



# FCC RF Test Report

**APPLICANT** : HTC Corporation  
**EQUIPMENT** : Smartphone  
**MODEL NAME** : 0P3Z112  
**FCC ID** : NM80P3Z112  
**STANDARD** : FCC 47 CFR Part 2, 24(E)  
**CLASSIFICATION** : PCS Licensed Transmitter Held to Ear (PCE)

The product was received on Jul. 11, 2013 and completely tested on Jul. 30, 2013. We, SPORTON INTERNATIONAL 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 INC., the test report shall not be reproduced except in full.

Reviewed by: Joseph Lin / Supervisor

Approved by: Jones Tsai / Manager



## **SPORTON INTERNATIONAL INC.**

No. 52, Hwa Ya 1<sup>st</sup> Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C.



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### SUMMARY OF TEST RESULT

Report Section	FCC Rule	IC Rule	Description	Limit	Result	Remark
3.1	§2.1046	RSS-133 (6.4)	Conducted Output Power	N/A	PASS	-
3.2	§24.232(d)	RSS-133(6.4)	Peak-to-Average Ratio	< 13 dB	PASS	-
3.3	§24.232(c)	RSS-133 (6.4) SRSP-510(5.1.2)	Equivalent Isotropic Radiated Power	< 2 Watts	PASS	-
3.4	§2.1049 §24.238(b)	RSS-GEN(4.6.1) RSS-133(2.3)	Occupied Bandwidth	N/A	PASS	-
3.5	§2.1051 §24.238(a)	RSS-133 (6.5)	Band Edge Measurement	< 43+10log <sub>10</sub> (P[Watts])	PASS	-
3.6	§2.1051 §24.238(a)	RSS-133 (6.5)	Conducted Spurious Emission	< 43+10log <sub>10</sub> (P[Watts])	PASS	-
3.7	§2.1053 §24.238(a)	RSS-133 (6.5)	Field Strength of Spurious Radiation	< 43+10log <sub>10</sub> (P[Watts])	PASS	Under limit 5.22 dB at 11280.000 MHz
3.8	§2.1055 §24.235	RSS-133(6.3)	Frequency Stability for Temperature & Voltage	< 2.5 ppm	PASS	-



# 1 General Description

## 1.1 Applicant

HTC Corporation

No. 23, Xinghua Rd., Taoyuan City, Taoyuan County 330, Taiwan.

## 1.2 Manufacturer

HTC Corporation

No. 23, Xinghua Rd., Taoyuan City, Taoyuan County 330, Taiwan.

## 1.3 Feature of Equipment Under Test

Product Feature	
Equipment	Smartphone
Model Name	0P3Z112
FCC ID	NM80P3Z112
Sample 1	EUT with LCM 1, Camera Front, and Camera Back 1
Sample 2	EUT with LCM 2, Camera Front, and Camera Back 2
EUT supports Radios application	GSM/EGPRS/WCDMA/HSPA WLAN 11bgn / Bluetooth 2.1/3.0/4.0-LE
HW Version	EVT
SW Version	0.97.10000.1
EUT Stage	Identical Prototype

**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	1850.2 MHz ~ 1909.8MHz
Rx Frequency	1930.2 MHz ~ 1989.8 MHz
Maximum Output Power to Antenna	29.59 dBm
Antenna Type	PIFA Antenna
Type of Modulation	GSM: GMSK GPRS: GMSK EDGE: GMSK / 8PSK

## 1.5 Modification of EUT

No modifications are made to the EUT during all test items.

## 1.6 Maximum EIRP Power, Frequency Tolerance, and Emission Designator

FCC Rule	System	Type of Modulation	Maximum EIRP (W)	Frequency Tolerance (% , Hz, ppm)	Emission Designator
Part 24	GSM1900 GPRS class 8	GMSK	1.2445	0.04 ppm	250KGXW
Part 24	GSM1900 EDGE class 8	8PSK	0.3133	0.04 ppm	246KG7W

## 1.7 Testing Site

<b>Test Site</b>	SPORTON INTERNATIONAL INC.		
<b>Test Site Location</b>	No. 52, Hwa Ya 1 <sup>st</sup> Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C. TEL: +886-3-327-3456 FAX: +886-3-328-4978		
<b>Test Site No.</b>	<b>Sporton Site No.</b>		<b>FCC/IC Registration No.</b>
	TH02-HY	03CH06-HY	722060/4086B-1

## 1.8 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, 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.

Frequency range investigated for radiated emission is as follows:

1. 30 MHz to 19000 MHz for GSM1900.

Test Modes		
Band	Radiated TCs	Conducted TCs
GSM 1900	<ul style="list-style-type: none"> <li>■ GPRS class 8 Link for Sample 1</li> <li>■ EDGE class 8 Link for Sample 1</li> <li>■ GPRS class 8 Link for Sample 2</li> </ul>	<ul style="list-style-type: none"> <li>■ GPRS class 8 Link</li> <li>■ EDGE class 8 Link</li> </ul>

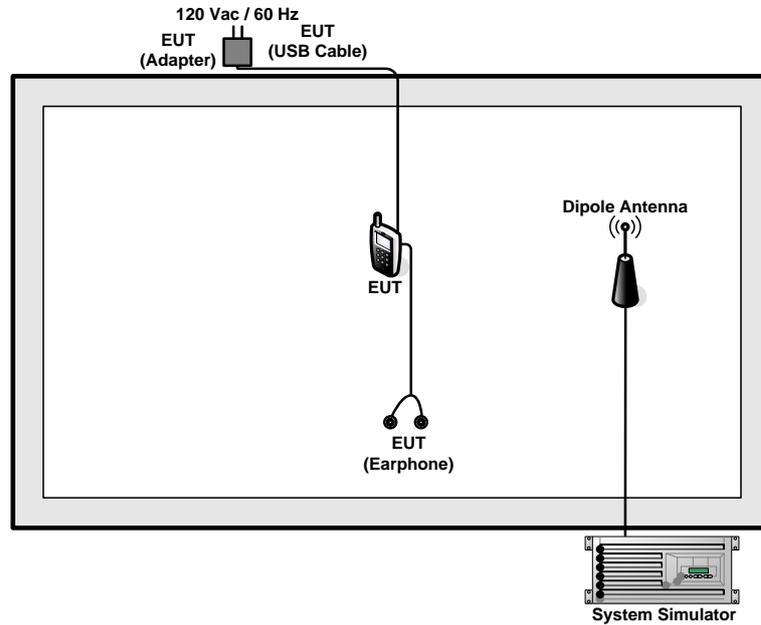
**Note:**

1. The maximum power levels are GPRS multi-slot class 8 mode for GMSK link and EDGE multi-slot class 8 mode for 8PSK link, only these modes were used for all tests.
2. Because there are individual antennas for each WWAN, WLAN, and Bluetooth, the co-location test modes are not required.

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	29.58	29.13	29.27
GPRS class 8	29.59	29.26	29.14
GPRS class 10	27.92	27.58	27.47
GPRS class 11	27.65	27.30	27.18
GPRS class 12	26.63	26.30	26.20
EGPRS class 8	25.48	25.16	25.02
EGPRS class 10	24.45	24.14	24.01
EGPRS class 11	23.44	23.12	22.98
EGPRS class 12	22.41	22.11	21.98

## 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	R&S	CMU 200	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.

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.

Example :

$$\begin{aligned} \text{Offset}(dB) &= \text{RF cable loss}(dB) + \text{attenuator factor}(dB). \\ &= 4.2 + 10 = 14.2 \text{ (dB)} \end{aligned}$$

### 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.

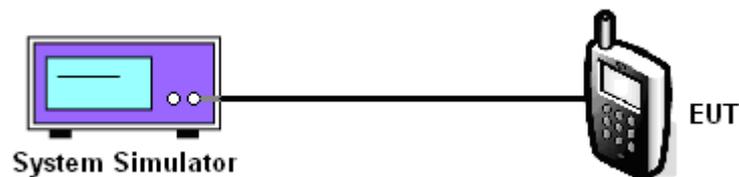
##### 3.1.2 Measuring Instruments

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.
4. 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 (GPRS class 8)			GSM1900 (EDGE class 8)		
Channel	512 (Low)	661 (Mid)	810 (High)	512 (Low)	661 (Mid)	810 (High)
Frequency (MHz)	1850.2	1880	1909.8	1850.2	1880	1909.8
Conducted Power (dBm)	29.59	29.26	29.14	25.48	25.16	25.02
Conducted Power (Watts)	0.91	0.84	0.82	0.35	0.33	0.32

Note: maximum burst average power for GPRS and EDGE.

## 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.

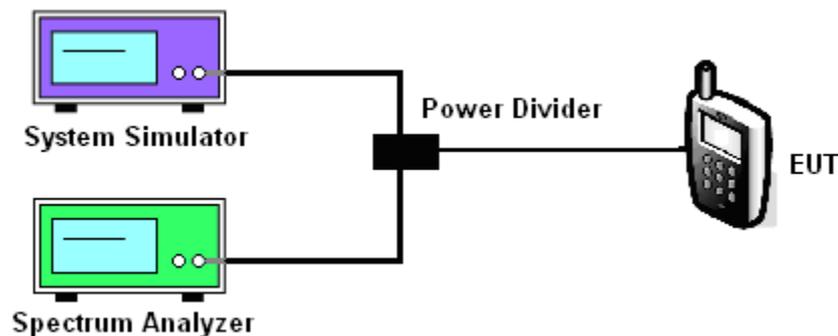
### 3.2.2 Measuring Instruments

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/EGPRS 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 UMTS 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





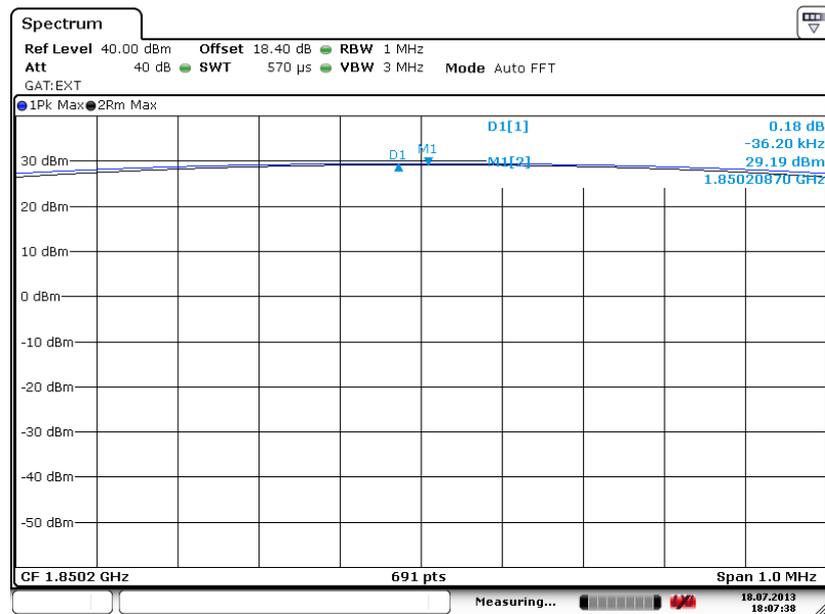
3.2.5 Test Result of Peak-to-Average Ratio

PCS Band						
Modes	GSM1900 (GPRS class 8)			GSM1900 (EDGE class 8)		
Channel	512 (Low)	661 (Mid)	810 (High)	512 (Low)	661 (Mid)	810 (High)
Frequency (MHz)	1850.2	1880	1909.8	1850.2	1880	1909.8
Peak-to-Average Ratio (dB)	0.18	0.19	0.20	2.75	2.72	2.56

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

Band :	GSM 1900	Test Mode :	GPRS class 8 Link (GMSK)
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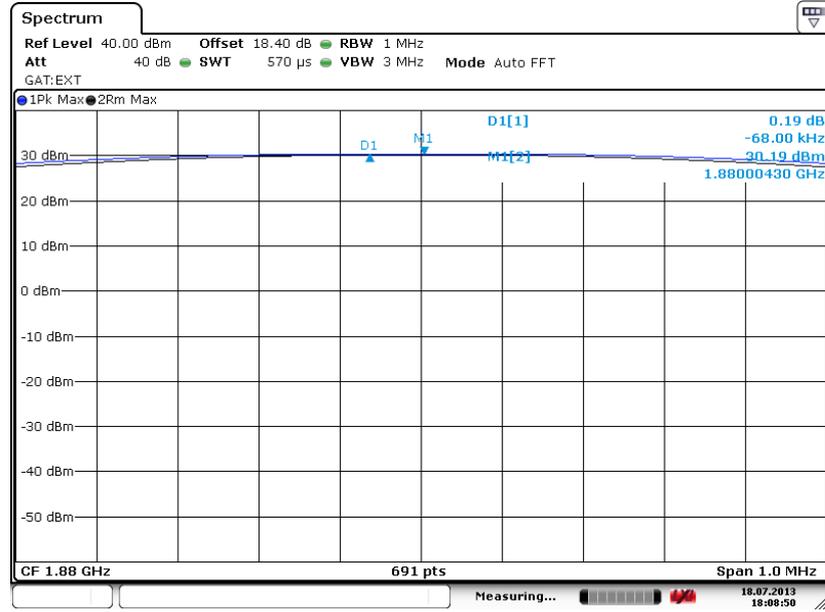
Peak-to-Average Ratio on Channel 512 (1850.2 MHz)



