FCC RF Test Report

APPLICANT	:	**Yulong Computer Telecommunication Scientific (Shenzhen) Co., Ltd.**
EQUIPMENT	:	**mobile phone**
BRAND NAME	:	**Coolpad**
MODEL NAME	:	**Coolpad 3700A**
FCC ID	:	**R38YL3700A**
STANDARD	:	**47 CFR Part 2, 27(F)**
CLASSIFICATION	:	**PCS Licensed Transmitter Held to Ear (PCE)**

The product was received on Jul. 29, 2014 and testing was completed on Sep. 11, 2014. 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 the testing has shown the tested sample to be 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

Testing Laboratory
2353

SPORTON INTERNATIONAL (SHENZHEN) INC.
No. 3 Building, the third floor of south, Shahe River west, Fengzeyuan warehouse, Nanshan District, Shenzhen, Guangdong, P.R.C.

TABLE OF CONTENTS

REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FG472901B	Rev. 01	Initial issue of report	Sep. 18, 2014

SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.1	§2.1046	Conducted Output Power	Reporting Only	PASS	-
3.2	N/A	Peak-to-Average Ratio	Reporting Only	PASS	-
3.3	§27.50(b)(10)	Effective Radiated Power (Band 13)	ERP < 3 Watt	PASS	-
3.4	§2.1049 §27.53(h)(3)	Occupied Bandwidth	Reporting Only	PASS	-
3.5	§2.1051 §27.53(c)(2) §27.53(c)(4)	Conducted Band Edge Measurement (Band 13)	< 43+10log10(P[Watt])	PASS	-
3.6	§2.1051 §27.53(c)(2) §27.53(f)	Conducted Spurious Emission (Band 13)	< $43+10\log_{10}$(P[Watts])	PASS	-
3.7	§2.1053 §27.53(c)(2) §27.53(f)	Radiated Spurious Emission (Band 13)	< $43+10\log_{10}$(P[Watts])	PASS	Under limit 1.61 dB at 1559.680 MHz
3.8	§2.1055 §27.54	Frequency Stability Temperature & Voltage	< 2.5 ppm	PASS	

1 General Description

1.1 Applicant

Yulong Computer Telecommunication Scientific (Shenzhen) Co., Ltd.
Coolpad Information Harbor, 2nd Mengxi Road, Northern Part of Science & Technology Park, Nanshan district, Shenzhen, P. R. China

1.2 Manufacturer

Yulong Computer Telecommunication Scientific (Shenzhen) Co., Ltd.
Coolpad Information Harbor, 2nd Mengxi Road, Northern Part of Science & Technology Park, Nanshan district, Shenzhen, P. R. China

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	mobile phone
Brand Name	Coolpad
Model Name	Coolpad 3700A
FCC ID	R38YL3700A
EUT supports Radios application	CDMA/EV-DO/LTE WLAN2.4GHz 802.11b/g/n HT20 Bluetooth v3.0+EDR Bluetooth v4.0 LE
HW Version	P2
SW Version	3700A.OM005
EUT Stage	Pre-Production

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	
Tx Frequency	LTE Band 13 : 779.5 MHz ~ 784.5 MHz
Rx Frequency	LTE Band 13 : 748.5 MHz ~ 753.5 MHz
Bandwidth	LTE Band 13 : 5MHz / 10MHz
Maximum Output Power to Antenna	LTE Band 13 : 23.79 dBm
Antenna Type	PIFA Antenna
Type of Modulation	QPSK / 16QAM

1.5 Modification of EUT

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

1.6 Maximum ERP Power, Frequency Tolerance, and Emission Designator

FCC Rule	System	Type of Modulation	BW	Emission Designator	Frequency Tolerance (ppm)	Maximum ERP
Part 27	LTE Band 13	QPSK	5MHz	4M48G7D	-	0.12 W
Part 27	LTE Band 13	16QAM	5MHz	4M48W7D	-	0.09 W
Part 27	LTE Band 13	QPSK	10MHz	9M05G7D	0.0028 ppm	0.12 W
Part 27	LTE Band 13	16QAM	10MHz	8M97W7D	-	0.09 W

1.7 Testing Location

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.C. TEL: +86-755-3320-2398		
Test Site No.	**Sporton Site No.**		**FCC Registration No.**
	TH01-SZ	03CH01-SZ	831040

Test Site	SPORTON INTERNATIONAL (SHENZHEN) INC.
Test Site Location	No. 101, Complex Building C, Guanlong Village, Xili Town, Nanshan District, Shenzhen, Guangdong, P.R.C. TEL:+86-755-8637-9589 FAX: +86-755-8637-9595
Test Site No.	**Sporton Site No.**
	OTA01-SZ

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, 27(F)
- ANSI / TIA / EIA-603-C-2004
- FCC KDB 971168 D01 Power Meas. License Digital Systems v02r01

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

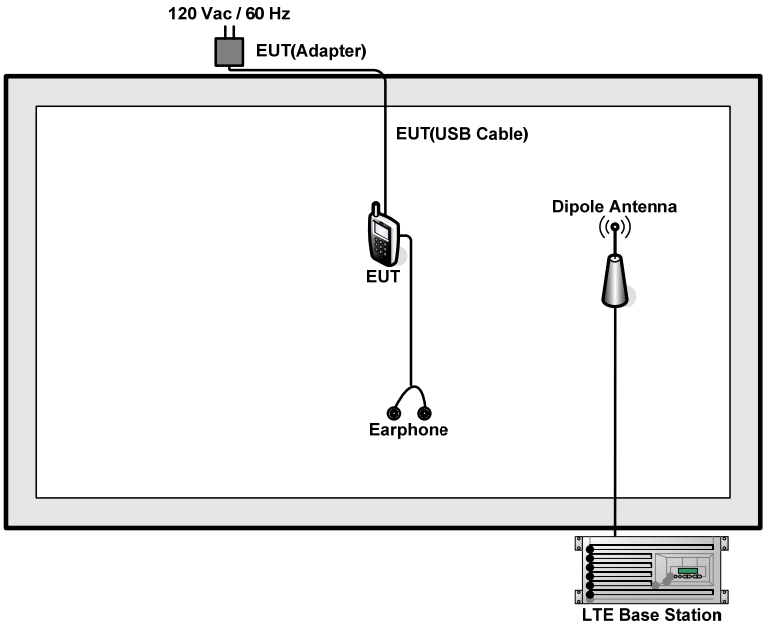
2.1 Test Mode

Antenna port conducted and radiated test items listed below are performed according to KDB 971168 D01 Power Meas. License Digital Systems v02r01 with maximum output power.

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

Test Items	Band	Bandwidth (MHz)						Modulation		RB #			Test Channel		
		1.4	3	5	10	15	20	QPSK	16QAM	1	Half	Full	L	M	H
Max. Output Power	13			v	v			v	v	v	v	v	v	v	v
Peak-to-Average Ratio	13				v				v	v		v		v	
26dB and 99% Bandwidth	13			v	v			v	v			v		v	
Conducted Band Edge	13			v	v			v	v	v		v	v		v
Conducted Spurious Emission	13			v	v			v	v	v			v	v	v
Frequency Stability	13				v			v				v		v	
E.R.P.	13			v	v			v	v	v			v	v	v
Radiated Spurious Emission	13			v	v			v		v			v	v	v
Note	1. The mark "v " means that this configuration is chosen for testing 2. The mark "-" means that this bandwidth is not supported. 3. The device is investigated from 30MHz to 10 times of fundamental signal for radiated spurious emission test under different RB size/offset and modulations in exploratory test. Subsequently, only the worst case emissions are reported.														

2.2 Connection Diagram of Test System



2.3 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model No.	FCC ID	Data Cable	Power Cord
1.	LTE Base Station	Anritsu	MT8820C	N/A	N/A	Unshielded, 1.8 m
2.	DC Power Supply	TOPWORD	3303DR	N/A	N/A	N/A
3.	Earphone	Lenovo	SH100	FCC ID	N/A	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 EUT conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

The spectrum analyzer offset is derived from RF cable loss and attenuator factor.
Offset = RF cable loss + attenuator factor.
Following shows an offset computation example with cable loss 7.0 dB and 10dB attenuator.

Example :
Offset(dB) = RF cable loss(dB) + attenuator factor(dB).
= 7.0 + 10 = 17.0 (dB)

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 force the EUT transmitting at maximum output power. The measured power in the radio frequency on the transmitter output terminals shall be reported.

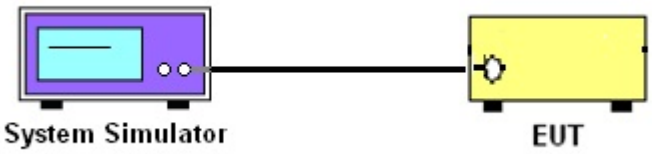
3.1.2 Measuring Instruments

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 the system simulator.
3. Select lowest, middle, and highest channels for each band and different modulation.
4. Measure and record the power level from the system simulator.

3.1.4 Test Setup



3.1.5 Test Result of Conducted Output Power

<LTE Band 13 Conducted Power>

BW [MHz]	Modulation	RB Size	RB Offset	Power (dBm) Low Ch. / Freq.	Power (dBm) Middle Ch. / Freq.	Power (dBm) High Ch. / Freq.
Channel					**23230**	
Frequency (MHz)					**782**	
10	QPSK	1	0		23.79	
10	QPSK	1	24		23.49	
10	QPSK	1	49		23.64	
10	QPSK	25	0		22.50	
10	QPSK	25	12		22.43	
10	QPSK	25	24		22.49	
10	QPSK	50	0		22.48	
10	16QAM	1	0		22.59	
10	16QAM	1	24		22.57	
10	16QAM	1	49		22.76	
10	16QAM	25	0		21.52	
10	16QAM	25	12		21.48	
10	16QAM	25	24		21.56	
10	16QAM	50	0		21.60	
Channel				**23205**	**23230**	**23255**
Frequency (MHz)				**779.5**	**782**	**784.5**
5	QPSK	1	0	23.57	23.47	23.61
5	QPSK	1	12	23.51	23.45	23.57
5	QPSK	1	24	23.46	23.41	23.53
5	QPSK	12	0	22.51	22.44	22.55
5	QPSK	12	6	22.41	22.40	22.52
5	QPSK	12	11	22.41	22.53	22.49
5	QPSK	25	0	22.42	22.49	22.52
5	16QAM	1	0	22.20	22.07	22.05
5	16QAM	1	12	22.28	22.20	22.15
5	16QAM	1	24	22.34	22.10	22.07
5	16QAM	12	0	21.55	21.46	21.63
5	16QAM	12	6	21.38	21.39	21.59
5	16QAM	12	11	21.43	21.60	21.66
5	16QAM	25	0	21.49	21.48	21.59

Note: maximum average power for LTE.

