



Test Report No.:
FCC2022-0078-RF1/R2

TEST REPORT

FCC ID : 2A9GO-XS1-32DISPLAY
Applicant : Jiangsu TSD Electronics Technology Co., Ltd
Product Name : XS1 32 inches Display
Mode No. : IDS320

CVC Testing Technology Co., Ltd.

Applicant		Name: Jiangsu TSD Electronics Technology Co., Ltd Address: No.198, East ChenFeng Road, Yushan Town	
Manufacturer		Name: Jiangsu TSD Electronics Technology Co., Ltd Address: No.198, East ChenFeng Road, Yushan Town	
Equipment Under Test		Product Name : XS1 32 inches Display Model No. : IDS320 Trade mark : TSD Serial no. : — Sampling : 1-1	
Date of Receipt.	2022.12.28	Date of Testing	2023.3.8
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 Issue Date: 2023.5.31	
Approved by:  Chen Huawen		Reviewed by:  Xu Zhenfei	Tested by:  Lu Weiji
Other Aspects: NONE.			
Abbreviations:OK, Pass= passed Fail = failed N/A= not applicable EUT= equipment, sample(s) under tested			
Note 1: This test report relates only to the EUT, and shall not be reproduced except in full, without written approval of CVC . Note 2: After the release of this report, it replaces the report numbered FCC2022-0078-RF1/R1.			

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1. General Product Information

1.1 General information

Product Name	XS1 32 inches Display
Model No.	IDS320
Additional model	N/A
Power Supply	AC 100-240V,50/60Hz
Serial Number(SN)	TM23C002814
HVIN	IDS320
firmware	XMA311D.B-2
software	20220620
specific power settings	Bluetooth(Low Energy): Default IEEE 802.11b: 35 IEEE 802.11g: 35 IEEE 802.11n(20MHz): 35 IEEE 802.11n(40MHz): 35
Antenna Type	External Antenna
Antenna Connector	A detachable antenna
Antenna Gain	2.0 dBi (provided by client)
Beamforming gain	Unsupported (provided by client)
Frequency Range	Bluetooth(Low Energy): 2402~2480MHz IEEE 802.11b/g/n20MHz): 2412~2462MHz IEEE 802.11n (40MHz): 2422~2452MHz
Channel Number	Bluetooth(Low Energy):40 Channels IEEE 802.11b/g/n (20MHz): 11 Channels IEEE 802.11n (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 (64QAM, 16QAM,QPSK,BPSK);
Max. Conducted Power	Bluetooth(Low Energy): 6.6 dBm IEEE 802.11b: 17.55 dBm IEEE 802.11g: 17.21 dBm IEEE 802.11n(20MHz): 17.30 dBm IEEE 802.11n(40MHz): 17.27 dBm
Operate Temp.Range	0~40°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 RF testing Lab. of CVC Testing Technology Co., Ltd.

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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(Low Energy)	1TX / 1RX	0,19,39
IEEE 802.11b	1TX / 1RX	1,6,11
IEEE 802.11g	1TX / 1RX	1,6,11
IEEE 802.11n 20 SISO	1TX / 1RX	1,6,11
IEEE 802.11n 40 SISO	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 channels are shown as following table.

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

Test Items	Test Antennas	Test Modes	Test Channels
Conducted Emissions	Antenna 1	IEEE 802.11n 20	1
Radiated Emissions	Antenna 1	IEEE 802.11n 20 Bluetooth(Low Energy)	1/ 0
Radiated Emissions (Band Edge)	Antenna 1	IEEE 802.11n 20/ Bluetooth(Low Energy)	1,11/ 0,39
Maximum conducted output power	Antenna 1	Bluetooth(Low Energy)/ IEEE 802.11b/ IEEE 802.11g/ IEEE 802.11n 20/ IEEE 802.11n 40	0,19,39/ 1,6,11/ 1,6,11/ 1,6,11/ 3,6,9
Minimum 6 dB bandwidth	Antenna 1	Bluetooth(Low Energy)/ IEEE 802.11b/ IEEE 802.11g/ IEEE 802.11n 20/ IEEE 802.11n 40	0,19,39/ 1,6,11/ 1,6,11/ 1,6,11/ 3,6,9
Occupied Channel Bandwidth	Antenna 1	Bluetooth(Low Energy)/ IEEE 802.11b/ IEEE 802.11g/ IEEE 802.11n 20/ IEEE 802.11n 40	0,19,39/ 1,6,11/ 1,6,11/ 1,6,11/ 3,6,9
Band Edge Measurement	Antenna 1	Bluetooth(Low Energy)/ IEEE 802.11b/ IEEE 802.11g/ IEEE 802.11n 20/ IEEE 802.11n 40	0,39/ 1,11/ 1,11/ 1,11/ 3,9
Maximum Power spectral density	Antenna 1	Bluetooth(Low Energy)/ IEEE 802.11b/ IEEE 802.11g/ IEEE 802.11n 20/ IEEE 802.11n 40	0,19,39/ 1,6,11/ 1,6,11/ 1,6,11/ 3,6,9
Spurious RF Conducted Emissions	Antenna 1	Bluetooth(Low Energy)/ IEEE 802.11b/ IEEE 802.11g/ IEEE 802.11n 20/ IEEE 802.11n 40	0,19,39/ 1,6,11/ 1,6,11/ 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	2.00	2.00	100.00	---	---
		2437	12.41	12.48	99.44	---	---
		2462	7.00	7.00	100.00	---	---
11G	Ant1	2412	0.00	0.00	100	---	---
		2437	0.00	0.01	100	---	---
		2462	0.00	0.00	100	---	---
11N20SISO	Ant1	2412	0.00	0.00	100	---	---
		2437	0.00	0.00	100	---	---
		2462	0.00	0.00	100	---	---
11N40SISO	Ant1	2422	0.94	1.07	87.85	---	---
		2437	0.00	0.01	100	---	---
		2452	0.95	1.11	85.59	---	---
BLE_1M	Ant1	2402	0.39	0.62	62.90	---	---
		2440	0.39	0.62	62.90	---	---
		2480	0.39	0.62	62.90	---	---

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	/
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.

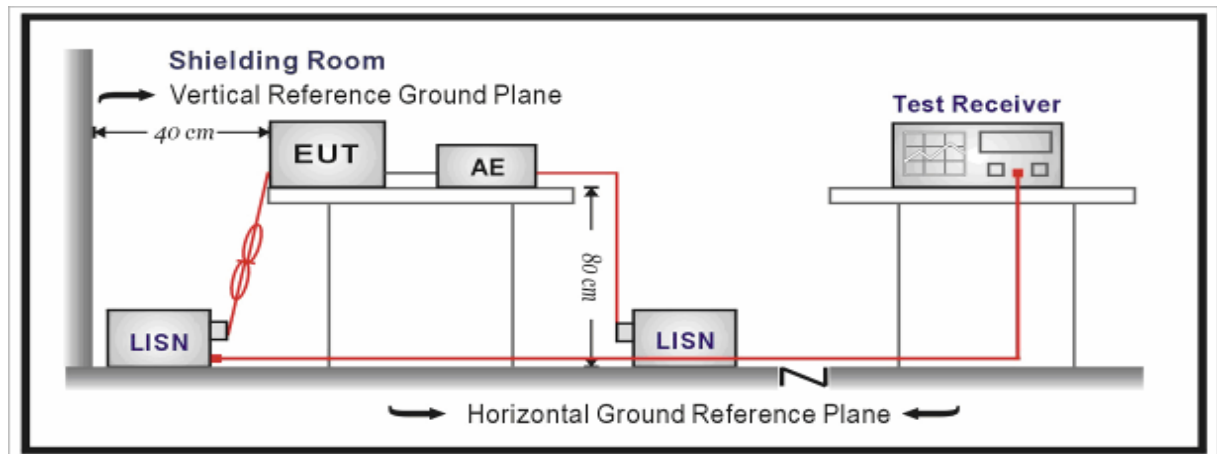
Limits:

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:

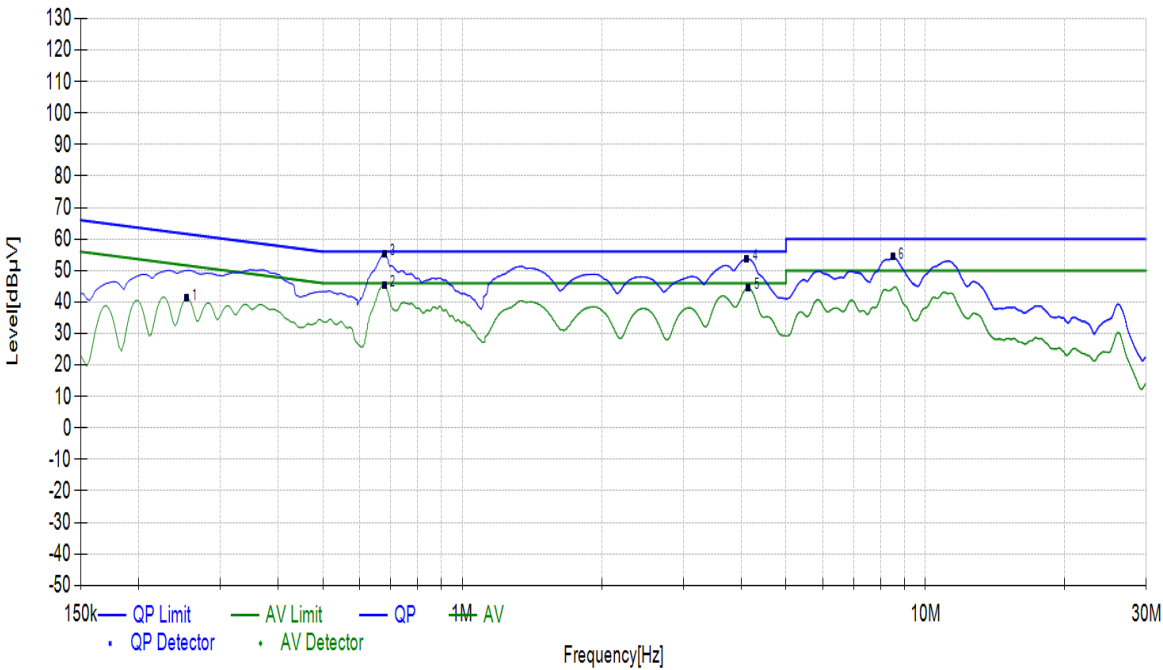
The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor $k = 1.96$. $U = 3.12$ dB.

Test Results:

During the test, the Conducted Emission from 150KHz to 30MHz was performed in all modes with all channels, and all antennas. 802.11n20, Channel 1, Antenna1 are selected as the worst condition. The test data of the worst-case condition was recorded in this report.

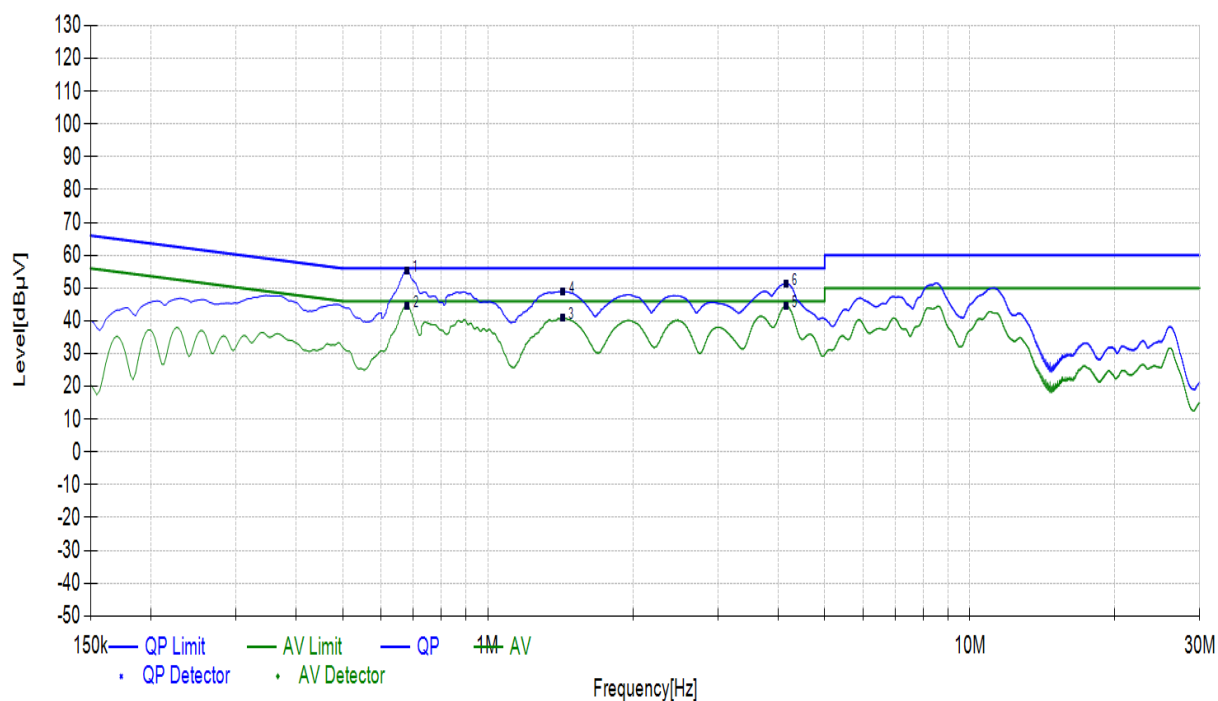
Power Line	L
Test channel	Worst-Case

Suspected List								
NO.	Freq. [MHz]	Factor [dB]	Reading [dBμV]	Level [dBμV]	Limit [dBμV]	Margin [dB]	Detector	Pass/Fail
6	8.5043	10.53	43.80	54.33	60.00	5.67	QP	PASS
4	4.1100	10.40	43.41	53.81	56.00	2.19	QP	PASS
3	0.6788	10.31	44.87	55.18	56.00	0.82	QP	PASS
2	0.6788	10.31	35.03	45.34	46.00	0.66	AV	PASS
5	4.1483	10.40	34.13	44.53	46.00	1.47	AV	PASS
1	0.2535	10.29	30.88	41.17	51.64	10.47	AV	PASS



Power Line	N
Test channel	Worst-Case

Suspected List								
NO.	Freq. [MHz]	Factor [dB]	Reading [dBμV]	Level [dBμV]	Limit [dBμV]	Margin [dB]	Detector	Pass/Fail
6	4.1550	10.41	41.07	51.48	56.00	4.52	QP	PASS
4	1.4325	10.34	38.67	49.01	56.00	6.99	QP	PASS
1	0.6788	10.31	44.90	55.21	56.00	0.79	QP	PASS
2	0.6810	10.31	34.22	44.53	46.00	1.47	AV	PASS
5	4.1528	10.41	34.30	44.71	46.00	1.29	AV	PASS
3	1.4303	10.34	30.50	40.84	46.00	5.16	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)).

