



# FCC RF Test Report

**APPLICANT** : LG Electronics Inc.  
**EQUIPMENT** : Cellular/PCS GSM/WCDMA Phone with WLAN, Bluetooth  
**BRAND NAME** : LG  
**MODEL NAME** : LG-X170g, X170g, LGX170g, LG-X165g, X165g, LGX165g  
**FCC ID** : ZNFX170G  
**STANDARD** : FCC 47 CFR Part 2, 22(H), 24(E)  
**CLASSIFICATION** : PCS Licensed Transmitter Held to Ear (PCE)

The product was received on Mar. 27, 2015 and testing was completed on Apr. 17, 2015. We, SPORTON INTERNATIONAL (KUNSHAN) INC., would like to declare that the tested sample has been evaluated in accordance with the test procedures given in ANSI / TIA / EIA-603-C-2004 and has been in 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: Joseph Lin / Supervisor

Approved by: Jones Tsai / Manager



**SPORTON INTERNATIONAL (KUNSHAN) INC.**

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FCC ID : ZNFX170G

Page Number : 1 of 80

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## 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	-
	§24.232(c)	Equivalent Isotropic Radiated Power	< 2 Watts	PASS	-
3.4	§2.1049 §22.917(b) §24.238(b)	Occupied Bandwidth	N/A	PASS	-
3.5	§2.1051 §22.917(a) §24.238(a)	Band Edge Measurement	< 43+10log <sub>10</sub> (P[Watts])	PASS	-
3.6	§2.1051 §22.917(a) §24.238(a)	Conducted Spurious Emission	< 43+10log <sub>10</sub> (P[Watts])	PASS	-
3.7	§2.1053 §22.917(a) §24.238(a)	Field Strength of Spurious Radiation	< 43+10log <sub>10</sub> (P[Watts])	PASS	Under limit 29.57 dB at 5644.000 MHz
3.8	§2.1055 §22.355	Frequency Stability for Temperature & Voltage	< 2.5 ppm for Part 22 Within Authorized Band	PASS	-
	§2.1055 §24.235				



# 1 General Description

## 1.1 Applicant

**LG Electronics Inc.**

60-39, Gasan-dong, Gumcheon-gu, Seoul, 153-023, Korea

## 1.2 Manufacturer

**Arima Communications Corp.**

6F, No.866, Jhongjheng Rd., Jhonghe Dist., New Taipei City 23586, Taiwan

## 1.3 Product Feature of Equipment Under Test

Product Feature	
<b>Equipment</b>	Cellular/PCS GSM/WCDMA Phone with WLAN, Bluetooth
<b>Brand Name</b>	LG
<b>Model Name</b>	LG-X170g, X170g, LGX170g, LG-X165g, X165g, LGX165g
<b>FCC ID</b>	ZNFX170G
<b>EUT supports Radios application</b>	GSM/GPRS/EGPRS (Downlink Only)/WCDMA/HSPA/ HSPA+(Downlink Only)/ WLAN 2.4GHz 802.11b/g/n HT20/HT40 Bluetooth v3.0+EDR/Bluetooth v4.0 LE
<b>IMEI Code</b>	Conducted: 353468062286713/353468062286721 Radiated: 353468062286838/353468062286846 ERP/EIRP: 353468062286838/353468062286846
<b>HW Version</b>	v0.2
<b>SW Version</b>	v08a
<b>EUT Stage</b>	Production Unit

**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 subjective to this standard

Product Specification subjective to this standard	
<b>Tx Frequency</b>	GSM850: 824.2 MHz ~ 848.8 MHz GSM1900: 1850.2 MHz ~ 1909.8MHz WCDMA Band V: 826.4 MHz ~ 846.6 MHz WCDMA Band II: 1852.4 MHz ~ 1907.6 MHz
<b>Rx Frequency</b>	GSM850: 869.2 MHz ~ 893.8 MHz GSM1900: 1930.2 MHz ~ 1989.8 MHz WCDMA Band V: 871.4 MHz ~ 891.6 MHz WCDMA Band II: 1932.4 MHz ~ 1987.6 MHz
<b>Maximum Output Power to Antenna</b>	GSM850 : 33.28 dBm GSM1900 : 30.46 dBm WCDMA Band V : 22.93 dBm WCDMA Band II : 23.15 dBm
<b>Antenna Type</b>	IFA Antenna
<b>Type of Modulation</b>	GSM: GMSK GPRS: GMSK EDGE: GMSK / 8PSK(Downlink Only) WCDMA: QPSK (Uplink) HSDPA : QPSK (Uplink) HSUPA : QPSK (Uplink) HSPA+ :16QAM (Downlink Only)

### 1.5 Modification of EUT

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



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

FCC Rule	System	Type of Modulation	Maximum ERP/EIRP (W)	Frequency Tolerance (ppm)	Emission Designator
Part 22	GSM850 GSM	GMSK	0.6996	0.0371 ppm	244KGXW
Part 22	WCDMA Band V RMC 12.2Kbps	QPSK	0.0769	0.0430 ppm	4M18F9W
Part 24	GSM1900 GSM	GMSK	0.6183	0.0271 ppm	244KGXW
Part 24	WCDMA Band II RMC 12.2Kbps	QPSK	0.1445	0.0319 ppm	4M16F9W

### 1.7 Testing Location

<b>Test Site</b>	SPORTON INTERNATIONAL (KUNSHAN) INC.	
<b>Test Site Location</b>	No. 3-2, PingXiang Road, Kunshan, Jiangsu Province, P. R. China TEL: +86-0512-5790-0158 FAX: +86-0512-5790-0958	
<b>Test Site No.</b>	<b>Sporton Site No.</b>	
	TH01-KS	OTA01-KS

<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 Registration No.</b>
	03CH10-HY	TW1022



## 1.8 Applicable 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 v02r02

### **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

Antenna port conducted and radiated test items were performed according to KDB 971168 D01 Power Meas. License Digital Systems v02r02 with maximum output power.

Radiated measurements were performed with rotating EUT in different three orthogonal test planes to find the maximum emission.

Radiated emissions were investigated from 30 MHz to 10th harmonic

All modes and data rates and positions were investigated.

Test modes are chosen to be reported as the worst case configuration below:

Test Modes		
Band	Radiated TCs	Conducted TCs
GSM 850	■ GSM Link	■ GSM Link
GSM 1900	■ GSM Link	■ GSM Link
WCDMA Band V	■ RMC 12.2Kbps Link	■ RMC 12.2Kbps Link
WCDMA Band II	■ RMC 12.2Kbps Link	■ RMC 12.2Kbps Link

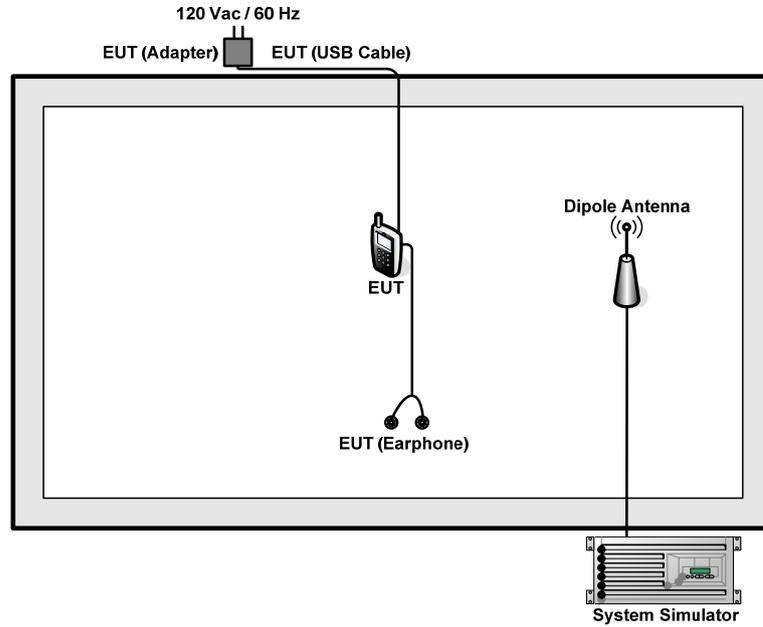


Conducted Power Measurement Results:

Conducted Power (*Unit: dBm)						
Band	GSM850			GSM1900		
Channel	128	189	251	512	661	810
Frequency	824.2	836.4	848.8	1850.2	1880.0	1909.8
GSM (GMSK, 1 Tx slot)	33.20	33.22	33.28	30.31	30.46	30.36
GPRS (GMSK, 1 Tx slot)	33.16	33.17	33.24	30.27	30.41	30.32
GPRS (GMSK, 2 Tx slots)	31.88	31.92	31.94	28.94	28.98	28.87
GPRS (GMSK, 3 Tx slots)	28.88	28.90	28.93	25.94	26.00	25.73
GPRS (GMSK, 4 Tx slots)	27.33	27.22	27.33	24.39	24.49	24.14

Conducted Power (*Unit: dBm)						
Band	WCDMA Band V			WCDMA Band II		
Channel	4132	4182	4233	9262	9400	9538
Frequency	826.4	836.4	846.6	1852.4	1880.0	1907.6
AMR 12.2Kbps	22.92	22.83	22.66	22.92	23.14	22.93
RMC 12.2Kbps	22.93	22.84	22.68	22.93	23.15	22.94
HSDPA Subtest-1	21.89	21.83	21.65	21.87	21.93	21.89
HSDPA Subtest-2	21.85	21.79	21.64	21.86	21.91	21.87
HSDPA Subtest-3	21.39	21.32	21.15	21.35	21.42	21.37
HSDPA Subtest-4	21.46	21.42	21.44	21.41	21.46	21.43
HSUPA Subtest-1	19.84	19.80	19.62	19.91	20.07	19.93
HSUPA Subtest-2	19.88	19.82	19.65	19.90	20.06	19.92
HSUPA Subtest-3	20.86	20.85	20.67	20.87	21.06	20.90
HSUPA Subtest-4	19.41	19.38	19.24	19.38	19.49	19.40
HSUPA Subtest-5	21.65	21.61	21.49	21.64	21.76	21.65

## 2.2 Connection Diagram of Test System



## 2.3 Support Unit used in test configuration

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.	DC Power Supply	GW INSTRON	GPS-3030D	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 RF conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level will be exactly the RF output level.

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

*Offset = RF cable loss + attenuator factor.*

The following shows an offset computation example with RF cable loss 6 dB and a 10dB attenuator.

Example :

$$\begin{aligned} \text{Offset(dB)} &= \text{RF cable loss(dB)} + \text{attenuator factor(dB)}. \\ &= 6 + 10 = 16 \text{ (dB)} \end{aligned}$$

### 3 Test Result

#### 3.1 Conducted Output Power Measurement

##### 3.1.1 Description of the Conducted Output Power Measurement

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

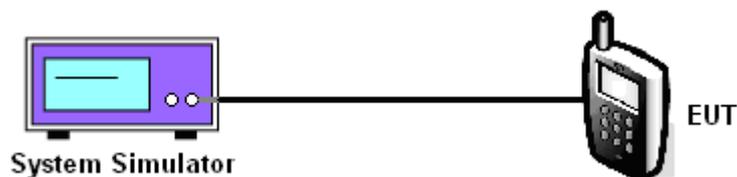
##### 3.1.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

##### 3.1.3 Test Procedures

1. The transmitter output port was connected to the system simulator.
2. Set EUT at maximum power through system simulator.
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

Cellular Band						
Modes	GSM850 (GSM)			WCDMA Band V (RMC 12.2Kbps)		
Channel	128 (Low)	189 (Mid)	251 (High)	4132 (Low)	4182 (Mid)	4233 (High)
Frequency (MHz)	824.2	836.4	848.8	826.4	836.4	846.6
Conducted Power (dBm)	33.20	33.22	33.28	22.93	22.84	22.68

PCS Band						
Modes	GSM1900 (GSM)			WCDMA Band II (RMC 12.2Kbps)		
Channel	512 (Low)	661 (Mid)	810 (High)	9262 (Low)	9400 (Mid)	9538 (High)
Frequency (MHz)	1850.2	1880	1909.8	1852.4	1880	1907.6
Conducted Power (dBm)	30.31	30.46	30.36	22.93	23.15	22.94

**Note:** Maximum burst average power for GSM, and maximum average power for WCDMA.

## 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.

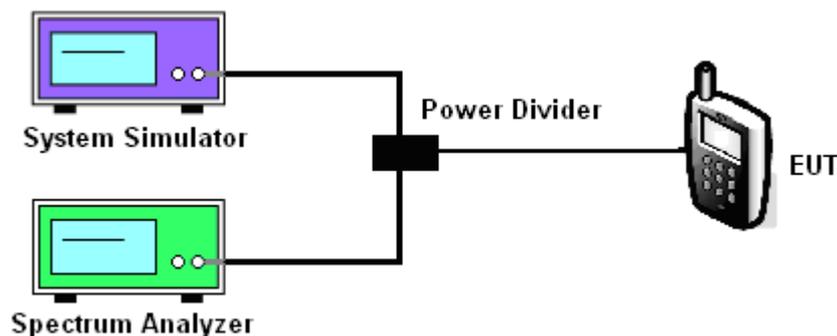
### 3.2.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

### 3.2.3 Test Procedures

1. The testing follows FCC KDB 971168 v02r02 Section 5.7.1.
2. The EUT was connected to the spectrum analyzer and system simulator via a power divider.
3. For GSM/EGPRS operating modes:
  - a. Set EUT in maximum power output.
  - b. Set the RBW = 1MHz, VBW = 3MHz, Peak detector on spectrum analyzer for first trace.
  - c. Set the RBW = 1MHz, VBW = 3MHz, RMS detector on 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 has synchronized with the spectrum analyzer.
4. For UMTS operating modes:
  - a. Set the CCDF (Complementary Cumulative Distribution Function) option on the spectrum analyzer.
  - b. The highest RF powers were measured and recorded the maximum PAPR level associated with a probability of 0.1 %.
5. Record the deviation as Peak to Average Ratio.

### 3.2.4 Test Setup





### 3.2.5 Test Result of Peak-to-Average Ratio

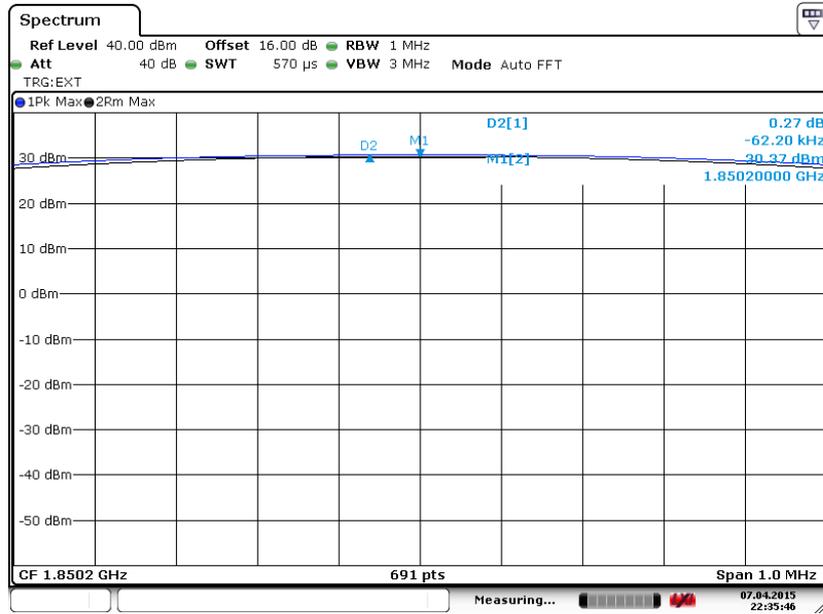
PCS Band						
Modes	GSM1900 (GSM)			WCDMA Band II (RMC 12.2Kbps)		
Channel	512 (Low)	661 (Mid)	810 (High)	9262 (Low)	9400 (Mid)	9538 (High)
Frequency (MHz)	1850.2	1880	1909.8	1852.4	1880	1907.6
Peak-to-Average Ratio (dB)	0.27	0.28	0.27	2.76	2.88	2.64



