FCC 47 CFR PART 22 SUBPART H AND PART 24 SUBPART E

TEST REPORT

For

EFTPOS

Trade Name: CASTLES TECHNOLOGY

Model: VEGA3000

Issued to

Castles Technology Co., Ltd.
2F, No.205, Sec. 3, Beixin Rd., Xindian District,
New Taipei City 23143, 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: January 13, 2014

Testing Laboratory
1309

Revision History

Rev.		Issue Date		Revisions	Effect Page	Revised By
00		January 13, 2014		Initial Issue	ALL	Kelly Cheng

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1. TEST RESULT CERTIFICATION

Applicant:	Castles Technology Co., Ltd. 2F, No.205, Sec. 3, Beixin Rd., Xindian District,New Taipei City 23143, Taiwan (R.O.C.)
Equipment Under Test:	EFTPOS
Trade Name:	CASTLES TECHNOLOGY
Model:	VEGA3000
Date of Test:	December 19, 2014

APPLICABLE STANDARDS	
STANDARD	**TEST RESULT**
FCC 47 CFR Part 22 Subpart H & Part 24 Subpart E	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: 2004 and the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits of FCC Rule FCC PART 22 Subpart H and PART 24 Subpart E.

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

Approved by:

Miller Lee
Section Manager
Compliance Certification Services Inc.

Reviewed by:

Angel Cheng
Section Manager
Compliance Certification Services Inc.

2. EUT DESCRIPTION

Product	EFTPOS
Trade Name	CASTLES TECHNOLOGY
Model Number	VEGA3000
Model Discrepancy	N/A
Received Date	December 2, 2014
Power Ratting	1. VDC from Power Adapter CASTLES TECHNOLOGY / AU1360903n I/P: 100-240V, 50/60Hz, 2A O/P: 9V, 4A 2. From DC Battery (DC3V) 3. Powered from Lithium cell battery: Rating: RPC / IP604355 Rating: 3.7V, 2100mAh, 7.77Wh
Frequency Range	TX: 824.7 ~ 848.31 MHz / 1851.25 ~ 1908.75 MHz RX: 869.7 ~ 893.31 MHz / 1931.25 ~ 1988.75 MHz
Transmit Power (ERP & EIRP Power)	CDMA2000 1xRTT 850 MHz: 19.53 dBm 1900 MHz: 27.16 dBm
Cellular Phone Protocol	CDMA2000 1xRTT
Type of Emission	CDMA2000 1xRTT: 824.7 ~ 848.31 MHz: 1M27F6W 1851.25 ~ 1908.75 MHz: 1M28F1W
Antenna Gain	Auden Techno Corp. / V3 850 MHz: -2.006dBi 1900 MHz: 0.672dBi
Antenna Type	Monopole Antenna

Remark:

1. *The sample selected for test was engineering sample that approximated to production product and was provided by manufacturer.*
2. *This submittal(s) (test report) is intended for FCC ID: **WIYVEGA3000-2G** filing to comply with Part 22 and Part 24 of the FCC 47 CFR Rules.*

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, 2.1046, 2.1047, 2.1049, 2.1051, 2.1053, 2.1055 and 2.1057.

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.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.

3.4 DESCRIPTION OF TEST MODES

The EUT (model: VEGA3000) had been tested under operating condition.

After verification, all tests were carried out 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 only.

EUT staying in continuous transmitting mode was programmed.

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**
Vector Signal Generator	ROHDE&SCHWARZ	SMU200A	102239	12/07/2015
Spectrum Analyzer	Agilent	E4446A	US42510252	11/23/2015
Spectrum Analyzer	Agilent	E4407B	MY44212686	03/12/2015
Pre-Amplifier	MITEQ	AFS44-00102650-42-10P-44	1042473	03/05/2015
Thermostatic/Hrgrosatic Chamber	TAICHY	MHG-150LF	930619	10/07/2015
S.G.	Agilent	E8257C	US42340383	11/25/2015
S.G.	Agilent	83630B	3844A01022	08/20/2015
AC Power Source	EXTECH	6205	1140845	N.C.R
DC Power Supply	ABM	8301HD	D011531	N.C.R
Power Sensor	Agilent	U2021XA	MY54250027	06/23/2015
Power Sensor	Agilent	U2021XA	MY54260020	06/29/2015
Power Sensor	Agilent	U2021XA	MY54260016	06/27/2015
Digitizer	Agilent	U2531A	TW54243508	06/08/2015
Digitizer	Agilent	U2531A	TW54233509	06/06/2015
Spectrum Analyzer	ROHDE&SCHWARZ	FSV40	101073	07/09/2015

Wugu 966 Chamber A				
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Due**
Spectrum Analyzer	Agilent	E4446A	US42510268	01/24/2015
EMI Test Receiver	R&S	ESCI	100064	05/30/2015
Bilog Antenna	Sunol Sciences	JB3	A030105	08/19/2015
Horn Antenna	EMCO	3117	00055165	02/04/2015
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
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., Lujhu Township, Taoyuan County 33841, TAIWAN, R.O.C.
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 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 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	TAF Testing Laboratory 1309
Canada	Industry Canada	3M Semi Anechoic Chamber (IC 2324G-1 / IC 2324G-2) to perform	Canada 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 I for the actual connections between EUT and support equipment.

6.2 SUPPORT EQUIPMENT

No.	Device Type	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.*

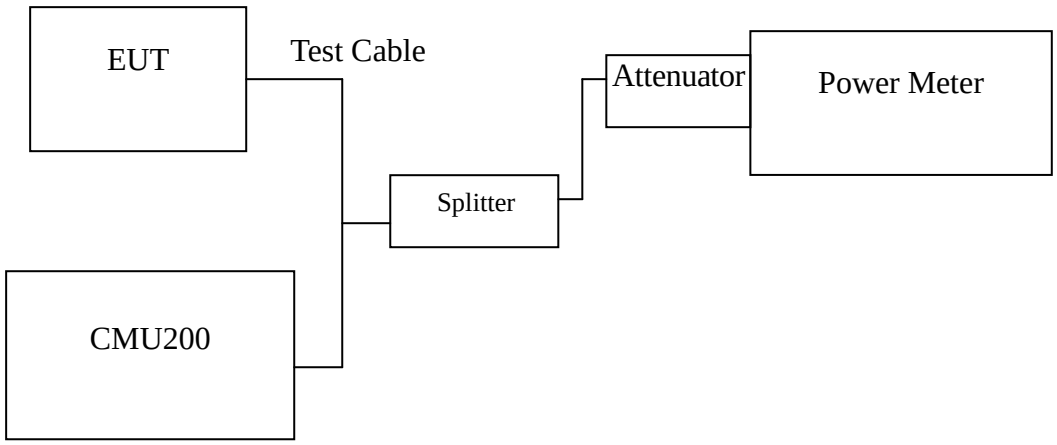
7. FCC PART 22 & 24 REQUIREMENTS

7.1 TRANSMIT POWER

LIMIT

According to FCC §2.1046.

Test Configuration



Remark: *Measurement setup for testing on Antenna connector*

TEST PROCEDURE

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

TEST RESULTS

No non-compliance noted.

Test Data

Average Power

Test Mode	CH	Frequency (MHz)	Average Power (dBm)
CDMA2000 1xRTT Cellular	1013	824.70	24.14
	384	836.52	23.79
	777	848.31	23.61

Test Mode	CH	Frequency (MHz)	Average Power (dBm)
CDMA2000 1xRTT PCS	25	1851.25	24.38
	600	1880.00	24.31
	1175	1908.75	23.85

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

Peak Power

Test Mode	CH	Frequency (MHz)	Peak Power (dBm)
CDMA2000 1xRTT Cellular	1013	824.70	24.35
	384	836.52	24.02
	777	848.31	23.84

Test Mode	CH	Frequency (MHz)	Peak Power (dBm)
CDMA2000 1xRTT PCS	25	1851.25	24.79
	600	1880.00	24.53
	1175	1908.75	24.07

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

7.2 ERP & EIRP MEASUREMENT

LIMIT

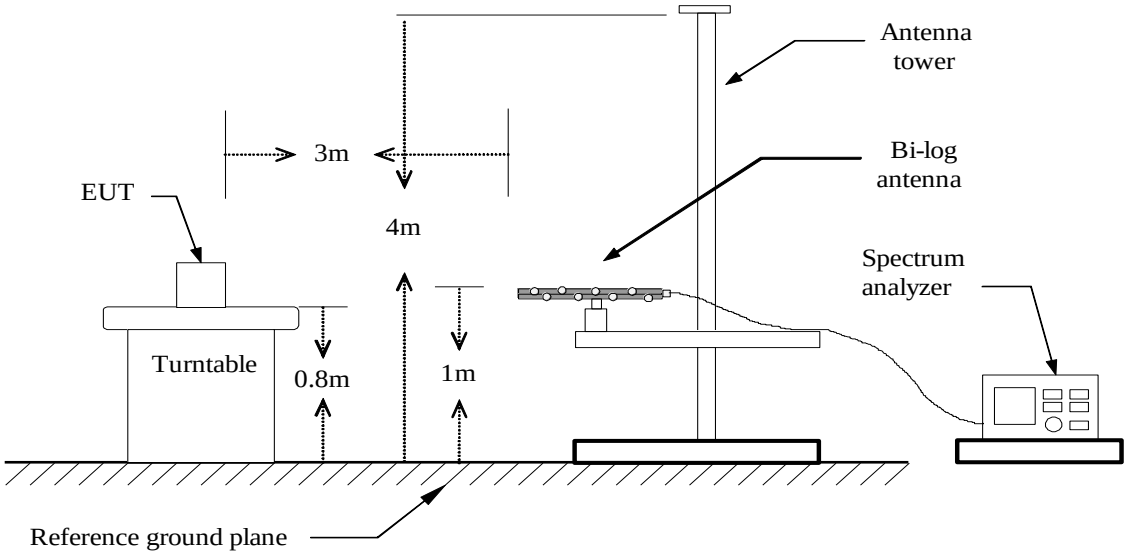
According to FCC §2.1046

FCC 22.913(b): The Effective Radiated Power (ERP) of mobile transmitters must not exceed 7 Watts.

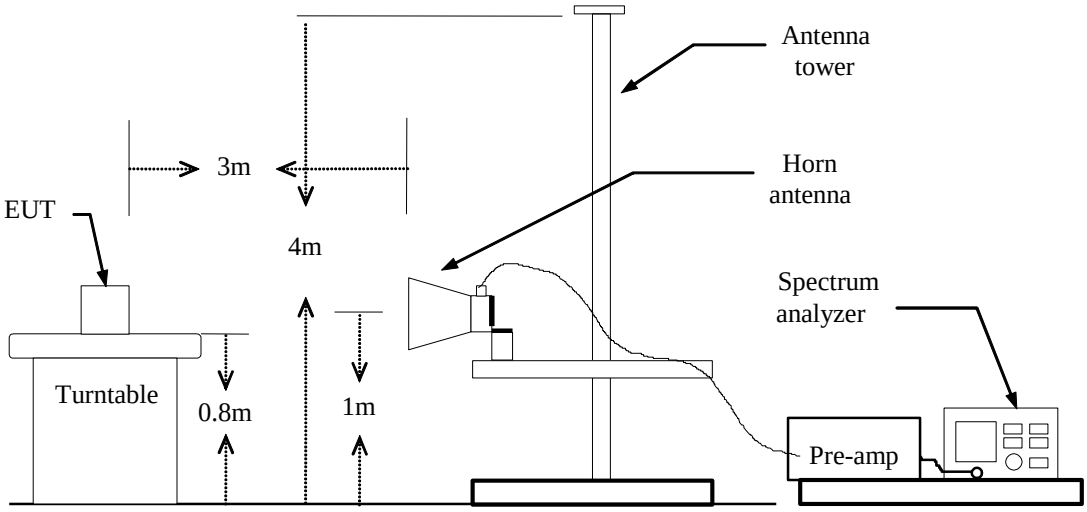
FCC 24.232(b): The equivalent Isotropic Radiated Power (EIRP) must not exceed 2 Watts.

