EMC Test Report

Product Name: Fixed Wireless Terminal

Model Number: ETS2207

Report No: SYBH(R)026092008EB-4

Reliability Laboratory of Huawei Technologies Co., Ltd.

Huawei Base, Bantian, Longgang District, Shenzhen 518129, P.R. China

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Notice 1

1. The laboratory has obtained the accreditation of China National Accreditation Service for Conformity Assessment (CNAS), and accreditation number: L0310.
2. The laboratory has obtained the accreditation of THE AMERICAN ASSOCIATION FOR LABORATORY ACCREDITATION (A2LA), and Accreditation Council Certificate Number: 2174.01.
3. The laboratory has been listed on the US Federal Communications Commission list of test facilities recognized to perform electromagnetic emissions measurements. The site recognition number is 97456.
4. The laboratory has been listed by industry Canada to perform electromagnetic emission measurement. The site recognition number is 6369A-1.
5. The laboratory also has been listed by the VCCI to perform EMC measurements. The accreditation number is R2364, C2583, and T256.
6. The test report is invalid if not marked with "exclusive stamp for the test report".
7. The test report is invalid if not marked with the stamps or the signatures of the persons responsible for performing, revising and approving the test report.
8. The test report is invalid if there is any evidence of erasure and/or falsification.
9. If there is any dissidence for the test report, please file objection to the test centre within 15 days from the date of receiving the test report.
10. Normally, the test report is only responsible for the samples that have undergone the test.
11. Context of the test report cannot be used partially or in full for publicity and/or promotional purposes without previous written approval of the laboratory.

Notice 2

Modification Information:

Table 1 Modification Information

Modification Information	1	
	2	
	3	Not Applicable!
	4	
	5	
	6	
	7	

REPORT ON	**EMC Test of Fixed Wireless terminal**
	M/N: ETS2207
REGULATION	**FCC CFR47 Part 15: Subpart B;**
	FCC CFR47 Part 22: Subpart H;
START OF TEST	**Oct.8, 2008**
END OF TEST	**Oct.15, 2008**
Final Judgement:	**Pass**

Approver	**2008-10-25**	**张兴海**	
	Date	**Name**	**Signature**
Reviewer	**2008-10-25**	**余辉**	
	Date	**Name**	**Signature**
Operator	**2008-10-25**	**张飞**	
	Date	**Name**	**Signature**

REPORT BODY CONTENT

1 Status

1.1 Product Information

CLIENT:	Huawei Technologies Co., Ltd.
ADDRESS:	Bantian Longgang District Shenzhen, P.R. China
MANUFACTURING DESCRIPTION	Fixed wireless terminal
MANUFACTURERS MODEL NUMBER	ETS2207

1.2 Applied Standard

FCC Measurement Specification	FCC Limits Part(s)	Description	Result
-	15.107	Conducted Emission at Power Port	PASS
-	15.109	Radiated Emission of Enclosure in Idle Mode	PASS
2.1051	22.917	Radiated Spurious Emission	PASS

1.3 Test Site

Site 1:
RELIABILITY LABORATORY OF HUAWEI TECHNOLOGIES CO., LTD

1.4 Test environment condition

Ambient temperature	20~25°C
Relative humidity	40%~52%
Atmospheric pressure	101kPa

2 Summary of Results

Table 2 below shows a brief summary of the results obtained.

Table 2 Summary of results

EUT Classification：Wireless Terminal				
Test Items	**Test Configuration &Test Mode**	**Required Performance Criteria**	**Result**	**Site**
Radiated Emissions Enclosure Port	TC1-TC3(TM2)	N/A	Pass	Site1
Conducted Emissions	TC1-TC3 (TM1~TM2)	N/A	Pass	Site1
Radiated Spurious Emissions Enclosure Port	TC1-TC3(TM1)	N/A	Pass	Site1
Note: 1, Measurement taken is within the measurement uncertainty of measurement system. 2, TC = Test configuration 3, NT=no test. Because of not containing devices susceptible to magnetic fields, the EUT has been exempt from immunity test of power frequency magnetic field.				

3 Equipment Specification

3.1 General Description

ETS2207 is CDMA Fixed Wireless Terminals. It's operated in Band Class 0 (800MHz). The Fixed Wireless Terminal implements such functions as RF signal receiving / Transmitting, CDMA protocol processing, voice, data etc. The TX is 824.025MHz-848.985MHz and the RX 869.026MHz-893.985MHz. Externally it provides USB interface (to computers), antenna interface, and power interface, in addition to the charging interface.

