



Report No.: SZ12020068E04



FCC TEST REPORT

Issued to

ToughShield Devices Limited

For

WCDMA/GSM digital mobile phone

Model Name: R500

Trade Name: Toughshield

Brand Name: Toughshield

FCC ID: OHV-R500

Standard: 47 CFR Part 15 Subpart B

Test date: June 10, 2012 – July 6, 2012

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Shenzhen Morlab Communications Technology Co., Ltd.

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Date 2012.7.23



Review by Huang Pulong
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Date 2012.7.23

CTIA Authorized Test Lab
LAB CODE 20081223-00

IEEE 1725 OTA 電訊管理局

OFTA

電訊管理局



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741109

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Change History		
Issue	Date	Reason for change
1.0	July 23, 2012	First edition

1. GENERAL INFORMATION

1.1 EUT Description

EUT Type : WCDMA/GSM digital mobile phone
Serial No..... : (n.a, marked #1 by test site)
Hardware Version..... : S042M001P000
Software Version : ROCK_V_2.0_01017_120510
Applicant..... : ToughShield Devices Limited
Manufacturer..... : Toughshield Devices Limited, 104A Park Street, London W1K 6NG, UK
Power Supply : Battery
Ancillary Equipment 1 : AC Adapter (Charger for Battery)

Brand Name:	N/A
Model No.:	ROCK
Serial No.:	(n.a. marked #1 by test site)
Capacitance:	1500mAh
Rated Voltage:	3.7V

Brand Name:	N/A
Model Name:	XHY050080U
Serial No.:	(n.a. marked #1 by test site)
Rated Input:	~ 100-240V, 0.25A, 50/60Hz
Rated Output:	5V, 800mA

Note 1: The EUT is a WCDMA/GSM digital mobile phone, it supports GSM 850MHz, 900MHz, 1800MHz, 1900MHz, GPRS, EGPRS, WCDMA 850MHz, 1900MHz, 2100MHz, HSDPA, GPS, NFC, ISM 2.4GHz Bluetooth and Wifi bands.

Note 2: The EUT is equipped with a T-Flash card slot; equipped with a USB port which can be connected to the ancillary equipments supplied by the manufacturer e.g. the AC Adapter and the USB Cable.

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:

No.	Identity	Document Title
1	47 CFR Part 15 (10-1-09 Edition)	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: The tests were performed according to the method of measurements prescribed in ANSI C63.4 2009.

1.3 Facilities and Accreditations

1.3.1 Facilities

Shenzhen Morlab Communications Technology Co., Ltd. Morlab Laboratory is a testing organization accredited by China National Accreditation Service for Conformity Assessment (CNAS) according to ISO/IEC 17025. The accreditation certificate number is L3572.

All measurement facilities used to collect the measurement data are located at 3/F, Electronic Testing Building, Shahe Road, Xili, Nanshan District, Shenzhen, 518055 P. R. China. The test site is constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22; the FCC registration number is 741109.

1.3.2 Test Environment Conditions

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

Temperature (°C):	15 - 35
Relative Humidity (%):	30 -60
Atmospheric Pressure (kPa):	86-106

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:	±1.8dB
Uncertainty of Radiated Emission:	±3.1dB

2. TEST CONDITIONS SETTING

2.1 Test Mode

(1) The first test mode (USB)

