



**FCC 47 CFR PART 15 SUBPART C
ISED RSS-247 ISSUE 2**

CERTIFICATION TEST REPORT

For

Communication Module

MODEL NUMBER: LBEE6ZZ1FD

FCC ID: VPYLB1FD

IC: 772C-LB1FD

REPORT NUMBER: 4788224831-1

ISSUE DATE: Feb. 10, 2018

Prepared for

Murata Manufacturing Co.,Ltd.

Prepared by

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Revision History

<u>Rev.</u>	<u>Issue Date</u>	<u>Revisions</u>	<u>Revised By</u>
--	02/11/2018	Initial Issue	

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1. ATTESTATION OF TEST RESULTS

Applicant Information

Company Name: Murata Manufacturing Co.,Ltd.
Address: 10-1,Higashikotari 1-chome,Nagaokakyo-shi,Kyoto
617-8555,Japan

Manufacturer Information

Company Name: Murata Manufacturing Co.,Ltd.
Address: 10-1,Higashikotari 1-chome,Nagaokakyo-shi,Kyoto
617-8555,Japan

Factory Information

Company Name: Murata Manufacturing Co.,Ltd.
Address: 10-1,Higashikotari 1-chome,Nagaokakyo-shi,Kyoto
617-8555,Japan

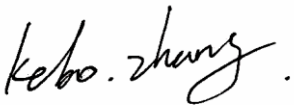
EUT Description

Product Name Communication Module
Model Name LBEE6ZZ1FD
Sample ID 1308669-001
Sample Status Good
Sample Received date Dec .7, 2017
Date Tested Dec .10, 2017 ~ Feb. 10, 2018

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart C	PASS
ISED RSS-247 Issue 2	PASS
ISED RSS-GEN Issue 4	PASS

Summary of Test Results			
Clause	Test Items	FCC/IC Rules	Test Results
1	6db DTS Bandwidth and 99% Bandwidth	FCC 15.247 (a) (2) RSS-247 Clause 5.2 (a) RSS-Gen Clause 6.6	Note1
2	Peak Conducted Power	FCC 15.247 (b) (3) RSS-247 Clause 5.4 (e)	Note1
3	Power Spectral Density	FCC 15.247 (e) RSS-247 Clause 5.2 (b)	Note1
4	Conducted Band edge And Spurious emission	FCC 15.247 (d) RSS-247 Clause 5.5	Note1
5	Radiated Band edges and Spurious emission	FCC 15.247 (d) FCC 15.209 FCC 15.205 RSS-247 Clause 5.5 RSS-GEN Clause 8.9 RSS-GEN Clause 8.10	PASS
6	Conducted Emission Test For AC Power Port	FCC 15.207 RSS-GEN Clause 8.8	NA
7	Antenna Requirement	FCC 15.203 RSS-GEN Clause 8.3	Complied
Note: 1.For the test data, please refer to the report of the FCC ID: VPYLB1FD, IC: 772C-LB1FD 2. "N/A" denotes test is not applicable in this Test Report			

Tested By:



Kebo Zhang
 Engineer

Checked By:



Shawn Wen
 Laboratory Leader

Approved By:



Stephen Guo
 Laboratory Manager

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with KDB414788 D01 Radiated Test Site v01, ANSI C63.10-2013, KDB558074 D01 DTS Meas Guidance v04, FCC CFR 47 Part 2, FCC CFR 47 Part 15, RSS-GEN Issue 4, and RSS-247 Issue 2.

3. FACILITIES AND ACCREDITATION

Test Location	UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch.
Address	Building 10, Innovation Technology Park, Song Shan Lake Hi tech Development Zone, Dongguan, 523808, China
Accreditation Certificate	UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing. The Certificate Registration Number is 4102.01. UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The Designation Number is CN1187. UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. EMC Laboratory has been registered and fully described in a report filed with Industry Canada. The Company Number is 21320.

Note: The test anechoic chamber in UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch had been calibrated and compared to the open field sites.

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognize national standards.

4.2. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

Test Item	Uncertainty
Uncertainty for Conduction emission test	2.90dB
Uncertainty for Radiation Emission test(include Fundamental emission) (9KHz-30MHz)	2.2dB
Uncertainty for Radiation Emission test(include Fundamental emission) (30MHz-1GHz)	4.52dB
Uncertainty for Radiation Emission test (1GHz to 26GHz)(include Fundamental emission)	5.04dB(1-6GHz)
	5.30dB (6GHz-18Gz)
	5.23dB (18GHz-26Gz)
Note: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.	

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

Equipment	Communication Module		
Model Name	LBEE6ZZ1FD		
Product Description	Operation Frequency	2402 MHz ~ 2480 MHz	
	Modulation Type	Data Rate	
	GFSK	1Mbps	
Power Supply	DC3.6V		
Bluetooth Version	BT 4.1LE Remark: This test report just include the data of the BLE mode		
Hardware Version	V1.0		
Software Version	9.35.48.73		

5.2. MAXIMUM OUTPUT POWER

Bluetooth Mode	Frequency (MHz)	Channel Number	Max Output Power (dBm)	Max Output Power (W)
BLE	2402-2480	0-39[40]	6.02	0.004

5.3. CHANNEL LIST

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2402	11	2424	22	2446	33	2468
1	2404	12	2426	23	2448	34	2470
2	2406	13	2428	24	2450	35	2472
3	2408	14	2430	25	2452	36	2474
4	2410	15	2432	26	2454	37	2476
5	2412	16	2434	27	2456	38	2478
6	2414	17	2436	28	2458	39	2480
7	2416	18	2438	29	2460		
8	2418	19	2440	30	2462		
9	2420	20	2442	31	2464		
10	2422	21	2444	32	2466		

5.4. TEST CHANNEL CONFIGURATION

Test Mode	Test Channel	Frequency
GFSK	CH 0, CH 19, CH 39	2402MHz, 2440MHz, 2480MHz

5.5. THE WORSE CASE POWER SETTING PARAMETER

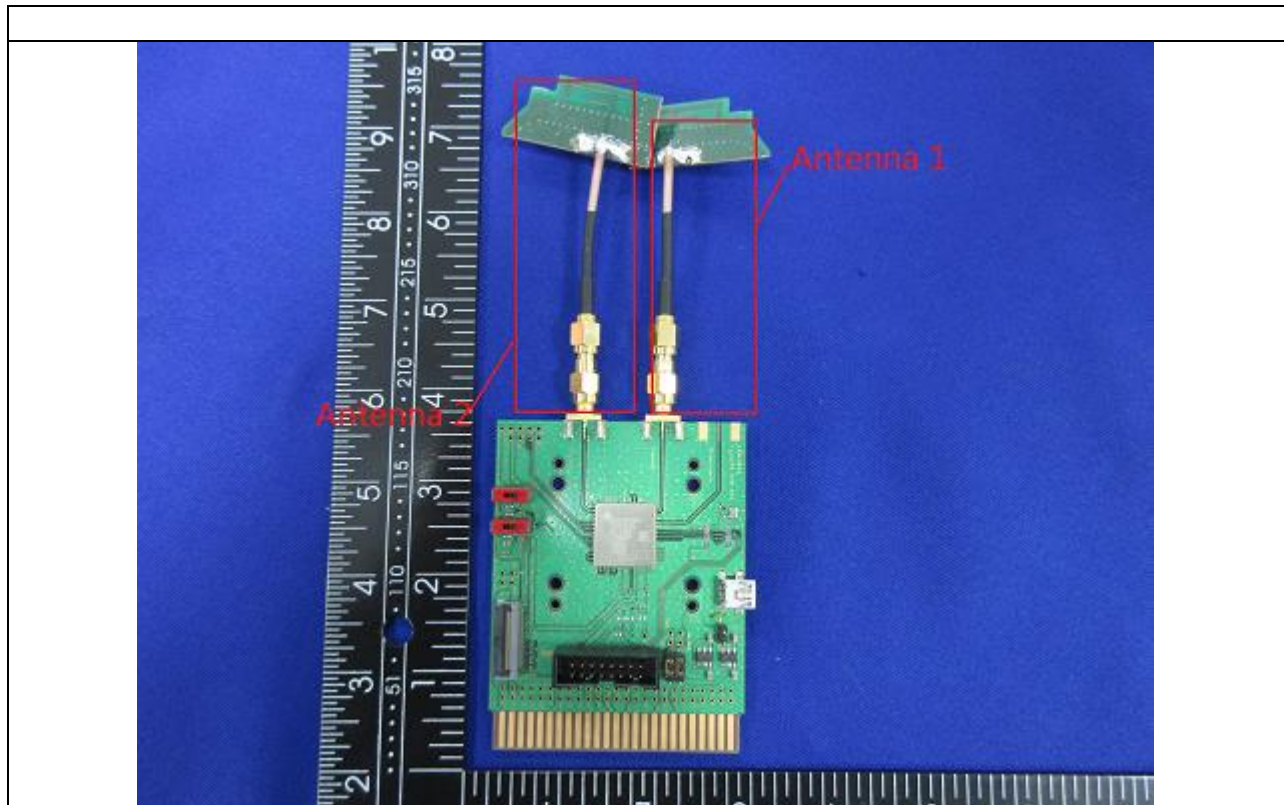
The Worst Case Power Setting Parameter under 2400 ~ 2483.5MHz Band				
Test Software		Bule Tool		
Modulation Type	Transmit Antenna Number	Test Channel		
		CH 00	CH 19	CH 39
GFSK	1	6	6	6

5.6. DESCRIPTION OF AVAILABLE ANTENNAS

Ant.	Frequency (MHz)	Antenna Type	Antenna Gain (dBi)
1	2402-2480	PCB Antenna	1

Note: There are two antenna in the EUT, only antenna 1 support BT mode.