3.1.1 Main Equipment Technical Data

Description:	:	Fixed Wireless Terminal
Models:		ETS2207
Input Rated Voltage	:	⎓ 12V
Dimensions	:	194(depth)×149(width)×49(height)(mm^3)
Weight	:	<1kg (with battery)

Table 3 Sub-Assembly Identity

Mode		Work Frequency	
		Transmitt Frequency(MHz)	Receive Frequency (MHz)
CDMA	Band Ⅰ	824.025-848.985	869.026-893.985

3.2 Sub-Assembly Identity

Table 4 Sub-Assembly Identity

Board				
Model Name	**Qty.**		**Serial**	**Description**
WLR2SEAU	1		VER.A	731052100189
WLR2BIPU	1		VER.A	731052100599
Accessory				
Name	**Qty**	**Manufacture**	**Serials number**	**Description**
Adaptor	1	Dongguan Shilong Fuhua Electronic Co., Ltd.	HF-120050E3	Input : AC 100-240V, 50/60Hz, 0.2A Output: 12VDC/0.5A
Adaptor	1	Shenzhen Moso Power Supply Technology Co.,Ltd	HF-120050E3	Input : AC 100-240V, 50/60Hz, 0.2A Output: 12VDC, 0.5A
Adaptor	1	Shenzhen OCT Xinqiao Technology Co.,Ltd.	HF-120050E3	Input : AC 100-240V, 50/60Hz, 0.2A Output: 12VDC, 0.5A
NI-MH Battery	1	HUAWEI Techonoly Co.,Ltd.	HGB-2A10x3	IRated operated voltage (V): 3.6V

4 System Configuration during EMC Test

The Equipment under Test (EUT) was functioning correctly during all tests. The EUT was installed within the test site and was configured to simulate a typical user installation.

4.1 Cables Used during Test

Table 5 Cable Used during Test

Port	Length	Quantity	Type of Cable
AC Power Port	1.5m	1	Unshielded

4.2 Associated Equipment Used during Test

Table 6 Associated Equipment Used during Test

Name	Model	Manufacturer	S/N	Cal Date
Radio Communication Tester	CMU200	R&S	108522	2008-07-25

4.3 Test Configurations and Test Mode

4.3.1 Test Configuration.

The EUT will be connected to test system (Base Station Simulator) in order to simulate normal operating conditions (with reference to the guidance given in the standard for this type of equipment).

Table 7 Configuration table

TC1/TC2/TC3	TM1~TM2

TC1: EUT was powered by the adapter(Fuhua);
TC2: EUT was powered by the adapter(Moso);
TC3: EUT was powered by the adapter(Xinqiao);

4.3.2 Test Mode

There were 2 test Modes. TM1 and TM2 were shown in the diagrams below:
TM1: operate in traffic mode CDMA 800;
TM2: operate in idle mode CDMA 800;

The EUT will be connected to test system (Base Station Simulator) in order to simulate normal operating conditions (with reference to the guidance given in the standard for this type of equipment).

4.4 Test conditions and test Connections

4.4.1 Test Conditions

The EUT will be connected to test system (Base Station Simulator) in order to simulate normal operating conditions (with reference to the guidance given in the standard for this type of equipment).

4.4.2 Test Connections

Traffic Mode:
The EUT will be connected to test system (Base Station Simulator) in order to simulate normal operating conditions (with reference to the guidance given in the standard for this type of equipment).

When the EUT is required to be in the traffic mode, a call is set up using Loop back Service Option according to the radio configuration supported by the fixed terminal (see clause 1.3 in 3GPP2 C.S0011-A), and the following conditions shall be met:
- The EUT shall be commanded to operate at maximum transmit power 24dBm;
- The "variable Data Rate Transmission" shall be disabled;
- The Fixed terminal shall be set for maximum data transmission rate.
- Assign channel frequency to an appropriate channel number, For ETS2207 the channel numbers is set to 283 (Transmit frequency833.49MHz) here.

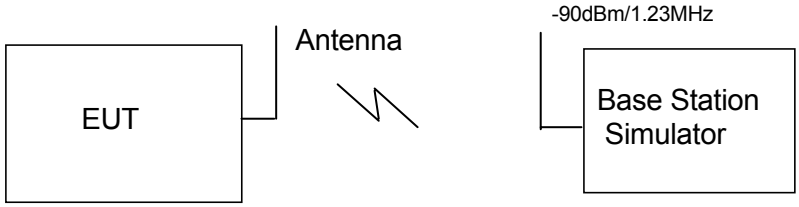


Figure 1.: Test Configuration

Idle Mode:
The EUT will be connected to test system (Base Station Simulator) in order to simulate normal operating conditions (with reference to the guidance given in the standard for this type of equipment). When the EUT is required to be in the idle mode, then the following conditions shall be met:
- Enable the receiver for CDMA-only mode;
- the test system shall simulate a Base Station with the Paging Channel or the Quick Paging Channel or Forward Common Control Channel/Broadcast Control Channel on one carrier. The Base Station Simulator shall be synchronized and be able to respond to paging messages. The fixed terminal shall not initiate a call (originated call), re-registration, or message transmission.

