FCC RF Test Report

APPLICANT	:	**Yulong Computer Telecommunication Scientific (Shenzhen) Co., Ltd.**
EQUIPMENT	:	**mobile phone**
BRAND NAME	:	**Coolpad**
MODEL NAME	:	**Coolpad 801EM**
FCC ID	:	**R38YL801EM**
STANDARD	:	**47 CFR Part 2, 27F**
CLASSIFICATION	:	**PCS Licensed Transmitter Held to Ear (PCE)**

The product was received on Aug. 09, 2013 and testing was completed on Sep. 06, 2013. We, SPORTON INTERNATIONAL (SHENZHEN) 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 (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.

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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FG311602-01B	Rev. 01	Initial issue of report	Sep. 18, 2013

SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.1	§2.1046	Conducted Output Power	Reporting Only	PASS	-
3.2	27.53(d)(5)	Peak-to-Average Ratio	<13 dB	PASS	-
3.3	§27.50(c)(10)	Effective Radiated Power	ERP < 3 Watts	PASS	-
3.4	§2.1049 §27.53(h)(3)	Occupied Bandwidth	Reporting Only	PASS	-
3.5	§2.1049 §27.53(c)	Conducted Band Edge Measurement	< 43+10log10(P[Watts])	PASS	-
3.6	§2.1051 §27.53(c)	Conducted Spurious Emission	< $43+10\log_{10}$(P[Watts])	PASS	-
3.7	§2.1053 §27.53(c)	Radiated Spurious Emission	< $43+10\log_{10}$(P[Watts])	PASS	Under limit 25.48 dB at 1572.000 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 Feature of Equipment Under Test

Product Feature	
Equipment	mobile phone
Brand Name	Coolpad
Model Name	Coolpad 801EM
FCC ID	R38YL801EM
EUT supports Radios application	CDMA/EV-DO/LTE/WLAN 2.4GHz 802.11bgn HT20/ Bluetooth v3.0 + EDR/Bluetooth v4.0
HW Version	P0
SW Version	4.1.003.P0.130809.801EM
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 of Equipment Under Test

Product Specification subjective to this standard	
Tx Frequency	779.5 MHz ~ 784.5 MHz
Rx Frequency	748.5 MHz ~ 753.5 MHz
Bandwidth	5MHz / 10MHz
Maximum Output Power to Antenna	22.76 dBm / 0.1888 W
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	Maximum ERP	Frequency Tolerance (%, Hz, ppm)	Emission Designator
Part 27	LTE Band 13	QPSK	5MHz	0.0545	0.008 ppm	4M50G7D
Part 27	LTE Band 13	16QAM	5MHz	0.0497	0.010 ppm	4M50D7W
Part 27	LTE Band 13	QPSK	10MHz	0.0543	0.010 ppm	9M16G7D
Part 27	LTE Band 13	16QAM	10MHz	0.0409	0.010 ppm	9M08D7W

1.7 Testing Site

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	OTA01-SZ	831040

1.8 Applied Standards

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

- 47 CFR Part 2, 27
- 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

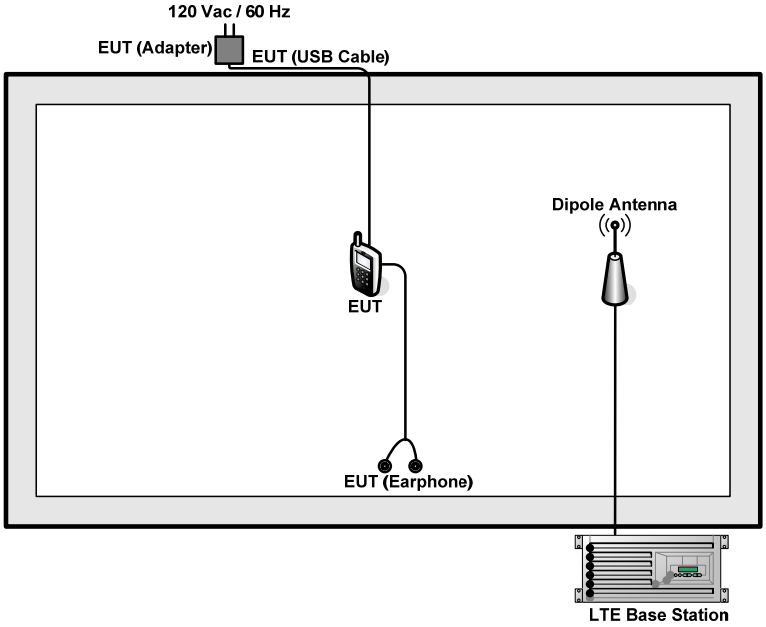
2.1 Test Mode

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 (X Plane).

Frequency range investigated for radiated emission: 30MHz to 10th harmonic.

Test Modes			
Band		**Radiated TCs**	**Conducted TCs**
LTE Band 13	**BW 5MHz**	■ LTE (RB Size 1, RB Offset 24) QPSK Link	■ LTE (RB Size 1, RB Offset 0) Link ■ LTE (RB Size 1, RB Offset 12) Link ■ LTE (RB Size 1, RB Offset 24) Link ■ LTE (RB Size 12, RB Offset 0) Link ■ LTE (RB Size 12, RB Offset 6) Link ■ LTE (RB Size 12, RB Offset 11) Link ■ LTE (RB Size 25, RB Offset 0) Link
	BW 10MHz	■ LTE (RB Size 1, RB Offset 49) QPSK Link	■ LTE (RB Size 1, RB Offset 0) Link ■ LTE (RB Size 1, RB Offset 24) Link ■ LTE (RB Size 1, RB Offset 49) Link ■ LTE (RB Size 25, RB Offset 0) Link ■ LTE (RB Size 25, RB Offset 12) Link ■ LTE (RB Size 25, RB Offset 24) Link ■ LTE (RB Size 50, RB Offset 0) Link

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	R&S	CMW500	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 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 dB and 10dB attenuator.

