EMC Test Report

Project Number: 3374150

Report Number: 3374150EMC06 **Revision Level:** 2

Client: MedicAlgorithmics

Equipment Under Test: Mobile Computer with WCDMA/GSM/WiFi/BT

Model: PocketECG III

FCC Rule Parts: Part 2, Part 22(H), Part 24(E)

IC Standards: RSS-132, Issue 3; RSS-133, Issue 6

Report issued on: 30OCT2014

Test Result: Compliant

Tested by: Brian Forster, EMC Engineer

Reviewed by: David Schramm, EMC Manager

Remarks:
This report details the results of the testing carried out on one sample, the results contained in this test report do not relate to other samples of the same product. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.

Table of Contents

1 Summary of Test Results

FCC Part Sections	Test Description	Test Limit	Test Condition	Test Result
Transmit Mode Testing				
2.1046	Conducted Output Power	N/A	Conducted	Pass
24.232(d) RSS-132 5.4 RSS-133 6.4	Peak-to-Average Ratio	<13 dB		Pass
2.1049 22.917(a) 24.238(a)	Occupied Bandwidth	N/A		Pass
2.1051 22.917(a) 24.238(a)	Band Edge / Conducted Spurious Emissions	< 43 +10log$_{10}$ ($P_{[Watts]}$) at band edge and for all out of band emissions		Pass
22.913(a)(2)	Effective Radiated Power	< 7 Watts max ERP	Radiated	Pass
RSS-132 5.4	Effective Radiated Power	< 11.5 Watts max ERP		Pass
24.232(c) RSS-133 6.4	Effective Isotropic Radiated Power	< 2 Watts max EIRP		Pass
2.1053 22.917(a) 24.238(a) RSS-132 5.5 RSS-133 6.5	Radiated Spurious Emissions	< 43 +10log$_{10}$ ($P_{[Watts]}$) at band edge and for all out of band emissions		Pass
2.1055 22.917(a) 24.238(a) RSS-132 5.3 RSS-132 6.3	Frequency Stability	<2.5 ppm		Pass

1.1 *Modifications Required to Compliance*

None

2 General Information

2.1 *Client Information*

Name:	Medicalgorithmics
Address:	Al. Jerozolimskie 81
City, State, Zip, Country:	02-001 Warsaw Poland

2.2 *Test Laboratory*

Name:	SGS North America, Inc.
Address:	620 Old Peachtree Road NW, Suite 100
City, State, Zip, Country:	Suwanee, GA 30024, USA
Accrediting Body:	A2LA
Type of lab:	Testing Laboratory
Certificate Number:	3212.01

2.3 *General Information of EUT*

Marketing Name:	PocketECG III
Model:	PocketECG III
Serial Number:	P3TR13-00013A(Conducted Measurements) P3TR13-00020A(Conducted Measurements) P3TR13-00002A(Radiated Measurements) P3TR13-00004A(Radiated Measurements)
Hardware Version:	R904
Software Version	10.001-6.000-8287
Rated Voltage:	3.8 VDC, battery
Test Voltage:	Fully charged 3.8 Vdc, battery
Sample Received Date:	10DEC2013
Dates of testing:	10 FEB – 03JUN2014

2.4 *Operating Modes and Conditions*

The EUT was exercised by connecting a CMW 500 Communications Tester to the device. The CMW was used to control signaling and power modes during testing.

3 US Cellular Band

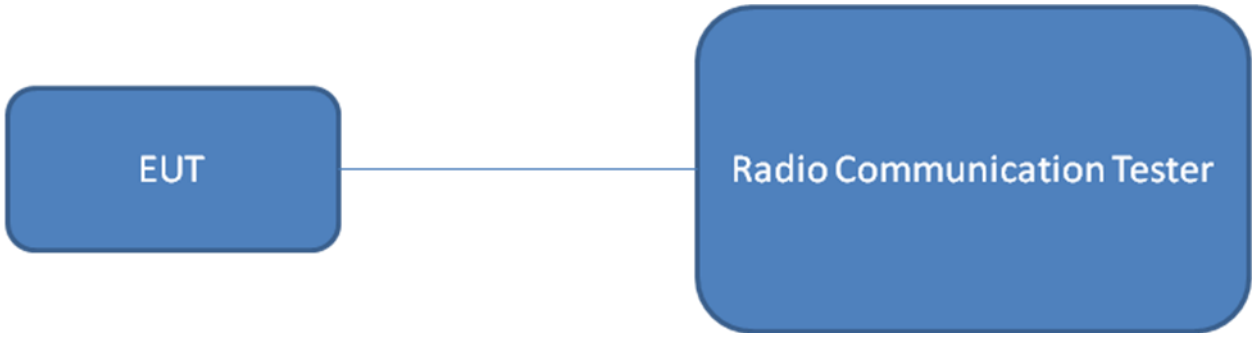
3.1 *RF Output Power*

3.1.1 Test Result

Test Description	Basic Standards	Test Result
RF Output Power	FCC Part 2.1046	Reported

3.1.2 Test Method

A radio link was established between EUT and Radio Communication Tester. The output power of the EUT was set to maximum value by using the maximum power setting on the Radio Communications Tester. The output power was measured by a spectrum analyzer with the use of a directional coupler.



3.1.3 Test Site

SGS EMC Laboratory, Suwanee, GA

Environmental Conditions

Temperature:	22.2 °C
Relative Humidity:	47.6 %
Atmospheric Pressure:	100.9 kPa

3.1.4 Test Equipment

Equipment	Model	Manufacturer	Asset Number	Cal Due Date
Radio Communications Tester	CMW-500	R & S	B079788	18OCT2014

Note: The calibration period equipment is 1 year.

3.1.5 Test Data

Mode	Band	Frequency (MHz)	Channel	Average Power (dBm)
GSM (1)	850	824-849	Max 128-251	26.3
GSM (2)	850	824-849	Max 128-251	**32.3**
WCDMA	Band V	824-849	Max 4132-4233	23.2

1) Maximum Frame-Averaged Power
2) Maximum Burst-Averaged Power

3.2 *Occupied Bandwidth*

3.2.1 Test Result

Test Description	Basic Standards	Test Result
Occupied Bandwidth	FCC Part 2.1049	Reported

3.2.2 Test Method

The occupied bandwidth is the frequency bandwidth such that below its lower and above its upper frequency limits, the mean powers are each equal to 0.5% of the total mean power by a given emission. The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts. The resolution bandwidth shall be set to as close to 1% of the selected span without being below 1%. The video bandwidth shall be set to 3 times the resolution bandwidth. Video averaging is not permitted. Where practical, a sample detector shall be used since a peak detector may produce a wider than actual bandwidth.

A radio link was established between EUT and Radio Communications Tester. The output power of the EUT was set to maximum value by using the maximum power setting on the Radio Communications Tester. The occupied bandwidth is measured using spectrum analyzer's occupied bandwidth measurement. RBW is set to 3 kHz on spectrum analyzer.

The bandwidth of 99% power can be read on spectrum analyzer.

The measurement was conducted at the center channel:

3.2.3 Test Site

SGS EMC Laboratory, Suwanee, GA

3.2.4 Test Equipment

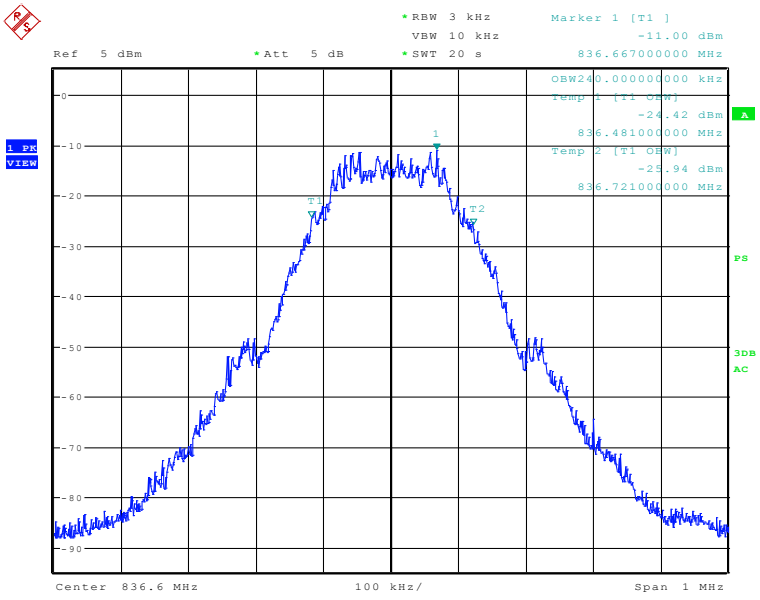
Equipment	Model	Manufacturer	Asset Number	Cal Due Date
Spectrum Analyzer	ESU40	R&S	B085629	07OCT14
Radio Communications Tester	CMW-500	R & S	B085757	29OCT2014
Power Splitter	ZFRSC-183-S+	Mini-Circuits	B101743	24SEP2014
Coaxial Cable	Sucoflex 102	Huber+Suhner	B079824	29OCT2014

Note: The calibration period equipment is 1 year.

3.2.5 **Test Data**

Cellular Band		
Mode	Frequency (MHz)	Bandwidth(kHz)
GPRS	836.6	240
EGPRS	836.6	243
WCDMA	836.6	4144

GPRS



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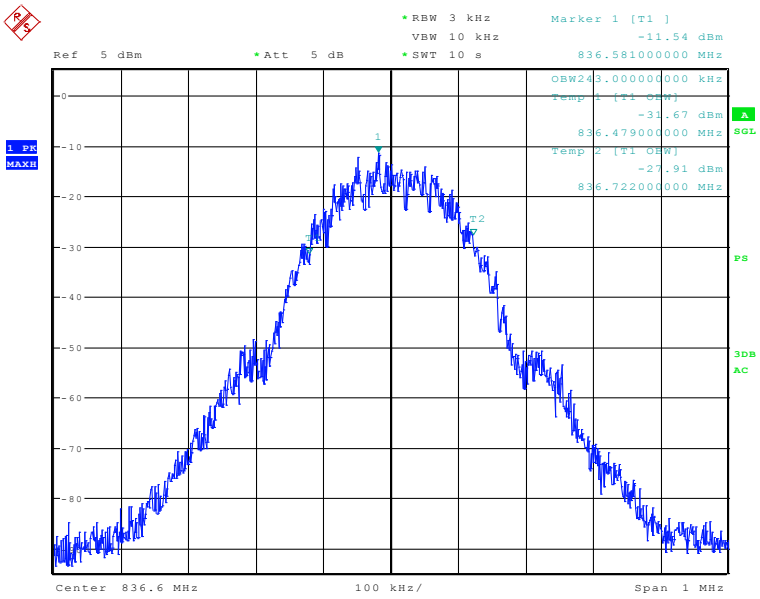
EGPRS



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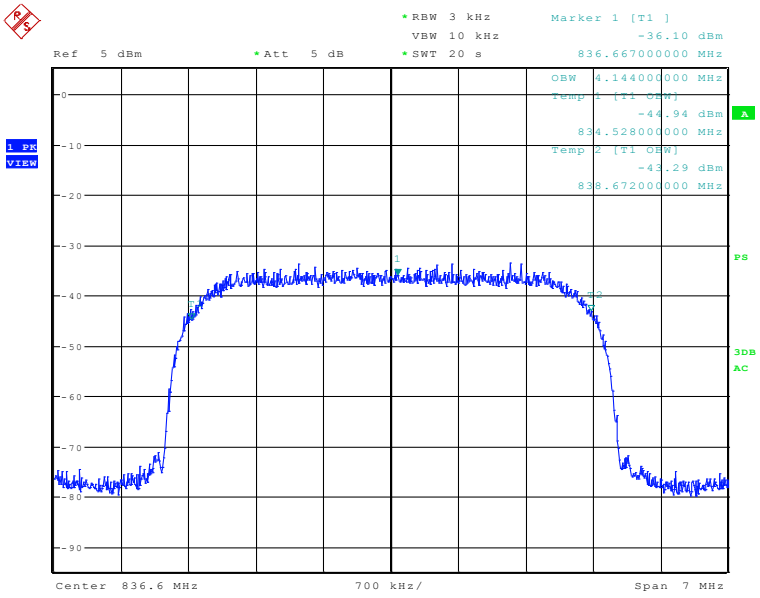
WCDMA



Date: 6.JUN.2014 10:46:55

3.3 *Conducted Band Edge and Spurious Emissions*

3.3.1 Test Result

Test Description	Basic Standards	Test Result
Conducted spurious emissions and Band Edge	2.1051 22.917(a)	Pass

3.3.2 Test Method

The levels of the carrier and the various conducted spurious and harmonics frequencies are measured by means of a calibrated spectrum analyzer. The emissions spectrum emanating from the EUT transmit antenna port is scanned from the lowest frequency generated in the equipment up to a frequency including its 10th harmonic. On any frequency outside a licensee's frequency block, the power of any emission shall be attenuated below the transmitter power (P) by at least 43 + 10 log (P) dB. Compliance is based on the use of a spectrum analyzer employing a resolution bandwidth of 1 MHz or greater. In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of a least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. The emissions 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.

