

FCC 47 CFR PART 27 SUBPART L

TEST REPORT

For

Product Name	Model
MXConnect M2M Advanced In-Vehicle 4G/LTE Wireless Router	BEC MX-1000
MXConnect M2M Wireless Router	BEC MX-500

Trade Name: BEC

Issued to

Billion Electric Co., Ltd.
8F., No.192, Sec. 2, Zhongxing Rd., Xindian Dist.,
New Taipei City 231, Taiwan (R.O.C.)

Issued by

Compliance Certification Services Inc.
No.11, Wugong 6th Rd., Wugu Dist.,
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Issued Date: September 23, 2015



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Revision History

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	September 23, 2015	Initial Issue	ALL	Kelly Cheng
01	October 19, 2015	1. Modify According to FCC §27.50 d) 4) 2. Modify the test procedure described	13, 28	Kelly Cheng
02	October 27, 2015	Modify the EIRP test results limit & Margin data.	29	Kelly Cheng

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1. TEST RESULT CERTIFICATION

Applicant: Billion Electric Co., Ltd.
 8F., No.192, Sec. 2, Zhongxing Rd., Xindian Dist., New Taipei City 231, Taiwan (R.O.C.)

Equipment Under Test / Model:

Product Name	Model
MXConnect M2M Advanced In-Vehicle 4G/LTE Wireless Router	BEC MX-1000
MXConnect M2M Wireless Router	BEC MX-500

Trade Name: BEC

Date of Test: August 31 ~ September 2, 2015

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
 Manager
 Compliance Certification Services Inc.

Angel Cheng
 Section Manager
 Compliance Certification Services Inc.

2. EUT DESCRIPTION

Product	MXConnect M2M Advanced In-Vehicle 4G/LTE Wireless Router	MXConnect M2M Wireless Router
Model Number	BEC MX-1000	BEC MX-500
Trade Name	BEC	
WLAN Module	Sierra / MC7354	
Received Date	July 21, 2015	
Power Supply	10~56VDC	
Frequency Range	WCDMA / HSDPA / HSUPA Band IV: 1712.5-1752.6 MHz	
Transmit Power (ERP & EIRP Power)	WCDMA Band IV: 11.47 dBm HSDPA Band IV: 10.68 dBm HSUPA Band IV: 10.64 dBm	
Type of Emission	WCDMA Band IV: 4M06F9W HSDPA Band IV: 4M07F9W HSUPA Band IV: 4M06F9W	
Cellular Phone Protocol	WCDMA: Quadrature Phase Shift Keying (QPSK) with Root-raised cosine pulse shaping filters (roll off = 0.22)	
Antenna Gain	-3.27 dBi	
Antenna Type	Monopole Antenna	

Note: 1. The above EUT information was declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or User's Manual.

2. The detail descriptions please see as below.

Model / Difference Item	BEC MX-1000	BEC MX-500
LTE / SIM	2	N/A
Wi-Fi 2.4Ghz	yes	yes
Mini USB	2	N/A
GPS	yes	yes
WIFI on/off Button	1	1
Reset Button	1	1
Giga LAN	4	4
Power	10~56VDC	

3. Client consigns only one sample to test (model number: BEC MX-1000). Therefore, the testing Lab. just guarantees the unit, which has been tested.

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: BEC MX-1000) 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.

The field strength of spurious emission was measured in the following position: EUT stand-up position (Z axis), lie-down position (X, Y axis). The worst emission was found in stand-up position (X axis) and the worst case was recorded.

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	US42510252	11/23/2015
Thermostatic/Humidity Chamber	TAICHY	MHG-150LF	930619	10/07/2015
AC Power Source	EXTECH	6205	1140845	N.C.R
DC Power Supply	ABM	8301HD	D011531	N.C.R
Power Meter	Anritsu	ML2495A	1012009	07/07/2016
Power Sensor	Anritsu	MA2411A	0917072	07/07/2016
Spectrum Analyzer	ROHDE&SCHWARZ	FSV40	101073	07/19/2016

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	E4407B	MY44212686	03/17/2016
Pre-Amplifier	MITEQ	AFS44-00102650-42-10P-44	1042473	04/13/2016
'Bilog Antenna	Sunol Sciences	JB1	A0526009	08/05/2016
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
Spectrum Analyzer	ROHDE&SCHWARZ	FSV40	101073	07/19/2016
Horn Antenna	EMCO	3117	00055165	01/26/2016
Wideband Radio Communication Tester	ROHDE&SCHWARZ	CMW 500	116875	04/13/2016

4.3 MEASUREMENT UNCERTAINTY

PARAMETER	UNCERTAINTY
Powerline Conducted Emission	+/-1.2159
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, Chungsen 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
	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.*

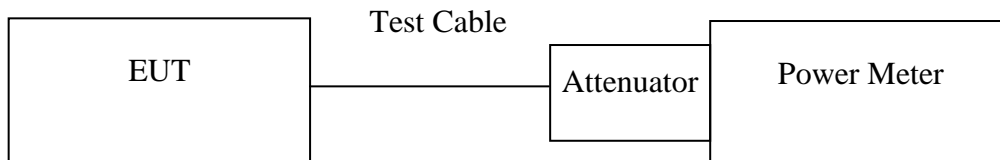
7. FCC PART 27 REQUIREMENTS

7.1 PEAK POWER

LIMIT

According to FCC §27.50 d) 4)

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	26.21	0.41783
	1427	1735.40	25.66	0.36813
	1513	1752.60	26.35	0.43152

Test Mode	CH	Frequency (MHz)	Peak Power (dBm)	Output Power (W)
HSDPA Band IV	1312	1712.40	25.85	0.38459
	1427	1735.40	25.44	0.34995
	1513	1752.60	25.91	0.38994

Test Mode	CH	Frequency (MHz)	Peak Power (dBm)	Output Power (W)
HSUPA Band IV	1312	1712.40	25.61	0.36392
	1427	1735.40	25.13	0.32584
	1513	1752.60	25.63	0.36559

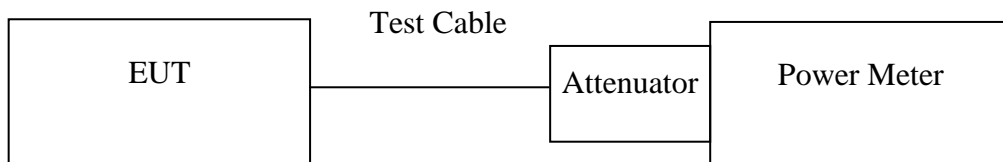
Remark: The value of factor includes both the loss of cable and external attenuator

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)	Average Power (dBm)	Output Power (W)
WCDMA Band IV	1312	1712.40	22.34	0.17140
	1427	1735.40	22.19	0.16558
	1513	1752.60	22.26	0.16827

Test Mode	CH	Frequency (MHz)	Average Power (dBm)	Output Power (W)
HSDPA Band IV	1312	1712.40	22.19	0.16558
	1427	1735.40	22.04	0.15996
	1513	1752.60	22.11	0.16255

Test Mode	CH	Frequency (MHz)	Average Power (dBm)	Output Power (W)
HSUPA Band IV	1312	1712.40	22.17	0.16470
	1427	1735.40	22.02	0.15911
	1513	1752.60	22.09	0.16170

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

7.3 OUT OF BAND EMISSION AT ANTENNA TERMINALS

LIMIT

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

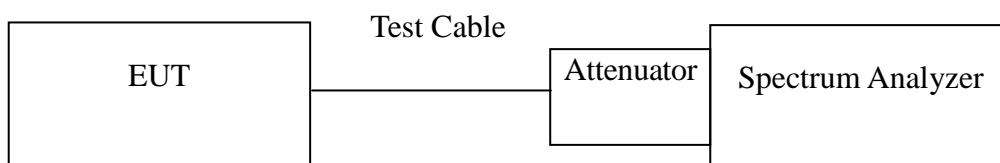
Out of Band Emissions: The mean power of emission must be attenuated below the mean power of the non-modulated carrier (P) on any frequency twice or more than twice the fundamental frequency by at least $43 + 10 \log P$ dB.

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
WCDMA (Band IV)	1312	Figure 8-1	Band Edge emissions
	1513	Figure 8-2	Band Edge emissions

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
HSDPA WCDMA (Band IV)	1312	Figure 8-3	Band Edge emissions
	1513	Figure 8-4	Band Edge emissions

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

Mode	CH	Location	Description
HSUPA WCDMA (Band IV)	1312	Figure 8-5	Band Edge emissions
	1513	Figure 8-6	Band Edge emissions

