



# EMC Test Report

**Product Name: Fixed Wireless Terminal**

**Model Number: F201**

**Report No: SYBH(Z-EMC)063052011-2**

**FCC ID:QISF201**

**Reliability Laboratory of Huawei Technologies Co., Ltd.**

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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 been listed on the US Federal Communications Commission list of test facilities recognized to perform electromagnetic emissions measurements. The site recognition number is 97456.
3. The laboratory has been listed by industry Canada to perform electromagnetic emission measurement. The site recognition number is 6369A-2.
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6. The test report is invalid if there is any evidence of erasure and/or falsification.
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8. Normally, the test report is only responsible for the samples that have undergone the test.
9. 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:

### Modification Information

Modification Information	1	
	2	
	3	<i>Not Applicable!</i>
	4	
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## 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	F201

### 1.2 Test Site

Site 1:

EMC LABORATORY OF RELIABILITY LABORATORY OF HUAWEI TECHNOLOGIES CO., LTD

### 1.3 Test environment condition

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

## 2 Summary of Results

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

<b>EUT Classification: Wireless Terminal</b>				
<b>Test Items</b>	<b>Test Configuration &amp; Test Mode</b>	<b>Required Performance Criteria</b>	<b>Result</b>	<b>Site</b>
<u>Radiated Emissions</u> Enclosure Port	TC1 (TM2)	N/A	Pass	Site1
<u>Conducted Emissions</u>	TC1 (TM1-TM2)	N/A	Pass	Site1
<u>Radiated Spurious Emissions</u> Enclosure Port	TC1 (TM1)	N/A	Pass	Site1

Note:  
1, Measurement taken is within the measurement uncertainty of measurement system.  
2, TC = Test configuration

### 3 Equipment Specification

#### 3.1 General Description

F201 is a CDMA Fixed Wireless Terminal. It's operated in Band Class 0. The Wireless Terminal implements such functions as RF signal receiving / Transmitting, CDMA protocol processing, voice. The TX is 824MHz-849MHz, the RX is 869MHz-894MHz for Band Class 0. And only CDMA 800. The TX is 824MHz-849MHz, the RX is 869MHz-894MHz.included.Externally it provides USB interface, and power interface, in addition to the charging interface.

##### 3.1.1 Main Equipment Technical Data

Description:	Fixed Wireless Terminal
Models:	F201
Input Rated Voltage	~ 120V
Maximum Emission Power:	Max 24 dBm(E.R.P.)
Dimensions	196 (depth) x152 (width) x51 (height) (mm3)
Weight	About 570g (including the battery)

Sub-Assembly Identity

Mode		Work Frequency	
		Transmitt Frequency (MHz)	Receive Frequency (MHz)
CDMA	800M	824-849	869-894

Sub-Assembly Identity

Board				
Model Name	Qty.	Serial	Description	
F201	1	9NA9KA1141100025	Centre Processing Unit	
F201	1	9NA9KA1141100025	Interface Processing Unit	
Accessory				
Name	Qty.	Manufacture	Serials number	Description
Adapter	1	Huawei Technologies Co., Ltd.	TPAB11255128	Adapter Model: HS-050040E1 Input Voltage : 100-240V ~50/60Hz, 0.2A Output Voltage: == 5V 400Ma Rated Power: 2W
Adapter	1	Huawei Technologies Co., Ltd.	BYAA70709949	Adapter Model: HS-050040E1 Input Voltage : 100-240V ~50/60Hz, 0.2A Output Voltage: == 5V 400mA Rated Power: 2W
Adapter	1	Huawei Technologies Co., Ltd.	HKAA80882822	Adapter Model: HS-050040E1 Input Voltage : 100-240V ~50/60Hz, 0.2A Output Voltage: == 5V 400mA Rated Power: 2W
Rechargeable Li-ion	1	Huawei Technologies	GRPA42867597	Battery Model: HGB-2A10x3 Rated capacity: 1000mAh



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		s Co., Ltd.		Nominal Voltage:  +3.6V Charging Voltage:  +4.2V
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#### 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

Cable Used during Test

Port	Quantity	Type of Cable
POWER	1	Non-shielding

##### 4.2 Associated Equipment Used during Test

Associated Equipment Used during Test

Name	Model	Manufacturer	S/N	Cal Date
Radio Communication Tester	CMU200	R&S	3607111817	2010-7-23

##### 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).

TC1:EUT powered with an adapter and connected to the test system (Base Station Simulator).

