

FCC PART 15B

TEST REPORT

For

MRN TECHNOLOGY SA.

Calle 15N°23-62 Pasto Colombia

FCC ID: 2AT9JX2

Report Type: Original Report	Product Type: Mobile Phone
Report Number:	RDG190806005-00B
Report Date:	2019-09-12
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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). This report must not be used by the customer to claim product certification, approval, or endorsement by A2LA* or any agency of the Federal Government. * This report may contain data that are not covered by the A2LA accreditation and are marked with an asterisk “*”.

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

EUT Name:		Mobile Phone
EUT Model:		X2
Multiple Models:		S7,S8,S9
Highest Operation Frequency:		2480 MHz
Rated Input Voltage:		DC 3.7V from battery or DC 5V from adapter
Adapter Information	Input:	AC 100V-240V 50/60Hz
	Output:	DC 5.0V, 500mA $\pm$ 50mA
External Dimension:		123mm(L)*52mm(W)*10mm(H)
Serial Number:		190806005
EUT Received Date:		2019.8.06

Notes: Model X2 was selected for fully testing, the detailed information about the difference among S7,S8,S9 and model X2 can be referred to the declaration letter which was stated and guaranteed by the manufacturer.

Objective

This report is prepared on behalf of *MRN TECHNOLOGY SA* 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: 2AT9JX2

FCC Part 15C DSS submissions with FCC ID: 2AT9JX2

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	$\pm 1^{\circ}\text{C}$
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.

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.

Equipment Modifications

No modification was made to the EUT.

EUT Exercise Software

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

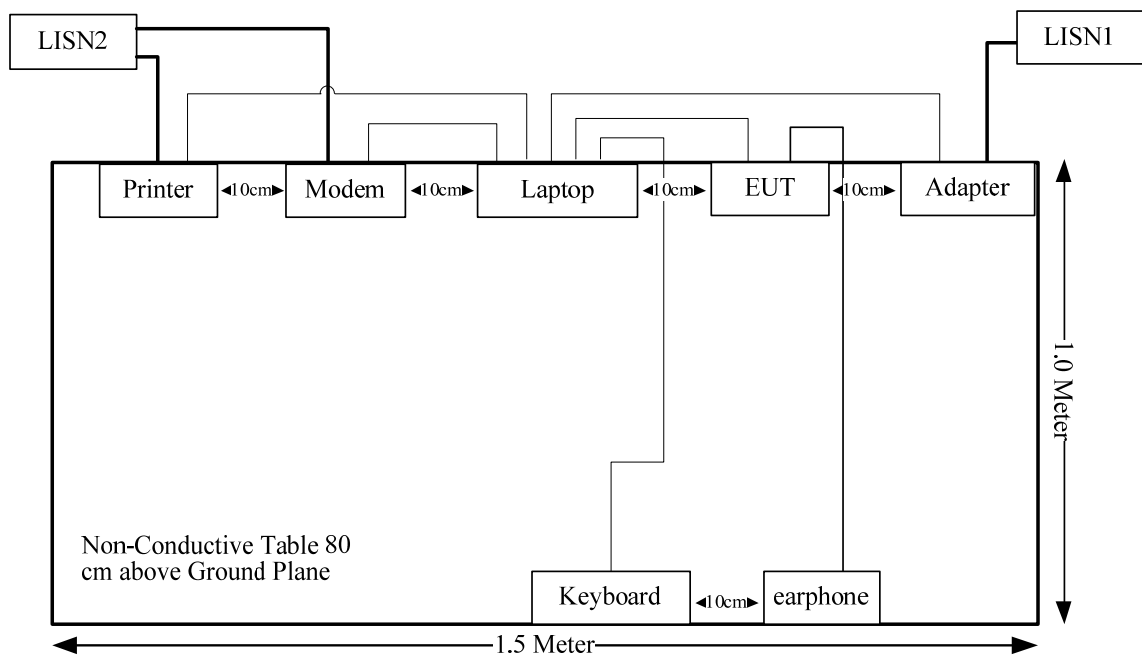
Local Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
DELL	Laptop	PP11L	QDS-BRCM1017
HP	Printer	C3941A	JPTVOB2337
DELL	Keyboard	L100	CNORH656658907BL05DC
SAST	Modem	AEM-2100	293

