

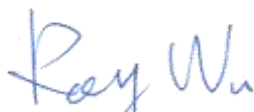
# FCC RF Test Report

APPLICANT : Sierra Wireless Inc.  
EQUIPMENT : Module  
BRAND NAME : WAVECOM  
MODEL NAME : WISMO228  
FCC ID : N7NWISMO228  
STANDARD : FCC 47 CFR Part 2, 22(H), 24(E)  
CLASSIFICATION : PCS Licensed Transmitter (PCB)  
Tx/Rx FREQUENCY RANGE : GSM850 : 824.2 ~ 848.8 MHz /  
869.2 ~ 893.8 MHz  
GSM1900 : 1850.2 ~ 1909.8 MHz /  
1930.2 ~ 1989.8 MHz  
MAX. ERP/EIRP POWER : GSM850 (GPRS 8) : 1.16 W  
GSM1900 (GPRS 8) : 0.88 W  
EMISSION DESIGNATOR : 254KGXW

The product was received on Aug. 04, 2009 and completely tested on Aug. 08, 2009. We, SPORTON INTERNATIONAL INC., would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI C63.4-2003 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 (KUNSHAN) INC., the test report shall not be reproduced except in full.

Reviewed by:



Roy Wu / Manager



**SPORTON INTERNATIONAL INC.**

**No. 3-2, PingXiang Road, Kunshan, Jiangsu Province, P.R.C.**



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## REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FG980420	Rev. 01	Initial issue of report	Oct. 21, 2009



## SUMMARY OF TEST RESULT

Report Section	FCC Rule	IC Rule	Description	Limit	Result	Remark
3.1	§2.1046	N/A	Conducted Output Power	N/A	PASS	
3.2	§22.913(a)(2)	RSS-132(4.4) SRSP-503(5.1.3)	Effective Radiated Power	< 7 Watts for FCC (<6.3 Watts for IC)	PASS	-
3.2	§24.232(c)	RSS-133 (6.4) SRSP-510(5.1.2)	Equivalent Isotropic Radiated Power	< 2 Watts	PASS	-
3.3	§2.1049 §22.917(a) §24.238(a)	N/A	Occupied Bandwidth	N/A	PASS	-
3.4	§2.1051 §22.917(a) §24.238(a)	RSS-132 (4.5.1) RSS-133 (6.5.1)	Band Edge Measurement	$< 43 + 10\log_{10}(P[\text{Watts}])$	PASS	-
3.5	§2.1051 §22.917(a) §24.238(a)	RSS-132 (4.5.1) RSS-133 (6.5.1)	Conducted Emission	$< 43 + 10\log_{10}(P[\text{Watts}])$	PASS	-
3.6	§2.1053 §22.917(a) §24.238(a)	RSS-132 (4.5.1) RSS-133 (6.5.1)	Field Strength of Spurious Radiation	$< 43 + 10\log_{10}(P[\text{Watts}])$	PASS	Under limit 23.80 dB at 7520 MHz
3.7	§2.1055 §22.355 §24.235	RSS-132(4.3) RSS-133(6.3)	Frequency Stability for Temperature & Voltage	< 2.5 ppm	PASS	-



# 1 General Description

## 1.1 Applicant

Sierra Wireless Inc.

13811 Wireless Way, Richmond, Canada

## 1.2 Manufacturer

Sierra Wireless Inc.

13811 Wireless Way, Richmond, Canada

## 1.3 Feature of Equipment Under Test

Product Feature & Specification	
Equipment	Module
Brand Name	WAVECOM
Model Name	WISMO228
FCC ID	N7NWISMO228
Tx Frequency	GSM850 : 824 MHz ~ 849 MHz GSM1900 : 1850 MHz ~ 1910 MHz
Rx Frequency	GSM850 : 869 MHz ~ 894 MHz GSM1900 : 1930 MHz ~ 1990 MHz
Maximum Output Power to Antenna	GSM850 : 32.31 dBm GSM1900 : 29.34 dBm
Maximum ERP/EIRP	GSM850 (GPRS 8) : 1.16 W (30.65 dBm) GSM1900 (GPRS 8) : 0.88 W (29.46 dBm)
HW Version	111
SW Version	Firmware L10_
Type of Modulation	GMSK
Type of Emission	254KGXW
EUT Stage	Production Unit

### Remark:

1. This test report recorded only product characteristics and test results of PCS Licensed Transmitter (PCB).
2. The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

## 1.4 Testing Site

<b>Test Site</b>	SPORTON INTERNATIONAL (KUNSHAN) INC.		
<b>Test Site Location</b>	No. 3-2, PingXiang Road, Kunshan, Jiangsu Province, P.R.C. TEL: +86-0512-5790-0158 FAX: +86-0512-5790-0958		
<b>Test Site No.</b>	<b>Sporton Site No.</b>		<b>FCC/IC Registration No.</b>
	TH01-KS	03CH01_KS	TW1022/4086B-1

## 1.5 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 C63.4-2003
- ANSI / TIA / EIA-603-C-2004
- IC RSS-132 Issue 2
- IC RSS-133 Issue 5

### 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 (DoC), recorded in a separate test report.

## 1.6 Ancillary Equipment List

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	System Simulator	R&S	CMU 200	N/A	N/A	Unshielded, 1.8 m
2.	DC Power Supply	GW	GPC-60300	N/A	N/A	Unshielded, 1.8 m
3.	Dipole Antenna	N/A	N/A	N/A	N/A	N/A

## 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.

Frequency range investigated for radiated emission is as follows:

1. 30 MHz to 9000 MHz for GSM850.
2. 30 MHz to 19000 MHz for GSM1900.

Test Modes		
Band	Radiated TCs	Conducted TCs
<b>GSM 850</b>	■ GPRS 8 Link	■ GPRS 8 Link
<b>GSM 1900</b>	■ GPRS 8 Link	■ GPRS 8 Link

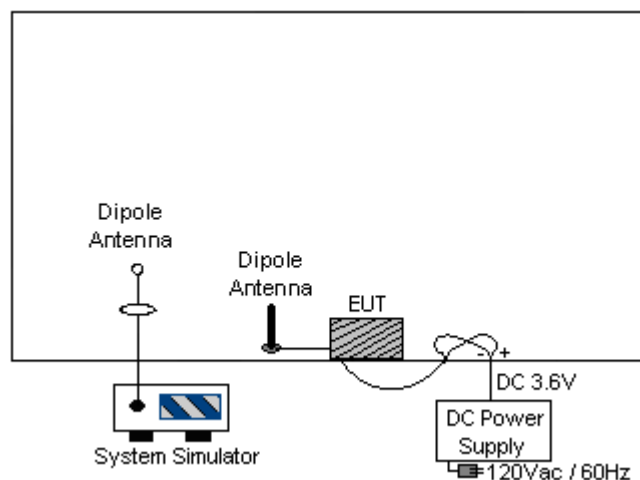
**Note:** The maximum power level is GPRS multi-slot class 8 mode for GMSK link, and only this mode was used for all tests.

The conducted power tables are as follows:

Conducted Power						
Band	GSM850			GSM1900		
Channel	128	189	251	512	661	810
Frequency	824.2	836.4	848.8	1850.2	1880.0	1909.8
GSM	32.22	32.28	32.31	29.31	29.32	29.03
GPRS 8	32.22	32.28	<b>32.31</b>	29.33	<b>29.34</b>	29.05
GPRS 10	32.21	32.26	32.30	29.31	29.32	29.03

(\*Unit: dBm)

### 2.2 Connection Diagram of Test System



### 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.

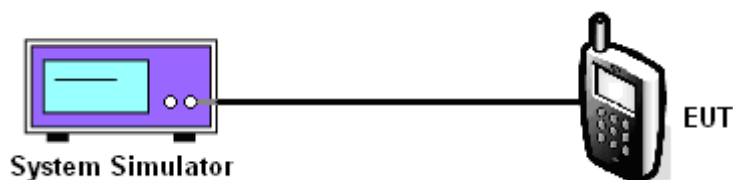
##### 3.1.2 Measuring Instruments

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. Set EUT at maximum power through base station.
3. Select lowest, middle, and highest channels for each band and different modulation.

