



FCC 47 CFR PART 15 SUBPART C

for

900MHz Wireless Headphone

Model: HP5990A, HP5990, HP5990J, HP5990AJ

Brand: ARKON

Test Report Number:
C161121Z01-RP1

Issued for:

Uni-Art Precise Products Ltd

11-12/F., Yue Xiu Ind'1 Bldg., 87 Hung To Road, Kwun Tong, Kowloon,
Hong Kong

Issued by:

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Issued Date: December 27, 2016



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TESTING CERT #2861.01

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Revision History

Rev.	Issue Date.	Revisions	Effect Page	Revised By
00	December 27, 2016	Initial Issue	ALL	Amzula Chen



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1 TEST CERTIFICATION

Product:	900MHz Wireless Headphone
Model:	HP5990A, HP5990, HP5990J, HP5990AJ
Brand:	ARKON
Tested:	November 21~December 27, 2016
Applicant:	Uni-Art Precise Products Ltd 11-12/F., Yue Xiu Ind'1 Bldg., 87 Hung To Road, Kwun Tong, Kowloon, Hong Kong ARKON ELECTRONICS(HUIZHOU)CO.,LIMITED
Manufacturer:	NO.4 Taihao Road, High-tech Industrial Park, Sandong Town, Huicheng District, Huizhou, Guangdong, China

APPLICABLE STANDARDS	
STANDARD	TEST RESULT
FCC 47 CFR Part 15 Subpart C	No non-compliance noted
DEVIATION FROM APPLICABLE STANDARD	
None	

We hereby certify that:

The above equipment was tested by Compliance Certification Services(Shenzhen) Inc. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in **ANSI C63.10: 2013** and the energy emitted by the sample EUT tested as described in this report is in compliance with the requirements of FCC Rules Part 15.207, 15.209, 15.249.

The test results of this report relate only to the tested sample EUT identified in this report.

Approved by:

Reviewed by:

Sunday Hu
Supervisor of EMC Dept.
Compliance Certification Service(Shenzhen)
Inc.

Ruby Zhang
Supervisor of Report Dept.
Compliance Certification Service(Shenzhen)
Inc.



2 EUT DESCRIPTION

Product	900MHz Wireless Headphone
Model Number	HP5990A, HP5990, HP5990J, HP5990AJ
Trade Name	ARKON
Model Discrepancy	The models are identical to each other except for model name, PCB board and appearance.
Identify Number	C161121Z01-RP1
EUT Power Rating	DC 8V supplied by the adapter
Adapter Manufacturer/ Model No.	Dongguan Yinli Electronics Co.,Ltd. / YLJXA-T080040 input: 100-240V,50/60Hz 0.3A output: DC8.0V 400mA DC output cable: Un-shielded, 1.70m
Frequency Range	912.0 MHz, 913.0MHz
Transmit Power	78.90dBuV/m (Max.)
Modulation Technique	FM
Number of Channels	2 Channel
Antenna Specification	Linear antenna with 0 dBi gain (Max)

Note: 1. The sample selected for test was engineering sample that approximated to production product and was provided by manufacturer.

2. This submittal(s) (test report) is intended for **FCC ID: MVAHP5991-001T** filing to comply with Section 15.207, 15.209 and 15.249 of the FCC Part 15, Subpart C Rules.



3 TEST METHODOLOGY

3.1. DESCRIPTION OF TEST MODES

The EUT had been tested under operating condition.

Test program used to control the EUT for staying in continuous transmitting and receiving mode is programmed.

The following test mode(s) were scanned during the preliminary test below 1G:

Test Item	Test mode	Worse mode
Conducted Emission	Mode 1: charge	☒
Radiated Emission	Mode 1: TX	☒

After verification, all tests were carried out with the worst case test modes as shown below except radiated spurious emission below 1GHz, which worst case was in normal link mode only, and power line conducted emission below 30MHz, which worst case was in normal link mode with charging only.

Channel 1 (912.0MHz) and Channel 2(913.0MHz) were chosen for the final testing.

The field strength of spurious radiation emission was measured in the following position: EUT stand-up position (Y mode) and lie-down position (X, Z mode) The following data show only the worst case setup.

The worst case (X axis) was reported.



4 TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.10: 2013 and FCC CFR 47 15.207, 15.209 and 15.249.

4.1. EUT EXERCISE

The EUT was operated in the engineering mode to fix the TX frequency that was for the purpose of the measurements.

According to its specifications, the EUT must comply with the requirements of the Section 15.207, 15.209, 15.249 under the FCC Rules Part 15 Subpart C.

4.2. FCC PART 15.205 RESTRICTED BANDS OF OPERATIONS

- (a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

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 -	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.52525	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	156.7 - 156.9	3260 - 3267	23.6 - 24.0
12.29 - 12.293	162.0125 - 167.17	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	167.72 - 173.2	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	240 - 285	3600 - 4400	(²)
13.36 - 13.41	322 - 335.4		

¹ Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

² Above 38.6

- (b) Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.



5 INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards.

6 SETUP OF EQUIPMENT UNDER TEST

6.1. DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

No.	Equipment	Model No.	Serial No.	FCC ID	Brand Name	Data Cable	Power Cord
1	Earphone	ST909	N/A	N/A	Shengli	Unshielded 1.80m	N/A
2	900MHz Wireless Headphone (Receiver)	HP5990A	N/A	MVAHP5991-001T	ARKON	N/A	N/A
3	IPOD	A1285	YM908BYU3QX	N/A	APPLE	Unshielded 1.80m	N/A

Note:

- 1) Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

6.2. CONFIGURATION OF SYSTEM UNDER TEST

See test photographs attached in Appendix II for the actual connections between EUT and support equipment.



7 FACILITIES AND ACCREDITATIONS

7.1. FACILITIES

All measurement facilities used to collect the measurement data are located at

☒ **No10-1, Mingkeda Logistics Park, No.18 Huanguan South Rd., Guan Lan Town, Baoan District, Shenzhen China**

The sites are constructed in conformance with the requirements of ANSI C63.10: 2013, ANSI C63.7 and CISPR Publication 22. All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

7.2. ACCREDITATIONS

Our laboratories are accredited and approved by the following accreditation body according to ISO/IEC 17025.

USA	A2LA
China	CNAS

The measuring facility of laboratories has been authorized or registered by the following approval agencies.

USA	FCC
Japan	VCCI (C-4815,R-4320,T-2317, G-10624)
Canada	INDUSTRY CANADA

Copies of granted accreditation certificates are available for downloading from our web site, <http://www.ccssz.com>

7.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

Parameter	Uncertainty
Radiated Emission, 30 to 200 MHz Test Site : 966(2)	+/-3.6880dB
Radiated Emission, 200 to 1000 MHz Test Site : 966(2)	+/-3.6695dB
Radiated Emission, 1 to 8 GHz	+/-5.1782dB
Radiated Emission, 8 to 18 GHz	+/-5.2173dB
Conducted Emissions	+/-3.6836dB
Band Width	178kHz
Peak Output Power MU	+/-1.906dB
Band Edge MU	+/-0.182dB
Channel Separation MU	416.178Hz
Duty Cycle MU	0.054ms
Frequency Stability MU	226Hz

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

The measured result is above (below) the specification limit by a margin less than the measurement uncertainty; it is therefore not possible to state compliance based on the 95% level of confidence. However, the result indicates that compliance (non-compliance) is more probable than non-compliance) with the specification limit.



8 FCC PART 15.249 REQUIREMENTS

8.1. BAND EDGES MEASUREMENT

LIMIT

1. In the above emission table, the tighter limit applies at the band edges.

Frequency (Hz)	Field Strength (μ V/m at 3-meter)	Field Strength (dB μ V/m at 3-meter)
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

2. As shown in Section 15.35(b), for frequencies above 1000 MHz, the above field strength limits in paragraphs (a) and (b) of this section are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For point-to-point operation under paragraph (b) of this section, the peak field strength shall not exceed 2500 millivolts/meter at 3 meters along the antenna azimuth.
3. As shown in Section 15.249(d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation.

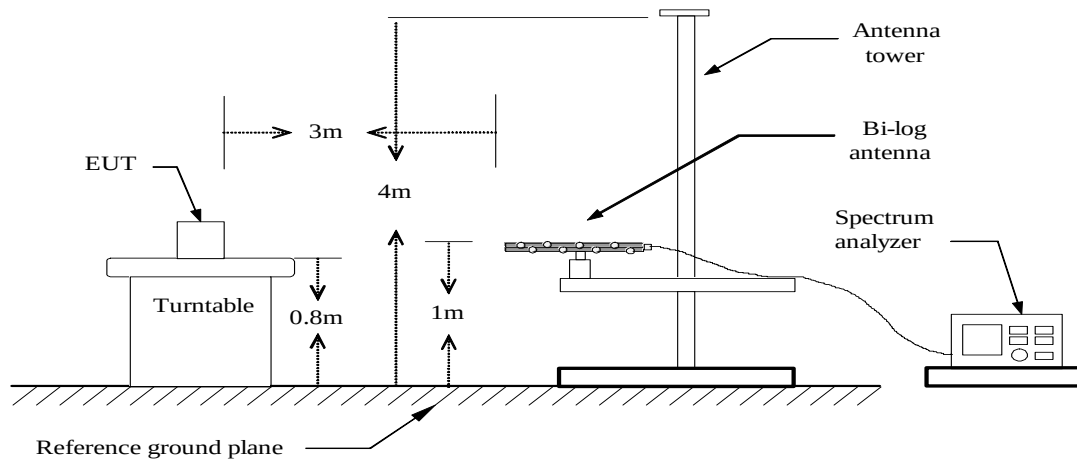
**MEASUREMENT EQUIPMENT USED**

Radiated Emission Test Site 966 (2)					
Name of Equipment	Manufacturer	Model Number	Serial Number	Last Calibration	Due Calibration
PSA Series Spectrum Analyzer	Agilent	E4446A	US44300399	02/21/2016	02/20/2017
EMI TEST RECEIVER	ROHDE&SCHWARZ	ESCI	100783	02/21/2016	02/20/2017
Amplifier	MITEQ	AM-1604-3000	1123808	03/18/2016	03/17/2017
High Noise Amplifier	Agilent	8449B	3008A01838	02/21/2016	02/20/2017
Board-Band Horn Antenna	Schwarzbeck	BBHA 9170	9170-497	02/28/2016	02/27/2017
Bilog Antenna	SCHAFFNER	CBL6143	5082	02/21/2016	02/20/2017
Horn Antenna	SCHWARZBECK	BBHA9120	D286	02/28/2016	02/27/2017
Loop Antenna	COM-POWER	AL-130	121044	09/25/2016	09/24/2017
Turn Table	N/A	N/A	N/A	N.C.R	N.C.R
Controller	Sunol Sciences	SC104V	022310-1	N.C.R	N.C.R
Controller	CT	N/A	N/A	N.C.R	N.C.R
Temp. / Humidity Meter	Anymetre	JR913	N/A	02/21/2016	02/20/2017
Antenna Tower	SUNOL	TLT2	N/A	N.C.R	N.C.R
Test S/W	FARAD	LZ-RF / CCS-SZ-3A2			

Remark: Each piece of equipment is scheduled for calibration once a year.



