ACCREDITED
CERTIFICATE #5473.01

Test Report No.:
FCC2022-0035-RF1/R3

TEST REPORT

FCC ID	:	2AK43RD-836
Applicant	:	Guangzhou Rigal Electronics Co., Ltd.
Product Name	:	Multimedia Projector
Mode No.	:	RD-***(***for 0-9), ACE K1

CVC Testing Technology Co., Ltd.

Applicant	**Name:** Guangzhou Rigal Electronics Co., Ltd. **Address:** Floor 1, Floor 2, Floor3, Factory Building, No.30, The north of Hongmlandadao, Xiuquan Street, Huadu District, Guangzhou
Manufacturer	**Name:** Guangzhou Rigal Electronics Co., Ltd. **Address:** No.3, Ruixiang Road,Huadu District,Guangzhou
Equipment Under Test	**Product Name :** Multimedia Projector **Model No. :** RD-***(***for 0-9), ACE K1 **Trade mark : —** **Serial no. : —** **Sampling :** 1-1

Date of Receipt.	**2022.06.29**	Date of Testing	**2022.08.30**

Test Specification	**Test Result**
FCC CFR47 Part 15C (2020) Radio Frequency Devices ANSI C63.10 (2013) KDB 558074 D01 DTS Meas Guidance v05 KDB 66911 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** **Issue Date: 2022.10.13**

Tested by:	Reviewed by:	Approved by:
Xu Zhenfei	**Liu YongHai**	**Chen HuaWen**

Other Aspects: NONE.

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

This test report relates only to the EUT, and shall not be reproduced except in full, without written approval of **CVC**.
This report replaces the report No.FCC2022-0035-RF1/R2 after issuance.

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1. General Product Information

1.1 General information

Product Name	Multimedia Projector
Model No.	RD-836
Additional model	RD-***(***for 0-9), ACE K1
Power Supply	AC100-240V~ 50/60Hz
Antenna Type	Internal Antenna
Antenna Connector	A detachable antenna
Antenna Gain	1.42 dBi (provided by client)
Beamforming gain	Unsupported (provided by client)
Frequency Range	Bluetooth(Low Energy): 2402~2480MHz IEEE 802.11b/g/n/ax(20MHz): 2412~2462MHz IEEE 802.11n/ax(40MHz): 2422~2452MHz
Channel Number	Bluetooth(Low Energy):40 Channels IEEE 802.11b/g/n/ax(20MHz): 11 Channels IEEE 802.11n/ax(40MHz): 7 Channels
Type of Modulation	Bluetooth(Low Energy):GFSK IEEE 802.11b: DSSS (CCK,DQPSK,DBPSK); IEEE 802.11g: OFDM (64QAM, 16QAM, QPSK, BPSK); IEEE 802.11n(HT20 and HT40) : OFDM (1024QAM,256QAM,64QAM, 16QAM,QPSK,BPSK); IEEE 802.11ax(HE20 and HE40) : OFDMA (1024QAM,256QAM,64QAM, 16QAM,QPSK,BPSK).
Max. Conducted Power	Bluetooth(Low Energy):4.32 dBm IEEE 802.11b: 16.20 dBm IEEE 802.11g: 13.82 dBm IEEE 802.11n(20MHz): 13.71 dBm IEEE 802.11n(40MHz): 12.07 dBm IEEE 802.11ax(20MHz): 12.13 dBm IEEE 802.11ax(40MHz): 14.87 dBm
Resource Unit(802.11ax)	■Full RU ☐Partial RU
Operate Temp.Range	+5°C to +40°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.

Test Mode	Antenna Delivery	Test Channel
Bluetooth(Low Energy)	1TX / 1RX	0,19,39
IEEE 802.11b TX mode	1TX / 1RX	1,6,11
IEEE 802.11g TX mode	1TX / 1RX	1,6,11
IEEE 802.11n 2.4GHz 20MHz TX mode	1TX / 1RX	1,6,11
IEEE 802.11n 2.4GHz 40MHz TX mode	1TX / 1RX	3,6,9
IEEE 802.11ax 2.4GHz 20MHz TX mode	1TX / 1RX	3,6,9
IEEE 802.11ax 2.4GHz 40MHz TX mode	1TX / 1RX	3,6,9

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 configuration for confirming worst case. Data rate below means worst-case rate of each test item.

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

Test Mode	Data Rate		
	Antenna 1	Antenna 2	MIMO
Bluetooth(Low Energy)	1	/	/
IEEE 802.11b TX mode	1	/	/
IEEE 802.11g TX mode	6	/	/
IEEE 802.11n 2.4GHz 20MHz TX mode	MCS 0	/	/
IEEE 802.11n 2.4GHz 40MHz TX mode	MCS 0	/	/
IEEE 802.11ax 2.4GHz 20MHz TX mode	MCS 0	/	/
IEEE 802.11ax 2.4GHz 40MHz TX mode	MCS 0	/	/

Test Mode	Test Modes	Test Channels
Conducted Emissions	IEEE 802.11ax 2.4GHz 20MHz TX mode	1
Radiated Emissions	IEEE 802.11ax 2.4GHz 20MHz TX mode	1
Radiated Emissions (Band Edge)	IEEE 802.11ax 2.4GHz 20MHz TX mode/ Bluetooth(Low Energy)	1,11/ 0,39
Maximum conducted output power	Bluetooth(Low Energy)/ IEEE 802.11b TX mode/ IEEE 802.11g TX mode/ IEEE 802.11n 2.4GHz 20MHz TX mode/ IEEE 802.11n 2.4GHz 40MHz TX mode/ IEEE 802.11ax 2.4GHz 20MHz TX mode/ IEEE 802.11ax 2.4GHz 40MHz TX mode	0,19,39/ 1,6,11/ 1,6,11/ 1,6,11/ 3,6,9/ 1,6,11/ 3,6,9
Minimum 6 dB bandwidth	Bluetooth(Low Energy)/ IEEE 802.11b TX mode/ IEEE 802.11g TX mode/ IEEE 802.11n 2.4GHz 20MHz TX mode/ IEEE 802.11n 2.4GHz 40MHz TX mode/ IEEE 802.11ax 2.4GHz 20MHz TX mode/ IEEE 802.11ax 2.4GHz 40MHz TX mode	0,19,39/ 1,6,11/ 1,6,11/ 1,6,11/ 3,6,9/ 1,6,11/ 3,6,9
Occupied Channel Bandwidth	Bluetooth(Low Energy)/ IEEE 802.11b TX mode/ IEEE 802.11g TX mode/ IEEE 802.11n 2.4GHz 20MHz TX mode/ IEEE 802.11n 2.4GHz 40MHz TX mode/ IEEE 802.11ax 2.4GHz 20MHz TX mode/ IEEE 802.11ax 2.4GHz 40MHz TX mode	0,19,39/ 1,6,11/ 1,6,11/ 1,6,11/ 3,6,9/ 1,6,11/ 3,6,9
Band Edge Measurement	Bluetooth(Low Energy)/ IEEE 802.11b TX mode/ IEEE 802.11g TX mode/ IEEE 802.11n 2.4GHz 20MHz TX mode/ IEEE 802.11n 2.4GHz 40MHz TX mode/ IEEE 802.11ax 2.4GHz 20MHz TX mode/ IEEE 802.11ax 2.4GHz 40MHz TX mode	0,39/ 1,11/ 1,11/ 1,11/ 3,9/ 1,11/ 3,9
Maximum Power spectral density	Bluetooth(Low Energy)/ IEEE 802.11b TX mode/ IEEE 802.11g TX mode/ IEEE 802.11n 2.4GHz 20MHz TX mode/ IEEE 802.11n 2.4GHz 40MHz TX mode/ IEEE 802.11ax 2.4GHz 20MHz TX mode/ IEEE 802.11ax 2.4GHz 40MHz TX mode	0,19,39/ 1,6,11/ 1,6,11/ 1,6,11/ 3,6,9/ 1,6,11/ 3,6,9
Spurious RF Conducted Emissions	Bluetooth(Low Energy)/ IEEE 802.11b TX mode/ IEEE 802.11g TX mode/ IEEE 802.11n 2.4GHz 20MHz TX mode/ IEEE 802.11n 2.4GHz 40MHz TX mode/ IEEE 802.11ax 2.4GHz 20MHz TX mode/ IEEE 802.11ax 2.4GHz 40MHz TX mode	0,19,39/ 1,6,11/ 1,6,11/ 1,6,11/ 3,6,9/ 1,6,11/ 3,6,9

3.2 Duty cycle

TestMode	Antenna	Channel	Transmission Duration [ms]	Transmission Period [ms]	Duty Cycle [%]	Limit	Verdict
11B	Ant1	2412	20.00	20.00	100.00	---	---
		2437	20.00	20.00	100.00	---	---
		2462	20.00	20.00	100.00	---	---
11G	Ant1	2412	2.70	2.73	98.90	---	---
		2437	2.70	2.73	98.90	---	---
		2462	2.70	2.73	98.90	---	---
11N20SISO	Ant1	2412	2.51	2.54	98.82	---	---
		2437	2.50	2.54	98.43	---	---
		2462	2.51	2.54	98.82	---	---
11N40SISO	Ant1	2422	1.22	1.26	96.83	---	---
		2437	1.22	1.26	96.83	---	---
		2452	1.22	1.26	96.83	---	---
11AX20SISO	Ant1	2412	1.91	1.95	97.95	---	---
		2437	1.92	1.95	98.46	---	---
		2462	1.92	1.95	98.46	---	---
11AX40SISO	Ant1	2422	0.97	1.01	96.04	---	---
		2437	0.96	1.01	95.05	---	---
		2452	0.01	0.02	50.00	---	---
BLE_1M	Ant1	2402	2.12	2.50	84.80	---	---
		2440	2.12	2.50	84.80	---	---
		2480	2.12	2.50	84.80	---	---
BLE_2M	Ant1	2402	1.07	1.88	56.91	---	---
		2440	1.07	1.88	56.91	---	---
		2480	1.07	1.88	56.91	---	---

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	/
Minimum 6 dB bandwidth	15.247(a)(2)	PASS	/
Occupied Channel Bandwidth	15.247(a)(2)	PASS	/
Band Edge Measurement	15.247(d)	PASS	/
Maximum Power spectral density	15.247(e)	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

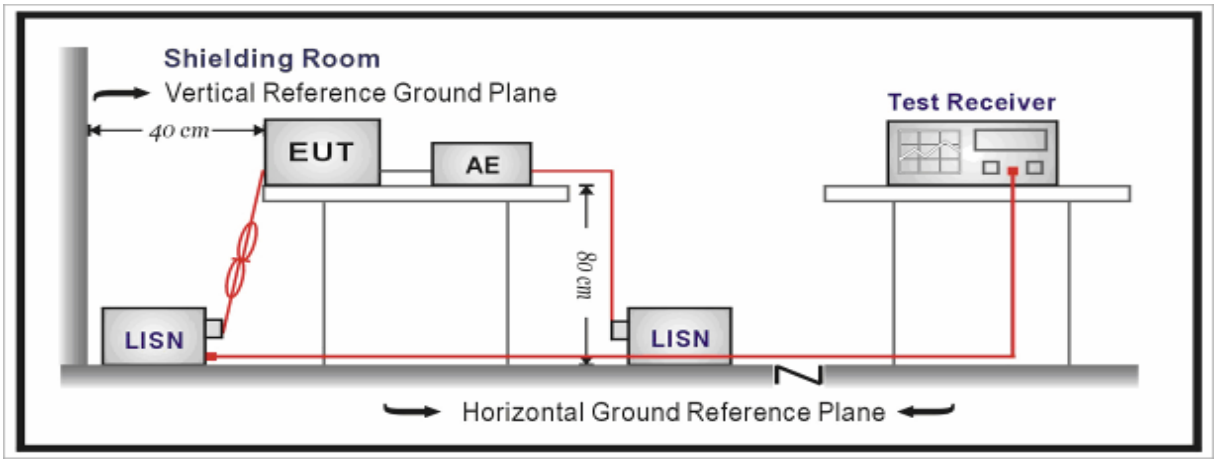
Method of Measurement:

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：

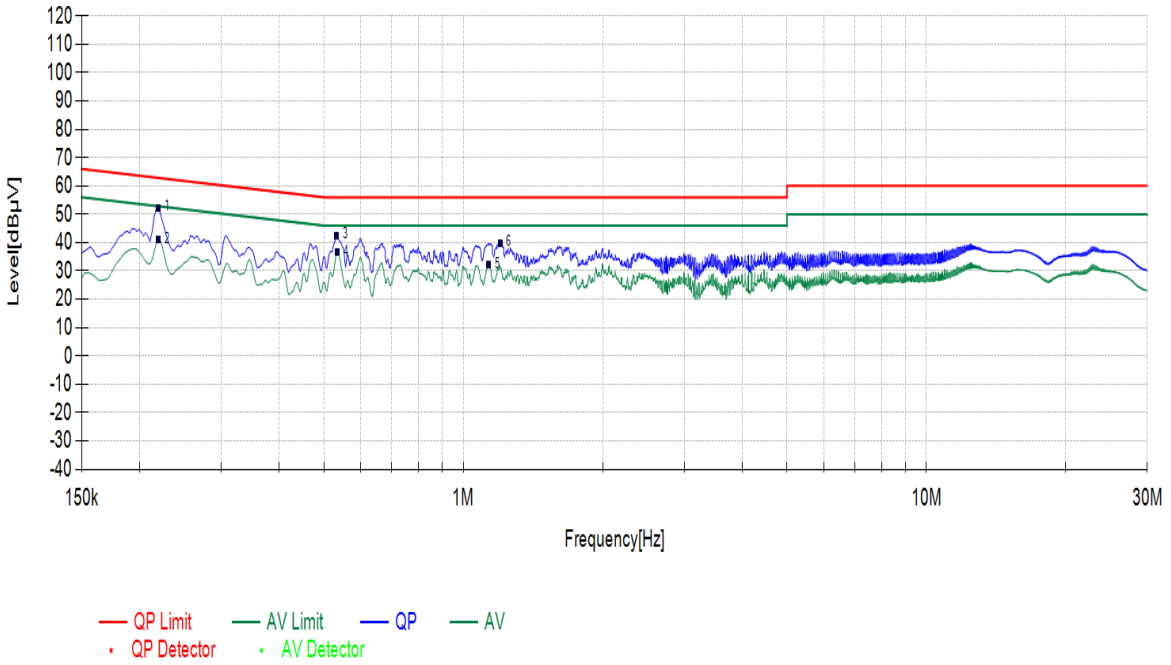
The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor k = 1.96. U= 3.12 dB.

