

FCC PART 15 B TEST REPORT

For

Shenzhen KVD Communication Equipment

Lenovo R&D Center 2F-B, South First Road, High-tech Park, Nanshan District, Shenzhen China

FCC ID: 2ADTE-X20L

Report Type: Original Report	Product Type: Mobile phone
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Reviewed By:	Jerry Zhang EMC Manager 
Test Laboratory:	Bay Area Compliance Laboratories Corp. (Dongguan) No.69 Pulongcun, Puxinhu Industry Area, Tangxia, Dongguan, Guangdong, China Tel: +86-769-86858888 Fax: +86-769-86858891 www.baclcorp.com.cn

Note: This test report is prepared for the customer shown above and for the device described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp.(Dongguan).

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GENERAL INFORMATION

Product Description for Equipment Under Test (EUT)

The *Shenzhen KVD Communication Equipment*'s product, model number: *X20L (FCC ID: 2ADTE-X20L)* (the "EUT") in this report was a *Mobile phone*, which was measured approximately: 145.5mm (L) x 71.9mm (W) x 8.8mm (H), rated input voltage:DC 3.8V from battery or DC 5V from adapter. The highest operation frequency is 2690MHz.

Adapter Information:

Model: HJ-0501000E1-US

Input: AC100-240V~50/60Hz 0.2A

Output: DC5V, 1000mA

**All measurement and test data in this report was gathered from production sample serial number: 171130004 (Assigned by BACL,Dongguan). The EUT was received on 2017-11-25.*

Objective

This test report is prepared on behalf of *Shenzhen KVD Communication Equipment* in accordance with Part 2, Subpart J, and Part 15-Subparts A and B of the Federal Communications Commission's rules.

The objective of the manufacturer is to determine the compliance of EUT with FCC Part 15 B Class B.

Related Submittal(s)/Grant(s)

FCC Part 15C DSS submissions with FCC ID: 2ADTE-X20L.

FCC Part 15C DTS submissions with FCC ID: 2ADTE-X20L.

FCC Part 22H, 24E, 27 PCE submissions with FCC ID: 2ADTE-X20L.

Test Methodology

All measurements contained in this report were conducted with ANSI C63.4-2014, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

All radiated and conducted emissions measurement was performed at Bay Area Compliance Laboratories Corp. (Dongguan).

Measurement Uncertainty

Parameter	Measurement Uncertainty
Unwanted Emissions, radiated	30M~200MHz: 4.58 dB for Horizontal, 4.59 dB for Vertical 200M~1GHz: 4.83 dB for Horizontal, 5.85 dB for Vertical 1G~6GHz: 4.45 dB, 6G~13GHz: 5.23 dB
Temperature	$\pm 1^{\circ}\text{C}$
Humidity	$\pm 5\%$
AC Power Lines Conducted Emission	3.12 dB (150 kHz to 30 MHz)

Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Dongguan) to collect test data is located on the No.69 Pulongcun, Puxinhu Industry Area, Tangxia, Dongguan, Guangdong, China

Bay Area Compliance Laboratories Corp. (Dongguan) has been accredited to ISO/IEC 17025 by CNAS(Lab code: L5662). And accredited to ISO/IEC 17025 by NVLAP(Test Laboratory Accreditation Certificate Number 500069-0), the FCC Designation No. CN5002 under the KDB 974614 D01.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 273710. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

Bay Area Compliance Laboratories Corp. (Dongguan) was registered with ISED Canada under ISED Canada Registration Number 3062D.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

The system was configured for testing in operating and downloading mode.

EUT Exercise Software

The software “winthrax.exe” was used during test.

Equipment Modifications

No modification was made to the EUT tested.

