



TESTING LABORATORY
CERTIFICATE #4820.01



FCC PART 15 B

TEST REPORT

For

CLC HONG KONG LIMITED

1011A, 10/F., Harbour Centre Tower 1, No.1 Hok Cheung St., Hung Hom, Kowloon, Hong Kong

FCC ID: 2AG4WE800

Report Type:	Product Type:
Original Report	Ram 8
Report Number:	RDG181121001-00A
Report Date:	2018-12-05
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GENERAL INFORMATION

Product Description for Equipment Under Test (EUT)

EUT Name:	Ram 8
EUT Model:	E800
FCC ID:	2AG4WE800
Highest Operation Frequency:	2480 MHz
Rated Input Voltage:	DC 3.7V from battery and DC 5V from adapter
External Dimension:	112mm(L)*58 mm(W)*24mm(H)
Serial Number:	181121001
EUT Received Date:	2018.11.21

Objective

This test report is prepared on behalf of *CLC HONG KONG LIMITED* 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: 2AG4WE800.

FCC Part 22H, 24E PCE submissions with FCC ID: 2AG4WE800.

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: 4.55 dB, 200M~1GHz: 5.92 dB, 1G~6GHz: 4.98 dB, 6G~18GHz: 5.89 dB, 18G~26.5G: 5.47 dB, 26.5G~40G: 5.63 dB
Temperature	±1 °C
Humidity	±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.

The lab has been recognized as the FCC accredited lab under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No. : 897218, the FCC Designation No. : CN1220.

The lab has been recognized by Innovation, Science and Economic Development Canada to test to Canadian radio equipment requirements, the CAB identifier : CN0022.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

The system was configured for testing in downloading mode.

EUT Exercise Software

The software "Winthrax.exe" was used during test.

Equipment Modifications

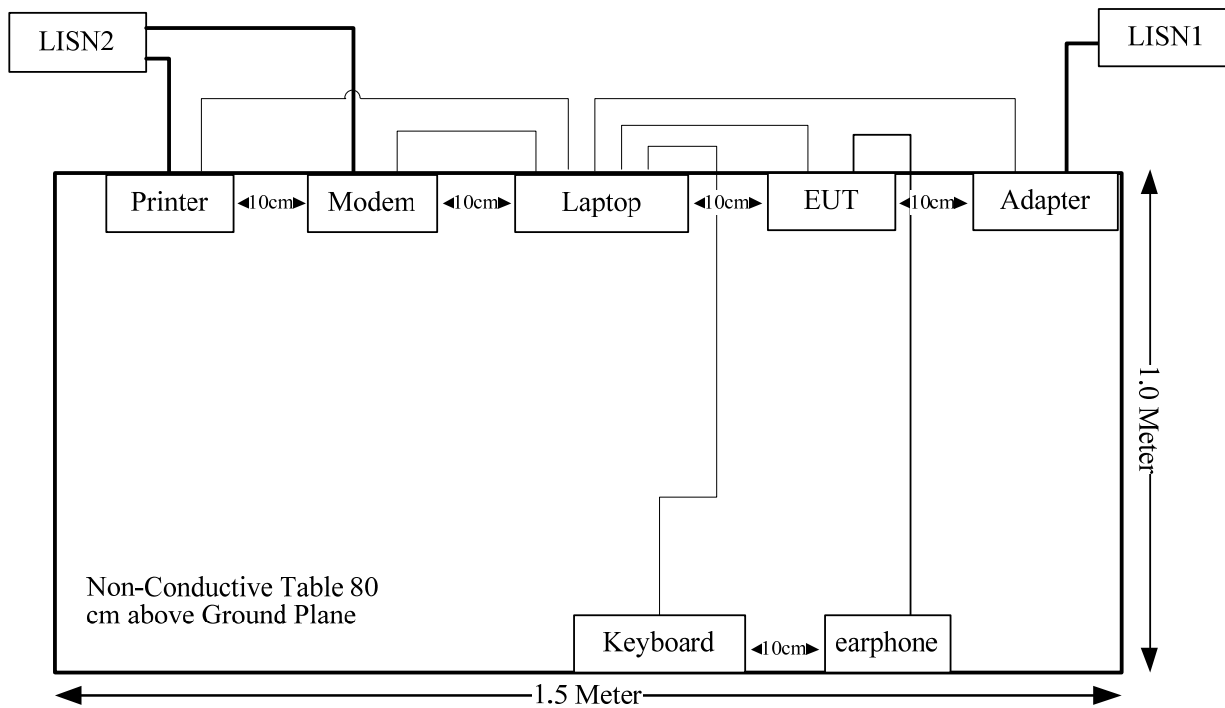
No modification was made to the EUT tested.

