



Test Report No.:
FCC2023-0030-RF1

TEST REPORT

FCC ID : 2AWMK-BTP-AIN2
Applicant : Guangzhou Pinzhong Electronic
Technology Co.,Ltd.
Product Name : BEITONG ASURA 2 PRO WIRELESS
GAMEPAD MULTI MODE
Mode No. : BTP-AIN2, BTP-A1N3S

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 PRO WIRELESS GAMEPAD MULTI MODE Model No. : BTP-AIN2 Trade mark :  BEITONG Serial no. : K22F97005846 Sampling : 1-1	
Date of Receipt.	2023.06.08	Date of Testing	2023.07.12
Test Specification		Test Result	
FCC CFR47 Part 15C (2020) Radio Frequency Devices ANSI C63.10 (2013) KDB 558074 D01 DTS Meas Guidance v05 KDB 662911 D01 Multiple Transmitter Output v02r01		PASS	
Evaluation of Test Result		The equipment under test was found to comply with the requirements of the standards applied. Seal of CVC Date of issue: 2023.10.07	
Approved by: Chen HuaWen 		Reviewed by: Xu Zhenfei 	
		Tested by: Lu Weiji 	
Other Aspects: NONE.			
Abbreviations: Pass= passed Fail = failed N/A= not applicable EUT= equipment, sample(s) under tested			
Note: This test report relates only to the EUT, and shall not be reproduced except in full, without written approval of CVC.			

TABLE OF CONTENTS

1. GENERAL PRODUCT INFORMATION.....	4
1.1 GENERAL INFORMATION	4
2. TEST SITES	5
2.1 TEST FACILITIES	5
2.2 DESCRIPTION OF NON-STANDARD METHOD AND DEVIATIONS.....	5
2.3 LIST OF TEST AND MEASUREMENT INSTRUMENTS	5
3. TEST CONFIGURATION	6
3.1 TEST MODE	6
3.2 DUTY CYCLE	8
4. SUMMARY OF MEASUREMENT RESULTS.....	9
5. MEASUREMENT PROCEDURE	10
5.1 CONDUCTED EMISSION	10
5.2 RADIATED EMISSION	16
5.3 MAXIMUM CONDUCTED OUTPUT POWER.....	45
5.4 MINIMUM 6 DB BANDWIDTH.....	47
5.5 OCCUPIED CHANNEL BANDWIDTH	49
5.6 BAND EDGE MEASUREMENT	51
5.7 MAXIMUM POWER SPECTRAL DENSITY	53
5.8 SPURIOUS RF CONDUCTED EMISSIONS	55
6. APPENDIX A.....	57

1. General Product Information

1.1 General information

Product Name	BEITONG ASURA 2 PRO WIRELESS GAMEPAD MULTI MODE	
Model No.	BTP-AIN2	
Additional model	BTP-A1N3S	
Power Supply	Rated voltage	DC 5.0V
	Battery voltage	DC 3.7V
Serial Number(SN)	K22F97005846	
firmware	2.1	
software	1.0.5	
specific power settings	Bluetooth(LE_1M): 0 2.4G Customization: -0.3	
Antenna Type	Internal Antenna	
Antenna Connector	A permanently attached antenna	
Antenna Gain	Bluetooth(LE_1M): 1.95 dBi (provided by client) 2.4G Customization: 1.78 dBi (provided by client)	
Beamforming gain	Unsupported (provided by client)	
Frequency Range	Bluetooth(LE_1M): 2402~2480MHz 2.4G Customization: 2402~2480MHz	
Channel Number	Bluetooth(LE_1M): 40 Channels 2.4G Customization: 40 Channels	
Type of Modulation	Bluetooth(LE_1M): GFSK 2.4G Customization: GFSK	
Max. Conducted Power	Bluetooth(LE_1M): -0.2 dBm 2.4G Customization: -3.91 dBm	
Operate Temp.Range	-20~60°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.
3. The product models of this application are: BTP-AIN2, BTP-A1N3S. The material difference between the parts and the parts in the product model for inspection is shown in the table below:

No	Model	Difference	Remarks
1	BTP-AIN2	1. The circuit, PCB layout, and electrical components of the product are the same.	Inspection model
2	BTP-A1N3S	2. Hall Joysticks, Tact Switch of Dpad, Mechanical Switch of ABXY, part of structure and appearance are different. 3. BTP-AIN2 comes in two colors: black and white.BTP-A1N3S comes in one color: blue. 4. The letters on the A1N3S version ABXY buttons adopt the surface printing process, the handle shell has added icons and line printing in two areas, and the joystick has partially changed to use transparent raw materials.	

All the tests carried out on model BTP-AIN2.

2. Test Sites

2.1 Test Facilities

The tests and measurements refer to this report were performed by RF 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 A**.

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.

Test Mode	Antenna Delivery	Test Channel
Bluetooth(LE_1M)	1TX / 1RX	0,19,39
2.4G Customization	1TX / 1RX	0,19,39

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 rate and different channels. Preliminary tests have been done on all the configurations for confirming worst case. Data rate below means worst-case rate of each test item.

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

Test Mode	Data Rate		
	Antenna 1	Antenna 2	MIMO
Bluetooth(LE_1M)	1Mbps	/	/
2.4G Customization	1Mbps	/	/

Test Items	Test Antennas	Test Modes	Test Channels
Conducted Emissions	Antenna 1	Bluetooth(LE_1M), 2.4G Customization	0, 0
Radiated Emissions	Antenna 1	Bluetooth(LE_1M), 2.4G Customization	0, 39
Radiated Emissions (Band Edge)	Antenna 1	Bluetooth(LE_1M), 2.4G Customization	0,39, 0,39
Maximum conducted output power	Antenna 1	Bluetooth(LE_1M), 2.4G Customization	0,19,39, 0,19,39
Minimum 6 dB bandwidth	Antenna 1	Bluetooth(LE_1M), 2.4G Customization	0,19,39, 0,19,39
Occupied Channel Bandwidth	Antenna 1	Bluetooth(LE_1M), 2.4G Customization	0,19,39, 0,19,39
Band Edge Measurement	Antenna 1	Bluetooth(LE_1M), 2.4G Customization	0,39, 0,39
Maximum Power spectral density	Antenna 1	Bluetooth(LE_1M), 2.4G Customization	0,19,39, 0,19,39
Spurious RF Conducted Emissions	Antenna 1	Bluetooth(LE_1M), 2.4G Customization	0,19,39, 0,19,39

3.2 Duty cycle

TestMode	Antenna	Channel	Transmission Duration [ms]	Transmission Period [ms]	Duty Cycle [%]	Limit	Verdict
BLE_1M	Ant1	2402	20.00	20.00	100	---	---
		2440	20.00	20.00	100	---	---
		2480	20.00	20.00	100	---	---
2.4G Customization	Ant1	2402	20.00	20.00	100	---	---
		2440	20.00	20.00	100	---	---
		2480	20.00	20.00	100	---	---

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	/
Maximum conducted output power	15.247(b)(3)	PASS	Appendix D of BLE_ diagram and Appendix D of 2.4G_ diagram
Minimum 6 dB bandwidth	15.247(a)(2)	PASS	Appendix B of BLE_ diagram and Appendix B of 2.4G_ diagram
Occupied Channel Bandwidth	15.247(a)(2)	PASS	Appendix C of BLE_ diagram and Appendix C of 2.4G_ diagram
Band Edge Measurement	15.247(d)	PASS	Appendix F of BLE_ diagram and Appendix F of 2.4G_ diagram
Maximum Power spectral density	15.247(e)	PASS	Appendix E of BLE_ diagram and Appendix E of 2.4G_ diagram
Spurious RF Conducted Emissions	15.247(d)	PASS	Appendix G of BLE_ diagram and Appendix G of 2.4G_ diagram
Antenna Requirement	15.203	PASS	See note 1

Note 1: According to 15.203, it is considered sufficient to comply with the provisions of this section.

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.

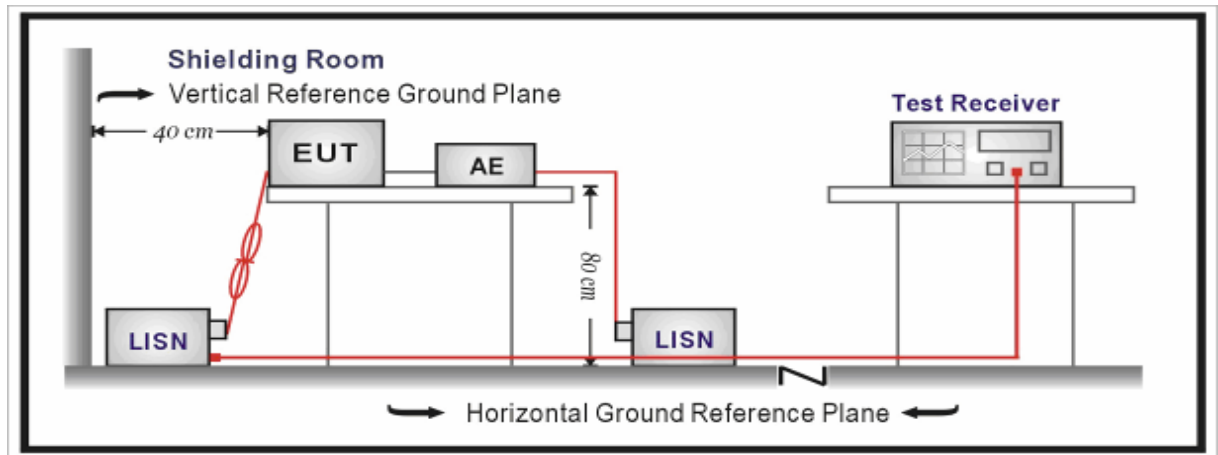
The excess length of the power cord between the EUT and the LISN receptacle were folded back and forth at the center of the lead to form a bundle not exceeding 40 cm in length.

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:

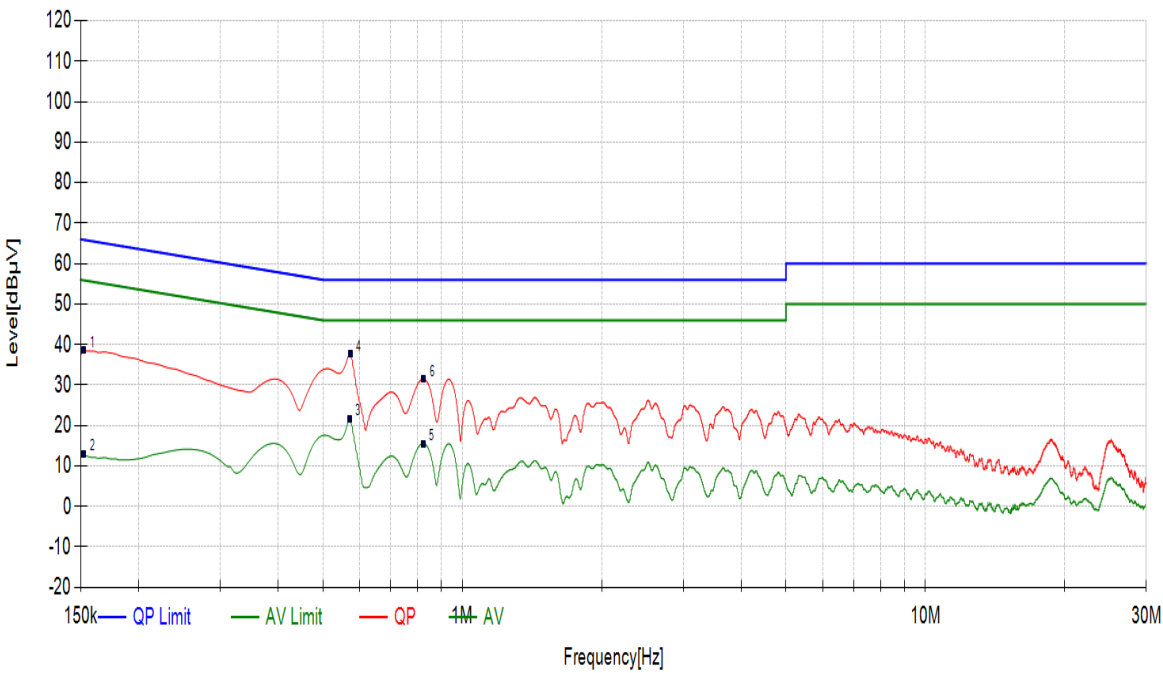
The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor $k = 1.96$. $U = 3.12$ dB.

Test Results:

During the test, the Conducted Emission from 150kHz to 30MHz was performed in all modes with all channels, and all antennas. Bluetooth(LE_1M), Channel 0, Antenna 1 are selected as the worst condition. The test data of the worst-case condition was recorded in this report.

