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Report On

Application for Grant of Equipment Authorization of the
Novatel Wireless Inc.
T1114 Wireless Router with Cellular Voice and Data Capabilities

FCC CFR 47 Part 2, Part 22 and Part 24

Report No. SC1307899B_REV1.0

September 2013



REPORT ON Radio Testing of the
Novatel Wireless Inc.
Wireless Router with Cellular Voice and Data Capabilities

TEST REPORT NUMBER SC1307899B_REV1.0

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Revision History

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SECTION 1

REPORT SUMMARY

Radio Testing of the
Novatel Wireless Inc.
Wireless Router with Cellular Voice and Data Capabilities



1.1 INTRODUCTION

The information contained in this report is intended to show verification of the Novatel Wireless Inc. Wireless Router with Cellular Voice and Data Capabilities to the requirements of the following: FCC CFR 47 Part 2, Part 22 and Part 24

Objective	To perform Radio Testing to determine the Equipment Under Test's (EUT's) compliance with the Test Specification, for the series of tests carried out.
Manufacturer	Novatel Wireless Inc.
Model Number(s)	T1114
FCC ID Number	PKRNVWT1114
IC Number	N/A
Serial Number(s)	SEZ100073700166
Number of Samples Tested	1
Test Specification/Issue/Date	FCC CFR 47 Part 2, Part 22 and Part 24 (October 1, 2011).
Start of Test	August 05, 2013
Finish of Test	August 26, 2013
Name of Engineer(s)	Juan Manuel Gonzalez Kathy Mackenzie Alex Chang
Related Document(s)	<ul style="list-style-type: none">Supporting documents for EUT certification are separate exhibits.



1.2 BRIEF SUMMARY OF RESULTS

A brief summary of the tests carried out in accordance with FCC CFR 47 Part 2, Part 22 and Part 24 standard is shown below.

Section	FCC Part Sections(s)	Test Description	Result
2.1	2.1046	Transmitter Conducted Output Power	Compliant
2.2	22.913(a)(2), 2.1046	Effective Radiated Power	Compliant
2.3	24.232(c),2.1046	Equivalent Isotropic Radiated Power	Compliant
2.4	2.1049,22.917(b), 24.238(b)	Occupied Bandwidth	Compliant
2.5	24.232(d)	Peak-Average Ratio	Compliant
2.6	2.1051,22.917(a), 24.238(a)	Band Edge/Conducted Spurious Emissions	Compliant
2.7	2.1053,22.917(a), 24.238(a)	Field Strength Of Spurious Radiation	Compliant
2.8	2.1055,22.355,24.235	Frequency Stability	Compliant



1.3 PRODUCT INFORMATION

1.3.1 EUT General Description

The Equipment Under Test (EUT) was a Novatel Wireless Inc. T1114 Wireless Router with cellular voice and data capabilities. The EUT is a wireless device that delivers Internet connectivity and telephone service, it uses LTE Bands 4 and 13 / CDMA BC0 & BC1. The EUT can make a phone call, connect up to 10 devices via Wi-Fi (b/g/n 2.4GHz and a/n 5 GHz UNII-1 and UNII-3) and connect up to 3 devices via Ethernet, simultaneously.

The EUT poses 2 optional antenna ports accessible to customers to improve the coverage range with Custom design antenna "Sold separately". (See Exhibit PKRNVWT1114_Theory of Operation page 24 - 28).

1.3.2 EUT General Description

EUT Description	T1114 Wireless Router with Cellular Voice and Data Capabilities
Model Number(s)	T1114
FCC Classification	PCB - PCS Licensed Transmitter
Rated Voltage	Ac DC Converter: 100-240VAC 50/60Hz to 5.0 VDC /3.5A Nominal voltage.
Mode	CDMA BC0 & BC1
Capability	CDMA BC0 (CELL) & BC1(PCS) , Band 4 (1.4,3.0, 5.0, 10, 15 and 20MHz BW) and 13 (5 and 10MHz BW) LTE, 802.11 b/g/n 2.4GHz & , 802.11 a/n 5 GHz.
Frequency Tolerance	±0.00025% (2.5ppm)
Primary Unit (EUT)	<input type="checkbox"/> Production <input type="checkbox"/> Pre-Production <input checked="" type="checkbox"/> Engineering



Internal Antennas Details
(Client declaration, max. antenna
gain covered under this test report)

WWAN Antenna – CDMA

Manufacturer: Pulse
Part Number: DA-010190774
Type: PIFA
Antenna Gain:

- CDMA BC0 – 850MHz: -0.59dBi
- CDMA BC1 – 1880MHz: -0.82dBi

WWAN Antenna – LTE Band 13/4

Manufacturer: Pulse
Part Number: DA-01019775
Type: PIFA
Antenna Gain:

- LTE B13 – 700MHz: 1.21dBi
- LTE B4 – 1700MHz: 2.44dBi

WLAN – Antenna: 802.11 a/b/g/n

Manufacturer: Murata
Part Number: 12023199
Type: CERAMIC CHIP
Antenna Gain:

- 802.11 b/g/n 2.4GHz: 2.99dBi
- 802.11 a/n 5GHz: 3.02dBi



1.3.3 Transmit Frequency Table

Mode	Tx Frequency (MHz)	Emission Designator	ERP/EIRP	
			Max. Power (dBm)	Max. Power (W)
CDMA850	824-849	1M28F9W	20.88(ERP)	0.12246
CDMA1900	1850-1910	1M28F9W	23.46(EIRP)	0.22181



1.4 EUT TEST CONFIGURATION

1.4.1 Test Configuration Description

Test Configuration	Description
A	Conducted antenna port measurement. EUT Tx a max power and connected to supply AC-DC power adapter.
B	Radiated test setup. EUT connected wirelessly with the wideband radio communication tester (CMW500, Tx a max power and connected to supply AC-DC power adapter).
C	Rx mode. EUT in Idle mode connected to supply AC-DC power adapter.

1.4.2 EUT Exercise Software

Before each test, the EUT is configured using Qualcomm Radio Control Toolkit version 3.0.11.0. The software allows configuration of channels, mode + data rate and power level. Power level is set according to manufacturer specification for each mode (802.11 b/g/n and 802.11 a/n).

1.4.3 Support Equipment and I/O cables

Manufacturer	Equipment/Cable	Description
Dell	Support Laptop	Novatel Wireless Test configuration Support Laptop
LUXSHARE-ICT	USB cable	Shielded, Type A to Micro USB (0.912 meter) USB Revision 2.0

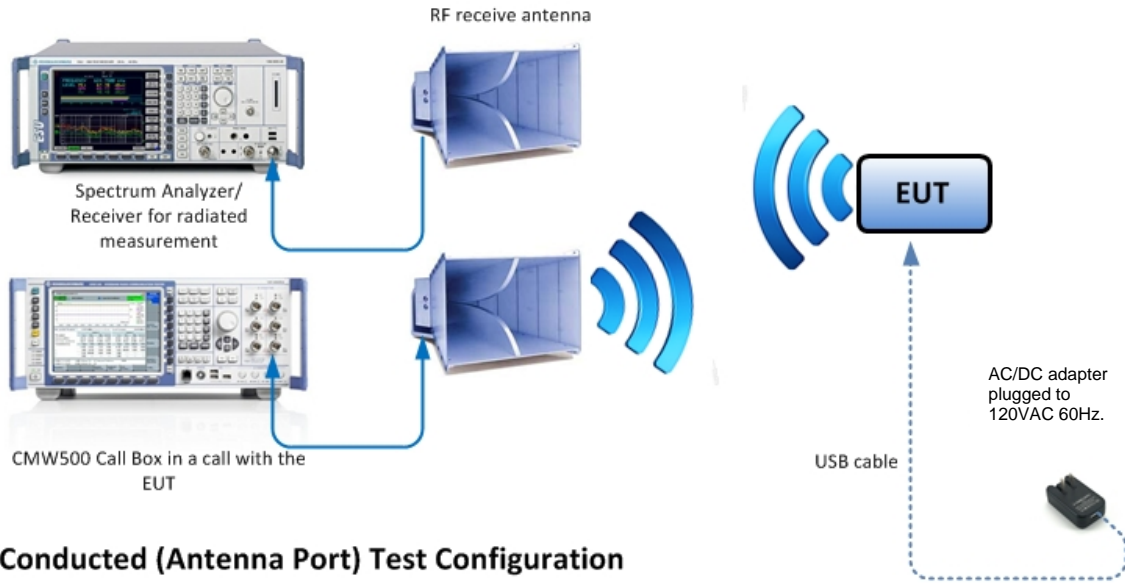
1.4.4 Worst Case Configuration

CDMA200	Channel/Freq(MHz)	SO/RC
BC0 (CELL)	1013/f=824.7	1/1_1
BC1(PCS)	1175/1908.75	73/4_3

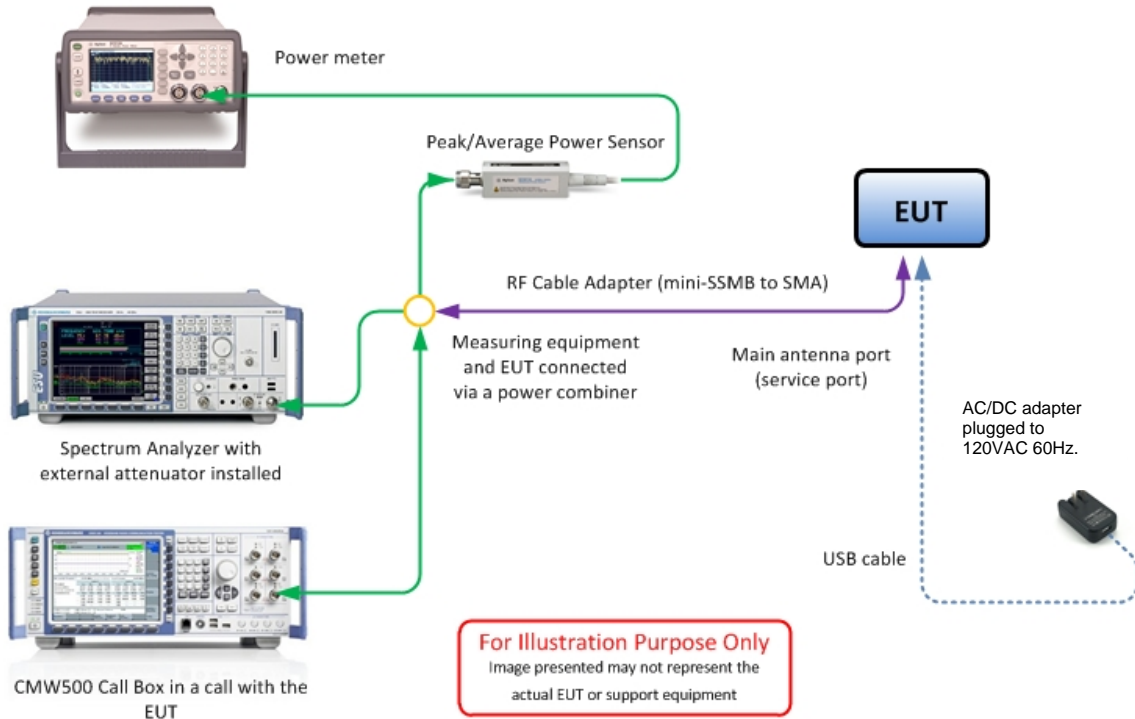
EUT is designed for indoor use a table top operation, for radiated spurious measurement only default configuration was evaluated (See test setup picture exhibit).

1.4.5 Simplified Test Configuration Diagram

Radiated Test Configuration/Conducted Emissions Test Configuration



Conducted (Antenna Port) Test Configuration





1.5 DEVIATIONS FROM THE STANDARD

No deviations from the applicable test standards or test plan were made during testing.

1.6 MODIFICATION RECORD

Description of Modification	Modification Fitted By	Date Modification Fitted
Serial Number SEZ100073700166		
N/A		

The table above details modifications made to the EUT during the test programme. The modifications incorporated during each test (if relevant) are recorded on the appropriate test pages.

1.7 TEST METHODOLOGY

All measurements contained in this report were conducted with ANSI C63.4-2009, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz. Effective Radiated Power (ERP) and Equivalent Isotropic Radiated Power (EIRP) measurements by Substitution method were conducted according to ANSI/TIA/EIA-603-C-2004, August 17,2004. Land Mobile FM or PM -Communications Equipment -Measurement and Performance Standards. For conducted and radiated emissions the equipment under test (EUT) was configured to measure its highest possible emission level. This level was based on the maximized cable configuration from exploratory testing per ANSI C63.4-2009. The test modes were adapted according to the Operating Instructions provided by the manufacturer/client.

1.8 TEST FACILITY

1.8.1 FCC – Registration No.: US5296

TUV SUD America Inc. (San Diego), a \$2.498 listed test firm operates the EMC Laboratory registered under Sony Electronics Inc. Product Quality Division EMC. This laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files and the Registration is US5296.

1.8.2 Industry Canada (IC) Registration No.: 3067A-1

The 10m Semi-anechoic chamber of TUV SUD America Inc. (San Diego), has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No. 3067A-1.



1.9 SAMPLE CALCULATIONS

1.9.1 CDMA Emission Designator

Emission Designator = 1M30F9W
 F = Frequency Modulation
 9= Composite Digital Info
 W = Combination (Audio/Data)

1.9.2 Spurious Radiated Emission (below 1GHz)

Measuring equipment raw measurement (dBµV/m) @ 30 MHz			24.4
Correction Factor (dB)	Asset# 1066 (cable)	0.3	-12.6
	Asset# 1172 (cable)	0.3	
	Asset# 1016 (preamplifier)	-30.7	
	Asset# 1175(cable)	0.3	
	Asset# 1002 (antenna)	17.2	
Reported QuasiPeak Final Measurement (dBµV/m) @ 30MHz			11.8

1.9.3 Spurious Radiated Emission – Substitution Method

Example = 84dBµV/m @ 1413 MHz (numerical sample only)

The field strength reading of 84dBµV/m @ 1413 MHz (2nd Harmonic of 706.5 MHz) is the maximized measurement when the EUT is on the turntable measured at 3 meters. The gain of the substituted antenna is 7.8dBi while the transmit cable loss is 1.0 dB (cable between signal generator and the substituted antenna). The signal generator level is adjusted until the 84dBµV/m level at the receiving end is replicated (identical test setup, i.e. same antenna, cable/s and preamp). If the adjusted signal generator level is -18dBm, then we have the following for both EIRP and ERP as required:

$$\begin{aligned}
 P_{EIRP} &= -18 \text{ dBm} + 7.8 \text{ dBi} - 1 \text{ dB} \\
 &= 11.2 \text{ dBm} \\
 P_{ERP} &= P_{EIRP} - 2.15 \text{ dB} \\
 &= 11.2 \text{ dBm} - 2.15 \text{ dB} \\
 &= 9.05 \text{ dBm}
 \end{aligned}$$



SECTION 2

TEST DETAILS

Radio Testing of the
Novatel Wireless Inc.
Wireless Router with Cellular Voice and Data Capabilities



2.1 TRANSMITTER CONDUCTED POWER MEASUREMENTS

2.1.1 Specification Reference

Part 2.1046

2.1.2 Standard Applicable

The conducted power measurements were made in accordance to FCC Part 2.1046

2.1.3 Equipment Under Test and Modification State

Serial No: SEZ100073700166 / Default Test Configuration

2.1.4 Date of Test/Initial of test personnel who performed the test

August 19, 2013/KM and JMG

2.1.5 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.1.6 Additional Observations

- This is a Conducted Test, All SO/RC evaluated, only worst case presented/recorded in this report.

2.1.7 Test Results

See attached table.



CDMA-2000				
	Channel	Frequency (MHz)	Max Power (dBm)	Service Option (SO) / (RC)
Cellular	1013	824.70	23.62	01 / 1_1
	384	836.52	23.61	68 / 1_1
	777	848.31	23.44	55 / 5_4
PCS	25	1851.25	24.03	73 / 4_3
	600	1880.00	24.25	01 / 4_3
	1175	1908.75	24.28	73 / 4_3



2.2 EFFECTIVE RADIATED POWER

2.2.1 Specification Reference

Part 22 Subpart H §22.913(a)(2)

2.2.2 Standard Applicable

The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.

2.2.3 Equipment Under Test and Modification State

Serial No: SEZ100073700166 / Default Test Configuration

2.2.4 Date of Test/Initial of test personnel who performed the test

August 26, 2013/ JMG

2.2.5 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.2.6 Environmental Conditions

Ambient Temperature	24.9°C
Relative Humidity	49.2%
ATM Pressure	98.6 kPa

2.2.7 Additional Observations

- ERP was calculated as per Section 1.3.2 of KDB412172 D01 (Determining ERP and EIRP v01).
 - Calculation formula in logarithmic terms:
$$\text{ERP} = \text{PT} + \text{GT} - \text{LC} - 2.15\text{dB}$$

Where:
PT = transmitter conducted output power dBm
GT = gain of the transmitting antenna, in dBi (EIRP: the -2.15 in the formula is to convert EIRP to RP);
LC = signal attenuation in the connecting cable between the Test Results

2.2.8 See attached table.



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CDMA2000						
Frequency (MHz)	Conducted Power (dBm)	Antenna Gain (dBi)	ERP (dBm)	ERP (Watts)	ERP Limit (dBm)	Margin (dB)
824.7	23.62	-0.59	20.88	0.12246	38.45	17.57
836.52	23.61	-0.59	20.87	0.12217	38.45	17.58
848.31	23.44	-0.59	20.7	0.1174	38.45	17.75



2.3 EQUIVALENT ISOTROPIC RADIATED POWER

2.3.1 Specification Reference

Part 24 Subpart E §24.234(c)

2.3.2 Standard Applicable

Mobile and portable stations are limited to 2 watts EIRP and the equipment must employ a means for limiting power to the minimum necessary for successful communications.

