

# FCC RF Test Report

**APPLICANT** : ZTE CORPORATION  
**EQUIPMENT** : CDMA-LTE Dual-Mode Digital Mobile Phone  
**BRAND NAME** : ZTE  
**MODEL NAME** : Z932L  
**FCC ID** : Q78-Z932L  
**STANDARD** : 47 CFR Part 2, 27F  
**CLASSIFICATION** : PCS Licensed Transmitter Held to Ear (PCE)

The product was received on Apr. 27, 2013 and completely tested on Jun. 02, 2013. We, SPORTON INTERNATIONAL (KUNSHAN) INC., would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI / TIA / EIA-603-C-2004 and shown compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL (KUNSHAN) INC., the test report shall not be reproduced except in full.

Reviewed by:



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Jones Tsai / Manager



**SPORTON INTERNATIONAL (KUNSHAN) INC.**  
**No. 3-2, PingXiang Road, Kunshan, Jiangsu Province, P.R.C.**



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**APPENDIX A. PHOTOGRAPHS OF EUT**

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### SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.1	§2.1046	Conducted Output Power	NA	PASS	-
3.1	§27.50(b)(10)	Effective Radiated Power	< 3 Watts	PASS	-
3.2	§27.50(d)(5)	Peak-to-Average Ratio	< 13 dB	PASS	-
3.3	§2.1049	Occupied Bandwidth	NA	PASS	-
3.4	§2.1049 §27.53(c)(4)	Conducted Band Edge Measurement	< $65+10\log_{10}(P[\text{Watts}])$ in a 6.25 KHz bandwidth for emissions in the 763 ~ 805 MHz bands.	PASS	-
3.5	§2.1051 §27.53(c)	Conducted Spurious Emission	< $43+10\log_{10}(P[\text{Watts}])$	PASS	-
3.6	§2.1053 §27.53(c)(2) §27.53(c)(4)	Field Strength of Spurious Radiation	< $43+10\log_{10}(P[\text{Watts}])$	PASS	Under limit 40.95 dB at 3128.000 MHz
3.7	§2.1055 §27.54	Frequency Stability Temperature & Voltage	< 2.5 ppm	PASS	-



# 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 Feature of Equipment Under Test

Product Feature & Specification	
Equipment	CDMA-LTE Dual-Mode Digital Mobile Phone
Brand Name	ZTE
Model Name	Z932L
FCC ID	Q78-Z932L
EUT supports Radios application	CDMA/EV-DO/LTE/WLAN 11bgn/ Bluetooth EDR/ Bluetooth v4.0-LE
HW Version	Z932LHWV1.1
SW Version	Z932LV3.0
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.

Product Specification subjective to this standard	
Tx Frequency Range	779.5 MHz ~ 784.5 MHz
Rx Frequency Range	748.5 MHz ~ 753.5 MHz
Bandwidth	5MHz / 10MHz
Maximum Output Power to Antenna	23.37 dBm
Antenna Type	PIFA Antenna
Type of Modulation	QPSK / 16QAM



### 1.4 Emission Designator and Maximum ERP Power

FCC Rule	System	Type of Modulation	BW	Maximum ERP (W)	Frequency Tolerance (% , Hz, ppm)	Emission Designator
Part 27F	LTE Band 13	QPSK	5MHz	0.1807	0.015 ppm	4M50G7D
Part 27F	LTE Band 13	16QAM	5MHz	0.1400	0.015 ppm	4M52D7W
Part 27F	LTE Band 13	QPSK	10MHz	0.1694	0.013 ppm	9M16G7D
Part 27F	LTE Band 13	16QAM	10MHz	0.1387	0.014 ppm	9M12D7W

## 1.5 Testing Site

<b>Test Site</b>	SPORTON INTERNATIONAL (KUNSHAN) INC.		
<b>Test Site Location</b>	No. 3-2, PingXiang Road, Kunshan, Jiangsu Province, P.R.C. TEL: +86-0512-5790-0158 FAX: +86-0512-5790-0958		
<b>Test Site No.</b>	<b>Sporton Site No.</b>		<b>FCC/IC Registration No.</b>
	TH01-KS	03CH01-KS	149928/4086E-1

## 1.6 Applied Standards

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

- ♦ 47 CFR Part 2, 27F
- ♦ ANSI / TIA / EIA-603-C-2004
- ♦ FCC KDB 971168 D01 Power Meas. License Digital Systems v01

### 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.

## 1.7 Ancillary Equipment List

Item	Equipment	Trade Name	Model No.	FCC ID	Data Cable	Power Cord
1.	System Simulator	Anritsu	MT-8820C	N/A	N/A	Unshielded, 1.8 m
2.	DC Power Supply	GWINSTEK	GPS-3030D	N/A	N/A	Unshielded, 1.8 m

## 2 Test Configuration of Equipment Under Test

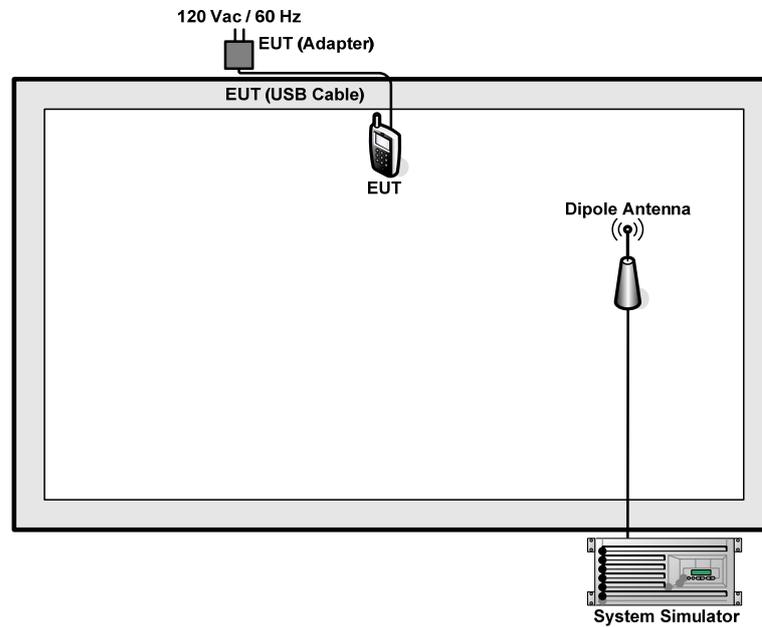
### 2.1 Test Mode

During all testing, EUT is in link mode with base station emulator at maximum power level. The spurious emission measurements were carried out in semi-anechoic chamber with 3-meter test range, and EUT is rotated on three test planes to find out the worst emission.

1. 30 MHz to 9000 MHz LTE Band 13.

Test Modes			
Band		Radiated TCs	Conducted TCs
LTE Band 13	BW 5MHz	<ul style="list-style-type: none"> <li>■ LTE (RB Size 1, RB Offset 0) QPSK Link</li> </ul>	<ul style="list-style-type: none"> <li>■ LTE (RB Size 1, RB Offset 0) Link</li> <li>■ LTE (RB Size 1, RB Offset 12) Link</li> <li>■ LTE (RB Size 1, RB Offset 24) Link</li> <li>■ LTE (RB Size 12, RB Offset 0) Link</li> <li>■ LTE (RB Size 12, RB Offset 6) Link</li> <li>■ LTE (RB Size 12, RB Offset 11) Link</li> <li>■ LTE (RB Size 25, RB Offset 0) Link</li> </ul>
	BW 10MHz	<ul style="list-style-type: none"> <li>■ LTE (RB Size 1, RB Offset 0) QPSK Link</li> </ul>	<ul style="list-style-type: none"> <li>■ LTE (RB Size 1, RB Offset 0) Link</li> <li>■ LTE (RB Size 1, RB Offset 24) Link</li> <li>■ LTE (RB Size 1, RB Offset 49) Link</li> <li>■ LTE (RB Size 25, RB Offset 0) Link</li> <li>■ LTE (RB Size 25, RB Offset 12) Link</li> <li>■ LTE (RB Size 25, RB Offset 24) Link</li> <li>■ LTE (RB Size 50, RB Offset 0) Link</li> </ul>

## 2.2 Connection Diagram of Test System





### **3 Test Result**

#### **3.1 Conducted Output Power and Effective Radiated Power Measurement**

##### **3.1.1 Maximum Output Power and Effective Radiated Power Measurement**

Effective radiated power output measurements by substitution method according to ANSI / TIA / EIA-603-C-2004, and the spectrum analyzer configuration follows KDB 971168 D01 Power Meas. License Digital Systems v01. Mobile and portable (hand-held) stations operating in the 777~787 MHz band are limited to a peak ERP of 3 watt.

##### **3.1.2 Measuring Instruments**

See list of measuring instruments of this test report.



### 3.1.3 Test Procedures

**For Conducted Power Measurement:**

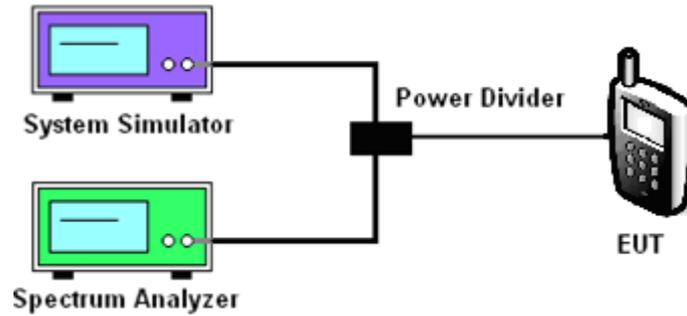
1. The RF output of the transmitter was connected to base station simulator.
2. Set EUT at maximum average power by base station simulator.
3. Measure lowest, middle, and highest channels for each bandwidth and different modulation.

