



# EMC TEST REPORT

**Report No.:** SET2015-04490

**Product Name:** Mobile WiFi

**FCC ID:** QISE5338

**Model No. :** E5338

**Applicant:** Huawei Technologies Co., Ltd.

**Address:** Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, 518129, P.R.C

**Received Date:** 2015-03-26

**Tested Date:** 2015-03-26—2015-04-07

**Issued by:** CCIC Southern Electronic Product Testing (Shenzhen) Co., Ltd.

**Lab Location:** Electronic Testing Building, Shahe Road, Xili, Nanshan District, Shenzhen, 518055, P. R. China

**Tel:** 86 755 26627338    **Fax:** 86 755 26627238

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### Test Report

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**Manufacturer**..... : Huawei Technologies Co., Ltd.

**Manufacturer Address** ..... : Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, 518129, P.R.C

**Test Standards**..... : 47 CFR Part 15 :2013 ,Subpart B

**Test Result** ..... : PASS

**Tested by** ..... : Xiaolong Zhang 2015.04.08  
Xiaolong Zhang, Test Engineer

**Reviewed by**..... : Shuangwen Zhang 2015.04.08  
Shuangwen Zhang, Senior Engineer

**Approved by** ..... : Wu Lian 2015.04.08  
Wu Li'an, Manager



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Change History		
Issue	Date	Reason for change
1.0	2015.04.08	First edition





Serial No.: HWHKACE62105342  
 AC Adapter 4(Charger for Battery)  
 Brand Name: HUAWEI  
 Model No.: HW-050100A2W  
 Rated Input: 100-240V, 50/60Hz ,0.2A  
 Rated Output: 5V=1.0A  
 Serial No.: BYAYE70101734  
 Serial No.: HWHKACE70112624

Ancillary Equipment 2 ..... : Data cable(Shielded)

Note1: The EUT is a Mobile WiFi, it supports the following operating frequency band:GSM850/1900, WCDMA850/WCDMA1700/WCDMA1900,802.11b,802.11g,802.11n/20M.

Note 2:The EUT support the work frequency as below:

Mode		Work Frequency	
		Transmitt Frequency (MHz)	Receive Frequency (MHz)
WCDMA	WCDMA1900	1850-1910	1930-1990
	WCDMA1700	1710-1755	2110-2155
	WCDMA850	824-849	869-894
GSM	PCS1900	1850-1910	1930-1990
	GSM850	824-849	869-894
WiFi2.4G	802.11 b/g/n	2417-2462	2417-2462

Note 3:For a more detailed description, please refer to Specification or User’s Manual supplied by the applicant and/or manufacturer.



## 1.2 Test Standards and Results

The objective of the report is to perform testing according to 47 CFR Part 15 Subpart B 2013:

No.	Identity	Document Title
1	47 CFR Part 15 Subpart B 2013	Radio Frequency Devices

Test detailed items/section required by FCC rules and results are as below:

No.	Section	Description	Result
1	15.107	Conducted Emission	PASS
2	15.107	Radiated Emission	PASS

**NOTE:**

(1) The EUT has been tested according to 47 CFR Part 15 Subpart B 2013. The test procedure is according to ANSI C63.4:2014.



### 1.3 Facilities and Accreditations

#### 1.3.1 Facilities

**CNAS-Lab Code: L1659**

CCIC Southern Electronic Product Testing (Shenzhen) Co., Ltd. CCIC is a third party testing organization accredited by China National Accreditation Service for Conformity Assessment (CNAS) according to ISO/IEC 17025. The accreditation certificate number is L1659. A 12.8\*6.8\*6.4 (m) fully anechoic chamber was used for the radiated spurious emissions test.

**FCC-Registration No.: 406086**

CCIC Southern Electronic Product Testing (Shenzhen) 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. Registration 406086, valid time is until October 28, 2017.

**IC-Registration No.: 11185A-1**

CCIC Southern Electronic Product Testing (Shenzhen) Co., Ltd. EMC Laboratory has been registered by Certification and Engineering Bureau of Industry Canada for the performance of radiated measurements with Registration No. 11185A-1 on July. 15, 2013, valid time is until July. 15, 2016.

#### 1.3.2 Test Environment Conditions

During the measurement, the environmental conditions were within the listed ranges:

Temperature ( °C):	15 °C - 35 °C
Relative Humidity (%):	25% -75%
Atmospheric Pressure (kPa):	86kPa-106kPa

#### 1.3.3 Measurement Uncertainty

The uncertainty is calculated using the methods suggested in the "Guide to the Expression of Uncertainty in Measurement" (GUM) published by ISO.

Uncertainty of Conducted Emission:	Uc = 3.6 dB (k=2)
Uncertainty of Radiated Emission:	Uc = 4.5 dB (k=2)



## 2. TEST CONDITIONS SETTING

### 2.1 Test Peripherals

The following is a listing of the EUT and peripherals utilized during the performance of EMC test:

Description	Manufacturer	Model	Serial No.	FCCID /DOC
Wireless router	TP-LINK	TL-WR842 N	114110408202 9	/
Notebook	Lenovo	ThinkPad Edge E431	/	/
MOUSE	Lenovo	MO32BOA	4449040	DOC

### 2.2 Test Mode

All the test modes were carried out with the EUT under normal operation, which were shown in this report and defined as below.