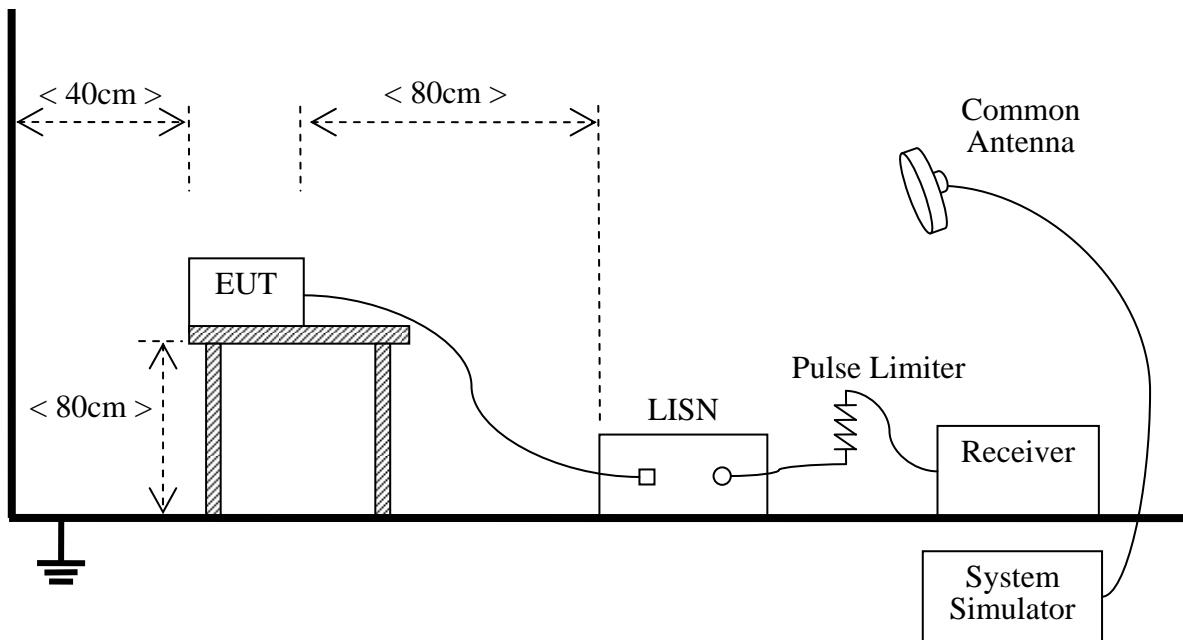
The EUT configuration of the emission tests is TransFlash Card + EUT + Battery + PC.

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.

2.2 Test Setup and Equipments List

2.2.1 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.

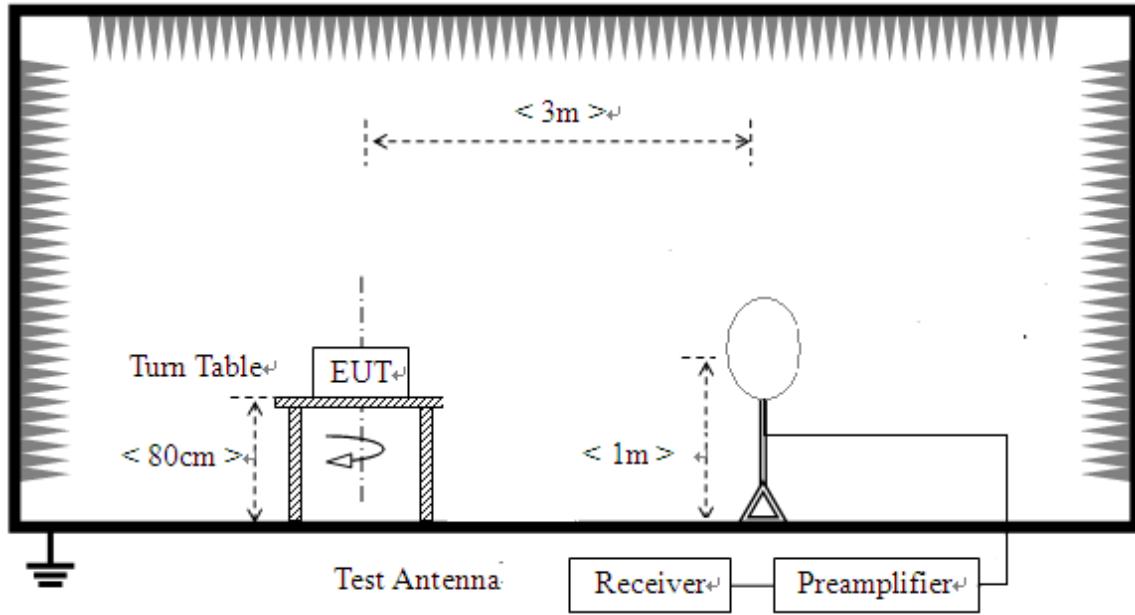
B. Equipments List:

Description	Manufacturer	Model	Serial No.	Cal. Date
EMC Analyzer	Agilent	E7405A	US44210471	2012.05
Receiver	Narda	PMM 9060	001WX11001	2011.12
Receiver	Narda	PMM 9010	595WX11007	2011.11
LISN	Schwarzbeck	NSLK 8127	812744	2012.05
Pulse Limiter (20dB)	Schwarzbeck	VTSD 9561-D	9391	(n.a.)
System Simulator	Agilent	E5515C	GB43130131	2012.05
T-Flash Card	SanDisk	256MB	(n.a.)	(n.a.)