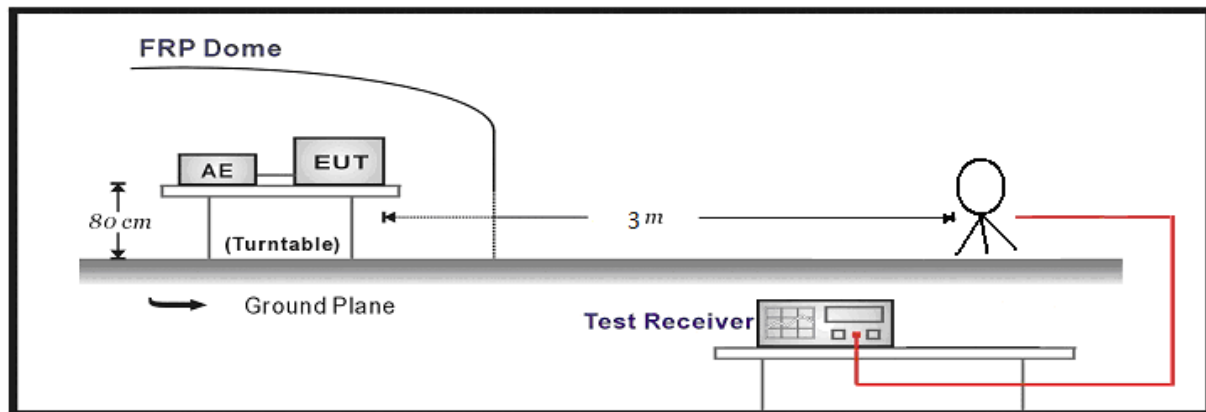
Frequency	Limit ($\mu\text{V/m}$)	Limit ($\text{dB}\mu\text{V/m @3m}$)	Remark
0.009MHz-0.490MHz	2400/F(kHz)@300m	20lg(240000/F(kHz))	Quasi-peak Level
0.490MHz~1.705MHz	24000/F(kHz)@30m	20lg(240000/F(kHz))	Quasi-peak Level
1.705MHz~30.0MHz	30@30m	49.54	Quasi-peak Level
30MHz-88MHz	100@3m	40.0	Quasi-peak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

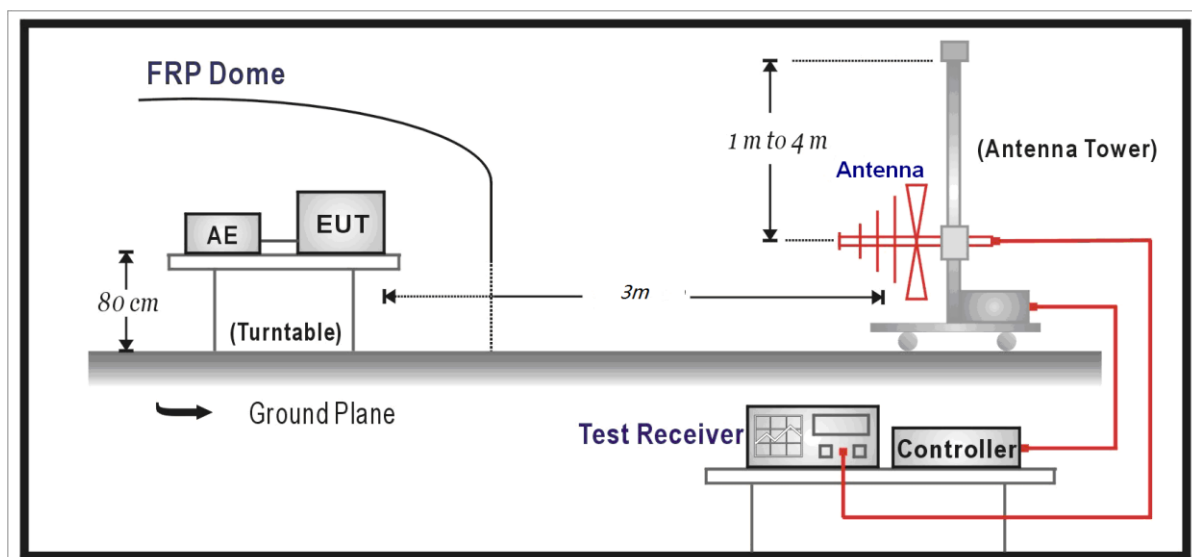
MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218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

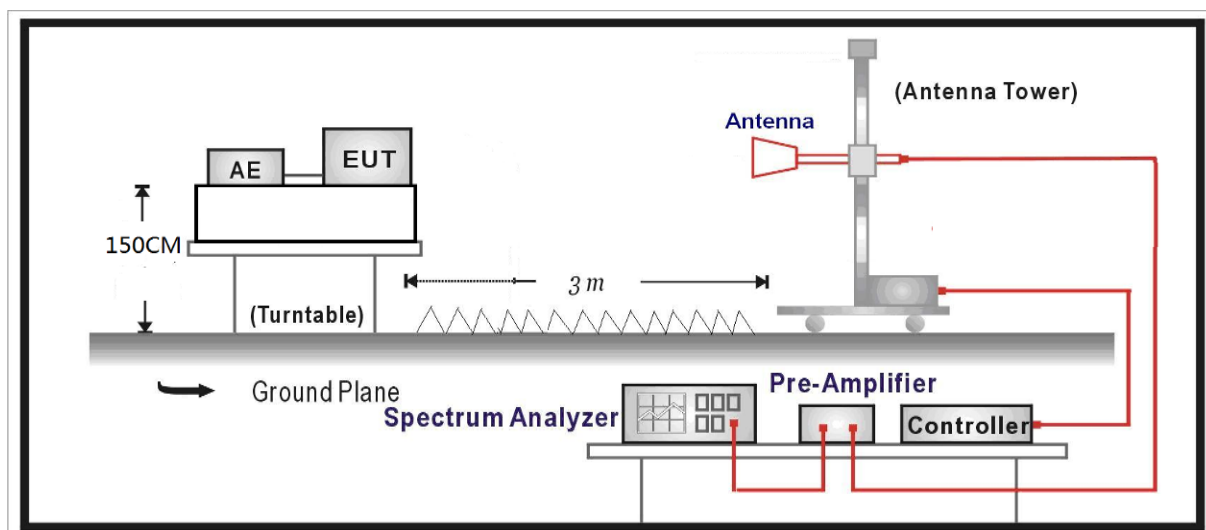
Below 30MHz Test Setup:



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

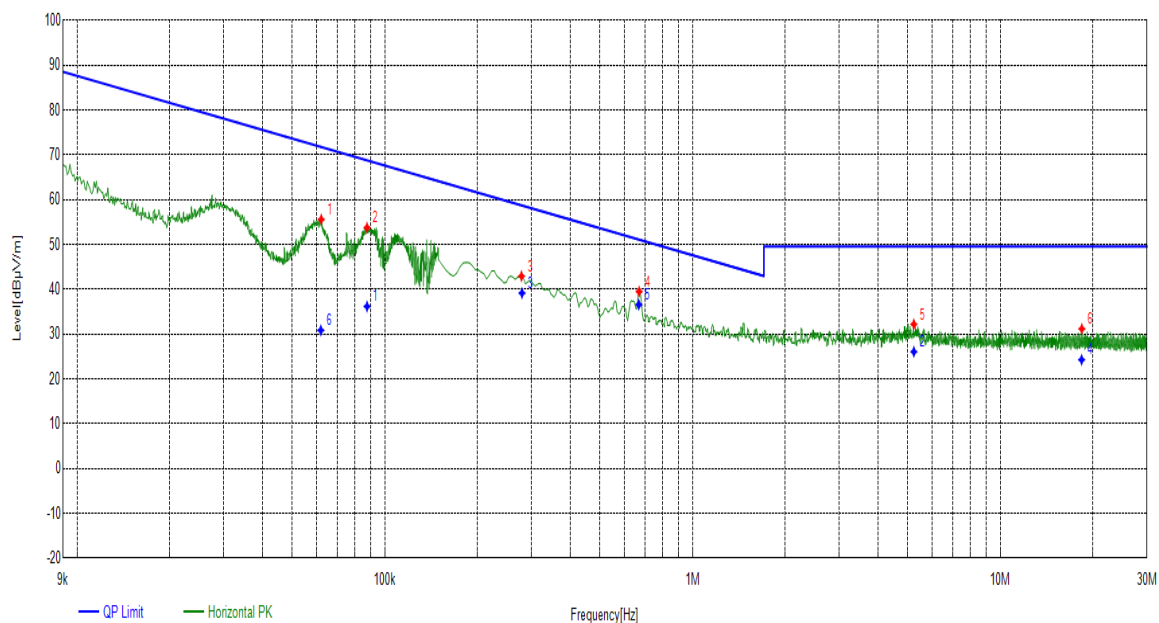
Test Results:

SPURIOUS EMISSIONS:

During the test, the Radiates Emission from 9KHz to 30MHz was performed in all modes with all channels and all antennas. 802.11n20, Channel 1, Antenna1, X axis 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
0.0619	X axis	19.65	30.85	71.77	40.92	100	320	PASS
0.0875	X axis	19.71	36.17	68.77	32.60	100	130	PASS
0.2790	X axis	19.51	39.14	58.69	19.55	100	253	PASS
0.6687	X axis	19.68	36.57	51.10	14.53	100	311	PASS
5.2395	X axis	19.64	26.06	49.54	23.48	100	204	PASS
18.3830	X axis	20.24	24.27	49.54	25.27	100	272	PASS

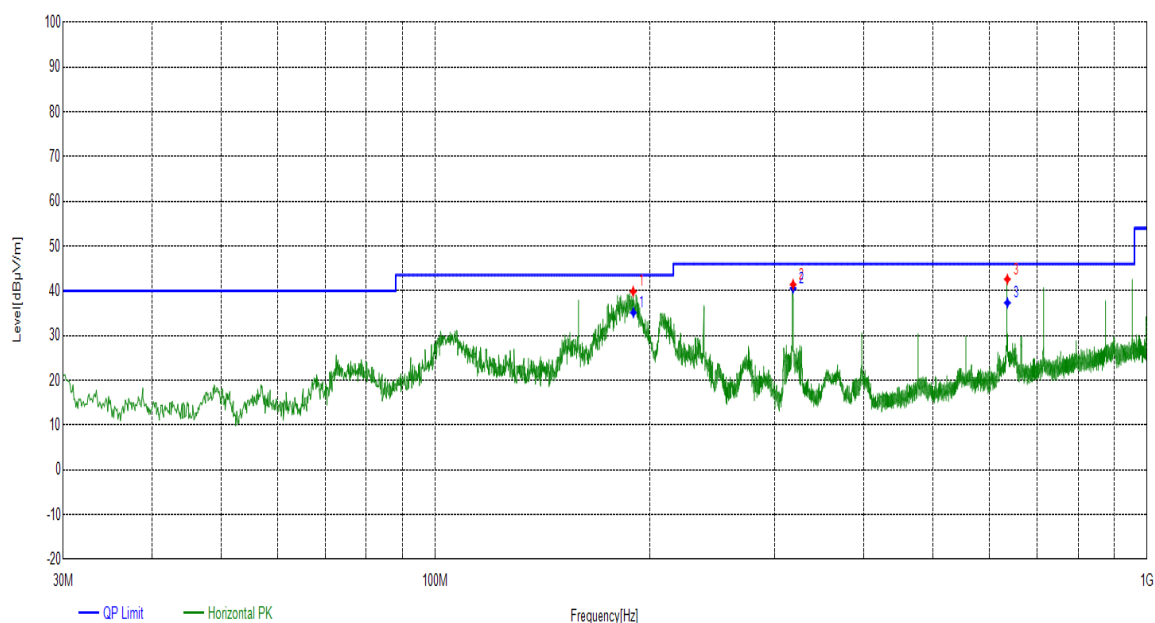


WIFI:

During the test, the Radiates Emission from 30MHz to 40GHz was performed in WIFI all modes with all channels and all antennas. 802.11n20, Channel 1, Antenna 1 are selected as the worst condition. The test data of the worst-case condition was recorded in this report.

