FCC CFR47 PART 27 SUBPART L
&
INDUSTRY CANADA RSS-139

CERTIFICATION TEST REPORT

FOR

802.11BG, BT, WWAN COMBO MODULE

MODEL NUMBER: FENWAY

FCC ID: J9CFENWAY-1

IC: 2723A-FENWAY1

REPORT NUMBER: 08U12127-4

ISSUE DATE: DECEMBER 16, 2008

Prepared for

QUALCOMM
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Prepared by

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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--	12-16-08	Initial Issue	--

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1. ATTESTATION OF TEST RESULTS

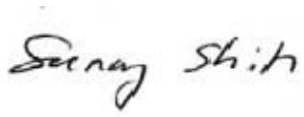
COMPANY NAME:	QUALCOMM CORPORATE 5775 MOREHOUSE DRIVE SAN DIEGO, CA. 92121, UNITED STATES.
EUT DESCRIPTION:	802.11bg, BT, WWAN Combo Module
MODEL:	FENWAY
SERIAL NUMBER:	HCR1JJW
DATE TESTED:	NOVEMBER 06-15, 2008

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
FCC PART 27 SUBPART L	Pass
IC RSS-139 ISSUE 1	Pass

Compliance Certification Services, Inc. (CCS) tested the above equipment in accordance with the requirements set forth in the above standards. All expressions of Pass/Fail in this report are opinions expressed by CCS based on interpretations of the test results. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by CCS and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by CCS will constitute fraud and shall nullify the document. No part of this report may be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any government agency.

Approved & Released For CCS By:



SUNNY SHIH
EMC SUPERVISOR
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EMC ENGINEER
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2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with RSS-GEN, RSS-139 Issue 1 and FCC CFR 47 Part 2, and FCC CFR 47 Part 27.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 Benicia Street, Fremont, California, USA.

CCS is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at http://ts.nist.gov/Standards/scopes/2000650.htm.

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

4.2. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	UNCERTAINTY
Radiated Emission, 30 to 200 MHz	+/- 3.3 dB
Radiated Emission, 200 to 1000 MHz	+4.5 / -2.9 dB
Radiated Emission, 1000 to 2000 MHz	+4.5 / -2.9 dB
Power Line Conducted Emission	+/- 2.9 dB

Uncertainty figures are valid to a confidence level of 95%.

5.3. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	Manufacturer	Model	Serial Number	FCC ID
Laptop	HP	Compaq6910p	CND8153FTV	DoC
AC Adapter	HP	PA-1131-08HC	7500329102	DoC
DC Power Supply	XANTREX	XHR60-18	1064	NA
Horn	EMCO	3115	6717	NA
AC Adapter	QUALCOMM	GWC-1700	CV90-C6024	DoC
Qualcomm Miniposer	QUALCOMM	NA	NA	NA

I/O CABLES (CONDUCTED TEST)

I/O CABLE LIST						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length	Remarks
1	AC	3	US 115V	Un-shielded	2m	No
2	DC	3	DC	Un-shielded	2m	No
3	USB	1	USB	Un-shielded	2m	Yes
4	RF In/Out	1	SMA	Un-shielded	1m	Yes

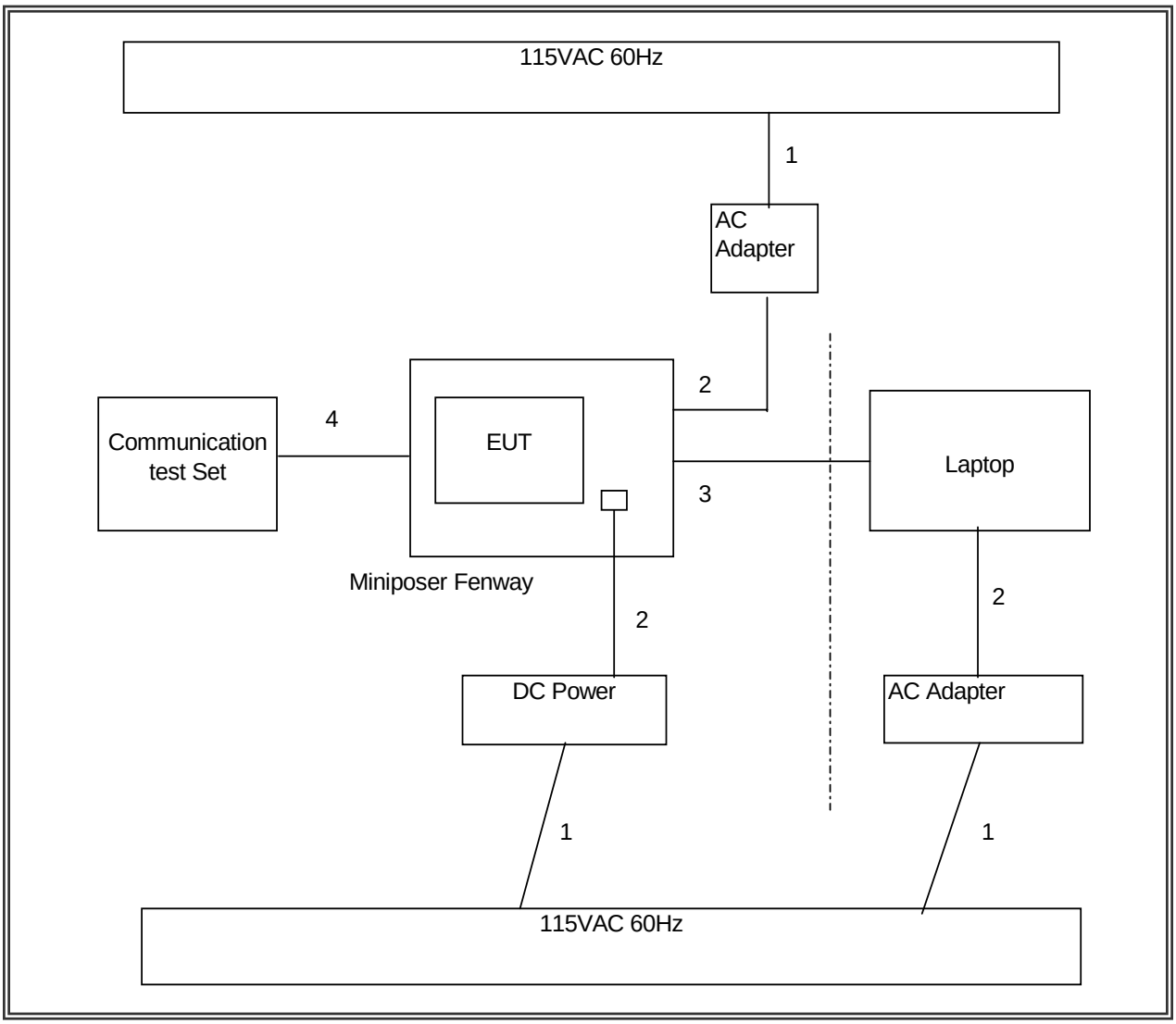
I/O CABLES (RADIATED TEST)

I/O CABLE LIST						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length	Remarks
1	AC	3	US 115V	Un-shielded	2m	No
2	DC	3	DC	Un-shielded	2m	No
3	USB	1	USB	Un-shielded	2m	Yes
4	RF In/Out	1	Horn	Un-shielded	1m	Yes

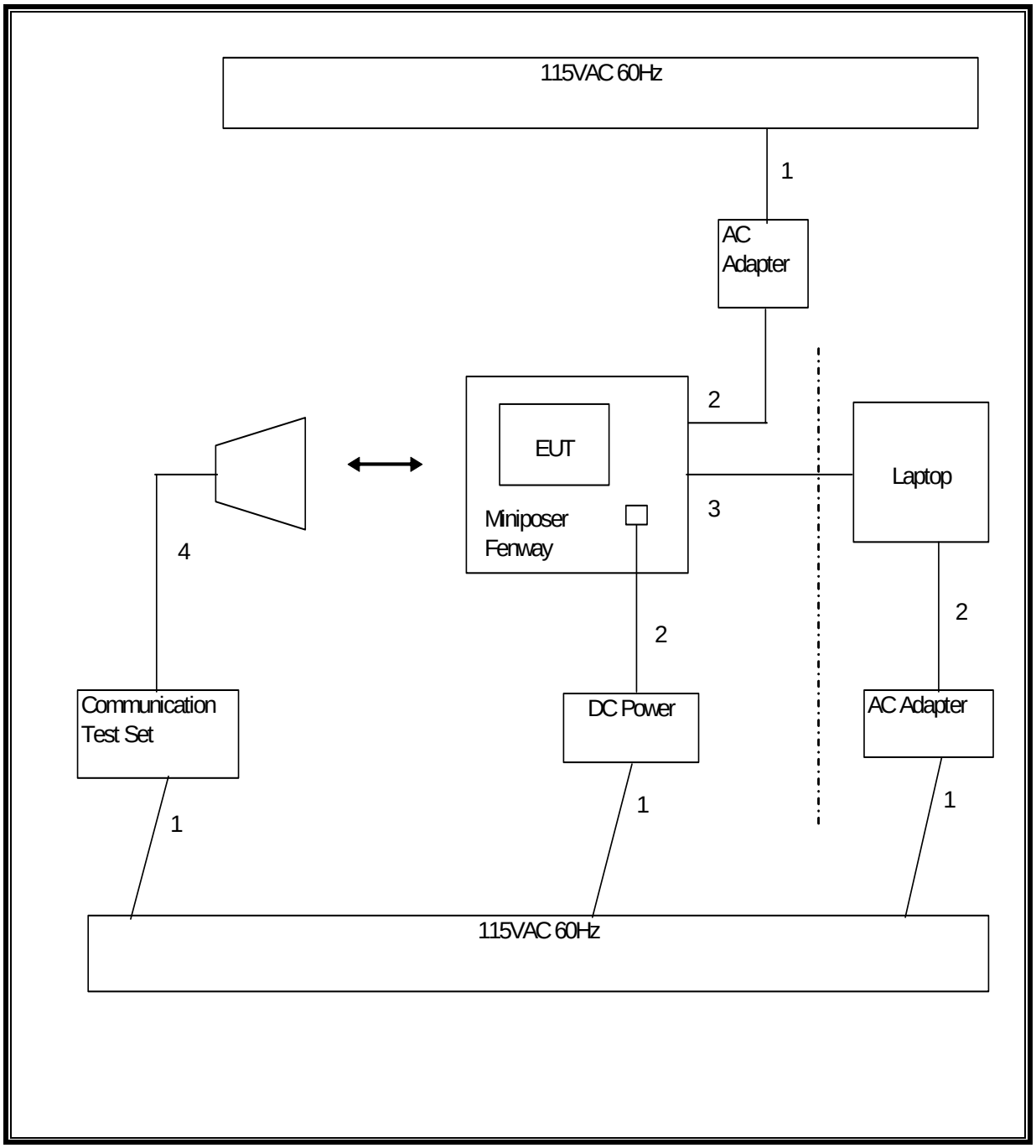
TEST SETUP

The EUT is installed in a test fixture during the tests. A link is established between the EUT and the Agilent 8960 communications test set.

