



**FCC 47 CFR PART 27 SUBPART L
&
INDUSTRY CANADA RSS-139
(Class II Permissive Change)**

TEST REPORT

For

LE920-NAG

Trade Name: LE920

Model: LE920-NAG

Issued to

**Telit Communications S.P.A.
Via Stazione di Prosecco 5/B
34010 Sgonico, Trieste - Italy**

Issued by

**Compliance Certification Services Inc.
No.11, Wugong 6th Rd., Wugu Dist.,
New Taipei City 24891, Taiwan. (R.O.C.)
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Issued Date: December 11, 2013**



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Revision History

| Rev. | Issue Date | Revisions | Effect Page | Revised By |
|------|-------------------|----------------------------------|-------------|-------------|
| 00 | July 25, 2013 | Initial Issue | ALL | Kelly Cheng |
| 01 | December 11, 2013 | See the following Note Rev. (01) | ALL | Kelly Cheng |

Rev. (01):

- 1. Modify the antenna gain to evaluate maximum antenna gain*
- 2. Other information, please refer to the T130708W02 and this test report.*



TABLE OF CONTENTS

| | |
|--|-----------|
| 1. TEST RESULT CERTIFICATION..... | 4 |
| 2. EUT DESCRIPTION | 5 |
| 3. TEST METHODOLOGY | 6 |
| 3.1 EUT CONFIGURATION | 6 |
| 3.2 EUT EXERCISE | 6 |
| 3.3 GENERAL TEST PROCEDURES | 6 |
| 3.4 DESCRIPTION OF TEST MODES | 7 |
| 4. INSTRUMENT CALIBRATION..... | 8 |
| 4.1 MEASURING INSTRUMENT CALIBRATION | 8 |
| 4.2 MEASUREMENT EQUIPMENT USED | 8 |
| 4.3 MEASUREMENT UNCERTAINTY | 9 |
| 5. FACILITIES AND ACCREDITATIONS | 10 |
| 5.1 FACILITIES | 10 |
| 5.2 EQUIPMENT | 10 |
| 5.3 LABORATORY ACCREDITATIONS AND LISTING | 10 |
| 5.4 TABLE OF ACCREDITATIONS AND LISTINGS | 11 |
| 6. SETUP OF EQUIPMENT UNDER TEST | 12 |
| 6.1 SETUP CONFIGURATION OF EUT | 12 |
| 6.2 SUPPORT EQUIPMENT..... | 12 |
| 7. FCC PART 27 REQUIREMENTS & INDUSTRY CANADA RSS-139 | 13 |
| 7.1 99% BANDWIDTH | 13 |
| 7.2 PEAK POWER..... | 19 |
| 7.3 AVERAGE POWER..... | 21 |
| 7.4 OUT OF BAND EMISSION AT ANTENNA TERMINALS | 23 |
| 7.5 ERP & EIRP MEASUREMENT | 31 |
| 7.6 FIELD STRENGTH OF SPURIOUS RADIATION MEASUREMENT | 34 |
| 7.7 FREQUENCY STABILITY V.S. TEMPERATURE MEASUREMENT | 55 |
| 7.8 FREQUENCY STABILITY V.S. VOLTAGE MEASUREMENT | 58 |
| 8. APPENDIX II PHOTOGRAPHS OF TEST SETUP | 61 |
| APPENDIX 1 - PHOTOGRAPHS OF EUT | |



1. TEST RESULT CERTIFICATION

Applicant: Telit Communications S.P.A.
Via Stazione di Prosecco 5/B
34010 Sgonico, Trieste - Italy

Manufacturer: Telit Communications S.P.A.
Via Stazione di Prosecco 5/B
34010 Sgonico, Trieste - Italy

Equipment Under Test: LE920-NAG

Trade Name: LE920

Model Number: LE920-NAG

Date of Test: July 10, 2013 ~ December 8, 2013

| APPLICABLE STANDARDS | |
|--|-------------------------|
| STANDARD | TEST RESULT |
| FCC 47 CFR PART 27 SUBPART L & IC RSS-139 Issue 2: February 2009 | No non-compliance noted |

We hereby certify that:

The above equipment was tested by Compliance Certification Services Inc. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in TIA/EIA-603-C and the energy emitted by the sample EUT tested as described in this report is in compliance with radiated emission limits of FCC Rule FCC PART 27 Subpart L, IC RSS-139 Issue 2.

The test results of this report relate only to the tested sample identified in this report.

Approved by:

Reviewed by:

Miller Lee
Section Manager
Compliance Certification Services Inc.

Angel Cheng
Section Manager
Compliance Certification Services Inc.



2. EUT DESCRIPTION

| | |
|--|--|
| Product | LE920-NAG |
| Trade Name | LE920 |
| Model Number | LE920-NAG |
| Model Discrepancy | N/A |
| Received Date | December 04, 2013 |
| Power Supply | DC 3.8V powered from Host device. |
| Frequency Range | WCDMA / HSDPA / HSUPA Band IV: 1710-1755 MHz |
| Transmit Power (ERP & EIRP Power) | WCDMA Band IV: 28.47dBm HSDPA Band IV: 26.12dBm HSUPA Band IV: 26.24 dBm |
| Type of Emission | WCDMA Band IV: 4M64F9W HSDPA Band IV: 4M63F9W HSUPA Band IV: 4M65F9W |
| Cellular Phone Protocol | WCDMA: Quadrature Phase Shift Keying (QPSK) with Root-raised cosine pulse shaping filters (roll off = 0.22) |
| Antenna Gain | Antenna gain including cable loss must not exceed 5dBi in the Band IV for satisfying the requirement of 2.1043 and 2.1091. |
| Antenna Type | Dipole Antenna |
| Class II Permissive Change | Modify the antenna gain to evaluate maximum antenna gain |

Remark: The sample selected for test was engineering sample that approximated to production product and was provided by manufacturer.



3. TEST METHODOLOGY

Both conducted and radiated testing were performed according to the procedures document on chapter 13 of ANSI C63.4: 2009, TIA/EIA-603-C: 2004 and FCC CFR 47, Part 27 Subpart L.

The tests documented in this report were performed in accordance with IC RSS-132, SPSR503, RSS-133, SPSR510 and ANSI C63.4 and TIA/EIA-603-C.

3.1 EUT CONFIGURATION

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

3.2 EUT EXERCISE

The EUT was operated in the engineering mode to fix the TX frequency that was for the purpose of the measurements.

3.3 GENERAL TEST PROCEDURES

Conducted Emissions

The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirements in Section 13.1.4.1 of ANSI C63.4: 2009. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-peak and average detector modes.

Radiated Emissions

The EUT is placed on a turn table, which is 0.8 m above ground plane. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna, which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the maximum emissions, exploratory radiated emission measurements were made according to the requirements in Section 13.1.4.1 of ANSI C63.4: 2009.



3.4 DESCRIPTION OF TEST MODES

The EUT (model: LE920-NAG) had been tested under operating condition.

EUT staying in continuous transmitting mode was programmed.

After verification, all tests carried out are with the worst-case test modes as shown below except radiated spurious emission below 1GHz and power line conducted emissions below 30MHz, which worst case was in normal link mode and receiving radiated spurious emission above 1GHz, which worst case was in CH Mid mode only.

WCDMA Band IV:

Channel Low (CH1312), Channel Mid (CH1427) and Channel High (CH1513) were chosen for full testing.

WCDMA / HSDPA Band IV:

Channel Low (CH1312), Channel Mid (CH1427) and Channel High (CH1513) were chosen for full testing.

WCDMA / HSUPA Band IV:

Channel Low (CH1312), Channel Mid (CH1427) and Channel High (CH1513) were chosen for full testing.



4. INSTRUMENT CALIBRATION

4.1 MEASURING INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards.

4.2 MEASUREMENT EQUIPMENT USED

Equipment Used for Emissions Measurement

Remark: Each piece of equipment is scheduled for calibration once a year and Loop Antenna is scheduled for calibration once three years.

| Conducted Emissions Test Site | | | | |
|-------------------------------|--------------|---------|---------------|-----------------|
| Name of Equipment | Manufacturer | Model | Serial Number | Calibration Due |
| Spectrum Analyzer | Agilent | E4446A | MY43360131 | 03/20/2014 |
| Power Meter | Anritsu | ML2495A | 1012009 | 06/04/2014 |
| Power Sensor | Anritsu | MA2411A | 0917072 | 06/04/2014 |

| Wugu 966 Chamber A | | | | |
|--------------------|--------------------|------------|---------------|-----------------|
| Name of Equipment | Manufacturer | Model | Serial Number | Calibration Due |
| Spectrum Analyzer | Agilent | E4446A | US42510268 | 11/05/2014 |
| EMI Test Receiver | R&S | ESCI | 100064 | 02/17/2014 |
| Pre-Amplifier | Mini-Circuits | ZFL-1000LN | SF350700823 | 01/12/2014 |
| Bilog Antenna | Sunol Sciences | JB3 | A030105 | 02/17/2014 |
| Bilog Antenna | Sunol Sciences | JB3 | A030205 | 10/01/2014 |
| Horn Antenna | EMCO | 3117 | 00055165 | 02/17/2014 |
| Horn Antenna | EMCO | 3117 | 00055167 | 01/28/2014 |
| Horn Antenna | EMCO | 3116 | 26370 | 01/07/2014 |
| Loop Antenna | EMCO | 6502 | 8905/2356 | 06/12/2014 |
| Turn Table | CCS | CC-T-1F | N/A | N.C.R |
| Antenna Tower | CCS | CC-A-1F | N/A | N.C.R |
| Controller | CCS | CC-C-1F | N/A | N.C.R |
| Site NSA | CCS | N/A | N/A | 12/22/2013 |
| Test S/W | EZ-EMC (CCS-3A1RE) | | | |



4.3 MEASUREMENT UNCERTAINTY

| PARAMETER | UNCERTAINTY |
|---------------------------------------|-------------|
| 3M Semi Anechoic Chamber / 30M~200M | +/-4.0138 |
| 3M Semi Anechoic Chamber / 200M~1000M | +/-3.9483 |
| 3M Semi Anechoic Chamber / 1G~8G | +/-2.5975 |
| 3M Semi Anechoic Chamber / 8G~18G | +/-2.6112 |
| 3M Semi Anechoic Chamber / 18G~26G | +/-2.7389 |
| 3M Semi Anechoic Chamber / 26G~40G | +/-2.9683 |

Remark: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=2$.



5. FACILITIES AND ACCREDITATIONS

5.1 FACILITIES

All measurement facilities used to collect the measurement data are located at

No.199, Chunghsen Road, Hsintien City, Taipei Hsien, Taiwan, R.O.C.
Tel: 886-2-2217-0894 / Fax: 886-2-2217-1029

No.11, Wugong 6th Rd., Wugu Dist., New Taipei City 24891, Taiwan. (R.O.C.)
Tel: 886-2-2299-9720 / Fax: 886-2-2298-4045

No.81-1, Lane 210, Bade 2nd Rd., Luchu Hsiang, Taoyuan Hsien 338, Taiwan
Tel: 886-3-324-0332 / Fax: 886-3-324-5235

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4: 2009 and CISPR Publication 22.

5.2 EQUIPMENT

Radiated emissions are measured with one or more of the following types of linearly polarized antennas: tuned dipole, biconical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with pre-selectors and quasi-peak detectors are used to perform radiated measurements.

Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers.

Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.




All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

5.3 LABORATORY ACCREDITATIONS AND LISTING

The test facilities used to perform radiated and conducted emissions tests are accredited by American Association for Laboratory Accreditation Program for the specific scope accreditation under Lab Code: 0824-01 to perform Electromagnetic Interference tests according to FCC Part 15 and CISPR 22 requirements. In addition, the test facilities are listed with Industry Canada, Certification and Engineering Bureau, IC 2324G-1 for 3M Semi Anechoic Chamber A, 2324G-2 for 3M Semi Anechoic Chamber B.



5.4 TABLE OF ACCREDITATIONS AND LISTINGS

| Country | Agency | Scope of Accreditation | Logo |
|---------|-----------------|--|---|
| USA | FCC | 3M Semi Anechoic Chamber (FCC MRA: TW1039) to perform FCC Part 15 measurements |  FCC MRA: TW1039 |
| Taiwan | TAF | LP0002, RTTE01, FCC Method-47 CFR Part 15 Subpart C, D, E, RSS-210, RSS-310 IDA TS SRD, AS/NZS 4268, AS/NZS 4771, TS 12.1 & 12.2, ETSI EN 300 440-1, ETSI EN 300 440-2, ETSI EN 300 328, ETSI EN 300 220-1, ETSI EN 300 220-2, ETSI EN 301 893, ETSI EN 301 489-1/3/7/17 FCC OET Bulletin 65 + Supplement C, EN 50360, EN 50361, EN 50371, RSS 102, EN 50383, EN 50385, EN 50392, IEC 62209, CNS 14958-1, CNS 14959 FCC Method -47 CFR Part 15 Subpart B IEC / EN 61000-3-2, IEC / EN 61000-3-3, IEC / EN 61000-4-2/3/4/5/6/8/11 |  |
| Canada | Industry Canada | 3M Semi Anechoic Chamber (IC 2324G-1 / IC 2324G-2) to perform |  IC 2324G-1 IC 2324G-2 |

** No part of this report may be used to claim or imply product endorsement by A2LA or any agency of the US Government.*



6. SETUP OF EQUIPMENT UNDER TEST

6.1 SETUP CONFIGURATION OF EUT

See test photographs attached in Appendix II for the actual connections between EUT and support equipment.

6.2 SUPPORT EQUIPMENT

| No | Equipment | Brand | Model | Series No. | FCC ID | Data Cable | Power Cord |
|----|--------------------------------------|-------|--------|------------|--------|------------|------------------|
| 1. | Universal Radio Communication Tester | R&S | CMU200 | 101245 | N/A | N/A | Unshielded, 1.8m |

Remark:

1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.



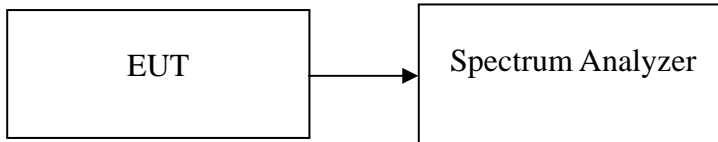
7. FCC PART 27 REQUIREMENTS & INDUSTRY CANADA RSS-139

7.1 99% BANDWIDTH

LIMIT

None; for reporting purposes only.

Test Configuration



TEST PROCEDURE

The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled.

TEST RESULTS

No non-compliance noted.

