FCC 47 CFR PART 15 SUBPART C

CERTIFICATION TEST REPORT

For

UAV Remote Controller

MODEL NUMBER: DHI-UAV-R10-RH

FCC ID: SVNX820UAV-R

REPORT NUMBER: 4788103049-2-7

ISSUE DATE: November 03, 2017

Prepared for

Zhejiang Dahua Vision Technology Co., Ltd.

No.1199, Bin'an Road, Binjiang District, Hangzhou, P.R. China

Prepared by

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The results reported herein have been performed in accordance with the laboratory's terms of accreditation. This report shall not be reproduced except in full without the written approval of the Laboratory. The results in this report apply to the test sample(s) mentioned above at the time of the testing period only and are not to be used to indicate applicability to other similar products. This report does not imply that the product(s) has met the criteria for certification.

Revision History

Rev.	Issue Date	Revisions	Revised By
--	11/03/2017	Initial Issue	

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1. ATTESTATION OF TEST RESULTS

Applicant Information

Company Name:	Zhejiang Dahua Vision Technology Co., Ltd.
Address:	No.1199, Bin'an Road, Binjiang District, Hangzhou, P.R. China

Manufacturer Information

Company Name:	Zhejiang Dahua Vision Technology Co., Ltd.
Address:	No.1199, Bin'an Road, Binjiang District, Hangzhou, P.R. China

Factory Information

Company Name:	Zhejiang Dahua Vision Technology Co., Ltd.
Address:	No.1199, Bin'an Road, Binjiang District, Hangzhou, P.R. China

EUT Name:	UAV Remote Controller
Brand:	alhua TECHNOLOGY
Model:	DHI-UAV-R10-RH
Serials mode:	UAV-R10-RH
Model Difference	All the same except for the model name.
Date of Tested:	September 01, 2017~ October 22, 2017

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

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Laboratory Manager

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2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC CFR 47 Part 2, FCC CFR 47 Part 15 and 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:

1. 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.
2. For below 30MHz, lab had performed measurements at test anechoic chamber and comparing to measurements obtained on an open field site. And these measurements below 30MHz had been correlated to measurements performed on an OATS.

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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.	

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5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

Equipment	UAV Remote Controller
Model Name	DHI-UAV-R10-RH
Operation frequency	915.000 ~ 919.050MHz
Modulation	2FSK
Bandwidth	15KHz
Adapter	Input: AC100-240V, 50/60Hz, 1.5A Output: DC 12V, 4.0A
Battery	7.4V, 7800mAh

5.2. MAXIMUM OUTPUT POWER

Frequency Range (MHz)	Number of Transmit Chains (NTX)	Frequency (MHz)	Channel Number	Max Power (dBµV/m)
915.000 ~ 919.050	1	915.000 ~ 919.050	0-162[163]	90.90

5.3. 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 7.4V
	VH	N/A

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

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5.4. DESCRIPTION OF AVAILABLE ANTENNAS

Ant.	Frequency (MHz)	Antenna Type	Antenna Gain (dBi)
3	915.000 ~ 919.050MHz	External Antenna	5.0

Test Mode	Transmit and Receive Mode	Description
2FSK	☒ 1TX, 1RX	Chain 3 can be used as transmitting/receiving antenna.

Note: Only 802.11n HT20 support MIMO mode.

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5.5. CHANNEL LIST

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	915.000	42	916.050	84	917.100	126	918.150
1	915.025	43	916.075	85	917.125	127	918.175
2	915.050	44	916.100	86	917.150	128	918.200
3	915.075	45	916.125	87	917.175	129	918.225
4	915.100	46	916.150	88	917.200	130	918.250
5	915.125	47	916.175	89	917.225	131	918.275
6	915.150	48	916.200	90	917.250	132	918.300
7	915.175	49	916.225	91	917.275	133	918.325
8	915.200	50	916.250	92	917.300	134	918.350
9	915.225	51	916.275	93	917.325	135	918.375
10	915.250	52	916.300	94	917.350	136	918.400
11	915.275	53	916.325	95	917.375	137	918.425
12	915.300	54	916.350	96	917.400	138	918.450
13	915.325	55	916.375	97	917.425	139	918.475
14	915.350	56	916.400	98	917.450	140	918.500
15	915.375	57	916.425	99	917.475	141	918.525
16	915.400	58	916.450	100	917.500	142	918.550
17	915.425	59	916.475	101	917.525	143	918.575
18	915.450	60	916.500	102	917.550	144	918.600
19	915.475	61	916.525	103	917.575	145	918.625
20	915.500	62	916.550	104	917.600	146	918.650
21	915.525	63	916.575	105	917.625	147	918.675
22	915.550	64	916.600	106	917.650	148	918.700
23	915.575	65	916.625	107	917.675	149	918.725
24	915.600	66	916.650	108	917.700	150	918.750
25	915.625	67	916.675	109	917.725	151	918.775
26	915.650	68	916.700	110	917.750	152	918.800
27	915.675	69	916.725	111	917.775	153	918.825
28	915.700	70	916.750	112	917.800	154	918.850
29	915.725	71	916.775	113	917.825	155	918.875

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30	915.750	72	916.800	114	917.850	156	918.900
31	915.775	73	916.825	115	917.875	157	918.925
32	915.800	74	916.850	116	917.900	158	918.950
33	915.825	75	916.875	117	917.925	159	918.975
34	915.850	76	916.900	118	917.950	160	919.000
35	915.875	77	916.925	119	917.975	161	919.025
36	915.900	78	916.950	120	918.000	162	919.050
37	915.925	79	916.975	121	918.025		
38	915.950	80	917.000	122	918.050		
39	915.975	81	917.025	123	918.075		
40	916.000	82	917.050	124	918.100		
41	916.025	83	917.075	125	918.125		

5.6. TEST CHANNEL CONFIGURATION

Test Mode	Test Channel	Frequency
GFSK	CH 0, CH 81, CH 162	915.000MHz, 917.025MHz, 919.050MHz

5.7. THE WORSE CASE POWER SETTING PARAMETER

The Worse Case Power Setting Parameter under 2402 ~ 2480MHz Band				
Test Software		N/A		
Modulation Type	Transmit Antenna Number	Test Channel		
		CH 0	CH 81	CH 162
2FSK	1	Default	Default	Default

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5.8. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Item	Equipment	Brand Name	Model Name
1	Laptop	ThinkPad	T460S
2	USB to Serial Conversion board	N/A	N/A

I/O CABLES

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

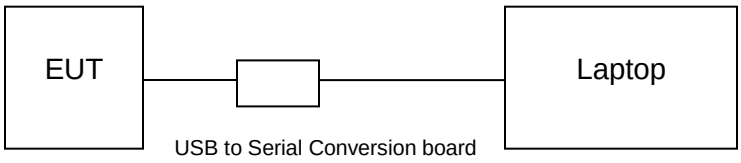
ACCESSORY

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 table PC.

SETUP DIAGRAM FOR TESTS



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5.9. MEASURING INSTRUMENT AND SOFTWARE USED

Radiated Emissions						
Instrument						
Used	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
☑	MXE EMI Receiver	KESIGHT	N9038A	MY56400036	Feb. 24, 2017	Feb. 24, 2018
☑	Hybrid Log Periodic Antenna	TDK	HLP-3003C	130960	Jan.09, 2016	Jan.09, 2019
☑	Preamplifier	HP	8447D	2944A09099	Feb. 13, 2017	Feb. 13, 2018
☑	EMI Measurement Receiver	R&S	ESR26	101377	Dec. 20, 2016	Dec. 20, 2017
☑	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	Jan. 14, 2017	Jan. 14, 2018
☑	Preamplifier	TDK	PA-02-2	TRS-307-00003	Dec. 20, 2016	Dec. 20, 2017
☑	Loop antenna	Schwarzbeck	1519B	00008	Mar. 26, 2016	Mar. 25, 2019
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. 20, 2016	Dec. 20, 2017
☑	Signal Analyzer	R&S	FSV40	A1512015	Dec.20,2016	Dec.20,2017

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6. SUMMARY OF TEST RESULTS

Summary of Test Results			
Clause	Test Items	FCC/IC Rules	Test Results
1	20dB Bandwidth	FCC 15.215	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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7. ANTENNA PORT TEST RESULTS

7.1. ON TIME AND DUTY CYCLE

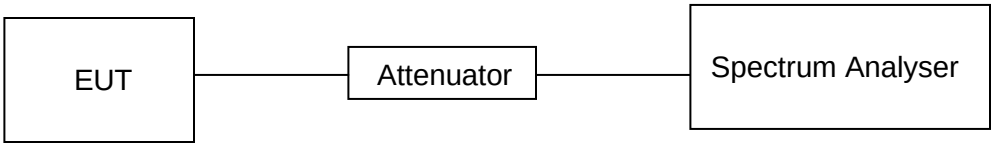
LIMITS

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)
2FSK	109.6	126.8	0.86	86%	0.66

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

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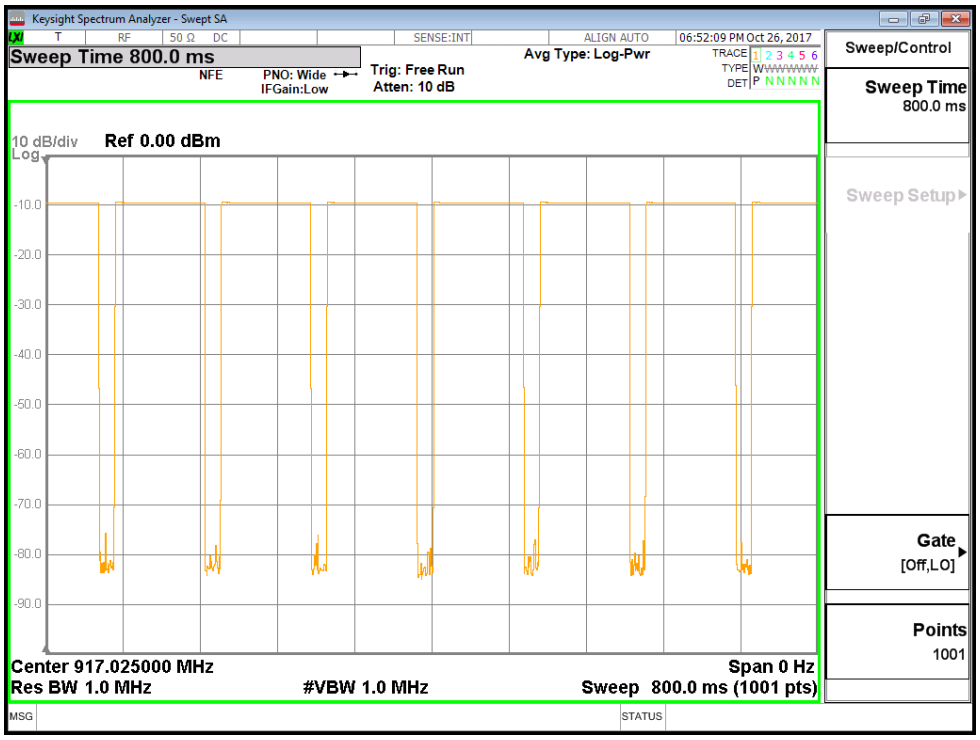
ON TIME AND DUTY CYCLE MID CH PLOT-1



ON TIME AND DUTY CYCLE MID CH PLOT-2

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7.2. 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	902-928 MHz

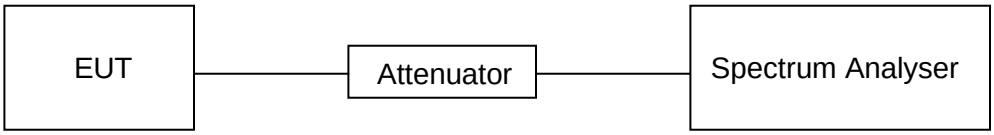
TEST PROCEDURE

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



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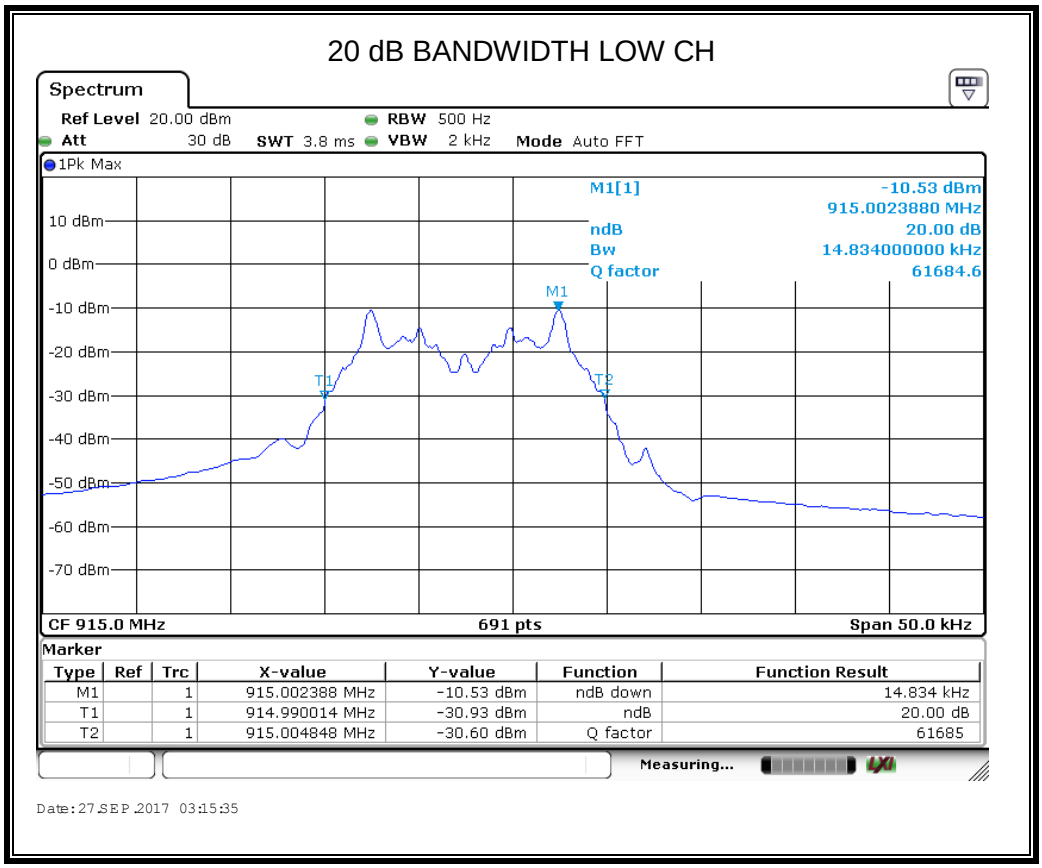
RESULTS