SETUP DIAGRAM FOR CONDUCTED TESTS



SETUP DIAGRAM FOR RADIATED TESTS



6. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

TEST EQUIPMENT LIST					
Description	**Manufacturer**	**Model**	**Asset**	**Cal Date**	**Cal Due**
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C01012	12/03/07	03/03/09
Temperature / Humidity	Thermotron	SE 600-10-10	C00930	05/13/08	05/13/09
Antenna, Horn, 18 GHz	ETS	3117	C01006	04/22/08	04/22/09
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C01063	09/27/07	08/05/09
EMI Receiver, 2.9 GHz	Agilent / HP	8542E	C00957	06/19/08	09/19/09
RF Filter Section, 2.9 GHz	Agilent / HP	85420E	C00958	06/19/08	09/19/09
EMI Test Receiver, 30 MHz	R & S	ESHS 20	N02396	02/06/08	08/06/09
Communications Test Set	Agilent / HP	E5515C	C01086	06/16/08	06/16/09
Antenna, Bilog, 2 GHz	Sunol Sciences	JB1	C01011	02/11/08	02/11/09
Preamplifier, 1300 MHz	Agilent / HP	8447D	C01064	05/09/07	03/31/09
LISN, 30 MHz	FCC	LISN-50/250-25-2	N02625	09/15/06	10/29/09

7. TEST SUMMARY

Description of test	Rule part		Results
	FCC	IC	
1. RF Power Output	§2.1046,	RSS-139	Complies
2. Occupied Bandwidth	§2.1049	RSS-Gen, 4.6	--
3. Block Edge (Band Edge)	§27.53	RSS-139, 6.5	Complies
4. Out of Band Emissions	§2.1051, §27.53	RSS-139, 6.5	Complies
5. Frequency Stability	§2.1055, §27.54	RSS-139, 6.3	Complies
6. Radiated Power (ERP & EIRP)	§2.1046, §27.50(d) (2)	RSS-139, 6.4	Complies
7. Field Strength of Spurious Radiation	§2.1053, §24.53	RSS-139, 6.5	Complies
8. Receiver Spurious Emissions (IC only)	n/a	RSS-139, 6.6 RSS-Gen	Complies

8. MAXIMUM OUTPUT POWER

The transmitter has a maximum output power as follows:

Part 27 UMTS Band IV

Frequency range (MHz)	Modulation	Conducted		EIRP	
		dBm	mW	dBm	mW
1710 – 1755	UMTS - Rel 99	28.8	756.8	27.5	562.3
	UMTS - HSDPA	29.2	822.2	27.8	602.6

9. RF POWER OUTPUT VERIFICATION

RULE PART(S)

FCC: §2.1046
IC: RSS-139, 6.4

LIMITS

For reporting purposes only

TEST PROCEDURE

The transmitter output was connected to an Agilent 8960Test Set and configured to operate at maximum power in a call. The peak power was measured using the spectrum analyzer at three equally spaced operating frequencies for each band. The RBW was set to 300 KHz for the GSM and EDGE measurements and 5 MHz for the UMTS (WCDMA) measurements.

MODES TESTED

- UMTS (W-CDMA) - Rel 99, Rel 6 HSDPA and HSPA (HSDPA & HSUPA)

RESULTS

See Section 9.1 to 9.3

9.1. RF POWER OUTPUT FOR UMTS REL99

The following tests were completed according to the test requirements outlined in section 5.2 of the 3GPP TS34.121-1 V7.5.0 specification. The EUT supports power Class 3, which has a nominal maximum output power of 24 dBm (+1.7/-3.7) 12.2kps RMC is used for this testing. Power control set to All bits up. A summary of these settings are illustrated below:

	Mode	Rel99
	Subtest	-
WCDMA General Settings	Loopback Mode	Test Mode 1
	Rel99 RMC	12.2kbps RMC
	HSDPA FRC	Not Applicable
	HSUPA Test	Not Applicable
	Power Control Algorithm	Algorithm2
	βc	Not Applicable
	βd	Not Applicable
	βec	Not Applicable
	βc/βd	8/15
	βhs	Not Applicable
	βed	Not Applicable

REL 99

Band	UL Ch	DL Ch	Frequency	Conducted output power (dBm)	
				Average	Peak
UNTS1710 (Band IV)	1312	1537	1712.4	24.50	28.81
	1412	1637	1732.4	24.20	28.61
	1513	1738	1754.0	24.50	28.82

9.2. RF POWER OUTPUT FOR UMTS Rel 6 HSDPA

The following Sub-Tests were completed according to the test requirements outlined in section 5.2A of the 3GPP TS34.121-1 V7.5.0 specification. All TX RMS and Peak power requirements for Power Class 3 were met according to table 5.2AA.5 and achieved through the outlined test procedure in section 5.2AA.4.2. A summary of these settings are illustrated below:

	Mode	Rel6 HSDPA	Rel6 HSDPA	Rel6 HSDPA	Rel6 HSDPA
	Subtest	1	2	3	4
WCDMA General Settings	Loopback Mode	Test Mode 1			
	Rel99 RMC	12.2kbps RMC			
	HSDPA FRC	H-Set1			
	HSUPA Test	Not Applicable			
	Power Control Algorithm	Algorithm 2			
	βc	2/15	12/15	15/15	15/15
	βd	15/15	15/15	8/15	4/15
	βec	-	-	-	-
	βc/βd	2/15	12/15	15/8	15/4
	βhs	4/15	24/15	30/15	30/15
	βed	Not Applicable			
HSDPA Specific Settings	DACK	8			
	DNAK	8			
	DCQI	8			
	Ack-Nack repetition factor	3			
	CQI Feedback (Table 5.2B.4)	4ms			
	CQI Repetition Factor (Table 5.2B.4)	2			
	Ahs = βhs/βc	30/15			

RESULTS

REL 6 HSDPA

Band	Subtest	UL Ch	DL Ch	Frequency	Conducted output power (dBm)	
					Average	Peak
UMTS1710 (Band IV)	1	1312	1537	1712.4	24.20	28.49
		1412	1637	1732.4	24.10	28.51
		1513	1738	1752.6	24.15	28.63
	2*	1312	1537	1712.4	**24.40**	**28.96***
		1412	1637	1732.4	24.10	28.57
		1513	1738	1752.6	24.12	28.65
	3	1312	1537	1712.4	24.08	28.91
		1412	1637	1732.4	24.10	28.79
		1513	1738	1752.6	24.15	28.89
	4	1312	1537	1712.4	23.60	28.62
		1412	1637	1732.4	23.60	28.72
		1513	1738	1752.6	23.50	28.68

9.3. RF POWER OUTPUT for UMTS– Rel 6 HSPA (HSDPA & HSUPA)

The following tests were completed according to the test requirements outlined in section 5.2 of the 3GPP TS34.121-1 V7.5.0 specification. The EUT supports power Class 3, which has a nominal maximum output power of 24 dBm (+1.7/-3.7) 12.2kps RMC is used for this testing. Power control set to All bits up. A summary of these settings are illustrated below:

	Mode	Rel6 HSUPA	Rel6 HSUPA	Rel6 HSUPA	Rel6 HSUPA	Rel6 HSUPA
	Subtest	1	2	3	4	5
WCDMA General Settings	Loopback Mode	Test Mode 1				
	Rel99 RMC	12.2kbps RMC				
	HSDPA FRC	H-Set1				
	HSUPA Test	HSUPA Loopback				
	Power Control Algorithm	Algorithm2				
	βc	11/15	6/15	15/15	2/15	15/15
	βd	15/15	15/15	9/15	15/15	15/15
	βec	209/225	12/15	30/15	2/15	24/15
	βc/βd	11/15	6/15	15/9	2/15	15/15
	βhs	22/15	12/15	30/15	4/15	30/15
	βed	1309/225	94/75	47/15 47/15	56/75	134/15
HSDPA Specific Settings	DACK	8				
	DNAK	8				
	DCQI	8				
	Ack-Nack repetition factor	3				
	CQI Feedback (Table 5.2B.4)	4ms				
	CQI Repetition Factor (Table 5.2B.4)	2				
	Ahs = βhs/βc	30/15				
HSUPA Specific Settings	D E-DPCCH	6	8	8	5	7
	DHARQ	0	0	0	0	0
	AG Index	20	12	15	17	21
	ETFCI (from 34.121 Table C.11.1.3)	75	67	92	71	81
	Associated Max UL Data Rate kbps	242.1	174.9	482.8	205.8	308.9
	Reference E_TFCIs	E-TFCI 11 E-TFCI PO 4 E-TFCI 67 E-TFCI PO 18 E-TFCI 71 E-TFCI PO 23 E-TFCI 75 E-TFCI PO 26 E-TFCI 81 E-TFCI PO 27		E-TFCI 11 E-TFCI PO 4 E-TFCI 92 E-TFCI PO 18	E-TFCI 11 E-TFCI PO 4 E-TFCI 67 E-TFCI PO 18 E-TFCI 71 E-TFCI PO 23 E-TFCI 75 E-TFCI PO 26 E-TFCI 81 E-TFCI PO 27	

RESULTS

REL 6 HSPA (HSDPA & HSUPA)

Band	Subtest	UL Ch	DL Ch	Frequency	Conducted output power (dBm)	
					Average	Peak
UMTS1700	1	1312	1537	1712.4	24.15	28.70
		1412	1637	1732.4	24.00	28.88
		1513	1738	1752.6	24.10	28.90
	2	1312	1537	1712.4	22.54	28.12
		1412	1637	1732.4	22.58	28.20
		1513	1738	1752.6	22.52	28.15
	3	1312	1537	1712.4	23.16	28.30
		1412	1637	1732.4	23.20	28.54
		1513	1738	1752.6	23.10	28.40
	4	1312	1537	1712.4	22.40	28.39
		1412	1637	1732.4	22.60	28.77
		1513	1738	1752.6	22.50	28.71
	5	1312	1537	1712.4	24.13	28.71
		1412	1637	1732.4	24.20	28.80
		1513	1738	1752.6	24.10	28.70

10. WORST-CASE CONFIGURATION AND MODE

Based on the following investigation results, see Section 6. RF POWER OUTPUT VERIFCATION. The highest peak power and enhanced data rate is the worst-case scenario for all measurements.