**For Effective Radiated Power Measurement:**

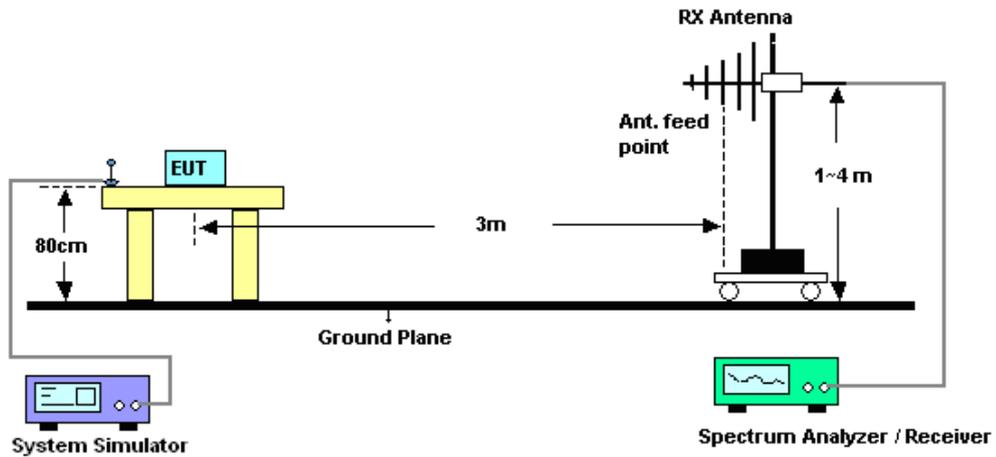
1. The EUT was placed on a turntable with 1.5 meter height in a fully anechoic chamber.
2. The EUT was set at 3 meters from the receiving antenna, which was mounted on the antenna tower.
3. GSM operating modes: Set RBW= 1MHz, VBW= 3MHz, RMS detector over burst;  
UMTS operating modes: Set RBW= 100 KHz, VBW= 300 KHz, RMS detector over frame, and use channel power option with bandwidth=5MHz, per section 4.0 of KDB 971168 D01.
4. The table was rotated 360 degrees to determine the position of the highest radiated power.
5. The height of the receiving antenna is adjusted to look for the maximum ERP.
6. Taking the record of maximum ERP.
7. A dipole antenna was substituted in place of the EUT and was driven by a signal generator.
8. The conducted power at the terminal of the dipole antenna is measured.
9. Repeat step 3 to step 5 to get the maximum ERP of the substitution antenna.
10.  $ERP = P_s + E_t - E_s + G_s = P_s + R_t - R_s + G_s$   
 $P_s$  (dBm) : Input power to substitution antenna.  
 $G_s$  (dBi or dBd) : Substitution antenna Gain.  
 $E_t = R_t + AF$   
 $E_s = R_s + AF$   
AF (dB/m) : Receive antenna factor  
 $R_t$  : The highest received signal in spectrum analyzer for EUT.  
 $R_s$  : The highest received signal in spectrum analyzer for substitution antenna.

### 3.1.4 Test Setup

#### <Conducted Power and Band Edge Measurement>



#### <Effective Radiated Power Measurement>



3.1.5 Test Result of Conducted Output Power

Mode	Band Width	Channel	Frequency (MHz)	Modulation	RB Configuration		Average Power (dBm)	Average Power (Watts)
					RB Size	RB Offset		
LTE Band 13	5MHz	23205	779.5	QPSK	1	0	23.28	0.2128
					1	12	23.21	0.2094
					1	24	23.12	0.2051
					12	0	22.28	0.1690
					12	6	22.23	0.1671
					12	11	22.17	0.1648
					25	0	22.22	0.1667
		16-QAM	1	0	22.38	0.1730		
			1	12	22.22	0.1667		
			1	24	22.36	0.1722		
			12	0	21.36	0.1368		
			12	6	21.26	0.1337		
			12	11	21.19	0.1315		
			25	0	21.15	0.1303		
		23230	782	QPSK	1	0	23.20	0.2089
	1				12	23.16	0.2070	
	1				24	23.15	0.2065	
	12				0	22.20	0.1660	
	12				6	22.18	0.1652	
	12				11	22.11	0.1626	
	25				0	22.15	0.1641	
	16-QAM		1	0	22.03	0.1596		
			1	12	21.99	0.1581		
			1	24	21.90	0.1549		
			12	0	21.14	0.1300		
			12	6	21.22	0.1324		
			12	11	21.26	0.1337		
			25	0	21.05	0.1274		
			23255	784.5	QPSK	1	0	23.16
	1	12				23.11	0.2046	
1	24	23.05				0.2018		
12	0	22.16				0.1644		
12	6	22.19				0.1656		
12	11	22.24				0.1675		
25	0	22.08				0.1614		
16-QAM	1	0		22.18	0.1652			
	1	12		22.15	0.1641			
	1	24		22.10	0.1622			
	12	0		21.20	0.1318			
	12	6		21.17	0.1309			
	12	11		21.23	0.1327			
	25	0		21.16	0.1306			



Mode	Band Width	Channel	Frequency (MHz)	Modulation	RB Configuration		Average Power (dBm)	Average Power (Watts)
					RB Size	RB Offset		
LTE Band 13	10MHz	23230	782	QPSK	1	0	23.37	0.2173
					1	24	23.24	0.2109
					1	49	23.25	0.2113
					25	0	22.26	0.1683
					25	12	22.17	0.1648
					25	24	22.24	0.1675
					50	0	22.15	0.1641
				16-QAM	1	0	22.33	0.1710
					1	24	22.16	0.1644
					1	49	22.25	0.1679
					25	0	21.20	0.1318
					25	12	21.19	0.1315
					25	24	21.08	0.1282
					50	0	21.03	0.1268



3.1.6 Test Result of ERP

LTE Band 13 Radiated Power ERP								
LTE BAND	Channel BW (MHz)	Modulation	RB Configuration		Freq. (MHz)	ERP (dBm)	ERP (W)	H/V
			RB Size	RB Offset				
13	5	QPSK	1	0	779.5	22.30	0.1698	H
13	5	QPSK	1	0	782	22.20	0.1660	H
13	5	QPSK	1	0	784.5	22.57	0.1807	H
13	5	QPSK	1	0	779.5	12.61	0.0182	V
13	5	QPSK	1	0	782	13.74	0.0237	V
13	5	QPSK	1	0	784.5	13.36	0.0217	V
13	5	16QAM	1	0	779.5	21.04	0.1271	H
13	5	16QAM	1	0	782	21.26	0.1337	H
13	5	16QAM	1	0	784.5	21.46	0.1400	H
13	5	16QAM	1	0	779.5	11.37	0.0137	V
13	5	16QAM	1	0	782	12.03	0.0160	V
13	5	16QAM	1	0	784.5	12.09	0.0162	V
13	10	QPSK	1	0	782	22.29	0.1694	H
13	10	QPSK	1	0	782	12.97	0.0198	V
13	10	16QAM	1	0	782	21.42	0.1387	H
13	10	16QAM	1	0	782	11.90	0.0155	V

## 3.2 Peak-to-Average Ratio

### 3.2.1 Description of the PAR Measurement

Power Complementary Cumulative Distribution Function (CCDF) curves provide a means for characterizing the power peaks of a digitally modulated signal on a statistical basis. A CCDF curve depicts the probability of the peak signal amplitude exceeding the average power level. Most contemporary measurement instrumentation include the capability to produce CCDF curves for an input signal provided that the instrument's resolution bandwidth can be set wide enough to accommodate the entire input signal bandwidth. The following guidelines are offered for performing a CCDF measurement.

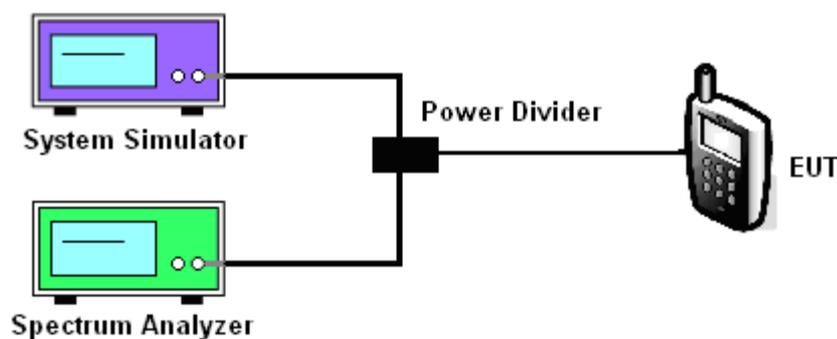
### 3.2.2 Measuring Instruments

See list of measuring instruments of this test report.

### 3.2.3 Test Procedures

1. The EUT was connected to Spectrum Analyzer and Base Station via power divider.
2. The CCDF (Complementary Cumulative Distribution Function) of the middle channel for the highest RF powers were measured.

### 3.2.4 Test Setup





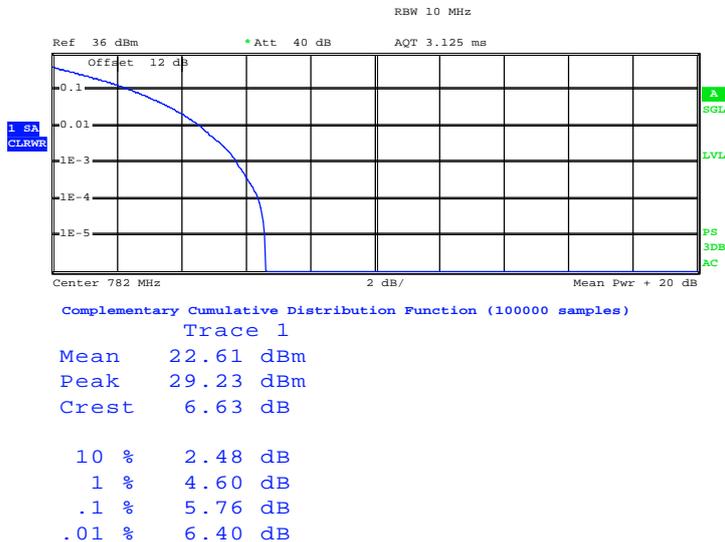
3.2.5 Test Result of Peak-to-Average Ratio

Band	Band Width	Channel	Frequency (MHz)	Modulation	PAR (dB)
LTE Band 13	5MHz	23230	782	QPSK	5.76
				16-QAM	6.36
	10MHz	23230	782	QPSK	5.52
				16-QAM	6.24



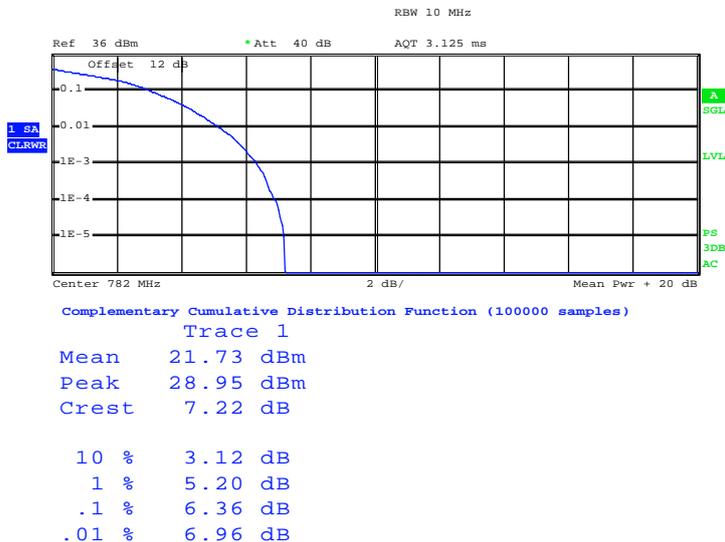
3.2.6 Peak to Average Power Ratio

Peak-to-Average Ratio for QPSK-RB Size 25, RB Offset 0



Date: 31.MAY.2013 17:16:12

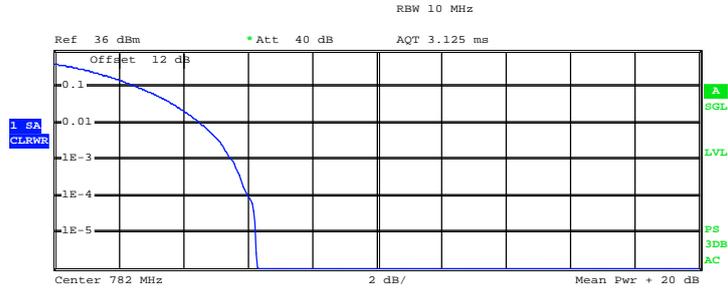
Peak-to-Average Ratio for 16QAM-RB Size 25, RB Offset 0