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

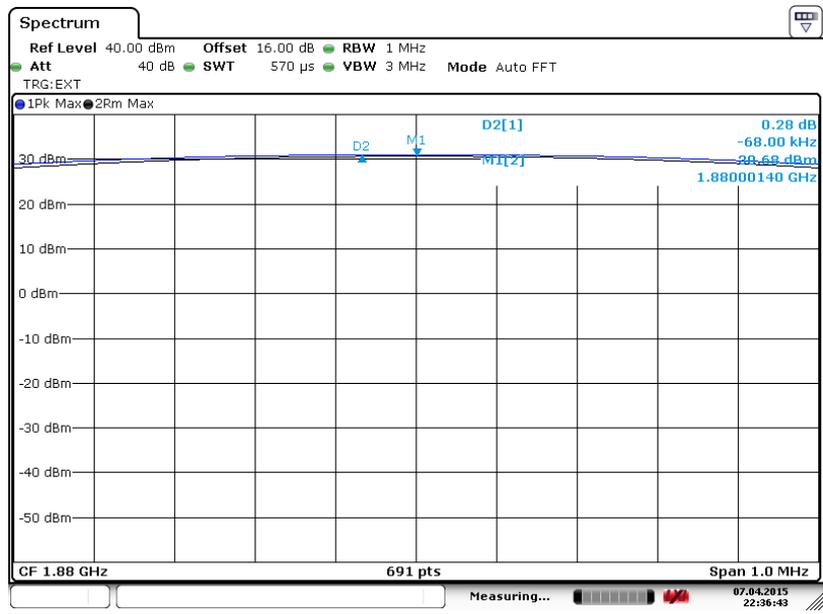
Band :	GSM 1900	Test Mode :	GSM Link (GMSK)
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Peak-to-Average Ratio on Channel 512 (1850.2 MHz)



Date: 7 APR 2015 22:35:46

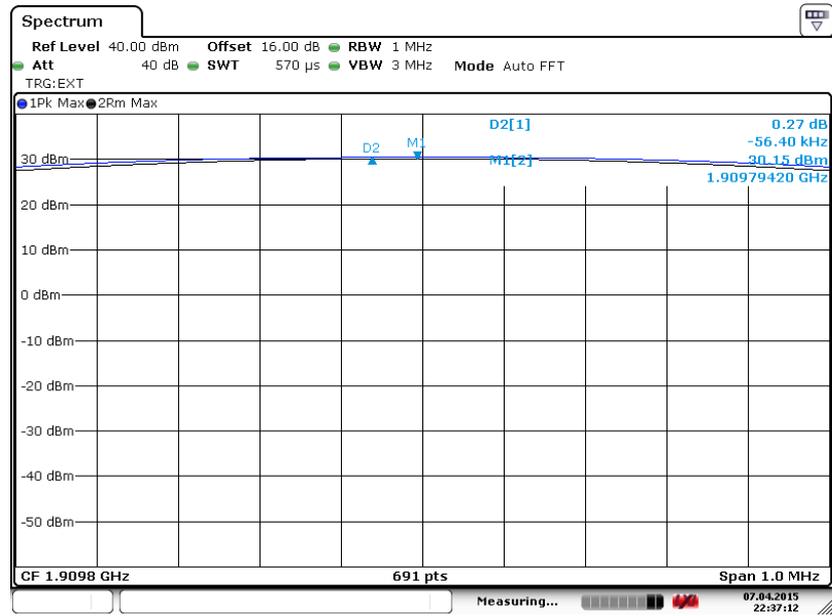
Peak-to-Average Ratio on Channel 661 (1880.0 MHz)



Date: 7 APR 2015 22:36:43



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

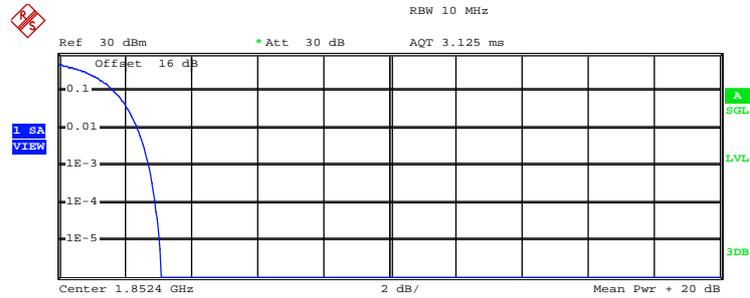


Date: 7 APR 2015 22:37:12



<b>Band :</b>	WCDMA Band II	<b>Test Mode :</b>	RMC 12.2Kbps Link (QPSK)
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**Peak-to-Average Ratio on Channel 9262 (1852.4 MHz)**



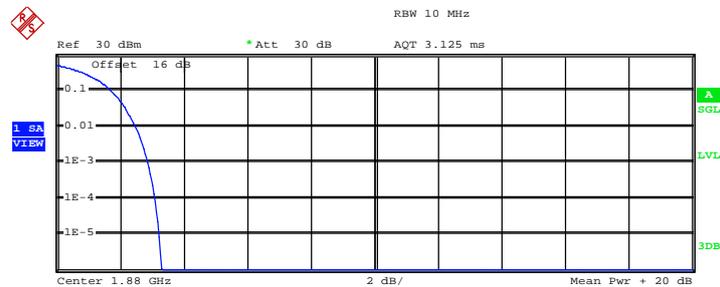
Complementary Cumulative Distribution Function (100000 samples)

Trace 1

Mean	23.02 dBm
Peak	26.12 dBm
Crest	3.10 dB
10 %	1.68 dB
1 %	2.40 dB
.1 %	2.76 dB
.01 %	2.92 dB

Date: 7.APR.2015 21:01:19

**Peak-to-Average Ratio on Channel 9400 (1880.0 MHz)**



Complementary Cumulative Distribution Function (100000 samples)

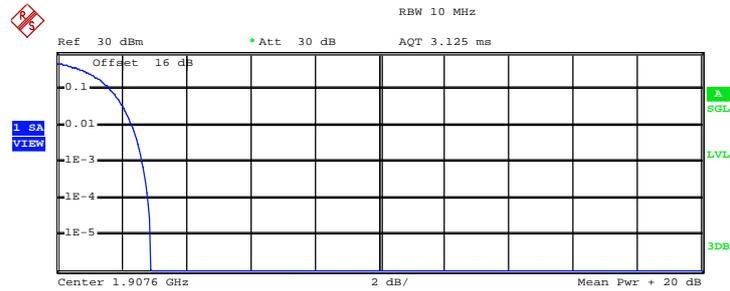
Trace 1

Mean	23.10 dBm
Peak	26.40 dBm
Crest	3.29 dB
10 %	1.72 dB
1 %	2.48 dB
.1 %	2.88 dB
.01 %	3.12 dB

Date: 7.APR.2015 21:00:23



Peak-to-Average Ratio on Channel 9538 (1907.6 MHz)



Complementary Cumulative Distribution Function (100000 samples)

Trace 1

Mean    22.78 dBm  
 Peak    25.69 dBm  
 Crest    2.91 dB

10 %    1.64 dB  
 1 %    2.32 dB  
 .1 %    2.64 dB  
 .01 %    2.84 dB

Date: 7.APR.2015 21:02:23



### 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 v02r02. 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

The measuring equipment is listed in the section 4 of this test report.

#### 3.3.3 Test Procedures

1. The testing follows FCC KDB 971168 v02r02 Section 5.2.1. (for CDMA/WCDMA), Section 5.2.2.2 (for GSM/GPRS/EDGE) and ANSI / TIA-603-C-2004 Section 2.2.17.
2. The EUT was placed on a turntable 1.5 meters high in a fully anechoic chamber.
3. The EUT was placed 3 meters from the receiving antenna, which was mounted on the antenna tower.
4. 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 KDB 971168 D01.
5. The table was rotated 360 degrees to determine the position of the highest radiated power.
6. The height of the receiving antenna is adjusted to look for the maximum ERP/EIRP.
7. Taking the record of maximum ERP/EIRP.
8. A dipole antenna was substituted in place of the EUT and was driven by a signal generator.
9. The conducted power at the terminal of the dipole antenna is measured.
10. Repeat step 3 to step 5 to get the maximum ERP/EIRP of the substitution antenna.
11.  $ERP/EIRP = P_s + E_t - E_s + G_s = P_s + R_t - R_s + G_s$

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

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

$E_t = R_t + AF$

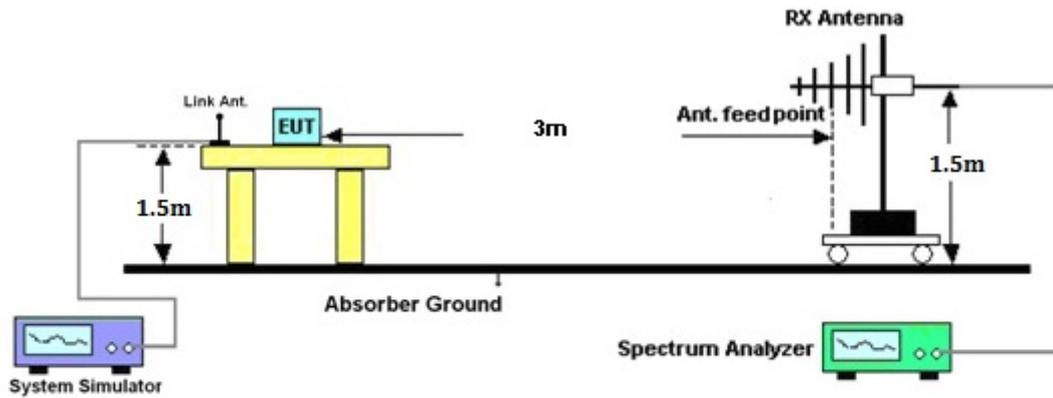
$E_s = R_s + AF$

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.

### 3.3.4 Test Setup





3.3.5 Test Result of ERP

GSM850 (GSM) Radiated Power ERP						
Horizontal Polarization						
Frequency (MHz)	Rt (dBm)	Rs (dBm)	Ps (dBm)	Gs (dBd)	ERP (dBm)	ERP (W)
824.20	-20.63	-48.12	0.00	-1.08	26.41	0.4377
836.40	-20.00	-48.28	0.00	-0.93	27.35	0.5434
848.80	-19.14	-48.35	0.00	-0.76	28.45	0.6996
Vertical Polarization						
Frequency (MHz)	Rt (dBm)	Rs (dBm)	Ps (dBm)	Gs (dBd)	ERP (dBm)	ERP (W)
824.20	-34.58	-47.97	0.00	-1.08	12.31	0.0170
836.40	-33.08	-48.01	0.00	-0.93	14.00	0.0251
848.80	-31.62	-48.05	0.00	-0.76	15.67	0.0369

WCDMA Band V (RMC 12.2Kbps) Radiated Power ERP						
Horizontal Polarization						
Frequency (MHz)	Rt (dBm)	Rs (dBm)	Ps (dBm)	Gs (dBd)	ERP (dBm)	ERP (W)
826.40	-28.90	-48.12	0.00	-1.08	18.14	0.0652
836.40	-28.49	-48.28	0.00	-0.93	18.86	0.0769
846.60	-29.67	-48.35	0.00	-0.76	17.92	0.0620
Vertical Polarization						
Frequency (MHz)	Rt (dBm)	Rs (dBm)	Ps (dBm)	Gs (dBd)	ERP (dBm)	ERP (W)
826.40	-41.86	-47.97	0.00	-1.08	5.03	0.0032
836.40	-41.03	-48.01	0.00	-0.93	6.05	0.0040
846.60	-42.01	-48.05	0.00	-0.76	5.28	0.0034



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	-26.44	-51.88	0.00	1.96	27.40	0.5494
1880.00	-27.44	-52.99	0.00	2.00	27.55	0.5684
1909.80	-28.35	-54.28	0.00	1.98	27.91	0.6183
Vertical Polarization						
Frequency (MHz)	Rt (dBm)	Rs (dBm)	Ps (dBm)	Gs (dBi)	EIRP (dBm)	EIRP (W)
1850.20	-27.35	-52.13	0.00	1.96	26.74	0.4723
1880.00	-28.08	-53.17	0.00	2.00	27.09	0.5117
1909.80	-28.96	-54.13	0.00	1.98	27.16	0.5194

WCDMA Band II (RMC 12.2Kbps) Radiated Power EIRP						
Horizontal Polarization						
Frequency (MHz)	Rt (dBm)	Rs (dBm)	Ps (dBm)	Gs (dBi)	EIRP (dBm)	EIRP (W)
1852.40	-33.06	-51.88	0.00	1.96	20.78	0.1196
1880.00	-33.80	-52.99	0.00	2.00	21.19	0.1315
1907.60	-34.66	-54.28	0.00	1.98	21.60	0.1445
Vertical Polarization						
Frequency (MHz)	Rt (dBm)	Rs (dBm)	Ps (dBm)	Gs (dBi)	EIRP (dBm)	EIRP (W)
1852.40	-33.66	-52.13	0.00	1.96	20.43	0.1104
1880.00	-34.24	-53.17	0.00	2.00	20.93	0.1240
1907.60	-34.90	-54.13	0.00	1.98	21.21	0.1321

## 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.

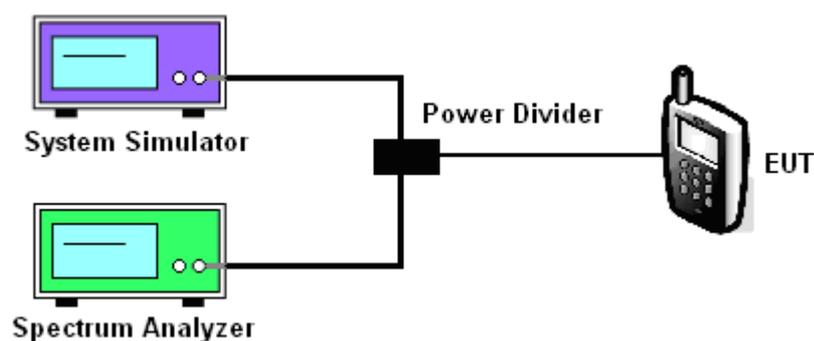
### 3.4.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

### 3.4.3 Test Procedures

1. The testing follows FCC KDB 971168 v02r02 Section 4.2.
2. The EUT was connected to the spectrum analyzer and system simulator via a power divider.
3. The RF output of the EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
4. The 99% occupied bandwidth were measured, set RBW= 1% of span, VBW= 3\*RBW, sample detector, trace maximum hold.
5. 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

Cellular Band			
Modes	GSM850 (GSM)		
Channel	128 (Low)	189 (Mid)	251 (High)
Frequency (MHz)	824.2	836.4	848.8
99% OBW (kHz)	244.00	244.00	244.00
26dB BW (kHz)	312.00	310.00	314.00

PCS Band			
Modes	GSM1900 (GSM)		
Channel	512 (Low)	661 (Mid)	810 (High)
Frequency (MHz)	1850.2	1880	1909.8
99% OBW (kHz)	244.00	244.00	244.00
26dB BW (kHz)	314.00	318.00	314.00

Cellular Band			
Modes	WCDMA Band V (RMC 12.2Kbps)		
Channel	4132 (Low)	4182 (Mid)	4233 (High)
Frequency (MHz)	826.4	836.4	846.6
99% OBW (MHz)	4.16	4.18	4.18
26dB BW (MHz)	4.72	4.72	4.72

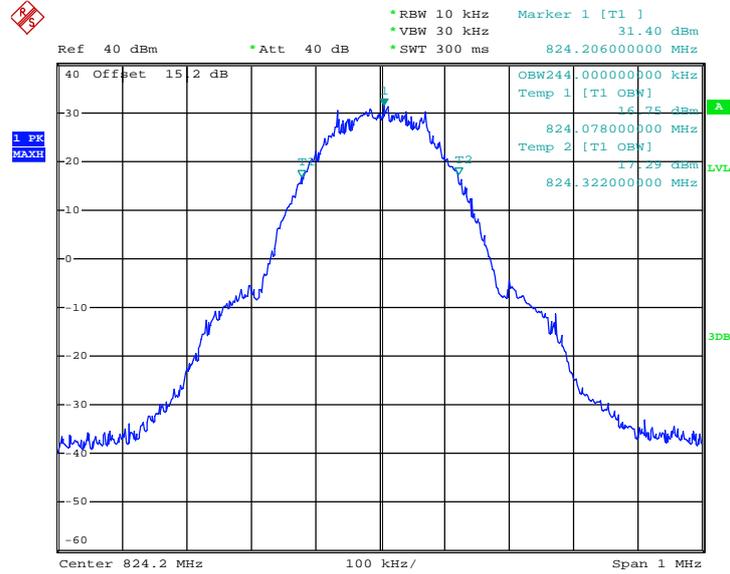
PCS Band			
Modes	WCDMA Band II (RMC 12.2Kbps)		
Channel	9262 (Low)	9400 (Mid)	9538 (High)
Frequency (MHz)	1852.4	1880	1907.6
99% OBW (MHz)	4.16	4.16	4.16
26dB BW (MHz)	4.72	4.68	4.70



