



**FCC 47 CFR PART 15 SUBPART C**

**CERTIFICATION TEST REPORT**

*For*

**Tablet**

**MODEL NUMBER: VT-TABLET-5081G**

**FCC ID: 2AAGE5081GB48**

**REPORT NUMBER: 4789823272-6**

**ISSUE DATE: March 25, 2021**

*Prepared for*

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*Prepared by*

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Revision History

<u>Rev.</u>	<u>Issue Date</u>	<u>Revisions</u>	<u>Revised By</u>
V0	3/25/2021	Initial Issue	



Summary of Test Results			
Clause	Test Items	FCC Rules	Test Results
1	Transmitter 99% Emission Bandwidth / 20dB Bandwidth	Part 15.215 (c)	PASS
2	Transmitter Frequency Stability (Temperature & Voltage Variation)	CFR 47 FCC §15.225(e)	PASS
3	Fundamental Field Strength	CFR 47 FCC §5.225(a)(b)(c)(d)	PASS
4	Radiated Emissions	CFR 47 FCC§15.209(a) CFR 47 FCC§15.225(d)	PASS
5	Band Edge Radiated Emissions	CFR 47 FCC §15.209(a) CFR 47 FCC §15.225(c)(d)	PASS
6	Conducted Emission Test for AC Power Port	CFR 47 FCC §15.207	PASS
7	Antenna Requirement	CFR 47 FCC §15.203	Pass
This test report is only published to and used by the applicant, and it is not for evidence purpose in China.			



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# 1. ATTESTATION OF TEST RESULTS

## Applicant Information

Company Name: Chengdu Vantron Technology Co., Ltd.  
Address: No.5 GaoPeng Road, Hi-Tech Zone, Chengdu, SiChuan, P.R. China

## Manufacturer Information

Company Name: Chengdu Vantron Technology Co., Ltd.  
Address: No.5 GaoPeng Road, Hi-Tech Zone, Chengdu, SiChuan, P.R. China

## EUT Information

EUT Name: Tablet  
Model: VT-TABLET-5081G  
Brand: VANTRON  
Sample Received Date: January 20, 2021  
Sample Status: Normal  
Sample ID: /  
Date of Tested: March 25,2021

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

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## 2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with KDB 414788 D01 Radiated Test Site v01r01, FCC CFR 47 Part 2, FCC CFR 47 Part 15, ANSI C63.10-2013.

## 3. FACILITIES AND ACCREDITATION

Accreditation Certificate	<p><b>A2LA (Certificate No.: 4102.01)</b> UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. has been assessed and proved to be in compliance with A2LA.</p> <p><b>FCC (FCC Designation No.: CN1187)</b> UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. Has been recognized to perform compliance testing on equipment subject to the Commission's Declaration of Conformity (DoC) and Certification rules.</p> <p><b>ISED (Company No.: 21320)</b> 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.</p> <p><b>VCCI (Registration No.: G-20019, R-20004, C-20012 and T-20011)</b> 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</p>
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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
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.
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
Radiation Emission test (include Fundamental emission) (9KHz-30MHz)	2.2 dB
Radiation Emission test (include Fundamental emission) (30MHz-1GHz)	4.00 dB
Radiation Emission test (1GHz to 26GHz) (include Fundamental emission)	5.78 dB (1 GHz-18 GHz)
	5.23 dB (18 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	Tablet		
Customer Display Model	VT-TABLET-5081G		
Operation Frequency	13.56MHz		
Modulation	ASK		
Rating	Power Adapter	Li-ion Battery	3.8 V, 8000 mAh, 30.4Wh

### 5.2. MAXIMUM FIELD STRENGTH

Frequency (MHz)	Max Peak field strength (dB $\mu$ V/m)
13.56	16.36

### 5.3. DESCRIPTION OF AVAILABLE ANTENNAS

Frequency (MHz)	Antenna Type	Antenna Gain (dBi)
13.56	FPC antenna	0



#### 5.4. TEST ENVIRONMENT

Environment Parameter	Selected Values During Tests	
Relative Humidity	55 ~ 65%	
Atmospheric Pressure:	1025Pa	
Temperature	TN	23 ~ 28°C
Voltage:	VL	DC 4.5V
	VN	DC 5.0V
	VH	DC 5.5V

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



## 5.5. DESCRIPTION OF TEST SETUP

### SUPPORT EQUIPMENT

Item	Equipment	Brand Name	Model Name	P/N
/	/	/	/	/

### I/O PORT

Cable No	Port	Connector Type	Cable Type	Cable Length(m)	Remarks
1	USB	/	/	1.0 m	/

### ACCESSORY

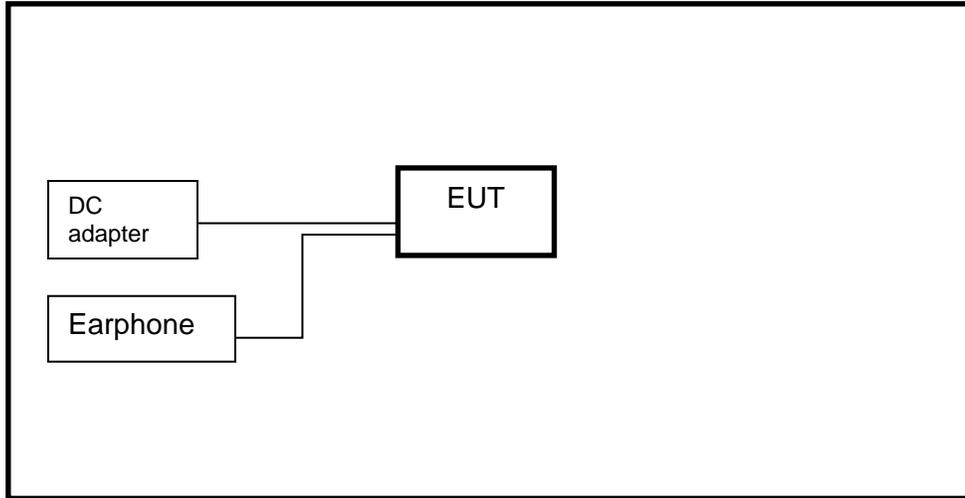
Item	Accessory	Brand Name	Model Name	Description
1	Power supply	/	NA010050020	OUTPUT 5V, 2A
2	Earphone	/	/	/

### TEST SETUP

The EUT can work in an engineering mode though the software inside.

Note: The EUT has two way to transmit the NFC signal, one is work in an engineering mode though the software inside and the other one is used the tag to approach the NFC antenna. Both the two way had been tested, but only the worst data (work in an engineering mode) was recorded in the report.

**SETUP DIAGRAM FOR TESTS**



Note: There are two Settings for the sample and both settings have Pre-Scanned, only the worst cases (Setup 1) were recorded in the report.