Configuration table

TC1	TM1~TM2
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###### 4.3.2 Test Mode

There were 2 test Modes. TM1 to 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 is required to be in the traffic mode, a call is set up according to the generic call set up procedure and enter the EUT into loop back test mode.

For CDMA, the following conditions shall also be met:  
The EUT shall be commanded to operate at maximum transmit power;

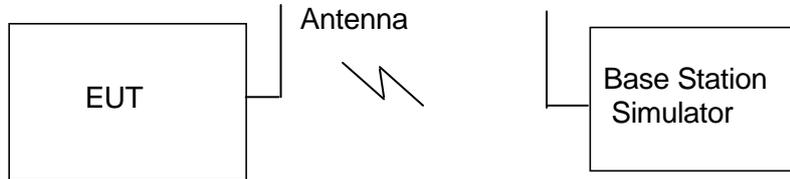


Figure 1.: Test Configuration

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). The EUT is required to be in the idle mode.

The EUT is required to be in the idle mode.

For CDMA, the following conditions shall be met:

When the EUT is required to be in the idle mode, the test system shall simulate a Base Station (BS) with Broadcast Control Channel/Common Control Channel (BCCH/CCCH) on one carrier. The EUT shall be synchronized to the BCCH, listening to the CCCH and able to respond to paging messages. Periodic Location Updating shall be disabled.

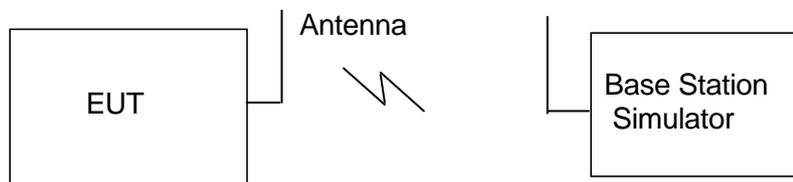


Figure 2. Test Configuration

## 5 Electromagnetic Interference (EMI)

### 5.1 Radiated Disturbance

#### 5.1.1 Test Procedure

The test site semi-anechoic chamber has met the requirement of NSA tolerance 4dB according to the standards: ANSI C63.4. The test distance was 3m. The set-up and test methods were according to ANSI C63.4.

A preliminary scan and a final scan of the emissions were made from 30 MHz to 18 GHz by using test script of software; the emissions were measured using Quasi-Peak Detector (30MHz~1GHz) and AV detector (above 1GHz). 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.

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

Measurement bandwidth: 30 MHz – 1000 MHz: 120 kHz

Measurement bandwidth: 1GHz – 18GHz: 1MHz

Test set up figure:

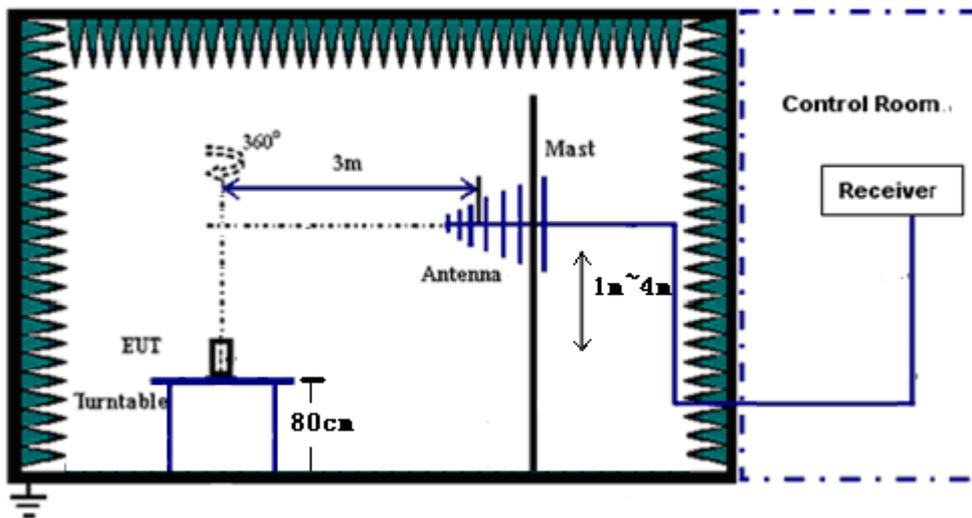


Figure 3. Test set-up

#### 5.1.2 Test Results

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

##### Test Limits

Frequency of Emission (MHz)	Radiated Limit	
	Unit( $\mu\text{V}/\text{m}$ )	Unit( $\text{dB}\mu\text{V}/\text{m}$ )
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

Note: Highest frequency generated or used in the device or on which the device operates or tunes less than 108MHz, so only frequency ranges were tested from 30MHz to 1GHz.

## 5.2 Conducted Disturbance 0.15 MHz to 30MHz

### 5.2.1 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.

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 150kHz to 30 MHz: 9 kHz;

Test Set-up figure:

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

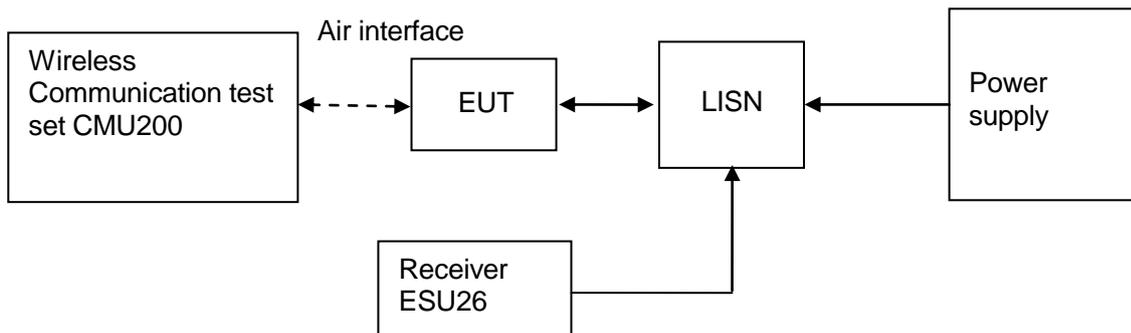


Figure 4. Test Set-up

### 5.2.2 Test Results

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

Test Limit of DC&AC Power Port

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

### 5.3 Radiated Spurious Emissions

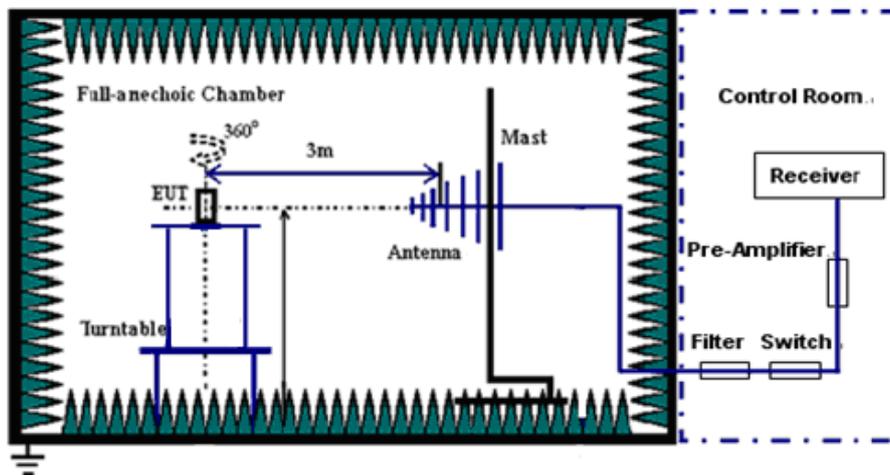
#### 5.3.1 Test Procedure

A test site fulfilling the requirements of ITU-R Recommendation SM329 was used and substitution method is reference standard ANSI/TIA-603-C. 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:

