



# TEST REPORT

No. 2010TAR176

for

**Nokia (China) Investment CO., LTD.**

**TD-SCDMA/GSM mobile phone**

**Model Name: Nokia X5-00 (RM-678)**

**FCC ID: QTLRM-678**

**with**

**Hardware Version: 2001**

**Software Version: 0.1011.C.16**

**Issued Date: May 31<sup>st</sup>, 2010**

**Note:**

The test results in this test report relate only to the devices specified in this report. This report shall not be reproduced except in full without the written approval of TMC Beijing.

**Test Laboratory:**

**DAR accreditation (DIN EN ISO/IEC 17025): No. DGA-PL-114/01-02**

**FCC 2.948 Listed: No.733176**

**IC O.A.T.S listed: No.6629A-1**

TMC Beijing, Telecommunication Metrology Center of Ministry of Industry and Information Technology

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## **1. Test Laboratory**

### **1.1. Testing Location**

Company Name: TMC Beijing, Telecommunication Metrology Center of MIIT  
Address: No 52, Huayuan beilu, Haidian District, Beijing, P.R.China  
Postal Code: 100191  
Telephone: 00861062304633  
Fax: 00861062304793

### **1.2. Testing Environment**

Normal Temperature: 15-35°C  
Relative Humidity: 20-75%

### **1.3. Project data**

Testing Start Date: Apr. 28,2010  
Testing End Date: May 31,2010

### **1.4. Signature**



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Qu Pengfei  
(Prepared this test report)



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Sun Xiangqian  
(Reviewed this test report)



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Lu Bingsong  
Deputy Director of the laboratory  
(Approved this test report)

## **2. Client Information**

### **2.1. Applicant Information**

Company Name: Nokia (China) Investment CO., LTD.  
Address /Post: Building 2, No.5 Donghuan Zhonglu, Beijing Economic and Technological Development Area  
City: Beijing  
Postal Code: 100176  
Country: China  
Telephone: +86-10-87111251  
Fax: +86-10-87114664

### **2.2. Manufacturer Information**

Company Name: BYD Precision Manufacturer Co., Ltd. Beijing Branch  
Address /Post: No.1, Kechuang Dong 5 Jie, Tongzhou District  
City: Beijing  
Postal Code: 101111  
Country: China  
Telephone: +86-10-58018888-71158  
Fax: +86-10-58018888-73000

### **3. Equipment Under Test (EUT) and Ancillary Equipment (AE)**

#### **3.1. About EUT**

Description	TD-SCDMA/GSM mobile phone
Model Name	Nokia X5-00 (RM-678)
FCC ID	QTLRM-678
Extreme vol. Limits	3.4VDC to 4.2VDC (nominal: 3.8VDC)

Note: Components list, please refer to documents of the manufacturer; it is also included in the original test record of Telecommunication Metrology Center of MII of People's Republic of China.

#### **3.2. Internal Identification of EUT used during the test**

<b>EUT ID*</b>	<b>SN or IMEI</b>	<b>HW Version</b>	<b>SW Version</b>
N03	004401019716980	2001	0.1011.C.16

\*EUT ID: is used to identify the test sample in the lab internally.

#### **3.3. Internal Identification of AE used during the test**

<b>AE ID*</b>	<b>Description</b>	<b>SN</b>
AE1	Battery	3635639484511702949
AE2	Travel Adapter	4090499484540810192
AE3	Earphone	06944229486h1R28268
AE4	Data Cable	07303699512Z1200098

##### AE1

Model	BL-5F
Manufacturer	Nokia
Capacitance	950 mAh
Nominal Voltage	3.7 V

##### AE2

Model	AC-8C
Manufacturer	Nokia
Length of DC line	149 cm

##### AE3

Model	WH205
Manufacturer	Nokia
Length of Cable	115 cm

##### AE4

Model	CA-101D
Manufacturer	Nokia
Length of Cable	18 cm

\*AE ID: is used to identify the test sample in the lab internally.

## **4. Reference Documents**

### **4.1. Reference Documents for testing**

The following documents listed in this section are referred for testing.