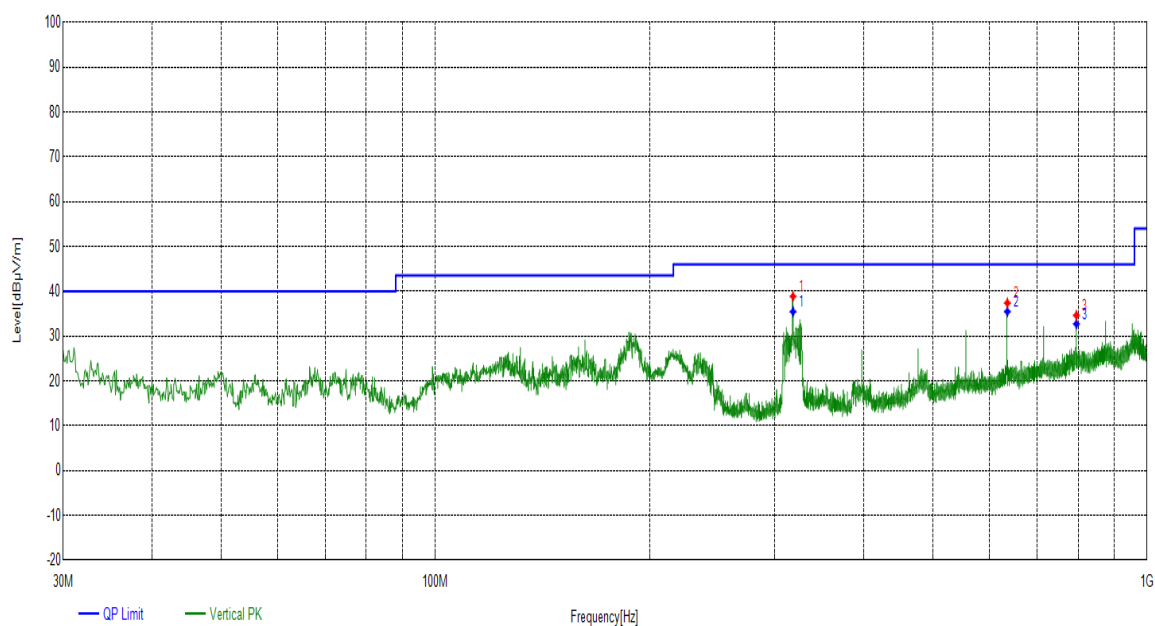
Radiates Emission			30M~1G							
Test channel			Worst-Case							
Suspected List										
Frequency [MHz]	Polarity	Factor [dB]	Reading [dBμV/m]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Detect or	Height [cm]	Angle deg	Pass/Fail
189.6780	Horizontal	11.86	27.98	39.84	43.50	3.66	PK	100	70	PASS
318.2158	Horizontal	15.53	25.89	41.42	46.00	4.58	PK	100	90	PASS
636.4076	Horizontal	23.06	19.53	42.59	46.00	3.41	PK	100	170	PASS

Final Data List									
Frequency [MHz]	Polarity	Factor [dB]	QP Value [dB μ V/m]	QP Limit [dB μ V/m]	QP Margin [dB]	Height [cm]	Angle [°]	Pass/Fail	
189.8290	Horizontal	11.86	35.12	43.50	8.38	160	70	PASS	
318.2204	Horizontal	15.54	40.57	46.00	5.43	210	90	PASS	
636.5366	Horizontal	23.06	37.32	46.00	8.68	280	170	PASS	

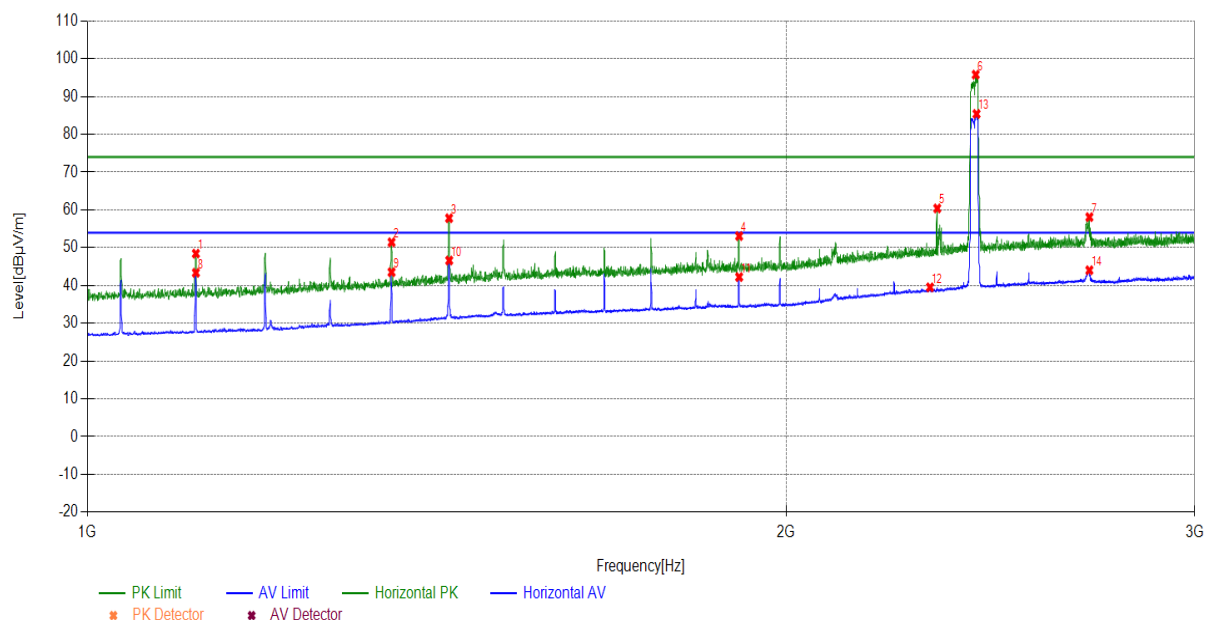


Radiates Emission			30M~1G							
Test channel			Worst-Case							
Suspected List										
Frequency [MHz]	Polarity	Factor [dB]	Reading [dBμV/m]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Detect or	Height [cm]	Angle deg	Pass/Fail
318.1188	Vertical	15.53	23.33	38.86	46.00	7.12	PK	100	80	PASS
636.4076	Vertical	23.06	14.32	37.38	46.00	8.62	PK	100	130	PASS
795.5036	Vertical	26.68	7.94	34.62	46.00	11.38	PK	100	150	PASS

Final Data List									
Frequency [MHz]	Polarity	Factor [dB]	QP Value [dB μ V/m]	QP Limit [dB μ V/m]	QP Margin [dB]	Height [cm]	Angle [°]	Pass/Fail	
318.1418	Vertical	15.53	35.46	46.00	10.54	110	80	PASS	
636.4076	Vertical	23.06	35.47	46.00	10.53	230	130	PASS	
795.5501	Vertical	26.68	32.71	46.00	13.29	120	150	PASS	

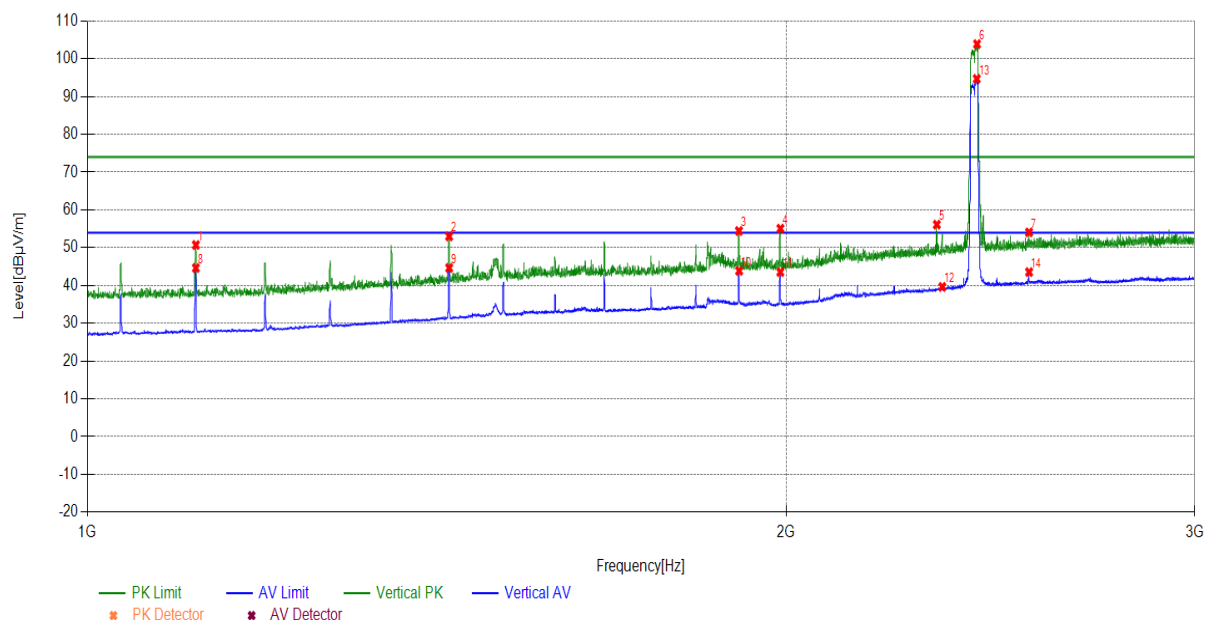


Radiates Emission		1G~3G							
Test channel		Worst-Case							
polarization		Horizontal							
Suspected List									
Frequency[MHz]	Factor [dB]	Reading [dBμV/m]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Detect or	Height [cm]	Angle deg	Pass/ Fail
1113.6114	26.88	21.56	48.44	74.00	25.56	PK	150	177	PASS
1352.2352	29.20	22.24	51.44	74.00	22.56	PK	150	220	PASS
1431.6432	30.06	27.76	57.82	74.00	16.18	PK	150	234	PASS
1909.0909	32.75	20.34	53.09	74.00	20.91	PK	150	163	PASS
2323.7324	36.47	23.93	60.40	74.00	13.60	PK	150	35	PASS
2414.1414	37.23	58.56	95.79	74.00	-21.79	PK	150	120	---
2702.3702	38.31	19.79	58.10	74.00	15.90	PK	150	148	PASS
1113.6114	26.88	16.49	43.37	54.00	10.63	AV	150	163	PASS
1352.2352	29.20	14.33	43.53	54.00	10.47	AV	150	163	PASS
1431.8432	30.07	16.55	46.62	54.00	7.38	AV	150	234	PASS
1909.0909	32.75	9.48	42.23	54.00	11.77	AV	150	163	PASS
2307.1307	36.32	3.20	39.52	54.00	14.48	AV	150	220	PASS
2416.1416	37.24	48.17	85.41	54.00	-31.41	AV	150	120	---
2702.3702	38.31	5.73	44.04	54.00	9.96	AV	150	134	PASS



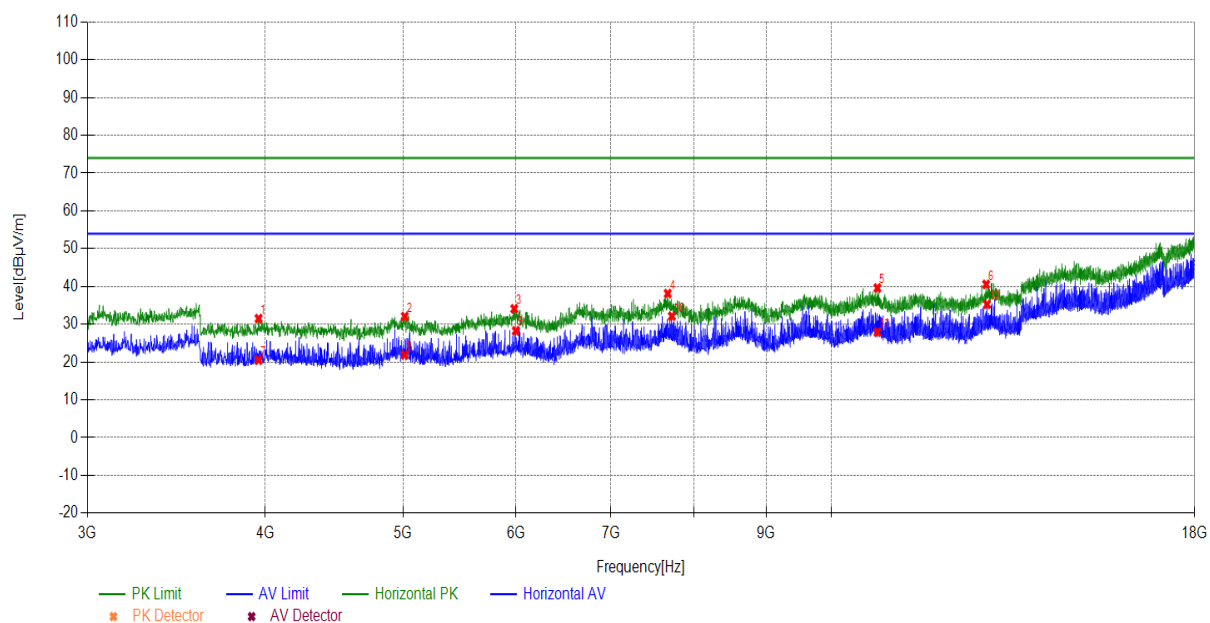
Note: The signal beyond the limit is carrier

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
1113.6114	26.88	23.85	50.73	74.00	23.27	PK	150	211	PASS
1431.6432	30.06	22.96	53.02	74.00	20.98	PK	150	239	PASS
1908.6909	32.75	21.68	54.43	74.00	19.57	PK	150	183	PASS
1988.8989	32.93	22.14	55.07	74.00	18.93	PK	150	183	PASS
2322.7323	36.46	19.65	56.11	74.00	17.89	PK	150	338	PASS
2417.3417	37.24	66.65	103.89	74.00	-29.89	PK	150	197	---
2545.3545	37.79	16.26	54.05	74.00	19.95	PK	150	183	PASS
1113.6114	26.88	17.75	44.63	54.00	9.37	AV	150	211	PASS
1431.8432	30.07	14.58	44.65	54.00	9.35	AV	150	239	PASS
1909.0909	32.75	11.14	43.89	54.00	10.11	AV	150	197	PASS
1988.6989	32.92	10.63	43.55	54.00	10.45	AV	150	183	PASS
2335.5336	36.58	3.07	39.65	54.00	14.35	AV	150	211	PASS
2416.7417	37.24	57.46	94.70	54.00	-40.70	AV	150	197	---
2545.5546	37.79	5.76	43.55	54.00	10.45	AV	150	183	PASS



