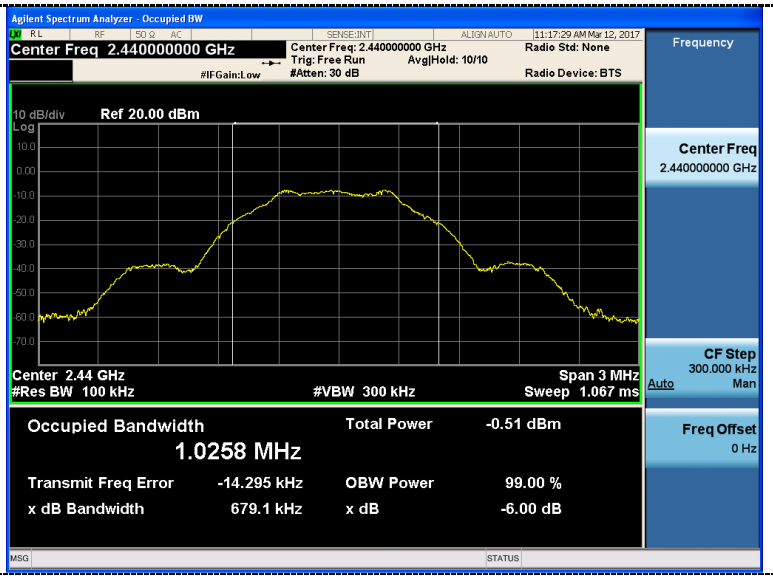
For digital modulation systems, the minimum 6 dB bandwidth shall be at least 500 kHz

TEST RESULTS

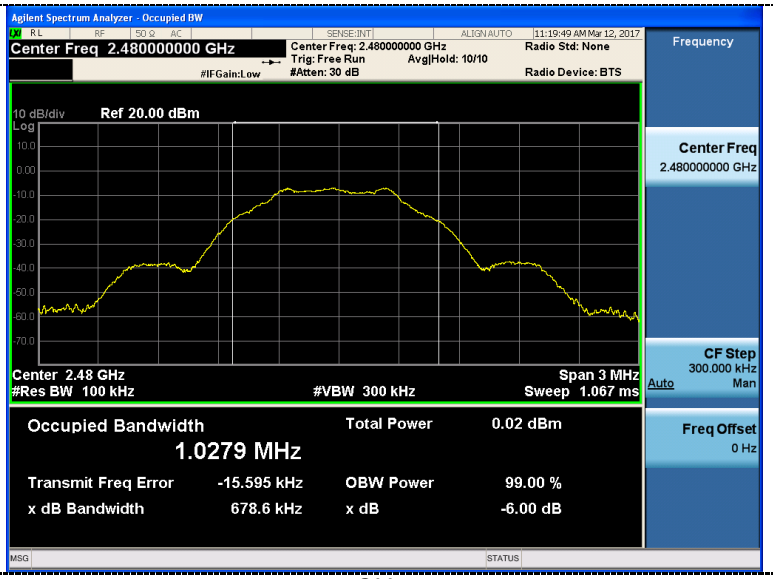
Type	Channel	6dB Bandwidth (KHz)	Limit (KHz)	Result
GFSK	0	685.8	≥500	Pass
	19	679.1		
	39	678.6		



CH0



CH19



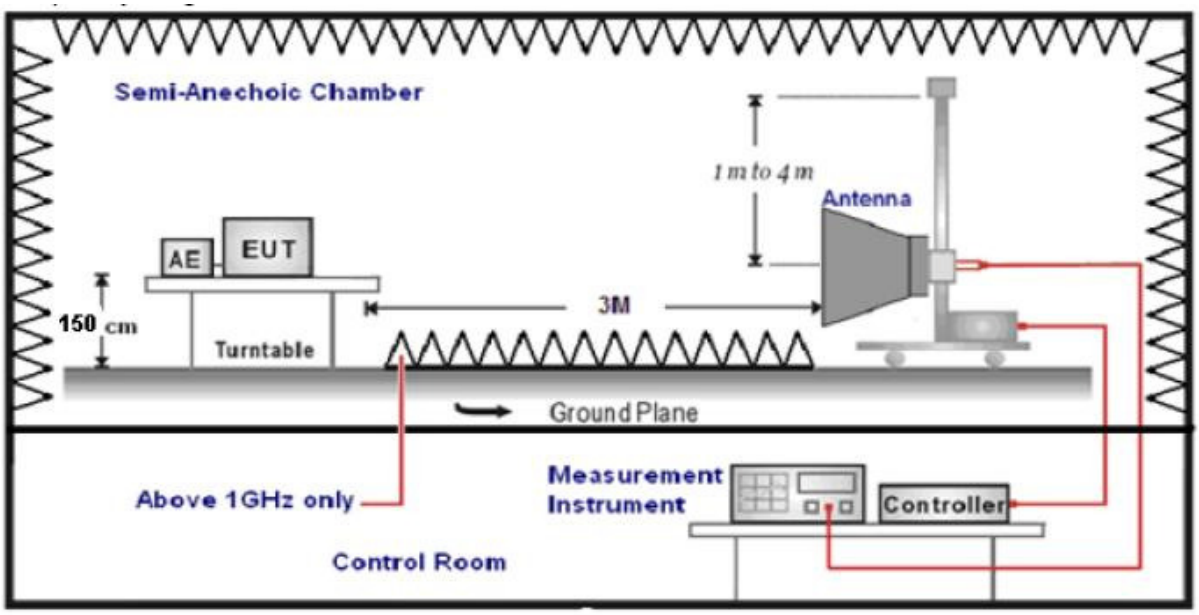
CH39

4.6. Band Edge Compliance of RF Emission

TEST REQUIREMENT

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 CONFIGURATION



TEST PROCEDURE

1. The EUT was placed on a turn table which is 1.5m above ground plane.
2. Maximum procedure was performed by raising the receiving antenna from 1m to 4m and rotating the turn table from 0° to 360° to acquire the highest emissions from EUT.
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4. Repeat above procedures until all frequency measurements have been completed..
5. The distance between test antenna and EUT was 3 meter:
6. Setting test receiver/spectrum as following table states:

Test Frequency range	Test Receiver/Spectrum Setting	Detector
1GHz-40GHz	Peak Value: RBW=1MHz/VBW=3MHz, Sweep time=Auto Average Value: RBW=1MHz/VBW=10Hz, Sweep time=Auto	Peak

LIMIT

Below -20dB of the highest emission level in operating band.
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)

TEST RESULTS

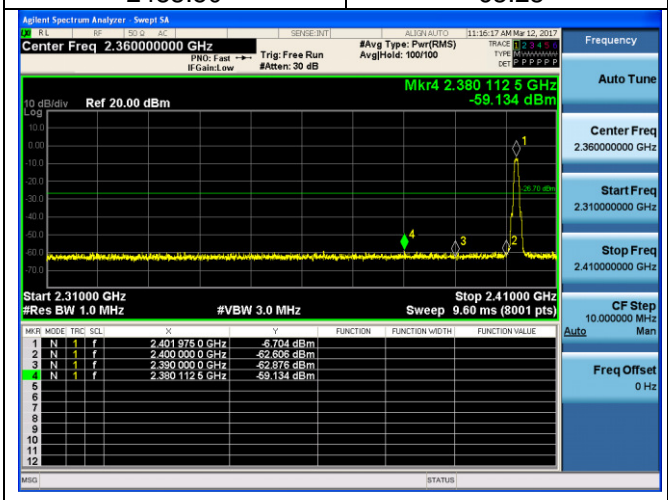
Remark: Test site: Shenzhen CTL Testing Technology Co., Ltd.

