



# FCC RF Test Report

**APPLICANT** : Xiaomi Inc.  
**EQUIPMENT** : Mobile Phone  
**BRAND NAME** : MI  
**MODEL NAME** : 2014215  
**FCC ID** : 2AFZY-MI4215  
**STANDARD** : FCC 47 CFR Part 2, 22(H), 24(E)  
**CLASSIFICATION** : PCS Licensed Transmitter Held to Ear (PCE)

The product was received on Sep. 30, 2015 and testing was completed on Oct. 19, 2015. We, SPORTON INTERNATIONAL (SHENZHEN) INC., would like to declare that the tested sample has been evaluated in accordance with the test procedures given in ANSI / TIA / EIA-603-D-2010 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 (SHENZHEN) INC., the test report shall not be reproduced except in full.

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## TABLE OF CONTENTS

<b>REVISION HISTORY.....</b>	<b>3</b>
<b>SUMMARY OF TEST RESULT .....</b>	<b>4</b>
<b>1 GENERAL DESCRIPTION .....</b>	<b>5</b>
1.1 Applicant.....	5
1.2 Manufacturer .....	5
1.3 Product Feature of Equipment Under Test .....	5
1.4 Product Specification subjective to this standard.....	6
1.5 Modification of EUT .....	6
1.6 Maximum ERP/EIRP Power, Frequency Tolerance, and Emission Designator .....	7
1.7 Testing Location .....	7
1.8 Applicable Standards .....	8
<b>2 TEST CONFIGURATION OF EQUIPMENT UNDER TEST .....</b>	<b>9</b>
2.1 Test Mode.....	9
2.2 Connection Diagram of Test System .....	11
2.3 Support Unit used in test configuration .....	12
2.4 Measurement Results Explanation Example .....	12
<b>3 TEST RESULT.....</b>	<b>13</b>
3.1 Conducted Output Power Measurement.....	13
3.2 Peak-to-Average Ratio .....	15
3.3 Effective Radiated Power and Effective Isotropic Radiated Power Measurement .....	23
3.4 99% Occupied Bandwidth and 26dB Bandwidth Measurement.....	27
3.5 Band Edge Measurement.....	48
3.6 Conducted Spurious Emission Measurement.....	55
3.7 Field Strength of Spurious Radiation Measurement .....	74
3.8 Frequency Stability Measurement.....	82
<b>4 LIST OF MEASURING EQUIPMENT .....</b>	<b>87</b>
<b>5 UNCERTAINTY OF EVALUATION .....</b>	<b>88</b>

### APPENDIX A. SETUP PHOTOGRAPHS



## REVISION HISTORY



## SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.1	§2.1046	Conducted Output Power	Reporting Only	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	Occupied Bandwidth	Reporting Only	PASS	-
3.5	§2.1051 §22.917(a) §24.238(a)	Band Edge Measurement	< 43+10log10(P[Watts])	PASS	-
3.6	§2.1051 §22.917(a) §24.238(a)	Conducted Emission	< 43+10log10(P[Watts])	PASS	-
3.7	§2.1053 §22.917(a) §24.238(a)	Field Strength of Spurious Radiation	< 43+10log10(P[Watts])	PASS	Under limit 31.90 dB at 2510.000 MHz
3.8	§2.1055 §22.355	Frequency Stability for Temperature & Voltage	< 2.5 ppm for Part 22H Within Authorized Band	PASS	-
	§2.1055 §24.235				



## 1 General Description

### 1.1 Applicant

**Xiaomi Inc.**

The Rainbow City of China Resources, NO.68, Qinghe Middle Street, Haidian District, Beijing, China

### 1.2 Manufacturer

**Xiaomi Inc.**

The Rainbow City of China Resources, NO.68, Qinghe Middle Street, Haidian District, Beijing, China

### 1.3 Product Feature of Equipment Under Test

Product Feature	
<b>Equipment</b>	Mobile Phone
<b>Brand Name</b>	MI
<b>Model Name</b>	2014215
<b>FCC ID</b>	2AFZY-MI4215
<b>EUT supports Radios application</b>	GSM/GPRS/EGPRS/WCDMA/HSPA/DC-HSDPA/ HSPA+(16QAM uplink is not supported) WLAN 2.4GHz 802.11b/g/n HT20 WLAN 5GHz 802.11a/n HT20/HT40/ WLAN 5GHz 802.11ac VHT20/VHT40/VHT80/ Bluetooth v3.0+EDR/Bluetooth v4.0 LE
<b>IMEI Code</b>	Conducted:867079021334053 Radiation: 867079021361494 ERP/EIRP: 867079021373739
<b>HW Version</b>	3501X4M000B
<b>SW Version</b>	MIUI 6
<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 : 31.98 dBm GSM1900 : 29.02 dBm WCDMA Band V : 22.76 dBm WCDMA Band II : 21.70 dBm
<b>Antenna Type</b>	LDS Antenna
<b>Type of Modulation</b>	GSM: GMSK GPRS: GMSK EGPRS : GMSK/8PSK WCDMA: QPSK (Uplink) HSDPA/DC-HSDPA: QPSK (Uplink) HSUPA: QPSK (Uplink) HSPA+:16QAM (16QAM uplink is not supported) DC-HSDPA : 64QAM

## 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	0.3334	0.0610	245KGXW
Part 22	GSM850 EDGE class 8	8PSK	0.1169	0.0681	246KG7W
Part 22	WCDMA Band V RMC 12.2Kbps	QPSK	0.0433	0.0132	4M14F9W
Part 24	GSM1900 GSM	GMSK	1.1482	0.0564	243KGXW
Part 24	GSM1900 EDGE class 8	8PSK	0.4775	0.0691	247KG7W
Part 24	WCDMA Band II RMC 12.2Kbps	QPSK	0.2884	0.0149	4M15F9W

## 1.7 Testing Location

Test Site	SPORTON INTERNATIONAL (SHENZHEN) INC.
Test Site Location	1F & 2F, Building A, Morning Business Center, No. 4003 ShiGu Rd., Xili Town, Nanshan District, Shenzhen, Guangdong, P. R. China TEL: +86-755-8637-9589 FAX: +86-755-8637-9595
Test Site No.	<b>Sporton Site No.</b>
	TH01-SZ

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



## 1.8 Applicable Standards

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

- 47 CFR Part 2, 22(H), 24(E)
- ANSI / TIA / EIA-603-D-2010
- 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 as following frequency range:

1. 30 MHz to 10th harmonic for GSM850 and WCDMA Band V.
2. 30 MHz to 10th harmonic for GSM1900 and WCDMA Band II.

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	<ul style="list-style-type: none"><li>■ GSM Link</li><li>■ EDGE class 8 Link</li></ul>	<ul style="list-style-type: none"><li>■ GSM Link</li><li>■ EDGE class 8 Link</li></ul>
GSM 1900	<ul style="list-style-type: none"><li>■ GSM Link</li><li>■ EDGE class 8 Link</li></ul>	<ul style="list-style-type: none"><li>■ GSM Link</li><li>■ EDGE class 8 Link</li></ul>
WCDMA Band V	<ul style="list-style-type: none"><li>■ RMC 12.2Kbps Link</li></ul>	<ul style="list-style-type: none"><li>■ RMC 12.2Kbps Link</li></ul>
WCDMA Band II	<ul style="list-style-type: none"><li>■ RMC 12.2Kbps Link</li></ul>	<ul style="list-style-type: none"><li>■ RMC 12.2Kbps Link</li></ul>

**Note:** The maximum power levels are chosen to test as the worst case configuration as follows:

GSM mode for GMSK modulation,

EDGE multi-slot class 8 mode for 8PSK modulation,

RMC 12.2Kbps mode for WCDMA band V,

RMC 12.2Kbps mode for WCDMA band II, only these modes were used for all tests.



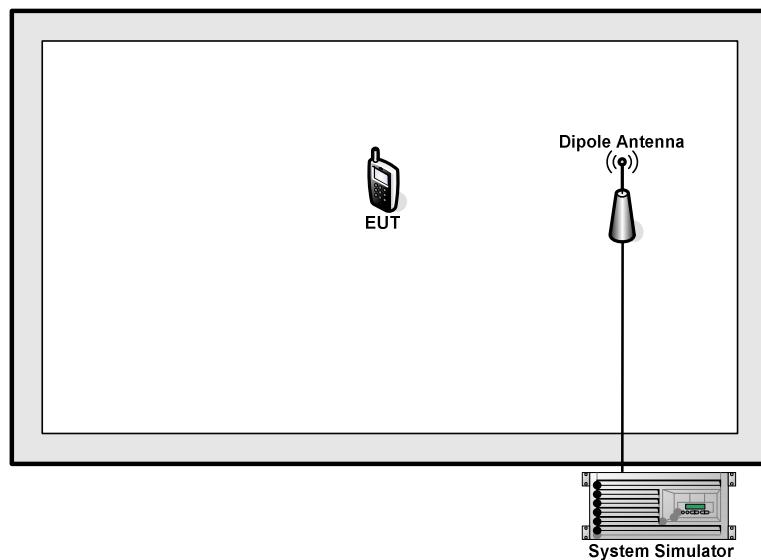
## Conducted Power Measurement Results:

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	31.98	31.95	31.86	28.86	28.97	29.02
GRPS class 8	31.95	31.90	31.82	28.81	28.94	29.00
GRPS class 10	30.37	30.36	30.30	27.23	27.41	27.48
GRPS class 11	28.78	28.74	28.70	25.40	25.56	25.72
GRPS class 12	27.64	27.61	27.50	24.20	24.38	24.45
EGPRS class 8	25.72	26.07	26.00	24.89	24.98	25.07
EGPRS class 10	24.26	24.48	24.57	23.22	23.32	23.40
EGPRS class 11	22.46	22.69	22.77	21.94	21.99	22.14
EGPRS class 12	21.14	21.30	21.30	20.53	20.58	20.71

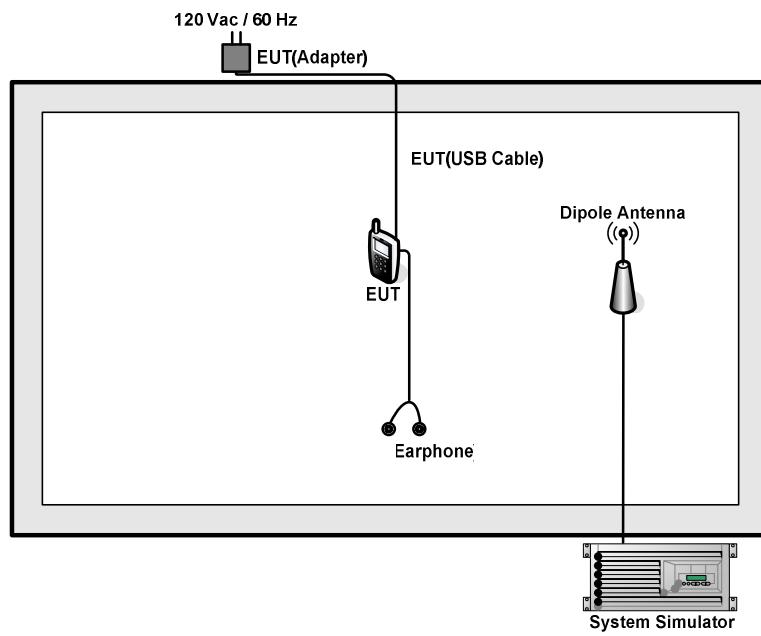
Conducted Power (*Unit: dBm)						
Band	WCDMA Band V			WCDMA Band II		
Channel	4132	4182	4233	9262	9400	9538
Frequency	826.4	836.4	846.6	1852.4	1880	1907.6
AMR 12.2K	22.71	22.75	22.70	21.55	21.59	21.68
RMC 12.2K	22.72	22.76	22.71	21.56	21.60	21.70
HSDPA Subtest-1	21.41	21.44	21.48	19.86	19.97	20.04
HSDPA Subtest-2	21.17	21.27	21.54	19.93	20.05	20.24
HSDPA Subtest-3	20.94	21.03	20.69	19.48	19.52	19.72
HSDPA Subtest-4	20.95	21.03	21.03	19.45	19.62	19.73
DC-HSDPA Subtest-1	21.22	21.28	21.25	19.69	19.77	19.85
DC-HSDPA Subtest-2	20.99	21.07	21.12	19.75	19.85	20.04
DC-HSDPA Subtest-3	20.74	20.83	20.67	19.22	19.32	19.50
DC-HSDPA Subtest-4	20.77	20.85	20.84	19.25	19.42	19.53
HSUPA Subtest-1	21.35	21.51	21.66	19.91	19.72	20.26
HSUPA Subtest-2	19.97	20.11	20.35	18.58	19.02	18.88
HSUPA Subtest-3	20.09	20.13	20.25	18.48	18.72	18.73
HSUPA Subtest-4	20.36	20.54	20.42	19.03	19.25	19.04
HSUPA Subtest-5	21.40	21.50	21.50	19.90	20.10	20.10

## 2.2 Connection Diagram of Test System

Part 22H



Part 24E





## 2.3 Support Unit used in test configuration

Item	Equipment	Trade Name	Model No.	FCC ID	Data Cable	Power Cord
1.	System Simulator	Anritsu	MT8820C	N/A	N/A	unshielded, 1.8 m
2.	DC Power Supply	GW INSTEK	GPS-3030D	N/A	N/A	unshielded, 1.8 m
3.	Earphone	Apple	N/A	N/A	Shielded, 1.2 m	N/A

## 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 4.5 dB and a 10dB attenuator.

Example :

$$\begin{aligned} \text{Offset(dB)} &= \text{RF cable loss(dB)} + \text{attenuator factor(dB)}. \\ &= 4.5 + 10 = 14.5 \text{ (dB)} \end{aligned}$$



## 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.

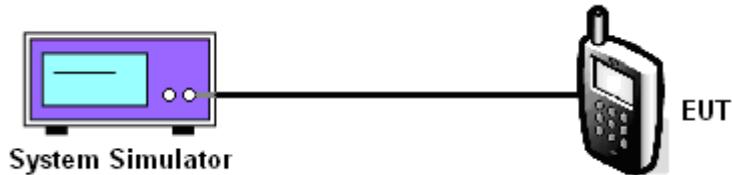
#### 3.1.2 Measuring Instruments

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)			GSM850 (EDGE class 8)			WCDMA Band V (RMC 12.2Kbps)		
Channel	128 (Low)	189 (Mid)	251 (High)	128 (Low)	189 (Mid)	251 (High)	4132 (Low)	4182 (Mid)	4233 (High)
Frequency (MHz)	824.2	836.4	848.8	824.2	836.4	848.8	826.4	836.4	846.6
Conducted Power (dBm)	31.98	31.95	31.86	25.72	26.07	26.00	22.72	22.76	22.71

PCS Band									
Modes	GSM1900 (GSM)			GSM1900 (EDGE class 8)			WCDMA Band II (RMC 12.2Kbps)		
Channel	512 (Low)	661 (Mid)	810 (High)	512 (Low)	661 (Mid)	810 (High)	9262 (Low)	9400 (Mid)	9538 (High)
Frequency (MHz)	1850.2	1880	1909.8	1850.2	1880	1909.8	1852.4	1880	1907.6
Conducted Power (dBm)	28.86	28.97	29.02	24.89	24.98	25.07	21.56	21.60	21.70

**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.

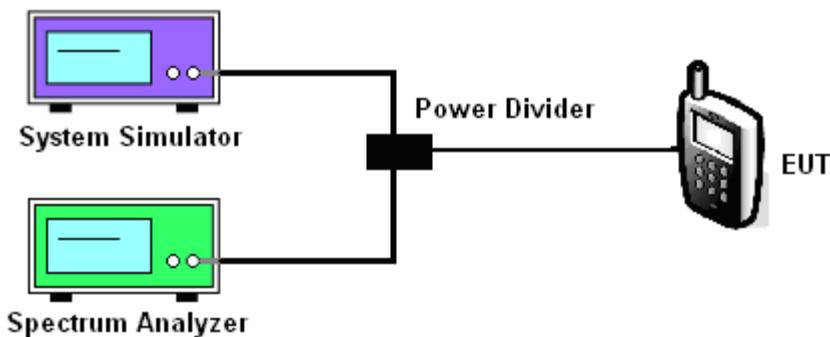
### 3.2.2 Measuring Instruments

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

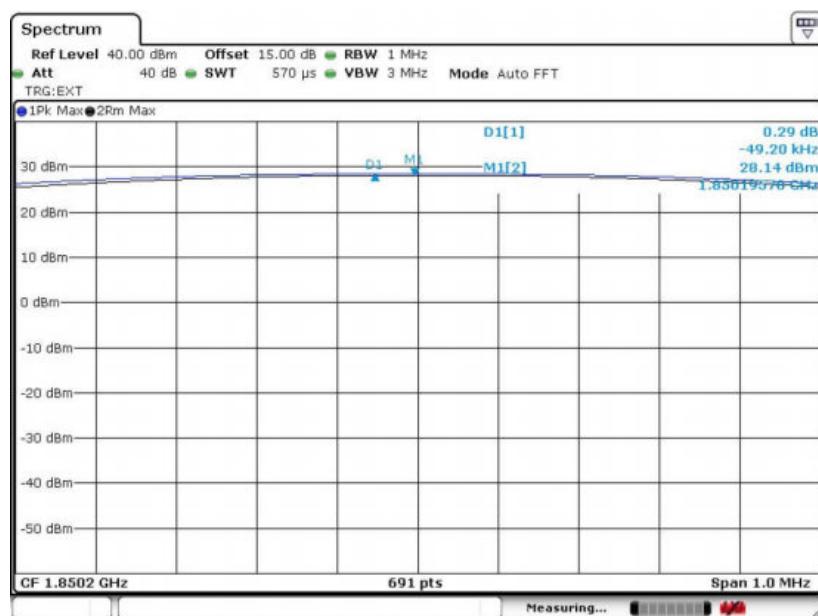
PCS Band									
Modes	GSM1900 (GSM)			GSM1900 (EDGE class 8)			WCDMA Band II (RMC 12.2Kbps)		
Channel	512 (Low)	661 (Mid)	810 (High)	512 (Low)	661 (Mid)	810 (High)	9262 (Low)	9400 (Mid)	9538 (High)
Frequency (MHz)	1850.2	1880	1909.8	1850.2	1880	1909.8	1852.4	1880	1907.6
Peak-to-Average Ratio (dB)	0.29	0.28	0.28	2.78	2.71	2.71	3.28	3.16	3.19



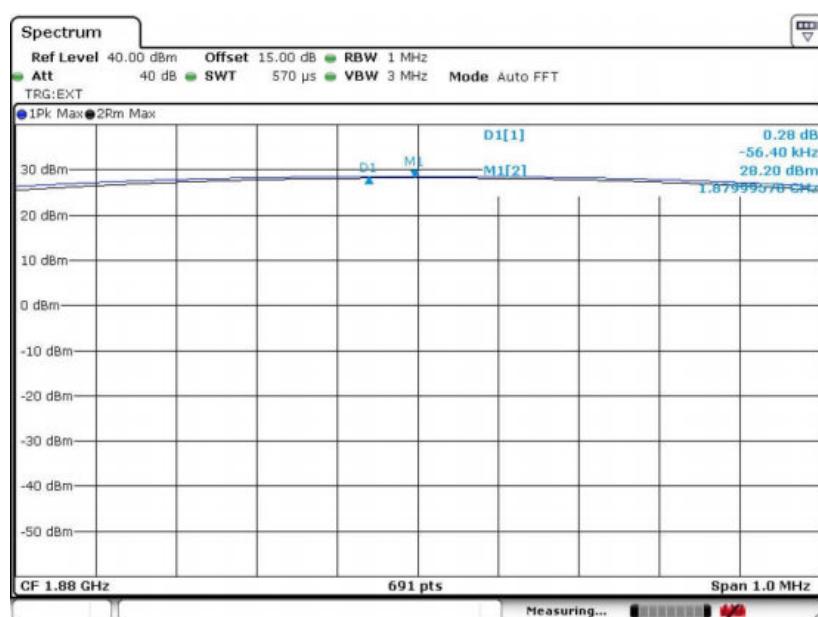
### 3.2.6 Test Result (Plots) of Peak-to-Average Ratio