**5.6. MEASURING INSTRUMENT AND SOFTWARE USED**

<b>Conducted Emissions</b>						
Instrument						
Used	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
<input checked="" type="checkbox"/>	EMI Test Receiver	R&S	ESR3	101961	Nov. 12, 2020	Nov. 11, 2021
<input checked="" type="checkbox"/>	Two-Line V-Network	R&S	ENV216	101983	Nov. 12, 2020	Nov. 11, 2021
Software						
Used	Description	Manufacturer	Name	Version		
<input checked="" type="checkbox"/>	Test Software for Conducted disturbance	Farad	EZ-EMC	Ver. UL-3A1		
<b>Radiated Emissions</b>						
Instrument						
Used	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
<input checked="" type="checkbox"/>	MXE EMI Receiver	KESIGHT	N9038A	MY56400036	Nov. 12, 2020	Nov. 11, 2021
<input checked="" type="checkbox"/>	Hybrid Log Periodic Antenna	TDK	HLP-3003C	130960	Aug. 11, 2018	Aug. 11, 2021
<input checked="" type="checkbox"/>	Preamplifier	HP	8447D	2944A09099	Nov. 12, 2020	Nov. 11, 2021
<input checked="" type="checkbox"/>	EMI Measurement Receiver	R&S	ESR26	101377	Nov. 12, 2020	Nov. 11, 2021
<input checked="" type="checkbox"/>	Loop antenna	Schwarzbeck	1519B	00008	Jan.17, 2019	Jan.17,2022
<input checked="" type="checkbox"/>	Preamplifier	TDK	PA-02-001-3000	TRS-302-00050	Nov. 12, 2020	Nov. 11, 2021
Software						
Used	Description	Manufacturer	Name	Version		
<input checked="" type="checkbox"/>	Test Software for Radiated disturbance	Farad	EZ-EMC	Ver. UL-3A1		
<b>Other instruments</b>						
Used	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
<input checked="" type="checkbox"/>	Temperature & Humidity Chamber	SANMOOD	SG-80-CC-2	2088	Nov.20,2020	Nov.19,2021

## 6. ANTENNA PORT TEST RESULTS

### 6.1. 99% & 20dB BANDWIDTH

#### LIMITS

FCC Part15 (15.247) Subpart C		
Section	Test Item	Limit
ANSI C63.10 Section 6.9.2	20dB% Bandwidth	For reporting purposes only.

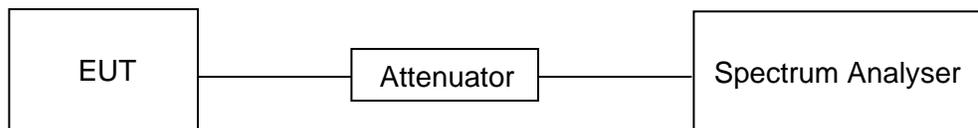
#### TEST PROCEDURE

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	For 20dB Occupied Bandwidth: 1% to 5% of the 20 dB bandwidth For 99% Occupied Bandwidth: 1% to 5% of the occupied bandwidth
VBW	For 20dB Occupied Bandwidth: approximately 3×RBW For 99% Occupied Bandwidth: ≥ 3×RBW
Span	Between 2 times and 5 times the 20dB OBW. Between 1.5 times and 5.0 times the 99% OBW.
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 99%/20dB relative to the maximum level measured in the fundamental emission.

#### TEST SETUP



#### TEST ENVIRONMENT

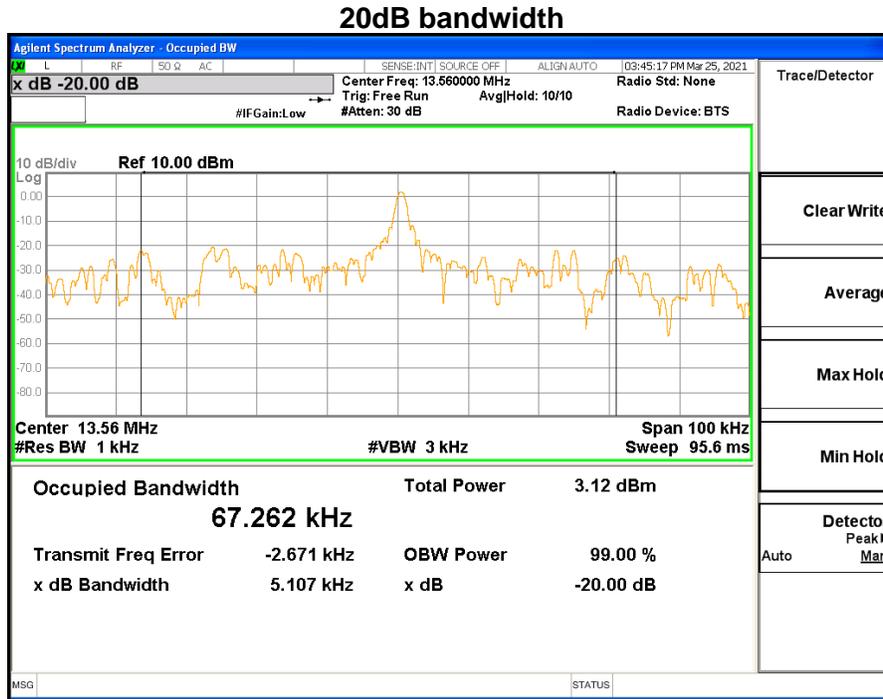
Temperature	23.1°C	Relative Humidity	62%
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Atmosphere Pressure	101kPa	Test Voltage	DC 5V
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**RESULTS**

Frequency (MHz)	20dB bandwidth (kHz)
13.56	5.107



**6.2. TRANSMITTER FREQUENCY STABILITY**

**LIMITS**

CFR 47 FCC §15.225(e)

The frequency tolerance of the carrier signal shall be maintained within  $\pm 0.01\%$  of the operating frequency over a temperature variation of  $-20$  degrees to  $+ 50$  degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C.

**TEST SETUP AND PROCEDURE**

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

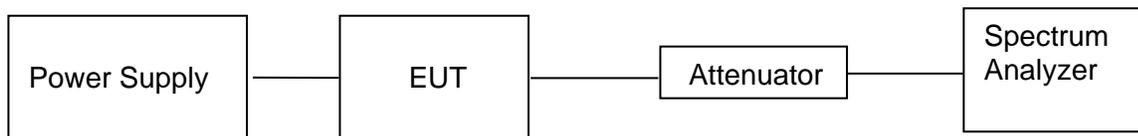
Center Frequency	The center frequency of the channel under test
Detector	PEAK



RBW	10KHz
VBW	$\geq 3 \times \text{RBW}$
Span	Encompass the entire emissions bandwidth (EBW) of the signal
Trace	Max hold
Sweep time	Auto

Allow the trace to stabilize, find the peak value of the power envelope and record the frequency, then calculated the frequency drift.

### TEST SETUP





**TEST RESULTS**

Maximum frequency error of the EUT with variations in ambient temperature

Temperature (°C)	Time after Start-up			
	0 minutes	2 minutes	5 minutes	10 minutes
-20	13.5613	13.5602	13.5603	13.5605
-10	13.5612	13.5602	13.5602	13.5604
0	13.5606	13.5603	13.5606	13.5605
10	13.5609	13.5602	13.5602	13.5604
20	13.5606	13.5602	13.5606	13.5605
30	13.5610	13.5601	13.5601	13.5606
40	13.5604	13.5602	13.5601	13.5609
50	13.5605	13.5609	13.5609	13.5609
Maximum frequency error	0.0096%	0.0066%	0.0066%	0.0066%
Limit	0.01%			
Result	Pass	Pass	Pass	Pass

Maximum frequency error of the EUT with variations in nominal operating voltage at an ambient normal temperature

Supply Voltage (V)	Time after Start-up			
	0 minutes	2 minutes	5 minutes	10 minutes
DC 5.0	13.5605	13.5607	13.5608	13.5607
DC 5.5	13.5603	13.5605	13.5607	13.5606
DC 4.5	13.5606	13.5607	13.5607	13.5608
Maximum frequency error	0.0044%	0.0052%	0.0058%	0.0059%
Limit	0.01%			
Result	Pass	Pass	Pass	Pass



## 7. RADIATED EMISSION TEST RESULTS

### LIMITS

Fundamental field strength

FCC Reference:	Part 15.225(a)(b)(c)(d) & 15.209(a)
Test Method Used:	ANSI C63.10 Sections 6.3, 6.4 and 6.5

Frequency (MHz)	Field Strength (uV/m)	Field Strength (dBuV/m)	Measured Distance (Meters)
13.553-13.567	15848	84	30
13.410-13.553/13.567-13.710	334	50.47	30
13.110-13.410/13.710-14.010	106	40.51	30

Note(s):

1. The field strength of any emissions appearing outside of the 13.110-14.010 MHz band shall not exceed the general radiated emission limits in §15.209.