3.3.3 Test Site

SGS EMC Laboratory, Suwanee, GA

3.3.4 Test Equipment

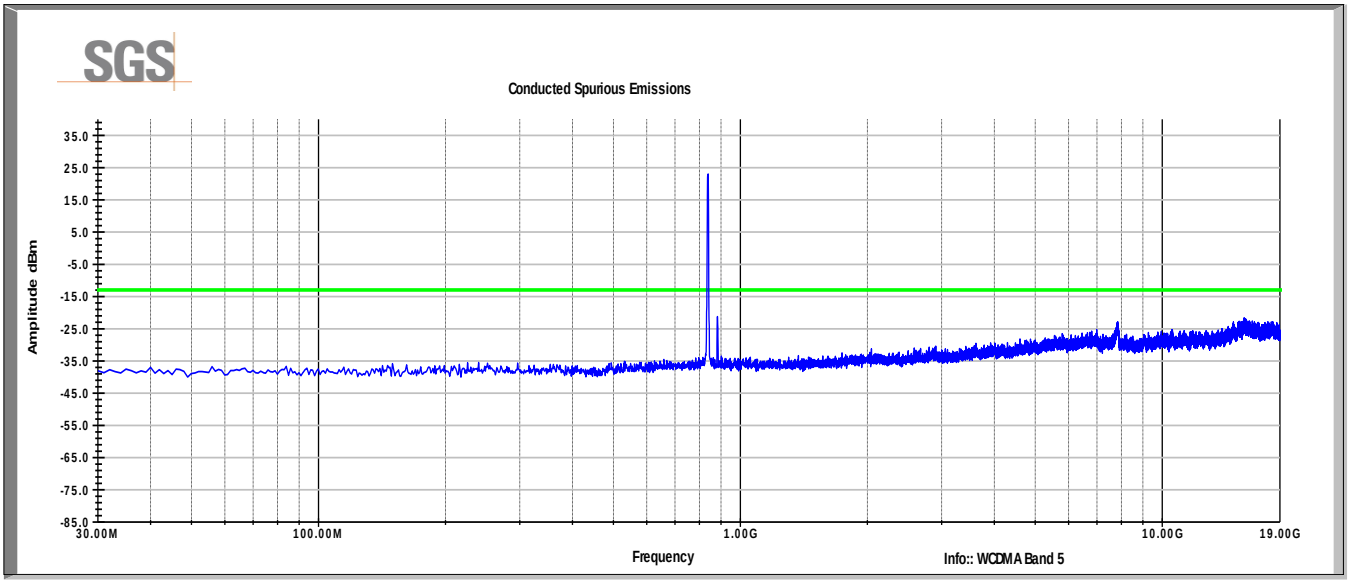
Equipment	Model	Manufacturer	Asset Number	Cal Due Date
Spectrum Analyzer	ESU40	R&S	B085629	07OCT 2014
Radio Communications Tester	CMW-500	R & S	B079788	18 OCT 2014
Power splitter	ZFRSC-183-S+	Mini-Circuits	EA01	Verified Before Use
Attentuator	BW-S10W2+	Mini-Circuits		Verified Before Use
Attenuator	BW-S10W2+	Mini-Circuits		Verified Before Use
Signal Generator	HMC-T2240	Hittite	B0799813	Verified Before Use
Coaxial Cable	086-112SM+	Mini-Circuits	NA	Verified Before Use
Coaxial Cable	086-112SM+	Mini-Circuits	NA	Verified Before Use

Note: The calibration period equipment is 1 year.

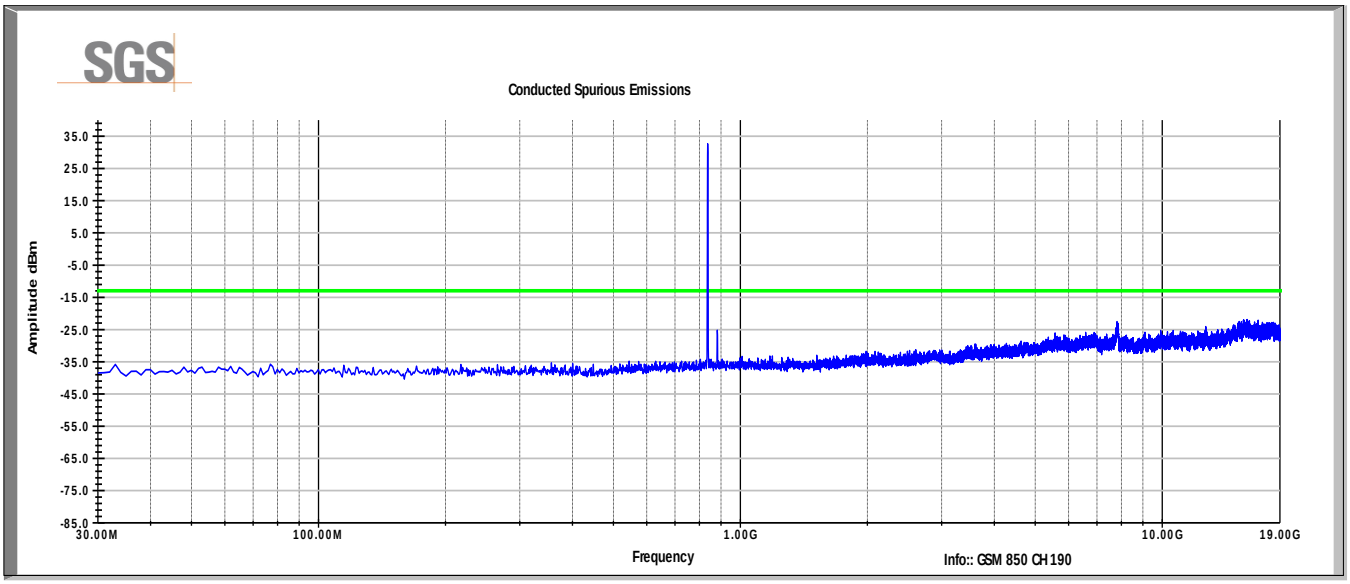
3.3.5 **Test Data**

Test Date: 2 Aug 2012

WCDMA
CH 837

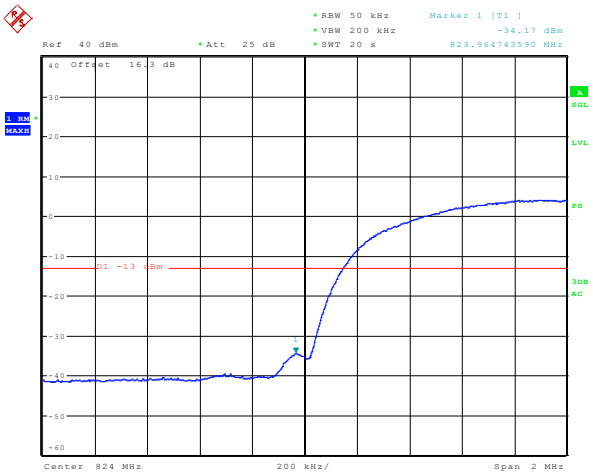


GSM
Ch190



Band Edges

WCDMA
BandV



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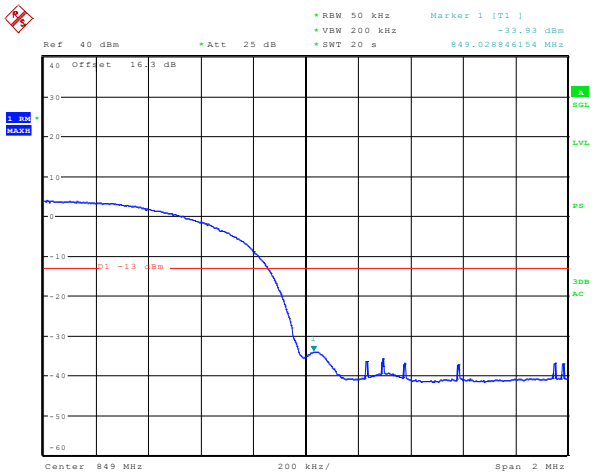

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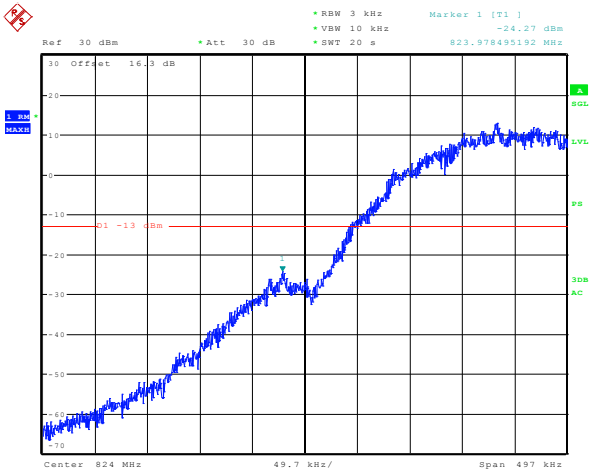
GSM 850
GPRS



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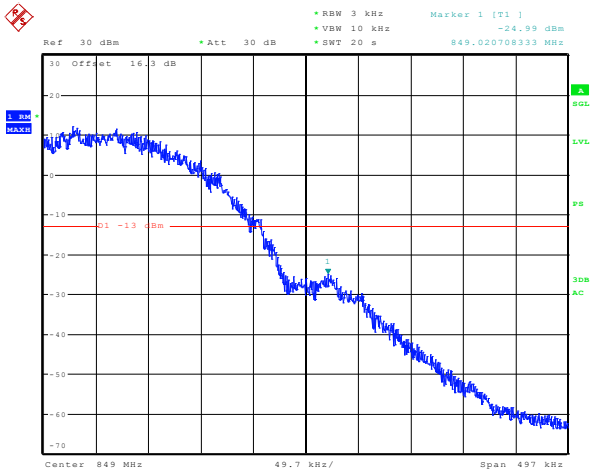

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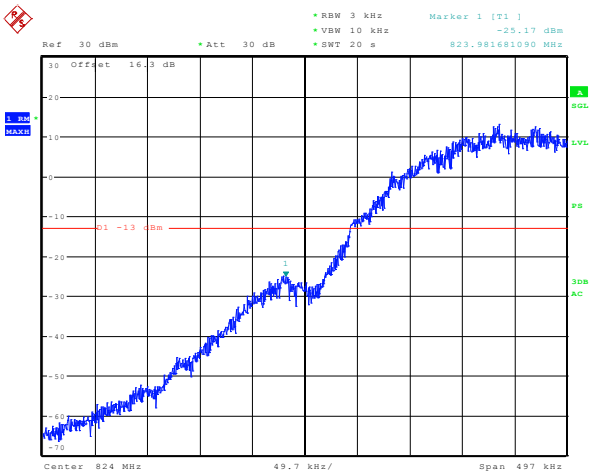
EGPRS



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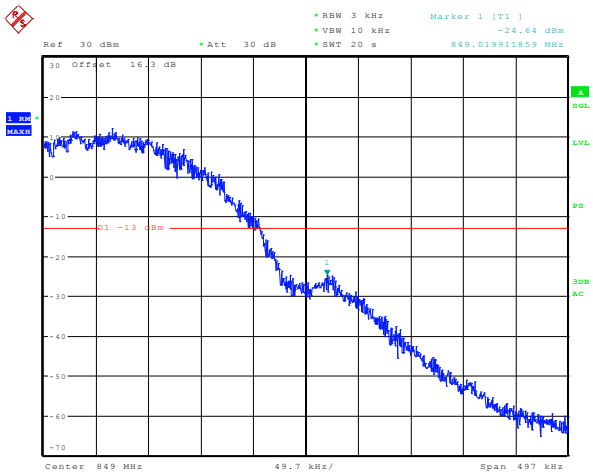

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3.4 *Radiated Spurious Emissions*

3.4.1 Test Result

Test Description	Basic Standards	Test Result
Radiated Spurious Emissions	FCC Part 2.1053 FCC Part 22.917(a)	Pass

3.4.2 Test Method

The levels of the carrier and the various conducted spurious and harmonics frequencies are measured by means of a calibrated spectrum analyzer. The spectrum is scanned from the lowest frequency generated in the equipment up to a frequency including its 10th harmonic. On any frequency outside a licensee's frequency block, the power of any emission shall be attenuated below the transmitter power (P) by at least 43 + 10 log (P) dB. Compliance is based on the use of a spectrum analyzer employing a resolution bandwidth of 1 MHz or greater. In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of a least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. The emissions 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.

The EUT was manipulated through each of its three orthogonal axes with the measurement oriented in both vertical and horizontal polarizations.

A radio link was established between EUT and Radio Communications Tester. The output power of the EUT was set to maximum value by using the maximum power setting on the Radio Communications Tester.

The measurement was conducted at the middle channels, 4183 in RC3/SO55 and 190 in GPRS.

3.4.3 Test Equipment

Equipment	Model	Manufacturer	Asset Number	Cal Due Date
17 FT N TYPE COAX CABLE	HS 84133232	HUBER&SUHNER	B079661	6-Aug-2014
ANTENNA, BILOG	JB6	SUNOL	B079690	24-Sep-2014
RF CABLE - 12000MM (10KHZ - 18GHZ)	SF106	HUBER&SUHNER	B079714	6-Aug-2014
COAXIAL CABLE	SUCOFLEX 102	HUBER&SUHNER	B079824	29-Oct-2014
PREAMPLIFIER	PAM-0118P	AH Systems	385	8-Oct-2014
DRG HORN (MEDIUM)	3117	ETS-LINDGREN	B079699	25-Mar-2014
RF CABLE	SF106	HUBER&SUHNER	B085892	16-Oct-2014
WIDEBAND RADIO COMMUNICATION TESTER	CMW 500	ROHDE & SCHWARZ	B085757	24-Oct-2014

Note: The calibration period equipment is 1 year.

