FCC Part 15C Test Report

FCC ID:2AIWX-H100

Product Name:	Wireless Presenter
Trademark:	N/A
Model Name :	H100
Prepared For :	Shenzhen Haojiehua Technology Co., Ltd.
Address :	Baoan Baoyuan Road, The Famous Industrial Products Exhibition Center B1-619, Shenzhen, China
Prepared By :	Shenzhen BCTC Testing Co., Ltd.
Address :	BCTC Building & 1-2F, East of B Building, Pengzhou Industrial, Fuyuan 1st Road, Qiaotou Community, Fuyong Street, Bao'an District, Shenzhen, China
Test Date:	Sep. 10, 2018 – Sep. 17, 2018
Date of Report :	Sep. 17, 2018
Report No.:	BCTC-FY180905199E

TEST RESULT CERTIFICATION

Applicant's name ..... :	Shenzhen Haojiehua Technology Co., Ltd.
Address ..... :	Baoan Baoyuan Road, The Famous Industrial Products Exhibition Center B1-619, Shenzhen, China
Manufacture's Name..... :	Shenzhen Haojiehua Technology Co., Ltd.
Address ..... :	Baoan Baoyuan Road, The Famous Industrial Products Exhibition Center B1-619, Shenzhen, China
Product description	
Product name ..... :	Wireless Presenter
Trademark ..... :	N/A
Model and/or type reference ..... :	H100
Standards ..... :	FCC Part15.247 ANSI C63.10:2013

This device described above has been tested by BCTC, and the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.
This report shall not be reproduced except in full, without the written approval of BCTC, this document may be altered or revised by BCTC, personal only, and shall be noted in the revision of the document.

Prepared by(Engineer):	Lake Xie	Lake Xie
Reviewer(Supervisor):	Eric Yang	Eric Yang
Approved(Manager):	Carson Zhang	Carson Zhang

Table of Contents

(Note: N/A means not applicable)

1. TEST SUMMARY

Test procedures according to the technical standards:

FCC Part15 (15.247) , Subpart C			
Standard Section	Test Item	Judgment	Remark
15.205(a) 15.209 15.247(d)	Radiated Spurious Emissions	PASS	
15.247(d)	Conducted Spurious emissions	PASS	
15.247(d) 15.205(a)	Band edge	PASS	
15.207	Conducted Emission	PASS	
15.247(a)	20dB Bandwidth	PASS	
15.247(b)	Maximum Peak Output Power	PASS	
15.247(a)	Frequency Separation	PASS	
15.247(a)	Number of Hopping Frequency	PASS	
15.247(a)	Dwell time	PASS	
15.203	Antenna Requirement	PASS	
Note: (1)" N/A" denotes test is not applicable in this Test Report			

2. TEST FACILITY

Shenzhen BCTC Testing Co., Ltd.
Add. : BCTC Building & 1-2F, East of B Building, Pengzhou Industrial, Fuyuan 1st Road, Qiaotou Community, Fuyong Street, Bao'an District, Shenzhen, China
Test Firm Registration Number: 712850
IC Registered No.: 23583

3. MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement y ± U，where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of k=2，providing a level of confidence of approximately 95 %。

No.	Item	Uncertainty
1	Conducted Emission Test	±1.38dB
2	RF power,conducted	±0.16dB
3	Spurious emissions,conducted	±0.21dB
4	All emissions,radiated(<1G)	±4.68dB
5	All emissions,radiated(>1G)	±4.89dB
6	Temperature	±0.5°C
7	Humidity	±2%

4. GENERAL INFORMATION

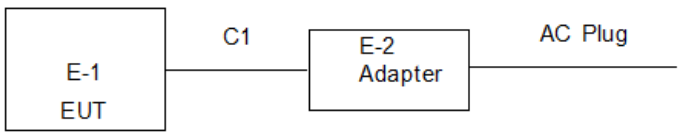
4.1 GENERAL DESCRIPTION OF EUT

Equipment	Wireless Presenter
Trade Name	N/A
Model Name	H100
Model Difference	N/A
Product Description	The EUT is a Wireless Presenter Operation Frequency: 2411-2476 MHz Modulation Type: GFSK Number Of Channel 16CH Antenna Designation: PCB Antenna , 0dBi Based on the application, features, or specification exhibited in User's Manual, the EUT is considered as an ITE/Computing Device. More details of EUT technical specification, please refer to the User's Manual.
Channel List	Please refer to the Note 2.
Ratings	DC 3.7V or DC 5V From Adapter
Adapter	N/A
Connecting I/O Port(s)	Please refer to the User's Manual
Hardware Version:	N/A
Software Version:	N/A

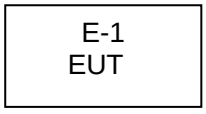
4.2 Test Setup Configuration

See test photographs attached in *EUT TEST SETUP PHOTOGRAPHS* for the actual

Conducted Emission Test



Radiated Spurious Emission



4.3 Support Equipment

No.	Device Type	Brand	Model	Series No.	Note
E-1	Wireless Presenter	N/A	H100	N/A	EUT
E-2	Adapter	---	BCTC005	---	Auxiliary

Notes:

1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

4.4 Channel List

CH	Frequency (MHz)	CH	Frequency (MHz)	CH	Frequency (MHz)	CH	Frequency (MHz)
0	2411	5	2433	10	2455	15	2476
1	2414	6	2436	11	2459		
2	2417	7	2440	12	2467		
3	2424	8	2447	13	2469		
4	2429	9	2451	14	2473		

4.5 Test Mode

All test mode(s) and condition(s) mentioned were considered and evaluated respectively by performing full tests, the worst data were recorded and reported.

During testing, Channel and Power Controlling Software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product.

The EUT is Continue Transmitting.

The software is installed in operation system, named “RFTestTool.apk” ,Version 1.0.

Test Mode	Test mode	Low channel	Middle channel	High channel
1	Transmitting(GFSK)	2411MHz	2440MHz	2476MHz
2	Normal Link (conducted emission and Radiated emission)			

5. TEST FACILITY AND TEST INSTRUMENT USED

5.1 Test Facility

All measurement facilities used to collect the measurement data are located at BCTC Building & 1-2F, East of B Building, Pengzhou Industrial, Fuyuan 1st Road, Qiaotou Community, Fuyong Street, Bao'an District, Shenzhen, China. The site and apparatus are constructed in conformance with the requirements of ANSI C63.4 and CISPR 16-1-1 other equivalent standards.

5.2 Test Instrument Used

Radiation Test equipment

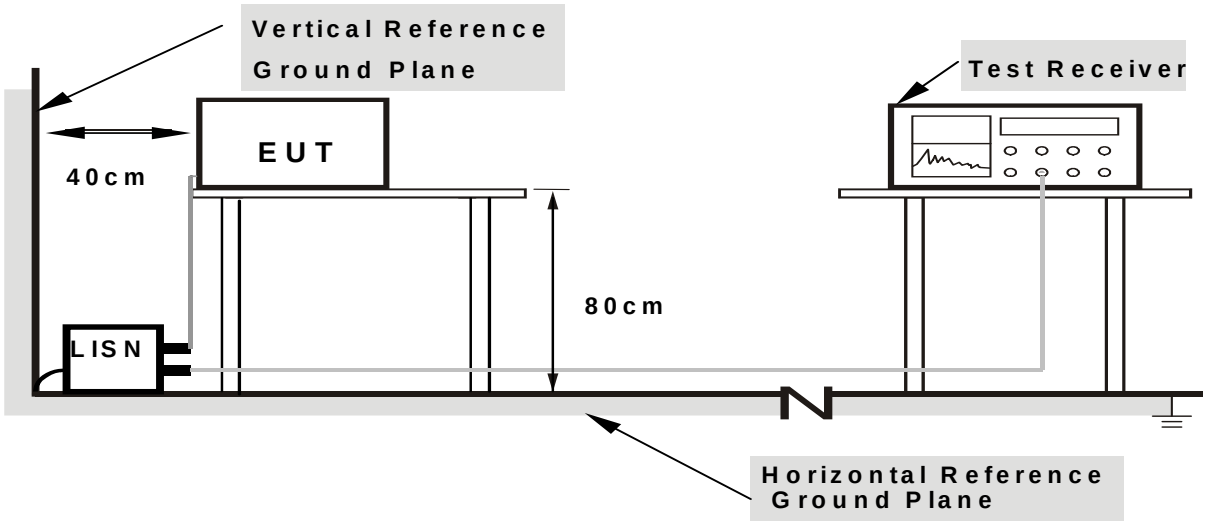
Item	Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
1	Spectrum Analyzer (9kHz-26.5GHz)	Agilent	E4407B	MY45108040	2018.06.20	2019.06.20
2	Test Receiver (9kHz-6GHz)	R&S	ESPI	101396	2018.06.19	2019.06.19
3	Bilog Antenna (30MHz-1GHz)	R&S	VULB 9168	VULB91 68-438	2018.06.23	2019.06.23
4	Horn Antenna (1GHz-18GHz)	SCHWARZBECK	BBHA9120D	1201	2018.06.23	2019.06.23
5	Horn Antenna (14GHz-40GHz)	SCHWARZBECK	BBHA 9170	9170-181	2018.08.06	2019.08.05
6	Amplifier (9KHz-6GHz)	SCHWARZBECK	BBV9744	9744-0037	2018.06.20	2019.06.20
7	Amplifier (1GHz-18GHz)	SCHWARZBECK	BBV9718	9718-309	2018.06.20	2019.06.20
8	Amplifier (18GHz-40GHz)	SCHWARZBECK	BBV 9721	9721-205	2018.08.06	2019.08.05
9	Loop Antenna (9KHz-30MHz)	SCHWARZBECK	FMZB1519B	00014	2018.06.23	2019.06.23
10	RF cables1 (9kHz-1GHz)	R&S	R203	R20X	2018.08.06	2019.08.05
11	RF cables2 (1GHz-40GHz)	R&S	R204	R21X	2018.08.06	2019.08.05
12	Antenna connector	Florida RF Labs	N/A	RF 01#	2018.08.06	2019.08.05
13	Power Metter	ANRITSU	ML2487A	6K00001568	2018.08.06	2019.08.05
14	Power Sensor (AV)	ANRITSU	ML2491A	030989	2018.08.06	2019.08.05
15	Signal Analyzer 9kHz-26.5GHz	Agilent	N9010A	MY48030494	2018.08.06	2019.08.05
16	Test Receiver 20kHz-40GHz	R&S	ESU 40	100376	2018.08.06	2019.08.05
17	D.C. Power Supply	LongWei	PS-305D	010964729	2018.08.06	2019.08.05