Test Data

| Test Mode | CH | Frequency (MHz) | 99% Bandwidth (MHz) |
|---------------|------|-----------------|---------------------|
| WCDMA Band IV | 1312 | 1712.40 | 4.641 |
| | 1427 | 1735.40 | 4.643 |
| | 1513 | 1752.60 | 4.648 |

| Test Mode | CH | Frequency (MHz) | 99% Bandwidth (MHz) |
|---------------|------|-----------------|---------------------|
| HSDPA Band IV | 1312 | 1712.40 | 4.635 |
| | 1427 | 1735.40 | 4.638 |
| | 1513 | 1752.60 | 4.634 |

| Test Mode | CH | Frequency (MHz) | 99% Bandwidth (MHz) |
|---------------|------|-----------------|---------------------|
| HSUPA Band IV | 1312 | 1712.40 | 4.644 |
| | 1427 | 1735.40 | 4.647 |
| | 1513 | 1752.60 | 4.654 |



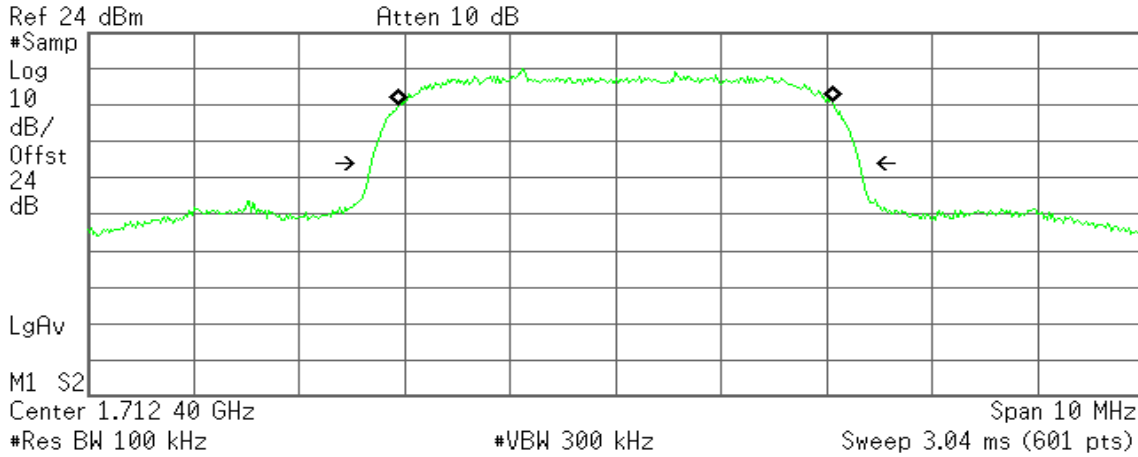
Test Plot

WCDMA Band IV

CH Low

Agilent

R T



Occupied Bandwidth
4.1324 MHz

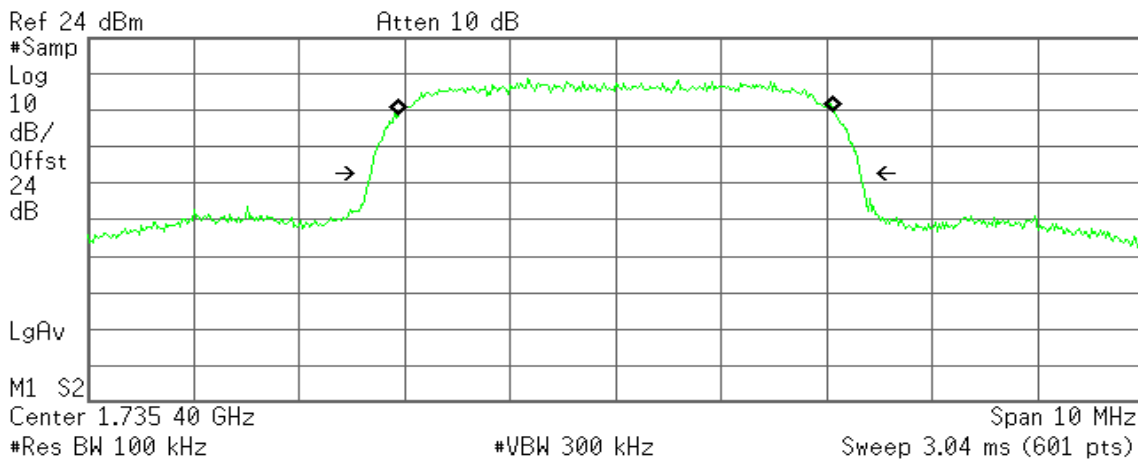
Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error -1.674 kHz
x dB Bandwidth 4.641 MHz*

CH Mid

Agilent

R T



Occupied Bandwidth
4.1457 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

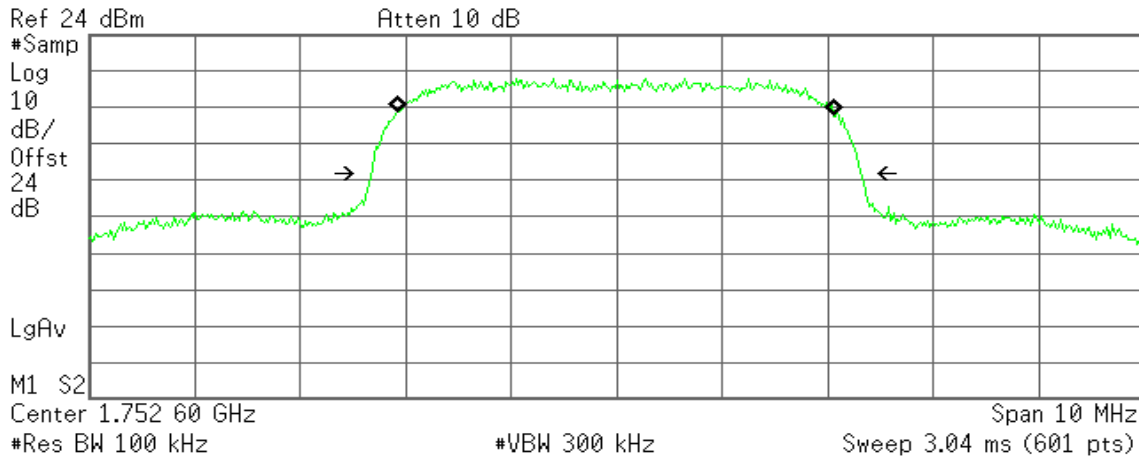
Transmit Freq Error 250.420 Hz
x dB Bandwidth 4.643 MHz*



CH High

Agilent

R T



Occupied Bandwidth
4.1414 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

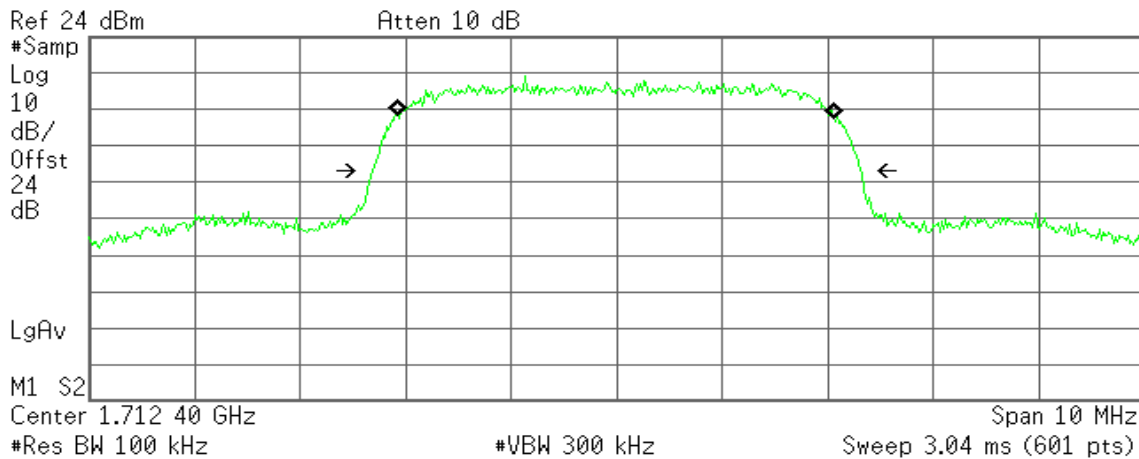
Transmit Freq Error -6.925 kHz
x dB Bandwidth 4.648 MHz*

HSDPA Band IV

CH Low

Agilent

R T



Occupied Bandwidth
4.1481 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

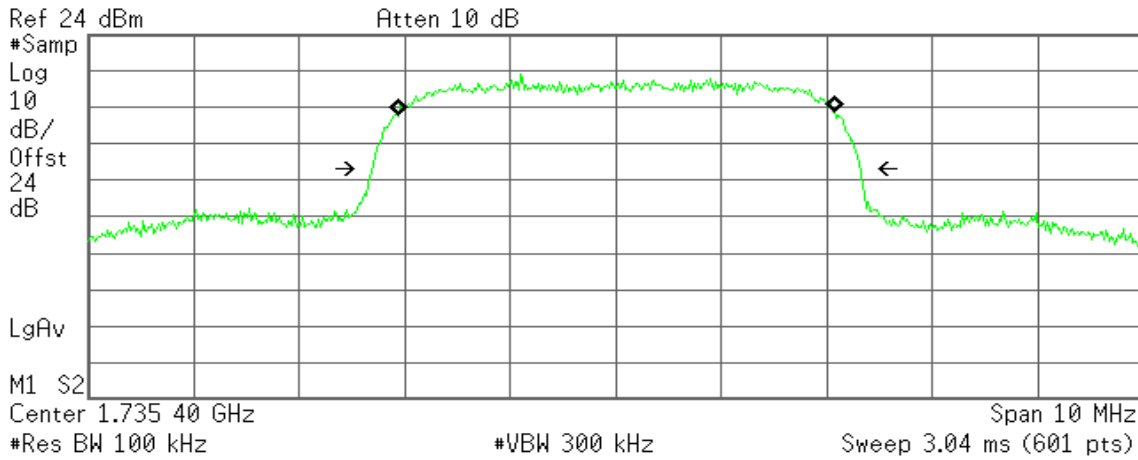
Transmit Freq Error -8.125 kHz
x dB Bandwidth 4.635 MHz*



CH Mid

Agilent

R T



Occupied Bandwidth
4.1547 MHz

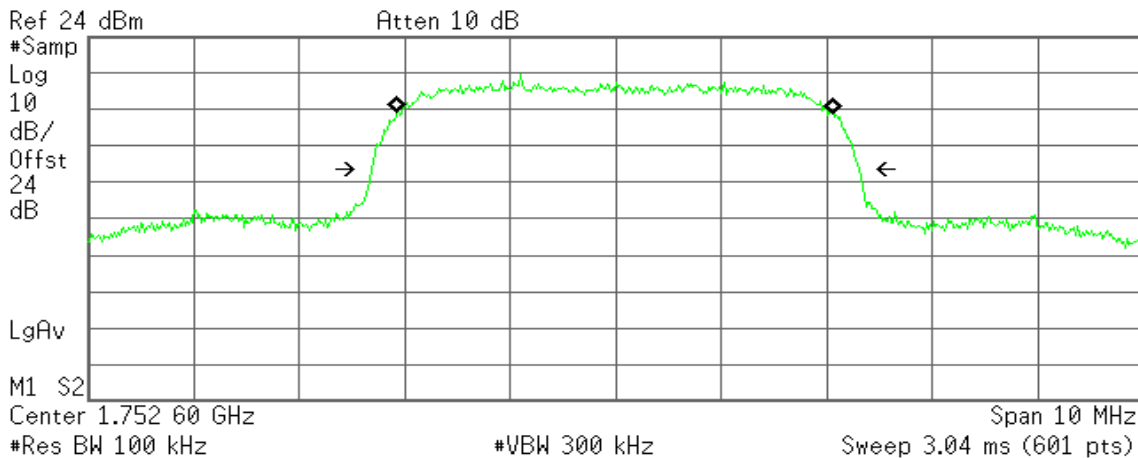
Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error 4.578 kHz
x dB Bandwidth 4.638 MHz*

CH High

Agilent

R T



Occupied Bandwidth
4.1506 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error -777.586 Hz
x dB Bandwidth 4.634 MHz*

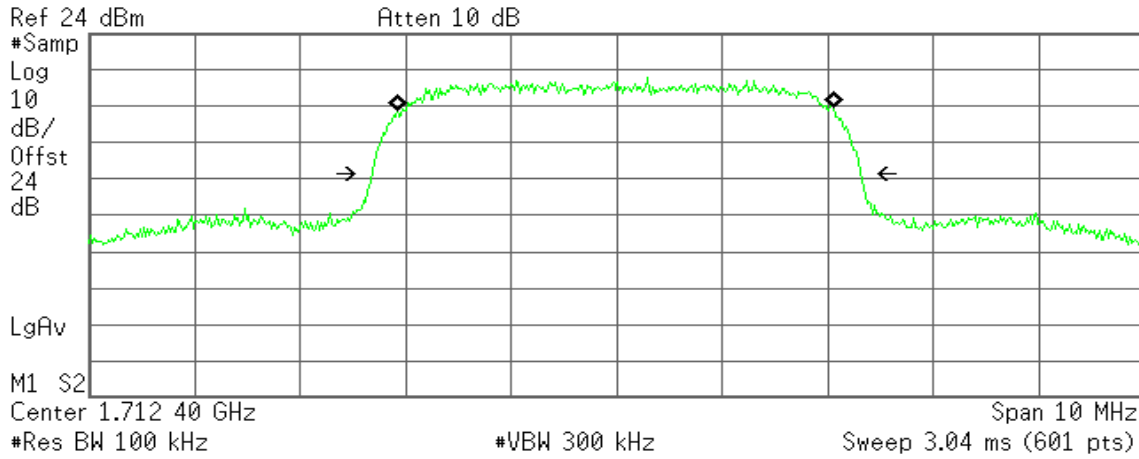


HSUPA Band IV

CH Low

Agilent

R T



Occupied Bandwidth
4.1513 MHz

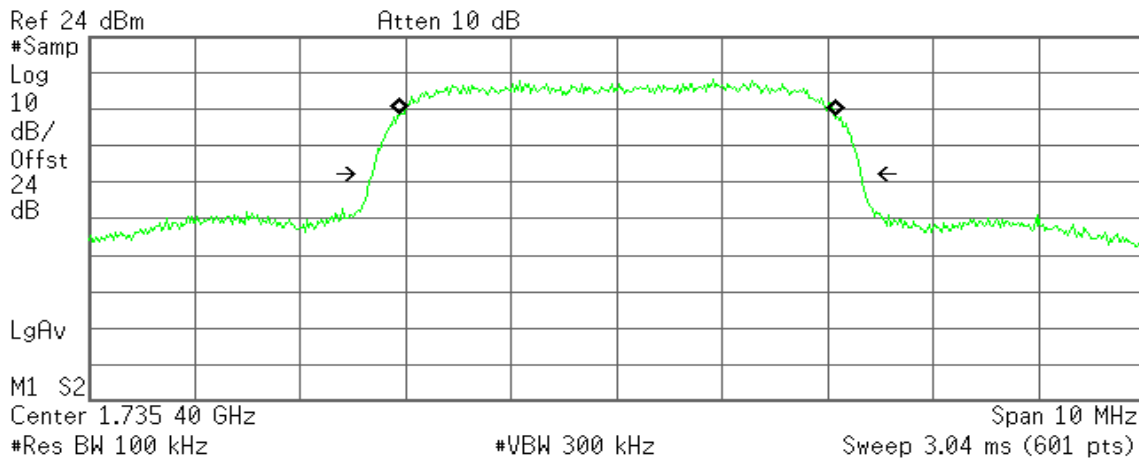
Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error -5.588 kHz
x dB Bandwidth 4.644 MHz*

CH Mid

Agilent

R T



Occupied Bandwidth
4.1384 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

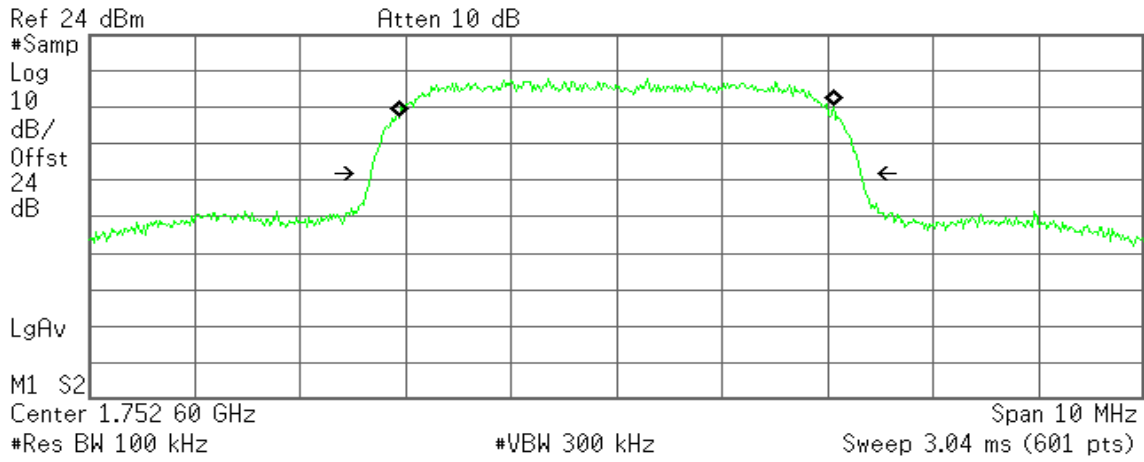
Transmit Freq Error 5.947 kHz
x dB Bandwidth 4.647 MHz*



CH High

Agilent

R T



Occupied Bandwidth
4.1365 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error -3.581 kHz
x dB Bandwidth 4.654 MHz*

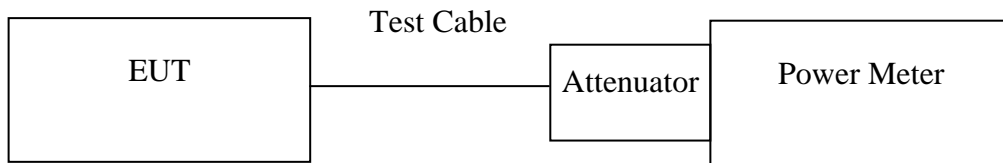


7.2 PEAK POWER

LIMIT

According to FCC §2.1046.