Test Plot

WCDMA Band IV

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

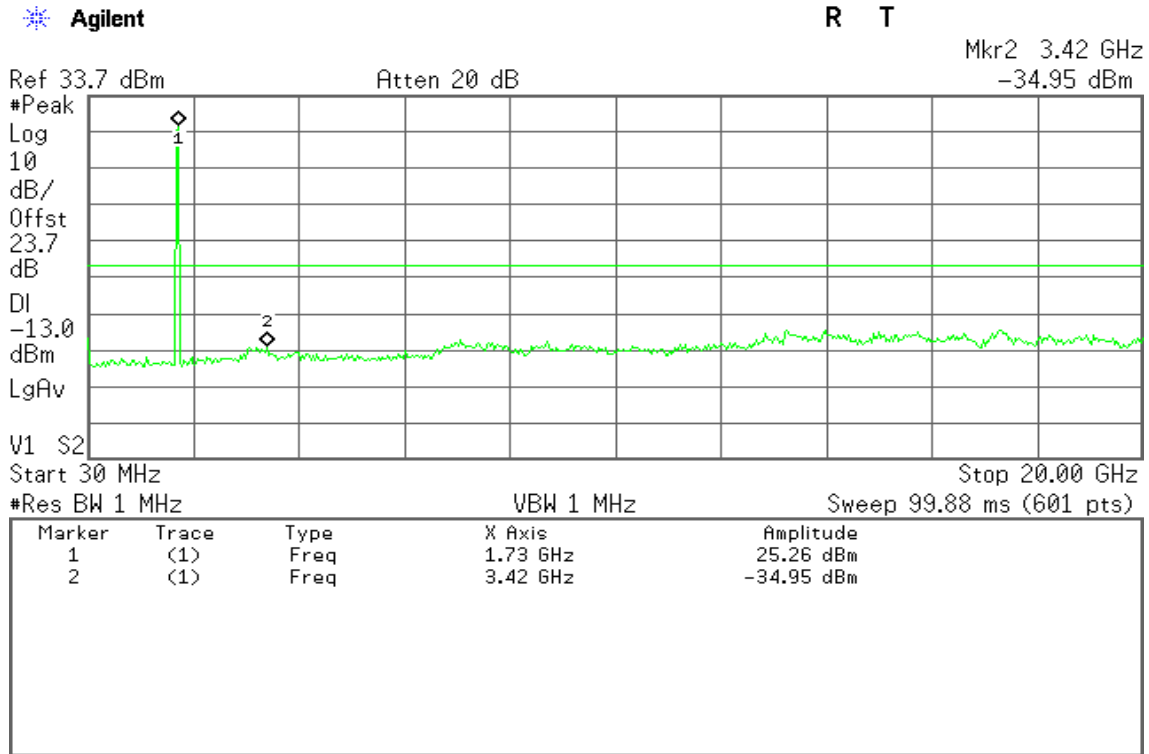


Figure 7-2: Out of Band emission at antenna terminals – CH Mid

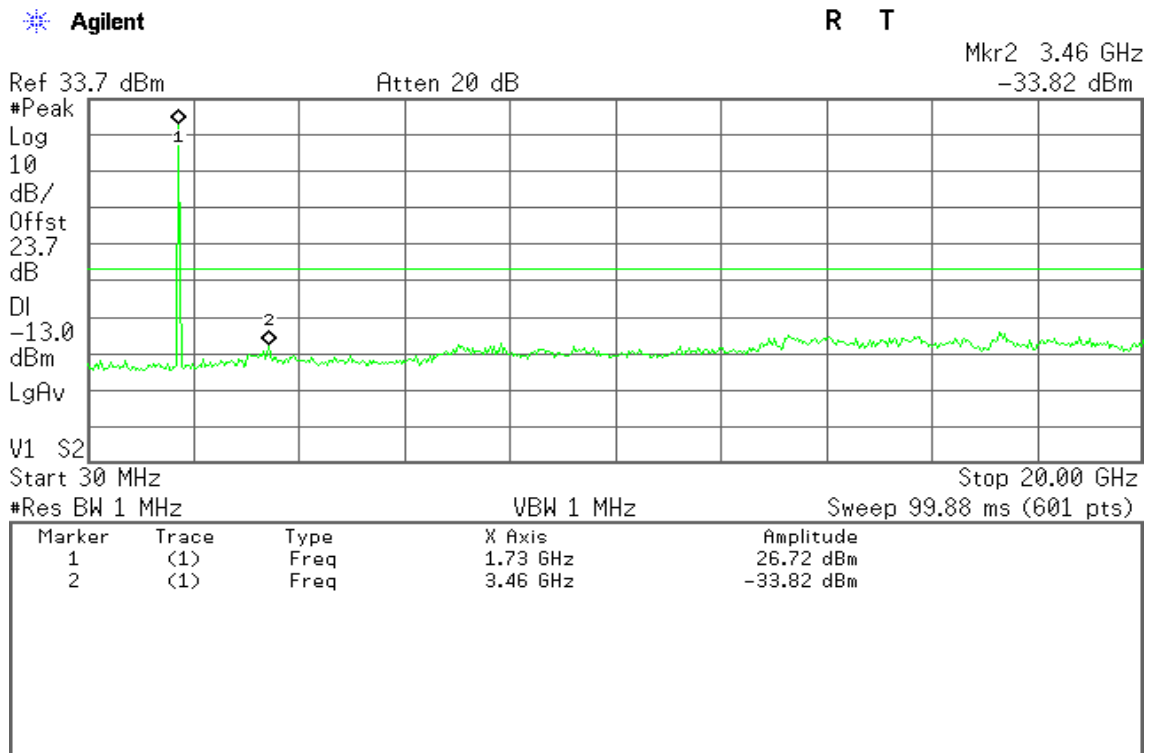
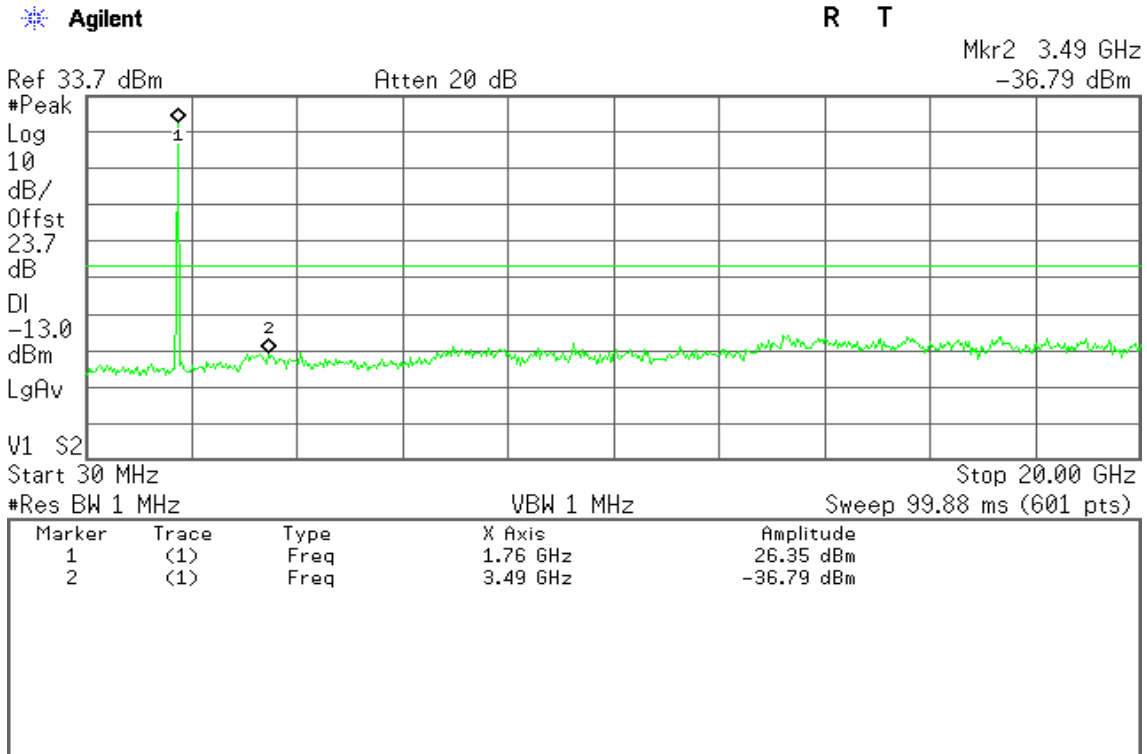


Figure 7-3: Out of Band emission at antenna terminals – CH High



HSDPA Band IV

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

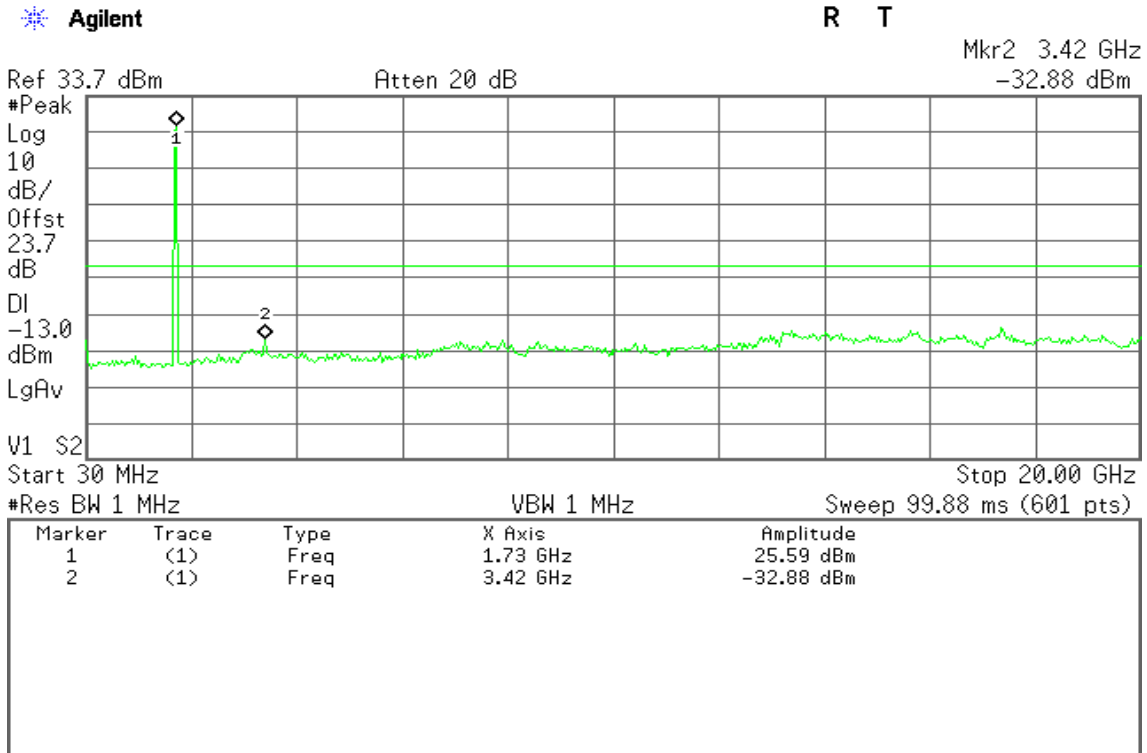


Figure 7-5: Out of Band emission at antenna terminals – CH Mid

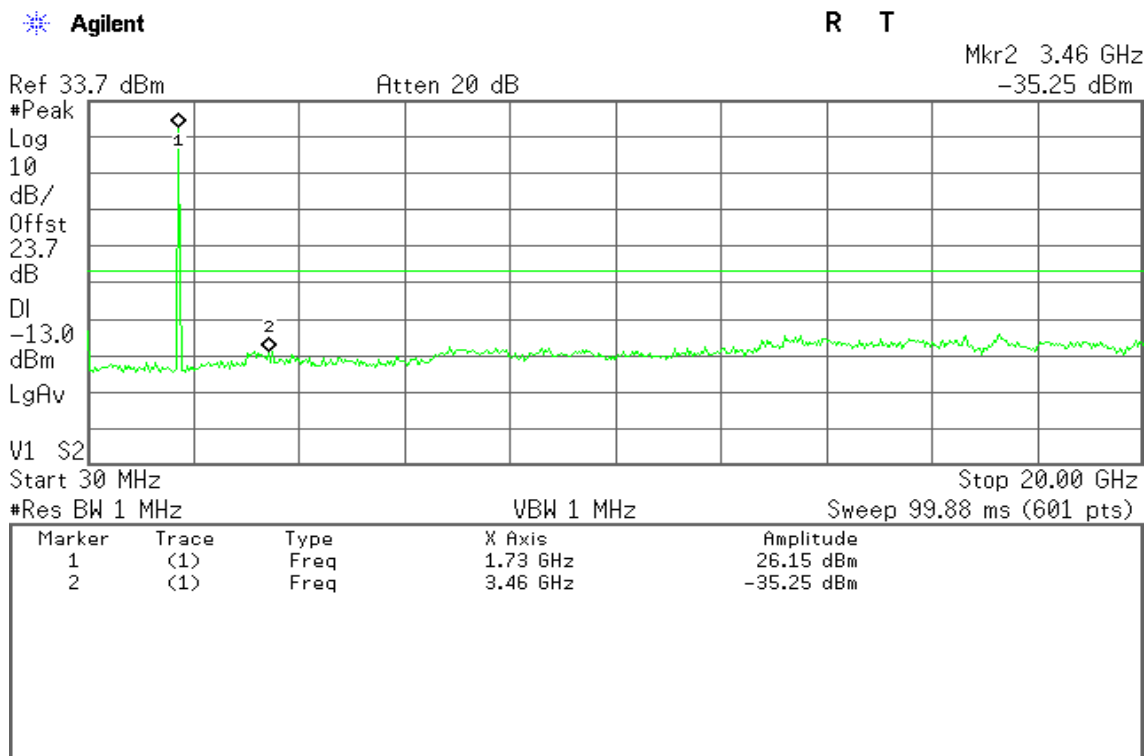
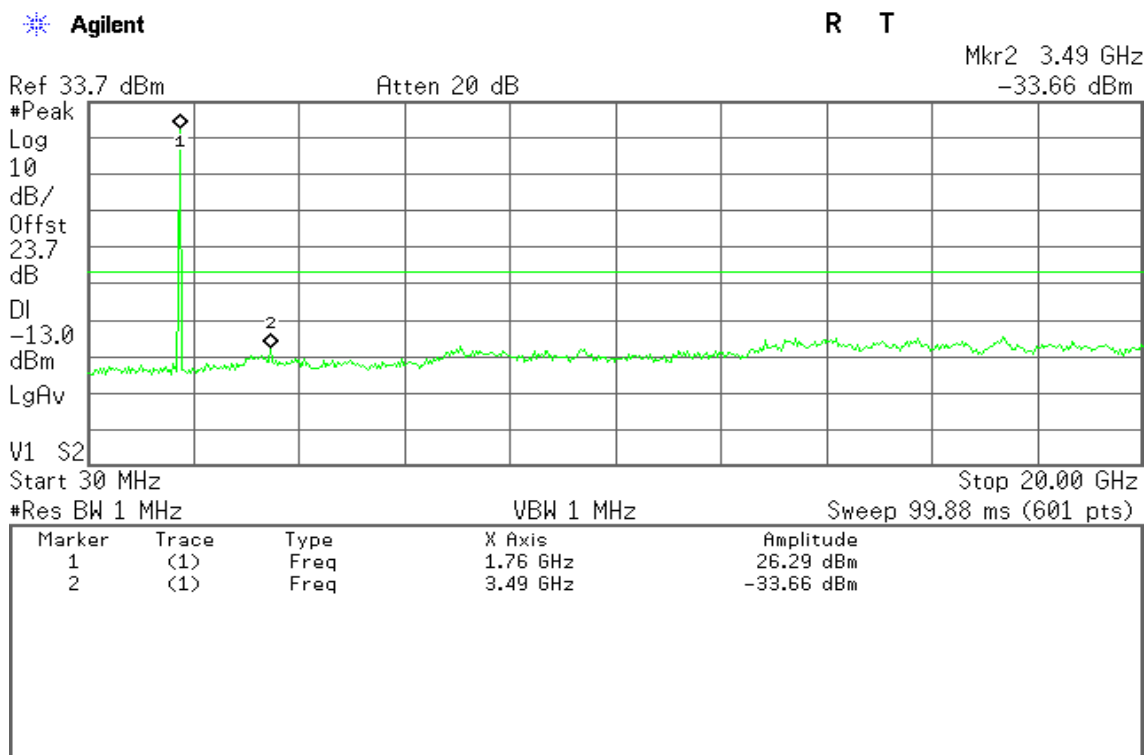


