



FCC 47 CFR PART 27 SUBPART L

TEST REPORT

For

Computer

Trade Name: ADVANTECH

**Model: TREK-520, TREK-520XXXXXXXXXXXXXXXXXXXXX,
TREK520XXXXXXXXXXXXXXXXXXXXX (where “X” may be any alphanumeric
character, “-”, “_” or blank)**

Issued to

Advantech Co. Ltd.

No.1, Alley 20, Lane 26, Rueiguang Road, Neihu District, Taipei 114, Taiwan, R.O.C.

Issued by

Compliance Certification Services Inc.

**No.11, Wugong 6th Rd., Wugu Dist.,
New Taipei City 24891, Taiwan. (R.O.C.)**

<http://www.ccsrf.com>

service@ccsrf.com

Issued Date: March 17, 2014



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Revision History

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	March 17, 2014	Initial Issue	ALL	Angel Cheng



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1. TEST RESULT CERTIFICATION

Applicant: Advantech Co. Ltd.
No.1, Alley 20, Lane 26, Rueiguang Road, Neihu District,
Taipei 114, Taiwan, R.O.C.

Equipment Under Test: Computer

Trade Name: ADVANTECH

Model Number: TREK-520, TREK-520XXXXXXXXXXXXXXXXXX,
TREK520XXXXXXXXXXXXXXXXXX (where "X" may be
any alphanumeric character, "-", "_" or blank)

Date of Test: November 7 ~ 15, 2013

APPLICABLE STANDARDS	
STANDARD	TEST RESULT
FCC 47 CFR PART 27 SUBPART L	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	Computer
Trade Name	ADVANTECH
Model Number	TREK-520, TREK-520XXXXXXXXXXXXXXXXXX, TREK520XXXXXXXXXXXXXXXXXX (where "X" may be any alphanumeric character, "-", "_" or blank)
Model Discrepancy	All the above models are identical except for the designation of model numbers. The suffix of (X= "-", "_" or blank) on model number is just for marketing purpose only.
Received Date	August 22, 2013
Power Supply	Powered by DC 12-32V
Frequency Range	WCDMA / HSDPA / HSUPA Band IV: 1710-1755 MHz
Transmit Power (ERP & EIRP Power)	WCDMA Band IV: 12.88 dBm HSDPA Band IV: 11.89 dBm HSUPA Band IV: 11.80 dBm
Cellular Phone Protocol	WCDMA: Quadrature Phase Shift Keying (QPSK) with Root-raised cosine pulse shaping filters (roll off = 0.22)
Antenna Gain	2 dBi
Antenna Type	PCB Antenna

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: TREK-520) 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	02/16/2015
Pre-Amplifier	Mini-Circuits	ZFL-1000LN	SF350700823	01/11/2015
Bilog Antenna	Sunol Sciences	JB3	A030105	02/16/2015
Bilog Antenna	Sunol Sciences	JB3	A030205	10/01/2014
Horn Antenna	EMCO	3117	00055165	02/16/2015
Horn Antenna	EMCO	3117	00055167	01/27/2015
Horn Antenna	EMCO	3116	26370	01/06/2015
Loop Antenna	EMCO	6502	8905/2356	06/11/2015
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	12/21/2014
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.

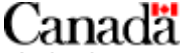
All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

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	 Testing Laboratory 1309
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
	N/A						

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

7.1 PEAK POWER

LIMIT

According to FCC §2.1046.

FCC 22.913

(a) Effective radiated power limits.

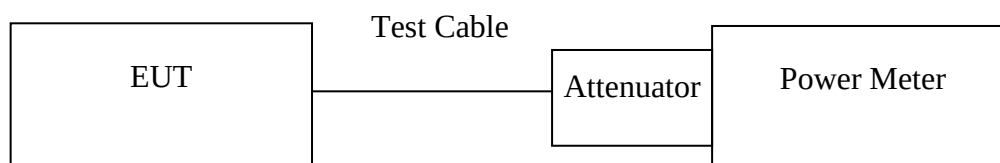
The effective radiated power (ERP) of mobile transmitters must not exceed 7 Watts.

FCC 24.232 (b)(c) Power limits.

(b) Mobile/portable stations are limited to 2 Watts effective isotropic radiated power (EIRP).

(c) Peak transmit power must be measured over any interval of continuous transmission using instrumentation calibrated in terms of an rms equivalent voltage. The measurement results shall be properly adjusted for any limitations, such as detector response times, limited resolution bandwidth capability when compared to the emission bandwidth, sensitivity, etc., so as to obtain a true peak measurement over the full bandwidth of the channel.

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)	Peak Power (W)
WCDMA Band IV	1312	1712.40	25.25	0.33497
	1427	1735.40	25.30	0.33884
	1513	1752.60	24.88	0.30761

Test Mode	CH	Frequency (MHz)	Peak Power (dBm)	Peak Power (W)
HSDPA Band IV	1312	1712.40	24.85	0.30549
	1427	1735.40	24.86	0.30620
	1513	1752.60	24.44	0.27797

Test Mode	CH	Frequency (MHz)	Peak Power (dBm)	Peak Power (W)
HSUPA Band IV	1312	1712.40	24.80	0.30200
	1427	1735.40	24.74	0.29785
	1513	1752.60	24.40	0.27542

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

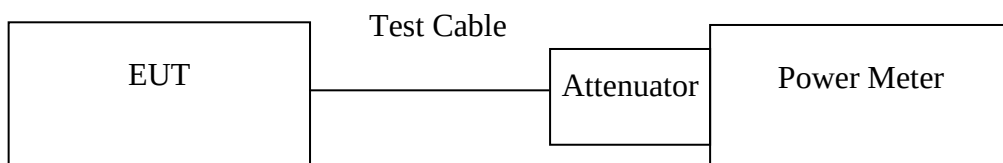


7.2 AVERAGE POWER

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)	AVG Power (dBm)
WCDMA Band IV	1312	1712.40	22.36
	1427	1735.40	22.44
	1513	1752.60	22.00

Test Mode	CH	Frequency (MHz)	Average Power (dBm)
HSDPA Band IV	1312	1712.40	21.25
	1427	1735.40	21.26
	1513	1752.60	20.90

Test Mode	CH	Frequency (MHz)	Average Power (dBm)
HSUPA Band IV	1312	1712.40	21.23
	1427	1735.40	21.24
	1513	1752.60	20.86

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

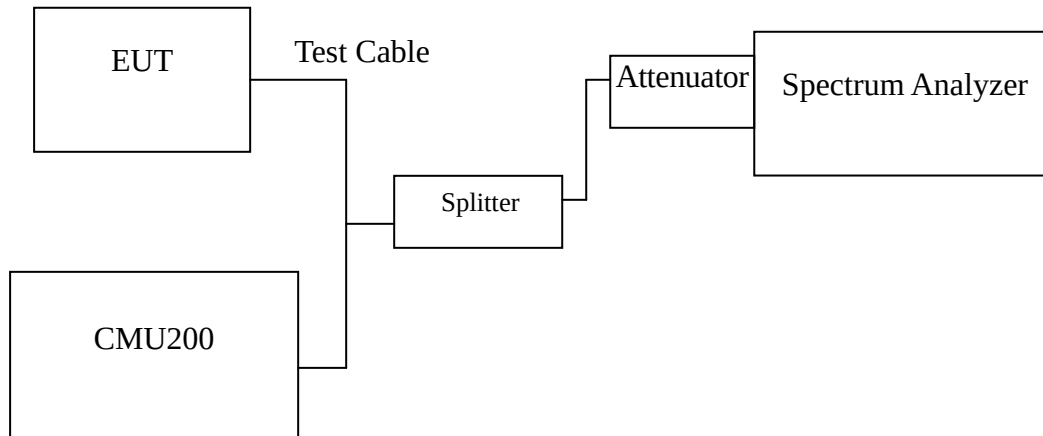


7.3 OCCUPIED BANDWIDTH MEASUREMENT

LIMIT

According to §FCC 2.1049.

Test Configuration



Remark: Measurement setup for testing on Antenna connector

TEST PROCEDURE

The EUT's output RF connector was connected with a short cable to the spectrum analyzer, RBW was set to about 1% of emission BW, VBW is set to 3 times the RBW, -26dBc display line was placed on the screen (or 99% bandwidth), the occupied bandwidth is the delta frequency between the two points where the display line intersects the signal trace.

TEST RESULTS

No non-compliance noted

**Test Data**

Test Mode	CH	Frequency (MHz)	99% Bandwidth (MHz)	26dB Bandwidth (MHz)
WCDMA Band IV	1312	1712.40	4.0612	4.639
	1427	1735.40	4.0646	4.632
	1513	1752.60	4.0678	4.649

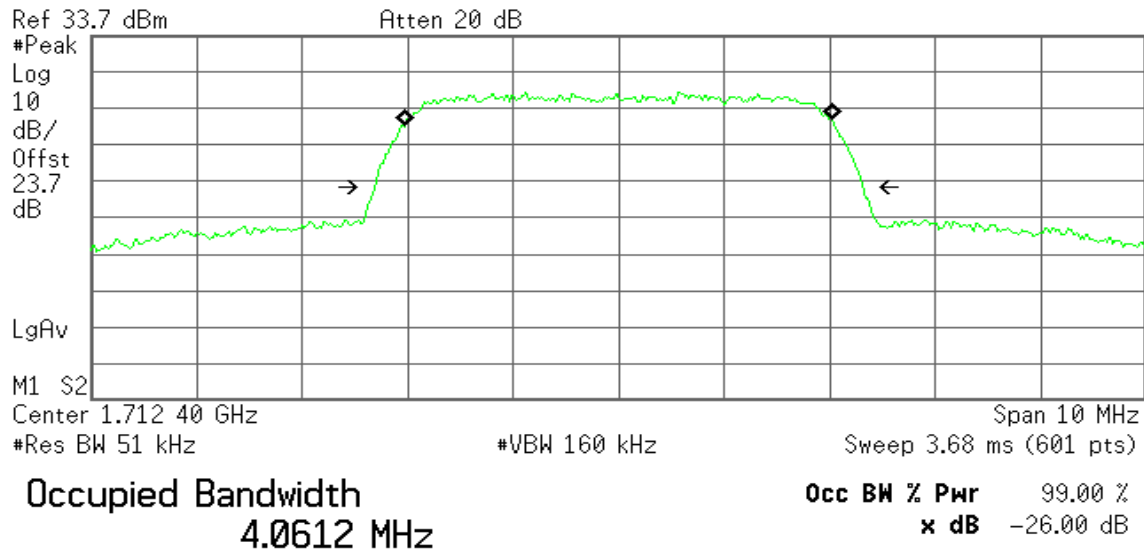
Test Mode	CH	Frequency (MHz)	99% Bandwidth (MHz)	26dB Bandwidth (MHz)
HSDPA Band IV	1312	1712.40	4.0655	4.639
	1427	1735.40	4.0586	4.635
	1513	1752.60	4.0714	4.636

Test Mode	CH	Frequency (MHz)	99% Bandwidth (MHz)	26dB Bandwidth (MHz)
HSUPA Band IV	1312	1712.40	4.0618	4.639
	1427	1735.40	4.0575	4.632
	1513	1752.60	4.0687	4.641

**Test Plot****WCDMA Band IV (CH Low)**

* Agilent 23:03:40 Nov 7, 2013

R T

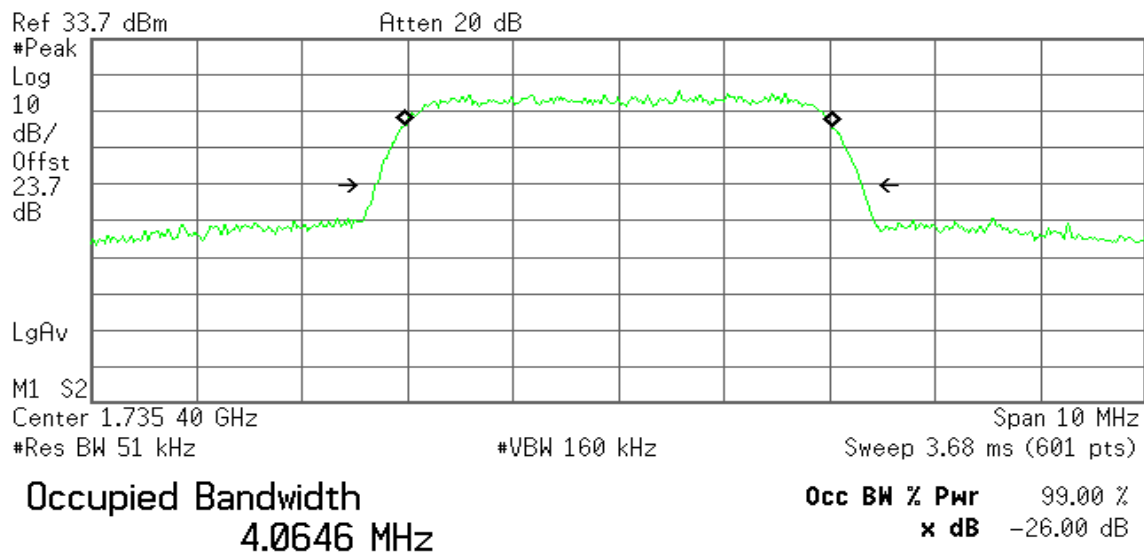


Transmit Freq Error 1.186 kHz
x dB Bandwidth 4.639 MHz

WCDMA Band IV (CH Mid)