Test Configuration



Remark: Measurement setup for testing on Antenna connector

TEST PROCEDURE

The transmitter output was connected to a calibrated attenuator, the other end of which was connected to a power meter. Transmitter output was read off the power meter in dBm. The power output at the transmitter antenna port was determined by adding the value of the attenuator to the power meter reading.

TEST RESULTS

No non-compliance noted.



Test Data

| Test Mode | CH | Frequency (MHz) | Peak Power (dBm) | Output Power (W) |
|---------------|------|-----------------|------------------|------------------|
| WCDMA Band IV | 1312 | 1712.40 | 24.98 | 0.31477 |
| | 1427 | 1735.40 | 24.97 | 0.31405 |
| | 1513 | 1752.60 | 24.76 | 0.29923 |

| Test Mode | CH | Frequency (MHz) | Peak Power (dBm) | Output Power (W) |
|---------------|------|-----------------|------------------|------------------|
| HSDPA Band IV | 1312 | 1712.40 | 24.91 | 0.30974 |
| | 1427 | 1735.40 | 24.85 | 0.30549 |
| | 1513 | 1752.60 | 24.62 | 0.28973 |

| Test Mode | CH | Frequency (MHz) | Peak Power (dBm) | Output Power (W) |
|---------------|------|-----------------|------------------|------------------|
| HSUPA Band IV | 1312 | 1712.40 | 24.88 | 0.30761 |
| | 1427 | 1735.40 | 24.71 | 0.29580 |
| | 1513 | 1752.60 | 24.45 | 0.27861 |

Remark: The value of factor includes both the loss of cable and external attenuator

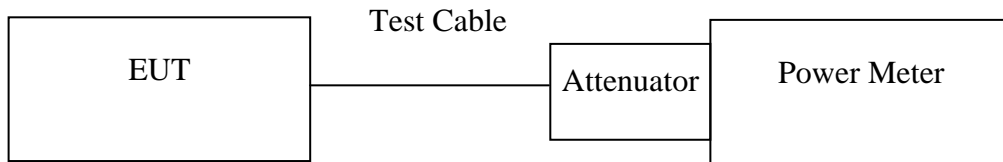


7.3 AVERAGE POWER

LIMIT

For reporting purposes only.

Test Configuration



Remark: Measurement setup for testing on Antenna connector

TEST PROCEDURE

The transmitter output was connected to a calibrated attenuator, the other end of which was connected to a power meter. Transmitter output was read off the power meter in dBm. The power output at the transmitter antenna port was determined by adding the value of the attenuator to the power meter reading.

TEST RESULTS

No non-compliance noted.



Test Data

| Test Mode | CH | Frequency (MHz) | Average Power (dBm) | Output Power (W) |
|---------------|------|-----------------|---------------------|------------------|
| WCDMA Band IV | 1312 | 1712.40 | 24.93 | 0.31117 |
| | 1427 | 1735.40 | 24.91 | 0.30974 |
| | 1513 | 1752.60 | 24.66 | 0.29242 |

| Test Mode | CH | Frequency (MHz) | Average Power (dBm) | Output Power (W) |
|---------------|------|-----------------|---------------------|------------------|
| HSDPA Band IV | 1312 | 1712.40 | 24.83 | 0.30409 |
| | 1427 | 1735.40 | 24.81 | 0.30269 |
| | 1513 | 1752.60 | 24.56 | 0.28576 |

| Test Mode | CH | Frequency (MHz) | Average Power (dBm) | Output Power (W) |
|---------------|------|-----------------|---------------------|------------------|
| HSUPA Band IV | 1312 | 1712.40 | 24.82 | 0.30339 |
| | 1427 | 1735.40 | 24.64 | 0.29107 |
| | 1513 | 1752.60 | 24.40 | 0.27542 |

Remark: The value of factor includes both the loss of cable and external attenuator



7.4 OUT OF BAND EMISSION AT ANTENNA TERMINALS

LIMIT

According to FCC §FCC 47 CFR PART 27 SUBPART L, IC RSS-139 Issue 2.

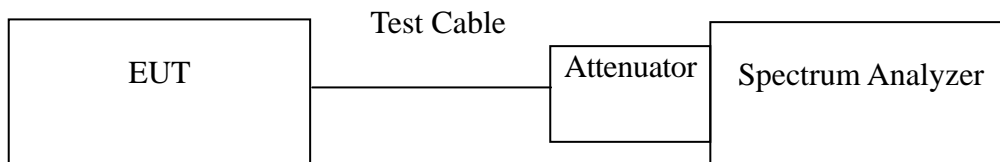
Out of Band Emissions: The mean power of emission must be attenuated below the mean power of the non-modulated carrier (P) on any frequency twice or more than twice the fundamental frequency by at least $43 + 10 \log P$ dB.

Mobile Emissions in Base Frequency Range: The mean power of any emissions appearing in the base station frequency range from cellular mobile transmitters operated must be attenuated to a level not exceed -80 dBm at the transmit antenna connector.

Band Edge Requirements: In the 1MHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least 1% of the emission bandwidth of the fundamental emission of the transmitter may be employed to measure the Out of band Emission

Test Configuration

Out of band emission at antenna terminals:



TEST PROCEDURE

The RF output of the transceiver was connected to a spectrum analyzer through appropriate attenuation. The resolution bandwidth of the spectrum analyzer was set at 1MHz, sufficient scans were taken to show the out of band Emissions if any up to 10th harmonic.

For the out of band: Set the RBW, VBW = 1MHz, Start=30MHz, Stop= 10 th harmonic. Limit = -13dBm

Band Edge Requirements (1710-1755 MHz): In the 1 MHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least 1 percent of the emission bandwidth of the fundamental emission of the transmitter may be employed to measure the out of band Emissions. Limit, -13dBm.

TEST RESULTS

No non-compliance noted.



Test Data

| Mode | CH | Location | Description |
|--------------------|------|------------|---|
| WCDMA (Band IV) | 1312 | Figure 7-1 | Conducted spurious emissions, 30MHz - 20GHz |
| | 1427 | Figure 7-2 | Conducted spurious emissions, 30MHz - 20GHz |
| | 1513 | Figure 7-3 | Conducted spurious emissions, 30MHz - 20GHz |

| Mode | CH | Location | Description |
|-----------------------------|------|------------|---|
| HSDPA WCDMA (Band IV) | 1312 | Figure 7-4 | Conducted spurious emissions, 30MHz - 20GHz |
| | 1427 | Figure 7-5 | Conducted spurious emissions, 30MHz - 20GHz |
| | 1513 | Figure 7-6 | Conducted spurious emissions, 30MHz - 20GHz |

| Mode | CH | Location | Description |
|-----------------------------|------|------------|---|
| HSUPA WCDMA (Band IV) | 1312 | Figure 7-7 | Conducted spurious emissions, 30MHz - 20GHz |
| | 1427 | Figure 7-8 | Conducted spurious emissions, 30MHz - 20GHz |
| | 1513 | Figure 7-9 | Conducted spurious emissions, 30MHz - 20GHz |



| WCDMA Band IV | | | | | | |
|----------------|-----------------|----------------------|--------------------|--------------|-------------|-------------|
| Operation Mode | Frequency (MHz) | Emission level (dBm) | Max.Ant.Gain (dBi) | Result (dBm) | Limit (dBm) | Margin (dB) |
| Low | N/A | | 5 | | -13 | |
| | | | 5 | | -13 | |
| Mid | N/A | | 5 | | -13 | |
| | | | 5 | | -13 | |
| High | N/A | | 5 | | -13 | |
| | | | 5 | | -13 | |
| HSDPA Band IV | | | | | | |
| Operation Mode | Frequency (MHz) | Emission level (dBm) | Max.Ant.Gain (dBi) | Result (dBm) | Limit (dBm) | Margin (dB) |
| Low | N/A | | 5 | | -13 | |
| | | | 5 | | -13 | |
| Mid | N/A | | 5 | | -13 | |
| | | | 5 | | -13 | |
| High | N/A | | 5 | | -13 | |
| | | | 5 | | -13 | |
| HSUPA Band IV | | | | | | |
| Operation Mode | Frequency (MHz) | Emission level (dBm) | Max.Ant.Gain (dBi) | Result (dBm) | Limit (dBm) | Margin (dB) |
| Low | N/A | | 5 | | -13 | |
| | | | 5 | | -13 | |
| Mid | N/A | | 5 | | -13 | |
| | | | 5 | | -13 | |
| High | N/A | | 5 | | -13 | |
| | | | 5 | | -13 | |

Remark: Data of measurement within this frequency range shown “ N/A ” in the table above means the emission is too small to be measured