TEST CONFIGURATION

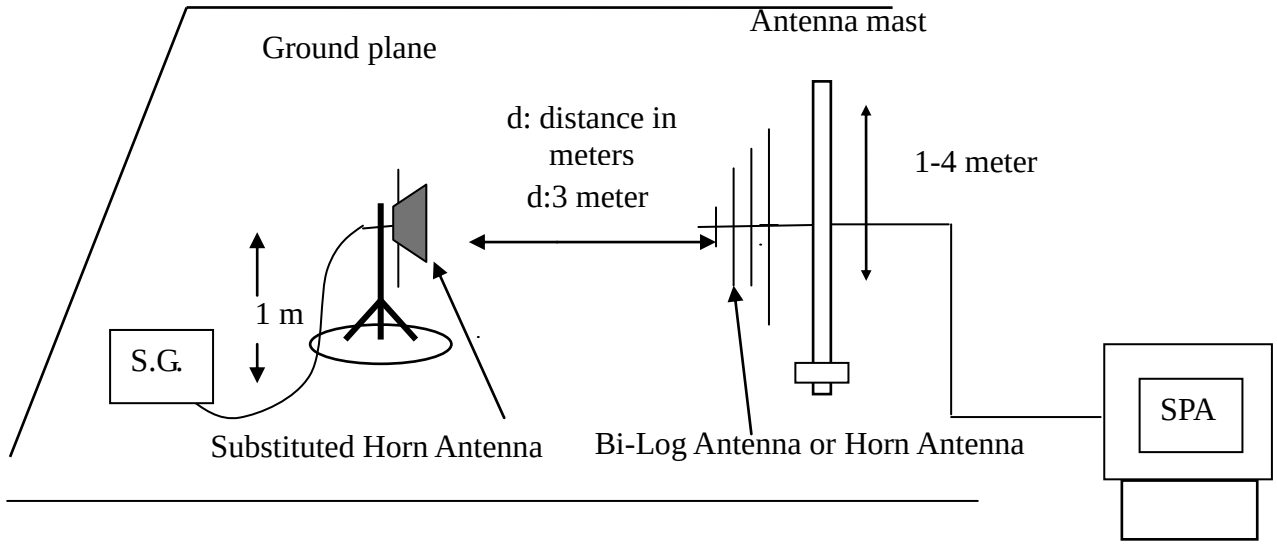
Below 1 GHz



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 to 5MHz and the average bandwidth was set to 50MHz. 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:

ERP = S.G. output (dBm) + Antenna Gain (dBi) – Cable (dB)-2.15
EIRP = S.G. output (dBm) + Antenna Gain (dBi) – Cable (dB)

TEST RESULTS

No non-compliance noted.

CDMA2000 1xRTT Cellular Test Data

EUT Pol.	Channel	Frequency (MHz)	Antenna Pol.	S.G. (dBm)	Cable loss (dB)	Ant.Gain (dBi)	Result (dBm)	Limit (dBm)	Margin (dB)
X	1013	824.8500	V	5.76	3.39	6.24	8.61	38.45	-29.84
		824.7800	H	16.15	3.39	6.24	19.00	38.45	-19.45
	384	836.7500	V	16.56	3.4	6.37	***19.53**	38.45	-18.92
		836.5400	H	6.34	3.4	6.36	9.30	38.45	-29.15
	777	848.0900	V	5.48	3.4	6.4	8.48	38.45	-29.97
		848.3000	H	16.51	3.4	6.4	19.51	38.45	-18.94

CDMA2000 1xRTT PCS Test Data

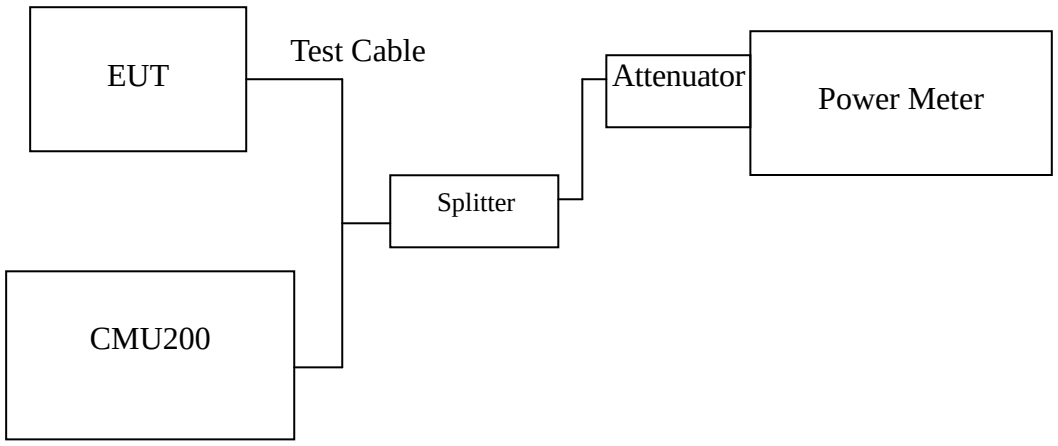
EUT Pol.	Channel	Frequency (MHz)	Antenna Pol.	S.G. (dBm)	Cable loss (dB)	Ant.Gain (dBi)	Result (dBm)	Limit (dBm)	Margin (dB)
Y	25	1851.000	V	26.4	5.37	5.67	26.70	33.00	-6.30
		1851.360	H	20.24	5.37	5.67	20.54	33.00	-12.46
	600	1880.040	V	20.34	5.42	5.62	20.54	33.00	-12.46
		1880.160	H	26.96	5.42	5.62	***27.16**	33.00	-5.84
	1175	1908.600	V	17.89	5.47	5.56	17.98	33.00	-15.02
		1908.600	H	25.88	5.47	5.56	25.97	33.00	-7.03

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.

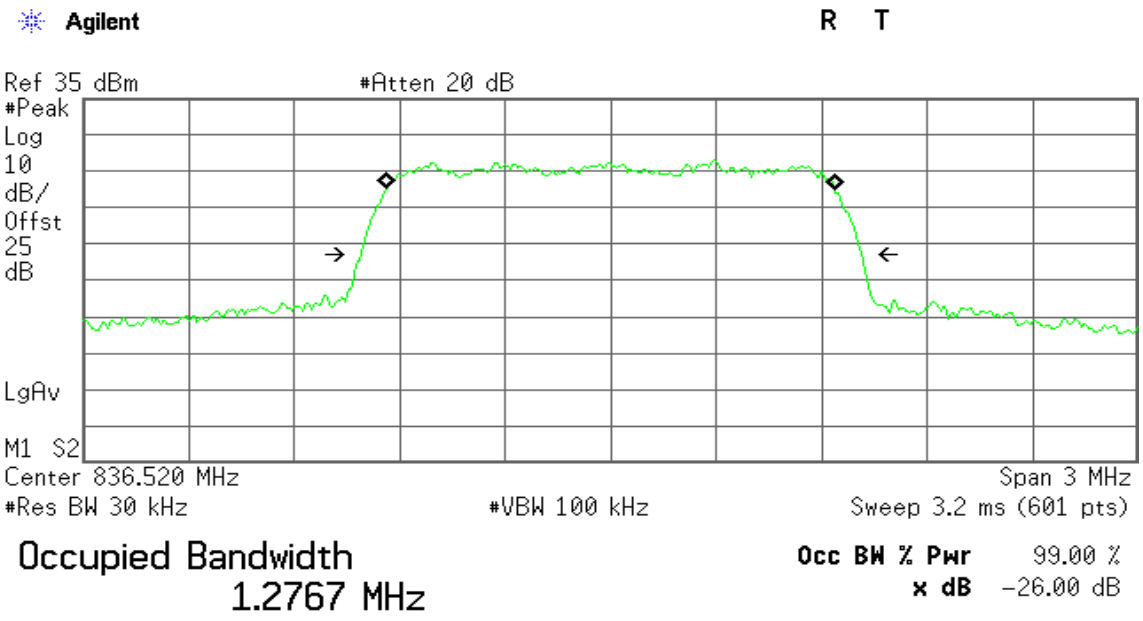
Test Data

Test Mode	CH	Frequency (MHz)	Bandwidth (MHz)
CDMA2000 1xRTT Cellular	1013	824.70	1.2767
	384	836.52	1.2718
	777	848.31	1.2737

Test Mode	CH	Frequency (MHz)	Bandwidth (MHz)
CDMA2000 1xRTT PCS	25	1851.25	1.2811
	600	1880.00	1.2788
	1175	1908.75	1.2783

