



EMC TEST REPORT

Report No.: SET2015-14282

Product Name: Smart Phone

FCC ID: CLNSS4451

Model No. : M4 SS4451

Applicant: MFOURTEL MEXICO S.A. DE C.V.

Address: Av. Ejército Nacional 436 Piso 3 Chapultepec Morales Miguel
Hidalgo Distrito Federal 11570.

Received Date: 2015-09-11

Tested Date: 2015-09-11—2015-09-30

Issued by: CCIC-SET

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

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Test Report

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Applicant Address..... : Av. Ejército Nacional 436 Piso 3 Chapultepec Morales
Miguel Hidalgo Distrito Federal 11570.

Manufacturer..... : CK Telecom Limited

Manufacturer Address : Technology Road.High-Tech Development Zone.
Heyuan, Guangdong,P.R.China.

Test Standards..... : 47 CFR Part 15 Subpart B: Radio Frequency Devices

Test Result : PASS

Tested by : Xiaolong Zhang 2015.10.10
Xiaolong Zhang, Test Engineer

Reviewed by..... : Shuangwen Zhang 2015.10.10
Shuangwen Zhang, Senior Engineer

Approved by : Wu Lian 2015.10.10
Wu Li'an, Manager

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Change History		
Issue	Date	Reason for change
1.0	2015.10.10	First edition



1. GENERAL INFORMATION

1.1 EUT Description

EUT Type : Smart Phone
FCC ID : CLN554451
Trade Name : M4
Brand Name : M4
Hardware Version : NOVA V1.0
Software Version : M4_SS4451_S11_Ver200
Power Supply : Battery
Model No.: M4
Capacitance: 3000 mAh
Rated Voltage: 3.85V
Charge Limit: 4.35V
Ancillary Equipment 1 : AC Adapter (Charger for Battery)
Model No.: M4
Rated Input: 100-240V, 50/60Hz, 150mA
Rated Output: 5V=1000mA

*Note1:*The EUT is a Smart Phone, it supports the following operating frequency band: GSM850/900/1800/1900, WCDMA850/1900, LTE band 2,3,4,7,17, Wifi 2.4G(802.11b, 802.11g, 802.11n/20M, 802.11n/40M), GPS, Bluetooth 3.0+EDR, Bluetooth 4.0 BLE.

*Note2:*The EUT is equipped with a T-Flash card slot; equipped with a USB port which can be connected to the ancillary equipments.

*Note 3:*The highest operation frequency or processor operate frequency is 1GHz, so the measurement of radiated disturbance shall only be made up to 5GHz.

*Note 4:*For a more detailed description, please refer to Specification or User's Manual supplied by the applicant and/or manufacturer.

*Note 5:*The detail information of EUT.

EUT Type	Smart Phone
EUT supports Radios application	GSM/GPRS/WCDMA/HSPA/LTE WLAN 2.4GHz 802.11b/g/n (HT20/HT40) Bluetooth v3.0+EDR Bluetooth v4.0 LE
Frequency Range	LTE Band 2 Tx: 1850.7MHz~1909.3MHz Rx: 1930.7MHz~1989.3MHz LTE Band 4



	Tx: 1710.7MHz~1754.3MHz Rx: 2110.7MHz~2154.3MHz LTE Band 7 Tx: 2502.5MHz~2567.5MHz Rx: 2622.5MHz~2687.5MHz LTE Band 17 Tx: 706.5MHz - 713.5MHz; Rx: 736.5MHz - 891.6MHz
	GSM 850MHz: Tx: 824.2 - 848.8MHz (at intervals of 200kHz); Rx: 869.2 - 893.8MHz (at intervals of 200kHz) GSM 1900MHz: Tx: 1850.2 - 1909.8MHz (at intervals of 200kHz); Rx: 1930.2 - 1989.8MHz (at intervals of 200kHz) WCDMA 850MHz Tx: 826.4 - 846.6MHz (at intervals of 200kHz); Rx: 871.4 - 891.6MHz (at intervals of 200kHz) WCDMA 1900MHz Tx: 1852.4 - 1907.6MHz (at intervals of 200kHz); Rx: 1932.4 - 1987.6MHz (at intervals of 200kHz)
	802.11b/g/n-20MHz:2.412GHz-2.462GHz 802.11n-40MHz:2.422GHz – 2.452GHz BT: 2402MHz~2480MHz
	Bandwidth LTE Band 2: 1.4MHz/3MHz/5MHz/10MHz/15MHz/20MHz LTE Band 4: 1.4MHz/3MHz/5MHz/10MHz/15MHz/20MHz LTE Band 7: 5MHz/10MHz/15MHz/20MHz LTE Band 17: 5MHz/10MHz
Modulation Type	LTE: QPSK/16QAM GSM: GSM / GPRS:GMSK EDGE:GMSK / 8PSK WCDMA: QPSK(Uplink) HSDPA:QPSK(Downlink) HSUPA:QPSK(Uplink) WIFI: DSSS (802.11b), OFDM (802.11g/n) BT: GFSK, $\pi/4$-DQPSK,8DPSK
Antenna Type	PIFA Antenna



