FCC 47 CFR PART 15 SUBPART C

CERTIFICATION TEST REPORT

For

remote-control for Terra-sect

MODEL NUMBER: US858320

FCC ID: 2AIRP8580023

REPORT NUMBER: 4788395811-1

ISSUE DATE: April 11, 2018

Prepared for

ALPHA GROUP CO.,LTD
AULDEY INDUSTRIAL AREA, WENGUAN RD., CHENGHAI, SHANTOU, GUANGDONG, CHINA

Prepared by

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Revision History

Rev.	Issue Date	Revisions	Revised By
--	04/11/2018	Initial Issue	

Summary of Test Results			
Clause	Test Items	FCC 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	N/A
4	Antenna Requirement	FCC 15.203	Pass

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1. ATTESTATION OF TEST RESULTS

Applicant Information

Company Name: ALPHA GROUP CO.,LTD

Address: AULDEY INDUSTRIAL AREA, WENGUAN RD., CHENGHAI, SHANTOU, GUANGDONG, CHINA

Manufacturer Information

Company Name: ALPHA GROUP CO.,LTD

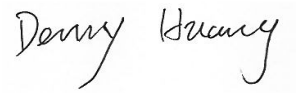
Address: AULDEY INDUSTRIAL AREA, WENGUAN RD., CHENGHAI, SHANTOU, GUANGDONG, CHINA

EUT Description

Product Name	remote-control for Terra-sect
Brand Name	N/A
Model Name	US858320
Serial Number	/
Date of Receipt	March 19, 2018
Sample ID	1495538
Date Tested	March 20, 2018 ~ April 04, 2018

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

Accreditation Certificate	**A2LA (Certificate No.: 4102.01)** UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. has been assessed and proved to be in compliance with A2LA. **IAS (Lab Code: TL-702)** UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. has demonstrated compliance with ISO/IEC Standard 17025:2005, General requirements for the competence of testing and calibration laboratories **FCC (FCC Designation No.: CN1187)** UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. Has been recognized to perform compliance testing on equipment subject to the Commission's Delcaration of Conformity (DoC) and Certification rules **IC(Company No.: 21320)** UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. has been registered and fully described in a report filed with ISED. The Company Number is 21320. **VCCI (Registration No.: G-20019, R-20004, C-20012 and T-20011)** UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. has been assessed and proved to be in compliance with VCCI, the Membership No. is 3793. Facility Name: Chamber D, the VCCI registration No. is G-20019 and R-20004 Shielding Room B , the VCCI registration No. is C-20012 and T-20011

Note 1: All tests measurement facilities use to collect the measurement data are located at Building 10, Innovation Technology Park, Song Shan Lake Hi tech Development Zone, Dongguan, 523808, China

Note 2: 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 and the test anechoic chamber is shown to be equivalent to or worst case from the open field site.

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	remote-control for Terra-sect	
Model Name	US858320	
Product Description	Operation Frequency	2405 MHz ~ 2475 MHz
	Modulation Type	
	GFSK	
Power Supply	3x1.5V AAA size battery	

5.2. MAXIMUM OUTPUT POWER

Frequency Range (MHz)	Number of Transmit Chains (NTX)	Frequency (MHz)	Channel Number	Max Power (dBµV/m)
2405-2475	1	2405-2475	0-70[71]	91.02

5.3. CHANNEL LIST

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
00	2405	20	2425	40	2445	60	2465
01	2406	21	2426	41	2446	61	2466
02	2407	22	2427	42	2447	62	2467
03	2408	23	2428	43	2448	63	2468
04	2409	24	2429	44	2449	64	2469
05	2410	25	2430	45	2450	65	2470
06	2411	26	2431	46	2451	66	2471
07	2412	27	2432	47	2452	67	2472
08	2413	28	2433	48	2453	68	2473
09	2414	29	2434	49	2454	69	2474
10	2415	30	2435	50	2455	70	2475
11	2416	31	2436	51	2456		
12	2417	32	2437	52	2457		
13	2418	33	2438	53	2458		
14	2419	34	2439	54	2459		
15	2420	35	2440	55	2460		
16	2421	36	2441	56	2461		
17	2422	37	2442	57	2462		
18	2423	38	2443	58	2463		
19	2424	39	2444	59	2464		

5.4. DESCRIPTION OF AVAILABLE ANTENNAS

Ant.	Frequency (MHz)	Antenna Type	Antenna Gain (dBi)
1	2405-2475	PCB Antenna	3.0

Test Mode	Transmit and Receive Mode	Description
GFSK	☒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 40, CH 70	2405MHz, 2445MHz, 2475MHz

5.6. THE WORSE CASE POWER SETTING PARAMETER

The Worse Case Power Setting Parameter under 2402 ~ 2483.5MHz Band				
Test Software		N/A		
Modulation Type	Transmit Antenna Number	Test Channel		
		CH 00	CH 40	CH 70
GFSK	1	Default	Default	Default

5.7. TEST ENVIRONMENT

Environment Parameter	Selected Values During Tests	
Relative Humidity	55 ~ 65%	
Atmospheric Pressure:	1025Pa	
Temperature	TN	22 ~ 28°C
Voltage :	VL	N/A
	VN	DC 4.5
	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	FCC ID
1	N/A	N/A	N/A	N/A

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 have the engineer mode inside.

SETUP DIAGRAM FOR TEST

EUT

Note: New battery was used during all tests.

5.9. MEASURING INSTRUMENT AND SOFTWARE USED

Conducted Emissions						
Instrument						
Used	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
☑	EMI Test Receiver	R&S	ESR3	101961	Dec.12,2017	Dec.11,2018
☑	Two-Line V-Network	R&S	ENV216	101983	Dec.12,2017	Dec.11,2018
☑	Artificial Mains Networks	Schwarzbeck	NSLK 8126	8126465	Dec.12,2017	Dec.11,2018
Software						
Used	Description		Manufacturer	Name	Version	
☑	Test Software for Conducted disturbance		Farad	EZ-EMC	Ver. UL-3A1	
Radiated Emissions						
Instrument						
Used	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
☑	MXE EMI Receiver	KESIGHT	N9038A	MY56400036	Dec.12,2017	Dec.11,2018
☑	Hybrid Log Periodic Antenna	TDK	HLP-3003C	130960	Jan.09, 2016	Jan.09, 2019
☑	Preamplifier	HP	8447D	2944A09099	Dec.12,2017	Dec.11,2018
☑	EMI Measurement Receiver	R&S	ESR26	101377	Dec.12,2017	Dec.11,2018
☑	Horn Antenna	TDK	HRN-0118	130939	Jan. 09, 2016	Jan. 09, 2019
☑	High Gain Horn Antenna	Schwarzbeck	BBHA-9170	691	Jan.06, 2016	Jan.06, 2019
☑	Preamplifier	TDK	PA-02-0118	TRS-305-00066	Dec.12,2017	Dec.11,2018
☑	Preamplifier	TDK	PA-02-2	TRS-307-00003	Dec.12,2017	Dec.11,2018
☑	Loop antenna	Schwarzbeck	1519B	00008	Mar. 26, 2016	Mar. 25, 2019
☑	Band Reject Filter	Wainwright	WRCJV8-2350-2400-2483.5-2533.5-40SS	4	Dec. 20, 2017	Dec. 20, 2018
Software						
Used	Description		Manufacturer	Name	Version	
☑	Test Software for Radiated disturbance		Farad	EZ-EMC	Ver. UL-3A1	

Other instruments						
Used	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
☑	Spectrum Analyzer	Keysight	N9030A	MY55410512	Dec.12,2017	Dec.11,2018
☑	Power Meter	Keysight	N1911A	MY55416024	Dec.12,2017	Dec.11,2018
☑	Power Sensor	Keysight	N1921A	MY51100041	Dec.12,2017	Dec.11,2018

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6. ANTENNA PORT TEST RESULTS

6.1. ON TIME AND DUTY CYCLE

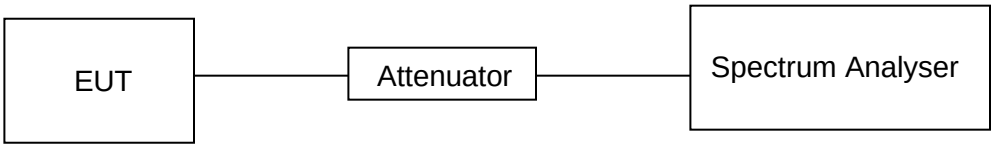
LIMITS

None; for reporting purposes only

PROCEDURE

KDB 558074 Zero-Span Spectrum Analyzer Method

TEST SETUP

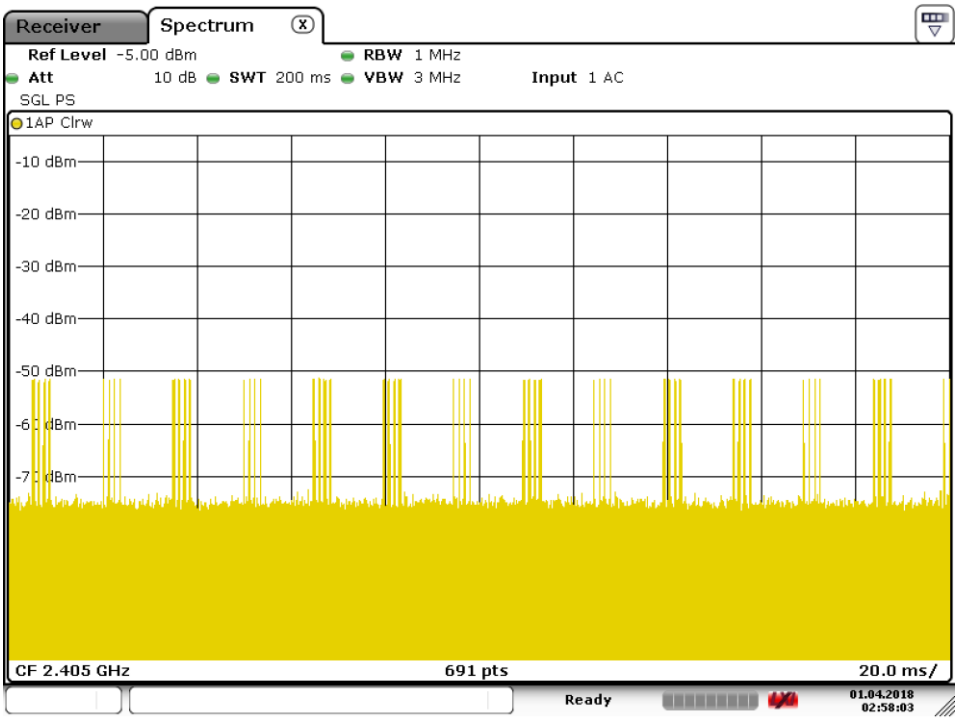


RESULTS

Mode	On Time (msec)	Period (msec)	Duty Cycle x (Linear)	Duty Cycle (%)	Duty Cycle Correction Factor (db)	1/T Minimum VBW (KHz)
GFSK	0.725	14.855	0.05	5%	13.01	2

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-1



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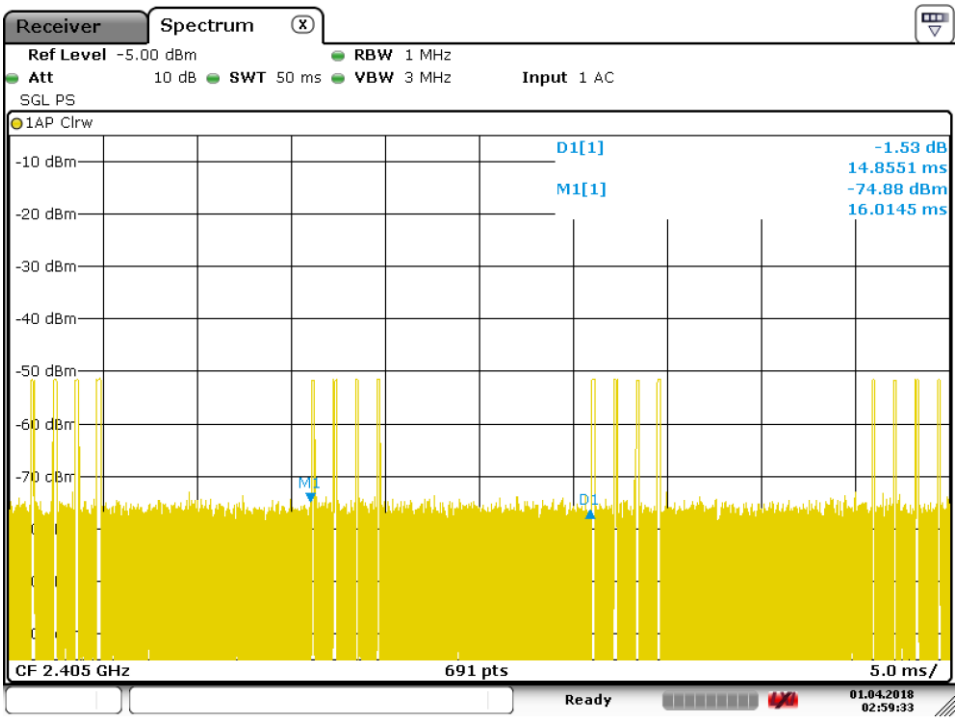
ON TIME AND DUTY CYCLE MID CH PLOT-2



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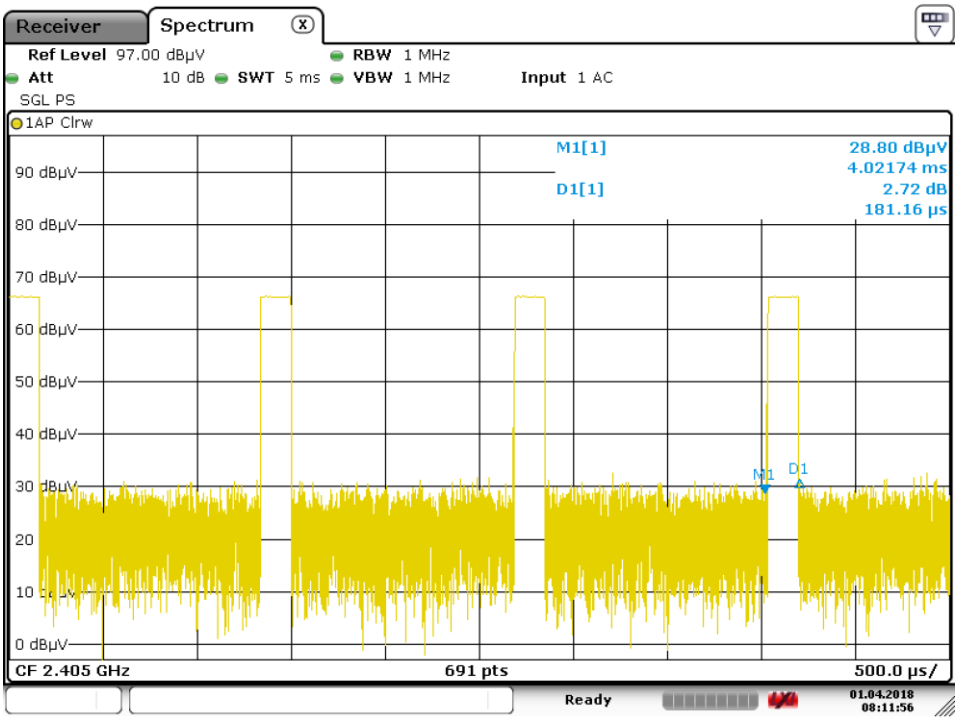
ON TIME AND DUTY CYCLE MID CH PLOT-3



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6.2. 20 dB BANDWIDTH AND 99% 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

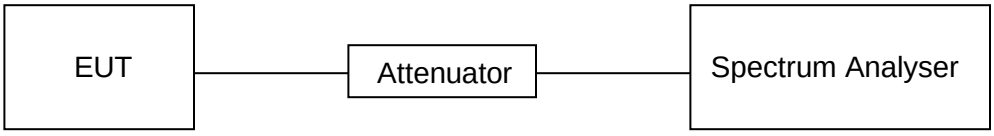
TEST PROCEDURE

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

Center Frequency	The center 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.