Figure 7-6: Out of Band emission at antenna terminals – CH High



HSUPA Band IV

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

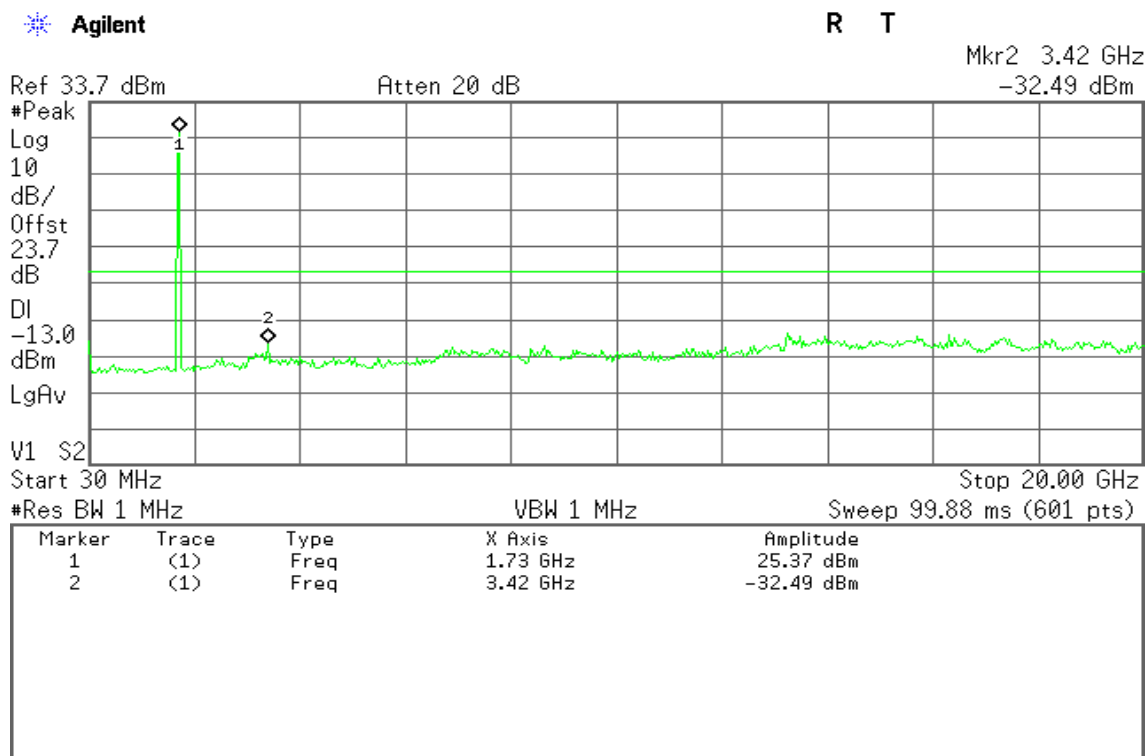


Figure 7-8: Out of Band emission at antenna terminals – CH Mid

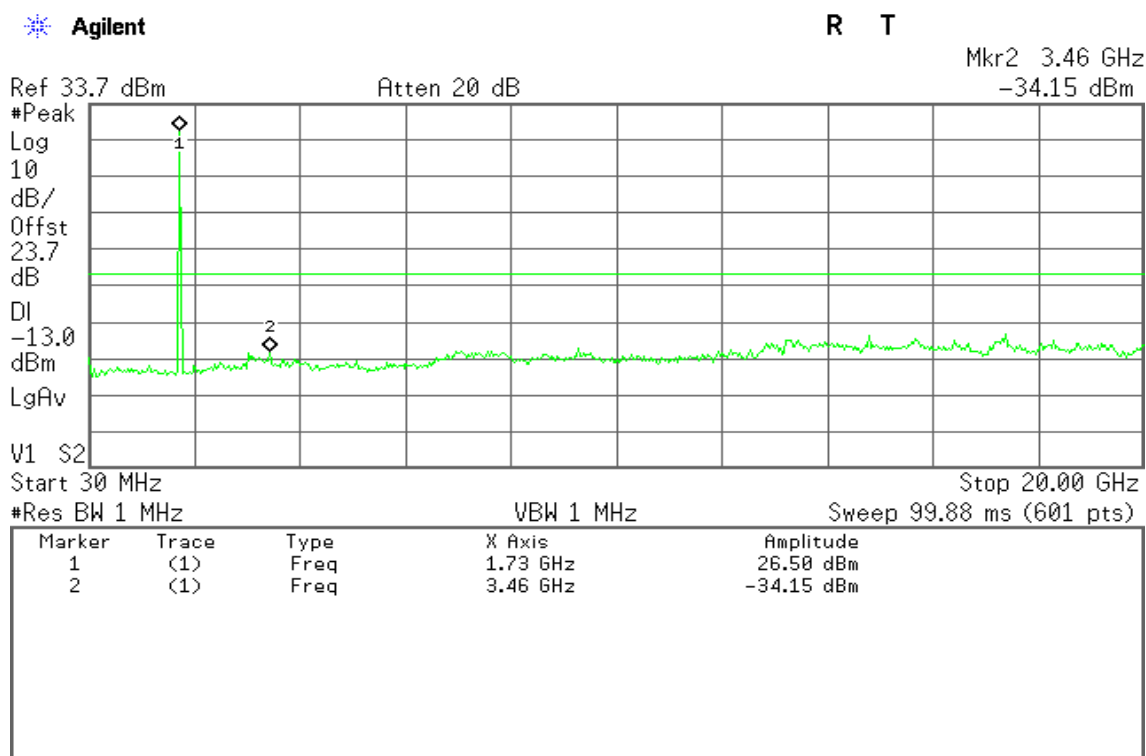
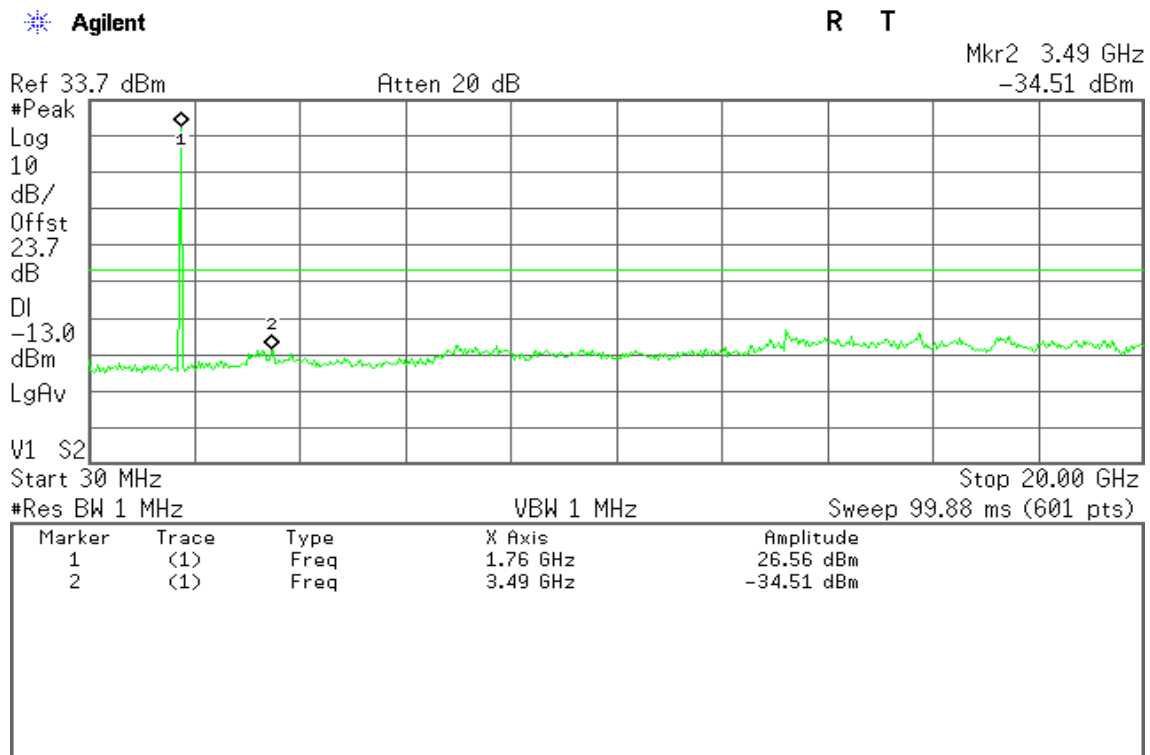


Figure 7-9: Out of Band emission at antenna terminals – CH High



WCDMA IV

Figure 8-1: Band Edge emissions –WCDMA CH Low

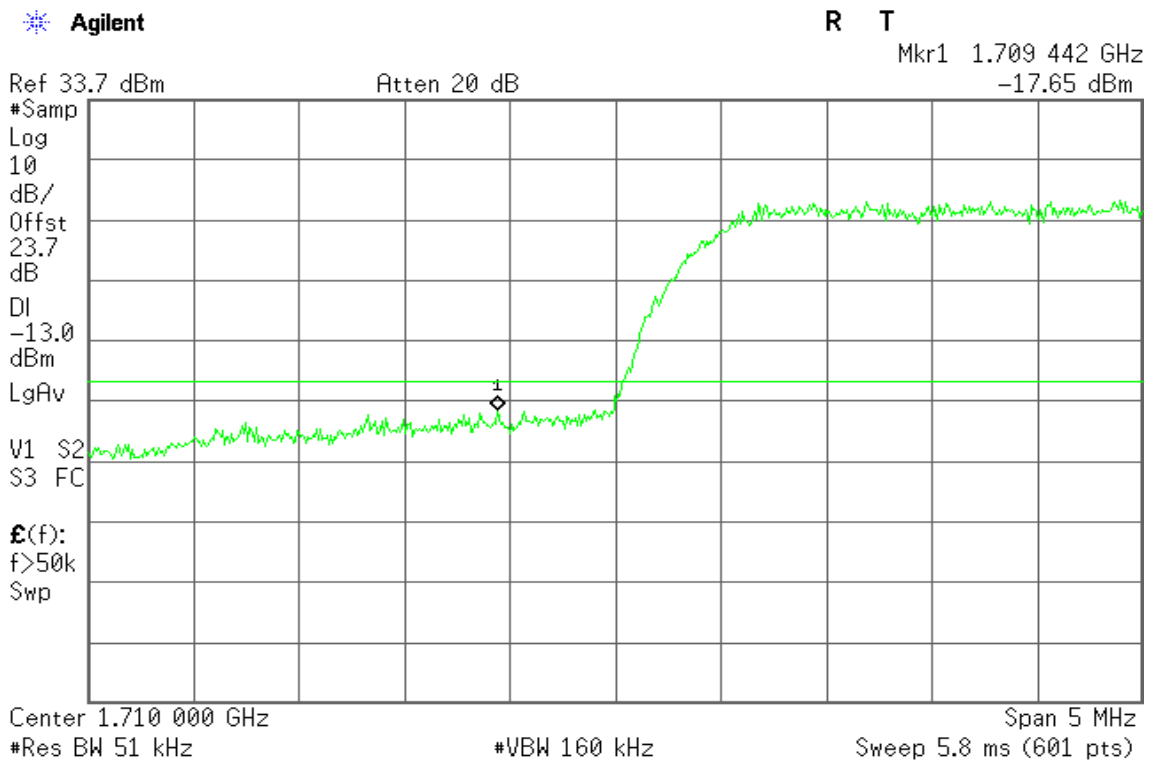
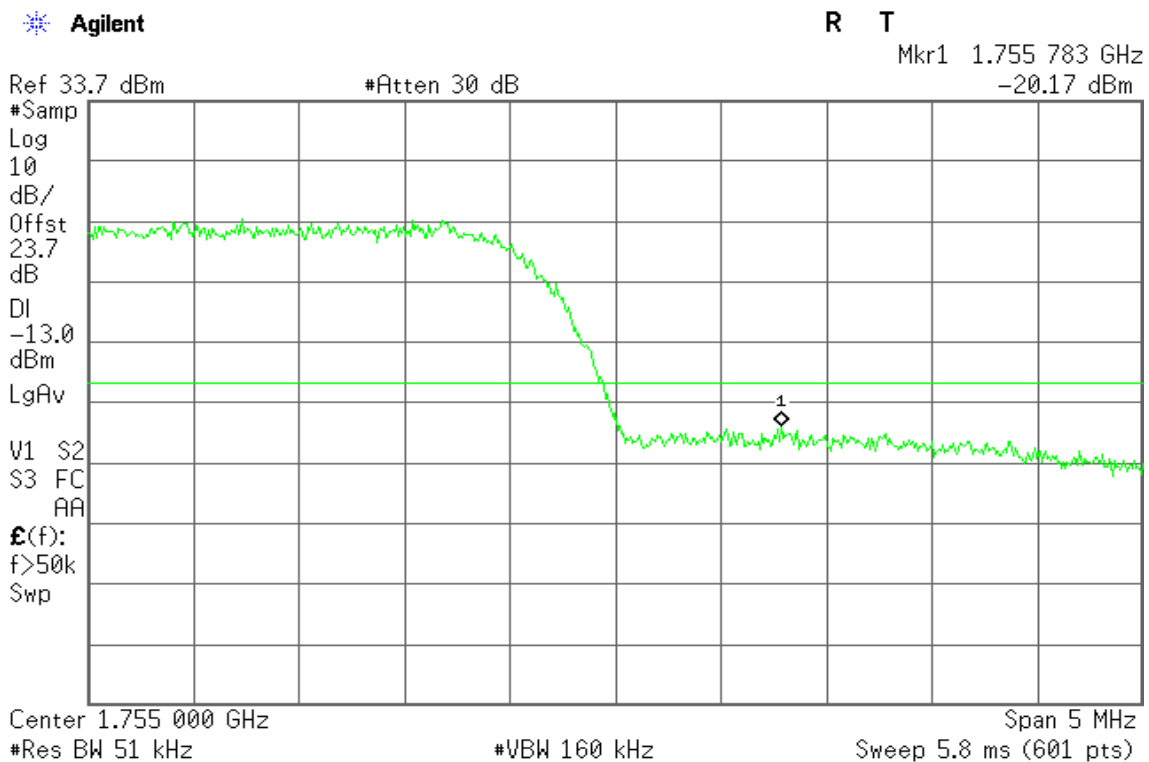


