FCC RF Test Report

APPLICANT	:	**SAMSUNG ELECTRONICS CO., LTD.**
EQUIPMENT	:	**Mobile Phone**
BRAND NAME	:	**SAMSUNG**
MODEL NAME	:	**SCH-W789**
FCC ID	:	**A3LSCHW789**
STANDARD	:	**FCC 47 CFR Part 2, 22(H), 24(E)**
CLASSIFICATION	:	**PCS Licensed Transmitter Held to Ear (PCE)**

The product was received on Jun. 09, 2013 and completely tested on Jun. 19, 2013. We, SPORTON INTERNATIONAL (SHENZHEN) INC., would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI / TIA / EIA-603-C-2004 and shown compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL (SHENZHEN) INC., the test report shall not be reproduced except in full.

Reviewed by: Joseph Lin / Manager

Approved by: Jones Tsai / Manager

Testing Laboratory
2353

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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FG360901	Rev. 01	Initial issue of report	Jul. 03, 2013

SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.1	§2.1046	Conducted Output Power	N/A	PASS	-
3.2	§24.232(d)	Peak-to-Average Ratio	<13 dB	PASS	-
3.3	§22.913(a)(2)	Effective Radiated Power	< 7 Watts	PASS	-
3.3	§24.232(c)	Equivalent Isotropic Radiated Power	< 2 Watts	PASS	-
3.4	§2.1049 §22.917(a) §24.238(b)	99% Occupied Bandwidth and 26dB Bandwidth	N/A	PASS	-
3.5	§2.1051 §22.917(a) §24.238(a)	Band Edge Measurement	< $43+10\log_{10}$(P[Watts])	PASS	-
3.6	§2.1051 §22.917(a) §24.238(a)	Conducted Spurious Emission	< $43+10\log_{10}$(P[Watts])	PASS	-
3.7	§2.1053 §22.917(a) §24.238(a)	Field Strength of Spurious Radiated	< $43+10\log_{10}$(P[Watts])	PASS	Under limit 3.92 dB at 3760.000 MHz
3.8	§2.1055 §22.355 §24.235	Frequency Stability for Temperature and Voltage	< 2.5 ppm	PASS	-

1 General Description

1.1 Applicant

SAMSUNG ELECTRONICS CO., LTD.

416 Maetan-3dong, Yeongtong-gu, Suwon-City, Gyeonggi-do, 443-742, Korea

1.2 Manufacturer

SAMSUNG ELECTRONICS CO., LTD.

416 Maetan-3dong, Yeongtong-gu, Suwon-City, Gyeonggi-do, 443-742, Korea

1.3 Feature of Equipment Under Test

Product Feature	
Equipment	Mobile Phone
Brand Name	SAMSUNG
Model Name	SCH-W789
FCC ID	A3LSCHW789
EUT supports Radios application	CDMA/EV-DO/GSM/GPRS/WLAN 11bgn/Bluetooth 2.1/3.0
HW Version	W789.03
SW Version	W789KEUAME8
EUT Stage	Pre-Production

Remark: The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

1.4 Product Specification of Equipment Under Test

Product Specification subjective to this standard	
Tx Frequency	GSM1900: 1850.2 MHz ~ 1909.8MHz CDMA2000 BC0: 824.70 MHz ~ 848.31 MHz CDMA2000 BC1: 1851.25 MHz ~ 1908.75 MHz
Rx Frequency	GSM1900: 1930.2 MHz ~ 1989.8 MHz CDMA2000 BC0: 869.70 MHz ~ 893.31 MHz CDMA2000 BC1: 1931.25 MHz ~ 1988.75 MHz
Maximum Output Power to Antenna	GSM1900 : 29.33 dBm CDMA2000 BC0 : 24.50 dBm CDMA2000 BC1 : 24.52 dBm
Antenna Type	IFA Antenna
Antenna Gain	-2 dBi
Type of Modulation	GSM: GMSK GPRS: GMSK CDMA2000 : QPSK CDMA2000 1xEV-DO : QPSK/8PSK

1.5 Maximum ERP/EIRP Power, Frequency Tolerance, and Emission Designator

FCC Rule	System	Type of Modulation	Maximum ERP/EIRP (W)	Frequency Tolerance (%, Hz, ppm)	Emission Designator
Part 22	CDMA2000 BC0 1xRTT	QPSK	0.0332	0.01 ppm	1M28F9W
Part 24	GSM1900 GSM	GMSK	0.1673	0.02 ppm	250KGXW
Part 24	CDMA2000 BC1 1xRTT	QPSK	0.0851	0.01 ppm	1M28F9W

1.6 Testing Site

Test Site	SPORTON INTERNATIONAL (SHENZHEN) INC.		
Test Site Location	No. 3 Building, the third floor of south, Shahe River west, Fengzeyuan warehouse, Nanshan District, Shenzhen, Guangdong, P.R.C. TEL: +86-755-3320-2398		
Test Site No.	**Sporton Site No.**		**FCC/IC Registration No.**
	TH01-SZ	03CH01-SZ	831040/4086F-1

1.7 Applied Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- FCC 47 CFR Part 2, 22(H), 24(E)
- ANSI / TIA / EIA-603-C-2004
- FCC KDB 971168 D01 Power Meas. License Digital Systems v02

Remark:

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.

2 Test Configuration of Equipment Under Test

2.1 Test Mode

During all testing, EUT is in link mode with base station emulator at maximum power level. The spurious emission measurements were carried out in semi-anechoic chamber with 3-meter test range, and EUT is rotated on three test planes to find out the worst emission (Z plane for 850 bands and Y plane for 1900 bands).

Frequency range investigated for radiated emission is as follows:

1. 30 MHz to 9000 MHz for CDMA2000 BC0.
2. 30 MHz to 19000 MHz for GSM1900 and CDMA2000 BC1.

Test Modes		
Band	**Radiated TCs**	**Conducted TCs**
GSM 1900	■ GSM Link	■ GSM Link
CDMA2000 BC0	■ 1xRTT Link Mode	■ 1xRTT Link Mode
CDMA2000 BC1	■ 1xRTT Link Mode	■ 1xRTT Link Mode

Note:

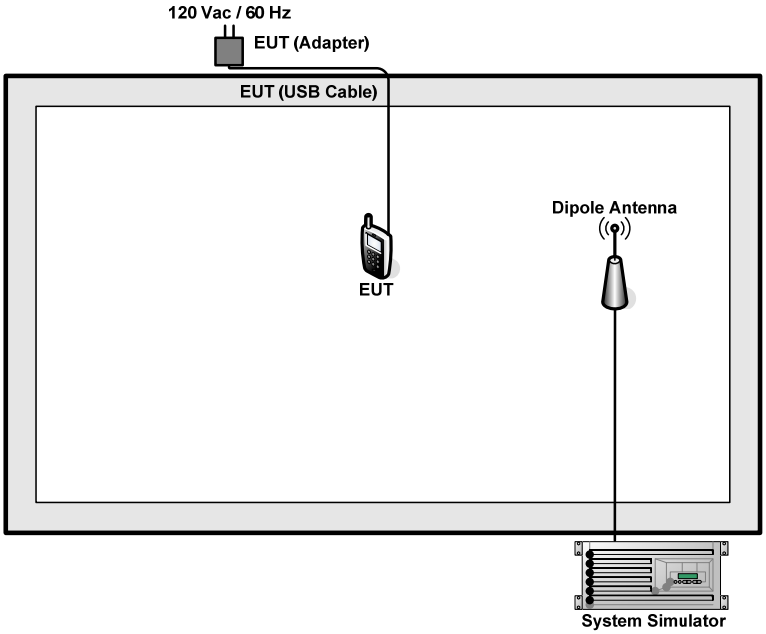
1. The maximum power levels are GSM mode for GMSK link, 1xRTT RC1+SO55 mode for CDMA2000 BC0 and CDMA2000 BC1 on QPSK Link, only these modes were used for all tests. Because there are individual antennas for each WWAN, WLAN, and Bluetooth, the co-location test modes are not required.
2. During all testing, EUT is in link mode with base station emulator at maximum power level. The spurious emission measurements were carried out in semi-anechoic chamber with 3-meter test range, and EUT is rotated on three test planes and clamp shell flip-close and off to find out the worst emission.

The conducted power tables are as follows:

Conducted Power (*Unit: dBm)			
Band	**GSM1900**		
Channel	**512**	**661**	**810**
Frequency	**1850.2**	**1880.0**	**1909.8**
GSM	28.78	**29.33**	28.90
GPRS 8	28.77	29.32	28.88
GPRS 10	27.30	27.80	27.35
GPRS 11	25.22	25.77	25.36
GPRS 12	23.15	23.79	23.40

Conducted Power (*Unit: dBm)						
Band	**CDMA2000 BC0**			**CDMA2000 BC1**		
Channel	**1013**	**384**	**777**	**25**	**600**	**1175**
Frequency	**824.7**	**836.52**	**848.31**	**1851.25**	**1880**	**1908.75**
1xRTT RC1 SO55	24.49	**24.50**	24.30	24.29	**24.52**	24.40
1xRTT RC3 SO55	24.32	24.37	24.23	24.32	24.40	24.36
1xRTT RC3 SO32(+ F-SCH)	24.36	24.34	24.26	24.37	24.39	24.40
1xRTT RC3 SO32(+SCH)	24.33	24.31	24.23	24.33	24.37	24.38
1xEVDO RTAP 153.6Kbps	24.21	24.35	24.20	24.24	24.33	24.19
1xEVDO RETAP 4096Bits	24.36	24.46	24.40	24.33	24.45	24.47

2.2 Connection Diagram of Test System



2.3 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model No.	FCC ID	Data Cable	Power Cord
1.	System Simulator	Agilent	E5515C	N/A	N/A	Unshielded, 1.8 m
2.	DC Power Supply	TOPWORD	3303DR	N/A	N/A	Unshielded, 1.8 m

2.4 Measurement Results Explanation Example

For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuator factor between EUT conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

Example:

Offset(dB) = RF cable loss(dB) + attenuator factor(dB).

= 8.5 + 10 = 18.5 (dB)

The spectrum analyzer offset is derived from RF cable loss and attenuator factor.

Offset = RF cable loss + attenuator factor.

Following shows an offset computation example with cable loss 4.2 dB and 10dB attenuator.

3 Test Result

3.1 Conducted Output Power Measurement

3.1.1 Description of the Conducted Output Power Measurement

A base station simulator was used to establish communication with the EUT. Its parameters were set to transmit the maximum power on the EUT. The measured power in the radio frequency on the transmitter output terminals shall be reported.

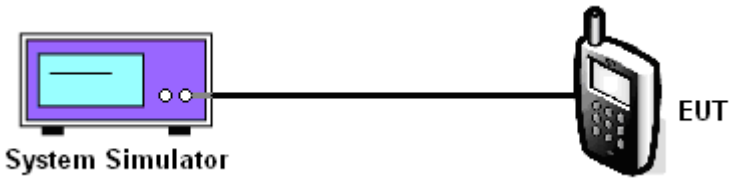
3.1.2 Measuring Instruments

See list of measuring instruments of this test report.

3.1.3 Test Procedures

1. The transmitter output port was connected to base station.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set EUT at maximum power through base station.
4. Select lowest, middle, and highest channels for each band and different modulation.
5. Measure the maximum burst average power for GSM and maximum average power for other modulation signal.

3.1.4 Test Setup



3.1.5 Test Result of Conducted Output Power

PCS Band			
Modes	**GSM1900 (GSM)**		
Channel	**512 (Low)**	**661 (Mid)**	**810 (High)**
Frequency (MHz)	**1850.2**	**1880**	**1909.8**
Conducted Power (dBm)	28.78	29.33	28.90
Conducted Power (Watts)	0.76	0.86	0.78

CDMA2000 BC0			
Test Mode	**CDMA 2000 1xRTT**		
Test Status	**RC1+SO55**		
Channel	**1013 (Low)**	**384 (Mid)**	**777 (High)**
Frequency (MHz)	**824.70**	**836.52**	**848.31**
Conducted Power (dBm)	24.49	24.50	24.30
Conducted Power (Watts)	0.28	0.28	0.27

CDMA2000 BC1			
Test Mode	**CDMA 2000 1xRTT**		
Test Status	**RC1+SO55**		
Channel	**25 (Low)**	**600 (Mid)**	**1175 (High)**
Frequency (MHz)	**1851.25**	**1880.00**	**1908.75**
Conducted Power (dBm)	24.29	24.52	24.40
Conducted Power (Watts)	0.27	0.28	0.28

Note: maximum burst average power for GSM and maximum average power for CDMA2000.

3.2 Peak-to-Average Ratio

3.2.1 Description of the PAR Measurement

The peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

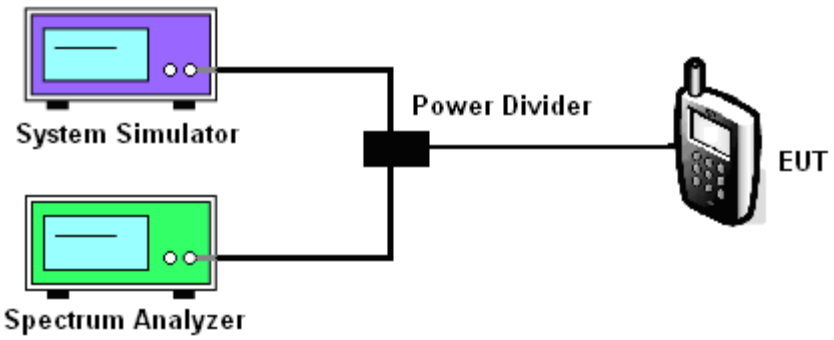
3.2.2 Measuring Instruments

See list of measuring instruments of this test report.

3.2.3 Test Procedures

1. The EUT was connected to Spectrum Analyzer and System Simulator via power divider.
2. For GSM operating modes:
   a. Set EUT in maximum power output.
   b. Set the RBW = 1MHz, VBW = 3MHz, Peak detector in spectrum analyzer for first trace.
   c. Set the RBW = 1MHz, VBW = 3MHz, RMS detector in spectrum analyzer for second trace.
   d. The wanted burst signal is triggered by spectrum analyzer, and measured respectively the peak level and Mean level without burst-off time, after system simulator synchronized with the spectrum analyzer.
3. For CDMA operating modes:
   a. Set the CCDF (Complementary Cumulative Distribution Function) option in spectrum analyzer.
   b. The highest RF powers were measured and recorded the maximum PAPR level associated with a probability of 0.1 %.
4. Record the deviation as Peak to Average Ratio.