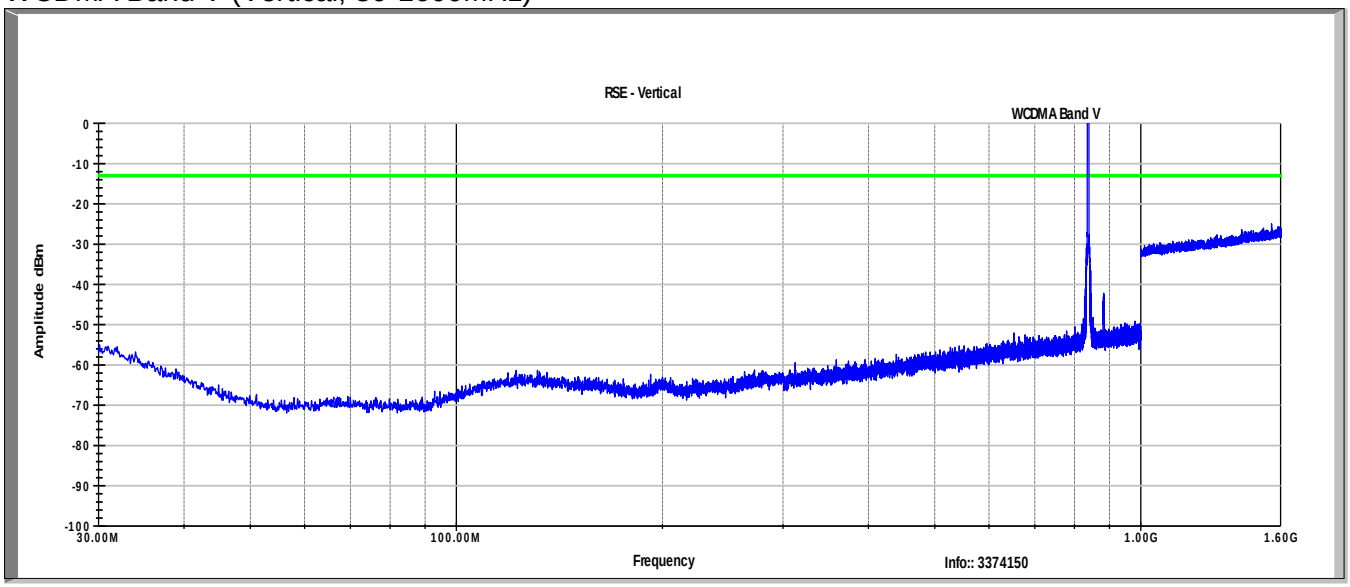
3.4.4 Test Data

Test Date: 21 – 30 Jan 2014

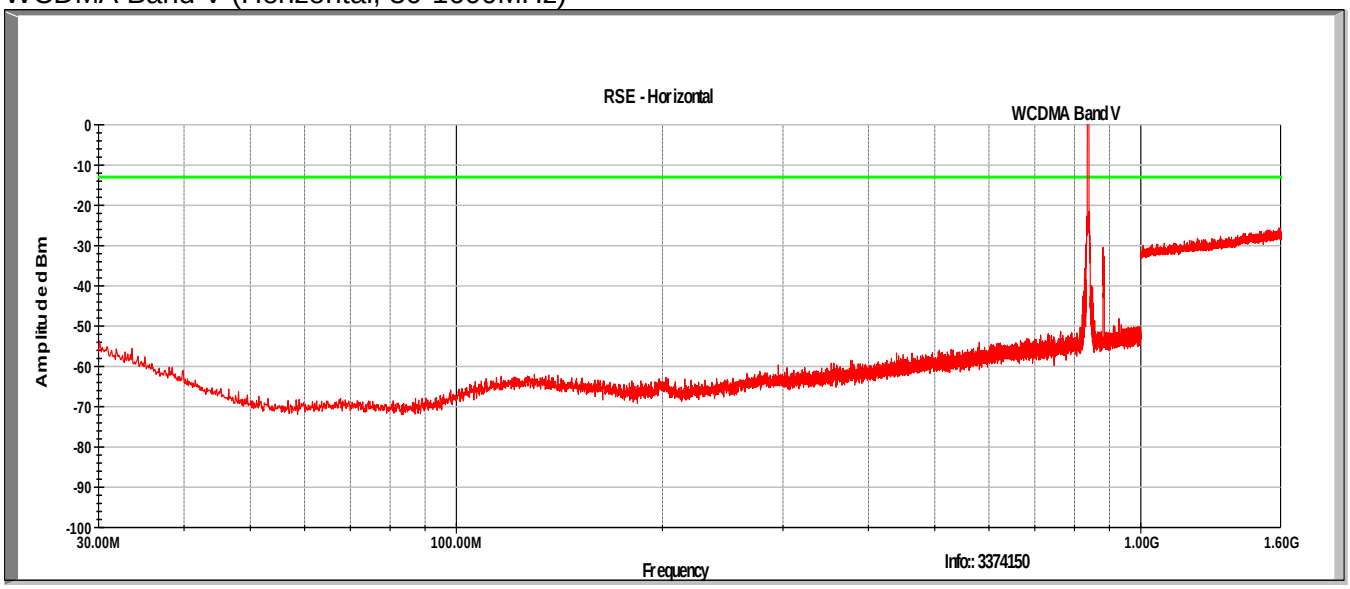
There were no spurious emissions within 20 dB of the limit.

3.4.5 Plots

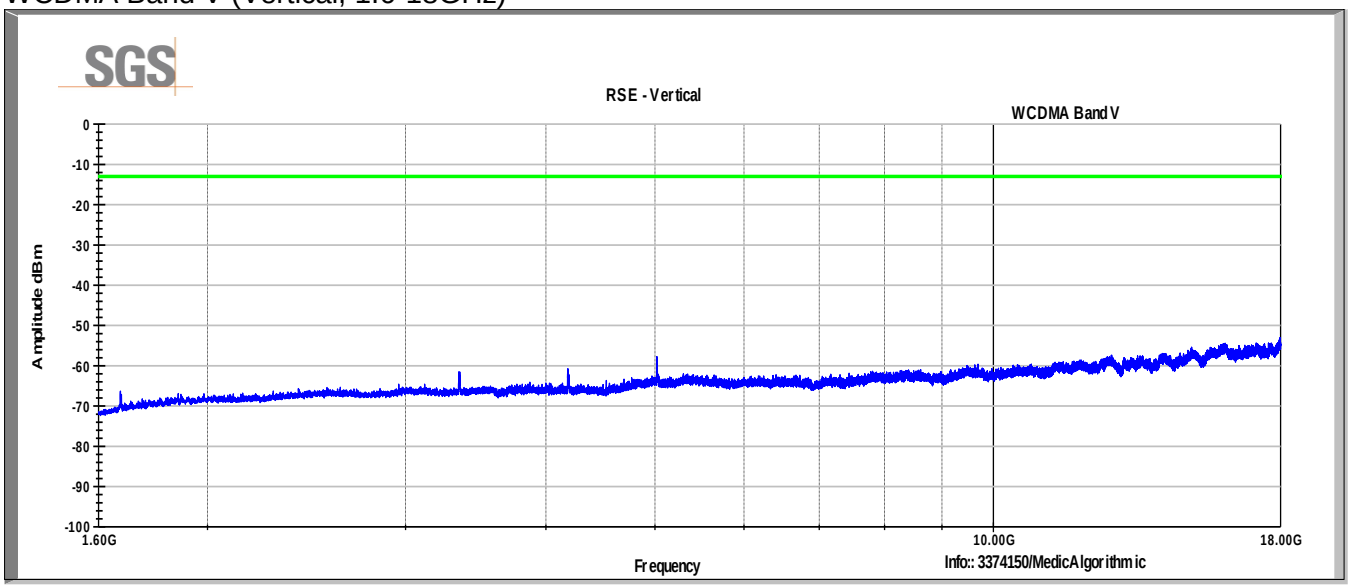
WCDMA Band V (Vertical, 30-1600MHz)



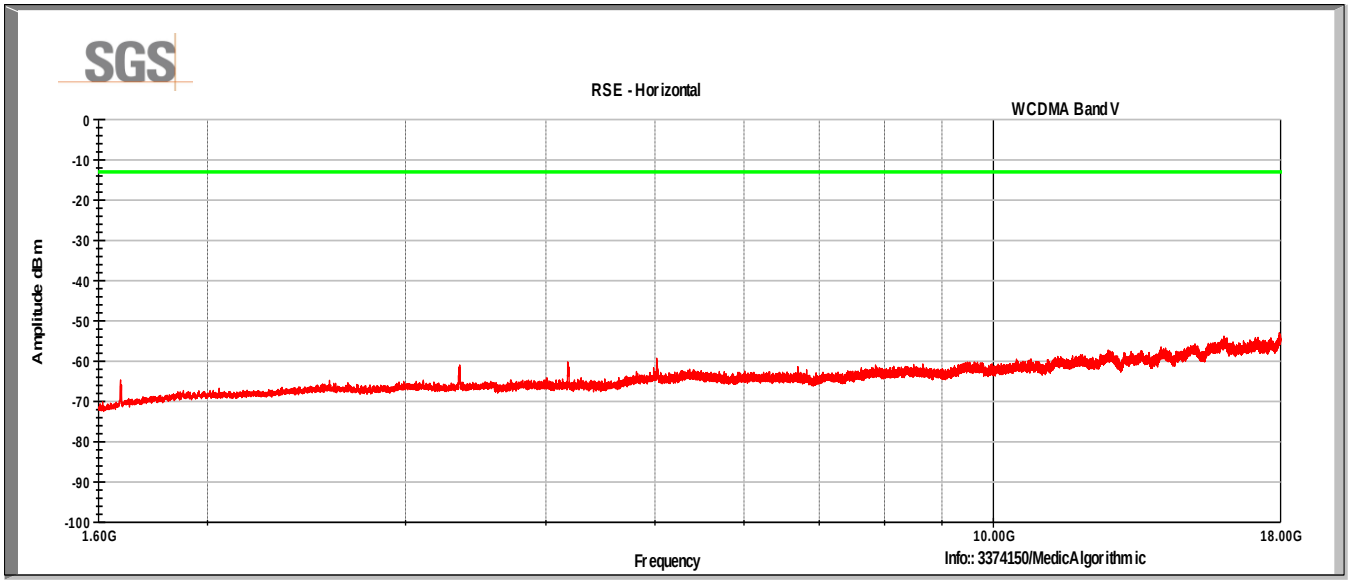
WCDMA Band V (Horizontal, 30-1600MHz)



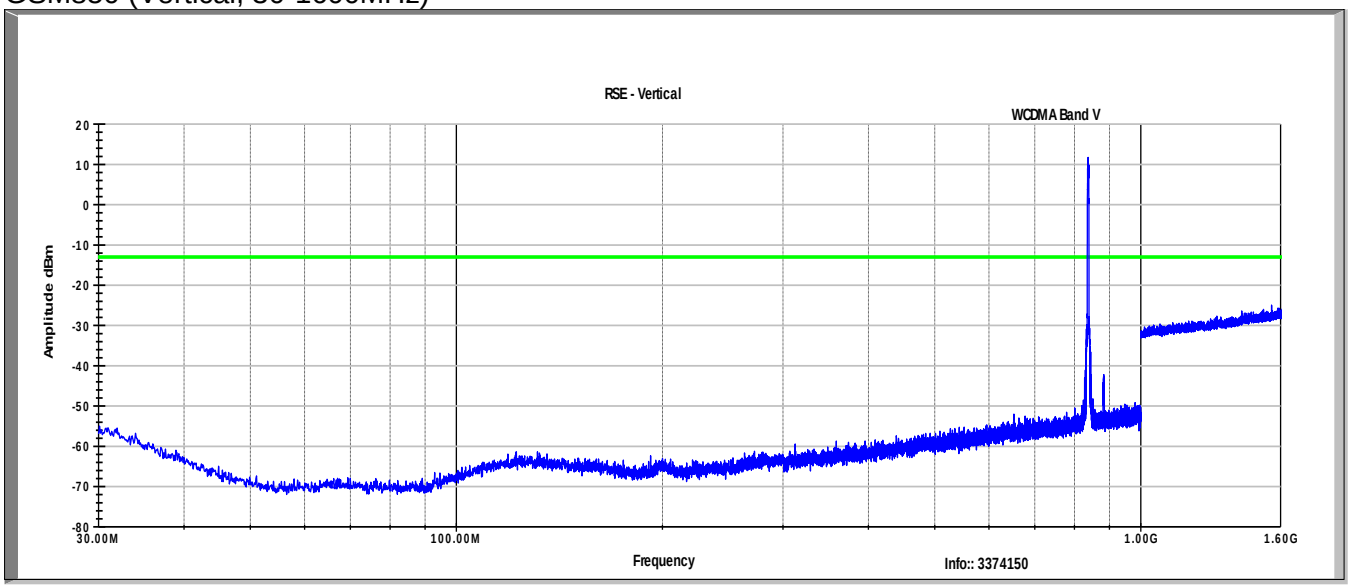
WCDMA Band V (Vertical, 1.6-18GHz)



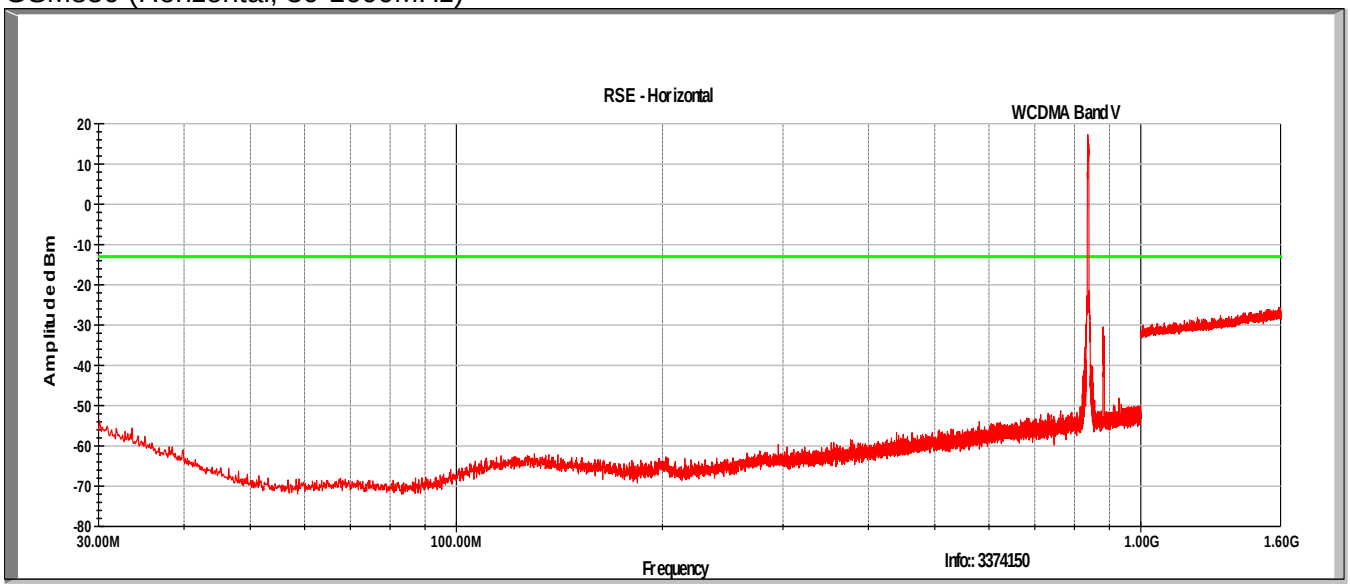
WCDMA Band V (Horizontal, 1.6-18GHz)



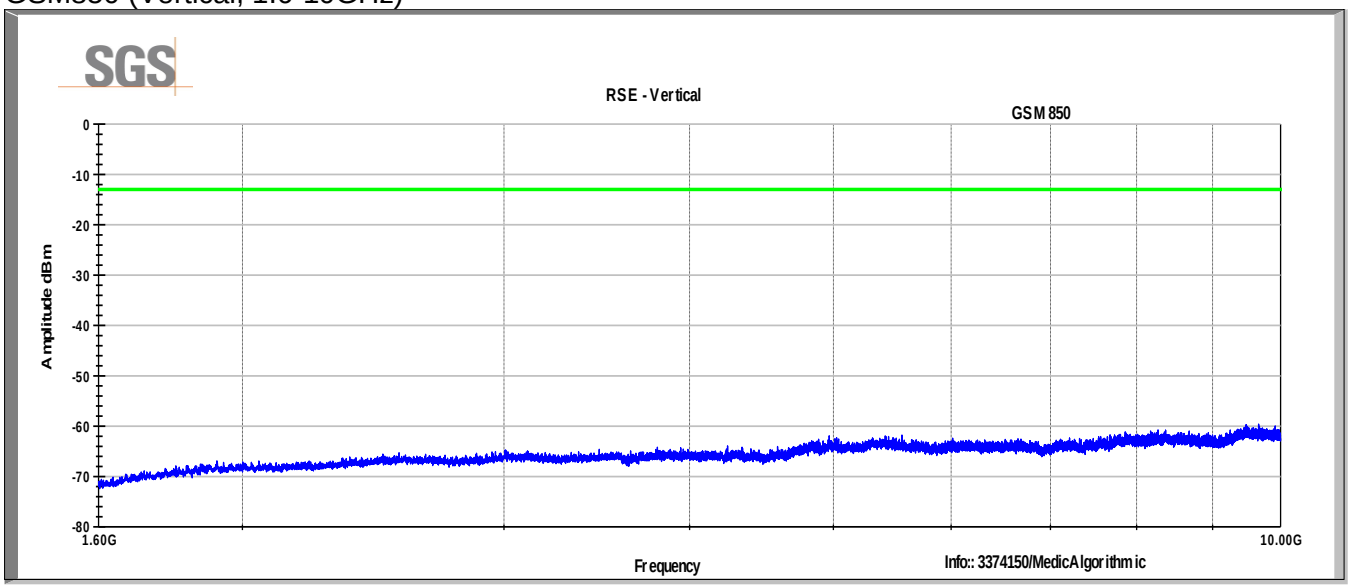
GSM850 (Vertical, 30-1600MHz)