Example :
Offset(dB) = RF cable loss(dB) + attenuator factor(dB).
= 7 + 10 = 17 (dB)

3 Test Result

3.1 Conducted Output Power Measurement

3.1.1 Description of the Conducted Output Power Measurement

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

3.1.2 Measuring Instruments

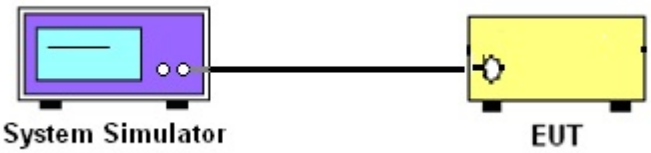
See list of measuring instruments of this test report.

3.1.3 Test Procedures

For Conducted Power Measurement:

1. The transmitter output port was connected to base station.
2. Set EUT at maximum power through base station.
3. Select lowest, middle, and highest channels for each band and different modulation.

3.1.4 Test Setup



3.1.5 Test Result of Conducted Output Power

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.
Channel					**23230**	
Frequency (MHz)					**782**	
10	QPSK	1	0		22.52	
10	QPSK	1	24		22.51	
10	QPSK	1	49		22.76	
10	QPSK	25	0		21.28	
10	QPSK	25	12		21.54	
10	QPSK	25	24		21.46	
10	QPSK	50	0		21.29	
10	16QAM	1	0		21.77	
10	16QAM	1	24		21.48	
10	16QAM	1	49		21.41	
10	16QAM	25	0		20.35	
10	16QAM	25	12		20.45	
10	16QAM	25	24		20.46	
10	16QAM	50	0		20.30	
Channel				**23205**	**23230**	**23255**
Frequency (MHz)				**779.5**	**782**	**784.5**
5	QPSK	1	0	22.72	22.53	22.39
5	QPSK	1	12	22.57	22.54	22.56
5	QPSK	1	24	22.70	22.68	22.74
5	QPSK	12	0	21.60	21.49	21.60
5	QPSK	12	6	21.62	21.51	21.59
5	QPSK	12	11	21.65	21.53	21.67
5	QPSK	25	0	21.49	21.46	21.50
5	16QAM	1	0	21.79	21.72	21.92
5	16QAM	1	12	21.95	21.83	21.71
5	16QAM	1	24	21.86	21.65	21.85
5	16QAM	12	0	20.65	20.58	20.59
5	16QAM	12	6	20.52	20.54	20.74
5	16QAM	12	11	20.63	20.59	20.71
5	16QAM	25	0	20.49	20.57	20.66

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.

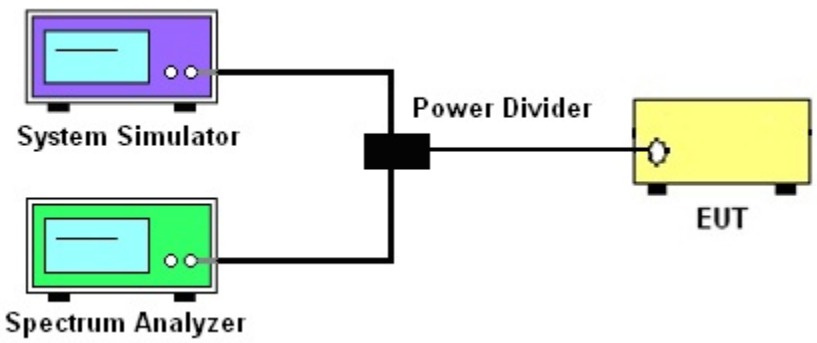
3.2.2 Measuring Instruments

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. For LTE operating modes:
   a. Set the CCDF (Complementary Cumulative Distribution Function) option in spectrum analyzer.
   b. The highest RF powers were measured and recorded the maximum PAPR level associated with a probability of 0.1 %.
3. Record the deviation as Peak to Average Ratio.

3.2.4 Test Setup



3.2.5 Test Result of Peak-to-Average Ratio

Modes	LTE Band 13			
BW / Mod.	5MHz / QPSK	5MHz / 16QAM	10MHz / QPSK	10MHz / 16QAM
Peak-to-Average Ratio (dB)	5.64	6.24	5.48	6.28

Note:

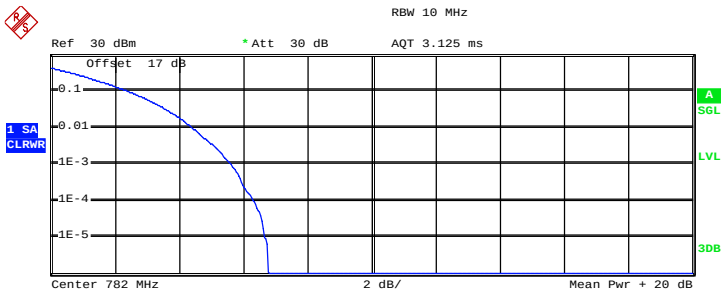
The maximum RB configurations of the PAPR summary as below:

BW5M RB setting：RB Size 25, RB offset 0

BW10M RB setting：RB Size 50, RB offset 0

3.2.6 Peak to Average Power Ratio

Peak-to-Average Ratio on LTE Band 13 5MHz / QPSK



Complementary Cumulative Distribution Function (100000 samples)

	Trace 1
Mean	20.28 dBm
Peak	27.08 dBm
Crest	6.79 dB
10 %	2.48 dB
1 %	4.44 dB
.1 %	5.64 dB
.01 %	6.36 dB

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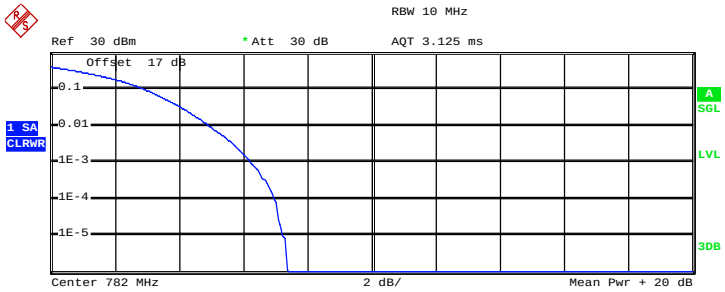
Peak-to-Average Ratio on LTE Band 13 5MHz / 16QAM