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. In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

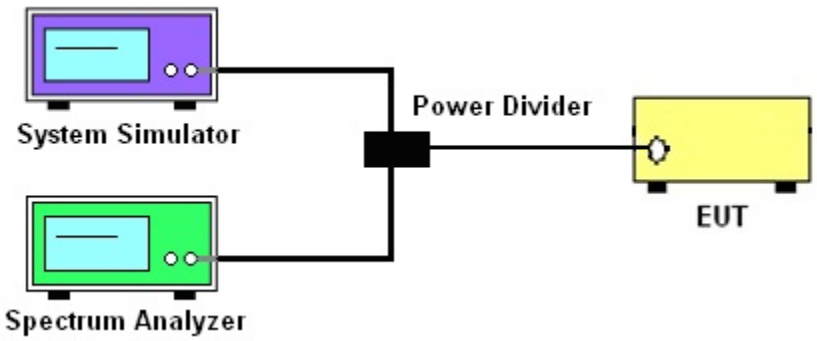
3.2.2 Measuring Instruments

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

3.2.3 Test Procedures

1. The EUT was connected to spectrum and system simulator via a power divider.
2. Set the CCDF (Complementary Cumulative Distribution Function) option in spectrum analyzer.
3. 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



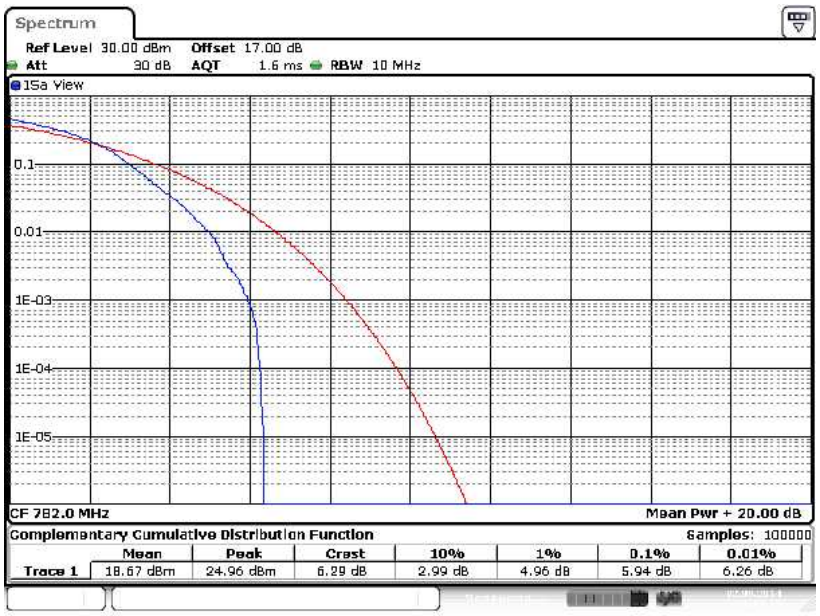
3.2.5 Test Result of Peak-to-Average Ratio

LTE Band 13						
BW [MHz]	Modulation	RB Size	RB Offset	Power (dBm) Low Ch. / Freq.	Power (dBm) Middle Ch. / Freq.	Power (dBm) High Ch. / Freq.
Channel					23230	
Frequency (MHz)					782	
10	16QAM	1	0		5.94	
10	16QAM	50	0		6.00	

3.2.6 Peak to Average Power Ratio

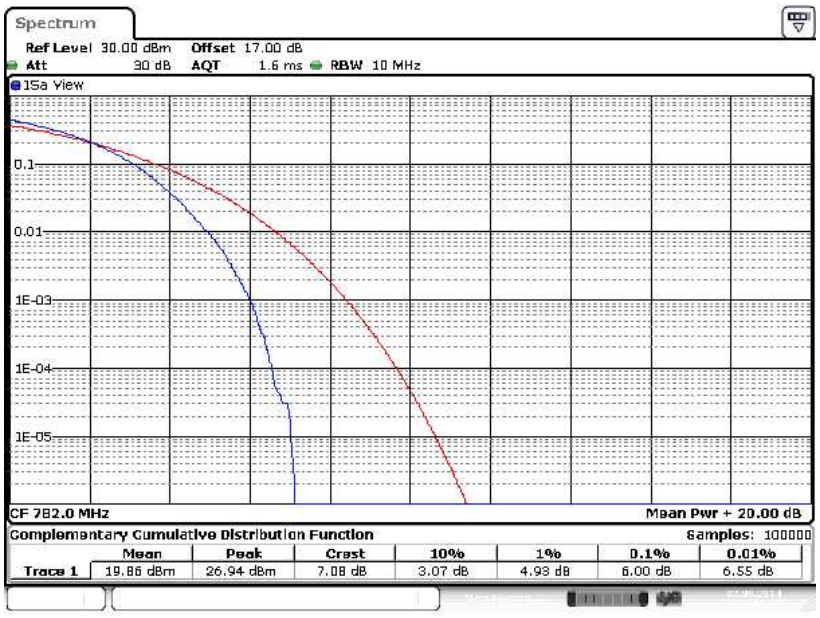
Peak-to-Average Ratio on LTE Band 13

10MHz / 16QAM in Ch. 23230 (1RB Size)



Peak-to-Average Ratio on LTE Band 13

10MHz / 16QAM in Ch. 23230 (50RB Size)



3.3 Effective Radiated Power Measurement

3.3.1 Description of the ERP 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 v02r01. Mobile and portable (hand-held) stations operating are limited to average 3 watts with LTE band 13.

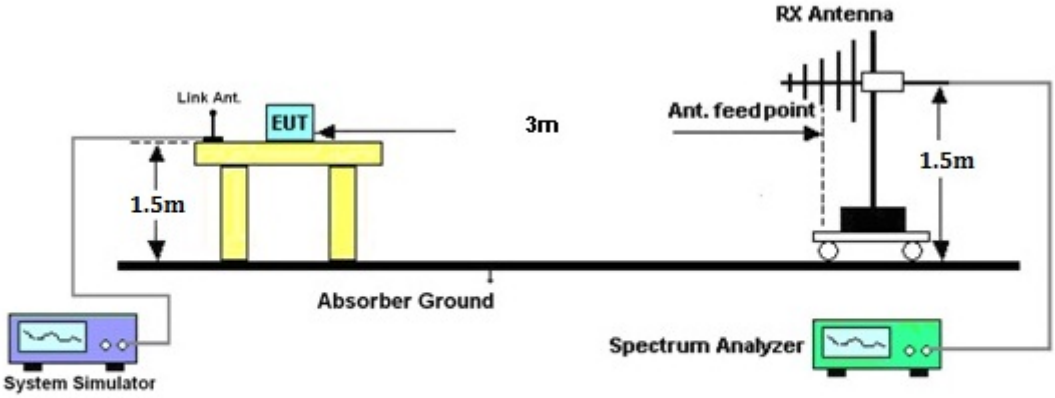
3.3.2 Measuring Instruments

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

3.3.3 Test Procedures

1. The 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. LTE operating modes: Set RBW= 1MHz, VBW= 3MHz, RMS detector over burst; and use channel power option with bandwidth=5MHz, per 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 = Ps + Et – Es + Gs = Ps + Rt – Rs + Gs
    Ps (dBm)：Input power to substitution antenna.
    Gs (dBi or dBd)：Substitution antenna Gain.
    Et = Rt + AF
    Es = Rs + AF
    AF (dB/m)：Receive antenna factor
    Rt：The highest received signal in spectrum analyzer for EUT.
    Rs：The highest received signal in spectrum analyzer for substitution antenna.

3.3.4 Test Setup



3.3.5 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	12	779.5	20.61	0.12	H
13	5	QPSK	1	12	782	20.38	0.11	H
13	5	QPSK	1	12	784.5	20.38	0.11	H
13	5	QPSK	1	12	779.5	10.43	0.01	V
13	5	QPSK	1	12	782	10.20	0.01	V
13	5	QPSK	1	12	784.5	10.41	0.01	V
13	5	16QAM	1	24	779.5	19.34	0.09	H
13	5	16QAM	1	12	782	19.32	0.09	H
13	5	16QAM	1	12	784.5	19.20	0.08	H
13	5	16QAM	1	24	779.5	9.17	0.01	V
13	5	16QAM	1	12	782	9.12	0.01	V
13	5	16QAM	1	12	784.5	9.21	0.01	V
13	10	QPSK	1	0	782	20.75	0.12	H
13	10	QPSK	1	0	782	10.70	0.01	V
13	10	16QAM	1	49	782	19.36	0.09	H
13	10	16QAM	1	49	782	9.64	0.01	V

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.

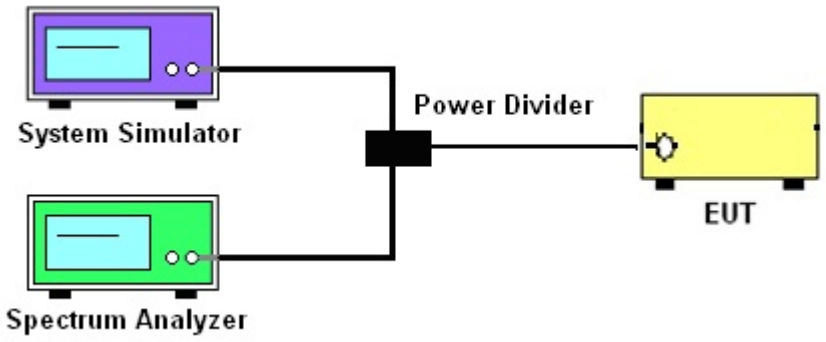
3.4.2 Measuring Instruments

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

3.4.3 Test Procedures

1. The EUT was connected to spectrum analyzer and system simulator via a power divider.
2. The 26dB and 99% occupied bandwidth (BW) of the middle channel for the highest RF power with full RB sizes were measured.

3.4.4 Test Setup



3.4.5 Test Result of 99% Occupied Bandwidth and 26dB Bandwidth

Modes	LTE Band 13			
BW / Mod.	5MHz / QPSK	5MHz / 16QAM	10MHz / QPSK	10MHz / 16QAM
99% OBW (MHz)	4.476	4.476	9.051	8.971
26dB BW (MHz)	5.005	5.005	9.990	9.930

Note:

The maximum RB configurations of the 99% Occupied Bandwidth and 26dB Bandwidth summary as below:

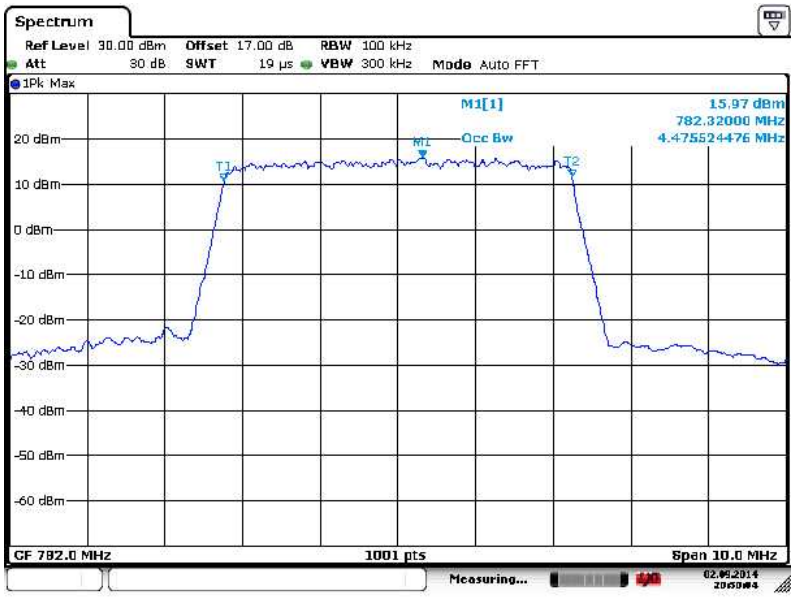
BW5.0MHz RB setting：RB Size 25, RB offset 0