Test Mode	
Mode 1	Adapter +Idle
Mode 2	Adapter +Traffic
Mode 3	Network transmission by USB(EUT with PC)+ Idle

Traffic Mode:

The EUT state is switch on and with Radio Resource Control connection established.

Idle Mode:

The EUT state is switch on But without Radio Resource Control connection established.

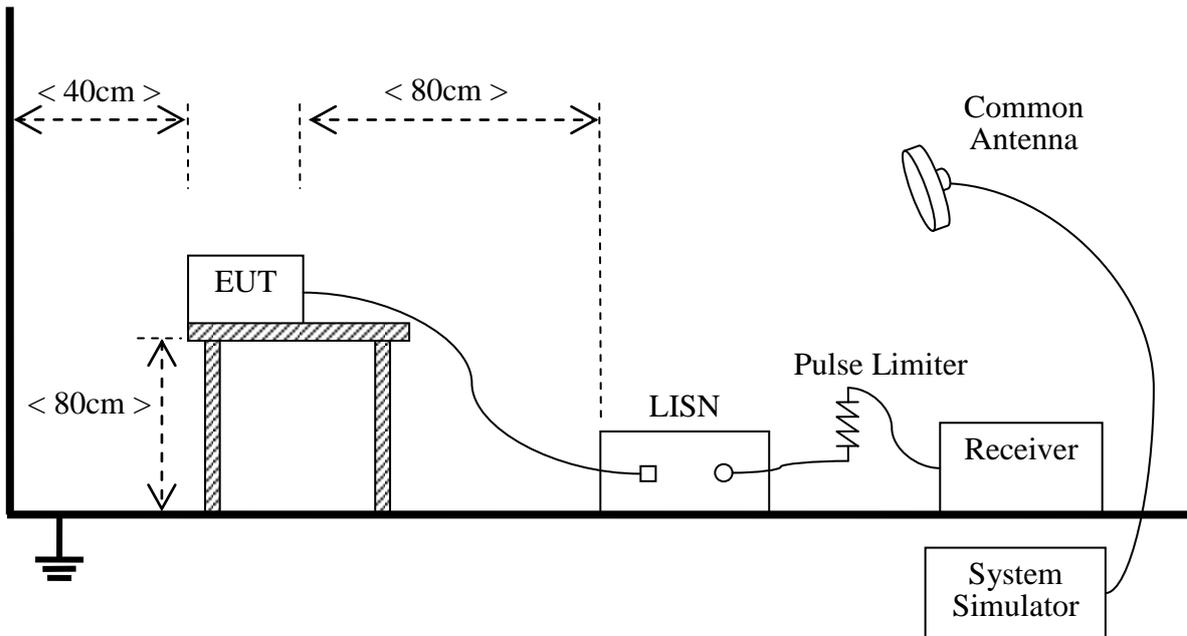
NOTE:

1. There is one kind of accessories with different models, each one should be applied throughout the compliance test respectively, however, only the worst case will be recorded in this report.
2. All test modes are performed, only the worst case is recorded in this report.

## 2.3 Test Setup and Equipments List

### 2.3.1 Conducted Emission

#### A. Test Setup:



The EUT is placed on a 0.8m high insulating table, which stands on the grounded conducting floor, and keeps 0.4m away from the grounded conducting wall. The EUT is connected to the power mains through a LISN which provides  $50\Omega/50\mu\text{H}$  of coupling impedance for the measuring instrument. The Common Antenna is used for the call between the EUT and the System Simulator (SS). A Pulse Limiter is used to protect the measuring instrument. The factors of the whole test system are calibrated to correct the reading.

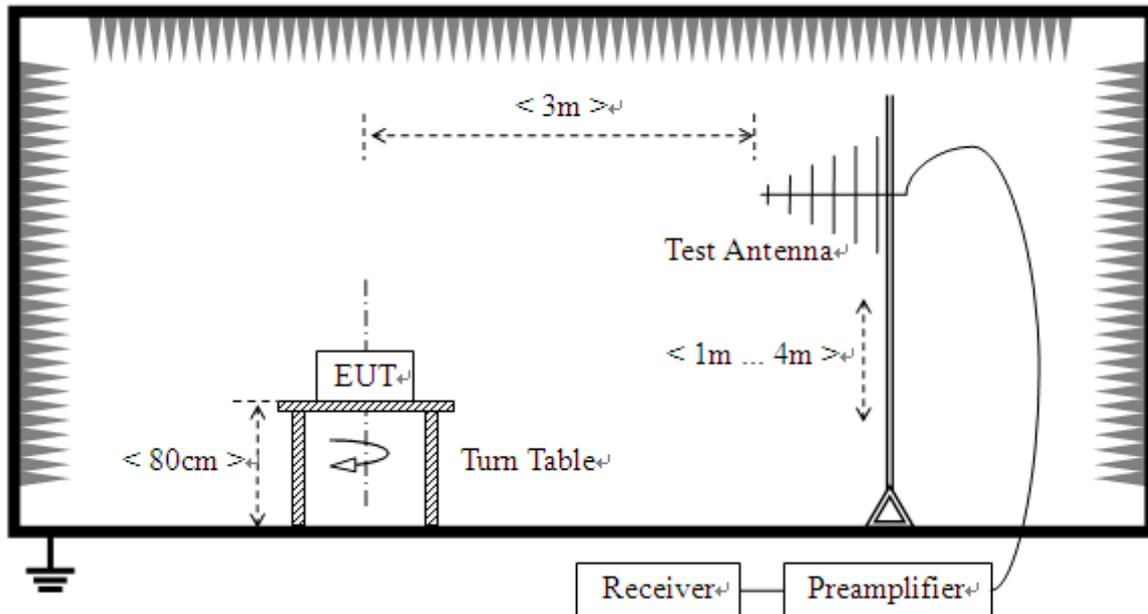
#### B. Equipments List:

Description	Manufacturer	Model	Serial No.	Calibration Date	Calibration Due. Date
Test Receiver	ROHDE&SCHWARZ	ESCI	A130901475	2014.09.09	2015.09.08
LISN	ROHDE&SCHWARZ	ENV216	/	2014.04.28	2015.04.27
Cable	MATCHING PAD	W7	/	2014.06.05	2015.06.04

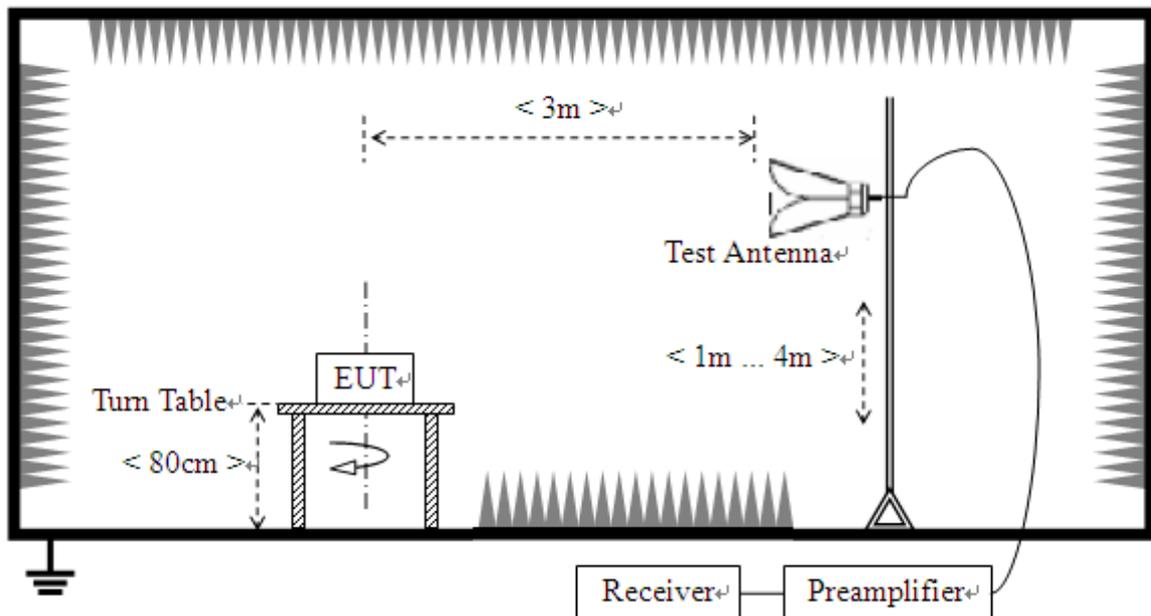
### 2.3.2 Radiated Emission

#### A. Test Setup:

- 1) For radiated emissions from 30MHz to 1GHz



- 2) For radiated emissions above 1GHz



## B. Test Procedure

The test is performed in a 3m Semi-Anechoic Chamber; the antenna factor, cable loss and so on of the site (factors) is calculated to correct the reading. The EUT is placed on a 0.8m high insulating Turn Table, and keeps 3m away from the Test Antenna, which is mounted on a



variable-height antenna master tower.

For the test Antenna:

- 1) In the frequency range above 30MHz, Bi-Log Test Antenna (30MHz to 1GHz) and Horn Test Antenna (above 1GHz) are used. Test Antenna is 3m away from the EUT. Test Antenna height is varied from 1m to 4m above the ground to determine the maximum value of the field strength. The emission levels at both horizontal and vertical polarizations should be tested.

### C. Equipments List:

Description	Manufacturer	Model	Serial No.	Calibration Date	Calibration Due. Date
Test Receiver	ROHDE&SCHWARZ	ESIB7	A0501375	2014.06.10	2015.06.09
Test Receiver	ROHDE&SCHWARZ	ESIB26	A0304218	2014.06.10	2015.06.09
Semi-Anechoic Chamber	Albatross	9m*6m*6m	A0412372	2015.03.22	2016.03.21
Test Antenna - Bi-Log	HP	CBL6111A	A9704202	2014.06.10	2015.06.09
Test Antenna – Horn	ROHDE&SCHWARZ	HF906	A0304225	2014.06.10	2015.06.09
Anechoic Chamber	Albatross	SAC-5MAC 12.8x6.8x6.4m	A0304210	2015.03.22	2016.03.21
Amplifier 1G~18GHz	ROHDE&SCHWARZ	MITEQ AFS42-001018 00	A0509366	2014.06.10	2015.06.09
Amplifier 20M~3GHz	Compliance Direction System	PAP-0203H	A0509377	2014.06.10	2015.06.09
Cable	SUNHNER	SUCOFLEX 100	/	2014.06.10	2015.06.09
Cable	SUNHNER	SUCOFLEX 104	MY1758/4	2014.06.10	2015.06.09