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	1.2	USB Port of Laptop	EUT
Earphone Cable	No	No	1.2	EUT	Earphone

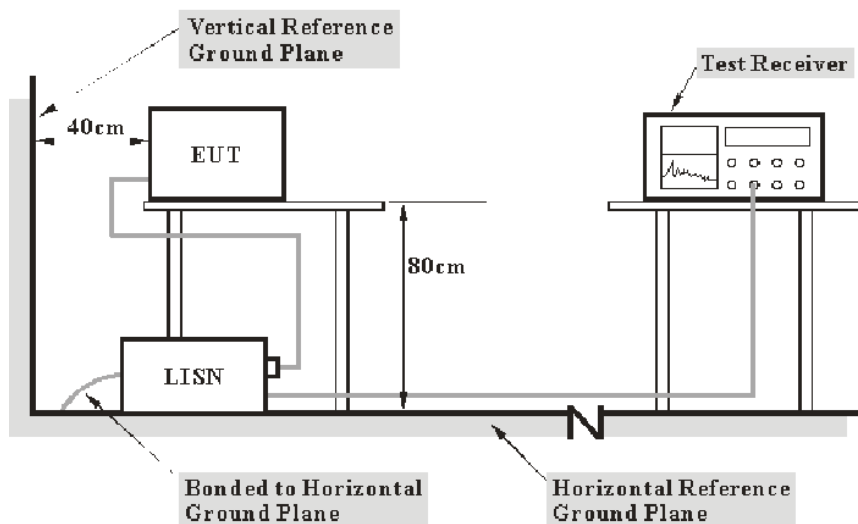
Configuration of Test Setup

SUMMARY OF TEST RESULTS

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

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	EMI Test Receiver	ESCS 30	830245/006	2017-12-11	2018-12-11
Unknown	Coaxial Cable	C-NJNJ-50	C-0200-01	2018-09-05	2019-09-05
R&S	Test Software	EMC32	Version8.53.0	N/A	N/A
R&S	Two-line V-network	ENV 216	101614	2017-12-08	2018-12-08
R&S	L.I.S.N	ESH2-Z5	892107/021	2018-09-19	2019-09-19

* **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**

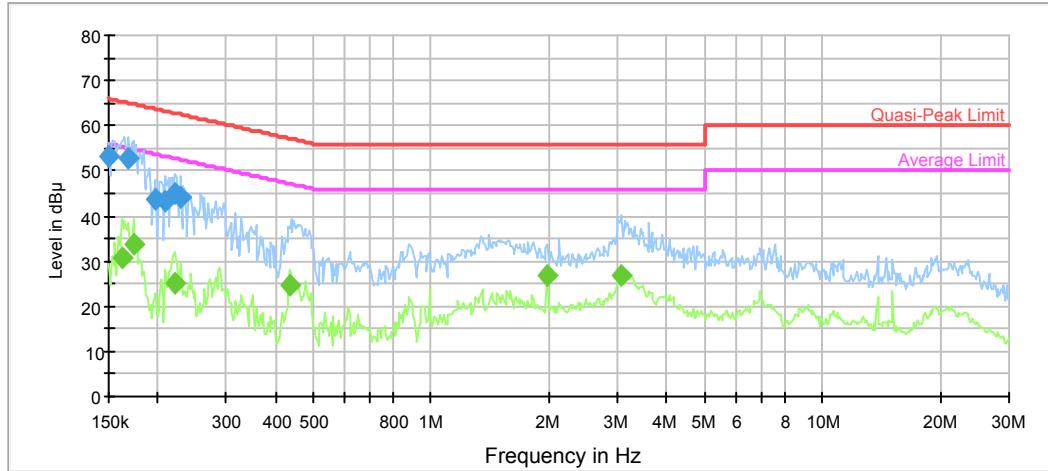
Temperature:	24.3 °C
Relative Humidity:	47 %
ATM Pressure:	100.3 kPa

The testing was performed by Lily Xie on 2018-12-01.

