

FCC PART 15B

TEST REPORT

For

MAXWEST COMMUNICATION LIMITED

ROOM 1802B FORTRESS TOWER 250 KING'S ROAD NORTH POINT,
Hong Kong

FCC ID:2ASP8RANGERX2

Report Type: Original Report	Product Type: Mobile Phone
Report Number:	RDG191205008-00A
Report Date:	2019-12-17
Reviewed By:	Jerry Zhang EMC Manager
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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

EUT Name:		Mobile Phone
EUT Model:		Ranger X2
Highest Operation Frequency:		2480 MHz
Adapter Information	Model:	AC 100-240V 50/60Hz 0.15A
	Output:	DC 5Vdc 500mA
Rated Input Voltage:		DC 3.7V from battery and DC 5V from adapter
Serial Number:		RDG191205008-RF-S1
EUT Received Date:		2019.12.05
EUT Received Status:		Good

Objective

This report is prepared on behalf of MAXWEST COMMUNICATION LIMITED in accordance with FCC Part 15B Part 2, subpart J, and Part 15, Subpart 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 22H, 24E PCE submissions with FCC ID:2ASP8RANGERX2
FCC Part 15C DSS submissions with FCC ID:2ASP8RANGERX2

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)

Note: Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty. The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval.

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.

Declarations

BACL is not responsible for the authenticity of any test data provided by the applicant. Data included from the applicant that may affect test results are marked with a triangle symbol “Δ”. Customer model name, addresses, names, trademarks etc. are not considered data.

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.

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This report may contain data that are not covered by the accreditation scope and shall be marked with an asterisk “★”.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

The system was configured for testing in downloading mode.

Equipment Modifications

No modification was made to the EUT.

EUT Exercise Software

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

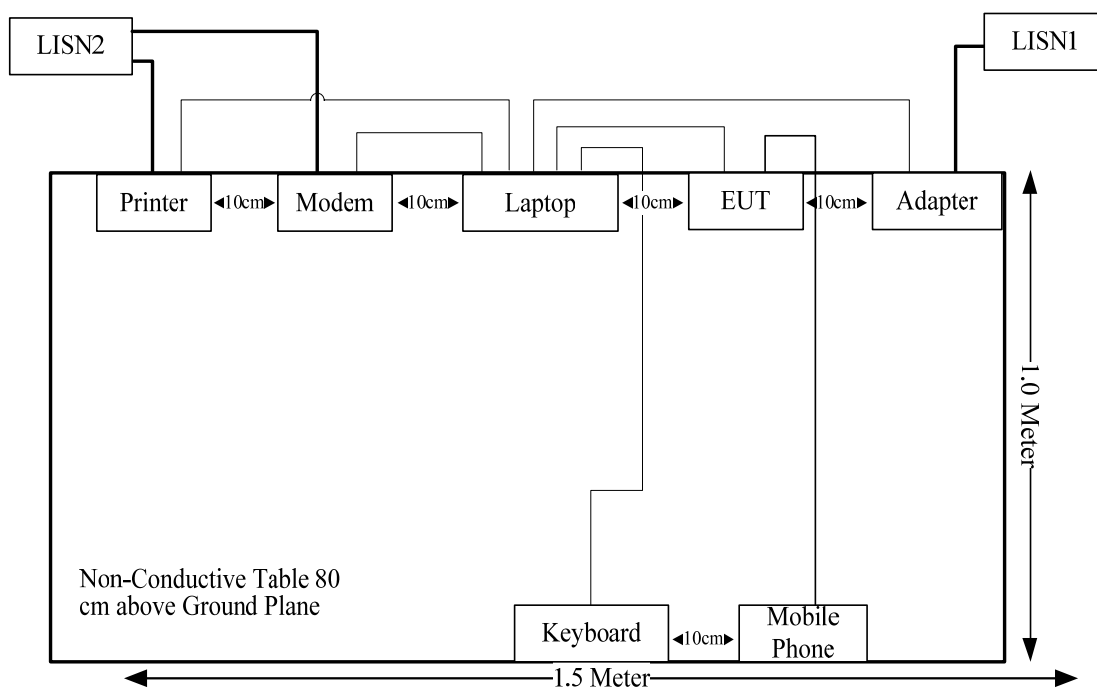
Local Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
DELL	Laptop	PP11L	QDS-BRCM1017
HP	Printer	C3941A	JPTVOB2337
DELL	Keyboard	L100	CNORH656658907BL05DC
SAST	Modem	AEM-2100	293
Maxwest	Mobile Phone	Ranger X1	191205007