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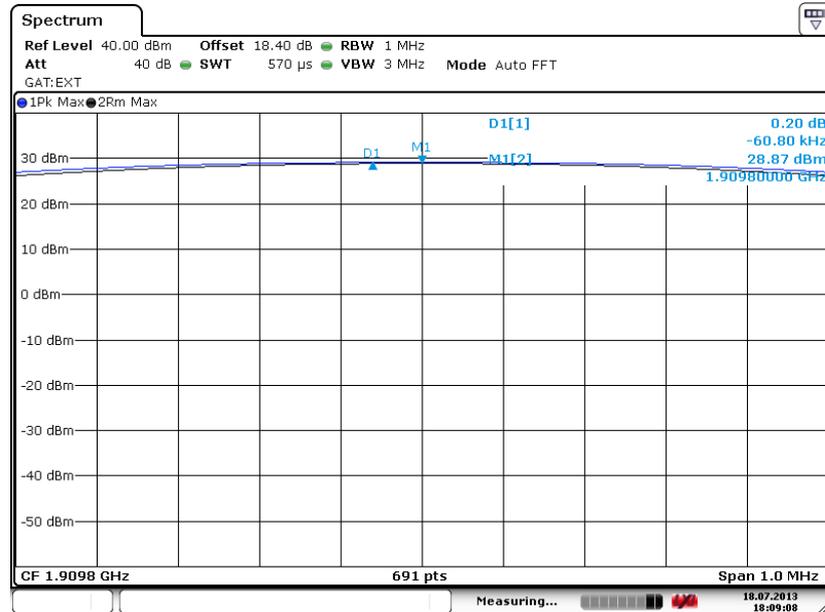


Peak-to-Average Ratio on Channel 661 (1880.0 MHz)



Date: 18.JUL.2013 18:08:50

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

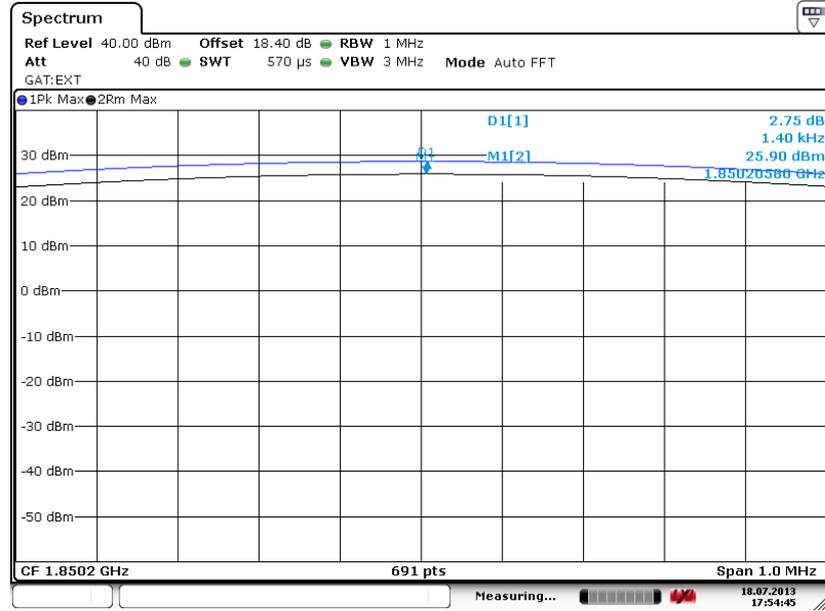


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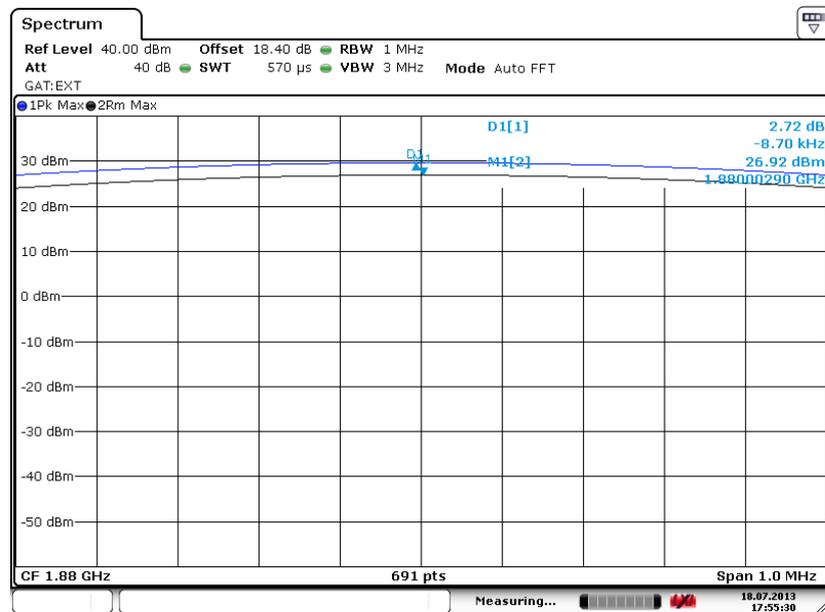
<b>Band :</b>	GSM 1900	<b>Test Mode :</b>	EDGE class 8 Link (8PSK)
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Peak-to-Average Ratio on Channel 512 (1850.2 MHz)



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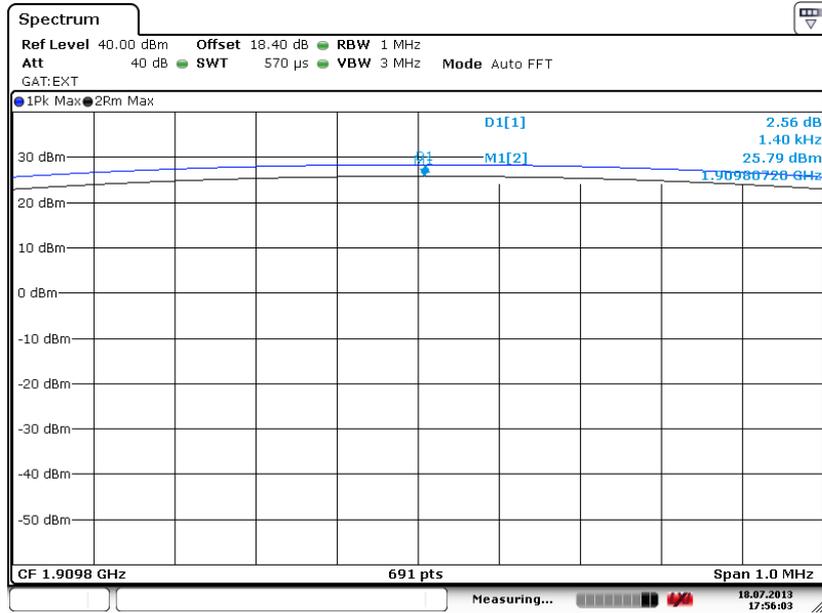
Peak-to-Average Ratio on Channel 661 (1880.0 MHz)



Date: 18.JUL.2013 17:55:31



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



Date: 18.JUL.2013 17:56:04



### 3.3 Effective Isotropic Radiated Power Measurement

#### 3.3.1 Description of the EIRP Measurement

The substitution method, in ANSI / TIA / EIA-603-C-2004, was used for EIRP measurement, and the spectrum analyzer configuration follows KDB 971168 D01 Power Meas. License Digital Systems v02. 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
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 EIRP.
6. Taking the record of maximum 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 EIRP of the substitution antenna.
10.  $EIRP = P_s + E_t - E_s + G_s = P_s + R_t - R_s + G_s$

$P_s$  (dBm) : Input power to substitution antenna.

$G_s$  (dBi or dBd) : Substitution antenna Gain.

$E_t = R_t + AF$

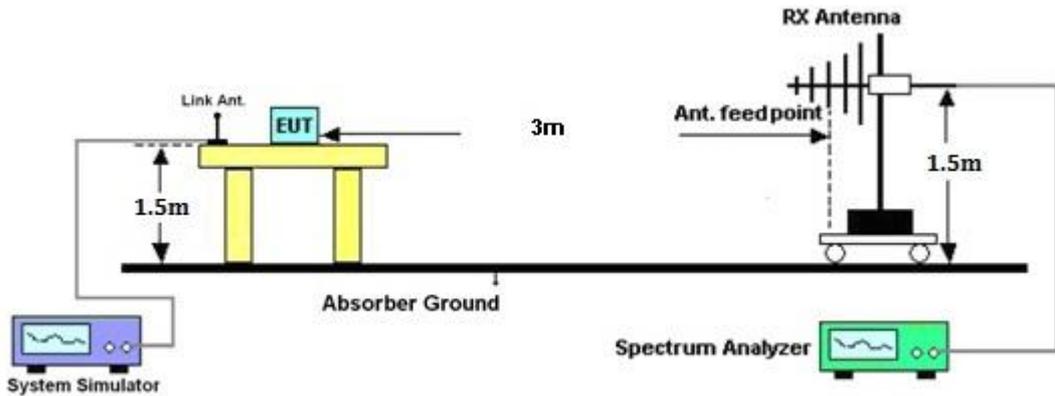
$E_s = R_s + AF$

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.

### 3.3.4 Test Setup



### 3.3.5 Test Result of EIRP

<Sample 1>

GSM1900 (GPRS class 8) Radiated Power EIRP						
Horizontal Polarization						
Frequency (MHz)	Rt (dBm)	Rs (dBm)	Ps (dBm)	Gs (dBi)	EIRP (dBm)	EIRP (W)
1850.20	-23.69	-51.88	0.00	1.96	30.15	1.0351
1880.00	-24.46	-52.99	0.00	2.00	30.53	1.1298
1909.80	-25.31	-54.28	0.00	1.98	30.95	1.2445
Vertical Polarization						
Frequency (MHz)	Rt (dBm)	Rs (dBm)	Ps (dBm)	Gs (dBi)	EIRP (dBm)	EIRP (W)
1850.20	-23.84	-52.13	0.00	1.96	30.25	1.0593
1880.00	-24.92	-53.17	0.00	2.00	30.25	1.0593
1909.80	-25.41	-54.13	0.00	1.98	30.70	1.1749



GSM1900 (EDGE class 8) Radiated Power EIRP						
Horizontal Polarization						
Frequency (MHz)	Rt (dBm)	Rs (dBm)	Ps (dBm)	Gs (dBi)	EIRP (dBm)	EIRP (W)
1850.20	-29.73	-51.88	0.00	1.96	24.11	0.2576
1880.00	-30.31	-52.99	0.00	2.00	24.68	0.2938
1909.80	-31.30	-54.28	0.00	1.98	24.96	0.3133
Vertical Polarization						
Frequency (MHz)	Rt (dBm)	Rs (dBm)	Ps (dBm)	Gs (dBi)	EIRP (dBm)	EIRP (W)
1850.20	-29.50	-52.13	0.00	1.96	24.59	0.2877
1880.00	-30.82	-53.17	0.00	2.00	24.35	0.2723
1909.80	-31.58	-54.13	0.00	1.98	24.53	0.2838

<Sample 2>

GSM1900 (GPRS class 8) Radiated Power EIRP						
Horizontal Polarization						
Frequency (MHz)	Rt (dBm)	Rs (dBm)	Ps (dBm)	Gs (dBi)	EIRP (dBm)	EIRP (W)
1850.20	-23.83	-51.88	0.00	1.96	30.01	1.0023
1880.00	-24.78	-52.99	0.00	2.00	30.21	1.0495
1909.80	-25.68	-54.28	0.00	1.98	30.58	1.1429
Vertical Polarization						
Frequency (MHz)	Rt (dBm)	Rs (dBm)	Ps (dBm)	Gs (dBi)	EIRP (dBm)	EIRP (W)
1850.20	-23.85	-52.13	0.00	1.96	30.24	1.0568
1880.00	-24.98	-53.17	0.00	2.00	30.19	1.0447
1909.80	-25.54	-54.13	0.00	1.98	30.57	1.1402



