

FCC Part 15B

Measurement and Test Report

For

Hyundai Corporation

25, Yulgok-ro 2-Gil, Jongno-gu, Seoul, South Korea

FCC ID: RQQHLT-FSL500A

Test Rule(s): FCC Part 15 Subpart B

Product Description: 4G Smart Phone

Tested Model: L500

Report No.: STR16108014I-6

Tested Date: 2016-10-09 to 2016-10-19

Issued Date: 2016-10-20

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Iven Guo

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Note: This test report is limited to the above client company and the product model only. It may not be duplicated without prior permitted by Shenzhen SEM.Test Technology Co., Ltd.

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1. GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

Client Information

Applicant: Hyundai Corporation
Address of applicant: 25, Yulgok-ro 2-Gil, Jongno-gu, Seoul, South Korea

Manufacturer: Shenzhen Fortuneship Technology Co., Ltd.
Address of manufacturer: Room 701-716, 7th Floor, Kanghesheng Building,
No.1 ChuangSheng Road, Nanshan District,
Shenzhen, Guangdong, P. R. China

General Description of EUT	
Product Name:	4G Smart Phone
Brand Name:	/
Model No.:	L500
Hardware version:	WW816 V0.6
Software version:	Android 6.0
Rated Voltage:	DC 3.7V
Battery Capacity:	2200mAh
Note: The test data is gathered from a production sample, provided by the manufacturer.	

Technical Characteristics of EUT	
Rated Voltage:	DC 3.7V
Rated Current:	/
Rated Power:	/
Power Adapter Model:	/
Lowest Internal Frequency:	32.768kHz
Highest Internal Frequency:	1.5GHz

1.2 Test Standards

The following report is prepared on behalf of the Hyundai Corporation in accordance with Part 2, Subpart J, and Part 15, Subparts A and B of the Federal Communication Commissions rules.

The objective is to determine compliance with FCC Part 15, Subpart B, and section 15.205, 15.107, and 15.109 rules.

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product, which result in lowering the emission, should be checked to ensure compliance has been maintained.

1.3 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.

1.4 Test Facility

FCC – Registration No.: 934118

Shenzhen SEM.Test Technology Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files and the Registration is 934118.

Industry Canada (IC) Registration No.: 11464A

The 3m Semi-anechoic chamber of Shenzhen SEM.Test Technology Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 11464A.

CNAS Registration No.: L4062

Shenzhen SEM.Test Technology Co., Ltd. is a testing organization accredited by China National Accreditation Service for Conformity Assessment (CNAS) according to ISO/IEC 17025. The accreditation certificate number is L4062. All measurement facilities used to collect the measurement data are located at 1/F, Building A, Hongwei Industrial Park, Liuxian 2nd Road, Bao'an District, Shenzhen, P.R.C (518101).

1.5 EUT Setup and Operation Mode

The equipment under test (EUT) was configured to measure its highest possible emission level. The test modes were adapted according to the operation manual for use, more detailed description as follows:

Test Mode List:

Test Mode	Description	Remark
TM1	Charging + Playing	With adapter, worst case
TM2	Downloading	Connected to PC
TM3	Charging + Camera	With adapter

EUT Cable List and Details

Cable Description	Length (M)	Shielded/Unshielded	With Core/Without Core
USB Cable	1.0	Shielded	Without Ferrite
Earphone	1.2	Unshielded	Without Ferrite

Auxiliary Equipment List and Details

Description	Manufacturer	Model	Serial Number
Notebook	Lenovo	E10	LR-63C8R

Special Cable List and Details

Cable Description	Length (M)	Shielded/Unshielded	With Core/Without Core
/	/	/	/

1.6 Measurement Uncertainty

Measurement uncertainty		
Parameter	Conditions	Uncertainty
Conducted Emissions	Conducted	$\pm 2.88\text{dB}$
Transmitter Spurious Emissions	Radiated	$\pm 5.1\text{dB}$

1.7 Test Equipment List and Details

No.	Description	Manufacturer	Model	Serial No.	Cal Date	Due Date
SEMT-1072	Spectrum Analyzer	Agilent	E4407B	MY41440400	2016-06-04	2017-06-03
SEMT-1031	Spectrum Analyzer	Rohde & Schwarz	FSP30	836079/035	2016-06-04	2017-06-03
SEMT-1007	EMI Test Receiver	Rohde & Schwarz	ESVB	825471/005	2016-06-04	2017-06-03
SEMT-1008	Amplifier	Agilent	8447F	3113A06717	2016-06-04	2017-06-03
SEMT-1043	Amplifier	C&D	PAP-1G18	2002	2016-06-04	2017-06-03
SEMT-1011	Broadband Antenna	Schwarz beck	VULB9163	9163-333	2016-06-04	2017-06-03
SEMT-1042	Horn Antenna	ETS	3117	00086197	2016-06-04	2017-06-03
SEMT-1121	Horn Antenna	ETS	3116B	00088203	2016-06-04	2017-06-03
SEMT-1069	Loop Antenna	Schwarz beck	FMZB 1516	9773	2016-06-04	2017-06-03
SEMT-1001	EMI Test Receiver	Rohde & Schwarz	ESPI	101611	2016-06-04	2017-06-03
SEMT-1003	L.I.S.N	Schwarz beck	NSLK8126	8126-224	2016-06-04	2017-06-03
SEMT-1002	Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100911	2016-06-04	2017-06-03

2. SUMMARY OF TEST RESULTS

FCC Rules	Description of Test Item	Result
§ 15.107 (a)	Conducted Emissions	Compliant
§ 15.109 (a)	Radiated Emissions	Compliant