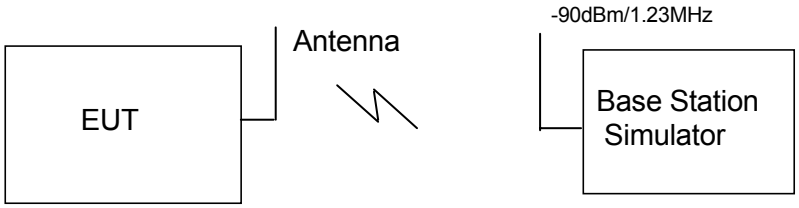


Figure 2. Test Configuration

4.5 Radiated Disturbance 30MHz to 1000MHz

4.5.1 Test Procedure

The test site semi-anechoic chamber has met the requirement of NSA tolerance 4dB according to the standards: ANSI C63.4 (2003). The test distance was 3m.The EUT was set-up on insulator 80cm above the Ground Plane. The set-up and test methods were according to ANSI C63.4.The Radiated Disturbance measurements were made using a Rohde and Schwarz ESMI Test Receiver and control software ES-K1.
A preliminary scan and a final scan of the emissions were made from 30 MHz to 1GHz by using test script of software; the emissions were measured using a Quasi-Peak Detector. The maximal emission value was acquired by adjusting the antenna height, polarisation and turntable azimuth in accordance with the software setup. Normally, the height range of antenna was 1m to 4m, the azimuth range of turntable was 0°to 360°, The receive antenna has two polarizations V and H.

Huawei Mobile Station was communicated with the BTS simulator through Air interface. The Mobile Station operated on the typical channel and the Mobile Station worked in idle mode, transmitter was not work in this test.

EUT was configured in idle mode and the test performed at worst emission state.

Measurement bandwidth: 30 MHz – 1000 MHz: 120 k Hz

Test set up figure:

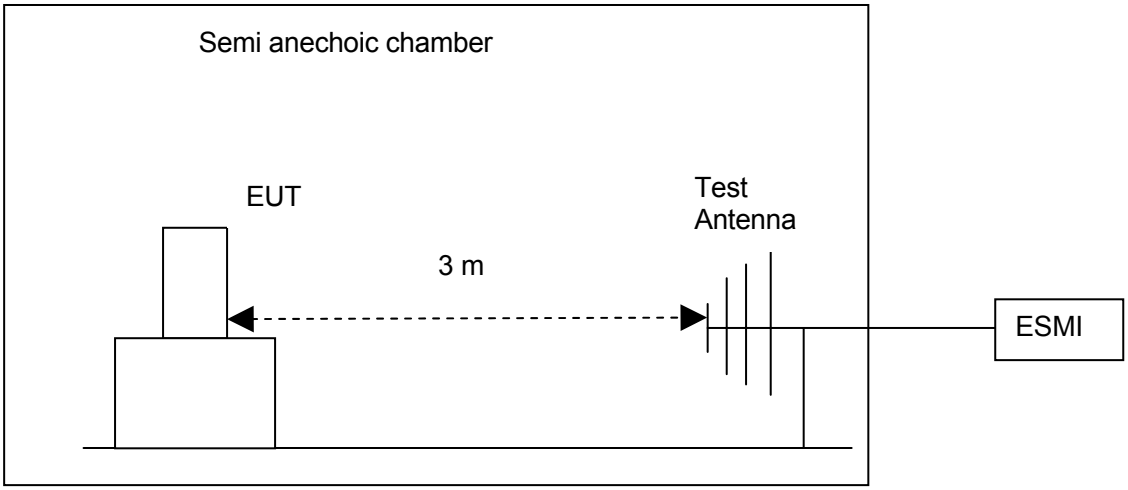


Figure 3. Test set-up

4.5.2 Test Results

The EUT has met the requirements for Radiated Emission of enclosure port.

Table 8 Test Limits

Frequency of Emission (MHz)	Radiated Limit	
	Unit(μv/m)	Unit(dBμV/m)
30-88	100	40
88-216	150	43.5
216-960	200	46
960-1000	500	54

4.6 Conducted Disturbance 0.15 MHz to 30MHz

4.6.1 Test Procedure

The Table-top EUT was placed upon a non-metallic table 0.8 m above the horizontal metal reference ground plane. EUT was connected to LISN and LISN was connected to reference Ground Plane. EUT was 80cm from LISN. The set-up and test methods were according to ANSI C63.4: 2003.

Conducted Disturbance at AC Port measurements were undertaken on the L and N Lines. The emissions were measured using a Quasi-Peak Detector and Average Detector.

Huawei Mobile Station was communicated with the BTS simulator through Air interface, the BTS simulator controls the Mobile Station to transmitter the maximum power which defined in specification of product. The Mobile Station operated on the typical channel.

Measurement bandwidth (RBW) for 150kz to 30 MHz: 9 kHz;

Test Set-up figure:

The Mobile Station was setup in the screened chamber and operated under nominal conditions.