## **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.

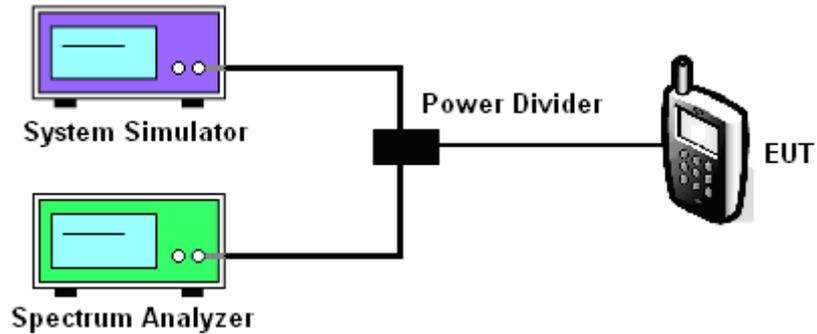
### **3.4.2 Measuring Instruments**

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.
4. 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 Occupied Bandwidth and 26dB Bandwidth

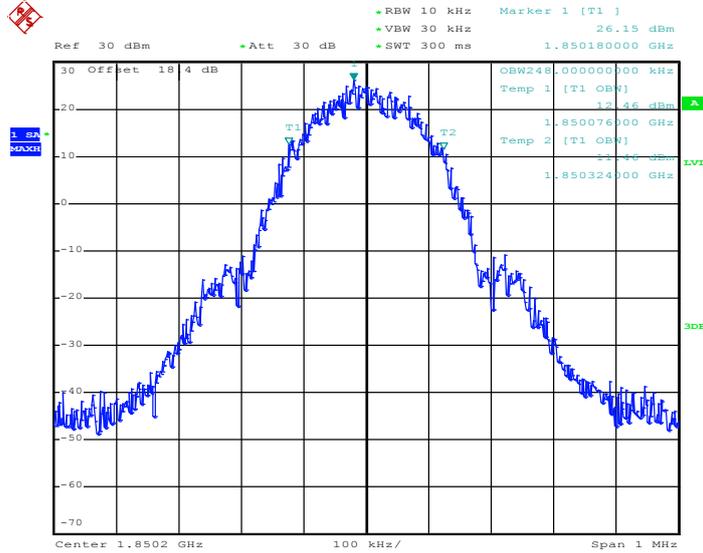
PCS Band						
Modes	GSM1900 (GPRS class 8)			GSM1900 (EDGE class 8)		
Channel	512 (Low)	661 (Mid)	810 (High)	512 (Low)	661 (Mid)	810 (High)
Frequency (MHz)	1850.2	1880	1909.8	1850.2	1880	1909.8
99% OBW (kHz)	248.00	246.00	250.00	244.00	244.00	246.00
26dB BW (kHz)	316.00	312.00	296.00	306.00	304.00	302.00



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

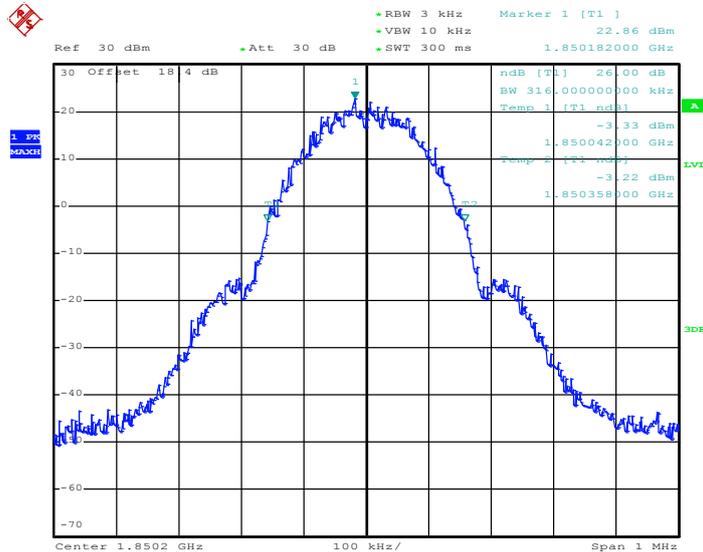
Band :	GSM 1900	Test Mode :	GPRS class 8 Link (GMSK)
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99% Occupied Bandwidth Plot on Channel 512 (1850.2 MHz)



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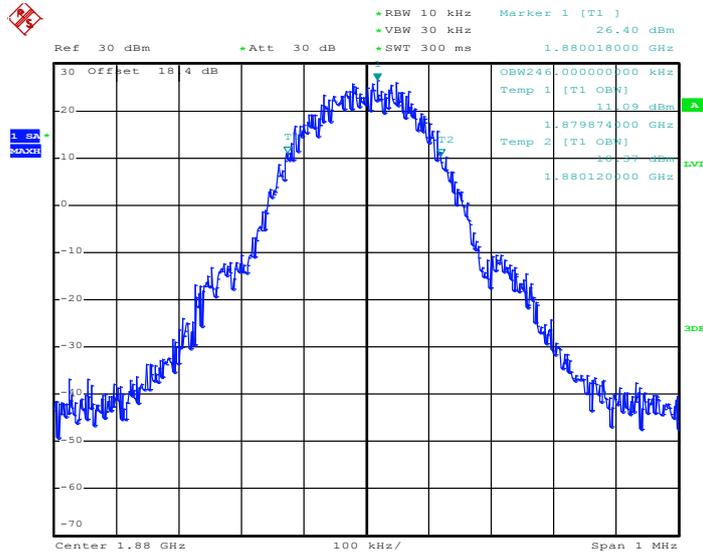
26dB Bandwidth Plot on Channel 512 (1850.2 MHz)



Date: 18.JUL.2013 15:38:56

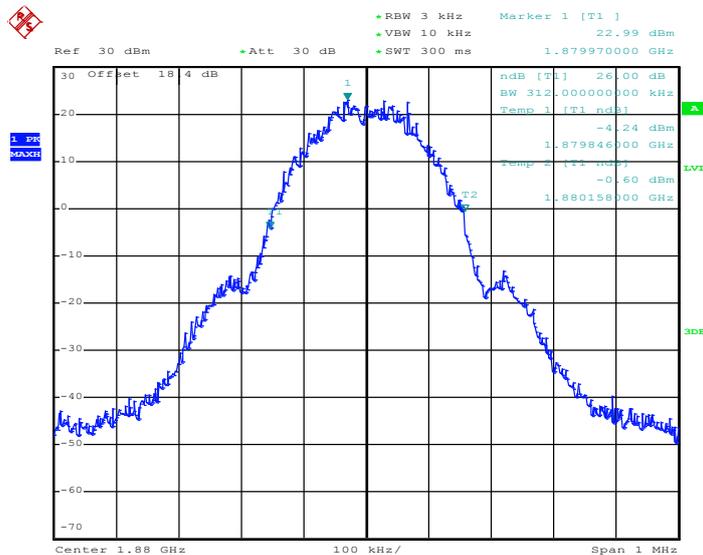


99% Occupied Bandwidth Plot on Channel 661 (1880.0 MHz)



Date: 18.JUL.2013 15:40:41

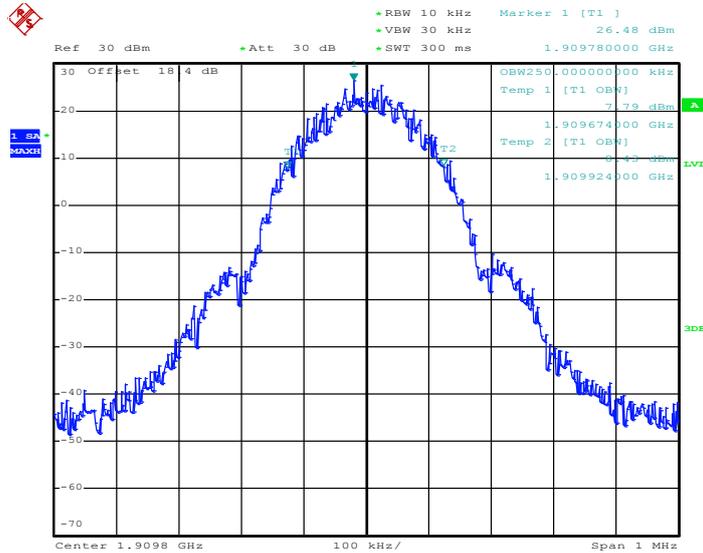
26dB Bandwidth Plot on Channel 661 (1880.0 MHz)



Date: 18.JUL.2013 15:39:22

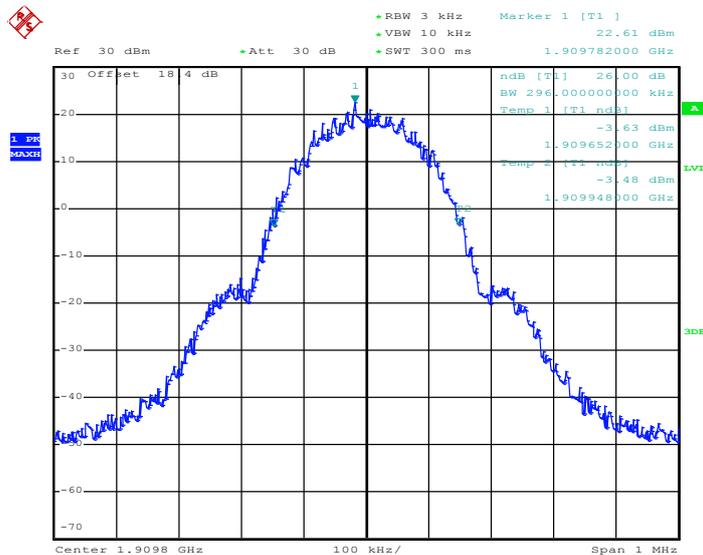


99% Occupied Bandwidth Plot on Channel 810 (1909.8 MHz)



Date: 18.JUL.2013 15:41:07

26dB Bandwidth Plot on Channel 810 (1909.8 MHz)

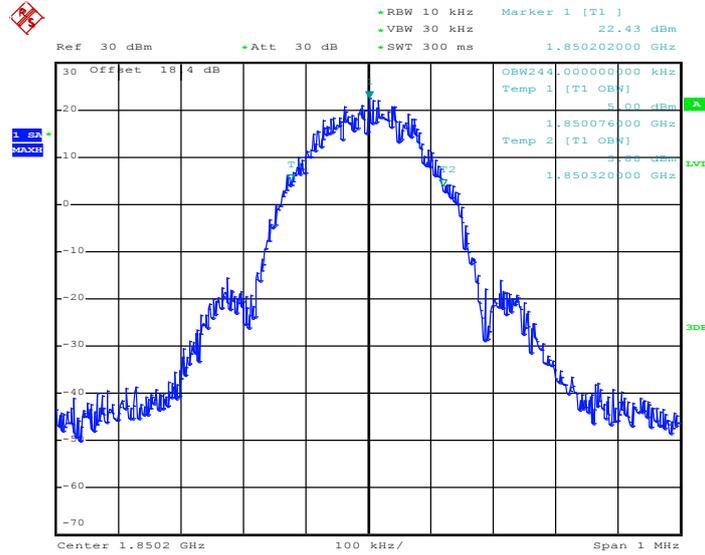


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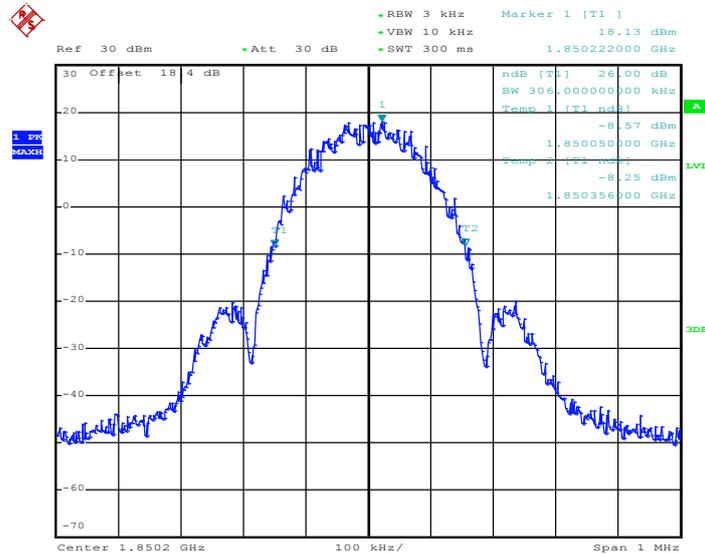
<b>Band :</b>	GSM 1900	<b>Test Mode :</b>	EDGE class 8 Link (8PSK)
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99% Occupied Bandwidth Plot on Channel 512 (1850.2 MHz)