### 3. 47 CFR PART 15B REQUIREMENTS

#### 3.1 Conducted Emission

##### 3.1.1 Requirement

According to FCC section 15.107, the radio frequency voltage that is conducted back onto the AC power line on any frequency within the band 150kHz to 30MHz shall not exceed the limits in the following table, as measured using a 50 $\mu$ H/50 $\Omega$  line impedance stabilization network (LISN).

Frequency range (MHz)	Conducted Limit (dB $\mu$ V)	
	Quasi-peak	Average
0.15 - 0.50	66 to 56	56 to 46
0.50 - 5	56	46
5 - 30	60	50

NOTE:

- The limit subjects to the Class B digital device.
- The lower limit shall apply at the band edges.
- The limit decreases linearly with the logarithm of the frequency in the range 0.15 - 0.50MHz.

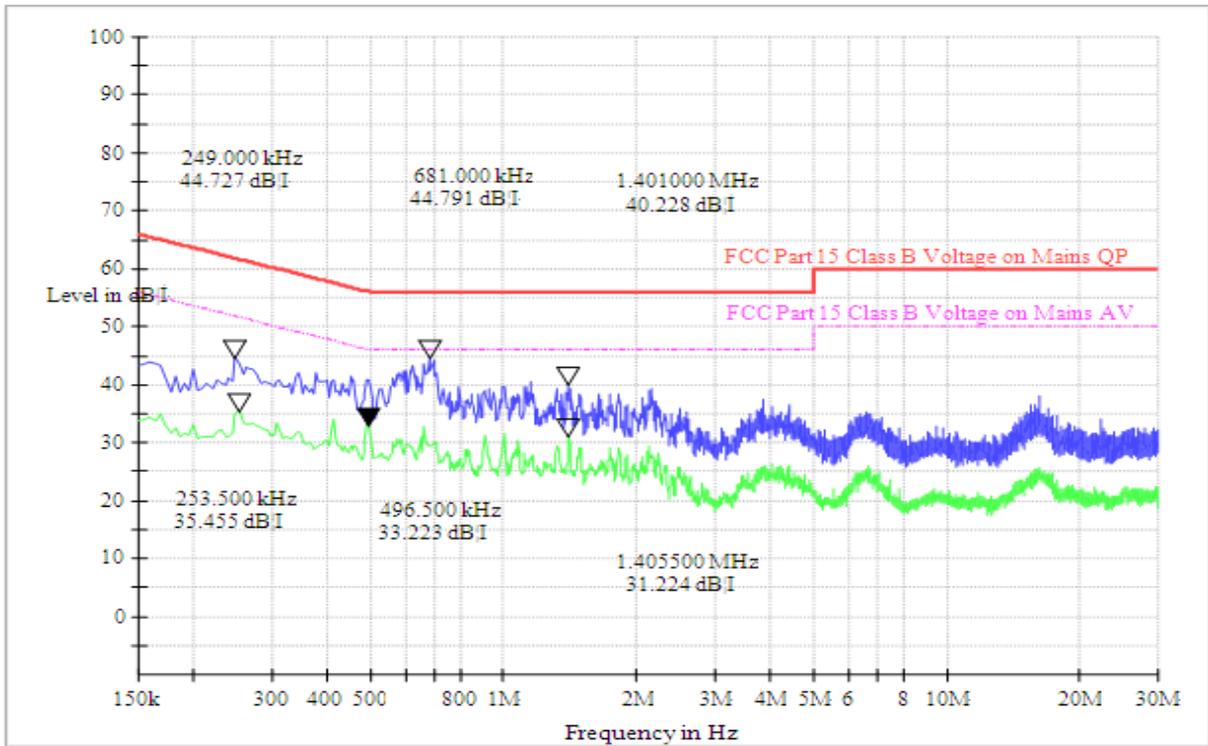
##### 3.1.2 Test Description

See section 2.3.1 of this report.