Complementary Cumulative Distribution Function (100000 samples)

	Trace 1
Mean	19.29 dBm
Peak	26.65 dBm
Crest	7.37 dB
10 %	3.00 dB
1 %	4.96 dB
.1 %	6.24 dB
.01 %	7.00 dB

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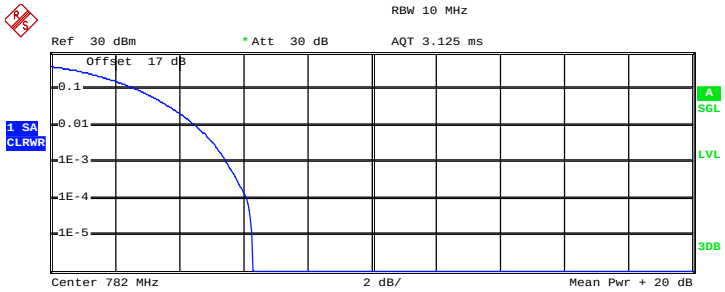
Peak-to-Average Ratio on LTE Band 13 10MHz / QPSK



Complementary Cumulative Distribution Function (100000 samples)

	Trace 1
Mean	19.85 dBm
Peak	26.16 dBm
Crest	6.31 dB
10 %	2.72 dB
1 %	4.52 dB
.1 %	5.48 dB
.01 %	6.12 dB

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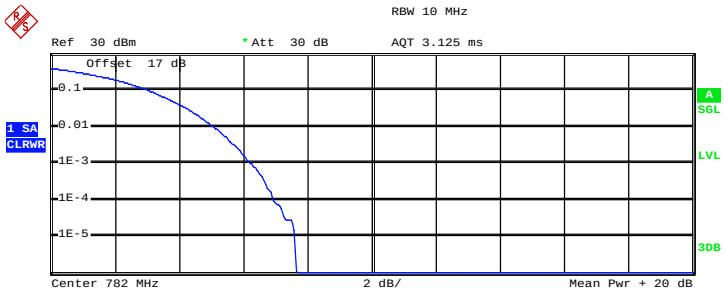
Peak-to-Average Ratio on LTE Band 13 10MHz / 16QAM



Complementary Cumulative Distribution Function (100000 samples)

	Trace 1
Mean	18.87 dBm
Peak	26.51 dBm
Crest	7.64 dB
10 %	3.12 dB
1 %	5.12 dB
.1 %	6.28 dB
.01 %	6.96 dB

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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 ERP of 3 watt.

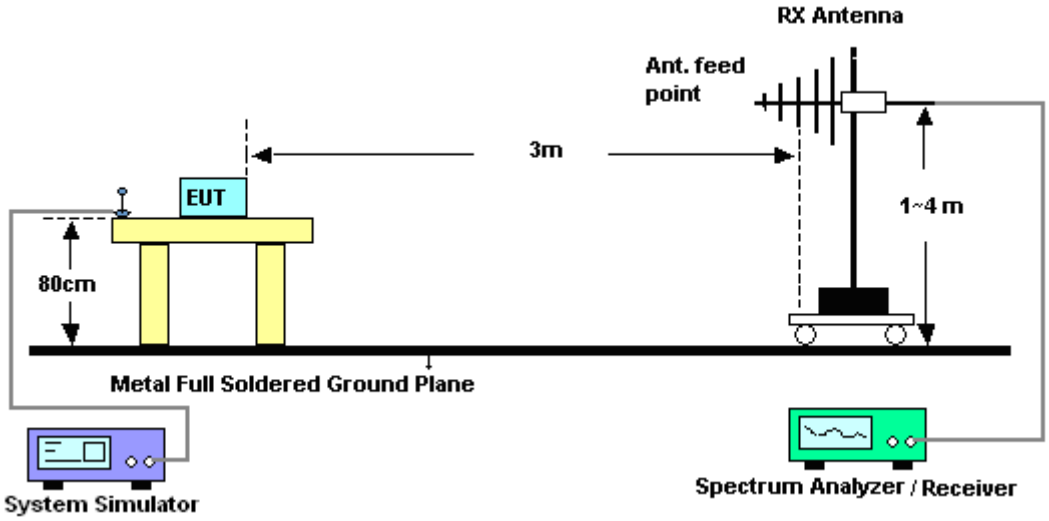
3.3.2 Measuring Instruments

See list of measuring instruments 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= 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 = 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	0	779.5	17.20	0.0525	H
13	5	QPSK	1	24	782	17.17	0.0521	H
13	5	QPSK	1	24	784.5	17.36	0.0545	H
13	5	QPSK	1	0	779.5	5.43	0.0035	V
13	5	QPSK	1	24	782	5.60	0.0036	V
13	5	QPSK	1	24	784.5	5.68	0.0037	V
13	5	16QAM	1	12	779.5	16.66	0.0463	H
13	5	16QAM	1	12	782	16.93	0.0493	H
13	5	16QAM	1	0	784.5	16.96	0.0497	H
13	5	16QAM	1	12	779.5	4.87	0.0031	V
13	5	16QAM	1	12	782	5.23	0.0033	V
13	5	16QAM	1	0	784.5	5.16	0.0033	V
13	10	QPSK	1	49	782	17.35	0.0543	H
13	10	QPSK	1	49	782	5.51	0.0036	V
13	10	16QAM	1	0	782	16.12	0.0409	H
13	10	16QAM	1	0	782	4.33	0.0027	V

3.4 99% Occupied Bandwidth

3.4.1 Description of 99% Occupied 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 26dB 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 26 dB.
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.