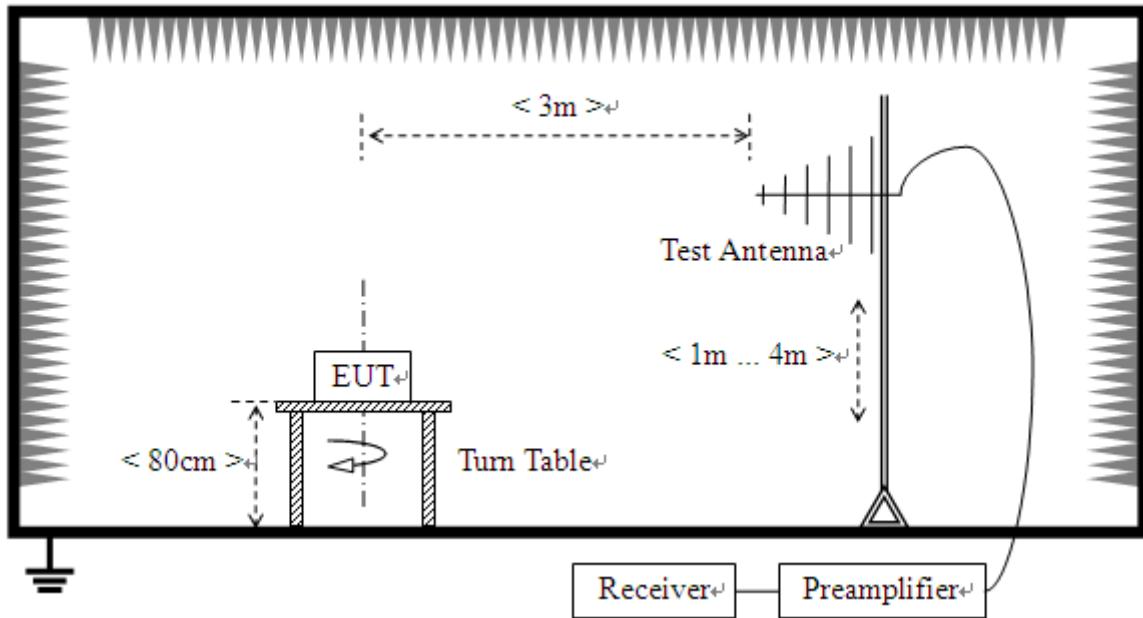
2.2.2 Radiated Emission

A. Test Setup:

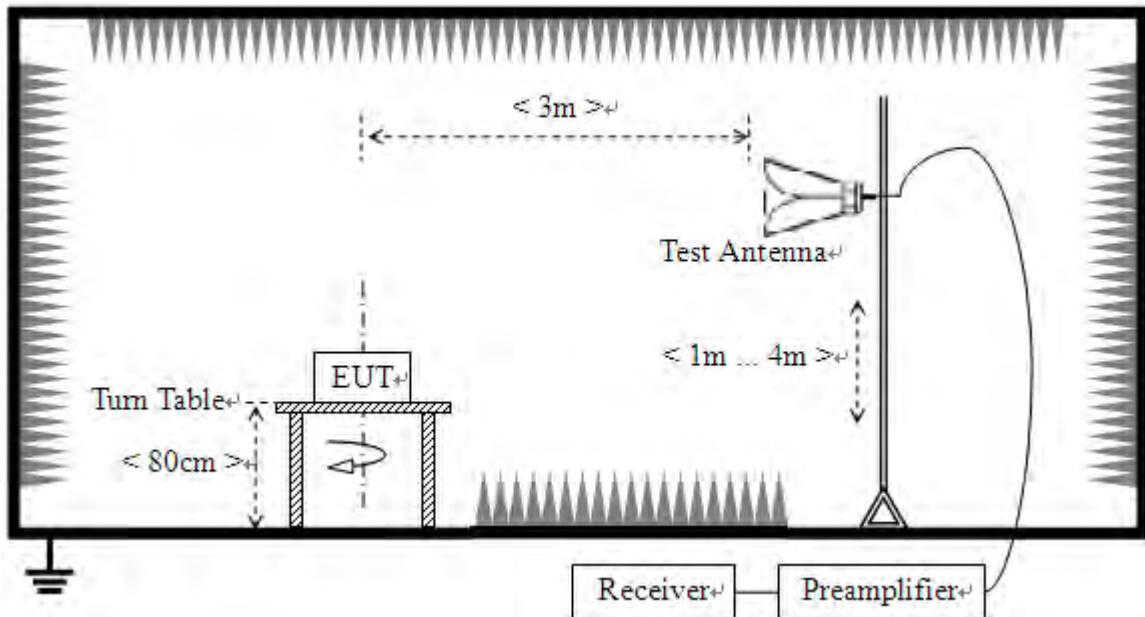
- 1) For radiated emissions from 9kHz to 30MHz