##### 3.1.3 Test Result

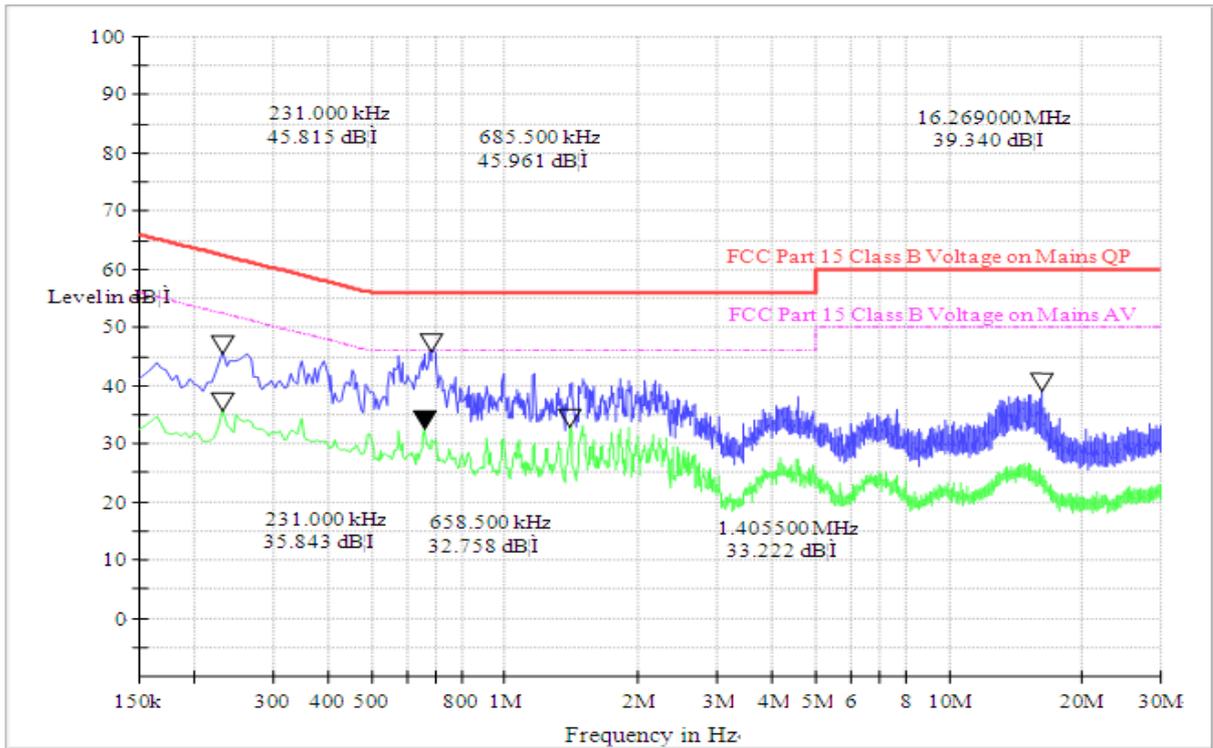
The maximum conducted interference is searched using Peak (PK), Quasi-peak (QP) and Average (AV) detectors; the emission levels more than the AV and QP limits, and that have narrow margins from the AV and QP limits will be re-measured with AV and QP detectors. Tests for both L phase and N phase lines of the power mains connected to the EUT are performed. All test modes are considered, refer to recorded points and plots below.

**A. Test Plot and Suspicious Points:**



(Plot A: L Phase)

Conducted Disturbance at Mains Terminals							
L Test Data							
QP				AV			
Frequency (MHz)	Limits (dB $\mu$ V)	Measurement Value (dB $\mu$ V)	Margin (dB)	Frequency (MHz)	Limits (dB $\mu$ V)	Measurement Value (dB $\mu$ V)	Margin (dB)
0.2490	61.80	43.21	18.59	0.2535	51.60	33.48	18.12
0.6810	56.00	43.04	12.96	0.4965	46.10	31.85	14.25
1.4010	56.00	38.30	17.70	1.4055	46.00	29.35	16.65



(Plot B: N Phase)

Conducted Disturbance at Mains Terminals							
N Test Data							
QP				AV			
Frequency (MHz)	Limits (dBμV)	Measurement Value (dBμV)	Margin (dB)	Frequency (MHz)	Limits (dBμV)	Measurement Value (dBμV)	Margin (dB)
0.2310	62.40	43.69	18.71	0.2310	52.40	33.68	18.72
0.6855	56.00	43.29	12.71	0.6585	46.00	30.37	15.63
16.2690	60.00	37.59	22.41	1.4055	46.00	31.64	14.36

**Test Result: PASS**

## 3.2 Radiated Emission

### 3.2.1 Requirement

According to FCC section 15.109, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values:

Radiated Emissions Limits below 1GHz

Frequency range (MHz)	ClassB Radiated Limit (dB $\mu$ V/m)	
	Quasi-peak	
30 to 88	40	
88 to 216	43.5	
216 to 960	46	
960 to 1000	54	

Radiated Emissions Limits above 1GHz

Frequency range (MHz)	ClassB Radiated Limit (dB $\mu$ V/m)	
	Linear Average Detector	Peak Detector
>1000	54	74

- a) As shown in FCC section 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector. When average radiated emission measurements are specified in this part, including emission measurements below 1000MHz, there also is a limit on the radio frequency emissions, as measured using instrumentation with a peak detector function, corresponding to 20dB above the maximum permitted average limit for the frequency being investigated unless a different peak emission limit is otherwise specified in the rules.
- b) Test Antenna is 3m away from the EUT. Test Antenna height is varied from 1m to 4m above the ground to determine the maximum value of the field strength.
- c) For below 1G :QP detector RBW 120kHz ,VBW 300kHz.
- d) For Above 1G: PK detector RBW 1MHz,VBW 3MHz for PK value ;PK detector RBW 1MHz, VBW 10Hz for AV value.

Note:

- 1) The tighter limit shall apply at the boundary between two frequency range.
- 2) Limitation expressed in dBuV/m is calculated by  $20\log$  Emission Level(uV/m).
- 3) If measurement is made at 3m distance, then F.S Limitation at 3m distance is adjusted by using the formula of  $Ld1 = Ld2 * (d2/d1)^2$ .