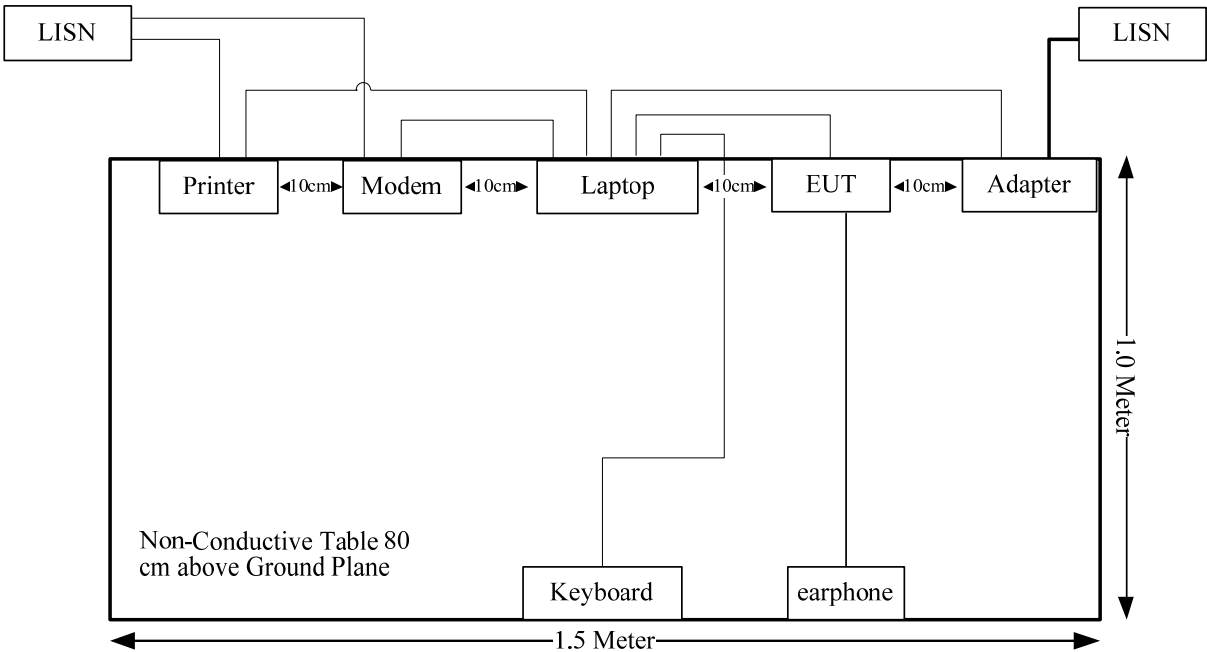
Local Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
DELL	Laptop	PP11L	QDS-BRCM1017
HP	Printer	C3941A	JPTVOB2337
DELL	Keyboard	L100	CNORH656658907BL05DC
SAST	Modem	AEM-2100	0293

Support Cable List and Details

Cable Description	Shielding Type	Ferrite Core	Length (m)	From Port	To
Serial Cable	yes	No	1.2	Serial Port of Laptop	Modem
Parallel Cable	yes	No	1.2	Parallel Port of Laptop	Printer
Keyboard Cable	yes	No	1.8	USB Port of Laptop	Keyboard
USB Cable	No	No	1.0	USB Port of Laptop	EUT
Earphone	No	No	1.2	EUT	Earphone

Configuration of Test Setup

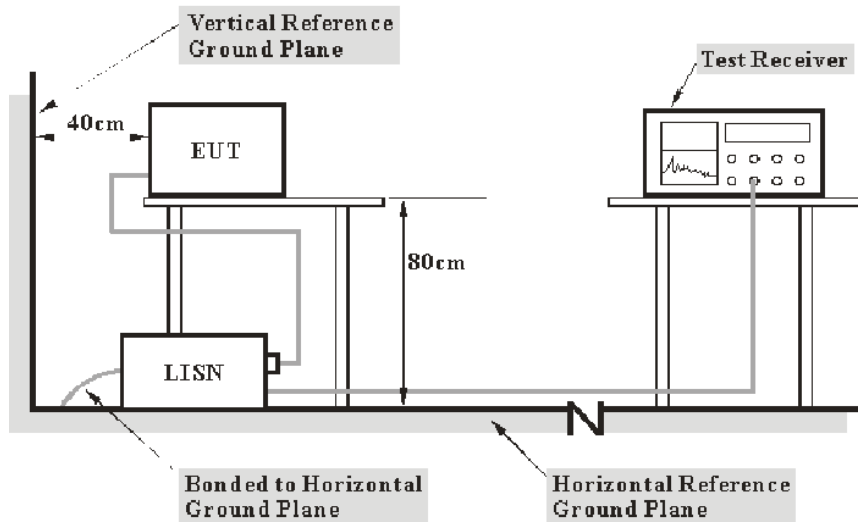


SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Results
§15.107	Conducted Emissions	Compliant
§15.109	Radiated Emissions	Compliant

FCC§15.107 - CONDUCTED EMISSIONS

EUT Setup



Note: 1. Support units were connected to second LISN.
 2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

The setup of EUT is according with per ANSI C63.4-2014 measurement procedure. The specification used was with the FCC Part 15 B Class B limits.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

The adapter was connected to the Main LISN with 120V/60Hz AC power source.

EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz.

During the conducted emission test, the EMI test receiver was set with the following configurations:

Frequency Range	IF B/W
150 kHz – 30 MHz	9 kHz

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	L.I.S.N	ESH2-Z5	892107/021	2017-09-01	2018-09-01
R&S	Two-line V-network	ENV 216	3560.6550.12	2016-12-08	2017-12-08
R&S	Test Software	EMC32	Version8.53.0	N/A	N/A
Unknown	Coaxial Cable	C-NJNJ-50	C-0200-01	2017-09-05	2018-09-05
R&S	EMI Test Receiver	ESCS 30	830245/006	2016-12-08	2017-12-08

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed traceable to National Primary Standards and International System of Units (SI).

Test Procedure

During the conducted emission test, the adapter of laptop was connected to the outlet of the first LISN and the other support equipments were connected to the outlet of the second LISN.

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All data was recorded in the Quasi-peak and average detection mode.

Corrected Amplitude & Margin Calculation

The basic equation is as follows:

$$V_C = V_R + A_C + VDF$$

Herein,

V_C : corrected voltage amplitude

V_R : reading voltage amplitude

A_C : attenuation caused by cable loss

VDF : voltage division factor of AMN or ISN

The “**Margin**” column of the following data tables indicates the degree of compliance within the applicable limit. For example, a margin of 7dB means the emission is 7dB below the limit. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Limit} - \text{Corrected Amplitude}$$

Test Results Summary

According to the recorded data in following table, the EUT complied with the FCC Part 15 B Class B.

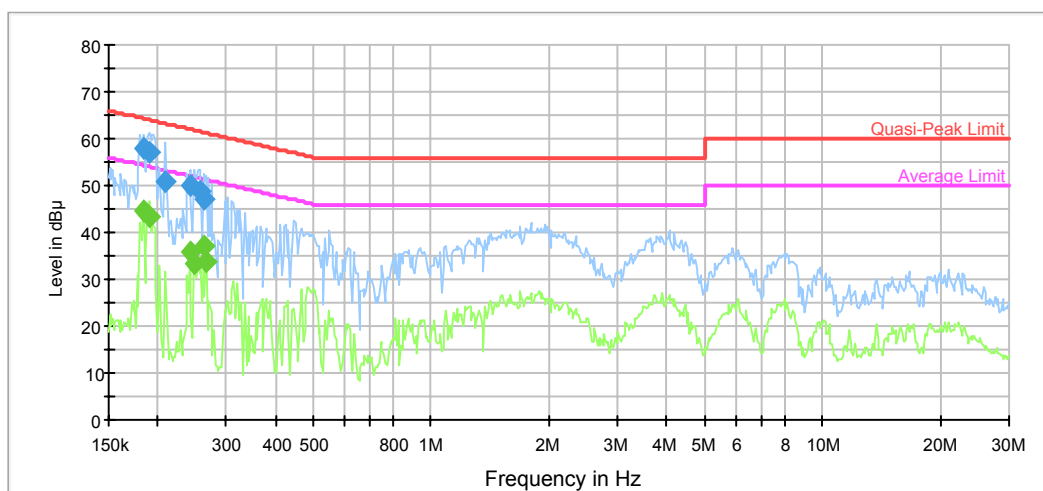
Test Data**Environmental Conditions**

Temperature:	25.3 °C
Relative Humidity:	40 %
ATM Pressure:	100.8 kPa

The testing was performed by Ade Xiao on 2017-12-04.

