



FCC 47 CFR PART 15 SUBPART C

CERTIFICATION TEST REPORT

For

USB RECEIVER

MODEL NUMBER: RX666

FCC ID: 2AN3N-RX666

REPORT NUMBER: 4788164888.1-3

ISSUE DATE: October 24, 2017

Prepared for

**HERO LOYAL LIMITED
B015, UNIT 5,27/F RICHMOND COMMERCIAL BUILDING 109 ARGYLE ST
MONGKOK HONGKONG**

Prepared by

**UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch
Room 101, Building 10, Innovation Technology Park,
Song Shan Lake Hi tech Development Zone, Dongguan, 523808, China
Tel: +86 769 33817100
Fax: +86 769 33244054
Website: www.ul.com**

Revision History

Rev.	Issue Date	Revisions	Revised By
--	10/24/2017	Initial Issue	

Summary of Test Results			
Clause	Test Items	FCC/IC Rules	Test Results
1	20dB Bandwidth	FCC 15.249 (d)	Pass
2	TX Spurious Emission	FCC 15.249 (a)(d)(e) FCC 15.209 FCC 15.205	Pass
3	Conducted Emission Test For AC Power Port	FCC 15.207	Pass

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1. ATTESTATION OF TEST RESULTS

Applicant Information

Company Name: HERO LOYAL LIMITED
Address: B015, UNIT 5,27/F RICHMOND COMMERCIAL BUILDING 109
ARGYLE ST MONGKOK HONGKONG

Manufacturer Information

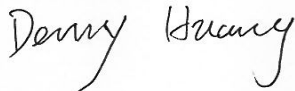
Company Name: HERO LOYAL LIMITED
Address: B015, UNIT 5,27/F RICHMOND COMMERCIAL BUILDING 109
ARGYLE ST MONGKOK HONGKONG

EUT Description

Product Name: USB RECEIVER
Brand Name: N/A
Model Name: RX666
Serial Number: N/A
Model Difference: N/A
Date of Receipt: October 12
Sample ID: 12303963
Date Tested: October 16, 2017 ~ October 19, 2017

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart C	Pass

Prepared By:



Denny Huang
Engineer Project Associate

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 FCC CFR 47 Part 2, FCC CFR 47 Part 15, ANSI C63.10-2014.

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 recognized 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) (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	USB RECEIVER		
Model Name	RX666		
Product Description	Operation Frequency	2402 MHz ~ 2480 MHz	
	Modulation Type		Data Rate
	GFSK		2M/bps
Power Supply	1.5V		

5.2. MAXIMUM OUTPUT POWER

Frequency Range (MHz)	Number of Transmit Chains (NTX)	Frequency (MHz)	Channel Number	Max Power (dBμV/m)
2402-2480	1	2402-2480	0-39[40]	95.15

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. DESCRIPTION OF AVAILABLE ANTENNAS

Ant.	Frequency (MHz)	Antenna Type	Antenna Gain (dBi)
1	2402-2480	Internal Antenna	-2.36

Test Mode	Transmit and Receive Mode	Description
GFSK	<input checked="" type="checkbox"/> 1TX, 1RX	Antenna 1 can be used as transmitting/receiving antenna.

5.5. TEST CHANNEL CONFIGURATION

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

5.6. THE WORSE CASE POWER SETTING PARAMETER

The Worse Case Power Setting Parameter under 2402 ~ 2480MHz Band				
Test Software		SE67T_FccTest_V6.7.0_Aoto_Test		
Modulation Type	Transmit Antenna Number	Test Channel		
		CH 00	CH 19	CH 39
GFSK	1	3dBm	3dBm	3dBm

5.7. 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 1.5V
	VH	N/A

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

5.8. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Item	Equipment	Brand Name	Model Name	P/N
1	Laptop	ThinkPad	T460S	SL10K24796 JS

I/O CABLES

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

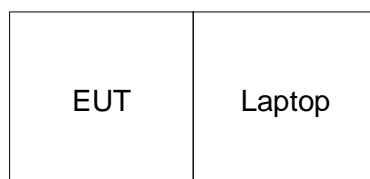
ACCESSORY

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

TEST SETUP

The EUT can work in engineering mode with software through a Laptop.

SETUP DIAGRAM FOR TEST



5.9. MEASURING INSTRUMENT AND SOFTWARE USED

Radiated Emissions						
Instrument						
Used	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
<input checked="" type="checkbox"/>	MXE EMI Receiver	KESIGHT	N9038A	MY56400036	Feb. 24, 2017	Feb. 24, 2018
<input checked="" type="checkbox"/>	Hybrid Log Periodic Antenna	TDK	HLP-3003C	130960	Jan.09, 2016	Jan.09, 2019
<input checked="" type="checkbox"/>	Preamplifier	HP	8447D	2944A09099	Feb. 13, 2017	Feb. 13, 2018
<input checked="" type="checkbox"/>	EMI Measurement Receiver	R&S	ESR26	101377	Dec. 20, 2016	Dec. 20, 2017
<input checked="" type="checkbox"/>	Horn Antenna	TDK	HRN-0118	130939	Jan. 09, 2016	Jan. 09, 2019
<input checked="" type="checkbox"/>	High Gain Horn Antenna	Schwarzbeck	BBHA-9170	691	Jan.06, 2016	Jan.06, 2019
<input checked="" type="checkbox"/>	Preamplifier	TDK	PA-02-0118	TRS-305-00066	Jan. 14, 2017	Jan. 14, 2018
<input checked="" type="checkbox"/>	Preamplifier	TDK	PA-02-2	TRS-307-00003	Dec. 20, 2016	Dec. 20, 2017
<input checked="" type="checkbox"/>	Loop antenna	Schwarzbeck	1519B	00008	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.	Last Cal.	Next Cal.
<input checked="" type="checkbox"/>	Spectrum Analyzer	Keysight	N9030A	MY55410512	Dec. 20, 2016	Dec. 20, 2017

6. ANTENNA PORT TEST RESULTS

6.1. ON TIME AND DUTY CYCLE

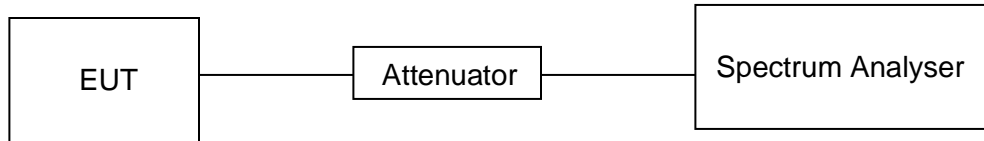
LIMITS

None; for reporting purposes only

PROCEDURE

KDB 558074 Zero-Span Spectrum Analyzer Method

TEST SETUP

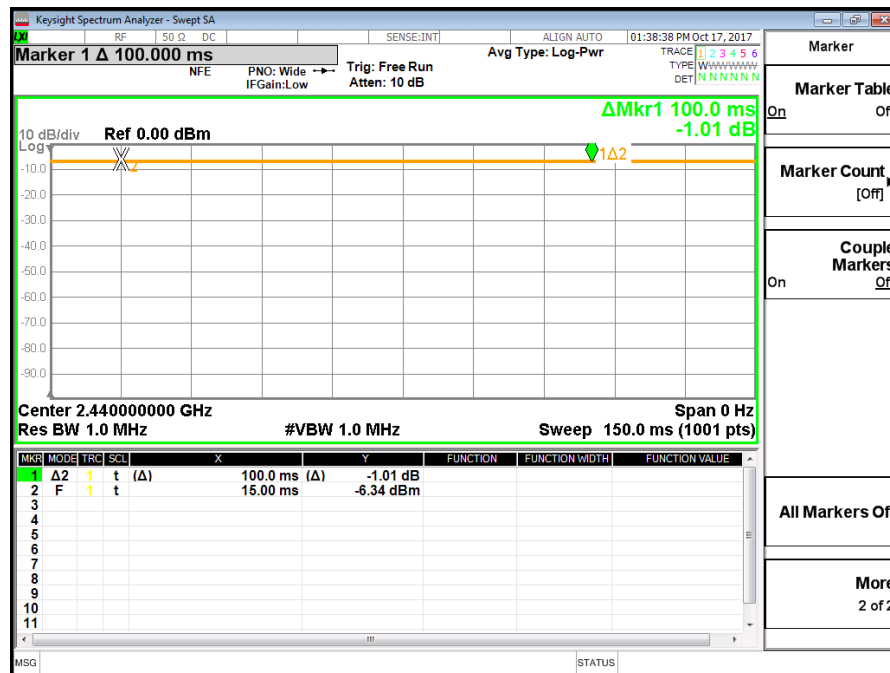


RESULTS

Mode	On Time (msec)	Period (msec)	Duty Cycle x (Linear)	Duty Cycle (%)	Duty Cycle Correction Factor (db)	1/T Minimum VBW (KHz)
GFSK	100	100	1	100%	0	0.01

Note: Duty Cycle Correction Factor=10log(1/x).
Where: x is Duty Cycle(Linear)
Where: T is On Time (transmit duration)

ON TIME AND DUTY CYCLE MID CH PLOT



6.2. 20 dB BANDWIDTH

LIMITS

FCC Part15 (15.249) , Subpart C			
Section	Test Item	Limit	Frequency Range (MHz)
FCC 15.249(d)	Bandwidth	for reporting purposes only	2400-2483.5

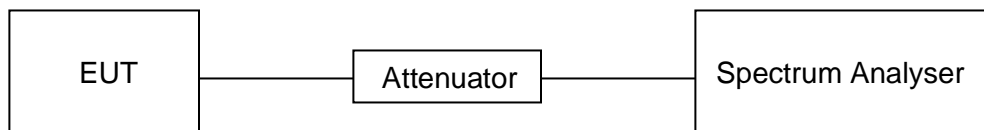
TEST PROCEDURE

Connect the UUT to the spectrum analyser and use the following settings:

Center Frequency	The centre frequency of the channel under test
Detector	Peak
RBW	1% to 5% of the occupied bandwidth
VBW	approximately 3×RBW
Trace	Max hold
Sweep	Auto couple

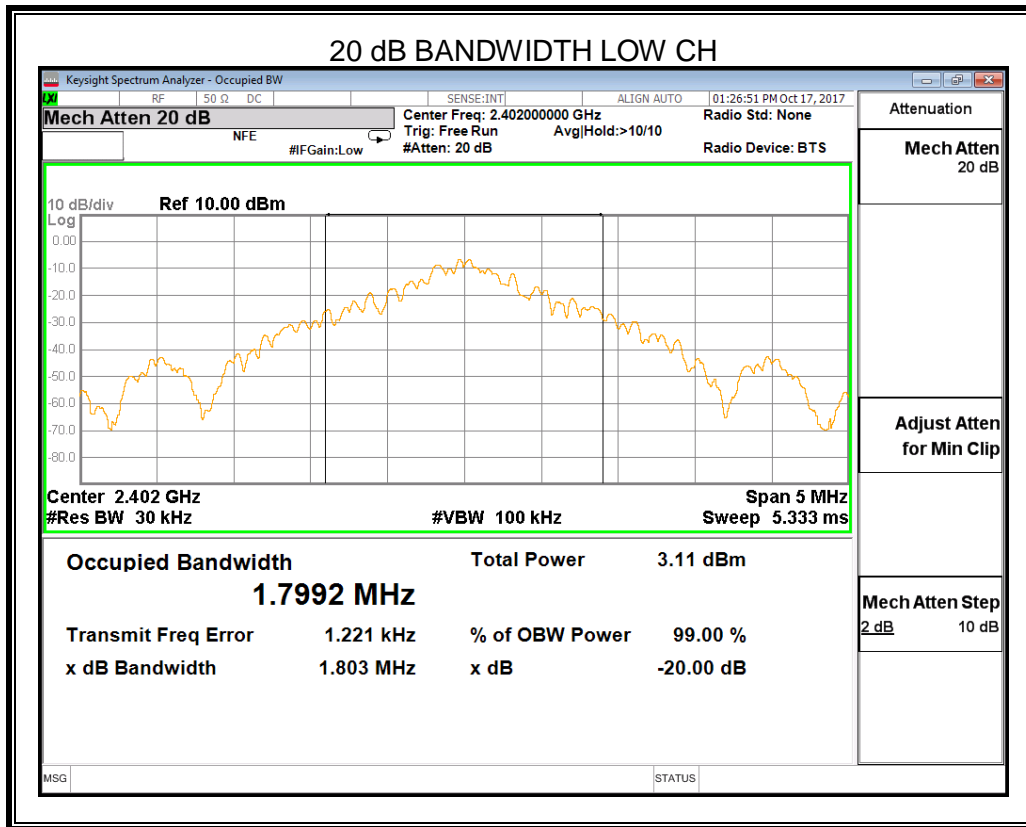
Allow the trace to stabilize and measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 20 dB relative to the maximum level measured in the fundamental emission.