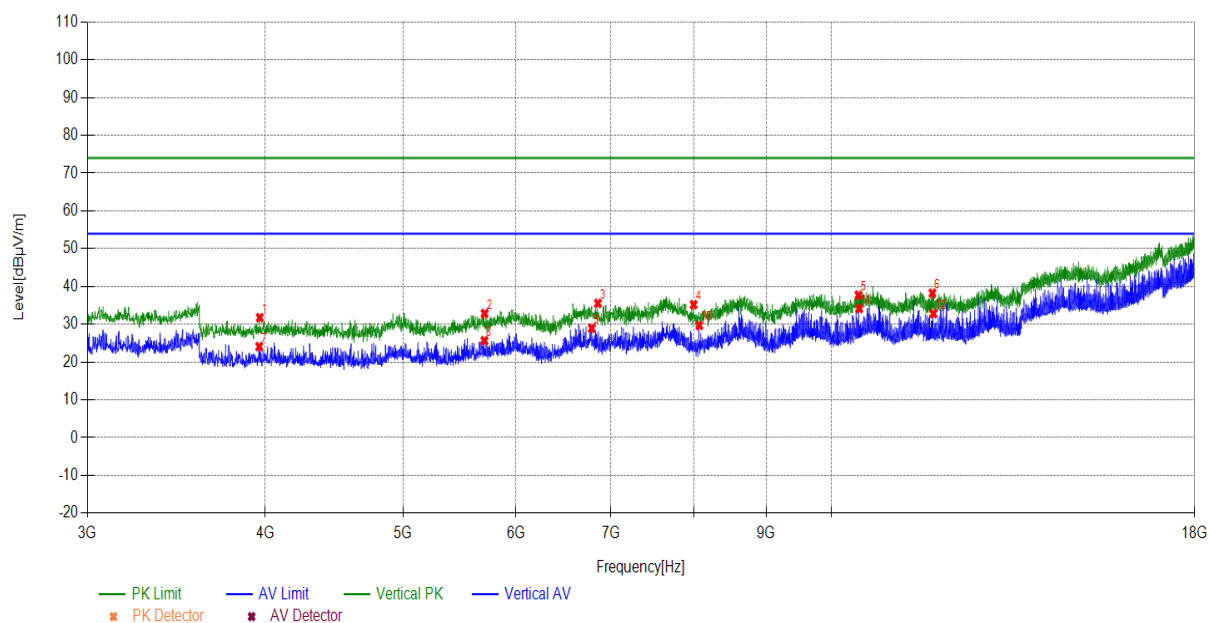
Note: The signal beyond the limit is carrier

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
3957.0957	-0.22	31.74	31.52	74.00	42.48	PK	150	320	PASS
5013.2013	1.50	30.57	32.07	74.00	41.93	PK	150	190	PASS
5985.2985	4.90	29.21	34.11	74.00	39.89	PK	150	110	PASS
7672.9673	8.38	29.75	38.13	74.00	35.87	PK	150	200	PASS
10772.2772	11.81	27.81	39.62	74.00	34.38	PK	150	180	PASS
12843.9844	12.89	27.69	40.58	74.00	33.42	PK	150	160	PASS
3957.0957	-0.22	20.73	20.51	54.00	33.49	AV	150	10	PASS
5013.2013	1.50	20.40	21.90	54.00	32.10	AV	150	40	PASS
6000.3	4.96	23.33	28.29	54.00	25.71	AV	150	10	PASS
7723.9724	8.39	23.73	32.12	54.00	21.88	AV	150	10	PASS
10772.2772	11.81	16.11	27.92	54.00	26.08	AV	150	70	PASS
12861.9862	12.94	22.33	35.27	54.00	18.73	AV	150	10	PASS



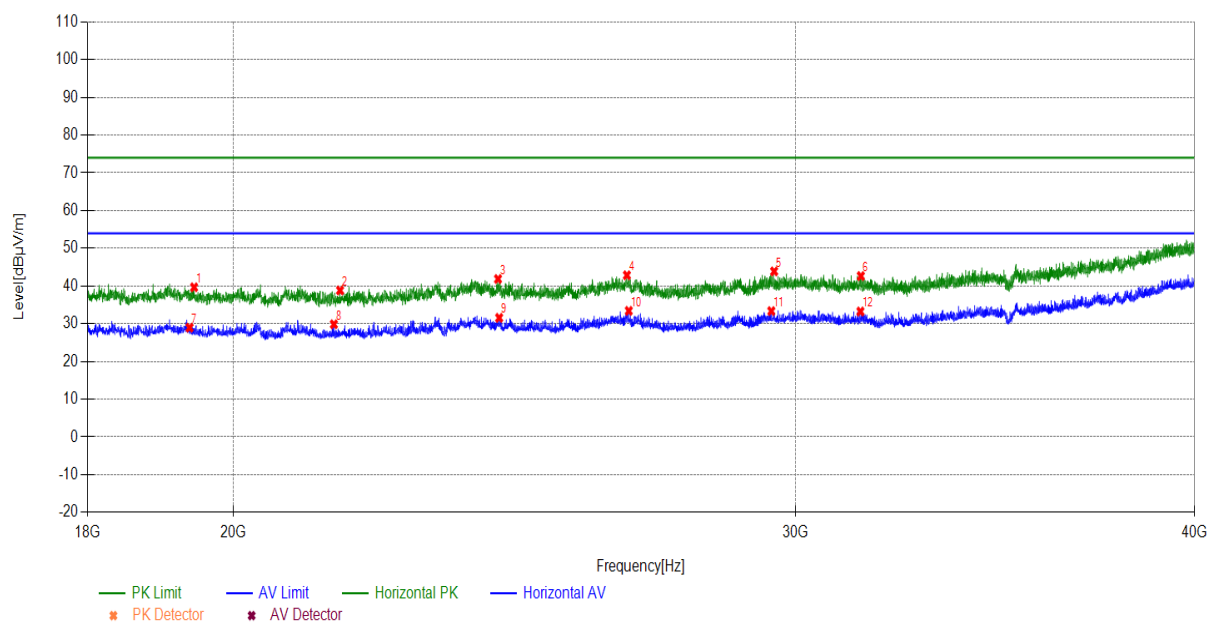
Note: The signal beyond the limit is carrier

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
3964.5965	-0.20	31.96	31.76	74.00	42.24	PK	150	200	PASS
5704.7705	3.67	29.18	32.85	74.00	41.15	PK	150	140	PASS
6852.3852	7.24	28.30	35.54	74.00	38.46	PK	150	130	PASS
8001.5002	8.48	26.71	35.19	74.00	38.81	PK	150	140	PASS
10446.7447	11.93	25.80	37.73	74.00	36.27	PK	150	240	PASS
11774.3774	10.77	27.46	38.23	74.00	35.77	PK	150	140	PASS
3961.5962	-0.21	24.32	24.11	54.00	29.89	AV	150	10	PASS
5703.2703	3.67	21.99	25.66	54.00	28.34	AV	150	10	PASS
6784.8785	6.90	22.05	28.95	54.00	25.05	AV	150	10	PASS
8075.0075	8.59	21.11	29.70	54.00	24.30	AV	150	10	PASS
10458.7459	11.93	22.25	34.18	54.00	19.82	AV	150	10	PASS
11793.8794	10.73	22.08	32.81	54.00	21.19	AV	150	10	PASS

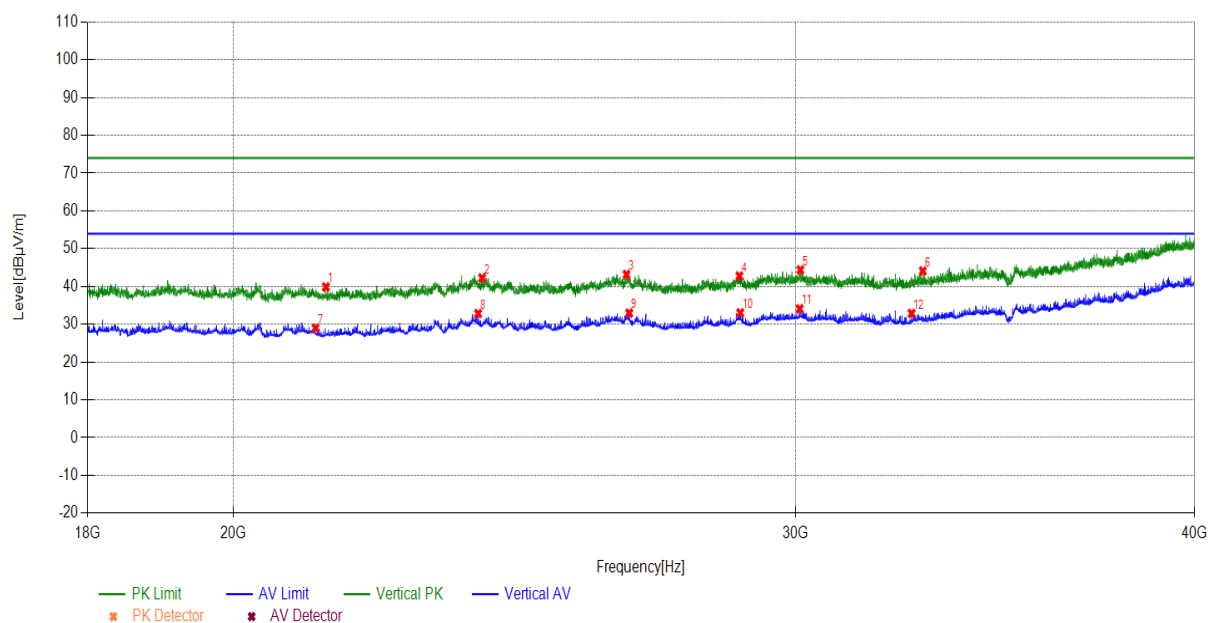


Note: The signal beyond the limit is carrier

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]	Detect or	Height [cm]	Angle deg	Pass/ Fail
19438.9439	1.33	38.34	39.67	74.00	34.33	PK	150	40	PASS
21597.3597	1.80	37.04	38.84	74.00	35.16	PK	150	20	PASS
24202.4202	3.78	38.09	41.87	74.00	32.13	PK	150	20	PASS
26561.0561	4.72	38.14	42.86	74.00	31.14	PK	150	50	PASS
29535.7536	6.38	37.50	43.88	74.00	30.12	PK	150	50	PASS
31441.1441	6.10	36.55	42.65	74.00	31.35	PK	150	30	PASS
19375.1375	1.33	27.64	28.97	54.00	25.03	AV	150	10	PASS
21500.5501	1.78	28.09	29.87	54.00	24.13	AV	150	10	PASS
24222.2222	3.79	27.79	31.58	54.00	22.42	AV	150	10	PASS
26596.2596	4.74	28.69	33.43	54.00	20.57	AV	150	10	PASS
29476.3476	6.33	27.03	33.36	54.00	20.64	AV	150	10	PASS
31432.3432	6.10	27.14	33.24	54.00	20.76	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]	Detect or	Height [cm]	Angle deg	Pass/ Fail
21377.3377	1.74	38.14	39.88	74.00	34.12	PK	150	240	PASS
23927.3927	3.64	38.63	42.27	74.00	31.73	PK	150	310	PASS
26552.2552	4.72	38.46	43.18	74.00	30.82	PK	150	240	PASS
28805.2805	5.88	36.90	42.78	74.00	31.22	PK	150	260	PASS
30099.0099	6.66	37.74	44.40	74.00	29.60	PK	150	280	PASS
32877.8878	6.25	37.86	44.11	74.00	29.89	PK	150	140	PASS
21218.9219	1.70	27.28	28.98	54.00	25.02	AV	150	10	PASS
23856.9857	3.59	29.24	32.83	54.00	21.17	AV	150	10	PASS
26605.0605	4.74	28.23	32.97	54.00	21.03	AV	150	10	PASS
28822.8823	5.89	27.15	33.04	54.00	20.96	AV	150	10	PASS
30083.6084	6.66	27.43	34.09	54.00	19.91	AV	150	10	PASS
32613.8614	6.15	26.72	32.87	54.00	21.13	AV	150	10	PASS

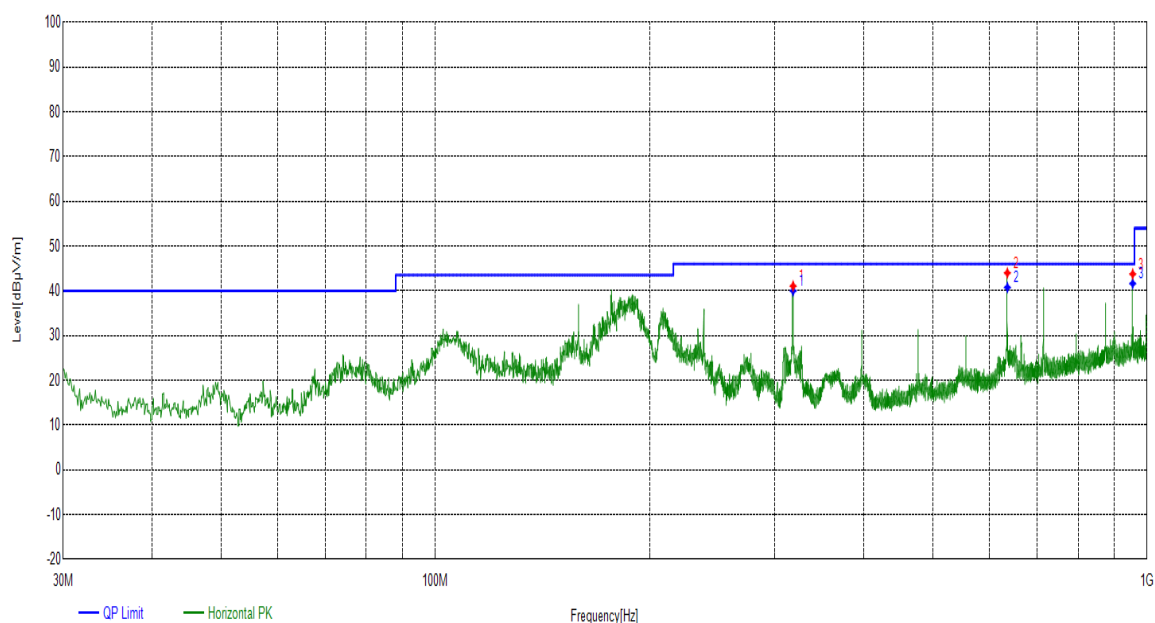


Bluetooth(Low Energy):

