

FCC Part 15B Measurement and Test Report

For

Shanghai ZhiWu Communication Technology Co.,Ltd

R711 UnitB, No.668 East Beijing Road, Huangpu District, Shanghai

FCC ID: 2AKL7MX680

Test Rule(s): FCC Part 15 Subpart B

Product Description: GSM/GPRS Module

Tested Model: MX680

Report No.: STR16118270I-2

Tested Date: 2016-11-30 to 2016-12-07

Issued Date: 2016-12-08

Tested By: Iven Guo / Engineer

Iven Guo

Reviewed By: Silin Chen / EMC Manager

Silin Chen

Approved & Authorized By: Jandy So / PSQ Manager

Jandy So

Prepared By:

Shenzhen SEM.Test Technology Co., Ltd.

1/F, Building A, Hongwei Industrial Park, Liuxian 2nd Road,
Bao'an District, Shenzhen, P.R.C. (518101)

Tel.: +86-755-33663308 Fax.: +86-755-33663309 Website: www.semtest.com.cn

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.

TABLE OF CONTENTS

1. GENERAL INFORMATION	3
1.1 PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT)	3
1.2 TEST STANDARDS	4
1.3 TEST METHODOLOGY	4
1.4 TEST FACILITY	4
1.5 EUT SETUP AND OPERATION MODE	5
1.6 MEASUREMENT UNCERTAINTY	5
1.7 TEST EQUIPMENT LIST AND DETAILS	5
2. SUMMARY OF TEST RESULTS	6
3. CONDUCTED EMISSIONS	7
3.1 TEST PROCEDURE	7
3.2 BASIC TEST SETUP BLOCK DIAGRAM	7
3.3 ENVIRONMENTAL CONDITIONS	7
3.4 SUMMARY OF TEST RESULTS/PLOTS	7
3.5 CONDUCTED EMISSIONS TEST DATA	8
4. RADIATED EMISSIONS	10
4.1 TEST PROCEDURE	10
4.2 TEST RECEIVER SETUP	11
4.3 CORRECTED AMPLITUDE & MARGIN CALCULATION	11
4.4 ENVIRONMENTAL CONDITIONS	11
4.5 SUMMARY OF TEST RESULTS/PLOTS	11

1. GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

Client Information

Applicant: Shanghai ZhiWu Communication Technology Co.,Ltd
Address of applicant: R711 UnitB,No.668 East Beijing Road, Huangpu
District, Shanghai

Manufacturer: Shanghai ZhiWu Communication Technology Co.,Ltd
Address of manufacturer: R711 UnitB,No.668 East Beijing Road, Huangpu
District, Shanghai

General Description of EUT	
Product Name:	GSM/GPRS Module
Trade Name:	/
Model No.:	MX680
Adding Model(s):	/
Note: The test data is gathered from a production sample, provided by the manufacturer.	

Technical Characteristics of EUT	
Rated Voltage:	MIN3.4V, NOR: 4V, MAX: 4.4V
Rated Current:	/
Rated Power:	/
Highest Internal Frequency:	26MHz

1.2 Test Standards

The following report is prepared on behalf of the Shanghai ZhiWu Communication Technology Co.,Ltd 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	Downloading	/