<b>Reference</b>	<b>Title</b>	<b>Version</b>
FCC Part 15, Subpart B	Radio frequency devices	July 10, 2008
ANSI C63.4	Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz	Edition 2009

## **5. LABORATORY ENVIRONMENT**

**Semi-anechoic chamber** (23 meters × 17meters × 10meters) did not exceed following limits along the EMC testing:

Temperature	Min. = 15 °C, Max. = 30 °C
Relative humidity	Min. = 30 %, Max. = 60 %
Shielding effectiveness	> 110 dB
Electrical insulation	> 10 kΩ
Ground system resistance	< 0.5 Ω
Normalised site attenuation (NSA)	< ±3.2 dB, 10 m distance, from 30 to 1000 MHz
Uniformity of field strength	Between 0 and 6 dB, from 80 to 2000 MHz

**Control room** did not exceed following limits along the EMC testing:

Temperature	Min. = 15 °C, Max. = 35 °C
Relative humidity	Min. = 30 %, Max. = 60 %
Shielding effectiveness	> 110 dB
Electrical insulation	> 10 kΩ
Ground system resistance	< 0.5 Ω

**Conducted chamber** did not exceed following limits along the EMC testing:

Temperature	Min. = 15 °C, Max. = 30 °C
Relative humidity	Min. = 30 %, Max. = 60 %
Shielding effectiveness	> 110 dB
Electrical insulation	> 10 kΩ
Ground system resistance	< 0.5 Ω

## **6. SUMMARY OF TEST RESULTS**

<b>Abbreviations used in this clause:</b>	
P	Pass
NA	Not applicable
F	Fail

<b>Clause</b>	<b>List</b>	<b>Clause in FCC rules</b>	<b>Verdict</b>
1	Radiated Emission	15.109(a)	P
2	Conducted Emission	15.107(a)	P

## **7. Test Equipments Utilized**

NO.	Description	TYPE	SERIES NUMBER	MANUFACTUR E	CAL DUE DATE
1	Test Receiver	ESCI	100344	R&S	2011-03-11
2	Test Receiver	ESCI	100766	R&S	2010-12-07
3	Test Receiver	ESI40	831564/002	R&S	2011-02-12
4	BiLog Antenna	VULB 9163	9163 301	Schwarzbeck	2011-04-29
5	Signal Generator	SMP04	100070	R&S	2011-04-19
6	LISN	ESH2-Z5	829991/012	R&S	2011-04-20
7	Spectrum Analyzer	FSU26	200030	R&S	2010-06-17
8	Dual-Ridge Waveguide Horn Antenna	3115	9906-5827	EMCO	2010-08-14
9	Vector Signal Generator	SMU200A	102082	R&S	2010-11-14
10	PC	9439-IAC	L3B4535	LENOVO	N/A
11	Monitor	9227-AE1	31/1033768/1/280 5	LENOVO	N/A
12	Printer	DeskJet D2368	TH72E12G7Q	HP	N/A
13	Keyboard	SK-8825(L)	00925776	LENOVO	N/A
14	Mouse	MO28UOL	23-115652	LENOVO	N/A

## **ANNEX A: MEASUREMENT RESULTS**

### **A.1 Radiated Emission (§15.109(a))**

#### **A.1.1 Method of measurement**

The field strength of radiated emissions from the unintentional radiator (USB mode of MS, FM radio receiving mode of MS and GPS signal receiving mode of MS) at a distance of 3 meters is tested. Tested in accordance with the procedures of ANSI C63.4 - 2009, section 8.3.

A "reference path loss" is established and the  $A_{RPL}$  is the attenuation of "reference path loss". The  $A_{RPL}$  is the summed correction factor of the antenna factor of receive antenna and the cable loss including the pre-amplifier gain. Calculation example of  $A_{RPL}$  at 2GHz:

$A_{RPL} = \text{antenna factor (27.5 dB/m)} + \text{cable loss including amplifier gain (-19.8dB)} = 7.7 \text{ dB/m}$

In the case of frequency mismatch between the correction factors and receiver readings, the correction factors should be recalculated using the logarithm interpolation method.

Then the measurement results are obtained as the formula described below:

$$P_{MEAS} = P_{READING} + A_{RPL}$$

Where:

$P_{MEAS}$  is the measurement result after recalculation. This value is corresponding to the *Result* column in the measurement result table.

$P_{READING}$  is the reading level in dB $\mu$ V displayed on measurement receiver. This value is corresponding to the *Reading* column in the measurement result table.

$A_{RPL}$  is the reference path loss in dB/m defined above. This value is corresponding to the  $A_{RPL}$  column in the measurement result table.

