

47 CFR PART 15B

TEST REPORT

Of

industrial HSUPA router

Brand Name: Greentel
Model Name: R211HHW-232, R201HHW-232
Report No.: SZ10110001E01
FCC ID.: Y2BR1H1

prepared for

Greentel Limited

11 Daling Rd, Longfeng, Huizhou, China, 516001

prepared by

Shenzhen Morlab Communications Technology Co., Ltd.

Morlab Laboratory

3/F, Electronic Testing Building, Shale Road, Xili,
Nanshan District, Shenzhen, 518055 P. R. China

Tel: +86 755 86130398

Fax: +86 755 86130218



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Change History		
Issue	Date	Reason for change
1.0	December 3, 2010	First edition

1. TEST CERTIFICATION

Equipment under Test: industrial HSUPA router

Trade Name: Greentel
Model Name: R211HHW-232, R201HHW-232
FCC ID: Y2BR1H1
Applicant: Greentel Limited
11 Daling Rd, Longfeng, Huizhou, China, 516001
Manufacturer: Greentel Limited
11 Daling Rd, Longfeng, Huizhou, China, 516001

Emission Designator GSM:300KGXW, WCDMA:4M18F9W, HSPA: 4M20F9W
Test Standards: 47 CFR Part 15 Subpart B

Test Date(s): November 29, 2010 – December 2, 2010

Test Result: PASS

* We Hereby Certify That:

The equipment under test was tested by Shenzhen Morlab Communications Technology Co., Ltd. Morlab Laboratory. The test data, data evaluation, test procedures and equipment configurations shown in this report were made in accordance with the requirement of related FCC rules.

The test results of this report only apply for the tested sample equipment identified above. The test report shall be invalid without all the signatures of the test engineer, the reviewer and the approver.

Tested by: Tu Lang Dated: 2010.12.3
Tu Lang

Reviewed by: Ni Yong Dated: 2010.12.03
Ni Yong

Approved by: Zeng Dexin Dated: 2010.12.03
Zeng dexin



2. GENERAL INFORMATION

2.1 EUT Description

EUT Type industrial HSUPA router
Model Name..... R211HHW-232, R201HHW-232
Serial No. (n.a, marked #1 by test site)
Hardware Version..... MAIN_BOARD_V2.6, MiniPCIE V1.2
Software Version 1.3.2.r1984
Modulation Type GPRS/GSM Mode with GMSK Modulation
WCDMA Mode with QPSK Modulation
HSDPA Mode with QPSK Modulation
HSUPA Mode with 16QAM Modulation
Ancillary Equipment AC Adapter
Model Name: DSA-20D-12 2 120150
Brand Name: DEE VAN
Serial No.: (n.a. marked #1 by test site)
Rated Input: ~ 90-264V, 47- 63Hz, 0.5-0.7A
Rated Output: = 12.0V, 1.25A
Manufacturer: DEE VAN ENTERPRISE CO., LTD
Manufacturer Address: NO.5, PAO-KAO RD, HSIN-TIEN, TAIPEI
COUNTY, TAIWAN, R.O.C

Note 1: The EUT is a industrial HSUPA router; it supports GPRS 850MHz, 1900MHz and WCDMA 850MHz, 1900MHz, HSDPA, HSUPA bands. GPRS, HSDPA, HSUPA and WCDMA bands are tested in this report.

Note 2: The EUT is a class A product. It is Machine-to-machine (M2M) industrial cellular router with Din-rail mounting, which works on 2G/3G cellular networks, provides reliable and robust wireless connections.

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

2.2 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 2003.

2.3 Facilities and Accreditations

2.3.1 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.

2.3.2 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

2.3.3 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

3. TEST CONDITIONS SETTING

3.1 Test Mode

1. Test Mode

- (1) The first test mode (GPRS-GSM 850)

The EUT configuration of the emission tests is EUT + Adapter + PC.

In this test mode, a GPRS link was established between the EUT and a System Simulator (SS); data was transmitted between EUT and System Simulator (SS), and maintained during the measurement.

- (2) The second test mode (GPRS-GSM 1900)

The EUT configuration of the emission tests is EUT + Adapter + PC.

In this test mode, a GPRS link was established between the EUT and a System Simulator (SS); data was transmitted between EUT and System Simulator (SS), and maintained during the measurement.

- (3) The third test mode (WCDMA 850)

The EUT configuration of the emission tests is EUT + Adapter + PC.

In this test mode, a communication link was established between the EUT and a System Simulator (SS); data was transmitted between EUT and System Simulator (SS), and maintained during the measurement.

- (4) The fourth test mode (HSDPA-WCDMA 850)

The EUT configuration of the emission tests is EUT + Adapter + PC.

In this test mode, a HSDPA link was established between the EUT and a System Simulator (SS); data was transmitted between EUT and System Simulator (SS), and maintained during the measurement.

- (5) The fifth test mode (HSUPA-WCDMA 850)

The EUT configuration of the emission tests is EUT + Adapter + PC.

In this test mode, a HSUPA link was established between the EUT and a System Simulator (SS); data was transmitted between EUT and System Simulator (SS), and maintained during the measurement.