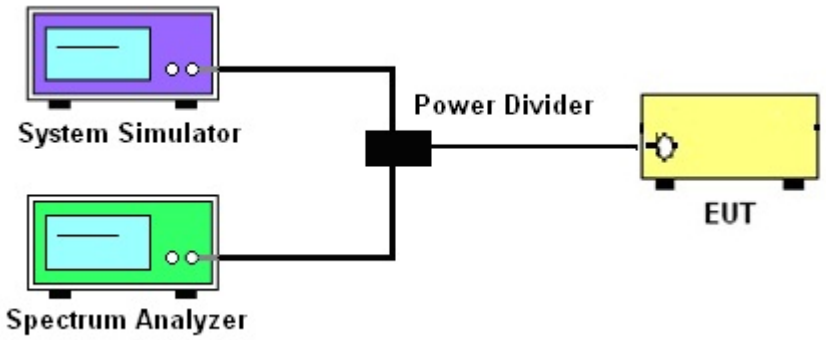
3.4.2 Measuring Instruments

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 26dB and 99% occupied bandwidth (BW) of the middle channel for the highest RF powers 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 / Modulation	5MHz / QPSK	5MHz / 16QAM	10MHz / QPSK	10MHz / 16QAM
99% OBW (MHz)	4.50	4.50	9.16	9.08
26dB BW (MHz)	5.10	5.02	10.04	10.04

Note:

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

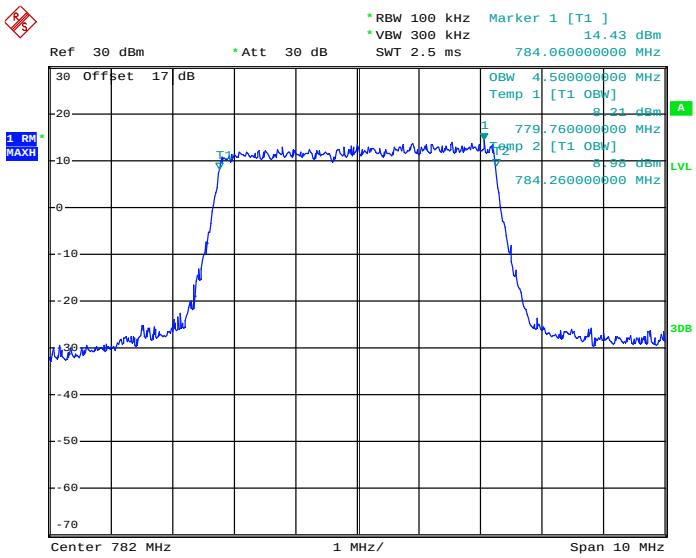
BW5M RB setting：RB Size 25, RB offset 0

BW10M RB setting：RB Size 50, RB offset 0

3.4.6 Test Plots of 99% Occupied Bandwidth and 26dB Bandwidth

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

99% Occupied Bandwidth Plot on Channel 23230



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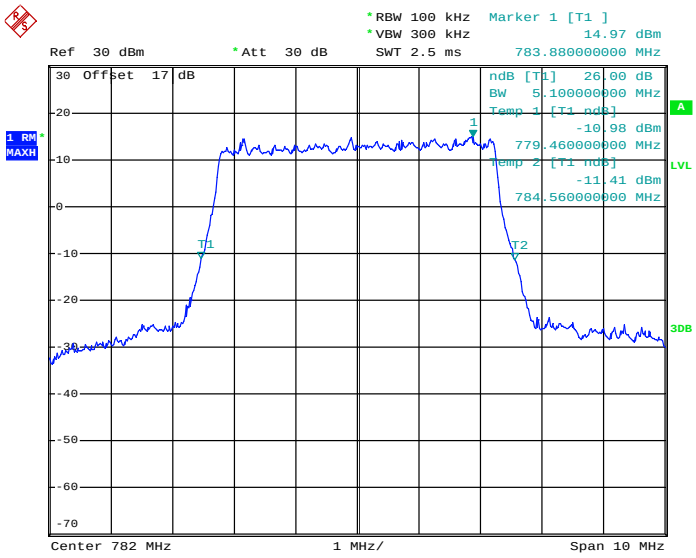
26dB Bandwidth Plot on Channel 23230



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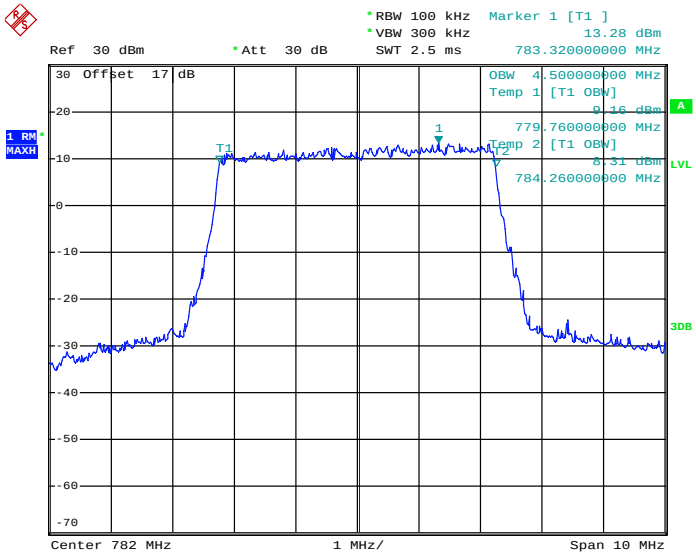
Band :	LTE Band 13	BW / Mod. :	5MHz / 16QAM

99% Occupied Bandwidth Plot on Channel 23230



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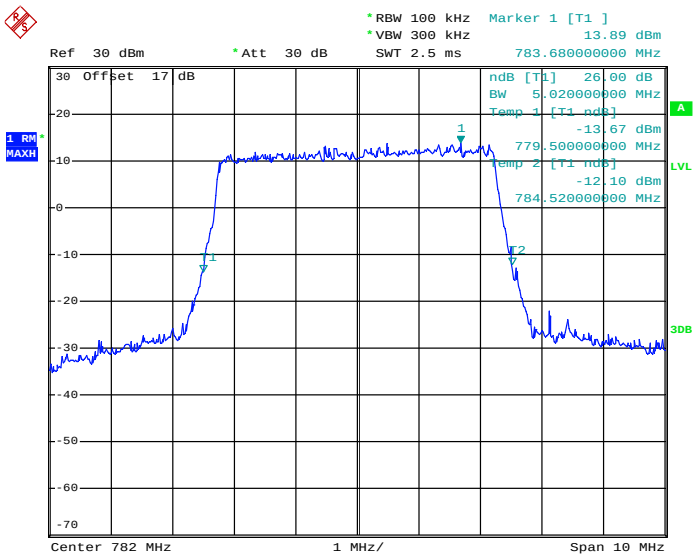
26dB Bandwidth Plot on Channel 23230