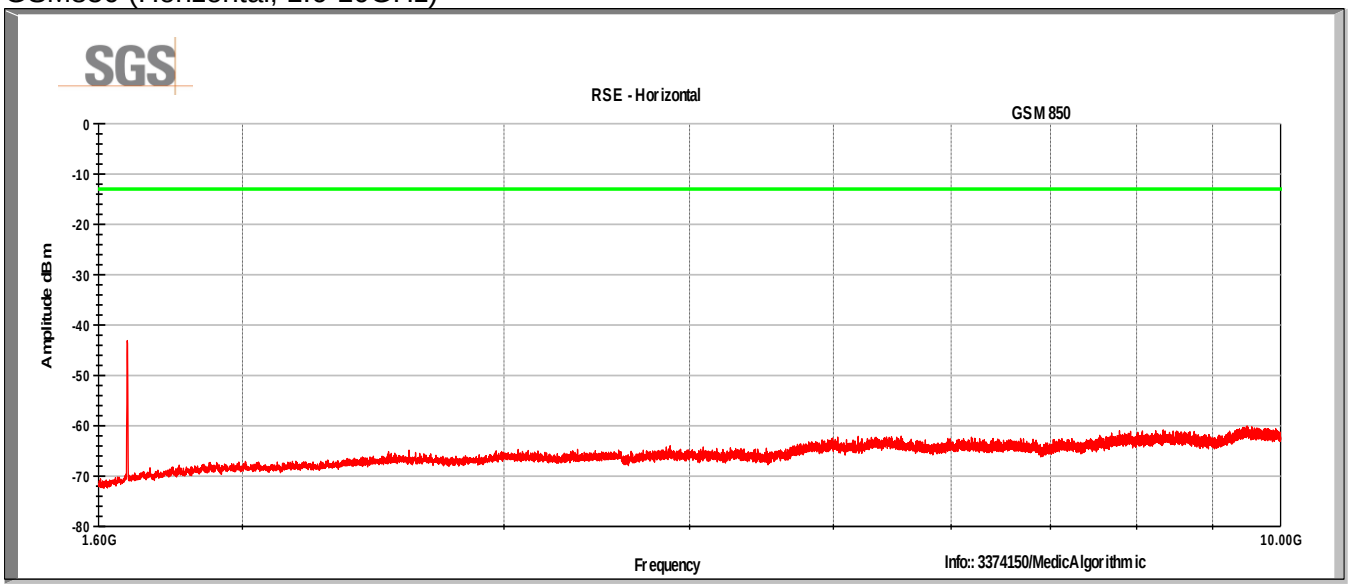
GSM850 (Horizontal, 30-1600MHz)



GSM850 (Vertical, 1.6-10GHz)



GSM850 (Horizontal, 1.6-10GHz)



3.5 *Effective Radiated Power*

3.5.1 Test Result

Test Description	Basic Standards	Test Result
Effective Radiated Power	FCC Part 22.913	Pass

3.5.2 Test Method

The measurements above 1 GHz are carried out in a fully anechoic chamber. Below 1 GHz, the measurements are carried out in semi-anechoic chamber. The EUT was placed on a 0.8 meter high non-conductive table at a 3 meters test distance from the test receive antenna. A receiving antenna was placed on the antenna mast 3 meters from the EUT. The height of receiving antenna is varied from 1 to 4 m to find the maximum power value. A radio link was established between EUT and Radio Communications Tester. The output power of the EUT was set to maximum value by using the maximum power setting on the Radio Communications Tester. A RMS detector is used and RBW is set to 3MHz. Then the antenna height and turn table rotation is adjusted till the maximum power value is founded on spectrum analyzer.

The EUT was positioned through each of its three orthogonal axes and the highest level was reported.

A dipole antenna (below 1 GHz) or double-ridged waveguide antenna (above 1 GHz) was substituted in place of the EUT. The substitution antenna will be driven by a signal generator. The receive antenna is varied to find the maximum response to the spectrum analyzer. Then the level of signal generator will be adjusted to achieve the same power value on the spectrum analyzer or receiver.

The ERP/EIRP of the EUT can be calculated through the level of the signal generator, cable loss, the gain of the substitution antenna and the reading of the spectrum analyzer or receiver.

3.5.3 Test Site

3m Semi-anechoic chamber, SGS EMC Laboratory, Suwanee, GA

3.5.4 Test Equipment

Equipment	Model	Manufacturer	Asset Number	Cal Due Date
Receiver	ESU40	R & S	B079629	07OCT 2014
Bilog Antenna	JB6	Sunol	B079689	24 SEP 2014
Signal Generator	HMC T2240	Hittite	B079813	NCR
Coaxial Cable	Sucoflex 106	Huber+Suhner	B079714	06AUG2014
Coaxial Cable	Sucoflex 106	Huber+Suhner	B079659	06AUG2014
Radio Communications Tester	CMW-500	R&S	B085757	24 Oct 2014
Dipole	3121D-DB4	ETS-Lindgren	B085753	16 Mar 2015

Note: The calibration period equipment is 1 year.

3.5.5 Test Data

Data in last column is ERP.

Freq (MHz)	Pol	Mode	SigGen Out (dBm)	Cable Loss (dB)	Net to Sub Ant (dBm)	Reading (dBuV)	Antenna Gain (dBi)	EUT Level (dBuV)	ERP / EIRP (dBm)
836.5	H	GSM EDGE	0.63	0.63	0	75.8	0.0	101.9	26.1
836.5	V	GSM EDGE	0.63	0.63	0	71.3	0.0	97.1	25.9
836.5	H	GSM GPRS	0.63	0.63	0	75.8	0.0	107.9	32.1
836.5	V	GSM GPRS	0.63	0.63	0	71.3	0.0	103.1	31.9
836.5	H	WCDMA	0.63	0.63	0	75.8	0.0	97.8	22.0
836.5	V	WCDMA	0.63	0.63	0	71.3	0.0	92.8	21.6

3.6 *Frequency Stability*

3.6.1 Test Result

Test Description	Basic Standards	Test Result
Frequency Stability	2.1055 22.917(a)	Pass

3.6.2 Test Method

The EUT was placed inside the Environmental Chamber and was left inside chamber to stabilize to set temperature for minimum of thirty minutes before any measurements were made.

3.6.3 Test Site

SGS EMC Laboratory, Suwanee, GA

Environmental Conditions

Temperature:	23.6 °C
Relative Humidity:	56.8 %
Atmospheric Pressure:	97.4 kPa

3.6.4 Test Equipment

Equipment	Model	Manufacturer	Asset Number	Cal Due Date
DC Power Supply	382280	Extech	EA03	14MAR2015
Wideband Radio Communications Tester	CMW500	Rohde & Schwarz	B085757	29OCT2014
Coaxial Cable	1302	Mini-circuits	NA	NCR
Environmental Chamber	8800	Thermotron	4476	16NOV2014

Note: The calibration period equipment is 1 year.

3.6.5 **Test Data**

Test Date: 03JUN2014

GSM 850

Voltage %	Power V_{DC}	Temp °C	Frequency Hz	Freq Dev max Hz	Freq Dev ppm	Deviation %
100%	3.70	+20 (Ref)	836,519,999		+0.00	+0.000000
100%	3.70	-30	836,520,034	+34	+0.04	+0.000004
100%	3.70	-20	836,520,034	+34	+0.04	+0.000004
100%	3.70	-10	836,520,008	+8	+0.01	+0.000001
100%	3.70	0	836,519,980	-20	-0.02	-0.000002
100%	3.70	+10	836,519,965	-35	-0.04	-0.000004
100%	3.70	+20	836,519,987	-13	-0.02	-0.000002
100%	3.70	+30	836,519,998	-2	-0.00	-0.000000
100%	3.70	+40	836,519,980	-20	-0.02	-0.000002
100%	3.70	+50	836,519,993	-7	-0.01	-0.000001
115%	4.23	+20	836,519,978	-22	-0.03	-0.000003
Battery End	3.35	+20	836,519,970	-30	-0.04	-0.000004

WCDMA

Voltage %	Power V_{DC}	Temp °C	Frequency Hz	Freq Dev max Hz	Freq Dev ppm	Deviation %
100%	3.70	+20 (Ref)	836,600,000		+0.00	+0.000000
100%	3.70	-30	836,599,981	-19	-0.02	-0.000002
100%	3.70	-20	836,599,980	-20	-0.02	-0.000002
100%	3.70	-10	836,599,983	-17	-0.02	-0.000002
100%	3.70	0	836,599,983	-18	-0.02	-0.000002
100%	3.70	+10	836,599,977	-23	-0.03	-0.000003
100%	3.70	+20	836,599,981	-19	-0.02	-0.000002
100%	3.70	+30	836,600,020	+20	+0.02	+0.000002
100%	3.70	+40	836,599,980	-20	-0.02	-0.000002
100%	3.70	+50	836,600,009	+9	+0.01	+0.000001
115%	4.23	+20	836,599,994	-6	-0.01	-0.000001
Battery End	3.35	+20	836,599,993	-7	-0.01	-0.000001

4 US PCS Band

4.1 *RF Output Power*

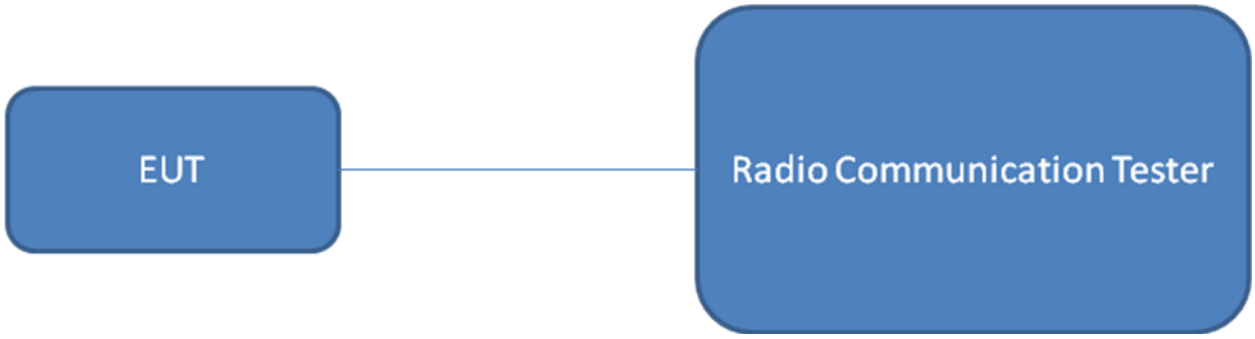
4.1.1 Test Result

Test Description	Basic Standards	Test Result
RF Output Power	FCC Part 2.1046	Pass

4.1.2 Test Method

A radio link was established between EUT and Radio Communication Tester. The output power of the EUT was set to maximum value by using the maximum power setting on the Radio Communications Tester. The output power was measured by a spectrum analyzer with the use of a directional coupler.

For CDMA Band 1, the measurement will be conducted at three channels: 25, 600, and 1175 (low, middle and high channels of the N American PCS Band).



4.1.3 Test Site

SGS EMC Laboratory, Suwanee, GA

Environmental Conditions

Temperature:	25.6 °C
Relative Humidity:	55.2 %
Atmospheric Pressure:	97.6 kPa

4.1.4 Test Equipment

Equipment	Model	Manufacturer	Asset Number	Cal Due Date
Radio Communications Tester	CMW-500	R & S	B079788	18 OCT 2014

Note: The calibration period equipment is 1 year.

4.1.5 Test Data

Mode	Band	Frequency (MHz)	Channel	Average Power (dBm)
GSM (1)	1900	1850-1910	Max 512-810	24.0
GSM (2)	1900	1850-1910	Max 512-810	**30.1**
WCDMA	Band II	1850-1910	Max 9262-9538	23.0

1) Maximum Frame-Averaged Power
2) Maximum Burst-Averaged Power

4.2 *Peak to Average Ratio*

4.2.1 Test Result

Test Description	Basic Standards	Test Result
Peak to Average Ratio	FCC Part 24.232(d)	Pass

4.2.2 Test Method

Clause 6.0 of 971168 D01 Power Meas License Digital Systems v01 was used to determine peak-to-average ratio.

4.2.3 Test Site

SGS EMC Laboratory, Suwanee, GA

4.2.4 Test Equipment

Equipment	Model	Manufacturer	Asset Number	Cal Due Date
Spectrum Analyzer	ESU40	R&S	B085629	07OCT 2014
Radio Communications Tester	CMW-500	R & S	B079788	18 OCT 2014
Power splitter	ZFRSC-183-S+	Mini-Circuits	EA01	Verified Before Use
Attentuator	BW-S10W2+	Mini-Circuits		Verified Before Use
Attenuator	BW-S10W2+	Mini-Circuits		Verified Before Use
Signal Generator	HMC-T2240	Hittite	B0799813	Verified Before Use
Coaxial Cable	086-112SM+	Mini-Circuits	NA	Verified Before Use
Coaxial Cable	086-112SM+	Mini-Circuits	NA	Verified Before Use

Note: The calibration period equipment is 1 year.

4.2.5 Test Data

Mode	Band	Center Frequency (MHz)	Channel	Peak to Average ratio (dB)
GSM	1900	1880	661	**0.5**
GPRS	1900	1880	661	**0.5**
EGPRS	1900	1880	661	**0.5**
WCDMA	Band II	1880	9400	**3.5**

4.3 *Occupied Bandwidth*

4.3.1 Test Result

Test Description	Basic Standards	Test Result
Occupied Bandwidth	FCC Part 2.1049 FCC Part 24.238(a)	Reported

4.3.2 Test Method

The occupied bandwidth is the frequency bandwidth such that below its lower and above its upper frequency limits, the mean powers are each equal to 0.5% of the total mean power by a given emission. The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts. The resolution bandwidth shall be set to as close to 1% of the selected span without being below 1%. The video bandwidth shall be set to 3 times the resolution bandwidth. Video averaging is not permitted. Where practical, a sample detector shall be used since a peak detector may produce a wider than actual bandwidth.

