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

CERTIFICATION TEST REPORT

For

VA-1000 HD STREAMING VIDEO DRONE

MODEL NUMBER: VL-6267, OA-6286, OA-6287

FCC ID: 2ASK3VL-6267RN

REPORT NUMBER: 4790134996.2-3

ISSUE DATE: November 30, 2021

Prepared for

AMAX INDUSTRIAL GROUP CHINA CO.,LTD
OFFICE NO.3 10/F WITTY COMMERCIAL BUILDING 1A-1L TUNG CHOI STREET MONGKOK KOWLOON HONG KONG

Prepared by

UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch
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Revision History

Rev.	Issue Date	Revisions	Revised By
V0	11/30/2021	Initial Issue	

Note: This is a spot check report base on FCC ID report 4789895964-2 which is issued by UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch on April 20, 2021. Parent Model VL-6267 (FCC ID: 2ASK3VL-6267RN) and variant model VL-6267 (FCC ID: 2ASK3VL-6267RN) are electrically identical. They included two modules, one is 2.4 GHz module and the other one is 2.4 GHz WiFi module, both devices share the same mainboard PCB layout, WiFi module (included WiFi antenna) and components but the variant model VL-6267 change a new 2.4 GHz module, according to general guidance of KDB KDB484596 D01(please refer to clause 1). a) b) c)), we used all the original WiFi test data to apply the FCC ID for the new sample, but added the conducted output power and radiated spurious emission as spot check in this report to demonstrate that the referenced test data remains valid for the new device. For other data, please refer to the original report.

The applicant takes full responsibility that the test data referenced below represents compliance for this FCC ID.

Parent Model: VL-6267, OA-6286, OA-6287
FCC ID: 2ASK3VL-6267R

Variant Model: VL-6267, OA-6286, OA-6287
FCC ID: 2ASK3VL-6267RN

Reference Details

Equipment Class	Application Type	Reference Test Report Number	Exhibit Type	Spot Check Report Number	Data Re-used
DTS	Original Grant	4789895964-2	Test Report	4790134996.2-3	All

Summary of Test Results			
Clause	**Test Items**	**FCC Rules**	**Test Results**
1	Conducted Output Power	FCC Part 15.247 (b) (3)	Pass
2	Radiated Bandedge and Spurious Emission Spot Check	FCC Part 15.247 (d) FCC Part 15.209 FCC Part 15.205	Pass
3	Antenna Requirement	FCC 15.203	PASS

Note:
1.This test report is only published to and used by the applicant, and it is not for evidence purpose in China.
2. The measurement result for the sample received is <Pass> according to < CFR 47 FCC PART 15 SUBPART C > when <Accuracy Method> decision rule is applied.

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1. ATTESTATION OF TEST RESULTS

Applicant Information

Company Name:	AMAX INDUSTRIAL GROUP CHINA CO.,LTD
Address:	OFFICE NO.3 10/F WITTY COMMERCIAL BUILDING 1A-1L TUNG CHOI STREET MONGKOK KOWLOON HONG KONG

Manufacturer Information

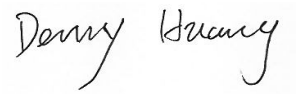
Company Name:	AMAX INDUSTRIAL GROUP CHINA CO.,LTD
Address:	OFFICE NO.3 10/F WITTY COMMERCIAL BUILDING 1A-1L TUNG CHOI STREET MONGKOK KOWLOON HONG KONG

EUT Information

EUT Name:	VA-1000 HD STREAMING VIDEO DRONE
Model:	VL-6267, OA-6286, OA-6287
Serial Model:	Please refer to clause 5.1. Description of EUT
Sample Received Date:	October 11, 2021
Sample Status:	Normal
Sample ID:	4294845
Date of Tested:	October 11, 2021 ~ November 30, 2021

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
CFR 47 FCC PART 15 SUBPART C	PASS

Prepared By:



Denny Huang
Project Engineer

Checked By:

Shawn Wen
Laboratory Leader

Approved By:

Stephen Guo

Laboratory Manager

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with KDB 558074 D01 15.247 Meas Guidance v05r02, KDB 414788 D01 Radiated Test Site v01r01, KDB484596 D01 Referencing Test Data v01, CFR 47 FCC Part 2, CFR 47 FCC Part 15, ANSI C63.10-2013.

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. **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 **ISED (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 and the test lab Conformity Assessment Body Identifier (CABID) is CN0046. **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.

Note 3: 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 OFS.

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

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

4.2. MEASUREMENT UNCERTAINTY

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

Test Item	Uncertainty
Conduction emission	3.62 dB
Radiated Emission (Included Fundamental Emission) (9 kHz ~ 30 MHz)	2.2 dB
Radiated Emission (Included Fundamental Emission) (30 MHz ~ 1 GHz)	4.00 dB
Radiated Emission (Included Fundamental Emission) (1 GHz to 26 GHz)	5.78 dB (1 GHz ~ 18 GHz)
	5.23 dB (18 GHz ~ 26 GHz)
Duty Cycle	±0.028%
DTS and 99% Occupied Bandwidth	±0.0196%
Maximum Conducted Output Power	±0.686 dB
Maximum Power Spectral Density Level	±0.743 dB
Conducted Band-edge Compliance	±1.328 dB
Conducted Unwanted Emissions In Non-restricted Frequency Bands	±0.746 dB (9 kHz ~ 1 GHz)
	±1.328dB (1 GHz ~ 26 GHz)
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

EUT Name	VA-1000 HD STREAMING VIDEO DRONE
Model	VL-6267, OA-6286, OA-6287
Model difference	OA-6286/OA-6287 have the same technical construction including circuit diagram, PCB Layout, components and component layout, all electrical construction and mechanical construction with VL-6267.The difference lies only the model number and color.
Radio Technology	WLAN (IEEE 802.11b/g/n HT20/n HT40)
Operation frequency	IEEE 802.11b: 2412MHz ~ 2462MHz IEEE 802.11g: 2412MHz ~ 2462MHz IEEE 802.11n HT20: 2412MHz ~ 2462MHz IEEE 802.11n HT40: 2422MHz ~ 2452MHz
Modulation	IEEE 802.11b: DSSS (CCK, DQPSK, DBPSK) IEEE 802.11g: OFDM (64QAM, 16QAM, QPSK, BPSK) IEEE 802.11n HT20: OFDM (256QAM, 64QAM, 16QAM, QPSK, BPSK) IEEE 802.11n HT40: OFDM (256QAM, 64QAM, 16QAM, QPSK, BPSK)
Power Supply	DC 3.7 V

5.2. CHANNEL LIST

Channel List for 802.11b/g/n (20 MHz)							
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2412	4	2427	7	2442	10	2457
2	2417	5	2432	8	2447	11	2462
3	2422	6	2437	9	2452	/	/

Channel List for 802.11n (40 MHz)							
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
3	2422	5	2432	7	2442	9	2452
4	2427	6	2437	8	2447	/	/

5.3. TEST CHANNEL CONFIGURATION

IEEE Std. 802.11	Test Channel Number	Frequency
b	CH 1(Low Channel), CH 6(MID Channel), CH 11(High Channel)	2412 MHz, 2437 MHz, 2462 MHz
g	CH 1(Low Channel), CH 6(MID Channel), CH 11(High Channel)	2412 MHz, 2437 MHz, 2462 MHz
n HT20	CH 1(Low Channel), CH 6(MID Channel), CH 11(High Channel)	2412 MHz, 2437 MHz, 2462 MHz
n HT40	CH 3(Low Channel), CH 6(MID Channel), CH 9(High Channel)	2422 MHz, 2437 MHz, 2452 MHz

5.4. DESCRIPTION OF AVAILABLE ANTENNAS

Antenna	Frequency (MHz)	Antenna Type	MAX Antenna Gain (dBi)
1	2412-2462	Wire Antenna	2

Test Mode	Transmit and Receive Mode	Description
IEEE 802.11b	☒1TX, 1RX	ANT 1 can be used as transmitting/receiving antenna.
IEEE 802.11g	☒1TX, 1RX	ANT 1 can be used as transmitting/receiving antenna.
IEEE 802.11n HT20	☒1TX, 1RX	ANT 1 can be used as transmitting/receiving antenna.
IEEE 802.11n HT40	☒1TX, 1RX	ANT 1 can be used as transmitting/receiving antenna.

Note: The value of the antenna gain was declared by customer.

5.5. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Item	Equipment	Brand Name	Model Name	Remarks
1	Laptop	ThinkPad	X230i	/
2	USB TO UART	/	/	/

I/O CABLES

Item	Port	Connector Type	Cable Type	Cable Length(m)	Remarks
1	USB	NA	NA	1	/

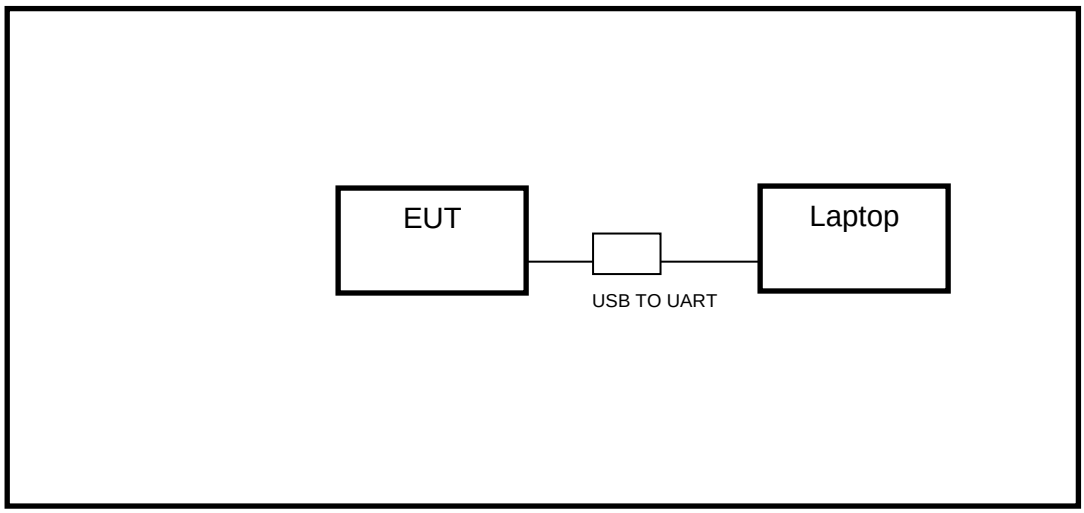
ACCESSORIES

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

TEST SETUP

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

SETUP DIAGRAM FOR TESTS



6. MEASURING INSTRUMENT AND SOFTWARE USED

Conducted Emissions					
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Due Date
EMI Test Receiver	R&S	ESR3	101961	Nov. 12, 2020	Nov. 11, 2021
Two-Line V-Network	R&S	ENV216	101983	Nov. 12, 2020	Nov. 11, 2021
Software					
Description			Manufacturer	Name	Version
Test Software for Conducted Emissions			Farad	EZ-EMC	Ver. UL-3A1