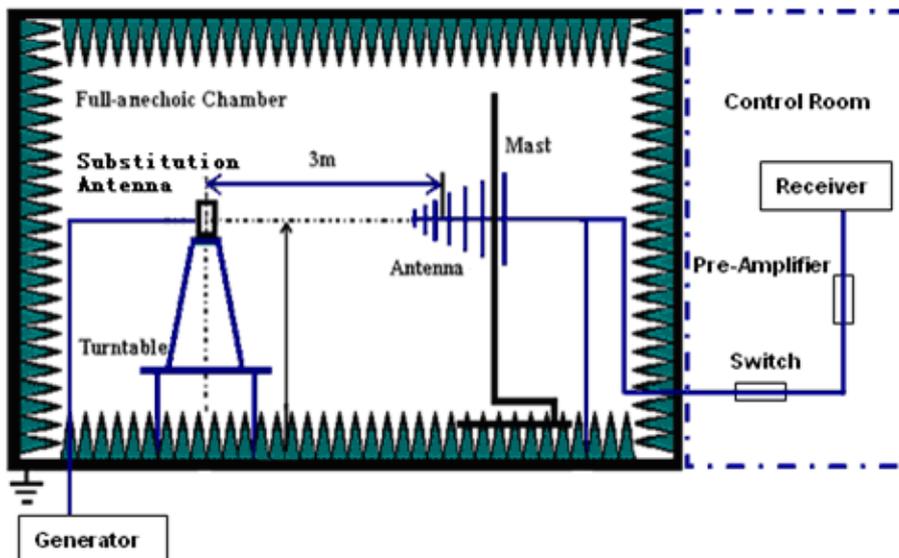
For transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, EIRP shall be measured when the transmitter is adjusted in accordance with the tune-up procedure to give the values of current and voltage on the circuit elements specified in 2.1033(c)(8). Connect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

Test the Radiated maximum output power by the 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 Test Receiver, and record the power level of Signal Generator. Of course, the cable loss at the test frequency should be compensated.



Test should be performed in normal voltage condition.

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

22.917(b) Measurement procedure: Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater.

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

Radiated Spurious Emissions Limits

Frequency band	Minimum requirement (E.R.P) traffic mode	Measurement detector
9KHz~18GHz	-13dBm	Peak

No peak found in pre- test. All frequency points' margin is bigger than 20dB, so the substitution method isn't used.

Calculation Sample:

Substitution Results

Freq. [MHz]	Measurement Value [dBm]	Substitution Antenna Type	Gain [dBd]	Cable Loss [dB]	Signal Generator Level [dBm]	Substitution Level [dBm]	FCC limit [dBm]	Result

Note: For get the E.R.P. (Efficient Radiated Power) in substitution method, the following formula should take to calculate it,

$$\text{E.R.P. [dBm]} = \text{SGP [dBm]} - \text{Cable Loss [dB]} + \text{Gain [dBd]}$$

NOTE: SGP- Signal Generator Level

### 5.3.2 Test Results

The EUT has met the requirements of FCC Part 22.

## 6 Main Test Instruments

Main Test Equipments

Test item	Test Instrument	Model	Manufacturer	Cal-Date	Cal Interval (month)
RE&CE	EMI Test receiver	ESU26	R&S	May.30, 2011	12
	Broadband Antenna	VULB 9163	SCHWARZBECK	May.30, 2011	12
	LISN	ENV216	R&S	May.30, 2011	12
RSE	EMI Test receiver	FSU40	R&S	May.30, 2011	12
	Broadband Antenna	VULB 9163	SCHWARZBECK	Jun.29,2010	12
	Horn Antenna	HF906	R&S	Sep.29,2010	12
	Signal generator	SMR 40	R&S	May.30, 2011	12
	Substitution dipole Antenna 30MHz-1GHz	D69250	SCHWARZBECK	Jan.30, 2011	12
	Substitution transmit Antenna 1GHz-18GHz	HF906	R&S	Jun.26,2010	12
Software Information					
Test Item	Software Name	Manufacturer	Version		
RE/CE	ES-K1	R&S	1.7.1		
RSE	EMC32	R&S	V8.10.10		