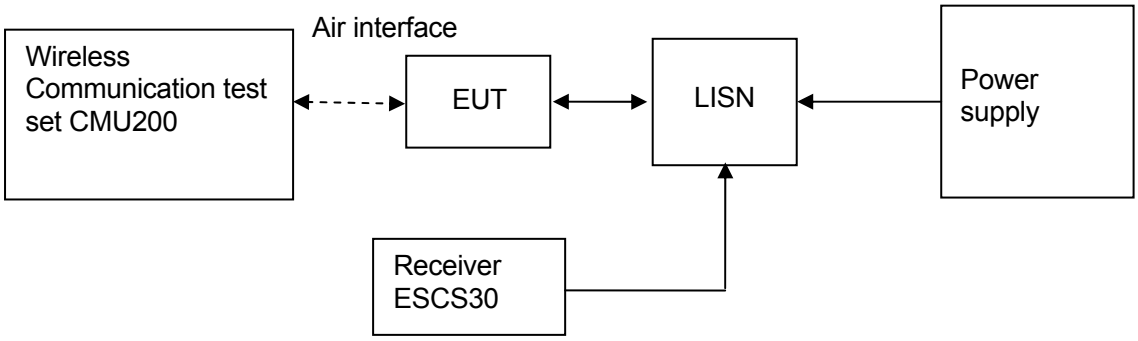


Figure 4. Test Set-up

4.6.2 Test Results

The EUT has met requirements for Conducted disturbance of power lines.

Table 9 Test Limit of AC Power Port

Frequency range	150kHz~ 30MHz	
Classification	Class B	
Limit(Class B)	Voltage limits	
	QP	AV
0.15MHz~0.5MHz	66~56 dBμV	56~46 dBμV
0.5MHz~5MHz	56 dBμV	46 dBμV
5MHz~30MHz	60 dBμV	50 dBμV

4.7 Radiated Spurious Emissions

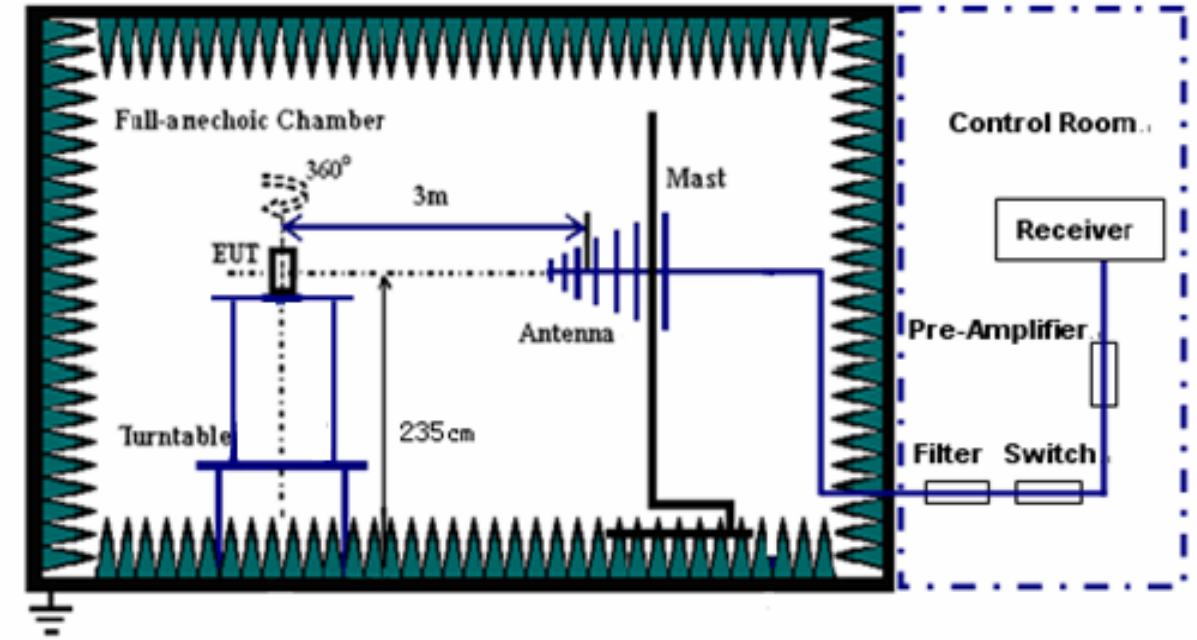
4.7.1 Test Procedure

A test site fulfilling the requirements of ITU-R Recommendation SM329-10 was used. The EUT was placed on a non-conducting support in the anechoic chamber and was operated from a power source via an RF filter to avoid radiation from the power leads.