A radio link was established between EUT and Radio Communications Tester. The output power of the EUT was set to maximum value by using the maximum power setting on the Radio Communications Tester. The occupied bandwidth is measured using spectrum analyzer's occupied bandwidth measurement. RBW is set to 3 kHz on spectrum analyzer.

The bandwidth of 99% power can be read on spectrum analyzer.

4.3.3 Test Site

SGS EMC Laboratory, Suwanee, GA

4.3.4 Test Equipment

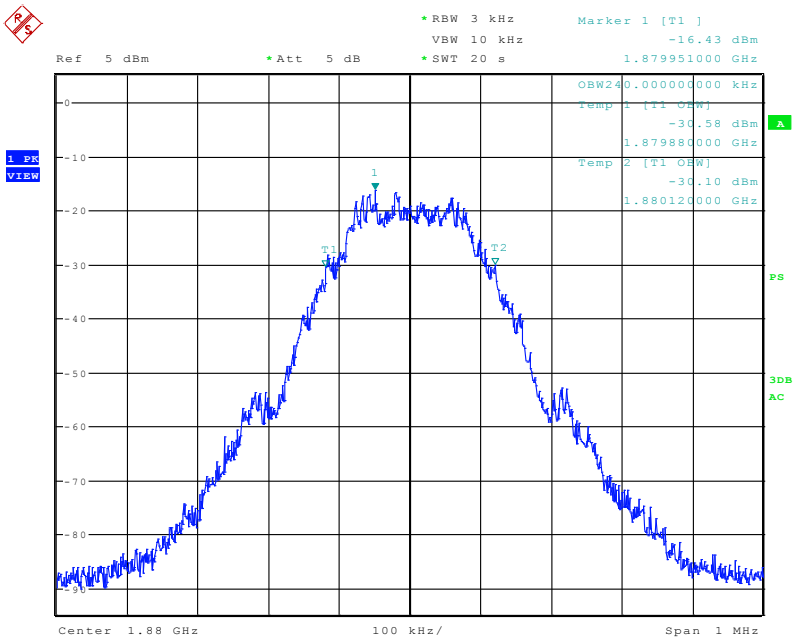
Equipment	Model	Manufacturer	Asset Number	Cal Due Date
Spectrum Analyzer	ESU40	R&S	B085629	07OCT 2014
Radio Communications Tester	CMW-500	R & S	B079788	18 OCT 2014
Power splitter	ZFRSC-183-S+	Mini-Circuits	EA01	Verified Before Use
Attentuator	BW-S10W2+	Mini-Circuits		Verified Before Use
Attenuator	BW-S10W2+	Mini-Circuits		Verified Before Use
Signal Generator	HMC-T2240	Hittite	B0799813	Verified Before Use
Coaxial Cable	086-112SM+	Mini-Circuits	NA	Verified Before Use
Coaxial Cable	086-112SM+	Mini-Circuits	NA	Verified Before Use

Note: The calibration period equipment is 1 year.

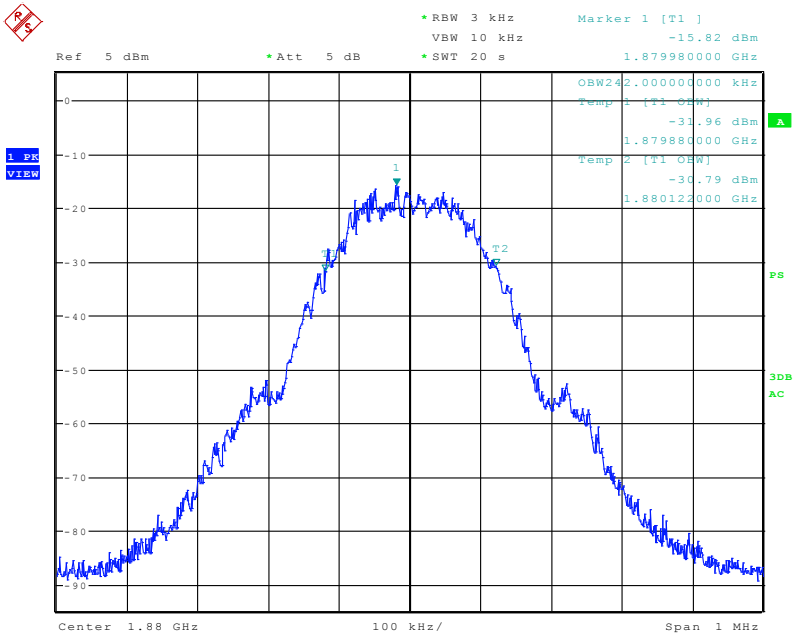
4.3.5 Test Data

PCS Band		
Mode	Frequency (MHz)	Bandwidth(kHz)
GPRS	1880	240
EGPRS	1880	242
WCDMA	1880	4144

GSM
GPRS

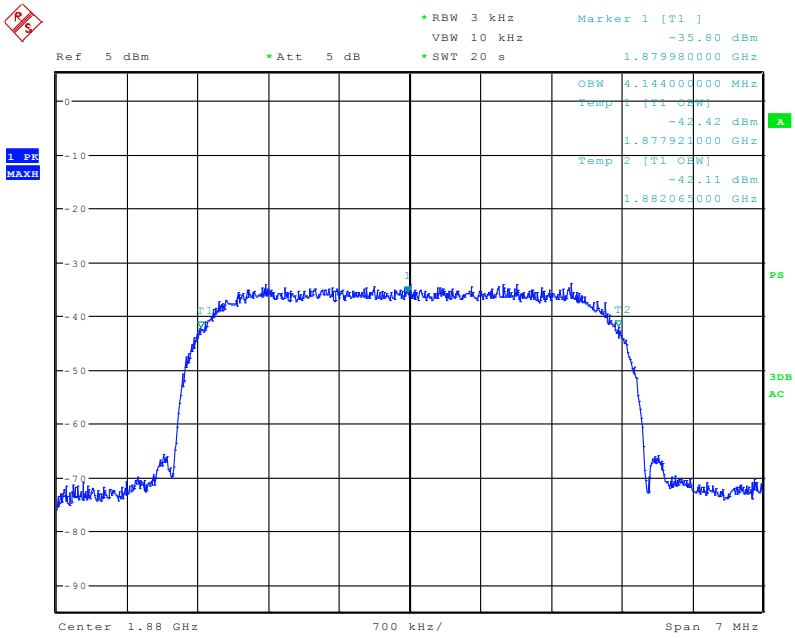


EGPRS



Date: 6.JUN.2014 11:04:10

WCDMA



Date: 6.JUN.2014 11:28:55

4.4 *Conducted Band Edge and Spurious Emissions*

4.4.1 Test Result

Test Description	Basic Standards	Test Result
Radiated spurious emissions and Band Edge	2.1051 24.238(a)	Pass

4.4.2 Test Method

The levels of the carrier and the various conducted spurious and harmonics frequencies are measured by means of a calibrated spectrum analyzer. The emissions spectrum emanating from the EUT transmit antenna port is scanned from the lowest frequency generated in the equipment up to a frequency including its 10th harmonic. On any frequency outside a licensee's frequency block, the power of any emission shall be attenuated below the transmitter power (P) by at least 43 + 10 log (P) dB. Compliance is based on the use of a spectrum analyzer employing a resolution bandwidth of 1 MHz or greater. In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of a least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. The emissions 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.

4.4.3 Test Site

SGS EMC Laboratory, Suwanee, GA

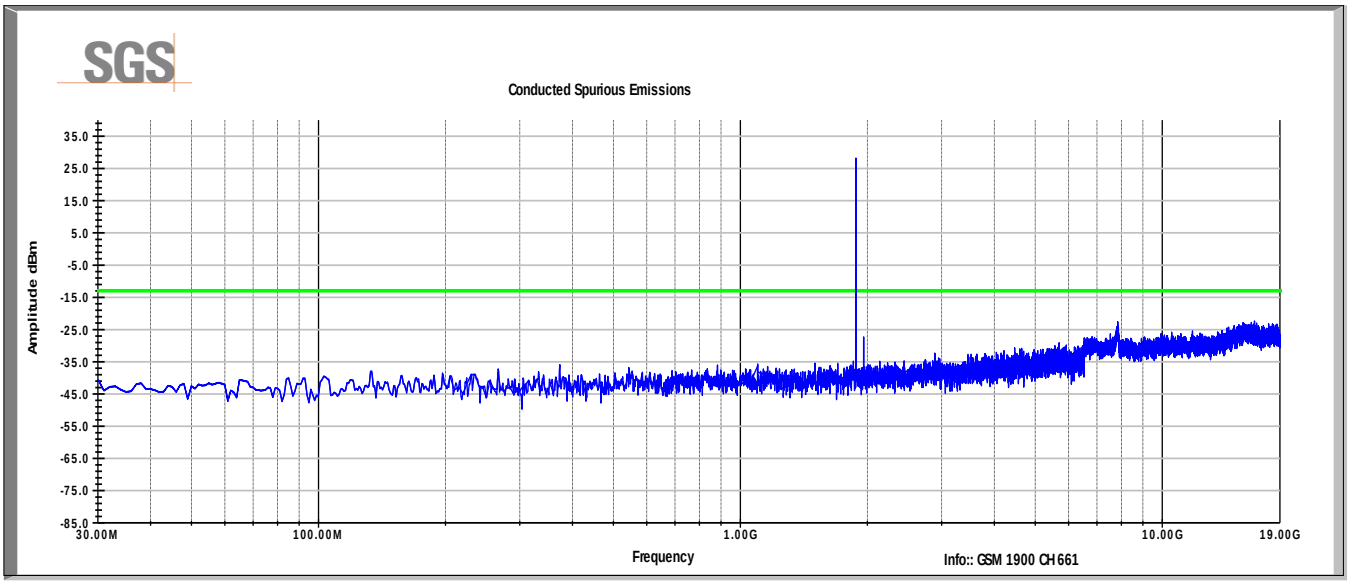
4.4.4 Test Equipment

Equipment	Model	Manufacturer	Asset Number	Cal Due Date
Spectrum Analyzer	ESU40	R&S	B085629	07OCT 2014
Radio Communications Tester	CMW-500	R & S	B079788	18 OCT 2014
Coaxial Cable	086-112SM+	Mini-Circuits	NA	Verified Before Use
Coaxial Cable	086-112SM+	Mini-Circuits	NA	Verified Before Use

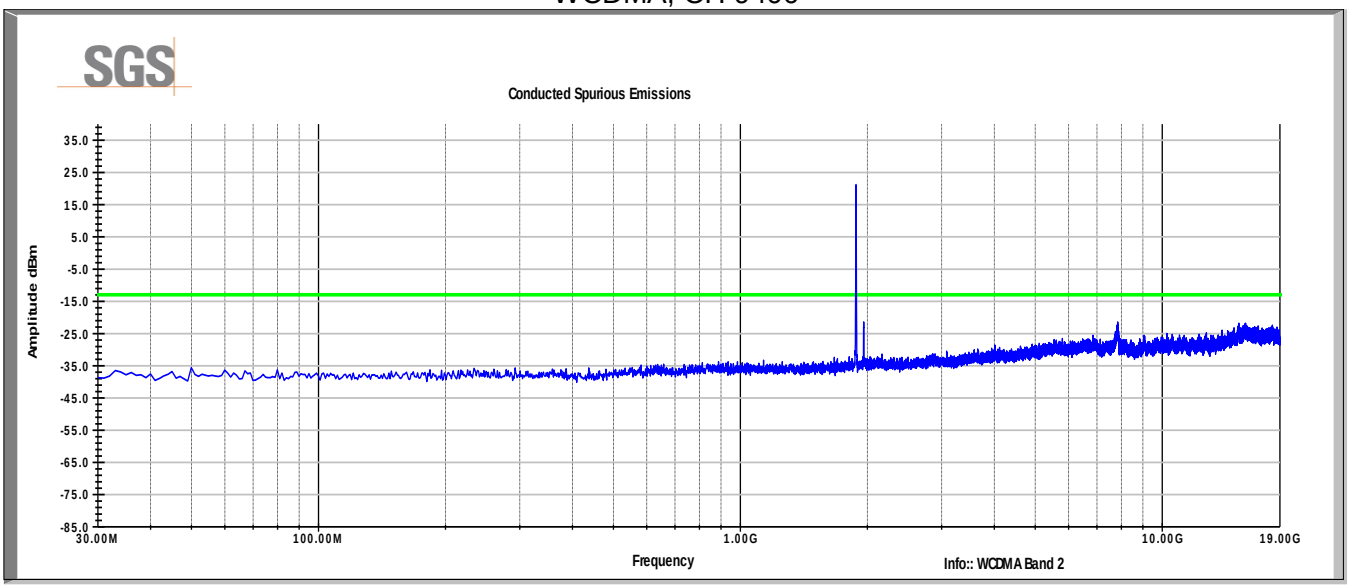
Note: The calibration period equipment is 1 year.