TEST CONFIGURATION



TEST PROCEDURE

1. The EUT is placed on a turntable, which is 0.8m above the ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emission.
4. Set the spectrum analyzer in the following setting in order to capture the lower and upper band-edges of the emission:
PEAK: RBW=100kHz, VBW=300kHz / Sweep=AUTO
5. Repeat the procedures until all the PEAK E versus POLARIZATION are measured.

TEST RESULTS

Refer to attach spectrum analyzer data chart.

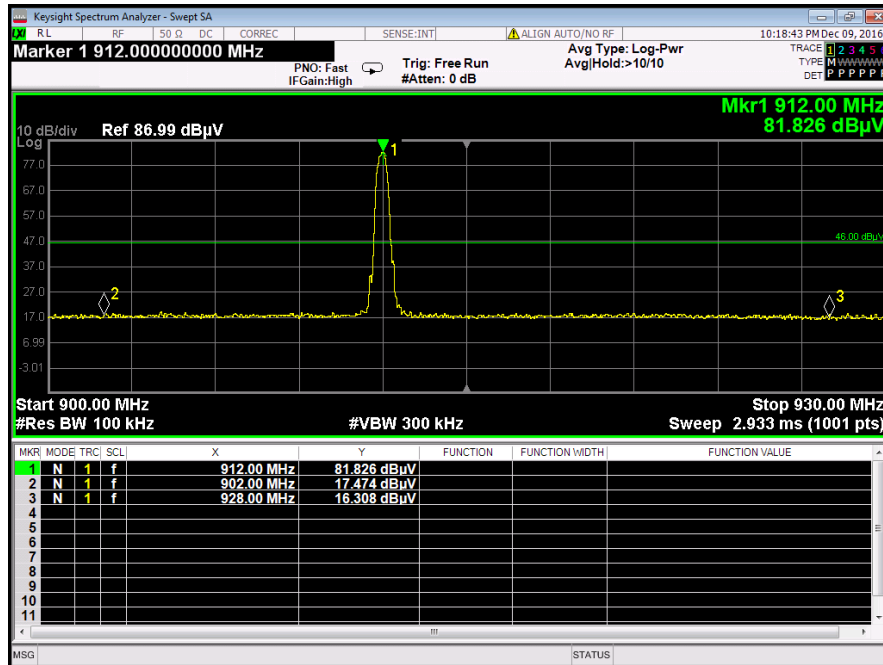


Test Data

Band Edges (TX / CH 1 912.0MHz)

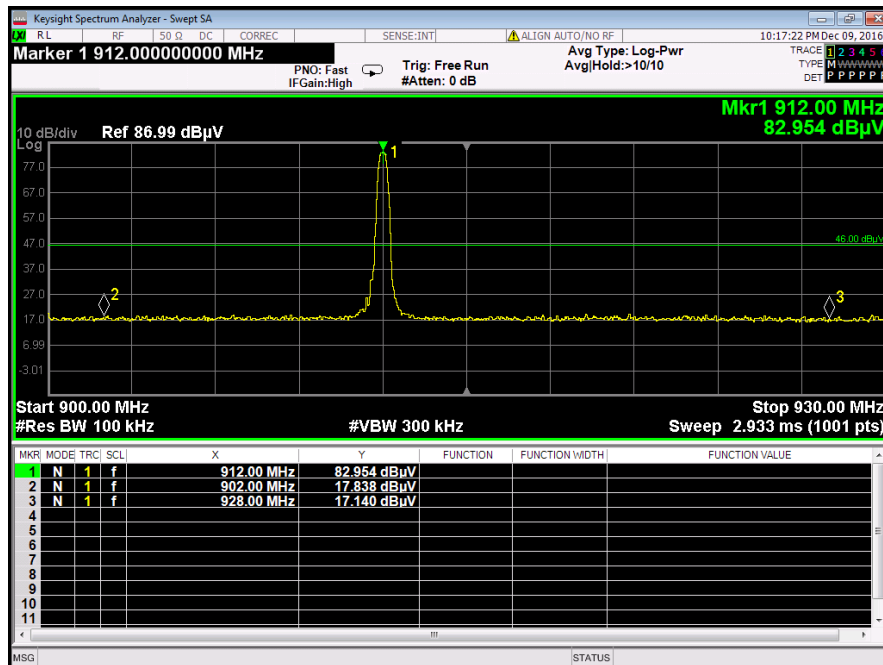
Detector mode: Peak

Polarity: Vertical



Detector mode: Peak

Polarity: Horizontal

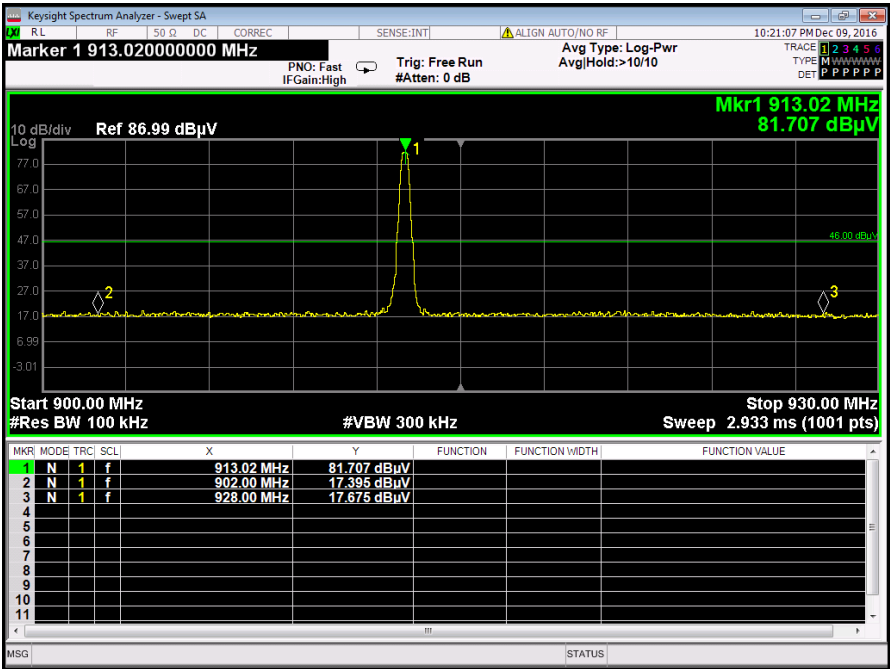




Band Edges (TX / CH 2 913.0 MHz)

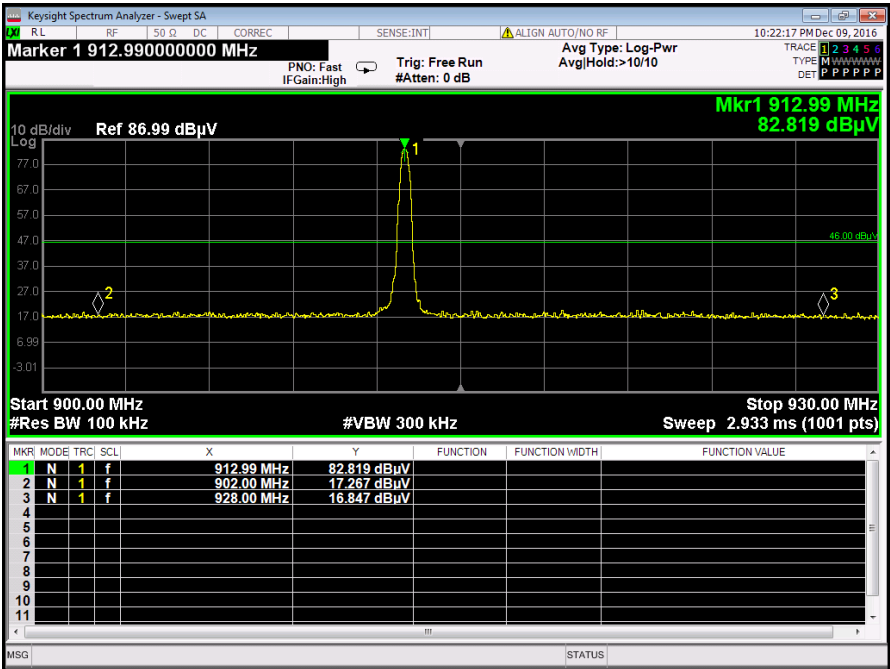
Detector mode: Peak

Polarity: Vertical



Detector mode: Peak

Polarity: Horizontal





8.2. POWER LINE CONDUCTED EMISSIONS MEASUREMENT

8.2.1. LIMITS OF CONDUCTED EMISSIONS MEASUREMENT

According to §15.207(a), except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 μ H/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Frequency Range (MHz)	Limits (dB μ V)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56*	56 to 46*
0.50 to 5	56	46
5 to 30	60	50

NOTE:

- (1) The lower limit shall apply at the transition frequencies.
- (2) The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50 MHz.
- (3) All emanations from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

TEST INSTRUMENTS

Conducted Emission Test Site					
Name of Equipment	Manufacturer	Model Number	Serial Number	Last Calibration	Due Calibration
ESCI EMI TEST RECEIVER.ESCI	ROHDE&SCHWARZ	ESCI	100783	02/21/2016	02/20/2017
LISN	ROHDE&SCHWARZ	ENV216	101543	02/21/2016	02/20/2017
LISN	EMCO	3825/2	8901-1459	02/21/2016	02/20/2017
Temp. / Humidity Meter	VICTOR	VC230	N/A	02/21/2016	02/20/2017
Test S/W	FARAD	EZ-EMC/ CCS-3A1-CE			

- NOTE:** 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. N.C.R = No Calibration Request.