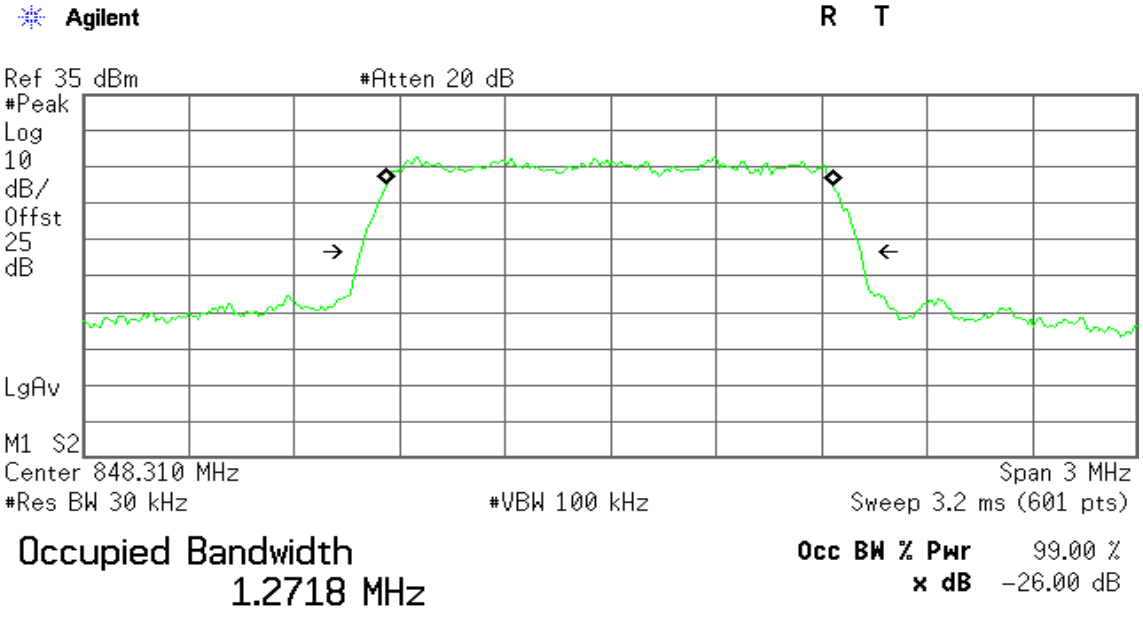
Test Plot

CDMA2000 1xRTT Cellular / CH Low



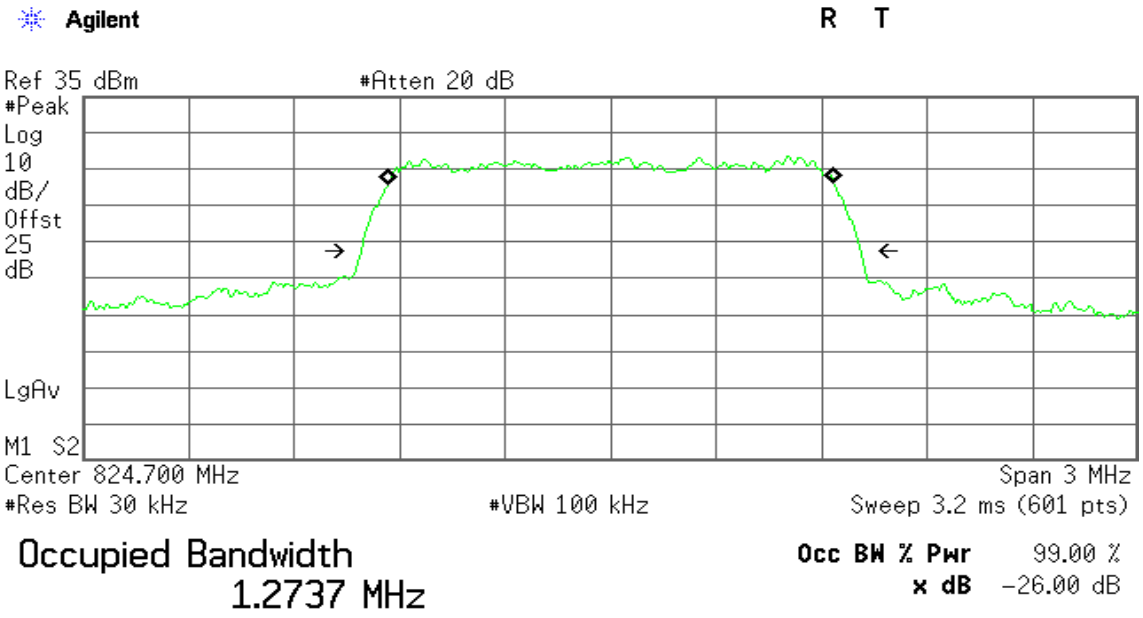
Transmit Freq Error −260.482 Hz
x dB Bandwidth 1.428 MHz

CDMA2000 1xRTT Cellular / CH Mid



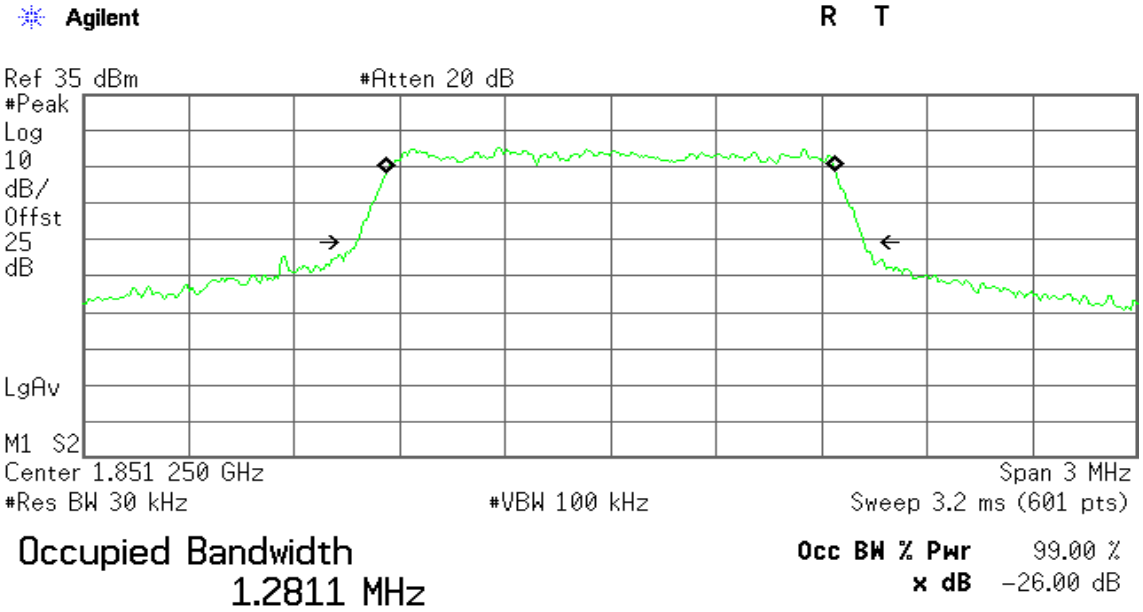
Transmit Freq Error −2.040 kHz
x dB Bandwidth 1.425 MHz

CDMA2000 1xRTT Cellular / CH High



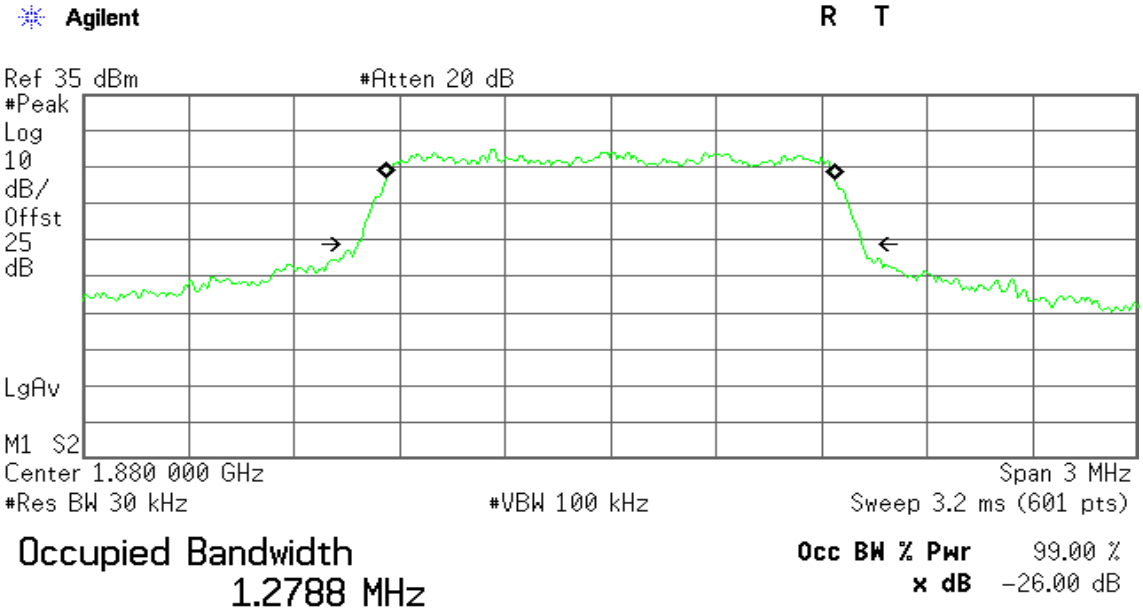
Transmit Freq Error	464.664 Hz
x dB Bandwidth	1.424 MHz

CDMA2000 1xRTT PCS / CH Low



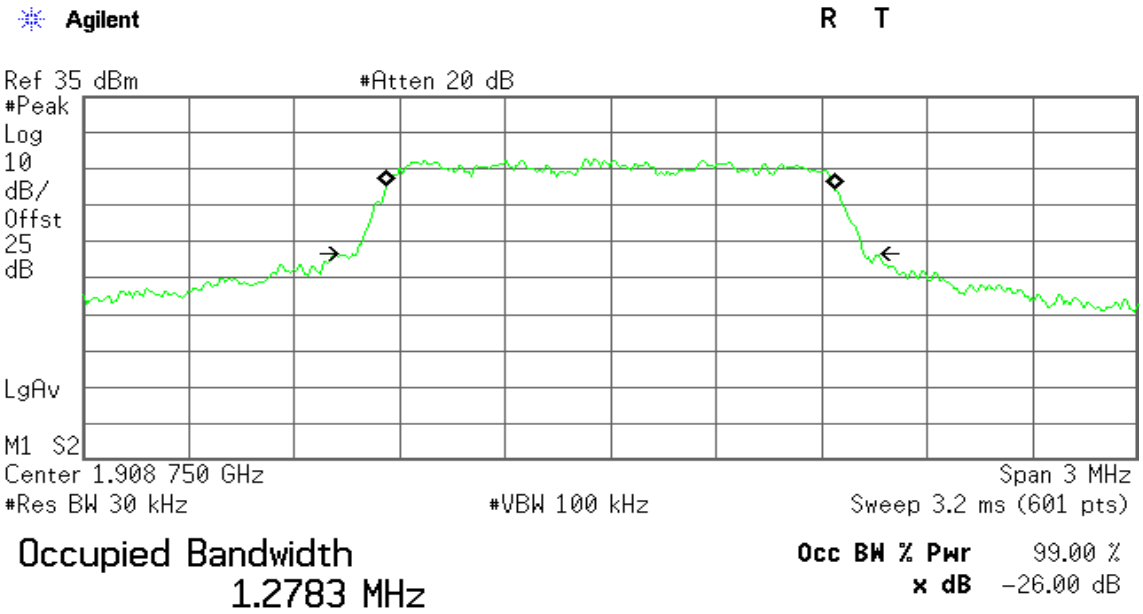
Transmit Freq Error	-163.907 Hz
x dB Bandwidth	1.445 MHz

CDMA2000 1xRTT PCS / CH Mid



Transmit Freq Error	967.237 Hz
x dB Bandwidth	1.439 MHz

CDMA2000 1xRTT PCS / CH High



Transmit Freq Error	-804.264 Hz
x dB Bandwidth	1.445 MHz

7.4 OUT OF BAND EMISSION AT ANTENNA TERMINALS

LIMIT

According to FCC §2.1051, FCC §22.917, FCC §24.238(a).