3.2.4 Test Setup



3.2.5 Test Result of Peak-to-Average Ratio

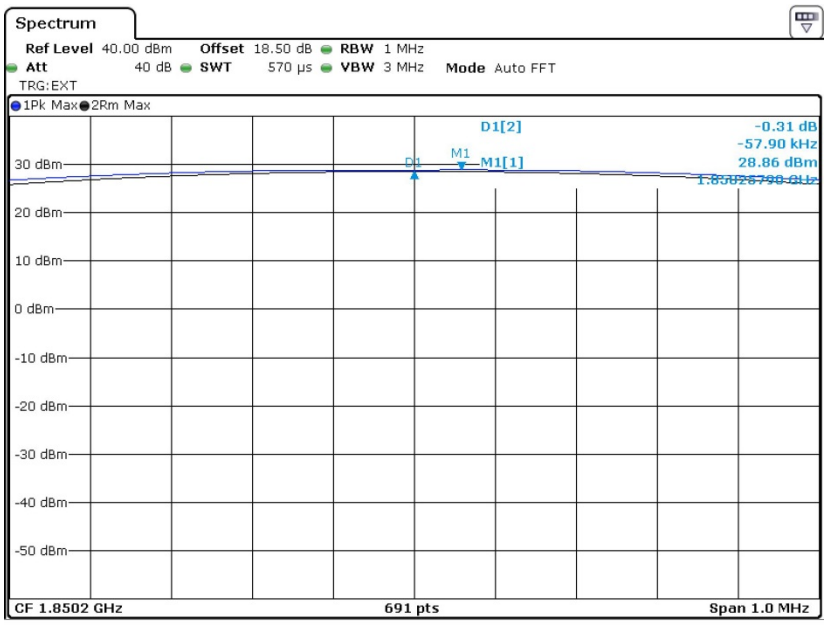
PCS Band			
Modes	**GSM1900 (GSM)**		
Channel	**512 (Low)**	**661 (Mid)**	**810 (High)**
Frequency (MHz)	**1850.2**	**1880**	**1909.8**
Peak-to-Average Ratio (dB)	0.31	0.32	0.29

CDMA2000 BC1			
Modes	**CDMA 2000 1xRTT**		
Channel	**25 (Low)**	**600 (Mid)**	**1175 (High)**
Frequency (MHz)	**1851.25**	**1880**	**1908.75**
Peak-to-Average Ratio (dB)	3.84	3.76	3.32

3.2.6 Test Result (Plots) of Peak-to-Average Ratio

Band :	GSM 1900	Test Mode :	GSM Link

Peak-to-Average Ratio on Channel 512 (1850.2 MHz)



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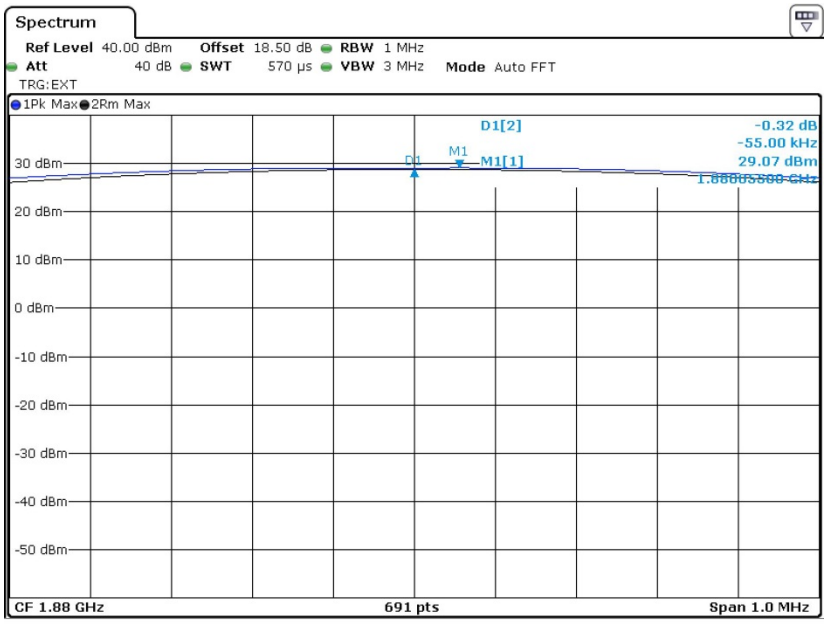
Peak-to-Average Ratio on Channel 661 (1880.0 MHz)



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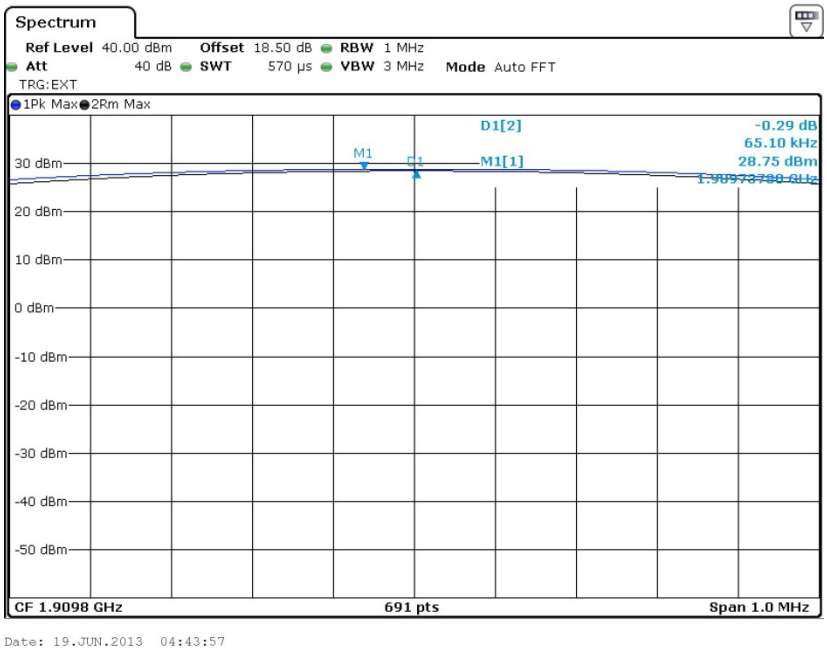
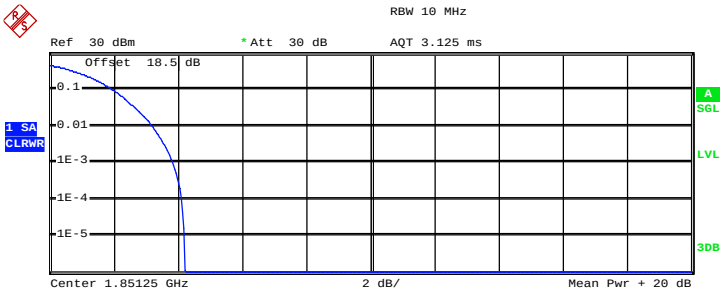
Peak-to-Average Ratio on Channel 810 (1909.8 MHz)



Band :	CDMA2000 BC1	Test Mode :	1xRTT Link

Peak-to-Average Ratio on Channel 25 (1851.25 MHz)



Complementary Cumulative Distribution Function (100000 samples)

	Trace 1
Mean	23.85 dBm
Peak	28.06 dBm
Crest	4.22 dB
10 %	2.00 dB
1 %	3.20 dB
.1 %	3.84 dB
.01 %	4.12 dB

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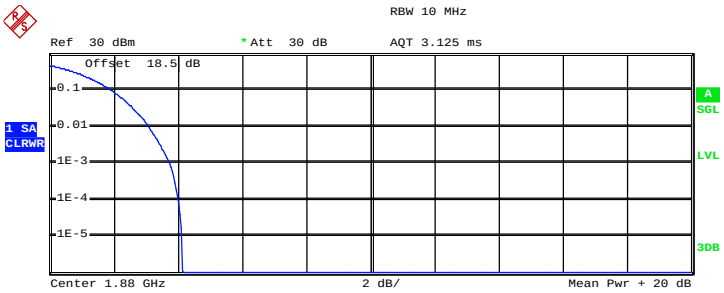
Peak-to-Average Ratio on Channel 600 (1880 MHz)



Complementary Cumulative Distribution Function (100000 samples)

	Trace 1
Mean	23.84 dBm
Peak	27.99 dBm
Crest	4.15 dB
10 %	1.96 dB
1 %	3.12 dB
.1 %	3.76 dB
.01 %	4.04 dB

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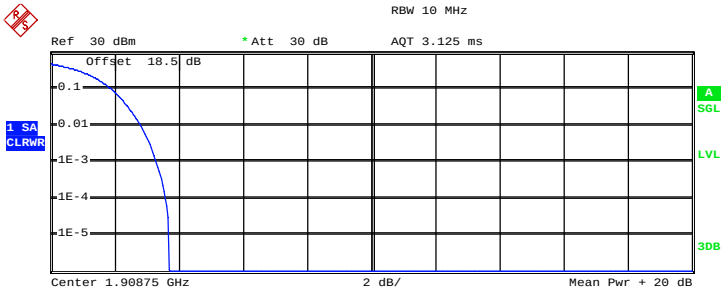
Peak-to-Average Ratio on Channel 1175 (1908.75 MHz)



Complementary Cumulative Distribution Function (100000 samples)

	Trace 1
Mean	23.44 dBm
Peak	27.15 dBm
Crest	3.71 dB
10 %	1.92 dB
1 %	2.84 dB
.1 %	3.32 dB
.01 %	3.60 dB

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3.3 Effective Radiated Power and Effective Isotropic Radiated Power Measurement

3.3.1 Description of the ERP/EIRP Measurement

The substitution method, in ANSI / TIA / EIA-603-C-2004, was used for ERP/EIRP measurement, and the spectrum analyzer configuration follows KDB 971168 D01 Power Meas. License Digital Systems v02. The ERP of mobile transmitters must not exceed 7 Watts and the EIRP of mobile transmitters are limited to 2 Watts.

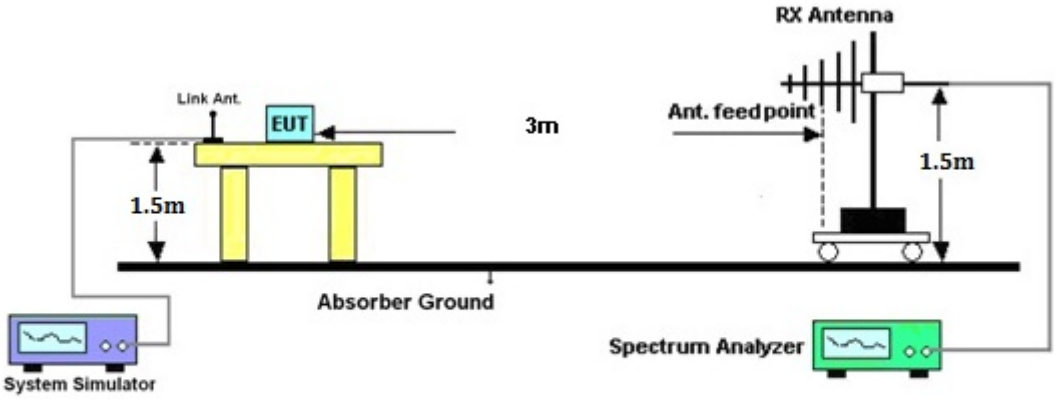
3.3.2 Measuring Instruments

See list of measuring instruments of this test report.

3.3.3 Test Procedures

1. The EUT was placed on a turntable with 1.5 meter height in a fully anechoic chamber.
2. The EUT was set at 3 meters from the receiving antenna, which was mounted on the antenna tower.
3. GSM operating modes: Set RBW= 1MHz, VBW= 3MHz, RMS detector over burst;
   UMTS operating modes: Set RBW= 100 kHz, VBW= 300 kHz, RMS detector over frame, and use channel power option with bandwidth=5MHz, per section 4.0 of KDB 971168 D01.
4. The table was rotated 360 degrees to determine the position of the highest radiated power.
5. The height of the receiving antenna is adjusted to look for the maximum ERP/EIRP.
6. Taking the record of maximum ERP/EIRP.
7. A dipole antenna was substituted in place of the EUT and was driven by a signal generator.
8. The conducted power at the terminal of the dipole antenna is measured.
9. Repeat step 3 to step 5 to get the maximum ERP/EIRP of the substitution antenna.
10. ERP/EIRP = Ps + Et – Es + Gs = Ps + Rt – Rs + Gs
    Ps (dBm)：Input power to substitution antenna.
    Gs (dBi or dBd)：Substitution antenna Gain.
    Et = Rt + AF
    Es = Rs + AF
    AF (dB/m)：Receive antenna factor
    Rt：The highest received signal in spectrum analyzer for EUT.
    Rs：The highest received signal in spectrum analyzer for substitution antenna.

3.3.4 Test Setup



3.3.5 Test Result of ERP

CDMA2000 BC0 1xRTT_RC1+SO55 Radiated Power ERP						
Horizontal Polarization						
Frequency (MHz)	Rt (dBm)	Rs (dBm)	Ps (dBm)	Gs (dBd)	ERP (dBm)	ERP (W)
824.70	-32.79	-48.12	0.00	-1.08	14.25	0.0266
836.52	-32.32	-48.28	0.00	-0.93	15.03	0.0318
848.31	-32.38	-48.35	0.00	-0.76	15.21	0.0332
Vertical Polarization						
Frequency (MHz)	Rt (dBm)	Rs (dBm)	Ps (dBm)	Gs (dBd)	ERP (dBm)	ERP (W)
824.70	-41.45	-47.97	0.00	-1.08	5.44	0.0035
836.52	-40.68	-48.01	0.00	-0.93	6.40	0.0044
848.31	-40.38	-48.05	0.00	-0.76	6.91	0.0049

3.3.6 Test Result of EIRP

GSM1900 (GSM) Radiated Power EIRP						
Horizontal Polarization						
Frequency (MHz)	**Rt (dBm)**	**Rs (dBm)**	**Ps (dBm)**	**Gs (dBi)**	**EIRP (dBm)**	**EIRP (W)**
1850.20	-32.38	-51.88	0.00	1.96	21.46	0.1401
1880.00	-34.61	-52.99	0.00	2.00	20.38	0.1092
1909.80	-35.98	-54.28	0.00	1.98	20.28	0.1066
Vertical Polarization						
Frequency (MHz)	**Rt (dBm)**	**Rs (dBm)**	**Ps (dBm)**	**Gs (dBi)**	**EIRP (dBm)**	**EIRP (W)**
1850.20	-31.85	-52.13	0.00	1.96	22.24	0.1673
1880.00	-33.90	-53.17	0.00	2.00	21.27	0.1341
1909.80	-35.29	-54.13	0.00	1.98	20.82	0.1207

CDMA2000 BC1 1xRTT_RC1+SO55 Radiated Power EIRP						
Horizontal Polarization						
Frequency (MHz)	**Rt (dBm)**	**Rs (dBm)**	**Ps (dBm)**	**Gs (dBi)**	**EIRP (dBm)**	**EIRP (W)**
1851.25	-37.62	-51.88	0.00	1.96	16.22	0.0419
1880.00	-37.13	-52.99	0.00	2.00	17.86	0.0611
1908.75	-36.96	-54.28	0.00	1.98	19.30	0.0851
Vertical Polarization						
Frequency (MHz)	**Rt (dBm)**	**Rs (dBm)**	**Ps (dBm)**	**Gs (dBi)**	**EIRP (dBm)**	**EIRP (W)**
1851.25	-45.99	-52.13	0.00	1.96	8.10	0.0065
1880.00	-44.82	-53.17	0.00	2.00	10.35	0.0108
1908.75	-43.71	-54.13	0.00	1.98	12.40	0.0174

3.4 99% Occupied Bandwidth and 26dB Bandwidth Measurement

3.4.1 Description of 99% Occupied Bandwidth and 26dB Bandwidth Measurement

The 99% occupied bandwidth is the width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0.5% of the total mean transmitted power.

The emission bandwidth is defined as the width of the signal between two points, located at the 2 sides of the carrier frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

3.4.2 Measuring Instruments

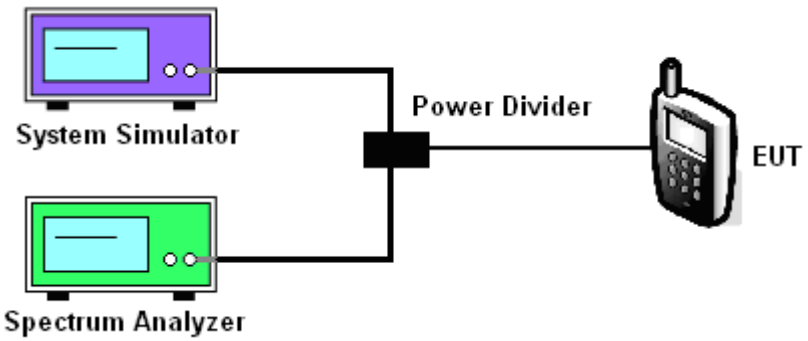
See list of measuring instruments of this test report.