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

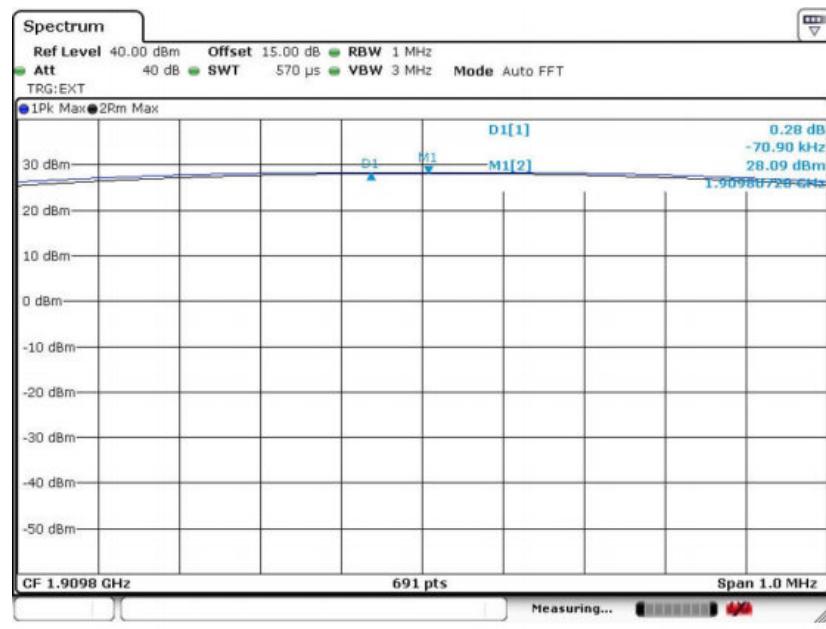


Peak-to-Average Ratio on Channel 661 (1880.0 MHz)





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

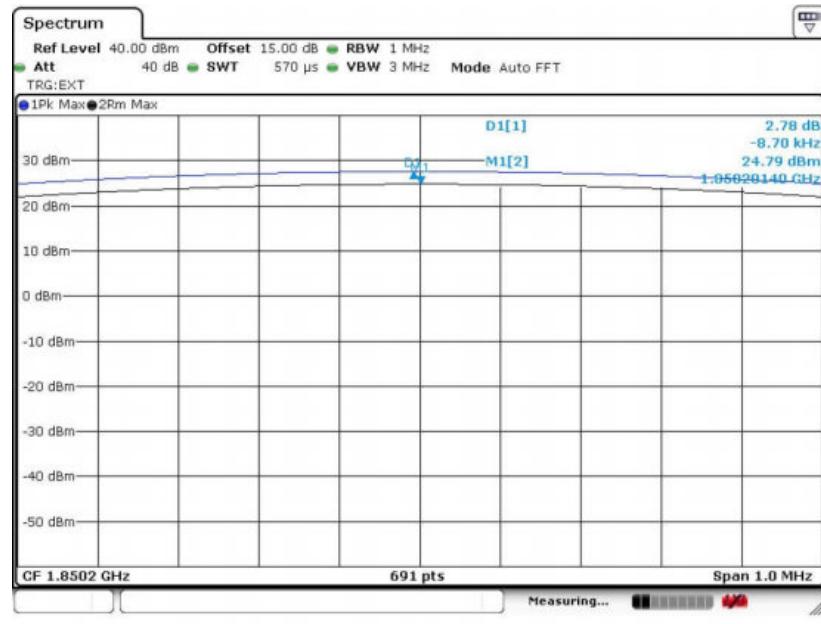


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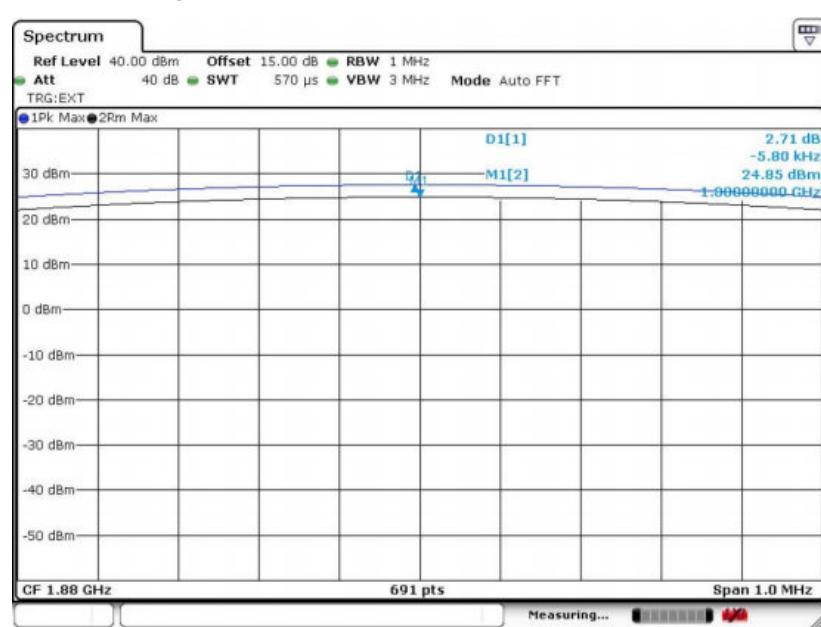


Band :	GSM 1900	Test Mode :	EDGE class 8 Link (8PSK)
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## Peak-to-Average Ratio on Channel 512 (1850.2 MHz)

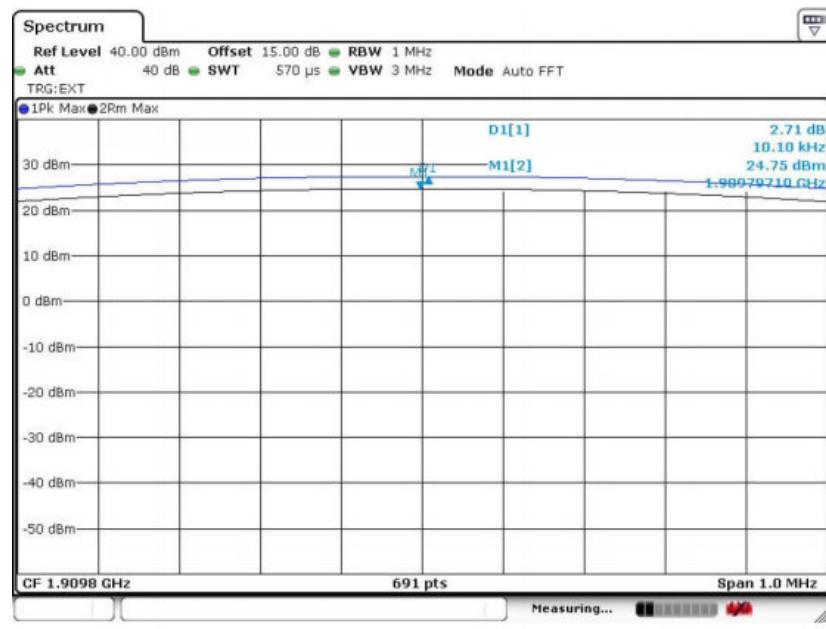


## Peak-to-Average Ratio on Channel 661 (1880.0 MHz)





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

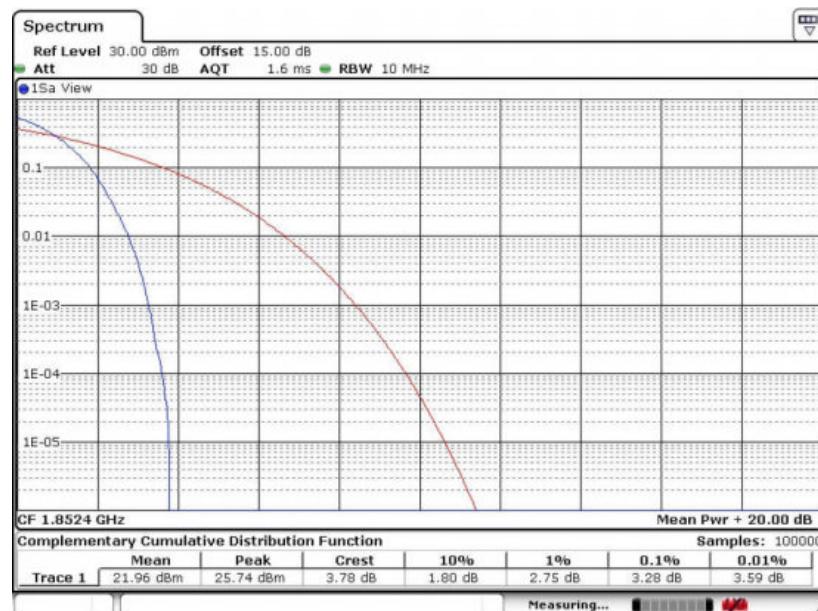


Date: 18.OCT.2015 11:41:55

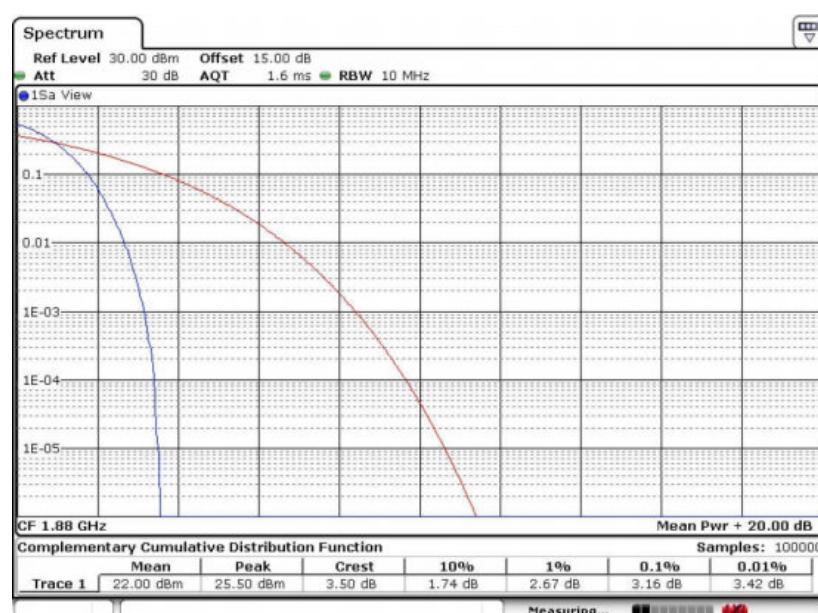


Band :	WCDMA Band II	Test Mode :	RMC 12.2Kbps Link (QPSK)
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## Peak-to-Average Ratio on Channel 9262 (1852.4 MHz)

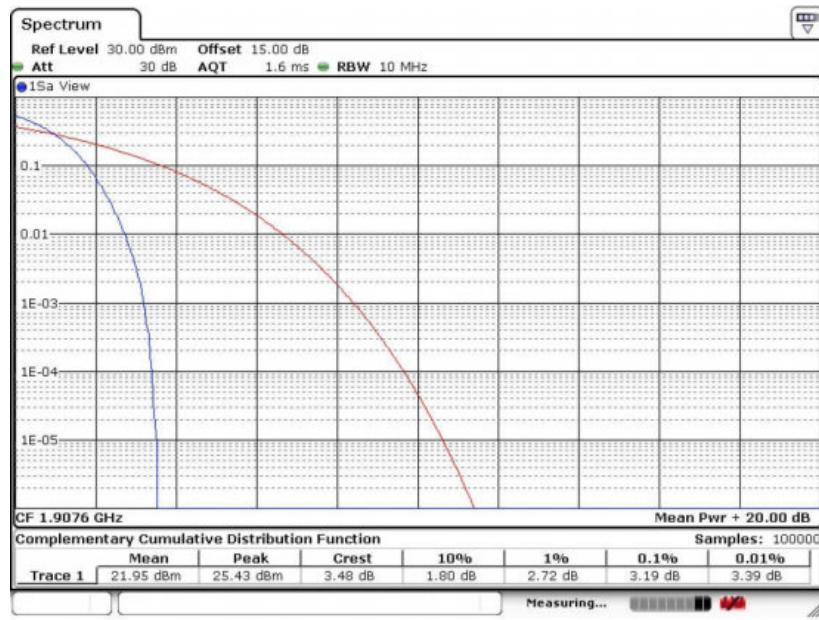


## Peak-to-Average Ratio on Channel 9400 (1880.0 MHz)





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





### 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-D-2010, 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 (Cellular Band) and the EIRP of mobile transmitters are limited to 2 Watts (PCS Band).

#### 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-D-2010 Section 2.2.17.
2. The EUT was placed on a non-conductive rotating platform 0.8 meters high in a semi-anechoic chamber. The radiated emission at the fundamental frequency was measured at 3 m with a test antenna and a spectrum analyzer with RMS detector per section 5. of KDB 971168 D01.
3. During the measurement, the system simulator parameters were set to force the EUT transmitting at maximum output power. The maximum emission was recorded from analyzer power level (LVL) from the 360 degrees rotation of the turntable and the test antenna raised and lowered over a range from 1 to 4 meters in both horizontally and vertically polarized orientations.
4. Effective Isotropic Radiated Power (EIRP) was measured by substitution method according to TIA/EIA-603-D. The EUT was replaced by the substitution antenna at same location, and then a known power from S.G. was applied into the dipole antenna through a Tx cable, and then recorded the maximum Analyzer reading through raised and lowered the test antenna. The correction factor (in dB) = S.G. - Tx Cable loss + Substitution antenna gain - Analyzer reading. Then the EUT's EIRP was calculated with the correction factor,  $EIRP = LVL + \text{Correction factor}$  and  $ERP = EIRP - 2.15$ . Take the record of the output power at substitution antenna.



	GSM/GPRS/EDGE	WCDMA/HSPA
SPAN	500kHz	10MHz
RBW	10kHz	100kHz
VBW	30kHz	300kHz
Detector	RMS	RMS
Trace	Average	Average
Average Type	Power	Power
Sweep Count	100	100



## 3.3.4 Test Result of ERP

GSM850 (GSM) Radiated Power ERP					
Channel	Frequency (MHz)	Horizontal		Vertical	
		ERP(dBm)	ERP(W)	ERP(dBm)	ERP(W)
Lowest	824.2	24.83	0.3041	17.71	0.0590
Middle	836.4	25.10	0.3236	17.87	0.0612
Highest	848.8	25.23	0.3334	18.69	0.0740
Limit	ERP < 7W	Result		PASS	

GSM850 (EDGE class 8) Radiated Power ERP					
Channel	Frequency (MHz)	Horizontal		Vertical	
		ERP(dBm)	ERP(W)	ERP(dBm)	ERP(W)
Lowest	824.2	20.68	0.1169	13.62	0.0230
Middle	836.4	20.59	0.1146	13.18	0.0208
Highest	848.8	20.08	0.1019	13.66	0.0232
Limit	ERP < 7W	Result		PASS	

WCDMA Band V (RMC 12.2Kbps) Radiated Power ERP					
Channel	Frequency (MHz)	Horizontal		Vertical	
		ERP(dBm)	ERP(W)	ERP(dBm)	ERP(W)
Lowest	826.4	15.87	0.0386	8.60	0.0072
Middle	836.4	16.16	0.0413	8.50	0.0071
Highest	846.6	16.36	0.0433	9.44	0.0088
Limit	ERP < 7W	Result		PASS	



## 3.3.5 Test Result of EIRP

GSM1900 (GSM) Radiated Power EIRP					
Channel	Frequency (MHz)	Horizontal		Vertical	
		EIRP(dBm)	EIRP(W)	EIRP(dBm)	EIRP(W)
Lowest	1850.2	29.79	0.9528	29.77	0.9484
Middle	1880.0	30.60	1.1482	30.18	1.0423
Highest	1909.8	30.28	1.0666	30.09	1.0209
Limit	EIRP < 2W	Result		PASS	

GSM1900 (EDGE class 8) Radiated Power EIRP					
Channel	Frequency (MHz)	Horizontal		Vertical	
		EIRP(dBm)	EIRP(W)	EIRP(dBm)	EIRP(W)
Lowest	1850.2	26.13	0.4102	25.85	0.3846
Middle	1880.0	26.79	0.4775	26.28	0.4246
Highest	1909.8	26.32	0.4285	26.20	0.4169
Limit	EIRP < 2W	Result		PASS	

WCDMA Band II (RMC 12.2Kbps) Radiated Power EIRP					
Channel	Frequency (MHz)	Horizontal		Vertical	
		EIRP(dBm)	EIRP(W)	EIRP(dBm)	EIRP(W)
Lowest	1852.4	23.96	0.2489	23.87	0.2438
Middle	1880.0	24.60	0.2884	24.10	0.2570
Highest	1907.6	24.27	0.2673	23.99	0.2506
Limit	EIRP < 2W	Result		PASS	



## 3.4 99% Occupied Bandwidth and 26dB Bandwidth Measurement

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

The 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 26 dB emission bandwidth is defined as the frequency range between two points, one above and one below the carrier frequency, at which the spectral density of the emission is attenuated 26 dB below the maximum in-band spectral density of the modulated signal. Spectral density (power per unit bandwidth) is to be measured with a detector of resolution bandwidth equal to approximately 1.0% of the emission bandwidth.

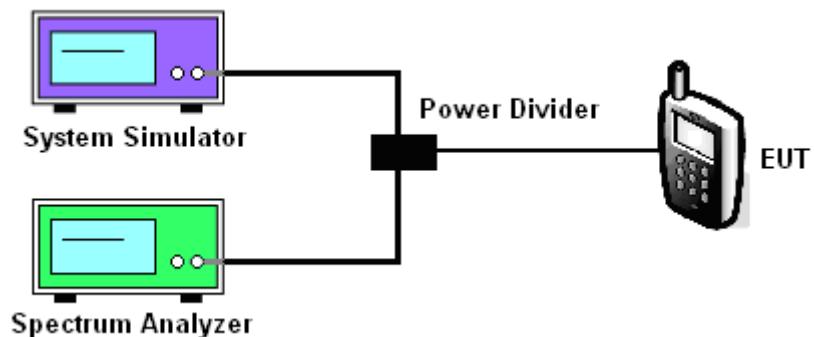
### 3.4.2 Measuring Instruments

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 spectrum analyzer and system simulator via a power divider.
3. The spectrum analyzer center frequency is set to the nominal EUT channel center frequency.  
The span range for the spectrum analyzer shall be between two and five times the anticipated OBW.
4. The nominal resolution bandwidth (RBW) shall be in the range of 1 to 5 % of the anticipated OBW, and the VBW shall be at least 3 times the RBW.
5. Set the detection mode to peak, and the trace mode to max hold.
6. Determine the reference value: Set the EUT to transmit a modulated signal. Allow the trace to stabilize. Set the spectrum analyzer marker to the highest level of the displayed trace.  
(this is the reference value)
7. Determine the “-26 dB down amplitude” as equal to (Reference Value – X).
8. Place two markers, one at the lowest and the other at the highest frequency of the envelope of the spectral display such that each marker is at or slightly below the “-X dB down amplitude” determined in step 6. If a marker is below this “-X dB down amplitude” value it shall be placed as close as possible to this value. The OBW is the positive frequency difference between the two markers.
9. Use the 99 % power bandwidth function of the spectrum analyzer and report the measured bandwidth.