Conduction Test equipment

Item	Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
1	Test Receiver	R&S	ESCI	1166.5950K03-101165-ha	2018.06.19	2019.06.19
2	LISN	SCHWARZBECK	NSLK8127	8127739	2018.06.19	2019.06.19
3	LISN	R&S	NSLK8126	8126487	2018.08.06	2019.08.05
4	RF cables	R&S	R204	R20X	2018.08.06	2019.08.05
5	Attenuator	R&S	ESH3-Z2	143206	2018.08.06	2019.08.05

6. CONDUCTED EMISSIONS

6.1 Block Diagram Of Test Setup



Note: 1.Support units were connected to second LISN.
2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

6.2 Limit

FREQUENCY (MHz)	Limit (dBuV)		Standard
	Quasi-peak	Average	
0.15 -0.5	66 - 56 *	56 - 46 *	FCC
0.50 -5.0	56.00	46.00	FCC
5.0 -30.0	60.00	50.00	FCC

6.3 Test procedure

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz

a. The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.

b. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.

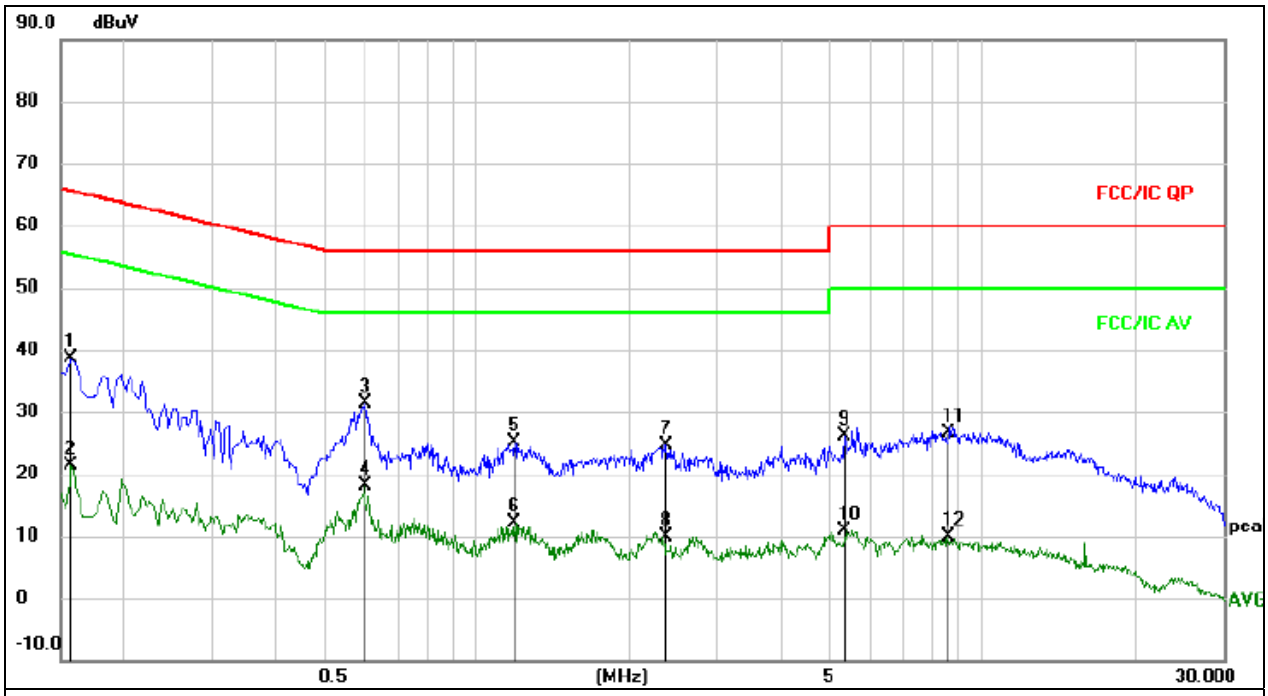
c. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.

d. LISN at least 80 cm from nearest part of EUT chassis.

e. For the actual test configuration, please refer to the related Item –EUT Test Photos.

6.4 Test Result

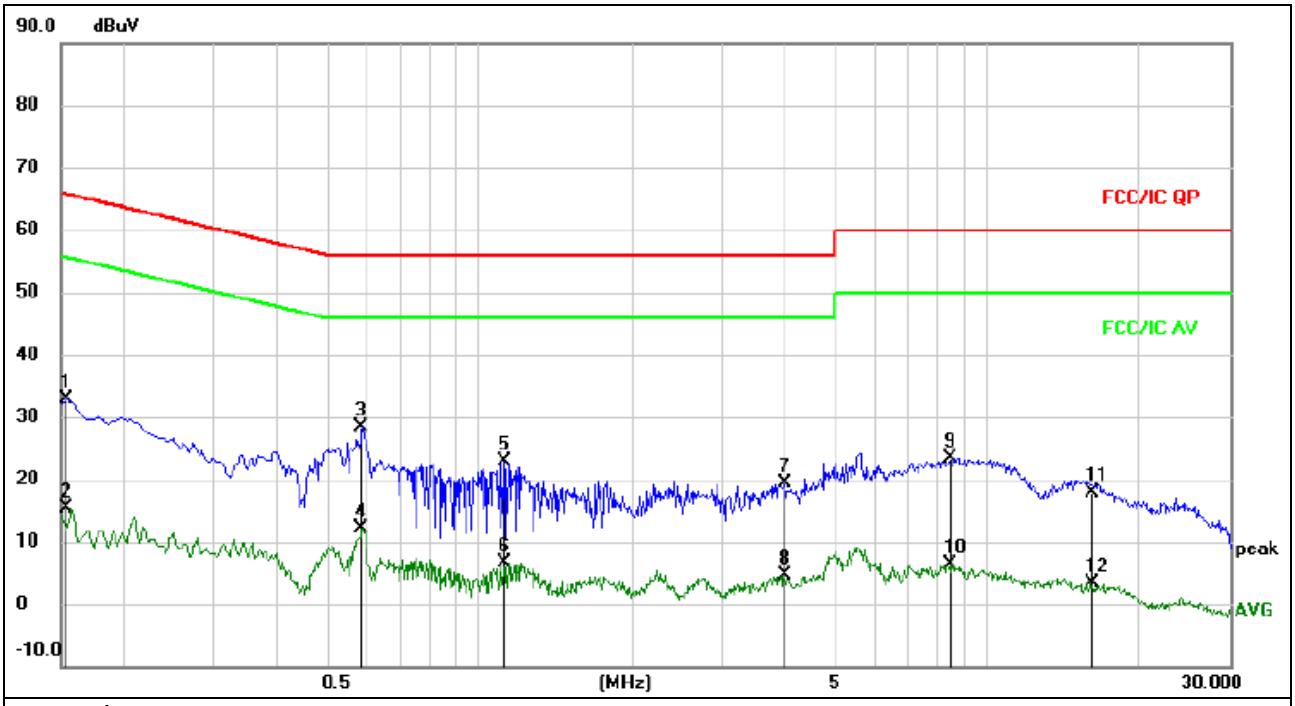
Temperature：	26℃	Relative Humidity：	54%
Pressure：	101kPa	Phase：	L
Test Voltage ：	DC 5V From Adapter AC 120V/60Hz	Test Mode：	Mode 2



Remark:
1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV		dBuV	dBuV	dB	Detector	Comment
1		0.1580	28.94	9.77	38.71	65.57	-26.86	QP	
2		0.1580	11.57	9.77	21.34	55.57	-34.23	AVG	
3	*	0.5980	21.09	10.19	31.28	56.00	-24.72	QP	
4		0.5980	8.05	10.19	18.24	46.00	-27.76	AVG	
5		1.1860	15.38	9.77	25.15	56.00	-30.85	QP	
6		1.1860	2.32	9.77	12.09	46.00	-33.91	AVG	
7		2.3740	14.81	9.80	24.61	56.00	-31.39	QP	
8		2.3740	0.19	9.80	9.99	46.00	-36.01	AVG	
9		5.3460	16.14	9.90	26.04	60.00	-33.96	QP	
10		5.3460	1.00	9.90	10.90	50.00	-39.10	AVG	
11		8.5500	16.73	9.90	26.63	60.00	-33.37	QP	
12		8.5500	0.00	9.90	9.90	50.00	-40.10	AVG	

Temperature：	26℃	Relative Humidity：	54%
Pressure：	101kPa	Phase：	N
Test Voltage ：	DC 5V From Adapter AC 120V/60Hz	Test Mode：	Mode 2