3.4.3 Test Procedures

1. The EUT was connected to Spectrum Analyzer and Base Station via power divider.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. The 99% occupied bandwidth were measured, set RBW= 1% of span, VBW= 3*RBW, sample detector, trace maximum hold.

   The 26dB bandwidth were measured, set RBW= 1% of EBW, VBW= 3*RBW, peak detector, trace maximum hold.

3.4.4 Test Setup



3.4.5 Test Result of 99% Occupied Bandwidth and 26dB Bandwidth

PCS Band			
Modes	**GSM1900 (GSM)**		
Channel	**512 (Low)**	**661 (Mid)**	**810 (High)**
Frequency (MHz)	**1850.2**	**1880**	**1909.8**
99% OBW (kHz)	250.00	246.00	248.00
26dB BW (kHz)	310.00	318.00	314.00

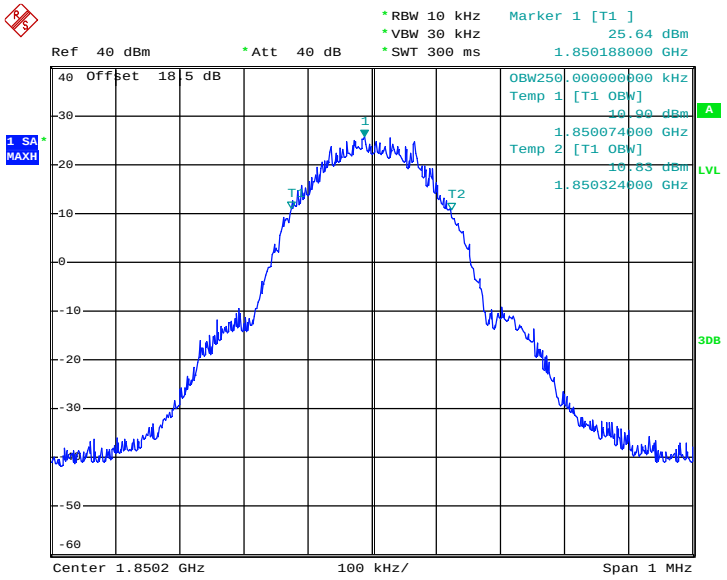
CDMA2000 BC0			
Test Mode	**CDMA 2000 1xRTT**		
Test Status	**RC1+SO55**		
Channel	**1013 (Low)**	**384 (Mid)**	**777 (High)**
Frequency (MHz)	**824.70**	**836.52**	**848.31**
99% OBW (MHz)	1.280	1.276	1.280
26dB BW (MHz)	1.432	1.432	1.432

CDMA2000 BC1			
Test Mode	**CDMA 2000 1xRTT**		
Test Status	**RC1+SO55**		
Channel	**25 (Low)**	**600 (Mid)**	**1175 (High)**
Frequency (MHz)	**1851.25**	**1880.00**	**1908.75**
99% OBW (MHz)	1.280	1.280	1.280
26dB BW (MHz)	1.432	1.432	1.444

3.4.6 Test Result (Plots) of 99% Occupied Bandwidth and 26dB Bandwidth

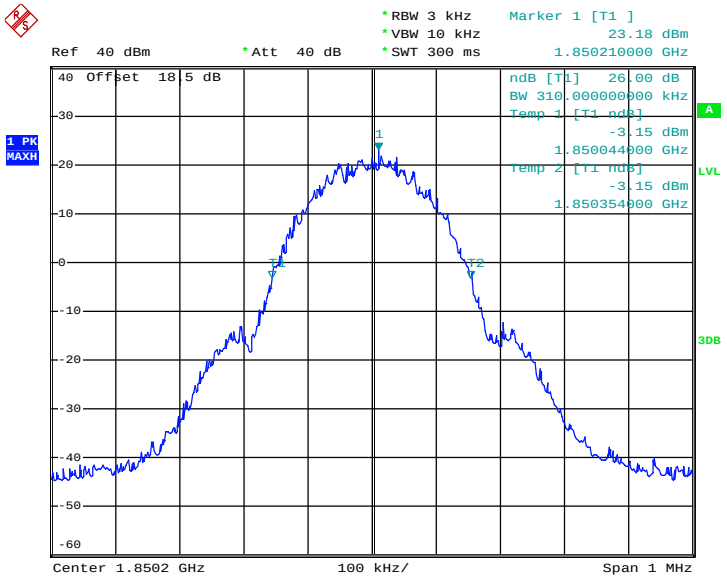
Band :	GSM1900	Test Mode :	GSM Link

99% Occupied Bandwidth Plot on Channel 512 (1850.2 MHz)



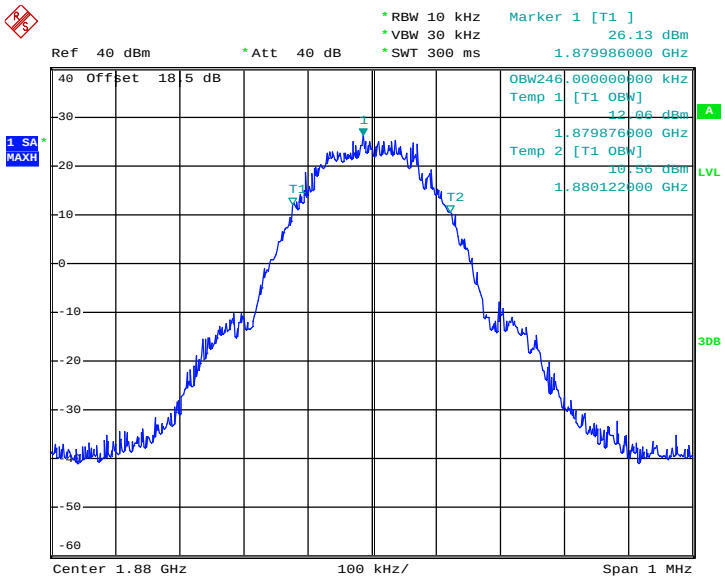
Date: 17.JUN.2013 22:58:40

26dB Bandwidth Plot on Channel 512 (1850.2 MHz)

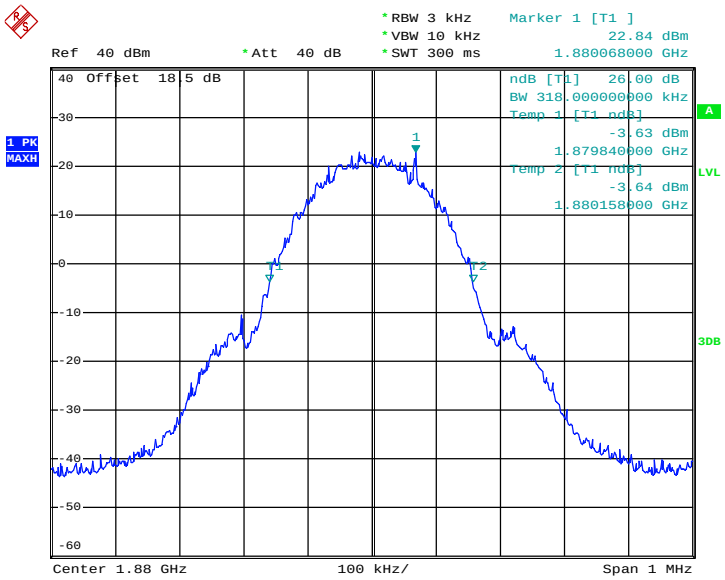


Date: 17.JUN.2013 22:45:18

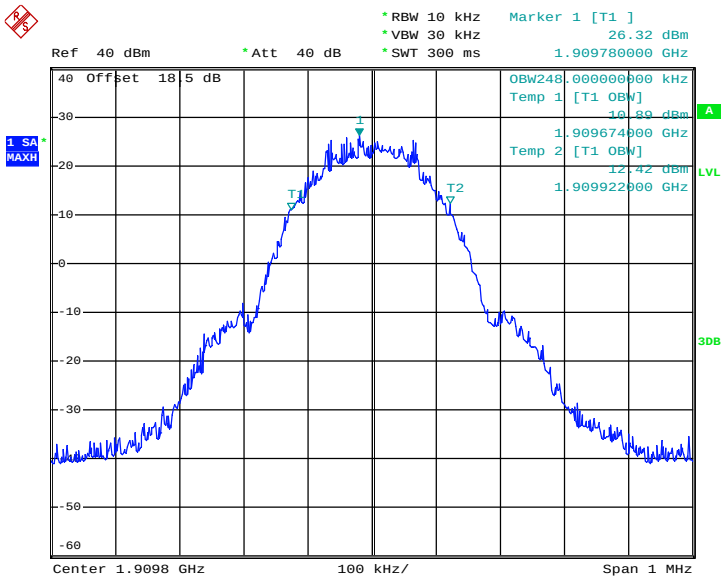
99% Occupied Bandwidth Plot on Channel 661 (1880.0 MHz)



26dB Bandwidth Plot on Channel 661 (1880.0 MHz)

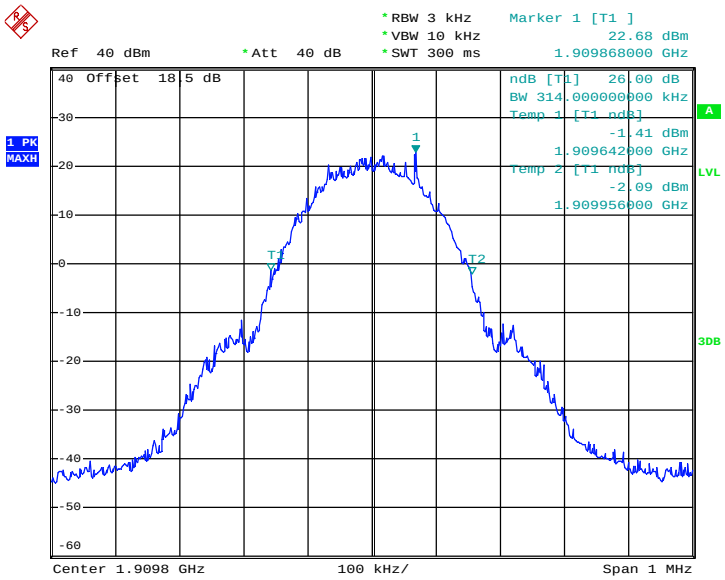


99% Occupied Bandwidth Plot on Channel 810 (1909.8 MHz)



Date: 17.JUN.2013 22:50:18

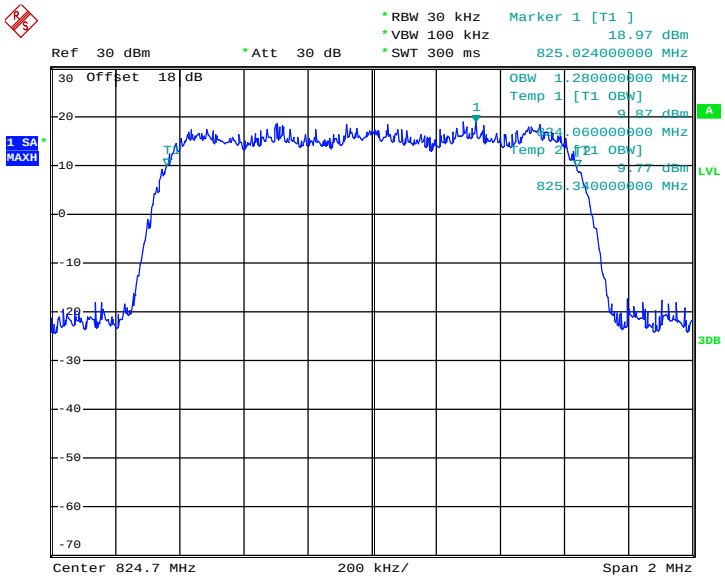
26dB Bandwidth Plot on Channel 810 (1909.8 MHz)



Date: 17.JUN.2013 22:47:34

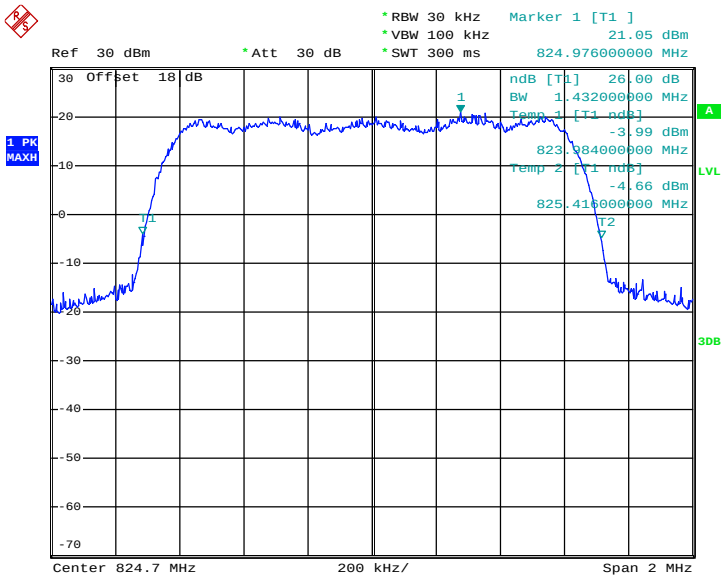
Band :	CDMA2000 BC0	Test Mode :	1xRTT_RC1+SO55

99% Occupied Bandwidth Plot on Channel 1013 (824.7 MHz)



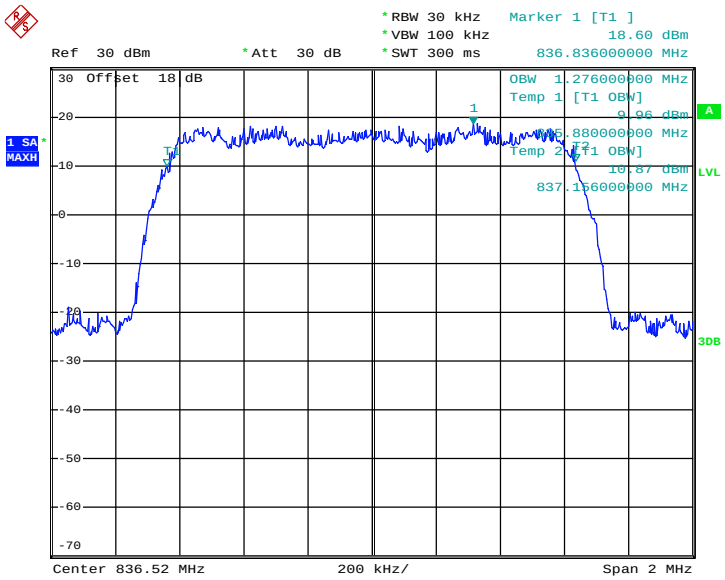
Date: 18.JUN.2013 03:08:37

26dB Bandwidth Plot on Channel 1013 (824.7 MHz)



