

FCC Part 15B

Measurement and Test Report

For

Hyundai Corporation

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

FCC ID: RQQHLT-FSL500C

Test Rule(s):	<u>FCC Part 15 Subpart B</u>
Product Description:	<u>4G Smart Phone</u>
Tested Model:	<u>L500U</u>
Report No.:	<u>STR17048424I-6</u>
Tested Date:	<u>2017-04-06 to 2017-04-20</u>
Issued Date:	<u>2017-04-21</u>
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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: Guizhou Fortuneship Technology Co., Ltd.
Address of manufacturer: (No. 4 Plant, High-tech Industrial Park, Xinpu Economic Development Zone) Jingkai Road, Xinpu Jingkai District, Xinpu New District, Zunyi City, Guizhou Province, P. R. China

General Description of EUT	
Product Name:	4G Smart Phone
Trade Name:	/
Model No.:	L500U
Adding Model(s):	/
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:	UAP-L05Y07-00A00 Input:100V-240V, 50/60Hz; Output:5V,0.7A
Lowest Internal Frequency:	32.768kHz
Highest Internal Frequency:	1.1GHz
Classification of ITE:	Class B

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
TM2	Downloading	Connect to PC
TM3	Charging + Camera	With Adapter
TM4	FM	/

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-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

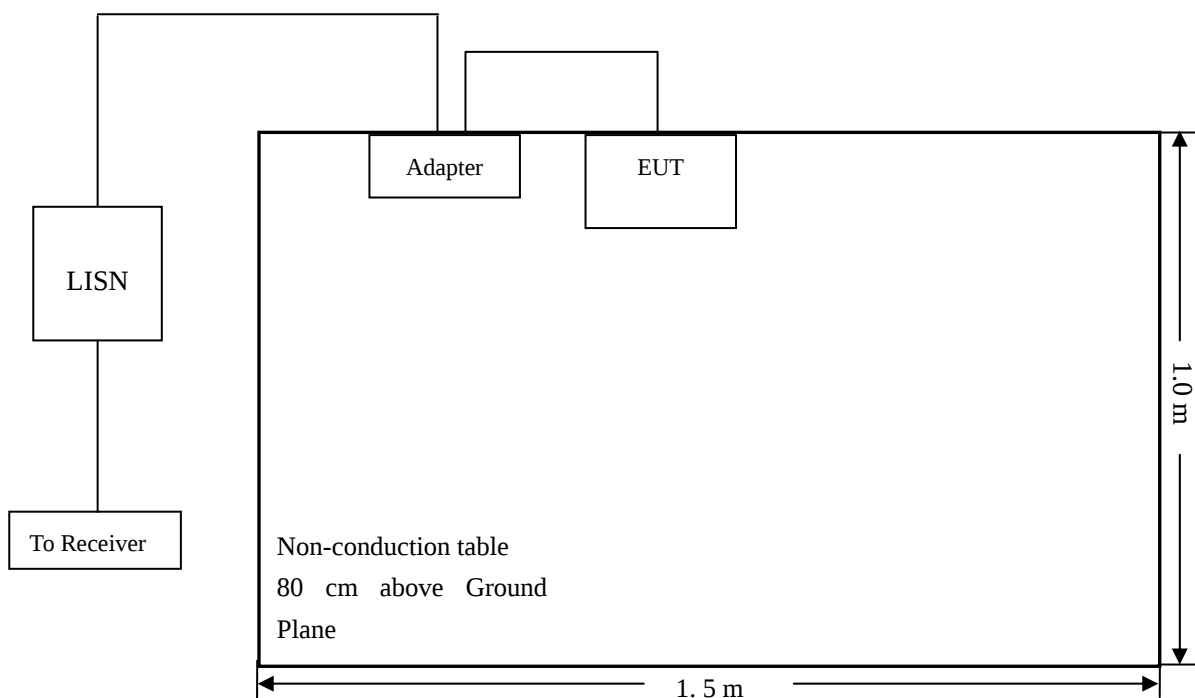
N/A: not applicable

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:

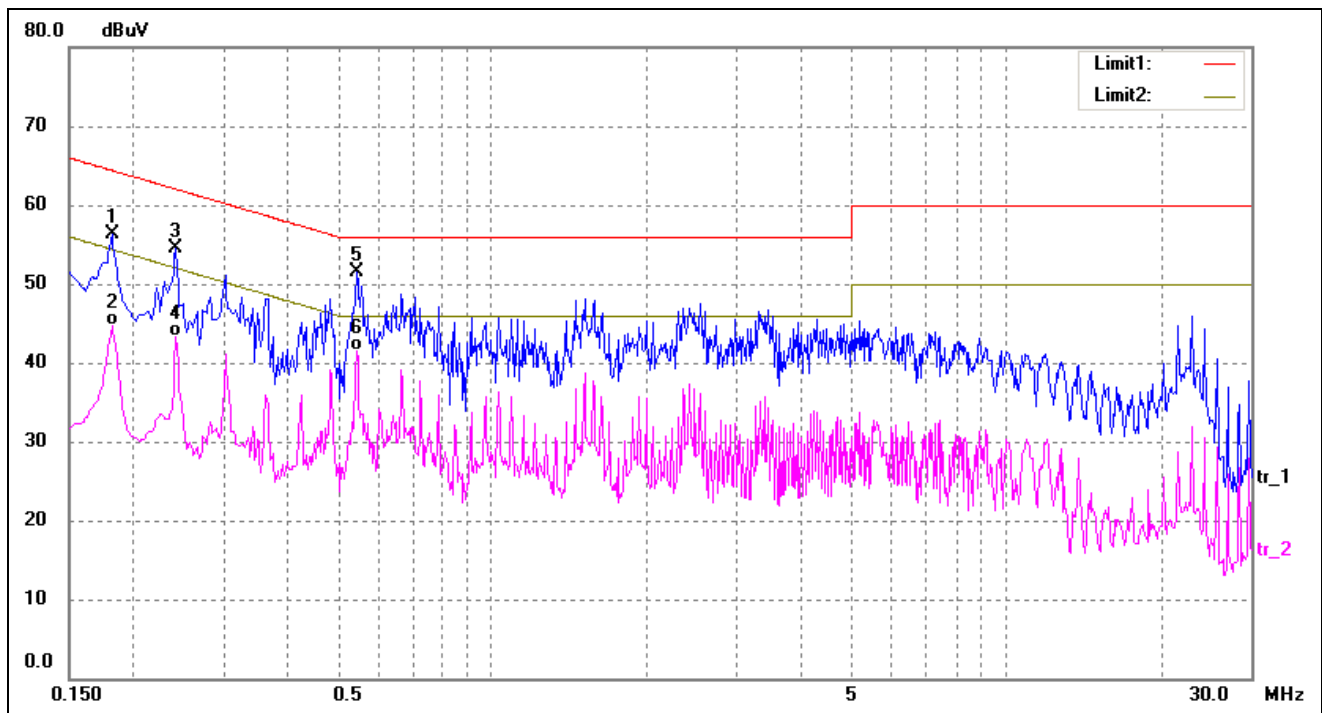
-3.25 dB at 0.5300 MHz in the **Line, QP** detector at TM1, 0.15-30MHz