#### **A.1.2 EUT Operating Mode:**

##### **A1.2.1 USB Mode**

**EUT Setup:** N03+ AE1+AE2+AE3+AE4

The MS is operating in the USB mode. During the test MS is connected to a PC via a USB cable. The travel adapter is connected to the AC power supply. The model of the PC is LENOVO 9439-IAC, and the serial number of the PC is L3B4535. A software is used to let the PC keep on copying data to MS, reading and erasing the data after copy action was finished.

##### **A1.2.2 FM Radio Receiving Mode**

**EUT Setup:** N03+ AE1+AE2+AE3

The MS is operating in the FM receiving mode. The travel adapter is connected to the AC power supply. During the test, a signal generator is used to provide the FM signaling. The frequency of signal generator is set to 98.1MHz. The MS is tuned to the signal generator's frequency.

**A1.2.3 GPS Signal Receiving Mode****EUT Setup:** N03+ AE1+AE2+AE3

The MS is operating in the GPS signal receiving mode. The travel adapter is connected to the AC power supply. During the test, a vector signal generator is used to provide the simulated GPS signal, and the frequency is set to 1575.42 MHz. Before the test start, the integrated GPS application in MS is started up and locked to the simulated GPS signal.

**A.1.3 Measurement Limit**

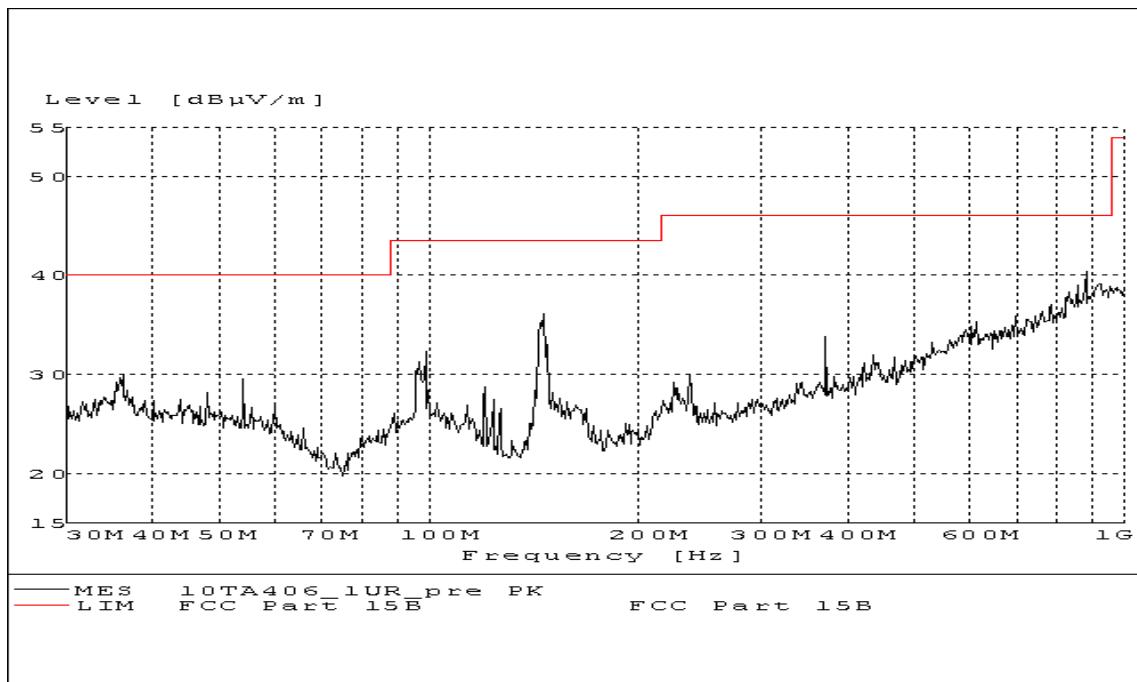
Frequency of emission (MHz)	Field strength (microvolts/meter)
30-88	100
88-216	150
216-960	200
Above 960	500