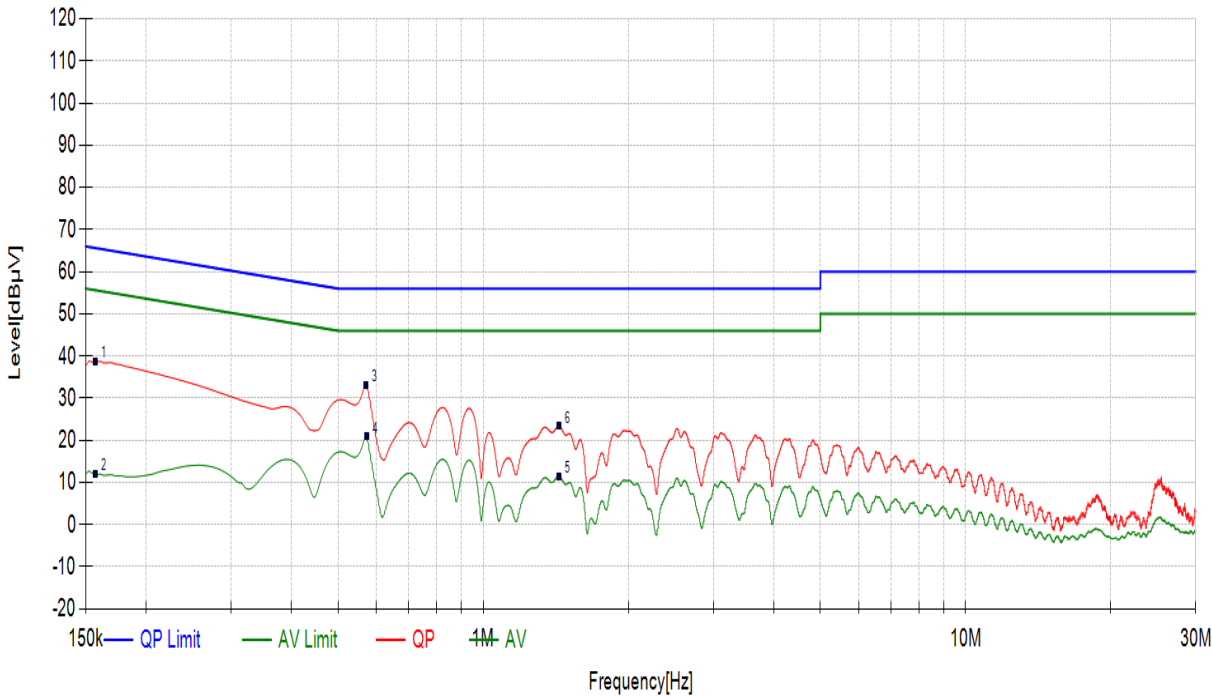
Power Line	L
Test channel	Worst-Case

Suspected List								
NO.	Freq. [MHz]	Factor [dB]	Reading [dBμV]	Level [dBμV]	Limit [dBμV]	Margin [dB]	Detector	Pass/Fail
6	0.8250	10.32	21.19	31.51	56.00	24.49	QP	PASS
4	0.5730	10.31	27.41	37.72	56.00	18.28	QP	PASS
1	0.1523	10.29	28.30	38.59	65.88	27.29	QP	PASS
2	0.1523	10.29	2.78	13.07	55.88	42.81	AV	PASS
5	0.8228	10.32	5.23	15.55	46.00	30.45	AV	PASS
3	0.5708	10.31	11.34	21.65	46.00	24.35	AV	PASS



Power Line	N
Test channel	Worst-Case

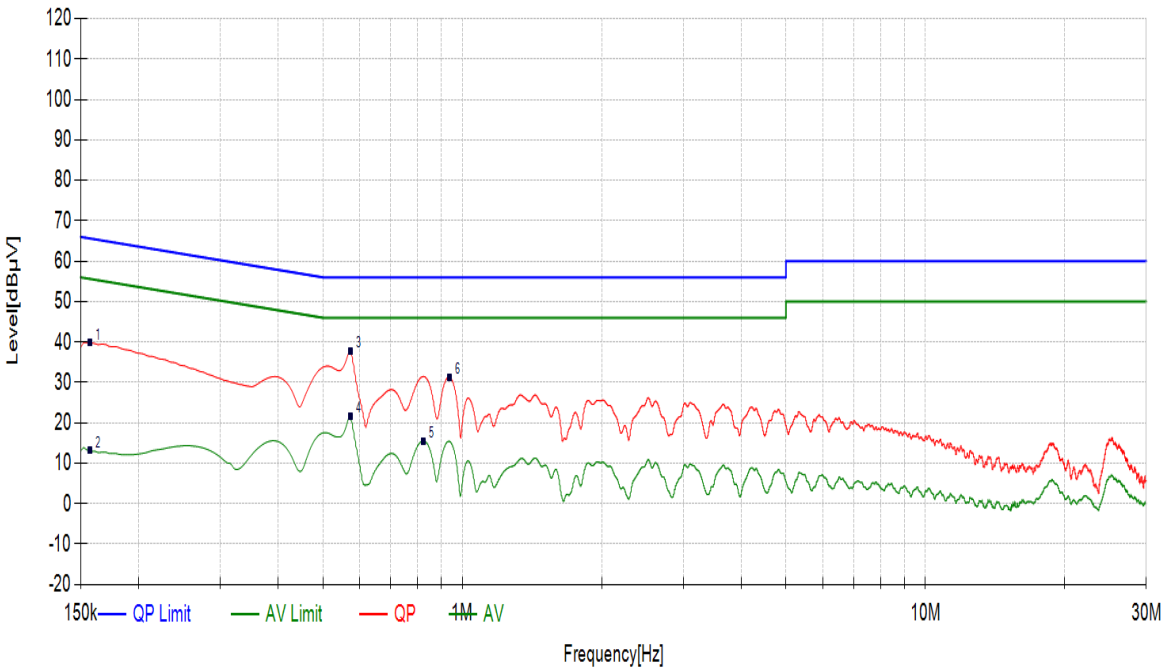
Suspected List								
NO.	Freq. [MHz]	Factor [dB]	Reading [dBμV]	Level [dBμV]	Limit [dBμV]	Margin [dB]	Detector	Pass/Fail
1	0.1568	10.28	28.46	38.74	65.63	26.89	QP	PASS
3	0.5708	10.30	22.86	33.16	56.00	22.84	QP	PASS
6	1.4348	10.34	13.03	23.37	56.00	32.63	QP	PASS
2	0.1568	10.28	1.77	12.05	55.63	43.58	AV	PASS
4	0.5730	10.30	10.68	20.98	46.00	25.02	AV	PASS
5	1.4348	10.34	1.14	11.48	46.00	34.52	AV	PASS



During the test, the Conducted Emission from 150kHz to 30MHz was performed in all modes with all channels, and all antennas. 2.4G Customization, Channel 0, Antenna 1 are selected as the worst condition. The test data of the worst-case condition was recorded in this report.

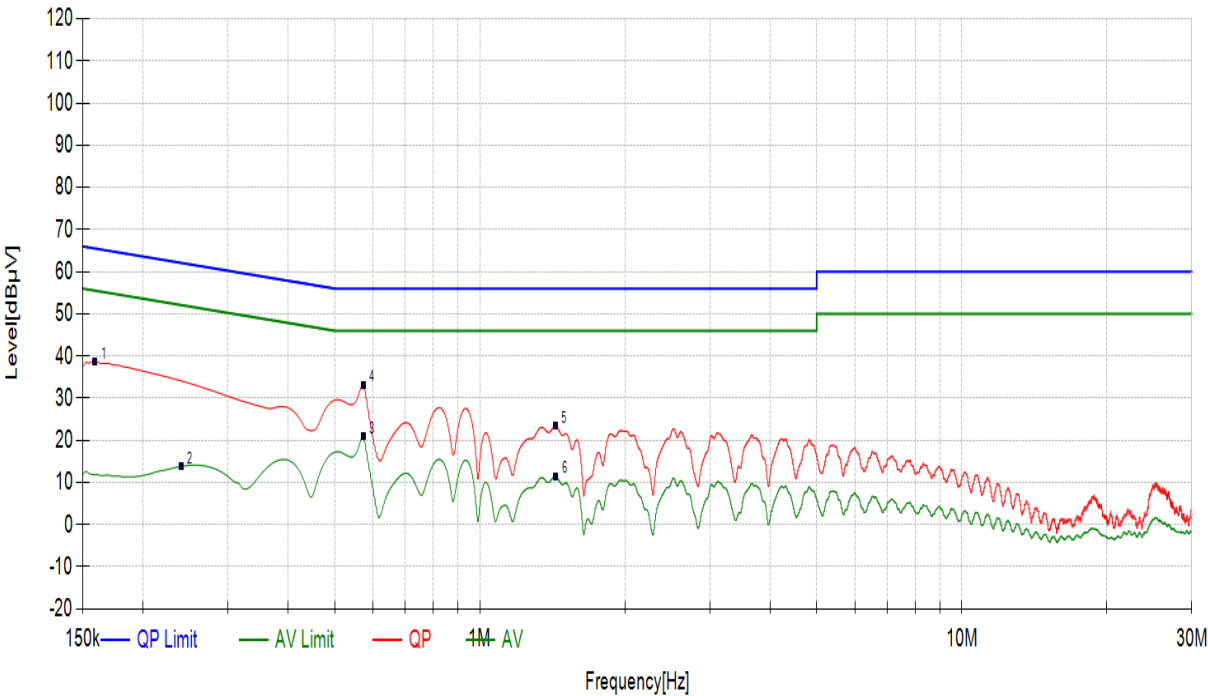
Power Line	L
Test channel	Worst-Case

Suspected List								
NO.	Freq. [MHz]	Factor [dB]	Reading [dBμV]	Level [dBμV]	Limit [dBμV]	Margin [dB]	Detector	Pass/Fail
1	0.1568	10.29	29.63	39.92	65.63	25.71	QP	PASS
3	0.5730	10.31	27.45	37.76	56.00	18.24	QP	PASS
6	0.9375	10.31	21.03	31.34	56.00	24.66	QP	PASS
2	0.1568	10.29	2.80	13.09	55.63	42.54	AV	PASS
4	0.5730	10.31	11.40	21.71	46.00	24.29	AV	PASS
5	0.8228	10.32	5.20	15.52	46.00	30.48	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
4	0.5730	10.30	22.87	33.17	56.00	22.83	QP	PASS
5	1.4348	10.34	13.01	23.35	56.00	32.65	QP	PASS
1	0.1590	10.28	28.27	38.55	65.52	26.97	QP	PASS
3	0.5730	10.30	10.70	21.00	46.00	25.00	AV	PASS
2	0.2400	10.28	3.51	13.79	52.10	38.31	AV	PASS
6	1.4370	10.34	1.14	11.48	46.00	34.52	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)).

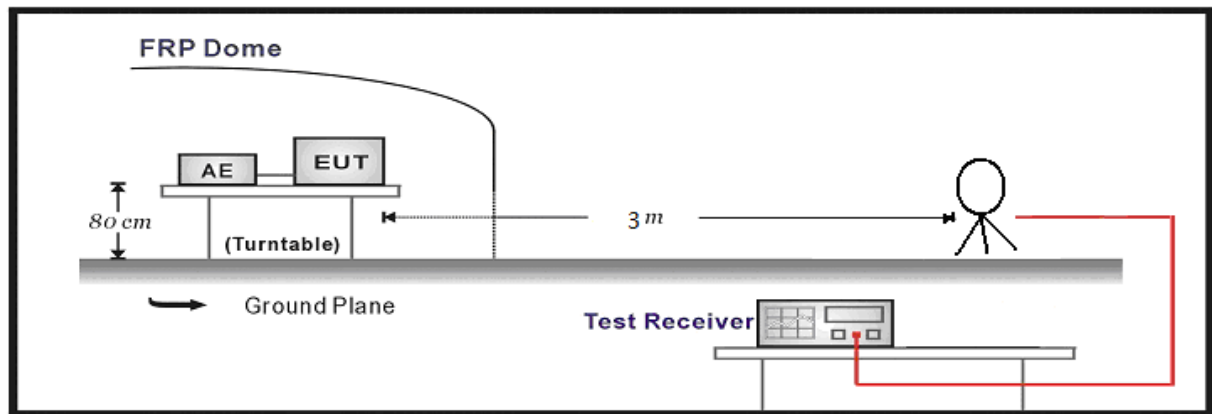
Frequency	Limit ($\mu\text{V/m}$)	Limit ($\text{dB}\mu\text{V/m @3m}$)	Remark
0.009MHz-0.490MHz	2400/F(kHz)@300m	20lg(240000/F(kHz))	Quasi-peak Level
0.490MHz~1.705MHz	24000/F(kHz)@30m	20lg(240000/F(kHz))	Quasi-peak Level
1.705MHz~30.0MHz	30@30m	49.54	Quasi-peak Level
30MHz-88MHz	100@3m	40.0	Quasi-peak 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:

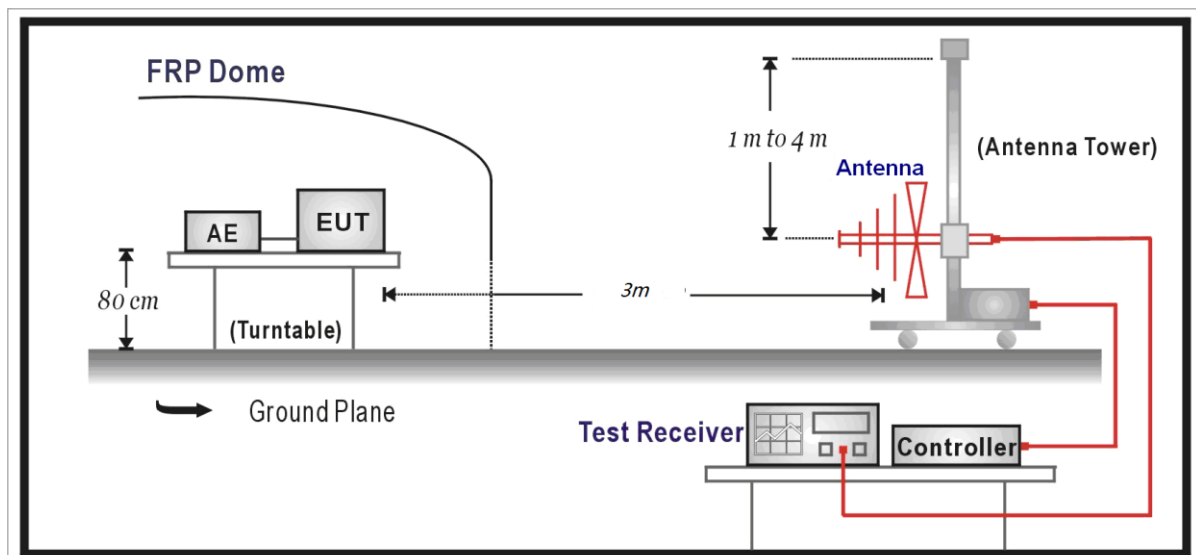
MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	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:

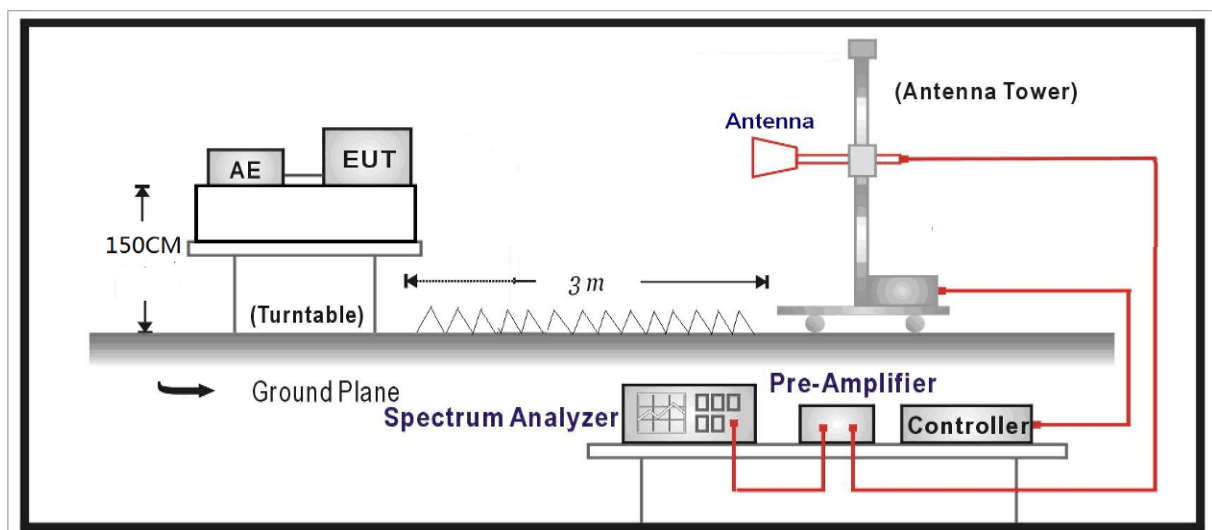
Below 30MHz Test Setup:



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:

SPURIOUS EMISSIONS:

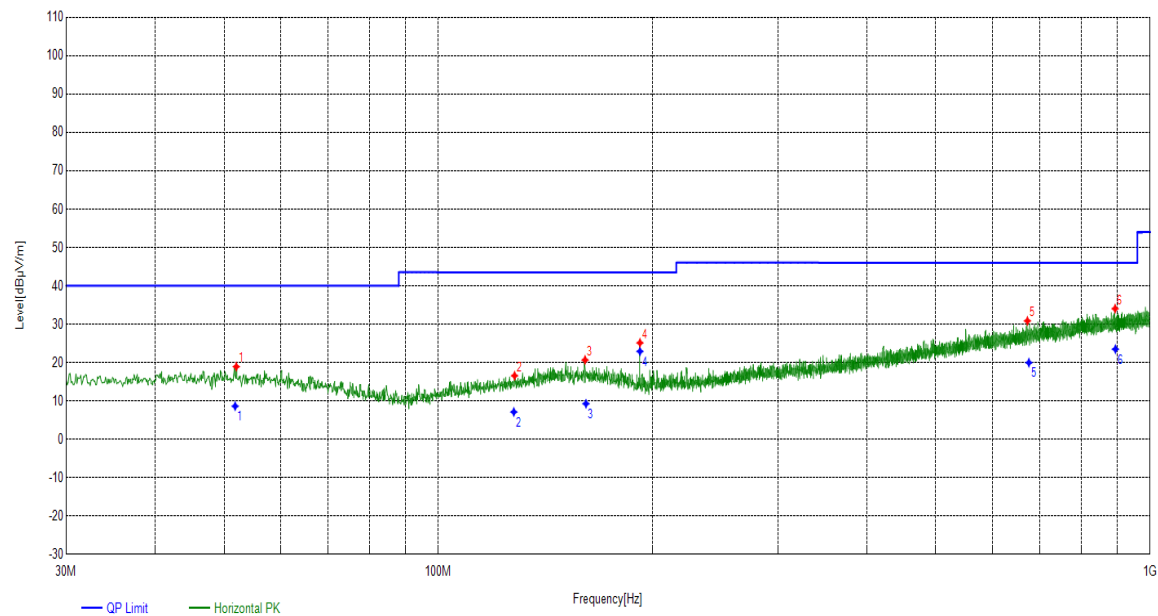
Bluetooth(Low Energy):

During the test, the Radiates Emission from 9kHz to 40GHz was performed in Bluetooth (LE_1M) all modes with all channels and all antennas. Bluetooth(LE_1M), channel 0, antenna 1 are selected as the worst condition. The test data of the worst-case condition was recorded in this report.

Radiates Emission		9kHz~1GHz							
Test channel		Worst-Case							
Polarity		Horizontal							
Suspected List									
Frequency [MHz]	Factor [dB]	Reading [dBμV/m]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Detector	Height [cm]	Angle deg	Pass/Fail
52.0212	20.34	-1.41	18.93	40.00	21.07	PK	100	270	PASS
127.9798	19.03	-2.47	16.56	43.51	26.95	PK	100	260	PASS
160.7691	20.84	-0.16	20.68	43.51	22.83	PK	100	160	PASS
192.0062	17.75	7.39	25.14	43.50	18.36	PK	100	20	PASS
672.4953	29.90	0.95	30.85	46.00	15.15	PK	100	80	PASS
893.0953	32.96	1.09	34.05	46.00	11.95	PK	100	280	PASS

Note: 9kHz~30MHz have been test and test data more than 20dB margin.

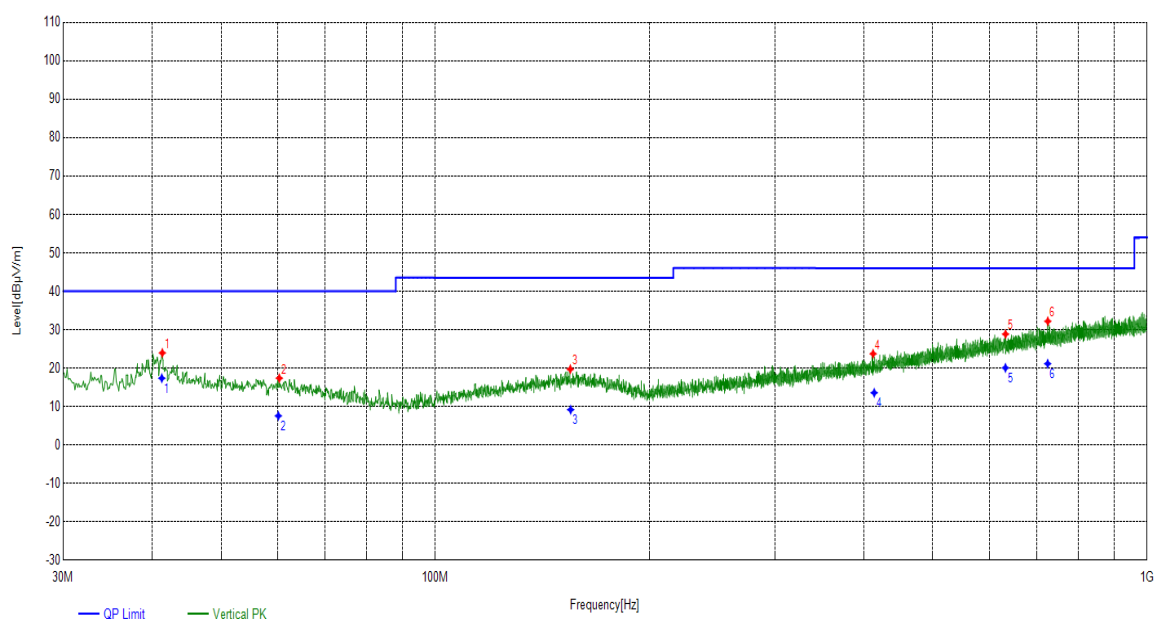
Final Data List							
Frequency [MHz]	Factor [dB]	QP Value [dBμV/m]	QP Limit [dBμV/m]	QP Margin [dB]	Height [cm]	Angle [°]	Pass/Fail
51.827	20.34	8.63	40.00	31.37	170	270	PASS
127.6798	19.03	7.12	43.51	36.39	380	260	PASS
161.2368	20.84	9.27	43.51	34.24	230	160	PASS
192.0035	17.75	22.92	43.50	20.58	280	20	PASS
675.7069	29.90	19.97	46.00	26.03	330	80	PASS
893.8968	32.96	23.49	46.00	22.51	250	280	PASS



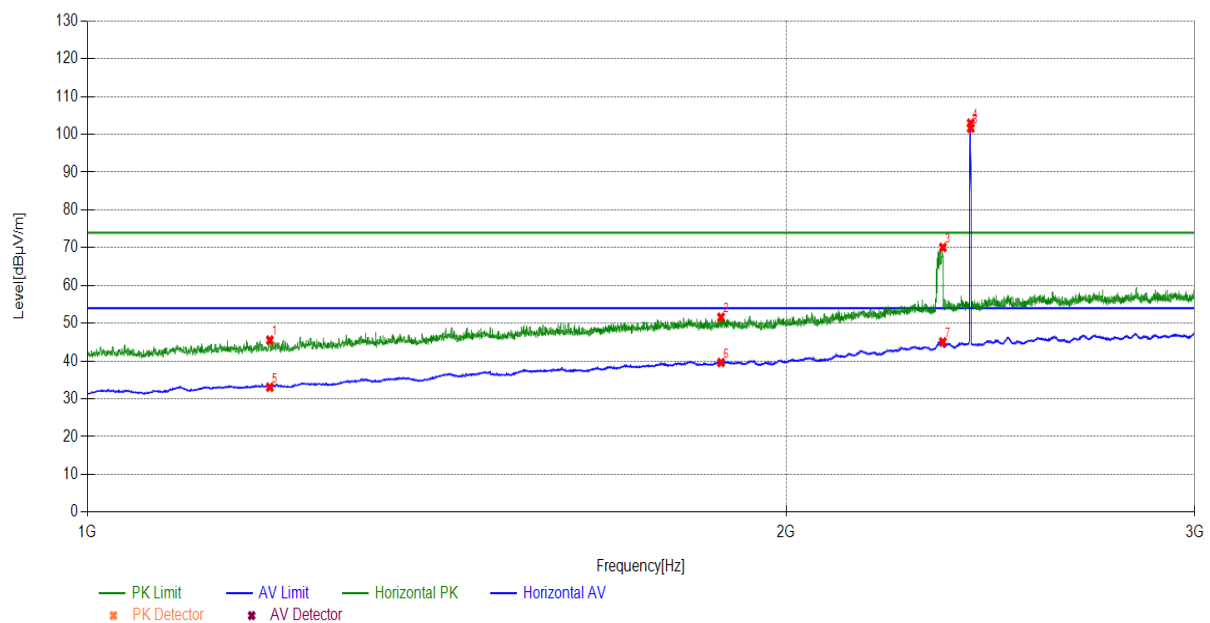
Radiates Emission		9kHz~1GHz							
Test channel		Worst-Case							
Polarity		Vertical							
Suspected List									
Frequency [MHz]	Factor [dB]	Reading [dBμV/m]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Detector	Height [cm]	Angle deg	Pass/Fail
41.3501	19.97	3.98	23.95	40.00	16.05	PK	100	110	PASS
60.364	19.81	-2.43	17.38	40.00	22.62	PK	100	310	PASS
154.7545	20.79	-1.08	19.71	43.51	23.80	PK	100	90	PASS
412.2182	24.28	-0.55	23.73	46.01	22.28	PK	100	240	PASS
632.7213	29.27	-0.43	28.84	46.01	17.17	PK	100	100	PASS
725.3655	30.82	1.37	32.19	46.00	13.81	PK	100	90	PASS

Note: 9kHz~30MHz have been test and test data more than 20dB margin.

Final Data List							
Frequency [MHz]	Factor [dB]	QP Value [dB μ V/m]	QP Limit [dB μ V/m]	QP Margin [dB]	Height [cm]	Angle [°]	Pass/Fail
41.2807	19.97	17.37	40.00	22.63	390	110	PASS
60.1814	19.81	7.57	40.00	32.43	220	310	PASS
154.9314	20.79	9.18	43.51	34.33	280	90	PASS
413.6618	24.28	13.58	46.01	32.43	270	240	PASS
632.4558	29.27	20.07	46.01	25.94	210	100	PASS
725.0717	30.82	21.15	46.00	24.85	330	90	PASS

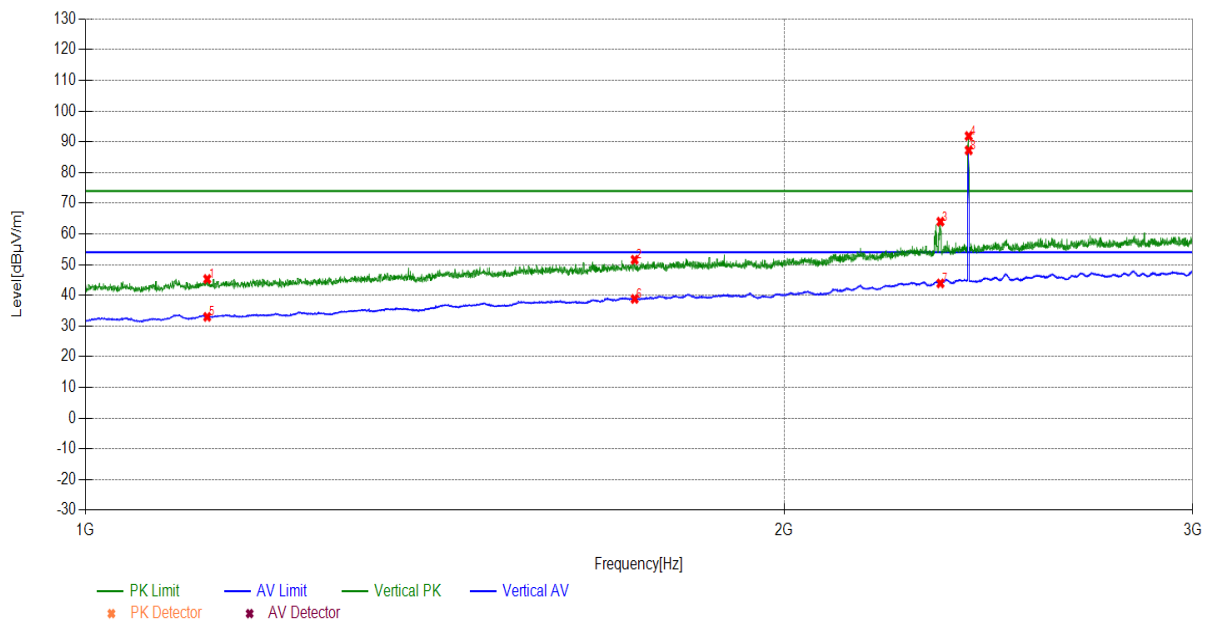


Radiates Emission		1G~3G							
Test channel		Worst-Case							
polarization		Horizontal							
Suspected List									
Frequency[MHz]	Factor [dB]	Reading [dBμV/m]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Detect or	Height [cm]	Angle deg	Pass/ Fail
1198.4198	27.90	17.64	45.54	74.00	28.46	PK	150	305	PASS
1875.0875	33.05	18.54	51.59	74.00	22.41	PK	150	239	PASS
2336.7337	36.77	33.30	70.07	74.00	3.93	PK	150	355	PASS
2402.1402	37.34	65.61	102.95	74.00	-28.95	PK	150	27	---
1198.4198	27.90	5.21	33.11	54.00	20.89	AV	150	4	PASS
1875.0875	33.05	6.58	39.63	54.00	14.37	AV	150	80	PASS
2336.7337	36.77	8.29	45.06	54.00	8.94	AV	150	355	PASS
2402.1402	37.34	64.32	101.66	54.00	-47.66	AV	150	331	---