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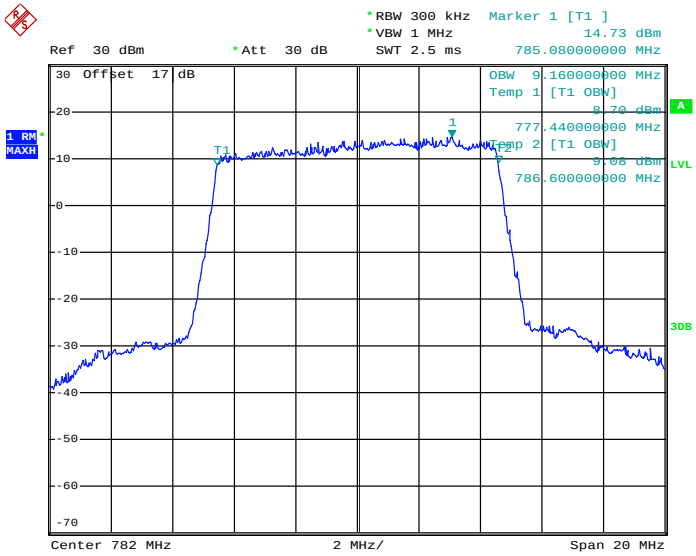
Band :	LTE Band 13	BW / Mod. :	10MHz / QPSK

99% Occupied Bandwidth Plot on Channel 23230



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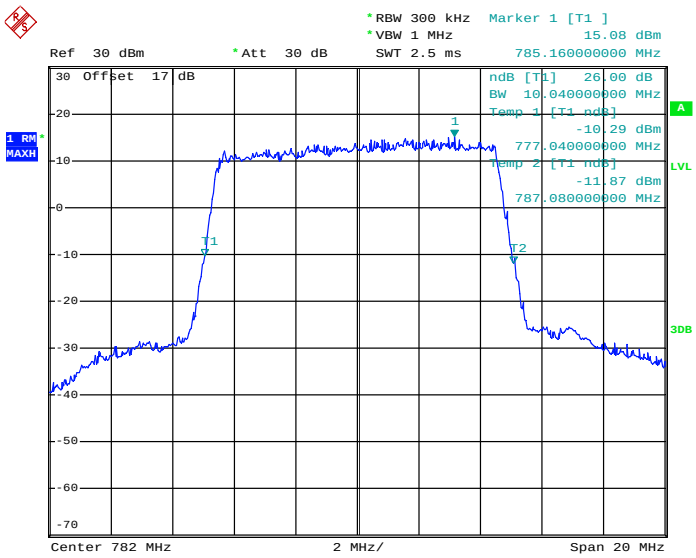
26dB Bandwidth Plot on Channel 23230



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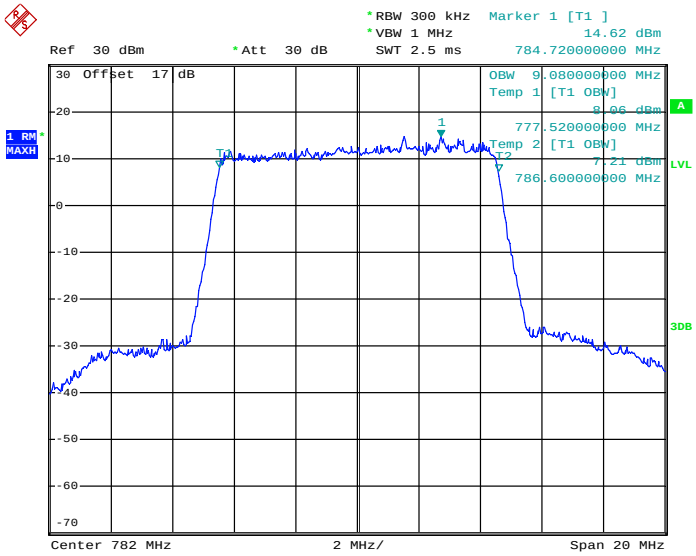
Band :	LTE Band 13	BW / Mod. :	10MHz / 16QAM

99% Occupied Bandwidth Plot on Channel 23230



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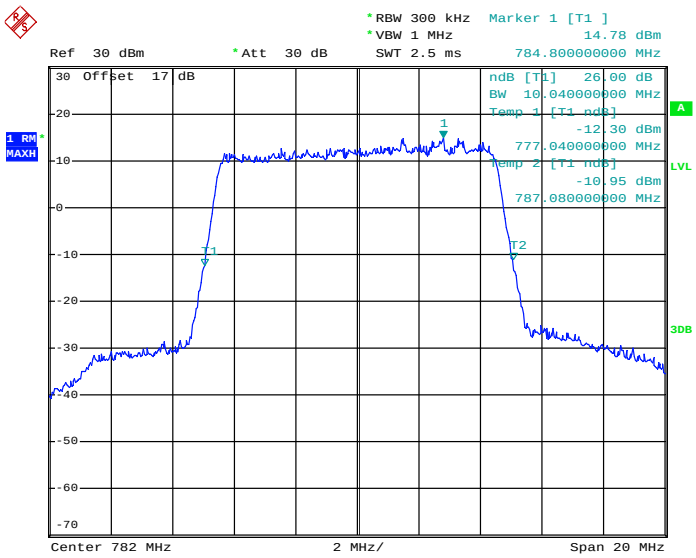
26dB Bandwidth Plot on Channel 23230



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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.