**A.1.4 Measurement Results****A.1.4.1 USB Mode**

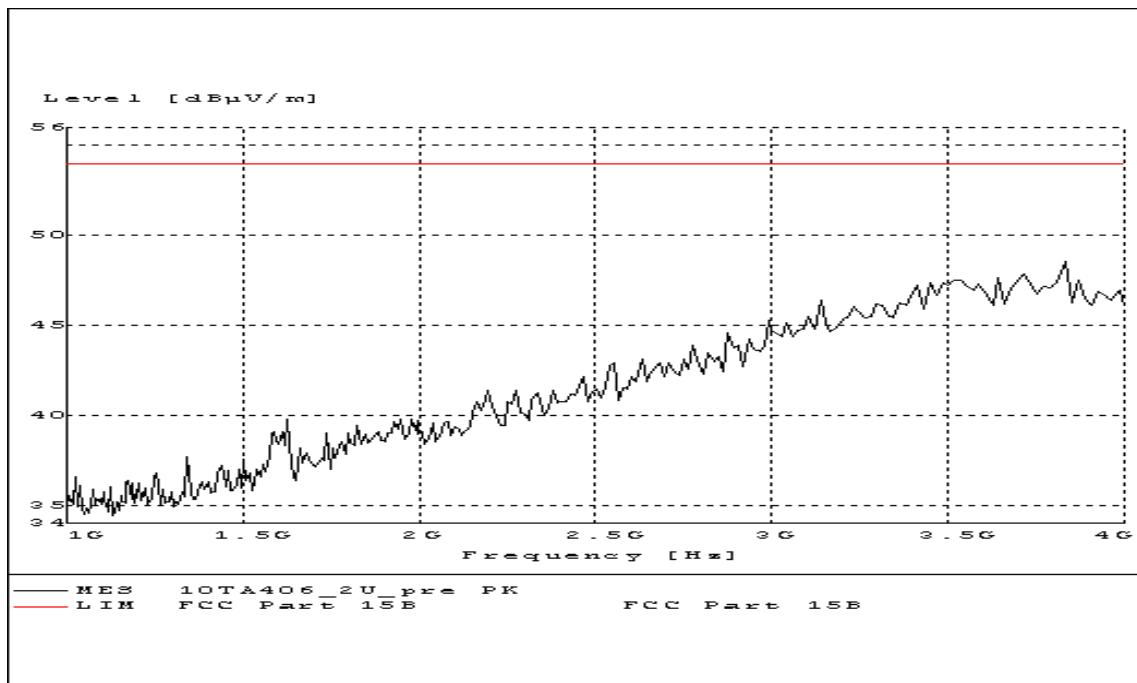
Frequency (MHz)	Result (dB $\mu$ V/m)	A <sub>RPL</sub> (dB/m)	Reading (dB $\mu$ V)	Polarity
3830.525	48.57	13.9	34.67	VERTICAL
3717.594	47.84	13.9	33.94	HORIZONTAL
3644.162	47.69	13.7	33.99	VERTICAL
3519.129	47.56	13.8	33.76	HORIZONTAL
3536.725	47.53	14.0	33.53	VERTICAL
3699.098	47.49	13.9	33.59	VERTICAL

Sample calculation (frequency: 3830.525MHz):

$$P_{\text{MEAS}} = P_{\text{READING}} (34.67 \text{ dB}\mu\text{V}) + A_{\text{RPL}} (13.9 \text{ dB/m}) = 48.57 \text{ dB}\mu\text{V/m}$$