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

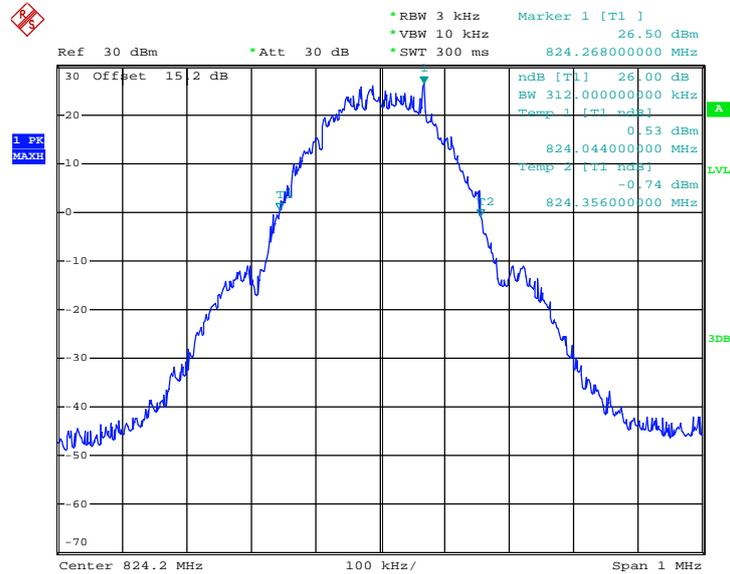
Band :	GSM 850	Test Mode :	GSM Link (GMSK)
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99% Occupied Bandwidth Plot on Channel 128 (824.2 MHz)



Date: 7.APR.2015 19:37:47

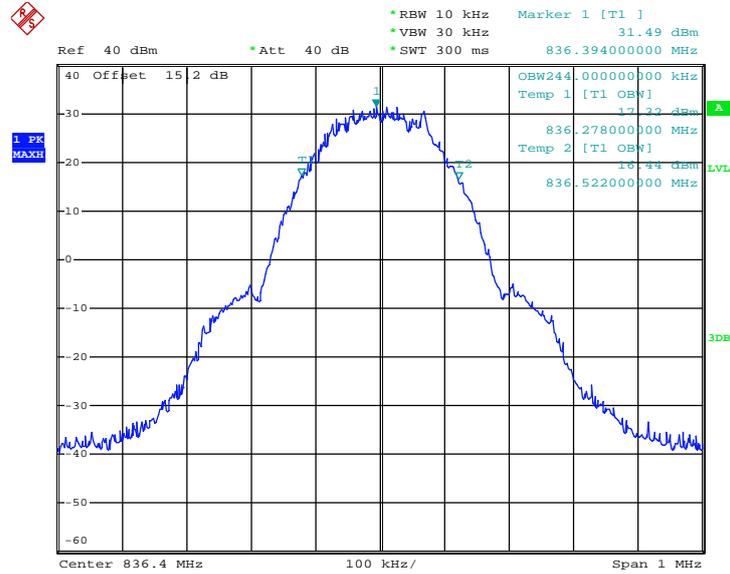
26dB Bandwidth Plot on Channel 128 (824.2 MHz)



Date: 7.APR.2015 19:30:41

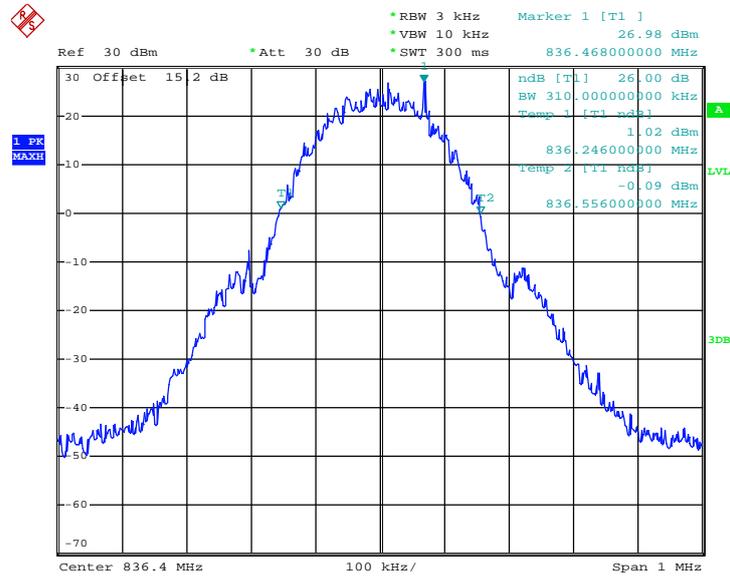


99% Occupied Bandwidth Plot on Channel 189 (836.4 MHz)



Date: 7.APR.2015 19:36:47

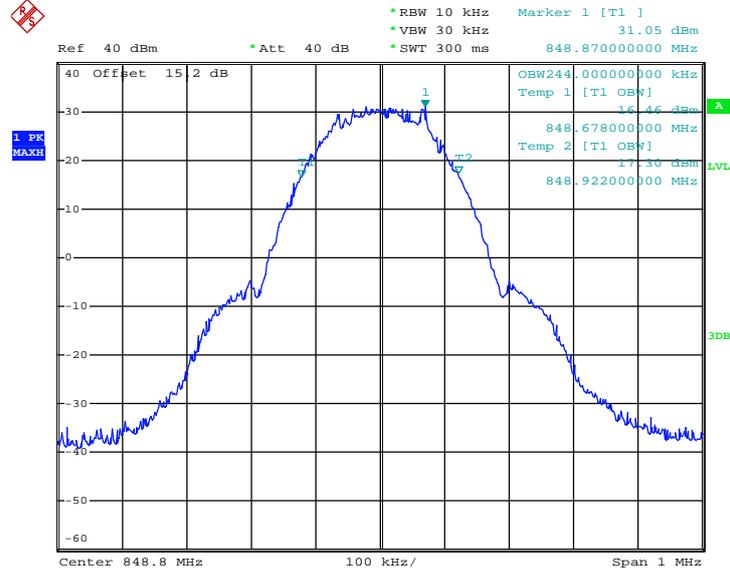
26dB Bandwidth Plot on Channel 189 (836.4 MHz)



Date: 7.APR.2015 19:31:22

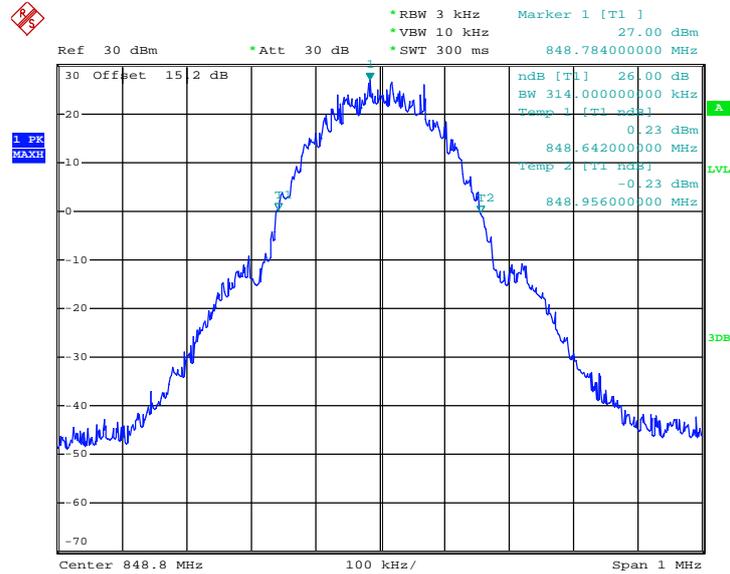


99% Occupied Bandwidth Plot on Channel 251 (848.8 MHz)



Date: 7.APR.2015 19:34:12

26dB Bandwidth Plot on Channel 251 (848.8 MHz)

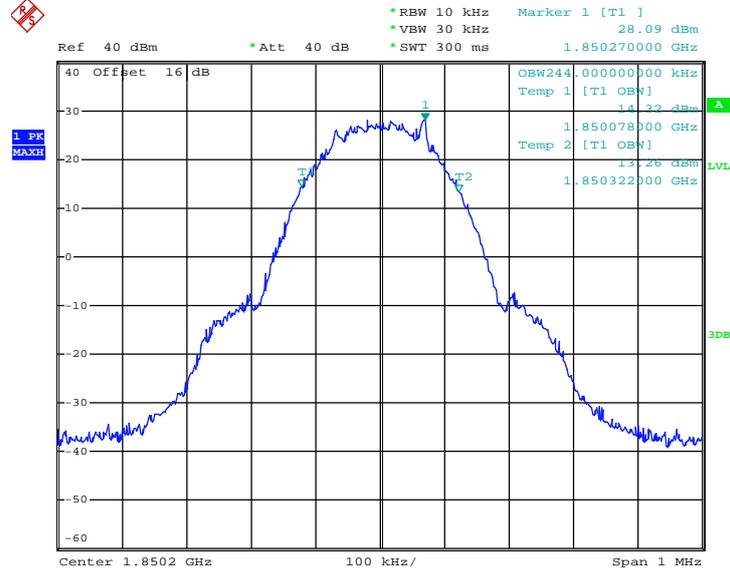


Date: 7.APR.2015 19:31:58



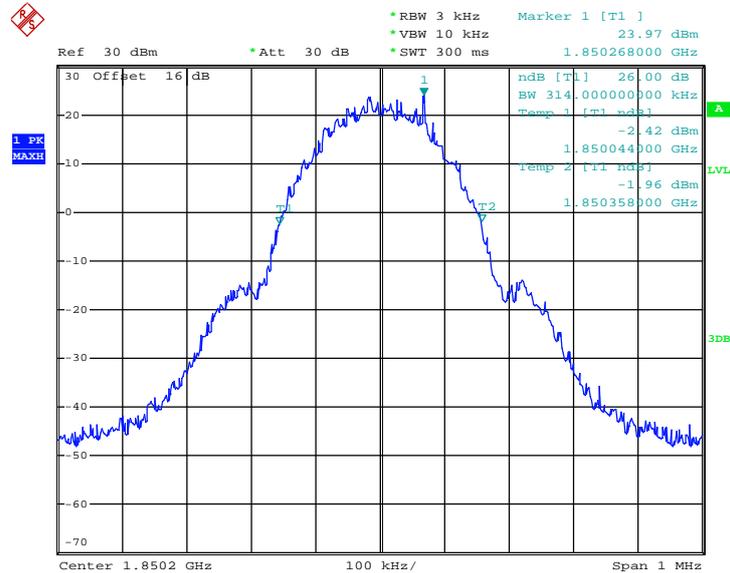
Band :	GSM 1900	Test Mode :	GSM Link (GMSK)
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99% Occupied Bandwidth Plot on Channel 512 (1850.2 MHz)



Date: 7.APR.2015 21:14:53

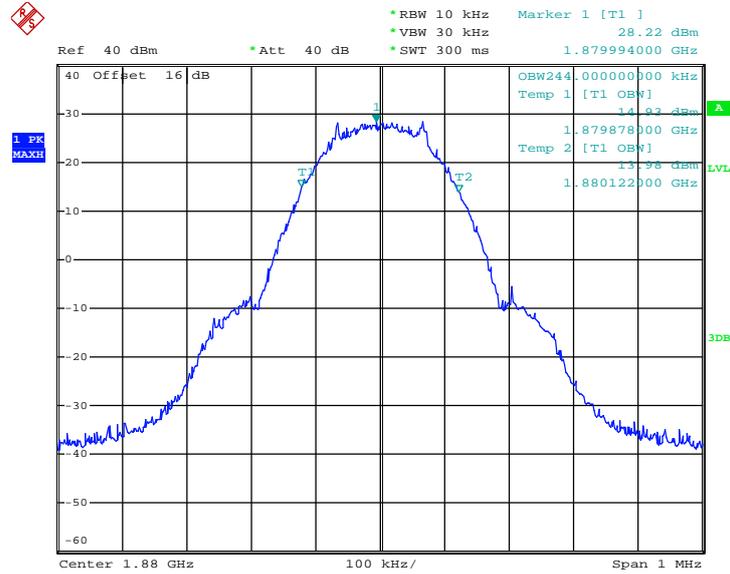
26dB Bandwidth Plot on Channel 512 (1850.2 MHz)



Date: 7.APR.2015 21:06:05

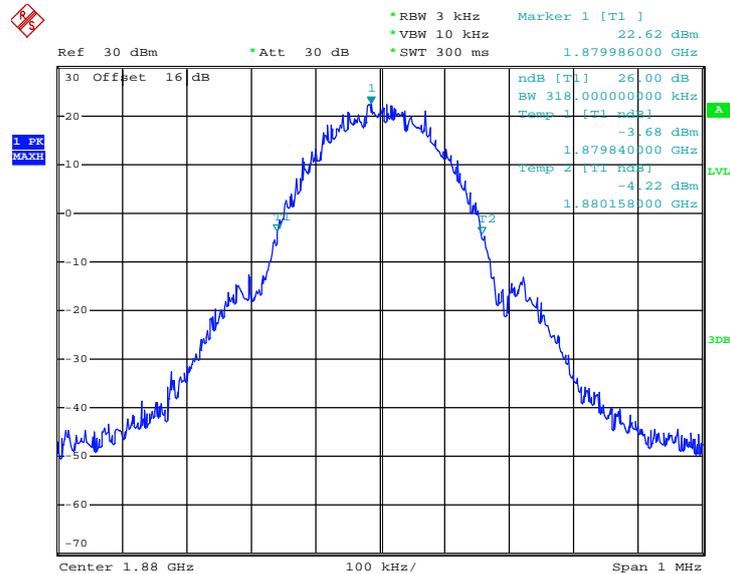


### 99% Occupied Bandwidth Plot on Channel 661 (1880.0 MHz)



Date: 7.APR.2015 21:13:47

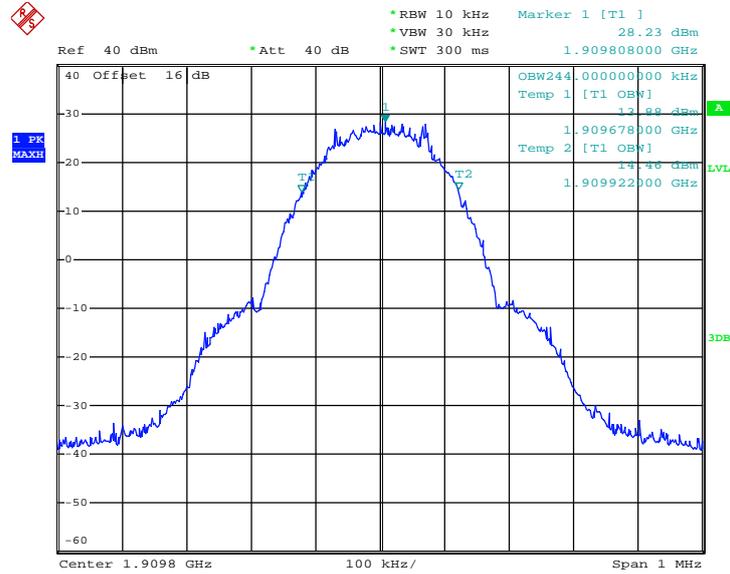
### 26dB Bandwidth Plot on Channel 661 (1880.0 MHz)