Test Plot

WCDMA Band IV

Figure 7-1: Out of Band emission at antenna terminals – CH Low

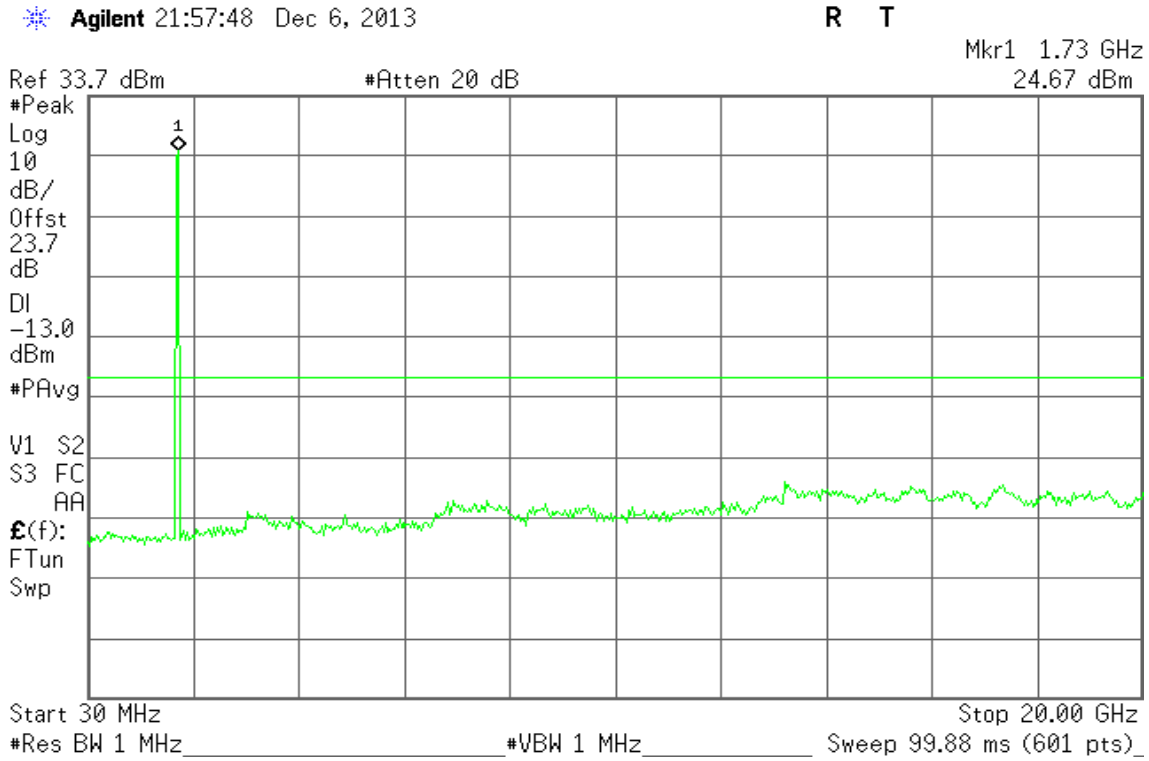


Figure 7-2: Out of Band emission at antenna terminals – CH Mid

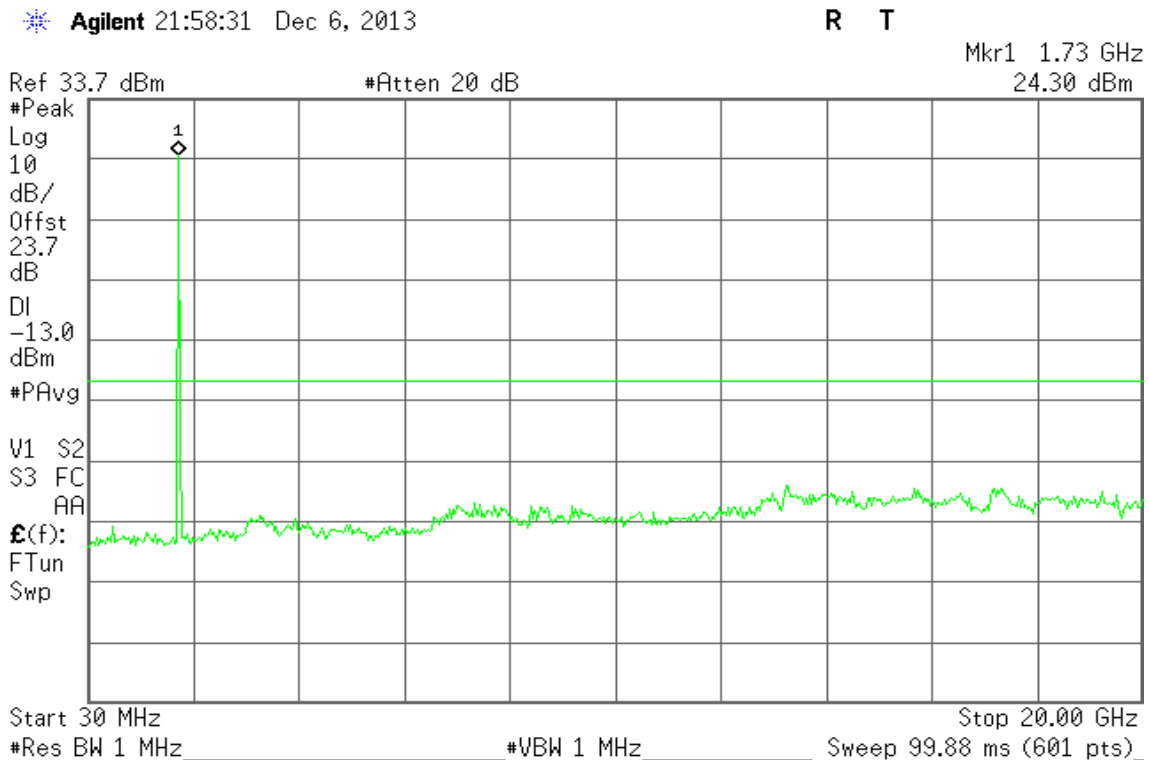
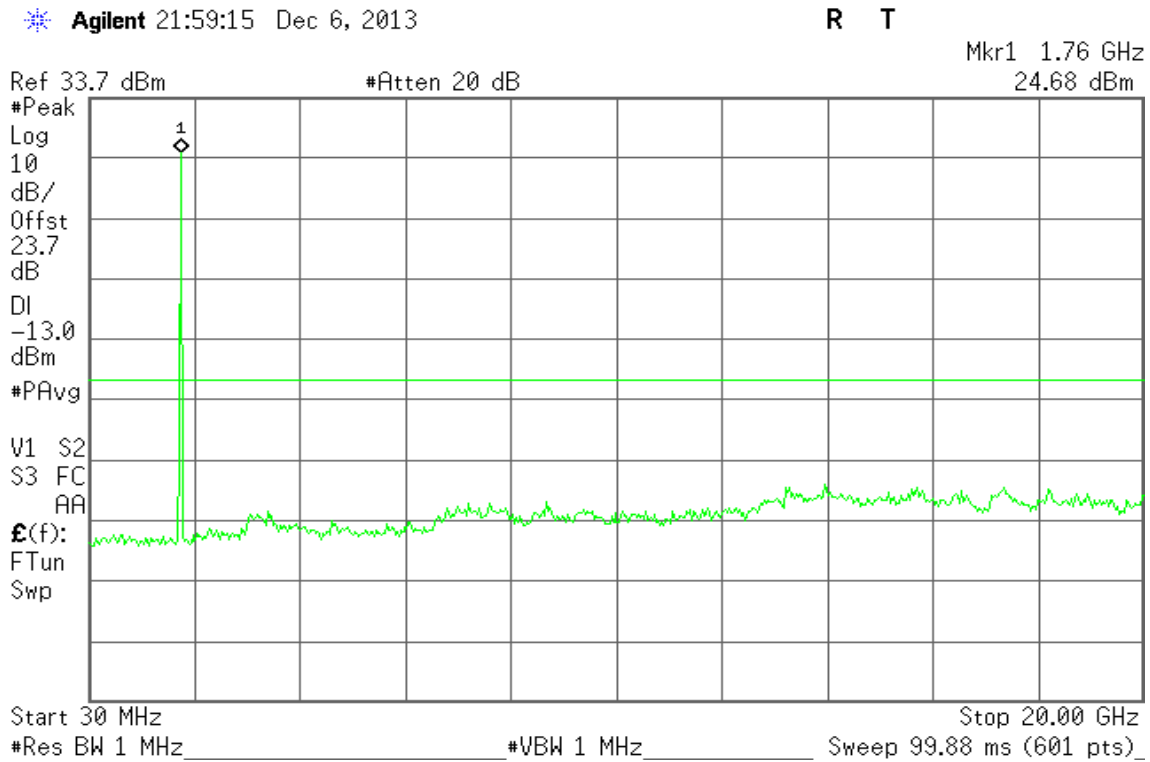




Figure 7-3: Out of Band emission at antenna terminals – CH High



HSDPA Band IV

Figure 7-4: Out of Band emission at antenna terminals – CH Low

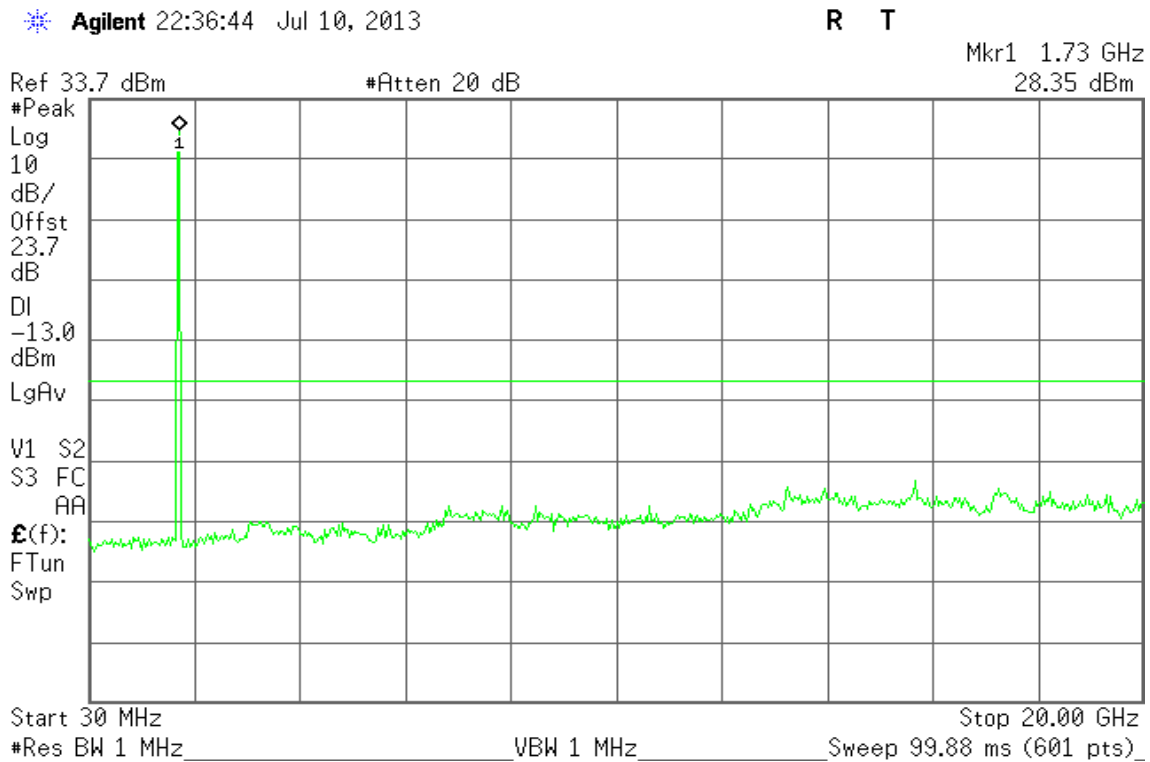




Figure 7-5: Out of Band emission at antenna terminals – CH Mid

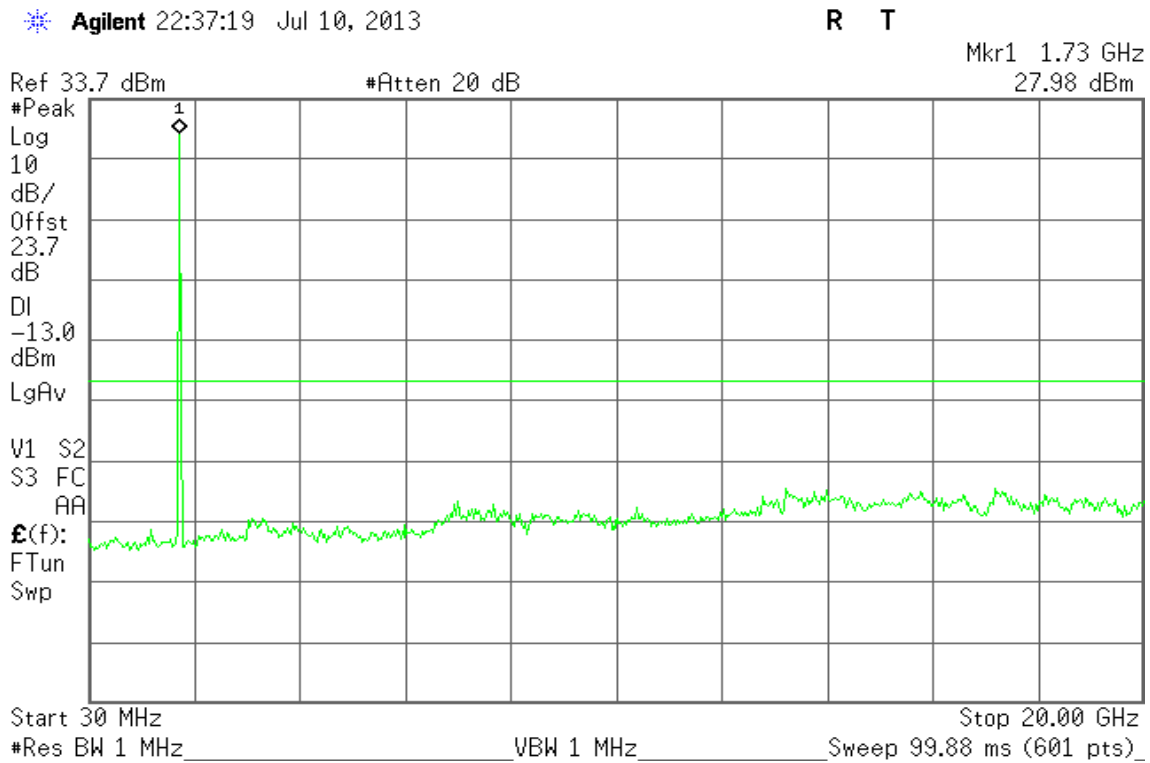
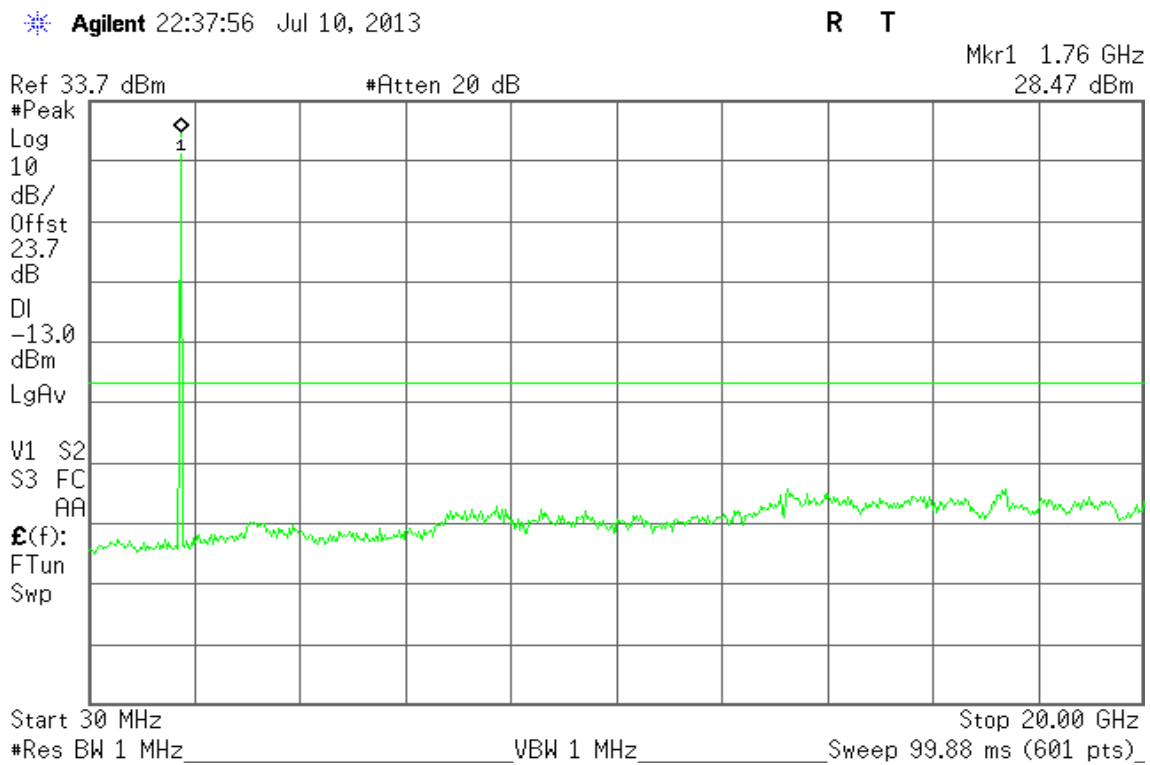