Worst case modes:

- Rel 99
- Rel 6 HSDPA Subtest 2

11. CONDUCTED TEST RESULTS

11.1. OCCUPIED BANDWIDTH

RULE PART(S)

FCC: §2.1049
IC: RSS-Gen, 4.6

LIMITS

For reporting purposes only

TEST PROCEDURE

The transmitter output was connected to a calibrated coaxial cable and coupler, the other end of which was connected to a spectrum analyzer. The occupied bandwidth was measured with the spectrum analyzer at the low, middle and high channel in each band. The –26dB bandwidth was also measured and recorded.

MODES TESTED

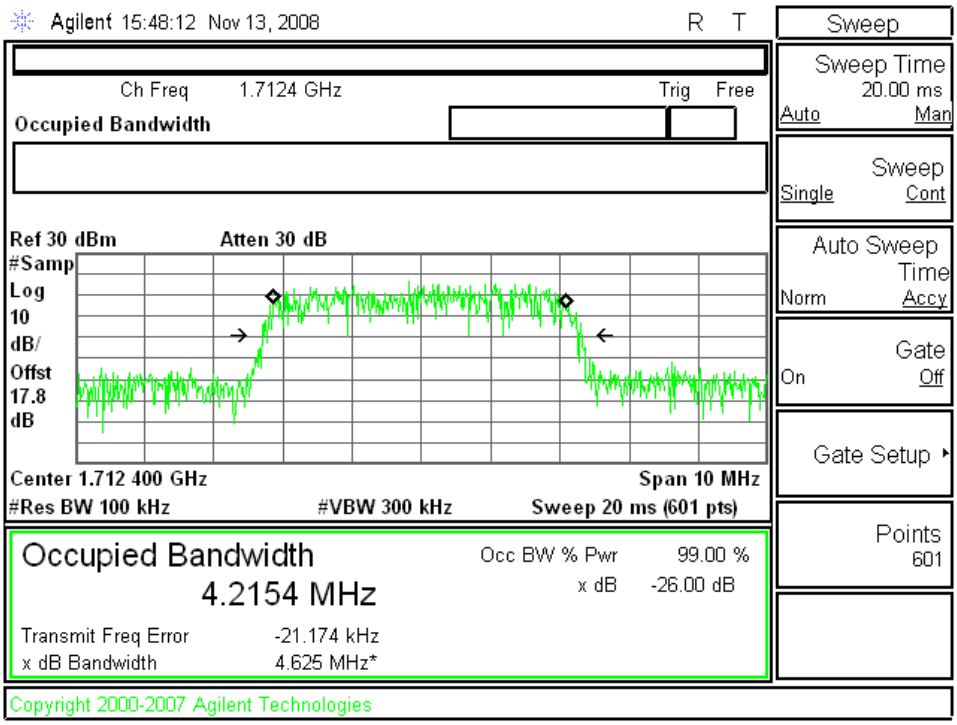
- UMTS (W-CDMA) - Rel 99, Rel 6 HSDPA Subtest 2

RESULTS

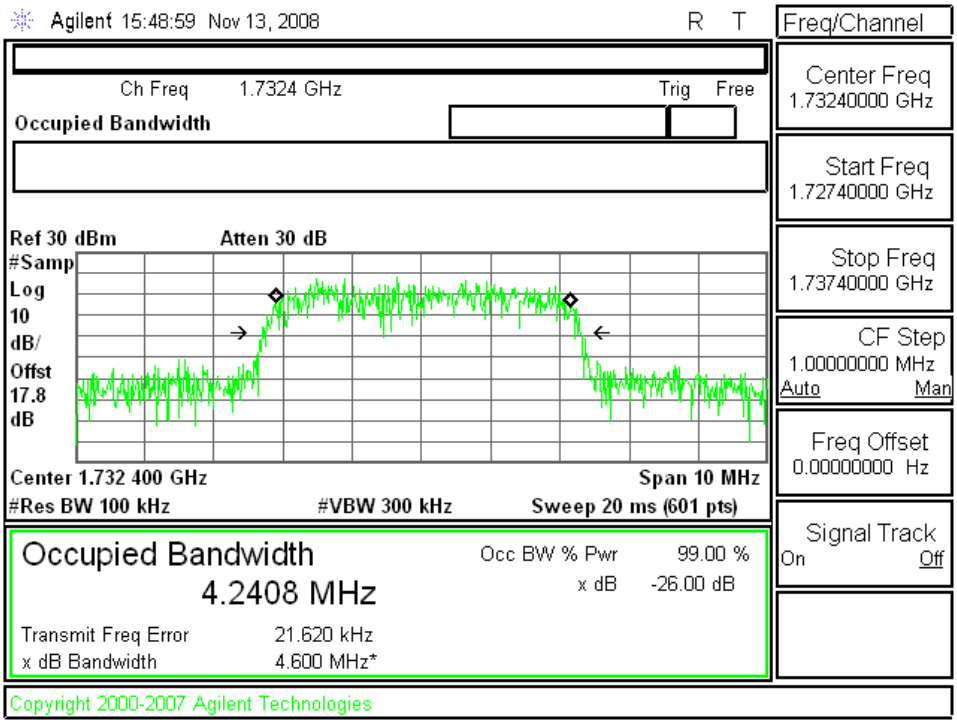
Band	Mode	Channel	f (MHz)	99% BW (MHz)	-26dB BW (MHz)
UMTS1710 (Band IV)	Rel 99	1312	1712.4	4.2154	4.625
		1412	1732.4	4.2408	4.600
		1513	1752.6	4.1597	4.647
	HSDPA Rel 6 Subtest 2	1312	1712.4	4.2006	4.618
		1412	1732.4	4.1655	4.662
		1513	1752.6	4.1601	4.609