BW10MHz RB setting：RB Size 50, RB offset 0

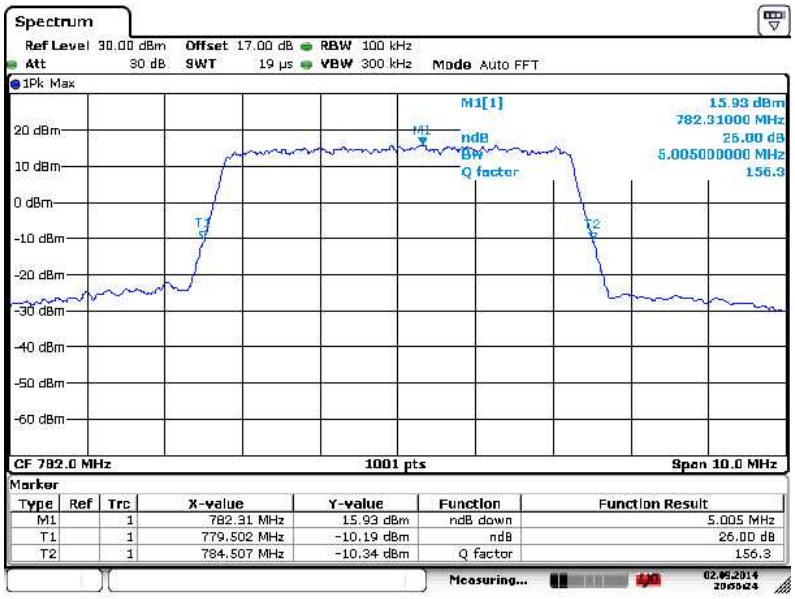
3.4.6 Test Result (Plots) of Occupied Bandwidth

Band :	LTE Band 13	BW / Mod. :	5MHz / QPSK

99% Occupied Bandwidth Plot on Channel 23230

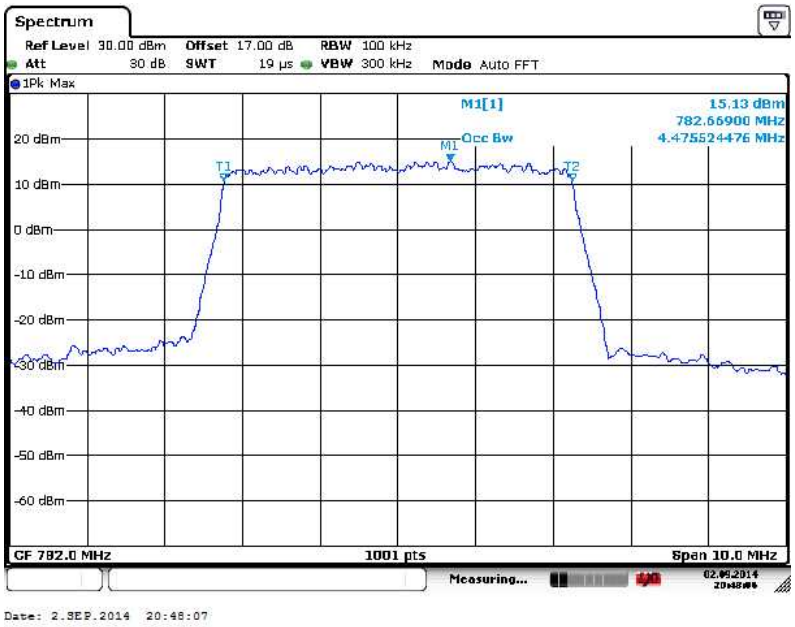


26dB Bandwidth Plot on Channel 23230



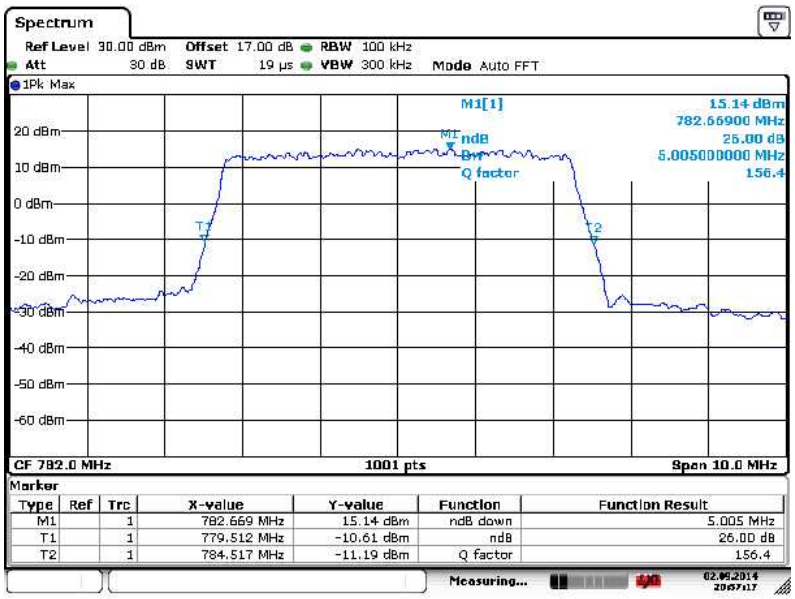
Band :	LTE Band 13	BW / Mod. :	5MHz / 16QAM

99% Occupied Bandwidth Plot on Channel 23230



Date: 2.SEP.2014 20:48:07

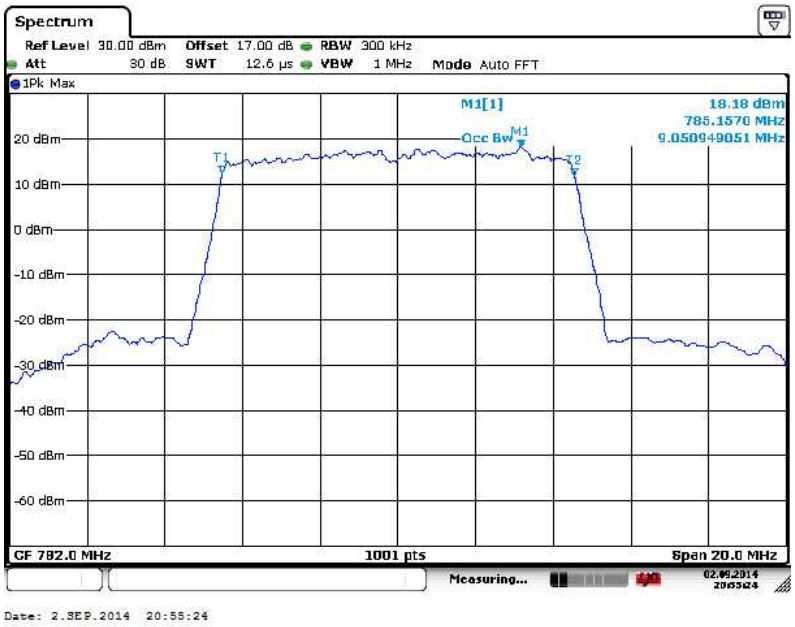
26dB Bandwidth Plot on Channel 23230



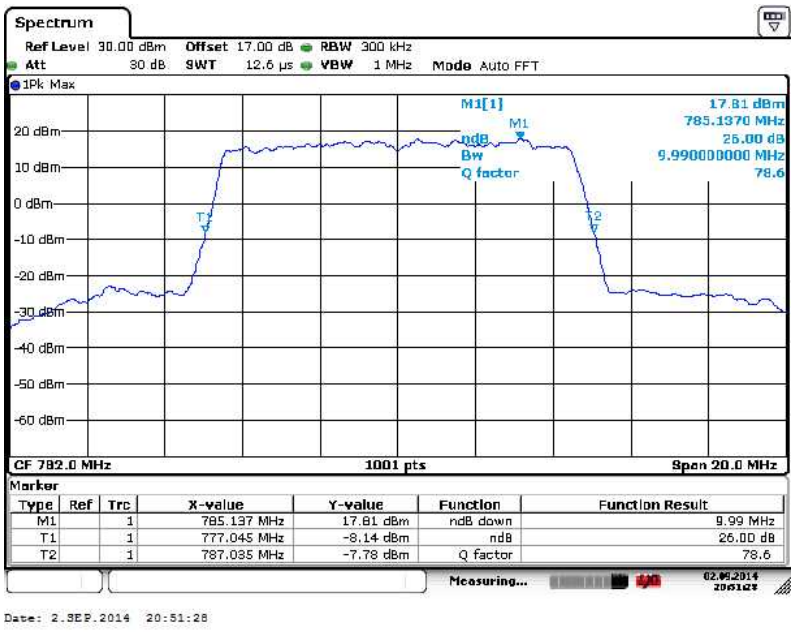
Date: 2.SEP.2014 20:57:17

Band :	LTE Band 13	BW / Mod. :	10MHz / QPSK

99% Occupied Bandwidth Plot on Channel 23230

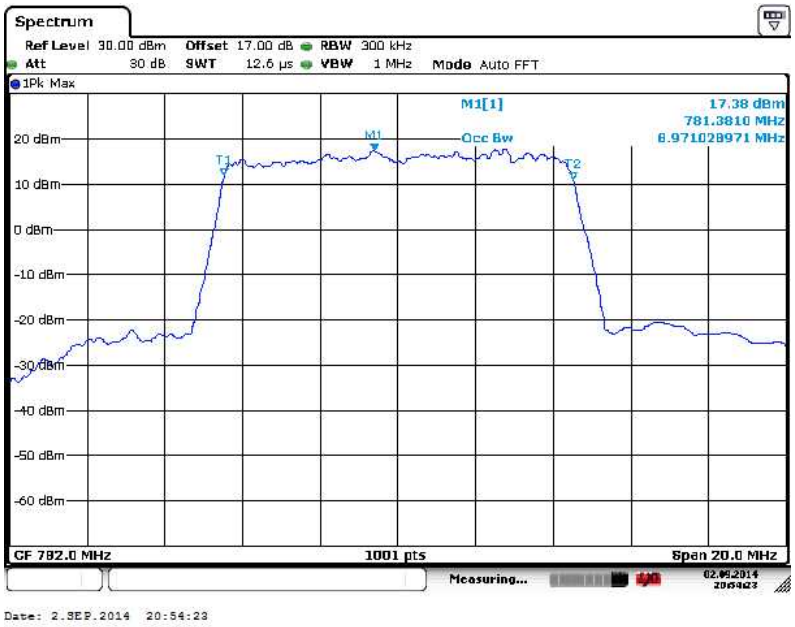


26dB Bandwidth Plot on Channel 23230

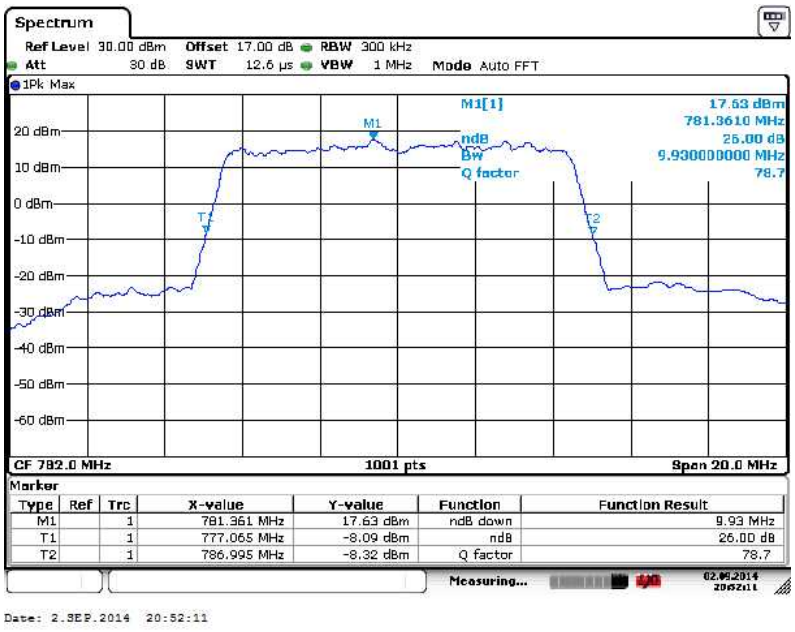


Band :	LTE Band 13	BW / Mod. :	10MHz / 16QAM

99% Occupied Bandwidth Plot on Channel 23230



26dB Bandwidth Plot on Channel 23230



3.5 Conducted Band Edge Measurement

3.5.1 Description of Conducted Band Edge Measurement

27.53 (c)

For operations in the 776-788 MHz band, the FCC limit is 43 + $10\log_{10}$(P[Watts]) dB below the transmitter power P(Watts) in a 100 kHz bandwidth. However, in the 100 kHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least 30 kHz may be employed. In addition, the power of any unwanted emissions in any 6.25 kHz bandwidth for all frequencies between 763-775 MHz and 793-806 MHz shall be attenuated below the transmitter power, P (dBW), by at least 65 + 10 log10 p(watts), dB, for mobile and portable equipment.