Example:

F.S Limit at 30m distance is 30uV/m, then F.S Limitation at 3m distance is adjusted as

$$Ld1 = L1 = 30\text{uV/m} * (10)^2 = 100 * 30\text{uV/m}.$$



### 3.2.2 Test Description

See section 2.3.2 of this report.

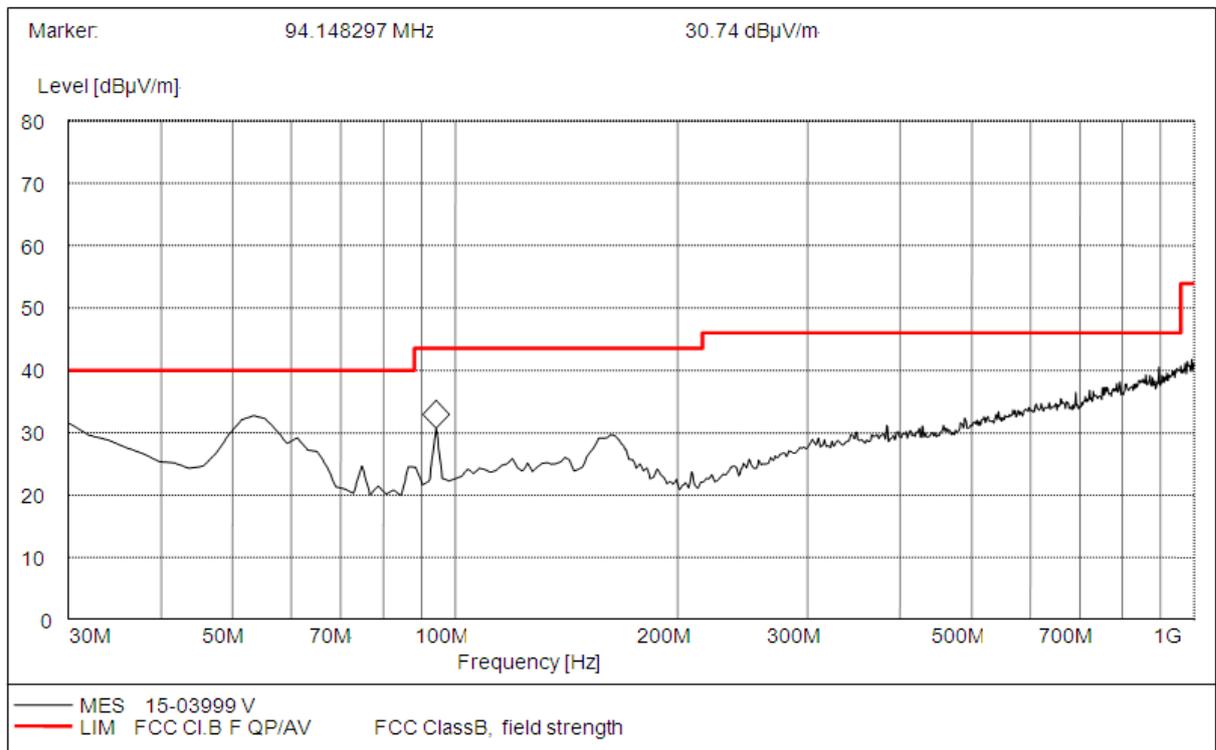
### 3.2.3 Test Result

The maximum radiated emission is searched using PK, QP and AV detectors; the emission levels more than the limits, and that have narrow margins from the limits will be re-measured with AV and QP detectors. Both the vertical and the horizontal polarizations of the Test Antenna are considered to perform the tests. All test modes are considered, refer to recorded points and plots below.

The amplitude of spurious emissions which are attenuated more than 20 dB below the permissible value need not be reported.

Note: All radiated emission tests were performed in X, Y, Z axis direction, and only the worst axis test condition was recorded in this test report.