##### 3.1.4 Test Setup





**3.1.5 Test Result of Conducted Output Power**

Cellular Band				
Modes	Channel	Frequency (MHz)	Conducted Power (dBm)	Conducted Power (Watts)
GSM850 (GPRS 8)	128 (Low)	824.2	32.22	1.67
	189 (Mid)	836.4	32.28	1.69
	251 (High)	848.8	32.31	1.70

PCS Band				
Modes	Channel	Frequency (MHz)	Conducted Power (dBm)	Conducted Power (Watts)
GSM1900 (GPRS 8)	512 (Low)	1850.2	29.33	0.86
	661 (Mid)	1880.0	29.34	0.86
	810 (High)	1909.8	29.05	0.80

## 3.2 Effective Radiated Power and Effective Isotropic Radiated Power Measurement

### 3.2.1 Description of the ERP/EIRP Measurement

ERP/EIRP is measured by substitution method according to ANSI / TIA / EIA-603-C-2004. The ERP of mobile transmitters must not exceed 7 Watts and the EIRP of mobile transmitters are limited to 2 Watts.

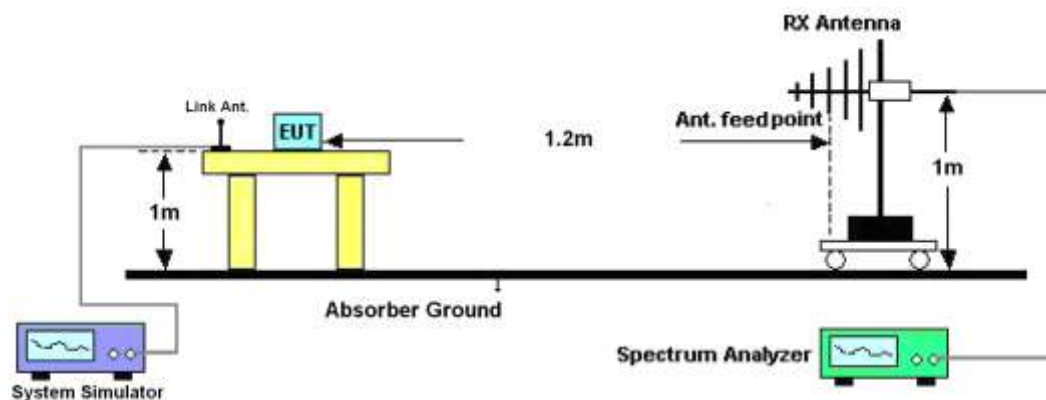
### 3.2.2 Measuring Instruments

See list of measuring instruments of this test report.

### 3.2.3 Test Procedures

1. The EUT was placed on a turntable with 1.0 meter height in a fully anechoic chamber.
2. The EUT was set at 1.2 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 radiated power.
4. The height of the receiving antenna is adjusted to look for the maximum ERP/EIRP.
5. Taking the record of maximum ERP/EIRP.
6. A dipole antenna was substituted in place of the EUT and was driven by a signal generator.
7. The conducted power at the terminal of the dipole antenna is measured.
8. Repeat step 3 to step 5 to get the maximum ERP/EIRP of the substitution antenna.
9.  $ERP/EIRP = P_s + E_t - E_s + G_s = P_s + R_t - R_s + G_s$   
     $P_s$  (dBm) : Input power to substitution antenna.  
     $G_s$  (dBi or dBd) : Substitution antenna Gain.  
     $E_t = R_t + AF$   
     $E_s = R_s + AF$   
     $AF$  (dB/m) : Receive antenna factor  
     $R_t$  : The highest received signal in spectrum analyzer for EUT.  
     $R_s$  : The highest received signal in spectrum analyzer for substitution antenna.

### 3.2.4 Test Setup



### 3.2.5 Test Result of ERP

<b>GSM850 (GPRS 8) Radiated Power ERP</b>						
Horizontal Polarization						
Frequency (MHz)	Rt (dBm)	Rs (dBm)	Ps (dBm)	Gs (dBd)	ERP (dBm)	ERP (W)
824.20	-18.77	-48.12	0.00	-1.08	28.27	0.67
836.40	-16.70	-48.28	0.00	-0.93	30.65	1.16
848.80	-19.57	-48.35	0.00	-0.76	28.02	0.63
Vertical Polarization						
Frequency (MHz)	Rt (dBm)	Rs (dBm)	Ps (dBm)	Gs (dBd)	ERP (dBm)	ERP (W)
824.20	-20.24	-47.97	0.00	-1.08	26.65	0.46
836.40	-19.12	-48.01	0.00	-0.93	27.96	0.63
848.80	-21.04	-48.05	0.00	-0.76	26.25	0.42

### 3.2.6 Test Result of EIRP

<b>GSM1900 (GPRS 8) Radiated Power EIRP</b>						
Horizontal Polarization						
Frequency (MHz)	Rt (dBm)	Rs (dBm)	Ps (dBm)	Gs (dBi)	EIRP (dBm)	EIRP (W)
1850.20	-27.30	-51.88	0.00	1.96	26.54	0.45
1880.00	-25.93	-52.99	0.00	2.00	29.06	0.81
1909.80	-26.80	-54.28	0.00	1.98	29.46	0.88
Vertical Polarization						
Frequency (MHz)	Rt (dBm)	Rs (dBm)	Ps (dBm)	Gs (dBi)	EIRP (dBm)	EIRP (W)
1850.20	-33.70	-52.13	0.00	1.96	20.39	0.11
1880.00	-33.76	-53.17	0.00	2.00	21.41	0.14
1909.80	-35.24	-54.13	0.00	1.98	20.87	0.12

### 3.3 Occupied Bandwidth Measurement

#### 3.3.1 Description of Occupied Bandwidth Measurement

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.

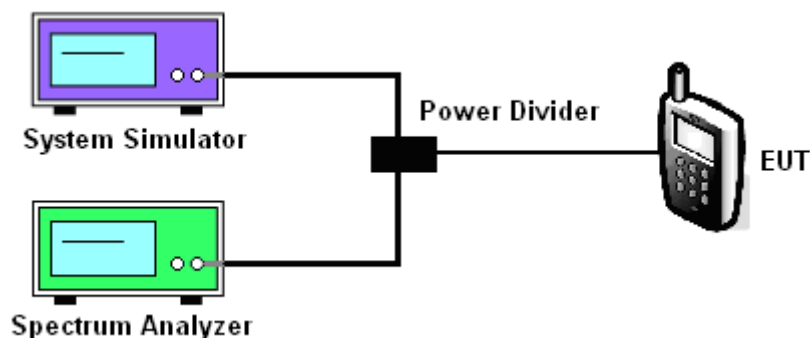
#### 3.3.2 Measuring Instruments

See list of measuring instruments of this test report.

#### 3.3.3 Test Procedures

1. The EUT was connected to Spectrum Analyzer and Base Station via power divider.
2. The 99% and 26 dB occupied bandwidth (BW) of the middle channel for the highest RF powers were measured.
3. The RBW was replaced by 10 kHz, due to the spectrum analyzer IF-Filter including an excess of the limit. A worst case correction factor of  $10 \log (1\% \text{ BW/measurement RBW})$  was implemented.