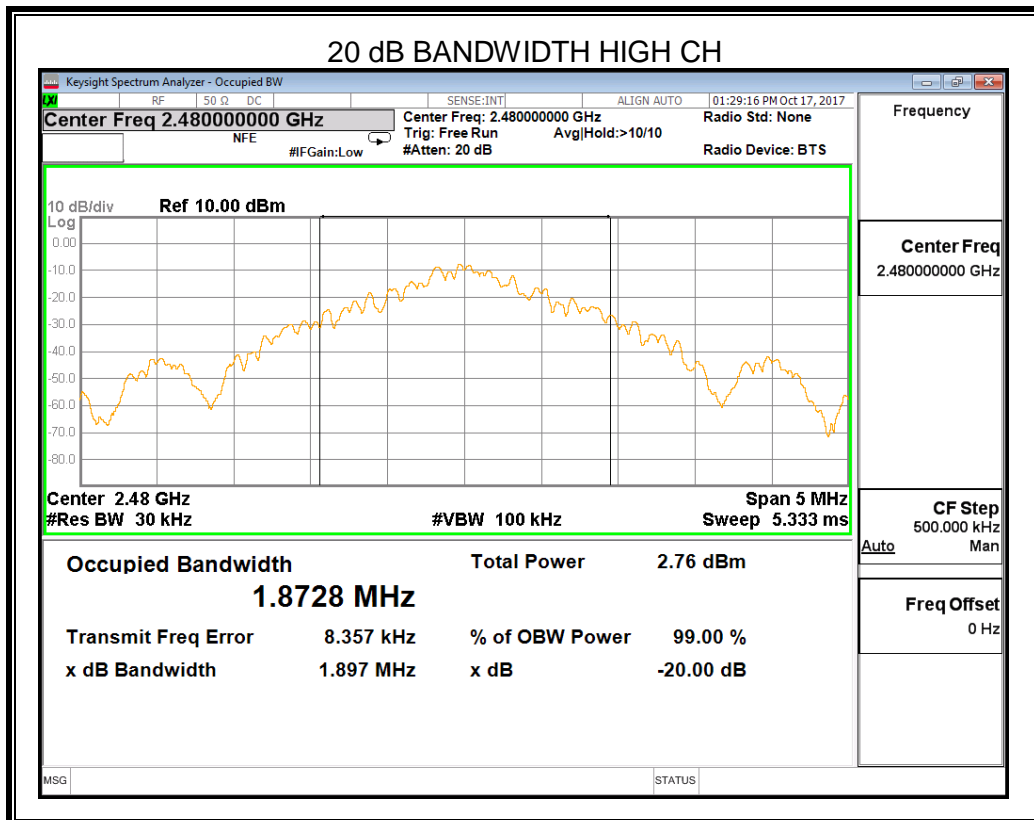
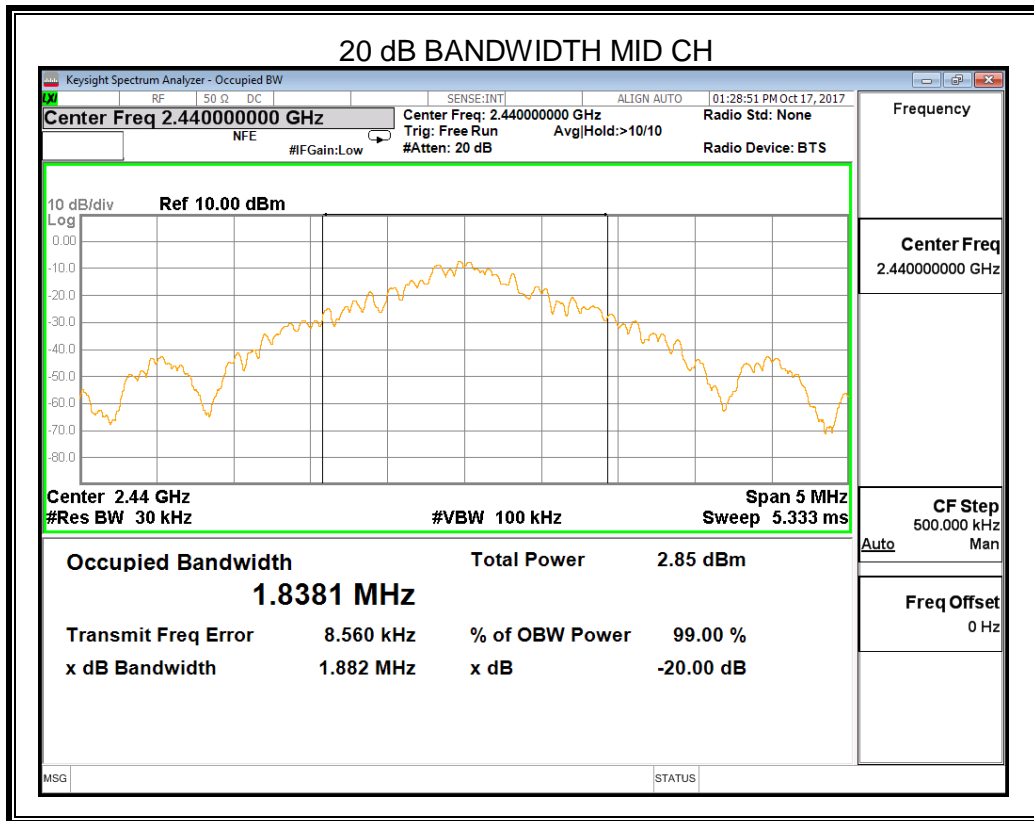
TEST SETUP



RESULTS

Channel	Frequency (MHz)	20dB bandwidth (MHz)	Result
Low	2402	1.803	Pass
Middle	2440	1.882	Pass
High	2480	1.897	Pass





7. RADIATED TEST RESULTS

7.1. LIMITS AND PROCEDURE

LIMITS

Please refer to FCC §15.205 and §15.209

Please refer to FCC §15.249 (a)(d)(e)

The field strength of emissions from intentional radiators operated within these frequency bands			
Frequency (MHz)	Field strength of Fundamental	Field strength of Harmonics	Distance (m)
902 - 928	50 mV/m (94dBuV/m)	500 uV/m (54dBuV/m)	3
2400 – 2483.5	50 mV/m (94dBuV/m)	500 uV/m (54dBuV/m)	3
5725 – 5875	50 mV/m (94dBuV/m)	500 uV/m (54dBuV/m)	3

Emissions radiated outside of the specified frequency bands			
Frequency Range (MHz)	Field Strength Limit (uV/m) at 3 m	Field Strength Limit (dBuV/m) at 3 m	
30 - 88	100	Quasi-Peak	
30 - 88	100	40	
88 - 216	150	43.5	
216 - 960	200	46	
Above 960	500	54	
Above 1000	500	Peak	Average
		74	54

Restricted bands of operation

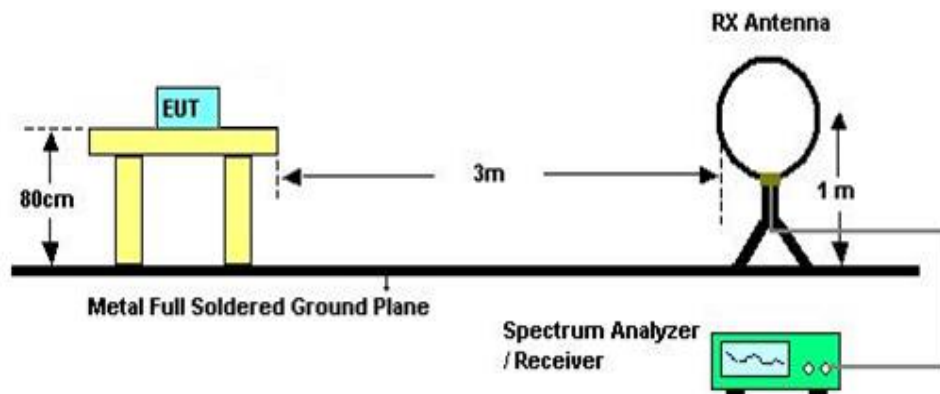
MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
¹ 0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	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 38.6

TEST SETUP AND PROCEDURE

Below 30MHz

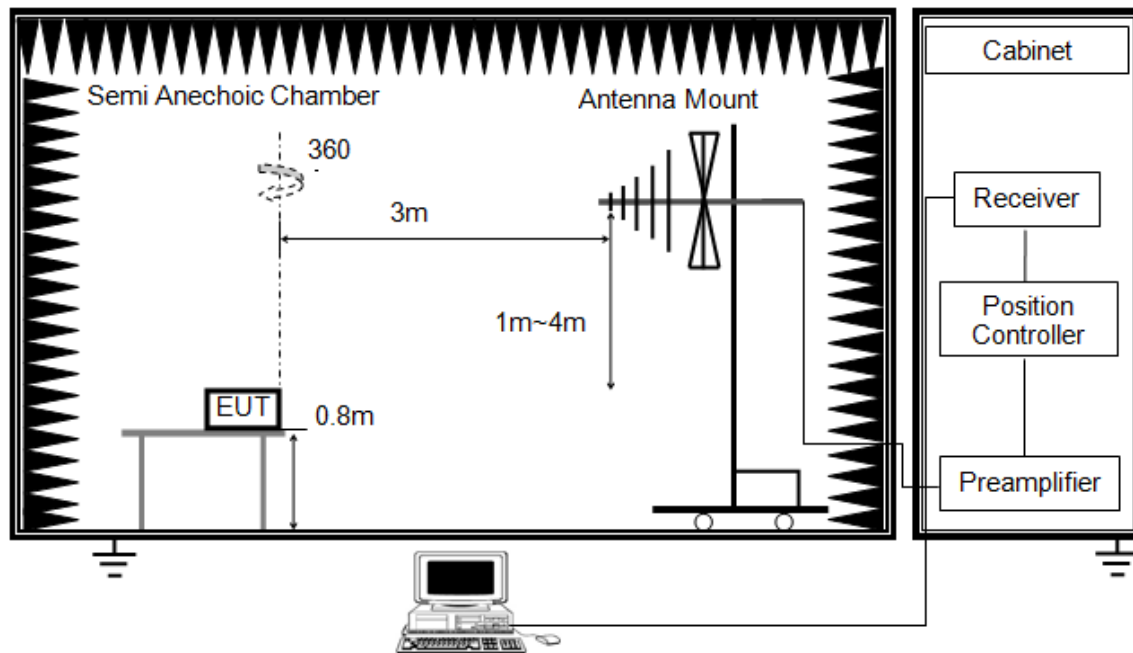


The setting of the spectrum analyser

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
Detector	Peak/QP/ Average
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 0.8 meter 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. Measurement = Reading Level + Correct Factor
6. 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.
7. For the actual test configuration, please refer to the related item in this test report (Photographs of the Test Configuration)

Below 1G

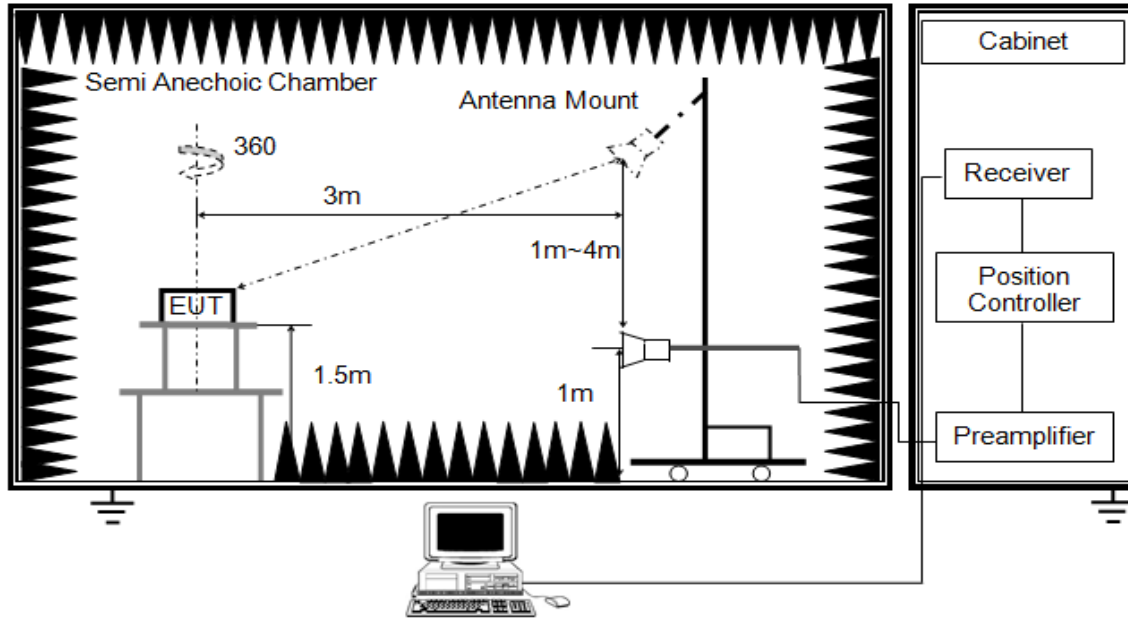


The setting of the spectrum analyser

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 0.8 meter 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. Measurement = Reading Level + Correct Factor
6. 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.
7. For the actual test configuration, please refer to the related Item in this test report (Photographs of the Test Configuration)