EUT Cable List and Details

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

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

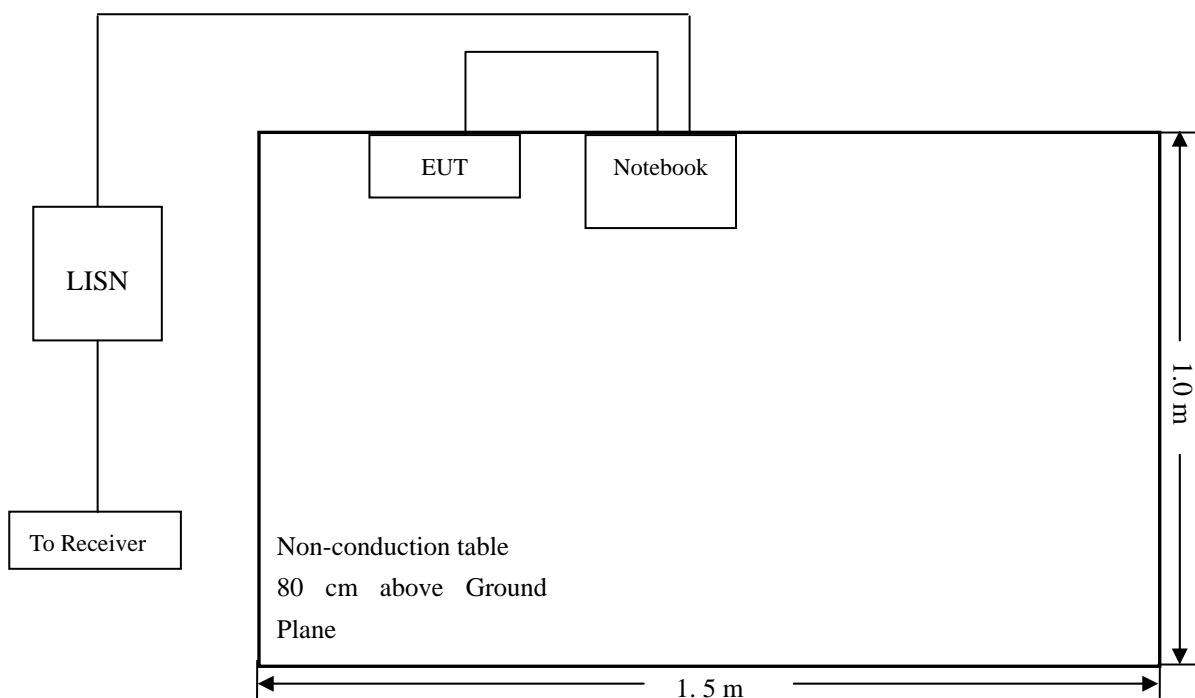
N/A: not applicable

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:

-4.64 dB at 0.8860 MHz in the Line, Average detector, 0.15-30MHz

3.5 Conducted Emissions Test Data

Plot of Conducted Emissions Test Data

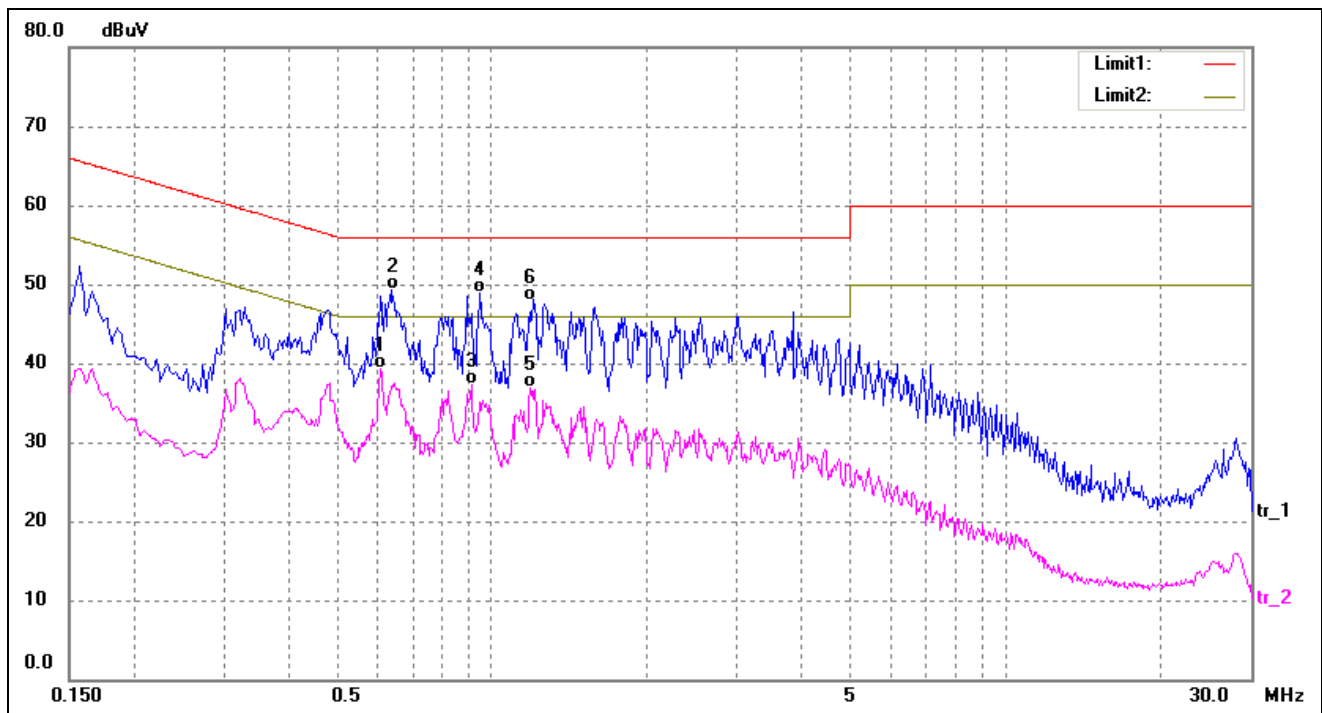
EUT: GSM/GPRS Module

Tested Model: MX680

Operating Condition: TM1

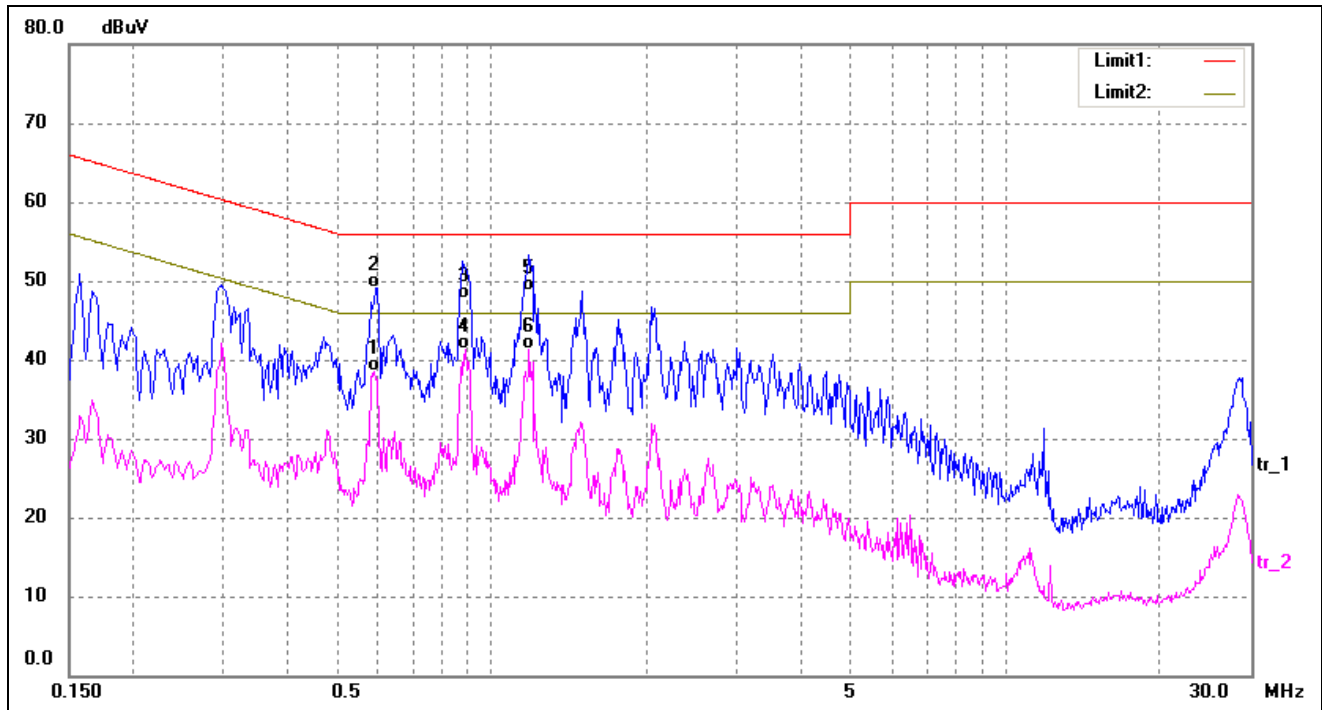
Comment: DC 3.7V

Test Specification: Neutral



No.	Frequency	Reading	Correct	Result	Limit	Margin	Detector
	(MHz)	(dBuV)	(dB/m)	(dBuV)	(dBuV)	(dB)	
1	0.6060	29.43	9.79	39.22	46.00	-6.78	AVG
2*	0.6340	39.49	9.79	49.28	56.00	-6.72	QP
3	0.9100	27.47	9.77	37.24	46.00	-8.76	AVG
4	0.9460	39.07	9.76	48.83	56.00	-7.17	QP
5	1.1900	27.08	9.76	36.84	46.00	-9.16	AVG
6	1.2060	38.20	9.75	47.95	56.00	-8.05	QP

