ACCREDITED
CERTIFICATE #5473.01

Test Report No.:
FCC2022-0045-RF2

TEST REPORT

FCC ID	:	2AWMK-BTP-2585NS
Applicant	:	Guangzhou Pinzhong Electronic Technology Co.,Ltd.
Product Name	:	BEITONG ASURA 2 GAME CONTROLLER MULTI-MODE
Mode No.	:	BTP-2585NS

CVC Testing Technology Co., Ltd.

Applicant	**Name:** Guangzhou Pinzhong Electronic Technology Co.,Ltd. **Address:** Room 611-612,Greenland Center of Financial city,No.662,Huangpu Avenue Middle Road.Tianhe District,Guangzhou City.
Manufacturer	**Name:** Guangzhou Pinzhong Electronic Technology Co.,Ltd. **Address:** Room 611-612,Greenland Center of Financial city,No.662,Huangpu Avenue Middle Road.Tianhe District,Guangzhou City.
Equipment Under Test	**Product Name :** BEITONG ASURA 2 GAME CONTROLLER MULTI-MODE **Model No. :** BTP-2585NS **Trade mark :** BEITONG **Serial no. :** — **Sampling :** 1-1

Date of Receipt.	**2022.08.15**	Date of Testing	**2022.08.16~2022.10.31**

Test Specification	**Test Result**
FCC CFR47 Part 15C (2020) Radio Frequency Devices ANSI C63.10 (2013) DA00-705 Filing and Frequency Measurement Guidelines For Frequency Hopping Spread Spectrum System (2000).	PASS

Evaluation of Test Result	The equipment under test was found to comply with the requirements of the standards applied. **Seal of CVC** **Issue Date: 2022.11.09**

Approved by:	Reviewed by:	Tested by:
Chen HuaWen	**Xu Zhenfei**	**Lu Weiji**

Other Aspects: NONE.

Abbreviations:OK, Pass= passed Fail = failed N/A= not applicable EUT= equipment, sample(s) under tested

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1. General Product Information

1.1 General information

Product Name	BEITONG ASURA 2 GAME CONTROLLER MULTI-MODE	
Model No.	BTP-2585NS	
Power Supply	DC 5V-600mA	
Serial Number(SN)	/	
Power Supply	Adapter	/
	Battery	/
Antenna Type	PCB Antenna	
Antenna Connector	A permanently attached antenna (meet with the standard FCC Part 15.203 requirement)	
Antenna Gain	1.5 dBi (provided by client)	
Frequency Range	2402MHz~2480MHz	
Bluetooth Version:	BT5.2	
Channel Number	79	
Type of Modulation	GFSK	
Hopping Channel Type:	Adaptive Frequency Hopping systems	
Max. Conducted Power	-7.88 dBm	
Operate Temp.Range	0°C to +85°C	

Note：
1. The information of the EUT is declared by the manufacturer.
2. The laboratory is not responsible for the product technical specification provided by the client.

2. Test Sites

2.1 Test Facilities

The tests and measurements refer to this report were performed by EMC testing Lab. of CVC Testing Technology Co., Ltd.

Add.: No.3, Tiantaiyi Road, Kaitai Avenue, Science City, Guangzhou,Guangdong,510663, People's Republic of China

Telephone : +86-20-32293888

Fax : +86-20-32293889

FCC(Test firm designation number：CN1282)

IC(Test firm CAB identifier number：CN0103)

2.2 Description of Non-standard Method and Deviations

The testing and measurement methods used in this report are applied by all standard methods. Not any non-standard method or deviation from the used standards was used.

2.3 List of Test and Measurement Instruments

Refer to **Appendix E**.

3. Test Configuration

3.1 Test Mode

The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application.

The radiated emission was measured in the following position: EUT stand-up position (Z axis), lie-down position (X, Y axis). The worst emission was found in lie-down position (X axis) and the worst case was recorded.

In order to find the worst case condition, Pre-tests are needed at the presence of different data rates and different channels. Preliminary tests have been done on all the configuration for confirming worst case. Data rate and channel below means worst-case rate of each test item.

Worst-case data rates and channels are shown as following table.

Test Mode	Antenna Delivery	Test Channel
DH1/DH3/DH5	1TX / 1RX	0,39,78,hop

Test Items	Test Modes	Teat Antennas	Test Channels
Conducted Emissions	DH5	Antenna 1	78
Radiated Emissions	DH5	Antenna 1	78
Radiated Emissions (Band Edge)	DH5	Antenna 1	0,78
Peak Power Output -Conducted	DH5	Antenna 1	0,39,78
20dB Emission Bandwidth	DH5	Antenna 1	0,39,78
Occupied Channel Bandwidth	DH5	Antenna 1	0,39,78
Frequency Separation	DH5	Antenna 1	hop
Time of Occupancy (Dwell Time)	DH1/DH3/DH5	Antenna 1	hop
Band Edge Compliance	DH5	Antenna 1	0,78
Number of Hopping Frequency	DH5	Antenna 1	hop
Spurious RF Conducted Emissions	DH5	Antenna 1	0,39,78

3.2 Duty cycle

TestMode	Antenna	Channel	Transmission Duration [ms]	Transmission Period [ms]	Duty Cycle [%]	Limit	Verdict
DH5	Ant1	2402	50.00	50.00	100.00	---	PASS
	Ant1	2441	50.00	50.00	100.00	---	PASS
	Ant1	2480	50.00	50.00	100.00	---	PASS

4. Summary of measurement results

Summary of measurements of results	Clause in FCC rules	Verdict	Note
Conducted Emissions	15.207	PASS	/
Radiated Emissions	15.247(d),15.205,15.209	PASS	/
Peak Power Output -Conducted	15.247(b)(1)	PASS	/
20dB Emission Bandwidth	15.247(a)(1)	PASS	/
Occupied Channel Bandwidth	15.247(a)(1)	PASS	/
Frequency Separation	15.247(a)(1)	PASS	/
Time of Occupancy (Dwell Time)	15.247(a)(1)(iii)	PASS	/
Band Edge Compliance	15.247(d)	PASS	/
Number of Hopping Frequency	15.247(a)(1)(iii)	PASS	/
Spurious RF Conducted Emissions	15.247(d)	PASS	/

5. Measurement procedure

5.1 Conducted Emission

Ambient condition:

Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

Method of Measurement:

The EUT was setup according to ANSI C63.10, 2013 for compliance to FCC 47CFR 15.247 requirements. The EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The vertical conducting plane was located 40 cm to the rear of the EUT. All other surfaces of EUT were at least 80 cm from any other grounded conducting surface. The EUT and simulators are connected to the main power through a line impedance stabilization network (LISN). The LISN provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN. (Please refer to the block diagram of the test setup and photographs) Each current-carrying conductor of the EUT power cord, except the ground (safety) conductor, was individually connected through a LISN to the input power source.

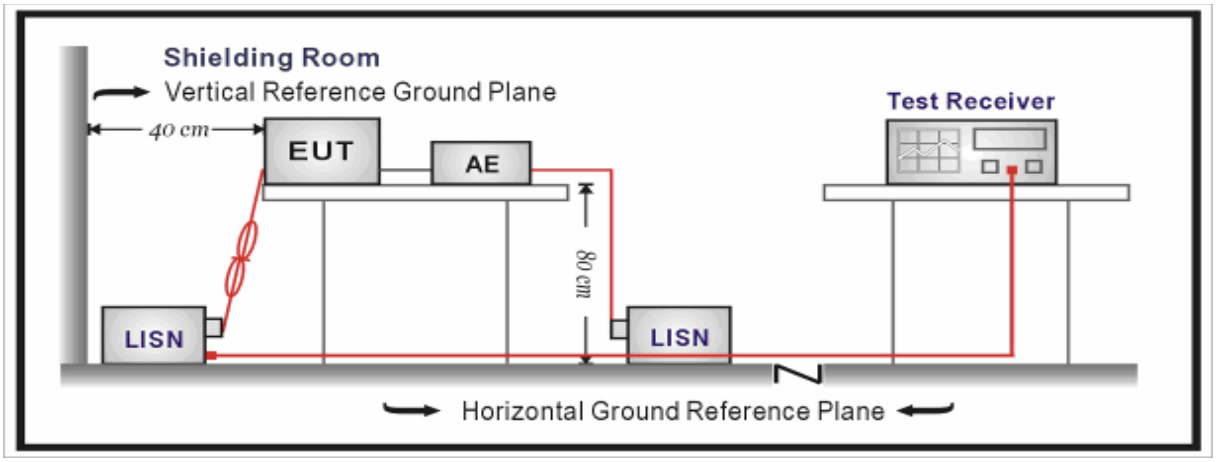
The excess length of the power cord between the EUT and the LISN receptacle were folded back and forth at the center of the lead to form a bundle not exceeding 40 cm in length.

Conducted emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9 kHz.

Limits:

Frequency (MHz)	Conducted Limits(dBμV)	
	Quasi-peak	Average
0.15 - 0.5	66 to 56 *	56 to 46*
0.5 - 5	56	46
5 - 30	60	50
Note 1: The lower limit shall apply at the transition frequencies. Note 2: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.		

Test Setup:



Measurement Data

An initial pre-scan was performed on the live and neutral lines with peak detector.

Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission were detected.