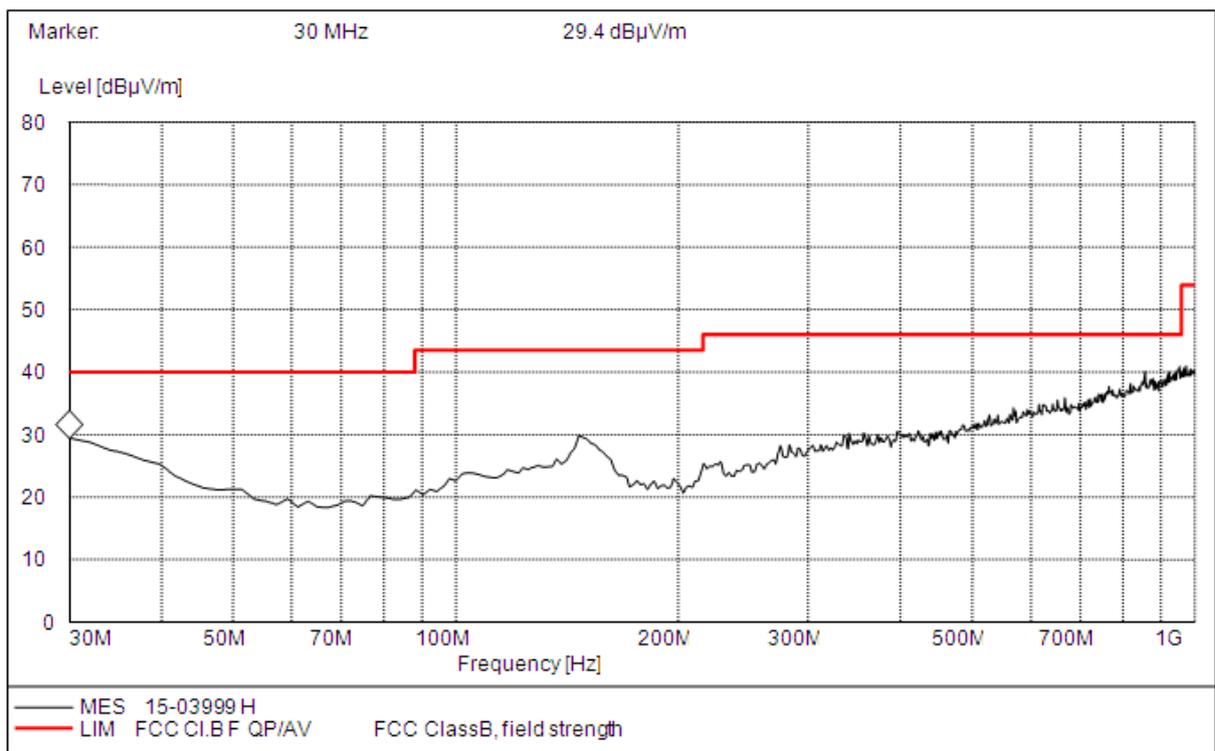
#### B. Test Plots and Suspicious Points:



(Plot C: Test Antenna Vertical 30M - 1G)

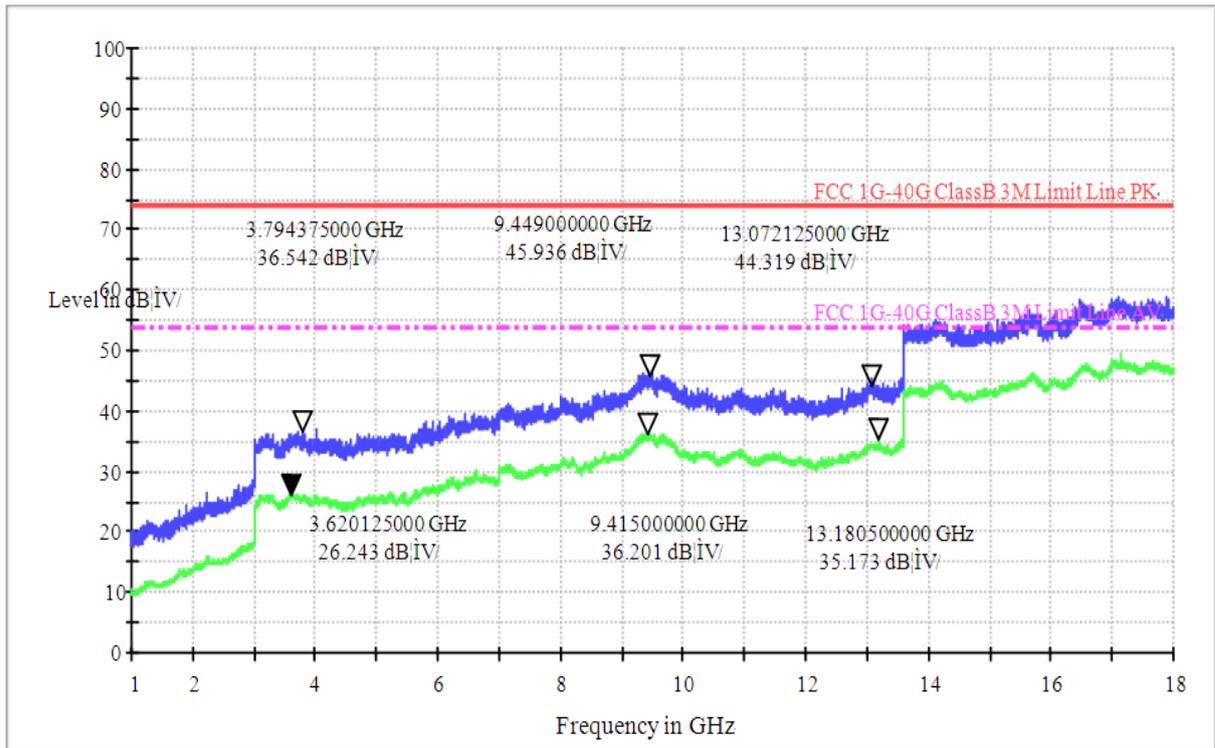


Frequency (MHz)	QuasiPeak (dB $\mu$ V/m)	Bandwidth (kHz)	Antenna height (cm)	Limit (dB $\mu$ V/m)	Margin (dB)	Antenna	Verdict
54.25000	29.44	120.000	100.0	40.00	10.56	Vertical	Pass
94.03000	28.14	120.000	100.0	43.50	15.36	Vertical	Pass
165.93000	27.71	120.000	100.0	43.50	15.79	Vertical	Pass