- (6) The sixth test mode (WCDMA 1900)

The EUT configuration of the emission tests is EUT + Charger. + PC

In this test mode, a communication link was established between the EUT and a System Simulator (SS); data was transmitted between EUT and System Simulator (SS), and maintained during the measurement.

- (7) The seventh test mode (HSDPA-WCDMA 1900)

The EUT configuration of the emission tests is EUT + Adapter + PC.

In this test mode, a HSDPA link was established between the EUT and a System Simulator (SS); data was transmitted between EUT and System Simulator (SS), and maintained during the measurement.

(8) The eighth test mode (HSUPA-WCDMA 1900)

The EUT configuration of the emission tests is EUT + Adapter + PC.

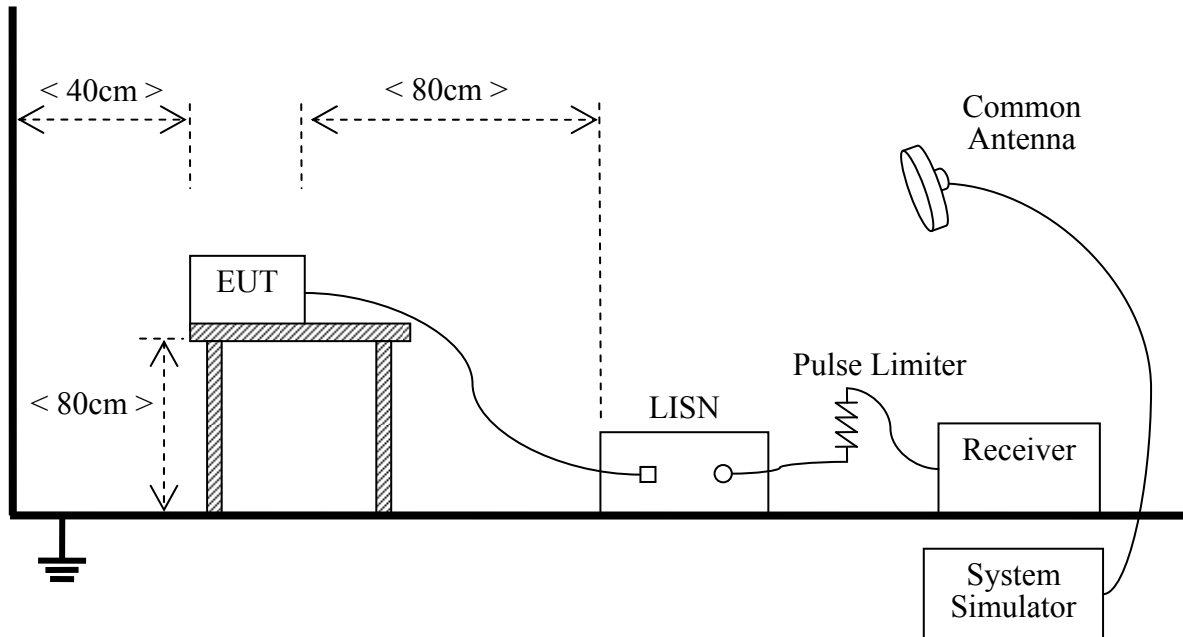
In this test mode, a HSUPA link was established between the EUT and a System Simulator (SS); data was transmitted between EUT and System Simulator (SS), and maintained during the measurement.

NOTE: All test modes are performed, only the worst cases are recorded in this report.