Test Mode	Transmit and Receive Mode	Description
GFSK	1TX, 1RX	Antenna 1 can be used as transmitting/receiving antenna.



5.7. WORST-CASE CONFIGURATIONS

Bluetooth Mode	Modulation Technology	Modulation Type	Data Rate (Mbps)
BLE	DTS	GFSK	1Mbit/s

5.8. TEST ENVIRONMENT

Environment Parameter	Selected Values During Tests	
Relative Humidity	55 ~ 65%	
Atmospheric Pressure:	1025Pa	
Temperature	TN	23 ~ 28°C
Voltage :	VL	N/A
	VN	DC 3.6V
	VH	N/A

Note: VL= Lower Extreme Test Voltage
 VN= Nominal Voltage
 VH= Upper Extreme Test Voltage
 TN= Normal Temperature

5.9. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Item	Equipment	Brand Name	Model Name	P/N
1	Laptop	ThinkPad	T410	N/A
2	Fixed Frequency Board	Supply by customer	N/A	N/A
3	Adapter	Supply by UL EMC Lab	N/A	N/A

I/O CABLES

Cable No	Port	Connector Type	Cable Type	Cable Length(m)	Remarks
1	N/A	N/A	N/A	N/A	N/A

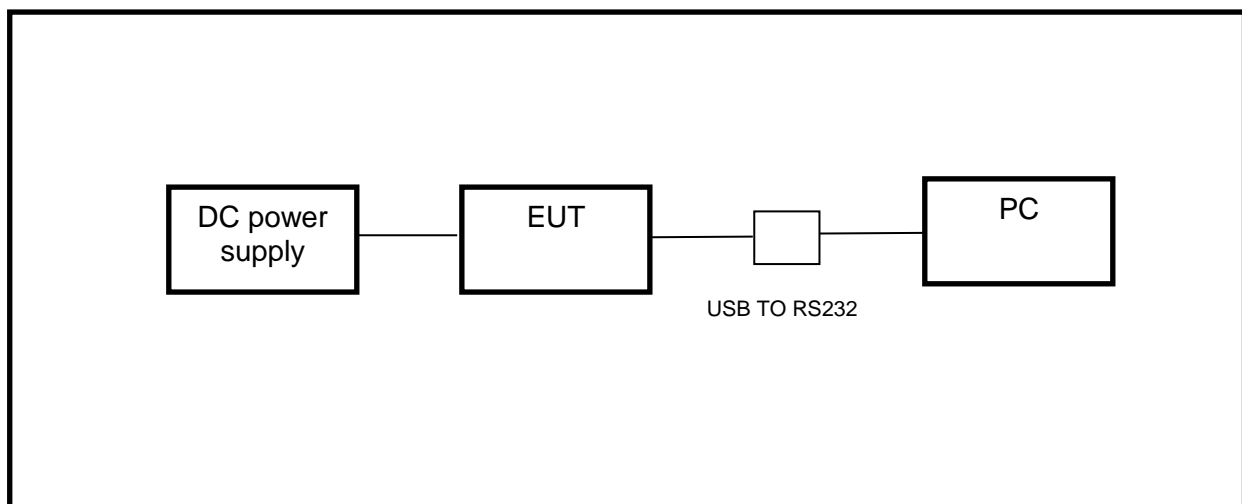
ACCESSORY

Item	Accessory	Brand Name	Model Name	Description
1	N/A	N/A	N/A	N/A

TEST SETUP

The EUT can work in an engineer mode with a software through a PC.

SETUP DIAGRAM FOR TEST



5.10. MEASURING INSTRUMENT AND SOFTWARE USED

Conducted Emissions							
Used	Equipment	Manufacturer	Model No.	Serial No.	Upper Last Cal.	Last Cal.	Next Cal.
<input checked="" type="checkbox"/>	EMI Test Receiver	R&S	ESR3	101961	Dec.20, 2016	Dec.12, 2017	Dec.11, 2018
<input checked="" type="checkbox"/>	Two-Line V-Network	R&S	ENV216	101983	Dec.20, 2016	Dec.12, 2017	Dec.11, 2018
<input checked="" type="checkbox"/>	Artificial Mains Networks	Schwarzbeck	NSLK 8126	8126465	Feb.10, 2017	Dec.12, 2017	Dec.11, 2018
Software							
Used	Description	Manufacturer	Name	Version			
<input checked="" type="checkbox"/>	Test Software for Conducted disturbance	UL	Antenna port	Ver. 7.2			
Radiated Emissions							
Used	Equipment	Manufacturer	Model No.	Serial No.	Upper Last Cal.	Last Cal.	Next Cal.
<input checked="" type="checkbox"/>	MXE EMI Receiver	KESIGHT	N9038A	MY56400036	Feb.24, 2017	Dec.12, 2017	Dec.11, 2018
<input checked="" type="checkbox"/>	Hybrid Log Periodic Antenna	TDK	HLP-3003C	130960	N/A	Jan.09, 2016	Jan.08, 2016
<input checked="" type="checkbox"/>	Preamplifier	HP	8447D	2944A09099	Feb.13, 2017	Dec.12, 2017	Dec.11, 2018
<input checked="" type="checkbox"/>	EMI Measurement Receiver	R&S	ESR26	101377	Dec.20, 2016	Dec.12, 2017	Dec.11, 2018
<input checked="" type="checkbox"/>	Horn Antenna	TDK	HRN-0118	130939	N/A	Jan. 09, 2016	Jan. 08, 2019
<input checked="" type="checkbox"/>	High Gain Horn Antenna	Schwarzbeck	BBHA-9170	691	N/A	Jan.06, 2016	Jan.05, 2019
<input checked="" type="checkbox"/>	Preamplifier	TDK	PA-02-0118	TRS-305-00066	Jan.14, 2017	Dec.12, 2017	Dec.11, 2018
<input checked="" type="checkbox"/>	Preamplifier	TDK	PA-02-2	TRS-307-00003	Dec.20, 2016	Dec.12, 2017	Dec.11, 2018
<input checked="" type="checkbox"/>	Loop antenna	Schwarzbeck	1519B	00008	N/A	Mar. 26, 2016	Mar. 25, 2019
Software							
Used	Description	Manufacturer	Name	Version			
<input checked="" type="checkbox"/>	Test Software for Radiated disturbance	Farad	EZ-EMC	Ver. UL-3A1			
Other instruments							
Used	Equipment	Manufacturer	Model No.	Serial No.	Upper Last Cal.	Last Cal.	Next Cal.
<input checked="" type="checkbox"/>	Spectrum Analyzer	Keysight	N9030A	MY55410512	Dec.20, 2016	Dec.12, 2017	Dec.11, 2018
<input checked="" type="checkbox"/>	Power Meter	Keysight	N9031A	MY55416024	Feb.13, 2017	Dec.12, 2017	Dec.11, 2018
<input checked="" type="checkbox"/>	Power Sensor	Keysight	N9323A	MY55440013	Feb.13, 2017	Dec.12, 2017	Dec.11, 2018

6. RADIATED TEST RESULTS

LIMITS

Please refer to FCC §15.205 and §15.209

Please refer to RSS-GEN Clause 8.9 and Clause 8.10

Radiation Disturbance Test Limit for FCC (Class B)(9KHz-1GHz)

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
960~1000	500	3

Note: 1) At frequencies at or above 30 MHz, measurements may be performed at a distance other than what is specified provided: measurements are not made in the near field except where it can be shown that near field measurements are appropriate due to the characteristics of the device; and it can be demonstrated that the signal levels needed to be measured at the distance employed can be detected by the measurement equipment. Measurements shall not be performed at a distance greater than 30 meters unless it can be further demonstrated that measurements at a distance of 30 meters or less are impractical. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse linear-distance for field strength measurements; inverse-linear-distance-squared for power density measurements).

(2) At frequencies below 30 MHz, measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field. Pending the development of an appropriate measurement procedure for measurements performed below 30 MHz, when performing measurements at a closer distance than specified, the results shall be extrapolated to the specified distance by either making measurements at a minimum of two distances on at least one radial to determine the proper extrapolation factor or by using the square of an inverse linear distance extrapolation factor (40 dB/decade). This paragraph (f) shall not apply to Access BPL devices operating below 30 MHz.