ABOVE 1G

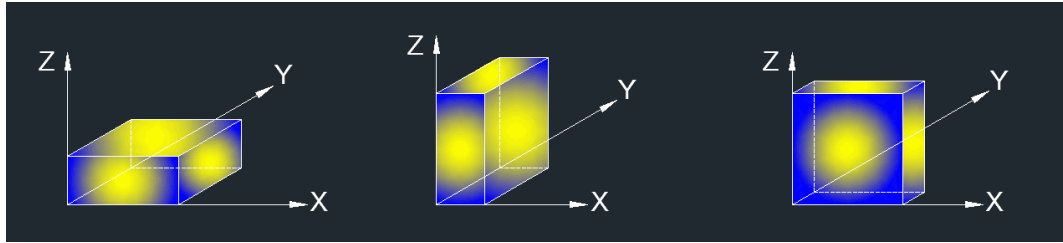


The setting of the spectrum analyser

RBW	1M MHz
VBW	PEAK: 3M AVG: see note 5
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 (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 1.5m 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 average power measurement, set the VBW to 10 Hz, while maintaining all of the other instrument settings, if the duty cycle of the EUT is less than 98%, the Duty Cycle Correction Factor shall be added to the measured emission levels. For the Duty Cycle and Correction Factor please refer to clause 6.1.ON TIME AND DUTY CYCLE.
8. For the actual test configuration, please refer to the related item in this test report (Photographs of the Test Configuration)

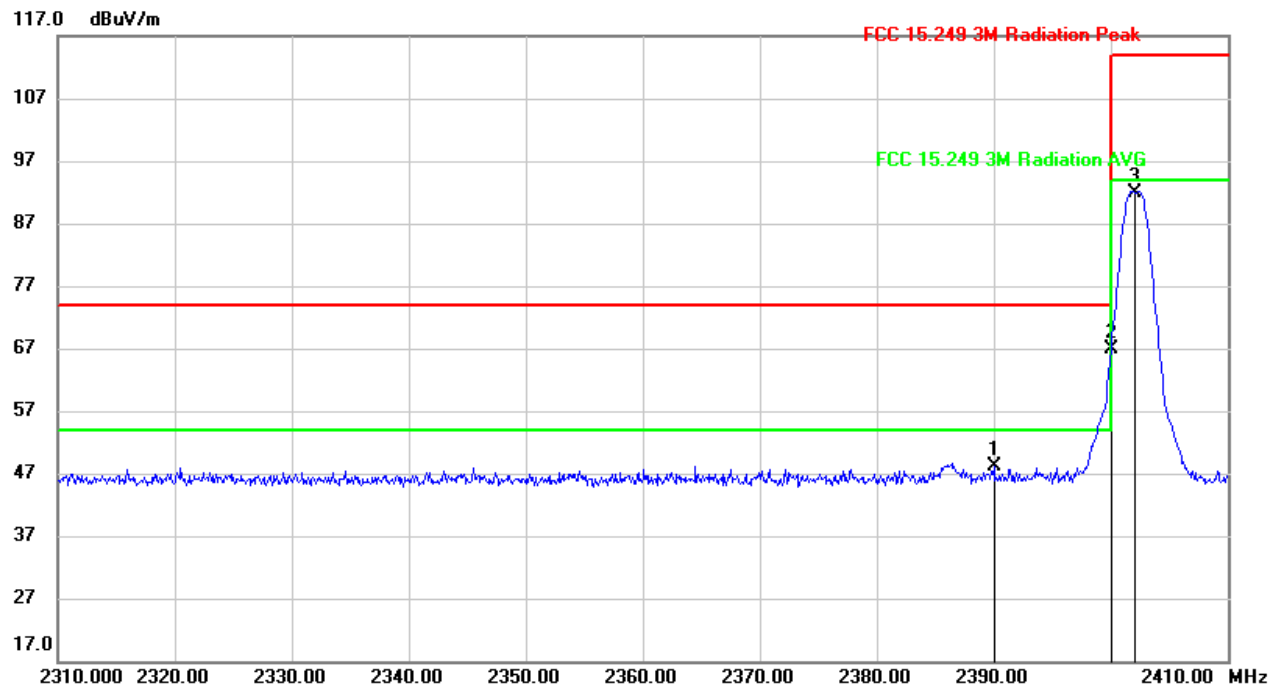
X axis, Y axis, Z axis positions:



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.

7.2. RESTRICTED BANDEDGE AND FIELD STRENGTH OF INTENTIONAL EMISSIONS

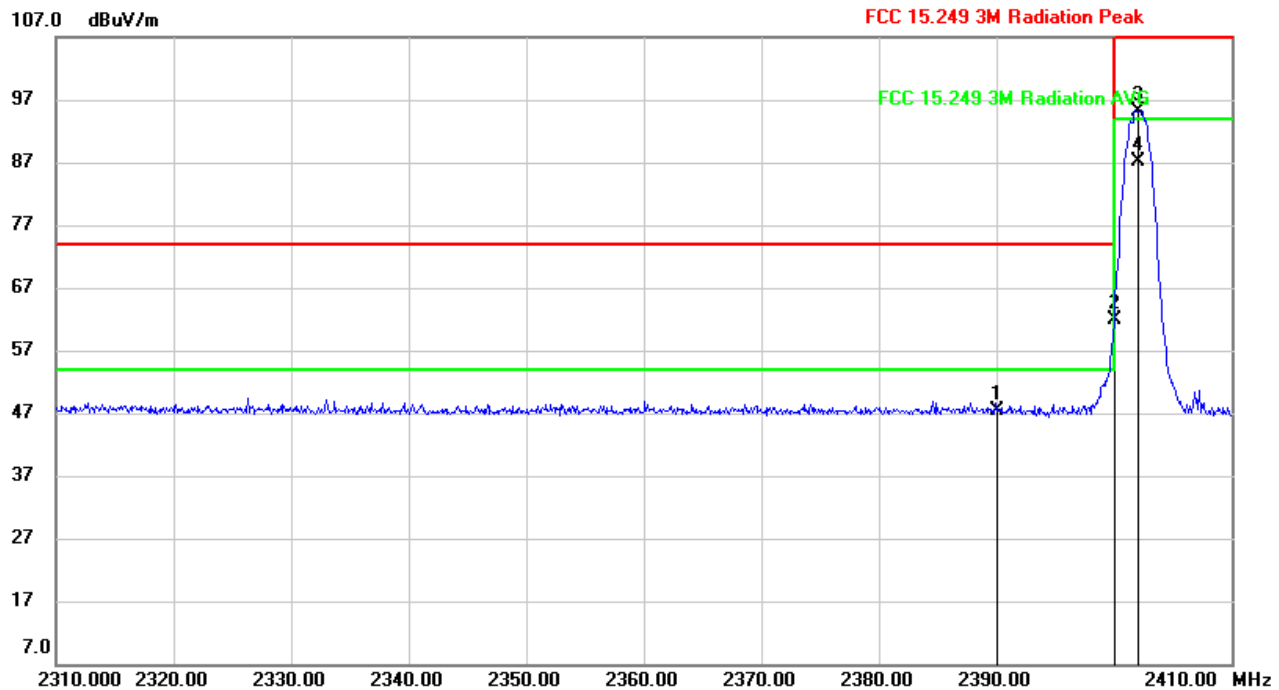
RESTRICTED BANDEDGE AND FIELD STRENGTH OF INTENTIONAL EMISSIONS (LOW CHANNEL, HORIZONTAL)



No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2390.000	15.07	33.14	48.21	54.00	-5.79	peak
3	2402.000	58.89	33.06	91.95	94.00	-2.05	peak

Note: 1. Measurement = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.

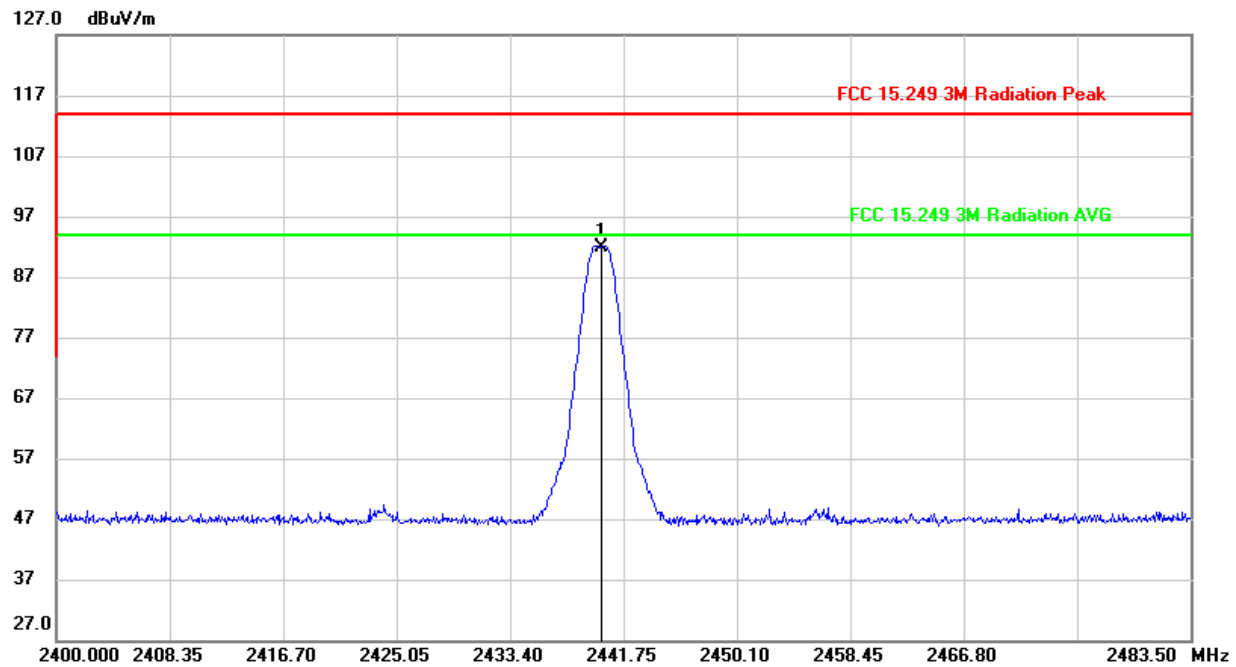
RESTRICTED BANDEDGE AND FIELD STRENGTH OF INTENTIONAL EMISSIONS (LOW CHANNEL, VERTICAL)



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2390.000	14.22	33.24	47.46	74.00	-26.54	peak
2	2400.000	28.71	33.17	61.88	74.00	-12.12	peak
3	2402.000	61.99	33.16	95.15	114.00	-18.85	peak
4	2402.000	53.99	33.16	87.15	94.00	-6.85	AVG

- Note: 1. Measurement = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector, AVG: VBW=10Hz

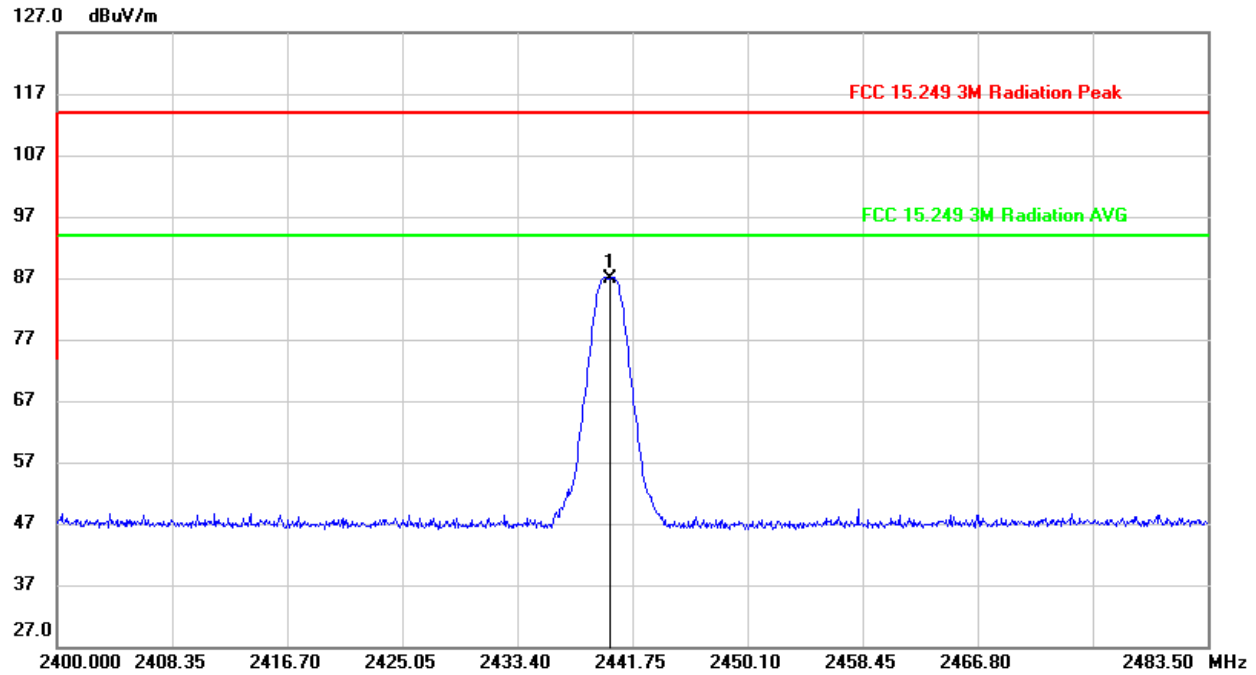
FIELD STRENGTH OF INTENTIONAL EMISSIONS (HIGH CHANNEL, HORIZONTAL)



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2440.000	59.11	32.87	91.98	94.00	-2.02	peak

Note: 1. Measurement = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.