3.5 Conducted Emissions Test Data

Plot of Conducted Emissions Test Data

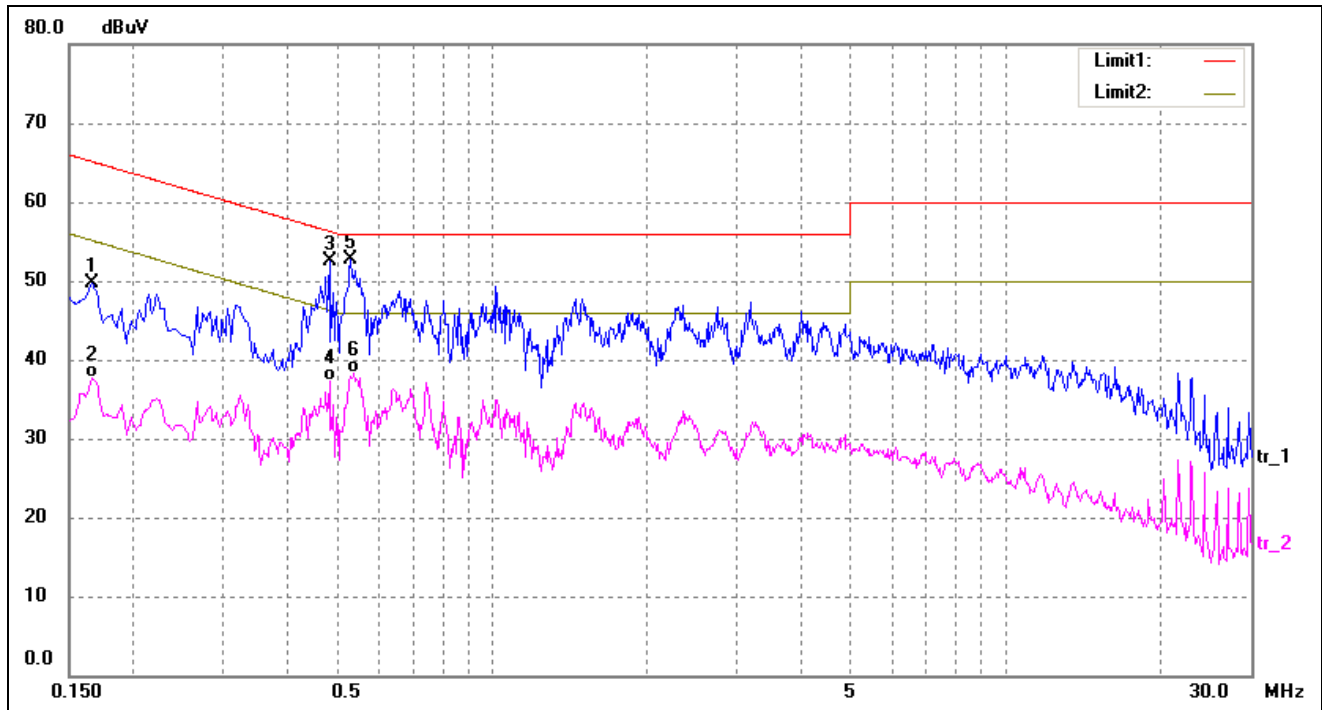
EUT: 4G Smart Phone
 Tested Model: L500U
 Operating Condition: TM1
 Comment: AC 120V/60Hz; Adapter DC 5V

Test Specification: Neutral



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.1820	46.44	9.82	56.26	64.39	-8.13	QP
2	0.1820	34.80	9.82	44.62	54.39	-9.77	AVG
3	0.2420	44.75	9.80	54.55	62.03	-7.48	QP
4	0.2420	33.58	9.80	43.38	52.03	-8.65	AVG
5*	0.5460	41.64	9.80	51.44	56.00	-4.56	QP
6	0.5460	31.64	9.80	41.44	46.00	-4.56	AVG