Plots for UMTS Rel 99 Mode

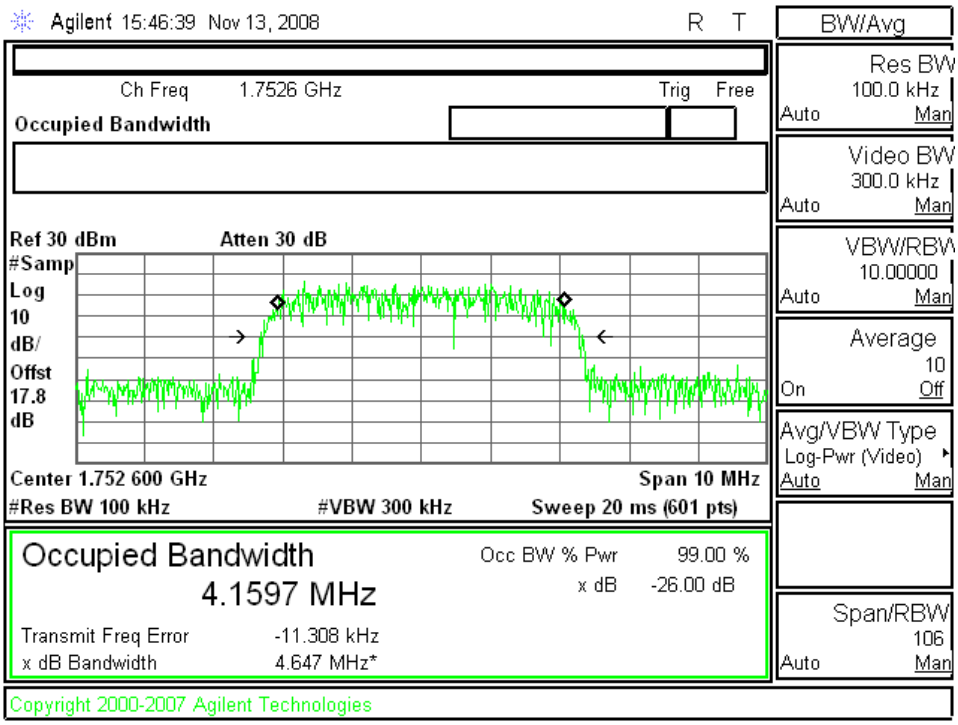
Rel 99, Ch 128



Rel99, Ch 1412

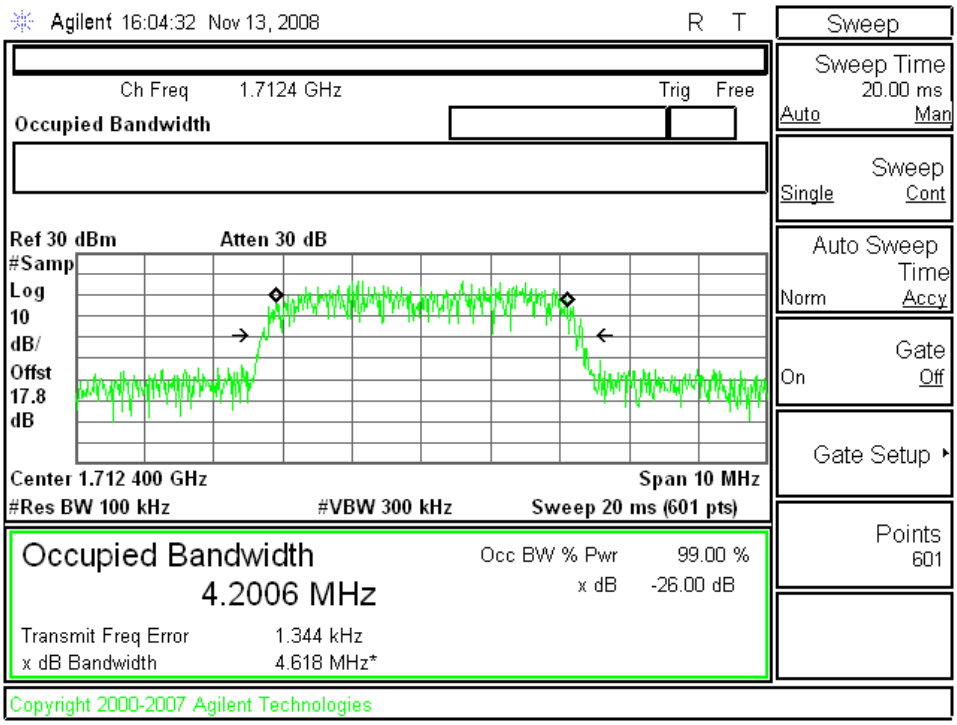


Rel 99, Ch 1513

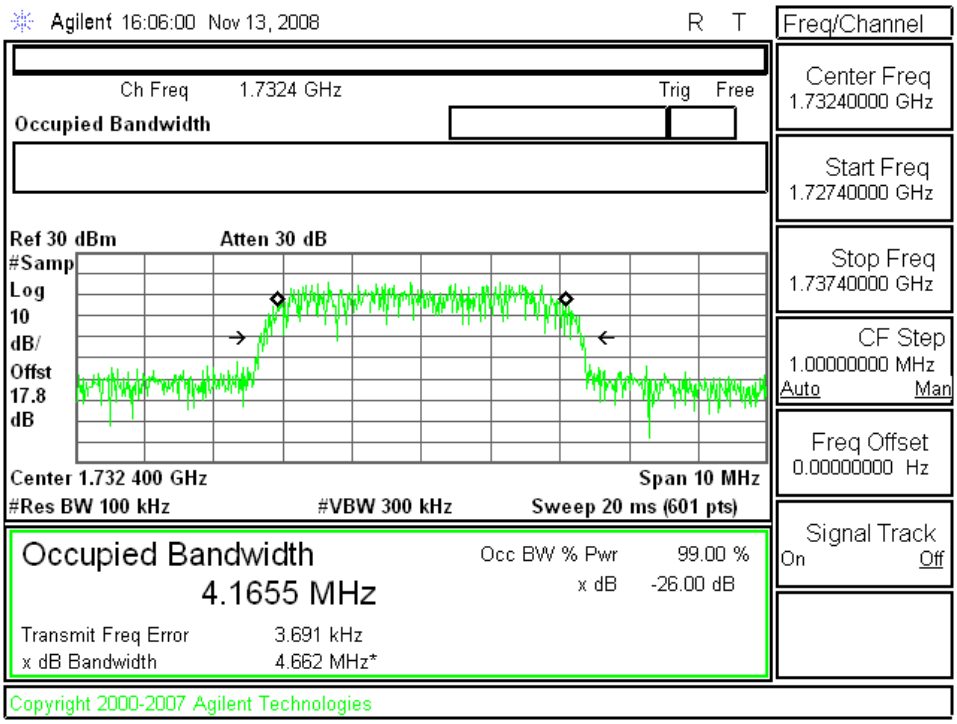


Plots for Rel 6 HSDPA Subtest 2 Mode

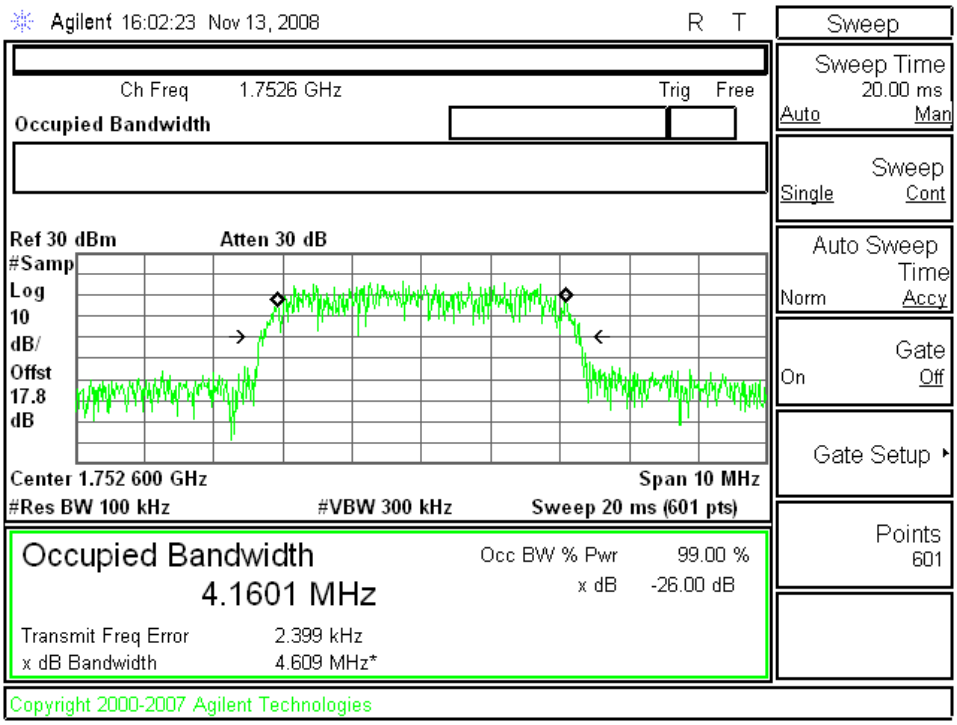
Rel 6 HSDPA Subtest 2, 1312



Rel 99 HSDPA Subtest 2, 1412



Rel 6 HSDPA Sub test 2, Ch1513



11.2. BAND EDGE

RULE PART(S)

FCC: §27.53
IC: RSS-139, 6.5

LIMITS

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log (P) dB.

TEST PROCEDURE

The transmitter output was connected to a Agilent 8960 Test Set and configured to operate at maximum power. The band edge emissions were measured at the required operating frequencies in each band on the Spectrum Analyzer.
For each band edge measurement:

- Set the spectrum analyzer span to include the block edge frequency (1710 MHz and 1755 MHz)
- Set a marker to point the corresponding band edge frequency in each test case.
- Set display line at -13 dBm
- Set resolution bandwidth to at least 1% of emission bandwidth.

MODES TESTED

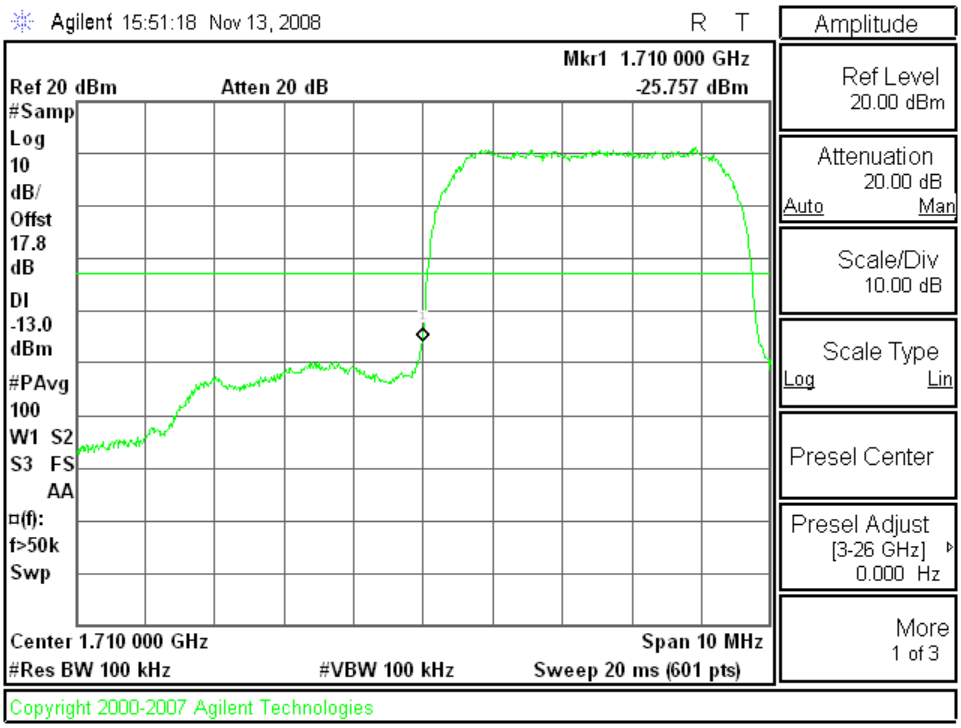
- GSM - GSM (GSMK) & EGPRS (8PSK),
- UMTS (W-CDMA) - Rel 99, Rel 6 HSDPA Subtest 2

RESULTS

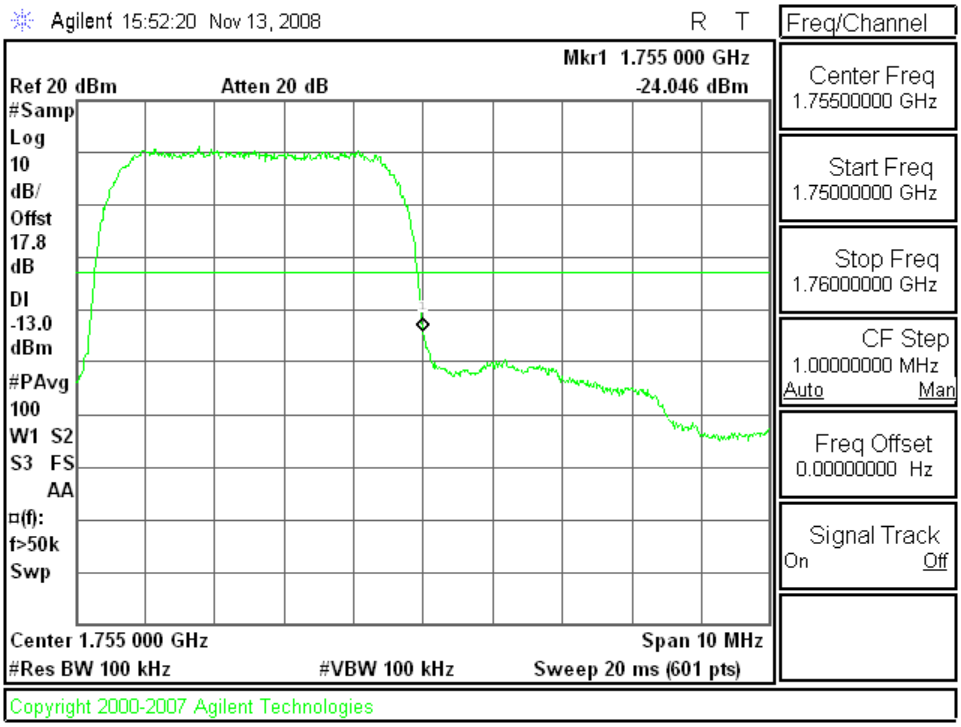
See the following pages.