4.6.1 For Radiated Bandedge Measurement

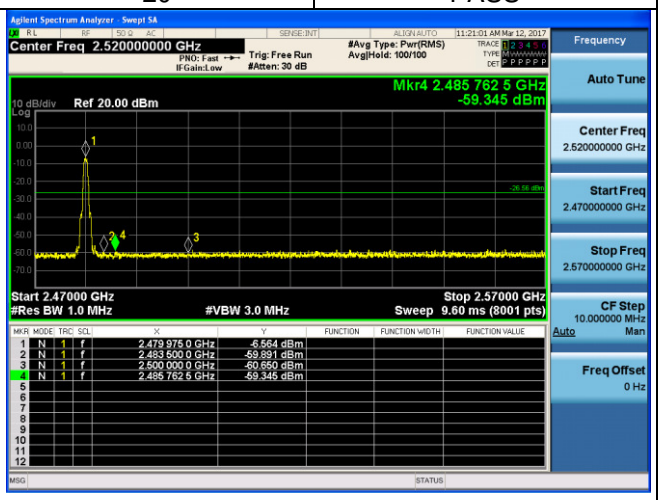
Frequency(MHz):			2402			Polarity:			HORIZONTAL		
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier	Correction Factor (dB/m)
2390.00	47.89	PK	74.00	26.11	1.00	79	53.20	27.49	3.32	36.12	-5.31
2390.00	38.61	AV	54.00	15.39	1.00	79	43.92	27.49	3.32	36.12	-5.31
Frequency(MHz):			**2402**			**Polarity:**			**VERTICAL**		
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	Correction Factor (dB/m)
2390.00	48.36	PK	74.00	25.64	1.00	135	53.67	27.49	3.32	36.12	-5.31
2390.00	39.51	AV	54.00	14.49	1.00	135	44.82	27.49	3.32	36.12	-5.31
Frequency(MHz):			**2480**			**Polarity:**			**HORIZONTAL**		
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	Correction Factor (dB/m)
2483.50	47.83	PK	74.00	26.17	1.00	216	53.55	27.45	3.38	36.55	-5.72
2483.50	37.49	AV	54.00	16.51	1.00	216	43.21	27.45	3.38	36.55	-5.72
Frequency(MHz):			**2480**			**Polarity:**			**VERTICAL**		
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	Correction Factor (dB/m)
2483.50	49.79	PK	74.00	24.21	1.00	187	55.51	27.45	3.38	36.55	-5.72
2483.50	39.91	AV	54.00	14.09	1.00	187	45.63	27.45	3.38	36.55	-5.72

4.6.2 For Conducted Bandedge Measurement

Frequency (MHz)	Delta Peak to Band emission (dBc)	Limit (dBc)	Verdict
2400.00	-55.90	-20	PASS
2483.50	-63.23	-20	PASS



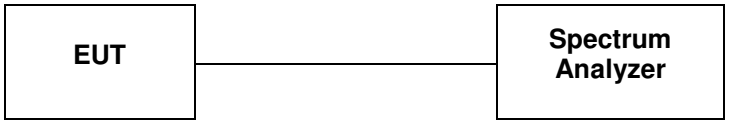
2402



2480

4.7. 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 C63.10-2013, For 9KHz-150kHz, Set RBW=1kHz and VBW= 3KHz;For 150KHz-10MHz, Set RBW=10kHz and VBW= 30KHz:For 10MHz-25GHz ,Set RBW=100kHz and VBW= 300KHz in order to measure the peak field strength, and mwasure frequeny range from 9KHz to 25GHz.

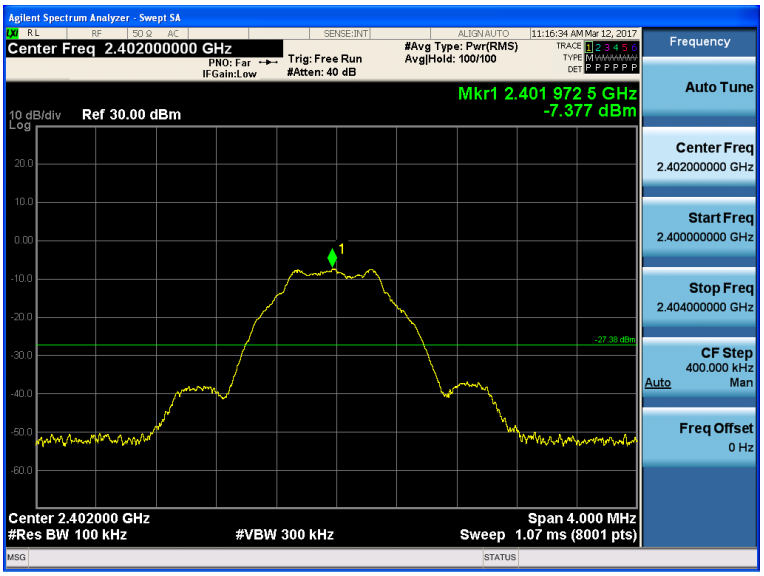
LIMIT

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.
3.For below 30MHz,For 9KHz-150kHz,150K-10MHz,We use the RBW 1KHz,10KHz, So the limit need to calculated by “10lg(BW1/BW2)“. for example For9KHz-150kHz,RBW 1KHz, The Limit= the highest emission level-20-10log(100/1)= the highest emission level-40.

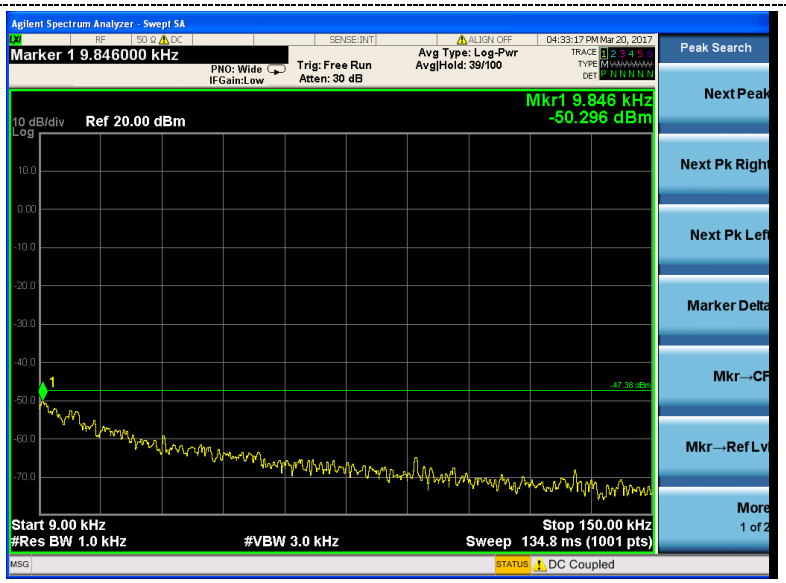
TEST RESULTS

Remark: The measurement frequency range is from 9KHz to the 10th harmonic of the fundamental frequency. The lowest, middle and highest channels are tested to verify the spurious emissions and bandege measurement data.