2. The limit is specified at a test distance of 30 meters. However, as specified by FCC Section 15.31 (f)(2), measurements may be performed at a closer distance and the measured level corrected to the specified measurement distance by using the square of an inverse linear distance extrapolation factor (40dB/decade).



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

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

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 <sup>Note 1</sup>	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.

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

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



## Restricted bands of operation

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
<sup>1</sup> 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	( <sup>2</sup> )
13.36-13.41			

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

<sup>2</sup>Above 38.6c



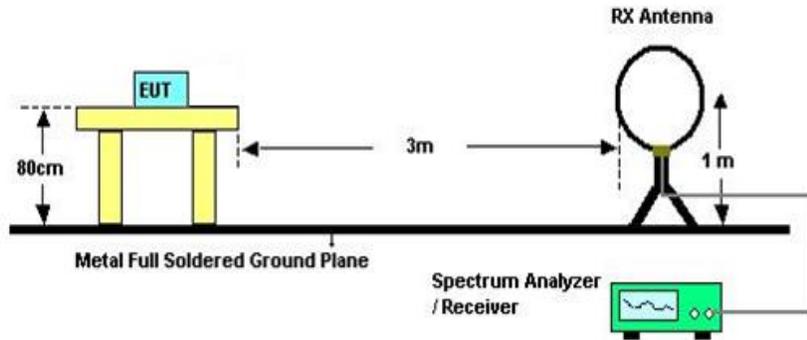
**Table 7 – Restricted frequency bands<sup>Note 1</sup>**

MHz	MHz	GHz
0.090 - 0.110	149.9 - 150.05	9.0 - 9.2
0.495 - 0.505	156.52475 - 156.52525	9.3 - 9.5
2.1735 - 2.1905	156.7 - 156.9	10.6 - 12.7
3.020 - 3.026	162.0125 - 167.17	13.25 - 13.4
4.125 - 4.128	167.72 - 173.2	14.47 - 14.5
4.17725 - 4.17775	240 - 285	15.35 - 16.2
4.20725 - 4.20775	322 - 335.4	17.7 - 21.4
5.677 - 5.683	399.9 - 410	22.01 - 23.12
6.215 - 6.218	608 - 614	23.6 - 24.0
6.26775 - 6.26825	960 - 1427	31.2 - 31.8
6.31175 - 6.31225	1435 - 1626.5	36.43 - 36.5
8.291 - 8.294	1645.5 - 1646.5	Above 38.6
8.362 - 8.366	1660 - 1710	
8.37625 - 8.38675	1718.8 - 1722.2	
8.41425 - 8.41475	2200 - 2300	
12.29 - 12.293	2310 - 2360	
12.51975 - 12.52025	2483.5 - 2500	
12.57675 - 12.57725	2655 - 2900	
13.36 - 13.41	3280 - 3267	
16.42 - 16.423	3332 - 3339	
16.69475 - 16.69525	3345.8 - 3358	
16.80425 - 16.80475	3500 - 4400	
25.5 - 25.67	4500 - 5150	
37.5 - 38.25	5350 - 5460	
73 - 74.6	7250 - 7750	
74.8 - 75.2	8025 - 8500	
108 - 138		

**Note 1:** Certain frequency bands listed in table 7 and in bands above 38.6 GHz are designated for licence-exempt applications. These frequency bands and the requirements that apply to related devices are set out in the 200 and 300 series of RSSs.

**TEST SETUP AND PROCEDURE**

Below 30MHz

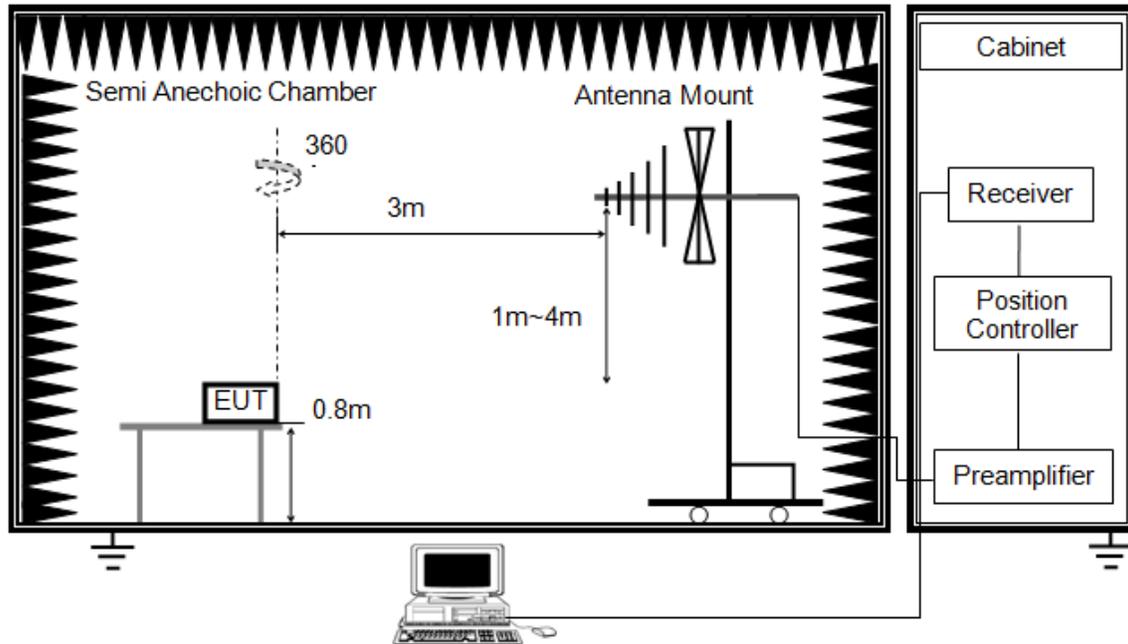


The setting of the spectrum analyser

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, Face-on and Face-off polarizations of the antenna are set to make the measurement.
3. The EUT was placed on a turntable with 80cm meter above ground.
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a 1m height antenna tower.
5. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
6. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
7. 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 1000MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.
8. Although these tests were performed other than open area test site, adequate comparison measurements were confirmed against 30m open field site. Therefore, the sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field based on KDB 414788.

Below 1G

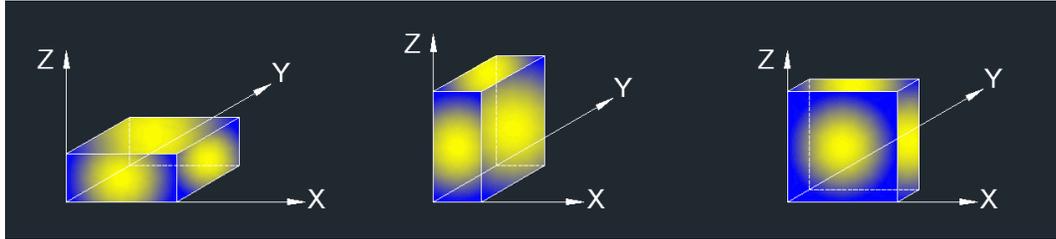


The setting of the spectrum analyser

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 80cm above ground.
4. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
5. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
6. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
7. 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.

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.