Radiated Emissions					
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Due Date
MXE EMI Receiver	KESIGHT	N9038A	MY56400036	Nov. 12, 2020	Nov. 11, 2021
Hybrid Log Periodic Antenna	TDK	HLP-3003C	130960	Aug. 02, 2021	Aug. 01, 2024
Preamplifier	HP	8447D	2944A09099	Nov. 12, 2020	Nov. 11, 2021
EMI Measurement Receiver	R&S	ESR26	101377	Nov. 12, 2020	Nov. 11, 2021
Horn Antenna	TDK	HRN-0118	130940	July 20, 2021	July 19, 2024
Preamplifier	TDK	PA-02-0118	TRS-305-00067	Nov. 20, 2020	Nov. 19, 2021
Horn Antenna	Schwarzbeck	BBHA9170	#697	July 20, 2021	July 19, 2024
Preamplifier	TDK	PA-02-2	TRS-307-00003	Nov. 12, 2020	Nov. 11, 2021
Preamplifier	TDK	PA-02-3	TRS-308-00002	Nov. 12, 2020	Nov. 11, 2021
Loop antenna	Schwarzbeck	1519B	00008	Jan.17, 2019	Jan.17,2022
Preamplifier	TDK	PA-02-001-3000	TRS-302-00050	Nov. 12, 2020	Nov. 11, 2021
Preamplifier	Mini-Circuits	ZX60-83LN-S+	SUP01201941	Nov. 20, 2020	Nov. 19, 2021
High Pass Filter	Wi	WHKX10-2700-3000-18000-40SS	23	Nov. 12, 2020	Nov. 11, 2021
Band Reject Filter	Wainwright	WRCJV8-2350-2400-2483.5-2533.5-40SS	4	Nov. 12, 2020	Nov. 11, 2021
Software					
Description			Manufacturer	Name	Version
Test Software for Radiated Emissions			Farad	EZ-EMC	Ver. UL-3A1

Tonsend RF Test System					
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Due. Date
Wideband Radio Communication Tester	R&S	CMW500	155523	Nov.20,2020	Nov.19,2021
PXA Signal Analyzer	Keysight	N9030A	MY55410512	Nov.20,2020	Nov.19,2021
MXG Vector Signal Generator	Keysight	N5182B	MY56200284	Nov.20,2020	Nov.19,2021
MXG Vector Signal Generator	Keysight	N5172B	MY56200301	Nov.20,2020	Nov.19,2021
DC power supply	Keysight	E3642A	MY55159130	Nov.24,2020	Nov.23,2021
Software					
Description	Manufacturer	Name		Version	
Tonsend SRD Test System	Tonsend	JS1120-3 RF Test System		2.6.77.0518	

Other Instruments					
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
Dual Channel Power Meter	Keysight	N1912A	MY55416024	Nov. 20, 2020	Nov. 19, 2021
Power Sensor	Keysight	USB Wideband Power Sensor	MY5100022	Nov. 20, 2020	Nov. 19, 2021

7. ANTENNA PORT TEST RESULTS

7.1. ON TIME AND DUTY CYCLE

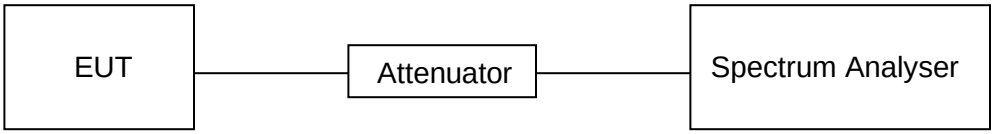
LIMITS

None; for reporting purposes only

PROCEDURE

Refer to ANSI C63.10-2013 clause 11.6 Zero – Span Spectrum Analyzer method.

TEST SETUP



TEST ENVIRONMENT

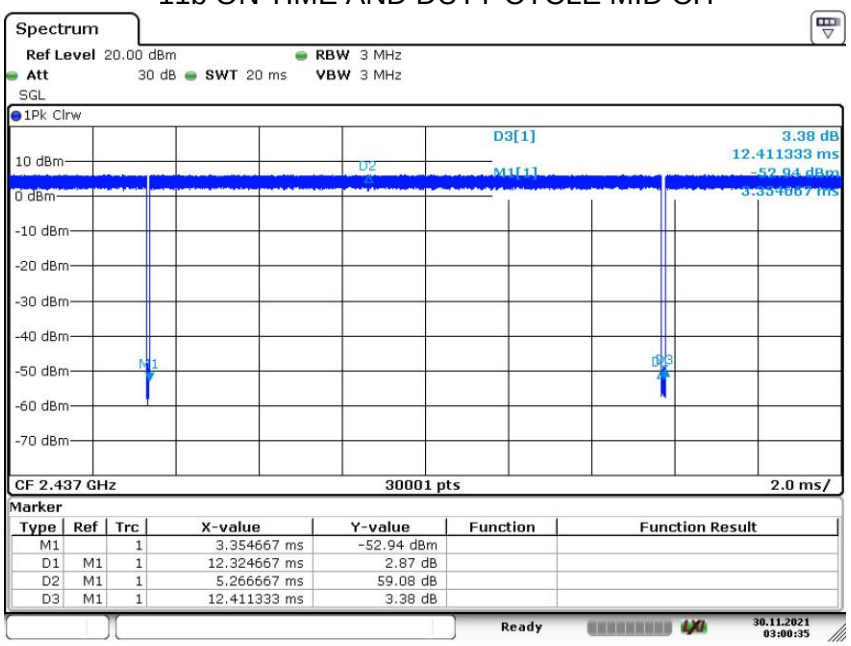
Temperature	26.7 °C	Relative Humidity	57.5 %
Atmosphere Pressure	101 kPa	Test Voltage	DC 3.7 V

RESULTS

Mode	On Time (msec)	Period (msec)	Duty Cycle x (Linear)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	1/T Minimum VBW (kHz)	Final setting For VBW (kHz)
11b	12.32	12.41	0.9927	99.27	0.03	0.08	0.5
11g	2.06	10.08	0.2044	20.44	6.90	0.49	0.5
11n HT20	1.92	9.98	0.1924	19.24	7.16	0.52	1
11n HT40	0.95	9.92	0.0958	9.58	10.19	1.05	2

Note:
Duty Cycle Correction Factor=10log (1/x).
Where: x is Duty Cycle (Linear)
Where: T is On Time
If that calculated VBW is not available on the analyzer then the next higher value should be used.

11b ON TIME AND DUTY CYCLE MID CH



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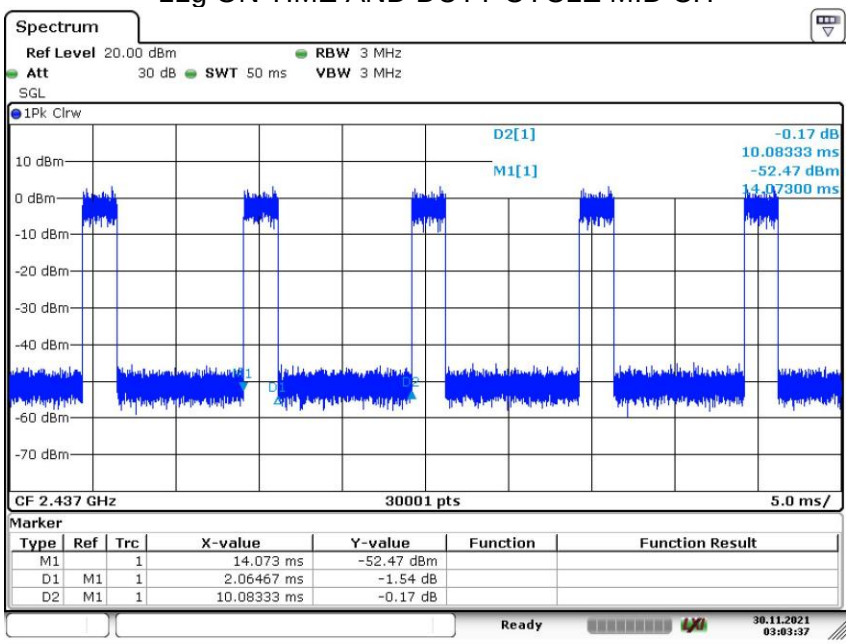
11g ON TIME AND DUTY CYCLE MID CH



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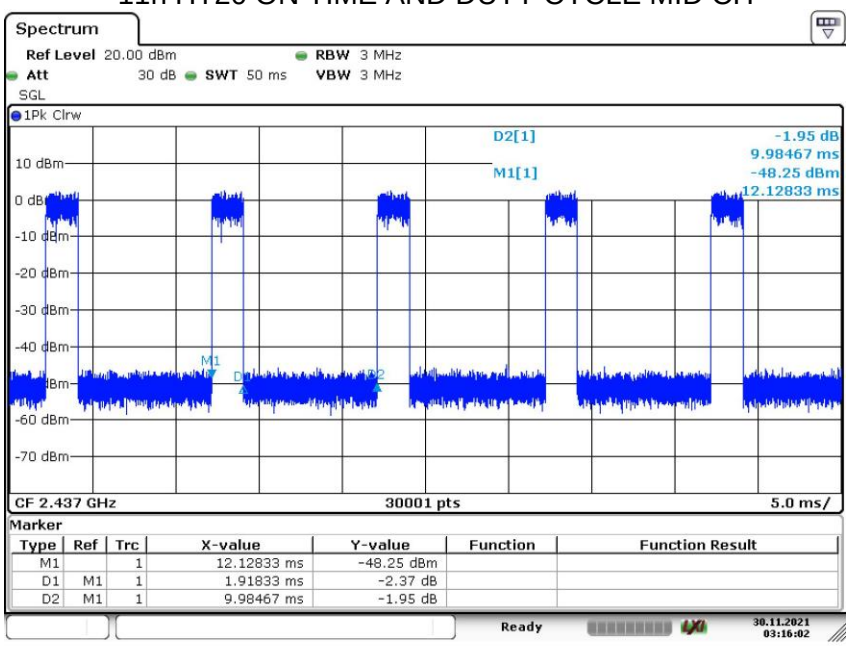
11n HT20 ON TIME AND DUTY CYCLE MID CH