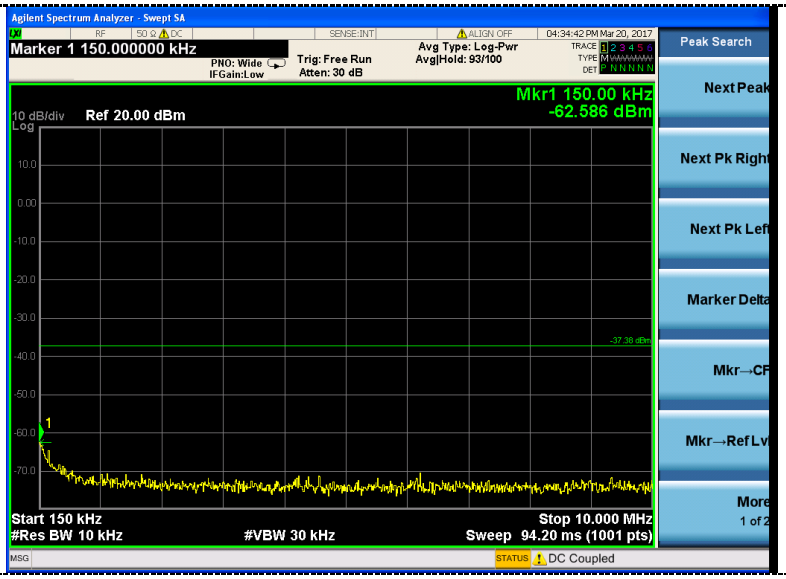
Test Mode:	GFSK	Test channel :	0



Channel 0

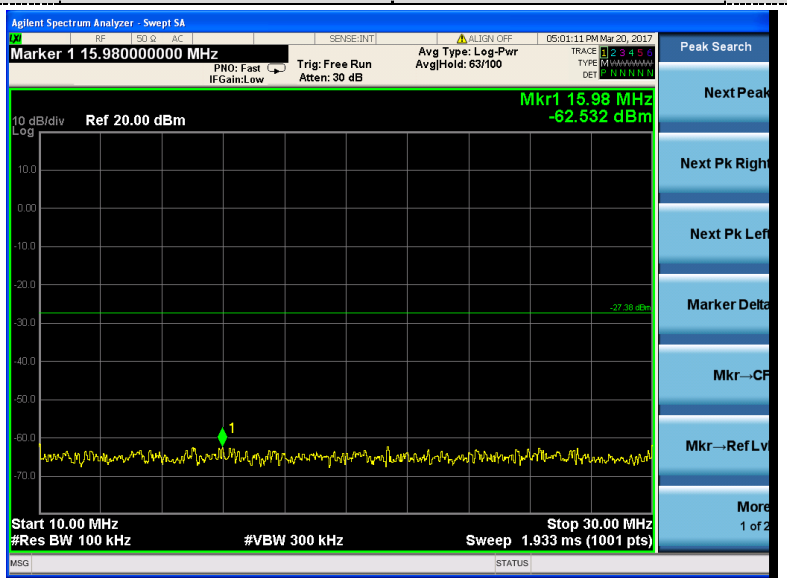


9KHz~150KHz

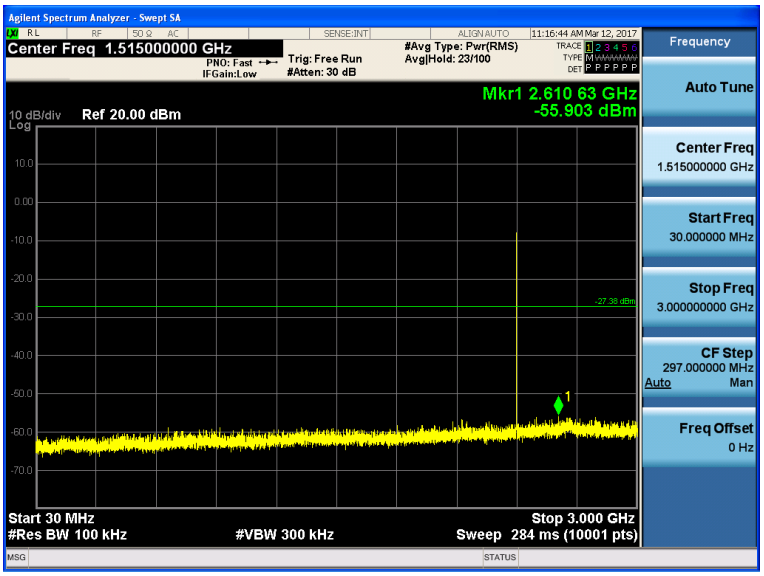


150KHz ~10MHz

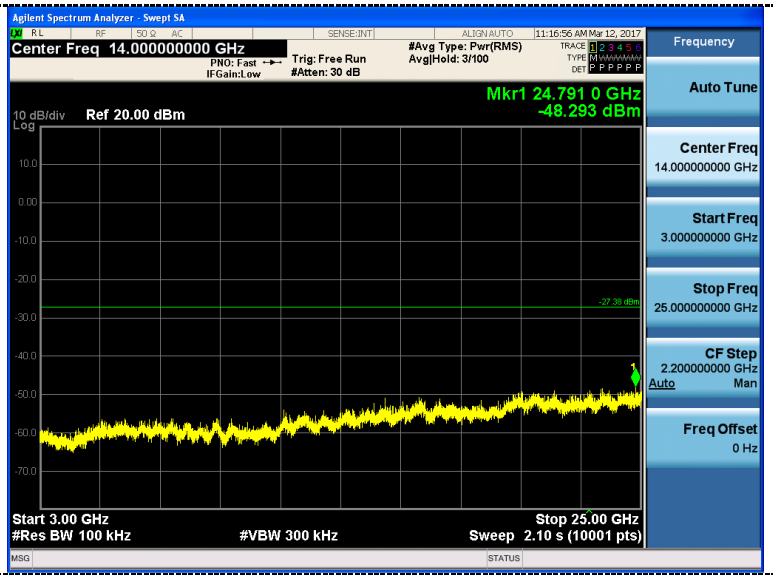
Test Mode:	GFSK	Test channel :	0



10MHz ~30MHz

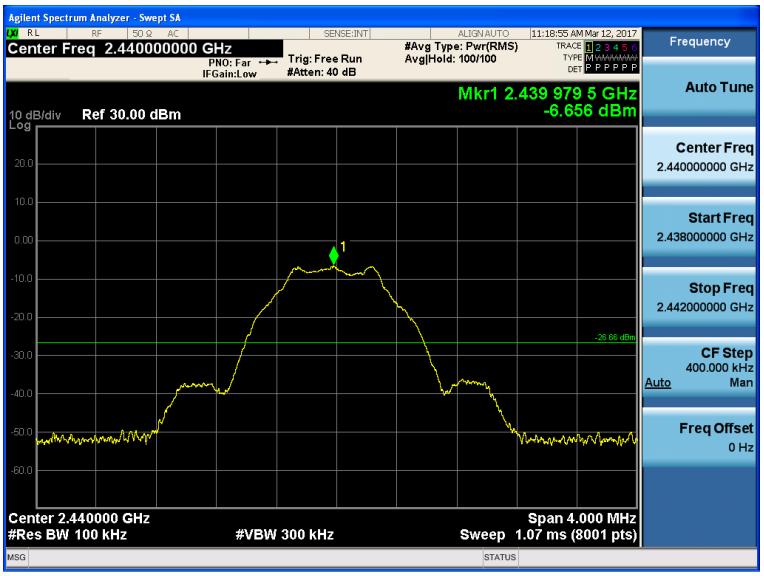


30MHz ~3GHz



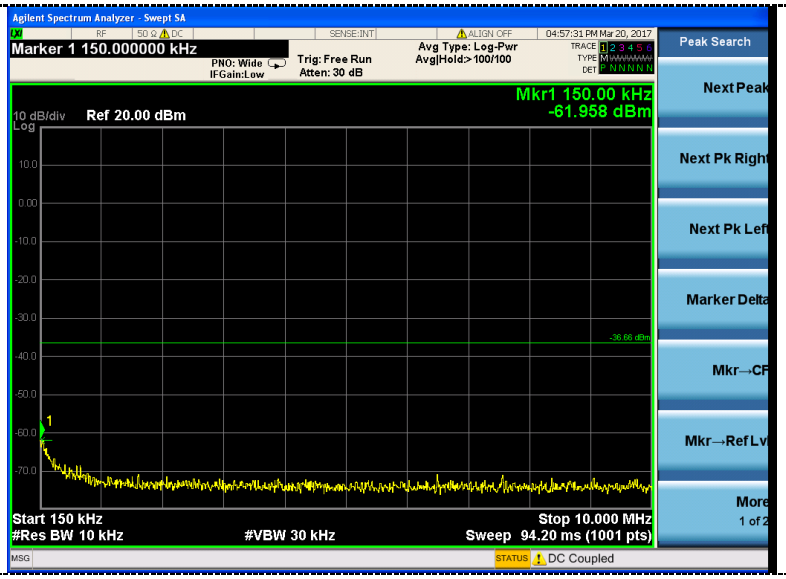