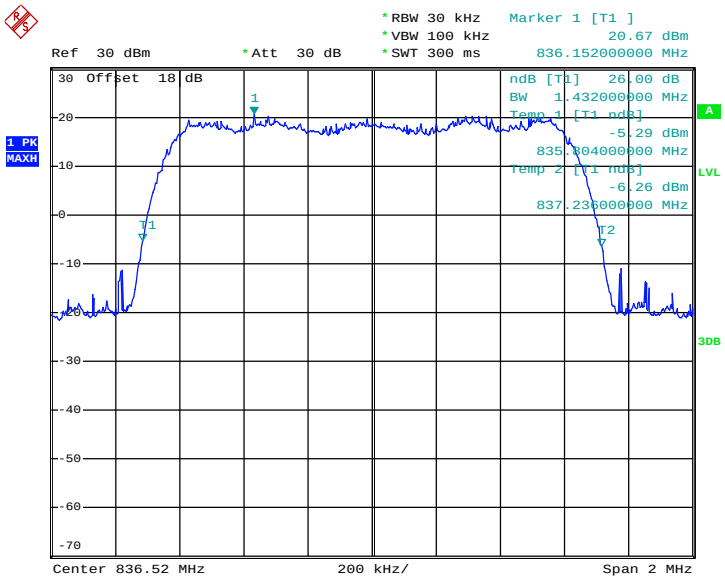
Date: 18.JUN.2013 02:55:01

99% Occupied Bandwidth Plot on Channel 384 (836.52 MHz)



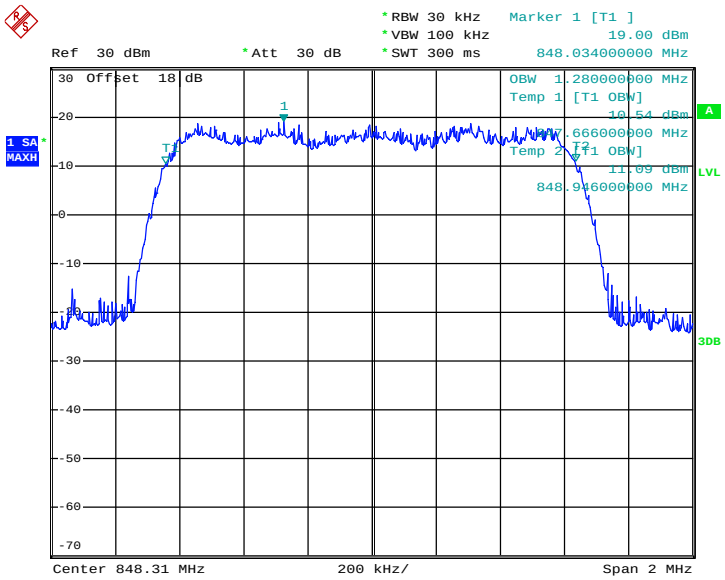
Date: 18.JUN.2013 03:06:18

26dB Bandwidth Plot on Channel 384 (836.52 MHz)



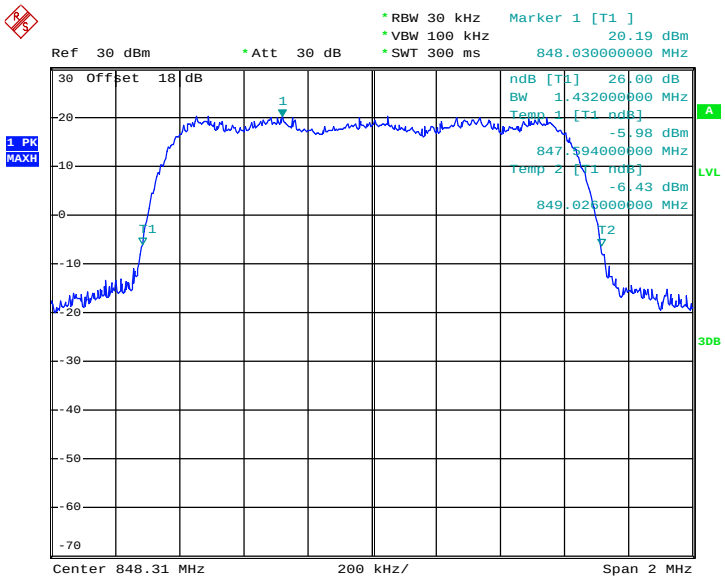
Date: 18.JUN.2013 02:57:01

99% Occupied Bandwidth Plot on Channel 777 (848.31 MHz)



Date: 18.JUN.2013 03:01:05

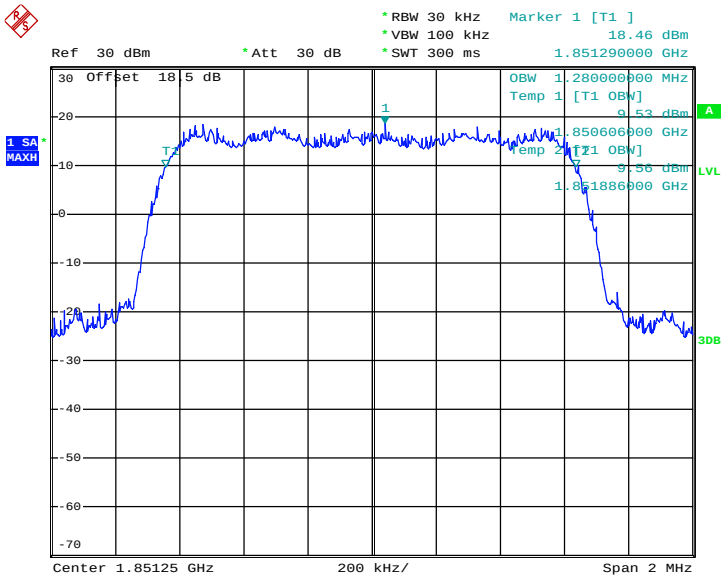
26dB Bandwidth Plot on Channel 777 (848.31 MHz)



Date: 18.JUN.2013 02:58:47

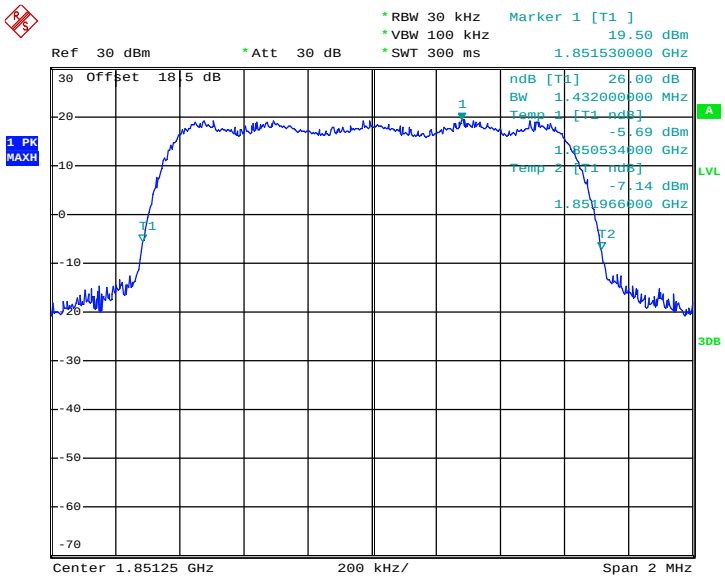
Band :	CDMA2000 BC1	Test Mode :	1xRTT_RC1+SO55

99% Occupied Bandwidth Plot on Channel 25 (1851.24 MHz)



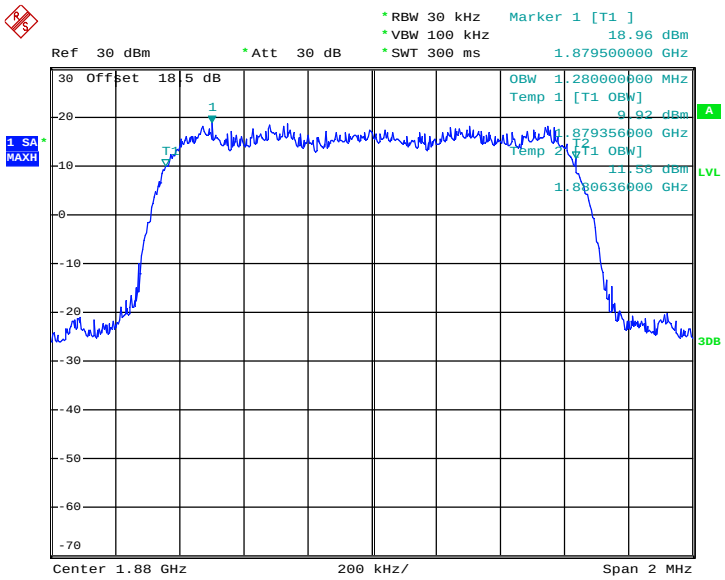
Date: 18.JUN.2013 02:08:42

26dB Bandwidth Plot on Channel 25 (1851.24 MHz)

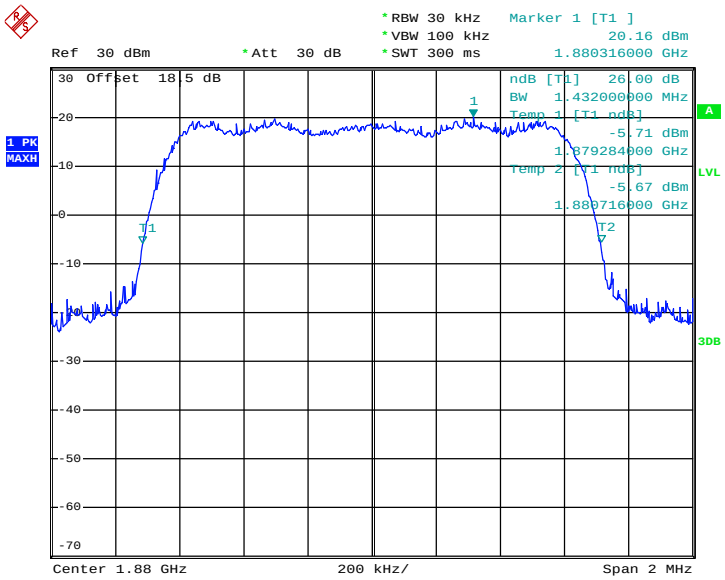


Date: 18.JUN.2013 01:59:38

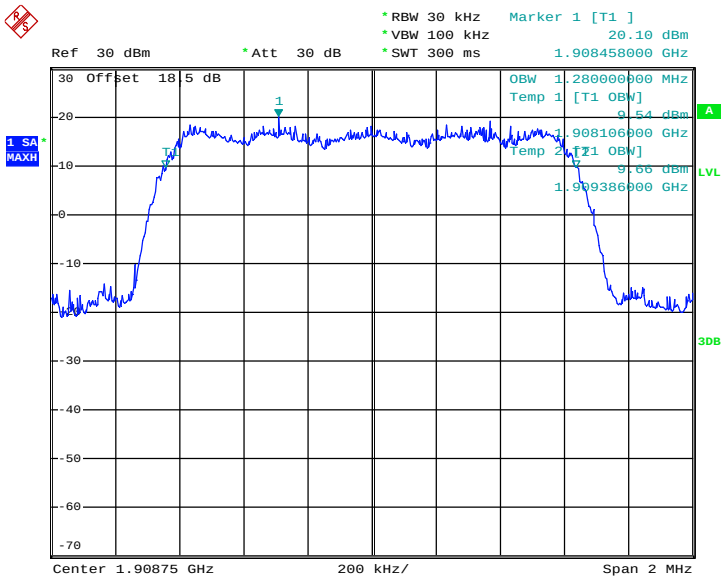
99% Occupied Bandwidth Plot on Channel 600 (1880.0 MHz)



26dB Bandwidth Plot on Channel 600 (1880.0 MHz)

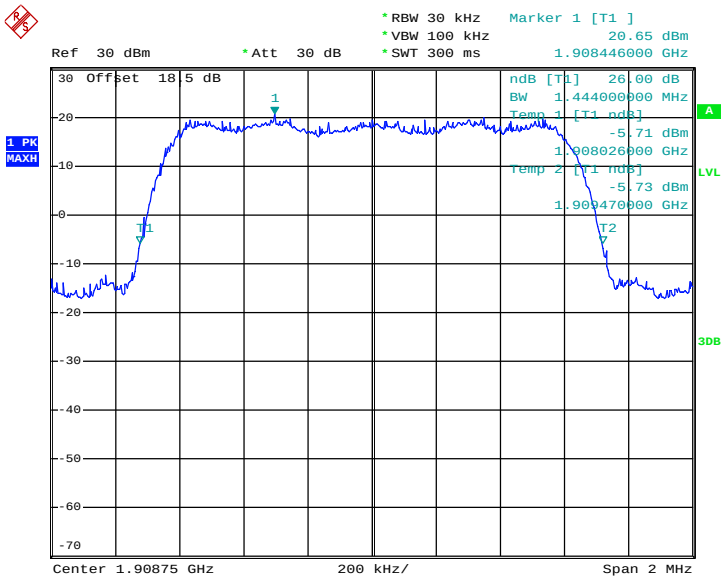


99% Occupied Bandwidth Plot on Channel 1175 (1908.75 MHz)



Date: 18.JUN.2013 02:12:40

26dB Bandwidth Plot on Channel 1175 (1908.75 MHz)



Date: 18.JUN.2013 01:57:44

3.5 Band Edge Measurement

3.5.1 Description of Band Edge Measurement

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

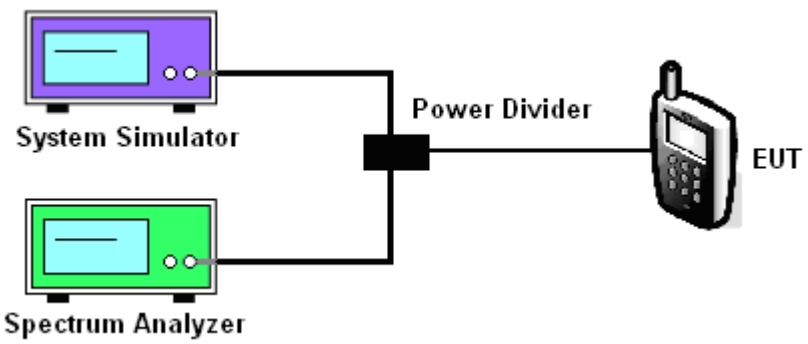
3.5.2 Measuring Instruments

See list of measuring instruments of this test report.

3.5.3 Test Procedures

1. The EUT was connected to Spectrum Analyzer and Base Station via power divider.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. The band edges of low and high channels for the highest RF powers were measured.
4. The RBW was replaced by 10 kHz, slightly smaller than the value in (2), due to the spectrum analyzer limitation to set the exact value. A worst case correction factor of 10*log (1% emission-BW/measurement RBW) was compensated.
5. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
6. The limit line is derived from 43 + 10log(P) dB below the transmitter power P(Watts)
   = P(W) - [43 + 10log(P)] (dB)
   = [30 + 10log(P)] (dBm) - [43 + 10log(P)] (dB)
   = -13dBm.

