



EMC TEST REPORT

Report No.: SET2015-03023

Product Name: LTE Wingle

FCC ID: QISE8372H-511

IC: 6369A-E8372H511

Model No. : E8372h-511

Applicant: Huawei Technologies Co., Ltd.

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

Received Date: 2015-03-02

Tested Date: 2015-03-02—2015-03-11

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

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

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Test Standards..... : 47 CFR Part 15 :2013 ,Subpart B
ICES-003 Issue 5 August 2012

Test Result : PASS

Tested by : Xiaolong Zhang 2015.03.12
Xiaolong Zhang, Test Engineer

Reviewed by..... : Shuangwen Zhang 2015.03.12
Shuangwen Zhang, Senior Engineer

Approved by : Wu Lian 2015.03.12
Wu Li'an, Manager

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Change History		
Issue	Date	Reason for change
1.0	2015.03.12	First edition



1. GENERAL INFORMATION

1.1 EUT Description

EUT Name : LTE Wingle
Serial No..... : X5T0115124000182
IMEI No. : 866783020001818
FCC ID..... : QISE8372H-511
IC..... : 6369A-E8372H511
Trade Name..... : Huawei
Brand Name..... : Huawei
Hardware Version..... : CL1E8372HM
Software Version : 22.521.00.00.00
Ancillary Equipment : AC Adapter
Brand Name: HUAWEI
Model No.: HW-050100U4W HW-050100E4W
HW-050100B4W
Rated Input: 100-240V, 50/60Hz ,0.2A
Rated Output: 5V=1.0A
Serial No.:B53867EBE00100
Serial No.:HWUEA01EC3003667
CAR CHARGE
Brand Name: HUAWEI
Model No.: HWCC02
Rated Input: 12V-24V, 1.0A
Rated Output: 5V=1.0A
Serial No.:HWUEA03E92300250
Serial No.:HWBYA28E51100376

Note1: E8372h-511 LTE/DC-HSDPA/HSPA+/HSPA/WCDMA/GSM ternary mode is subscriber equipment in the LTE/UMTS/GSM system. E8372h-511 implement such functions as RF signal receiving/ transmitting, LTE/DC-HSDPA/ HSPA+/WCDMA/GSM protocol processing, data service etc, and it can act as a Wi-Fi hotspot for user accessing to internet. Externally it provides USIM card interface and Micro SD card interface.

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

Mode		Work Frequency		
		Transmitt Frequency (MHz)	Receive Frequency (MHz)	Bandwidths (including wifi chanel)
GSM	GSM850	824-849	869-894	



	PCS1900	1850-1910	1930-1990	
WCDMA	WCDMA1900	1850-1910	1930-1990	
	WCDMA 1700	1710-1755	2110-2155	
	WCDMA850	824-849	869-894	
LTE	LTE1900(2)	1850-1910	1930-1990	5,10,15,20
	LTE AWS(4)	1710-1755	2110-2155	5,10,15,20
	LTE850 (5)	824-849	869-894	5,10
	LTE (12)	699-716	729-746	5,10
	LTE (17)	704-716	734-746	5,10
WiFi	2.4G	2412-2462	2412-2462	20MCH1-11 40M CH3-9

*Note3:*The EUT is equipped with a T-Flash card slot; equipped with a USB port which can be connected to the ancillary equipments.

*Note 4:*The EUT equips with two travel chargers(which is made by different Manufacturer) and two car chargers(which is made by different Manufacturer), two USB cables.

*Note 5:*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 and ICES-003 Issue5 August 2012:

No.	Identity	Document Title
1	47 CFR Part 15 Subpart B 2013	Radio Frequency Devices
2	ICES-003 Issue5 August 2012	Information Technology Equipment(ITE) -Limits and methods of measurement

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

No.	Section		Description	Result
	FCC	IC		
1	15.107	6.1	Conducted Emission	PASS
2	15.109	6.2	Radiated Emission	PASS

NOTE:

- (1) The EUT has been tested according to 47 CFR Part 15 Subpart B 2013 and ICES-003 Issue5 August 2012. 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
Notebook	ThinkPad	E430C	A131101550	/
Micro SD card	4GB	SanDisk	/	/
Mouse	Microsoft	1068	/	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	USB Copy(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.