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	Yes	No	0.8	EUT	Laptop
USB Cable	Yes	No	1.2	EUT	Mobile Phone

Block Diagram of Test Setup



Test Equipment List

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Conducted emissions					
Unknown	Coaxial Cable	C-NJNJ-50	C-0200-01	2019-09-05	2020-09-05
R&S	Test Software	EMC32	Version8.53.0	N/A	N/A
R&S	Two-line V-network	ENV 216	101614	2019-09-12	2020-09-12
R&S	EMI Test Receiver	ESCI	101121	2019-05-09	2020-05-09
R&S	L.I.S.N	ESH2-Z5	892107/021	2019-09-19	2020-09-19
Radiated emissions Below 1GHz					
R&S	EMI Test Receiver	ESCI	100224	2019-09-12	2020-09-12
Farad	Test Software	EZ-EMC	V1.1.4.2	N/A	N/A
Sunol Sciences	Antenna	JB3	A060611-2	2017-08-25	2020-08-25
Unknown	Coaxial Cable	C-NJNJ-50	C-1000-01	2019-09-05	2020-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-0400-02	2019-09-05	2020-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-0530-01	2019-09-24	2020-09-24
Sonoma	Amplifier	310N	185914	2019-10-13	2020-10-13
Radiated emissions Above 1GHz					
Agilent	Spectrum Analyzer	E4440A	SG43360054	2019-05-09	2020-05-09
Farad	Test Software	EZ-EMC	V1.1.4.2	N/A	N/A
ETS-Lindgren	Horn Antenna	3115	000 527 35	2018-10-12	2021-10-12
Unknown	Coaxial Cable	C-SJSJ-50	C-0800-01	2019-09-05	2020-09-05
MITEQ	Amplifier	AFS42-00101800-25-S-42	2001271	2019-09-05	2020-09-05

* 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).

Environmental Conditions

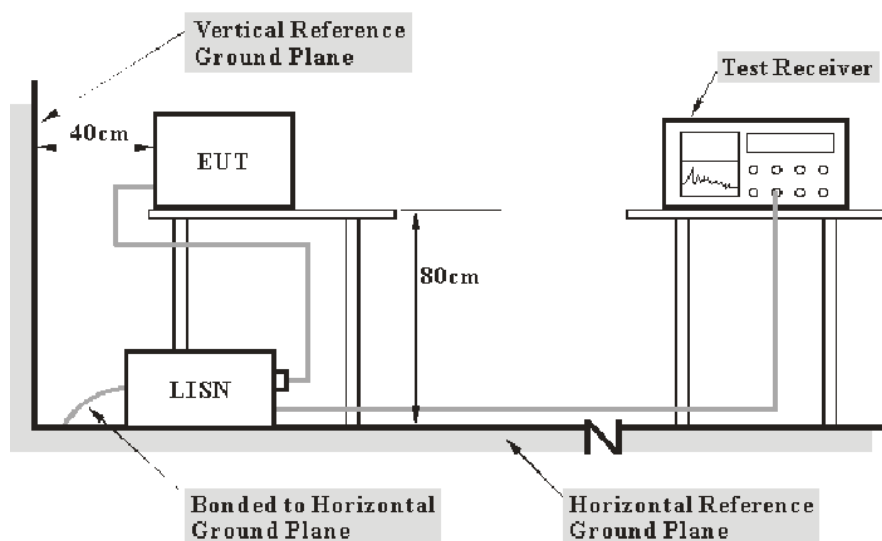
Test Item:	Conducted emissions	Radiated emissions (Below 1GHz)	Radiated emissions (Above 1GHz)
Temperature:	22.4°C	22.4 °C	23.6 °C
Relative Humidity:	37%	37%	37%
ATM Pressure:	102.3kPa	101.9 kPa	101.9 kPa
Tester:	Sern Xiang	Jackson Zhang	Jackson Zhang
Test Date:	2019-12-10	2019-12-12	2019-12-12