**Figure A.1 Radiated Emission from 30MHz to 1GHz**



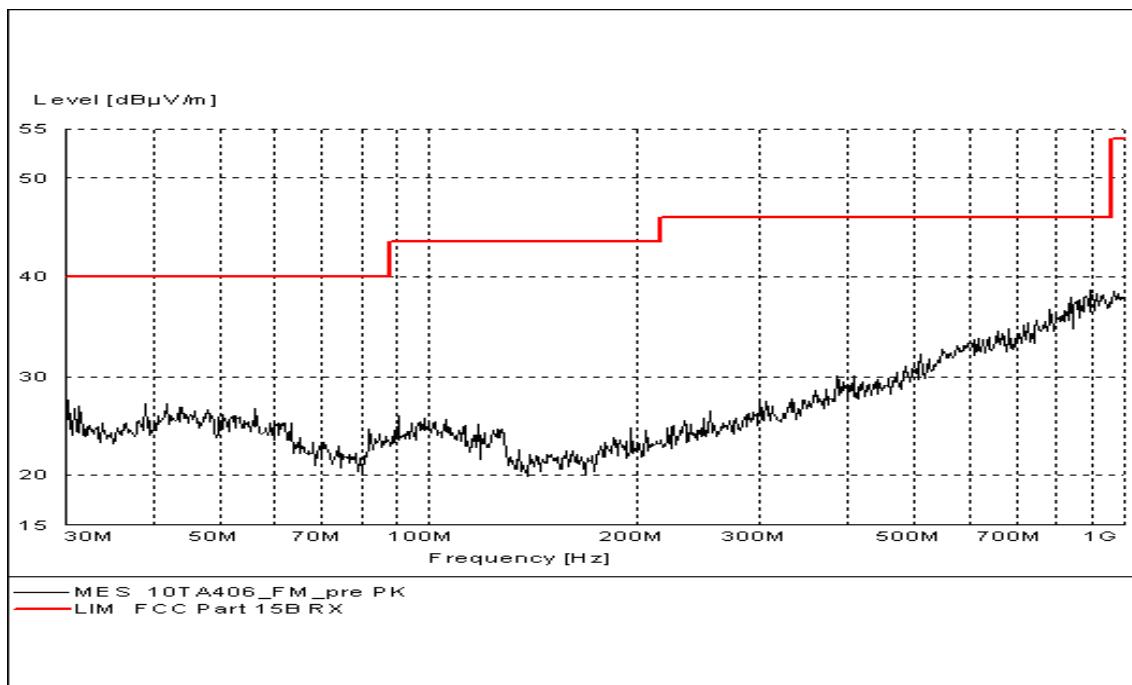
**Figure A.2 Radiated Emission from 1GHz to 4GHz**

**A.1.4.2 FM Radio Receiving Mode**

Frequency (MHz)	Result (dB $\mu$ V/m)	$A_{RPL}$ (dB/m)	Reading (dB $\mu$ V)	Polarity
895.7964	38.70	27.97	10.73	HORIZONTAL
965.3843	38.59	29.23	9.36	VERTICAL
913.8471	38.38	29.07	9.31	VERTICAL
984.8373	38.32	29.21	9.11	VERTICAL
932.2616	38.20	29.13	9.07	VERTICAL
927.6235	38.11	29.17	8.94	VERTICAL

Sample calculation (frequency: 895.7964MHz):

$$P_{MEAS} = P_{READING} (10.73 \text{ dB}\mu\text{V}) + A_{RPL} (27.97 \text{ dB/m}) = 38.70 \text{ dB}\mu\text{V/m}$$