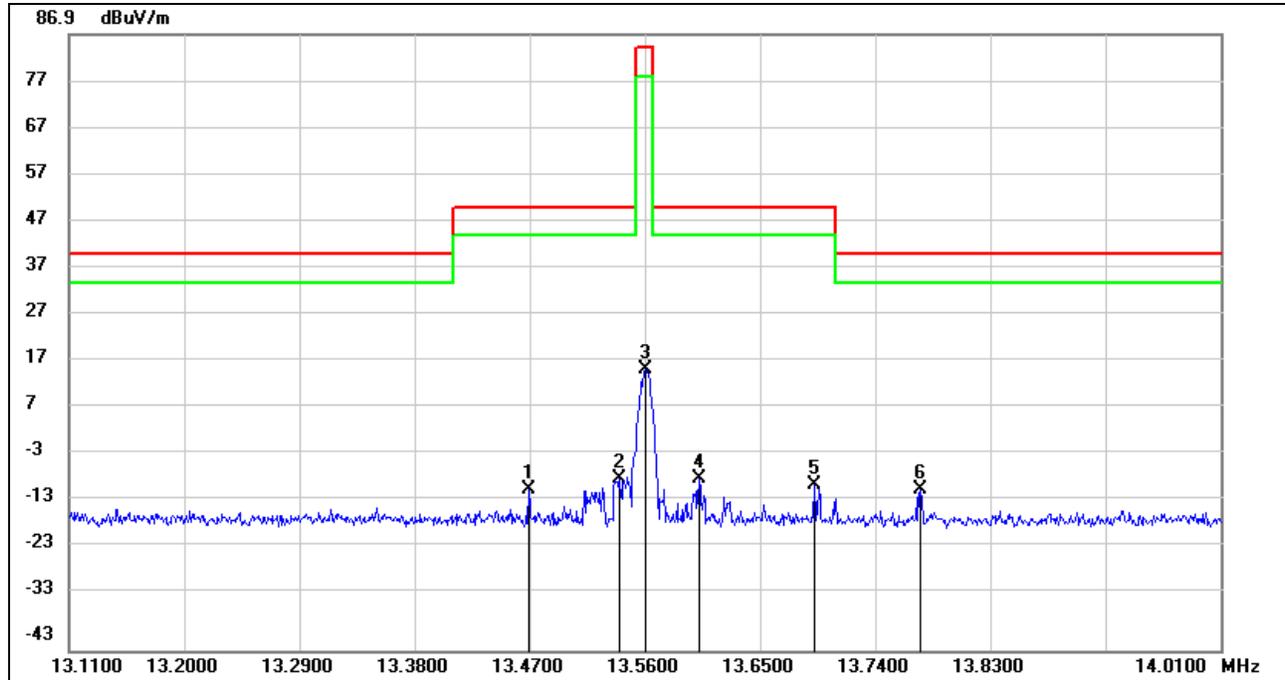
### TEST ENVIRONMENT

Temperature	24.2°C	Relative Humidity	66%
Atmosphere Pressure	101kPa	Test Voltage	DC 5V

### RESULTS

## 7.1. FIELD STRENGTH OF INTENTIONAL EMISSIONS

### FIELD STRENGTH OF INTENTIONAL EMISSIONS (LOOP ANTENNA FACE ON TO THE EUT)



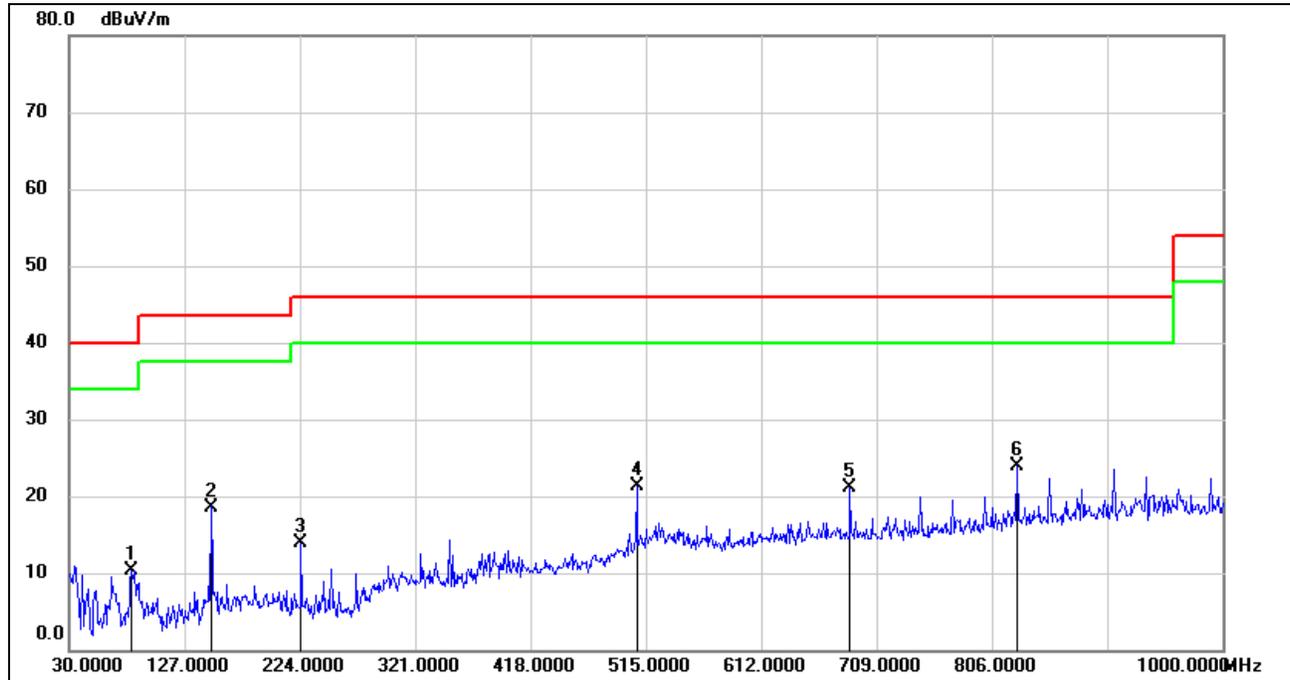
No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	13.4691	52.16	-61.41	-9.25	50.47	-59.72	peak
2	13.5402	54.69	-61.41	-6.72	50.47	-57.19	peak
3	13.5600	77.73	-61.41	16.32	84.00	-67.68	peak
4	13.6023	54.54	-61.41	-6.87	50.47	-57.34	peak
5	13.6923	53.15	-61.41	-8.26	50.47	-58.73	peak
6	13.7751	52.20	-61.43	-9.23	40.51	-49.74	peak

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

2. 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.