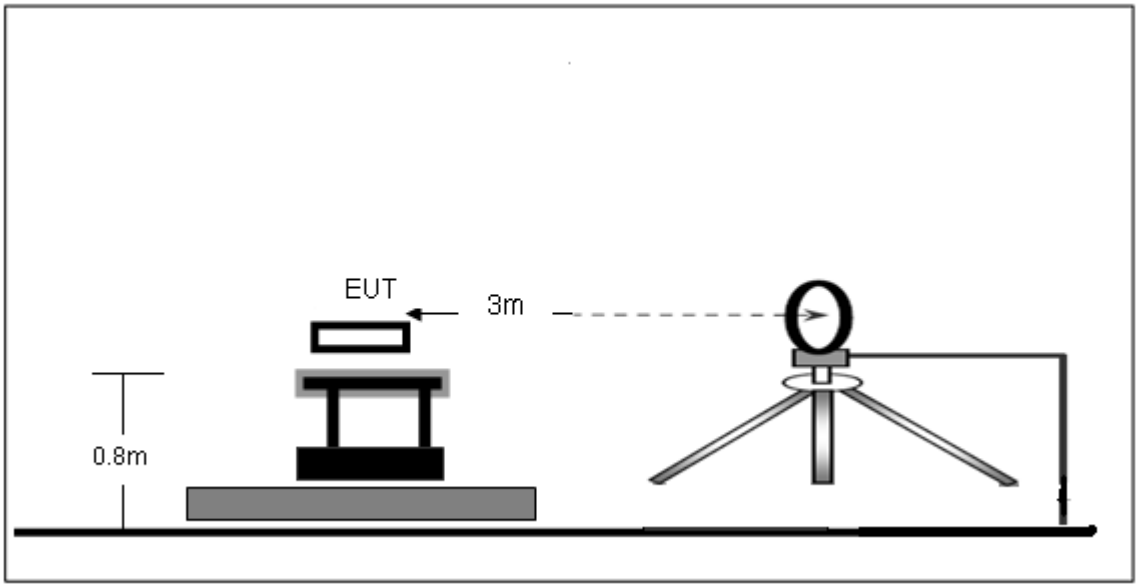
Remark:
1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV		dBuV	dBuV	dB	Detector	Comment
1		0.1539	22.99	9.77	32.76	65.79	-33.03	QP	
2		0.1539	5.53	9.77	15.30	55.79	-40.49	AVG	
3	*	0.5860	18.36	10.14	28.50	56.00	-27.50	QP	
4		0.5860	2.10	10.14	12.24	46.00	-33.76	AVG	
5		1.1180	13.07	9.77	22.84	56.00	-33.16	QP	
6		1.1180	-3.08	9.77	6.69	46.00	-39.31	AVG	
7		3.9980	9.50	9.86	19.36	56.00	-36.64	QP	
8		3.9980	-5.28	9.86	4.58	46.00	-41.42	AVG	
9		8.4700	13.42	9.91	23.33	60.00	-36.67	QP	
10		8.4700	-3.58	9.91	6.33	50.00	-43.67	AVG	
11		16.0260	7.93	10.02	17.95	60.00	-42.05	QP	
12		16.0260	-6.73	10.02	3.29	50.00	-46.71	AVG	

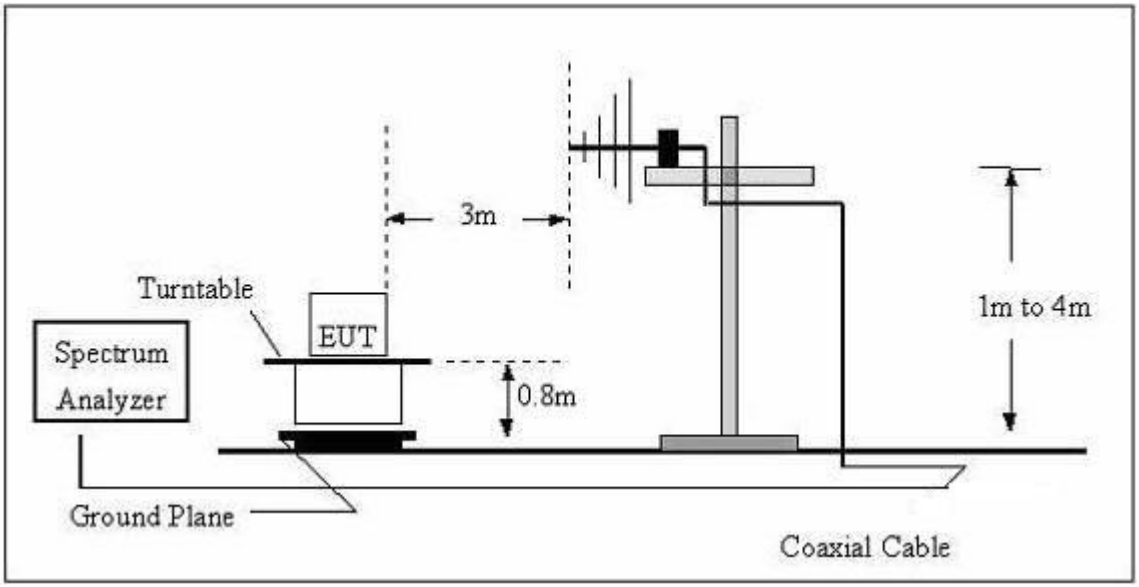
7. RADIATED EMISSIONS

7.1 Block Diagram Of Test Setup

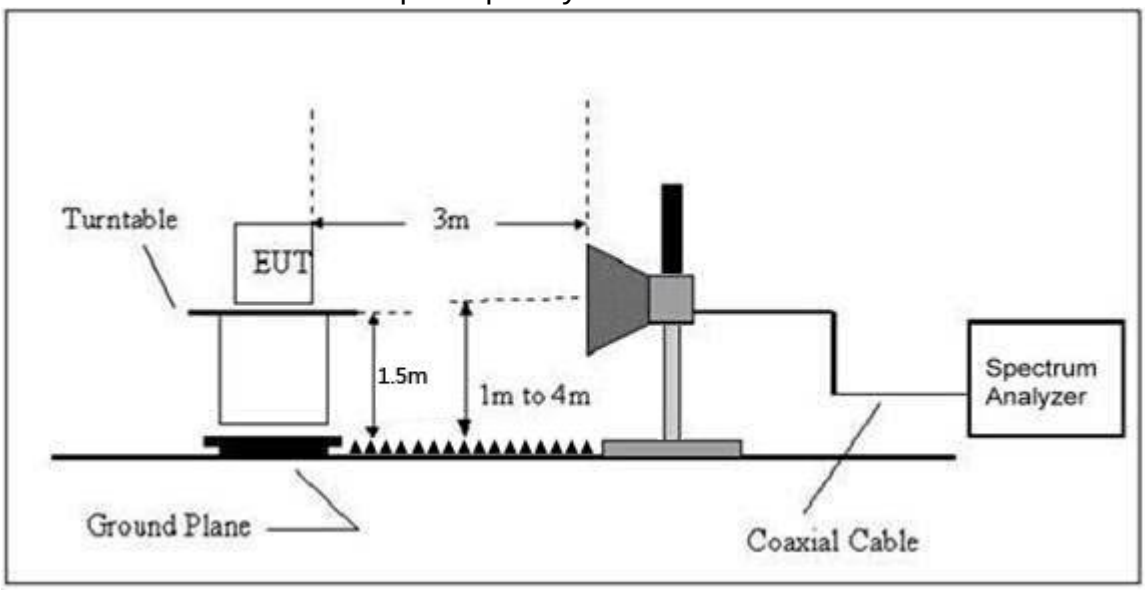
（A）Radiated Emission Test-Up Frequency Below 30MHz



（B）Radiated Emission Test-Up Frequency 30MHz~1GHz



（C）Radiated Emission Test-Up Frequency Above 1GHz



7.2 Limit

20dBc in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

Frequency	Field Strength	Distance	Field Strength Limit at 3m Distance	
(MHz)	uV/m	(m)	uV/m	dBuV/m
0.009 ~ 0.490	2400/F(kHz)	300	10000 * 2400/F(kHz)	$20\log^{(2400/F(kHz))}$ + 80
0.490 ~ 1.705	24000/F(kHz)	30	100 * 24000/F(kHz)	$20\log^{(24000/F(kHz))}$ + 40
1.705 ~ 30	30	30	100 * 30	$20\log^{(30)}$ + 40
30 ~ 88	100	3	100	$20\log^{(100)}$
88 ~ 216	150	3	150	$20\log^{(150)}$
216 ~ 960	200	3	200	$20\log^{(200)}$
Above 960	500	3	500	$20\log^{(500)}$

7.3 Test procedure

Receiver Parameter	Setting
Attenuation	Auto
9kHz~150kHz	RBW 200Hz for QP
150kHz~30MHz	RBW 9kHz for QP
30MHz~1000MHz	RBW 120kHz for QP

Spectrum Parameter	Setting
1-25GHz	RBW 1 MHz /VBW 1 MHz for Peak, RBW 1 MHz / VBW 10Hz for Average

Below 1GHz test procedure as below:

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation.

b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

Above 1GHz test procedure as below:

g. Different between above is the test site, change from Semi- Anechoic Chamber to fully Anechoic Chamber and change form table 0.8 metre to 1.5 metre(Above 18GHz the distance is 1 meter and table is 1.5 metre).

h. Test the EUT in the lowest channel ,the middle channel ,the Highest channel.

Note:

Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported.