3.2 Test Setup and Equipments List

3.2.1 Conducted Emission

A. Test Setup:



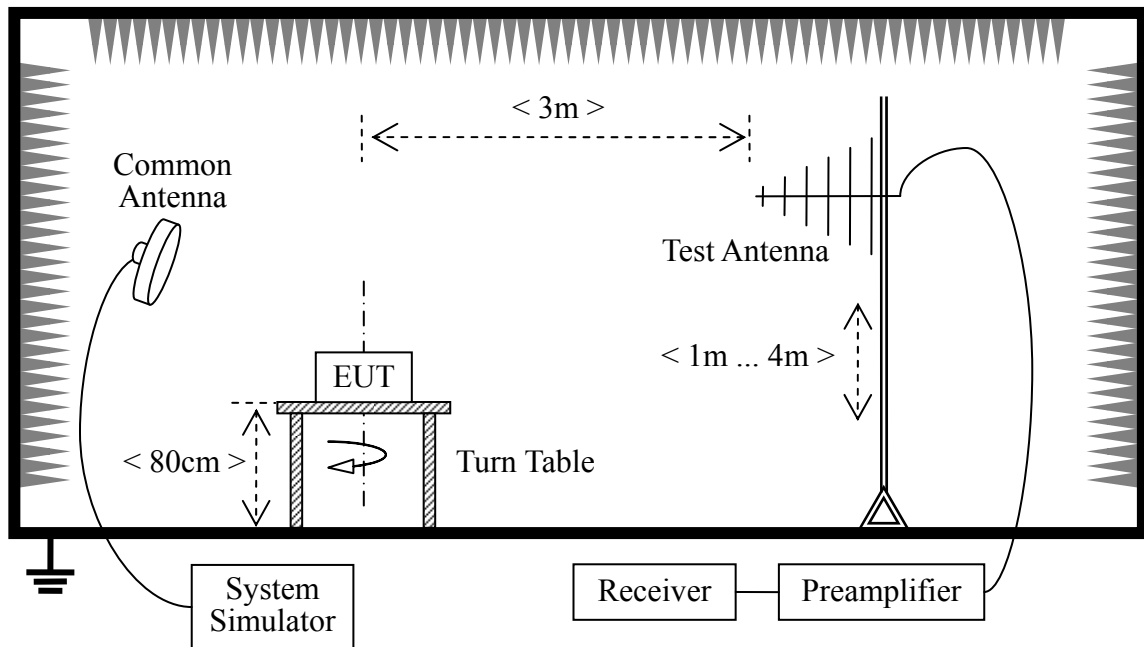
The EUT is placed on a 0.8m high insulating table, which stands on the grounded conducting floor, and keeps 0.4m away from the grounded conducting wall. The EUT is connected to the power mains through a LISN which provides $50\Omega/50\mu\text{H}$ of coupling impedance for the measuring instrument. The 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	Cal. Due
Receiver	Agilent	E7405A	US44210471	2009.09	2year
LISN	Schwarzbeck	NSLK 8127	812744	2009.09	2year
Pulse Limiter (20dB)	Schwarzbeck	VTSD 9561-D	9391	(n.a.)	(n.a.)
System Simulator	Agilent	E5515C	GB43130131	2009.09	2year
Personal Computer	IBM	IBM_T20	(n.a.)	(n.a.)	(n.a.)
Bluetooth-Headset	Nokia	HS-36W	(n.a.)	(n.a.)	(n.a.)
T-Flash Card	SanDisk	256MB	(n.a.)	(n.a.)	(n.a.)

3.2.2 Radiated Emission

A. Test Setup:



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. The Common Antenna is used for the call between the EUT and the System Simulator (SS).

B. Equipments List:

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
Receiver	Agilent	E7405A	US44210471	2009.09	2year
Semi-Anechoic Chamber	Albatross	9m*6m*6m	(n.a.)	2009.09	2year
Test Antenna - Bi-Log	Schwarzbeck	VULB 9163	9163-274	2009.09	2year
Test Antenna - Horn	Schwarzbeck	BBHA 9120C	9120C-384	2009.09	2year
System Simulator	Agilent	E5515C	GB43130131	2009.09	2year
Personal Computer	IBM	IBM_T20	(n.a.)	(n.a.)	(n.a.)
Bluetooth-Headset	Nokia	HS-36W	(n.a.)	(n.a.)	(n.a.)
T-Flash Card	SanDisk	256MB	(n.a.)	(n.a.)	(n.a.)

4. 47 CFR PART 15B REQUIREMENTS

4.1 Conducted Emission

4.1.1 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	79	66
0.50 - 5	73	60
5 - 30	73	60

NOTE:

- a) The limit subjects to the Class A 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.

4.1.2 Test Description

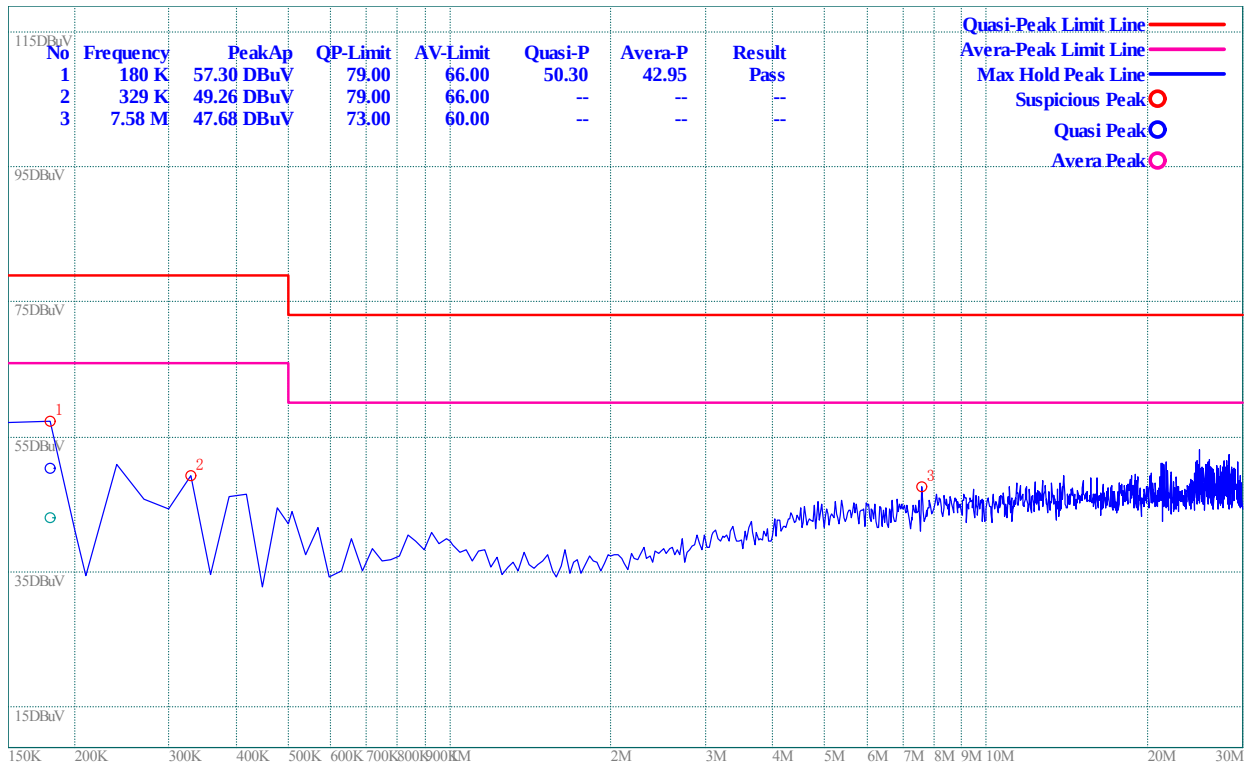
See section 3.2.1 of this report.