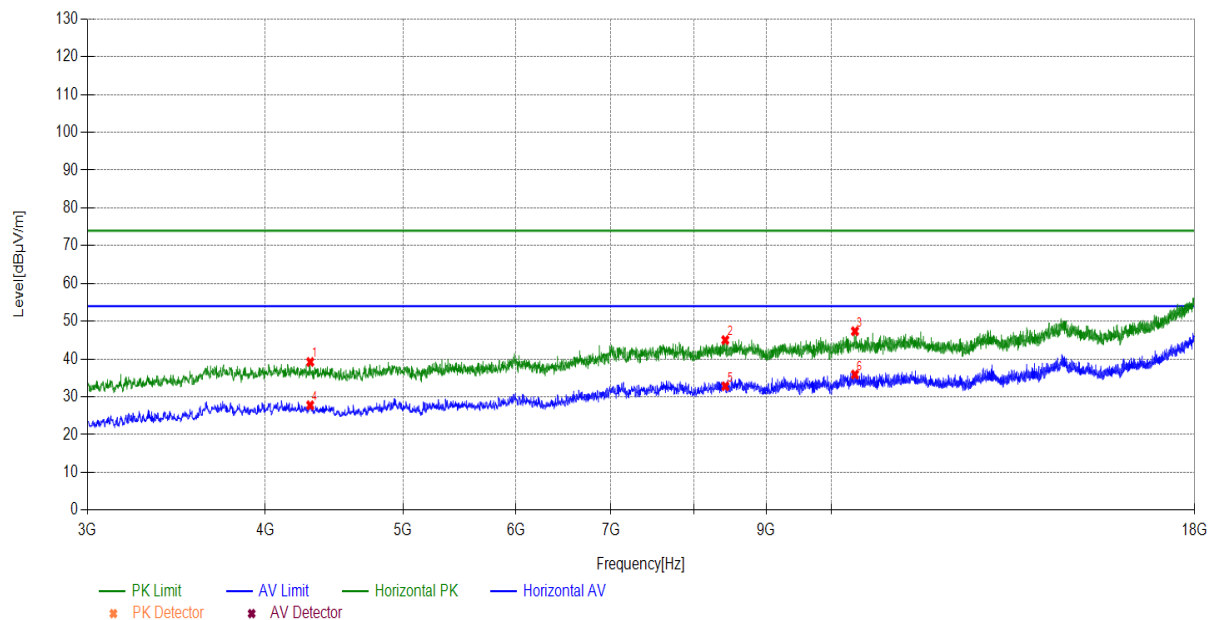
Note: The signal beyond the limit is carrier

Radiates Emission		1G~3G							
Test channel		Worst-Case							
polarization		Vertical							
Suspected List									
Frequency[MHz]	Factor [dB]	Reading [dBμV/m]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Detect or	Height [cm]	Angle deg	Pass/ Fail
1128.4128	27.29	18.02	45.31	74.00	28.69	PK	150	222	PASS
1724.4724	32.45	19.14	51.59	74.00	22.41	PK	150	197	PASS
2335.7336	36.76	27.24	64.00	74.00	10.00	PK	150	50	PASS
2402.1402	37.34	54.54	91.88	74.00	-17.88	PK	150	24	---
1128.4128	27.29	5.69	32.98	54.00	21.02	AV	150	302	PASS
1724.4724	32.45	6.38	38.83	54.00	15.17	AV	150	302	PASS
2335.7336	36.76	7.12	43.88	54.00	10.12	AV	150	50	PASS
2402.1402	37.34	49.88	87.22	54.00	-33.22	AV	150	37	---

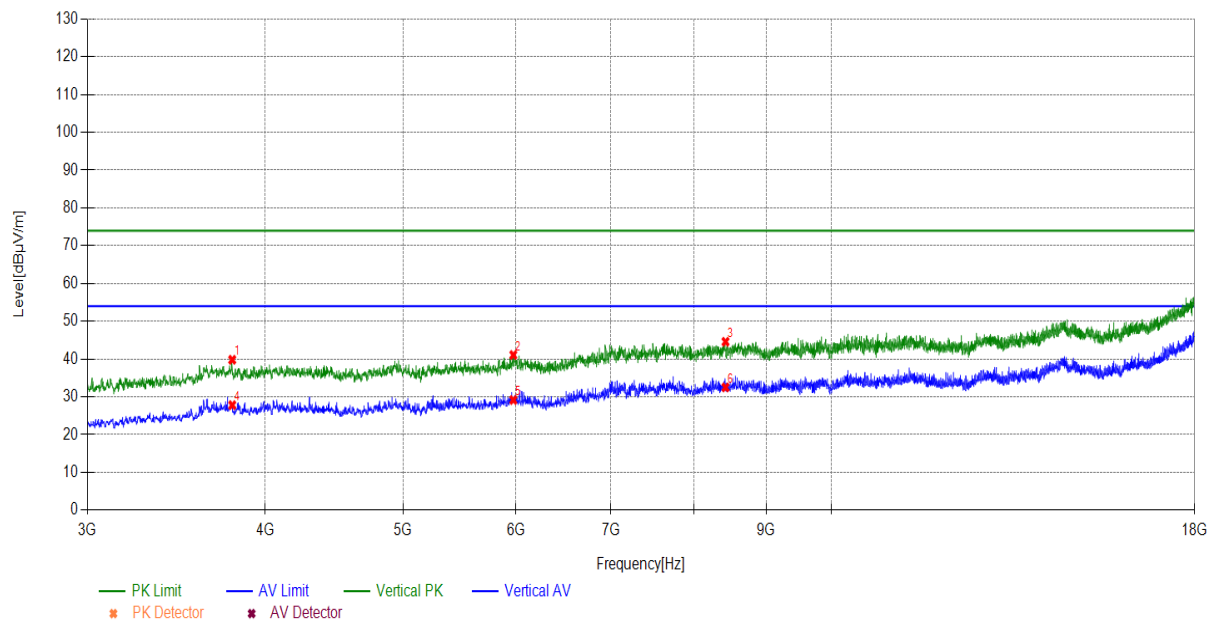


Note: The signal beyond the limit is carrier

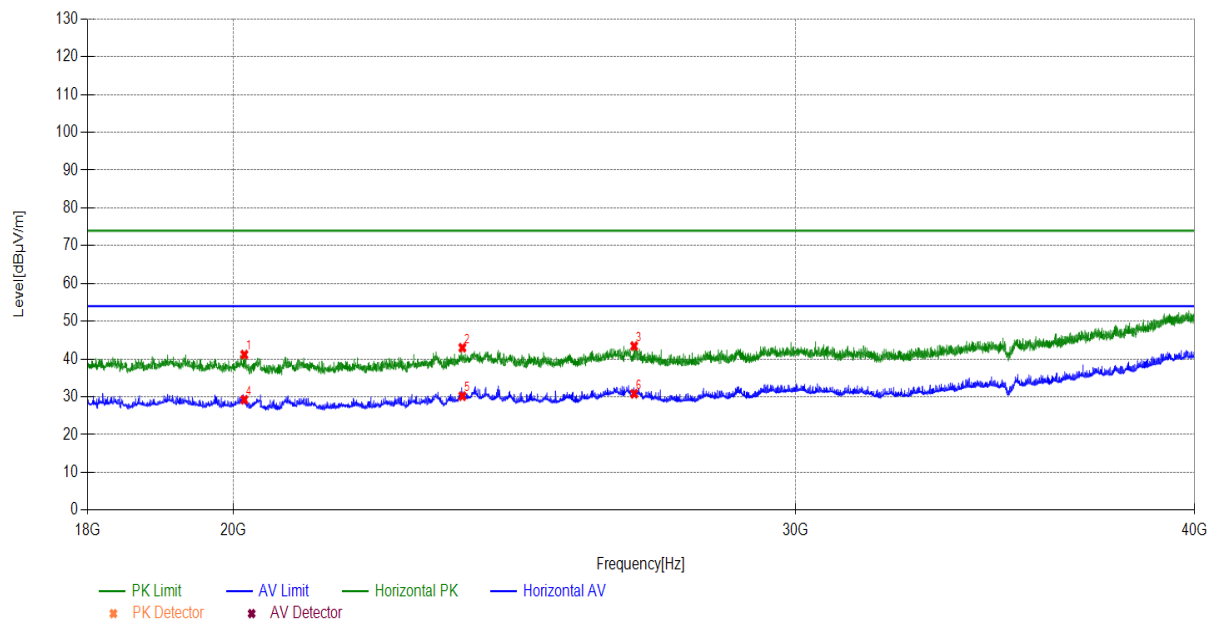
Radiates Emission		3G~18G							
Test channel		Worst-Case							
polarization		Horizontal							
Suspected List									
Frequency[MHz]	Factor [dB]	Reading [dBμV/m]	Level [dBμV/ m]	Limit [dBμV/ m]	Margin [dB]	Detect or	Height [cm]	Angle deg	Pass/ Fail
4302.1302	-0.46	39.70	39.24	74.00	34.76	PK	150	230	PASS
8421.5422	9.04	35.99	45.03	74.00	28.97	PK	150	110	PASS
10388.2388	11.91	35.46	47.37	74.00	26.63	PK	150	210	PASS
4302.1302	-0.46	28.25	27.79	54.00	26.21	AV	150	10	PASS
8421.5422	9.04	23.78	32.82	54.00	21.18	AV	150	100	PASS
10388.2388	11.91	24.00	35.91	54.00	18.09	AV	150	10	PASS



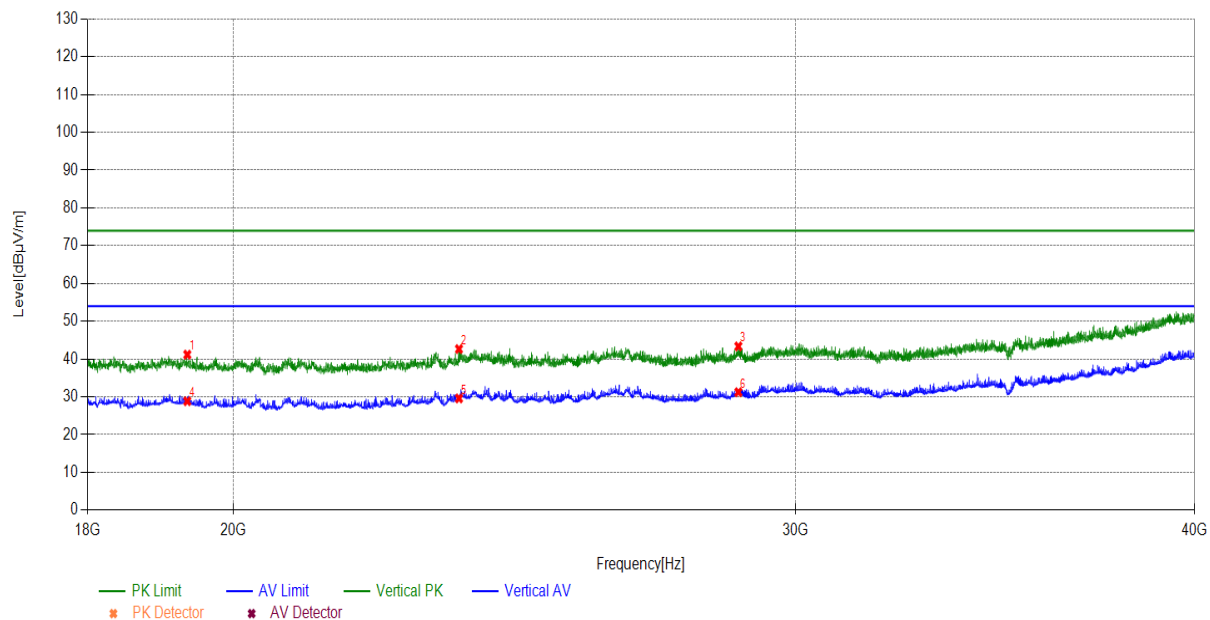
Radiates Emission		3G~18G							
Test channel		Worst-Case							
polarization		Vertical							
Suspected List									
Frequency[MHz]	Factor [dB]	Reading [dBμV/m]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Detect or	Height [cm]	Angle deg	Pass/Fail
3792.0792	-0.56	40.38	39.82	74.00	34.18	PK	150	130	PASS
5976.2976	4.86	36.23	41.09	74.00	32.91	PK	150	30	PASS
8424.5425	9.05	35.54	44.59	74.00	29.41	PK	150	50	PASS
3792.0792	-0.56	28.38	27.82	54.00	26.18	AV	150	20	PASS
5976.2976	4.86	24.32	29.18	54.00	24.82	AV	150	70	PASS
8424.5425	9.05	23.46	32.51	54.00	21.49	AV	150	290	PASS



Radiates Emission		18G~40G							
Test channel		Worst-Case							
polarization		Horizontal							
Suspected List									
Frequency[MHz]	Factor [dB]	Reading [dBμV/m]	Level [dBμV/ m]	Limit [dBμV/ m]	Margin [dB]	Detect or	Height [cm]	Angle deg	Pass/ Fail
20156.2156	1.35	39.83	41.18	74.00	32.82	PK	150	70	PASS
23588.5589	3.37	39.65	43.02	74.00	30.98	PK	150	260	PASS
26699.67	4.78	38.66	43.44	74.00	30.56	PK	150	290	PASS
20156.2156	1.35	27.89	29.24	54.00	24.76	AV	150	10	PASS
23588.5589	3.37	26.82	30.19	54.00	23.81	AV	150	230	PASS
26699.67	4.78	26.05	30.83	54.00	23.17	AV	150	20	PASS



Radiates Emission		18G~40G							
Test channel		Worst-Case							
polarization		Vertical							
Suspected List									
Frequency[MHz]	Factor [dB]	Reading [dBμV/m]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Detect or	Height [cm]	Angle deg	Pass/Fail
19344.3344	1.33	39.84	41.17	74.00	32.83	PK	150	70	PASS
23531.3531	3.33	39.33	42.66	74.00	31.34	PK	150	110	PASS
28783.2783	5.87	37.49	43.36	74.00	30.64	PK	150	90	PASS
19344.3344	1.33	27.52	28.85	54.00	25.15	AV	150	150	PASS
23531.3531	3.33	26.27	29.60	54.00	24.40	AV	150	140	PASS
28783.2783	5.87	25.37	31.24	54.00	22.76	AV	150	300	PASS



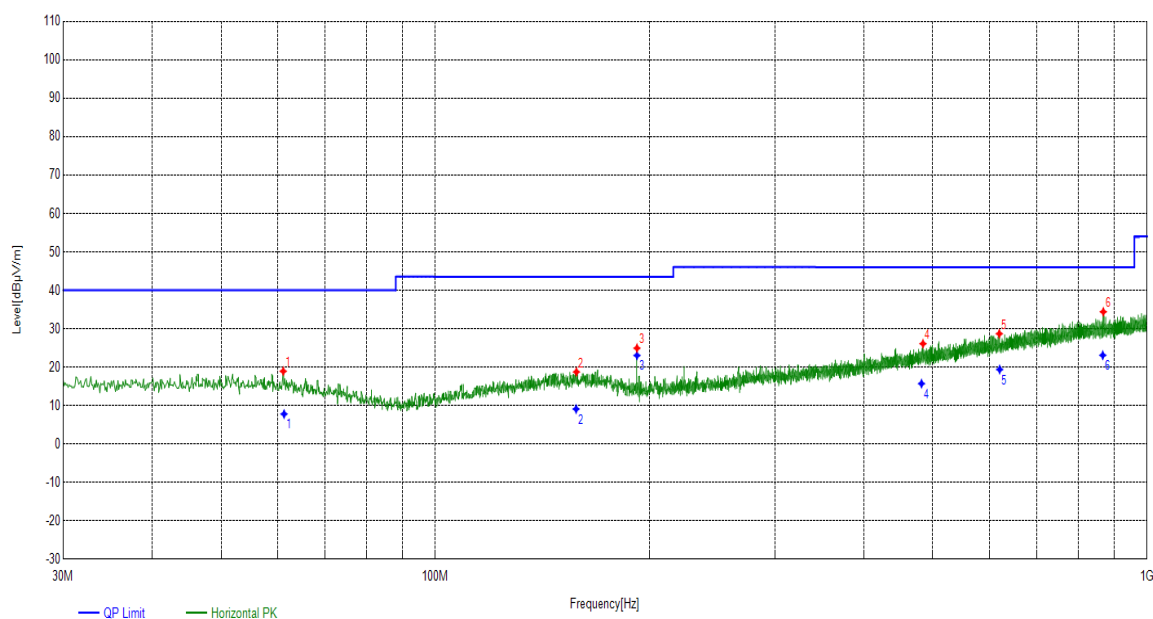
2.4G Customization:

During the test, the Radiates Emission from 9kHz to 40GHz was performed in 2.4G Customization all modes with all channels and all antennas. 2.4G Customization, channel 39, antenna 1 are selected as the worst condition. The test data of the worst-case condition was recorded in this report.