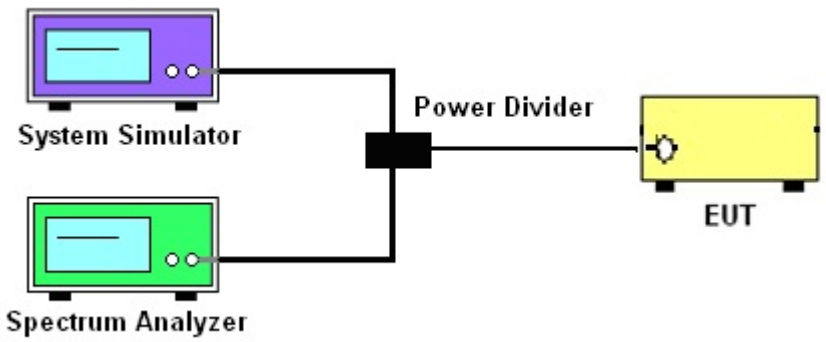
3.5.2 Measuring Instruments

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 band edges of low and high channels for the highest RF powers were measured. Setting RBW ≥ 1% EBW, and measuring bandwidth = 1MHz.
3. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
4. 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.

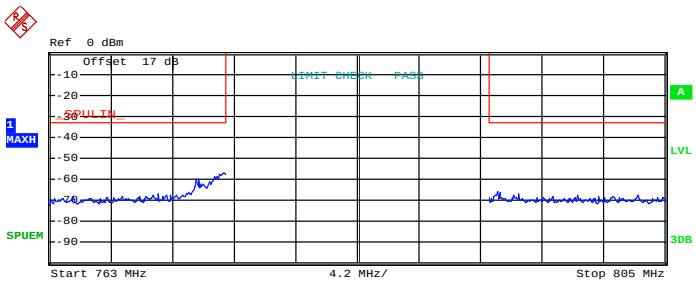
3.5.4 Test Setup



3.5.5 Test Result (Plots) of Conducted Band Edge

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

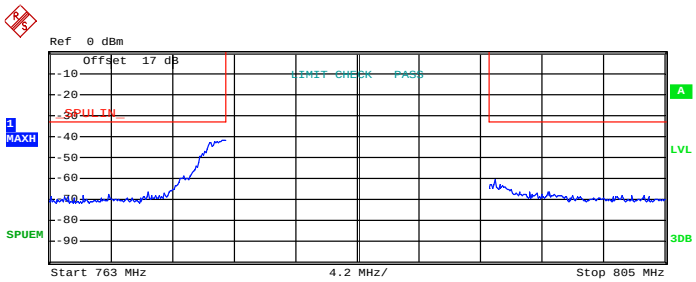
Lower Band Edge Plot for QPSK-RB Size 1, RB Offset 0



Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	ΔLimit [dB]
763.000 M	775.000 M	10.00 k	774.928000 M	-56.86	-23.86
793.000 M	805.000 M	10.00 k	793.582000 M	-65.73	-32.73

Date: 6.SEP.2013 10:51:39

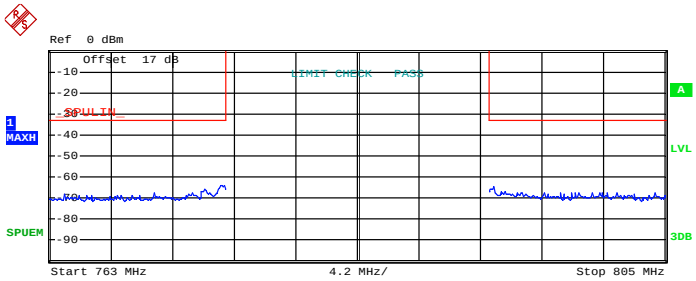
Lower Band Edge Plot for QPSK-RB Size 25, RB Offset 0



Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	ΔLimit [dB]
763.000 M	775.000 M	10.00 k	774.970000 M	-41.67	-8.67
793.000 M	805.000 M	10.00 k	793.384000 M	-60.54	-27.54

Date: 6.SEP.2013 10:52:53

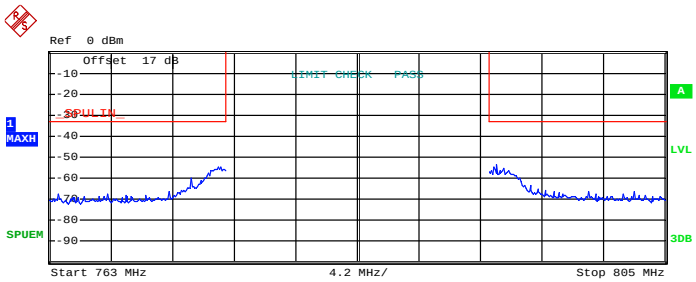
Higher Band Edge Plot for QPSK-RB Size 1, RB Offset 24



Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	ΔLimit [dB]
763.000 M	775.000 M	10.00 k	774.904000 M	-63.88	-30.88
793.000 M	805.000 M	10.00 k	793.294000 M	-64.48	-31.48

Date: 6.SEP.2013 10:56:10

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

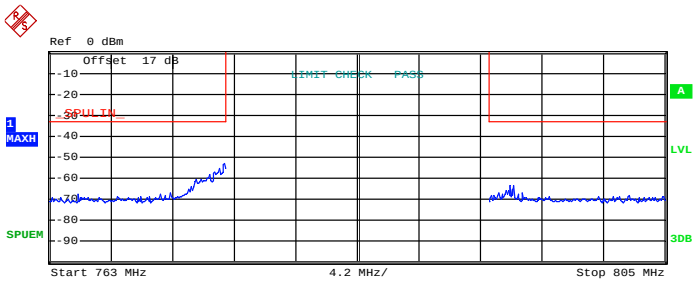


Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	ΔLimit [dB]
763.000 M	775.000 M	10.00 k	774.544000 M	-54.70	-21.70
793.000 M	805.000 M	10.00 k	793.480000 M	-53.71	-20.71

Date: 6.SEP.2013 10:53:56

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

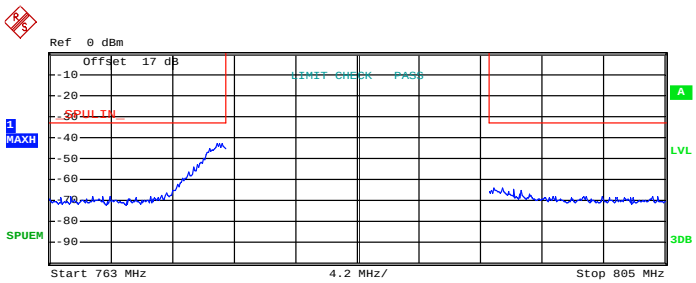
Lower Band Edge Plot for 16QAM-RB Size 1, RB Offset 0



Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	ΔLimit [dB]
763.000 M	775.000 M	10.00 k	774.934000 M	-52.91	-19.91
793.000 M	805.000 M	10.00 k	794.638000 M	-63.39	-30.39

Date: 6.SEP.2013 10:52:03

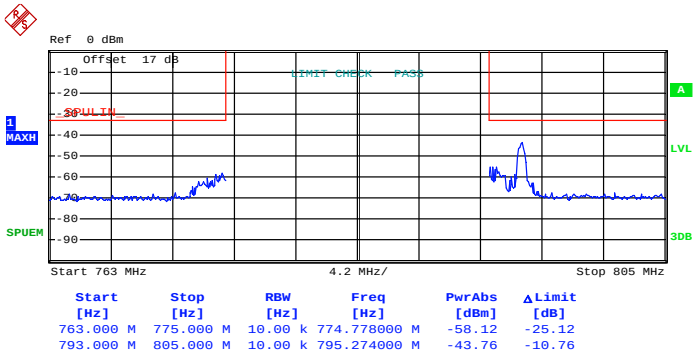
Lower Band Edge Plot for 16QAM-RB Size 25, RB Offset 0



Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	ΔLimit [dB]
763.000 M	775.000 M	10.00 k	774.778000 M	-42.82	-9.82
793.000 M	805.000 M	10.00 k	793.912000 M	-63.83	-30.83

Date: 6.SEP.2013 10:52:30

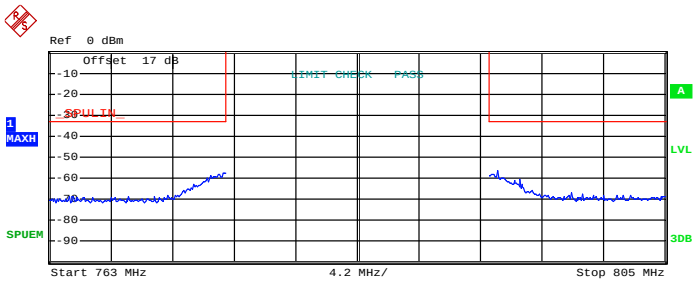
Higher Band Edge Plot for 16QAM-RB Size 1, RB Offset 24



Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	ΔLimit [dB]
763.000 M	775.000 M	10.00 k	774.778000 M	-58.12	-25.12
793.000 M	805.000 M	10.00 k	795.274000 M	-43.76	-10.76

Date: 6.SEP.2013 10:55:45

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



Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	ΔLimit [dB]
763.000 M	775.000 M	10.00 k	774.922000 M	-57.56	-24.56
793.000 M	805.000 M	10.00 k	793.558000 M	-56.37	-23.37

Date: 6.SEP.2013 10:54:25

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 9 kHz up to a frequency including its 10^{th} harmonic.

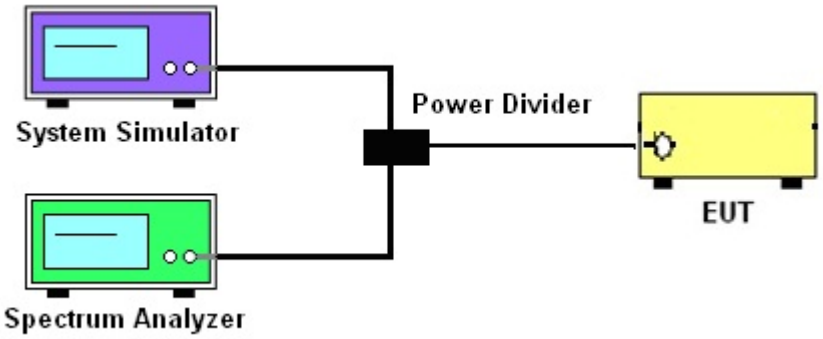
3.6.2 Measuring Instruments

See list of measuring instruments of this test report.

3.6.3 Test Procedures

1. The EUT was connected to spectrum analyzer and base station via 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.

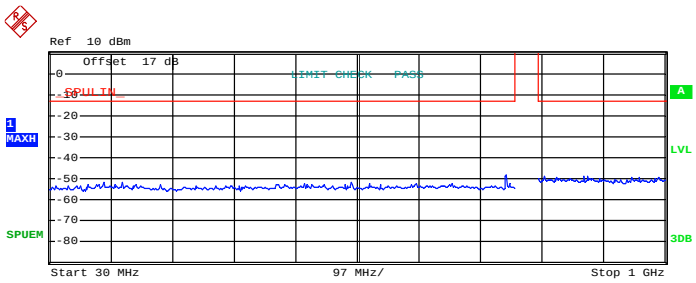
3.6.4 Test Setup



3.6.5 Test Result (Plots) of Conducted Spurious Emission

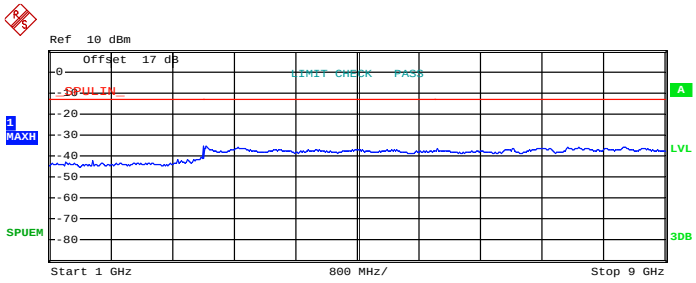
Band :	LTE Band 13	Channel :	CH23205 (Low)
Band Width :	5MHz	Frequency :	779.5

QPSK (RB Size 1, RB Offset 0)



Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	ΔLimit [dB]
30.000 M	763.500 M	100.00 k	750.297000 M	-48.04	-35.04
799.500 M	1.000 G	100.00 k	878.096000 M	-48.88	-35.88