Test Result: Compliance

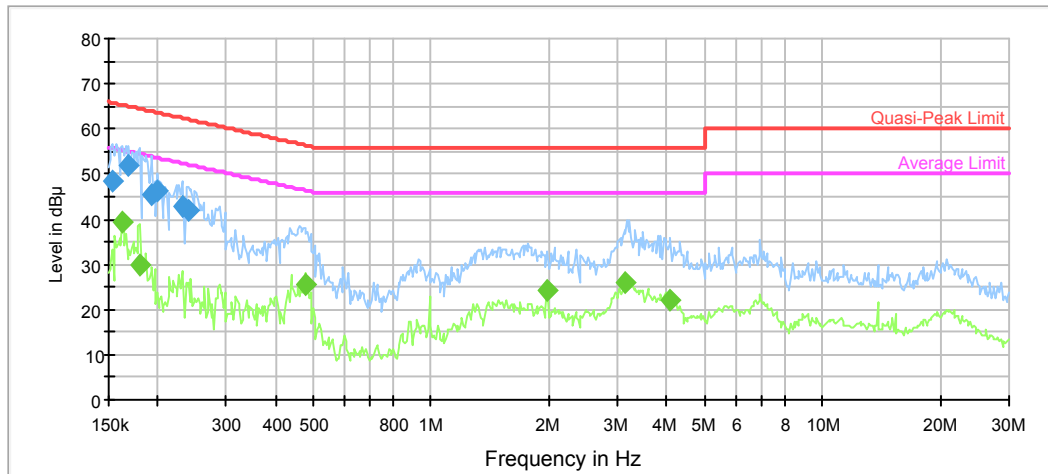
Test Mode: Downloading

AC120V, 60Hz, Line:



Frequency (MHz)	QuasiPeak (dB μ V)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.150000	53.0	9.000	L1	11.2	13.0	66.0
0.169044	52.7	9.000	L1	10.9	12.3	65.0
0.196675	43.9	9.000	L1	10.6	19.8	63.7
0.209621	43.2	9.000	L1	10.6	20.0	63.2
0.221645	45.1	9.000	L1	10.5	17.7	62.8
0.228823	43.9	9.000	L1	10.4	18.6	62.5

Frequency (MHz)	Average (dB μ V)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.162441	30.9	9.000	L1	11.0	24.4	55.3
0.173134	33.9	9.000	L1	10.9	20.9	54.8
0.221645	24.9	9.000	L1	10.5	27.9	52.8
0.436318	24.9	9.000	L1	9.9	22.2	47.1
1.982914	26.8	9.000	L1	9.7	19.2	46.0
3.073500	26.6	9.000	L1	9.8	19.4	46.0

AC120V, 60Hz, Neutral:

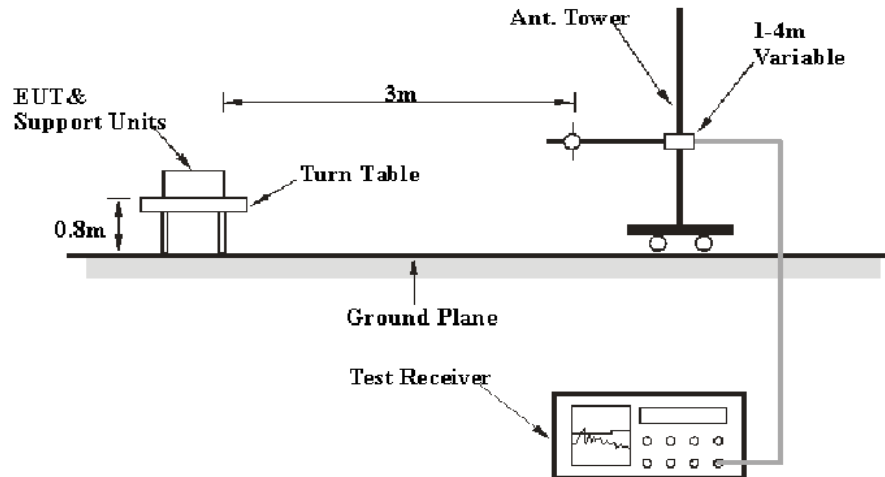
Frequency (MHz)	QuasiPeak (dB μ V)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.153629	48.5	9.000	N	11.1	17.3	65.8
0.169044	51.8	9.000	N	10.9	13.2	65.0
0.193566	45.6	9.000	N	10.7	18.3	63.9
0.199835	46.1	9.000	N	10.6	17.5	63.6
0.230654	42.8	9.000	N	10.4	19.6	62.4
0.240029	41.9	9.000	N	10.4	20.2	62.1