* Agilent 23:04:10 Nov 7, 2013

R T



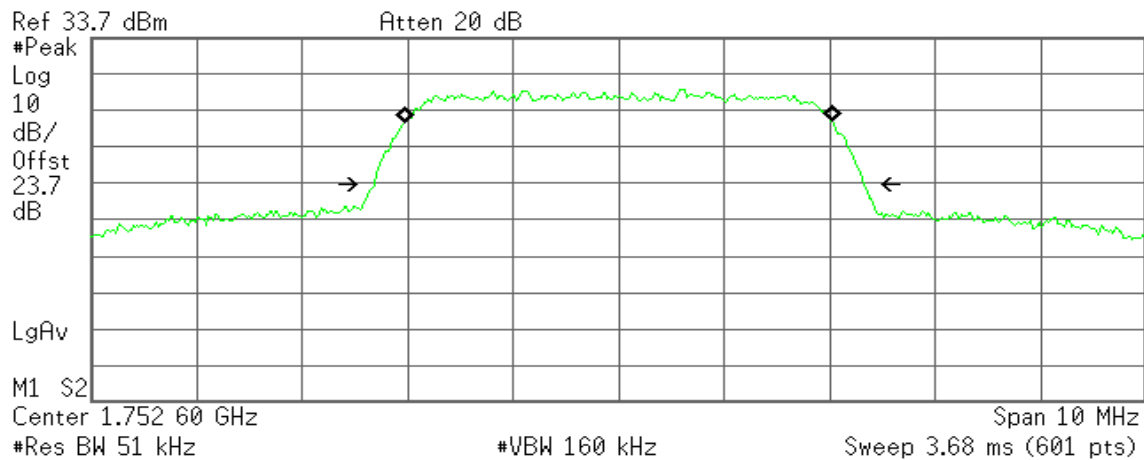
Transmit Freq Error -6.006 kHz
x dB Bandwidth 4.632 MHz



WCDMA Band IV (CH High)

Agilent 23:05:26 Nov 7, 2013

R T



Occupied Bandwidth
4.0678 MHz

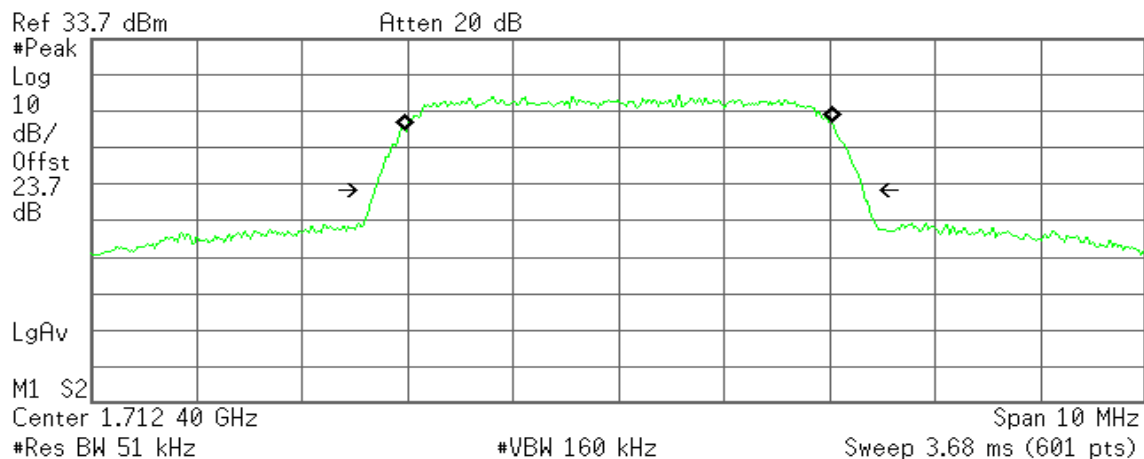
Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error -1.861 kHz
x dB Bandwidth 4.649 MHz

WCDMA / HSDPA Band IV (CH Low)

Agilent 23:03:19 Nov 7, 2013

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Occupied Bandwidth
4.0655 MHz

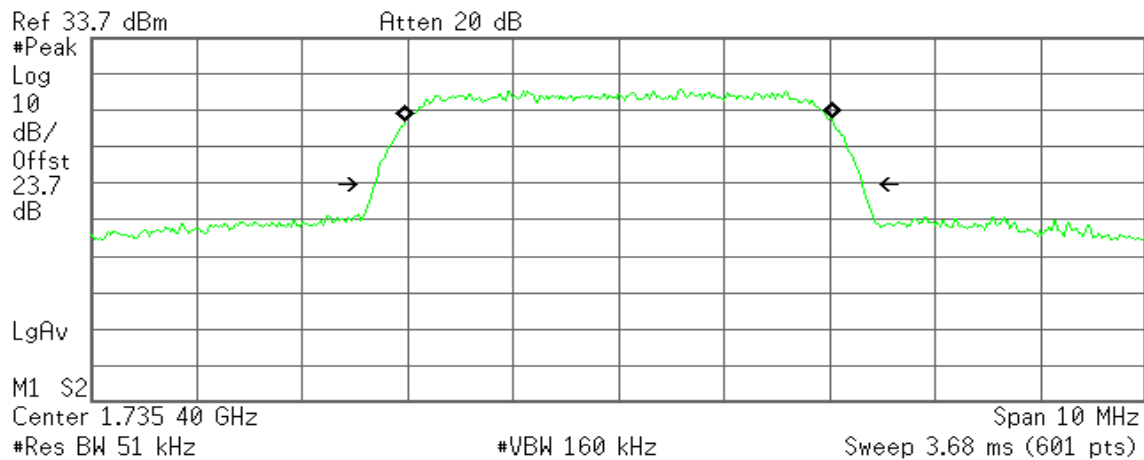
Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error 907.756 Hz
x dB Bandwidth 4.639 MHz

**WCDMA / HSDPA Band IV (CH Mid)**

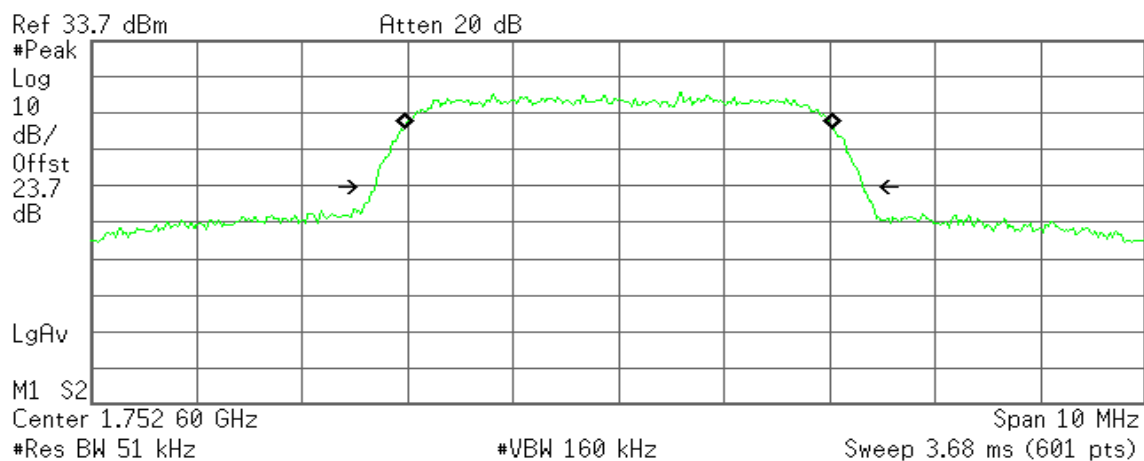
* Agilent 23:04:32 Nov 7, 2013

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**Occupied Bandwidth**
4.0586 MHz**Occ BW % Pwr** 99.00 %
x dB -26.00 dB**Transmit Freq Error** 739.770 Hz
x dB Bandwidth 4.635 MHz**WCDMA / HSDPA Band IV (CH High)**

* Agilent 23:05:05 Nov 7, 2013

R T

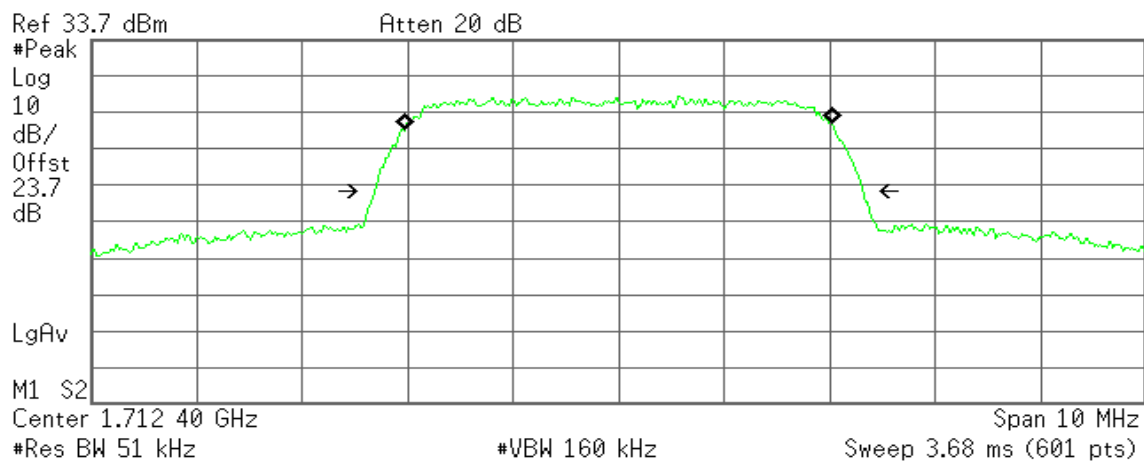
**Occupied Bandwidth**
4.0714 MHz**Occ BW % Pwr** 99.00 %
x dB -26.00 dB**Transmit Freq Error** -1.538 kHz
x dB Bandwidth 4.636 MHz



WCDMA / HSUPA Band IV (CH Low)

* Agilent 23:03:29 Nov 7, 2013

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Occupied Bandwidth
4.0618 MHz

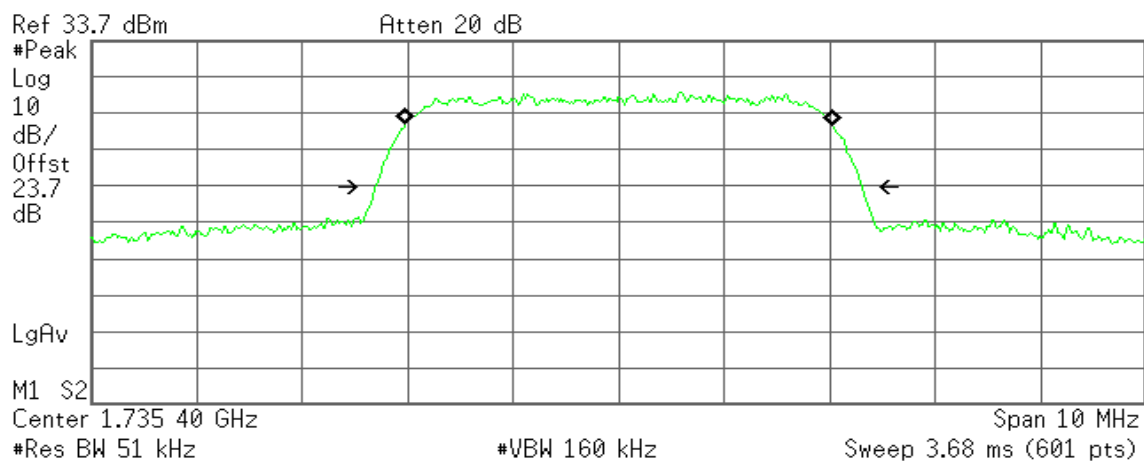
Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error 549.370 Hz
x dB Bandwidth 4.639 MHz

WCDMA / HSUPA Band IV (CH Mid)

* Agilent 23:04:21 Nov 7, 2013

R T



Occupied Bandwidth
4.0575 MHz

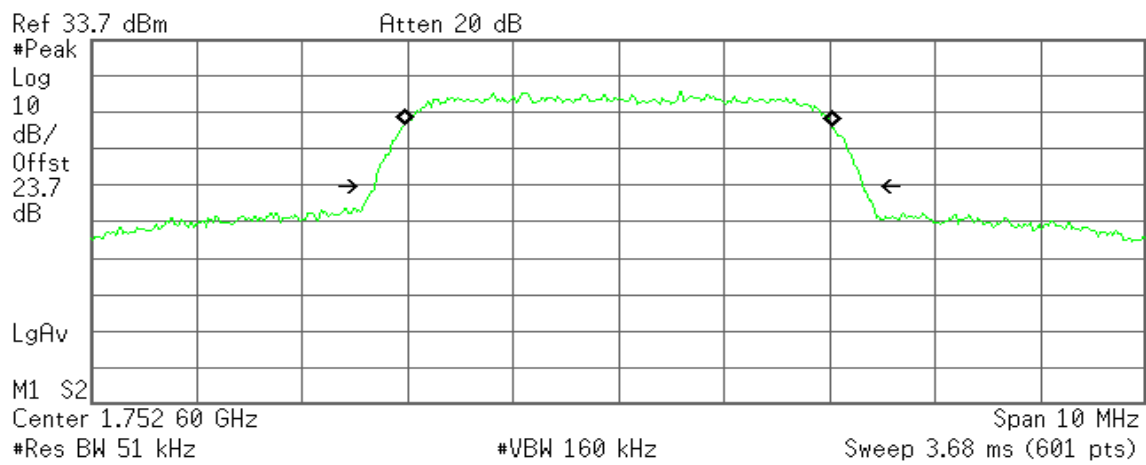
Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error 134.104 Hz
x dB Bandwidth 4.632 MHz

WCDMA / HSUPA Band IV (CH High)

Agilent 23:05:15 Nov 7, 2013

R T



Occupied Bandwidth
4.0687 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error	-3.562 kHz
x dB Bandwidth	4.641 MHz



7.4 OUT OF BAND EMISSION AT ANTENNA TERMINALS

LIMIT

According to FCC §FCC 47 CFR PART 27 SUBPART L.

