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......:	**GTSR15120136-2.4G**
FCC ID..... :	**2AG5E-HF8**
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.....:	Jan. 25, 2016
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
Testing Laboratory Name .....:	**Shenzhen CTL Testing Technology Co., Ltd**
Address .....:	1/F.-A, Baisha Technology Park, No.3011, Shahexi Road, Nanshan District, Shenzhen, Guangdong, China
Applicant's name.....:	**HaiShiTeng (Shenzhen) Co.,Ltd.**
Address .....:	3F, Building No.7, Science and Technology Industrial Park,Kefa Road No. 2, Nanshan District, Shenzhen, Guangdong province
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 Global Test Service Co.,Ltd.
Master TRF.....:	Dated 2014-12

Test item description .....:	Wireless four-way monitor unit
Trade Mark .....:	/
Manufacturer .....:	**HaiShiTeng (Shenzhen) Co.,Ltd.**
Model/Type reference.....:	HF8
Listed Models .....:	/
Modulation Type .....:	GFSK
Operation Frequency.....:	From 2408.625MHz to 2473.875MHz
EUT Type .....:	Production Unit
Rating .....:	DC 5.0V from Adapter AC 120V/60Hz
Result.....:	**PASS**

T E S T R E P O R T

Test Report No. :	GTSR15120136- 2.4G	Jan. 25, 2016 Date of issue

Equipment under Test	:	Wireless four-way monitor unit
Model /Type	:	HF8
Listed Models	:	/
Applicant	:	**HaiShiTeng (Shenzhen) Co.,Ltd.**
Address	:	3F, Building No.7, Science and Technology Industrial Park,Kefa Road No. 2, Nanshan District, Shenzhen, Guangdong province
Manufacturer	:	**HaiShiTeng (Shenzhen) Co.,Ltd.**
Address	:	3F, Building No.7, Science and Technology Industrial Park,Kefa Road No. 2, Nanshan District, Shenzhen, Guangdong province

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.

Contents

1. TEST STANDARDS

The tests were performed according to following standards:

FCC Rules Part 15.247: Frequency Hopping, Direct Spread Spectrum and Hybrid Systems that are in operation within the bands of 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz.
ANSI C63.10-2009: American National Standard for Testing Unlicensed Wireless Devices
KDB558074 D01 V03r02: 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	:	Dec. 30, 2015
Testing commenced on	:	Dec. 30, 2015
Testing concluded on	:	Jan. 25, 2016

2.2. Product Description

Name of EUT	Wireless four-way monitor unit
Model Number	HF8
FCC ID	2AG5E-HF8
Adapter information:	Model: Thw_B0501000 Input: 100-240V～50/60Hz Output:DC 5.0V 1000mA
Antenna Type	External antenna
Operation frequency	From 2408.625MHz to 2473.875MHz
Modulation Type	GFSK

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 5.0V from Adapter AC 120V/60Hz

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

This is a Wireless four-way monitor unit.

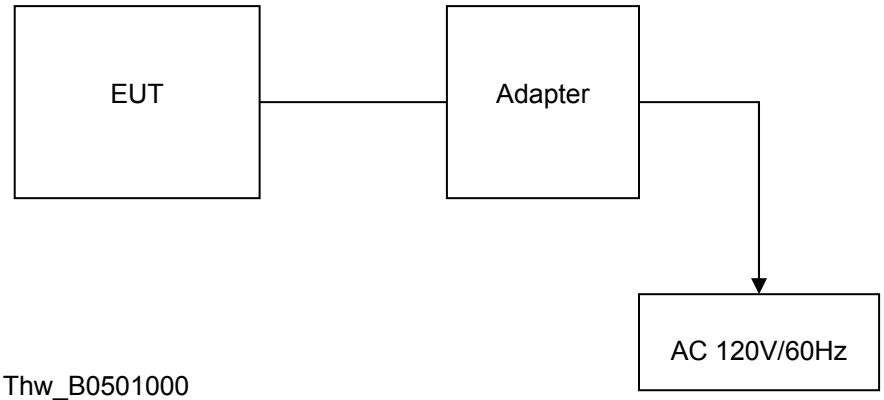
For more details, refer to the user's manual of the EUT.

2.5. EUT operation mode

There are 24 channels provided to the EUT. Channel 00/12/23 was selected to test.

Channel	Frequency(MHz)	Channel	Frequency(MHz)
00	**2408.625**	**12**	**2442.375**
01	2412.000	13	2444.625
02	2414.250	14	2448.000
03	2417.625	15	2450.250
04	2422.125	16	2453.625
05	2425.500	17	2457.000
06	2427.750	18	2459.250
07	2430.000	19	2461.500
08	2432.250	20	2464.875
09	2434.500	21	2467.125
10	2436.750	22	2470.500
11	2439.000	**23**	**2473.875**

2.6. Block Diagram of Test Setup



Adapter:

Model: Thw_B0501000
Input: 100-240V～50/60Hz
Output:DC 5.0V 1000mA
Power Cable: 120cm
◇ Shielded ◆ Unshielded

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

This submittal(s) (test report) is intended for **FCC ID: 2AG5E-HF8** 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

	Test Standards	Reference Report
2.4GHz	FCC Part 15 Subpart C	GTSR15120136-2.4G
MPE	FCC Per 47 CFR 2.1093(d)	GTSR15120136-MPE

3. TEST ENVIRONMENT

3.1. Address of the test laboratory

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.: 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	☒	☐	☐	☐	complies
§15.247(e)	Power spectral density	GFSK	☒ Lowest ☒ Middle ☒ Highest	GFSK	☒ Lowest ☒ Middle ☒ Highest	☒	☐	☐	☐	complies
§15.247(a)(1)	Spectrum bandwidth – 6 dB bandwidth	GFSK	☒ Lowest ☒ Middle ☒ Highest	GFSK	☒ Lowest ☒ Middle ☒ Highest	☒ ☒	☐	☐	☐	complies
§15.247(b)(1)	Maximum output power	GFSK	☒ Lowest ☒ Middle ☒ Highest	GFSK	☒ Lowest ☒ Middle ☒ Highest	☒ ☒ ☒	☐	☐	☐	complies
§15.247(d)	Band edge compliance conducted	GFSK	☒ Lowest ☒ Highest	GFSK	☒ Lowest ☒ Highest	☒ ☒	☐	☐	☐	complies
§15.205	Band edge compliance radiated	GFSK	☒ Lowest ☒ Highest	GFSK	☒ Lowest ☒ Highest	☒	☐	☐	☐	complies
§15.247(d)	TX spurious emissions conducted	GFSK	☒ Lowest ☒ Middle ☒ Highest	GFSK	☒ Lowest ☒ Middle ☒ Highest	☒ ☒	☐	☐	☐	complies
§15.247(d)	TX spurious emissions radiated	GFSK	☒ Lowest ☒ Middle ☒ Highest	GFSK	☒ Lowest ☒ Middle ☒ Highest	☒	☐	☐	☐	complies
§15.109	RX spurious emissions radiated	-/-	-/-	-/-	-/-	☒	☐	☐	☐	complies
§15.209(a)	TX spurious Emissions radiated < 30 MHz	GFSK	-/-	GFSK	-/-	☒	☐	☐	☐	complies
§15.107(a) §15.207	Conducted Emissions < 30 MHz	GFSK	-/-	GFSK	-/-	☒	☐	☐	☐	complies

Remark:
1. The measurement uncertainty is not included in the test result.
2. NA = Not Applicable; NP = Not Performed

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 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 Shenzhen CTL Testing Technology Co., Ltd 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	3.20 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

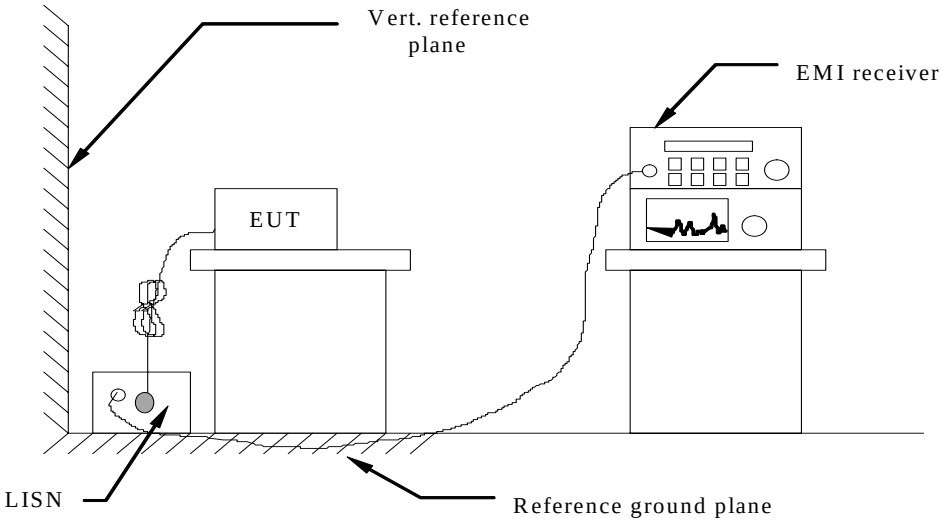
Test Equipment	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Due Date
LISN	R&S	ENV216	3560.6550.12	2015/06/02	2016/06/01
LISN	R&S	ESH2-Z5	860014/010	2015/06/02	2016/06/01
Bilog Antenna	Sunol Sciences Corp.	JB1	A061713	2015/06/02	2016/06/01
EMI Test Receiver	R&S	ESCI	103710	2015/06/02	2016/06/01
Spectrum Analyzer	Agilent	N9020A	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	SCHWARZBECK	FMZB1519	1519-037	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
Temperature/Humidity Meter	Gangxing	CTH-608	02	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