Figure 7-6: Out of Band emission at antenna terminals – CH High





HSUPA Band IV

Figure 7-7: Out of Band emission at antenna terminals – CH Low

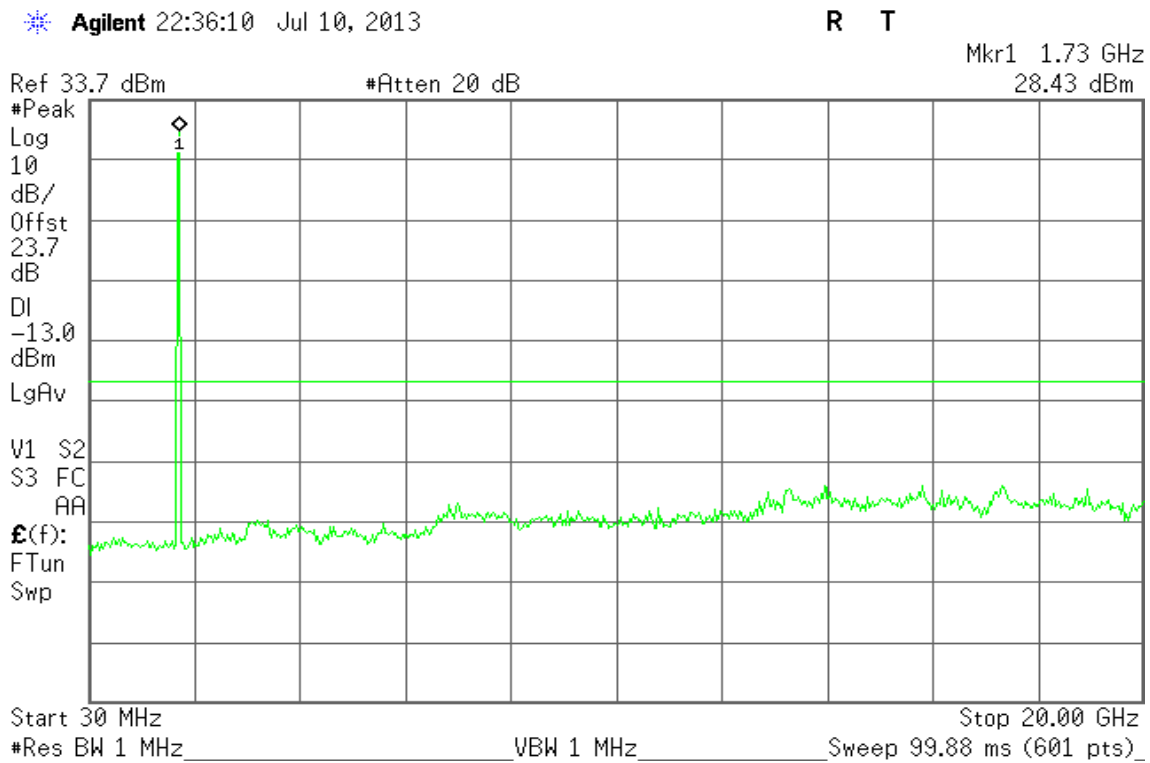


Figure 7-8: Out of Band emission at antenna terminals – CH Mid

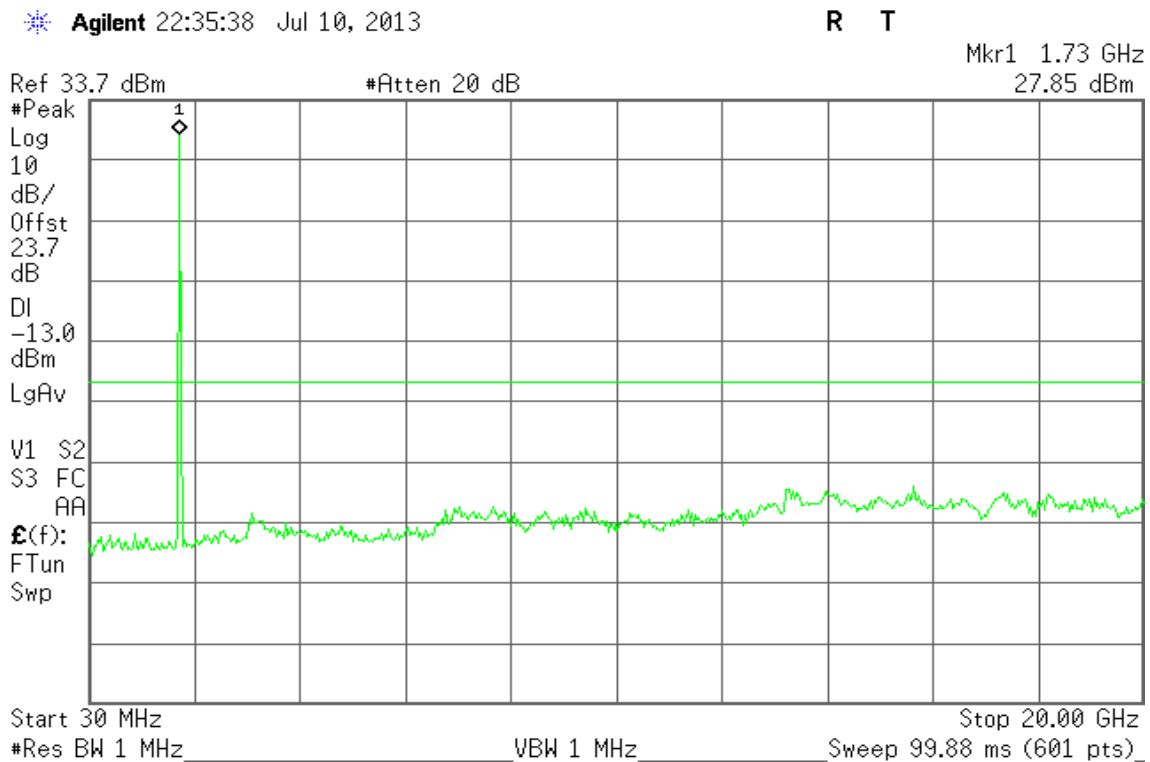
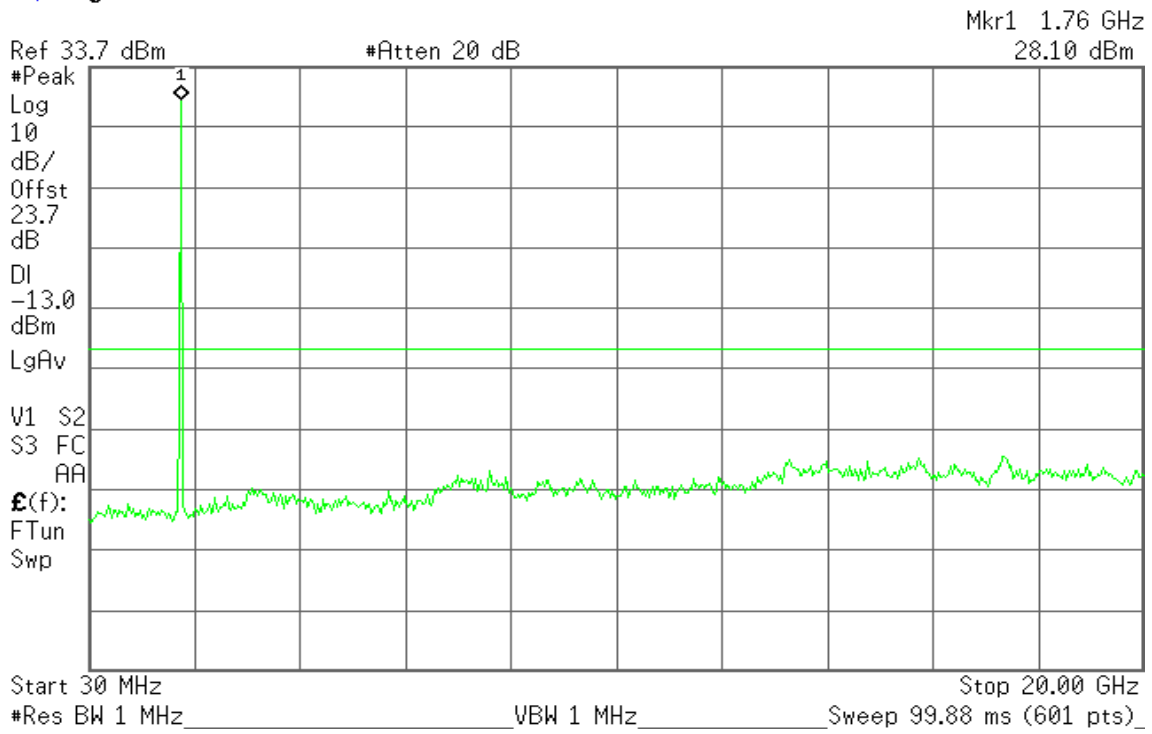




Figure 7-9: Out of Band emission at antenna terminals – CH High

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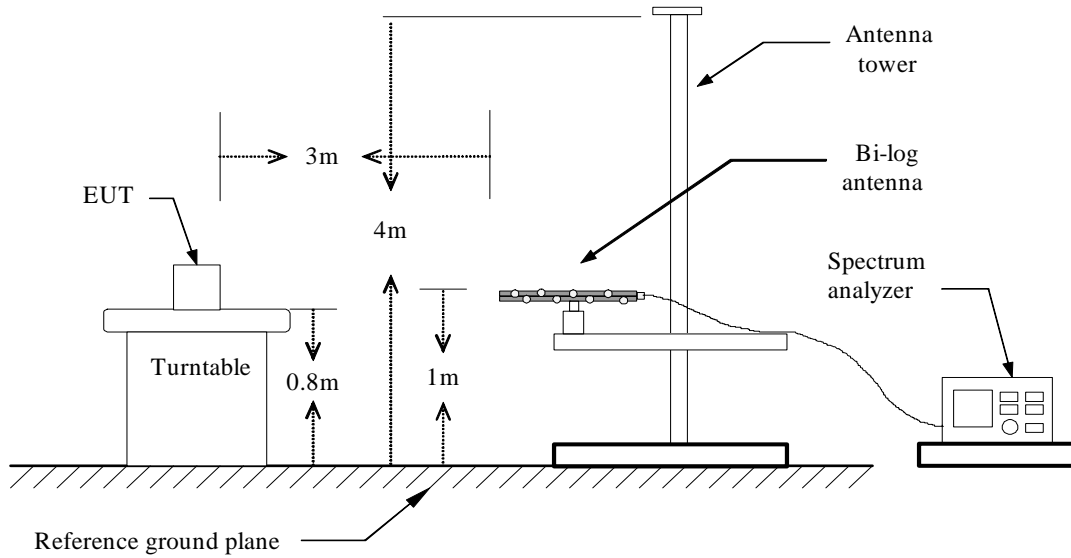




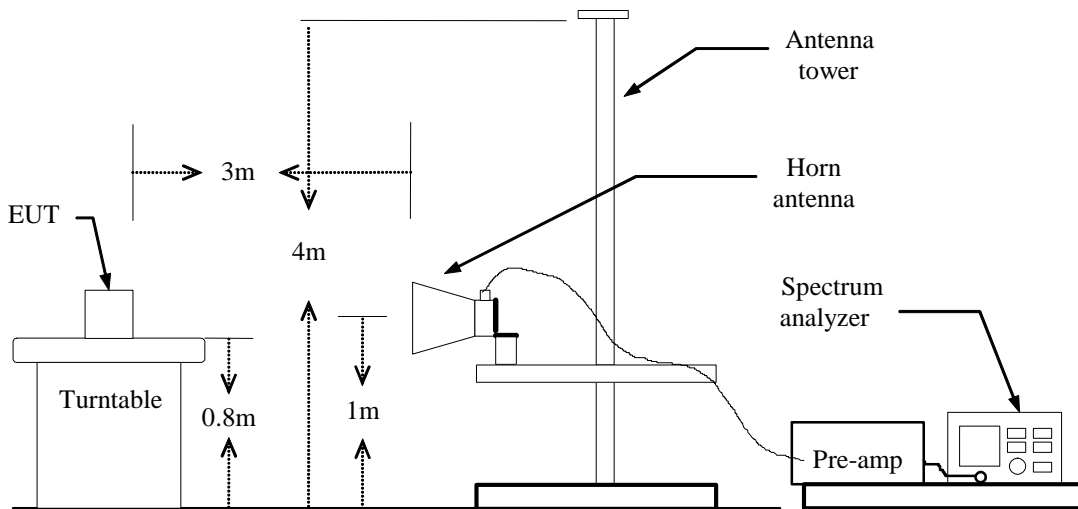
7.5 ERP & EIRP MEASUREMENT

Test Configuration

Below 1 GHz

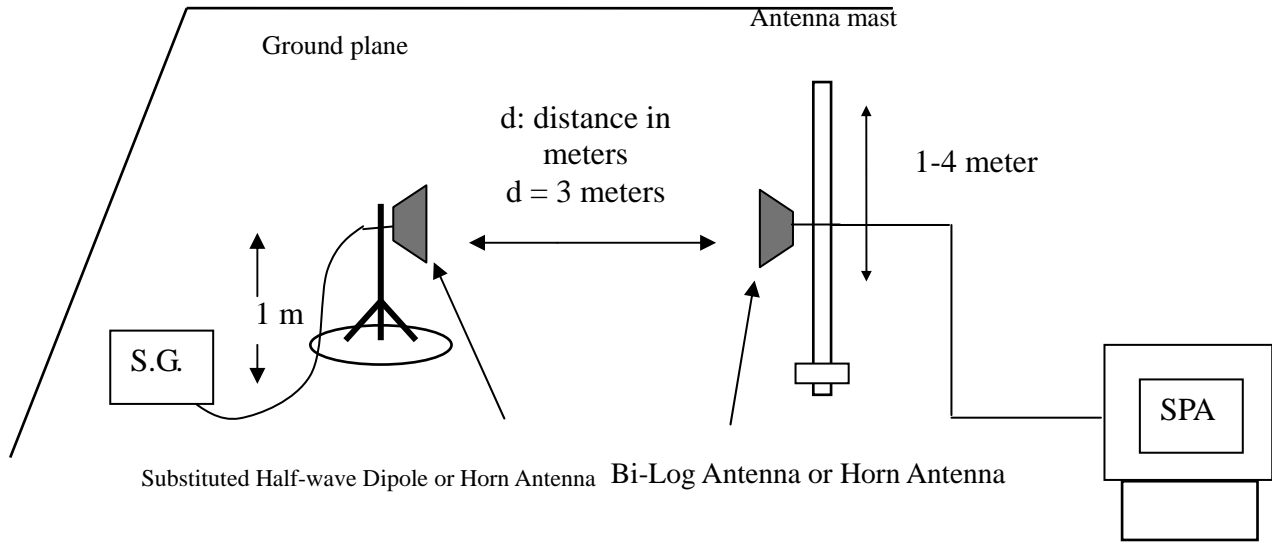


Above 1 GHz





For Substituted Method Test Set-UP



TEST PROCEDURE

The EUT was placed on a non-conductive turntable using a non-conductive support. The radiated emission at the fundamental frequency was measured at 3 m with a test antenna and EMI spectrum analyzer.

During the measurement of the EUT, the resolution bandwidth was set to 3MHz and the average bandwidth was set to 3MHz. The highest emission was recorded with the rotation of the turntable and the lowering of the test antenna. The reading was recorded and the field strength (E in dBuV/m) was calculated.

ERP in frequency band 824-849MHz, and EIRP in frequency band 1851.25 –1910MHz were measured using a substitution method. The EUT was replaced by half-wave dipole (824-849MHz) or horn antenna (1851.25-1910MHz) connected to a signal generator. The spectrum analyzer reading was recorded and ERP/EIRP was calculated as follows:

$$\text{ERP} = \text{S.G. output (dBm)} + \text{Antenna Gain (dBd)} - \text{Cable (dB)}$$

$$\text{EIRP} = \text{S.G. output (dBm)} + \text{Antenna Gain (dBi)} - \text{Cable (dB)}$$

TEST RESULTS

No non-compliance noted.