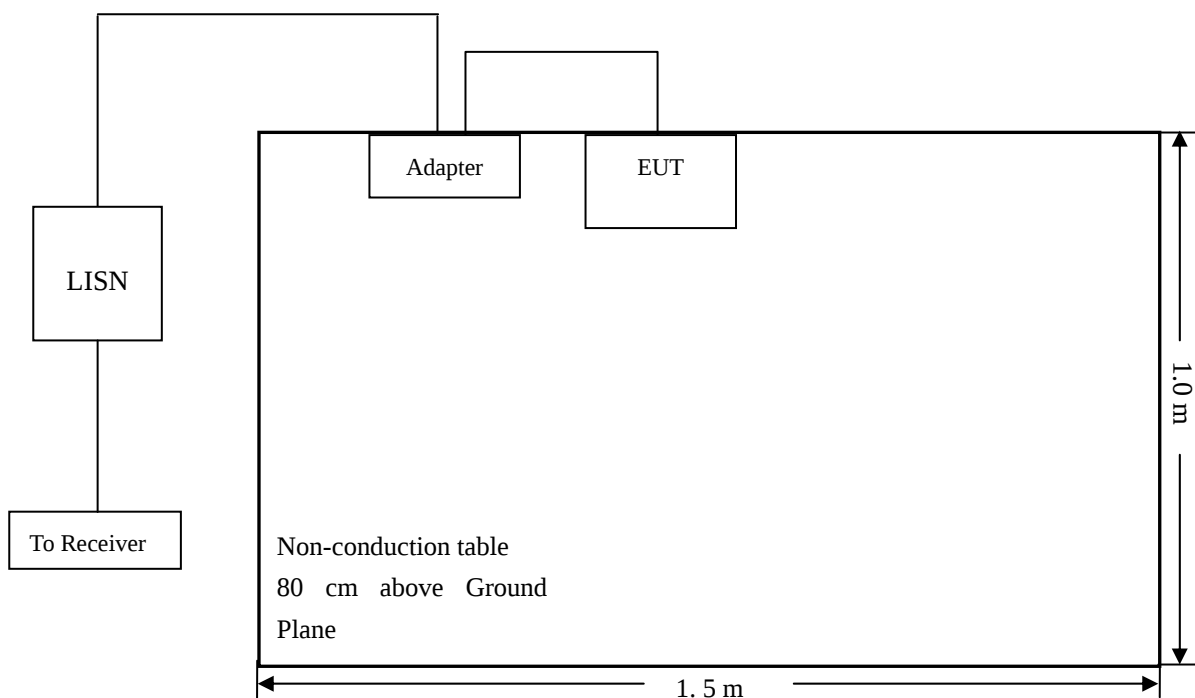
N/A: not applicable

3. Conducted Emissions

3.1 Test Procedure

Test is conducting under the description of 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.

3.2 Basic Test Setup Block Diagram



3.3 Environmental Conditions

Temperature:	23 °C
Relative Humidity:	52%
ATM Pressure:	1011 mbar

3.4 Summary of Test Results/Plots

According to the data in section 3.5, the EUT complied with the FCC Part 15.107(a) Conducted margin for a Class B device, with the *worst* margin reading of:

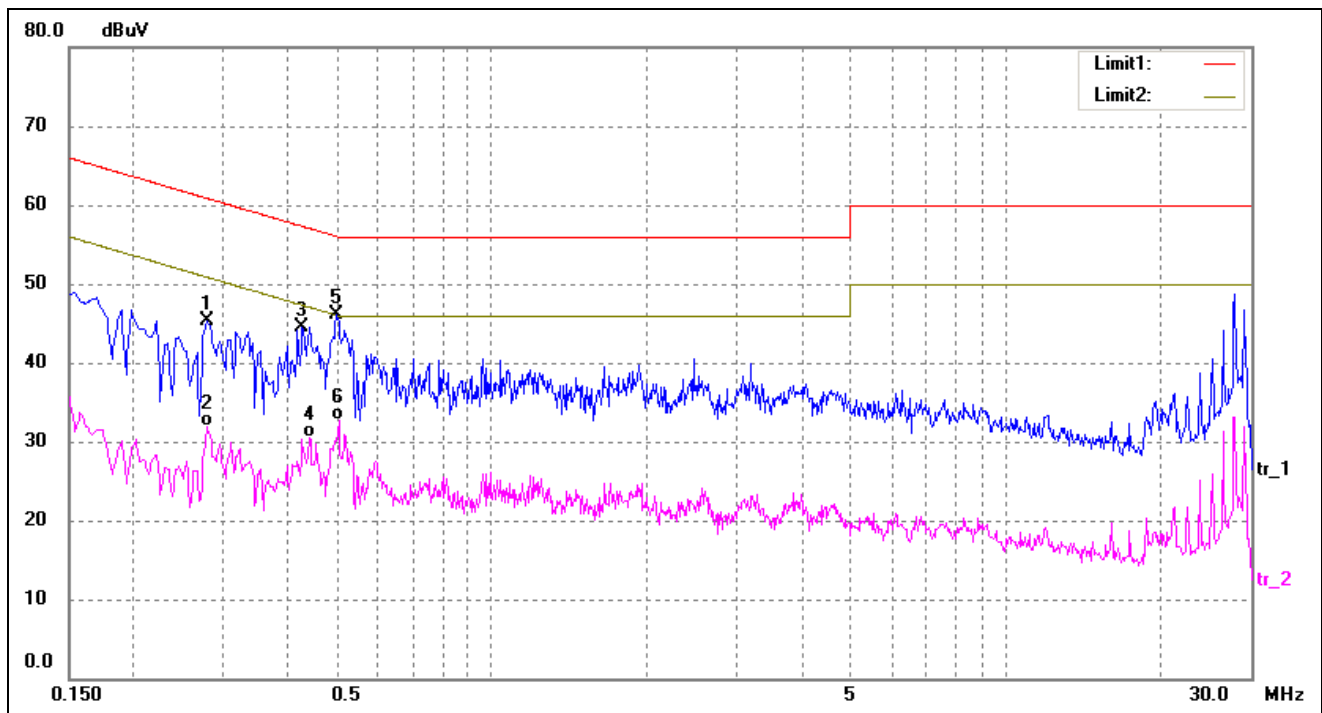
-2.72 dB at 0.5100 MHz in the Line, Peak detector, 0.15-30MHz at TM2 mode