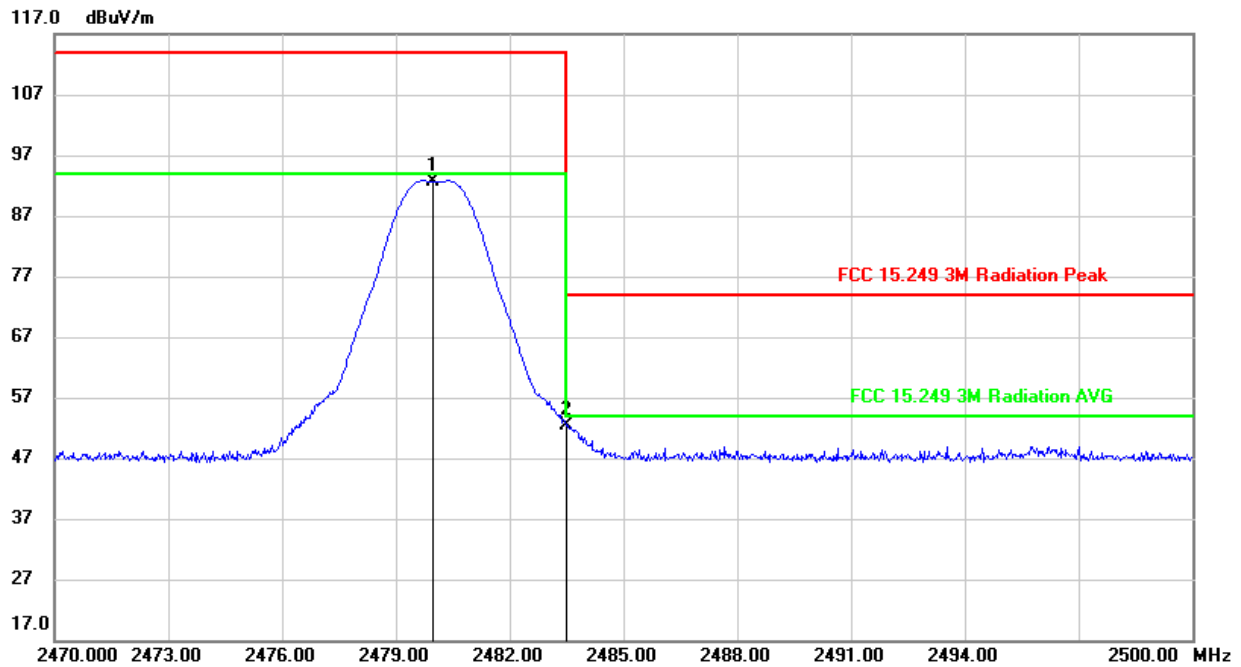
FIELD STRENGTH OF INTENTIONAL EMISSIONS (HIGH CHANNEL, VERTICAL)



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2440.000	53.92	32.97	86.89	94.00	-7.11	peak

Note: 1. Measurement = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.

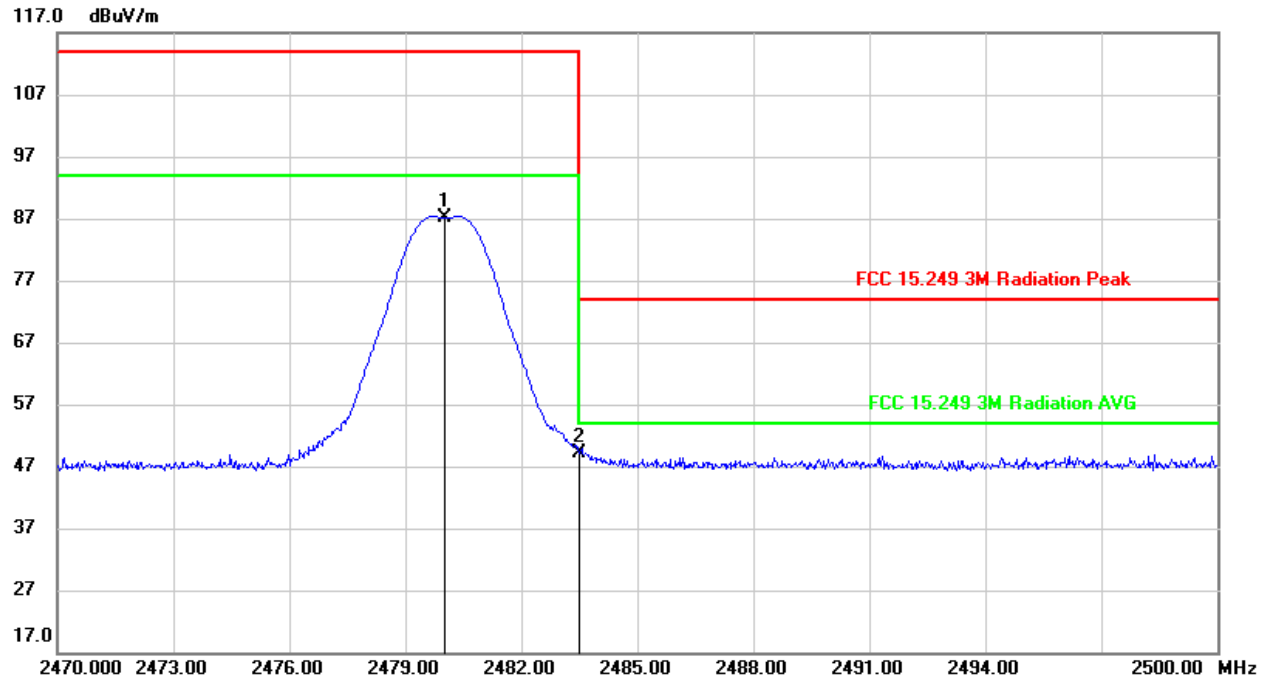
RESTRICTED BANDEDGE AND FIELD STRENGTH OF INTENTIONAL EMISSIONS (HIGH CHANNEL, HORIZONTAL)



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2480.000	59.76	32.79	92.55	94.00	-1.45	peak
2	2483.500	19.48	32.78	52.26	54.00	-1.74	peak

Note: 1. Measurement = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.

RESTRICTED BANDEDGE AND FIELD STRENGTH OF INTENTIONAL EMISSIONS (HIGH CHANNEL, VERTICAL)



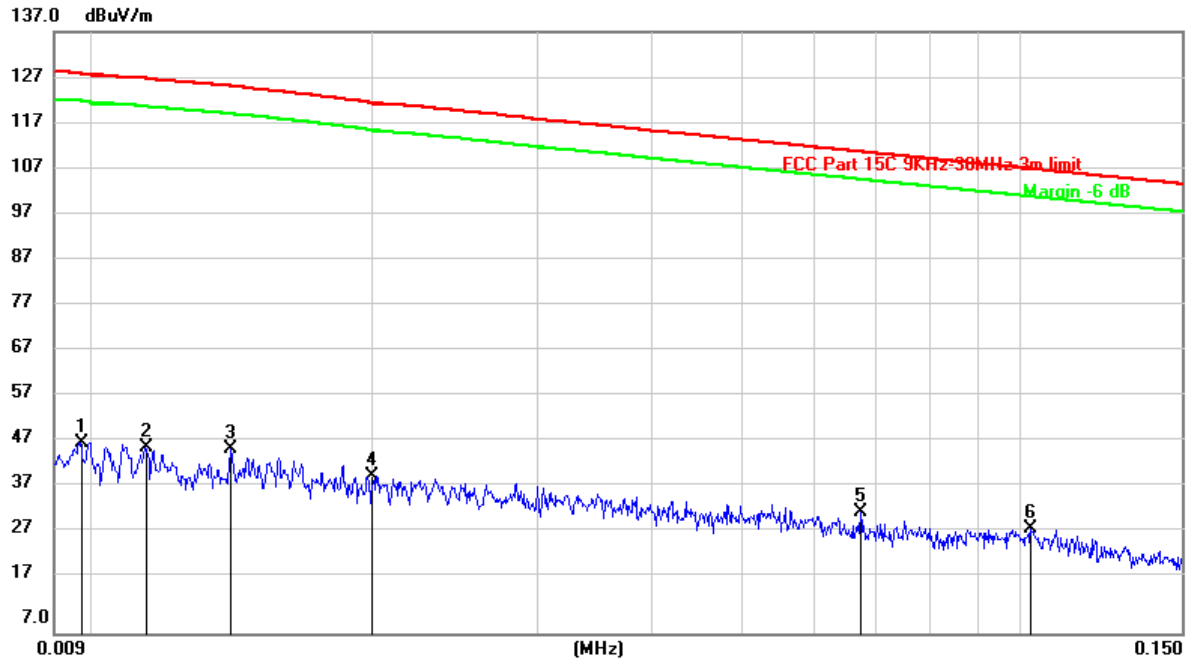
No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2480.000	54.26	32.89	87.15	94.00	-6.85	peak
2	2483.500	16.32	32.88	49.20	54.00	-4.8	peak

Note: 1. Measurement = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.

Note 2: EUT in each of three orthogonal axis emissions had been tested, but only the worst case (X axis) data recorded in the report.

7.3. SPURIOUS EMISSIONS BELOW 30M (WORST-CASE CONFIGURATION)

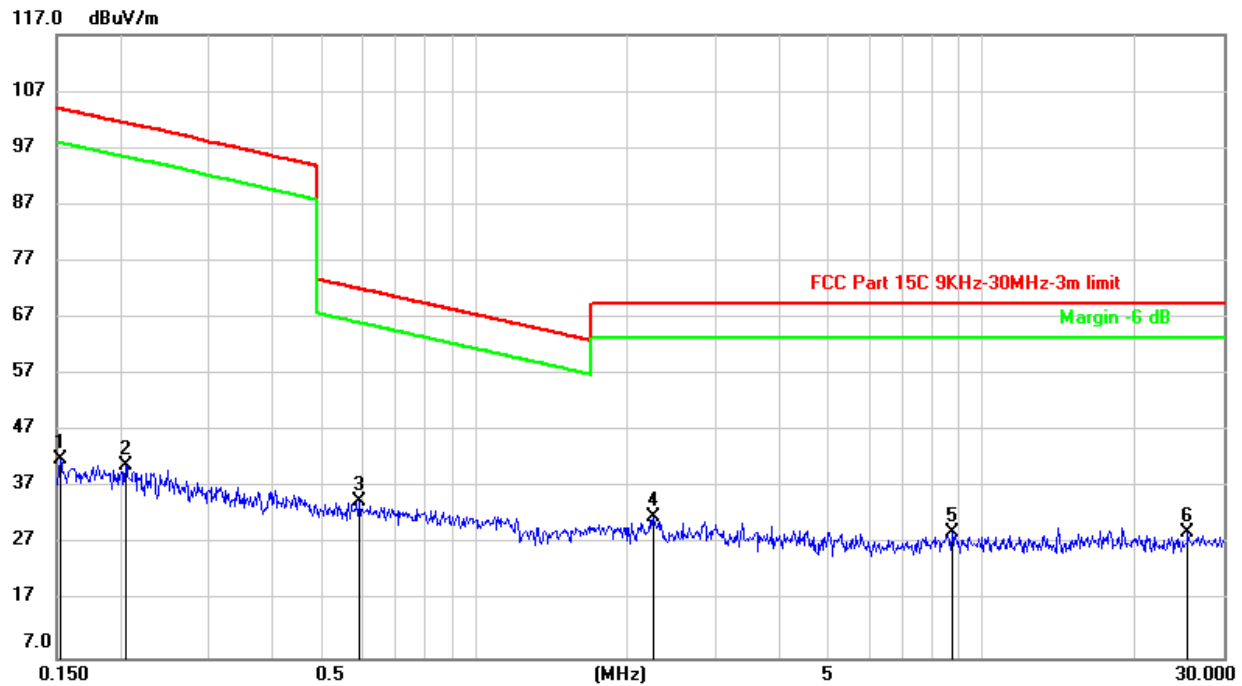
SPURIOUS EMISSIONS BELOW 150KHz (MIDDLE CHANNEL, HORIZONTAL)



No.	Frequency (KHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	0.0095	28.00	20.25	48.25	127.98	-79.73	peak
2	0.0112	27.02	20.22	47.24	126.88	-79.64	peak
3	0.0140	26.47	20.25	46.72	125.19	-78.47	peak
4	0.0200	20.80	20.31	41.11	121.58	-80.47	peak
5	0.0672	12.71	20.31	33.02	111.08	-78.06	peak
6	0.1029	9.22	20.23	29.45	107.36	-77.91	peak

Note: 1. Measurement = Reading Level + Correct Factor.
2. Peak: Peak detector.