SUMMARY OF TEST RESULTS

Rule and Clause	Description of Test	Test Result
FCC §15.107	Conducted emissions	Compliance
FCC §15.109	Radiated emissions	Compliance

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 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

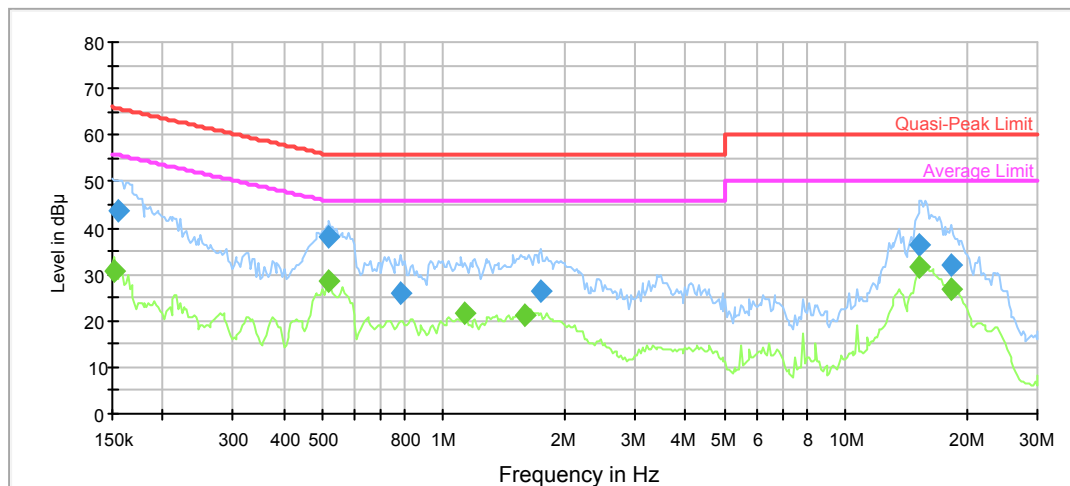
The “**Margin**” column of the following data tables indicates the degree of compliance within the applicable limit. For example, a margin of 7dB means the emission is 7dB below the limit. The equation for margin calculation is as follows:

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

Test Data

Please refer to following table and plots:

Model Number: Ranger X2
 Port: L
 Test Mode: Downloading
 Power Source: AC 120V/60Hz
 Note:



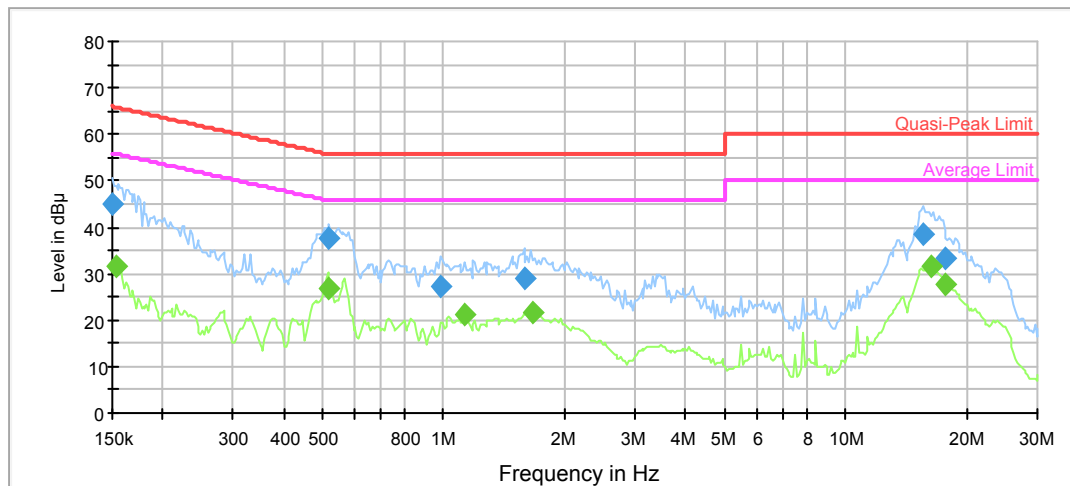
Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.156091	43.6	9.000	L1	11.1	22.1	65.7
0.520311	38.0	9.000	L1	9.9	18.0	56.0
0.782419	25.7	9.000	L1	9.8	30.3	56.0
1.751745	26.2	9.000	L1	9.7	29.8	56.0
15.329584	36.3	9.000	L1	9.9	23.7	60.0
18.336443	31.8	9.000	L1	10.0	28.2	60.0