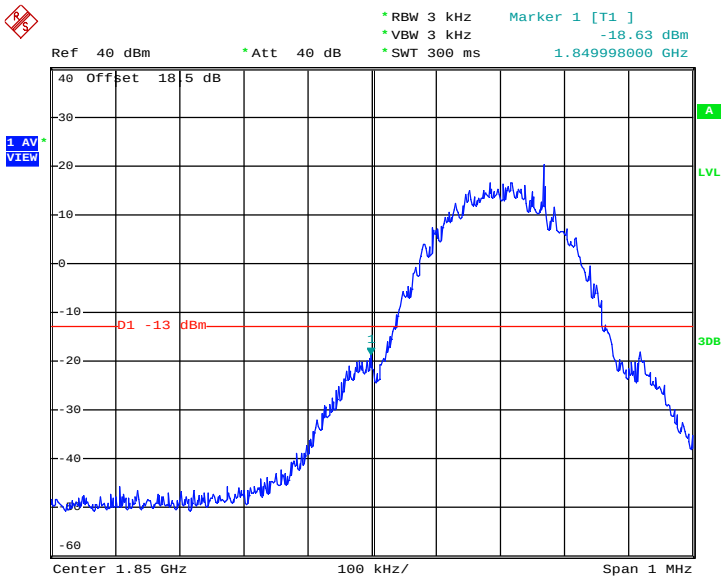
3.5.4 Test Setup



3.5.5 Test Result (Plots) of Conducted Band Edge

Band :	GSM1900	Test Mode :	GSM Link
Correction Factor :	0.25dB	Maximum 26dB Bandwidth :	0.318MHz
Band Edge :	-18.38dBm	Measurement Value :	-18.63dBm

Lower Band Edge Plot on Channel 512 (1850.2 MHz)

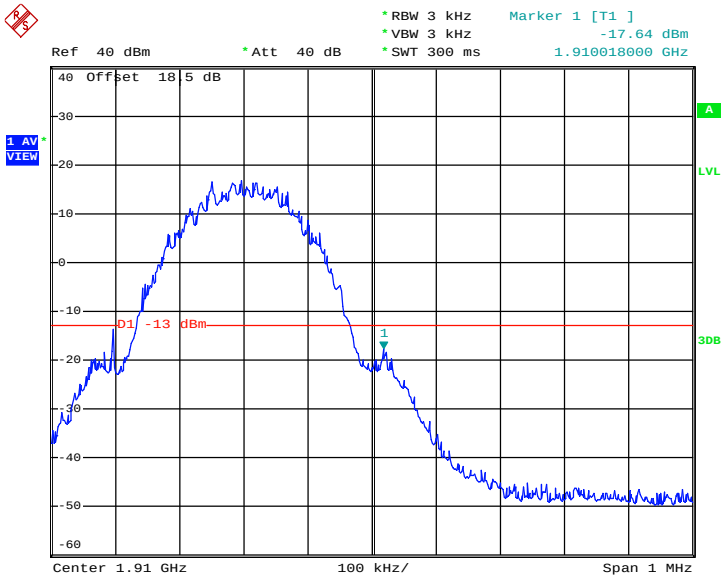


1. Correction Factor(dB)= 10log(1% Emission BW/RBW)

2. Band Edge= Measurement Value + Correction Factor(dB)

Band :	GSM1900	Test Mode :	GSM Link
Correction Factor :	0.25dB	Maximum 26dB Bandwidth :	0.318MHz
Band Edge :	-17.39dBm	Measurement Value :	-17.64dBm

Higher Band Edge Plot on Channel 810 (1909.8 MHz)



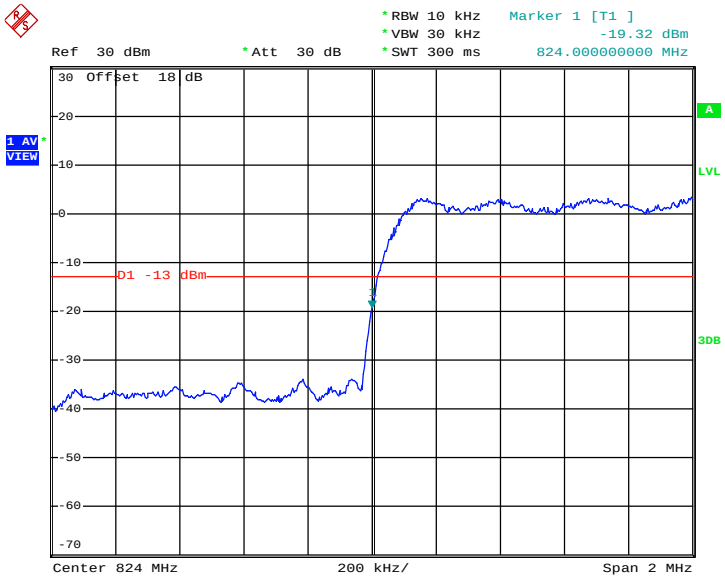
Date: 17.JUN.2013 23:15:02

1. Correction Factor(dB)= 10log(1% Emission BW/RBW)

2. Band Edge= Measurement Value + Correction Factor(dB)

Band :	CDMA2000 BC0	Test Mode :	1xRTT_RC1+SO55
Correction Factor :	1.56dB	Maximum 26dB Bandwidth :	1.432MHz
Band Edge :	-17.76dBm	Measurement Value :	-19.32dBm

Lower Band Edge Plot on Channel 1013 (824.7 MHz)

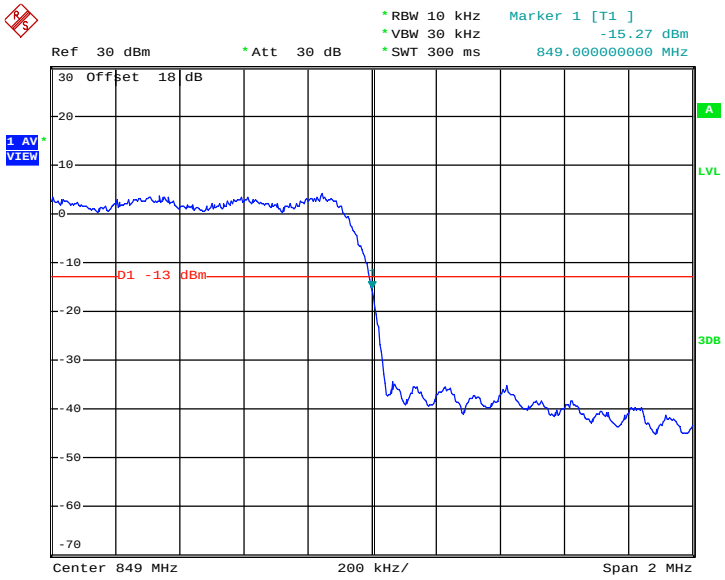


1. Correction Factor(dB)= 10log(1% Emission BW/RBW)

2. Band Edge= Measurement Value + Correction Factor(dB)

Band :	CDMA2000 BC0	Test Mode :	1xRTT_RC1+SO55
Correction Factor :	1.56dB	Maximum 26dB Bandwidth :	1.432MHz
Band Edge :	-13.71dBm	Measurement Value :	-15.27dBm

Higher Band Edge Plot on Channel 777 (848.31 MHz)

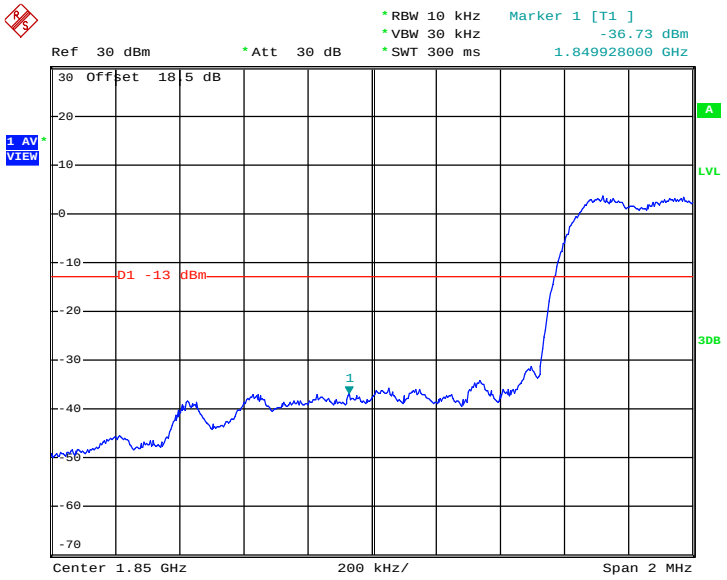


1. Correction Factor(dB)= 10log(1% Emission BW/RBW)

2. Band Edge= Measurement Value + Correction Factor(dB)

Band :	CDMA2000 BC1	Test Mode :	1xRTT_RC1+SO55
Correction Factor :	1.60dB	Maximum 26dB Bandwidth :	1.444MHz
Band Edge :	-35.13dBm	Measurement Value :	-36.73dBm

Lower Band Edge Plot on Channel 25 (1851.25 MHz)



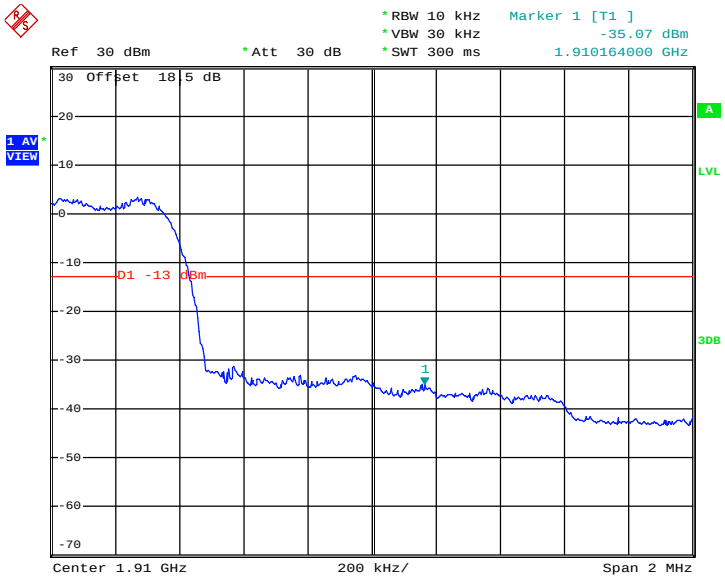
Date: 18.JUN.2013 01:49:43

1. Correction Factor(dB)= 10log(1% Emission BW/RBW)

2. Band Edge= Measurement Value + Correction Factor(dB)

Band :	CDMA2000 BC1	Test Mode :	1xRTT_RC1+SO55
Correction Factor :	1.60dB	Maximum 26dB Bandwidth :	1.444MHz
Band Edge :	-33.47dBm	Measurement Value :	-35.07dBm

Higher Band Edge Plot on Channel 1175 (1908.75 MHz)



1. Correction Factor(dB)= 10log(1% Emission BW/RBW)

2. Band Edge= Measurement Value + Correction Factor(dB)

3.6 Conducted Spurious Emission Measurement

3.6.1 Description of Conducted Spurious Emission Measurement

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

It is measured by means of a calibrated spectrum analyzer and scanned from 30 MHz up to a frequency including its 10th harmonic.

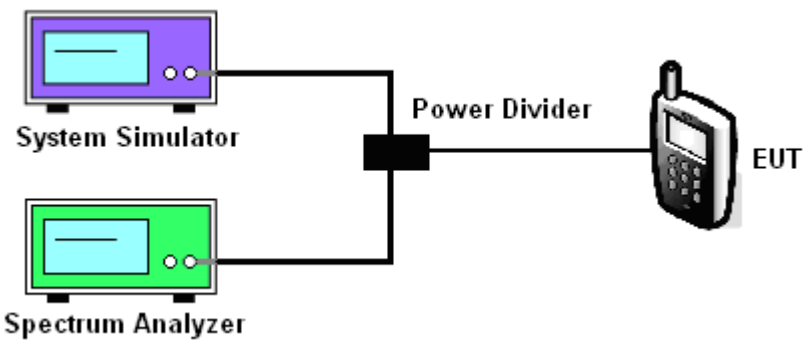
3.6.2 Measuring Instruments

See list of measuring instruments of this test report.

3.6.3 Test Procedures

1. The EUT was connected to spectrum analyzer and base station via power divider.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. The middle channel for the highest RF power within the transmitting frequency was measured.
4. The conducted spurious emission for the whole frequency range was taken.
5. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
6. The limit line is derived from 43 + 10log(P) dB below the transmitter power P(Watts)
   = P(W) - [43 + 10log(P)] (dB)
   = [30 + 10log(P)] (dBm) - [43 + 10log(P)] (dB)
   = -13dBm.

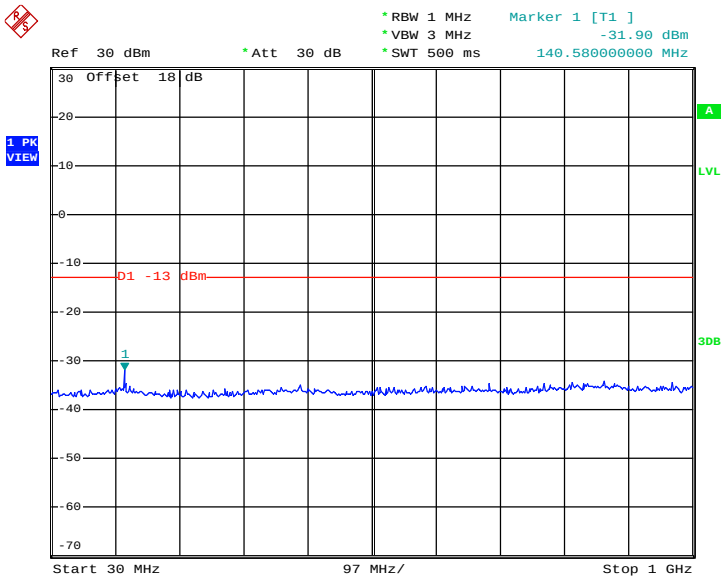
3.6.4 Test Setup



3.6.5 Test Result (Plots) of Conducted Spurious Emission

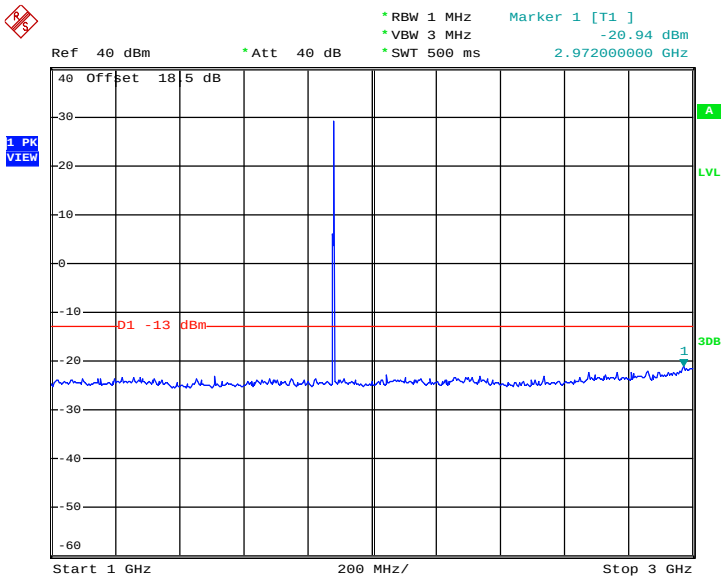
Band :	GSM1900	Channel :	CH661
Test Mode :	GSM Link	Frequency :	1880.0 MHz