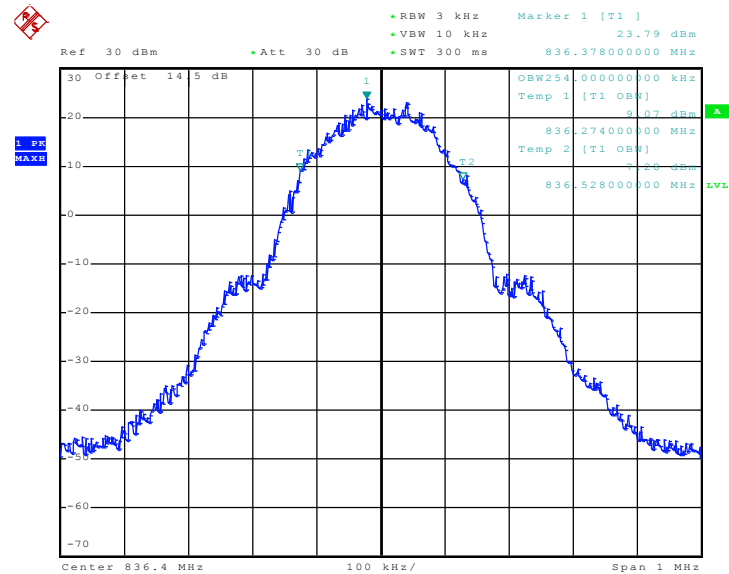
#### 3.3.4 Test Setup



### 3.3.5 Test Result (Plots) of Occupied Bandwidth

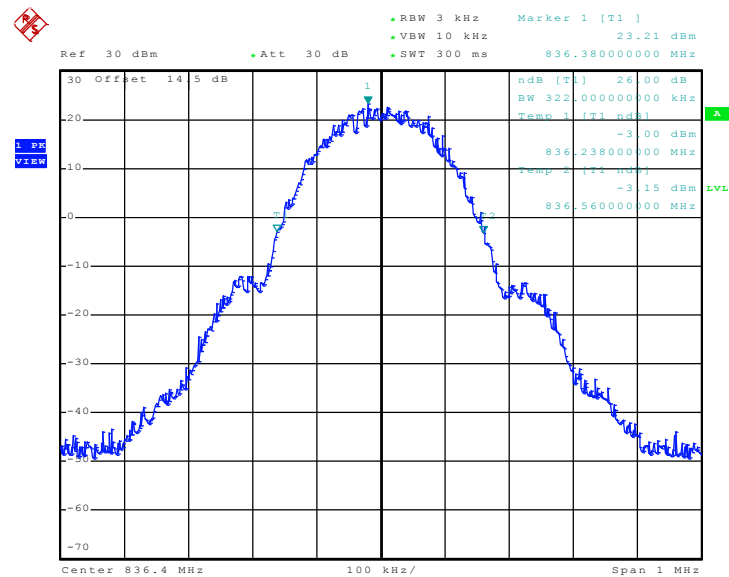
<b>Band :</b>	GSM 850	<b>Power Stage :</b>	High
<b>Test Mode :</b>	GPRS 8 Link		

#### 99% Occupied Bandwidth Plot on Channel 189



Date: 6.AUG.2009 13:23:55

#### 26dB Bandwidth Plot on Channel 189

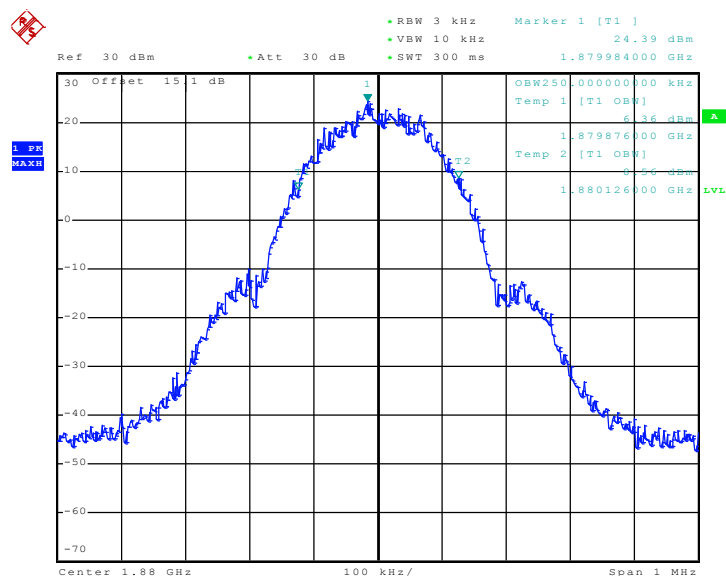


Date: 6.AUG.2009 12:57:22



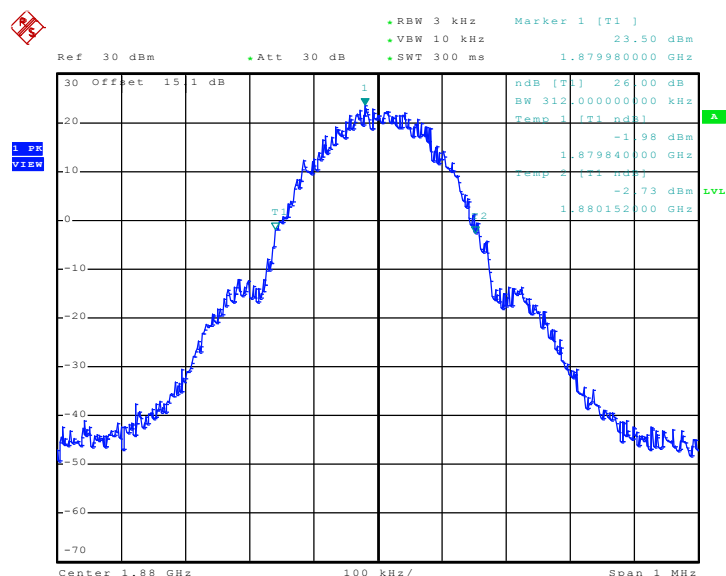
Band :	GSM 1900	Power Stage :	High
Test Mode :	GPRS 8 Link		

99% Occupied Bandwidth Plot on Channel 661



Date: 6.AUG.2009 04:05:35

26dB Bandwidth Plot on Channel 661



Date: 6.AUG.2009 03:57:40

### 3.4 Band Edge Measurement

#### 3.4.1 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.

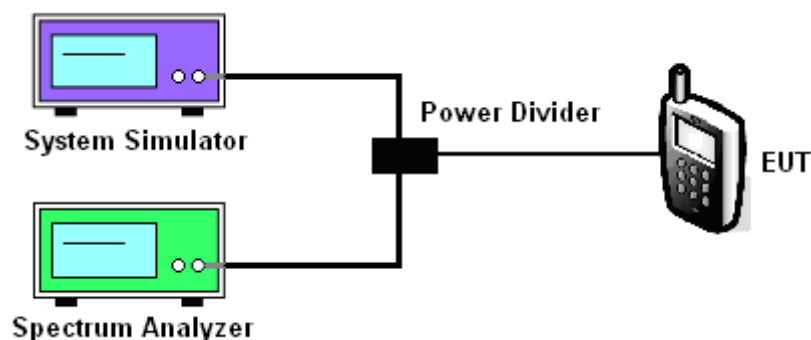
#### 3.4.2 Measuring Instruments

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 band edges of low and high channels for the highest RF powers were measured. Setting RBW as roughly BW/100.

#### 3.4.4 Test Setup



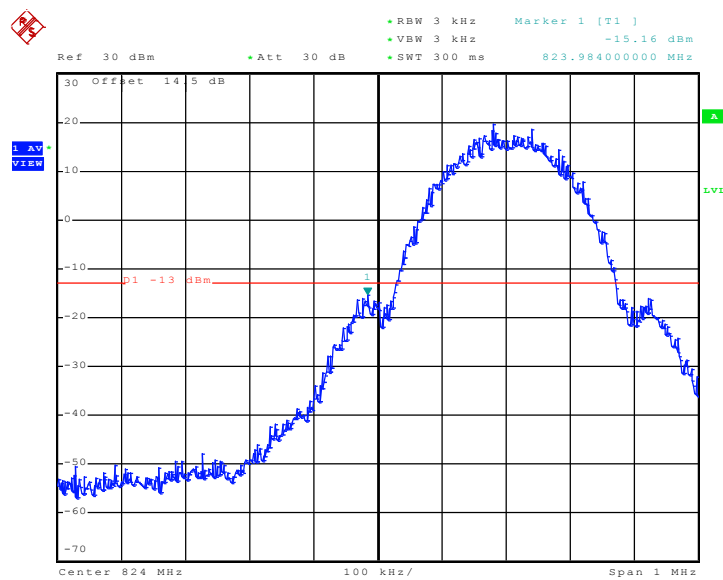




### 3.4.5 Test Result (Plots) of Conducted Band Edge

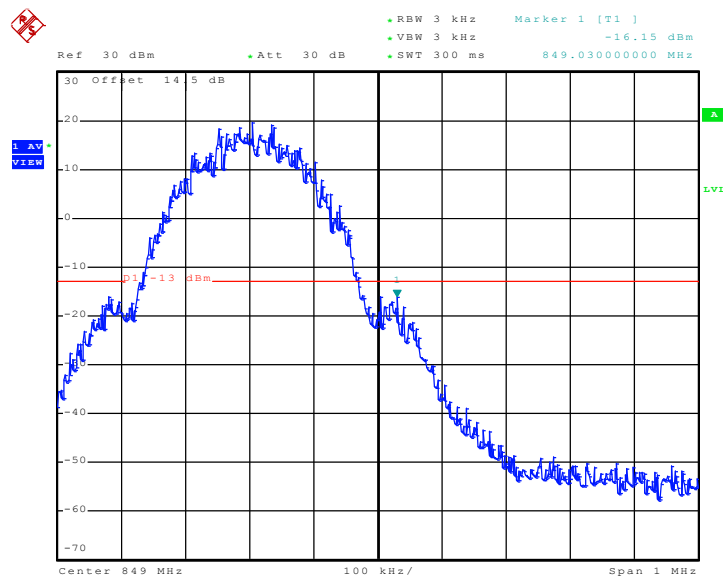
Band :	GSM850	Power Stage :	High
Test Mode :	GPRS 8 Link		