Radiation Disturbance Test Limit for FCC (Above 1G)

Frequency (MHz)	dB(uV/m) (at 3 meters)	
	Peak	Average
Above 1000	74	54

Restricted bands of operation

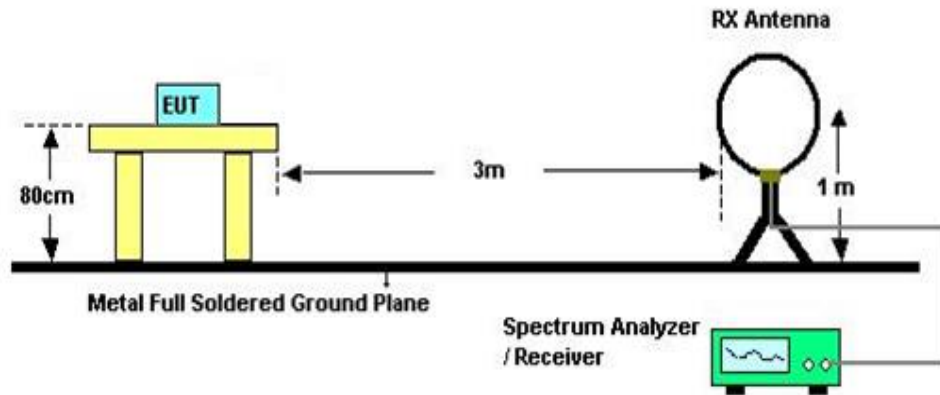
MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
¹ 0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	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	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	(²)
13.36-13.41			

Note: ¹Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

²Above 38.6c

TEST SETUP AND PROCEDURE

Below 30MHz

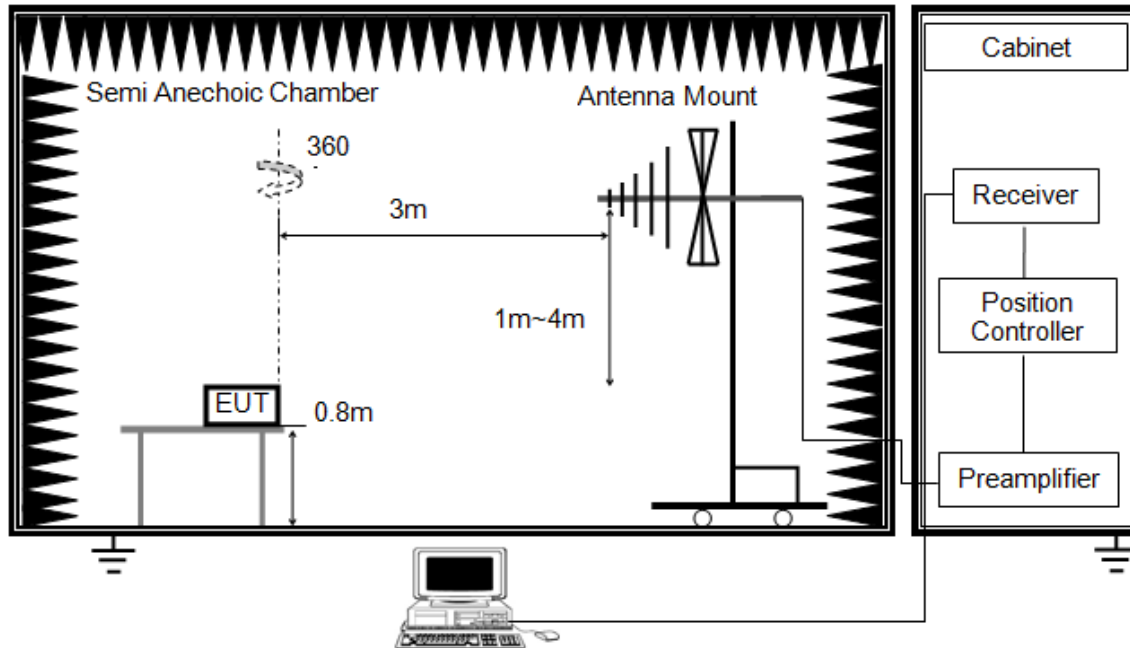


The setting of the spectrum analyser

RBW	200Hz (From 9kHz to 0.15MHz)/ 9KHz (From 0.15MHz to 30MHz)
VBW	200Hz (From 9kHz to 0.15MHz)/ 9KHz (From 0.15MHz to 30MHz)
Sweep	Auto
Trace	Max hold

1. The testing follows the guidelines in ANSI C63.10-2013
2. The EUT was arranged to its worst case and then turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
3. The EUT was placed on a turntable with 80cm above ground.
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
5. The radiated emission limits are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.
6. For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 3 MHz for peak measurements and 1 MHz resolution bandwidth with set $VBW \leq RBW/100$, but not less than 10Hz video bandwidth with peak detector, max hold to be run for at least 50 traces for average measurements.
7. For the actual test configuration, please refer to the related item in this test report (Photographs of the Test Configuration)

Below 1G and above 30MHz

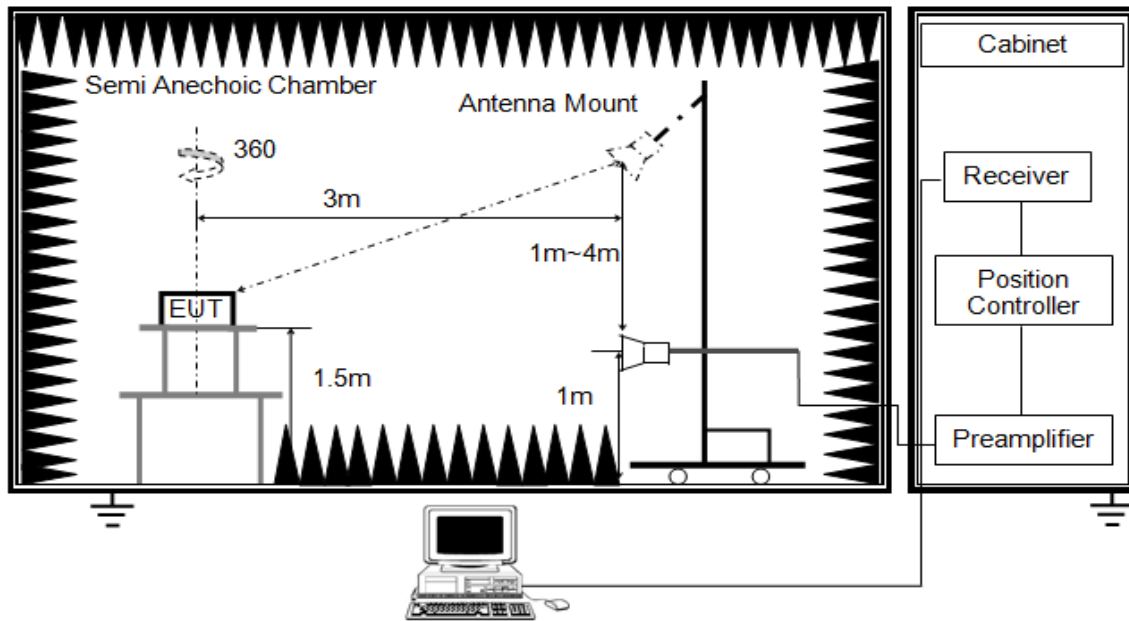


The setting of the spectrum analyser

RBW	120K
VBW	300K
Sweep	Auto
Detector	Peak/QP
Trace	Max hold

1. The testing follows the guidelines in ANSI C63.10-2013.
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
3. The EUT was placed on a turntable with 80cm above ground.
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
5. For measurement below 1GHz, the initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured. If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.
6. For the actual test configuration, please refer to the related item in this test report (Photographs of the Test Configuration)

Above 1G

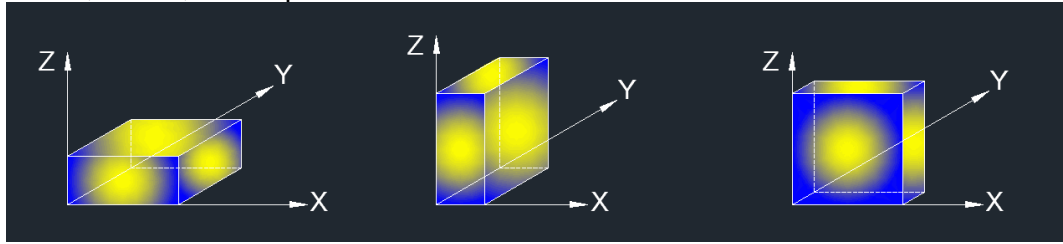


The setting of the spectrum analyser

RBW	1M
VBW	PEAK: 3M
Sweep	Auto
Detector	Peak
Trace	Max hold

1. The testing follows the guidelines in ANSI C63.10-2013.
2. The EUT was arranged to its worst case and then tune the antenna tower (1.5 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
3. The EUT was placed on a turntable with 80cm above ground.
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
5. For measurement above 1GHz, the emission measurement will be measured by the peak detector. This peak level, once corrected, must comply with the limit specified in Section 15.209.
6. For the actual test configuration, please refer to the related Item in this test report (Photographs of the Test Configuration)

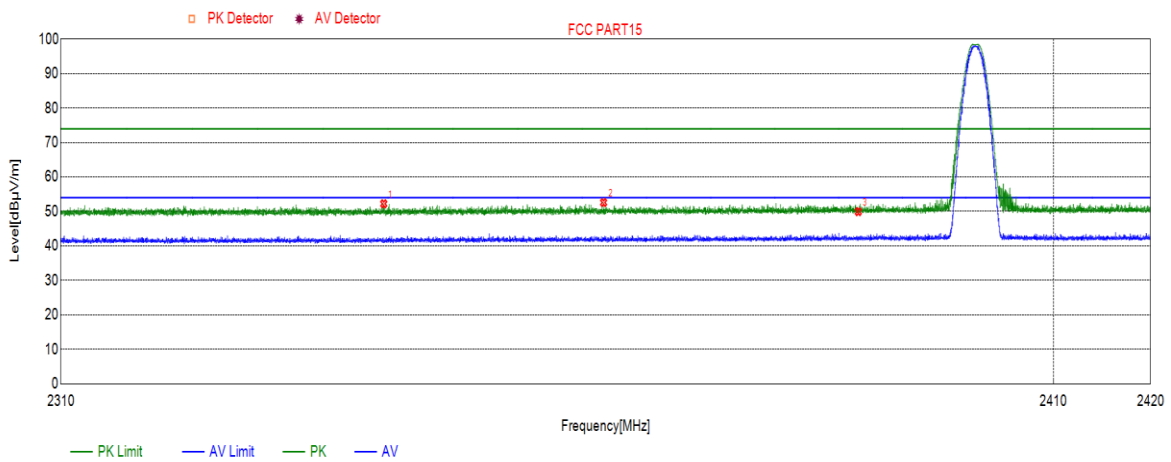
X axis, Y axis, Z axis positions:



Note: For all radiated test, EUT in each of three orthogonal axis emissions had been tested, but only the worst case (X axis) data recorded in the report.