Notes:

1. The following Quasi-Peak and Average measurements were performed on the EUT:

2. Final Level =Reading + Factor.

Measurement Uncertainty：

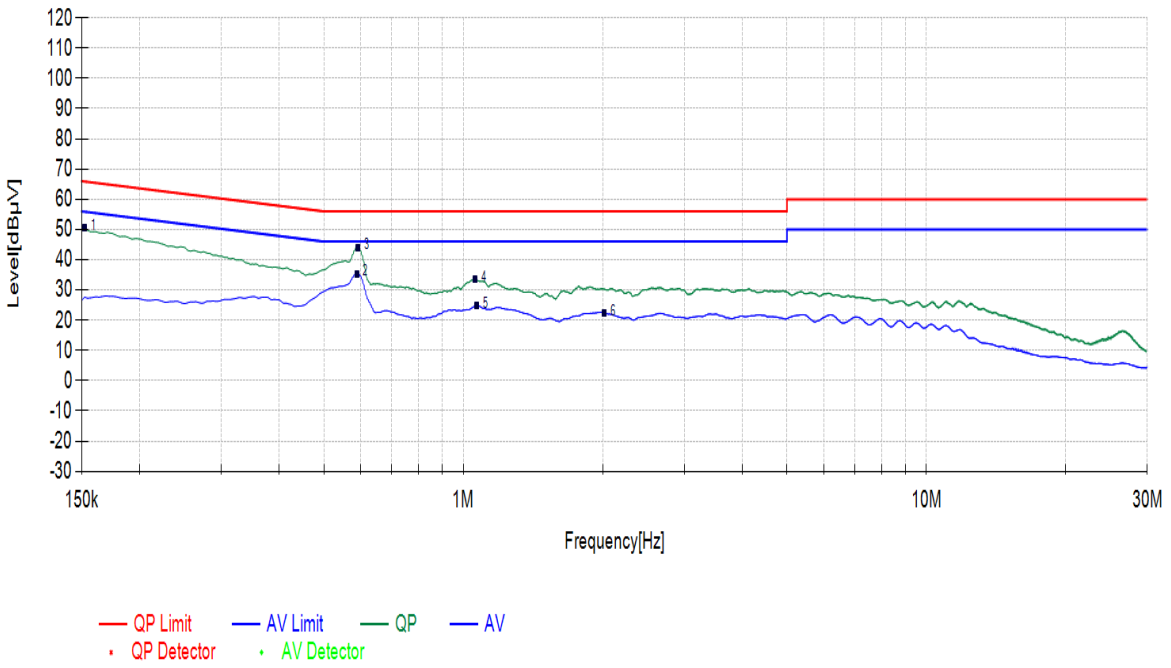
The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor k = 1.96. U= 3.12 dB.

Test Results:

During the test, the Conducted Emission from 150KHz to 30MHz was performed in all modes with all channels, and all antenna. BT:DH5, Channel 78, antenna 1 are selected as the worst condition. The test data of the worst-case condition was recorded in this report.

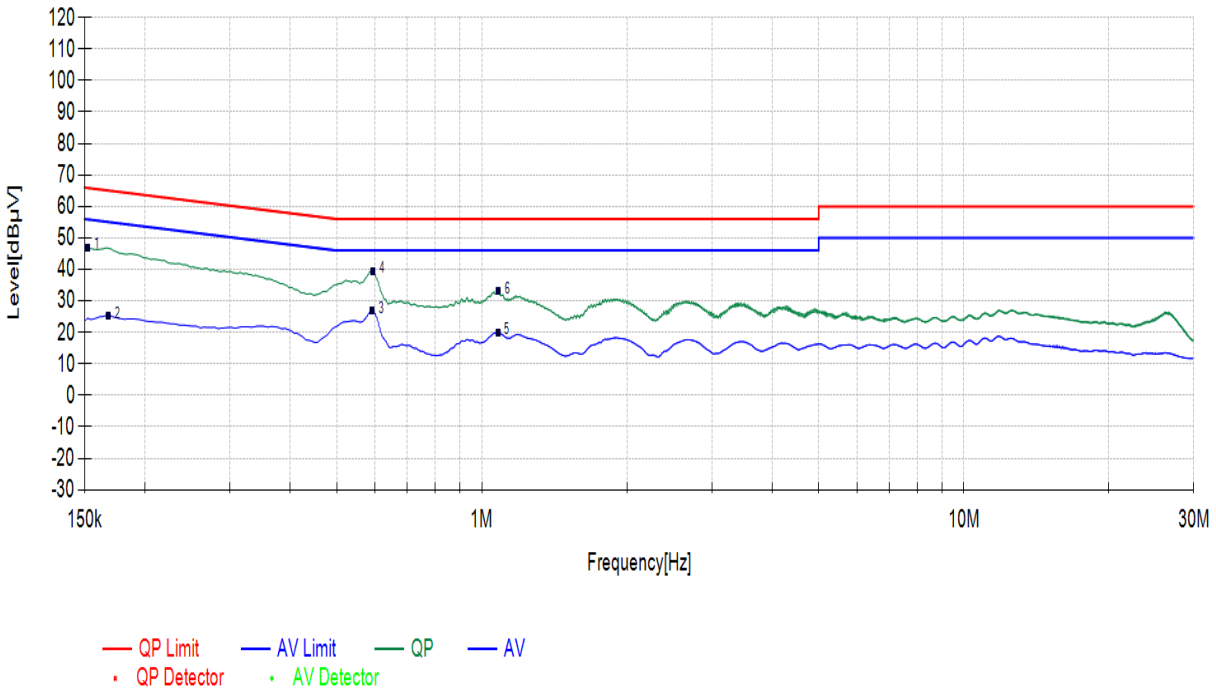
Power Line	L
Test channel	Worst-Case

Suspected List								
NO.	Freq. [MHz]	Factor [dB]	Reading [dBμV]	Level [dBμV]	Limit [dBμV]	Margin [dB]	Detector	Pass/Fail
1	0.1523	10.17	40.42	50.59	65.88	15.29	QP	PASS
4	1.0613	10.19	23.16	33.35	56.00	22.65	QP	PASS
3	0.5933	10.17	33.85	44.02	56.00	11.98	QP	PASS
2	0.5888	10.17	25.22	35.39	46.00	10.61	AV	PASS
5	1.0703	10.19	14.67	24.86	46.00	21.14	AV	PASS
6	2.0175	10.21	12.17	22.38	46.00	23.62	AV	PASS



Power Line	N
Test channel	Worst-Case

Suspected List								
NO.	Freq. [MHz]	Factor [dB]	Reading [dBµV]	Level [dBµV]	Limit [dBµV]	Margin [dB]	Detector	Pass/Fail
6	1.0838	10.19	22.84	33.03	56.00	22.97	QP	PASS
4	0.5955	10.17	29.39	39.56	56.00	16.44	QP	PASS
1	0.1523	10.16	36.75	46.91	65.88	18.97	QP	PASS
2	0.1680	10.15	15.16	25.31	55.06	29.75	AV	PASS
5	1.0815	10.19	9.81	20.00	46.00	26.00	AV	PASS
3	0.5933	10.17	16.61	26.78	46.00	19.22	AV	PASS



5.2 Radiated Emission

Ambient condition:

Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

Method of Measurement:

The EUT was setup and tested according to ANSI C63.10, 2013.

The EUT is placed on a turn table which is 1.5 meter above ground. The turn table is rotated 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from Antenna to the EUT was 3 meters.

The Antenna is scanned from 1 meter to 4 meters to find out the maximum emission level. This is repeated for both horizontal and vertical polarization of the Antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10:2013 on radiated measurement.

The resolution bandwidth below 1GHz setting on the field strength meter is 120 kHz and above 1GHz is 1MHz.

The frequency range from 30MHz to 10th harmonic is checked.

Note: When doing emission measurement above 1GHz, the horn Antenna will be bended down a little (as horn

Antenna has the narrow beamwidth) in order to keeping the Antenna in the “cone of radiation” of EUT. The 3dB beamwidth is 10~60 degrees for H-plane and 10~90 degrees for E-plane.

Limits:

Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a) of FCC part 15, must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

Frequency	Limit (μV/m)	Limit (dBμV/m @3m)	Remark
0.009MHz-0.490MHz	2400/F(kHz)@300m	/	Quasi-peak Level
0.490MHz~1.705MHz	24000/F(kHz)@30m	/	Quasi-peak Level
1.705MHz~30.0MHz	30@30m	/	Quasi-peak Level

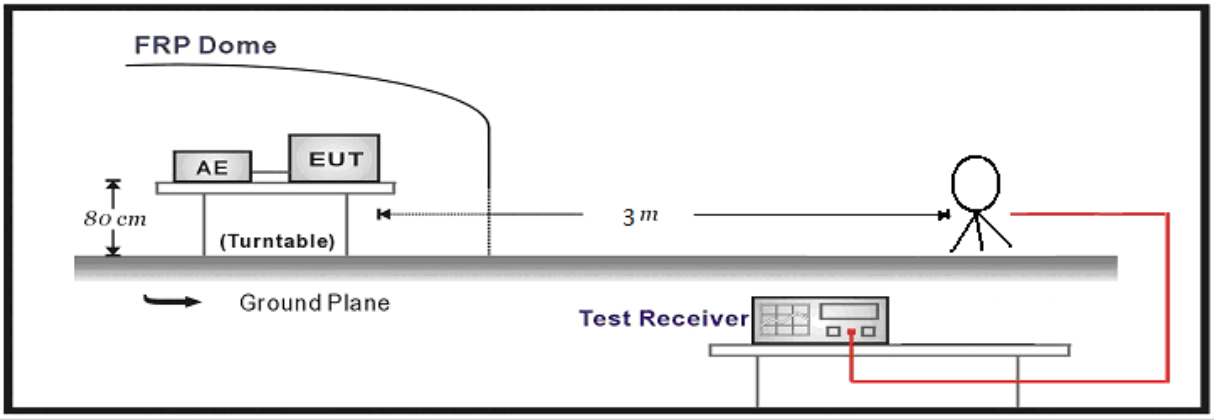
30MHz-88MHz	100@3m	40.0	Quasi-peak Level
88MHz-216MHz	150@3m	43.5	Quasi-peak Level
216MHz-960MHz	200@3m	46.0	Quasi-peak Level
960MHz-1GHz	500@3m	54.0	Quasi-peak Level
Above 1GHz	500@3m	54.0	Average Level
	5000@3m	74.0	Peak Level