1.2 Test Standards and Results

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

No.	Identity	Document Title
1	47 CFR Part 15 Subpart B 2014	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	15.109	Radiated Emission	PASS

NOTE:

(1) The EUT has been tested according to 47 CFR Part 15 Subpart B, Class B. The test procedure is according to ANSI C63.4:2009.



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.

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	Brand name	Model	Serial No.	FCCID /DOC
Notebook	ThinkPad	E430C	A131101550	/
Micro SD card	SanDisk	/	/	/
Mouse	deiog			DOC

2.2 Test Mode

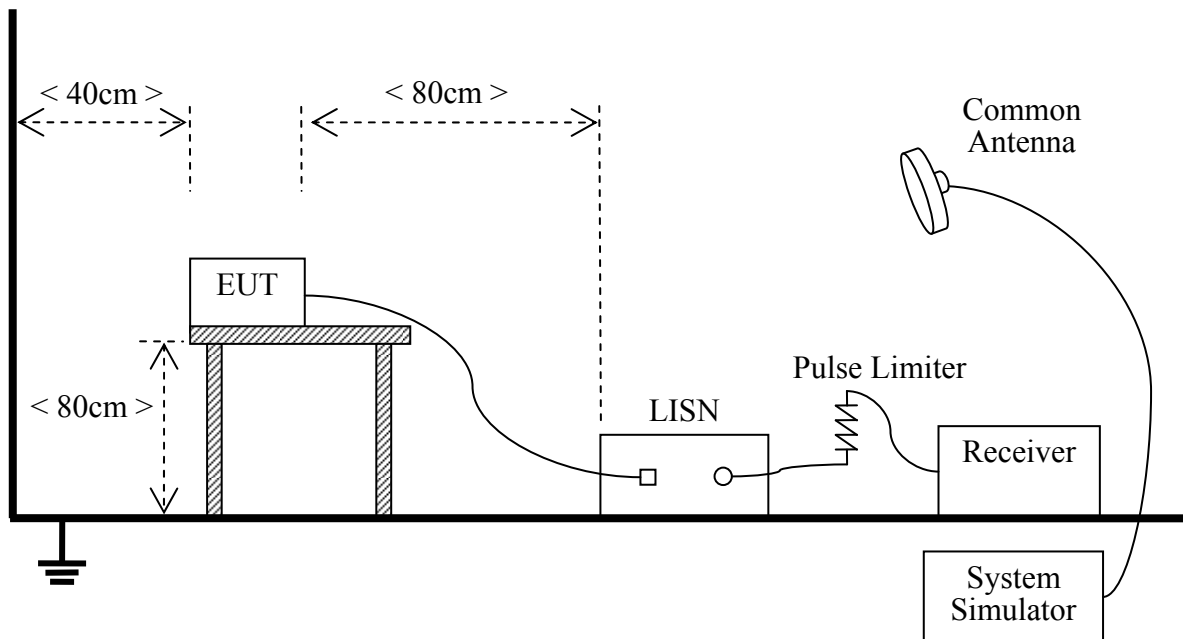
(1) The first test mode

The EUT configuration of the emission tests is TransFlash Card + EUT + PC+Earphone.
In this test mode, the EUT with a TransFlash Card embedded is connected with a PC via a USB cable supplied by applicant. During the measurement, the data is transmitting between the PC and the TransFlash Card of the EUT.

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.