3.5 Conducted Emissions Test Data

Plot of Conducted Emissions Test Data

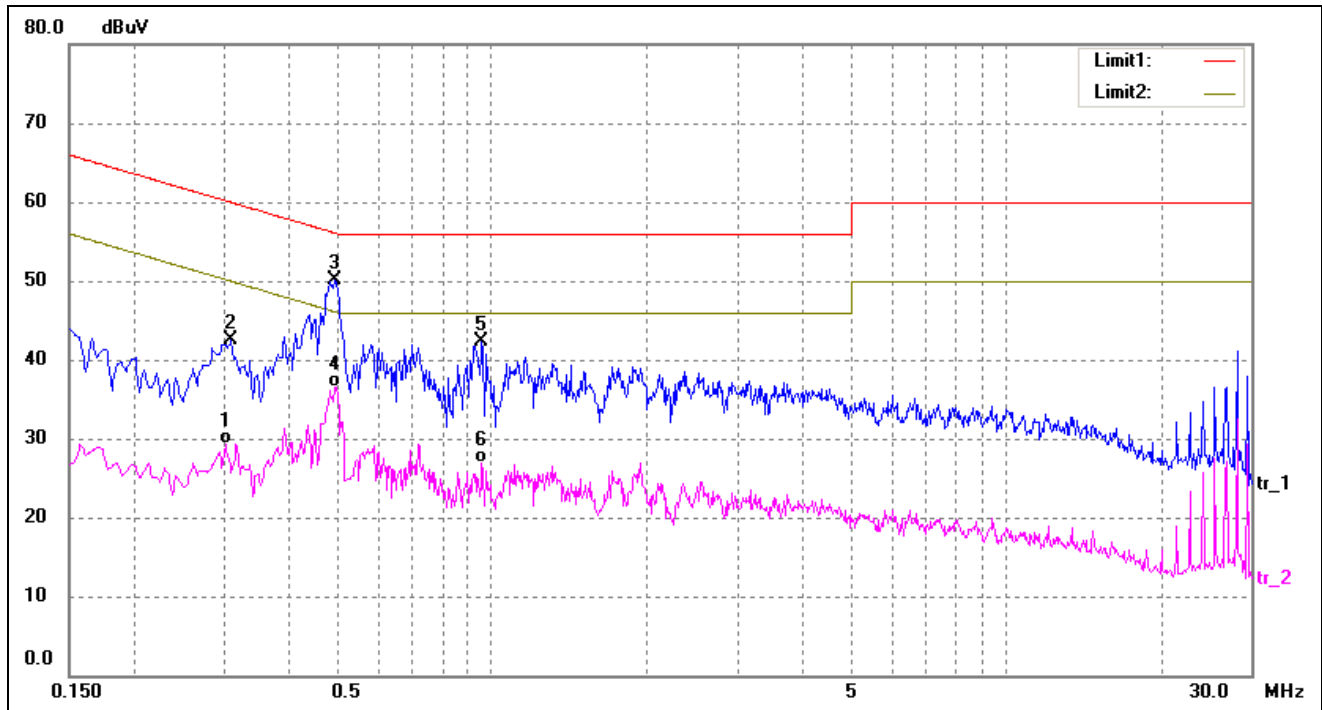
EUT: 4G Smart Phone
 Tested Model: L500
 Operating Condition: TM1
 Comment: AC 120V/60Hz; Adapter DC 5V

Test Specification: Neutral



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.2780	35.48	9.80	45.28	60.88	-15.60	peak
2	0.2780	22.06	9.80	31.86	50.88	-19.02	AVG
3	0.4260	34.67	9.80	44.47	57.33	-12.86	peak
4	0.4420	20.61	9.80	30.41	47.02	-16.61	AVG
5*	0.4980	36.21	9.80	46.01	56.03	-10.02	peak
6	0.5020	22.99	9.80	32.79	46.00	-13.21	AVG

Test Specification: Line

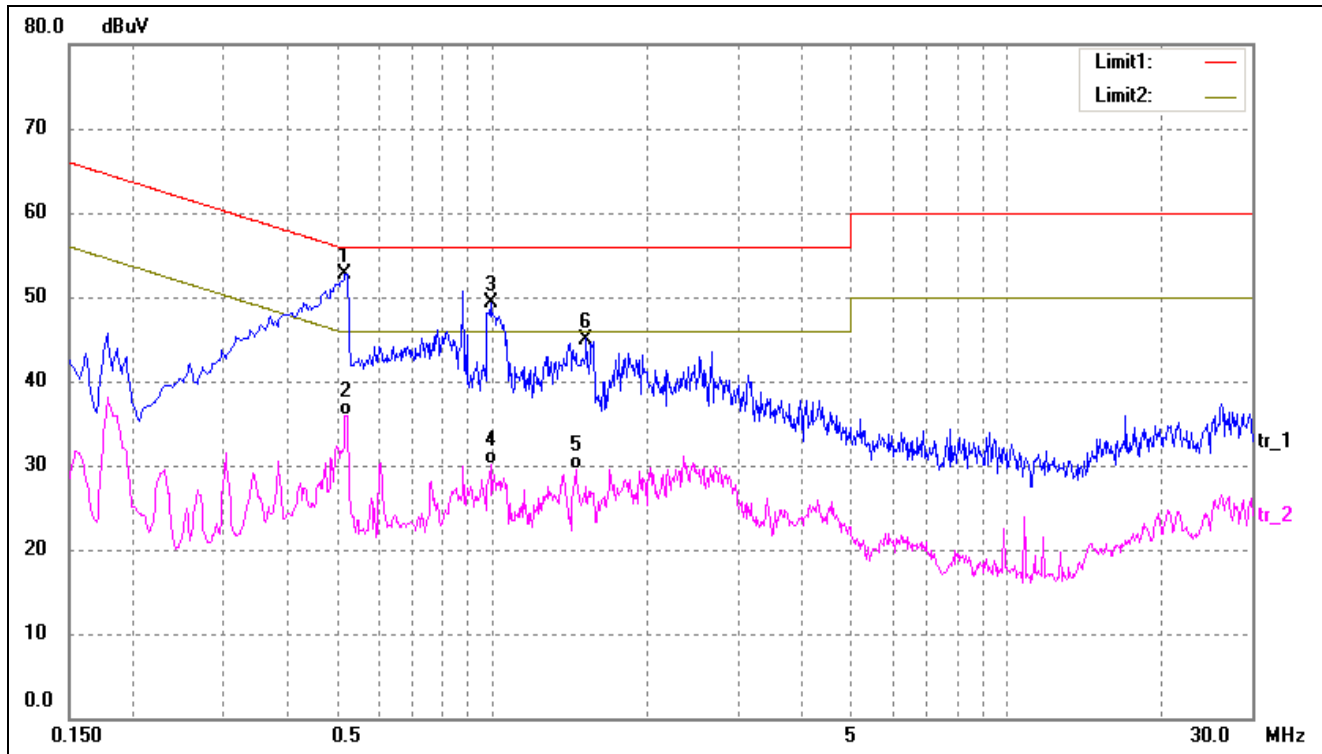


No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.3020	19.58	9.80	29.38	50.19	-20.81	AVG
2	0.3100	32.70	9.80	42.50	59.97	-17.47	peak
3*	0.4940	40.30	9.80	50.10	56.10	-6.00	peak
4	0.4980	26.75	9.80	36.55	46.03	-9.48	AVG
5	0.9580	32.55	9.76	42.31	56.00	-13.69	peak
6	0.9580	17.10	9.76	26.86	46.00	-19.14	AVG