Conducted Spurious Emission Plot between 30MHz ~ 1GHz



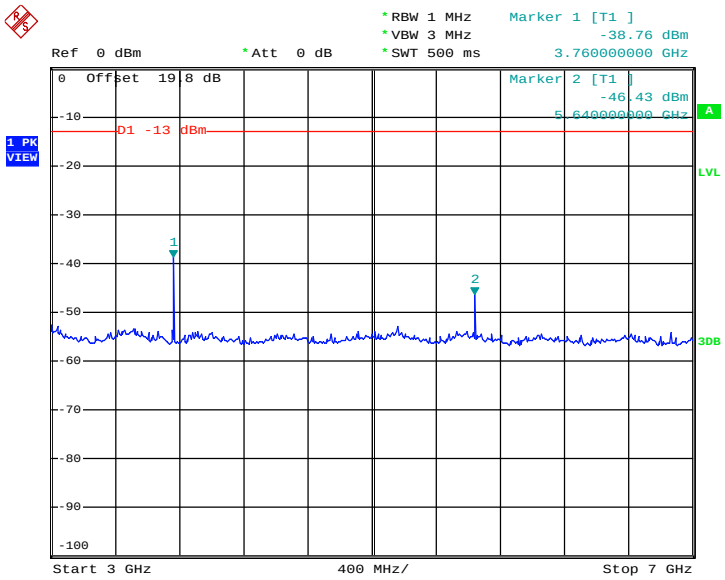
Date: 17.JUN.2013 23:22:44

Conducted Spurious Emission Plot between 1GHz ~ 3GHz



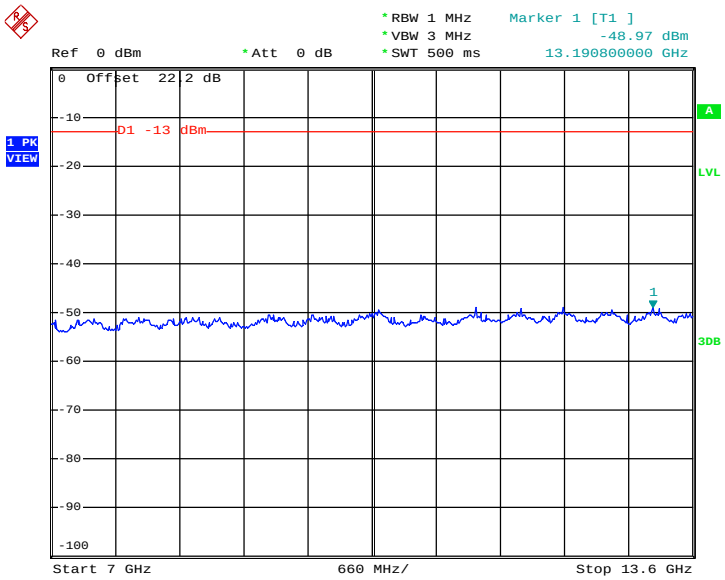
Date: 17.JUN.2013 23:25:14

Conducted Spurious Emission Plot between 3GHz ~ 7GHz



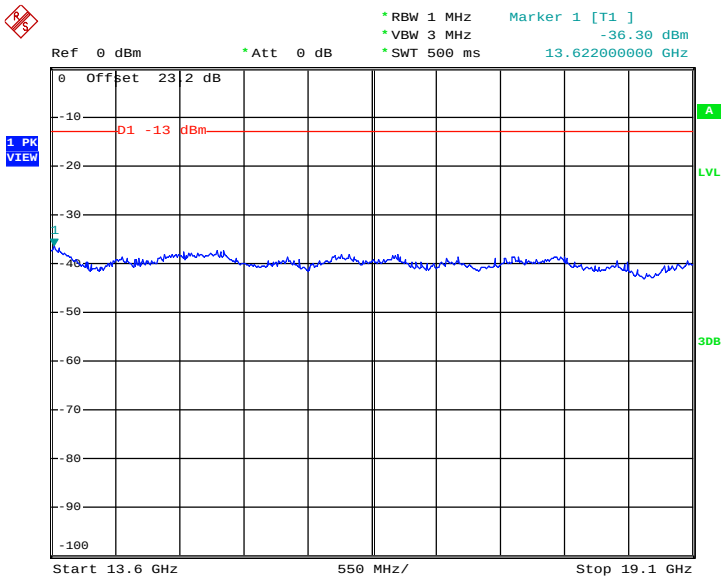
Date: 17.JUN.2013 23:29:56

Conducted Spurious Emission Plot between 7GHz ~ 13.6GHz



Date: 17.JUN.2013 23:32:03

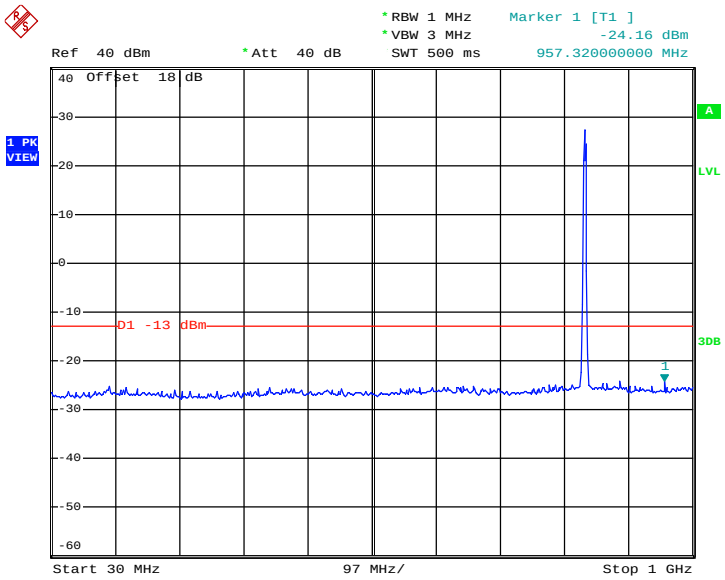
Conducted Spurious Emission Plot between 13.6GHz ~ 19.1GHz



Date: 17.JUN.2013 23:35:55

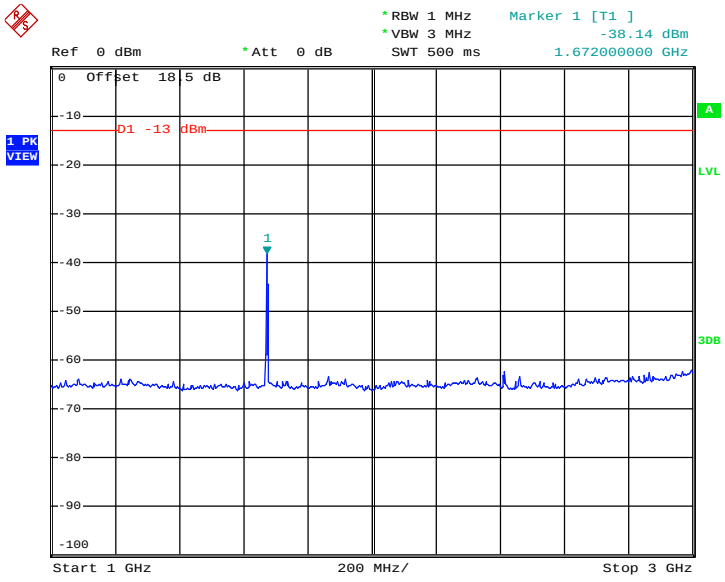
Band :	CDMA2000 BC0	Channel :	CH384
Test Mode :	1xRTT_RC1+SO55	Frequency :	836.52 MHz

Conducted Spurious Emission Plot between 30MHz ~ 1GHz



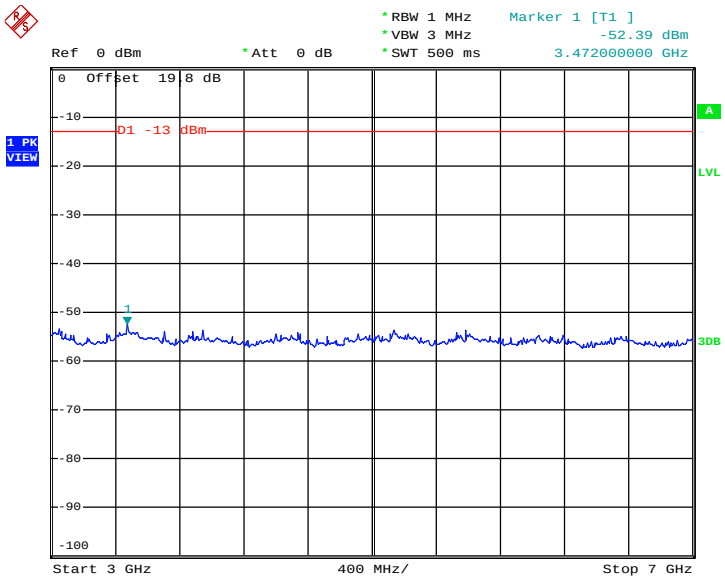
Date: 18.JUN.2013 03:15:36

Conducted Spurious Emission Plot between 1GHz ~ 3GHz



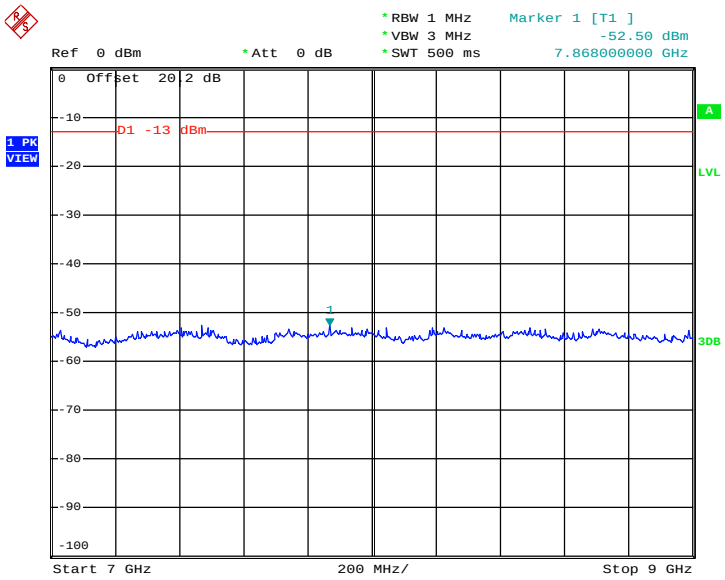
Date: 18.JUN.2013 03:22:04

Conducted Spurious Emission Plot between 3GHz ~ 7GHz



Date: 18.JUN.2013 03:23:53

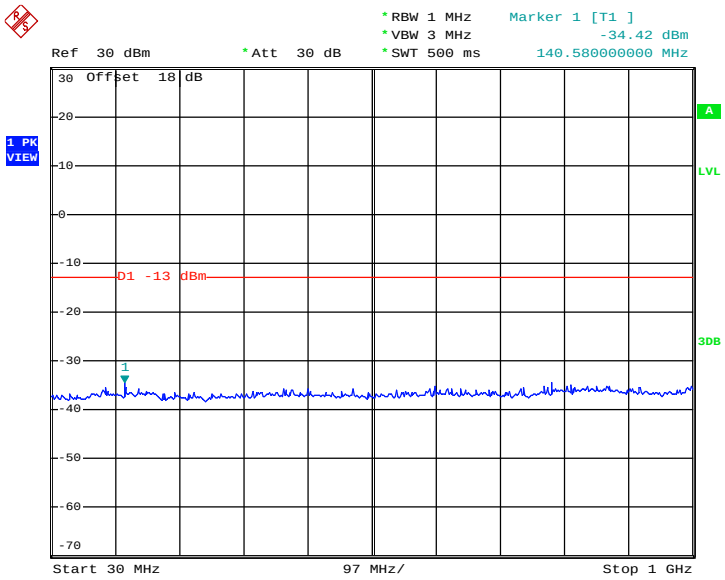
Conducted Spurious Emission Plot between 7GHz ~ 9GHz



Date: 18.JUN.2013 03:24:45

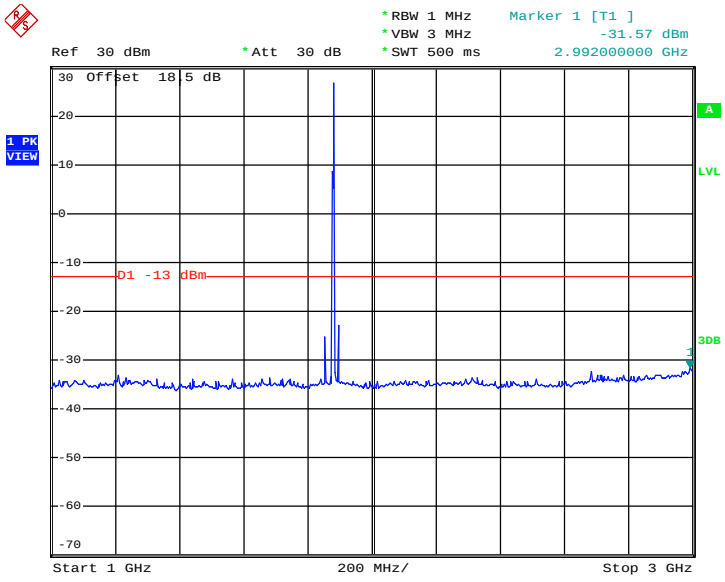
Band :	CDMA2000 BC1	Channel :	CH600
Test Mode :	1xRTT_RC1+SO55	Frequency :	1880.0 MHz

Conducted Spurious Emission Plot between 30MHz ~ 1GHz



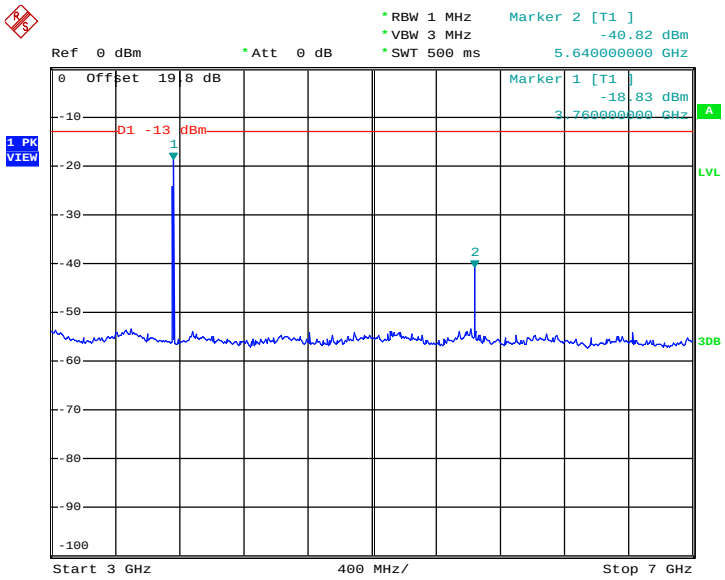
Date: 18.JUN.2013 02:32:42

Conducted Spurious Emission Plot between 1GHz ~ 3GHz



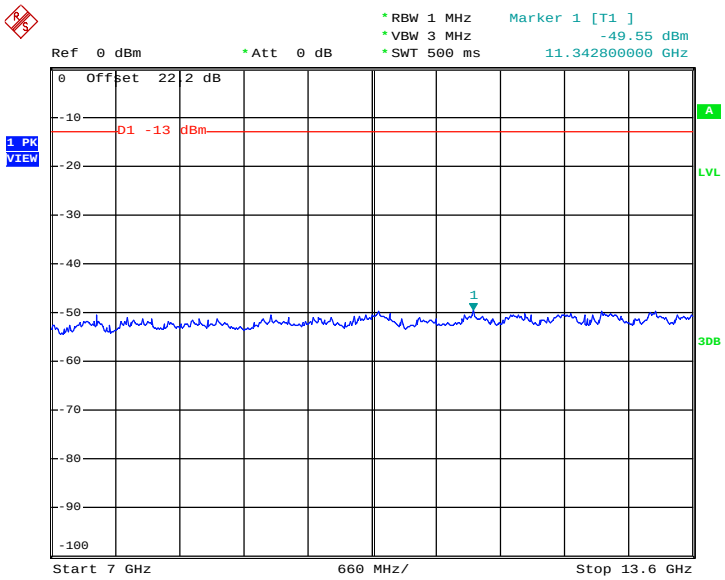
Date: 18.JUN.2013 02:37:11

Conducted Spurious Emission Plot between 3GHz ~ 7GHz



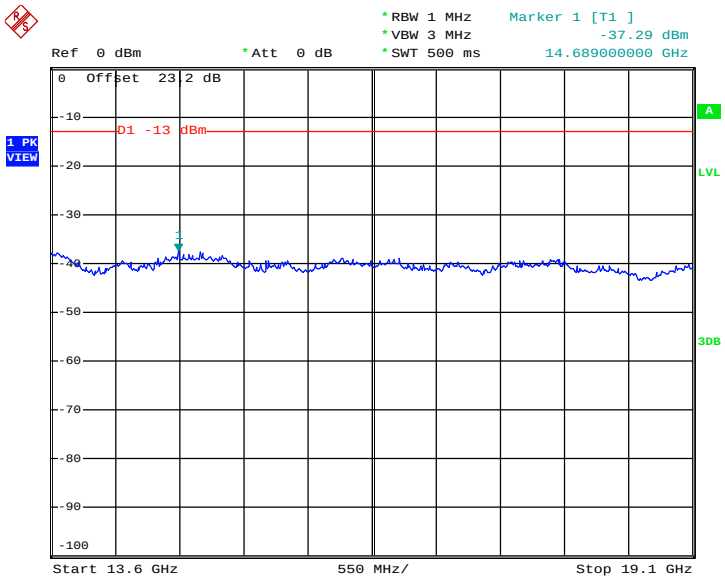
Date: 18.JUN.2013 02:26:40

Conducted Spurious Emission Plot between 7GHz ~ 13.6GHz



Date: 18.JUN.2013 02:29:30

Conducted Spurious Emission Plot between 13.6GHz ~ 19.1GHz



Date: 18.JUN.2013 02:30:48

3.7 Field Strength of Spurious Radiated Measurement

3.7.1 Description of Field Strength of Spurious Radiated Measurement

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitter power (P) by a factor of at least 43 + 10 log (P) dB. The spectrum is scanned from 30 MHz up to a frequency including its 10th harmonic.