## 7 System Measurement Uncertainty

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

System Measurement Uncertainty

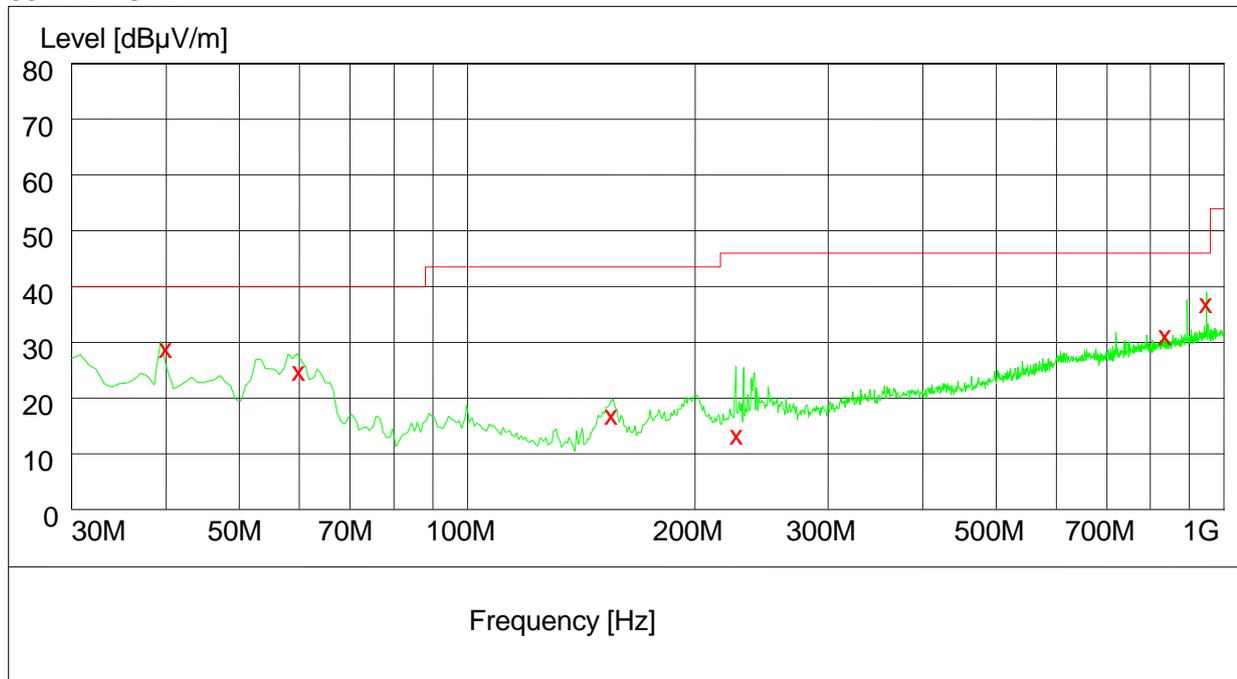
Items		Extended Uncertainty
RE	Field strength (dB $\mu$ V/m)	U=4.1dB; k=2(30MHz-1GHz)
RSE	ERP (dBm)	U=2.8dB; k=2
CE	Disturbance Voltage (dB $\mu$ V)	U=3.4dB; k=2

## 8 Graph and Data of Emission Test

### 8.1 Radiated Disturbance

This test was carried out in all the test modes, here only the worst test result with the TPAB11255128 adapter was shown.