Plot of Conducted Emissions Test Data

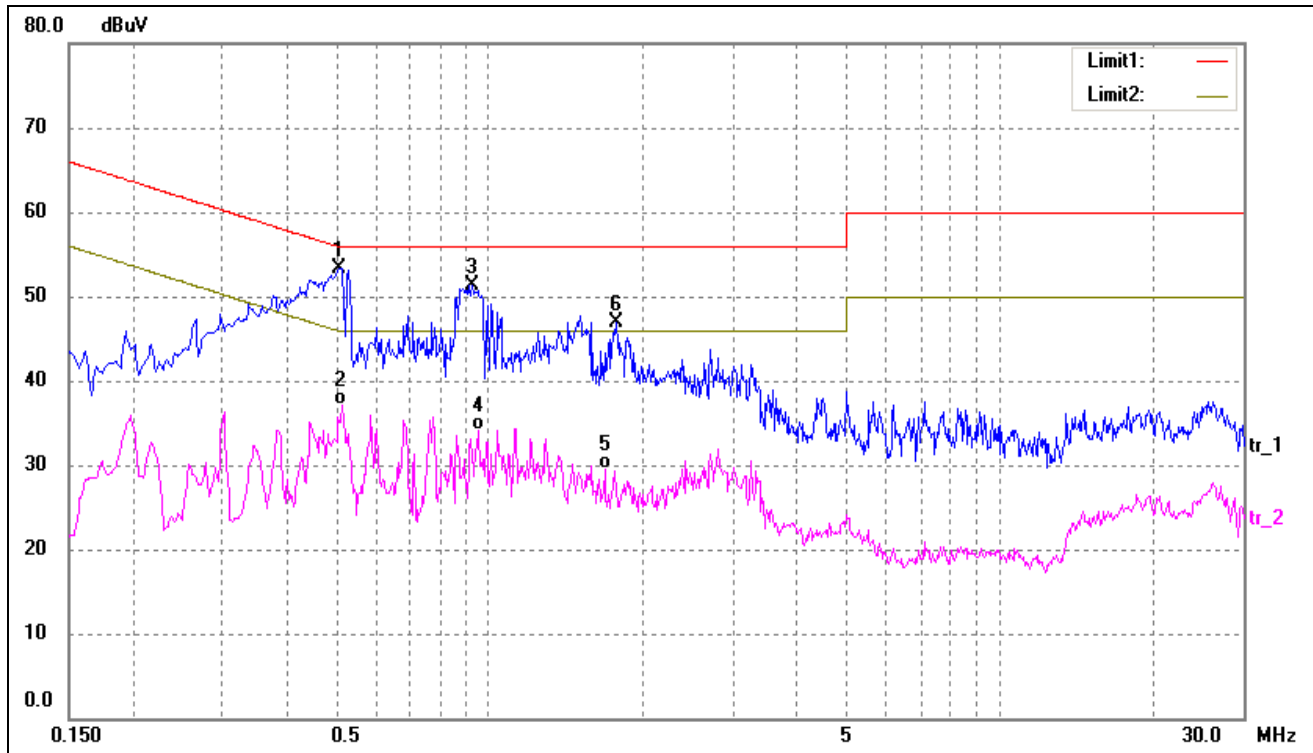
EUT: 4G Smart Phone
Tested Model: L500
Operating Condition: TM2
Comment: AC 120V/60Hz; USB 5V

Test Specification: Neutral



No.	Frequency	Reading	Correct	Result	Limit	Margin	Detector
	(MHz)	(dBuV)	(dB/m)	(dBuV)	(dBuV)	(dB)	
1*	0.5180	46.86	5.80	52.66	56.00	-3.34	peak
2	0.5220	30.06	5.80	35.86	46.00	-10.14	AVG
3	0.9900	43.45	5.76	49.21	56.00	-6.79	peak
4	0.9900	24.34	5.76	30.10	46.00	-15.90	AVG
5	1.4500	23.80	5.75	29.55	46.00	-16.45	AVG
6	1.5260	39.25	5.75	45.00	56.00	-11.00	peak

Test Specification: Line



No.	Frequency	Reading	Correct	Result	Limit	Margin	Detector
	(MHz)	(dBuV)	(dB/m)	(dBuV)	(dBuV)	(dB)	
1*	0.5100	47.48	5.80	53.28	56.00	-2.72	peak
2	0.5140	31.40	5.80	37.20	46.00	-8.80	AVG
3	0.9260	45.45	5.77	51.22	56.00	-4.78	peak
4	0.9500	28.38	5.76	34.14	46.00	-11.86	AVG
5	1.6860	23.69	5.74	29.43	46.00	-16.57	AVG
6	1.7740	41.17	5.74	46.91	56.00	-9.09	peak