Step 1:

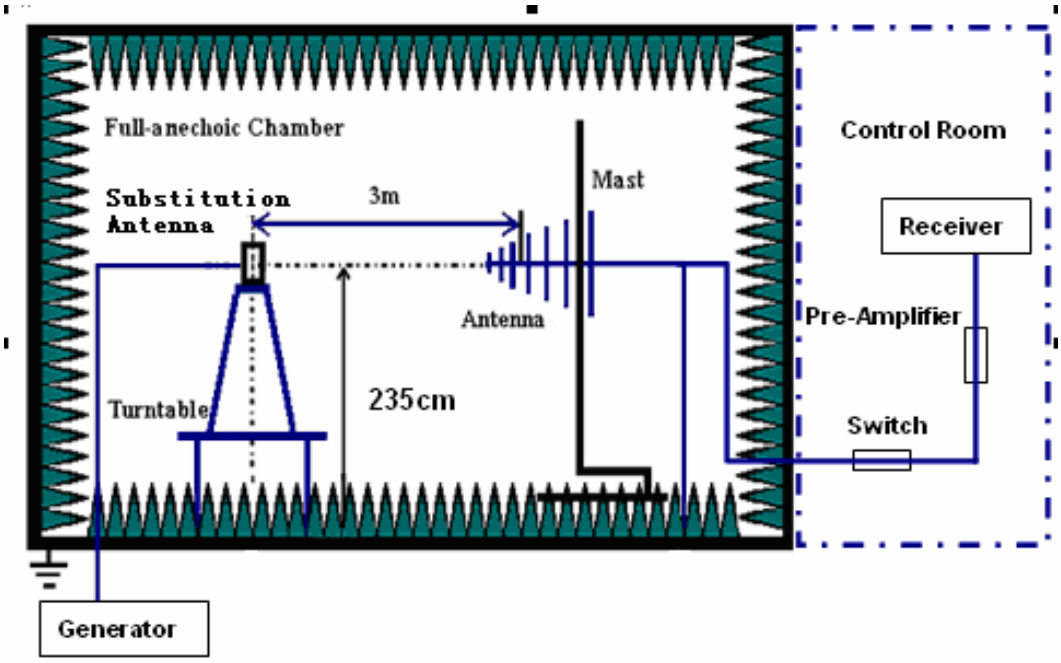
For transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, EIRP shall be measured when the transmitter is adjusted in accordance with the tune-up procedure to give the values of current and voltage on the circuit elements specified in 2.1033(c)(8). Connect the EUT to the BTS simulator via the air interface.

Test the Radiated maximum output power by the Rohde and Schwarz ESIB26 Test Receiver from test antenna.



Step 2:

Use substitution method to verify the maximum output power. The EUT is substituted by a dipole antenna. The dipole is connected to a signal generator. And then adjust the output level of the signal generator to get the same received power recorded in step1 on ESIB26 Test Receiver, and record the power level of Signal Generator. Of course, the cable loss at the test frequency should be compensated.



According to part 22.917, the defined measurement bandwidth as following:

22.917 (b) Measurement procedure: Compliance with these provisions is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater.

Measurement bandwidth (RBW) for 9 kHz up to 150 kHz: 1 kHz;
Measurement bandwidth (RBW) for 150 kHz up to 30 MHz: 10 kHz;
Measurement bandwidth (RBW) for 30 MHz up to 1 GHz: 100 kHz
Measurement bandwidth (RBW) for 30 MHz up to 18 GHz: 1 MHz;

Table 10 Radiated Spurious Emissions Limits

Frequency band	Minimum requirement (E.R.P) traffic mode
30MHz~18GHz	-13dBm

4.7.2 Test Results

The EUT has met the requirements of FCC Part 22 requirement.

5 Main Test Instruments

Table 11 Main Test Equipments

Test item	Test Instrument	Model	Manufacturer	Cal-Date	Cal Interval (month)
RE	EMI Test receiver	ESMI	R&S	April.22, 2008	12
	Broadband Antenna	CBL 6112B (2536)	SCHAFFNER	Oct.17, 2007	12
CE	EMI Test receiver	ESCS30	R&S	May.12, 2008	12
	Artificial Mains Network	ENV4200	R&S	May.12, 2008	12
RSE	EMI Test receiver	ESIB26	R&S	April.22, 2008	12
	Horn Antenna	3117	EMCO	Aug.22, 2008	12
	Broadband Antenna	CBL6112B (2747)	SCHAFFNER	Oct.17.2007	12
	Horn Antenna	3160	EMCO	Aug.22, 2008	12

Software Information			
Test Item	Software Name	Manufacturer	Version
RE/CE	ES-K1	R&S	1.7.1
RSE	EMC32	R&S	V5.10.99

6 System Measurement Uncertainty

For a 95% confidence level, the measurement expanded uncertainties for defined systems, in accordance with the recommendations of ISO 17025 were:

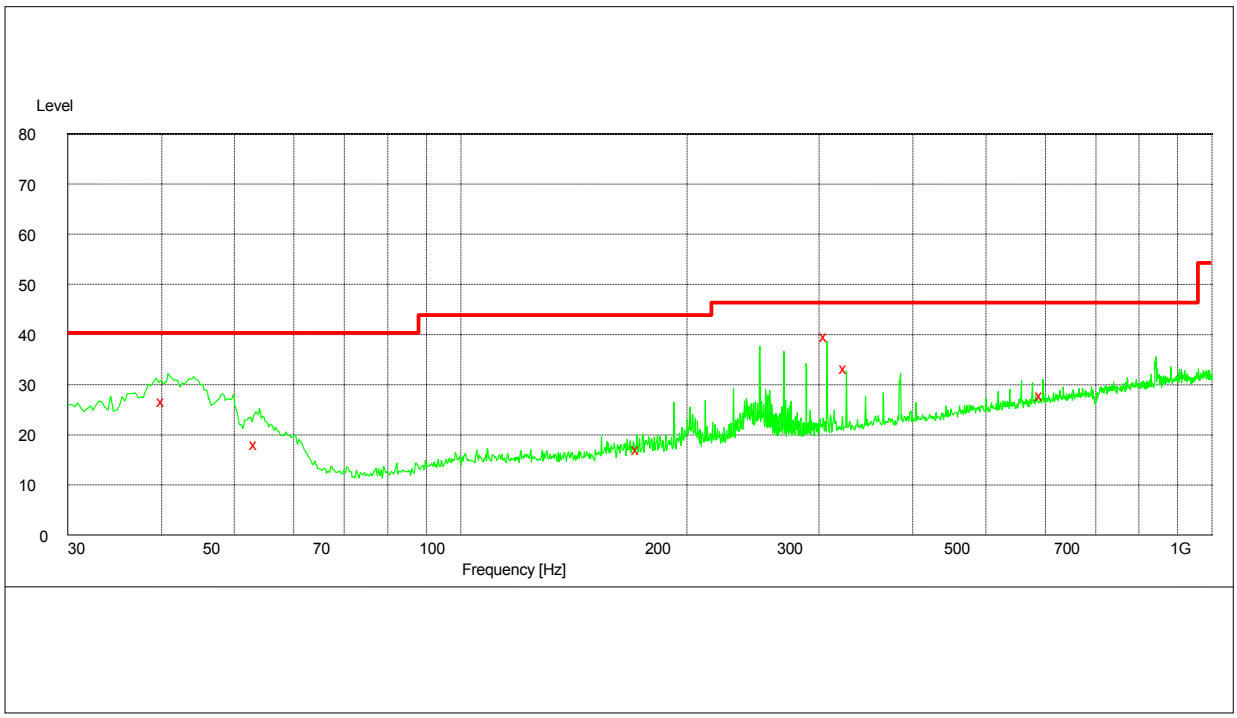
Table 12 System Measurement Uncertainty

Items		Extended Uncertainty
RE	Field strength (dBμV/m)	U=4.6dB; k=2(30MHz-1GHz)
RSE	ERP (dBm)	U=2.2dB; k=2
CE	Disturbance Voltage(dBμV)	U=3.3dB; k=2

7 Graph and Data of Emission Test

7.1 Radiated Disturbance

This test was carried out in all the test modes, Here only the worst test result was shown.