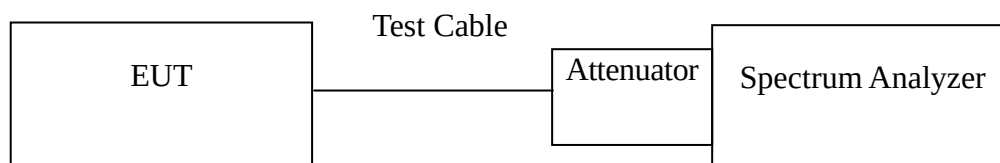
Out of Band Emissions: The mean power of emission must be attenuated below the mean power of the non-modulated carrier (P) on any frequency twice or more than twice the fundamental frequency by at least $43 + 10 \log P$ dB.

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 8-1	Conducted spurious emissions, 30MHz - 20GHz
	1427	Figure 8-2	Conducted spurious emissions, 30MHz - 20GHz
	1513	Figure 8-3	Conducted spurious emissions, 30MHz - 20GHz

Mode	CH	Location	Description
HSUPA WCDMA (Band IV)	1312	Figure 9-1	Conducted spurious emissions, 30MHz - 20GHz
	1427	Figure 9-2	Conducted spurious emissions, 30MHz - 20GHz
	1513	Figure 9-3	Conducted spurious emissions, 30MHz - 20GHz

Mode	CH	Location	Description
WCDMA (Band IV)	1312	Figure 10-1	Band Edge emissions
	1513	Figure 10-2	Band Edge emissions

Mode	CH	Location	Description
HSDPA WCDMA (Band IV)	1312	Figure 11-1	Band Edge emissions
	1513	Figure 11-2	Band Edge emissions

Mode	CH	Location	Description
HSUPA WCDMA (Band IV)	1312	Figure 12-1	Band Edge emissions
	1513	Figure 12-2	Band Edge emissions

**Test Plot**

WCDMA Band IV

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

Agilent 23:13:28 Nov 7, 2013

R T

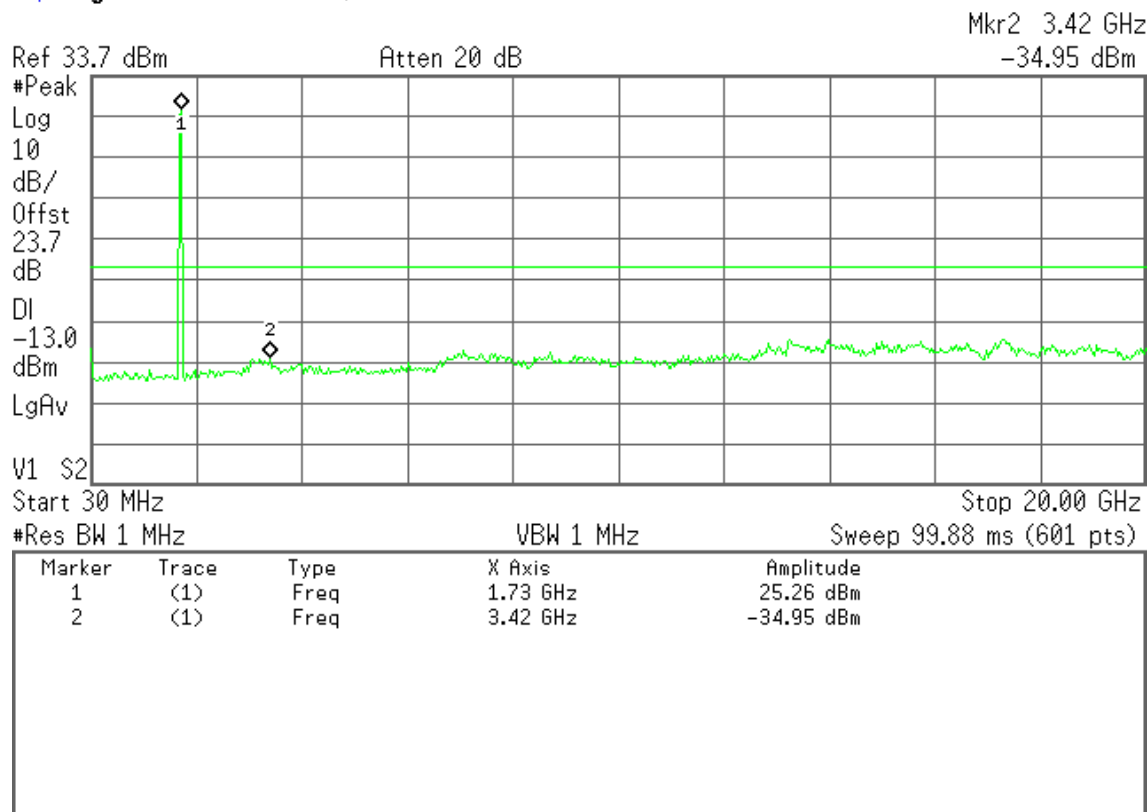


Figure 7-2: Out of Band emission at antenna terminals – CH Mid

Agilent 23:14:08 Nov 7, 2013

R T

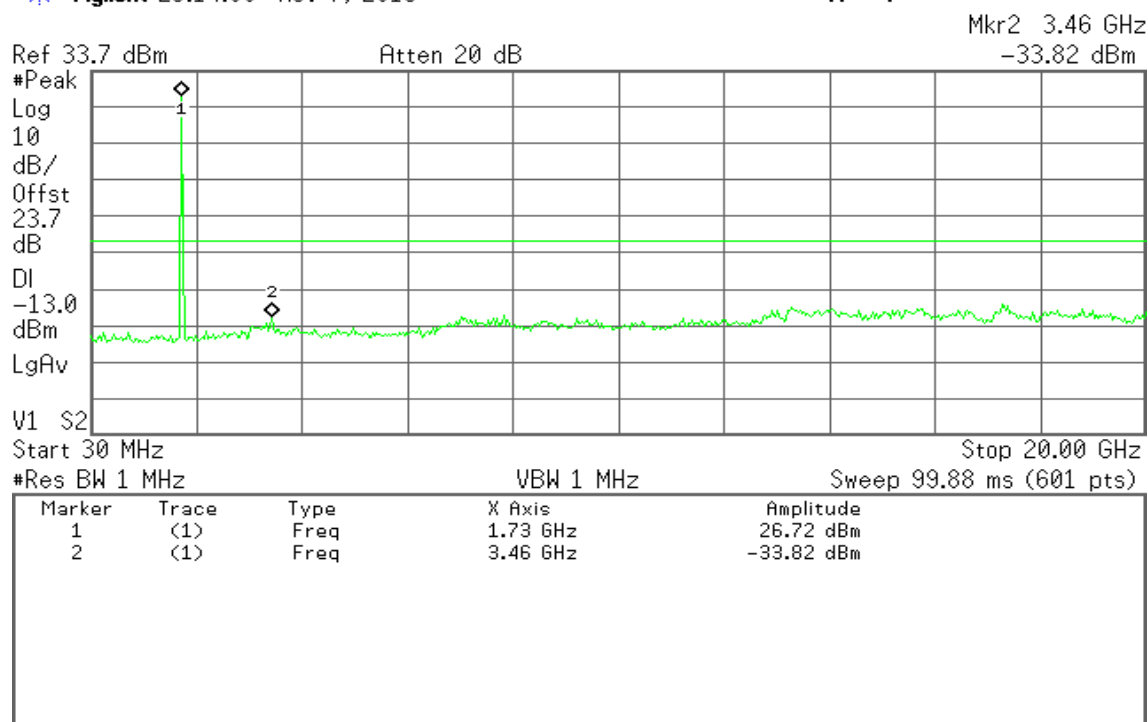
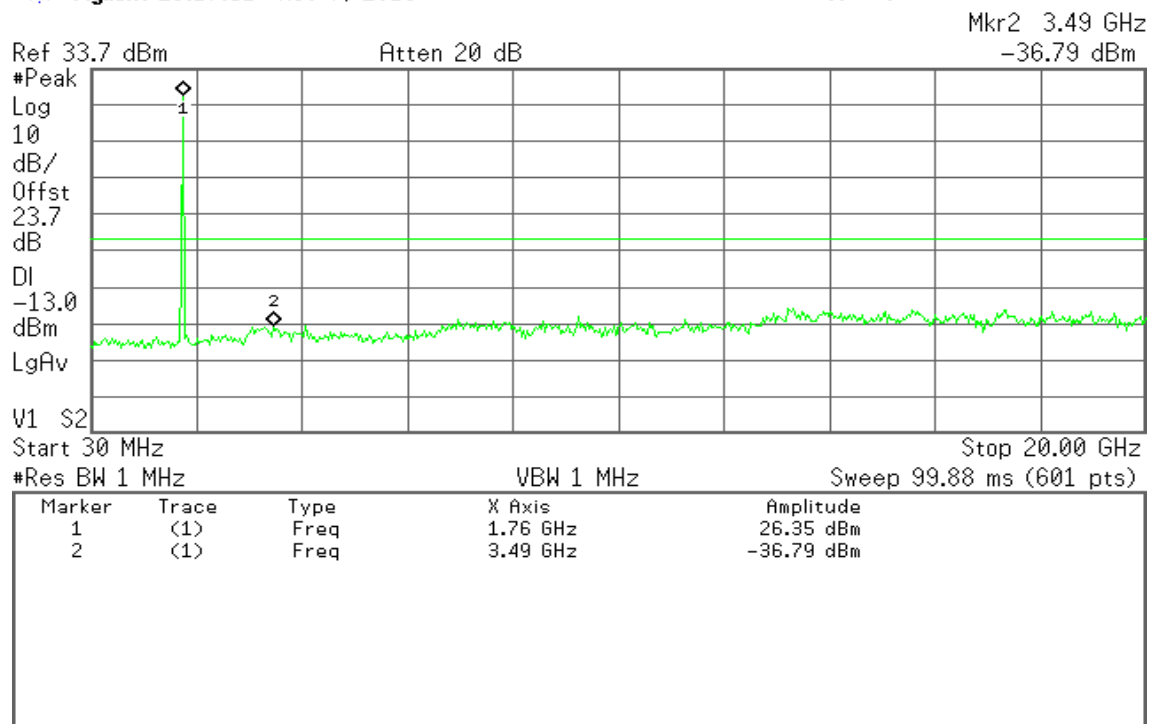