Calculation of maximum antenna gain

| 1700MHz frequency band | | | | RF Output Power | | | | Calculations to meet ERP limits | | |
|------------------------|--------------|----------|-----------------|---------------------|---------|------------------------|---------|---------------------------------|----------------------|-------|
| WCDMA FDD-IV | | | | Burst Average Power | | Max peak tune up power | | EIRP limit | Antenna Gain to meet | |
| BAND | MODE | Sub-Test | Frequency [MHz] | [dBm] | [W] | [dBm] | [W] | [W] | Numerical | [dBi] |
| WCDMA FDD-IV | WCDMA FDD-IV | - | 1712.4 | 24.93 | 0.31117 | 25 | 0.31623 | 1 | 3.162 | 5.00 |
| | | | 1735.4 | 24.91 | 0.30974 | 25 | 0.31623 | 1 | 3.162 | 5.00 |
| | | | 1752.6 | 24.66 | 0.29242 | 25 | 0.31623 | 1 | 3.162 | 5.00 |
| | HSDPA FDD-IV | - | 1712.4 | 24.83 | 0.30409 | 25 | 0.31623 | 1 | 3.162 | 5.00 |
| | | | 1735.4 | 24.81 | 0.30269 | 25 | 0.31623 | 1 | 3.162 | 5.00 |
| | | | 1752.6 | 24.56 | 0.28576 | 25 | 0.31623 | 1 | 3.162 | 5.00 |
| | HSUPA FDD-IV | - | 1712.4 | 24.82 | 0.30339 | 25 | 0.31623 | 1 | 3.162 | 5.00 |
| | | | 1735.4 | 24.64 | 0.29107 | 25 | 0.31623 | 1 | 3.162 | 5.00 |
| | | | 1752.6 | 24.4 | 0.27542 | 25 | 0.31623 | 1 | 3.162 | 5.00 |



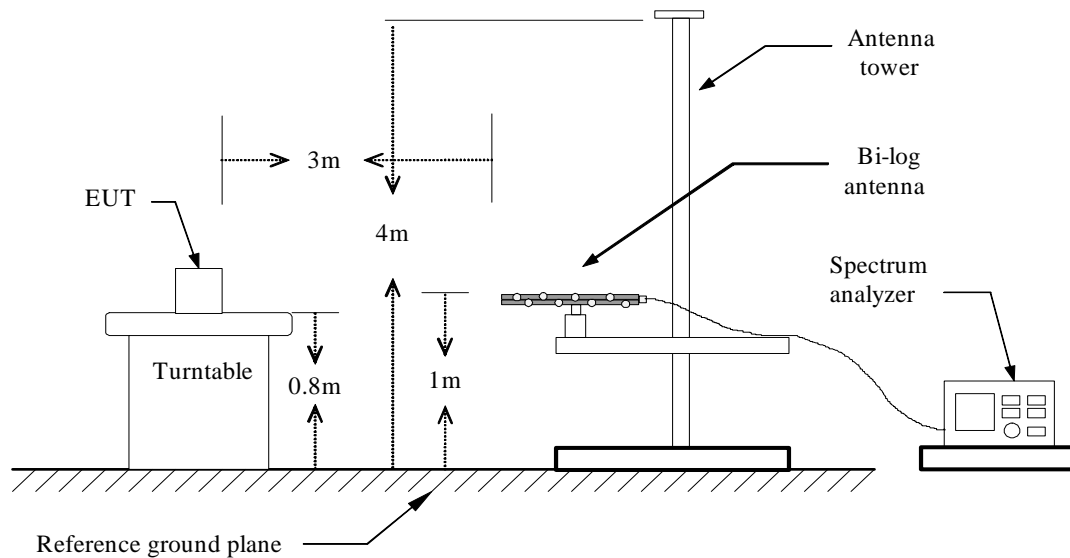
7.6 FIELD STRENGTH OF SPURIOUS RADIATION MEASUREMENT

LIMIT

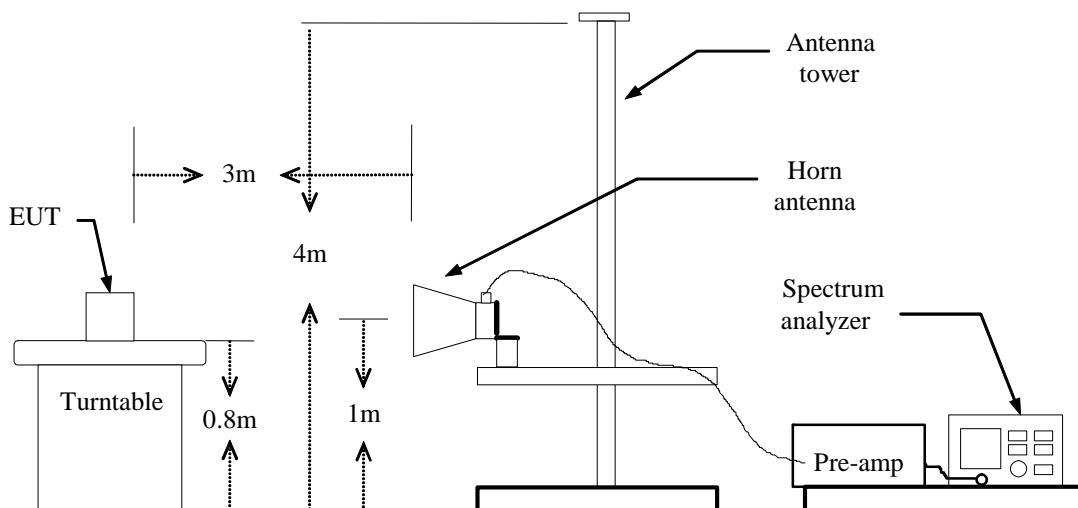
§27.53 (g) and RSS-139 § 6.5 For operations in the 1710–1755MHz and 2110–2155 MHz bands, the power of any emission outside a licensee’s frequency block shall be attenuated below the transmitter power (P) by at least $43 + 10 \log_{10} (P)$ dB.

Test Configuration

Below 1 GHz

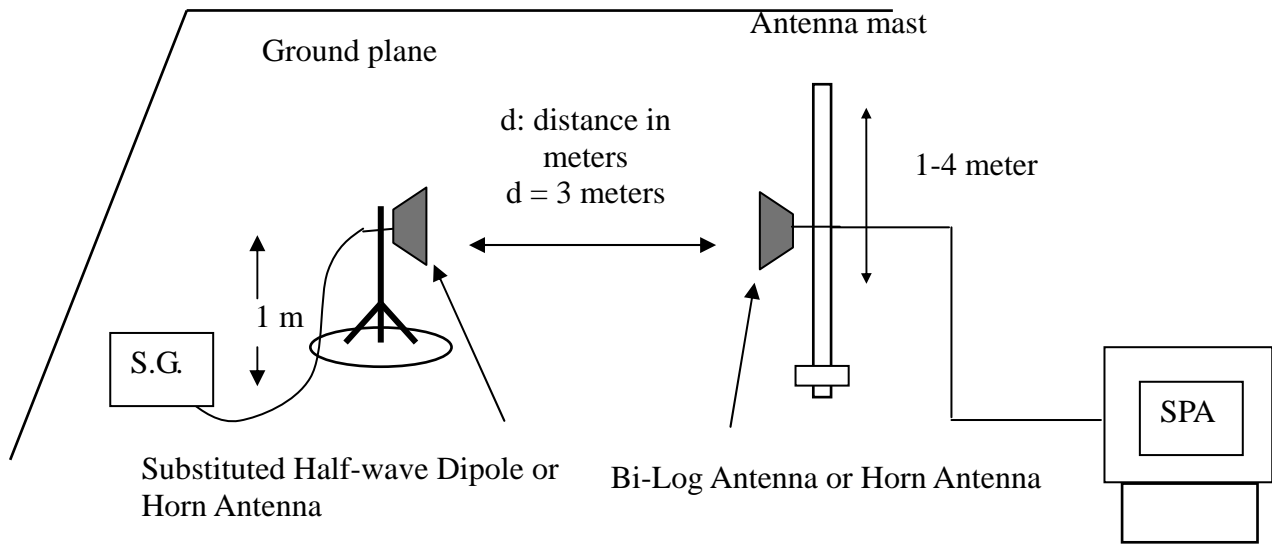


Above 1 GHz





Substituted Method Test Set-up



TEST PROCEDURE

The EUT was placed on a non-conductive, the measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and the EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. This maximization process was repeated with the EUT positioned in each of its three orthogonal orientations.

The frequency range up to tenth harmonic was investigated for each of three fundamental frequency (low, middle and high channels). Once spurious emission were identified, the power of the emission was determined using the substitution method.

The spurious emissions attenuation was calculated as the difference between radiated power at the fundamental frequency and the spurious emissions frequency.

$$\text{ERP} = \text{S.G. output (dBm)} + \text{Antenna Gain (dBd)} - \text{Cable (dB)}$$

$$\text{EIRP} = \text{S.G. output (dBm)} + \text{Antenna Gain (dBi)} - \text{Cable (dB)}$$

TEST RESULTS

Refer to the attached tabular data sheets.

**Below 1GHz****Operation Mode:** WCDMA Band IV / TX / CH 1312**Test Date:** December 8, 2013**Temperature:** 26°C**Tested by:** David Shu**Humidity:** 60 % RH**Polarity:** Ver. / Hor.

| Frequency (MHz) | S.G. (dBm) | Cable loss (dB) | Ant.Gain (dBi) | Emission level (dBm) | Limit (dBm) | Margin (dB) | Antenna Polarization (V/H) |
|-----------------|------------|-----------------|----------------|----------------------|-------------|-------------|----------------------------|
| 71.7100 | -60.5 | 0.97 | -1.61 | -63.08 | -13.00 | -50.08 | V |
| 101.7800 | -66.09 | 1.16 | -0.64 | -67.89 | -13.00 | -54.89 | V |
| 330.7000 | -73.84 | 2.16 | 5.71 | -70.29 | -13.00 | -57.29 | V |
| 390.8400 | -76.42 | 2.32 | 6 | -72.74 | -13.00 | -59.74 | V |
| 597.4500 | -70.32 | 2.9 | 6.35 | -66.87 | -13.00 | -53.87 | V |
| 897.1800 | -66.07 | 3.51 | 6.64 | -62.94 | -13.00 | -49.94 | V |
| 71.7100 | -51.8 | 0.97 | -1.61 | -54.38 | -13.00 | -41.38 | H |
| 101.7800 | -59.67 | 1.16 | -0.64 | -61.47 | -13.00 | -48.47 | H |
| 330.7000 | -73.35 | 2.16 | 5.71 | -69.80 | -13.00 | -56.80 | H |
| 379.2000 | -72.99 | 2.31 | 5.98 | -69.32 | -13.00 | -56.32 | H |
| 597.4500 | -64.28 | 2.9 | 6.35 | -60.83 | -13.00 | -47.83 | H |
| 897.1800 | -65.46 | 3.51 | 6.64 | -62.33 | -13.00 | -49.33 | H |

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin > 20dB from the applicable limit) and considered that's already beyond the background noise floor.*



Operation Mode: WCDMA Band IV / TX / CH 1427

Test Date: December 8, 2013

Temperature: 26°C

Tested by: David Shu

Humidity: 60 % RH

Polarity: Ver. / Hor.

| Frequency (MHz) | S.G. (dBm) | Cable loss (dB) | Ant.Gain (dBi) | Emission level (dBm) | Limit (dBm) | Margin (dB) | Antenna Polarization (V/H) |
|-----------------|------------|-----------------|----------------|----------------------|-------------|-------------|----------------------------|
| 71.7100 | -60.61 | 0.97 | -1.61 | -63.19 | -13.00 | -50.19 | V |
| 101.7800 | -65.88 | 1.16 | -0.64 | -67.68 | -13.00 | -54.68 | V |
| 330.7000 | -73.3 | 2.16 | 5.71 | -69.75 | -13.00 | -56.75 | V |
| 448.0700 | -79.3 | 2.58 | 5.74 | -76.14 | -13.00 | -63.14 | V |
| 597.4500 | -69.39 | 2.9 | 6.35 | -65.94 | -13.00 | -52.94 | V |
| 897.1800 | -65.88 | 3.51 | 6.64 | -62.75 | -13.00 | -49.75 | V |
| 71.7100 | -51.63 | 0.97 | -1.61 | -54.21 | -13.00 | -41.21 | H |
| 120.2100 | -57.48 | 1.27 | -2.06 | -60.81 | -13.00 | -47.81 | H |
| 330.7000 | -73.36 | 2.16 | 5.71 | -69.81 | -13.00 | -56.81 | H |
| 379.2000 | -72.64 | 2.31 | 5.98 | -68.97 | -13.00 | -55.97 | H |
| 598.4200 | -66.5 | 2.9 | 6.37 | -63.03 | -13.00 | -50.03 | H |
| 897.1800 | -63.22 | 3.51 | 6.64 | -60.09 | -13.00 | -47.09 | H |

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin > 20dB from the applicable limit) and considered that's already beyond the background noise floor.



Operation Mode: WCDMA Band IV / TX / CH 1513

Test Date: December 8, 2013

Temperature: 26°C

Tested by: David Shu

Humidity: 60 % RH

Polarity: Ver. / Hor.

| Frequency (MHz) | S.G. (dBm) | Cable loss (dB) | Ant.Gain (dBi) | Emission level (dBm) | Limit (dBm) | Margin (dB) | Antenna Polarization (V/H) |
|-----------------|------------|-----------------|----------------|----------------------|-------------|-------------|----------------------------|
| 71.7100 | -60.15 | 0.97 | -1.61 | -62.73 | -13.00 | -49.73 | V |
| 101.7800 | -65.27 | 1.16 | -0.64 | -67.07 | -13.00 | -54.07 | V |
| 342.3400 | -74.87 | 2.18 | 5.8 | -71.25 | -13.00 | -58.25 | V |
| 598.4200 | -69.82 | 2.9 | 6.37 | -66.35 | -13.00 | -53.35 | V |
| 684.7500 | -72.2 | 3.11 | 6.5 | -68.81 | -13.00 | -55.81 | V |
| 897.1800 | -66 | 3.51 | 6.64 | -62.87 | -13.00 | -49.87 | V |
| 71.7100 | -51.55 | 0.97 | -1.61 | -54.13 | -13.00 | -41.13 | H |
| 120.2100 | -56.29 | 1.27 | -2.06 | -59.62 | -13.00 | -46.62 | H |
| 294.8100 | -76.41 | 2.06 | 5.5 | -72.97 | -13.00 | -59.97 | H |
| 379.2000 | -72.39 | 2.31 | 5.98 | -68.72 | -13.00 | -55.72 | H |
| 597.4500 | -65.93 | 2.9 | 6.35 | -62.48 | -13.00 | -49.48 | H |
| 897.1800 | -65.73 | 3.51 | 6.64 | -62.60 | -13.00 | -49.60 | H |

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin > 20dB from the applicable limit) and considered that's already beyond the background noise floor.*



Operation Mode: WCDMA / HSDPA Band IV / TX / CH 1312

Test Date: July 21, 2013

Temperature: 26°C

Tested by: David Shu

Humidity: 60 % RH

Polarity: Ver. / Hor.

| Frequency (MHz) | S.G. (dBm) | Cable loss (dB) | Ant.Gain (dBi) | Emission level (dBm) | Limit (dBm) | Margin (dB) | Antenna Polarization (V/H) |
|-----------------|------------|-----------------|----------------|----------------------|-------------|-------------|----------------------------|
| 101.7800 | -61.56 | 1.16 | -0.64 | -63.36 | -13.00 | -50.36 | V |
| 150.2800 | -67.22 | 1.43 | 0.71 | -67.94 | -13.00 | -54.94 | V |
| 234.6700 | -79.61 | 1.8 | 5.38 | -76.03 | -13.00 | -63.03 | V |
| 354.9500 | -74.2 | 2.25 | 5.75 | -70.70 | -13.00 | -57.70 | V |
| 407.3300 | -74.61 | 2.43 | 5.93 | -71.11 | -13.00 | -58.11 | V |
| 770.1100 | -77.61 | 3.27 | 6.38 | -74.50 | -13.00 | -61.50 | V |
| 71.7100 | -49.68 | 0.97 | -1.61 | -52.26 | -13.00 | -39.26 | H |
| 150.2800 | -62.03 | 1.43 | 0.71 | -62.75 | -13.00 | -49.75 | H |
| 234.6700 | -75.1 | 1.8 | 5.38 | -71.52 | -13.00 | -58.52 | H |
| 390.8400 | -67.58 | 2.32 | 6 | -63.90 | -13.00 | -50.90 | H |
| 499.4800 | -74.17 | 2.7 | 5.89 | -70.98 | -13.00 | -57.98 | H |
| 691.5400 | -76.36 | 3.13 | 6.48 | -73.01 | -13.00 | -60.01 | H |

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin > 20dB from the applicable limit) and considered that's already beyond the background noise floor.