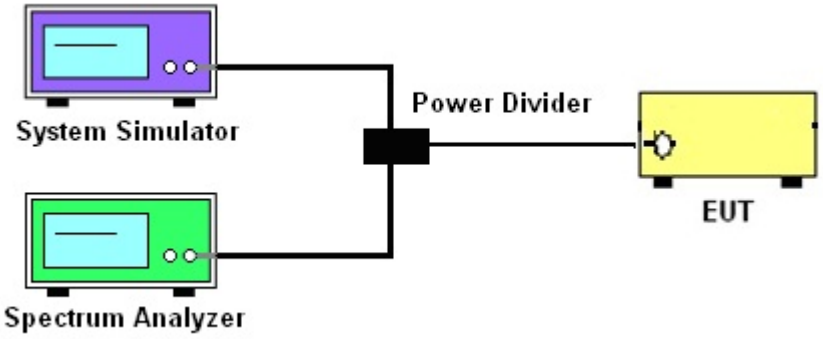
3.5.2 Measuring Instruments

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

3.5.3 Test Procedures

1. The EUT was connected to spectrum analyzer and system simulator via a power divider.
2. The band edges of low and high channels for the highest RF powers were measured. Set RBW >= 1% EBW in the 1MHz band immediately outside and adjacent to the band edge.
3. Set spectrum analyzer with RMS detector.
4. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
5. The limit line is derived from 43 + 10log(P)dB below the transmitter power P(Watts)
   = P(W)- [43 + 10log(P)] (dB)
   = [30 + 10log(P)] (dBm) - [43 + 10log(P)] (dB)
   = -13dBm.

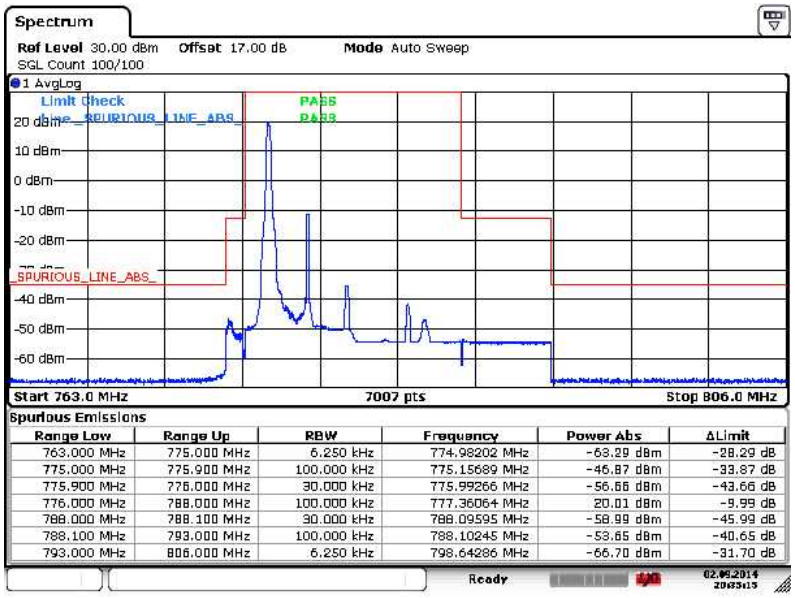
3.5.4 Test Setup



3.5.5 Test Result (Plots) of Conducted Band Edge

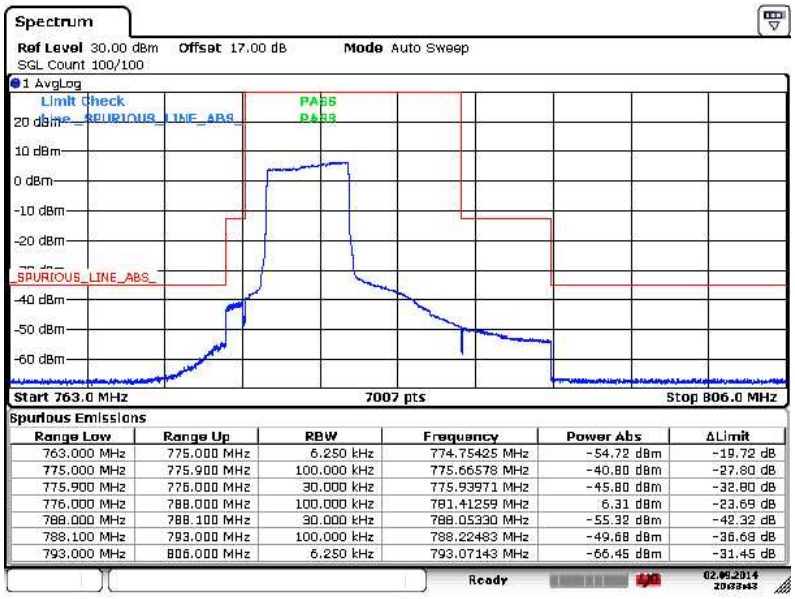
Band :	LTE Band 13	Band Width :	5MHz / QPSK

Lower Band Edge Plot for QPSK-RB Size 1, RB Offset 0



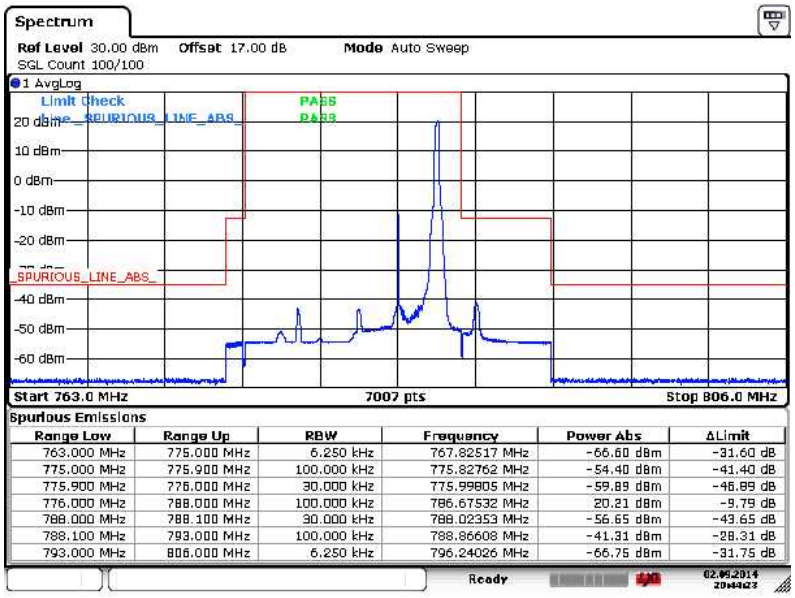
Date: 2.SEP.2014 20:35:16

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



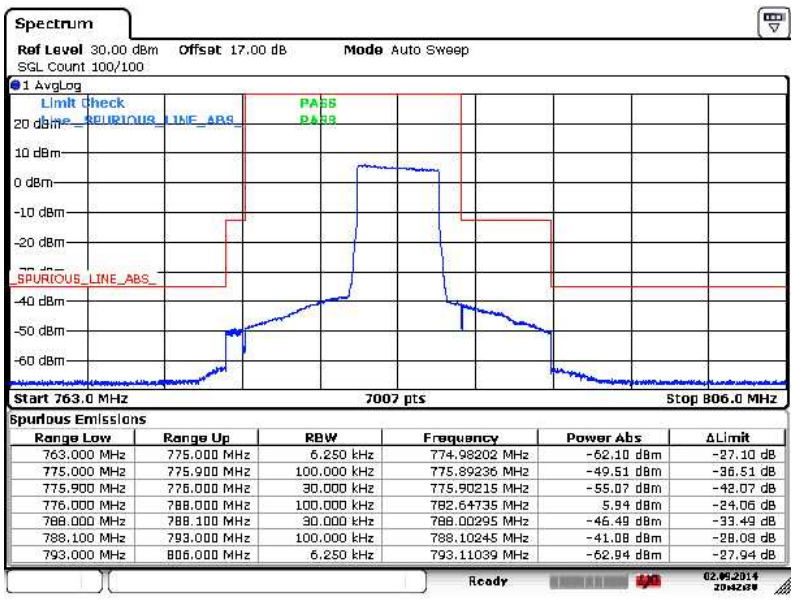
Date: 2.SEP.2014 20:33:43

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



Date: 2.SEP.2014 20:44:24

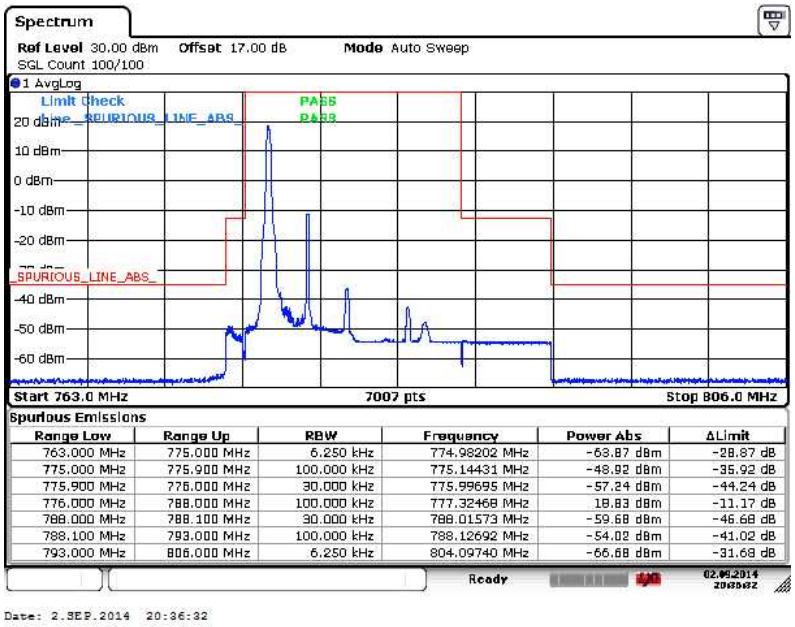
Higher Band Edge Plot for QPSK-RB Size 25, RB Offset 0