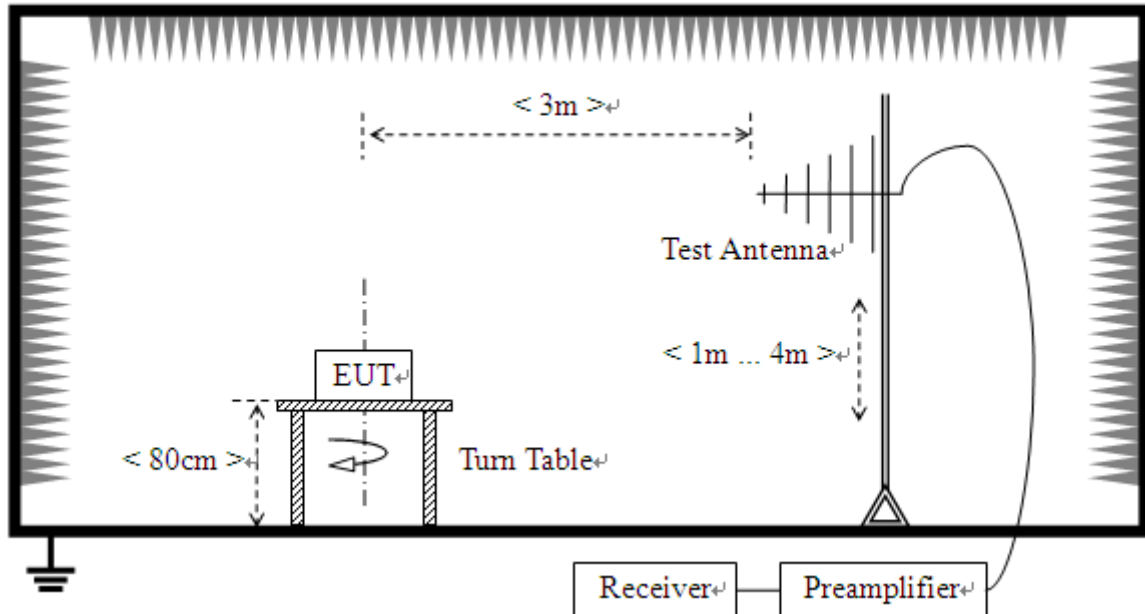
B. Equipments List:

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	/	2015.04.28	2016.04.27
Cable	MATCHING PAD	W7	/	2015.06.05	2016.06.04