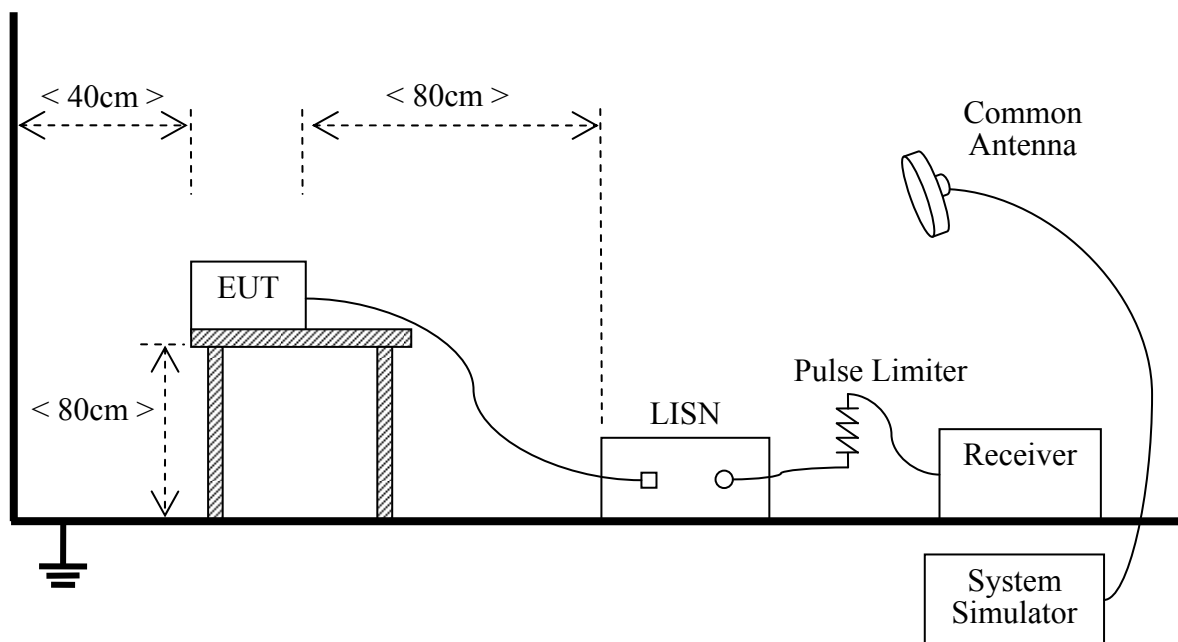
NOTE:

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 50Ω/50μH 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.

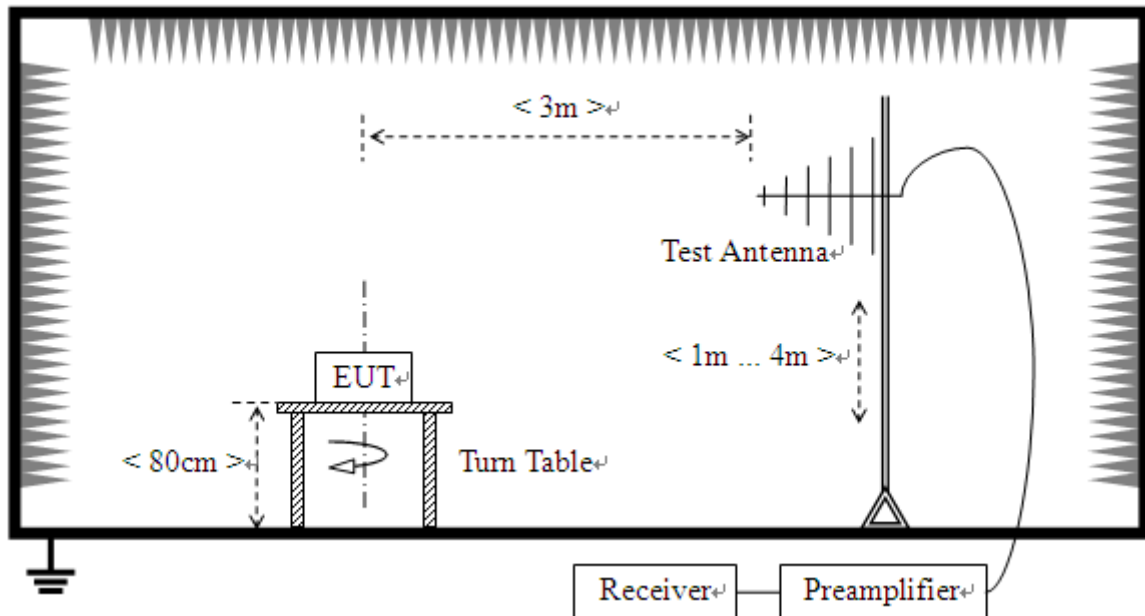
B. Equipments List:

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

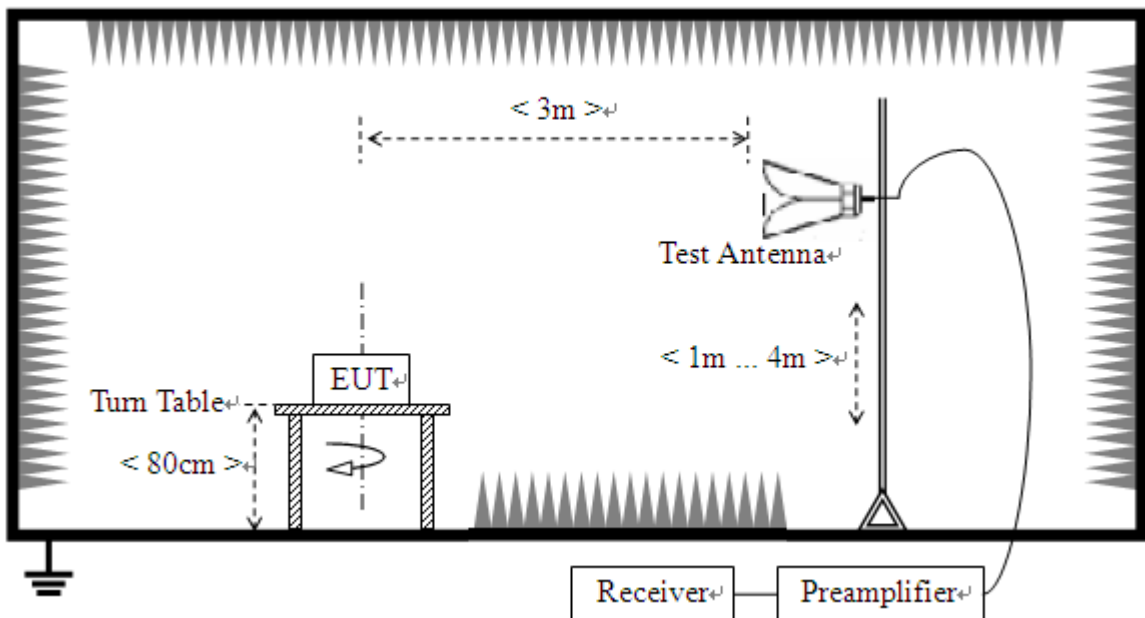
2.3.2 Radiated Emission

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	2014.03.22	2015.03.21
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	2014.03.22	2015.03.21
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 AND ICES-003 REQUIREMENTS

3.1 Conducted Emission

3.1.1 Requirement

According to FCC section 15.107 and ICES-003, 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 μ H/50 Ω line impedance stabilization network (LISN).

Frequency range (MHz)	Conducted Limit (dB μ 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.

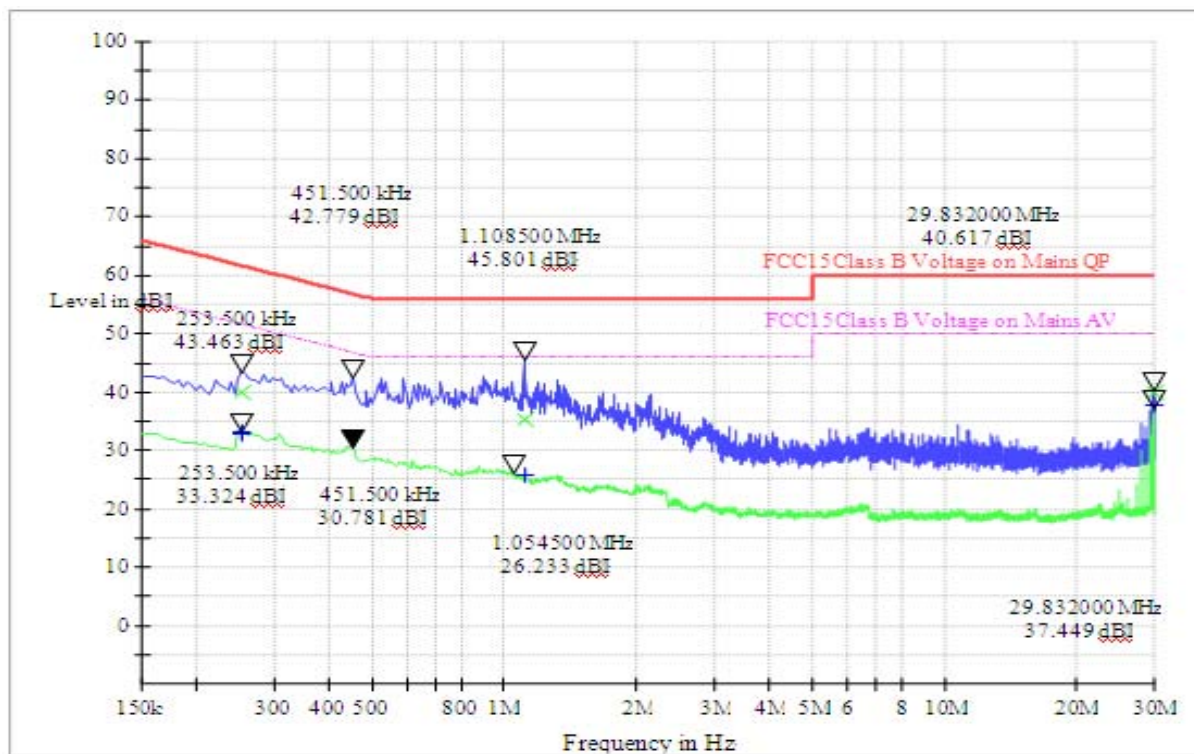
3.1.2 Test Description

See section 2.3.1 of this report.