4.4.5 **Test Data**

GSM CH661

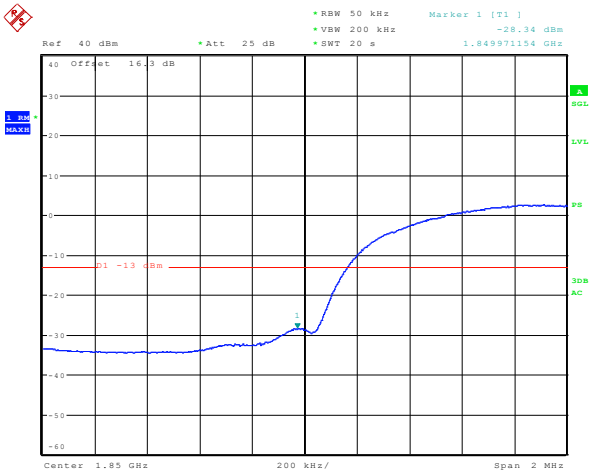


WCDMA, CH 9400



Band Edges

WCDMA



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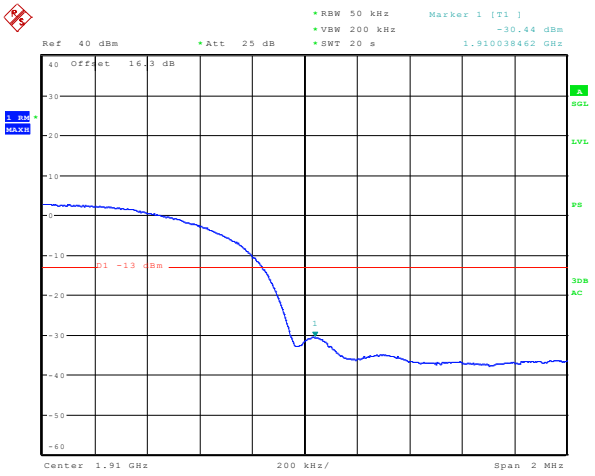

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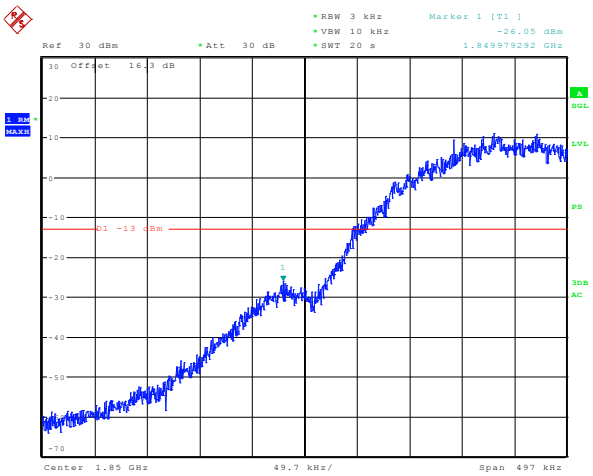
GPRS



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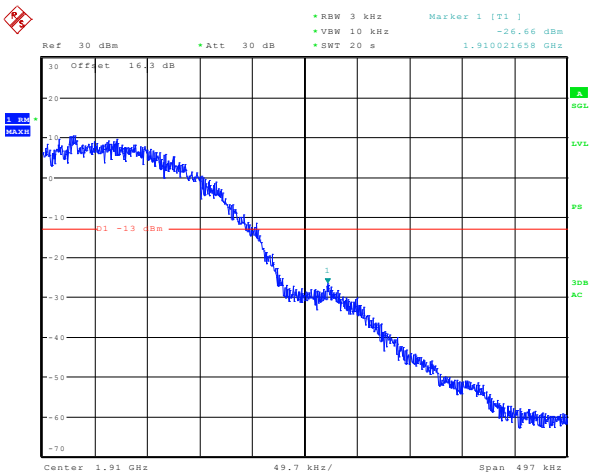

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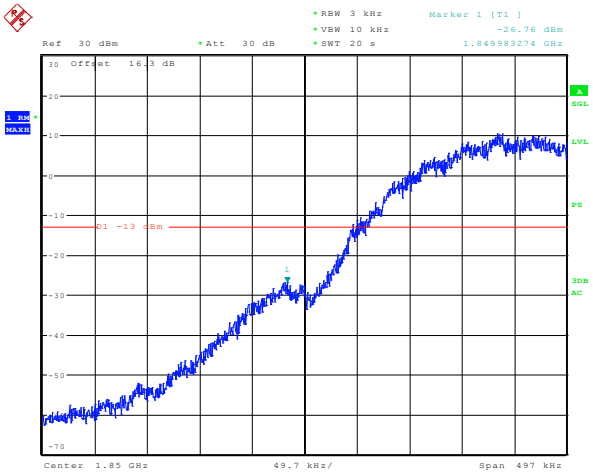
EGPRS



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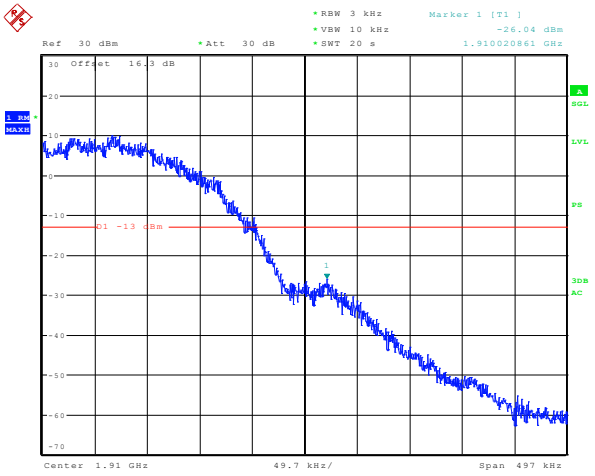


Date: 27.FEB.2014 14:29:34

4.5 *Effective Isotropic Radiated Power*

4.5.1 Test Result

Test Description	Basic Standards	Test Result
Effective Radiated Power	FCC Part 24.232(c)	Pass

4.5.2 Test Method

The measurements above 1 GHz are carried out in a fully anechoic chamber. Below 1 GHz, the measurements are carried out in semi-anechoic chamber. The EUT was placed on a 0.8 meter high non-conductive table at a 3 meters test distance from the test receive antenna. A receiving antenna was placed on the antenna mast 3 meters from the EUT. The height of receiving antenna is varied from 1 to 4 m to find the maximum power value. A radio link was established between EUT and Radio Communications Tester. The output power of the EUT was set to maximum value by using the maximum power setting on the Radio Communications Tester. A RMS detector is used and RBW is set to 3MHz. Then the antenna height and turn table rotation is adjusted till the maximum power value is founded on spectrum analyzer.

The EUT was positioned through each of its three orthogonal axes and the highest level was reported.

A dipole antenna (below 1 GHz) or double-ridged waveguide antenna (above 1 GHz) was substituted in place of the EUT. The substitution antenna will be driven by a signal generator. The receive antenna is varied to find the maximum response to the spectrum analyzer. Then the level of signal generator will be adjusted to achieve the same power value on the spectrum analyzer or receiver.

The ERP/EIRP of the EUT can be calculated through the level of the signal generator, cable loss, the gain of the substitution antenna and the reading of the spectrum analyzer or receiver.

4.5.3 Test Site

3m Semi-anechoic chamber, SGS EMC Laboratory, Suwanee, GA

4.5.4 Test Equipment

Equipment	Model	Manufacturer	Asset Number	Cal Due Date
Spectrum Analyzer	ESU40	R&S	B085629	07OCT 2014
Bilog Antenna	JB6	Sunol	B079689	24 SEP 2014
Signal Generator	HMC T2240	Hittite	B079813	NCR
Coaxial Cable	Sucoflex 106	Huber+Suhner	B079714	06AUG2014
Coaxial Cable	Sucoflex 106	Huber+Suhner	B079659	06AUG2014
Radio Communications Tester	CMW-500	R&S	B085757	24 Oct 2014
DRWG antenna	3117	ETS-Lindgren	B079699	25MAR2014
Coaxial Cable	Sucoflex 102	Huber+Suhner	B079822	29OCT2014

Note: The calibration period equipment is 1 year.

4.5.5 Test Data

The highest measured EIRP is reported below for each mode.

Freq (MHz)	Pol	Mode	SigGen Out (dBm)	Cable Loss (dB)	Net to Sub Ant (dBm)	Reading (dBuV)	Antenna Gain (dBi)	EUT Level (dBuV)	ERP / EIRP (dBm)
1880	H	GSM-EDGE	0.96	0.96	0	70.7	4.7	93.6	27.7
1880	V	GSM-EDGE	0.96	0.96	0	69.2	4.7	92.7	28.3
1880	H	GSM-GPRS	0.96	0.96	0	70.7	4.7	97.6	31.7
1880	V	GSM-GPRS	0.96	0.96	0	69.2	4.7	96.2	31.7
1880	H	WCDMA	0.96	0.96	0	70.7	4.7	88.7	22.7
1880	V	WCDMA	0.96	0.96	0	69.2	4.7	86.9	22.5

4.6 *Radiated Spurious Emissions*

4.6.1 Test Result

Test Description	Basic Standards	Test Result
Radiated Spurious Emissions	FCC Part 2.1053 FCC Part 22.917(a)	Pass

4.6.2 Test Method

The levels are measured by means of a calibrated spectrum analyzer. The spectrum is scanned from the lowest frequency generated in the equipment up to a frequency including its 10th harmonic. On any frequency outside a licensee's frequency block, the power of any emission shall be attenuated below the transmitter power (P) by at least 43 + 10 log (P) dB. Compliance is based on the use of a spectrum analyzer employing a resolution bandwidth of 1 MHz or greater. In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of a least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. The emissions 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.

The EUT was manipulated through each of its three orthogonal axes with the measurement oriented in both vertical and horizontal polarizations.

A radio link was established between EUT and Radio Communications Tester. The output power of the EUT was set to maximum value by using the maximum power setting on the Radio Communications Tester.

The measurement was conducted at the middle channel.

4.6.3 Test Equipment

Equipment	Model	Manufacturer	Asset Number	Cal Due Date
17 FT N TYPE COAX CABLE	HS 84133232	HUBER&SUHNER	B079661	6-Aug-2014
Spectrum Analyzer	ESU40	R&S	B085629	7-Oct-2014
ANTENNA, BILOG	JB6	SUNOL	B079690	24-Sep-2014
RF CABLE - 12000MM (10KHZ - 18GHZ)	SF106	HUBER&SUHNER	B079714	6-Aug-2014
COAXIAL CABLE	SUCOFLEX 102	HUBER&SUHNER	B079824	29-Oct-2014
PREAMPLIFIER	PAM-0118P	AH Systems	385	8-Oct-2014
DRG HORN (MEDIUM)	3117	ETS-LINDGREN	B079699	25-Mar-2014
RF CABLE	SF106	HUBER&SUHNER	B085892	16-Oct-2014

Note: The calibration period equipment is 1 year.

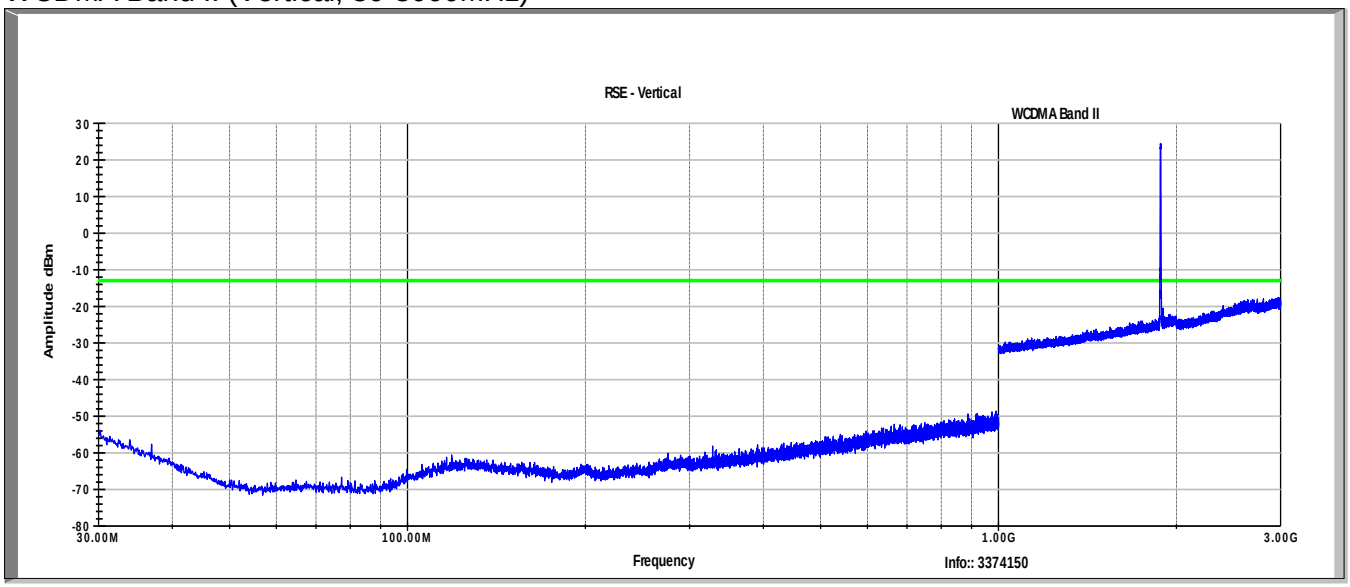
4.6.4 Test Data

Test Date: 21 – 30 Jan 2014

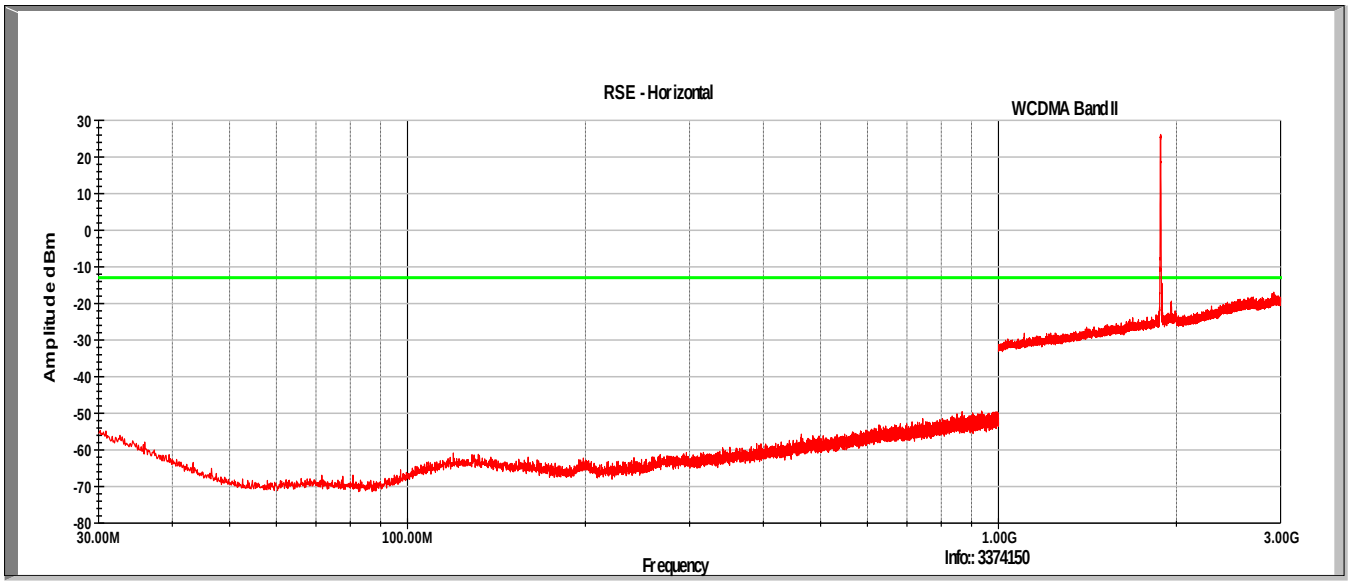
There were no other emissions within 20 dB of the limit.