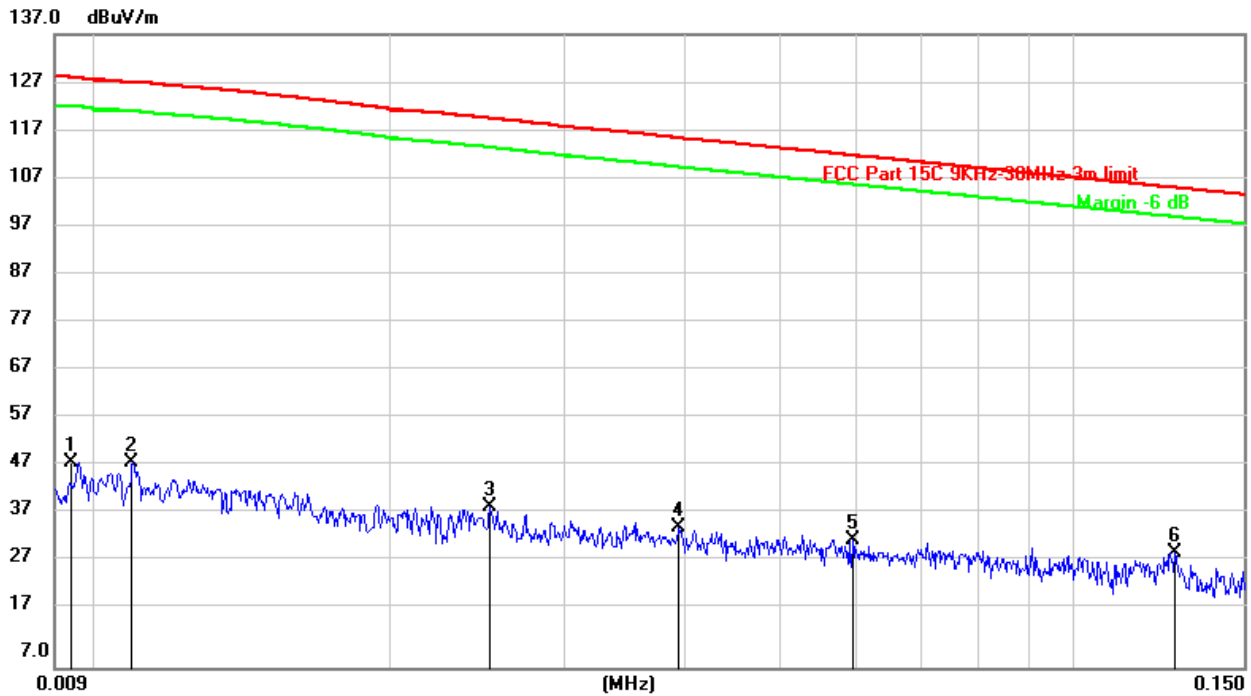
SPURIOUS EMISSIONS BELOW 30MHz (LOW CHANNEL, HORIZONTAL)



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	0.1524	21.66	20.42	42.08	103.95	-61.87	peak
2	0.2048	20.70	20.36	41.06	101.41	-60.35	peak
3	0.5916	14.40	20.29	34.69	72.17	-37.48	peak
4	2.2486	11.05	20.77	31.82	69.54	-37.72	peak
5	8.7293	8.02	20.99	29.01	69.54	-40.53	peak
6	25.4556	7.44	21.61	29.05	69.54	-40.49	peak

Note: 1. Measurement = Reading Level + Correct Factor.
2. Peak: Peak detector.

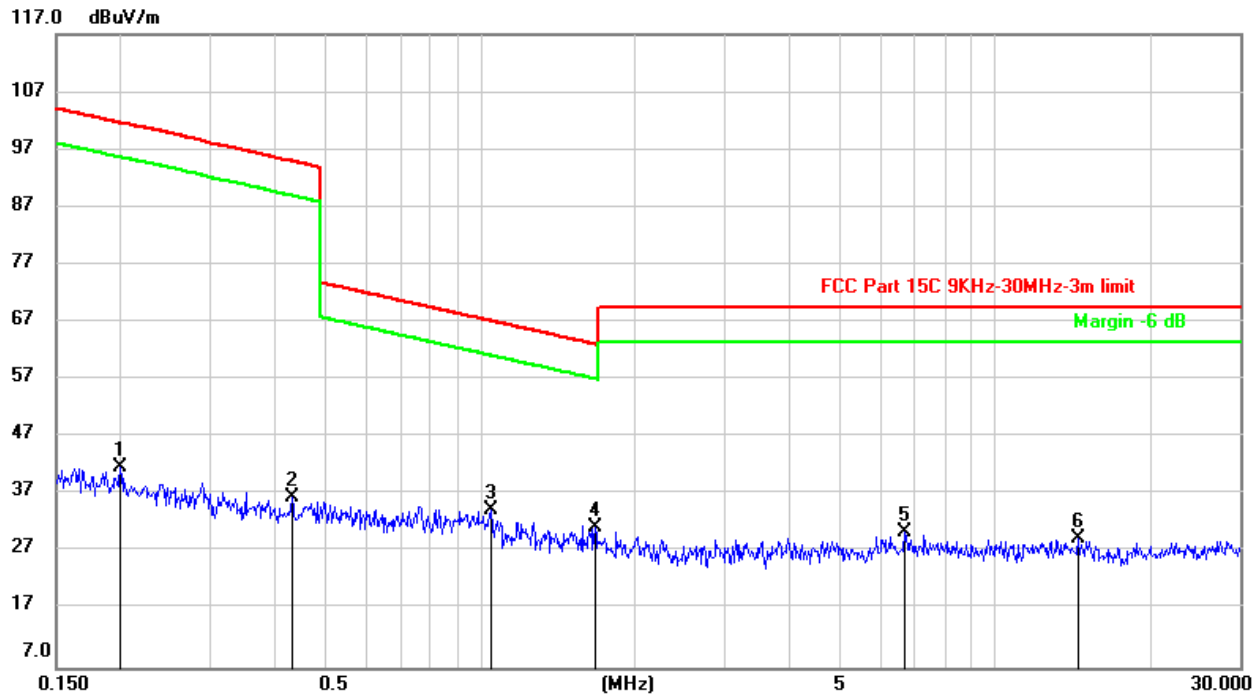
SPURIOUS EMISSIONS BELOW 150KHz (LOW CHANNEL, VERTICAL)



No.	Frequency (KHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	0.0094	28.90	20.26	49.16	128.06	-78.90	peak
2	0.0108	28.74	20.22	48.96	127.12	-78.16	peak
3	0.0252	19.79	20.31	40.10	119.75	-79.65	peak
4	0.0393	15.51	20.31	35.82	115.73	-79.91	peak
5	0.0594	12.76	20.31	33.07	112.13	-79.06	peak
6	0.1274	10.35	20.33	30.68	105.51	-74.83	peak

Note: 1. Measurement = Reading Level + Correct Factor.
2. Peak: Peak detector.

SPURIOUS EMISSIONS BELOW 30MHz (LOW CHANNEL, VERTICAL)



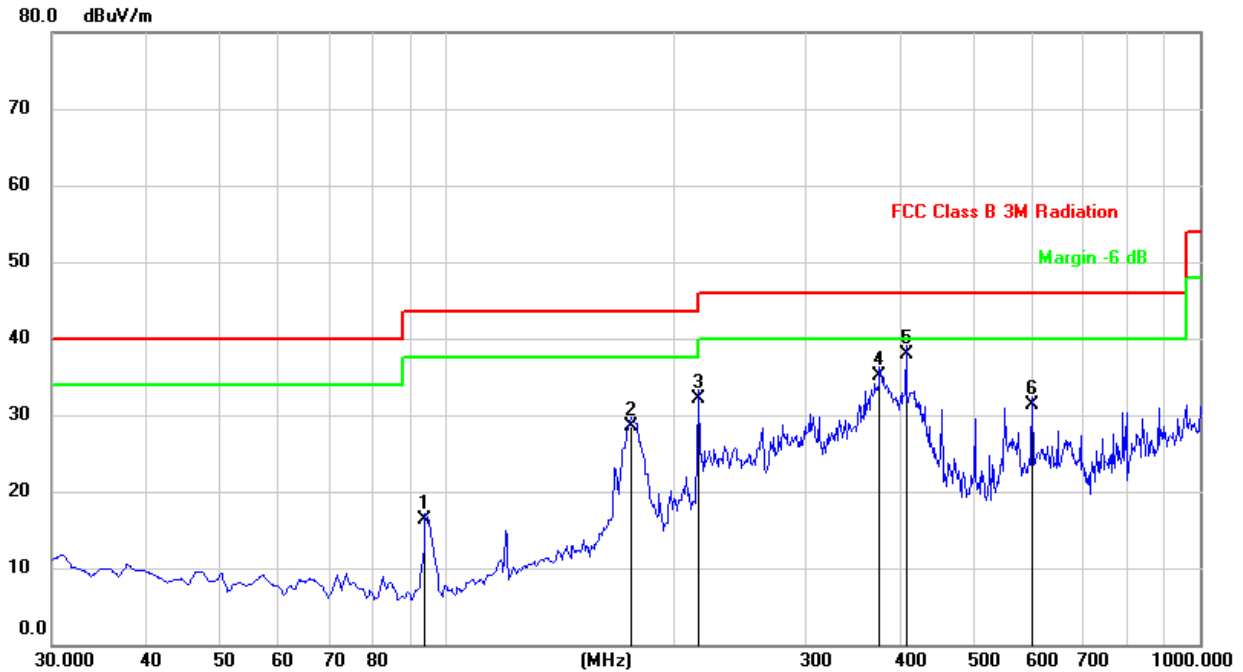
No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	0.1995	21.35	20.37	41.72	101.60	-59.88	peak
2	0.4304	16.43	20.27	36.70	94.97	-58.27	peak
3	1.0483	13.89	20.38	34.27	67.20	-32.93	peak
4	1.6713	10.73	20.61	31.34	63.15	-31.81	peak
5	6.6623	9.71	20.90	30.61	69.54	-38.93	peak
6	14.5168	8.50	20.94	29.44	69.54	-40.10	peak

Note: 1. Measurement = Reading Level + Correct Factor.
2. Peak: Peak detector.

Note 2: EUT in each of three orthogonal axis emissions had been tested, but only the worst case (X axis) data recorded in the report.

7.4. SPURIOUS EMISSIONS BELOW 1 GHz (WORST-CASE CONFIGURATION)

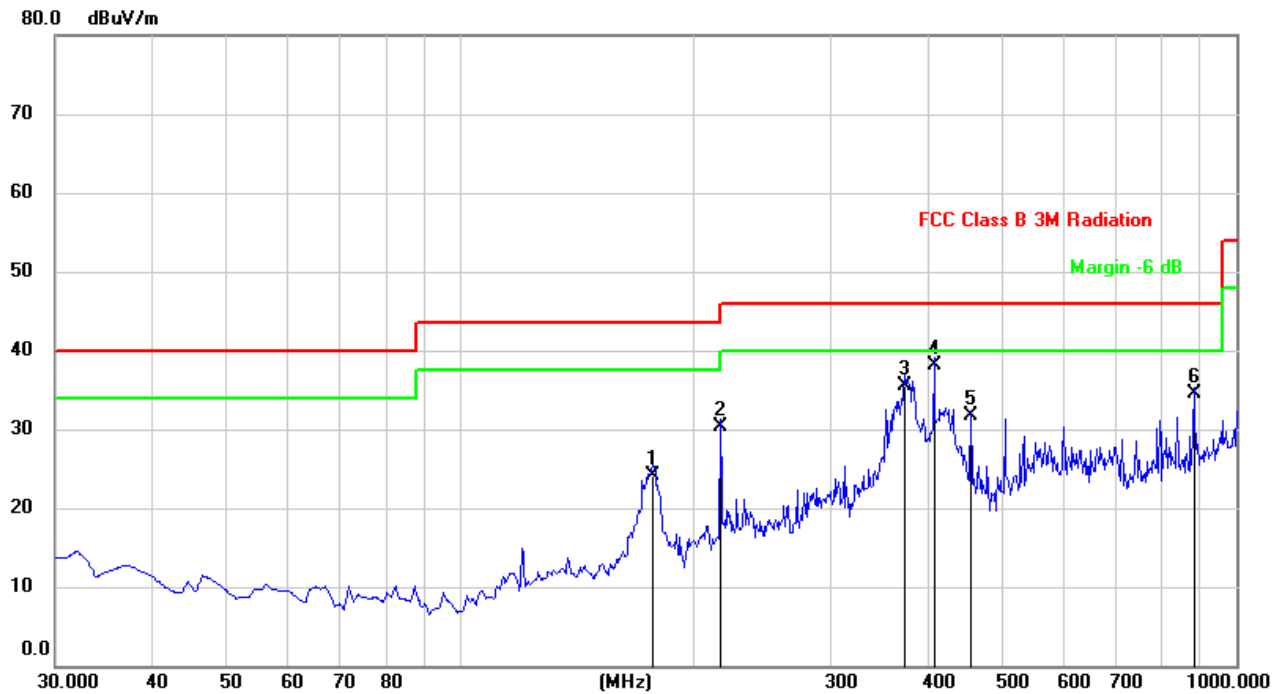
SPURIOUS EMISSIONS BELOW 1GHz (MIDDLE CHANNEL, HORIZONTAL)



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	94.0199	34.70	-18.46	16.24	43.50	-27.26	QP
2	176.4700	41.48	-12.93	28.55	43.50	-14.95	QP
3	216.2400	45.01	-12.91	32.10	46.00	-13.90	QP
4	376.2900	45.45	-10.29	35.16	46.00	-10.84	QP
5	408.3000	47.82	-9.96	37.86	46.00	-8.14	QP
6	600.3600	37.21	-5.88	31.33	46.00	-14.67	QP

Note: 1. Result Level = Read Level + Antenna Factor + Cable loss.
2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.
3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.