Channel	Frequency (MHz)	20dB bandwidth (KHz)	Result
Low	915.000	14.834	Pass
Middle	917.025	14.761	Pass
High	919.050	14.761	Pass



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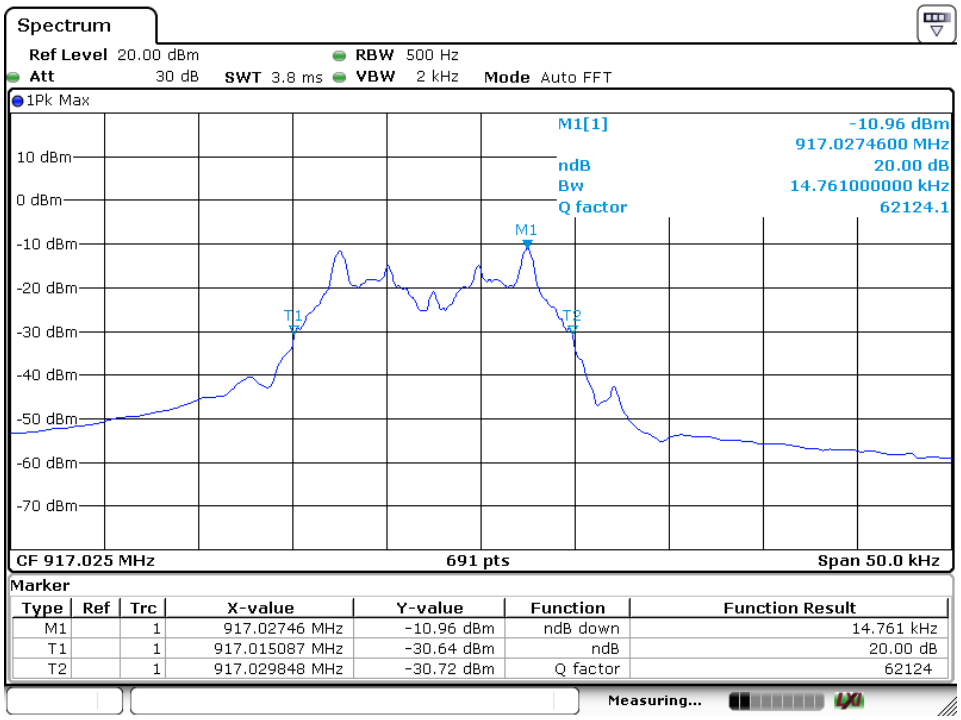
20 dB BANDWIDTH MID CH

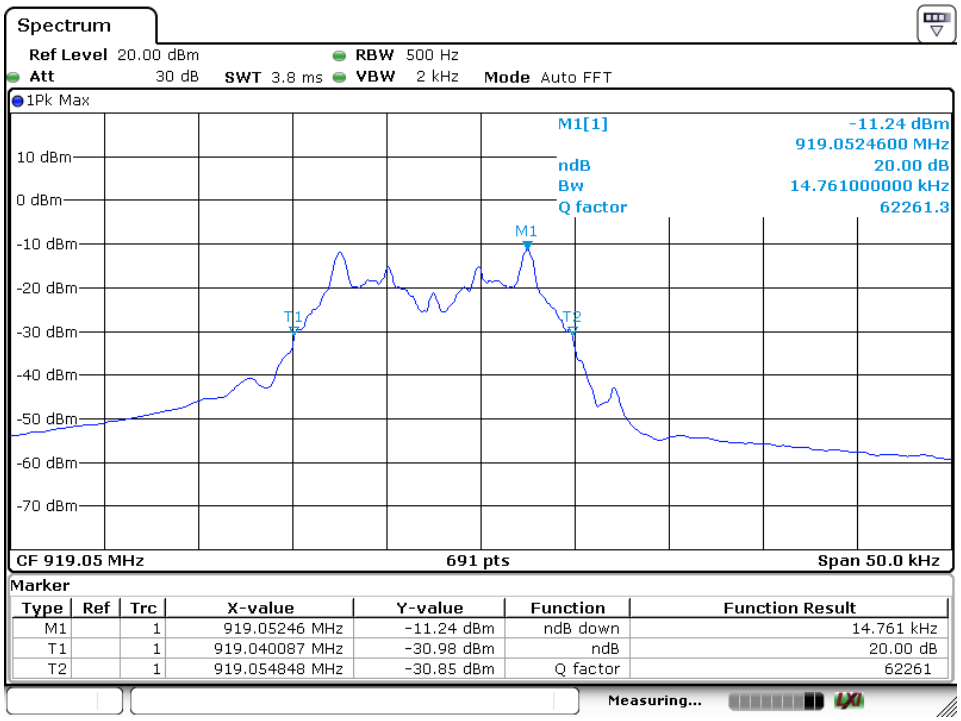


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	917.02746 MHz	-10.96 dBm	ndB down	14.761 kHz
T1		1	917.015087 MHz	-30.64 dBm	ndB	20.00 dB
T2		1	917.029848 MHz	-30.72 dBm	Q factor	62124

Date: 27.SEP.2017 03:19:15

20 dB BANDWIDTH HIGH CH



Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	919.05246 MHz	-11.24 dBm	ndB down	14.761 kHz
T1		1	919.040087 MHz	-30.98 dBm	ndB	20.00 dB
T2		1	919.054848 MHz	-30.85 dBm	Q factor	62261

Date: 27.SEP.2017 03:20:40

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8. RADIATED TEST RESULTS

8.1. 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

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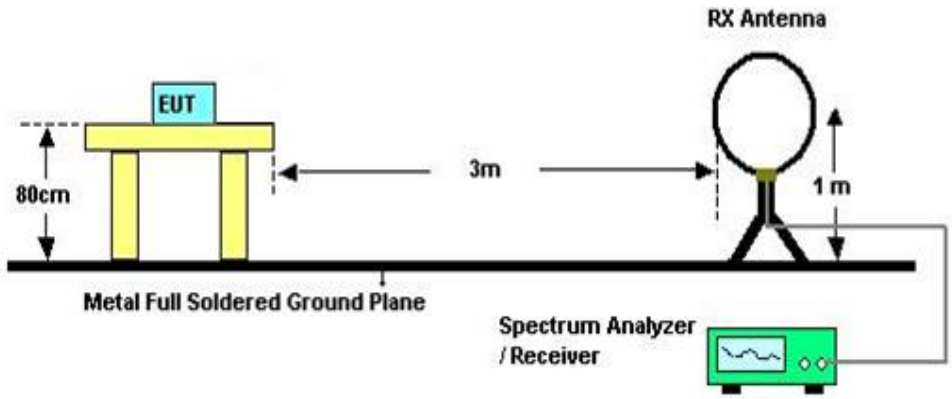
TEST SETUP AND PROCEDURE

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. 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)

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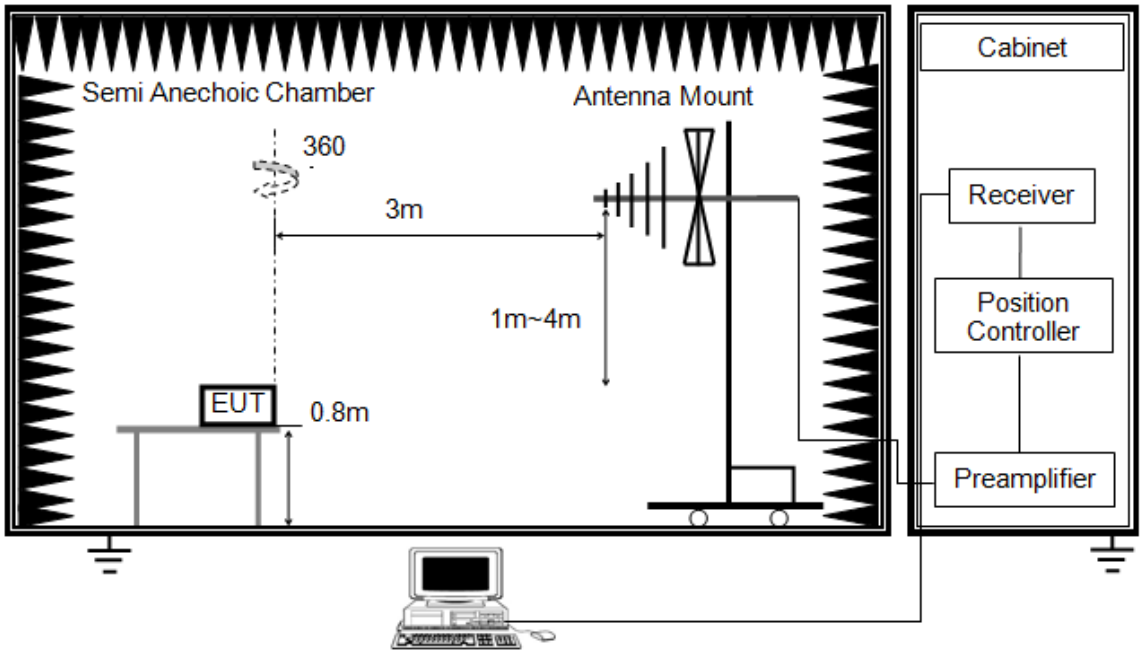
Below 1G



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. 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)

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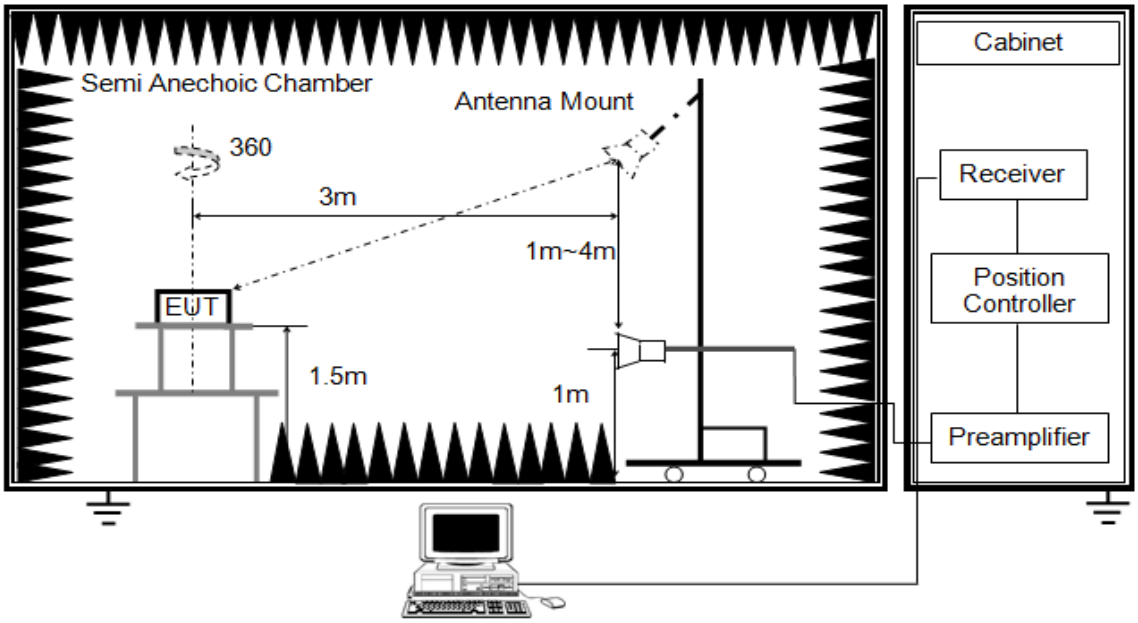
ABOVE 1G



The setting of the spectrum analyser

RBW	1M MHz
VBW	PEAK: 3M AVG: See Note 6
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 detector to AVG, 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 7.1.ON TIME AND DUTY CYCLE.

7. For the actual test configuration, please refer to the related item in this test report (Photographs of the Test Configuration)

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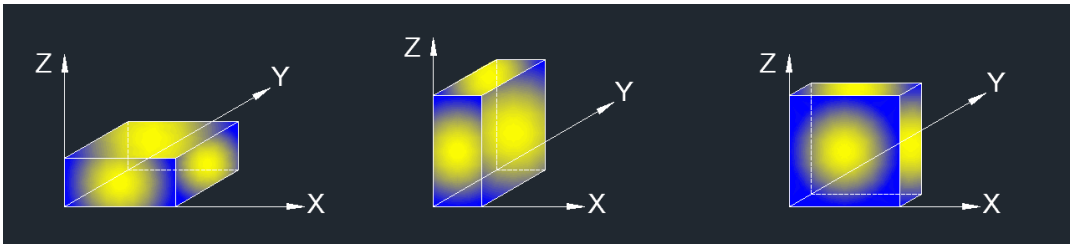
X axis, Y axis, Z axis positions:

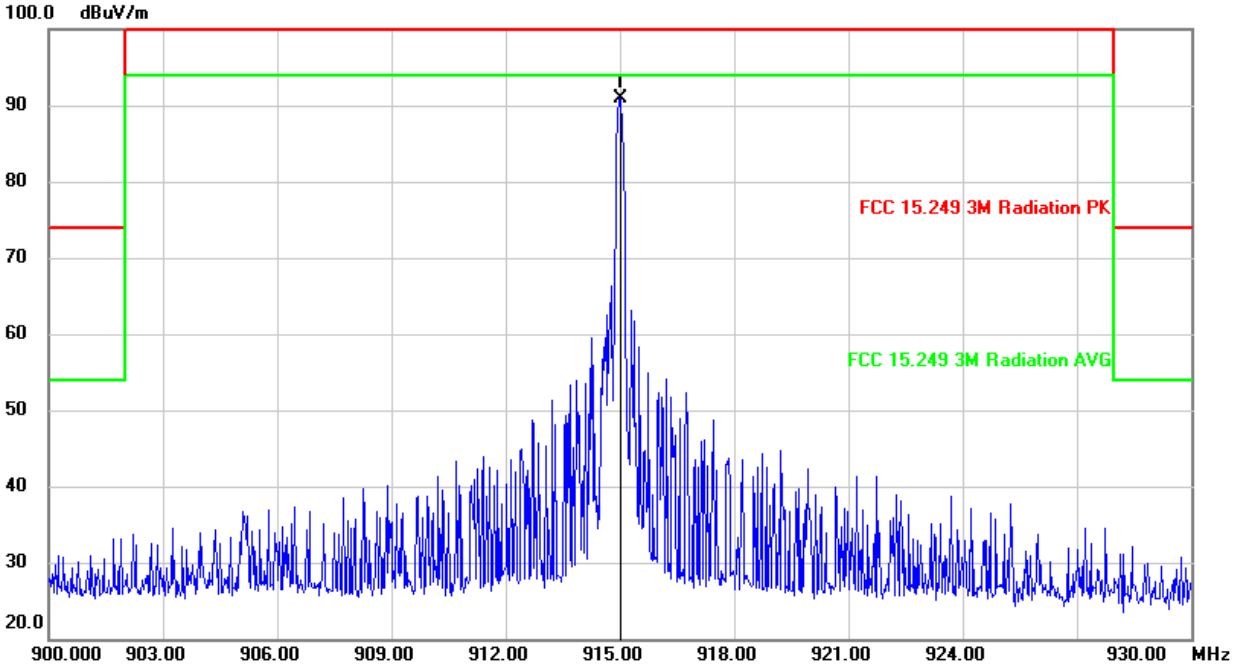


Note 1: For all radiated test, EUT in each of three orthogonal axis emissions had been tested, but only the worst case (X axis) data recorded in the report.