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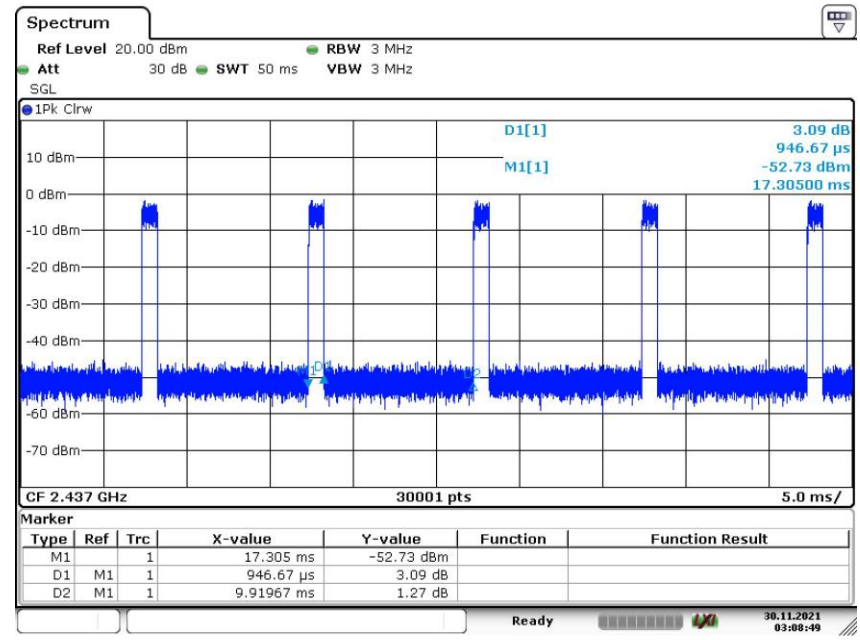
11n HT40 ON TIME AND DUTY CYCLE MID CH



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7.2. CONDUCTED OUTPUT POWER

LIMITS

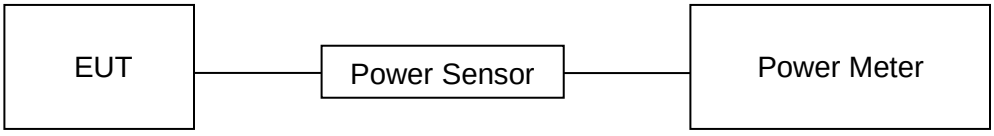
CFR 47 FCC Part15 (15.247) Subpart C ISED RSS-247 ISSUE 2			
Section	Test Item	Limit	Frequency Range (MHz)
CFR 47 FCC 15.247(b)(3) ISED RSS-247 5.4 (d)	AVG Output Power	1 watt or 30 dBm	2400-2483.5

TEST PROCEDURE

Refer to ANSI C63.10-2013 clause 11.9.

Connect the EUT to a low loss RF cable from the antenna port to the power sensor (video bandwidth is greater than the occupied bandwidth).
Measure peak emission level, the indicated level is the average output power, after any corrections for external attenuators and cables.

TEST SETUP



TEST ENVIRONMENT

Temperature	24.4 °C	Relative Humidity	34.4 %
Atmosphere Pressure	101 kPa	Test Voltage	DC 3.3 V

RESULTS

Spot Check Verification Summery:

Test Item	Test Mode	Frequency	Worst Case Test Result	
			Original Model	Spot Check Model
Conducted AV Power	802.11b	2437 MHz	10.26 dBm	10.48 dBm
	802.11g	2437 MHz	13.47 dBm	13.44 dBm
	802.11n HT20	2437 MHz	11.14 dBm	11.03 dBm
	802.11n HT40	2437 MHz	10.28 dBm	10.21 dBm

Conclusion:
The spot check test result show that the new devices still comply with the standard and the new test result was close to the original test result, so it can demonstrate that the referenced test data remains valid for the new device.

Test Data:

Test Mode	Antenna	Channel	Result[dBm]	Limit[dBm]	Verdict
11B	Ant1	2412	10.82	<=30	PASS
		2437	10.48	<=30	PASS
		2462	10.31	<=30	PASS
11G	Ant1	2412	13.97	<=30	PASS
		2437	13.44	<=30	PASS
		2462	14.21	<=30	PASS
11N20SISO	Ant1	2412	11.82	<=30	PASS
		2437	11.03	<=30	PASS
		2462	10.37	<=30	PASS
11N40SISO	Ant1	2422	11.83	<=30	PASS
		2437	10.21	<=30	PASS
		2452	10.86	<=30	PASS

Note: The duty cycle correction factor had already added to the test result, about the duty cycle correction factor, please refer to clause 7.1.

8. RADIATED TEST RESULTS

LIMITS

Please refer to CFR 47 FCC §15.205 and §15.209.

Radiation Disturbance Test Limit for FCC (Class B) (9 kHz ~ 1 GHz)

Emissions radiated outside of the specified frequency bands above 30 MHz			
Frequency Range (MHz)	Field Strength Limit (uV/m) at 3 m	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

FCC Emissions radiated outside of the specified frequency bands below 30 MHz		
Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30

ISED General field strength limits at frequencies below 30 MHz

Table 6 – General field strength limits at frequencies below 30 MHz

Frequency	Magnetic field strength (H-Field) (µA/m)	Measurement distance (m)
9 - 490 kHz[Note 1]	6.37/F (F in kHz)	300
490 - 1705 kHz	63.7/F (F in kHz)	30
1.705 - 30 MHz	0.08	30

Note 1: The emission limits for the ranges 9-90 kHz and 110-490 kHz are based on measurements employing a linear average detector.

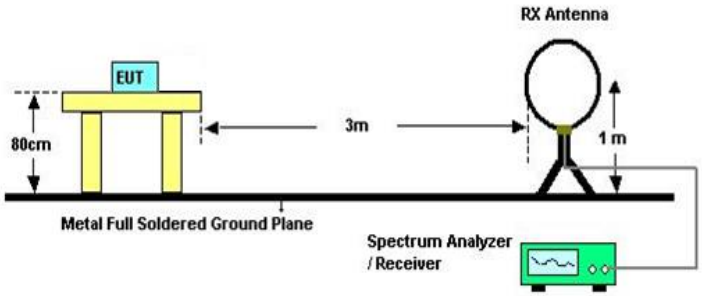
FCC Restricted bands of operation refer to FCC §15.205 (a):

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 38.6c

TEST SETUP AND PROCEDURE

Below 30MHz



The setting of the spectrum analyser

RBW	200 Hz (From 9 kHz to 0.15 MHz)/ 9 kHz (From 0.15 MHz to 30 MHz)
VBW	200 Hz (From 9 kHz to 0.15 MHz)/ 9 kHz (From 0.15 MHz to 30 MHz)
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, Face-on and Face-off polarizations of the antenna are set to make the measurement.

3. The EUT was placed on a turntable with 80 cm above ground.

4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a 1 m height antenna tower.

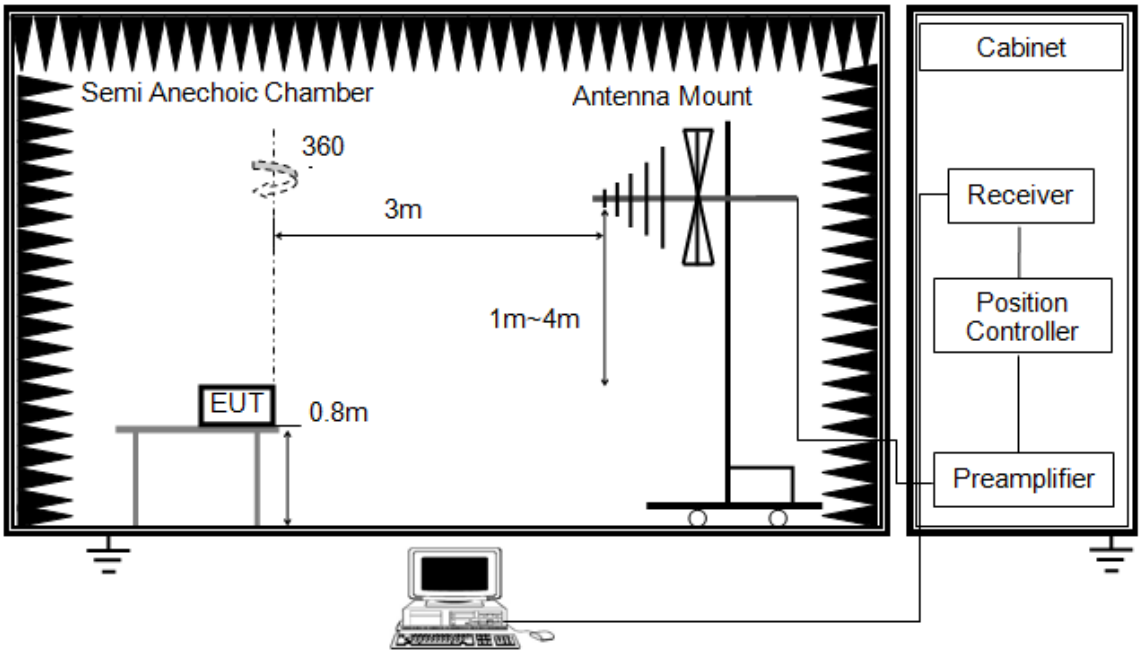
5. The radiated emission limits are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

6. For measurement below 1 GHz, 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 and average 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 and average detector and reported.

7. Although these tests were performed other than open field site, adequate comparison measurements were confirmed against 30 m open field site. Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field site based on KDB 414788.

8. The limits in CFR 47, Part 15, Subpart C, paragraph 15.209 (a), are identical to those in RSS-GEN Section 8.9, Table 6, since the measurements are performed in terms of magnetic field strength and converted to electric field strength levels (as reported in the table) using the free space impedance of 377 Ω. For example, the measurement frequency X kHz resulted in a level of Y dBuV/m, which is equivalent to Y-51.5 = Z dBuA/m, which has the same margin, W dB, to the corresponding RSS-GEN Table 6 limit as it has to be 15.209(a) limit.