Figure 7-3: Out of Band emission at antenna terminals – CH High

Agilent 23:17:51 Nov 7, 2013

R T



HSDPA Band IV

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

Agilent 23:12:32 Nov 7, 2013

R T

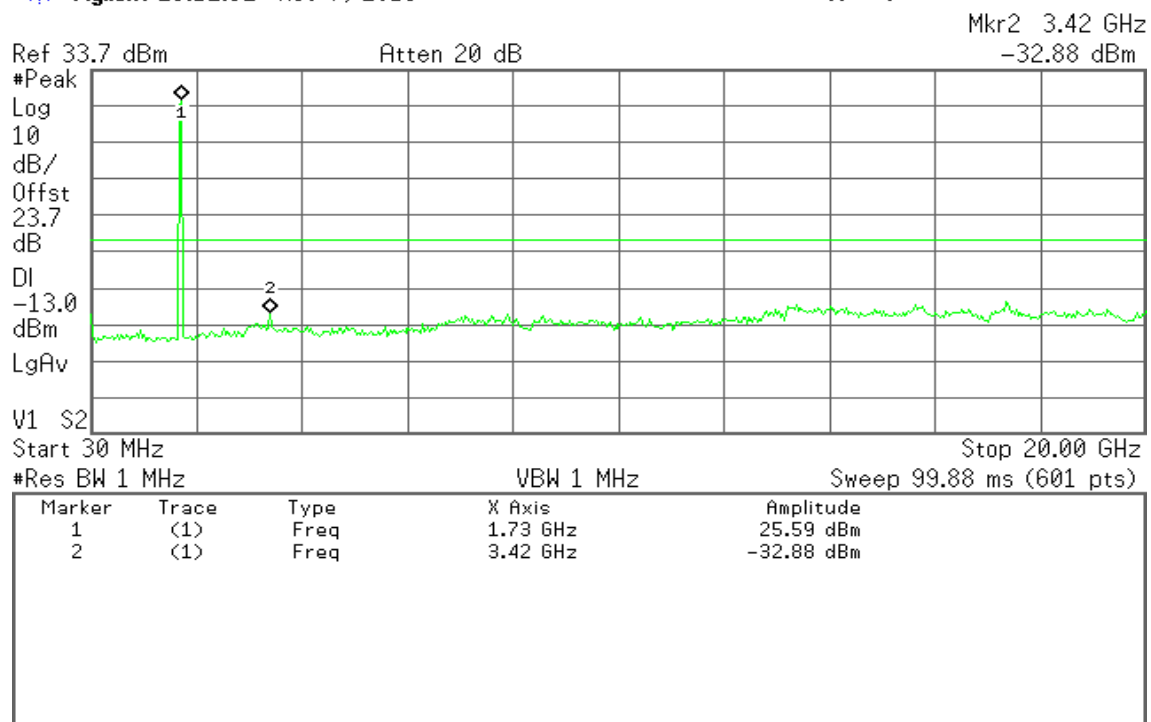




Figure 7-5: Out of Band emission at antenna terminals – CH Mid

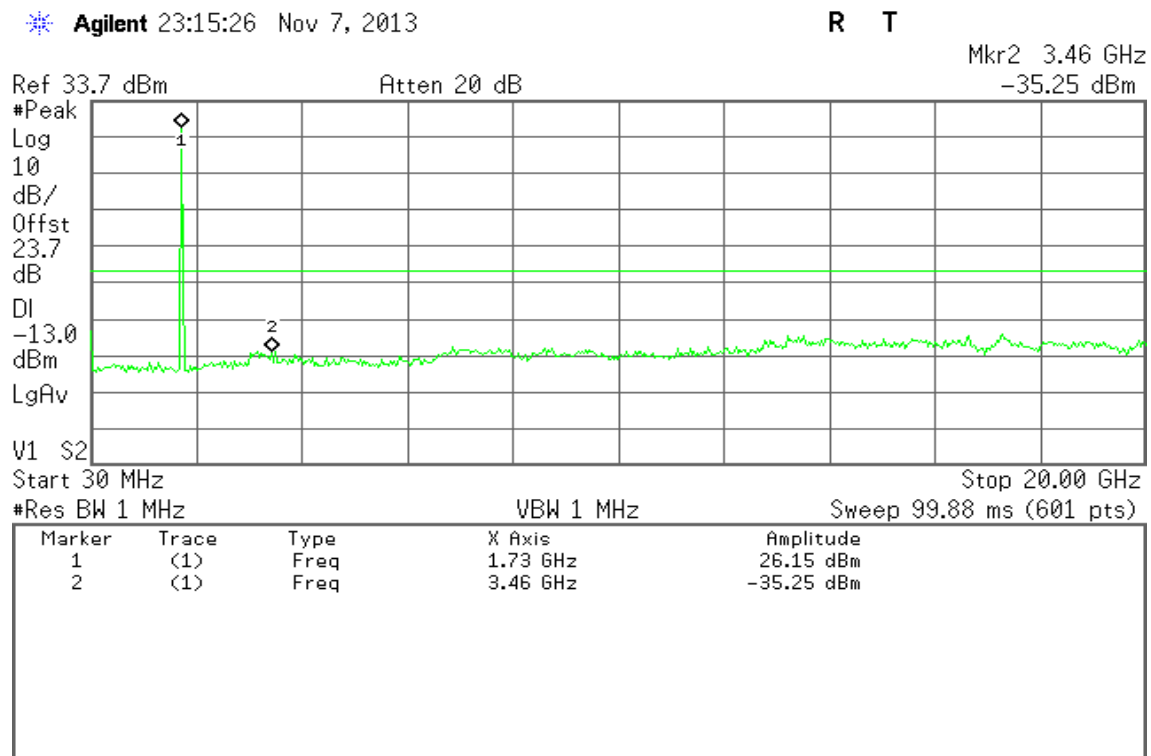
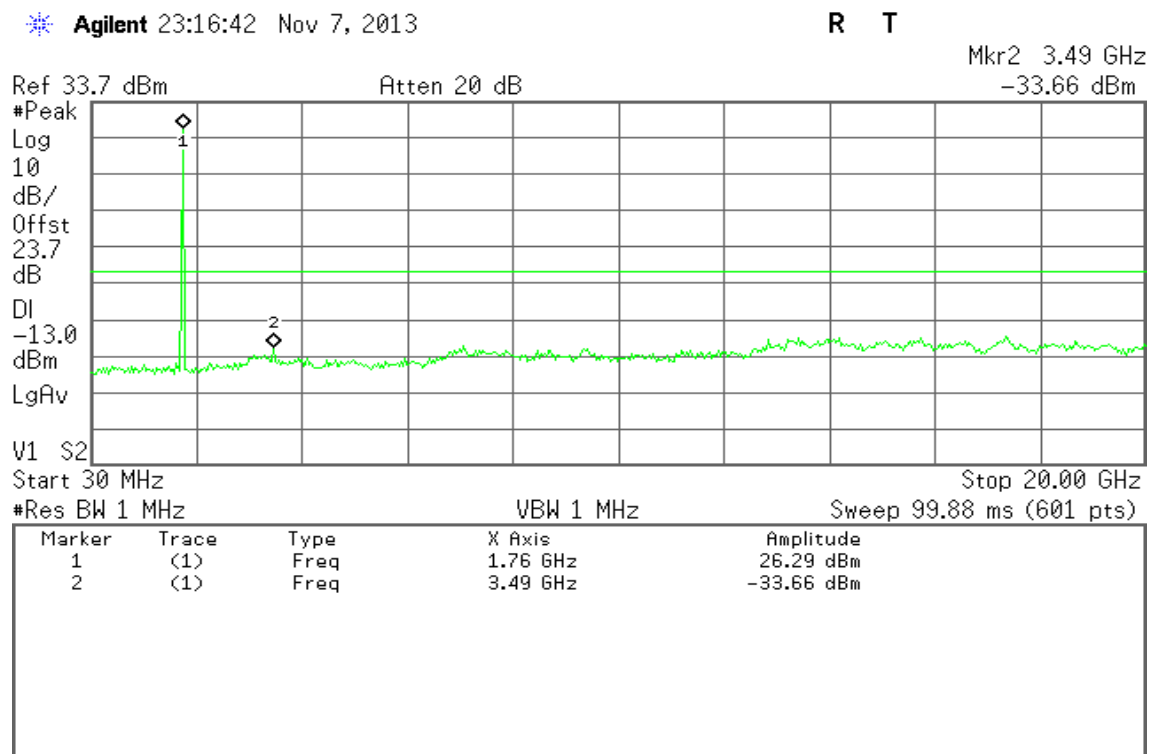


Figure 7-6: Out of Band emission at antenna terminals – CH High





HSUPA Band IV

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

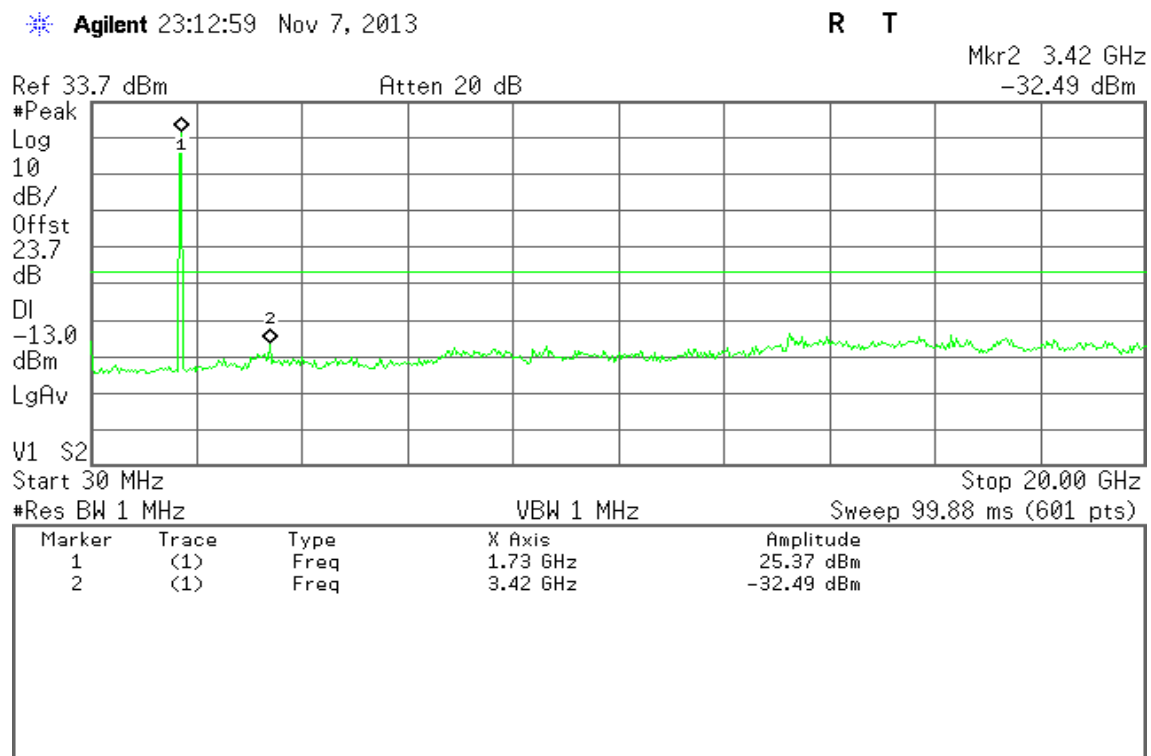


Figure 7-8: Out of Band emission at antenna terminals – CH Mid

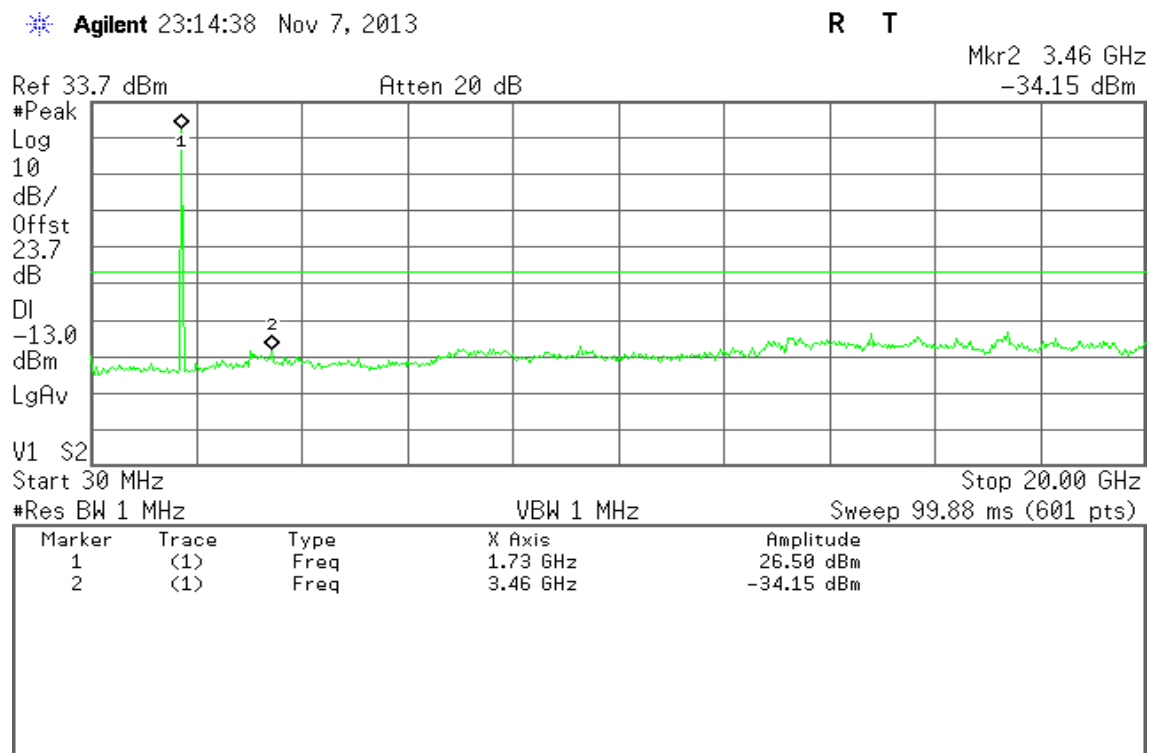
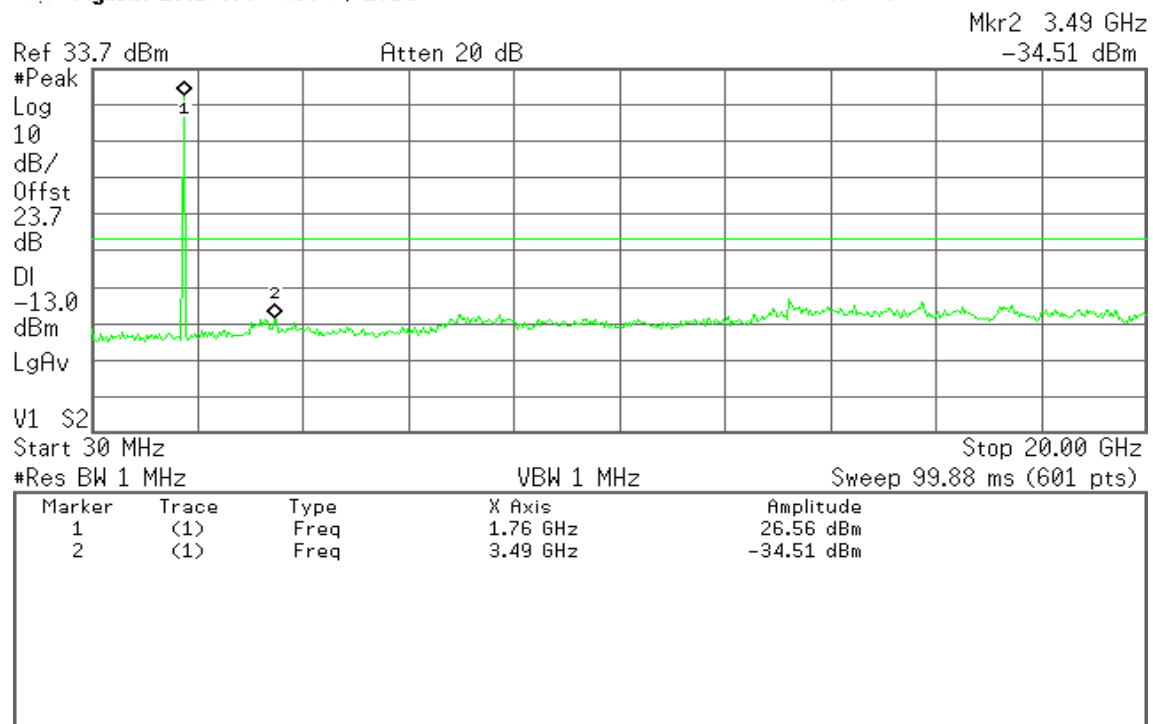