3.1.3 Test Result

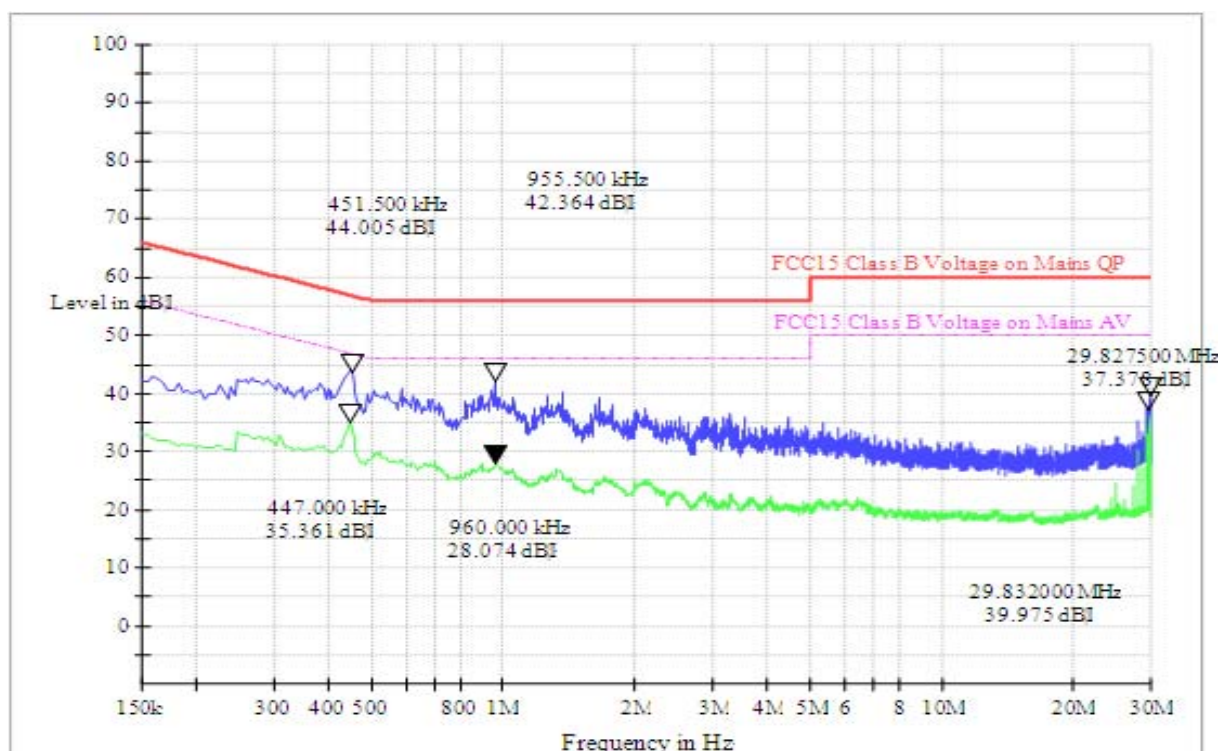
The maximum conducted interference is searched using Peak (PK), Quasi-peak (QP) and Average (AV) detectors; the emission levels more than the AV and QP limits, and that have narrow margins from the AV and QP limits will be re-measured with AV and QP detectors. Tests for both L phase and N phase lines 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 (dBμV)	Measurement Value (dBμV)	Margin (dB)	Frequency (MHz)	Limits (dBμV)	Measurement Value (dBμV)	Margin (dB)
0.2535	61.60	39.90	21.70	0.2535	51.60	33.00	18.60
1.1085	56.00	35.30	20.70	1.1085	46.00	25.80	20.20
29.8320	60.00	40.00	20.00	29.8320	50.00	37.70	12.30



(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)
0.4515	56.80	43.02	13.78	0.4470	46.90	33.26	13.64
0.9555	56.00	41.26	14.74	0.9600	46.00	26.57	19.43
29.8275	60.00	38.82	21.18	29.8275	50.00	36.40	13.60

Test Result: PASS

3.2 Radiated Emission

3.2.1 Requirement

According to FCC section 15.109 and ICES-003, 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 μ 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 μ V/m)	
	Linear Average Detector	Peak Detector
>1000	54	74

- 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.
- 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.
- For below 1G :QP detector RBW 120kHz ,VBW 300kHz.
- For Above 1G: PK detector RBW 1MHz,VBW 3MHz for PK value ;PK detector RBW 1MHz, VBW 10Hz for AV value.

Note:

- The tighter limit shall apply at the boundary between two frequency range.
- Limitation expressed in dB μ V/m is calculated by $20\log$ Emission Level(μ V/m).
- 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 30 μ V/m, then F.S Limitation at 3m distance is adjusted as

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

3.2.2 Test Description

See section 2.3.2 of this report.