Figure 8-2: Band Edge emissions –WCDMA CH High



HSDPA IV

Figure 8-3: Band Edge emissions –HSDPA CH Low

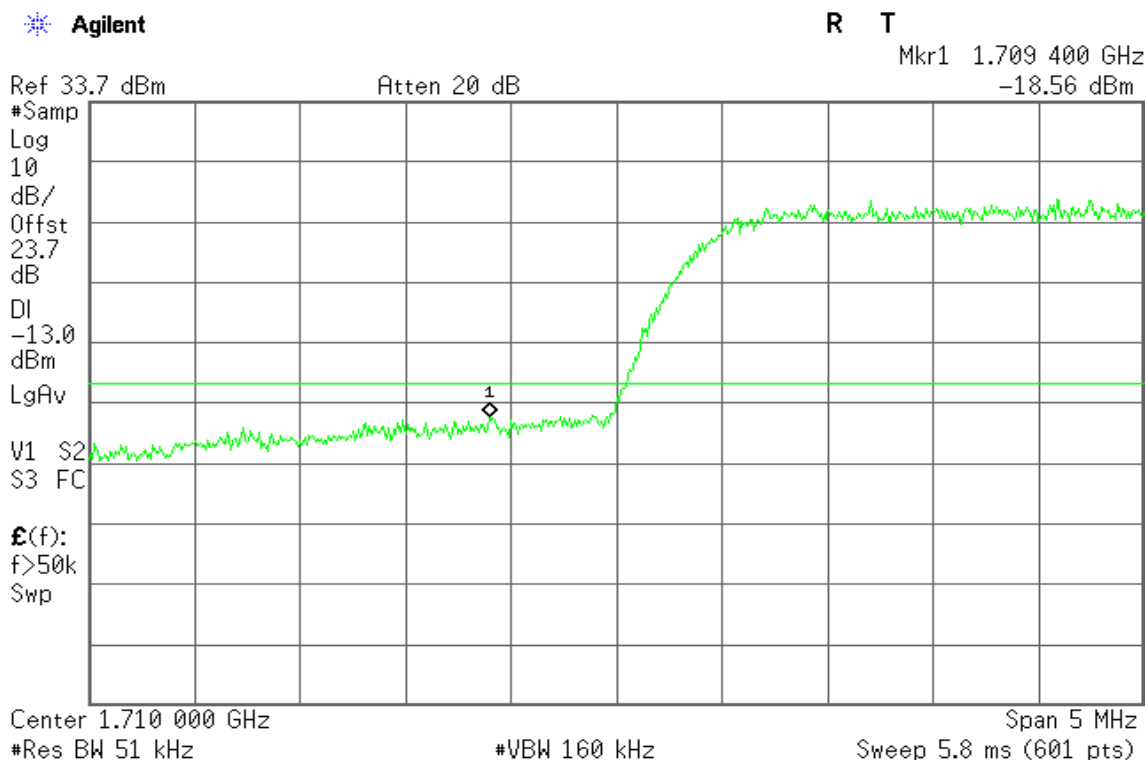
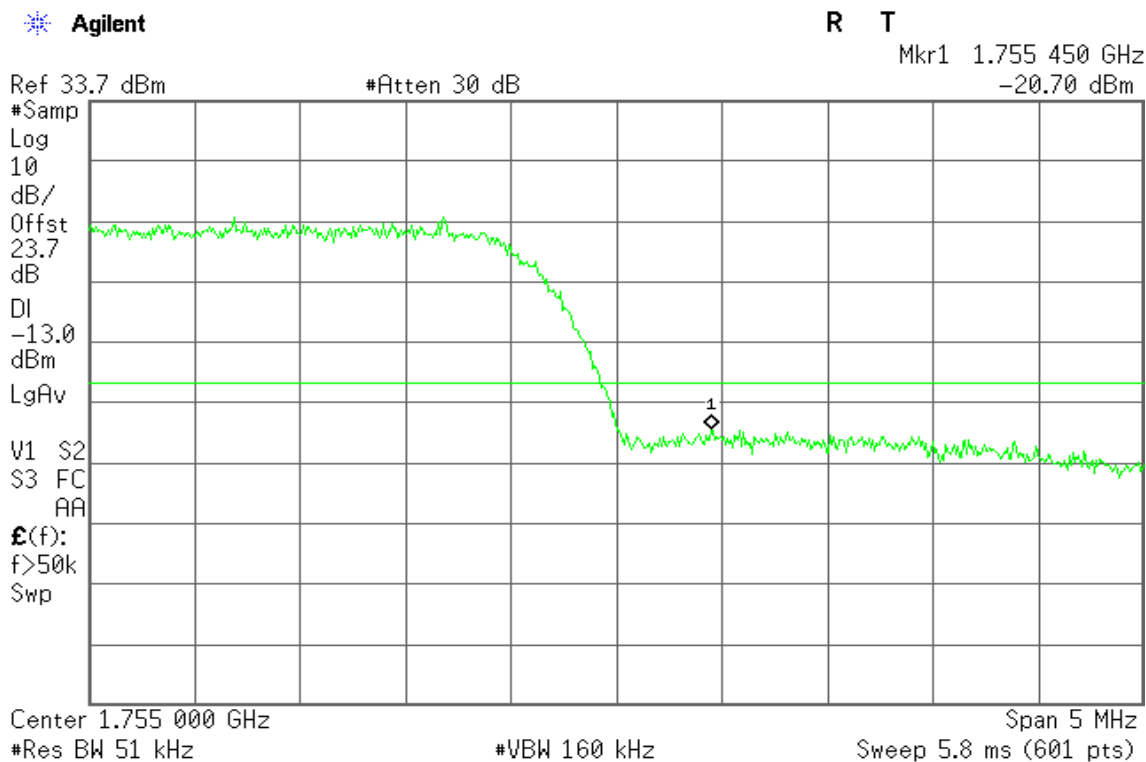


Figure 8-4: Band Edge emissions –HSDPA CH High



HSUPA IV

Figure 8-5: Band Edge emissions –HSUPA CH Low

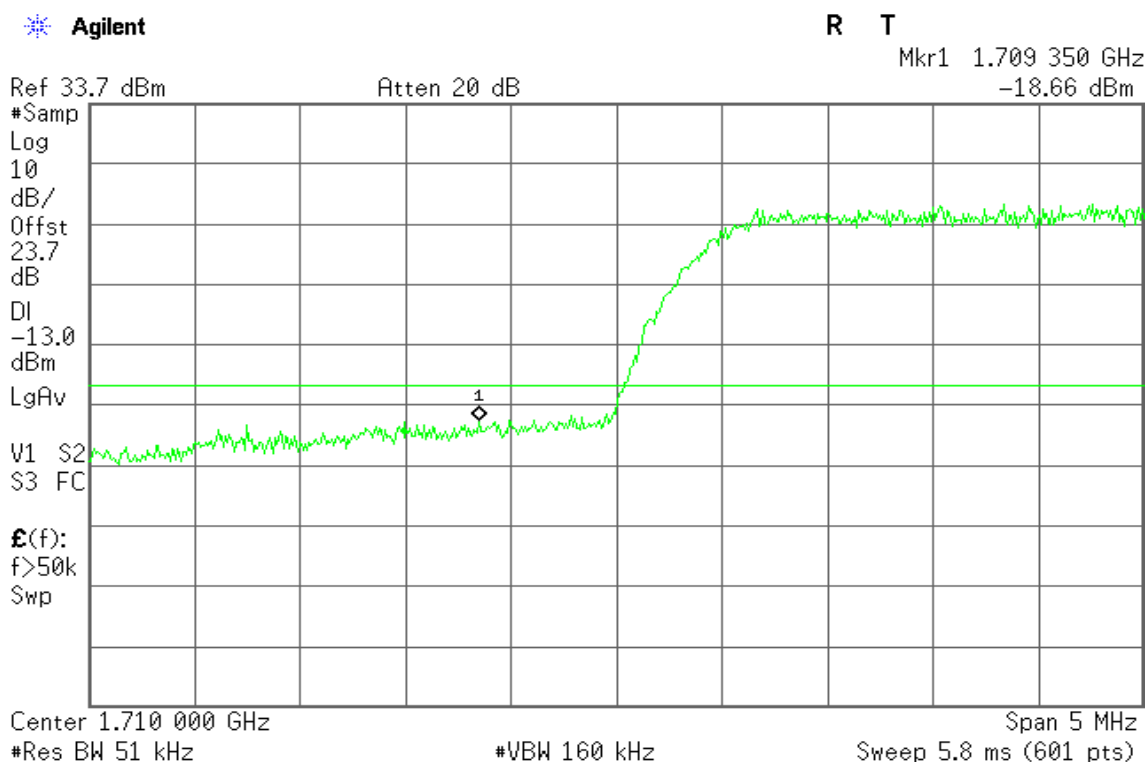
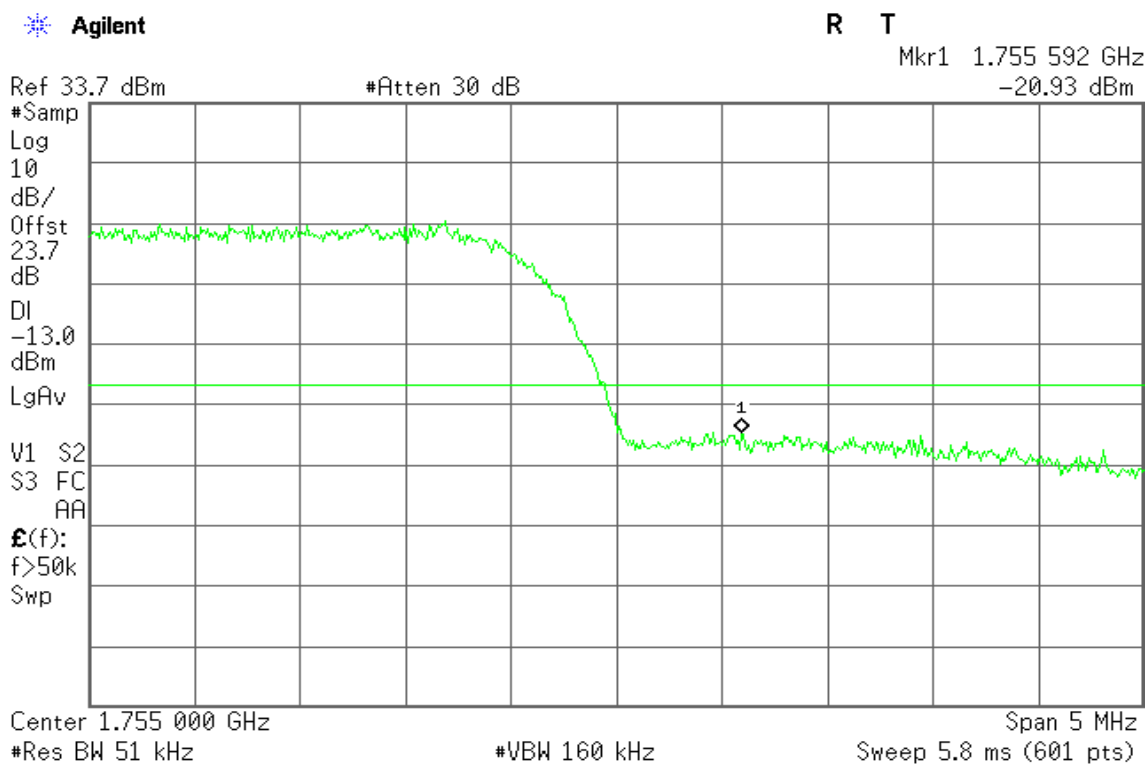