4.1.3 Test Result

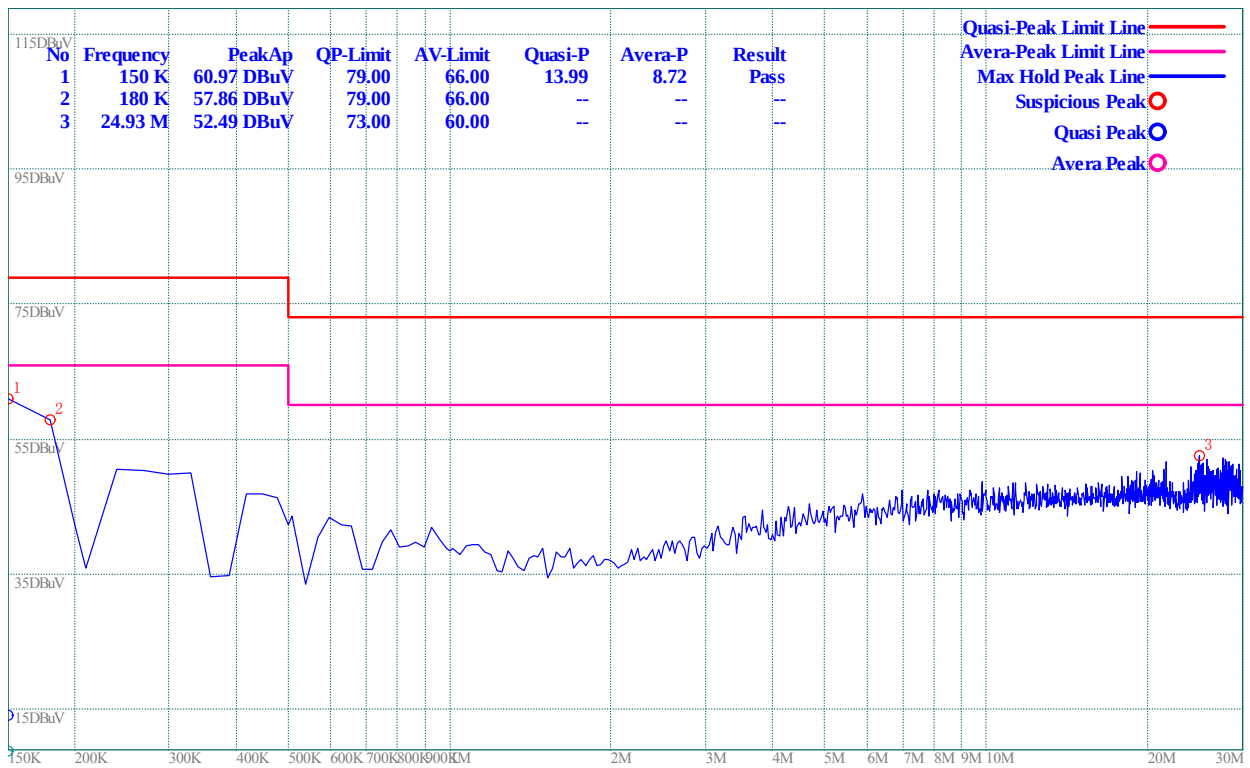
The maximum conducted interference is searched using Peak (PK), Quasi-peak (QP) and Average (AV) detectors; the emission levels more than the AV and QP limits, and that have narrow margins from the AV and QP limits will be re-measured with AV and QP detectors. Tests for both L phase and N phase lines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