Radiates Emission		9kHz~1GHz							
Test channel		Worst-Case							
Polarity		Horizontal							
Suspected List									
Frequency [MHz]	Factor [dB]	Reading [dBμV/m]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Detector	Height [cm]	Angle deg	Pass/Fail
61.1401	19.69	-0.76	18.93	40.00	21.07	PK	100	90	PASS
157.8588	20.84	-2.09	18.75	43.51	24.76	PK	100	40	PASS
192.0062	17.75	7.18	24.93	43.50	18.57	PK	100	220	PASS
484.3934	26.22	-0.14	26.08	46.01	19.93	PK	100	330	PASS
620.013	29.06	-0.37	28.69	46.01	17.32	PK	100	210	PASS
868.0668	32.75	1.64	34.39	46.00	11.61	PK	100	70	PASS

Note: 9kHz~30MHz have been test and test data more than 20dB margin.

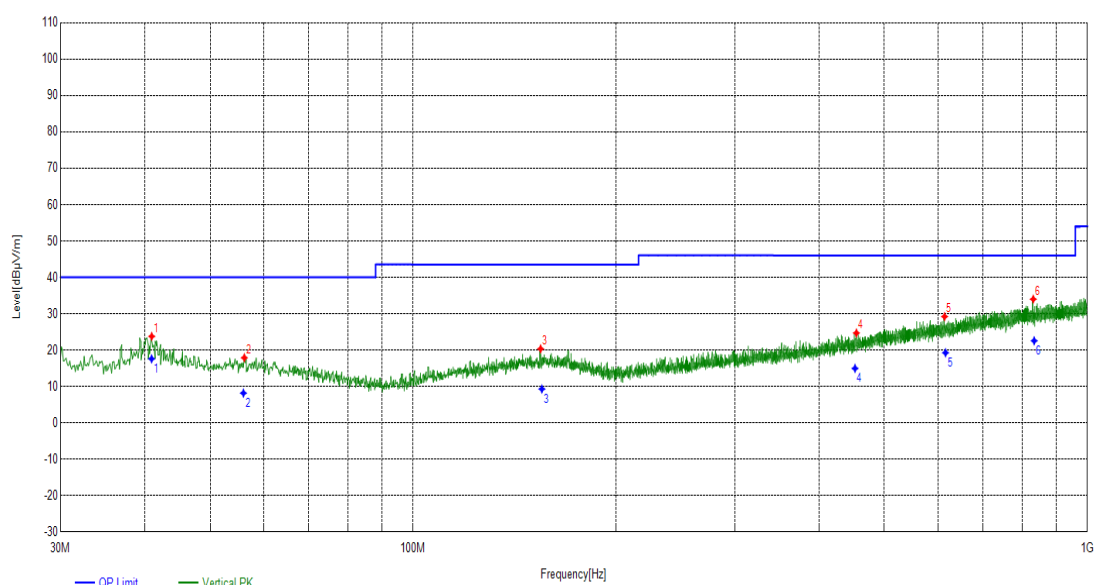
Final Data List							
Frequency [MHz]	Factor [dB]	QP Value [dB μ V/m]	QP Limit [dB μ V/m]	QP Margin [dB]	Height [cm]	Angle [°]	Pass/Fail
61.302	19.69	7.79	40.00	32.21	320	90	PASS
157.6829	20.84	9.09	43.51	34.42	290	40	PASS
192.009	17.75	23.04	43.50	20.46	260	220	PASS
482.0801	26.22	15.70	46.01	30.31	310	330	PASS
620.7128	29.06	19.38	46.01	26.63	190	210	PASS
866.5845	32.75	23.08	46.00	22.92	140	70	PASS



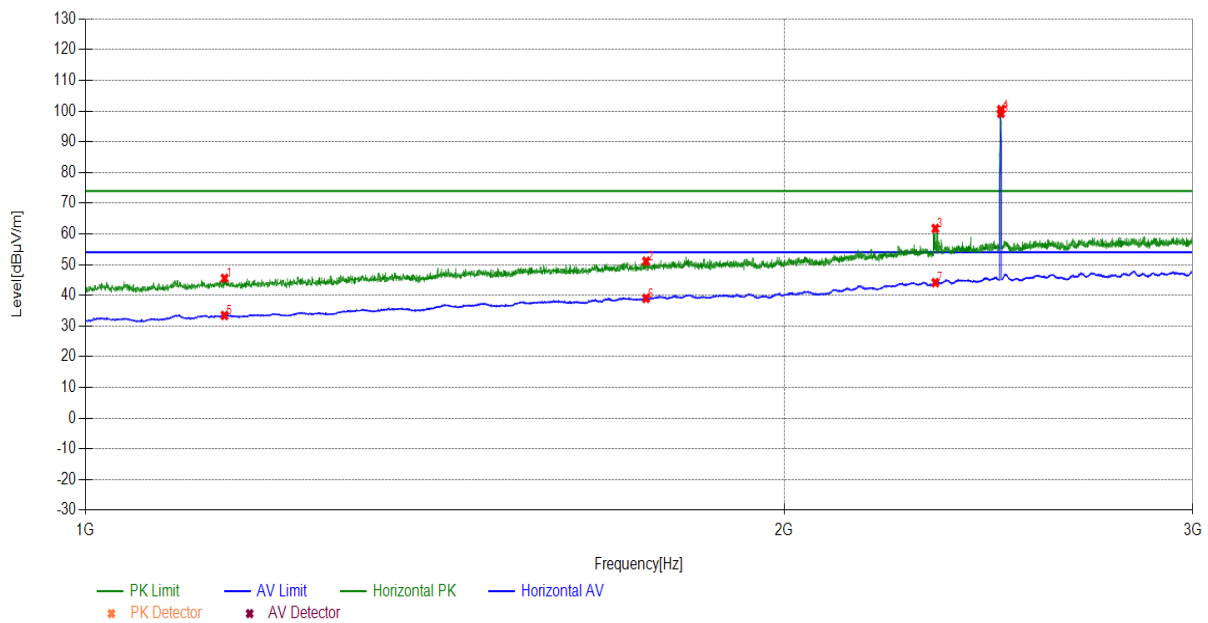
Radiates Emission		9kHz~1GHz							
Test channel		Worst-Case							
Polarity		Vertical							
Suspected List									
Frequency [MHz]	Factor [dB]	Reading [dBμV/m]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Detector	Height [cm]	Angle deg	Pass/Fail
40.9621	19.95	3.81	23.76	40.00	16.24	PK	100	110	PASS
56.1926	20.09	-2.20	17.89	40.00	22.11	PK	100	310	PASS
154.5605	20.79	-0.46	20.33	43.51	23.18	PK	100	90	PASS
454.4174	25.41	-0.72	24.69	46.01	21.32	PK	100	240	PASS
614.0954	28.96	0.24	29.20	46.01	16.81	PK	100	100	PASS
831.3001	32.44	1.55	33.99	46.00	12.01	PK	100	90	PASS

Note: 9kHz~30MHz have been test and test data more than 20dB margin.

Final Data List							
Frequency [MHz]	Factor [dB]	QP Value [dB μ V/m]	QP Limit [dB μ V/m]	QP Margin [dB]	Height [cm]	Angle [°]	Pass/Fail
40.9437	19.95	17.59	40.00	22.41	110	350	PASS
56.0251	20.09	8.17	40.00	31.83	210	190	PASS
155.2539	20.79	9.30	43.51	34.21	300	320	PASS
452.2867	25.41	14.96	46.01	31.05	350	200	PASS
616.095	28.96	19.26	46.01	26.75	210	150	PASS
833.9106	32.44	22.55	46.00	23.45	210	150	PASS

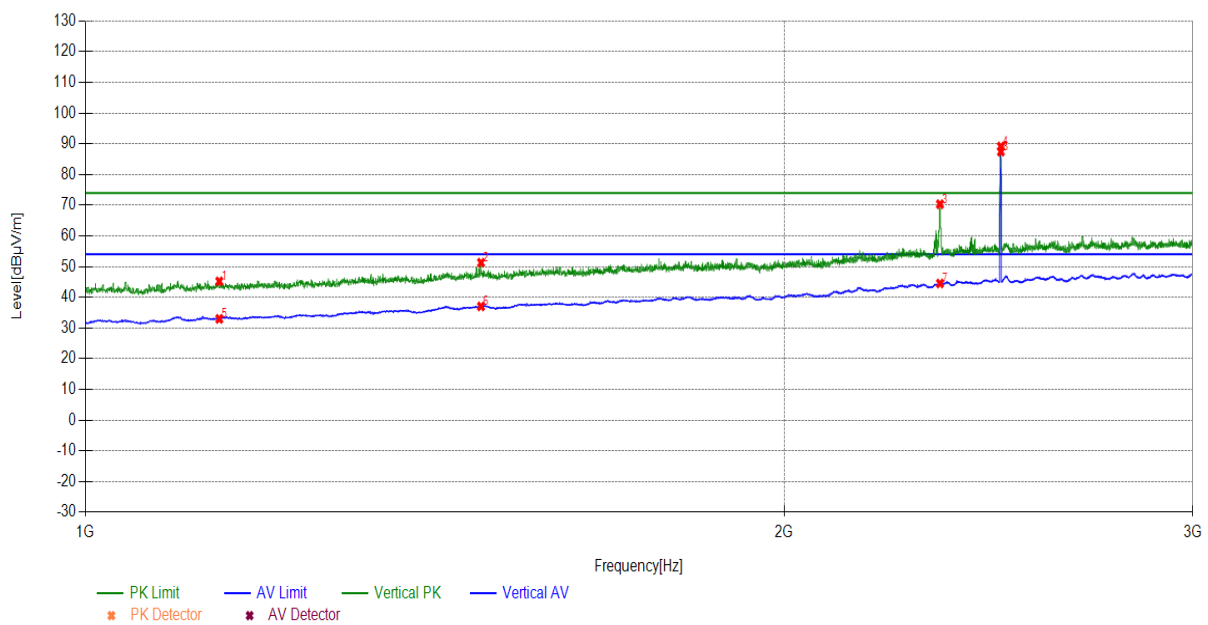


Radiates Emission		1G~3G							
Test channel		Worst-Case							
polarization		Horizontal							
Suspected List									
Frequency[MHz]	Factor [dB]	Reading [dBμV/m]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Detect or	Height [cm]	Angle deg	Pass/ Fail
1148.0148	27.46	18.10	45.56	74.00	28.44	PK	150	332	PASS
1744.0744	32.60	18.50	51.10	74.00	22.90	PK	150	147	PASS
2323.9324	36.65	25.12	61.77	74.00	12.23	PK	150	121	PASS
2480.148	37.70	62.75	100.45	74.00	-26.45	PK	150	253	---
1148.0148	27.46	5.99	33.45	54.00	20.55	AV	150	41	PASS
1744.0744	32.60	6.41	39.01	54.00	14.99	AV	150	147	PASS
2323.9324	36.65	7.47	44.12	54.00	9.88	AV	150	227	PASS
2480.148	37.70	61.58	99.28	54.00	-45.28	AV	150	253	---



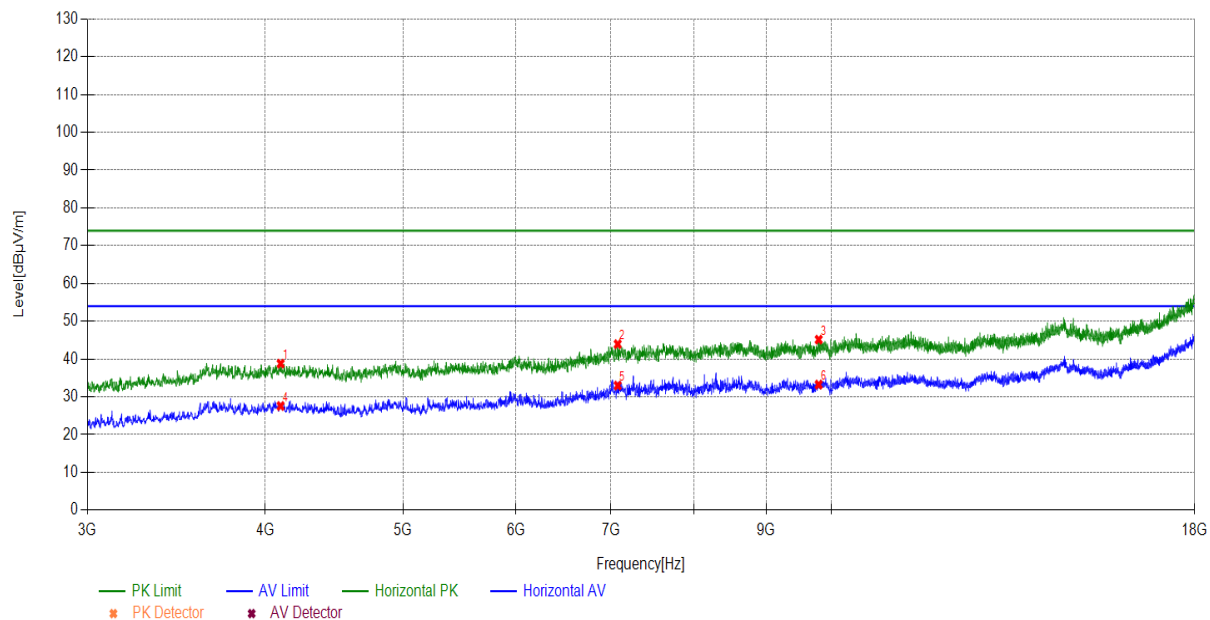
Note: The signal beyond the limit is carrier