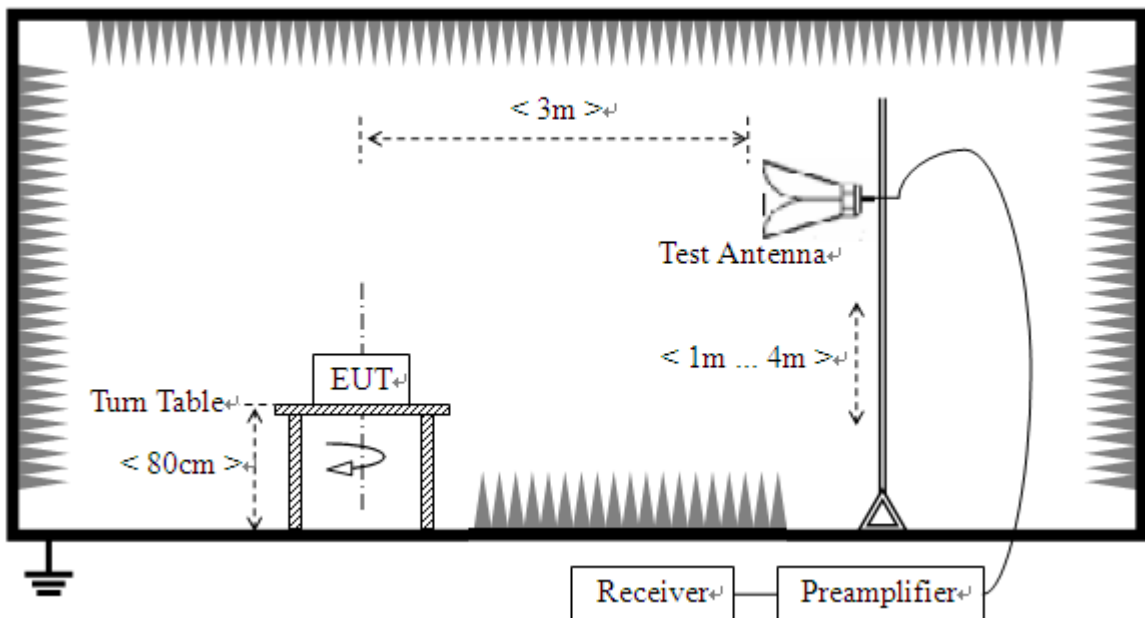
2.3.2 Radiated Emission

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	2015.06.10	2016.06.09
Test Receiver	ROHDE&SCHWARZ	ESIB26	A0304218	2015.06.10	2016.06.09
Semi-Anechoic Chamber	Albatross	9m*6m*6m	A0412372	2015.03.22	2016.03.21
Test Antenna - Bi-Log	HP	CBL6111A	A9704202	2015.06.10	2016.06.09
Test Antenna – Horn	ROHDE&SCHWARZ	HF906	A0304225	2015.06.10	2016.06.09
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	2015.06.10	2016.06.09
Amplifier 20M~3GHz	Compliance Direction System	PAP-0203H	A0509377	2015.06.10	2016.06.09
Cable	SUNHNER	SUCOFLEX 100	/	2015.06.10	2016.06.09
Cable	SUNHNER	SUCOFLEX 104	MY1758/4	2015.06.10	2016.06.09

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 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

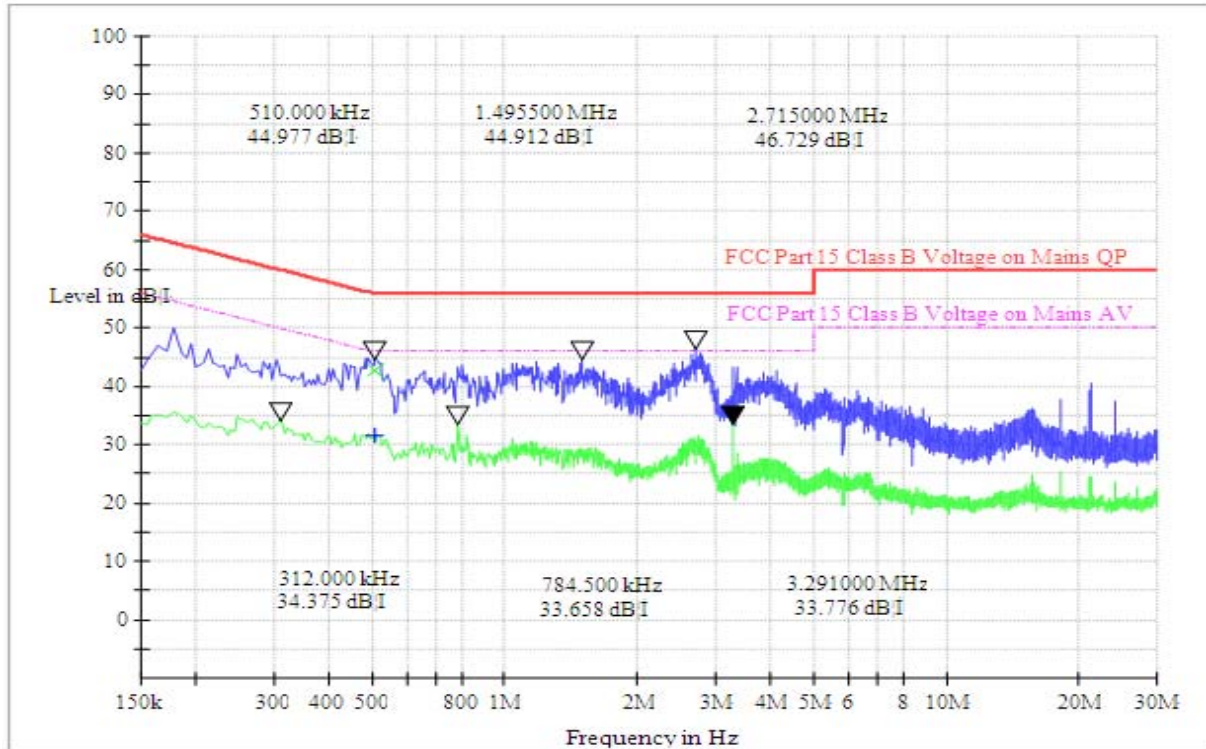
The maximum conducted interference is searched using Peak (PK), Quasi-peak (QP) and Average (AV) detectors; the emission levels more than the AV and QP limits, and that have narrow margins from the AV and QP limits will be re-measured with AV and QP detectors. Tests for both L phase and N phase lines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

Note:

Devices subject to Part 15 must be tested for all available U.S. voltages and frequencies (such as a Nominal 120V AC,50/60Hz) for which the device is capable of operation. A device rated for 50/60 Hz operation need not be tested at both frequencies provided the radiated and line conducted emissions are the same at both frequencies.