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

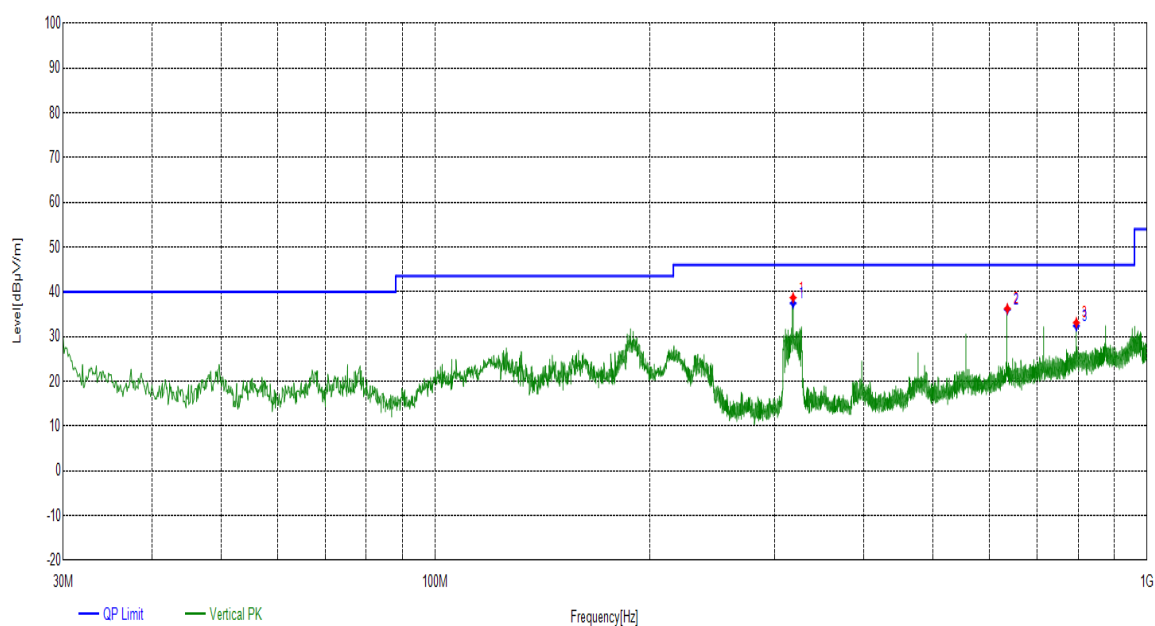
Radiates Emission			30M~1G							
Test channel			Worst-Case							
Suspected List										
Frequency [MHz]	Polarity	Factor [dB]	Reading [dBμV/m]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Detect or	Height [cm]	Angle deg	Pass/Fail
318.2158	Horizontal	15.53	25.54	41.07	46.00	4.93	PK	100	110	PASS
636.4076	Horizontal	23.06	20.93	43.99	46.00	2.01	PK	100	110	PASS
954.6965	Horizontal	28.28	15.47	43.75	46.00	2.25	PK	100	360	PASS

Final Data List									
Frequency [MHz]	Polarity	Factor [dB]	QP Value [dB μ V/m]	QP Limit [dB μ V/m]	QP Margin [dB]	Height [cm]	Angle [°]	Pass/Fail	
318.1835	Horizontal	15.54	39.99	46.00	6.01	210	110	PASS	
636.4629	Horizontal	23.06	40.75	46.00	5.25	150	110	PASS	
954.6410	Horizontal	28.28	41.63	46.00	4.37	60	260	PASS	

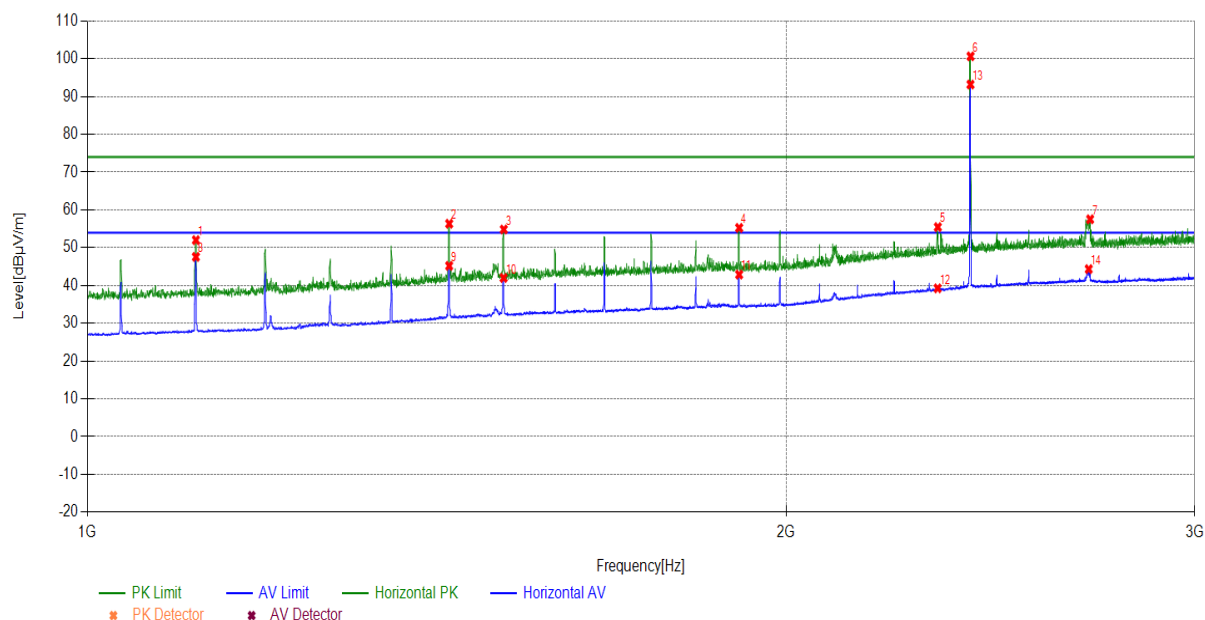


Radiates Emission			30M~1G							
Test channel			Worst-Case							
Suspected List										
Frequency [MHz]	Polarity	Factor [dB]	Reading [dBμV/m]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Detect or	Height [cm]	Angle deg	Pass/Fail
318.2158	Vertical	15.53	23.16	38.69	46.00	7.31	PK	100	40	PASS
636.4076	Vertical	23.06	13.18	36.24	46.00	9.76	PK	100	270	PASS
795.6006	Vertical	26.68	6.43	33.11	46.00	12.89	PK	100	290	PASS

Final Data List									
Frequency [MHz]	Polarity	Factor [dB]	QP Value [dB μ V/m]	QP Limit [dB μ V/m]	QP Margin [dB]	Height [cm]	Angle [°]	Pass/Fail	
318.1928	Vertical	15.54	37.45	46.00	8.55	20	40	PASS	
636.4353	Vertical	23.06	36.06	46.00	9.94	110	270	PASS	
795.5086	Vertical	26.68	32.37	46.00	13.63	50	290	PASS	

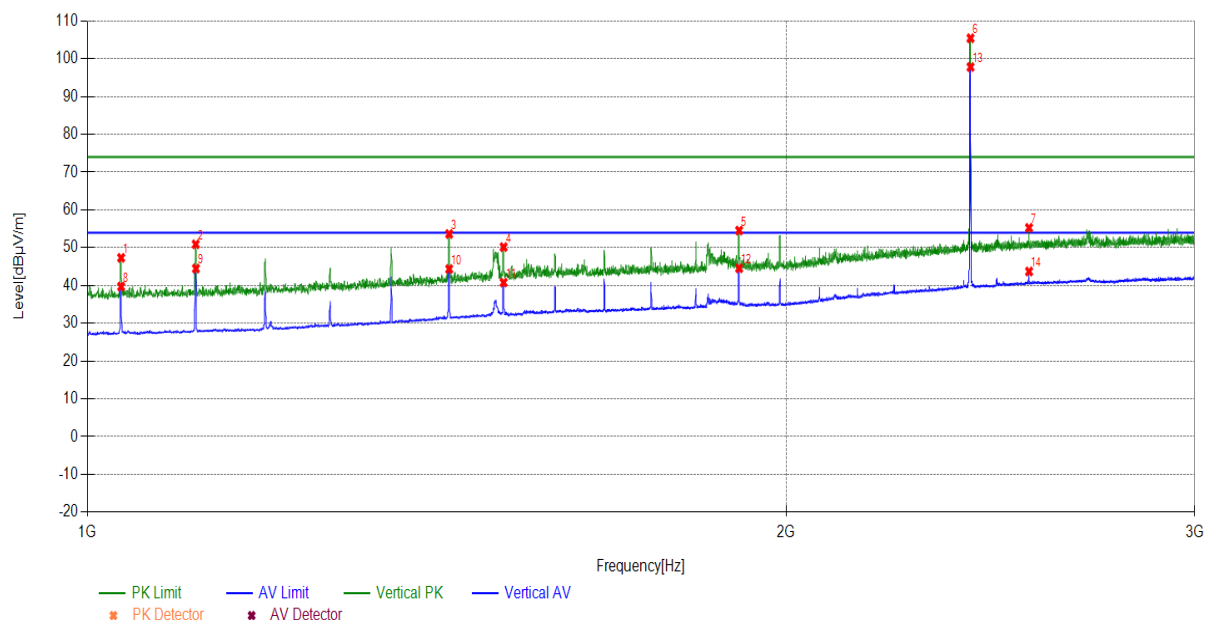


Radiates Emission		1G~3G							
Test channel		Worst-Case							
polarization		Horizontal							
Suspected List									
Frequency[MHz]	Factor [dB]	Reading [dBμV/m]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Detect or	Height [cm]	Angle deg	Pass/ Fail
1113.6114	26.88	25.13	52.01	74.00	21.99	PK	150	193	PASS
1431.8432	30.07	26.28	56.35	74.00	17.65	PK	150	236	PASS
1511.4511	30.89	23.94	54.83	74.00	19.17	PK	150	81	PASS
1909.0909	32.75	22.50	55.25	74.00	18.75	PK	150	95	PASS
2325.1325	36.48	18.99	55.47	74.00	18.53	PK	150	236	PASS
2401.9402	37.17	63.48	100.65	74.00	-26.65	PK	150	122	---
2704.3704	38.32	19.21	57.53	74.00	16.47	PK	150	137	PASS
1113.6114	26.88	20.69	47.57	54.00	6.43	AV	150	193	PASS
1431.8432	30.07	15.13	45.20	54.00	8.80	AV	150	236	PASS
1511.2511	30.89	11.11	42.00	54.00	12.00	AV	150	81	PASS
1909.0909	32.75	10.15	42.90	54.00	11.10	AV	150	95	PASS
2324.7325	36.48	2.77	39.25	54.00	14.75	AV	150	236	PASS
2401.7402	37.17	56.02	93.19	54.00	-39.19	AV	150	122	---
2700.7701	38.31	6.03	44.34	54.00	9.66	AV	150	137	PASS



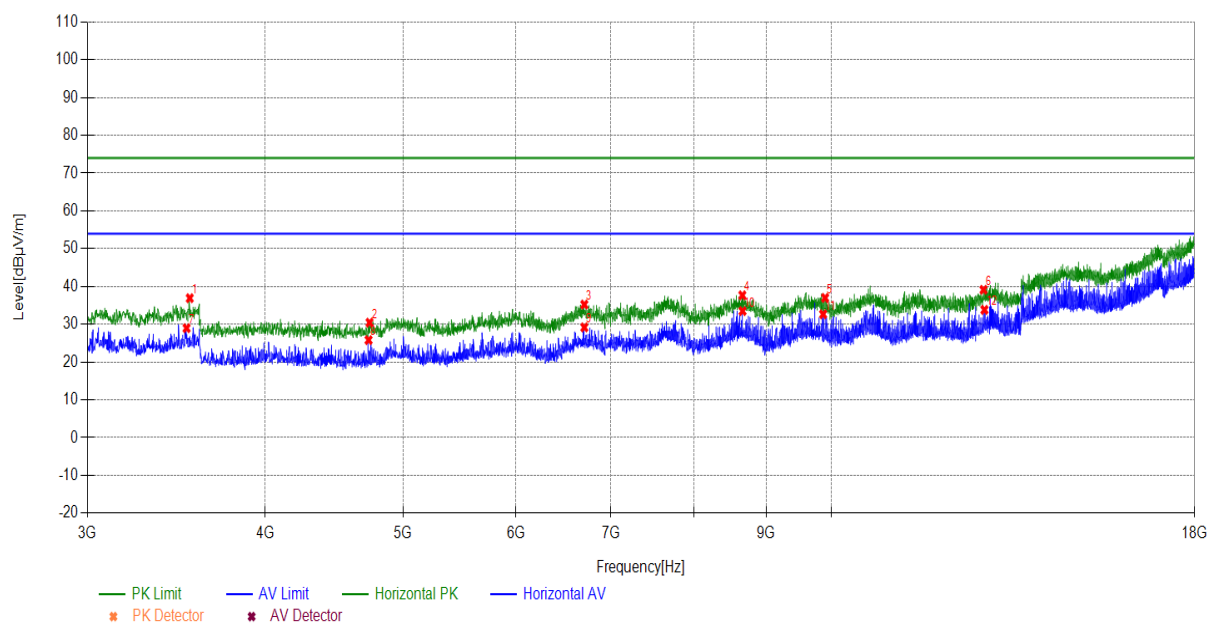
Note: The signal beyond the limit is carrier

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
1034.0034	26.26	21.07	47.33	74.00	26.67	PK	150	138	PASS
1113.4113	26.88	24.02	50.90	74.00	23.10	PK	150	181	PASS
1431.8432	30.07	23.57	53.64	74.00	20.36	PK	150	224	PASS
1511.2511	30.89	19.28	50.17	74.00	23.83	PK	150	210	PASS
1909.0909	32.75	21.80	54.55	74.00	19.45	PK	150	152	PASS
2401.7402	37.17	68.27	105.44	74.00	-31.44	PK	150	167	---
2545.3545	37.79	17.48	55.27	74.00	18.73	PK	150	124	PASS
1034.0034	26.26	13.46	39.72	54.00	14.28	AV	150	196	PASS
1113.6114	26.88	17.61	44.49	54.00	9.51	AV	150	181	PASS
1431.8432	30.07	14.30	44.37	54.00	9.63	AV	150	210	PASS
1511.2511	30.89	9.90	40.79	54.00	13.21	AV	150	152	PASS
1909.0909	32.75	11.82	44.57	54.00	9.43	AV	150	167	PASS
2401.7402	37.17	60.65	97.82	54.00	-43.82	AV	150	152	---
2545.5546	37.79	5.93	43.72	54.00	10.28	AV	150	167	PASS