2.3.3 Equipment Under Test and Modification State

Serial No: SEZ100073700166 / Default Test Configuration

2.3.4 Date of Test/Initial of test personnel who performed the test

August 26, 2013/ JMG

2.3.5 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.3.6 Environmental Conditions

Ambient Temperature	24.9°C
Relative Humidity	49.2%
ATM Pressure	98.6 kPa

2.3.7 Additional Observations

- ERP was calculated as per Section 1.3.2 of KDB412172 D01 (Determining ERP and EIRP v01).
 - Calculation formula in logarithmic terms:
 $ERP = PT + GT - LC$
Where:
PT = transmitter conducted output power dBm
GT = gain of the transmitting antenna, in dBi (EIRP: the -2.15 in the formula is to convert EIRP to RP);
LC = signal attenuation in the connecting cable between the Test Results

2.3.8 Test Results

See attached table.



CDMA2000						
Frequency (MHz)	Conducted Power (dBm)	Antenna Gain (dBi)	ERP (dBm)	ERP (Watts)	ERP Limit (dBm)	Margin (dB)
1851.25	24.03	-0.82	23.21	0.2094	33	9.79
1880.00	24.25	-0.82	23.43	0.2202	33	9.57
1908.75	24.28	-0.82	23.46	0.22181	33	9.54



2.4 OCCUPIED BANDWIDTH

2.4.1 Specification Reference

Part 22 Subpart H §22.917(b) and Part 24 Subpart E §24.238(b)

2.4.2 Standard Applicable

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.

2.4.3 Equipment Under Test and Modification State

Serial No: SEZ100073700166 / Default Test Configuration

2.4.4 Date of Test/Initial of test personnel who performed the test

August 13, 2013/AC, KM, JMG

2.4.5 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.4.6 Environmental Conditions

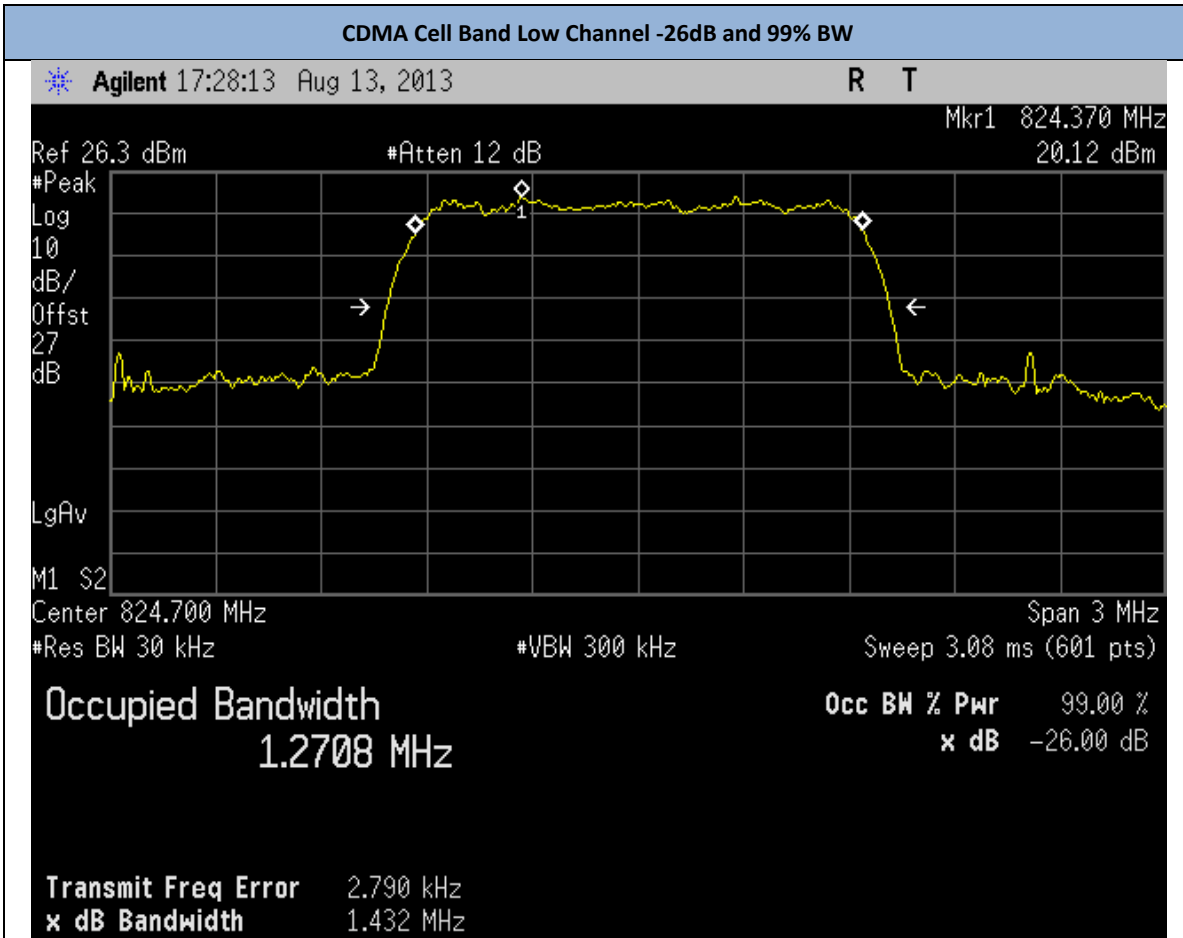
Ambient Temperature	25.3°C
Relative Humidity	49.4%
ATM Pressure	98.8 kPa

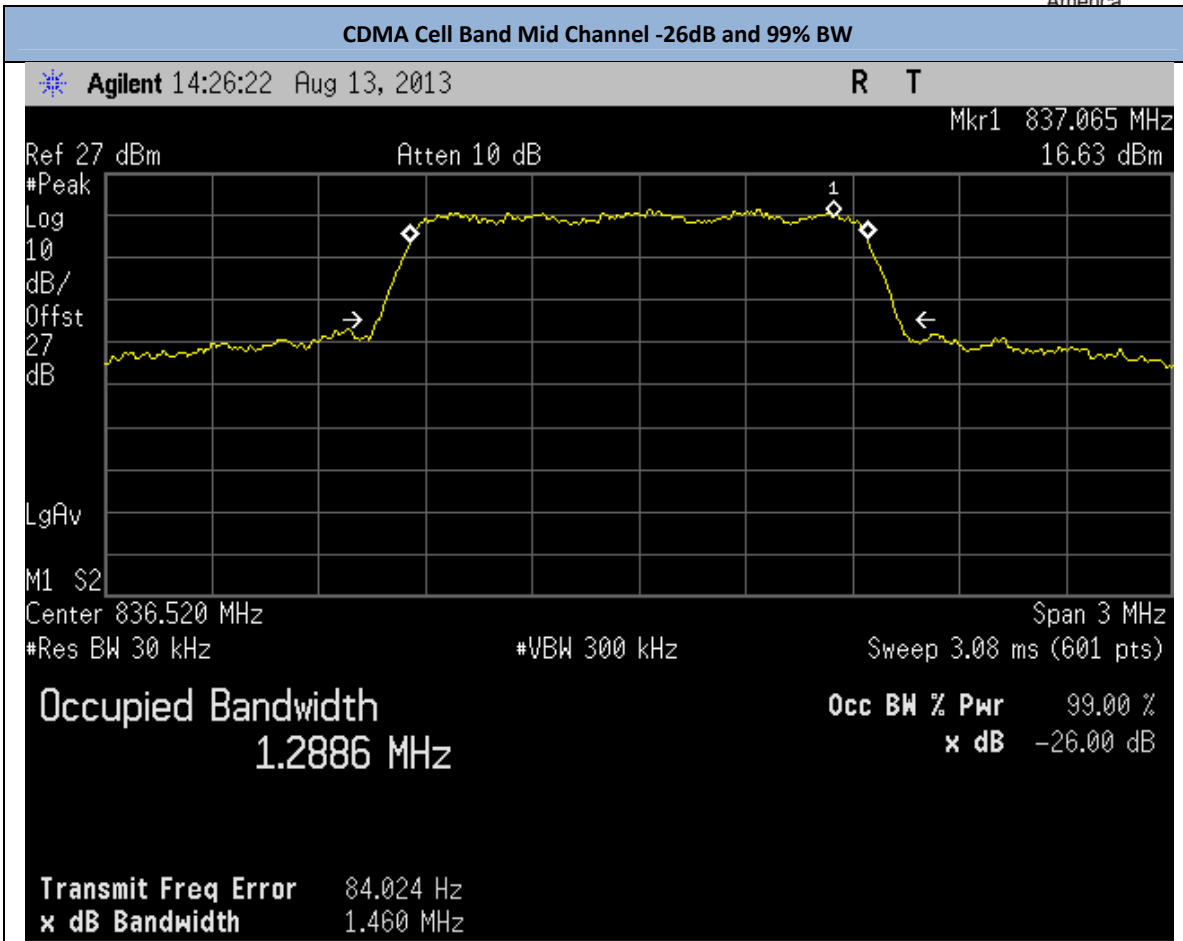
2.4.7 Additional Observations

- This is a conducted test. Both 26dB bandwidth and 99% bandwidth presented.
- All channels for emission bandwidth verification verified.
- For 26 dB bandwidth, the span was set to encompass the whole emission.
- The RBW is set to 1% of the span while the VBW is 3X RBW.
- The highest level is recorded and 26dBc is drawn from this level.
- The bandwidth where the fundamental emission intersected this line is the 26dB bandwidth.
- For 99% BW, the SA built-in emission bandwidth measurement feature is utilized. The power level setting is set to 99%.

2.4.8 Test Results

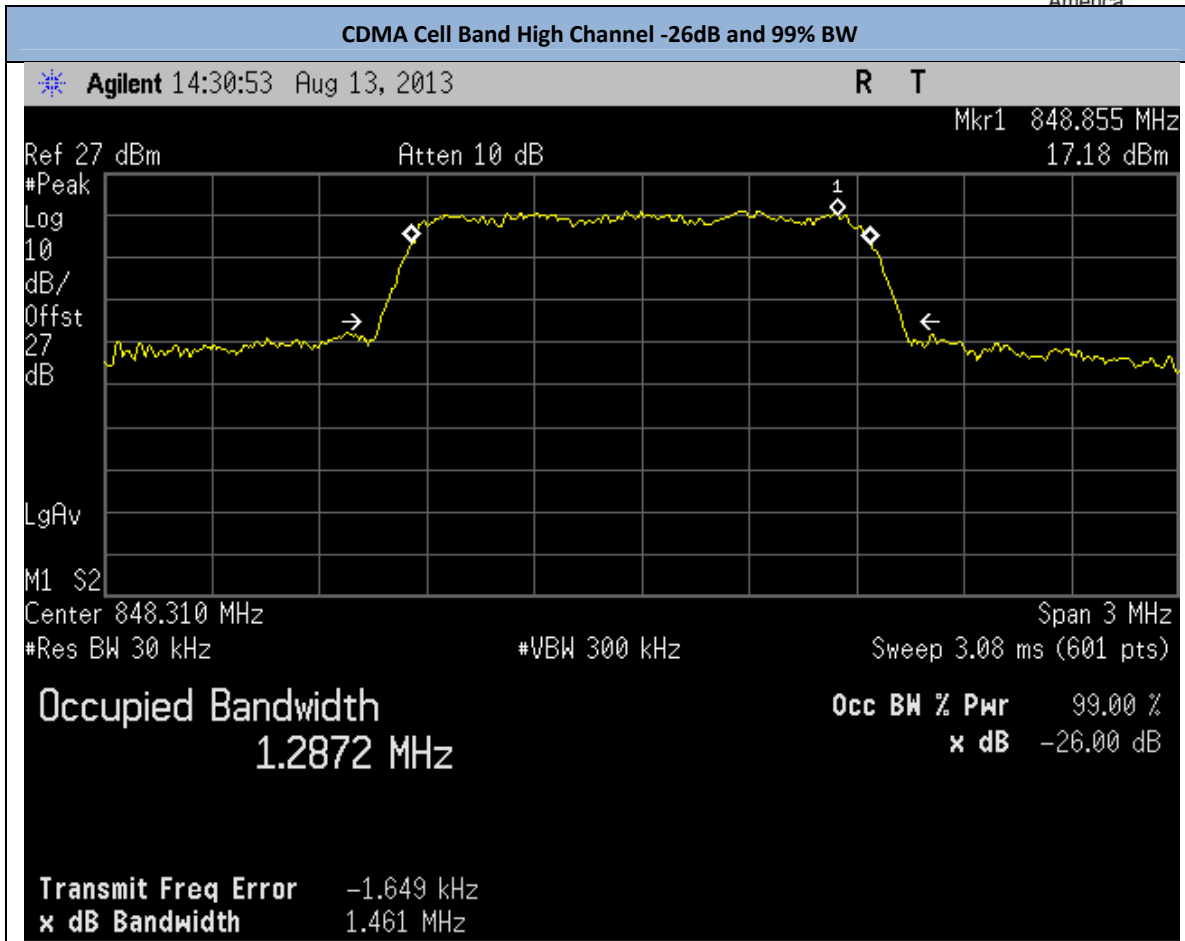
See attached plots.