SPURIOUS EMISSIONS BELOW 1GHz (MIDDLE CHANNEL, VERTICAL)



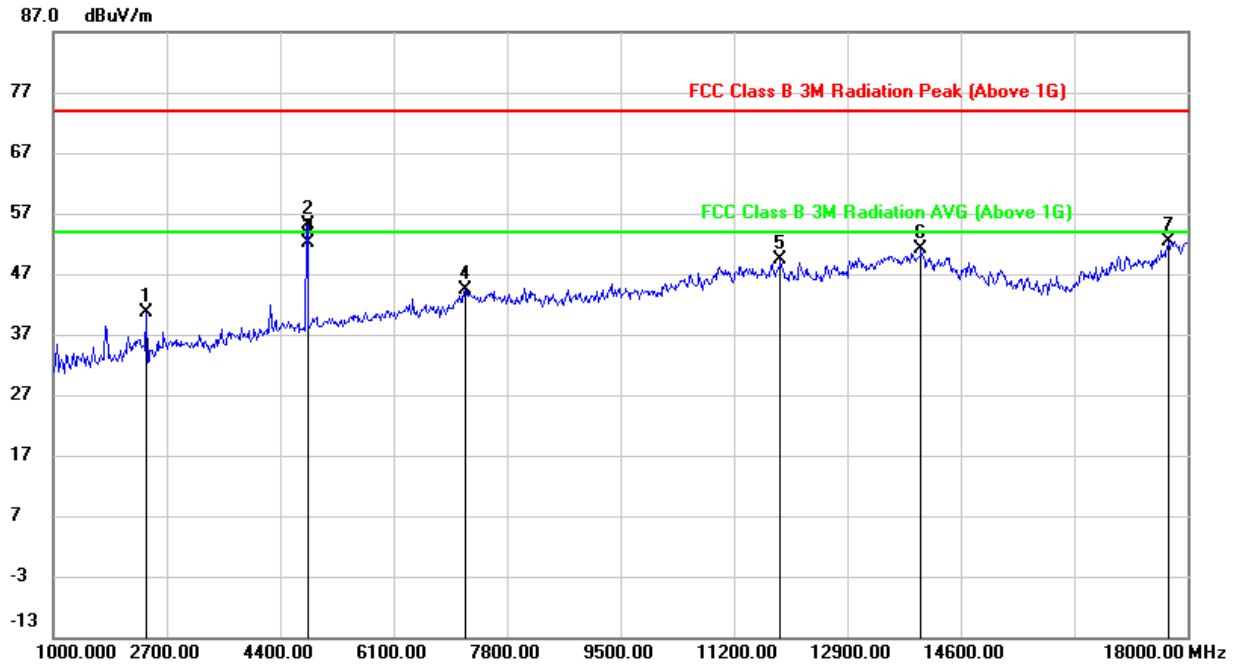
No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	177.4400	37.06	-12.94	24.12	43.50	-19.38	QP
2	216.2400	43.18	-12.91	30.27	46.00	-15.73	QP
3	373.3800	45.79	-10.36	35.43	46.00	-10.57	QP
4	408.3000	47.98	-9.96	38.02	46.00	-7.98	QP
5	455.8300	41.68	-9.94	31.74	46.00	-14.26	QP
6	882.6300	10.13	24.43	34.56	46.00	-11.44	QP

Note: 1. Result Level = Read Level + Antenna Factor + Cable loss.
2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.
3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto

Note 2: EUT in each of three orthogonal axis emissions had been tested, but only the worst case (X axis) data recorded in the report.

7.5. SPURIOUS EMISSIONS 1~18GHz

HARMONICS AND SPURIOUS EMISSIONS 1G~18GHz (LOW CHANNEL, HORIZONTAL)



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2394.000	49.58	-8.94	40.64	74.00	-33.36	peak
2	4804.084	56.86	-1.76	55.10	74.00	-18.90	peak
3	4804.084	53.97	-1.76	52.21	54.00	-1.79	AVG
4	7171.000	38.50	5.81	44.31	74.00	-29.69	peak
5	11897.000	33.73	15.53	49.26	74.00	-24.74	peak
6	14005.000	32.16	18.87	51.03	74.00	-22.97	peak
7	17711.000	27.31	25.03	52.34	74.00	-21.66	peak

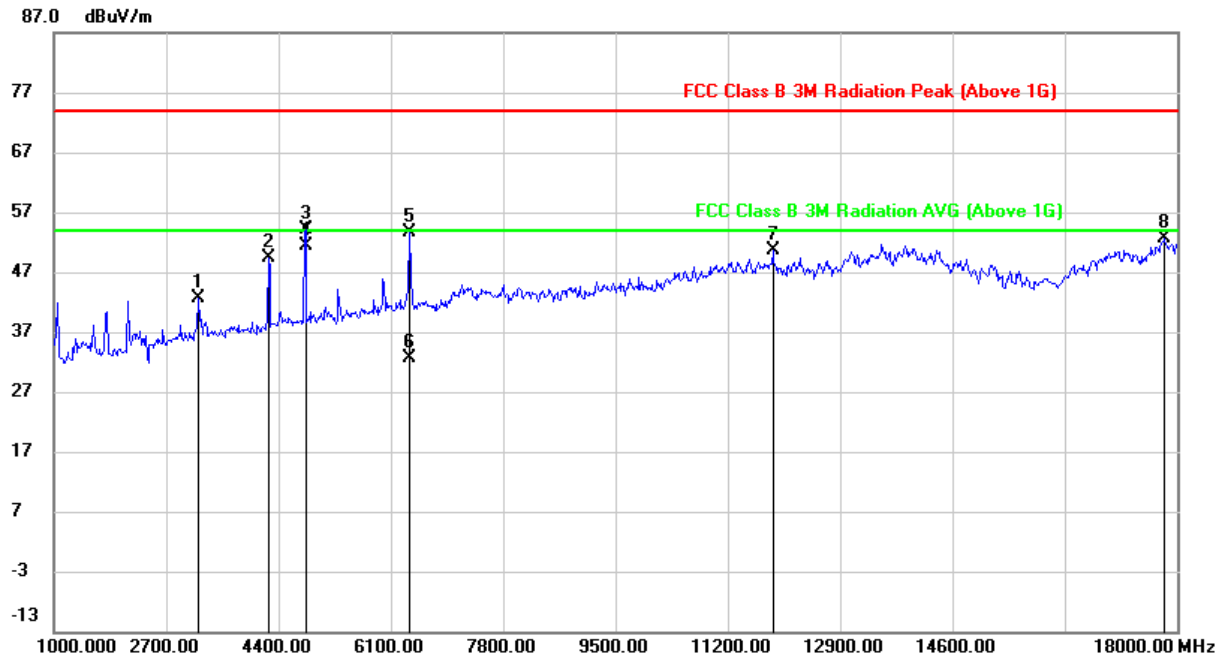
Note: 1. Result = Reading + Correct Factor.

2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.

4. Peak: Peak detector, AVG: VBW=10Hz

HARMONICS AND SPURIOUS EMISSIONS 1G~18GHz (LOW CHANNEL, VERTICAL)



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	3176.000	49.15	-6.42	42.73	74.00	-31.27	peak
2	4247.000	52.68	-3.26	49.42	74.00	-24.58	peak
3	4804.084	55.77	-1.67	54.10	74.00	-19.90	peak
4	4804.084	53.04	-1.67	51.37	54.00	-2.63	AVG
5	6389.000	50.48	3.11	53.59	74.00	-20.41	peak
6	6389.000	29.50	3.11	32.61	54.00	-21.39	AVG
7	11880.000	35.46	15.08	50.54	74.00	-23.46	peak
8	17813.000	26.56	26.11	52.67	74.00	-21.33	peak

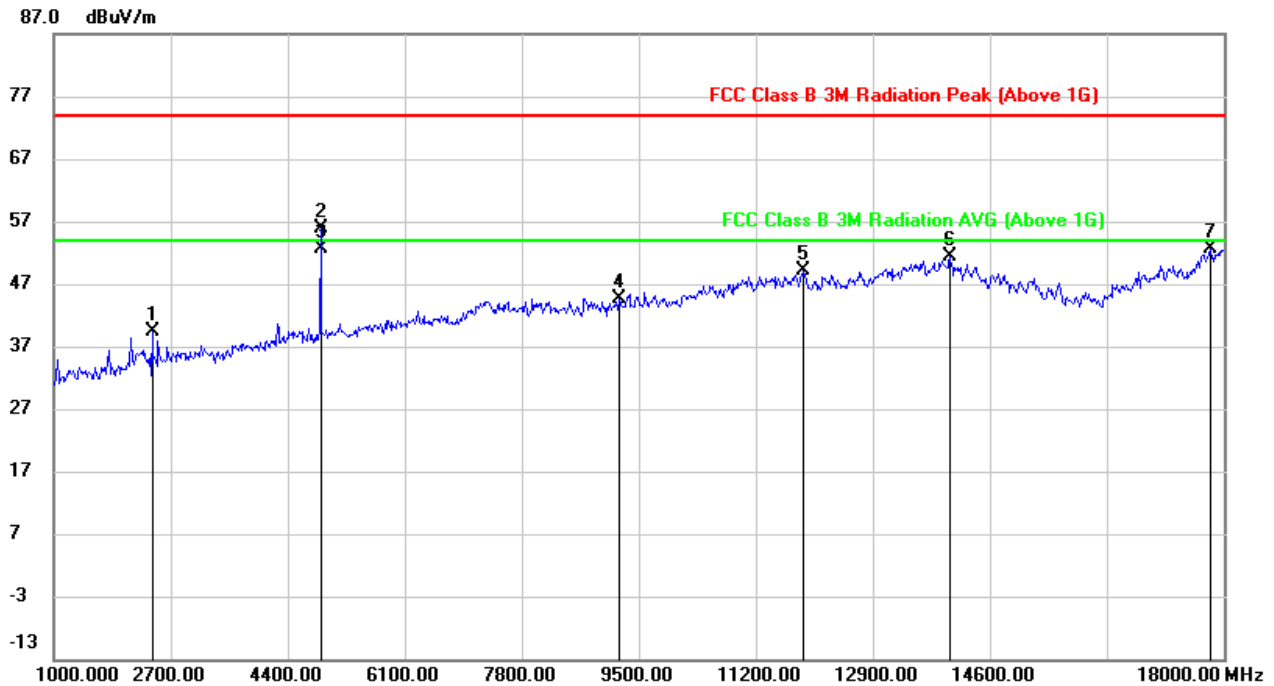
Note: 1. Result = Reading + Correct Factor.

2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.

4. Peak: Peak detector, AVG: VBW=10Hz

HARMONICS AND SPURIOUS EMISSIONS 1G~18GHz (MIDDLE CHANNEL, HORIZONTAL)



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2428.000	48.49	-9.11	39.38	74.00	-34.62	peak
2	4880.116	56.75	-0.89	55.86	74.00	-18.14	peak
3	4880.116	53.40	-0.89	52.51	54.00	-1.49	AVG
4	9211.000	36.34	8.39	44.73	74.00	-29.27	peak
5	11897.000	33.50	15.53	49.03	74.00	-24.97	peak
6	14022.000	32.40	18.87	51.27	74.00	-22.73	peak
7	17796.000	26.72	25.84	52.56	74.00	-21.44	peak

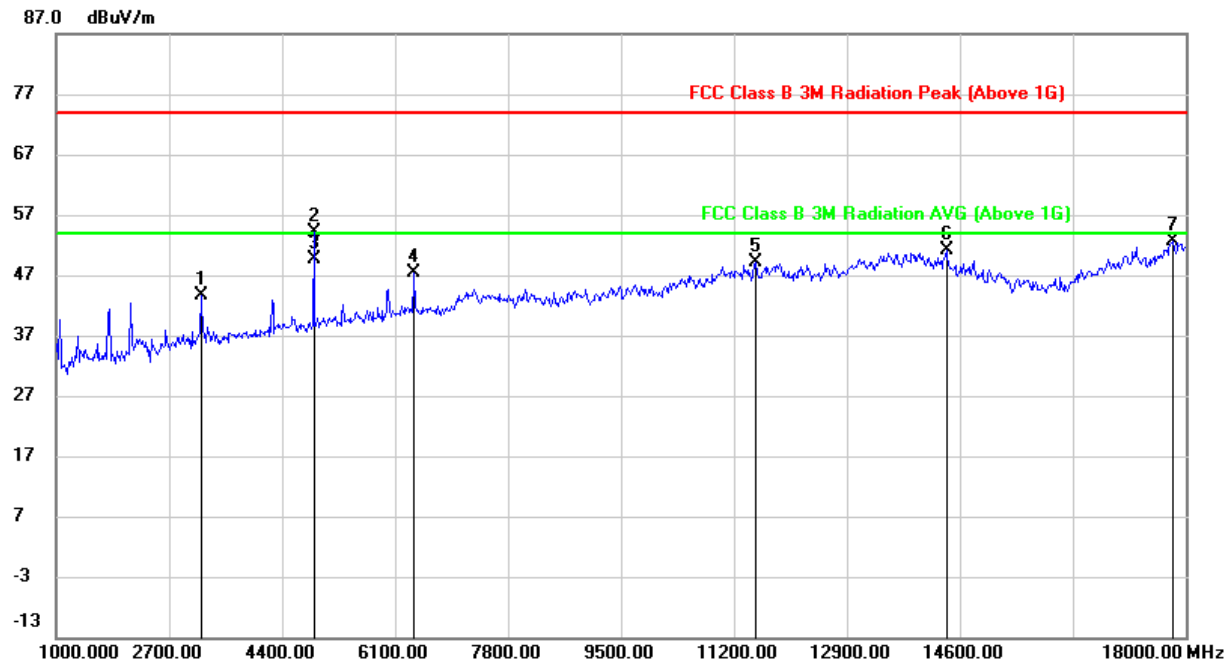
Note: 1. Result = Reading + Correct Factor.