Plots for WCDMA REL99 Mode

WCDMA REL99 (Low Ch)

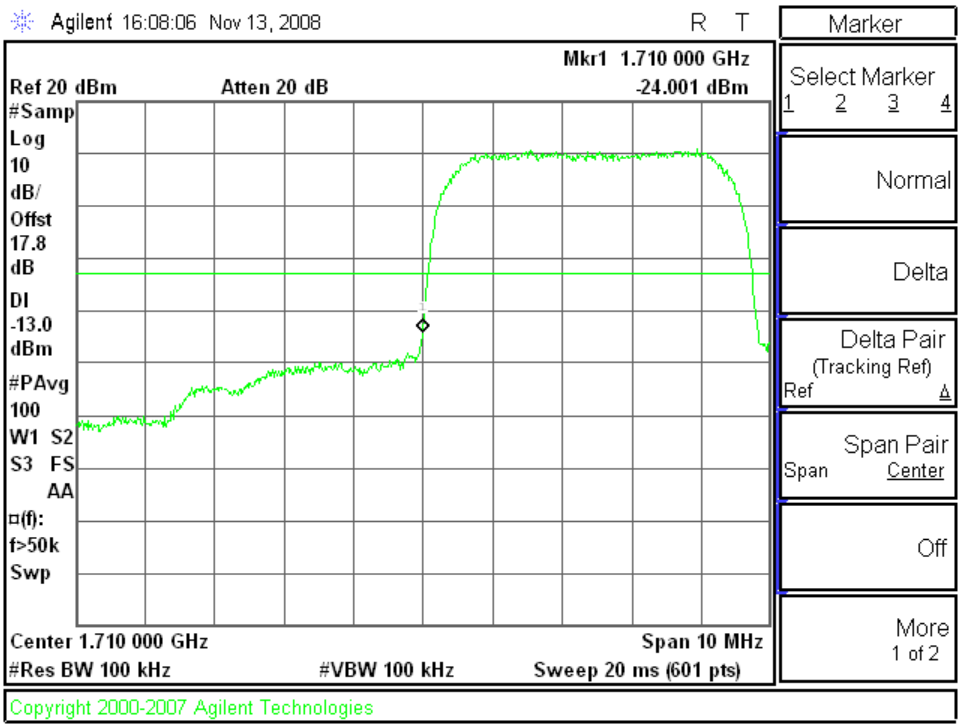


WCDMA REL99 (High Ch)

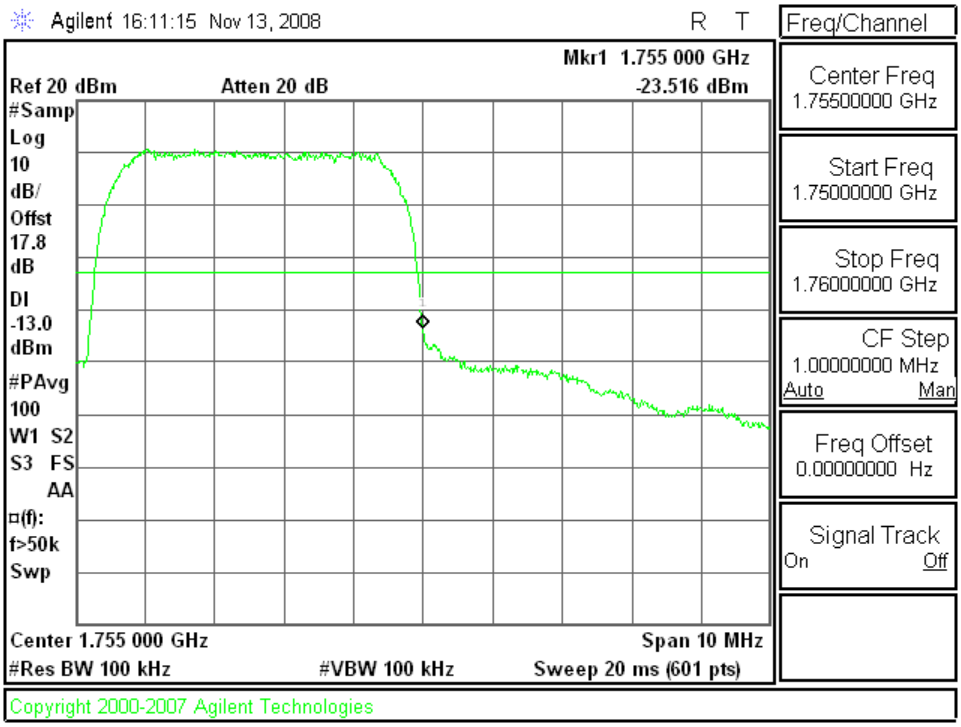


Plots for WCDMA Rel 6 HSDPA Subtest 2 Mode

HSDPA Subtest 2 (Low Ch)



HSDPA Subtest 2 (High Ch)



11.3. OUT OF BAND EMISSIONS

RULE PART(S)

FCC: §2.1051, §27.53
IC: RSS-139, 6.5

LIMITS

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log (P) dB.

TEST PROCEDURE

The RF output of the transmitter was connected to a spectrum analyzer through a calibrated coaxial cable. Sufficient scans were taken to show the out-of-band Emissions, if any, up to 10th harmonic. Multiple sweeps were recorded in maximum hold mode using a peak detector to ensure that the worst-case emissions were caught.

For each out of band emissions measurement:

- Set display line at -13 dBm
- Set RBW & VBW to 100 kHz for the measurement below 1 GHz, and 1 MHz for the measurement above 1 GHz.

MODES TESTED

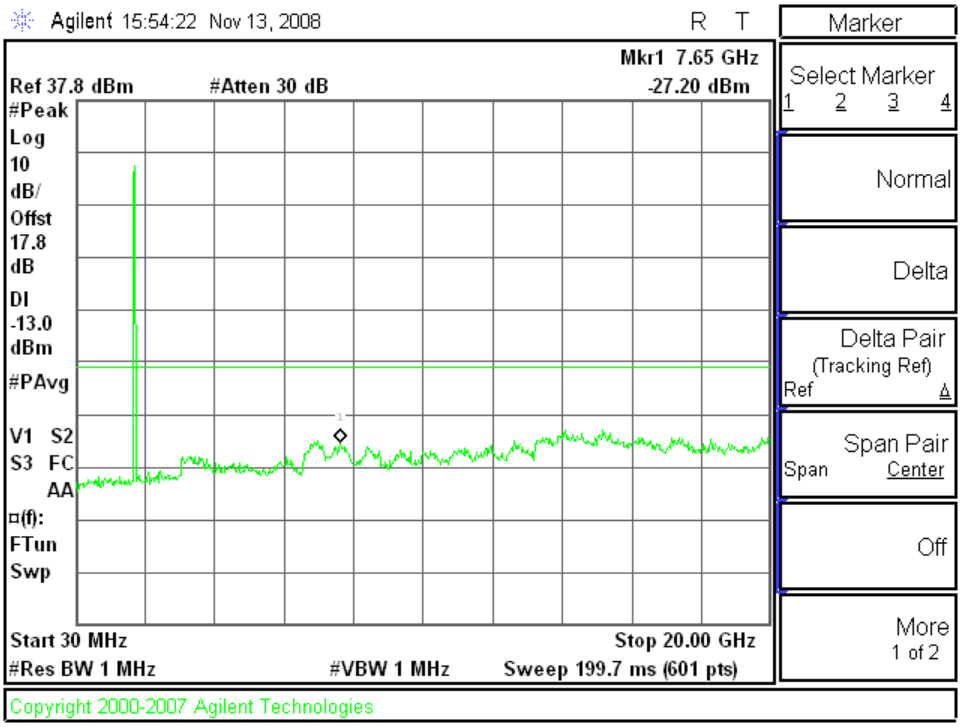
- UMTS (W-CDMA) - Rel 99, Rel 6 HSDPA Subtest 2

RESULTS

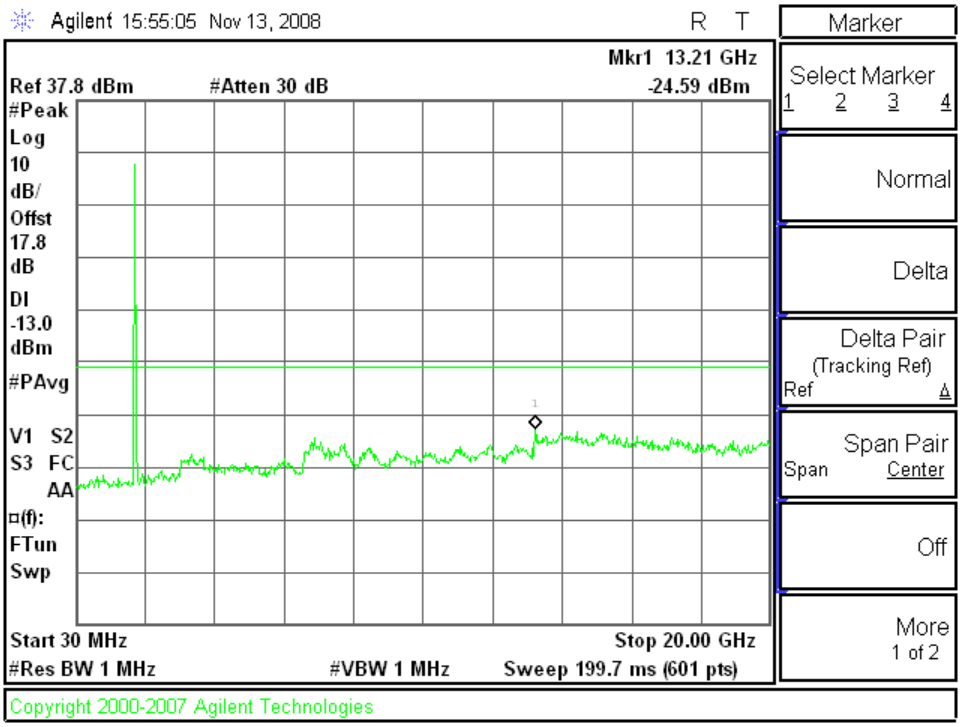
See the following pages.