Date: 31.MAY.2013 17:15:54



Peak-to-Average Ratio for QPSK-RB Size 50, RB Offset 0



Complementary Cumulative Distribution Function (100000 samples)

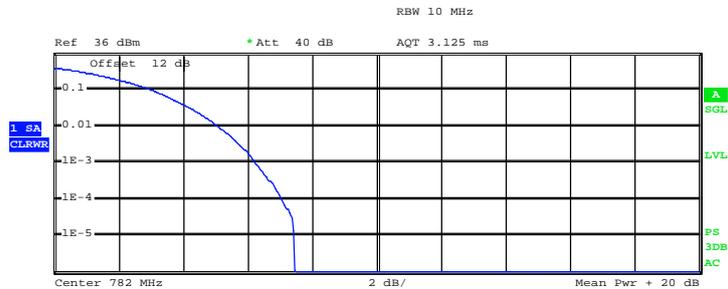
Trace 1

Mean 22.04 dBm  
 Peak 28.31 dBm  
 Crest 6.27 dB

10 % 2.64 dB  
 1 % 4.56 dB  
 .1 % 5.52 dB  
 .01 % 6.04 dB

Date: 31.MAY.2013 17:16:39

Peak-to-Average Ratio for 16QAM-RB Size 50, RB Offset 0



Complementary Cumulative Distribution Function (100000 samples)

Trace 1

Mean 21.21 dBm  
 Peak 28.67 dBm  
 Crest 7.46 dB

10 % 3.08 dB  
 1 % 5.12 dB  
 .1 % 6.24 dB  
 .01 % 7.08 dB

Date: 31.MAY.2013 17:17:03

### 3.3 Occupied Bandwidth and 26dB Bandwidth Measurement

#### 3.3.1 Description of 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 emission bandwidth is defined as the width of the signal between two points, located at the 2 sides of the carrier frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

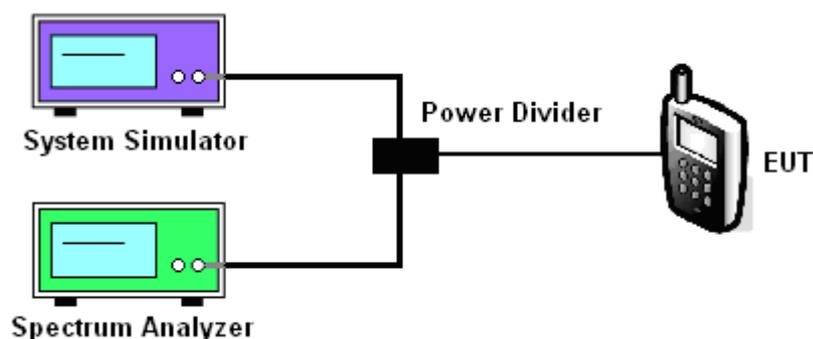
#### 3.3.2 Measuring Instruments

See list of measuring instruments of this test report.

#### 3.3.3 Test Procedures

1. The EUT was connected to Spectrum Analyzer and Base Station via power divider.
2. The 99% occupied bandwidth and 26 dB bandwidth of the middle channel for the highest RF powers were measured.

#### 3.3.4 Test Setup





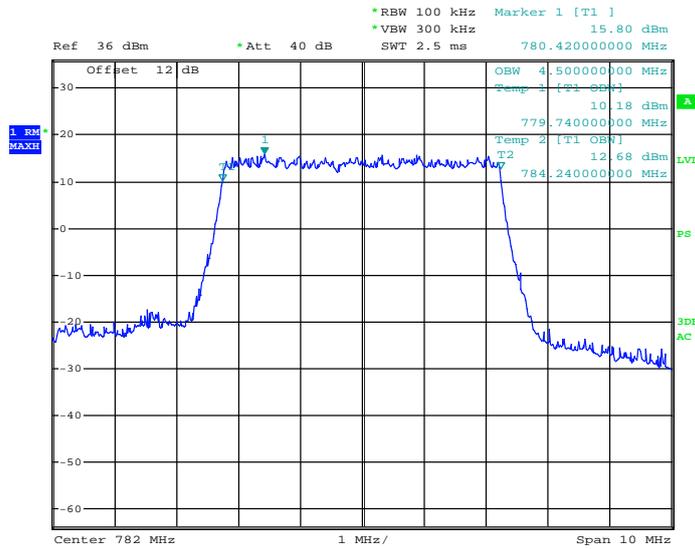
3.3.5 Test Result of Occupied Bandwidth and 26dB Bandwidth

Band	Band Width	Channel	Frequency (MHz)	Modulation	99% Bandwidth (MHz)	26dB Bandwidth (MHz)
LTE Band 13	5MHz	23230	782	QPSK	4.50	5.14
				16-QAM	4.52	5.12
	10MHz	23230	782	QPSK	9.16	10.16
				16-QAM	9.12	10.04

3.3.6 Test Result (Plots) of Occupied Bandwidth

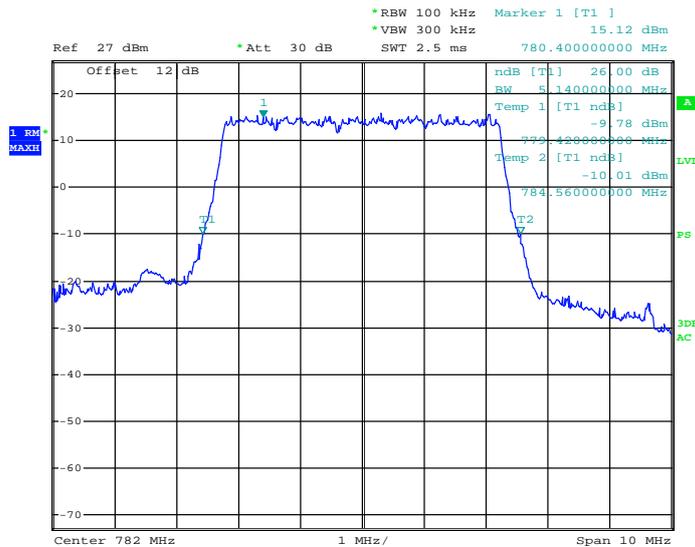
Band :	LTE Band 13	BW / Mod. :	5MHz / QPSK
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99% Occupied Bandwidth Plot on Channel 23230  
for RB Size 25, RB Offset 0



Date: 31.MAY.2013 17:10:35

26dB Bandwidth Plot on Channel 23230  
for RB Size 25, RB Offset 0

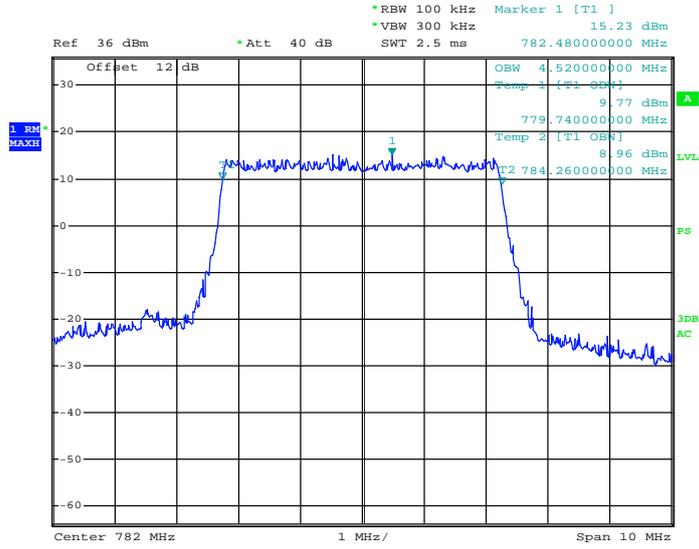


Date: 31.MAY.2013 16:21:52



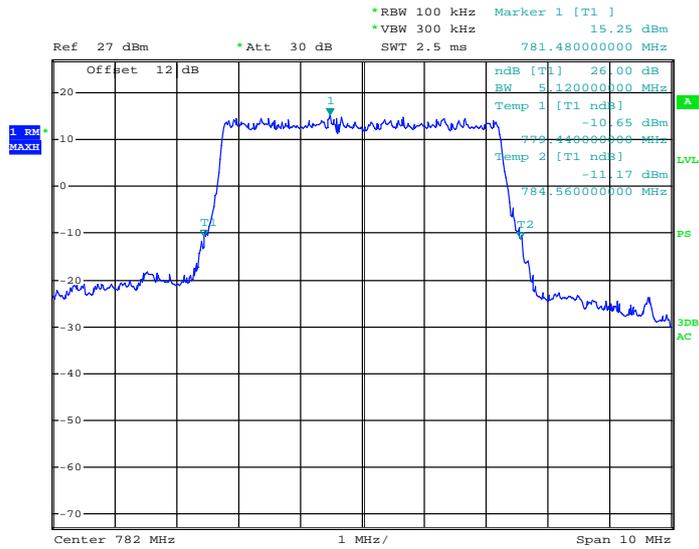
<b>Band :</b>	LTE Band 13	<b>BW / Mod. :</b>	5MHz / 16QAM
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**99% Occupied Bandwidth Plot on Channel 23230  
for RB Size 25, RB Offset 0**



Date: 31.MAY.2013 17:10:54

**26dB Bandwidth Plot on Channel 23230  
for RB Size 25, RB Offset 0**

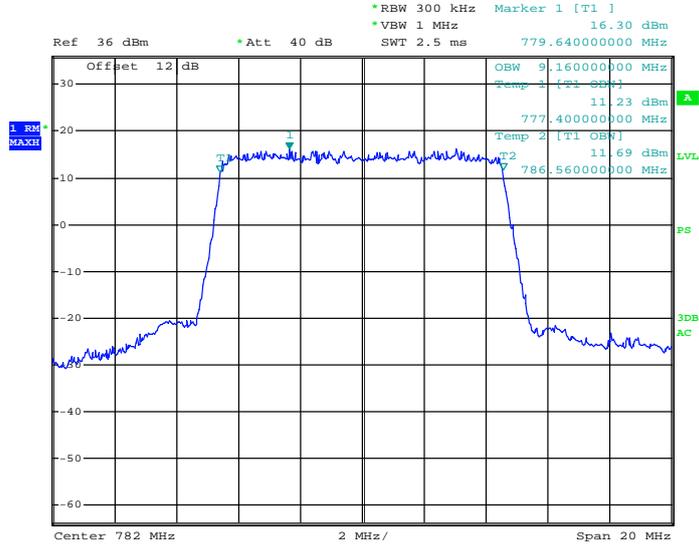


Date: 31.MAY.2013 16:22:49



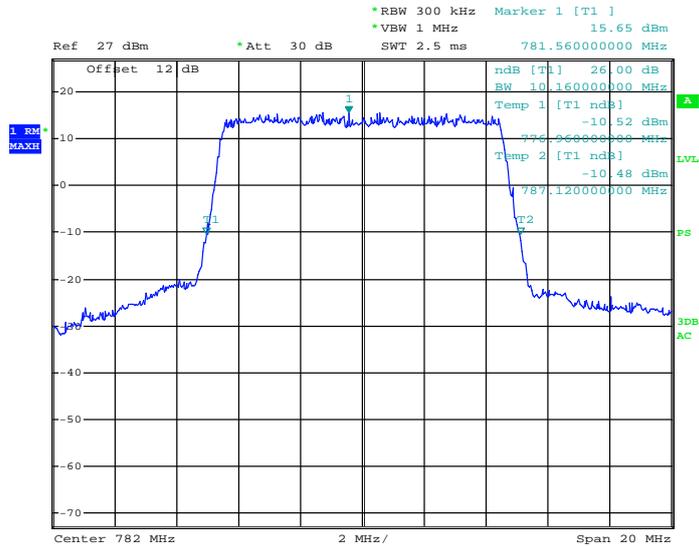
Band :	LTE Band 13	BW / Mod. :	10MHz / QPSK
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**99% Occupied Bandwidth Plot on Channel 23230  
for RB Size 50, RB Offset 0**