Support Cable List and Details

Cable Description	Shielding Type	Ferrite Core	Length (m)	From Port	To
Earphone Cable	No	No	1.2	EUT	Earphone
USB Cable	Yes	No	0.8	USB Port of Laptop	EUT
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

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	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	2018-12-10	2019-12-10
R&S	EMI Test Receiver	ESPI	100120	2019-05-09	2020-05-09
Radiated emissions Below 1GHz					
R&S	EMI Test Receiver	ESCI	101121	2019-05-09	2020-05-09
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-1000-01	2018-09-05	2019-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-0400-02	2018-09-05	2019-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-0530-01	2018-09-24	2019-09-24
Sonoma	Amplifier	310N	185914	2018-10-13	2019-10-13
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	2018-09-05	2019-09-05
MITEQ	Amplifier	AFS42-00101800-25-S-42	2001271	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).

Environmental Conditions

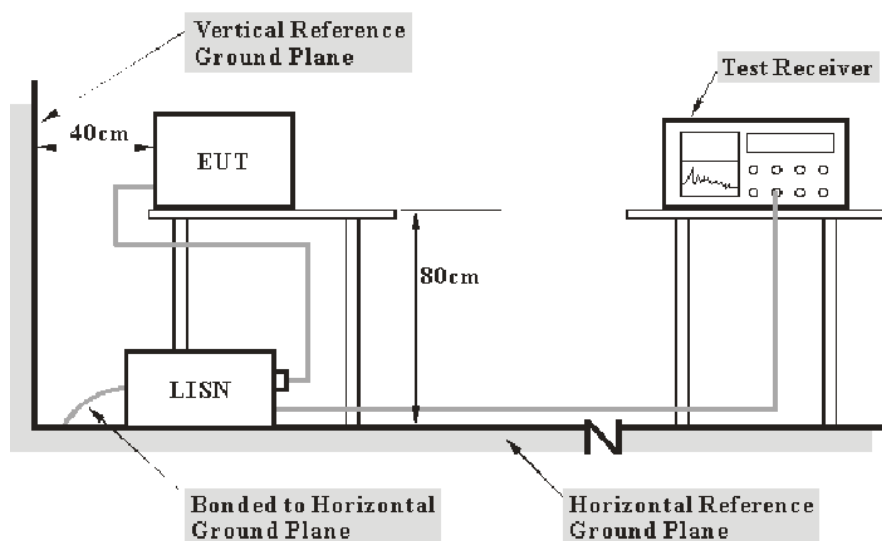
Test Item:	Conducted emissions	Radiated emissions Below 1GHz	Radiated emissions Above 1GHz
Test Date:	2019-08-27	2019-08-25	2019-08-26
Tester:	Sky Lu	Ade Xiao	Neil Liao
Temperature:	26.4°C	24.1°C	27.6°C
Relative Humidity:	61%	54%	57%
ATM Pressure:	100.6kPa	100.4kPa	100.5kPa

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

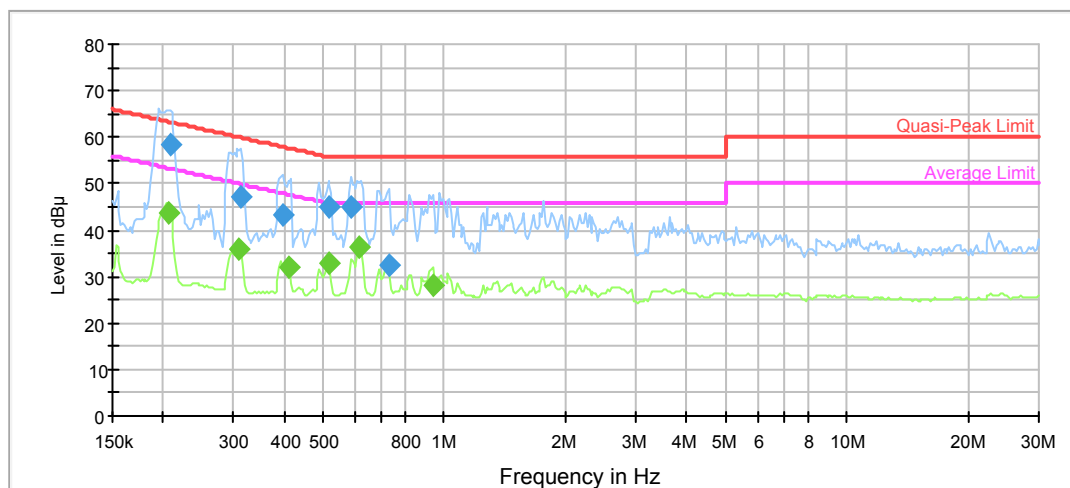
The “**Margin**” column of the following data tables indicates the degree of compliance within the applicable limit. For example, a margin of 7dB means the emission is 7dB below the limit. The equation for margin calculation is as follows:

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

Test Data

Please refer to following table and plots:

Port: L
 Test Mode: Downloading
 Power Source: AC120V/60Hz



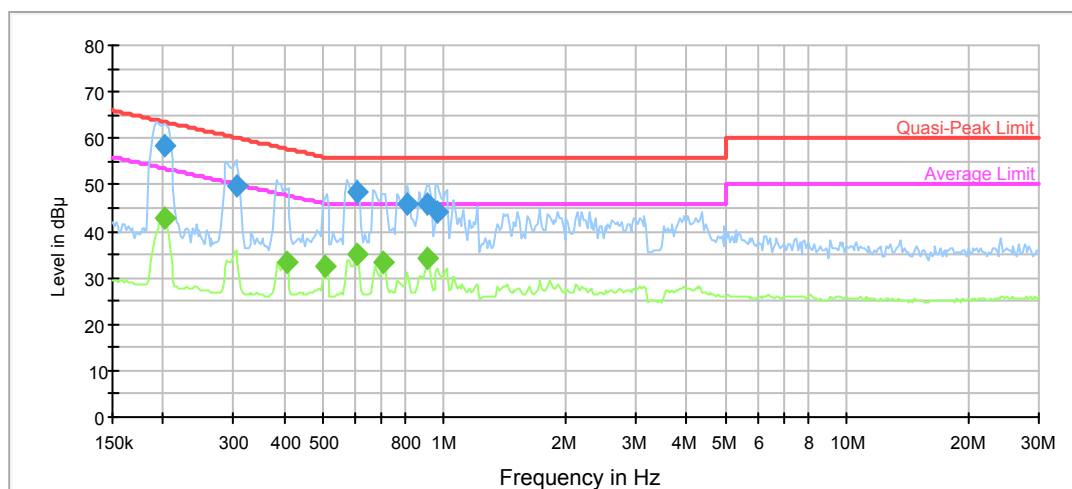
Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.208304	58.3	9.000	L1	10.6	5.0	63.3
0.313237	47.1	9.000	L1	10.1	12.8	59.9
0.397728	43.3	9.000	L1	10.0	14.6	57.9
0.515160	45.1	9.000	L1	9.9	10.9	56.0
0.586300	44.8	9.000	L1	9.8	11.2	56.0
0.729777	32.4	9.000	L1	9.8	23.6	56.0

Final Result 2

Frequency (MHz)	Average (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.206241	43.6	9.000	L1	10.6	9.8	53.4
0.310136	35.7	9.000	L1	10.1	14.3	50.0
0.413877	32.0	9.000	L1	9.9	15.6	47.6
0.515160	32.7	9.000	L1	9.9	13.3	46.0
0.616207	36.3	9.000	L1	9.8	9.7	46.0
0.935889	28.3	9.000	L1	9.8	17.7	46.0

Port: N
 Test Mode: Downloading
 Power Source: AC120V/60Hz



Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.202177	58.3	9.000	N	10.6	5.2	63.5
0.304025	49.9	9.000	N	10.1	10.2	60.1
0.610106	48.2	9.000	N	9.8	7.8	56.0
0.814189	45.7	9.000	N	9.8	10.3	56.0
0.908365	46.0	9.000	N	9.8	10.0	56.0
0.964247	44.0	9.000	N	9.8	12.0	56.0