Plots for WCDMA Rel 99 Mode

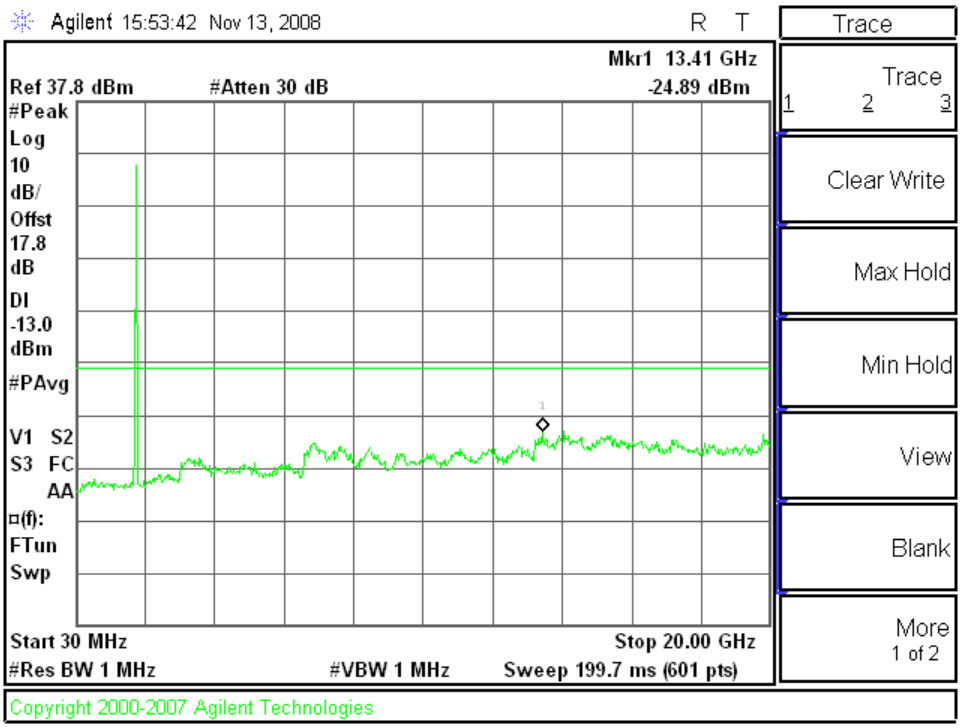
REL99 (Low Ch)



Rel 99 (Mid Ch)

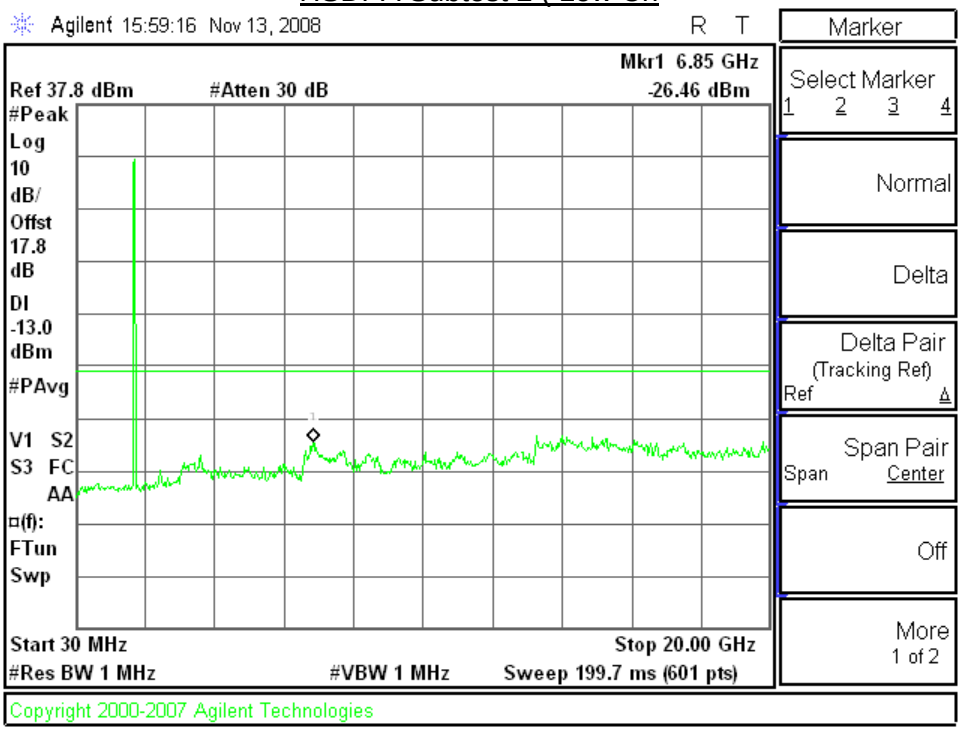


Rel 99 (High Ch)

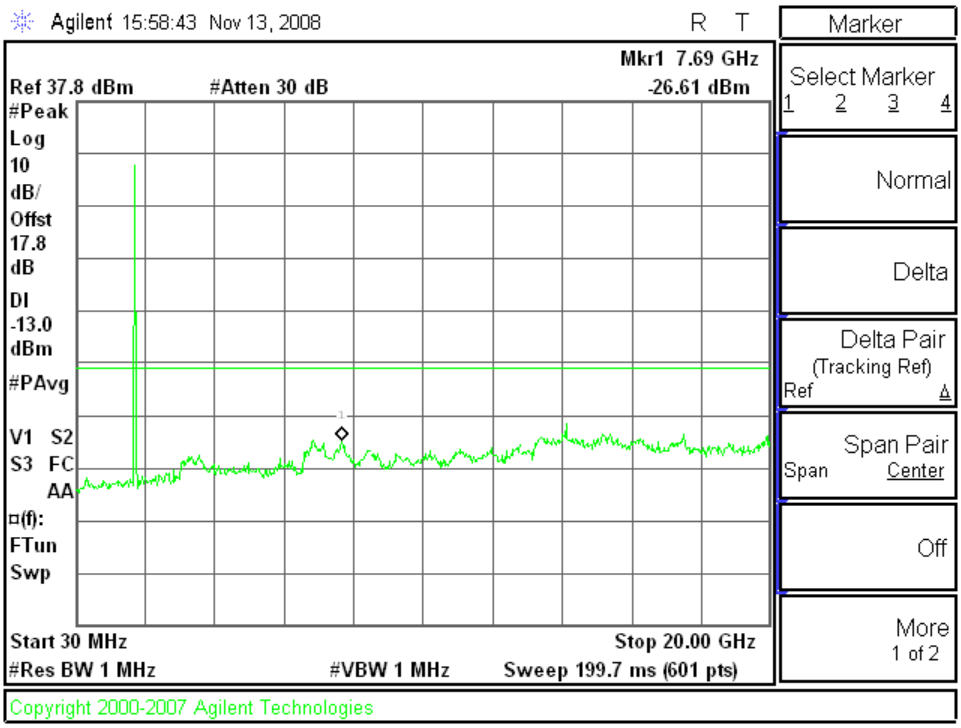


Plots for HSDPA Subtest 2 Mode

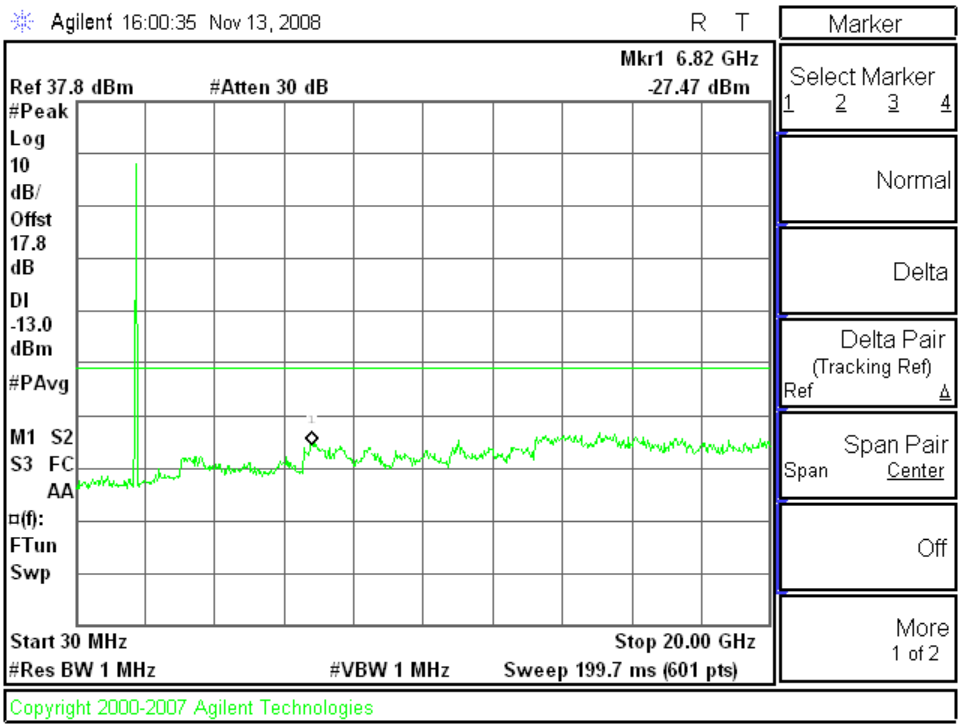
HSDPA Subtest 2 (Low Ch



HSDPA Subtest 2 (Mid Ch



HSDPA Subtest 2 (High Ch)



11.4. FREQUENCY STABILITY

RULE PART(S)

FCC: §2.1055, §27.54
IC: RSS-139, 6.3

LIMITS

The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

TEST PROCEDURE

Use Agilent 8960 with Frequency Error measurement capability.

- Temp. = −20° to +50°C
- Voltage = 3.3 Vdc
- 3.0 – 3.6 Vdc (85% - 115%)

Frequency Stability vs Temperature:

The EUT is place inside a temperature chamber. The temperature is set to 20ºC and allowed to stabilize. After sufficient soak time, the transmitting frequency error is measured. The temperature is increased by 10 degrees, allowed to stabilize and soak, and then the measurement is repeated. This is repeated until +50ºC is reached. Reference power supply voltage for these tests is 3.3 Vdc.

Frequency Stability vs Voltage:

The peak frequency error is recorded (worst-case). The test voltages are 3.0 to 3.6 Vdc.

MODES TESTED

- UMTS (W-CDMA) - Rel 99

RESULTS

See the following pages.