Below 1 GHz and above 30 MHz



The setting of the spectrum analyser

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

1. The testing follows the guidelines in ANSI C63.10-2013 clause 6.5.

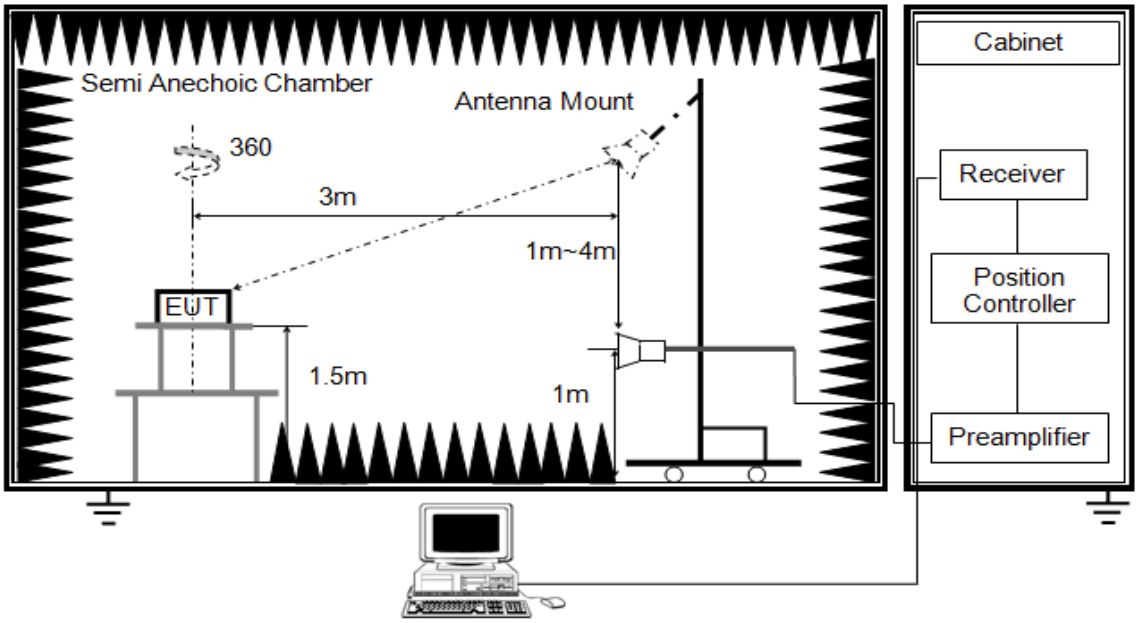
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

3. The EUT was placed on a turntable with 80 cm 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 1 GHz, 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 1 GHz



The setting of the spectrum analyser

RBW	1 MHz
VBW	PEAK: 3 MHz AVG: see note 6
Sweep	Auto
Detector	Peak
Trace	Max hold

1. The testing follows the guidelines in ANSI C63.10-2013 clause 6.6.

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.

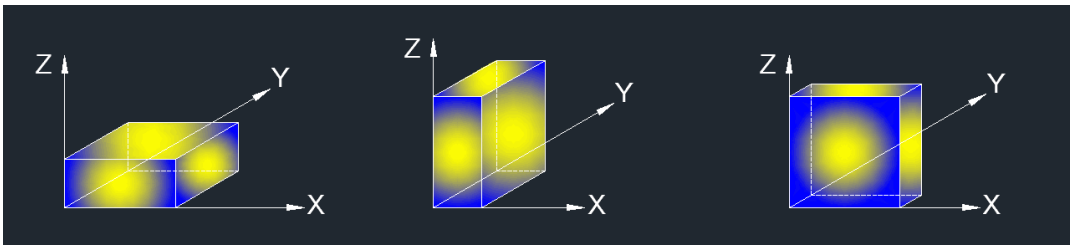
3. The EUT was placed on a turntable with 1.5 m above ground.

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 1 GHz, 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, then 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. For the Duty Cycle please refer to clause 7.1.ON TIME AND DUTY CYCLE.

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: Simultaneous transmission had been evaluated with the 2.4 GHz WiFi and 2.4 GHz and there were no any additional or worse emissions found. Only the worst data was recorded in the test report.

TEST ENVIRONMENT

Temperature	19.3 °C	Relative Humidity	50.6 %
Atmosphere Pressure	101 kPa	Test Voltage	DC 3.3 V

RESULTS

8.1.1. SPOT CHECK VERIFICATION SUMMERY

Test Item	Test Mode	Test Channel	Frequency	Worst Case Test Result	
				Original Model	Spot Check Model
		MHz	MHz	dBuV/m	
Restricted Bandedge	802.11g	2472	2483.5	50.63	50.09
Spurious Emission	802.11g	2412	7380 (3^{th} harmonic)	43.71	43.57

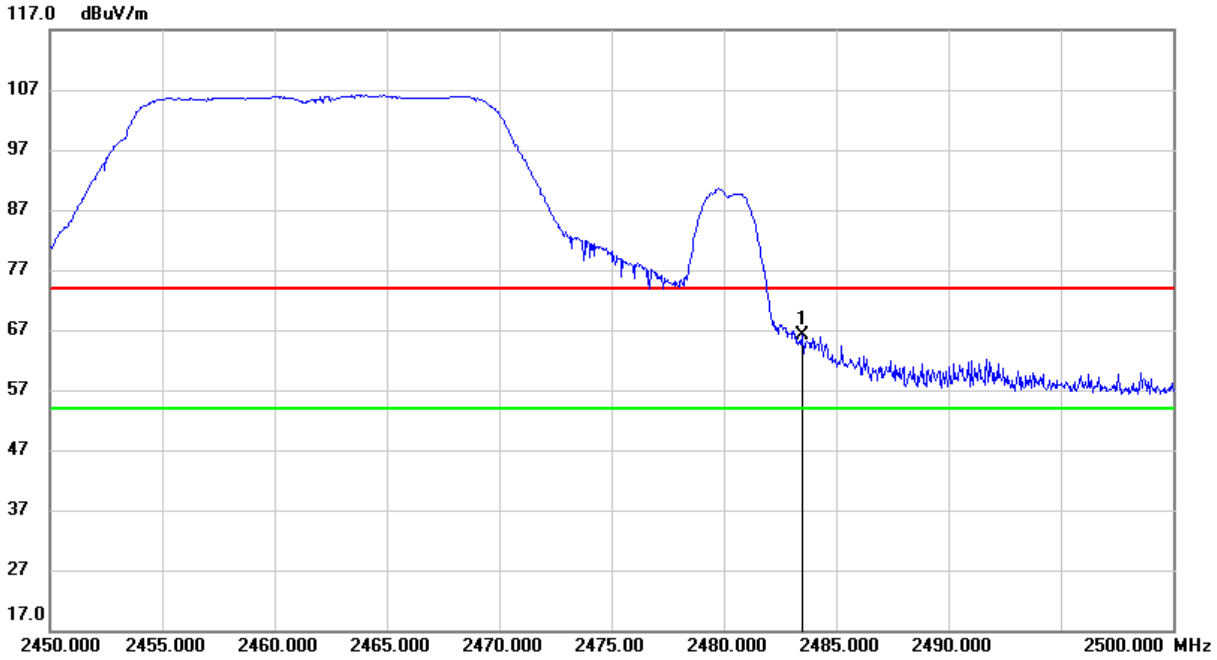
Conclusion:
The spot check test result show that the new devices still comply with the standard and the new test result was close to the original test result, so it can demonstrate that the referenced test data remains valid for the new device.

8.2. RESTRICTED BANDEDGE

8.2.1. 802.11g SISO MODE AND 2.4 GHz WORST CASE

SPURIOUS EMISSIONS (2.4 GHz HIGH CHANNEL, 802.11g HIGH LOW CHANNEL, WORST-CASE CONFIGURATION, VERTICAL)

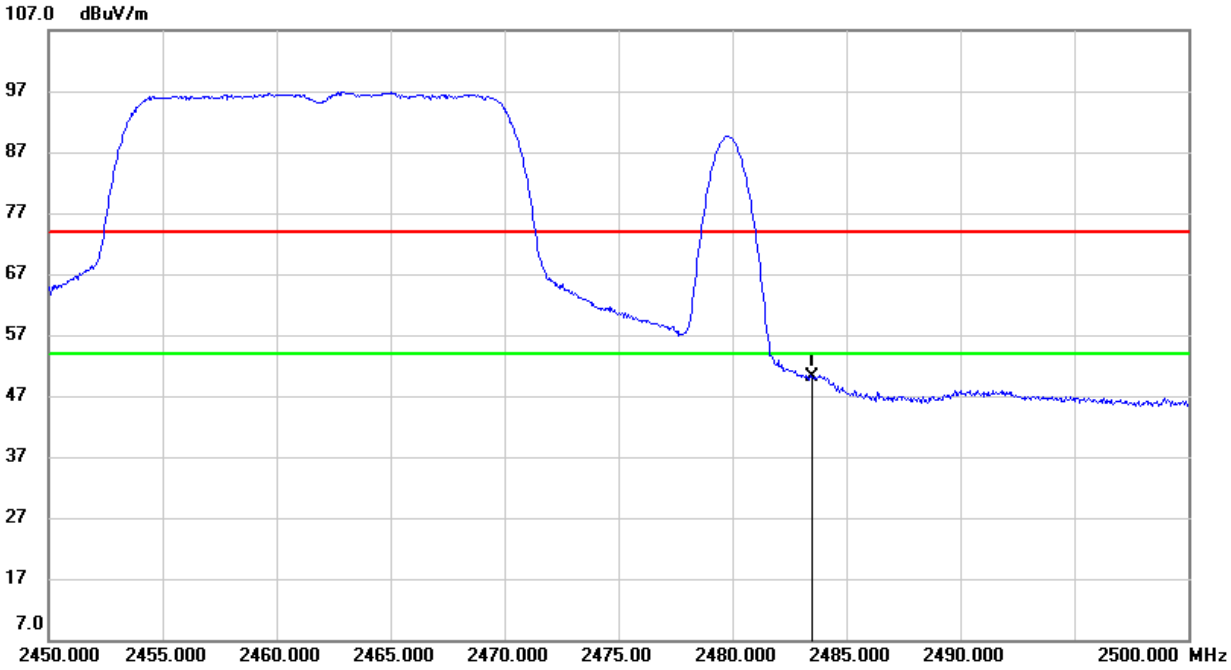
PEAK



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2483.500	32.91	33.10	66.01	74.00	-7.99	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. Only the worst data was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

AVERAGE



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2483.500	16.99	33.10	50.09	54.00	-3.91	AVG