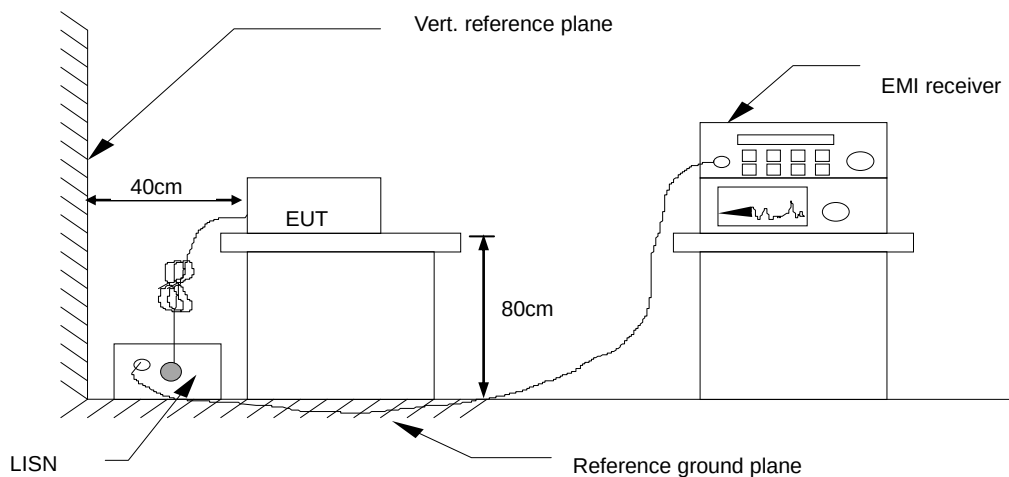


8.2.2. TEST PROCEDURES (please refer to measurement standard)

- The EUT and Support equipment, if needed, was placed on a non-conducted table, which is 0.8m above the ground plane and 0.4m away from the conducted wall.
- The test equipment EUT installed received AC main power, through a Line Impedance Stabilization Network (LISN), which supplied power source and was grounded to the ground plane. All support equipment power received from a second LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
- The EUT test program was started. Emissions were measured on each current carrying line of the EUT using an EMI Test Receiver connected to the LISN powering the EUT.
- The frequency range from 150 kHz to 30 MHz was searched. The test data of the worst-case condition(s) was recorded. Emission levels under limit 20dB were not recorded.



8.2.3. TEST SETUP



- For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

8.2.4. DATA SAMPLE

Frequency (MHz)	QuasiPeak Reading (dBuV)	Average Reading (dBuV)	Correction Factor (dB)	QuasiPeak Result (dBuV)	Average Result (dBuV)	QuasiPeak Limit (dBuV)	Average Limit (dBuV)	QuasiPeak Margin (dB)	Average Margin (dB)	Remark (Pass/Fail)
X.XXXX	32.69	25.65	11.52	44.21	37.17	65.78	55.79	-21.57	-18.62	Pass

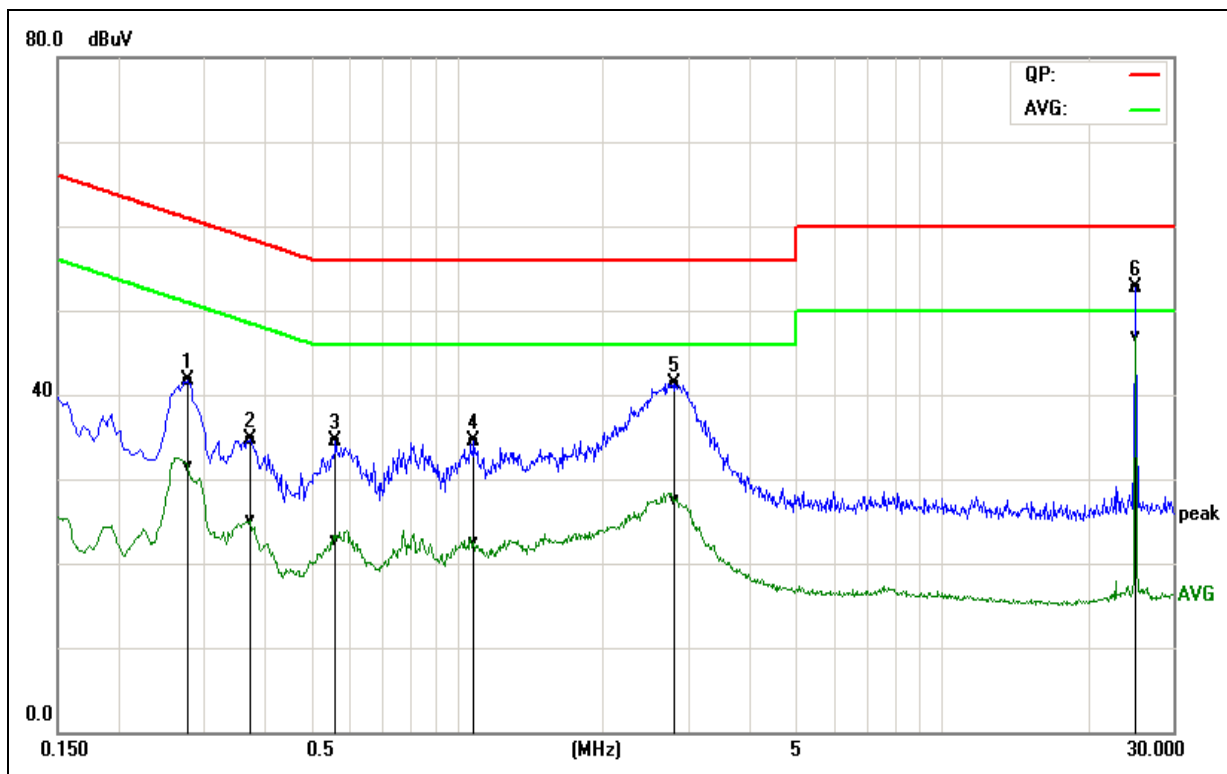
Factor = Insertion loss of LISN + Cable Loss
Result = Quasi-peak Reading/ Average Reading + Factor
Limit = Limit stated in standard
Margin = Result (dBuV) – Limit (dBuV)



8.2.5. TEST RESULTS

Model No.	HP5990A	RBW,VBW	9 kHz
Environmental Conditions	22°C, 45% RH	Test Mode	Mode 1
Tested by	Saber Huang	Line	L1
Tested Date	2016/12/09	Tested Voltage	120Vac/60Hz

(The chart below shows the highest readings taken from the final data.)



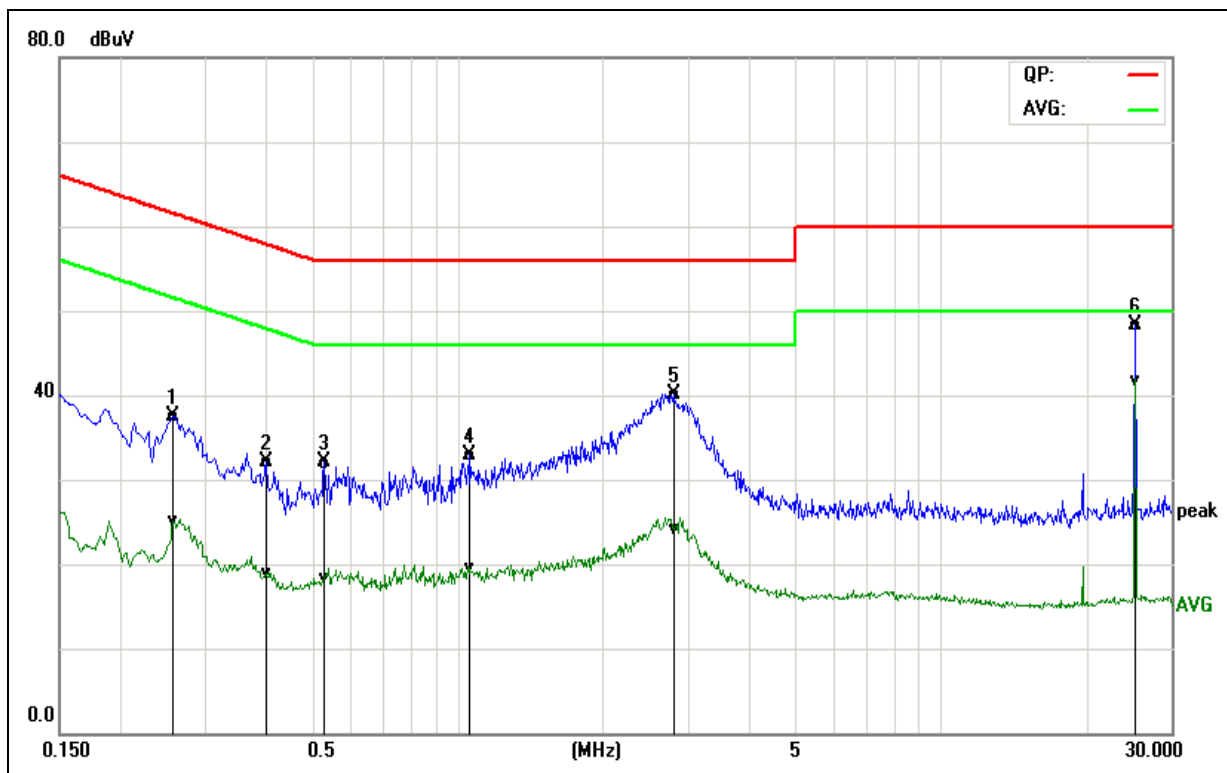
Frequency (MHz)	QuasiPeak Reading (dBuV)	Average Reading (dBuV)	Correction Factor (dB)	QuasiPeak Result (dBuV)	Average Result (dBuV)	QuasiPeak Limit (dBuV)	Average Limit (dBuV)	QuasiPeak Margin (dB)	Average Margin (dB)	Remark (Pass/Fail)
0.2779	21.98	11.96	19.64	41.62	31.60	60.88	50.88	-19.26	-19.28	Pass
0.3740	15.01	5.50	19.63	34.64	25.13	58.41	48.41	-23.77	-23.28	Pass
0.5620	14.78	2.98	19.68	34.46	22.66	56.00	46.00	-21.54	-23.34	Pass
1.0859	14.92	2.84	19.66	34.58	22.50	56.00	46.00	-21.42	-23.50	Pass
2.8220	21.70	7.89	19.69	41.39	27.58	56.00	46.00	-14.61	-18.42	Pass
25.1460	32.86	26.91	19.94	52.80	46.85	60.00	50.00	-7.20	-3.15	Pass

NOTE: L1 = Line One (Live Line)



Model No.	HP5990A	RBW,VBW	9 kHz
Environmental Conditions	22°C, 45% RH	Test Mode	Mode 1
Tested by	Saber Huang	Line	L2
Tested Date	2016/12/09	Tested Voltage	120Vac/60Hz

(The chart below shows the highest readings taken from the final data.)