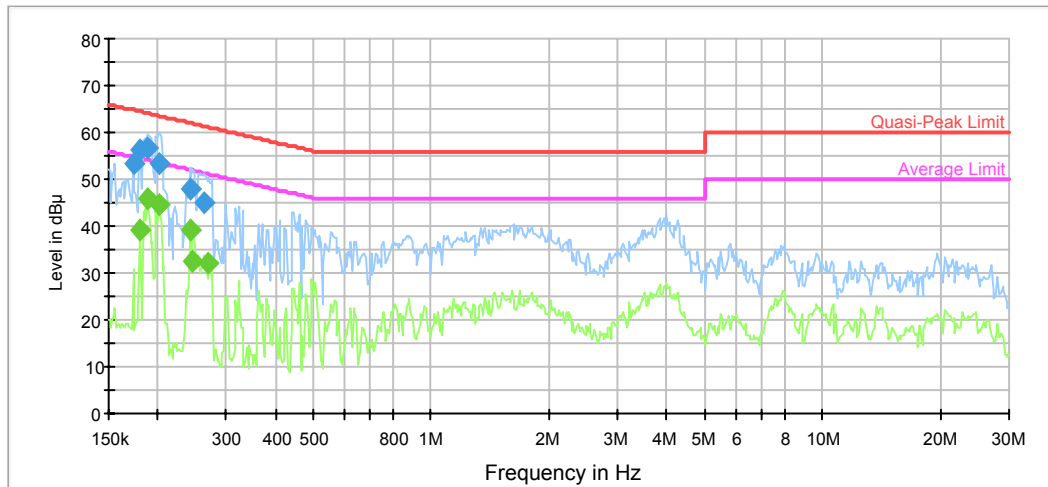
Test Mode: Downloading

AC120V, 60Hz, Line:



Frequency (MHz)	QuasiPeak (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.184529	58.1	9.000	L1	10.8	6.2	64.3	Compliance
0.190505	57.2	9.000	L1	10.7	6.8	64.0	Compliance
0.209621	51.0	9.000	L1	10.6	12.2	63.2	Compliance
0.241949	49.8	9.000	L1	10.4	12.2	62.0	Compliance
0.255827	48.9	9.000	L1	10.3	12.7	61.6	Compliance
0.262017	47.0	9.000	L1	10.3	14.4	61.4	Compliance

Frequency (MHz)	Average (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.184529	44.8	9.000	L1	10.8	9.5	54.3	Compliance
0.190505	43.3	9.000	L1	10.7	10.7	54.0	Compliance
0.241949	35.6	9.000	L1	10.4	16.4	52.0	Compliance
0.247802	33.3	9.000	L1	10.3	18.6	51.8	Compliance
0.262017	37.3	9.000	L1	10.3	14.1	51.4	Compliance
0.266226	33.8	9.000	L1	10.3	17.4	51.2	Compliance

AC120V, 60Hz, Neutral:

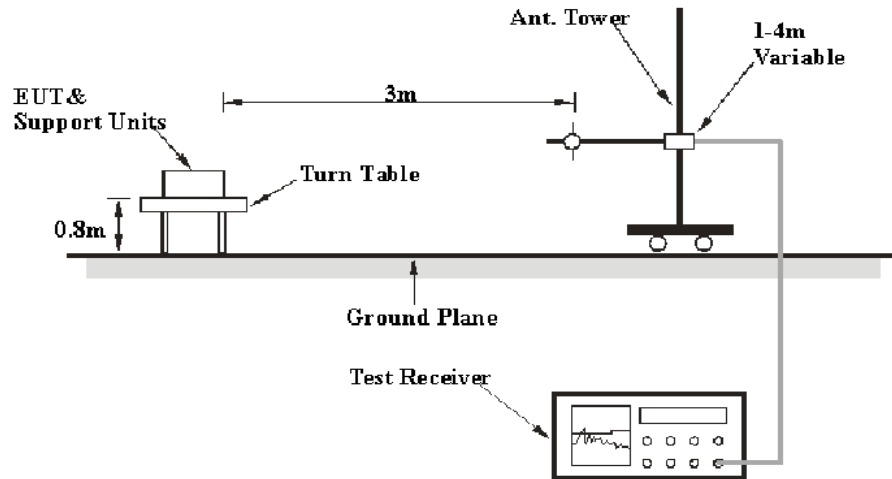
Frequency (MHz)	QuasiPeak (dB μ V)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)	Comment
0.173134	53.2	9.000	N	10.9	11.6	64.8	Compliance
0.180171	56.2	9.000	N	10.8	8.3	64.5	Compliance
0.188994	56.6	9.000	N	10.7	7.5	64.1	Compliance
0.203045	53.5	9.000	N	10.6	10.0	63.5	Compliance
0.241949	48.0	9.000	N	10.4	14.0	62.0	Compliance
0.264113	44.9	9.000	N	10.3	16.4	61.3	Compliance