Radiates Emission		1G~3G							
Test channel		Worst-Case							
polarization		Vertical							
Suspected List									
Frequency[MHz]	Factor [dB]	Reading [dBμV/m]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Detect or	Height [cm]	Angle deg	Pass/ Fail
1142.0142	27.41	17.79	45.20	74.00	28.80	PK	150	151	PASS
1480.6481	30.73	20.56	51.29	74.00	22.71	PK	150	164	PASS
2334.7335	36.75	33.59	70.34	74.00	3.66	PK	150	177	PASS
2480.148	37.70	51.45	89.15	74.00	-15.15	PK	150	1	---
1142.0142	27.41	5.58	32.99	54.00	21.01	AV	150	98	PASS
1480.6481	30.73	6.31	37.04	54.00	16.96	AV	150	177	PASS
2334.7335	36.75	7.77	44.52	54.00	9.48	AV	150	177	PASS
2480.148	37.70	49.76	87.46	54.00	-33.46	AV	150	1	---

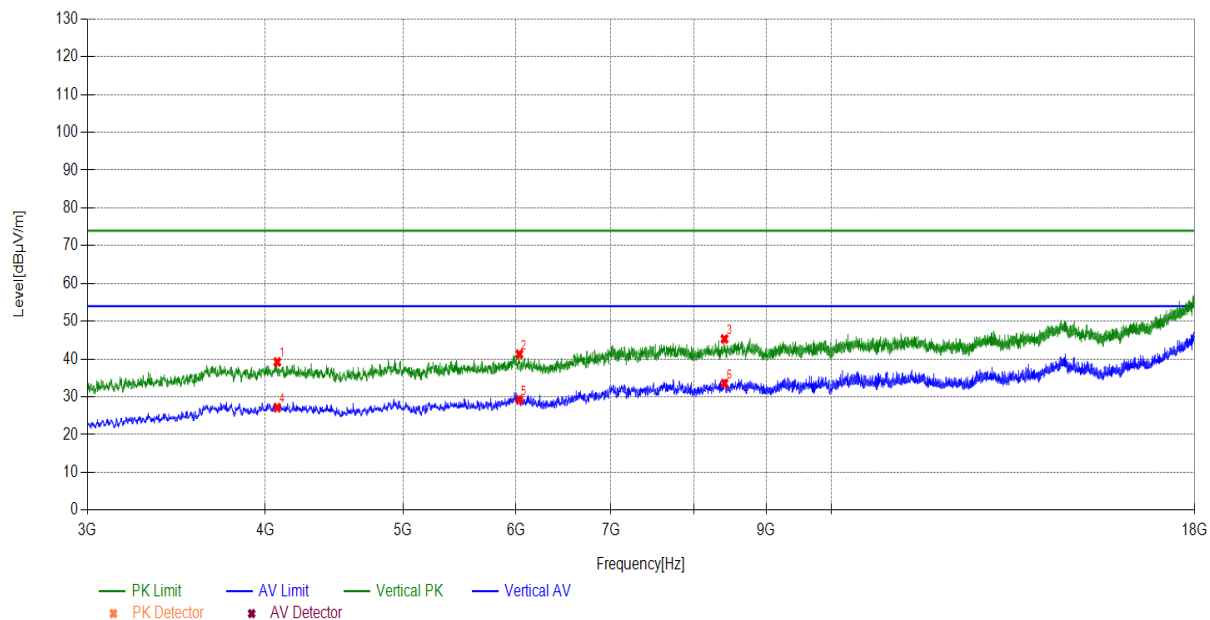


Note: The signal beyond the limit is carrier

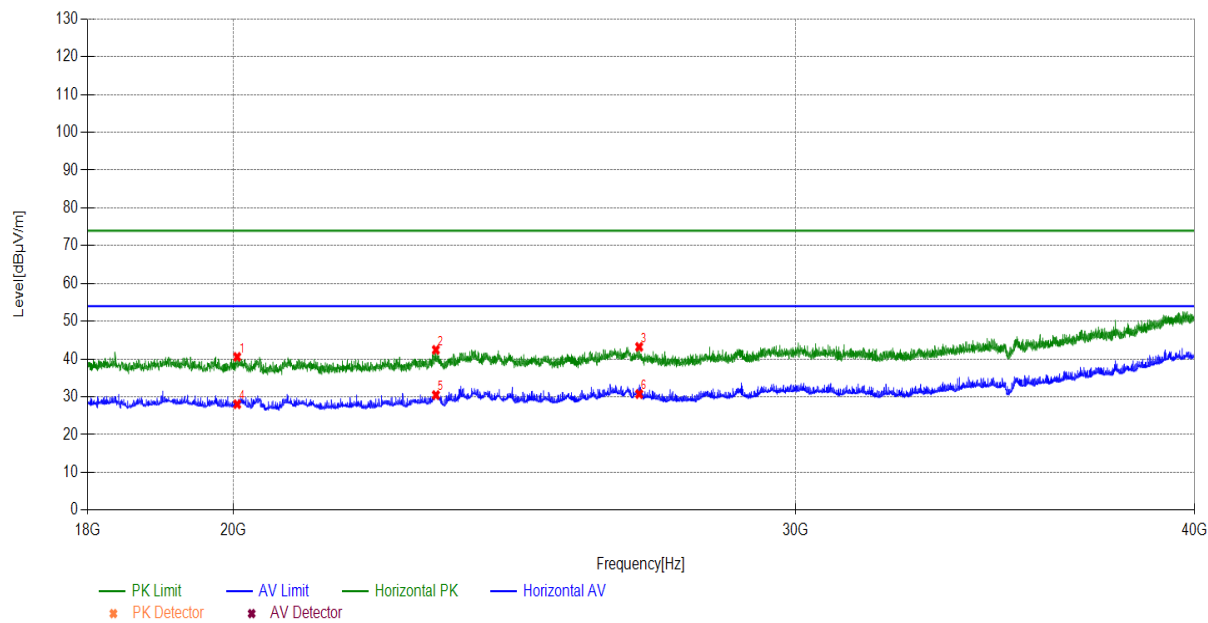
Radiates Emission		3G~18G							
Test channel		Worst-Case							
polarization		Horizontal							
Suspected List									
Frequency[MHz]	Factor [dB]	Reading [dBμV/m]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Detect or	Height [cm]	Angle deg	Pass/ Fail
4101.1101	-0.24	39.03	38.79	74.00	35.21	PK	150	230	PASS
7075.9076	8.03	35.94	43.97	74.00	30.03	PK	150	110	PASS
9795.6796	11.57	33.58	45.15	74.00	28.85	PK	150	210	PASS
4101.1101	-0.24	27.83	27.59	54.00	26.41	AV	150	10	PASS
7075.9076	8.03	24.97	33.00	54.00	21.00	AV	150	100	PASS
9795.6796	11.57	21.68	33.25	54.00	20.75	AV	150	10	PASS



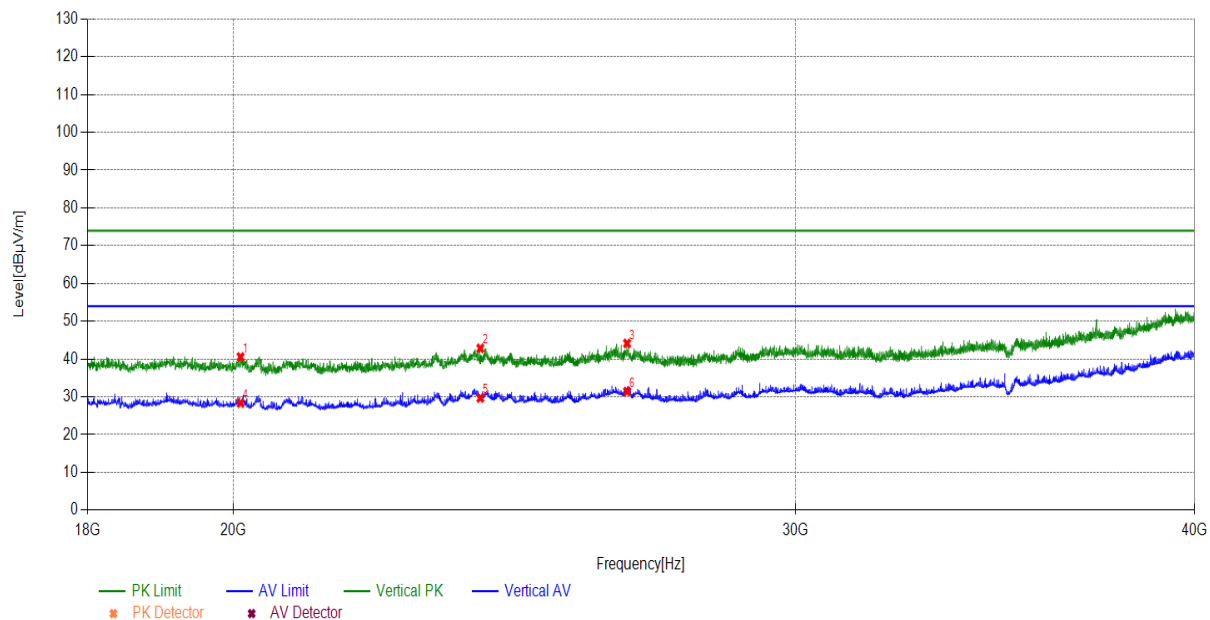
Radiates Emission		3G~18G							
Test channel		Worst-Case							
polarization		Vertical							
Suspected List									
Frequency[MHz]	Factor [dB]	Reading [dBμV/m]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Detect or	Height [cm]	Angle deg	Pass/ Fail
4078.6079	-0.22	39.47	39.25	74.00	34.75	PK	150	250	PASS
6034.8035	4.98	36.34	41.32	74.00	32.68	PK	150	100	PASS
8411.0411	9.03	36.29	45.32	74.00	28.68	PK	150	130	PASS
4078.6079	-0.22	27.37	27.15	54.00	26.85	AV	150	140	PASS
6034.8035	4.98	24.25	29.23	54.00	24.77	AV	150	350	PASS
8411.0411	9.03	24.54	33.57	54.00	20.43	AV	150	20	PASS



Radiates Emission		18G~40G							
Test channel		Worst-Case							
polarization		Horizontal							
Suspected List									
Frequency[MHz]	Factor [dB]	Reading [dBμV/m]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Detect or	Height [cm]	Angle deg	Pass/ Fail
20052.8053	1.32	39.26	40.58	74.00	33.42	PK	150	110	PASS
23141.9142	3.01	39.42	42.43	74.00	31.57	PK	150	120	PASS
26796.4796	4.82	38.40	43.22	74.00	30.78	PK	150	250	PASS
20052.8053	1.32	26.74	28.06	54.00	25.94	AV	150	340	PASS
23141.9142	3.01	27.47	30.48	54.00	23.52	AV	150	40	PASS
26796.4796	4.82	25.93	30.75	54.00	23.25	AV	150	240	PASS



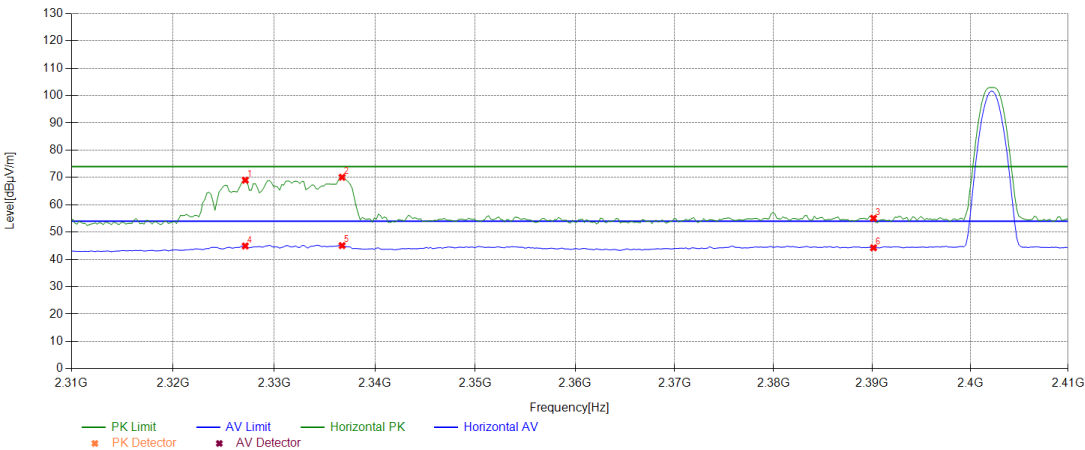
Radiates Emission		18G~40G							
Test channel		Worst-Case							
polarization		Vertical							
Suspected List									
Frequency[MHz]	Factor [dB]	Reading [dBμV/m]	Level [dBμV/ m]	Limit [dBμV/ m]	Margin [dB]	Detect or	Height [cm]	Angle deg	Pass/ Fail
20101.2101	1.34	39.22	40.56	74.00	33.44	PK	150	270	PASS
23896.5897	3.62	39.23	42.85	74.00	31.15	PK	150	90	PASS
26563.2563	4.73	39.43	44.16	74.00	29.84	PK	150	90	PASS
20101.2101	1.34	27.03	28.37	54.00	25.63	AV	150	50	PASS
23896.5897	3.62	26.09	29.71	54.00	24.29	AV	150	310	PASS
26563.2563	4.73	26.69	31.42	54.00	22.58	AV	150	180	PASS



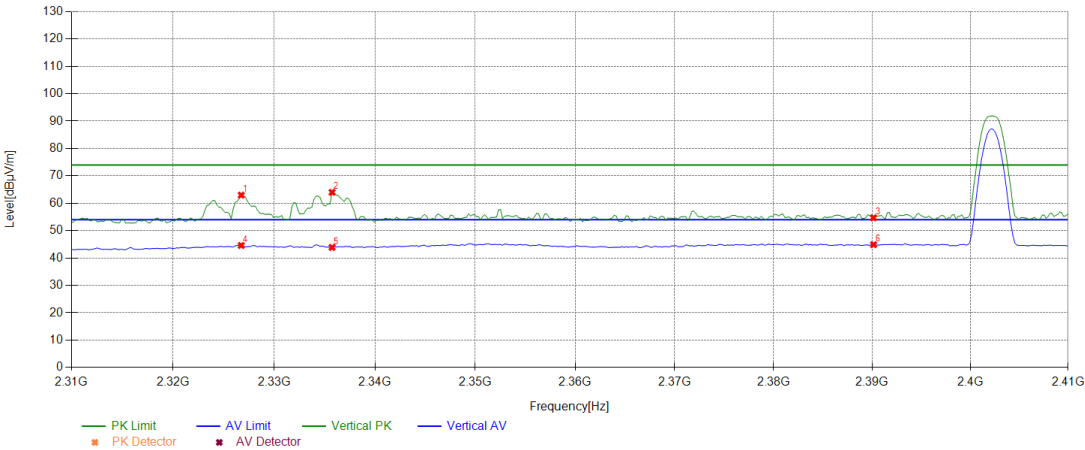
Band Edge: Bluetooth(LE_1M)

During the test, the Band Edge was performed in Bluetooth(LE_1M) all modes with all channels and all antennas. Bluetooth(LE_1M), Antenna 1 are selected as the worst condition. The test data of the worst-case condition was recorded in this report.