Date: 7.APR.2015 21:06:42

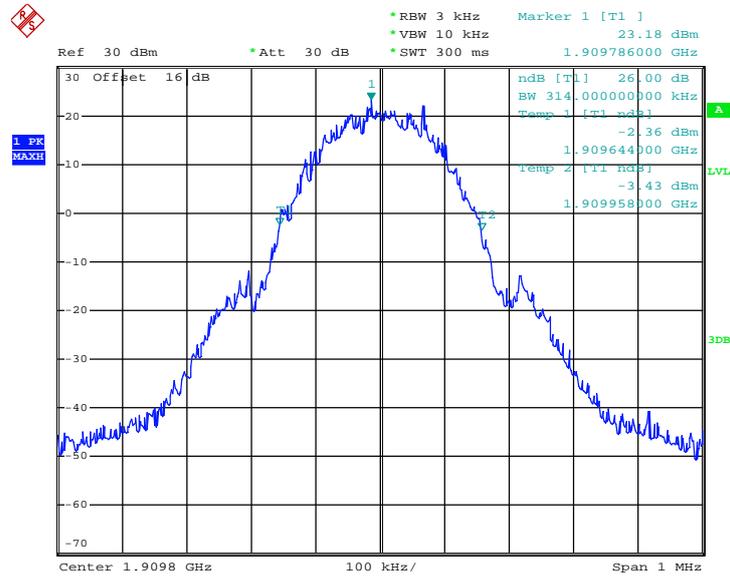


### 99% Occupied Bandwidth Plot on Channel 810 (1909.8 MHz)



Date: 7.APR.2015 21:09:47

### 26dB Bandwidth Plot on Channel 810 (1909.8 MHz)

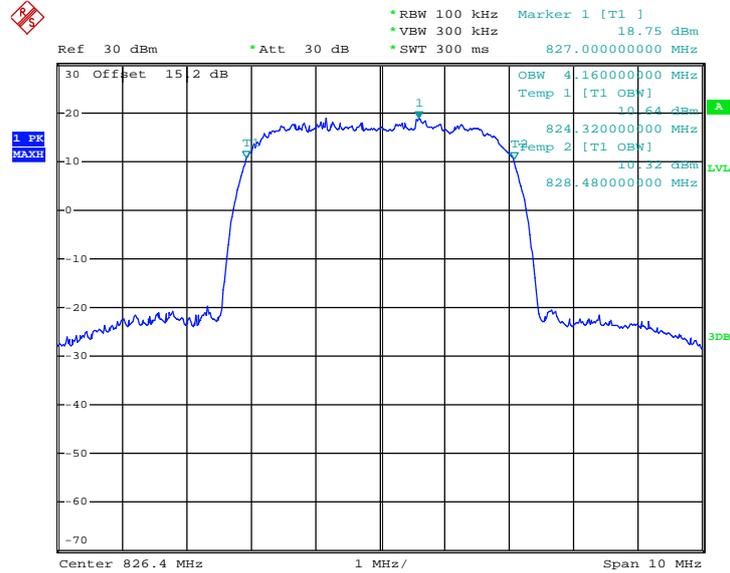


Date: 7.APR.2015 21:07:20



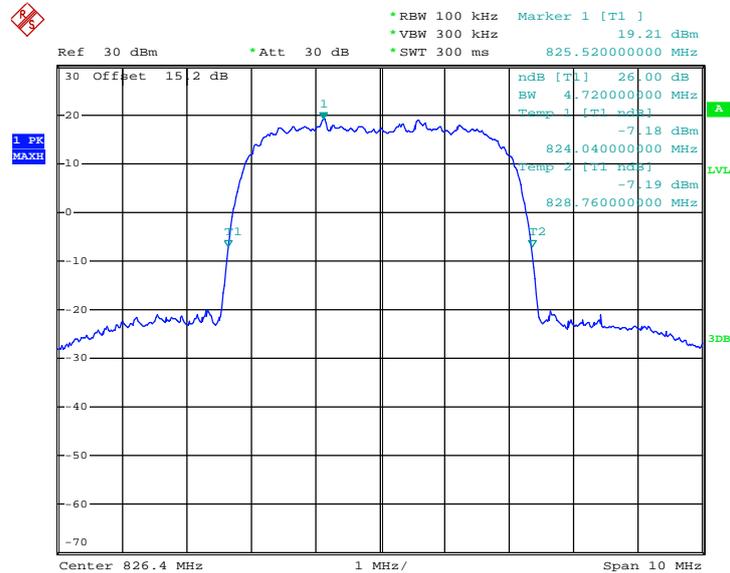
Band :	WCDMA Band V	Test Mode :	RMC 12.2Kbps Link (QPSK)
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99% Occupied Bandwidth Plot on Channel 4132 (826.4 MHz)



Date: 7.APR.2015 20:19:48

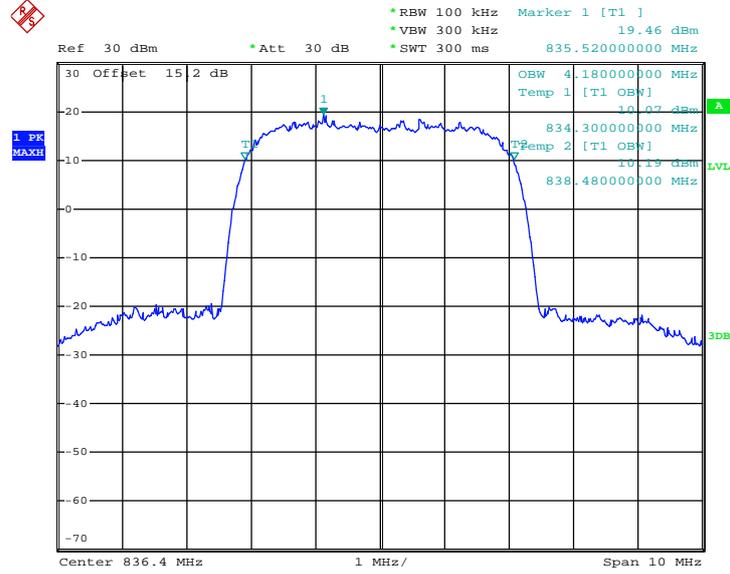
26dB Bandwidth Plot on Channel 4132 (826.4 MHz)



Date: 7.APR.2015 20:15:23

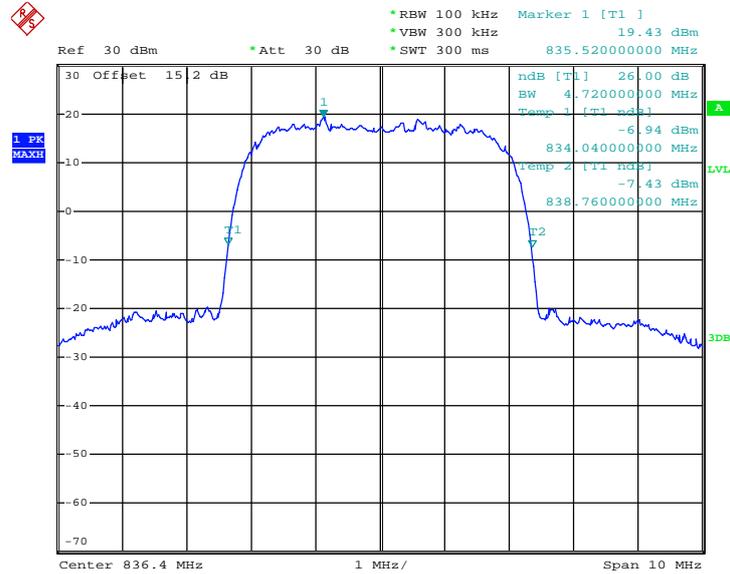


99% Occupied Bandwidth Plot on Channel 4182 (836.4 MHz)



Date: 7.APR.2015 20:19:12

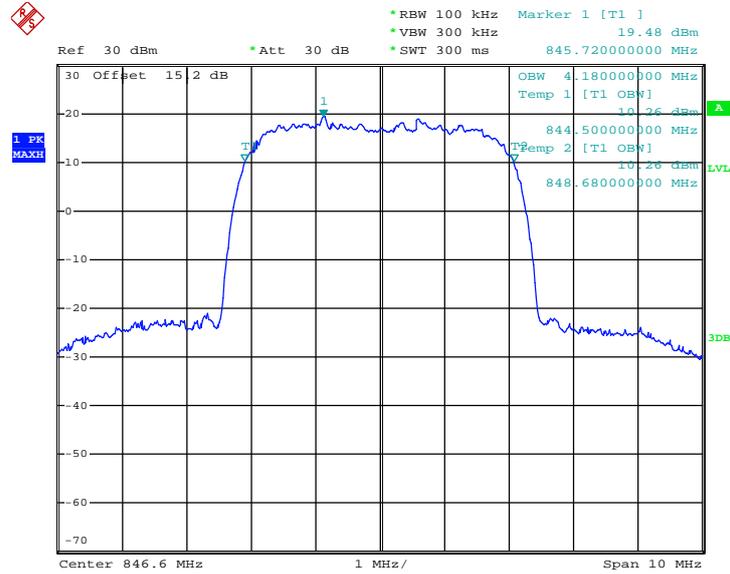
26dB Bandwidth Plot on Channel 4182 (836.4 MHz)



Date: 7.APR.2015 20:16:01

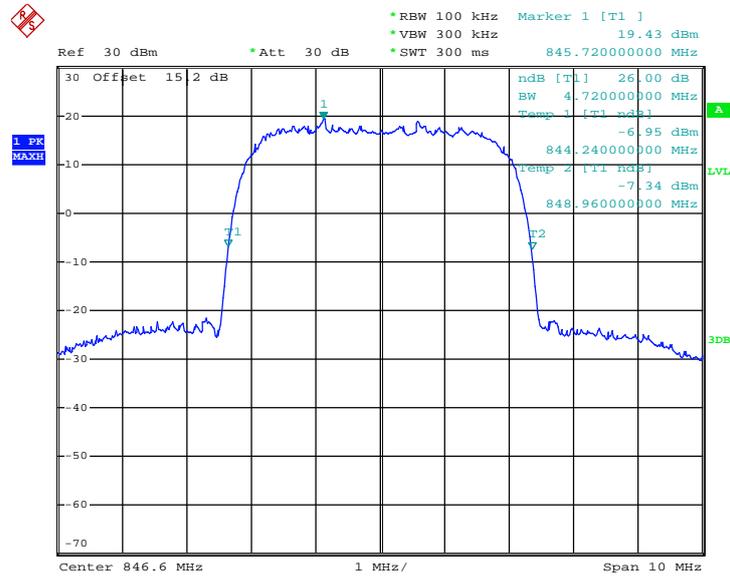


99% Occupied Bandwidth Plot on Channel 4233 (846.6 MHz)



Date: 7.APR.2015 20:17:26

26dB Bandwidth Plot on Channel 4233 (846.6 MHz)

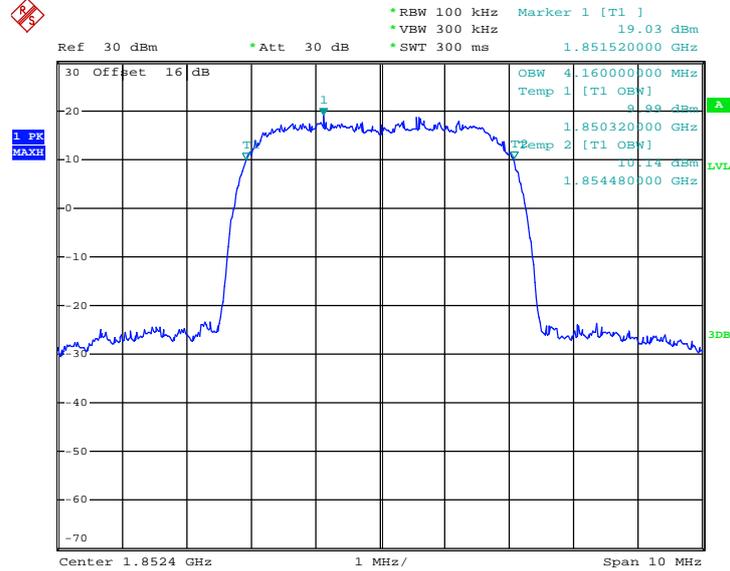


Date: 7.APR.2015 20:16:36



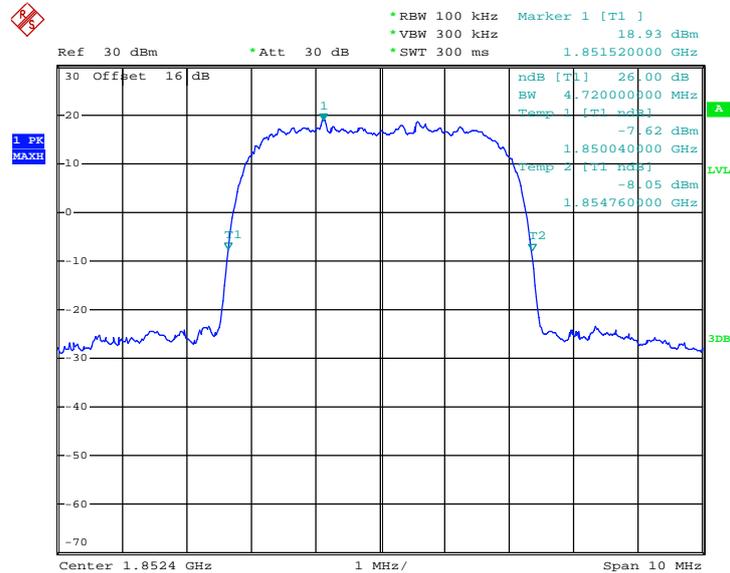
Band :	WCDMA Band II	Test Mode :	RMC 12.2Kbps Link (QPSK)
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99% Occupied Bandwidth Plot on Channel 9262 (1852.4 MHz)



Date: 7.APR.2015 20:47:40

26dB Bandwidth Plot on Channel 9262 (1852.4 MHz)

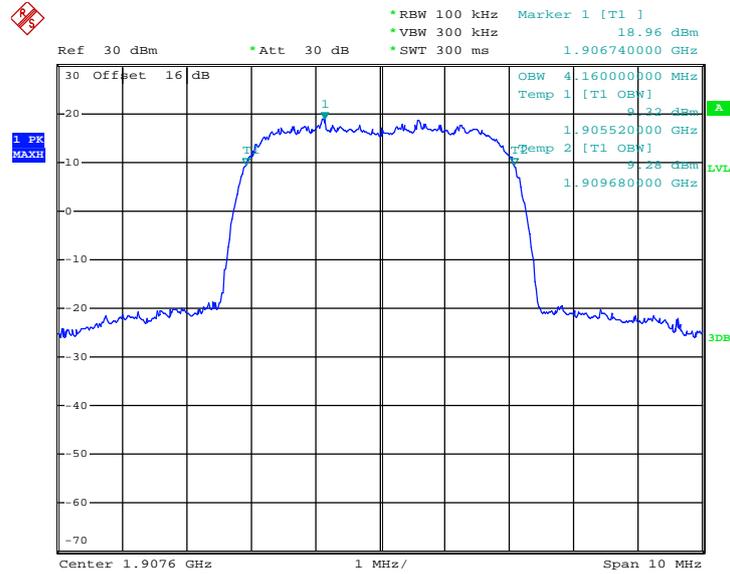


Date: 7.APR.2015 20:44:11



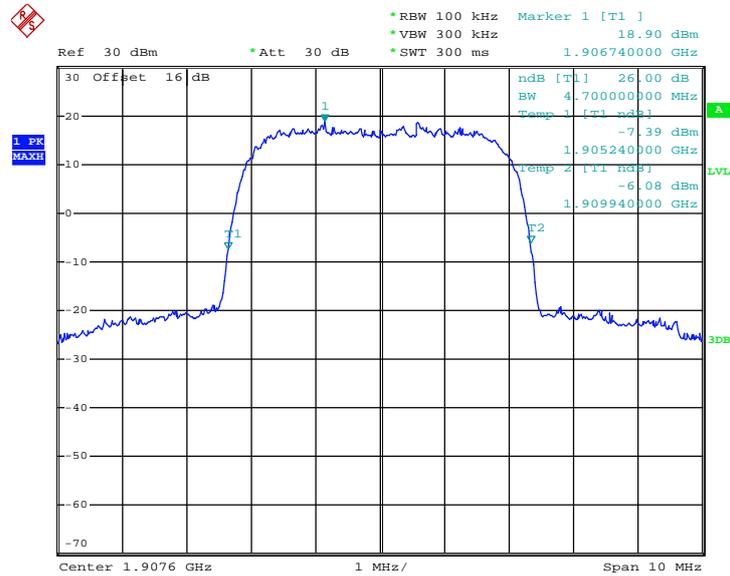


### 99% Occupied Bandwidth Plot on Channel 9538 (1907.6 MHz)



Date: 7.APR.2015 20:45:51

### 26dB Bandwidth Plot on Channel 9538 (1907.6 MHz)



Date: 7.APR.2015 20:45:15

## 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.

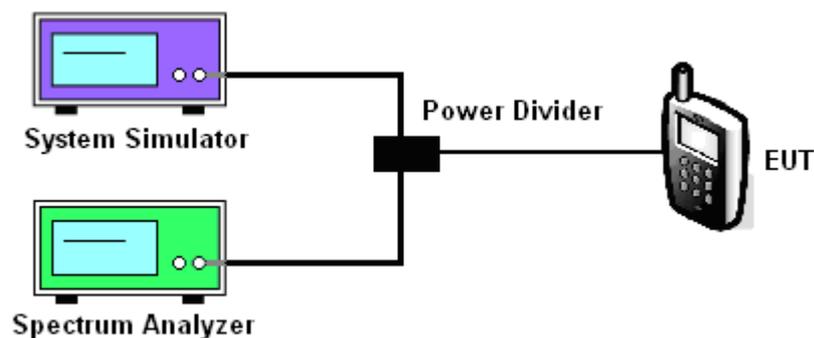
### 3.5.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

### 3.5.3 Test Procedures

1. The testing follows FCC KDB 971168 v02r02 Section 6.0.
2. The EUT was connected to the spectrum analyzer and system simulator via a power divider.
3. The RF output of EUT was connected to the spectrum analyzer by an RF cable and attenuator. The path loss was compensated to the results for each measurement.
4. The band edges of low and high channels for the highest RF powers were measured.
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)  
 $= P(W) - [43 + 10\log(P)] \text{ (dB)}$   
 $= [30 + 10\log(P)] \text{ (dBm)} - [43 + 10\log(P)] \text{ (dB)}$   
 $= -13\text{dBm}.$