Date: 31.MAY.2013 17:14:09

**26dB Bandwidth Plot on Channel 23230  
for RB Size 50, RB Offset 0**

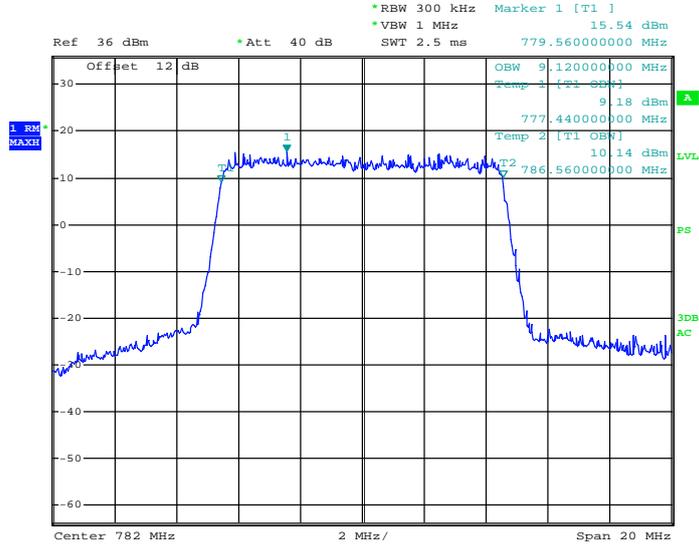


Date: 31.MAY.2013 16:24:10



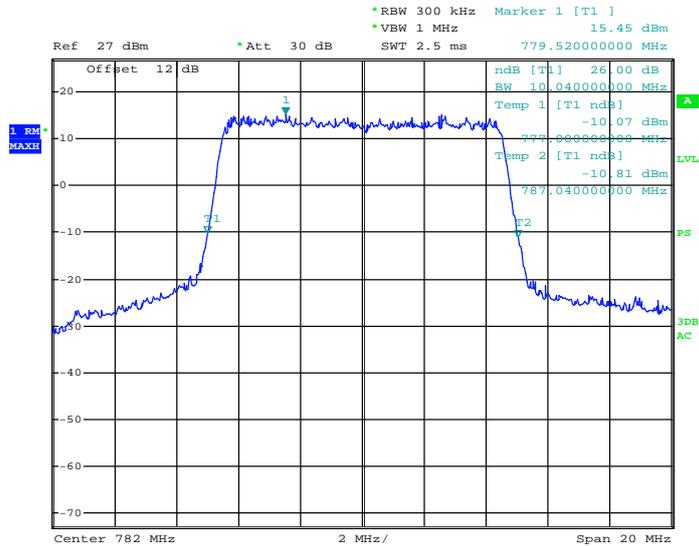
Band :	LTE Band 13	BW / Mod. :	10MHz / 16QAM
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**99% Occupied Bandwidth Plot on Channel 23230  
for RB Size 50, RB Offset 0**



Date: 31.MAY.2013 17:14:26

**26dB Bandwidth Plot on Channel 23230  
for RB Size 50, RB Offset 0**



Date: 31.MAY.2013 16:23:46

## 3.4 Band Edge Measurement

### 3.4.1 Limit

For operations in band 13, the FCC limit is  
 $65 + 10\log_{10}(P[\text{Watts}]) = -35 \text{ dBm}$  in a 6.25kHz bandwidth.

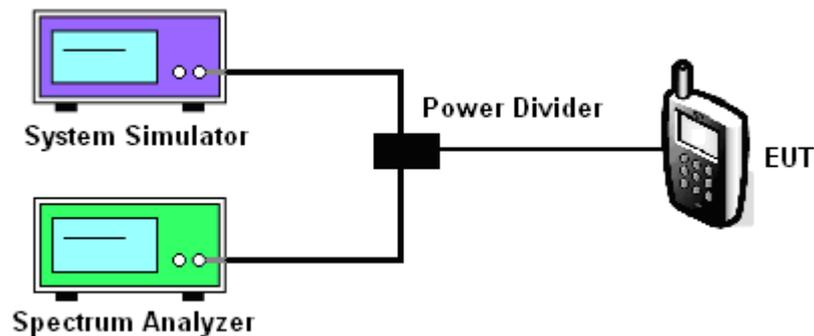
### 3.4.2 Measuring Instruments

See list of measuring instruments of this test report.

### 3.4.3 Test Procedures

1. The EUT was connected to Spectrum Analyzer and Base Station via power divider.
2. The band edges of low and high channels for the highest RF powers were measured.

### 3.4.4 Test Setup

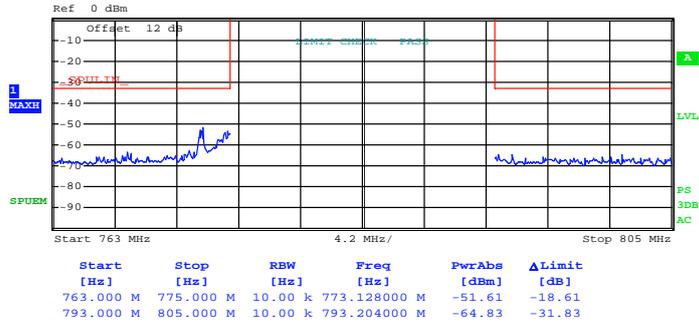




3.4.5 Test Result (Plots) of Conducted Band Edge

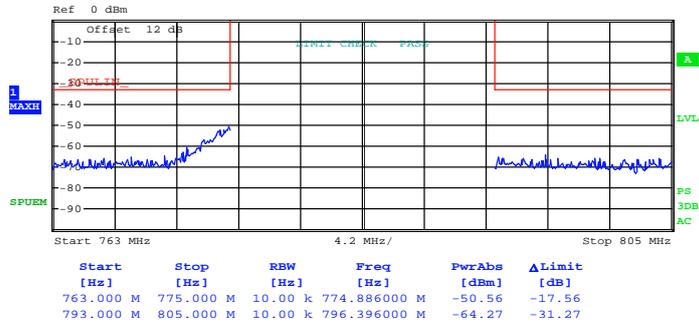
Band :	LTE Band 13	Band Width	5MHz / QPSK
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Lower Band Edge Plot for QPSK-RB Size 1, RB Offset 0



Date: 31.MAY.2013 18:23:27

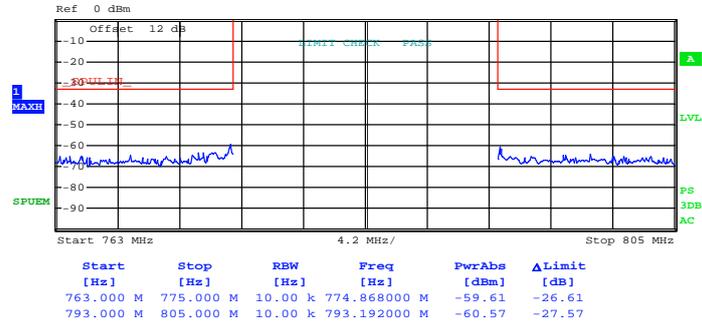
Lower Band Edge Plot for QPSK-RB Size 25, RB Offset 0



Date: 31.MAY.2013 18:23:43

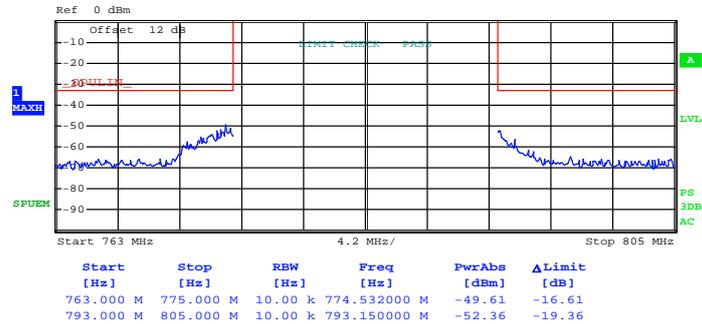


Higher Band Edge Plot for QPSK-RB Size 1, RB Offset 24



Date: 31.MAY.2013 18:33:13

Higher Band Edge Plot for QPSK-RB Size 25, RB Offset 0

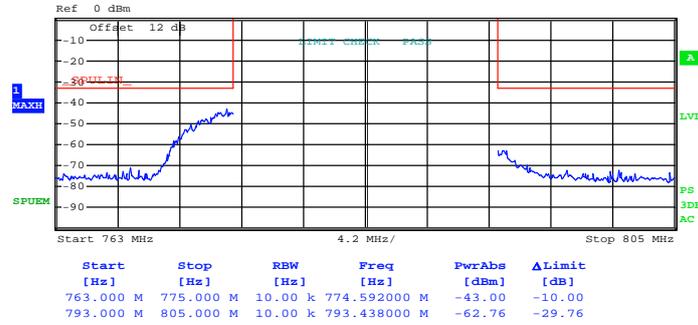


Date: 31.MAY.2013 18:33:32



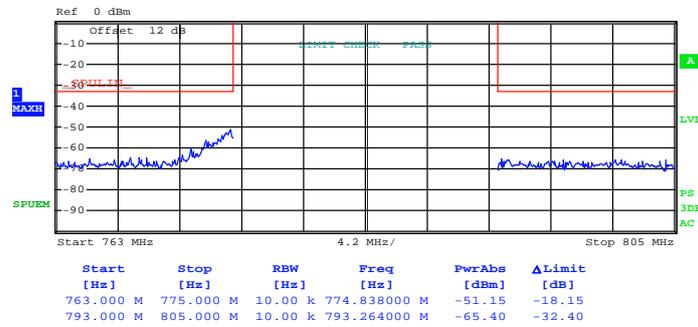
<b>Band :</b>	LTE Band 13	<b>Band Width</b>	5MHz / 16QAM
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Lower Band Edge Plot for 16QAM-RB Size 1, RB Offset 0



