



# FCC RF Test Report

APPLICANT : ZTE CORPORATION  
EQUIPMENT : Rogers HSPA/LTE CPE  
BRAND NAME : ZTE  
MODEL NAME : MF275R  
FCC ID : SRQ-MF275R  
STANDARD : FCC 47 CFR Part 2, 22(H), 24(E)  
CLASSIFICATION : PCS Licensed Transmitter (PCB)

The product was received on Jun. 05, 2015 and testing was completed on Jul. 09, 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-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 (SHENZHEN) INC., the test report shall not be reproduced except in full.

Reviewed by: Joseph Lin / Supervisor

Approved by: Jones Tsai / Manager



**SPORTON INTERNATIONAL (SHENZHEN) INC.**

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## SUMMARY OF TEST RESULT

Report Section	FCC Rule	IC Rule	Description	Limit	Result	Remark
3.1	§2.1046	RSS-132 (5.4) RSS-133 (6.4)	Conducted Output Power	N/A	PASS	-
3.2	§24.232(d)	RSS-132 (5.4) RSS-133 (6.4)	Peak-to-Average Ratio	<13 dB	PASS	-
3.3	§22.913(a)(2)	RSS-132(5.4) SRSP-503(5.1.3)	Effective Radiated Power	< 7 Watts	PASS	-
	§24.232(c)	RSS-133 (6.4) SRSP-510(5.1.2)	Equivalent Isotropic Radiated Power	< 2 Watts	PASS	-
3.4	§2.1049	RSS-GEN(6.6) RSS-133(6.5)	Occupied Bandwidth	N/A	PASS	-
3.5	§2.1051 §22.917(a) §24.238(a)	RSS-132 (5.5) RSS-133 (6.5)	Band Edge Measurement	< 43+10log <sub>10</sub> (P[Watts])	PASS	-
3.6	§2.1051 §22.917(a) §24.238(a)	RSS-132 (5.5) RSS-133 (6.5)	Conducted Spurious Emission	< 43+10log <sub>10</sub> (P[Watts])	PASS	-
3.7	§2.1053 §22.917(a) §24.238(a)	RSS-132 (5.5) RSS-133 (6.5)	Field Strength of Spurious Radiation	< 43+10log <sub>10</sub> (P[Watts])	PASS	Under limit 15.60 dB at 3760.000 MHz
3.8	§2.1055 §22.355	RSS-GEN(6.11) RSS-132 (5.3)	Frequency Stability for Temperature & Voltage	< 2.5 ppm	PASS	-
	§2.1055 §24.235	RSS-GEN(6.11) RSS-133 (6.3)		Within Authorized Band		



# 1 General Description

## 1.1 Applicant

**ZTE CORPORATION**

ZTE Plaza, Keji Road South, Hi-Tech Industrial Park, Nanshan District, Shenzhen, Guangdong, 518057, P.R.China

## 1.2 Manufacturer

**ZTE CORPORATION**

ZTE Plaza, Keji Road South, Hi-Tech Industrial Park, Nanshan District, Shenzhen, Guangdong, 518057, P.R.China

## 1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	Rogers HSPA/LTE CPE
Brand Name	ZTE
Model Name	MF275R
FCC ID	SRQ-MF275R
EUT supports Radios application	WCDMA/HSPA/HSPA+(Downlink Only)/DC-HSDPA/LTE/ WLAN 2.4GHz 802. 11b/g/n HT20/HT40/ WLAN 5GHz 802. 11a/n HT20/HT40/
IMEI Code	Conducted:004401783465723 Radiation:004401783465541 ERP/EIRP: 004401783465541
HW Version	dgpB
SW Version	MF275R1.0.5
EUT Stage	Identical Prototype

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



### 1.4 Product Specification subjective to this standard

Product Specification subjective to this standard	
<b>Tx Frequency</b>	WCDMA Band V: 826.4 MHz ~ 846.6 MHz WCDMA Band II: 1852.4 MHz ~ 1907.6 MHz
<b>Rx Frequency</b>	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>	WCDMA Band V : 23.85 dBm WCDMA Band II : 22.53 dBm
<b>Antenna Type</b>	Monopole Antenna
<b>Type of Modulation</b>	WCDMA : QPSK (Uplink) HSDPA/DC-HSDPA : QPSK (Uplink) HSUPA : QPSK (Uplink) HSPA+ : 16QAM (Downlink Only) 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	WCDMA Band V RMC 12.2Kbps	QPSK	0.1611	0.0442 ppm	4M16F9W
Part 24	WCDMA Band II RMC 12.2Kbps	QPSK	0.3412	0.0229 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	

<b>Test Site</b>	SPORTON INTERNATIONAL (SHENZHEN) INC.	
<b>Test Site Location</b>	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	
<b>Test Site No.</b>	<b>Sporton Site No.</b>	<b>FCC/IC Registration No.</b>
	03CH02-SZ	566869/4086F

**Note:** The test site complies with ANSI C63.4 2009 requirement.



## **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-C-2004
- ♦ FCC KDB 971168 D01 Power Meas. License Digital Systems v02r02
- ♦ IC RSS-132 Issue 3
- ♦ IC RSS-133 Issue 6
- ♦ IC RSS-Gen Issue 4

### **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 WCDMA Band V.
2. 30 MHz to 10th harmonic for 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
WCDMA Band V	■ RMC 12.2Kbps Link	■ RMC 12.2Kbps Link
WCDMA Band II	■ RMC 12.2Kbps Link	■ RMC 12.2Kbps Link

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

RMC 12.2Kbps mode for WCDMA band V,

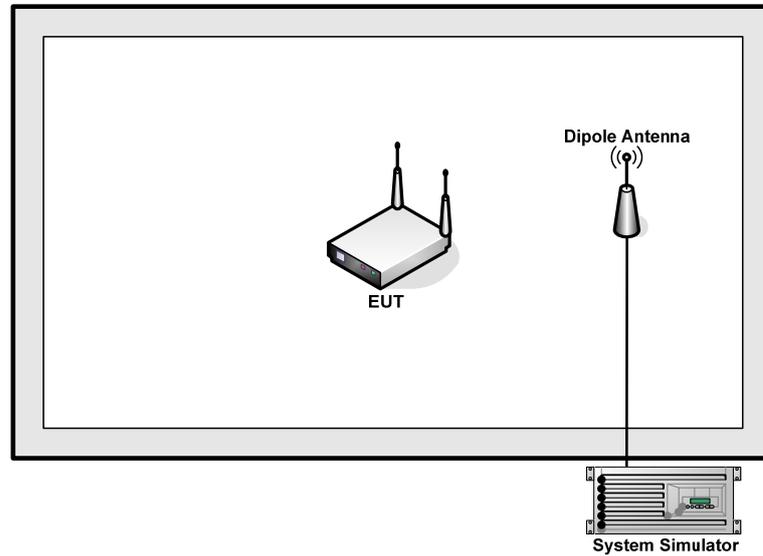
RMC 12.2Kbps mode for WCDMA band II, only these modes were used for all tests.



Conducted Power Measurement Results:

Conducted Power (*Unit: dBm)						
Band	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
RMC 12.2Kbps	23.83	23.72	23.85	22.42	22.53	22.44
HSDPA Subtest-1	22.83	22.34	23.16	21.52	21.74	21.31
HSDPA Subtest-2	22.90	22.39	23.24	21.45	21.68	21.45
HSDPA Subtest-3	22.32	21.75	22.75	20.92	21.36	20.96
HSDPA Subtest-4	22.35	21.80	22.64	20.91	21.39	21.04
DC-HSDPA Subtest-1	22.83	22.30	23.28	21.56	21.28	21.33
DC-HSDPA Subtest-2	22.82	22.29	23.25	21.54	21.26	21.29
DC-HSDPA Subtest-3	22.38	21.65	22.74	20.97	21.37	20.64
DC-HSDPA Subtest-4	22.34	21.61	22.73	20.94	21.16	20.63
HSUPA Subtest-1	22.27	22.02	22.36	21.10	21.32	21.09
HSUPA Subtest-2	21.77	21.68	21.82	20.07	20.44	20.39
HSUPA Subtest-3	21.79	21.45	22.04	20.17	20.38	20.41
HSUPA Subtest-4	22.58	22.52	22.61	21.38	21.41	21.39
HSUPA Subtest-5	23.06	22.90	23.56	21.86	22.31	22.01

## 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	TOPWORD	3303DR	N/A	N/A	Unshielded, 1.8 m

### 2.4 Measurement Results Explanation Example

For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuator factor between 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.

$$\text{Offset} = \text{RF cable loss} + \text{attenuator factor}.$$

The following shows an offset computation example with RF cable loss 5.2dB and a 10dB attenuator.

Example :

$$\begin{aligned} \text{Offset(dB)} &= \text{RF cable loss(dB)} + \text{attenuator factor(dB)}. \\ &= 5.2 + 10 = 15.2 \text{ (dB)} \end{aligned}$$

### 3 Test Result

#### 3.1 Conducted Output Power Measurement

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

A 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.