Lower Band Edge Plot on Channel 128



Date: 6.AUG.2009 13:05:00

Higher Band Edge Plot on Channel 251

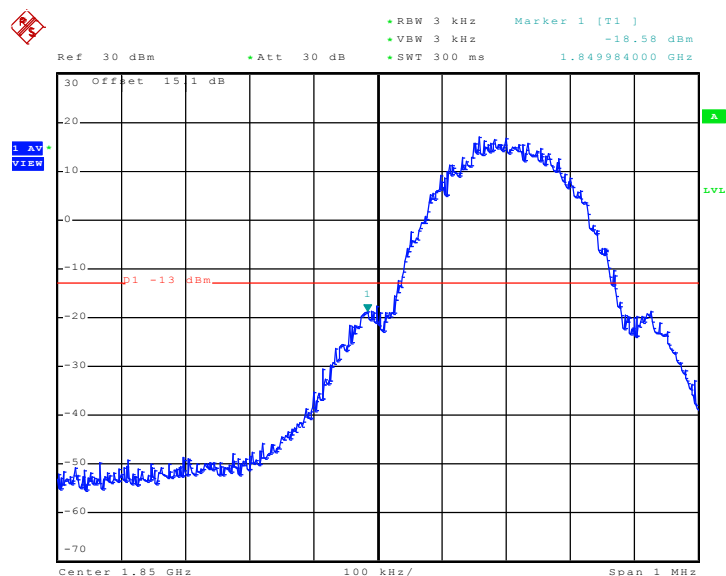


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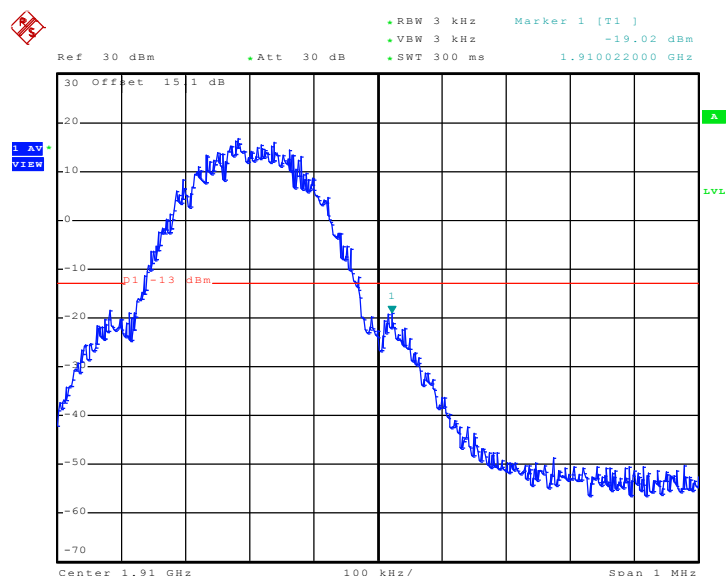
Band :	GSM1900	Power Stage :	High
Test Mode :	GPRS 8 Link		

Lower Band Edge Plot on Channel 512



Date: 6.AUG.2009 04:01:21

Higher Band Edge Plot on Channel 810



Date: 6.AUG.2009 04:03:21

### 3.5 Conducted Emission Measurement

#### 3.5.1 Description of Conducted 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 10<sup>th</sup> harmonic.

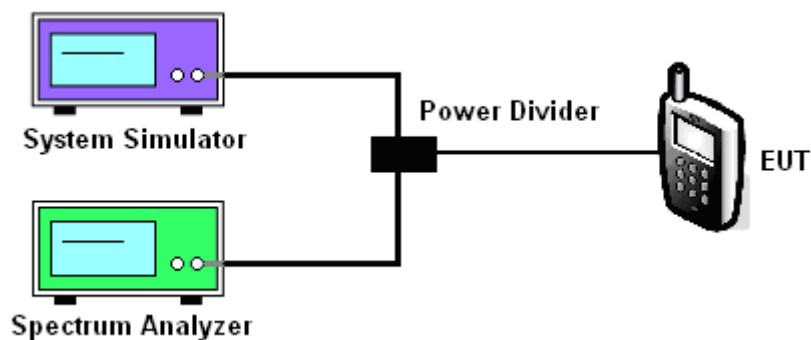
#### 3.5.2 Measuring Instruments

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 middle channel for the highest RF power within the transmitting frequency was measured.
3. The conducted spurious emission for the whole frequency range was taken.

#### 3.5.4 Test Setup

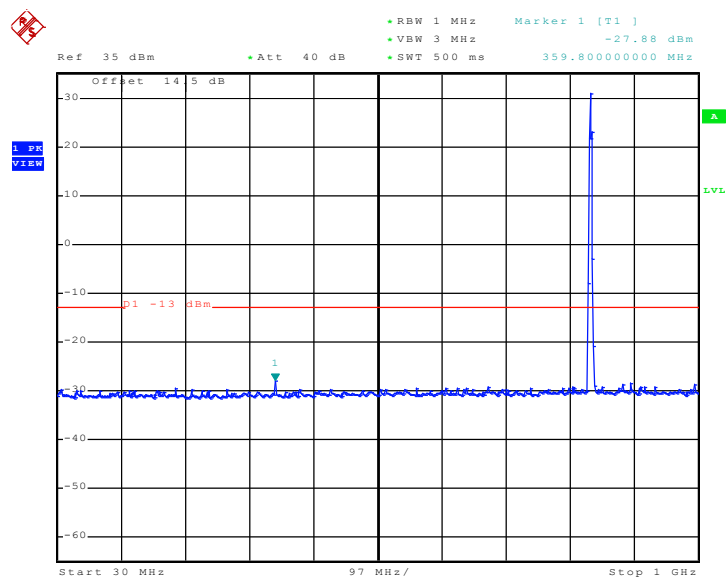




### 3.5.5 Test Result (Plots) of Conducted Emission

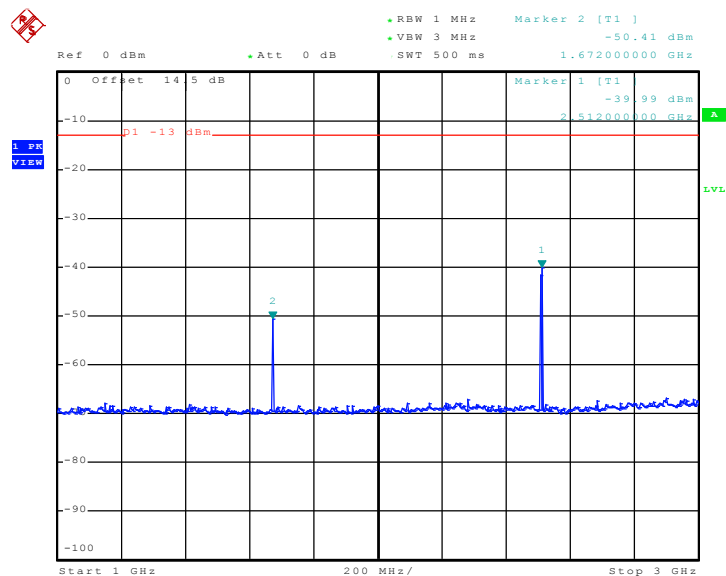
Band :	GSM850	Channel :	CH189
Test Mode :	GPRS 8 Link		