3GHz~25GHz

Test Mode:	GFSK	Test channel :	19



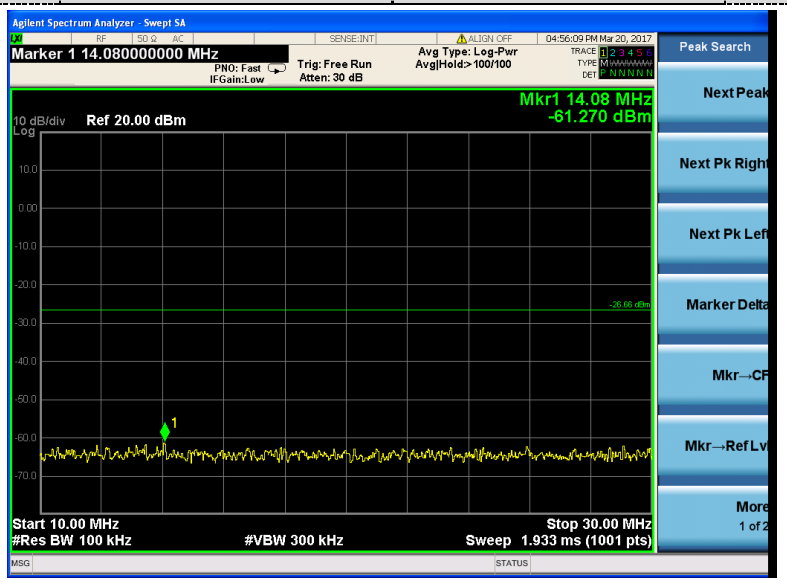
Channel 19

9KHz~150KHz

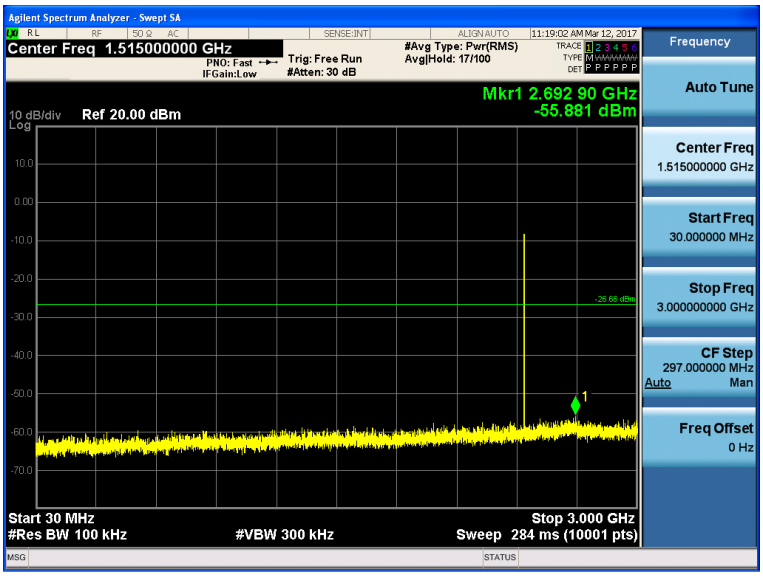


150KHz ~10MHz

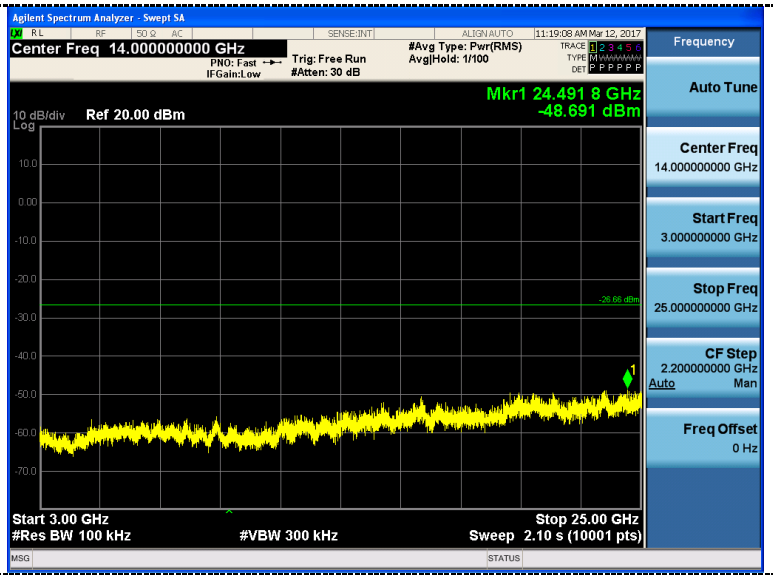
Test Mode:	GFSK	Test channel :	19



10MHz ~30MHz

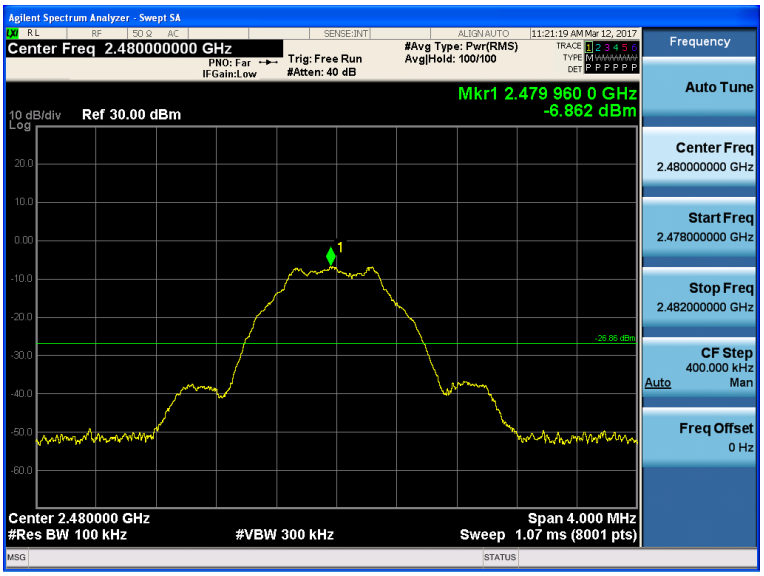


30MHz ~3GHz

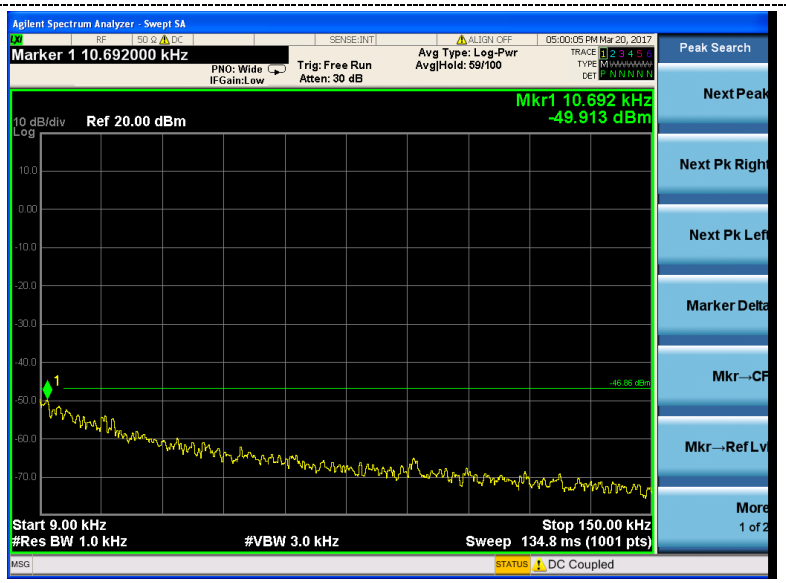