6.1. RESTRICTED BANDEDGE

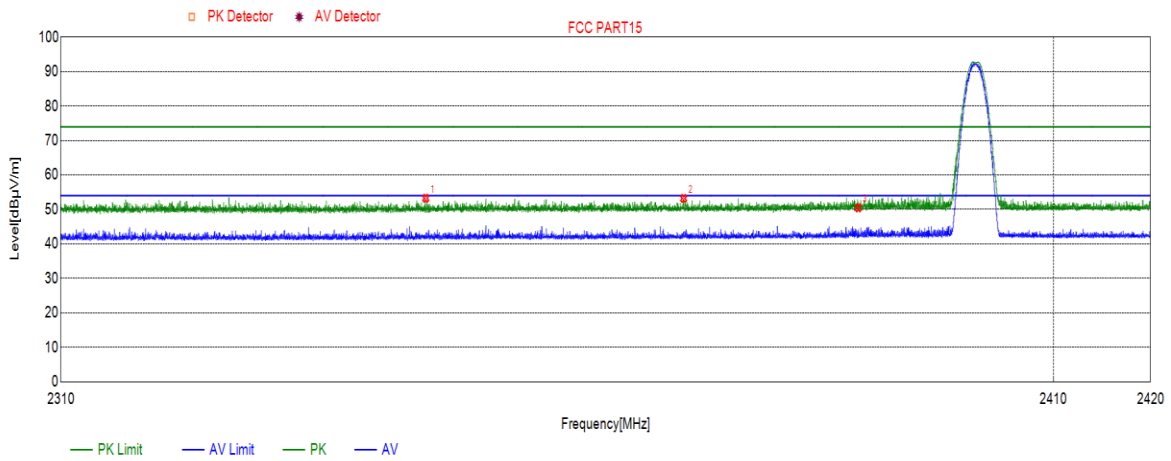
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



No.	Frequency (MHz)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2342.1045	52.24	74.00	-21.76	peak
2	2364.1808	52.60	74.00	-21.40	peak
3	2390.0000	49.94	74.00	-24.06	peak

Note: 1. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
 2. Peak: Peak detector.

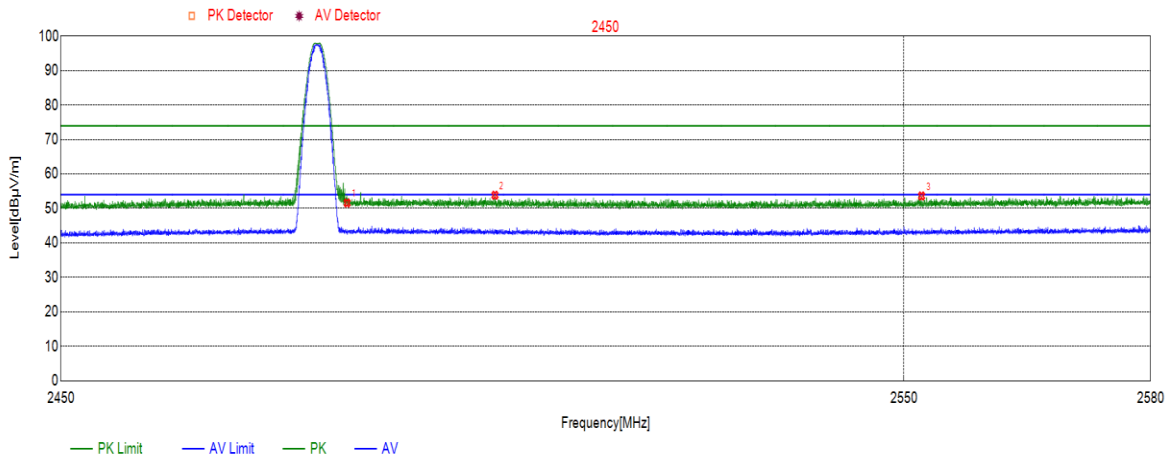
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



No.	Frequency (MHz)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2346.2518	53.25	74.00	-20.75	peak
2	2372.2933	53.19	54.00	-20.81	peak
3	2390.0000	50.48	74.00	-23.52	peak

Note: 1. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
 2. Peak: Peak detector.

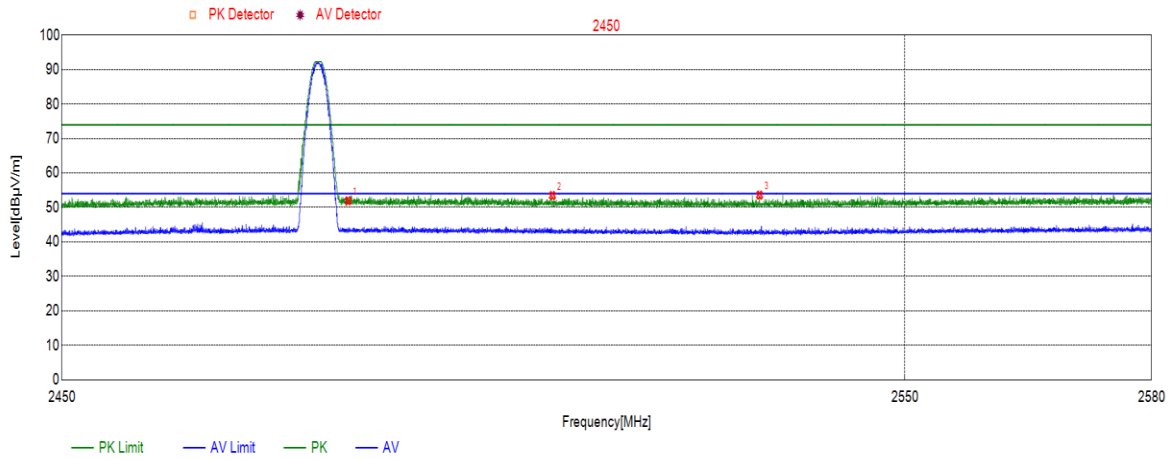
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



No.	Frequency (MHz)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2483.5000	51.60	74.00	-22.40	peak
2	2500.9645	53.84	74.00	-20.16	peak
3	2552.1214	53.63	74.00	-20.37	peak

Note: 1. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
 2. Peak: Peak detector.

RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)

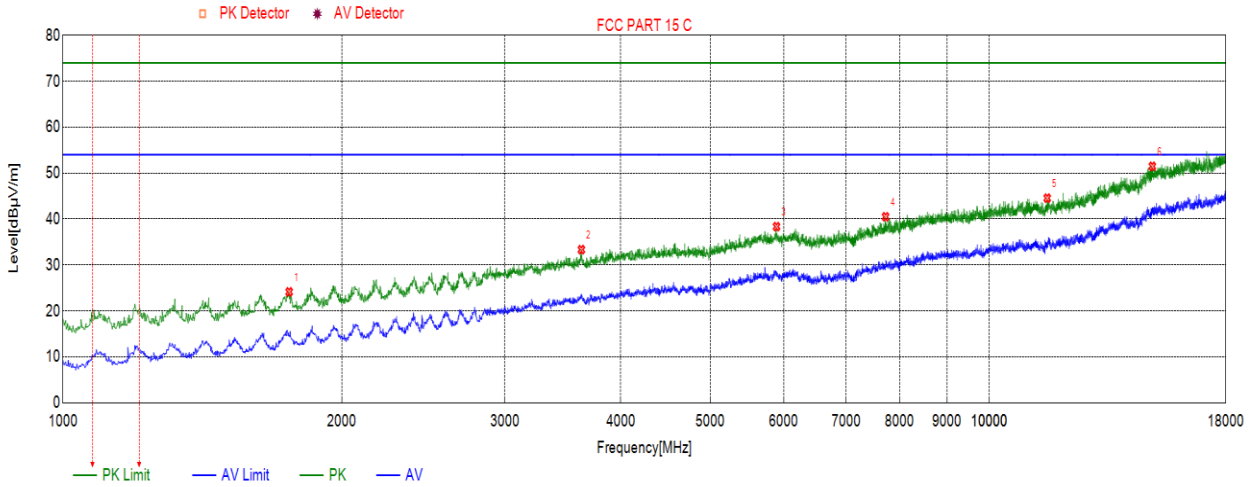


No.	Frequency (MHz)	Result (dBµV)	Limit (dBµV)	Margin (dB)	Remark
1	2483.5000	51.94	74.00	-22.06	peak
2	2507.6978	53.45	74.00	-20.53	peak
3	2532.5171	53.58	74.00	-20.42	peak

Note: 1. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
 2. Peak: Peak detector.