### 3.5.4 Test Setup

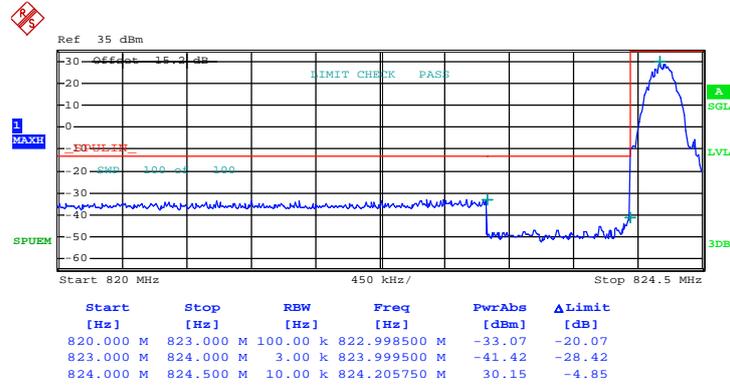




### 3.5.5 Test Result (Plots) of Conducted Band Edge

Band :	GSM850	Test Mode :	GSM Link (GMSK)
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Lower Band Edge Plot on Channel 128 (824.2 MHz)

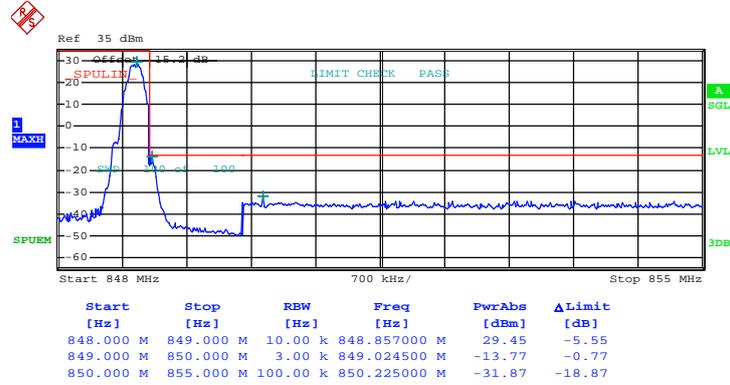


Date: 7.APR.2015 20:00:51



Band :	GSM850	Test Mode :	GSM Link (GMSK)
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Higher Band Edge Plot on Channel 251 (848.8 MHz)

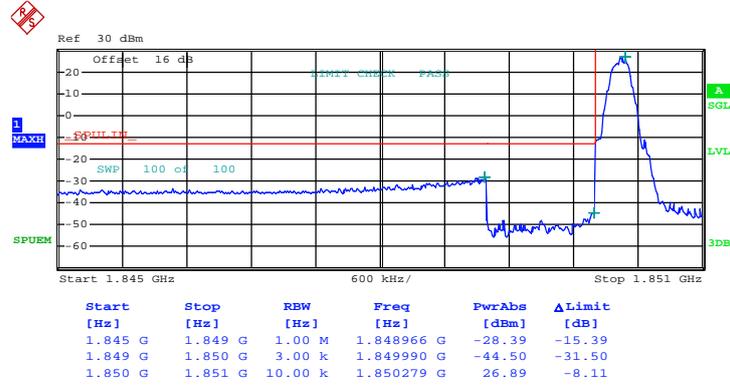


Date: 7.APR.2015 20:08:23



Band :	GSM1900	Test Mode :	GSM Link (GMSK)
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Lower Band Edge Plot on Channel 512 (1850.2 MHz)

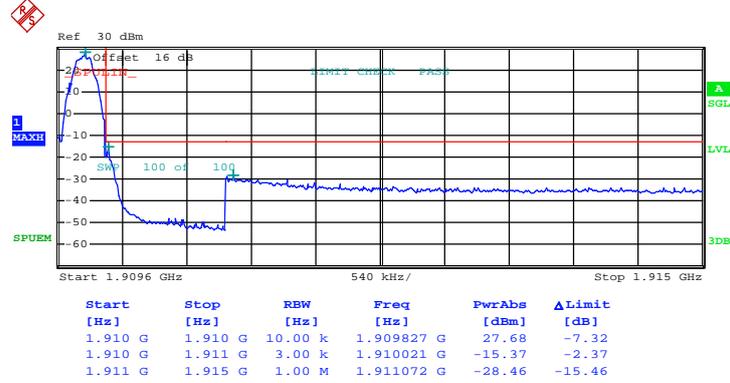


Date: 7.APR.2015 21:24:29



Band :	GSM1900	Test Mode :	GSM Link (GMSK)
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Higher Band Edge Plot on Channel 810 (1909.8 MHz)

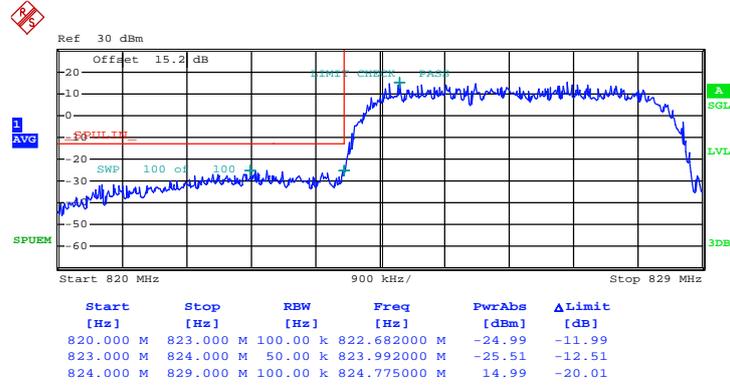


Date: 7.APR.2015 21:28:21



Band :	WCDMA Band V	Test Mode :	RMC 12.2Kbps Link (QPSK)
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Lower Band Edge Plot on Channel 4132 (826.4 MHz)



Date: 7.APR.2015 20:37:30



Band :	WCDMA Band V	Test Mode :	RMC 12.2Kbps Link (QPSK)
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Higher Band Edge Plot on Channel 4233 (846.6 MHz)

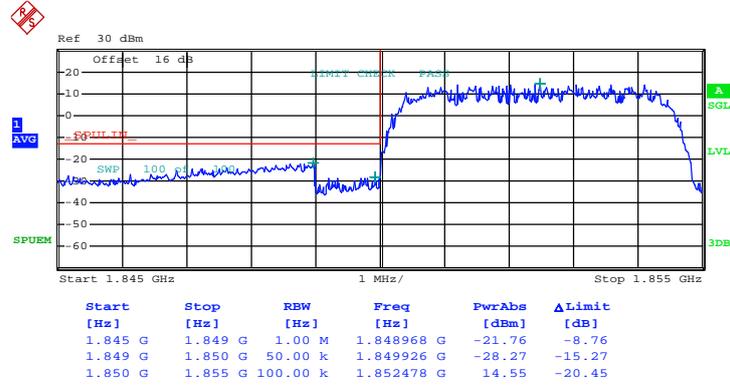


Date: 7.APR.2015 20:39:46



Band :	WCDMA Band II	Test Mode :	RMC 12.2Kbps Link (QPSK)
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Lower Band Edge Plot on Channel 9262 (1852.4 MHz)

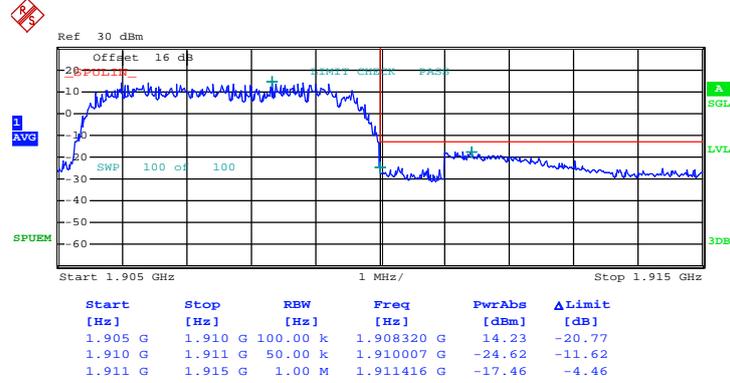


Date: 7.APR.2015 20:56:42



Band :	WCDMA Band II	Test Mode :	RMC 12.2Kbps Link (QPSK)
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Higher Band Edge Plot on Channel 9538 (1907.6 MHz)



Date: 7.APR.2015 20:58:08

## 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.

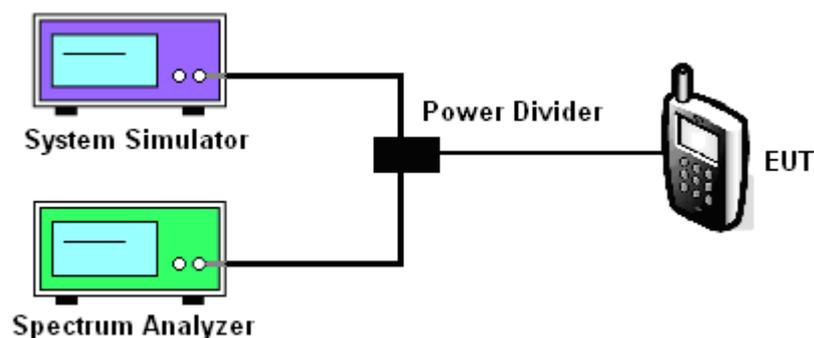
### 3.6.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

### 3.6.3 Test Procedures

1. The testing follows FCC KDB 971168 v02r02 Section 6.0.
2. The EUT was connected to the spectrum analyzer and system simulator via a power divider.
3. The RF output of EUT was connected to the spectrum analyzer by an RF cable and attenuator. The path loss was compensated to the results for each measurement.
4. The middle channel for the highest RF power within the transmitting frequency was measured.
5. The conducted spurious emission for the whole frequency range was taken.
6. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
7. 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)  
 $= -13\text{dBm}$ .

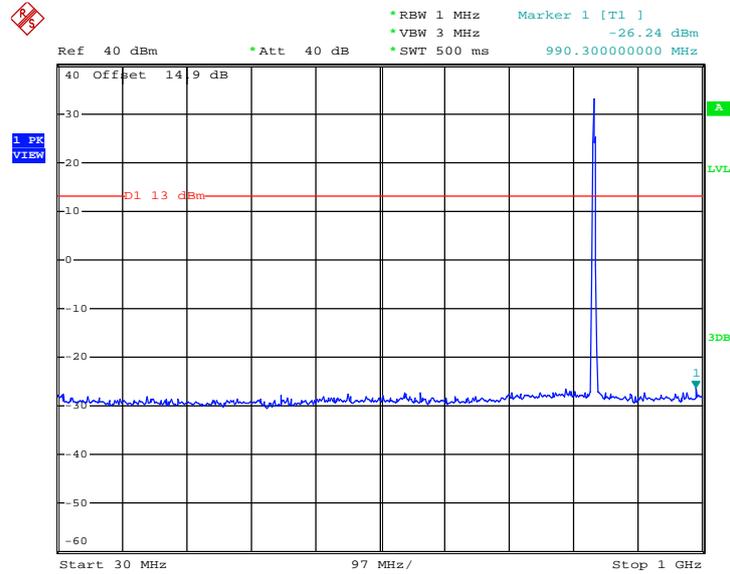
### 3.6.4 Test Setup



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

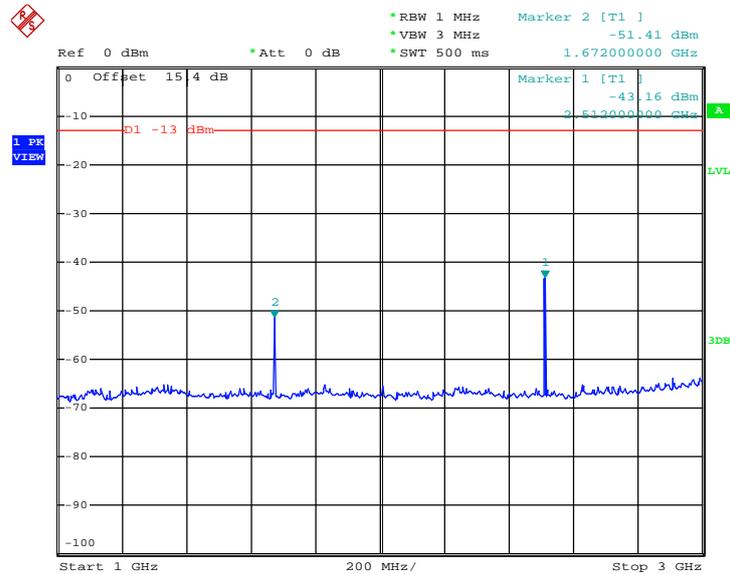
Band :	GSM850	Channel :	CH189
Test Mode :	GSM Link (GMSK)	Frequency :	836.4 MHz

Conducted Spurious Emission Plot between 30MHz ~ 1GHz



Date: 7.APR.2015 19:41:08

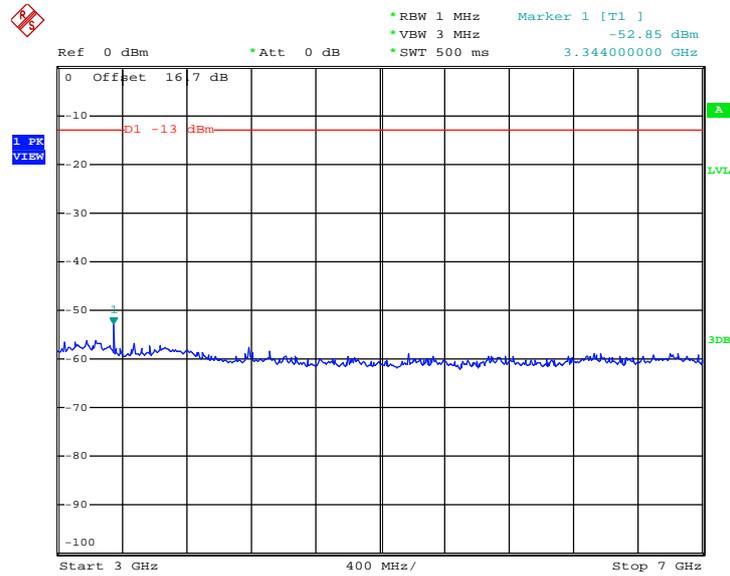
Conducted Spurious Emission Plot between 1GHz ~ 3GHz



Date: 7.APR.2015 19:43:27

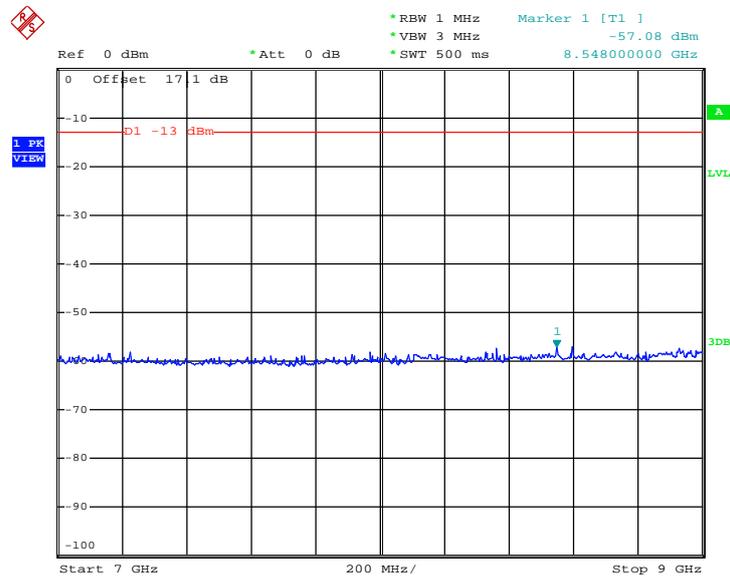


### Conducted Spurious Emission Plot between 3GHz ~ 7GHz



Date: 7.APR.2015 19:49:34

### Conducted Spurious Emission Plot between 7GHz ~ 9GHz

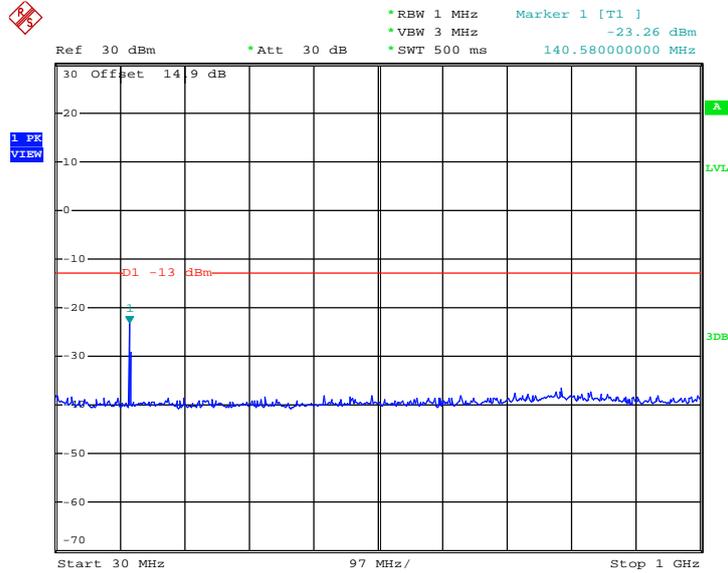


Date: 7.APR.2015 19:47:35



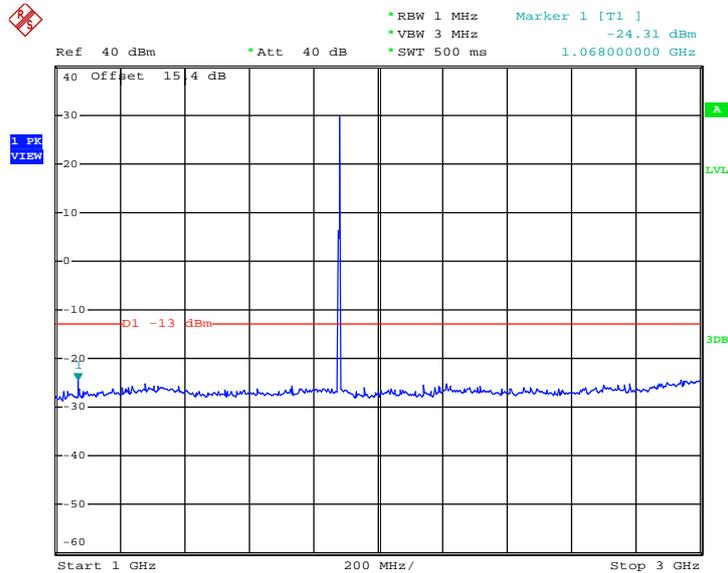
<b>Band :</b>	GSM1900	<b>Channel :</b>	CH661
<b>Test Mode :</b>	GSM Link (GMSK)	<b>Frequency :</b>	1880.0 MHz