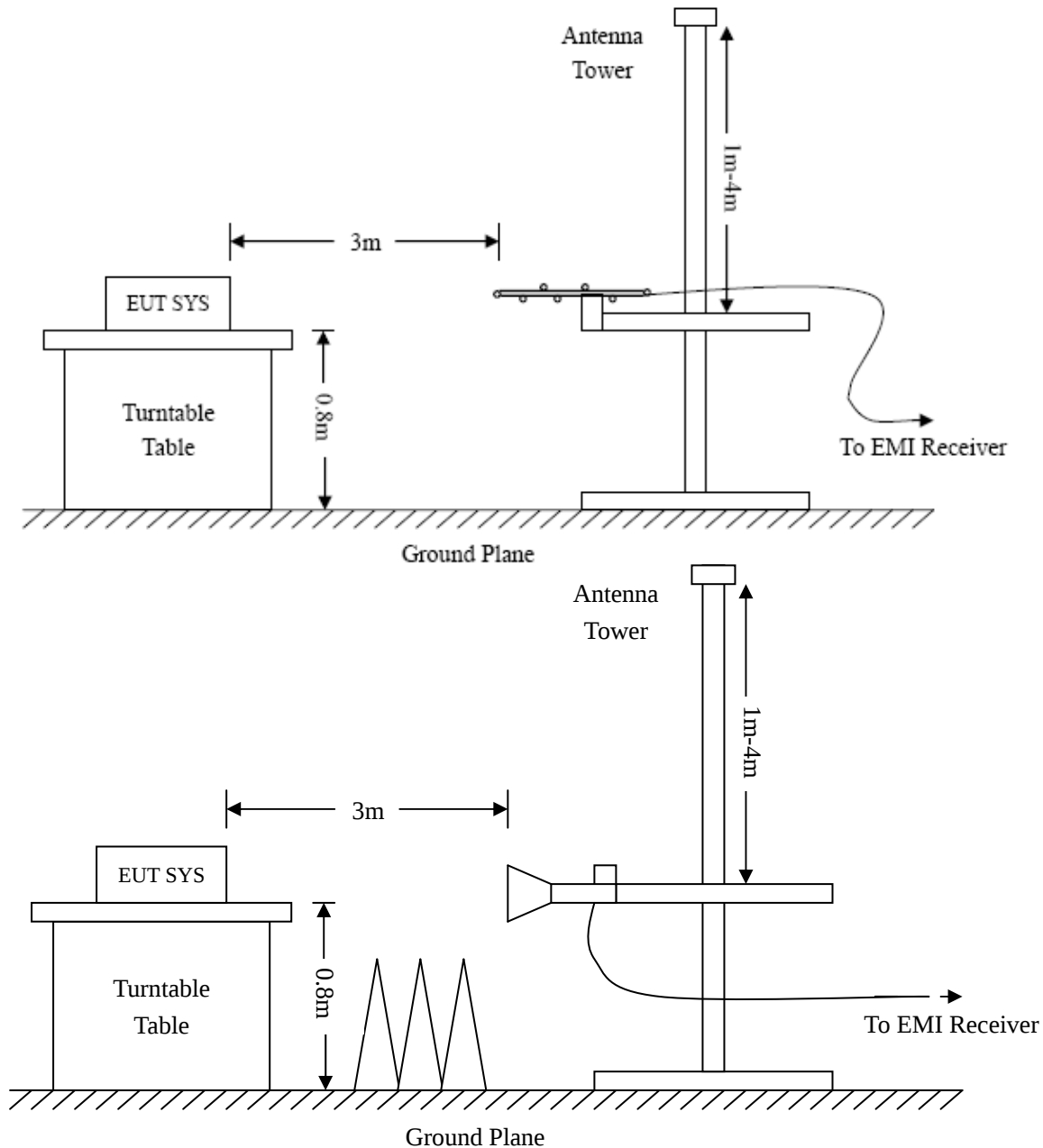
4. Radiated Emissions

4.1 Test Procedure

The setup of EUT is according with per ANSI C63.4-2014 measurement procedure. The specification used was with the FCC Part 15.109 Limit.

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

The spacing between the peripherals was 10 cm.



4.2 Test Receiver Setup

Frequency :9kHz-30MHz

RBW=10KHz,

VBW =30KHz

Sweep time= Auto

Trace = max hold

Detector function = peak

Frequency :30MHz-1GHz

RBW=120KHz,

VBW=300KHz

Sweep time= Auto

Trace = max hold

Detector function = peak, QP

Frequency :Above 1GHz

RBW=1MHz,

VBW=3MHz(Peak), 10Hz(AV)

Sweep time= Auto

Trace = max hold

Detector function = peak, AV

4.3 Corrected Amplitude & Margin Calculation

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

$$\text{Corr. Ampl.} = \text{Indicated Reading} - \text{Corr. Factor}$$

The “**Margin**” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -6dB μ V means the emission is 6dB μ V below the maximum limit for a Class B device. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Corr. Ampl.} - \text{FCC Part 15.109(a) Limit}$$

4.4 Environmental Conditions

Temperature:	23 °C
Relative Humidity:	55 %
ATM Pressure:	1011 mbar

4.5 Summary of Test Results/Plots

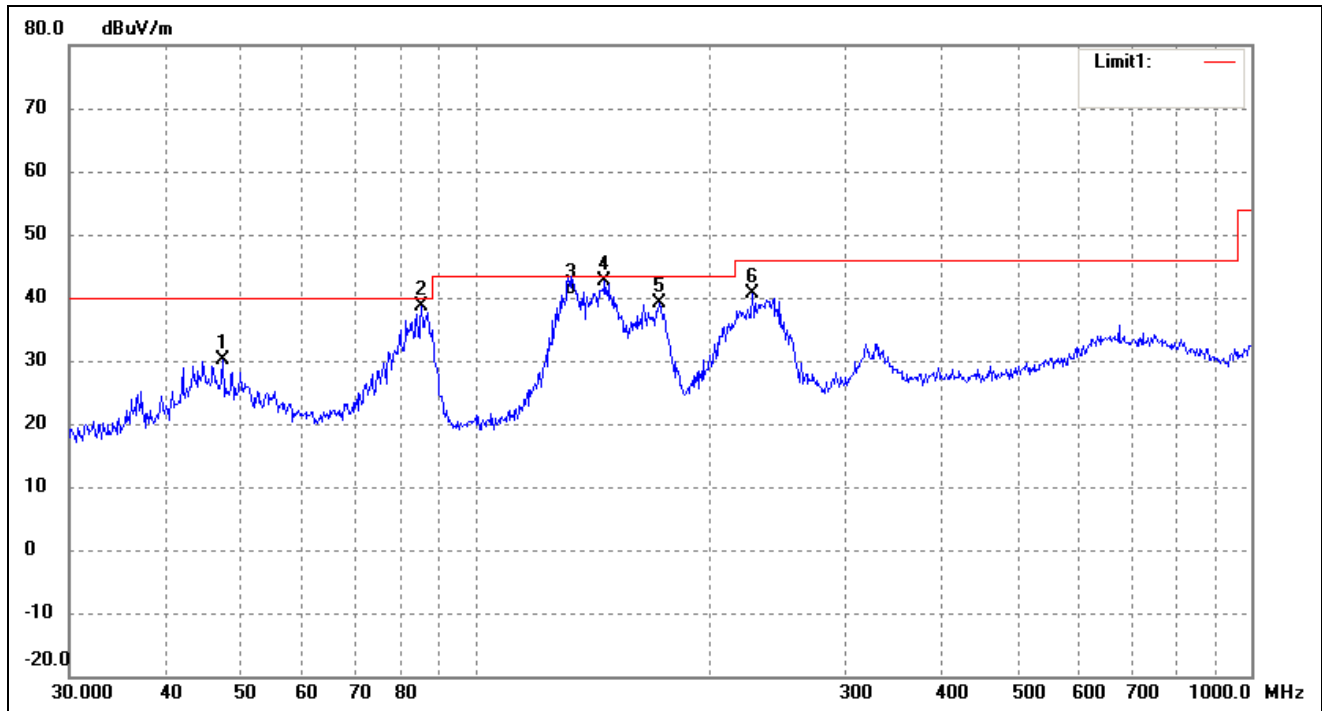
According to the data, the EUT complied with the FCC Part 15.109(a) rule, and had the worst margin of:

-0.93 dB at 146.8877 MHz in the Horizontal polarization, TM1 Mode, 30MHz to 7.5 GHz, 3Meters