Date: 31.MAY.2013 18:15:14

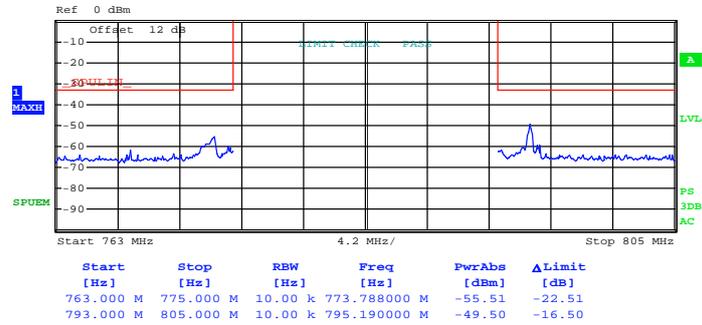
Lower Band Edge Plot for 16QAM-RB Size 25, RB Offset 0



Date: 31.MAY.2013 18:24:00

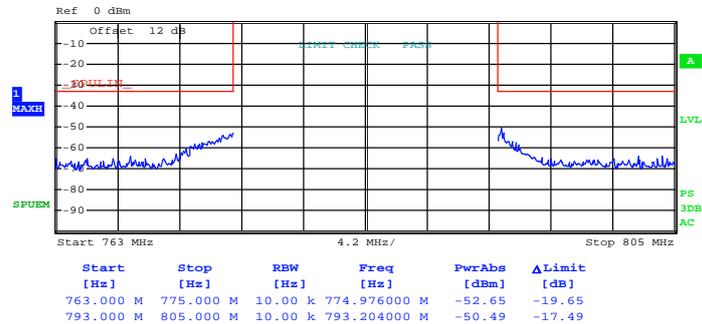


Higher Band Edge Plot for 16QAM-RB Size 1, RB Offset 24



Date: 31.MAY.2013 18:32:56

Higher Band Edge Plot for 16QAM-RB Size 25, RB Offset 0



Date: 31.MAY.2013 18:33:44

## 3.5 Conducted Spurious Emission Measurement

### 3.5.1 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.

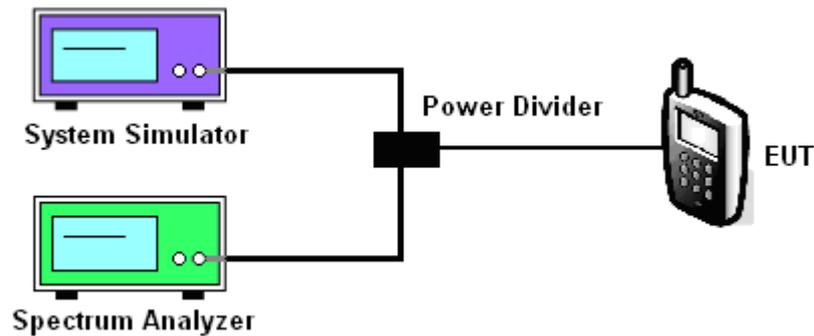
### 3.5.2 Measuring Instruments

See list of measuring instruments of this test report.

### 3.5.3 Test Procedures

1. The EUT was connected to spectrum analyzer and base station via power divider.
2. The middle channel for the highest RF power within the transmitting frequency was measured.
3. The conducted spurious emission for the whole frequency range was taken.

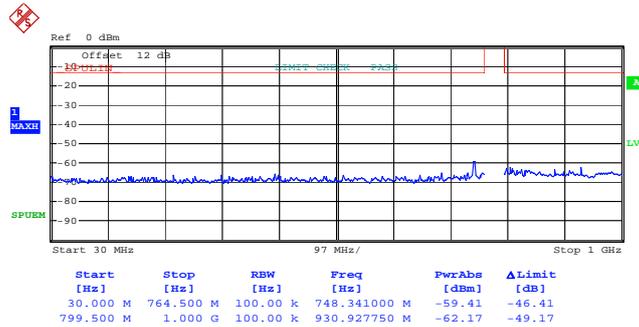
### 3.5.4 Test Setup



3.5.5 Test Result (Plots) of Conducted Spurious Emission

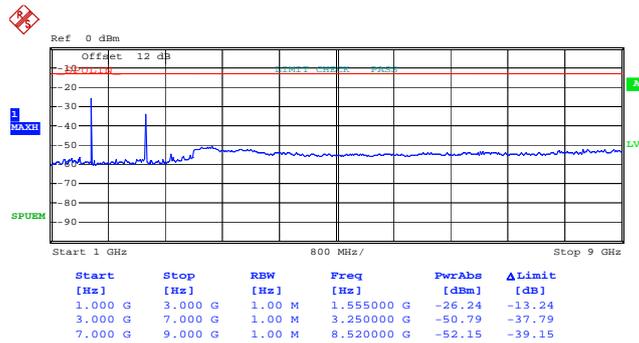
Band :	LTE Band 13	BW / Mod. :	5MHz / QPSK
Frequency :	779.5	Channel :	23205

Conducted Emission Plot (30MHz ~ 1GHz) for QPSK (RB Size 1, RB Offset 0)



Date: 2.JUN.2013 09:57:45

Conducted Emission Plot (1GHz ~ 9GHz) for QPSK (RB Size 1, RB Offset 0)

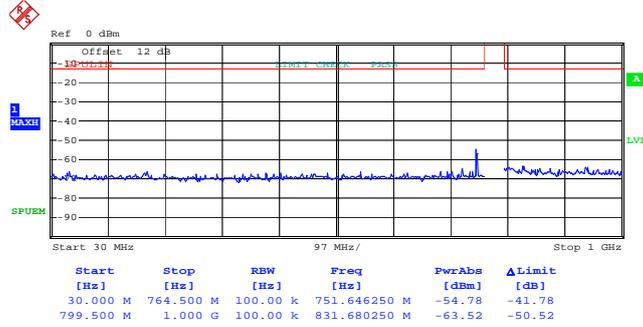


Date: 2.JUN.2013 09:56:54



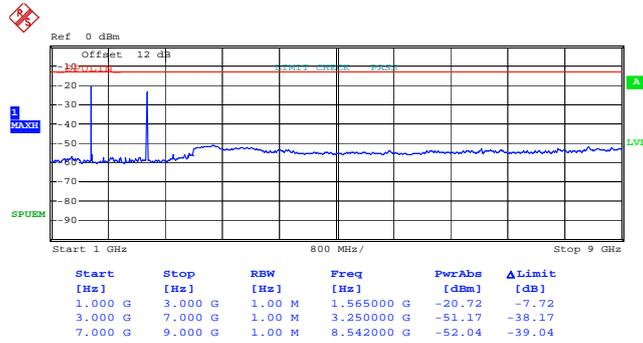
Band :	LTE Band 13	BW / Mod. :	5MHz / QPSK
Frequency :	782	Channel :	23230

Conducted Emission Plot (30MHz ~ 1GHz) for QPSK (RB Size 1, RB Offset 0)



Date: 2.JUN.2013 09:58:07

Conducted Emission Plot (1GHz ~ 9GHz) for QPSK (RB Size 1, RB Offset 0)

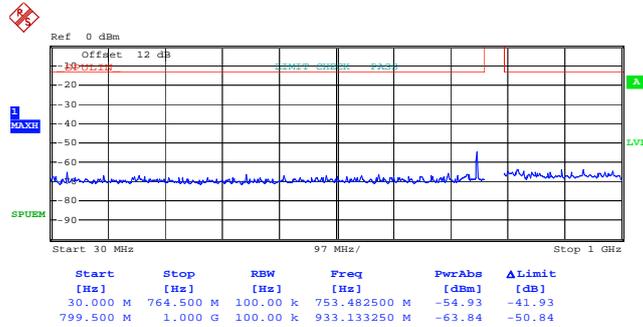


Date: 2.JUN.2013 09:59:44



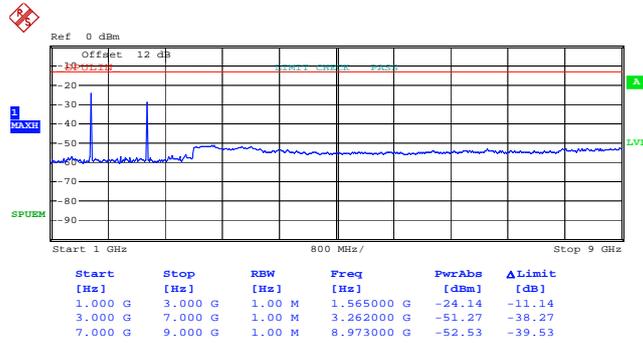
Band :	LTE Band 13	BW / Mod. :	5MHz / QPSK
Frequency :	784.5	Channel :	23255

Conducted Emission Plot (30MHz ~ 1GHz) for QPSK (RB Size 1, RB Offset 0)



Date: 2.JUN.2013 09:53:40

Conducted Emission Plot (1GHz ~ 9GHz) for QPSK (RB Size 1, RB Offset 0)

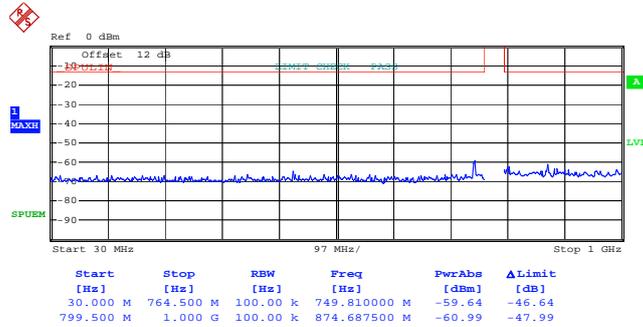


Date: 2.JUN.2013 09:55:05



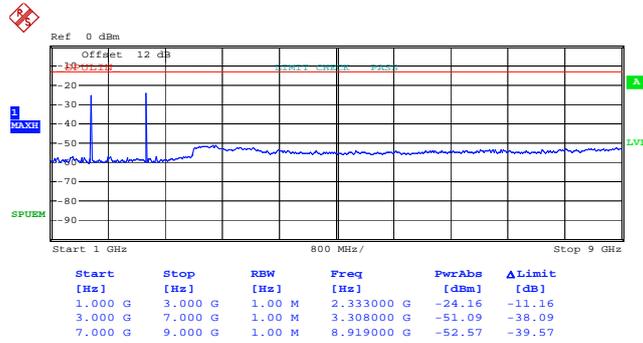
<b>Band :</b>	LTE Band 13	<b>BW / Mod. :</b>	5MHz / 16QAM
<b>Frequency :</b>	779.5	<b>Channel :</b>	23205