Frequency (MHz)	Average (dB μ V)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)	Comment
0.180171	39.2	9.000	N	10.8	15.3	54.5	Compliance
0.188994	45.8	9.000	N	10.7	8.3	54.1	Compliance
0.201433	44.4	9.000	N	10.6	9.1	53.6	Compliance
0.241949	39.3	9.000	N	10.4	12.7	52.0	Compliance
0.245835	32.7	9.000	N	10.3	19.2	51.9	Compliance
0.270502	32.1	9.000	N	10.3	19.0	51.1	Compliance

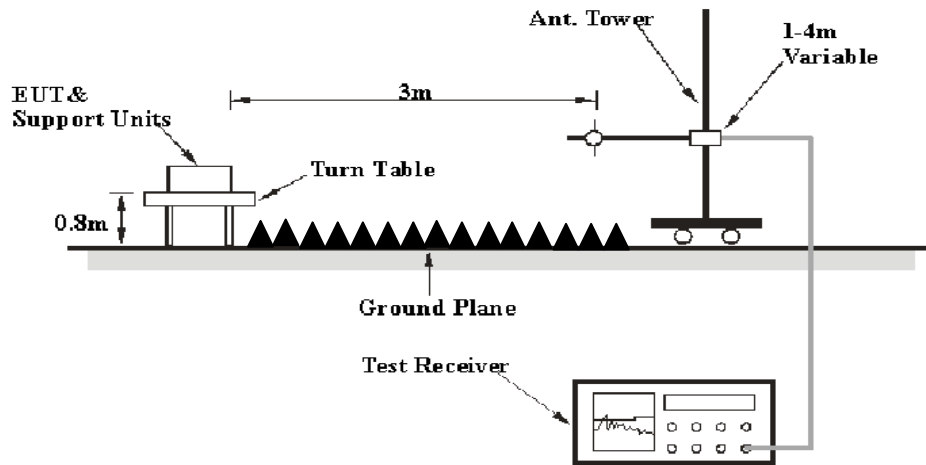
FCC §15.109 - RADIATED SPURIOUS EMISSIONS

EUT Setup

Below 1GHz:



Above 1GHz:



The radiated emission Below 1GHz tests were performed in the 3 meters chamber test site, above 1GHz tests were performed in the 3 meters chamber test site, using the setup accordance with the ANSI C63.4-2014. The specification used was the FCC Part 15.109 Class B limits.

EMI Test Receiver Setup

The system was investigated from 30 MHz to 13.5 GHz.

During the radiated emission test, the EMI test receiver was set with the following configurations:

Frequency Range	RBW	Video B/W	IF B/W	Measurement
30 MHz – 1000 MHz	120 kHz	300 kHz	120 kHz	QP
Above 1 GHz	1 MHz	3 MHz	/	Peak
	1 MHz	10 Hz	/	AVG

Test Procedure

During the radiated emissions, the adapter of laptop was connected to the first AC floor outlet and the other support equipments were connected to the second AC floor outlet.

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

The data was recorded in the Quasi-peak detection mode for below 1 GHz, peak and average detection mode above 1 GHz.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESCI	100224	2017-09-01	2018-09-01
Sunol Sciences	Antenna	JB3	A060611-1	2017-11-10	2020-11-10
HP	Amplifier	8447D	2727A05902	2017-09-05	2018-09-05
Agilent	Spectrum Analyzer	E4440A	SG43360054	2016-12-08	2017-12-08
ETS-Lindgren	Horn Antenna	3115	000 527 35	2016-01-05	2019-01-04
MITEQ	Amplifier	AFS42-00101800-2 5-S-42	2001271	2017-09-05	2018-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-0400-01	2017-09-05	2018-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-0075-01	2017-09-05	2018-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-1000-01	2017-09-05	2018-09-05
Unknown	Coaxial Cable	C-SJSJ-50	C-0800-01	2017-09-05	2018-09-05
Farad	Test Software	EZ-EMC	V1.1.4.2	N/A	N/A

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Loss, and subtracting the Amplifier Gain from the Meter Reading. The basic equation is as follows:

$$\text{Corrected Amplitude} = \text{Meter Reading} + \text{Antenna Factor} + \text{Cable Loss} - \text{Amplifier Gain}$$