Figure 7-9: Out of Band emission at antenna terminals – CH High

Agilent 23:17:09 Nov 7, 2013

R T





WCDMA Band IV

Figure 10-1: Band Edge emissions –CH Low

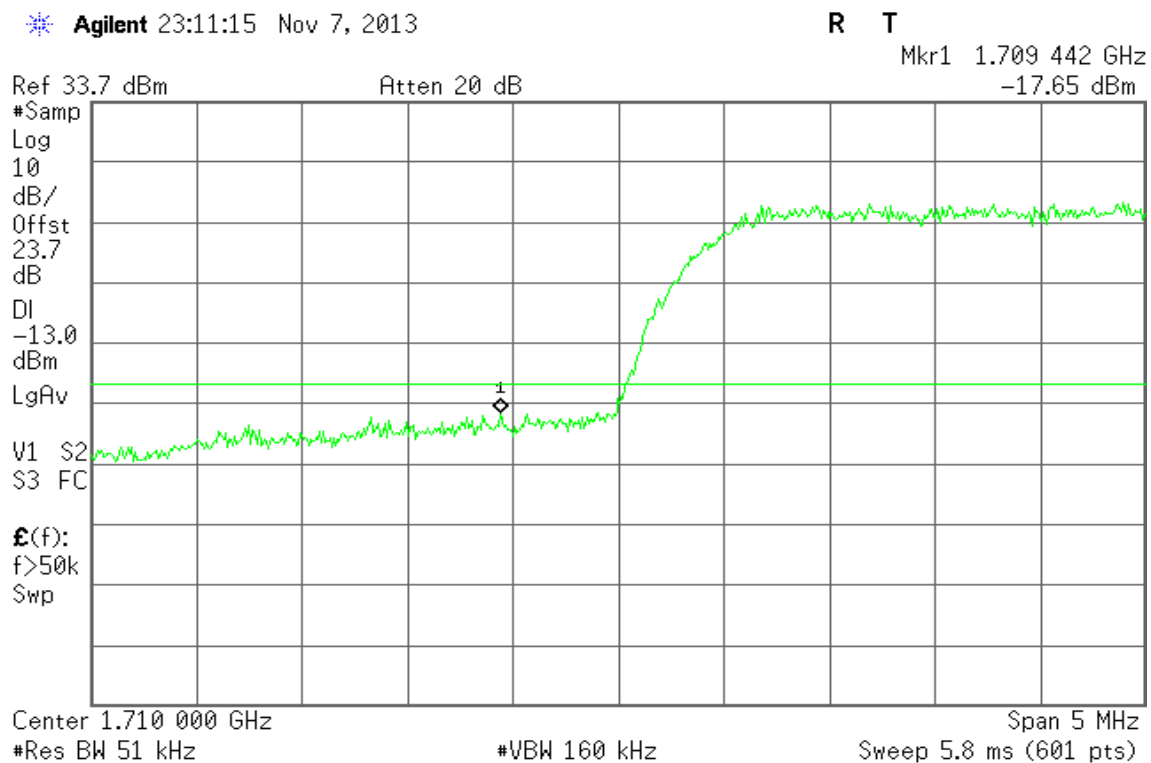
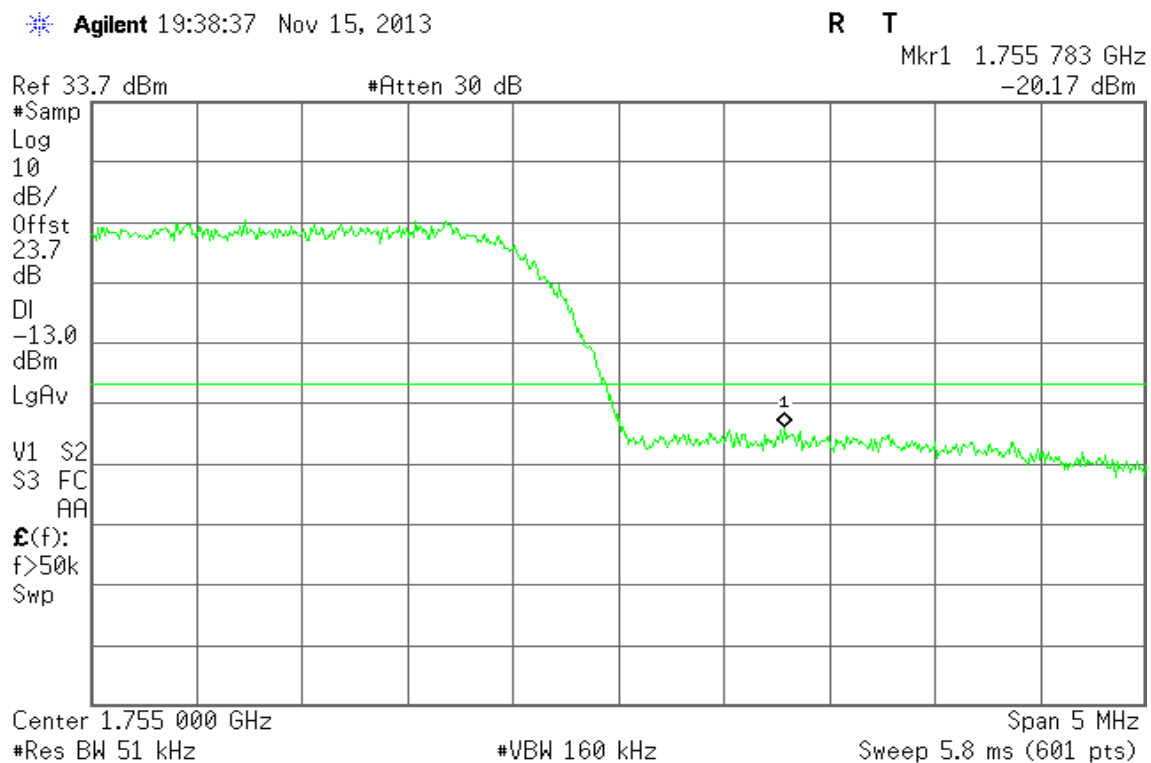


Figure 10-2: Band Edge emissions –CH High





HSDPA Band IV

Figure 11-1: Band Edge emissions –CH Low

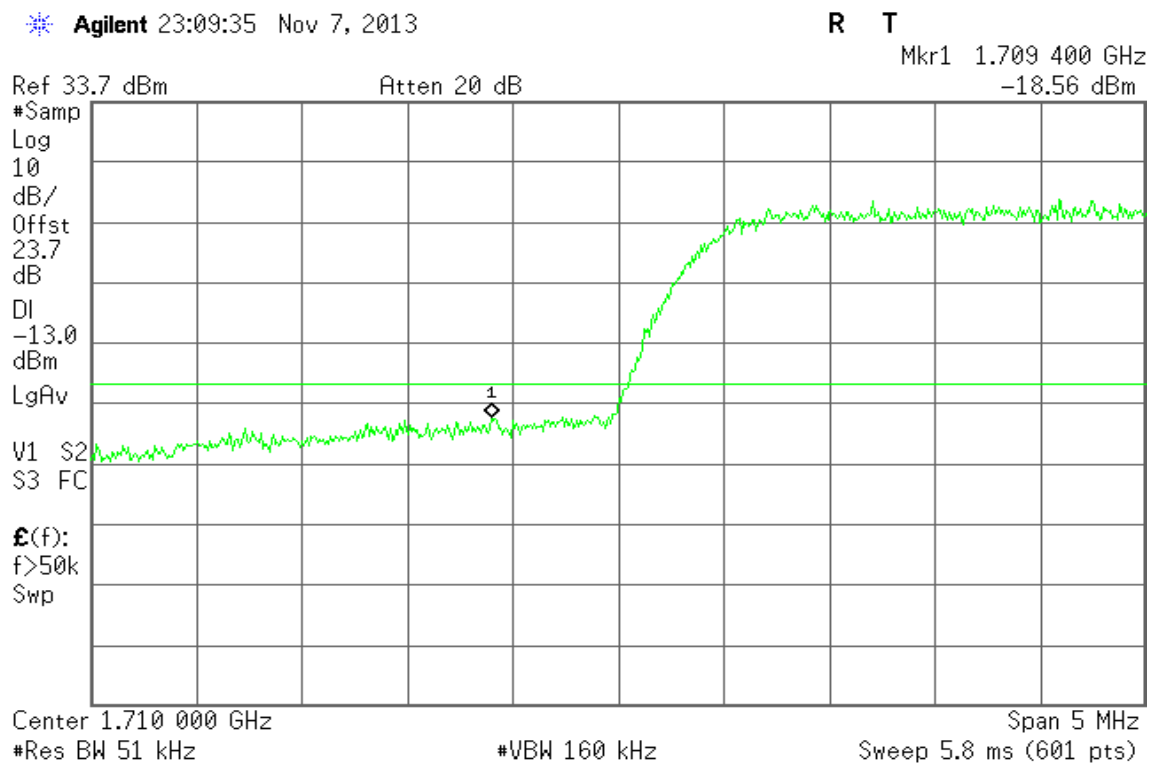
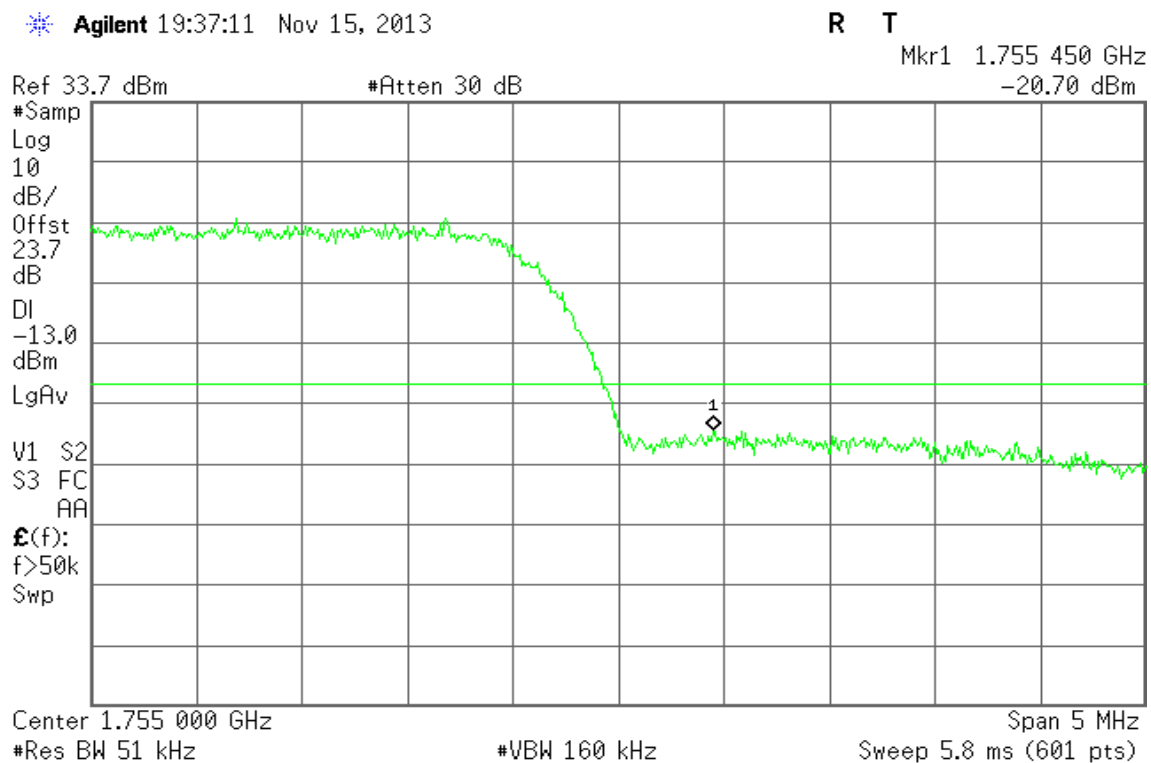


Figure 11-2: Band Edge emissions –CH High





HSUPA Band IV

Figure 12-1: Band Edge emissions –CH Low

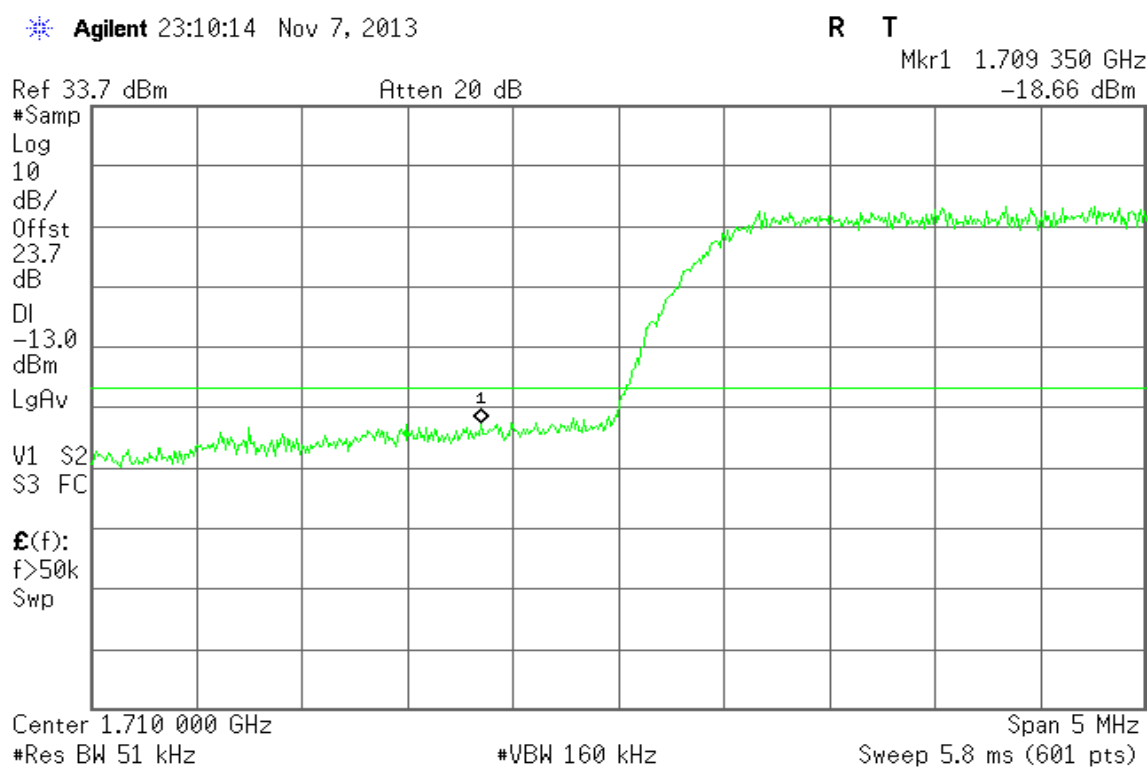
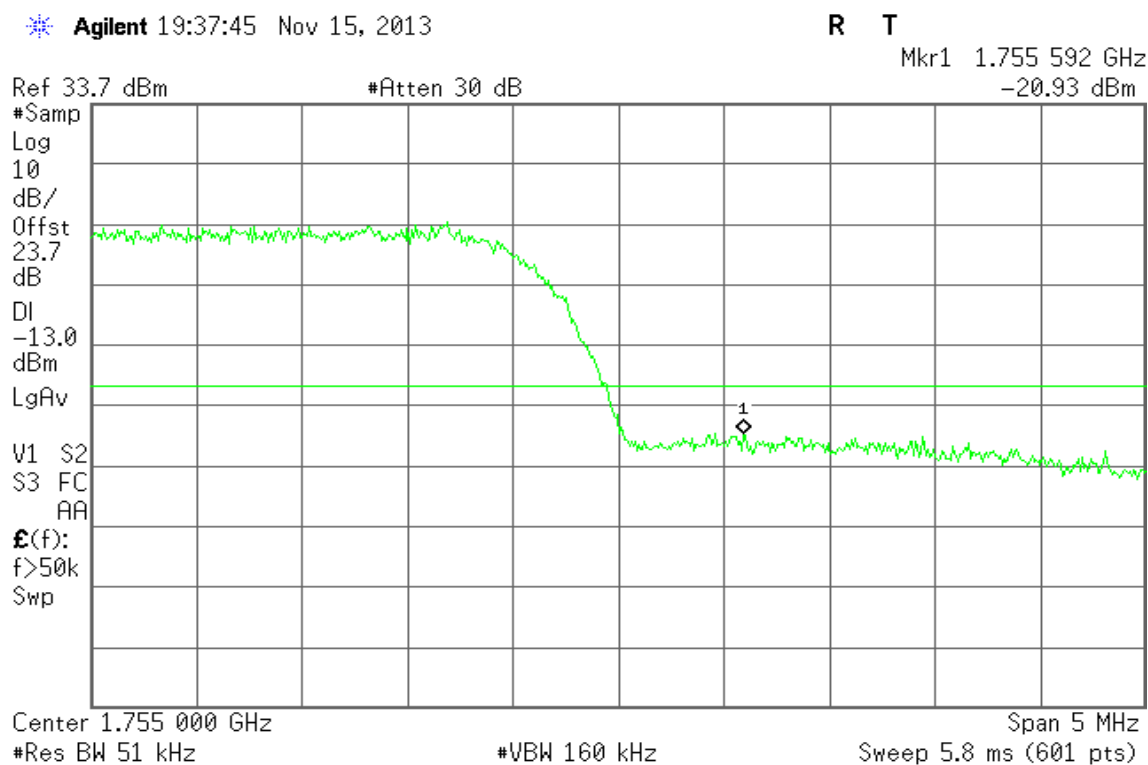