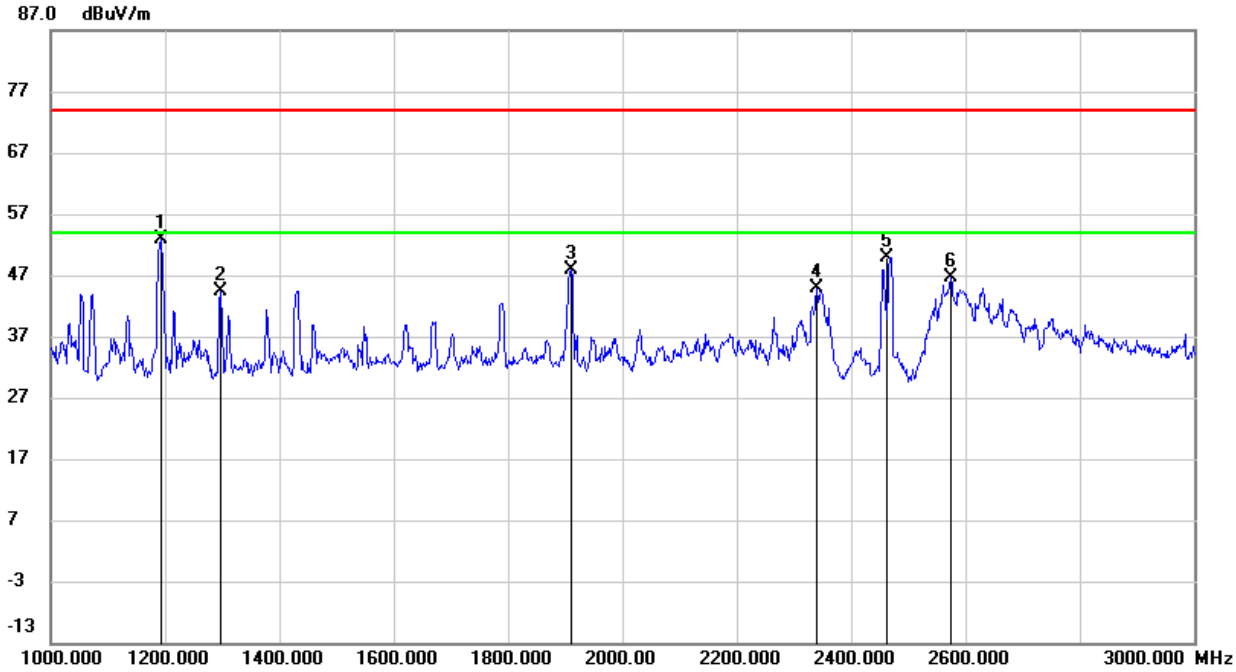
Note: 1. Measurement = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. AVG: VBW=1/Ton, where: Ton is the transmitting duration.
4. For the transmitting duration, please refer to clause 7.1.
5. Only the worst data was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

Note: Both horizontal and vertical had been tested, but only the worst data was recorded in the report.

8.3. SPURIOUS EMISSIONS (1 GHz ~ 3 GHz)

8.3.1. 802.11g SISO MODE AND 2.4 GHz MODE WORST CASE

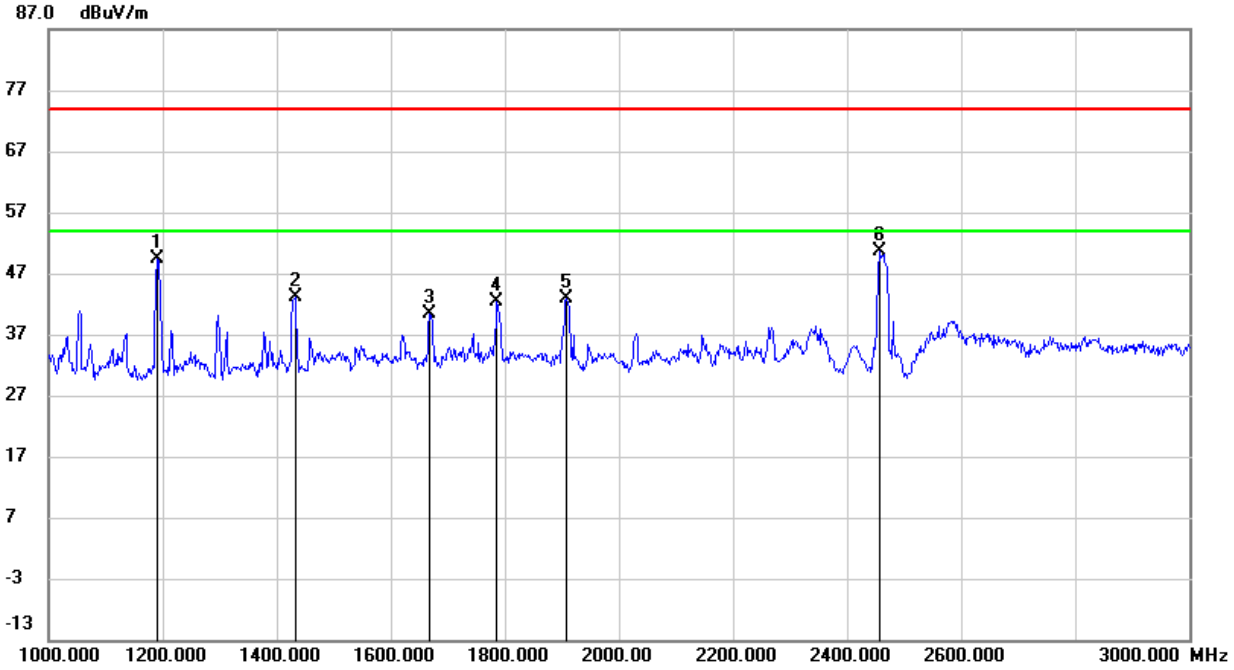
SPURIOUS EMISSIONS (2.4 GHz HIGH CHANNEL, 802.11g HIGH LOW CHANNEL, WORST-CASE CONFIGURATION, HORIZONTAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	1192.000	66.83	-13.83	53.00	74.00	-21.00	peak
2	1296.000	57.95	-13.47	44.48	74.00	-29.52	peak
3	1910.000	58.91	-11.00	47.91	74.00	-26.09	peak
4	2340.000	54.27	-9.32	44.95	74.00	-29.05	peak
5	2462.000	58.74	-8.92	49.82	/	/	Fundamental
6	2574.000	55.35	-8.69	46.66	74.00	-27.34	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. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for Band reject filter losses.
5. Proper operation of the transmitter prior to adding the filter to the measurement chain.

SPURIOUS EMISSIONS (802.11g MODE HIGH CHANNEL, 2.4 GHz HIGH CHANNEL, WORST-CASE CONFIGURATION, VERTICAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	1190.000	63.18	-13.83	49.35	74.00	-24.65	peak
2	1432.000	56.18	-12.96	43.22	74.00	-30.78	peak
3	1668.000	52.07	-11.58	40.49	74.00	-33.51	peak
4	1786.000	53.12	-10.85	42.27	74.00	-31.73	peak
5	1908.000	53.94	-10.99	42.95	74.00	-31.05	peak
6	2462.000	59.55	-8.93	50.62	/	/	Fundamental

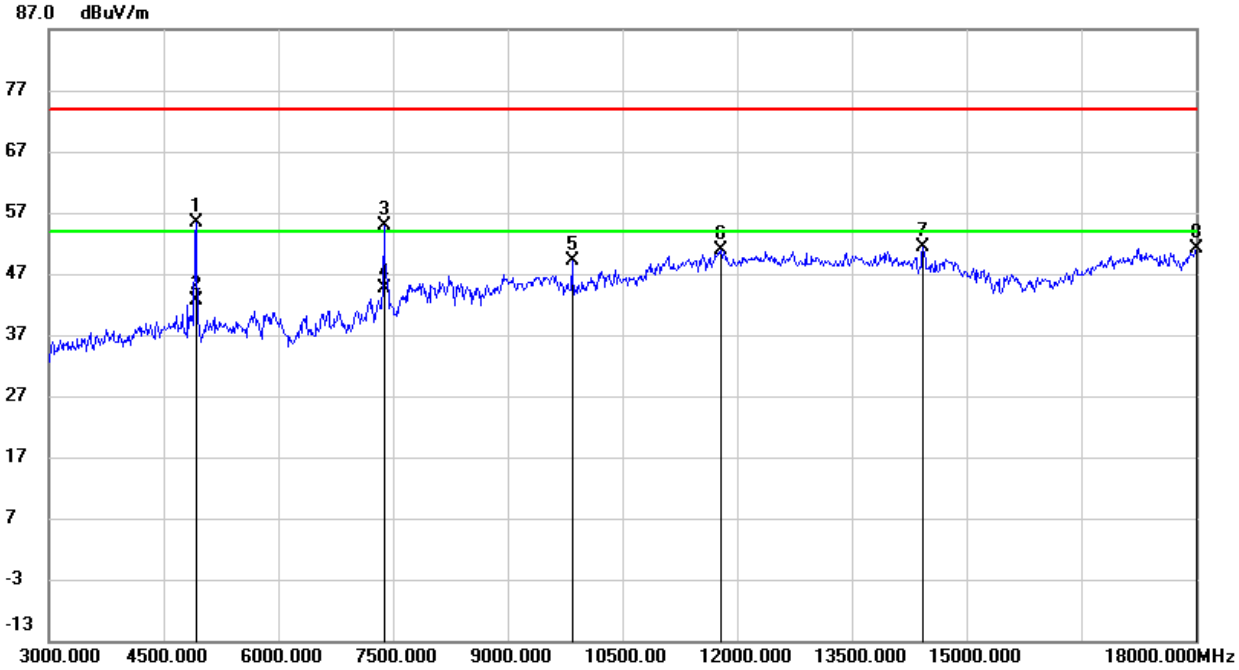
Note: 1. Measurement = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for Band reject filter losses.
5. Proper operation of the transmitter prior to adding the filter to the measurement chain.

Note: All the modes had been tested, only the worst data was recorded in the report.