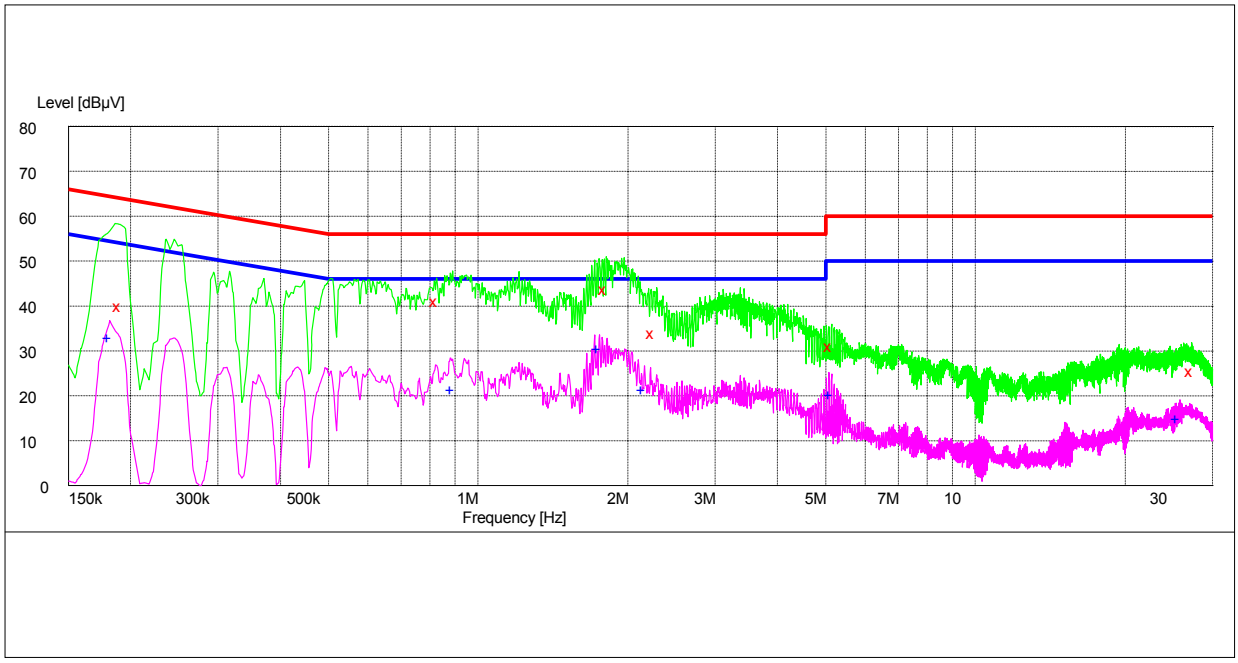
MEASUREMENT RESULT: QP Detector

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Height cm	Azimuth deg	Polarisation
40.320000	26.90	-11.4	40.0	13.1	107.0	360.00	VERTICAL
53.580000	18.20	-17.0	40.0	21.8	107.0	205.00	VERTICAL
172.800000	17.30	-14.2	43.5	26.2	200.0	46.00	HORIZONTAL
307.200000	39.80	-9.4	46.0	6.2	100.0	340.00	HORIZONTAL
326.400000	33.30	-8.9	46.0	12.7	100.0	340.00	HORIZONTAL
595.200000	28.10	-3.6	46.0	17.9	100.0	181.00	VERTICAL

7.2 Conducted Disturbance

This test was carried out in all the test modes, Here only the worst test result was shown.

7.2.1 AC Power Port Test Data



MEASUREMENT RESULT: QP Detector

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.190500	40.40	10.1	64	23.6	N	GND
0.825000	41.40	10.0	56	14.6	L3	GND
1.806000	44.10	10.1	56	11.9	L3	GND
2.256000	34.30	10.1	56	21.7	L3	GND
5.140500	31.50	10.1	60	28.5	L3	GND
27.294000	25.80	10.4	60	34.2	N	GND

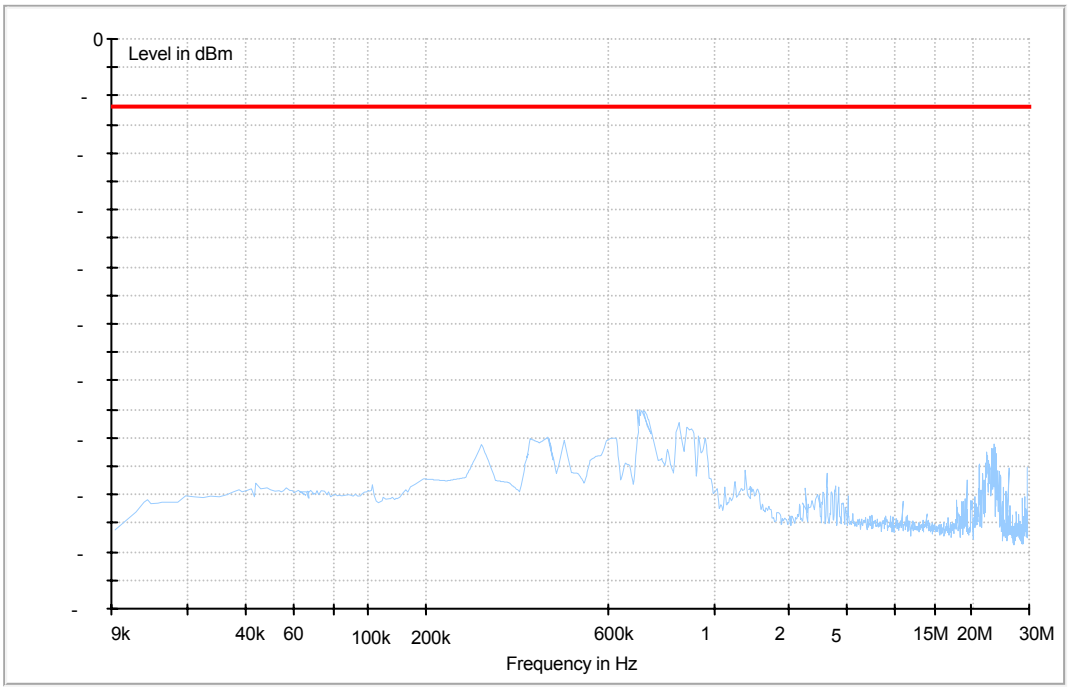
MEASUREMENT RESULT: AV Detector

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.181500	33.10	10.1	54	20.9	L3	GND
0.888000	21.60	10.0	46	24.4	L3	GND
1.752000	30.80	10.0	46	15.2	L3	GND
2.157000	21.60	10.1	46	24.4	L3	GND
5.136000	20.50	10.1	50	29.5	L3	GND
25.566000	15.10	10.4	50	34.9	N	GND