Test Specification: Line

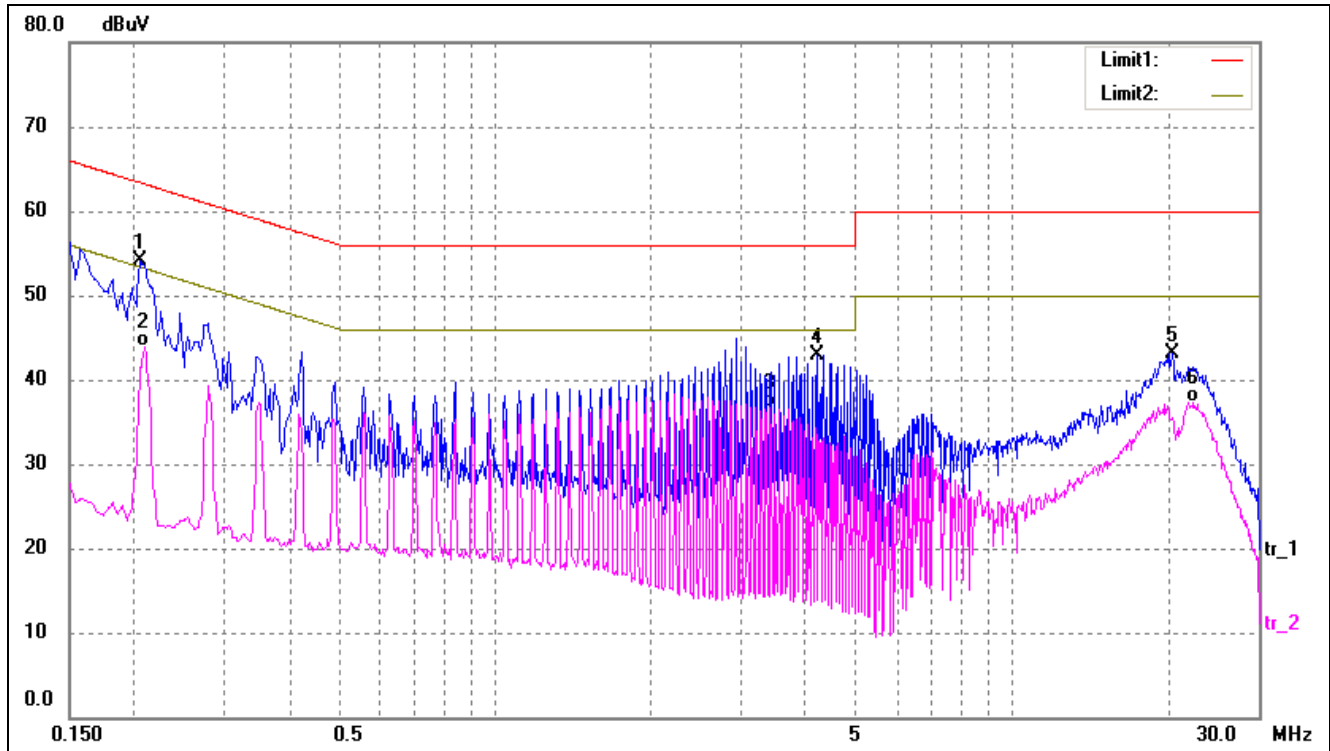


No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.1660	39.88	9.83	49.71	65.16	-15.45	QP
2	0.1660	27.80	9.83	37.63	55.16	-17.53	AVG
3	0.4820	42.61	9.80	52.41	56.30	-3.89	QP
4	0.4820	27.49	9.80	37.29	46.30	-9.01	AVG
5*	0.5300	42.95	9.80	52.75	56.00	-3.25	QP
6	0.5380	28.45	9.80	38.25	46.00	-7.75	AVG

Plot of Conducted Emissions Test Data

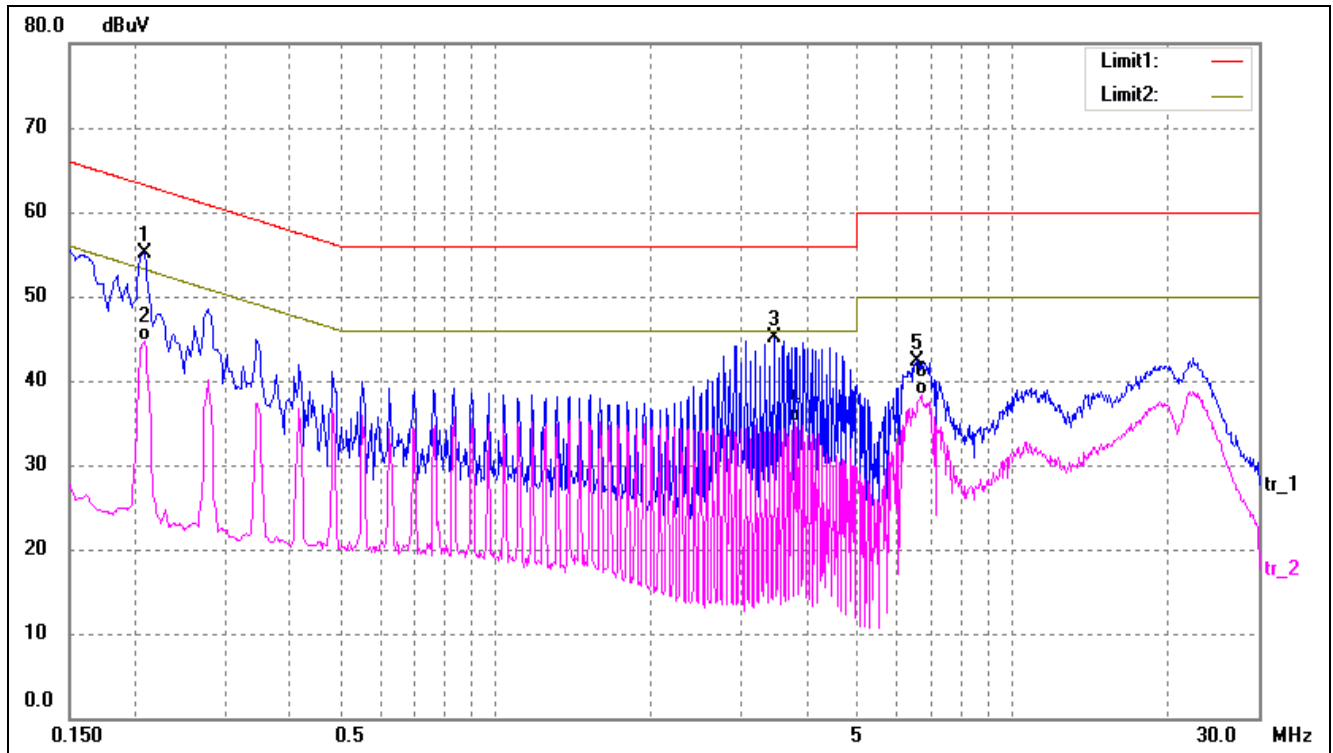
EUT: 4G Smart Phone
Tested Model: L500U
Operating Condition: TM2
Comment: AC 120V/60Hz; USB 5V

Test Specification: Neutral



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.2060	44.27	9.80	54.07	63.37	-9.30	peak
2*	0.2100	34.18	9.80	43.98	53.21	-9.23	AVG
3	3.4140	26.91	9.70	36.61	46.00	-9.39	AVG
4	4.1820	33.20	9.68	42.88	56.00	-13.12	peak
5	20.4100	33.43	9.68	43.11	60.00	-16.89	peak
6	22.4300	27.69	9.68	37.37	50.00	-12.63	AVG

Test Specification: Line



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1*	0.2100	45.32	9.80	55.12	63.21	-8.09	peak
2	0.2100	34.94	9.80	44.74	53.21	-8.47	AVG
3	3.4700	35.50	9.70	45.20	56.00	-10.80	peak
4	3.8140	25.38	9.69	35.07	46.00	-10.93	AVG
5	6.5340	32.78	9.62	42.40	60.00	-17.60	peak
6	6.6660	28.67	9.61	38.28	50.00	-11.72	AVG