2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.

4. Peak: Peak detector, AVG: VBW=10Hz

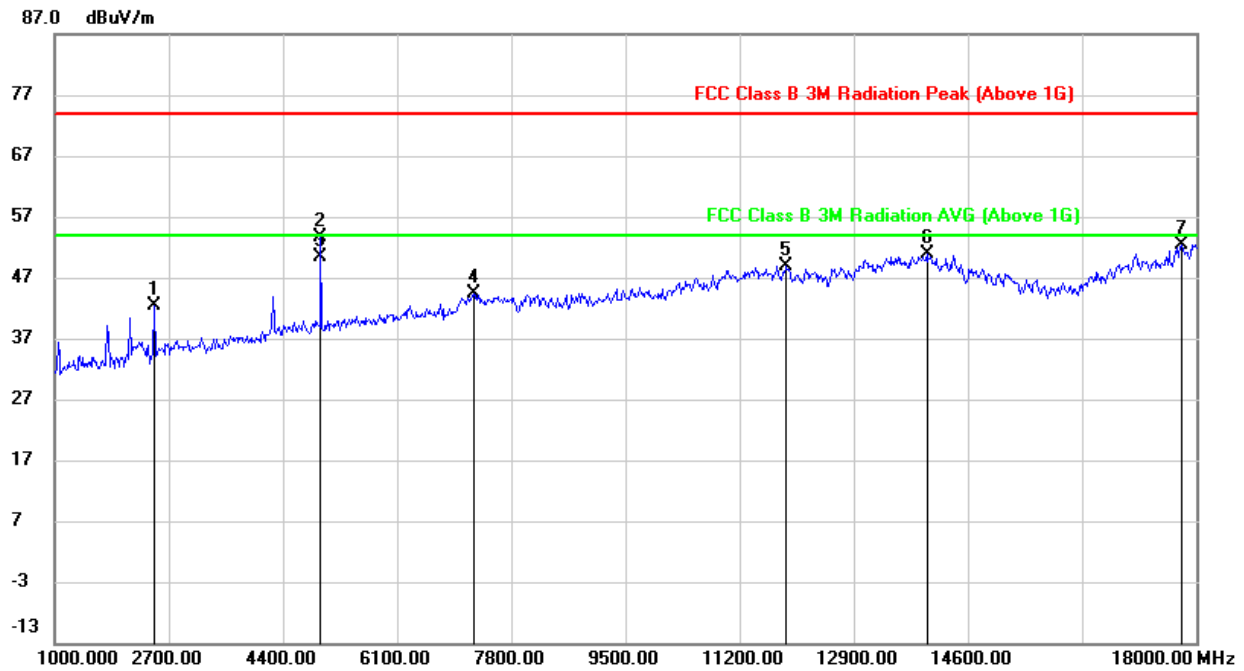
HARMONICS AND SPURIOUS EMISSIONS 1G~18GHZ (MIDDLE CHANNEL, VERTICAL)



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	3176.000	50.00	-6.42	43.58	74.00	-30.42	peak
2	4876.000	55.10	-0.98	54.12	74.00	-19.88	peak
3	4880.136	50.62	-0.95	49.67	54.00	-4.33	AVG
4	6389.000	44.19	3.11	47.30	74.00	-26.70	peak
5	11523.000	34.60	14.43	49.03	74.00	-24.97	peak
6	14396.000	32.60	18.60	51.20	74.00	-22.80	peak
7	17813.000	26.44	26.11	52.55	74.00	-21.45	peak

Note: 1. Result = Reading + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.
4. Peak: Peak detector, AVG: VBW=10Hz

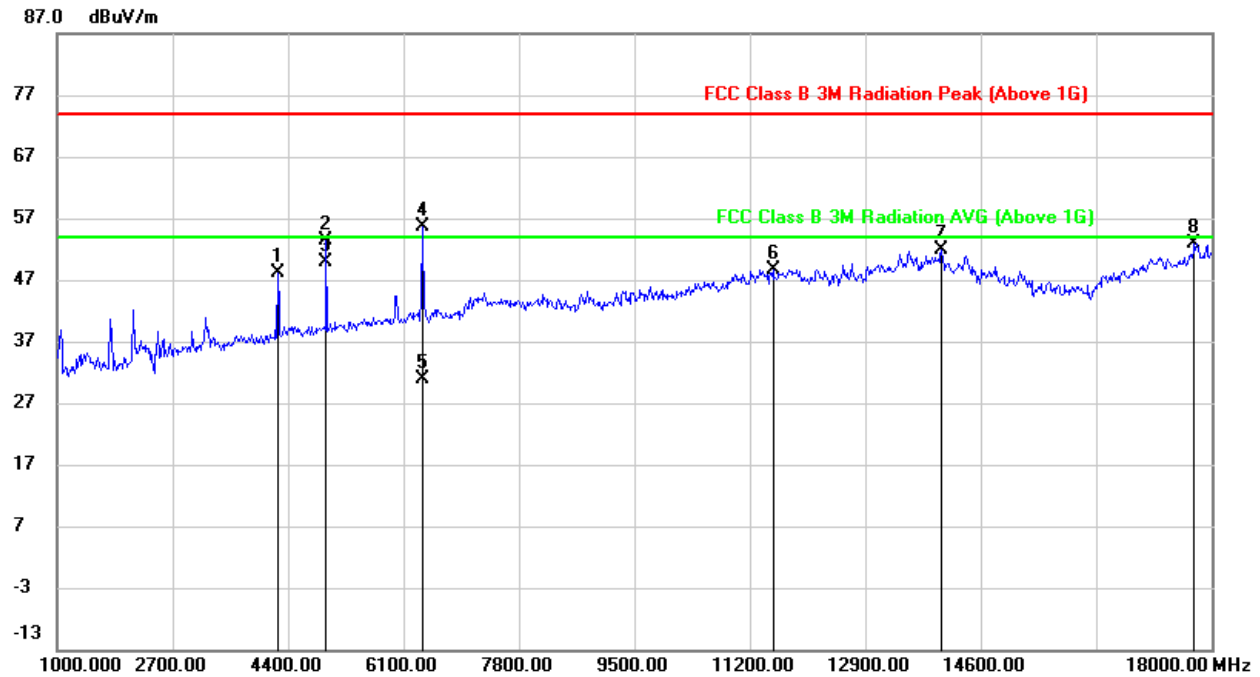
HARMONICS AND SPURIOUS EMISSIONS 1G~18GHz (HIGH CHANNEL, HORIZONTAL)



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2479.000	51.63	-9.21	42.42	74.00	-31.58	peak
2	4960.081	54.49	-0.79	53.70	74.00	-20.30	peak
3	4960.081	51.25	-0.79	50.46	54.00	-3.54	AVG
4	7239.000	38.45	5.91	44.36	74.00	-29.64	peak
5	11897.000	33.44	15.53	48.97	74.00	-25.03	peak
6	13988.000	31.94	18.89	50.83	74.00	-23.17	peak
7	17779.000	26.72	25.59	52.31	74.00	-21.69	peak

- Note: 1. Result = Reading + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.
4. Peak: Peak detector, AVG: VBW=10Hz

HARMONICS AND SPURIOUS EMISSIONS 1G~18GHz (HIGH CHANNEL, VERTICAL)



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4247.000	51.40	-3.26	48.14	74.00	-25.86	peak
2	4960.061	54.08	-0.77	53.31	74.00	-20.69	peak
3	4960.061	50.67	-0.77	49.90	54.00	-4.10	AVG
4	6372.000	52.65	3.07	55.72	74.00	-18.28	peak
5	6372.000	27.84	3.07	30.91	54.00	-23.09	AVG
6	11540.000	34.17	14.49	48.66	74.00	-25.34	peak
7	14022.000	32.90	18.88	51.78	74.00	-22.22	peak
8	17745.000	27.43	25.51	52.94	74.00	-21.06	peak

Note: 1. Result = Reading + Correct Factor.

2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

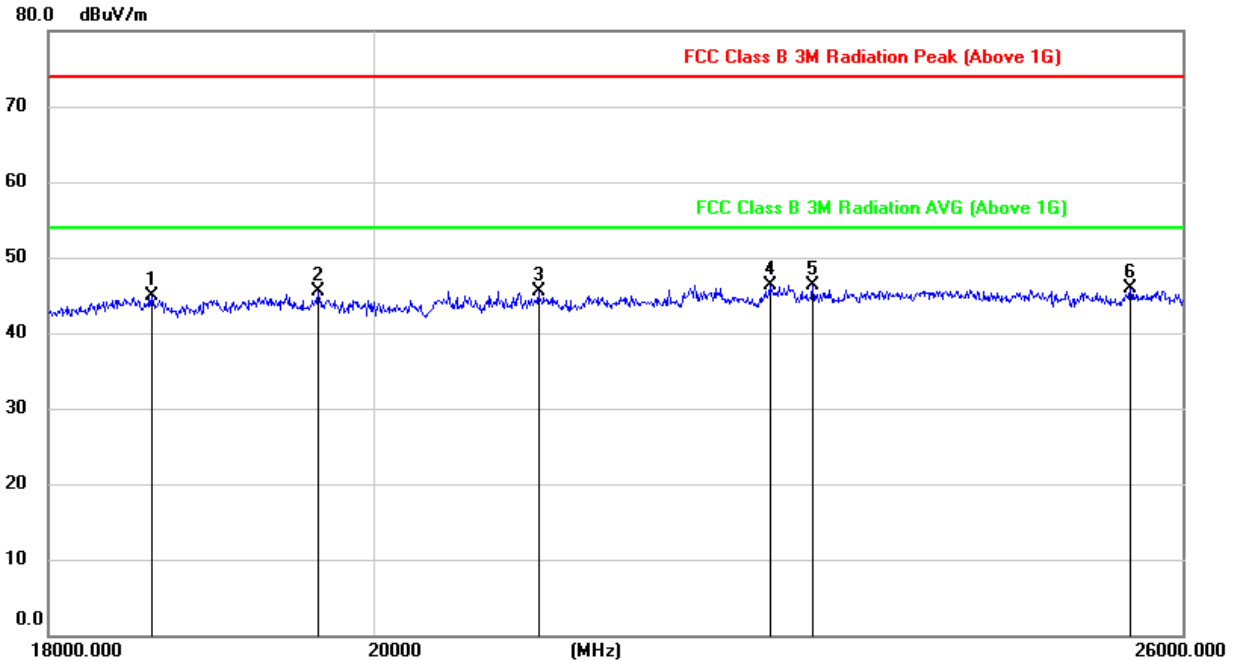
3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.

4. Peak: Peak detector, AVG: VBW=10Hz

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

7.1. SPURIOUS EMISSIONS 18G ~ 26GHz (WORST-CASE CONFIGURATION)

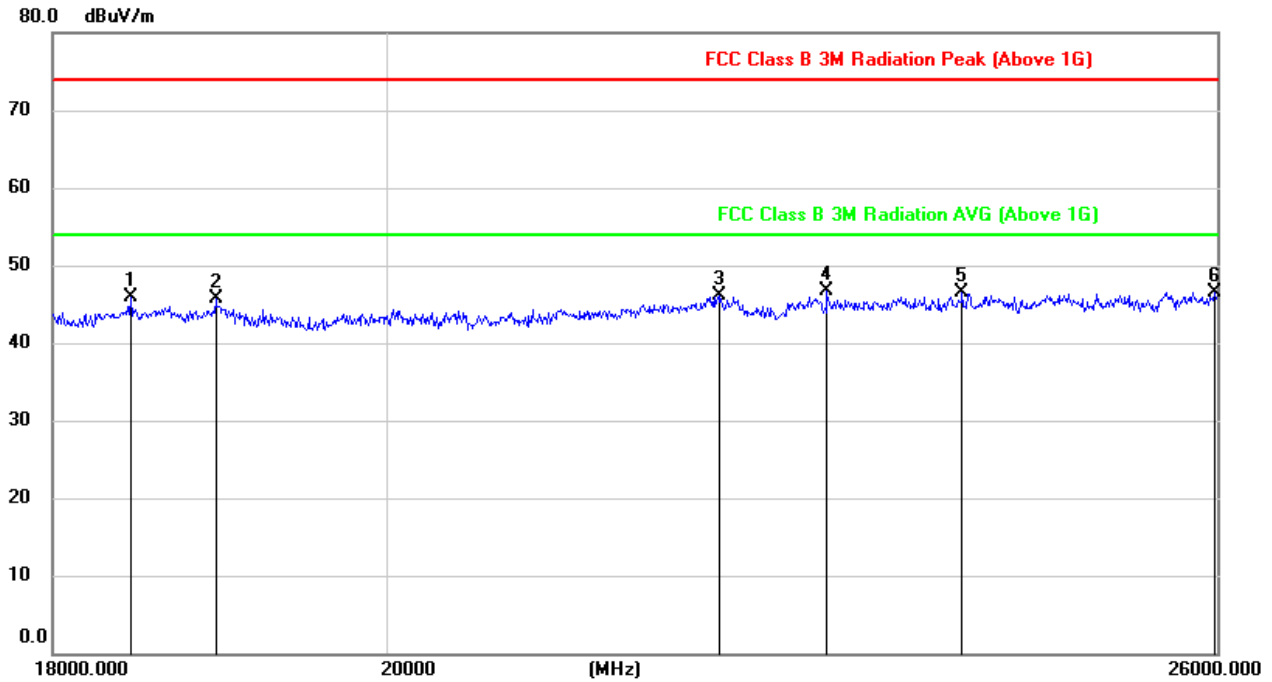
SPURIOUS EMISSIONS 18GHz TO 26GHz (MIDDLE CHANNEL, HORIZONTAL)



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	18612.524	50.24	-5.34	44.90	54.00	-9.10	peak
2	19646.324	50.86	-5.38	45.48	54.00	-8.52	peak
3	21099.068	50.32	-4.83	45.49	54.00	-8.51	peak
4	22742.711	49.96	-3.70	46.26	54.00	-7.74	peak
5	23062.738	49.70	-3.43	46.27	54.00	-7.73	peak
6	25563.900	47.30	-1.48	45.82	54.00	-8.18	peak

Note: 1. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor.
 2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
 3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.