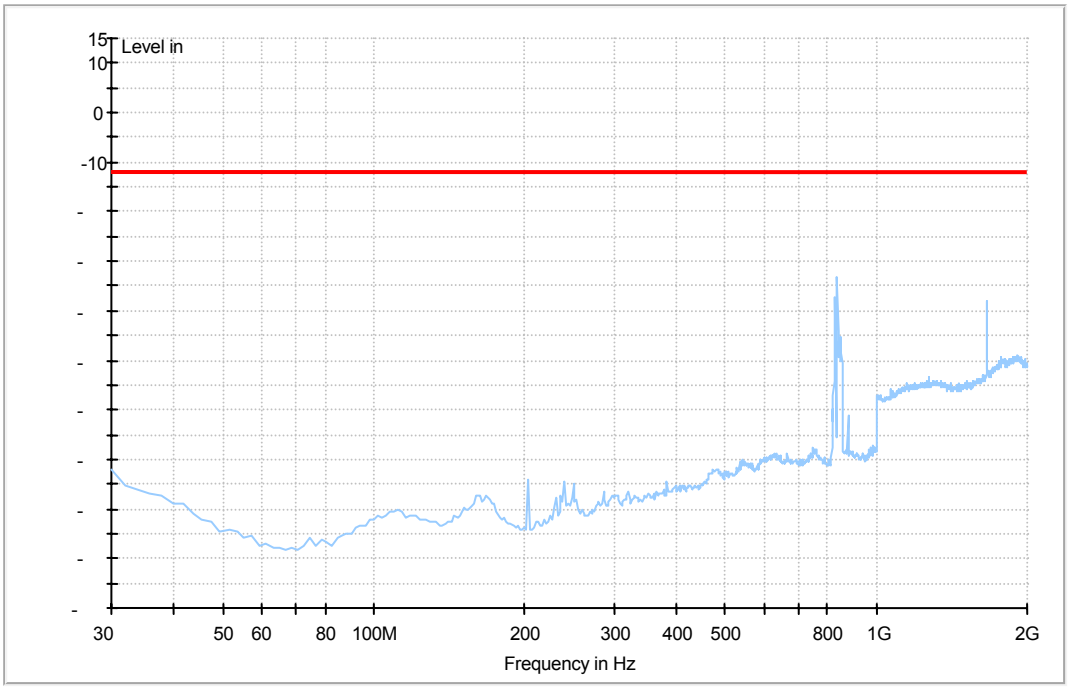
7.3 Radiated Spurious Emission

7.3.1 For Cellular 800

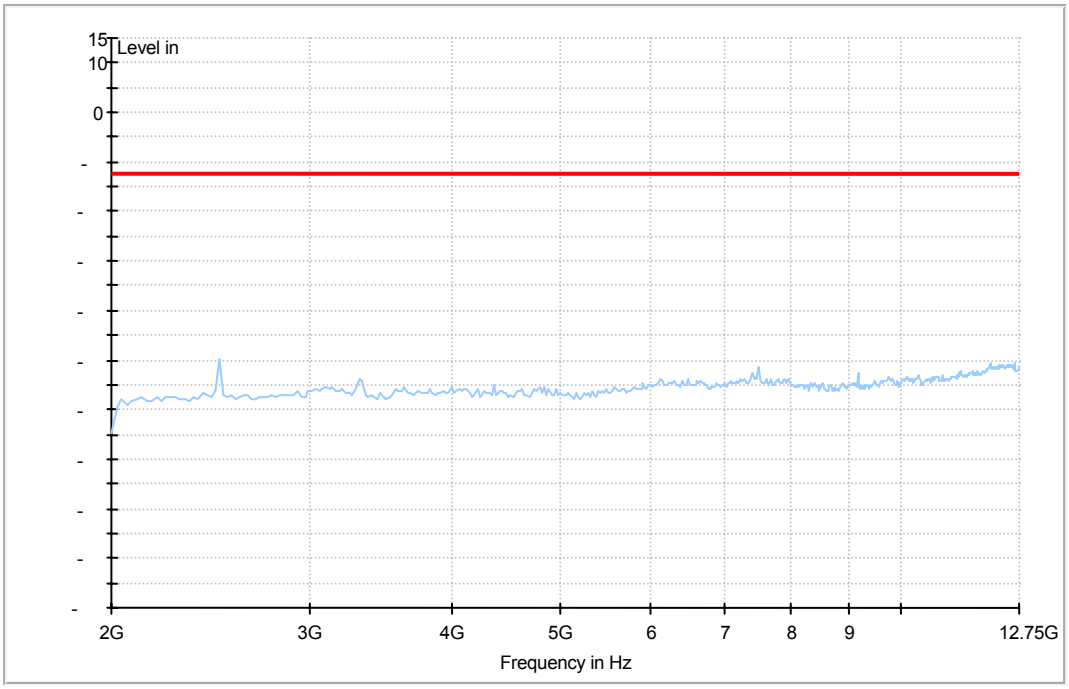
Traffic Mode (9kHz-30MHz)



Traffic Mode (30MHz-2GHz)



Traffic Mode (2GHz-12.75GHz)



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