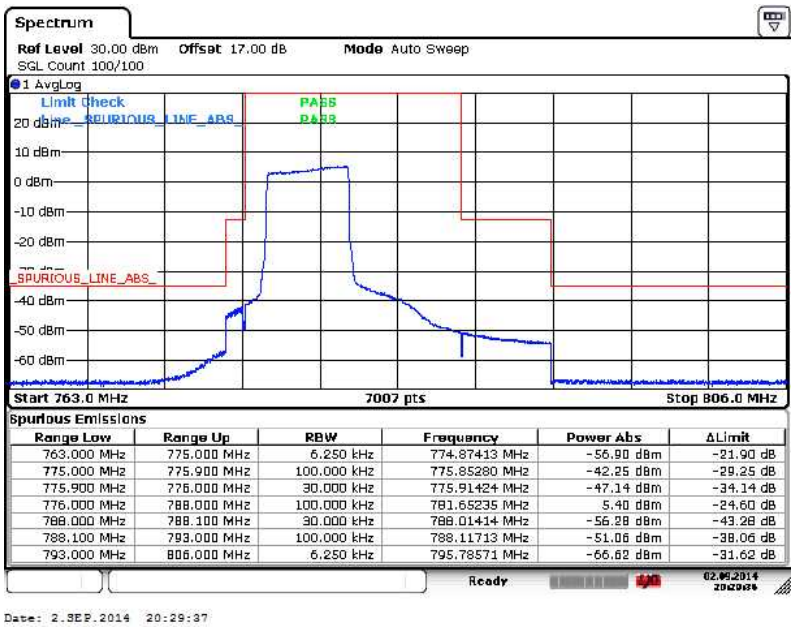
Date: 2.SEP.2014 20:42:31

Band :	LTE Band 13	Band Width :	5MHz / 16QAM

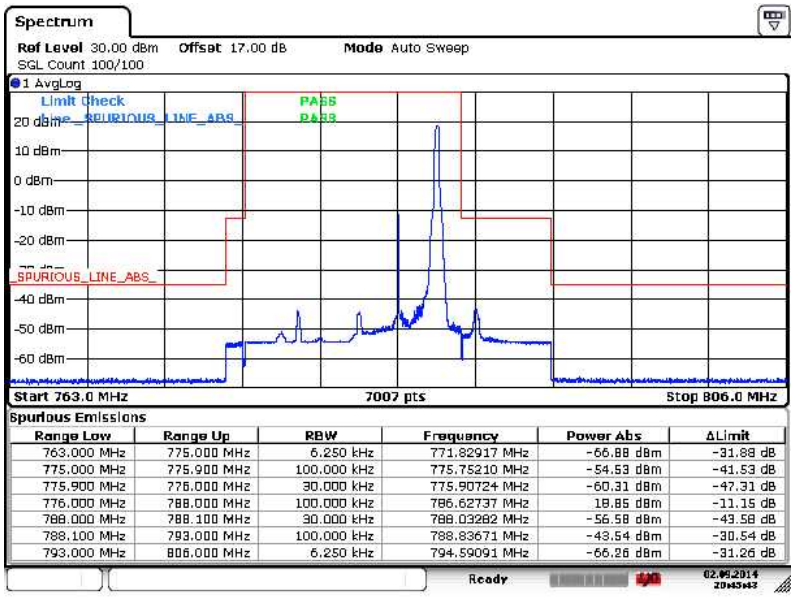
Lower Band Edge Plot for 16QAM-RB Size 1, RB Offset 0



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

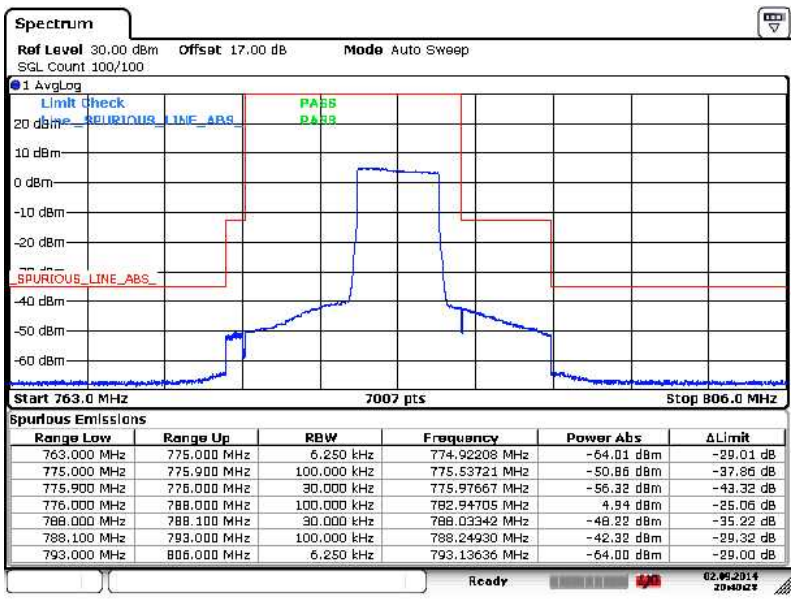


Higher Band Edge Plot for 16QAM-RB Size 1, RB Offset 24



Date: 2.SEP.2014 20:45:43

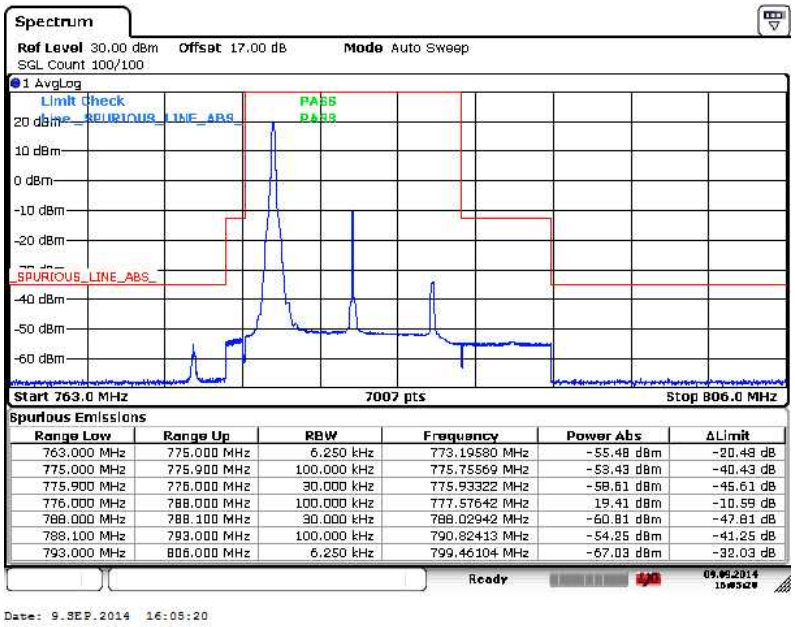
Higher Band Edge Plot for 16QAM-RB Size 25, RB Offset 0



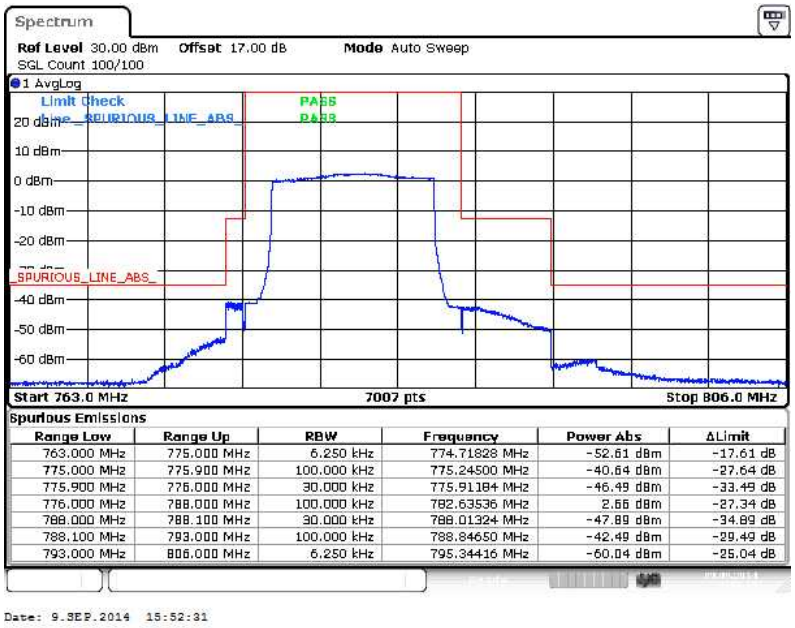
Date: 2.SEP.2014 20:40:29

Band :	LTE Band 13	Band Width :	10MHz / QPSK

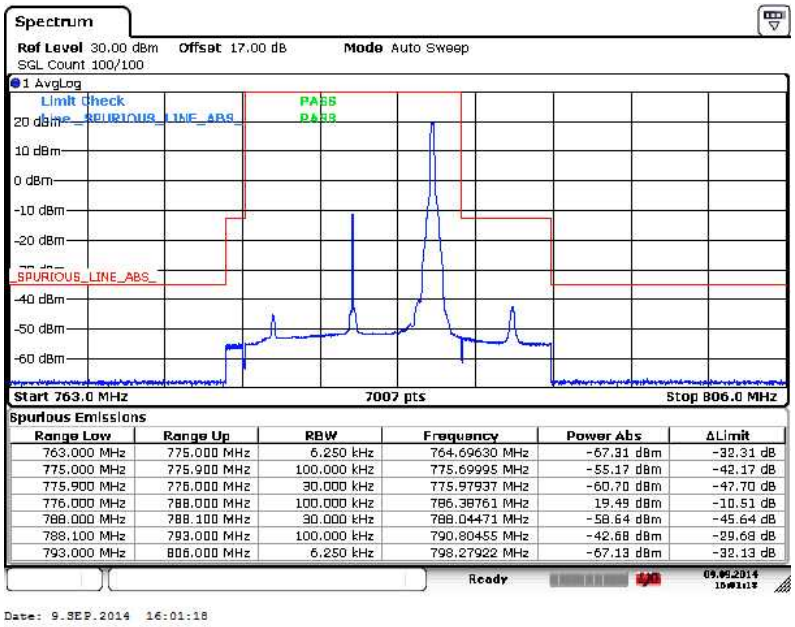
Middle Band Edge Plot for QPSK-RB Size 1, RB Offset 0



Middle Band Edge Plot for QPSK-RB Size 50, RB Offset 0



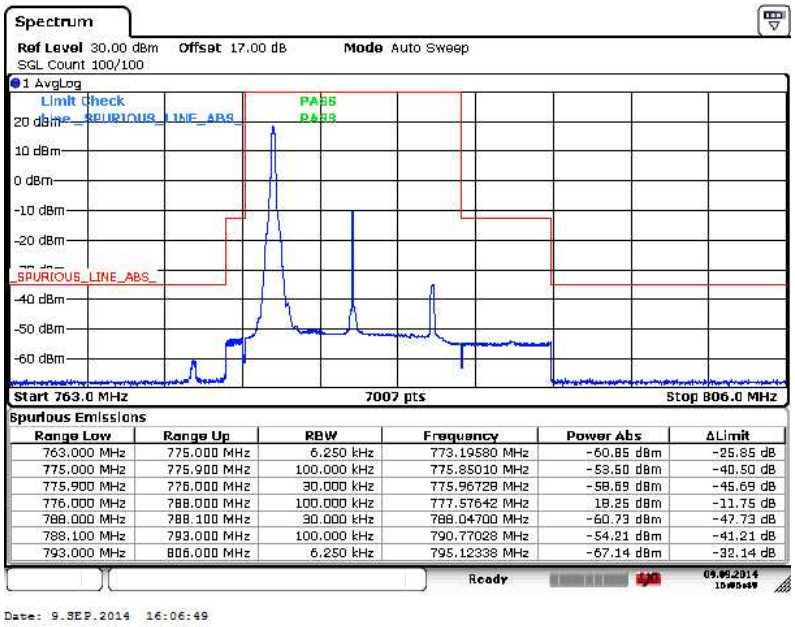
Middle Band Edge Plot for QPSK-RB Size 1, RB Offset 49