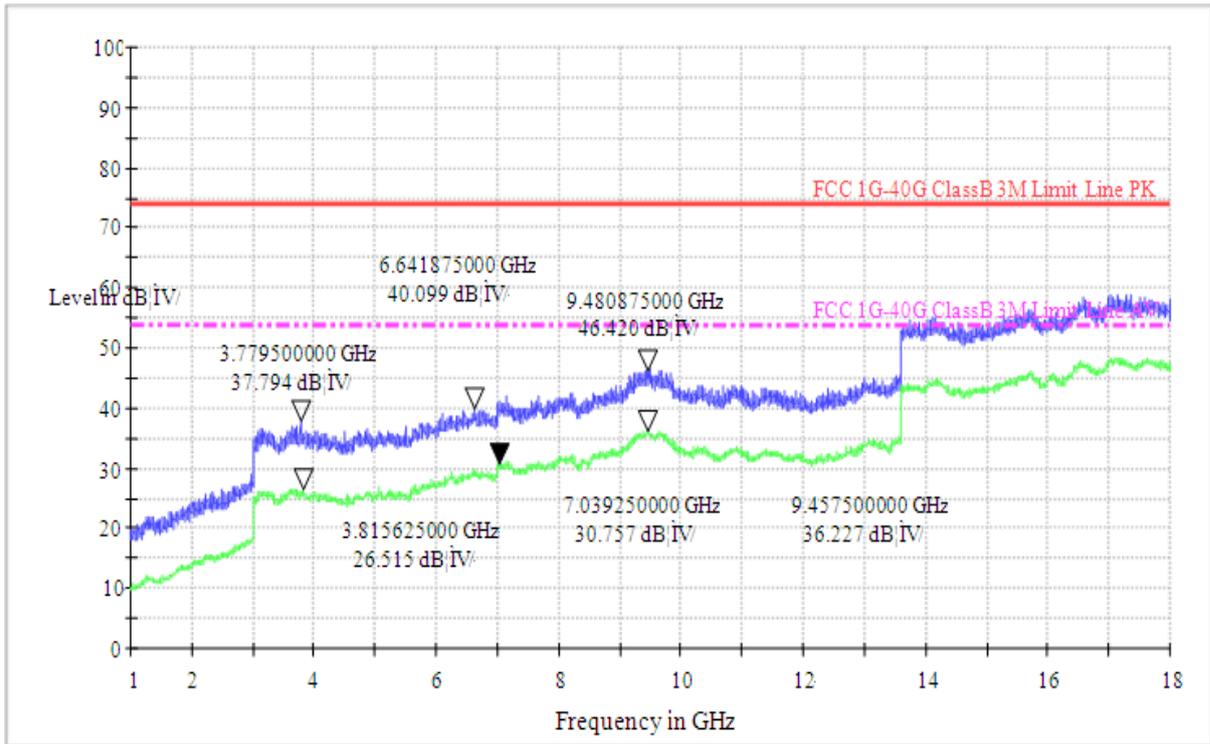
(Plot D: Test Antenna Horizontal 30M - 1G)

Frequency (MHz)	QuasiPeak (dB $\mu$ V/m)	Bandwidth (kHz)	Antenna height (cm)	Limit (dB $\mu$ V/m)	Margin (dB)	Antenna	Verdict
30.53000	26.44	120.000	100.0	40.00	13.56	Horizontal	Pass
147.82000	26.37	120.000	100.0	43.50	17.13	Horizontal	Pass
756.23000	38.48	120.000	100.0	46.00	7.52	Horizontal	Pass



(Plot E: Test Antenna Horizontal 1G – 18G)

Frequency (MHz)	PK/AV (dBµV/m)	Bandwidth (kHz)	Antenna height (cm)	Limit (dBµV/m)	Margin (dB)	Antenna	Verdict
3620.01090	25.65	1000.000	150.0	54.00	28.35	Horizontal	Pass
9415.25352	35.65	1000.000	150.0	54.00	18.35	Horizontal	Pass
13180.6145	34.25	1000.000	200.0	54.00	19.75	Horizontal	Pass
3794.32090	35.43	1000.000	200.0	74.00	38.57	Horizontal	Pass
9448.46352	44.13	1000.000	150.0	74.00	29.87	Horizontal	Pass
13072.0145	43.31	1000.000	150.0	74.00	30.69	Horizontal	Pass



(Plot F: Test Antenna Vertical 1G – 18G)

Frequency (MHz)	PK/AV (dB $\mu$ V/m)	Bandwidth (kHz)	Antenna height (cm)	Limit (dB $\mu$ V/m)	Margin (dB)	Antenna	Verdict
3815.24120	31.69	1000.000	175.0	54.00	22.31	Vertical	Pass
7038.25122	31.46	1000.000	150.0	54.00	22.54	Vertical	Pass
9457.22415	33.78	1000.000	100.0	54.00	20.22	Vertical	Pass
3779.50120	36.46	1000.000	150.0	74.00	37.54	Vertical	Pass
6641.76122	39.27	1000.000	205.0	74.00	34.73	Vertical	Pass
9480.14132	45.43	1000.000	150.0	74.00	28.57	Vertical	Pass

**Test Result: PASS**