Conducted Spurious Emission Plot between 30MHz ~ 1GHz



Date: 7.APR.2015 21:17:04

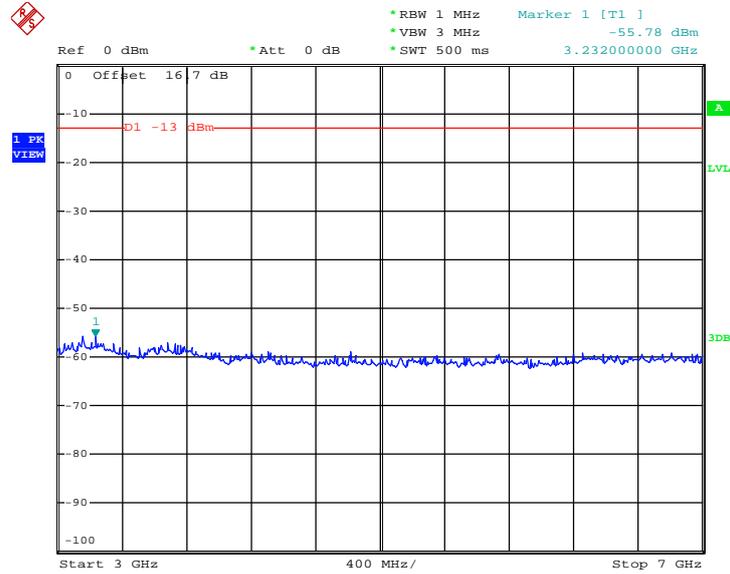
Conducted Spurious Emission Plot between 1GHz ~ 3GHz



Date: 7.APR.2015 21:18:05

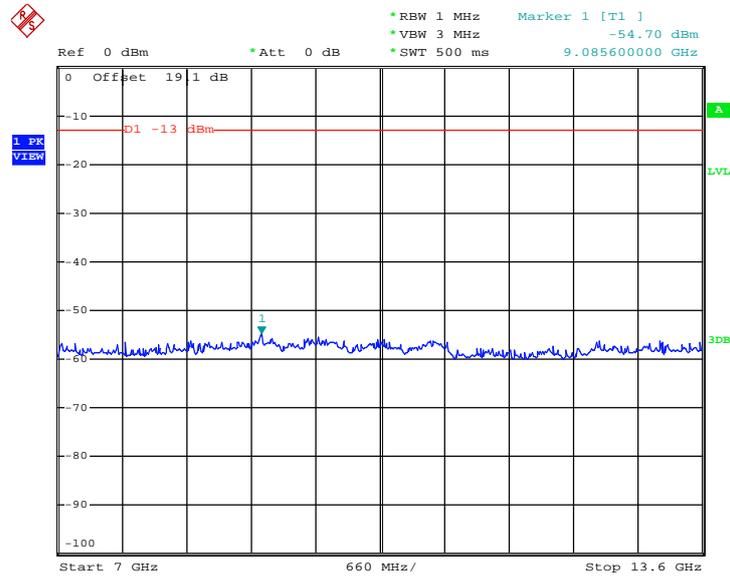


### Conducted Spurious Emission Plot between 3GHz ~ 7GHz



Date: 7.APR.2015 21:18:42

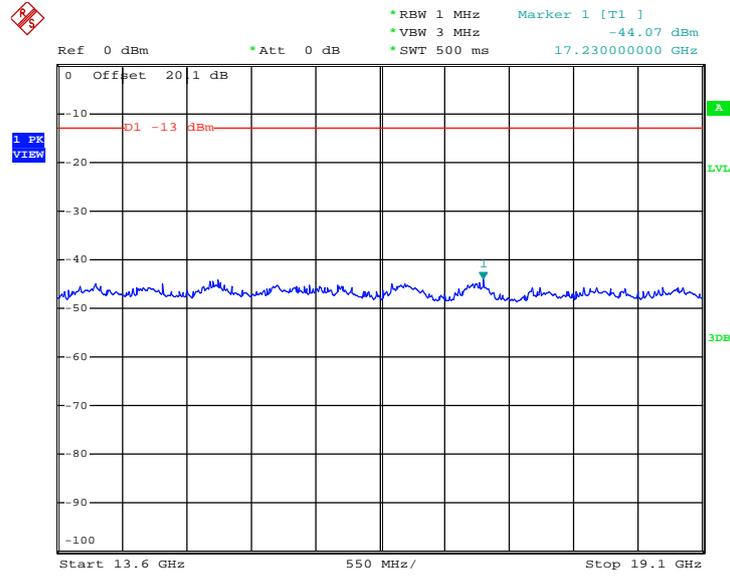
### Conducted Spurious Emission Plot between 7GHz ~ 13.6GHz



Date: 7.APR.2015 21:19:21



Conducted Spurious Emission Plot between 13.6GHz ~ 19.1GHz

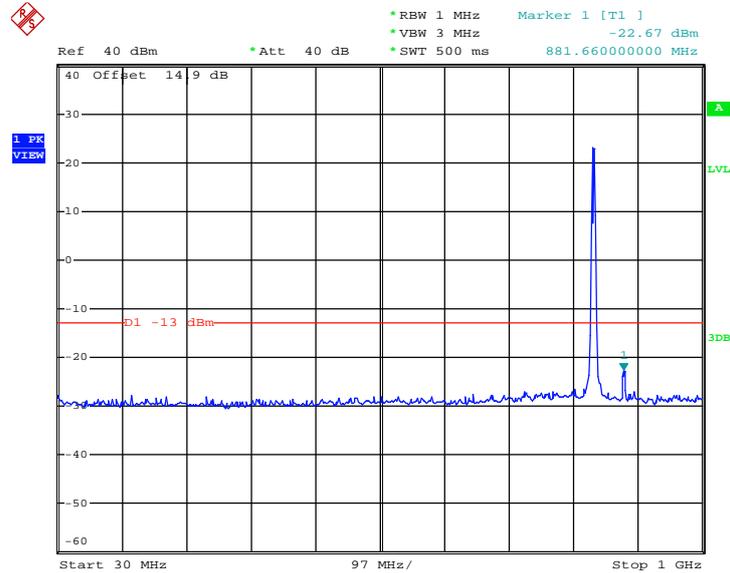


Date: 7.APR.2015 21:20:45



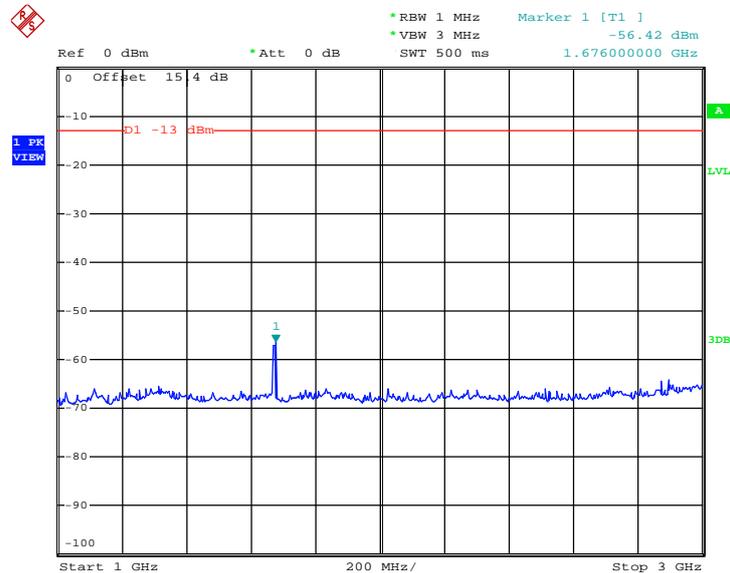
Band :	WCDMA Band V	Channel :	CH4182
Test Mode :	RMC 12.2Kbps Link (QPSK)	Frequency :	836.4 MHz

Conducted Spurious Emission Plot between 30MHz ~ 1GHz



Date: 7.APR.2015 20:22:57

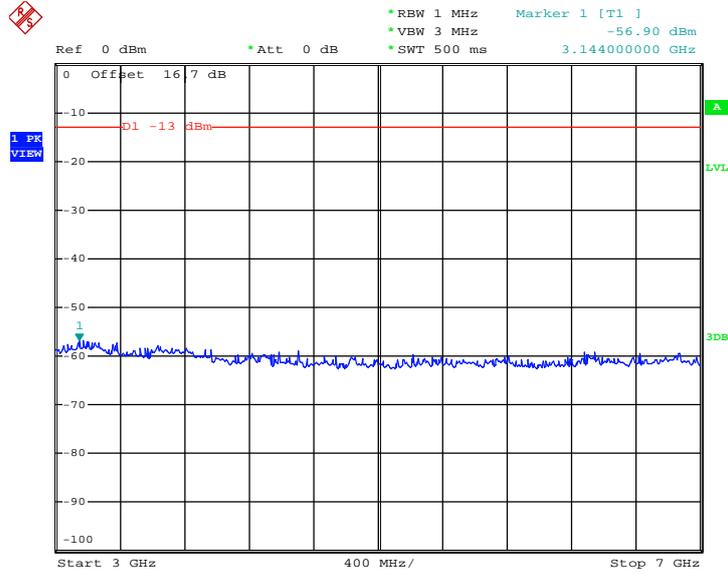
Conducted Spurious Emission Plot between 1GHz ~ 3GHz



Date: 7.APR.2015 20:24:32

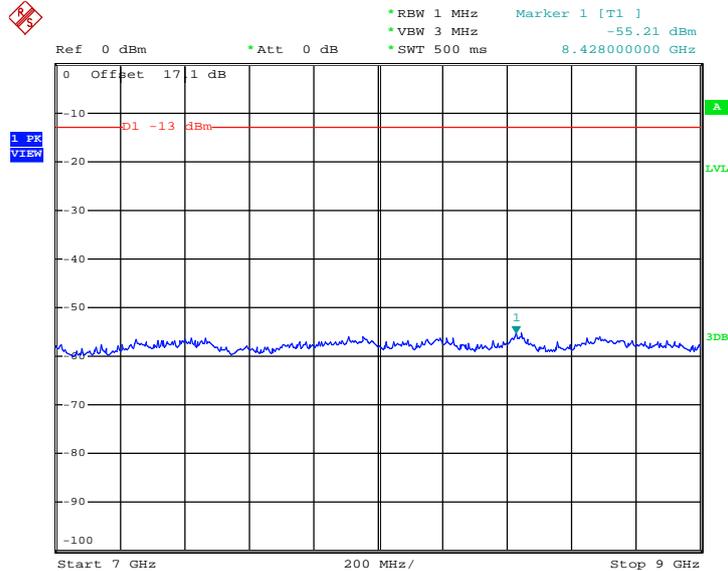


Conducted Spurious Emission Plot between 3GHz ~ 7GHz



Date: 7.APR.2015 20:25:26

Conducted Spurious Emission Plot between 7GHz ~ 9GHz

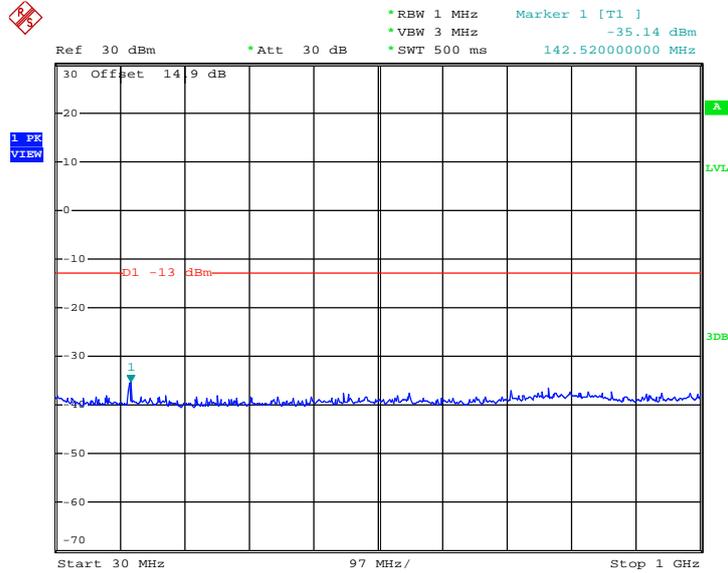


Date: 15.APR.2015 17:35:25



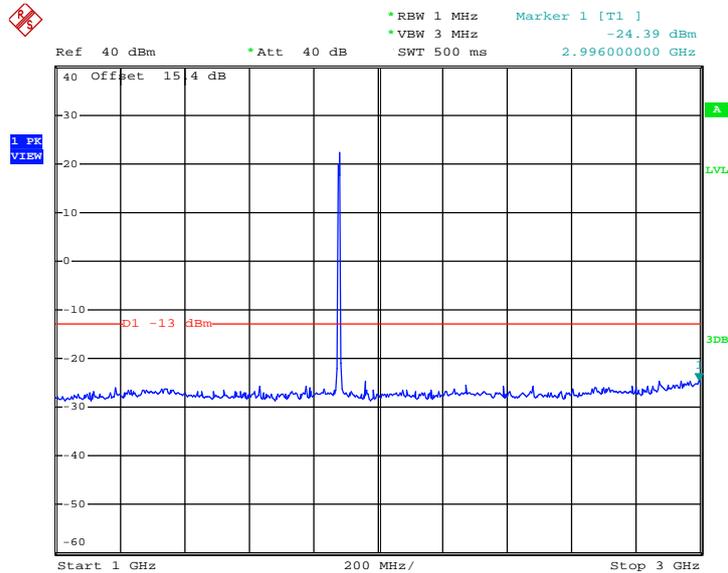
Band :	WCDMA Band II	Channel :	CH9400
Test Mode :	RMC 12.2Kbps Link (QPSK)	Frequency :	1880.0 MHz

Conducted Spurious Emission Plot between 30MHz ~ 1GHz



Date: 7.APR.2015 20:49:37

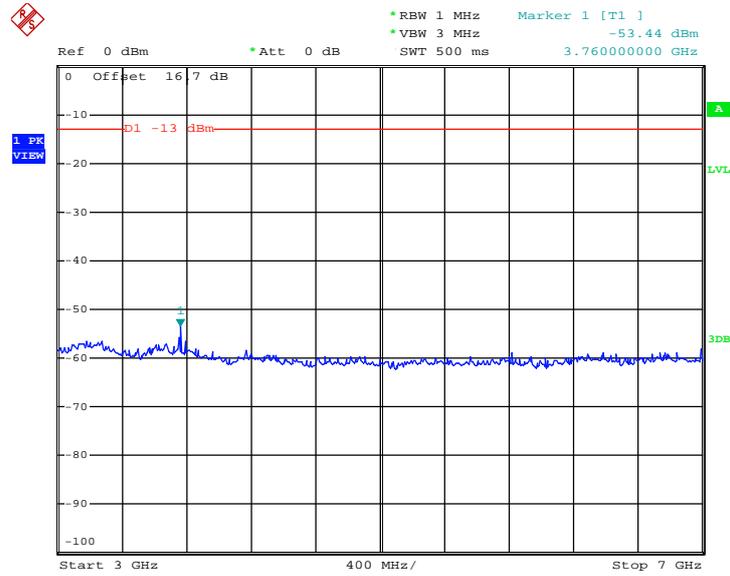
Conducted Spurious Emission Plot between 1GHz ~ 3GHz