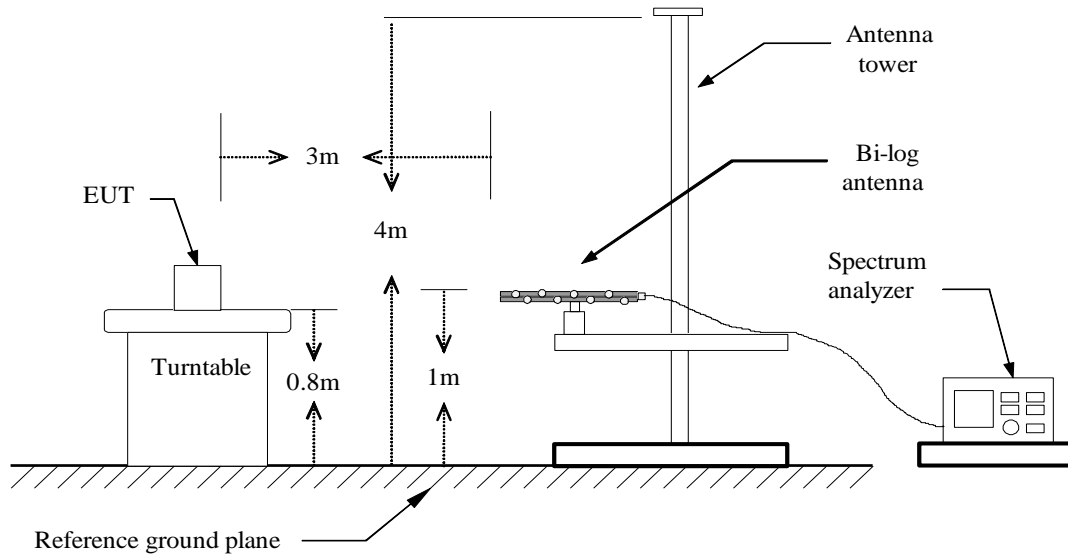
Figure 8-6: Band Edge emissions –HSUPA CH High



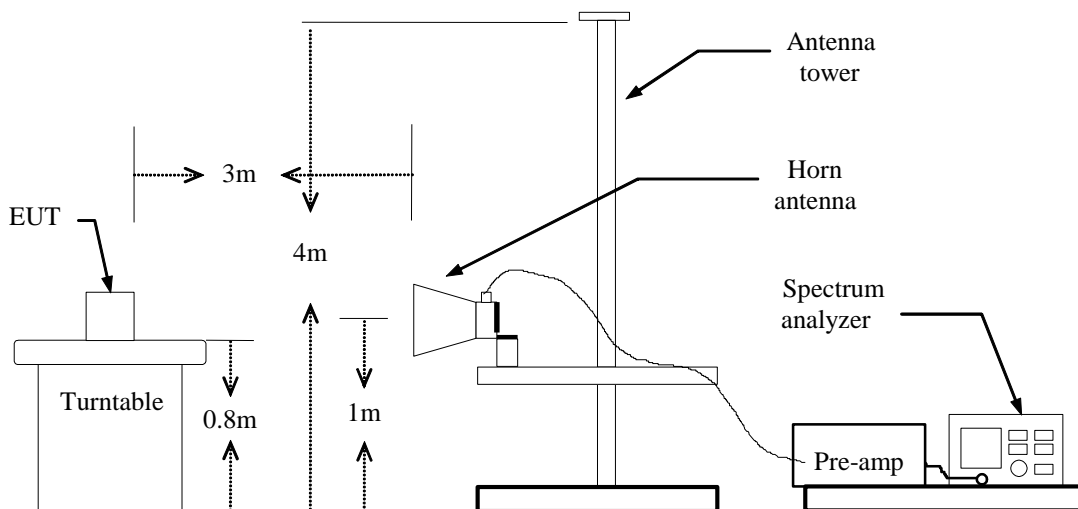
7.4 ERP & EIRP MEASUREMENT

Test Configuration

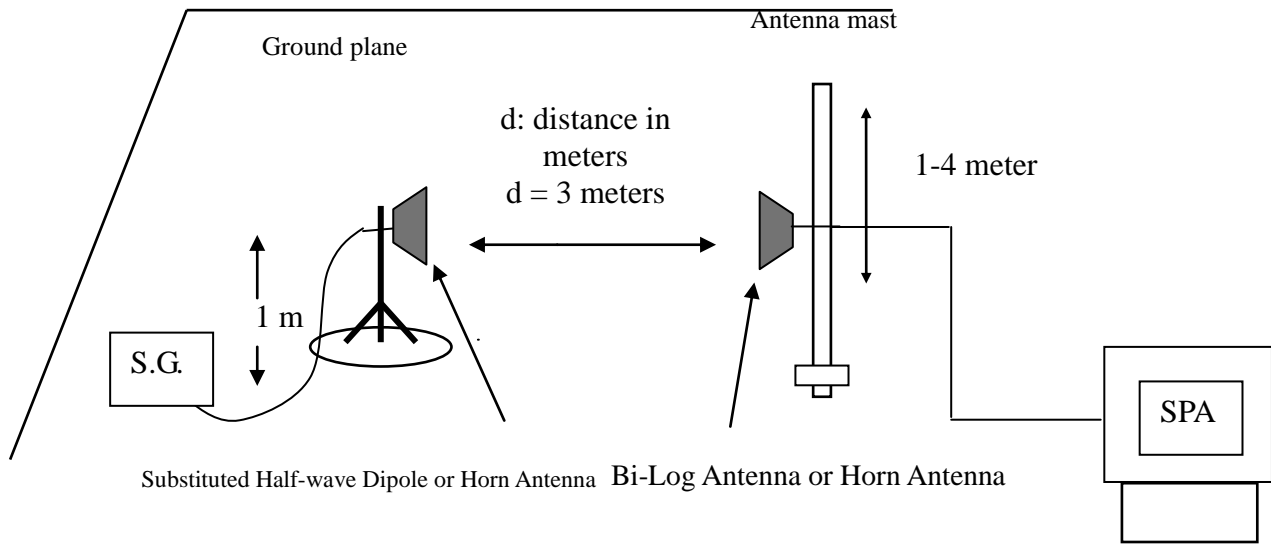
Below 1 GHz



Above 1 GHz



For Substituted Method Test Set-UP



TEST PROCEDURE

The EUT was placed on an 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 1% to 5% of the OBW and not to exceed 1 MHz. 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	1713.000	V	9.51	5.13	5.92	10.30	30.00	-19.70
	1713.600	H	2.81	5.13	5.92	3.60	30.00	-26.40
1427	1734.300	V	9.52	5.17	5.88	10.23	30.00	-19.77
	1734.300	H	3.72	5.17	5.88	4.43	30.00	-25.57
1513	1753.400	V	10.84	5.21	5.84	*11.47	30.00	-18.53
	1752.900	H	3.79	5.21	5.84	4.42	30.00	-25.58

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	1712.700	V	7.12	5.13	5.92	7.91	30.00	-22.09
	1712.100	H	1.47	5.13	5.92	2.26	30.00	-27.74
1427	1734.200	V	8.43	5.17	5.88	9.14	30.00	-20.86
	1734.500	H	2.71	5.17	5.88	3.42	30.00	-26.58
1513	1753.800	V	10.05	5.21	5.84	*10.68	30.00	-19.32
	1753.800	H	3.14	5.21	5.84	3.77	30.00	-26.23

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	1713.500	V	8.59	5.13	5.92	9.38	30.00	-20.62
	1713.800	H	2.56	5.13	5.92	3.35	30.00	-26.65
1427	1734.400	V	8.49	5.17	5.88	9.20	30.00	-20.80
	1734.100	H	2.58	5.17	5.88	3.29	30.00	-26.71
1513	1753.000	V	10.01	5.21	5.84	*10.64	30.00	-19.36
	1752.700	H	2.99	5.2	5.85	3.64	30.00	-26.36

7.5 OCCUPIED BANDWIDTH MEASUREMENT

Limits

The width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0.5 %of the total mean power of a given emission.

TEST PROCEDURES

1. The EUT makes a phone call to the communication simulator. The power was measured with Spectrum Analyzer. All measurements were done at 3 channels. (low, middle and high operational frequency range.)
2. The conducted occupied bandwidth used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer.
3. The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency. Use OBW measurement function of Spectrum analyzer to measure 99 % occupied bandwidth.

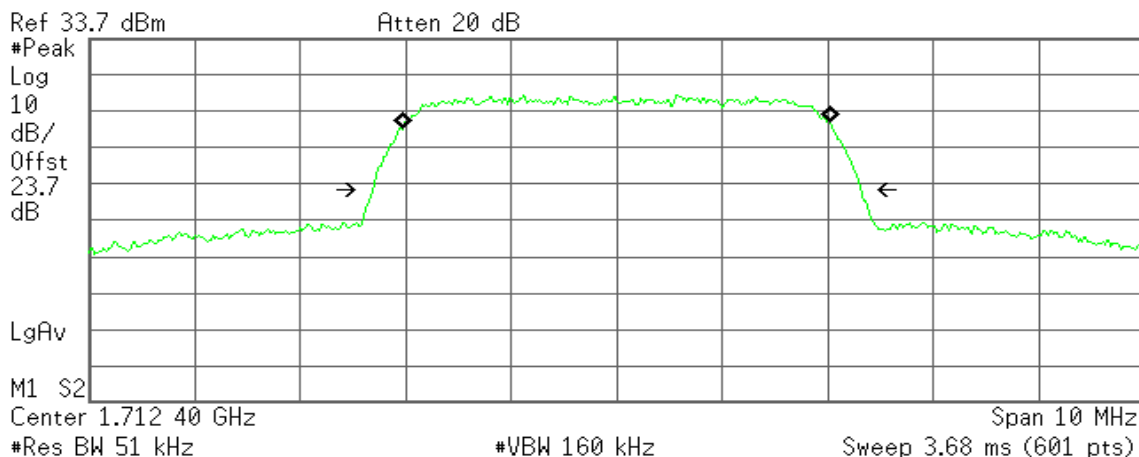
Test Data

Test Mode	CH	Frequency (MHz)	Occupied bandwidth (MHz)
WCDMA (Band IV)	4132	826.40	4.0612
	4182	836.40	4.0646
	4233	846.60	*4.0678
WCDMA / HSDPA (BAND IV)	4132	826.40	4.0655
	4182	836.40	4.0586
	4233	846.60	*4.0714
WCDMA / HSUPA (BAND IV)	4132	826.40	4.0618
	4182	836.40	4.0575
	4233	846.60	*4.0687

WCDMA Band IV (CH Low)

Agilent

R T



Occupied Bandwidth
4.0612 MHz

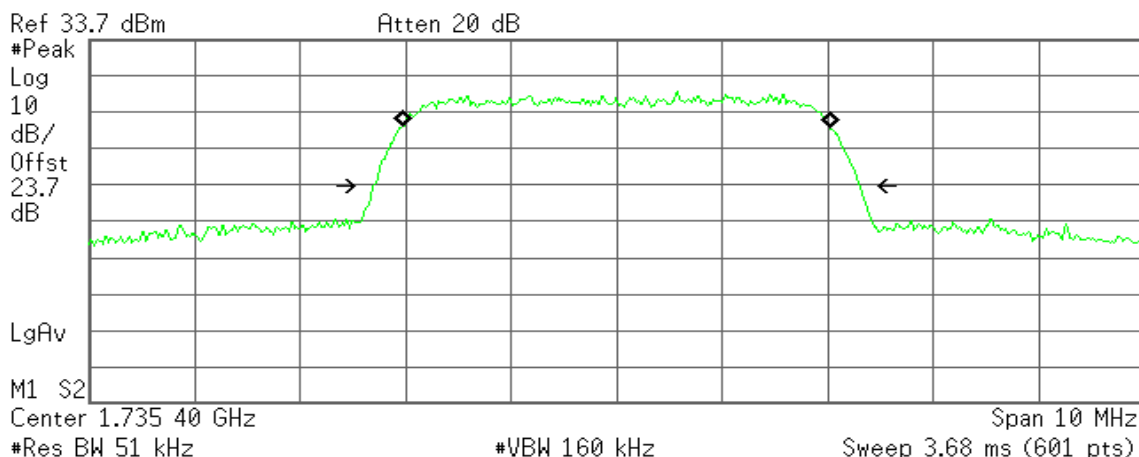
Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error 1.186 kHz
x dB Bandwidth 4.639 MHz

WCDMA Band IV (CH Mid)

Agilent

R T



Occupied Bandwidth
4.0646 MHz

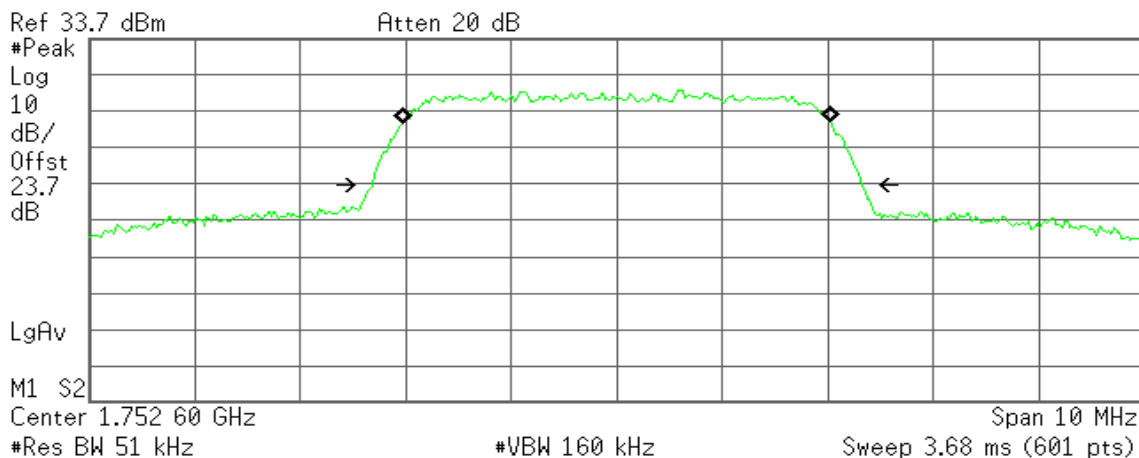
Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error -6.006 kHz
x dB Bandwidth 4.632 MHz