Final Result 2

Frequency (MHz)	Average (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.151500	30.8	9.000	L1	11.2	25.1	55.9
0.520311	28.5	9.000	L1	9.9	17.5	46.0
1.130656	21.6	9.000	L1	9.8	24.4	46.0
1.585832	21.3	9.000	L1	9.7	24.7	46.0
15.329584	31.4	9.000	L1	9.9	18.6	50.0
18.336443	26.7	9.000	L1	10.0	23.3	50.0

Model Number: Ranger X2
 Port: N
 Test Mode: Downloading
 Power Source: AC 120V/60Hz
 Note:



Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.150000	44.9	9.000	N	11.2	21.1	66.0
0.520311	37.5	9.000	N	9.9	18.5	56.0
0.983629	27.1	9.000	N	9.8	28.9	56.0
1.585832	28.8	9.000	N	9.8	27.2	56.0
15.637708	38.4	9.000	N	9.9	21.6	60.0
17.797171	33.2	9.000	N	10.0	26.8	60.0

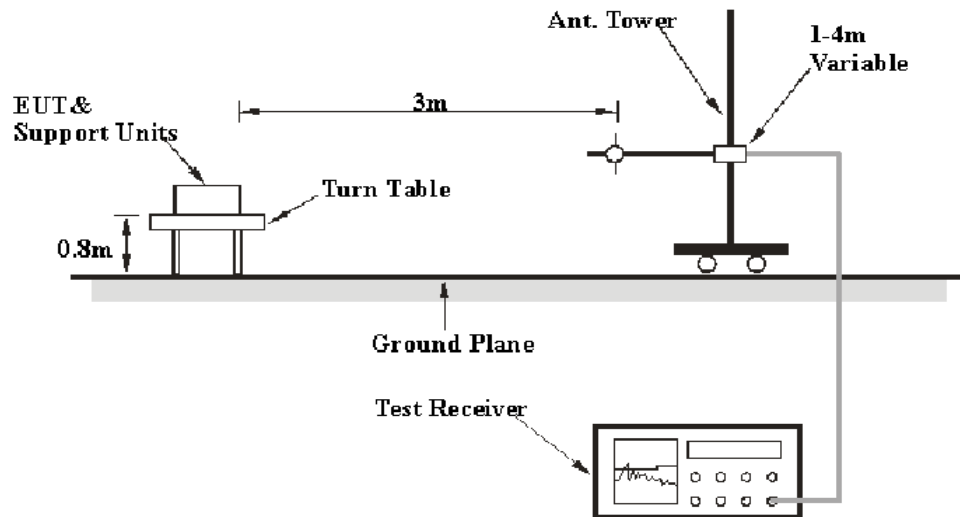
Final Result 2

Frequency (MHz)	Average (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.153015	31.5	9.000	N	11.1	24.3	55.8
0.515160	27.0	9.000	N	9.9	19.0	46.0
1.130656	21.1	9.000	N	9.8	24.9	46.0
1.666725	21.7	9.000	N	9.8	24.3	46.0
16.272662	31.4	9.000	N	9.9	18.6	50.0
17.797171	27.6	9.000	N	10.0	22.4	50.0