Date: 18.JUL.2013 16:25:32

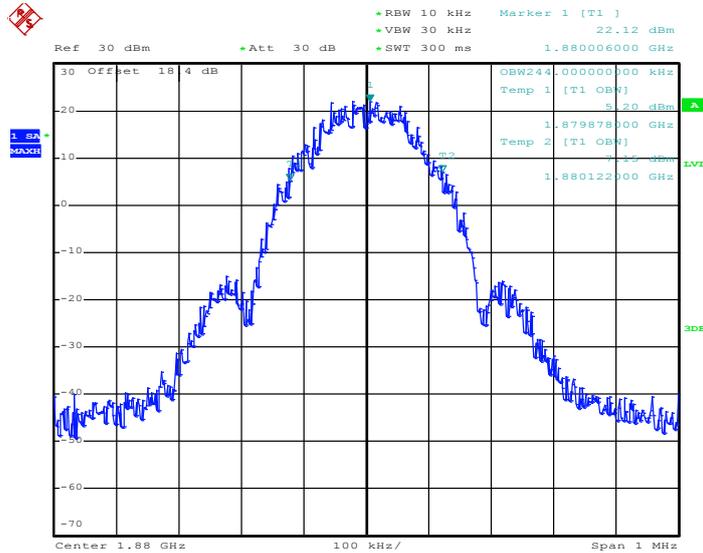
26dB Bandwidth Plot on Channel 512 (1850.2 MHz)



Date: 18.JUL.2013 16:20:03

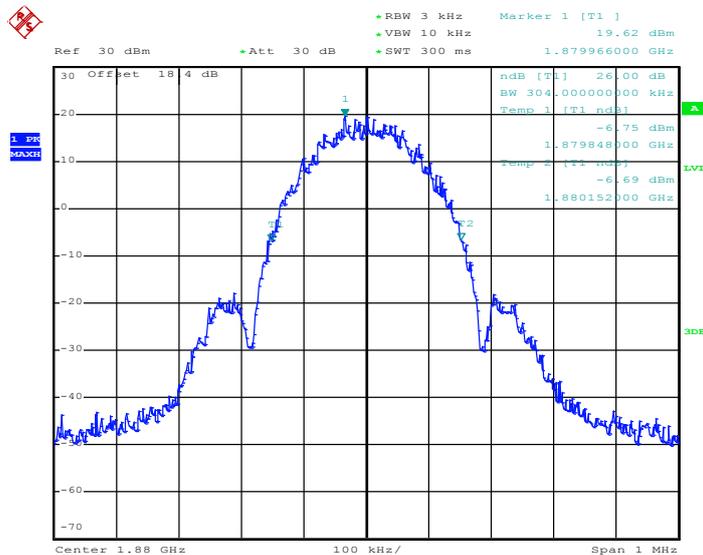


99% Occupied Bandwidth Plot on Channel 661 (1880.0 MHz)



Date: 18.JUL.2013 16:25:58

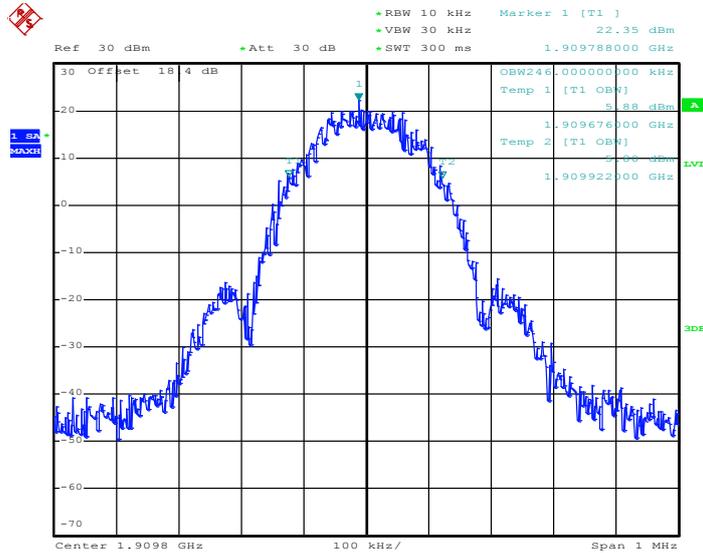
26dB Bandwidth Plot on Channel 661 (1880.0 MHz)



Date: 18.JUL.2013 16:20:30

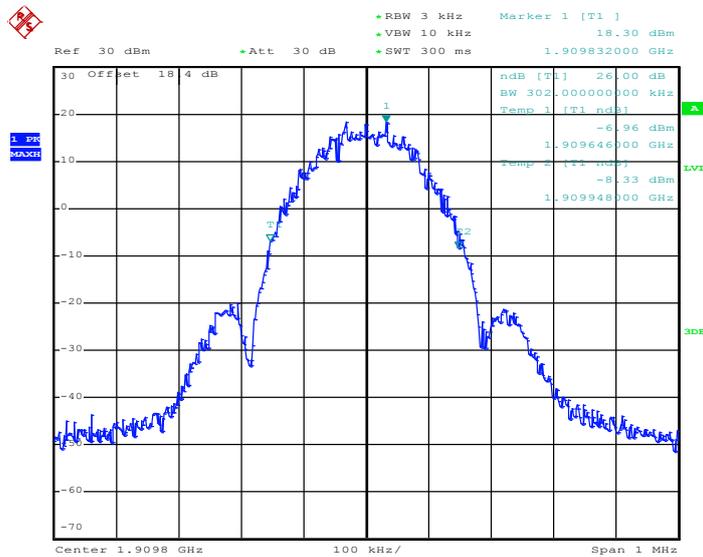


99% Occupied Bandwidth Plot on Channel 810 (1909.8 MHz)



Date: 18.JUL.2013 16:22:14

26dB Bandwidth Plot on Channel 810 (1909.8 MHz)



Date: 18.JUL.2013 16:20:56

### 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.

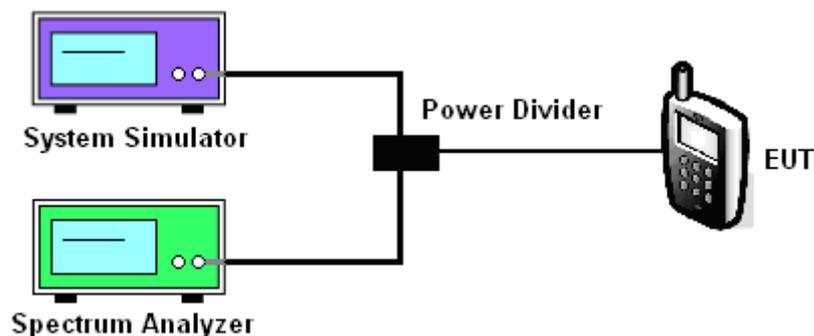
#### 3.5.3 Test Procedures

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. Setting RBW as roughly BW/100.
4. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
5. The limit line is derived from  $43 + 10\log(P)$  dB below the transmitter power P(Watts)
 
$$= P(W) - [43 + 10\log(P)] \text{ (dB)}$$

$$= [30 + 10\log(P)] \text{ (dBm)} - [43 + 10\log(P)] \text{ (dB)}$$

$$= -13\text{dBm}.$$

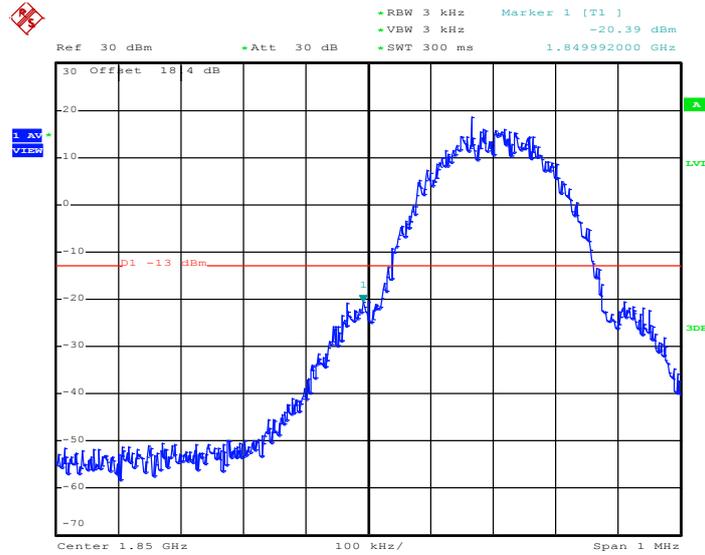
#### 3.5.4 Test Setup



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

Band :	GSM1900	Test Mode :	GPRS class 8 Link (GMSK)
Correction Factor :	0.23dB	Maximum 26dB Bandwidth :	0.316MHz
Band Edge :	-20.16dBm	Measurement Value :	-20.39dBm

Lower Band Edge Plot on Channel 512 (1850.2 MHz)



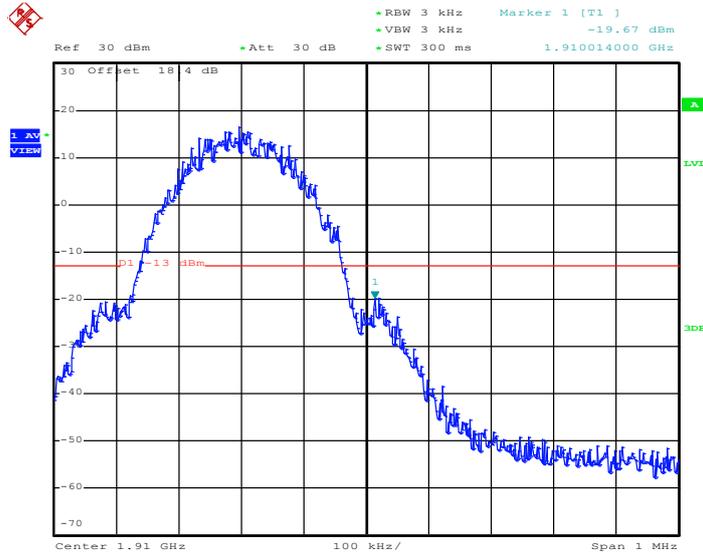
Date: 18.JUL.2013 15:41:34

1. Correction Factor(dB)=  $10\log(1\% \text{ Emission BW/RBW})$
  2. Band Edge= Measurement Value + Correction Factor(dB)
- For example,  $-20.39\text{dBm} + 0.23\text{dB} = -20.16\text{dBm}$



Band :	GSM1900	Test Mode :	GPRS class 8 Link (GMSK)
Correction Factor :	0.23dB	Maximum 26dB Bandwidth :	0.316MHz
Band Edge :	-19.44dBm	Measurement Value :	-19.67dBm

Higher Band Edge Plot on Channel 810 (1909.8 MHz)



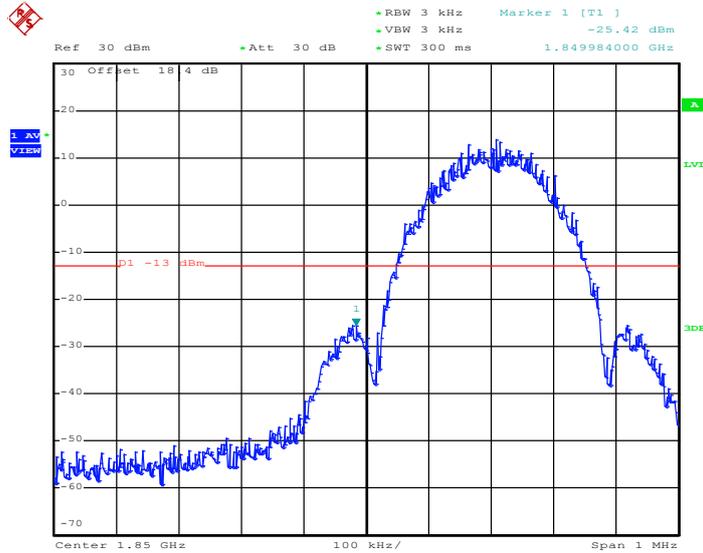
Date: 18.JUL.2013 15:42:00

1. Correction Factor(dB)=  $10\log(1\% \text{ Emission BW/RBW})$
2. Band Edge= Measurement Value + Correction Factor(dB)



Band :	GSM1900	Test Mode :	EDGE class 8 Link (8PSK)
Correction Factor :	0.09dB	Maximum 26dB Bandwidth :	0.306MHz
Band Edge :	-25.33dBm	Measurement Value :	-25.42dBm