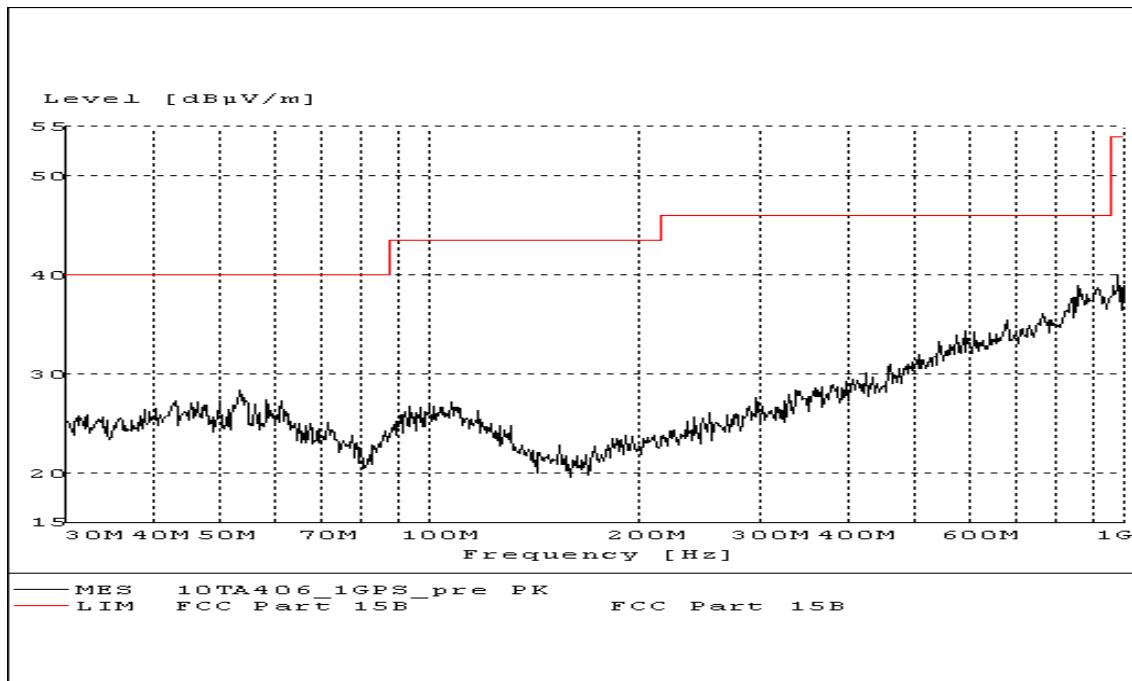
**FM Radio Receiving Mode**

**Figure A.3 Radiated Emission from 30MHz to 1GHz**

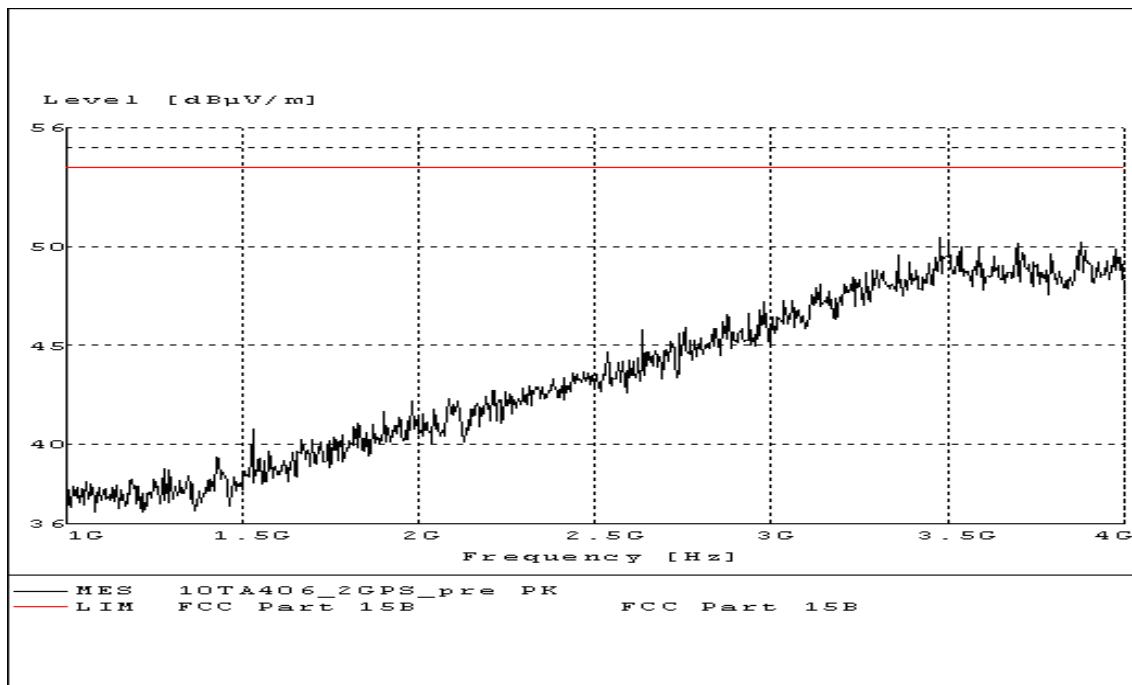
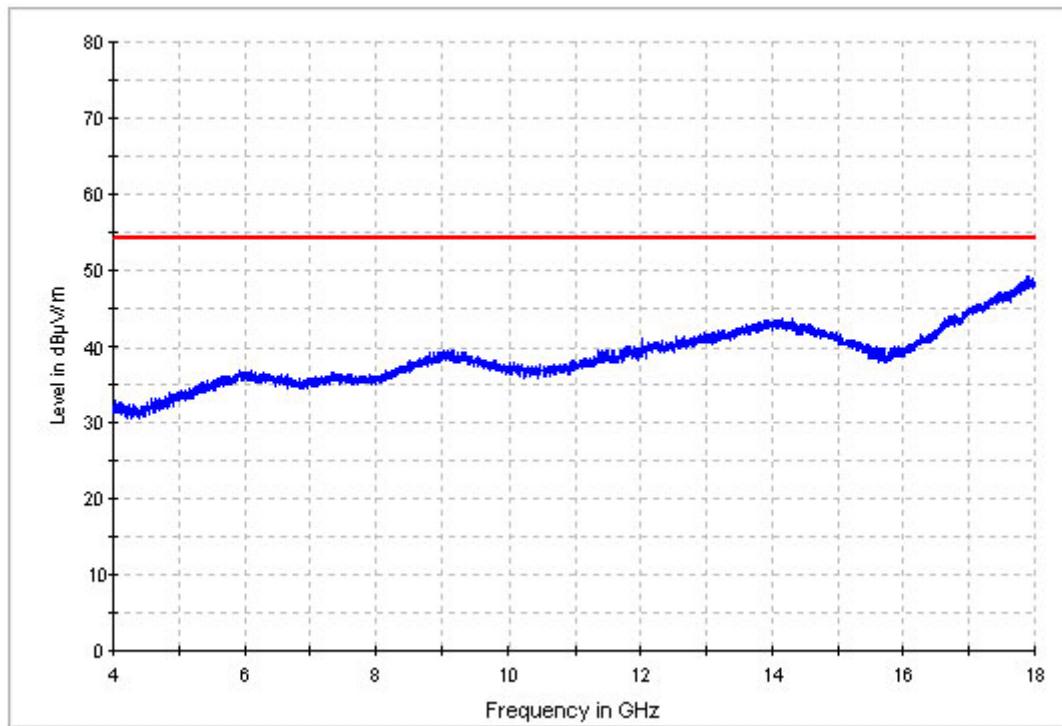
**A.1.4.3 GPS Signal Receiving Mode**