The “**Margin**” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7 dB means the emission is 7 dB below the limit. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Limit} - \text{Corrected Amplitude}$$

Test Data

Environmental Conditions

Temperature:	24.0~26.8 °C
Relative Humidity:	27.8~42 %
ATM Pressure:	101~101.4 kPa

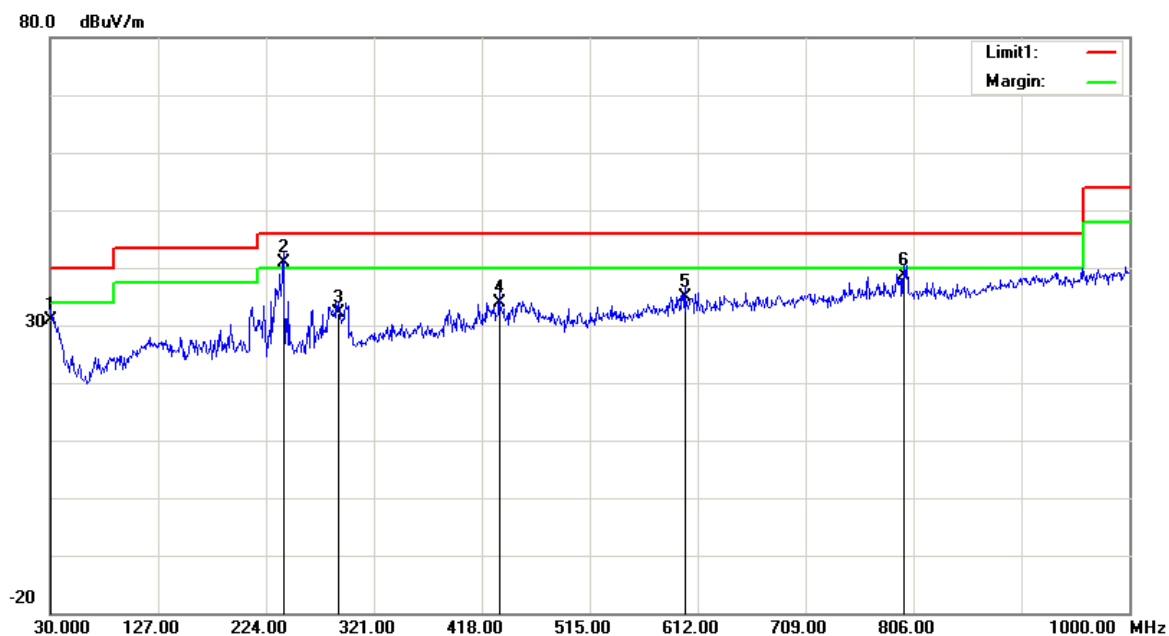
** The testing was performed by Blake Yang & Steven Zuo from 2017-11-30 to 2017-12-04.*