Lower Band Edge Plot on Channel 512 (1850.2 MHz)



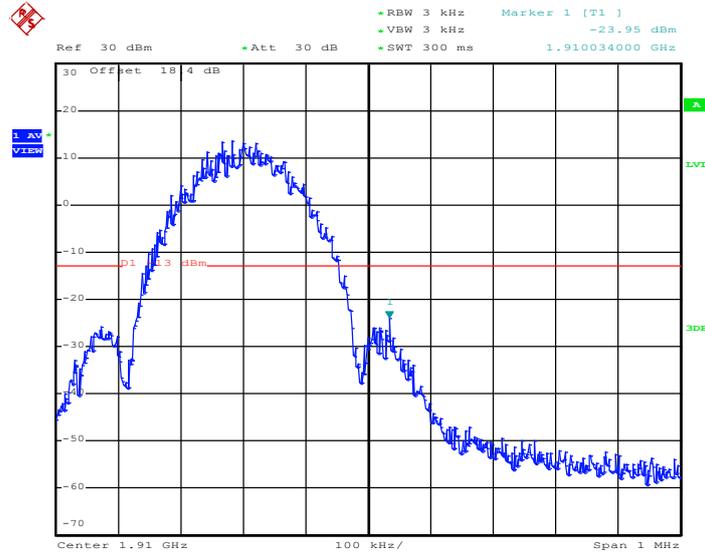
Date: 18.JUL.2013 16:22:41

1. Correction Factor(dB)=  $10\log(1\% \text{ Emission BW/RBW})$
2. Band Edge= Measurement Value + Correction Factor(dB)



Band :	GSM1900	Test Mode :	EDGE class 8 Link (8PSK)
Correction Factor :	0.09dB	Maximum 26dB Bandwidth :	0.306MHz
Band Edge :	-23.86dBm	Measurement Value :	-23.95dBm

Higher Band Edge Plot on Channel 810 (1909.8 MHz)



Date: 18.JUL.2013 16:23:07

1. Correction Factor(dB)=  $10\log(1\% \text{ Emission BW/RBW})$
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 10<sup>th</sup> harmonic.

#### 3.6.2 Measuring Instruments

See list of measuring instruments of this test report.

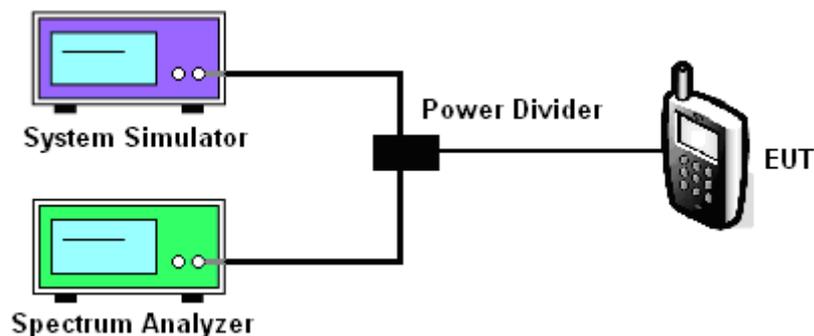
#### 3.6.3 Test Procedures

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  $43 + 10\log(P)$  dB below the transmitter power P(Watts)
 
$$= P(W) - [43 + 10\log(P)] \text{ (dB)}$$

$$= [30 + 10\log(P)] \text{ (dBm)} - [43 + 10\log(P)] \text{ (dB)}$$

$$= -13\text{dBm}$$

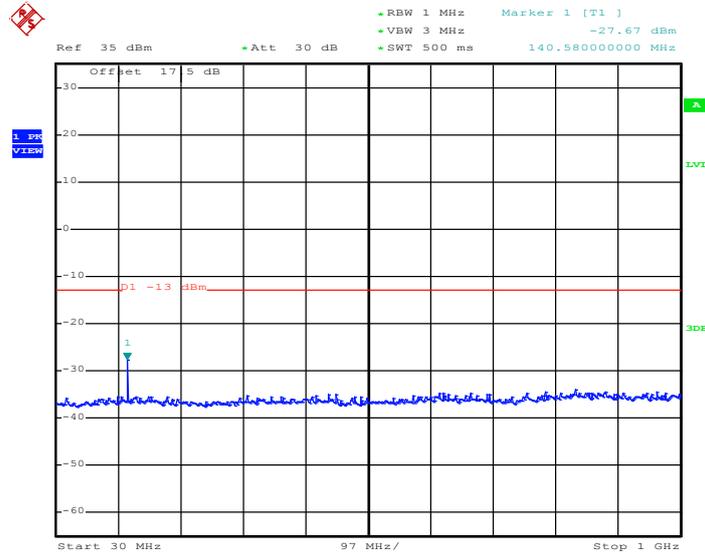
#### 3.6.4 Test Setup



### 3.6.5 Test Result (Plots) of Conducted Spurious Emission

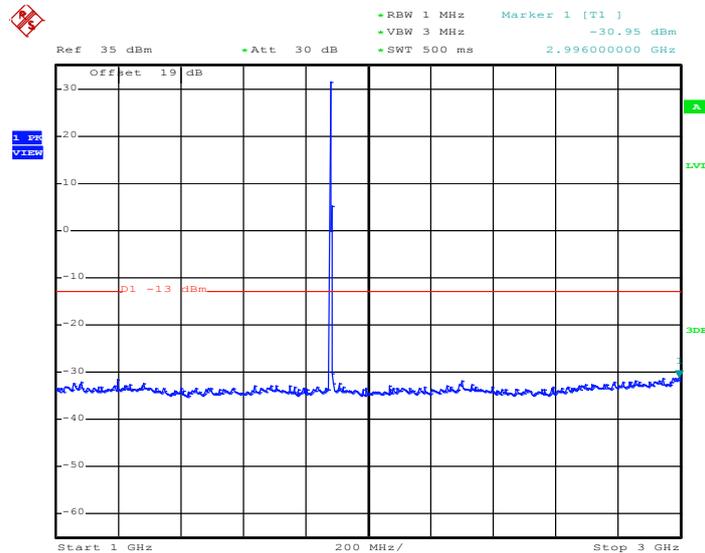
Band :	GSM1900	Channel :	CH661
Test Mode :	GPRS class 8 Link (GMSK)	Frequency :	1880.0 MHz

Conducted Spurious Emission Plot between 30MHz ~ 1GHz



Date: 18.JUL.2013 15:25:32

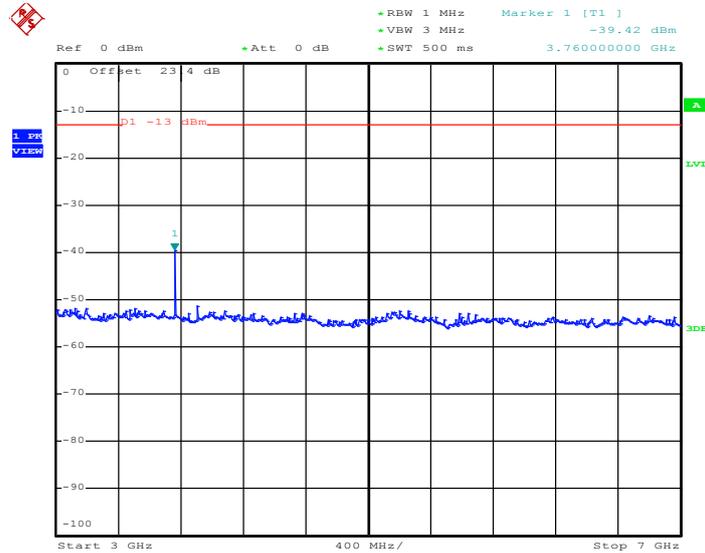
Conducted Spurious Emission Plot between 1GHz ~ 3GHz



Date: 18.JUL.2013 15:25:45

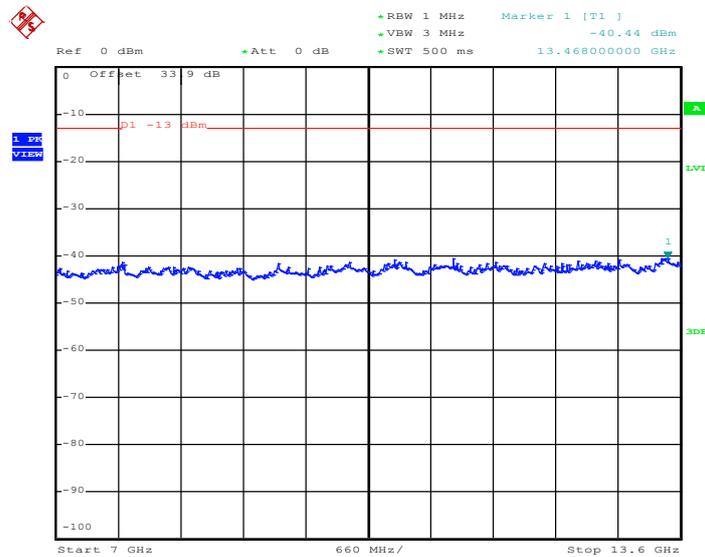


### Conducted Spurious Emission Plot between 3GHz ~ 7GHz



Date: 18.JUL.2013 15:26:02

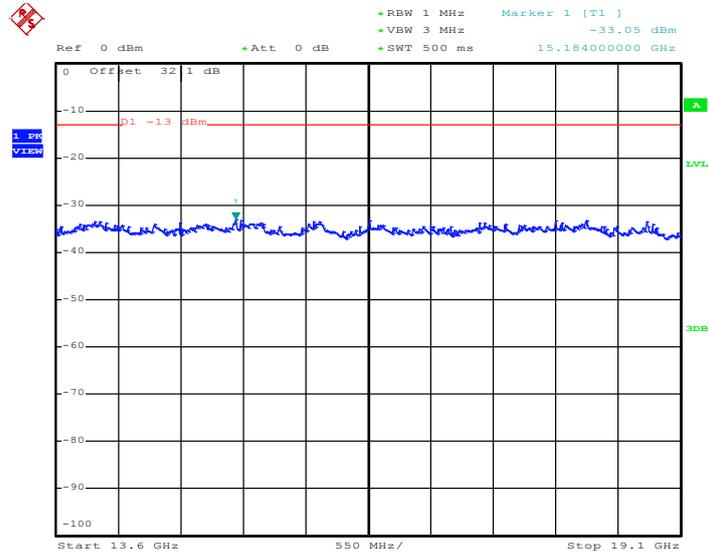
### Conducted Emission Plot between 7GHz ~ 13.6GHz



Date: 18.JUL.2013 15:26:15



Conducted Spurious Emission Plot between 13.6GHz ~ 19.1GHz

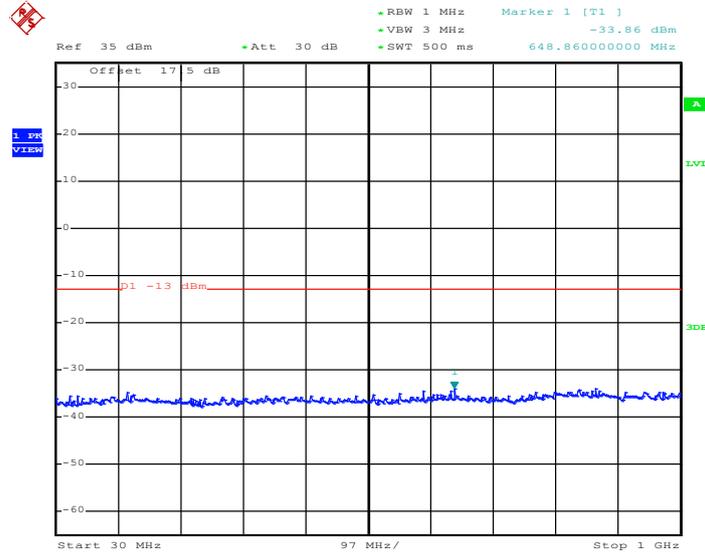


Date: 18.JUL.2013 15:26:27



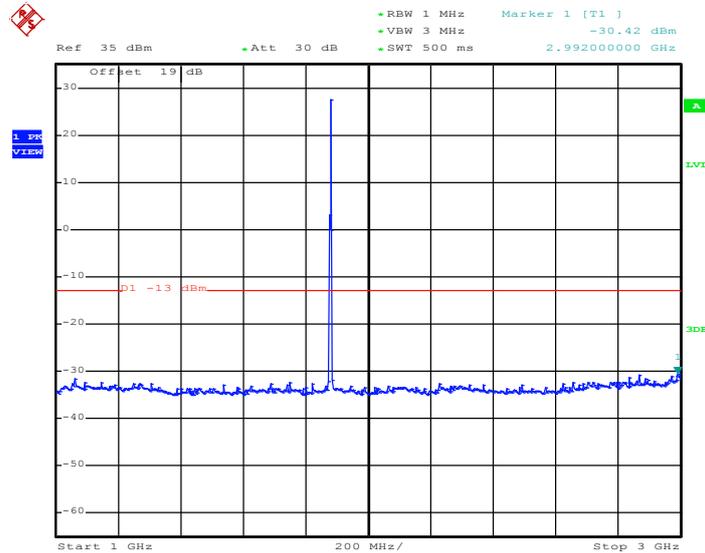
Band :	GSM1900	Channel :	CH661
Test Mode :	EDGE class 8 Link (8PSK)	Frequency :	1880.0 MHz