7.4 Test Result

Below 9KHz – 30MHz

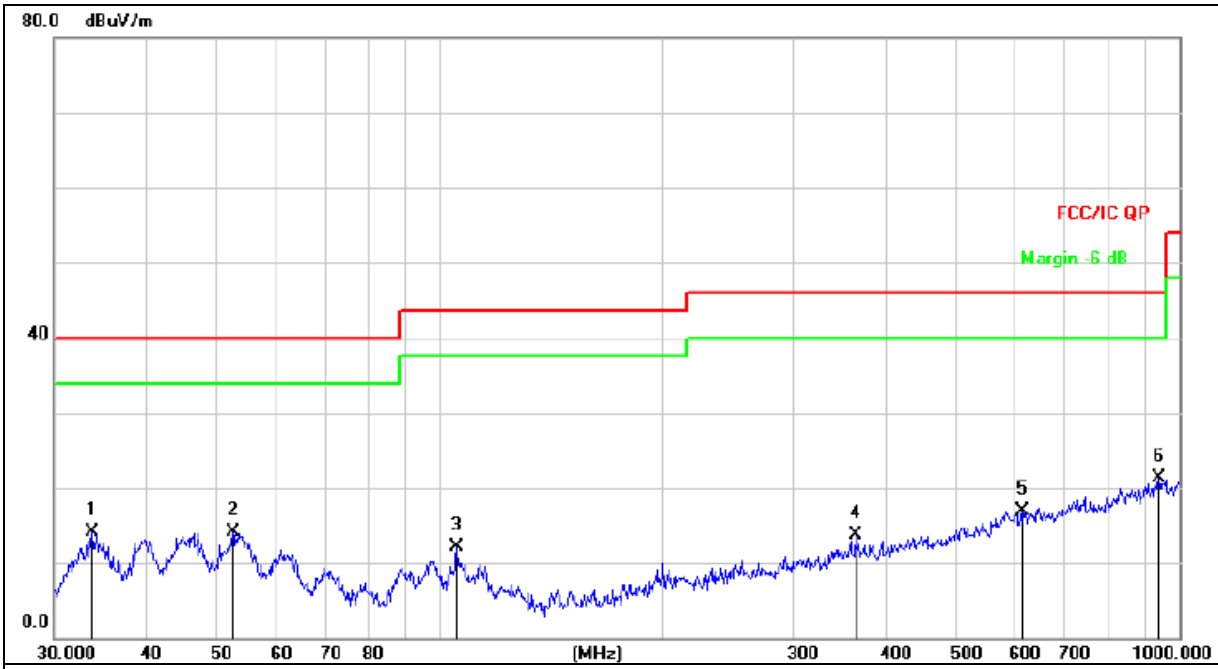
Temperature：	26℃	Relative Humidtity：	54%
Pressure：	101 kPa	Test Voltage ：	DC 3.7V
Test Mode ：	Mode 2	Polarization :	--

Freq.	Reading	Limit	Margin	State
(MHz)	(dBuV/m)	(dBuV/m)	(dB)	P/F
--	--	--	--	PASS
--	--	--	--	PASS

Note:
The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.
Distance extrapolation factor =40 log (specific distance/test distance)(dB);
Limit line = specific limits(dBuv) + distance extrapolation factor.

Between 30MHz – 1GHz

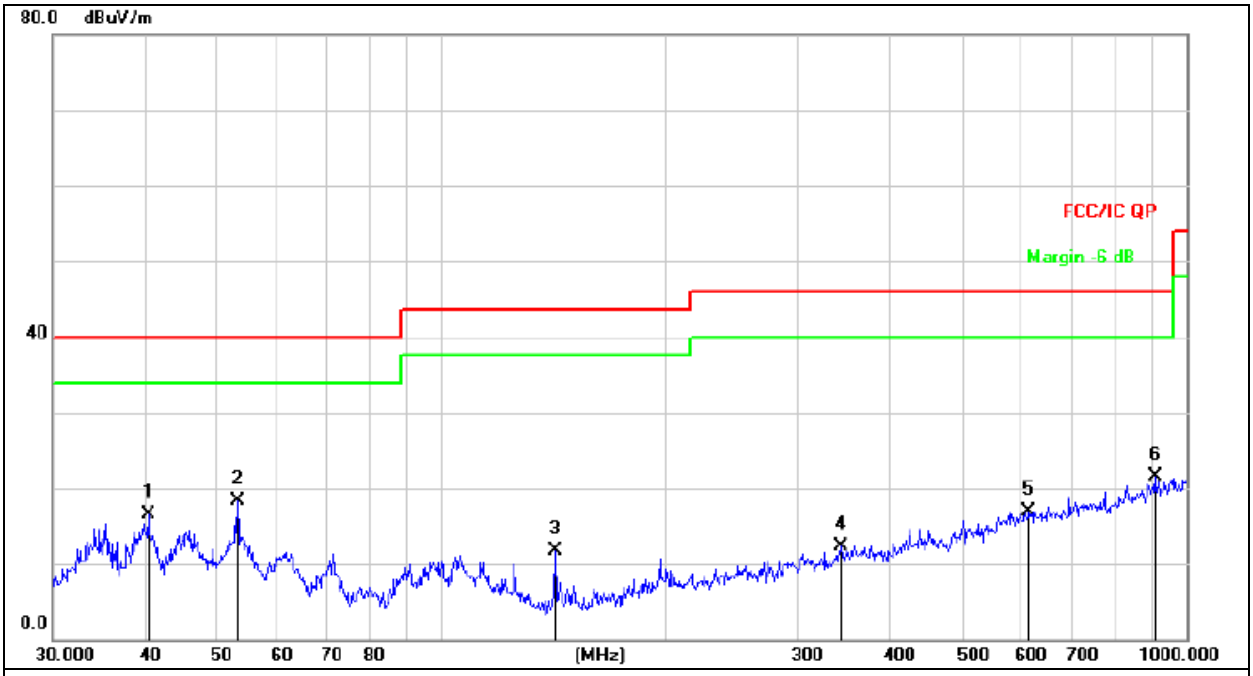
Temperature：	26℃	Relative Humidtity：	54%
Pressure：	101kPa	Test Voltage ：	DC 3.7V
Test Mode ：	Mode 2	Polarization :	Horizontal



Remark:
Factor = Antenna Factor + Cable Loss – Pre-amplifier.

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector
1		33.7986	30.62	-16.58	14.04	40.00	-25.96	QP
2		52.3912	28.39	-14.35	14.04	40.00	-25.96	QP
3		105.2718	27.79	-15.66	12.13	43.50	-31.37	QP
4		364.2595	25.95	-12.18	13.77	46.00	-32.23	QP
5		612.0642	23.49	-6.61	16.88	46.00	-29.12	QP
6	*	938.8326	23.39	-2.10	21.29	46.00	-24.71	QP

Temperature：	26℃	Relative Humidtity：	54%
Pressure：	101kPa	Test Voltage ：	DC 3.7V
Test Mode ：	Mode 2	Polarization :	Vertical



Remark:
Factor = Antenna Factor + Cable Loss – Pre-amplifier.

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector
1		40.2757	31.19	-14.69	16.50	40.00	-23.50	QP
2	*	53.1313	32.67	-14.46	18.21	40.00	-21.79	QP
3		141.8262	31.03	-19.37	11.66	43.50	-31.84	QP
4		343.1800	24.91	-12.58	12.33	46.00	-33.67	QP
5		614.2142	23.47	-6.59	16.88	46.00	-29.12	QP
6		906.4824	23.83	-2.30	21.53	46.00	-24.47	QP

Between 1-25GHz

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Pre-amplifier (dB)	Cable Loss (dB)	Antenna Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
GFSK Low Channel:2411MHz									
V	4822.00	52.48	39.55	7.85	25.66	46.44	74.00	-27.56	PK
V	4822.00	43.41	39.55	7.85	25.66	37.37	54.00	-16.63	AV
V	7233.00	54.37	38.33	7.52	24.55	48.11	74.00	-25.89	PK
V	7233.00	43.09	38.33	7.52	24.55	36.83	54.00	-17.17	AV
V	15450.00	50.74	35.23	6.75	26.59	48.85	74.00	-25.15	PK
H	4822.00	51.13	39.55	7.85	25.66	45.09	74.00	-28.91	PK
H	4822.00	43.19	39.55	7.85	25.66	37.15	54.00	-16.85	AV
H	7233.00	52.52	38.33	7.52	23.55	45.26	74.00	-28.74	PK
H	7233.00	43.90	38.33	7.52	23.22	36.31	54.00	-17.69	AV
H	15450.00	53.63	35.45	6.75	27.88	52.81	74.00	-21.19	PK

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Pre-amplifier (dB)	Cable Loss (dB)	Antenna Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
GFSK Middle Channel:2440MHz									
V	4880.00	51.72	39.55	7.85	25.66	45.68	74.00	-28.32	PK
V	4880.00	43.07	39.55	7.85	25.66	37.03	54.00	-16.97	AV
V	7320.00	54.75	38.33	7.52	24.55	48.49	74.00	-25.51	PK
V	7320.00	43.51	38.33	7.52	24.55	37.25	54.00	-16.75	AV
V	15450.00	51.59	35.23	6.75	26.59	49.70	74.00	-24.30	PK
H	4880.00	51.96	39.55	7.85	25.66	45.92	74.00	-28.08	PK
H	4880.00	43.04	39.55	7.85	25.66	37.00	54.00	-17.00	AV
H	7320.00	51.69	38.33	7.52	23.55	44.43	74.00	-29.57	PK
H	7320.00	43.65	38.33	7.52	23.22	36.06	54.00	-17.94	AV
H	15450.00	52.18	35.45	6.75	27.88	51.36	74.00	-22.64	PK

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Pre-amplifier (dB)	Cable Loss (dB)	Antenna Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
GFSK High Channel:2476MHz									
V	4952.00	54.67	39.55	7.85	25.66	48.63	74.00	-25.37	PK
V	4952.00	43.81	39.55	7.85	25.66	37.77	54.00	-16.23	AV
V	7428.00	50.24	38.33	7.52	24.55	43.98	74.00	-30.02	PK
V	7428.00	43.84	38.33	7.52	24.55	37.58	54.00	-16.42	AV
V	15450.00	50.72	35.23	6.75	26.59	48.83	74.00	-25.17	PK
H	4952.00	53.34	39.55	7.85	25.66	47.30	74.00	-26.70	PK
H	4952.00	43.57	39.55	7.85	25.66	37.53	54.00	-16.47	AV
H	7428.00	52.09	38.33	7.52	23.55	44.83	74.00	-29.17	PK
H	7428.00	43.16	38.33	7.52	23.22	35.57	54.00	-18.43	AV
H	15450.00	51.38	35.45	6.75	27.88	50.56	74.00	-23.44	PK