Frequency (MHz)	Average (dB μ V)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.162441	39.6	9.000	N	11.0	15.7	55.3
0.180171	29.7	9.000	N	10.8	24.8	54.5
0.480097	25.5	9.000	N	9.9	20.8	46.3
1.982914	24.2	9.000	N	9.8	21.8	46.0
3.147856	25.9	9.000	N	9.8	20.1	46.0
4.094608	22.1	9.000	N	9.8	23.9	46.0

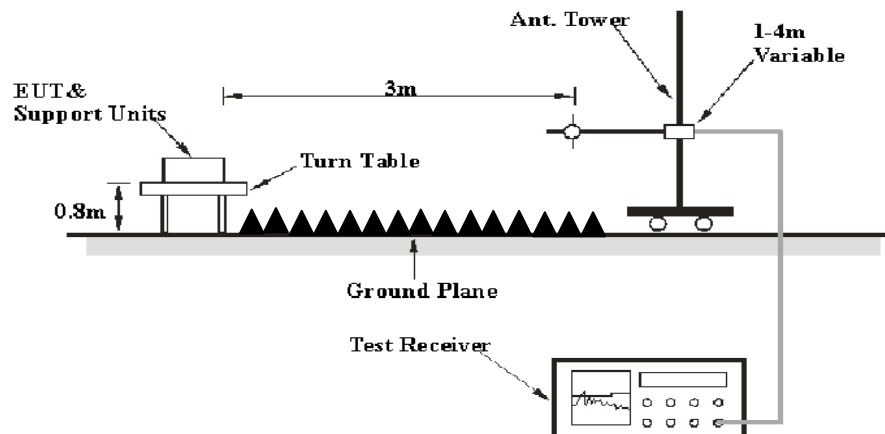
FCC §15.109 - RADIATED SPURIOUS EMISSIONS

EUT Setup

Below 1GHz:



Above 1GHz:



The radiated emission tests were performed in the 3 meters chamber test site A for the range 30MHz to 1GHz and the 3 meters chamber test site A for above 1GHz, 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 13.0 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	2017-12-11	2018-12-11
Farad	Test Software	EZ-EMC	V1.1.4.2	N/A	N/A
Sunol Sciences	Antenna	JB3	A060611-1	2017-11-10	2020-11-10
Unknown	Coaxial Cable	C-NJNJ-50	C-0400-01	2018-09-05	2019-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-0075-01	2018-09-05	2019-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-1400-01	2018-05-06	2019-05-06
HP	Amplifier	8447D	2727A05902	2018-09-05	2019-09-05
R&S	Spectrum Analyzer	FSP 38	100478	2017-12-08	2018-12-08
TDK RF	Horn Antenna	HRN-0118	130 084	2016-01-05	2019-01-04
MICRO-COAX	Coaxial Cable	UFA147-1-2362-10 0100	64639 231029-001	2018-02-24	2019-02-28
Mini	Pre-amplifier	ZVA-183-S+	5969001149	2018-09-05	2019-09-05

* **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:	25~26 °C
Relative Humidity:	37~40 %
ATM Pressure:	100.2~100.3 kPa