### 3.4.4 Test Setup





### 3.4.5 Test Result of Occupied Bandwidth and 26dB Bandwidth

Cellular Band						
Modes	GSM850 (GSM)			GSM850 (EDGE class 8)		
Channel	128 (Low)	189 (Mid)	251 (High)	128 (Low)	189 (Mid)	251 (High)
Frequency (MHz)	824.2	836.4	848.8	824.2	836.4	848.8
99% OBW (kHz)	244.57	243.13	243.13	246.02	244.57	244.57
26dB BW (kHz)	316.90	316.90	316.90	315.50	312.60	314.00

PCS Band						
Modes	GSM1900 (GSM)			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)	243.13	243.13	243.13	247.47	246.02	246.02
26dB BW (kHz)	318.40	316.90	316.90	311.10	312.60	311.10

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)	4.14	4.14	4.14
26dB BW (MHz)	4.66	4.66	4.66

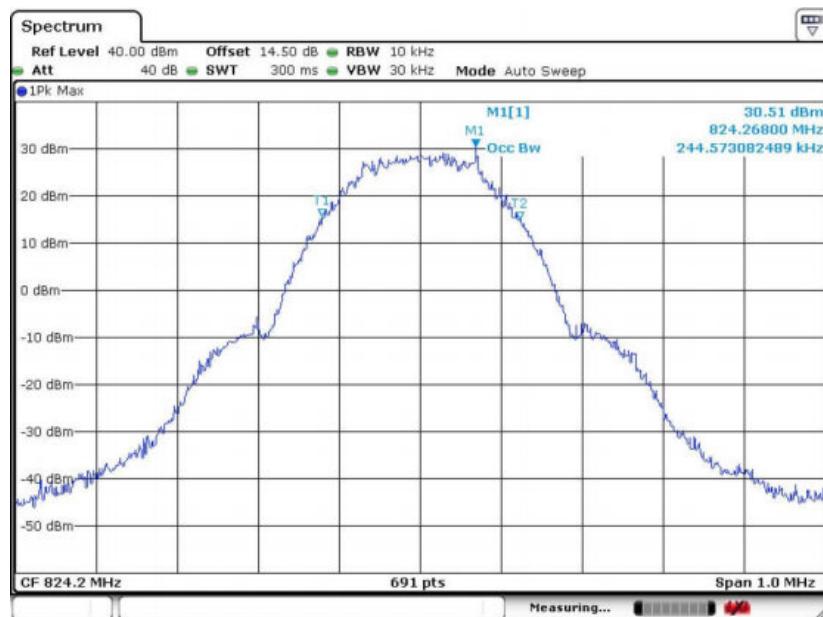
PCS Band			
Modes	WCDMA Band II (RMC 12.2Kbps)		
Channel	9262 (Low)	9400 (Mid)	9538 (High)
Frequency (MHz)	1852.4	1880	1907.6
99% OBW (MHz)	4.15	4.14	4.15
26dB BW (MHz)	4.66	4.66	4.67



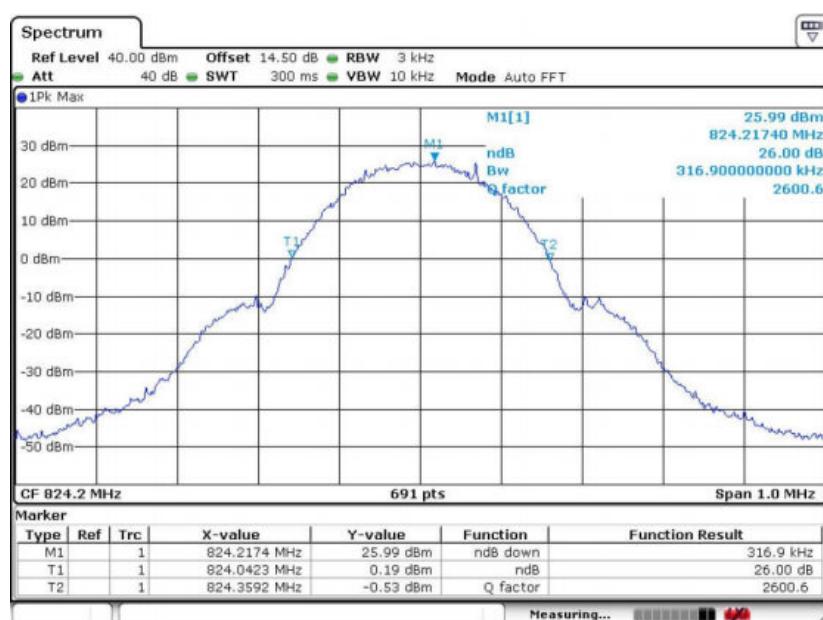
### 3.4.6 Test Result (Plots) of Occupied Bandwidth and 26dB Bandwidth

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



26dB Bandwidth Plot on Channel 128 (824.2 MHz)



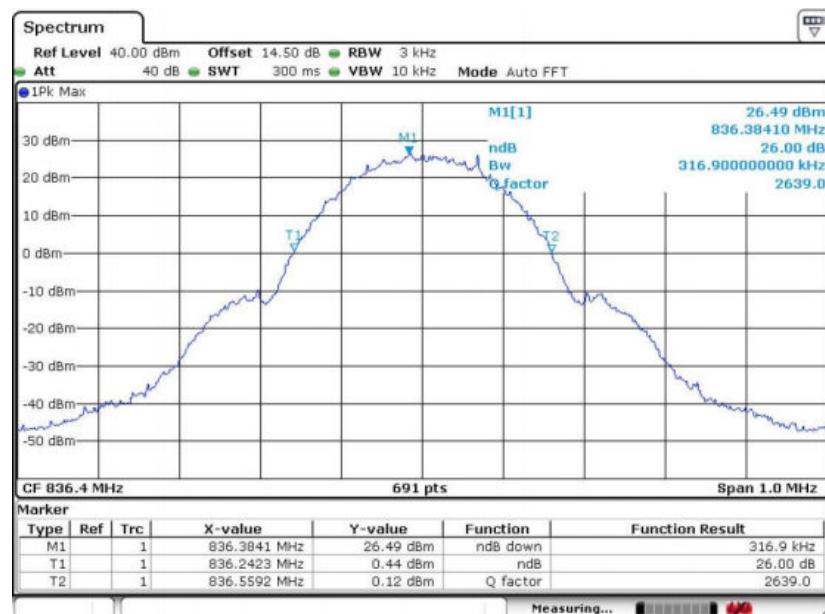


## 99% Occupied Bandwidth Plot on Channel 189 (836.4 MHz)



Date: 19.OCT.2015 19:02:25

## 26dB Bandwidth Plot on Channel 189 (836.4 MHz)



Date: 18.OCT.2015 09:23:05

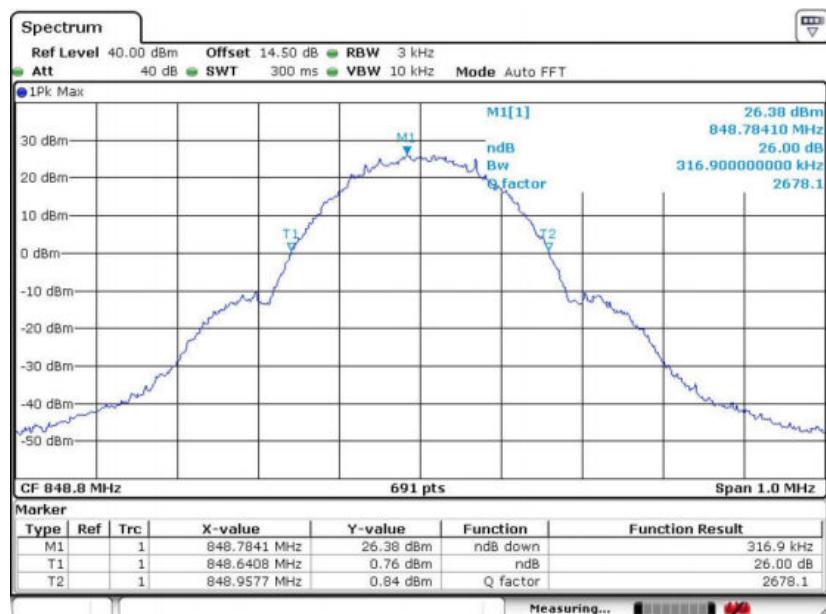


## 99% Occupied Bandwidth Plot on Channel 251 (848.8 MHz)



Date: 19.OCT.2015 19:03:27

## 26dB Bandwidth Plot on Channel 251 (848.8 MHz)

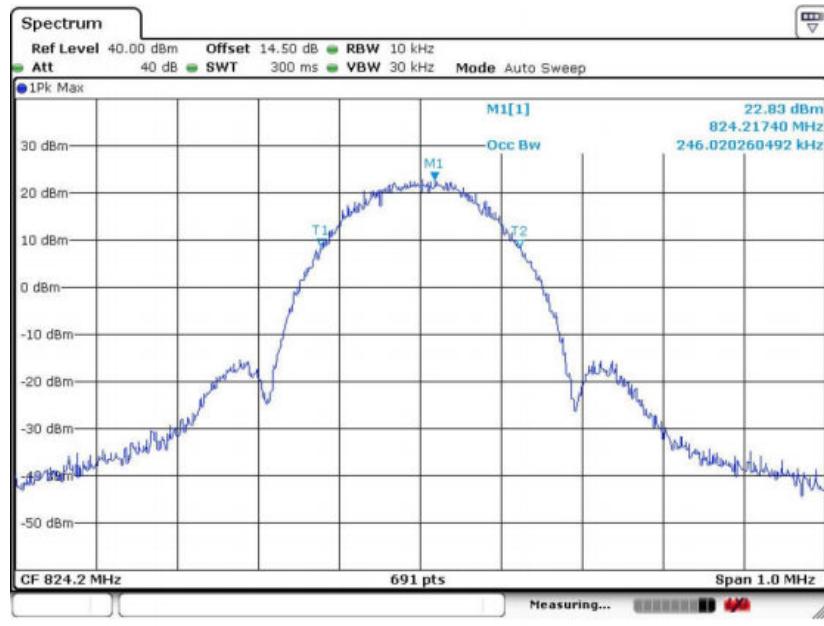


Date: 18.OCT.2015 09:25:22

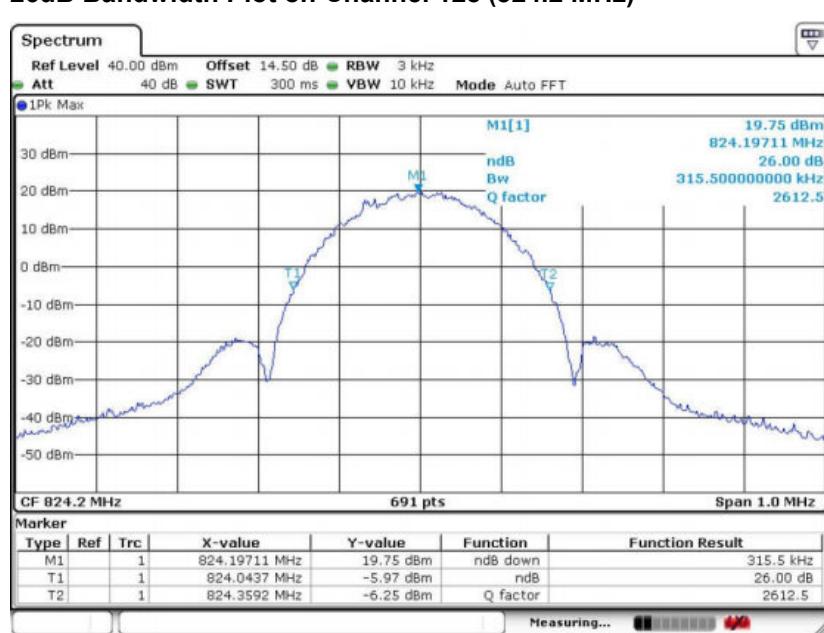


Band :	GSM 850	Test Mode :	EDGE class 8 Link (8PSK)
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## 99% Occupied Bandwidth Plot on Channel 128 (824.2 MHz)



## 26dB Bandwidth Plot on Channel 128 (824.2 MHz)



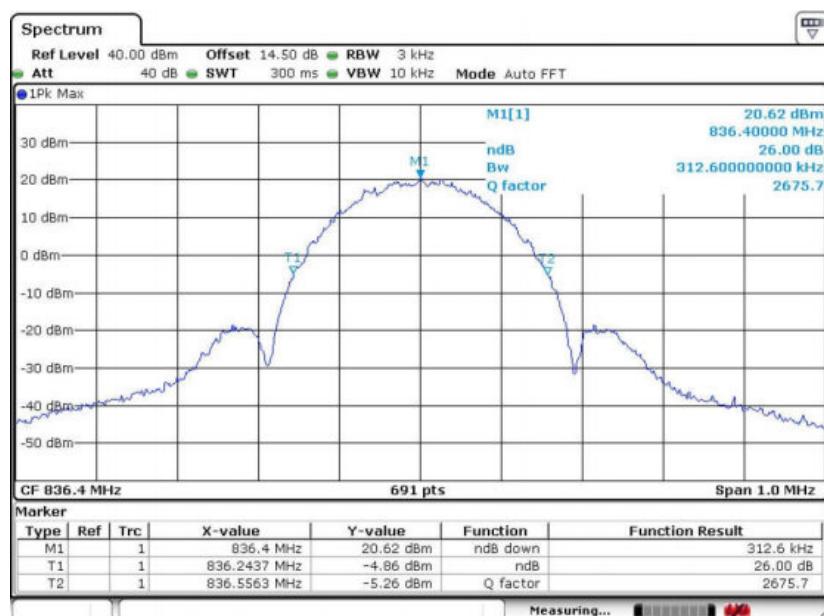


## 99% Occupied Bandwidth Plot on Channel 189 (836.4 MHz)



Date: 15.OCT.2015 00:02:15

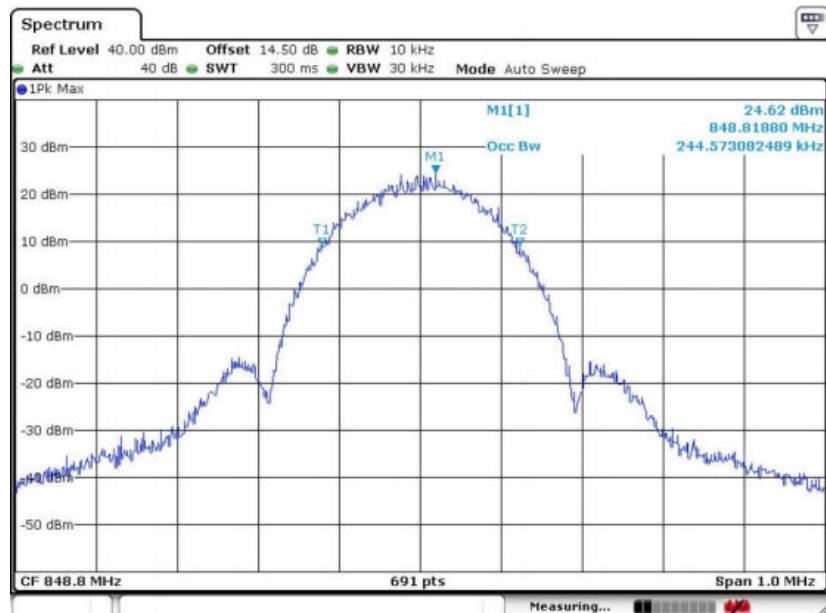
## 26dB Bandwidth Plot on Channel 189 (836.4 MHz)



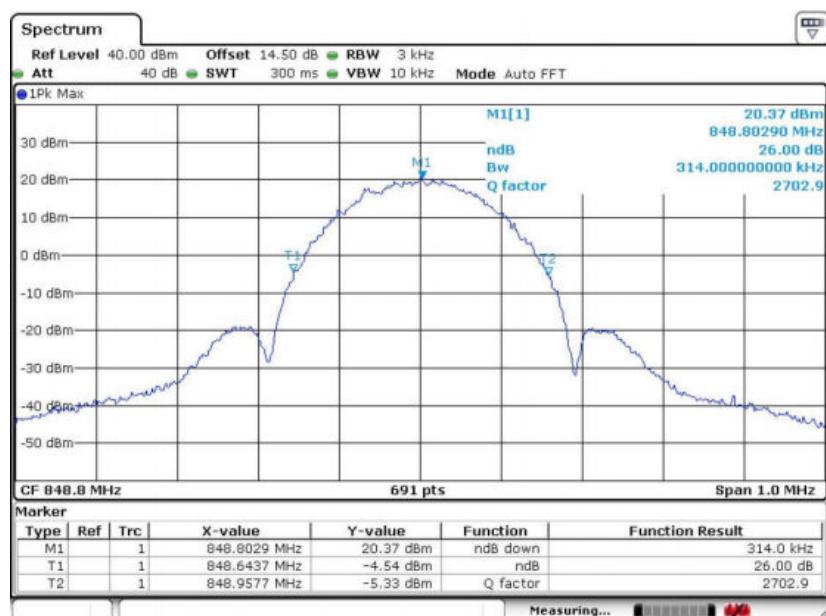
Date: 15.OCT.2015 00:07:18



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



## 26dB Bandwidth Plot on Channel 251 (848.8 MHz)



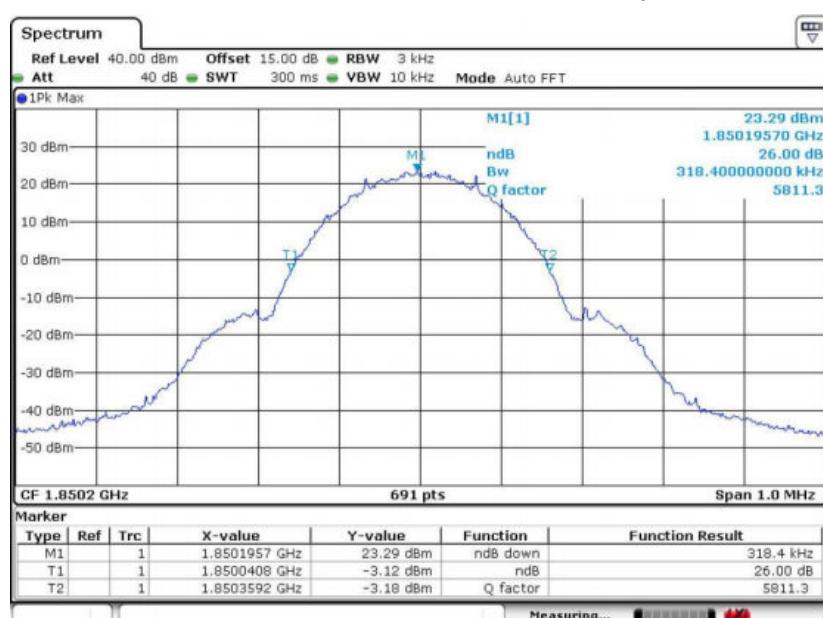


Band :	GSM 1900	Test Mode :	GSM Link (GMSK)
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## 99% Occupied Bandwidth Plot on Channel 512 (1850.2 MHz)



## 26dB Bandwidth Plot on Channel 512 (1850.2 MHz)



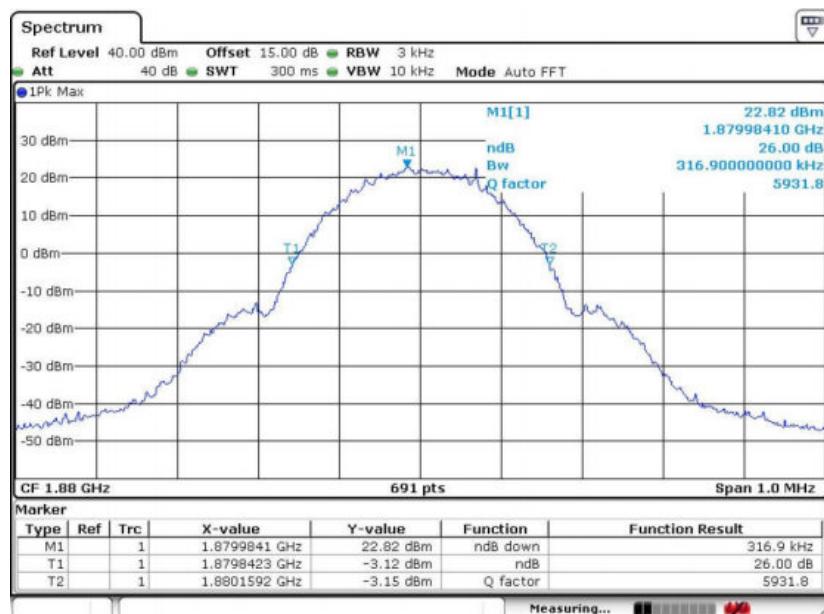


## 99% Occupied Bandwidth Plot on Channel 661 (1880.0 MHz)



Date: 18.OCT.2015 10:21:49

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



Date: 18.OCT.2015 10:33:13

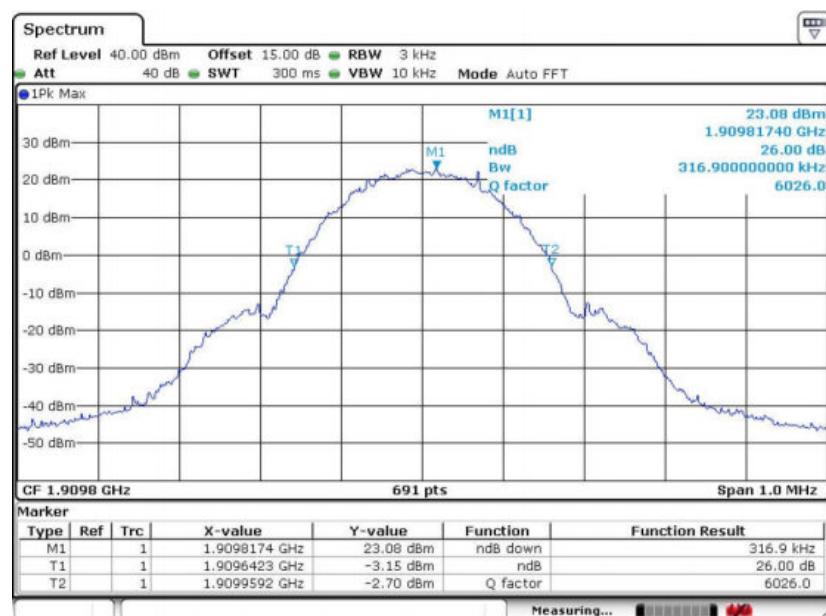


## 99% Occupied Bandwidth Plot on Channel 810 (1909.8 MHz)



Date: 18.OCT.2015 10:16:53

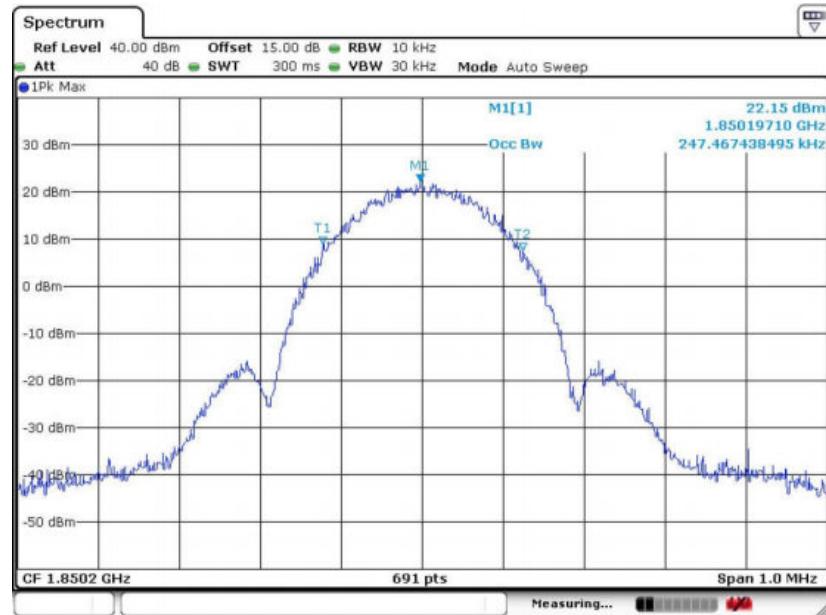
## 26dB Bandwidth Plot on Channel 810 (1909.8 MHz)