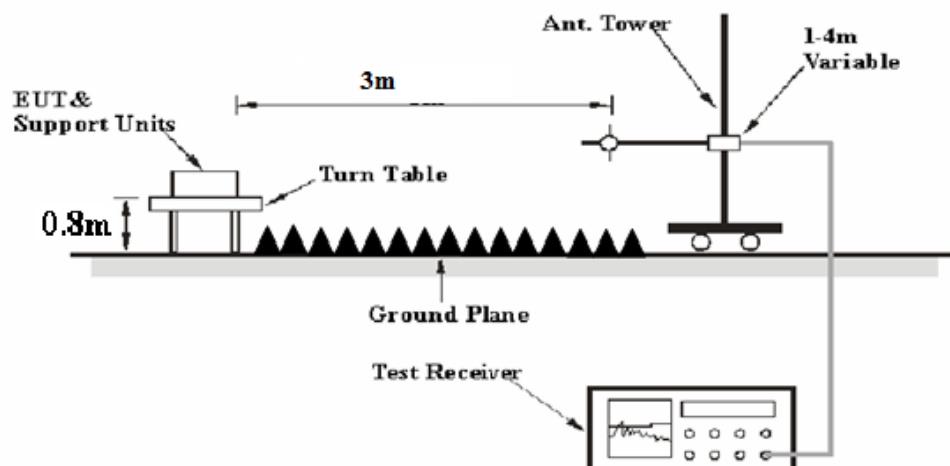
RADIATED EMISSIONS

EUT Setup

Below 1GHz:



Above 1GHz:



The radiated emission below 1GHz tests were performed in the 10 meters chamber test site, above 1GHz tests were performed in the 3 meters chamber test site B, using the setup accordance with the ANSI C63.4-2014. The specification used was with the FCC Part 15 B Class B limits.

EMI Test Receiver Setup

The system was investigated from 30 MHz to 13 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	Reduced video bandwidth	/	AVG

If the maximized peak measured value complies with under the QP/Average limit more than 6dB, then it is unnecessary to perform an QP/Average measurement.

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.

Corrected Amplitude & Margin Calculation

The basic equation is as follows:

Result = Meter Reading+ Corrected

Note:

Corrected = Antenna Factor + Cable Loss - 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:

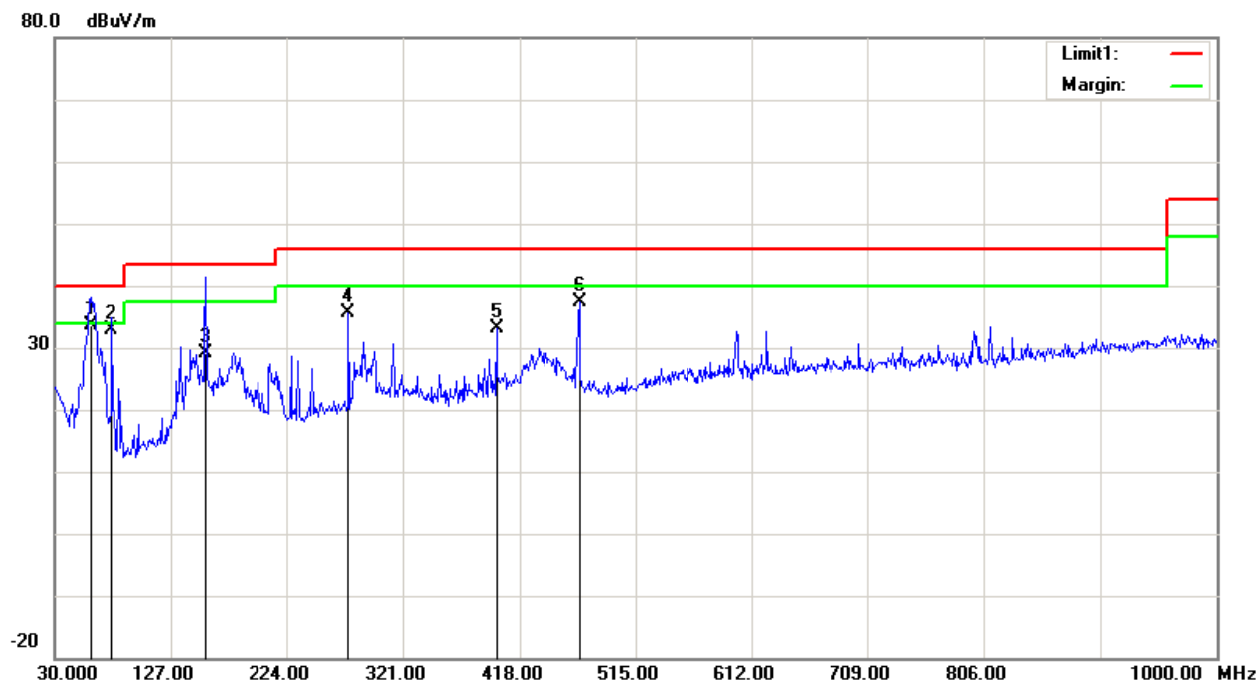
$$\text{Margin} = \text{Limit} - \text{Result}$$