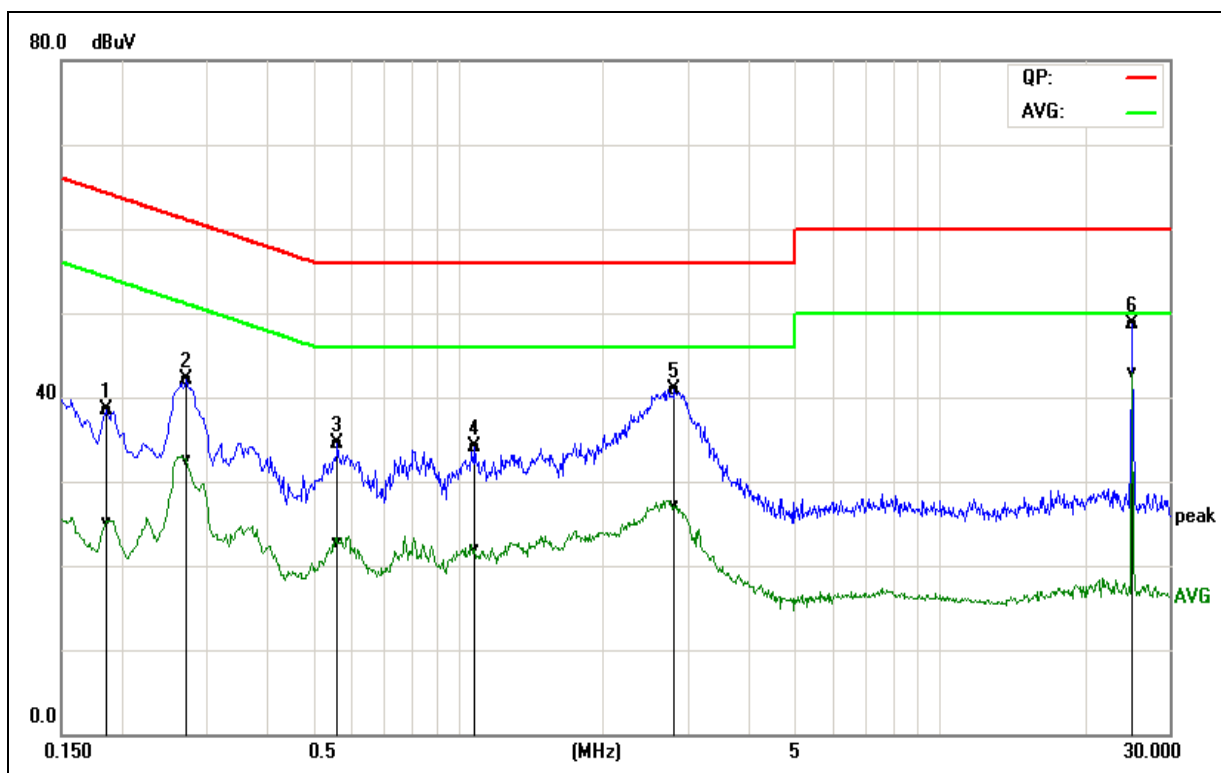
Frequency (MHz)	QuasiPeak Reading (dBuV)	Average Reading (dBuV)	Correction Factor (dB)	QuasiPeak Result (dBuV)	Average Result (dBuV)	QuasiPeak Limit (dBuV)	Average Limit (dBuV)	QuasiPeak Margin (dB)	Average Margin (dB)	Remark (Pass/Fail)
0.2580	17.84	5.48	19.72	37.56	25.20	61.49	51.50	-23.93	-26.30	Pass
0.4020	12.38	-0.83	19.66	32.04	18.83	57.81	47.81	-25.77	-28.98	Pass
0.5299	12.36	-1.30	19.64	32.00	18.34	56.00	46.00	-24.00	-27.66	Pass
1.0620	13.24	-0.18	19.74	32.98	19.56	56.00	46.00	-23.02	-26.44	Pass
2.8020	20.47	4.44	19.72	40.19	24.16	56.00	46.00	-15.81	-21.84	Pass
25.2180	28.54	21.96	19.84	48.38	41.80	60.00	50.00	-11.62	-8.20	Pass

NOTE: L2 = Line Two (Neutral Line).



Model No.	HP5990A	RBW,VBW	9 kHz
Environmental Conditions	22°C, 45% RH	Test Mode	Mode 1
Tested by	Saber Huang	Line	L1
Tested Date	2016/12/09	Tested Voltage	240Vac/50Hz

(The chart below shows the highest readings taken from the final data.)



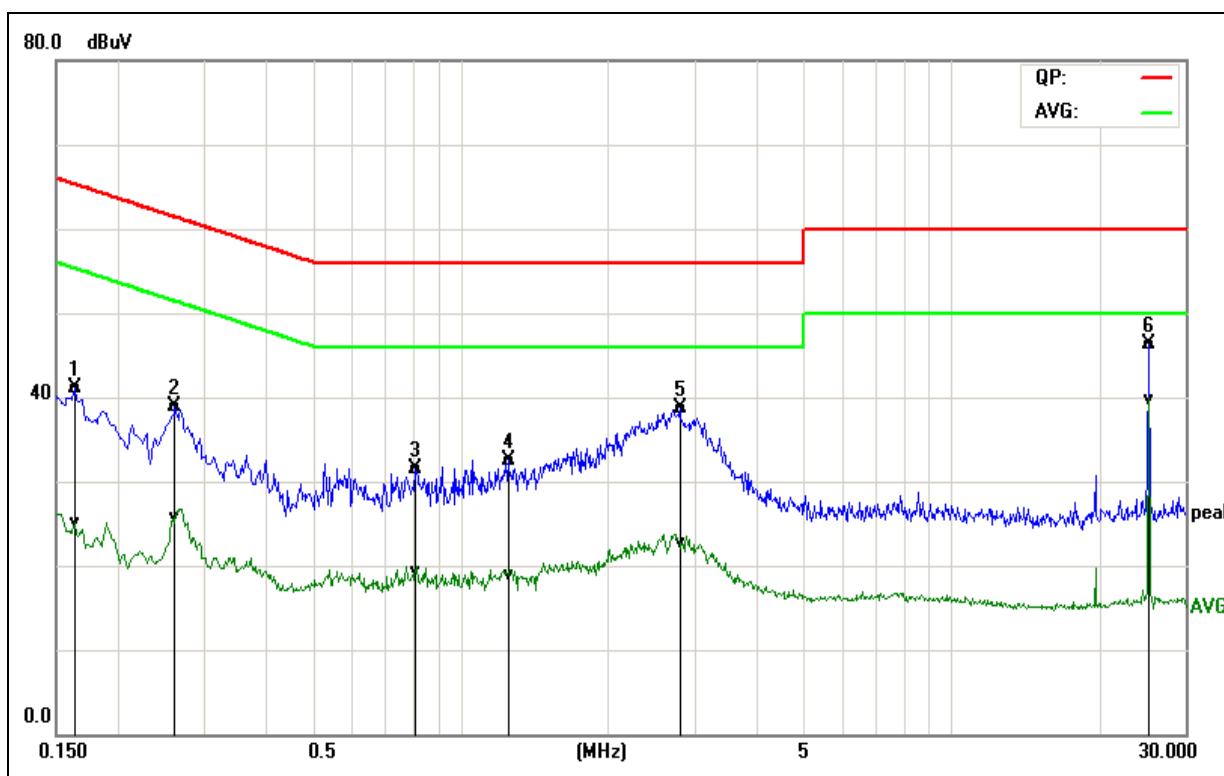
Frequency (MHz)	QuasiPeak Reading (dBuV)	Average Reading (dBuV)	Correction Factor (dB)	QuasiPeak Result (dBuV)	Average Result (dBuV)	QuasiPeak Limit (dBuV)	Average Limit (dBuV)	QuasiPeak Margin (dB)	Average Margin (dB)	Remark (Pass/Fail)
0.1860	18.94	5.59	19.60	38.54	25.19	64.21	54.21	-25.67	-29.02	Pass
0.2740	22.38	12.88	19.64	42.02	32.52	60.99	51.00	-18.97	-18.48	Pass
0.5620	14.78	2.98	19.68	34.46	22.66	56.00	46.00	-21.54	-23.34	Pass
1.0859	14.42	2.34	19.66	34.08	22.00	56.00	46.00	-21.92	-24.00	Pass
2.8220	21.20	7.39	19.69	40.89	27.08	56.00	46.00	-15.11	-18.92	Pass
25.1460	28.86	22.91	19.94	48.80	42.85	60.00	50.00	-11.20	-7.15	Pass

NOTE: L1 = Line One (Live Line)



Model No.	HP5990A	RBW,VBW	9 kHz
Environmental Conditions	22°C, 45% RH	Test Mode	Mode 1
Tested by	Saber Huang	Line	L2
Tested Date	2016/12/09	Tested Voltage	240Vac/50Hz

(The chart below shows the highest readings taken from the final data.)



Frequency (MHz)	QuasiPeak Reading (dBuV)	Average Reading (dBuV)	Correction Factor (dB)	QuasiPeak Result (dBuV)	Average Result (dBuV)	QuasiPeak Limit (dBuV)	Average Limit (dBuV)	QuasiPeak Margin (dB)	Average Margin (dB)	Remark (Pass/Fail)
0.1640	21.33	5.45	19.73	41.06	25.18	65.25	55.26	-24.19	-30.08	Pass
0.2620	19.15	5.99	19.72	38.87	25.71	61.36	51.37	-22.49	-25.66	Pass
0.8100	11.85	-0.39	19.73	31.58	19.34	56.00	46.00	-24.42	-26.66	Pass
1.2540	12.68	-0.74	19.74	32.42	19.00	56.00	46.00	-23.58	-27.00	Pass
2.8020	18.97	2.94	19.72	38.69	22.66	56.00	46.00	-17.31	-23.34	Pass
25.2180	26.54	19.96	19.84	46.38	39.80	60.00	50.00	-13.62	-10.20	Pass

NOTE: L2 = Line Two (Neutral Line).