Plot of Radiated Emissions Test Data

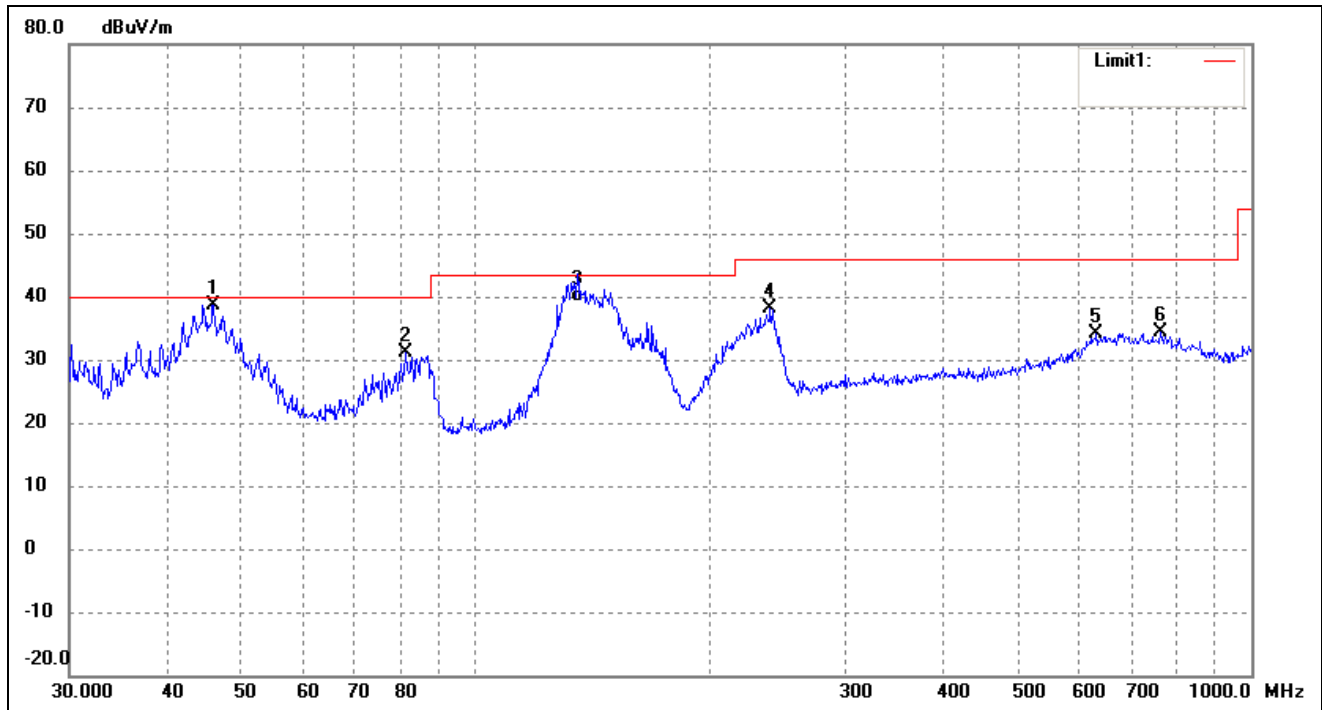
EUT: 4G Smart Phone
Tested Model: L500
Operating Condition: TM1
Comment: AV120V/60Hz; Adapter DC 5V

Test Specification: Horizontal



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	47.3255	25.12	4.96	30.08	40.00	-9.92	0	100	peak
2	85.2980	36.05	2.61	38.66	40.00	-1.34	0	100	QP
3	132.6850	36.59	3.76	40.35	43.50	-3.15	0	100	peak
4	146.8877	39.69	2.88	42.57	43.50	-0.93	0	100	QP
5	172.5988	36.77	2.46	39.23	43.50	-4.27	0	100	peak
6	227.6906	32.44	8.14	40.58	46.00	-5.42	0	100	peak