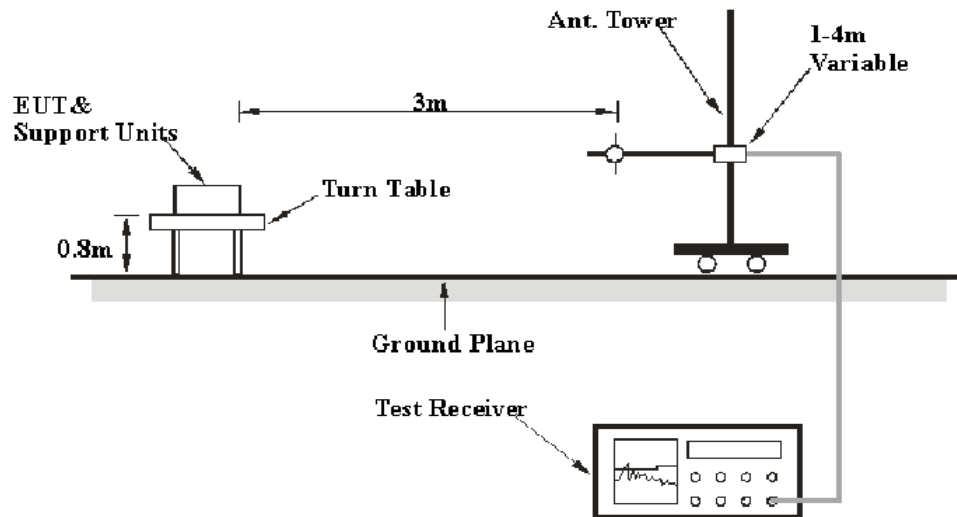
Final Result 2

Frequency (MHz)	Average (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.202177	43.0	9.000	N	10.6	10.5	53.5
0.405722	33.3	9.000	N	10.0	14.4	47.7
0.505009	32.5	9.000	N	9.9	13.5	46.0
0.610106	35.2	9.000	N	9.8	10.8	46.0
0.708314	33.5	9.000	N	9.8	12.5	46.0
0.908365	34.0	9.000	N	9.8	12.0	46.0

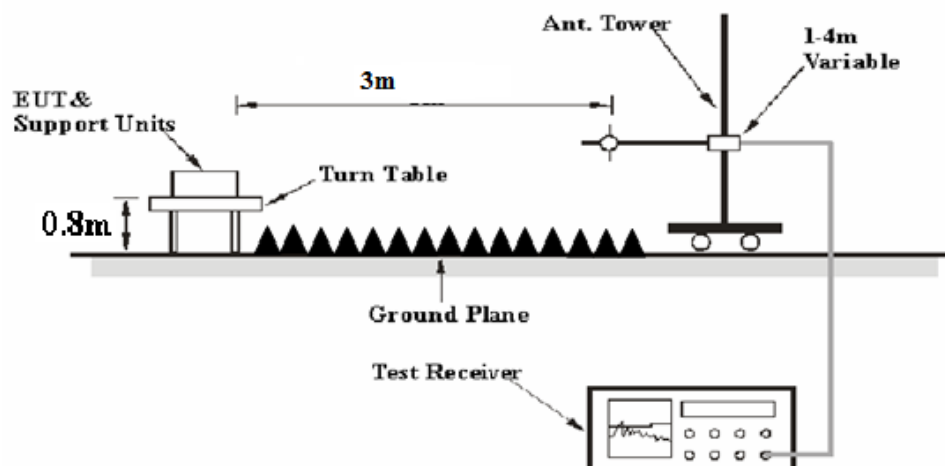
RADIATED EMISSIONS

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:

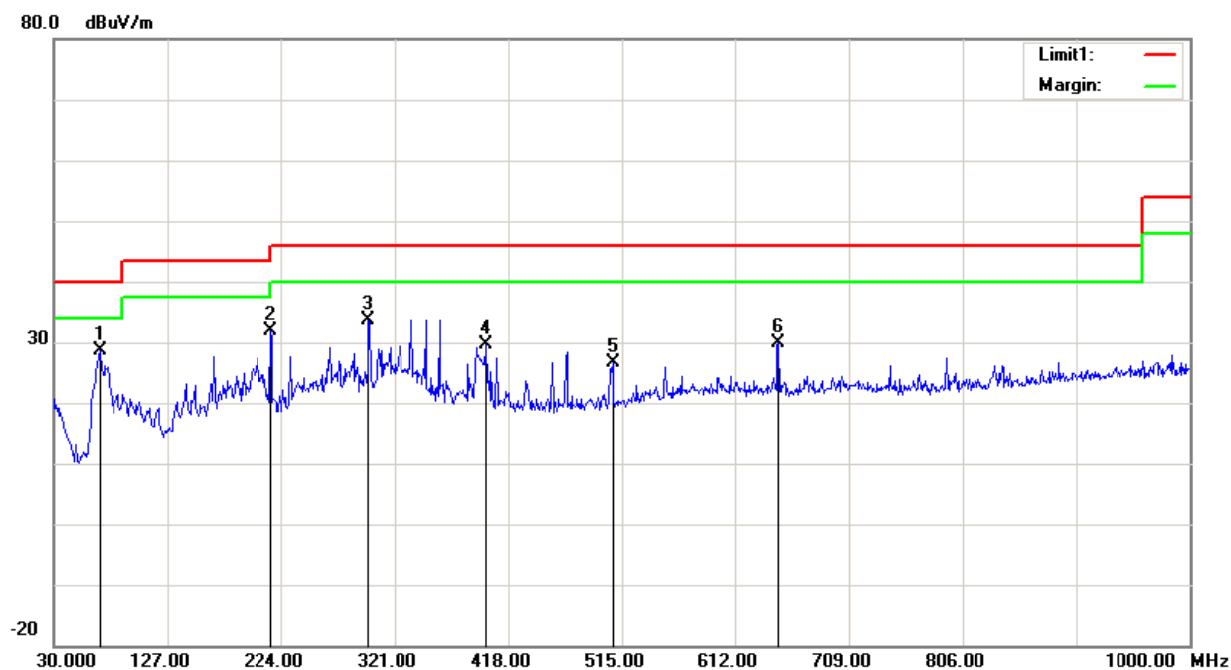
$$\text{Margin} = \text{Limit} - \text{Result}$$

Test Data

Please refer to following table and plots:

Condition: FCC Part 15B Class B
EUT: Mobile Phone
Test Mode: downloading

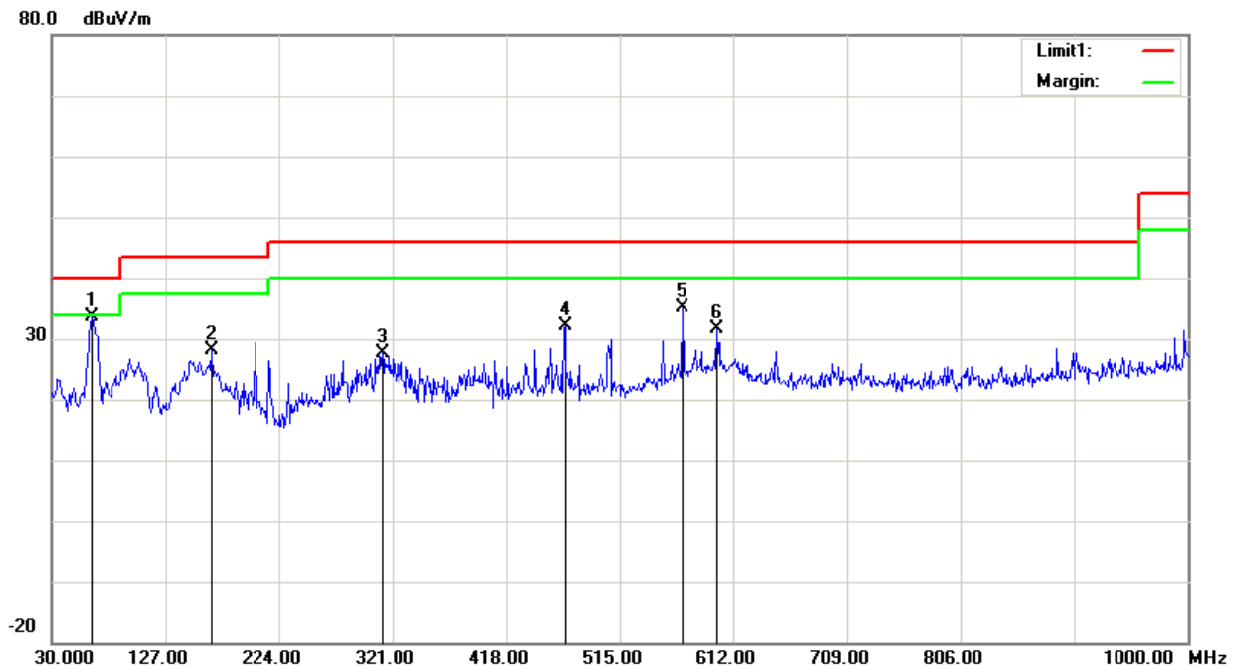
Polarization: Horizontal
Power: AC 120V/60Hz
Distance: 3m