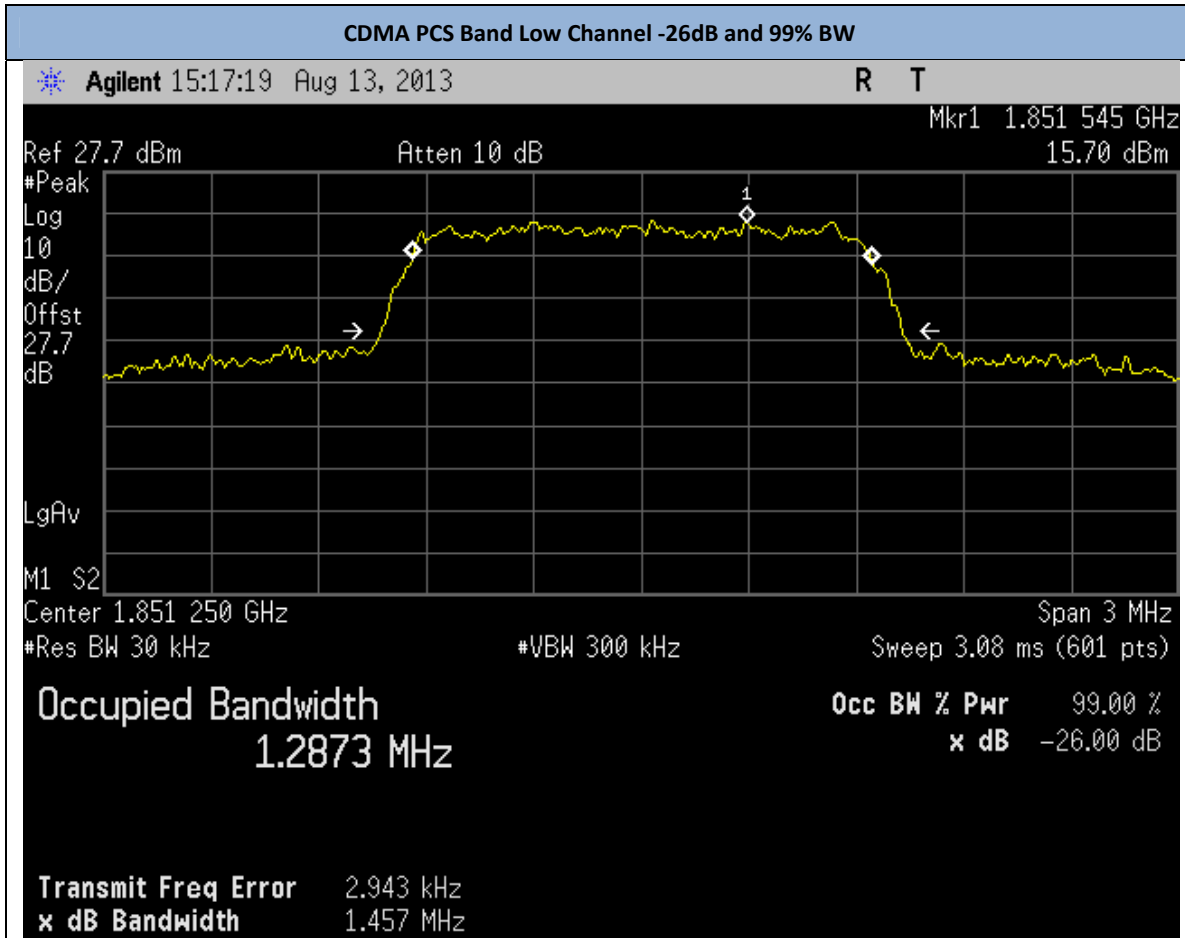


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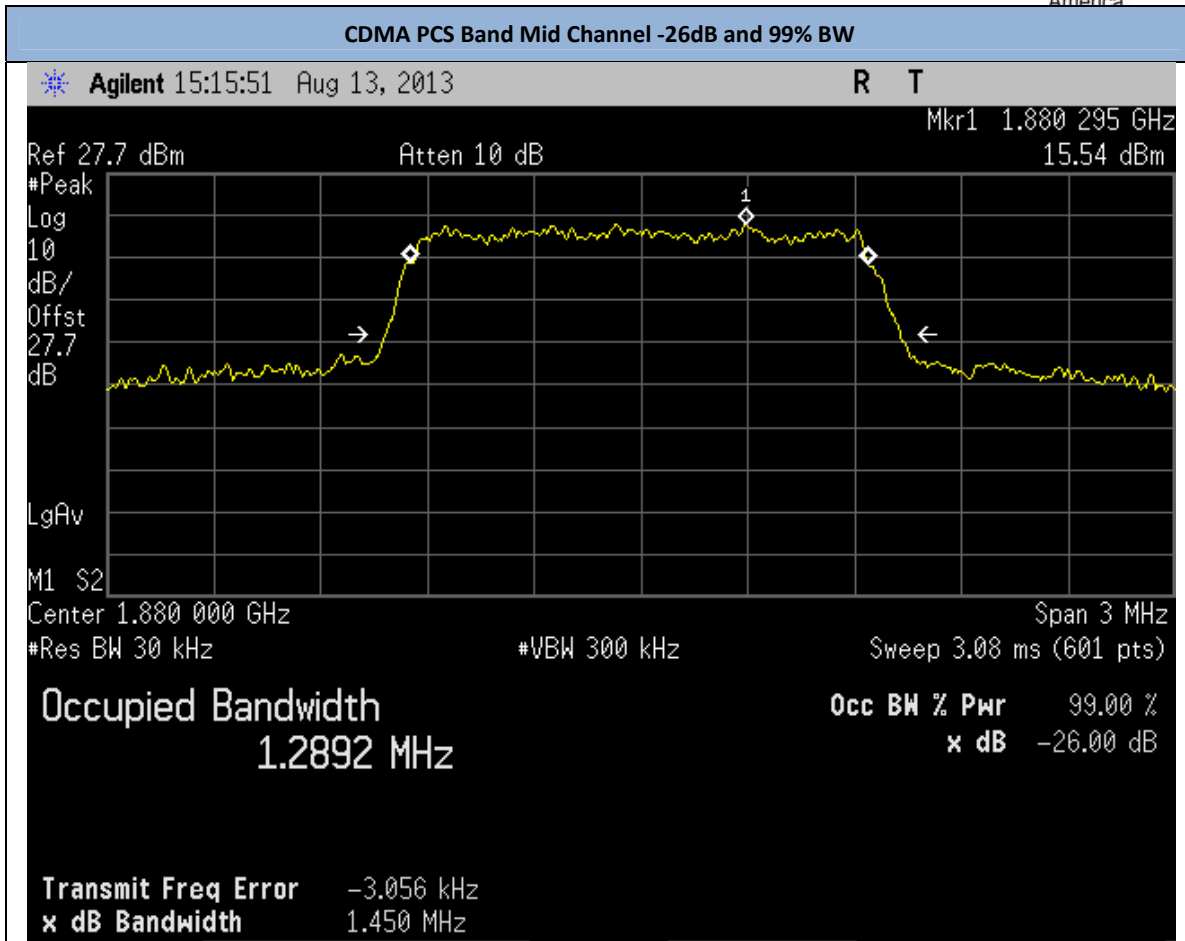


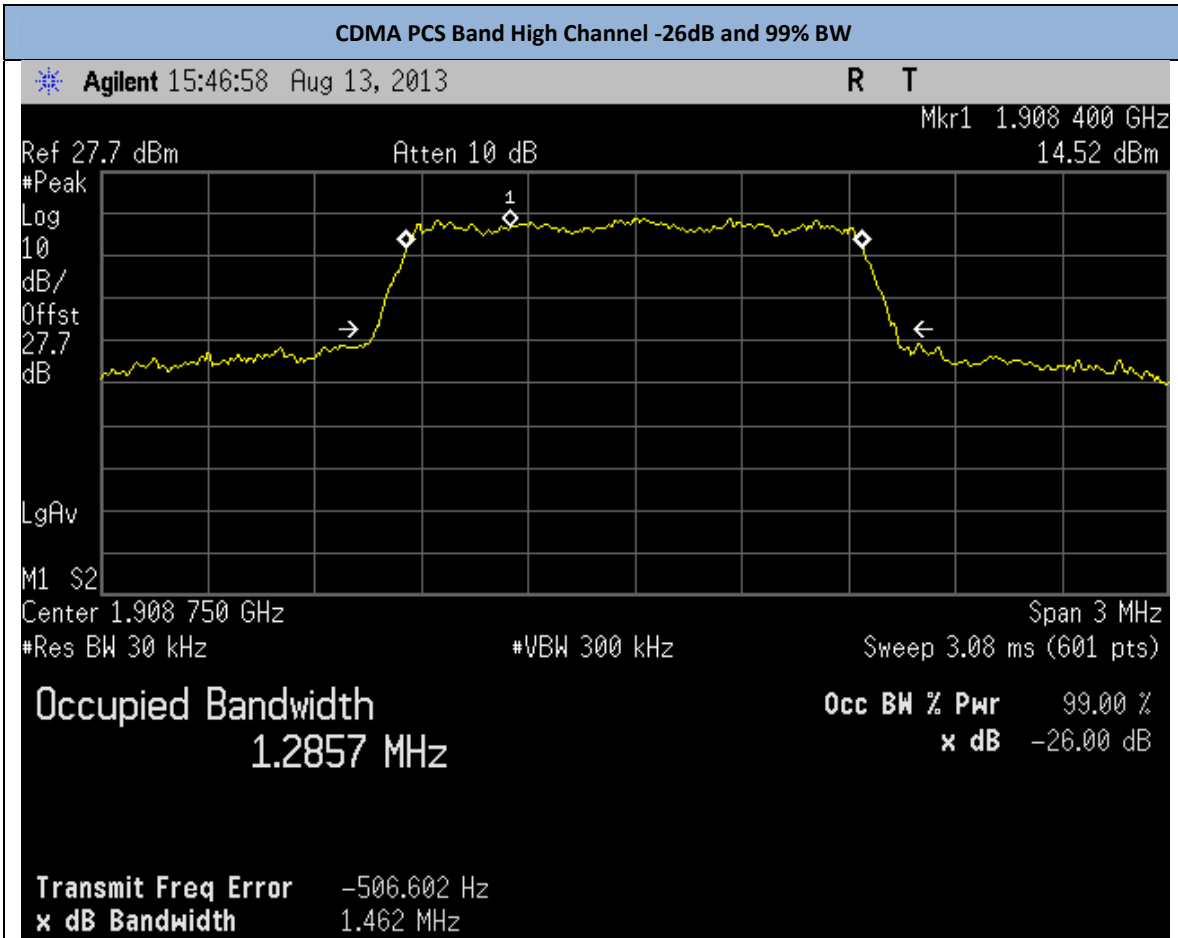
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2.5 PEAK-AVERAGE RATIO

2.5.1 Specification Reference

Part 24 Subpart E §24.232(d)

2.5.2 Standard Applicable

Power measurements for transmissions by stations authorized under this section may be made either in accordance with a Commission-approved average power technique or in compliance with paragraph (e) of this section. In both instances, equipment employed must be authorized in accordance with the provisions of §24.51. In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB

2.5.3 Equipment Under Test and Modification State

Serial No: SEZ100073700166 / Default Test Configuration

2.5.4 Date of Test/Initial of test personnel who performed the test

August 13, 2013/AC and JGM

2.5.5 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.5.6 Environmental Conditions

Ambient Temperature	25.3°C
Relative Humidity	49.4%
ATM Pressure	98.8 kPa

2.5.7 Additional Observations

- This is a conducted test. Test procedure is per Section 3.0 of KDB971168 (D01 Power Meas License Digital Systems v01).
- Measurement was done using the Spectrum Analyzer's Complementary Cumulative Distribution Function (CCDF) measurement profile. The built-in function is used to determine the largest deviation between the average and the peak power of the EUT in a given bandwidth (crest factor or peak-to-average ratio) The CCDF curve shows how much time the peak waveform spends at or above a given average power level. The percent of time the signals spends at or above the level defines the probability for that particular power level. For GSM signals, an average and a peak trace are used to determine the largest deviation between the average and the peak power of the EUT in a bandwidth greater than the emission bandwidth.

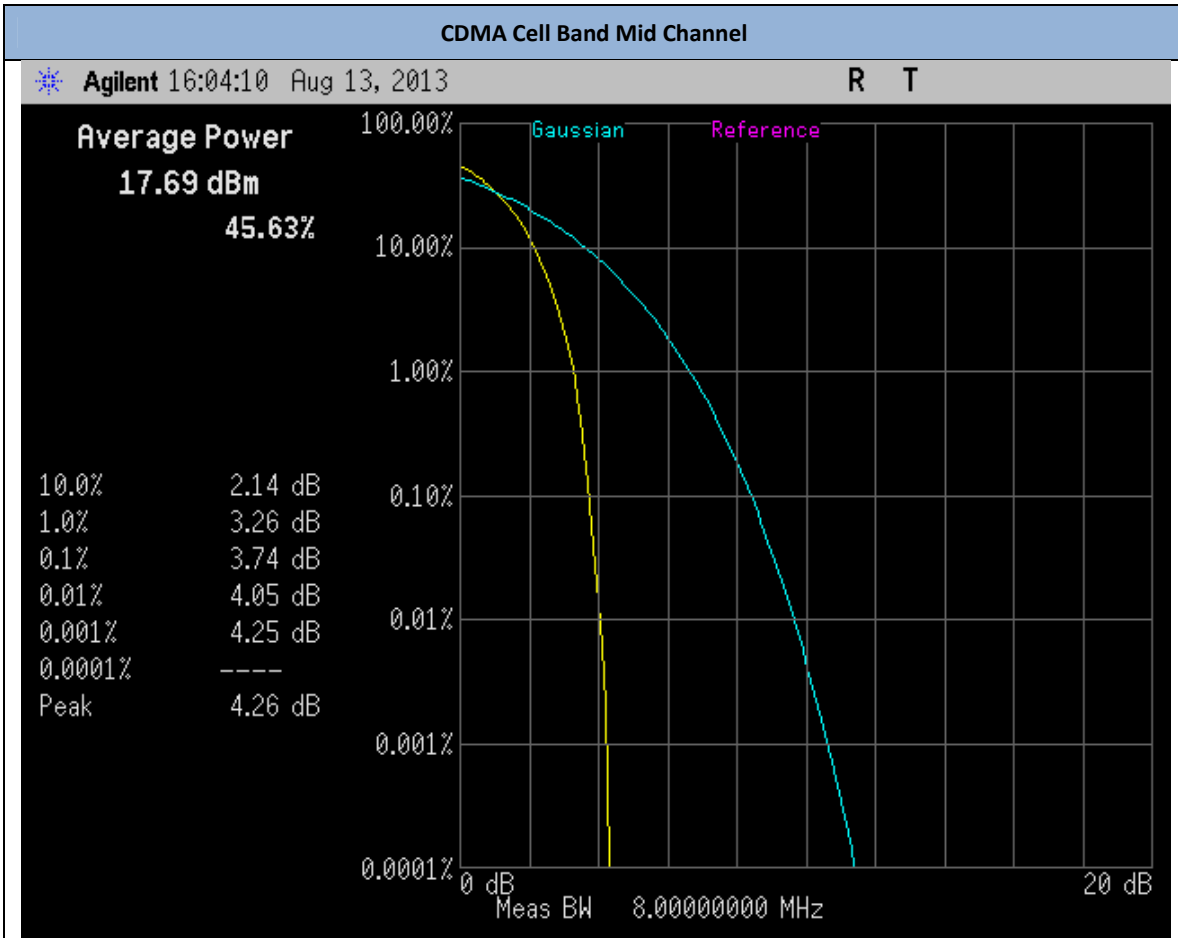


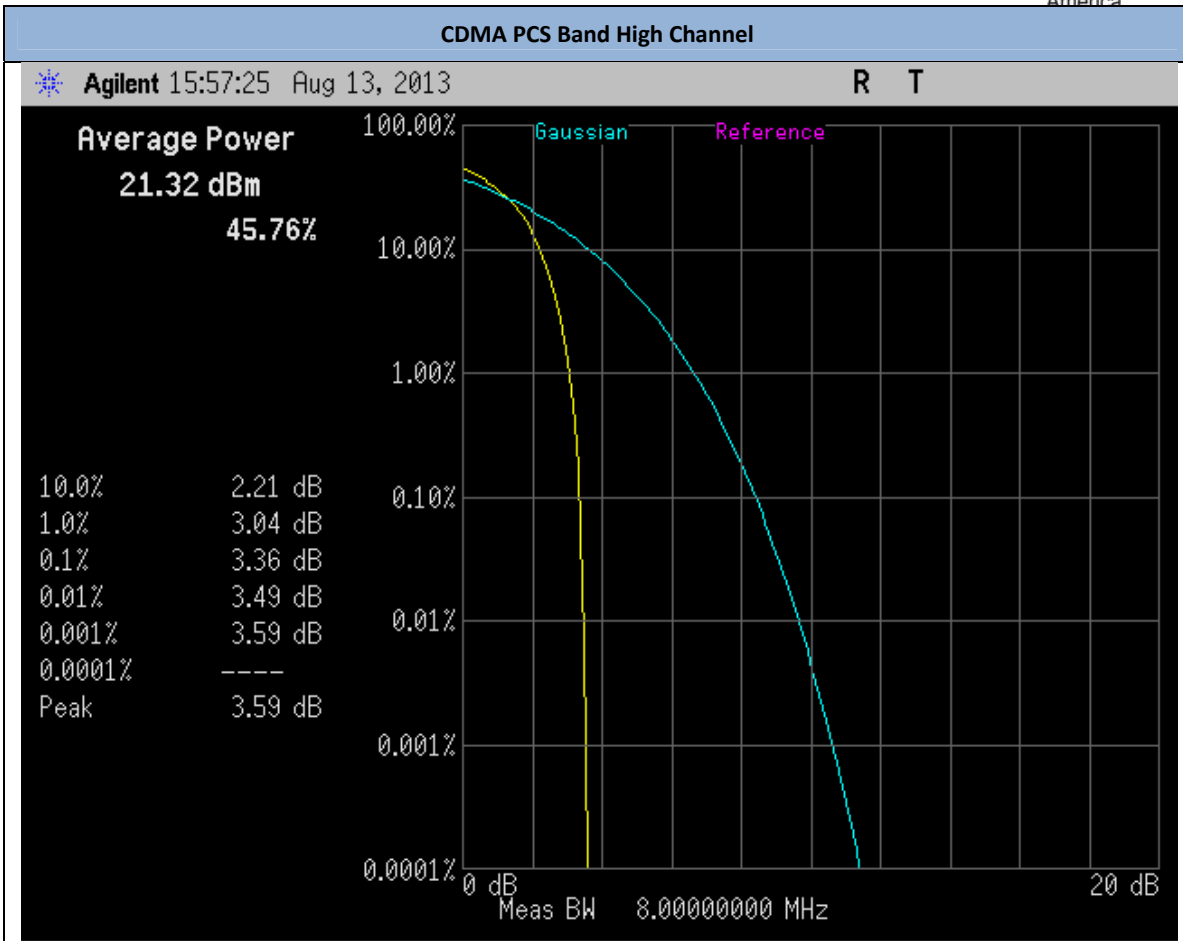
- All channels based from worst case configuration were verified. Only the worst channel and configuration presented.
- There are no measured PAPR levels greater than 13dB. EUT complies.

2.5.8 Test Results

The worst-case measured PARP level was preformed each band (Cell and PCS).

See attached plots.







2.6 BAND EDGE/CONDUCTED SPURIOUS EMISSIONS

2.6.1 Specification Reference

Part 22 Subpart H §22.917(a) and Part 24 Subpart E §24.238(a)

2.6.2 Standard Applicable

Out of band emissions. 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.