#### 30MHz-1GHz

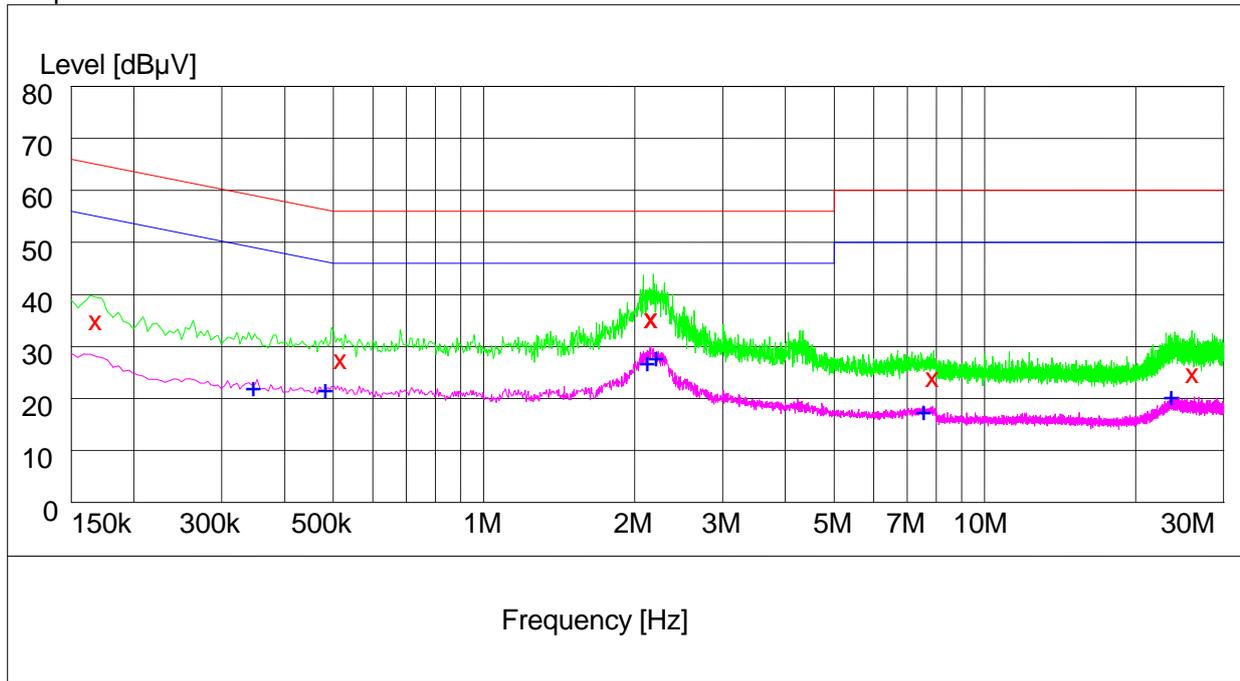


#### MEASUREMENT RESULT: QP Detector

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Height cm	Azimuth deg	Polarisation
40.020000	29.10	13.1	40.0	10.9	100.0	119.00	VERTICAL
60.000000	25.00	12.3	40.0	15.0	100.0	307.00	VERTICAL
155.100000	17.40	9.3	43.5	26.1	200.0	198.00	HORIZONTAL
227.220000	14.10	13.3	46.0	31.9	121.0	207.00	HORIZONTAL
836.580000	31.00	25.3	46.0	15.0	100.0	180.00	HORIZONTAL
947.400000	36.80	26.6	46.0	9.2	100.0	78.00	HORIZONTAL

## 8.2 Conducted Disturbance

This test was carried out in all the test modes, here only the worst test result with the TPAB11255128 adapter was shown.



### MEASUREMENT RESULT: QP Detector

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.168000	35.20	10.1	65	29.8	N	FLO
0.518000	28.30	10.1	56	27.7	N	FLO
2.162000	36.80	10.1	56	19.2	N	FLO
2.170000	36.90	10.1	56	19.1	N	FLO
7.876000	25.00	10.2	60	35.0	N	FLO
26.006000	26.40	10.4	60	33.6	N	FLO