Frequency (MHz)	Reading (dBuV)	Detector	Corrected (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
68.8000	48.79	peak	-20.06	28.73	40.00	11.27
215.2700	46.61	peak	-14.66	31.95	43.50	11.55
298.6900	44.44	peak	-10.90	33.54	46.00	12.46
399.5700	37.89	peak	-8.18	29.71	46.00	16.29
507.2400	32.55	peak	-5.85	26.70	46.00	19.30
648.8600	32.46	peak	-2.65	29.81	46.00	16.19

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

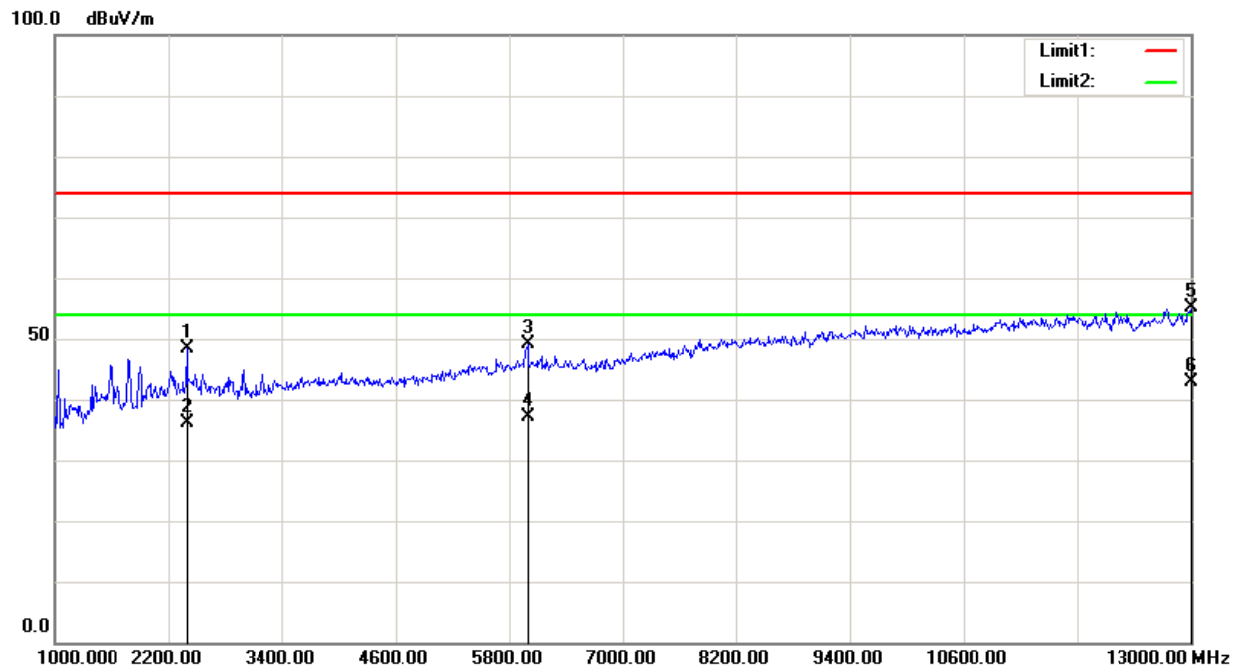
Polarization: Vertical
Power: AC 120V/60Hz
Distance: 3m