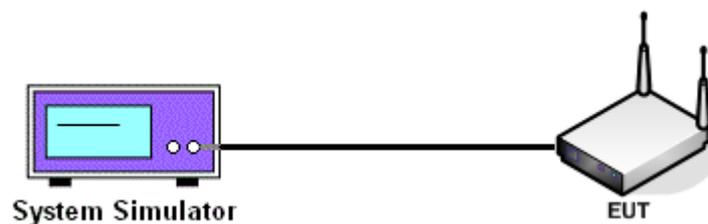
##### 3.1.2 Measuring Instruments

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 average power.

##### 3.1.4 Test Setup





### 3.1.5 Test Result of Conducted Output Power

Cellular Band			
Mode	WCDMA Band V (RMC 12.2Kbps)		
Channel	4132 (Low)	4182 (Mid)	4233 (High)
Frequency (MHz)	826.4	836.4	846.6
Conducted Power (dBm)	23.83	23.72	23.85

PCS Band			
Mode	WCDMA Band II (RMC 12.2Kbps)		
Channel	9262 (Low)	9400 (Mid)	9538 (High)
Frequency (MHz)	1852.4	1880	1907.6
Conducted Power (dBm)	22.42	22.53	22.44

**Note:** 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.

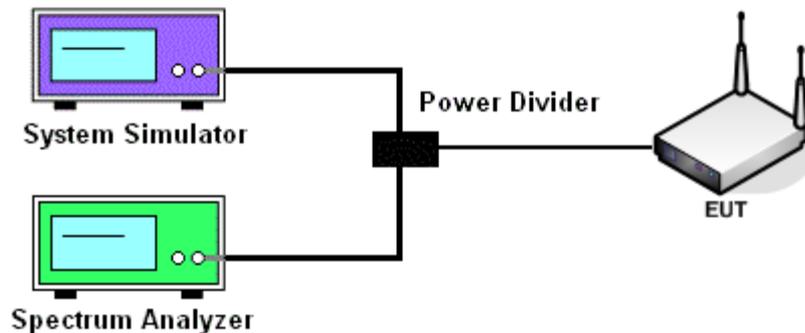
### 3.2.2 Measuring Instruments

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 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 %.
4. Record the deviation as Peak to Average Ratio.

### 3.2.4 Test Setup





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

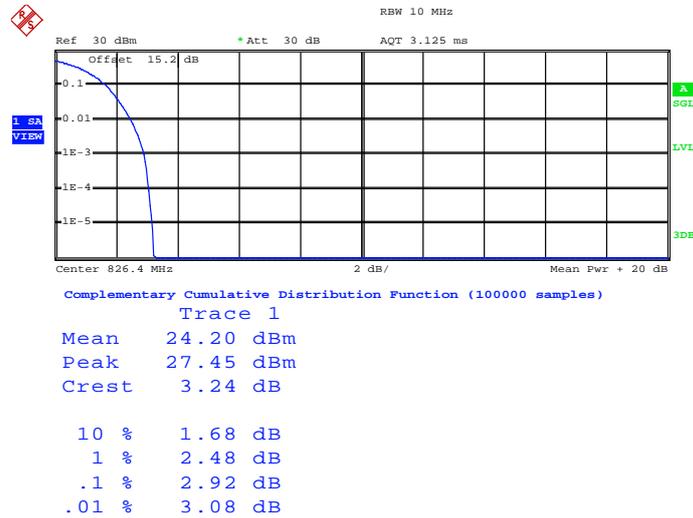
Cellular Band			
Modes	WCDMA Band V (RMC 12.2Kbps)		
Channel	4132 (Low)	4182 (Mid)	4233 (High)
Frequency (MHz)	826.4	836.4	846.6
Peak-to-Average Ratio (dB)	2.92	2.96	3.12

PCS Band			
Modes	WCDMA Band II (RMC 12.2Kbps)		
Channel	9262 (Low)	9400 (Mid)	9538 (High)
Frequency (MHz)	1852.4	1880	1907.6
Peak-to-Average Ratio (dB)	2.64	2.80	2.68

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

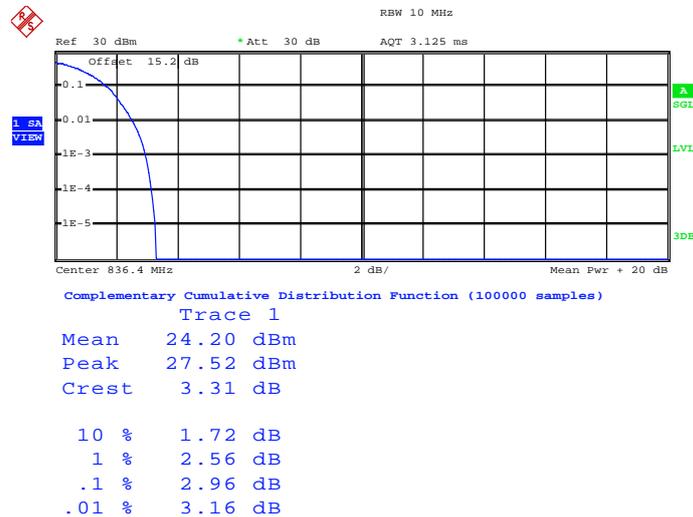
<b>Band :</b>	WCDMA Band V	<b>Test Mode :</b>	RMC 12.2Kbps Link (QPSK)
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#### Peak-to-Average Ratio on Channel 4132 (826.4 MHz)



Date: 18.JUN.2015 07:24:09

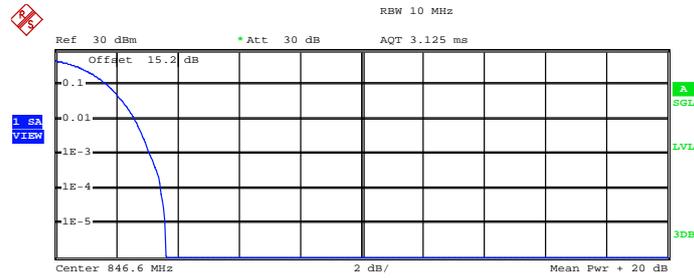
#### Peak-to-Average Ratio on Channel 4182 (836.4 MHz)



Date: 18.JUN.2015 07:23:38



Peak-to-Average Ratio on Channel 4233 (846.6 MHz)



Complementary Cumulative Distribution Function (100000 samples)

Trace 1

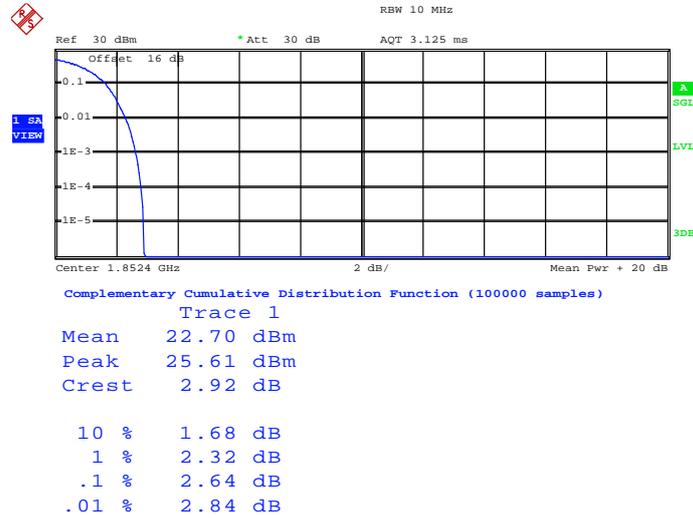
Mean	24.32 dBm
Peak	27.94 dBm
Crest	3.62 dB
10 %	1.72 dB
1 %	2.60 dB
.1 %	3.12 dB
.01 %	3.48 dB

Date: 18.JUN.2015 07:23:07



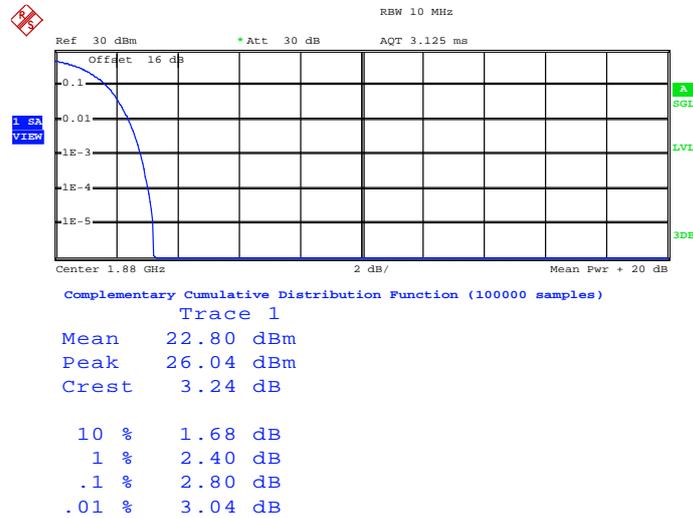
<b>Band :</b>	WCDMA Band II	<b>Test Mode :</b>	RMC 12.2Kbps Link (QPSK)
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**Peak-to-Average Ratio on Channel 9262 (1852.4 MHz)**