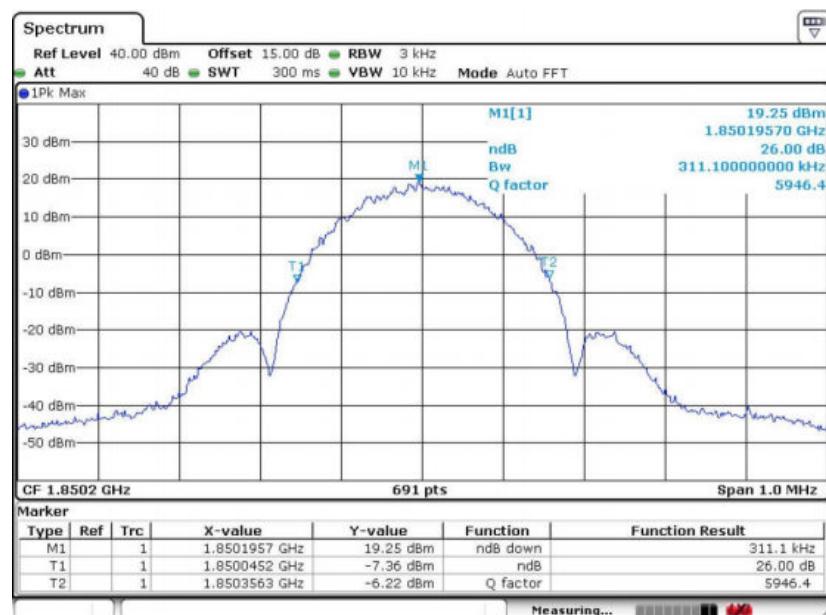
Date: 18.OCT.2015 10:40:11



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

Date: 15.OCT.2015 00:29:44

**26dB Bandwidth Plot on Channel 512 (1850.2 MHz)**

Date: 15.OCT.2015 00:35:37

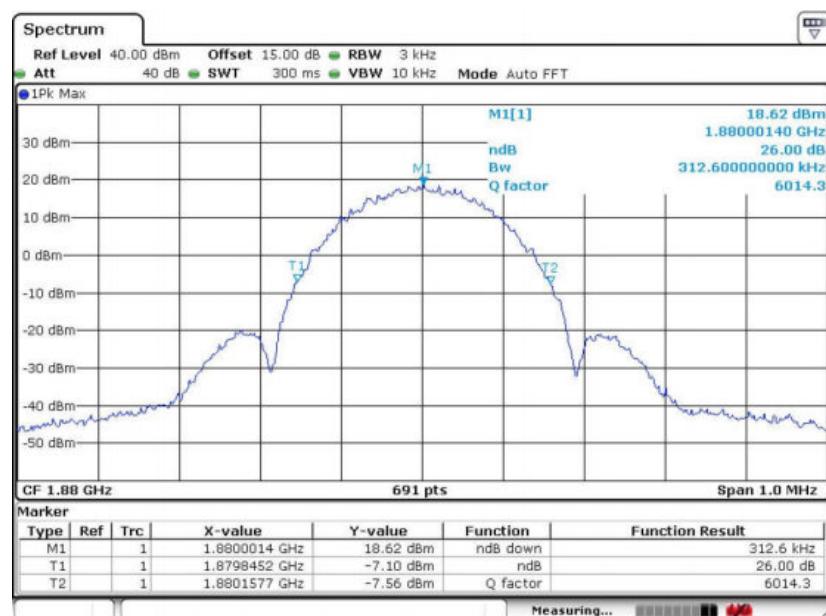


## 99% Occupied Bandwidth Plot on Channel 661 (1880.0 MHz)



Date: 15.OCT.2015 00:31:01

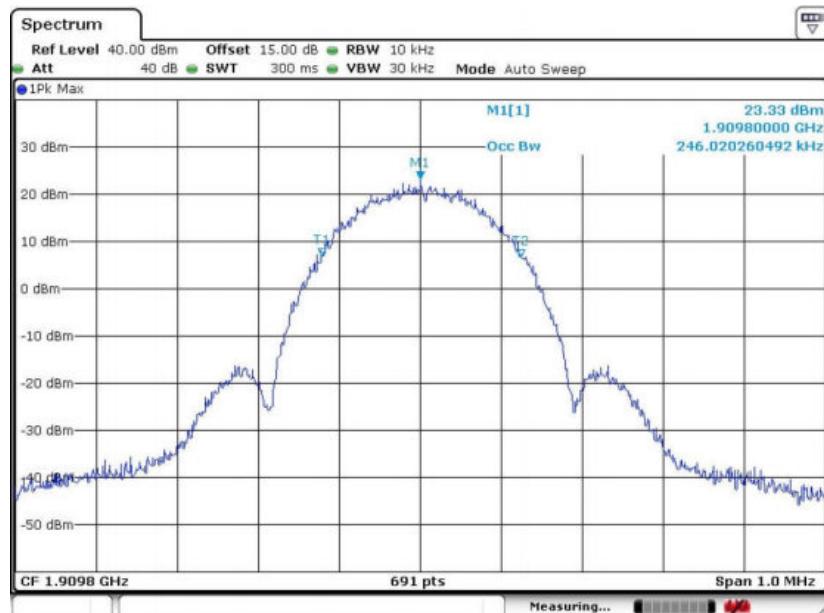
## 26dB Bandwidth Plot on Channel 661 (1880.0 MHz)



Date: 15.OCT.2015 00:36:27

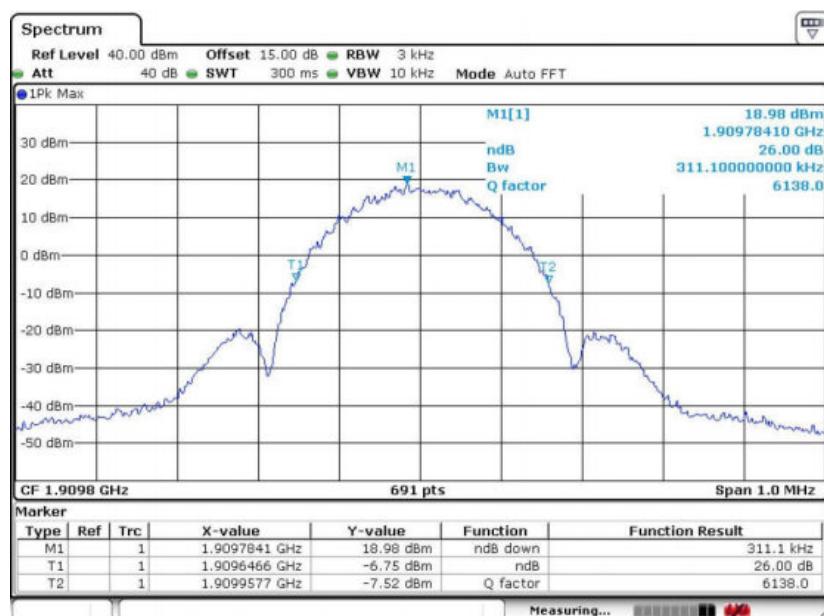


## 99% Occupied Bandwidth Plot on Channel 810 (1909.8 MHz)



Date: 15.OCT.2015 00:32:55

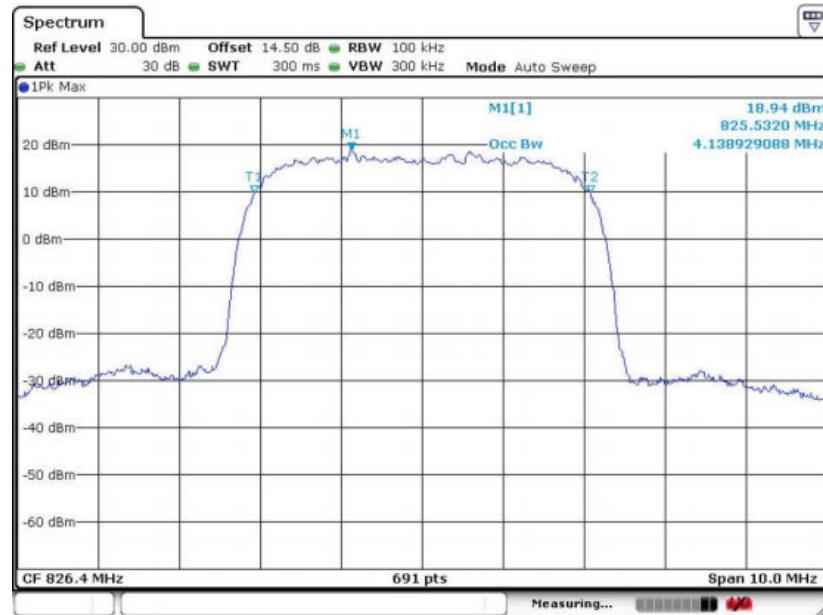
## 26dB Bandwidth Plot on Channel 810 (1909.8 MHz)



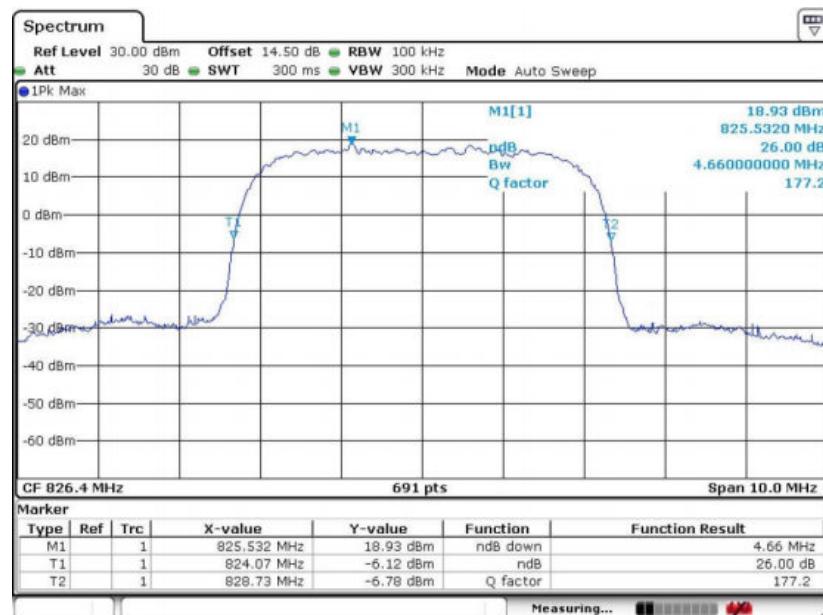
Date: 15.OCT.2015 00:37:07



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)**

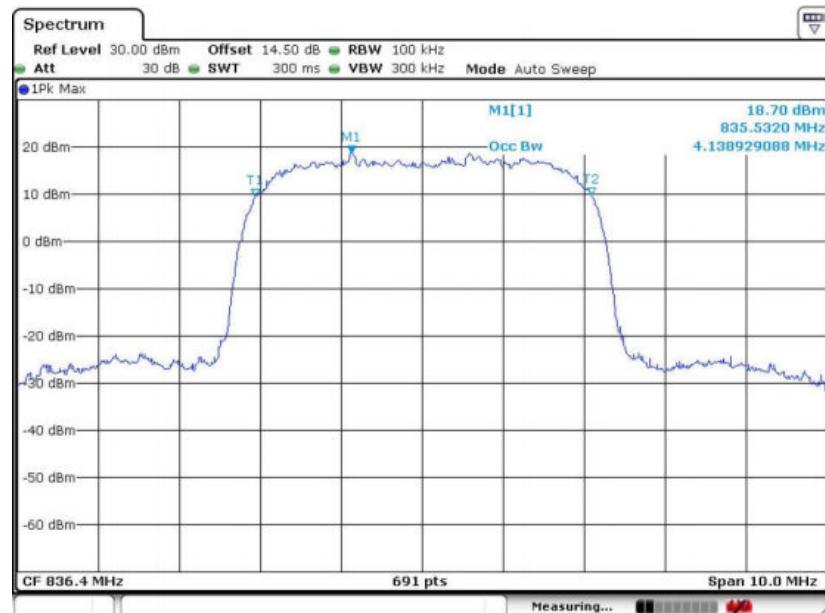
Date: 18.OCT.2015 13:04:28

**26dB Bandwidth Plot on Channel 4132 (826.4 MHz)**

Date: 18.OCT.2015 13:09:43

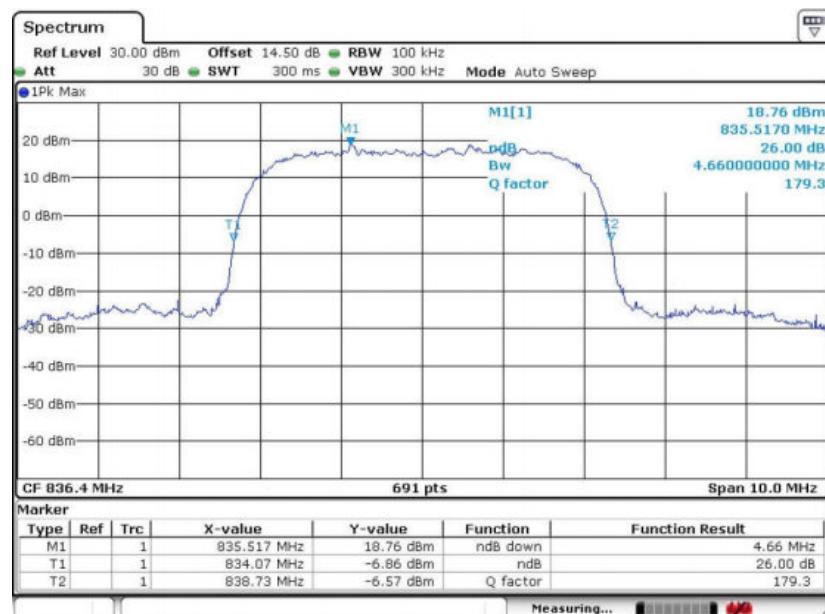


## 99% Occupied Bandwidth Plot on Channel 4182 (836.4 MHz)



Date: 18.OCT.2015 13:06:24

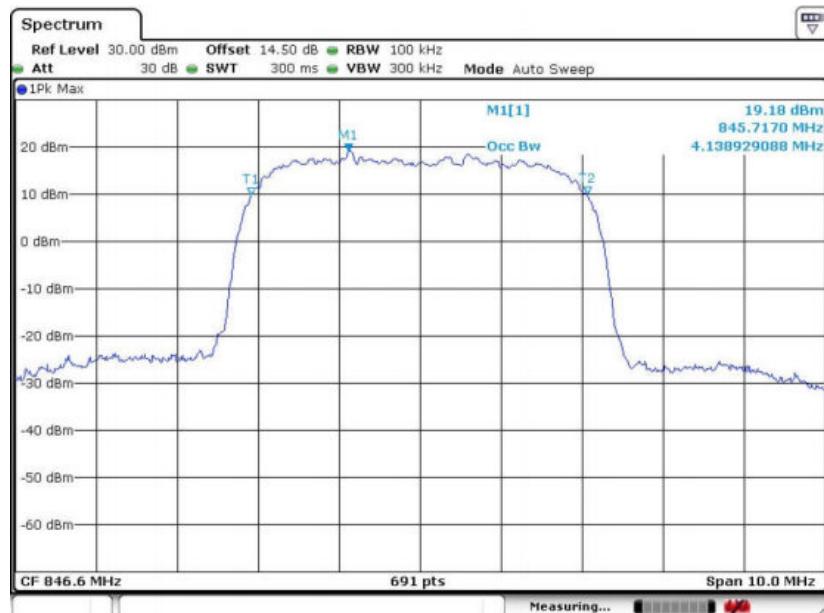
## 26dB Bandwidth Plot on Channel 4182 (836.4 MHz)



Date: 18.OCT.2015 13:10:25

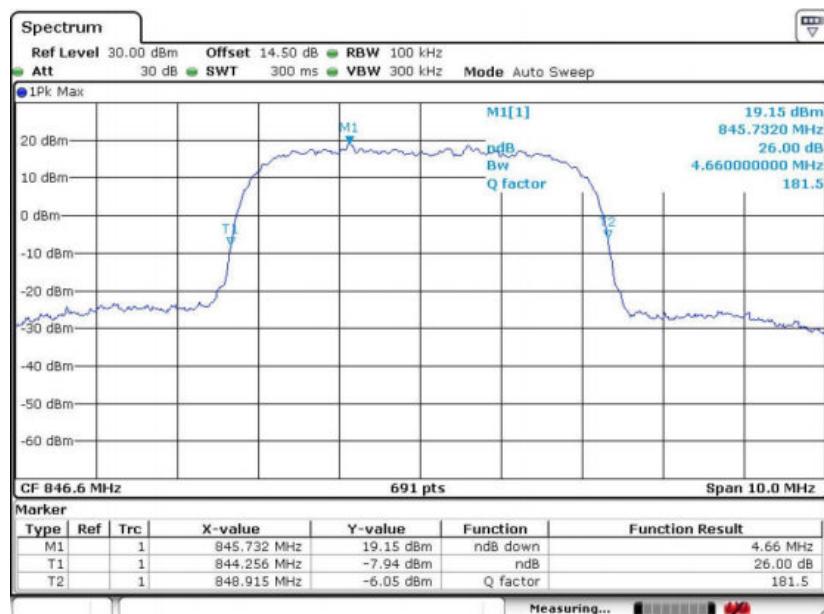


## 99% Occupied Bandwidth Plot on Channel 4233 (846.6 MHz)



Date: 18.OCT.2015 13:08:07

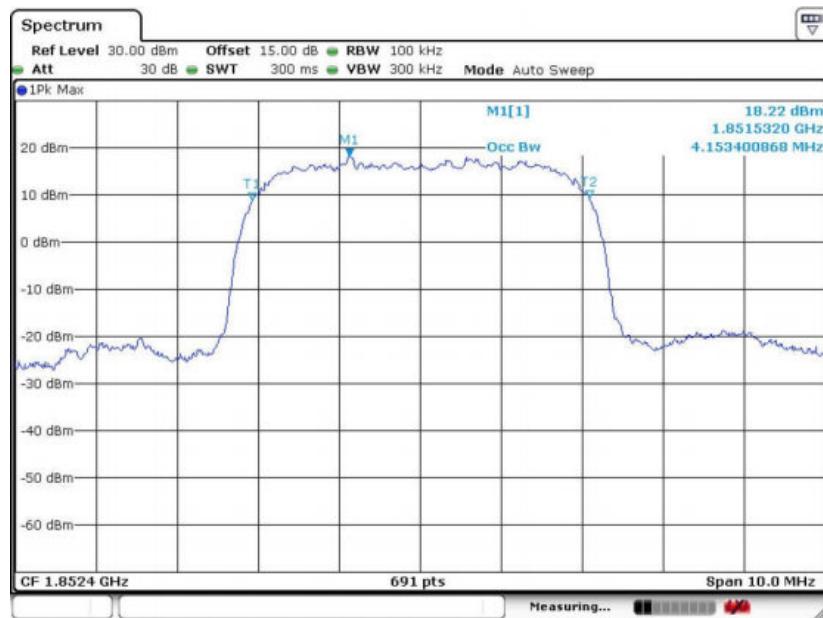
## 26dB Bandwidth Plot on Channel 4233 (846.6 MHz)