Conducted Emission Plot between 30MHz ~ 1GHz



Date: 6.AUG.2009 13:36:28

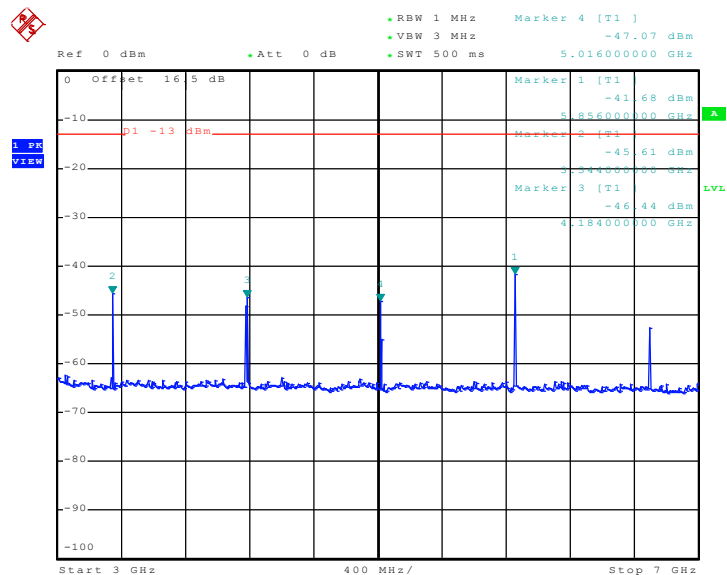
Conducted Emission Plot between 1GHz ~ 3GHz



Date: 6.AUG.2009 13:39:36

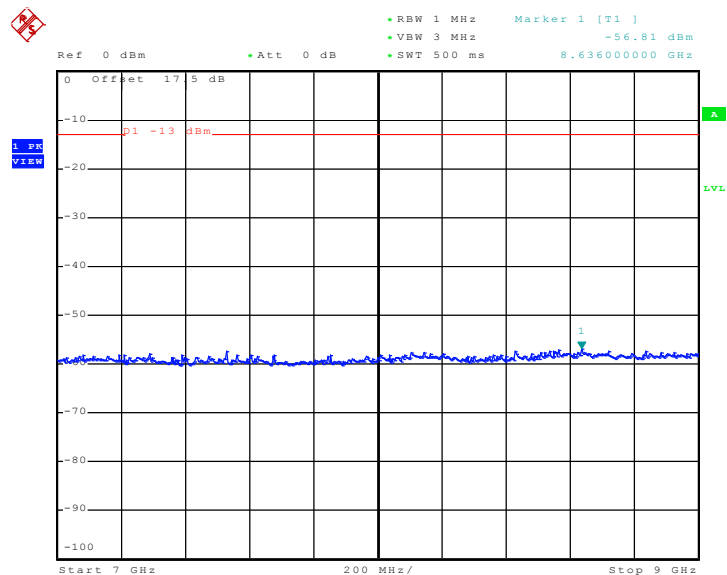


Conducted Emission Plot between 3GHz ~ 7GHz



Date: 6.AUG.2009 13:42:32

Conducted Emission Plot between 7GHz ~ 9GHz

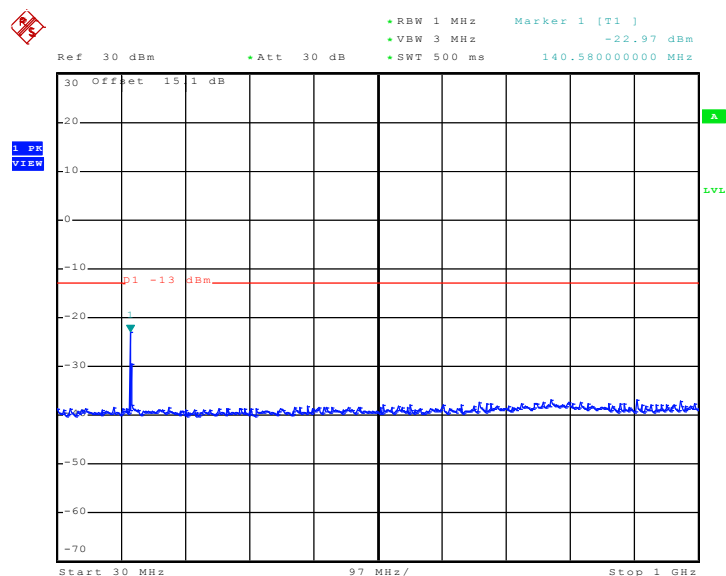


Date: 6.AUG.2009 03:45:15



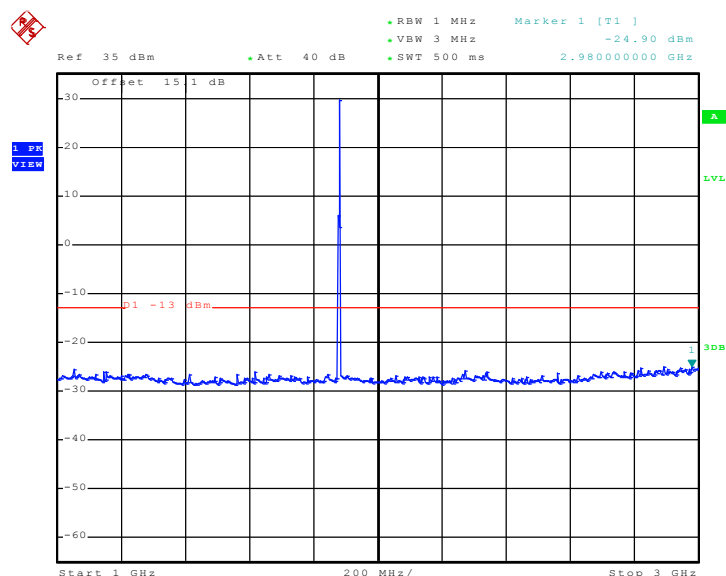
Band :	GSM1900	Channel :	CH661
Test Mode :	GPRS 8 Link		

Conducted Emission Plot between 30MHz ~ 1GHz



Date: 6.AUG.2009 04:13:46

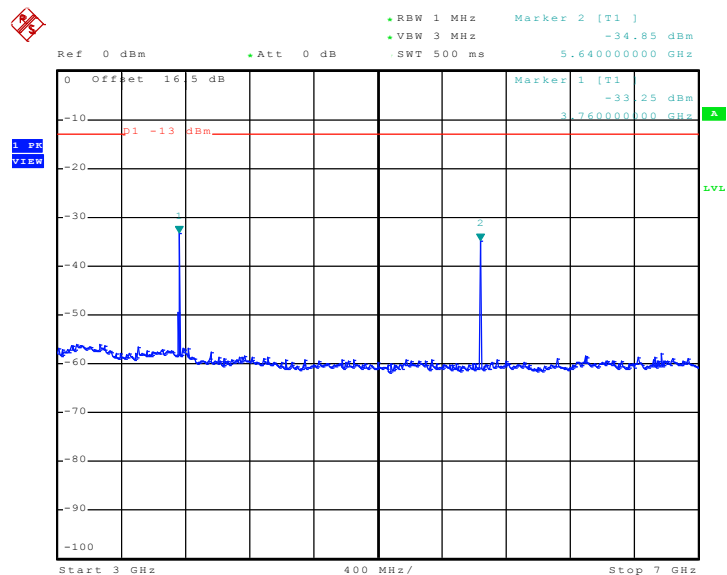
Conducted Emission Plot between 1GHz ~ 3GHz