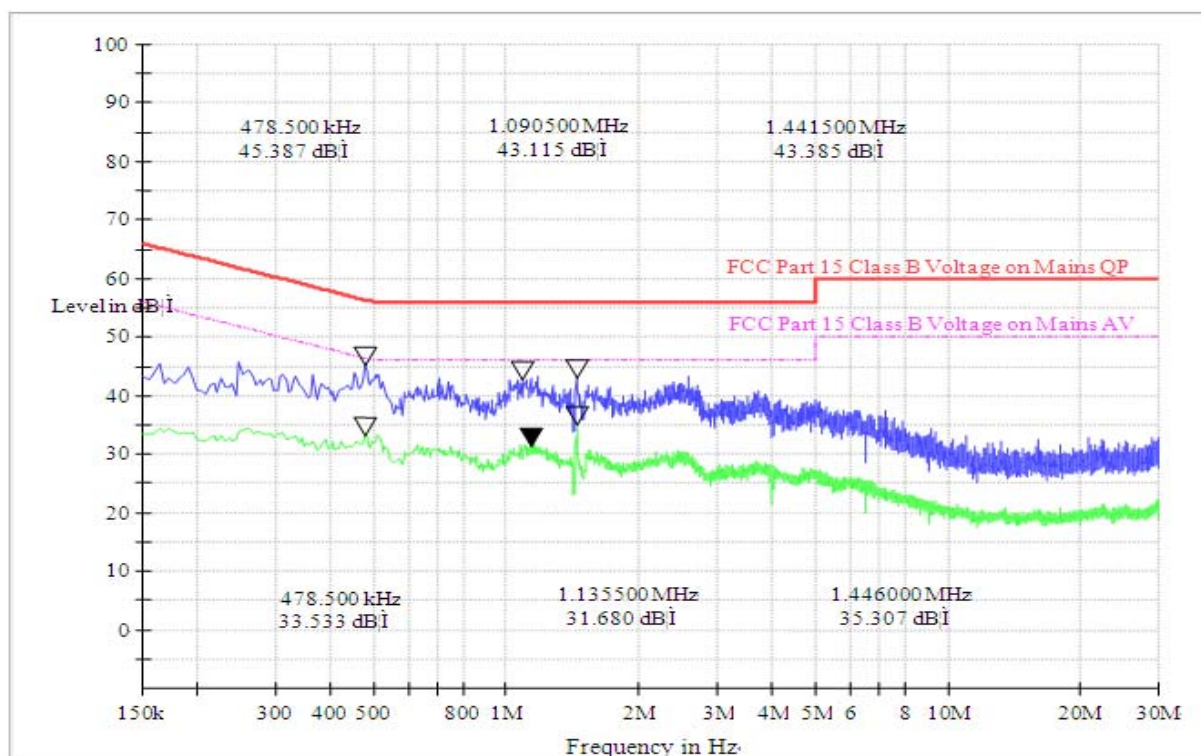
Test voltage and frequency (120V AC,60Hz)

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)
0.5100	56.00	42.68	13.32	0.5100	46.00	31.60	14.40
1.4955	56.00	43.26	12.74	0.7845	46.00	32.19	13.81
2.7150	56.00	45.13	10.87	3.2910	46.00	32.31	13.69



(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)
0.4785	56.40	44.36	12.04	0.4785	46.40	32.96	13.44
1.0905	56.00	42.62	13.38	1.1355	46.00	30.64	15.36
1.4415	56.00	42.64	13.36	1.4460	46.00	34.26	11.74

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:

Frequency range (MHz)	Field Strength		Field Strength Limitation at 3m Measurement Dist	
	$\mu\text{V/m}$	Dist	($\mu\text{V/m}$)	(dBuV/m)
0.009 - 0.490	$2400/F(\text{kHz})$	300m	$10000 * 2400/F(\text{kHz})$	$20\log 2400/F(\text{kHz}) + 80$
0.490 - 1.705	$2400/F(\text{kHz})$	30m	$100 * 2400/F(\text{kHz})$	$20\log 2400/F(\text{kHz}) + 40$
1.705 - 30.00	30	30m	$100 * 30$	$20\log 30 + 40$
30.0 - 88.0	100	3m	100	$20\log 100$
88.0 - 216.0	150	3m	150	$20\log 150$
216.0 - 960.0	200	3m	200	$20\log 200$
Above 960.0	500	3m	500	$20\log 500$

- 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 dBuV/m is calculated by $20\log \text{Emission Level}(\mu\text{V/m})$.
- 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 $30\mu\text{V/m}$, 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.