6.2. SPURIOUS EMISSIONS (1~18GHz)

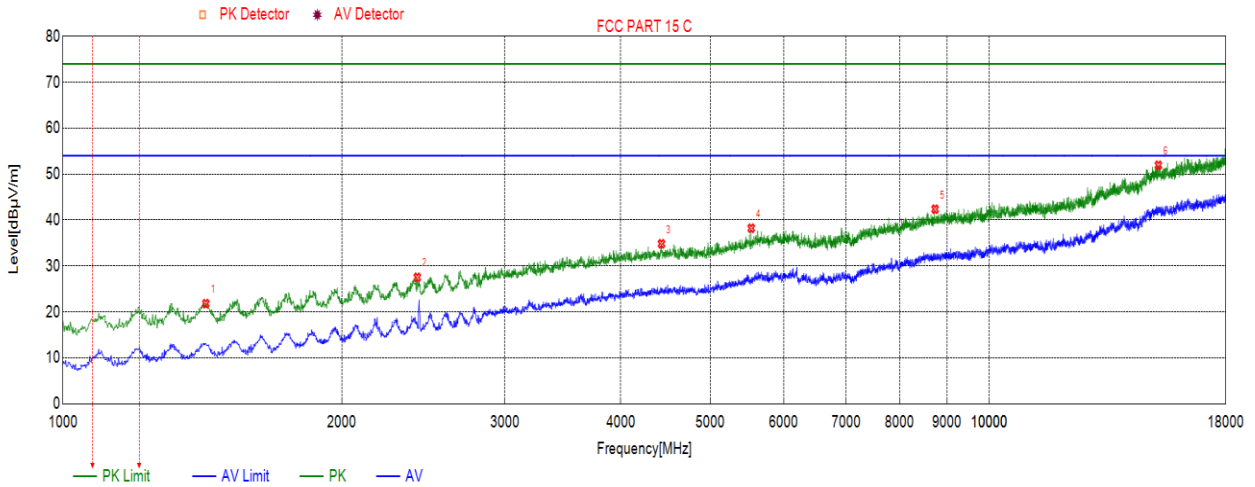
HARMONICS AND SPURIOUS EMISSIONS (LOW CHANNEL, HORIZONTAL)



No.	Frequency (MHz)	Result (dBuV /m)	Limit (Peak) (dBuV/m)	Margin (Peak) (dB)	Limit (Ave) (dBuV/m)	Margin (Ave) (dB)	Remark
1	1754.8755	24.15	74.00	-49.85	54.00	-29.85	peak
2	3628.4628	33.35	74.00	-40.65	54.00	-20.65	peak
3	5893.0893	38.35	74.00	-35.65	54.00	-15.65	peak
4	7727.5728	40.50	74.00	-33.50	54.00	-13.5	peak
5	11549.5550	44.56	74.00	-29.44	54.00	-9.44	peak
6	14995.7996	51.48	74.00	-22.52	54.00	-2.52	peak

Note: 1. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
 2. Peak: Peak detector.

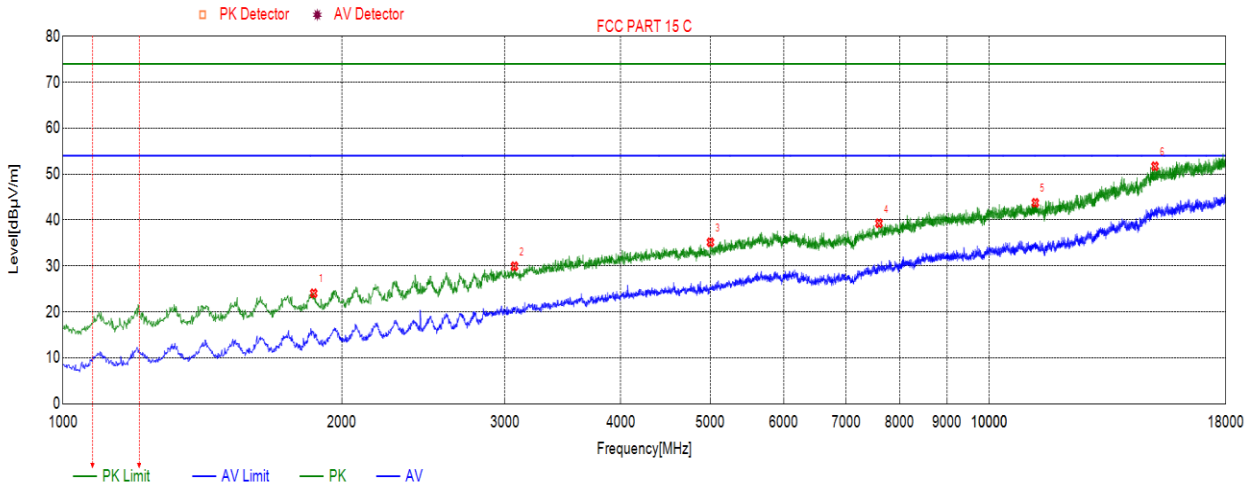
HARMONICS AND SPURIOUS EMISSIONS (LOW CHANNEL, VERTICAL)



No.	Frequency (MHz)	Result (dBuV/m)	Limit (Peak) (dBuV/m)	Margin (Peak) (dB)	Limit (Ave) (dBuV/m)	Margin (Ave) (dB)	Remark
1	1426.7427	21.80	74.00	-52.20	54.00	-32.20	peak
2	2412.8413	27.53	74.00	-46.47	54.00	-26.47	peak
3	4427.5428	34.83	74.00	-39.17	54.00	-19.17	peak
4	5534.3534	38.23	74.00	-35.77	54.00	-15.77	peak
5	8739.1739	42.37	74.00	-31.63	54.00	-11.63	peak
6	15223.6224	51.93	74.00	-22.07	54.00	-2.07	peak

Note: 1. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
 2. Peak: Peak detector.

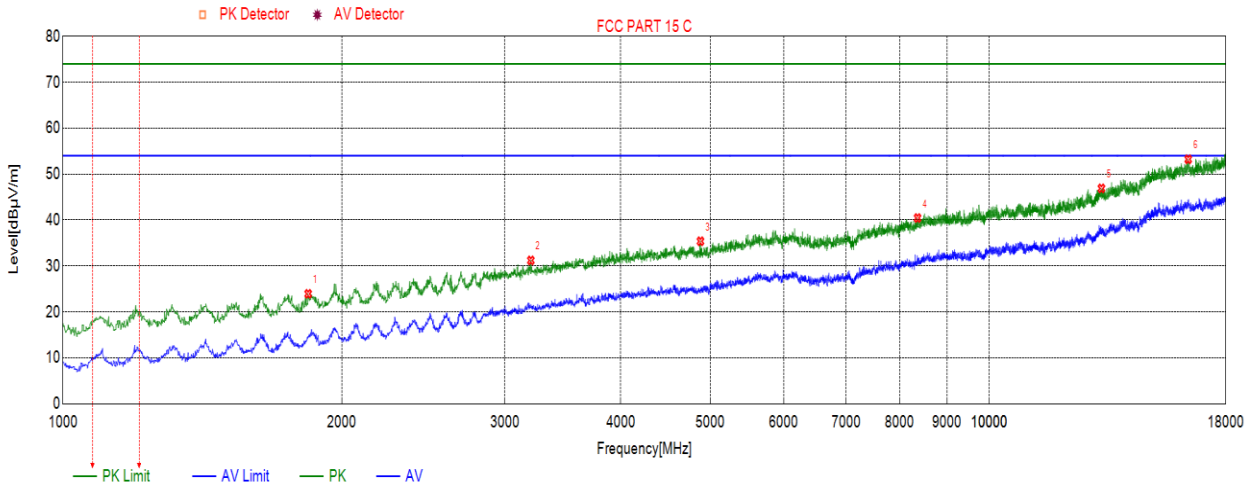
HARMONICS AND SPURIOUS EMISSIONS (MID CHANNEL, HORIZONTAL)



No.	Frequency (MHz)	Result (dBuV/m)	Limit (Peak) (dBuV/m)	Margin (Peak) (dB)	Limit (Ave) (dBuV/m)	Margin (Ave) (dB)	Remark
1	1865.3865	24.05	74.00	-49.95	54.00	-29.95	peak
2	3072.5073	29.95	74.00	-44.05	54.00	-24.05	peak
3	5000.5001	35.16	74.00	-38.84	54.00	-18.84	peak
4	7601.7602	39.30	74.00	-34.70	54.00	-14.7	peak
5	11211.2211	43.75	74.00	-30.25	54.00	-10.25	peak
6	15094.4094	51.72	74.00	-22.28	54.00	-2.28	peak

Note: 1. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
 2. Peak: Peak detector.

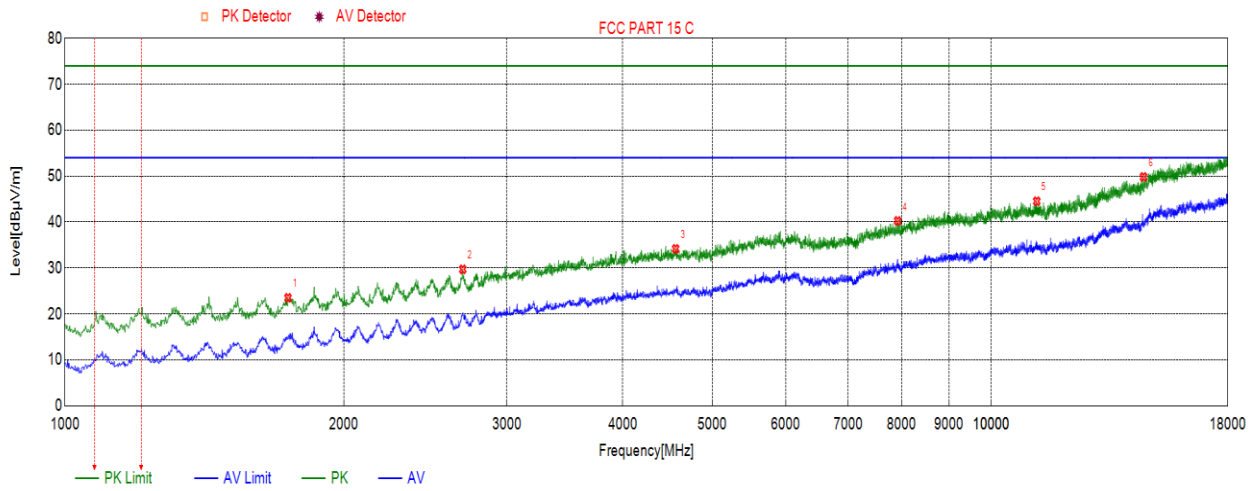
HARMONICS AND SPURIOUS EMISSIONS (MID CHANNEL, VERTICAL)



No.	Frequency (MHz)	Result (dBuV/m)	Limit (Peak) (dBuV/m)	Margin (Peak) (dB)	Limit (Ave) (dBuV/m)	Margin (Ave) (dB)	Remark
1	1839.8840	23.94	74.00	-50.06	54.00	-30.06	peak
2	3200.0200	31.22	74.00	-42.78	54.00	-22.78	peak
3	4878.0878	35.39	74.00	-38.61	54.00	-18.61	peak
4	8366.8367	40.45	74.00	-33.55	54.00	-13.55	peak
5	13215.7216	46.90	74.00	-27.10	54.00	-7.1	peak
6	16396.7397	53.24	74.00	-20.76	54.00	-0.76	peak

Note: 1. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
 2. Peak: Peak detector.