WCDMA Band IV (CH High)

Agilent

R T



Occupied Bandwidth
 4.0678 MHz

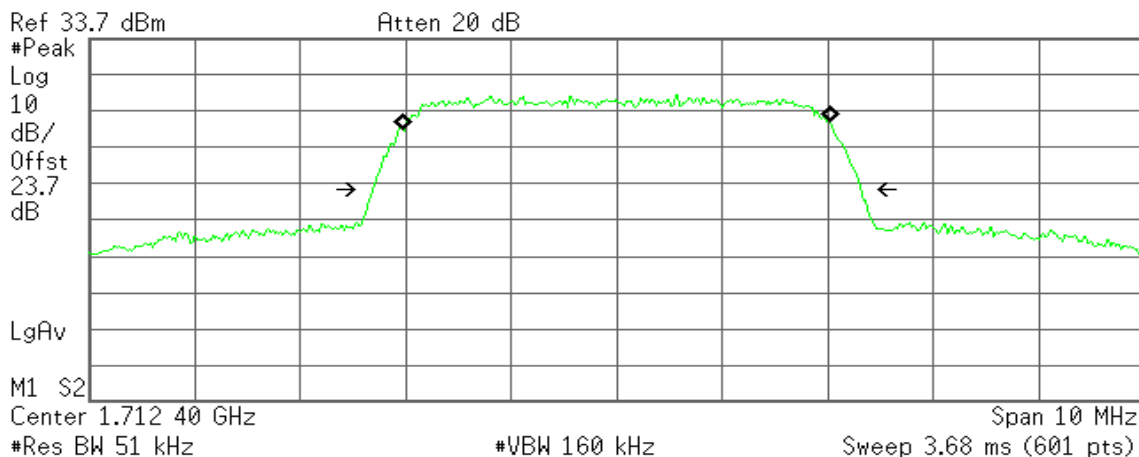
Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error -1.861 kHz
x dB Bandwidth 4.649 MHz

WCDMA / HSDPA Band IV (CH Low)

Agilent

R T



Occupied Bandwidth
 4.0655 MHz

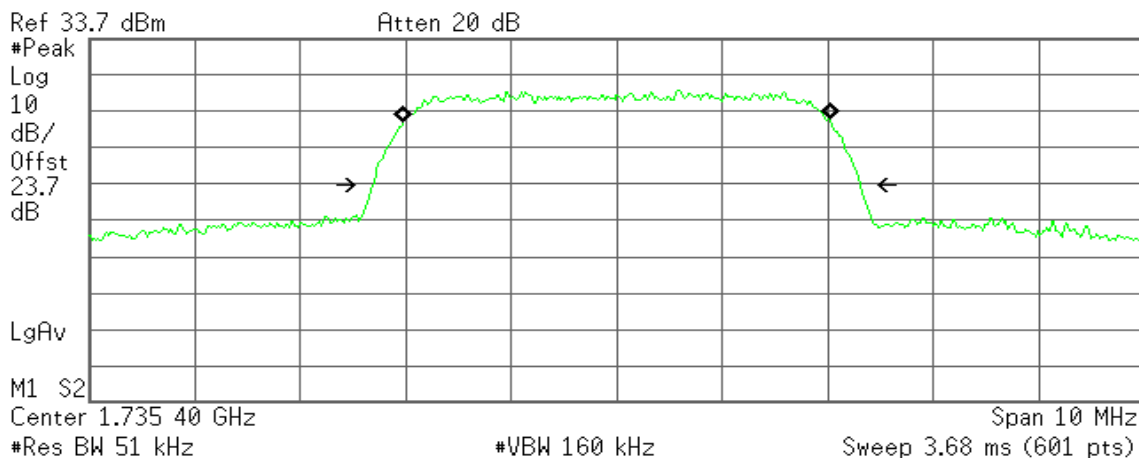
Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error 907.756 Hz
x dB Bandwidth 4.639 MHz

WCDMA / HSDPA Band IV (CH Mid)

Agilent

R T



Occupied Bandwidth
 4.0586 MHz

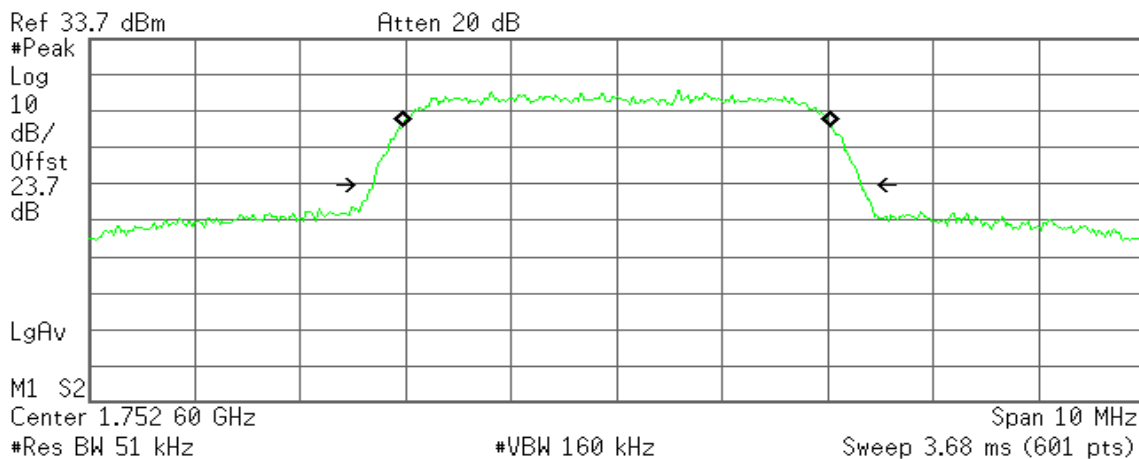
Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error 739.770 Hz
x dB Bandwidth 4.635 MHz

WCDMA / HSDPA Band IV (CH High)

Agilent

R T



Occupied Bandwidth
 4.0714 MHz

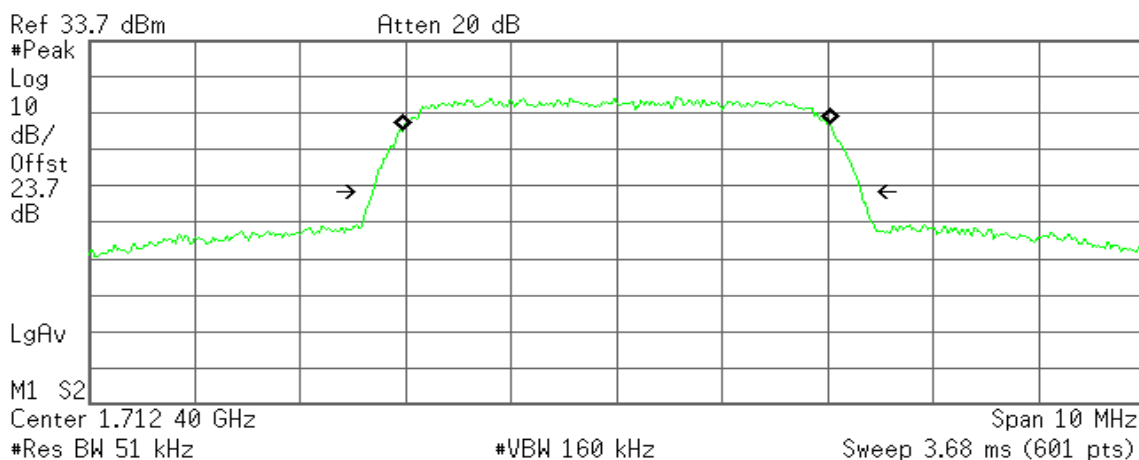
Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error -1.538 kHz
x dB Bandwidth 4.636 MHz

WCDMA / HSUPA Band IV (CH Low)

Agilent

R T



Occupied Bandwidth
4.0618 MHz

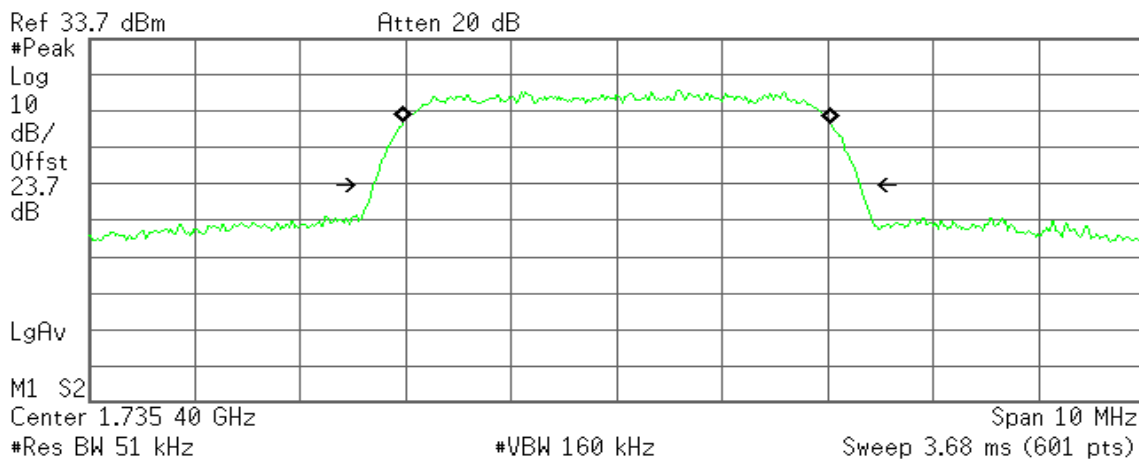
Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error 549.370 Hz
x dB Bandwidth 4.639 MHz

WCDMA / HSUPA Band IV (CH Mid)

Agilent

R T



Occupied Bandwidth
4.0575 MHz

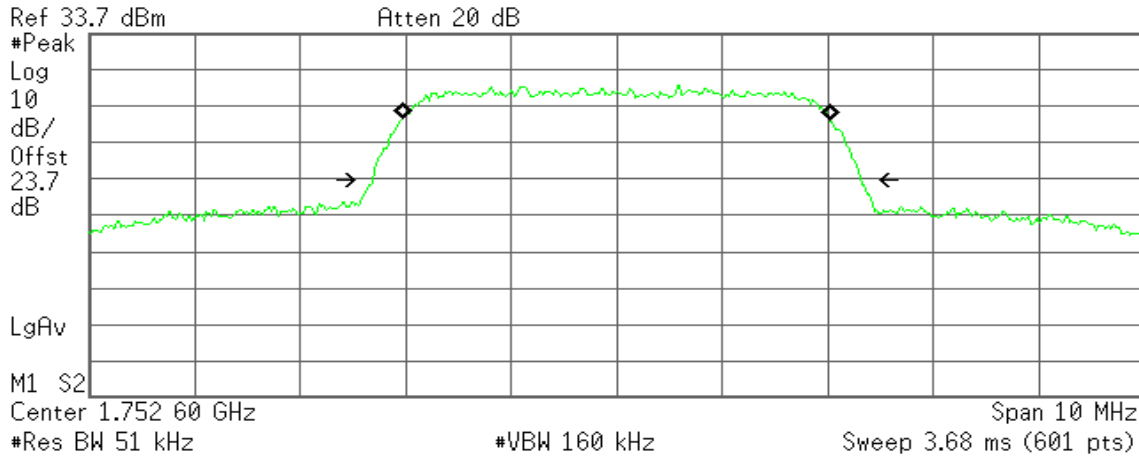
Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error 134.104 Hz
x dB Bandwidth 4.632 MHz

WCDMA / HSUPA Band IV (CH High)