8.3. RADIATED EMISSIONS MEASUREMENT

8.3.1. LIMITS OF RADIATED EMISSIONS MEASUREMENT

1. In the section 15.249(a):

Except as provided in paragraph (b) of this section, the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental Frequency	Field Strength of Fundamental Field Strength (mV/m)	Field Strength of Harmonics (μV/m)
902-928 MHz	50	500
2400 - 2483.5 MHz	50	500
5725 - 5875 MHz	50	500
24.0 - 24.25 GHz	250	2500

2. Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (μV/m)	Measurement Distance (m)
30-88	100*	3
88-216	150*	3
216-960	200*	3
Above 960	500	3

Remark: Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

3. In the above emission table, the tighter limit applies at the band edges.

Frequency (Hz)	Field Strength (μV/m at 3-meter)	Field Strength (dBμV/m at 3-meter)
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

**8.3.2. TEST INSTRUMENTS**

Radiated Emission Test Site 966 (2)					
Name of Equipment	Manufacturer	Model Number	Serial Number	Last Calibration	Due Calibration
PSA Series Spectrum Analyzer	Agilent	E4446A	US44300399	02/21/2016	02/20/2017
EMI TEST RECEIVER	ROHDE&SCHWARZ	ESCI	100783	02/21/2016	02/20/2017
Amplifier	MITEQ	AM-1604-3000	1123808	03/18/2016	03/17/2017
High Noise Amplifier	Agilent	8449B	3008A01838	02/21/2016	02/20/2017
Board-Band Horn Antenna	Schwarzbeck	BBHA 9170	9170-497	02/28/2016	02/27/2017
Bilog Antenna	SCHAFFNER	CBL6143	5082	02/21/2016	02/20/2017
Horn Antenna	SCHWARZBECK	BBHA9120	D286	02/28/2016	02/27/2017
Loop Antenna	COM-POWER	AL-130	121044	09/25/2016	09/24/2017
Turn Table	N/A	N/A	N/A	N.C.R	N.C.R
Controller	Sunol Sciences	SC104V	022310-1	N.C.R	N.C.R
Controller	CT	N/A	N/A	N.C.R	N.C.R
Temp. / Humidity Meter	Anymetre	JR913	N/A	02/21/2016	02/20/2017
Antenna Tower	SUNOL	TLT2	N/A	N.C.R	N.C.R
Test S/W	FARAD	LZ-RF / CCS-SZ-3A2			

NOTE: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

2. The FCC Site Registration number is 101879.

3. N.C.R = No Calibration Required.



8.3.3. TEST PROCEDURE (please refer to measurement standard)

1. The EUT is placed on a turntable, which is 0.8m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Set the spectrum analyzer in the following setting as:

Below 1GHz:

RBW=100kHz / VBW=300kHz / Sweep=AUTO

Above 1GHz:

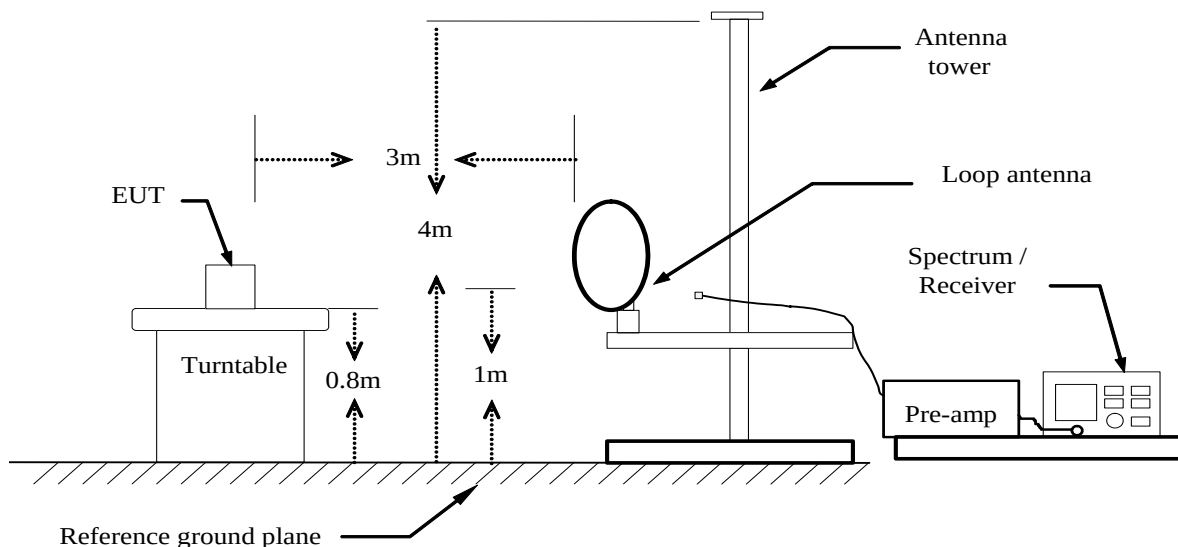
(a) PEAK: RBW=VBW=1MHz / Sweep=AUTO

(b) AVERAGE: RBW=1MHz / VBW=10Hz / Sweep=AUTO

7. Repeat above procedures until the measurements for all frequencies are complete.

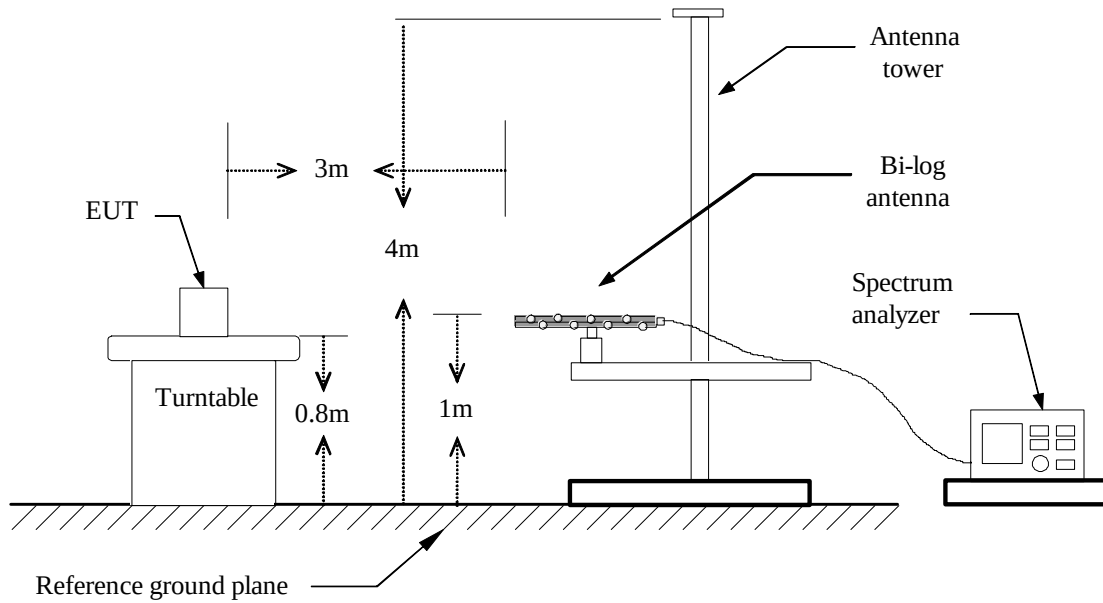
8.3.4. TEST SETUP

Below 30 MHz

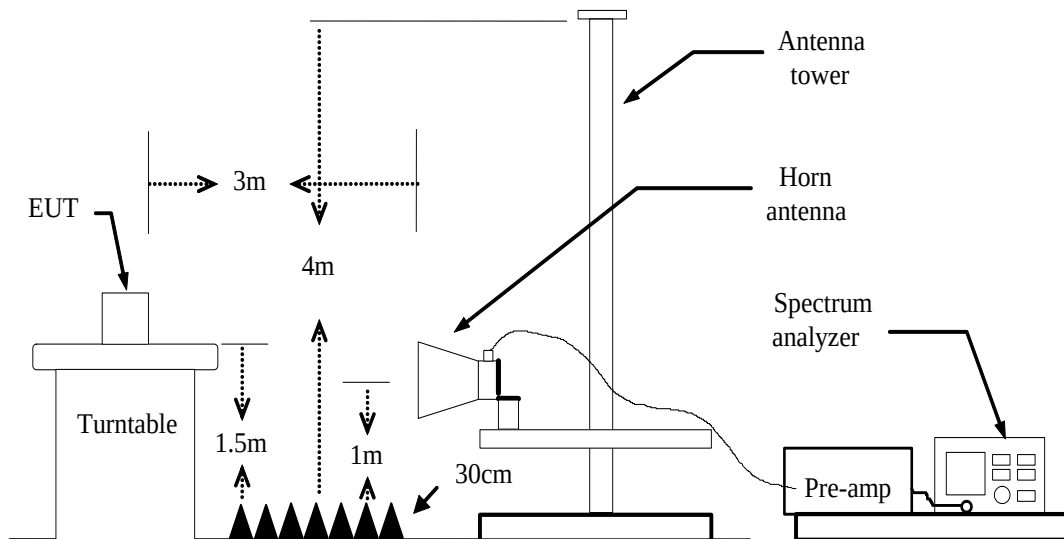




Below 1 GHz



Above 1 GHz



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.



8.3.4.1. DATA SAMPLE

Below 1 GHz

Frequency (MHz)	Ant.Pol. (H/V)	Reading (Remark) (dBuV)	Correction Factor (dB/m)	Result (Remark) (dBuV/m)	Limit (Peak) (dBuV/m)	Margin (dB)	Remark
xxx	V	12.12	10.21	22.33	40.00	-17.67	Peak

Above 1 GHz

Frequency (MHz)	Ant.Pol. (H/V)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark
xxx	V	65.45	63.00	-11.12	54.33	51.88	74.00	54.00	-2.12	AVG

Frequency (MHz)	= Emission frequency in MHz
Ant.Pol. (H/V)	= Antenna polarization
Reading (dBuV)	= Uncorrected Analyzer / Receiver reading
Correction Factor (dB/m)	= Antenna factor + Cable loss – Amplifier gain
Result (dBuV/m)	= Reading (dBuV) + Correction Factor (dB/m)
Limit (dBuV/m)	= Limit stated in standard
Margin (dB)	= Remark Result (dBuV/m) – Limit (dBuV/m)
Peak	= Peak Reading
QP	= Quasi-peak Reading
AVG	= Average Reading

**8.3.4.2. TEST RESULTS****Below 1 GHz****Operation Mode:** TX / CH 1 (912.0MHz)**Test Date:** December 8, 2016**Temperature:** 27°C**Tested by:** Saber Huang**Humidity:** 56 % RH**Polarity:** Ver. / Hor.**Fundamental**

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
912.0000	86.54	-9.54	77.00	94.00	-17.00	V	QP
912.0000	88.44	-9.54	78.90	94.00	-15.10	H	QP