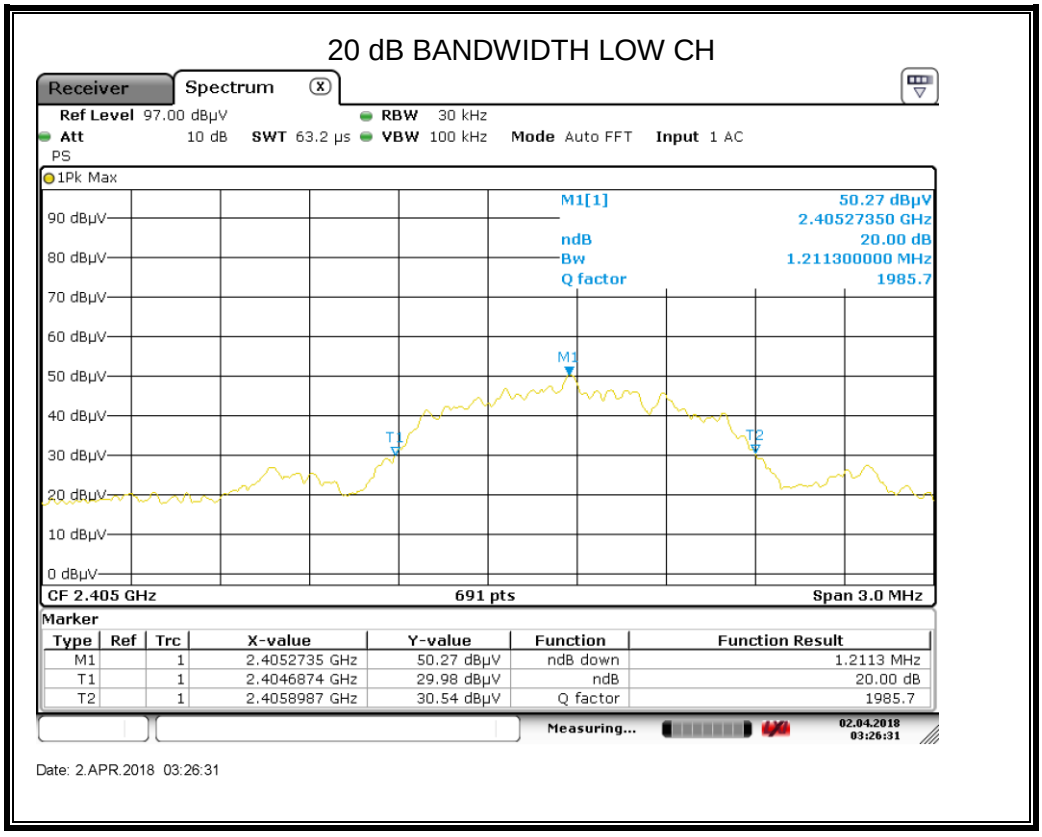
TEST SETUP



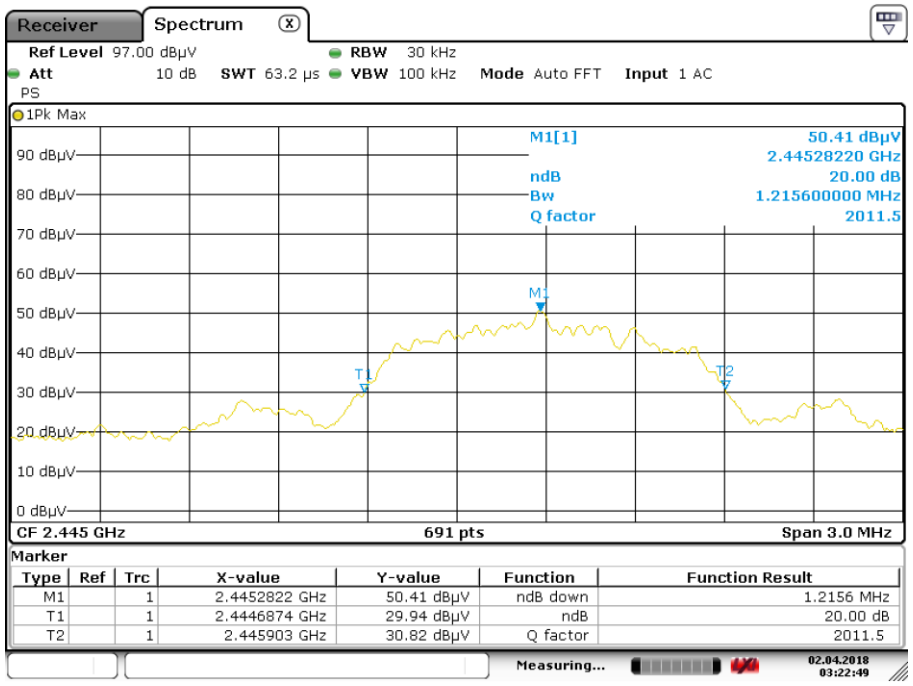
RESULTS

Channel	Frequency (MHz)	20dB bandwidth (MHz)	99% bandwidth (MHz)	Result
Low	2405	1.211	1.263	PASS
Middle	2445	1.216	1.485	PASS
High	2475	1.216	1.381	PASS

20 dB BANDWIDTH LOW CH



20 dB BANDWIDTH MID CH



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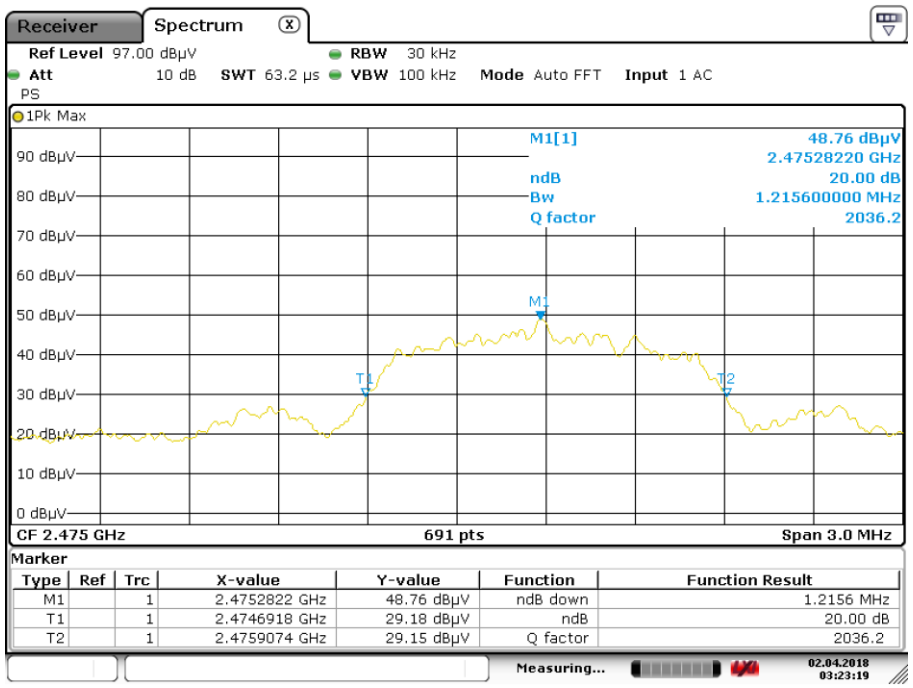
20 dB BANDWIDTH HIGH CH



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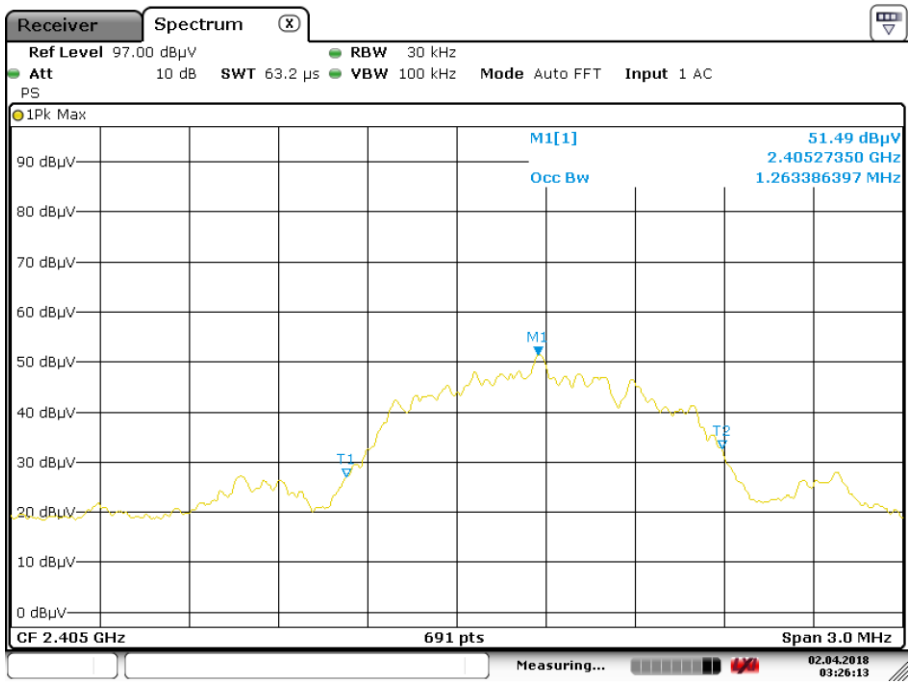
99% BANDWIDTH LOW CH



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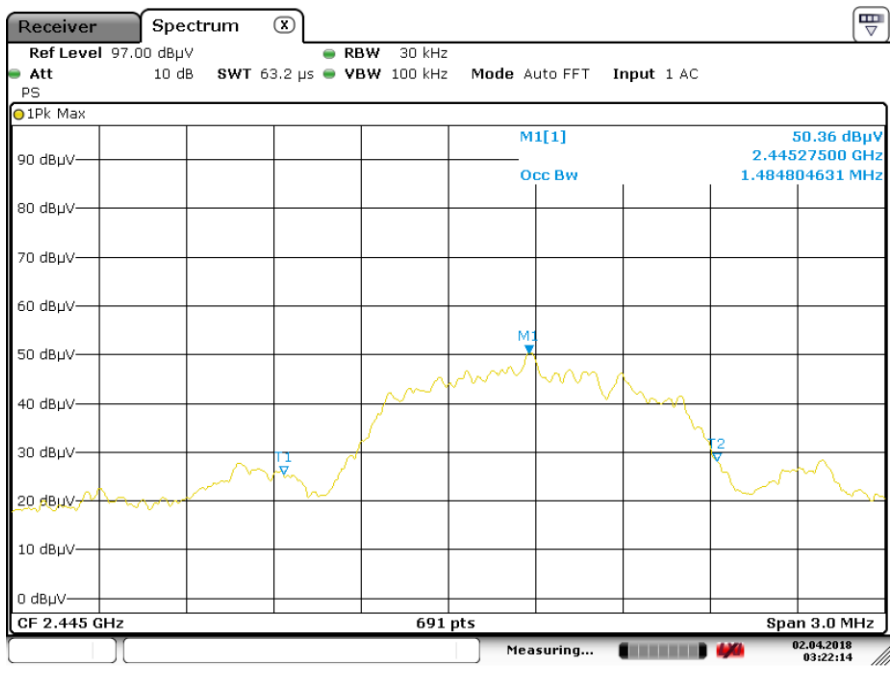
99% BANDWIDTH MID CH



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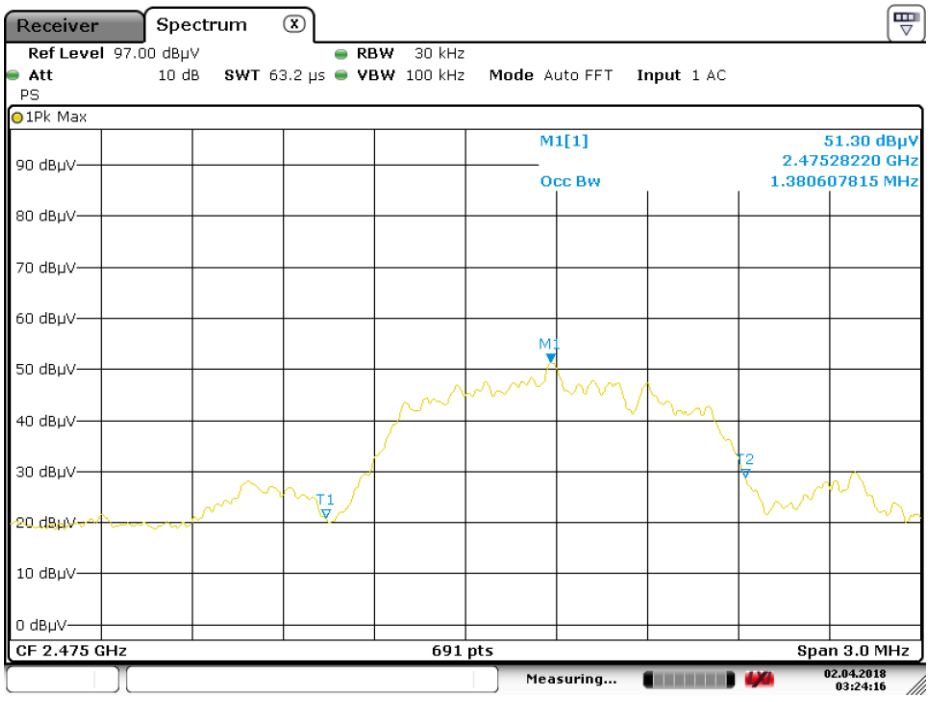
99% BANDWIDTH HIGH CH



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) 30 - 88	Field Strength Limit (uV/m) at 3 m 100	Field Strength Limit (dBuV/m) at 3 m	
		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

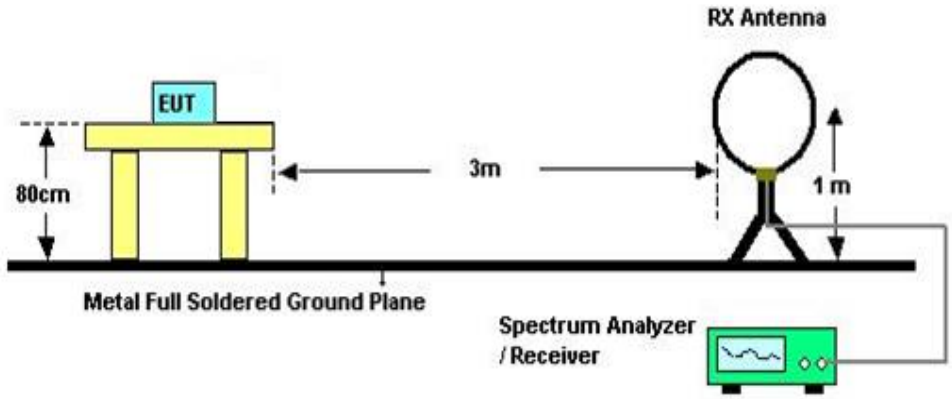
Restricted bands of operation

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: [1]Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.
[2]Above 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.

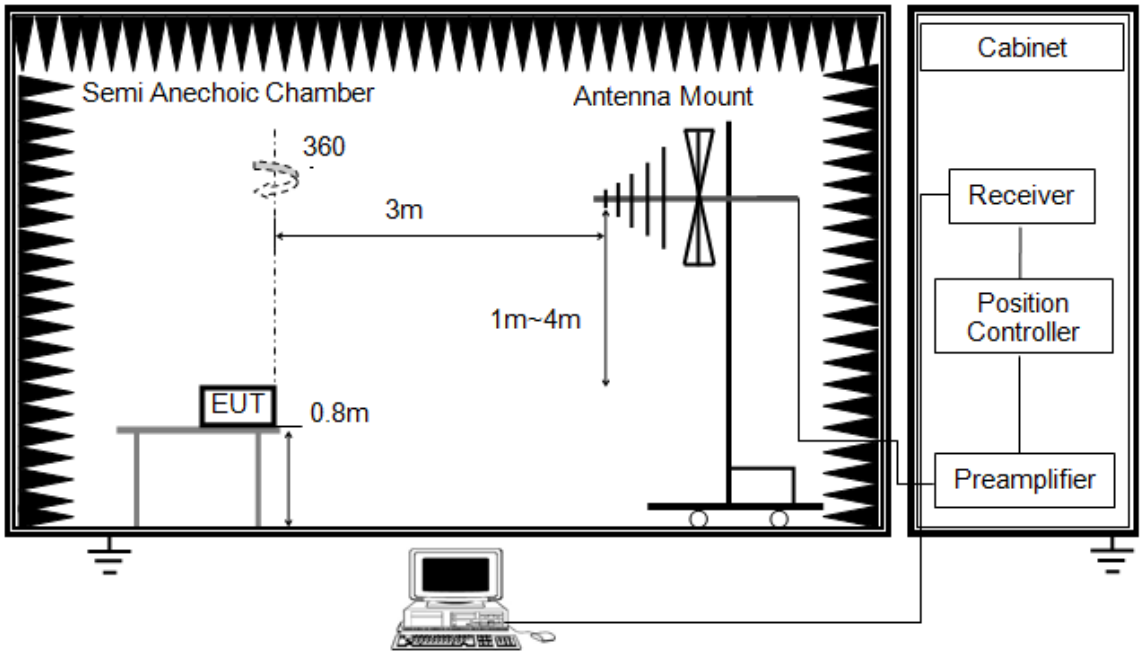
3. The EUT was placed on a turntable with 0.8 meter above ground.

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.

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.

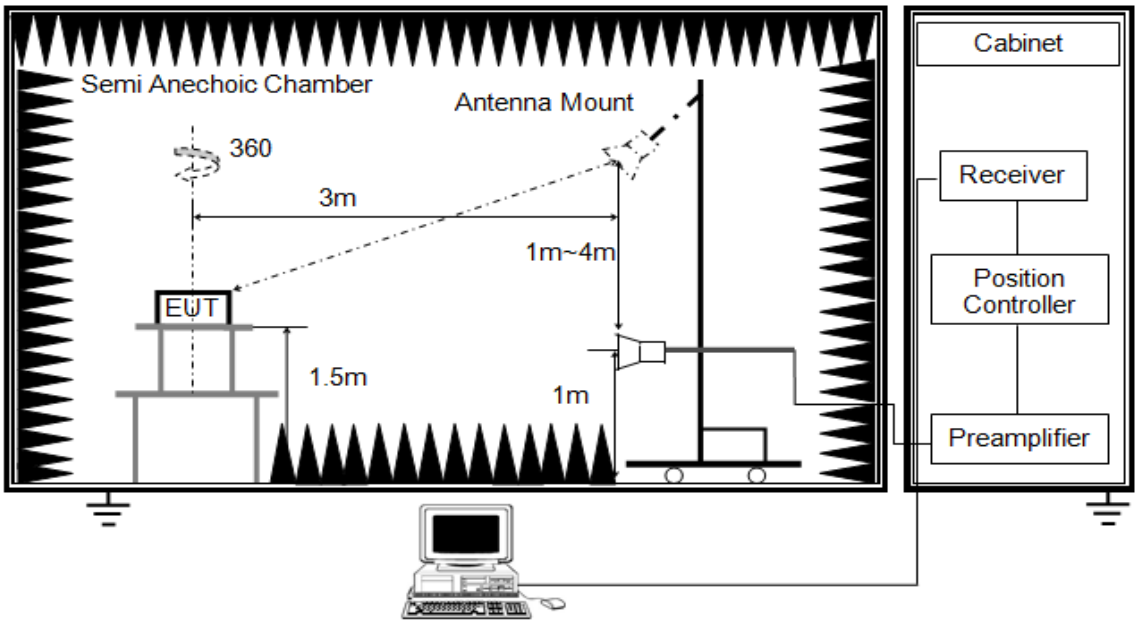
3. The EUT was placed on a turntable with 0.8 meter above ground.

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.

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.