Agilent

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

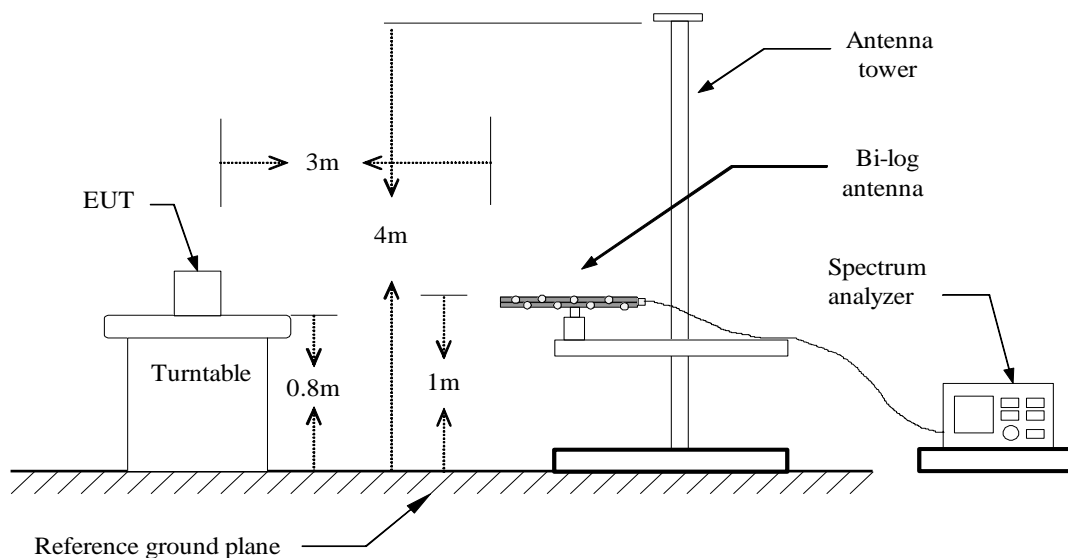
7.6 FIELD STRENGTH OF SPURIOUS RADIATION MEASUREMENT

LIMIT

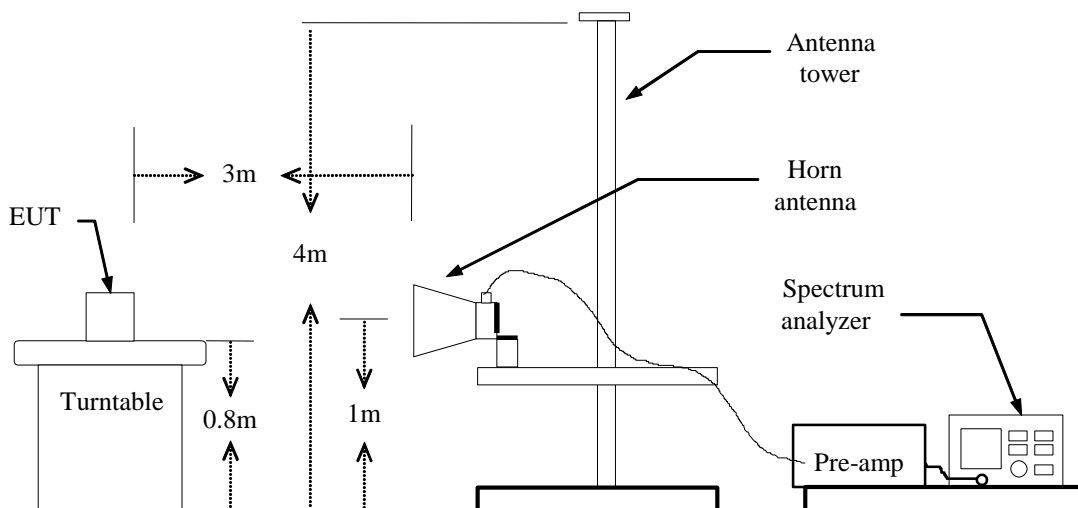
§27.53 (g) For operations in the 1710–1755MHz and 2110–2155 MHz bands, the power of any emission outside a licensee’s frequency block shall be attenuated below the transmitter power (P) by at least $43 + 10 \log_{10} (P)$ dB.

Test Configuration

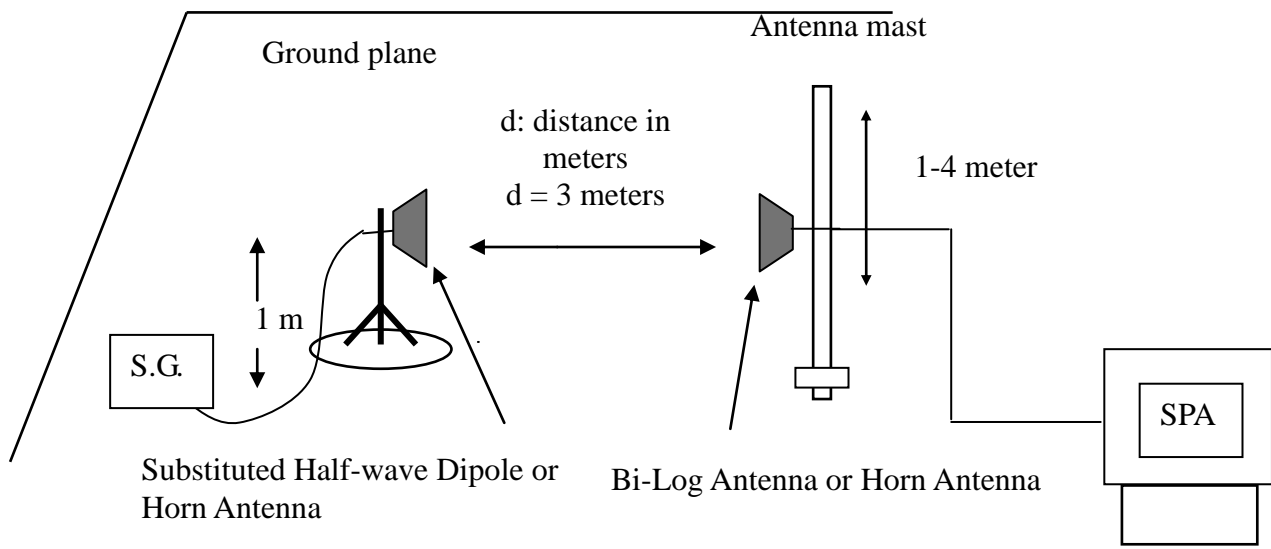
Below 1 GHz



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.

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

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

TEST RESULTS

Refer to the attached tabular data sheets.

Operation Mode: WCDMA Band IV / TX / CH 1312 **Test Date:** September 2, 2015
Temperature: 21°C **Tested by:** Jason Lu
Humidity: 56 % 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)
56.1900	-63.64	0.85	-3.09	-67.58	-13.00	-54.58	V
169.6800	-71.94	1.56	2.48	-71.02	-13.00	-58.02	V
256.9800	-71.15	1.89	5.62	-67.42	-13.00	-54.42	V
361.7400	-80.42	2.28	5.72	-76.98	-13.00	-63.98	V
480.0800	-76.01	2.64	5.54	-73.11	-13.00	-60.11	V
729.3700	-78.39	3.18	6.4	-75.17	-13.00	-62.17	V
96.9300	-60.16	1.14	0.1	-61.20	-13.00	-48.20	H
282.2000	-66.29	2.01	5.33	-62.97	-13.00	-49.97	H
385.9900	-72.09	2.32	5.99	-68.42	-13.00	-55.42	H
544.1000	-75.26	2.79	6.23	-71.82	-13.00	-58.82	H
737.1300	-74.93	3.2	6.2	-71.93	-13.00	-58.93	H
875.8400	-74.05	3.46	6.61	-70.90	-13.00	-57.90	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: September 2, 2015

Temperature: 21°C

Tested by: Jason Lu

Humidity: 56 % 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)
57.1600	-63.16	0.86	-2.8	-66.82	-13.00	-53.82	V
194.9000	-76.74	1.63	3.47	-74.90	-13.00	-61.90	V
327.7900	-82.88	2.17	5.71	-79.34	-13.00	-66.34	V
480.0800	-76.3	2.64	5.54	-73.40	-13.00	-60.40	V
573.2000	-80.7	2.88	6.08	-77.50	-13.00	-64.50	V
773.0200	-78.08	3.28	6.29	-75.07	-13.00	-62.07	V
86.2600	-68.89	1.08	0.62	-69.35	-13.00	-56.35	H
171.6200	-74.75	1.57	2.69	-73.63	-13.00	-60.63	H
244.3700	-79.32	1.82	5.47	-75.67	-13.00	-62.67	H
386.9600	-79.5	2.32	6	-75.82	-13.00	-62.82	H
635.2800	-76.75	2.99	6.17	-73.57	-13.00	-60.57	H
866.1400	-75.34	3.44	6.47	-72.31	-13.00	-59.31	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:** September 2, 2015
Temperature: 21°C **Tested by:** Jason Lu
Humidity: 56 % 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)
57.1600	-67.29	0.86	-2.8	-70.95	-13.00	-57.95	V
171.6200	-76.01	1.57	2.69	-74.89	-13.00	-61.89	V
268.6200	-84.27	1.97	5.17	-81.07	-13.00	-68.07	V
416.0600	-83.64	2.46	5.85	-80.25	-13.00	-67.25	V
538.2800	-82.51	2.78	6.24	-79.05	-13.00	-66.05	V
631.4000	-80.18	2.98	6.2	-76.96	-13.00	-63.96	V
69.7700	-60.75	0.96	-1.76	-63.47	-13.00	-50.47	H
128.9400	-60.94	1.34	-1.5	-63.78	-13.00	-50.78	H
245.3400	-74.89	1.82	5.5	-71.21	-13.00	-58.21	H
360.7700	-73.52	2.27	5.71	-70.08	-13.00	-57.08	H
480.0800	-73.03	2.64	5.54	-70.13	-13.00	-57.13	H
623.6400	-75.29	2.95	6.14	-72.10	-13.00	-59.10	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 / HSDPA Band IV / TX / CH 1312
Temperature: 21°C
Humidity: 56 % RH

Test Date: September 2, 2015
Tested by: Jason Lu
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)
57.1600	-66.27	0.86	-2.8	-69.93	-13.00	-56.93	V
92.0800	-71.41	1.12	0.89	-71.64	-13.00	-58.64	V
172.5900	-75.72	1.58	2.8	-74.50	-13.00	-61.50	V
429.6400	-83.19	2.49	5.8	-79.88	-13.00	-66.88	V
633.3400	-81.94	2.99	6.18	-78.75	-13.00	-65.75	V
848.6800	-79.66	3.4	6.4	-76.66	-13.00	-63.66	V
66.8600	-67.22	0.93	-1.89	-70.04	-13.00	-57.04	H
191.0200	-77.27	1.62	3.89	-75.00	-13.00	-62.00	H
360.7700	-79.93	2.27	5.71	-76.49	-13.00	-63.49	H
480.0800	-74.93	2.64	5.54	-72.03	-13.00	-59.03	H
644.9800	-76.14	3.02	6.19	-72.97	-13.00	-59.97	H
965.0800	-73.89	3.67	6.35	-71.21	-13.00	-58.21	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
Temperature: 21°C
Humidity: 56 % RH

Test Date: September 2, 2015
Tested by: Jason Lu
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)
57.1600	-65.68	0.86	-2.8	-69.34	-13.00	-56.34	V
272.5000	-84.48	1.99	5.15	-81.32	-13.00	-68.32	V
399.5700	-83.73	2.39	5.98	-80.14	-13.00	-67.14	V
490.7500	-83.24	2.67	5.8	-80.11	-13.00	-67.11	V
621.7000	-81	2.95	6.13	-77.82	-13.00	-64.82	V
807.9400	-78.83	3.34	6.3	-75.87	-13.00	-62.87	V
86.2600	-70.32	1.08	0.62	-70.78	-13.00	-57.78	H
128.9400	-67.42	1.34	-1.5	-70.26	-13.00	-57.26	H
242.4300	-79.98	1.81	5.39	-76.40	-13.00	-63.40	H
480.0800	-75.27	2.64	5.54	-72.37	-13.00	-59.37	H
550.8900	-77.74	2.81	6.17	-74.38	-13.00	-61.38	H
800.1800	-75.14	3.33	6.52	-71.95	-13.00	-58.95	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 1513
Temperature: 21°C
Humidity: 56 % RH