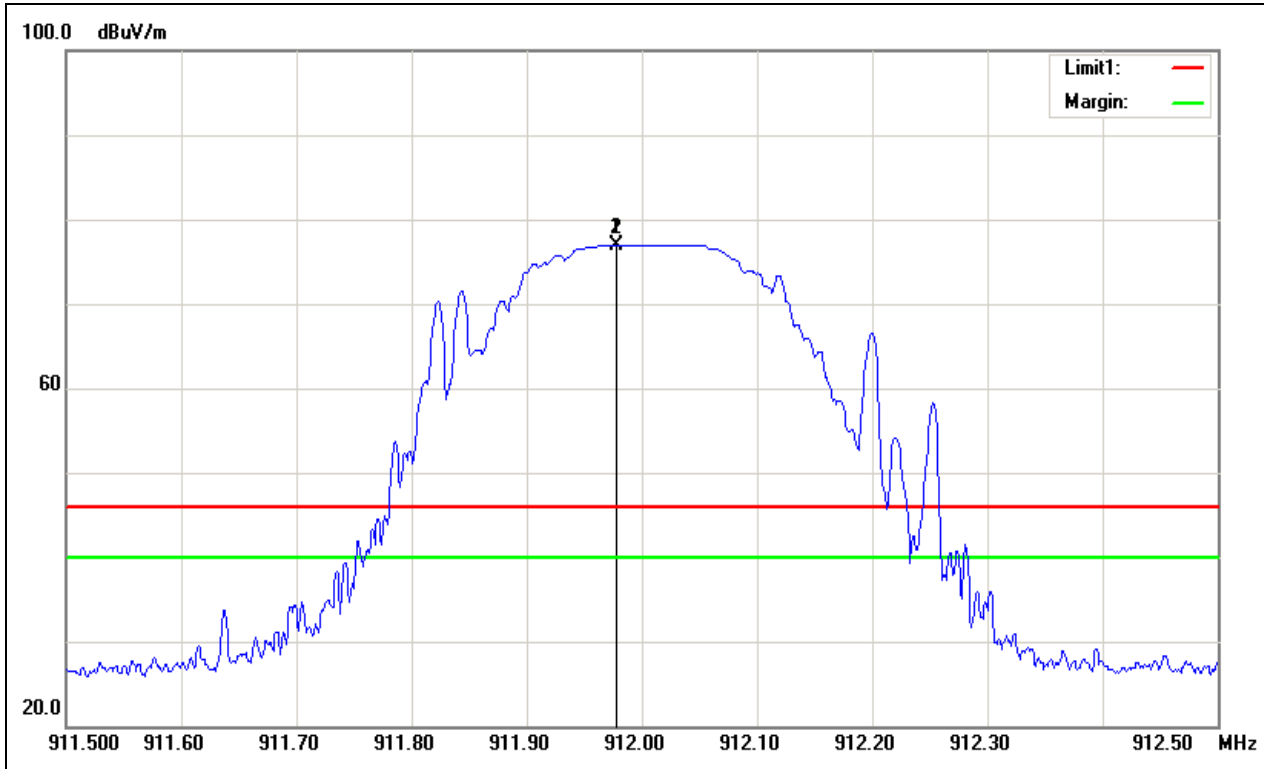
Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
37.7600	36.88	-15.48	21.40	40.00	-18.60	V	QP
54.2500	44.72	-22.47	22.25	40.00	-17.75	V	QP
105.6600	38.61	-22.63	15.98	43.50	-27.52	V	QP
207.5100	37.35	-21.81	15.54	43.50	-27.96	V	QP
434.4900	31.31	-15.63	15.68	46.00	-30.32	V	QP
590.6600	29.82	-13.03	16.79	46.00	-29.21	V	QP
37.7600	36.11	-15.48	20.63	40.00	-19.37	H	QP
56.1900	39.18	-23.02	16.16	40.00	-23.84	H	QP
107.6000	40.24	-22.27	17.97	43.50	-25.53	H	QP
263.7700	33.75	-20.13	13.62	46.00	-32.38	H	QP
487.8400	29.24	-14.36	14.88	46.00	-31.12	H	QP
600.3600	32.90	-12.86	20.04	46.00	-25.96	H	QP

****Note:** No emission found between lowest internal used/generated frequency to 30 MHz.**REMARKS:**

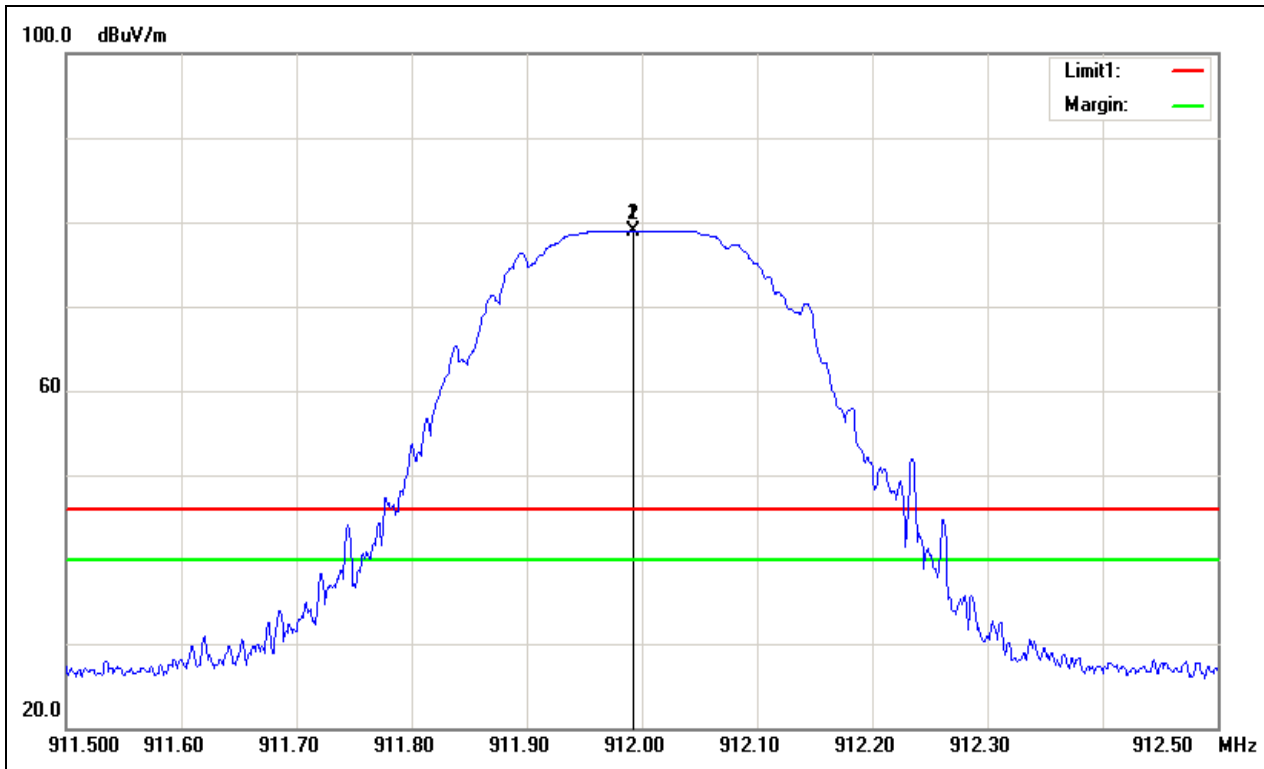
1. Radiated emissions measured in frequency range from 9kHz to 1GHz were made with an instrument using peak/quasi-peak detector mode.
2. Quasi-peak test would be performed if the peak result were greater than the quasi-peak limit or as required by the applicant.
3. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with "N/A" remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
4. Margin (dB) = Remark result (dBuV/m) – Quasi-peak limit (dBuV/m)