4.1.3.1 GPRS-GSM Test Mode

A. Test Plot and Suspicious Points:



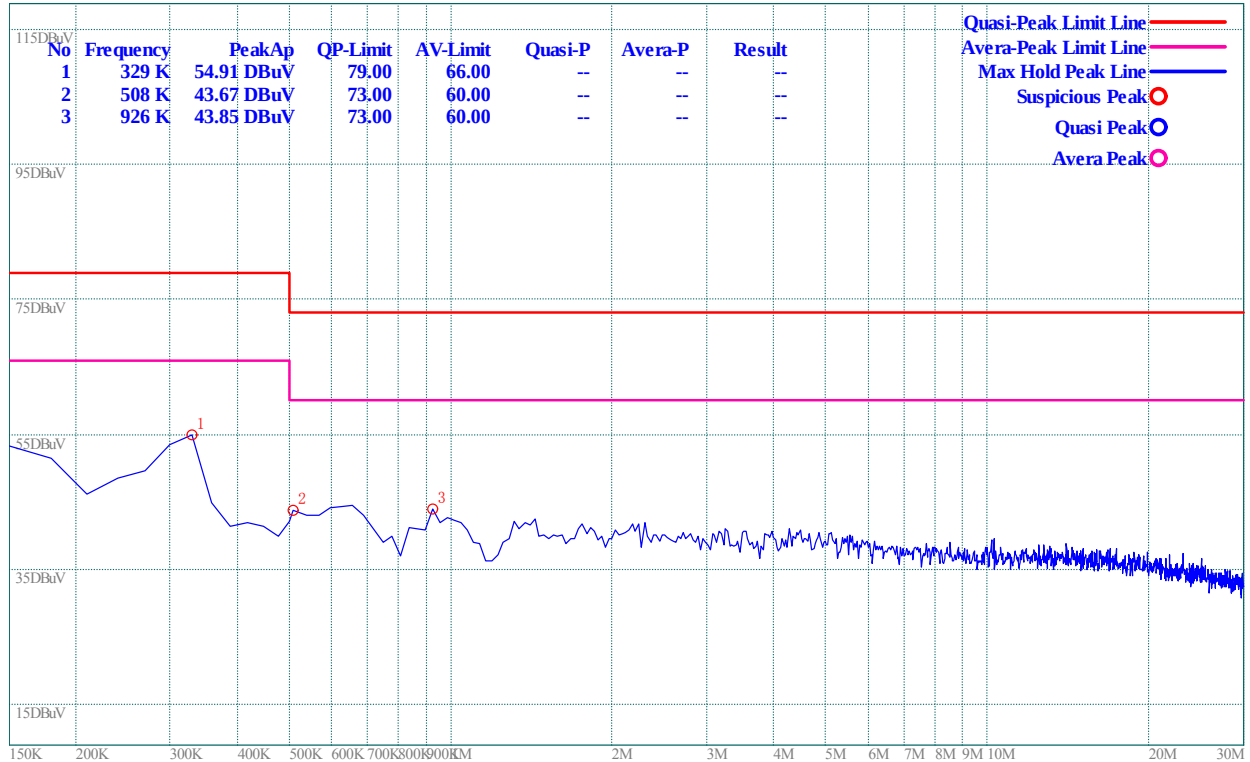
(Plot A: L Phase)



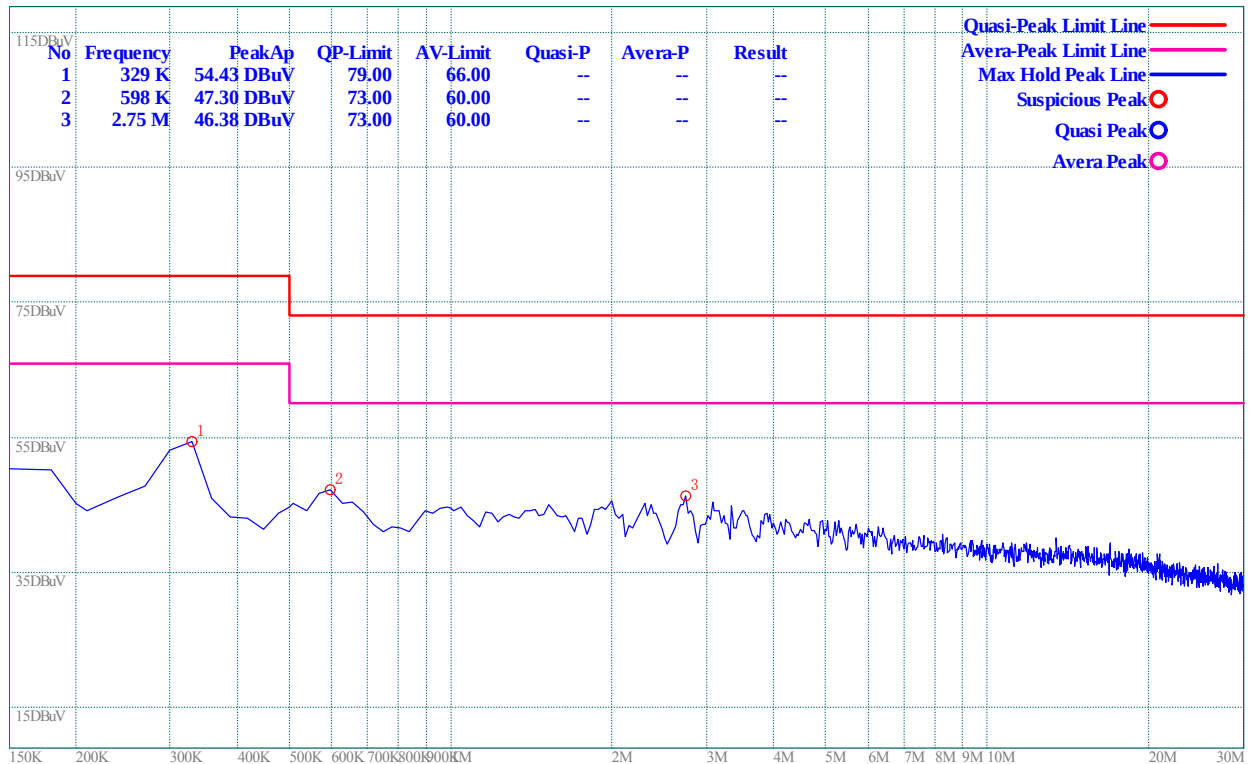
(Plot B: N Phase)