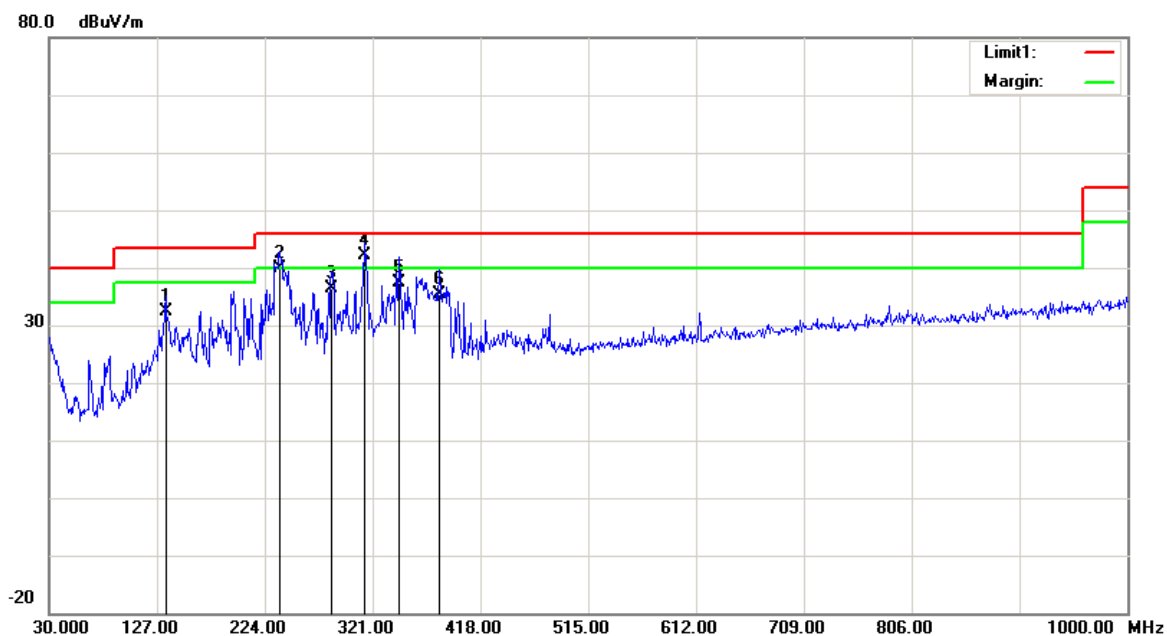
** The testing was performed by Vern Shen & Neil Liao from 2018-11-30 to 2018-12-01.*