Vertical



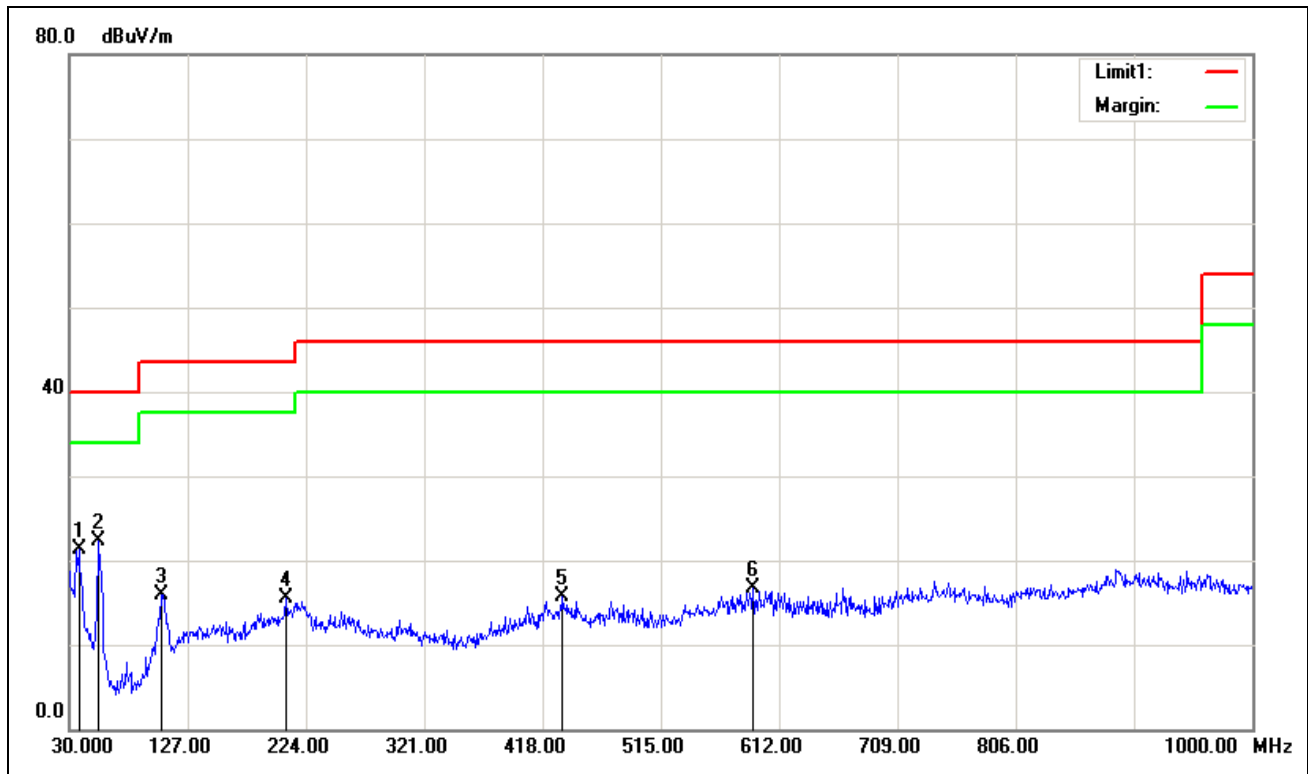
Horizontal



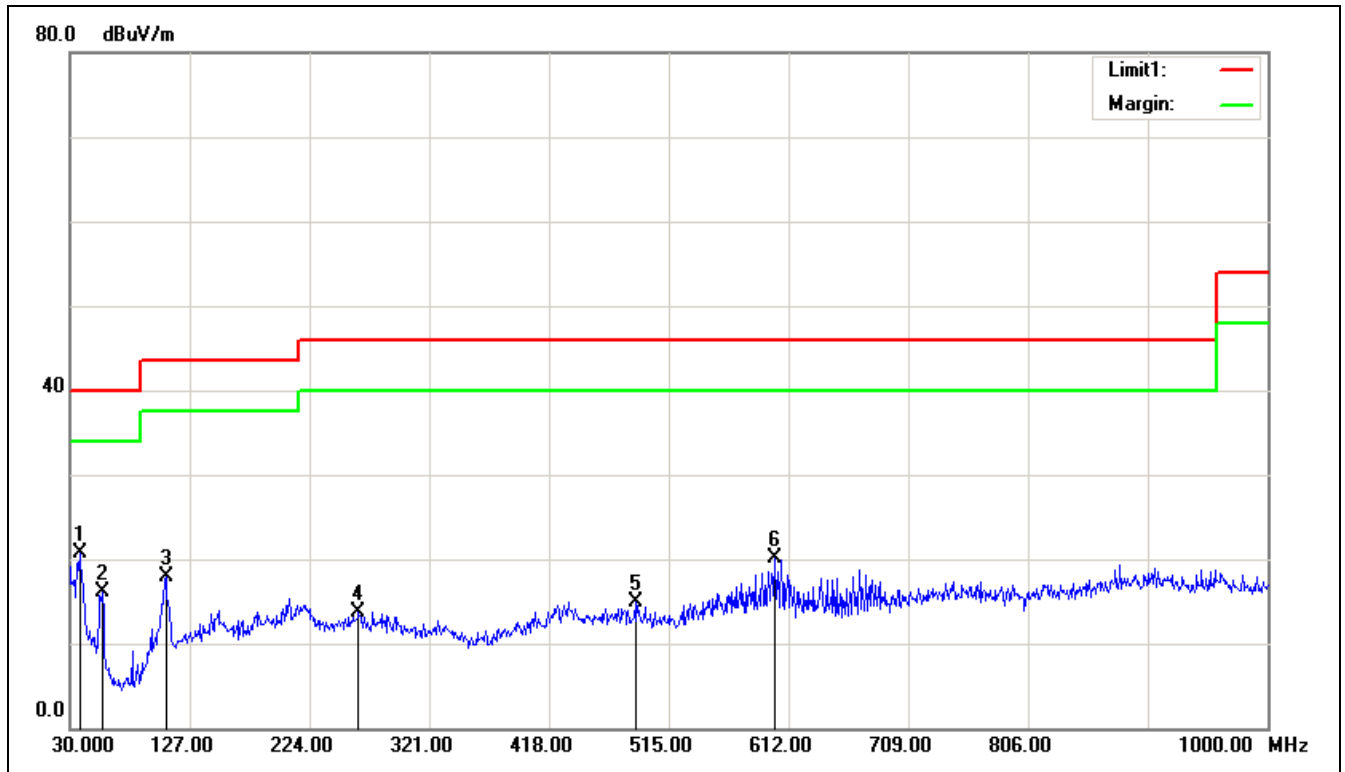
Note: Tested will add 900 MHz notch filter to protect spectrum



Vertical



Horizontal





Operation Mode: TX / CH 2 (913.0MHz)

Test Date: December 8, 2016

Temperature: 27°C

Tested by: Saber Huang

Humidity: 56 % RH

Polarity: Ver. / Hor.

Fundamental

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
913.0000	86.41	-9.52	76.89	94.00	-17.11	V	QP
913.0000	88.29	-9.52	78.77	94.00	-15.23	H	QP

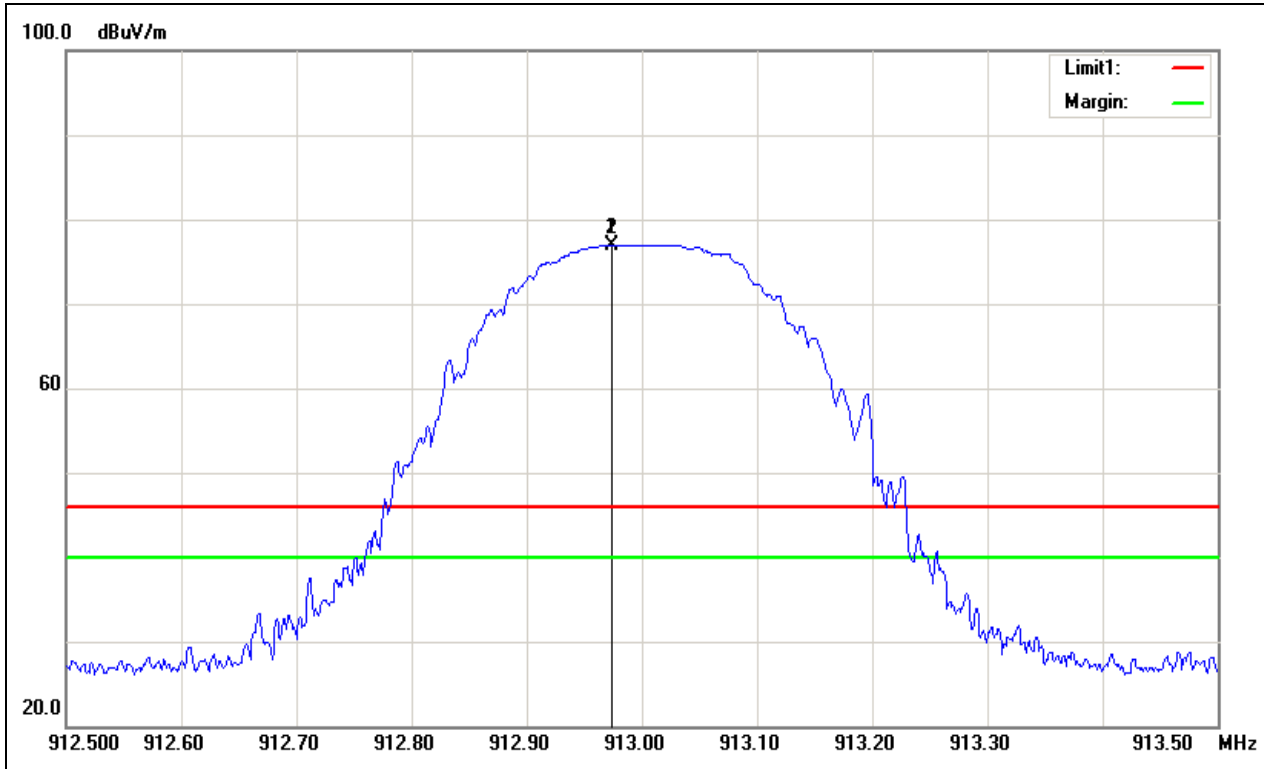
Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
54.2500	48.06	-22.47	25.59	40.00	-14.41	V	QP
108.5700	39.36	-22.09	17.27	43.50	-26.23	V	QP
209.4500	37.11	-21.58	15.53	43.50	-27.97	V	QP
250.1900	35.63	-21.06	14.57	46.00	-31.43	V	QP
426.7300	30.86	-15.53	15.33	46.00	-30.67	V	QP
643.0400	28.90	-12.49	16.41	46.00	-29.59	V	QP
35.8200	37.46	-14.91	22.55	40.00	-17.45	H	QP
53.2800	43.25	-22.18	21.07	40.00	-18.93	H	QP
107.6000	39.00	-22.27	16.73	43.50	-26.77	H	QP
387.9300	28.99	-16.44	12.55	46.00	-33.45	H	QP
537.3100	28.00	-13.44	14.56	46.00	-31.44	H	QP
675.0500	29.53	-12.28	17.25	46.00	-28.75	H	QP

****Note:** No emission found between lowest internal used/generated frequency to 30 MHz.**REMARKS:**

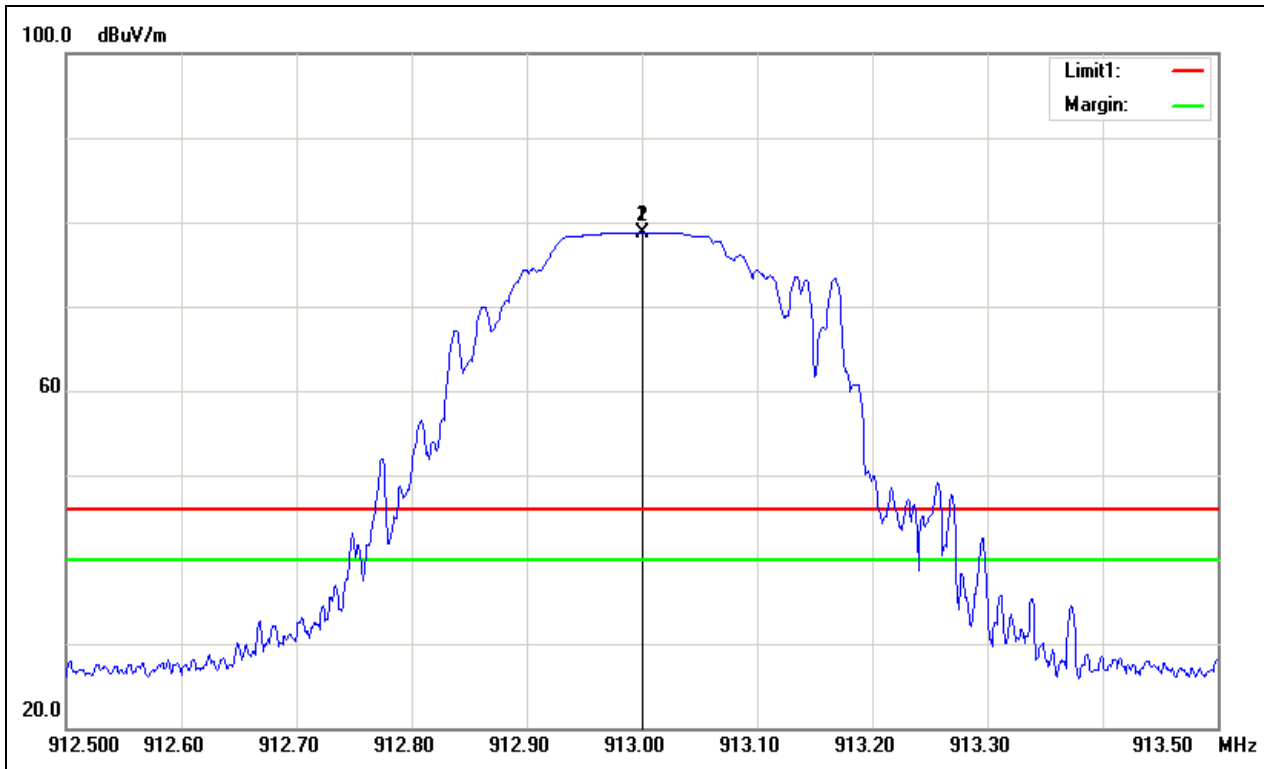
1. Radiated emissions measured in frequency range from 9kHz to 1GHz were made with an instrument using peak/quasi-peak detector mode.
2. Quasi-peak test would be performed if the peak result were greater than the quasi-peak limit or as required by the applicant.
3. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with "N/A" remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
4. Margin (dB) = Remark result (dBuV/m) – Quasi-peak limit (dBuV/m)