4.1.3.2 WCDMA Test Mode

A. Test Plot and Suspicious Points:



(Plot A: L Phase)



(Plot B: N Phase)

4.2 Radiated Emission

4.2.1 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	
	$\mu\text{V/m}$	$\text{dB}\mu\text{V/m}$
30 - 88	284.6	49
88 - 216	474.3	53.5
216 - 960	664.1	56.5
Above 960	948.7	59.5

NOTE:

- a) Field Strength ($\text{dB}\mu\text{V/m}$) = $20 \cdot \log[\text{Field Strength } (\mu\text{V/m})]$.
- b) In the emission tables above, the tighter limit applies at the band edges.
- c) The limit subjects to the Class A digital device.

4.2.2 Test Description

See section 3.2.2 of this report.

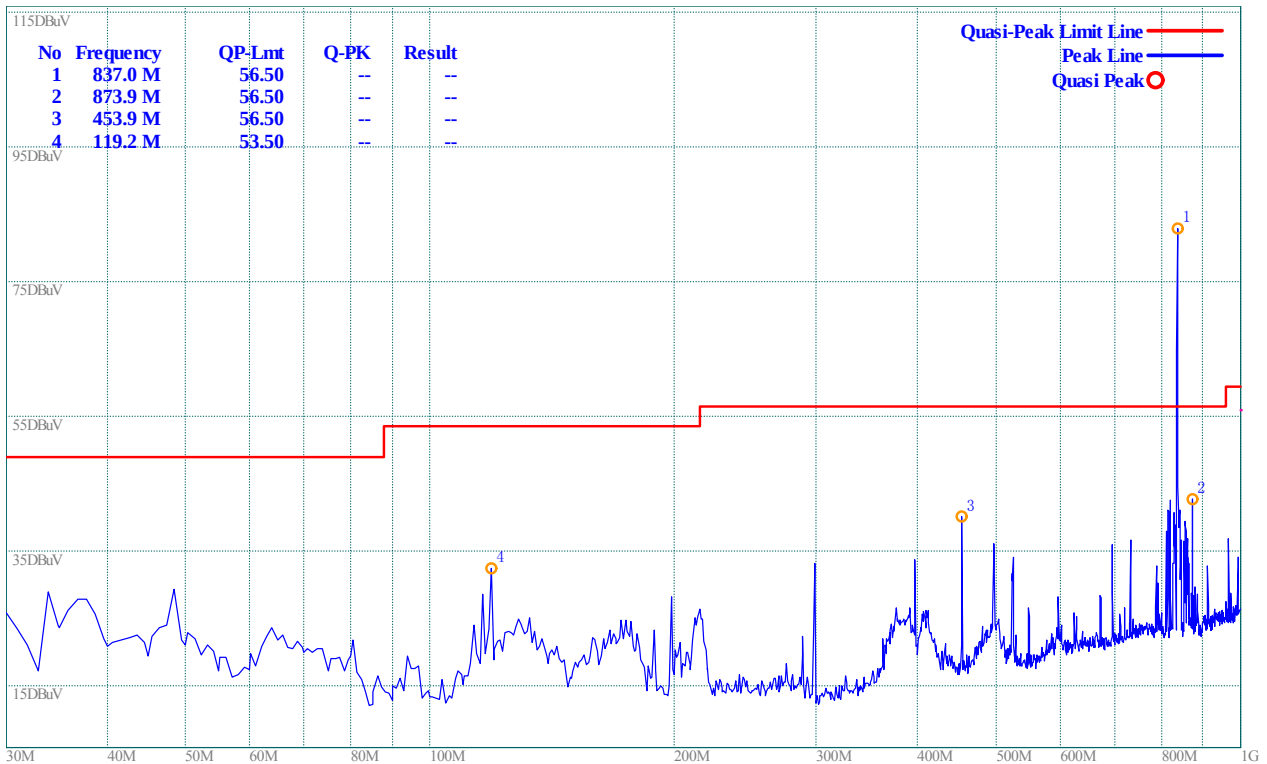
4.2.3 Test Result

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.