Figure 12-2: Band Edge emissions –CH High

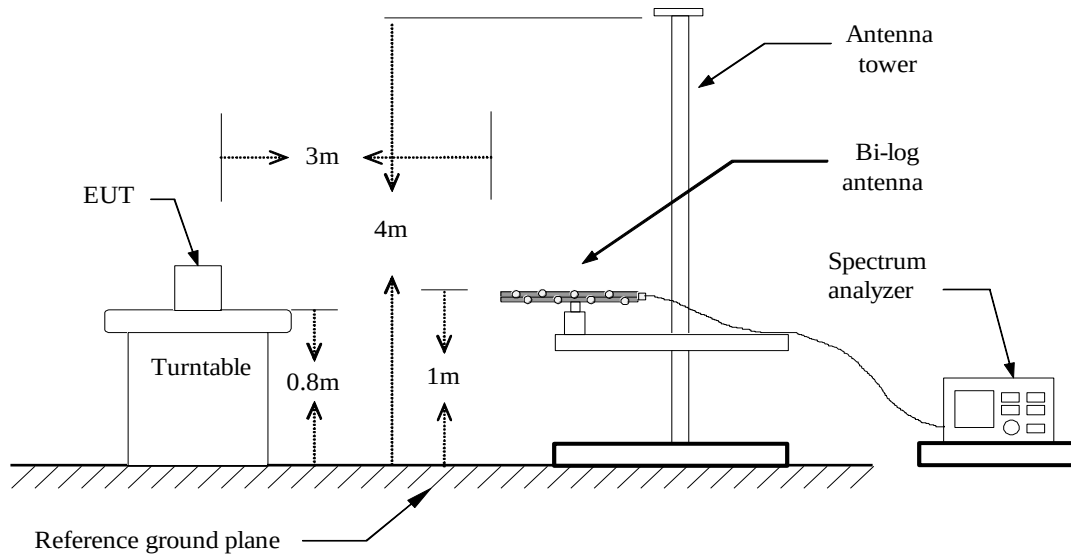




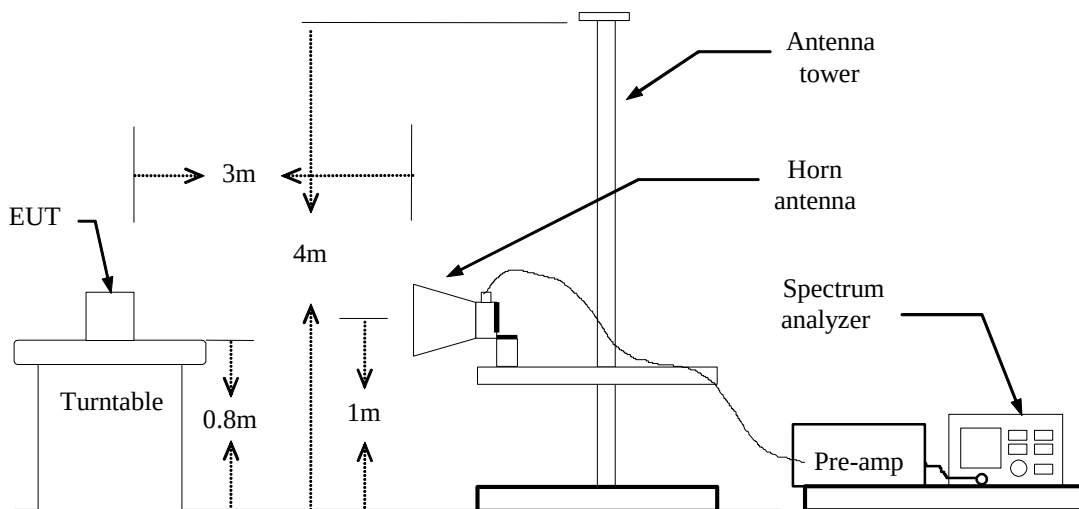
7.5 ERP & EIRP MEASUREMENT

Test Configuration

Below 1 GHz

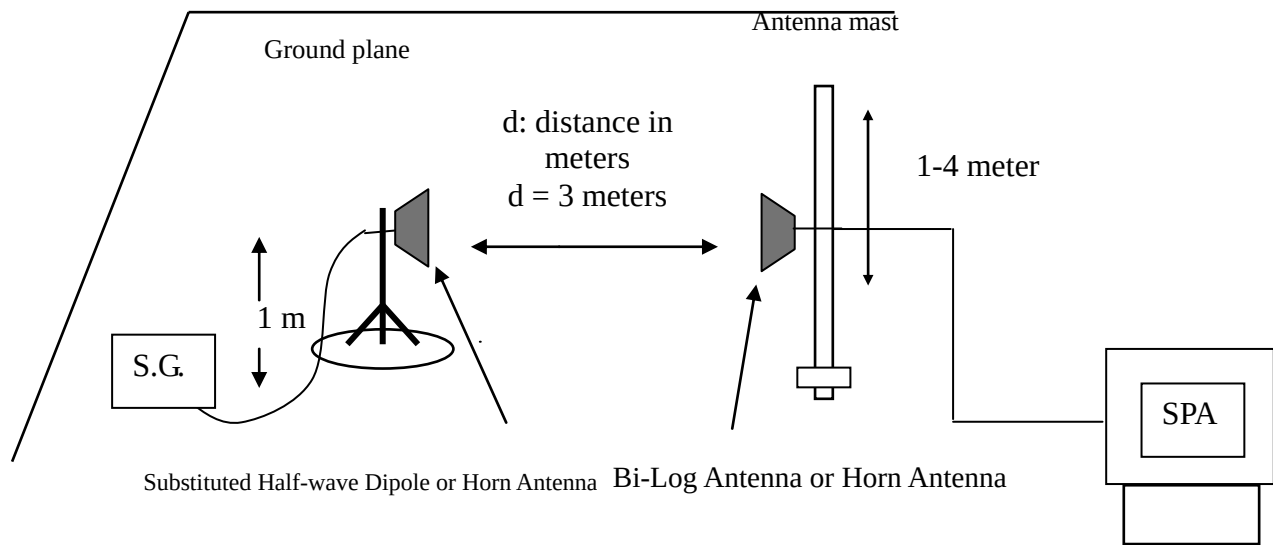


Above 1 GHz





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.

**WCDMA BAND IV Test Data**

Channel	Frequency (MHz)	Antenna Pol.	S.G. (dBm)	Cable loss (dB)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)
1312	1712.40	V	11.27	5.13	5.92	12.06	33.00	-20.94
	1712.40	H	8.25	5.13	5.92	9.04	33.00	-23.96
1427	1735.40	V	12.19	5.18	5.87	*12.88	33.00	-20.12
	1735.40	H	11.11	5.18	5.87	11.80	33.00	-21.20
1513	1752.60	V	11.53	5.21	5.84	12.16	33.00	-20.84
	1752.60	H	10.32	5.2	5.85	10.97	33.00	-22.03

HSDPA BAND IV Test Data

Channel	Frequency (MHz)	Antenna Pol.	S.G. (dBm)	Cable loss (dB)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)
1312	1712.40	V	7.49	5.13	5.92	8.28	33.00	-24.72
	1712.40	H	11.1	5.13	5.92	*11.89	33.00	-21.11
1427	1735.40	V	8.95	5.18	5.87	9.64	33.00	-23.36
	1735.40	H	11.62	5.17	5.88	12.33	33.00	-20.67
1513	1752.60	V	10.68	5.21	5.84	11.31	33.00	-21.69
	1752.60	H	10.54	5.2	5.85	11.19	33.00	-21.81

HSUPA BAND IV Test Data

Channel	Frequency (MHz)	Antenna Pol.	S.G. (dBm)	Cable loss (dB)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)
1312	1712.40	V	6.88	5.13	5.92	7.67	33.00	-25.33
	1712.40	H	10.36	5.13	5.92	11.15	33.00	-21.85
1427	1735.40	V	8.43	5.18	5.87	9.12	33.00	-23.88
	1735.40	H	11.11	5.18	5.87	*11.80	33.00	-21.20
1513	1752.60	V	10.18	5.21	5.84	10.81	33.00	-22.19
	1752.60	H	10.13	5.21	5.84	10.76	33.00	-22.24



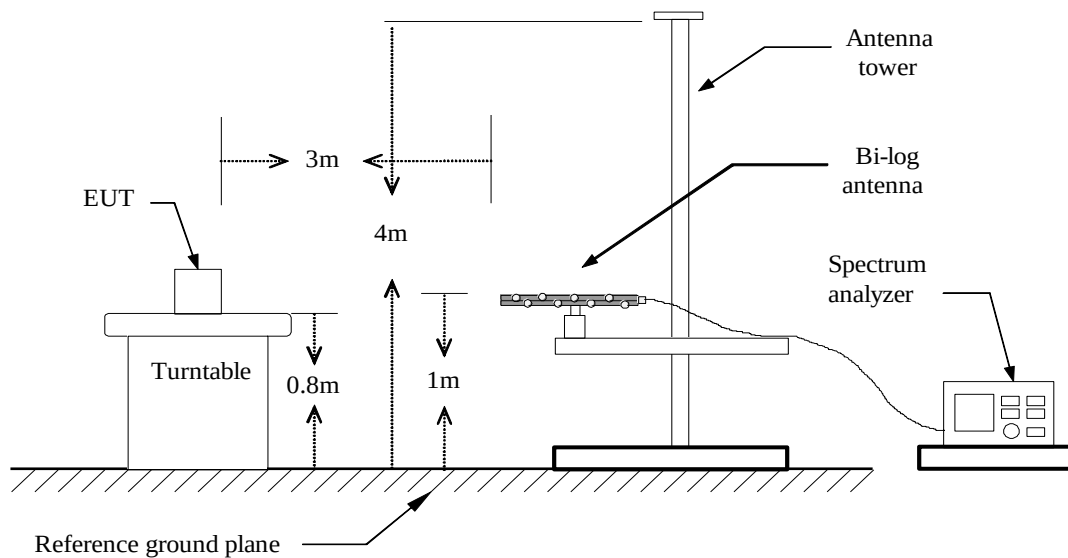
7.6 FIELD STRENGTH OF SPURIOUS RADIATION MEASUREMENT

LIMIT

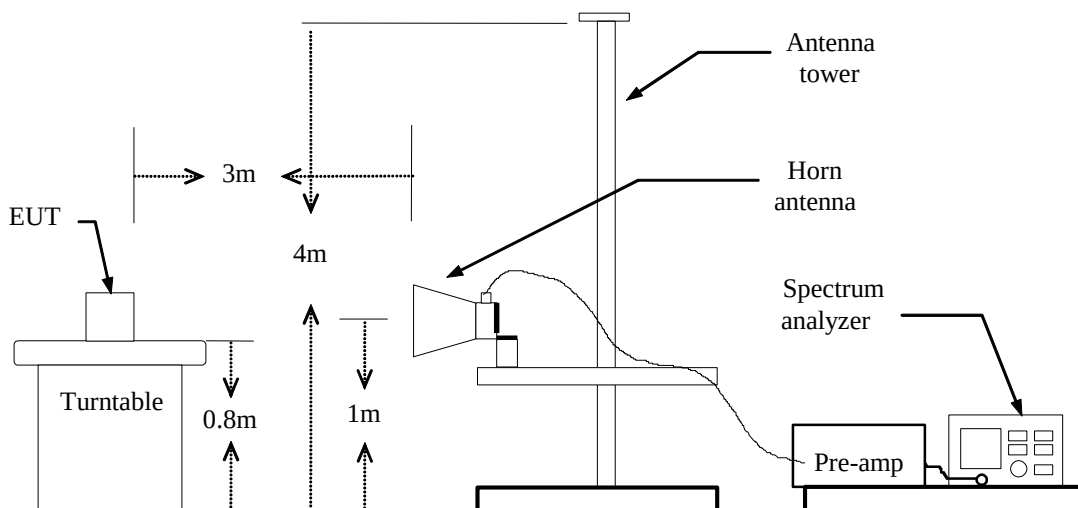
§27.53 (g) For operations in the 1710–1755MHz and 2110–2155 MHz bands, the power of any emission outside a licensee’s frequency block shall be attenuated below the transmitter power (P) by at least $43 + 10 \log_{10} (P)$ dB.