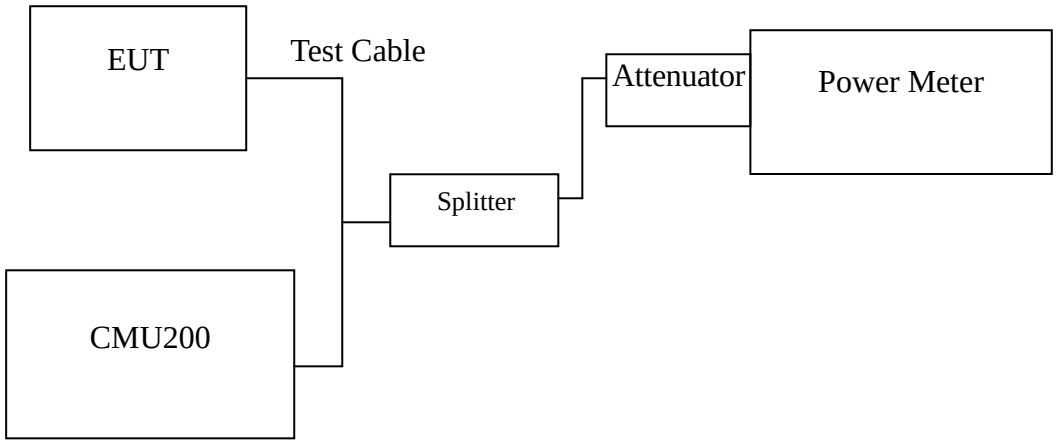
Out of Band Emissions: The mean power of emission must be attenuated below the mean power of the non-modulated carrier (P) on any frequency twice or more than twice the fundamental frequency by at lease 43 + 10 log P dB.

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 lease 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 (824 MHz and 849 MHz /1850MHz and 1910MHz): 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
CDMA2000 1xRTT Cellular	1013	Figure 7-1	Conducted spurious emissions, 30MHz - 20GHz
	384	Figure 7-2	Conducted spurious emissions, 30MHz - 20GHz
	777	Figure 7-3	Conducted spurious emissions, 30MHz - 20GHz

Mode	CH	Location	Description
CDMA2000 1xRTT PCS	25	Figure 9-1	Conducted spurious emissions, 30MHz - 20GHz
	600	Figure 9-2	Conducted spurious emissions, 30MHz - 20GHz
	1175	Figure 9-3.	Conducted spurious emissions, 30MHz - 20GHz

Mode	CH	Location	Description
CDMA2000 1xRTT Cellular	1013	Figure 11-1	Band Edge emissions
	777	Figure11-2	Band Edge emissions

Mode	CH	Location	Description
CDMA2000 1xRTT PCS	25	Figure 13-1	Band Edge emissions
	1175	Figure 13-2	Band Edge emissions

Test Plot

CDMA2000 1xRTT Cellular

Figure 7-1: Out of Band emission at antenna terminals – CDMA2000 1xRTT / CH Low

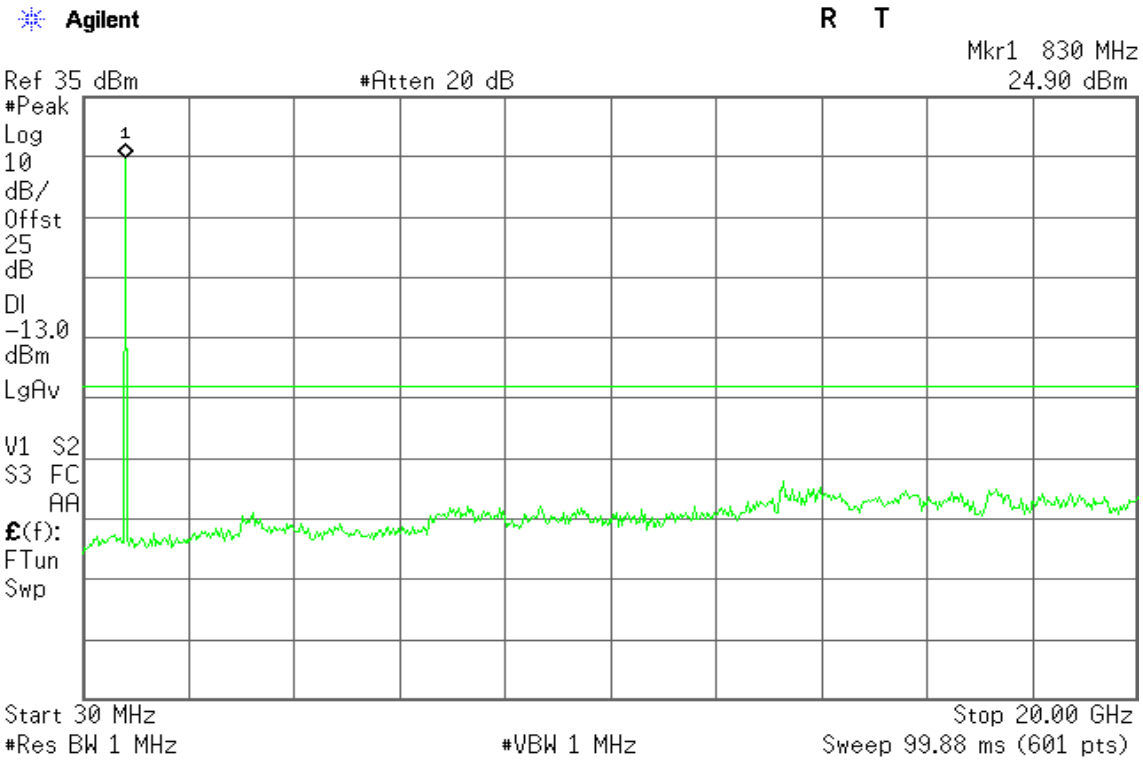


Figure 7-2: Out of Band emission at antenna terminals – CDMA2000 1xRTT / CH Mid

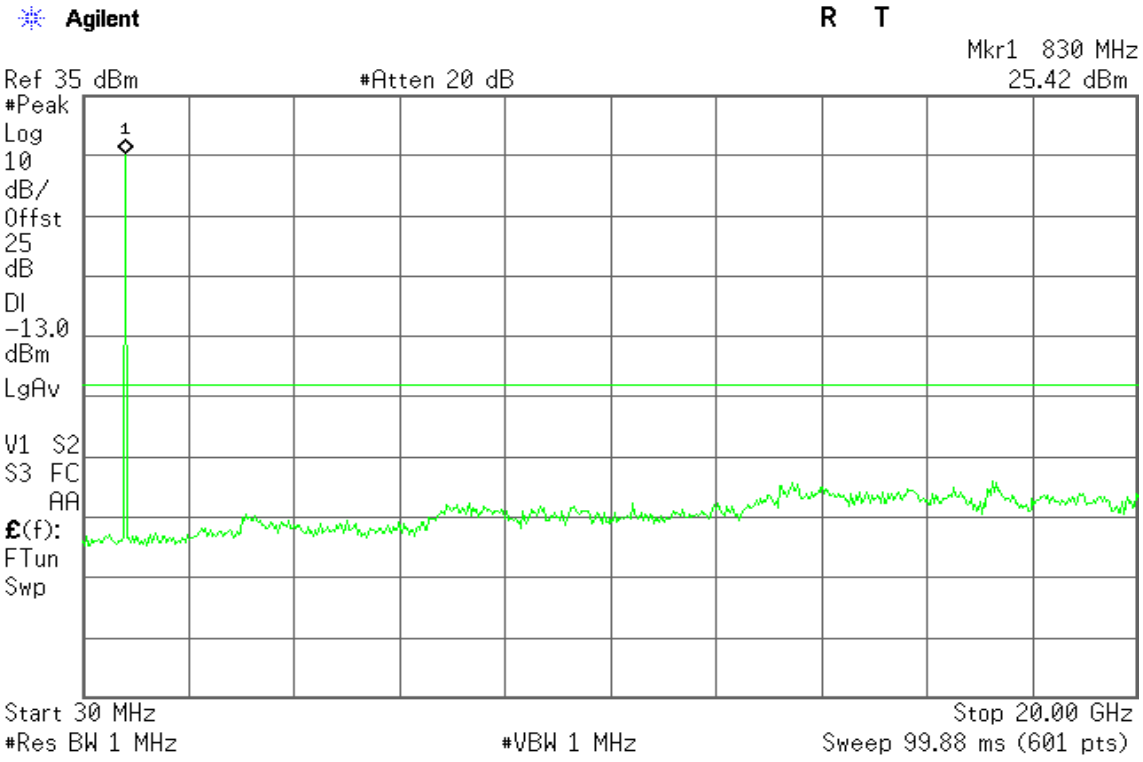
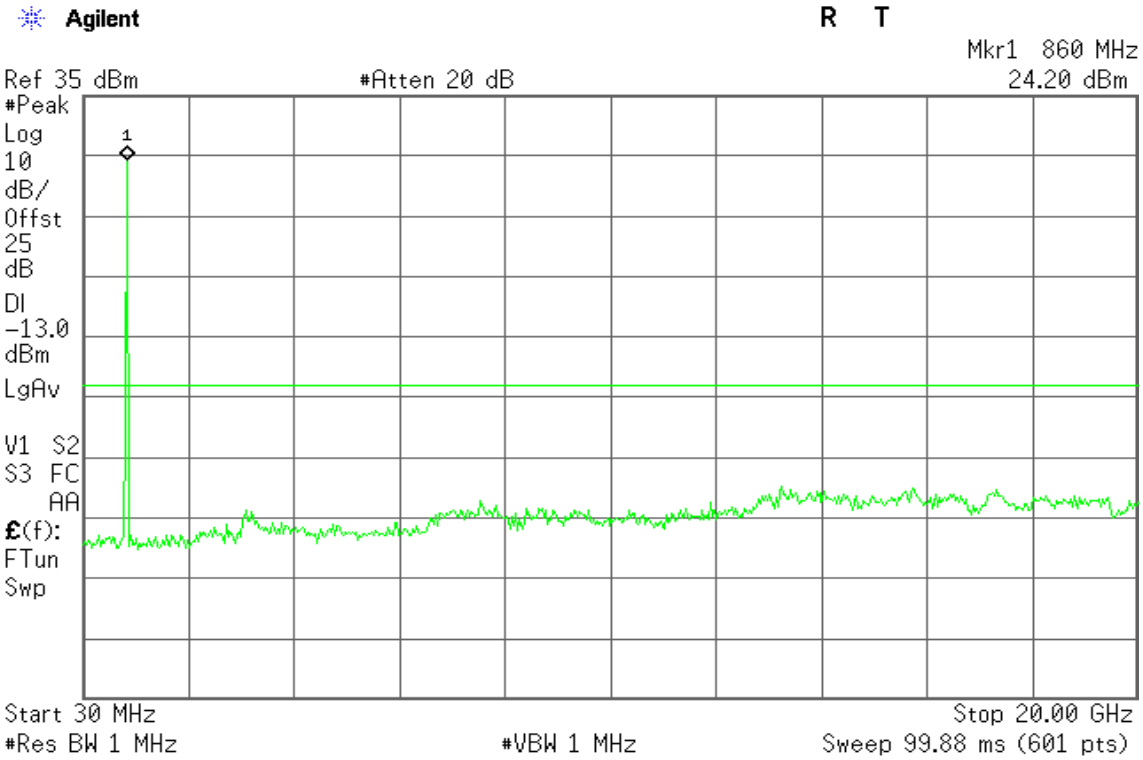