Test Results:

During the test, the Conducted Emission from 150KHz to 30MHz was performed in all modes with all channels, and all antenna. 802.11ax20, Channel 1, Antenna1 are selected as the worst condition. The test data of the worst-case condition was recorded in this report.

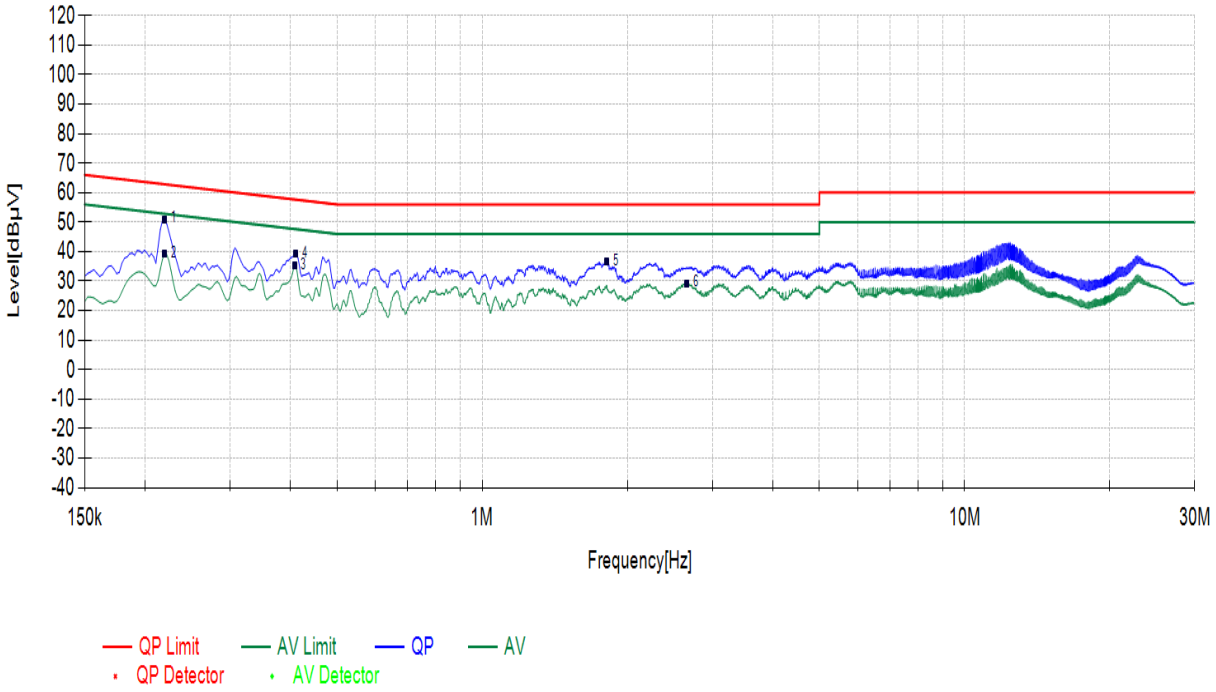
Power Line	L
Test channel	Worst-Case

Suspected List								
NO.	Freq. [MHz]	Factor [dB]	Reading [dBµV]	Level [dBµV]	Limit [dBµV]	Margin [dB]	Detector	Pass/Fail
6	1.2008	10.51	29.27	39.78	56.00	16.22	QP	PASS
1	0.2198	10.46	41.72	52.18	62.83	10.65	QP	PASS
3	0.5325	10.48	31.94	42.42	56.00	13.58	QP	PASS
4	0.5348	10.48	25.94	36.42	46.00	9.58	AV	PASS
5	1.1355	10.51	21.48	31.99	46.00	14.01	AV	PASS
2	0.2198	10.46	30.54	41.00	52.83	11.83	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	0.2198	10.27	40.75	51.02	62.83	11.81	QP	PASS
4	0.4110	10.29	28.81	39.10	57.63	18.53	QP	PASS
5	1.8150	10.35	26.15	36.50	56.00	19.50	QP	PASS
2	0.2198	10.27	28.93	39.20	52.83	13.63	AV	PASS
6	2.6588	10.39	18.74	29.13	46.00	16.87	AV	PASS
3	0.4088	10.29	24.93	35.22	47.67	12.45	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)).

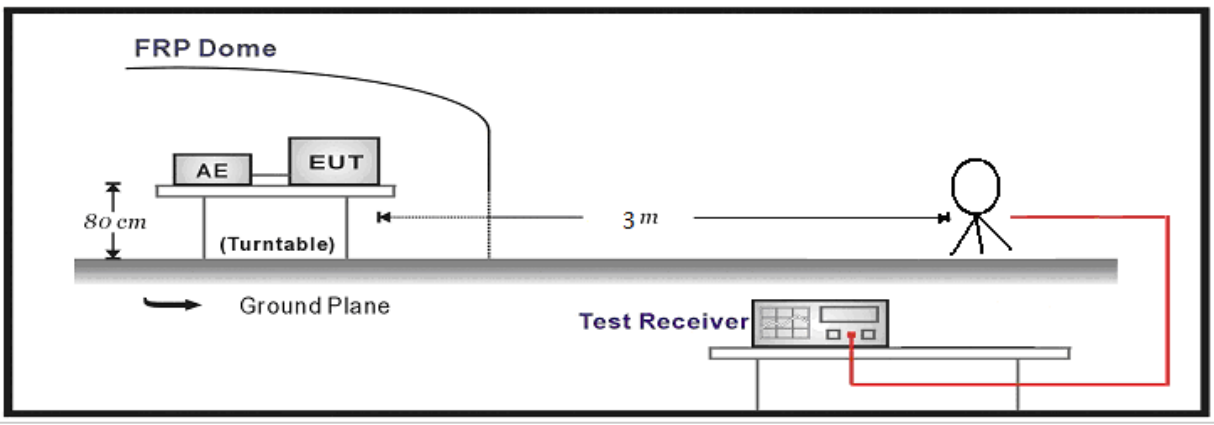
Frequency	Limit (dBμV/m @3m)	Remark
30MHz-88MHz	40.0	Quasi-peak Level
88MHz-216MHz	43.5	Quasi-peak Level
216MHz-960MHz	46.0	Quasi-peak Level
960MHz-1GHz	54.0	Quasi-peak Level
Above 1GHz	54.0	Average Level
	74.0	Peak Level

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

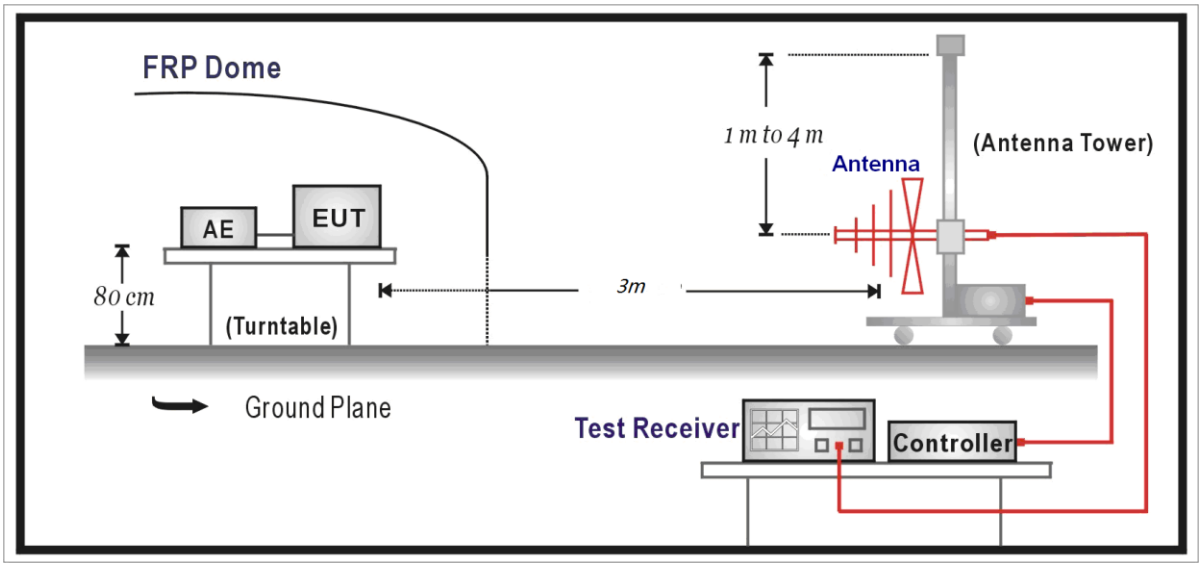
MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218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

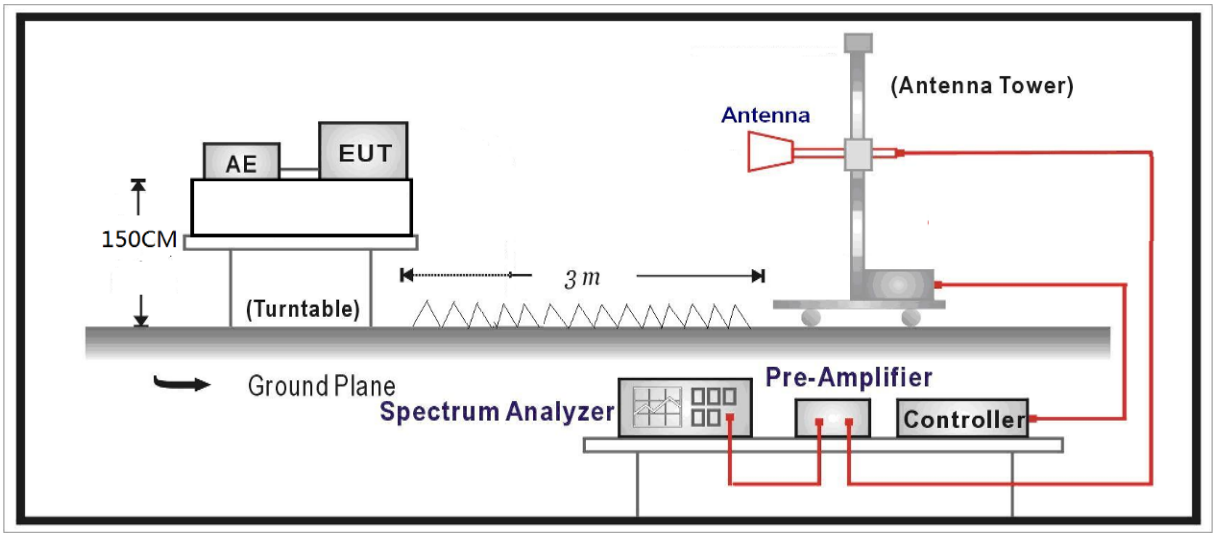
Below 30MHz Test Setup:



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

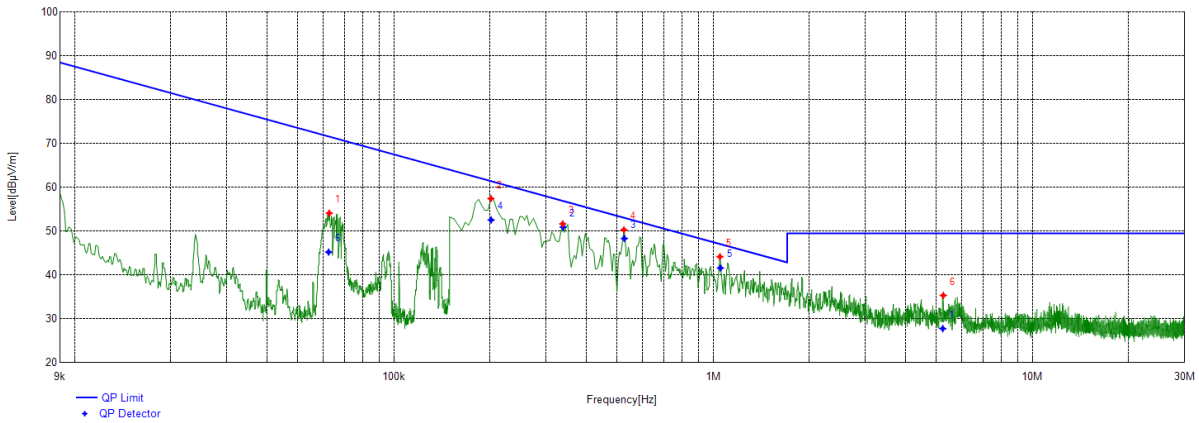
Test Results:

SPURIOUS EMISSIONS：

During the test, the Radiates Emission from 9KHz to 30MHz was performed in all modes with all channels and all antenna. 802.11ax20, Channel 1, Antenna1 are selected as the worst condition. The test data of the worst-case condition was recorded in this report.