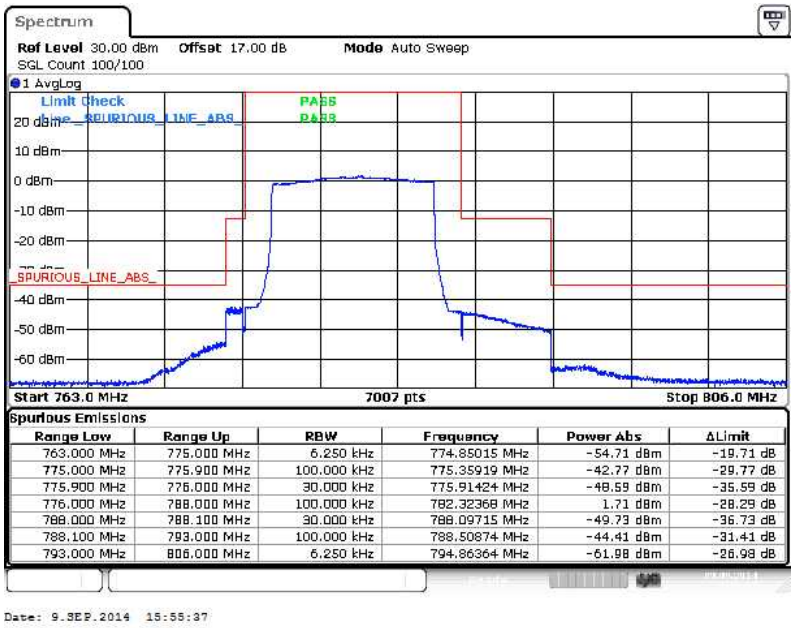
Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
763.000 MHz	775.000 MHz	6.250 kHz	764.69630 MHz	-67.31 dBm	-32.31 dB
775.000 MHz	775.900 MHz	100.000 kHz	775.69995 MHz	-55.17 dBm	-42.17 dB
775.900 MHz	776.000 MHz	30.000 kHz	775.97937 MHz	-60.70 dBm	-47.70 dB
776.000 MHz	788.000 MHz	100.000 kHz	786.38761 MHz	19.49 dBm	-10.51 dB
788.000 MHz	788.100 MHz	30.000 kHz	788.04471 MHz	-58.64 dBm	-45.64 dB
788.100 MHz	793.000 MHz	100.000 kHz	790.80455 MHz	-42.68 dBm	-29.68 dB
793.000 MHz	806.000 MHz	6.250 kHz	798.27922 MHz	-67.13 dBm	-32.13 dB

Band :	LTE Band 13	Band Width :	10MHz / 16QAM

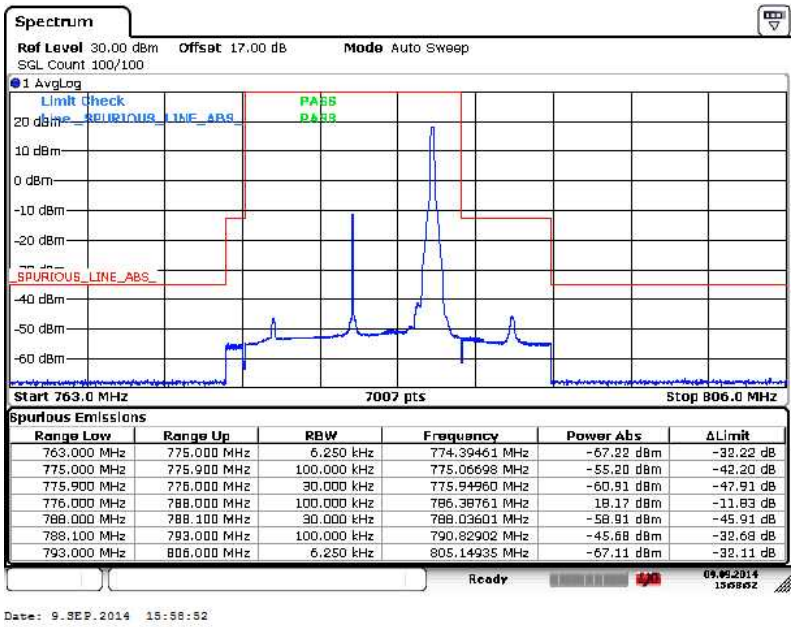
Middle Band Edge Plot for 16QAM-RB Size 1, RB Offset 0



Middle Band Edge Plot for 16QAM-RB Size 50, RB Offset 0



Middle Band Edge Plot for 16QAM-RB Size 1, RB Offset 49



Date: 9.SEP.2014 15:58:52

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 30MHz up to a frequency including its 10^{th} harmonic.

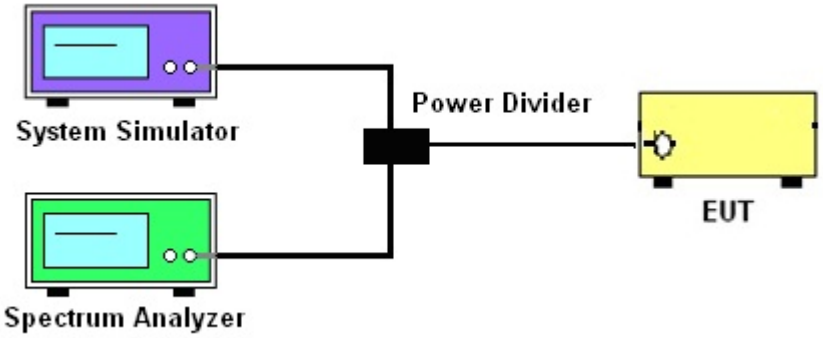
3.6.2 Measuring Instruments

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

3.6.3 Test Procedures

1. The EUT was connected to spectrum analyzer and system simulator via a power divider.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. The middle channel for the highest RF power within the transmitting frequency was measured.
4. The conducted spurious emission for the whole frequency range was taken.
5. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, taking the record of maximum spurious emission.
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 + 10log(P)dB below the transmitter power P(Watts)
   = P(W)- [43 + 10log(P)] (dB)
   = [30 + 10log(P)] (dBm) - [43 + 10log(P)] (dB)
   = -13dBm.

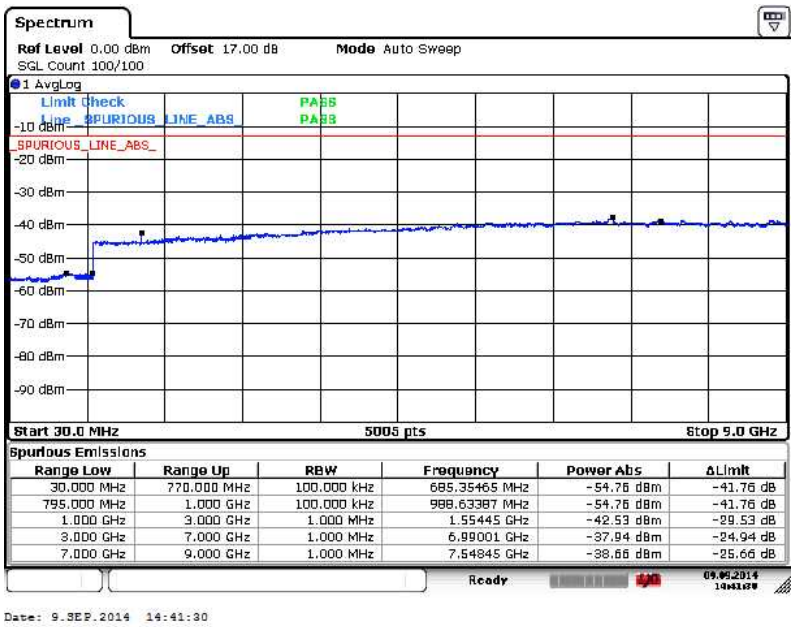
3.6.4 Test Setup



3.6.5 Test Result (Plots) of Conducted Spurious Emission

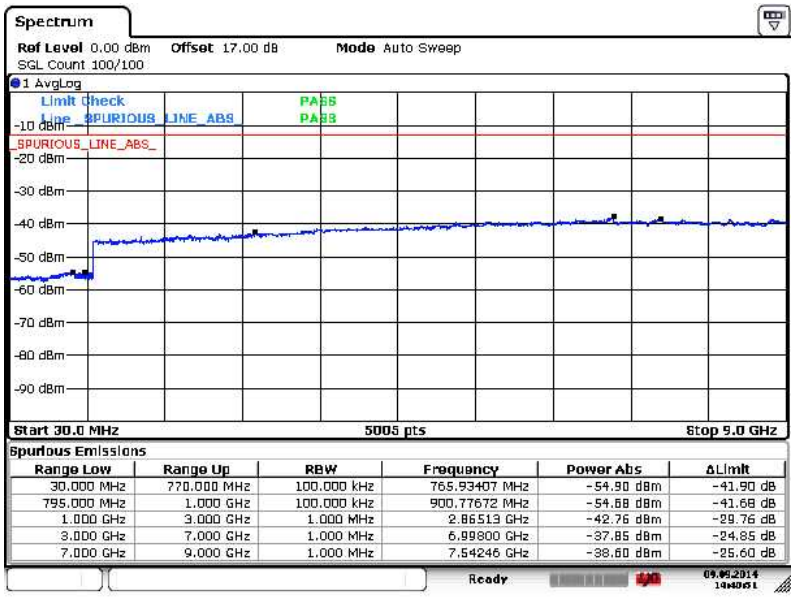
Band :	LTE Band 13	Channel :	CH23205 (Low)
Band Width :	5MHz		

QPSK (RB Size 1, RB Offset 0)



Date: 9.SEP.2014 14:41:30

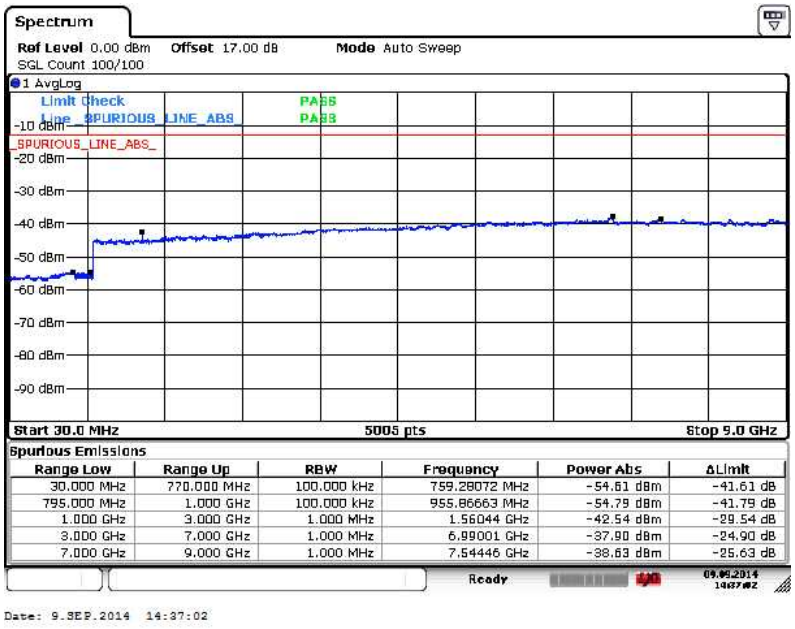
16QAM (RB Size 1, RB Offset 0)