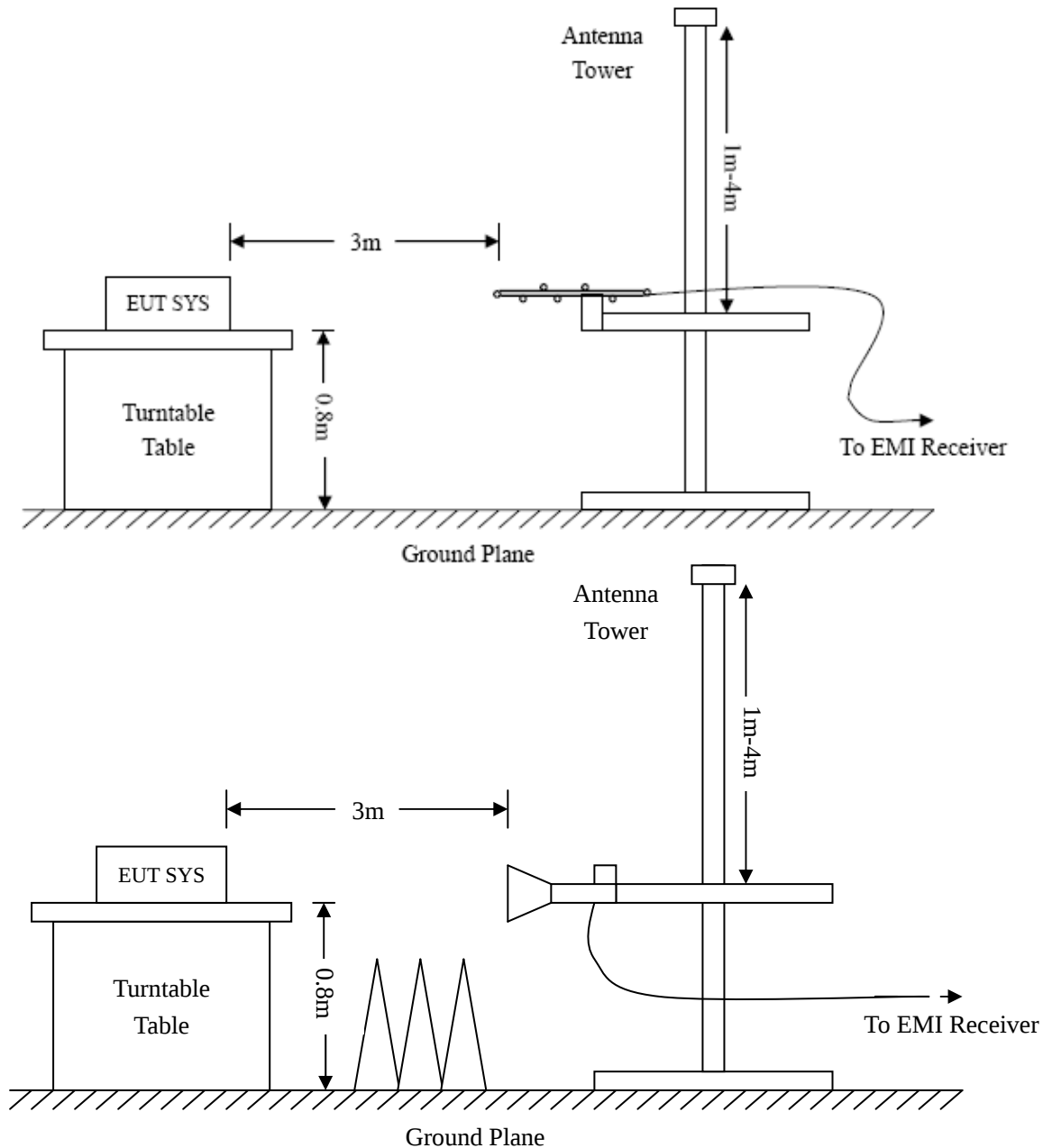
4. Radiated Emissions

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

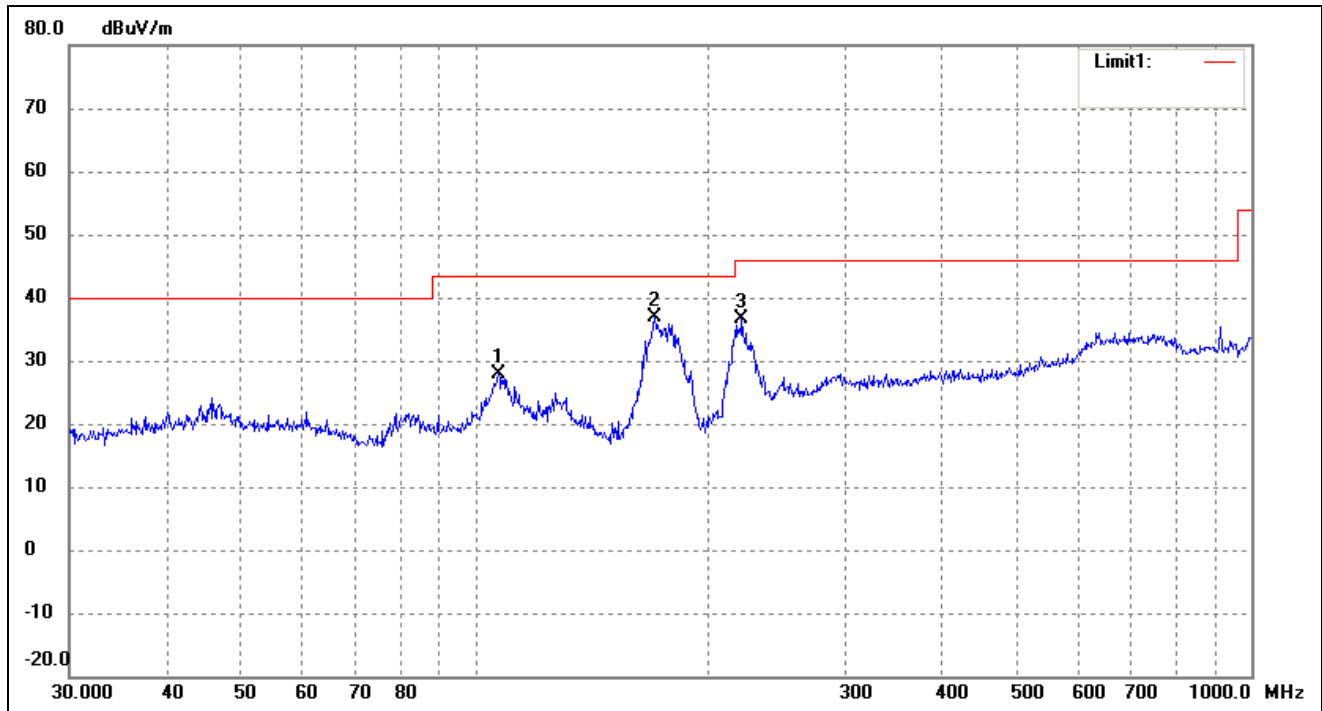
According to the data, the EUT complied with the FCC Part 15.109(a) rule, and had the worst margin of:

-1.55 dB at 143.8295 MHz in the Horizontal polarization, TM2 Mode, 30MHz to 12.75 GHz, 3Meters

Plot of Radiated Emissions Test Data

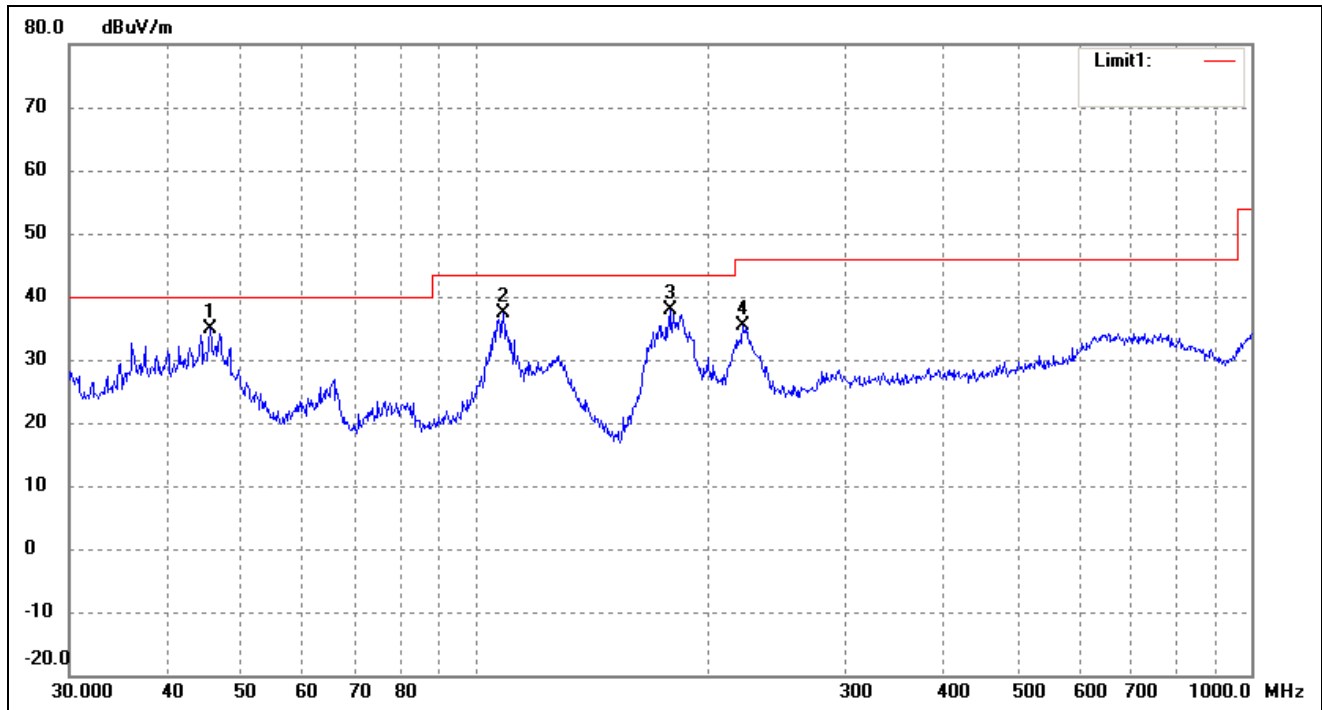
EUT: 4G Smart Phone
Tested Model: L500U
Operating Condition: TM1
Comment: AC 120V/60Hz; Adapter DC 5V

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	107.1337	22.98	4.88	27.86	43.50	-15.64	175	100	QP
2	170.1948	34.50	2.46	36.96	43.50	-6.54	183	100	QP
3	220.6171	28.80	7.71	36.51	46.00	-9.49	55	100	QP