## 7.2. SPURIOUS EMISSIONS BELOW 1GHz AND ABOVE 30MHz

### SPURIOUS EMISSIONS (HORIZONTAL)

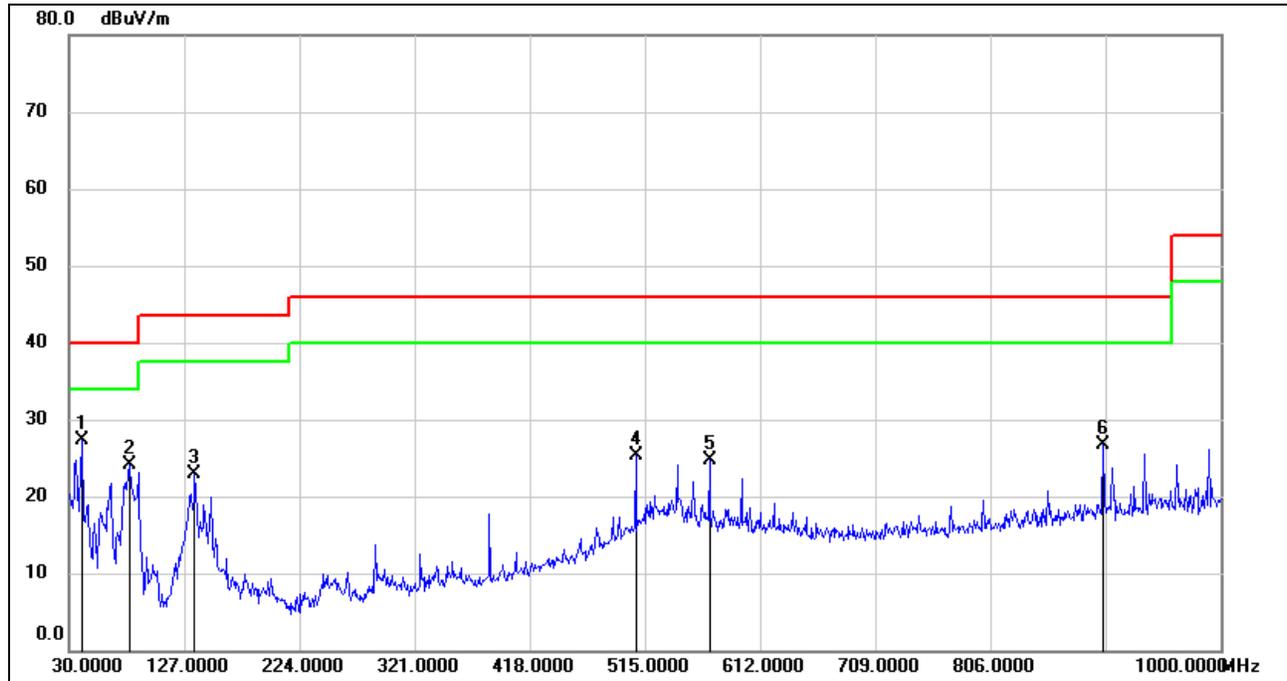


No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	82.3800	32.02	-21.65	10.37	40.00	-29.63	QP
2	149.3100	37.13	-18.53	18.60	43.50	-24.90	QP
3	224.9700	32.54	-18.72	13.82	46.00	-32.18	QP
4	507.2400	32.71	-11.34	21.37	46.00	-24.63	QP
5	686.6900	30.09	-8.95	21.14	46.00	-24.86	QP
6	827.3400	31.15	-7.22	23.93	46.00	-22.07	QP

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



**HARMONICS AND SPURIOUS EMISSIONS (VERTICAL)**



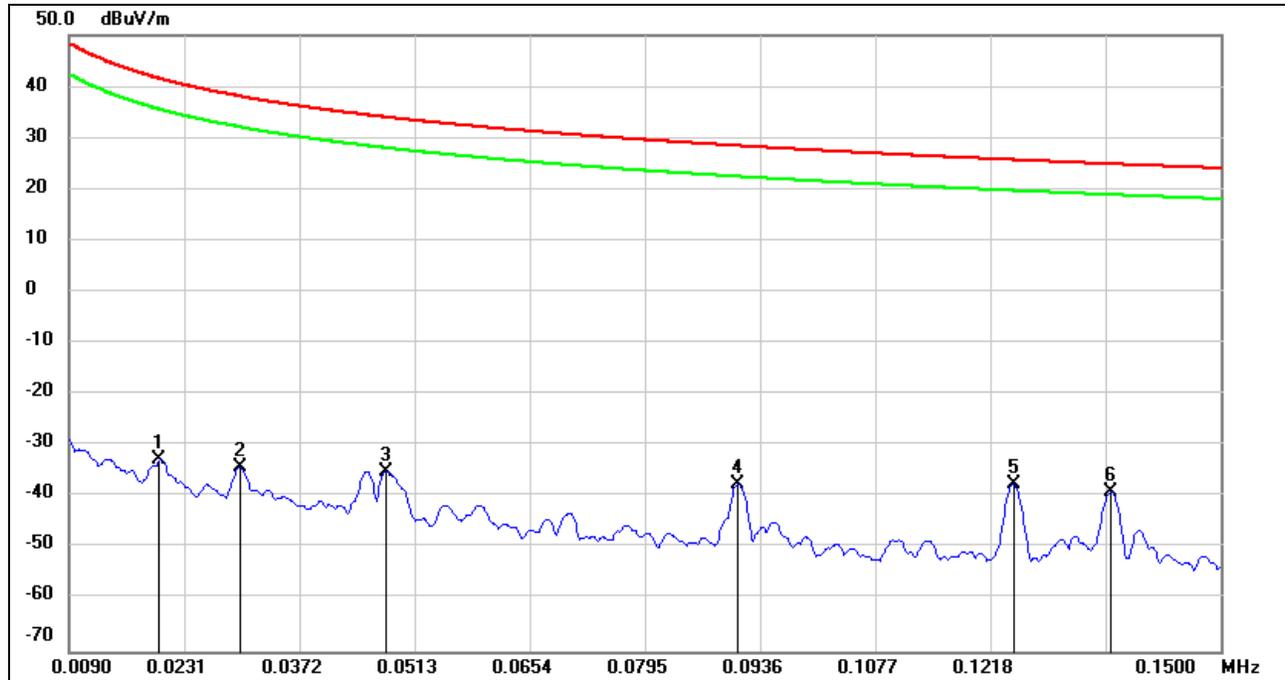
No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	40.6699	47.45	-20.14	27.31	40.00	-12.69	QP
2	80.4400	45.59	-21.53	24.06	40.00	-15.94	QP
3	135.7300	42.14	-19.28	22.86	43.50	-20.64	QP
4	507.2400	36.64	-11.34	25.30	46.00	-20.70	QP
5	569.3200	35.19	-10.39	24.80	46.00	-21.20	QP
6	901.0600	32.37	-5.64	26.73	46.00	-19.27	QP

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

### 7.3. SPURIOUS EMISSIONS BELOW 30MHz

#### SPURIOUS EMISSIONS (LOOP ANTENNA FACE ON TO THE EUT)

#### 9kHz~ 150kHz



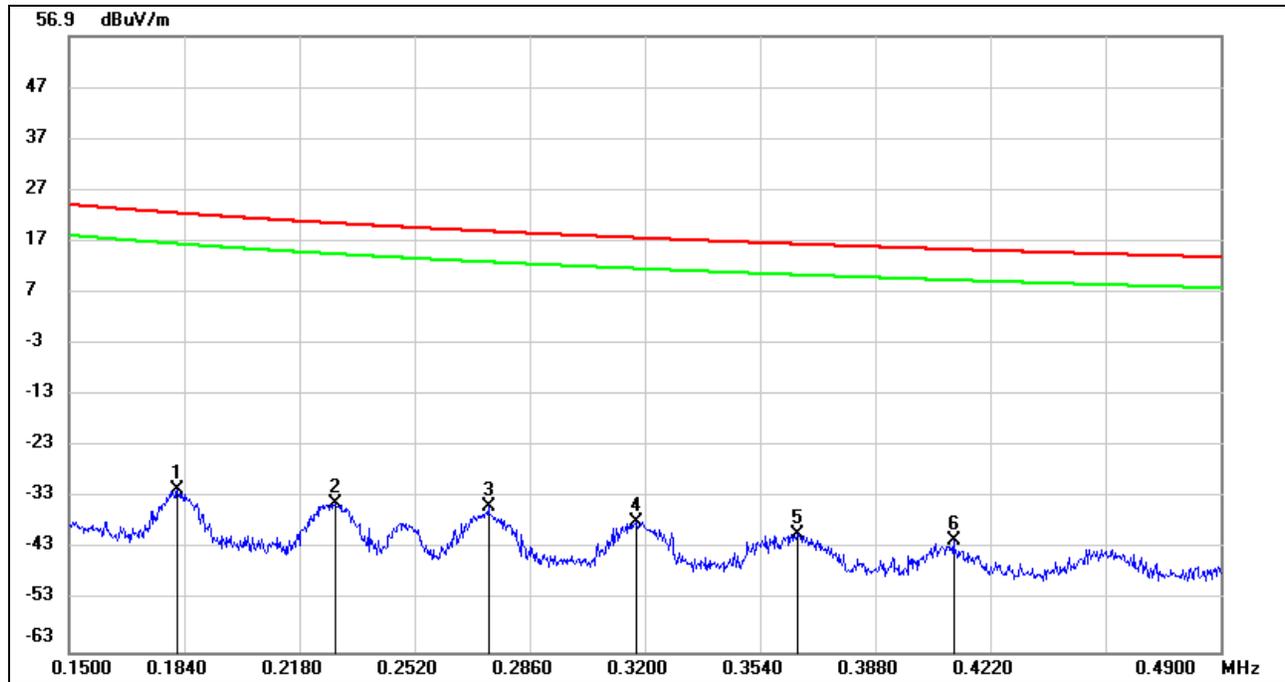
No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	0.0200	68.33	-100.98	-32.65	41.58	-74.23	peak
2	0.0299	66.98	-101.11	-34.13	38.09	-72.22	peak
3	0.0478	66.44	-101.35	-34.91	34.01	-68.92	peak
4	0.0909	63.66	-101.14	-37.48	28.43	-65.91	peak
5	0.1246	64.13	-101.59	-37.46	25.70	-63.16	peak
6	0.1366	62.69	-101.73	-39.04	24.90	-63.94	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.