Date: 9.SEP.2014 14:40:52

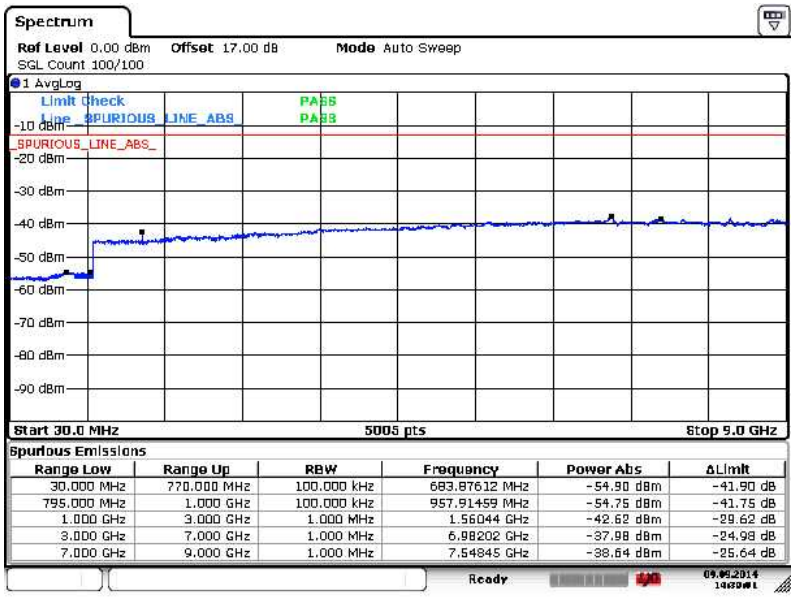
Band :	LTE Band 13	Channel :	CH23230 (Middle)
Band Width :	5MHz		

QPSK (RB Size 1, RB Offset 0)



Date: 9.SEP.2014 14:37:02

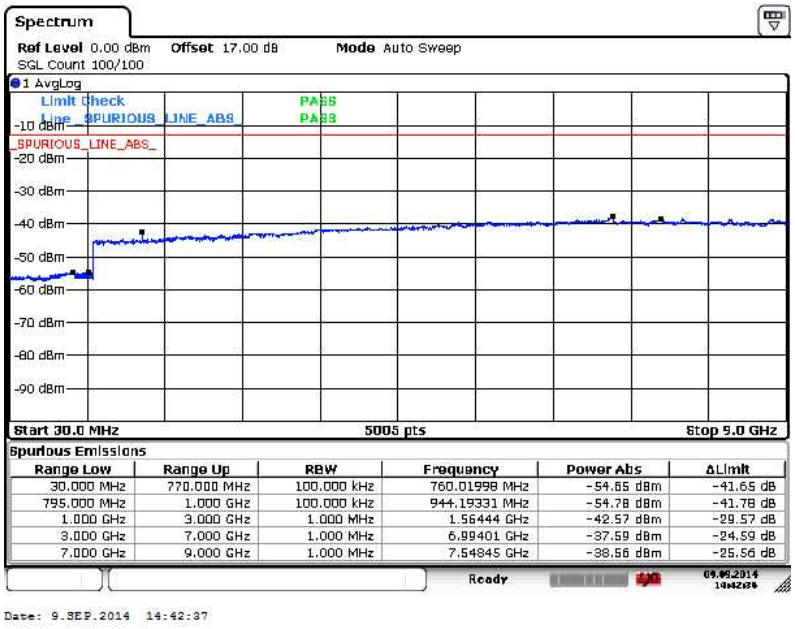
16QAM (RB Size 1, RB Offset 0)



Date: 9.SEP.2014 14:39:02

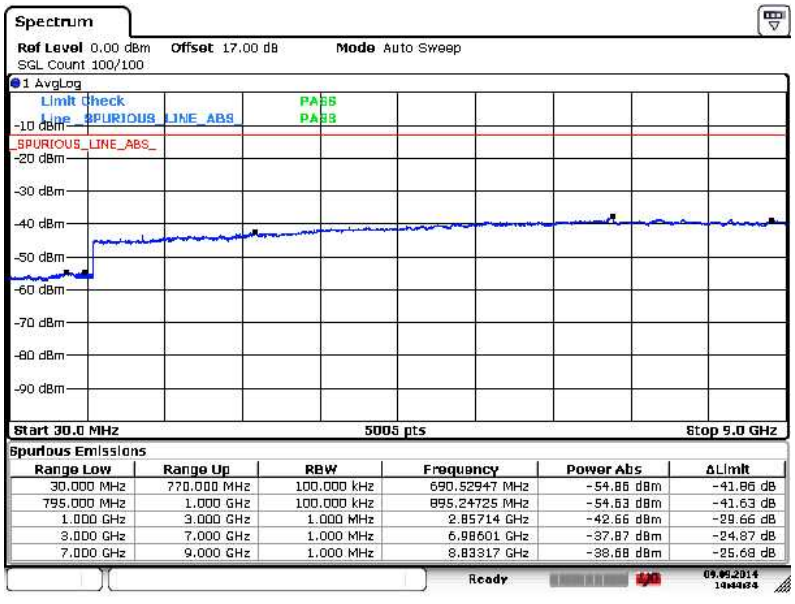
Band :	LTE Band 13	Channel :	CH23255 (High)
Band Width :	5MHz		

QPSK (RB Size 1, RB Offset 0)



Date: 9.SEP.2014 14:42:37

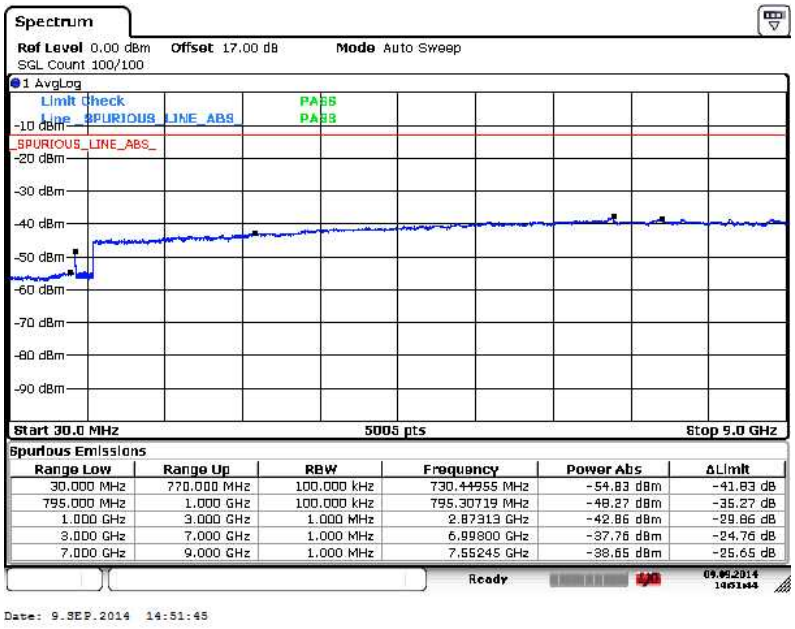
16QAM (RB Size 1, RB Offset 0)



Date: 9.SEP.2014 14:44:35

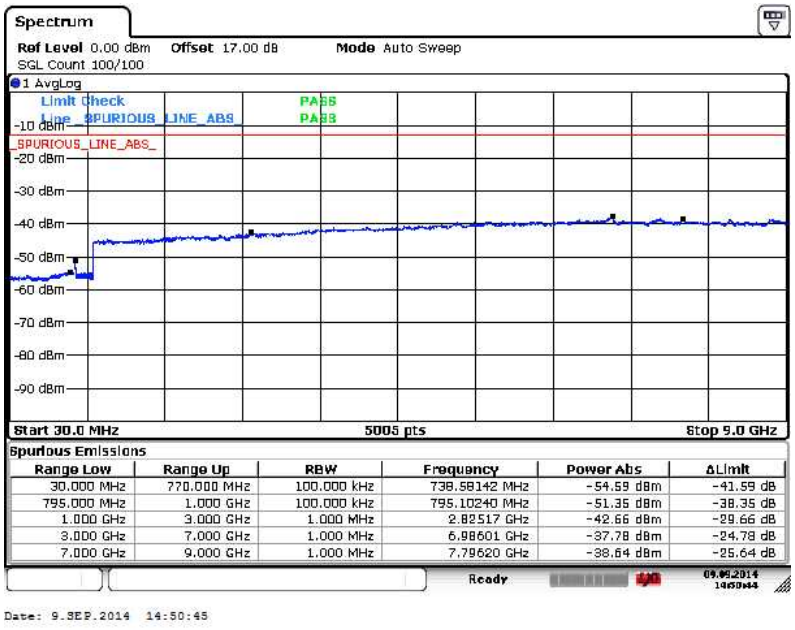
Band :	LTE Band 13	Channel :	CH23230 (Middle)
Band Width :	10MHz		

QPSK (RB Size 1, RB Offset 0)



Date: 9.SEP.2014 14:51:45

16QAM (RB Size 1, RB Offset 0)



Date: 9.SEP.2014 14:50:45

3.7 Radiated Spurious Emission Measurement

3.7.1 Description of Radiated Spurious Emission

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.

For LTE Band 13

For operations in the 775-788 MHz bands, emissions in the band 1559-1610 MHz shall be limited to −70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and −80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth.

The spectrum is scanned from 30 MHz up to a frequency including its 10th harmonic.

3.7.2 Measuring Instruments

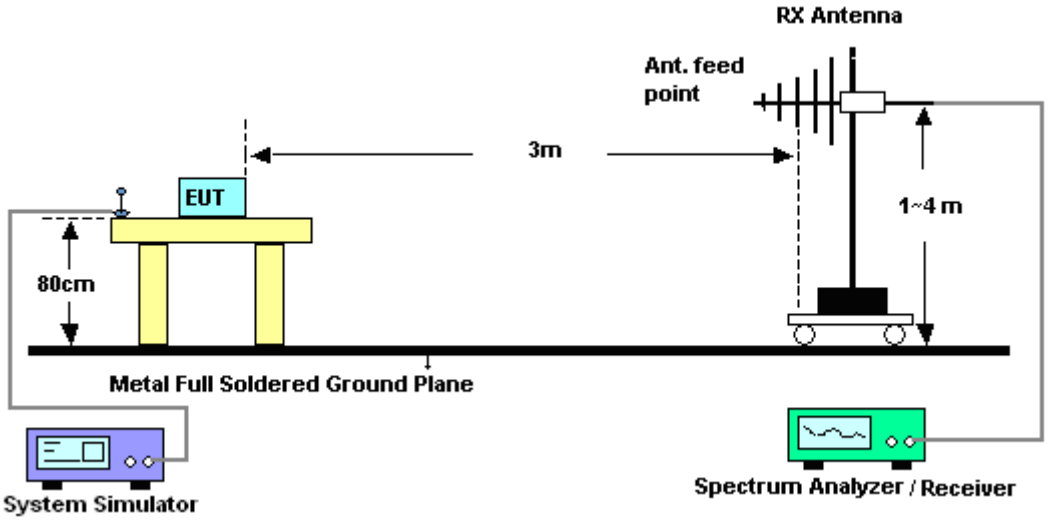
The measuring equipment is listed in the section 4 of this test report.