Spurious Radiated Emissions are permitted in any of the frequency bands listed below:

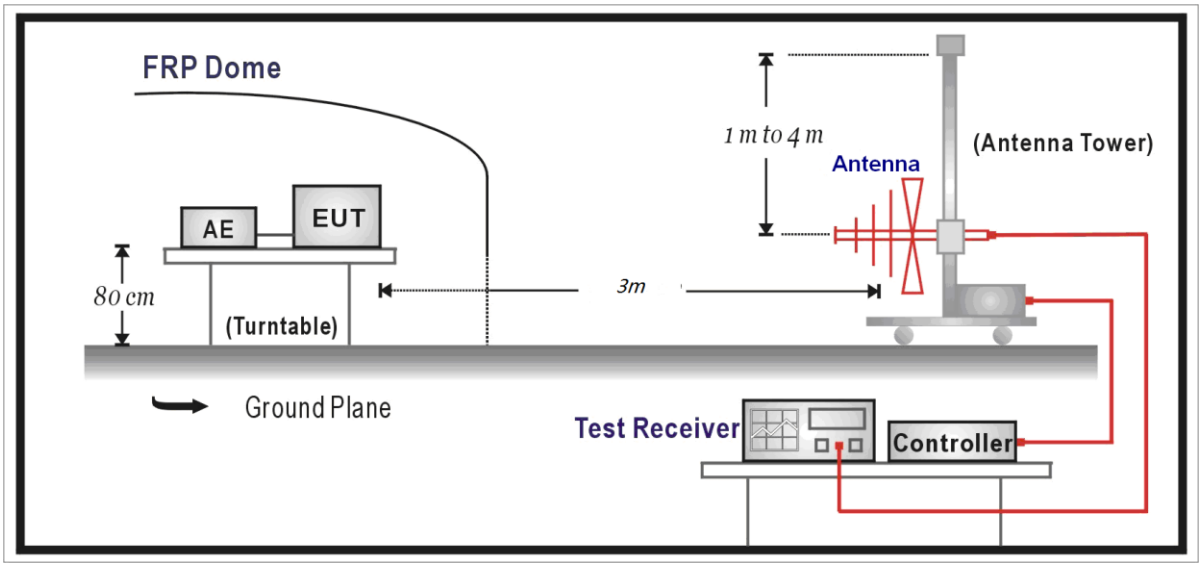
MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.
12.57675-12.57725	322-335.4	3600-4400	/
13.36-13.41	/	/	/

Test Setup:

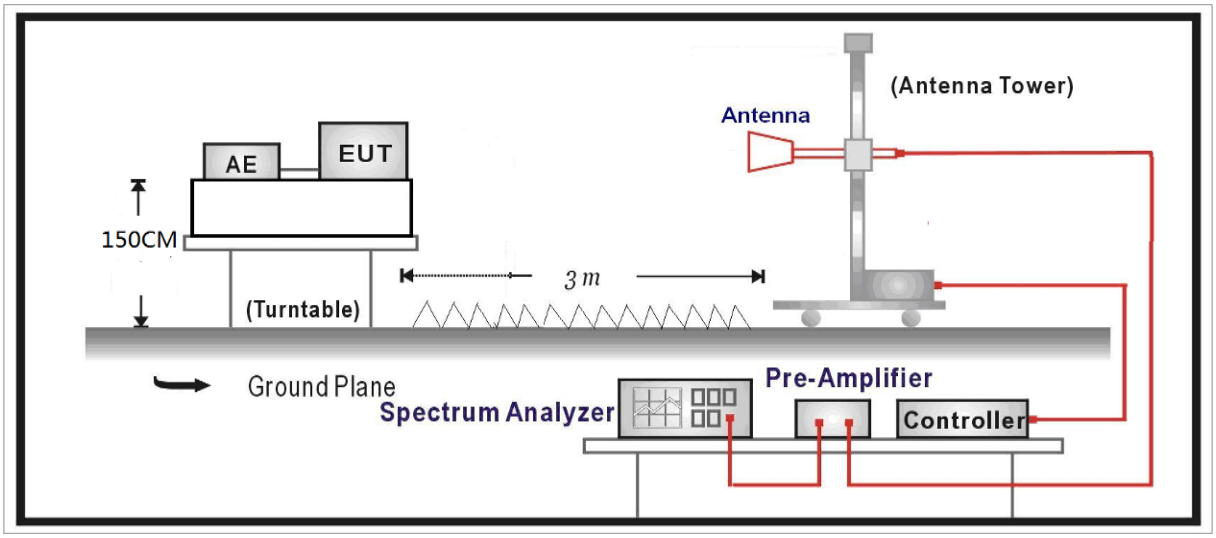
Below 30MHz Test Setup:



Below 1GHz Test Setup:



Above 1GHz Test Setup:



Measurement Data：

The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

Final Level =Reading - Factor

Factor = Preamplifier Factor – Antenna Factor–Cable Loss

Measurement Uncertainty：

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor k = 1.96.

Frequency	Uncertainty
9KHz-30MHz	3.55 dB
30MHz-200MHz	4.19 dB
200MHz-1GHz	3.63 dB
Above 1GHz	3.68 dB

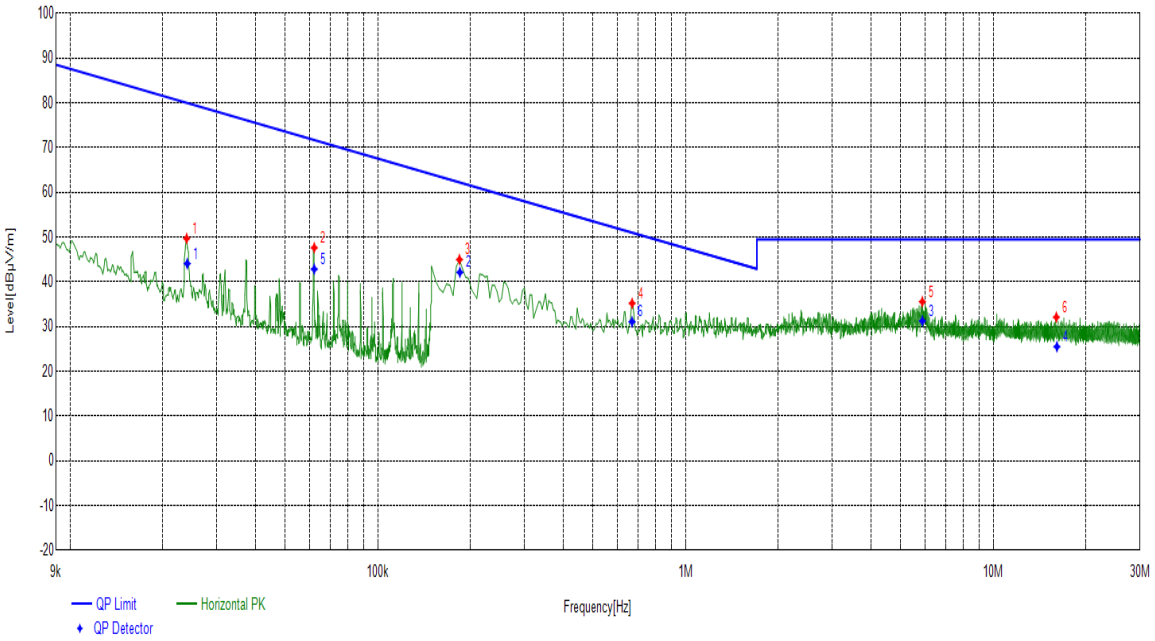
Test Results:

During the test, the Radiates Emission from 9KHz to 40GHz was performed in all modes with all channels, and all antenna, BT: DH5, Channel 78, antenna 1, X axis are selected as the worst condition. The test data of the worst-case condition was recorded in this report.

SPURIOUS EMISSIONS:

Radiated Emission	9KHz-30MHz
Polarity	X axis
Test channel	Worst-Case

Final Data List								
Frequency [MHz]	Polarity	Factor [dB]	QP Value [dBμV/m]	QP Limit [dBμV/m]	QP Margin [dB]	Height [cm]	Angle [°]	Pass/Fail
0.0240	X axis	20.74	44.06	79.95	35.89	100	360	PASS
0.1847	X axis	20.37	42.12	62.20	20.08	100	0	PASS
5.8829	X axis	20.98	31.25	49.50	18.25	100	5	PASS
16.1012	X axis	21.21	25.51	49.50	23.99	100	19	PASS
0.0621	X axis	20.55	42.83	71.68	28.85	100	63	PASS
0.6700	X axis	20.41	31.08	50.99	19.91	100	207	PASS