Test Data

Please refer to following table and plots:

Condition: FCC Part 15B Class B
EUT: Mobile Phone
Model: Ranger X2
Test Mode: Downloading

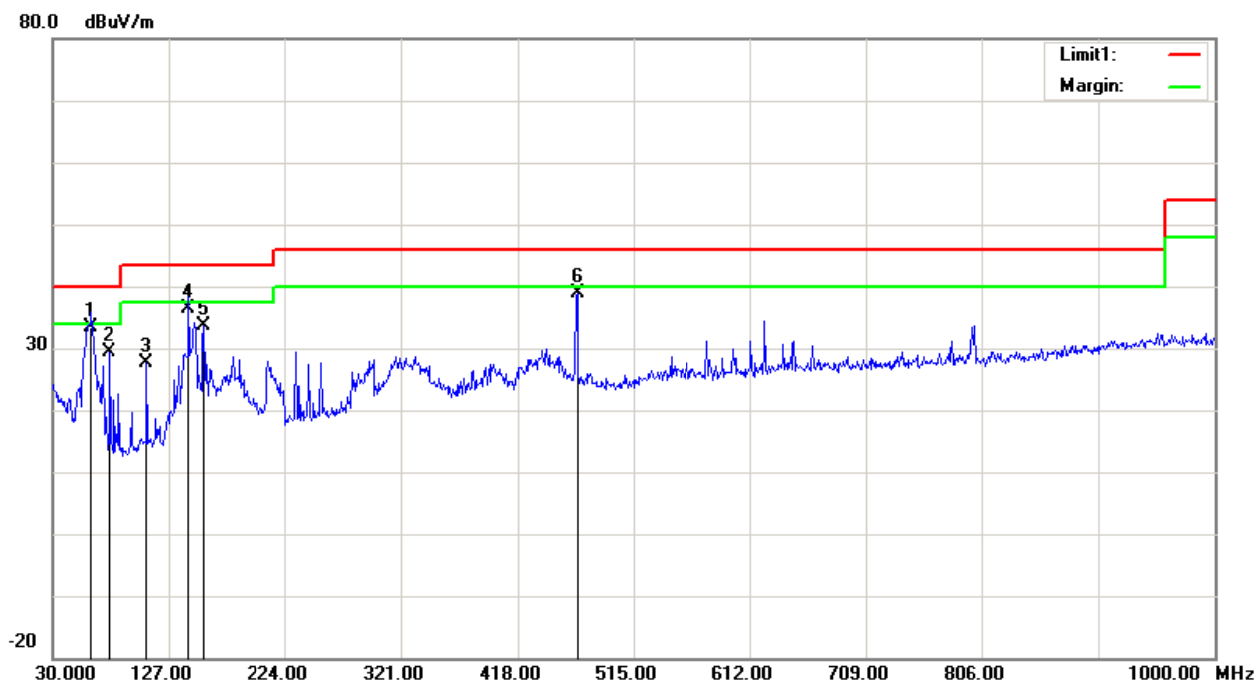
Polarization: Horizontal
Distance: 3m



No.	Frequency (MHz)	Reading (dB μ V)	Detector	Corrected (dB/m)	Result (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
1	60.0700	50.17	QP	-16.57	33.60	40.00	6.40
2	77.5300	49.11	QP	-16.16	32.95	40.00	7.05
3	156.1000	38.62	QP	-9.52	29.10	43.50	14.40
4	275.4100	44.41	peak	-8.67	35.74	46.00	10.26
5	398.6000	38.42	peak	-5.31	33.11	46.00	12.89
6	468.4400	41.39	peak	-3.99	37.40	46.00	8.60