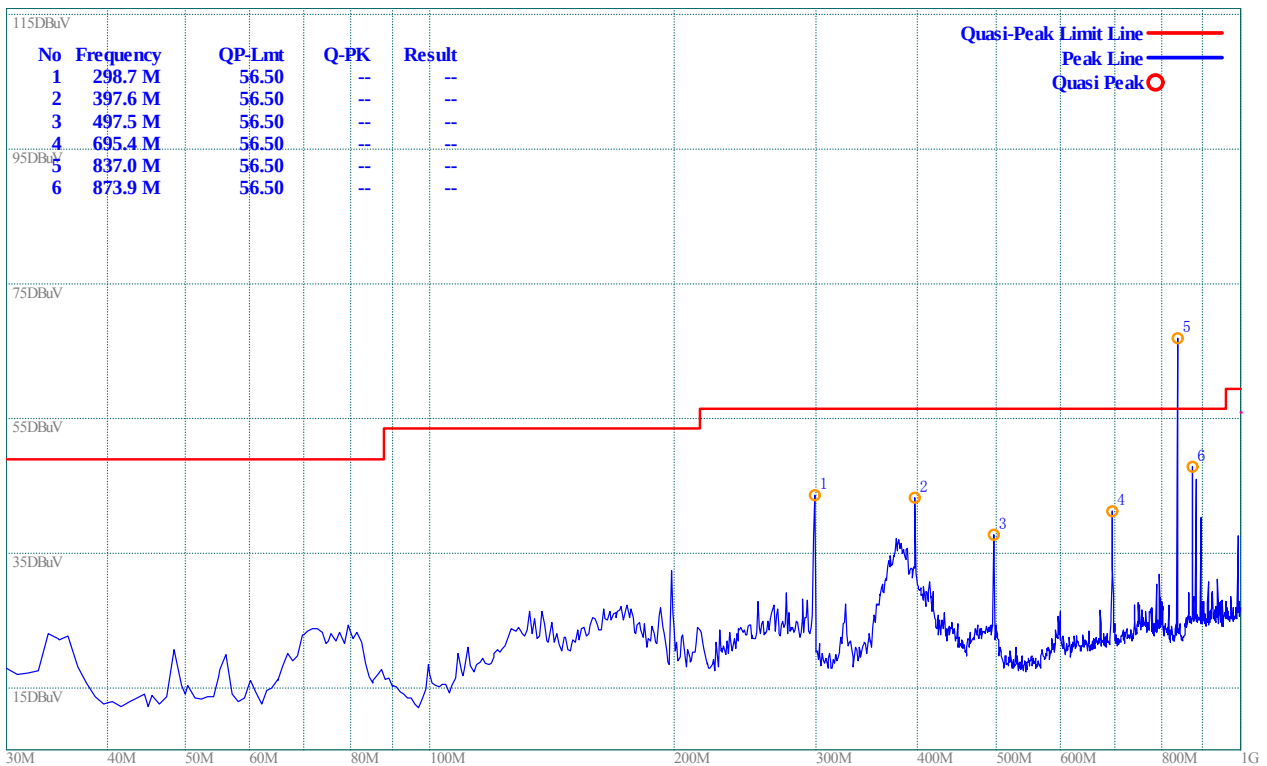
4.2.3.1 GPRS-GSM Test Mode

A. Test Plot and Suspicious Points:

Note: Following is the plots for emission measurement; please note that marked spikes near 850MHz with circle should be ignored because they are MS and SS carrier frequency.



(Plot A: Test Antenna Vertical)