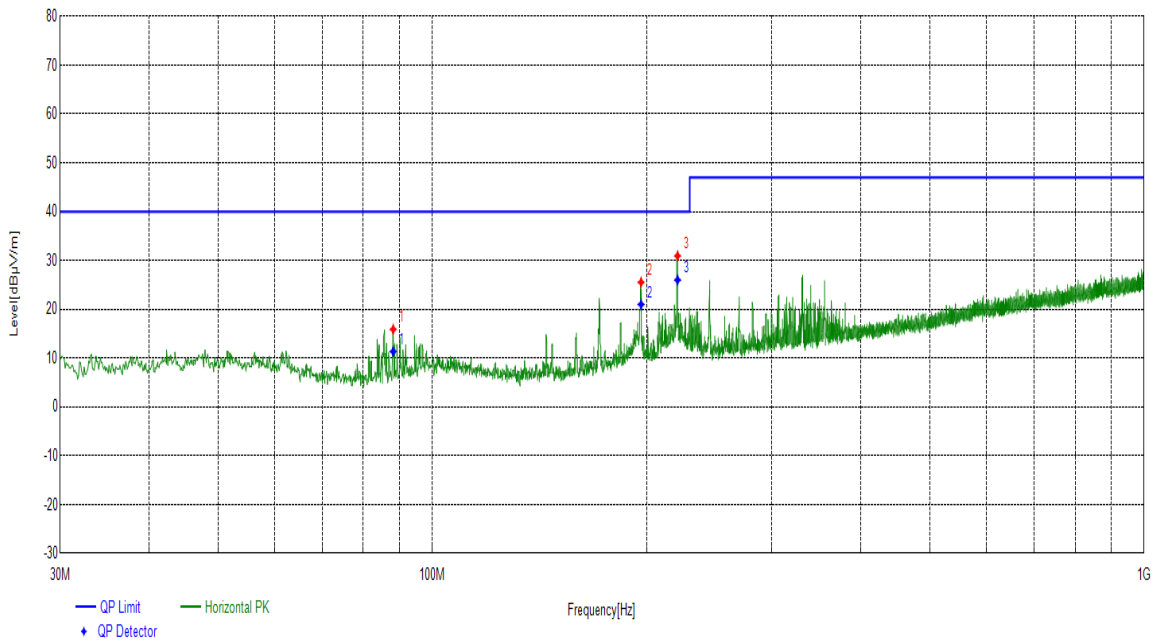


Radiates Emission	30M~1G
Test channel	Worst-Case

Suspected List										
Frequency [MHz]	Polarity	Factor [dB]	Reading [dBμV/m]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Detector	Height [cm]	Angle deg	Pass/Fail
88.1088	Horizontal	9.67	6.21	15.88	40.00	24.12	PK	100	4	PASS
196.4686	Horizontal	12.84	12.68	25.52	40.00	14.48	PK	100	174	PASS
221.1091	Horizontal	13.45	17.48	30.93	40.00	9.07	PK	100	167	PASS

Final Data List								
Frequency [MHz]	Polarity	Factor [dB]	QP Value [dBμV/m]	QP Limit [dBμV/m]	QP Margin [dB]	Height [cm]	Angle [°]	Pass/Fail
88.1088	Horizontal	9.67	11.35	40.00	28.65	107	4	PASS
196.4686	Horizontal	12.84	20.99	40.00	19.01	119	174	PASS
221.1091	Horizontal	13.45	25.99	40.00	14.01	121	167	PASS

TRACE

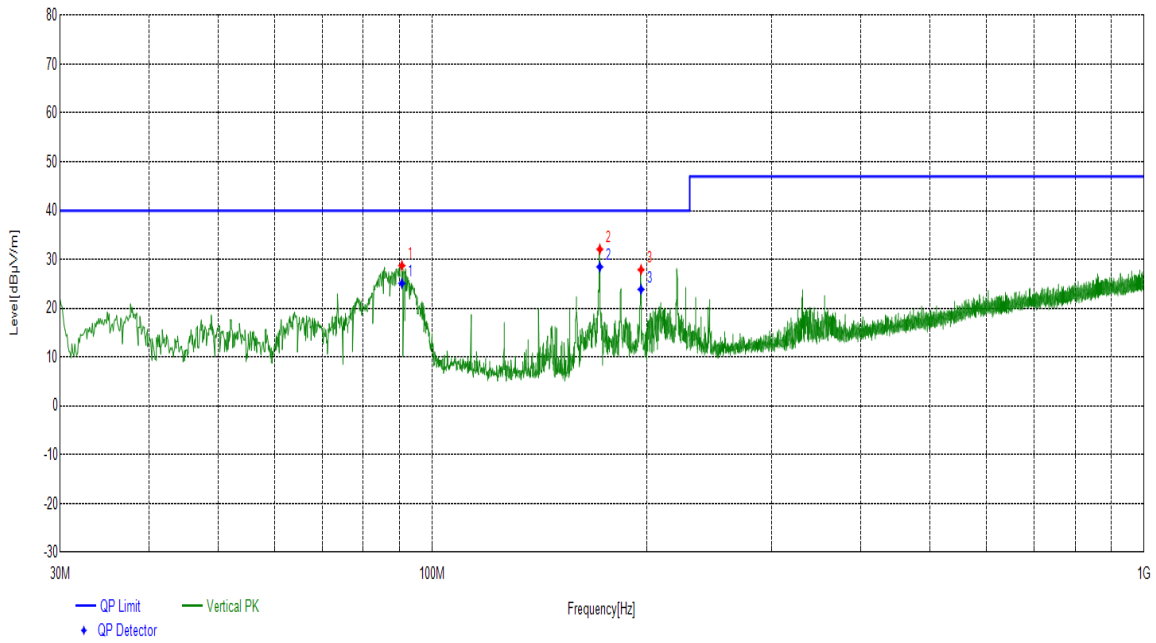


Radiates Emission	30M~1G
Test channel	Worst-Case

Suspected List										
Frequency [MHz]	Polarity	Factor [dB]	Reading [dBµV/m]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Detector	Height [cm]	Angle deg	Pass/Fail
90.6311	Vertical	10.01	18.71	28.72	40.00	11.28	PK	100	147	PASS
171.9252	Vertical	11.02	21.06	32.08	40.00	7.92	PK	100	60	PASS
196.4686	Vertical	12.84	15.05	27.89	40.00	12.11	PK	100	120	PASS

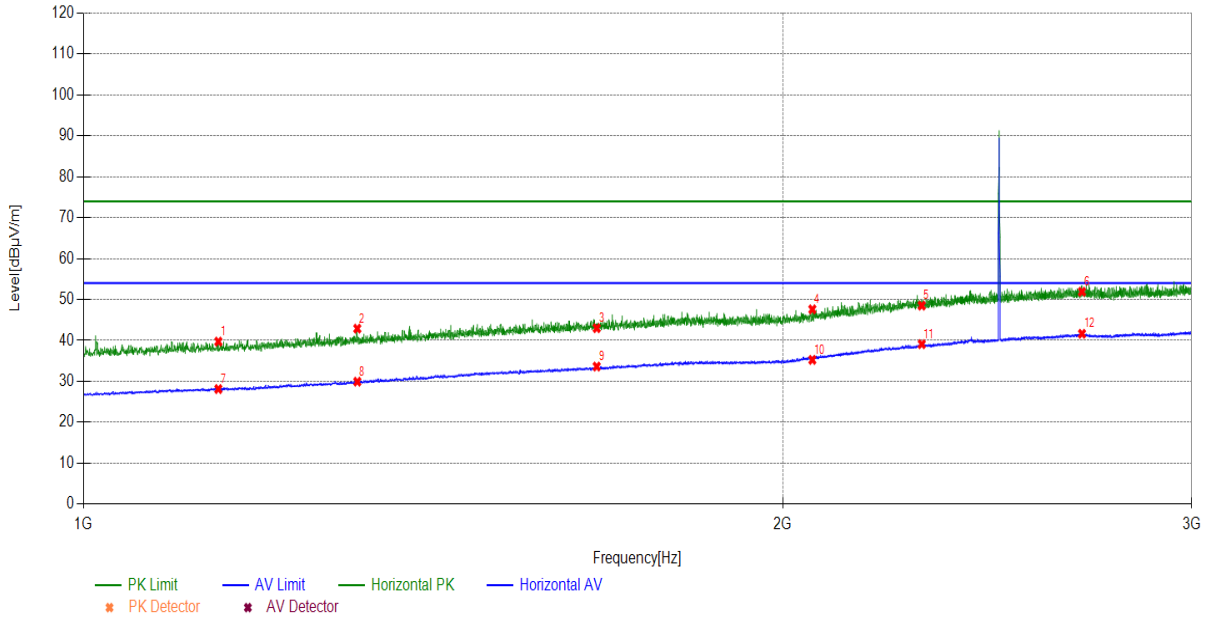
Final Data List								
Frequency [MHz]	Polarity	Factor [dB]	QP Value [dBµV/m]	QP Limit [dBµV/m]	QP Margin [dB]	Height [cm]	Angle [°]	Pass/Fail
90.6311	Vertical	10.01	25.10	40.00	14.90	127	147	PASS
171.9252	Vertical	11.02	28.46	40.00	11.54	106	60	PASS
196.4686	Vertical	12.84	23.86	40.00	16.14	115	120	PASS