SPURIOUS EMISSIONS 18GHz TO 26GHz (MIDDLE CHANNEL, VERTICAL)



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	18448.984	51.27	-5.32	45.95	54.00	-8.05	peak
2	18950.934	50.99	-5.26	45.73	54.00	-8.27	peak
3	22221.895	50.34	-4.26	46.08	54.00	-7.92	peak
4	22986.538	50.12	-3.45	46.67	54.00	-7.33	peak
5	23988.266	49.25	-2.77	46.48	54.00	-7.52	peak
6	25980.885	47.53	-1.02	46.51	54.00	-7.49	peak

Note: 1. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.

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

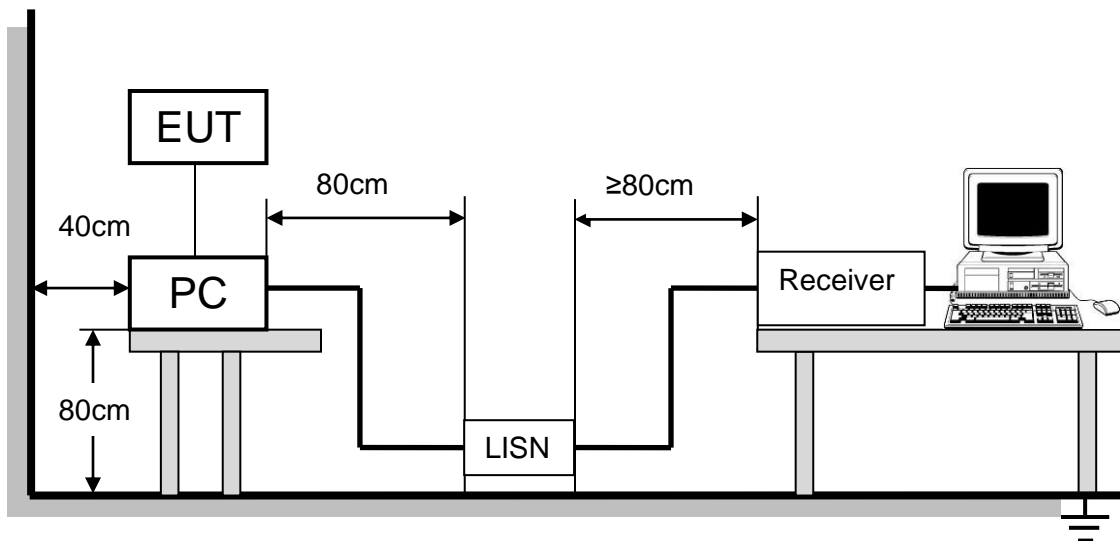
8. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

Please refer to FCC §15.207 (a)

FREQUENCY (MHz)	Class A (dBuV)		Class B (dBuV)	
	Quasi-peak	Average	Quasi-peak	Average
0.15 -0.5	79.00	66.00	66 - 56 *	56 - 46 *
0.50 -5.0	73.00	60.00	56.00	46.00
5.0 -30.0	73.00	60.00	60.00	50.00

TEST SETUP AND PROCEDURE



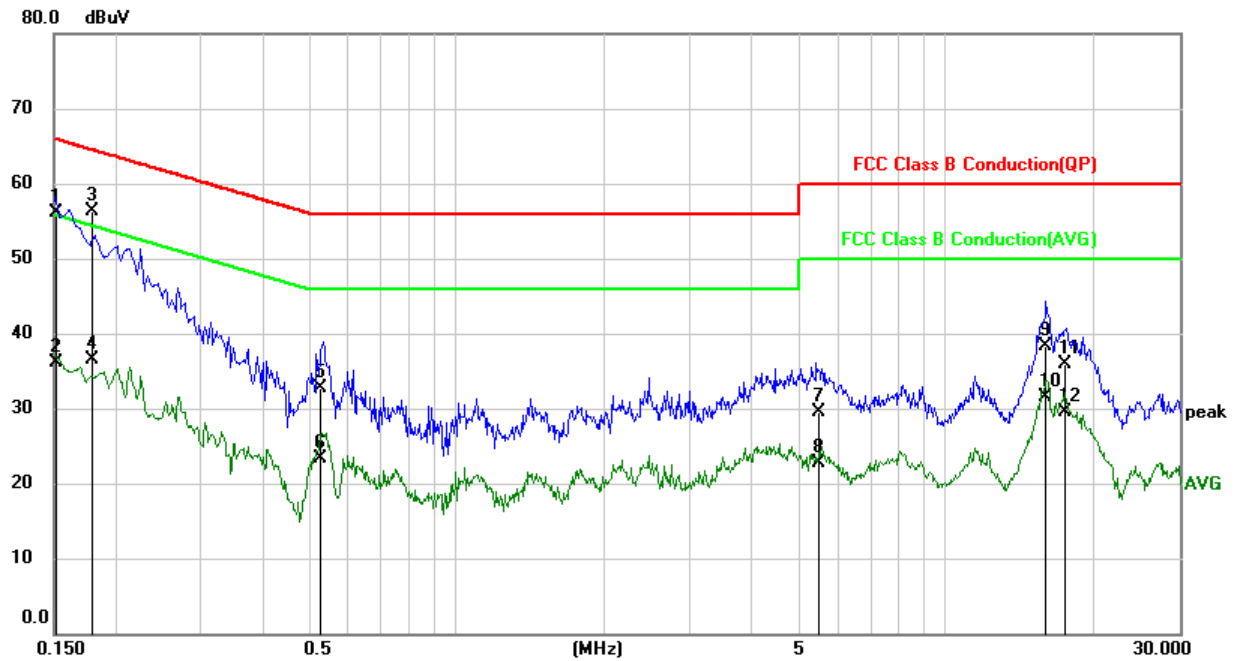
The EUT is put on a table of non-conducting material that is 80cm high. The vertical conducting wall of shielding is located 40cm to the rear of the EUT. The power line of the EUT is connected to the AC mains through a Artificial Mains Network (A.M.N.). A EMI Measurement Receiver (R&S Test Receiver ESR3) is used to test the emissions from both sides of AC line. According to the requirements in Section 6.2 of ANSI C63.10 -2013. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-Peak and average detector mode. The bandwidth of EMI test receiver is set at 9kHz.

The arrangement of the equipment is installed to meet the standards and operating in a manner, which tends to maximize its emission characteristics in a normal application.

TEST RESULTS

TEST RESULTS

LINE N RESULTS (MID CHANNEL, WORST-CASE CONFIGURATION)



No.	Frequency (MHz)	Reading (dBuV)	Correct dB	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.1522	46.52	9.66	56.18	65.88	-9.70	QP
2	0.1522	26.36	9.66	36.02	55.88	-19.86	AVG
3	0.1794	46.67	9.66	56.33	64.51	-8.18	QP
4	0.1794	26.85	9.66	36.51	54.51	-18.00	AVG
5	0.5234	23.06	9.65	32.71	56.00	-23.29	QP
6	0.5234	13.56	9.65	23.21	46.00	-22.79	AVG
7	5.4958	19.78	9.72	29.50	60.00	-30.50	QP
8	5.4958	12.94	9.72	22.66	50.00	-27.34	AVG
9	16.0666	28.42	9.82	38.24	60.00	-21.76	QP
10	16.0666	21.76	9.82	31.58	50.00	-18.42	AVG
11	17.5143	26.01	9.84	35.85	60.00	-24.15	QP
12	17.5143	19.64	9.84	29.48	50.00	-20.52	AVG

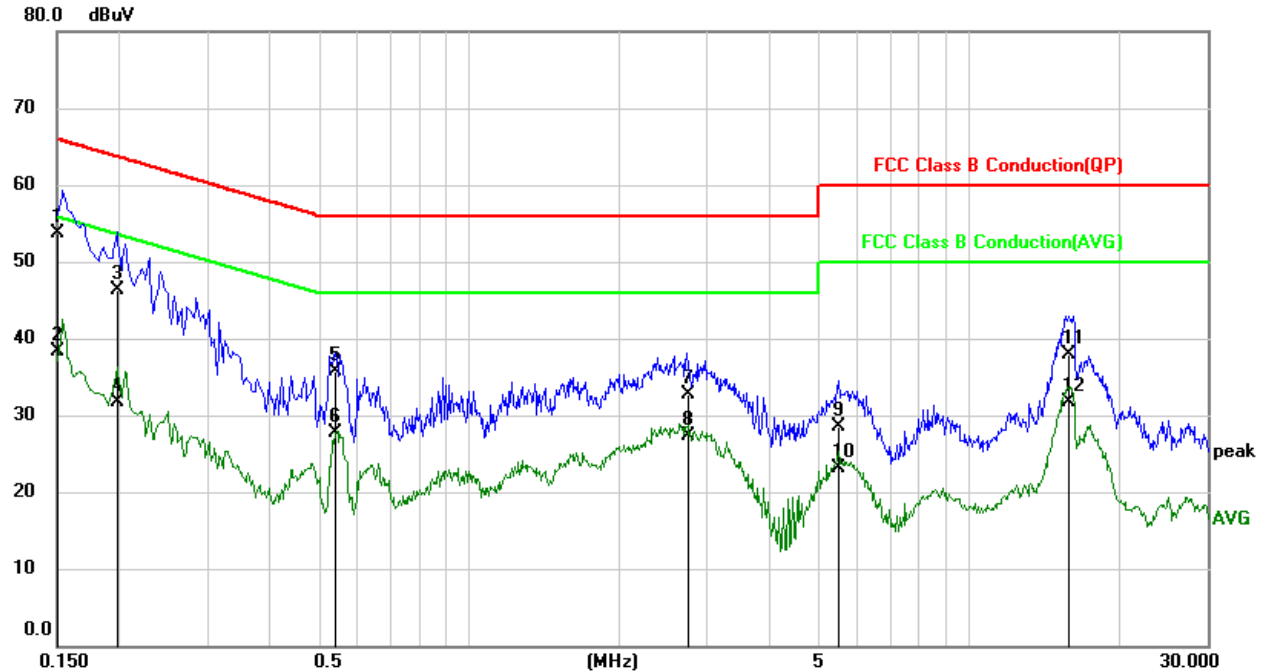
Note: 1. Result = Reading +Correct Factor.

2. If QP Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Test setup: RBW: 200 Hz (9 kHz—150 kHz), 9 kHz (150 kHz—30 MHz).

4. Step size: 80Hz (0.009MHz-0.15MHz), 4 kHz (0.15MHz-30MHz), Scan time: auto.

LINE L RESULTS (MID CHANNEL, WORST-CASE CONFIGURATION)



No.	Frequency (MHz)	Reading (dBuV)	Correct dB	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.1500	44.01	9.65	53.66	66.00	-12.34	QP
2	0.1500	28.57	9.65	38.22	56.00	-17.78	AVG
3	0.1980	36.75	9.64	46.39	63.69	-17.30	QP
4	0.1980	22.10	9.64	31.74	53.69	-21.95	AVG
5	0.5435	26.09	9.65	35.74	56.00	-20.26	QP
6	0.5435	18.05	9.65	27.70	46.00	-18.30	AVG
7	2.7482	23.01	9.69	32.70	56.00	-23.30	QP
8	2.7482	17.65	9.69	27.34	46.00	-18.66	AVG
9	5.4956	18.84	9.73	28.57	60.00	-31.43	QP
10	5.4956	13.31	9.73	23.04	50.00	-26.96	AVG
11	15.8710	28.11	9.85	37.96	60.00	-22.04	QP
12	15.8710	21.83	9.85	31.68	50.00	-18.32	AVG

Note: 1. Result = Reading +Correct Factor.
2. If QP Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Test setup: RBW: 200 Hz (9 kHz—150 kHz), 9 kHz (150 kHz—30 MHz).
4. Step size: 80Hz (0.009MHz-0.15MHz), 4 kHz (0.15MHz-30MHz), Scan time: auto.

9. ANTENNA REQUIREMENTS

APPLICABLE REQUIREMENTS

Please refer to FCC §15.203

If directional gain of transmitting antennas is greater than 6dBi, the power shall be reduced by the same level in dB comparing to gain minus 6dBi. For the fixed point-to-point operation, the power shall be reduced by one dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi. 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 FCC rule.

ANTENNA CONNECTOR

EUT has an Integrated antenna without antenna connector.

ANTENNA GAIN

The antenna gain of EUT is less than 6 dBi.

END OF REPORT