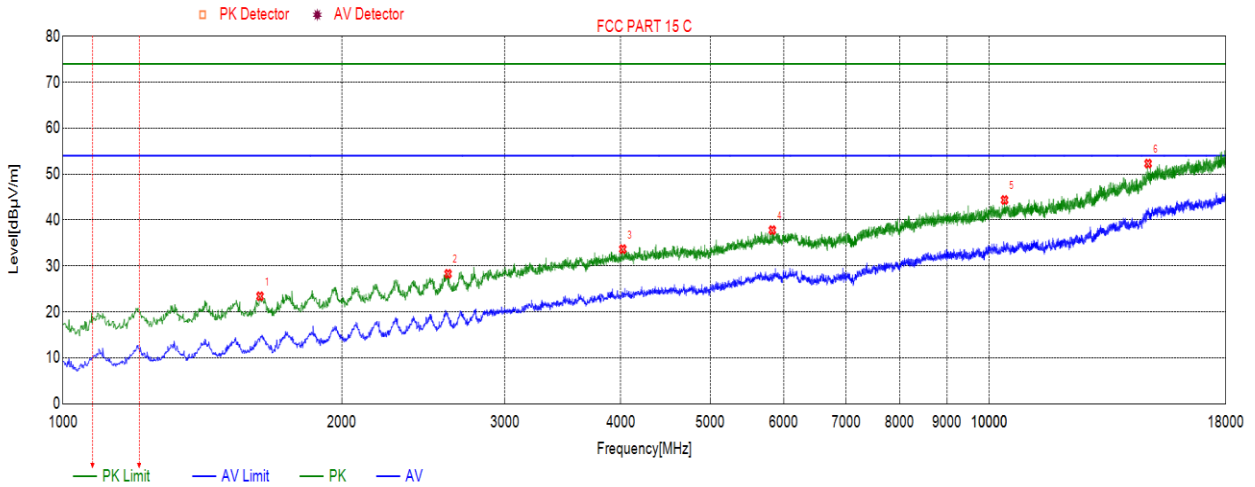
HARMONICS AND SPURIOUS EMISSIONS (HIGH CHANNEL, HORIZONTAL)



No.	Frequency (MHz)	Result (dBuV /m)	Limit (Peak) (dBuV/m)	Margin (Peak) (dB)	Limit (Ave) (dBuV/m)	Margin (Ave) (dB)	Remark
1	1741.2741	23.50	74.00	-50.50	54.00	-30.5	peak
2	2688.2688	29.71	74.00	-44.29	54.00	-24.29	peak
3	4563.5564	34.17	74.00	-39.83	54.00	-19.83	peak
4	7923.0923	40.26	74.00	-33.74	54.00	-13.74	peak
5	11195.9196	44.53	74.00	-29.47	54.00	-9.47	peak
6	14597.9598	49.84	74.00	-24.16	54.00	-4.16	peak

Note: 1. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
 2. Peak: Peak detector.

HARMONICS AND SPURIOUS EMISSIONS (HIGH CHANNEL, VERTICAL)

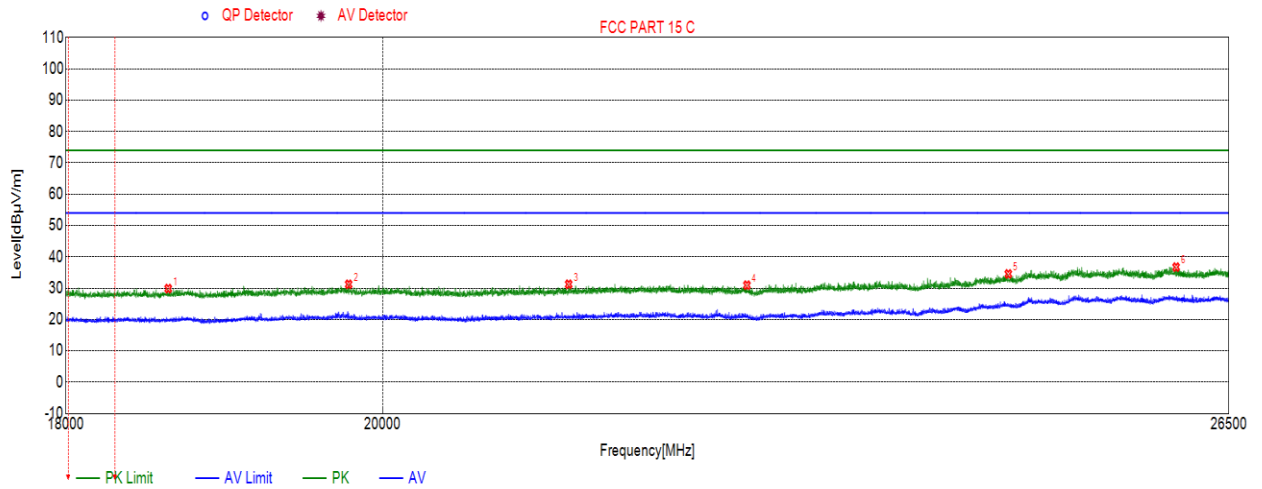


No.	Frequency (MHz)	Result (dBuV/m)	Limit (Peak) (dBuV/m)	Margin (Peak) (dB)	Limit (Ave) (dBuV/m)	Margin (Ave) (dB)	Remark
1	1632.4632	23.41	74.00	-50.59	54.00	-30.59	peak
2	2604.9605	28.30	74.00	-45.70	54.00	-25.7	peak
3	4021.2021	33.67	74.00	-40.33	54.00	-20.33	peak
4	5831.8832	37.80	74.00	-36.20	54.00	-16.2	peak
5	10386.6387	44.37	74.00	-29.63	54.00	-9.63	peak
6	14841.0841	52.29	74.00	-21.71	54.00	-1.71	peak

Note: 1. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
 2. Peak: Peak detector.

6.3. SPURIOUS EMISSIONS 18G ~ 26GHz

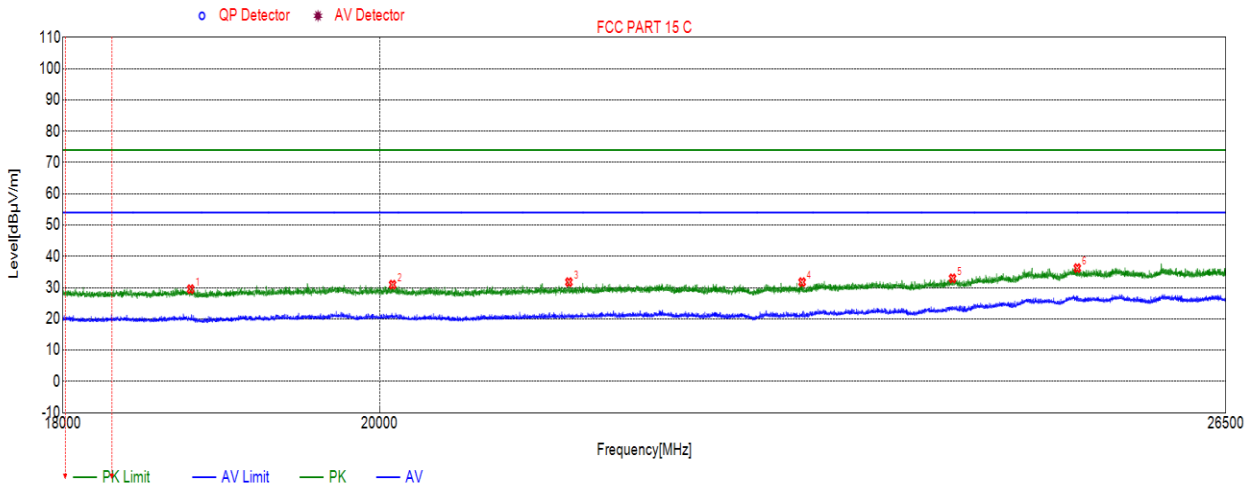
SPURIOUS EMISSIONS (MID CHANNEL, WORST-CASE CONFIGURATION, HORIZONTAL)



No.	Frequency (MHz)	Result (dBuV/m)	Limit (Peak) (dBuV/m)	Margin (Peak) (dB)	Limit (Ave) (dBuV/m)	Margin (Ave) (dB)	Remark
1	18623.1123	29.86	74.00	-44.14	54.00	-24.14	peak
2	19774.9775	31.23	74.00	-42.77	54.00	-22.77	peak
3	21276.2276	31.24	74.00	-42.76	54.00	-22.76	peak
4	22576.0076	30.94	74.00	-43.06	54.00	-23.06	peak
5	24626.4126	34.54	74.00	-39.46	54.00	-19.46	peak
6	26040.1040	36.71	74.00	-37.29	54.00	-17.29	peak