Date: 18.JUN.2015 05:41:49

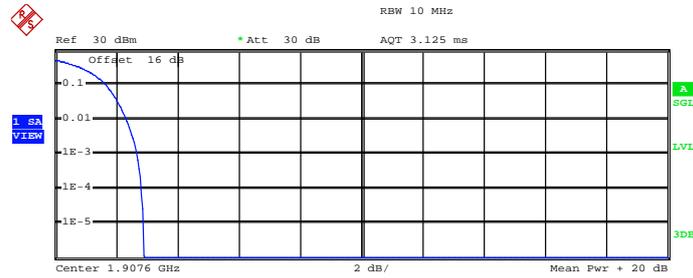
**Peak-to-Average Ratio on Channel 9400 (1880.0 MHz)**



Date: 18.JUN.2015 05:42:14



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



Complementary Cumulative Distribution Function (100000 samples)

Trace 1

Mean	22.64 dBm
Peak	25.54 dBm
Crest	2.90 dB
10 %	1.68 dB
1 %	2.36 dB
.1 %	2.68 dB
.01 %	2.84 dB

Date: 18.JUN.2015 05:42:41



### **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 (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) and ANSI / TIA-603-C-2004 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-C. 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.



	WCDMA/HSPA
SPAN	10MHz
RBW	100kHz
VBW	300kHz
Detector	RMS
Trace	Average
Average Type	Power
Sweep Count	100



3.3.4 Test Result of ERP

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	21.02	0.1265	20.71	0.1178
Middle	836.4	22.07	0.1611	21.55	0.1429
Highest	846.6	19.77	0.0948	19.61	0.0914
Limit	ERP < 7W	Result		PASS	



3.3.5 Test Result of EIRP

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	25.33	0.3412	19.52	0.0895
Middle	1880.0	23.93	0.2472	18.18	0.0658
Highest	1907.6	23.05	0.2018	18.41	0.0693
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 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.

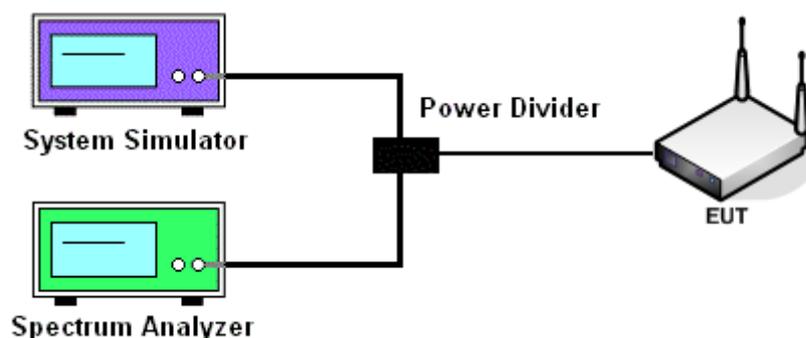
### 3.4.2 Measuring Instruments

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

### 3.4.3 Test Procedures

5. The testing follows FCC KDB 971168 v02r02 Section 4.2.
6. The EUT was connected to the spectrum analyzer and system simulator via a power divider.
7. 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.
8. The 99% occupied bandwidth were measured, set RBW= 1% of span, VBW= 3\*RBW, peak detector, trace maximum hold.
9. 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	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	4.16
26dB BW (MHz)	4.74	4.74	4.74

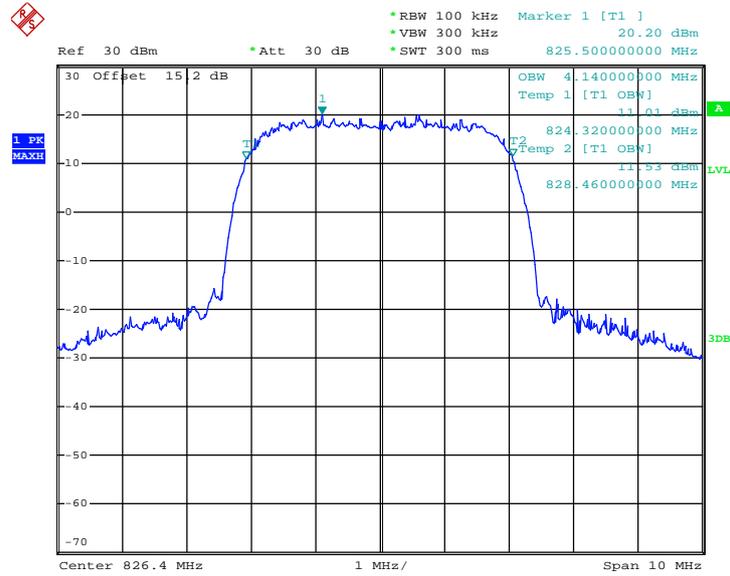
PCS Band			
Modes	WCDMA Band II (RMC 12.2Kbps)		
Channel	9262 (Low)	9400 (Mid)	9538 (High)
Frequency (MHz)	1852.4	1880	1907.6
99% OBW (MHz)	4.14	4.16	4.16
26dB BW (MHz)	4.76	4.76	4.76



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

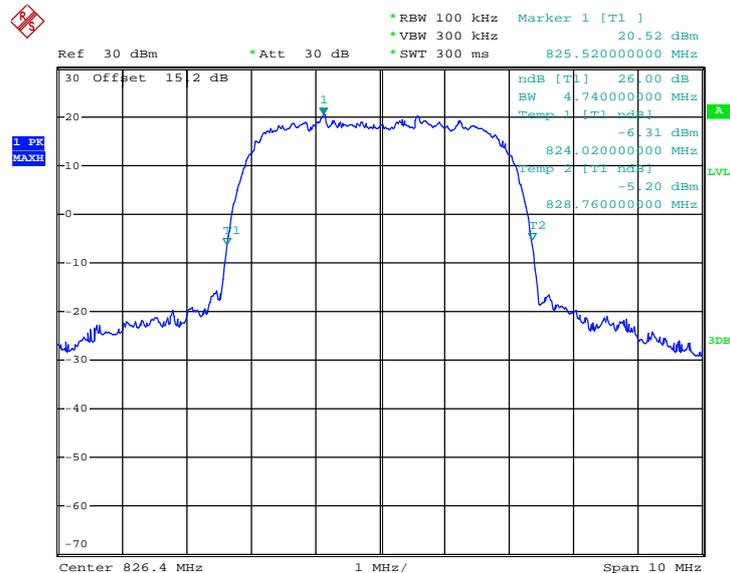
<b>Band :</b>	WCDMA Band V	<b>Test Mode :</b>	RMC 12.2Kbps Link (QPSK)
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#### 99% Occupied Bandwidth Plot on Channel 4132 (826.4 MHz)



Date: 18.JUN.2015 06:35:23

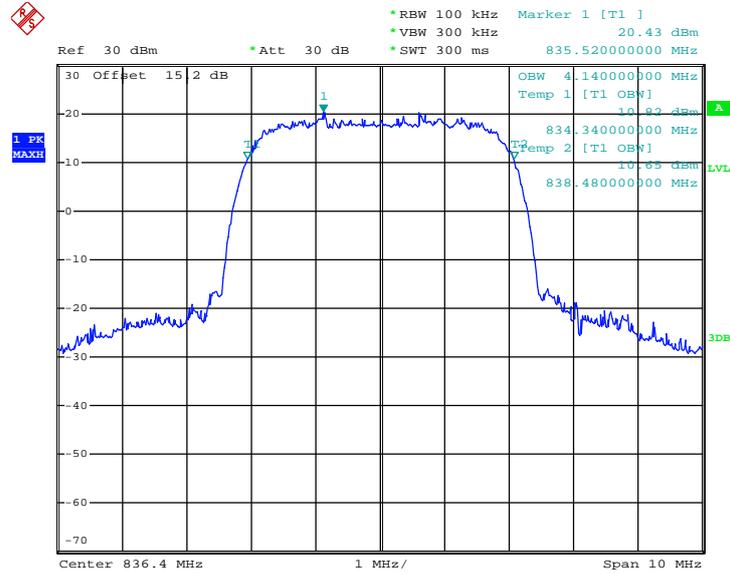
#### 26dB Bandwidth Plot on Channel 4132 (826.4 MHz)