Frequency (MHz)	Result (dB $\mu$ V/m)	$A_{RPL}$ (dB/m)	Reading (dB $\mu$ V)	Polarity
3478.958	50.41	11.5	38.91	HORIZONTAL
3503.006	50.20	13.7	36.50	VERTICAL
3877.756	50.18	13.8	36.38	HORIZONTAL
3697.395	50.16	13.9	36.26	VERTICAL
3541.082	49.96	13.9	36.06	VERTICAL
3585.17	49.96	13.8	36.16	VERTICAL

Sample calculation (frequency: 3478.958 MHz):

$$P_{MEAS} = P_{READING} (38.91 \text{ dB}\mu\text{V}) + A_{RPL} (11.5 \text{ dB/m}) = 50.41 \text{ dB}\mu\text{V/m}$$


**Figure A.4 Radiated Emission from 30MHz to 1GHz**

**Figure A.5 Radiated Emission from 1GHz to 4GHz****Figure A.6 Radiated Emission from 4GHz to 18GHz**

## A.2 Conducted Emission (§15.107(a))

### A.2.1 Method of measurement

For equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150kHz to 30MHz shall not exceed the limits. Test is performed in accordance with the procedures of ANSI C63.4 - 2009, section 7.2. The measurement result is recalculated based on the receiver readings. The calculation formula is as follows:

$$V_{\text{MEAS}} = V_{\text{READING}} + A_{\text{CORR}}$$

Where

$V_{\text{MEAS}}$  is the measurement result after recalculation. This value is corresponding to the *Level* column in the measurement result table.

$V_{\text{READING}}$  is the reading level in  $\text{dB}\mu\text{V}$  displayed on measurement receiver. This value is corresponding to the *Reading* column in the measurement result table.

$A_{\text{CORR}}$  is the summed correction factor in dB including the LISN correction and the cable attenuation. This value is corresponding to the *Transd* column in the measurement result table.

In the case of frequency mismatch between the correction factors and receiver readings, the correction factors should be recalculated using the logarithm interpolation method.

### A.2.2 EUT Operating Mode:

**EUT Setup:** N03+ AE1+AE2+AE3+AE4

The MS is operating in the USB mode. The travel adapter is connected to the AC power supply.

During the test MS is connected to a PC via a USB cable. The model of the PC is LENOVO 9439-IAC, and the serial number of the PC is L3B4535. A software is used to let the PC keep on copying data to MS, reading and erasing the data after copy action was finished.