Figure 7-3: Out of Band emission at antenna terminals – CDMA2000 1xRTT / CH High



CDMA2000 1xRTT PCS

Figure 9-1: Out of Band emission at antenna terminals – CDMA2000 1xRTT / CH Low

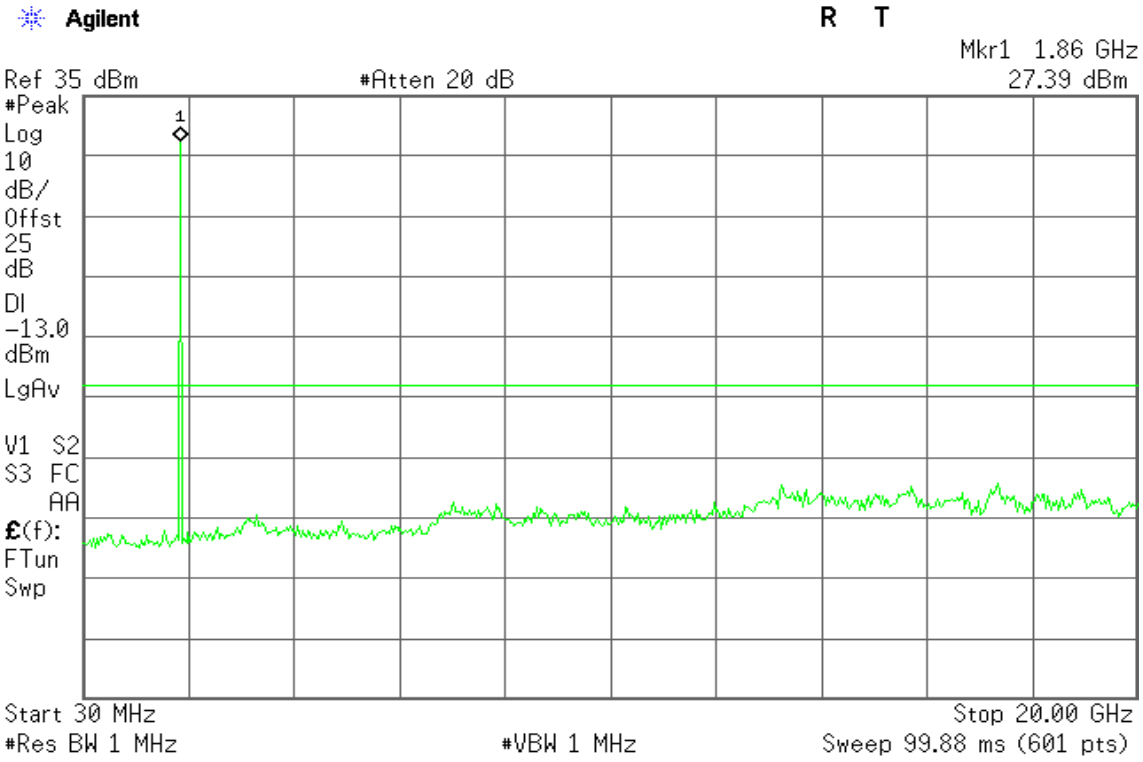


Figure 9-2: Out of Band emission at antenna terminals – CDMA2000 1xRTT / CH Mid

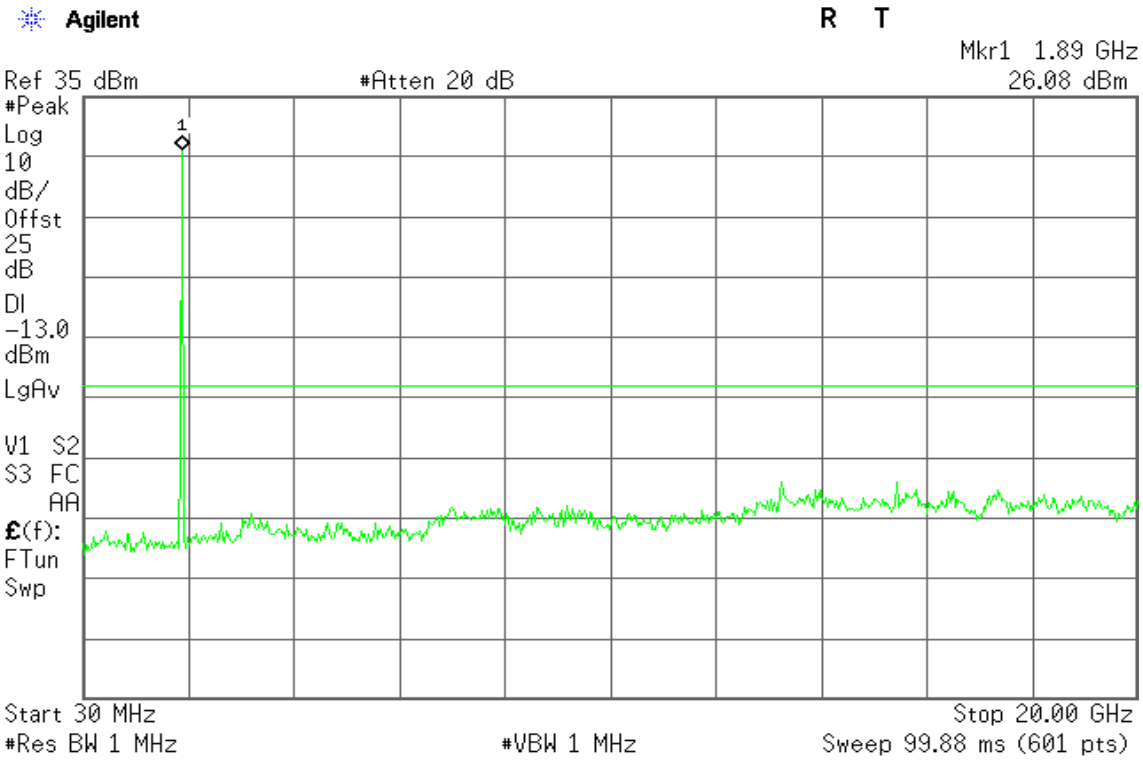
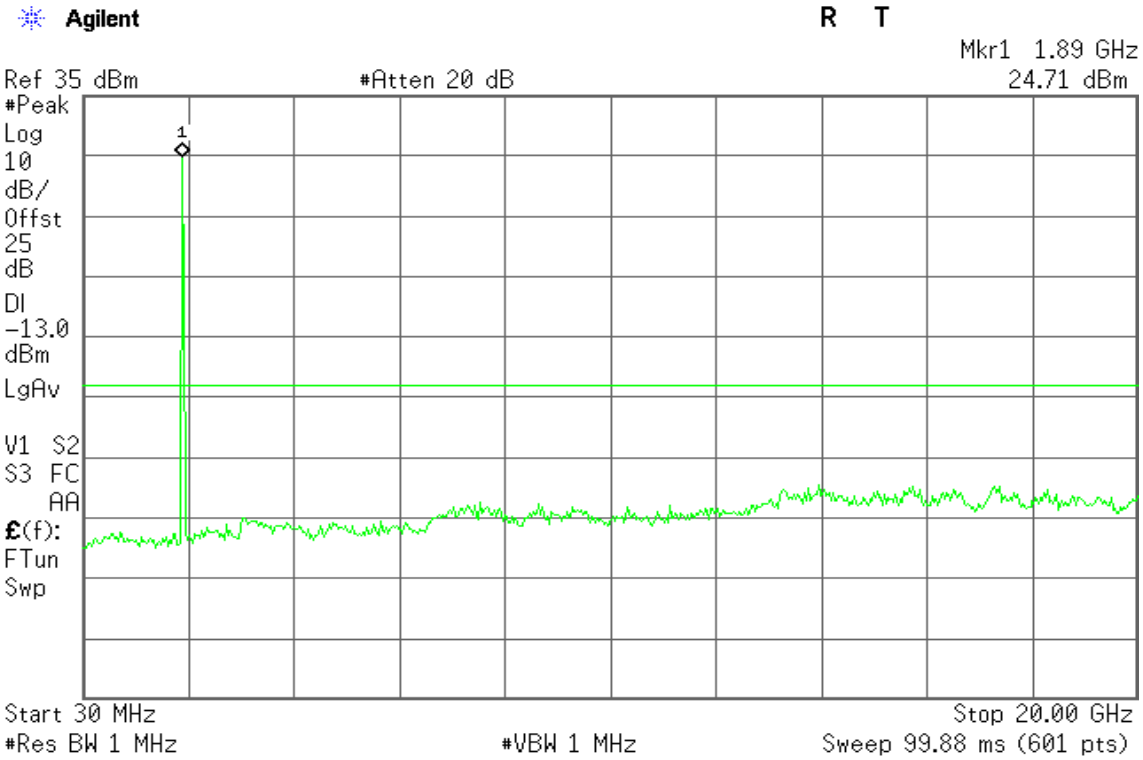