3.7.2 Measuring Instruments

See list of measuring instruments of this test report.

3.7.3 Test Procedures

1. The EUT was placed on a rotatable wooden table with 0.8 meter above ground.
2. The EUT was set 3 meters from the receiving antenna, which was mounted on the antenna tower.
3. The table was rotated 360 degrees to determine the position of the highest spurious emission.
4. The height of the receiving antenna is varied between one meter and four meters to search the maximum spurious emission for both horizontal and vertical polarizations.
5. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, taking the record of maximum spurious emission.
6. A horn antenna was substituted in place of the EUT and was driven by a signal generator.
7. Tune the output power of signal generator to the same emission level with EUT maximum spurious emission.
8. Taking the record of output power at antenna port.
9. Repeat step 7 to step 8 for another polarization.
10. EIRP (dBm) = S.G. Power – Tx Cable Loss + Tx Antenna Gain
11. ERP (dBm) = EIRP - 2.15
12. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
13. The limit line is derived from 43 + 10log(P) dB below the transmitter power P(Watts)

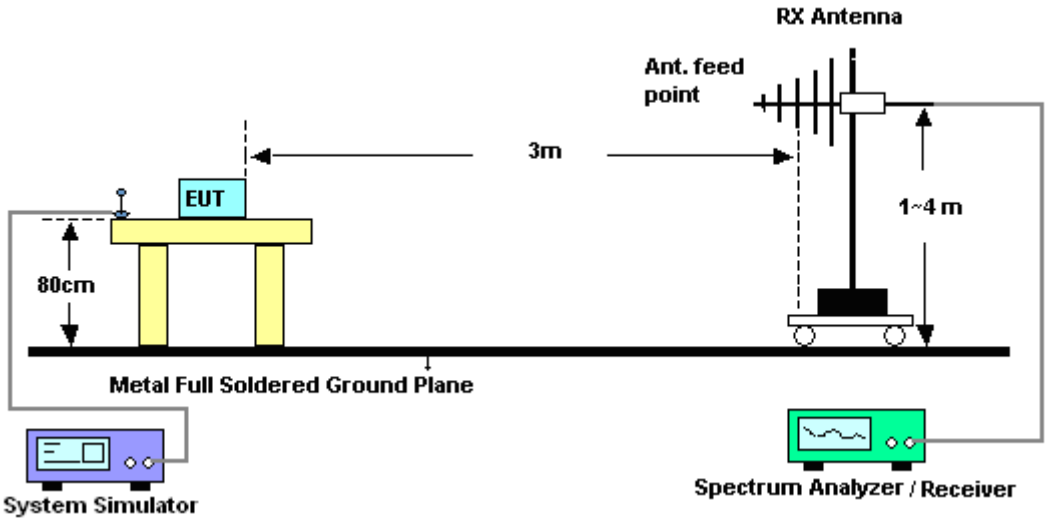
    = P(W) - [43 + 10log(P)] (dB)

    = [30 + 10log(P)] (dBm) - [43 + 10log(P)] (dB)

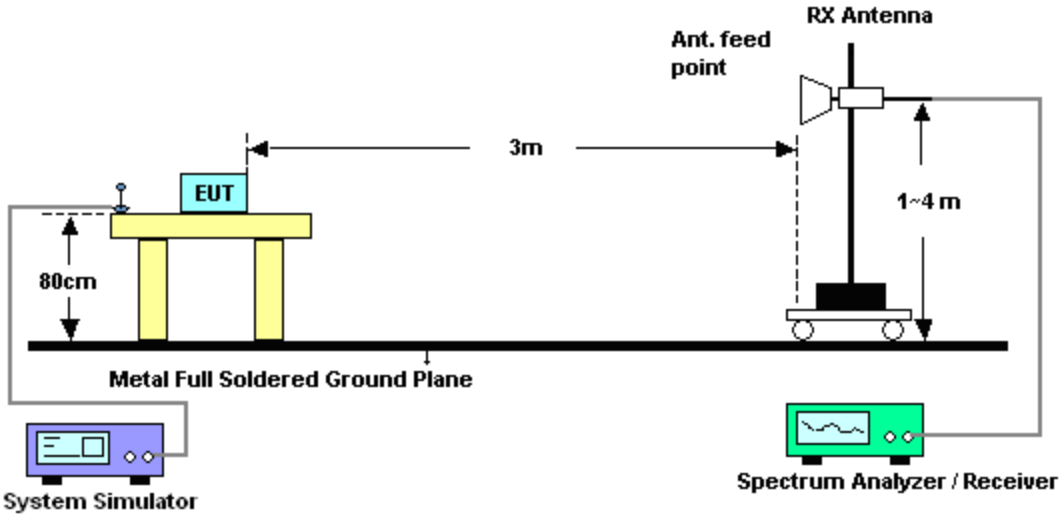
    = -13dBm.

3.7.4 Test Setup

For radiated emissions from 30MHz to 1GHz

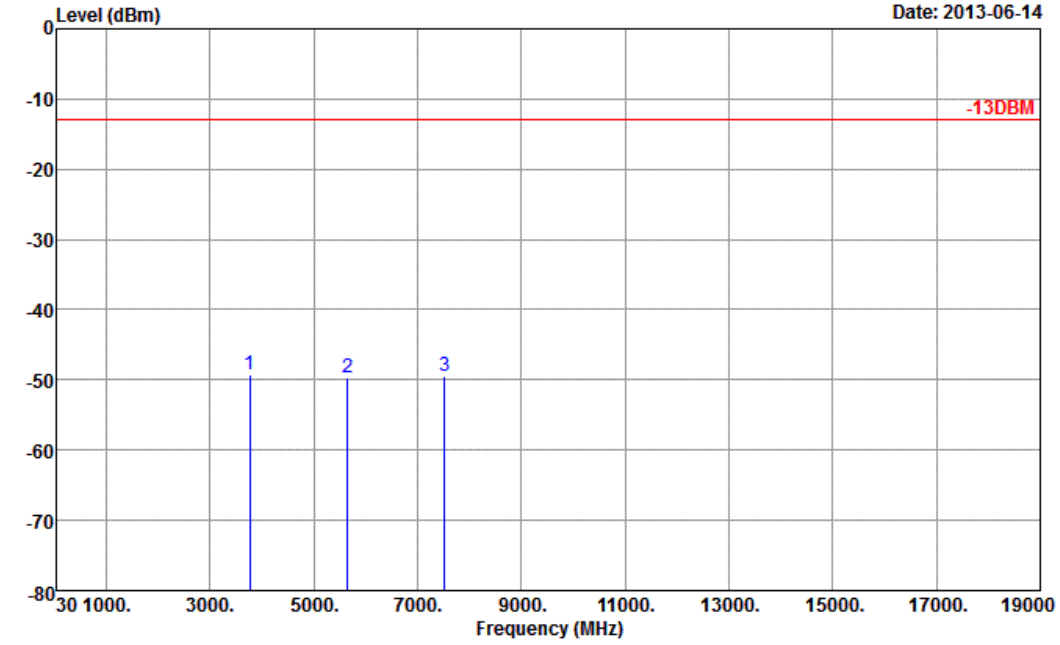


For radiated emissions above 1GHz



3.7.5 Test Result of Field Strength of Spurious Radiated

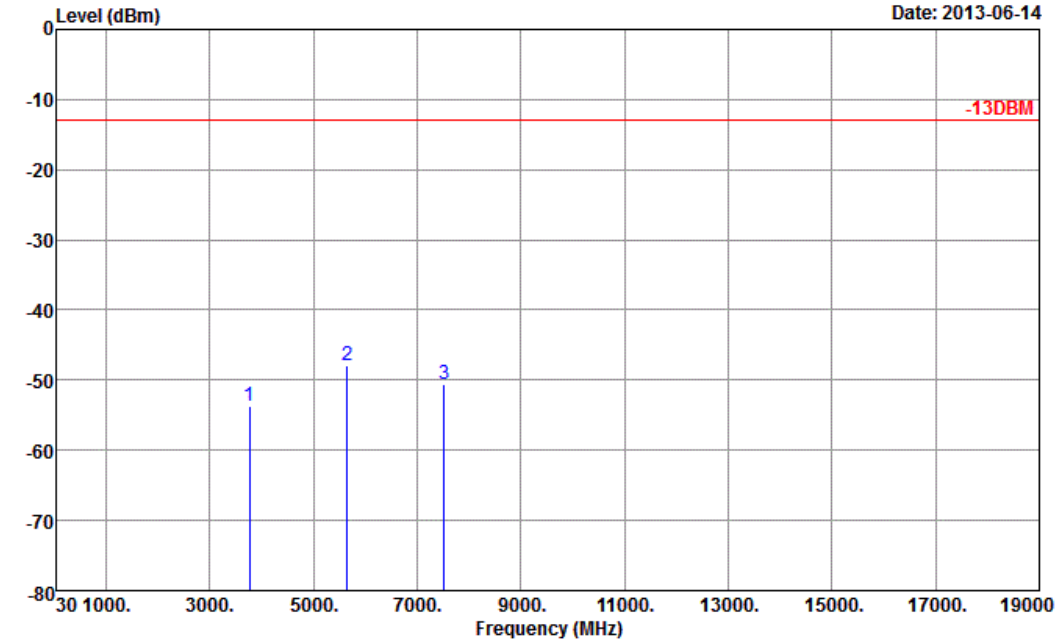
Band :	GSM1900	**Temperature :**	24~25°C
Test Mode :	GSM Link	**Relative Humidity :**	54~55%
Test Engineer :	Robin Luo	**Polarization :**	Horizontal
Remark :	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.		



Site : 03CH01-SZ
Condition : -13DBM HF_EIRP_H_130101 HORIZONTAL
Project : (FG)360901

Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Over Limit (dB)	SPA Reading (dBm)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)	Result
3760	-49.18	-13	-36.18	-62.66	-55.92	1.28	8.02	H	Pass
5640	-49.73	-13	-36.73	-67.72	-58.15	1.58	10.00	H	Pass
7520	-49.47	-13	-36.47	-71.41	-59.79	1.78	12.10	H	Pass

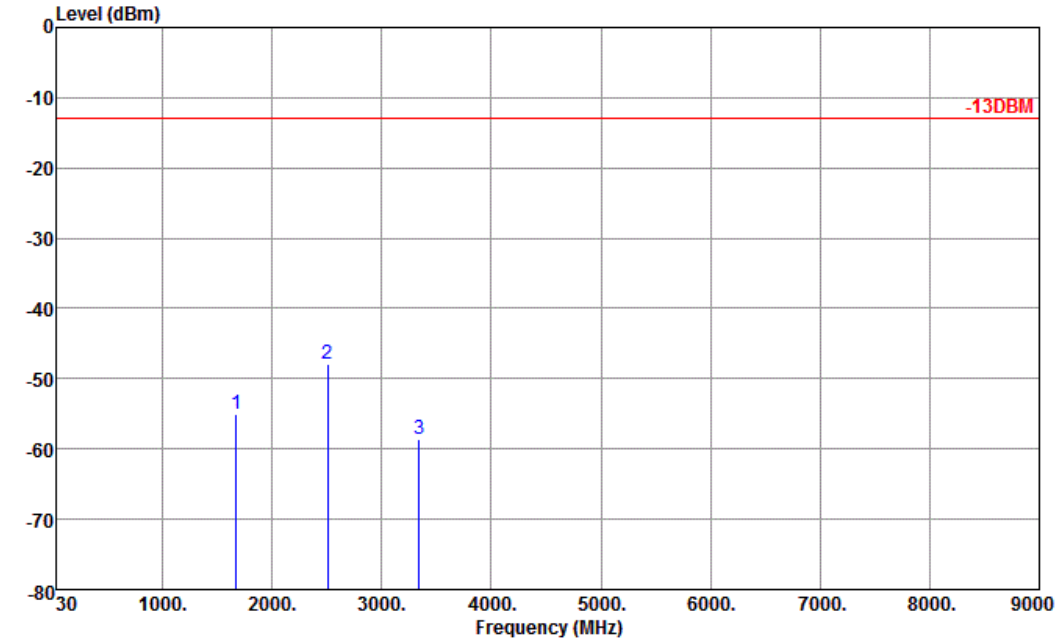
Band :	GSM1900	Temperature :	24~25°C
Test Mode :	GSM Link	Relative Humidity :	54~55%
Test Engineer :	Robin Luo	Polarization :	Vertical
Remark :	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.		



Site : 03CH01-SZ
Condition : -13DBM HF_EIRP_V_130101 VERTICAL
Project : (FG)360901

Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Over Limit (dB)	SPA Reading (dBm)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)	Result
3760	-53.74	-13	-40.74	-68.77	-60.48	1.28	8.02	V	Pass
5640	-48.01	-13	-35.01	-65.09	-56.43	1.58	10	V	Pass
7520	-50.48	-13	-37.48	-72.73	-60.80	1.78	12.1	V	Pass

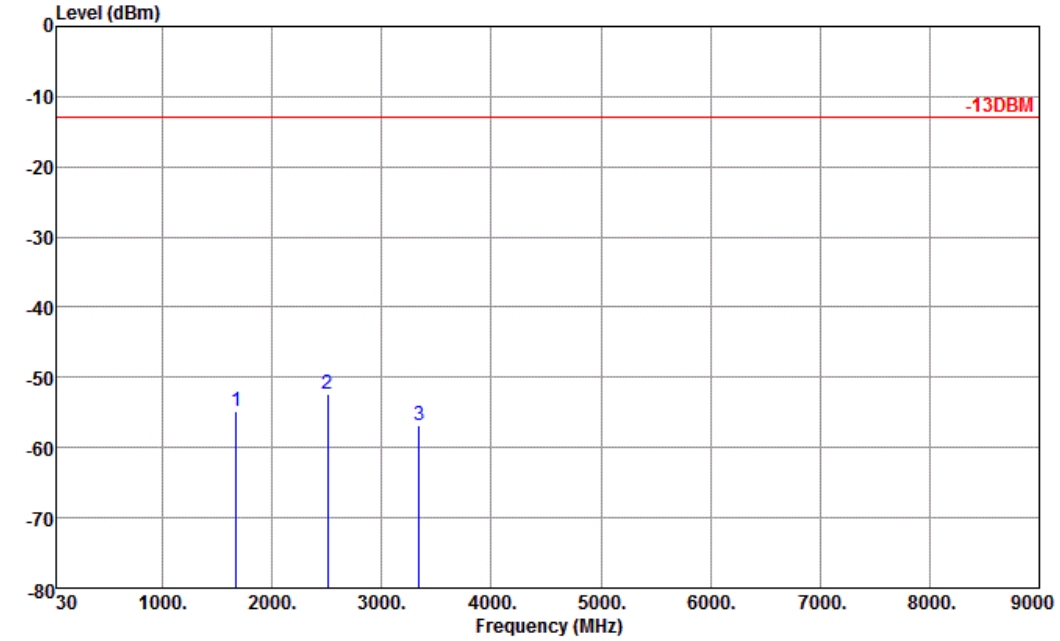
Band :	CDMA2000 BC0	Temperature :	24~25°C
Test Mode :	1xRTT_RC1+SO55	Relative Humidity :	54~55%
Test Engineer :	Robin Luo	Polarization :	Horizontal
Remark :	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.		