Note: 1. 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 DC5V power from PC, the adapter of PC 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：

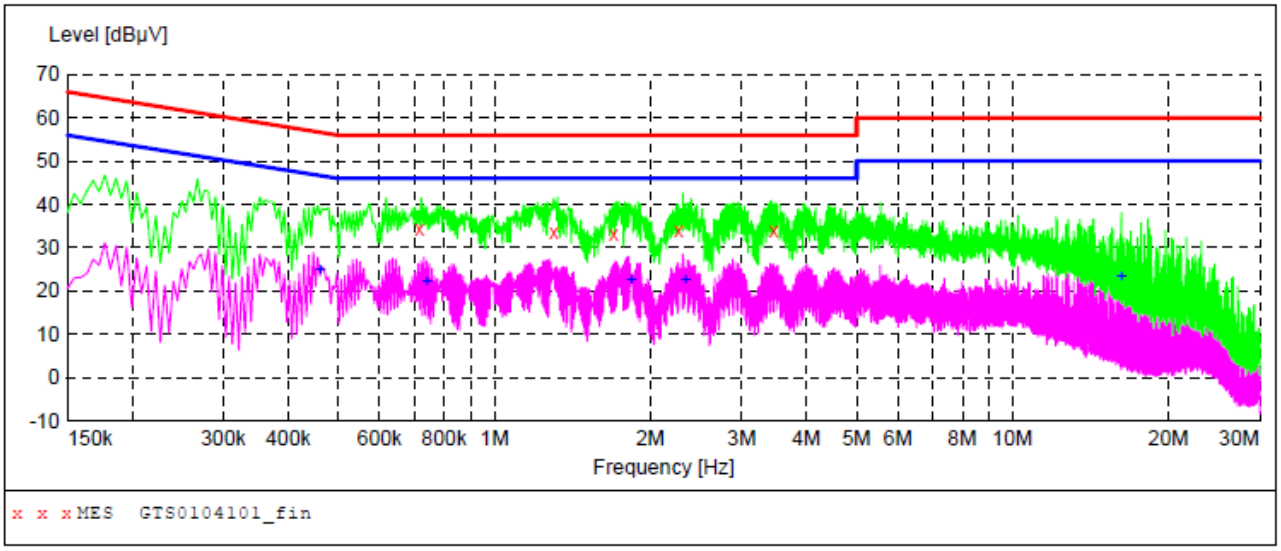
Frequency range (MHz)	Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50
* Decreases with the logarithm of the frequency.		

TEST RESULTS

Remark;

1. We tested AC conducted emissions at both AC 120V/60Hz and AC 240V/50Hz, recorded worst case at AC 120V/60Hz.

Power supply:	DC 5V from Adapter	Polarization	L



MEASUREMENT RESULT: "GTS0104101_fin"

1/4/2016 8:54AM

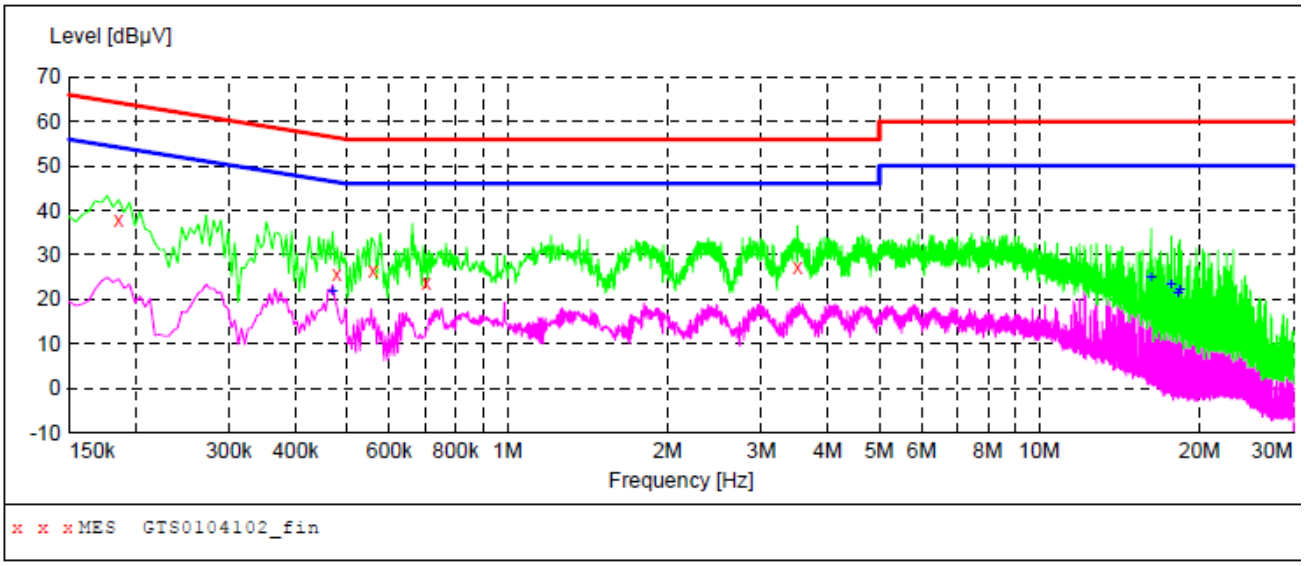
Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.717000	34.50	9.7	56	21.5	QP	L1	GND
1.302000	33.70	9.6	56	22.3	QP	L1	GND
1.698000	33.10	9.5	56	22.9	QP	L1	GND
2.265000	33.90	9.5	56	22.1	QP	L1	GND
3.462000	33.80	9.4	56	22.2	QP	L1	GND

MEASUREMENT RESULT: "GTS0104101_fin2"

1/4/2016 8:54AM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.460500	25.00	9.8	47	21.7	AV	L1	GND
0.739500	22.00	9.7	46	24.0	AV	L1	GND
1.837500	22.40	9.5	46	23.6	AV	L1	GND
2.332500	22.50	9.5	46	23.5	AV	L1	GND
16.224000	23.20	7.9	50	26.8	AV	L1	GND

Power supply:	DC 5V from Adapter	Polarization	N



MEASUREMENT RESULT: "GTS0104102_fin"

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Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.186000	38.00	10.0	64	26.2	QP	N	GND
0.478500	25.60	9.8	56	30.8	QP	N	GND
0.559500	26.50	9.7	56	29.5	QP	N	GND
0.703500	23.80	9.7	56	32.2	QP	N	GND
3.511500	27.30	9.4	56	28.7	QP	N	GND

MEASUREMENT RESULT: "GTS0104102_fin2"

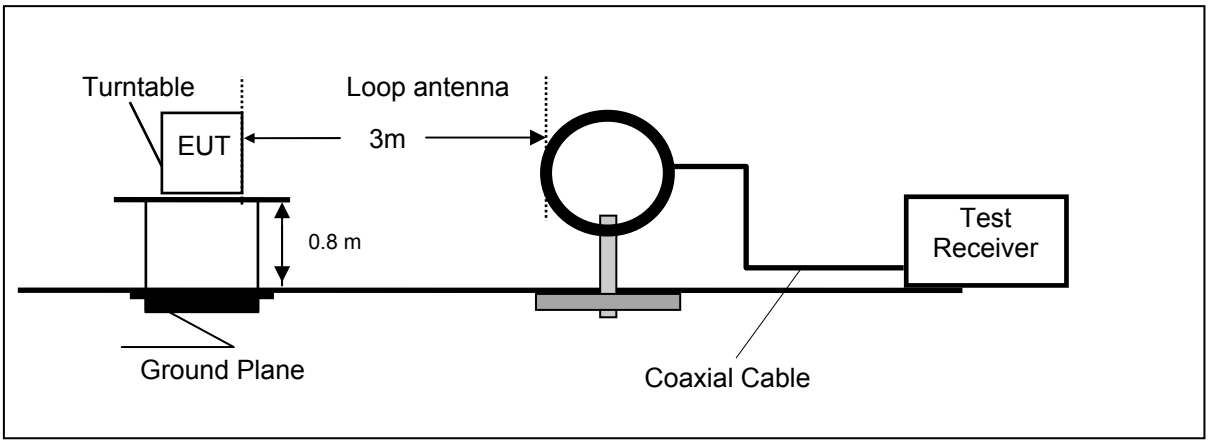
1/4/2016 8:57AM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.469500	21.60	9.8	47	24.9	AV	N	GND
16.228500	24.80	7.9	50	25.2	AV	N	GND
17.695500	23.30	7.5	50	26.7	AV	N	GND
18.240000	21.50	7.4	50	28.5	AV	N	GND
18.366000	22.10	7.4	50	27.9	AV	N	GND