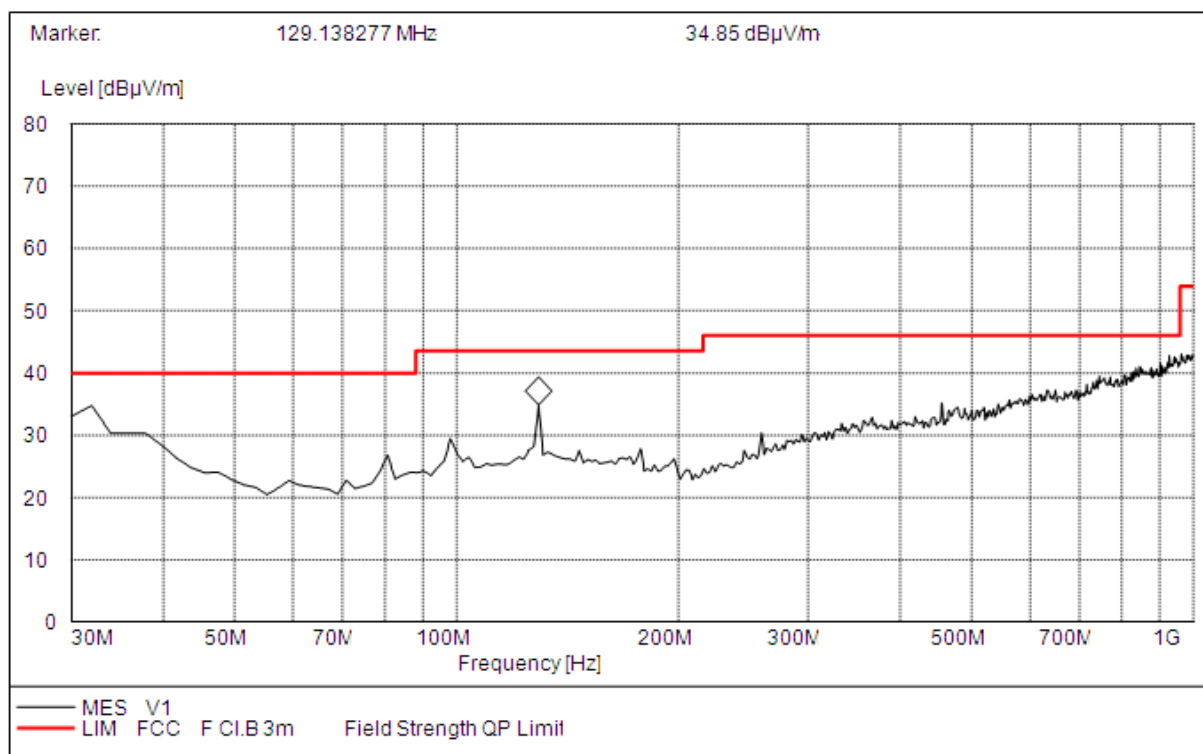
3.2.3 Test Result

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.

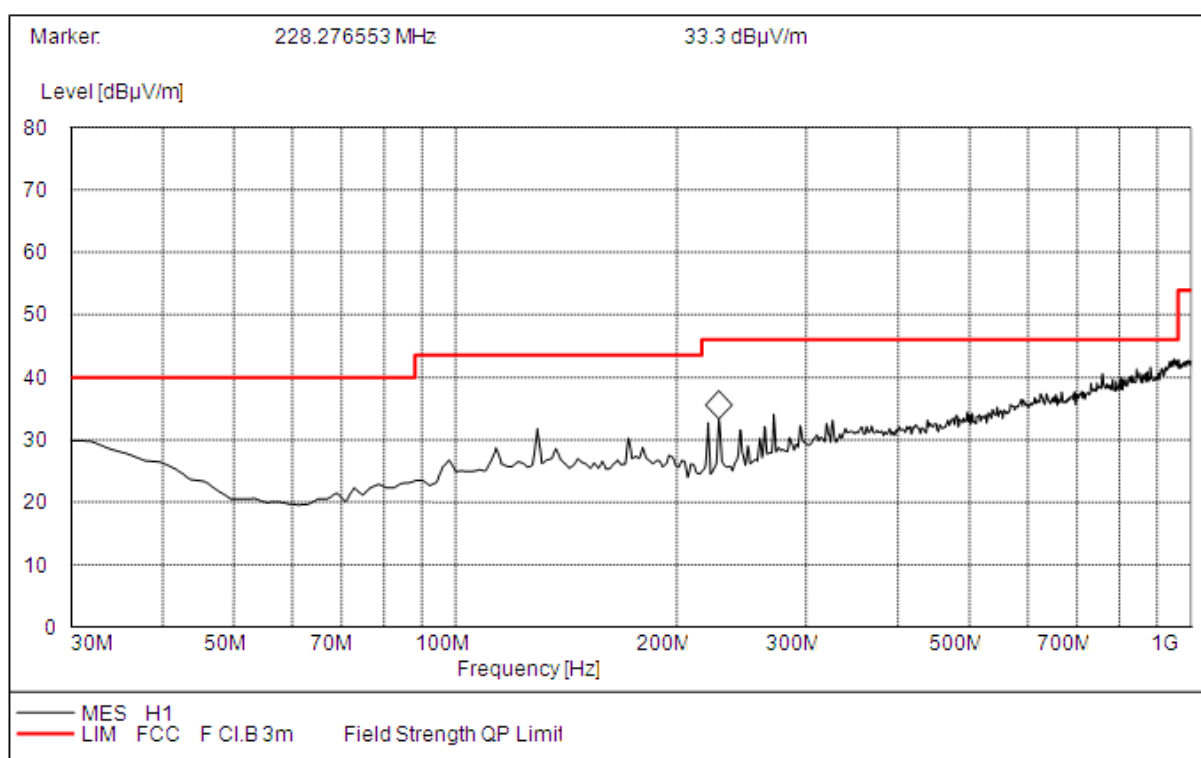
Note: All radiated emission tests were performed in X, Y, Z axis direction, and only the worst axis test condition was recorded in this test report.