Test Result: Compliance

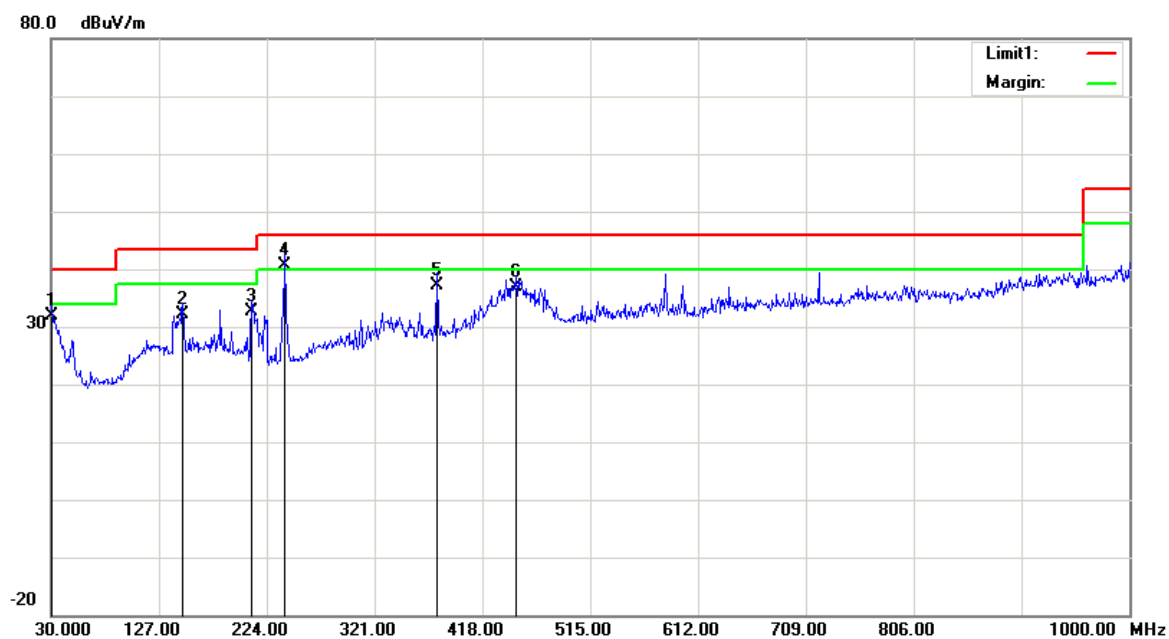
Test Mode: Downloading

1) Below 1GHz:

Horizontal



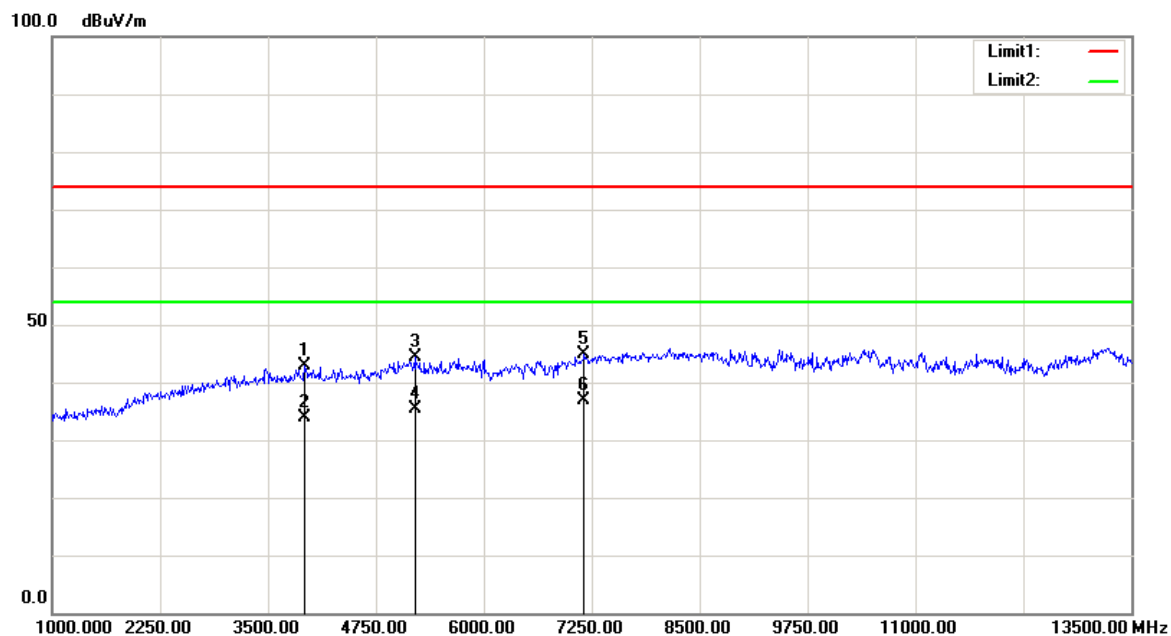
Frequency (MHz)	Receiver Reading (dBμV)	Detector	Correction Factor (dB/m)	Cord. Amp. (dBμV/m)	Limit (dBμV/m)	Margin (dB)
30.9700	30.45	QP	0.35	30.80	40.00	9.20
239.5200	47.02	QP	-6.22	40.80	46.00	5.20
288.9900	36.01	QP	-3.91	32.10	46.00	13.90
433.5200	35.71	QP	-1.81	33.90	46.00	12.10
600.3600	34.60	QP	0.20	34.80	46.00	11.20
797.2700	35.25	QP	3.45	38.70	46.00	7.30