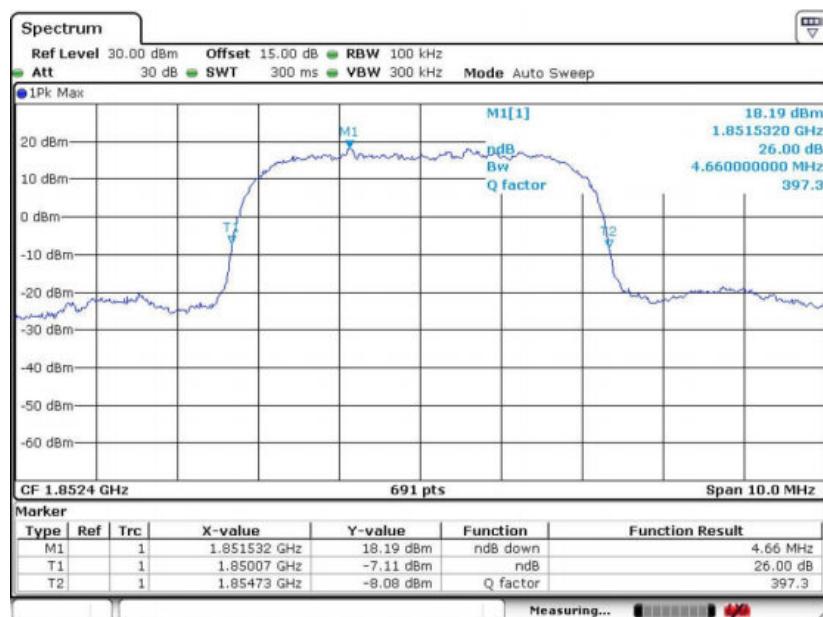
Date: 18.OCT.2015 13:12:07



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)**

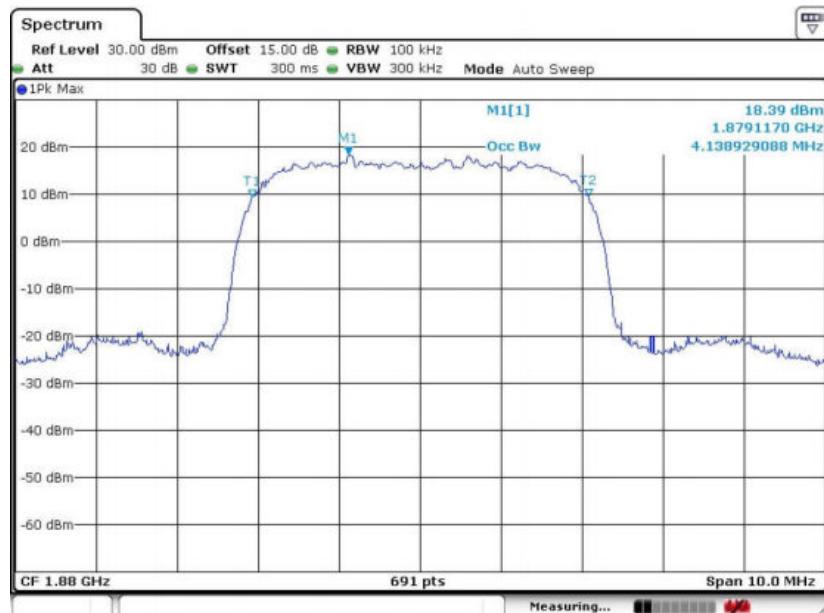
Date: 18.OCT.2015 13:23:35

**26dB Bandwidth Plot on Channel 9262 (1852.4 MHz)**

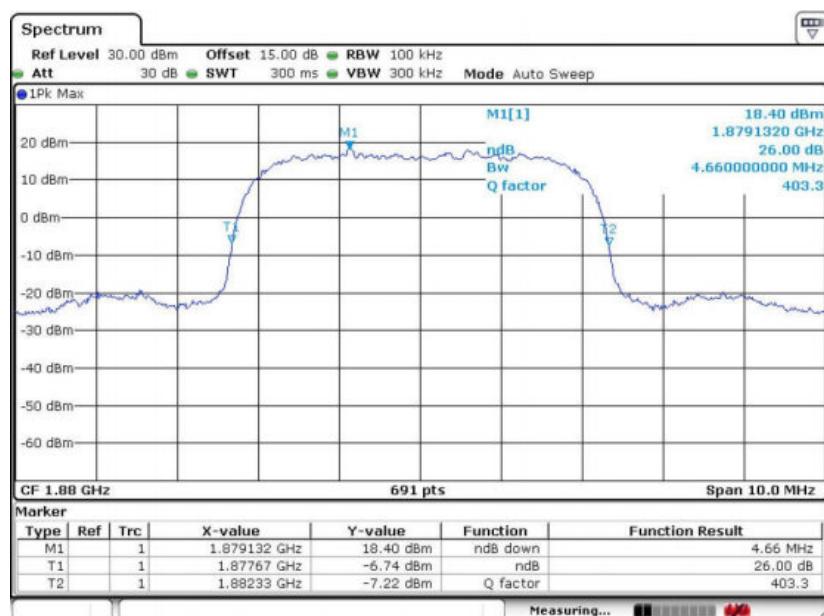
Date: 18.OCT.2015 13:30:59



## 99% Occupied Bandwidth Plot on Channel 9400 (1880.0 MHz)

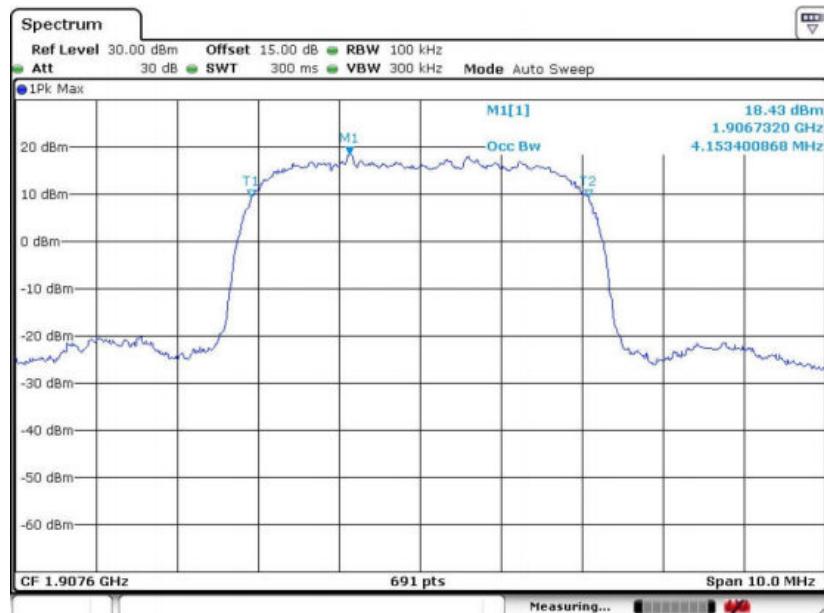


## 26dB Bandwidth Plot on Channel 9400 (1880.0 MHz)



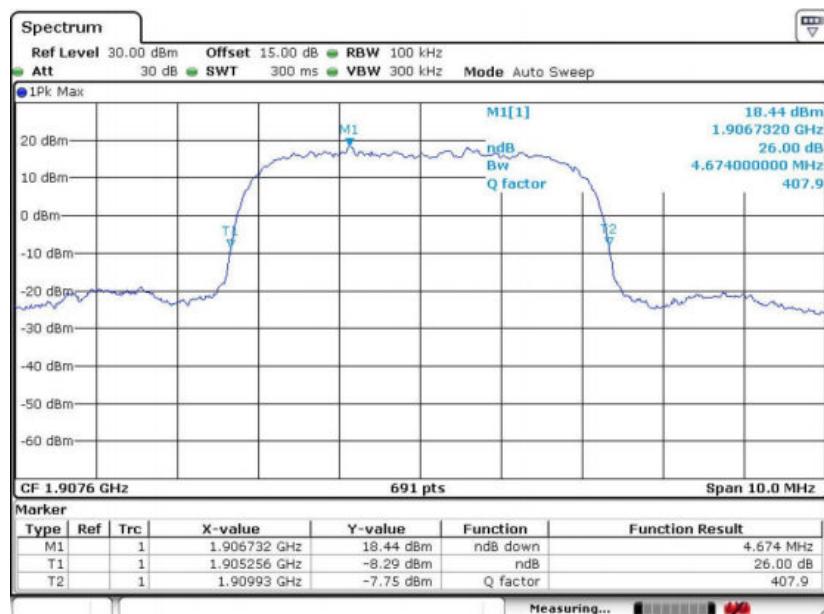


## 99% Occupied Bandwidth Plot on Channel 9538 (1907.6 MHz)



Date: 18.OCT.2015 13:29:01

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



Date: 18.OCT.2015 13:34:12

## 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

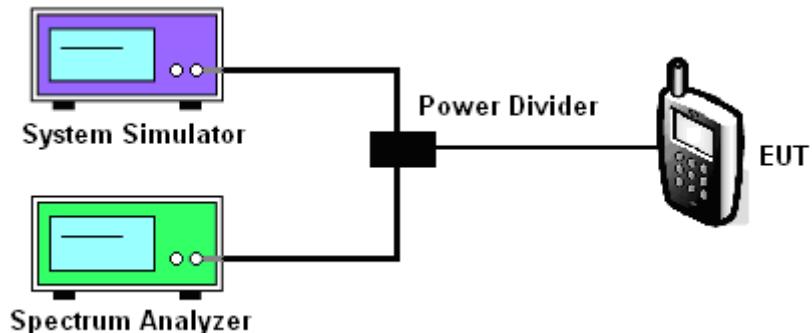
The measuring equipment is listed in the section 4 of this test report.

### 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)  
 $= P(W) - [43 + 10\log(P)]$  (dB)  
 $= [30 + 10\log(P)]$  (dBm) -  $[43 + 10\log(P)]$  (dB)  
 $= -13$  dBm.

### 3.5.4 Test Setup

#### <Conducted Band Edge >

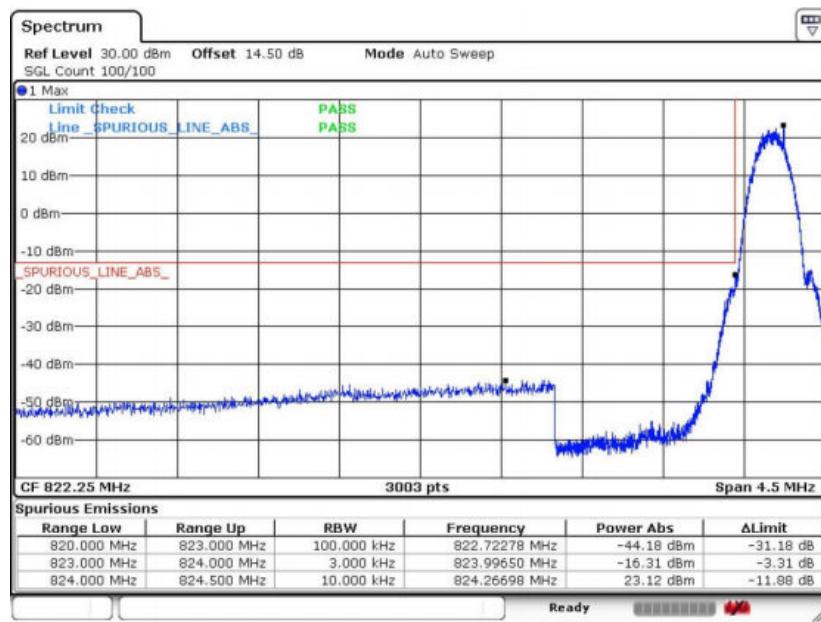




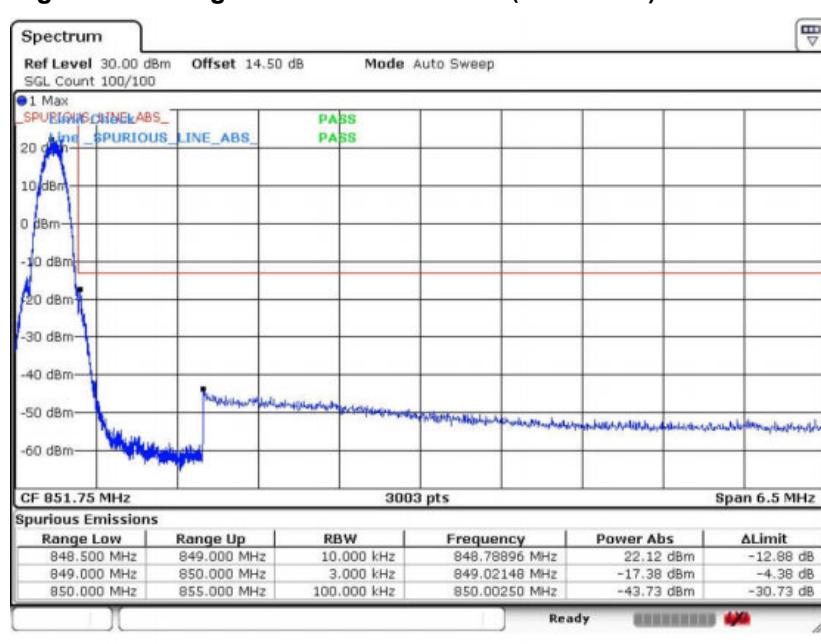
### 3.5.5 Test Result (Plots) of Conducted Band Edge

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



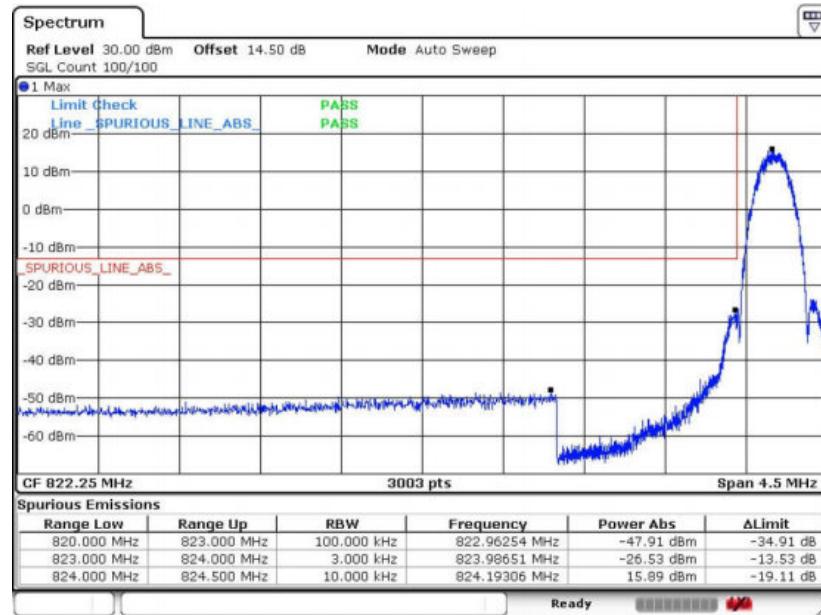
Higher Band Edge Plot on Channel 251 (848.8 MHz)



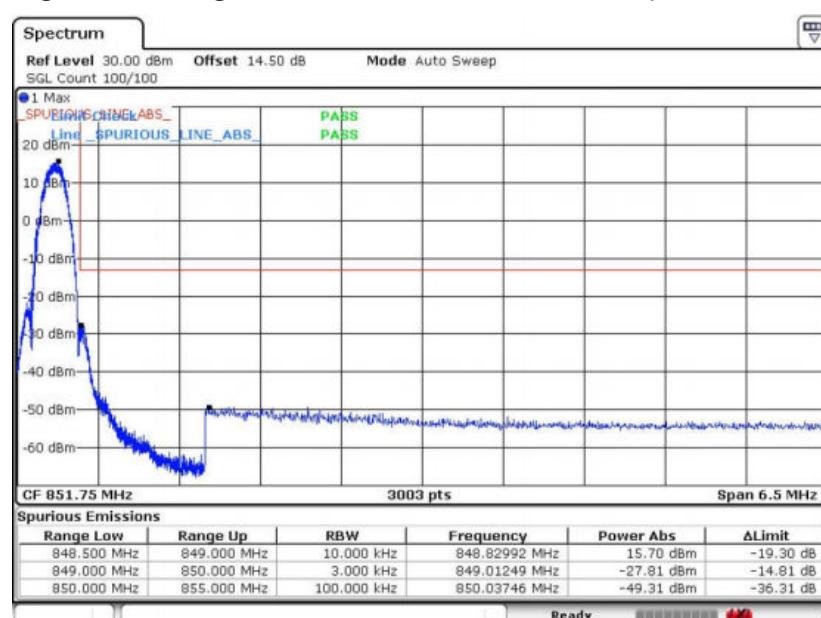


Band :	GSM850	Test Mode :	EDGE class 8 Link (8PSK)
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## Lower Band Edge Plot on Channel 128 (824.2 MHz)



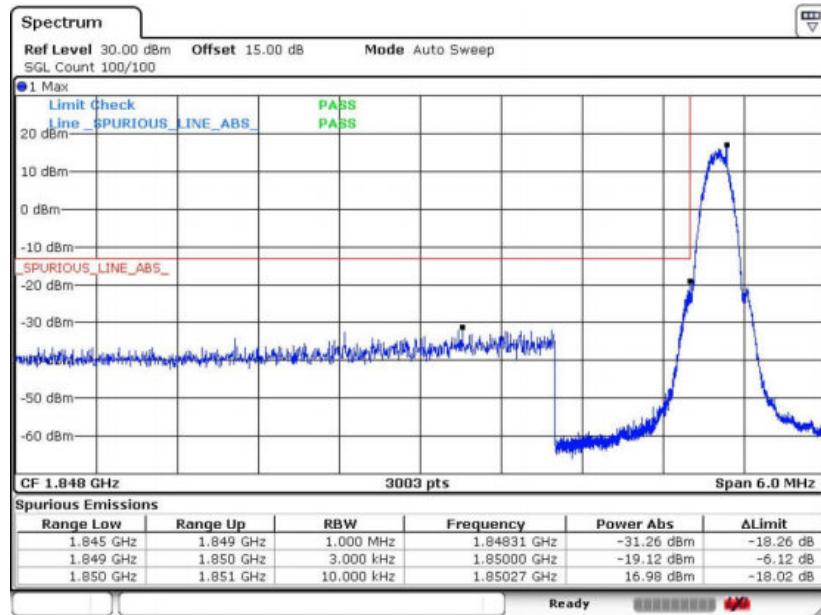
## Higher Band Edge Plot on Channel 251 (848.8 MHz)



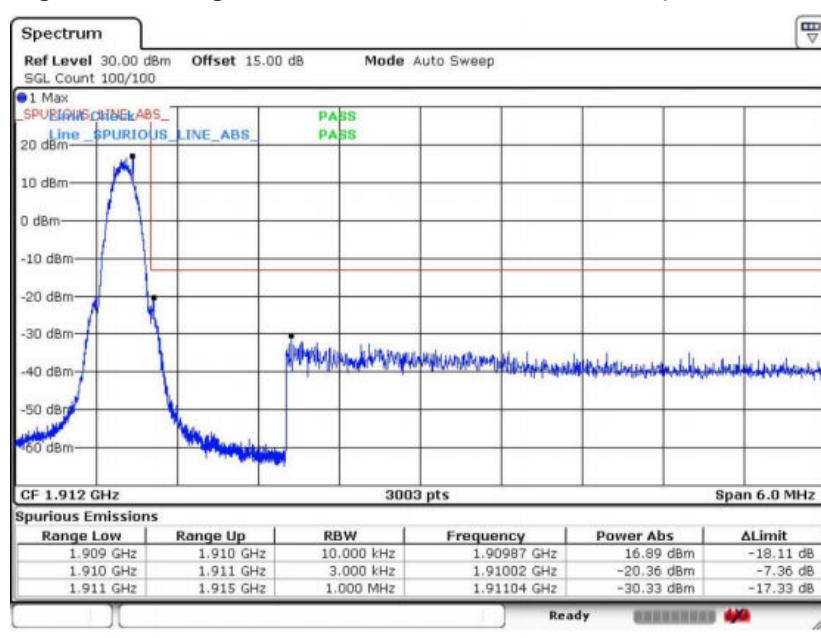


Band :	GSM1900	Test Mode :	GSM Link (GMSK)
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## Lower Band Edge Plot on Channel 512 (1850.2 MHz)