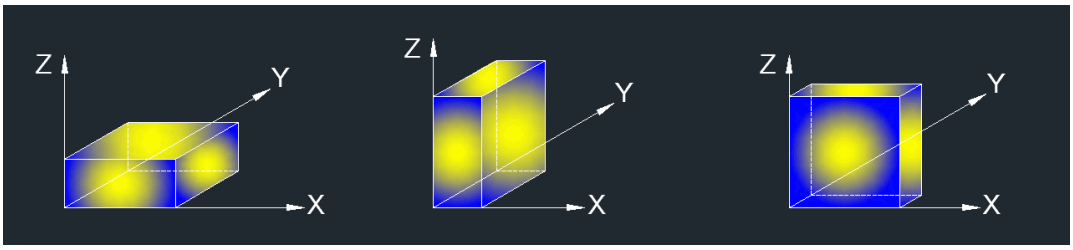
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.

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 measurements above 1 GHz the resolution bandwidth is set to 1 MHz, the video bandwidth is set to 3 MHz for peak measurements and 1 MHz resolution bandwidth with 1/T video bandwidth with peak detector for average measurements.

7. For SPURIOUS EMISSIONS 1~18GHz, a notch filter will be used for the fundamental.

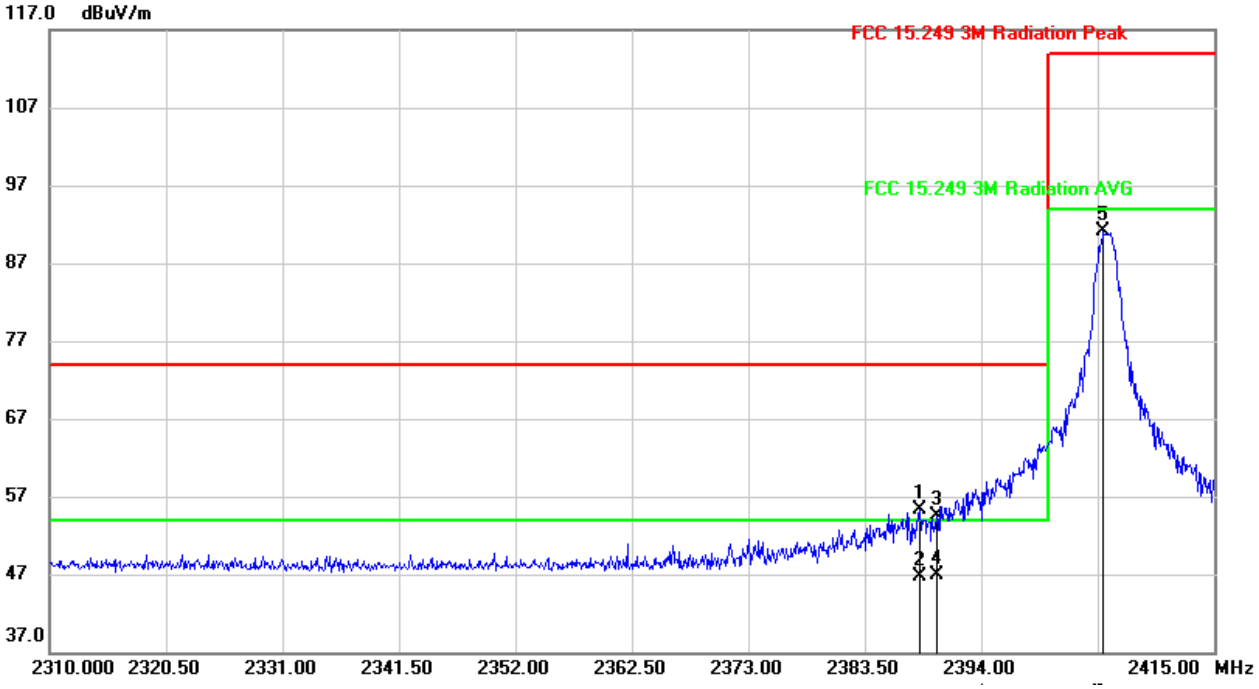
X axis, Y axis, Z axis positions:



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

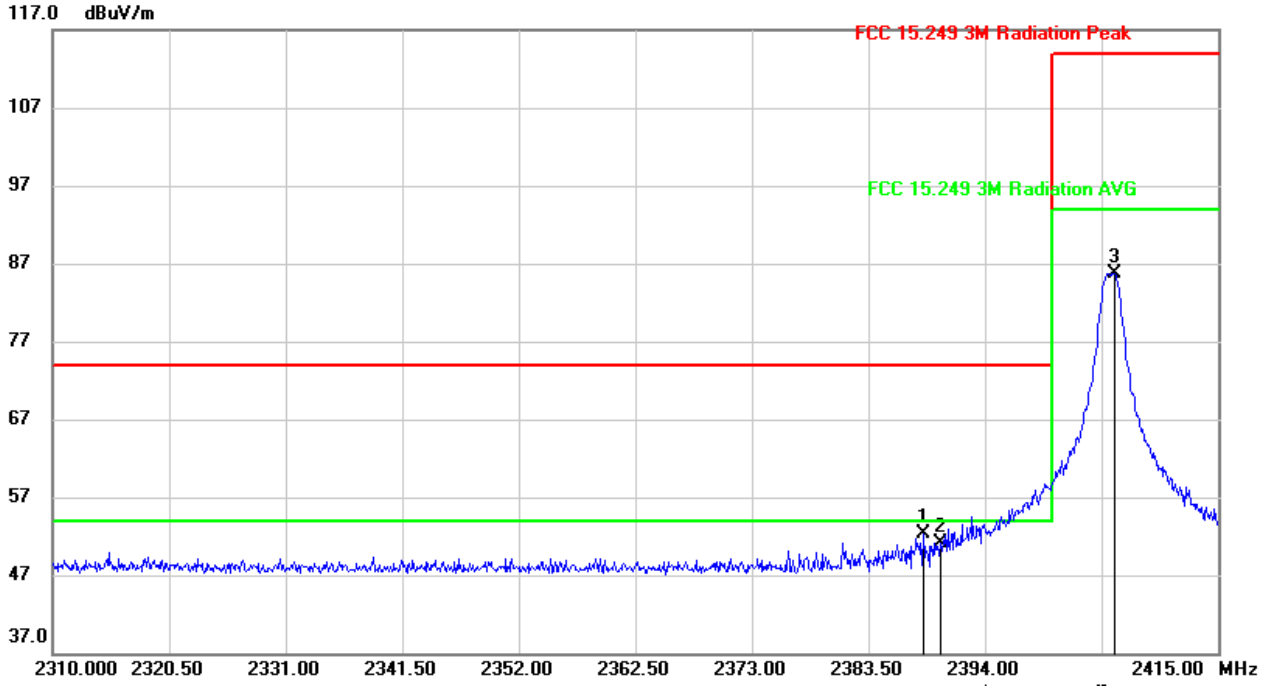
RESTRICTED BANDEDGE AND FIELD STRENGTH OF INTENTIONAL EMISSIONS (LOW CHANNEL, HORIZONTAL)



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2388.435	22.07	33.15	55.22	74.00	-18.78	peak
2	2388.435	13.61	33.15	46.76	54.00	-7.24	AVG
3	2390.000	21.41	33.14	54.55	74.00	-19.45	peak
4	2390.000	13.67	33.14	46.81	54.00	-7.19	AVG
5	2405.025	57.97	33.05	91.02	114.00	-22.98	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.
4. AVG: VBW=1/Ton, where: ton is transmit duration
5. For more information about VBW, please refer to clause 6.1.

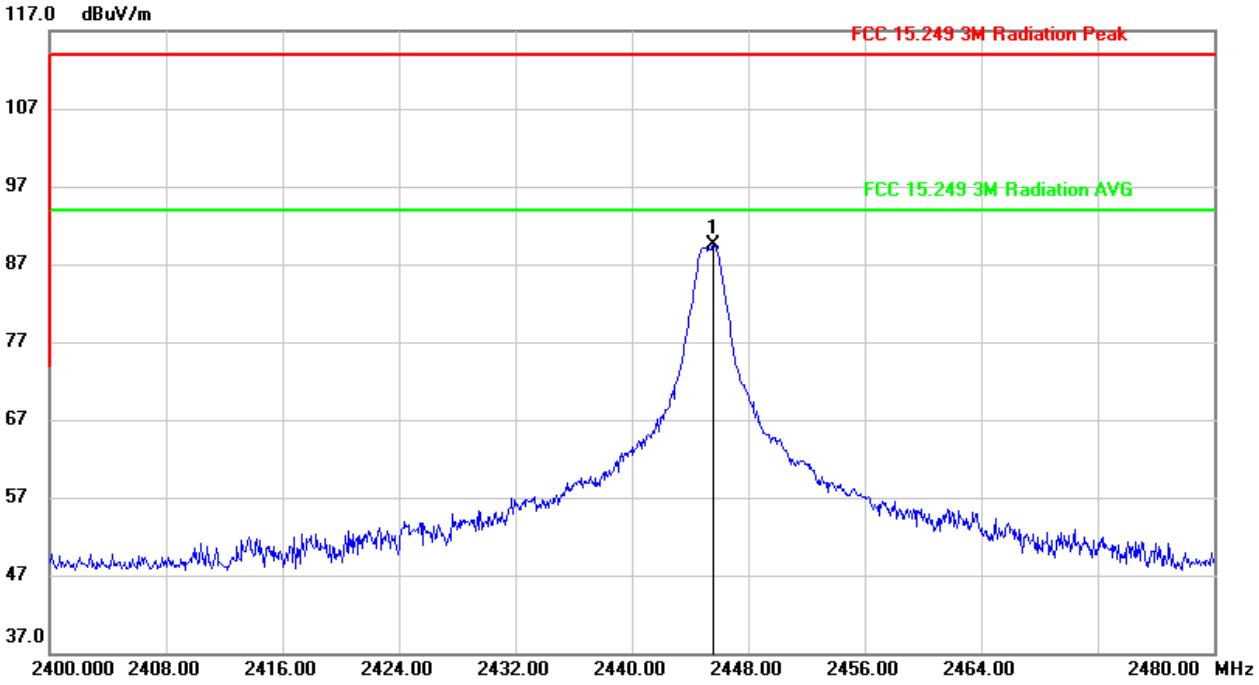
RESTRICTED BANDEDGE AND FIELD STRENGTH OF INTENTIONAL EMISSIONS (LOW CHANNEL, VERTICAL)



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
1	2388.435	19.12	33.25	52.37	74.00	-21.63	peak
2	2390.000	17.85	33.24	51.09	74.00	-22.91	peak
3	2405.655	52.54	33.15	85.69	114.00	-28.31	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.

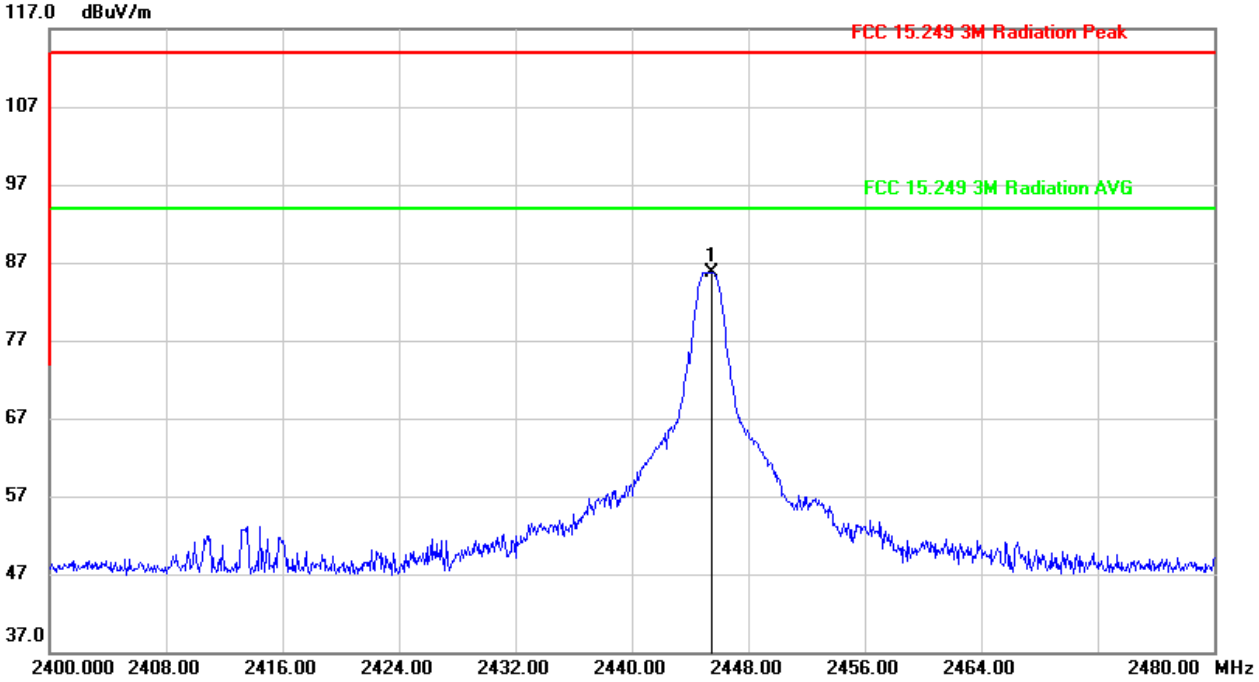
FIELD STRENGTH OF INTENTIONAL EMISSIONS (MID CHANNEL, HORIZONTAL)



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
1	2445.600	56.62	32.85	89.47	114.00	-24.53	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.

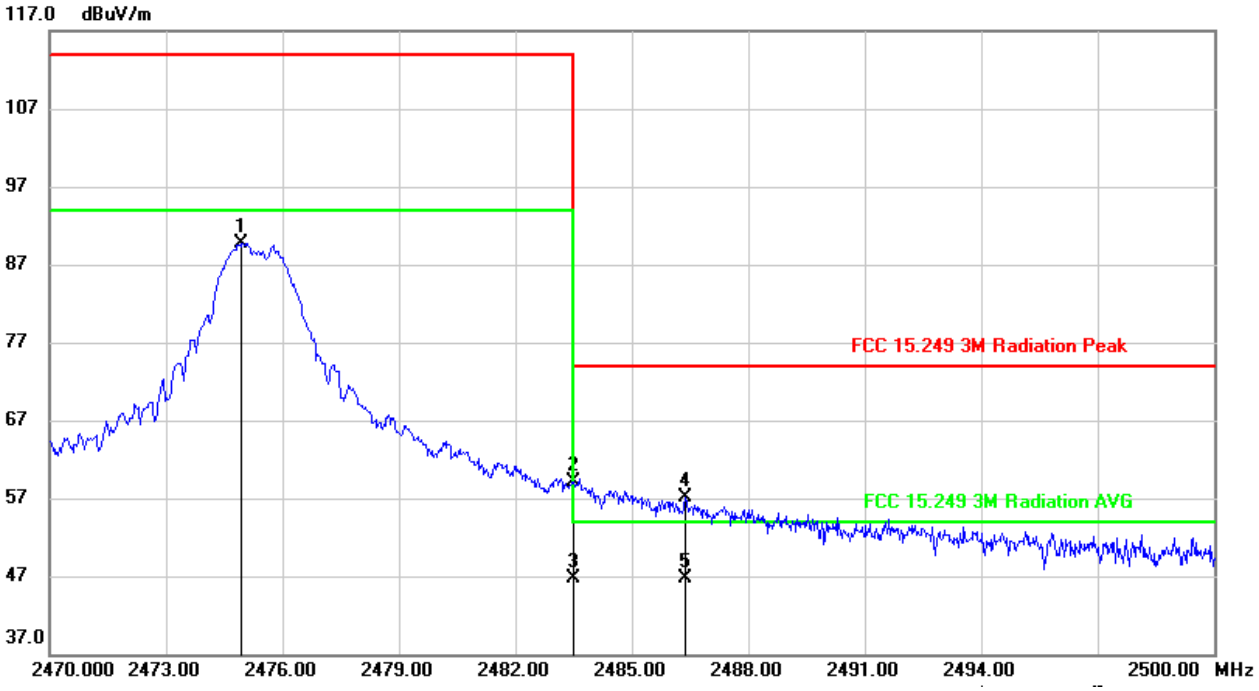
FIELD STRENGTH OF INTENTIONAL EMISSIONS (MID CHANNEL, VERTICAL)



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
1	2445.520	52.80	32.95	85.75	114.00	-28.25	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.

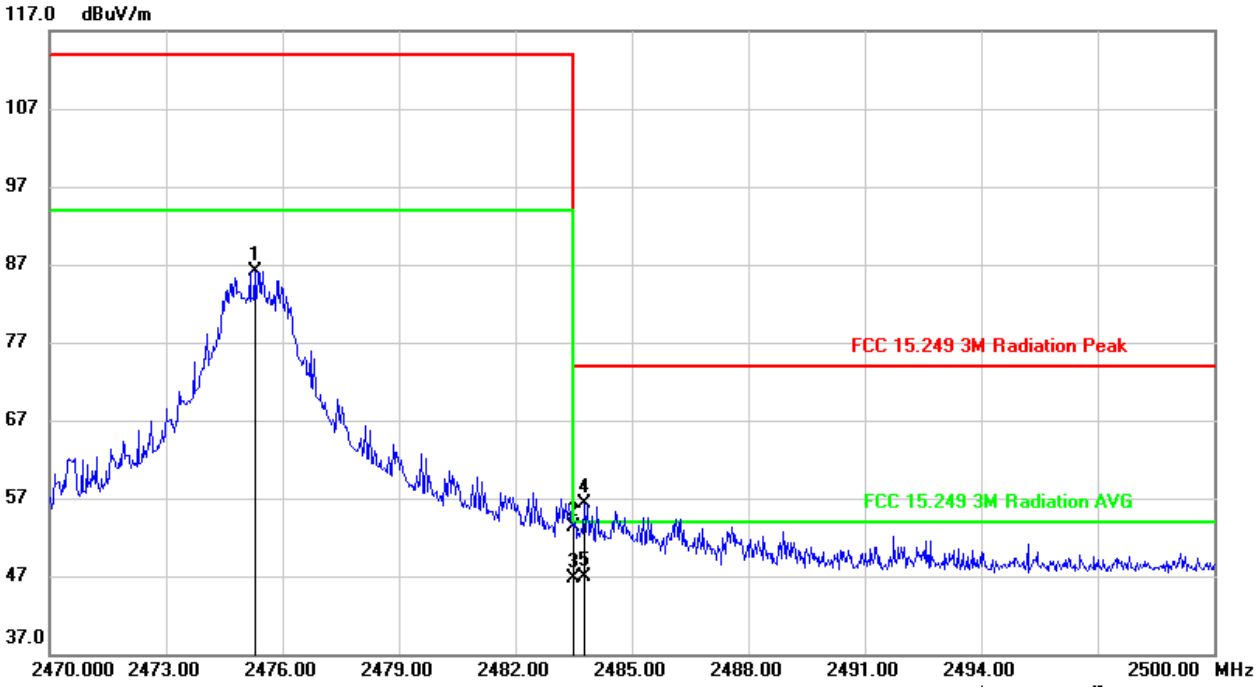
FIELD STRENGTH OF INTENTIONAL EMISSIONS (HIGH CHANNEL, HORIZONTAL)



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
1	2474.950	56.96	32.79	89.75	114.00	-24.25	peak
2	2483.500	26.31	32.78	59.09	74.00	-14.91	peak
3	2483.500	13.91	32.78	46.69	54.00	-7.31	AVG
4	2486.380	24.34	32.79	57.13	74.00	-16.87	peak
5	2486.380	13.96	32.79	46.75	54.00	-7.25	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.
4. AVG: VBW=1/Ton, where: ton is transmit duration
5. For more information about VBW, please refer to clause 6.1.