Test Specification: Vertical

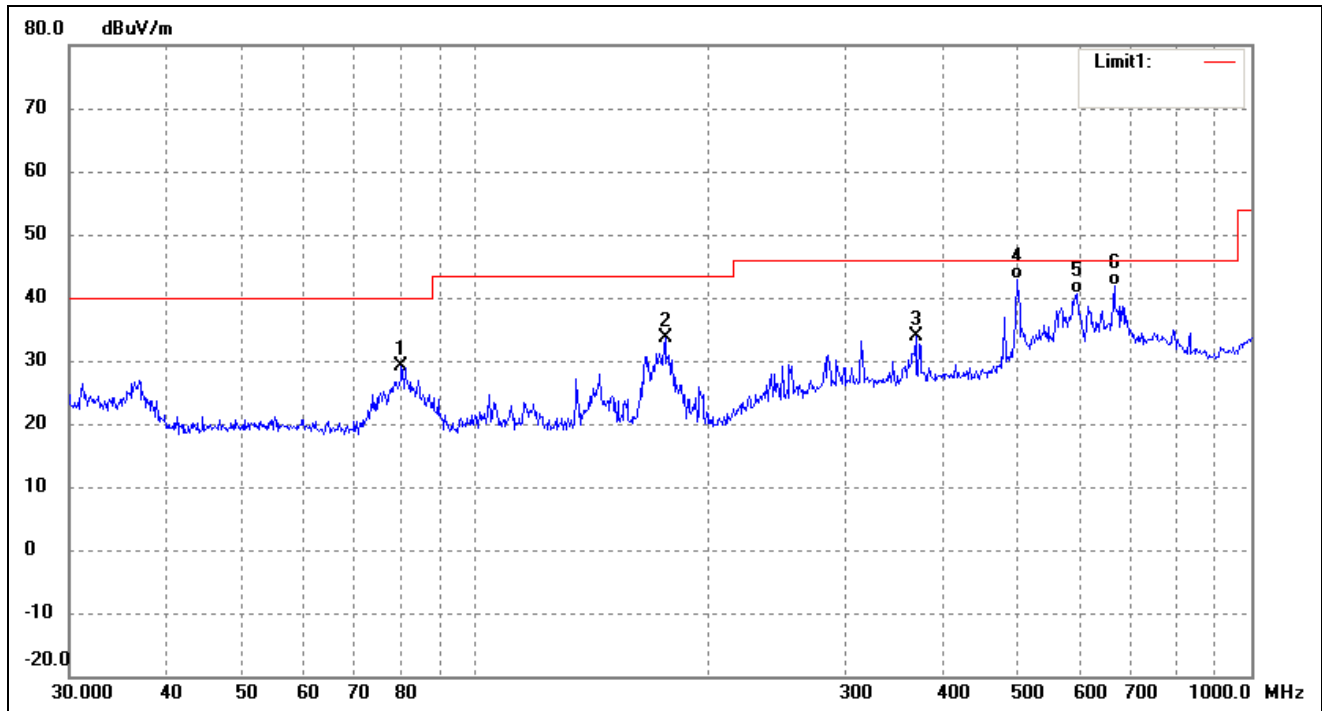


No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	46.0164	33.73	4.95	38.68	40.00	-1.32	0	100	peak
2	81.4970	29.18	1.98	31.16	40.00	-8.84	0	100	peak
3	135.5062	35.50	3.52	39.02	43.50	-4.48	0	100	QP
4	239.9874	29.27	8.93	38.20	46.00	-7.80	0	100	peak
5	631.6884	16.43	17.78	34.21	46.00	-11.79	0	100	peak
6	763.3757	16.50	17.95	34.45	46.00	-11.55	0	100	peak

Plot of Radiated Emissions Test Data

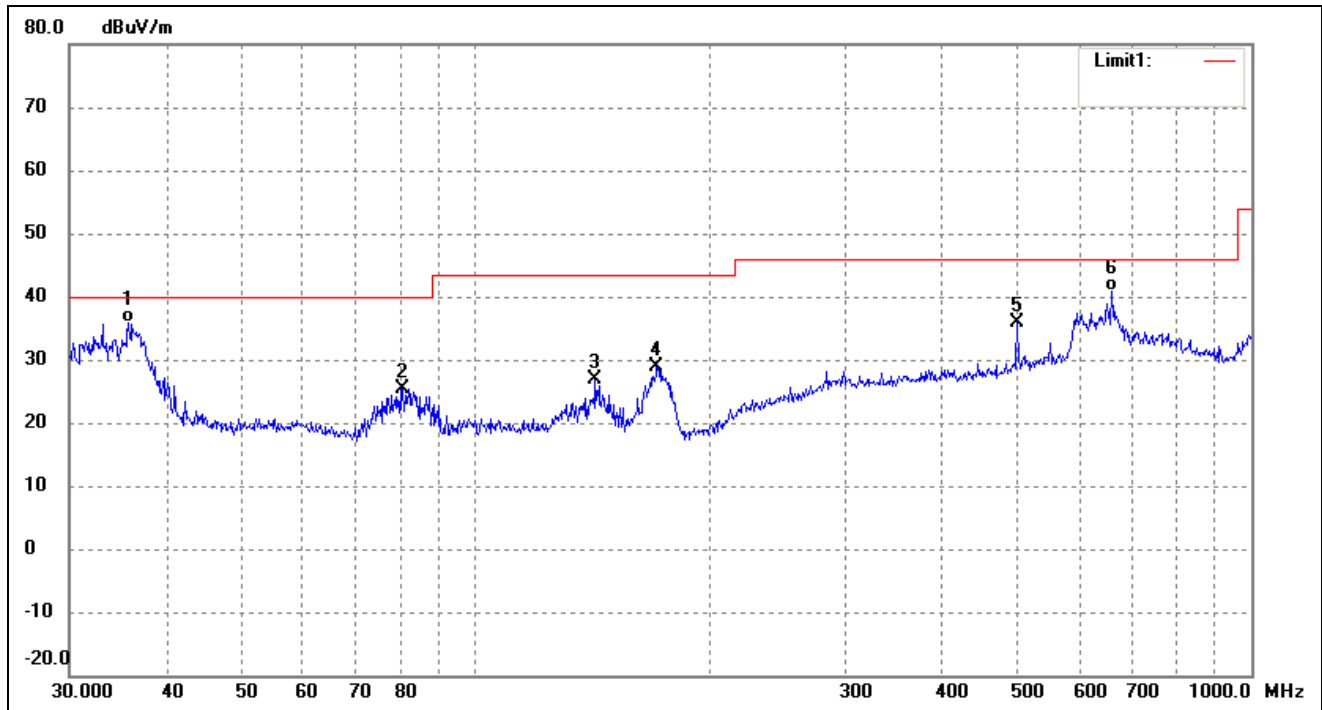
EUT: 4G Smart Phone
Tested Model: L500
Operating Condition: TM2
Comment: AC 120V/60Hz; USB 5V

Test Specification: Horizontal



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	80.3619	27.36	1.78	29.14	40.00	-10.86	0	100	peak
2	175.6516	31.23	2.46	33.69	43.50	-9.81	0	100	peak
3	369.4047	22.04	11.86	33.90	46.00	-12.10	0	100	peak
4	499.4247	29.55	13.31	42.86	46.00	-3.14	0	100	QP
5	597.2234	22.32	18.24	40.56	46.00	-5.44	0	100	QP
6	665.8035	23.99	17.90	41.89	46.00	-4.11	0	100	QP