2.6.3 Equipment Under Test and Modification State

Serial No: SEZ100073700166 / Default Test Configuration

2.6.4 Date of Test/Initial of test personnel who performed the test

August 13, 2013/AC and JMG

2.6.5 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.6.6 Environmental Conditions

Ambient Temperature	25.4°C
Relative Humidity	52.3%
ATM Pressure	98.8 kPa

2.6.7 Additional Observations

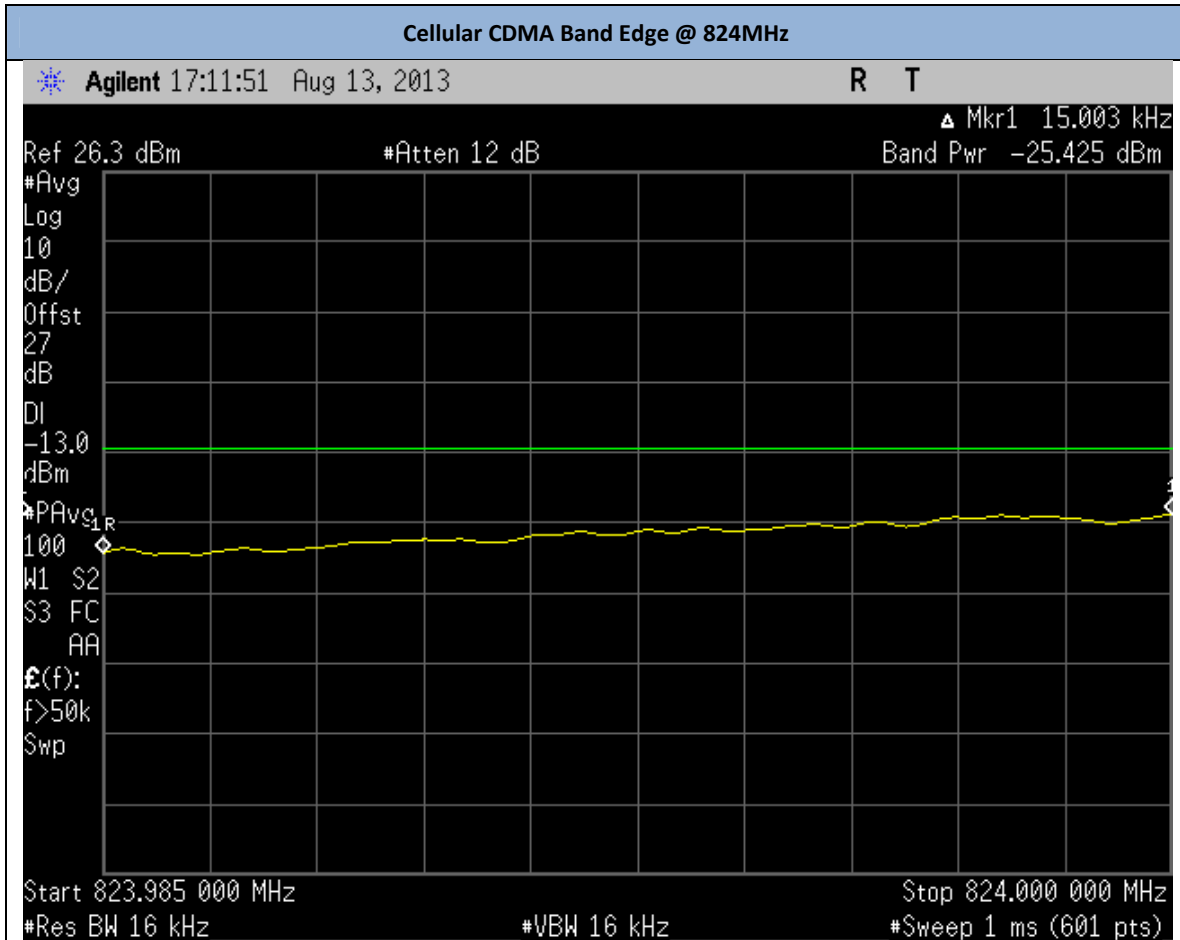
- This is a conducted test.
- The 27dB offset is from the power splitter, external attenuator and cable used.
- For band edge measurements, set RBW to 1% of the span.
- For both band edge and out of band emissions, set the limit to -13dBm.
- All RB size available verified and the worst case size for band edge verification presented in this test report.
- Only worst case configuration for all technologies presented in this test report.
- For PCS band edge measurements, set RBW to 1% of the span or greater.
- Band power was integrated over 1% of EBW for cellular band edge measurements.

2.6.8 Test Results

See attached plots.

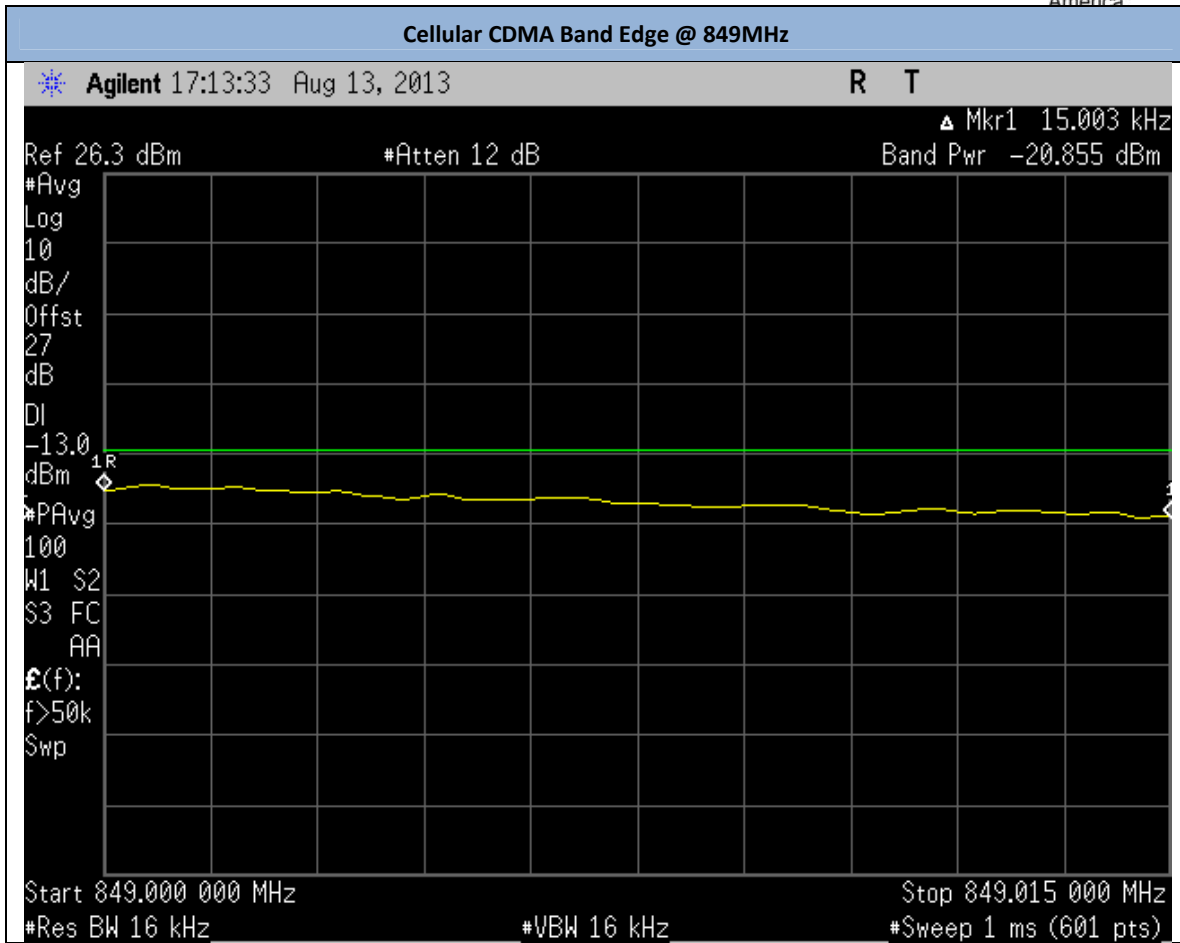


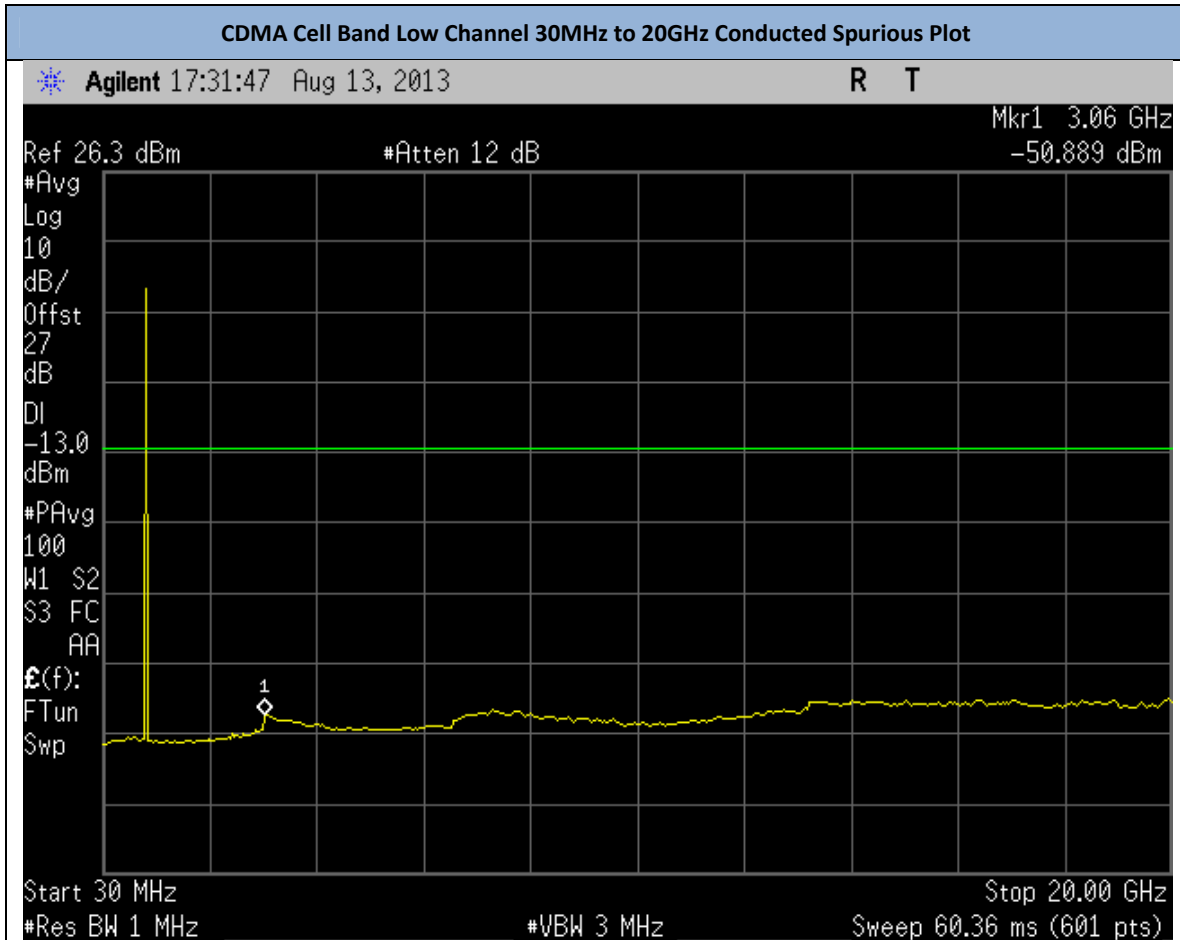
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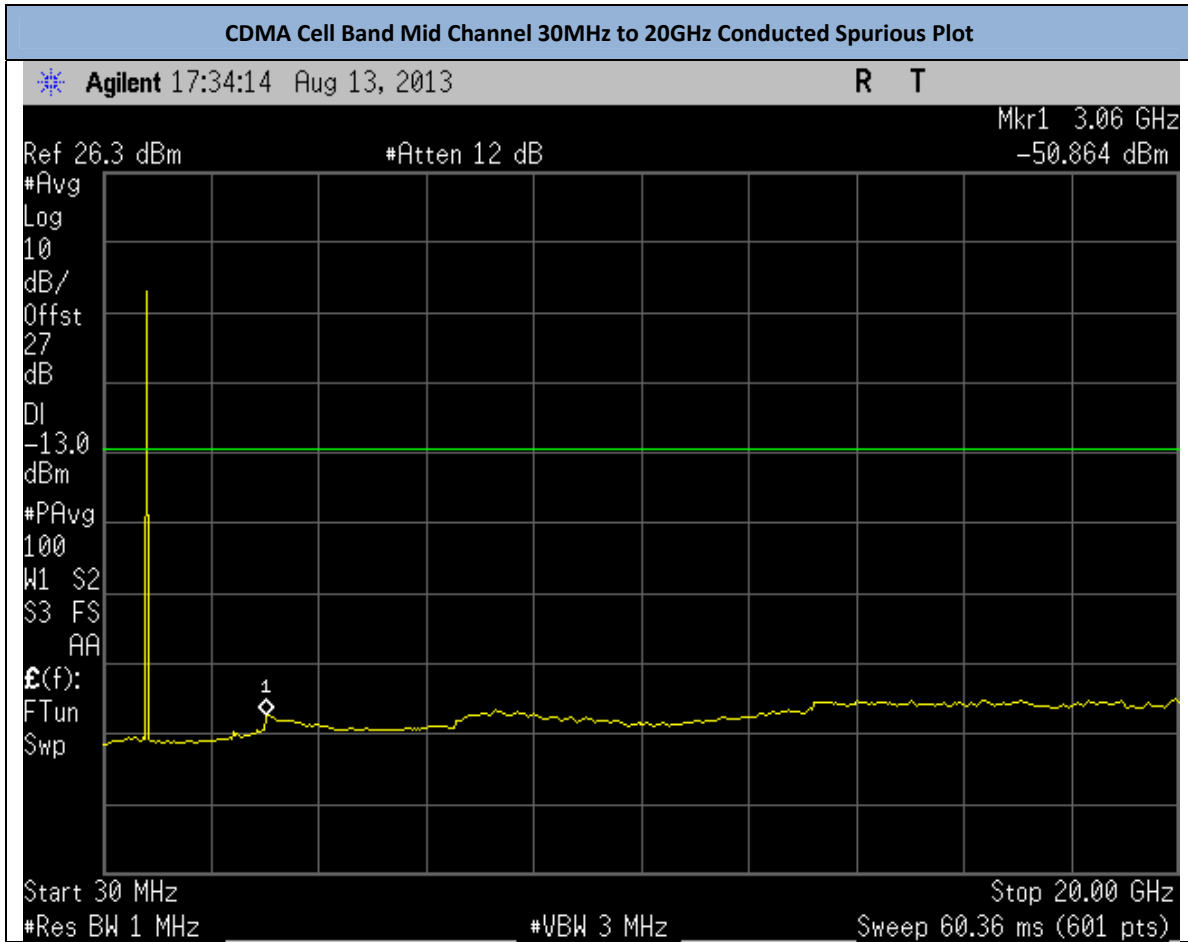
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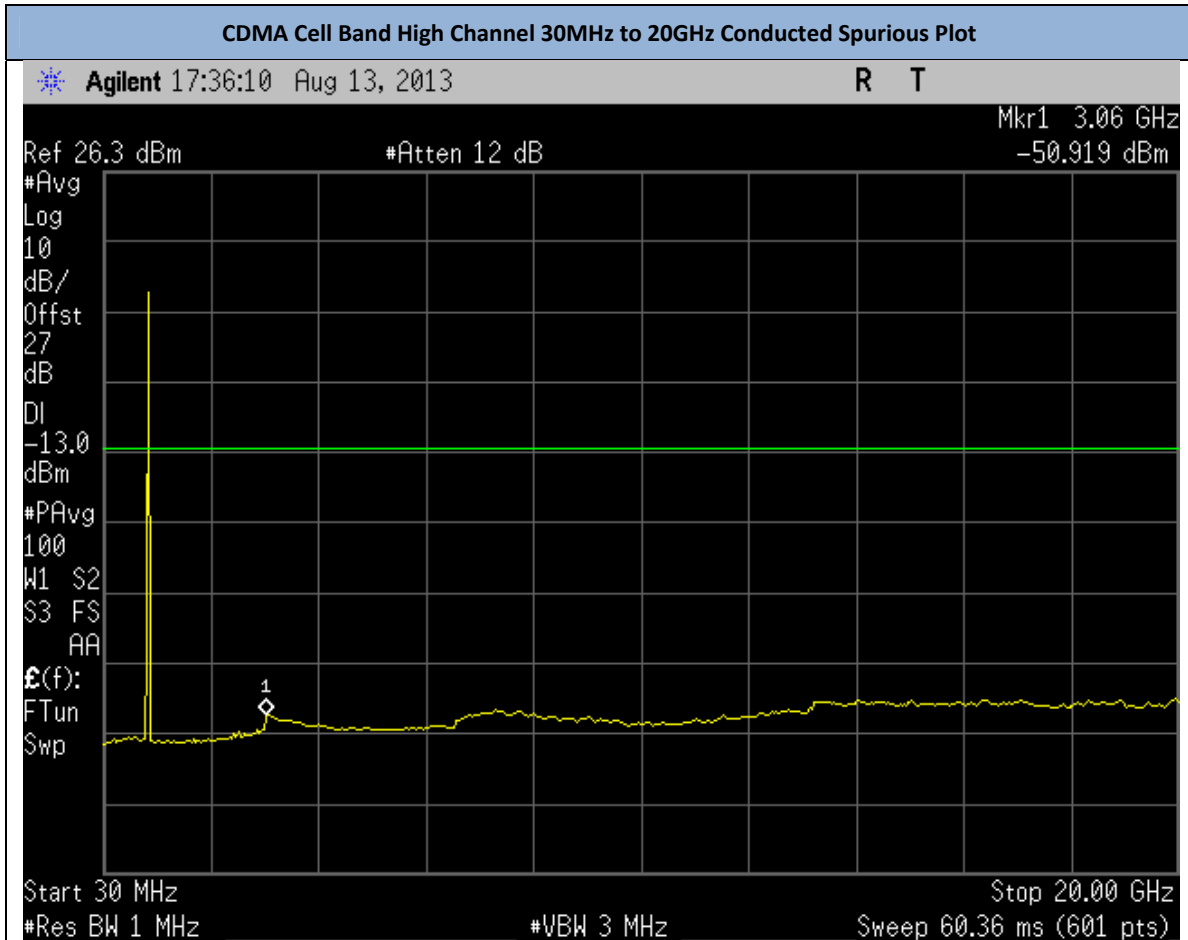