Figure 9-3: Out of Band emission at antenna terminals – CDMA2000 1xRTT / CH High



CDMA2000 1xRTT Cellular

Figure 11-1: Band Edge emissions – CDMA2000 1xRTT / CH Low

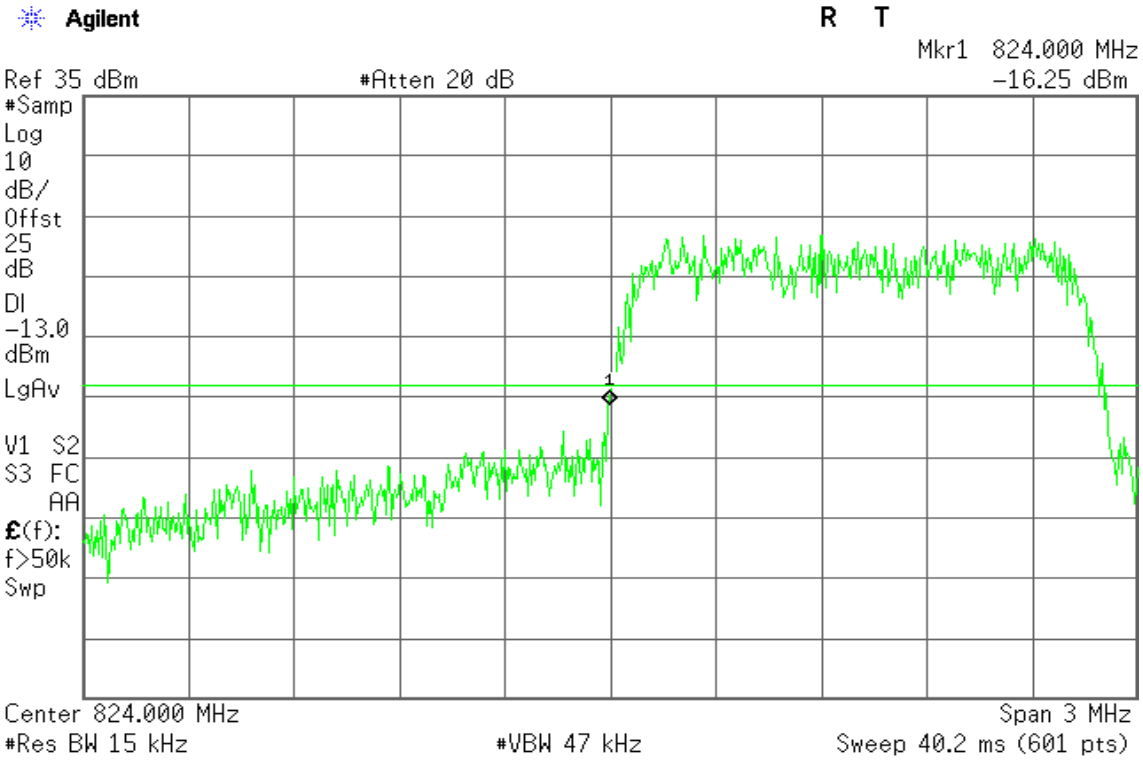
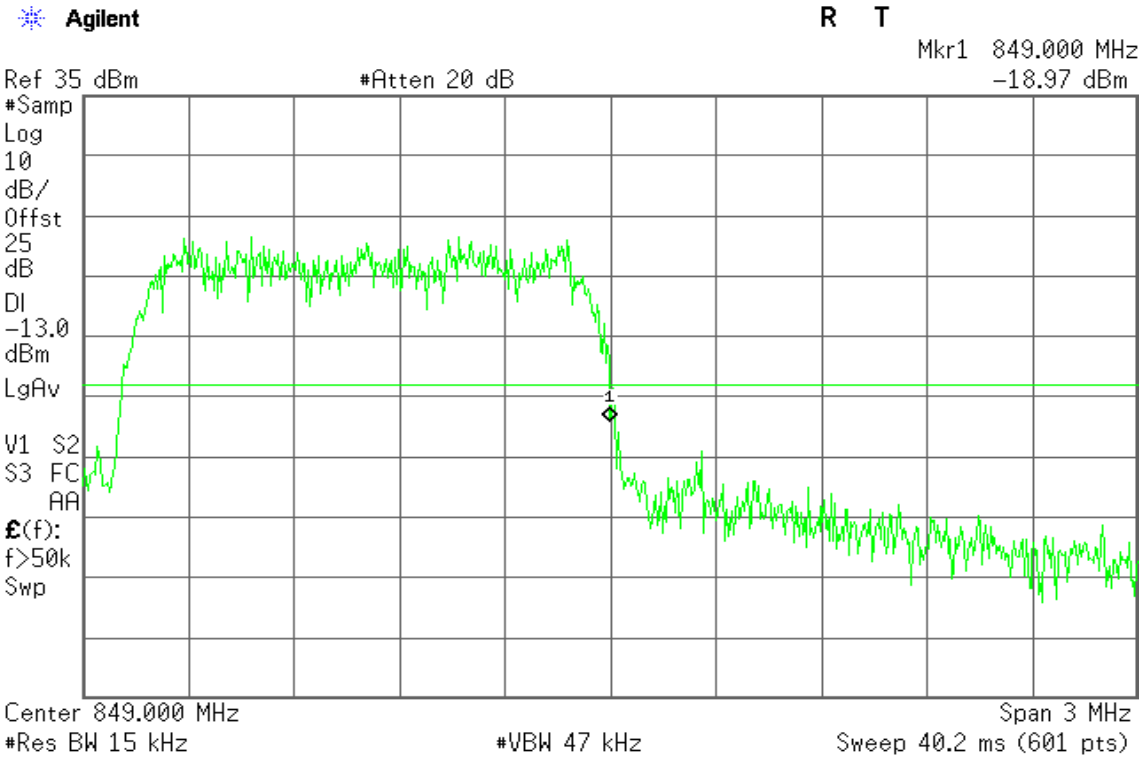


Figure 11-2: Band Edge emissions – CDMA2000 1xRTT / CH High



CDMA2000 1xRTT PCS

Figure 13-1: Band Edge emissions – CDMA2000 1xRTT / CH Low

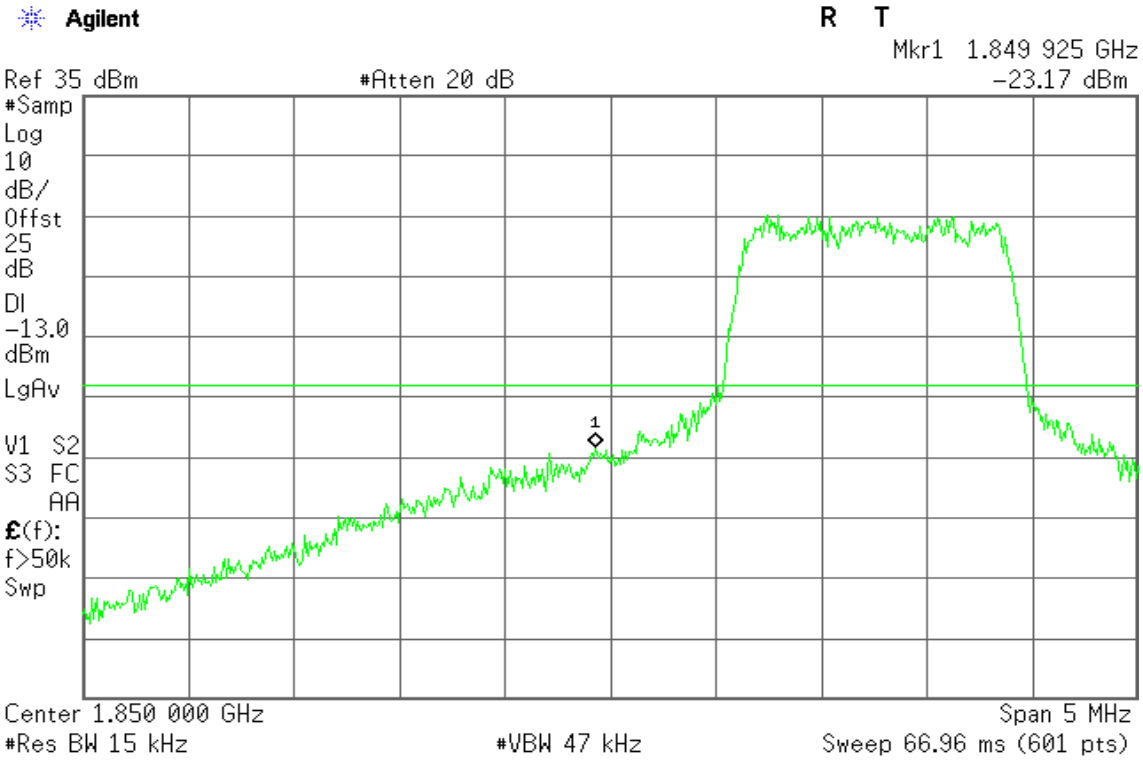
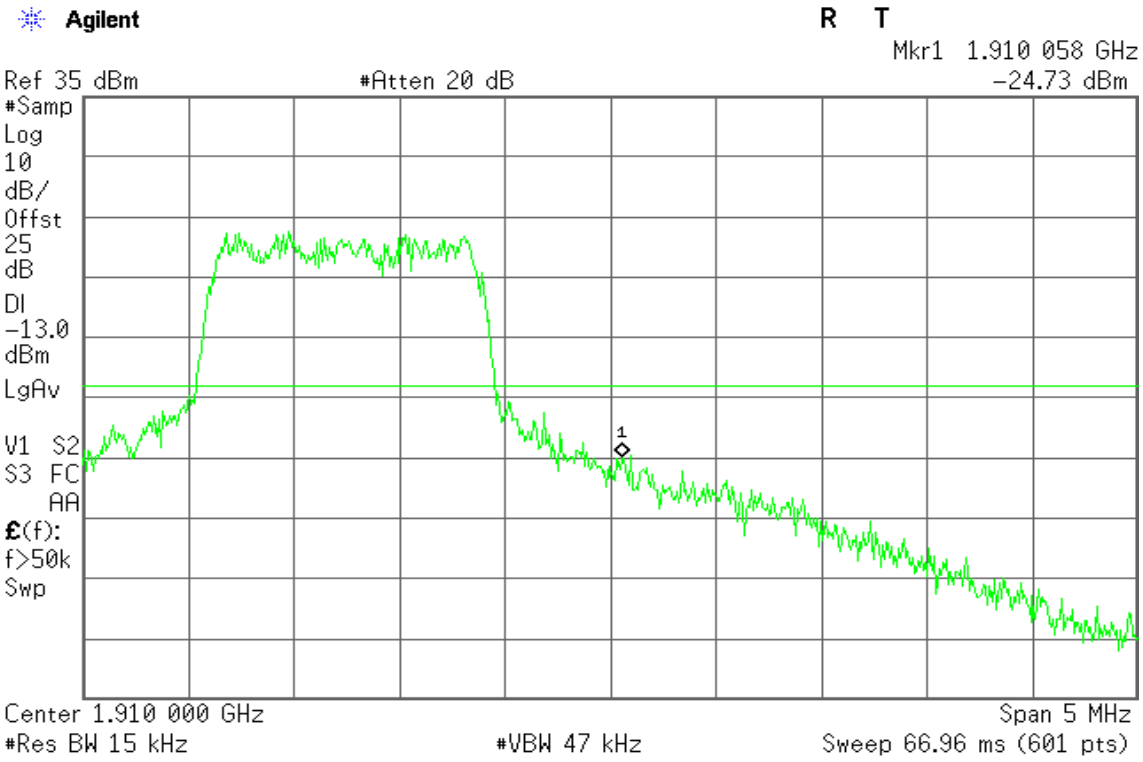


Figure 13-2: Band Edge emissions – CDMA2000 1xRTT / CH High



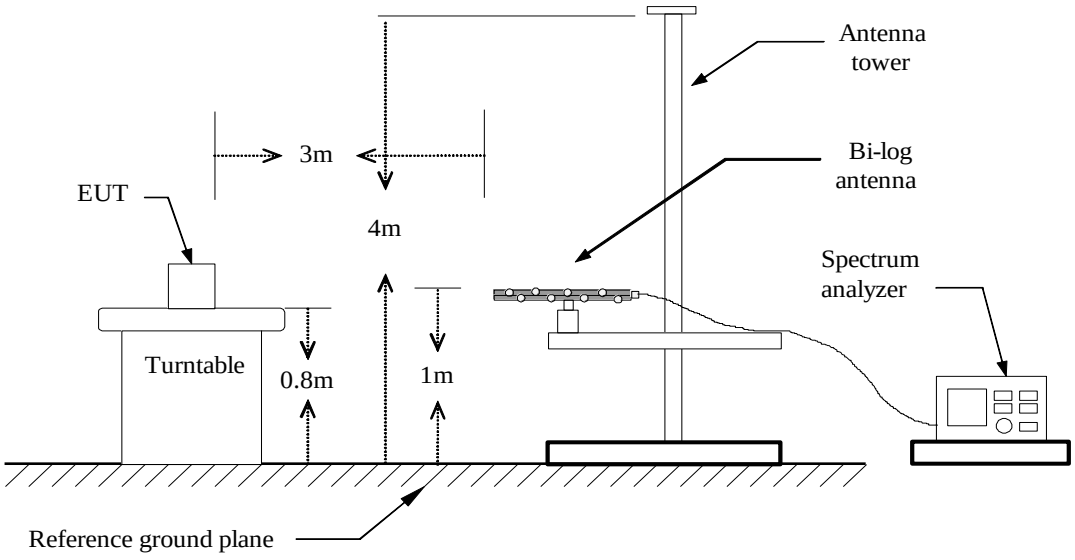
7.5 FIELD STRENGTH OF SPURIOUS RADIATION MEASUREMENT