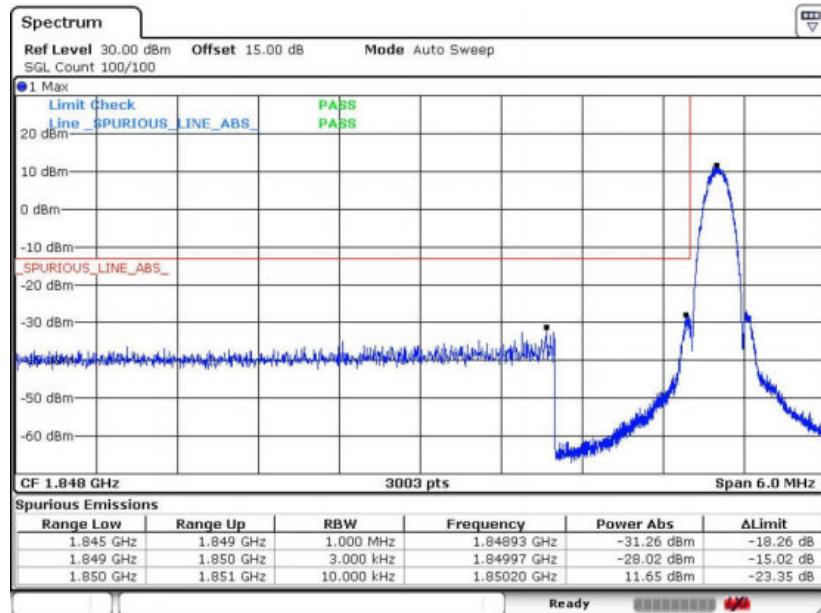
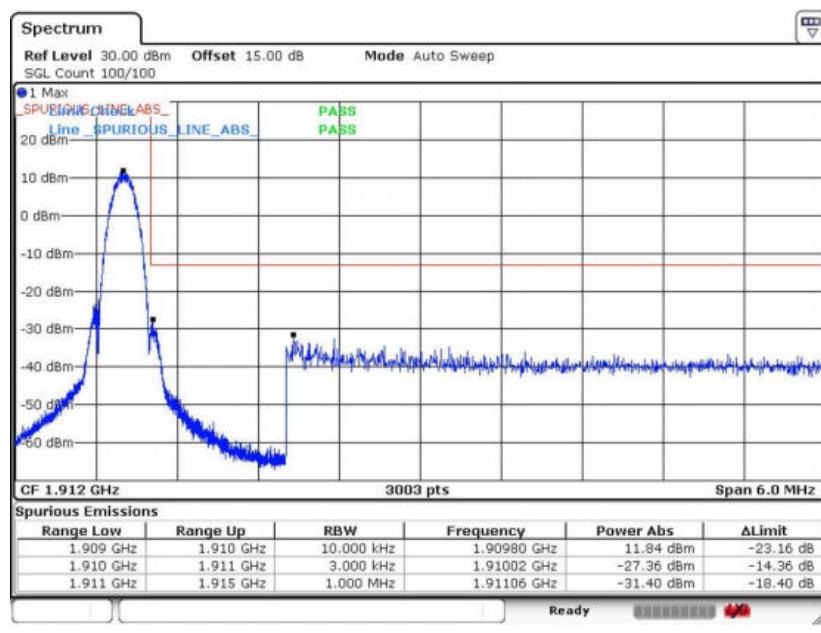


## Higher Band Edge Plot on Channel 810 (1909.8 MHz)



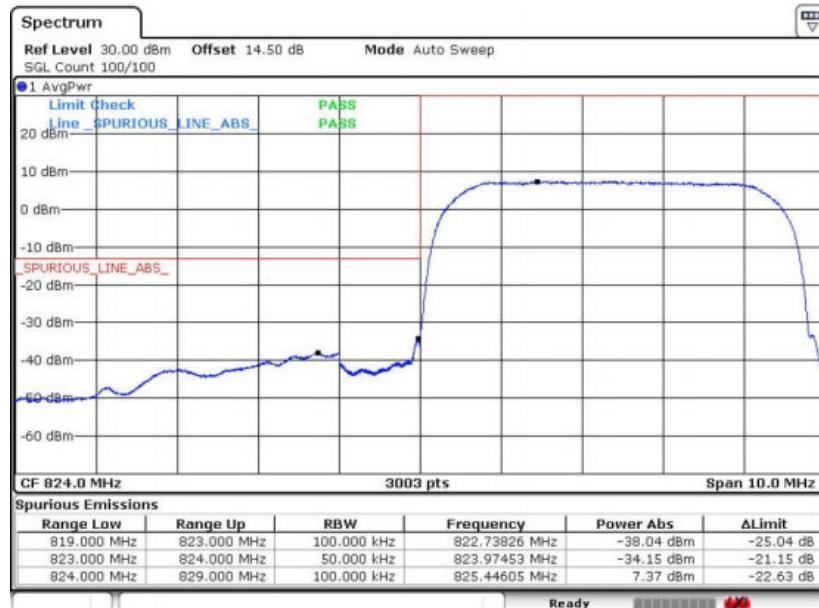


Band :	GSM1900	Test Mode :	EDGE class 8 Link (8PSK)
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**Lower Band Edge Plot on Channel 512 (1850.2 MHz)****Higher Band Edge Plot on Channel 810 (1909.8 MHz)**

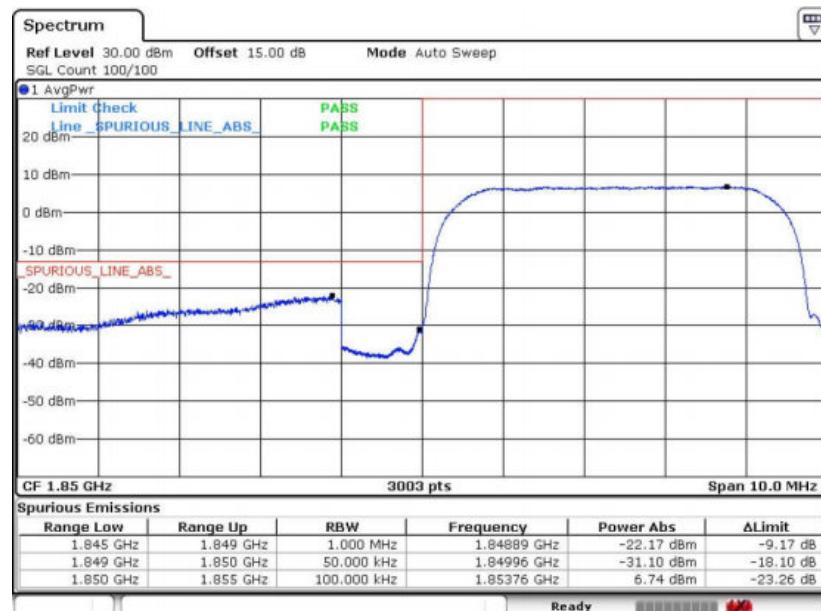
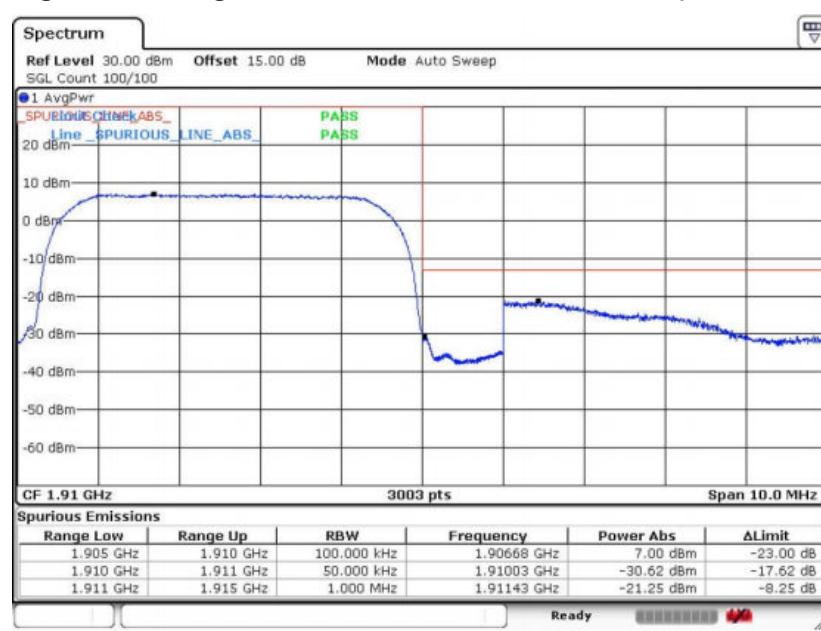


Band :	WCDMA Band V	Test Mode :	RMC 12.2Kbps Link (QPSK)
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**Lower Band Edge Plot on Channel 4132 (826.4 MHz)****Higher Band Edge Plot on Channel 4233 (846.6 MHz)**



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)****Higher Band Edge Plot on Channel 9538 (1907.6 MHz)**

## 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.

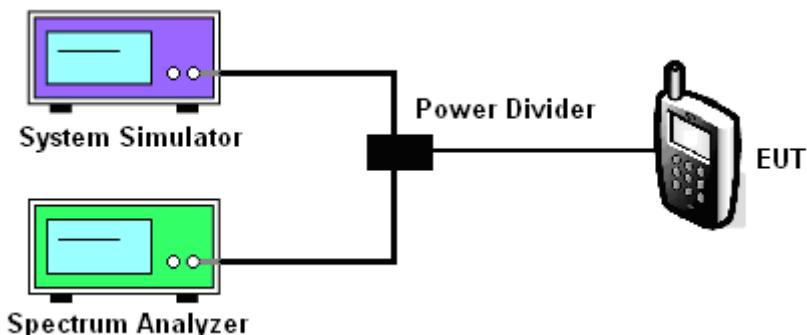
### 3.6.2 Measuring Instruments

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)  
 $= -13$  dBm.

### 3.6.4 Test Setup

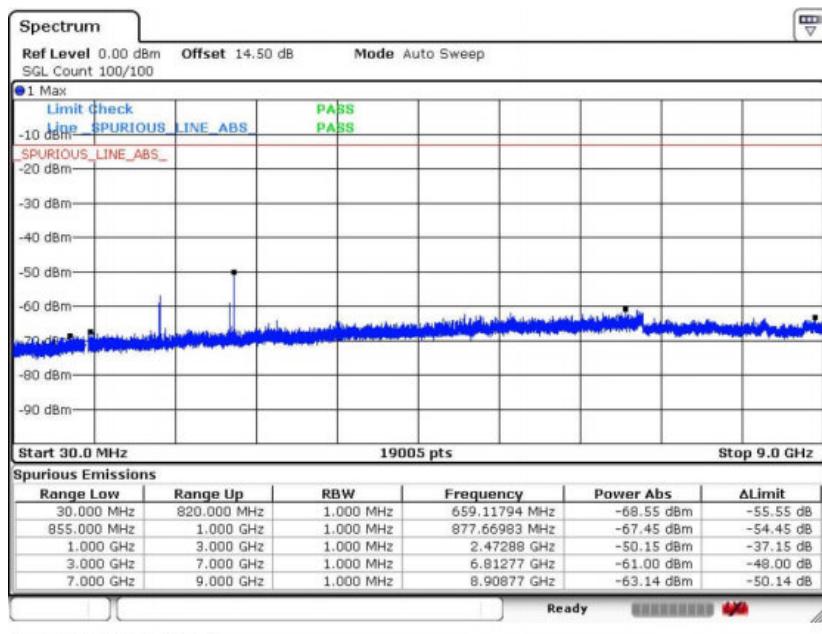




### 3.6.5 Test Result (Plots) of Conducted Spurious Emission

Band :	GSM850	Channel :	CH128
Test Mode :	GSM Link (GMSK)	Frequency :	824.2 MHz

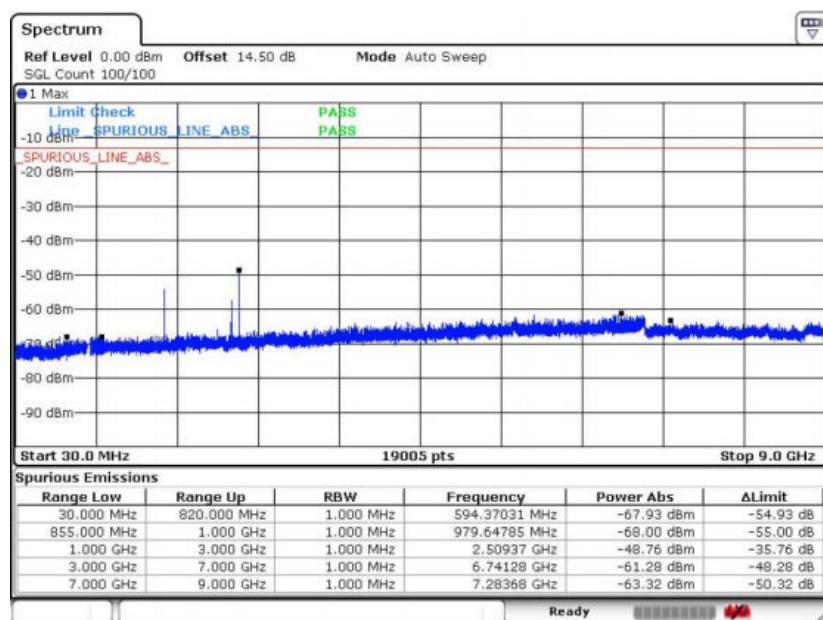
Conducted Spurious Emission Plot between 30MHz ~ 9GHz





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

## Conducted Spurious Emission Plot between 30MHz ~ 9GHz

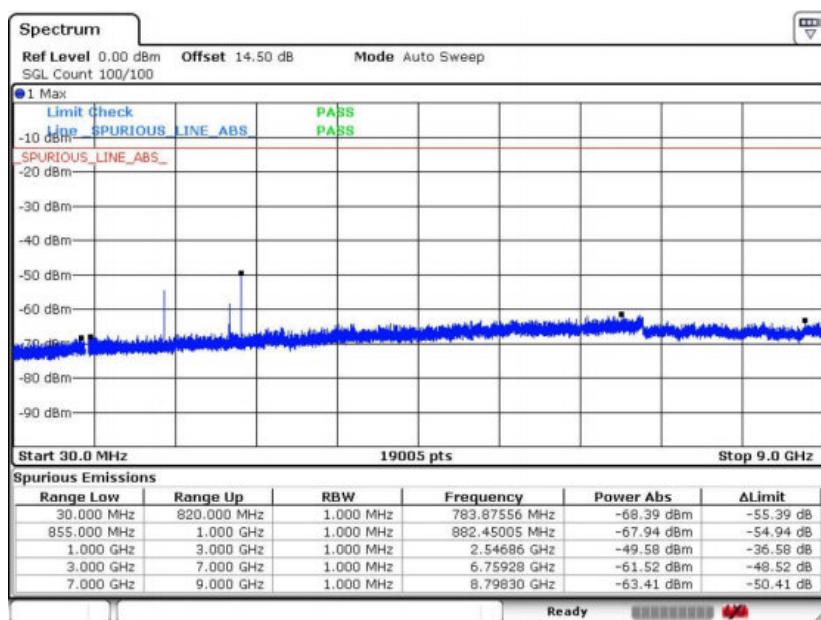


Date: 18.OCT.2015 09:55:49



Band :	GSM850	Channel :	CH 251
Test Mode :	GSM Link (GMSK)	Frequency :	848.8 MHz

## Conducted Spurious Emission Plot between 30MHz ~ 9GHz

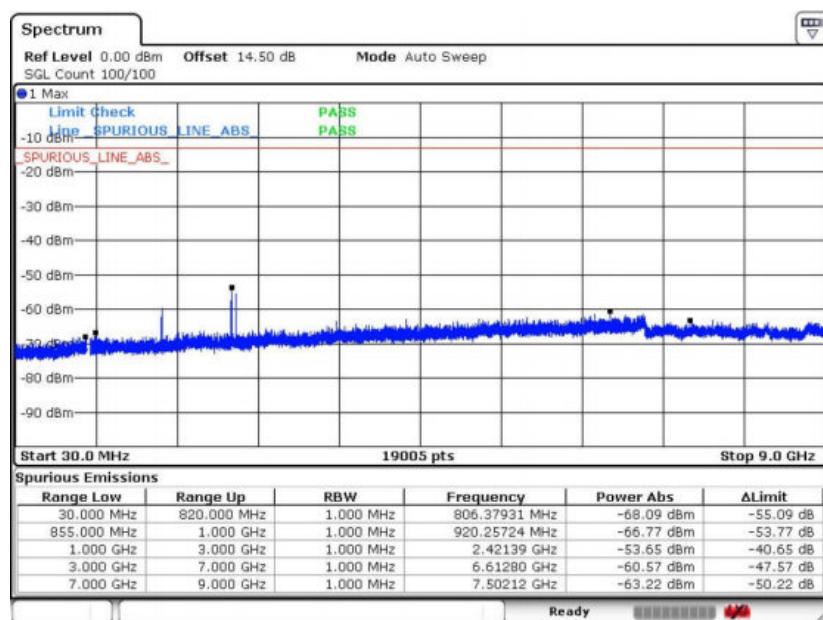


Date: 18.OCT.2015 09:57:49



Band :	GSM850	Channel :	CH128
Test Mode :	EDGE class 8 Link (8PSK)	Frequency :	824.2 MHz

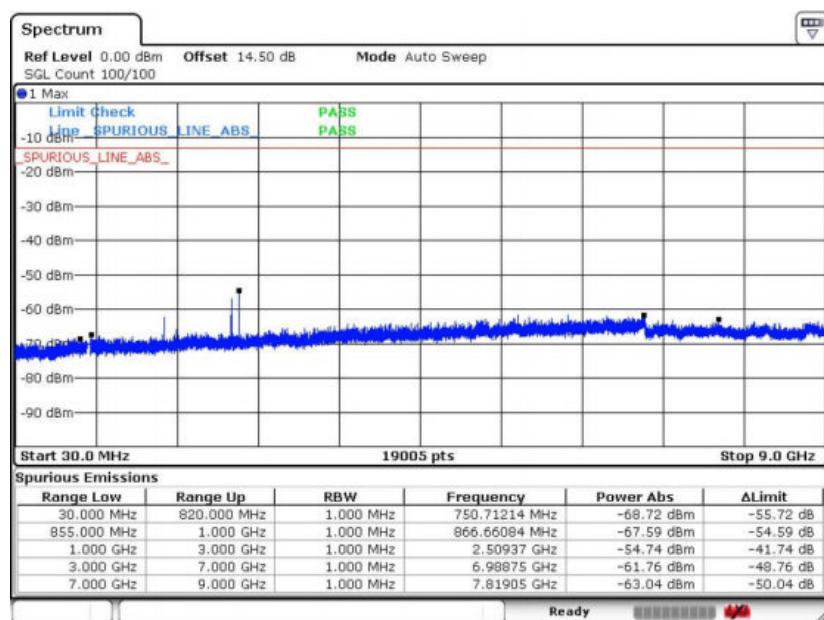
## Conducted Spurious Emission Plot between 30MHz ~ 9GHz





Band :	GSM850	Channel :	CH189
Test Mode :	EDGE class 8 Link (8PSK)	Frequency :	836.4 MHz

## Conducted Spurious Emission Plot between 30MHz ~ 9GHz

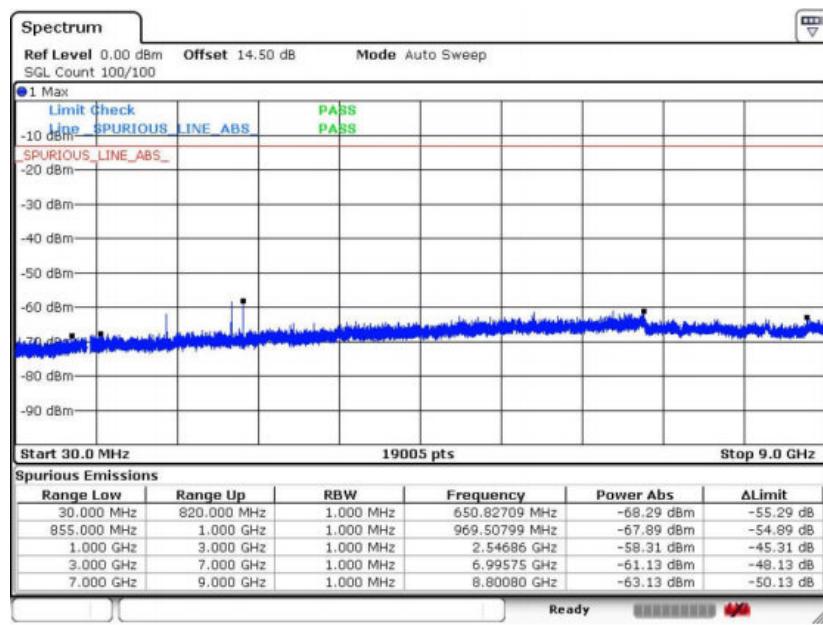


Date: 15.OCT.2015 00:23:24



Band :	GSM850	Channel :	CH251
Test Mode :	EDGE class 8 Link (8PSK)	Frequency :	848.8 MHz