FIELD STRENGTH OF INTENTIONAL EMISSIONS (HIGH CHANNEL, VERTICAL)



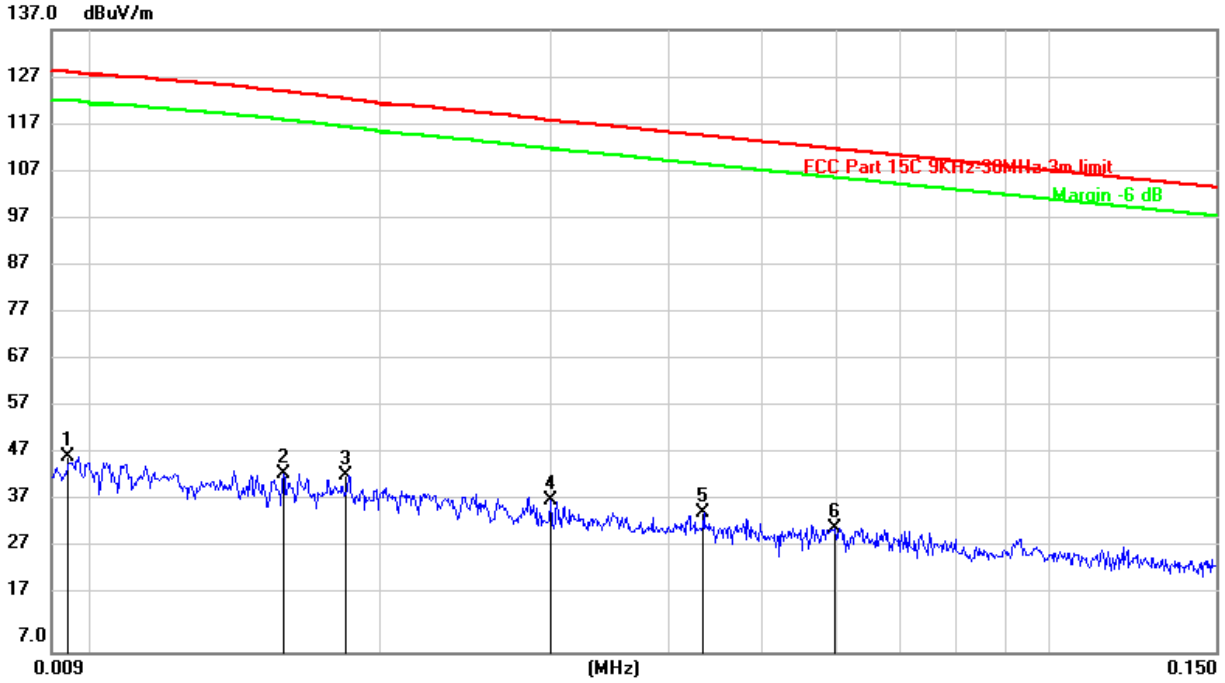
No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2475.280	53.21	32.90	86.11	114.00	-27.89	peak
2	2483.500	20.49	32.88	53.37	74.00	-20.63	peak
3	2483.500	13.91	32.88	46.79	54.00	-7.21	AVG
4	2483.770	23.32	32.88	56.20	74.00	-17.8	peak
5	2483.770	13.93	32.88	46.81	54.00	-7.19	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.
4. AVG: VBW=1/Ton, where: ton is transmit duration
5. For more information about VBW, please refer to clause 6.1.

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)

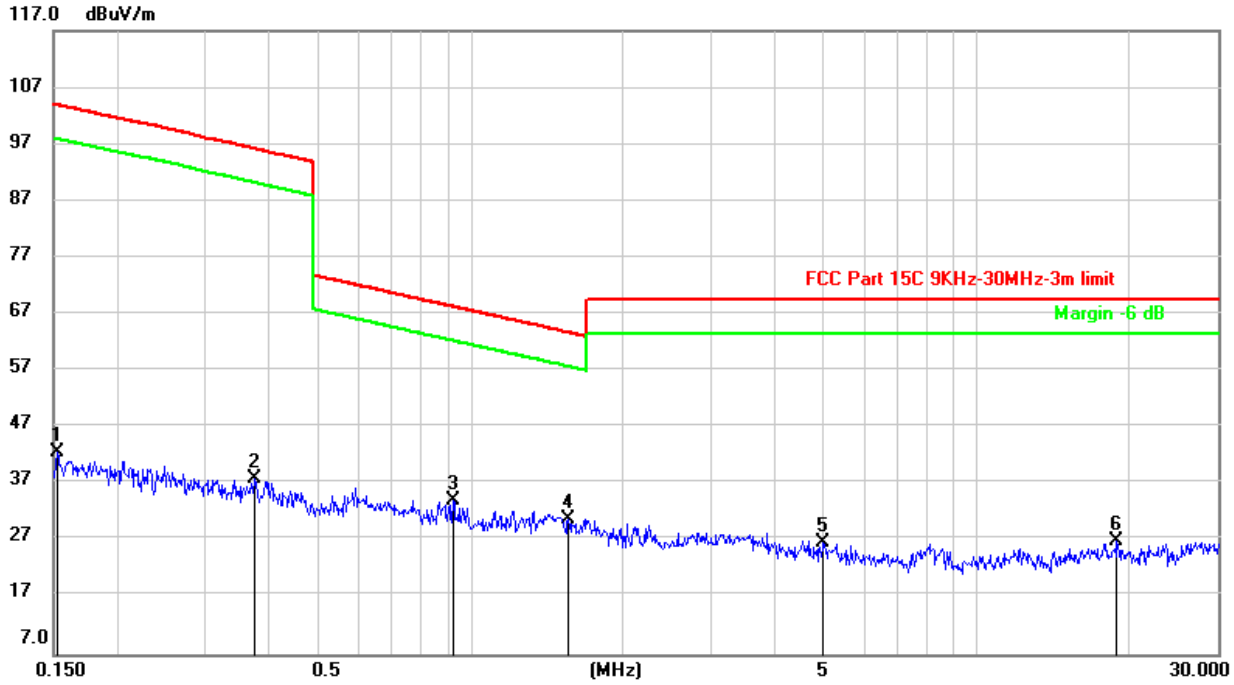
SPURIOUS EMISSIONS BELOW 150KHz (LOW CHANNEL, HORIZONTAL)



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(KHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
1	0.0094	27.37	20.26	47.63	128.06	-80.43	peak
2	0.0158	24.06	20.27	44.33	124.11	-79.78	peak
3	0.0183	23.57	20.29	43.86	122.60	-78.74	peak
4	0.0300	18.42	20.31	38.73	118.06	-79.33	peak
5	0.0434	15.63	20.31	35.94	114.90	-78.96	peak
6	0.0597	12.66	20.31	32.97	112.09	-79.12	peak

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

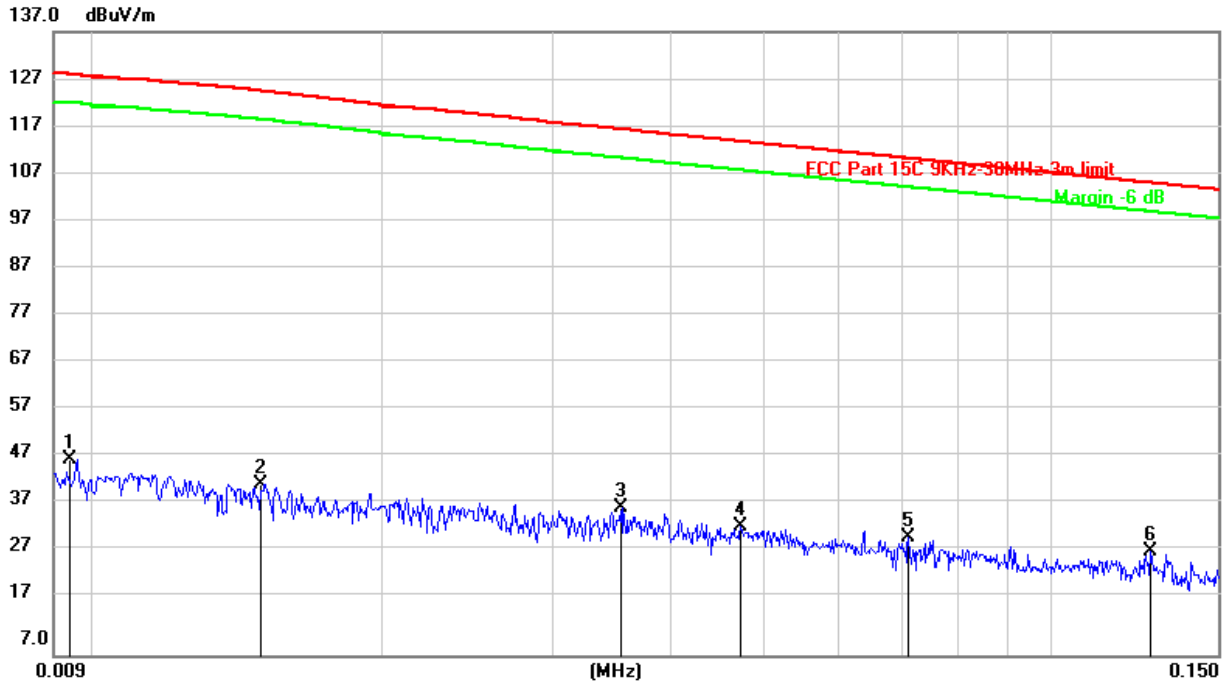
SPURIOUS EMISSIONS BELOW 30MHz (LOW CHANNEL, HORIZONTAL)



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
1	0.1524	22.16	20.42	42.58	103.95	-61.37	peak
2	0.3729	17.61	20.28	37.89	96.24	-58.35	peak
3	0.9233	13.82	20.37	34.19	68.31	-34.12	peak
4	1.5601	10.21	20.58	30.79	63.74	-32.95	peak
5	4.9782	5.82	20.83	26.65	69.54	-42.89	peak
6	18.9205	5.85	21.02	26.87	69.54	-42.67	peak

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

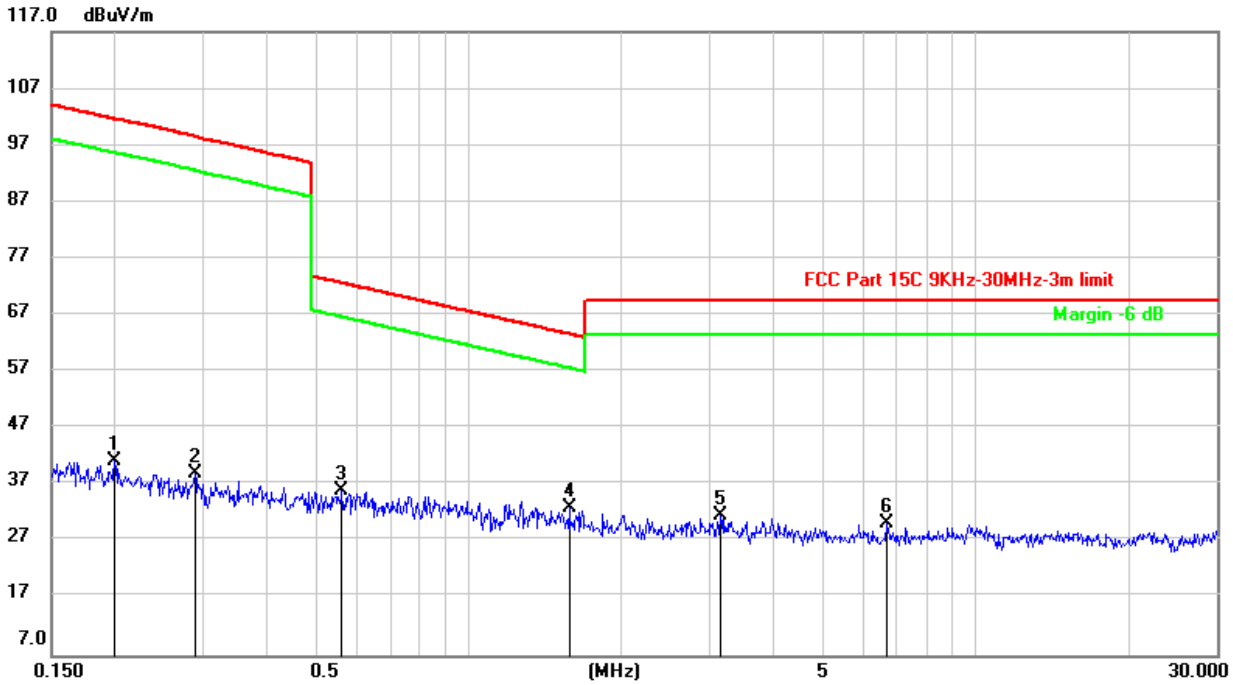
SPURIOUS EMISSIONS BELOW 150KHz (LOW CHANNEL, VERTICAL)



No.	Frequency (KHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	0.0094	27.40	20.26	47.66	128.06	-80.40	peak
2	0.0149	22.47	20.26	42.73	124.65	-81.92	peak
3	0.0354	17.47	20.31	37.78	116.71	-78.93	peak
4	0.0473	13.53	20.31	33.84	114.14	-80.30	peak
5	0.0709	11.21	20.31	31.52	110.60	-79.08	peak
6	0.1274	8.35	20.33	28.68	105.51	-76.83	peak

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

SPURIOUS EMISSIONS BELOW 30MHz (LOW CHANNEL, VERTICAL)



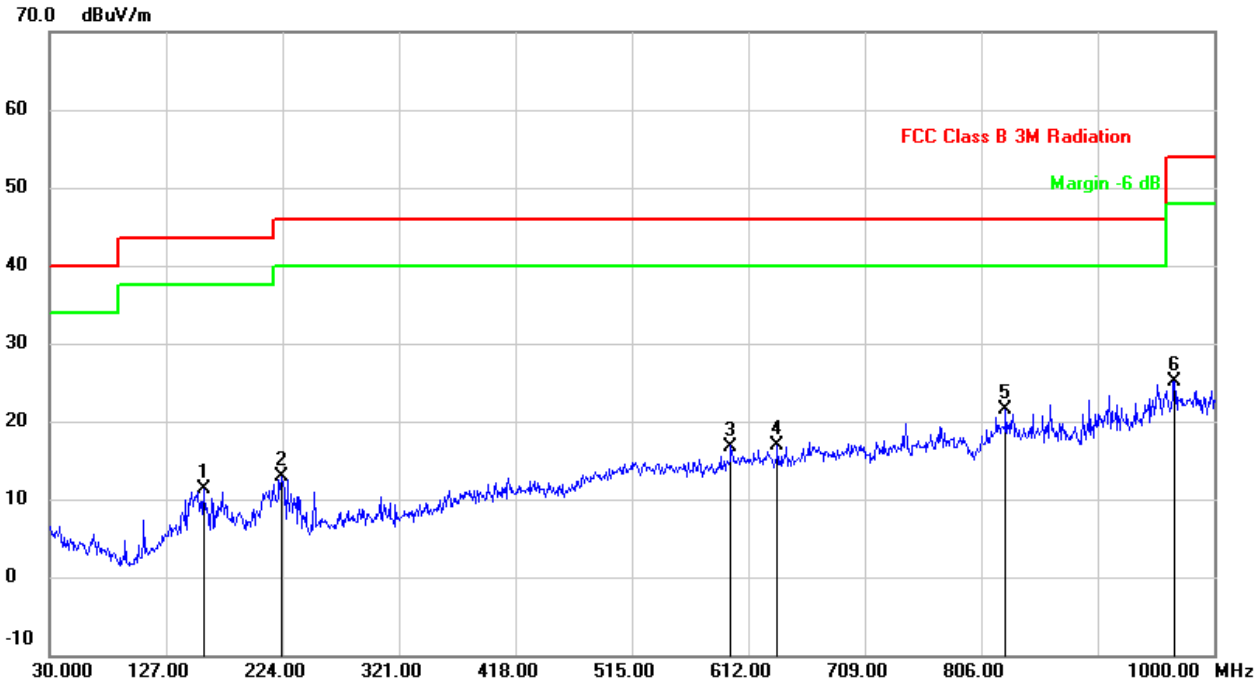
No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
1	0.1995	20.85	20.37	41.22	101.60	-60.38	peak
2	0.2878	18.66	20.31	38.97	98.49	-59.52	peak
3	0.5611	15.66	20.26	35.92	72.66	-36.74	peak
4	1.5766	12.49	20.58	33.07	63.65	-30.58	peak
5	3.1396	10.82	20.91	31.73	69.54	-37.81	peak
6	6.6623	9.21	20.90	30.11	69.54	-39.43	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)