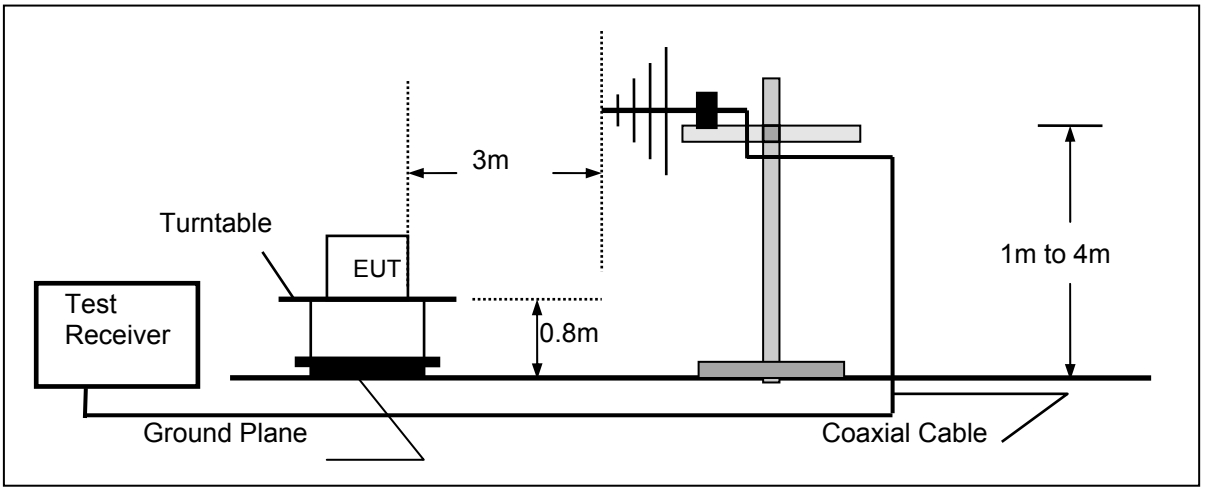
4.2. Radiated Emission

TEST CONFIGURATION

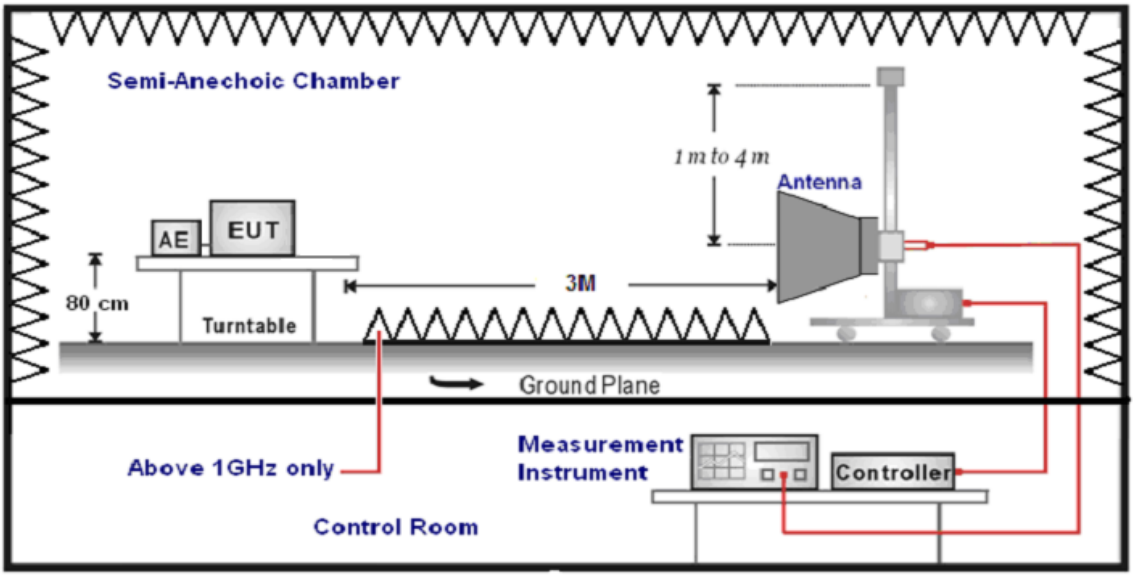
Frequency range 9 KHz – 30MHz



Frequency range 30MHz – 1000MHz



Frequency range above 1GHz-25GHz



TEST PROCEDURE

2. The EUT was placed on a turn table which is 0.8m above ground plane.
3. 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.
4. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
5. Repeat above procedures until all frequency measurements have been completed.
6. The EUT minimum operation frequency was 32.768KHz and maximum operation frequency was 2480MHz.so radiated emission test frequency band from 9KHz to 25GHz.
7. 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

8. 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

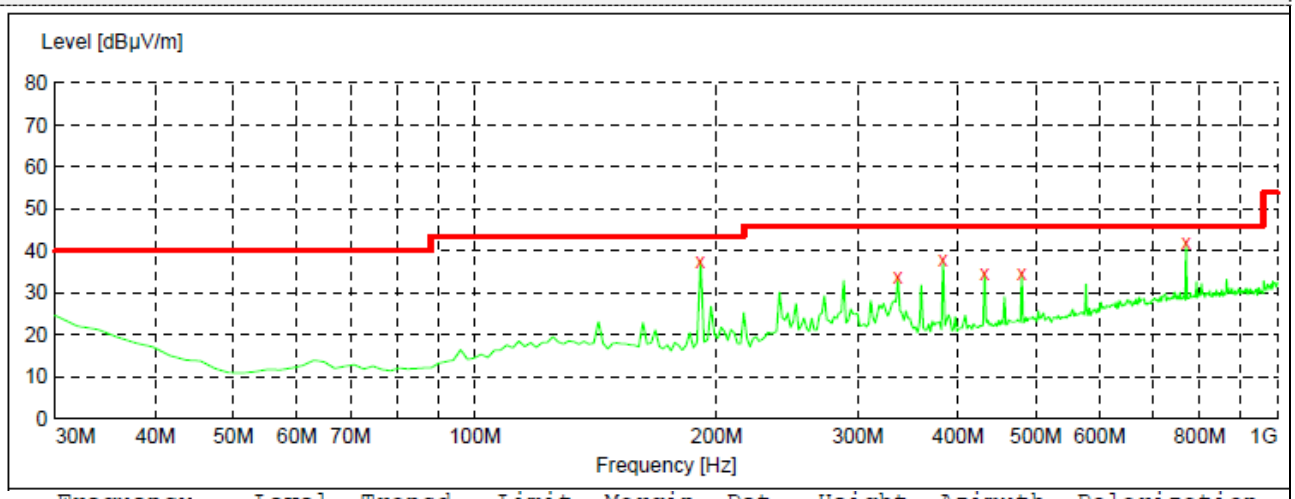
TEST RESULTS

For 9KHz to 30MHz

Frequency (MHz)	Corrected Reading (dBuV/m)@3m	FCC Limit (dBuV/m) @3m	Margin (dB)	Detector	Result
0.39	47.34	95.78	48.44	QP	PASS
1.54	42.53	63.85	21.32	QP	PASS
20.27	46.82	69.54	22.72	QP	PASS
25.69	50.73	69.54	18.81	QP	PASS

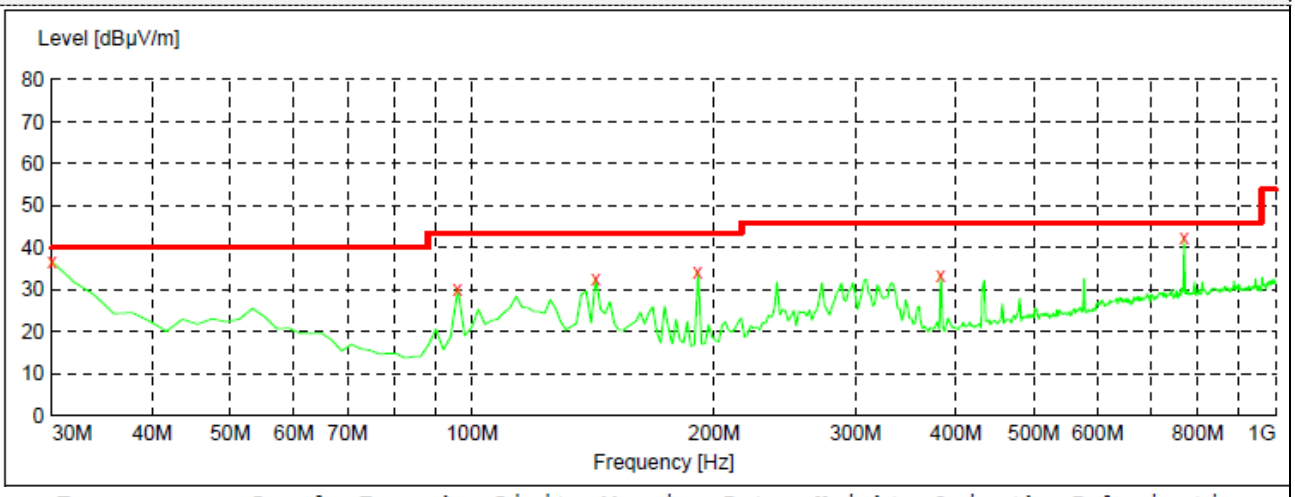
For 30MHz to 1000MHz

Horizontal



Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
191.020000	37.70	13.2	43.5	5.8	---	0.0	0.00	HORIZONTAL
336.520000	34.00	16.3	46.0	12.0	---	0.0	0.00	HORIZONTAL
383.080000	37.80	17.7	46.0	8.2	---	0.0	0.00	HORIZONTAL
431.580000	34.60	18.8	46.0	11.4	---	0.0	0.00	HORIZONTAL
480.080000	34.80	20.0	46.0	11.2	---	0.0	0.00	HORIZONTAL
769.140000	42.20	24.4	46.0	3.8	---	0.0	0.00	HORIZONTAL