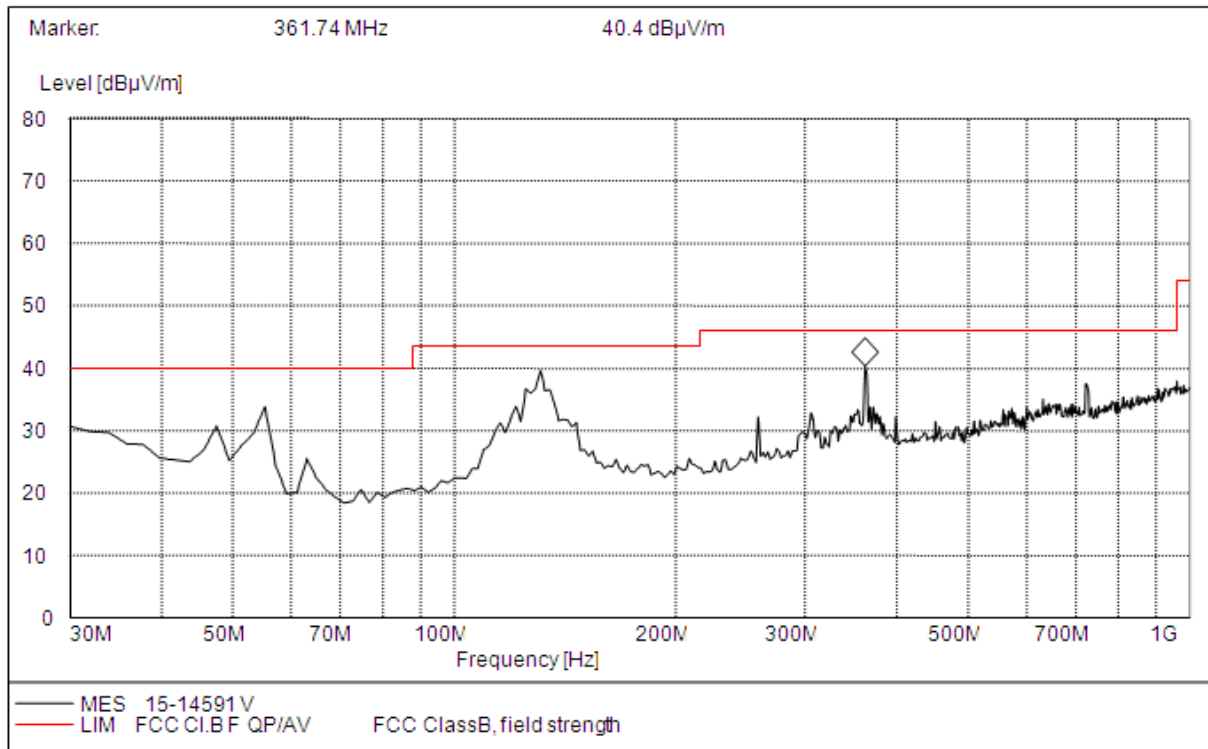
The amplitude of spurious emissions which are attenuated more than 20 dB below the permissible value need not be reported.

Note:

- 1.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.
- 2.The highest operation frequency or processor operate frequency is 1GHz,so the measurement of radiated disturbance shall only be made up to 5GHz.