Condition: FCC Part 15B Class B
EUT: Mobile Phone
Model: Ranger X2
Test Mode: Downloading

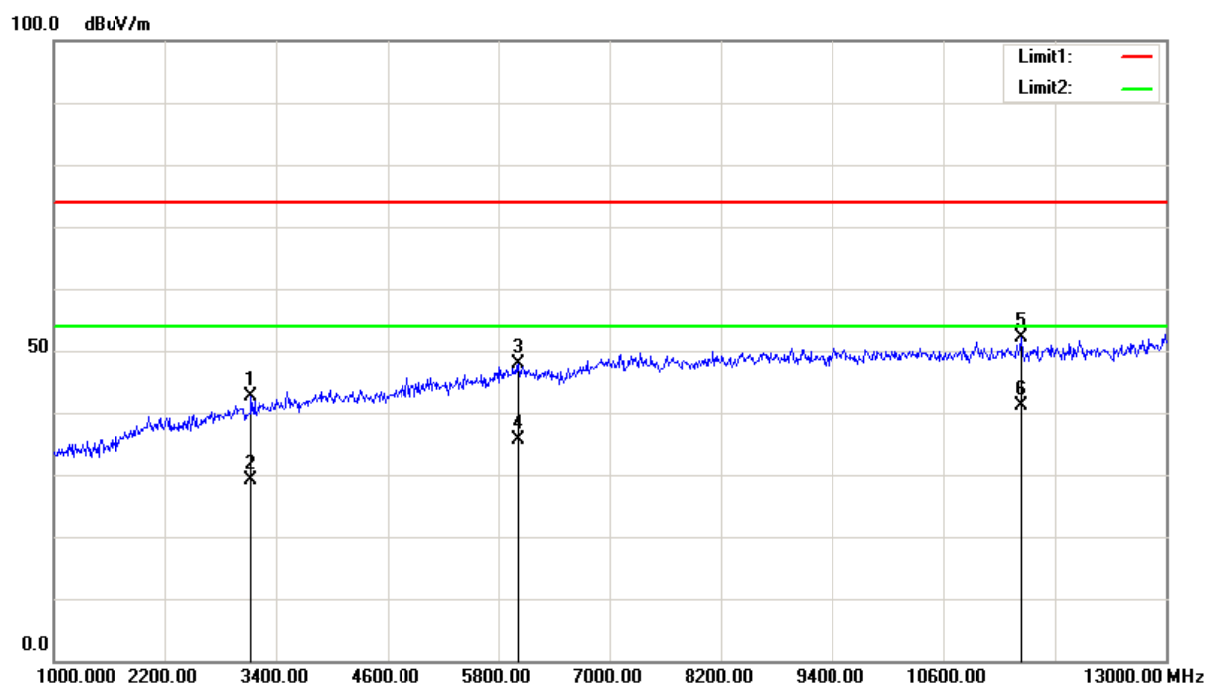
Polarization: Vertical
Distance: 3m



No.	Frequency (MHz)	Reading (dB μ V)	Detector	Corrected (dB/m)	Result (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
1	62.0100	49.85	QP	-16.59	33.26	40.00	6.74
2	77.5300	45.43	peak	-16.16	29.27	40.00	10.73
3	108.5700	40.75	peak	-13.14	27.61	43.50	15.89
4	143.4900	45.60	QP	-9.17	36.43	43.50	7.07
5	156.1000	43.23	peak	-9.52	33.71	43.50	9.79
6	468.4400	42.77	peak	-3.99	38.78	46.00	7.22

Condition: FCC Part 15B Class B
EUT: Mobile Phone
Model: Ranger X1
Test Mode: Downloading