Test Configuration

Below 1 GHz

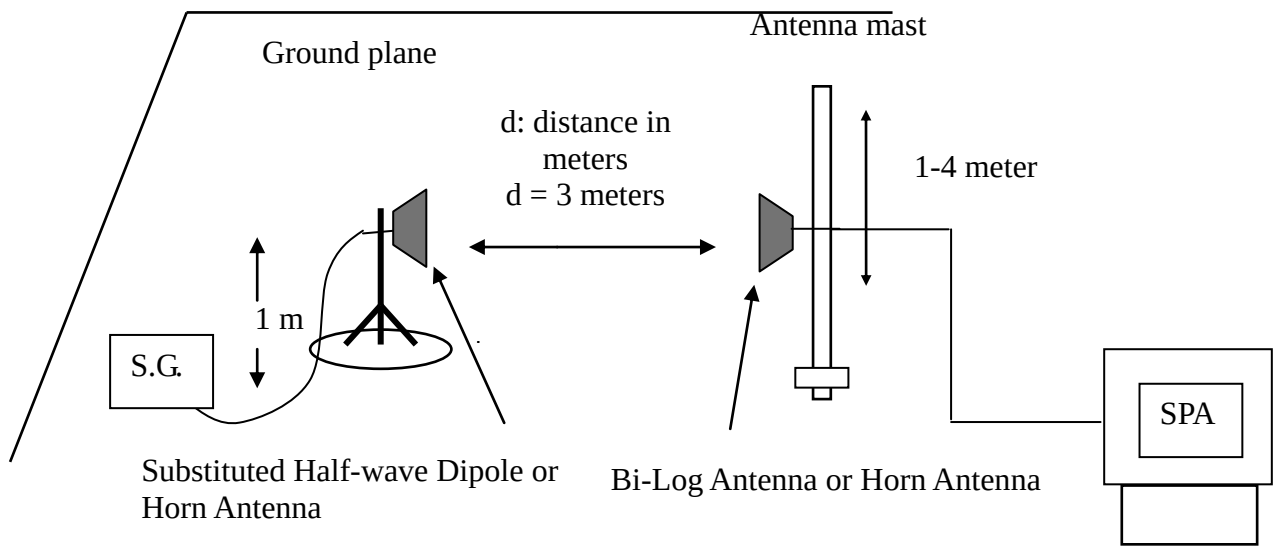


Above 1 GHz





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.

**Operation Mode:** WCDMA Band IV / TX / CH 1312**Test Date:** November 18, 2013**Temperature:** 25°C**Tested by:** David Shu**Humidity:** 45 % 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)
62.9800	-64.91	0.9	-2.06	-67.87	-13.00	-54.87	V
150.2800	-63.69	1.43	0.71	-64.41	-13.00	-51.41	V
342.3400	-77.08	2.18	5.8	-73.46	-13.00	-60.46	V
493.6600	-77.05	2.68	5.83	-73.90	-13.00	-60.90	V
600.3600	-75.45	2.9	6.4	-71.95	-13.00	-58.95	V
771.0800	-73.23	3.27	6.35	-70.15	-13.00	-57.15	V
71.7100	-60.9	0.97	-1.61	-63.48	-13.00	-50.48	H
150.2800	-59.69	1.43	0.71	-60.41	-13.00	-47.41	H
216.2400	-67.22	1.74	5.36	-63.60	-13.00	-50.60	H
399.5700	-68.91	2.39	5.98	-65.32	-13.00	-52.32	H
600.3600	-69.41	2.9	6.4	-65.91	-13.00	-52.91	H
802.1200	-70.55	3.33	6.51	-67.37	-13.00	-54.37	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:** November 18, 2013**Temperature:** 25°C**Tested by:** David Shu**Humidity:** 45 % 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)
60.0700	-64.59	0.88	-2.19	-67.66	-13.00	-54.66	V
150.2800	-63.38	1.43	0.71	-64.10	-13.00	-51.10	V
342.3400	-77.15	2.18	5.8	-73.53	-13.00	-60.53	V
599.3900	-76.44	2.9	6.39	-72.95	-13.00	-59.95	V
771.0800	-73	3.27	6.35	-69.92	-13.00	-56.92	V
883.6000	-77.84	3.48	6.7	-74.62	-13.00	-61.62	V
150.2800	-59.14	1.43	0.71	-59.86	-13.00	-46.86	H
216.2400	-69.2	1.74	5.36	-65.58	-13.00	-52.58	H
345.2500	-73.91	2.2	5.8	-70.31	-13.00	-57.31	H
399.5700	-68.42	2.39	5.98	-64.83	-13.00	-51.83	H
599.3900	-69.82	2.9	6.39	-66.33	-13.00	-53.33	H
771.0800	-70.13	3.27	6.35	-67.05	-13.00	-54.05	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:** November 18, 2013**Temperature:** 25°C**Tested by:** David Shu**Humidity:** 45 % 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)
62.9800	-63.91	0.9	-2.06	-66.87	-13.00	-53.87	V
150.2800	-63.33	1.43	0.71	-64.05	-13.00	-51.05	V
342.3400	-76.14	2.18	5.8	-72.52	-13.00	-59.52	V
493.6600	-77	2.68	5.83	-73.85	-13.00	-60.85	V
599.3900	-76.67	2.9	6.39	-73.18	-13.00	-60.18	V
771.0800	-72.77	3.27	6.35	-69.69	-13.00	-56.69	V
150.2800	-59.65	1.43	0.71	-60.37	-13.00	-47.37	H
216.2400	-68.21	1.74	5.36	-64.59	-13.00	-51.59	H
345.2500	-73.18	2.2	5.8	-69.58	-13.00	-56.58	H
442.2500	-69.81	2.55	5.85	-66.51	-13.00	-53.51	H
599.3900	-70.82	2.9	6.39	-67.33	-13.00	-54.33	H
771.0800	-70.03	3.27	6.35	-66.95	-13.00	-53.95	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:** November 18, 2013**Temperature:** 25°C**Tested by:** David Shu**Humidity:** 45 % 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)
60.0700	-64.42	0.88	-2.19	-67.49	-13.00	-54.49	V
150.2800	-63.49	1.43	0.71	-64.21	-13.00	-51.21	V
342.3400	-77.28	2.18	5.8	-73.66	-13.00	-60.66	V
599.3900	-75.99	2.9	6.39	-72.50	-13.00	-59.50	V
678.9300	-77.89	3.09	6.48	-74.50	-13.00	-61.50	V
771.0800	-73.72	3.27	6.35	-70.64	-13.00	-57.64	V
150.2800	-58.87	1.43	0.71	-59.59	-13.00	-46.59	H
216.2400	-68.34	1.74	5.36	-64.72	-13.00	-51.72	H
345.2500	-74.02	2.2	5.8	-70.42	-13.00	-57.42	H
399.5700	-70.47	2.39	5.98	-66.88	-13.00	-53.88	H
599.3900	-69.77	2.9	6.39	-66.28	-13.00	-53.28	H
771.0800	-71.05	3.27	6.35	-67.97	-13.00	-54.97	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:** November 18, 2013**Temperature:** 25°C**Tested by:** David Shu**Humidity:** 45 % 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)
62.9800	-63.89	0.9	-2.06	-66.85	-13.00	-53.85	V
150.2800	-63.49	1.43	0.71	-64.21	-13.00	-51.21	V
342.3400	-76.77	2.18	5.8	-73.15	-13.00	-60.15	V
493.6600	-77.92	2.68	5.83	-74.77	-13.00	-61.77	V
600.3600	-78.32	2.9	6.4	-74.82	-13.00	-61.82	V
771.0800	-72.96	3.27	6.35	-69.88	-13.00	-56.88	V
150.2800	-59.82	1.43	0.71	-60.54	-13.00	-47.54	H
216.2400	-67.78	1.74	5.36	-64.16	-13.00	-51.16	H
399.5700	-71.65	2.39	5.98	-68.06	-13.00	-55.06	H
442.2500	-70.74	2.55	5.85	-67.44	-13.00	-54.44	H
600.3600	-71.42	2.9	6.4	-67.92	-13.00	-54.92	H
771.0800	-71.24	3.27	6.35	-68.16	-13.00	-55.16	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:** November 18, 2013**Temperature:** 25°C**Tested by:** David Shu**Humidity:** 45 % 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)
62.0100	-64.19	0.89	-2.1	-67.18	-13.00	-54.18	V
150.2800	-63.22	1.43	0.71	-63.94	-13.00	-50.94	V
342.3400	-77.23	2.18	5.8	-73.61	-13.00	-60.61	V
599.3900	-73.76	2.9	6.39	-70.27	-13.00	-57.27	V
771.0800	-73.51	3.27	6.35	-70.43	-13.00	-57.43	V
802.1200	-76.82	3.33	6.51	-73.64	-13.00	-60.64	V
150.2800	-59.15	1.43	0.71	-59.87	-13.00	-46.87	H
216.2400	-67.96	1.74	5.36	-64.34	-13.00	-51.34	H
399.5700	-69.83	2.39	5.98	-66.24	-13.00	-53.24	H
442.2500	-71.08	2.55	5.85	-67.78	-13.00	-54.78	H
599.3900	-64.29	2.9	6.39	-60.80	-13.00	-47.80	H
771.0800	-71.47	3.27	6.35	-68.39	-13.00	-55.39	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:** November 18, 2013**Temperature:** 25°C**Tested by:** David Shu**Humidity:** 45 % 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)
60.0700	-64.13	0.88	-2.19	-67.20	-13.00	-54.20	V
150.2800	-63.26	1.43	0.71	-63.98	-13.00	-50.98	V
342.3400	-77.13	2.18	5.8	-73.51	-13.00	-60.51	V
493.6600	-76.5	2.68	5.83	-73.35	-13.00	-60.35	V
600.3600	-76.91	2.9	6.4	-73.41	-13.00	-60.41	V
771.0800	-73.7	3.27	6.35	-70.62	-13.00	-57.62	V
71.7100	-61.55	0.97	-1.61	-64.13	-13.00	-51.13	H
150.2800	-61.15	1.43	0.71	-61.87	-13.00	-48.87	H
216.2400	-68.4	1.74	5.36	-64.78	-13.00	-51.78	H
399.5700	-67.44	2.39	5.98	-63.85	-13.00	-50.85	H
600.3600	-68.28	2.9	6.4	-64.78	-13.00	-51.78	H
771.0800	-70.19	3.27	6.35	-67.11	-13.00	-54.11	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:** November 18, 2013**Temperature:** 25°C**Tested by:** David Shu**Humidity:** 45 % 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)
62.0100	-64.75	0.89	-2.1	-67.74	-13.00	-54.74	V
150.2800	-63.71	1.43	0.71	-64.43	-13.00	-51.43	V
342.3400	-76.54	2.18	5.8	-72.92	-13.00	-59.92	V
493.6600	-78.13	2.68	5.83	-74.98	-13.00	-61.98	V
600.3600	-73.76	2.9	6.4	-70.26	-13.00	-57.26	V
771.0800	-72.74	3.27	6.35	-69.66	-13.00	-56.66	V
60.0700	-61.25	0.88	-2.19	-64.32	-13.00	-51.32	H
150.2800	-60.44	1.43	0.71	-61.16	-13.00	-48.16	H
216.2400	-68.31	1.74	5.36	-64.69	-13.00	-51.69	H
399.5700	-69.8	2.39	5.98	-66.21	-13.00	-53.21	H
599.3900	-68.36	2.9	6.39	-64.87	-13.00	-51.87	H
771.0800	-70.72	3.27	6.35	-67.64	-13.00	-54.64	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 1513**Test Date:** November 18, 2013**Temperature:** 25°C**Tested by:** David Shu**Humidity:** 45 % 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)
62.9800	-64.78	0.9	-2.06	-67.74	-13.00	-54.74	V
150.2800	-63.12	1.43	0.71	-63.84	-13.00	-50.84	V
342.3400	-77.15	2.18	5.8	-73.53	-13.00	-60.53	V
493.6600	-77.56	2.68	5.83	-74.41	-13.00	-61.41	V
600.3600	-75.83	2.9	6.4	-72.33	-13.00	-59.33	V
771.0800	-72.74	3.27	6.35	-69.66	-13.00	-56.66	V
150.2800	-59.66	1.43	0.71	-60.38	-13.00	-47.38	H
216.2400	-67.96	1.74	5.36	-64.34	-13.00	-51.34	H
400.5400	-69.07	2.4	5.98	-65.49	-13.00	-52.49	H
493.6600	-72.71	2.68	5.83	-69.56	-13.00	-56.56	H
599.3900	-71	2.9	6.39	-67.51	-13.00	-54.51	H
771.0800	-71.14	3.27	6.35	-68.06	-13.00	-55.06	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:** November 18, 2013**Temperature:** 25°C**Tested by:** David Shu**Humidity:** 45 % 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)
2134.000	-52.03	5.84	5.59	-52.28	-13.00	-39.28	V
3471.000	-52.95	7.78	8.81	-51.92	-13.00	-38.92	V
N/A							
2134.000	-41.25	5.84	5.59	-41.50	-13.00	-28.50	H
3471.000	-51.46	7.78	8.81	-50.43	-13.00	-37.43	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:** November 18, 2013**Temperature:** 25°C**Tested by:** David Shu**Humidity:** 45 % 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)
1735.000	-32.78	5.17	5.88	-32.07	-13.00	-19.07	V
2134.000	-49.38	5.84	5.59	-49.63	-13.00	-36.63	V
2862.000	-56.85	7.02	7.04	-56.83	-13.00	-43.83	V
N/A							
2134.000	-40.85	5.84	5.59	-41.10	-13.00	-28.10	H
3471.000	-52.17	7.78	8.81	-51.14	-13.00	-38.14	H
4199.000	-53.91	8.49	9.56	-52.84	-13.00	-39.84	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 1513**Test Date:** November 18, 2013**Temperature:** 25°C**Tested by:** David Shu**Humidity:** 45 % 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)
3786.000	-54.83	8.25	9.19	-53.89	-13.00	-40.89	V
4395.000	-53.81	8.64	9.72	-52.73	-13.00	-39.73	V
N/A							
N/A							
2113.000	-46.79	5.8	5.56	-47.03	-13.00	-34.03	H
3422.000	-50.37	7.64	8.67	-49.34	-13.00	-36.34	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 / HSDPA Band IV / TX / CH 1312**Test Date:** November 18, 2013**Temperature:** 25°C**Tested by:** David Shu**Humidity:** 45 % 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)
2442.000	-44.53	6.25	6.02	-44.76	-13.00	-31.76	V
3471.000	-54.53	7.78	8.81	-53.50	-13.00	-40.50	V
N/A							
2134.000	-40.92	5.84	5.59	-41.17	-13.00	-28.17	H
3471.000	-51.15	7.78	8.81	-50.12	-13.00	-37.12	H
4416.000	-53.24	8.68	9.73	-52.19	-13.00	-39.19	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 / HSDPA Band IV / TX / CH 1427**Test Date:** November 18, 2013**Temperature:** 25°C**Tested by:** David Shu**Humidity:** 45 % 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)
2456.000	-54.35	6.28	6.04	-54.59	-13.00	-41.59	V
3471.000	-54.25	7.78	8.81	-53.22	-13.00	-40.22	V
N/A							
2134.000	-41.88	5.84	5.59	-42.13	-13.00	-29.13	H
2414.000	-48.76	6.2	5.98	-48.98	-13.00	-35.98	H
3471.000	-52.06	7.78	8.81	-51.03	-13.00	-38.03	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 / HSDPA Band IV / TX / CH 1513**Test Date:** November 18, 2013**Temperature:** 25°C**Tested by:** David Shu**Humidity:** 45 % 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)
2435.000	-49.76	6.24	6.01	-49.99	-13.00	-36.99	V
3422.000	-55.47	7.64	8.67	-54.44	-13.00	-41.44	V
N/A							
2113.000	-45.82	5.8	5.56	-46.06	-13.00	-33.06	H
3429.000	-50.76	7.66	8.69	-49.73	-13.00	-36.73	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 / HSUPA Band IV / TX / CH 1312 **Test Date:** November 18, 2013**Temperature:** 25°C**Tested by:** David Shu**Humidity:** 45 % 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)
2134.000	-52.09	5.84	5.59	-52.34	-13.00	-39.34	V
3471.000	-54.67	7.78	8.81	-53.64	-13.00	-40.64	V
4332.000	-53.1	8.61	9.67	-52.04	-13.00	-39.04	V
N/A							
2134.000	-40.74	5.84	5.59	-40.99	-13.00	-27.99	H
2463.000	-39.36	6.29	6.05	-39.60	-13.00	-26.60	H
3471.000	-51.48	7.78	8.81	-50.45	-13.00	-37.45	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 / HSUPA Band IV / TX / CH 1427 **Test Date:** November 18, 2013**Temperature:** 25°C**Tested by:** David Shu**Humidity:** 45 % 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)
2134.000	-52	5.84	5.59	-52.25	-13.00	-39.25	V
3471.000	-53.8	7.78	8.81	-52.77	-13.00	-39.77	V
N/A							
2134.000	-40.56	5.84	5.59	-40.81	-13.00	-27.81	H
3471.000	-50.72	7.78	8.81	-49.69	-13.00	-36.69	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 / HSUPA Band IV / TX / CH 1513 **Test Date:** November 18, 2013**Temperature:** 25°C**Tested by:** David Shu**Humidity:** 45 % 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)
2421.000	-52.05	6.22	5.99	-52.28	-13.00	-39.28	V
3422.000	-54.19	7.64	8.67	-53.16	-13.00	-40.16	V
N/A							
2113.000	-46.3	5.8	5.56	-46.54	-13.00	-33.54	H
3422.000	-51.02	7.64	8.67	-49.99	-13.00	-36.99	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.