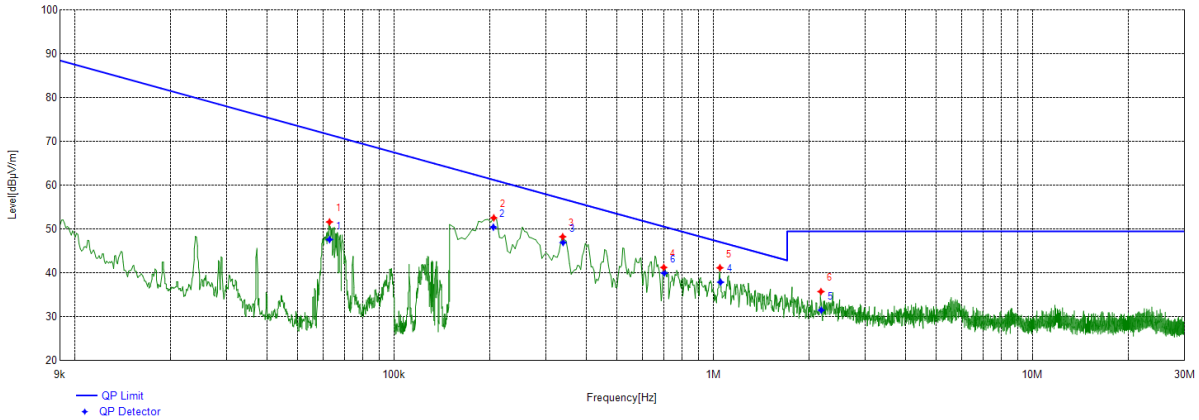
Radiated Emission	9KHz-30MHz
Polarity	X axis
Test channel	Worst-Case

Final Data List								
Frequency [MHz]	Polarity	Factor [dB]	QP Value [dBμV/m]	QP Limit [dBμV/m]	QP Margin [dB]	Height [cm]	Angle [°]	Pass/ Fail
5.2392	X axis	19.66	27.80	49.50	21.70	100	186	PASS
0.3388	X axis	19.55	50.95	56.91	5.96	100	138	PASS
0.5267	X axis	19.67	48.35	53.07	4.72	100	129	PASS
0.2015	X axis	19.45	52.58	61.44	8.86	100	125	PASS
1.0535	X axis	19.71	41.63	47.07	5.44	100	117	PASS
0.0624	X axis	19.66	45.25	71.64	26.39	100	99	PASS



Radiated Emission	9KHz-30MHz
Polarity	Y 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
0.0628	Y axis	19.66	47.65	71.58	23.93	100	131	PASS
0.2048	Y axis	19.45	50.48	61.29	10.81	100	194	PASS
0.3387	Y axis	19.55	46.97	56.92	9.95	100	199	PASS
1.0547	Y axis	19.71	37.93	47.06	9.13	100	205	PASS
2.1807	Y axis	19.93	31.53	49.50	17.97	100	214	PASS
0.7027	Y axis	19.68	40.02	50.58	10.56	100	219	PASS



WIFI:

During the test, the Radiates Emission from 30MHz to 40GHz was performed in WIFI all modes with all channels and all antenna. 802.11ax20, Channel 1, Antenna 1 are selected as the worst condition. The test data of the worst-case condition was recorded in this report.

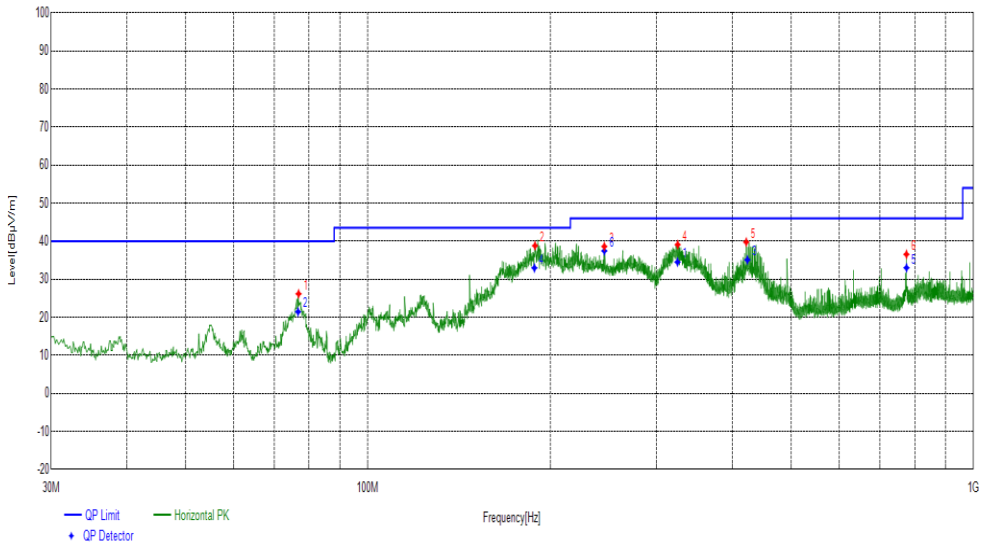
Radiates Emission	30M~1G
Test channel	Worst-Case

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
76.8557	Horizontal	8.98	17.19	26.17	40.00	13.83	PK	100	30	PASS
188.8049	Horizontal	12.63	26.18	38.81	43.52	4.71	PK	100	327	PASS
245.7496	Horizontal	14.10	24.51	38.61	46.02	7.41	PK	100	357	PASS
324.8125	Horizontal	16.10	23.00	39.10	46.02	6.92	PK	100	25	PASS
421.5312	Horizontal	18.28	21.48	39.76	46.02	6.26	PK	100	65	PASS
775.0345	Horizontal	24.24	12.31	36.55	46.02	9.47	PK	100	344	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
324.5915	Horizontal	16.10	34.52	46.02	11.50	130	30	PASS
76.7066	Horizontal	8.98	21.45	40.00	18.55	140	35	PASS
423.4284	Horizontal	18.27	35.09	46.02	10.93	260	70	PASS
188.3814	Horizontal	12.62	32.97	43.52	10.55	290	332	PASS
775.2583	Horizontal	24.25	33.01	46.02	13.01	120	349	PASS
245.7496	Horizontal	14.10	37.45	46.02	8.57	150	90	PASS



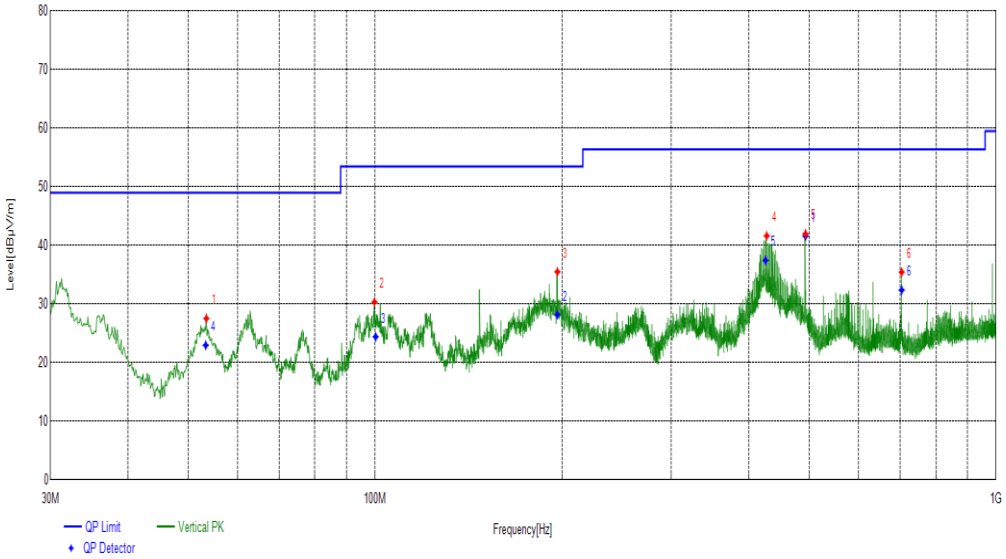
Radiates Emission	30M~1G
Test channel	Worst-Case

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
53.4763	Vertical	12.78	14.77	27.55	40.00	12.45	PK	100	160	PASS
99.7500	Vertical	11.80	18.57	30.37	43.52	13.15	PK	100	177	PASS
196.5657	Vertical	12.84	22.67	35.51	43.52	8.01	PK	100	243	PASS
427.1577	Vertical	18.38	23.27	41.65	46.02	4.37	PK	100	73	PASS
493.2213	Vertical	19.59	22.41	42.00	46.02	4.02	PK	100	0	PASS
704.7025	Vertical	23.27	12.19	35.46	46.02	10.56	PK	100	1	PASS

Final Data List

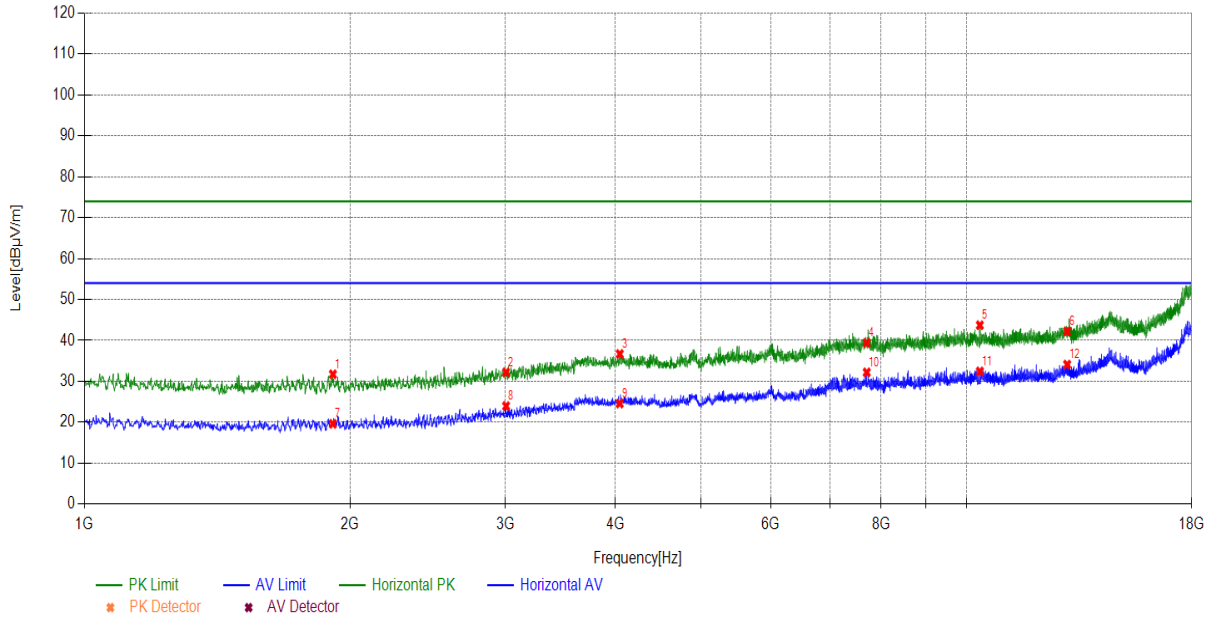
Frequency [MHz]	Polarity	Factor [dB]	QP Value [dBµV/m]	QP Limit [dBµV/m]	QP Margin [dB]	Height [cm]	Angle [°]	Pass/Fail
493.2427	Vertical	19.59	41.60	46.02	4.42	160	350	PASS
196.6084	Vertical	12.84	28.22	43.52	15.30	290	248	PASS
100.1802	Vertical	11.80	24.43	43.52	19.09	120	182	PASS
53.3532	Vertical	12.78	22.99	40.00	17.01	180	165	PASS
425.2846	Vertical	18.38	37.48	46.02	8.54	190	78	PASS
704.6820	Vertical	23.27	32.40	46.02	13.62	180	60	PASS



Radiates Emission	1G~18G
Test channel	Worst-Case
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
1912.9913	-7.99	39.73	31.74	74.00	42.26	PK	150	120	PASS
3006.2006	-4.64	36.87	32.23	74.00	41.77	PK	150	350	PASS
4045.0045	-2.23	38.93	36.70	74.00	37.30	PK	150	200	PASS
7707.1707	4.92	34.49	39.41	74.00	34.59	PK	150	200	PASS
10354.3354	8.36	35.39	43.75	74.00	30.25	PK	150	70	PASS
13003.2003	9.70	32.53	42.23	74.00	31.77	PK	150	350	PASS
1912.9913	-7.99	27.63	19.64	54.00	34.36	AV	150	350	PASS
3006.2006	-4.64	28.63	23.99	54.00	30.01	AV	150	10	PASS
4045.0045	-2.23	26.84	24.61	54.00	29.39	AV	150	320	PASS
7707.1707	4.92	27.29	32.21	54.00	21.79	AV	150	10	PASS
10354.3354	8.36	24.07	32.43	54.00	21.57	AV	150	10	PASS
13003.2003	9.70	24.42	34.12	54.00	19.88	AV	150	10	PASS