Test Result: Compliance

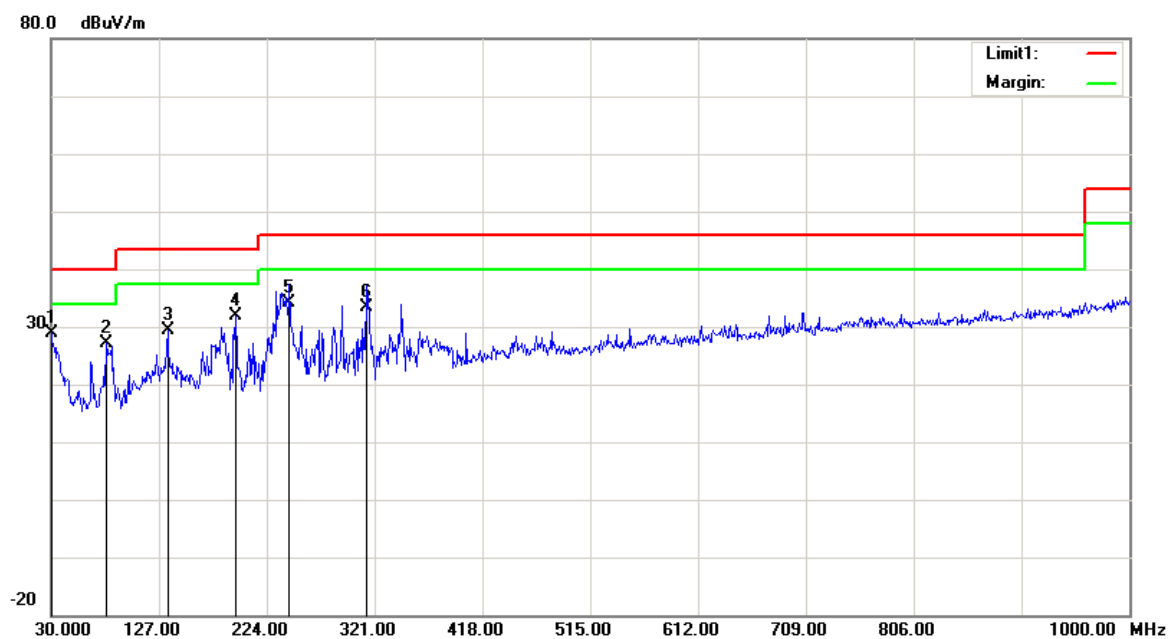
Test Mode: Downloading

1) Below 1GHz:

Horizontal



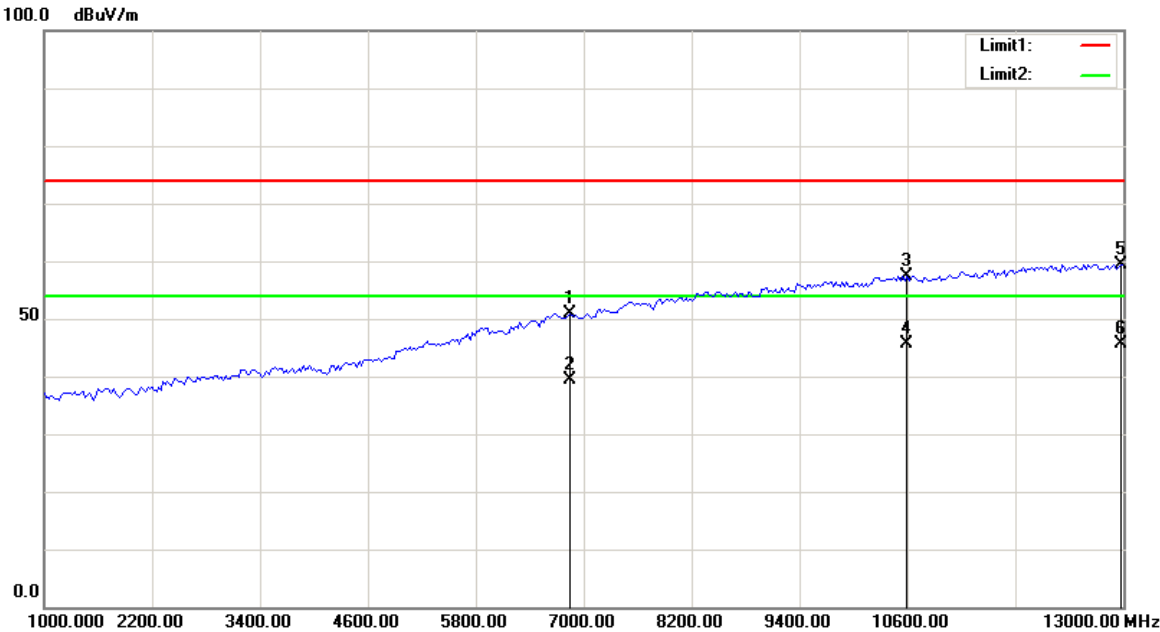
Frequency (MHz)	Receiver Reading (dBμV)	Detector	Correction Factor (dB/m)	Cord. Amp. (dBμV/m)	Limit (dBμV/m)	Margin (dB)
134.7600	37.51	QP	-5.11	32.40	43.50	11.10
237.5800	45.92	QP	-6.12	39.80	46.00	6.20
284.1400	40.33	QP	-4.03	36.30	46.00	9.70
314.2100	45.57	QP	-3.47	42.10	46.00	3.90
345.2500	40.60	QP	-3.20	37.40	46.00	8.60
381.1400	38.03	QP	-2.53	35.50	46.00	10.50