Remark:

1. Emission Level = Meter Reading + Antenna Factor + Cable Loss – Pre-amplifier,
   Margin= Emission Level - Limit
2. If peak below the average limit, the average emission was no test.
3. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

Radiated Band edge Emission

Temperature：	26℃	Relative Humidtity：	54%
Pressure：	101kPa	Test Voltage ：	DC 3.7V
Test Mode ：	Mode 1	Polarization :	

Radiated Bandedge Emission

Modulation	Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Pre-amplifier (dB)	Cable Loss (dB)	Antenna Factor (dB/m)	Emission evel (dBuV/m)	Limits (dBuV/m)		Result
							PK	PK	AV	
GFSK	**Low Channel 2411MHz**									
	H	2390.00	62.75	38.06	7.42	20.15	52.26	74.00	54.00	PASS
	H	2400.00	55.04	38.06	7.42	20.15	44.55	74.00	54.00	PASS
	V	2390.00	62.45	38.06	7.42	20.15	51.96	74.00	54.00	PASS
	V	2400.00	54.22	38.06	7.42	20.15	43.73	74.00	54.00	PASS
	High Channel 2476MHz									
	H	2483.50	60.76	38.17	7.45	20.54	50.58	74.00	54.00	PASS
	H	2485.50	52.48	38.17	7.45	20.54	42.30	74.00	54.00	PASS
	V	2483.50	63.14	38.20	7.45	20.54	52.93	74.00	54.00	PASS
	V	2485.50	55.06	38.20	7.45	20.54	44.85	74.00	54.00	PASS

Remark:

1.Emission Level = Meter Reading + Antenna Factor + Cable Loss – Pre-amplifier,
Margin= Emission Level - Limit

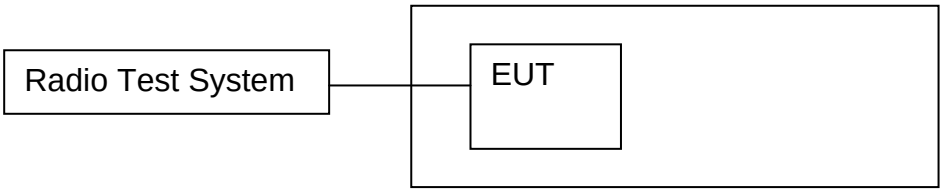
2. If the PK measured levels comply with average limit, then the average level were deemed to comply with average limit.

All the modulation modes have been tested, and the worst result was report as below:

Note: (1) All other emissions more than 20dB below the limit.

8. CONDUCTED EMISSION

8.1 Block Diagram Of Test Setup



8.2 Limit

Regulation 15.247 (d),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)).

8.3 Test procedure

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

2. Set the spectrum analyzer:

Blow 30MHz:

RBW = 100kHz, VBW = 300kHz, Sweep = auto

Detector function = peak, Trace = max hold

Above 30MHz:

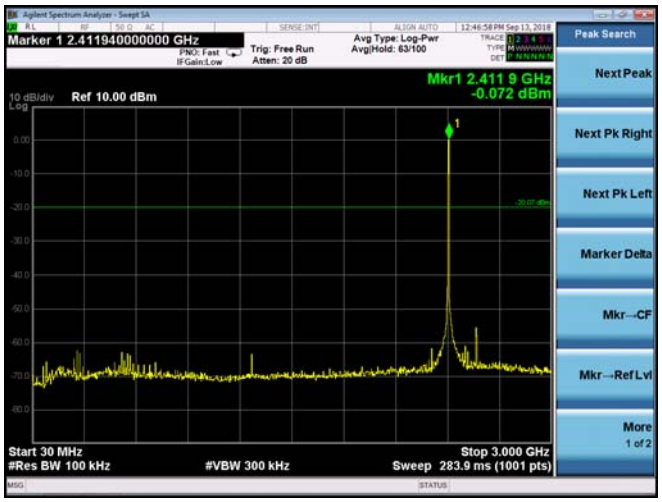
RBW = 100KHz, VBW = 300KHz, Sweep = auto