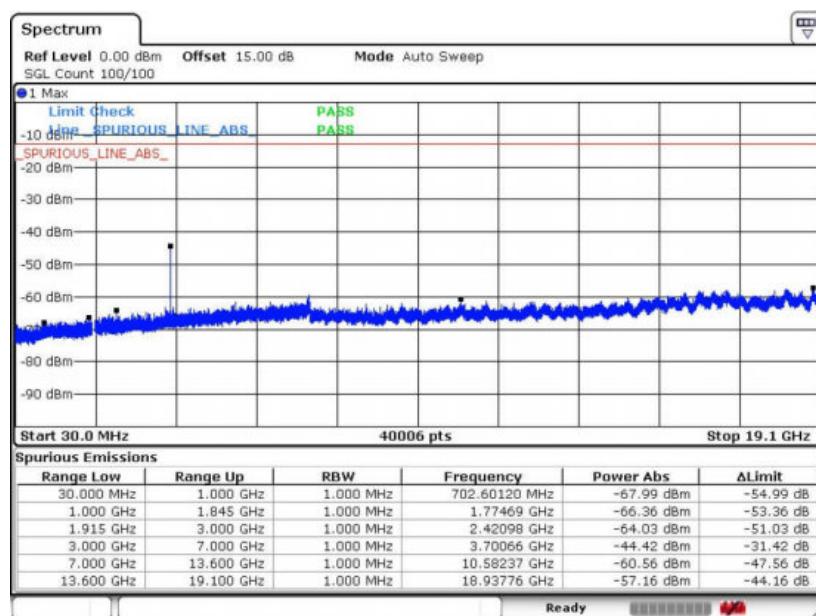
## Conducted Spurious Emission Plot between 30MHz ~ 9GHz





Band :	GSM1900	Channel :	CH512
Test Mode :	GSM Link (GMSK)	Frequency :	1850.2 MHz

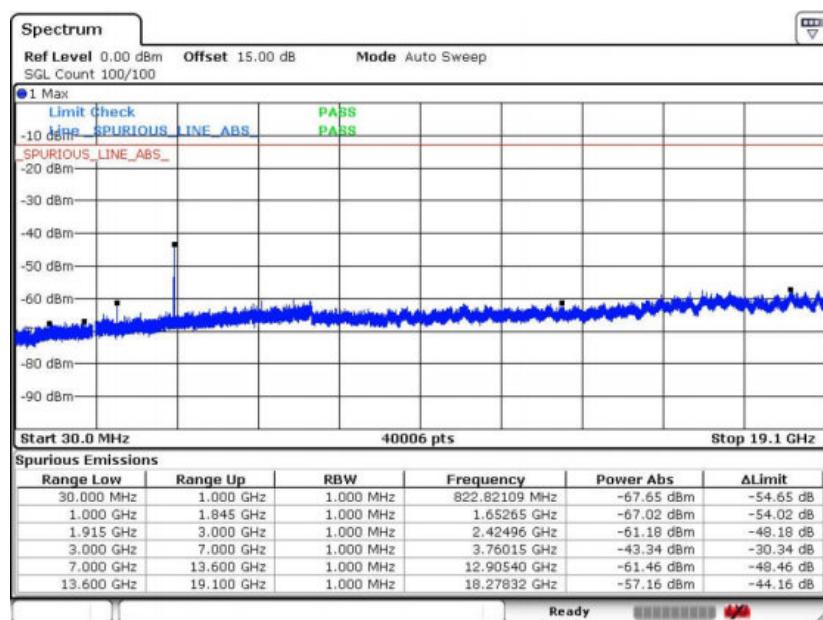
## Conducted Spurious Emission Plot between 30MHz ~ 19.1GHz





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

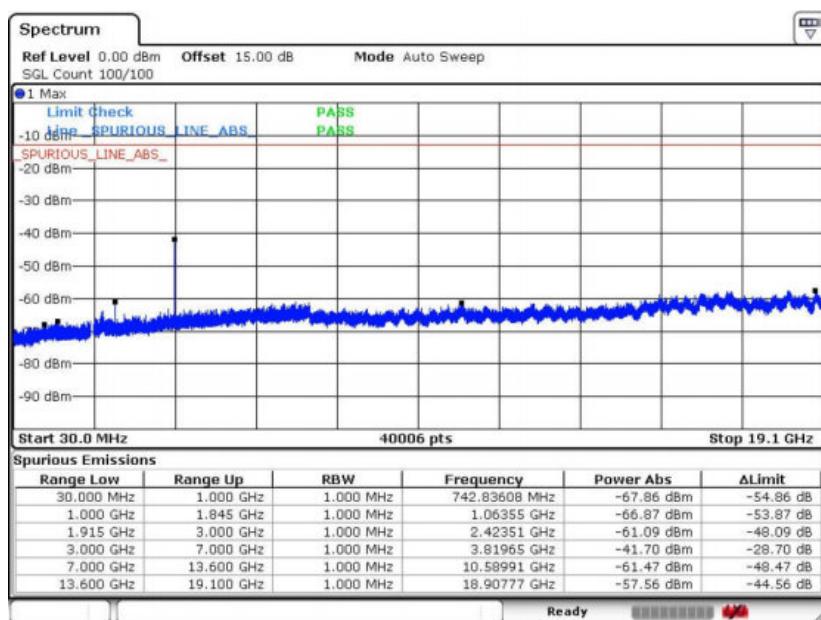
## Conducted Spurious Emission Plot between 30MHz ~ 19.1GHz





Band :	GSM1900	Channel :	CH810
Test Mode :	GSM Link (GMSK)	Frequency :	1909.8 MHz

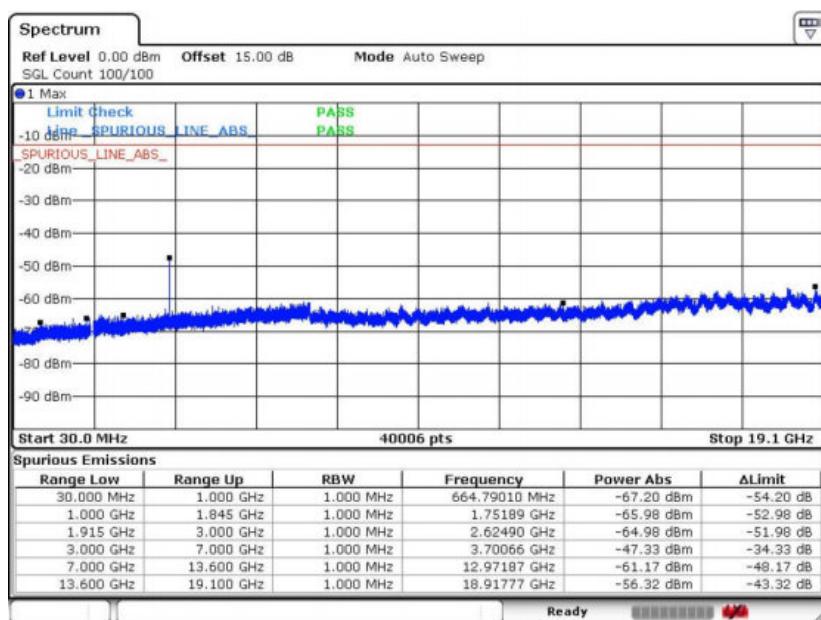
## Conducted Spurious Emission Plot between 30MHz ~ 19.1GHz





Band :	GSM1900	Channel :	CH512
Test Mode :	EDGE class 8 Link (8PSK)	Frequency :	1850.2 MHz

## Conducted Spurious Emission Plot between 30MHz ~ 19.1GHz

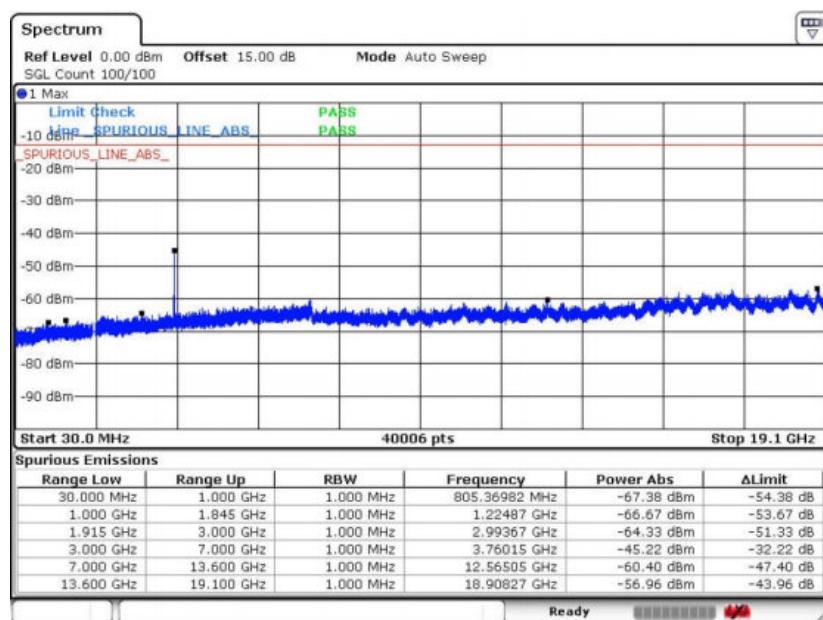


Date: 15.OCT.2015 00:53:07



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

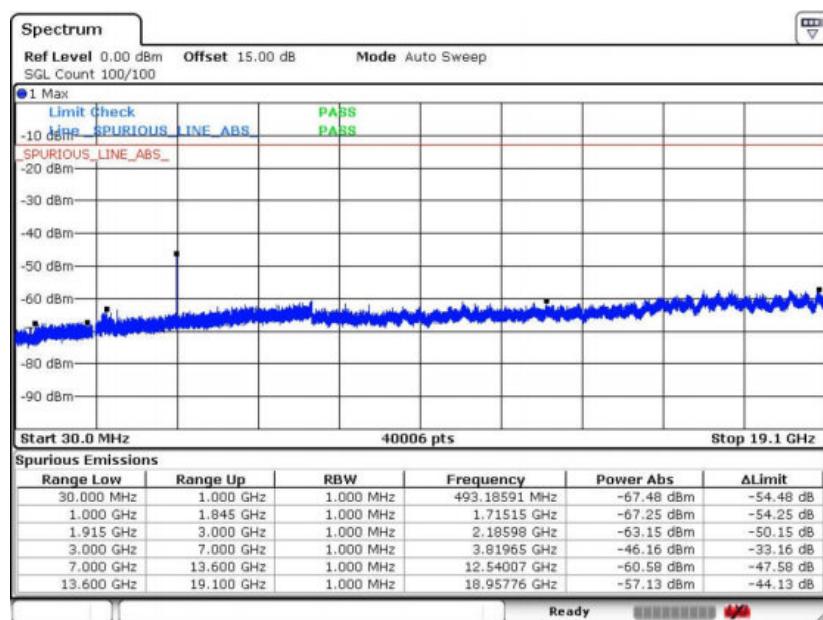
## Conducted Spurious Emission Plot between 30MHz ~ 19.1GHz





Band :	GSM1900	Channel :	CH810
Test Mode :	EDGE class 8 Link (8PSK)	Frequency :	1909.8 MHz

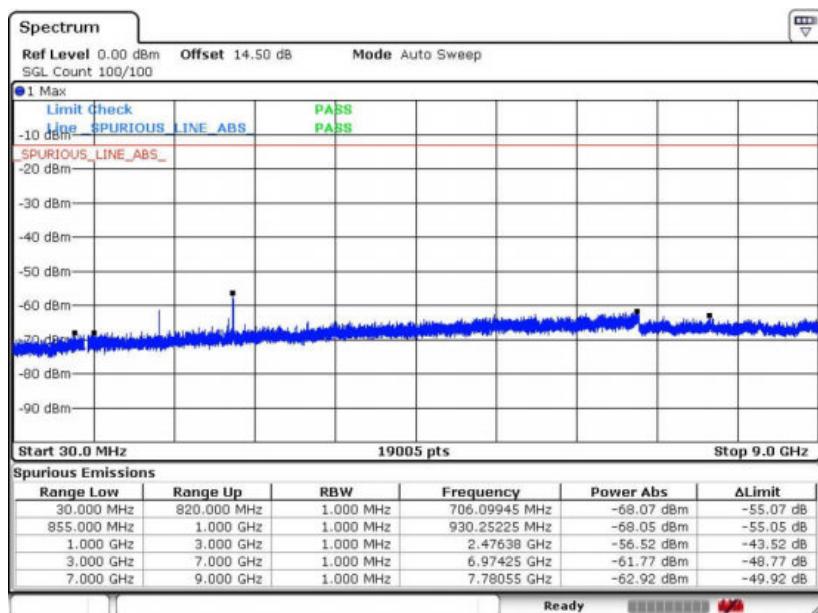
## Conducted Spurious Emission Plot between 30MHz ~ 19.1GHz





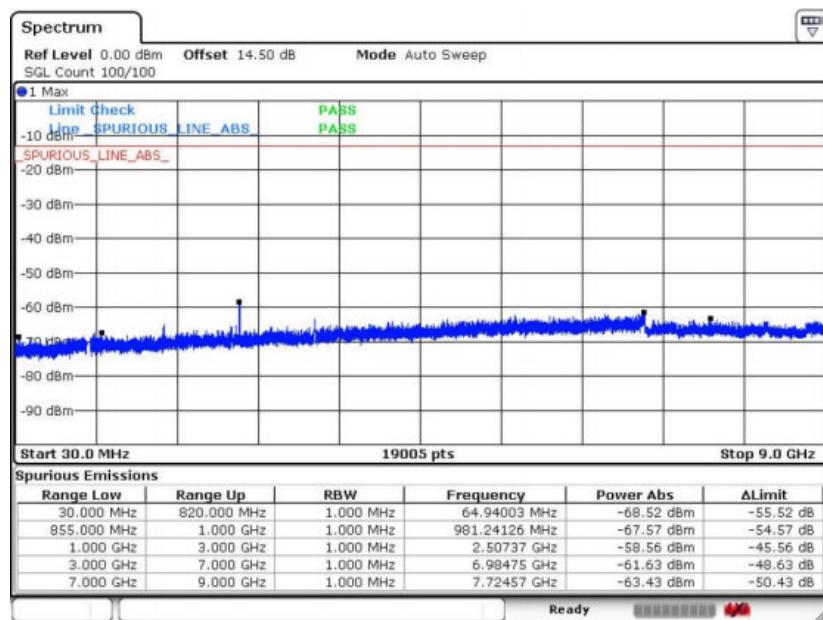
Band :	WCDMA Band V	Channel :	CH4132
Test Mode :	RMC 12.2Kbps Link (QPSK)	Frequency :	826.4 MHz

## Conducted Spurious Emission Plot between 30MHz ~ 9GHz





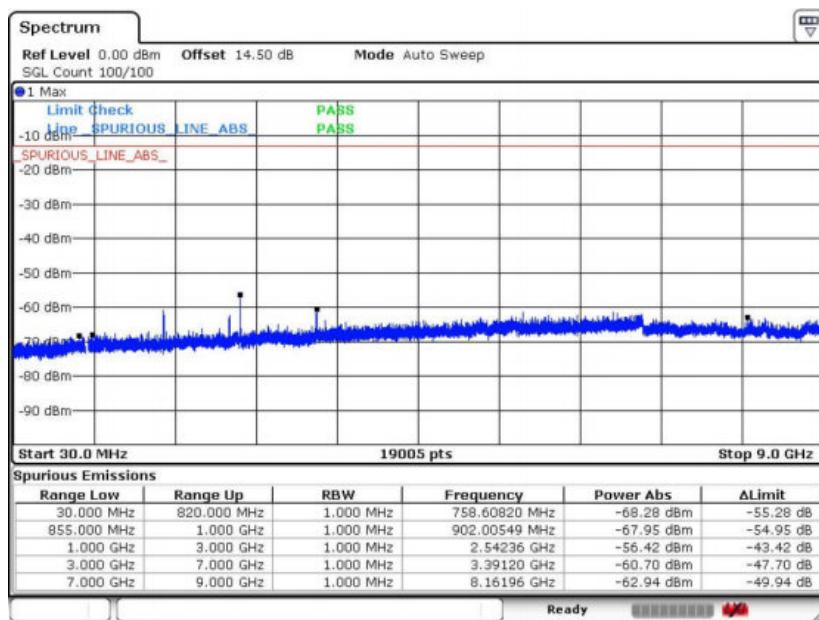
<b>Band :</b>	WCDMA Band V	<b>Channel :</b>	CH4182
<b>Test Mode :</b>	RMC 12.2Kbps Link (QPSK)	<b>Frequency :</b>	836.4 MHz

**Conducted Spurious Emission Plot between 30MHz ~ 9GHz**



Band :	WCDMA Band V	Channel :	CH4233
Test Mode :	RMC 12.2Kbps Link (QPSK)	Frequency :	846.6 MHz

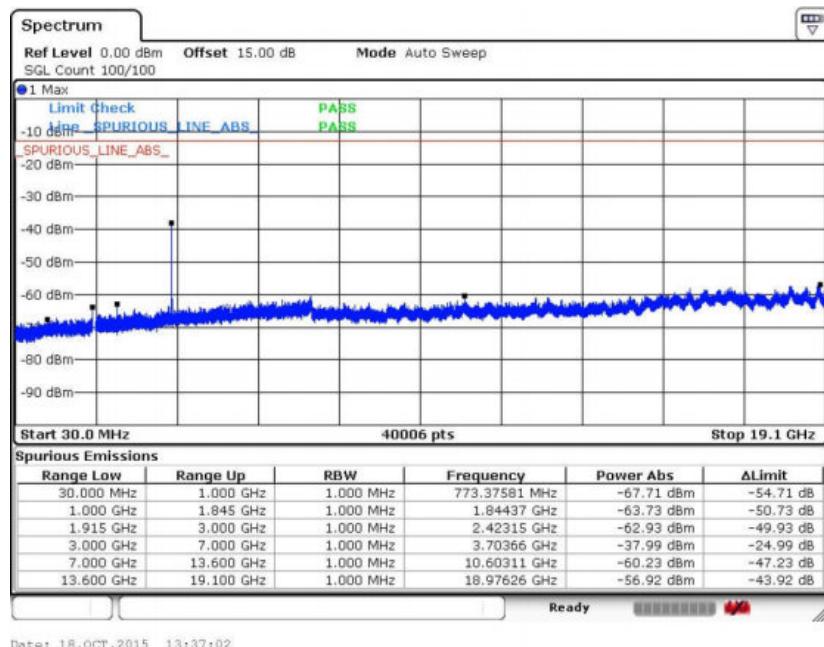
## Conducted Spurious Emission Plot between 30MHz ~ 9GHz





Band :	WCDMA Band II	Channel :	CH9262
Test Mode :	RMC 12.2Kbps Link (QPSK)	Frequency :	1852.4MHz

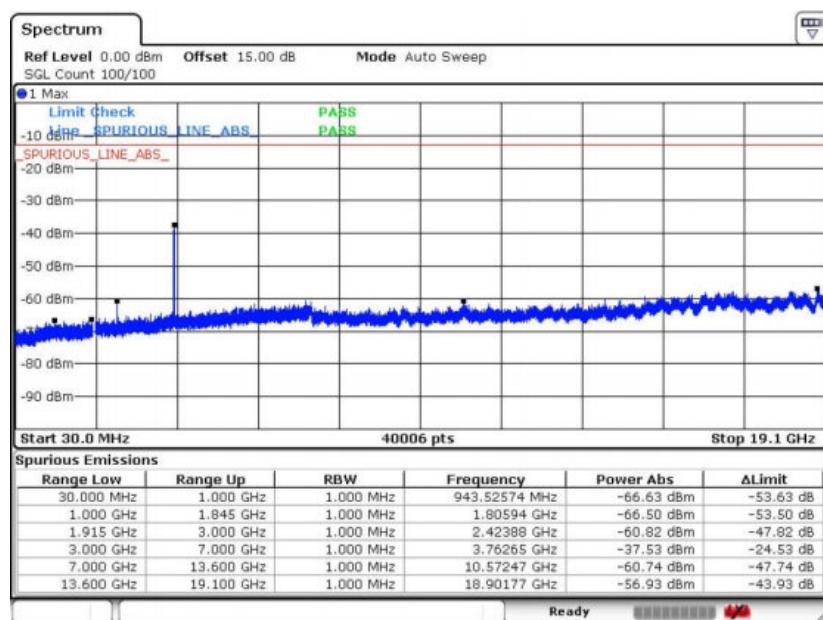
## Conducted Spurious Emission Plot between 30MHz ~ 19.1GHz