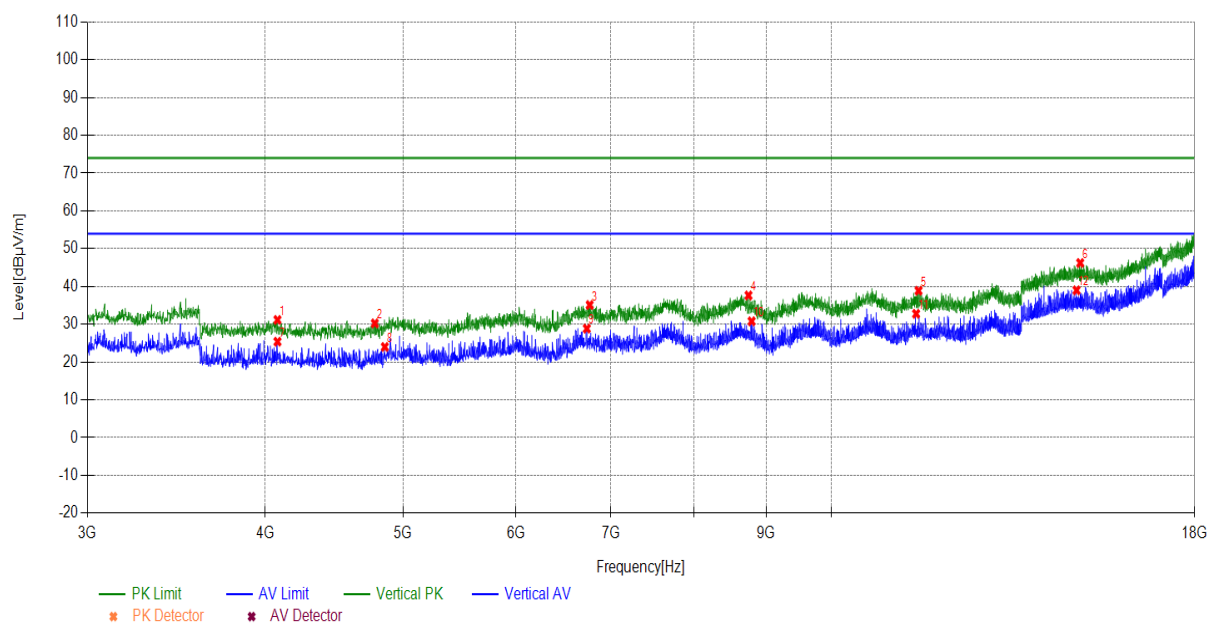


Note: The signal beyond the limit is carrier

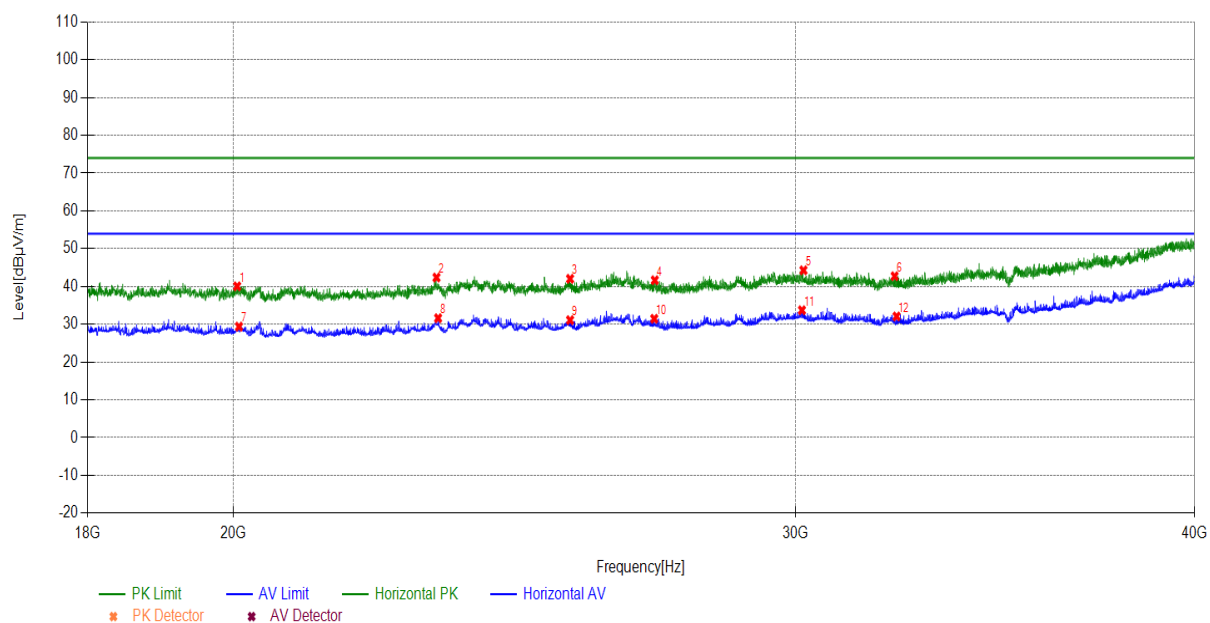
Radiates Emission		3G~18G							
Test channel		Worst-Case							
polarization		Horizontal							
Suspected List									
Frequency[MHz]	Factor [dB]	Reading [dBμV/m]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Detect or	Height [cm]	Angle deg	Pass/ Fail
3540.054	-0.97	37.88	36.91	74.00	37.09	PK	150	40	PASS
4735.6736	0.34	30.09	30.43	74.00	43.57	PK	150	200	PASS
6703.8704	6.51	28.73	35.24	74.00	38.76	PK	150	310	PASS
8657.0657	9.24	28.44	37.68	74.00	36.32	PK	150	20	PASS
9897.6898	11.54	25.45	36.99	74.00	37.01	PK	150	30	PASS
12789.979	12.75	26.38	39.13	74.00	34.87	PK	150	190	PASS
3522.0522	-1.01	29.99	28.98	54.00	25.02	AV	150	10	PASS
4728.1728	0.31	25.51	25.82	54.00	28.18	AV	150	10	PASS
6703.8704	6.51	22.68	29.19	54.00	24.81	AV	150	10	PASS
8660.066	9.24	24.25	33.49	54.00	20.51	AV	150	10	PASS
9866.1866	11.55	21.11	32.66	54.00	21.34	AV	150	10	PASS
12809.4809	12.80	21.02	33.82	54.00	20.18	AV	150	10	PASS



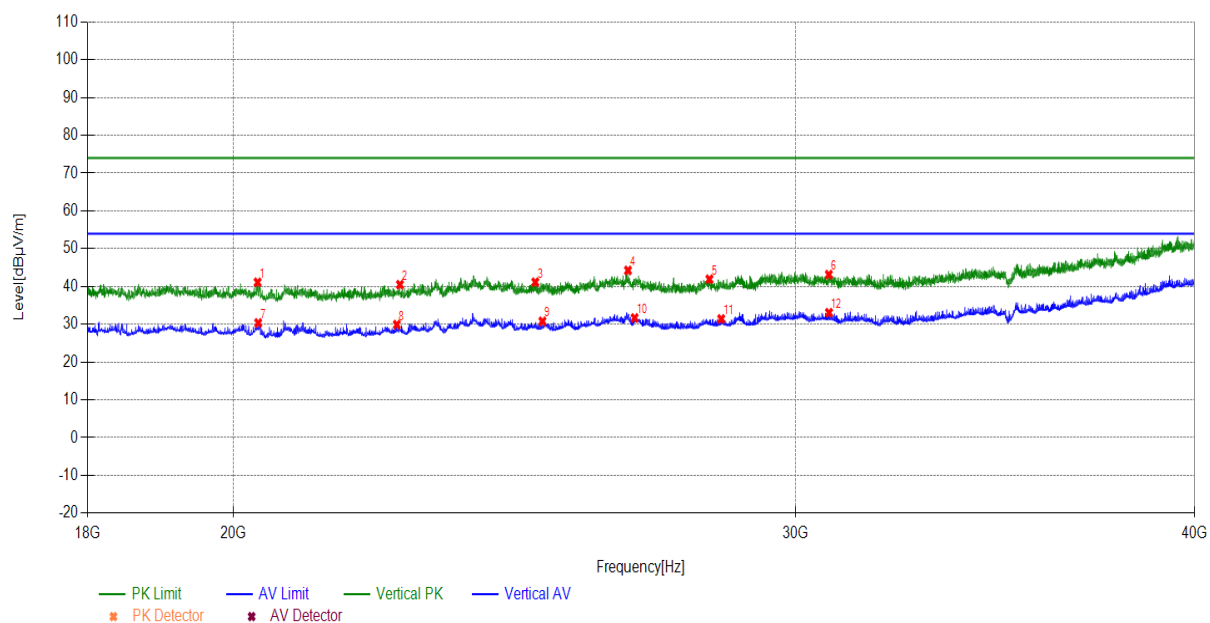
Radiates Emission		3G~18G							
Test channel		Worst-Case							
polarization		Vertical							
Suspected List									
Frequency[MHz]	Factor [dB]	Reading [dBμV/m]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Detect or	Height [cm]	Angle deg	Pass/ Fail
4080.108	-0.22	31.39	31.17	74.00	42.83	PK	150	10	PASS
4776.1776	0.50	29.74	30.24	74.00	43.76	PK	150	130	PASS
6762.3762	6.79	28.33	35.12	74.00	38.88	PK	150	320	PASS
8744.0744	9.32	28.32	37.64	74.00	36.36	PK	150	60	PASS
11513.3513	11.18	27.71	38.89	74.00	35.11	PK	150	170	PASS
14956.1956	16.62	29.60	46.22	74.00	27.78	PK	150	30	PASS
4080.108	-0.22	25.61	25.39	54.00	28.61	AV	150	10	PASS
4854.1854	0.83	23.17	24.00	54.00	30.00	AV	150	10	PASS
6730.8731	6.64	22.23	28.87	54.00	25.13	AV	150	10	PASS
8787.5788	9.37	21.43	30.80	54.00	23.20	AV	150	10	PASS
11468.3468	11.23	21.54	32.77	54.00	21.23	AV	150	10	PASS
14867.6868	16.79	22.20	38.99	54.00	15.01	AV	150	10	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	38.74	40.06	74.00	33.94	PK	150	170	PASS
23152.9153	3.02	39.36	42.38	74.00	31.62	PK	150	280	PASS
25493.9494	4.30	37.74	42.04	74.00	31.96	PK	150	100	PASS
27100.11	4.95	36.72	41.67	74.00	32.33	PK	150	280	PASS
30167.2167	6.62	37.67	44.29	74.00	29.71	PK	150	210	PASS
32217.8218	5.99	36.75	42.74	74.00	31.26	PK	150	120	PASS
20079.2079	1.33	28.05	29.38	54.00	24.62	AV	150	10	PASS
23179.3179	3.04	28.58	31.62	54.00	22.38	AV	150	10	PASS
25493.9494	4.30	26.80	31.10	54.00	22.90	AV	150	10	PASS
27089.1089	4.94	26.52	31.46	54.00	22.54	AV	150	10	PASS
30134.2134	6.64	27.09	33.73	54.00	20.27	AV	150	10	PASS
32261.8262	6.00	26.08	32.08	54.00	21.92	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]	Detect or	Height [cm]	Angle deg	Pass/ Fail
20349.835	1.42	39.69	41.11	74.00	32.89	PK	150	180	PASS
22550.055	2.45	38.04	40.49	74.00	33.51	PK	150	350	PASS
24862.4862	4.04	37.10	41.14	74.00	32.86	PK	150	100	PASS
26580.8581	4.73	39.53	44.26	74.00	29.74	PK	150	130	PASS
28189.2189	5.51	36.41	41.92	74.00	32.08	PK	150	280	PASS
30723.8724	6.37	36.77	43.14	74.00	30.86	PK	150	90	PASS
20358.6359	1.43	28.92	30.35	54.00	23.65	AV	150	10	PASS
22499.4499	2.40	27.51	29.91	54.00	24.09	AV	150	10	PASS
24990.099	4.10	26.68	30.78	54.00	23.22	AV	150	10	PASS
26708.4708	4.78	26.89	31.67	54.00	22.33	AV	150	10	PASS
28429.0429	5.66	25.75	31.41	54.00	22.59	AV	150	10	PASS
30728.2728	6.37	26.69	33.06	54.00	20.94	AV	150	10	PASS

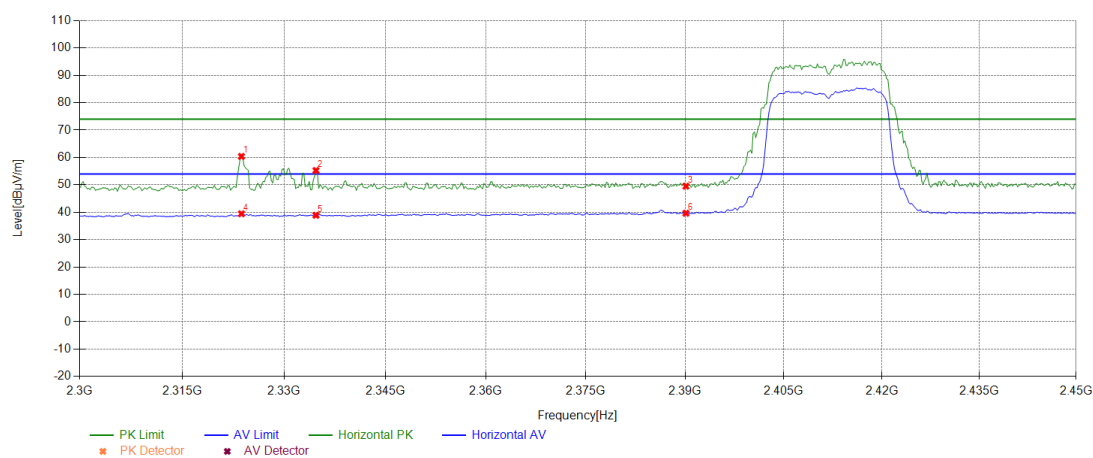


Band Edge:

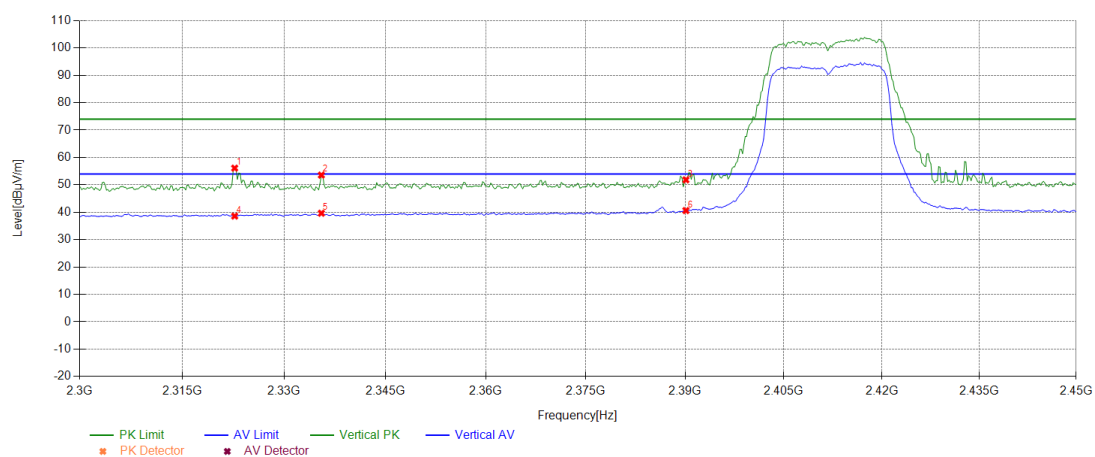
During the test, the Band Edge was performed in WIFI all modes with all channels and all antennas.