Note 2: All the EUT's emissions had been evaluated for simultaneous transmission with the other 2.4GHz transmitter and there were no any additional or worse emissions found.

8.2. FIELD STRENGTH OF INTENTIONAL EMISSIONS

FIELD STRENGTH OF INTENTIONAL EMISSIONS (LOW CHANNEL, HORIZONTAL)



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
1	915.0000	65.38	25.52	90.90	114.00	-23.10	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.

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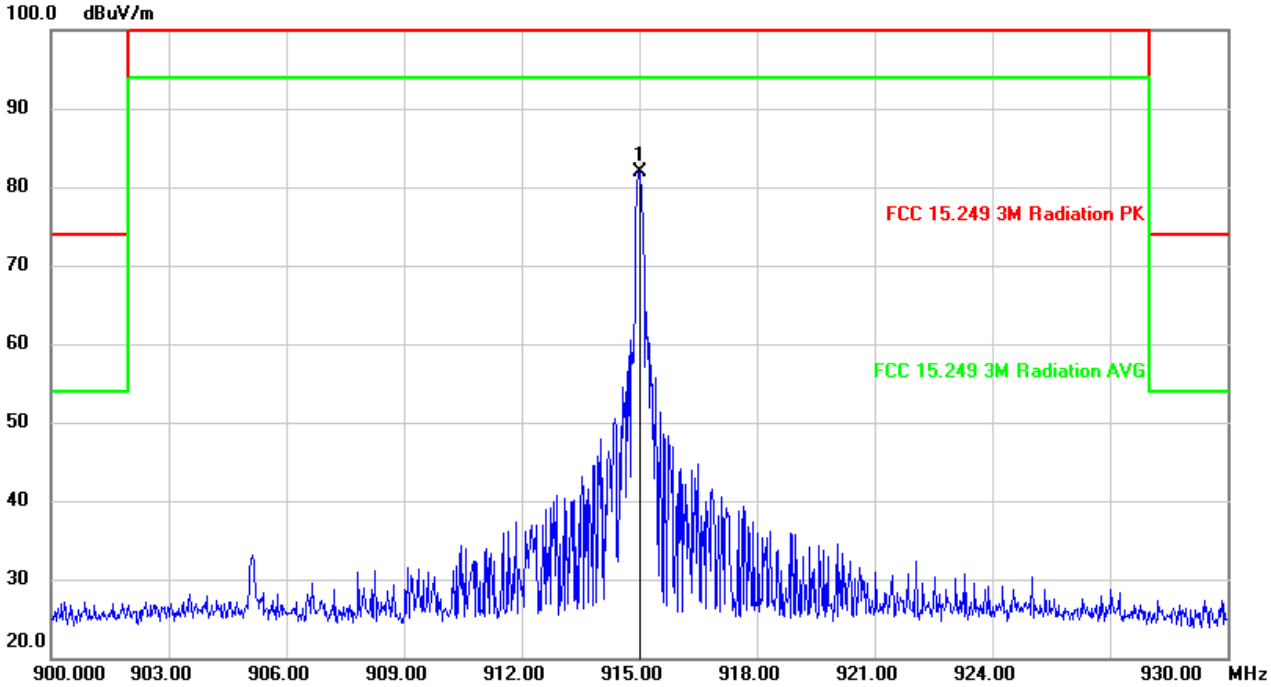
FIELD STRENGTH OF INTENTIONAL EMISSIONS (LOW CHANNEL, VERTICAL)



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	915.0000	56.48	25.52	82.00	114.00	-32.00	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.

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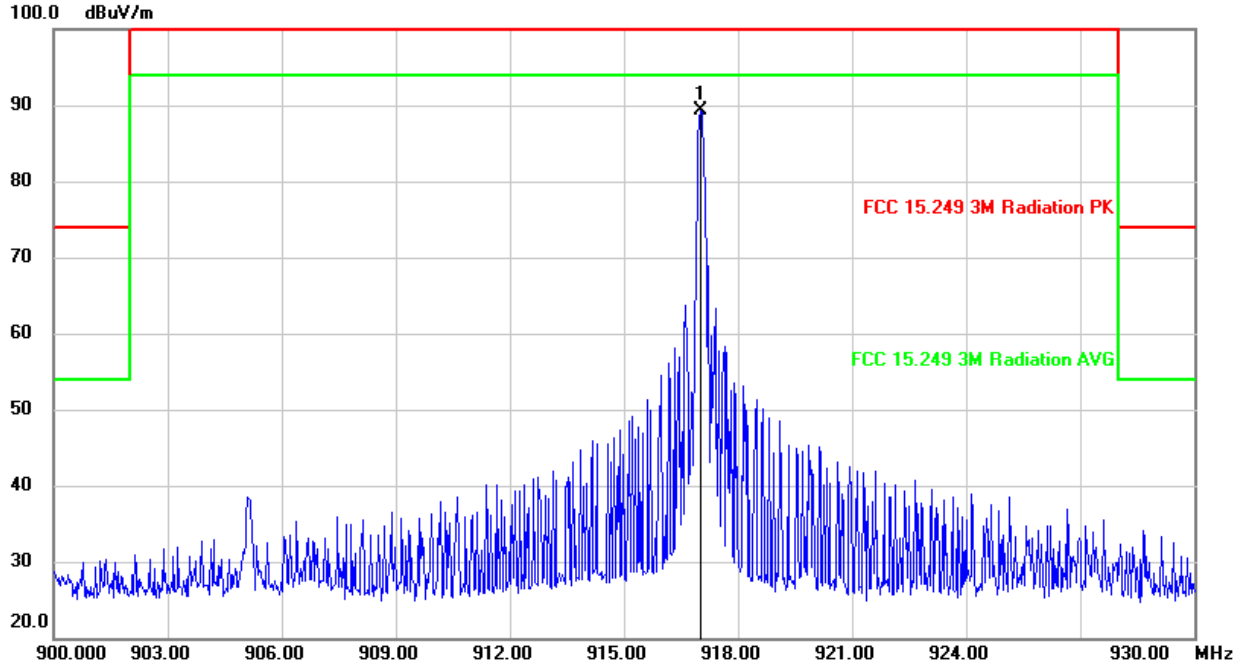
FIELD STRENGTH OF INTENTIONAL EMISSIONS (HIGH CHANNEL, HORIZONTAL)



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
1	917.0100	63.66	25.56	89.22	114.00	-24.78	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.

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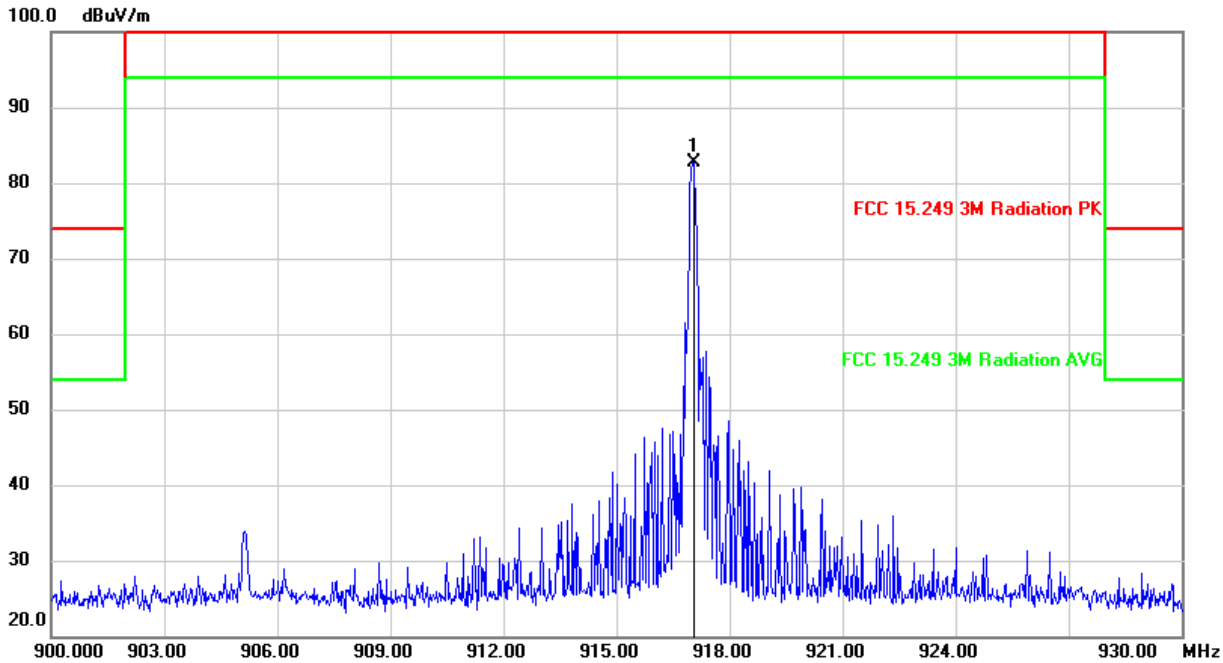
FIELD STRENGTH OF INTENTIONAL EMISSIONS (HIGH CHANNEL, VERTICAL)



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	917.0400	57.05	25.56	82.61	114.00	-31.39	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.

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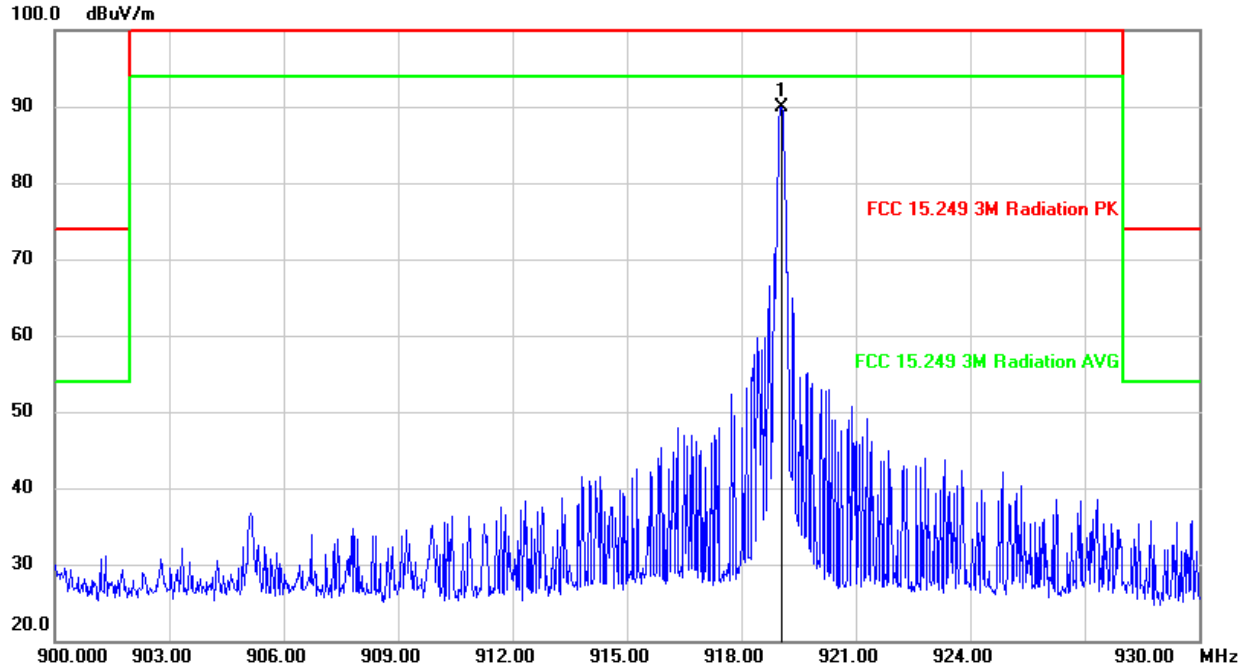
FIELD STRENGTH OF INTENTIONAL EMISSIONS (HIGH CHANNEL, HORIZONTAL)



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
1	919.0500	64.35	25.59	89.94	114.00	-24.06	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.