### MEASUREMENT RESULT: AV Detector

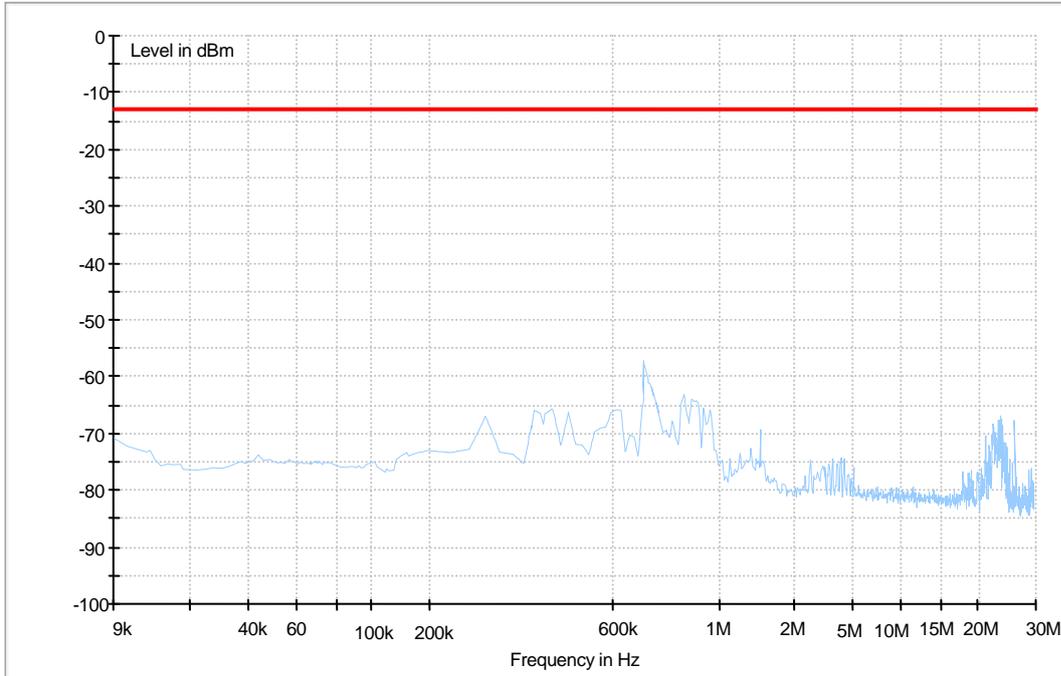
Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.346000	23.10	10.0	49	25.9	N	FLO
0.482000	22.60	10.1	46	23.7	N	FLO
2.116000	28.40	10.1	46	17.6	N	FLO
2.206000	29.50	10.1	46	16.5	N	FLO
7.548000	19.10	10.2	50	30.9	N	FLO
23.536000	20.40	10.4	50	29.6	N	FLO

### 8.3 Radiated Spurious Emission

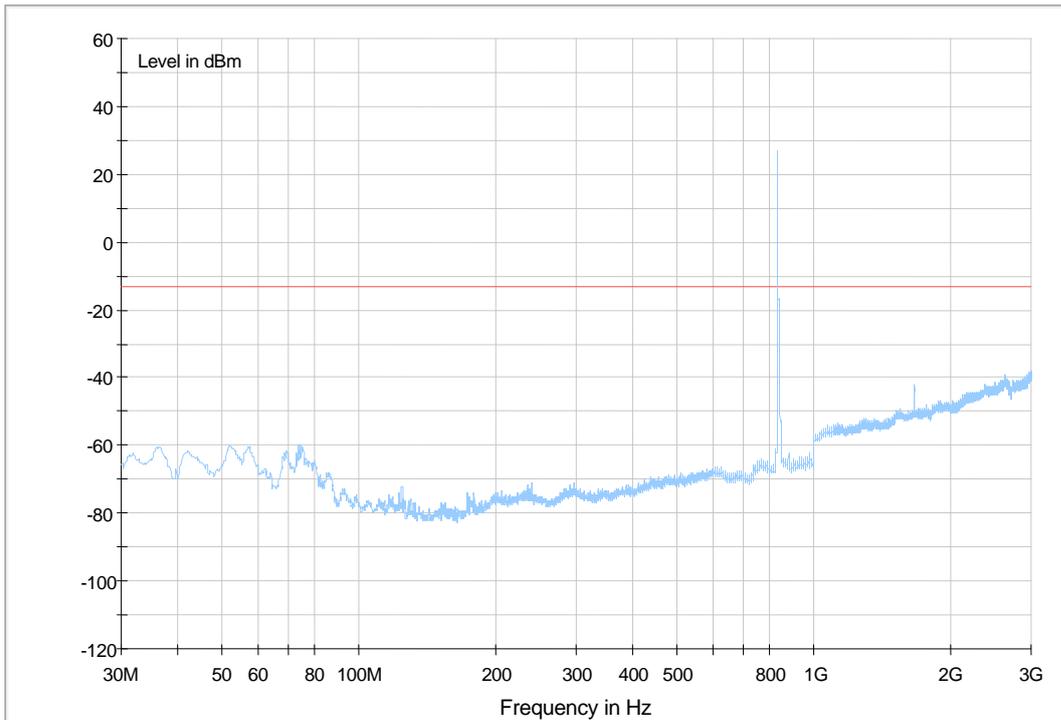
This test was carried out in all the test modes, here only the worst test result was shown. EUT operates in the ARFCN 283 channel of CDMA 800 mode with the TPAB11255128 adapter. The highest peak exceeds the limit line is carrier frequency.