Date: 18.JUN.2015 06:32:46

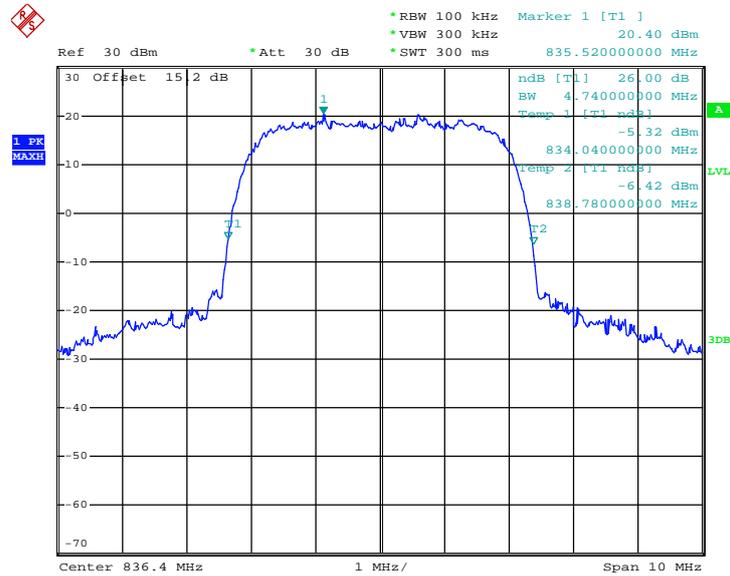


### 99% Occupied Bandwidth Plot on Channel 4182 (836.4 MHz)



Date: 18.JUN.2015 06:35:05

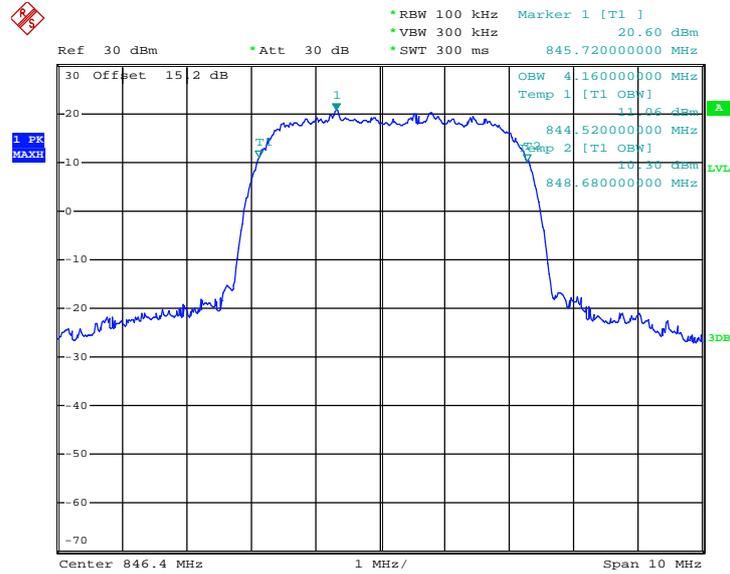
### 26dB Bandwidth Plot on Channel 4182 (836.4 MHz)



Date: 18.JUN.2015 06:33:12

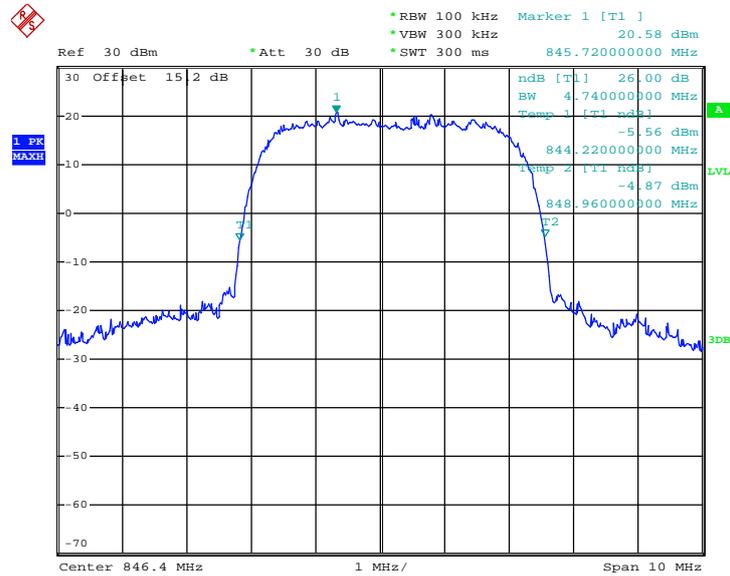


### 99% Occupied Bandwidth Plot on Channel 4233 (846.6 MHz)



Date: 18.JUN.2015 06:34:47

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

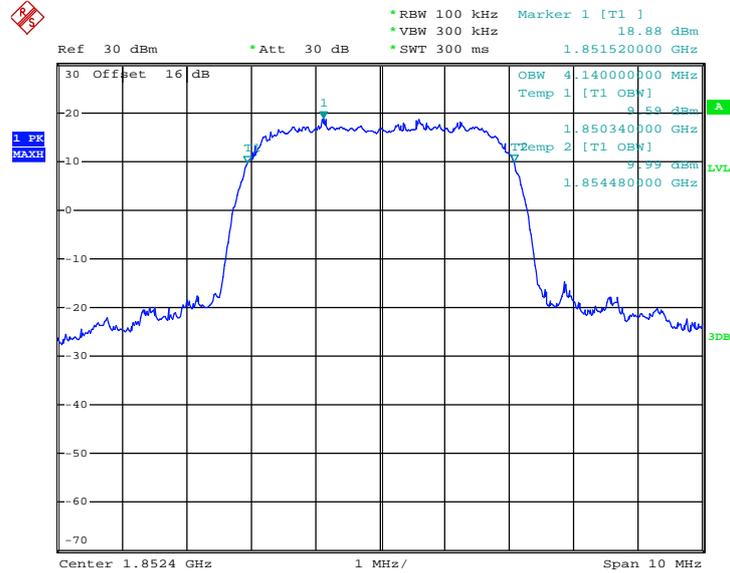


Date: 18.JUN.2015 06:33:36



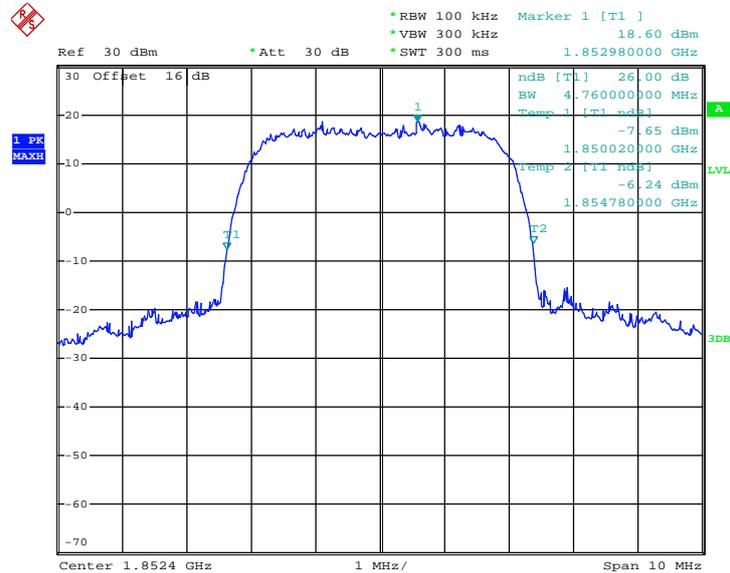
Band :	WCDMA Band II	Test Mode :	RMC 12.2Kbps Link (QPSK)
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99% Occupied Bandwidth Plot on Channel 9262 (1852.4 MHz)



Date: 18.JUN.2015 05:35:02

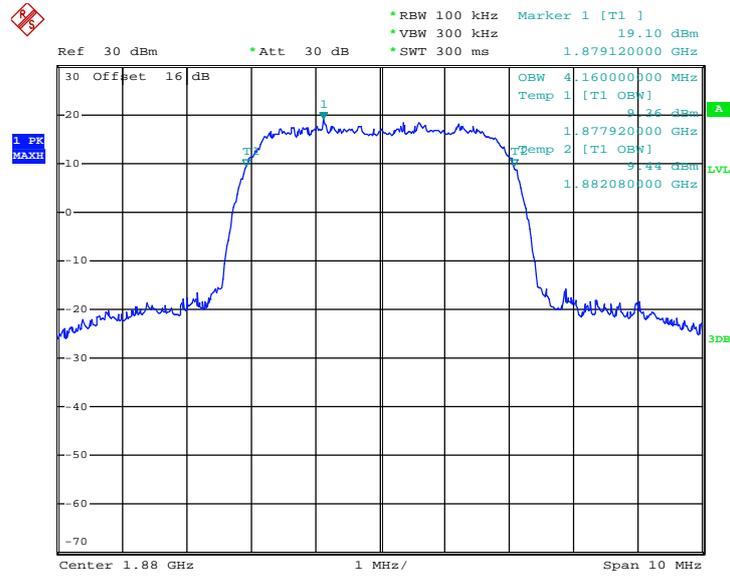
26dB Bandwidth Plot on Channel 9262 (1852.4 MHz)