TRACE



Radiates Emission	1G~3G
Test channel	Worst-Case

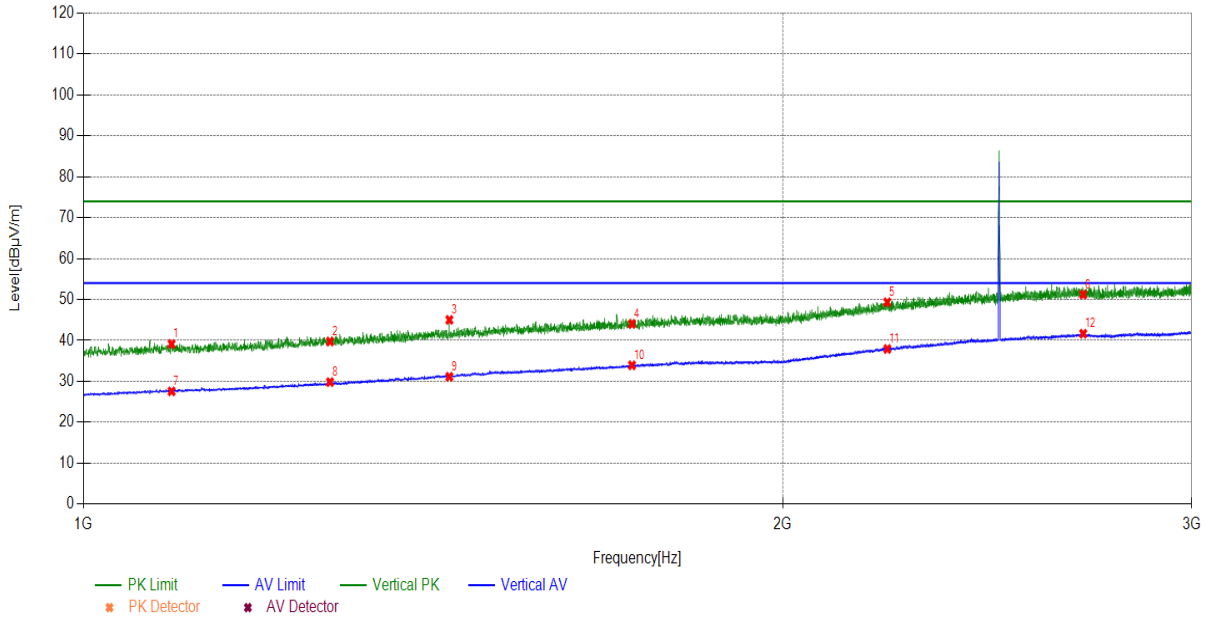
Suspected List										
Frequency [MHz]	Polarity	Factor [dB]	Reading [dBμV/m]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Detector	Height [cm]	Angle deg	Pass/Fail
1143.01	Horizont	27.41	12.32	39.73	74.00	34.27	PK	150	112	PASS
1311.83	Horizont	28.98	13.93	42.91	74.00	31.09	PK	150	281	PASS
1663.26	Horizont	31.98	11.03	43.01	74.00	30.99	PK	150	306	PASS
2059.70	Horizont	33.83	13.78	47.61	74.00	26.39	PK	150	26	PASS
2295.72	Horizont	36.40	12.12	48.52	74.00	25.48	PK	150	172	PASS
2690.96	Horizont	38.46	13.45	51.91	74.00	22.09	PK	150	318	PASS
1143.01	Horizont	27.41	0.73	28.14	54.00	25.86	AV	150	281	PASS
1311.83	Horizont	28.98	0.96	29.94	54.00	24.06	AV	150	160	PASS
1663.26	Horizont	31.98	1.65	33.63	54.00	20.37	AV	150	209	PASS
2059.70	Horizont	33.83	1.44	35.27	54.00	18.73	AV	150	209	PASS
2295.72	Horizont	36.40	2.71	39.11	54.00	14.89	AV	150	294	PASS
2690.96	Horizont	38.46	3.19	41.65	54.00	12.35	AV	150	318	PASS



Note: The signal beyond the limit is carrier

Radiates Emission	1G~3G
Test channel	Worst-Case

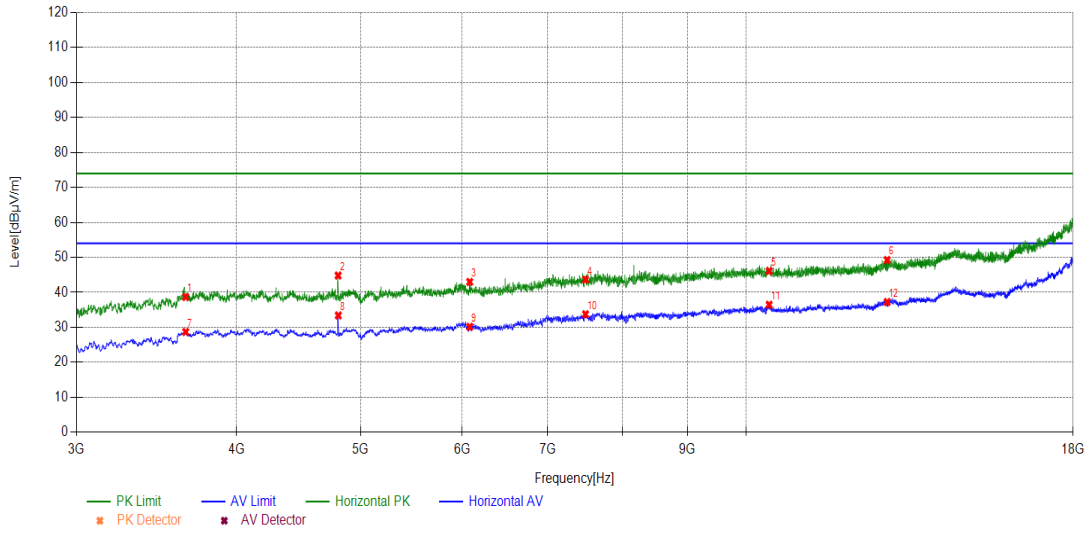
Suspected List										
Frequency [MHz]	Polarity	Factor [dB]	Reading [dBμV/m]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Detector	Height [cm]	Angle deg	Pass/Fail
1091.20	Vertical	26.96	12.17	39.13	74.00	34.87	PK	150	215	PASS
1276.82	Vertical	28.65	11.10	39.75	74.00	34.25	PK	150	94	PASS
1437.24	Vertical	30.24	14.80	45.04	74.00	28.96	PK	150	191	PASS
1722.47	Vertical	32.43	11.62	44.05	74.00	29.95	PK	150	358	PASS
2218.52	Vertical	35.71	13.65	49.36	74.00	24.64	PK	150	33	PASS
2694.36	Vertical	38.47	12.77	51.24	74.00	22.76	PK	150	350	PASS
1091.20	Vertical	26.96	0.60	27.56	54.00	26.44	AV	150	131	PASS
1276.82	Vertical	28.65	1.18	29.83	54.00	24.17	AV	150	8	PASS
1437.24	Vertical	30.24	0.91	31.15	54.00	22.85	AV	150	8	PASS
1722.47	Vertical	32.43	1.51	33.94	54.00	20.06	AV	150	131	PASS
2218.72	Vertical	35.71	2.22	37.93	54.00	16.07	AV	150	179	PASS
2694.36	Vertical	38.47	3.20	41.67	54.00	12.33	AV	150	358	PASS



Note: The signal beyond the limit is carrier

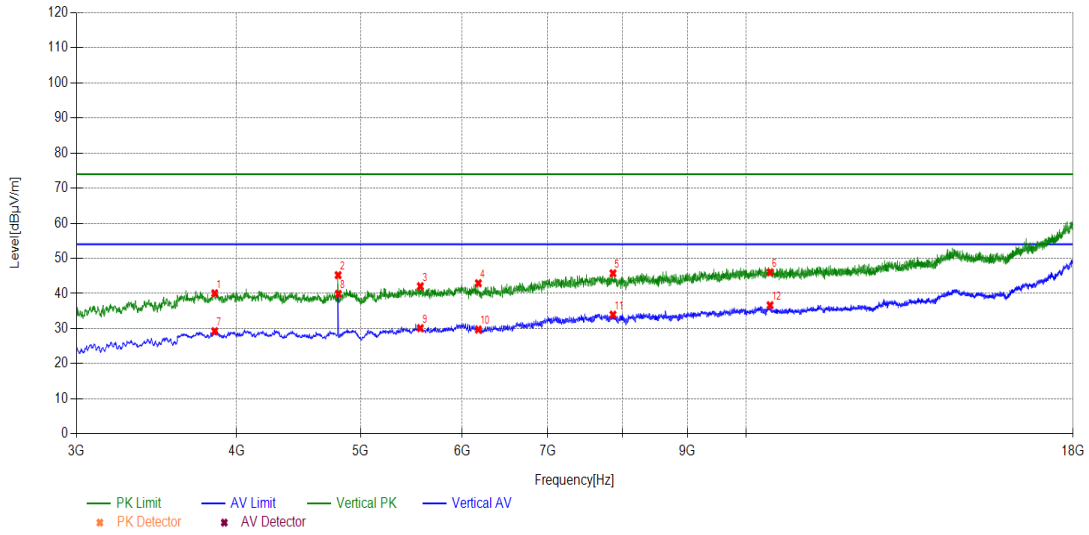
Radiates Emission	3G~18G
Test channel	Worst-Case

Suspected List										
Frequency [MHz]	Polarity	Factor [dB]	Reading [dBµV/m]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Detector	Height [cm]	Angle deg	Pass/Fail
3650.5651	Horizont	0.43	38.25	38.68	74.00	35.32	PK	150	311	PASS
4801.5802	Horizont	2.03	42.80	44.83	74.00	29.17	PK	150	326	PASS
6083.5084	Horizont	6.20	36.79	42.99	74.00	31.01	PK	150	247	PASS
7491.2491	Horizont	8.73	34.93	43.66	74.00	30.34	PK	150	92	PASS
10422.3422	Horizont	12.86	33.25	46.11	74.00	27.89	PK	150	215	PASS
12884.1884	Horizont	14.46	34.80	49.26	74.00	24.74	PK	150	13	PASS
3650.5651	Horizont	0.43	28.28	28.71	54.00	25.29	AV	150	8	PASS
4803.2803	Horizont	2.04	31.38	33.42	54.00	20.58	AV	150	348	PASS
6083.5084	Horizont	6.20	23.97	30.17	54.00	23.83	AV	150	23	PASS
7491.2491	Horizont	8.73	25.02	33.75	54.00	20.25	AV	150	2	PASS
10422.3422	Horizont	12.86	23.62	36.48	54.00	17.52	AV	150	2	PASS
12884.1884	Horizont	14.46	22.79	37.25	54.00	16.75	AV	150	3	PASS