#### 8.3.1 For CDMA 800

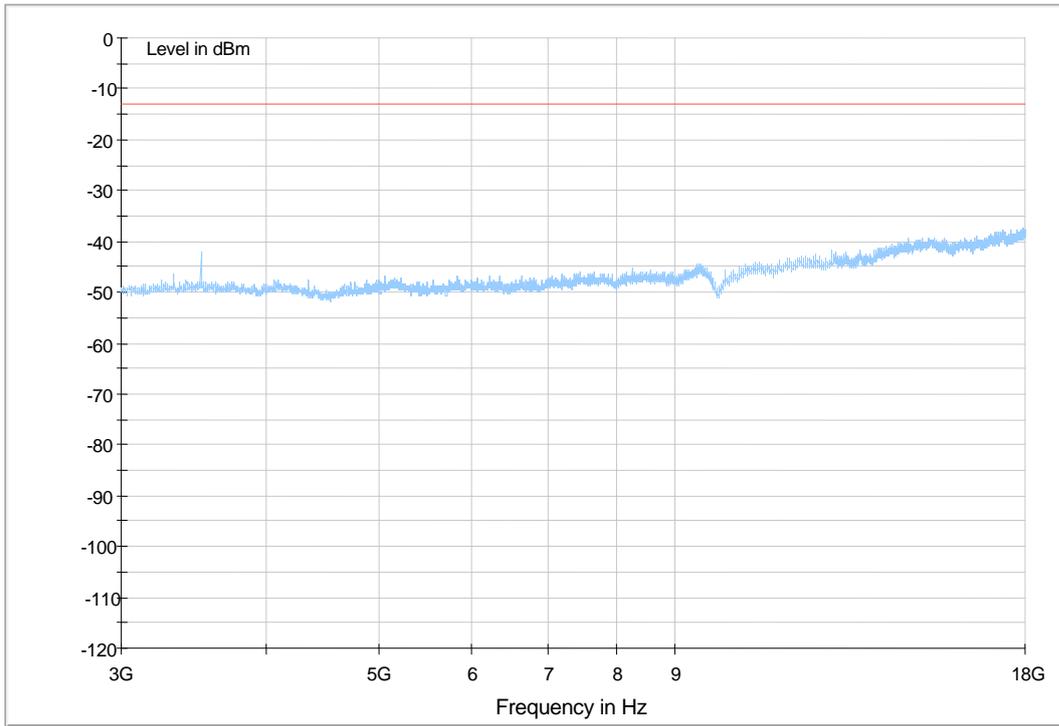
Traffic Mode (9kHz-30MHz)



Traffic Mode (30MHz-3GHz)



Traffic Mode (3GHz-18GHz)



-----**END**-----