Vertical



Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
30.000000	36.70	20.8	40.0	3.3	---	0.0	0.00	VERTICAL
95.960000	30.20	10.2	43.5	13.3	---	0.0	0.00	VERTICAL
142.520000	32.70	14.2	43.5	10.8	---	0.0	0.00	VERTICAL
191.020000	34.30	13.2	43.5	9.2	---	0.0	0.00	VERTICAL
383.080000	33.60	17.7	46.0	12.4	---	0.0	0.00	VERTICAL
769.140000	42.30	24.4	46.0	3.7	---	0.0	0.00	VERTICAL

For 1GHz to 25GHz

Frequency(MHz):				2408.625			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	Correction Factor (dB/m)
1	4817.250	52.44	PK	74.00	21.56	1.00 H	86	54.57	32.31	7.02	37.2	2.13
1	4817.250	38.65	AV	54.00	15.35	1.00 H	86	40.78	32.31	7.02	37.2	2.13
2	7225.875	43.24	PK	74.00	30.76	1.00 H	242	53.83	38.04	8.95	36.4	10.59
2	7225.875	--	AV	--	--	--	--	--	--	--	--	--

Frequency(MHz):				2408.625			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	Correction Factor (dB/m)
1	4817.250	54.25	PK	74.00	19.75	1.00 V	164	56.38	32.31	7.02	37.2	2.13
1	4817.250	40.31	AV	54.00	13.69	1.00 V	164	42.44	32.31	7.02	37.2	2.13
2	7225.875	41.35	PK	74.00	32.65	1.00 V	204	51.94	38.04	8.95	36.4	10.59
2	7225.875	--	AV	--	--	--	--	--	--	--	--	--

Frequency(MHz):				2442.375			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	Correction Factor (dB/m)
1	4884.750	53.42	PK	74.00	20.58	1.00 H	108	56.36	32.79	7.95	37.8	2.94
1	4884.750	41.62	AV	54.00	12.38	1.00 H	108	44.56	32.79	7.95	37.8	2.94
2	7327.125	42.49	PK	74.00	31.51	1.00 H	186	53.30	38.46	9.05	36.7	10.81
2	7327.125	--	AV	--	--	--	--	--	--	--	--	--

Frequency(MHz):				2442.375			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	Correction Factor (dB/m)
1	4884.750	55.82	PK	74.00	18.18	1.00 V	112	58.76	32.79	7.95	37.8	2.94
1	4884.750	44.67	AV	54.00	9.33	1.00 V	112	47.61	32.79	7.95	37.8	2.94
2	7327.125	41.82	PK	74.00	32.18	1.00 V	162	52.63	38.46	9.05	36.7	10.81
2	7327.125	--	AV	--	--	--	--	--	--	--	--	--

Frequency(MHz):				2473.875			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	Correction Factor (dB/m)
1	4947.750	53.46	PK	74.00	20.54	1.00 H	46	58.10	33.52	8.02	36.9	4.64
1	4947.750	41.62	AV	54.00	12.38	1.00 H	46	46.26	33.52	8.02	36.9	4.64
2	7421.625	40.54	PK	74.00	33.46	1.00 H	132	52.43	38.85	9.24	36.2	11.89
2	7421.625	--	AV	--	--	--	--	--	--	--	--	--

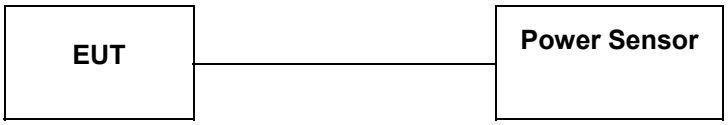
Frequency(MHz):				2473.875			Polarity:			VERTICAL		
No.	Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier	Correction Factor (dB/m)
1	4947.750	54.63	PK	74.00	19.37	1.00 V	164	59.27	33.52	8.02	36.9	4.64
1	4947.750	42.64	AV	54.00	11.36	1.00 V	164	47.28	33.52	8.02	36.9	4.64
2	7421.625	41.48	PK	74.00	32.52	1.00 V	268	53.37	38.85	9.24	36.2	11.89
2	7421.625	--	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.
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.

LIMIT

The Maximum Peak Output Power Measurement is 30dBm.

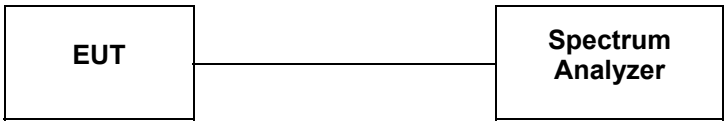
TEST RESULTS

Type	Channel	Output power PK (dBm)	Output power AV (dBm)	Limit (dBm)	Result
GFSK	00	7.82	5.12	30.00	Pass
	12	8.65	5.46		
	23	8.92	6.04		

Note:
1. The test results including the cable lose.
2. Meausrement Average power is for MPE report requirement;

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 =100 kHz.
3.Set the VBW =300 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/100KHz)	Limit (dBm/3KHz)	Result
GFSK	00	6.58	8.00	Pass
	12	6.94		
	23	7.82		

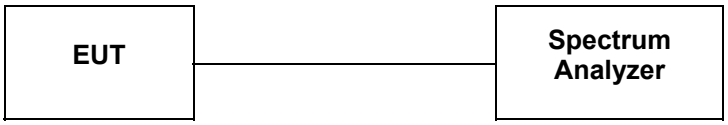
CH00

CH12

CH23

4.5. 6dB Bandwidth

TEST CONFIGURATION



TEST PROCEDURE

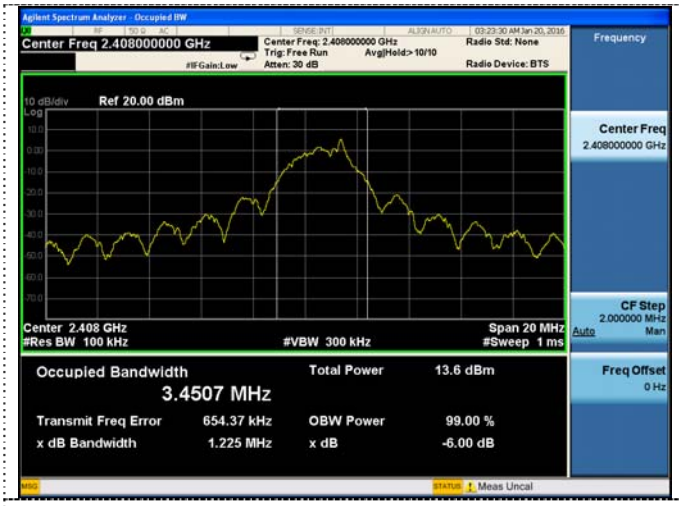
The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with RBW=100 KHz and VBW=300KHz.
The 6dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 6dB.
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

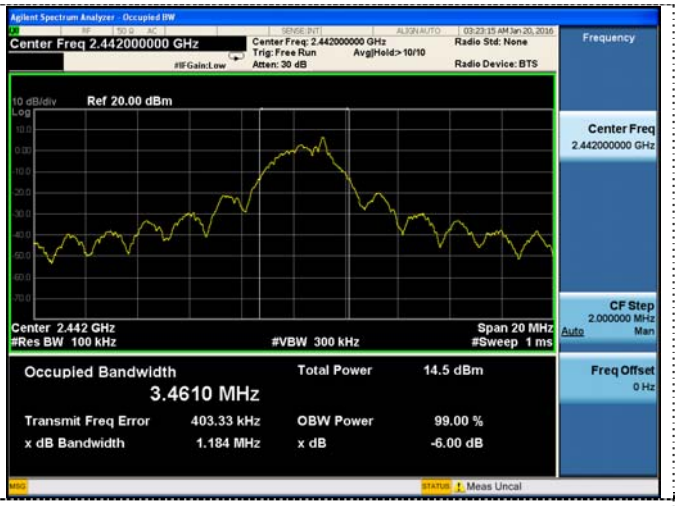
For digital modulation systems, the minimum 6 dB bandwidth shall be at least 500 kHz