Site : 03CH01-SZ
Condition : -13DBM HF_EIRP_H_130101 HORIZONTAL
Project : (FG)360901

Frequency (MHz)	ERP (dBm)	Limit (dBm)	Over Limit (dB)	SPA Reading (dBm)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)	Result
1672	-54.99	-13	-41.99	-67.91	-57.96	0.88	6.00	H	Pass
2510	-47.90	-13	-34.90	-70.05	-50.51	1.08	5.84	H	Pass
3345	-58.61	-13	-45.61	-69.21	-62.98	1.14	7.66	H	Pass

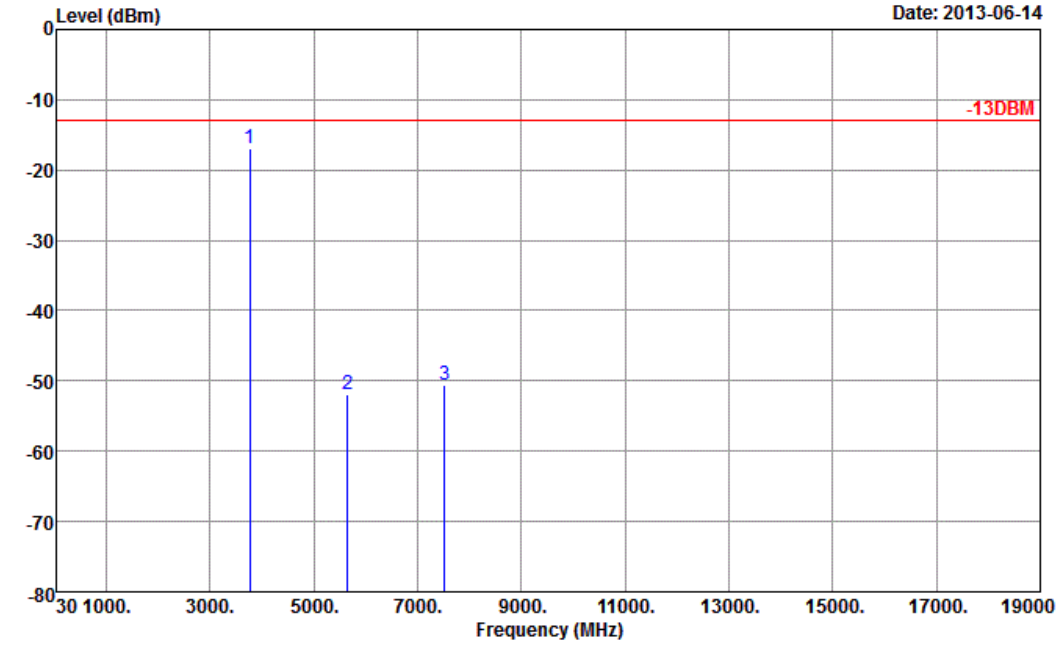
Band :	CDMA2000 BC0	Temperature :	24~25°C
Test Mode :	1xRTT_RC1+SO55	Relative Humidity :	54~55%
Test Engineer :	Robin Luo	Polarization :	Vertical
Remark :	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.		



Site : 03CH01-SZ
Condition : -13DBM HF_EIRP_V_130101 VERTICAL
Project : (FG)360901

Frequency (MHz)	ERP (dBm)	Limit (dBm)	Over Limit (dB)	SPA Reading (dBm)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)	Result
1672	-54.73	-13	-41.73	-65.57	-57.70	0.88	6.00	V	Pass
2510	-52.26	-13	-39.26	-71.08	-54.87	1.08	5.84	V	Pass
3345	-56.92	-13	-43.92	-68.75	-61.29	1.14	7.66	V	Pass

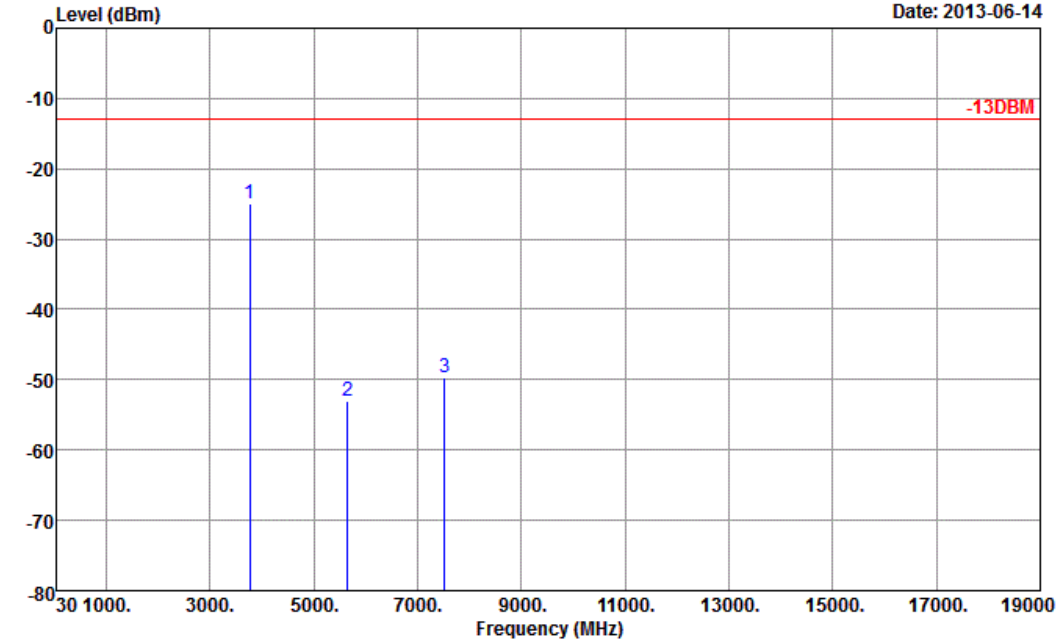
Band :	CDMA2000 BC1	Temperature :	24~25°C
Test Mode :	1xRTT_RC1+SO55	Relative Humidity :	54~55%
Test Engineer :	Robin Luo	Polarization :	Horizontal
Remark :	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.		



Site : 03CH01-SZ
Condition : -13DBM HF_EIRP_H_130101 HORIZONTAL
Project : (FG)360901

Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Over Limit (dB)	SPA Reading (dBm)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)	Result
3760	-16.92	-13	-3.92	-34.79	-23.66	1.28	8.02	H	Pass
5640	-51.87	-13	-38.87	-69.86	-60.29	1.58	10.00	H	Pass
7520	-50.54	-13	-37.54	-72.48	-60.86	1.78	12.10	H	Pass

Band :	CDMA2000 BC1	Temperature :	24~25°C
Test Mode :	1xRTT_RC1+SO55	Relative Humidity :	54~55%
Test Engineer :	Robin Luo	Polarization :	Vertical
Remark :	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.		



Site : 03CH01-SZ
Condition : -13DBM HF_EIRP_V_130101 VERTICAL
Project : (FG)360901

Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Over Limit (dB)	SPA Reading (dBm)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)	Result
3760	-24.96	-13	-11.96	-43.61	-31.70	1.28	8.02	V	Pass
5640	-53.14	-13	-40.14	-70.22	-61.56	1.58	10	V	Pass
7520	-49.75	-13	-36.75	-72	-60.07	1.78	12.1	V	Pass

3.8 Frequency Stability for Temperature and Voltage Measurement

3.8.1 Description of Frequency Stability Measurement

The frequency stability shall be measured by variation of ambient temperature and variation of primary supply voltage to ensure that the fundamental emission stays within the authorized frequency block. The frequency stability of the transmitter shall be maintained within ±0.00025% (±2.5ppm) of the center frequency.

3.8.2 Measuring Instruments

See list of measuring instruments of this test report.

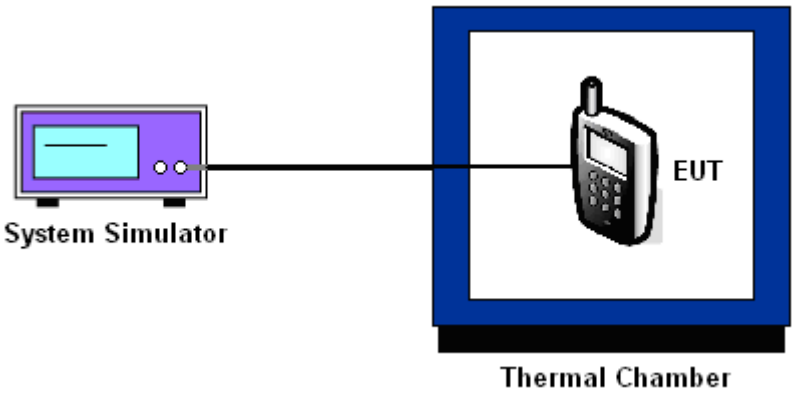
3.8.3 Test Procedures for Temperature Variation

1. The EUT was set up in the thermal chamber and connected with the base station.
2. With power OFF, the temperature was decreased to -30°C and the EUT was stabilized before testing. Power was applied and the maximum change in frequency was recorded within one minute.
3. With power OFF, the temperature was raised in 10°C step up to 50°C. The EUT was stabilized at each step for at least half an hour. Power was applied and the maximum frequency change was recorded within one minute.
4. If the EUT cannot be turned on at -30°C, the testing lowest temperature will be raised in 10°C step until the EUT can be turned on.

3.8.4 Test Procedures for Voltage Variation

1. The EUT was placed in a temperature chamber at 25±5° C and connected with the base station.
2. The power supply voltage to the EUT was varied from BEP to 115% of the nominal value measured at the input to the EUT.
3. The variation in frequency was measured for the worst case.

3.8.5 Test Setup



3.8.6 Test Result of Temperature Variation

Band :	GSM1900	Channel :	661
Limit (ppm) :	2.5	Frequency :	1880.0 MHz

Temperature (°C)	GSM		Result
	Freq. Dev. (Hz)	Deviation (ppm)	
-30	-45	-0.02	PASS
-20	-42	-0.02	
-10	-41	-0.02	
0	-42	-0.02	
10	-40	-0.02	
20	-43	-0.02	
30	-39	-0.02	
40	-42	-0.02	
50	-43	-0.02	
60	-44	-0.02	

Note: The manufacturer declared that the EUT could work properly at temperature 60°C.

Band :	CDMA2000 BC0 1xRTT_RC1+SO55	Channel :	384
Limit (ppm) :	2.5	Frequency :	836.52 MHz

Temperature (°C)	Freq. Dev. (Hz)	Deviation (ppm)	Result
-30	-8	-0.01	PASS
-20	-8	-0.01	
-10	-7	-0.01	
0	7	+0.01	
10	6	+0.01	
20	7	+0.01	
30	-7	-0.01	
40	-8	-0.01	
50	-8	-0.01	
60	-9	-0.01	

Note: The manufacturer declared that the EUT could work properly at temperature 60°C.

Band :	CDMA2000 BC1 1xRTT_RC1+SO55	Channel :	600
Limit (ppm) :	2.5	Frequency :	1880.0 MHz

Temperature (°C)	Freq. Dev. (Hz)	Deviation (ppm)	Result
-30	-5	-0.01	PASS
-20	-5	-0.01	
-10	-4	-0.01	
0	-4	-0.01	
10	-3	-0.01	
20	-3	-0.01	
30	-3	-0.01	
40	-4	-0.01	
50	-5	-0.01	
60	-5	-0.01	

Note: The manufacturer declared that the EUT could work properly at temperature 60°C.

3.8.7 Test Result of Voltage Variation

Band & Channel	Mode	Voltage (Volt)	Freq. Dev. (Hz)	Deviation (ppm)	Limit (ppm)	Result
GSM 1900 CH661	GSM	3.7	-43	-0.02	2.5	PASS
		BEP	-41	-0.02		
		4.2	-43	-0.02		
CDMA2000 BC0 CH384	1xRTT RC1+SO55	3.7	7	+0.01		
		BEP	6	+0.01		
		4.2	-8	-0.01		
CDMA2000 BC1 CH600	1xRTT RC1+SO55	3.7	-3	-0.01		
		BEP	-3	-0.01		
		4.2	-4	-0.01		

Note:

1. Normal Voltage = 3.7V.
2. Battery End Point (BEP) = 3.4 V.

4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Power Meter	Anritsu	ML2495A	1218010	N/A	Mar. 28, 2013	Jun. 17, 2013~ Jun. 19, 2013	Mar. 27, 2014	Conducted (TH01-SZ)
Power Sensor	Anritsu	MA2411B	1207253	N/A	Mar. 28, 2013	Jun. 17, 2013~ Jun. 19, 2013	Mar. 27, 2014	Conducted (TH01-SZ)
ESCI TEST Receiver	R&S	ESCI	100724	9kHz~3GHz	Mar. 28, 2013	Jun. 14, 2013	Mar. 27, 2014	Radiation (03CH01-SZ)
Spectrum Analyzer	R&S	FSP30	101362	9kHz~30GHz	Oct. 11, 2012	Jun. 14, 2013	Oct. 10, 2013	Radiation (03CH01-SZ)
Double Ridge Horn Antenna	ETS Lindgren	3117	00119436	1GHz~18GHz	Oct. 12, 2012	Jun. 14, 2013	Oct. 11, 2013	Radiation (03CH01-SZ)
Bilog Antenna	SCHAFFNER	CBL6112B	2614	30MHz~2GHz	Nov. 03, 2012	Jun. 14, 2013	Nov. 02, 2013	Radiation (03CH01-SZ)
Amplifier	ADVANTEST	BB525C	E9007003	9kHz~3GHz Gain 30dB	Mar. 28, 2013	Jun. 14, 2013	Mar. 27, 2014	Radiation (03CH01-SZ)
Amplifier	Yiai	AV3860B	04030	2GHz~26.5GHz	Mar. 28, 2013	Jun. 14, 2013	Mar. 27, 2014	Radiation (03CH01-SZ)
SHF-EHF-Horn	Schwarzbeck	BBHA9170	BBHA9170249	14GHz~40GHz	Nov. 23, 2012	Jun. 14, 2013	Nov. 22, 2013	Radiation (03CH01-SZ)
Turn Table	EM Electronice	EM 1000	N/A	0 ~ 360 degree	N/A	Jun. 14, 2013	N/A	Radiation (03CH01-SZ)
Antenna Mast	EM Electronice	EM 1000	N/A	1 m - 4 m	N/A	Jun. 14, 2013	N/A	Radiation (03CH01-SZ)

5 Uncertainty of Evaluation

Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**2.54**

Uncertainty of Radiated Emission Measurement (1 GHz ~ 40 GHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**4.72**

Appendix A. Photographs of EUT

Please refer to Sporton report number EP360901 as below.