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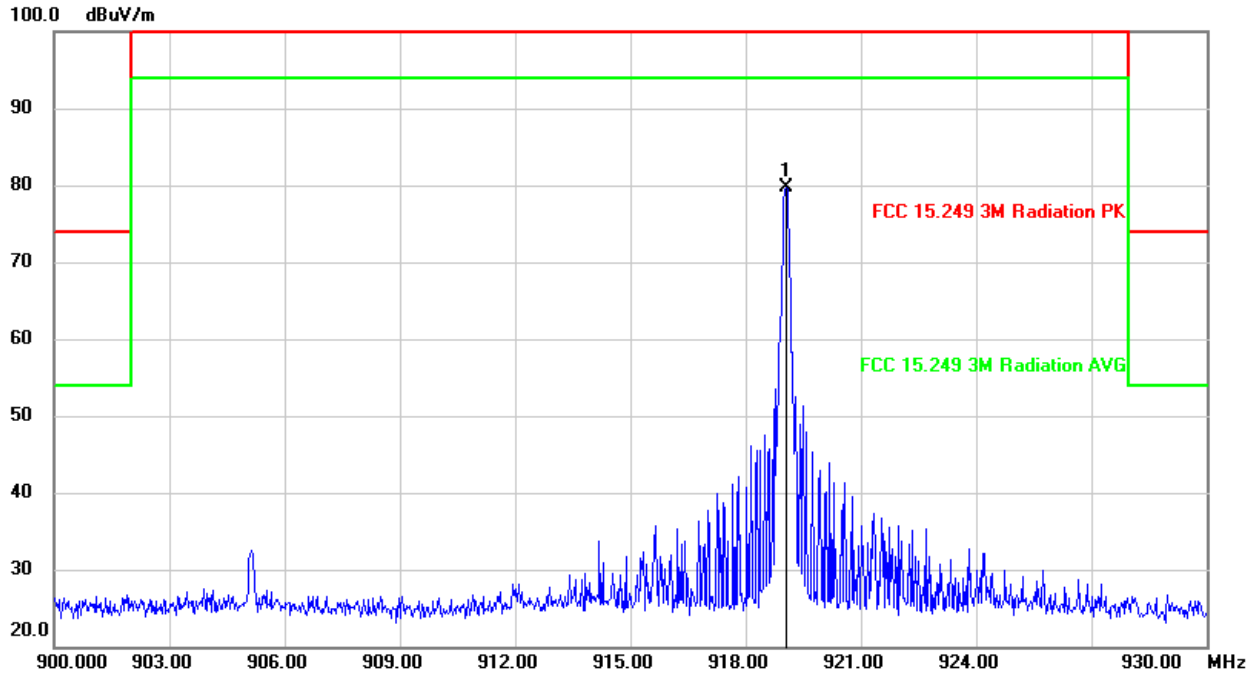
FIELD STRENGTH OF INTENTIONAL EMISSIONS (HIGH CHANNEL, VERTICAL)



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
1	919.0500	54.19	25.59	79.78	114.00	-34.22	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 1: EUT in each of three orthogonal axis emissions had been tested, but only the worst case (X axis) data recorded in the report.

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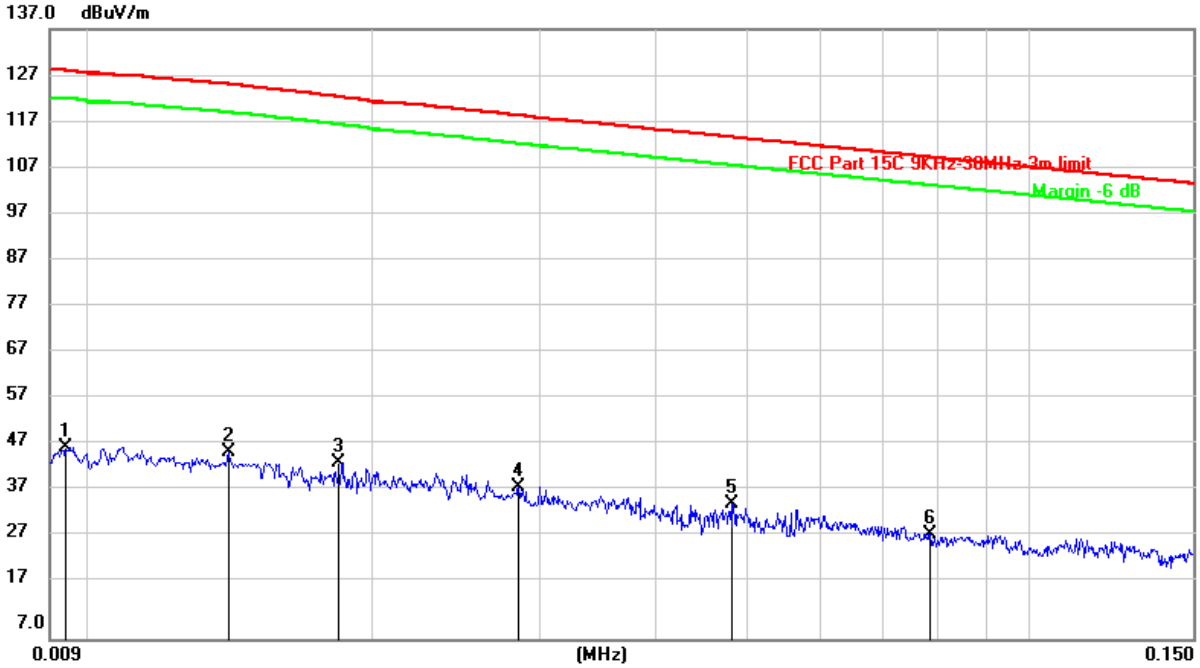
8.3. SPURIOUS EMISSIONS BELOW 30M (WORST-CASE CONFIGURATION)

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	0.0094	27.58	20.26	47.84	128.06	-80.22	peak
2	0.0140	26.47	20.25	46.72	125.19	-78.47	peak
3	0.0183	24.39	20.29	44.68	122.60	-77.92	peak
4	0.0285	19.06	20.31	39.37	118.59	-79.22	peak
5	0.0483	15.40	20.31	35.71	113.95	-78.24	peak
6	0.0785	9.07	20.30	29.37	109.71	-80.34	peak

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

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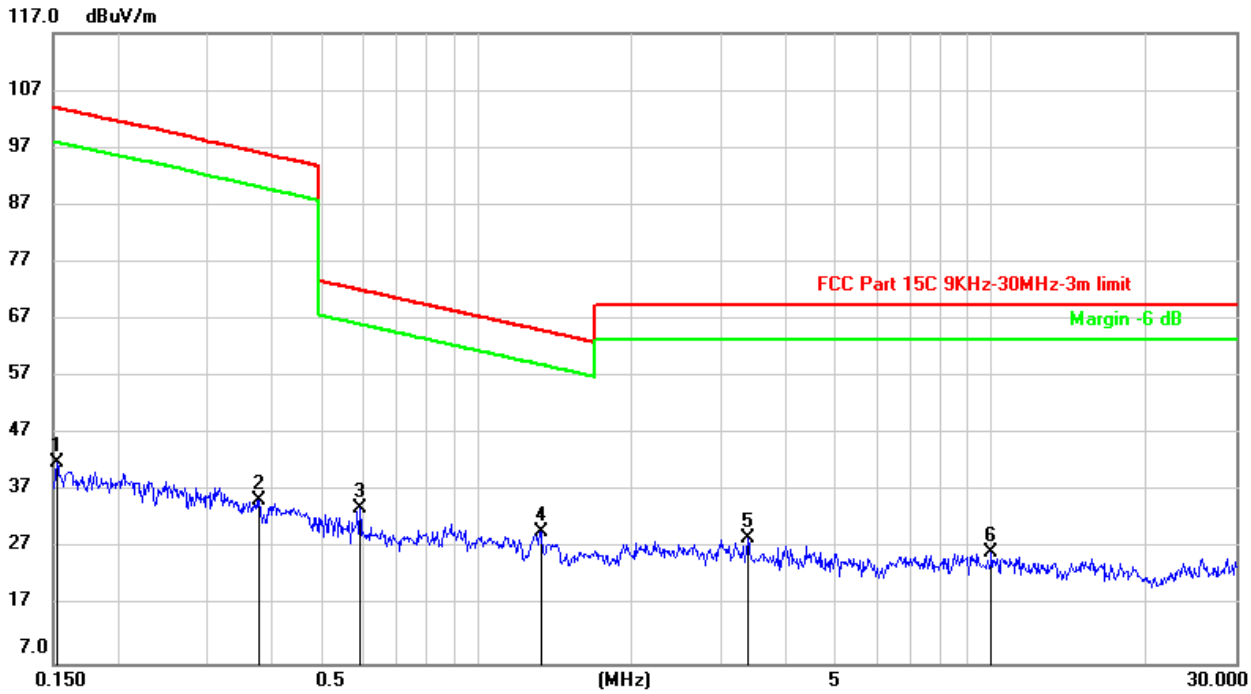
SPURIOUS EMISSIONS BELOW 30MHz (LOW CHANNEL, HORIZONTAL)



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	0.3769	15.15	20.28	35.43	96.14	-60.71	peak
3	0.5916	13.90	20.29	34.19	72.17	-37.98	peak
4	1.3306	9.58	20.49	30.07	65.13	-35.06	peak
5	3.3635	7.79	20.96	28.75	69.54	-40.79	peak
6	10.0182	5.29	21.06	26.35	69.54	-43.19	peak

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

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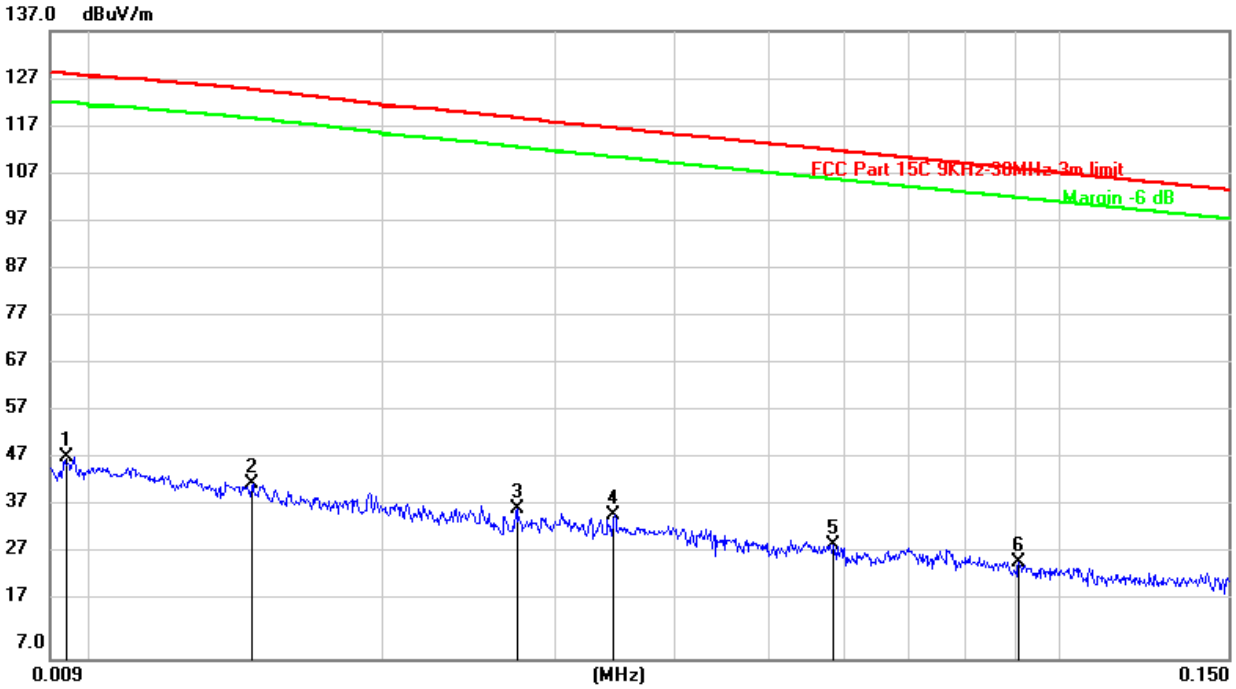
SPURIOUS EMISSIONS BELOW 150KHz (LOW CHANNEL, VERTICAL)



No.	Frequency (KHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	0.0094	28.40	20.26	48.66	128.06	-79.40	peak
2	0.0146	22.84	20.26	43.10	124.83	-81.73	peak
3	0.0274	17.60	20.31	37.91	118.98	-81.07	peak
4	0.0345	16.38	20.31	36.69	116.94	-80.25	peak
5	0.0582	10.21	20.31	30.52	112.32	-81.80	peak
6	0.0908	6.84	20.26	27.10	108.45	-81.35	peak

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

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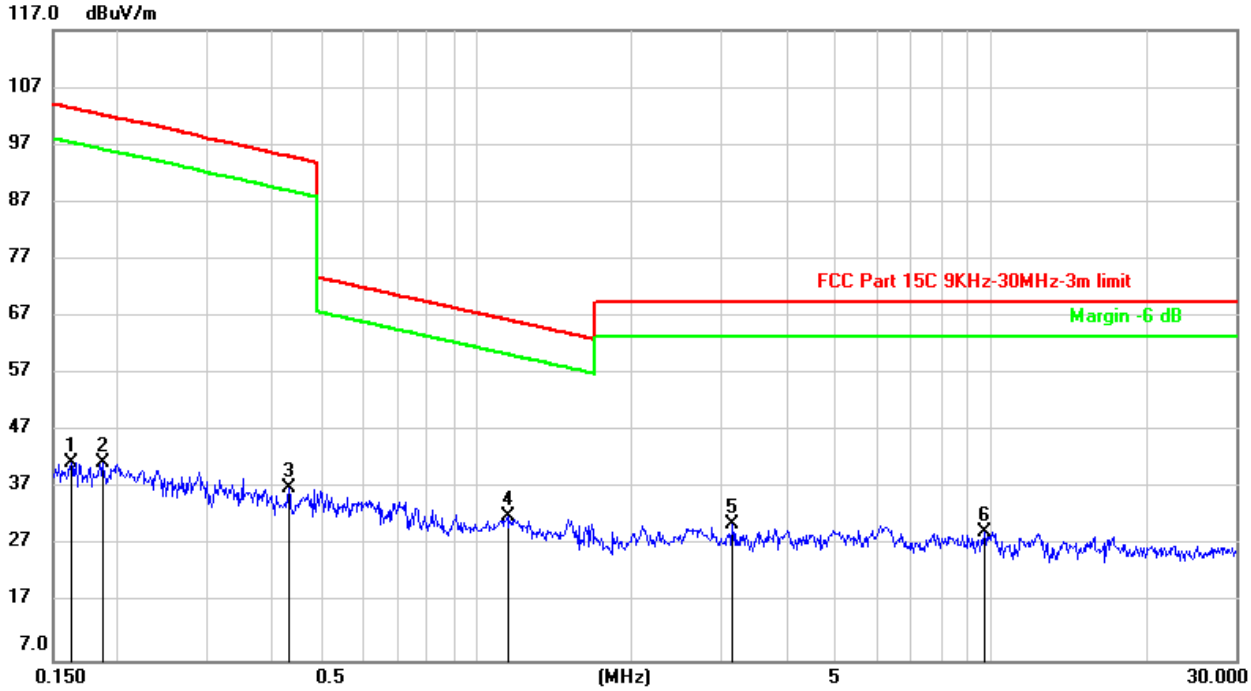
SPURIOUS EMISSIONS BELOW 30MHz (LOW CHANNEL, VERTICAL)



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
1	0.1621	21.11	20.41	41.52	103.41	-61.89	peak
2	0.1874	21.04	20.38	41.42	102.15	-60.73	peak
3	0.4304	16.93	20.27	37.20	94.97	-57.77	peak
4	1.1471	11.70	20.42	32.12	66.42	-34.30	peak
5	3.1396	9.82	20.91	30.73	69.54	-38.81	peak
6	9.7050	8.47	21.04	29.51	69.54	-40.03	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.