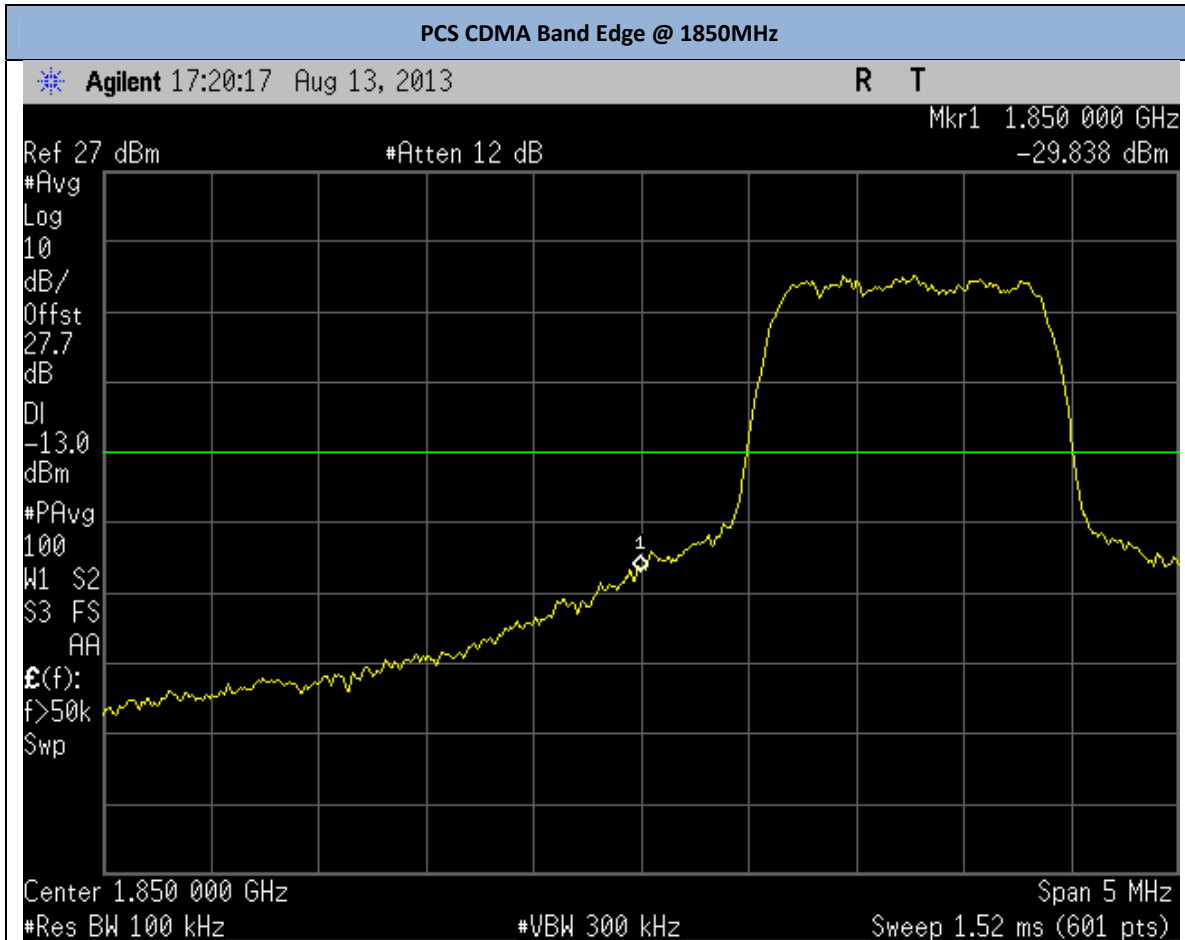
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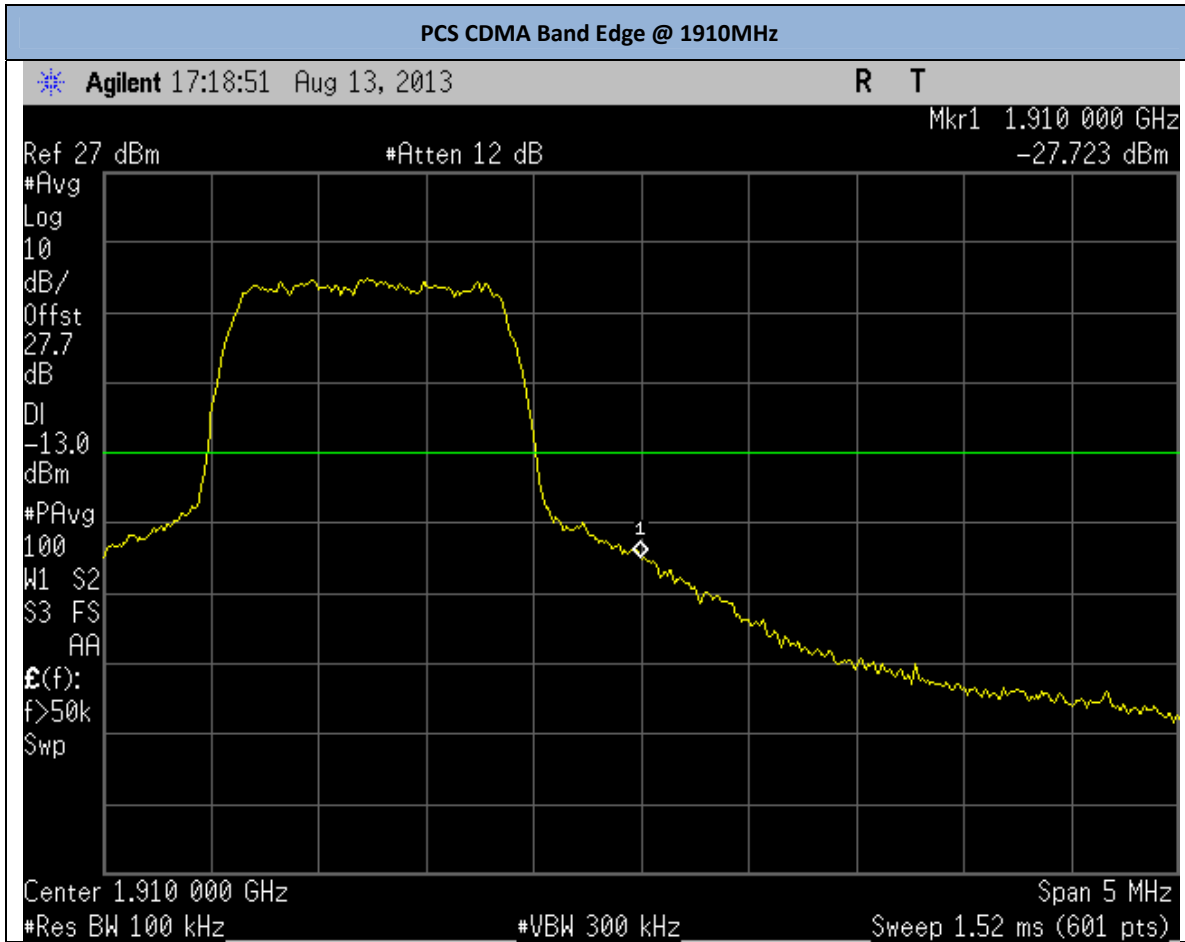


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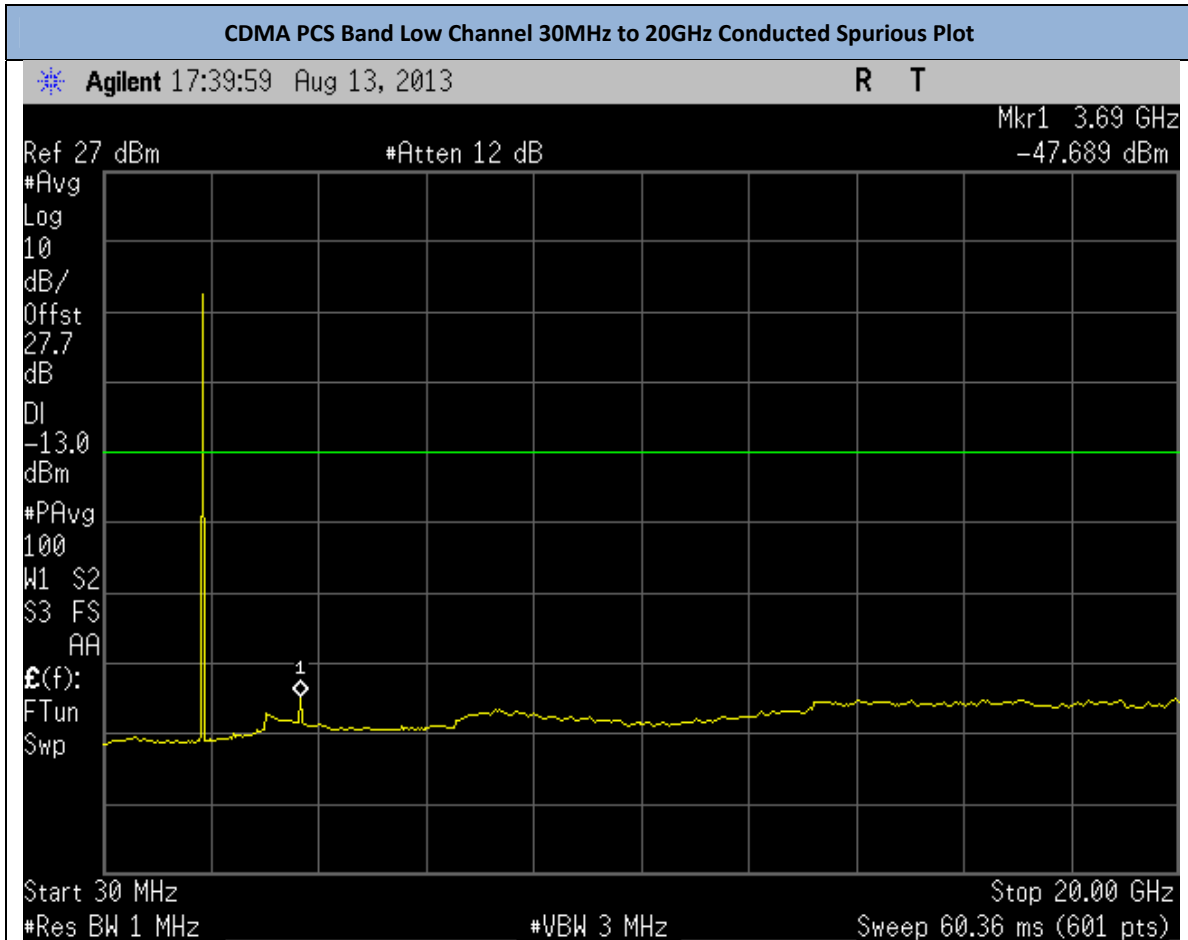


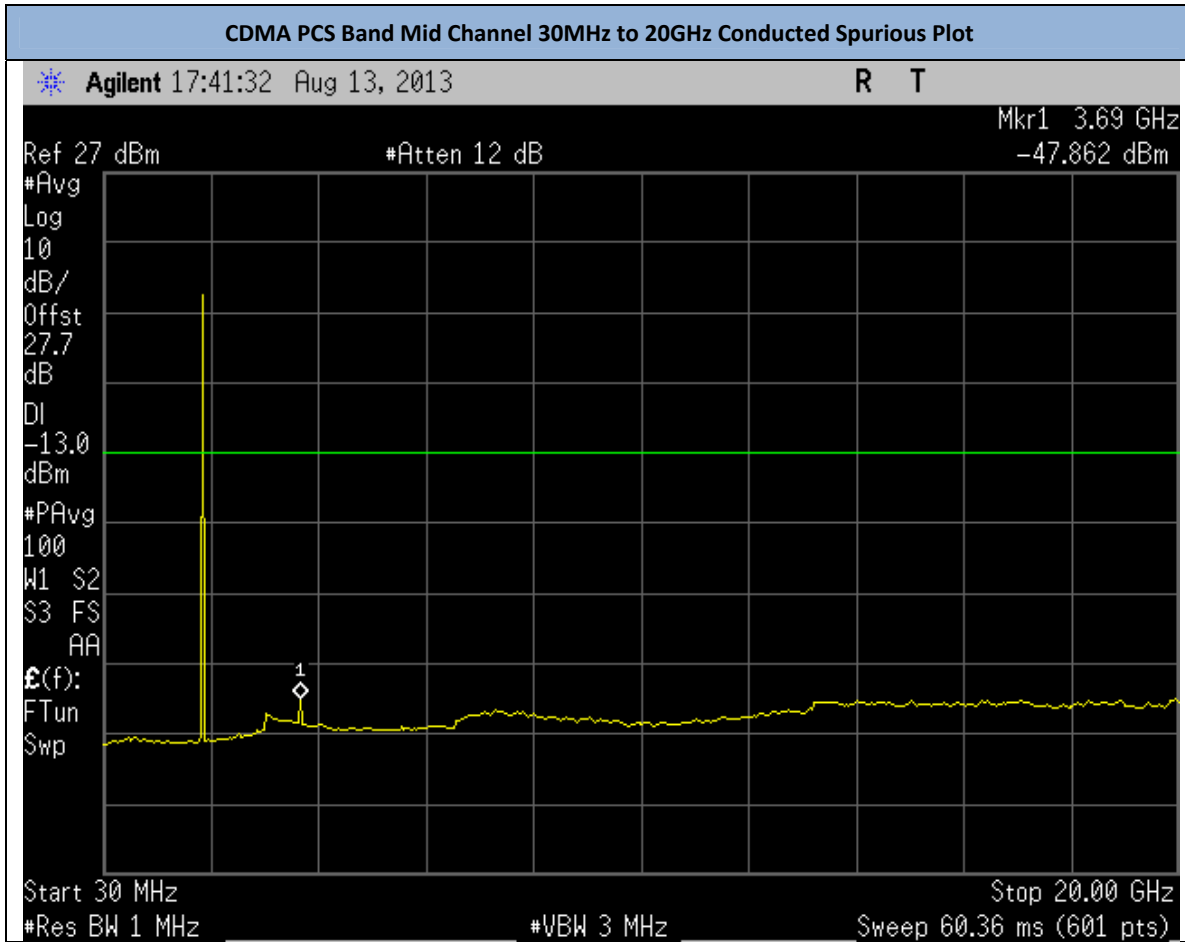
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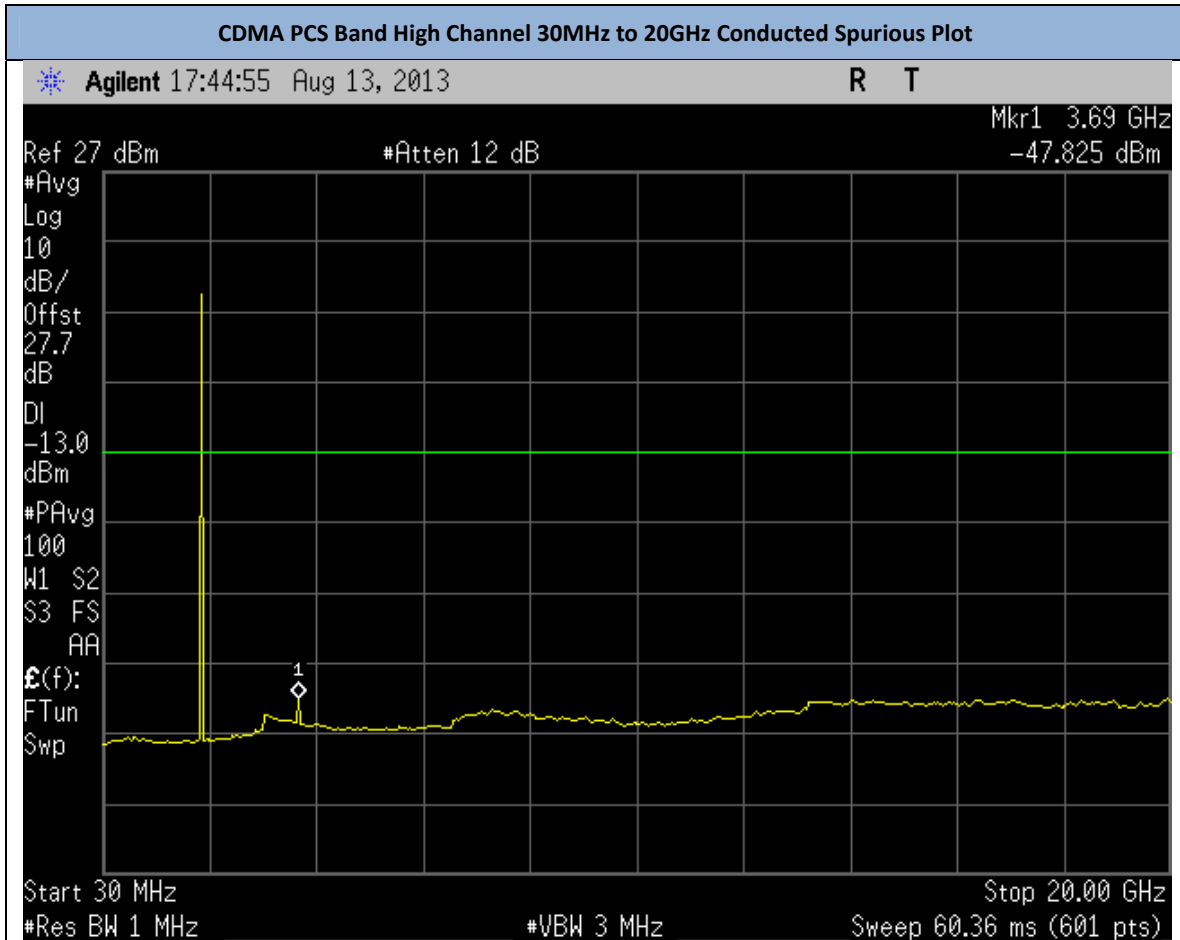




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2.7 FIELD STRENGTH OF SPURIOUS RADIATION

2.7.1 Specification Reference

Part 22 Subpart H §22.917(a) and Part 24 Subpart E §24.238(a)

2.7.2 Standard Applicable

Out of band emissions. 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.