Vertical



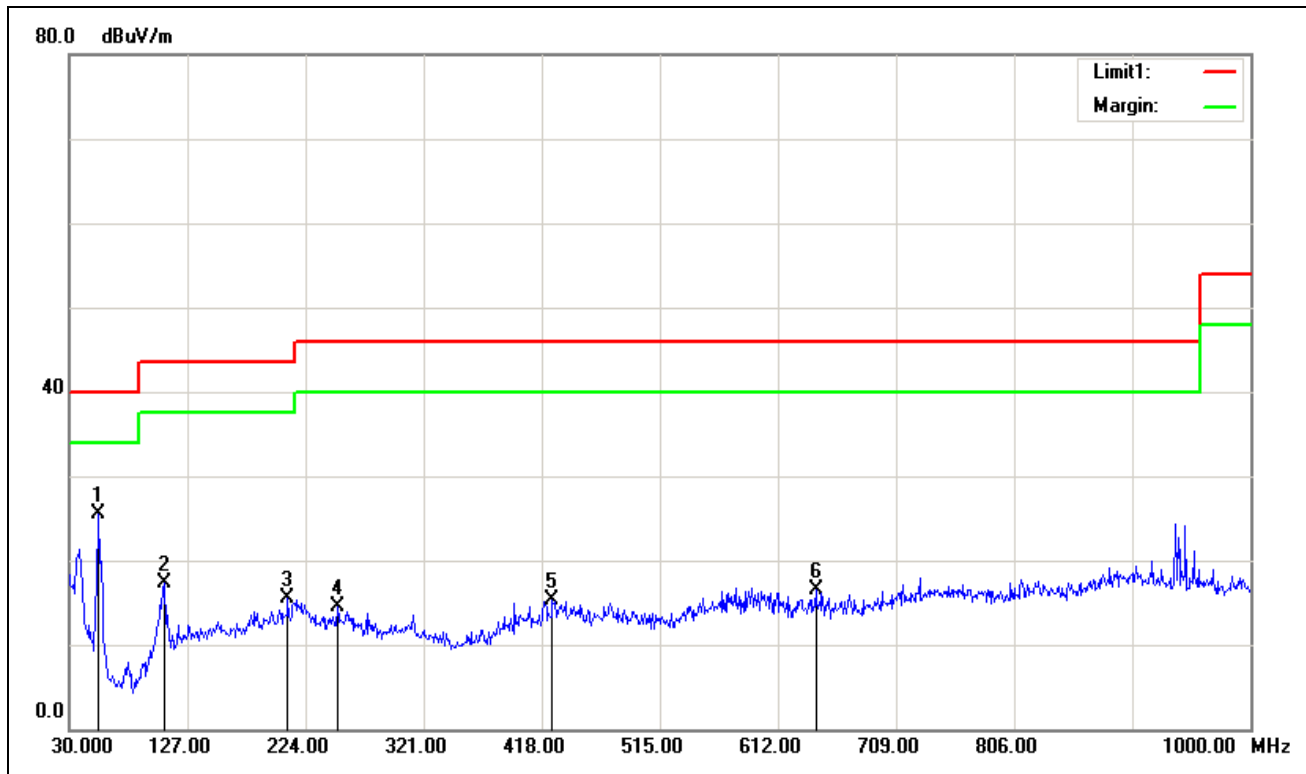
Horizontal



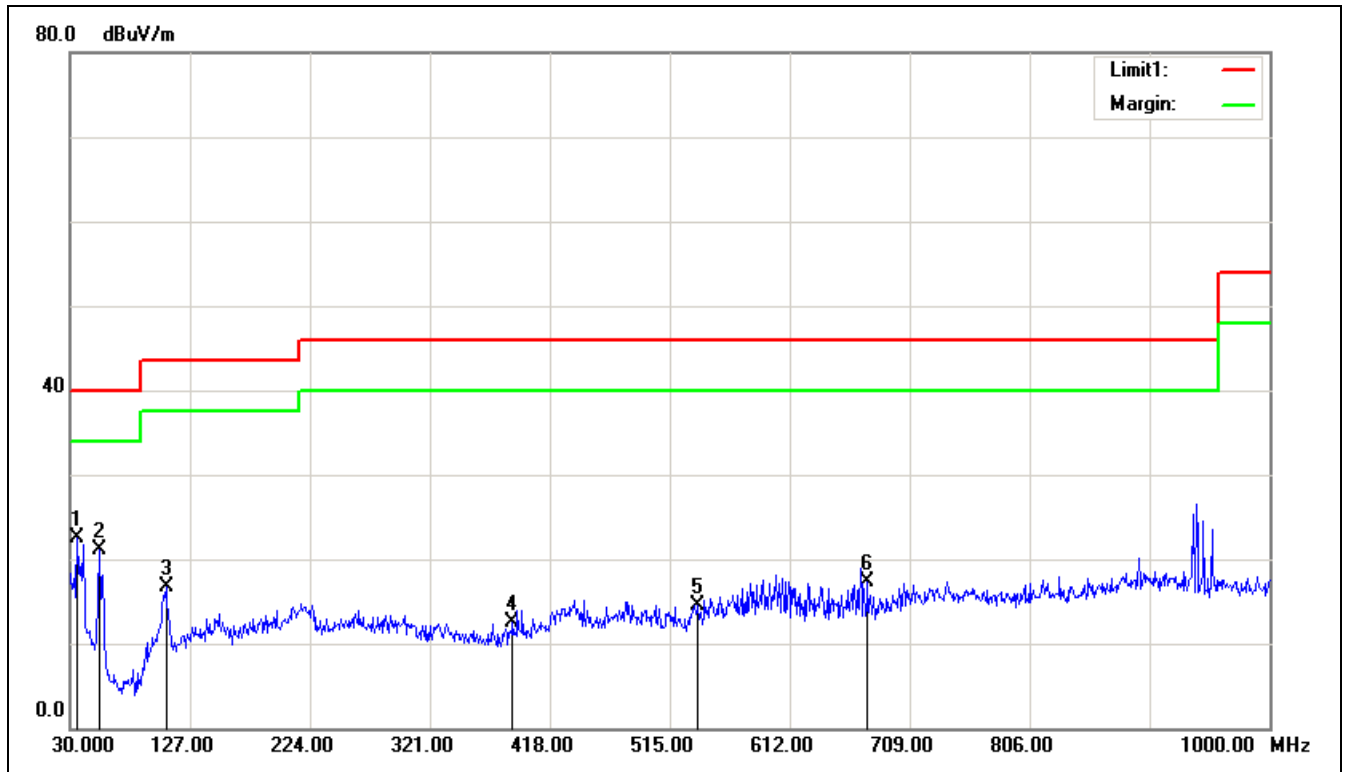
Note: Tested will add 900 MHz notch filter to protect spectrum



Vertical



Horizontal





Above 1 GHz

Operation Mode: TX / CH 1 (912.0MHz)

Test Date: December 8, 2016

Temperature: 20°C

Tested by: Saber Huang

Humidity: 55% RH

Polarity: Ver. / Hor.

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
1477.000	47.57	-6.92	40.65	74.00	-33.35	V	Peak
2512.000	45.92	-2.24	43.68	74.00	-30.32	V	Peak
2584.000	49.52	-2.11	47.41	74.00	-26.59	V	Peak
3052.000	44.97	-1.27	43.70	74.00	-30.30	V	Peak
3772.000	43.42	0.63	44.05	74.00	-29.95	V	Peak
5140.000	42.30	5.23	47.53	74.00	-26.47	V	Peak
2098.000	46.31	-4.46	41.85	74.00	-32.15	H	Peak
3043.000	46.26	-1.29	44.97	74.00	-29.03	H	Peak
3934.000	44.76	1.31	46.07	74.00	-27.93	H	Peak
4600.000	43.81	3.68	47.49	74.00	-26.51	H	Peak
5572.000	42.39	5.90	48.29	74.00	-25.71	H	Peak
6553.000	41.73	6.98	48.71	74.00	-25.29	H	Peak

REMARKS:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).

**Operation Mode:** TX / CH 2 (913.0MHz)**Temperature:** 27°C**Humidity:** 56% RH**Test Date:** December 8, 2016**Tested by:** Saber Huang**Polarity:** Ver. / Hor.

Frequency (MHz)	Reading (dBUV)	Correction Factor (dB/m)	Result (dBUV/m)	Limit (dBUV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
1333.000	47.62	-7.30	40.32	74.00	-33.68	V	Peak
2530.000	45.43	-2.21	43.22	74.00	-30.78	V	Peak
3187.000	44.26	-1.05	43.21	74.00	-30.79	V	Peak
3718.000	44.59	0.40	44.99	74.00	-29.01	V	Peak
4708.000	43.86	4.03	47.89	74.00	-26.11	V	Peak
5950.000	41.61	6.06	47.67	74.00	-26.33	V	Peak
1360.000	48.48	-7.21	41.27	74.00	-32.73	H	Peak
2296.000	47.50	-3.38	44.12	74.00	-29.88	H	Peak
3223.000	44.49	-0.99	43.50	74.00	-30.50	H	Peak
4159.000	43.56	2.15	45.71	74.00	-28.29	H	Peak
5500.000	42.26	5.87	48.13	74.00	-25.87	H	Peak
6949.000	41.35	7.62	48.97	74.00	-25.03	H	Peak

REMARKS:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBUV/m) – Average limit (dBUV/m).