Date: 24.AUG.2009 09:18:18

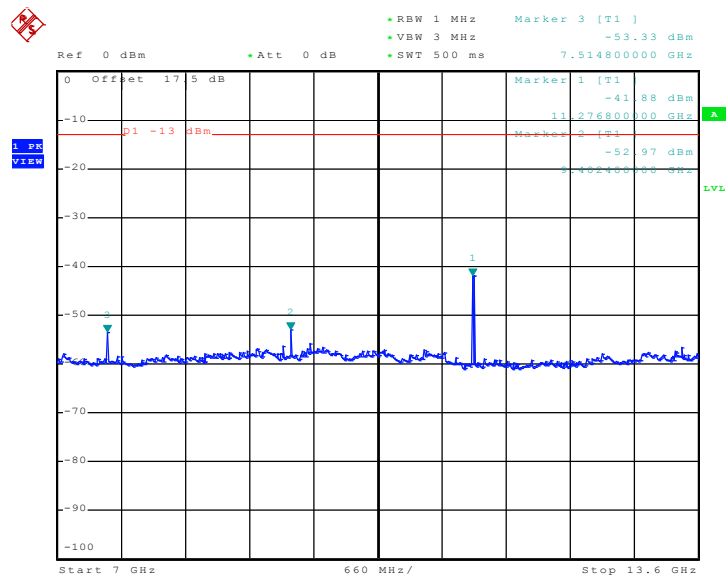


Conducted Emission Plot between 3GHz ~ 7GHz



Date: 6.AUG.2009 04:19:45

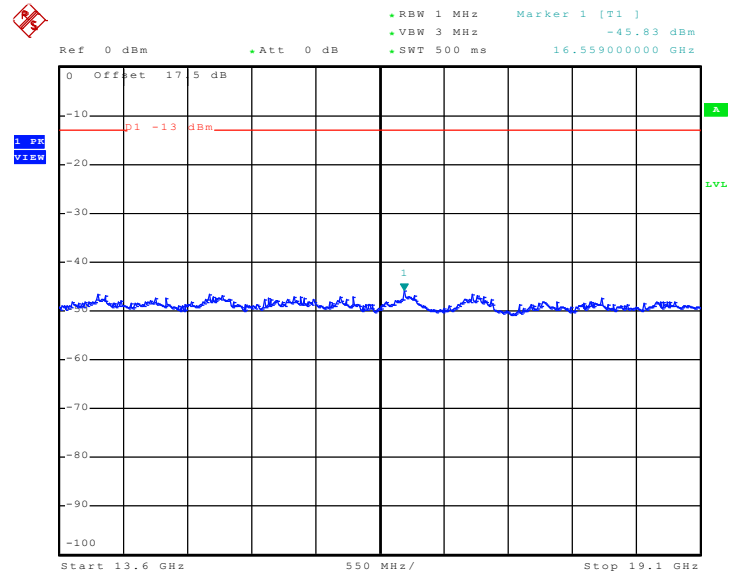
Conducted Emission Plot between 7GHz ~ 13.6GHz



Date: 6.AUG.2009 04:21:33



Conducted Emission Plot between 13.6GHz ~ 19.1GHz



Date: 6.AUG.2009 04:23:07



### 3.6 Field Strength of Spurious Radiation Measurement

#### 3.6.1 Description of Field Strength of Spurious Radiated Measurement

The radiated spurious emission was measured by substitution method according to ANSI / TIA / EIA-603-C-2004. 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.

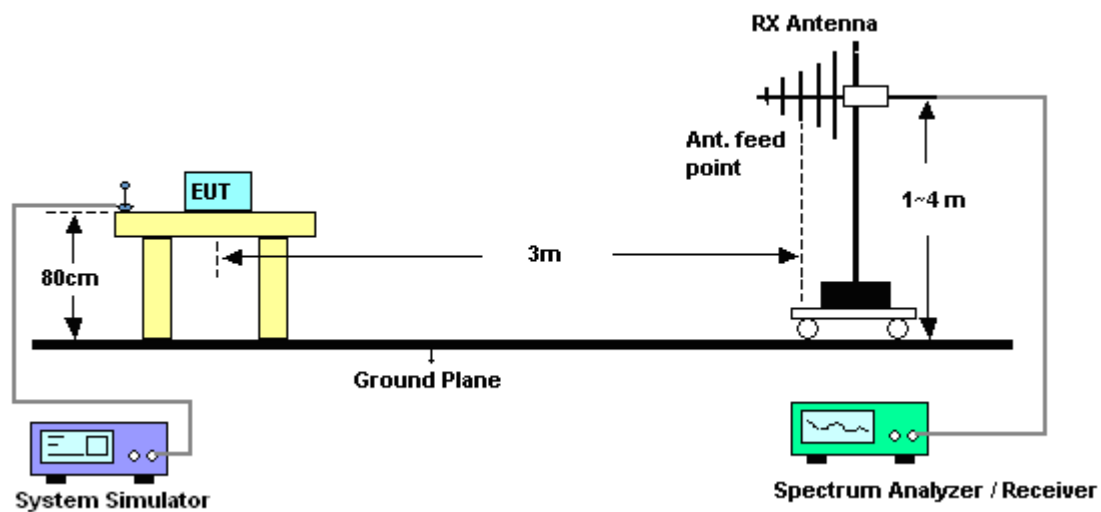
#### 3.6.2 Measuring Instruments

See list of measuring instruments of this test report.

#### 3.6.3 Test Procedures

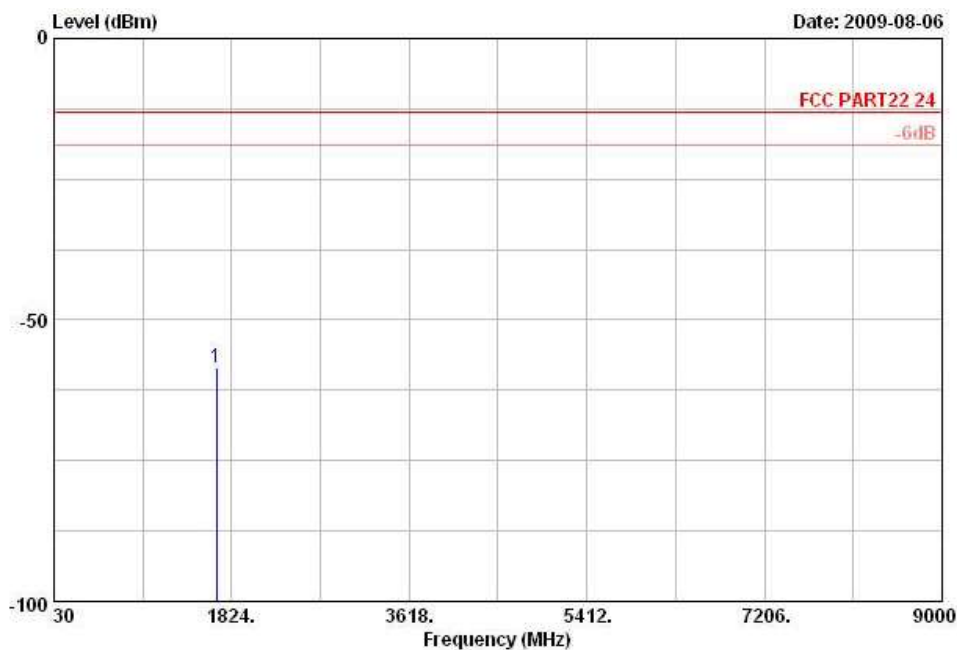
1. The EUT was placed on a rotatable wooden table with 0.8 meter about ground.
2. The EUT was set 3 meters from the receiving antenna, which was mounted on the antenna tower.
3. The table was rotated 360 degrees to determine the position of the highest spurious emission.
4. The height of the receiving antenna is varied between one meter and four meters to search the maximum spurious emission for both horizontal and vertical polarizations.
5. 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.  $EIRP \text{ (dBm)} = S.G. \text{ Power} - Tx \text{ Cable Loss} + Tx \text{ Antenna Gain}$
11.  $ERP \text{ (dBm)} = EIRP - 2.15$

### 3.6.4 Test Setup



**3.6.5 Test Result of Field Strength of Spurious Radiated**

<b>Band :</b>	GSM850	<b>Temperature :</b>	23~26°C
<b>Test Mode :</b>	GPRS 8 Link	<b>Relative Humidity :</b>	45~48%
<b>Test Engineer :</b>	Harvey Tang	<b>Polarization :</b>	Horizontal
<b>Remark :</b>	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.		