LIMIT

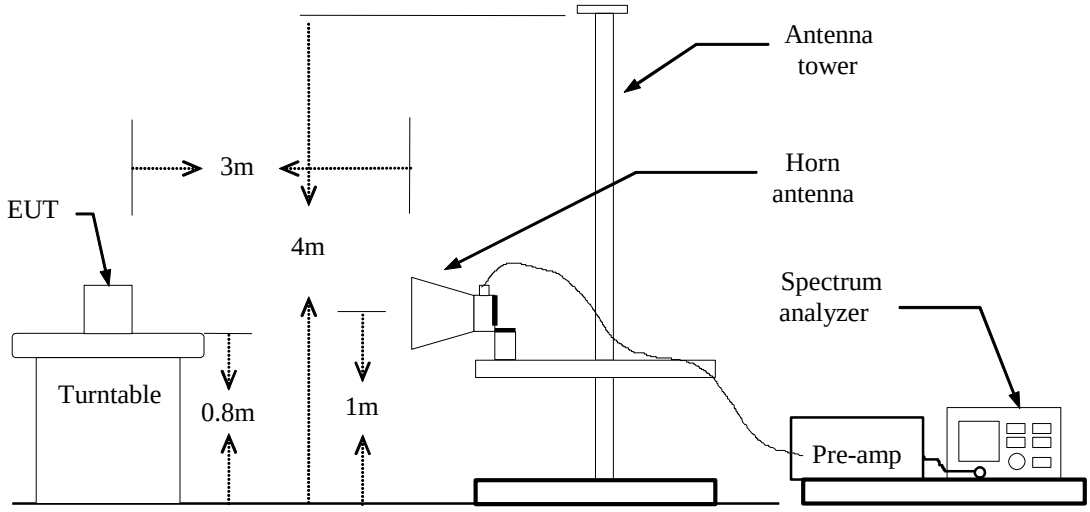
According to FCC §2.1053

Test Configuration

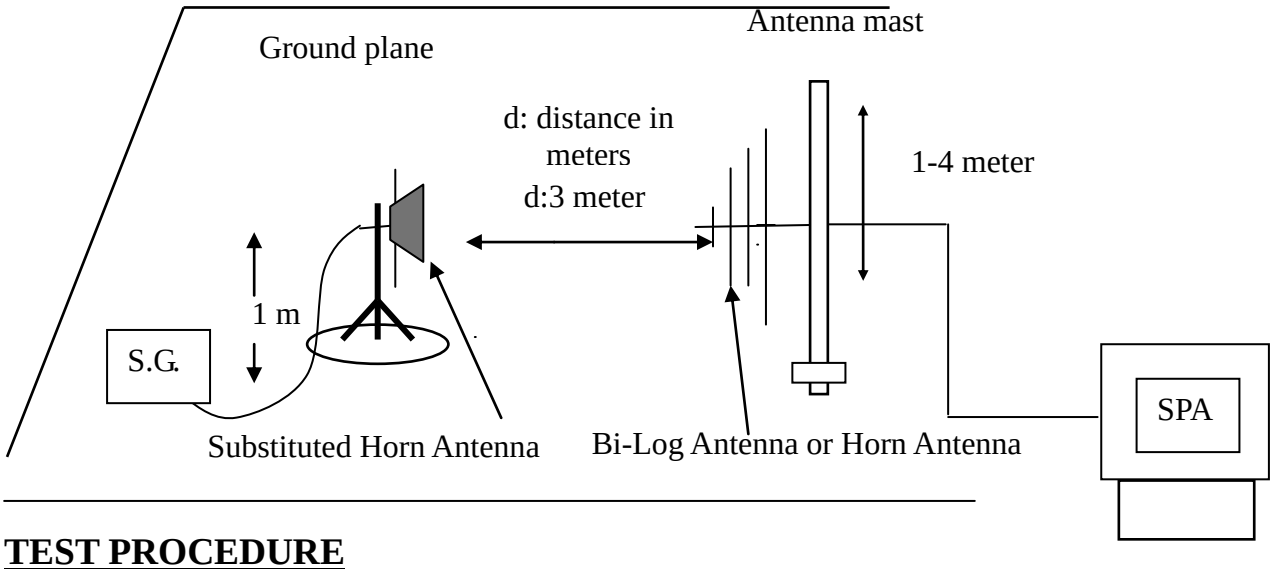
Below 1 GHz



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 = S.G. output (dBm) + Antenna Gain (dBd) – Cable (dB)

EIRP = S.G. output (dBm) + Antenna Gain (dBi) – Cable (dB)

TEST RESULTS

Refer to the attached tabular data sheets.

Radiated Spurious Emission Measurement Result

Below 1GHz

Operation Mode: CDMA2000 / 850 / TX / CH 384 **Test Date:** December 19, 2014

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

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

Frequency (MHz)	S.G. (dBm)	Cable loss (dB)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
166.7700	-77.3	1.54	2.15	-76.69	-13.00	-63.69	V
275.4100	-76.4	1.99	5.21	-73.18	-13.00	-60.18	V
324.8800	-77.95	2.17	5.7	-74.42	-13.00	-61.42	V
375.3200	-74.96	2.31	5.91	-71.36	-13.00	-58.36	V
464.5600	-78.89	2.61	5.84	-75.66	-13.00	-62.66	V
599.3900	-75.46	2.9	6.39	-71.97	-13.00	-58.97	V
126.0300	-69.54	1.32	-1.69	-72.55	-13.00	-59.55	H
191.0200	-77.38	1.62	3.89	-75.11	-13.00	-62.11	H
275.4100	-74.58	1.99	5.21	-71.36	-13.00	-58.36	H
375.3200	-61.75	2.31	5.91	-58.15	-13.00	-45.15	H
504.3300	-69.28	2.7	5.94	-66.04	-13.00	-53.04	H
618.7900	-64.09	2.94	6.12	-60.91	-13.00	-47.91	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: CDMA2000 / 850 / TX / CH 777 **Test Date:** December 19, 2014

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

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

Frequency (MHz)	S.G. (dBm)	Cable loss (dB)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
274.4400	-74.68	1.99	5.19	-71.48	-13.00	-58.48	V
324.8800	-77.29	2.17	5.7	-73.76	-13.00	-60.76	V
375.3200	-74.6	2.31	5.91	-71.00	-13.00	-58.00	V
504.3300	-76.67	2.7	5.94	-73.43	-13.00	-60.43	V
638.1900	-74.62	3	6.14	-71.48	-13.00	-58.48	V
769.1400	-79.6	3.27	6.39	-76.48	-13.00	-63.48	V
174.5300	-76.65	1.59	3	-75.24	-13.00	-62.24	H
275.4100	-74.42	1.99	5.21	-71.20	-13.00	-58.20	H
375.3200	-62.11	2.31	5.91	-58.51	-13.00	-45.51	H
498.5100	-70.52	2.69	5.88	-67.33	-13.00	-54.33	H
600.3600	-63.48	2.9	6.4	-59.98	-13.00	-46.98	H
657.5900	-68.64	3.05	6.3	-65.39	-13.00	-52.39	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: CDMA2000 / 850 / TX / CH 1013 **Test Date:** December 19, 2014

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

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

Frequency (MHz)	S.G. (dBm)	Cable loss (dB)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
150.2800	-77.27	1.43	0.71	-77.99	-13.00	-64.99	V
275.4100	-74.94	1.99	5.21	-71.72	-13.00	-58.72	V
324.8800	-76.37	2.17	5.7	-72.84	-13.00	-59.84	V
375.3200	-74.41	2.31	5.91	-70.81	-13.00	-57.81	V
502.3900	-76.34	2.7	5.92	-73.12	-13.00	-60.12	V
618.7900	-74.81	2.94	6.12	-71.63	-13.00	-58.63	V
324.8800	-70.26	2.17	5.7	-66.73	-13.00	-53.73	H
375.3200	-59.45	2.31	5.91	-55.85	-13.00	-42.85	H
475.2300	-69.99	2.63	5.65	-66.97	-13.00	-53.97	H
533.4300	-66.68	2.76	6.11	-63.33	-13.00	-50.33	H
600.3600	-62.1	2.9	6.4	-58.60	-13.00	-45.60	H
638.1900	-63.25	3	6.14	-60.11	-13.00	-47.11	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: CDMA2000 / 1900 / TX / CH 25 **Test Date:** December 19, 2014

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

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

Frequency (MHz)	S.G. (dBm)	Cable loss (dB)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
275.4100	-80.71	1.99	5.21	-77.49	-13.00	-64.49	V
323.9100	-79.33	2.17	5.7	-75.80	-13.00	-62.80	V
375.3200	-77.44	2.31	5.91	-73.84	-13.00	-60.84	V
502.3900	-79.12	2.7	5.92	-75.90	-13.00	-62.90	V
638.1900	-76.39	3	6.14	-73.25	-13.00	-60.25	V
749.7400	-76.65	3.2	6.1	-73.75	-13.00	-60.75	V
275.4100	-70.1	1.99	5.21	-66.88	-13.00	-53.88	H
375.3200	-61.68	2.31	5.91	-58.08	-13.00	-45.08	H
561.5600	-65.96	2.85	6	-62.81	-13.00	-49.81	H
638.1900	-64.19	3	6.14	-61.05	-13.00	-48.05	H
800.1800	-61.69	3.33	6.52	-58.50	-13.00	-45.50	H
874.8700	-67.43	3.45	6.6	-64.28	-13.00	-51.28	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: CDMA2000 / 1900 / TX / CH 600 **Test Date:** December 19, 2014

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

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

Frequency (MHz)	S.G. (dBm)	Cable loss (dB)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
275.4100	-81.24	1.99	5.21	-78.02	-13.00	-65.02	V
375.3200	-77.97	2.31	5.91	-74.37	-13.00	-61.37	V
504.3300	-78.58	2.7	5.94	-75.34	-13.00	-62.34	V
657.5900	-74.36	3.05	6.3	-71.11	-13.00	-58.11	V
800.1800	-72.42	3.33	6.52	-69.23	-13.00	-56.23	V
874.8700	-77.92	3.45	6.6	-74.77	-13.00	-61.77	V
275.4100	-70.82	1.99	5.21	-67.60	-13.00	-54.60	H
375.3200	-62.43	2.31	5.91	-58.83	-13.00	-45.83	H
504.3300	-70.95	2.7	5.94	-67.71	-13.00	-54.71	H
561.5600	-66.2	2.85	6	-63.05	-13.00	-50.05	H
638.1900	-64.65	3	6.14	-61.51	-13.00	-48.51	H
800.1800	-60.41	3.33	6.52	-57.22	-13.00	-44.22	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: CDMA2000 / 1900 / TX / CH 1175 **Test Date:** December 19, 2014