B. Test Plots and Suspicious Points:



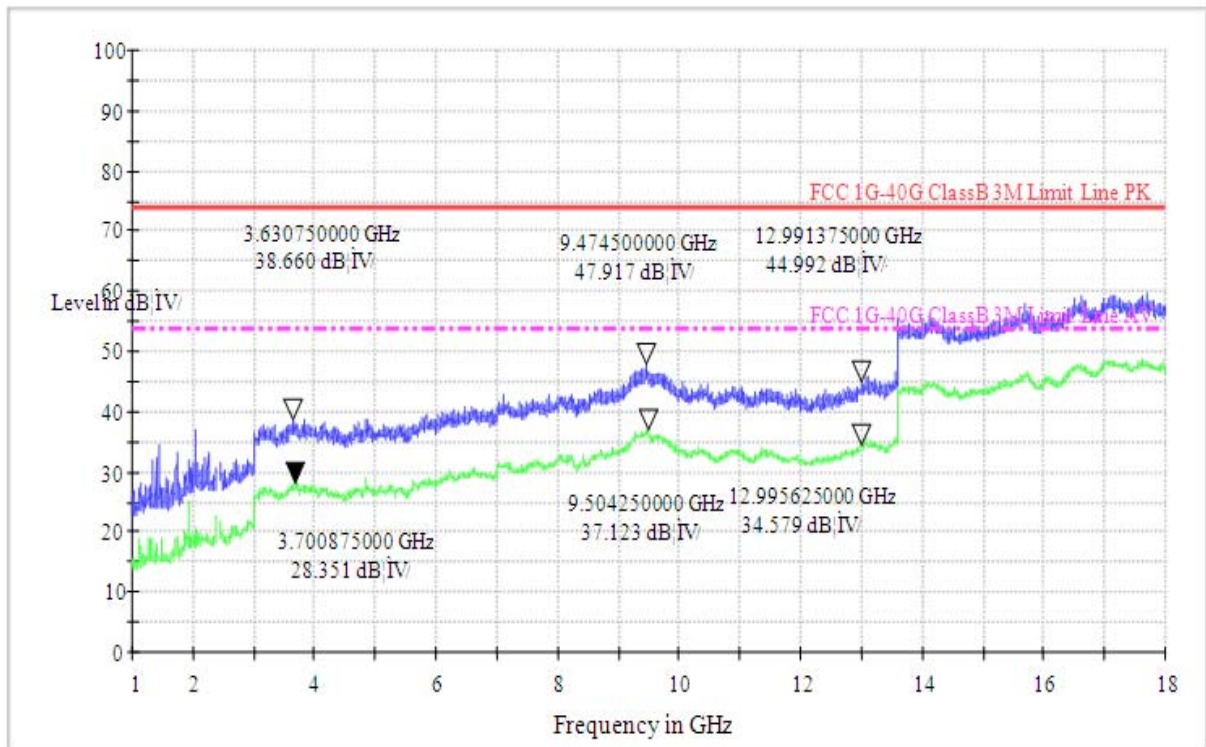
(Plot C: Test Antenna Vertical 30M - 1G)

Frequency (MHz)	QuasiPeak (dB μ V/m)	Bandwidth (kHz)	Antenna height (cm)	Limit (dB μ V/m)	Margin (dB)	Antenna	Verdict
32.01000	31.39	120.000	100.0	40.00	8.61	Vertical	Pass
129.36000	32.67	120.000	150.0	43.50	10.83	Vertical	Pass
455.23000	32.26	120.000	200.0	46.00	13.74	Vertical	Pass



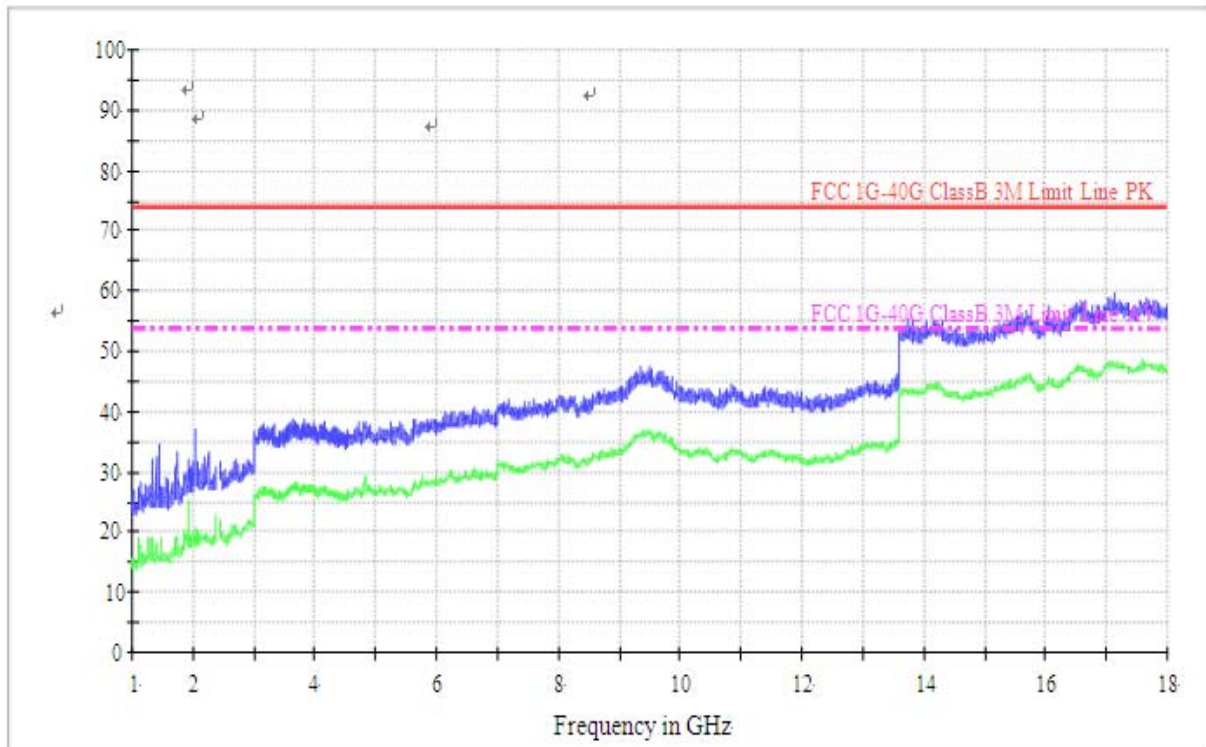
(Plot D: Test Antenna Horizontal 30M - 1G)