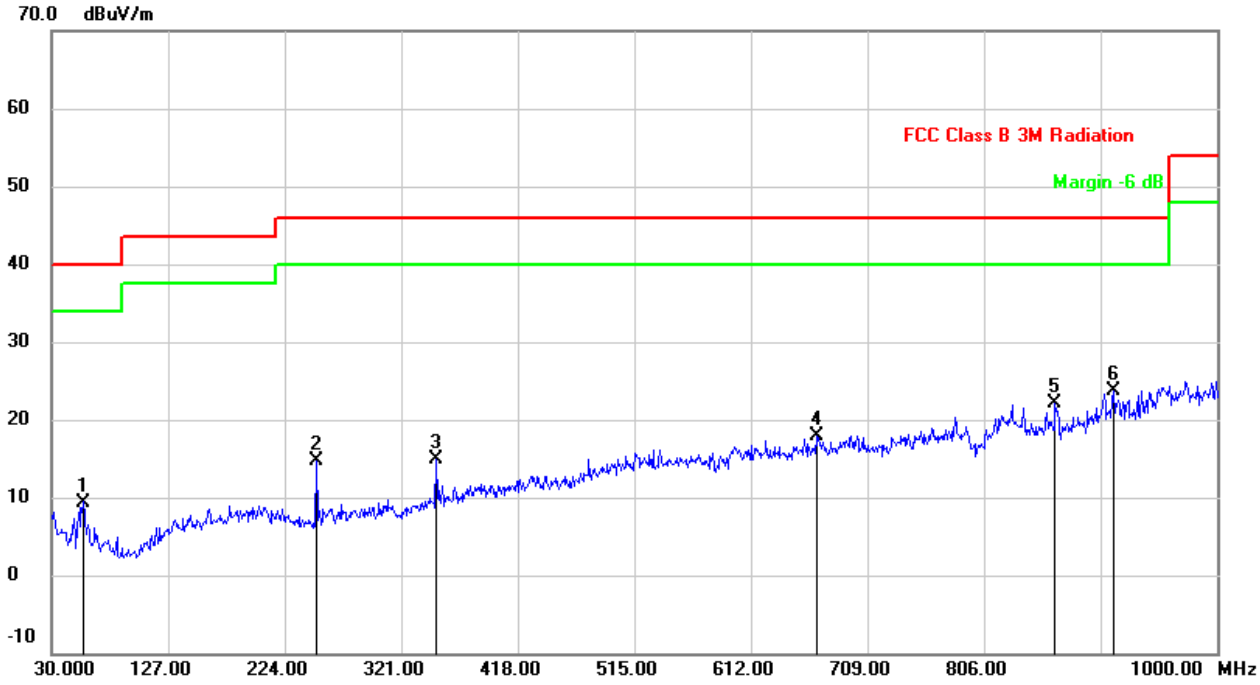
SPURIOUS EMISSIONS BELOW 1GHZ (MIDDLE CHANNEL, HORIZONTAL)



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
1	158.0399	28.62	-17.39	11.23	43.50	-32.27	QP
2	223.0300	29.51	-16.70	12.81	46.00	-33.19	QP
3	597.4500	25.88	-9.08	16.80	46.00	-29.20	QP
4	636.2500	26.21	-9.36	16.85	46.00	-29.15	QP
5	826.3700	26.98	-5.55	21.43	46.00	-24.57	QP
6	967.0200	28.95	-3.81	25.14	54.00	-28.86	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)



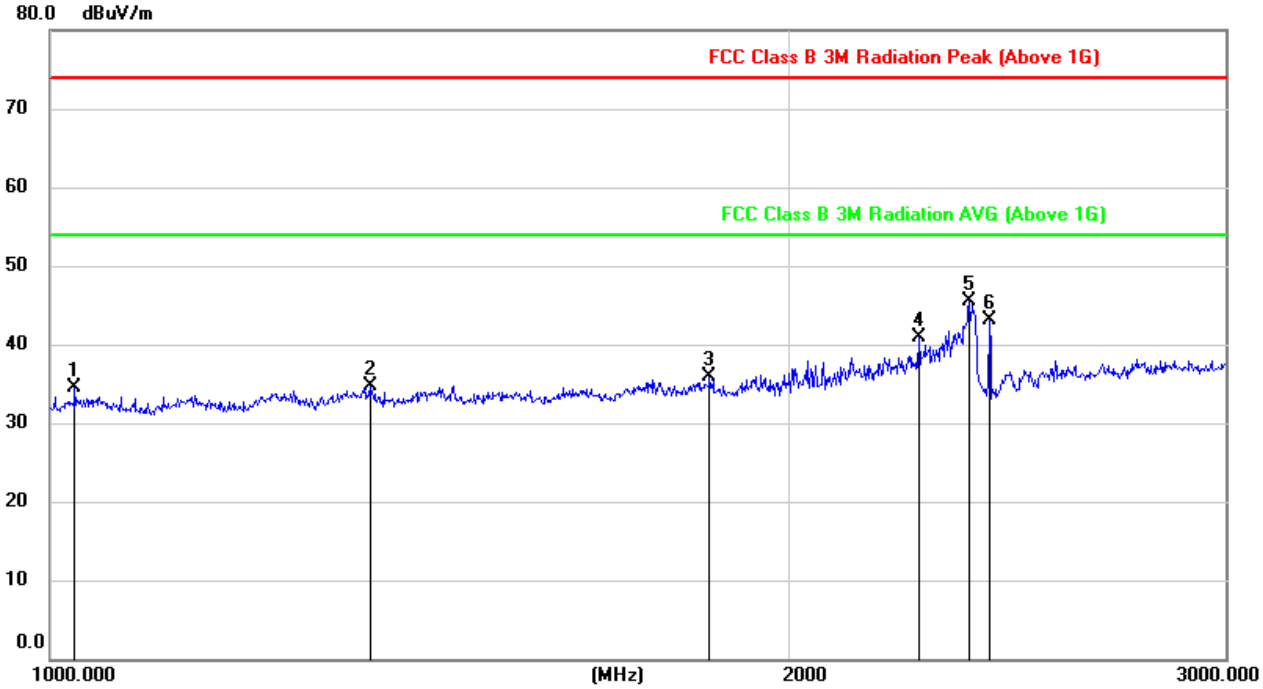
No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	56.1900	29.35	-19.95	9.40	40.00	-30.60	QP
2	250.1900	31.55	-16.90	14.65	46.00	-31.35	QP
3	350.1000	29.24	-14.30	14.94	46.00	-31.06	QP
4	666.3200	26.49	-8.63	17.86	46.00	-28.14	QP
5	865.1700	28.22	-6.04	22.18	46.00	-23.82	QP
6	913.6700	28.50	-4.84	23.66	46.00	-22.34	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.

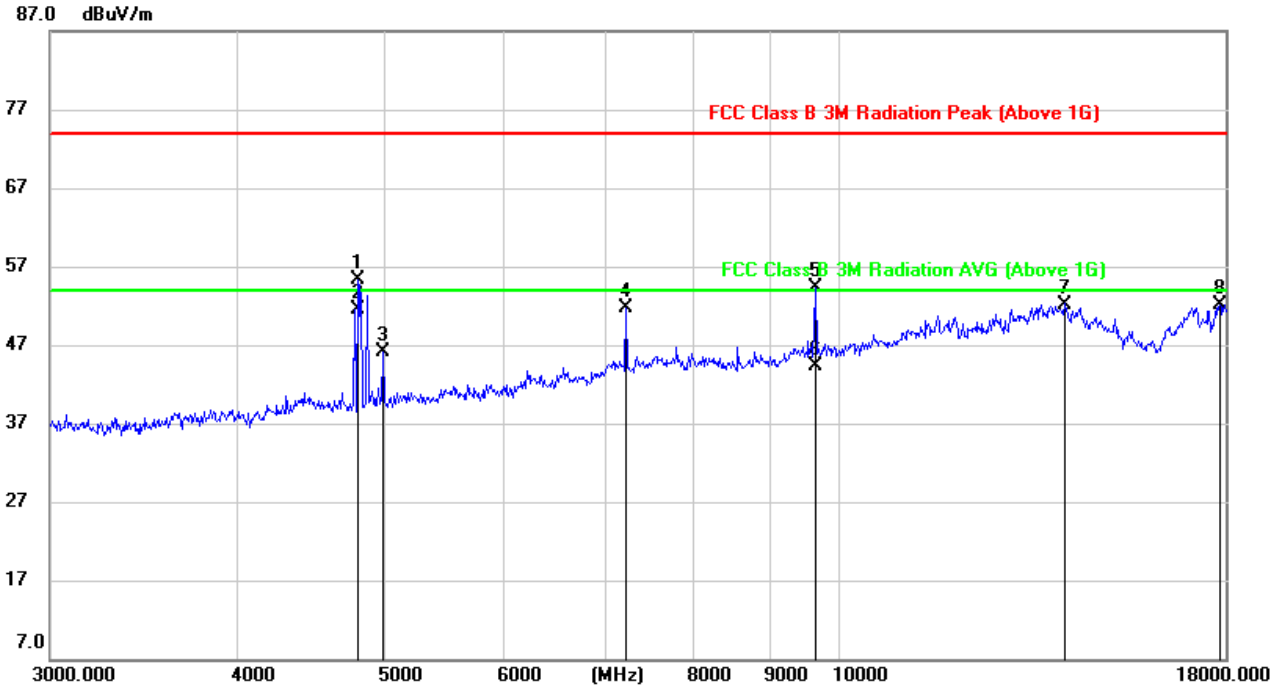
7.5. SPURIOUS EMISSIONS 1~18GHz

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



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
1	1023.339	48.53	-13.94	34.59	74.00	-39.41	peak
2	1348.270	47.16	-12.37	34.79	74.00	-39.21	peak
3	1852.102	46.70	-10.88	35.82	74.00	-38.18	peak
4	2252.126	48.47	-7.58	40.89	74.00	-33.11	peak
5	2363.665	53.31	-7.85	45.46	74.00	-28.54	peak
6	2405.580	51.15	-8.13	43.02	74.00	-30.98	peak

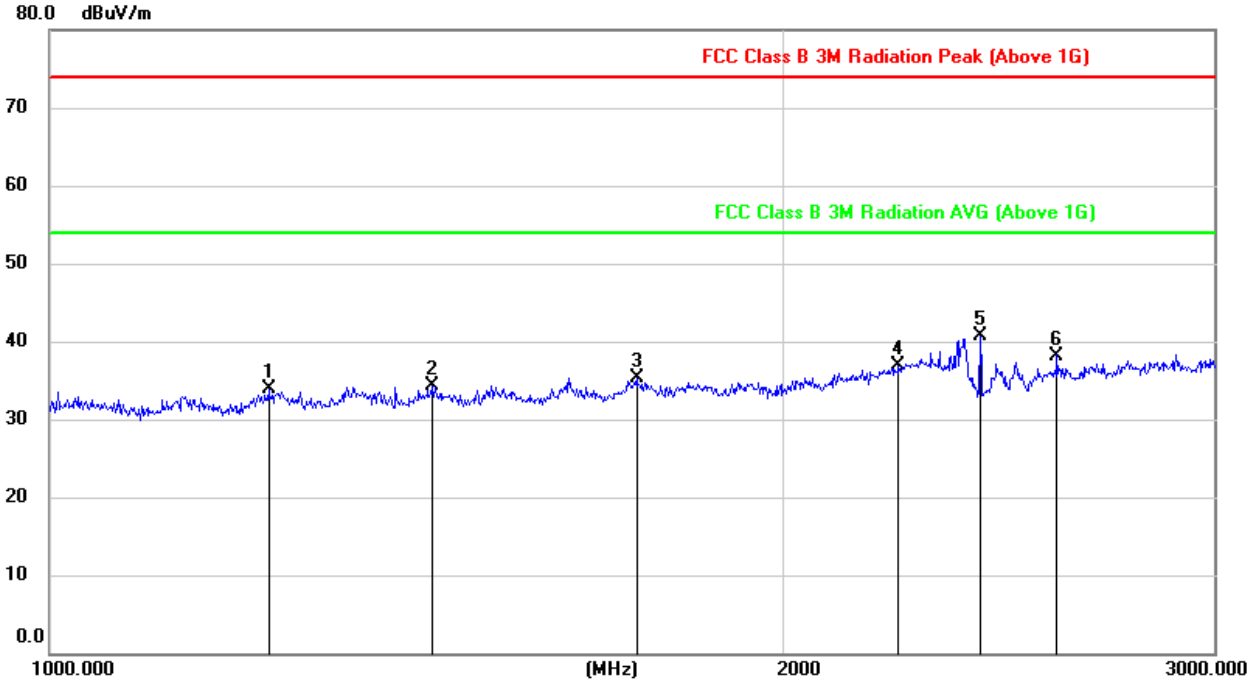
Note: 1. Measurement = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
1	4797.420	55.79	-0.56	55.23	74.00	-18.77	peak
2	4797.420	52.09	-0.56	51.53	54.00	-2.47	AVG
3	4990.180	45.63	0.49	46.12	74.00	-27.88	peak
4	7230.919	43.88	7.81	51.69	74.00	-22.31	peak
5	9620.296	43.10	11.19	54.29	74.00	-19.71	peak
6	9620.296	33.09	11.19	44.28	54.00	-9.72	AVG
7	14082.047	31.54	20.66	52.20	74.00	-21.80	peak
8	17839.462	25.68	26.49	52.17	74.00	-21.83	peak

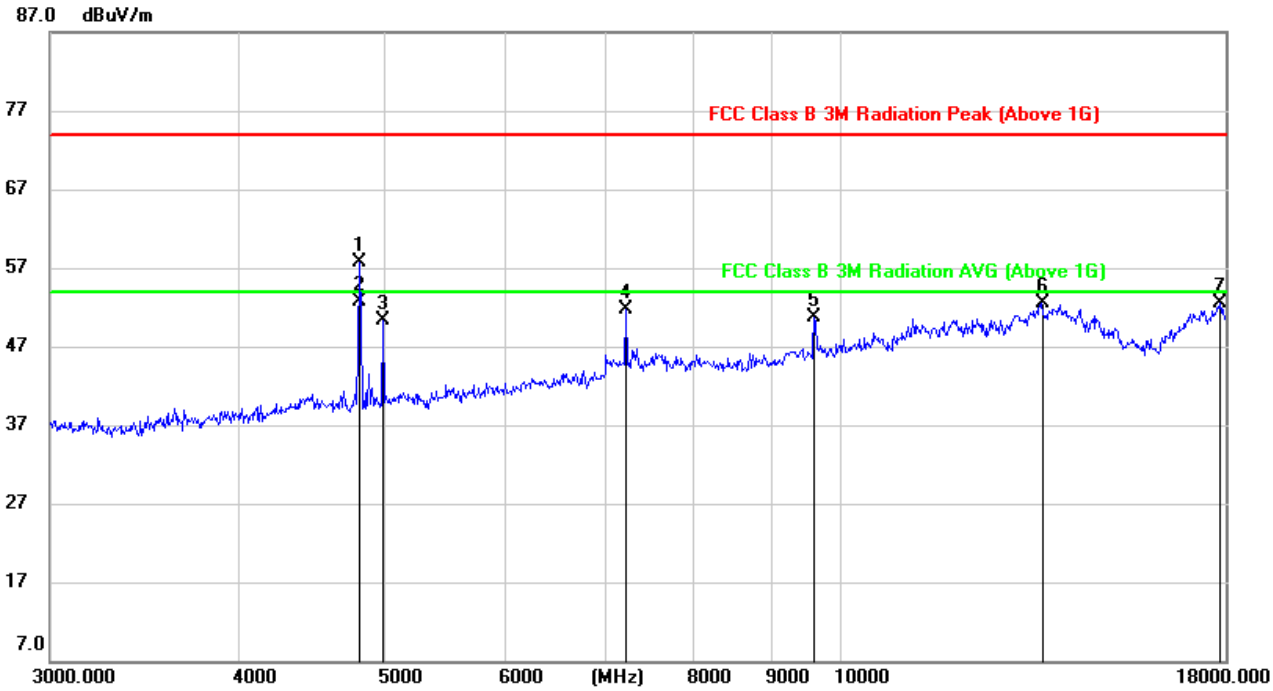
Note: 1. Measurement = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. AVG: VBW=1/Ton, where: ton is transmit duration
5. For more information about VBW, please refer to clause 6.1.