150kHz ~ 490kHz



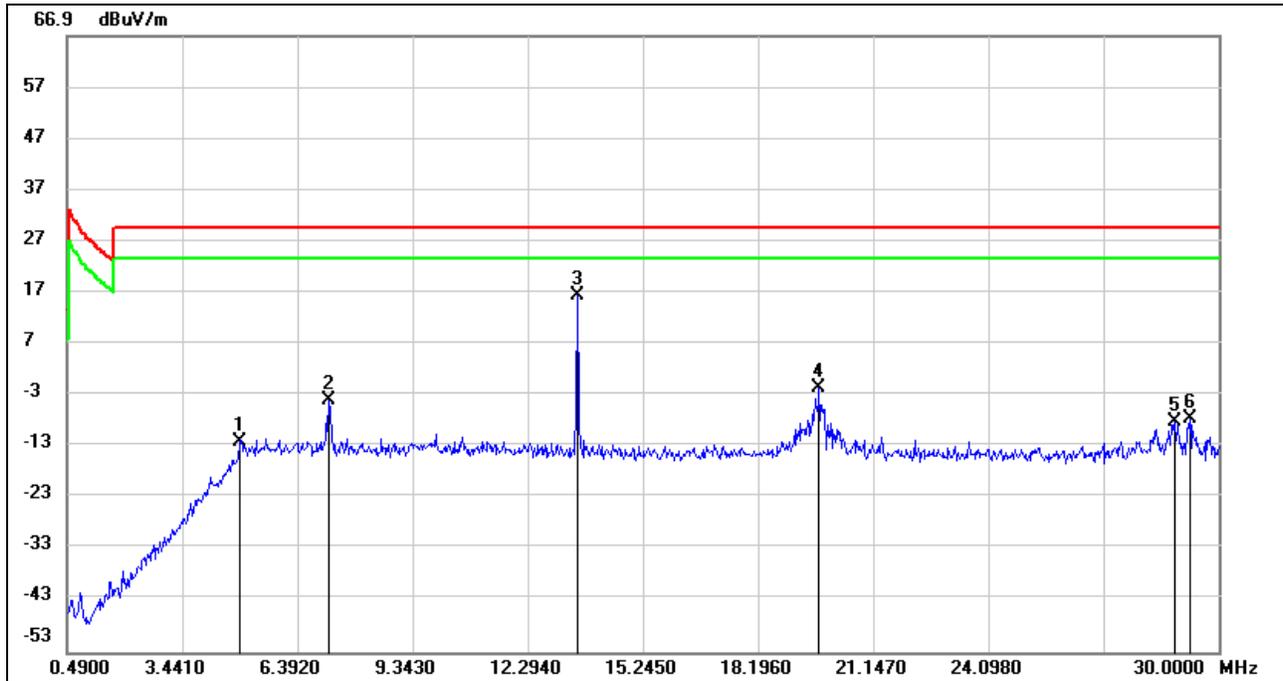
No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	0.1819	70.27	-101.86	-31.59	22.41	-54.00	peak
2	0.2285	67.78	-101.81	-34.03	20.42	-54.45	peak
3	0.2738	67.05	-101.78	-34.73	18.85	-53.58	peak
4	0.3175	63.93	-101.77	-37.84	17.57	-55.41	peak
5	0.3652	61.68	-101.75	-40.07	16.35	-56.42	peak
6	0.4111	60.34	-101.74	-41.40	15.32	-56.72	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.

490kHz ~ 30MHz



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4.9165	50.48	-62.66	-12.18	29.54	-41.72	peak
2	7.1888	57.70	-61.61	-3.91	29.54	-33.45	peak
3	13.5629	77.77	-61.41	16.36	29.54	-13.18	peak
4	19.7600	59.52	-61.11	-1.59	29.54	-31.13	peak
5	28.8786	52.39	-60.72	-8.33	29.54	-37.87	peak
6	29.2623	52.98	-60.70	-7.72	29.54	-37.26	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.

4. About the Fundamental emission test result please refer to section 7.1.



## 8. AC POWER LINE CONDUCTED EMISSIONS

### LIMITS

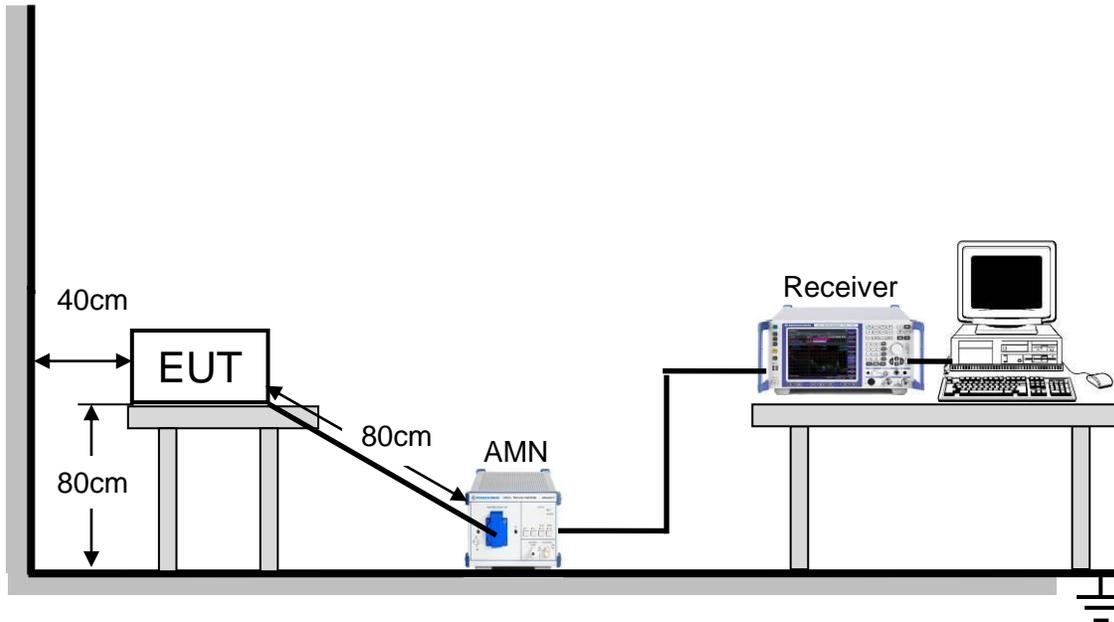
Please refer to CFR 47 FCC §15.207 (a).