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



3) 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 of 9KHz to 30MHz, magnetic field is measured with Loop Test Antenna.
The Test Antenna is positioned with its plane vertical at 1m distance from the EUT. The center of the Loop Test Antenna is 1m above the ground. During the measurement the Loop Test Antenna rotates about its vertical axis for maximum response at each azimuth about the EUT.
- 2) 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.	Cal. Date
EMC Analyzer	Agilent	E7405A	US44210471	2012.05
Receiver	Narda	PMM 9060	001WX11001	2011.12



Description	Manufacturer	Model	Serial No.	Cal. Date
Receiver	Narda	PMM 9010	595WX11007	2011.11
Semi-Anechoic Chamber	Albatross	9m*6m*6m	(n.a.)	2012.05
Test Antenna - Bi-Log	Schwarzbeck	VULB 9163	9163-274	2012.05
Test Antenna - Horn	Schwarzbeck	BBHA 9120D	9120D-963	2012.05
Test Antenna -Loop	Schwarzbeck	FMZB 1519	1519-022	2012.05
T-Flash Card	SanDisk	256MB	(n.a.)	(n.a.)

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:

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

3.1.2 Test Description

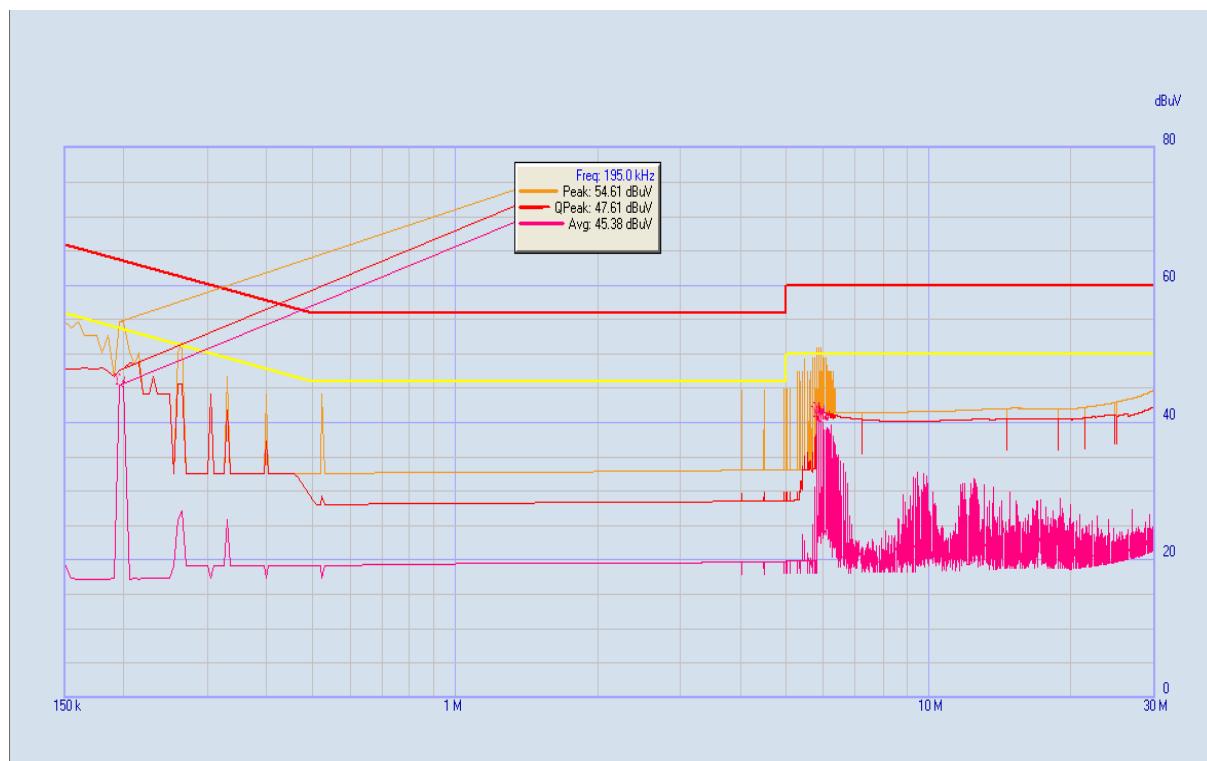
See section 2.2.1 of this report.