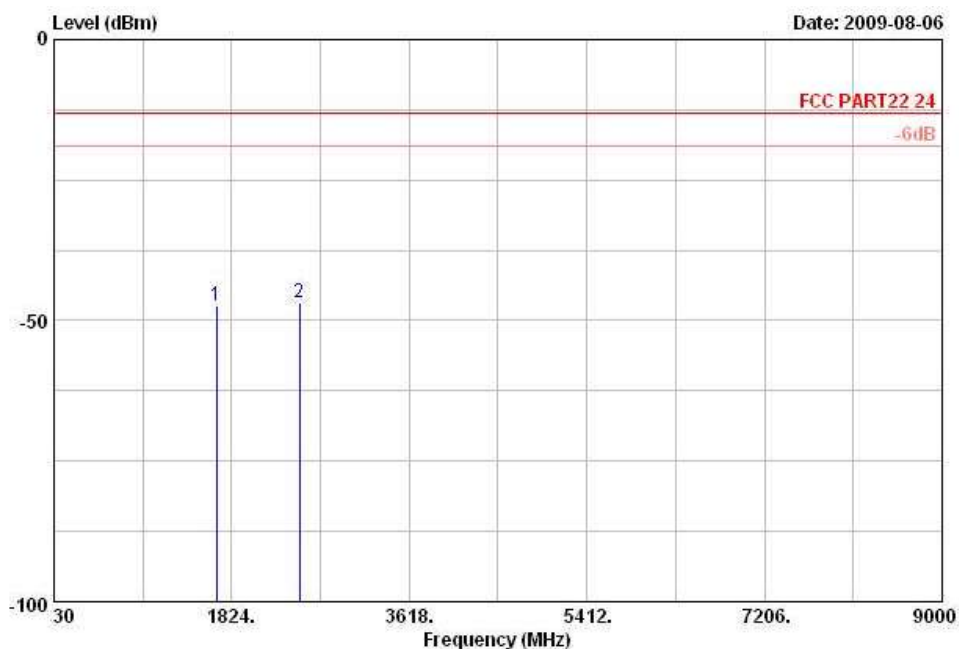
Site : 03CH01-KS

Condition: FCC PART22 24 HF EIRP FACTOR-09020 HORIZONTAL

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
1674	-58.43	-13	-45.43	-66.23	-61.64	0.69	6.05	H	Pass



<b>Band :</b>	GSM850	<b>Temperature :</b>	23~26°C
<b>Test Mode :</b>	GPRS 8 Link	<b>Relative Humidity :</b>	45~48%
<b>Test Engineer :</b>	Harvey Tang	<b>Polarization :</b>	Vertical
<b>Remark :</b>	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.		

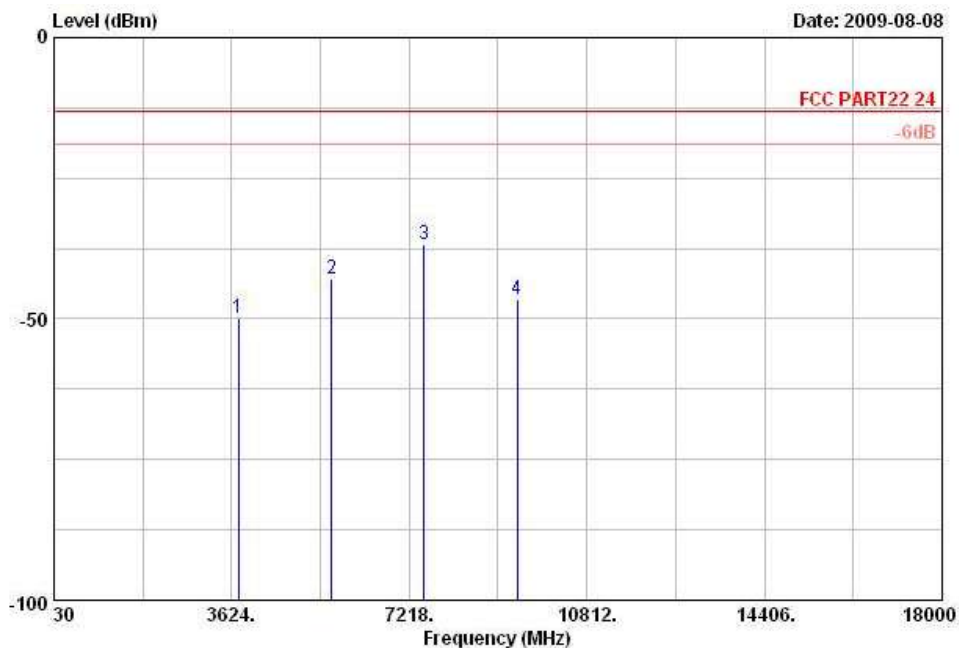


Site : 03CH01-KS  
Condition: FCC PART22 24 HF EIRP FACTOR-09020 VERTICAL

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	-47.48	-13	-34.48	-55.28	-50.69	0.69	6.05	V	Pass
2510	-46.68	-13	-33.68	-55.09	-49.48	0.82	5.77	V	Pass



<b>Band :</b>	GSM1900	<b>Temperature :</b>	23~26°C
<b>Test Mode :</b>	GPRS 8 Link	<b>Relative Humidity :</b>	45~48%
<b>Test Engineer :</b>	Harvey Tang	<b>Polarization :</b>	Horizontal
<b>Remark :</b>	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.		

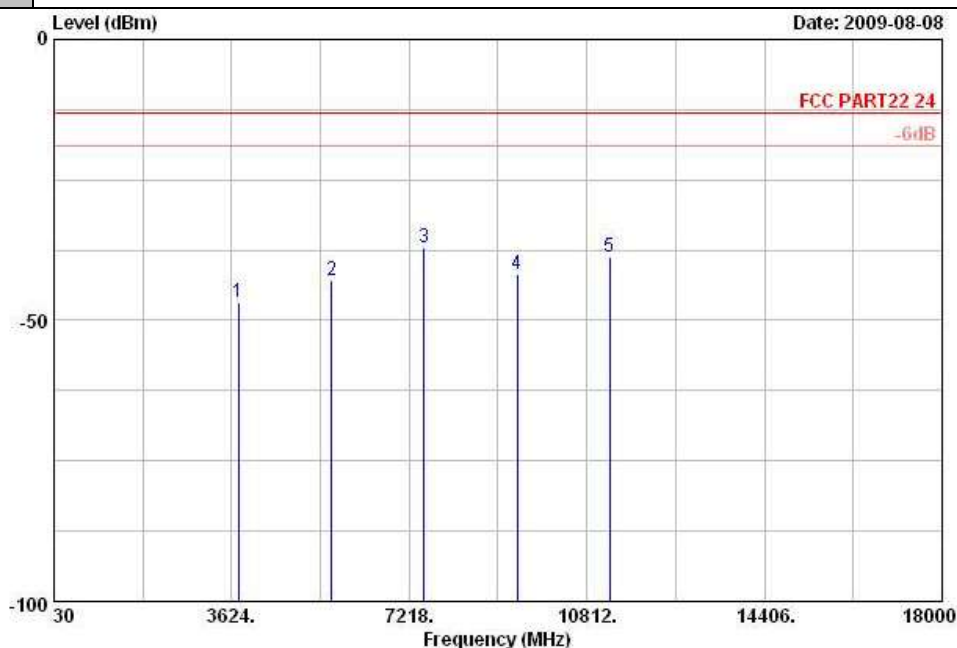


Site : 03CH01-KS  
 Condition: FCC PART22 24 HF EIRP FACTOR-09020 HORIZONTAL  
 Project : FG 980301  
 Power : 3.6Wdc  
 Mode : Mode 1

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
3762	-49.74	-13	-36.74	-63.45	-57.67	0.11	8.04	H	Pass
5640	-42.91	-13	-29.91	-57.23	-51.69	1.22	10.00	H	Pass
7520	-36.80	-13	-23.80	-54.90	-47.60	1.31	12.11	H	Pass
9400	-46.38	-13	-33.38	-65.95	-57.79	1.55	12.96	H	Pass



<b>Band :</b>	GSM1900	<b>Temperature :</b>	23~26°C
<b>Test Mode :</b>	GPRS 8 Link	<b>Relative Humidity :</b>	45~48%
<b>Test Engineer :</b>	Harvey Tang	<b>Polarization :</b>	Vertical
<b>Remark :</b>	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.		



Site : 03CH01-KS  
 Condition: FCC PART22 24 HF EIRP FACTOR-09020 VERTICAL  
 Project : FG 980301  
 Power : 3.6Vdc  
 Mode : Mode 1

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	-46.85	-13	-33.85	-60.56	-54.78	0.11	8.04	V	Pass
5640	-42.8	-13	-29.80	-57.21	-51.58	1.22	10.00	V	Pass
7520	-37.08	-13	-24.08	-55.18	-47.88	1.31	12.11	V	Pass
9400	-41.65	-13	-28.65	-61.22	-53.06	1.55	12.96	V	Pass
11279	-38.72	-13	-25.72	-59.66	-49.57	2.09	12.94	V	Pass

### 3.7 Frequency Stability Measurement

#### 3.7.1 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  $\pm 0.00025\%$  ( $\pm 2.5\text{ppm}$ ) of the center frequency.

#### 3.7.2 Measuring Instruments

See list of measuring instruments of this test report.