Vertical

Frequency (MHz)	Receiver Reading (dBuV)	Detector	Correction Factor (dB/m)	Cord. Amp. (dBuV/m)	Limit (dBuV/m)	Margin (dB)
30.9700	31.55	QP	0.35	31.90	40.00	8.10
148.3400	38.70	QP	-6.50	32.20	43.50	11.30
210.4200	40.13	QP	-7.43	32.70	43.50	10.80
240.4900	46.93	QP	-6.23	40.70	46.00	5.30
377.2600	39.92	QP	-2.72	37.20	46.00	8.80
448.0700	38.39	QP	-1.49	36.90	46.00	9.10

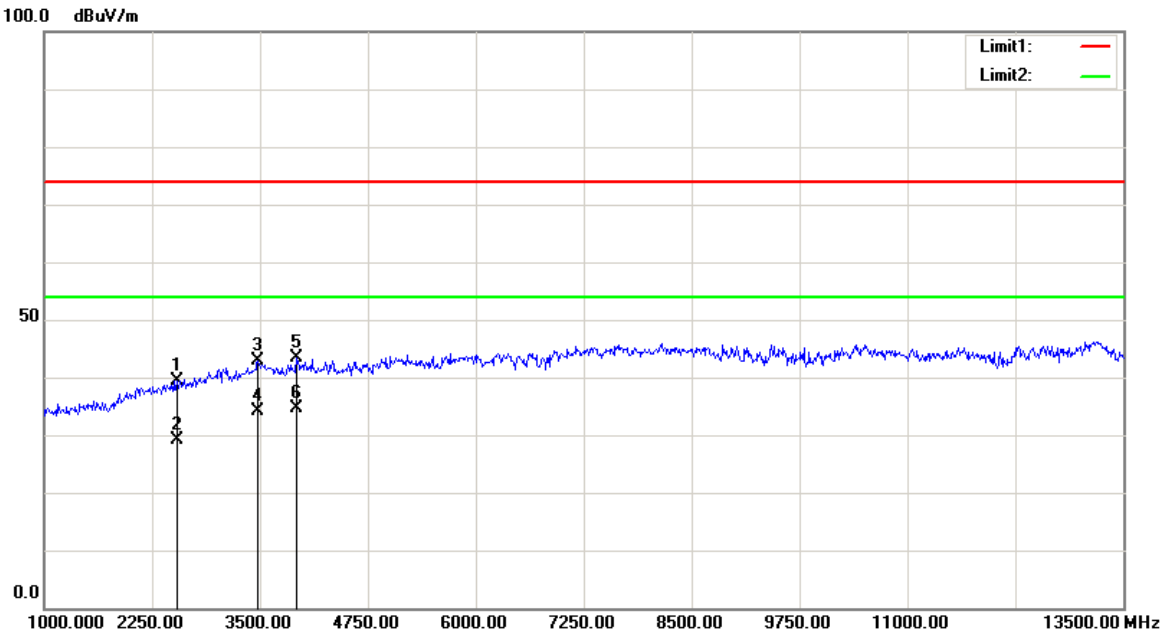
2) Above 1GHz:

Horizontal



Frequency (MHz)	Receiver Reading (dBμV)	Detector	Correction Factor (dB/m)	Cord. Amp. (dBμV/m)	Limit (dBμV/m)	Margin (dB)
3925.000	44.97	peak	-2.12	42.85	74.00	31.15
3925.000	35.88	AVG	-2.12	33.76	54.00	20.24
5206.250	44.49	peak	-0.19	44.30	74.00	29.70
5206.250	35.62	AVG	-0.19	35.43	54.00	18.57
7168.750	41.52	peak	3.35	44.87	74.00	29.13
7168.750	33.48	AVG	3.35	36.83	54.00	17.17

Vertical



Frequency (MHz)	Receiver Reading (dBμV)	Detector	Correction Factor (dB/m)	Cord. Amp. (dBμV/m)	Limit (dBμV/m)	Margin (dB)
2537.500	45.37	peak	-6.07	39.30	74.00	34.70
2537.500	35.21	AVG	-6.07	29.14	54.00	24.86
3475.000	46.25	peak	-3.31	42.94	74.00	31.06
3475.000	37.44	AVG	-3.31	34.13	54.00	19.87
3925.000	45.47	peak	-2.12	43.35	74.00	30.65
3925.000	36.85	AVG	-2.12	34.73	54.00	19.27

END OF REPORT