Test Specification: Line



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.5900	28.76	9.79	38.55	46.00	-7.45	AVG
2	0.5940	39.37	9.79	49.16	56.00	-6.84	QP
3	0.8780	37.87	9.77	47.64	56.00	-8.36	QP
4*	0.8860	31.59	9.77	41.36	46.00	-4.64	AVG
5	1.1820	39.00	9.76	48.76	56.00	-7.24	QP
6	1.1820	31.60	9.76	41.36	46.00	-4.64	AVG

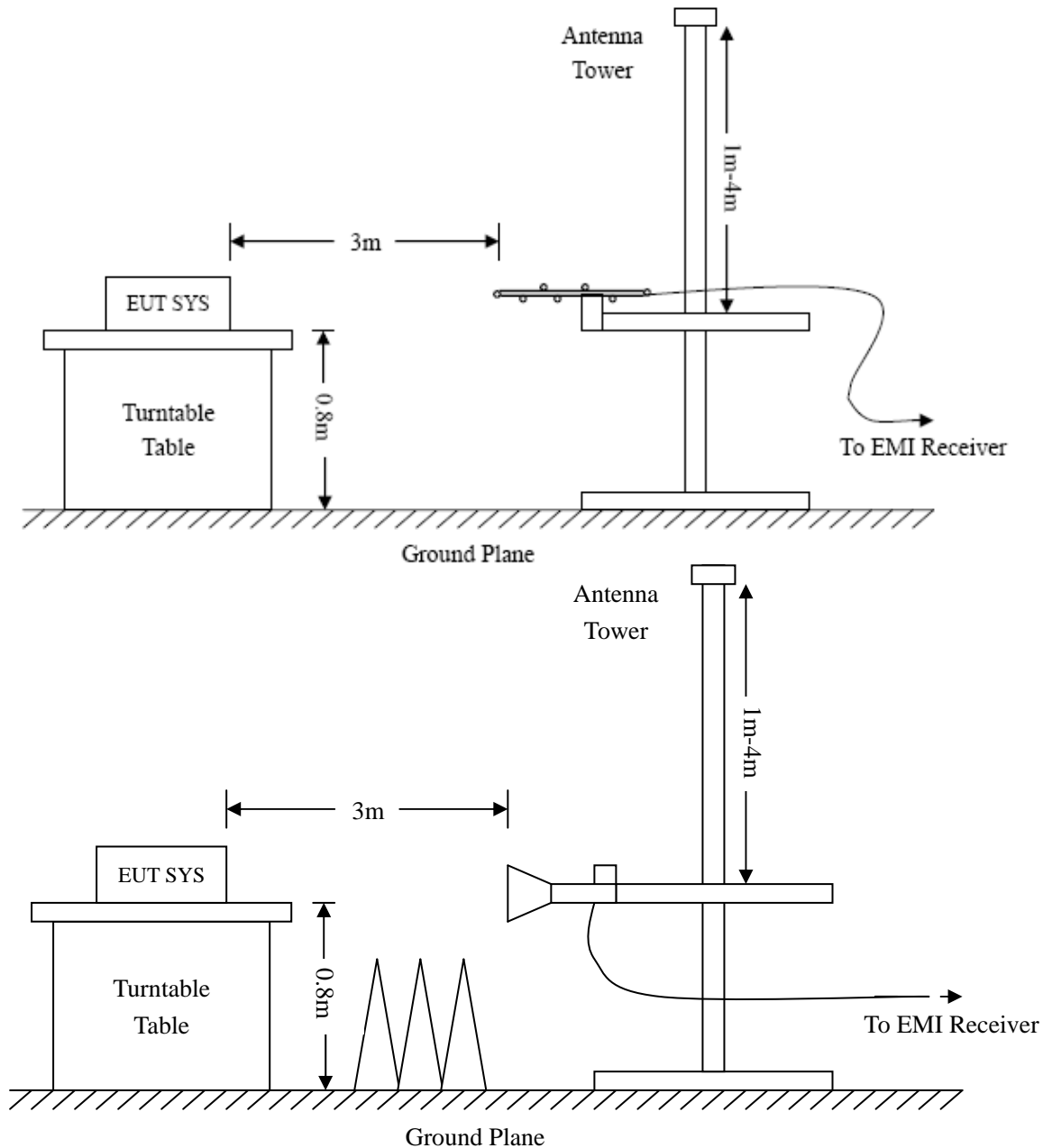
4. Radiated Emissions

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:

-5.18 dB at 35.2512 MHz in the Vertical polarization, 30MHz to 10 GHz, 3Meters

Plot of Radiated Emissions Test Data

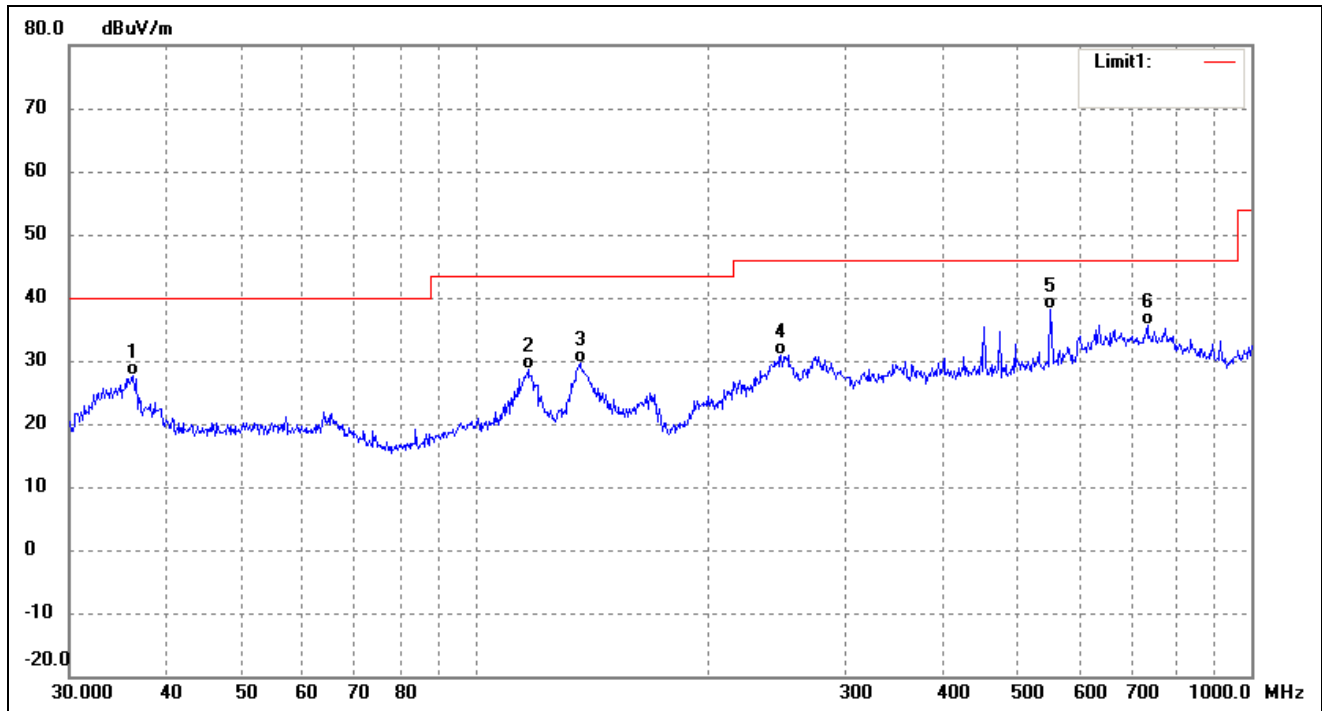
EUT: GSM/GPRS Module

Tested Model: MX680

Operating Condition: TM1

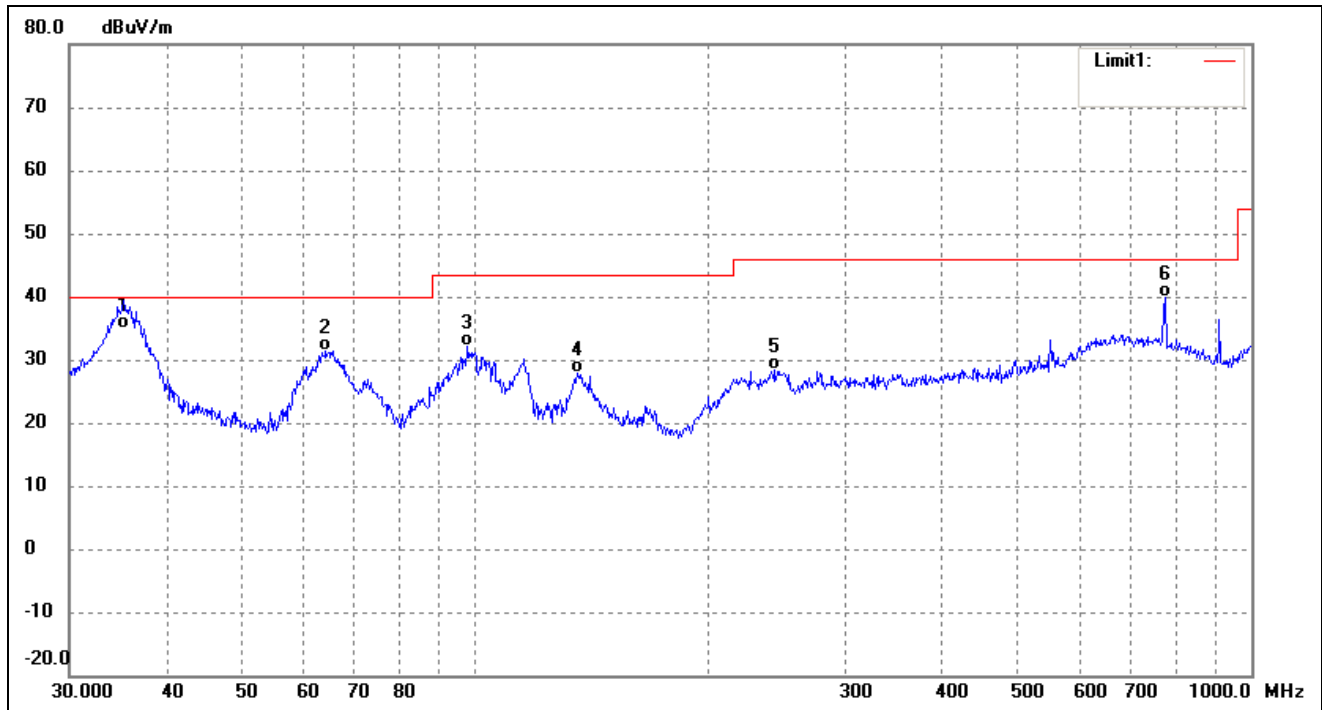
Comment: DC 3.7V

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	36.2541	23.14	4.38	27.52	40.00	-12.48	58	150	QP
2	116.9495	23.73	4.83	28.56	43.50	-14.94	326	100	QP
3	136.4598	26.22	3.44	29.66	43.50	-13.84	29	120	QP
4	247.6819	21.62	9.22	30.84	46.00	-15.16	209	100	QP
5	550.9480	24.08	13.93	38.01	46.00	-7.99	159	200	QP
6	734.4913	17.01	18.69	35.70	46.00	-10.30	69	150	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	35.2512	30.60	4.22	34.82	40.00	-5.18	51	100	QP
2	64.2074	27.29	4.16	31.45	40.00	-8.55	308	100	QP
3	97.7983	27.47	4.61	32.08	43.50	-11.42	120	100	QP
4	135.5062	24.40	3.52	27.92	43.50	-15.58	359	100	QP
5	243.3772	19.38	9.06	28.44	46.00	-17.56	159	100	QP
6	774.1584	22.63	17.19	39.82	46.00	-6.18	251	100	QP

Note: Testing is carried out with frequency rang 30MHz to the 10GHz, which above 1GHz are attenuated more than 20 dB below the permissible value and are not showed in the test report.

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