3.1.3 Test Result

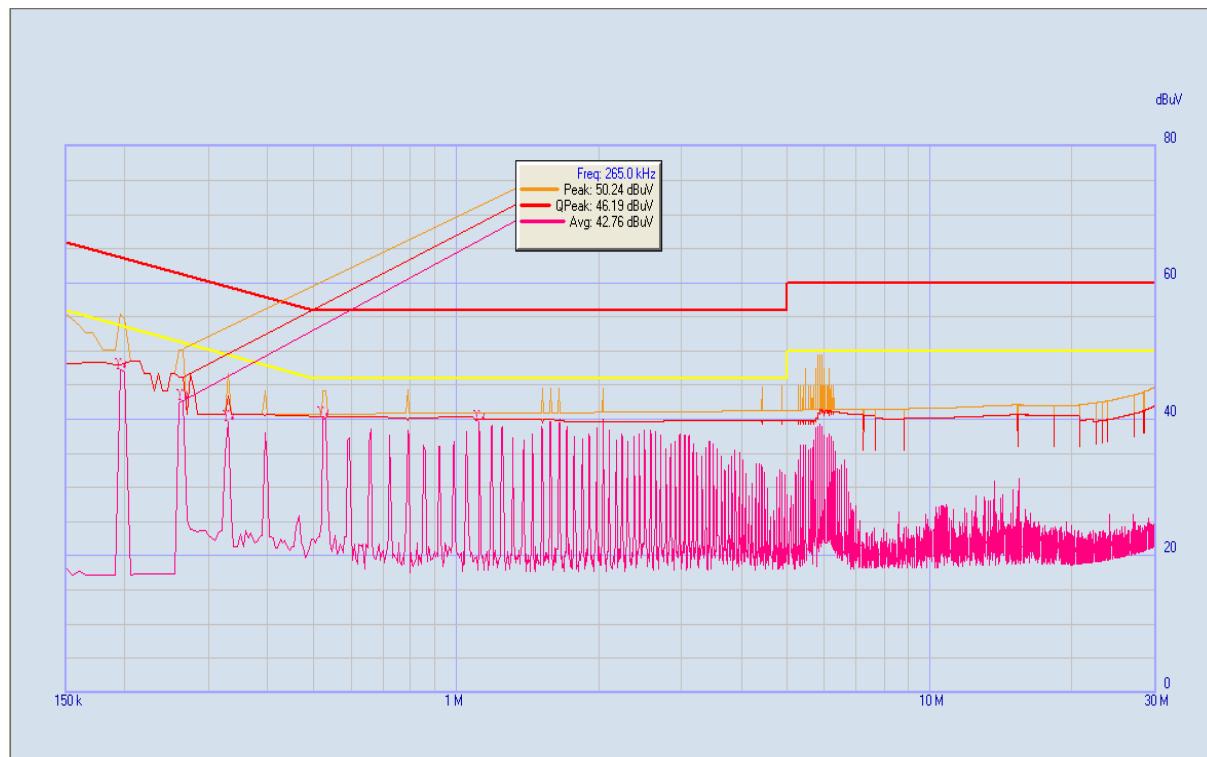
The maximum conducted interference is searched using Peak (PK), Quasi-peak (QP) and Average (AV) detectors; the emission levels more than the AV and QP limits, and that have narrow margins from the AV and QP limits will be re-measured with AV and QP detectors. Tests for both L phase and N phase lines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