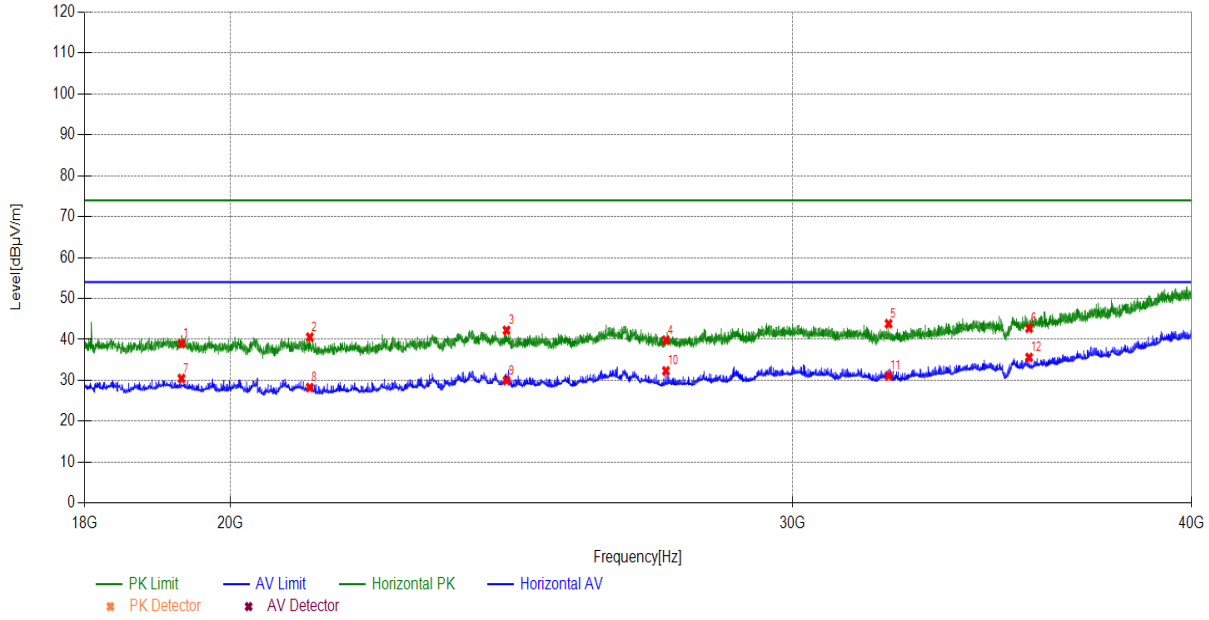
Radiates Emission	3G~18G
Test channel	Worst-Case

Suspected List										
Frequency [MHz]	Polarity	Factor [dB]	Reading [dBμV/m]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Detector	Height [cm]	Angle deg	Pass/Fail
3846.08	Vertical	0.95	39.11	40.06	74.00	33.94	PK	150	280	PASS
4801.58	Vertical	2.03	43.21	45.24	74.00	28.76	PK	150	280	PASS
5566.65	Vertical	4.62	37.45	42.07	74.00	31.93	PK	150	360	PASS
6178.71	Vertical	6.25	36.68	42.93	74.00	31.07	PK	150	360	PASS
7870.38	Vertical	8.95	36.80	45.75	74.00	28.25	PK	150	213	PASS
10439.3	Vertical	12.84	33.19	46.03	74.00	27.97	PK	150	129	PASS
3846.08	Vertical	0.95	28.33	29.28	54.00	24.72	AV	150	2	PASS
4803.28	Vertical	2.04	37.85	39.89	54.00	14.11	AV	150	3	PASS
5566.65	Vertical	4.62	25.51	30.13	54.00	23.87	AV	150	2	PASS
6178.71	Vertical	6.25	23.50	29.75	54.00	24.25	AV	150	83	PASS
7870.38	Vertical	8.95	25.03	33.98	54.00	20.02	AV	150	8	PASS
10439.3	Vertical	12.84	23.83	36.67	54.00	17.33	AV	150	2	PASS



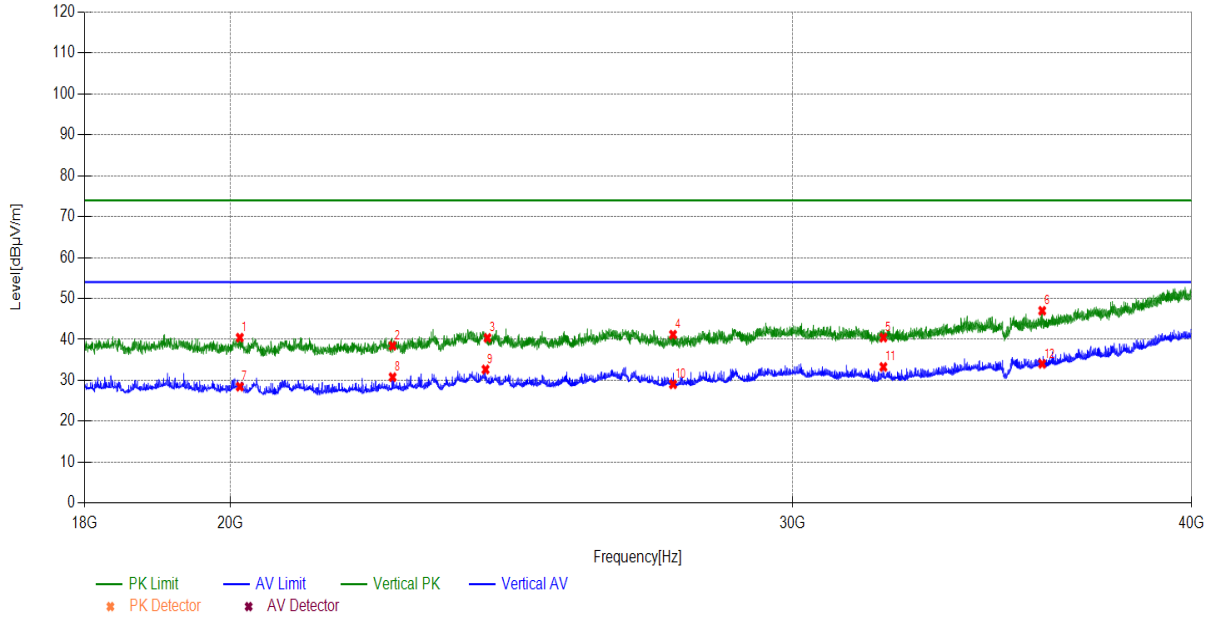
Radiates Emission	18G~40G
Test channel	Worst-Case

Suspected List										
Frequency [MHz]	Polarity	Factor [dB]	Reading [dBµV/m]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Detector	Height [cm]	Angle deg	Pass/Fail
19304.7305	Horizontal	1.33	37.67	39.00	74.00	35.00	PK	150	90	PASS
21177.1177	Horizontal	1.69	38.89	40.58	74.00	33.42	PK	150	80	PASS
24404.8405	Horizontal	3.86	38.38	42.24	74.00	31.76	PK	150	350	PASS
27377.3377	Horizontal	5.09	34.74	39.83	74.00	34.17	PK	150	250	PASS
32145.2145	Horizontal	5.96	37.91	43.87	74.00	30.13	PK	150	230	PASS
35575.3575	Horizontal	7.26	35.51	42.77	74.00	31.23	PK	150	160	PASS
19304.7305	Horizontal	1.33	29.16	30.49	54.00	23.51	AV	150	10	PASS
21177.1177	Horizontal	1.69	26.57	28.26	54.00	25.74	AV	150	210	PASS
24404.8405	Horizontal	3.86	26.11	29.97	54.00	24.03	AV	150	310	PASS
27377.3377	Horizontal	5.09	27.25	32.34	54.00	21.66	AV	150	10	PASS
32145.2145	Horizontal	5.96	25.18	31.14	54.00	22.86	AV	150	10	PASS
35575.3575	Horizontal	7.26	28.36	35.62	54.00	18.38	AV	150	10	PASS



Radiates Emission	18G~40G
Test channel	Worst-Case

Suspected List										
Frequency [MHz]	Polarity	Factor [dB]	Reading [dBμV/m]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Detector	Height [cm]	Angle deg	Pass/Fail
20134.2134	Vertical	1.35	39.09	40.44	74.00	33.56	PK	150	130	PASS
22479.6480	Vertical	2.38	36.09	38.47	74.00	35.53	PK	150	80	PASS
24072.6073	Vertical	3.73	36.65	40.38	74.00	33.62	PK	150	250	PASS
27518.1518	Vertical	5.16	36.03	41.19	74.00	32.81	PK	150	180	PASS
32026.4026	Vertical	5.91	34.56	40.47	74.00	33.53	PK	150	10	PASS
35911.9912	Vertical	7.53	39.48	47.01	74.00	26.99	PK	150	300	PASS
20134.2134	Vertical	1.35	27.13	28.48	54.00	25.52	AV	150	350	PASS
22479.6480	Vertical	2.38	28.43	30.81	54.00	23.19	AV	150	10	PASS
24037.4037	Vertical	3.71	28.96	32.67	54.00	21.33	AV	150	10	PASS
27518.1518	Vertical	5.16	23.89	29.05	54.00	24.95	AV	150	270	PASS
32026.4026	Vertical	5.91	27.38	33.29	54.00	20.71	AV	150	10	PASS
35911.9912	Vertical	7.53	26.51	34.04	54.00	19.96	AV	150	150	PASS