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	1229.416	46.83	-12.90	33.93	74.00	-40.07	peak
2	1433.824	46.60	-12.33	34.27	74.00	-39.73	peak
3	1739.679	46.67	-11.32	35.35	74.00	-38.65	peak
4	2227.519	44.83	-7.91	36.92	74.00	-37.08	peak
5	2405.580	48.64	-8.03	40.61	74.00	-33.39	peak
6	2586.485	46.36	-8.16	38.20	74.00	-35.80	peak

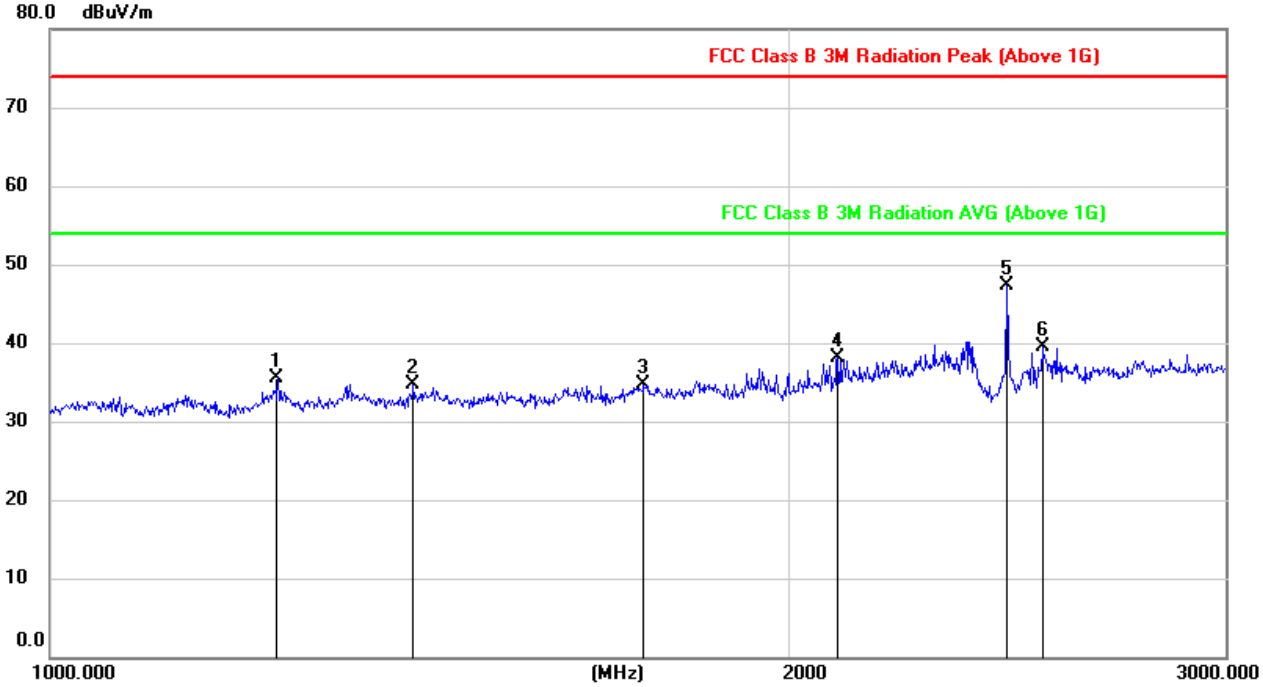
Note: 1. Measurement = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
1	4810.558	58.10	-0.35	57.75	74.00	-16.25	peak
2	4810.558	53.15	-0.35	52.80	54.00	-1.20	AVG
3	4990.180	49.83	0.57	50.40	74.00	-23.60	peak
4	7230.919	43.82	7.79	51.61	74.00	-22.39	peak
5	9614.342	39.38	11.35	50.73	74.00	-23.27	peak
6	13610.714	32.01	20.43	52.44	74.00	-21.56	peak
7	17839.462	26.19	26.26	52.45	74.00	-21.55	peak

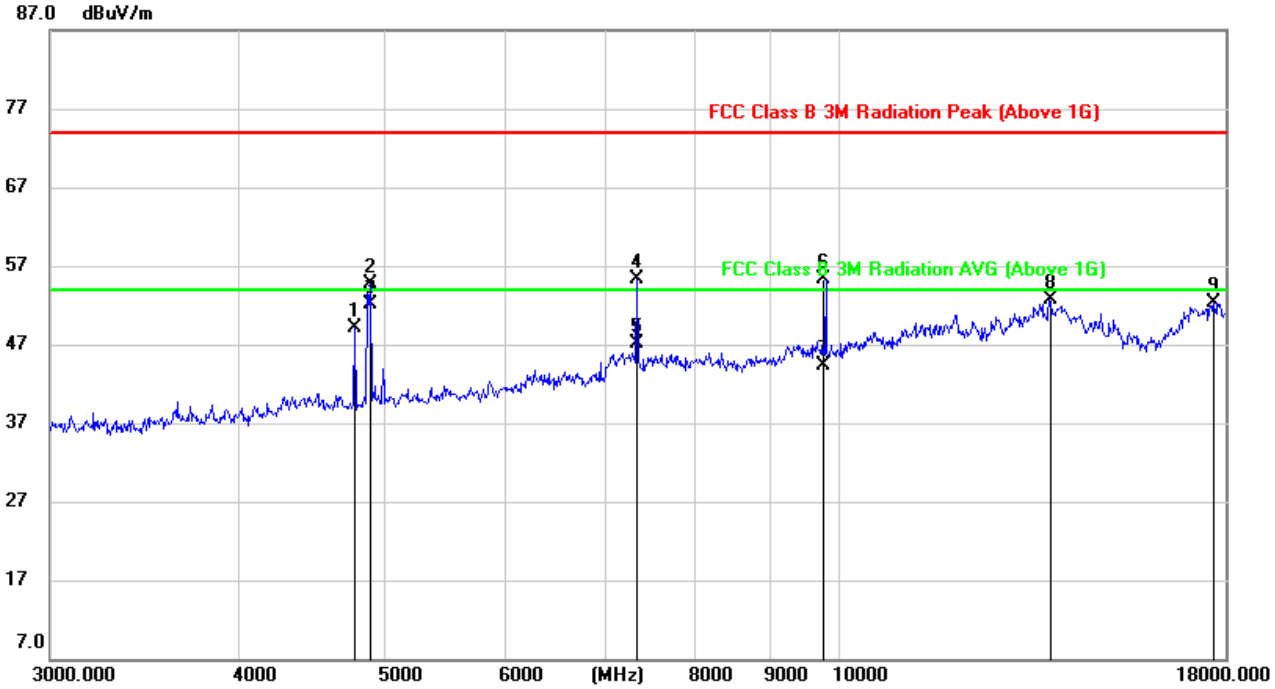
Note: 1. Measurement = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. AVG: VBW=1/Ton, where: ton is transmit duration
5. For more information about VBW, please refer to clause 6.1.

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



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
1	1237.546	48.37	-12.89	35.48	74.00	-38.52	peak
2	1404.205	46.79	-12.08	34.71	74.00	-39.29	peak
3	1741.591	45.94	-11.31	34.63	74.00	-39.37	peak
4	2087.715	47.79	-9.73	38.06	74.00	-35.94	peak
5	2448.239	55.75	-8.35	47.40	74.00	-26.60	peak
6	2530.273	47.92	-8.37	39.55	74.00	-34.45	peak

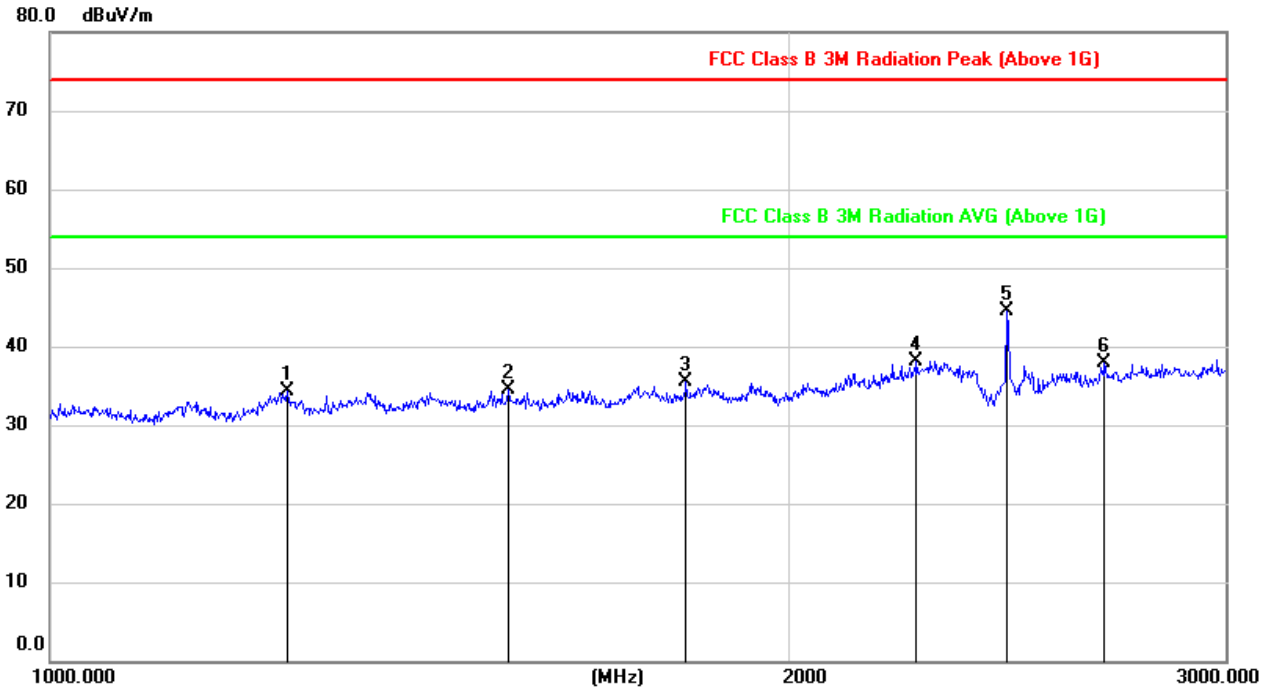
Note: 1. Measurement = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
1	4771.582	49.79	-0.60	49.19	74.00	-24.81	peak
2	4890.624	54.10	0.58	54.68	74.00	-19.32	peak
3	4890.624	51.58	0.58	52.16	54.00	-1.84	AVG
4	7335.794	47.79	7.44	55.23	74.00	-18.77	peak
5	7335.794	39.76	7.44	47.20	54.00	-6.80	AVG
6	9780.088	43.57	11.64	55.21	74.00	-18.79	peak
7	9780.088	32.70	11.64	44.34	54.00	-9.66	AVG
8	13782.499	31.95	20.75	52.70	74.00	-21.30	peak
9	17680.356	27.13	25.26	52.39	74.00	-21.61	peak

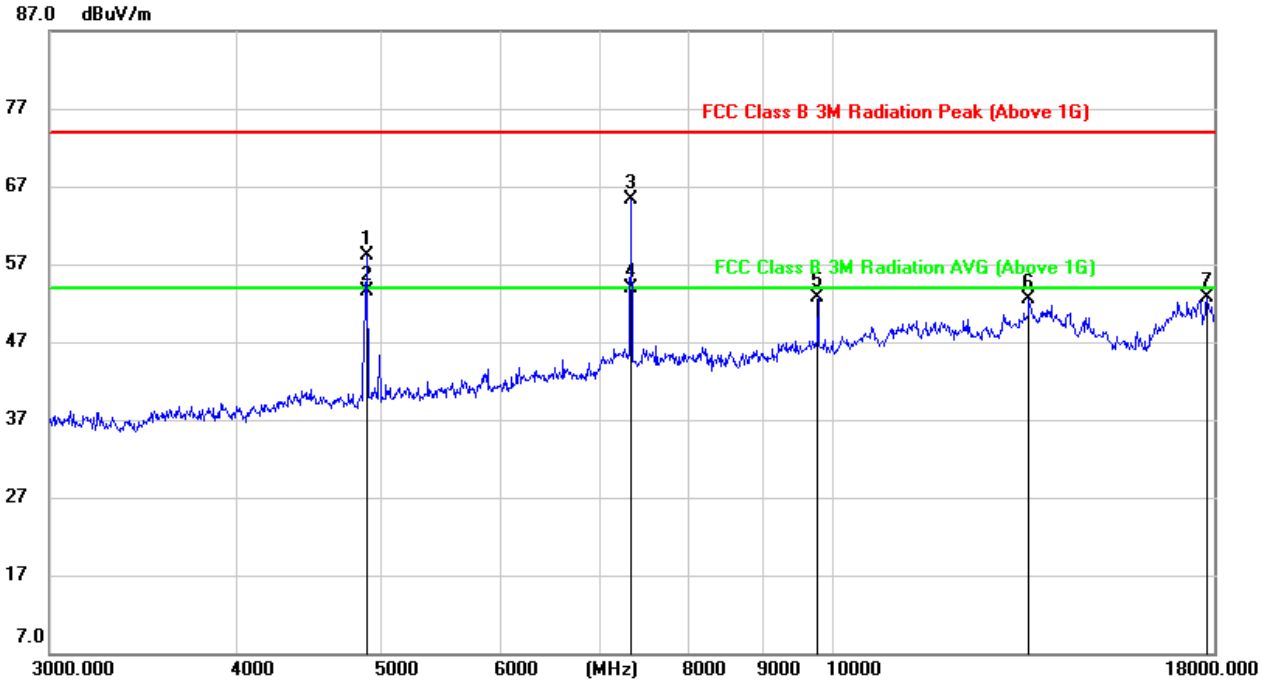
Note: 1. Measurement = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. AVG: VBW=1/Ton, where: ton is transmit duration
5. For more information about VBW, please refer to clause 6.1.

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



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
1	1248.471	46.98	-12.74	34.24	74.00	-39.76	peak
2	1534.890	46.69	-12.27	34.42	74.00	-39.58	peak
3	1811.851	46.50	-11.07	35.43	74.00	-38.57	peak
4	2247.183	45.71	-7.64	38.07	74.00	-35.93	peak
5	2448.239	52.69	-8.25	44.44	74.00	-29.56	peak
6	2681.976	45.70	-7.73	37.97	74.00	-36.03	peak

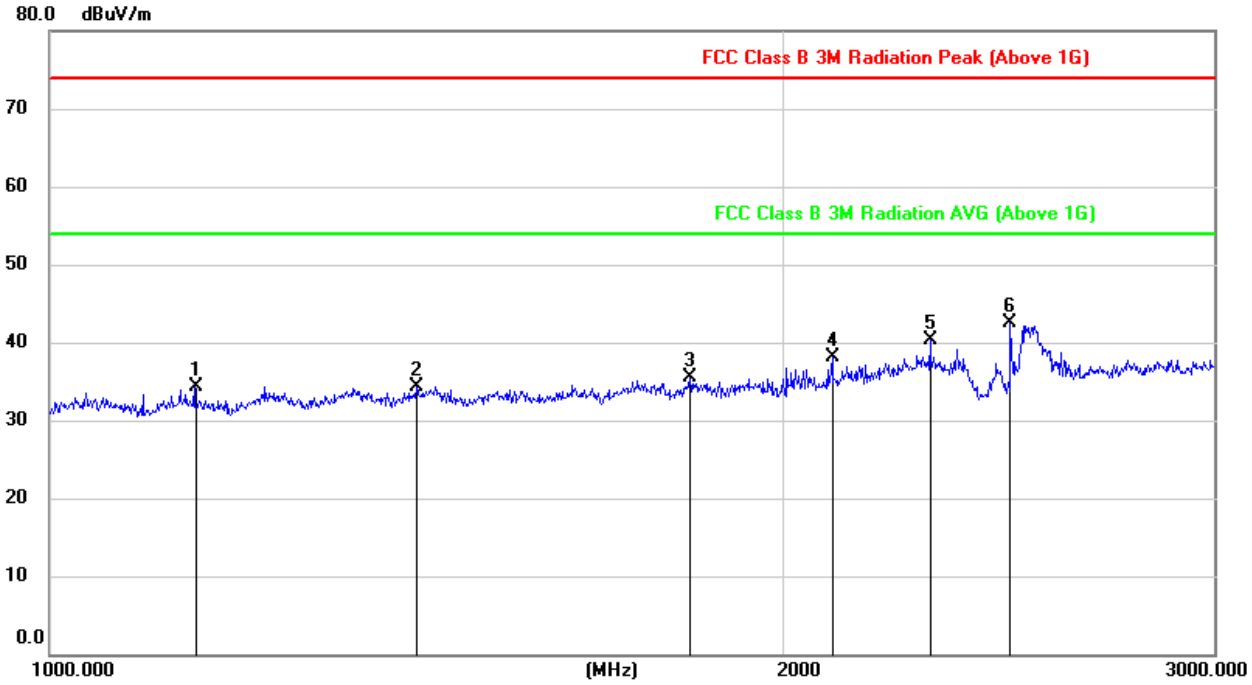
Note: 1. Measurement = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
1	4890.544	57.69	0.50	58.19	74.00	-15.81	peak
2	4890.544	52.94	0.50	53.44	54.00	-0.56	AVG
3	7335.853	57.89	7.51	65.40	74.00	-8.60	peak
4	7335.853	46.34	7.51	53.85	54.00	-0.15	AVG
5	9788.160	40.80	11.84	52.64	74.00	-21.36	peak
6	13562.027	31.67	20.79	52.46	74.00	-21.54	peak
7	17807.526	25.95	26.76	52.71	74.00	-21.29	peak

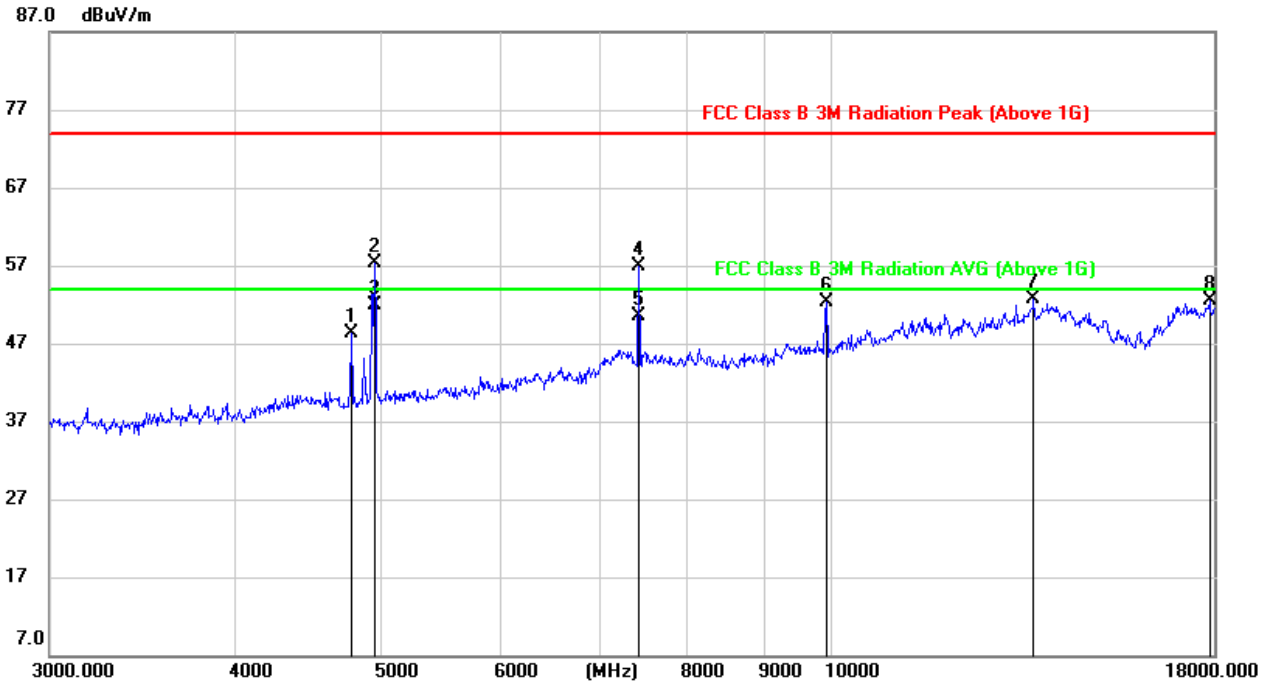
Note: 1. Measurement = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. AVG: VBW=1/Ton, where: ton is transmit duration
5. For more information about VBW, please refer to clause 6.1.