Conducted Spurious Emission Plot between 30MHz ~ 1GHz



Date: 18.JUL.2013 16:00:18

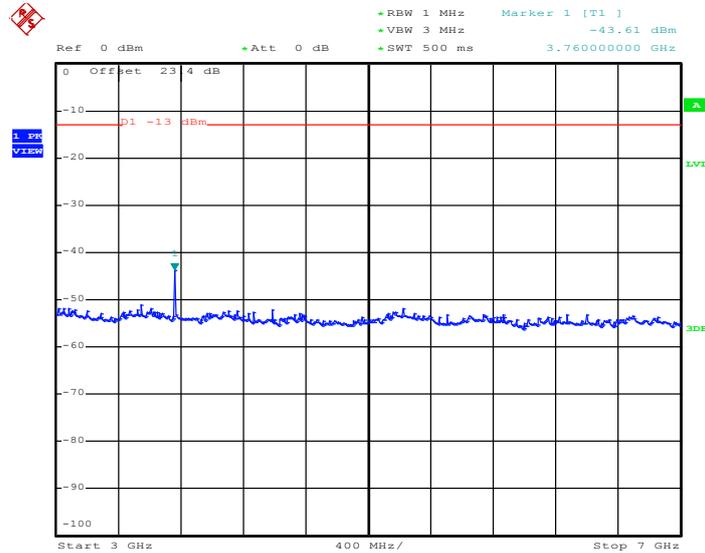
Conducted Spurious Emission Plot between 1GHz ~ 3GHz



Date: 18.JUL.2013 16:00:30

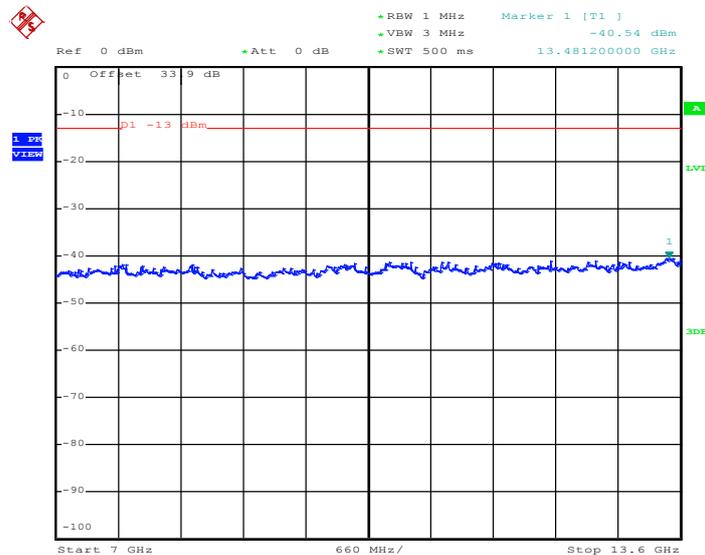


### Conducted Spurious Emission Plot between 3GHz ~ 7GHz



Date: 18.JUL.2013 16:00:47

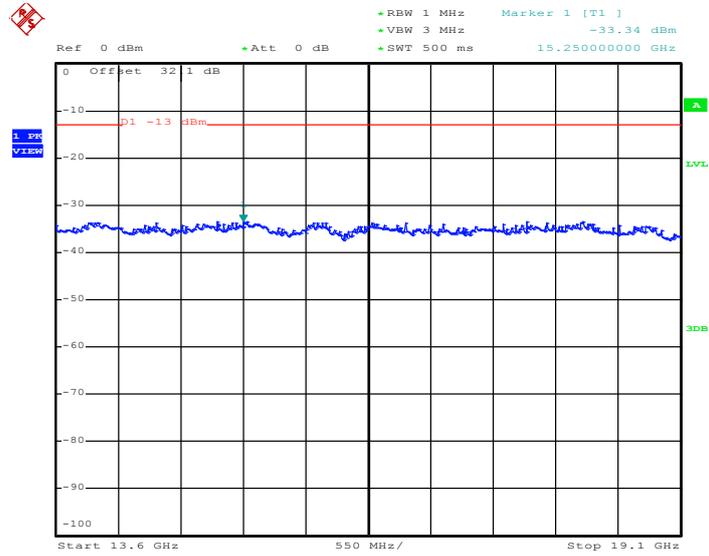
### Conducted Spurious Emission Plot between 7GHz ~ 13.6GHz



Date: 18.JUL.2013 16:00:59



Conducted Spurious Emission Plot between 13.6GHz ~ 19.1GHz



Date: 18.JUL.2013 16:01:12



### 3.7 Field Strength of Spurious Radiation 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

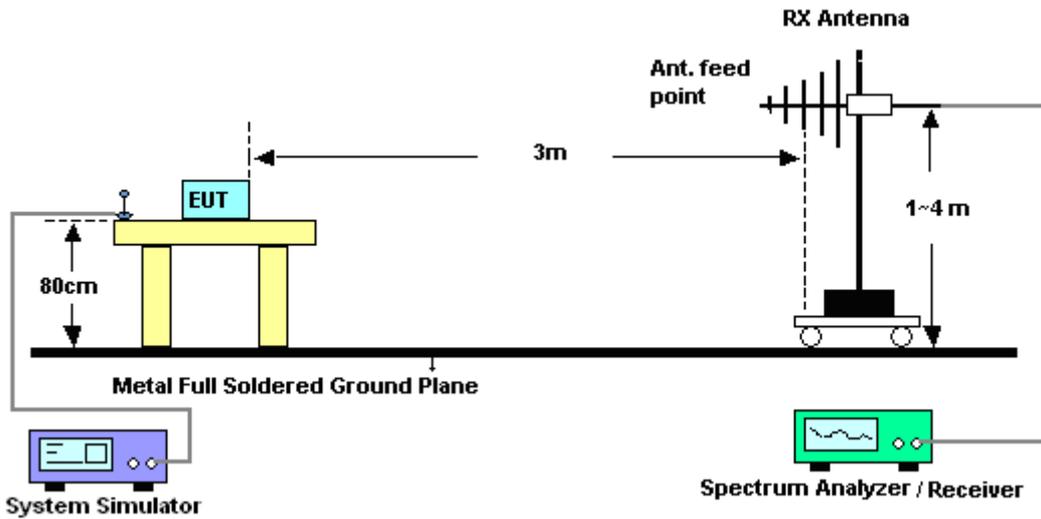
See list of measuring instruments of this test report.

#### 3.7.3 Test Procedures

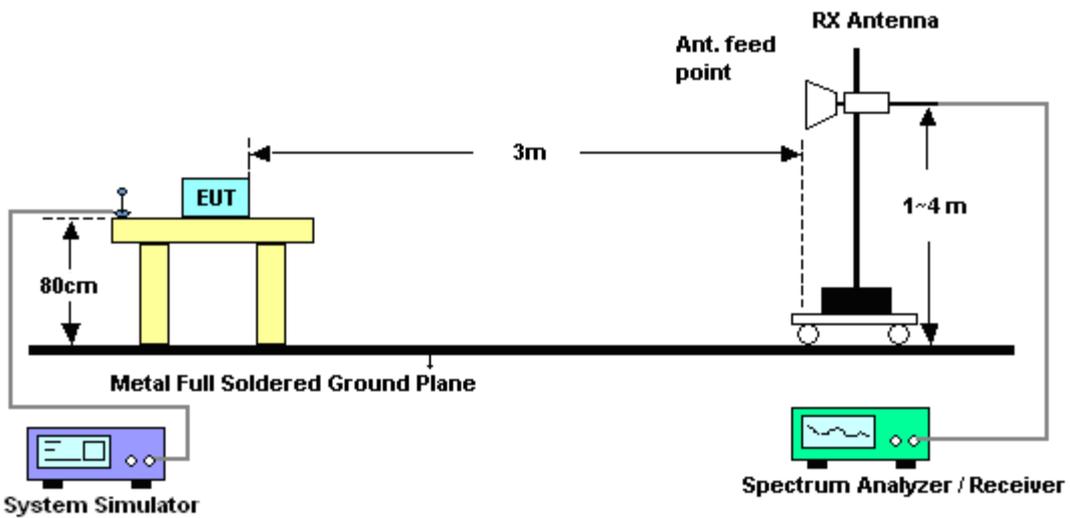
1. The EUT was placed on a rotatable wooden table with 0.8 meter above ground.
2. The EUT was set 3 meters from the receiving antenna, which was mounted on the antenna tower.
3. The table was rotated 360 degrees to determine the position of the highest spurious emission.
4. The height of the receiving 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. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
11. The limit line is derived from  $43 + 10\log(P)$  dB below the transmitter power P(Watts)  
=  $P(W) - [43 + 10\log(P)]$  (dB)  
=  $[30 + 10\log(P)]$  (dBm) -  $[43 + 10\log(P)]$  (dB)  
= -13dBm.
12. EIRP (dBm) = S.G. Power – Tx Cable Loss + Tx Antenna Gain