3.7.3 Test Procedures

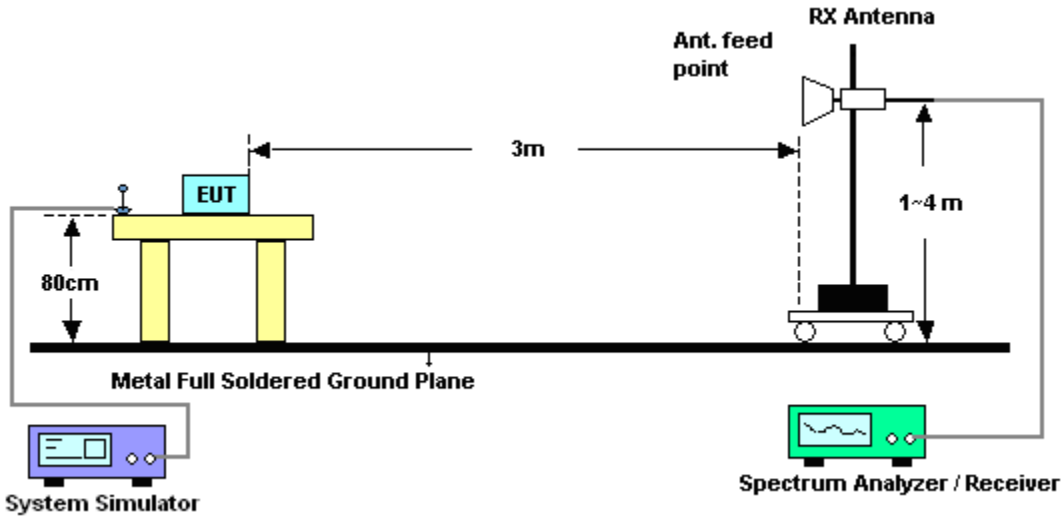
1. The EUT was placed on a rotatable wooden table with 0.8 meter above ground.
2. The EUT was set 3 meters from the receiving antenna, which was mounted on the antenna tower.
3. The table was rotated 360 degrees to determine the position of the highest spurious emission.
4. The height of the receiving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

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

Band :	LTE Band 13 for CH23205	**Temperature :**	24~25°C
Test Mode :	5MHz QPSK RB Size 1 Offset 0	**Relative Humidity :**	48~49%
Test Engineer :	Leo Liao	**Polarization :**	Horizontal
Remark :	Spurious emissions within 30-10th harmonic 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
1554.68	-42.47	-13	-29.47	-58.68	-45.40	0.78	5.86	H	Pass
2332.02	-46.28	-13	-33.28	-68.91	-48.88	1.00	5.75	H	Pass
3109.36	-60.33	-13	-47.33	-70.69	-64.63	1.05	7.50	H	Pass

Band :	LTE Band 13 for CH23205	**Temperature :**	24~25°C
Test Mode :	5MHz QPSK RB Size 1 Offset 0	**Relative Humidity :**	48~49%
Test Engineer :	Leo Liao	**Polarization :**	Vertical
Remark :	Spurious emissions within 30-10th harmonic 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
1554.68	-45.93	-13	-32.93	-59.11	-48.86	0.78	5.86	V	Pass
2332.02	-48.60	-13	-35.60	-68.85	-51.20	1.00	5.75	V	Pass
3109.36	-58.08	-13	-45.08	-69.67	-62.38	1.05	7.50	V	Pass

Band :	LTE Band 13 for CH23230	Temperature :	24~25°C
Test Mode :	5MHz QPSK RB Size 1 Offset 0	Relative Humidity :	48~49%
Test Engineer :	Leo Liao	Polarization :	Horizontal
Remark :	Spurious emissions within 30-10th harmonic 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
1559.68	-43.76	-42.15	-1.61	-59.74	-46.69	0.78	5.86	H	Pass
2339.52	-41.44	-13	-28.44	-65.34	-44.04	1.00	5.75	H	Pass
3119.36	-61.49	-13	-48.49	-71.85	-65.79	1.05	7.50	H	Pass

Band :	LTE Band 13 for CH23230	Temperature :	24~25°C
Test Mode :	5MHz QPSK RB Size 1 Offset 0	Relative Humidity :	48~49%
Test Engineer :	Leo Liao	Polarization :	Vertical
Remark :	Spurious emissions within 30-10th harmonic 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
1559.68	-47.98	-42.15	-5.83	-60.71	-50.91	0.78	5.86	V	Pass
2339.52	-44.22	-13	-31.22	-65.50	-46.82	1.00	5.75	V	Pass
3119.36	-59.36	-13	-46.36	-70.95	-63.66	1.05	7.50	V	Pass

Band :	LTE Band 13 for CH23255	Temperature :	24~25°C
Test Mode :	5MHz QPSK RB Size 1 Offset 0	Relative Humidity :	48~49%
Test Engineer :	Leo Liao	Polarization :	Horizontal
Remark :	Spurious emissions within 30-10th harmonic 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
1564.68	-44.06	-42.15	-1.91	-59.98	-46.99	0.78	5.86	H	Pass
2347.02	-45.97	-13	-32.97	-68.67	-48.57	1.00	5.75	H	Pass
3129.36	-60.30	-13	-47.30	-70.66	-64.60	1.05	7.50	H	Pass

Band :	LTE Band 13 for CH23255	Temperature :	24~25°C
Test Mode :	5MHz QPSK RB Size 1 Offset 0	Relative Humidity :	48~49%
Test Engineer :	Leo Liao	Polarization :	Vertical
Remark :	Spurious emissions within 30-10th harmonic 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
1564.68	-48.56	-42.15	-6.41	-61.34	-51.49	0.78	5.86	V	Pass
2347.02	-52.96	-13	-39.96	-71.69	-55.56	1.00	5.75	V	Pass
3129.36	-57.71	-13	-44.71	-69.30	-62.01	1.05	7.50	V	Pass

Band :	LTE Band 13 for CH23230	Temperature :	24~25°C
Test Mode :	10MHz QPSK RB Size 1 Offset 0	Relative Humidity :	48~49%
Test Engineer :	Leo Liao	Polarization :	Horizontal
Remark :	Spurious emissions within 30-10th harmonic 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
1555.18	-43.14	-13	-30.14	-59.28	-46.07	0.78	5.86	H	Pass
2332.77	-43.01	-13	-30.01	-66.50	-45.61	1.00	5.75	H	Pass
3110.36	-60.28	-13	-47.28	-70.64	-64.58	1.05	7.50	H	Pass

Band :	LTE Band 13 for CH23230	Temperature :	24~25°C
Test Mode :	10MHz QPSK RB Size 1 Offset 0	Relative Humidity :	48~49%
Test Engineer :	Leo Liao	Polarization :	Vertical
Remark :	Spurious emissions within 30-10th harmonic 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
1555.18	-44.40	-13	-31.40	-57.72	-47.33	0.78	5.86	V	Pass
2332.77	-47.11	-13	-34.11	-67.83	-49.71	1.00	5.75	V	Pass
3110.36	-58.13	-13	-45.13	-69.72	-62.43	1.05	7.50	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 ±0.00025% (±2.5ppm) of the center frequency.

3.8.2 Measuring Instruments

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

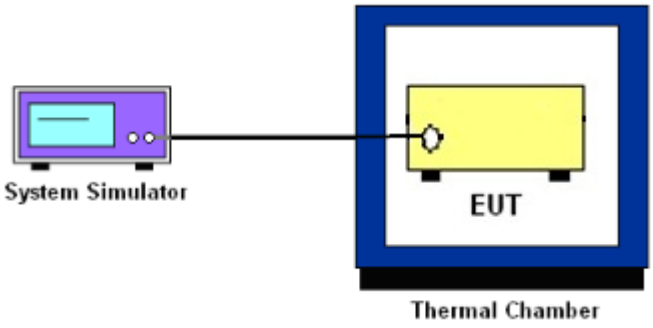
3.8.3 Test Procedures for Temperature Variation

1. The EUT was set up in the thermal chamber and connected with the system simulator.
2. With power OFF, the temperature was decreased to -30°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°C step up to 50°C. The EUT was stabilized at each step for at least half an hour. Power was applied and the maximum frequency change was recorded within one minute.

3.8.4 Test Procedures for Voltage Variation

1. The EUT was placed in a temperature chamber at 25±5° C and connected with the system simulator.
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.

3.8.5 Test Setup



3.8.6 Test Result of Temperature Variation (FCC)

Band :	LTE Band 13 (QPSK)	Limit (ppm) :	2.5

Temperature (°C)	BW 10MHz	Result
	Deviation (ppm)	
50	0.0009	PASS
40	0.0005	
30	0.0003	
20(Ref.)	0.0000	
10	0.0006	
0	0.0022	
-10	0.0024	
-20	0.0026	
-30	0.0028	

3.8.7 Test Result of Voltage Variation (FCC)

Band	Bandwidth	Voltage (Volt)	Deviation (ppm)	Limit (ppm)	Result
LTE Band 13	10M	3.60	0.0003	2.5	PASS
		Normal	0.0003		
		4.20	0.0003		

Remark:

1. Normal Voltage = 3.70V.
2. The manufacturer declared that the EUT could work properly between voltage 3.60V ~ 4.20V.

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	10Hz~40GHz	May 08, 2014	Sep. 02, 2014~ Sep. 09, 2014	May 07, 2015	Conducted (TH01-SZ)
Thermal Chamber	Hongzhangroup	LP-150U	HD20120425	-40℃~150℃	Feb. 21, 2014	Sep. 02, 2014~ Sep. 09, 2014	Feb. 20, 2015	Conducted (TH01-SZ)
ESCIO TEST Receiver	R&S	ESCI	100724	9kHz~3GHz	Feb. 21, 2014	Aug. 31, 2014	Feb. 20, 2015	Radiation (03CH01-SZ)
Spectrum Analyzer	Agilent Technologies	N9038A	MY52260185	20Hz~26.5GHz	May 26, 2014	Aug. 31, 2014	May 25, 2015	Radiation (03CH01-SZ)
Bilog Antenna	TESEQ	CBL 6112D	23188	30MHz~2GHz	Oct. 26, 2013	Aug. 31, 2014	Oct. 25, 2014	Radiation (03CH01-SZ)
Double Ridge Horn Antenna	ETS Lindgren	3117	00119436	1GHz~18GHz	Oct. 26, 2013	Aug. 31, 2014	Oct. 25, 2014	Radiation (03CH01-SZ)
Double Ridged Horn Antenna	COM-POWER	AH-840	101073	18GHz~40GHz	Jun. 09, 2014	Aug. 31, 2014	Jun. 08, 2015	Radiation (03CH01-SZ)
Amplifier	ADVANTEST	BB525C	E9007003	9kHz~3000MHz	Feb. 21, 2014	Aug. 31, 2014	Feb. 20, 2015	Radiation (03CH01-SZ)
Amplifier	Yiai	AV3860B	04030	2GHz~26.5GHz	May 08, 2014	Aug. 31, 2014	May 07, 2015	Radiation (03CH01-SZ)
AC Source(AVR)	Chroma	61601	616010001985	100Vac~250Vac	Mar. 25, 2014	Aug. 31, 2014	Mar. 24, 2015	Radiation (03CH01-SZ)
Turn Table	EM Electronics	EM 1000	N/A	0~360 degree	NCR	Aug. 31, 2014	NCR	Radiation (03CH01-SZ)
Antenna Mast	EM Electronics	EM 1000	N/A	1 m~4 m	NCR	Aug. 31, 2014	NCR	Radiation (03CH01-SZ)
Spectrum Analyzer	R&S	FSP 7	100818	9kHz~7GHz	Sep. 03, 2013	Sep. 01, 2014	Sep. 02, 2014	ERP (OTA01-SZ)
Quad-Ridged Horn	ETS-Lindgren	3164-08	00102954	700MHz~10000MHz	N/A	Sep. 01, 2014	N/A	ERP (OTA01-SZ)
Multi-Devices Controller	ETS-Lindgren	2090-OPT1	00108147	N/A	N/A	Sep. 01, 2014	N/A	ERP (OTA01-SZ)
Switch Control Mainframe	Agilent	3499A	MY42005451	N/A	N/A	Sep. 01, 2014	N/A	ERP (OTA01-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))	**3.9**