Date: 18.JUN.2015 05:38:10

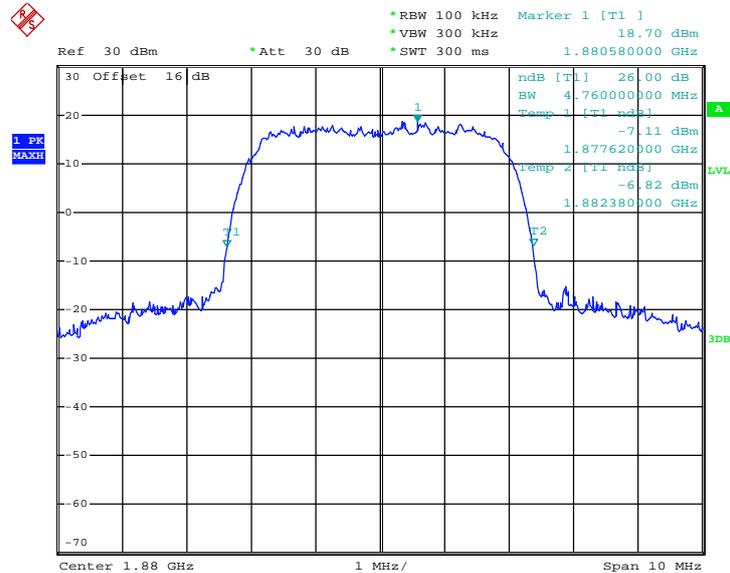


### 99% Occupied Bandwidth Plot on Channel 9400 (1880.0 MHz)



Date: 18.JUN.2015 05:35:23

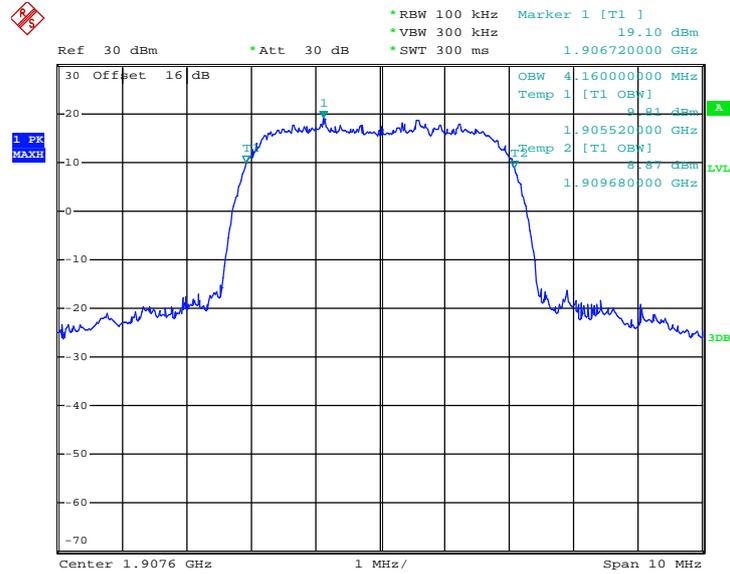
### 26dB Bandwidth Plot on Channel 9400 (1880.0 MHz)



Date: 18.JUN.2015 05:37:53

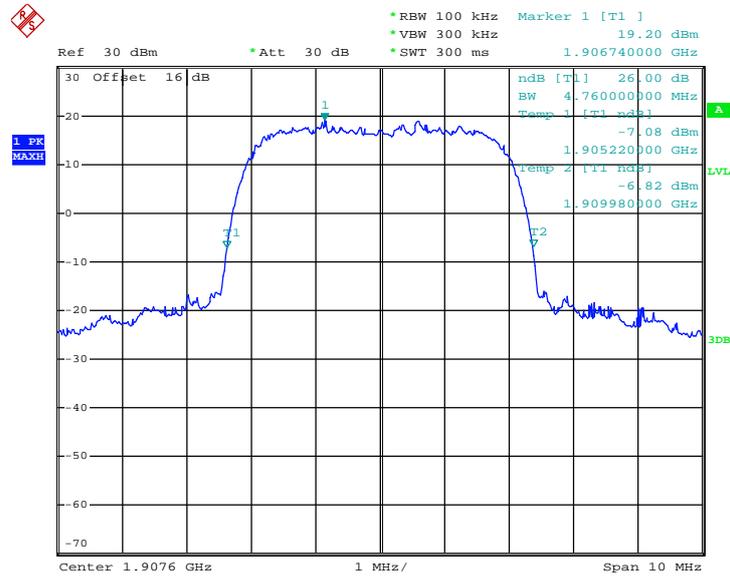


### 99% Occupied Bandwidth Plot on Channel 9538 (1907.6 MHz)



Date: 18.JUN.2015 05:36:45

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



Date: 18.JUN.2015 05:37:36

## 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.

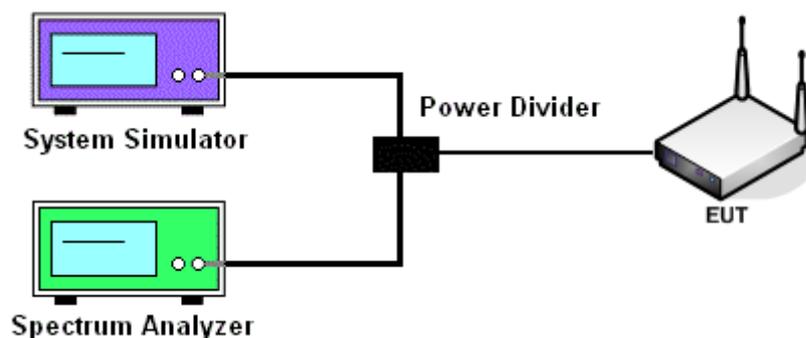
### 3.5.2 Measuring Instruments

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

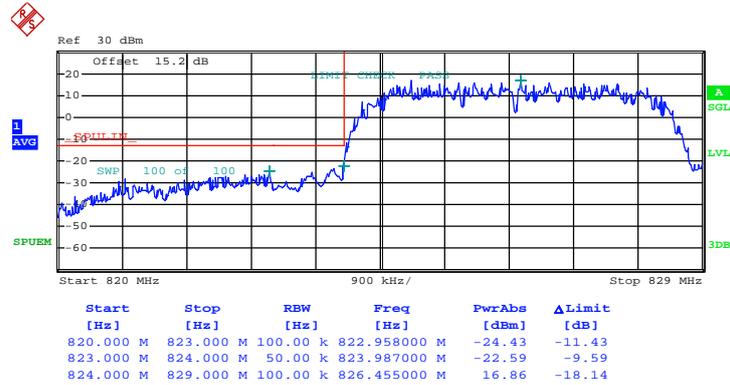




### 3.5.5 Test Result (Plots) of Conducted Band Edge

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

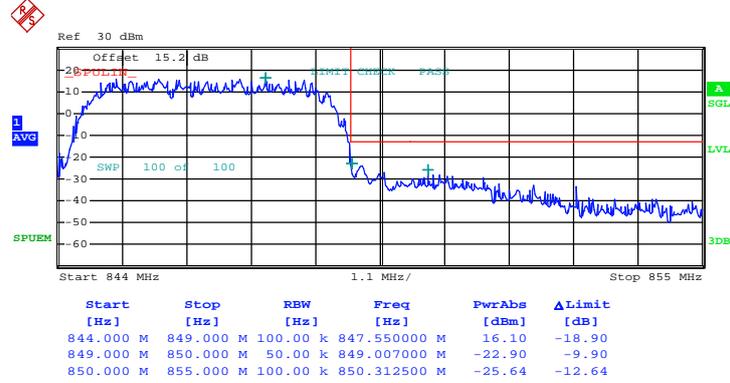


Date: 18.JUN.2015 06:42:33



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)

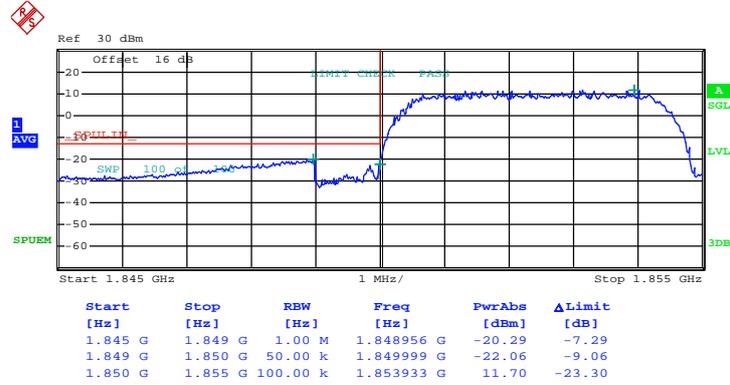


Date: 18.JUN.2015 06:40:51



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)