3.1.3.1 Test Mode

A. Test Plot and Suspicious Points:



(Plot A: L Phase)



(Plot B: N Phase)

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	
	μ V/m	Dist	(uV/m)	(dBuV/m)
0.009 - 0.490	2400/F(KHz)	300m	10000* 2400/F(KHz)	20log 2400/F(KHz) + 80
0.490 - 1.705	2400/F(KHz)	30m	100* 2400/F(KHz)	20log 2400/F(KHz) + 40
1.705 - 30.00	30	30m	100*30	20log 30 + 40
30.0 - 88.0	100	3m	100	20log 100
88.0 - 216.0	150	3m	150	20log 150
216.0 - 960.0	200	3m	200	20log 200
Above 960.0	500	3m	500	20log 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.

Note:

- 1) The tighter limit shall apply at the boundary between two frequency range.
- 2) Limitation expressed in dBuV/m is calculated by 20log 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
 $Ld1 = L1 = 30uV/m * (10)^2 = 100 * 30uV/m$

3.2.2 Test Description

See section 2.2.2 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

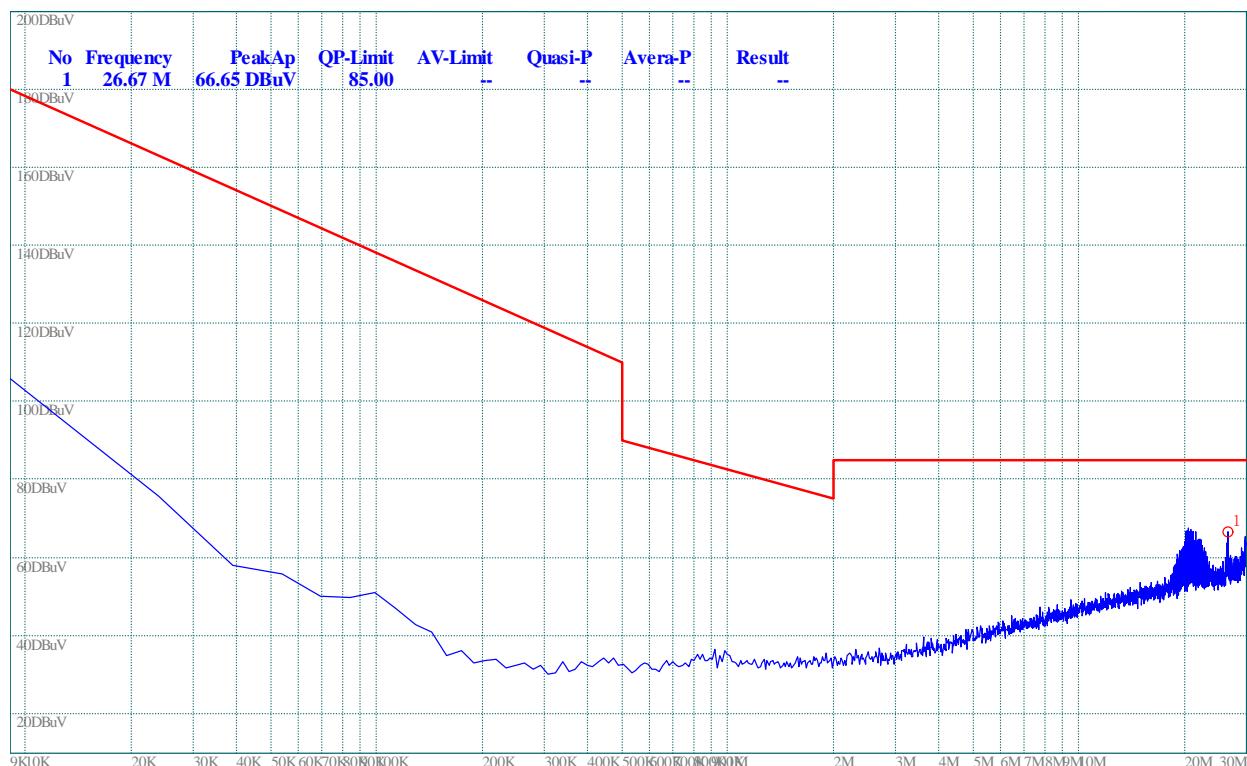
perform the tests. All test modes are considered, refer to recorded points and plots below.