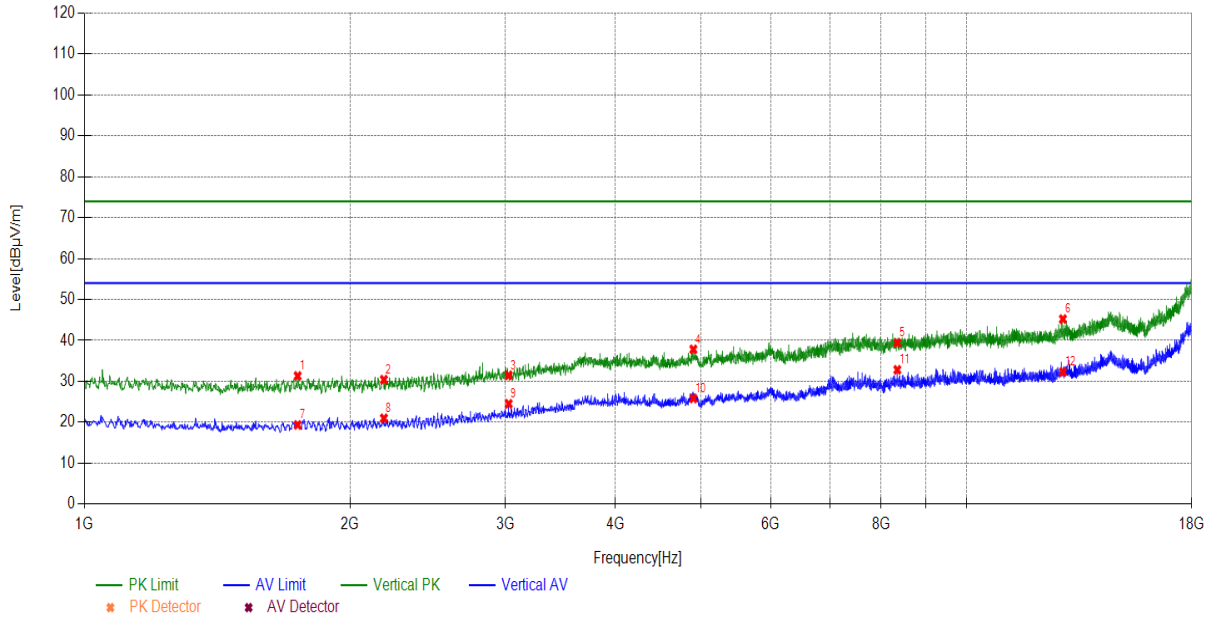


Note: The signal beyond the limit is carrier

Radiates Emission	1G~18G
Test channel	Worst-Case
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
1744.6745	-8.41	39.76	31.35	74.00	42.65	PK	150	260	PASS
2185.0185	-7.40	37.83	30.43	74.00	43.57	PK	150	350	PASS
3026.6027	-4.56	36.05	31.49	74.00	42.51	PK	150	230	PASS
4901.8902	-0.93	38.75	37.82	74.00	36.18	PK	150	80	PASS
8348.1348	5.50	33.93	39.43	74.00	34.57	PK	150	260	PASS
12860.386	9.30	35.93	45.23	74.00	28.77	PK	150	360	PASS
1744.6745	-8.41	27.79	19.38	54.00	34.62	AV	150	30	PASS
2185.0185	-7.40	28.39	20.99	54.00	33.01	AV	150	10	PASS
3026.6027	-4.56	29.10	24.54	54.00	29.46	AV	150	10	PASS
4901.8902	-0.93	26.77	25.84	54.00	28.16	AV	150	330	PASS
8348.1348	5.50	27.34	32.84	54.00	21.16	AV	150	10	PASS
12860.386	9.30	23.00	32.30	54.00	21.70	AV	150	10	PASS

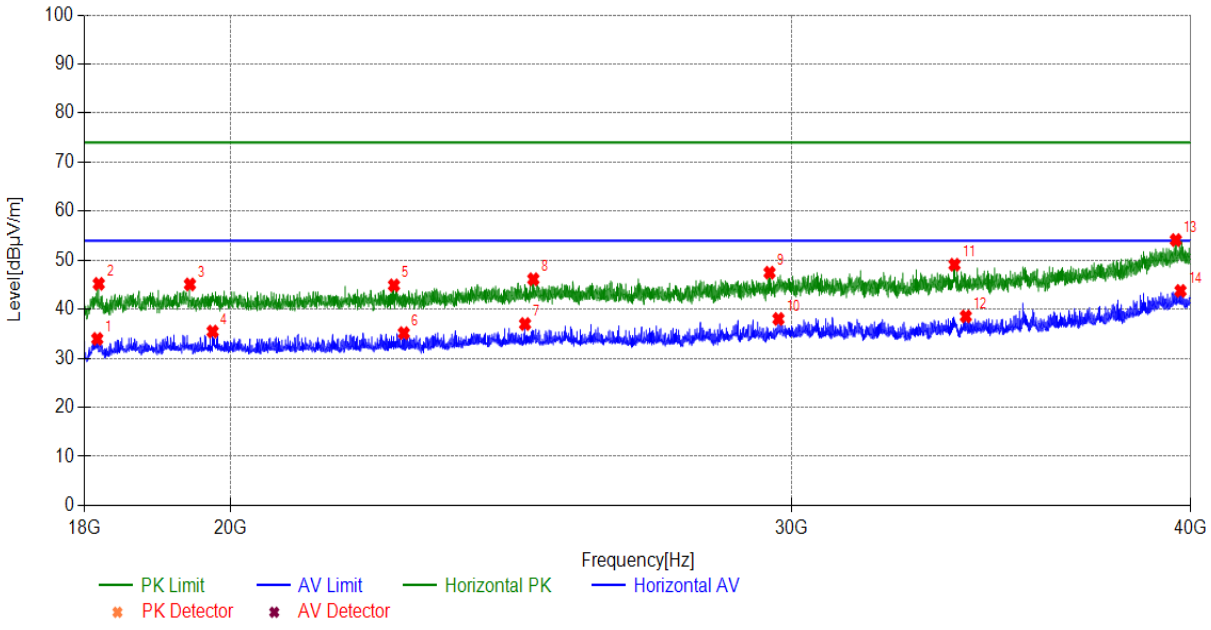


Note: The signal beyond the limit is carrier

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

Suspected List

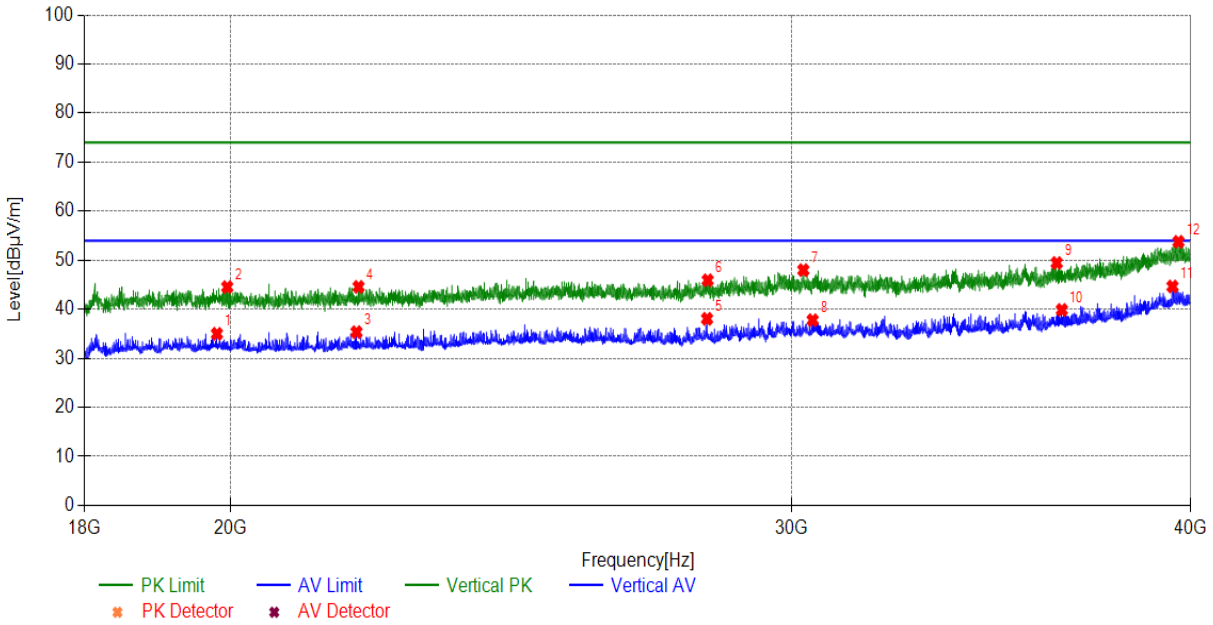
Frequency[MHz]	Factor [dB]	Reading [dBμV/m]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Detector	Height [cm]	Angle deg	Pass/Fail
19423.5424	1.33	43.74	45.07	74.00	28.93	PK	150	100	PASS
24888.8889	4.06	42.06	46.12	74.00	27.88	PK	150	60	PASS
39575.3575	10.78	43.33	54.11	74.00	19.89	PK	150	150	PASS
18187.0187	1.15	44.03	45.18	74.00	28.82	PK	150	60	PASS
33731.5732	6.52	42.56	49.08	74.00	24.92	PK	150	180	PASS
22506.0506	2.41	42.47	44.88	74.00	29.12	PK	150	90	PASS
29515.9516	6.36	41.10	47.46	74.00	26.54	PK	150	170	PASS
19744.7745	1.31	34.14	35.45	54.00	18.55	AV	150	10	PASS
22666.6667	2.57	32.56	35.13	54.00	18.87	AV	150	10	PASS
24739.2739	4.00	32.99	36.99	54.00	17.01	AV	150	10	PASS
39709.5710	10.79	32.95	43.74	54.00	10.26	AV	150	10	PASS
29705.1705	6.49	31.53	38.02	54.00	15.98	AV	150	10	PASS
34008.8009	6.60	31.94	38.54	54.00	15.46	AV	150	10	PASS
18167.2167	1.14	32.82	33.96	54.00	20.04	AV	150	10	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]	Detector	Height [cm]	Angle deg	Pass/Fail
39650.1650	10.78	42.97	53.75	74.00	20.25	PK	150	230	PASS
19953.7954	1.30	43.22	44.52	74.00	29.48	PK	150	150	PASS
28226.6227	5.54	40.37	45.91	74.00	28.09	PK	150	190	PASS
30244.2244	6.59	41.39	47.98	74.00	26.02	PK	150	200	PASS
36314.6315	7.38	42.06	49.44	74.00	24.56	PK	150	30	PASS
21938.3938	1.88	42.69	44.57	74.00	29.43	PK	150	270	PASS
39480.7481	10.77	33.87	44.64	54.00	9.36	AV	150	10	PASS
28213.4213	5.53	32.52	38.05	54.00	15.95	AV	150	10	PASS
21905.3905	1.88	33.45	35.33	54.00	18.67	AV	150	10	PASS
36448.8449	7.48	32.39	39.87	54.00	14.13	AV	150	10	PASS
30448.8449	6.50	31.27	37.77	54.00	16.23	AV	150	10	PASS
19806.3806	1.31	33.68	34.99	54.00	19.01	AV	150	10	PASS



Bluetooth(Low Energy):

During the test, the Radiates Emission from 30MHz to 40GHz was performed in Bluetooth(Low Energy) all modes with all channels and all antenna. BLE(2Mbps), channel 0, antenna 1 are selected as the worst condition. The test data of the worst-case condition was recorded in this report.

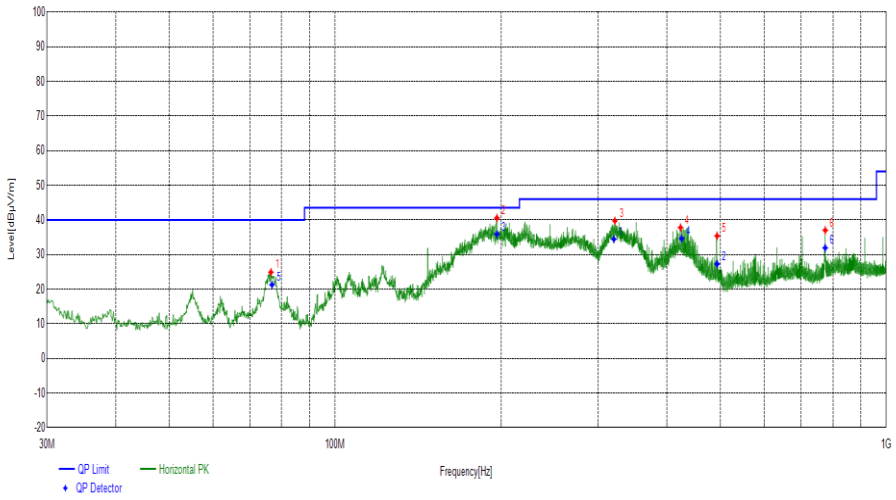
Radiates Emission	30M~1G
Test channel	Worst-Case

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
76.4676	Horizontal	9.02	15.87	24.89	40.00	15.11	PK	100	44	PASS
196.5657	Horizontal	12.84	27.72	40.56	43.52	2.96	PK	100	184	PASS
321.8052	Horizontal	16.03	23.70	39.73	46.02	6.29	PK	100	4	PASS
423.3743	Horizontal	18.31	19.48	37.79	46.02	8.23	PK	100	65	PASS
493.2213	Horizontal	19.59	15.79	35.38	46.02	10.64	PK	100	198	PASS
774.9375	Horizontal	24.24	12.76	37.00	46.02	9.02	PK	100	346	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
320.4128	Horizontal	16.03	34.45	46.02	11.57	140	250	PASS
493.2356	Horizontal	19.59	27.29	46.02	18.73	110	203	PASS
196.6027	Horizontal	12.84	35.87	43.52	7.65	250	189	PASS
425.2675	Horizontal	18.31	34.63	46.02	11.39	190	70	PASS
76.8129	Horizontal	9.02	21.28	40.00	18.72	240	49	PASS
774.8138	Horizontal	24.23	31.93	46.02	14.09	300	351	PASS