### 3.7.4 Test Setup

For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz

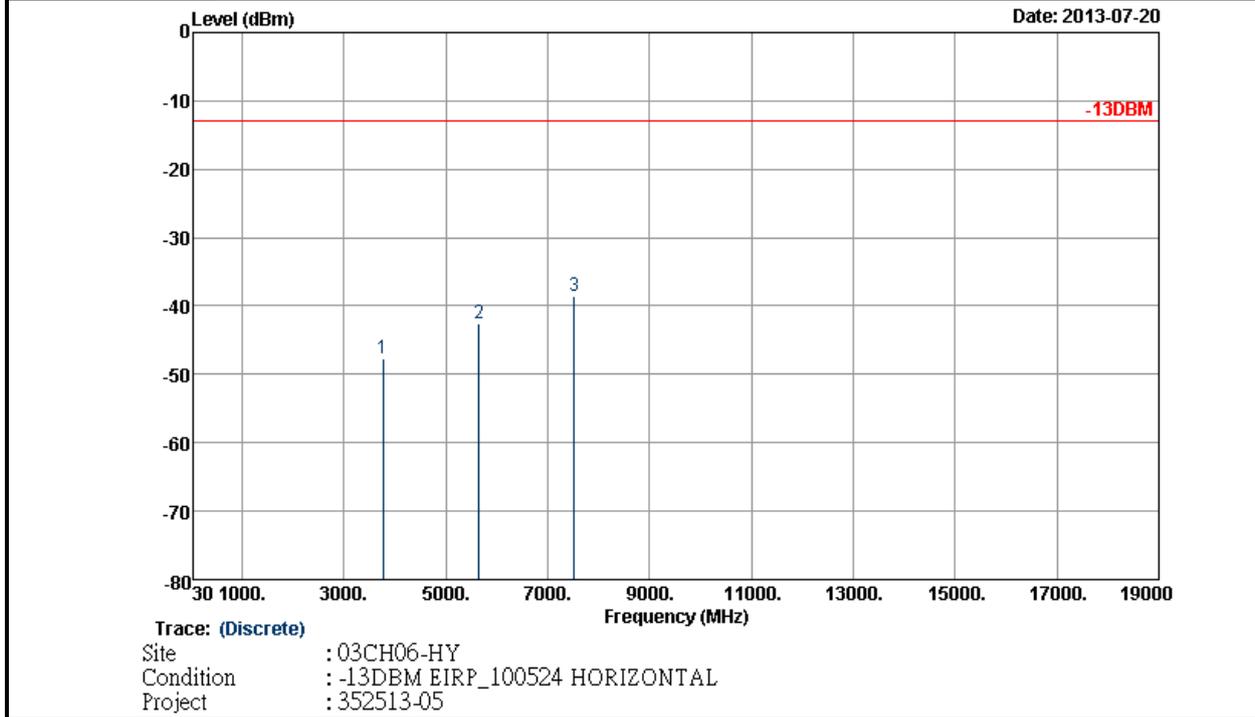




3.7.5 Test Result of Field Strength of Spurious Radiated

<Sample 1>

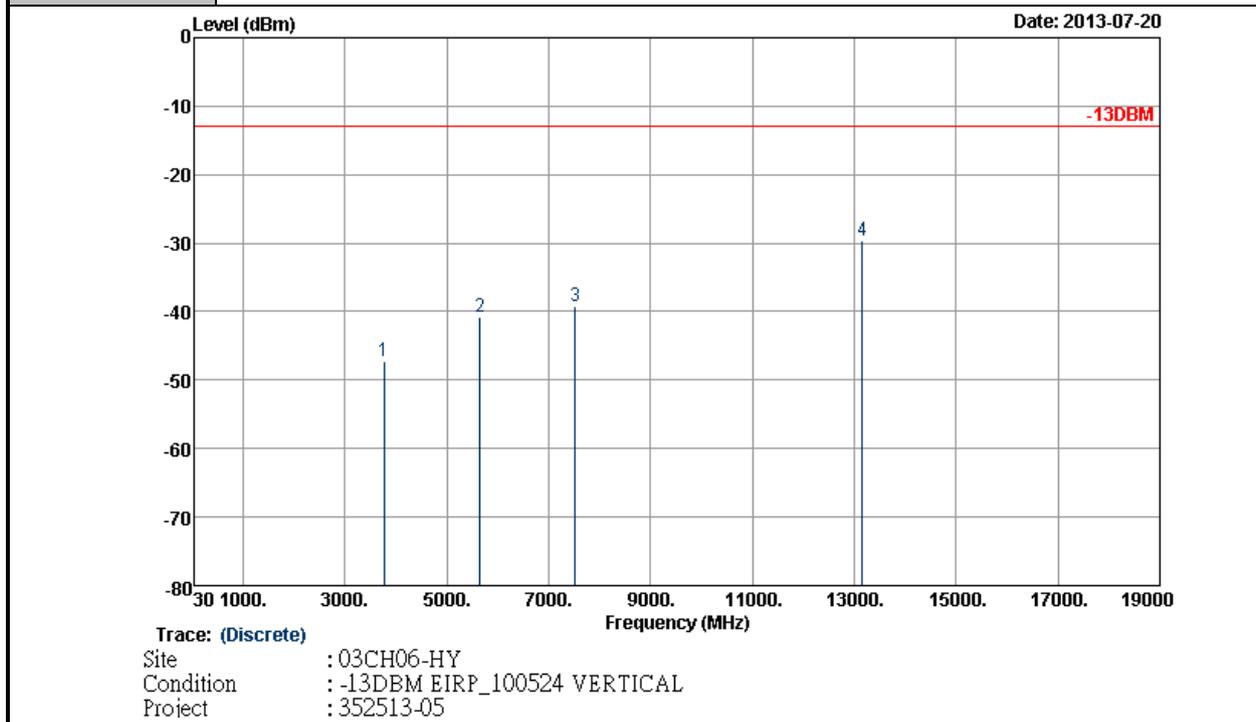
Band :	GSM1900	Temperature :	24~25°C
Test Mode :	GPRS class 8 Link (GMSK)	Relative Humidity :	51~53%
Test Engineer :	David Yang	Polarization :	Horizontal
Remark :	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.		



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	-47.72	-13	-34.72	-66.36	-54.12	2.37	8.78	H	Pass
5640	-42.64	-13	-29.64	-66.49	-50.68	2.68	10.72	H	Pass
7520	-38.52	-13	-25.52	-67.01	-47.63	3.04	12.15	H	Pass



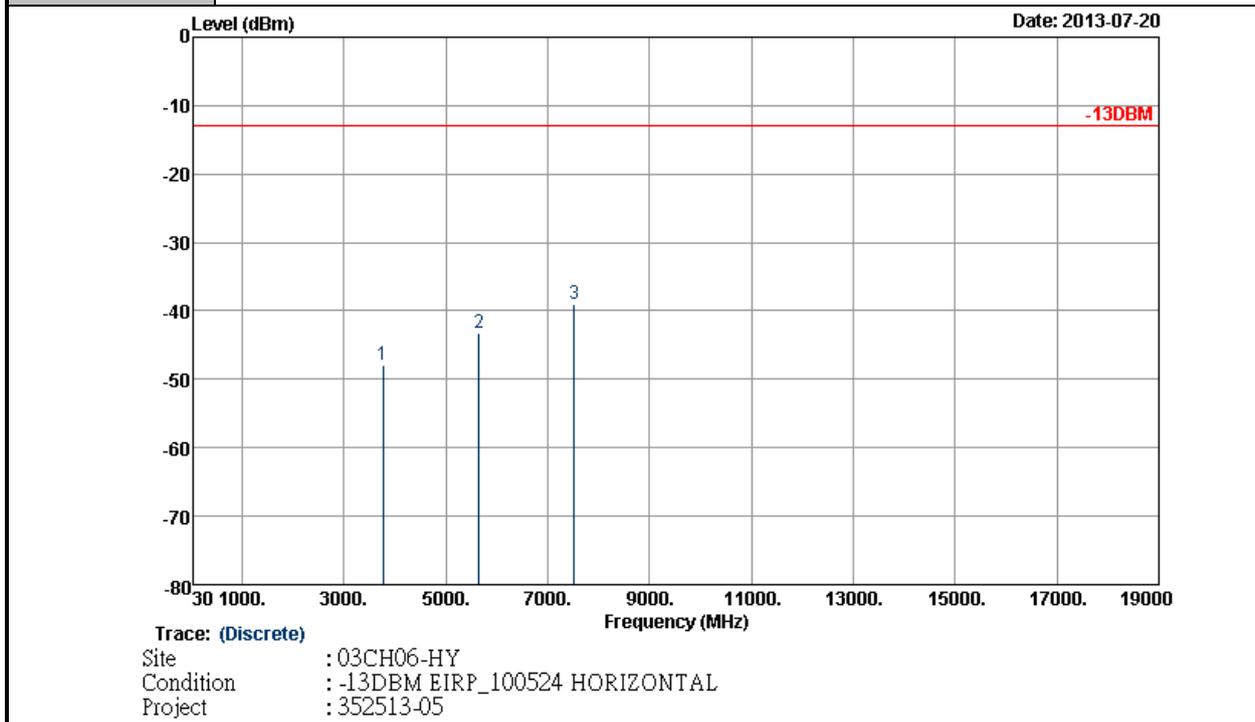
<b>Band :</b>	GSM1900	<b>Temperature :</b>	24~25°C
<b>Test Mode :</b>	GPRS class 8 Link (GMSK)	<b>Relative Humidity :</b>	51~53%
<b>Test Engineer :</b>	David Yang	<b>Polarization :</b>	Vertical
<b>Remark :</b>	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.		



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	-47.22	-13	-34.22	-66.59	-53.62	2.37	8.78	V	Pass
5640	-40.77	-13	-27.77	-65.1	-48.81	2.68	10.72	V	Pass
7520	-39.21	-13	-26.21	-67.42	-48.32	3.04	12.15	V	Pass
13160	-29.70	-13	-16.70	-65.66	-40.18	3.27	13.76	V	Pass



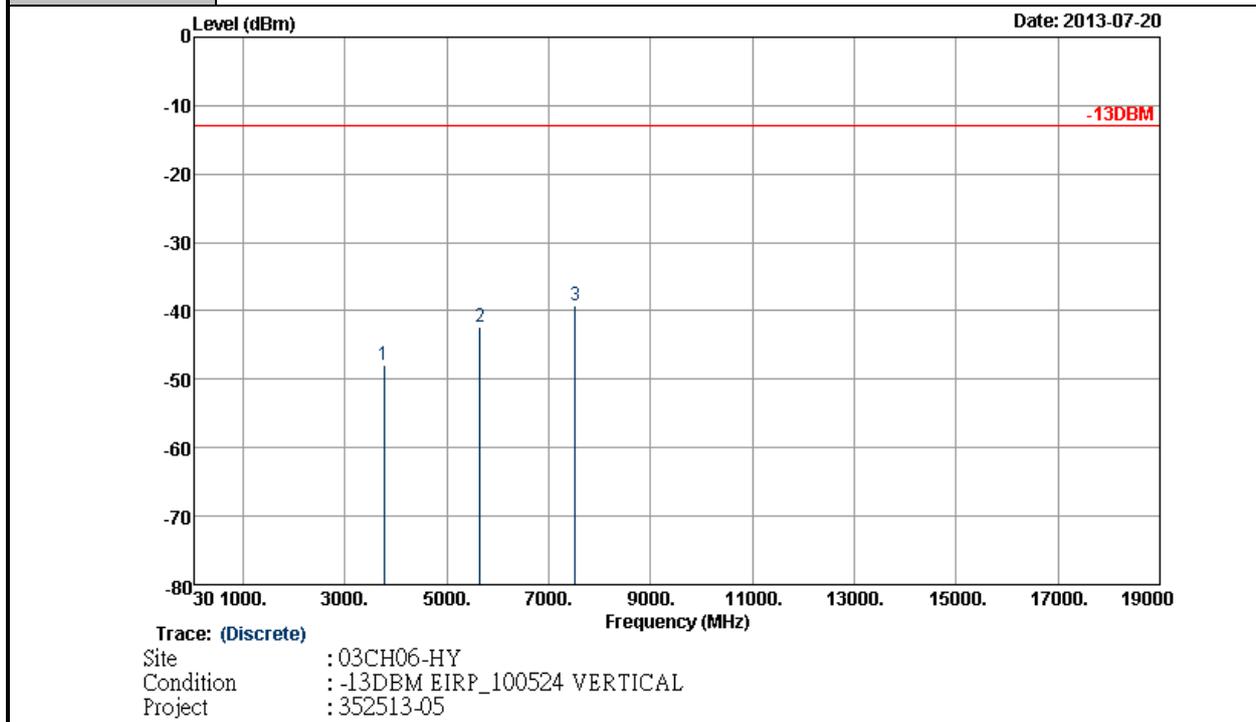
<b>Band :</b>	GSM1900	<b>Temperature :</b>	24~25°C
<b>Test Mode :</b>	EDGE class 8 Link (8PSK)	<b>Relative Humidity :</b>	51~53%
<b>Test Engineer :</b>	David Yang	<b>Polarization :</b>	Horizontal
<b>Remark :</b>	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.		



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	-47.81	-13	-34.81	-66.6	-54.21	2.37	8.78	H	Pass
5640	-43.34	-13	-30.34	-67.38	-51.38	2.68	10.72	H	Pass
7520	-39.10	-13	-26.10	-67.71	-48.21	3.04	12.15	H	Pass



<b>Band :</b>	GSM1900	<b>Temperature :</b>	24~25°C
<b>Test Mode :</b>	EDGE class 8 Link (8PSK)	<b>Relative Humidity :</b>	51~53%
<b>Test Engineer :</b>	David Yang	<b>Polarization :</b>	Vertical
<b>Remark :</b>	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.		