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

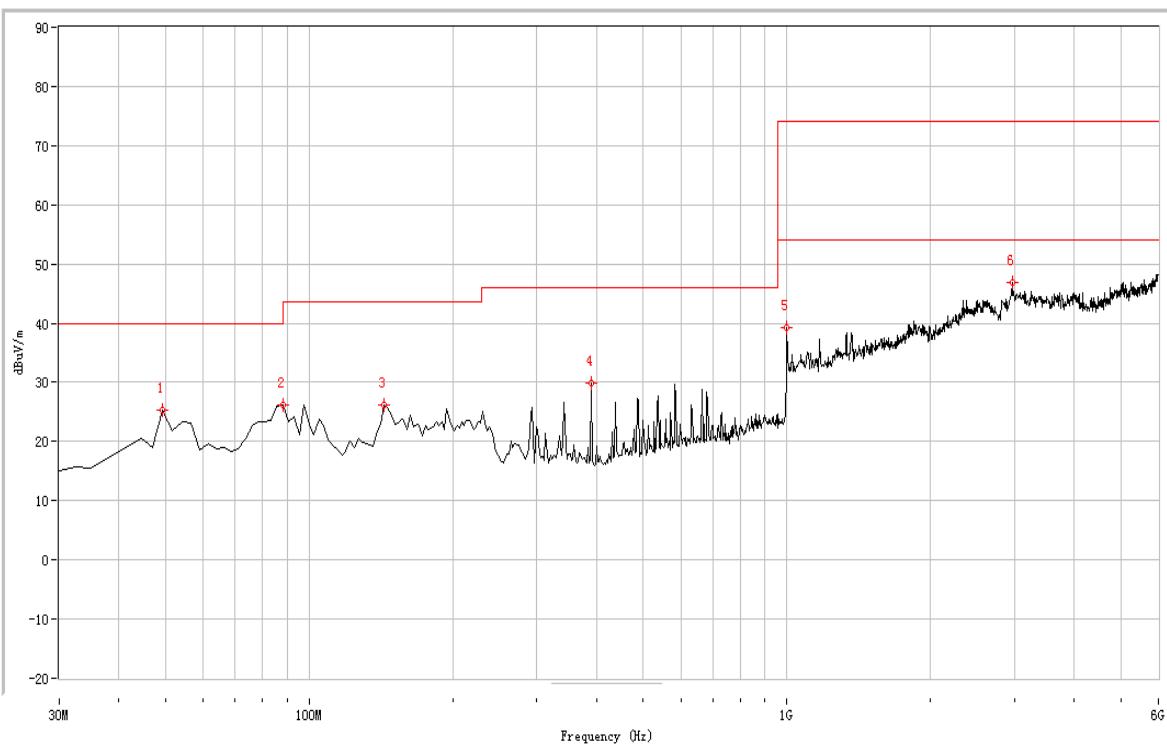
Note: All radiated emission tests were performed in X, Y, Z axis direction, and only the worst axis test condition was recorded in this test report.

A. Test Plots and Suspicious Points:

NOTE: The emissions are too small to be measured and are at least 6 dB below the limit, So all the data of marked are pass.