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



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
1	1147.203	47.69	-13.38	34.31	74.00	-39.69	peak
2	1413.492	46.36	-12.11	34.25	74.00	-39.75	peak
3	1831.866	46.45	-10.97	35.48	74.00	-38.52	peak
4	2094.607	47.69	-9.63	38.06	74.00	-35.94	peak
5	2297.105	47.64	-7.41	40.23	74.00	-33.77	peak
6	2475.284	50.94	-8.37	42.57	74.00	-31.43	peak

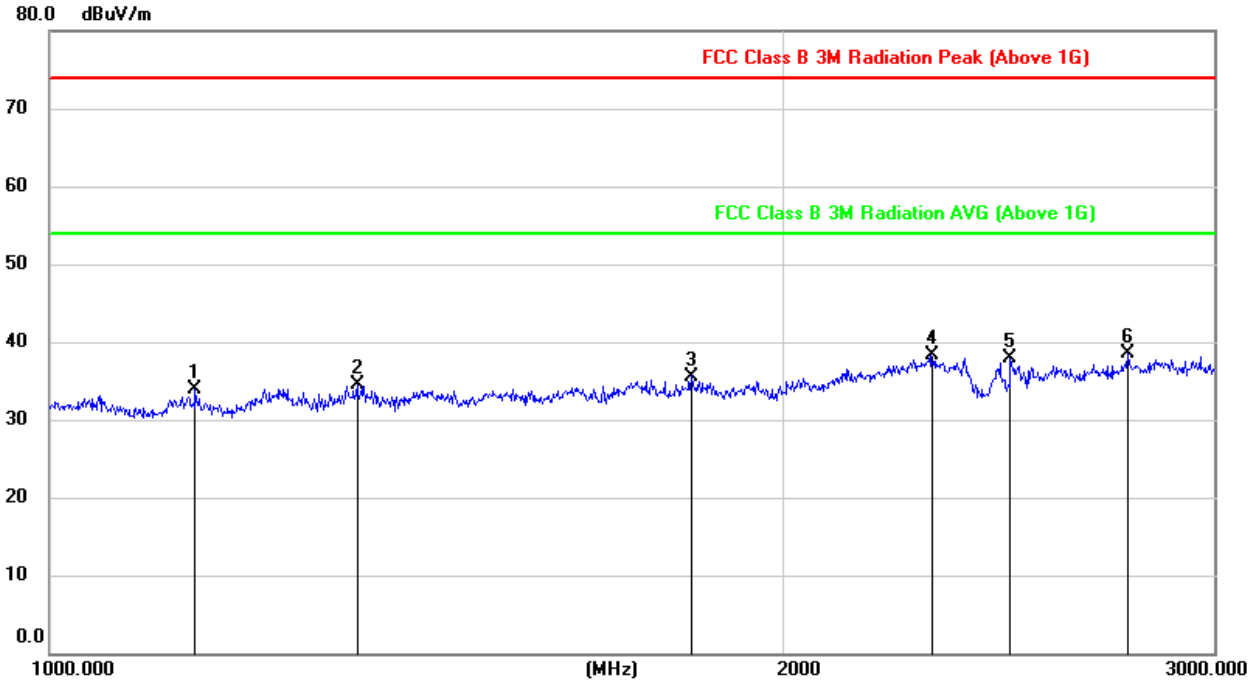
Note: 1. Measurement = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
1	4771.582	48.94	-0.60	48.34	74.00	-25.66	peak
2	4950.489	56.64	0.58	57.22	74.00	-16.78	peak
3	4950.489	51.31	0.58	51.89	54.00	-2.11	AVG
4	7425.838	49.61	7.28	56.89	74.00	-17.11	peak
5	7425.838	43.14	7.28	50.42	54.00	-3.58	AVG
6	9929.475	40.32	11.89	52.21	74.00	-21.79	peak
7	13635.123	32.16	20.46	52.62	74.00	-21.38	peak
8	17871.454	26.18	26.36	52.54	74.00	-21.46	peak

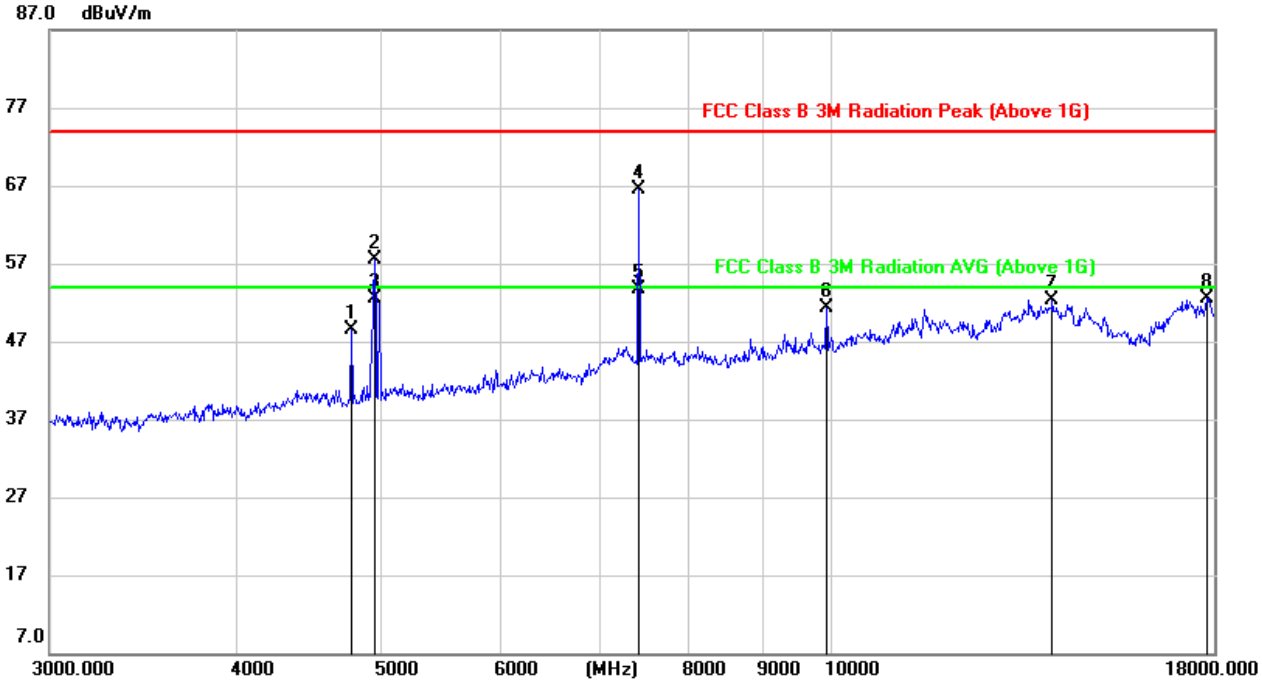
Note: 1. Measurement = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. AVG: VBW=1/Ton, where: ton is transmit duration
5. For more information about VBW, please refer to clause 6.1.

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



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
1	1147.203	47.43	-13.58	33.85	74.00	-40.15	peak
2	1336.473	47.00	-12.45	34.55	74.00	-39.45	peak
3	1833.880	46.56	-10.96	35.60	74.00	-38.40	peak
4	2297.105	45.60	-7.23	38.37	74.00	-35.63	peak
5	2475.284	46.08	-8.27	37.81	74.00	-36.19	peak
6	2765.759	45.66	-7.22	38.44	74.00	-35.56	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.



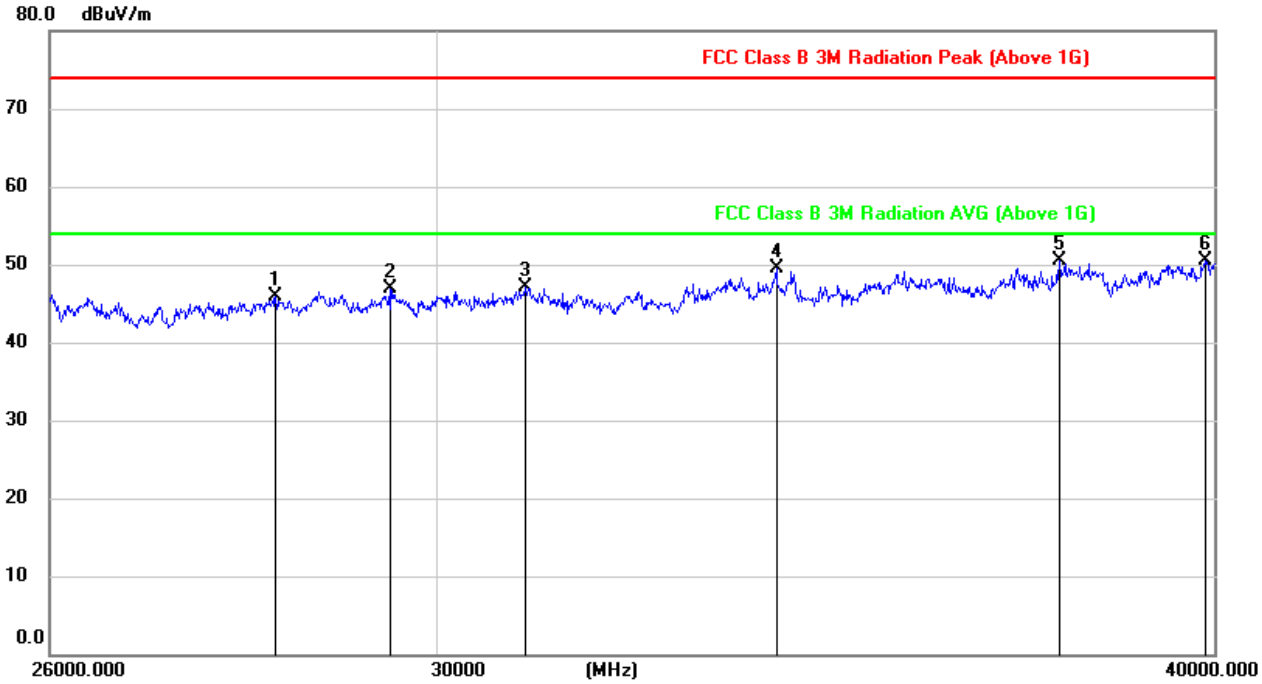
No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4771.582	49.03	-0.50	48.53	74.00	-25.47	peak
2	4950.649	56.86	0.58	57.44	74.00	-16.56	peak
3	4950.649	51.83	0.58	52.41	54.00	-1.59	AVG
4	7425.838	59.13	7.33	66.46	74.00	-7.54	peak
5	7425.838	46.39	7.33	53.72	54.00	-0.28	AVG
6	9929.475	39.18	12.13	51.31	74.00	-22.69	peak
7	14031.674	31.79	20.61	52.40	74.00	-21.60	peak
8	17807.526	25.69	26.76	52.45	74.00	-21.55	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.
4. AVG: VBW=1/Ton, where: ton is transmit duration
5. For more information about VBW, please refer to clause 6.1.

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

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

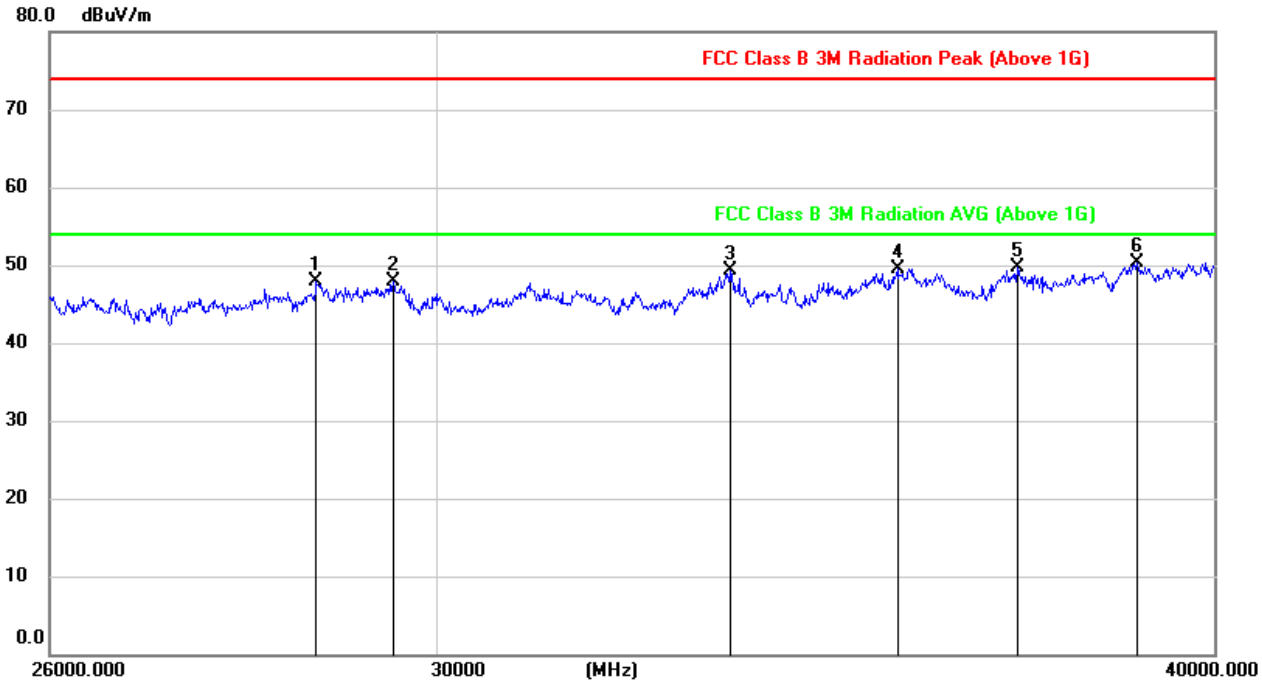
SPURIOUS EMISSIONS 18GHz TO 26GHz (MIDDLE CHANNEL, HORIZONTAL)



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
1	28266.248	46.42	-0.53	45.89	74.00	-28.11	peak
2	29485.103	46.19	0.73	46.92	74.00	-27.08	peak
3	30995.932	48.32	-1.15	47.17	74.00	-26.83	peak
4	34018.520	47.61	1.84	49.45	74.00	-24.55	peak
5	37772.651	45.55	4.90	50.45	74.00	-23.55	peak
6	39862.387	43.67	6.80	50.47	74.00	-23.53	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.

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



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
1	28695.658	46.69	1.18	47.87	74.00	-26.13	peak
2	29523.232	47.41	0.58	47.99	74.00	-26.01	peak
3	33437.357	47.00	2.39	49.39	74.00	-24.61	peak
4	35577.254	46.69	2.80	49.49	74.00	-24.51	peak
5	37191.385	45.76	3.90	49.66	74.00	-24.34	peak
6	38878.748	45.09	5.15	50.24	74.00	-23.76	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: EUT in each of three orthogonal axis emissions had been tested, but only the worst case (X axis) data recorded in the report.

8. ANTENNA REQUIREMENTS

PPLICABLE 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

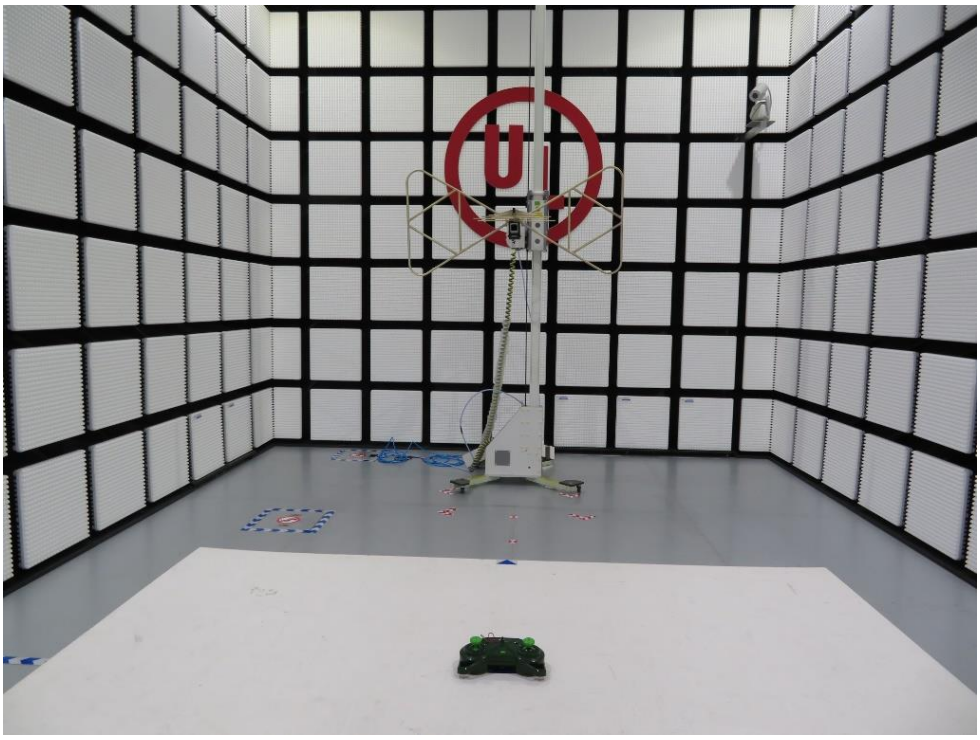
EUT has an Integrated antenna without antenna connector.