Test Specification: Vertical

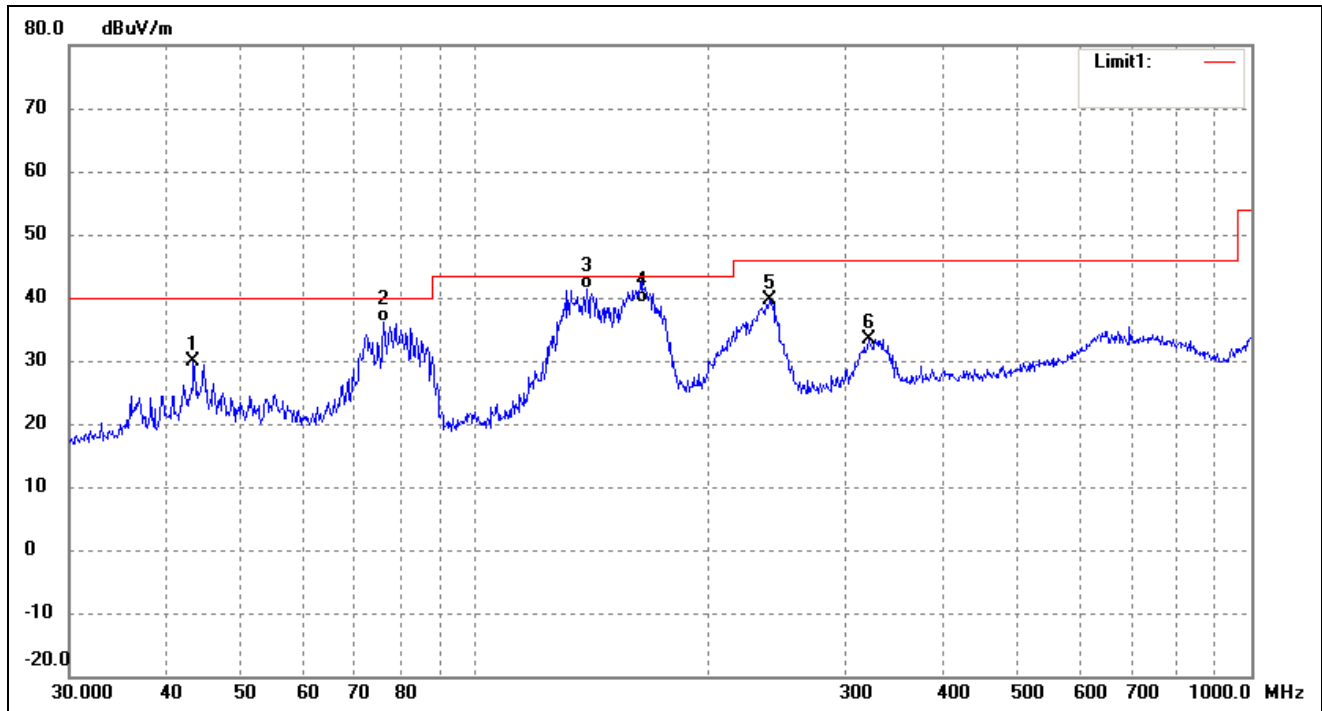


No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	35.7491	31.51	4.29	35.80	40.00	-4.20	0	100	QP
2	80.6442	23.58	1.82	25.40	40.00	-14.60	0	100	peak
3	142.8244	23.78	3.04	26.82	43.50	-16.68	0	100	peak
4	171.3926	26.46	2.46	28.92	43.50	-14.58	0	100	peak
5	499.4247	22.49	13.31	35.80	46.00	-10.20	0	100	peak
6	661.1505	23.34	17.64	40.98	46.00	-5.02	0	100	QP

Plot of Radiated Emissions Test Data

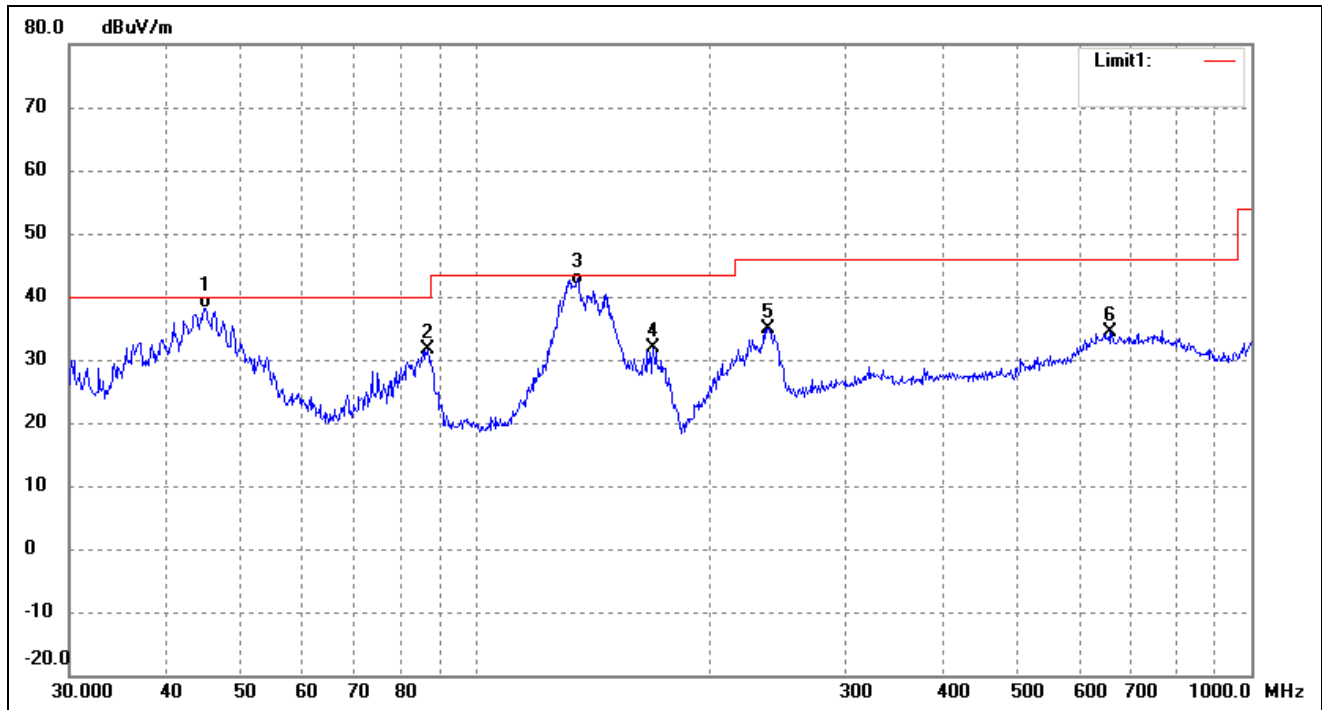
EUT: 4G Smart Phone
Tested Model: L500
Operating Condition: TM3
Comment: AV 120V/60Hz; Adapter DC 5V

Test Specification: Horizontal



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	43.3534	25.00	4.94	29.94	40.00	-10.06	0	100	peak
2	76.2442	33.93	2.15	36.08	40.00	-3.92	0	100	QP
3	139.3613	38.05	3.21	41.26	43.50	-2.24	0	100	QP
4	163.7550	36.60	2.44	39.04	43.50	-4.46	0	100	QP
5	239.1473	30.72	8.87	39.59	46.00	-6.41	0	100	peak
6	321.0608	21.58	11.92	33.50	46.00	-12.50	0	100	peak

Test Specification: Vertical



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	44.9006	33.11	4.95	38.06	40.00	-1.94	0	100	QP
2	86.8068	28.66	2.86	31.52	40.00	-8.48	0	100	peak
3	135.5062	38.30	3.52	41.82	43.50	-1.68	0	100	QP
4	169.5990	29.45	2.46	31.91	43.50	-11.59	0	100	peak
5	238.3102	26.01	8.83	34.84	46.00	-11.16	0	100	peak
6	656.5300	16.69	17.67	34.36	46.00	-11.64	0	100	peak

Note: Testing is carried out with frequency rang 30MHz to the 7.5GHz, which above 1GHz is close to the noise base even antenna close up to 1meter distance according the measurement of ANSI C63.4.

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