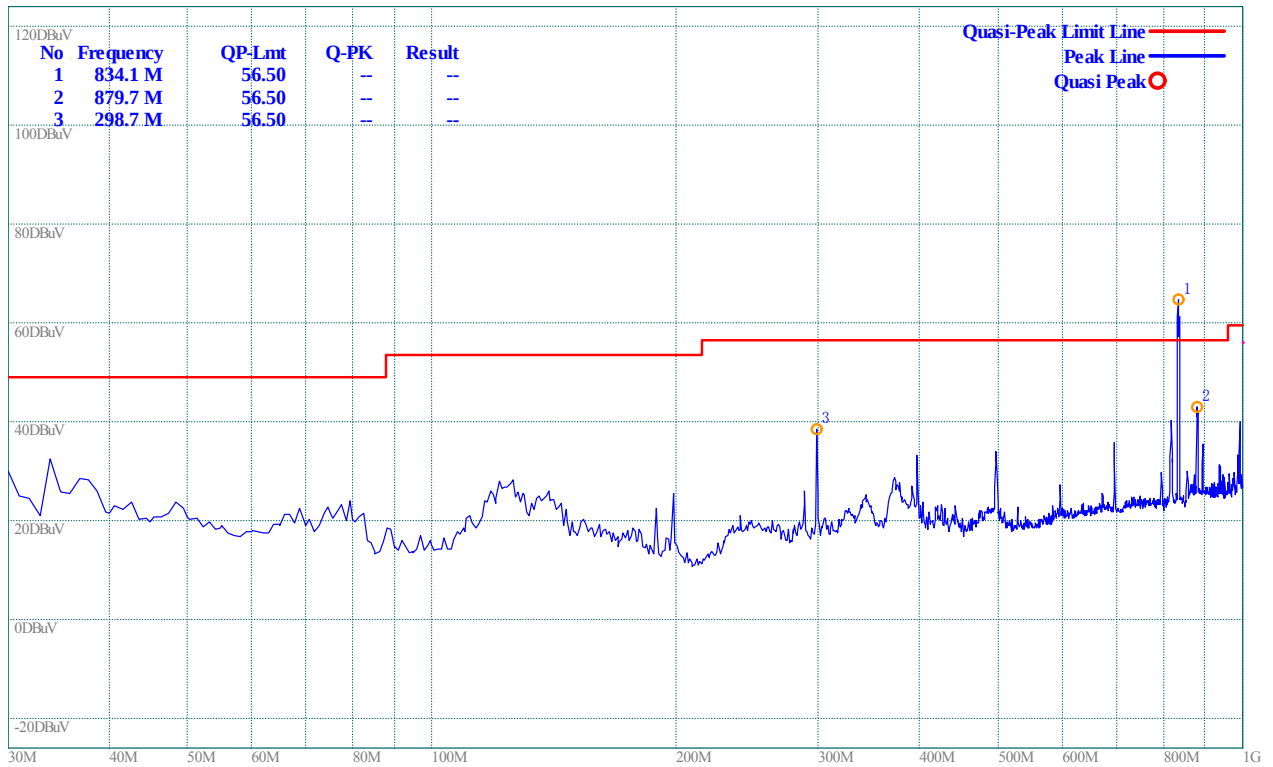


(Plot B: Test Antenna Horizontal)

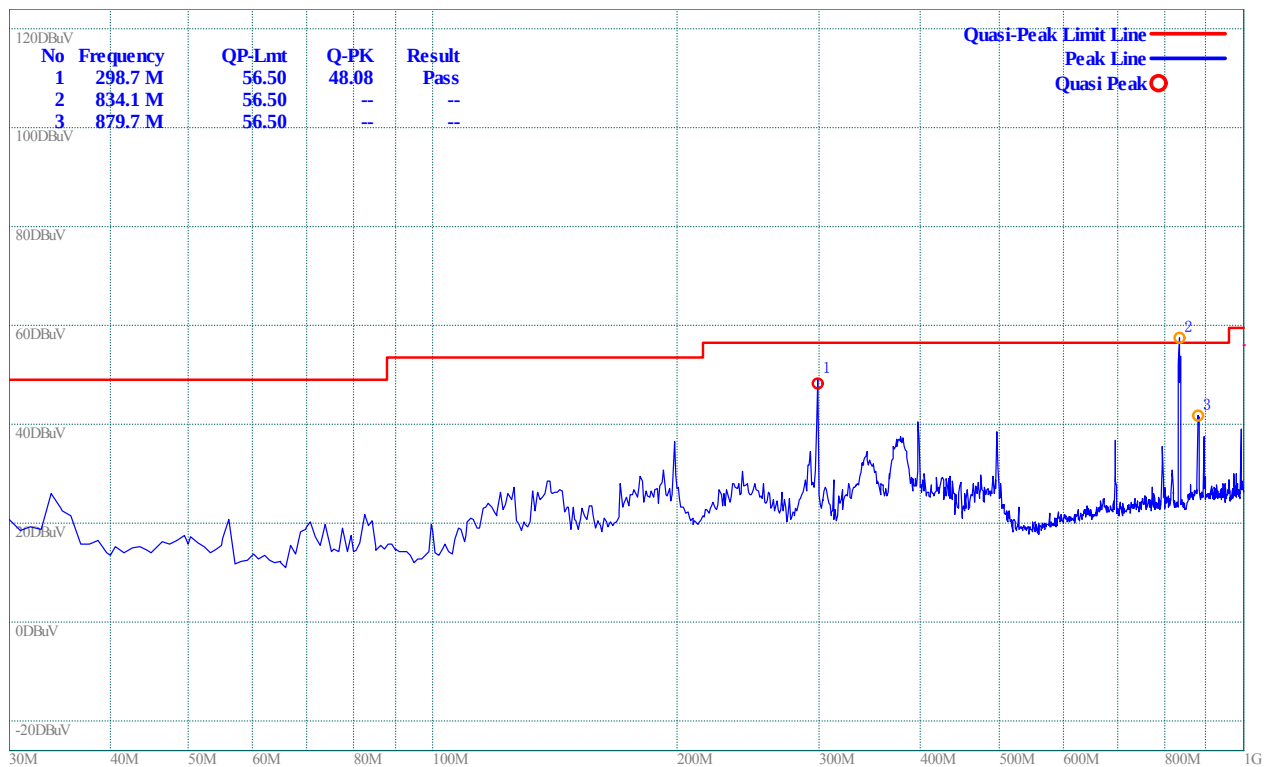
4.2.3.2 WCDMA Test Mode

A. Test Plot and Suspicious Points:

Note: Following is the plots for emission measurement; please note that marked spikes near 850MHz with circle should be ignored because they are MS and SS carrier frequency.



(Plot A: Test Antenna Vertical)



(Plot B: Test Antenna Horizontal)

**** END OF REPORT ****