Detector function = peak, Trace = max hold

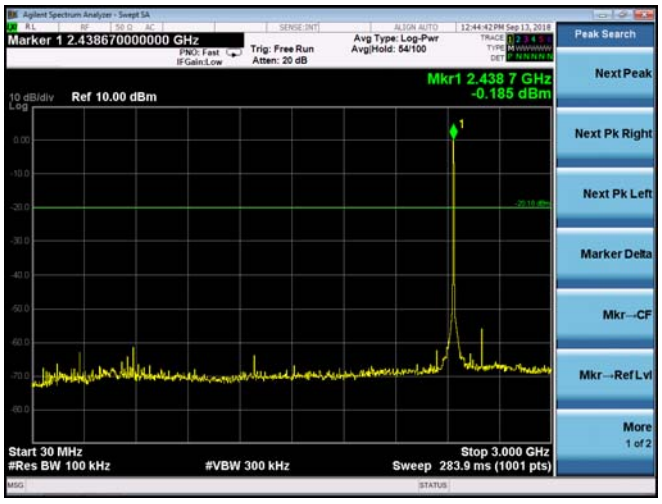
8.4 Test Result

30MHz – 25GHz

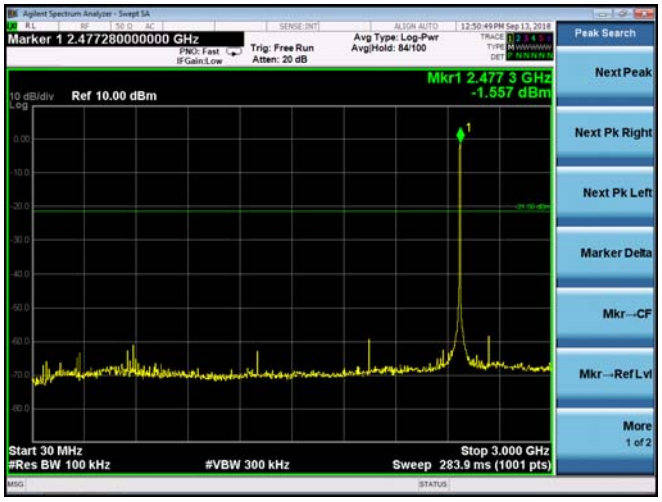
GFSK Low Channel



GFSK Middle Channel

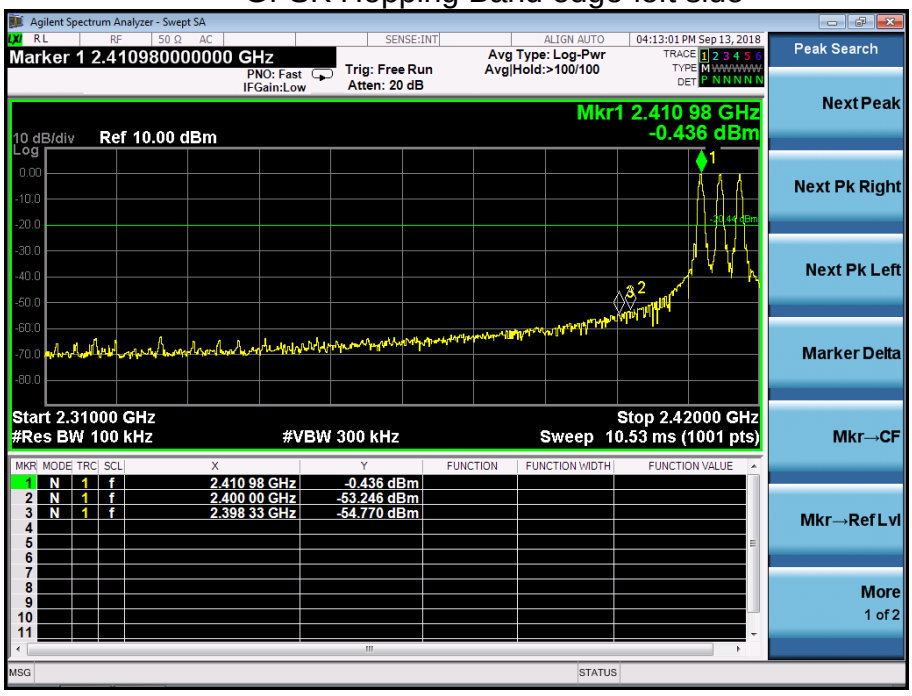


GFSK High Channel

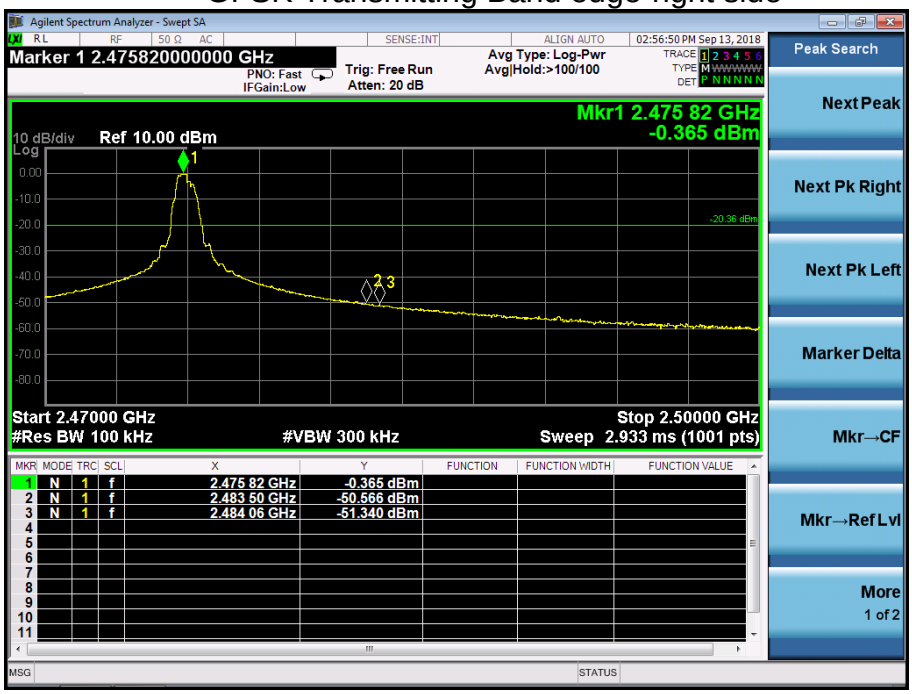


GFSK Transmitting Band edge-left side

GFSK Hopping Band edge-left side



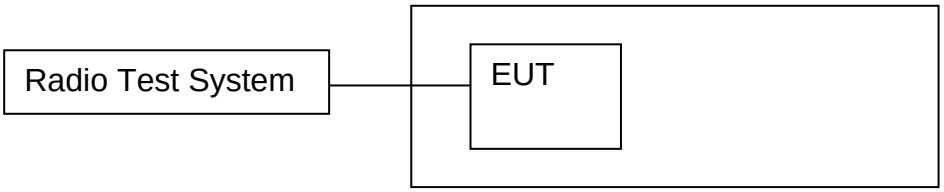
GFSK Transmitting Band edge-right side



GFSK Hopping Band edge-right side

9. 20 DB BANDWIDTH

9.1 Block Diagram Of Test Setup



9.2 Limit

N/A

9.3 Test procedure

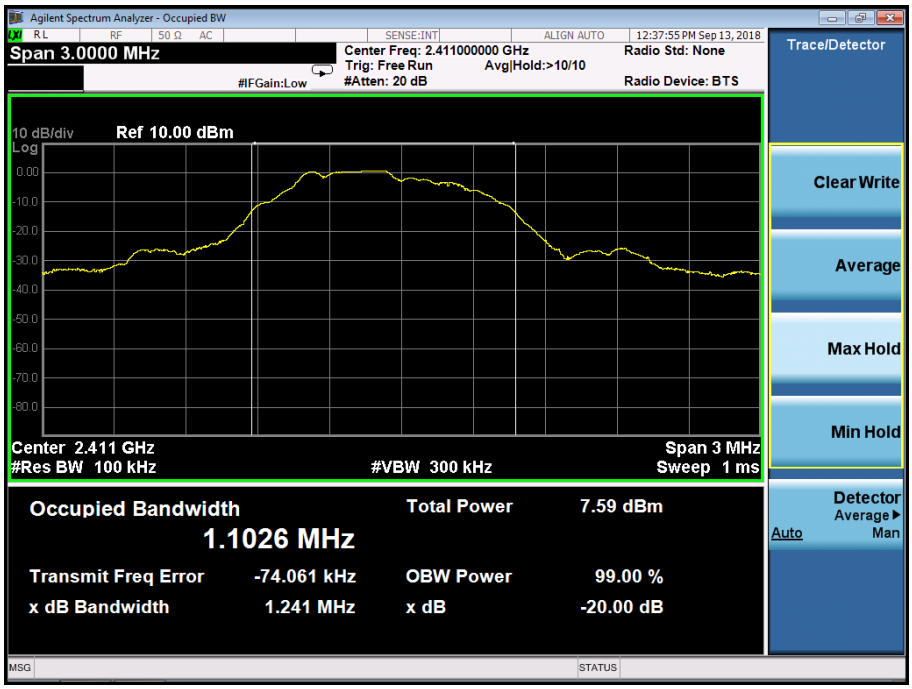
1. Set RBW = 100 kHz.
2. Set the video bandwidth (VBW) ≥ 3 x RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

9.4 Test Result

Modulation	Test Channel	Bandwidth(MHz)
GFSK	Low	1.241
GFSK	Middle	1.275
GFSK	High	1.305

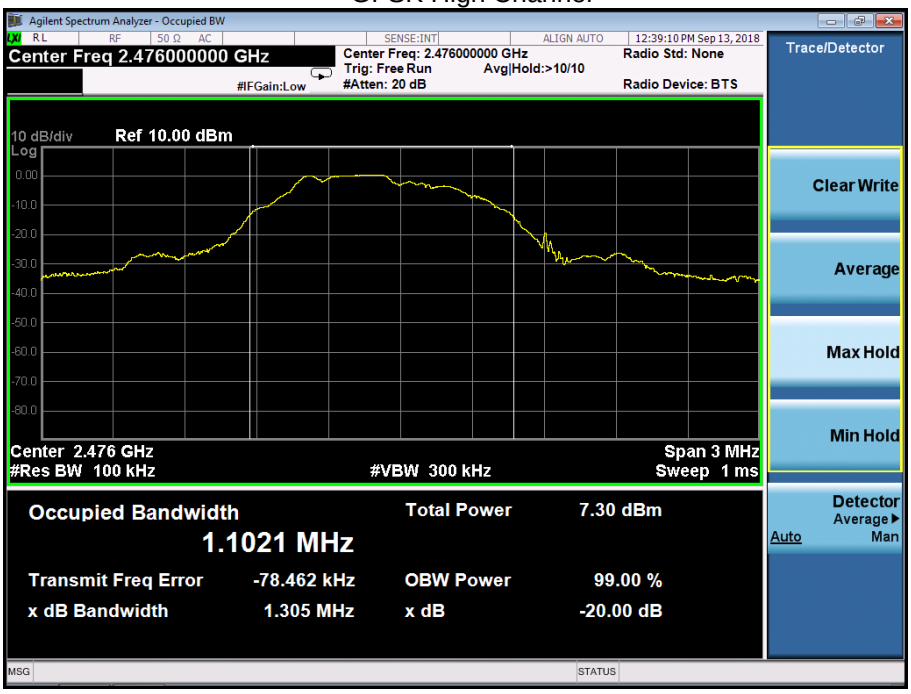
Test plots

GFSK Low Channel



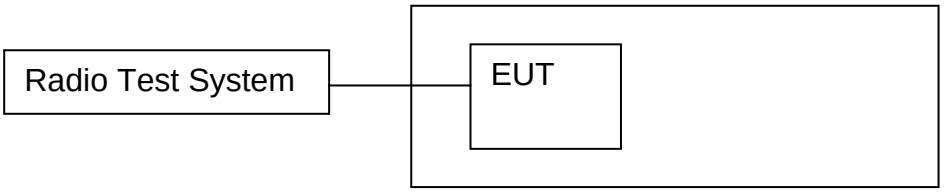
GFSK Middle Channel

GFSK High Channel



10. MAXIMUM PEAK OUTPUT POWER

10.1 Block Diagram Of Test Setup



10.2 Limit

For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.

10.3 Test procedure

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

2. Set the spectrum analyzer: RBW = 3MHz. VBW = 3MHz. Sweep = auto; Detector Function = Peak.

3. Keep the EUT in transmitting at lowest, medium and highest channel individually. Record the max value.

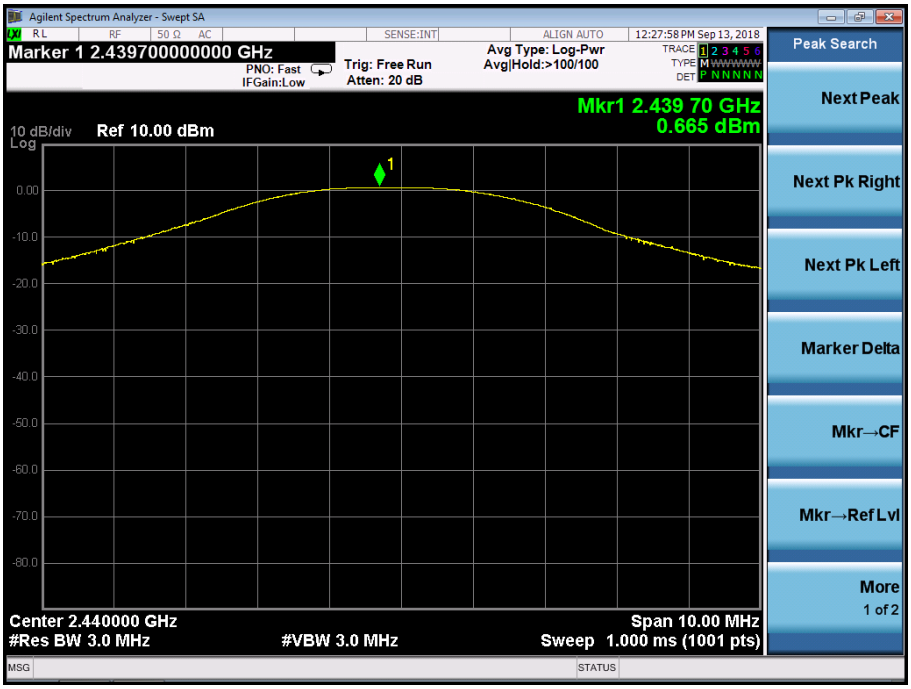
10.4 Test Result

Modulation	Test Channel	Output Power (dBm)	Limit (dBm)
GFSK	Low	0.538	21
GFSK	Middle	0.665	21
GFSK	High	-0.116	21