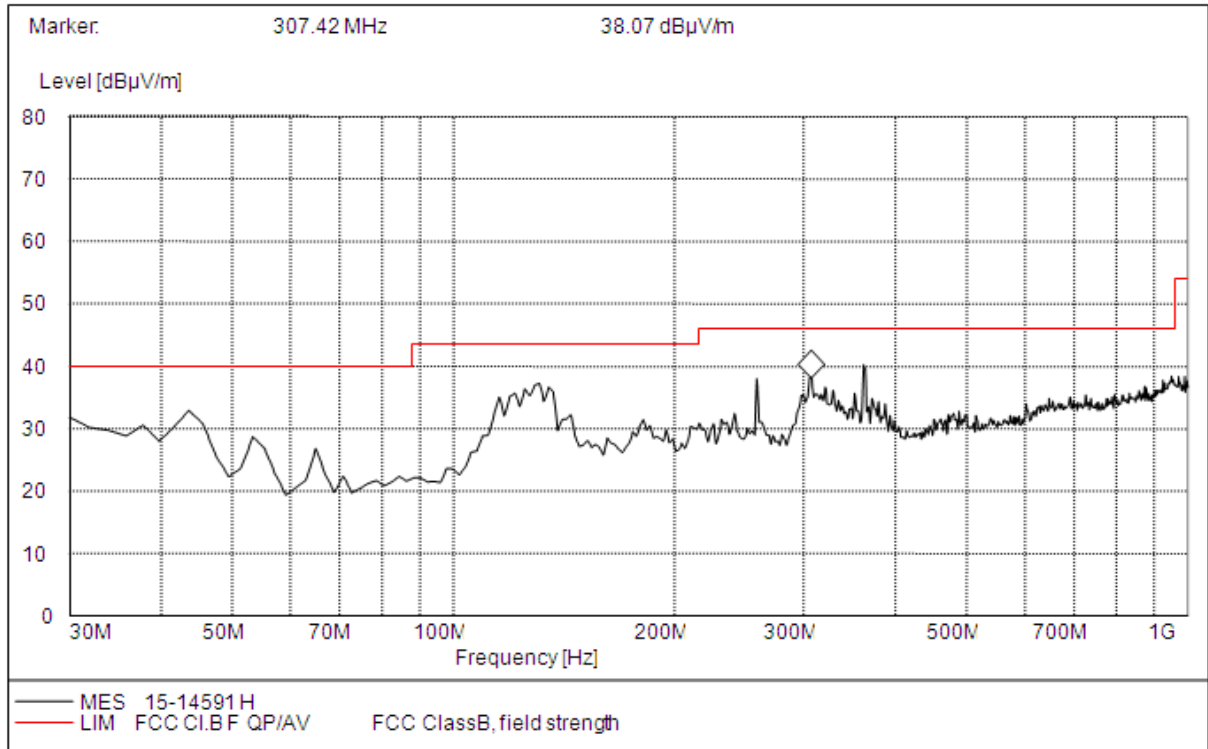
B. Test Plots and Suspicious Points:

Test result of radiated emission below 1GHz



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

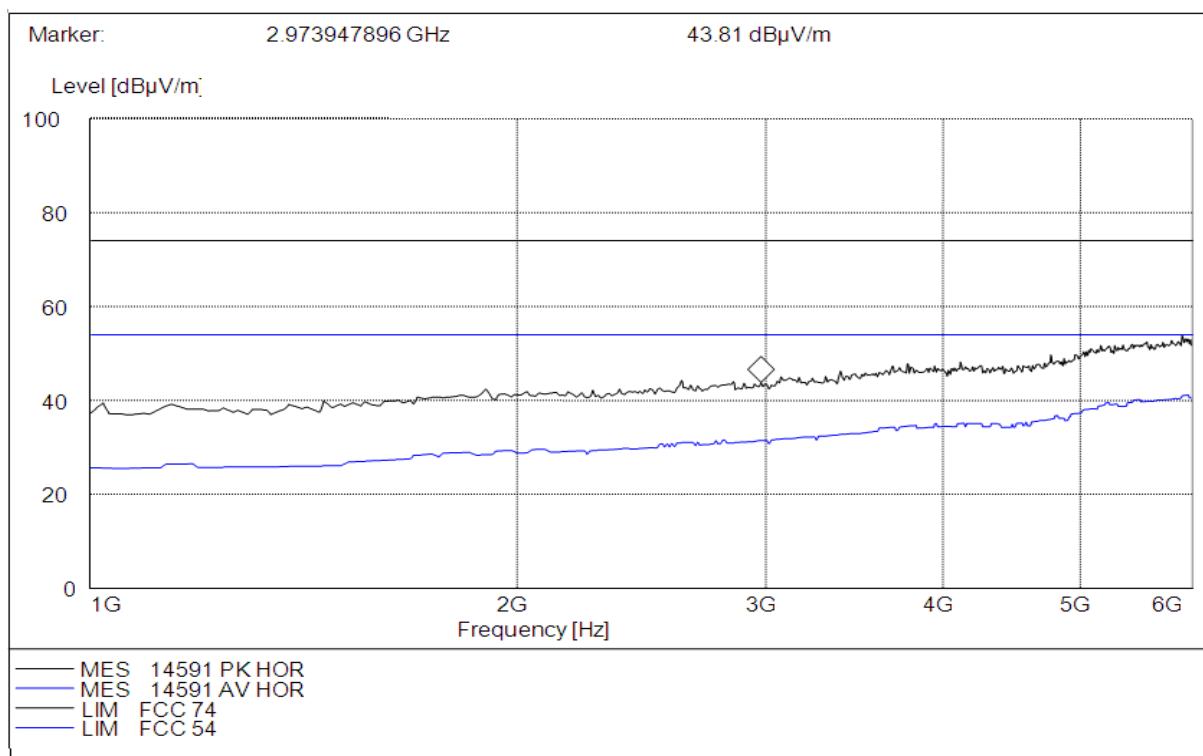
Frequency (MHz)	QuasiPeak (dBμV/m)	Bandwidth (kHz)	Antenna height (cm)	Limit (dBμV/m)	Margin (dB)	Antenna	Verdict
56.30000	31.26	120.000	168.0	40.00	8.74	Vertical	Pass
130.26000	35.89	120.000	240.0	43.50	7.61	Vertical	Pass
361.74000	37.36	120.000	185.0	46.00	8.64	Vertical	Pass