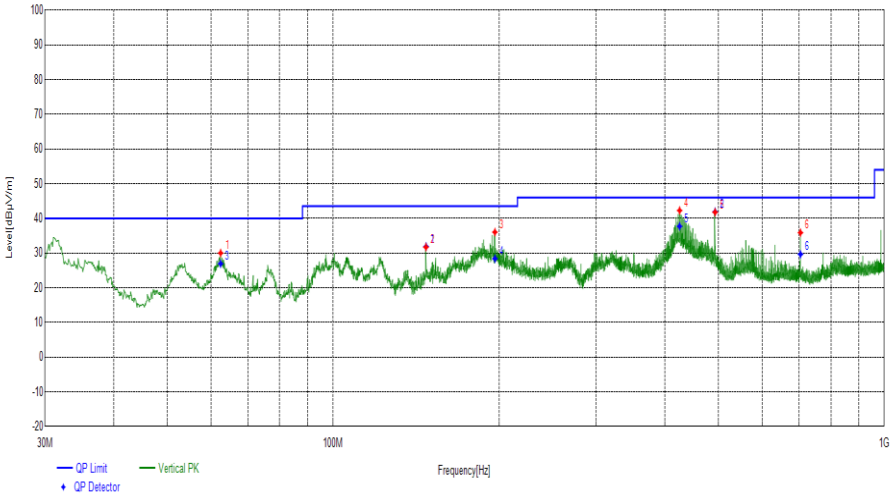
Radiates Emission	30M~1G
Test channel	Worst-Case

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
62.4983	Vertical	11.53	18.48	30.01	40.00	9.99	PK	100	95	PASS
147.3817	Vertical	9.52	22.19	31.71	43.52	11.81	PK	100	4	PASS
196.5657	Vertical	12.84	23.19	36.03	43.52	7.49	PK	100	95	PASS
425.3145	Vertical	18.35	23.93	42.28	46.02	3.74	PK	100	65	PASS
493.2213	Vertical	19.59	22.19	41.78	46.02	4.24	PK	100	4	PASS
704.7025	Vertical	23.27	12.61	35.88	46.02	10.14	PK	100	359	PASS

Final Data List

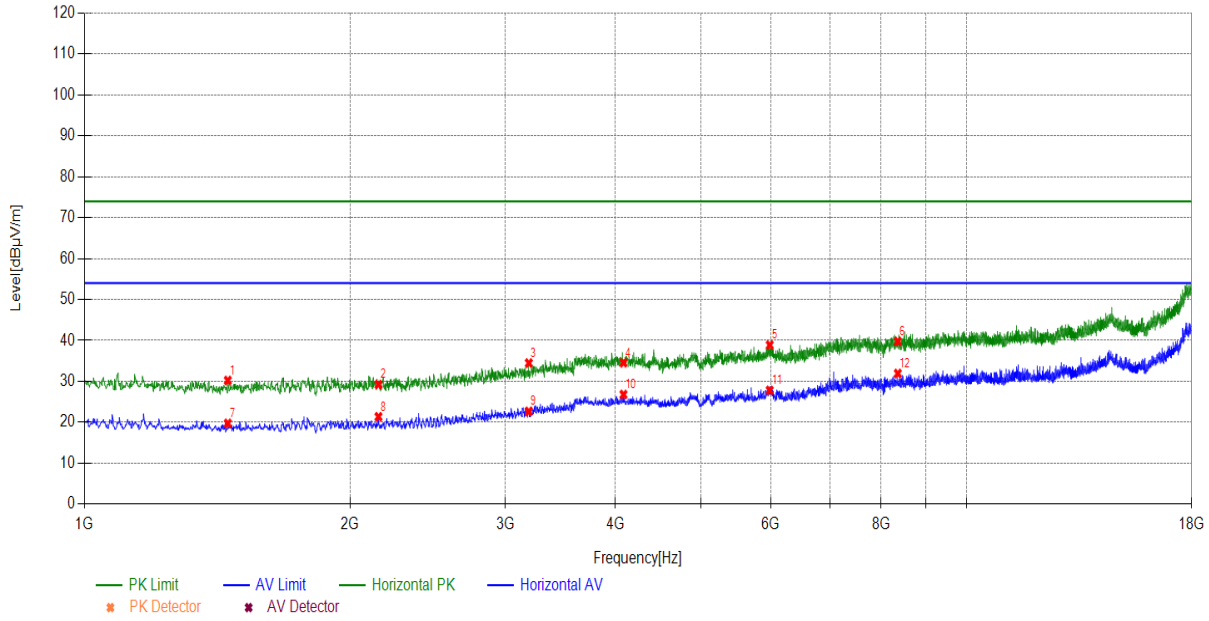
Frequency [MHz]	Polarity	Factor [dB]	QP Value [dBμV/m]	QP Limit [dBμV/m]	QP Margin [dB]	Height [cm]	Angle [°]	Pass/Fail
147.4649	Vertical	9.52	31.90	43.52	11.62	200	30	PASS
493.2570	Vertical	19.59	41.89	46.02	4.13	220	180	PASS
62.4802	Vertical	11.53	26.94	40.00	13.06	180	100	PASS
196.6084	Vertical	12.84	28.39	43.52	15.13	160	100	PASS
425.2714	Vertical	18.35	37.72	46.02	8.30	240	70	PASS
704.7030	Vertical	23.27	29.67	46.02	16.35	130	10	PASS



Radiates Emission	1G~18G
Test channel	Worst-Case
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
1453.9454	-9.48	39.70	30.22	74.00	43.78	PK	150	280	PASS
2154.4154	-7.48	36.72	29.24	74.00	44.76	PK	150	130	PASS
3189.819	-3.97	38.46	34.49	74.00	39.51	PK	150	310	PASS
4084.1084	-2.26	36.81	34.55	74.00	39.45	PK	150	270	PASS
5983.1983	2.65	36.23	38.88	74.00	35.12	PK	150	240	PASS
8358.3358	5.52	34.27	39.79	74.00	34.21	PK	150	250	PASS
1453.9454	-9.48	29.22	19.74	54.00	34.26	AV	150	10	PASS
2154.4154	-7.48	28.84	21.36	54.00	32.64	AV	150	10	PASS
3189.819	-3.97	26.64	22.67	54.00	31.33	AV	150	110	PASS
4084.1084	-2.26	29.06	26.80	54.00	27.20	AV	150	10	PASS
5983.1983	2.65	25.15	27.80	54.00	26.20	AV	150	10	PASS
8358.3358	5.52	26.42	31.94	54.00	22.06	AV	150	10	PASS

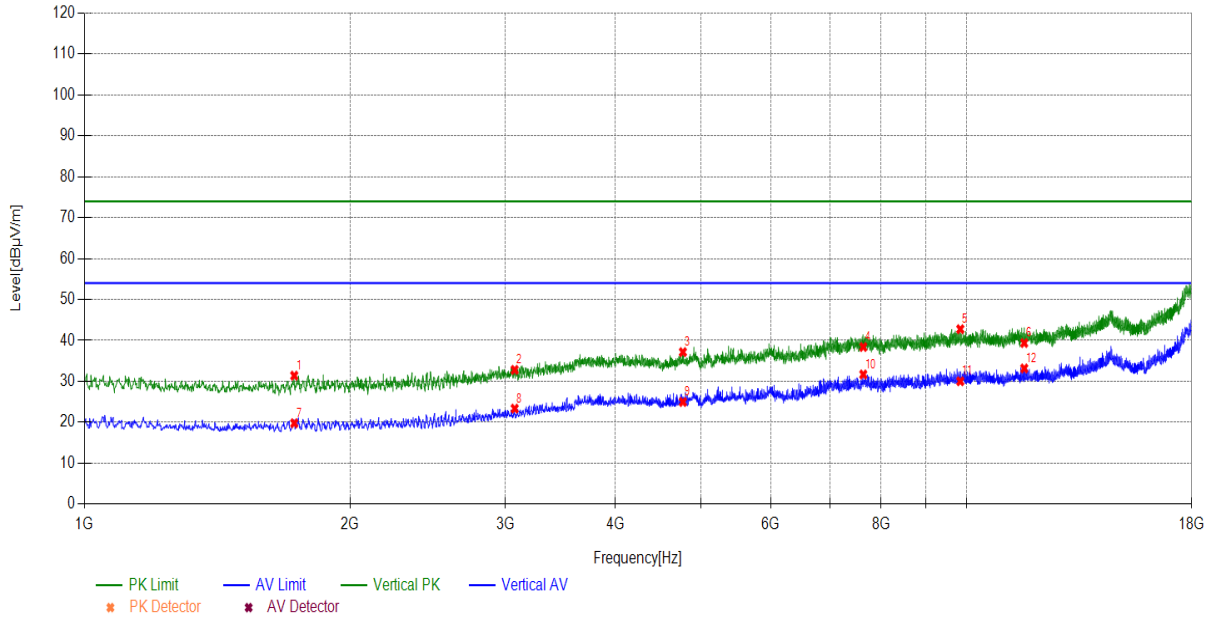


Note: The signal beyond the limit is carrier

Radiates Emission	1G~18G
Test channel	Worst-Case
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
1729.3729	-8.49	39.90	31.41	74.00	42.59	PK	150	60	PASS
3074.2074	-4.39	37.21	32.82	74.00	41.18	PK	150	300	PASS
4769.2769	-1.44	38.60	37.16	74.00	36.84	PK	150	230	PASS
7637.4637	4.91	33.50	38.41	74.00	35.59	PK	150	330	PASS
9839.1839	8.54	34.22	42.76	74.00	31.24	PK	150	60	PASS
11626.0626	7.14	32.24	39.38	74.00	34.62	PK	150	30	PASS
1729.3729	-8.49	28.28	19.79	54.00	34.21	AV	150	20	PASS
3074.2074	-4.39	27.76	23.37	54.00	30.63	AV	150	10	PASS
4769.2769	-1.44	26.42	24.98	54.00	29.02	AV	150	60	PASS
7637.4637	4.91	26.79	31.70	54.00	22.30	AV	150	10	PASS
9839.1839	8.54	21.50	30.04	54.00	23.96	AV	150	210	PASS
11626.0626	7.14	26.03	33.17	54.00	20.83	AV	150	10	PASS