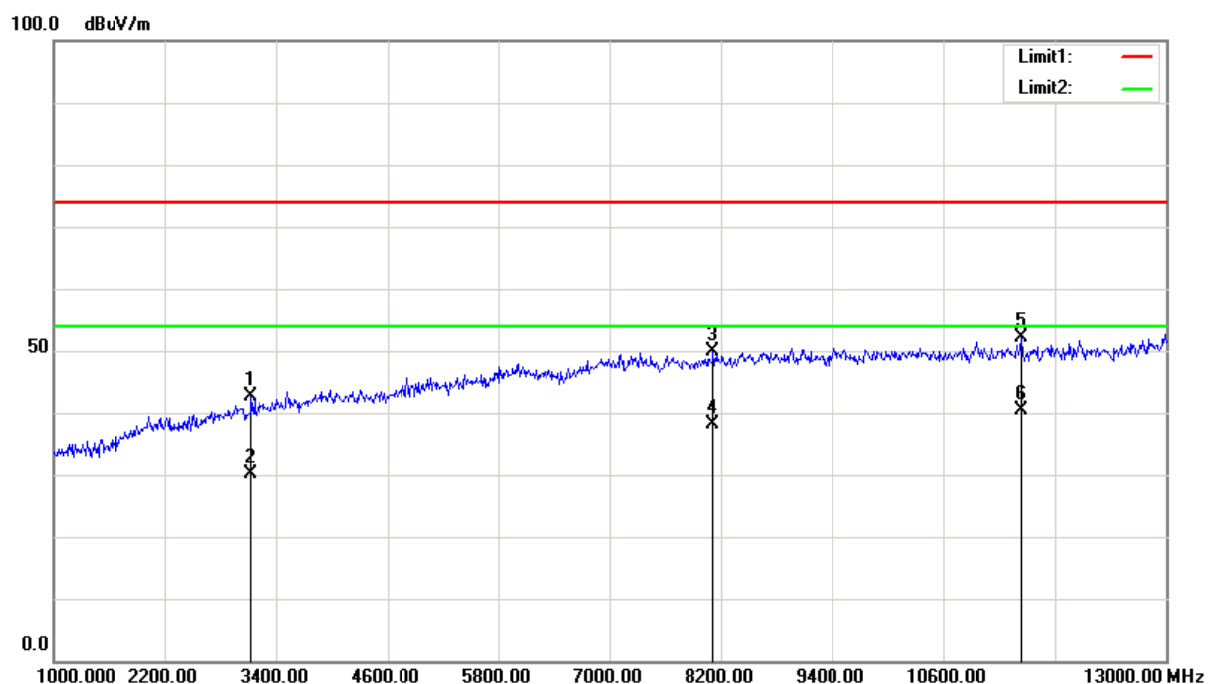
Polarization: Horizontal
Distance: 3m



No.	Frequency (MHz)	Reading (dB μ V)	Detector	Corrected (dB/m)	Result (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
1	3124.000	35.92	peak	6.72	42.64	74.00	31.36
2	3124.000	22.36	AVG	6.72	29.08	54.00	24.92
3	6016.000	33.72	peak	14.05	47.77	74.00	26.23
4	6016.000	21.54	AVG	14.05	35.59	54.00	18.41
5	11440.000	32.00	peak	20.03	52.03	74.00	21.97
6	11440.000	21.09	AVG	20.03	41.12	54.00	12.88

Condition: FCC Part 15B Class B
EUT: Mobile Phone
Model: Ranger X1
Test Mode: Downloading

Polarization: Vertical
Distance: 3m



No.	Frequency (MHz)	Reading (dB μ V)	Detector	Corrected (dB/m)	Result (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
1	3124.000	35.92	peak	6.72	42.64	74.00	31.36
2	3124.000	23.45	AVG	6.72	30.17	54.00	23.83
3	8122.000	34.22	peak	15.76	49.98	74.00	24.02
4	8122.000	22.45	AVG	15.76	38.21	54.00	15.79
5	11440.000	32.00	peak	20.03	52.03	74.00	21.97
6	11440.000	20.45	AVG	20.03	40.48	54.00	13.52

*****END OF REPORT*****