Test Specification: Vertical

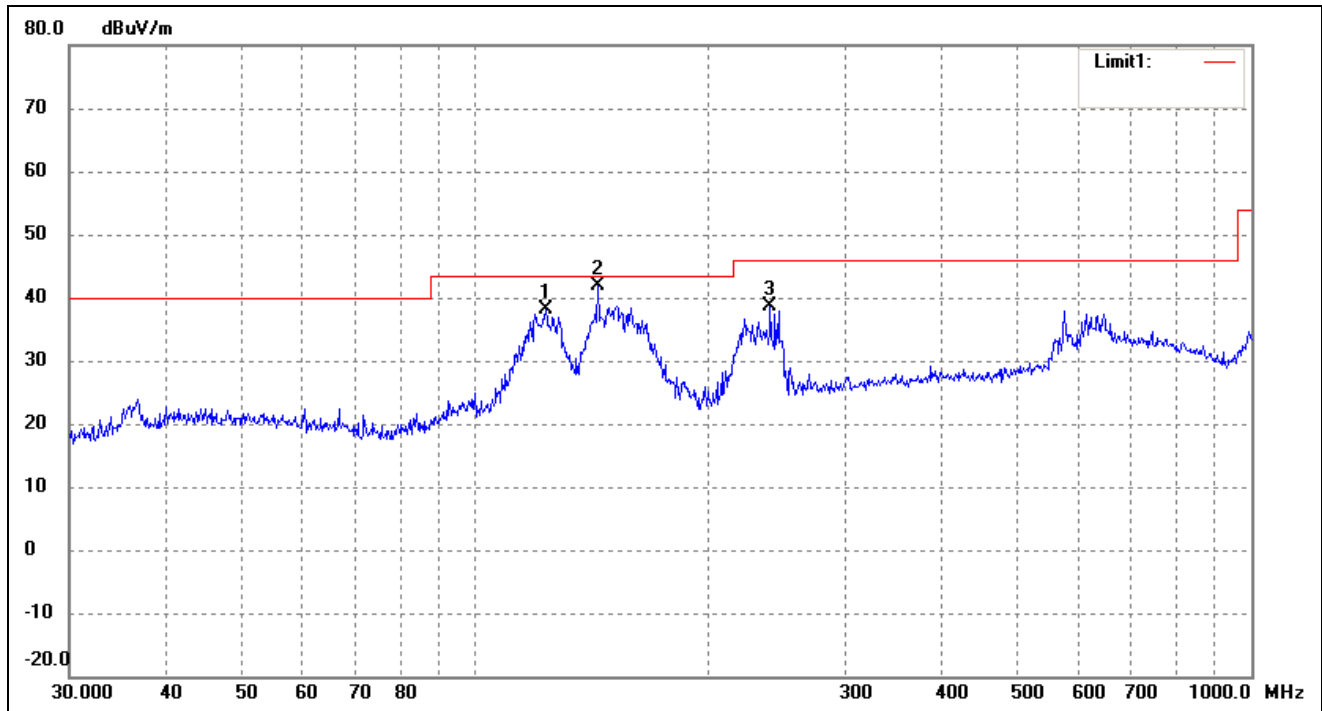


No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	45.5348	29.81	4.95	34.76	40.00	-5.24	177	100	QP
2	108.6470	32.43	4.87	37.30	43.50	-6.20	128	100	QP
3	178.7584	35.37	2.45	37.82	43.50	-5.68	78	100	QP
4	221.3921	27.62	7.76	35.38	46.00	-10.62	159	100	QP

Plot of Radiated Emissions Test Data

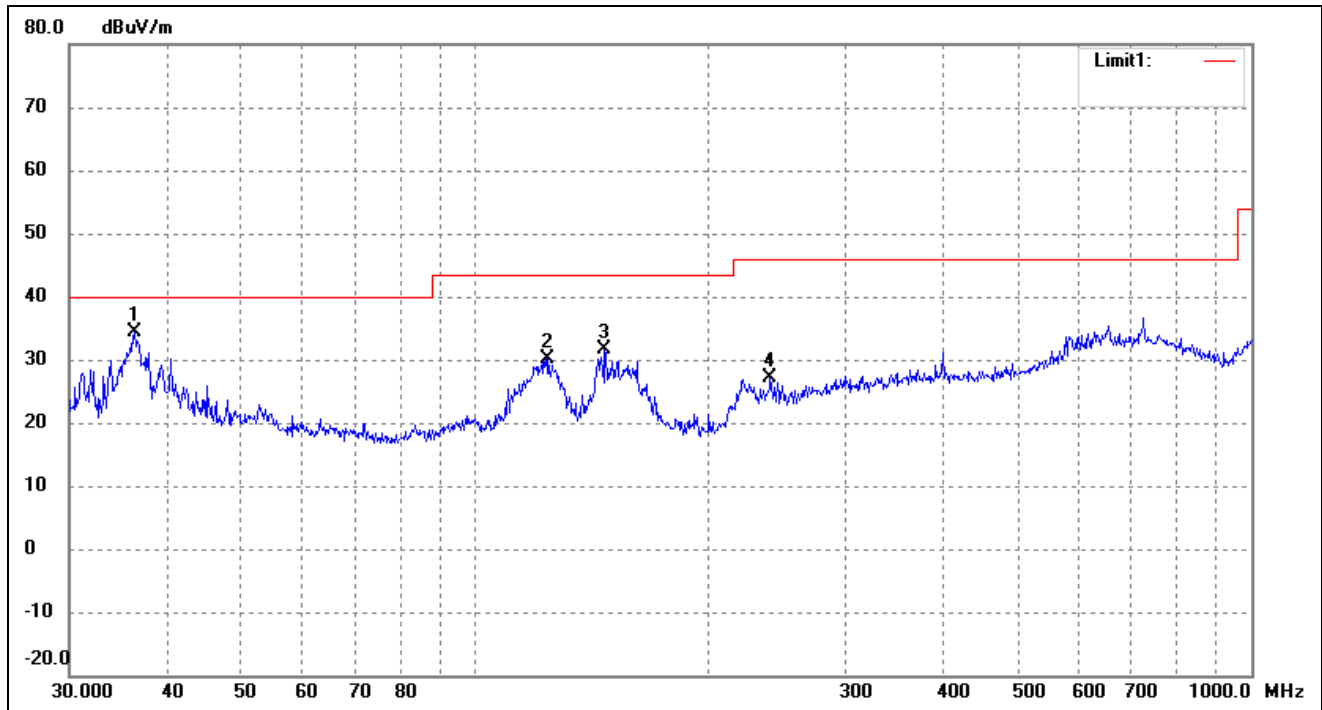
EUT: 4G Smart Phone
Tested Model: L500U
Operating Condition: TM2
Comment: AC 120V/60Hz, USB DC 5V

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	123.2655	33.51	4.55	38.06	43.50	-5.44	63	100	QP
2	143.8295	38.94	3.01	41.95	43.50	-1.55	90	100	QP
3	239.9874	29.77	8.93	38.70	46.00	-7.30	74	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	36.3814	29.88	4.40	34.28	40.00	-5.72	170	100	QP
2	124.1330	25.69	4.48	30.17	43.50	-13.33	108	100	QP
3	146.8877	28.85	2.88	31.73	43.50	-11.77	97	100	QP
4	239.9874	18.21	8.93	27.14	46.00	-18.86	128	100	QP