Test Date: September 2, 2015
Tested by: Jason Lu
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)
57.1600	-66.91	0.86	-2.8	-70.57	-13.00	-57.57	V
170.6500	-76.24	1.57	2.59	-75.22	-13.00	-62.22	V
349.1300	-84.58	2.22	5.8	-81.00	-13.00	-68.00	V
480.0800	-80.95	2.64	5.54	-78.05	-13.00	-65.05	V
733.2500	-80.39	3.19	6.31	-77.27	-13.00	-64.27	V
864.2000	-78.22	3.44	6.45	-75.21	-13.00	-62.21	V
93.0500	-66.37	1.12	0.74	-66.75	-13.00	-53.75	H
128.9400	-63.68	1.34	-1.5	-66.52	-13.00	-53.52	H
200.7200	-73.36	1.63	3.19	-71.80	-13.00	-58.80	H
282.2000	-70.37	2.01	5.33	-67.05	-13.00	-54.05	H
362.7100	-74.47	2.28	5.73	-71.02	-13.00	-58.02	H
480.0800	-74.57	2.64	5.54	-71.67	-13.00	-58.67	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:** September 2, 2015
Temperature: 21°C **Tested by:** Jason Lu
Humidity: 56 % 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)
57.1600	-66.54	0.86	-2.8	-70.20	-13.00	-57.20	V
124.0900	-71.31	1.3	-1.81	-74.42	-13.00	-61.42	V
176.4700	-77.79	1.59	3.21	-76.17	-13.00	-63.17	V
355.9200	-83.52	2.25	5.74	-80.03	-13.00	-67.03	V
495.6000	-83.08	2.69	5.85	-79.92	-13.00	-66.92	V
742.9500	-79.3	3.21	6.1	-76.41	-13.00	-63.41	V
57.1600	-68.85	0.86	-2.8	-72.51	-13.00	-59.51	H
128.9400	-65.76	1.34	-1.5	-68.60	-13.00	-55.60	H
326.8200	-79.25	2.17	5.71	-75.71	-13.00	-62.71	H
480.0800	-73.45	2.64	5.54	-70.55	-13.00	-57.55	H
644.0100	-76.97	3.02	6.17	-73.82	-13.00	-60.82	H
706.0900	-76.01	3.13	6.33	-72.81	-13.00	-59.81	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:** September 2, 2015
Temperature: 21°C **Tested by:** Jason Lu
Humidity: 56 % 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)
57.1600	-66.4	0.86	-2.8	-70.06	-13.00	-57.06	V
172.5900	-75.64	1.58	2.8	-74.42	-13.00	-61.42	V
331.6700	-84.94	2.16	5.72	-81.38	-13.00	-68.38	V
392.7800	-83.28	2.33	5.99	-79.62	-13.00	-66.62	V
483.9600	-82.31	2.65	5.6	-79.36	-13.00	-66.36	V
656.6200	-81.1	3.05	6.3	-77.85	-13.00	-64.85	V
86.2600	-68.81	1.08	0.62	-69.27	-13.00	-56.27	H
128.9400	-65.82	1.34	-1.5	-68.66	-13.00	-55.66	H
169.6800	-74.98	1.56	2.48	-74.06	-13.00	-61.06	H
353.9800	-78.45	2.25	5.76	-74.94	-13.00	-61.94	H
480.0800	-74.48	2.64	5.54	-71.58	-13.00	-58.58	H
670.2000	-76.63	3.07	6.3	-73.40	-13.00	-60.40	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:** September 2, 2015
Temperature: 21°C **Tested by:** Jason Lu
Humidity: 56 % 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)
57.1600	-66.87	0.86	-2.8	-70.53	-13.00	-57.53	V
170.6500	-75.18	1.57	2.59	-74.16	-13.00	-61.16	V
186.1700	-82.82	1.62	3.85	-80.59	-13.00	-67.59	V
390.8400	-84.05	2.32	6	-80.37	-13.00	-67.37	V
558.6500	-82.1	2.84	6.04	-78.90	-13.00	-65.90	V
660.5000	-80.75	3.06	6.3	-77.51	-13.00	-64.51	V
86.2600	-69.11	1.08	0.62	-69.57	-13.00	-56.57	H
128.9400	-65.32	1.34	-1.5	-68.16	-13.00	-55.16	H
241.4600	-78.65	1.81	5.36	-75.10	-13.00	-62.10	H
490.7500	-77.99	2.67	5.8	-74.86	-13.00	-61.86	H
607.1500	-76.79	2.93	6.33	-73.39	-13.00	-60.39	H
813.7600	-75.54	3.35	6.2	-72.69	-13.00	-59.69	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: August 31, 2015

Temperature: 21°C

Tested by: Jason Lu

Humidity: 56 % 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)
3114.000	-55.2	7.18	7.74	-54.64	-13.00	-41.64	V
6229.000	-50.71	11.08	11.08	-50.71	-13.00	-37.71	V
N/A							
2442.000	-53.64	6.25	6.02	-53.87	-13.00	-40.87	H
4983.000	-52.12	9.38	10.57	-50.93	-13.00	-37.93	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
Temperature: 21°C
Humidity: 56 % RH

Test Date: August 31, 2015
Tested by: Jason Lu
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	-50.52	6.24	6.01	-50.75	-13.00	-37.75	V
3471.000	-52.24	7.78	8.81	-51.21	-13.00	-38.21	V
N/A							
2435.000	-49.03	6.24	6.01	-49.26	-13.00	-36.26	H
6509.000	-47.28	11.06	11.31	-47.03	-13.00	-34.03	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 Band IV / TX / CH 1513
Temperature: 21°C
Humidity: 56 % RH

Test Date: August 31, 2015
Tested by: Jason Lu
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)
2155.000	-50.26	5.87	5.62	-50.51	-13.00	-37.51	V
3506.000	-49.03	7.88	8.91	-48.00	-13.00	-35.00	V
N/A							
2435.000	-51.73	6.24	6.01	-51.96	-13.00	-38.96	H
6775.000	-47.27	11.3	11.63	-46.94	-13.00	-33.94	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:** August 31, 2015
Temperature: 21°C **Tested by:** Jason Lu
Humidity: 56 % 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)
4815.000	-52.62	9.31	10.3	-51.63	-13.00	-38.63	V
6271.000	-50.62	10.89	11.12	-50.39	-13.00	-37.39	V
N/A							
5137.000	-51.45	9.49	10.65	-50.29	-13.00	-37.29	H
7013.000	-46.31	11.58	11.92	-45.97	-13.00	-32.97	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:** August 31, 2015
Temperature: 21°C **Tested by:** Jason Lu
Humidity: 56 % 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)
3800.000	-53.57	8.26	9.2	-52.63	-13.00	-39.63	V
6684.000	-48.97	11.29	11.52	-48.74	-13.00	-35.74	V
N/A							
2435.000	-56.04	6.24	6.01	-56.27	-13.00	-43.27	H
5123.000	-52.98	9.48	10.65	-51.81	-13.00	-38.81	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:** August 31, 2015
Temperature: 21°C **Tested by:** Jason Lu
Humidity: 56 % 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)
3576.000	-55.37	8.05	8.98	-54.44	-13.00	-41.44	V
6040.000	-52.25	10.75	10.93	-52.07	-13.00	-39.07	V
N/A							
3814.000	-52.86	8.28	9.21	-51.93	-13.00	-38.93	H
6341.000	-49.46	10.94	11.17	-49.23	-13.00	-36.23	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
Temperature: 21°C
Humidity: 56 % RH

Test Date: August 31, 2015
Tested by: Jason Lu
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)
3569.000	-55.32	8.04	8.97	-54.39	-13.00	-41.39	V
5907.000	-52.77	10.43	10.88	-52.32	-13.00	-39.32	V
N/A							
3667.000	-54.49	8.17	9.07	-53.59	-13.00	-40.59	H
6341.000	-50.73	10.94	11.17	-50.50	-13.00	-37.50	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
Temperature: 21°C
Humidity: 56 % RH

Test Date: August 31, 2015
Tested by: Jason Lu
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	-52.52	7.78	8.81	-51.49	-13.00	-38.49	V
5767.000	-52.24	10.33	10.85	-51.72	-13.00	-38.72	V
N/A							
4346.000	-53.5	8.62	9.68	-52.44	-13.00	-39.44	H
6852.000	-46.91	11.42	11.72	-46.61	-13.00	-33.61	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
Temperature: 21°C
Humidity: 56 % RH

Test Date: August 31, 2015
Tested by: Jason Lu
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)
3506.000	-49.29	7.88	8.91	-48.26	-13.00	-35.26	V
5256.000	-50.67	9.61	10.7	-49.58	-13.00	-36.58	V
N/A							
4437.000	-52.26	8.74	9.75	-51.25	-13.00	-38.25	H
7321.000	-44.93	12.05	12.41	-44.57	-13.00	-31.57	H
N/A							

Remark:

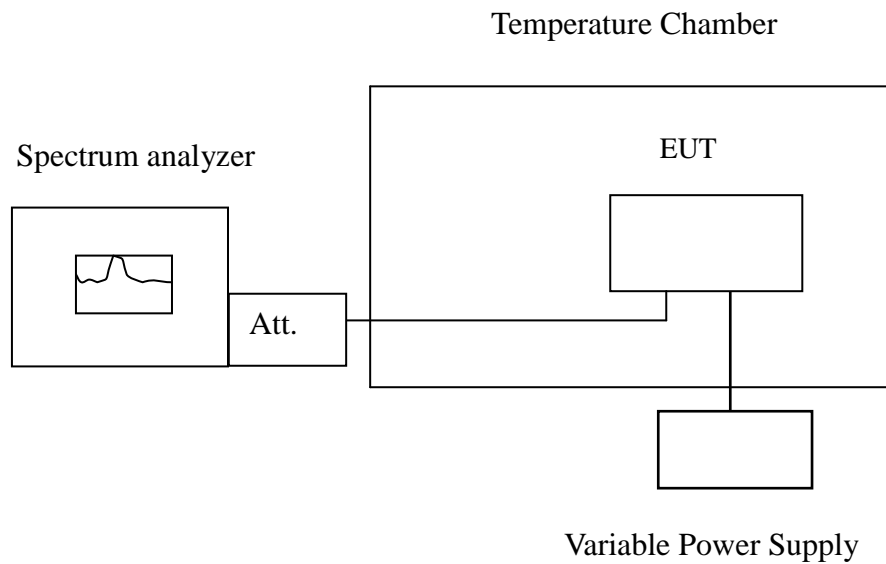
1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered 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 = 4331Hz				
Power Supply Vdc	Environment Temperature (°C)	Frequency (Hz)	Delta (Hz)	Limit (Hz)
24	50	1738	15	4331
	40	1753	30	
	30	1748	25	
	20	1723	0	
	10	1721	-2	
	0	1729	6	
	-10	1734	11	
	-20	1733	10	
	-30	1737	14	

Reference Frequency: HSDPA Band IV Mid Channel 1735.40 MHz @ 20°C				
Limit: ± 2.5 ppm = 4331Hz				
Power Supply Vdc	Environment Temperature (°C)	Frequency (Hz)	Delta (Hz)	Limit (Hz)
24	50	1712	-11	4331
	40	1720	-3	
	30	1736	13	
	20	1723	0	
	10	1744	21	
	0	1723	0	
	-10	1735	12	
	-20	1738	15	
	-30	1715	-8	

Reference Frequency: HSUPA Band IV Mid Channel 1735.40 MHz @ 20°C				
Limit: ± 2.5 ppm = 4331Hz				
Power Supply Vdc	Environment Temperature (°C)	Frequency (Hz)	Delta (Hz)	Limit (Hz)
24	50	1727	-13	4331
	40	1730	-10	
	30	1739	-1	
	20	1740	0	
	10	1714	-26	
	0	1740	0	
	-10	1727	-13	
	-20	1752	12	
	-30	1710	-30	

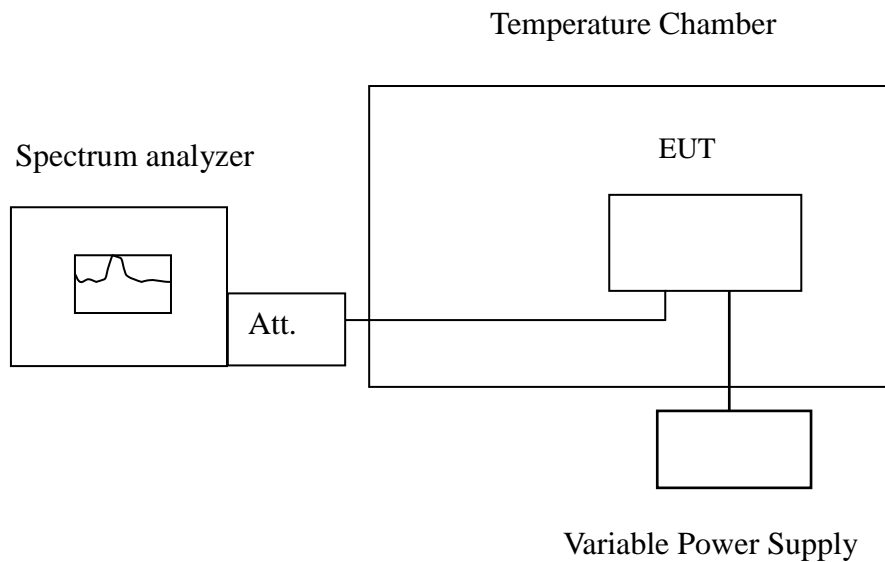
7.8 FREQUENCY STABILITY V.S. VOLTAGE MEASUREMENT

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 = 4331Hz				
Power Supply Vdc	Environment Temperature (°C)	Frequency (Hz)	Delta (Hz)	Limit (Hz)
27.6	20	1729000621	3	4331
24		1726000121	0	
20.4		1732000321	6	

Reference Frequency: HSDPA Band IV Mid Channel 1735.40 MHz @ 20°C				
Limit: ± 2.5 ppm = 4331Hz				
Power Supply Vdc	Environment Temperature (°C)	Frequency (Hz)	Delta (Hz)	Limit (Hz)
27.6	20	1736000321	1	4331
24		1735000654	0	
20.4		1716000789	-19	

Reference Frequency: HSUPA Band IV Mid Channel 1735.40 MHz @ 20°C				
Limit: ± 2.5 ppm = 4331Hz				
Power Supply Vdc	Environment Temperature (°C)	Frequency (Hz)	Delta (Hz)	Limit (Hz)
27.6	20	1750000895	20	4331
24		1730000321	0	
20.4		1742000147	12	