2.7.3 Equipment Under Test and Modification State

Serial No: SEZ100073700166 / Default Test Configuration

2.7.4 Date of Test/Initial of test personnel who performed the test

August 14 and 15, 2013/AC and JMG

2.7.5 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.7.6 Environmental Conditions

Ambient Temperature	25.4°C
Relative Humidity	52.3%
ATM Pressure	98.8 kPa

2.7.7 Additional Observations

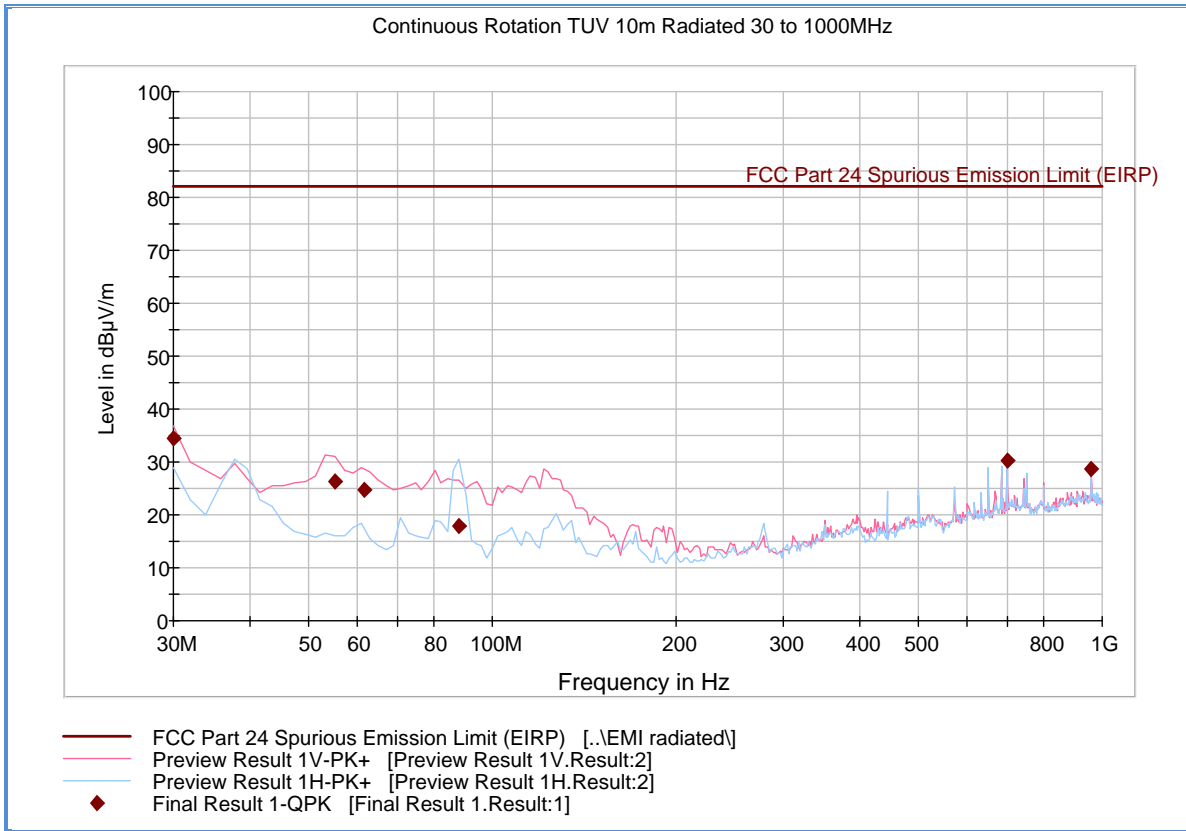
- This is a radiated test using substitution method as per Unwanted Emissions: Radiated Spurious method of measurement of ANSI/TIA/EIA-603-C 2004, August 17, 2004.
- Only the worst case configuration presented in this test report.
- Measurement was done using EMC32 V8.52 automated software. Reported level is the actual level with all the correction factors factored in. Correction Factor column is for informational purposes only.

2.7.8 Test Results

See attached plots.



2.7.9 Test Results Below 1GHz (Worst Case Configuration)



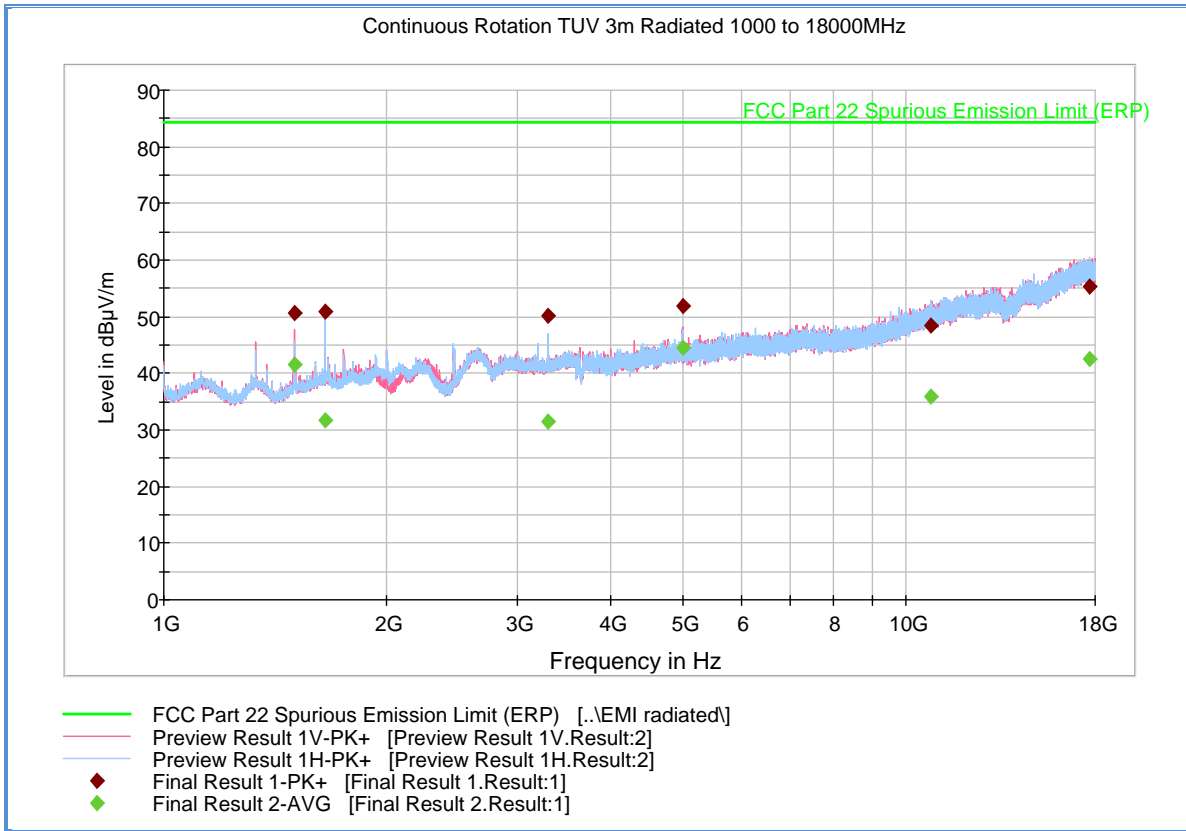
Quasi Peak Data

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
30.000000	34.6	1000.0	120.000	100.0	V	196.0	-12.3	47.7	82.2
55.086653	26.2	1000.0	120.000	100.0	V	19.0	-21.8	56.0	82.2
61.502204	24.8	1000.0	120.000	100.0	V	166.0	-22.3	57.4	82.2
88.196633	18.0	1000.0	120.000	200.0	H	18.0	-21.7	64.3	82.2
698.257395	30.2	1000.0	120.000	100.0	V	252.0	-3.6	52.0	82.2
960.082244	28.8	1000.0	120.000	100.0	V	46.0	-0.5	53.4	82.2

Test Notes: Only worst case channel presented for spurious emissions below 1GHz.



2.7.10 Test Results Above 1GHz (CDMA Cell Band Low Channel)



Peak Data

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1500.000000	50.6	1000.0	1000.000	303.2	V	343.0	-5.1	33.8	84.4
1649.433333	51.0	1000.0	1000.000	197.4	H	300.0	-3.8	33.4	84.4
3298.933333	50.0	1000.0	1000.000	99.6	H	338.0	1.5	34.3	84.4
4999.900000	51.8	1000.0	1000.000	115.6	V	329.0	5.4	32.5	84.4
10807.30000	48.6	1000.0	1000.000	324.2	H	195.0	13.9	35.8	84.4
17661.00000	55.3	1000.0	1000.000	226.4	H	204.0	22.1	29.1	84.4

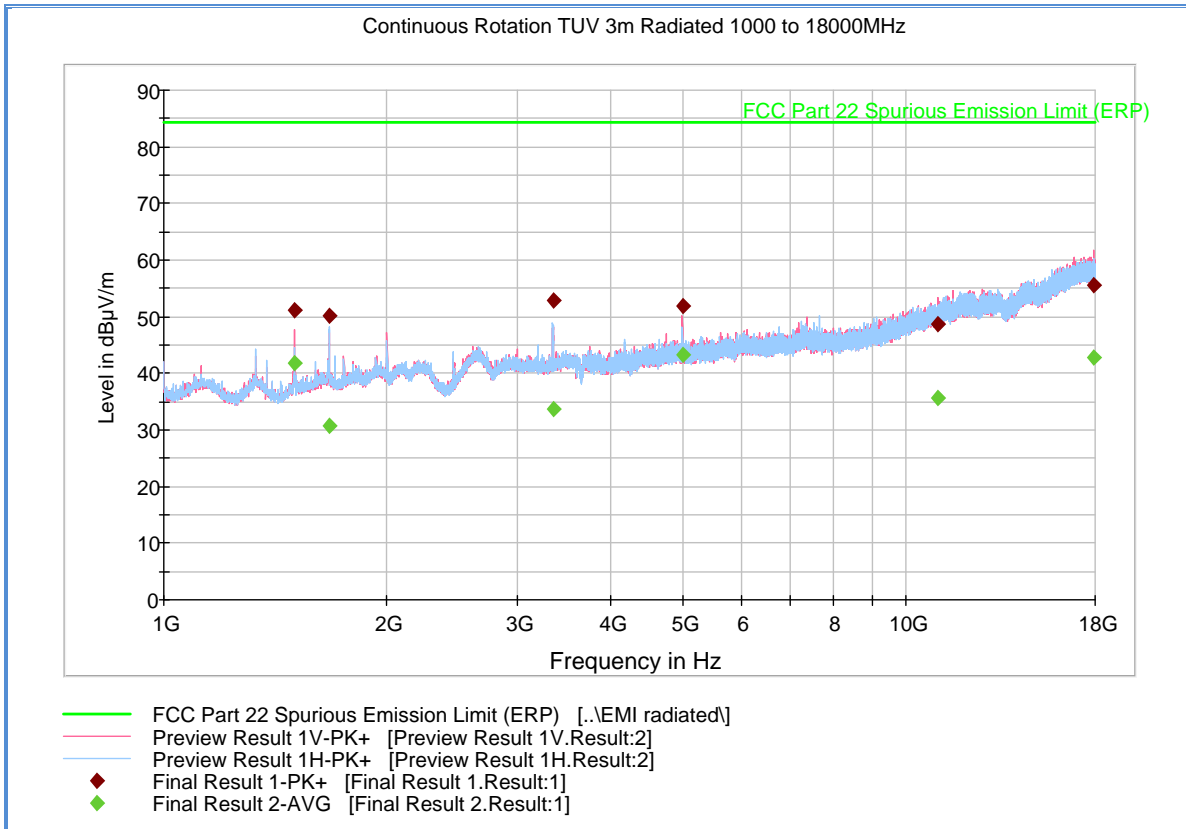
Substitution Data

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)

Test Notes: Substitution data not needed since Peak data > 20dB in all peaks.



2.7.11 Test Results Above 1GHz (CDMA Cell Band Mid Channel)



Peak Data

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1500.000000	51.0	1000.0	1000.000	291.2	V	342.0	-5.1	33.3	84.4
1673.600000	50.1	1000.0	1000.000	198.4	H	301.0	-3.6	34.3	84.4
3345.666667	53.0	1000.0	1000.000	114.6	H	275.0	1.6	31.4	84.4
5000.333333	51.8	1000.0	1000.000	114.6	V	329.0	5.4	32.6	84.4
11067.20000	48.7	1000.0	1000.000	399.7	V	156.0	14.6	35.7	84.4
17919.53333	55.6	1000.0	1000.000	176.5	V	130.0	22.4	28.8	84.4

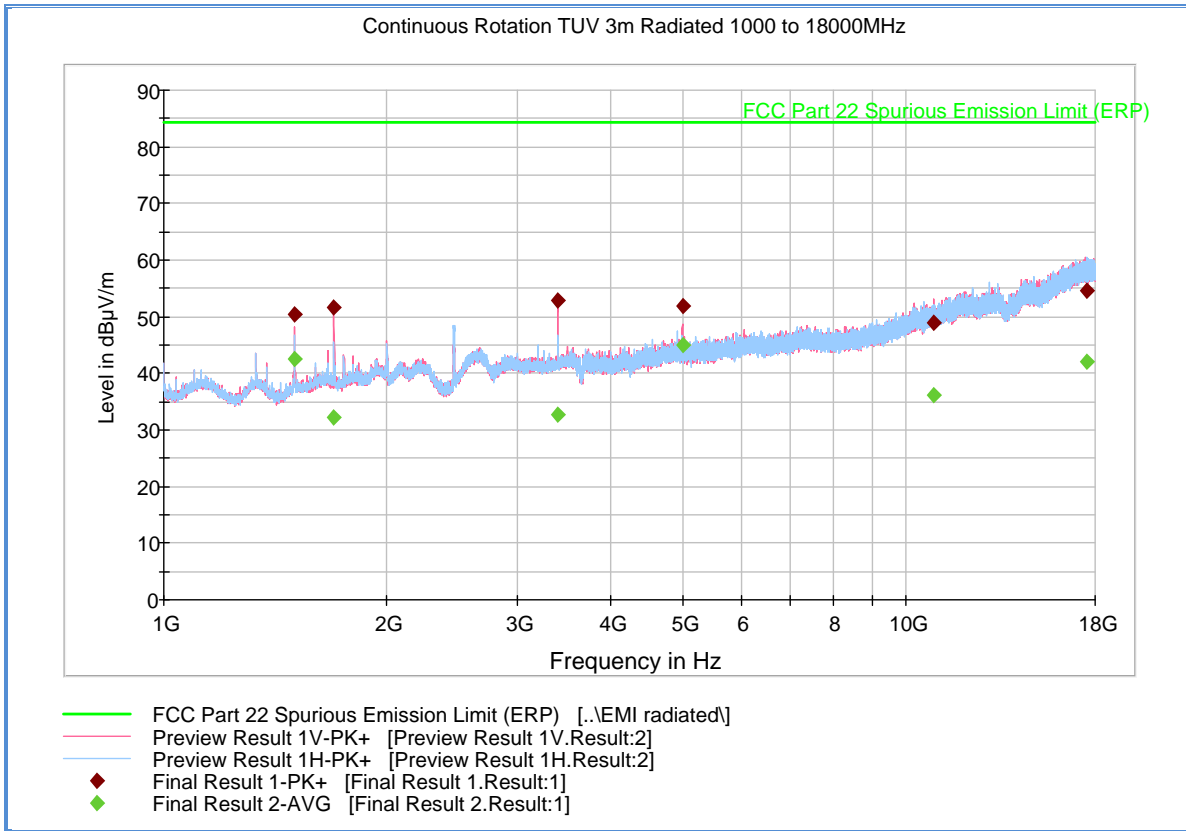
Substitution Data

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)

Test Notes: Substitution data not needed since Peak data > 20dB in all peaks.