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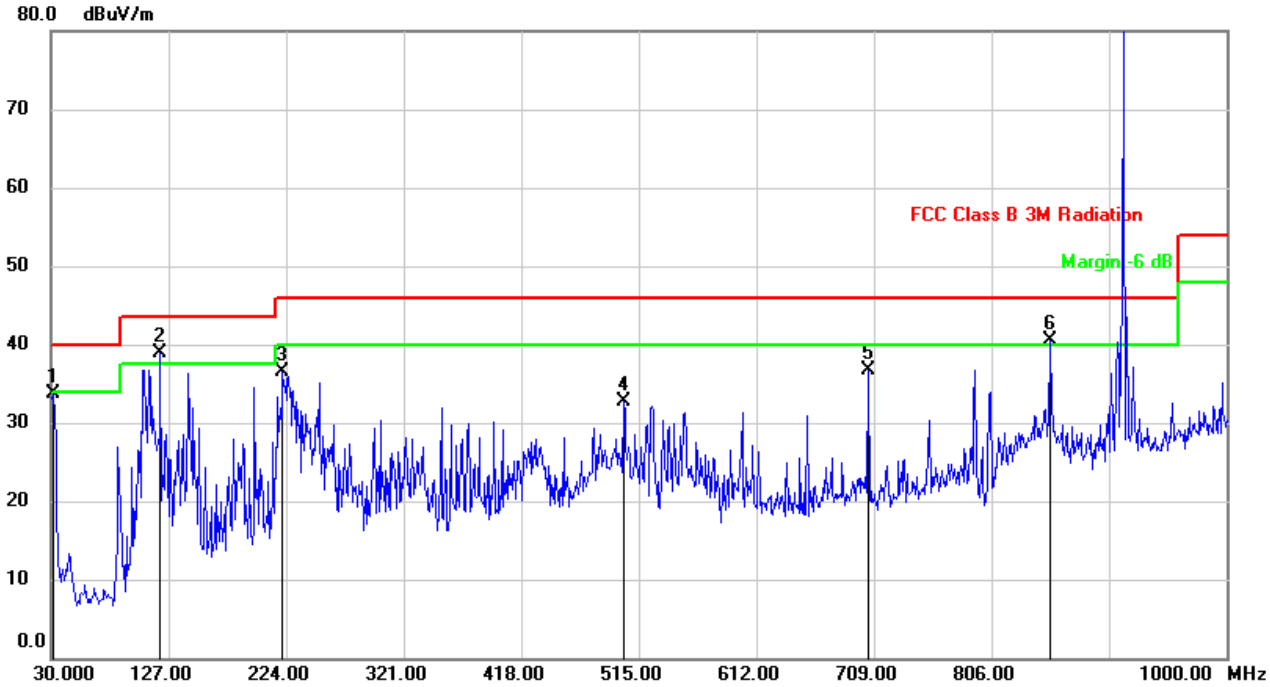
8.4. SPURIOUS EMISSIONS BELOW 1 GHz (WORST-CASE CONFIGURATION)

SPURIOUS EMISSIONS BELOW 1GHZ (LOW CHANNEL, HORIZONTAL)



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	31.9400	48.27	-14.53	33.74	40.00	-6.26	QP
2	120.2100	54.83	-15.86	38.97	43.50	-4.53	QP
3	221.0900	49.47	-13.05	36.42	46.00	-9.58	QP
4	502.3900	40.49	-7.80	32.69	46.00	-13.31	QP
5	704.1500	14.15	22.47	36.62	46.00	-9.38	QP
6	854.5000	16.16	24.43	40.59	46.00	-5.41	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.

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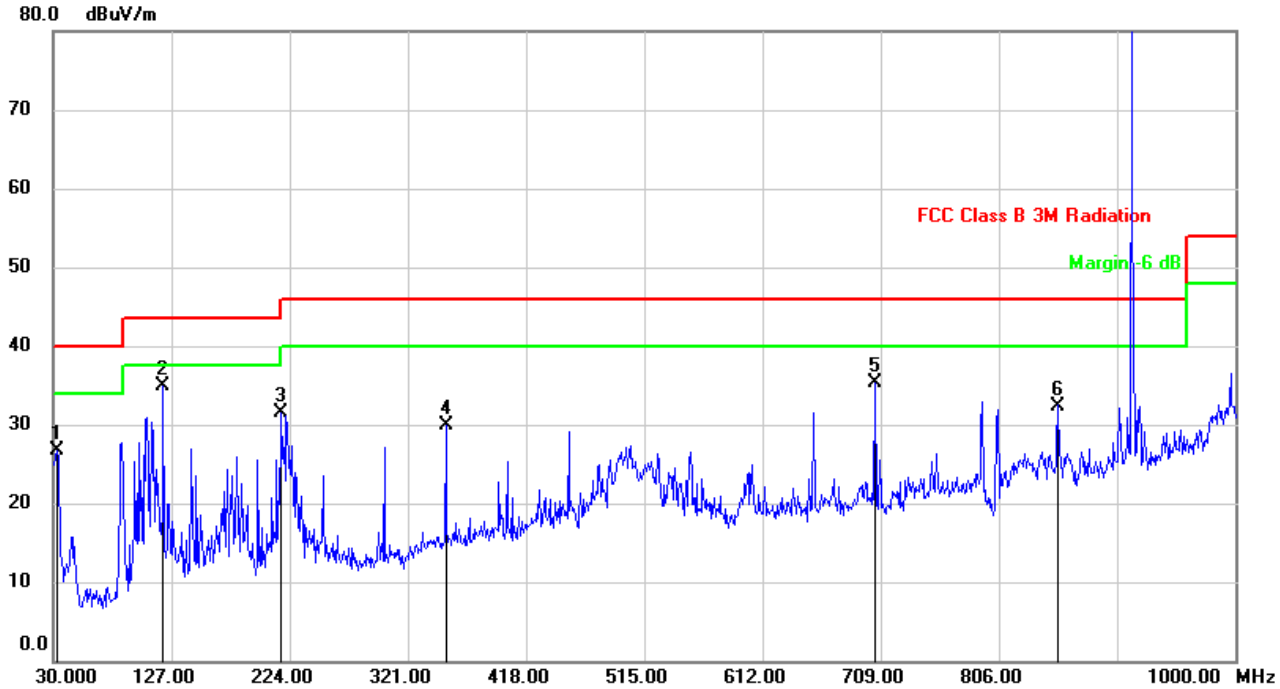
SPURIOUS EMISSIONS BELOW 1GHz (LOW CHANNEL, VERTICAL)



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	32.9100	41.43	-14.68	26.75	40.00	-13.25	QP
2	120.2100	50.77	-15.86	34.91	43.50	-8.59	QP
3	217.2100	44.36	-12.95	31.41	46.00	-14.59	QP
4	352.0400	40.94	-11.05	29.89	46.00	-16.11	QP
5	704.1500	12.77	22.47	35.24	46.00	-10.76	QP
6	854.5000	7.97	24.43	32.40	46.00	-13.60	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.

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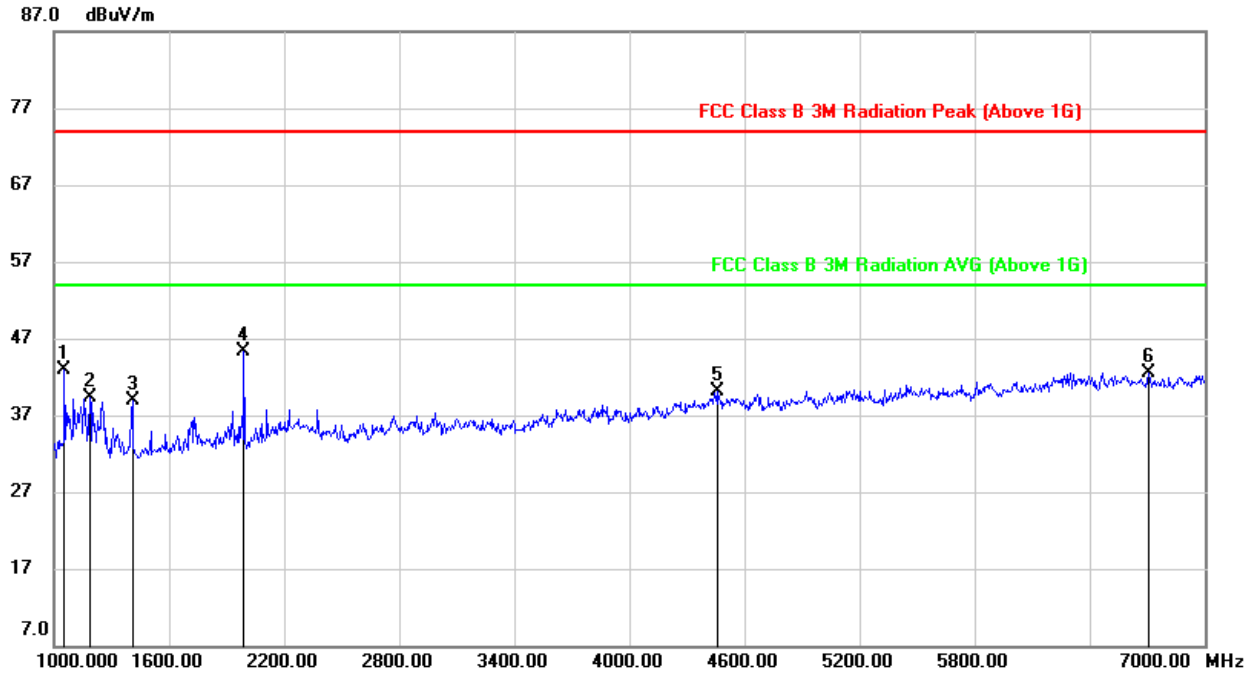
8.5. SPURIOUS EMISSIONS 1 ~ 7GHz

HARMONICS AND SPURIOUS EMISSIONS 1G~7GHz (LOW CHANNEL, HORIZONTAL)



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	1054.000	56.93	-14.10	42.83	74.00	-31.17	peak
2	1186.000	52.91	-13.57	39.34	74.00	-34.66	peak
3	1408.000	51.46	-12.61	38.85	74.00	-35.15	peak
4	1990.000	56.49	-11.26	45.23	74.00	-28.77	peak
5	4456.000	42.43	-2.30	40.13	74.00	-33.87	peak
6	6706.000	38.81	3.73	42.54	74.00	-31.46	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.

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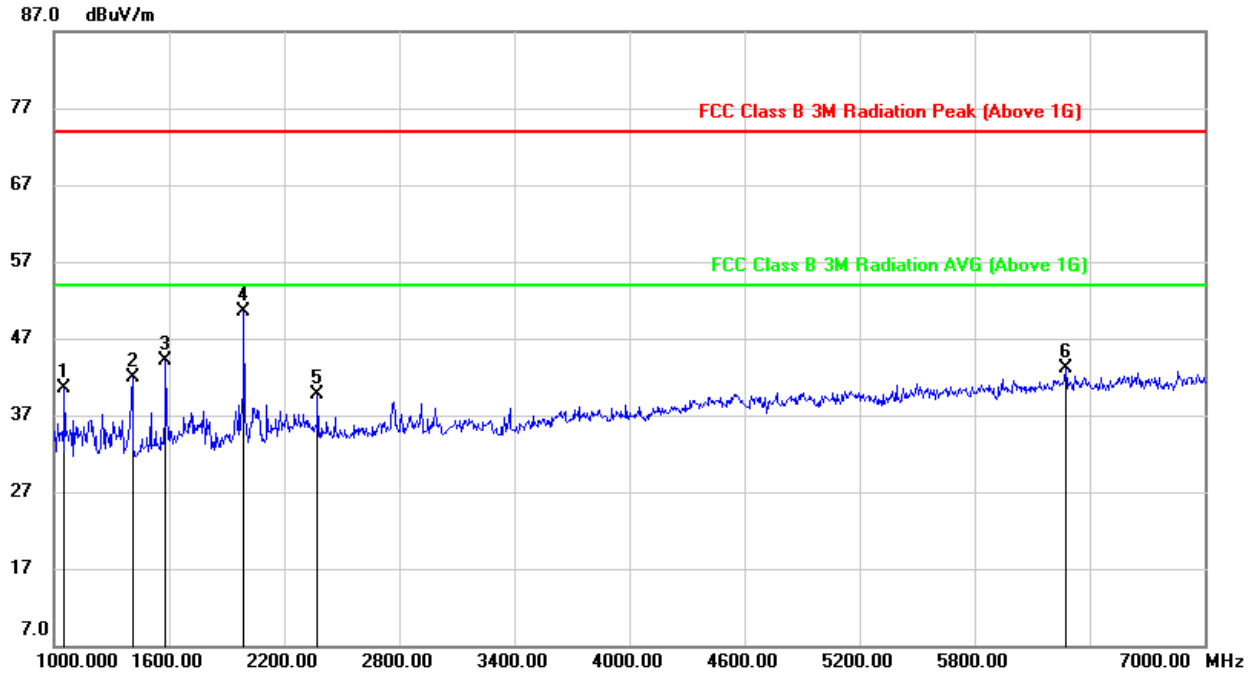
HARMONICS AND SPURIOUS EMISSIONS 1G~7GHz (LOW CHANNEL, VERTICAL)



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	1054.000	54.98	-14.40	40.58	74.00	-33.42	peak
2	1408.000	54.86	-12.94	41.92	74.00	-32.08	peak
3	1582.000	56.83	-12.74	44.09	74.00	-29.91	peak
4	1990.000	61.70	-11.28	50.42	74.00	-23.58	peak
5	2374.000	48.46	-8.71	39.75	74.00	-34.25	peak
6	6274.000	40.16	3.01	43.17	74.00	-30.83	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.