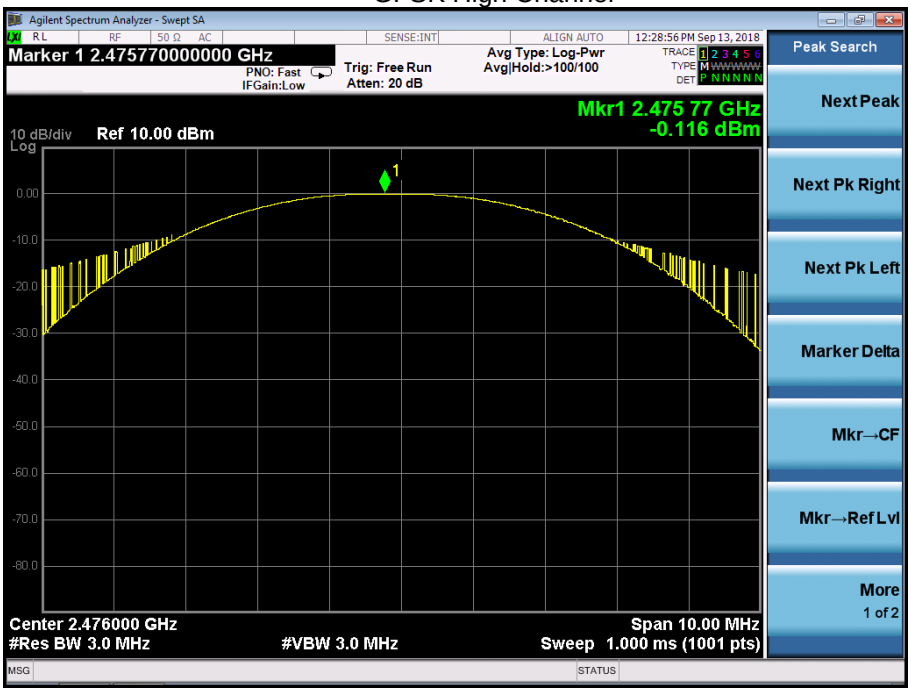
Test plots

GFSK Low Channel

GFSK Middle Channel

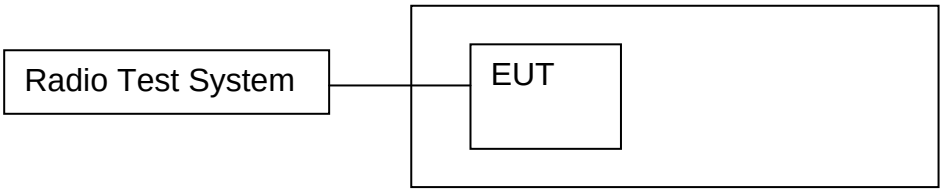


GFSK High Channel



11. HOPPING CHANNEL SEPARATION

11.1 Block Diagram Of Test Setup



11.2 Limit

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 0.125W.

11.3 Test procedure

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

2. Set the spectrum analyzer: RBW = 30kHz. VBW = 100kHz , Span = 3.0MHz. Sweep = auto; Detector Function = Peak. Trace = Max hold.

3. Allow the trace to stabilize. Use the marker-delta function to determine the separation between the peaks of the adjacent channels. The limit is specified in one of the subparagraphs of this Section Submit this plot.

11.4 Test Result

Modulation	Test Channel	Separation (MHz)	Limit(MHz)	Result
GFSK	Low	3.005	0.827	PASS
GFSK	Middle	3.996	0.850	PASS
GFSK	High	3.005	0.870	PASS

Test plots

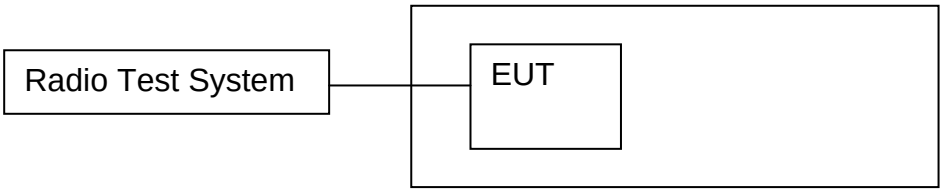
GFSK Low Channel

GFSK Middle Channel

GFSK High Channel

12. NUMBER OF HOPPING FREQUENCY

12.1 Block Diagram Of Test Setup



12.2 Limit

Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels.

12.3 Test procedure

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

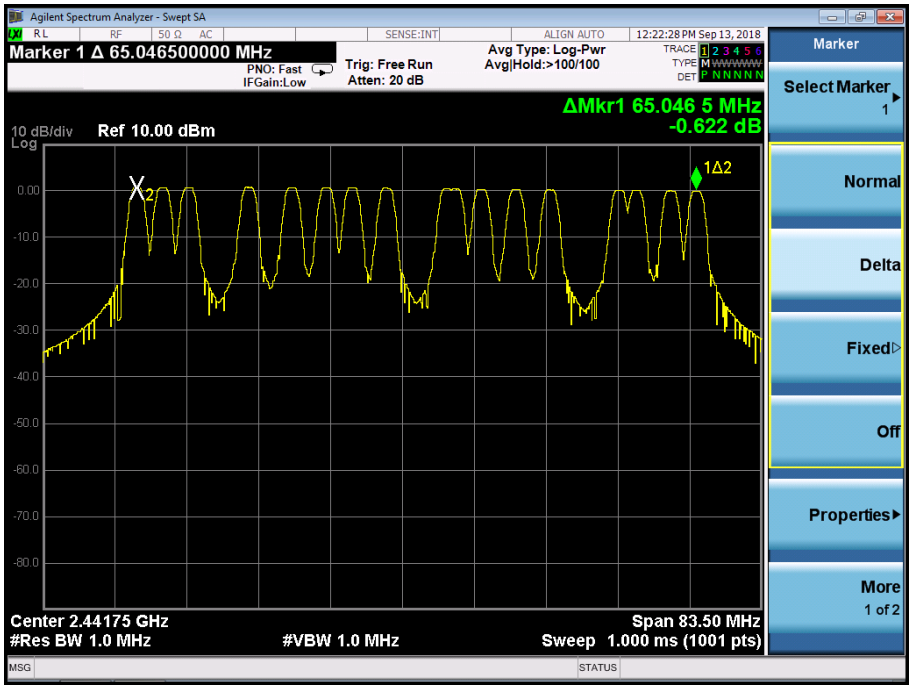
2. Set the spectrum analyzer: RBW = 100kHz. VBW = 300kHz. Sweep = auto; Detector Function = Peak. Trace = Max hold.

3. Allow the trace to stabilize. It may prove necessary to break the span up to sections. in order to clearly show all of the hopping frequencies. The limit is specified in one of the subparagraphs of this Section.

4. Set the spectrum analyzer: Start Frequency = 2.4GHz, Stop Frequency = 2.4835GHz. Sweep=auto;

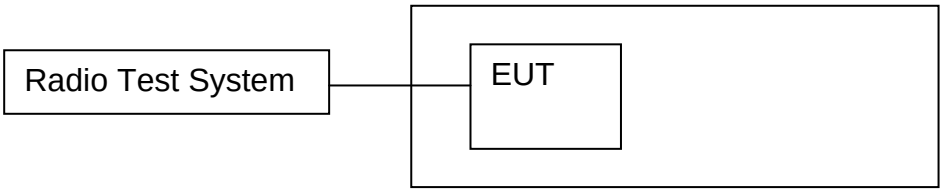
12.4 Test Result

Test Plots:
16 Channels in total
GFSK



13. DWELL TIME

13.1 Block Diagram Of Test Setup



13.2 Limit

Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

13.3 Test procedure

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

2. Set spectrum analyzer span = 0. Centred on a hopping channel;

3. Set RBW = 1MHz and VBW = 3MHz.Sweep = as necessary to capture the entire dwell time per hopping channel. Set the EUT for DH1 packet transmitting.

4. Use the marker-delta function to determine the dwell time. If this value varies with different modes of operation (e.g.. data rate. modulation format. etc.). repeat this test for each variation. The limit is specified in one of the subparagraphs of this Section. Submit this plot(s).

13.4 Test Result

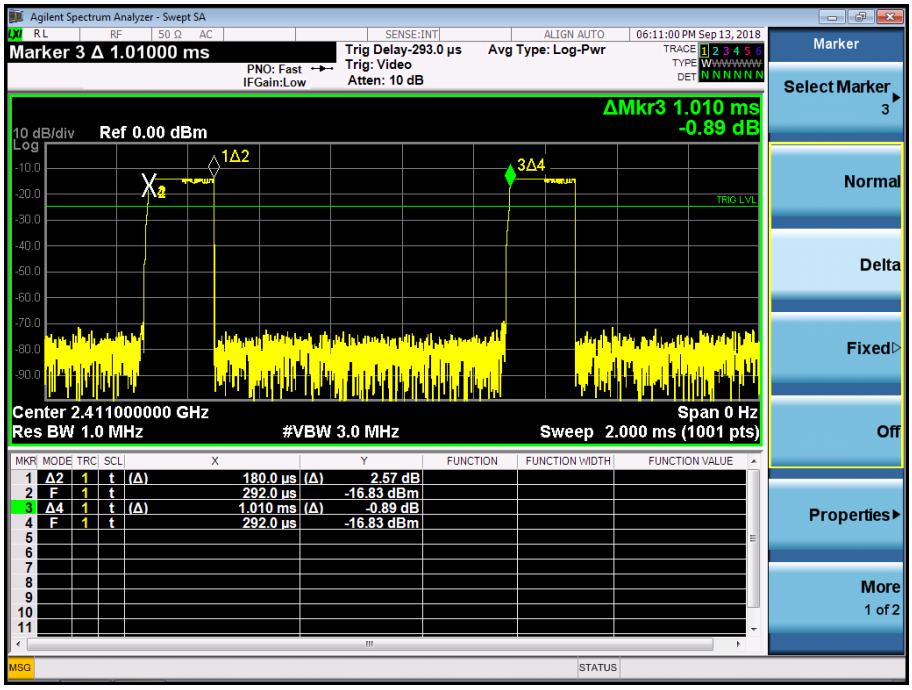
DH1 Packet permit maximum 1600 / 16 /2 hops per second in each channel (1 time slot RX, 1 time slot TX). So, the Dwell Time can be calculated as follows:

DH1:1600/16/2*0.4*16*(MkrDelta)/1000
Remark: Mkr Delta is once pulse time.