4.6.5 Test Plots

WCDMA Band II (Vertical, 30-3000MHz)



WCDMA Band II (Horizontal, 30-3000MHz)



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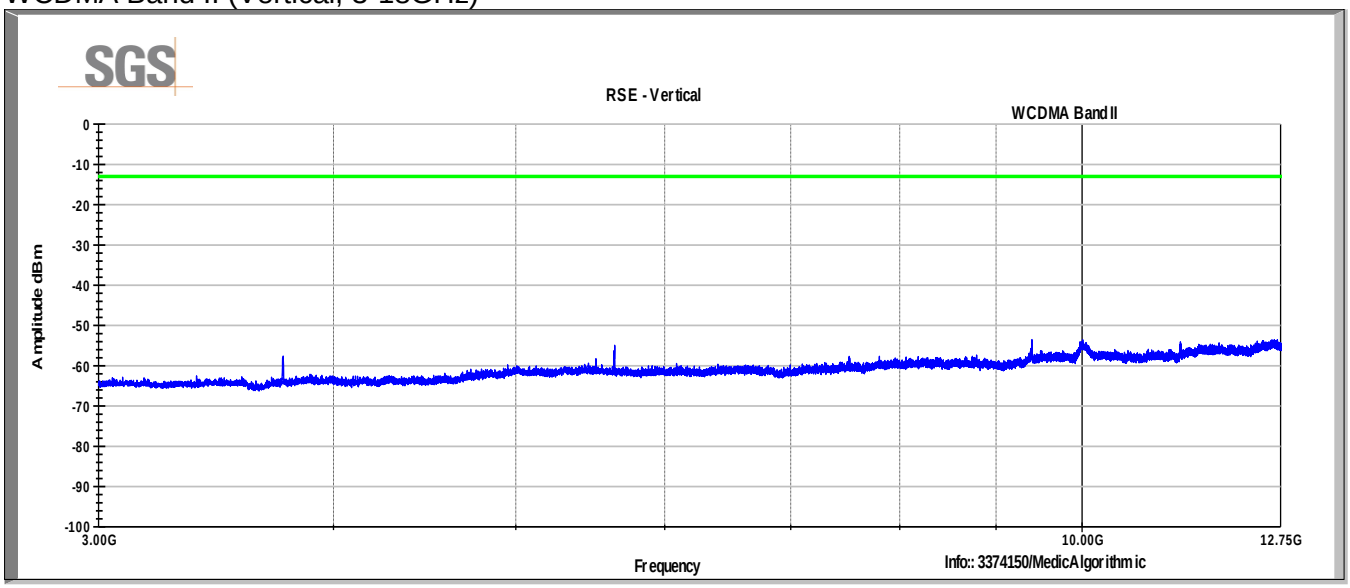
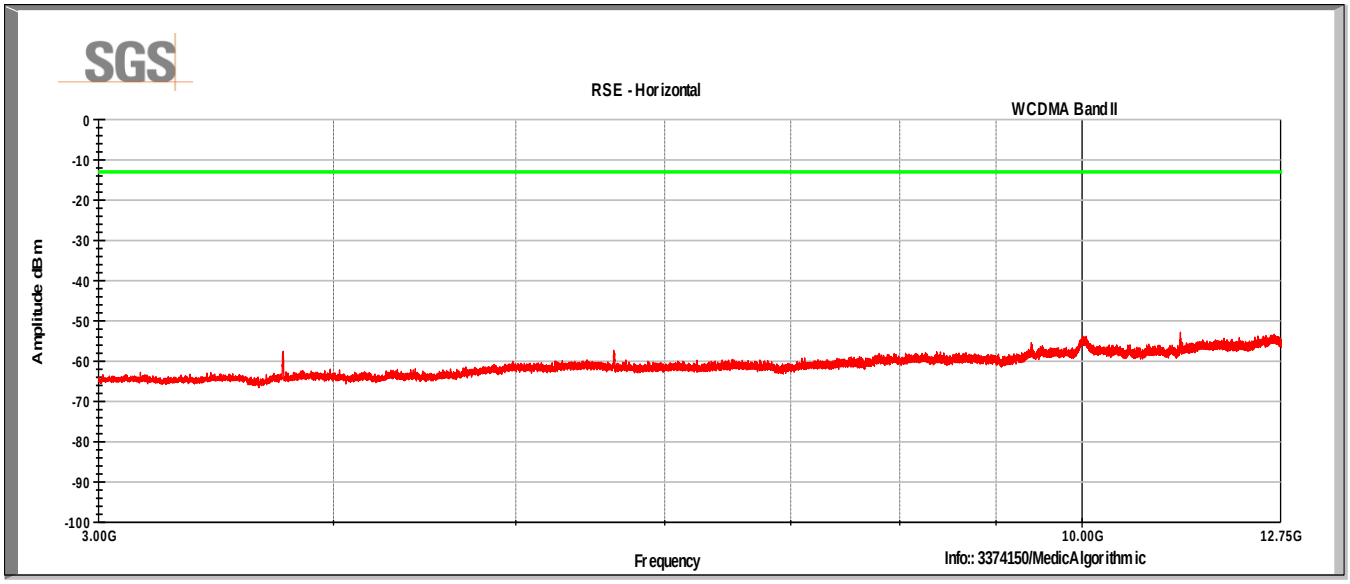
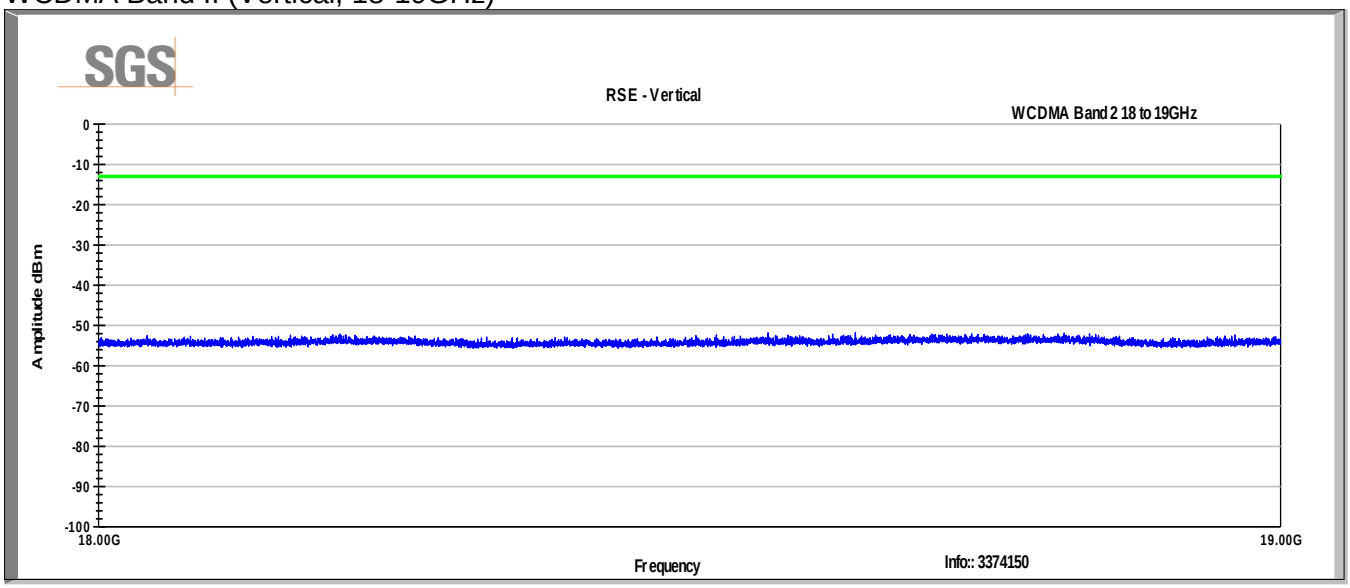


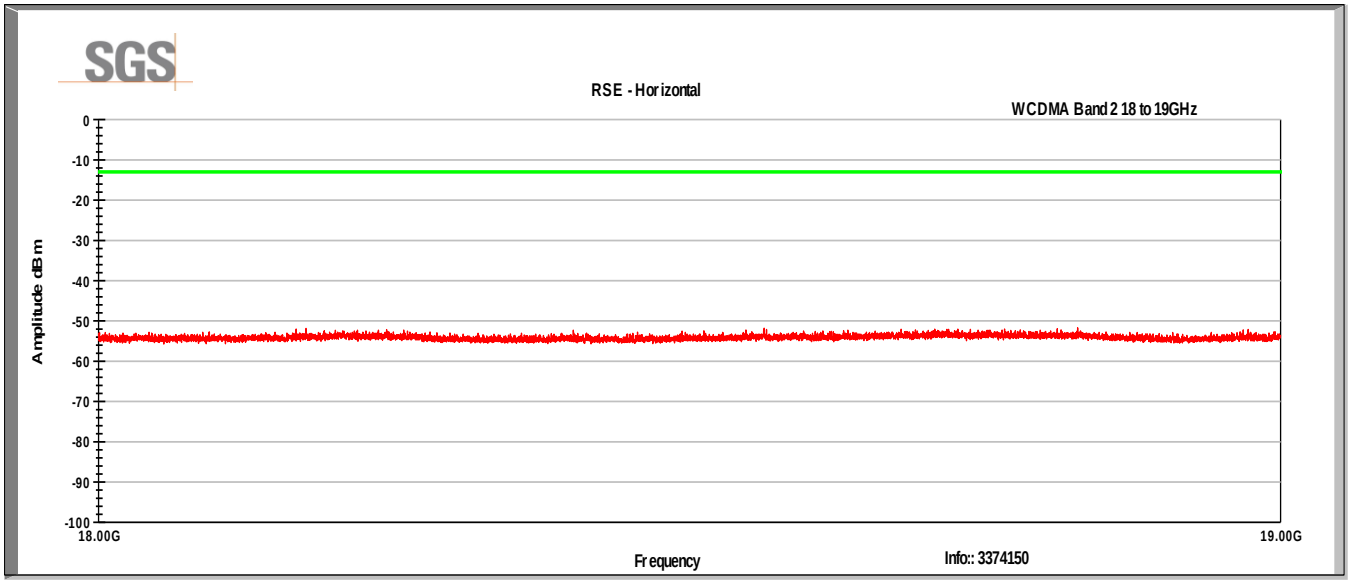
WCDMA Band II (Horizontal, 3-18GHz)



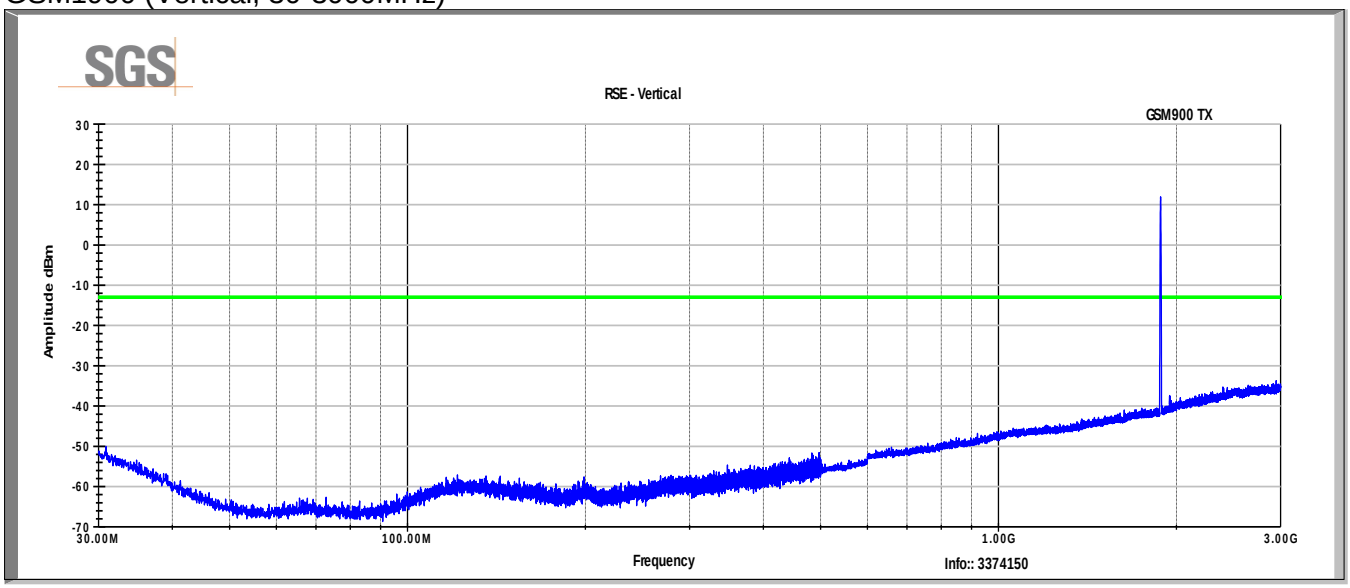
WCDMA Band II (Vertical, 18-19GHz)



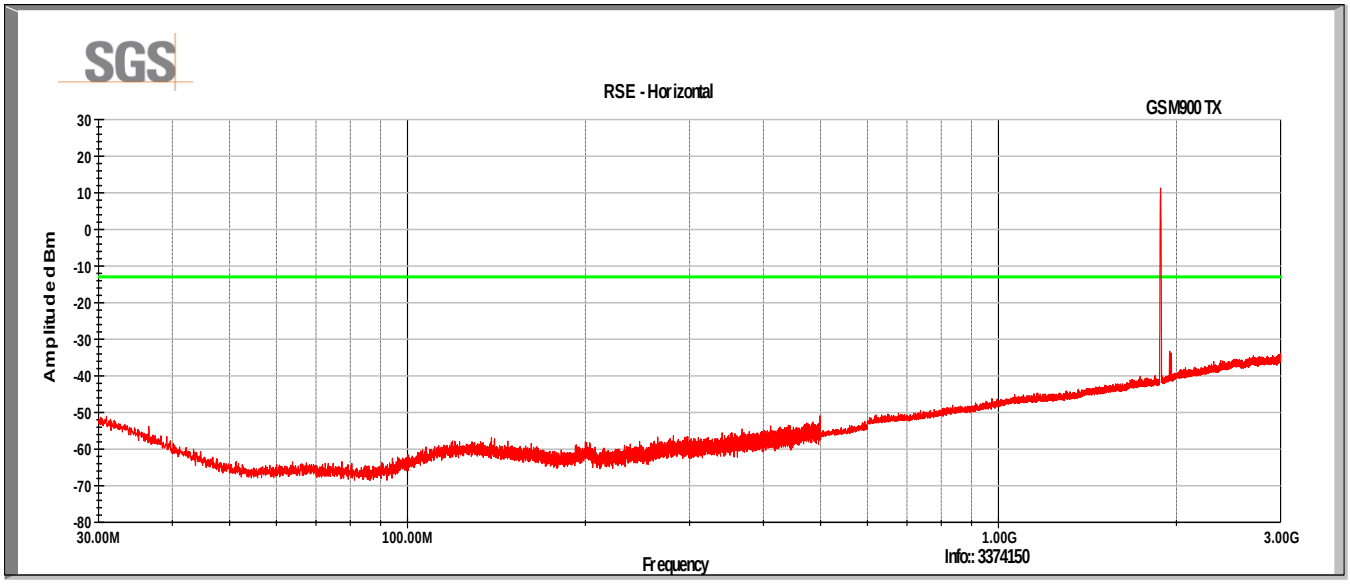
WCDMA Band II (Horizontal, 18-19GHz)