3GHz~25GHz

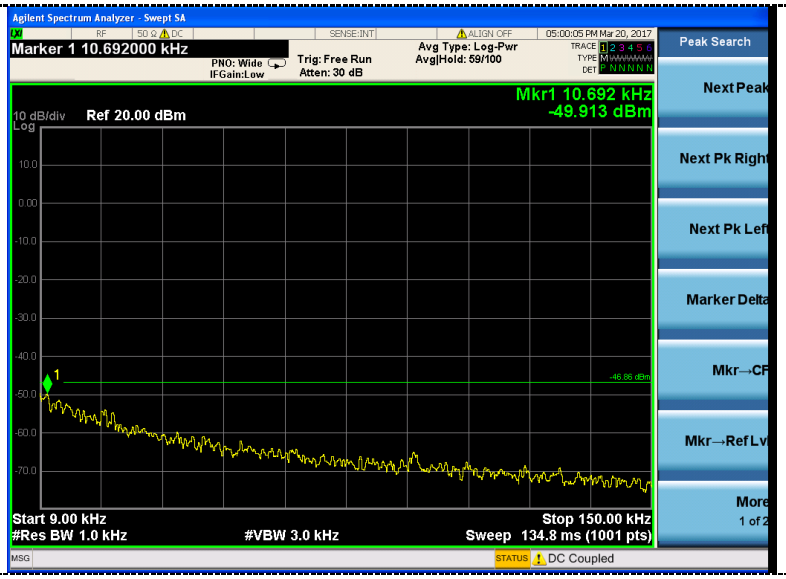
Test Mode:	GFSK	Test channel :	39



Channel 39

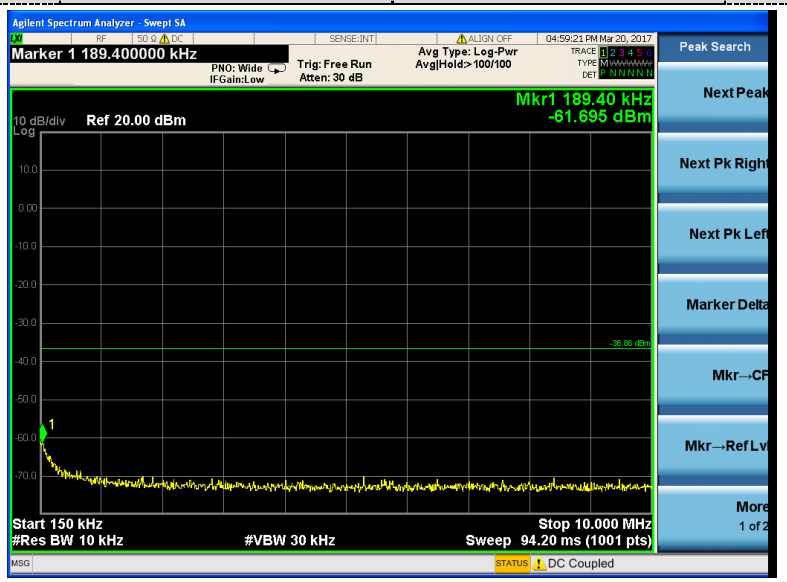


9KHz~150KHz

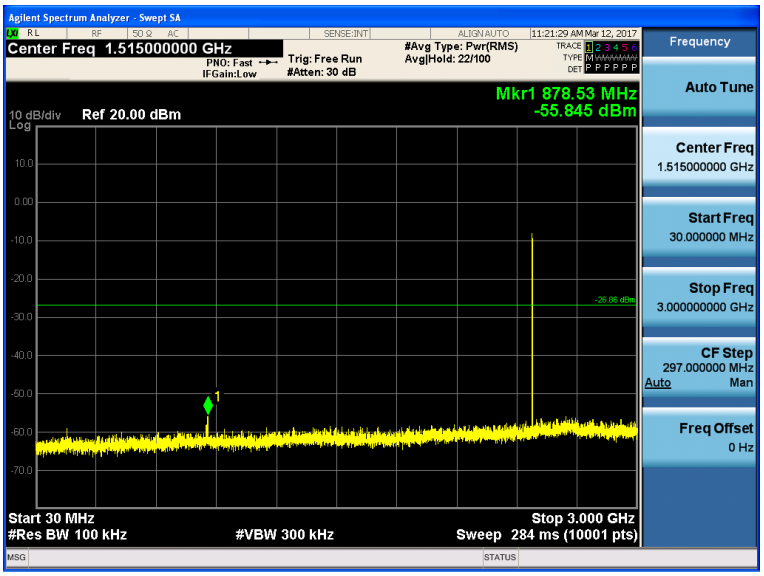


150KHz ~10MHz

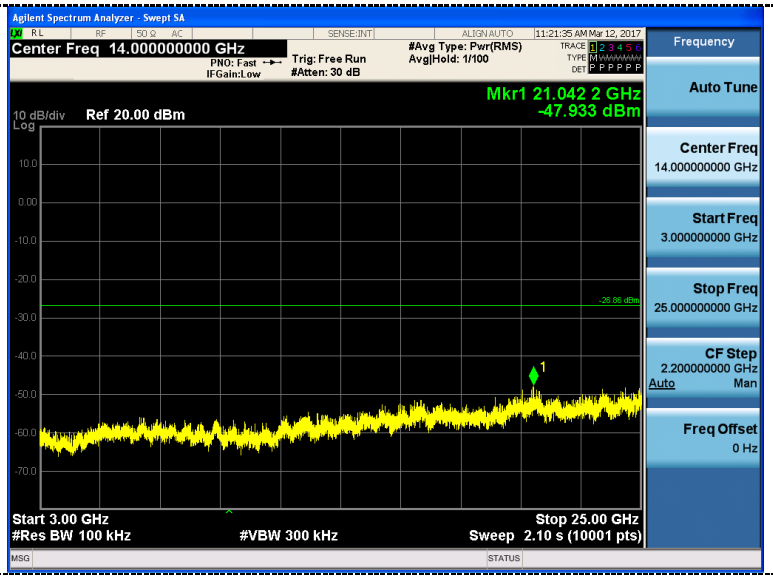
Test Mode:	GFSK	Test channel :	39



10MHz ~30MHz



30MHz ~3GHz



3GHz~25GHz

4.8. Antenna Requirement