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

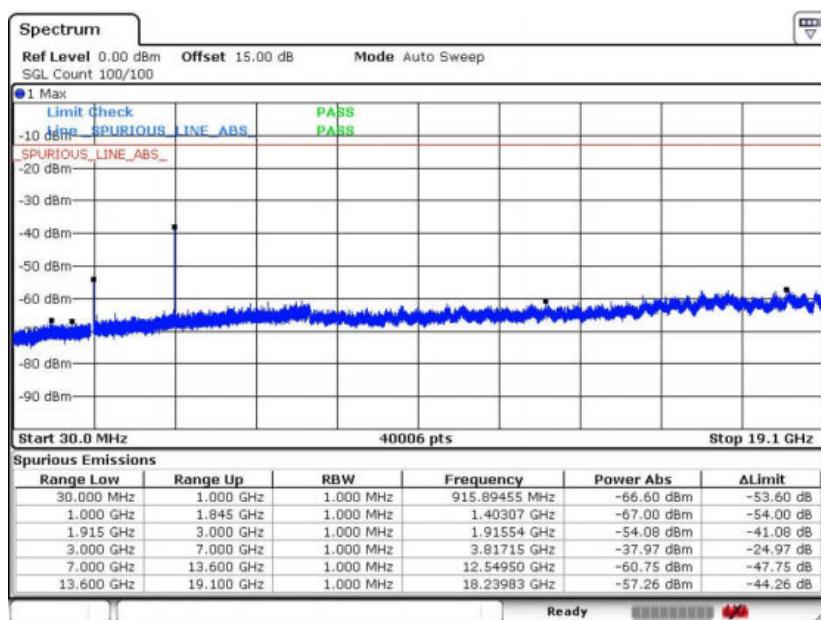
## Conducted Spurious Emission Plot between 30MHz ~ 19.1GHz





Band :	WCDMA Band II	Channel :	CH9538
Test Mode :	RMC 12.2Kbps Link (QPSK)	Frequency :	1907.6 MHz

## Conducted Spurious Emission Plot between 30MHz ~ 19.1GHz





## 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

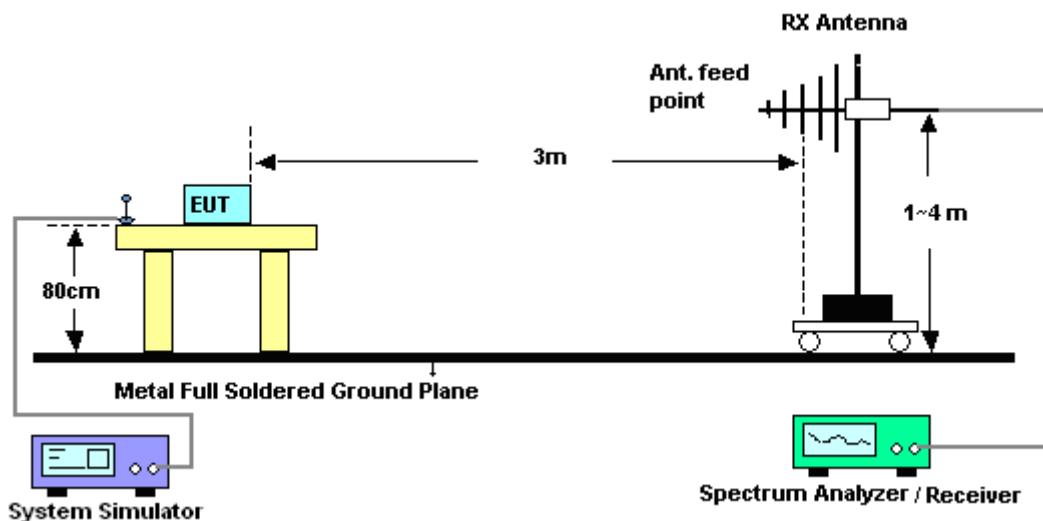
The measuring equipment is listed in the section 4 of this test report.

### 3.7.3 Test Procedures

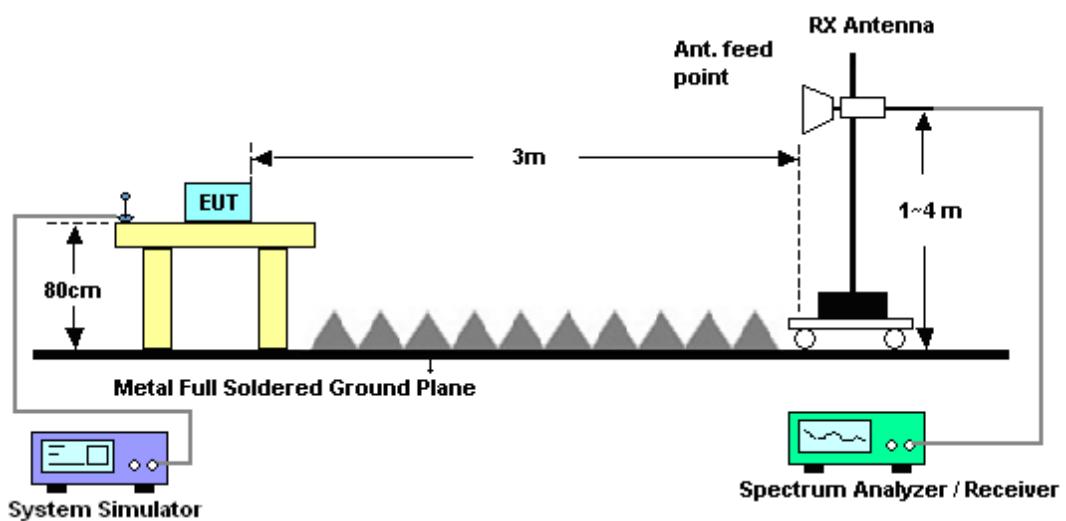
1. The testing follows FCC KDB 971168 v02r02 Section 5.8 and ANSI / TIA-603-D-2010 Section 2.2.12.
2. The EUT was placed on a rotatable wooden table 0.8 meters above the ground.
3. The EUT was set 3 meters from the receiving antenna, which was mounted on the antenna tower.
4. The table was rotated 360 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 (dBm) = S.G. Power – Tx Cable Loss + Tx Antenna Gain
12. ERP (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)  
 $= P(W) - [43 + 10\log(P)]$  (dB)  
 $= [30 + 10\log(P)]$  (dBm) -  $[43 + 10\log(P)]$  (dB)  
 $= -13$  dBm.

### 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				<b>Temperature :</b>	23~25°C			
<b>Test Mode :</b>	GSM Link (GMSK)				<b>Relative Humidity :</b>	48~52%			
<b>Test Engineer :</b>	Jeff Yao				<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 ( dBm )	S.G. Power ( dBm )	TX Cable loss ( dB )	TX Antenna Gain ( dBi )	Polarization ( H/V )	Result
1672	-61.91	-13	-48.91	-69.48	-68.59	0.57	9.40	H	Pass
2510	-44.90	-13	-31.90	-59.81	-52.61	0.74	10.60	H	Pass
3346	-56.33	-13	-43.33	-71.93	-65.93	0.85	12.60	H	Pass

<b>Band :</b>	GSM850				<b>Temperature :</b>	23~25°C			
<b>Test Mode :</b>	GSM Link (GMSK)				<b>Relative Humidity :</b>	48~52%			
<b>Test Engineer :</b>	Jeff Yao				<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 ( dBm )	S.G. Power ( dBm )	TX Cable loss ( dB )	TX Antenna Gain ( dBi )	Polarization ( H/V )	Result
1672	-61.05	-13	-48.05	-67.88	-67.73	0.57	9.40	V	Pass
2510	-49.34	-13	-36.34	-62.56	-57.05	0.74	10.60	V	Pass
3346	-57.14	-13	-44.14	-71.75	-66.74	0.85	12.60	V	Pass



<b>Band :</b>	GSM850			<b>Temperature :</b>		23~25°C		
<b>Test Mode :</b>	EDGE class 8 Link (8PSK)			<b>Relative Humidity :</b>		48~52%		
<b>Test Engineer :</b>	Jeff Yao			<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 ( dBm )	S.G. Power ( dBm )	TX Cable loss ( dB )	TX Antenna Gain ( dBi )	Polarization ( H/V )
1672	-60.77	-13	-47.77	-68.34	-67.45	0.57	9.40	H Pass
2510	-54.42	-13	-41.42	-66.70	-62.13	0.74	10.60	H Pass
3346	-56.19	-13	-43.19	-71.79	-65.79	0.85	12.60	H Pass

<b>Band :</b>	GSM850			<b>Temperature :</b>		23~25°C		
<b>Test Mode :</b>	EDGE class 8 Link (8PSK)			<b>Relative Humidity :</b>		48~52%		
<b>Test Engineer :</b>	Jeff Yao			<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 ( dBm )	S.G. Power ( dBm )	TX Cable loss ( dB )	TX Antenna Gain ( dBi )	Polarization ( H/V )
1672	-62.77	-13	-49.77	-69.60	-69.45	0.57	9.40	V Pass
2510	-58.41	-13	-45.41	-69.91	-66.12	0.74	10.60	V Pass
3346	-56.98	-13	-43.98	-71.59	-66.58	0.85	12.60	V Pass



<b>Band :</b>	GSM1900			<b>Temperature :</b>		23~25°C			
<b>Test Mode :</b>	GSM Link (GMSK)			<b>Relative Humidity :</b>		48~52%			
<b>Test Engineer :</b>	Jeff Yao			<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	-53.03	-13	-40.03	-73.36	-64.76	0.87	12.60	H	Pass
5640	-49.90	-13	-36.90	-72.77	-61.93	1.07	13.10	H	Pass
7520	-50.69	-13	-37.69	-75.82	-60.30	1.69	11.30	H	Pass

<b>Band :</b>	GSM1900			<b>Temperature :</b>		23~25°C			
<b>Test Mode :</b>	GSM Link (GMSK)			<b>Relative Humidity :</b>		48~52%			
<b>Test Engineer :</b>	Jeff Yao			<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	-51.49	-13	-38.49	-73.05	-63.22	0.87	12.6	V	Pass
5640	-51.24	-13	-38.24	-73.99	-63.27	1.07	13.1	V	Pass
7520	-50.58	-13	-37.58	-75.49	-60.01	1.87	11.3	V	Pass



<b>Band :</b>	GSM1900			<b>Temperature :</b>		23~25°C			
<b>Test Mode :</b>	EDGE class 8 Link (8PSK)			<b>Relative Humidity :</b>		48~52%			
<b>Test Engineer :</b>	Jeff Yao			<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	-52.89	-13	-39.89	-73.22	-64.62	0.87	12.60	H	Pass
5640	-50.38	-13	-37.38	-73.25	-62.41	1.07	13.10	H	Pass
7520	-50.90	-13	-37.90	-76.03	-60.51	1.69	11.30	H	Pass

<b>Band :</b>	GSM1900			<b>Temperature :</b>		23~25°C			
<b>Test Mode :</b>	EDGE class 8 Link (8PSK)			<b>Relative Humidity :</b>		48~52%			
<b>Test Engineer :</b>	Jeff Yao			<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	-52.22	-13	-39.22	-73.78	-63.95	0.87	12.6	V	Pass
5640	-50.30	-13	-37.30	-73.05	-62.33	1.07	13.1	V	Pass
7520	-51.25	-13	-38.25	-76.16	-60.68	1.87	11.3	V	Pass



<b>Band :</b>	WCDMA Band V				<b>Temperature :</b>	23~25°C			
<b>Test Mode :</b>	RMC 12.2Kbps Link (QPSK)				<b>Relative Humidity :</b>	48~52%			
<b>Test Engineer :</b>	Jeff Yao				<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 ( dBm )	S.G. Power ( dBm )	TX Cable loss ( dB )	TX Antenna Gain ( dBi )	Polarization ( H/V )	Result
1672	-62.15	-13	-49.15	-69.72	-68.83	0.57	9.40	H	Pass
2510	-58.21	-13	-45.21	-70.49	-65.92	0.74	10.60	H	Pass
3346	-56.11	-13	-43.11	-71.71	-65.71	0.85	12.60	H	Pass

<b>Band :</b>	WCDMA Band V				<b>Temperature :</b>	23~25°C			
<b>Test Mode :</b>	RMC 12.2Kbps Link (QPSK)				<b>Relative Humidity :</b>	48~52%			
<b>Test Engineer :</b>	Jeff Yao				<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 ( dBm )	S.G. Power ( dBm )	TX Cable loss ( dB )	TX Antenna Gain ( dBi )	Polarization ( H/V )	Result
1672	-62.88	-13	-49.88	-69.71	-69.56	0.57	9.40	V	Pass
2510	-58.46	-13	-45.46	-69.96	-66.17	0.74	10.60	V	Pass
3346	-57.31	-13	-44.31	-71.92	-66.91	0.85	12.60	V	Pass



<b>Band :</b>	WCDMA Band II				<b>Temperature :</b>	23~25°C			
<b>Test Mode :</b>	RMC 12.2Kbps Link (QPSK)				<b>Relative Humidity :</b>	48~52%			
<b>Test Engineer :</b>	Jeff Yao				<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 ( dBm )	S.G. Power ( dBm )	TX Cable loss ( dB )	TX Antenna Gain ( dBi )	Polarization ( H/V )	Result
3760	-52.14	-13	-39.14	-72.47	-63.87	0.87	12.60	H	Pass
5640	-45.18	-13	-32.18	-68.05	-57.21	1.07	13.10	H	Pass
7520	-50.79	-13	-37.79	-75.92	-60.40	1.69	11.30	H	Pass

<b>Band :</b>	WCDMA Band II				<b>Temperature :</b>	23~25°C			
<b>Test Mode :</b>	RMC 12.2Kbps Link (QPSK)				<b>Relative Humidity :</b>	48~52%			
<b>Test Engineer :</b>	Jeff Yao				<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 ( dBm )	S.G. Power ( dBm )	TX Cable loss ( dB )	TX Antenna Gain ( dBi )	Polarization ( H/V )	Result
3760	-51.59	-13	-38.59	-73.15	-63.32	0.87	12.6	V	Pass
5640	-48.27	-13	-35.27	-71.02	-60.30	1.07	13.1	V	Pass
7520	-50.70	-13	-37.70	-75.61	-60.13	1.87	11.3	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

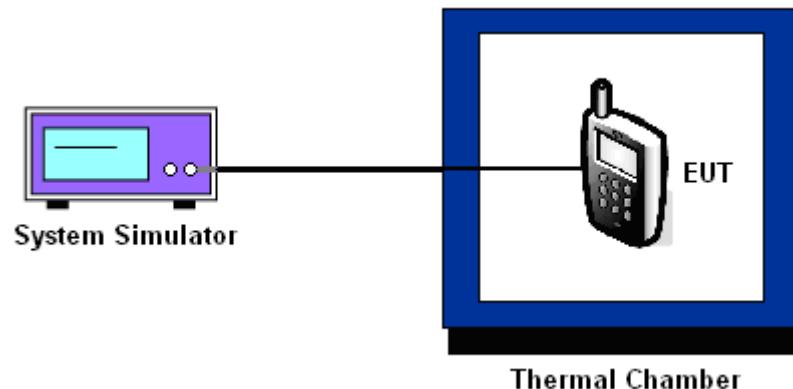
1. The testing follows FCC KDB 971168 v02r02 Section 9.0.
2. The EUT was set up in the thermal chamber and connected with the system simulator.
3. With power OFF, the temperature was decreased to  $-30^\circ\text{C}$  and the EUT was stabilized before testing. Power was applied and the maximum change 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

<b>Band :</b>	GSM 850	<b>Channel :</b>	189
<b>Limit (ppm) :</b>	2.5	<b>Frequency :</b>	836.4 MHz

<b>Temperature (°C)</b>	<b>GSM</b>	<b>EDGE class 8</b>	<b>Result</b>
	<b>Deviation (ppm)</b>	<b>Deviation (ppm)</b>	
50	0.0084	0.0072	PASS
40	0.0538	0.0681	
30	0.0024	0.0658	
20(Ref.)	0.0000	0.0000	
10	0.0514	0.0012	
0	0.0060	0.0646	
-10	0.0072	0.0036	
-20	0.0096	0.0060	
-30	0.0610	0.0084	

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

<b>Temperature (°C)</b>	<b>GSM</b>	<b>EDGE class 8</b>	<b>Result</b>
	<b>Deviation (ppm)</b>	<b>Deviation (ppm)</b>	
50	0.0032	0.0037	PASS
40	0.0559	0.0027	
30	0.0543	0.0660	
20(Ref.)	0.0000	0.0000	
10	0.0016	0.0005	
0	0.0553	0.0665	
-10	0.0564	0.0021	
-20	0.0048	0.0032	
-30	0.0059	0.0691	

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

<b>Temperature (°C)</b>	RMC 12.2Kbps	<b>Result</b>
	Deviation (ppm)	
50	0.0132	PASS
40	0.0108	
30	0.0024	
20(Ref.)	0.0000	
10	0.0108	
0	0.0036	
-10	0.0120	
-20	0.0108	
-30	0.0132	

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

<b>Temperature (°C)</b>	RMC 12.2Kbps	<b>Result</b>
	Deviation (ppm)	
50	0.0037	PASS
40	0.0133	
30	0.0011	
20(Ref.)	0.0000	
10	0.0122	
0	0.0011	
-10	0.0021	
-20	0.0032	
-30	0.0149	

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)	Deviation (ppm)	Limit (ppm)	Result
GSM 850 CH189	GSM	4.35	0.0048	2.5	PASS
		3.8	0.0000		
		BEP	0.0024		
	EDGE class 8	4.35	0.0000		
		3.8	0.0000		
		BEP	0.0024		
GSM 1900 CH661	GSM	4.35	0.0021	(Note 3.)	PASS
		3.8	0.0000		
		BEP	0.0011		
	EDGE class 8	4.35	0.0021		
		3.8	0.0000		
		BEP	0.0005		
WCDMA Band V CH4182	RMC 12.2Kbps	4.35	0.0120	2.5	
		3.8	0.0096		
		BEP	0.0132		
WCDMA Band II CH9400	RMC 12.2Kbps	4.35	0.0005	(Note 3.)	
		3.8	0.0000		
		BEP	0.0016		

**Note:**

1. Normal Voltage = 3.8V.
2. Battery End Point (BEP) = 3.4 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	FSV40	101078	9kHz~40GHz	May 05, 2015	Oct. 15, 2015~Oct. 19, 2015	May 04, 2016	Conducted (TH01-SZ)
Thermal Chamber	Ten Billion Hongzhangroup	LP-150U	H2014081803	-40~+150°C	Aug. 07, 2015	Oct. 15, 2015~Oct. 19, 2015	Aug. 06, 2016	Conducted (TH01-SZ)
EMI Test Receiver&SA	Agilent Technologies	N9038A	MY52260185	20Hz~26.5GHz	May 26, 2015	Oct. 16, 2015	May 25, 2016	Radiation (03CH01-SZ)
Spectrum Analyzer	KEYSIGHT	N9010A	MY55150213	10Hz~44GHz;Max 30dBm	Jun. 07, 2015	Oct. 16, 2015	Jun. 06, 2016	Radiation (03CH01-SZ)
Bilog Antenna	TeseQ	CBL6112D	23188	30MHz-2GHz	Nov. 07, 2014	Oct. 16, 2015	Nov. 06, 2015	Radiation (03CH01-SZ)
Double Ridge Horn Antenna	ETS Lindgren	3117	00119436	1GHz~18GHz	Oct. 18, 2014	Oct. 16, 2015	Oct. 17, 2015	Radiation (03CH01-SZ)
SHF-EHF Horn	com-power	AH-840	101071	18Ghz-40GHz	Aug. 19, 2015	Oct. 16, 2015	Aug. 18, 2016	Radiation (03CH01-SZ)
Amplifier	ADVANTEST	BB525C	E9007003	9kHz ~3000MHz / 30 dB	Jan. 28, 2015	Oct. 16, 2015	Jan. 27, 2016	Radiation (03CH01-SZ)
Amplifier	Agilent Technologies	83017A	MY39501302	500MHz~26.5GHz	Jan. 28, 2015	Oct. 16, 2015	Jan. 27, 2016	Radiation (03CH01-SZ)
Amplifier	Yiai	AV3860B	04030	2GHz~26.5GHz	May 05, 2015	Oct. 16, 2015	May 04, 2016	Radiation (03CH01-SZ)
AC Power Source	Chroma	61601	61601000198 5	N/A	NCR	Oct. 16, 2015	NCR	Radiation (03CH01-SZ)
Turn Table	EM	EM1000	N/A	0~360 degree	NCR	Oct. 16, 2015	NCR	Radiation (03CH01-SZ)
Antenna Mast	EM	EM1000	N/A	1 m~4 m	NCR	Oct. 16, 2015	NCR	Radiation (03CH01-SZ)



## 5 Uncertainty of Evaluation

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

Measuring Uncertainty for a Level of Confidence of 95% ( $U = 2U_c(y)$ )	4.8dB
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