FREQUENCY (MHz)	Quasi-peak	Average
0.15 -0.5	66 - 56 *	56 - 46 *
0.50 -5.0	56.00	46.00
5.0 -30.0	60.00	50.00

Note:

- (1) The tighter limit applies at the band edges.
- (2) The limit of " \* " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

**TEST SETUP AND PROCEDURE**



The following table is the setting of the receiver

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz

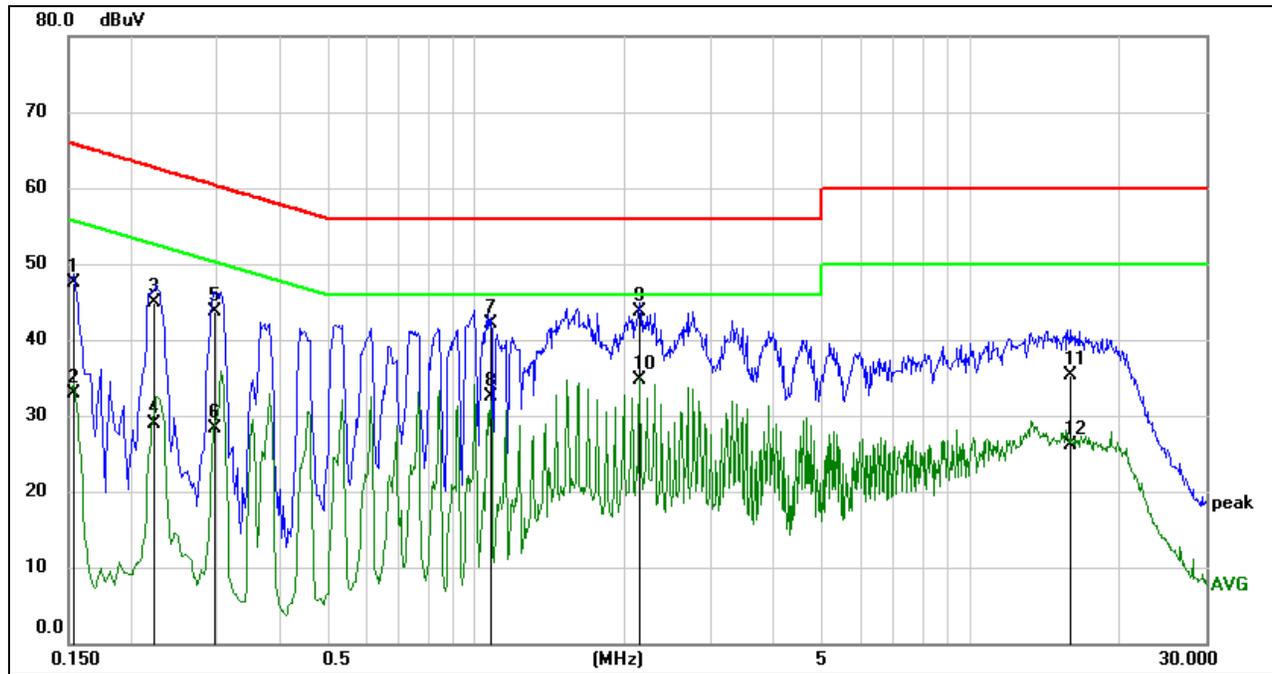
1. The testing follows the guidelines in ANSI C63.10-2013.
2. The EUT was placed on the top of a rotating table 0.8 meters above the horizontal ground plane and being connected to the power mains through a line impedance stabilization network (LISN). All other support equipment powered from additional LISN(s). The LISN provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
3. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
4. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
5. LISN at least 80 cm from nearest part of EUT chassis.
6. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-Peak and average detector mode.
7. 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 ENVIRONMENT**

Temperature	23.1°C	Relative Humidity	55%
Atmosphere Pressure	101kPa	Test Voltage	DC 5V

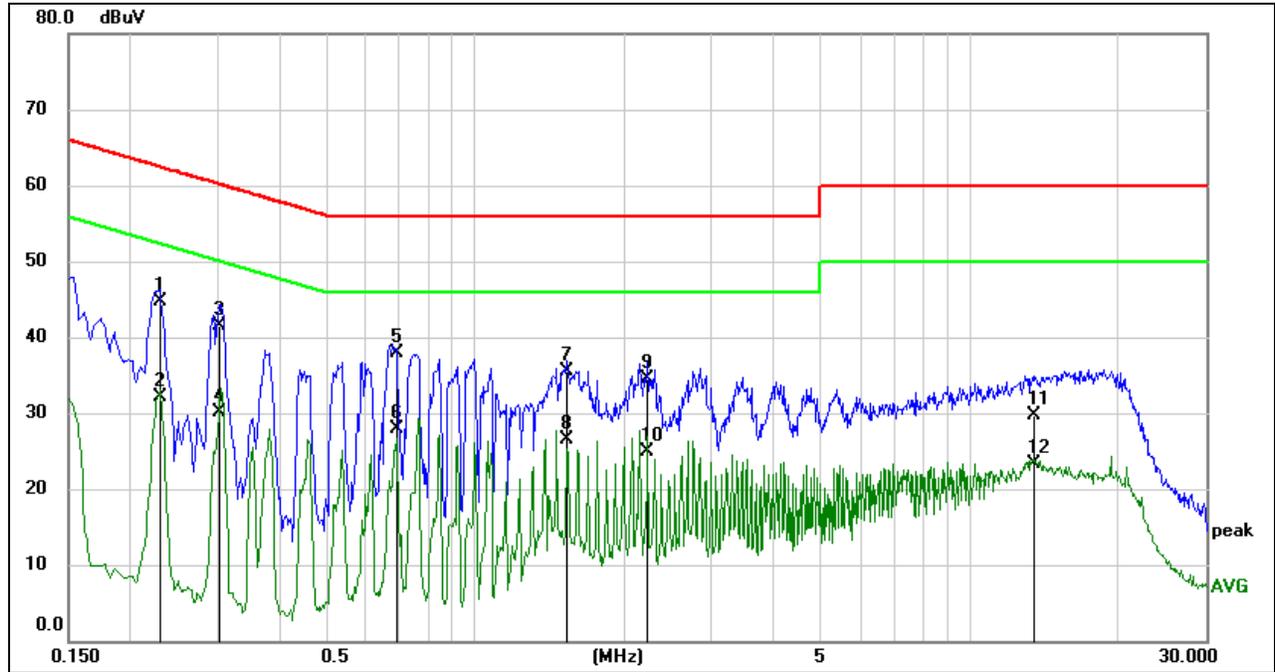
**LINE N RESULTS with modified sample (transmitter terminated into a dummy load)**



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.1533	37.92	9.59	47.51	65.82	-18.31	QP
2	0.1533	23.38	9.59	32.97	55.82	-22.85	AVG
3	0.2230	35.40	9.59	44.99	62.71	-17.72	QP
4	0.2230	19.35	9.59	28.94	52.71	-23.77	AVG
5	0.2980	34.12	9.59	43.71	60.30	-16.59	QP
6	0.2980	18.67	9.59	28.26	50.30	-22.04	AVG
7	1.0742	32.41	9.61	42.02	56.00	-13.98	QP
8	1.0742	22.81	9.61	32.42	46.00	-13.58	AVG
9	2.1489	34.04	9.63	43.67	56.00	-12.33	QP
10	2.1489	25.14	9.63	34.77	46.00	-11.23	AVG
11	16.0333	25.60	9.65	35.25	60.00	-24.75	QP
12	16.0333	16.51	9.65	26.16	50.00	-23.84	AVG

Note: 1. Result = Reading +Correct Factor.  
2. If QP Result complies with AV limit, AV Result is deemed to comply with AV limit.