- Note: 1. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
 2. Peak: Peak detector.
 3. All the modes had been tested, but only the worst data were recorded in the report.
 4. Pre-test all the modes, then choose the worst case as final result.
 5. Result=Reading Level+ Corrective factor
 Corrective factor =Antenna Factor +Cable loss-Amplifier

SPURIOUS EMISSIONS (MID CHANNEL, WORST-CASE CONFIGURATION, VERTICAL)

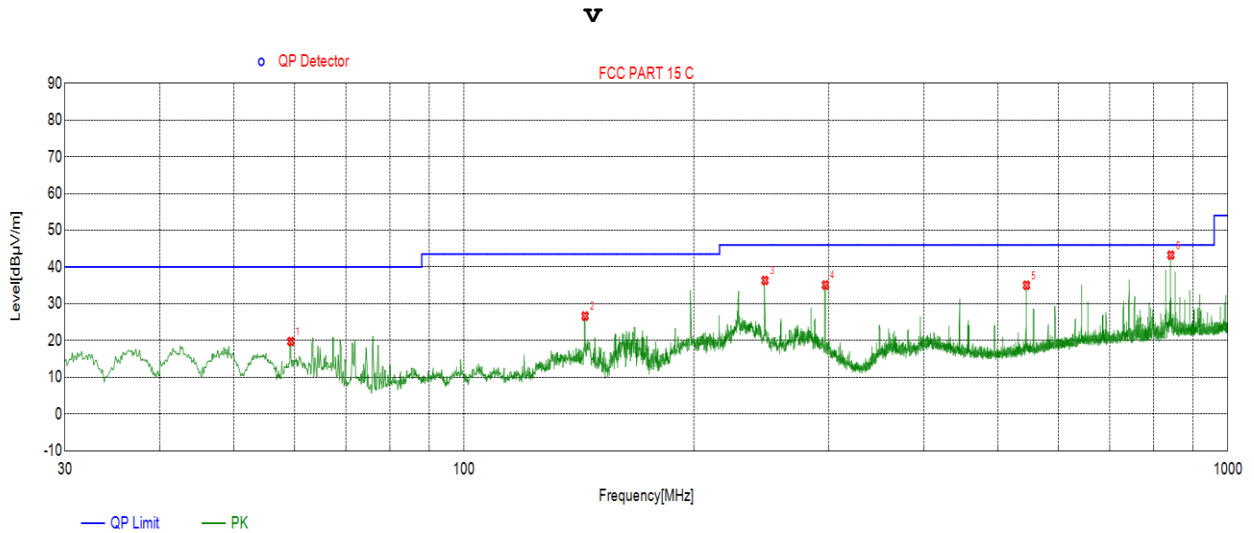


No.	Frequency (MHz)	Result (dBuV /m)	Limit (Peak) (dBuV/m)	Margin (Peak) (dB)	Limit (Ave) (dBuV/m)	Margin (Ave) (dB)	Remark
1	18781.2281	29.51	74.00	-44.49	54.00	-24.49	peak
2	20086.1086	30.94	74.00	-43.06	54.00	-23.06	peak
3	21299.1799	31.75	74.00	-42.25	54.00	-22.25	peak
4	23017.2017	31.74	74.00	-42.26	54.00	-22.26	peak
5	24197.9698	32.94	74.00	-41.06	54.00	-21.06	peak
6	25223.1723	36.23	74.00	-37.77	54.00	-17.77	peak

- Note: 1. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
 2. Peak: Peak detector.
 3. All the modes had been tested, but only the worst data were recorded in the report.
 4. Pre-test all the modes, then choose the worst case as final result.
 5. Result=Reading Level+ Corrective factor
 Corrective factor =Antenna Factor +Cable loss-Amplifier

6.4. SPURIOUS EMISSIONS 30M ~ 1 GHz

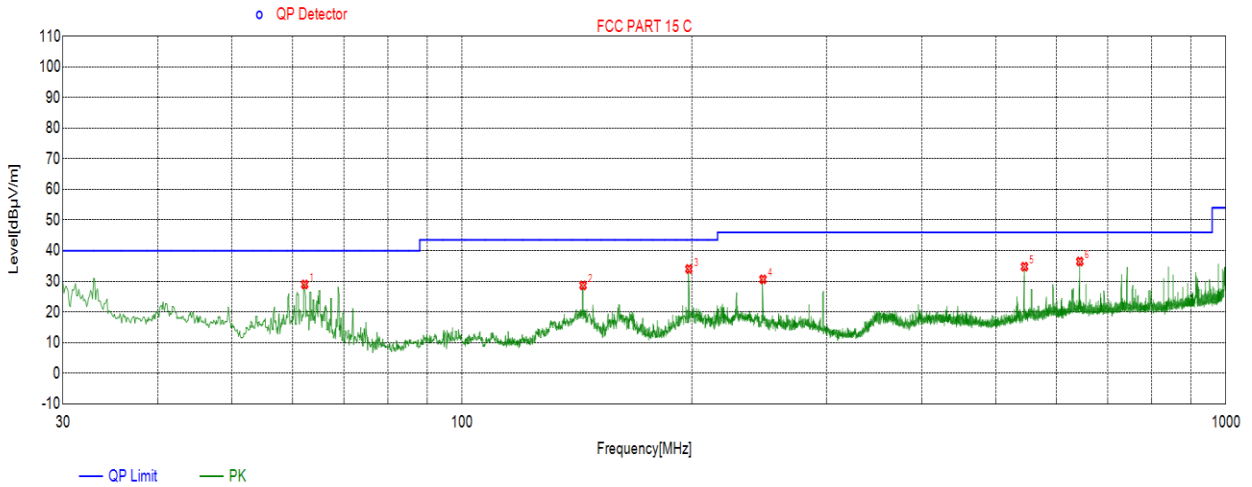
SPURIOUS EMISSIONS (MID CHANNEL, WORST-CASE CONFIGURATION, HORIZONTAL)



No.	Frequency (MHz)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	59.2969	19.75	40.00	-20.25	QP
2	143.9864	26.65	43.50	-16.85	QP
3	247.6898	36.35	46.00	-9.65	QP
4	297.2617	35.12	46.00	-10.88	QP
5	545.0245	35.05	46.00	-10.95	QP
6	842.3592	43.26	46.00	-2.74	QP

- Note: 1. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.
 2. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.
 3. Pre-test all the modes, then choose the worst case as final result.
 4. Result=Reading Level+ Corrective factor
 Corrective factor =Antenna Factor +Cable loss-Amplifier

SPURIOUS EMISSIONS (MID CHANNEL, WORST-CASE CONFIGURATION, VERTICAL)

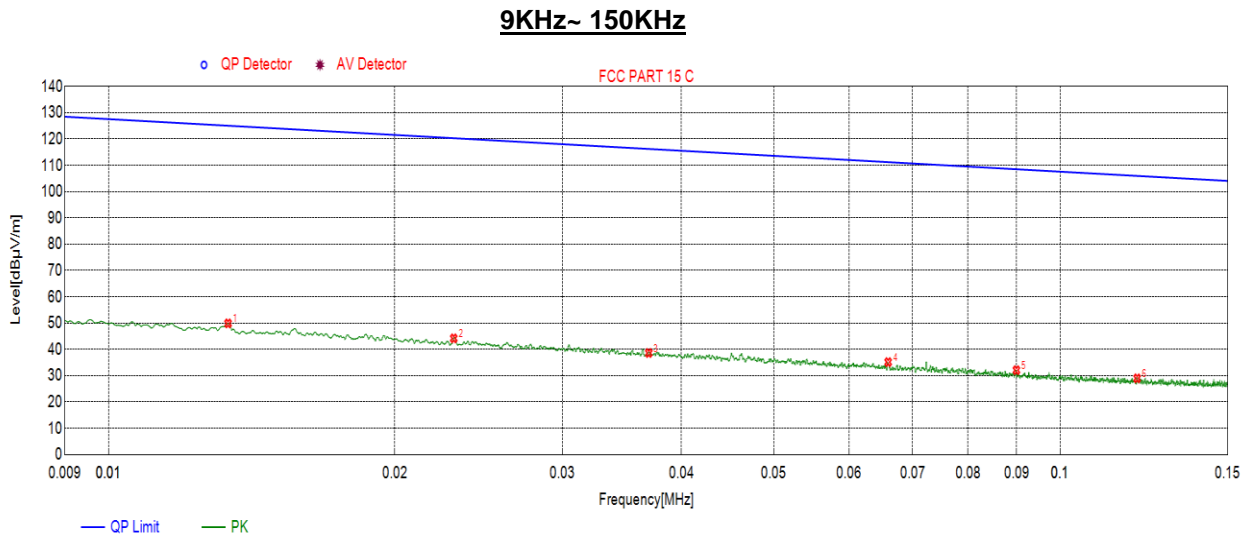


No.	Frequency (MHz)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	62.2072	28.98	40.00	-11.02	QP
2	143.9864	28.66	43.50	-14.84	QP
3	198.1178	34.04	43.50	-9.46	QP
4	247.6898	30.64	46.00	-15.36	QP
5	545.0245	34.77	46.00	-11.23	QP
6	643.9744	36.48	46.00	-9.52	QP

- Note: 1. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.
 2. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.
 3. Pre-test all the modes, then choose the worst case as final result.
 4. Result=Reading Level+ Corrective factor
 Corrective factor =Antenna Factor +Cable loss-Amplifier