TEST RESULTS

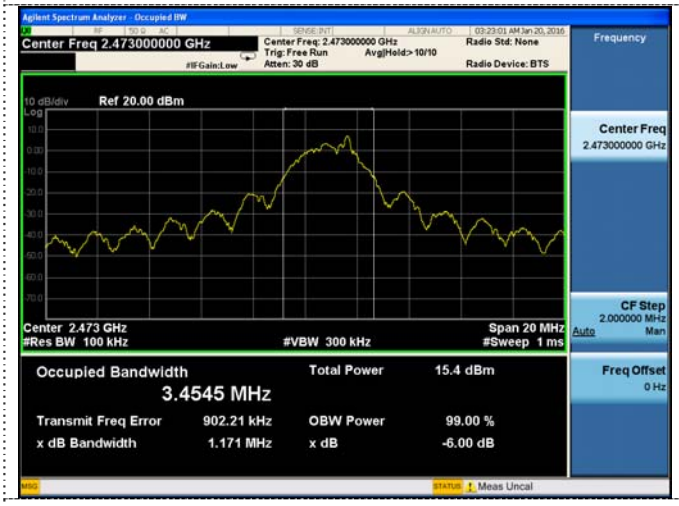
Type	Channel	6dB Bandwidth (MHz)	Limit (KHz)	Result
GFSK	00	1.225	≥500	Pass
	12	1.184		
	23	1.171		



CH00



CH12



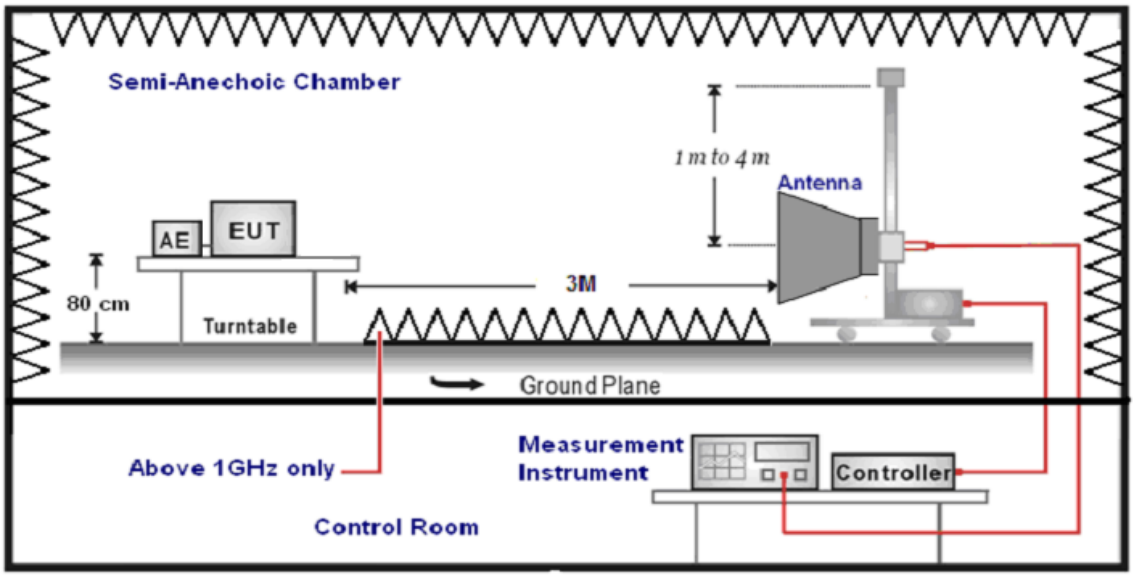
CH23

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 0.8m above ground plane.
2. Maximum procedure was performed by raising the receiving antenna from 1m to 4m and rotating the turn table from 0℃ to 360℃ to acquire the highest emissions from EUT.
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4. Repeat above procedures until all frequency measurements have been completed..
5. The 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)

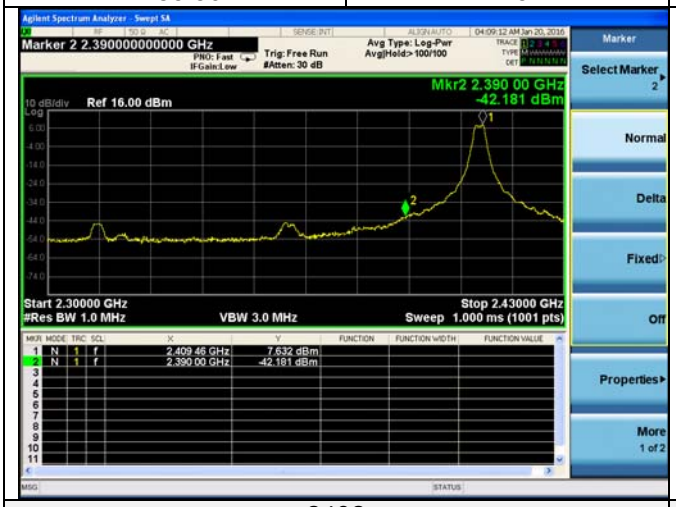
TEST RESULTS

4.6.1 For Radiated Bandedge Measurement

Frequency(MHz):			2408.625			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	56.42	PK	74.00	17.58	1.00	167	51.11	27.49	3.32	36.12	-5.31
2390.00	40.21	AV	54.00	13.79	1.00	167	34.90	27.49	3.32	36.12	-5.31
Frequency(MHz):			**2408.625**			**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	55.62	PK	74.00	18.38	1.00	87	50.31	27.49	3.32	36.12	-5.31
2390.00	40.34	AV	54.00	13.66	1.00	87	35.03	27.49	3.32	36.12	-5.31
Frequency(MHz):			**2473.875**			**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	57.02	PK	74.00	16.98	1.00	206	51.30	27.45	3.38	36.55	-5.72
2483.50	39.82	AV	54.00	14.18	1.00	206	34.10	27.45	3.38	36.55	-5.72
Frequency(MHz):			**2473.875**			**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	57.61	PK	74.00	16.39	1.00	150	51.89	27.45	3.38	36.55	-5.72
2483.50	40.03	AV	54.00	13.97	1.00	150	34.31	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	-49.81	-20	PASS
2483.50	-42.34	-20	PASS

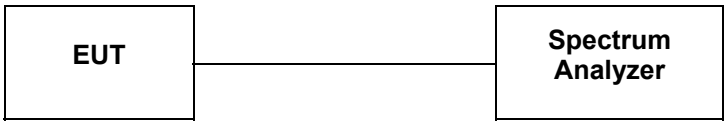


2402

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 C63.10-2009 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 VBW= 300KHz to measure the peak field strength , and mwasure frequeny range from 9KHz to 25GHz.

LIMIT

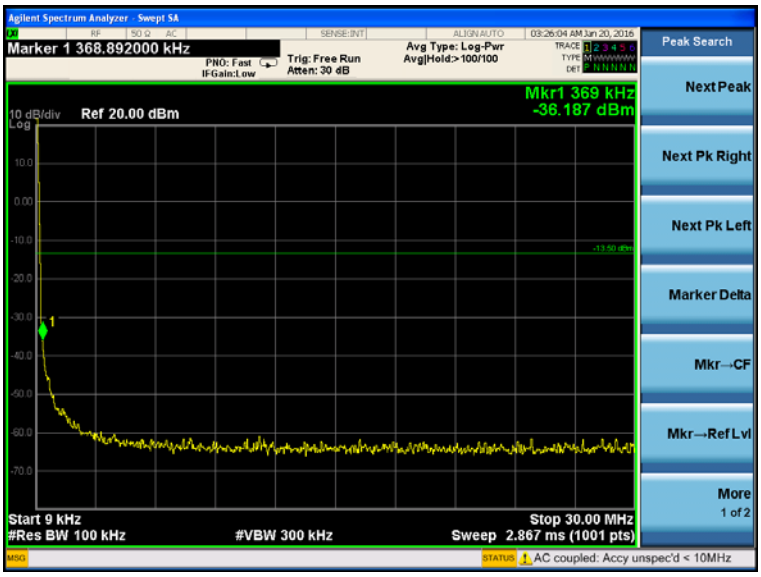
1. Below -20dB of the highest emission level in operating band.
2. Fall in the restricted bands listed in section 15.205. The maximum permitted average field strength is listed in section 15.209.

TEST RESULTS

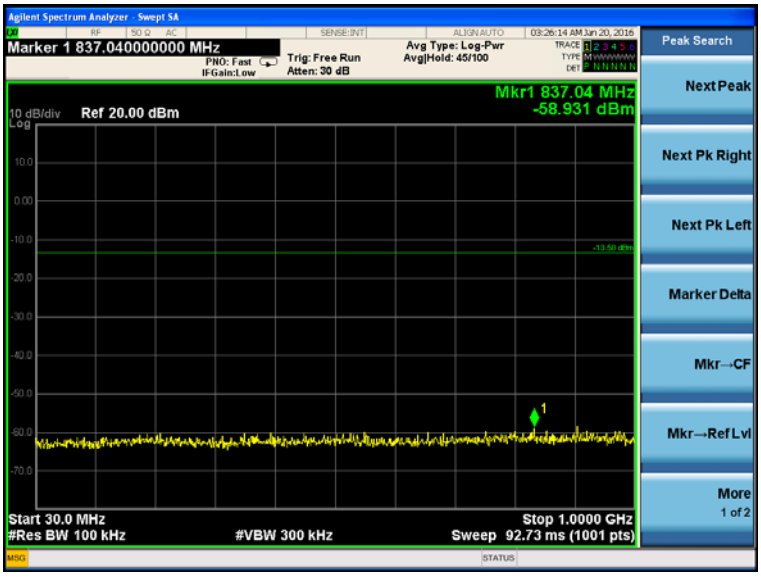
Remark: The measurement frequency range is from 9KHz to the 10^{th} harmonic of the fundamental frequency. The lowest, middle and highest channels are tested to verify the spurious emissions and bandege measurement data.