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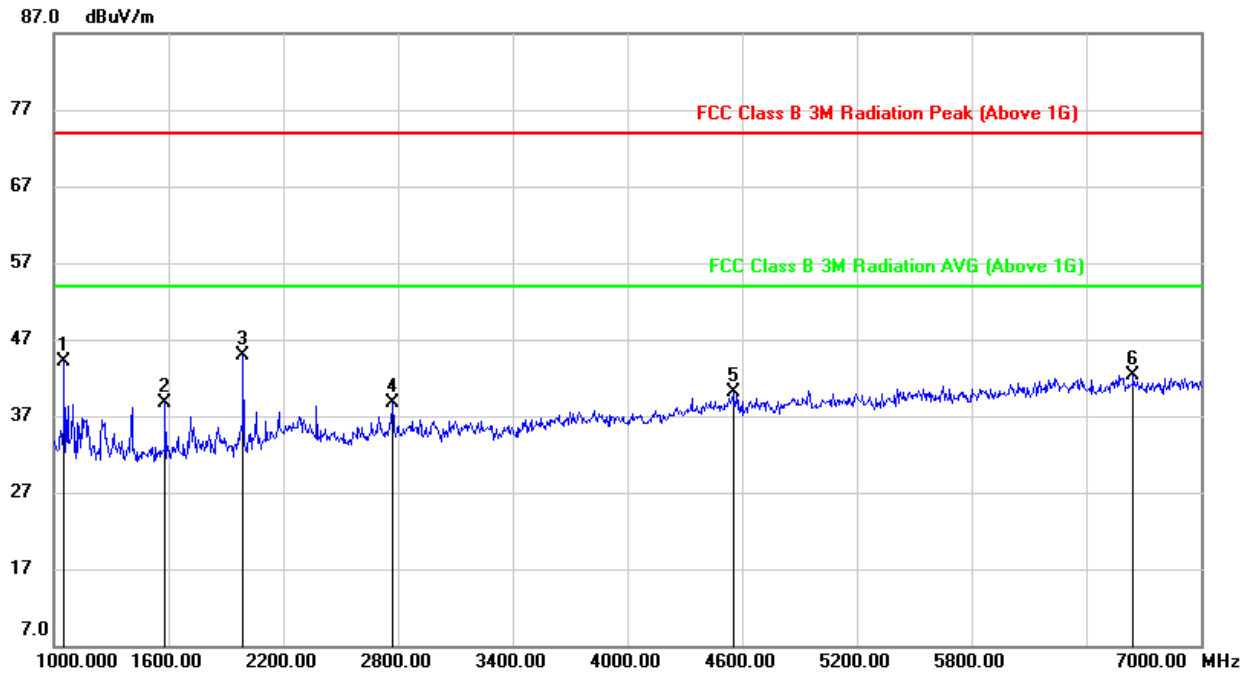
HARMONICS AND SPURIOUS EMISSIONS 1G~7GHz (MIDDLE CHANNEL, HORIZONTAL)



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	1054.000	58.12	-14.10	44.02	74.00	-29.98	peak
2	1582.000	51.45	-12.77	38.68	74.00	-35.32	peak
3	1990.000	56.25	-11.26	44.99	74.00	-29.01	peak
4	2770.000	46.45	-7.75	38.70	74.00	-35.30	peak
5	4552.000	42.25	-2.10	40.15	74.00	-33.85	peak
6	6646.000	38.48	3.77	42.25	74.00	-31.75	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.

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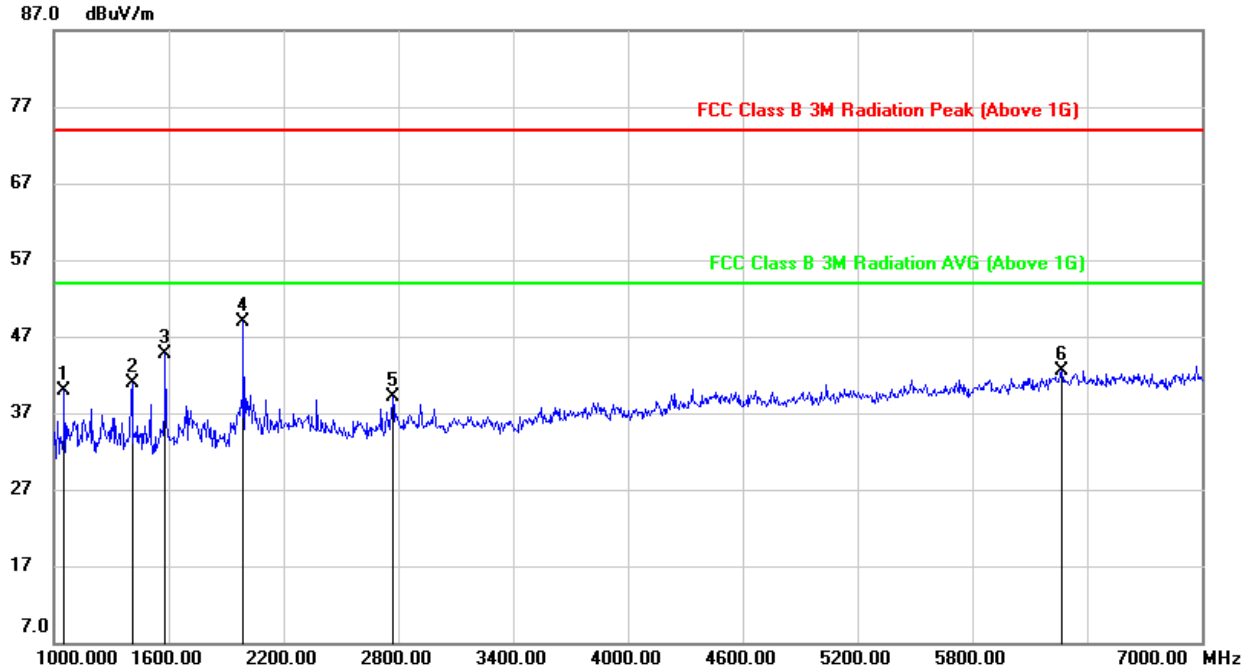
HARMONICS AND SPURIOUS EMISSIONS 1G~7GHz (MIDDLE CHANNEL, VERTICAL)



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	1054.000	54.37	-14.40	39.97	74.00	-34.03	peak
2	1408.000	53.78	-12.94	40.84	74.00	-33.16	peak
3	1582.000	57.48	-12.74	44.74	74.00	-29.26	peak
4	1990.000	60.16	-11.28	48.88	74.00	-25.12	peak
5	2770.000	46.98	-7.81	39.17	74.00	-34.83	peak
6	6268.000	39.48	2.99	42.47	74.00	-31.53	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.

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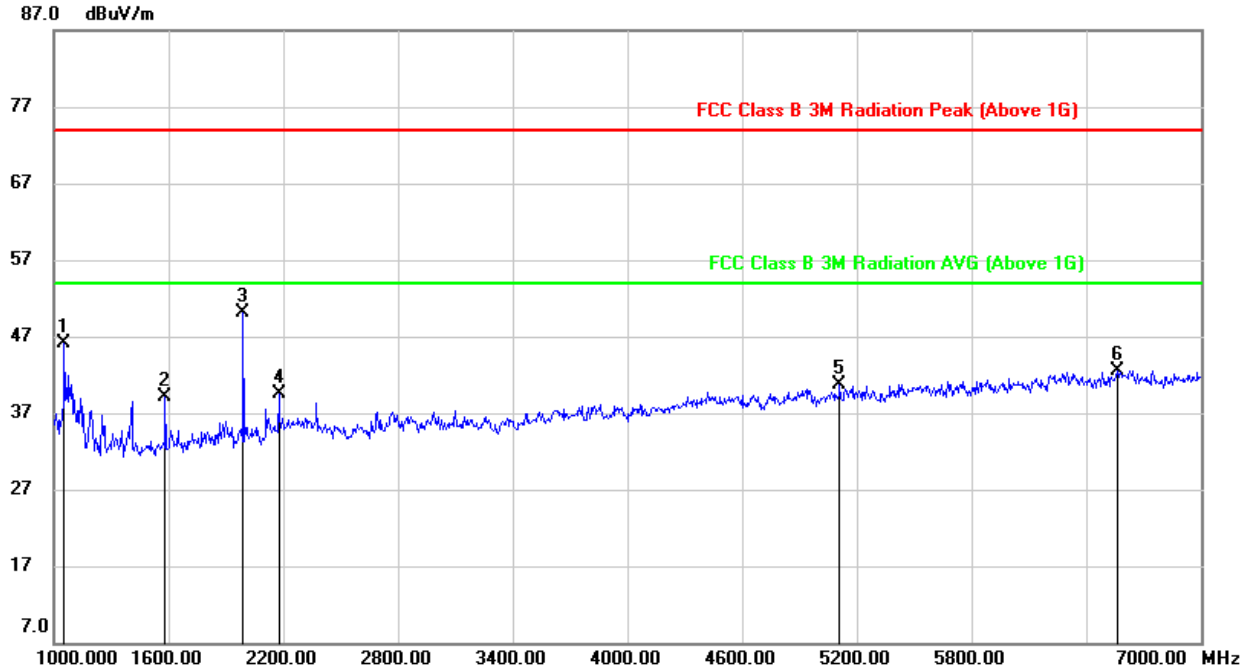
HARMONICS AND SPURIOUS EMISSIONS 1G~7GHz (HIGH CHANNEL, HORIZONTAL)



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	1054.000	60.22	-14.10	46.12	74.00	-27.88	peak
2	1582.000	51.78	-12.77	39.01	74.00	-34.99	peak
3	1990.000	61.32	-11.26	50.06	74.00	-23.94	peak
4	2176.000	48.66	-9.19	39.47	74.00	-34.53	peak
5	5110.000	41.17	-0.42	40.75	74.00	-33.25	peak
6	6562.000	38.86	3.64	42.50	74.00	-31.50	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.

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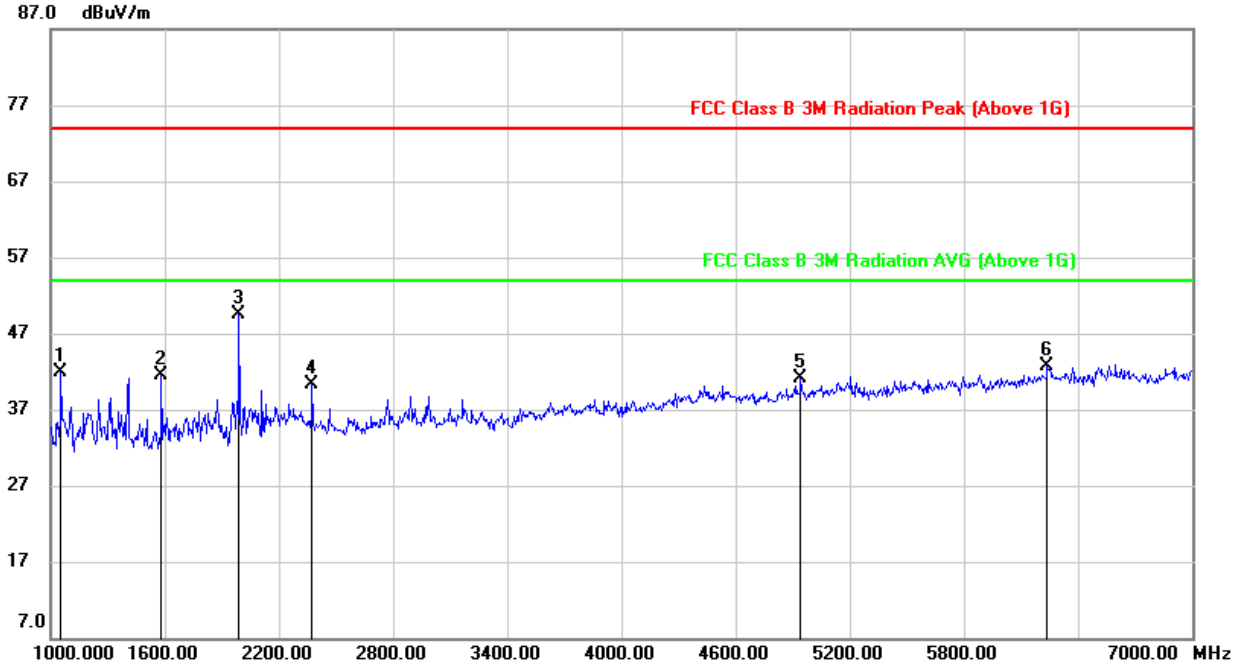
HARMONICS AND SPURIOUS EMISSIONS 1G~7GHz (HIGH CHANNEL, VERTICAL)



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	1054.000	56.35	-14.40	41.95	74.00	-32.05	peak
2	1582.000	54.15	-12.74	41.41	74.00	-32.59	peak
3	1990.000	60.85	-11.28	49.57	74.00	-24.43	peak
4	2374.000	49.05	-8.71	40.34	74.00	-33.66	peak
5	4942.000	41.88	-0.76	41.12	74.00	-32.88	peak
6	6238.000	39.84	2.90	42.74	74.00	-31.26	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.