AWS 1700 WCDMA MODULATION – MID CHANNEL

Reference Frequency: AWS WCDMA Mid Channel 1730.1511MHz @ 20ºC Limit: within the authorized block or +- 2.5 ppm = 4325.378 Hz				
Power Supply (Vdc)	Environment Temperature (*C)	Frequency Deviation Measureed with Time Elapse		
		(MHz)	Delta (ppm)	Limit (ppm)
4.20	50	1730.15072	0.220	2.5
4.20	40	1730.15105	0.029	2.5
4.20	30	1730.15068	0.243	2.5
4.20	***20***	***1730.15110***	***0***	***2.5***
4.20	10	1730.15075	0.202	2.5
4.20	0	1730.15113	-0.017	2.5
4.20	-10	1730.15153	-0.249	2.5
4.20	-20	1730.15145	-0.202	2.5
4.20	-30	1730.15155	-0.260	2.5

Reference Frequency: PCS Mid Channel 1730.1511MHz @ 20ºC Limit: within the authorized block or +- 2.5 ppm = 4325.378 Hz				
Power Supply (Vdc)	Environment Temperature (*C)	Frequency Deviation Measureed with Time Elapse		
		(MHz)	Delta (ppm)	Limit (ppm)
100%	***20***	***1730.15110***	***0***	***2.5***
85%	20	***1730.15142***	*-0.185*	2.5
115%	20	1730.15150	*-0.231*	2.5

12. RADIATED TEST RESULTS

12.1. RADIATED POWER (ERP & EIRP)

RULE PART(S)

FCC: §2.1046, §27.50(d) (2)
IC: RSS-139, 6.4

LIMITS

27.50(d) (2) - The Fixed, mobile, and portable (hand-held) stations operating in the 1710–1755 MHz band are limited to a peak EIRP of 1 watt.

RSS-139 § 6.4 - The peak equivalent isotropically radiated power (e.i.r.p.) for fixed, mobile and portable transmitters in the 1710-1755 MHz shall not exceed 1 watt.

TEST PROCEDURE

ANSI / TIA / EIA 603C, RSS-139

MODES TESTED

- UMTS (W-CDMA) - Rel 99, Rel 6 HSDPA Subtest 2

RESULTS for Cellular Band (ERP)

Mode	Channel	f (MHz)	EIRP	
			dBm	mW
Rel 99	1312	1712.40	27.10	512.86
	1412	1733.00	27.00	501.19
	1513	1754.00	27.50	562.34
HSDPA (Subtest 2)	1312	1712.40	26.20	416.87
	1412	1733.00	27.80	602.56
	1513	1754.00	27.20	524.81

EIRP for Rel 99 Mode

High Frequency Fundamental Measurement
Compliance Certification Services, Fremont 5m Chamber Site

Company: Qualcomm
Project #: 08U12127
Date: 11/18/2008
Test Engineer: Chin Pang
Configuration: EUT with Magnetic Mount triple-frequency mobile antenna
Mode: AWS1700, WCDMA Rel 99

Test Equipment:
Receiving: Horn T73, and Chamber B 20ft S/N 228076 005
Substitution: Horn T60Substitution, 4ft SMA Cable Warehouse S/N: 187215 001

f GHz	SA reading (dBuV/m)	Ant. Pol. (H/V)	SG reading (dBm)	CL (dB)	Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch									
1.712	96.4	V	19.8	0.7	8.0	27.1	30.0	-2.9	
1.712	89.0	H	12.1	0.7	8.0	19.4	30.0	-10.6	
Mid Ch									
1.733	96.2	V	19.7	0.7	8.0	27.0	30.0	-3.0	
1.733	89.5	H	12.9	0.7	8.0	20.2	30.0	-9.8	
High Ch									
1.754	96.7	V	20.3	0.8	8.0	27.5	30.0	-2.5	
1.754	89.6	H	12.9	0.8	8.0	20.1	30.0	-9.9	

Rev. 1.24.7

EIRP for Rel 6 HSDPA Subtest 2 Mode

High Frequency Fundamental Measurement
Compliance Certification Services, Fremont 5m Chamber Site

Company: Qualcomm
Project #: 08U12127
Date: 11/18/2008
Test Engineer: Chin Pang
Configuration: EUT with Magnetic Mount triple-frequency mobile antenna
Mode: AWS1700, WCDMA+HSDPA

Test Equipment:
Receiving: Horn T73, and Chamber B 20ft S/N 228076 005
Substitution: Horn T60 Substitution, 4ft SMA Cable Warehouse S/N: 187215 001

f GHz	SA reading (dBuV/m)	Ant. Pol. (H/V)	SG reading (dBm)	CL (dB)	Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch									
1.712	95.5	V	18.9	0.7	8.0	26.2	30.0	-3.8	
1.712	88.1	H	11.2	0.7	8.0	18.5	30.0	-11.5	
Mid Ch									
1.733	97.0	V	20.5	0.7	8.0	27.8	30.0	-2.2	
1.733	87.7	H	11.1	0.7	8.0	18.4	30.0	-11.6	
High Ch									
1.754	96.4	V	20.0	0.8	8.0	27.2	30.0	-2.9	
1.754	86.5	H	9.8	0.8	8.0	17.0	30.0	-13.0	

Rev. 1.24.7

12.2. FIELD STRENGTH OF SPURIOUS RADIATION

RULE PART(S)

FCC: §2.1053, §27.53
IC: RSS-139, 6.5

LIMIT

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log (P) dB.

TEST PROCEDURE

Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e. 1 MHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

MODES TESTED

- UMTS (W-CDMA) - Rel 99, Rel 6 HSDPA Subtest 2

RESULTS

See the following pages.

Rel 99 Mode

High Frequency Substitution Measurement
Compliance Certification Services, Fremont 3m C-Chamber

Company: Qualcomm
Project #: 08U12127
Date: 11/19/2008
Test Engineer: Chin Pang
Configuration: EUT with Magnetic Mount triple-frequency mobile antenna
Mode: AWS1700, WCDMA Rel 99

Test Equipment:

EMCO Horn 1-18 GHz: T60; S/N: 2238 @3m
Horn > 18GHz:
Limit: FCC 27
High Pass Filter: ☑
Hi Frequency Cables: ☐ (2' Chin 17707903) ☑ (2 ~ 3', Thanh 187213003) ☑ (12' S/N: 208946002)
Pre-amplifer 1-26GHz: T34 HP 8449B
Pre-amplifer 26-40GHz:

f GHz	SA reading (dBuV/m)	Ant. Pol. (H/V)	SG reading (dBm)	CL (dB)	Gain (dBi)	Gain (dBd)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch, 1712.4MHz										
3.425	43.8	H	-59.8	3.1	9.5	7.4	-53.4	-13.0	-40.4	
5.137	39.0	H	-60.6	3.2	11.0	8.9	-52.8	-13.0	-39.8	
3.425	45.6	V	-58.1	3.1	9.5	7.4	-51.7	-13.0	-38.7	
5.137	39.5	V	-61.1	3.2	11.0	8.9	-53.3	-13.0	-40.3	
Mid Ch, 1732.4MHz										
3.465	42.8	H	-60.7	3.1	9.5	7.4	-54.3	-13.0	-41.3	
5.197	38.6	H	-60.8	3.2	11.0	8.9	-53.0	-13.0	-40.0	
3.465	44.5	V	-59.1	3.1	9.5	7.4	-52.7	-13.0	-39.7	
5.197	39.5	V	-60.9	3.2	11.0	8.9	-53.1	-13.0	-40.1	
High Ch, 1752.6MHz										
3.505	42.6	H	-60.8	3.1	9.6	7.4	-54.3	-13.0	-41.3	
5.258	39.2	H	-60.0	3.3	11.0	8.8	-52.3	-13.0	-39.3	
3.505	43.6	V	-59.9	3.1	9.6	7.4	-53.4	-13.0	-40.4	
5.258	39.8	V	-60.4	3.3	11.0	8.8	-52.7	-13.0	-39.7	

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Relo 6 HSDPA Subtest 2 Mode

High Frequency Substitution Measurement
Compliance Certification Services, Fremont 3m C-Chamber

Company: Qualcomm
Project #: 08U12127
Date: 11/19/2008
Test Engineer: Chin Pang
Configuration: EUT with Magnetic Mount triple-frequency mobile antenna
Mode: AWS1700, WCDMA+HSDPA

Test Equipment:

EMCO Horn 1-18GHz: T60; S/N: 2238 @3m
Horn > 18GHz:
Limit: FCC 27
High Pass Filter: ☑
Hi Frequency Cables: ☐ (2' Chin 17707903) ☑ (2 ~ 3', Thanh 187215003) ☑ (12' S/N: 208946002)
Pre-amplifer 1-26GHz: T34 HP 8449B
Pre-amplifer 26-40GHz:

f GHz	SA reading (dBuV/m)	Ant. Pol. (H/V)	SG reading (dBm)	CL (dB)	Gain (dBi)	Gain (dBd)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch, 1712.4MHz										
3.425	43.0	H	-60.6	3.1	9.5	7.4	-54.2	-13.0	-41.2	
5.137	39.0	H	-60.6	3.2	11.0	8.9	-52.8	-13.0	-39.8	
3.425	44.4	V	-59.3	3.1	9.5	7.4	-52.9	-13.0	-39.9	
5.137	39.0	V	-61.6	3.2	11.0	8.9	-53.8	-13.0	-40.8	
Mid Ch, 1732.4MHz										
3.465	42.5	H	-61.0	3.1	9.5	7.4	-54.6	-13.0	-41.6	
5.197	38.6	H	-60.8	3.2	11.0	8.9	-53.0	-13.0	-40.0	
3.465	45.0	V	-58.6	3.1	9.5	7.4	-52.2	-13.0	-39.2	
5.197	39.5	V	-60.9	3.2	11.0	8.9	-53.1	-13.0	-40.1	
High Ch, 1752.6MHz										
3.505	43.0	H	-60.4	3.1	9.6	7.4	-53.9	-13.0	-40.9	
5.258	38.8	H	-60.4	3.3	11.0	8.8	-52.7	-13.0	-39.7	
3.505	44.0	V	-59.5	3.1	9.6	7.4	-53.0	-13.0	-40.0	
5.258	40.0	V	-60.2	3.3	11.0	8.8	-52.5	-13.0	-39.5	

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12.3. RECEIVER SPURIOUS EMISSIONS

RULE PART(S)

FCC: N/A
IC: RSS-139, 6.6, RSS-Gen

LIMIT

RSS-Gen 6 (a) - If a radiated measurement is made, all spurious emissions shall comply with the limits of Table 1.