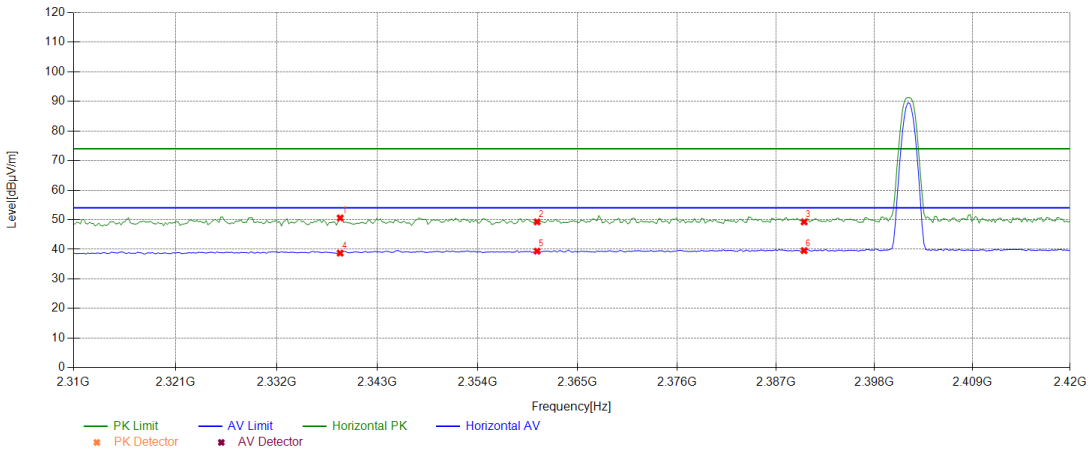


Band Edge：

Test mode	DH5
Test channel	LOW channel

Suspected List

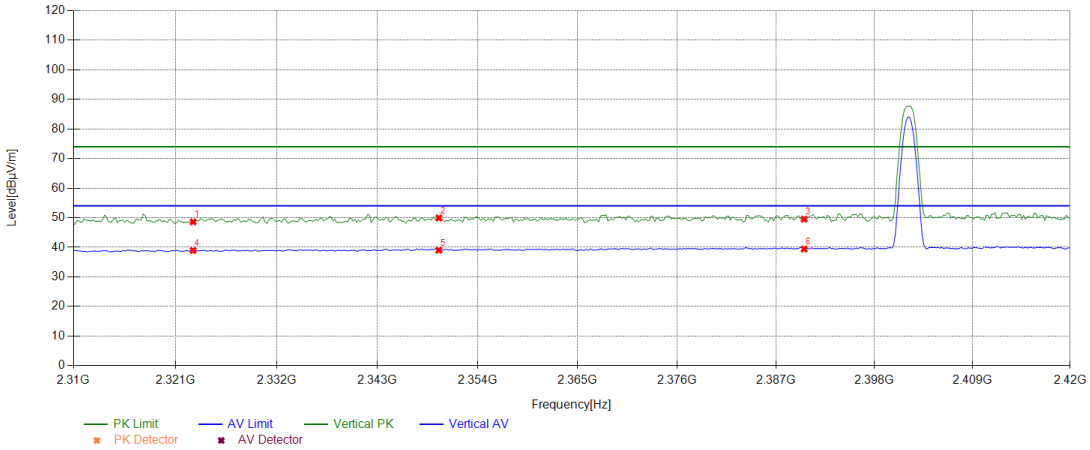
Frequency [MHz]	Polarity	Factor [dB]	Reading [dBμV/m]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Detector	Height [cm]	Angle deg	Pass/Fail
2338.93	Horizont	36.79	13.80	50.59	74.00	23.41	PK	150	346	PASS
2360.53	Horizont	36.98	12.31	49.29	74.00	24.71	PK	150	164	PASS
2390.13	Horizont	37.24	12.04	49.28	74.00	24.72	PK	150	17	PASS
2338.93	Horizont	36.79	1.92	38.71	54.00	15.29	AV	150	115	PASS
2360.53	Horizont	36.98	2.40	39.38	54.00	14.62	AV	150	6	PASS
2390.13	Horizont	37.24	2.33	39.57	54.00	14.43	AV	150	236	PASS



Test mode	DH5
Test channel	LOW channel

Suspected List

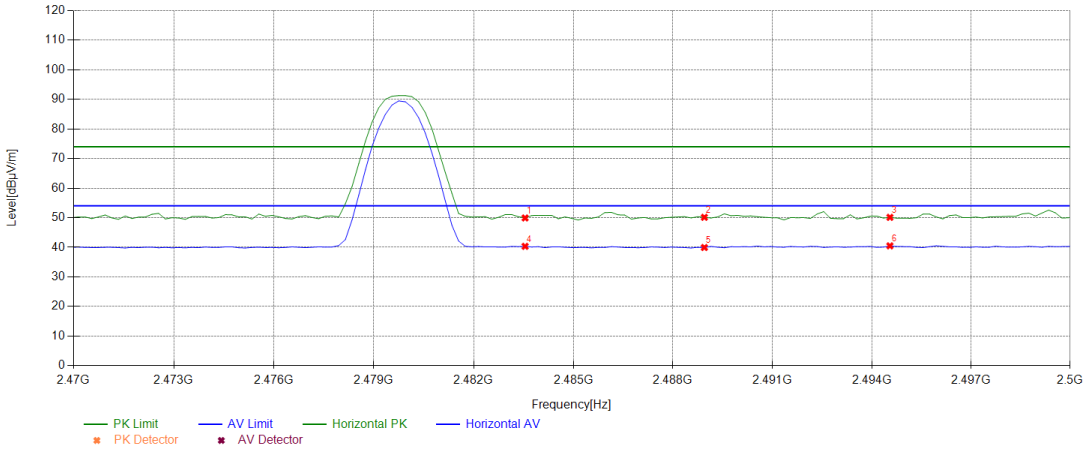
Frequency [MHz]	Polarity	Factor [dB]	Reading [dBµV/m]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Detector	Height [cm]	Angle deg	Pass/Fail
2322.93	Vertical	36.64	11.95	48.59	74.00	25.41	PK	150	98	PASS
2349.73	Vertical	36.88	13.05	49.93	74.00	24.07	PK	150	293	PASS
2390.13	Vertical	37.24	12.28	49.52	74.00	24.48	PK	150	305	PASS
2322.93	Vertical	36.64	2.31	38.95	54.00	15.05	AV	150	38	PASS
2349.73	Vertical	36.88	2.17	39.05	54.00	14.95	AV	150	293	PASS
2390.13	Vertical	37.24	2.19	39.43	54.00	14.57	AV	150	3	PASS



Test mode	DH5
Test channel	HIGH channel

Suspected List

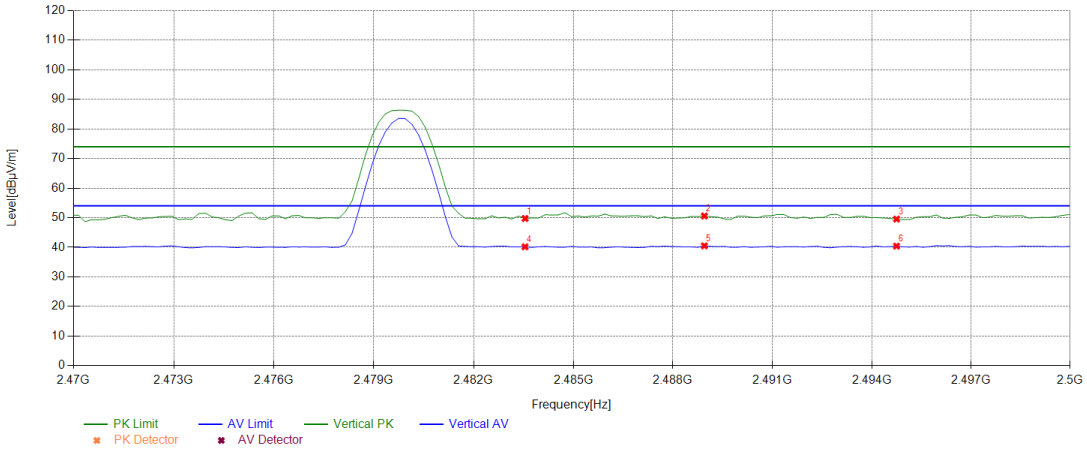
Frequency [MHz]	Polarity	Factor [dB]	Reading [dBµV/m]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Detector	Height [cm]	Angle deg	Pass/Fail
2483.54	Horizont	37.72	12.20	49.92	74.00	24.08	PK	150	233	PASS
2488.94	Horizont	37.74	12.41	50.15	74.00	23.85	PK	150	197	PASS
2494.54	Horizont	37.77	12.37	50.14	74.00	23.86	PK	150	160	PASS
2483.54	Horizont	37.72	2.62	40.34	54.00	13.66	AV	150	233	PASS
2488.94	Horizont	37.74	2.21	39.95	54.00	14.05	AV	150	294	PASS
2494.54	Horizont	37.77	2.73	40.50	54.00	13.50	AV	150	160	PASS



Test mode	DH5
Test channel	HIGH channel

Suspected List

Frequency [MHz]	Polarity	Factor [dB]	Reading [dBµV/m]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Detector	Height [cm]	Angle deg	Pass/Fail
2483.54	Vertical	37.72	12.02	49.74	74.00	24.26	PK	150	1	PASS
2488.94	Vertical	37.74	12.85	50.59	74.00	23.41	PK	150	119	PASS
2494.74	Vertical	37.77	11.77	49.54	74.00	24.46	PK	150	106	PASS
2483.54	Vertical	37.72	2.47	40.19	54.00	13.81	AV	150	228	PASS
2488.94	Vertical	37.74	2.75	40.49	54.00	13.51	AV	150	337	PASS
2494.74	Vertical	37.77	2.64	40.41	54.00	13.59	AV	150	179	PASS



5.3 Peak Power Output -Conducted

Ambient condition:

Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

Method of Measurement:

During the process of the testing, The EUT was connected to the spectrum analyzer and Bluetooth test set via a power splitter with a known loss. The EUT is controlled by the Bluetooth test set to ensure max power transmission with proper modulation. The peak detector is used.