6.5. SPURIOUS EMISSIONS BELOW 30M

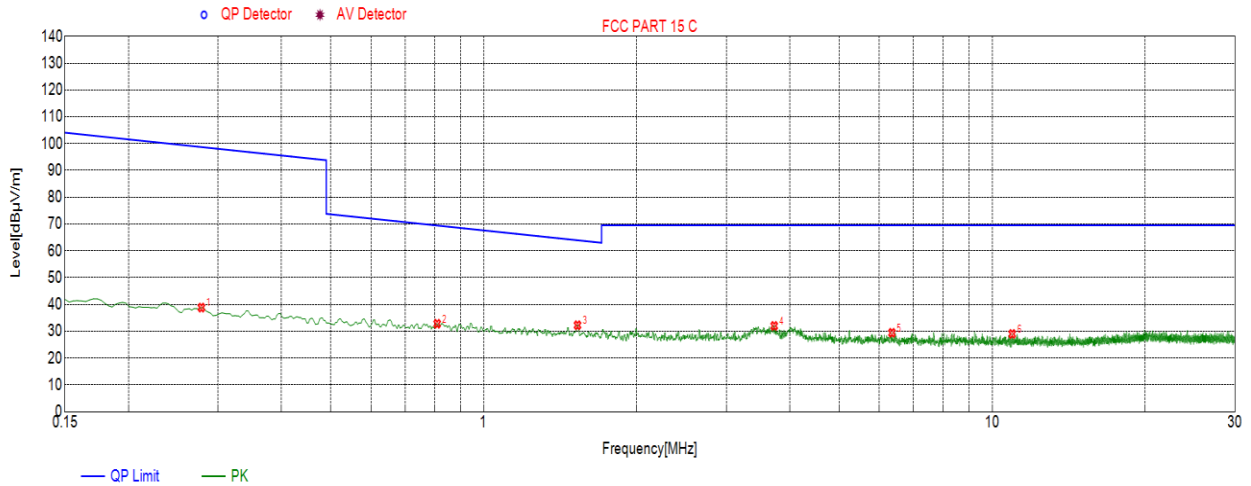
SPURIOUS EMISSIONS (MID CHANNEL, WORST-CASE CONFIGURATION, HORIZONTAL)



No.	Frequency (MHz)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	0.0134	49.90	125.07	-75.17	Peak
2	0.0231	44.20	120.32	-76.12	Peak
3	0.0370	38.64	116.23	-77.59	Peak
4	0.0660	35.16	111.21	-76.05	Peak
5	0.0900	32.09	108.52	-76.43	Peak
6	0.1205	29.00	105.98	-76.98	Peak

- Note:
1. All the modes had been tested, but only the worst data were recorded in the report.
 2. If Peak Result complies with AV and QP limit, AV and QP Result are deemed to comply with AV limit.
 3. Pre-test all the modes, then choose the worst case as final result.
 4. Result=Reading Level+ Corrective factor
 Corrective factor =Antenna Factor +Cable loss-Amplifier

150KHz ~ 30M

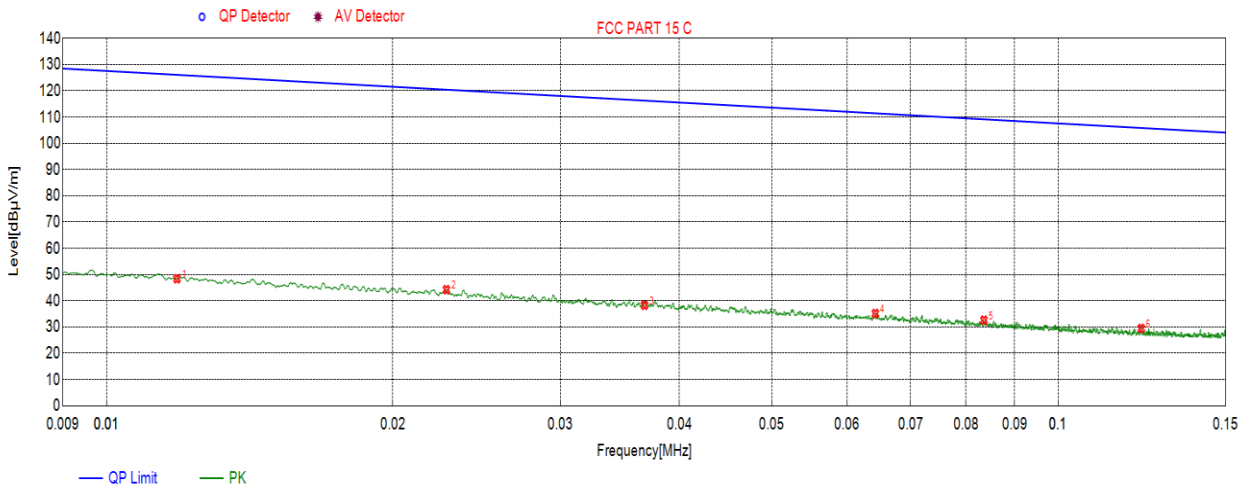


No.	Frequency (MHz)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	0.2724	39.65	98.90	-59.25	Peak
2	0.6933	34.37	70.79	-36.42	Peak
3	1.9919	30.55	69.50	-38.95	Peak
4	4.0578	33.65	69.50	-35.85	Peak
5	11.1210	28.92	69.50	-40.58	Peak
6	19.0917	30.73	69.50	-38.77	Peak

- Note: 1. All the modes had been tested, but only the worst data were recorded in the report.
 2. If Peak Result complies with AV and QP limit, AV and QP Result are deemed to comply with AV limit.
 3. Pre-test all the modes, then choose the worst case as final result.
 4. Result=Reading Level+ Corrective factor
 Corrective factor =Antenna Factor +Cable loss-Amplifier

SPURIOUS EMISSIONS (MID CHANNEL, WORST-CASE CONFIGURATION, VERTICAL)

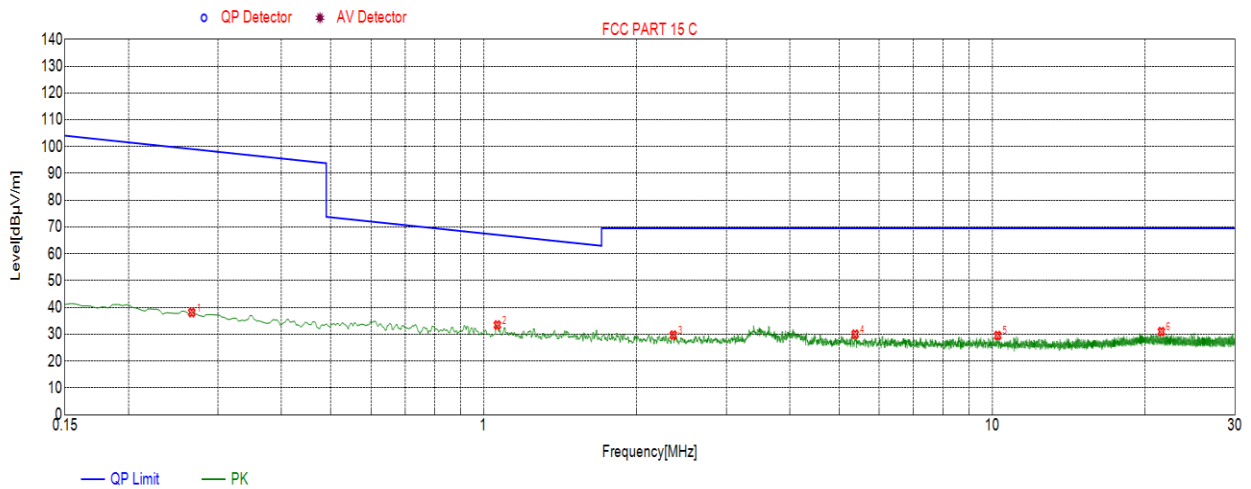
9KHz~ 150KHz



No.	Frequency (MHz)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	0.0119	48.39	126.04	-77.65	Peak
2	0.0228	44.22	120.44	-76.22	Peak
3	0.0368	38.29	116.27	-77.98	Peak
4	0.0643	35.15	111.43	-76.28	Peak
5	0.0836	32.61	109.16	-76.55	Peak
6	0.1223	29.48	105.85	-76.37	Peak

- Note:
1. All the modes had been tested, but only the worst data were recorded in the report.
 2. If Peak Result complies with AV and QP limit, AV and QP Result are deemed to comply with AV limit.
 3. Pre-test all the modes, then choose the worst case as final result.
 4. Result=Reading Level+ Corrective factor
 Corrective factor =Antenna Factor +Cable loss-Amplifier

150KHz ~ 30M



No.	Frequency (MHz)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	0.2664	38.11	99.09	-60.98	Peak
2	1.0635	33.44	67.09	-33.65	Peak
3	2.3591	29.69	69.50	-39.81	Peak
4	5.3773	30.01	69.50	-39.49	Peak
5	10.2552	29.52	69.50	-39.98	Peak
6	21.5158	30.98	69.50	-38.52	Peak

- Note:
1. All the modes had been tested, but only the worst data were recorded in the report.
 2. If Peak Result complies with AV and QP limit, AV and QP Result are deemed to comply with AV limit.
 3. Pre-test all the modes, then choose the worst case as final result.
 4. Result=Reading Level+ Corrective factor
 Corrective factor =Antenna Factor +Cable loss-Amplifier

7. ANTENNA REQUIREMENTS

Applicable requirements

Please refer to FCC §15.203

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

Please refer to FCC §15.247(b)(4)

The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Antenna Connector

EUT has an external antenna with antenna connector, it will be installed in a specific environment and users cannot change the antenna.

Antenna Gain

The antenna gain of EUT is less than 6 dBi.

END OF REPORT

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