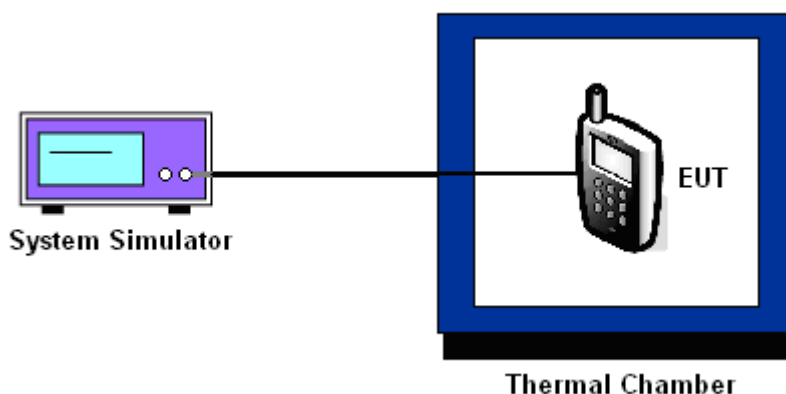
#### 3.7.3 Test Procedures for Temperature Variation

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  $-30^{\circ}\text{C}$  and the EUT was stabilized for three hours. Power was applied and the maximum change in frequency was recorded within one minute.
3. With power OFF, the temperature was raised in  $10^{\circ}\text{C}$  step up to  $50^{\circ}\text{C}$ . 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 can not be turned on at  $-30^{\circ}\text{C}$ , the testing lowest temperature will be raised in  $10^{\circ}\text{C}$  step until the EUT can be turned on.

#### 3.7.4 Test Procedures for Voltage Variation

1. The EUT was placed in a temperature chamber at  $25\pm 5^{\circ}\text{C}$  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.

#### 3.7.5 Test Setup



**3.7.6 Test Result of Temperature Variation**

<b>Band :</b>	GSM 850	<b>Channel :</b>	189
<b>Limit (ppm) :</b>	2.5		

Temperature (°C)	GPRS 8		Result
	Freq. Dev. (Hz)	Deviation (ppm)	
-30	34	0.04	PASS
-20	24	0.03	
-10	22	0.03	
0	19	0.02	
10	45	0.05	
20	44	0.05	
30	30	0.04	
40	22	0.03	
50	34	0.04	

<b>Band :</b>	GSM 1900	<b>Channel :</b>	661
<b>Limit (ppm) :</b>	2.5		

Temperature (°C)	GPRS 8		Result
	Freq. Dev. (Hz)	Deviation (ppm)	
-30	-25	-0.01	PASS
-20	24	0.01	
-10	65	0.03	
0	78	0.04	
10	102	0.05	
20	115	0.06	
30	58	0.03	
40	19	0.01	
50	-25	-0.01	



**3.7.7 Test Result of Voltage Variation**

Band & Channel	Mode	Voltage (Volt)	Freq. Dev. (Hz)	Deviation (ppm)	Limit (ppm)	Result
GSM 850 CH189	GPRS 8	3.6	-25	-0.03	2.5	PASS
		3.2	20	0.02		
		4.8	22	0.03		
GSM 1900 CH661	GPRS 8	3.6	-25	-0.01		
		3.2	26	0.01		
		4.8	24	0.01		

**Note:** Normal Voltage = 3.6V.

## 4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Due Date	Remark
Spectrum Analyzer	R&S	FSP40	100319	9kHz~40GHz	Dec. 08, 2008	Dec. 07, 2009	Conducted (TH01-KS)
System Simulator	R&S	CMU200	837587/066	Full-Band/BT	Jan. 08, 2009	Jan. 07, 2011	Conducted (TH02-HY)
Thermal Chamber	Ten Billion	TTC-B3S	TBN-930701	N/A	Dec. 15, 2008	Dec. 14, 2009	Conducted (TH01-KS)
Spectrum Analyzer	R&S	ESCI	100534	9kHz – 2.75GHz	Dec. 08, 2008	Dec. 07, 2009	Radiation (03CH01-KS)
Spectrum Analyzer	R&S	FSP40	100319	9kHz~40GHz	Dec. 08, 2008	Dec. 07, 2009	Radiation (03CH01-KS)
Bilog Antenna	SCHAFFNER	CBL6112D	23182	25MHz~2GHz	Dec. 17, 2008	Dec. 16, 2009	Radiation (03CH01-KS)
Double Ridge Horn Antenna	EMCO	3117	75959	1GHz~18GHz	Dec. 17, 2008	Dec. 16, 2009	Radiation (03CH01-KS)
Amplifier	Wireless	FPA6592G	600006	30MHz~2GHz	Dec. 17, 2008	Dec. 16, 2009	Radiation (03CH01-KS)
Amplifier	Agilent	8449B	3008A02370	1GHz~26.5GHz	Dec. 17, 2008	Dec. 16, 2009	Radiation (03CH01-KS)
Signal Generator	R&S	SMR40	100455	10MHz~40GHz	Aug. 29, 2007	Aug. 28, 2009	Radiation (03CH01-KS)
System Simulator	R&S	CMU200	837587/066	Full-Band/BT	Jan. 08, 2009	Jan. 07, 2011	Radiation (03CH01-KS)

## 5 Uncertainty of Evaluation

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

Contribution	Uncertainty of $x_i$		$u(x_i)$
	dB	Probability Distribution	
Receiver reading	0.41	Normal(k=2)	0.21
Antenna factor calibration	0.83	Normal(k=2)	0.42
Cable loss calibration	0.25	Normal(k=2)	0.13
Pre Amplifier Gain calibration	0.27	Normal(k=2)	0.14
RCV/SPA specification	2.50	Rectangular	0.72
Antenna Factor Interpolation for Frequency	1.00	Rectangular	0.29
Site imperfection	1.43	Rectangular	0.83
Mismatch	+0.39/-0.41	U-shaped	0.28
<b>Combined standard uncertainty Uc(y)</b>	<b>1.27</b>		
<b>Measuring uncertainty for a level of confidence of 95% U=2Uc(y)</b>	<b>2.54</b>		

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

Contribution	Uncertainty of $x_i$		$u(x_i)$	$C_i$	$C_i * u(x_i)$
	dB	Probability Distribution			
Receiver reading	±0.10	Normal(k=1)	0.10	1	0.10
Antenna factor calibration	±1.70	Normal(k=2)	0.85	1	0.85
Cable loss calibration	±0.50	Normal(k=2)	0.25	1	0.25
Receiver Correction	±2.00	Rectangular	1.15	1	1.15
Antenna Factor Directional	±1.50	Rectangular	0.87	1	0.87
Site imperfection	±2.80	Triangular	1.14	1	1.14
Mismatch Receiver VSWR $\Gamma_1 = 0.197$ Antenna VSWR $\Gamma_2 = 0.194$ Uncertainty = $20 \log(1 - \Gamma_1 * \Gamma_2)$	+0.34/-0.35	U-shaped	0.244	1	0.244
<b>Combined standard uncertainty Uc(y)</b>	<b>2.36</b>				
<b>Measuring uncertainty for a level of confidence of 95% U=2Uc(y)</b>	<b>4.72</b>				

## 6 Certification of TAF Accreditation

  
Certificate No. : L1190-090417  
**財團法人全國認證基金會**  
**Taiwan Accreditation Foundation**

### Certificate of Accreditation

This is to certify that

**Sporton International Inc.**  
**EMC & Wireless Communications Laboratory**  
No.52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien,  
Taiwan, R.O.C.

**is accredited in respect of laboratory**

<b>Accreditation Criteria</b>	: ISO/IEC 17025:2005
<b>Accreditation Number</b>	: 1190
<b>Originally Accredited</b>	: December 15, 2003
<b>Effective Period</b>	: January 10, 2007 to January 09, 2010
<b>Accredited Scope</b>	: Testing Field, see described in the Appendix
<b>Specific Accreditation Program</b>	: Accreditation Program for Designated Testing Laboratory for Commodities Inspection Accreditation Program for Telecommunication Equipment Testing Laboratory Accreditation Program for BSMI Mutual Recognition Arrangement with Foreign Authorities

  
Jay-San Chen  
President, Taiwan Accreditation Foundation  
Date : April 17, 2009

P1, total 20 pages

The Appendix forms an integral part of this Certificate, which shall be invalid when use without the Appendix



## **Appendix A. Photographs of EUT**

Please refer to Sporton report number EP980420 as below.