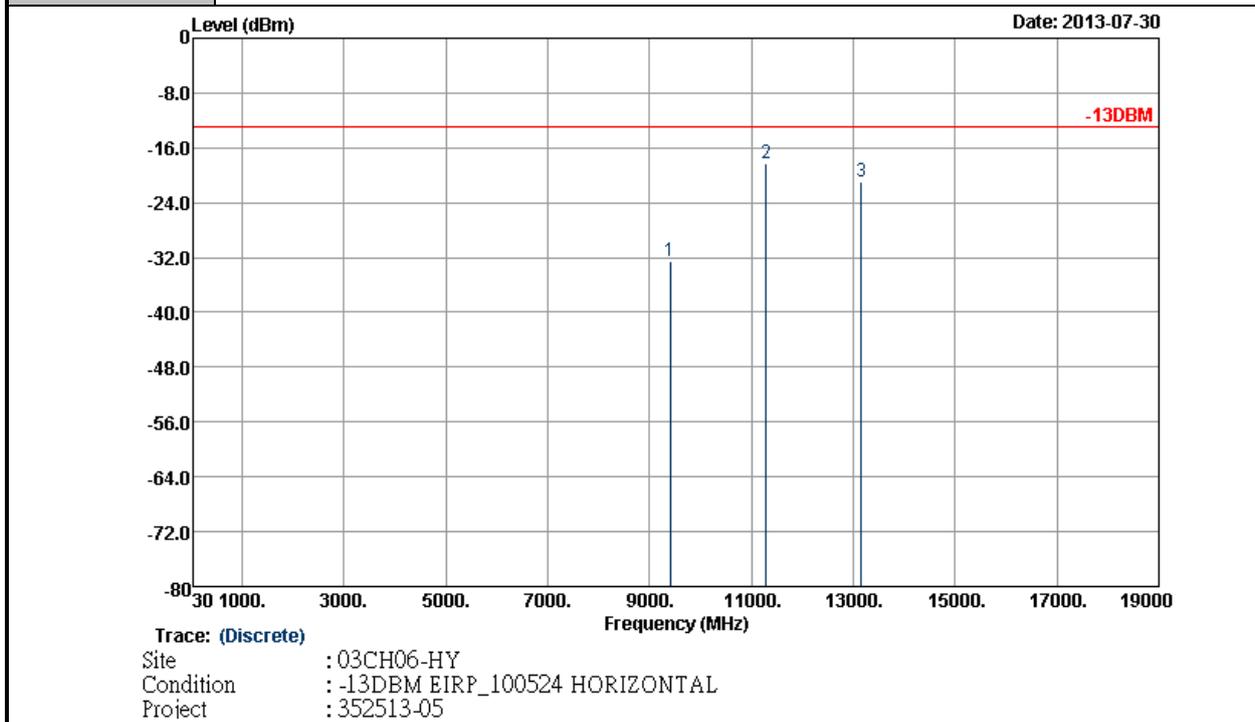


Frequency ( MHz )	EIRP ( dBm )	Limit ( dBm )	Over Limit ( dB )	SPA Reading ( dBm )	S.G. Power ( dBm )	TX Cable loss ( dB )	TX Antenna Gain ( dBi )	Polarization ( H/V )	Result
3760	-47.88	-13	-34.88	-66.42	-54.28	2.37	8.78	V	Pass
5640	-42.43	-13	-29.43	-66.31	-50.47	2.68	10.72	V	Pass
7520	-39.26	-13	-26.26	-67.95	-48.37	3.04	12.15	V	Pass



<Sample 2>

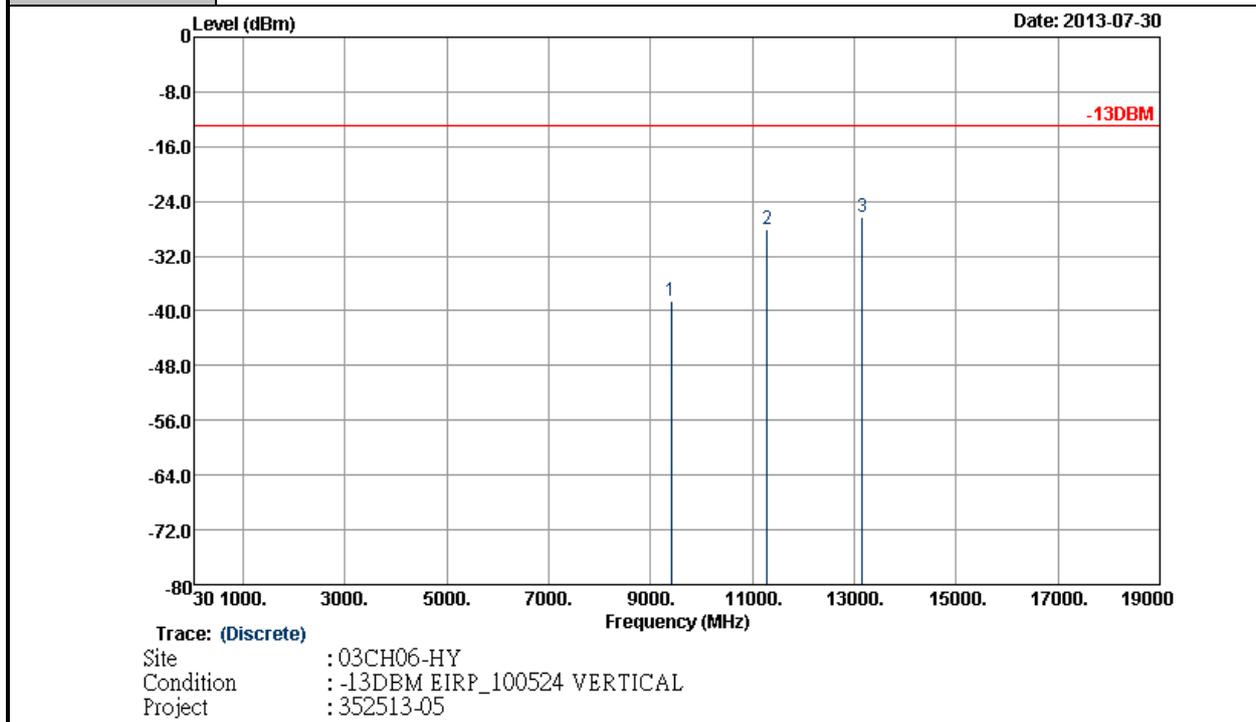
<b>Band :</b>	GSM1900	<b>Temperature :</b>	24~25°C
<b>Test Mode :</b>	GPRS class 8 Link (GMSK)	<b>Relative Humidity :</b>	51~53%
<b>Test Engineer :</b>	David Yang	<b>Polarization :</b>	Horizontal
<b>Remark :</b>	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.		



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
9400	-32.47	-13	-19.47	-60.44	-42.33	3.40	13.26	H	Pass
11280	-18.22	-13	-5.22	-50.35	-27.84	3.71	13.33	H	Pass
13160	-20.99	-13	-7.99	-56.8	-31.47	3.27	13.76	H	Pass



<b>Band :</b>	GSM1900	<b>Temperature :</b>	24~25°C
<b>Test Mode :</b>	GPRS class 8 Link (GMSK)	<b>Relative Humidity :</b>	51~53%
<b>Test Engineer :</b>	David Yang	<b>Polarization :</b>	Vertical
<b>Remark :</b>	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.		



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
9400	-38.50	-13	-25.50	-67.26	-48.36	3.40	13.26	V	Pass
11280	-28.06	-13	-15.06	-60.86	-37.68	3.71	13.33	V	Pass
13160	-26.27	-13	-13.27	-62.09	-36.75	3.27	13.76	V	Pass

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

### 3.8.2 Measuring Instruments

See list of measuring instruments of this test report.

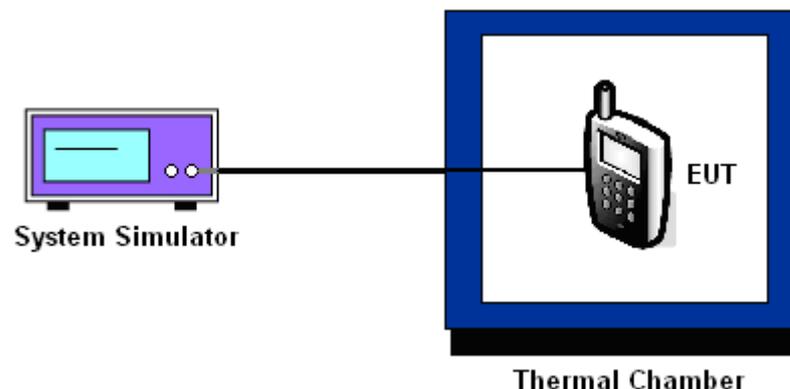
### 3.8.3 Test Procedures for Temperature Variation

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  $-30^{\circ}\text{C}$  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  $10^{\circ}\text{C}$  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.

### 3.8.4 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.

### 3.8.5 Test Setup



**3.8.6 Test Result of Temperature Variation**

<b>Band :</b>	GSM 1900	<b>Channel :</b>	661
<b>Limit (ppm) :</b>	2.5	<b>Frequency :</b>	1880.0 MHz

Temperature (°C)	GPRS class 8		EDGE class 8		Result
	Freq. Dev. (Hz)	Deviation (ppm)	Freq. Dev. (Hz)	Deviation (ppm)	
-30	-85	-0.04	-73	-0.04	PASS
-20	-78	-0.04	-69	-0.04	
-10	-75	-0.04	-70	-0.04	
0	-73	-0.04	-65	-0.03	
10	-69	-0.04	-63	-0.03	
20	-72	-0.04	-62	-0.03	
30	-77	-0.04	-65	-0.03	
40	-75	-0.04	-68	-0.04	
50	-82	-0.04	-71	-0.04	

**3.8.7 Test Result of Voltage Variation**

Band & Channel	Mode	Voltage (Volt)	Freq. Dev. (Hz)	Deviation (ppm)	Limit (ppm)	Result
GSM 1900 CH661	GPRS class 8	3.80	-61	-0.03	2.5	PASS
		BEP	-72	-0.04		
		4.35	-65	-0.03		
	EDGE class 8	3.80	-66	-0.03		
		BEP	-67	-0.04		
		4.35	-64	-0.03		

**Note:**

1. Normal Voltage = 3.80V.
2. Battery End Point (BEP) = 3.60 V.



## 4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
System Simulator	R&S	CMU200	117995	N/A	Jul. 30, 2012	Jul. 18, 2013	Jul. 29, 2013	Conducted (TH02-HY)
Spectrum Analyzer	Rohde & Schwarz	FSP40	100055	9kHz~40GHz	Jun. 07, 2013	Jul. 18, 2013	Jun. 06, 2014	Conducted (TH02-HY)
Thermal Chamber	Ten Billion	TTH-D3SP	TBN-930701	N/A	Jul. 23, 2012	Jul. 18, 2013	Jul. 22, 2013	Conducted (TH02-HY)
Spectrum Analyzer	R&S	FSP30	101352	9kHz~30GHz	Nov. 07, 2012	Jul. 20, 2013 ~ Jul. 30, 2013	Nov. 06, 2013	Radiation (03CH06-HY)
Spectrum Analyzer	Agilent	E4408B	MY44211030	9kHz ~ 26.5GHz	Nov. 26, 2012	Jul. 20, 2013 ~ Jul. 30, 2013	Nov. 25, 2013	Radiation (03CH06-HY)
EMI Test Receiver	R&S	ESVS10	834468/0003	20MHz ~ 1000MHz	May 06, 2013	Jul. 20, 2013 ~ Jul. 30, 2013	May 05, 2014	Radiation (03CH06-HY)
Bilog Antenna	SCHAFFNER	CBL6112B	2885	30MHz ~ 2GHz	Oct. 06, 2012	Jul. 20, 2013 ~ Jul. 30, 2013	Oct. 05, 2013	Radiation (03CH06-HY)
Double Ridge Horn Antenna	EMCO	3117	00066583	1GHz ~ 18GHz	Aug. 01, 2012	Jul. 20, 2013 ~ Jul. 30, 2013	Jul. 31, 2013	Radiation (03CH06-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170251	15GHz ~ 40GHz	Sep. 28, 2012	Jul. 20, 2013 ~ Jul. 30, 2013	Sep. 27, 2013	Radiation (03CH06-HY)
Amplifier	Agilent	310N	186713	9kHz ~ 1GHz	Apr. 12, 2013	Jul. 20, 2013 ~ Jul. 30, 2013	Apr. 11, 2014	Radiation (03CH06-HY)
Preamplifier	MITEQ	AMF-7D-00 101800-30-1	159088	1GHz ~ 18GHz	Feb. 27, 2013	Jul. 20, 2013 ~ Jul. 30, 2013	Feb. 26, 2014	Radiation (03CH06-HY)
Preamplifier	Agilent	8449B	3008A01917	1GHz ~ 26.5GHz	Apr. 12, 2013	Jul. 20, 2013 ~ Jul. 30, 2013	Apr. 11, 2014	Radiation (03CH06-HY)
Turn Table	INN-CO	DS2000	420/650/00	0 - 360 degree	N/A	Jul. 20, 2013 ~ Jul. 30, 2013	N/A	Radiation (03CH06-HY)
Antenna Mast	MF	MF-7802	MF780208212	1 m ~ 4 m	N/A	Jul. 20, 2013 ~ Jul. 30, 2013	N/A	Radiation (03CH06-HY)



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

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