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

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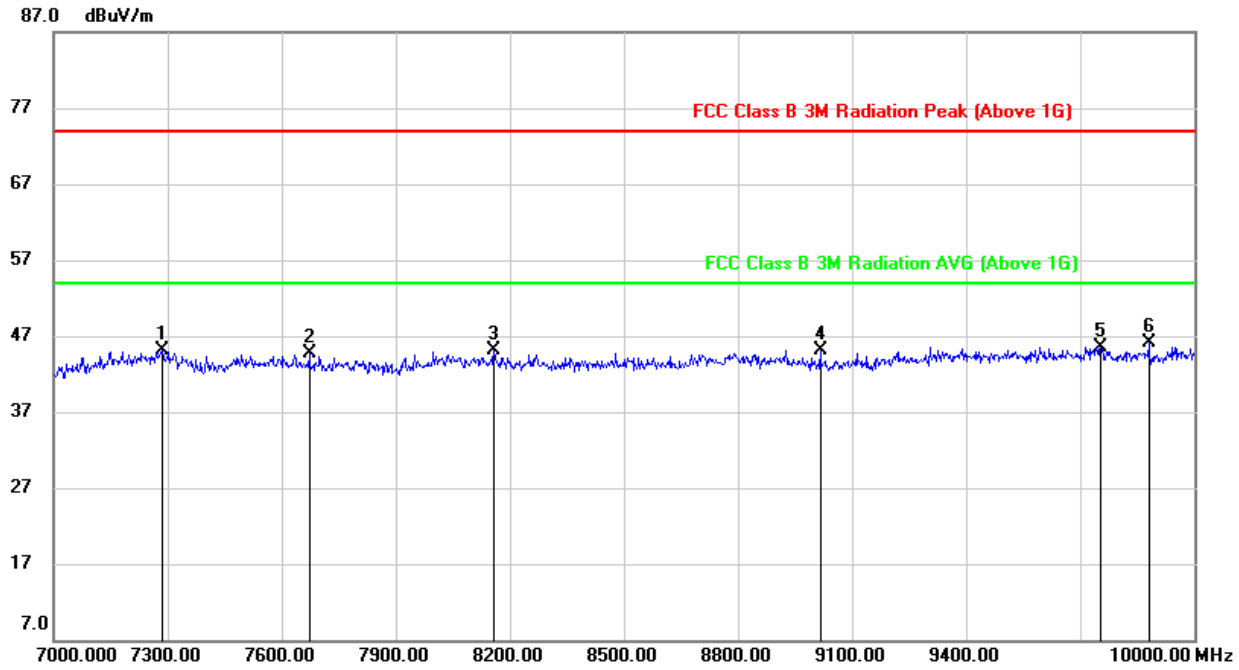
8.6. SPURIOUS EMISSIONS 7G ~ 10GHz

SPURIOUS EMISSIONS 7GHz TO 10GHz (LOW CHANNEL, HORIZONTAL)



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	7285.000	39.05	5.97	45.02	74.00	-28.98	peak
2	7672.000	38.65	6.12	44.77	74.00	-29.23	peak
3	8158.000	38.16	6.88	45.04	74.00	-28.96	peak
4	9016.000	37.35	7.76	45.11	74.00	-28.89	peak
5	9754.000	36.16	9.38	45.54	74.00	-28.46	peak
6	9880.000	36.57	9.53	46.10	74.00	-27.90	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.

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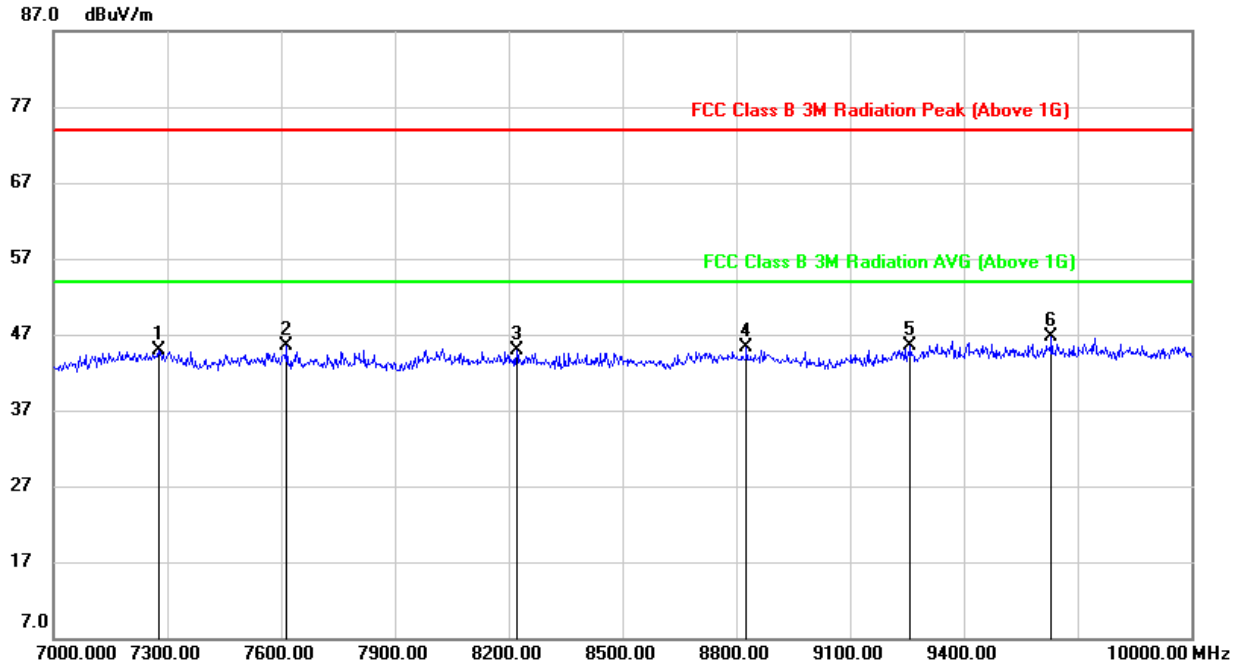
SPURIOUS EMISSIONS 7GHz TO 10GHz (LOW CHANNEL, VERTICAL)



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	7276.000	38.91	5.92	44.83	74.00	-29.17	peak
2	7615.000	39.30	6.13	45.43	74.00	-28.57	peak
3	8221.000	37.86	7.05	44.91	74.00	-29.09	peak
4	8827.000	37.40	7.82	45.22	74.00	-28.78	peak
5	9259.000	36.89	8.62	45.51	74.00	-28.49	peak
6	9631.000	37.46	9.21	46.67	74.00	-27.33	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.

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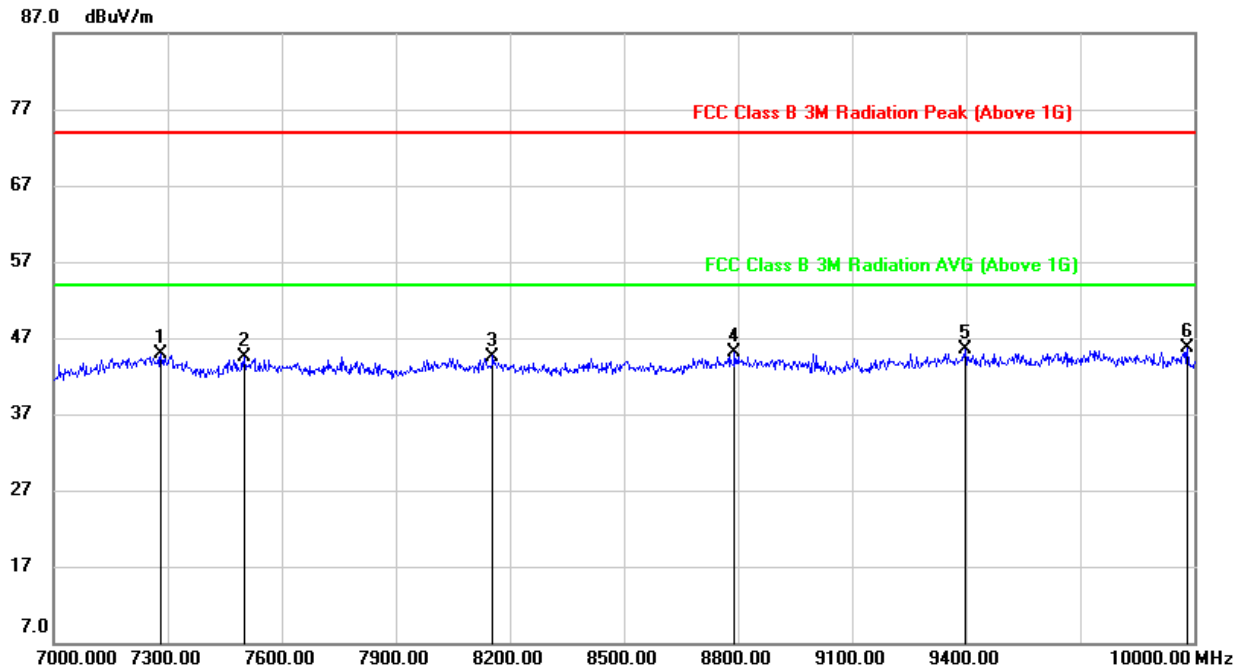
SPURIOUS EMISSIONS 7GHz TO 10GHz (MIDDLE CHANNEL, HORIZONTAL)



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	7282.000	38.86	5.98	44.84	74.00	-29.16	peak
2	7501.000	38.18	6.40	44.58	74.00	-29.42	peak
3	8155.000	37.73	6.87	44.60	74.00	-29.40	peak
4	8791.000	37.17	7.85	45.02	74.00	-28.98	peak
5	9397.000	36.44	9.12	45.56	74.00	-28.44	peak
6	9982.000	35.97	9.65	45.62	74.00	-28.38	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.

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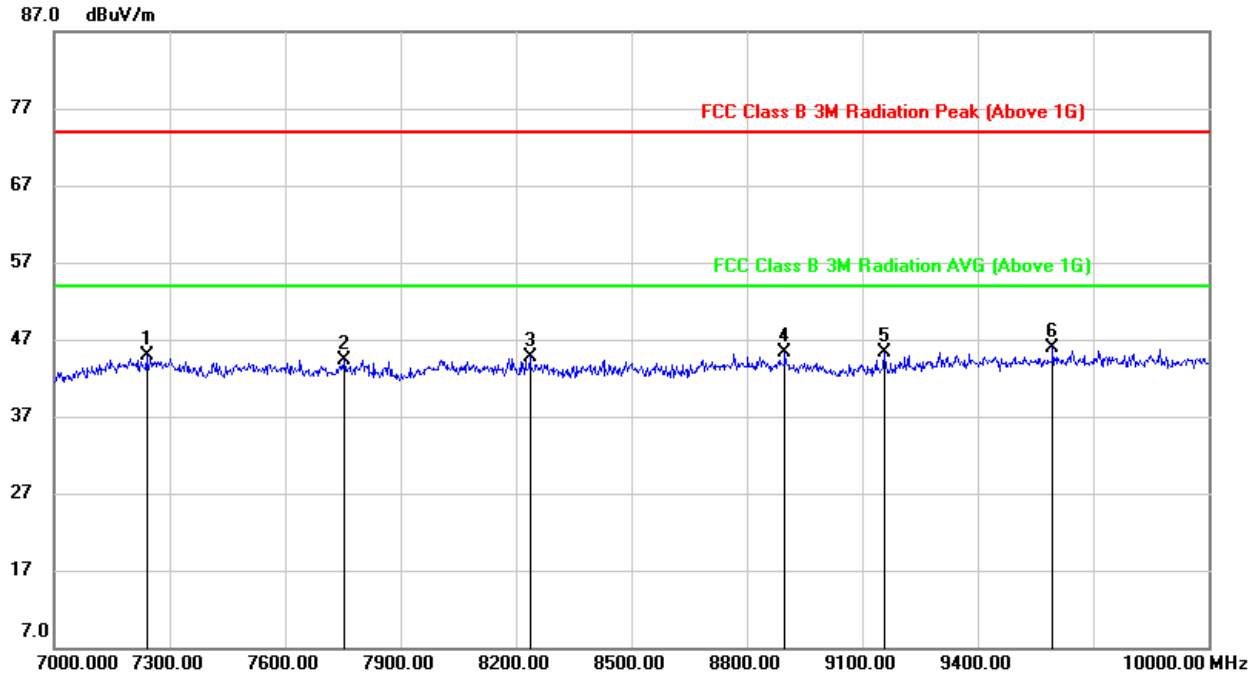
SPURIOUS EMISSIONS 7GHz TO 10GHz (MIDDLE CHANNEL, VERTICAL)



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	7240.000	39.03	5.86	44.89	74.00	-29.11	peak
2	7753.000	38.02	6.32	44.34	74.00	-29.66	peak
3	8236.000	37.60	7.02	44.62	74.00	-29.38	peak
4	8899.000	37.43	7.82	45.25	74.00	-28.75	peak
5	9157.000	37.21	8.19	45.40	74.00	-28.60	peak
6	9595.000	36.56	9.25	45.81	74.00	-28.19	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.

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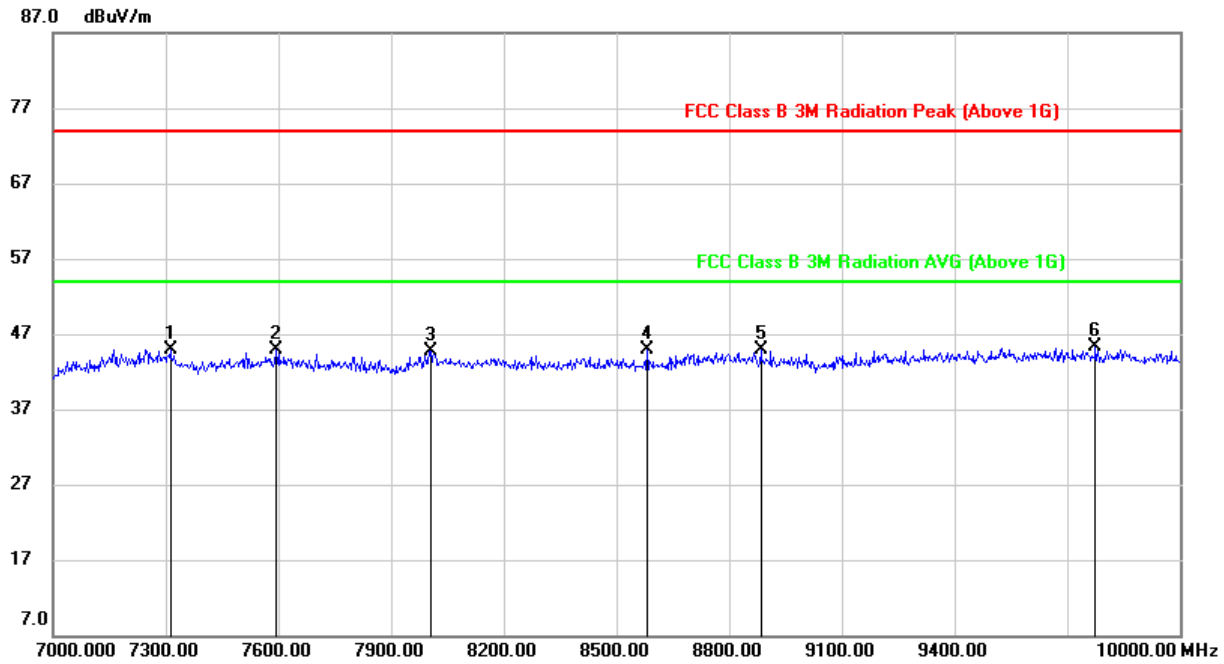
SPURIOUS EMISSIONS 7GHz TO 10GHz (HIGH CHANNEL, HORIZONTAL)



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
1	7312.000	38.98	5.86	44.84	74.00	-29.16	peak
2	7594.000	38.73	6.24	44.97	74.00	-29.03	peak
3	8005.000	37.92	6.79	44.71	74.00	-29.29	peak
4	8581.000	38.21	6.77	44.98	74.00	-29.02	peak
5	8884.000	37.13	7.80	44.93	74.00	-29.07	peak
6	9775.000	35.80	9.45	45.25	74.00	-28.75	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.