Date: 7.APR.2015 20:50:51

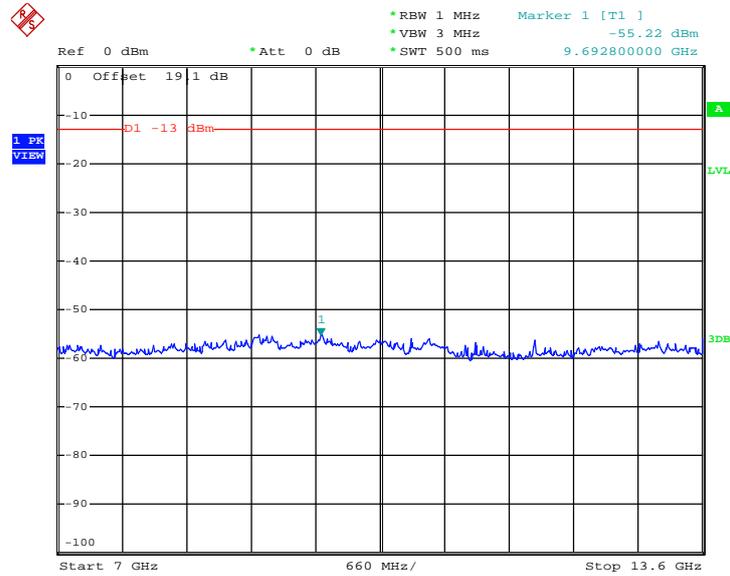


### Conducted Spurious Emission Plot between 3GHz ~ 7GHz



Date: 7.APR.2015 20:51:40

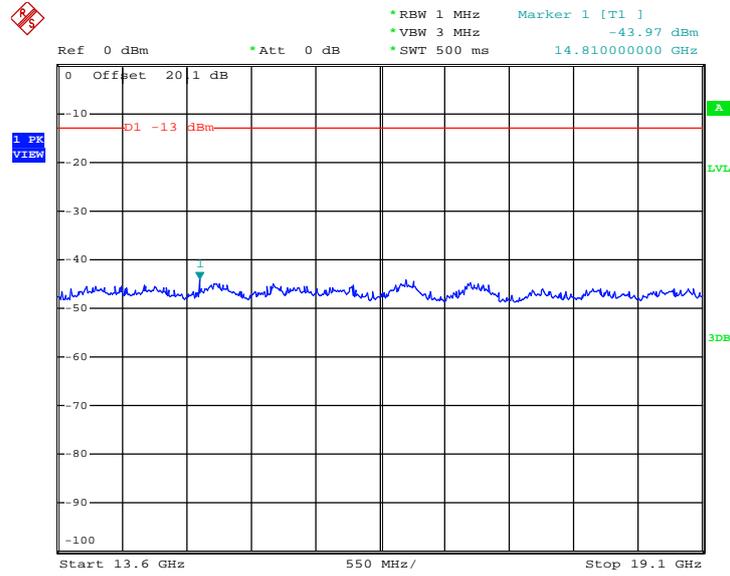
### Conducted Spurious Emission Plot between 7GHz ~ 13.6GHz



Date: 7.APR.2015 20:52:21



Conducted Spurious Emission Plot between 13.6GHz ~ 19.1GHz



Date: 7.APR.2015 20:52:58

## 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

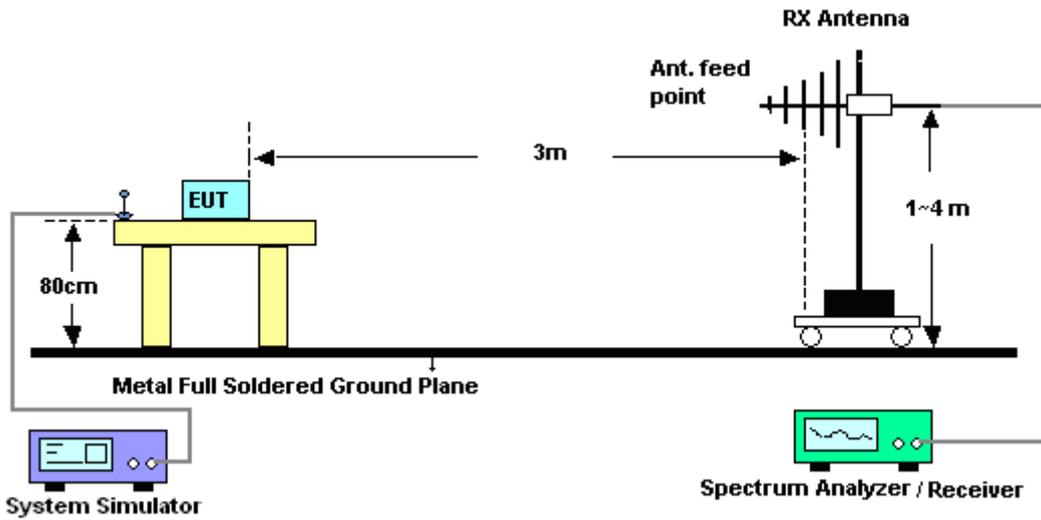
The measuring equipment is listed in the section 4 of this test report.

### 3.7.3 Test Procedures

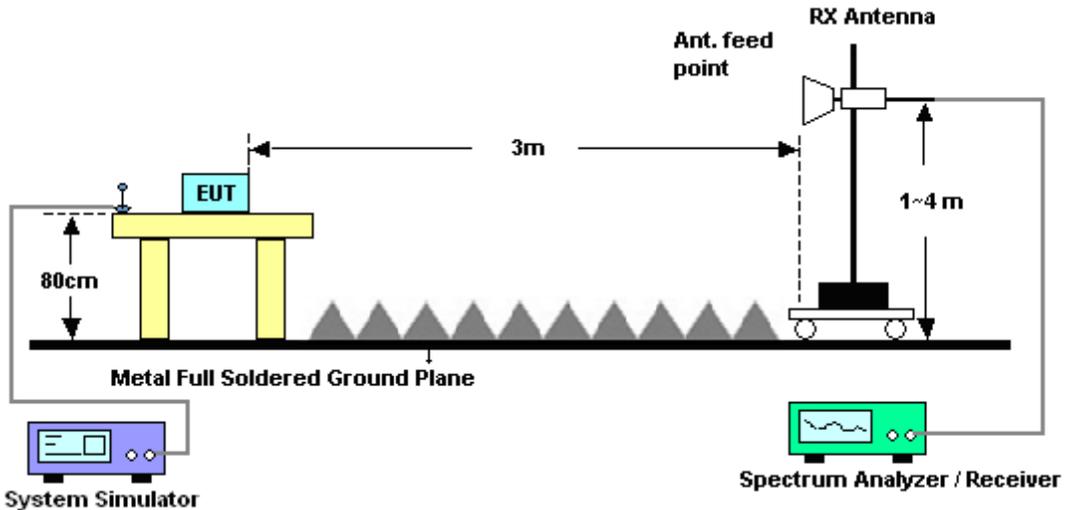
1. The testing follows FCC KDB 971168 v02r02 Section 5.8 and ANSI / TIA-603-C-2004 Section 2.2.12.
2. The EUT was placed on a rotatable wooden table 0.8 meters above the ground.
3. The EUT was set 3 meters from the receiving antenna, which was mounted on the antenna tower.
4. The table was rotated 360 degrees to determine the position of the highest spurious emission.
5. The height of the receiving antenna is varied between one meter and four meters to search for the maximum spurious emission for both horizontal and vertical polarizations.
6. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, taking record of maximum spurious emission.
7. A horn antenna was substituted in place of the EUT and was driven by a signal generator.
8. Tune the output power of signal generator to the same emission level with EUT maximum spurious emission.
9. Taking the record of output power at antenna port.
10. Repeat step 7 to step 8 for another polarization.
11.  $EIRP \text{ (dBm)} = S.G. \text{ Power} - Tx \text{ Cable Loss} + Tx \text{ Antenna Gain}$
12.  $ERP \text{ (dBm)} = EIRP - 2.15$
13. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
14. The limit line is derived from  $43 + 10\log(P)$  dB below the transmitter power P(Watts)  
 $= P(W) - [43 + 10\log(P)] \text{ (dB)}$   
 $= [30 + 10\log(P)] \text{ (dBm)} - [43 + 10\log(P)] \text{ (dB)}$   
 $= -13dBm.$

### 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

<b>Band :</b>	GSM850 for CH128		<b>Temperature :</b>	20~22°C					
<b>Test Mode :</b>	GSM Link (GMSK)		<b>Relative Humidity :</b>	46~48%					
<b>Test Engineer :</b>	Lewis He		<b>Polarization :</b>	Horizontal					
<b>Remark :</b>	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.								
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
1651	-46.78	-13	-33.78	-56.44	-48.53	0.98	4.88	H	Pass
2476	-49.52	-13	-36.52	-62.62	-51.41	1.28	5.33	H	Pass
3301	-58.45	-13	-45.45	-74.88	-61.88	1.54	7.12	H	Pass

<b>Band :</b>	GSM850 for CH128		<b>Temperature :</b>	20~22°C					
<b>Test Mode :</b>	GSM Link (GMSK)		<b>Relative Humidity :</b>	46~48%					
<b>Test Engineer :</b>	Lewis He		<b>Polarization :</b>	Vertical					
<b>Remark :</b>	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.								
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
1651	-54.75	-13	-41.75	-62.41	-56.5	0.98	4.88	V	Pass
2476	-46.73	-13	-33.73	-62	-48.62	1.28	5.33	V	Pass
3295	-61.18	-13	-48.18	-76.48	-64.59	1.54	7.10	V	Pass



<b>Band :</b>	GSM850 for CH189		<b>Temperature :</b>	20~22°C					
<b>Test Mode :</b>	GSM Link (GMSK)		<b>Relative Humidity :</b>	46~48%					
<b>Test Engineer :</b>	Lewis He		<b>Polarization :</b>	Horizontal					
<b>Remark :</b>	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.								
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	-45.58	-13	-32.58	-55.09	-47.26	0.99	4.82	H	Pass
2512	-46.15	-13	-33.15	-59.53	-48.12	1.29	5.41	H	Pass
3352	-59.54	-13	-46.54	-75.75	-63.18	1.56	7.35	H	Pass

<b>Band :</b>	GSM850 for CH189		<b>Temperature :</b>	20~22°C					
<b>Test Mode :</b>	GSM Link (GMSK)		<b>Relative Humidity :</b>	46~48%					
<b>Test Engineer :</b>	Lewis He		<b>Polarization :</b>	Vertical					
<b>Remark :</b>	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.								
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	-55.73	-13	-42.73	-62.74	-57.41	0.99	4.82	V	Pass
2512	-43.29	-13	-30.29	-59.12	-45.26	1.29	5.41	V	Pass
3352	-60.65	-13	-47.65	-75.65	-64.29	1.56	7.35	V	Pass



<b>Band :</b>	GSM850 for CH251		<b>Temperature :</b>	20~22°C					
<b>Test Mode :</b>	GSM Link (GMSK)		<b>Relative Humidity :</b>	46~48%					
<b>Test Engineer :</b>	Lewis He		<b>Polarization :</b>	Horizontal					
<b>Remark :</b>	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.								
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
1702	-47.91	-13	-34.91	-57.41	-49.49	1.00	4.73	H	Pass
2548	-54.34	-13	-41.34	-68.04	-56.32	1.31	5.44	H	Pass
3391	-60.34	-13	-47.34	-76.81	-64.14	1.57	7.52	H	Pass

<b>Band :</b>	GSM850 for CH251		<b>Temperature :</b>	20~22°C					
<b>Test Mode :</b>	GSM Link (GMSK)		<b>Relative Humidity :</b>	46~48%					
<b>Test Engineer :</b>	Lewis He		<b>Polarization :</b>	Vertical					
<b>Remark :</b>	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.								
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
1702	-52.96	-13	-39.96	-60.66	-54.54	1.00	4.73	V	Pass
2548	-52.27	-13	-39.27	-67.69	-54.25	1.31	5.44	V	Pass
3391	-61.08	-13	-48.08	-76.94	-64.88	1.57	7.52	V	Pass



<b>Band :</b>	GSM1900 for CH512		<b>Temperature :</b>	20~22°C					
<b>Test Mode :</b>	GSM Link (GMSK)		<b>Relative Humidity :</b>	46~48%					
<b>Test Engineer :</b>	Lewis He		<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
3700	-57.43	-13	-44.43	-76.05	-64	1.67	8.24	H	Pass
5556	-45.78	-13	-32.78	-69.52	-52.85	2.66	9.72	H	Pass
7400	-49.02	-13	-36.02	-77.89	-58.16	2.46	11.60	H	Pass

<b>Band :</b>	GSM1900 for CH512		<b>Temperature :</b>	20~22°C					
<b>Test Mode :</b>	GSM Link (GMSK)		<b>Relative Humidity :</b>	46~48%					
<b>Test Engineer :</b>	Lewis He		<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
3700	-57.55	-13	-44.55	-76.11	-64.12	1.67	8.24	V	Pass
5556	-52.20	-13	-39.20	-74.35	-59.27	2.66	9.72	V	Pass
7400	-49.72	-13	-36.72	-77.7	-58.86	2.46	11.60	V	Pass



<b>Band :</b>	GSM1900 for CH661	<b>Temperature :</b>	20~22°C						
<b>Test Mode :</b>	GSM Link (GMSK)	<b>Relative Humidity :</b>	46~48%						
<b>Test Engineer :</b>	Lewis He	<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	-57.30	-13	-44.30	-76.26	-63.93	1.69	8.31	H	Pass
5644	-42.57	-13	-29.57	-66.38	-49.62	2.71	9.76	H	Pass
7520	-49.63	-13	-36.63	-78.27	-59.02	2.42	11.81	H	Pass

<b>Band :</b>	GSM1900 for CH661	<b>Temperature :</b>	20~22°C						
<b>Test Mode :</b>	GSM Link (GMSK)	<b>Relative Humidity :</b>	46~48%						
<b>Test Engineer :</b>	Lewis He	<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	-57.69	-13	-44.69	-76.29	-64.32	1.69	8.31	V	Pass
5644	-47.20	-13	-34.20	-69.46	-54.25	2.71	9.76	V	Pass
7520	-49.79	-13	-36.79	-78.08	-59.18	2.42	11.81	V	Pass



<b>Band :</b>	GSM1900 for CH810		<b>Temperature :</b>	20~22°C					
<b>Test Mode :</b>	GSM Link (GMSK)		<b>Relative Humidity :</b>	46~48%					
<b>Test Engineer :</b>	Lewis He		<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
3820	-56.21	-13	-43.21	-75.85	-62.89	1.70	8.38	H	Pass
5732	-50.53	-13	-37.53	-74.68	-57.56	2.76	9.79	H	Pass
7640	-49.34	-13	-36.34	-77.65	-58.84	2.38	11.88	H	Pass

<b>Band :</b>	GSM1900 for CH810		<b>Temperature :</b>	20~22°C					
<b>Test Mode :</b>	GSM Link (GMSK)		<b>Relative Humidity :</b>	46~48%					
<b>Test Engineer :</b>	Lewis He		<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
3820	-57.19	-13	-44.19	-75.84	-63.87	1.70	8.38	V	Pass
5732	-53.71	-13	-40.71	-76.78	-60.74	2.76	9.79	V	Pass
7640	-49.65	-13	-36.65	-77.59	-59.15	2.38	11.88	V	Pass



<b>Band :</b>	WCDMA Band V for CH4132	<b>Temperature :</b>	20~22°C						
<b>Test Mode :</b>	RMC 12.2Kbps Link (QPSK)	<b>Relative Humidity :</b>	46~48%						
<b>Test Engineer :</b>	Lewis He	<b>Polarization :</b>	Horizontal						
<b>Remark :</b>	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.								
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
1654	-63.12	-13	-50.12	-72.83	-64.86	0.98	4.87	H	Pass
2479	-62.70	-13	-49.70	-75.76	-64.6	1.28	5.34	H	Pass
3307	-61.31	-13	-48.31	-77.66	-64.77	1.54	7.15	H	Pass

<b>Band :</b>	WCDMA Band V for CH4132	<b>Temperature :</b>	20~22°C						
<b>Test Mode :</b>	RMC 12.2Kbps Link (QPSK)	<b>Relative Humidity :</b>	46~48%						
<b>Test Engineer :</b>	Lewis He	<b>Polarization :</b>	Vertical						
<b>Remark :</b>	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.								
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
1654	-66.08	-13	-53.08	-73.77	-67.82	0.98	4.87	V	Pass
2482	-58.59	-13	-45.59	-73.58	-60.5	1.29	5.35	V	Pass
3307	-62.38	-13	-49.38	-77.65	-65.84	1.54	7.15	V	Pass