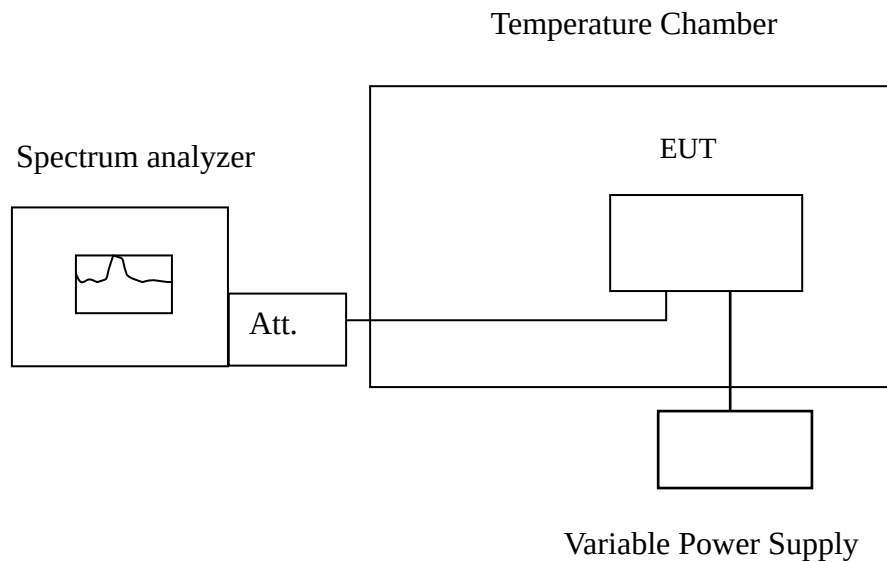
7.7 FREQUENCY STABILITY V.S. TEMPERATURE MEASUREMENT

LIMIT

According to FCC §27.54.

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 = 4700Hz				
Power Supply Vdc	Environment Temperature (°C)	Frequency (Hz)	Delta (Hz)	Limit (Hz)
24	50	1735399990	18	4338
	40	1735399964	-8	
	30	1735399965	-7	
	20	1735399972	0	
	10	1735400014	42	
	0	1735399972	0	
	-10	1735399998	26	
	-20	1735399953	-19	
	-30	1735399968	-4	

Reference Frequency: HSDPA Band IV Mid Channel 1735.40 MHz @ 20°C				
Limit: ± 2.5 ppm = 4700Hz				
Power Supply Vdc	Environment Temperature (°C)	Frequency (Hz)	Delta (Hz)	Limit (Hz)
24	50	1735399983	-4	4338
	40	1735399977	-10	
	30	1735399965	-22	
	20	1735399987	0	
	10	1735399991	4	
	0	1735400028	41	
	-10	1735400013	26	
	-20	1735399961	-26	
	-30	1735400032	45	



Reference Frequency: HSUPA Band IV Mid Channel 1735.40 MHz @ 20°C				
Limit: ± 2.5 ppm = 4700Hz				
Power Supply Vdc	Environment Temperature (°C)	Frequency (Hz)	Delta (Hz)	Limit (Hz)
24	50	1735399997	-6	4338
	40	1735399995	-8	
	30	1735399992	-11	
	20	1735400003	0	
	10	1735399990	-13	
	0	1735399975	-28	
	-10	1735399971	-32	
	-20	1735400002	-1	
	-30	1735399999	-4	



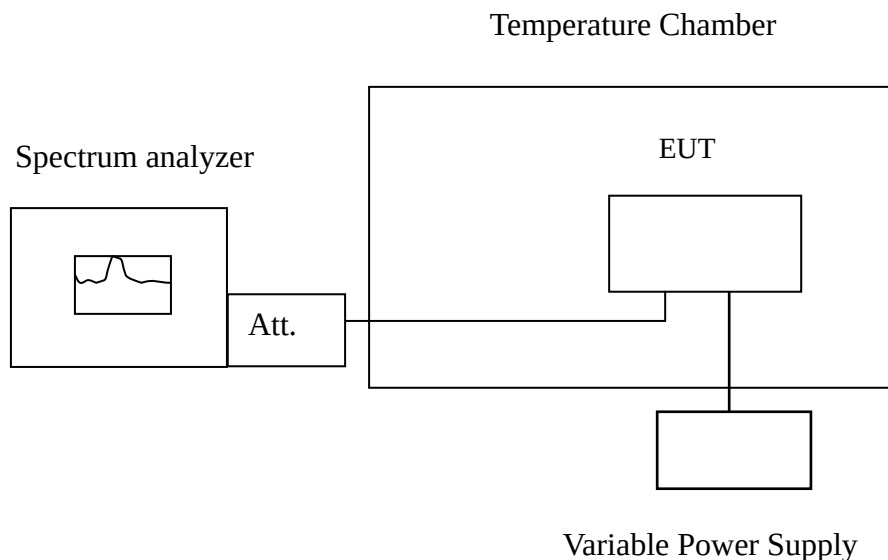
7.8 FREQUENCY STABILITY V.S. VOLTAGE MEASUREMENT

LIMIT

According to FCC §27.54.

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 = 4700Hz				
Power Supply Vdc	Environment Temperature (°C)	Frequency (Hz)	Delta (Hz)	Limit (Hz)
27.6	20	1735400025	53	4338
24		1735399972	0	
20.4		1735400049	77	
12END		1735400005	33	

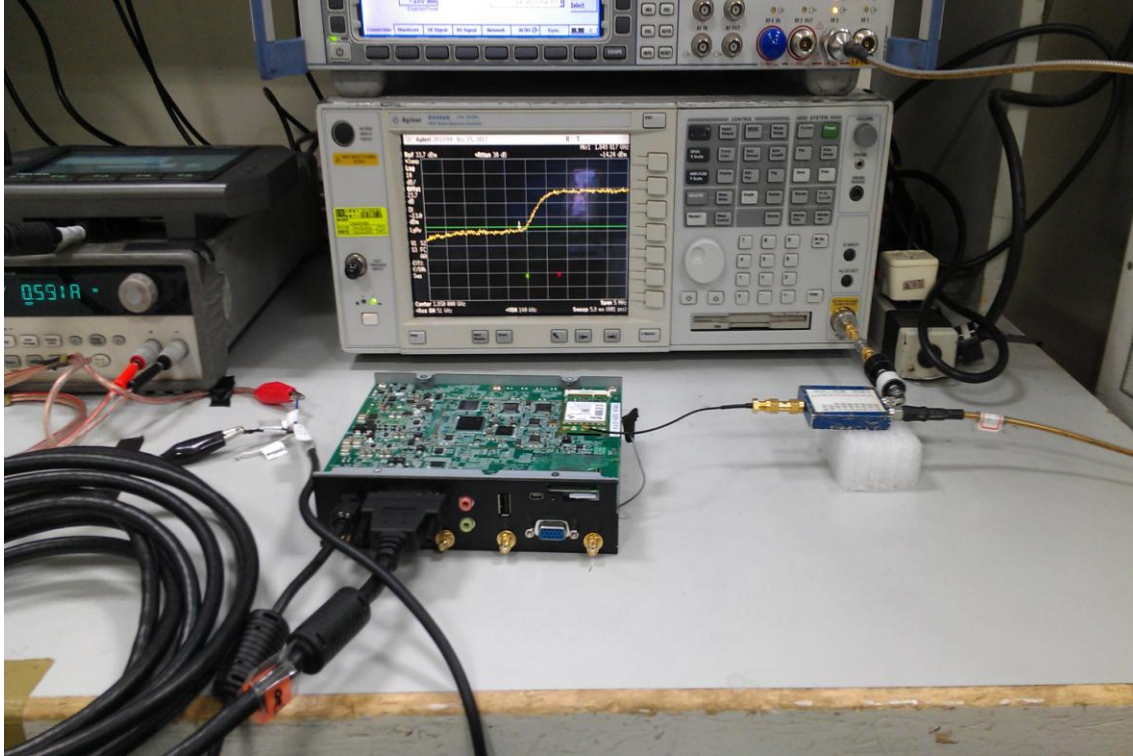
Reference Frequency: HSDPA Band IV Mid Channel 1735.40 MHz @ 20°C				
Limit: ± 2.5 ppm = 4700Hz				
Power Supply Vdc	Environment Temperature (°C)	Frequency (Hz)	Delta (Hz)	Limit (Hz)
27.6	20	1735400048	61	4338
24		1735399987	0	
20.4		1735399961	-26	
12END		1735400093	106	

Reference Frequency: HSUPA Band IV Mid Channel 1735.40 MHz @ 20°C				
Limit: ± 2.5 ppm = 4700Hz				
Power Supply Vdc	Environment Temperature (°C)	Frequency (Hz)	Delta (Hz)	Limit (Hz)
27.6	20	1735399992	-11	4338
24		1735400003	0	
20.4		1735399966	-37	
12END		1735400050	47	



8. APPENDIX II PHOTOGRAPHS OF TEST SETUP

Conducted Emission Set Up Photo



Radiated Emission Set up Photos