Operation Mode: WCDMA / HSDPA Band IV / TX / CH 1427

Test Date: July 21, 2013

Temperature: 26°C

Tested by: David Shu

Humidity: 60 % RH

Polarity: Ver. / Hor.

| Frequency (MHz) | S.G. (dBm) | Cable loss (dB) | Ant.Gain (dBi) | Emission level (dBm) | Limit (dBm) | Margin (dB) | Antenna Polarization (V/H) |
|-----------------|------------|-----------------|----------------|----------------------|-------------|-------------|----------------------------|
| 101.7800 | -61.44 | 1.16 | -0.64 | -63.24 | -13.00 | -50.24 | V |
| 161.9200 | -74.12 | 1.5 | 1.61 | -74.01 | -13.00 | -61.01 | V |
| 309.3600 | -79.17 | 2.13 | 5.78 | -75.52 | -13.00 | -62.52 | V |
| 354.9500 | -75.11 | 2.25 | 5.75 | -71.61 | -13.00 | -58.61 | V |
| 411.2100 | -73.58 | 2.45 | 5.9 | -70.13 | -13.00 | -57.13 | V |
| 745.8600 | -77.4 | 3.2 | 6.1 | -74.50 | -13.00 | -61.50 | V |
| 71.7100 | -49.52 | 0.97 | -1.61 | -52.10 | -13.00 | -39.10 | H |
| 150.2800 | -61.84 | 1.43 | 0.71 | -62.56 | -13.00 | -49.56 | H |
| 234.6700 | -74.59 | 1.8 | 5.38 | -71.01 | -13.00 | -58.01 | H |
| 390.8400 | -68.5 | 2.32 | 6 | -64.82 | -13.00 | -51.82 | H |
| 577.0800 | -74.75 | 2.88 | 6.04 | -71.59 | -13.00 | -58.59 | H |
| 757.5000 | -73.83 | 3.22 | 6.25 | -70.80 | -13.00 | -57.80 | H |

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.



Operation Mode: WCDMA / HSDPA Band IV / TX / CH 1513

Test Date: July 21, 2013

Temperature: 26°C

Tested by: David Shu

Humidity: 60 % RH

Polarity: Ver. / Hor.

| Frequency (MHz) | S.G. (dBm) | Cable loss (dB) | Ant.Gain (dBi) | Emission level (dBm) | Limit (dBm) | Margin (dB) | Antenna Polarization (V/H) |
|-----------------|------------|-----------------|----------------|----------------------|-------------|-------------|----------------------------|
| 71.7100 | -61.81 | 0.97 | -1.61 | -64.39 | -13.00 | -51.39 | V |
| 101.7800 | -60.99 | 1.16 | -0.64 | -62.79 | -13.00 | -49.79 | V |
| 138.6400 | -65.43 | 1.39 | -0.38 | -67.20 | -13.00 | -54.20 | V |
| 342.3400 | -74.36 | 2.18 | 5.8 | -70.74 | -13.00 | -57.74 | V |
| 404.4200 | -74.13 | 2.42 | 5.95 | -70.60 | -13.00 | -57.60 | V |
| 745.8600 | -77.65 | 3.2 | 6.1 | -74.75 | -13.00 | -61.75 | V |
| 71.7100 | -50.2 | 0.97 | -1.61 | -52.78 | -13.00 | -39.78 | H |
| 150.2800 | -61.76 | 1.43 | 0.71 | -62.48 | -13.00 | -49.48 | H |
| 234.6700 | -75.56 | 1.8 | 5.38 | -71.98 | -13.00 | -58.98 | H |
| 402.4800 | -68.2 | 2.41 | 5.97 | -64.64 | -13.00 | -51.64 | H |
| 601.3300 | -75.78 | 2.91 | 6.39 | -72.30 | -13.00 | -59.30 | H |
| 770.1100 | -73.75 | 3.27 | 6.38 | -70.64 | -13.00 | -57.64 | H |

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.



Operation Mode: WCDMA / HSUPA Band IV / TX / CH 1312 **Test Date:** July 21, 2013

Temperature: 26°C **Tested by:** David Shu

Humidity: 60 % RH **Polarity:** Ver. / Hor.

| Frequency (MHz) | S.G. (dBm) | Cable loss (dB) | Ant.Gain (dBi) | Emission level (dBm) | Limit (dBm) | Margin (dB) | Antenna Polarization (V/H) |
|-----------------|------------|-----------------|----------------|----------------------|-------------|-------------|----------------------------|
| 101.7800 | -59.97 | 1.16 | -0.64 | -61.77 | -13.00 | -48.77 | V |
| 138.6400 | -65.32 | 1.39 | -0.38 | -67.09 | -13.00 | -54.09 | V |
| 234.6700 | -79.62 | 1.8 | 5.38 | -76.04 | -13.00 | -63.04 | V |
| 342.3400 | -75.21 | 2.18 | 5.8 | -71.59 | -13.00 | -58.59 | V |
| 414.1200 | -74.45 | 2.45 | 5.87 | -71.03 | -13.00 | -58.03 | V |
| 529.5500 | -79.78 | 2.75 | 6 | -76.53 | -13.00 | -63.53 | V |
| 71.7100 | -52.22 | 0.97 | -1.61 | -54.80 | -13.00 | -41.80 | H |
| 101.7800 | -56.13 | 1.16 | -0.64 | -57.93 | -13.00 | -44.93 | H |
| 138.6400 | -59.25 | 1.39 | -0.38 | -61.02 | -13.00 | -48.02 | H |
| 153.1900 | -65.61 | 1.44 | 0.94 | -66.11 | -13.00 | -53.11 | H |
| 390.8400 | -68.09 | 2.32 | 6 | -64.41 | -13.00 | -51.41 | H |
| 770.1100 | -72.77 | 3.27 | 6.38 | -69.66 | -13.00 | -56.66 | H |

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*



Operation Mode: WCDMA / HSUPA Band IV / TX / CH 1427 **Test Date:** July 21, 2013

Temperature: 26°C **Tested by:** David Shu

Humidity: 60 % RH **Polarity:** Ver. / Hor.

| Frequency (MHz) | S.G. (dBm) | Cable loss (dB) | Ant.Gain (dBi) | Emission level (dBm) | Limit (dBm) | Margin (dB) | Antenna Polarization (V/H) |
|-----------------|------------|-----------------|----------------|----------------------|-------------|-------------|----------------------------|
| 101.7800 | -60.1 | 1.16 | -0.64 | -61.90 | -13.00 | -48.90 | V |
| 107.6000 | -64.09 | 1.19 | -1.39 | -66.67 | -13.00 | -53.67 | V |
| 150.2800 | -66.42 | 1.43 | 0.71 | -67.14 | -13.00 | -54.14 | V |
| 342.3400 | -74.08 | 2.18 | 5.8 | -70.46 | -13.00 | -57.46 | V |
| 408.3000 | -74.66 | 2.44 | 5.92 | -71.18 | -13.00 | -58.18 | V |
| 745.8600 | -77.2 | 3.2 | 6.1 | -74.30 | -13.00 | -61.30 | V |
| 71.7100 | -50.79 | 0.97 | -1.61 | -53.37 | -13.00 | -40.37 | H |
| 138.6400 | -59.27 | 1.39 | -0.38 | -61.04 | -13.00 | -48.04 | H |
| 234.6700 | -74.62 | 1.8 | 5.38 | -71.04 | -13.00 | -58.04 | H |
| 319.0600 | -74.76 | 2.17 | 5.71 | -71.22 | -13.00 | -58.22 | H |
| 345.2500 | -70.63 | 2.2 | 5.8 | -67.03 | -13.00 | -54.03 | H |
| 390.8400 | -66.78 | 2.32 | 6 | -63.10 | -13.00 | -50.10 | H |

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin > 20dB from the applicable limit) and considered that's already beyond the background noise floor.*



Operation Mode: WCDMA / HSUPA Band IV / TX / CH 1513 **Test Date:** July 21, 2013

Temperature: 26°C **Tested by:** David Shu

Humidity: 60 % RH **Polarity:** Ver. / Hor.

| Frequency (MHz) | S.G. (dBm) | Cable loss (dB) | Ant.Gain (dBi) | Emission level (dBm) | Limit (dBm) | Margin (dB) | Antenna Polarization (V/H) |
|-----------------|------------|-----------------|----------------|----------------------|-------------|-------------|----------------------------|
| 101.7800 | -60.56 | 1.16 | -0.64 | -62.36 | -13.00 | -49.36 | V |
| 153.1900 | -70.52 | 1.44 | 0.94 | -71.02 | -13.00 | -58.02 | V |
| 234.6700 | -80.14 | 1.8 | 5.38 | -76.56 | -13.00 | -63.56 | V |
| 342.3400 | -75.23 | 2.18 | 5.8 | -71.61 | -13.00 | -58.61 | V |
| 401.5100 | -74.58 | 2.4 | 5.98 | -71.00 | -13.00 | -58.00 | V |
| 770.1100 | -77.85 | 3.27 | 6.38 | -74.74 | -13.00 | -61.74 | V |
| 71.7100 | -50.36 | 0.97 | -1.61 | -52.94 | -13.00 | -39.94 | H |
| 101.7800 | -55.51 | 1.16 | -0.64 | -57.31 | -13.00 | -44.31 | H |
| 138.6400 | -58.97 | 1.39 | -0.38 | -60.74 | -13.00 | -47.74 | H |
| 222.0600 | -74.95 | 1.77 | 5.34 | -71.38 | -13.00 | -58.38 | H |
| 390.8400 | -68.35 | 2.32 | 6 | -64.67 | -13.00 | -51.67 | H |
| 612.9700 | -75.76 | 2.94 | 6.23 | -72.47 | -13.00 | -59.47 | H |

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*



Above 1GHz

Operation Mode: WCDMA Band IV / TX / CH 1312

Test Date: December 8, 2013

Temperature: 26°C

Tested by: David Shu

Humidity: 60 % RH

Polarity: Ver. / Hor.

| Frequency (MHz) | S.G. (dBm) | Cable loss (dB) | Ant.Gain (dBi) | Emission level (dBm) | Limit (dBm) | Margin (dB) | Antenna Polarization (V/H) |
|-----------------|------------|-----------------|----------------|----------------------|-------------|-------------|----------------------------|
| 2519.000 | -43.04 | 6.38 | 6.15 | -43.27 | -13.00 | -30.27 | V |
| 3422.000 | -46.76 | 7.64 | 8.67 | -45.73 | -13.00 | -32.73 | V |
| 5137.000 | -48.32 | 9.49 | 10.65 | -47.16 | -13.00 | -34.16 | V |
| N/A | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| 2519.000 | -46.59 | 6.38 | 6.15 | -46.82 | -13.00 | -33.82 | H |
| 3422.000 | -49.05 | 7.64 | 8.67 | -48.02 | -13.00 | -35.02 | H |
| 5137.000 | -49.82 | 9.49 | 10.65 | -48.66 | -13.00 | -35.66 | H |
| N/A | | | | | | | |
| | | | | | | | |
| | | | | | | | |

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*



Operation Mode: WCDMA Band IV / TX / CH 1427

Test Date: December 8, 2013

Temperature: 26°C

Tested by: David Shu

Humidity: 60 % RH

Polarity: Ver. / Hor.

| Frequency (MHz) | S.G. (dBm) | Cable loss (dB) | Ant.Gain (dBi) | Emission level (dBm) | Limit (dBm) | Margin (dB) | Antenna Polarization (V/H) |
|-----------------|------------|-----------------|----------------|----------------------|-------------|-------------|----------------------------|
| 2519.000 | -42.28 | 6.38 | 6.15 | -42.51 | -13.00 | -29.51 | V |
| 3471.000 | -45.53 | 7.78 | 8.81 | -44.50 | -13.00 | -31.50 | V |
| 5200.000 | -50.04 | 9.56 | 10.68 | -48.92 | -13.00 | -35.92 | V |
| N/A | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| 2477.000 | -46.9 | 6.31 | 6.07 | -47.14 | -13.00 | -34.14 | H |
| 3471.000 | -46.08 | 7.78 | 8.81 | -45.05 | -13.00 | -32.05 | H |
| 5200.000 | -48.95 | 9.56 | 10.68 | -47.83 | -13.00 | -34.83 | H |
| N/A | | | | | | | |
| | | | | | | | |
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Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin > 20dB from the applicable limit) and considered that's already beyond the background noise floor.



Operation Mode: WCDMA Band IV / TX / CH 1513

Test Date: December 8, 2013

Temperature: 26°C

Tested by: David Shu

Humidity: 60 % RH

Polarity: Ver. / Hor.

| Frequency (MHz) | S.G. (dBm) | Cable loss (dB) | Ant.Gain (dBi) | Emission level (dBm) | Limit (dBm) | Margin (dB) | Antenna Polarization (V/H) |
|-----------------|------------|-----------------|----------------|----------------------|-------------|-------------|----------------------------|
| 2519.000 | -41.67 | 6.38 | 6.15 | -41.90 | -13.00 | -28.90 | V |
| 3506.000 | -47.5 | 7.88 | 8.91 | -46.47 | -13.00 | -33.47 | V |
| 4171.000 | -52.27 | 8.48 | 9.54 | -51.21 | -13.00 | -38.21 | V |
| 5256.000 | -49.6 | 9.61 | 10.7 | -48.51 | -13.00 | -35.51 | V |
| N/A | | | | | | | |
| | | | | | | | |
| 2456.000 | -46.95 | 6.28 | 6.04 | -47.19 | -13.00 | -34.19 | H |
| 3506.000 | -46.49 | 7.88 | 8.91 | -45.46 | -13.00 | -32.46 | H |
| 5256.000 | -50.54 | 9.61 | 10.7 | -49.45 | -13.00 | -36.45 | H |
| N/A | | | | | | | |
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Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin > 20dB from the applicable limit) and considered that's already beyond the background noise floor.



Operation Mode: WCDMA / HSDPA Band IV / TX / CH 1312 Test Date: July 21, 2013

Temperature: 26°C Tested by: David Shu

Humidity: 60 % RH Polarity: Ver. / Hor.

| Frequency (MHz) | S.G. (dBm) | Cable loss (dB) | Ant.Gain (dBi) | Emission level (dBm) | Limit (dBm) | Margin (dB) | Antenna Polarization (V/H) |
|-----------------|------------|-----------------|----------------|----------------------|-------------|-------------|----------------------------|
| 3429.000 | -55.66 | 7.66 | 8.69 | -54.63 | -13.00 | -41.63 | V |
| 4269.000 | -55.21 | 8.57 | 9.62 | -54.16 | -13.00 | -41.16 | V |
| N/A | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| 3429.000 | -47.42 | 7.66 | 8.69 | -46.39 | -13.00 | -33.39 | H |
| 4934.000 | -54.38 | 9.31 | 10.49 | -53.20 | -13.00 | -40.20 | H |
| N/A | | | | | | | |
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Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin > 20dB from the applicable limit) and considered that's already beyond the background noise floor.



Operation Mode: WCDMA / HSDPA Band IV / TX / CH 1427 Test Date: July 21, 2013

Temperature: 26°C Tested by: David Shu

Humidity: 60 % RH Polarity: Ver. / Hor.

| Frequency (MHz) | S.G. (dBm) | Cable loss (dB) | Ant.Gain (dBi) | Emission level (dBm) | Limit (dBm) | Margin (dB) | Antenna Polarization (V/H) |
|-----------------|------------|-----------------|----------------|----------------------|-------------|-------------|----------------------------|
| 3471.000 | -56.12 | 7.78 | 8.81 | -55.09 | -13.00 | -42.09 | V |
| 4570.000 | -53.64 | 9.06 | 9.91 | -52.79 | -13.00 | -39.79 | V |
| N/A | | | | | | | |
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| | | | | | | | |
| | | | | | | | |
| 3471.000 | -48.46 | 7.78 | 8.81 | -47.43 | -13.00 | -34.43 | H |
| 5389.000 | -53.6 | 9.8 | 10.76 | -52.64 | -13.00 | -39.64 | H |
| N/A | | | | | | | |
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Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin > 20dB from the applicable limit) and considered that's already beyond the background noise floor.