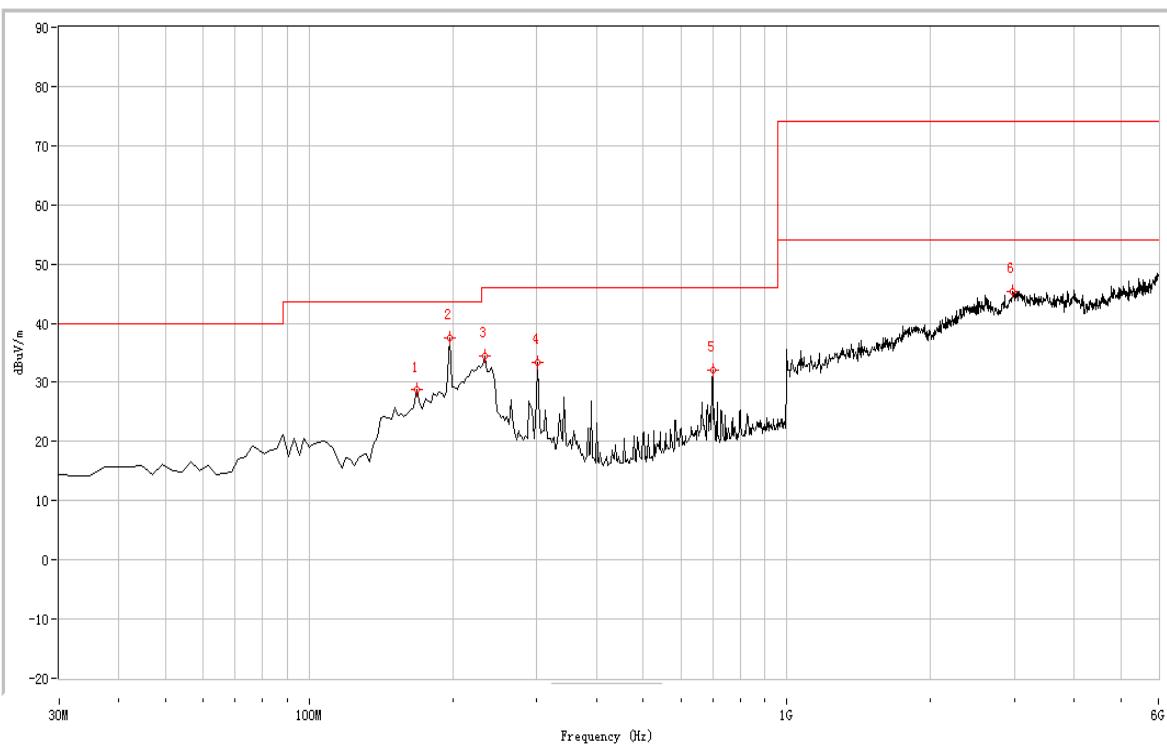


(Plot A: 9K – 30M)



(Plot A: Test Antenna Vertical)

NO.	Fre. (MHz)	Pk	QP	AV	Limit- PK	Limit- QP	Limit- AV	Antenna	Verdict
1	49.352	25.28	N.A	N.A	N.A	40.0	N.A	Vertical	Pass
2	88.055	26.17	N.A	N.A	N.A	43.5	N.A	Vertical	Pass
3	143.691	26.16	N.A	N.A	N.A	43.5	N.A	Vertical	Pass
4	390.424	29.83	N.A	N.A	N.A	46.0	N.A	Vertical	Pass
5	1000.000	39.23	N.A	N.A	N.A	74.0	N.A	Vertical	Pass
6	2963.342	46.83	N.A	N.A	74.0	N.A	54.0	Vertical	Pass



(Plot B: Test Antenna Horizontal)

NO.	Fre. (MHz)	Pk	QP	AV	Limit- PK	Limit- QP	Limit- AV	Antenna	Verdict
1	167.880	28.90	N.A	N.A	N.A	43.5	N.A	Horizontal	Pass
2	196.908	37.49	29.52	N.A	N.A	43.5	N.A	Horizontal	Pass
3	233.192	34.37	N.A	N.A	N.A	46.0	N.A	Horizontal	Pass
4	300.923	33.44	N.A	N.A	N.A	46.0	N.A	Horizontal	Pass
5	700.050	32.04	N.A	N.A	N.A	46.0	N.A	Horizontal	Pass
6	2971.571	45.28	N.A	N.A	74.0	N.A	54.0	Horizontal	Pass

Test Result: PASS

** END OF REPORT **