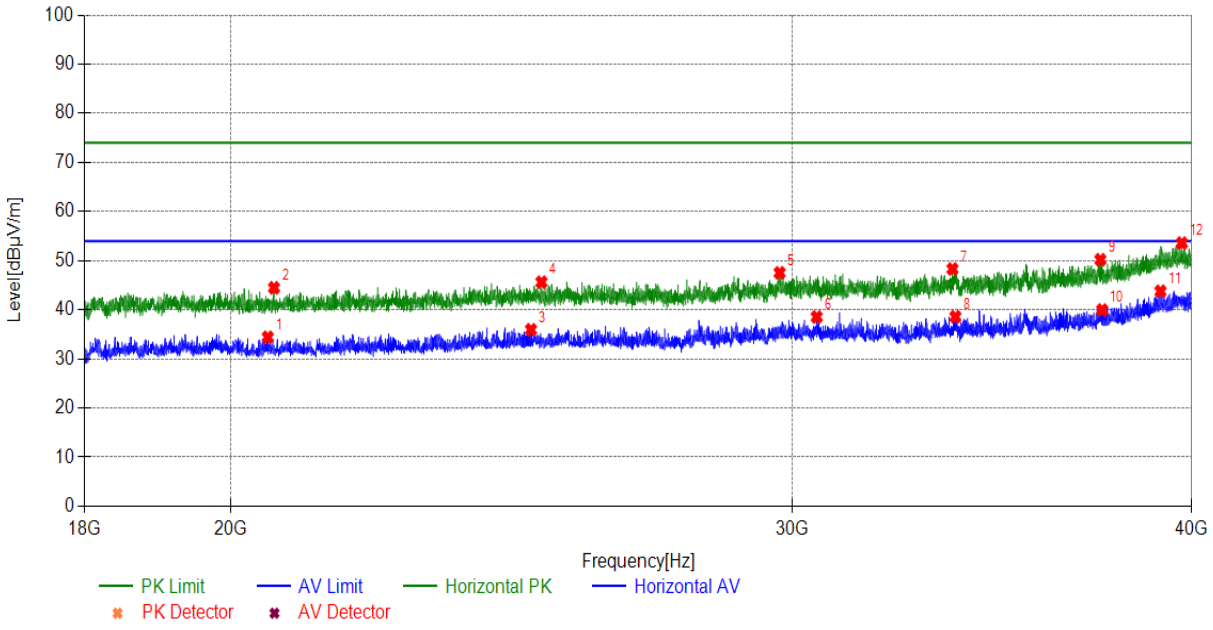


Note: The signal beyond the limit is carrier

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

Suspected List

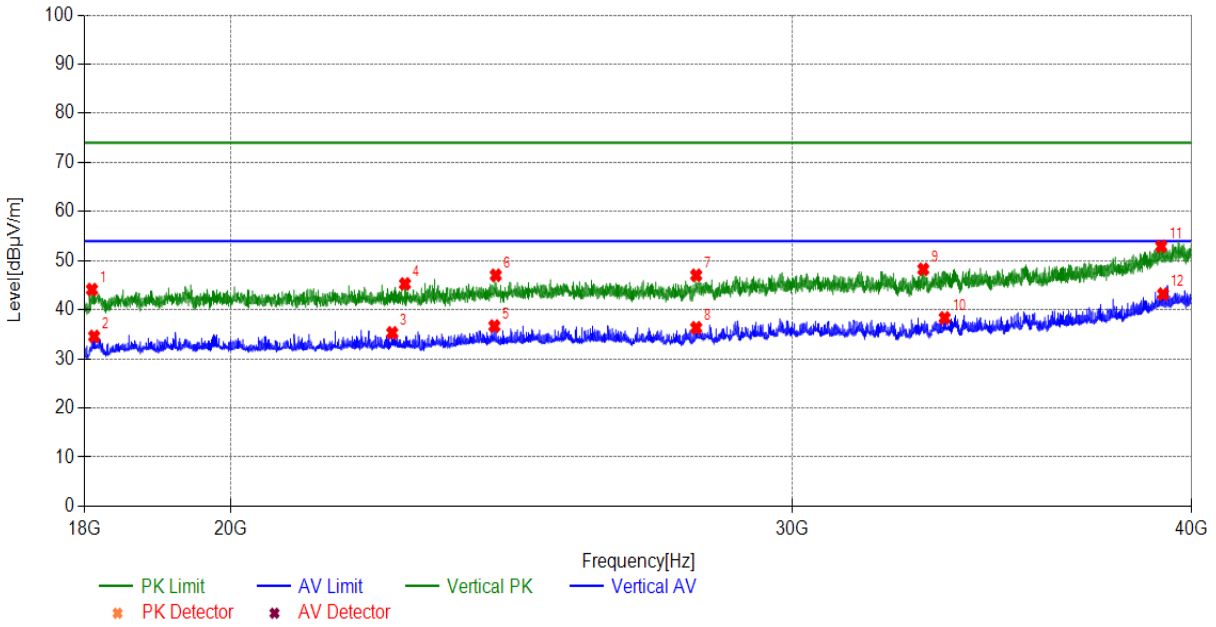
Frequency[MHz]	Factor [dB]	Reading [dBμV/m]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Detector	Height [cm]	Angle deg	Pass/Fail
39720.5721	10.79	42.78	53.57	74.00	20.43	PK	100	50	PASS
20635.8636	1.52	42.95	44.47	74.00	29.53	PK	100	100	PASS
33663.3663	6.50	41.79	48.29	74.00	25.71	PK	100	40	PASS
29718.3718	6.50	41.02	47.52	74.00	26.48	PK	100	90	PASS
37454.3454	8.25	41.93	50.18	74.00	23.82	PK	100	50	PASS
25027.5028	4.11	41.50	45.61	74.00	28.39	PK	100	100	PASS
37502.7503	8.29	31.65	39.94	54.00	14.06	AV	100	10	PASS
30523.6524	6.46	32.07	38.53	54.00	15.47	AV	100	10	PASS
24838.2838	4.04	31.89	35.93	54.00	18.07	AV	100	10	PASS
39113.3113	10.76	33.00	43.76	54.00	10.24	AV	100	10	PASS
33733.7734	6.52	32.05	38.57	54.00	15.43	AV	100	10	PASS
20543.4543	1.49	32.91	34.40	54.00	19.60	AV	100	10	PASS
34008.8009	10.79	42.78	53.57	74.00	20.43	PK	100	50	PASS
18167.2167	1.52	42.95	44.47	74.00	29.53	PK	100	100	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]	Detector	Height [cm]	Angle deg	Pass/Fail
18096.8097	1.12	42.99	44.11	74.00	29.89	PK	100	280	PASS
24215.6216	3.79	43.23	47.02	74.00	26.98	PK	100	230	PASS
39133.1133	10.76	42.15	52.91	74.00	21.09	PK	100	160	PASS
27982.3982	5.39	41.63	47.02	74.00	26.98	PK	100	100	PASS
32963.6964	6.29	41.94	48.23	74.00	25.77	PK	100	360	PASS
22679.8680	2.58	42.68	45.26	74.00	28.74	PK	100	170	PASS
24191.4191	3.78	32.89	36.67	54.00	17.33	AV	100	10	PASS
18125.4125	1.13	33.44	34.57	54.00	19.43	AV	100	10	PASS
22473.0473	2.37	32.92	35.29	54.00	18.71	AV	100	10	PASS
33474.1474	6.44	31.90	38.34	54.00	15.66	AV	100	20	PASS
27982.3982	5.39	30.93	36.32	54.00	17.68	AV	100	10	PASS
39185.9186	10.76	32.43	43.19	54.00	10.81	AV	100	10	PASS



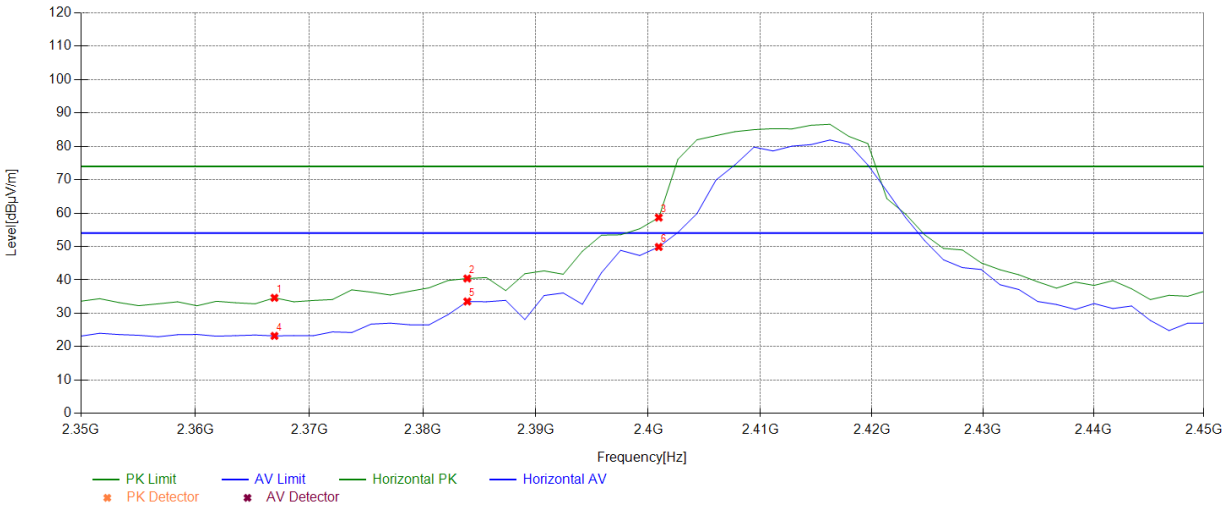
Band Edge：

During the test, the Band Edge was performed in WIFI all modes with all channels and all antenna. 802.11ax20, Antenna1 are selected as the worst condition. The test data of the worst-case condition was recorded in this report.

Test mode	802.11ax20
Test channel	Lowest channel
polarization	Horizontal

Suspected List

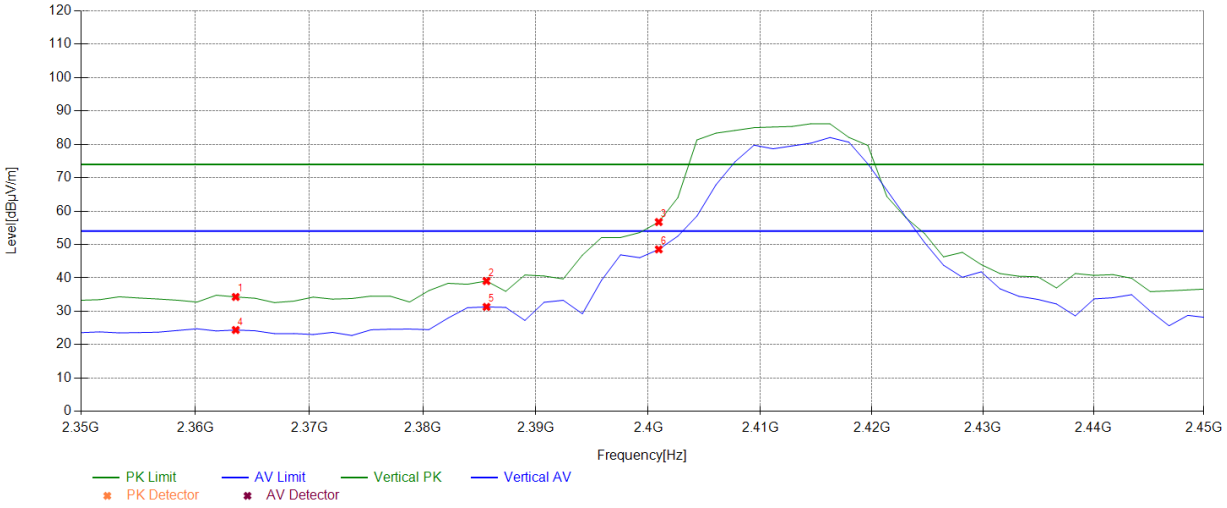
Frequency [MHz]	Factor [dB]	Reading [dBµV/m]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Detector	Height [cm]	Angle deg	Pass/ Fail
2366.9367	-6.91	41.56	34.65	74.00	39.35	PK	150	230	PASS
2383.9384	-6.87	47.30	40.43	74.00	33.57	PK	150	150	PASS
2400.9401	-6.82	65.48	58.66	74.00	15.34	PK	150	20	PASS
2366.9367	-6.91	30.15	23.24	54.00	30.76	AV	150	10	PASS
2383.9384	-6.87	40.42	33.55	54.00	20.45	AV	150	60	PASS
2400.9401	-6.82	56.70	49.88	54.00	4.12	AV	150	320	PASS



Test mode	802.11ax20
Test channel	Lowest channel
polarization	Vertical

Suspected List

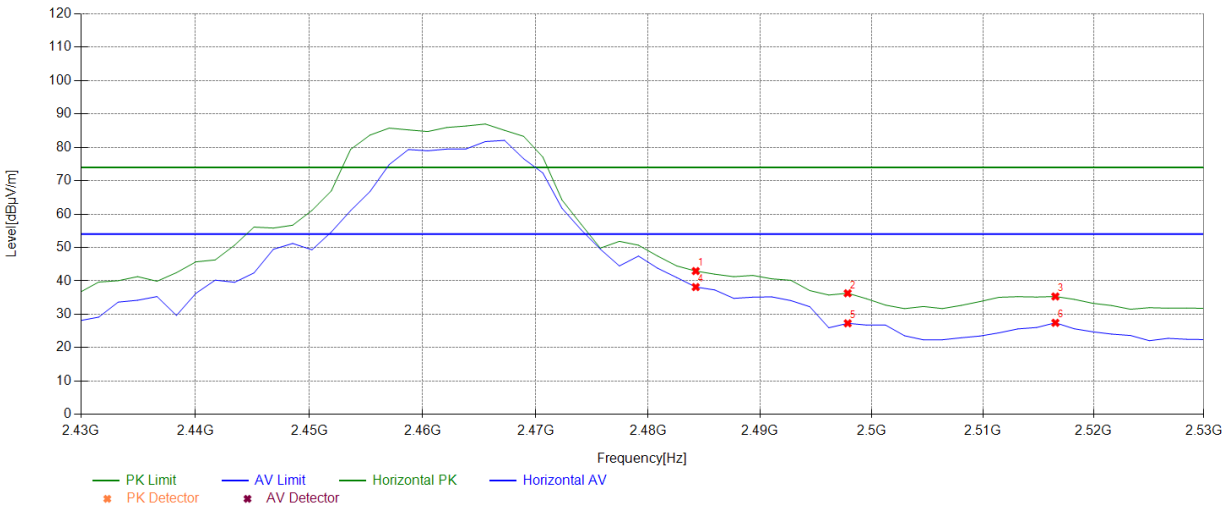
Frequency [MHz]	Factor [dB]	Reading [dBµV/m]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Detector	Height [cm]	Angle deg	Pass/ Fail
2363.5364	-6.92	41.22	34.30	74.00	39.70	PK	150	170	PASS
2385.6386	-6.86	45.93	39.07	74.00	34.93	PK	150	120	PASS
2400.9401	-6.82	63.55	56.73	74.00	17.27	PK	150	360	PASS
2363.5364	-6.92	31.33	24.41	54.00	29.59	AV	150	20	PASS
2385.6386	-6.86	38.19	31.33	54.00	22.67	AV	150	10	PASS
2400.9401	-6.82	55.37	48.55	54.00	5.45	AV	150	20	PASS