802.11n20, Antenna1 are selected as the worst condition. The test data of the worst-case condition was recorded in this report.

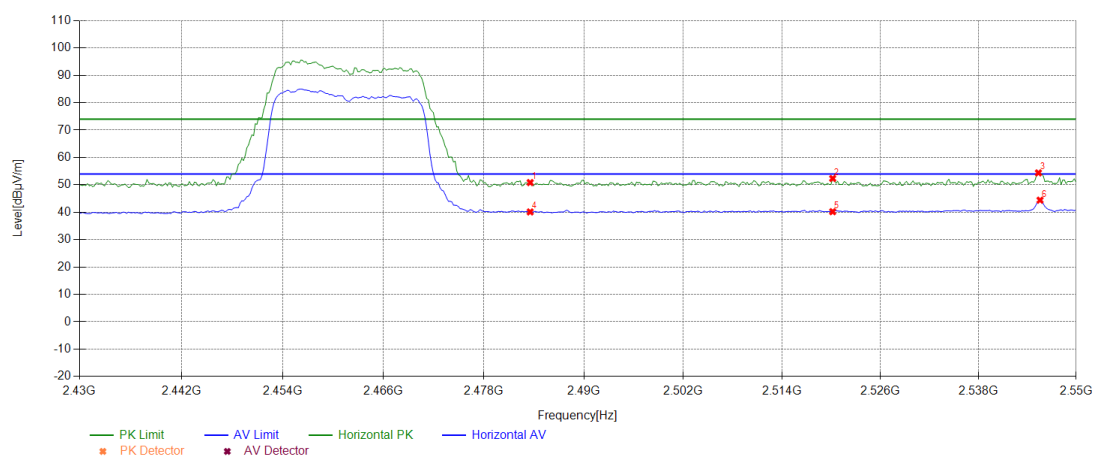
Test mode			802.11n20						
Test channel			Lowest channel						
polarization			Horizontal						
Suspected List									
Frequency [MHz]	Factor [dB]	Reading [dBμV/m]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Detector	Height [cm]	Angle deg	Pass/ Fail
2323.7324	36.47	23.93	60.40	74.00	13.60	PK	150	35	PASS
2334.7335	36.57	18.69	55.26	74.00	18.74	PK	150	21	PASS
2390.139	37.07	12.45	49.52	74.00	24.48	PK	150	347	PASS
2323.7324	36.47	2.98	39.45	54.00	14.55	AV	150	35	PASS
2334.7335	36.57	2.33	38.90	54.00	15.10	AV	150	305	PASS
2390.139	37.07	2.58	39.65	54.00	14.35	AV	150	177	PASS



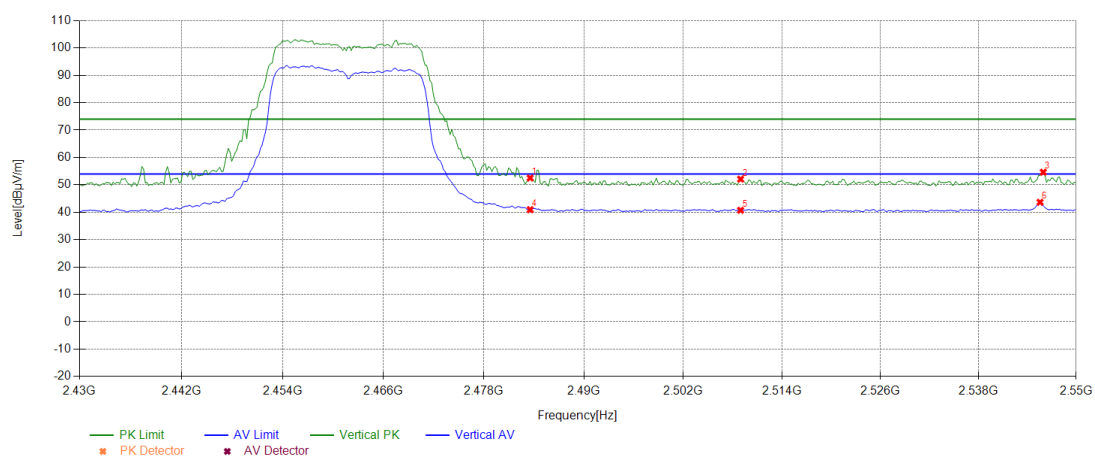
Test mode			802.11n20						
Test channel			Lowest channel						
polarization			Vertical						
Suspected List									
Frequency [MHz]	Factor [dB]	Reading [dBμV/m]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Detector	Height [cm]	Angle deg	Pass/ Fail
2322.7323	36.46	19.65	56.11	74.00	17.89	PK	150	338	PASS
2335.5336	36.58	17.00	53.58	74.00	20.42	PK	150	211	PASS
2390.139	37.07	14.78	51.85	74.00	22.15	PK	150	169	PASS
2322.7323	36.46	2.14	38.60	54.00	15.40	AV	150	97	PASS
2335.5336	36.58	3.07	39.65	54.00	14.35	AV	150	211	PASS
2390.139	37.07	3.55	40.62	54.00	13.38	AV	150	183	PASS



Test mode			802.11n20						
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	37.54	13.31	50.85	74.00	23.15	PK	150	153	PASS
2520.152	37.69	14.65	52.34	74.00	21.66	PK	150	252	PASS
2545.3545	37.79	16.60	54.39	74.00	19.61	PK	150	110	PASS
2483.5484	37.54	2.58	40.12	54.00	13.88	AV	150	110	PASS
2520.152	37.69	2.53	40.22	54.00	13.78	AV	150	2	PASS
2545.5546	37.79	6.64	44.43	54.00	9.57	AV	150	110	PASS

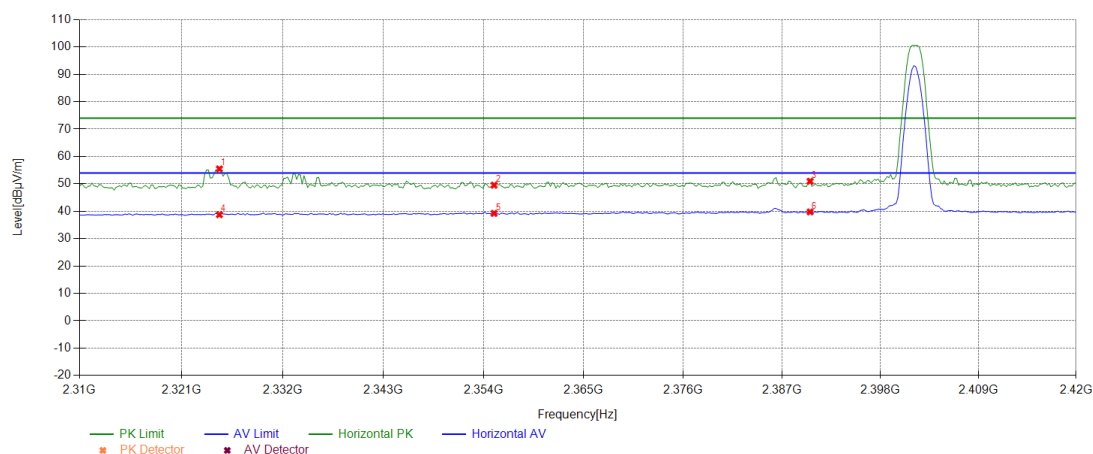


Test mode			802.11n20						
Test channel			Highest channel						
polarization			Vertical						
Suspected List									
Frequency [MHz]	Factor [dB]	Reading [dBμV/m]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Detector	Height [cm]	Angle deg	Pass/ Fail
2483.5484	37.54	14.97	52.51	74.00	21.49	PK	150	202	PASS
2508.9509	37.65	14.45	52.10	74.00	21.90	PK	150	287	PASS
2545.9546	37.79	16.85	54.64	74.00	19.36	PK	150	145	PASS
2483.5484	37.54	3.41	40.95	54.00	13.05	AV	150	159	PASS
2508.9509	37.65	3.09	40.74	54.00	13.26	AV	150	159	PASS
2545.5546	37.79	5.87	43.66	54.00	10.34	AV	150	145	PASS

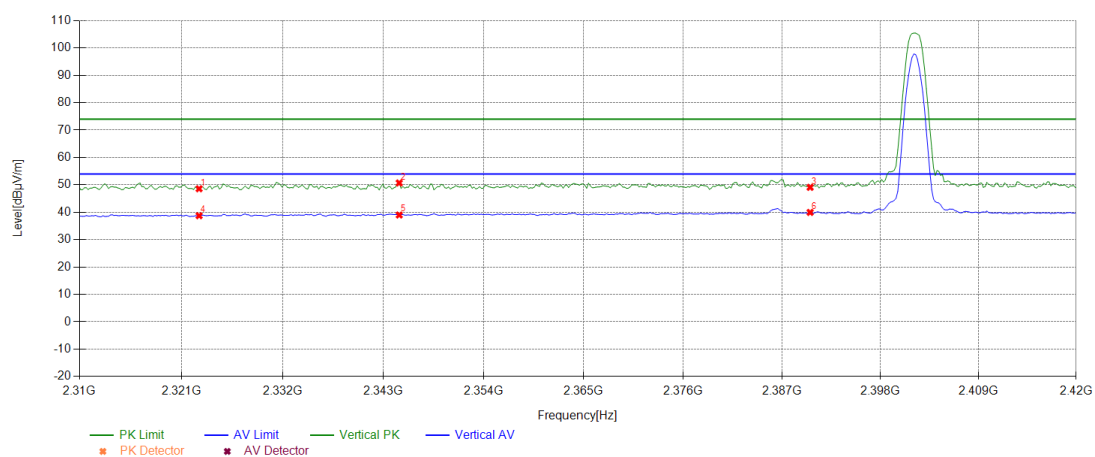


During the test, the Band Edge was performed in BLE all modes with all channels and all antennas. BLE(1Mbps), Antenna 1 are selected as the worst condition. The test data of the worst-case condition was recorded in this report.

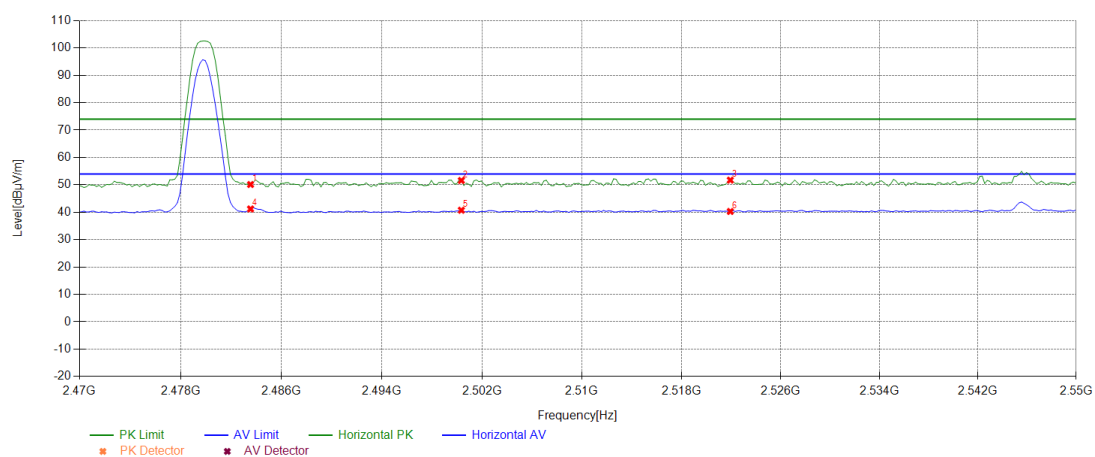
Test mode			BLE(1Mbps)						
Test channel			Lowest channel						
polarization			Horizontal						
Suspected List									
Frequency [MHz]	Factor [dB]	Reading [dBμV/m]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Detector	Height [cm]	Angle deg	Pass/ Fail
2325.1325	36.48	18.99	55.47	74.00	18.53	PK	150	236	PASS
2355.1355	36.75	12.77	49.52	74.00	24.48	PK	150	67	PASS
2390.139	37.07	13.89	50.96	74.00	23.04	PK	150	122	PASS
2325.1325	36.48	2.28	38.76	54.00	15.24	AV	150	222	PASS
2355.1355	36.75	2.50	39.25	54.00	14.75	AV	150	278	PASS
2390.139	37.07	2.69	39.76	54.00	14.24	AV	150	208	PASS