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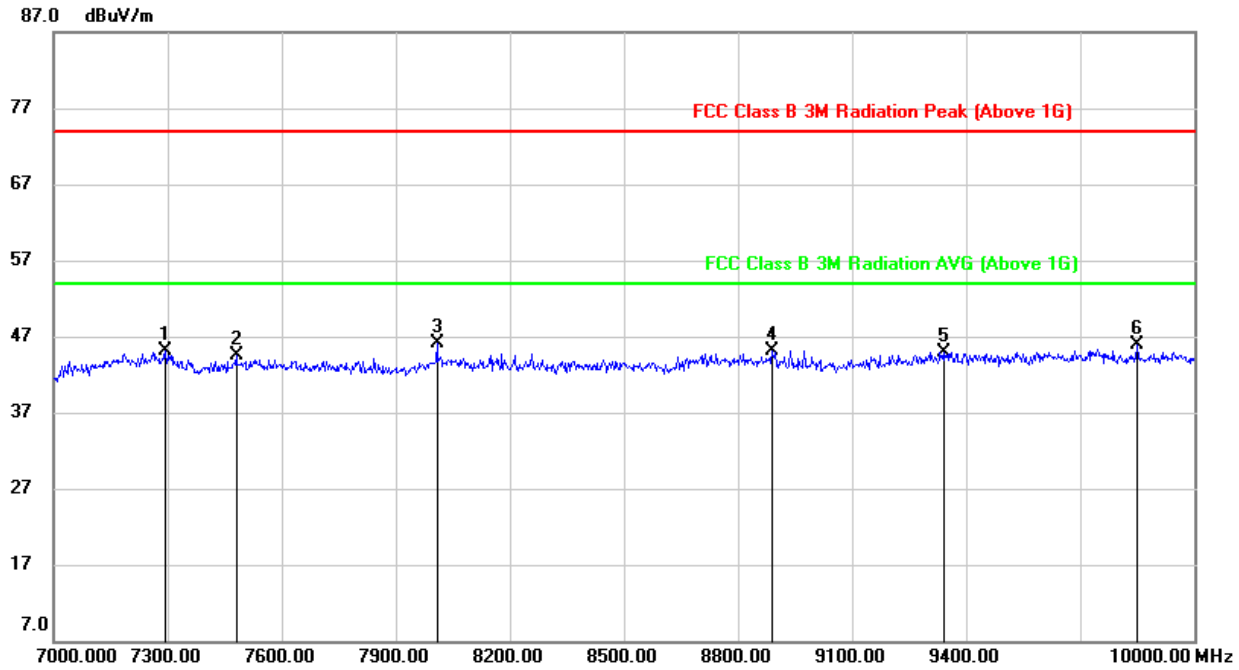
SPURIOUS EMISSIONS 7GHz TO 10GHz (HIGH CHANNEL, VERTICAL)



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
1	7294.000	39.14	5.97	45.11	74.00	-28.89	peak
2	7480.000	38.18	6.24	44.42	74.00	-29.58	peak
3	8008.000	39.18	6.87	46.05	74.00	-27.95	peak
4	8890.000	37.20	7.83	45.03	74.00	-28.97	peak
5	9340.000	35.90	9.05	44.95	74.00	-29.05	peak
6	9850.000	36.09	9.75	45.84	74.00	-28.16	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.

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

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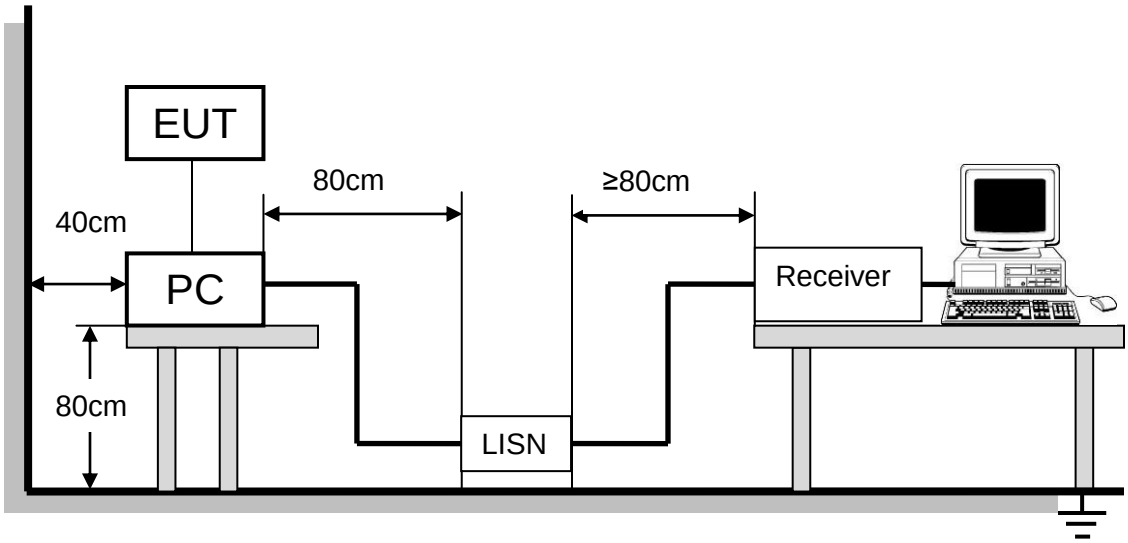
9. AC POWER LINE CONDUCTED EMISSIONS

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

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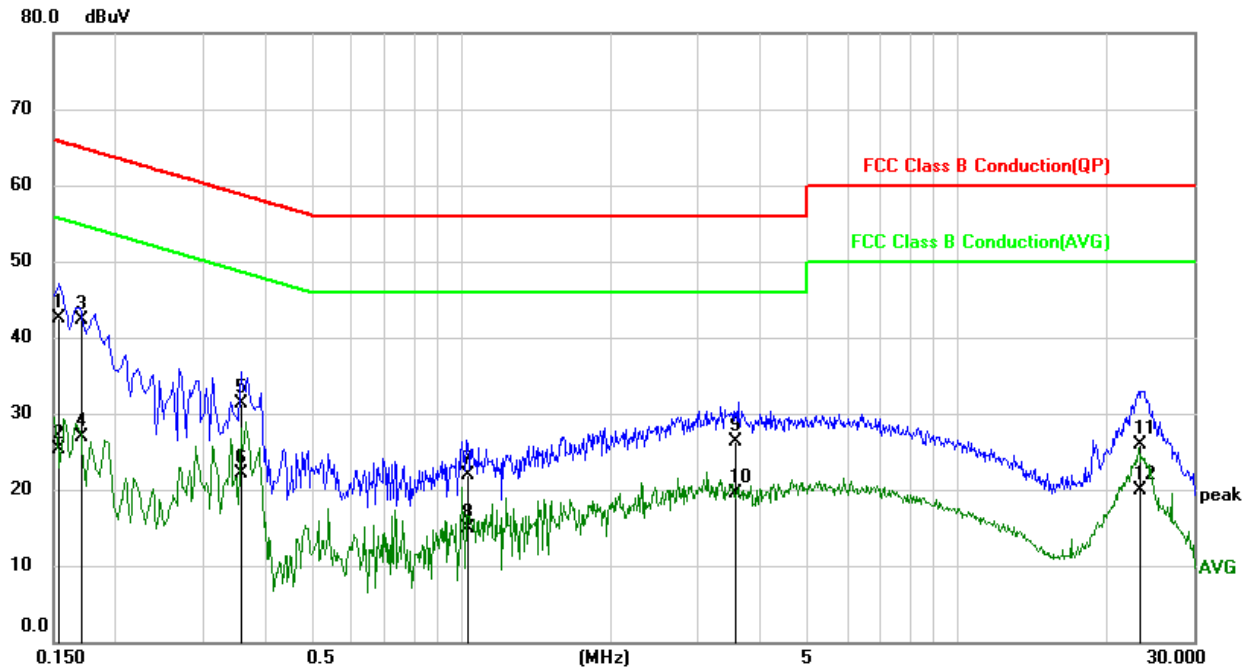
TEST RESULTS

LINE N RESULTS (HIGH CHANNEL, WORST-CASE CONFIGURATION, HORIZONTAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct dB	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.1532	32.88	9.66	42.54	65.82	-23.28	QP
2	0.1532	15.73	9.66	25.39	55.82	-30.43	AVG
3	0.1706	32.64	9.66	42.30	64.93	-22.63	QP
4	0.1706	17.33	9.66	26.99	54.93	-27.94	AVG
5	0.3580	21.68	9.64	31.32	58.77	-27.45	QP
6	0.3580	12.39	9.64	22.03	48.77	-26.74	AVG
7	1.0338	12.19	9.66	21.85	56.00	-34.15	QP
8	1.0338	5.28	9.66	14.94	46.00	-31.06	AVG
9	3.5624	16.54	9.71	26.25	56.00	-29.75	QP
10	3.5624	9.80	9.71	19.51	46.00	-26.49	AVG
11	23.4774	16.08	9.86	25.94	60.00	-34.06	QP
12	23.4774	10.10	9.86	19.96	50.00	-30.04	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.

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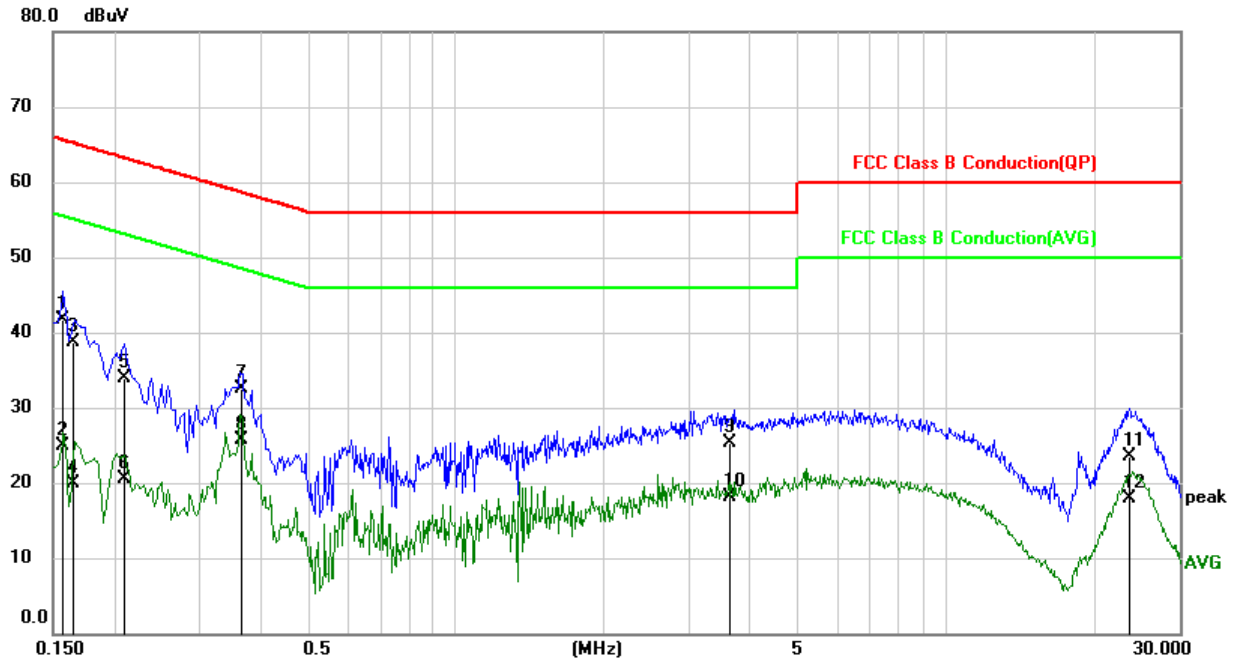
LINE L RESULTS (HIGH CHANNEL, WORST-CASE CONFIGURATION, HORIZONTAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct dB	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.1565	32.09	9.65	41.74	65.65	-23.91	QP
2	0.1565	15.33	9.65	24.98	55.65	-30.67	AVG
3	0.1644	29.13	9.64	38.77	65.24	-26.47	QP
4	0.1644	10.19	9.64	19.83	55.24	-35.41	AVG
5	0.2091	24.32	9.64	33.96	63.24	-29.28	QP
6	0.2091	10.89	9.64	20.53	53.24	-32.71	AVG
7	0.3642	22.87	9.65	32.52	58.63	-26.11	QP
8	0.3642	16.08	9.65	25.73	48.63	-22.90	AVG
9	3.6280	15.57	9.70	25.27	56.00	-30.73	QP
10	3.6280	8.36	9.70	18.06	46.00	-27.94	AVG
11	23.7534	13.55	9.93	23.48	60.00	-36.52	QP
12	23.7534	8.01	9.93	17.94	50.00	-32.06	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.

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10. 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 external antenna with antenna connector.

ANTENNA GAIN

The antenna gain of EUT is less than 6 dBi.

END OF REPORT

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