### A.2.3 Measurement Limit

Frequency of emission (MHz)	Conducted limit ( $\text{dB}\mu\text{V}$ )	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

\*Decreases with the logarithm of the frequency

### A.2.4 Test Condition in charging mode

Voltage (V)	Frequency (Hz)
110	60

### A.2.5 Measurement Results

#### USB Mode

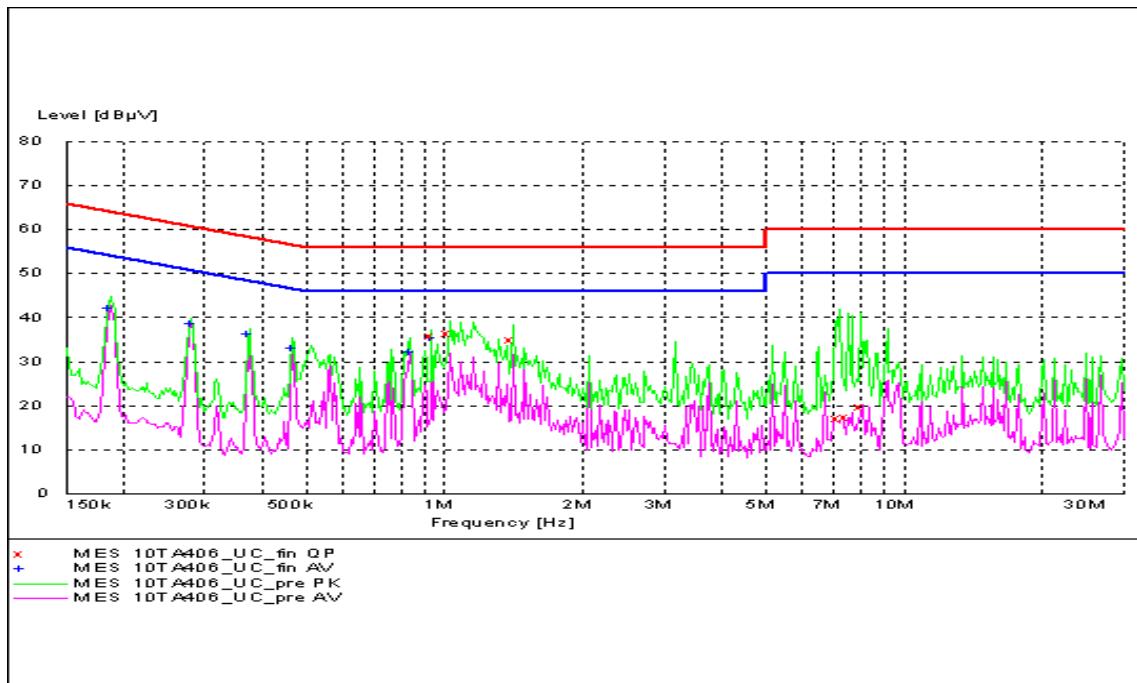


Figure A.7 Conducted Emission

QUASI-PEAK MEASUREMENT RESULT: "10TA406\_UC\_fin QP"

Frequency MHz	Level dB $\mu$ V	Transd dB	Reading dB $\mu$ V	Limit dB $\mu$ V	Margin dB	Line	PE
0.935888	35.80	10.1	25.70	56	20.2	N	FLO
1.023567	36.40	10.1	26.30	56	19.6	N	FLO
1.407344	34.90	10.1	24.80	56	21.1	N	FLO
7.219169	17.00	10.2	6.80	60	43.0	N	GND
7.512296	17.20	10.2	7.00	60	42.8	L1	FLO
8.054198	19.70	10.2	9.50	60	40.3	L1	GND

AVERAGE MEASUREMENT RESULT: "10TA406\_UC\_fin AV"

Frequency MHz	Level dB $\mu$ V	Transd dB	Reading dB $\mu$ V	Limit dB $\mu$ V	Margin dB	Line	PE
0.186707	42.10	10.1	32.00	54	12.1	L1	FLO
0.280762	38.70	10.1	28.60	51	12.1	N	GND
0.374678	36.20	10.1	26.10	48	12.2	N	FLO
0.466367	33.10	10.1	23.00	47	13.4	N	FLO
0.838859	32.20	10.1	22.10	46	13.8	N	FLO
0.935888	35.40	10.1	25.30	46	10.6	N	FLO

Sample calculation (frequency 0.935888MHz for average detector):

$$V_{\text{MEAS}} = V_{\text{READING}} (25.30 \text{ dB}\mu\text{V}) + A_{\text{CORR}} (10.1 \text{ dB}) = 35.40 \text{ dB}\mu\text{V}$$

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