8.4. SPURIOUS EMISSIONS (3 GHz ~ 18 GHz)

8.4.1. 802.11g SISO MODE AND 2.4 GHz MODE WORST CASE

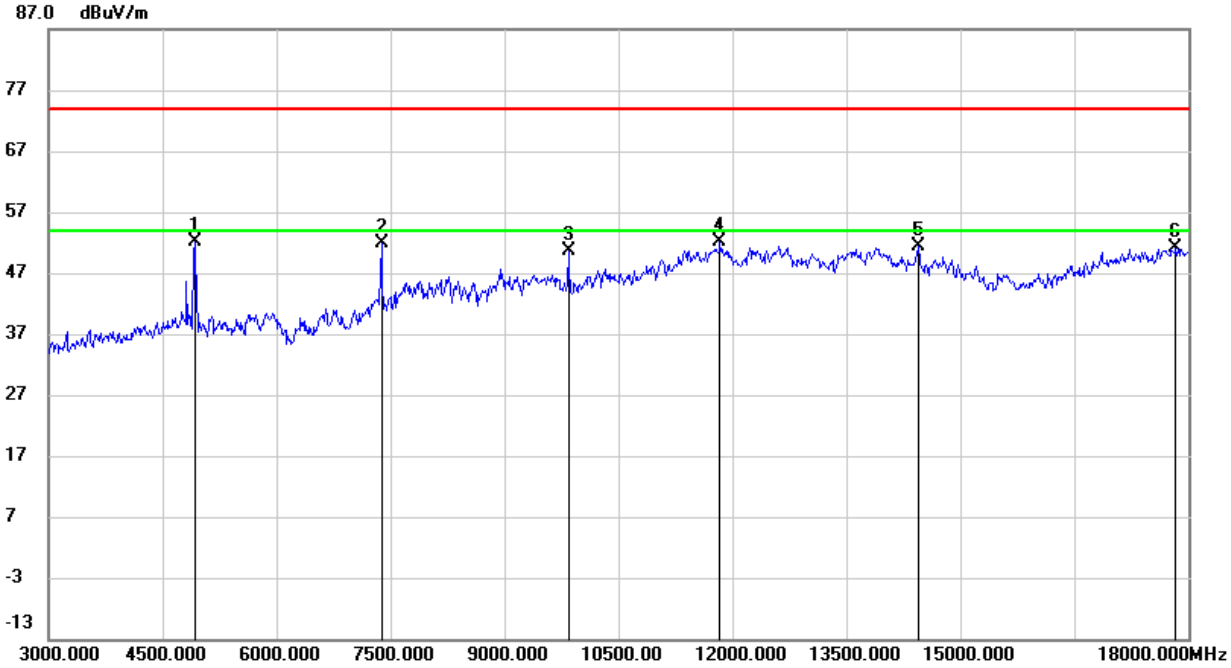
SPURIOUS EMISSIONS (2.4 GHz HIGH CHANNEL, 802.11g HIGH LOW CHANNEL, WORST-CASE CONFIGURATION, HORIZONTAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4920.000	55.90	-0.56	55.34	74.00	-18.66	peak
2	4920.000	43.07	-0.56	42.51	54.00	-11.49	AVG
3	7380.000	47.94	6.89	54.83	74.00	-19.17	peak
4	7380.000	37.68	6.89	43.57	54.00	-9.43	AVG
5	9840.000	38.77	10.39	49.16	74.00	-24.84	peak
6	11790.000	33.53	17.30	50.83	74.00	-23.17	peak
7	14430.000	34.12	17.30	51.42	74.00	-22.58	peak
8	18000.000	27.76	23.37	51.13	74.00	-22.87	peak

Note: 1. Peak Result = 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 the transmitting duration.
5. For the transmitting duration, please refer to clause 7.1.
6. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for High Pass Filter losses.
7. Proper operation of the transmitter prior to adding the filter to the measurement chain.

SPURIOUS EMISSIONS (802.11g MODE HIGH CHANNEL, 2.4 GHz HIGH CHANNEL, WORST-CASE CONFIGURATION,VERTICAL)



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	4920.000	52.71	-0.56	52.15	74.00	-21.85	peak
2	7380.000	44.96	6.89	51.85	74.00	-22.15	peak
3	9840.000	40.29	10.39	50.68	74.00	-23.32	peak
4	11835.000	34.73	17.29	52.02	74.00	-21.98	peak
5	14445.000	34.15	17.23	51.38	74.00	-22.62	peak
6	17835.000	28.09	22.95	51.04	74.00	-22.96	peak

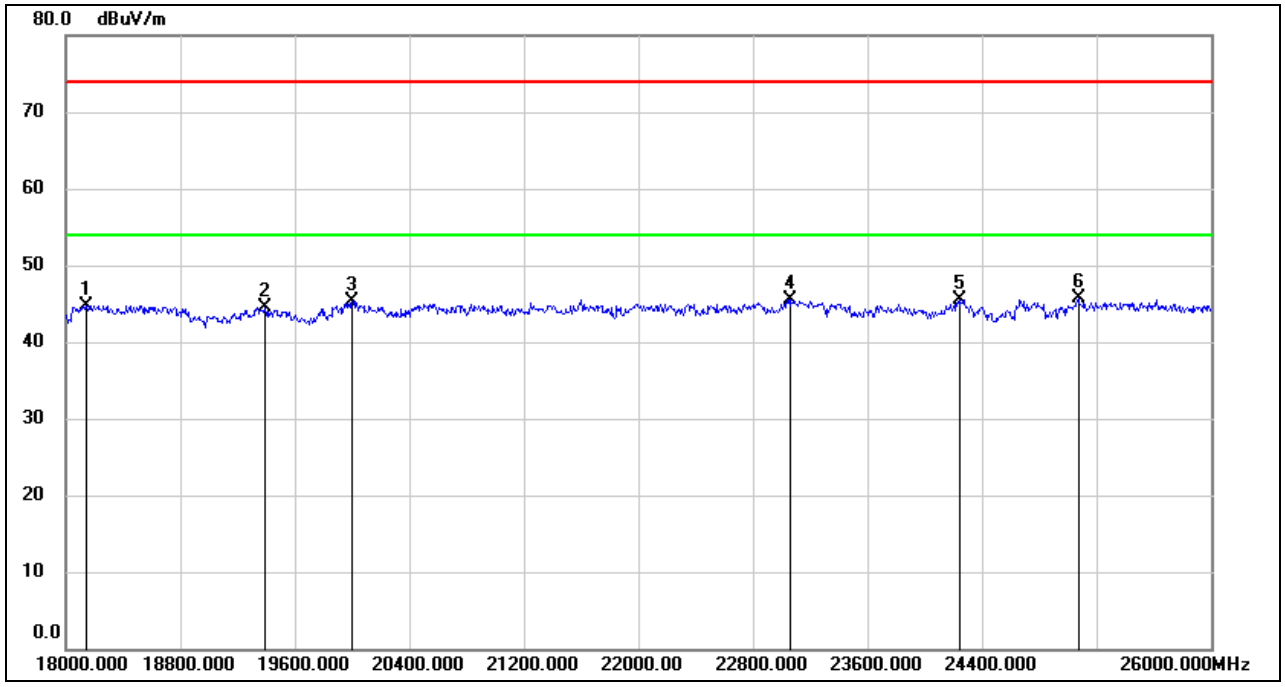
Note: 1. Peak Result = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. AVG: VBW=1/Ton, where: Ton is the transmitting duration.
5. For the transmitting duration, please refer to clause 7.1.
6. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for High Pass Filter losses.
7. Proper operation of the transmitter prior to adding the filter to the measurement chain.

Note: All the modes had been tested, but only the worst data was recorded in the report.

8.5. SPURIOUS EMISSIONS (18 GHz ~ 26 GHz)

8.5.1. 802.11g SISO MODE AND 2.4 GHz MODE WORST CASE

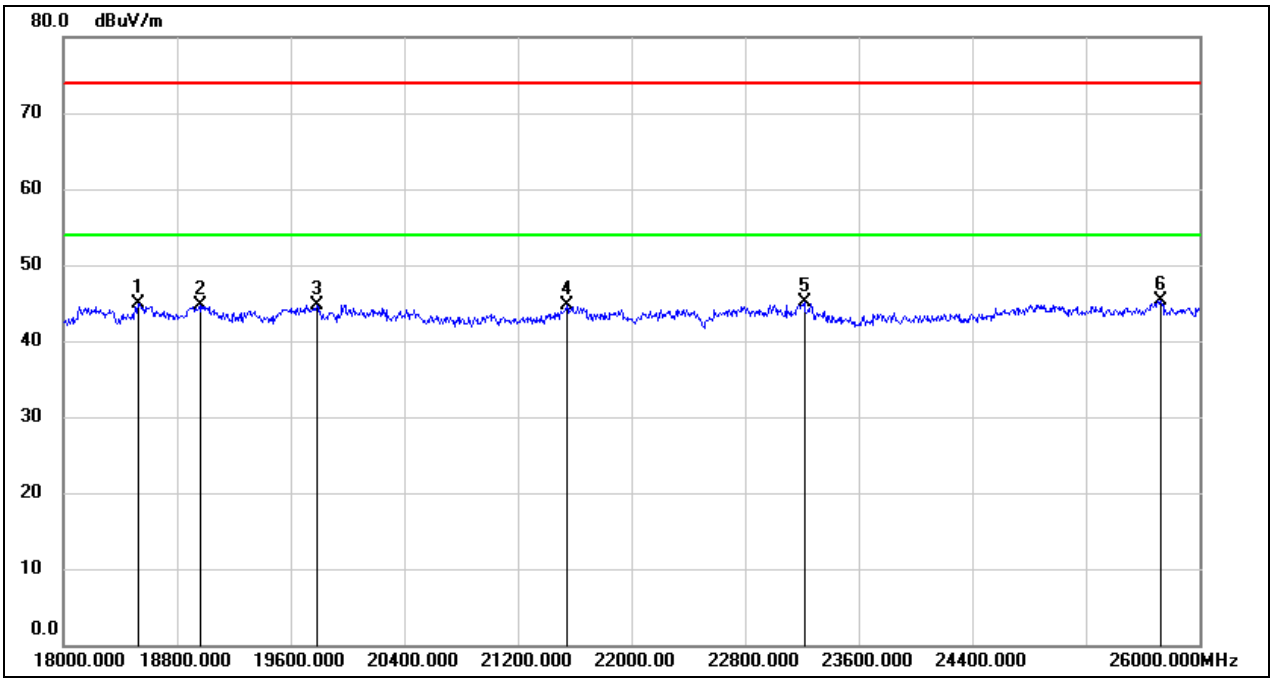
SPURIOUS EMISSIONS (2.4 GHz HIGH CHANNEL, 802.11g HIGH LOW CHANNEL, WORST-CASE CONFIGURATION, HORIZONTAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	18144.000	50.27	-5.48	44.79	74.00	-29.21	peak
2	19392.000	50.12	-5.57	44.55	74.00	-29.45	peak
3	20000.000	50.81	-5.45	45.36	74.00	-28.64	peak
4	23064.000	48.99	-3.42	45.57	74.00	-28.43	peak
5	24248.000	48.32	-2.83	45.49	74.00	-28.51	peak
6	25072.000	47.67	-1.97	45.70	74.00	-28.30	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. The preamplifier only effect to the above 18GHz signal and no filter added to the measurement chain.