Test mode	802.11ax20
Test channel	Highest channel
polarization	Horizontal

Suspected List

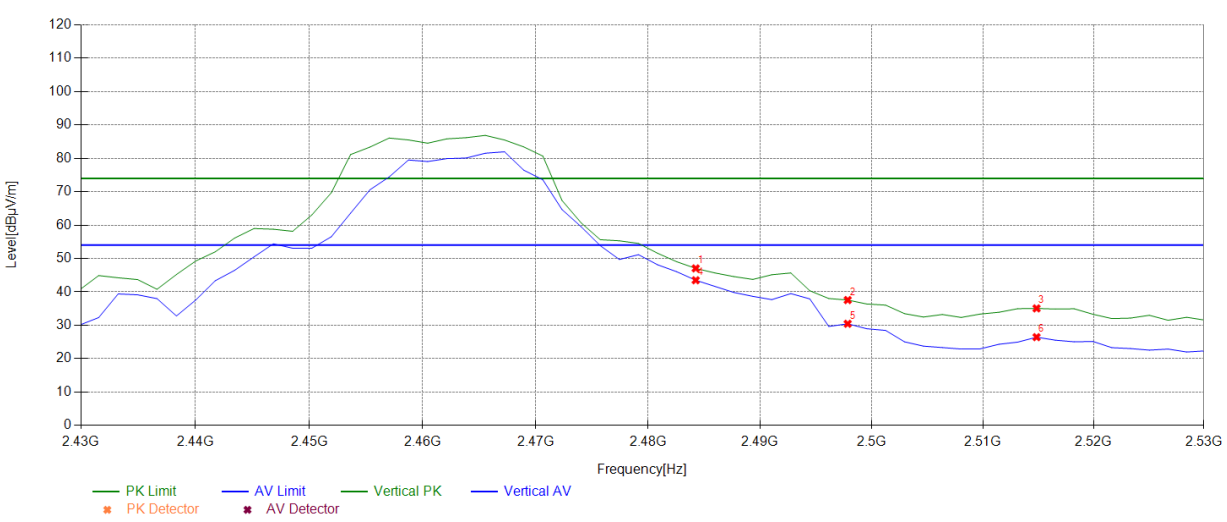
Frequency [MHz]	Factor [dB]	Reading [dBµV/m]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Detector	Height [cm]	Angle deg	Pass/ Fail
2483.5484	-6.62	49.57	42.95	74.00	31.05	PK	150	150	PASS
2497.8498	-6.59	42.90	36.31	74.00	37.69	PK	150	170	PASS
2516.5517	-6.52	41.86	35.34	74.00	38.66	PK	150	120	PASS
2483.5484	-6.62	44.78	38.16	54.00	15.84	AV	150	10	PASS
2497.8498	-6.59	33.90	27.31	54.00	26.69	AV	150	10	PASS
2516.5517	-6.52	33.98	27.46	54.00	26.54	AV	150	20	PASS



Test mode	802.11ax20
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	-6.62	53.67	47.05	74.00	26.95	PK	150	140	PASS
2497.8498	-6.59	44.15	37.56	74.00	36.44	PK	150	350	PASS
2514.8515	-6.53	41.60	35.07	74.00	38.93	PK	150	320	PASS
2483.5484	-6.62	50.12	43.50	54.00	10.50	AV	150	70	PASS
2497.8498	-6.59	37.05	30.46	54.00	23.54	AV	150	30	PASS
2514.8515	-6.53	32.98	26.45	54.00	27.55	AV	150	10	PASS

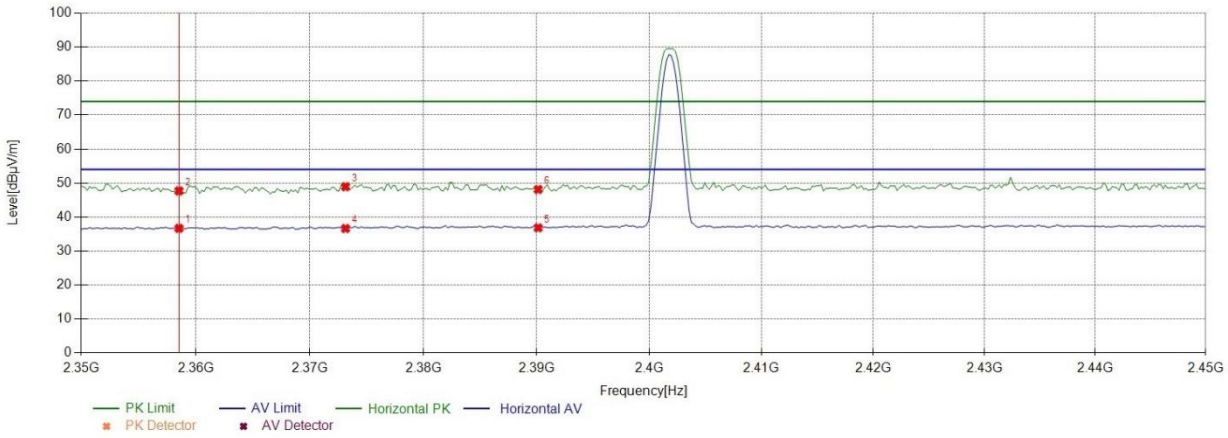


During the test, the Band Edge was performed in BLE all modes with all channels and all antenna. BLE(1Mbps), Antenna 1 are selected as the worst condition. The test data of the worst-case condition was recorded in this report.

Test mode	BLE(1Mbps)
Test channel	Lowest channel
polarization	Horizontal

Suspected List

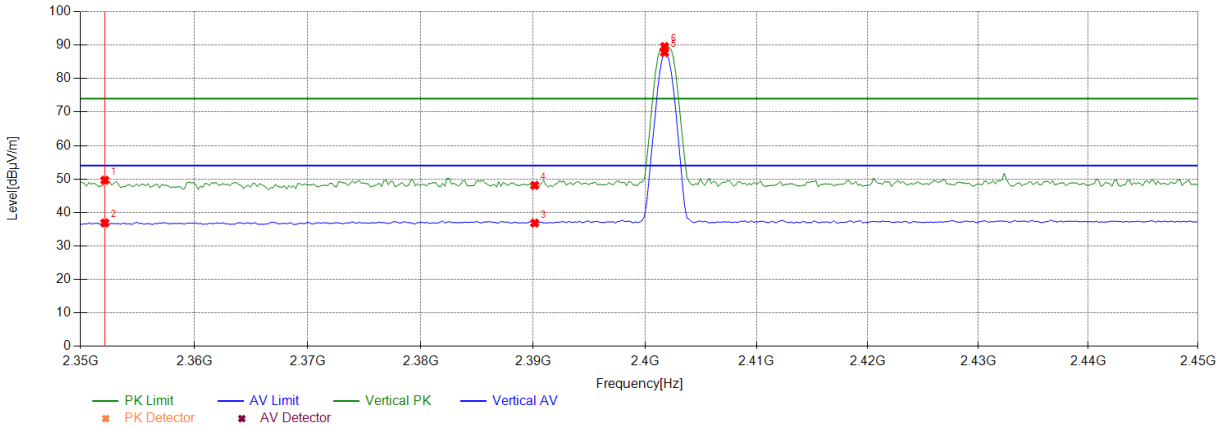
Frequency [MHz]	Factor [dB]	Reading [dBµV/m]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Detector	Height [cm]	Angle deg	Pass/ Fail
2358.5359	35.54	1.12	36.66	54.00	17.34	AV	150	296	PASS
2358.5359	35.54	12.13	47.67	74.00	26.33	PK	150	140	PASS
2373.1373	35.66	13.25	48.91	74.00	25.09	PK	150	38	PASS
2373.1373	35.66	0.95	36.61	54.00	17.39	AV	150	230	PASS
2390.1390	35.79	1.02	36.81	54.00	17.19	AV	150	247	PASS
2390.1390	35.79	12.30	48.09	74.00	25.91	PK	150	85	PASS



Test mode	BLE(1Mbps)
Test channel	Lowest channel
polarization	Vertical

Suspected List

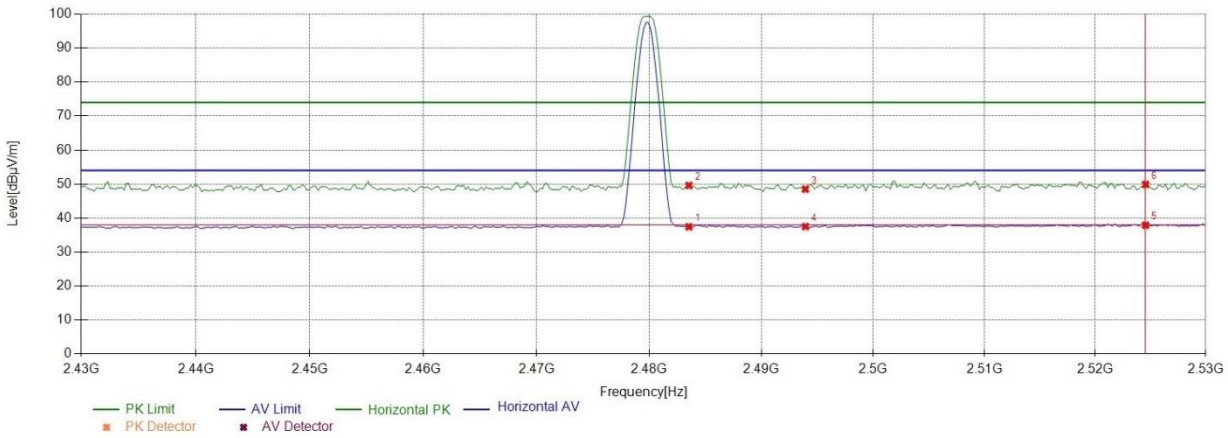
Frequency [MHz]	Factor [dB]	Reading [dBµV/m]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Detector	Height [cm]	Angle deg	Pass/ Fail
2352.1352	35.49	14.13	49.62	74.00	24.38	PK	150	7	PASS
2352.1352	35.49	1.35	36.84	54.00	17.16	AV	150	7	PASS
2390.1390	35.79	1.02	36.81	54.00	17.19	AV	150	247	PASS
2390.1390	35.79	12.30	48.09	74.00	25.91	PK	150	85	PASS
2401.7402	35.88	51.92	87.80	54.00	-33.80	AV	150	188	---
2401.7402	35.88	53.69	89.57	74.00	-15.57	PK	150	188	---



Test mode	BLE(1Mbps)
Test channel	Highest channel
polarization	Horizontal

Suspected List

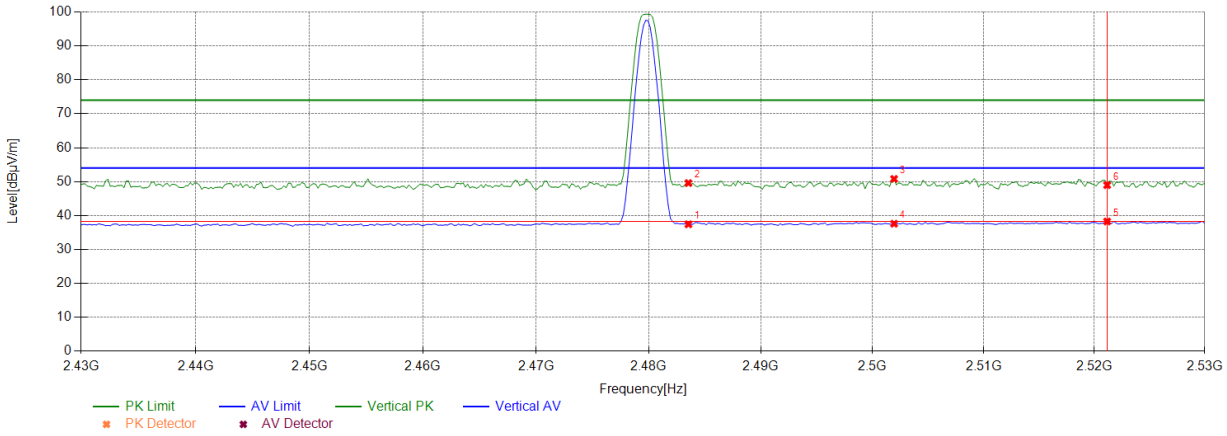
Frequency [MHz]	Factor [dB]	Reading [dBµV/m]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Detector	Height [cm]	Angle deg	Pass/ Fail
2483.5484	36.20	1.20	37.40	54.00	16.60	AV	150	124	PASS
2483.5484	36.20	13.37	49.57	74.00	24.43	PK	150	244	PASS
2493.9494	36.25	12.24	48.49	74.00	25.51	PK	150	44	PASS
2493.9494	36.25	1.22	37.47	54.00	16.53	AV	150	159	PASS
2524.5525	36.37	1.49	37.86	54.00	16.14	AV	150	183	PASS
2524.5525	36.37	13.49	49.86	74.00	24.14	PK	150	81	PASS



Test mode	BLE(2Mbps)
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	36.20	1.20	37.40	54.00	16.60	AV	150	124	PASS
2483.5484	36.20	13.37	49.57	74.00	24.43	PK	150	244	PASS
2501.9502	36.28	14.50	50.78	74.00	23.22	PK	150	219	PASS
2501.9502	36.28	1.29	37.57	54.00	16.43	AV	150	44	PASS
2521.1521	36.36	1.86	38.22	54.00	15.78	AV	150	344	PASS
2521.1521	36.36	12.58	48.94	74.00	25.06	PK	150	142	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.

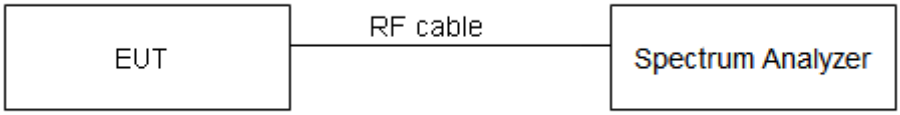
Limits:

Average Output Power	≤ 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 dB.