Frequency (MHz)	QuasiPeak (dB μ V/m)	Bandwidth (kHz)	Antenna height (cm)	Limit (dB μ V/m)	Margin (dB)	Antenna	Verdict
30.36000	28.27	120.000	100.0	40.00	11.73	Horizontal	Pass
129.29000	29.15	120.000	100.0	43.50	14.35	Horizontal	Pass
228.30000	32.20	120.000	100.0	46.00	13.80	Horizontal	Pass



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

Frequency (MHz)	PK/AV (dB μ V/m)	Bandwidth (kHz)	Antenna height (cm)	Limit (dB μ V/m)	Margin (dB)	Antenna	Verdict
3603.10090	28.79	1000.000	100.0	54.00	25.21	Horizontal	Pass
9474.76352	36.16	1000.000	150.0	54.00	17.84	Horizontal	Pass
12991.7145	34.08	1000.000	120.0	54.00	19.92	Horizontal	Pass
3603.10090	37.29	1000.000	100.0	74.00	36.71	Horizontal	Pass
9474.76352	46.15	1000.000	150.0	74.00	27.85	Horizontal	Pass
12991.7145	44.11	1000.000	120.0	74.00	29.89	Horizontal	Pass



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

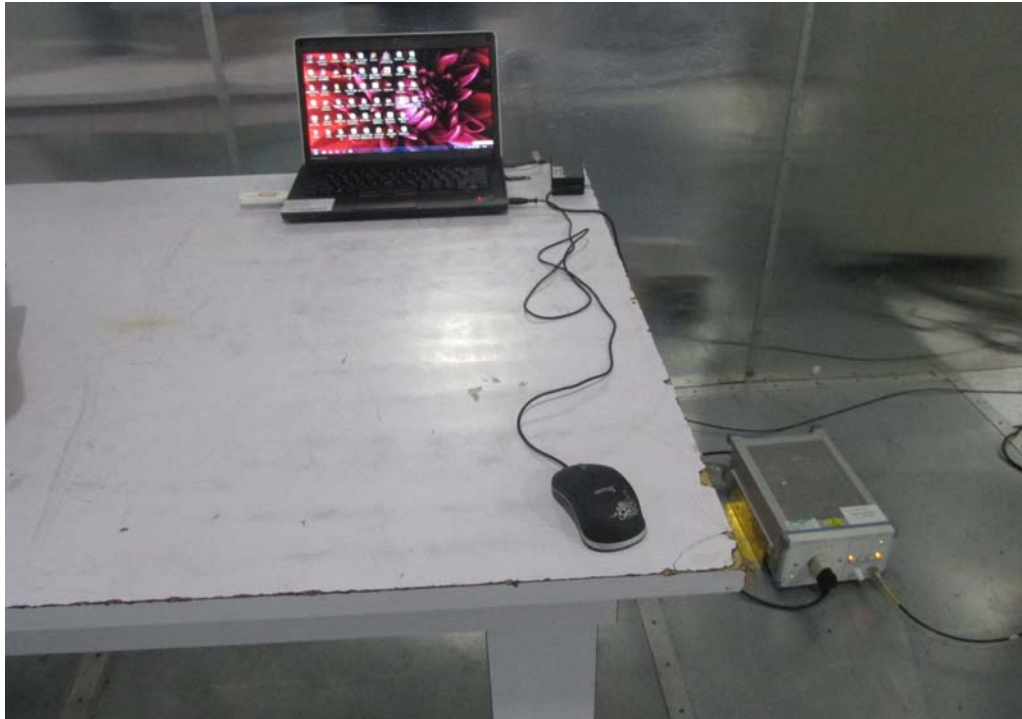
Frequency (MHz)	PK/AV (dBμV/m)	Bandwidth (kHz)	Antenna height (cm)	Limit (dBμV/m)	Margin (dB)	Antenna	Verdict
3660.20124	27.69	1000.000	100.0	54.00	26.31	Vertical	Pass
9421.76124	36.06	1000.000	150.0	54.00	17.94	Vertical	Pass
11516.1410	33.18	1000.000	120.0	54.00	20.82	Vertical	Pass
3660.20124	38.26	1000.000	100.0	74.00	35.74	Vertical	Pass
9421.76124	46.25	1000.000	150.0	74.00	27.75	Vertical	Pass
11516.1410	44.05	1000.000	120.0	74.00	29.95	Vertical	Pass