SPURIOUS EMISSIONS (802.11g MODE HIGH CHANNEL, 2.4 GHz HIGH CHANNEL, WORST-CASE CONFIGURATION,VERTICAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	18528.000	50.11	-5.26	44.85	74.00	-29.15	peak
2	18960.000	50.01	-5.25	44.76	74.00	-29.24	peak
3	19784.000	50.07	-5.28	44.79	74.00	-29.21	peak
4	21544.000	49.26	-4.63	44.63	74.00	-29.37	peak
5	23216.000	48.51	-3.38	45.13	74.00	-28.87	peak
6	25728.000	46.11	-0.72	45.39	74.00	-28.61	peak

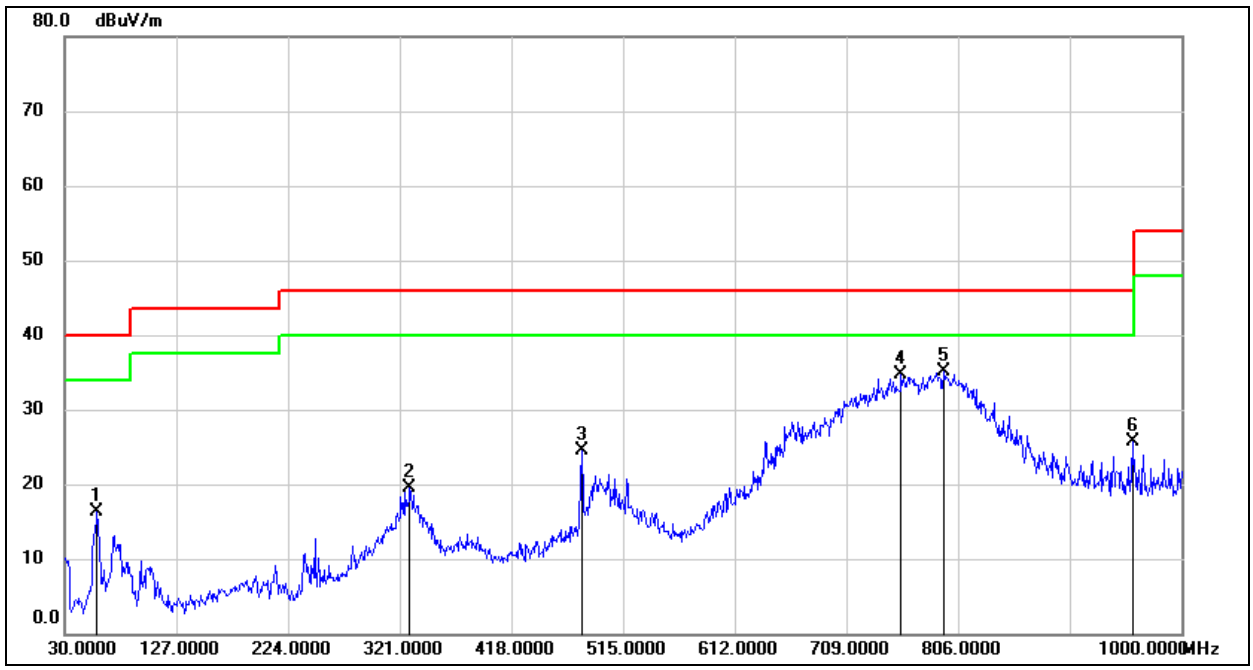
Note: 1. Measurement = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. The preamplifier only effect to the above 18GHz signal and no filter added to the measurement chain.

Note: All the modes had been tested, but only the worst data was recorded in the report.

8.6. SPURIOUS EMISSIONS (30 MHz ~ 1 GHz)

8.6.1. 802.11g MODE AND 2.4 GHz MODE WORST CASE

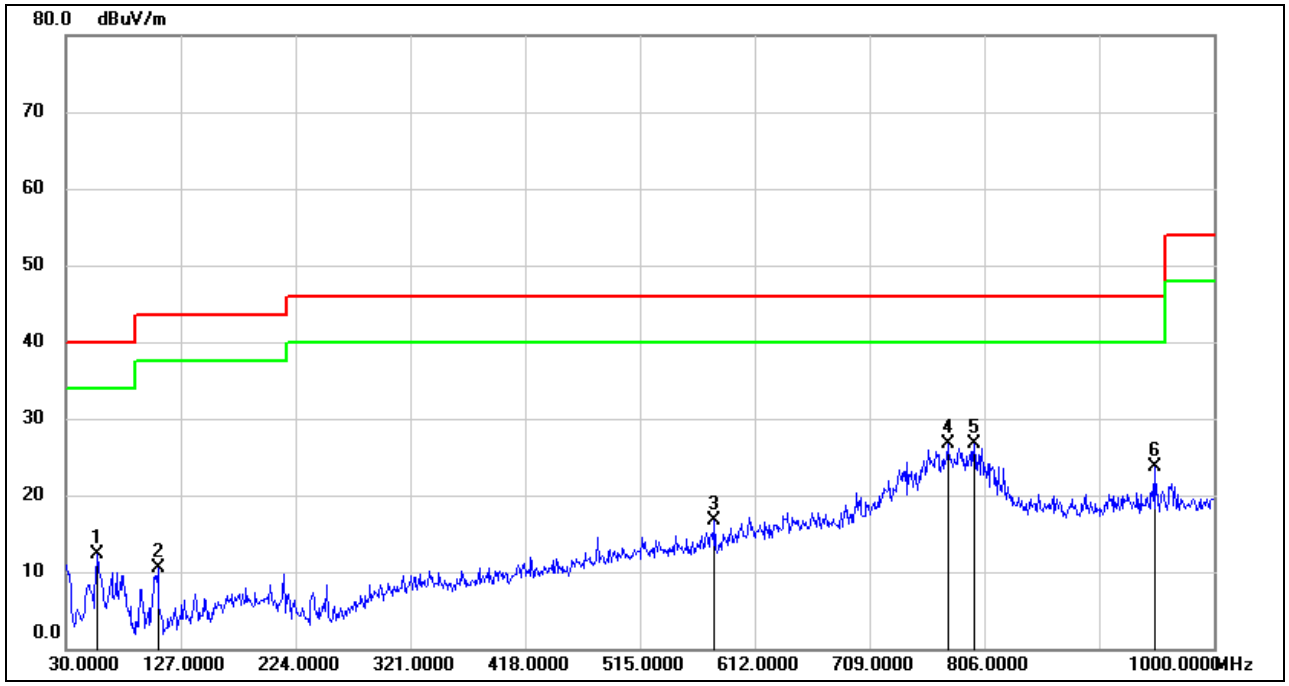
SPURIOUS EMISSIONS (2.4 GHz HIGH CHANNEL, 802.11g HIGH LOW CHANNEL, WORST-CASE CONFIGURATION, HORIZONTAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	58.1300	36.85	-20.55	16.30	40.00	-23.70	QP
2	329.7300	34.12	-14.69	19.43	46.00	-26.57	QP
3	479.1100	36.26	-11.82	24.44	46.00	-21.56	QP
4	756.5300	42.47	-7.79	34.68	46.00	-11.32	QP
5	793.3900	42.47	-7.37	35.10	46.00	-10.90	QP
6	957.3200	30.13	-4.50	25.63	46.00	-20.37	QP

Note: 1. Result Level = Read Level + Correct Factor.
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 (802.11g MODE HIGH CHANNEL, 2.4 GHz CHANNEL, , WORST-CASE CONFIGURATION,VERTICAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	56.1900	32.95	-20.61	12.34	40.00	-27.66	QP
2	107.6000	31.12	-20.58	10.54	43.50	-32.96	QP
3	578.0500	26.73	-10.00	16.73	46.00	-29.27	QP
4	774.9600	34.32	-7.60	26.72	46.00	-19.28	QP
5	797.2700	34.06	-7.35	26.71	46.00	-19.29	QP
6	949.5600	28.10	-4.41	23.69	46.00	-22.31	QP

Note: 1. Result Level = Read Level + Correct Factor.
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

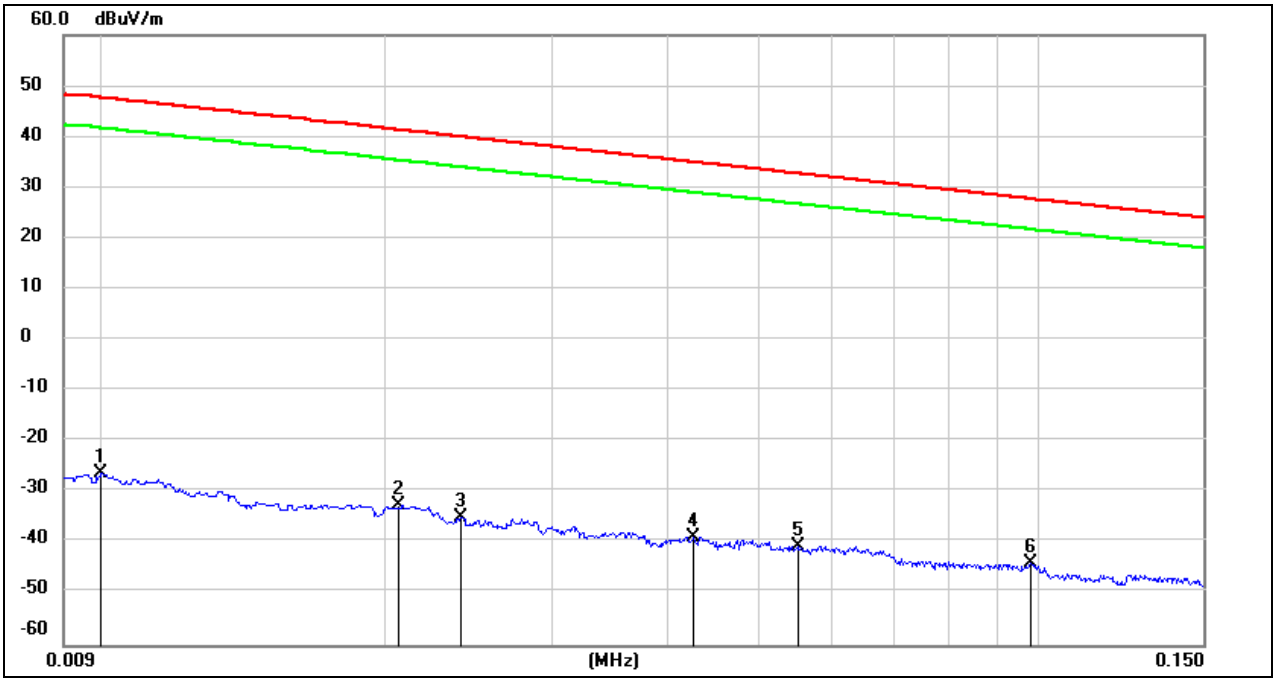
Note: All the modes had been tested, but only the worst data was recorded in the report.