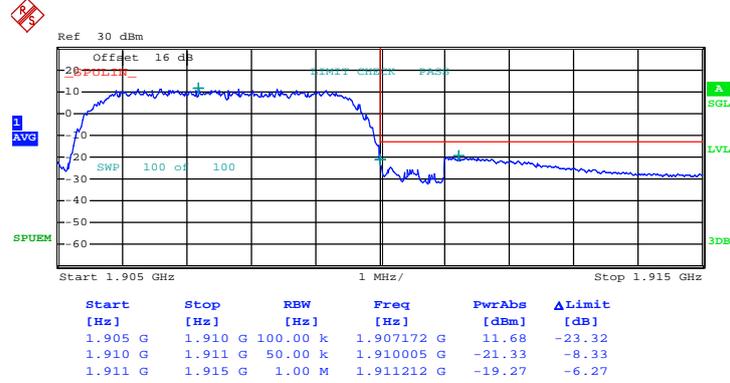


Date: 18.JUN.2015 06:05:15



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: 18.JUN.2015 06:06:41

### 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.

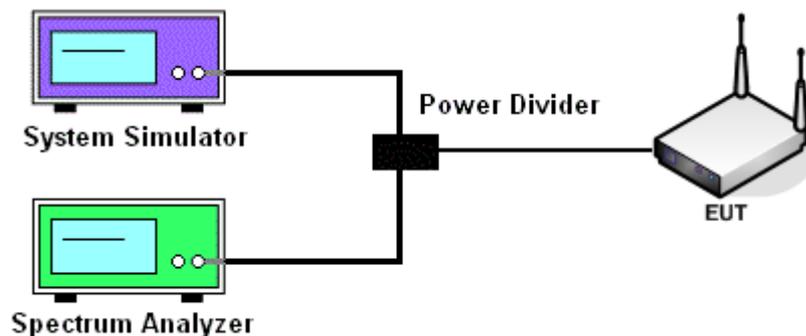
#### 3.6.2 Measuring Instruments

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)
  - = -13dBm.