Operation Mode: WCDMA / HSDPA Band IV / TX / CH 1513 Test Date: July 21, 2013

Temperature: 26°C Tested by: David Shu

Humidity: 60 % RH Polarity: Ver. / Hor.

| Frequency (MHz) | S.G. (dBm) | Cable loss (dB) | Ant.Gain (dBi) | Emission level (dBm) | Limit (dBm) | Margin (dB) | Antenna Polarization (V/H) |
|-----------------|------------|-----------------|----------------|----------------------|-------------|-------------|----------------------------|
| 3142.000 | -56.96 | 7.21 | 7.83 | -56.34 | -13.00 | -43.34 | V |
| 3506.000 | -55.13 | 7.88 | 8.91 | -54.10 | -13.00 | -41.10 | V |
| N/A | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| 3506.000 | -49.78 | 7.88 | 8.91 | -48.75 | -13.00 | -35.75 | H |
| 4479.000 | -53.82 | 8.85 | 9.78 | -52.89 | -13.00 | -39.89 | H |
| N/A | | | | | | | |
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Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin > 20dB from the applicable limit) and considered that's already beyond the background noise floor.



Operation Mode: WCDMA / HSUPA Band IV / TX / CH 1312 Test Date: July 21, 2013

Temperature: 26°C

Tested by: David Shu

Humidity: 60 % RH

Polarity: Ver. / Hor.

| Frequency (MHz) | S.G. (dBm) | Cable loss (dB) | Ant.Gain (dBi) | Emission level (dBm) | Limit (dBm) | Margin (dB) | Antenna Polarization (V/H) |
|-----------------|------------|-----------------|----------------|----------------------|-------------|-------------|----------------------------|
| 3471.000 | -56.21 | 7.78 | 8.81 | -55.18 | -13.00 | -42.18 | V |
| 5186.000 | -54.72 | 9.54 | 10.67 | -53.59 | -13.00 | -40.59 | V |
| N/A | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| 3471.000 | -49.22 | 7.78 | 8.81 | -48.19 | -13.00 | -35.19 | H |
| 5354.000 | -53.48 | 9.74 | 10.74 | -52.48 | -13.00 | -39.48 | H |
| N/A | | | | | | | |
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Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin > 20dB from the applicable limit) and considered that's already beyond the background noise floor.



Operation Mode: WCDMA / HSUPA Band IV / TX / CH 1427 Test Date: July 21, 2013

Temperature: 26°C

Tested by: David Shu

Humidity: 60 % RH

Polarity: Ver. / Hor.

| Frequency (MHz) | S.G. (dBm) | Cable loss (dB) | Ant.Gain (dBi) | Emission level (dBm) | Limit (dBm) | Margin (dB) | Antenna Polarization (V/H) |
|-----------------|------------|-----------------|----------------|----------------------|-------------|-------------|----------------------------|
| 4003.000 | -55.58 | 8.35 | 9.4 | -54.53 | -13.00 | -41.53 | V |
| 5550.000 | -54.35 | 10.06 | 10.81 | -53.60 | -13.00 | -40.60 | V |
| N/A | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| 3471.000 | -49.74 | 7.78 | 8.81 | -48.71 | -13.00 | -35.71 | H |
| 3814.000 | -53.77 | 8.28 | 9.21 | -52.84 | -13.00 | -39.84 | H |
| N/A | | | | | | | |
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Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin > 20dB from the applicable limit) and considered that's already beyond the background noise floor.



Operation Mode: WCDMA / HSUPA Band IV / TX / CH 1513 Test Date: July 21, 2013

Temperature: 26°C

Tested by: David Shu

Humidity: 60 % RH

Polarity: Ver. / Hor.

| Frequency (MHz) | S.G. (dBm) | Cable loss (dB) | Ant.Gain (dBi) | Emission level (dBm) | Limit (dBm) | Margin (dB) | Antenna Polarization (V/H) |
|-----------------|------------|-----------------|----------------|----------------------|-------------|-------------|----------------------------|
| 2827.000 | -55.89 | 6.9 | 6.95 | -55.84 | -13.00 | -42.84 | V |
| 3506.000 | -54.38 | 7.88 | 8.91 | -53.35 | -13.00 | -40.35 | V |
| N/A | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| 3506.000 | -49.85 | 7.88 | 8.91 | -48.82 | -13.00 | -35.82 | H |
| 4528.000 | -53.06 | 8.97 | 9.84 | -52.19 | -13.00 | -39.19 | H |
| N/A | | | | | | | |
| | | | | | | | |
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Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin > 20dB from the applicable limit) and considered that's already beyond the background noise floor.



Calculation of maximum antenna gain

WCDMA BandIV

| Operation Mode | Frequency (MHz) | Emission level (dBm) | Max. Ant. Gain (dBi) | Result (dBm) | Limit (dBm) | Margin (dB) |
|----------------|-----------------|----------------------|----------------------|--------------|-------------|-------------|
| Low | 2519 | -43.27 | 5 | -38.27 | -13 | -25.27 |
| Mid | 2519 | -42.51 | 5 | -37.51 | -13 | -24.51 |
| High | 2519 | -41.9 | 5 | -36.9 | -13 | -23.9 |

HSDPA BandIV

| Operation Mode | Frequency (MHz) | Emission level (dBm) | Max. Ant. Gain (dBi) | Result (dBm) | Limit (dBm) | Margin (dB) |
|----------------|-----------------|----------------------|----------------------|--------------|-------------|-------------|
| Low | 3429 | -46.39 | 5 | -41.39 | -13 | -28.39 |
| Mid | 3471 | -47.43 | 5 | -42.43 | -13 | -29.43 |
| High | 3506 | -48.75 | 5 | -43.75 | -13 | -30.75 |

HSUPA BandIV

| Operation Mode | Frequency (MHz) | Emission level (dBm) | Max. Ant. Gain (dBi) | Result (dBm) | Limit (dBm) | Margin (dB) |
|----------------|-----------------|----------------------|----------------------|--------------|-------------|-------------|
| Low | 3471 | -48.19 | 5 | -43.19 | -13 | -30.19 |
| Mid | 3471 | -48.71 | 5 | -43.71 | -13 | -30.71 |
| High | 3506 | -48.82 | 5 | -43.82 | -13 | -30.82 |

Remark: Data of measurement within this frequency range shown " N/A " in the table above means the emission is too small to be measured



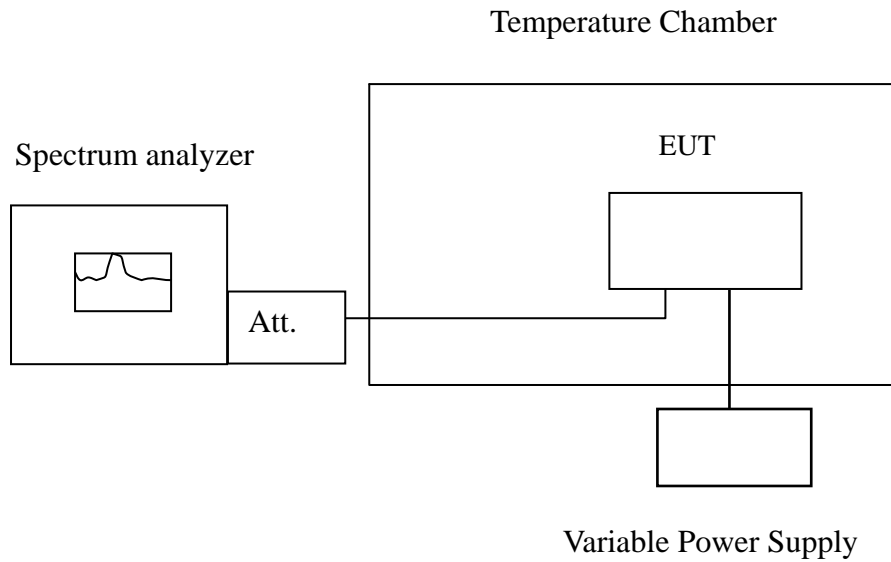
7.7 FREQUENCY STABILITY V.S. TEMPERATURE MEASUREMENT

LIMIT

According to FCC §27.54, RSS-139.

Frequency Tolerance: 2.5 ppm

Test Configuration



Remark: Measurement setup for testing on Antenna connector.



TEST PROCEDURE

The equipment under test was connected to an external AC or DC power supply and input rated voltage. RF output was connected to a frequency counter or spectrum analyzer via feed through attenuators. The EUT was placed inside the temperature chamber. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and measure EUT 20°C operating frequency as reference frequency. Turn EUT off and set the chamber temperature to -30°C. After the temperature stabilized for approximately 30 minutes recorded the frequency. Repeat step measure with 10°C increased per stage until the highest temperature of +50°C reached.

TEST RESULTS

No non-compliance noted.

| Reference Frequency: WCDMA Band IV Mid Channel 1735.40 MHz @ 20°C | | | | |
|--|------------------------------|----------------|------------|------------|
| Limit: ± 2.5 ppm = 4338Hz | | | | |
| Power Supply Vdc | Environment Temperature (°C) | Frequency (Hz) | Delta (Hz) | Limit (Hz) |
| 3.8 | 50 | 1735399998 | -5 | 4338 |
| | 40 | 1735399995 | -8 | |
| | 30 | 1735399996 | -7 | |
| | 20 | 1735400003 | 0 | |
| | 10 | 1735399994 | -9 | |
| | 0 | 1735399989 | -14 | |
| | -10 | 1735399993 | -10 | |
| | -20 | 1735399991 | -12 | |
| | -30 | 1735399989 | -14 | |

| Reference Frequency: HSDPA Band IV Mid Channel 1735.40 MHz @ 20°C | | | | |
|--|------------------------------|----------------|------------|------------|
| Limit: ± 2.5 ppm = 4338Hz | | | | |
| Power Supply Vdc | Environment Temperature (°C) | Frequency (Hz) | Delta (Hz) | Limit (Hz) |
| 3.8 | 50 | 1735399997 | -12 | 4338 |
| | 40 | 1735399996 | -13 | |
| | 30 | 1735399995 | -14 | |
| | 20 | 1735400009 | 0 | |
| | 10 | 1735399989 | -20 | |
| | 0 | 1735399999 | -10 | |
| | -10 | 1735399995 | -14 | |
| | -20 | 1735399992 | -17 | |
| | -30 | 1735399991 | -18 | |



| Reference Frequency: HSUPA Band IV Mid Channel 1735.40 MHz @ 20°C | | | | |
|--|---------------------------------|-------------------|---------------|---------------|
| Limit: ± 2.5 ppm = 4338Hz | | | | |
| Power Supply Vdc | Environment Temperature (°C) | Frequency (Hz) | Delta (Hz) | Limit (Hz) |
| 3.8 | 50 | 1735399998 | -5 | 4338 |
| | 40 | 1735399995 | -8 | |
| | 30 | 1735399993 | -10 | |
| | 20 | 1735400003 | 0 | |
| | 10 | 1735399995 | -8 | |
| | 0 | 1735399993 | -10 | |
| | -10 | 1735399995 | -8 | |
| | -20 | 1735399991 | -12 | |
| | -30 | 1735399996 | -7 | |



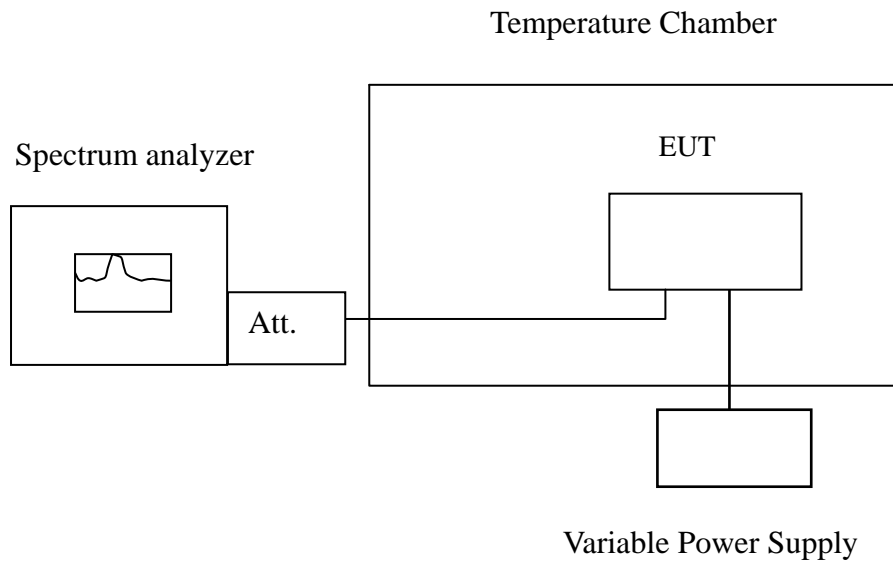
7.8 FREQUENCY STABILITY V.S. VOLTAGE MEASUREMENT

LIMIT

According to FCC §27.54, RSS-139.

Frequency Tolerance: 2.5 ppm.

Test Configuration



Remark: Measurement setup for testing on Antenna connector.



TEST PROCEDURE

Set chamber temperature to 20°C. Use a variable AC power supply / DC power source to power the EUT and set the voltage to rated voltage. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and recorded the frequency.

Reduce the input voltage to specify extreme voltage variation ($\pm 15\%$) and endpoint, record the maximum frequency change.



TEST RESULTS

No non-compliance noted.

| Reference Frequency: WCDMA Band IV Mid Channel 1735.40 MHz @ 20°C | | | | |
|---|------------------------------|----------------|------------|------------|
| Limit: ± 2.5 ppm = 4338Hz | | | | |
| Power Supply Vdc | Environment Temperature (°C) | Frequency (Hz) | Delta (Hz) | Limit (Hz) |
| 4.37 | 20 | 1735400006 | 3 | 4338 |
| 3.8 | | 1735400003 | 0 | |
| 3.23 | | 1735400004 | 1 | |
| 2.7 END | | 1735400057 | 54 | |

| Reference Frequency: HSDPA Band IV Mid Channel 1735.40 MHz @ 20°C | | | | |
|---|------------------------------|----------------|------------|------------|
| Limit: ± 2.5 ppm = 4338Hz | | | | |
| Power Supply Vdc | Environment Temperature (°C) | Frequency (Hz) | Delta (Hz) | Limit (Hz) |
| 4.37 | 20 | 1735400008 | -1 | 4338 |
| 3.8 | | 1735400009 | 0 | |
| 3.23 | | 1735400007 | -2 | |
| 2.7 END | | 1735400005 | -4 | |

| Reference Frequency: HSUPA Band IV Mid Channel 1735.40 MHz @ 20°C | | | | |
|---|------------------------------|----------------|------------|------------|
| Limit: ± 2.5 ppm = 4338Hz | | | | |
| Power Supply Vdc | Environment Temperature (°C) | Frequency (Hz) | Delta (Hz) | Limit (Hz) |
| 4.37 | 20 | 1735400002 | -1 | 4338 |
| 3.8 | | 1735400003 | 0 | |
| 3.23 | | 1735400006 | 3 | |
| 2.7 END | | 1735400002 | -1 | |