Test Mode:	GFSK	Test channel :	00

Channel 00

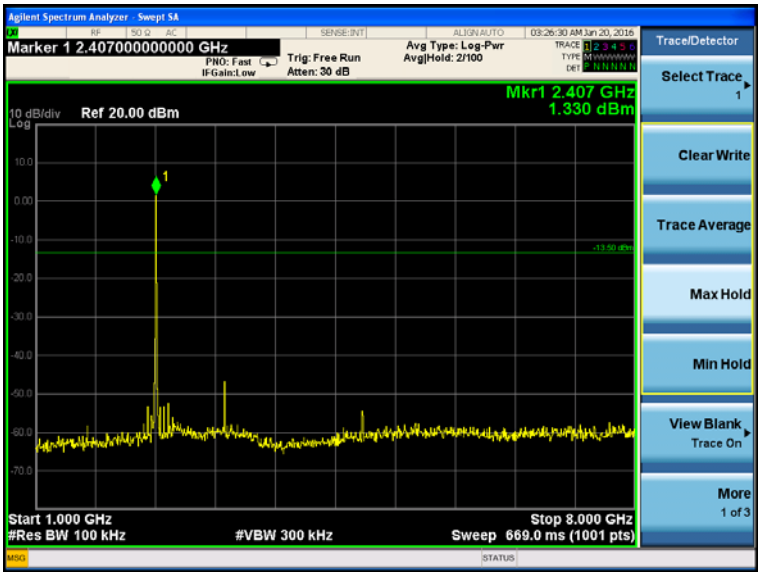


9KHz~30MHz



30M Hz~1GHz

Test Mode:	GFSK	Test channel :	00



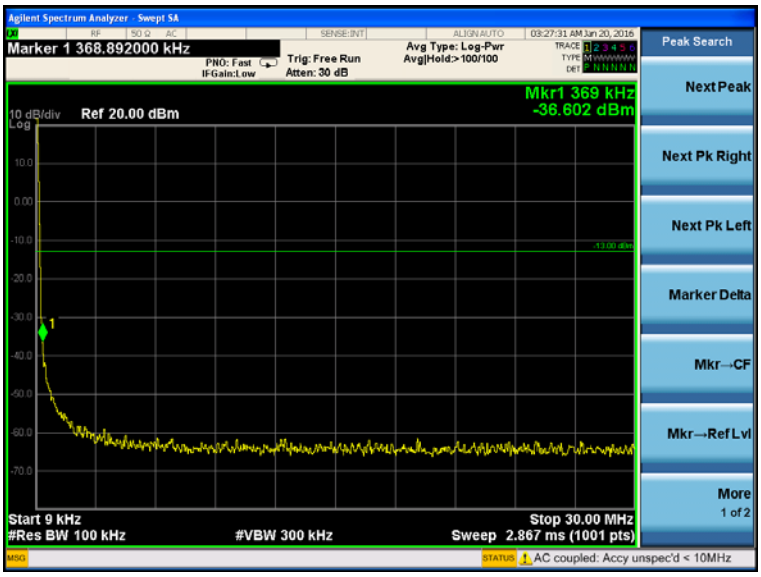
1GHz~8GHz

8GHz~16GHz

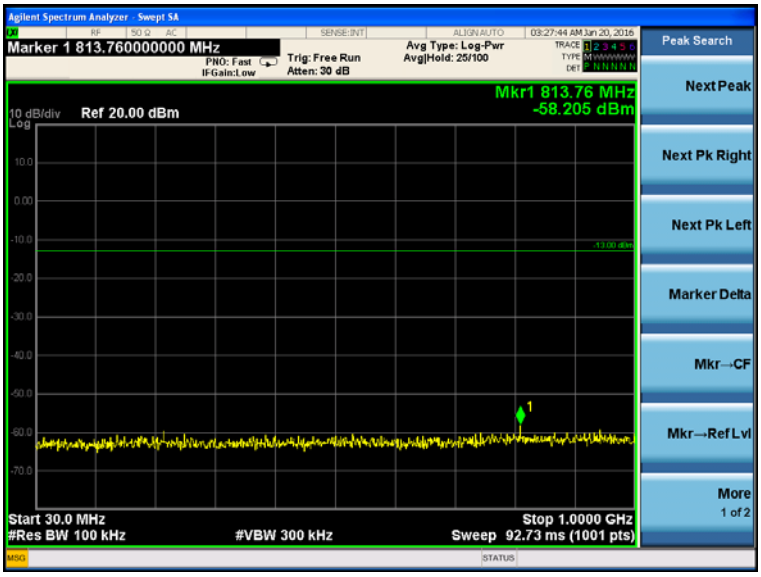
16GHz~25GHz

Test Mode:	GFSK	Test channel :	12

Channel 12

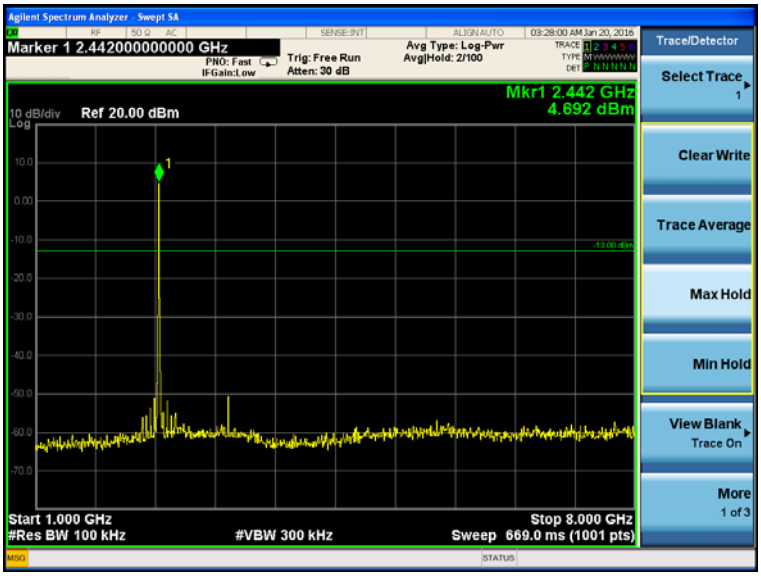


9KHz~30MHz



30M Hz~1GHz

Test Mode:	GFSK	Test channel :	12



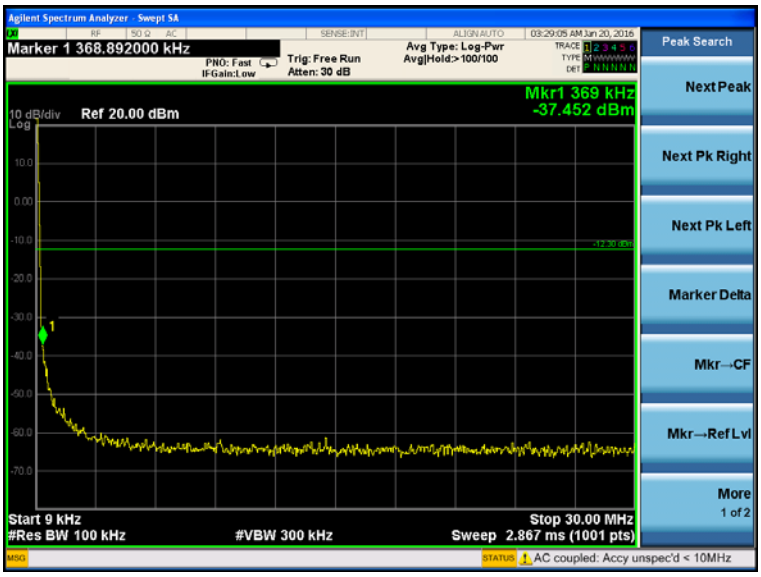
1GHz~8GHz

8GHz~16GHz

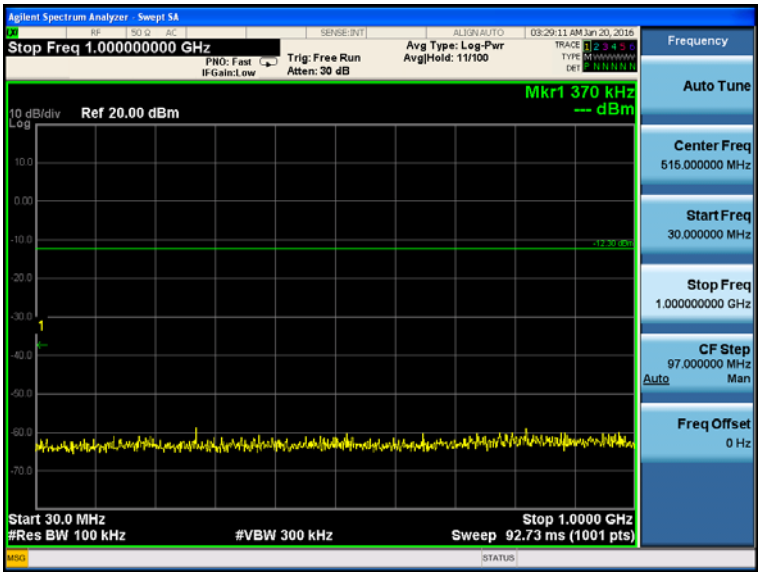
16GHz~25GHz

Test Mode:	GFSK	Test channel :	23

Channel 23

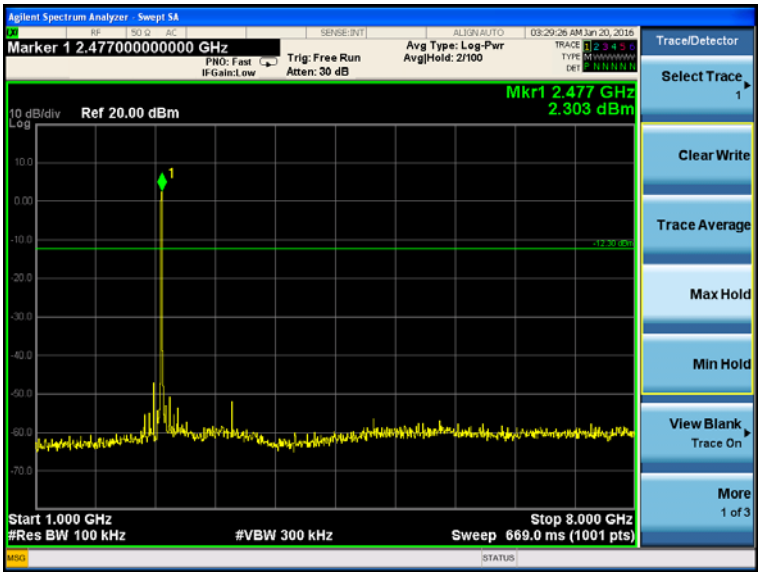


9KHz~30MHz



30M Hz~1GHz

Test Mode:	GFSK	Test channel :	23



1GHz~8GHz

8GHz~16GHz

16GHz~25GHz

4.8. Antenna Requirement

Standard Applicable

According to antenna requirement of §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. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be re-placed by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of Sections 15.211, 15.213, 15.217, 15.219, or 15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with Section 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this Part are not exceeded.

And according to §15.247(4)(1), system operating in the 2400-2483.5MHz bands that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum peak output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6dBi.