#### 3.6.4 Test Setup

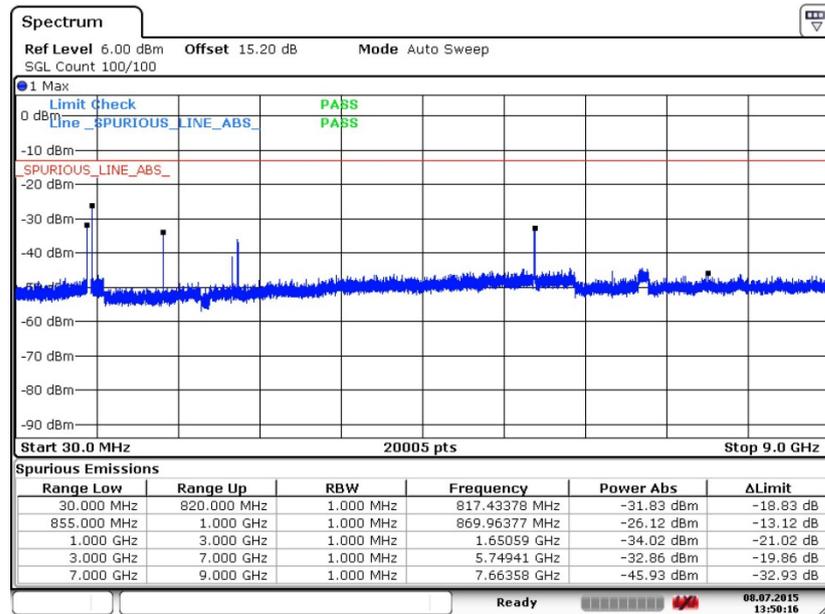




### 3.6.5 Test Result (Plots) of Conducted Spurious Emission

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

Conducted Spurious Emission Plot between 30MHz ~ 9GHz

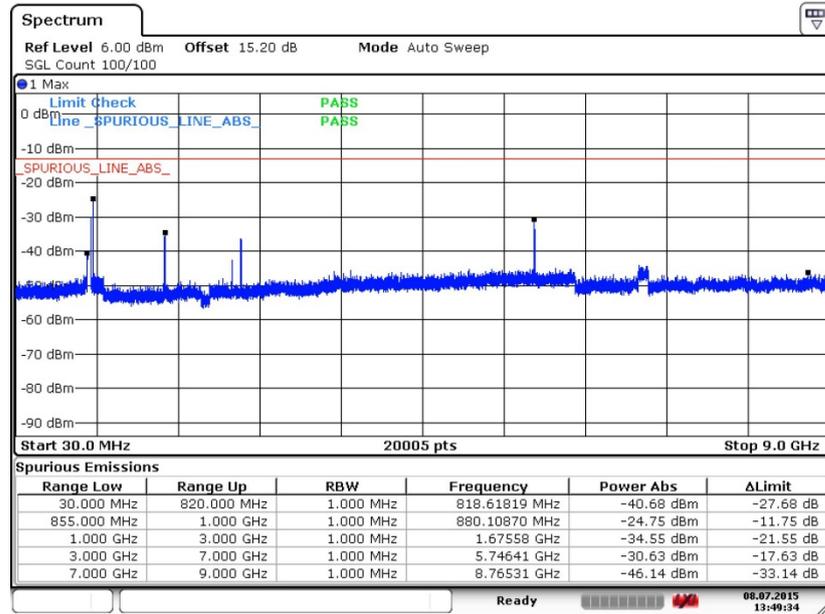


Date: 8 JUL 2015 13:50:16



<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

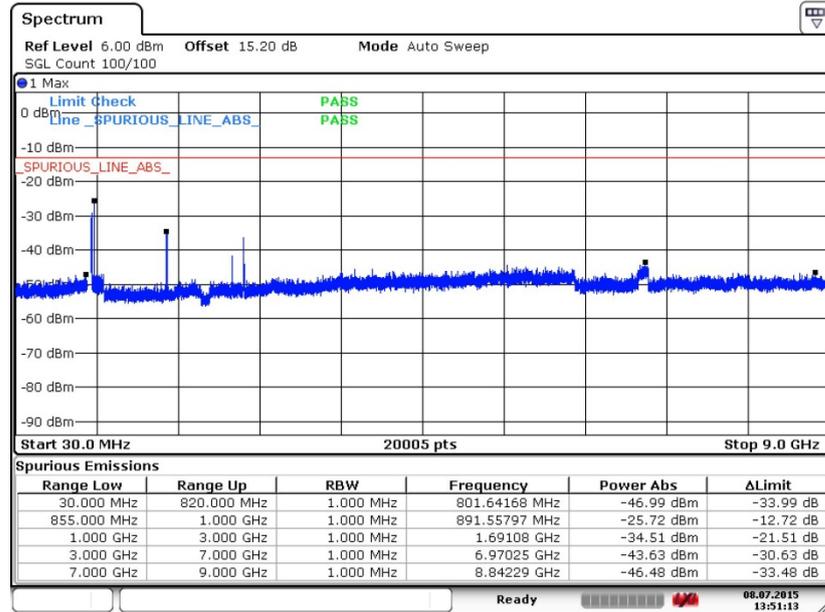


Date: 8 JUL 2015 13:49:35



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

Conducted Spurious Emission Plot between 30MHz ~ 9GHz

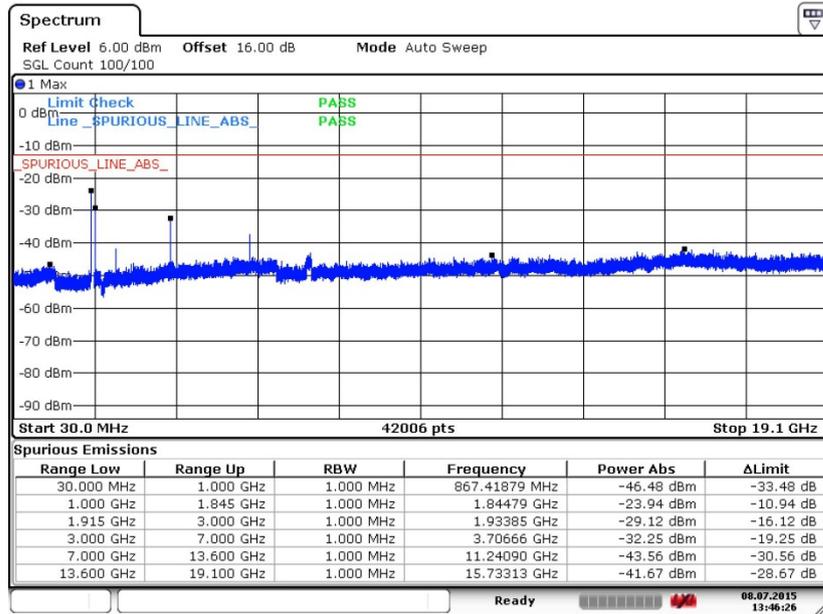


Date: 8.JUL.2015 13:51:14



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

Conducted Spurious Emission Plot between 30MHz ~ 19.1GHz

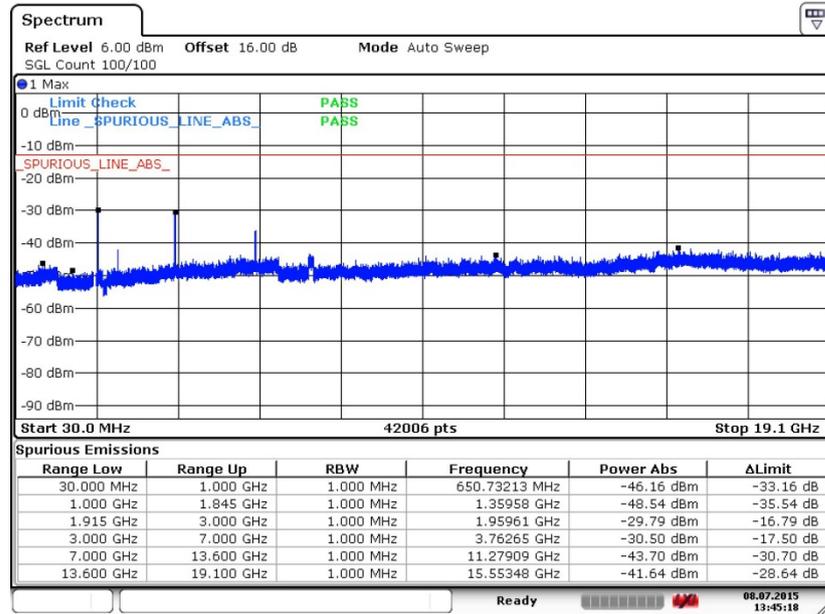


Date: 8 JUL 2015 13:46:26



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

Conducted Spurious Emission Plot between 30MHz ~ 19.1GHz

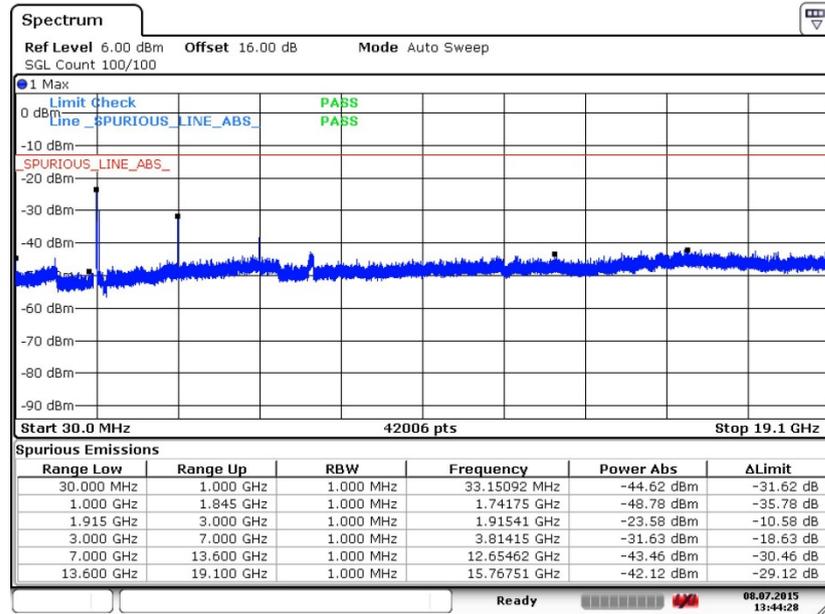


Date: 8 JUL 2015 13:45:19



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

Conducted Spurious Emission Plot between 30MHz ~ 19.1GHz



Date: 8 JUL 2015 13:44:28

## 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

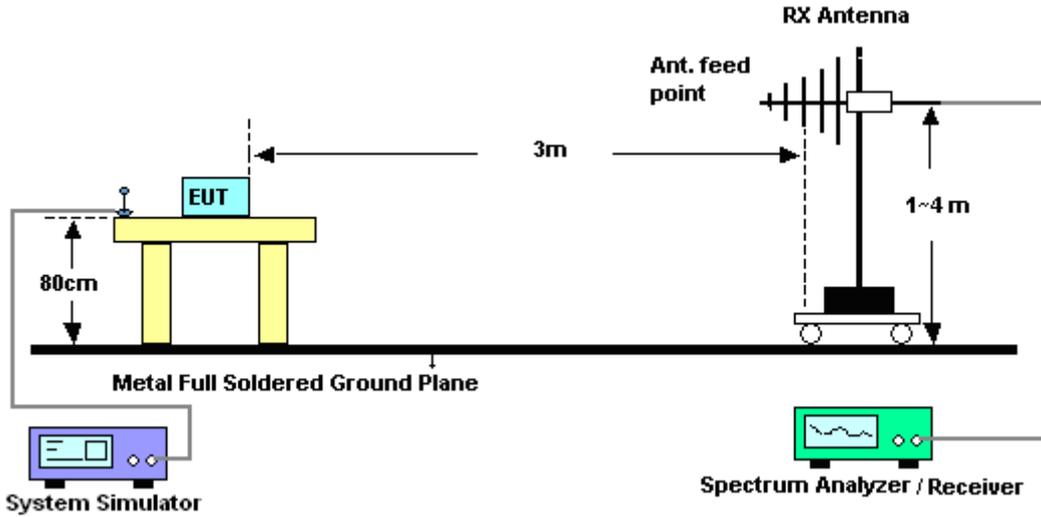
The measuring equipment is listed in the section 4 of this test report.

### 3.7.3 Test Procedures

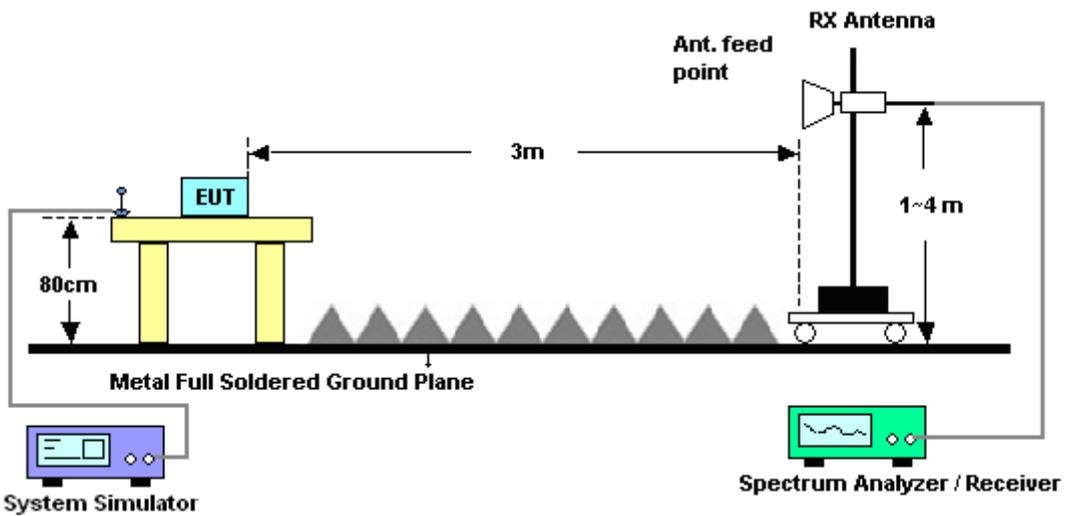
1. The testing follows FCC KDB 971168 v02r02 Section 5.8 and ANSI / TIA-603-C-2004 Section 2.2.12.
2. The EUT was placed on a rotatable wooden table 0.8 meters above the ground.
3. The EUT was set 3 meters from the receiving antenna, which was mounted on the antenna tower.
4. The table was rotated 360 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)  
 $= P(W) - [43 + 10\log(P)] \text{ (dB)}$   
 $= [30 + 10\log(P)] \text{ (dBm)} - [43 + 10\log(P)] \text{ (dB)}$   
 $= -13\text{dBm}.$

### 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>	WCDMA Band V for CH4132				<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>	Sam Li				<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
1652.8	-58.86	-13	-45.86	-61.41	-62.68	0.53	6.50	H	Pass
2479.2	-58.59	-13	-45.59	-64.01	-61.46	0.68	5.70	H	Pass
3305.6	-56.17	-13	-43.17	-66.19	-61.21	0.81	8.00	H	Pass

<b>Band :</b>	WCDMA Band V for CH4132				<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>	Sam Li				<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
1652.8	-59.14	-13	-46.14	-62.05	-62.96	0.53	6.50	V	Pass
2479.2	-58.94	-13	-45.94	-63.26	-61.81	0.68	5.70	V	Pass
3305.6	-56.77	-13	-43.77	-65.78	-61.81	0.81	8.00	V	Pass