Frequency	Reading	Detector	Corrected	Result	Limit	Margin
(MHz)	(dBuV)		(dB/m)	(dBuV/m)	(dBuV/m)	(dB)
63.9500	53.88	peak	-20.14	33.74	40.00	6.26
165.8000	41.13	peak	-12.89	28.24	43.50	15.26
312.2700	38.19	peak	-10.44	27.75	46.00	18.25
468.4400	39.09	peak	-6.93	32.16	46.00	13.84
568.3500	38.91	peak	-3.74	35.17	46.00	10.83
598.4200	34.90	peak	-3.37	31.53	46.00	14.47

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

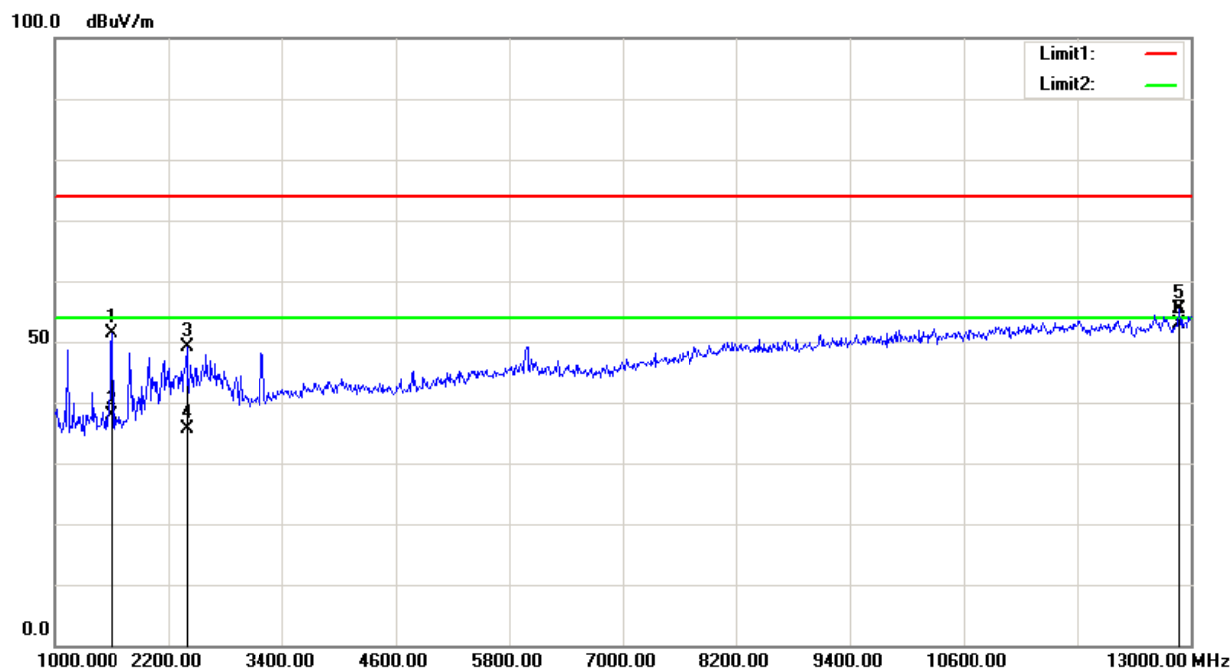
Polarization: Horizontal
Power: AC 120V/60Hz
Distance: 3m



Frequency (MHz)	Reading (dB μ V)	Detector	Corrected (dB/m)	Result (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
2398.000	55.02	peak	-6.52	48.50	74.00	25.50
2398.000	42.74	AVG	-6.52	36.22	54.00	17.78
5992.000	48.28	peak	0.81	49.09	74.00	24.91
5992.000	36.21	AVG	0.81	37.02	54.00	16.98
13000.000	46.66	peak	8.37	55.03	74.00	18.97
13000.000	34.55	AVG	8.37	42.92	54.00	11.08

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

Polarization: Vertical
Power: AC 120V/60Hz
Distance: 3m



Frequency (MHz)	Reading (dBμV)	Detector	Corrected (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
1600.000	60.21	peak	-8.72	51.49	74.00	22.51
1600.000	46.57	AVG	-8.72	37.85	54.00	16.15
2398.000	55.76	peak	-6.52	49.24	74.00	24.76
2398.000	42.14	AVG	-6.52	35.62	54.00	18.38
12886.000	47.19	peak	8.11	55.30	74.00	18.70
12886.000	44.78	AVG	8.11	52.89	54.00	1.11

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