2.7.12 Test Results Above 1GHz (CDMA Cell Band High Channel)



Peak Data

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1500.000000	50.4	1000.0	1000.000	200.4	V	348.0	-5.1	34.0	84.4
1697.200000	51.6	1000.0	1000.000	208.4	V	109.0	-3.4	32.8	84.4
3393.733333	53.0	1000.0	1000.000	159.5	V	248.0	1.8	31.4	84.4
4999.900000	51.8	1000.0	1000.000	114.6	V	329.0	5.4	32.6	84.4
10903.866666	48.9	1000.0	1000.000	314.1	V	-13.0	14.3	35.5	84.4
17515.466666	54.7	1000.0	1000.000	399.7	H	176.0	22.1	29.7	84.4

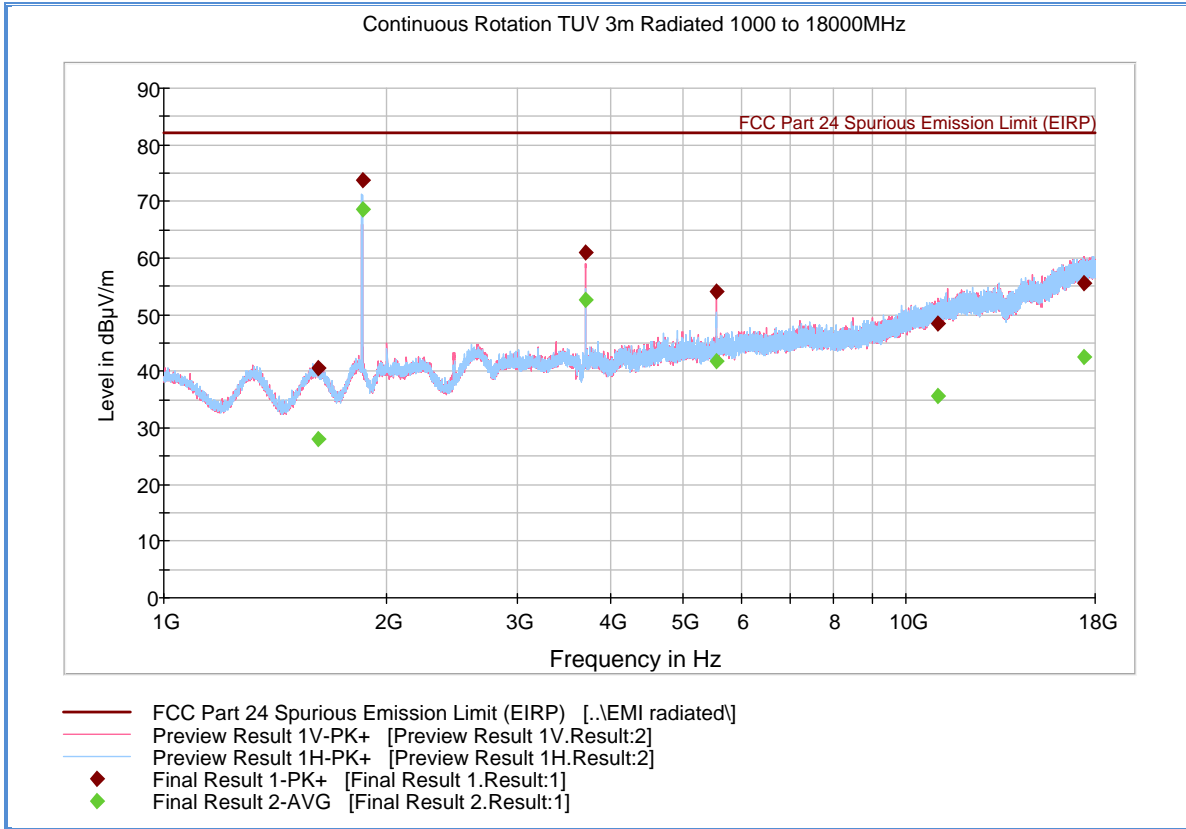
Substitution Data

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)

Test Notes: Substitution data not needed since Peak data > 20dB in all peaks.



2.7.13 Test Results Above 1GHz (CDMA PCS Band Low Channel)



Peak Data

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1614.266667	40.6	1000.0	1000.000	399.7	V	1.0	-4.2	41.6	82.2
1851.566667	73.9	1000.0	1000.000	152.5	H	78.0	-2.5	8.3	82.2
3701.666667	60.9	1000.0	1000.000	113.6	V	291.0	2.8	21.3	82.2
5553.533333	54.0	1000.0	1000.000	102.6	V	173.0	6.8	28.2	82.2
11046.666666	48.3	1000.0	1000.000	301.6	V	317.0	14.6	33.9	82.2
17422.533333	55.5	1000.0	1000.000	101.6	V	105.0	22.2	26.8	82.2

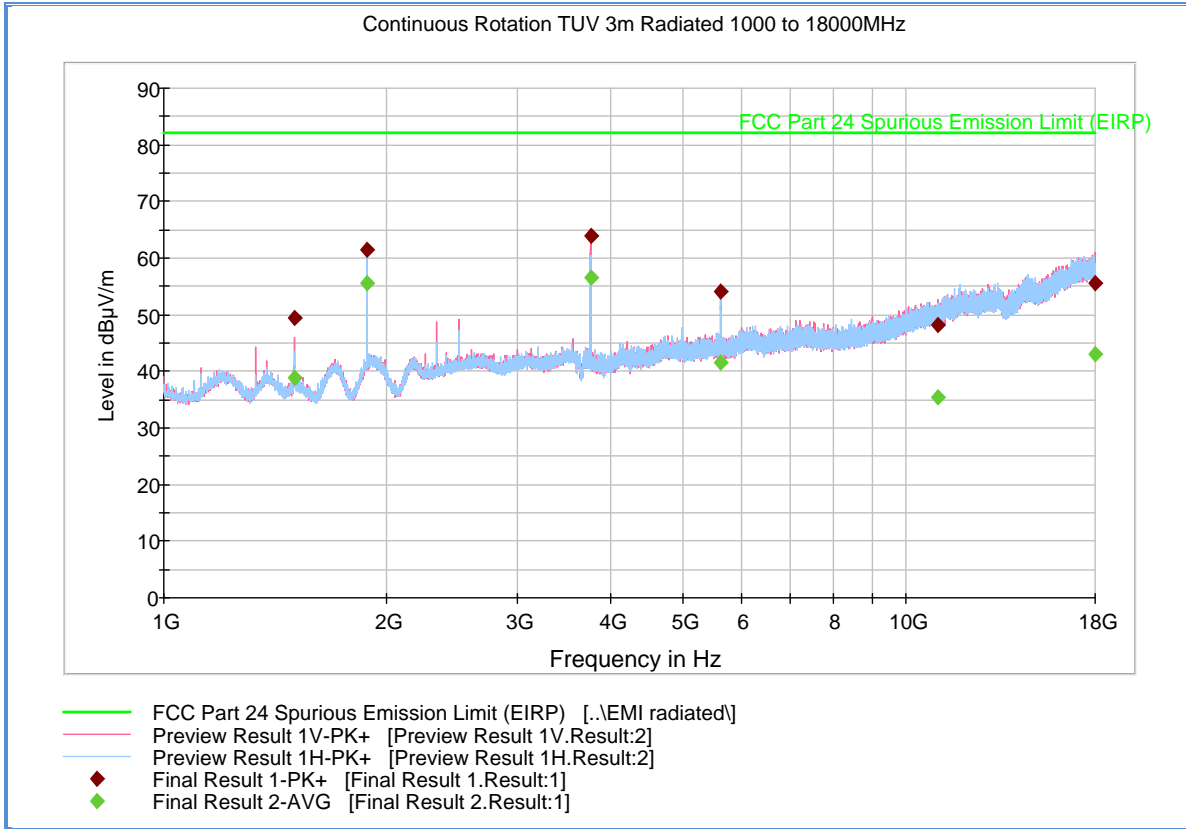
Substitution Data

Frequency (MHz)	Field Strength @ 3 meters (dBµV/m)	Cable Loss (dB)	Substitution Antenna Gain (dBi)	Signal Generator Level (dBm)	Substitution Data SGL+AG-CL (dBm)	Limit (dBm)	Compliance
1851.566667	73.9	-3.3	8.379	-26.4078	-21.3288	-13	Complies

Test Notes: Only worst case channel presented for spurious emissions above 1GHz. Substitution data not needed for Peak data > 20dB.



2.7.14 Test Results Above 1GHz (CDMA PCS Band Mid Channel)



Peak Data

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1500.000000	49.3	1000.0	1000.000	399.7	V	343.0	-5.1	32.9	82.2
1879.666667	61.6	1000.0	1000.000	198.4	H	54.0	-2.3	20.7	82.2
3759.866667	63.8	1000.0	1000.000	122.5	V	274.0	2.9	18.4	82.2
5639.300000	54.1	1000.0	1000.000	230.3	V	170.0	7.3	28.2	82.2
11035.10000	48.3	1000.0	1000.000	157.5	V	158.0	14.6	34.0	82.2
17985.46666	55.7	1000.0	1000.000	148.5	V	71.0	22.6	26.5	82.2

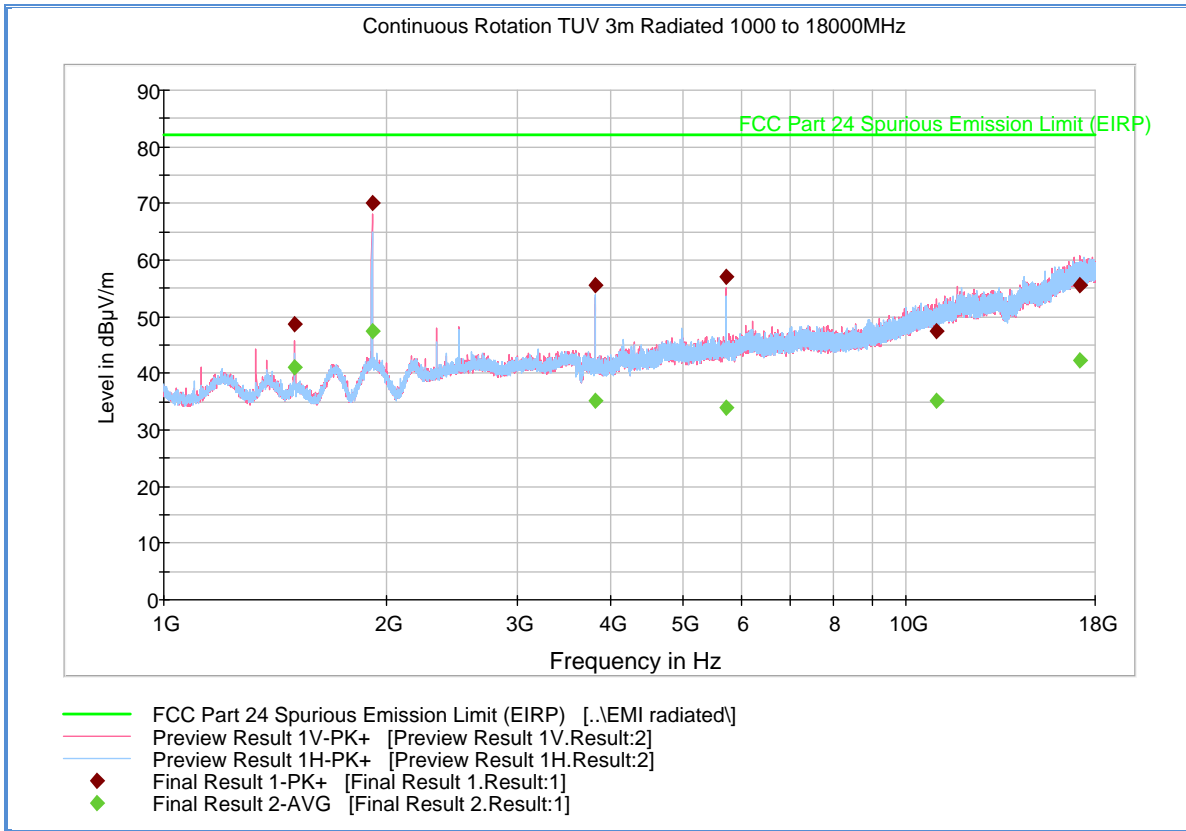
Substitution Data

Frequency (MHz)	Field Strength @ 3 meters (dBµV/m)	Cable Loss (dB)	Substitution Antenna Gain (dBi)	Signal Generator Level (dBm)	Substitution Data SGL+AG-CL (dBm)	Limit (dBm)	Compliance
3759.866667	63.8	-3.8	9.637	-37.2658	-31.4288	-13	Complies

Test Notes: Only worst case channel presented for spurious emissions above 1GHz. Substitution data not needed for Peak data > 20dB.



2.7.15 Test Results Above 1GHz (CDMA PCS Band High Channel)



Peak Data

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1500.000000	48.8	1000.0	1000.000	99.6	V	155.0	-5.1	33.4	82.2
1908.333333	70.1	1000.0	1000.000	158.5	V	327.0	-2.1	12.2	82.2
3817.700000	55.7	1000.0	1000.000	240.3	H	66.0	2.9	26.6	82.2
5725.400000	57.0	1000.0	1000.000	99.6	V	320.0	7.8	25.2	82.2
10989.000000	47.6	1000.0	1000.000	132.6	V	214.0	14.5	34.7	82.2
17163.400000	55.6	1000.0	1000.000	99.6	V	346.0	21.8	26.6	82.2

Substitution Data

Frequency (MHz)	Field Strength @ 3 meters (dBµV/m)	Cable Loss (dB)	Substitution Antenna Gain (dBi)	Signal Generator Level (dBm)	Substitution Data SGL+AG-CL (dBm)	Limit (dBm)	Compliance
1908.333333	70.1	-3.3	8.285	-30.1138	-25.1288	-13	Complies

Test Notes: Only worst case channel presented for spurious emissions above 1GHz. Substitution data not needed for Peak data > 20dB.



2.8 FREQUENCY STABILITY

2.8.1 Specification Reference

Part 22 Subpart H §22.355 and Part 24 Subpart E §24.235

2.8.2 Standard Applicable

(§22.355) Except as otherwise provided in this part, the carrier frequency of each transmitter in the Public Mobile Services must be maintained within the tolerances given in Table C–1 of this section.

Table C–1—Frequency Tolerance for Transmitters in the Public Mobile Services

Frequency range (MHz)	Mobile ≤ 3 watts (ppm)
821 to 896	2.5

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

2.8.3 Equipment Under Test and Modification State

Serial No: SEZ100073700166 / Default Test Configuration

2.8.4 Date of Test/Initial of test personnel who performed the test

August 16, 2013/AC and JMG

2.8.5 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.8.6 Environmental Conditions

Ambient Temperature 25.4°C
Relative Humidity 51.0%
ATM Pressure 98.7 kPa

2.8.7 Additional Observations

- This is a conducted test. The spectrum was searched from 30MHz to the 10th harmonic (25GHz).
- Measurement was done using the Spectrum Analyzer's Complementary Cumulative Distribution Function (CCDF) measurement profile. The built-in function is used to determine the largest deviation between the average and the peak power of the EUT in a given bandwidth (crest factor or peak-to-average ratio)

FCC ID PKRNVWT1114
IC: N/A
Report No. SC1307899B_REV1.0



2.8.8 Test Results

See attached plots.



CDMA Cell Band Low Channel BC0 Worst Case Configuration					
Voltage (%)	Power (VDC)	Temp (°C)	Frequency (MHz)	Frequency Deviation (Hz)	Deviation Limit (Hz)
100	5.0	-30	824.7	-15.31	2061.75
100		-20		-12.96	2061.75
100		-10		-13.40	2061.75
100		0		-12.52	2061.75
100		+10		13.11	2061.75
100		+20		15.75	2061.75
100		+30		-18.68	2061.75
100		+40		-17.14	2061.75
100		+50		-15.16	2061.75
115		5.75		+20	
85	4.25	+20		12.52	2061.75

CDMA PCS Band High Channel BC1 Worst Case Configuration					
Voltage (%)	Power (VDC)	Temp (°C)	Frequency (MHz)	Frequency Deviation (Hz)	Operating within the 1850-1910 Band <1.25MHZ
100	5.0	-30	1908.75	-18.53	Complies
100		-20		-11.65	Complies
100		-10		-13.62	Complies
100		0		-15.89	Complies
100		+10		-15.58	Complies
100		+20		-16.85	Complies
100		+30		-17.65	Complies
100		+40		-18.02	Complies
100		+50		-20.51	Complies
115		5.75		+20	
85	4.25	+20		-15.89	Complies



SECTION 3

TEST EQUIPMENT USED



3.1 TEST EQUIPMENT USED

List of absolute measuring and other principal items of test equipment.