Table 1 - Spurious Emission Limits for Receivers:

Spurious Frequency (MHz)	Field Strength(microvolt/m at 3 meters)
30 - 88	100
88 - 216	150
216 - 960	200
Above 960	500

TEST PROCEDURE

RSS-Gen 4.10 - The search for spurious emissions shall be from the lowest frequency internally generated or used in the receiver (e.g. local oscillator, intermediate or carrier frequency), or 30 MHz, whichever is the higher, to at least 3 times the highest tuneable or local oscillator frequency, whichever is the higher, without exceeding 40 GHz.

RESULTS

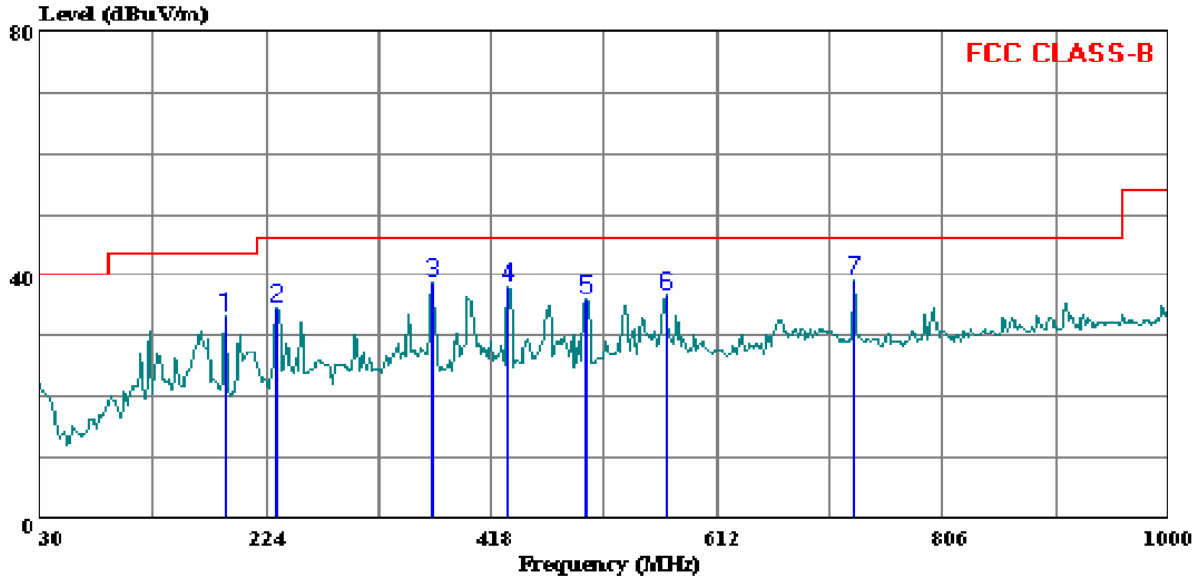
See the following pages.

RECEIVER SPURIOUS EMISSIONS FOR 30 TO 1000 MHz, HORIZONTAL

COMPLIANCE Engineering Services, Inc.
FCC, VCCI, CB/NRTL/CE
UL,CSA,TUV

Compliance Certification Services
47173 Benicia Street
Fremont, CA 94538
Tel: (510) 771-1000
Fax: (510) 661-0888

Data#: 30 File#: 08u12127.emi Date: 11-26-2008 Time: 08:58:51



Trace: 19 Ref Trace:

Condition: FCC CLASS-B HORIZONTAL
Test Operator:: Chin Pang
Project #: : 08U12127
Company: : Qualcomm
Configuration:: EUT and antenna
Mode : : RX
Target: : FCC Class B

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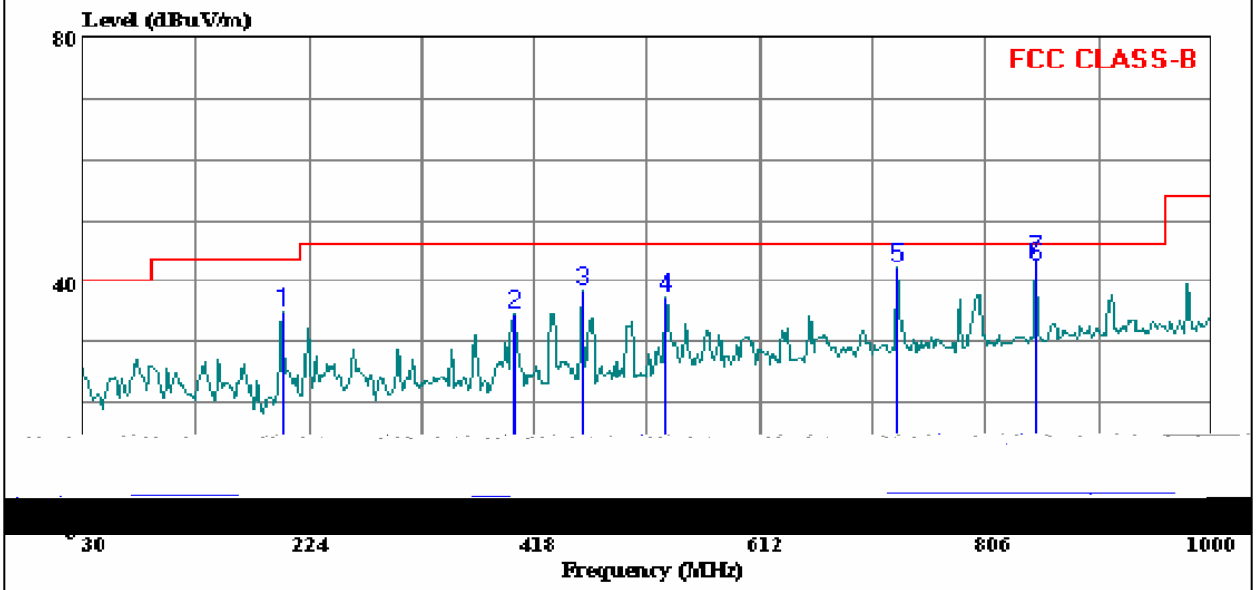
	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	189.080	47.19	-13.89	33.30	43.50	-10.20	Peak
2	232.730	47.64	-13.15	34.49	46.00	-11.51	Peak
3	366.590	47.91	-9.16	38.75	46.00	-7.25	Peak
4	431.580	45.31	-7.11	38.20	46.00	-7.80	Peak
5	499.480	40.94	-4.79	36.15	46.00	-9.85	Peak
6	567.380	40.14	-3.48	36.66	46.00	-9.34	Peak
7	730.340	39.29	-0.04	39.25	46.00	-6.75	Peak

RECEIVER SPURIOUS EMISSIONS FOR 30 TO 1000 MHz, VERTICAL

Compliance Certification Services
47173 Benicia Street
Fremont, CA 94538
Tel: (510) 771-1000
Fax: (510) 661-0888

Data#: 29 File#: 08u12127.emi Date: 11-26-2008 Time: 08:44:50



Trace: 11 Ref Trace:

Condition: FCC CLASS-B VERTICAL
Test Operator:: Chin Pang
Project #: : 08U12127
Company: : Qualcomm
Configuration:: EUT and antenna
Mode : : RX
Target: : FCC class B

Page: 1

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	201.690	47.97	-12.98	34.99	43.50	-8.51	Peak
2	400.540	42.70	-8.18	34.52	46.00	-11.48	Peak
3	458.740	44.46	-6.18	38.28	46.00	-7.72	Peak
4	531.490	41.54	-4.18	37.36	46.00	-8.64	Peak
5	730.340	42.16	-0.04	42.12	46.00	-3.88	Peak
6	848.680	40.68	1.74	42.42	46.00	-3.58	QP
7	848.680	41.78	1.74	43.52	46.00	-2.48	Peak

13. MAXIMUM PERMISSIBLE EXPOSURE

LIMITS

§1.1310 The criteria listed in Table 1 shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation as specified in §1.1307(b), except in the case of portable devices which shall be evaluated according to the provisions of §2.1093 of this chapter.

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm^2)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3–3.0	614	1.63	*(100)	6
3.0–30	1842/f	4.89/f	*($900/f^2$)	6
30–300	61.4	0.163	1.0	6
300–1500			f/300	6
1500–100,000			5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3–1.34	614	1.63	*(100)	30
1.34–30	824/f	2.19/f	*($180/f^2$)	30

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)—Continued

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm^2)	Averaging time (minutes)
30–300	27.5	0.073	0.2	30
300–1500			f/1500	30
1500–100,000			1.0	30

f = frequency in MHz
* = Plane-wave equivalent power density

NOTE 1 TO TABLE 1: Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure.

NOTE 2 TO TABLE 1: General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or can not exercise control over their exposure.

CALCULATIONS

Given

$E = \sqrt{(30 * P * G)} / d$

and

$S = E ^ 2 / 3770$

where

E = Field Strength in Volts/meter
P = Power in Watts
G = Numeric antenna gain
d = Distance in meters
S = Power Density in milliwatts/square centimeter

Combining equations and rearranging the terms to express the distance as a function of the remaining variables yields:

$d = \sqrt{((30 * P * G) / (3770 * S))}$

Changing to units of Power to mW and Distance to cm, using:

P (mW) = P (W) / 1000 and
d (cm) =100 * d (m)

yields

$d = 100 * \sqrt{((30 * (P / 1000) * G) / (3770 * S))}$
$d = 0.282 * \sqrt{(P * G / S)}$

where

d = distance in cm
P = Power in mW
G = Numeric antenna gain
S = Power Density in mW/cm^2

Substituting the logarithmic form of power and gain using:

P (mW) = 10 ^ (P (dBm) / 10) and
G (numeric) = 10 ^ (G (dBi) / 10)

yields

$d = 0.282 * 10 ^ ((P + G) / 20) / \sqrt{S}$ Equation (1)

where

d = MPE distance in cm
P = Power in dBm
G = Antenna Gain in dBi
S = Power Density Limit in mW/cm^2

Equation (1) and the measured peak power is used to calculate the MPE distance.

LIMITS

From §1.1310 Table 1 (B), S = 0.549 mW/cm^2 (Cell) and 1.0 mW/cm^2 (PCS)

RESULTS

No non-compliance noted: (MPE distance equals 20 cm)

Modulation	MPE Distance (cm)	Output Power (dBm)	Antenna Gain (dBi)	Power Density (mW/cm^2)	FCC MPE Limit (mW/cm^2)
UMTS - Rel 99	20.0	28.80	0.00	0.151	1.0
UMTS - HSDPA	20.0	29.20	0.00	0.165	1.0

NOTE: For mobile or fixed location transmitters, the minimum separation distance is 20 cm, even if calculations indicate that the MPE distance would be less.