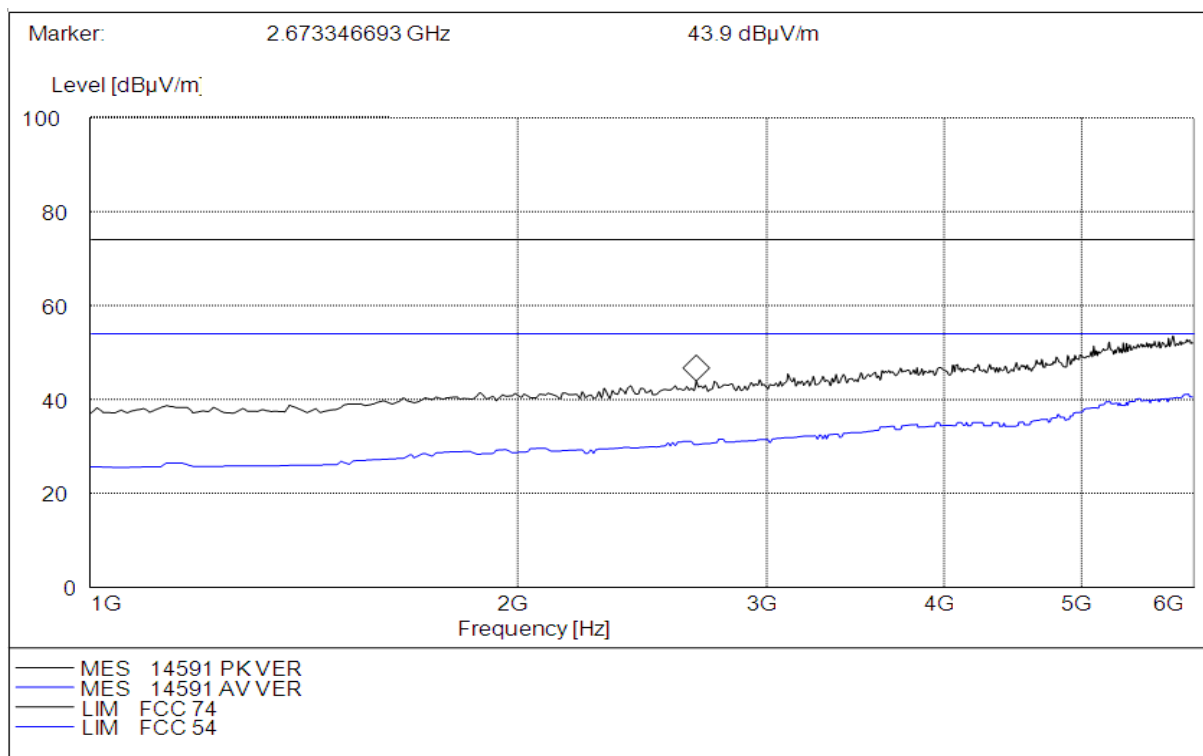
(Plot D: Test Antenna Horizontal 30M - 1G)

Frequency (MHz)	QuasiPeak (dB μ V/m)	Bandwidth (kHz)	Antenna height (cm)	Limit (dB μ V/m)	Margin (dB)	Antenna	Verdict
130.26000	33.59	120.000	292.0	43.50	9.91	Horizontal	Pass
307.21000	36.29	120.000	244.0	46.00	9.71	Horizontal	Pass
361.58000	37.75	120.000	183.0	46.00	8.25	Horizontal	Pass

Test result of radiated emission above 1GHz



(Plot E: Test Antenna Horizontal 1G – 6G)



(Plot F: Test Antenna Vertical 1G – 6G)



Note: The test result margin of radiated emission above 1GHz is more than 20dB.

Test Result: PASS

**** END OF REPORT ****