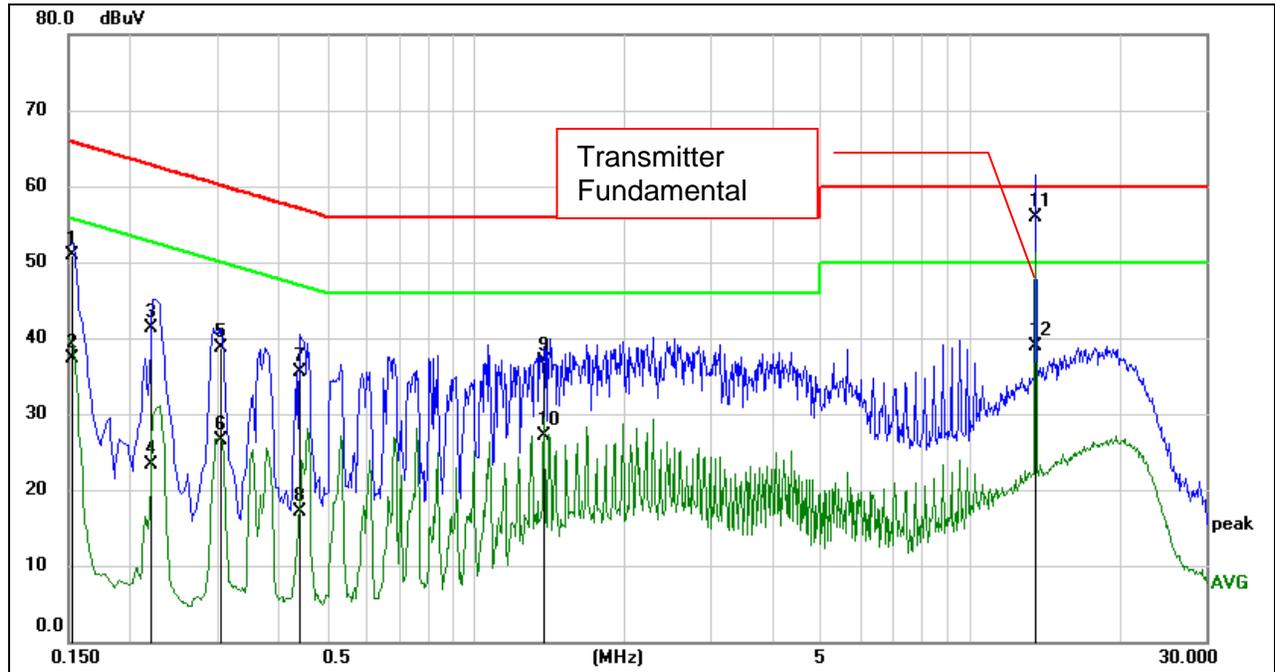
**LINE L RESULTS with modified sample (transmitter terminated into a dummy load)**



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.2298	35.18	9.59	44.77	62.46	-17.69	QP
2	0.2298	22.61	9.59	32.20	52.46	-20.26	AVG
3	0.3028	31.84	9.59	41.43	60.17	-18.74	QP
4	0.3028	20.46	9.59	30.05	50.17	-20.12	AVG
5	0.6908	28.35	9.60	37.95	56.00	-18.05	QP
6	0.6908	18.26	9.60	27.86	46.00	-18.14	AVG
7	1.5351	25.97	9.62	35.59	56.00	-20.41	QP
8	1.5351	16.80	9.62	26.42	46.00	-19.58	AVG
9	2.2266	24.97	9.63	34.60	56.00	-21.40	QP
10	2.2266	15.36	9.63	24.99	46.00	-21.01	AVG
11	13.4341	20.11	9.66	29.77	60.00	-30.23	QP
12	13.4341	13.56	9.66	23.22	50.00	-26.78	AVG

Note: 1. Result = Reading +Correct Factor.  
2. If QP Result complies with AV limit, AV Result is deemed to comply with AV limit.

**LINE N RESULTS with unmodified sample (antenna present)**

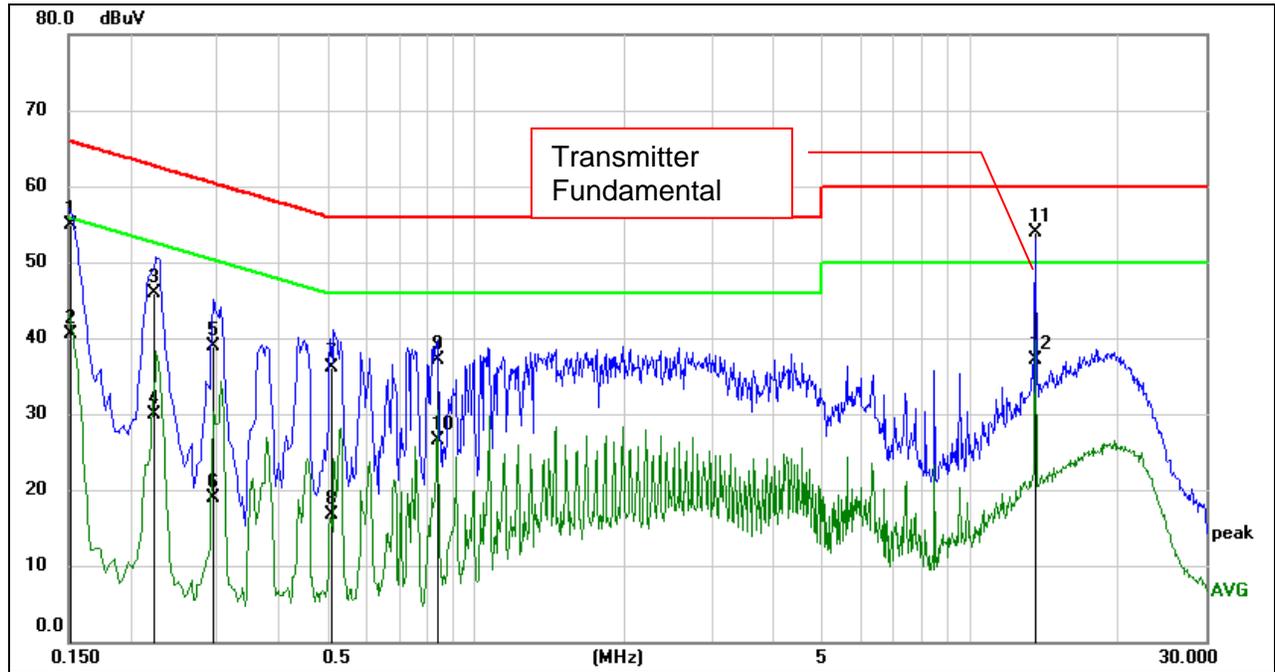


No.	Frequency (MHz)	Reading (dBuV)	Correct (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.1521	41.33	9.59	50.92	65.88	-14.96	QP
2	0.1521	27.73	9.59	37.32	55.88	-18.56	AVG
3	0.2198	31.80	9.59	41.39	62.83	-21.44	QP
4	0.2198	13.67	9.59	23.26	52.83	-29.57	AVG
5	0.3053	29.14	9.59	38.73	60.10	-21.37	QP
6	0.3053	16.92	9.59	26.51	50.10	-23.59	AVG
7	0.4396	25.86	9.60	35.46	57.07	-21.61	QP
8	0.4396	7.43	9.60	17.03	47.07	-30.04	AVG
9	1.3752	27.20	9.61	36.81	56.00	-19.19	QP
10	1.3752	17.59	9.61	27.20	46.00	-18.80	AVG
11	13.5604	46.24	9.66	55.90	60.00	-4.10	QP
12	13.5604	29.29	9.66	38.95	50.00	-11.05	AVG

Note: 1. Result = Reading +Correct Factor.  
2. If QP Result complies with AV limit, AV Result is deemed to comply with AV limit.



**LINE L RESULTS with unmodified sample (antenna present)**



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.1522	45.36	9.59	54.95	65.88	-10.93	QP
2	0.1522	30.95	9.59	40.54	55.88	-15.34	AVG
3	0.2227	36.28	9.59	45.87	62.72	-16.85	QP
4	0.2227	20.22	9.59	29.81	52.72	-22.91	AVG
5	0.2929	29.35	9.59	38.94	60.44	-21.50	QP
6	0.2929	9.37	9.59	18.96	50.44	-31.48	AVG
7	0.5126	26.51	9.60	36.11	56.00	-19.89	QP
8	0.5126	7.19	9.60	16.79	46.00	-29.21	AVG
9	0.8397	27.57	9.60	37.17	56.00	-18.83	QP
10	0.8397	16.98	9.60	26.58	46.00	-19.42	AVG
11	13.5604	44.21	9.66	53.87	60.00	-6.13	QP
12	13.5604	27.54	9.66	37.20	50.00	-12.80	AVG

Note: 1. Result = Reading +Correct Factor.  
2. If QP Result complies with AV limit, AV Result is deemed to comply with AV limit.



## 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

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**END OF REPORT**