ANTENNA GAIN

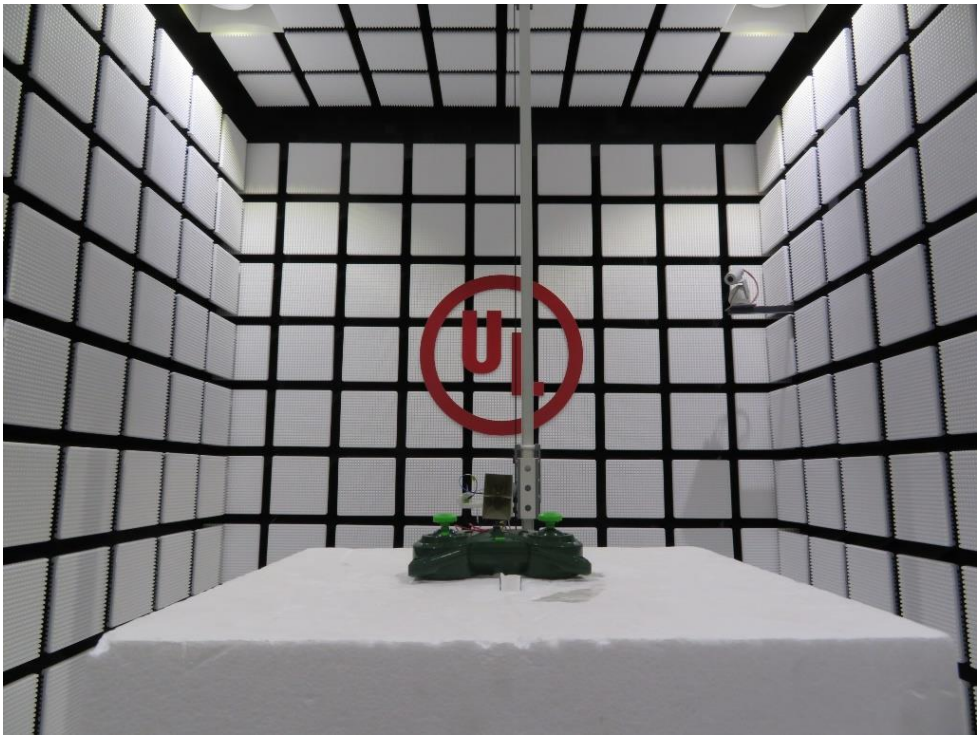
The antenna gain of EUT is less than 6 dBi.

Appendix I: Photographs of Test Configuration

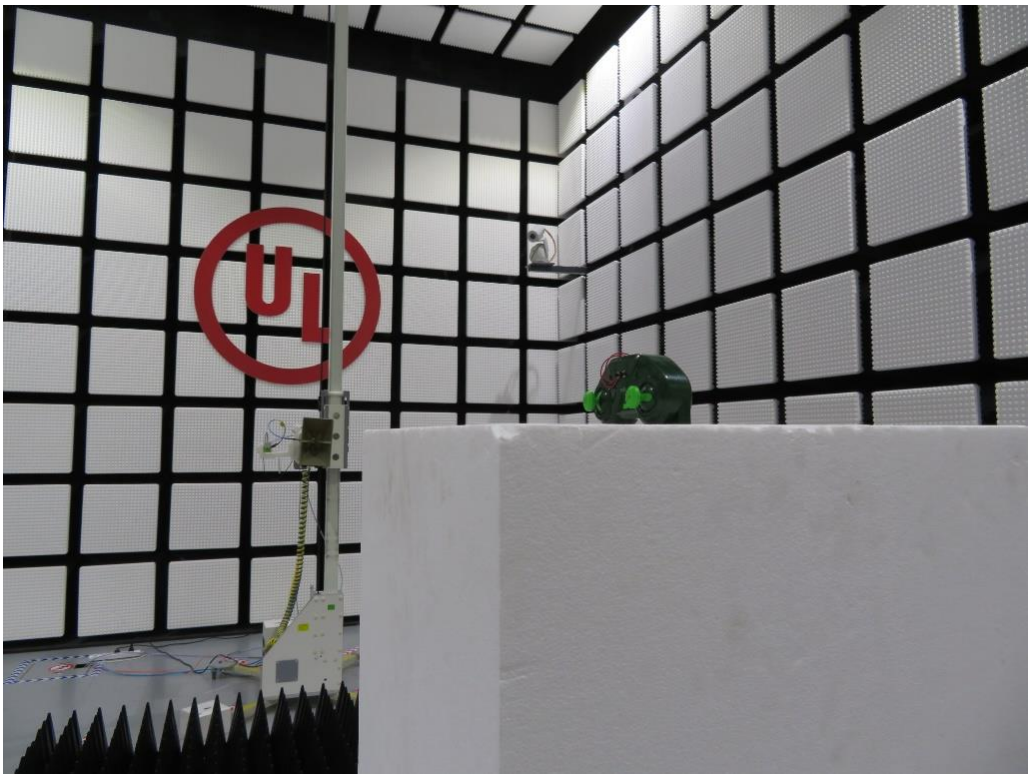
RADIATED RF MEASUREMENT SETUP (30MHz ~ 1 GHz)



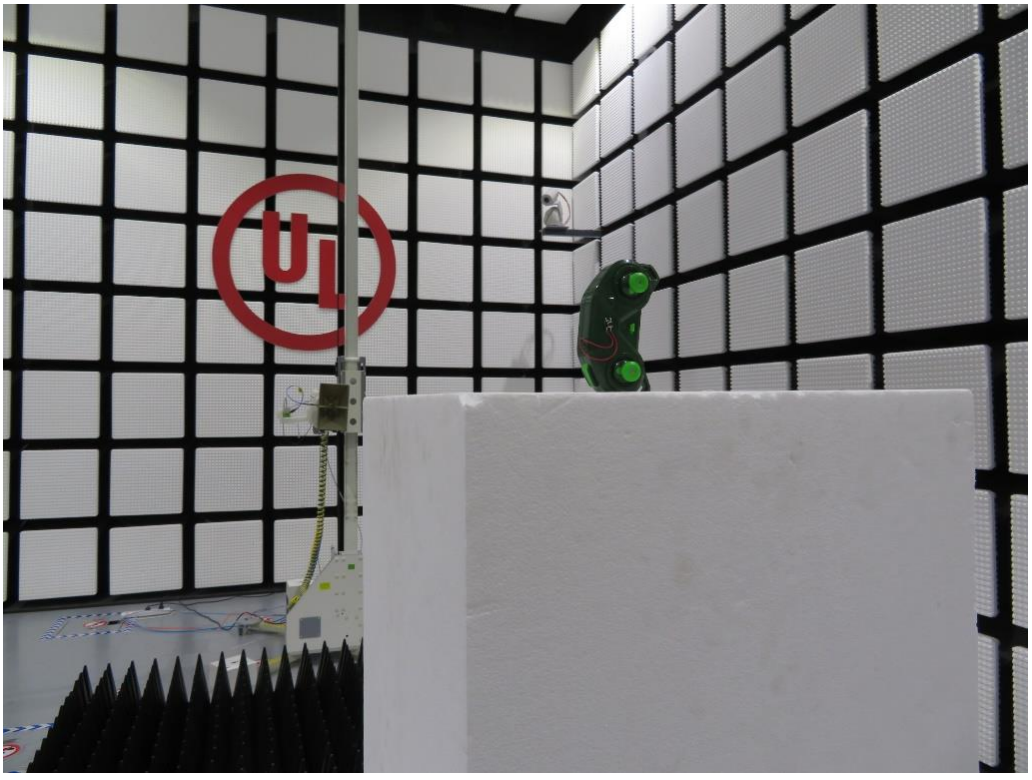
RADIATED RF MEASUREMENT SETUP (ABOVE 1 GHz- X axis)



RADIATED RF MEASUREMENT SETUP (ABOVE 1 GHz- Y axis)



RADIATED RF MEASUREMENT SETUP (ABOVE 1 GHz- Z axis)



Appendix II: Photographs of EUT

Top View of EUT

Bottom View of EUT

Left View of EUT

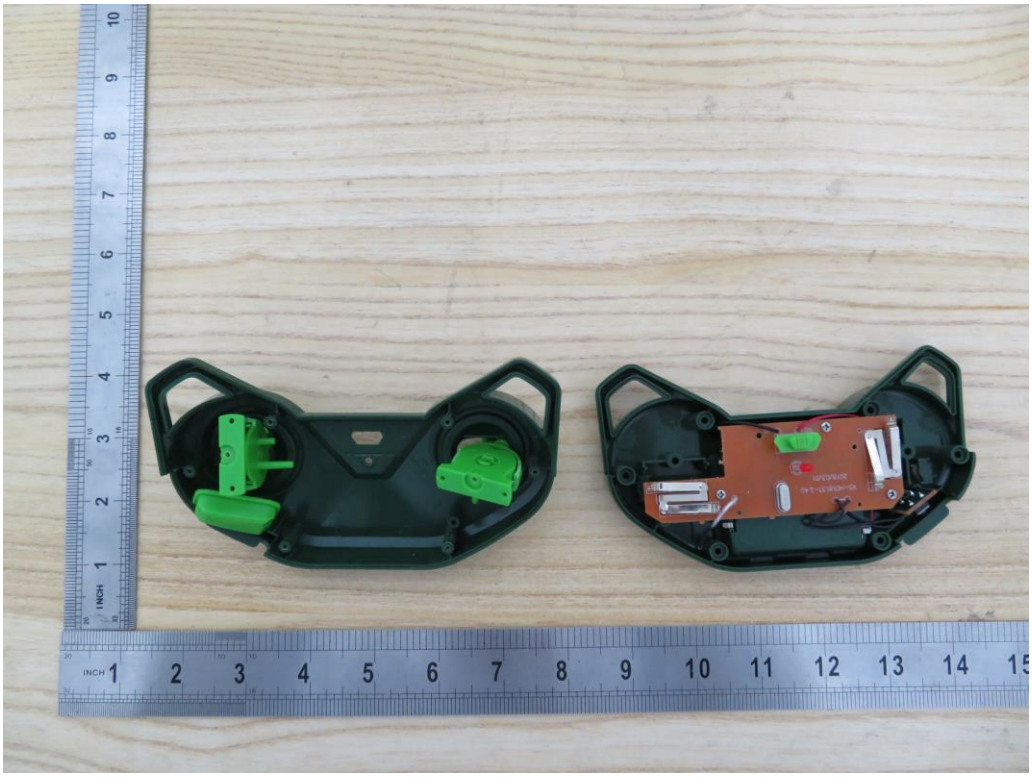
Right View of EUT

Front View of EUT

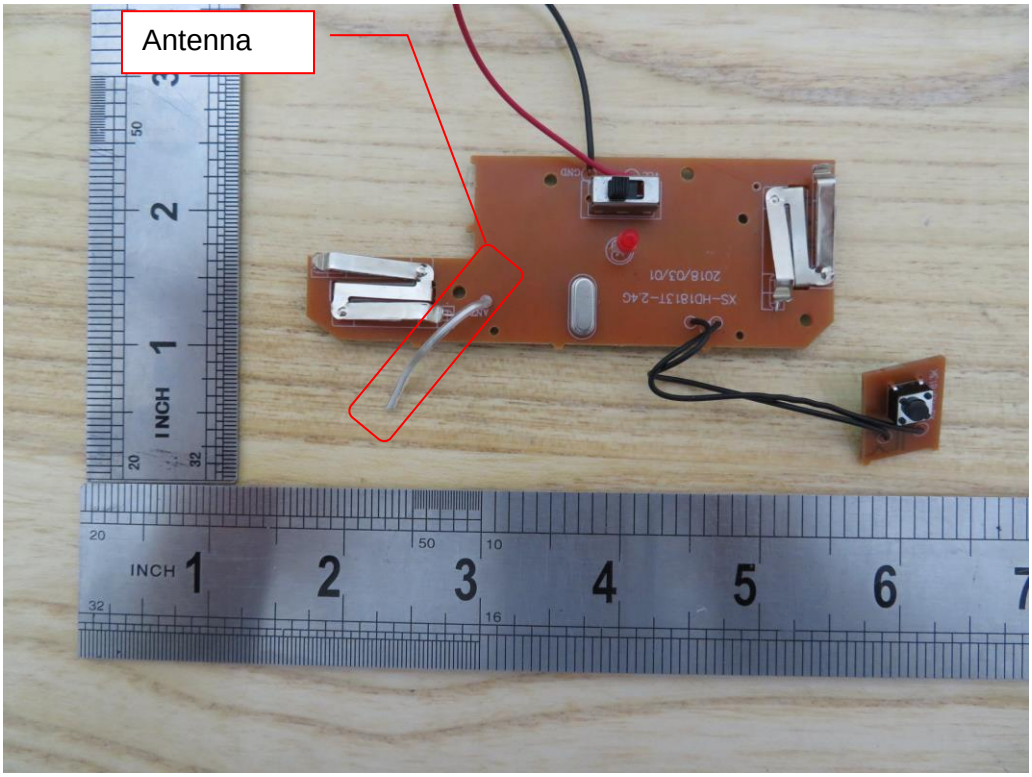
Back View of EUT

Open View of EUT

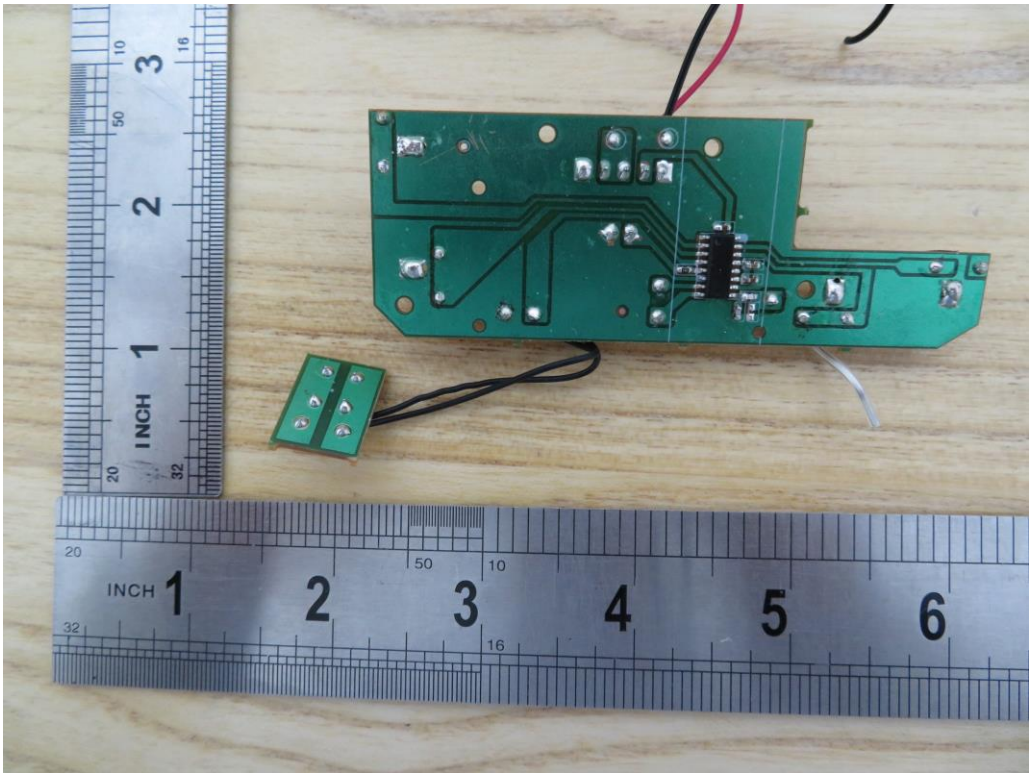
Internal View of EUT-1



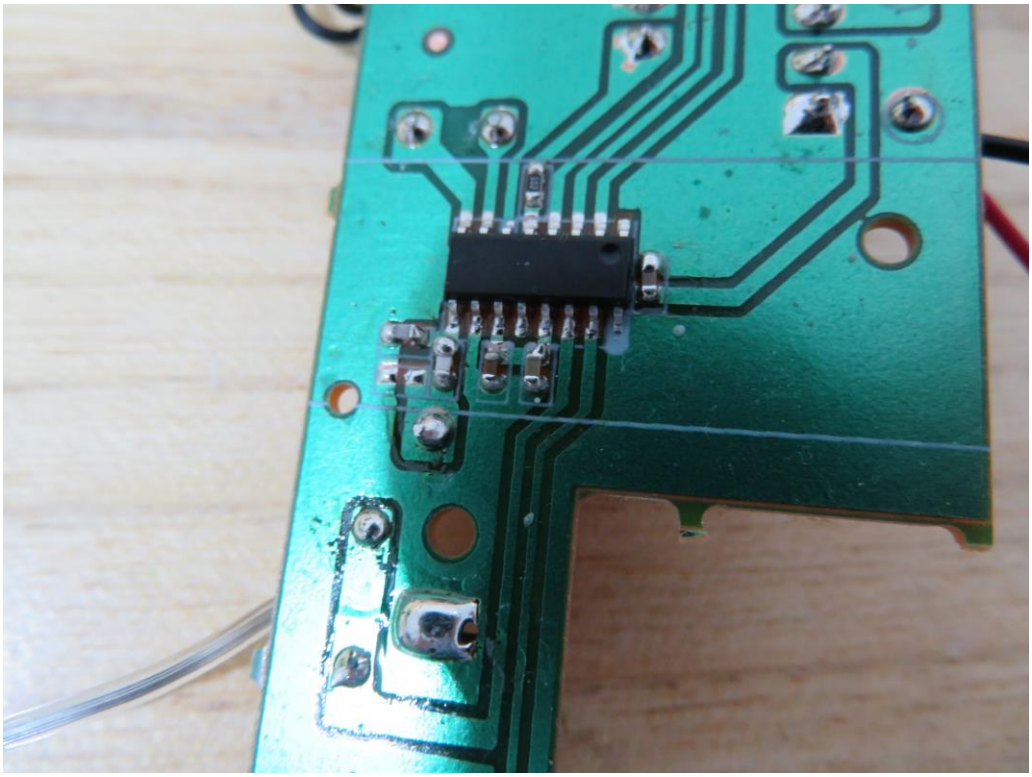
Internal View of EUT-2



Internal View of EUT-3



Detail View of Chip



END OF REPORT