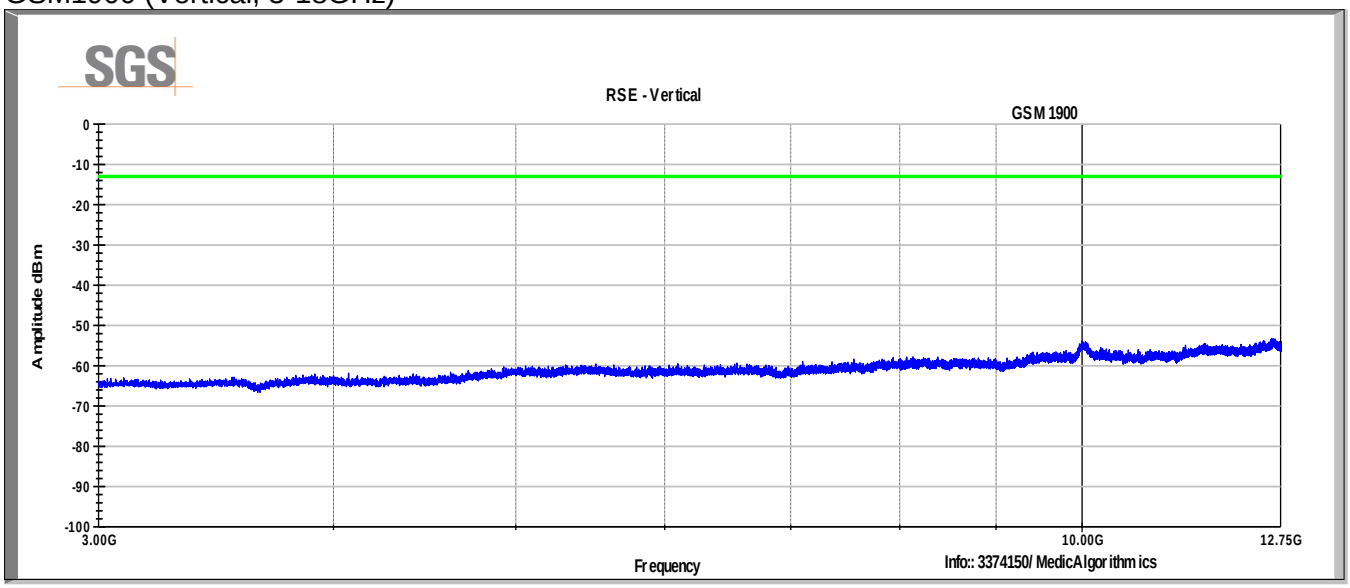
GSM1900 (Vertical, 30-3000MHz)



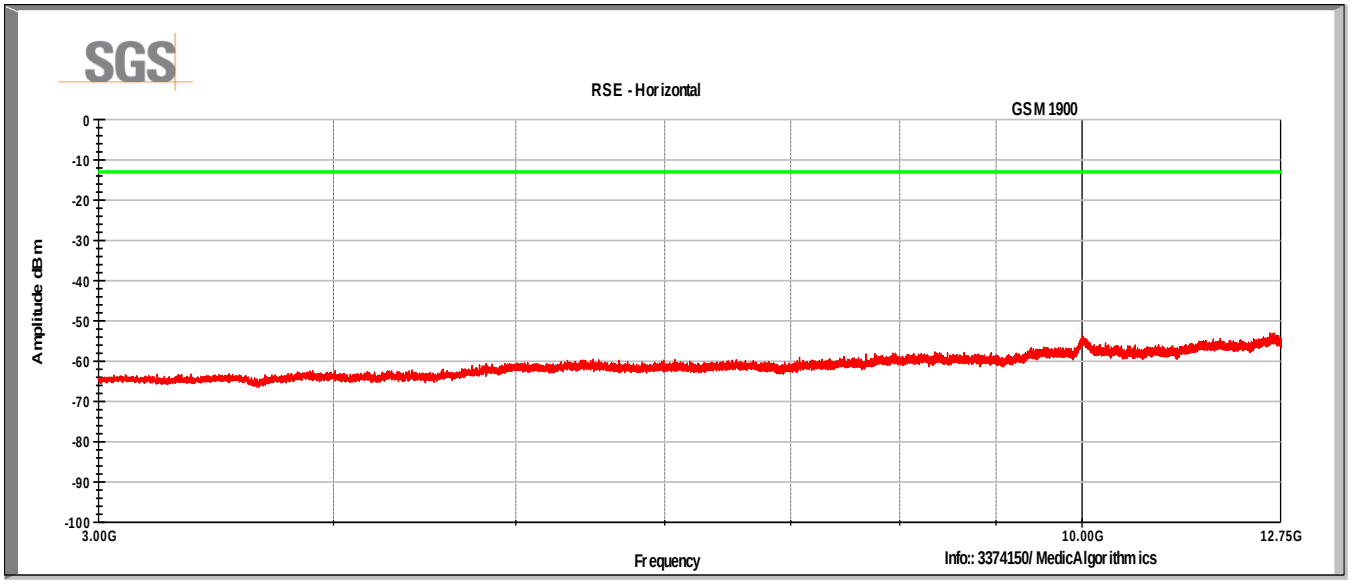
GSM1900 (Horizontal, 30-3000MHz)



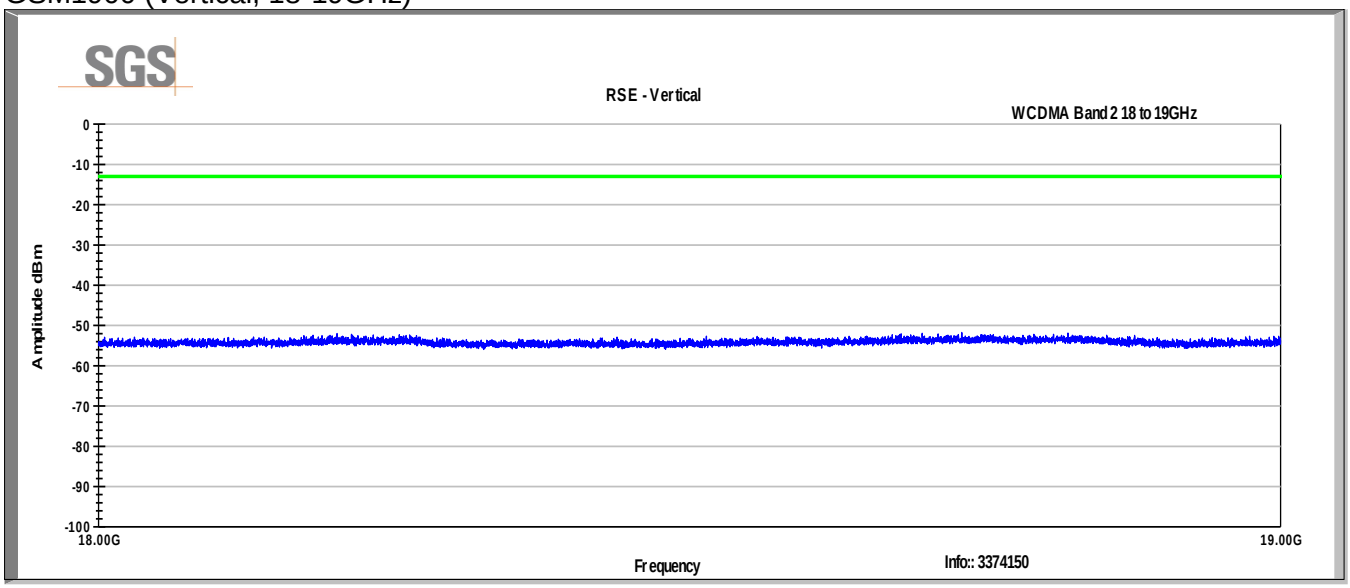
GSM1900 (Vertical, 3-18GHz)



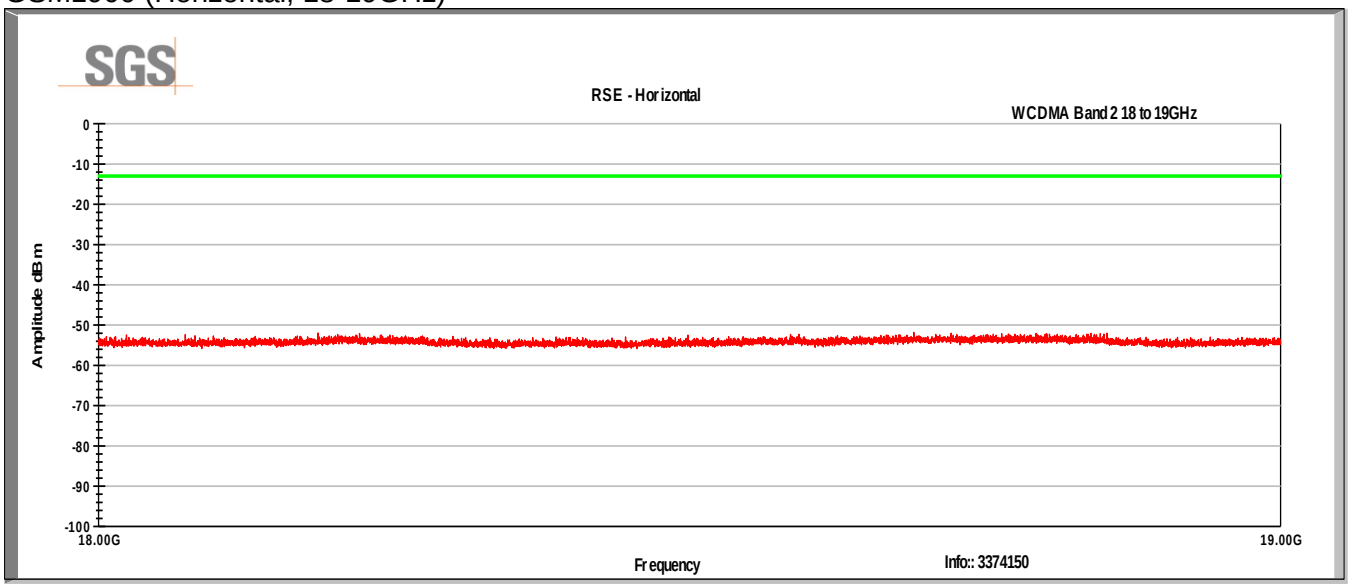
GSM1900 (Horizontal, 3-18GHz)



GSM1900 (Vertical, 18-19GHz)



GSM1900 (Horizontal, 18-19GHz)



4.7 *Frequency Stability*

4.7.1 Test Result

Test Description	Basic Standards	Test Result
Frequency Stability	2.1055 24.238(a)	Pass

4.7.2 Test Method

The EUT was placed inside the Environmental Chamber and was left inside chamber to stabilize to set temperature for minimum of thirty minutes before any measurements were made. EUT was tested at BC10 channel 684, BC 1 channel 600, and BC0 channel 384.

4.7.3 Test Site

SGS EMC Laboratory, Suwanee, GA

Environmental Conditions

Temperature:	23.6 °C
Relative Humidity:	56.8 %
Atmospheric Pressure:	97.4 kPa

4.7.4 Test Equipment

Equipment	Model	Manufacturer	Asset Number	Cal Due Date
DC Power Supply	382280	Extech	EA03	14MAR2015
Wideband Radio Communications Tester	CMW500	Rohde & Schwarz	B085757	29OCT2014
Coaxial Cable	1302	Mini-circuits	NA	NCR
Environmental Chamber	8800	Thermotron	4476	16NOV2014

Note: The calibration period equipment is 1 year.

4.7.5 **Test Data**

Test Date: 03JUN2014

GSM 1900

Voltage %	Power V_{DC}	Temp °C	Frequency Hz	Freq Dev max Hz	Freq Dev ppm	Deviation %
100%	3.70	+20 (Ref)	1,880,000,000		+0.00	+0.000000
100%	3.70	-30	1,880,000,024	+24	+0.01	+0.000001
100%	3.70	-20	1,880,000,033	+33	+0.02	+0.000002
100%	3.70	-10	1,880,000,099	+99	+0.05	+0.000005
100%	3.70	0	1,880,000,067	+67	+0.04	+0.000004
100%	3.70	+10	1,880,000,056	+56	+0.03	+0.000003
100%	3.70	+20	1,880,000,049	+49	+0.03	+0.000003
100%	3.70	+30	1,880,000,035	+35	+0.02	+0.000002
100%	3.70	+40	1,879,999,980	-20	-0.01	-0.000001
100%	3.70	+50	1,879,999,749	-251	-0.13	-0.000013
115%	4.23	+20	1,879,999,982	-18	-0.01	-0.000001
Battery End	3.35	+20	1,879,999,978	-22	-0.01	-0.000001

WCDMA Band II

Voltage %	Power V_{DC}	Temp °C	Frequency Hz	Freq Dev max Hz	Freq Dev ppm	Deviation %
100%	3.70	+20 (Ref)	1,880,000,000		+0.00	+0.000000
100%	3.70	-30	1,880,000,024	+24	+0.01	+0.000001
100%	3.70	-20	1,879,999,951	-49	-0.03	-0.000003
100%	3.70	-10	1,879,999,959	-41	-0.02	-0.000002
100%	3.70	0	1,880,000,037	+37	+0.02	+0.000002
100%	3.70	+10	1,879,999,958	-42	-0.02	-0.000002
100%	3.70	+20	1,880,000,046	+46	+0.02	+0.000002
100%	3.70	+30	1,880,000,042	+42	+0.02	+0.000002
100%	3.70	+40	1,879,999,938	-62	-0.03	-0.000003
100%	3.70	+50	1,880,000,006	+6	+0.00	+0.000000
115%	4.23	+20	1,880,000,034	+34	+0.02	+0.000002
Battery End	3.35	+20	1,879,999,993	-7	-0.00	-0.000000

5 Revision History

Revision Level	Description of changes	Revision Date
0	Initial release	09JUN2014
1	Clarified the maximum powers were reported. Clarified ERP results. Corrected EIRP limits and added clarification.	15OCT2014
2	Clarified EIRP data.	30OCT2014