Plot of Radiated Emissions Test Data

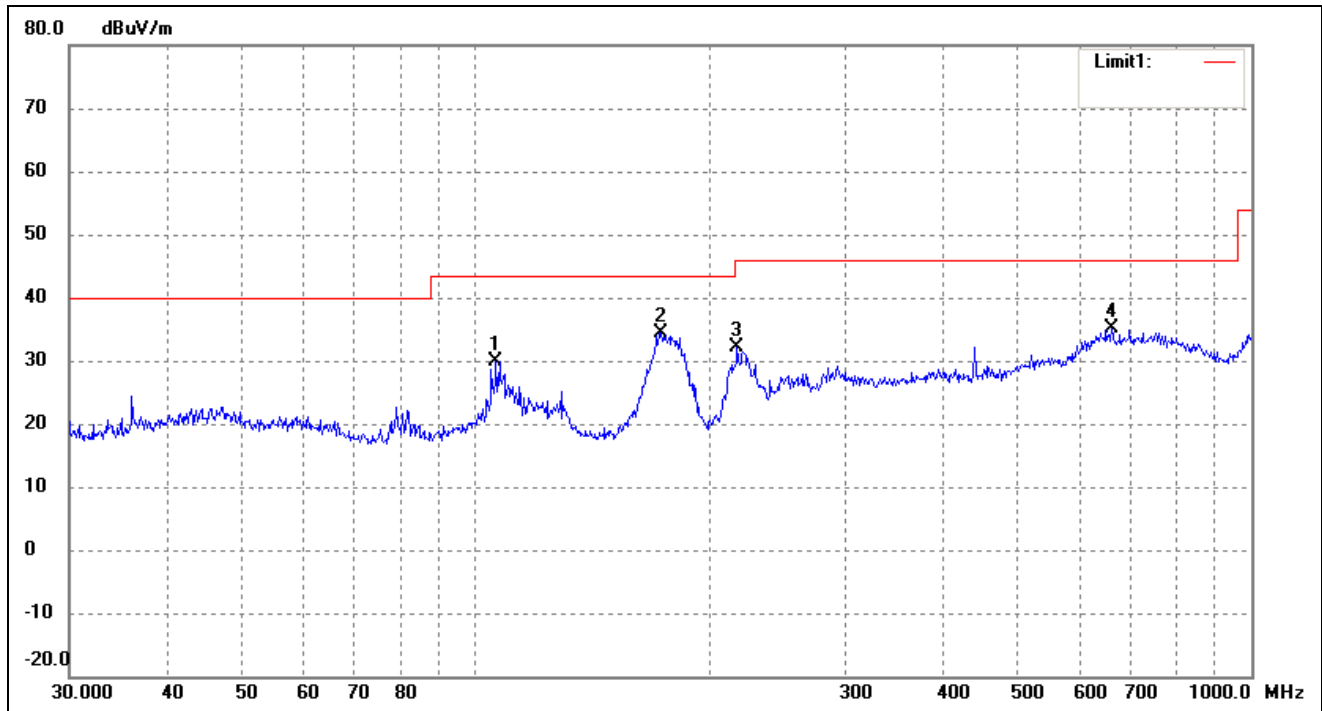
EUT: 4G Smart Phone

Tested Model: L500U

Operating Condition: TM3

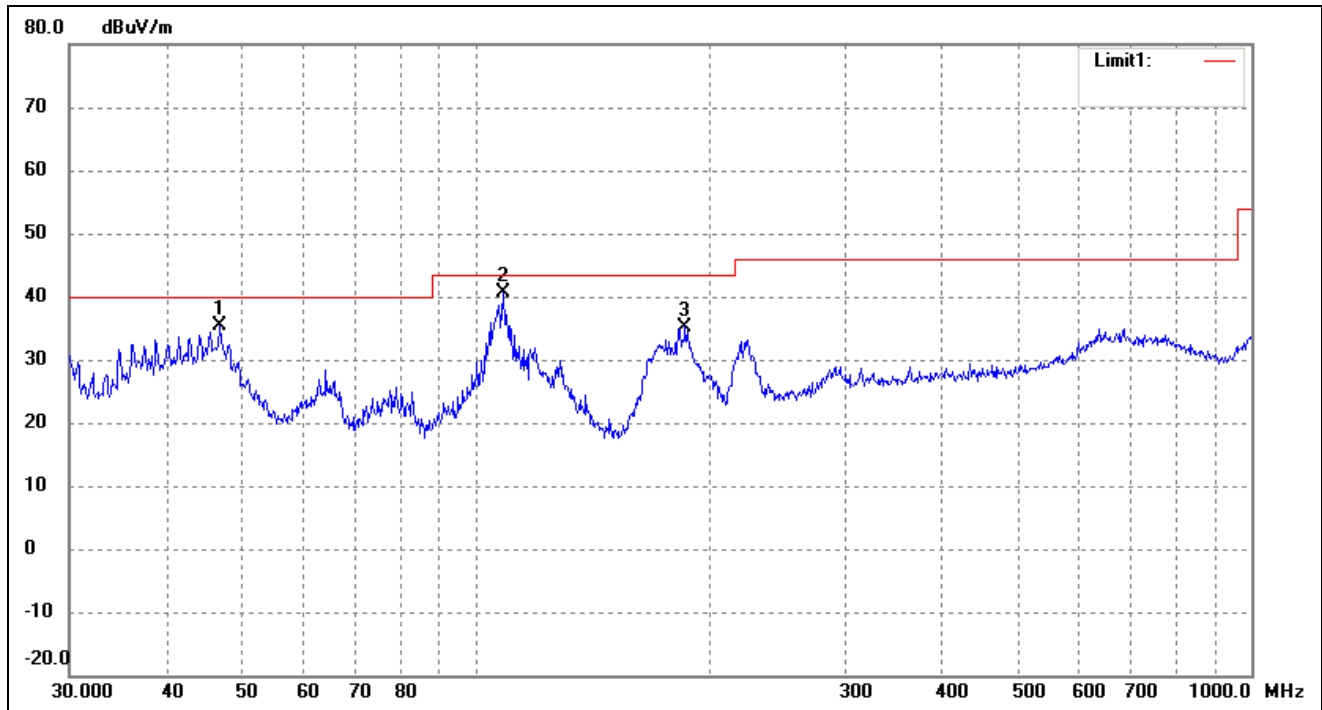
Comment: DC 3.7V

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	106.3850	25.00	4.89	29.89	43.50	-13.61	135	100	QP
2	173.8135	31.98	2.46	34.44	43.50	-9.06	315	100	QP
3	217.5443	24.90	7.15	32.05	46.00	-13.95	62	100	QP
4	661.1505	17.60	17.64	35.24	46.00	-10.76	268	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	46.8303	30.43	4.96	35.39	40.00	-4.61	175	100	QP
2	108.6470	35.85	4.87	40.72	43.50	-2.78	268	100	QP
3	186.4409	32.52	2.73	35.25	43.50	-8.25	103	101	QP