Limits:

Rule Part 15.247 (b) (1)specifies that " 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."

Peak Output Power	⩽ 1W (30dBm)

Test Setup:

Measurement Uncertainty：

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor k = 2, U= 0.44 dB.

Test Results:

TestMode	Antenna	Channel	Result[dBm]	Limit[dBm]	Verdict
DH5	Ant1	2402	-8.00	<=30	PASS
	Ant1	2441	-8.00	<=30	PASS
	Ant1	2480	-7.88	<=30	PASS

5.4 20dB Emission Bandwidth

Ambient condition:

Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

Method of Measurement:

The EUT was connected to the spectrum analyzer through an external attenuator (20dB) and a known loss cable. RBW is set to 30 kHz; VBW is set to 100 kHz on spectrum analyzer.
Detector=Peak, Trace mode=Max hold.

Limits:

No specific occupied bandwidth requirements in part 15.247(a) (1).

Test Setup:

Measurement Uncertainty：

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor k = 2, U= 936 Hz.

Test Results:

TestMode	Antenna	Channel	20db EBW[MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
DH5	Ant1	2402	0.888	2401.517	2402.405	---	PASS
	Ant1	2441	0.894	2440.517	2441.411	---	PASS
	Ant1	2480	0.894	2479.517	2480.411	---	PASS

5.5 Occupied Channel Bandwidth

Ambient condition:

Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

Method of Measurement:

The EUT was connected to the spectrum analyzer through an external attenuator (20dB) and a known loss cable. RBW is set to 30 kHz; VBW is set to 100 kHz on spectrum analyzer.
Detector=Peak, Trace mode=Max hold.

Limits:

No specific occupied bandwidth requirements in part 15.247(a) (1).

Test Setup:

Measurement Uncertainty：

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor k = 2, U= 936 Hz.

Test Results:

TestMode	Antenna	Channel	OCB [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
DH5	Ant1	2402	0.827	2401.5504	2402.3776	---	PASS
	Ant1	2441	0.836	2440.5475	2441.3836	---	PASS
	Ant1	2480	0.839	2479.5445	2480.3836	---	PASS

5.6 Frequency Separation

Ambient condition:

Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

Method of Measurement:

The EUT was connected to the spectrum analyzer through an external attenuator (20dB) and a known loss cable the band edge of the lowest and highest channels were measured. The peak detector is used and RBW is set to 100 kHz and VBW is set to 300 kHz on spectrum analyzer.

Limits:

Rule Part 15.247(a)(1)specifies that “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 125 mW. ”

Note: The value of two-thirds of 20 dB bandwidth is always greater than 25 kHz.

Test Setup:

Measurement Uncertainty：

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor k = 2, U=936 Hz.

Test Results:

TestMode	Antenna	Channel	Result[MHz]	Limit[MHz]	Verdict
DH5	Ant1	Hop	1.003	>=0.894	PASS

5.7 Time of Occupancy (Dwell Time)

Ambient condition:

Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

Method of Measurement:

The EUT was connected to the spectrum analyzer and Bluetooth test set via a power splitter with a known loss. RBW is set to 1MHz and VBW is set to 3MHz on spectrum analyzer. The dwell time is calculated by: Dwell time = time slot length * hop rate * 0.4s with:

The selected EUT Packet type uses a slot type of 5-Tx&1-Rx and a hopping rate of 1600(ch*hop/s) for all channels.So the final hopping rate for all channel is1600/6=266.67(ch*hop/s)

Limits:

Rule Part15.247(a) specifies that " 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."

Dwell time	⩽ 400ms

Test Setup:

Measurement Uncertainty：

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor k = 2.

Requirements	Uncertainty					
Dwell Time	DH5	U=0.70ms	2DH5	U=0.70ms	3DH5	U=0.70ms

Test Results:

TestMode	Antenna	Channel	BurstWidth [ms]	TotalHops [Num]	Result[s]	Limit[s]	Verdict
DH1	Ant1	Hop	0.37	320	0.12	<=0.4	PASS
DH3	Ant1	Hop	1.61	160	0.26	<=0.4	PASS
DH5	Ant1	Hop	2.85	107	0.30	<=0.4	PASS

5.8 Band Edge Measurement

Ambient condition:

Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

Method of Measurement:

The EUT was connected to the spectrum analyzer through an external attenuator (20dB) and a known loss cable the band edge of the lowest and highest channels were measured. The peak detector is used and RBW is set to 100 kHz and VBW is set to 300 kHz on spectrum analyzer.

Limits:

Rule Part 15.247(d) specifies that “In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits.

Test Setup:

Measurement Uncertainty：

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor k = 1.96, U= 936 Hz, 2 GHz-3 GHz = 1.407 dB.

Test Result:

TestMode	Antenna	ChName	Channel	RefLevel [dBm]	Result [dBm]	Limit [dBm]	Verdict
DH5	Ant1	Low	2402	-8.46	-48.63	≤-28.46	PASS
	Ant1	High	2480	-8.73	-46.95	≤-28.73	PASS
	Ant1	Low	Hop_2402	-11.65	-49.21	≤-31.65	PASS
	Ant1	High	Hop_2480	-11.25	-47.08	≤-31.25	PASS

5.9 Number of hopping Frequency

Ambient condition:

Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

Method of Measurement:

The EUT was connected to the spectrum analyzer and Bluetooth test set via a power splitter with a known loss. RBW is set to 100KHz and VBW is set to 300KHz on spectrum analyzer. Set EUT on Hopping on mode.

Limits:

Rule Part 15.247(a) (1) (iii) specifies that" Frequency hopping systems in the 2400–2483.5 MHz band shall use at least 15 channels."

Limits	≥ 15 channels

Test Setup:

Measurement Uncertainty：

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor k = 2, U= 0.75dB.

Test Results:

TestMode	Antenna	Channel	Result[Num]	Limit[Num]	Verdict
DH5	Ant1	Hop	79	>=15	PASS

5.10 Spurious RF Conducted Emissions

Ambient condition:

Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

Method of Measurement:

The EUT was connected to the spectrum analyzer with a known loss. The spectrum analyzer scans from 30MHz to the 10th harmonic of the carrier. The peak detector is used. Set RBW to100kHz and VBW to 300 kHz, Sweep is set to AUTO .The test is in transmitting mode.

Limits:

Rule Part 15.247(d) pacifies that “In any 100 kHz bandwidth outside the frequency band in which the spread spectrum 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.

Test Setup:

Measurement Uncertainty：

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor k = 1.96.

Frequency	Uncertainty
100kHz-2GHz	0.684 dB
2GHz-26GHz	1.407 dB

Test Results:

TestMode	Antenna	Channel	FreqRange [MHz]	RefLevel [dBm]	Result [dBm]	Limit [dBm]	Verdict
DH5	Ant1	2402	Reference	-10.79	-10.79	---	PASS
			30~1000	-10.79	-59.61	≤-30.79	PASS
			1000~26500	-10.79	-48.88	≤-30.79	PASS
	Ant1	2441	Reference	-8.60	-8.60	---	PASS
			30~1000	-8.60	-59.07	≤-28.6	PASS
			1000~26500	-8.60	-48.25	≤-28.6	PASS
	Ant1	2480	Reference	-10.60	-10.60	---	PASS
			30~1000	-10.60	-59.13	≤-30.6	PASS
			1000~26500	-10.60	-47.76	≤-30.6	PASS

6. Appendix E

Test Equipment	Type/Mode	SERIAL NO.	Equipment No.	Manufacturer	Cal. Due
Spectrum Analyzer	FSV40	101580	DZ-000238-3	R&S	2023/06/05
Comprehensive Test Instrument	CMW270	100304	DZ-000240-1	R&S	2022/12/09
Analog Signal Generator	SMB100A	181858	DZ-000238-2	R&S	2023/06/05
Vector Signal Generator	SGT100A	111661	DZ-000238-1	R&S	2023/06/05
RF Radio Frequency Switch	JS0806-2	19H9080187	DZ-000241	Tonscend	2023/06/06
Programmable DC Power Supply	E3644A	MY58036222	DZ-000178	KEYSIGHT	2023/04/21
3m Semi-Anechoic Chamber	FACT-4	ST08035	WKNA-0024	ETS	2024/12/12
Spectrum Analyzer	N9010B	MY57470323	DZ-000174	KEYSIGHT	2023/03/02
EMI Test Receiver	N9038A-508	MY532290079	EM-000397	Agilent	2023/03/02
Broadband Antenna	VULB 9163	9163-530	EM-000342	SCHWARZBECK	2023/06/25
Waveguide Horn Antenna	HF906	360306/008	WKNA-0024-8	R&S	2023/03/04
Waveguide Horn Antenna	BBHA9170	00949	EM-000383	SCHWARZBECK	2023/08/26
Bandstop Filters	SW-BSF-2400-100-7-A1	/	EM-000495	/	2023/08/30
5G Bandstop Filters	WRCJV12-4900-5100-5900-6100-50EE	1	DZ-000186	WI	2022/12/20

The End