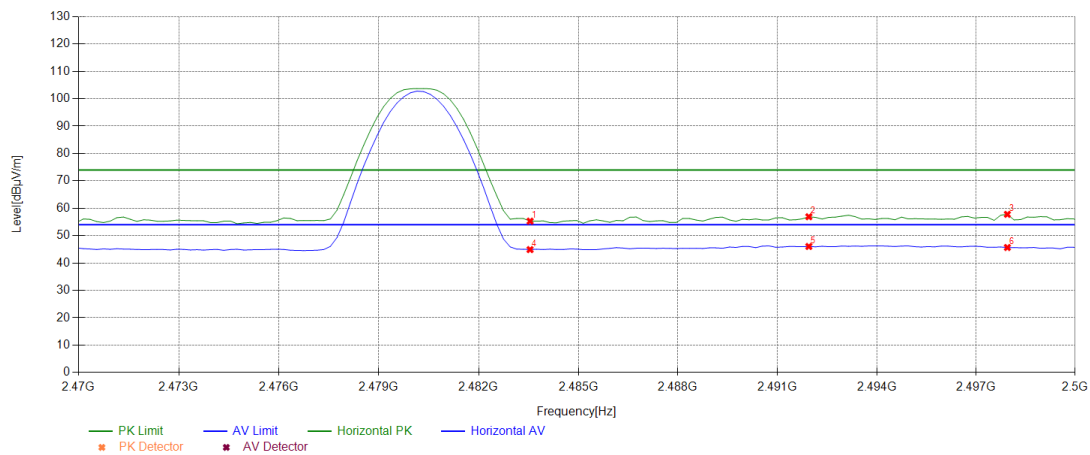
Test mode			Bluetooth(LE_1M)						
Test channel			Lowest channel						
polarization			Horizontal						
Suspected List									
Frequency [MHz]	Factor [dB]	Reading [dBμV/m]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Detector	Height [cm]	Angle deg	Pass/ Fail
2327.1327	36.68	32.33	69.01	74.00	4.99	PK	150	318	PASS
2336.7337	36.77	33.30	70.07	74.00	3.93	PK	150	355	PASS
2390.139	37.24	17.83	55.07	74.00	18.93	PK	150	146	PASS
2327.1327	36.68	8.25	44.93	54.00	9.07	AV	150	41	PASS
2336.7337	36.77	8.29	45.06	54.00	8.94	AV	150	355	PASS
2390.139	37.24	7.04	44.28	54.00	9.72	AV	150	318	PASS



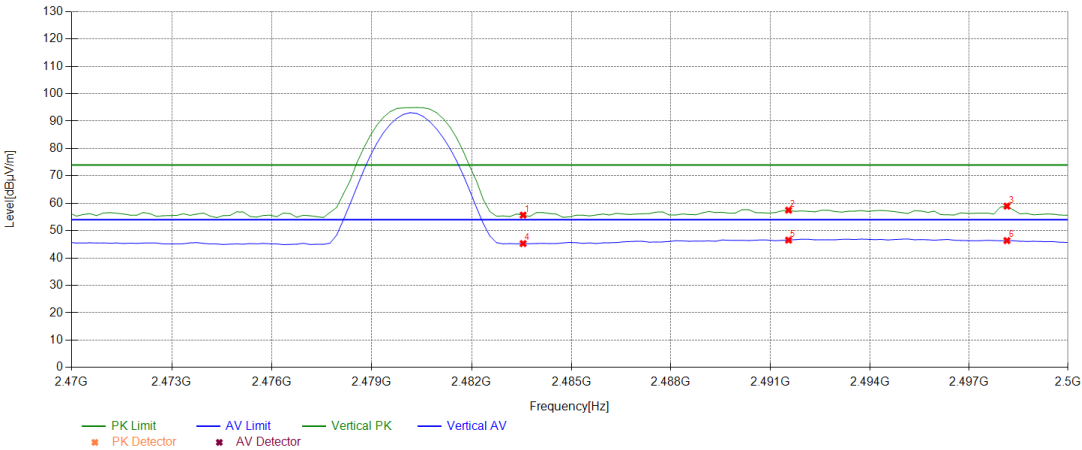
Test mode			Bluetooth(LE_1M)						
Test channel			Lowest channel						
polarization			Vertical						
Suspected List									
Frequency [MHz]	Factor [dB]	Reading [dBμV/m]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Detector	Height [cm]	Angle deg	Pass/ Fail
2326.7327	36.68	26.28	62.96	74.00	11.04	PK	150	354	PASS
2335.7336	36.76	27.24	64.00	74.00	10.00	PK	150	50	PASS
2390.139	37.24	17.47	54.71	74.00	19.29	PK	150	342	PASS
2326.7327	36.68	7.91	44.59	54.00	9.41	AV	150	354	PASS
2335.7336	36.76	7.12	43.88	54.00	10.12	AV	150	50	PASS
2390.139	37.24	7.65	44.89	54.00	9.11	AV	150	157	PASS



Test mode			Bluetooth(LE_1M)						
Test channel			Highest channel						
polarization			Horizontal						
Suspected List									
Frequency [MHz]	Factor [dB]	Reading [dBμV/m]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Detector	Height [cm]	Angle deg	Pass/ Fail
2483.5484	37.72	17.57	55.29	74.00	18.71	PK	150	304	PASS
2491.9492	37.76	19.14	56.90	74.00	17.10	PK	150	159	PASS
2497.9498	37.79	19.99	57.78	74.00	16.22	PK	150	344	PASS
2483.5484	37.72	7.19	44.91	54.00	9.09	AV	150	344	PASS
2491.9492	37.76	8.30	46.06	54.00	7.94	AV	150	93	PASS
2497.9498	37.79	7.88	45.67	54.00	8.33	AV	150	93	PASS



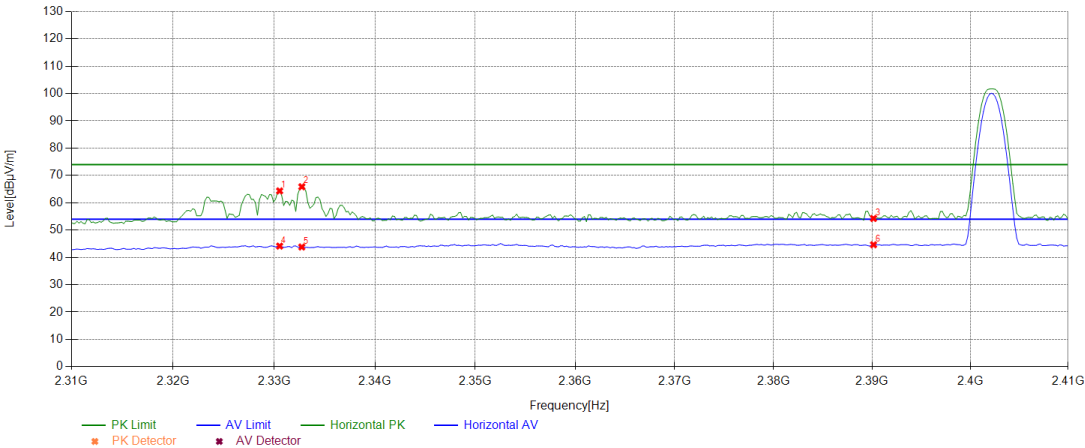
Test mode			Bluetooth(LE_1M)						
Test channel			Highest channel						
polarization			Vertical						
Suspected List									
Frequency [MHz]	Factor [dB]	Reading [dBμV/m]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Detector	Height [cm]	Angle deg	Pass/ Fail
2483.5484	37.72	17.95	55.67	74.00	18.33	PK	150	266	PASS
2491.5492	37.76	19.73	57.49	74.00	16.51	PK	150	52	PASS
2498.1498	37.79	21.16	58.95	74.00	15.05	PK	150	212	PASS
2483.5484	37.72	7.56	45.28	54.00	8.72	AV	150	356	PASS
2491.5492	37.76	8.78	46.54	54.00	7.46	AV	150	13	PASS
2498.1498	37.79	8.57	46.36	54.00	7.64	AV	150	52	PASS



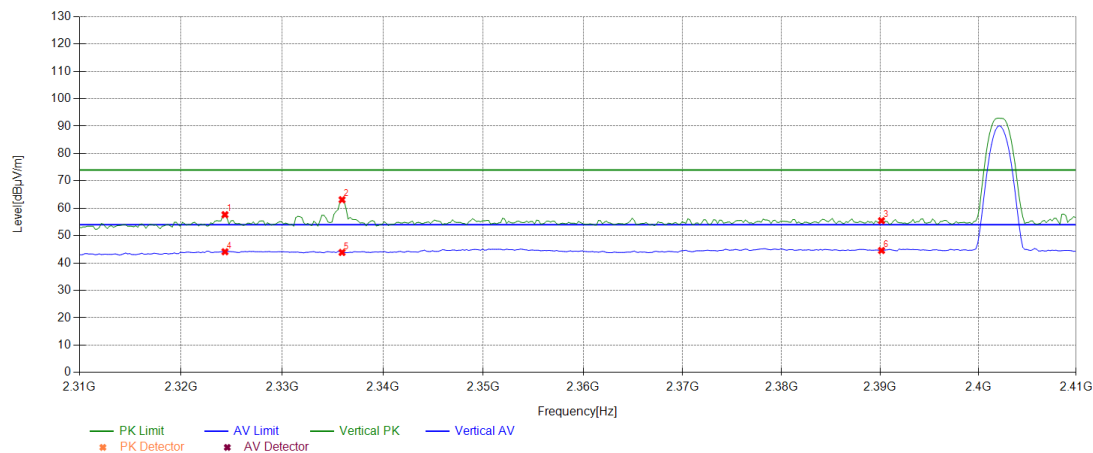
Band Edge: 2.4G Customization

During the test, the Band Edge was performed in 2.4G Customization all modes with all channels and all antennas. 2.4G Customization, Antenna 1 are selected as the worst condition. The test data of the worst-case condition was recorded in this report.

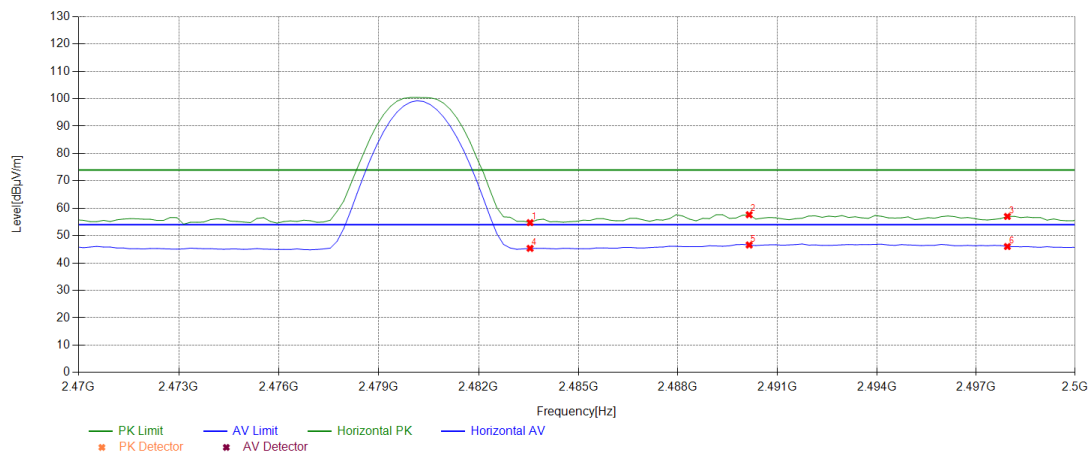
Test mode			2.4G Customization						
Test channel			Lowest channel						
polarization			Horizontal						
Suspected List									
Frequency [MHz]	Factor [dB]	Reading [dBμV/m]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Detector	Height [cm]	Angle deg	Pass/ Fail
2330.5331	36.71	27.65	64.36	74.00	9.64	PK	150	213	PASS
2332.7333	36.73	29.15	65.88	74.00	8.12	PK	150	213	PASS
2390.139	37.24	17.03	54.27	74.00	19.73	PK	150	226	PASS
2330.5331	36.71	7.44	44.15	54.00	9.85	AV	150	186	PASS
2332.7333	36.73	7.10	43.83	54.00	10.17	AV	150	174	PASS
2390.139	37.24	7.40	44.64	54.00	9.36	AV	150	147	PASS



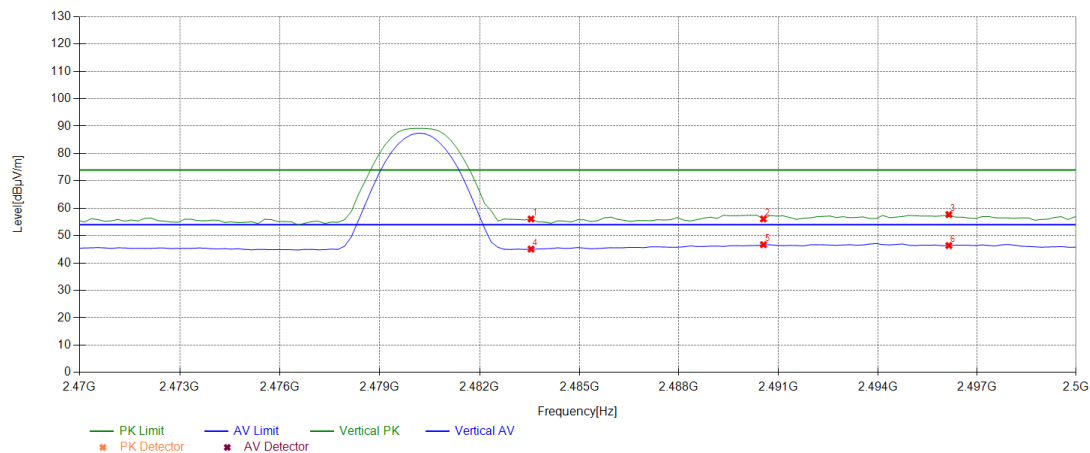
Test mode			2.4G Customization						
Test channel			Lowest channel						
polarization			Vertical						
Suspected List									
Frequency [MHz]	Factor [dB]	Reading [dBμV/m]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Detector	Height [cm]	Angle deg	Pass/ Fail
2324.3324	36.66	20.98	57.64	74.00	16.36	PK	150	90	PASS
2335.9336	36.76	26.36	63.12	74.00	10.88	PK	150	37	PASS
2390.139	37.24	18.22	55.46	74.00	18.54	PK	150	90	PASS
2324.3324	36.66	7.46	44.12	54.00	9.88	AV	150	330	PASS
2335.9336	36.76	7.11	43.87	54.00	10.13	AV	150	317	PASS
2390.139	37.24	7.33	44.57	54.00	9.43	AV	150	11	PASS