Standard Applicable

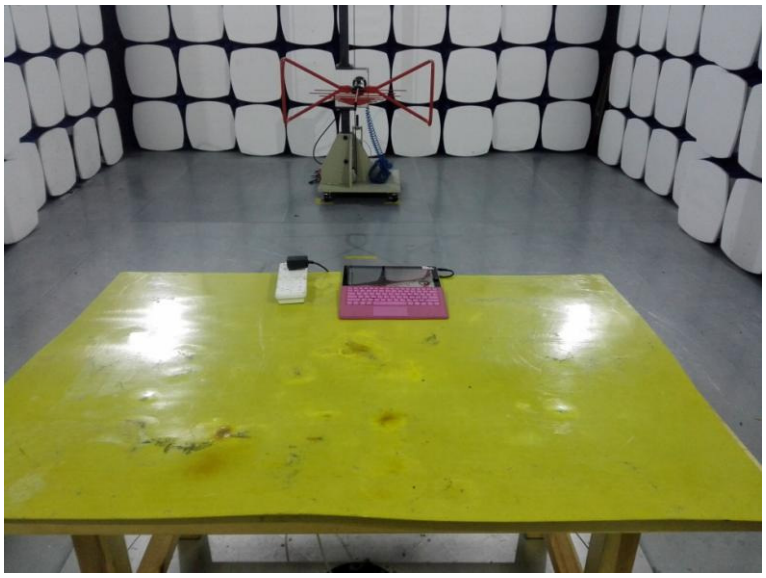
For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

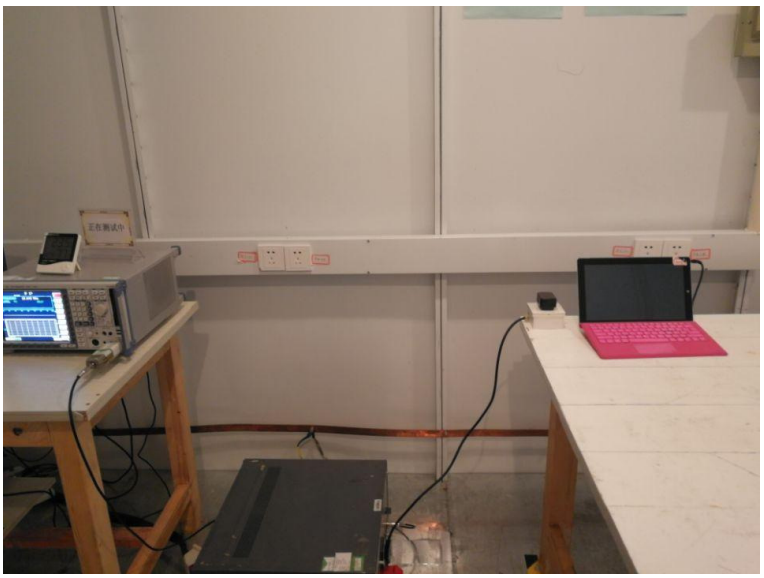
And according to FCC 47 CFR Section 15.247 (c), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

Antenna Information

The antenna is FPC antenna, The directional gains of antenna used for transmitting is -0.65dBi.