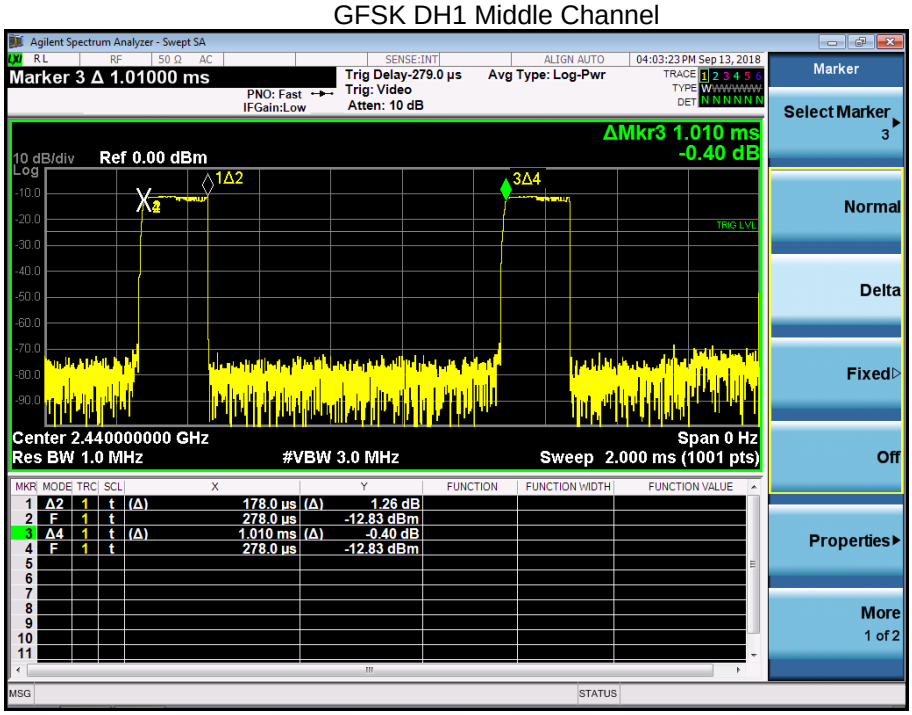
Modulation	Channel Data	Packet	pulse time(ms)	Dwell Time(s)	Limits(s)
GFSK	Low Channel	DH1	0.180	0.058	0.4
	Middle Channel	DH1	0.178	0.057	0.4
	High Channel	DH1	0.182	0.058	0.4

Test Plots

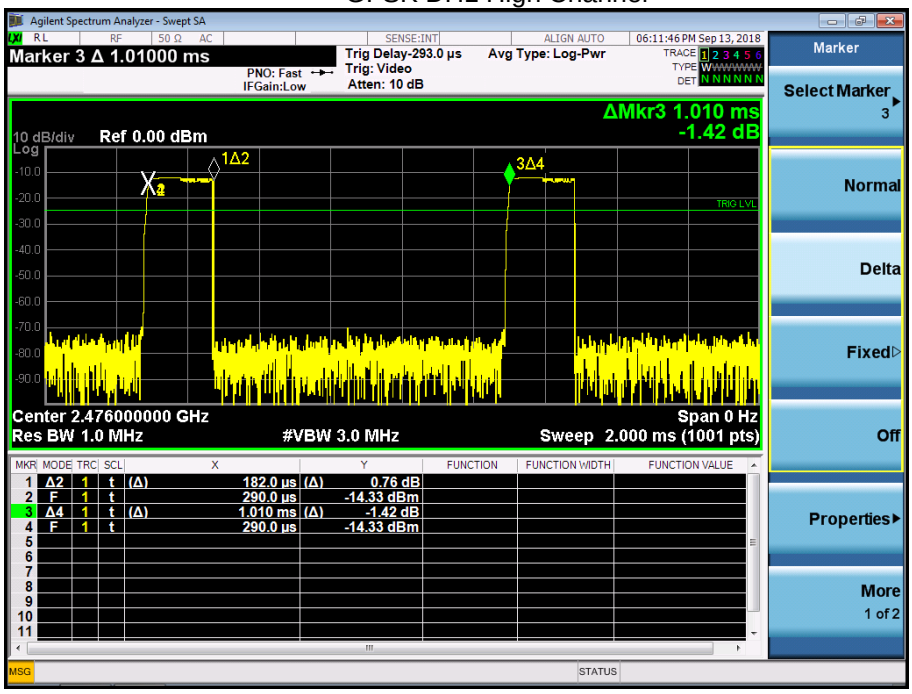
GFSK DH1 Low Channel



GFSK DH1 Middle Channel



GFSK DH1 High Channel



14. ANTENNA REQUIREMENT

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 replaced 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 §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 §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.

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.

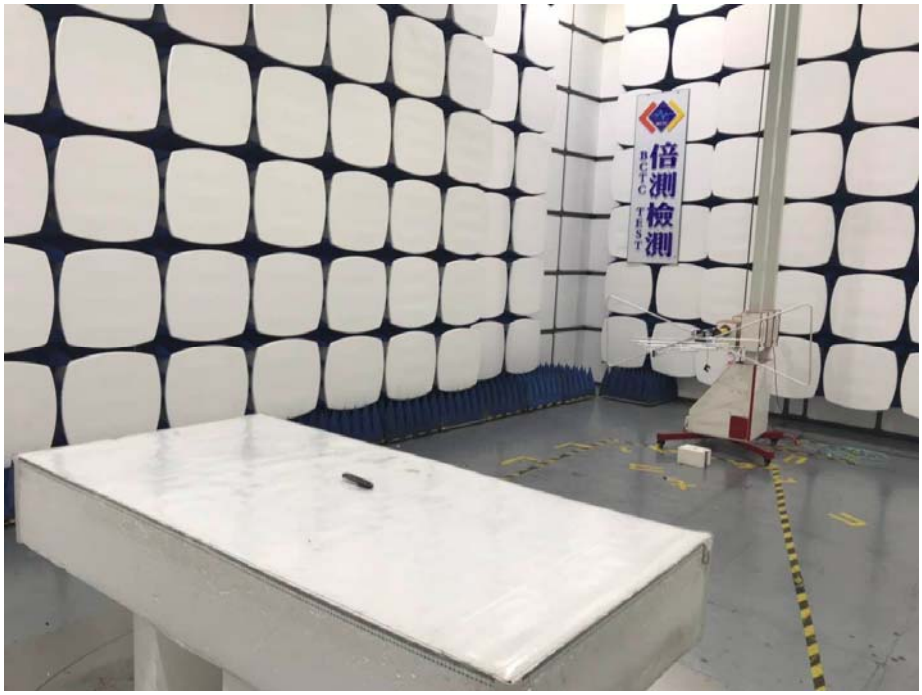
The EUT antenna is PCB Antenna, antenna Gain 0dBi, meets the requirements of FCC 15.203.

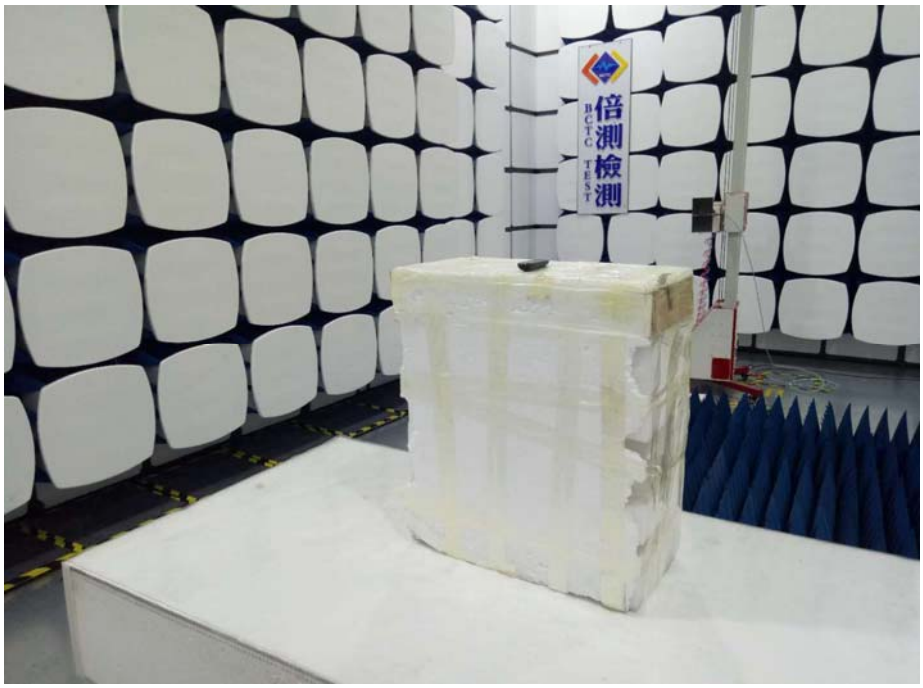
15. EUT PHOTOGRAPHS

EUT Photo 1

16. EUT TEST SETUP PHOTOGRAPHS

Spurious emissions





Conducted emissions

※※※※※ END OF REPORT ※※※※※