8.7. SPURIOUS EMISSIONS BELOW 30 MHz

8.7.1. 802.11b MIMO MODE AND BT MODE WORST CASE

SPURIOUS EMISSIONS (802.11g MODE HIGH CHANNEL, 2.4 GHz HIGH CHANNEL, LOOP ANTENNA FACE ON TO THE EUT)

9 kHz~ 150 kHz



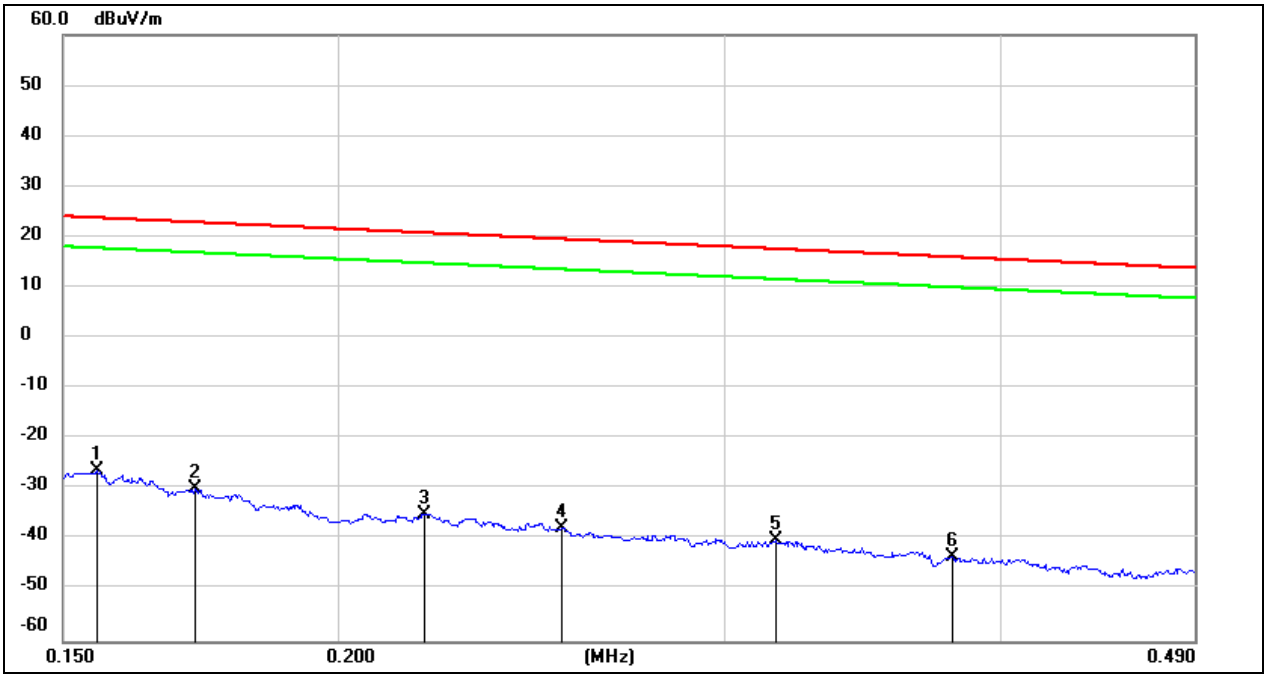
No.	Frequency	Reading	Correct	FCC Result	FCC Limit	ISED Result	ISED Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dBuA/m)	(dBuA/m)	(dB)	
1	0.0100	75.22	-101.40	-26.18	-77.68	47.60	-3.90	-73.78	peak
2	0.0206	68.92	-101.35	-32.43	-83.93	41.32	-10.18	-73.75	peak
3	0.0240	66.32	-101.36	-35.04	-86.54	40.00	-11.5	-75.04	peak
4	0.0427	62.64	-101.45	-38.81	-90.31	34.99	-16.51	-73.80	peak
5	0.0551	60.95	-101.50	-40.55	-92.05	32.78	-18.72	-73.33	peak
6	0.0981	57.77	-101.78	-44.01	-95.51	27.77	-23.73	-71.78	peak

Note: 1. Measurement = Reading Level + Correct Factor (dBuA/m= dBuV/m- 20Log10[120π] = dBuV/m- 51.5).

2. If Peak Result complies with AV and QP limit, AV and QP Result are deemed to comply with AV limit.

3. All 3 polarizations (Horizontal, Face-on and Face-off) of the loop antenna had been tested, but only the worst data recorded in the report.

150 kHz ~ 490 kHz



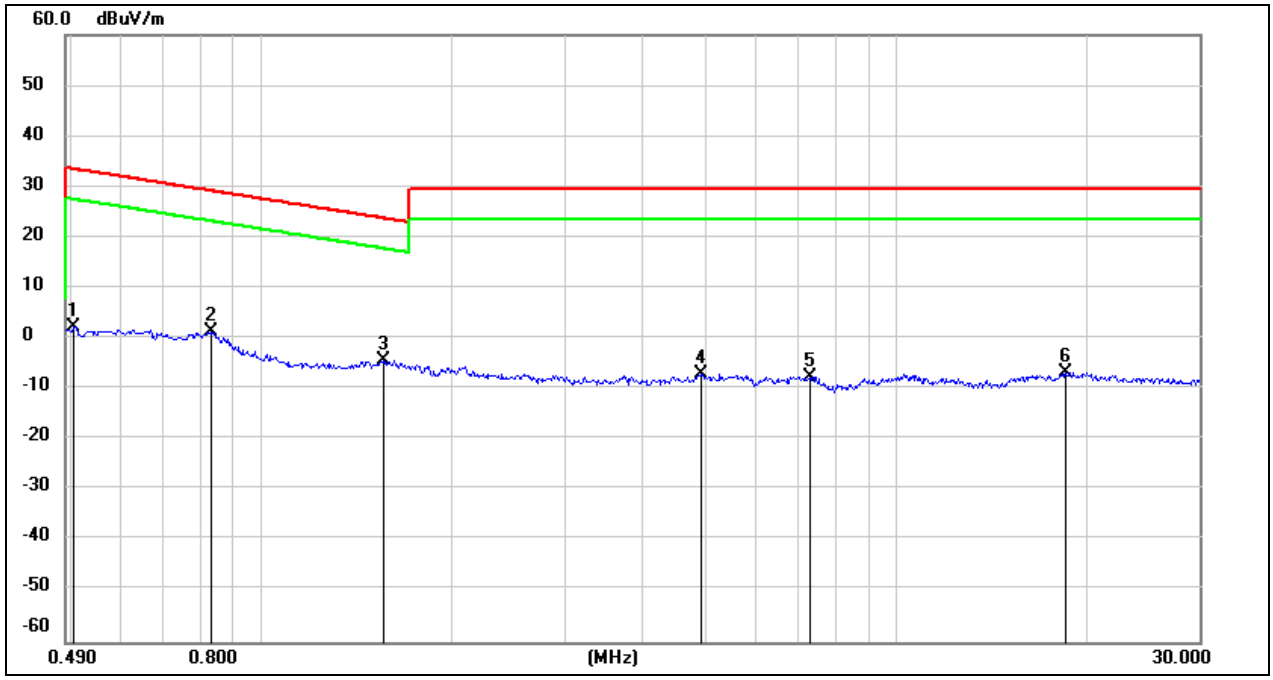
No.	Frequency	Reading	Correct	FCC Result	FCC Limit	ISED Result	ISED Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dBuA/m)	(dBuA/m)	(dB)	
1	0.1554	75.27	-101.65	-26.38	-77.88	23.77	-27.73	-50.15	peak
2	0.172	71.69	-101.67	-29.98	-81.48	22.9	-28.6	-52.88	peak
3	0.219	66.77	-101.75	-34.98	-86.48	20.79	-30.71	-55.77	peak
4	0.253	64.14	-101.8	-37.66	-89.16	19.54	-31.96	-57.20	peak
5	0.3163	61.7	-101.87	-40.17	-91.67	17.6	-33.9	-57.77	peak
6	0.3805	58.49	-101.94	-43.45	-94.95	15.99	-35.51	-59.44	peak

Note: 1. Measurement = Reading Level + Correct Factor (dBuA/m= dBuV/m- 20Log10[120π] = dBuV/m- 51.5).

2. If Peak Result complies with AV and QP limit, AV and QP Result are deemed to comply with AV limit.

3. All 3 polarizations (Horizontal, Face-on and Face-off) of the loop antenna had been tested, but only the worst data recorded in the report.

490 kHz ~ 30 MHz



No.	Frequency	Reading	Correct	FCC Result	FCC Limit	ISED Result	ISED Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dBuA/m)	(dBuA/m)	(dB)	
1	0.5039	64.44	-62.07	2.37	-49.13	33.56	-17.94	-31.19	peak
2	0.8296	63.44	-62.17	1.27	-50.23	29.23	-22.27	-27.96	peak
3	1.5564	57.68	-62.02	-4.34	-55.84	23.76	-27.74	-28.10	peak
4	4.9165	54.38	-61.48	-7.1	-58.60	29.54	-21.96	-36.64	peak
5	7.3361	53.58	-61.17	-7.59	-59.09	29.54	-21.96	-37.13	peak
6	18.4908	54.06	-60.89	-6.83	-58.33	29.54	-21.96	-36.37	peak

Note: 1. Measurement = Reading Level + Correct Factor (dBuA/m= dBuV/m- 20Log10[120π] = dBuV/m- 51.5).

2. If Peak Result complies with AV and QP limit, AV and QP Result are deemed to comply with AV limit.

3. All 3 polarizations (Horizontal, Face-on and Face-off) of the loop antenna had been tested, but only the worst data recorded in the report.

Note: All the modes had been tested, but only the worst data was recorded in the report.

9. ANTENNA REQUIREMENTS

APPLICABLE REQUIREMENTS

Please refer to FCC §15.203
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

Please refer to FCC §15.247(b)(4)
The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

RESULTS

Complies

END OF REPORT