**Conducted Emission Plot (30MHz ~ 1GHz) for 16-QAM (RB Size 1, RB Offset 0)**



Date: 2.JUN.2013 09:57:31

**Conducted Emission Plot (1GHz ~ 9GHz) for 16-QAM (RB Size 1, RB Offset 0)**

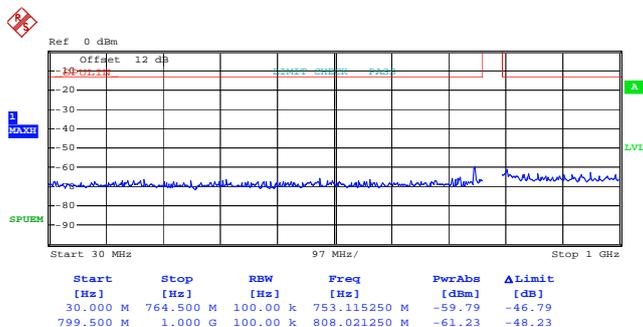


Date: 2.JUN.2013 09:57:09



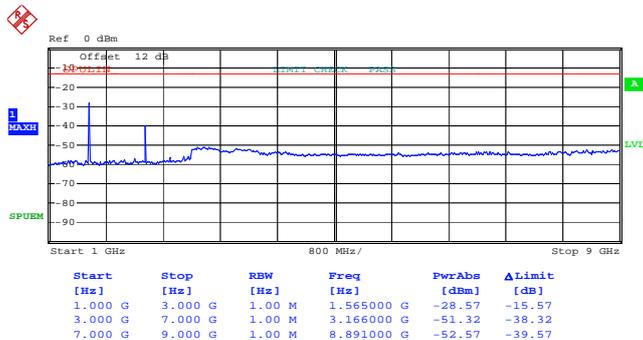
<b>Band :</b>	LTE Band 13	<b>BW / Mod. :</b>	5MHz / 16QAM
<b>Frequency :</b>	782	<b>Channel :</b>	23230

**Conducted Emission Plot (30MHz ~ 1GHz) for  
16-QAM (RB Size 1, RB Offset 0)**



Date: 2.JUN.2013 09:58:22

**Conducted Emission Plot (1GHz ~ 9GHz) for  
16-QAM (RB Size 1, RB Offset 0)**

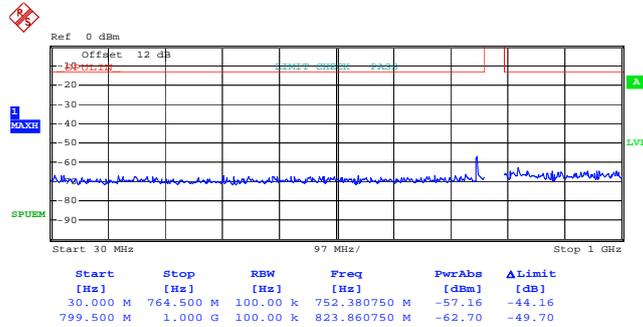


Date: 2.JUN.2013 09:59:26



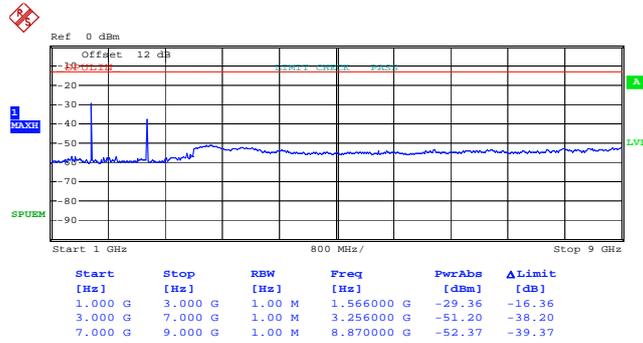
<b>Band :</b>	LTE Band 13	<b>BW / Mod. :</b>	5MHz / 16QAM
<b>Frequency :</b>	784.5	<b>Channel :</b>	23255

**Conducted Emission Plot (30MHz ~ 1GHz) for 16-QAM (RB Size 1, RB Offset 0)**



Date: 2.JUN.2013 09:53:59

**Conducted Emission Plot (1GHz ~ 9GHz) for 16-QAM (RB Size 1, RB Offset 0)**

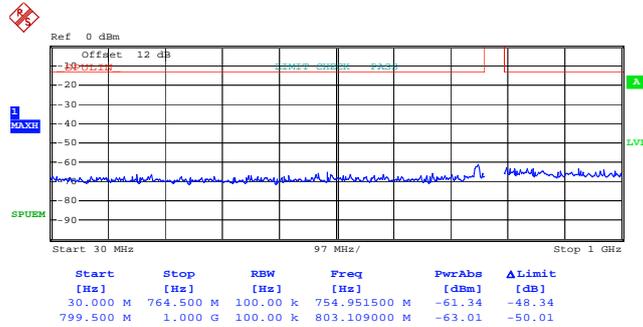


Date: 2.JUN.2013 09:54:34



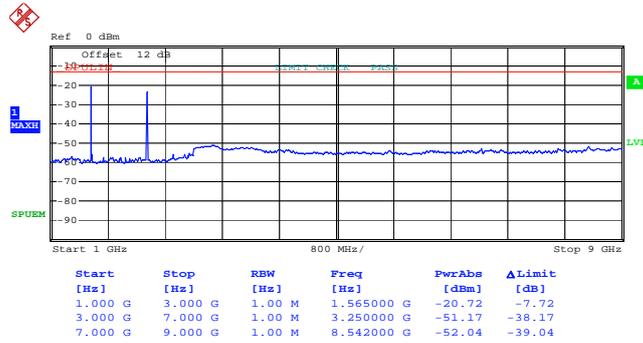
<b>Band :</b>	LTE Band 13	<b>BW / Mod. :</b>	10MHz / QPSK
<b>Frequency :</b>	782	<b>Channel :</b>	23230

**Conducted Emission Plot (30MHz ~ 1GHz) for QPSK (RB Size 1, RB Offset 0)**



Date: 2.JUN.2013 10:02:47

**Conducted Emission Plot (1GHz ~ 9GHz) for QPSK (RB Size 1, RB Offset 0)**

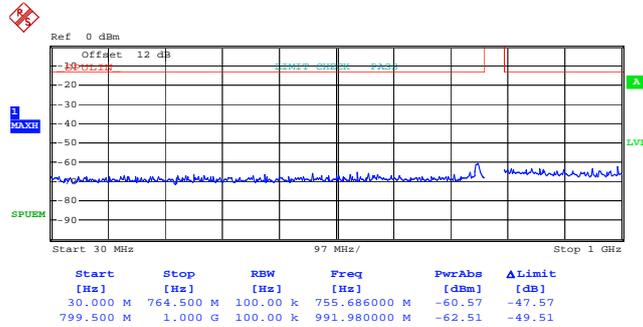


Date: 2.JUN.2013 10:01:47



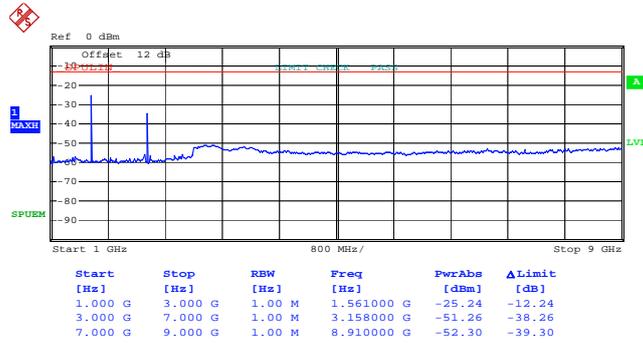
Band :	LTE Band 13	BW / Mod. :	10MHz / 16QAM
Frequency :	782	Channel :	23230

Conducted Emission Plot (30MHz ~ 1GHz) for QPSK (RB Size 1, RB Offset 0)



Date: 2.JUN.2013 10:02:35

Conducted Emission Plot (1GHz ~ 9GHz) for QPSK (RB Size 1, RB Offset 0)



Date: 2.JUN.2013 10:02:10

## 3.6 Field Strength of Spurious Radiation Measurement

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

The radiated spurious emission was measured by substitution method according to ANSI / TIA / EIA-603-C-2004. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitter power (P) by a factor of at least  $43 + 10 \log (P)$  dB. The spectrum is scanned from 30 MHz up to a frequency including its 10th harmonic.

### 3.6.2 Measuring Instruments

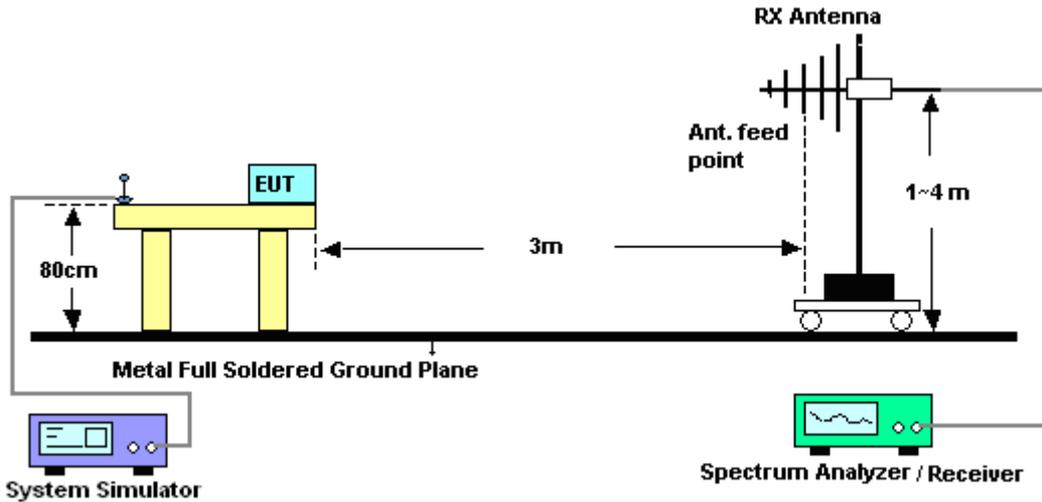
See list of measuring instruments of this test report.

### 3.6.3 Test Procedures

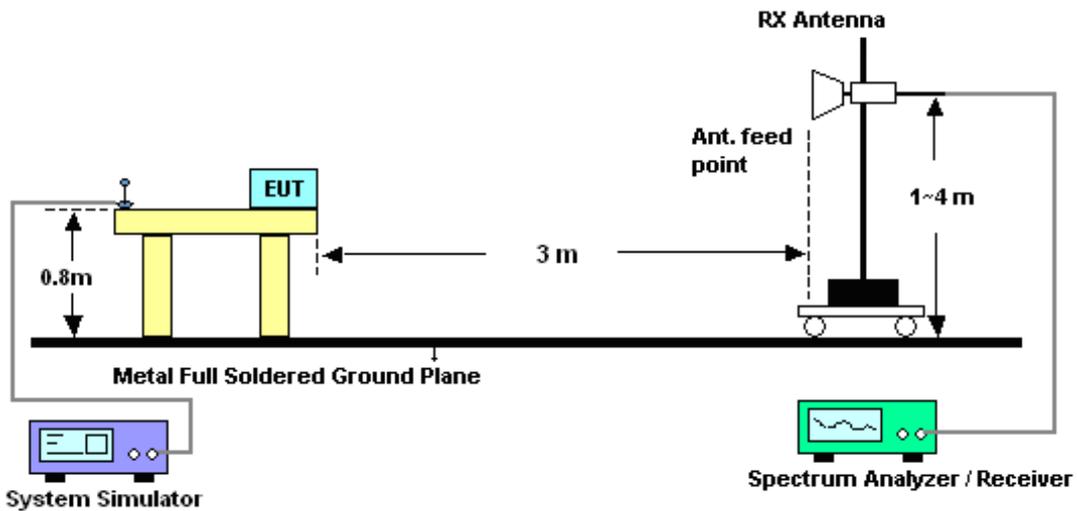
1. The EUT was placed on a rotatable wooden table with 0.8 meter above ground.
2. The EUT was set 3 meters from the receiving antenna, which was mounted on the antenna tower.
3. The table was rotated 360 degrees to determine the position of the highest spurious emission.
4. The height of the receiving antenna is varied between one meter and four meters to search the maximum spurious emission for both horizontal and vertical polarizations.
5. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, Sweep = 500ms, Taking the record of maximum spurious emission.
6. A horn antenna was substituted in place of the EUT and was driven by a signal generator.
7. Tune the output power of signal generator to the same emission level with EUT maximum spurious emission.
8. Taking the record of output power at antenna port.
9. Repeat step 7 to step 8 for another polarization.
10. Emission level (dBm) = output power + substitution Gain.