Test mode			2.4G Customization						
Test channel			Highest channel						
polarization			Horizontal						
Suspected List									
Frequency [MHz]	Factor [dB]	Reading [dBμV/m]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Detector	Height [cm]	Angle deg	Pass/ Fail
2483.5484	37.72	17.03	54.75	74.00	19.25	PK	150	80	PASS
2490.149	37.75	19.89	57.64	74.00	16.36	PK	150	293	PASS
2497.9498	37.79	19.23	57.02	74.00	16.98	PK	150	80	PASS
2483.5484	37.72	7.64	45.36	54.00	8.64	AV	150	293	PASS
2490.149	37.75	8.83	46.58	54.00	7.42	AV	150	360	PASS
2497.9498	37.79	8.25	46.04	54.00	7.96	AV	150	280	PASS



Test mode			2.4G Customization						
Test channel			Highest channel						
polarization			Vertical						
Suspected List									
Frequency [MHz]	Factor [dB]	Reading [dBμV/m]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Detector	Height [cm]	Angle deg	Pass/ Fail
2483.5484	37.72	18.38	56.10	74.00	17.90	PK	150	358	PASS
2490.5491	37.75	18.37	56.12	74.00	17.88	PK	150	203	PASS
2496.1496	37.78	19.93	57.71	74.00	16.29	PK	150	59	PASS
2483.5484	37.72	7.38	45.10	54.00	8.90	AV	150	309	PASS
2490.5491	37.75	8.96	46.71	54.00	7.29	AV	150	203	PASS
2496.1496	37.78	8.62	46.40	54.00	7.60	AV	150	335	PASS



5.3 Maximum conducted output power

Ambient condition:

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

Method of Measurement:

The EUT was tested according to DTS test procedure of ANSI C63.10 for compliance to FCC 47CFR 15.247 requirements. The maximum conducted output power using ANSI C63.10 section 11.9.2.3 AVGPM Average power meter method.

1. Power meter and sensor's minimum video bandwidth is 50MHz, larger than 802.11n(40MHz) bandwidth;
2. Fast responding diode sensors respond immediately to changes in power level to reduce total test time.
3. Use average detector to test.

During the process of the testing, The EUT was connected to Spectrum Analyzer with a known loss. The EUT is max power transmission with proper modulation. The Average detector is used. We use Maximum Average Conducted Output Power Level Method AVGSA-2 in KDB 558074 D01 /KDB662911 D01 for this test.

The conducted Power is measured at each antenna port. The measured results at the various antenna ports are then summed mathematically.

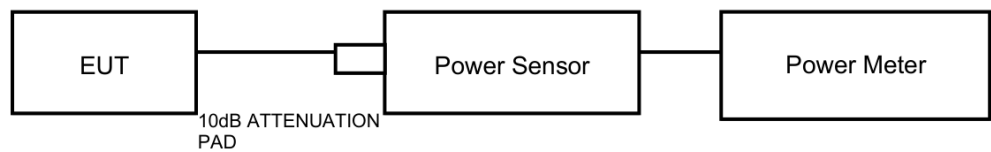
Limits:

Average Output Power	$\leq 1W$ (30dBm)
----------------------	-------------------

Note: the conducted output power limit specified above is based on the use the antennas with directional gains that do not exceed 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated Levels above, as appropriate, by the amount in dB that the directional gain of antenna exceeds 6 dBi.

Systems operating in the 2400-2483.5 MHz band that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6 dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.

Test Setup:



Measurement Uncertainty:

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

Test Results:

TestMode	Antenna	Channel	Result[dBm]	Limit[dBm]	Verdict
BLE_1M	Ant1	2402	-0.2	≤ 30	PASS
	Ant1	2440	-0.56	≤ 30	PASS
	Ant1	2480	-1.18	≤ 30	PASS
2.4G Customization	Ant1	2402	-3.91	≤ 30	PASS
	Ant1	2440	-4.8	≤ 30	PASS
	Ant1	2480	-4.99	≤ 30	PASS

5.4 Minimum 6 dB 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 100 kHz; VBW is set to 300 kHz on spectrum analyzer.

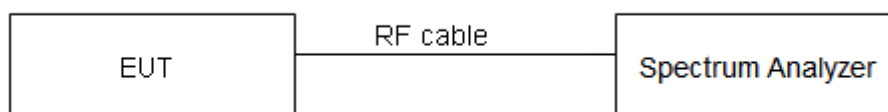
Detector=Peak, Trace mode=Max hold.

Limits:

Rule Part 15.247 (a) (2) specifies that “Systems using digital modulation techniques may operate in the 902–928 MHz, 2400–2483.5 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.”

Minimum 6dB Bandwidth	≥ 500 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	DTS BW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
BLE_1M	Ant1	2402	0.67	2401.70	2402.36	≥ 0.5	PASS
		2440	0.67	2439.70	2440.36	≥ 0.5	PASS
		2480	0.67	2479.70	2480.37	≥ 0.5	PASS
2.4G Customization	Ant1	2402	0.66	2401.69	2402.35	≥ 0.5	PASS
		2440	0.68	2439.68	2440.36	≥ 0.5	PASS
		2480	0.66	2479.69	2480.35	≥ 0.5	PASS

5.5 Occupied Channel Bandwidth

Ambient condition:

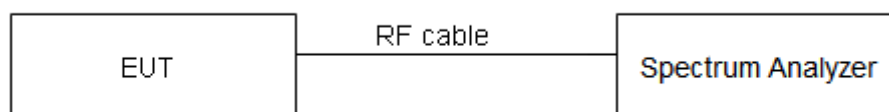
Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

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 50 kHz; VBW is set to 200 kHz on spectrum analyzer.

Detector=Peak, Trace mode=Max hold.

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
BLE_1M	Ant1	2402	1.023	2401.517	2402.540	---	---
		2440	1.019	2439.521	2440.540	---	---
		2480	1.027	2479.517	2480.544	---	---
2.4G Customization	Ant1	2402	1.023	2401.505	2402.528	---	---
		2440	1.019	2439.509	2440.528	---	---
		2480	1.023	2479.505	2480.528	---	---

5.6 Band Edge Measurement

Ambient condition:

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

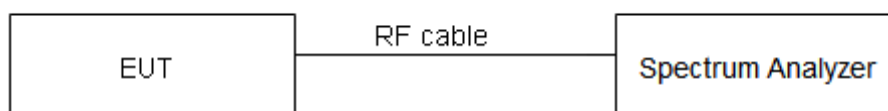
Method of Measurement:

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 $k = 1.96$, $U = 936 \text{ Hz}$, $2 \text{ GHz}-3 \text{ GHz} = 1.407 \text{ dB}$.

Test Results:

TestMode	Antenna	ChName	Channel	RefLevel[dBm]	Result[dBm]	Limit[dBm]	Verdict
BLE_1M	Ant1	Low	2402	-0.64	-48.49	≤ -20.64	PASS
		High	2480	-1.38	-48.53	≤ -21.38	PASS
2.4G Customization	Ant1	Low	2402	-4.26	-49.68	≤ -24.26	PASS
		High	2480	-5.29	-48.53	≤ -25.29	PASS

5.7 Maximum Power Spectral Density

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 Spectrum Analyzer with a known loss. The EUT is max power transmission with proper modulation. The Average detector is used. We use Method AVGPSD-2 in KDB 558074 D01 for this test.

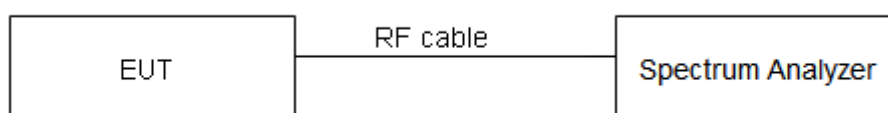
The conducted Power is measured at each antenna port. The measured results at the various antenna ports are then summed mathematically.

Limits:

Rule Part 15.247(e) specifies that" 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.

Maximum Power Spectral Density	$\leq 8 \text{ dBm} / 3\text{kHz}$
--------------------------------	------------------------------------

Test Setup:



Measurement Uncertainty:

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

Test Results:

TestMode	Antenna	Channel	Result[dBm/3kHz]	Limit[dBm/3kHz]	Verdict
BLE_1M	Ant1	2402	-9.44	≤8	PASS
		2440	-9.54	≤8	PASS
		2480	-9.76	≤8	PASS
2.4G Customization	Ant1	2402	-13.55	≤8	PASS
		2440	-14.18	≤8	PASS
		2480	-13.71	≤8	PASS

5.8 Spurious RF Conducted Emissions

Ambient condition:

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

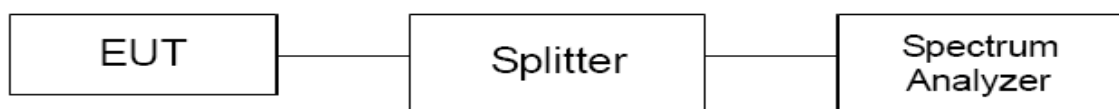
Method of Measurement:

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 to 100kHz and VBW to 300 kHz, Sweep is set to AUTO. The test is in transmitting mode.

Limits:

Rule Part 15.247(d) specifies 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
BLE_1M	Ant1	2402	Reference	-0.44	-0.44	---	PASS
			30~1000	-0.44	-60.03	≤ -20.44	PASS
			1000~26500	-0.44	-39.35	≤ -20.44	PASS
		2440	Reference	-0.80	-0.80	---	PASS
			30~1000	-0.80	-61.2	≤ -20.8	PASS
			1000~26500	-0.80	-49.54	≤ -20.8	PASS
		2480	Reference	-1.40	-1.40	---	PASS
			30~1000	-1.40	-59.93	≤ -21.4	PASS
			1000~26500	-1.40	-36.69	≤ -21.4	PASS
2.4G Customization	Ant1	2402	Reference	-4.06	-4.06	---	PASS
			30~1000	-4.06	-60.97	≤ -24.06	PASS
			1000~26500	-4.06	-42.07	≤ -24.06	PASS
		2440	Reference	-5.11	-5.11	---	PASS
			30~1000	-5.11	-61.25	≤ -25.11	PASS
			1000~26500	-5.11	-41.2	≤ -25.11	PASS
		2480	Reference	-5.19	-5.19	---	PASS
			30~1000	-5.19	-61.42	≤ -25.19	PASS
			1000~26500	-5.19	-39.64	≤ -25.19	PASS

6. Appendix A

Test Equipment	Type/Mode	SERIAL NO.	Equipment No.	Manufacturer	Cal. Due
Spectrum Analyzer	FSV40	101580	DZ-000238-3	R&S	2024/04/22
Comprehensive Test Instrument	CMW270	100304	DZ-000240-1	R&S	2023/12/06
Analog Signal Generator	SMB100A	181858	DZ-000238-2	R&S	2024/05/29
Vector Signal Generator	SGT100A	111661	DZ-000238-1	R&S	2024/05/29
RF Radio Frequency Switch	JS0806-2	19H9080187	DZ-000241	Tonscend	2024/05/29
Programmable DC Power Supply	E3644A	MY58036222	DZ-000178	KEYSIGHT	2024/04/12
3m Semi-Anechoic Chamber	FACT-4	ST08035	WKNA-0024	ETS	2024/12/12
5m Semi-Anechoic Chamber	SAC-5	SAC-5-2.0	EM-000557	COMTEST	2024/11/02
Spectrum Analyzer	N9010B	MY57470323	DZ-000174	KEYSIGHT	2024/02/22
EMI Test Receiver	N9038A-508	MY532290079	EM-000397	Agilent	2024/02/22
EMI Test Receiver	ESR7	102235	VG DY-0956	R&S	2024/02/22
loop antenna	HLA 6121	540046	EM-000546	TESEQ	2024/06/05
Broadband Antenna	VULB 9168	01537	EM-000736-1	SCHWARZBECK	2024/04/24
Broadband Antenna	VULB 9163	9163-530	EM-000342	SCHWARZBECK	2024/06/10
Waveguide Horn Antenna	HF906	360306/008	EM-000093	R&S	2024/02/24
Waveguide Horn Antenna	BBHA9170	00949	EM-000383	SCHWARZBECK	2023/08/26
Bandstop Filters	SW-BSF-2400-100-7-A1	/	EM-000495	/	2024/08/29
5G Bandstop Filters	WRCJV12-4900-5100-5900-6100-50EE	1	DZ-000186	WI	2023/12/06
Preamplifier	BBV 9721	9721-050	DZ-000209-1	SCHWARZBECK	2024/06/04
EMI Test Receiver	ESR3	102394	VG DY-0705	R&S	2024/04/22
LISN	NSLK 8127	8127644	EM-000370	SCHWARZBECK	2024/07/27
Plus Limiter (#2)	VTSD 9561	9561-F017	EM-000367	SCHWARZBECK	2024/09/03
Shielding Room(#2)	GP1A	001	WKNF-0006	LEINING	2024/08/07
Temperature and humidity meter	MHO-C201	/	DZ-000249-2	Seconds test	2024/09/23

The End

Important

1. The test report is invalid without the official stamp of CVC;
2. Any part photocopies of the test report are forbidden without the written permission from CVC;
3. The test report is invalid without the signatures of Author and Reviewer;
4. The test report is invalid if altered;
5. Objections to the test report must be submitted to CVC within 15 days;
6. Generally, commission test is responsible for the tested samples only;
7. As for the test result, “—” or “ N/A” means “not applicable”, “ / ”means “not testing”, “P” means “pass” and “F” means “fail”.

***The test data and test results given in this test report should only be used for purposes of scientific research, teaching and internal quality control when the CMA symbol is not presented. ***

Address: No.3,Tiantaiyi Road, Kaitai Avenue, Science City, Guangzhou, China (Test location)

Post Code: 510663 Tel: 020-32293888

FAX: 020 32293889 E-mail: office@cvc.org.cn