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

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

Frequency (MHz)	S.G. (dBm)	Cable loss (dB)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
323.9100	-79.48	2.17	5.7	-75.95	-13.00	-62.95	V
375.3200	-78.17	2.31	5.91	-74.57	-13.00	-61.57	V
474.2600	-81.49	2.63	5.68	-78.44	-13.00	-65.44	V
609.0900	-81.05	2.94	6.31	-77.68	-13.00	-64.68	V
657.5900	-75.22	3.05	6.3	-71.97	-13.00	-58.97	V
800.1800	-71.74	3.33	6.52	-68.55	-13.00	-55.55	V
275.4100	-68.82	1.99	5.21	-65.60	-13.00	-52.60	H
375.3200	-62.13	2.31	5.91	-58.53	-13.00	-45.53	H
561.5600	-66.13	2.85	6	-62.98	-13.00	-49.98	H
618.7900	-62.01	2.94	6.12	-58.83	-13.00	-45.83	H
638.1900	-65.32	3	6.14	-62.18	-13.00	-49.18	H
800.1800	-62.34	3.33	6.52	-59.15	-13.00	-46.15	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: CDMA2000 / 850 / TX / CH 384 **Test Date:** December 19, 2014

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

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

Frequency (MHz)	S.G. (dBm)	Cable loss (dB)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
1672.000	-38.74	5.07	5.99	-37.82	-13.00	-24.82	V
3345.000	-48.44	7.51	8.44	-47.51	-13.00	-34.51	V
N/A							
1672.000	-39	5.07	5.99	-38.08	-13.00	-25.08	H
3345.000	-48.11	7.51	8.44	-47.18	-13.00	-34.18	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: CDMA2000 / 850 / TX / CH 777 **Test Date:** December 19, 2014

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

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

Frequency (MHz)	S.G. (dBm)	Cable loss (dB)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
1693.000	-37.31	5.1	5.95	-36.46	-13.00	-23.46	V
3394.000	-47.71	7.56	8.58	-46.69	-13.00	-33.69	V
N/A							
1693.000	-37.77	5.1	5.95	-36.92	-13.00	-23.92	H
3394.000	-48	7.56	8.58	-46.98	-13.00	-33.98	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: CDMA2000 / 850 / TX / CH 1013 **Test Date:** December 19, 2014

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

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

Frequency (MHz)	S.G. (dBm)	Cable loss (dB)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
1651.000	-40.95	5.05	6.03	-39.97	-13.00	-26.97	V
3296.000	-49.07	7.45	8.29	-48.23	-13.00	-35.23	V
N/A							
1651.000	-41.41	5.05	6.03	-40.43	-13.00	-27.43	H
3296.000	-49.56	7.45	8.29	-48.72	-13.00	-35.72	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: CDMA2000 / 1900 / TX / CH 25 **Test Date:** December 19, 2014

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

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

Frequency (MHz)	S.G. (dBm)	Cable loss (dB)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
3702.000	-38.09	8.2	9.1	-37.19	-13.00	-24.19	V
5592.000	-52.65	10.17	10.82	-52.00	-13.00	-39.00	V
N/A							
3702.000	-36.2	8.2	9.1	-35.30	-13.00	-22.30	H
5550.000	-50.98	10.06	10.81	-50.23	-13.00	-37.23	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: CDMA2000 / 1900 / TX / CH 600 **Test Date:** December 19, 2014

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

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

Frequency (MHz)	S.G. (dBm)	Cable loss (dB)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
3758.000	-39.61	8.23	9.16	-38.68	-13.00	-25.68	V
5956.000	-51.62	10.64	10.89	-51.37	-13.00	-38.37	V
N/A							
3758.000	-38.67	8.23	9.16	-37.74	-13.00	-24.74	H
5641.000	-49.89	10.18	10.83	-49.24	-13.00	-36.24	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: CDMA2000 / 1900 / TX / CH 1175 **Test Date:** December 19, 2014

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

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

Frequency (MHz)	S.G. (dBm)	Cable loss (dB)	Ant.Gain (dBi)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization (V/H)
3821.000	-39.98	8.29	9.22	-39.05	-13.00	-26.05	V
5543.000	-50.42	10.05	10.81	-49.66	-13.00	-36.66	V
N/A							
3821.000	-41.75	8.29	9.22	-40.82	-13.00	-27.82	H
4493.000	-51.25	8.89	9.79	-50.35	-13.00	-37.35	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.*

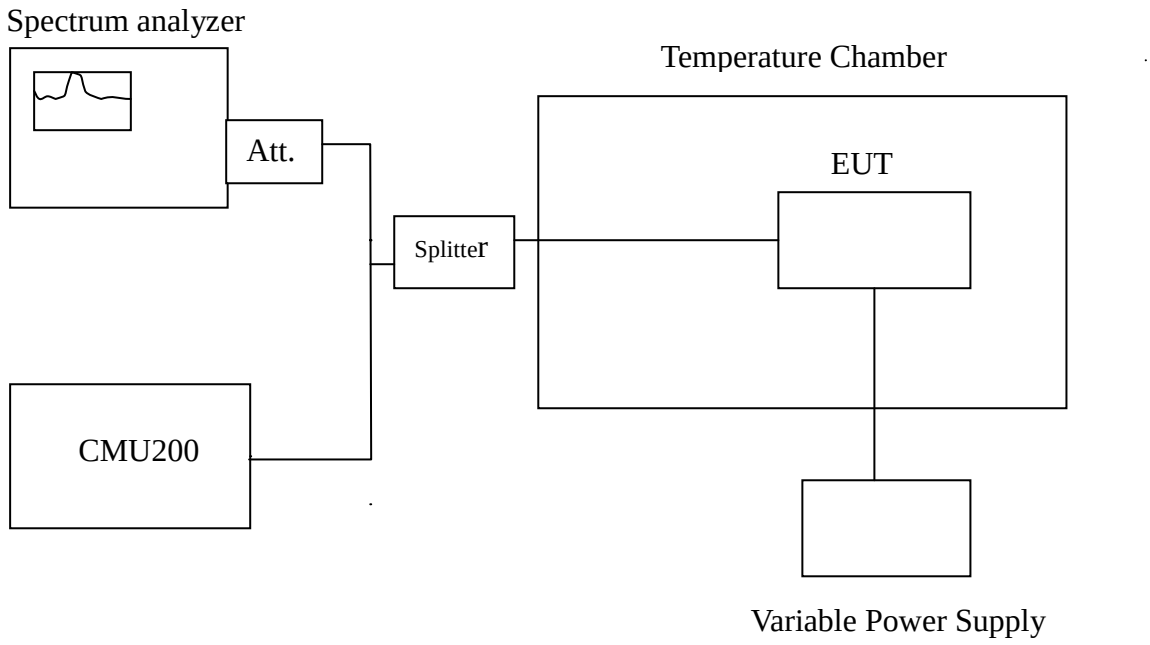
7.6 FREQUENCY STABILITY V.S. TEMPERATURE MEASUREMENT

LIMIT

According to FCC §2.1055, FCC §24.235.

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: CDMA2000 Mid Channel 836.52MHz @ 20℃				
Limit: +/- 2.5 ppm = 2091 Hz				
Power Supply Vdc	**Environment Temperature (℃)**	**Frequency (Hz)**	**Delta (Hz)**	**Limit (Hz)**
110	50	83600000	0	2090
	40	83599999	-1	
	30	83599997	-3	
	20	83600000	0	
	10	83600001	1	
	0	83600002	2	
	-10	83599999	-1	
	-20	83600002	2	
	-30	83599997	-3	

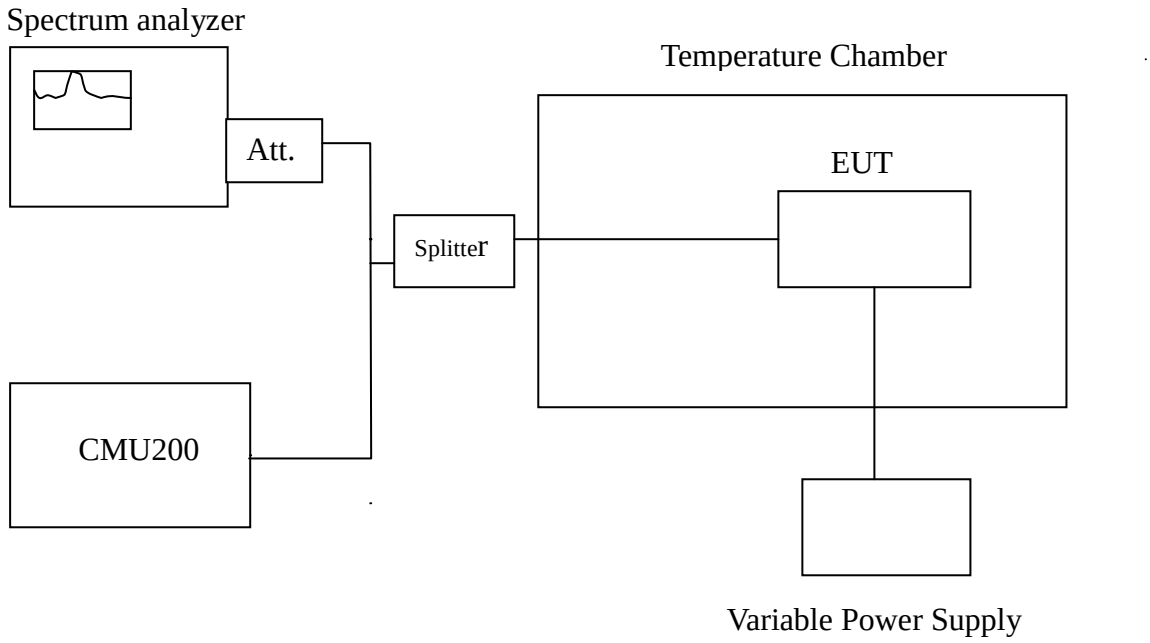
Reference Frequency: CDMA2000 Mid Channel 1880MHz @ 20℃				
Limit: +/- 2.5 ppm = 4700 Hz				
Power Supply Vdc	**Environment Temperature (°C)**	**Frequency (Hz)**	**Delta (Hz)**	**Limit (Hz)**
110	50	1879999999	-3	4700
	40	1880000000	-2	
	30	1880000002	0	
	20	1880000002	0	
	10	1880000000	-2	
	0	1879999999	-3	
	-10	1880000001	-1	
	-20	1880000001	-1	
	-30	1880000000	-2	

7.7 FREQUENCY STABILITY V.S. VOLTAGE MEASUREMENT

LIMIT

According to FCC §2.1055, FCC §24.235,
Frequency Tolerance: 2.5 ppm.

Test Configuration



Remark: *Measurement setup for testing on Antenna connector.*

TEST PROCEDURE

Set chamber temperature to 20℃. 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 (± 15%) and endpoint, record the maximum frequency change.

TEST RESULTS

No non-compliance noted.

Reference Frequency: CDMA2000 Mid Channel 836.52MHz @ 20℃				
Limit: +/- 2.5 ppm = 2091 Hz				
Power Supply Vdc	**Environment Temperature (℃)**	**Frequency (Hz)**	**Delta (Hz)**	**Limit (Hz)**
121	20	83600001	1	2090
110		83600000	0	
99		83600002	2	
89end		83600068	66	

Reference Frequency: CDMA2000 Mid Channel 1880MHz @ 20℃				
Limit: ± 2.5 ppm = 4700 Hz				
Power Supply Vdc	**Environment Temperature (℃)**	**Frequency (Hz)**	**Delta (Hz)**	**Limit (Hz)**
121	20	1880000003	1	4700
110		1880000002	0	
99		1880000004	2	
89end		1880000058	56	