Antenna Connected Construction

Standard Applicable
According to § 15.203 & RSS-Gen, 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.

Antenna Connector Construction
The sample use external antenna and reverse SMA antenna port meet FCC 15.203 requirement, the maximum antenna gain is 3.0dBi. Please see EUT photo for details.

Results: Compliance.

Measurement
The antenna gain of the complete system is calculated by the difference of radiated power in EIRP and the conducted power of the module.
Conducted power refers ANSI C63.10:2013 Output power test procedure for DTS devices.
Radiated power refers to ANSI C63.10:2013 Radiated emissions tests.

Measurement parameters

Measurement parameter	
Detector:	Peak
Sweep time:	Auto
Resolution bandwidth:	1MHz
Video bandwidth:	3MHz
Trace-Mode:	Max hold

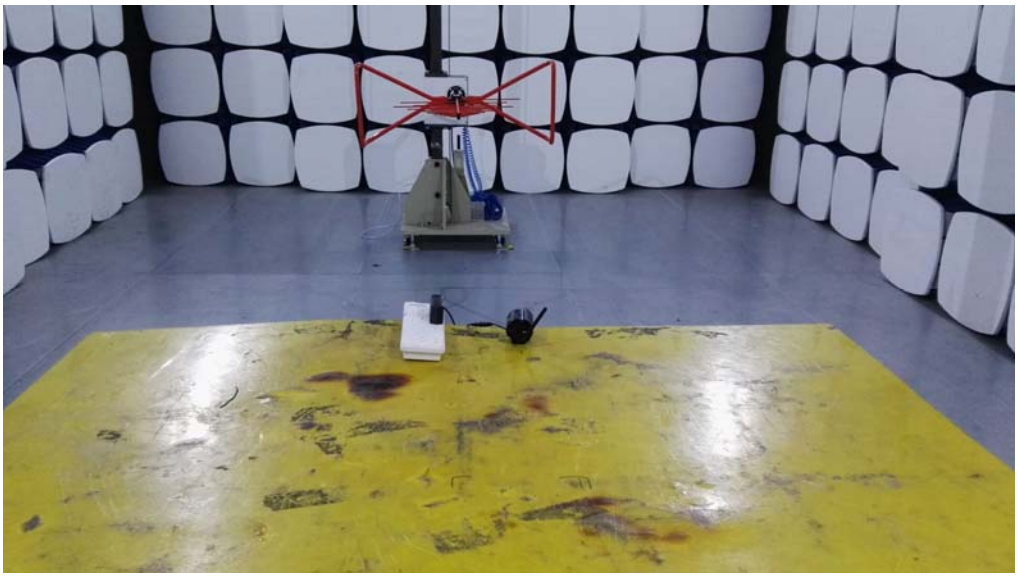
Limits

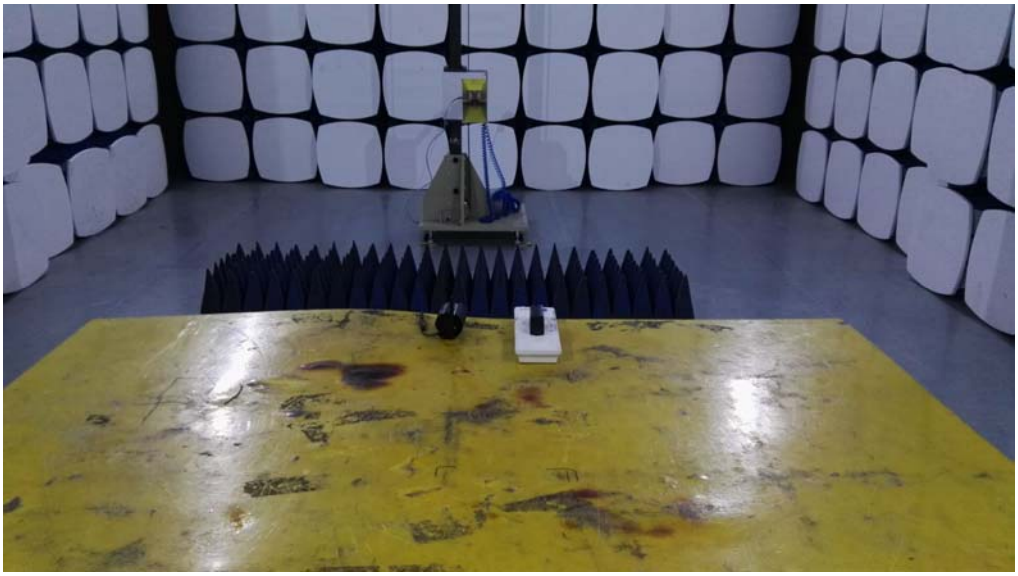
Antenna Gain	6 dBi

Results

T_{nom}	V_{nom}	Lowest Channel 2408.625 MHz	Middle Channel 2442.375 MHz	Highest Channel 2473.875 MHz
Conducted power [dBm]		7.82	8.65	8.92
Radiated power [dBm]		10.64	11.56	11.71
Gain [dBi] Calculated		2.82	2.91	2.79
Measurement uncertainty		± 0.6 dB (cond.) / ± 4.32 dB (rad.)		