ID Number (SDGE/SDRB)	Test Equipment	Type	Serial Number	Manufacturer	Cal Date	Cal Due Date
Conducted Port Setup						
7569	Series Power Meter	N1911A P-	MY45100625	Agilent	04/15/13	04/15/14
7570	50MHz-18GHz Wideband Power Sensor	N1921A	MY45240588	Agilent	05/06/13	05/06/14
1049	EMI Test Receiver	ESU	100133	Rhode & Schwarz	07/24/13	07/24/14
6814	PSA Series Spectrum Analyzer	E4440A	MY42510441	Agilent	11/07/12	11/07/13
8607	20dB Attenuator	34-20-34	BP4180	MCE/Weinschel	Verified by 6814 and 1003	
7571	Wideband Radio Communication Tester	CMW 500	1201.0002k50/103829	Rhode & Schwarz	Verified 04/04/13	
8686	20dB Attenuator	0846	BW-N20W5+	MCL	Verified by 6814 and 1003	
Radiated Test Setup						
1033	Bilog Antenna	3142C	00044556	EMCO	06/25/13	06/25/14
7575	Double-ridged waveguide horn antenna	3117	00155511	EMCO	03/25/13	03/25/14
8628	Pre-amplifier	QLJ 01182835-JO	8986002	QuinStar Technologies Inc.	09/21/12	09/21/13
1153	High-frequency cable	SucoFlex 100 SX	N/A	Suhner	09/21/12	09/21/13
8543	High-frequency cable	Micropore 19057793	N/A	United Microwave Products	09/21/12	09/21/13
1040	EMI Test Receiver	ESIB40	100292	Rhode & Schwarz	07/31/13	07/31/14
1049	EMI Test Receiver	ESU	100133	Rhode & Schwarz	07/24/13	07/24/14
7571	Wideband Radio Communication Tester	CMW 500	1201.0002k50/103829	Rhode & Schwarz	Verified 04/04/13	
1016	Pre-amplifier	PAM-0202	187	PAM	09/24/12	09/24/13
Miscellaneous						
	Test Software	EMC32	V8.53	Rhode & Schwarz	N/A	
1003	Signal Generator	SMR-40	1104.0002.40	Rhode & Schwarz	11/12/12	11/12/13
6452	Multimeter	3478A	2911A52177	Hewlett Packard	08/02/13	08/02/14
7560	Barometer/Temperature /Humidity Transmitter	iBTHX-W	1240476	Omega	11/19/12	11/19/13



3.2 MEASUREMENT UNCERTAINTY

For a 95% confidence level, the measurement uncertainties for defined systems are:

3.2.1 Radiated Emission Measurements (Below 1GHz)

Contribution		Probability Distribution Type	Probability Distribution x_i	Standard Uncertainty $u(x_i)$	$[u(x_i)]^2$
1	Receiver/Spectrum Analyzer	Rectangular	0.45	0.26	0.07
2	Cables	Rectangular	0.50	0.29	0.08
3	Preamp	Rectangular	0.50	0.29	0.08
4	Antenna	Rectangular	0.75	0.43	0.19
5	Site	Rectangular	3.89	2.25	5.04
6	EUT Setup	Rectangular	1.00	0.58	0.33
Combined Uncertainty (u_c):					2.41
Coverage Factor (k):					2
Expanded Uncertainty:					4.82

3.2.2 Radiated Emission Measurements (Above 1GHz)

Contribution		Probability Distribution Type	Probability Distribution x_i	Standard Uncertainty $u(x_i)$	$[u(x_i)]^2$
1	Receiver/Spectrum Analyzer	Rectangular	0.57	0.33	0.11
2	Cables	Rectangular	0.70	0.40	0.16
3	Preamp	Rectangular	0.50	0.29	0.08
4	Antenna	Rectangular	0.37	0.21	0.05
5	Site	Rectangular	3.89	2.25	5.04
6	EUT Setup	Rectangular	1.00	0.58	0.33
Combined Uncertainty (u_c):					2.40
Coverage Factor (k):					2
Expanded Uncertainty:					4.81

3.2.3 Conducted Antenna Port Measurement

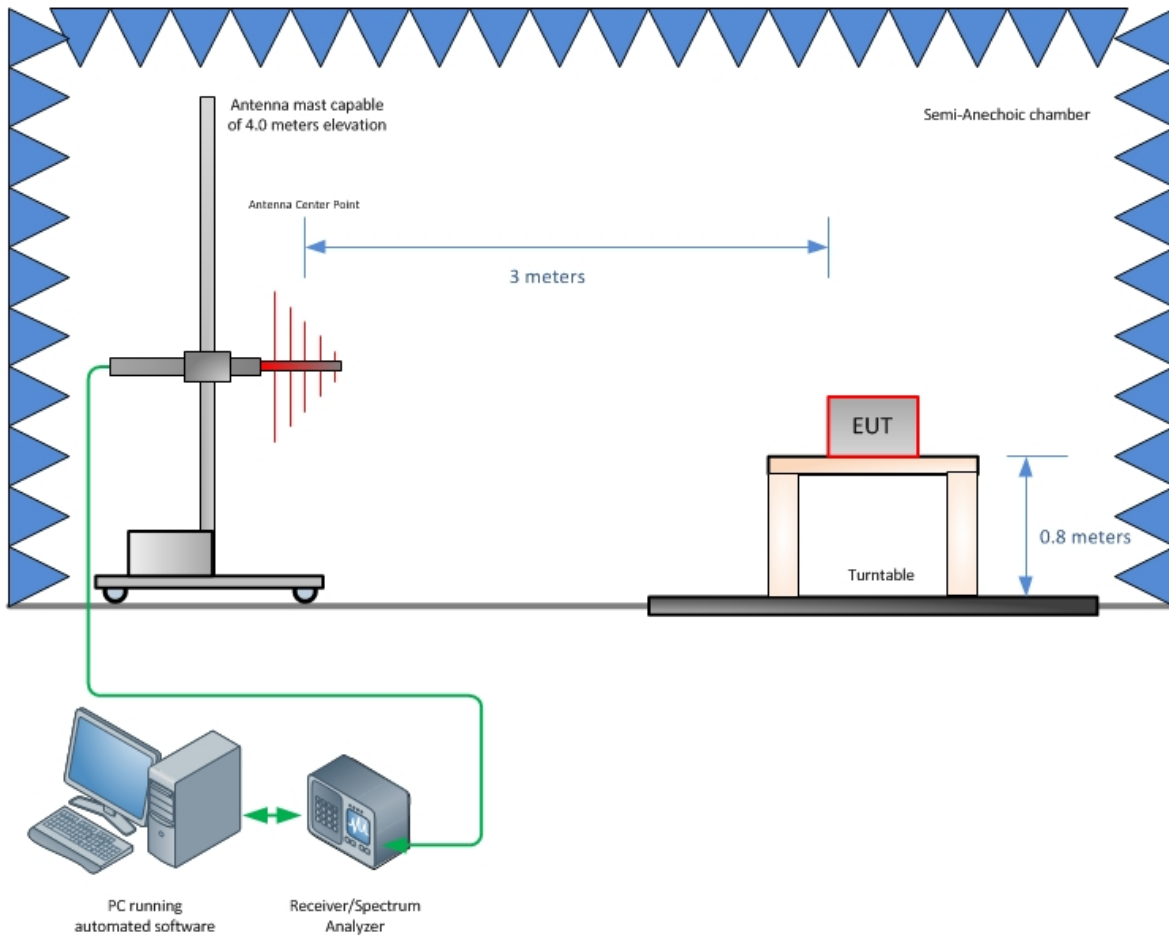
Contribution		Probability Distribution Type	Probability Distribution x_i	Standard Uncertainty $u(x_i)$	$[u(x_i)]^2$
1	Receiver/Spectrum Analyzer	Rectangular	0.57	0.33	0.11
2	Cables	Rectangular	0.50	0.29	0.08
3	EUT Setup	Rectangular	1.00	0.58	0.33
Combined Uncertainty (u_c):					0.72
Coverage Factor (k):					2
Expanded Uncertainty:					1.45



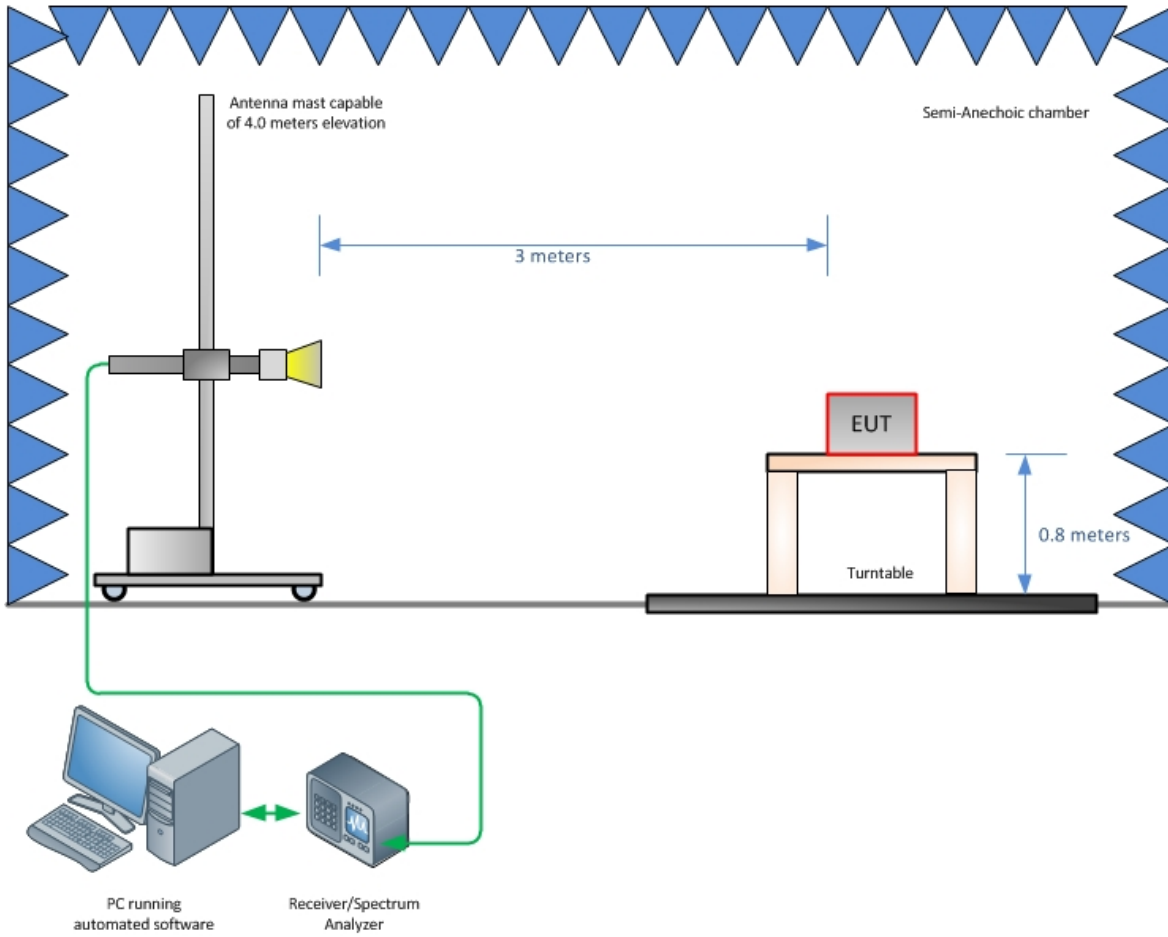
SECTION 4

DIAGRAM OF TEST SETUP

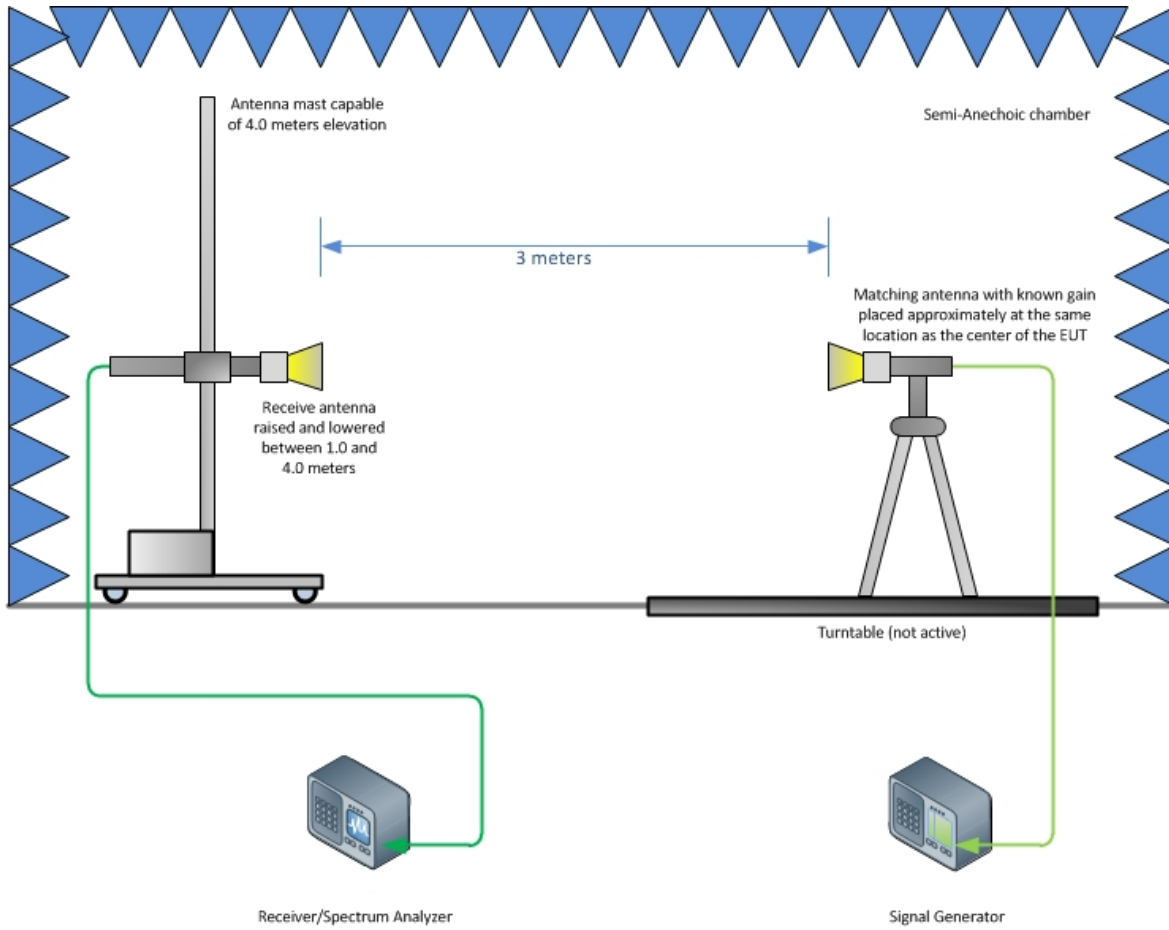
4.1 TEST SETUP DIAGRAM



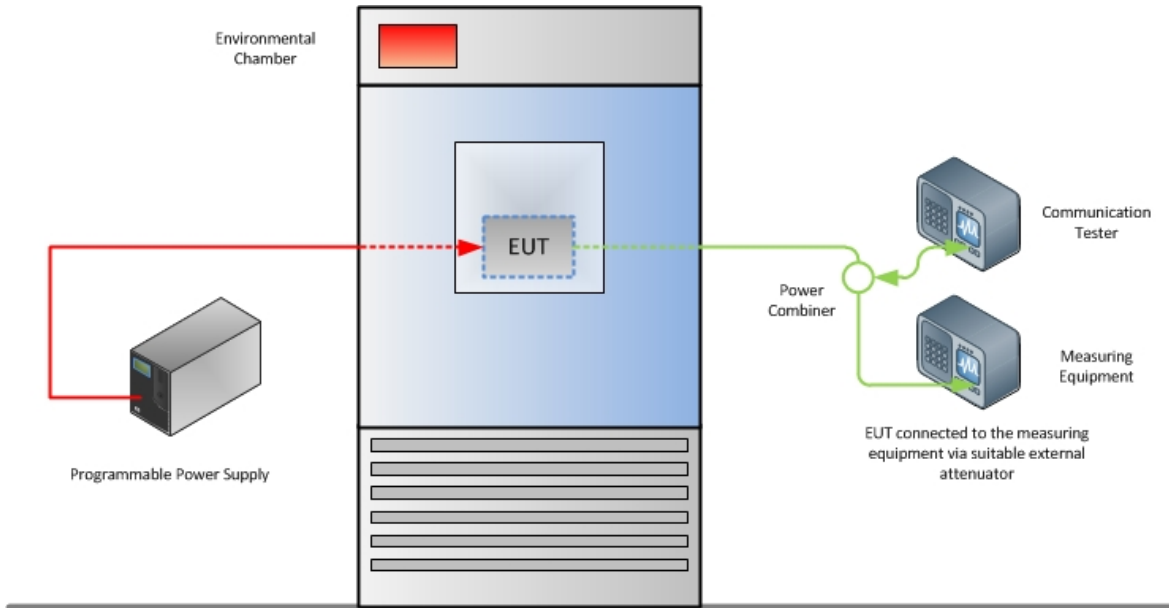
Radiated Emission Test Setup (Below 1GHz)



Radiated Emission Test Setup (Above 1GHz)



Substitution Test Method (Above 1GHz)



Frequency Stability Test Configuration



SECTION 5

ACCREDITATION, DISCLAIMERS AND COPYRIGHT



5.1 ACCREDITATION, DISCLAIMERS AND COPYRIGHT

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