### 3.6.4 Test Setup

For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



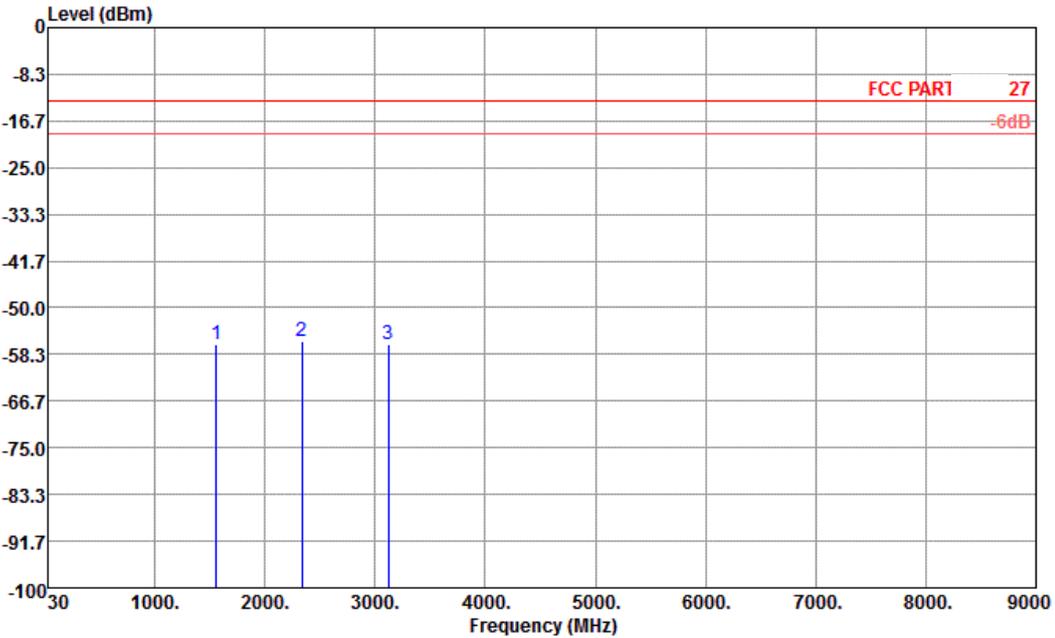
### 3.6.5 Test Results of Radiated Emissions (9 KHz ~ 30 MHz)

The low frequency, which started from 9 KHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.



3.6.6 Test Result of Field Strength of Spurious Radiated

<b>Band :</b>	LTE Band 13	<b>Temperature :</b>	23~24°C
<b>Test Mode :</b>	5MHz, QPSK, RB Size 1, RB Offset 0	<b>Relative Humidity :</b>	41~43%
<b>Test Engineer :</b>	Steven Hao	<b>Polarization :</b>	Horizontal
<b>Remark :</b>	Spurious emissions were found more than 20dB below limit line.		

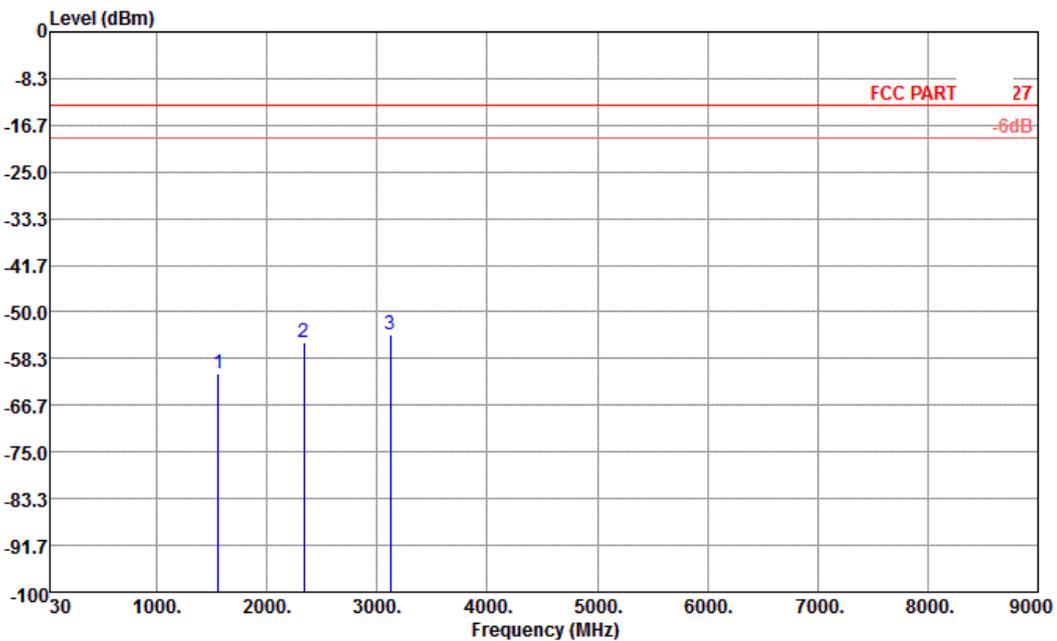


Site : 03CH01-KS  
 Condition : FCC PART 27 HF EIRP FACTOR HORIZONTAL  
 EUT : (FG) 342701  
 Plane : E2

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
1564	-56.64	-13	-43.64	-57.06	-57.29	0.57	3.37	H	Pass
2346	-55.95	-13	-42.95	-61.66	-58.18	0.78	5.16	H	Pass
3128	-56.62	-13	-43.62	-63.26	-60.26	0.87	6.66	H	Pass



Band :	LTE Band 13	Temperature :	23~24°C
Test Mode :	5MHz, QPSK, RB Size 1, RB Offset 0	Relative Humidity :	41~43%
Test Engineer :	Steven Hao	Polarization :	Vertical
Remark :	Spurious emissions were found more than 20dB below limit line.		

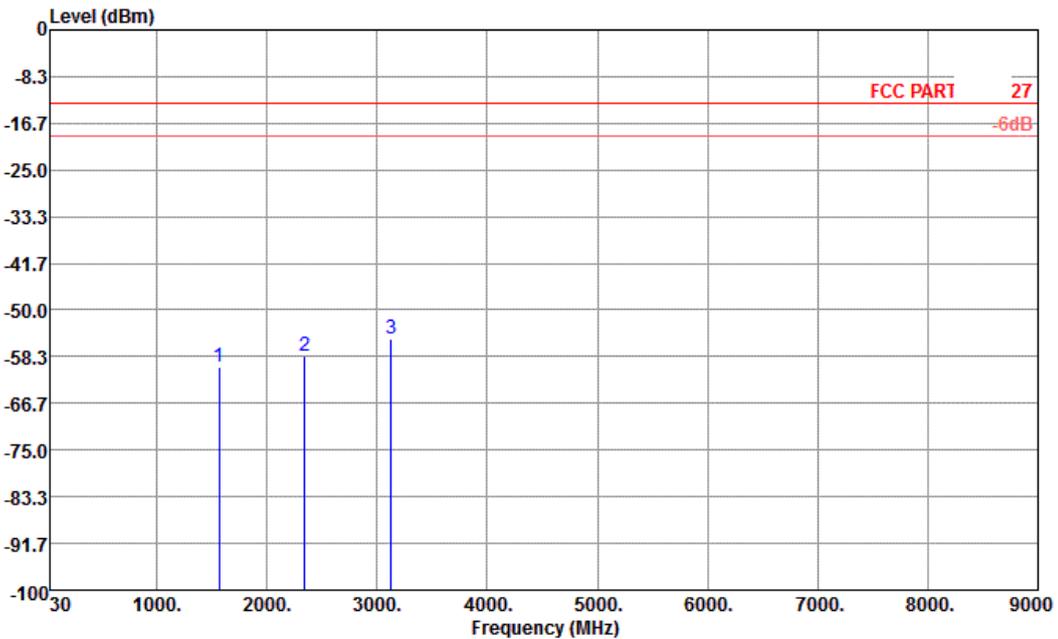


Site : 03CH01-KS  
 Condition : FCC PART 27 HF EIRP FACTOR VERTICAL  
 EUT : (FG) 342701  
 Plane : E2

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
1564	-60.94	-13	-47.94	-61.56	-61.59	0.57	3.37	V	Pass
2346	-55.54	-13	-42.54	-63.73	-57.77	0.78	5.16	V	Pass
3128	-53.95	-13	-40.95	-62.40	-57.59	0.87	6.66	V	Pass



<b>Band :</b>	LTE Band 13	<b>Temperature :</b>	23~24°C
<b>Test Mode :</b>	10MHz, QPSK, RB Size 1, RB Offset 0	<b>Relative Humidity :</b>	41~43%
<b>Test Engineer :</b>	Steven Hao	<b>Polarization :</b>	Horizontal
<b>Remark :</b>	Spurious emissions were found more than 20dB below limit line.		