<b>Band :</b>	WCDMA Band V for CH4182					<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>	Sam Li					<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	-58.55	-13	-45.55	-61.10	-62.37	0.53	6.50	H	Pass
2510	-58.20	-13	-45.20	-63.62	-61.07	0.68	5.70	H	Pass
3346	-55.93	-13	-42.93	-65.95	-60.97	0.81	8.00	H	Pass

<b>Band :</b>	WCDMA Band V for CH4182					<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>	Sam Li					<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	-59.42	-13	-46.42	-62.33	-63.24	0.53	6.50	V	Pass
2510	-58.50	-13	-45.50	-62.82	-61.37	0.68	5.70	V	Pass
3346	-56.66	-13	-43.66	-65.67	-61.70	0.81	8.00	V	Pass



<b>Band :</b>	WCDMA Band V for CH4233	<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>	Sam Li	<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
1693.2	-55.81	-13	-42.81	-58.36	-59.63	0.53	6.50	H	Pass
2539.8	-57.04	-13	-44.04	-62.46	-59.91	0.68	5.70	H	Pass
3386.4	-55.56	-13	-42.56	-65.58	-60.60	0.81	8.00	H	Pass

<b>Band :</b>	WCDMA Band V for CH4233	<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>	Sam Li	<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
1693.2	-56.63	-13	-43.63	-59.54	-60.45	0.53	6.50	V	Pass
2539.8	-55.47	-13	-42.47	-59.79	-58.34	0.68	5.70	V	Pass
3386.4	-56.26	-13	-43.26	-65.27	-61.30	0.81	8.00	V	Pass



<b>Band :</b>	WCDMA Band II for CH9262	<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>	Sam Li	<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
3704.8	-36.97	-13	-23.97	-51.03	-44.16	0.81	8.00	H	Pass
5557.2	-48.26	-13	-35.26	-67.01	-58.25	1.01	11.00	H	Pass
7409.6	-43.27	-13	-30.27	-65.44	-55.51	1.46	13.70	H	Pass

<b>Band :</b>	WCDMA Band II for CH9262	<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>	Sam Li	<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
3704.8	-33.29	-13	-20.29	-47.67	-40.48	0.81	8	V	Pass
5557.2	-46.28	-13	-33.28	-65.34	-56.27	1.01	11	V	Pass
7409.6	-42.94	-13	-29.94	-65.43	-55.18	1.46	13.7	V	Pass



<b>Band :</b>	WCDMA Band II for CH9400	<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>	Sam Li	<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	-35.01	-13	-22.01	-49.53	-42.20	0.81	8.00	H	Pass
5640	-49.15	-13	-36.15	-67.90	-59.14	1.01	11.00	H	Pass
7520	-40.36	-13	-27.36	-62.53	-52.60	1.46	13.70	H	Pass

<b>Band :</b>	WCDMA Band II for CH9400	<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>	Sam Li	<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	-28.60	-13	-15.60	-43.29	-35.79	0.81	8	V	Pass
5640	-48.81	-13	-35.81	-67.87	-58.80	1.01	11	V	Pass
7520	-39.68	-13	-26.68	-62.17	-51.92	1.46	13.7	V	Pass



<b>Band :</b>	WCDMA Band II for CH9538	<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>	Sam Li	<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
3815.2	-34.17	-13	-21.17	-48.60	-41.36	0.81	8.00	H	Pass
5722.8	-49.13	-13	-36.13	-67.88	-59.12	1.01	11.00	H	Pass
7630.4	-41.70	-13	-28.70	-63.87	-53.94	1.46	13.70	H	Pass

<b>Band :</b>	WCDMA Band II for CH9538	<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>	Sam Li	<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
3815.2	-30.36	-13	-17.36	-44.76	-37.55	0.81	8	V	Pass
5722.8	-48.23	-13	-35.23	-67.29	-58.22	1.01	11	V	Pass
7630.4	-37.73	-13	-24.73	-60.22	-49.97	1.46	13.7	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.

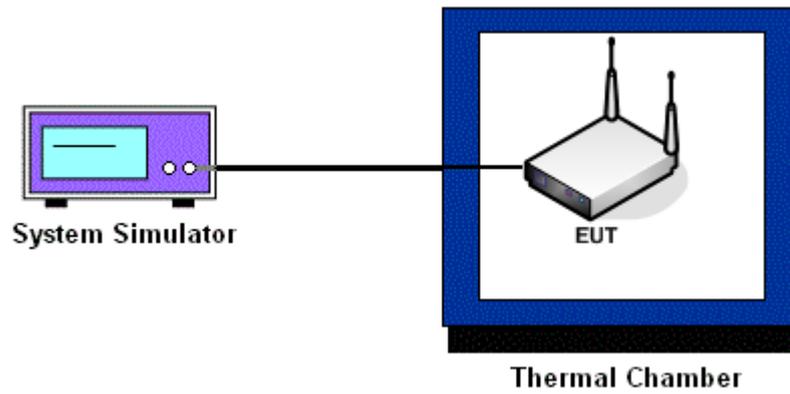
### 3.8.3 Test Procedures for Temperature Variation

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>	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
	Deviation (ppm)		
50	0.0179		PASS
40	0.0442		
30	0.0048		
20(Ref.)	0.0000		
10	0.0311		
0	0.0395		
-10	0.0096		
-20	0.0060		
-30	0.0383		

<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
	Deviation (ppm)		
50	0.0106		PASS
40	0.0074		
30	0.0122		
20(Ref.)	0.0000		
10	0.0202		
0	0.0144		
-10	0.0032		
-20	0.0176		
-30	0.0117		

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
WCDMA Band V CH4182	RMC 12.2Kbps	4.35	0.0012	2.5	PASS
		3.80	0.0155		
		BEP	0.0036		
WCDMA Band II CH9400	RMC 12.2Kbps	4.35	0.0048	(Note 3.)	
		3.80	0.0080		
		BEP	0.0229		

Note:

- 1. Normal Voltage = 3.8V.
- 2. Battery End Point (BEP) = 3.60 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	Jun. 18, 2015~ Jul. 09, 2015	Oct. 27, 2015	Conducted (TH01-KS)
Spectrum Analyzer	R&S	FSV30	101338	9kHz~30GHz	May 04, 2015	Jun. 18, 2015~ Jul. 09, 2015	May 03, 2016	Conducted (TH01-KS)
Thermal Chamber	Ten Billion	TTC-B3S	TBN-960502	-40~+150°C	Oct. 25, 2014	Jun. 18, 2015~ Jul. 09, 2015	Oct. 24, 2015	Conducted (TH01-KS)
EMI Test Receiver	R&S	ESR7	101404	9kHz~7GHz; Max 30dBm	Oct. 14, 2014	Jun. 23, 2015	Oct. 13, 2015	Radiation (03CH02-SZ)
Spectrum Analyzer	R&S	FSV40	101041	10kHz~40GHz;Ma x 30dBm	Oct. 15, 2014	Jun. 23, 2015	Oct. 14, 2015	Radiation (03CH02-SZ)
Bilog Antenna	TeseQ	CBL6112D	23188	30MHz~2GHz	Nov. 07, 2014	Jun. 23, 2015	Nov. 06, 2015	Radiation (03CH02-SZ)
Double Ridge Horn Antenna	SCHWARZBECK	BBHA 9120D	9120D-1285	1GHz~18GHz	Jan. 20, 2015	Jun. 23, 2015	Jan. 19, 2016	Radiation (03CH02-SZ)
SHF-EHF Horn	com-power	AH-840	101071	18GHz~40GHz	Sep. 04, 2014	Jun. 23, 2015	Sep. 03, 2015	Radiation (03CH02-SZ)
Amplifier	ADVANTEST	BB525C	E9007003	9kHz~3000MHz / 30 dB	Jan. 28, 2015	Jun. 23, 2015	Jan. 27, 2016	Radiation (03CH02-SZ)
Amplifier	Agilent	8449B	3008A01023	1GHz~26.5GHz	Oct. 29, 2014	Jun. 23, 2015	Oct. 28, 2015	Radiation (03CH02-SZ)
AC Power Source	Chroma	61601	616010002470	N/A	NCR	Jun. 23, 2015	NCR	Radiation (03CH02-SZ)
Turn Table	Chaintek	T-200	N/A	0~360 degree	NCR	Jun. 23, 2015	NCR	Radiation (03CH02-SZ)
Antenna Mast	Chaintek	MBS-400	N/A	1 m~4 m	NCR	Jun. 23, 2015	NCR	Radiation (03CH02-SZ)



## 5 Uncertainty of Evaluation

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

Measuring Uncertainty for a Level of Confidence of 95% ( $U = 2Uc(y)$ )	4.5dB
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