<b>Band :</b>	WCDMA Band V for CH4182	<b>Temperature :</b>	20~22°C						
<b>Test Mode :</b>	RMC 12.2Kbps Link (QPSK)	<b>Relative Humidity :</b>	46~48%						
<b>Test Engineer :</b>	Lewis He	<b>Polarization :</b>	Horizontal						
<b>Remark :</b>	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.								
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
1678	-61.80	-13	-48.80	-71.13	-63.46	0.99	4.80	H	Pass
2509	-61.56	-13	-48.56	-74.88	-63.52	1.29	5.41	H	Pass
3346	-60.68	-13	-47.68	-76.92	-64.3	1.56	7.32	H	Pass

<b>Band :</b>	WCDMA Band V for CH4182	<b>Temperature :</b>	20~22°C						
<b>Test Mode :</b>	RMC 12.2Kbps Link (QPSK)	<b>Relative Humidity :</b>	46~48%						
<b>Test Engineer :</b>	Lewis He	<b>Polarization :</b>	Vertical						
<b>Remark :</b>	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.								
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
1678	-65.82	-13	-52.82	-72.98	-67.48	0.99	4.80	V	Pass
2509	-60.26	-13	-47.26	-75.63	-62.22	1.29	5.41	V	Pass
3346	-61.50	-13	-48.50	-76.83	-65.12	1.56	7.32	V	Pass



<b>Band :</b>	WCDMA Band V for CH4233	<b>Temperature :</b>	20~22°C						
<b>Test Mode :</b>	RMC 12.2Kbps Link (QPSK)	<b>Relative Humidity :</b>	46~48%						
<b>Test Engineer :</b>	Lewis He	<b>Polarization :</b>	Horizontal						
<b>Remark :</b>	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.								
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
1696	-62.55	-13	-49.55	-72.06	-64.15	1.00	4.75	H	Pass
2542	-62.22	-13	-49.22	-75.94	-64.2	1.30	5.43	H	Pass
3385	-60.63	-13	-47.63	-76.98	-64.41	1.57	7.49	H	Pass

<b>Band :</b>	WCDMA Band V for CH4233	<b>Temperature :</b>	20~22°C						
<b>Test Mode :</b>	RMC 12.2Kbps Link (QPSK)	<b>Relative Humidity :</b>	46~48%						
<b>Test Engineer :</b>	Lewis He	<b>Polarization :</b>	Vertical						
<b>Remark :</b>	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.								
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
1696	-65.46	-13	-52.46	-73.26	-67.06	1.00	4.75	V	Pass
2539	-61.26	-13	-48.26	-76.66	-63.24	1.30	5.43	V	Pass
3385	-61.36	-13	-48.36	-76.99	-65.14	1.57	7.49	V	Pass



<b>Band :</b>	WCDMA Band II for CH9262	<b>Temperature :</b>	20~22°C						
<b>Test Mode :</b>	RMC 12.2Kbps Link (QPSK)	<b>Relative Humidity :</b>	46~48%						
<b>Test Engineer :</b>	Lewis He	<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
3704	-57.36	-13	-44.36	-76.03	-63.94	1.67	8.24	H	Pass
5556	-53.71	-13	-40.71	-77.44	-60.78	2.66	9.72	H	Pass
7408	-48.58	-13	-35.58	-77.33	-57.74	2.46	11.62	H	Pass

<b>Band :</b>	WCDMA Band II for CH9262	<b>Temperature :</b>	20~22°C						
<b>Test Mode :</b>	RMC 12.2Kbps Link (QPSK)	<b>Relative Humidity :</b>	46~48%						
<b>Test Engineer :</b>	Lewis He	<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
3704	-57.66	-13	-44.66	-76.18	-64.24	1.67	8.24	V	Pass
5556	-55.51	-13	-42.51	-77.6	-62.58	2.66	9.72	V	Pass
7408	-49.70	-13	-36.70	-77.59	-58.86	2.46	11.62	V	Pass



<b>Band :</b>	WCDMA Band II for CH9400	<b>Temperature :</b>	20~22°C						
<b>Test Mode :</b>	RMC 12.2Kbps Link (QPSK)	<b>Relative Humidity :</b>	46~48%						
<b>Test Engineer :</b>	Lewis He	<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	-57.05	-13	-44.05	-76.05	-63.68	1.69	8.31	H	Pass
5640	-52.90	-13	-39.90	-76.62	-59.95	2.71	9.76	H	Pass
7520	-48.81	-13	-35.81	-77.44	-58.2	2.42	11.81	H	Pass

<b>Band :</b>	WCDMA Band II for CH9400	<b>Temperature :</b>	20~22°C						
<b>Test Mode :</b>	RMC 12.2Kbps Link (QPSK)	<b>Relative Humidity :</b>	46~48%						
<b>Test Engineer :</b>	Lewis He	<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	-57.37	-13	-44.37	-75.96	-64	1.69	8.31	V	Pass
5640	-54.50	-13	-41.50	-76.77	-61.55	2.71	9.76	V	Pass
7520	-49.49	-13	-36.49	-77.81	-58.88	2.42	11.81	V	Pass



<b>Band :</b>	WCDMA Band II for CH9538	<b>Temperature :</b>	20~22°C						
<b>Test Mode :</b>	RMC 12.2Kbps Link (QPSK)	<b>Relative Humidity :</b>	46~48%						
<b>Test Engineer :</b>	Lewis He	<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
3816	-56.37	-13	-43.37	-75.96	-63.05	1.70	8.38	H	Pass
5724	-52.95	-13	-39.95	-76.99	-59.99	2.75	9.79	H	Pass
7632	-48.37	-13	-35.37	-76.77	-57.86	2.39	11.88	H	Pass

<b>Band :</b>	WCDMA Band II for CH9538	<b>Temperature :</b>	20~22°C						
<b>Test Mode :</b>	RMC 12.2Kbps Link (QPSK)	<b>Relative Humidity :</b>	46~48%						
<b>Test Engineer :</b>	Lewis He	<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
3816	-57.16	-13	-44.16	-75.93	-63.84	1.70	8.38	V	Pass
5724	-53.22	-13	-40.22	-76.33	-60.26	2.75	9.79	V	Pass
7632	-49.38	-13	-36.38	-77.31	-58.87	2.39	11.88	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

The measuring equipment is listed in the section 4 of this test report.

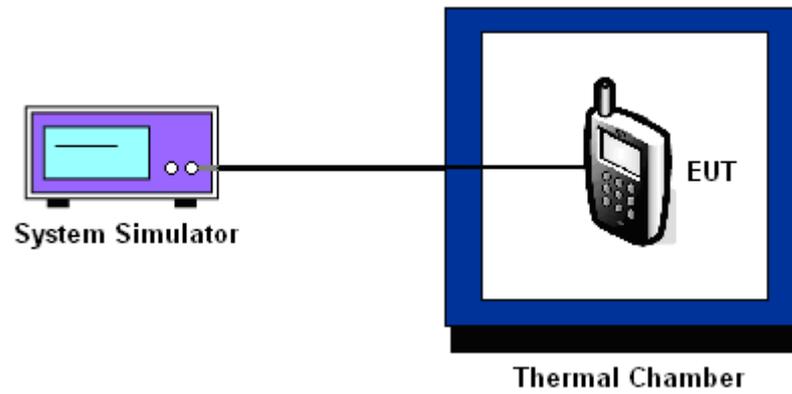
### 3.8.3 Test Procedures for Temperature Variation

1. The testing follows FCC KDB 971168 v02r02 Section 9.0.
2. The EUT was set up in the thermal chamber and connected with the system simulator.
3. 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.
4. With power OFF, the temperature was raised in  $10^{\circ}\text{C}$  steps 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 testing follows FCC KDB 971168 v02r02 Section 9.0.
2. The EUT was placed in a temperature chamber at  $25\pm 5^{\circ}\text{C}$  and connected with the system simulator.
3. The power supply voltage to the EUT was varied from BEP to 115% of the nominal value measured at the input to the EUT.
4. The variation in frequency was measured for the worst case.

### 3.8.5 Test Setup





3.8.6 Test Result of Temperature Variation

Band :	GSM 850	Channel :	189
Limit (ppm) :	2.5	Frequency :	836.4 MHz

Temperature (°C)	GSM		Result
	Freq. Dev. (Hz)	Deviation (ppm)	
50	-20	0.0347	PASS
40	23	0.0167	
30	16	0.0084	
20(Ref.)	9	0.0000	
10	-14	0.0275	
0	-18	0.0323	
-10	10	0.0012	
-20	13	0.0048	
-30	-22	0.0371	

Band :	GSM 1900	Channel :	661
Limit (ppm) :	within authorized band	Frequency :	1880.0 MHz

Temperature (°C)	GSM		Result
	Freq. Dev. (Hz)	Deviation (ppm)	
50	32	0.0074	PASS
40	27	0.0048	
30	-22	0.0213	
20(Ref.)	18	0.0000	
10	21	0.0016	
0	-25	0.0229	
-10	26	0.0043	
-20	-25	0.0229	
-30	-33	0.0271	

Note: The frequency fundamental emissions stay within the authorized frequency block based on the frequency deviation measured is small.



<b>Band :</b>	WCDMA Band V	<b>Channel :</b>	4182
<b>Limit (ppm) :</b>	2.5	<b>Frequency :</b>	836.4 MHz

Temperature (°C)	RMC 12.2Kbps		Result
	Freq. Dev. (Hz)	Deviation (ppm)	
50	-28	0.0143	PASS
40	-26	0.0120	
30	-20	0.0048	
20(Ref.)	-16	0.0000	
10	18	0.0407	
0	-12	0.0048	
-10	-23	0.0084	
-20	8	0.0287	
-30	20	0.0430	

<b>Band :</b>	WCDMA Band II	<b>Channel :</b>	9400
<b>Limit (ppm) :</b>	within authorized band	<b>Frequency :</b>	1880.0 MHz

Temperature (°C)	RMC 12.2Kbps		Result
	Freq. Dev. (Hz)	Deviation (ppm)	
50	-33	0.0309	PASS
40	-27	0.0277	
30	-23	0.0255	
20(Ref.)	25	0.0000	
10	20	0.0027	
0	-24	0.0261	
-10	-30	0.0293	
-20	19	0.0032	
-30	-35	0.0319	

Note: The frequency fundamental emissions stay within the authorized frequency block based on the frequency deviation measured is small.



3.8.7 Test Result of Voltage Variation

Band & Channel	Mode	Voltage (Volt)	Freq. Dev. (Hz)	Deviation (ppm)	Limit (ppm)	Result
GSM 850 CH189	GSM	4.3	-19	0.0335	2.5	PASS
		3.8	7	0.0024		
		BEP	-15	0.0287		
GSM 1900 CH661	GSM	4.3	17	0.0005	(Note 3.)	
		3.8	10	0.0043		
		BEP	14	0.0021		
WCDMA Band V CH4182	RMC 12.2Kbps	4.3	9	0.0299	2.5	
		3.8	-6	0.0120		
		BEP	-11	0.0060		
WCDMA Band II CH9400	RMC 12.2Kbps	4.3	-11	0.0191	(Note 3.)	
		3.8	-12	0.0197		
		BEP	16	0.0048		

Note:

1. Normal Voltage = 3.8V.
2. Battery End Point (BEP) = 3.5 V.
3. The frequency fundamental emissions stay within the authorized frequency block based on the frequency deviation measured is small.



## 4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	R&S	FSP40	100319	9kHz~40GHz	Oct. 28, 2014	Apr. 07, 2015~ Apr. 15, 2015	Oct. 27, 2015	Conducted (TH01-KS)
Thermal Chamber	Ten Billion	TTC-B3S	TBN-960502	-40~+150°C	Oct. 25, 2014	Apr. 07, 2015~ Apr. 15, 2015	Oct. 24, 2015	Conducted (TH01-KS)
Amplifier	SONOMA	310N	187311	9kHz~1GHz	Nov. 24, 2014	Apr. 16, 2015~ Apr. 17, 2015	Nov. 23, 2015	Radiation (03CH10-HY)
Base Station	Anritsu	MT8820C	6201432817	GSM/GPRS/WCD MA/LTE	Oct. 28, 2014	Apr. 16, 2015~ Apr. 17, 2015	Oct. 27, 2016	Radiation (03CH10-HY)
Bilog Antenna	TESEQ	CBL 6111D	35413	30MHz~1GHz	Oct. 24, 2014	Apr. 16, 2015~ Apr. 17, 2015	Oct. 23, 2015	Radiation (03CH10-HY)
Horn Antenna	SCHWARZBEC K	BBHA 9120 D	9120D-1325	1GHz ~ 18GHz	Oct. 03, 2014	Apr. 16, 2015~ Apr. 17, 2015	Oct. 02, 2015	Radiation (03CH10-HY)
Hygrometer	TECPEL	DTM-303B	TP140320	N/A	Nov. 17, 2014	Apr. 16, 2015~ Apr. 17, 2015	Nov. 16, 2015	Radiation (03CH10-HY)
Preamplifier	Keysight	83017A	MY53270078	1GHz~26.5GHz	Nov. 20, 2014	Apr. 16, 2015~ Apr. 17, 2015	Nov. 19, 2015	Radiation (03CH10-HY)
Spectrum Analyzer	Keysight	N9010A	MY54200485	10Hz ~ 44GHZ	Oct. 14, 2014	Apr. 16, 2015~ Apr. 17, 2015	Oct. 13, 2015	Radiation (03CH10-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY249564 MY249524	30MHz~1GHz	Nov. 06, 2014	Apr. 16, 2015~ Apr. 17, 2015	Nov. 05, 2015	Radiation (03CH10-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY249564 MY249524	1GHz~25GHz	Nov. 06, 2014	Apr. 16, 2015~ Apr. 17, 2015	Nov. 05, 2015	Radiation (03CH10-HY)
Controller	EMEC	EM 1000	N/A	Control Turn table & Ant Mast	N/A	Apr. 16, 2015~ Apr. 17, 2015	N/A	Radiation (03CH10-HY)
Antenna Mast	EMEC	AM-BS-4500 -B	N/A	1~4m	N/A	Apr. 16, 2015~ Apr. 17, 2015	N/A	Radiation (03CH10-HY)
Turn Table	EMEC	TT 2200	N/A	0-360 degree	N/A	Apr. 16, 2015~ Apr. 17, 2015	N/A	Radiation (03CH10-HY)



Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	R&S	FSP 7	100819	9kHz~7GHz	May 04, 2014	Apr. 15, 2015	May 03, 2015	ERP/EIRP (OTA01-KS)
Switch Control Manframe	Agilent	3499A	MY42005452	N/A	N/A	Apr. 15, 2015	N/A	ERP/EIRP (OTA01-KS)
Dual 1-to-6(4) MW MUX	Agilent	N2276A	MY42000841	N/A	N/A	Apr. 15, 2015	N/A	ERP/EIRP (OTA01-KS)
Microwave Switch	Agilent	44476A	MY42002573	N/A	N/A	Apr. 15, 2015	N/A	ERP/EIRP (OTA01-KS)
Microwave Switch	Agilent	44476A	MY42002586	N/A	N/A	Apr. 15, 2015	N/A	ERP/EIRP (OTA01-KS)
Diagonal Dual Polarized Horn	ETS-Lindgren	3164-04	00066993	700MHz~6GHz	N/A	Apr. 15, 2015	N/A	ERP/EIRP (OTA01-KS)
Multi-Devices Controller	ETS-Lindgren	2090-OPT1	00066604	N/A	N/A	Apr. 15, 2015	N/A	ERP/EIRP (OTA01-KS)
Conical Log Spiral (Small)	ETS-Lindgren	3102	00066951	1~10GHz	N/A	Apr. 15, 2015	N/A	ERP/EIRP (OTA01-KS)
Turn Table	ETS-Lindgren	2088	N/A	Resolution :0.1deg	N/A	Apr. 15, 2015	N/A	ERP/EIRP (OTA01-KS)
Limiting Amplifier	ETS-lindgren	109643	920326	10MHz~2.5GHz	N/A	Apr. 15, 2015	N/A	ERP/EIRP (OTA01-KS)
EMQuest	ETS-Lindgren	EMQ-100	1125	N/A	N/A	Apr. 15, 2015	N/A	ERP/EIRP (OTA01-KS)
Medium Duty Holder	ETS-Lindgren	2015	N/A	N/A	N/A	Apr. 15, 2015	N/A	ERP/EIRP (OTA01-KS)



## 5 Uncertainty of Evaluation

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

Measuring Uncertainty for a Level of Confidence of 95% ( $U = 2Uc(y)$ )	4.9 dB
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