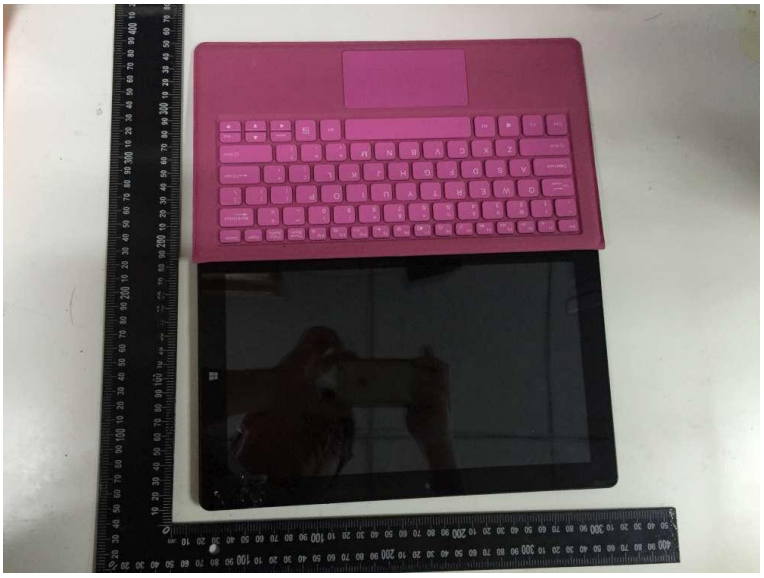
5. Test Setup Photos of the EUT

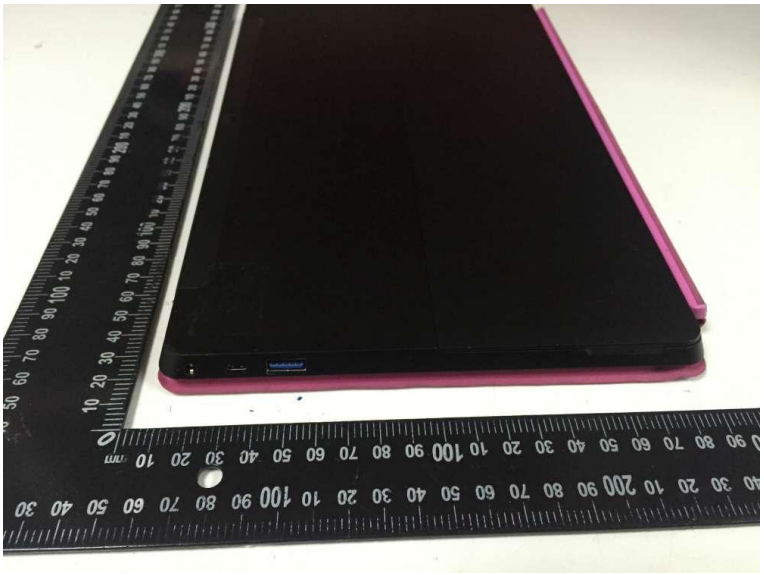




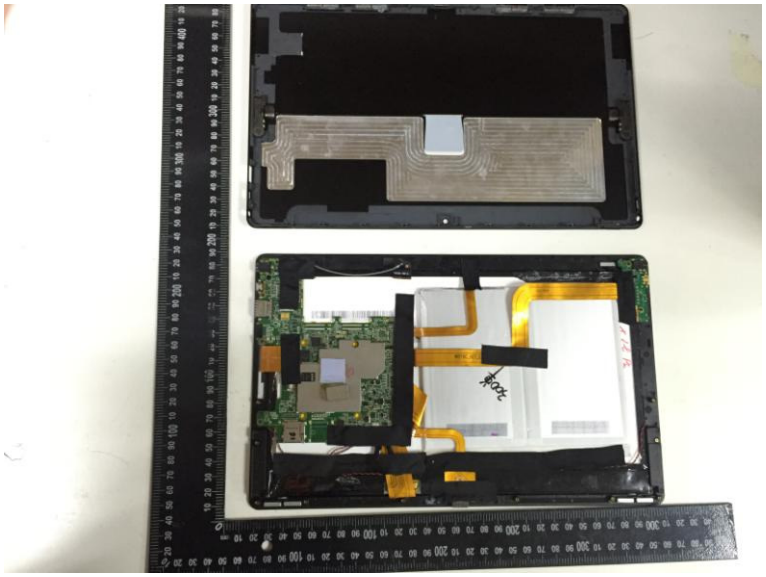
6. External and Internal Photos of the EUT