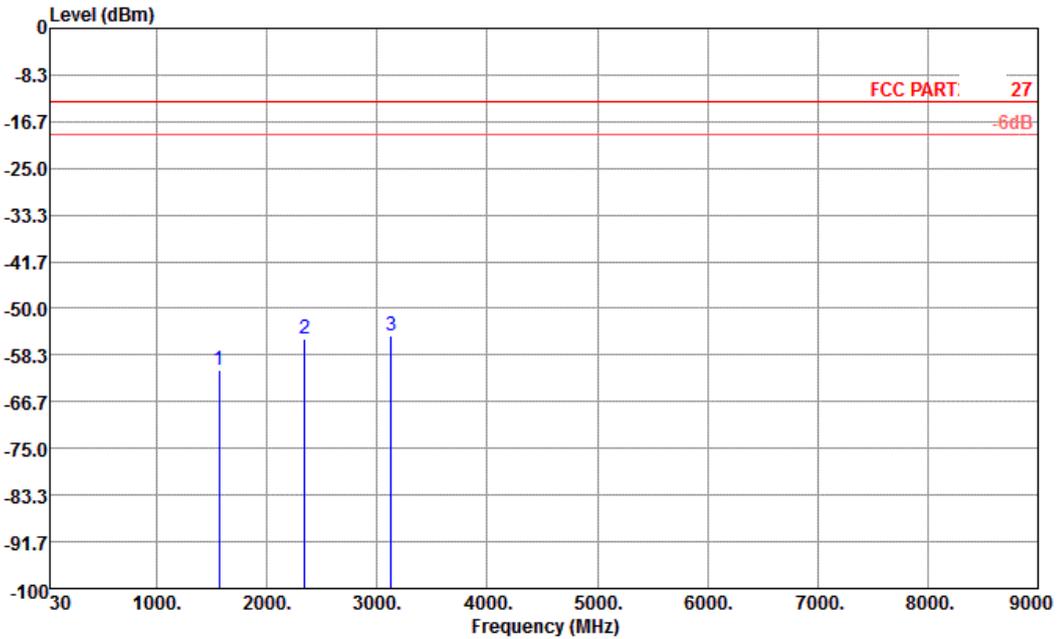


Site : 03CH01-KS  
 Condition : FCC PART 27 HF EIRP FACTOR HORIZONTAL  
 EUT : (FG) 342701  
 Plane : E2

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
1564	-60.08	-13	-47.08	-59.24	-60.73	0.57	3.37	H	Pass
2346	-58.30	-13	-45.30	-64.01	-60.53	0.78	5.16	H	Pass
3128	-55.24	-13	-42.24	-61.88	-58.88	0.87	6.66	H	Pass



<b>Band :</b>	LTE Band 13	<b>Temperature :</b>	23~24°C
<b>Test Mode :</b>	10MHz, QPSK, RB Size 1, RB Offset 0	<b>Relative Humidity :</b>	41~43%
<b>Test Engineer :</b>	Steven Hao	<b>Polarization :</b>	Vertical
<b>Remark :</b>	Spurious emissions were found more than 20dB below limit line.		



Site : 03CH01-KS  
 Condition : FCC PART 27 HF EIRP FACTOR VERTICAL  
 EUT : (FG) 342701  
 Plane : E2

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
1564	-61.11	-13	-48.11	-61.73	-61.76	0.57	3.37	V	Pass
2346	-55.51	-13	-42.51	-63.70	-57.74	0.78	5.16	V	Pass
3128	-54.79	-13	-41.79	-63.24	-58.43	0.87	6.66	V	Pass

## 3.7 Frequency Stability Measurement

### 3.7.1 Description of Frequency Stability Measurement

The frequency stability shall be measured by variation of ambient temperature and variation of primary supply voltage to ensure that the fundamental emission stays within the authorized frequency block. The frequency stability of the transmitter shall be maintained within  $\pm 0.00025\%$  ( $\pm 2.5\text{ppm}$ ) of the center frequency.

### 3.7.2 Measuring Instruments

See list of measuring instruments of this test report.

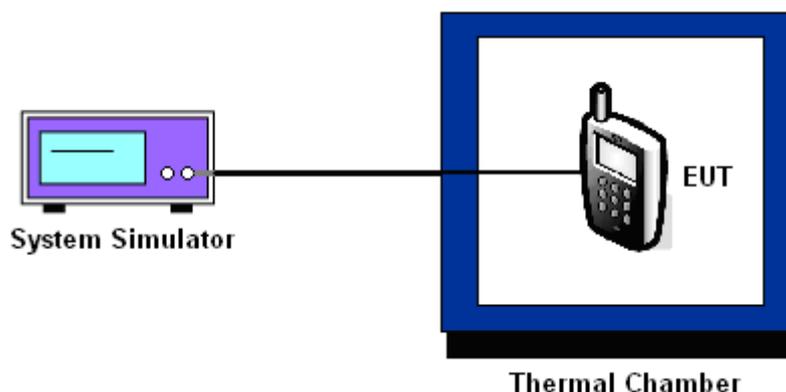
### 3.7.3 Test Procedures for Temperature Variation

1. The EUT was set up in the thermal chamber and connected with the base station.
2. With power OFF, the temperature was decreased to  $-30^{\circ}\text{C}$  and the EUT was stabilized before testing. Power was applied and the maximum change in frequency was recorded within one minute.
3. With power OFF, the temperature was raised in  $10^{\circ}\text{C}$  step up to  $50^{\circ}\text{C}$ . The EUT was stabilized at each step for at least half an hour. Power was applied and the maximum frequency change was recorded within one minute.
4. If the EUT cannot be turned on at  $-30^{\circ}\text{C}$ , the testing lowest temperature will be raised in  $10^{\circ}\text{C}$  step until the EUT can be turned on.

### 3.7.4 Test Procedures for Voltage Variation

1. The EUT was placed in a temperature chamber at  $25\pm 5^{\circ}\text{C}$  and connected with the base station.
2. The power supply voltage to the EUT was varied from 85% to 115% of the nominal value measured at the input to the EUT.
3. The variation in frequency was measured for the worst case.

### 3.7.5 Test Setup



3.7.6 Test Result of Temperature Variation

Band :	LTE Band 13 (QPSK)		Limit (ppm) :	2.5	
Temperature (°C)	BW 5MHz		BW 10MHz		Result
	Freq. Dev. (Hz)	Deviation (ppm)	Freq. Dev. (Hz)	Deviation (ppm)	
-30	-2.3	-0.003	5.0	0.007	PASS
-20	3.6	0.005	6.2	0.009	
-10	4.1	0.006	7.7	0.011	
0	6.0	0.008	5.3	0.007	
10	-7.0	-0.010	-8.0	-0.011	
20	-9.0	-0.013	-7.2	-0.010	
30	8.0	0.011	-7.6	-0.011	
40	11.0	0.015	-3.1	-0.004	
50	-10.0	-0.014	4.9	0.007	
55	-5.0	-0.007	6.7	0.009	

Note: The manufacturer declared that the EUT could work properly between temperatures 55°C.

Band :	LTE Band 13 (16QAM)		Limit (ppm) :	2.5	
Temperature (°C)	BW 5MHz		BW 10MHz		Result
	Freq. Dev. (Hz)	Deviation (ppm)	Freq. Dev. (Hz)	Deviation (ppm)	
-30	-8.0	-0.011	-4.0	-0.006	PASS
-20	-11.0	-0.015	-5.5	-0.008	
-10	-6.0	-0.008	-6.8	-0.010	
0	10.0	0.014	7.9	0.011	
10	9.0	0.013	-5.0	-0.007	
20	3.5	0.005	-8.9	-0.013	
30	-9.8	-0.014	-1.3	-0.002	
40	-6.2	-0.009	-2.0	-0.003	
50	-7.0	-0.010	-3.6	-0.005	
55	-5.5	-0.008	-9.0	-0.013	

Note: The manufacturer declared that the EUT could work properly between temperatures 55°C.

3.7.7 Test Result of Voltage Variation

Band	Bandwidth	Voltage (Volt)	Freq. Dev. (Hz)	Deviation (ppm)	Limit (ppm)	Result
LTE Band 13 (QPSK)	5MHz	Normal	3.5	0.005	2.5	PASS
		3.6	6.9	0.010		
		4.35	-9.2	-0.013		
	10MHz	Normal	6.7	0.009		
		3.6	-8.6	-0.012		
		4.35	-9.5	-0.013		

Band	Bandwidth	Voltage (Volt)	Freq. Dev. (Hz)	Deviation (ppm)	Limit (ppm)	Result
LTE Band 13 (16QAM)	5MHz	Normal	-10.0	-0.014	2.5	PASS
		3.6	8.0	0.011		
		4.35	6.5	0.009		
	10MHz	Normal	8.6	0.012		
		3.6	4.0	0.006		
		4.35	-9.0	-0.013		

Remark:

1. Normal Voltage = 3.8V
2. The manufacturer declared that the EUT could work properly between voltage 3.6V ~ 4.35V.



## 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	Dec. 29, 2012	May 31, 2013~ Jun. 02, 2013	Dec. 28, 2013	Conducted (TH01-KS)
Power Meter	Agilent	E4416A	MY45101555	N/A	Aug. 22, 2012	May 31, 2013~ Jun. 02, 2013	Aug. 21, 2013	Conducted (TH01-KS)
DC Power Supply	GWINSTEK	GPS-3030D	E1884515	N/A	Aug. 22, 2012	May 31, 2013~ Jun. 02, 2013	Aug. 21, 2013	Conducted (TH01-KS)
Thermal Chamber	Ten Billion	TTC-B3S	TBN-960502	N/A	Dec. 29, 2012	May 31, 2013~ Jun. 02, 2013	Dec. 28, 2013	Conducted (TH01-KS)
EMI Test Receiver	R&S	ESCI	100534	9kHz~3GHz	Nov. 08, 2012	May 29, 2013	Nov. 07, 2013	Radiation (03CH01-KS)
Spectrum Analyzer	R&S	FSP30	100400	9kHz~30GHz	Jun. 01, 2012	May 29, 2013	May 31, 2013	Radiation (03CH01-KS)
Bilog Antenna	SCHAFFNER	CBL6112D	23182	25MHz~2GHz	Dec. 07, 2012	May 29, 2013	Dec. 06, 2013	Radiation (03CH01-KS)
Loop Antenna	R&S	HFH2-Z2	100321	9KHZ-30MHZ	Oct. 22, 2012	May 29, 2013	Oct. 21, 2013	Radiation (03CH01-KS)
Double Ridge Horn Antenna	EMCO	3117	00075959	1GHz~18GHz	Jan. 06, 2013	May 29, 2013	Jan. 05, 2014	Radiation (03CH01-KS)
Amplifier	com-power	PA-103A	161069	1MHz~1GHz	Jun. 01, 2012	May 29, 2013	May 31, 2013	Radiation (03CH01-KS)
Amplifier	Agilent	8449B	3008A02370	1GHz~26.5GHz	Dec. 29, 2012	May 29, 2013	Dec. 28, 2013	Radiation (03CH01-KS)
Active Horn Antenna	com-power	AHA-118	701023	1GHz~18GHz	Nov. 07, 2012	May 29, 2013	Nov. 06, 2013	Radiation (03CH01-KS)
SHF-EHF Horn	Schwarzbeck	BBHA 9170	9170249	15GHz~40GHz	Nov. 23, 2012	May 29, 2013	Nov. 22, 2013	Radiation (03CH01-KS)
LTE Base Station	Anritsu	MT8820C	6201074235	LTE_FDD full band	Nov. 29, 2012	May 29, 2013	Nov. 28, 2012	Radiation (03CH01-KS)



## 5 Uncertainty of Evaluation

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

Measuring Uncertainty for a Level of Confidence of 95% ( $U = 2Uc(y)$ )	2.54
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### Uncertainty of Radiated Emission Measurement (1 GHz ~ 40 GHz)

Measuring Uncertainty for a Level of Confidence of 95% ( $U = 2Uc(y)$ )	4.72
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## **Appendix A. Photographs of EUT**

Please refer to Sporton report number EP342701 as below.