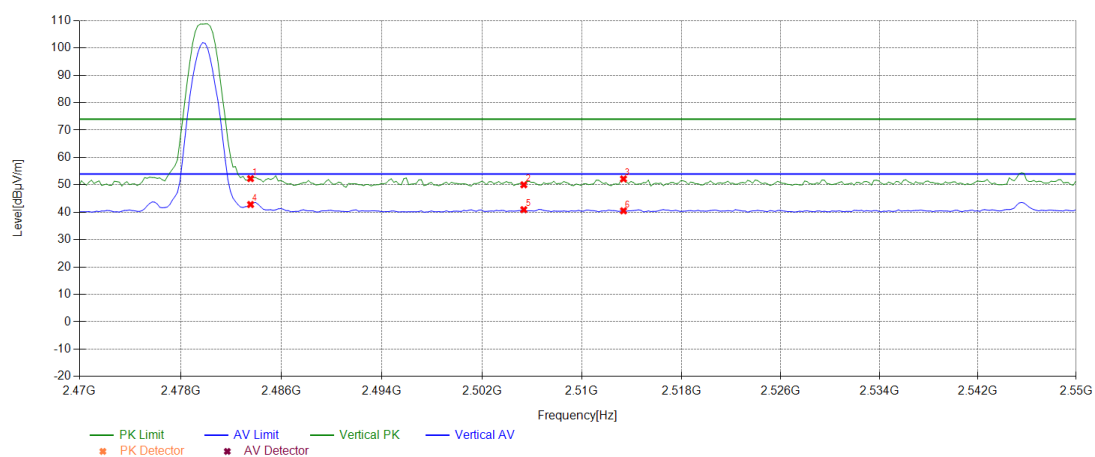
Test mode			BLE(1Mbps)						
Test channel			Lowest channel						
polarization			Vertical						
Suspected List									
Frequency [MHz]	Factor [dB]	Reading [dBμV/m]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Detector	Height [cm]	Angle deg	Pass/ Fail
2322.9323	36.46	12.12	48.58	74.00	25.42	PK	150	167	PASS
2344.7345	36.66	14.04	50.70	74.00	23.30	PK	150	167	PASS
2390.139	37.07	12.03	49.10	74.00	24.90	PK	150	2	PASS
2322.9323	36.46	2.28	38.74	54.00	15.26	AV	150	82	PASS
2344.7345	36.66	2.33	38.99	54.00	15.01	AV	150	40	PASS
2390.139	37.07	2.88	39.95	54.00	14.05	AV	150	280	PASS



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	37.54	12.60	50.14	74.00	23.86	PK	150	332	PASS
2500.35	37.62	13.99	51.61	74.00	22.39	PK	150	218	PASS
2521.9522	37.70	14.03	51.73	74.00	22.27	PK	150	204	PASS
2483.5484	37.54	3.67	41.21	54.00	12.79	AV	150	105	PASS
2500.35	37.62	3.12	40.74	54.00	13.26	AV	150	147	PASS
2521.9522	37.70	2.61	40.31	54.00	13.69	AV	150	105	PASS



Test mode			BLE(1Mbps)						
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	37.54	14.75	52.29	74.00	21.71	PK	150	187	PASS
2505.3505	37.64	12.40	50.04	74.00	23.96	PK	150	4	PASS
2513.3513	37.67	14.50	52.17	74.00	21.83	PK	150	101	PASS
2483.5484	37.54	5.30	42.84	54.00	11.16	AV	150	187	PASS
2505.3505	37.64	3.31	40.95	54.00	13.05	AV	150	158	PASS
2513.3513	37.67	2.86	40.53	54.00	13.47	AV	150	101	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.

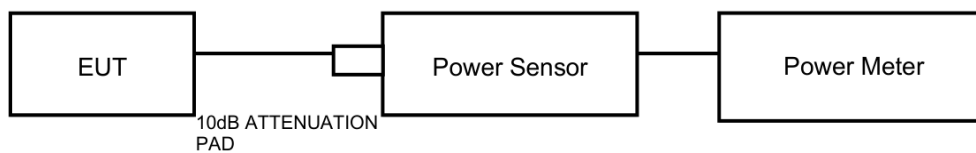
Limits:

Average Output Power	$\leq 1W$ (30dBm)
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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	17.55	≤ 30	PASS
	Ant1	2437	16.95	≤ 30	PASS
	Ant1	2462	16.64	≤ 30	PASS
11G	Ant1	2412	17.21	≤ 30	PASS
	Ant1	2437	16.83	≤ 30	PASS
	Ant1	2462	16.92	≤ 30	PASS
11N20SISO	Ant1	2412	17.30	≤ 30	PASS
	Ant1	2437	16.78	≤ 30	PASS
	Ant1	2462	16.67	≤ 30	PASS
11N40SISO	Ant1	2422	17.27	≤ 30	PASS
	Ant1	2437	16.98	≤ 30	PASS
	Ant1	2452	17.04	≤ 30	PASS
BLE_1M	Ant1	2402	5.14	≤ 30	PASS
	Ant1	2440	5.5	≤ 30	PASS
	Ant1	2480	6.6	≤ 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.

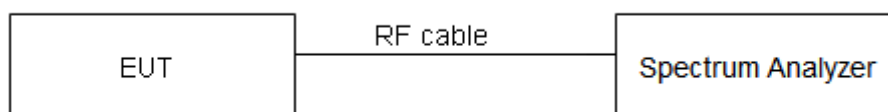
Detector=Peak, Trace mode=Max hold.

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
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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	10.08	2406.96	2417.04	≥0.5	PASS
		2437	10.08	2431.96	2442.04	≥0.5	PASS
		2462	10.08	2456.96	2467.04	≥0.5	PASS
11G	Ant1	2412	16.32	2403.84	2420.16	≥0.5	PASS
		2437	16.32	2428.84	2445.16	≥0.5	PASS
		2462	16.32	2453.84	2470.16	≥0.5	PASS
11N20SISO	Ant1	2412	17.08	2403.44	2420.52	≥0.5	PASS
		2437	17.08	2428.44	2445.52	≥0.5	PASS
		2462	16.92	2453.48	2470.40	≥0.5	PASS
11N40SISO	Ant1	2422	35.52	2404.24	2439.76	≥0.5	PASS
		2437	35.20	2424.44	2459.64	≥0.5	PASS
		2452	35.68	2434.24	2469.92	≥0.5	PASS
BLE_1M	Ant1	2402	0.73	2401.62	2402.35	≥0.5	PASS
		2440	0.71	2439.63	2440.34	≥0.5	PASS
		2480	0.74	2479.62	2480.36	≥0.5	PASS

5.5 Occupied Channel Bandwidth

Ambient condition:

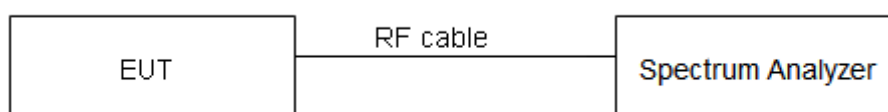
Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

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	14.985	2404.488	2419.473	---	---
		2437	14.985	2429.488	2444.473	---	---
		2462	14.985	2454.488	2469.473	---	---
11G	Ant1	2412	17.183	2403.369	2420.551	---	---
		2437	17.143	2428.409	2445.551	---	---
		2462	17.183	2453.369	2470.551	---	---
11N20SISO	Ant1	2412	18.102	2402.929	2421.031	---	---
		2437	18.102	2427.889	2445.991	---	---
		2462	18.022	2453.009	2471.031	---	---
11N40SISO	Ant1	2422	36.444	2403.698	2440.142	---	---
		2437	36.603	2423.653	2460.257	---	---
		2452	36.603	2433.618	2470.222	---	---
BLE_1M	Ant1	2402	1.035	2401.485	2402.520	---	---
		2440	1.051	2439.469	2440.520	---	---
		2480	1.043	2479.477	2480.520	---	---

5.6 Band Edge Measurement

Ambient condition:

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

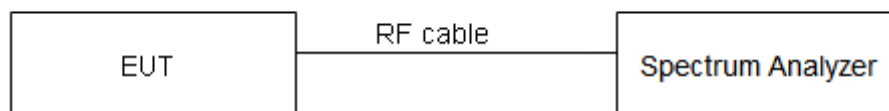
Method of Measurement:

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
11B	Ant1	Low	2412	5.66	-39.44	≤ -14.34	PASS
		High	2462	4.57	-48	≤ -15.43	PASS
11G	Ant1	Low	2412	-1.88	-40.55	≤ -21.88	PASS
		High	2462	-2.13	-47.28	≤ -22.13	PASS
11N20SISO	Ant1	Low	2412	-1.59	-41.2	≤ -21.59	PASS
		High	2462	-2.35	-47.3	≤ -22.35	PASS
11N40SISO	Ant1	Low	2422	-4.73	-41.5	≤ -24.73	PASS
		High	2452	-5.06	-46.94	≤ -25.06	PASS
BLE_1M	Ant1	Low	2402	4.32	-46.61	≤ -15.68	PASS
		High	2480	5.76	-46.24	≤ -14.24	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 AVGPS-2 in KDB 558074 D01 for this test.

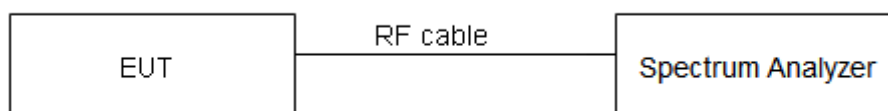
The conducted Power is measured at each antenna port. The measured results at the various antenna ports are then summed mathematically.

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	$\leq 8 \text{ dBm} / 3\text{kHz}$
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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
11B	Ant1	2412	-7.55	≤8	PASS
		2437	-6	≤8	PASS
		2462	-7.11	≤8	PASS
11G	Ant1	2412	-16.12	≤8	PASS
		2437	-16.31	≤8	PASS
		2462	-15.83	≤8	PASS
11N20SISO	Ant1	2412	-16	≤8	PASS
		2437	-15.46	≤8	PASS
		2462	-16.71	≤8	PASS
11N40SISO	Ant1	2422	-18.1	≤8	PASS
		2437	-19.35	≤8	PASS
		2452	-19.52	≤8	PASS
BLE_1M	Ant1	2402	-10.05	≤8	PASS
		2440	-9.75	≤8	PASS
		2480	-9.97	≤8	PASS

5.8 Spurious RF Conducted Emissions

Ambient condition:

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

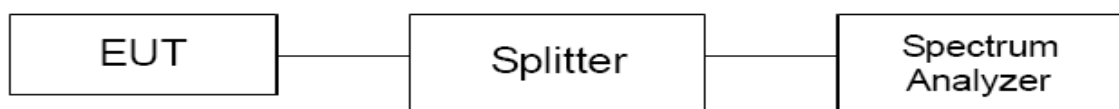
Method of Measurement:

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
11B	Ant1	2412	Reference	5.08	5.08	---	PASS
			30~1000	5.08	-58.98	≤-14.92	PASS
			1000~26500	5.08	-48.93	≤-14.92	PASS
		2437	Reference	4.99	4.99	---	PASS
			30~1000	4.99	-50.46	≤-15.01	PASS
			1000~26500	4.99	-48.65	≤-15.01	PASS
		2462	Reference	4.54	4.54	---	PASS
			30~1000	4.54	-60.07	≤-15.46	PASS
			1000~26500	4.54	-48.64	≤-15.46	PASS
11G	Ant1	2412	Reference	-1.90	-1.90	---	PASS
			30~1000	-1.90	-48.79	≤-21.9	PASS
			1000~26500	-1.90	-48.09	≤-21.9	PASS
		2437	Reference	-2.78	-2.78	---	PASS
			30~1000	-2.78	-53.37	≤-22.78	PASS
			1000~26500	-2.78	-48.88	≤-22.78	PASS
		2462	Reference	-2.29	-2.29	---	PASS
			30~1000	-2.29	-49.1	≤-22.29	PASS
			1000~26500	-2.29	-48.88	≤-22.29	PASS
11N20SISO	Ant1	2412	Reference	-1.86	-1.86	---	PASS
			30~1000	-1.86	-47.94	≤-21.86	PASS
			1000~26500	-1.86	-48.74	≤-21.86	PASS
		2437	Reference	-2.19	-2.19	---	PASS
			30~1000	-2.19	-54.02	≤-22.19	PASS
			1000~26500	-2.19	-48.8	≤-22.19	PASS
		2462	Reference	-2.33	-2.33	---	PASS
			30~1000	-2.33	-53.64	≤-22.33	PASS
			1000~26500	-2.33	-48.71	≤-22.33	PASS
11N40SISO	Ant1	2422	Reference	-4.89	-4.89	---	PASS
			30~1000	-4.89	-48.04	≤-24.89	PASS
			1000~26500	-4.89	-48.89	≤-24.89	PASS
		2437	Reference	-5.21	-5.21	---	PASS
			30~1000	-5.21	-47.98	≤-25.21	PASS
			1000~26500	-5.21	-48.86	≤-25.21	PASS
		2452	Reference	-5.11	-5.11	---	PASS
			30~1000	-5.11	-48.07	≤-25.11	PASS
			1000~26500	-5.11	-48.13	≤-25.11	PASS

TestMode	Antenna	Channel	FreqRange [MHz]	RefLevel [dBm]	Result[dBm]	Limit[dBm]	Verdict
BLE_1M	Ant1	2402	Reference	4.31	4.31	---	PASS
			30~1000	4.31	-59.31	≤-15.69	PASS
			1000~26500	4.31	-48.53	≤-15.69	PASS
		2440	Reference	4.57	4.57	---	PASS
			30~1000	4.57	-60.05	≤-15.43	PASS
			1000~26500	4.57	-48.9	≤-15.43	PASS
		2480	Reference	5.64	5.64	---	PASS
			30~1000	5.64	-60.13	≤-14.36	PASS
			1000~26500	5.64	-48.41	≤-14.36	PASS

6. Appendix A

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	2023/12/06
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	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	VGDY-0956	R&S	2024/02/22
loop antenna	HLA 6121	540046	EM-000546	TESEQ	2023/06/06
Broadband Antenna	VULB 9163	9163-676	EM-000382	SCHWARZBECK	2023/07/01
Broadband Antenna	VULB 9163	9163-530	EM-000342	SCHWARZBECK	2023/06/25
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	/	2023/08/30
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	2023/06/05
EMI Test Receiver (#1)	ESW44	103123	EM-000698	R&S	2023/06/18
LISN	NSLK 8128	8128-316	VGDY-0149	SCHWARZBECK	2023/09/04
Plus Limiter (#1)	VTSD 9561 F-N	00515	VGDY-0808	SCHWARZBECK	2024/03/04
Shielding Room(#1)	GP1A	001	WKNF-0001	LEINING	2024/08/08

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.

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