Plot of Radiated Emissions Test Data

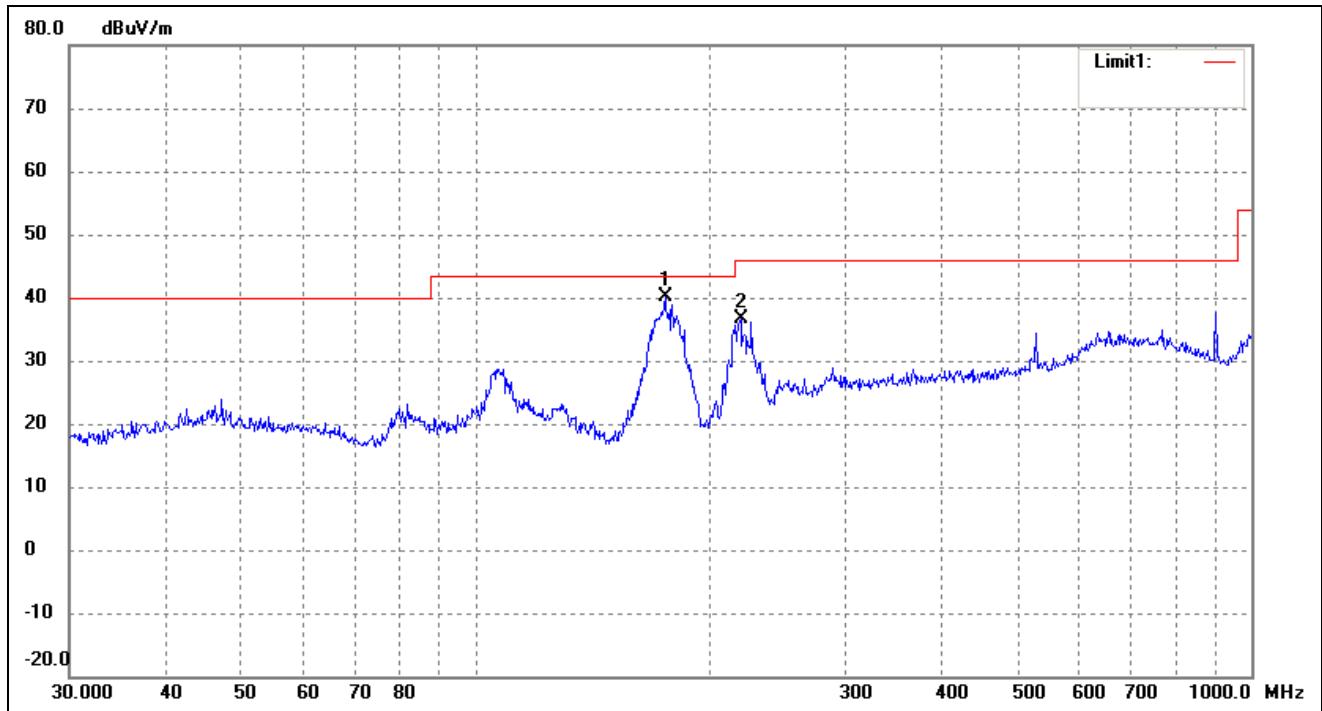
EUT: 4G Smart Phone

Tested Model: L500U

Operating Condition: TM4

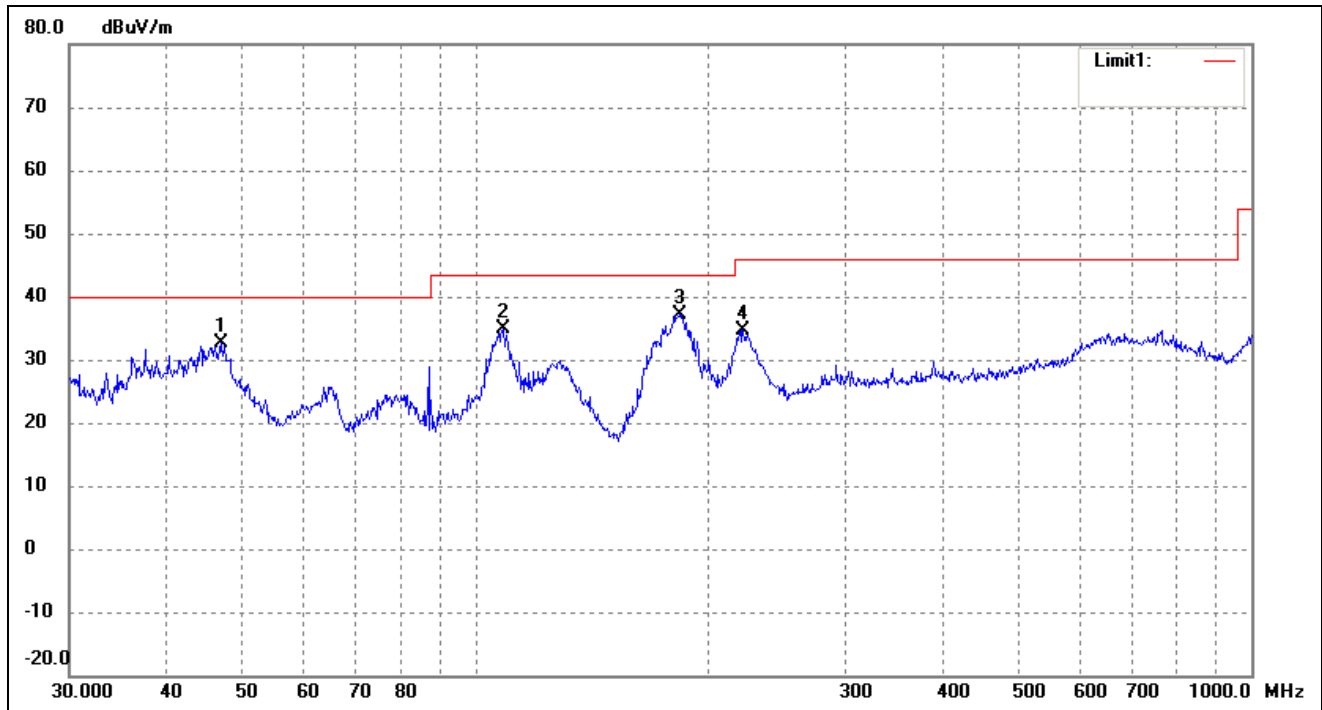
Comment: DC 3.7V

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	175.6516	37.55	2.46	40.01	43.50	-3.49	357	100	QP
2	219.8449	29.02	7.64	36.66	46.00	-9.34	139	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	46.9948	27.59	4.96	32.55	40.00	-7.45	265	100	QP
2	108.6470	30.01	4.87	34.88	43.50	-8.62	102	100	QP
3	183.2005	34.52	2.58	37.10	43.50	-6.40	163	100	QP
4	221.3921	26.82	7.76	34.58	46.00	-11.42	221	101	QP

Note: Testing is carried out with frequency rang 30MHz to the 12.75GHz, which above 1GHz are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

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