Test Results:

TestMode	Antenna	Channel	Result[dBm]	Limit[dBm]	Verdict
11B	Ant1	2412	16.09	<=30	PASS
	Ant1	2437	16.20	<=30	PASS
	Ant1	2462	16.04	<=30	PASS
11G	Ant1	2412	12.30	<=30	PASS
	Ant1	2437	13.82	<=30	PASS
	Ant1	2462	13.69	<=30	PASS
11N20SISO	Ant1	2412	13.50	<=30	PASS
	Ant1	2437	13.71	<=30	PASS
	Ant1	2462	13.54	<=30	PASS
11N40SISO	Ant1	2422	11.56	<=30	PASS
	Ant1	2437	12.00	<=30	PASS
	Ant1	2452	12.07	<=30	PASS
11AX20SISO	Ant1	2412	12.11	<=30	PASS
	Ant1	2437	12.28	<=30	PASS
	Ant1	2462	12.15	<=30	PASS
11AX40SISO	Ant1	2422	11.59	<=30	PASS
	Ant1	2437	11.92	<=30	PASS
	Ant1	2452	12.04	<=30	PASS
BLE_1M	Ant1	2402	2.93	<=30	PASS
	Ant1	2440	2.98	<=30	PASS
	Ant1	2480	4.29	<=30	PASS
BLE_2M	Ant1	2402	2.96	<=30	PASS
	Ant1	2440	3.01	<=30	PASS
	Ant1	2480	4.32	<=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:

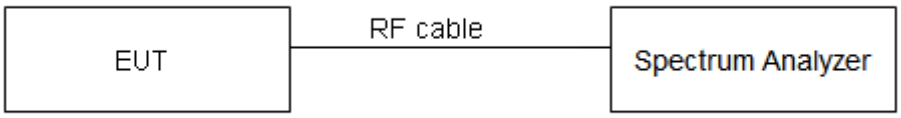
The EUT was connected to the spectrum analyzer through an external attenuator (20dB) and a known loss cable. RBW is set to 100 kHz; VBW is set to 300 kHz on spectrum analyzer.
Detector=Peak, Trace mode=Max hold.

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
11B	Ant1	2412	7.08	2408.44	2415.52	0.5	PASS
		2437	7.08	2433.44	2440.52	0.5	PASS
		2462	7.08	2458.44	2465.52	0.5	PASS
11G	Ant1	2412	15.12	2404.44	2419.56	0.5	PASS
		2437	15.52	2429.24	2444.76	0.5	PASS
		2462	15.32	2454.20	2469.52	0.5	PASS
11N20SISO	Ant1	2412	15.12	2404.44	2419.56	0.5	PASS
		2437	15.12	2429.44	2444.56	0.5	PASS
		2462	15.36	2454.20	2469.56	0.5	PASS
11N40SISO	Ant1	2422	35.36	2404.24	2439.60	0.5	PASS
		2437	35.36	2419.24	2454.60	0.5	PASS
		2452	35.36	2434.24	2469.60	0.5	PASS
11AX20SISO	Ant1	2412	15.48	2404.28	2419.76	0.5	PASS
		2437	16.16	2428.64	2444.80	0.5	PASS
		2462	15.28	2454.28	2469.56	0.5	PASS
11AX40SISO	Ant1	2422	36.32	2403.60	2439.92	0.5	PASS
		2437	36.40	2418.52	2454.92	0.5	PASS
		2452	36.24	2433.52	2469.76	0.5	PASS
BLE_1M	Ant1	2402	0.66	2401.67	2402.33	0.5	PASS
		2440	0.66	2439.67	2440.33	0.5	PASS
		2480	0.66	2479.67	2480.33	0.5	PASS
BLE_2M	Ant1	2402	1.23	2401.36	2402.58	0.5	PASS
		2440	1.18	2439.40	2440.58	0.5	PASS
		2480	1.24	2479.35	2480.58	0.5	PASS

5.5 Occupied Channel Bandwidth

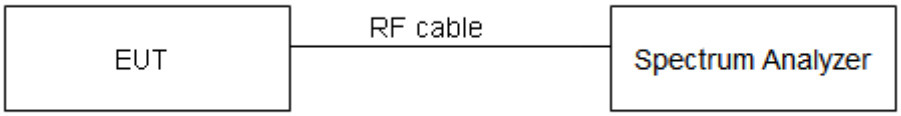
Ambient condition:

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
11B	Ant1	2412	12.627	2405.646	2418.274	---	---
		2437	12.507	2430.726	2443.234	---	---
		2462	12.468	2455.726	2468.194	---	---
11G	Ant1	2412	16.823	2403.568	2420.392	---	---
		2437	16.823	2428.568	2445.392	---	---
		2462	16.823	2453.529	2470.352	---	---
11N20SISO	Ant1	2412	17.862	2403.049	2420.911	---	---
		2437	17.902	2428.049	2445.951	---	---
		2462	17.902	2453.009	2470.911	---	---
11N40SISO	Ant1	2422	36.523	2403.698	2440.222	---	---
		2437	36.603	2418.618	2455.222	---	---
		2452	36.603	2433.618	2470.222	---	---
11AX20SISO	Ant1	2412	18.781	2402.569	2421.351	---	---
		2437	18.781	2427.569	2446.351	---	---
		2462	18.781	2452.569	2471.351	---	---
11AX40SISO	Ant1	2422	37.722	2403.059	2440.781	---	---
		2437	37.802	2418.059	2455.861	---	---
		2452	37.802	2433.059	2470.861	---	---
BLE_1M	Ant1	2402	1.035	2401.489	2402.524	---	---
		2440	1.023	2439.485	2440.508	---	---
		2480	1.047	2479.477	2480.524	---	---
BLE_2M	Ant1	2402	2.054	2400.989	2403.043	---	---
		2440	2.01	2439.005	2441.015	---	---
		2480	2.082	2478.969	2481.051	---	---

5.6 Band Edge Measurement

Ambient condition:

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

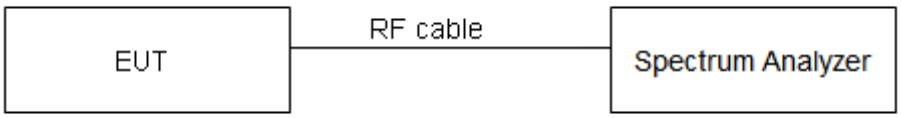
Method of Measurement:

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 Hz, 2 GHz-3 GHz = 1.407 dB.

Test Results:

TestMode	Antenna	ChName	Channel	RefLevel[dBm]	Result[dBm]	Limit[dBm]	Verdict
11B	Ant1	Low	2412	8.23	-36.82	<=-21.77	PASS
		High	2462	8.21	-48.91	<=-21.79	PASS
11G	Ant1	Low	2412	1.55	-33.81	<=-28.45	PASS
		High	2462	2.80	-46.5	<=-27.20	PASS
11N20SISO	Ant1	Low	2412	1.35	-32.63	<=-28.65	PASS
		High	2462	2.83	-45.45	<=-27.17	PASS
11N40SISO	Ant1	Low	2422	-2.57	-37.33	<=-32.57	PASS
		High	2452	-2.06	-40.95	<=-32.06	PASS
11AX20SISO	Ant1	Low	2412	1.37	-35.18	<=-28.63	PASS
		High	2462	1.35	-46.75	<=-28.65	PASS
11AX40SISO	Ant1	Low	2422	-2.38	-36.55	<=-32.38	PASS
		High	2452	-2.06	-41.16	<=-32.06	PASS
BLE_1M	Ant1	Low	2402	2.87	-45.68	<=-17.13	PASS
		High	2480	4.14	-47.71	<=-15.86	PASS
BLE_2M	Ant1	Low	2402	1.79	-31.5	<=-18.21	PASS
		High	2480	3.33	-45.48	<=-16.67	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.

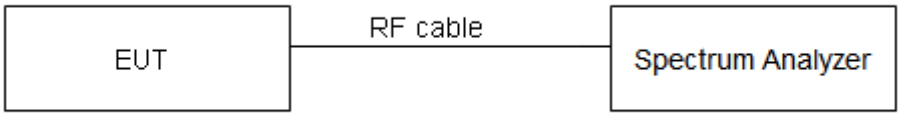
The conducted Power is measured at each antenna port. The measured results at the various antenna ports are then summed mathematically.

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	≤ 8 dBm / 3kHz

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[dBm/3kHz]	Limit[dBm/3kHz]	Verdict
11B	Ant1	2412	-13.52	<=8	PASS
		2437	-12.82	<=8	PASS
		2462	-12.85	<=8	PASS
11G	Ant1	2412	-19.32	<=8	PASS
		2437	-17.57	<=8	PASS
		2462	-17.78	<=8	PASS
11N20SISO	Ant1	2412	-19.34	<=8	PASS
		2437	-18.79	<=8	PASS
		2462	-18.69	<=8	PASS
11N40SISO	Ant1	2422	-23.69	<=8	PASS
		2437	-22.91	<=8	PASS
		2452	-22.97	<=8	PASS
11AX20SISO	Ant1	2412	-21.04	<=8	PASS
		2437	-20.92	<=8	PASS
		2462	-21.16	<=8	PASS
11AX40SISO	Ant1	2422	-23.00	<=8	PASS
		2437	-23.26	<=8	PASS
		2452	-19.23	<=8	PASS
BLE_1M	Ant1	2402	-13.86	<=8	PASS
		2440	-13.71	<=8	PASS
		2480	-12.41	<=8	PASS
BLE_2M	Ant1	2402	-16.59	<=8	PASS
		2440	-16.41	<=8	PASS
		2480	-15.23	<=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 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
11B	Ant1	2412	Reference	8.07	8.07	---	PASS
			30~1000	8.07	-59.78	≤-21.93	PASS
			1000~26500	8.07	-48.53	≤-21.93	PASS
		2437	Reference	8.39	8.39	---	PASS
			30~1000	8.39	-60.53	≤-21.61	PASS
			1000~26500	8.39	-49.1	≤-21.61	PASS
		2462	Reference	8.43	8.43	---	PASS
			30~1000	8.43	-60.47	≤-21.57	PASS
			1000~26500	8.43	-49.31	≤-21.57	PASS
11G	Ant1	2412	Reference	1.46	1.46	---	PASS
			30~1000	1.46	-60.45	≤-28.54	PASS
			1000~26500	1.46	-49.19	≤-28.54	PASS
		2437	Reference	2.99	2.99	---	PASS
			30~1000	2.99	-59.55	≤-27.01	PASS
			1000~26500	2.99	-49.04	≤-27.01	PASS
		2462	Reference	3.14	3.14	---	PASS
			30~1000	3.14	-59.82	≤-26.86	PASS
			1000~26500	3.14	-48.51	≤-26.86	PASS
11N20SISO	Ant1	2412	Reference	1.43	1.43	---	PASS
			30~1000	1.43	-60.68	≤-28.57	PASS
			1000~26500	1.43	-48.99	≤-28.57	PASS
		2437	Reference	3.20	3.20	---	PASS
			30~1000	3.20	-59.28	≤-26.8	PASS
			1000~26500	3.20	-48.9	≤-26.8	PASS
		2462	Reference	2.80	2.80	---	PASS
			30~1000	2.80	-60.21	≤-27.2	PASS
			1000~26500	2.80	-49.2	≤-27.2	PASS
11N40SISO	Ant1	2422	Reference	-2.70	-2.70	---	PASS
			30~1000	-2.70	-60.17	≤-32.7	PASS
			1000~26500	-2.70	-48.81	≤-32.7	PASS
		2437	Reference	-2.11	-2.11	---	PASS
			30~1000	-2.11	-59.47	≤-32.11	PASS
			1000~26500	-2.11	-48.67	≤-32.11	PASS
		2452	Reference	-2.11	-2.11	---	PASS
			30~1000	-2.11	-60.16	≤-32.11	PASS
			1000~26500	-2.11	-48.84	≤-32.11	PASS
11AX20SISO	Ant1	2412	Reference	1.45	1.45	---	PASS
			30~1000	1.45	-60.05	≤-28.55	PASS
			1000~26500	1.45	-48.92	≤-28.55	PASS
		2437	Reference	1.53	1.53	---	PASS
			30~1000	1.53	-60.34	≤-28.47	PASS
			1000~26500	1.53	-48.66	≤-28.47	PASS
		2462	Reference	1.68	1.68	---	PASS
			30~1000	1.68	-60.1	≤-28.32	PASS
			1000~26500	1.68	-49.52	≤-28.32	PASS
11AX40SISO	Ant1	2422	Reference	-2.68	-2.68	---	PASS
			30~1000	-2.68	-60.21	≤-32.68	PASS
			1000~26500	-2.68	-48.71	≤-32.68	PASS
		2437	Reference	-2.17	-2.17	---	PASS
			30~1000	-2.17	-59.99	≤-32.17	PASS
			1000~26500	-2.17	-48.93	≤-32.17	PASS
		2452	Reference	-1.94	-1.94	---	PASS
			30~1000	-1.94	-60.27	≤-31.94	PASS
			1000~26500	-1.94	-48.7	≤-31.94	PASS

TestMode	Antenna	Channel	FreqRange [MHz]	RefLevel [dBm]	Result[dBm]	Limit[dBm]	Verdict
BLE_1M	Ant1	2402	Reference	2.87	2.87	---	PASS
			30~1000	2.87	-59.89	≤-17.13	PASS
			1000~26500	2.87	-44.71	≤-17.13	PASS
		2440	Reference	2.86	2.86	---	PASS
			30~1000	2.86	-58.75	≤-17.14	PASS
			1000~26500	2.86	-47.83	≤-17.14	PASS
		2480	Reference	4.20	4.20	---	PASS
			30~1000	4.20	-58.49	≤-15.8	PASS
			1000~26500	4.20	-49.02	≤-15.8	PASS
BLE_2M	Ant1	2402	Reference	1.89	1.89	---	PASS
			30~1000	1.89	-60.12	≤-18.11	PASS
			1000~26500	1.89	-44.77	≤-18.11	PASS
		2440	Reference	1.91	1.91	---	PASS
			30~1000	1.91	-60.16	≤-18.09	PASS
			1000~26500	1.91	-48.32	≤-18.09	PASS
		2480	Reference	3.22	3.22	---	PASS
			30~1000	3.22	-59.93	≤-16.78	PASS
			1000~26500	3.22	-47.9	≤-16.78	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
Preamplifier	BBV 9721	9721-050	DZ-000209-1	SCHWARZBECK	2023/06/05

The End