Vertical

Frequency (MHz)	Receiver Reading (dBμV)	Detector	Correction Factor (dB/m)	Cord. Amp. (dBμV/m)	Limit (dBμV/m)	Margin (dB)
30.0000	27.06	QP	1.76	28.82	40.00	11.18
79.4700	38.38	QP	-11.18	27.20	40.00	12.80
134.7600	34.41	QP	-5.11	29.30	43.50	14.20
195.8700	38.45	QP	-6.60	31.85	43.50	11.65
244.3700	40.04	QP	-5.94	34.10	46.00	11.90
314.2100	36.97	QP	-3.47	33.50	46.00	12.50

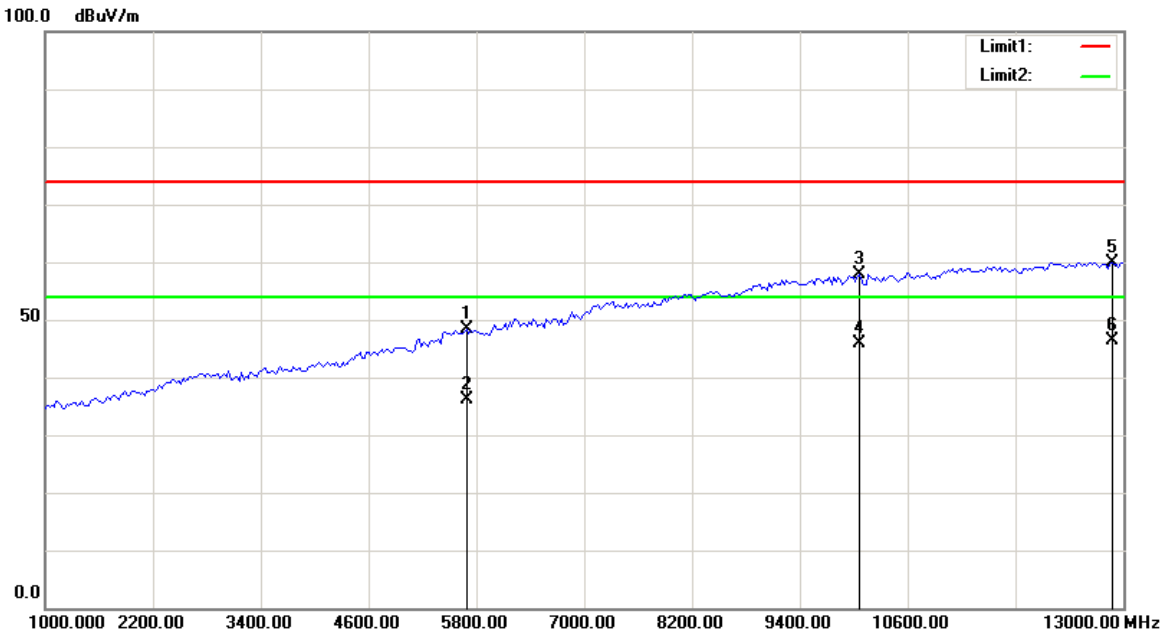
2) Above 1GHz:

Horizontal



Frequency (MHz)	Receiver Reading (dBμV)	Detector	Correction Factor (dB/m)	Cord. Amp. (dBμV/m)	Limit (dBμV/m)	Margin (dB)
6843.687	39.03	peak	11.91	50.94	74.00	23.06
6843.687	27.36	AVG	11.91	39.27	54.00	14.73
10595.190	40.03	peak	17.43	57.46	74.00	16.54
10595.190	28.11	AVG	17.43	45.54	54.00	8.46
12975.952	38.84	peak	20.60	59.44	74.00	14.56
12975.952	25.11	AVG	20.60	45.71	54.00	8.29

Vertical



Frequency (MHz)	Receiver Reading (dBμV)	Detector	Correction Factor (dB/m)	Cord. Amp. (dBμV/m)	Limit (dBμV/m)	Margin (dB)
5689.379	38.49	peak	9.86	48.35	74.00	25.65
5689.379	26.33	AVG	9.86	36.19	54.00	17.81
10066.132	41.37	peak	16.48	57.85	74.00	16.15
10066.132	29.41	AVG	16.48	45.89	54.00	8.11
12879.760	39.34	peak	20.63	59.97	74.00	14.03
12879.760	25.73	AVG	20.63	46.36	54.00	7.64

END OF REPORT