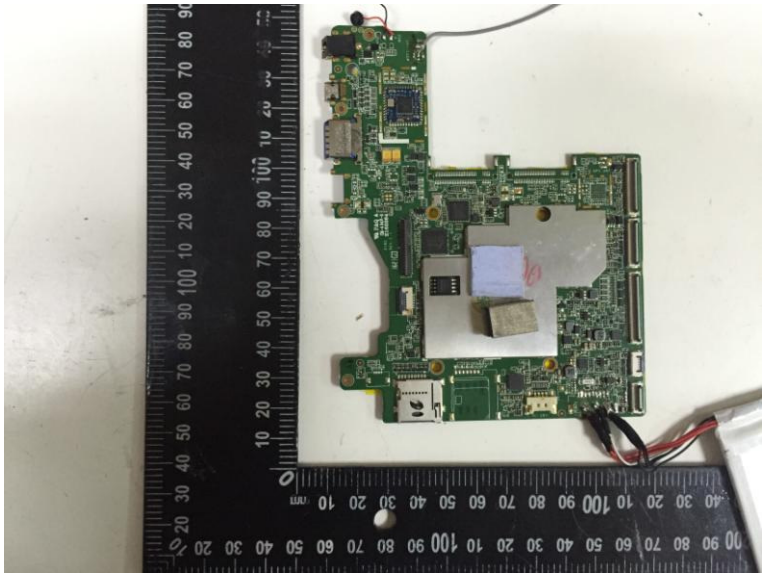
External Photos

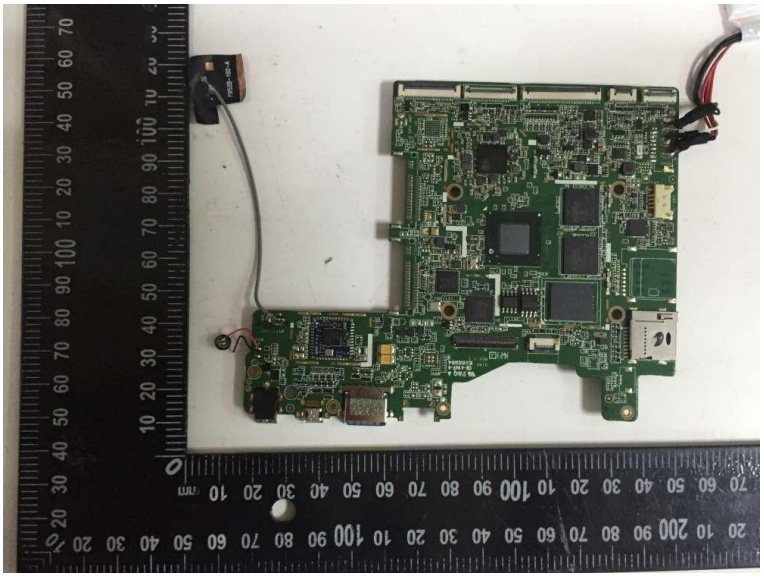


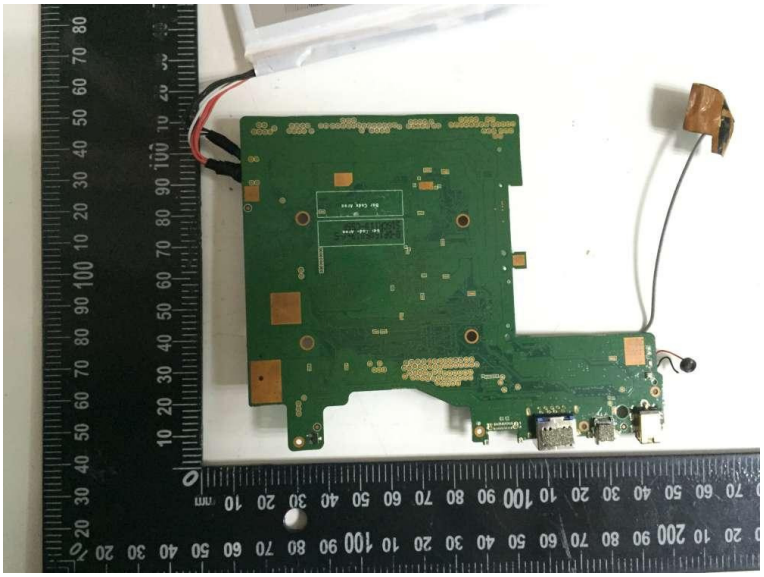


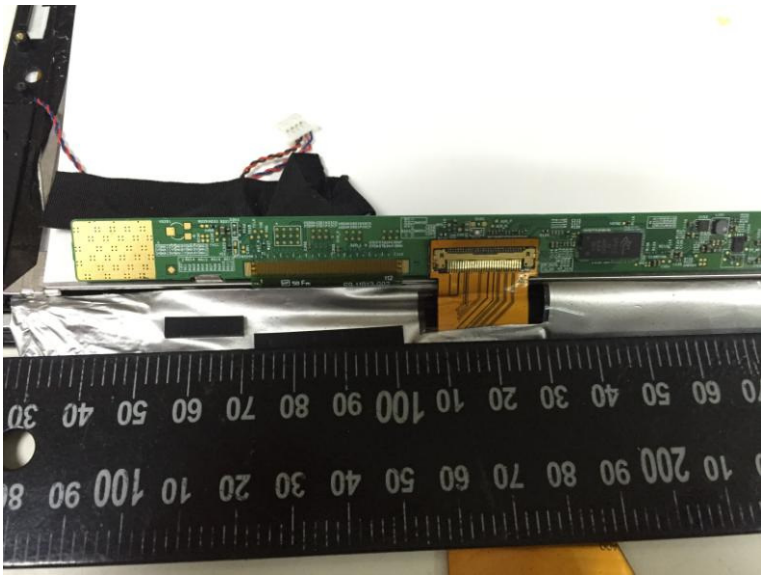
Internal Photos

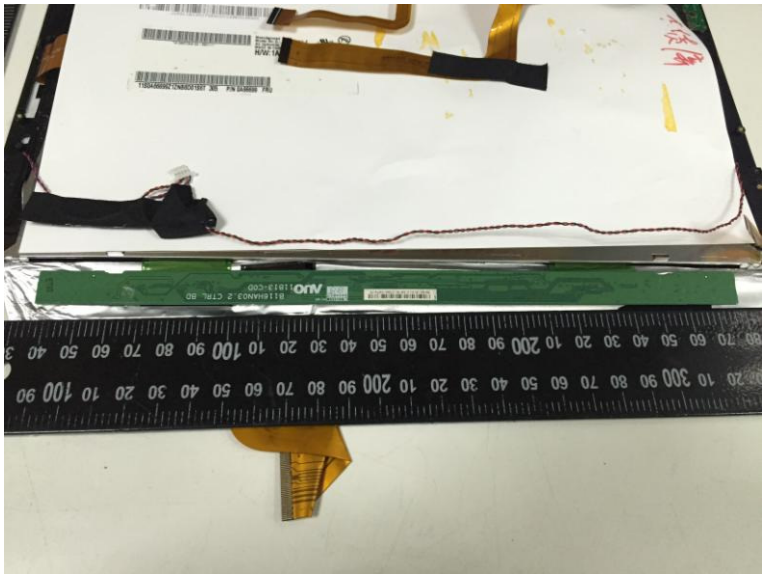


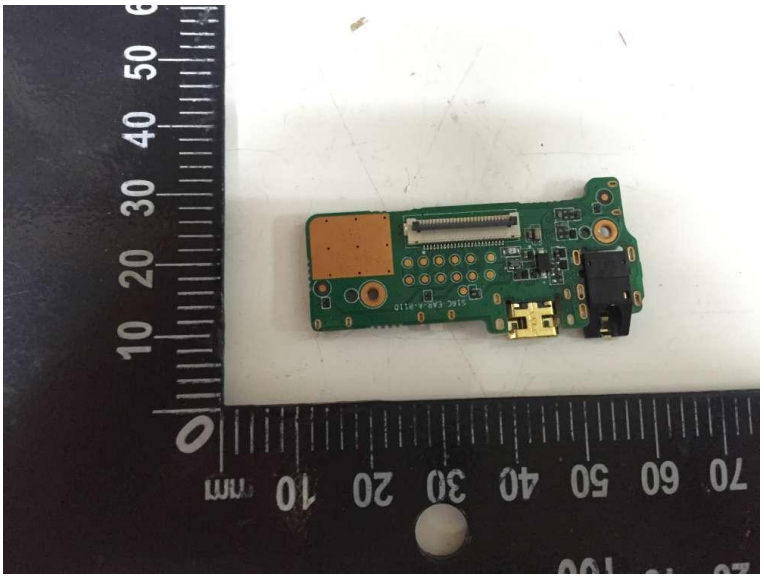


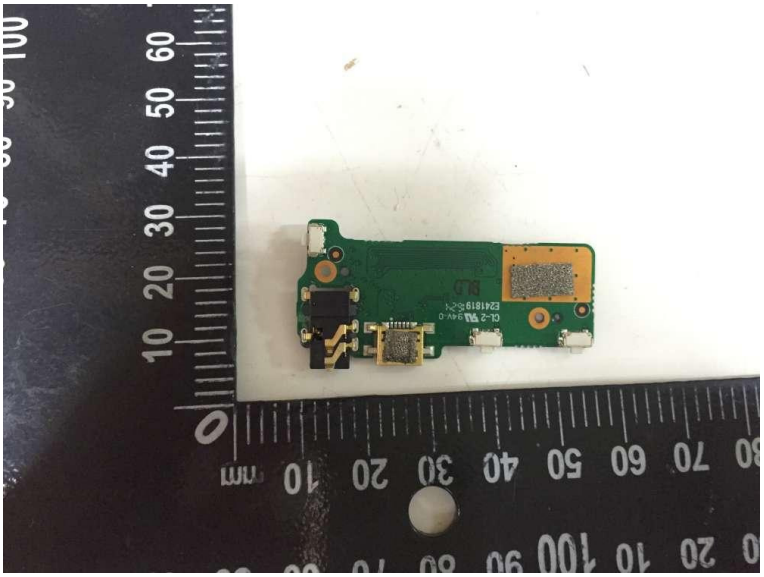












.....End of Report.....