Test Result: PASS

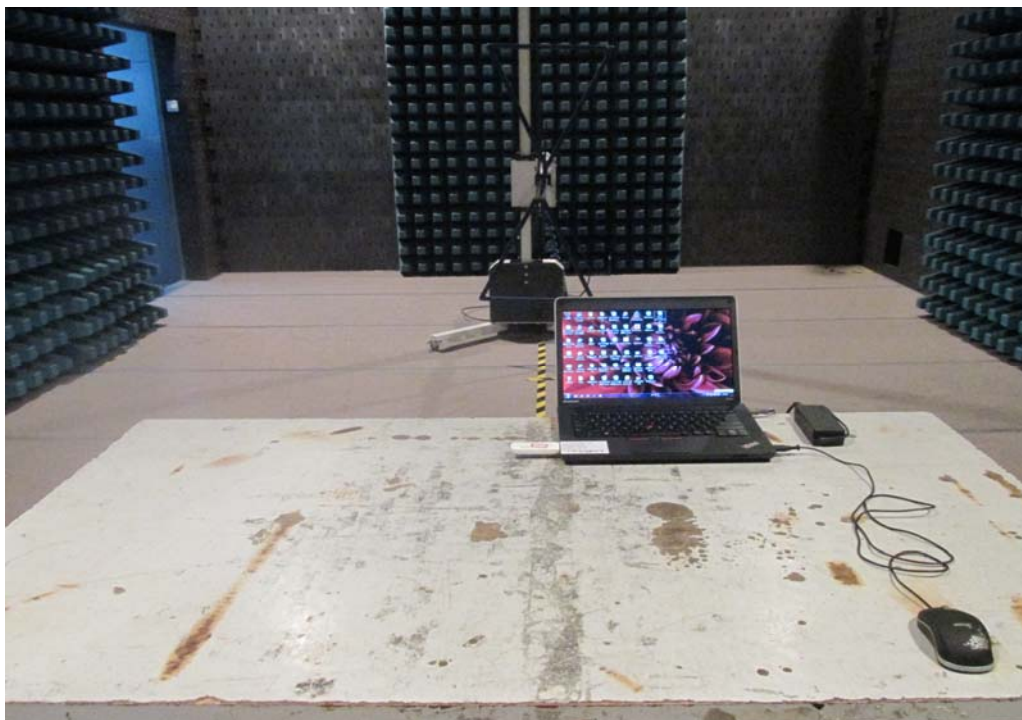
4. PHOTOGRAPHS OF THE EUT



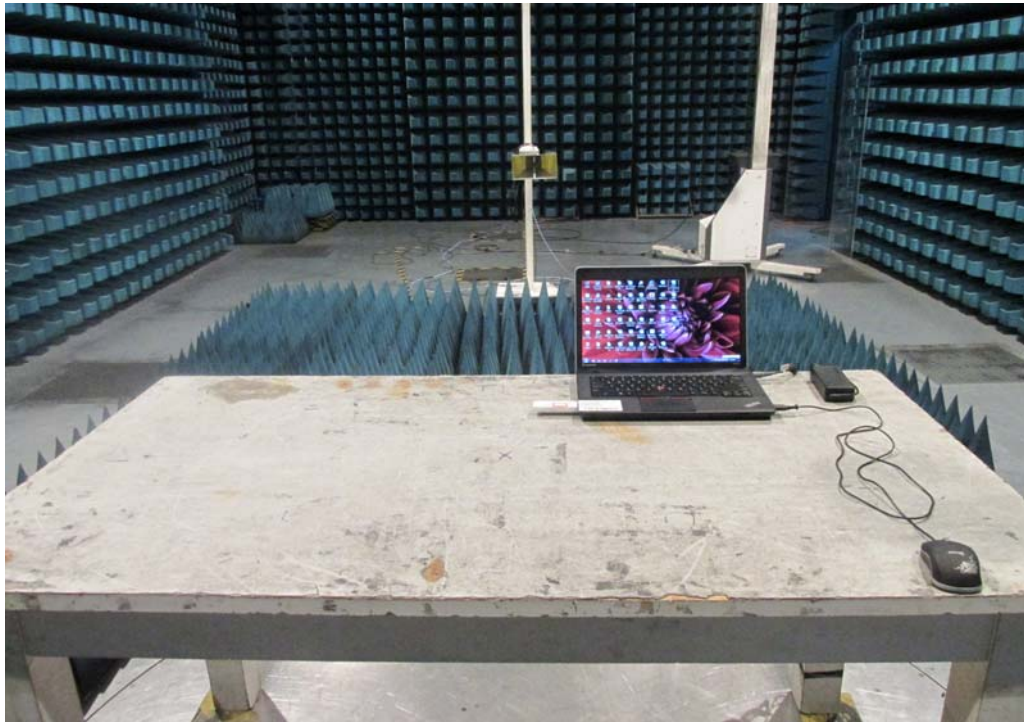
5. PHOTOGRAPHS OF THE TEST SET-UP



Conducted Emission



Radiated Emission of 30M-1G



Radiated Emission of 1-18G

** END OF REPORT **