5. Test Setup Photos of the EUT



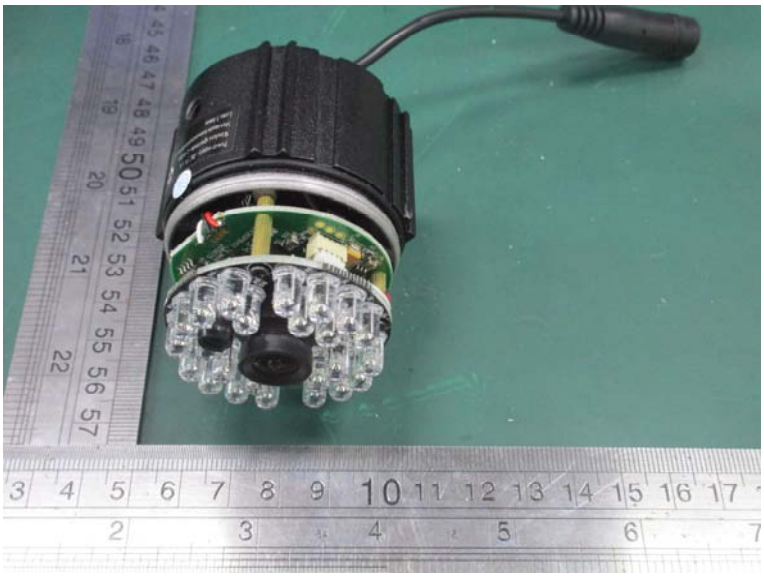


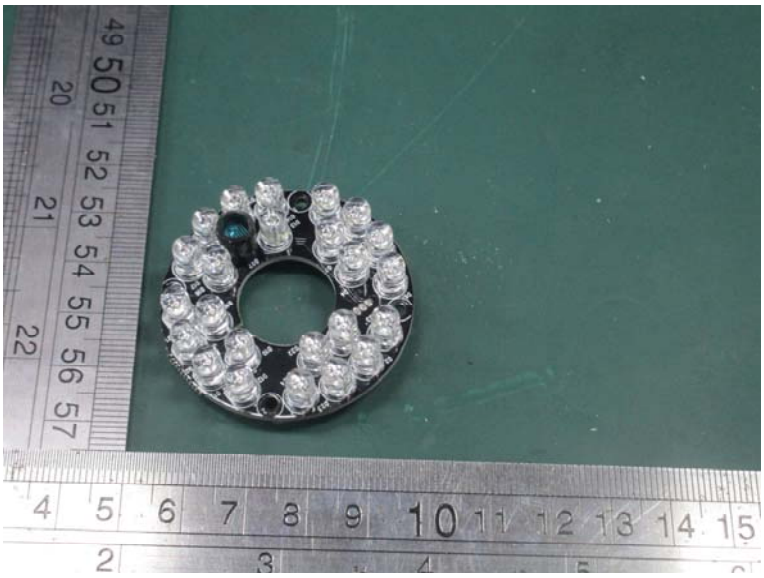
6. External and Internal Photos of the EUT

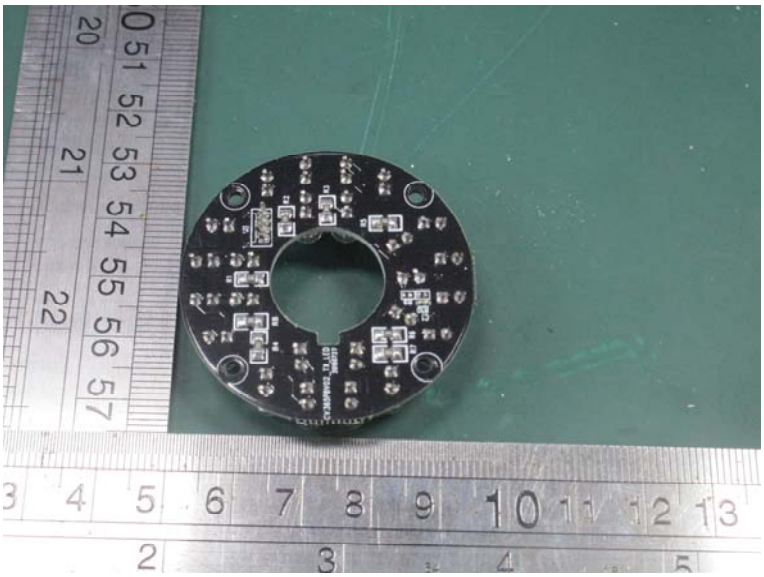
External Photos

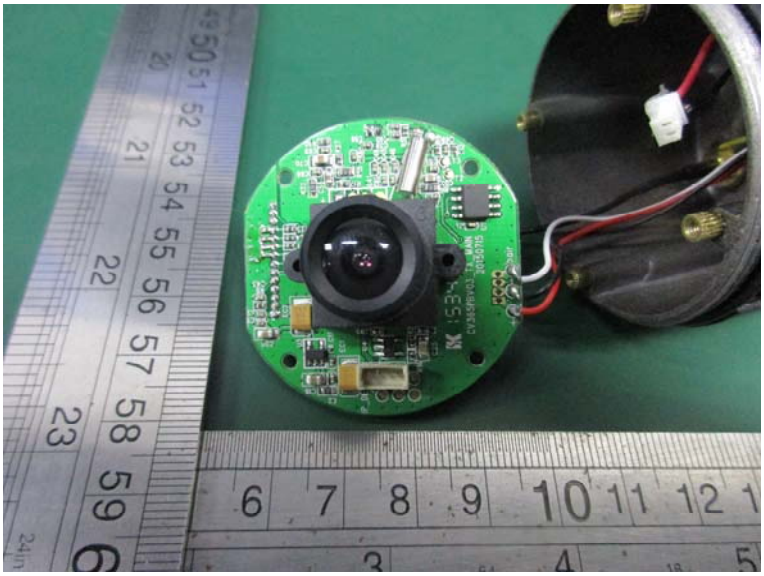

Power Adapter
Input: AC 110V-240V
50/60Hz
Output: +5V ⎓ 1A
CE
CB
INDOOR USED ONLY
MADE IN CHINA

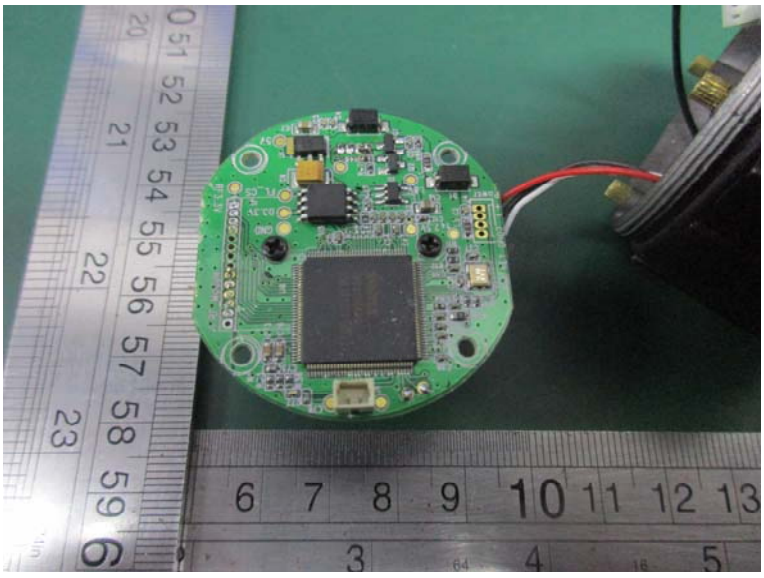
Internal Photos

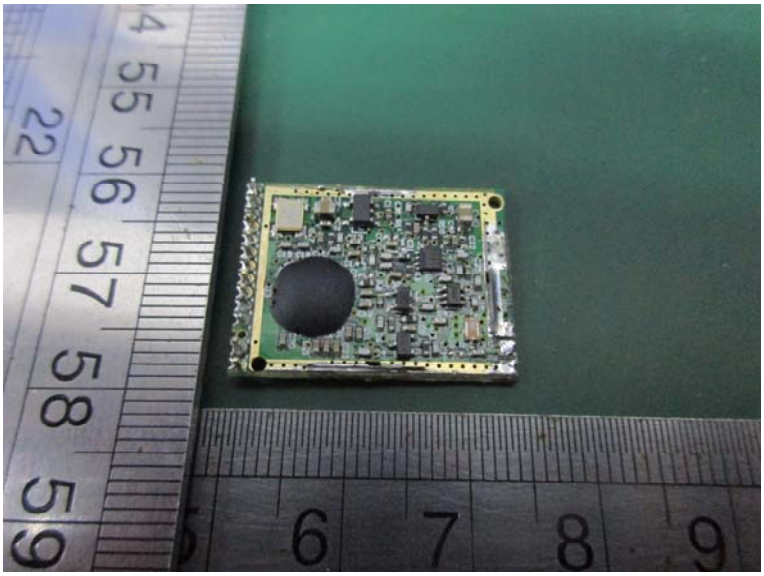


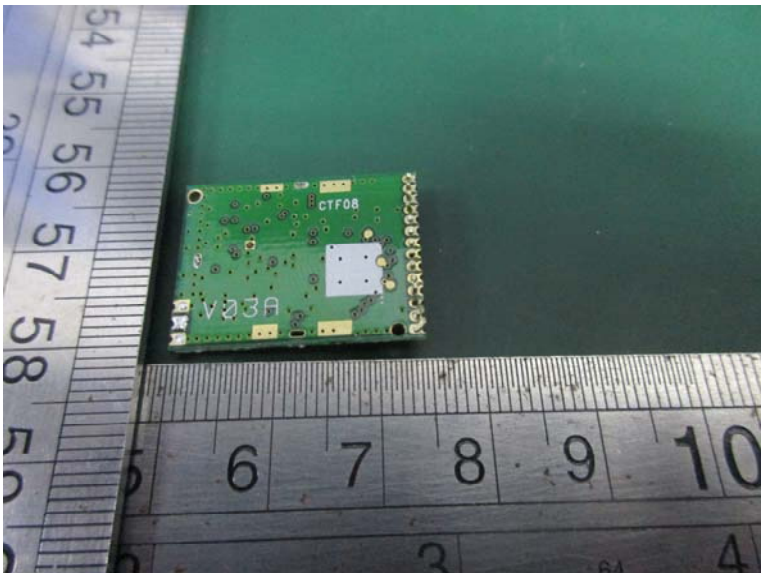












.....End of Report.....