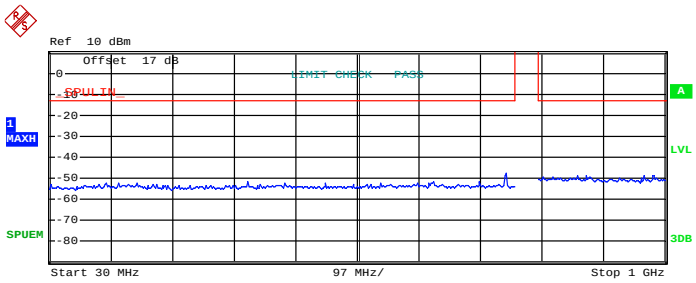
Date: 6.SEP.2013 11:07:39



Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	ΔLimit [dB]
1.000 G	3.000 G	1.00 M	2.970000 G	-40.61	-27.61
3.000 G	6.000 G	1.00 M	3.000000 G	-35.38	-22.38
6.000 G	9.000 G	1.00 M	8.469000 G	-35.78	-22.78

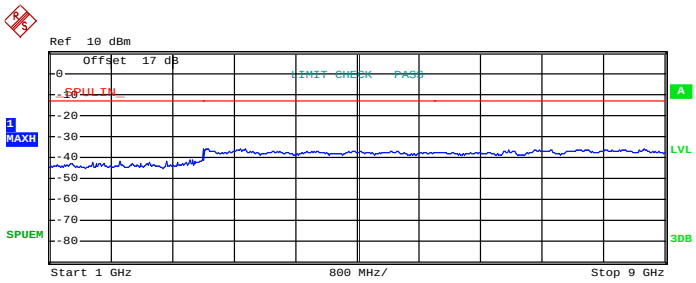
Date: 6.SEP.2013 11:08:33

16QAM (RB Size 1, RB Offset 12)



Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	ΔLimit [dB]
30.000 M	763.500 M	100.00 k	748.830000 M	-47.41	-34.41
799.500 M	1.000 G	100.00 k	875.088500 M	-48.67	-35.67

Date: 6.SEP.2013 11:09:43

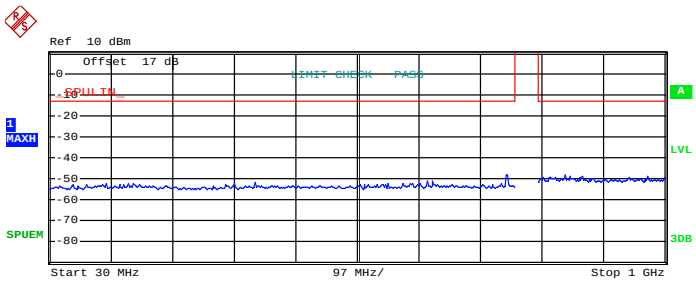


Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	ΔLimit [dB]
1.000 G	3.000 G	1.00 M	2.977000 G	-41.08	-28.08
3.000 G	6.000 G	1.00 M	3.535500 G	-35.90	-22.90
6.000 G	9.000 G	1.00 M	8.730000 G	-36.15	-23.15

Date: 6.SEP.2013 11:09:14

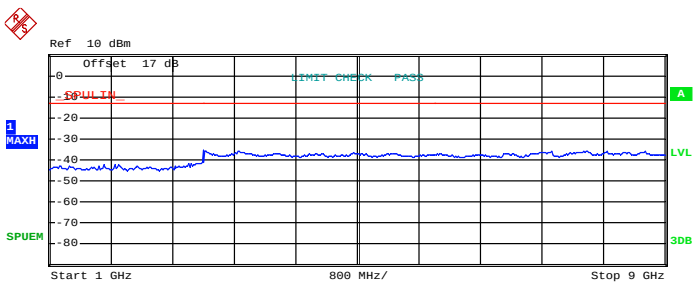
Band :	LTE Band 13	Channel :	CH23230 (Middle)
Band Width :	5MHz	Frequency :	782

QPSK (RB Size 1, RB Offset 24)



Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	ΔLimit [dB]
30.000 M	763.500 M	100.00 k	751.764000 M	-47.96	-34.96
799.500 M	1.000 G	100.00 k	843.309250 M	-48.07	-35.07

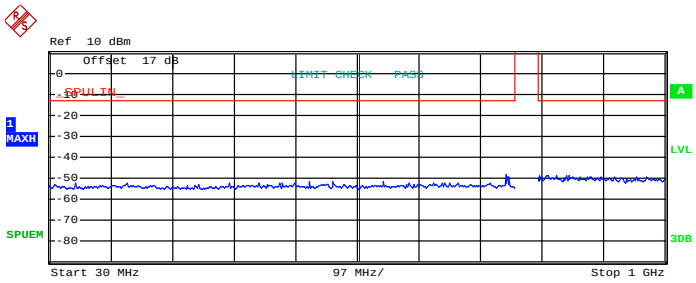
Date: 6.SEP.2013 11:14:54



Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	ΔLimit [dB]
1.000 G	3.000 G	1.00 M	2.986000 G	-41.43	-28.43
3.000 G	6.000 G	1.00 M	3.000000 G	-35.37	-22.37
6.000 G	9.000 G	1.00 M	7.521000 G	-35.89	-22.89

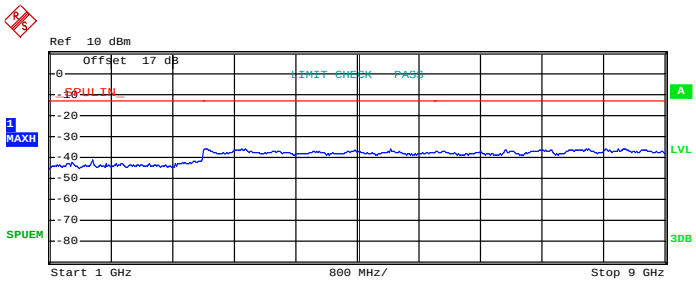
Date: 6.SEP.2013 11:14:26

16QAM (RB Size 1, RB Offset 12)



Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	ΔLimit [dB]
30.000 M	763.500 M	100.00 k	749.196750 M	-48.38	-35.38
799.500 M	1.000 G	100.00 k	847.620000 M	-48.56	-35.56

Date: 6.SEP.2013 11:13:18

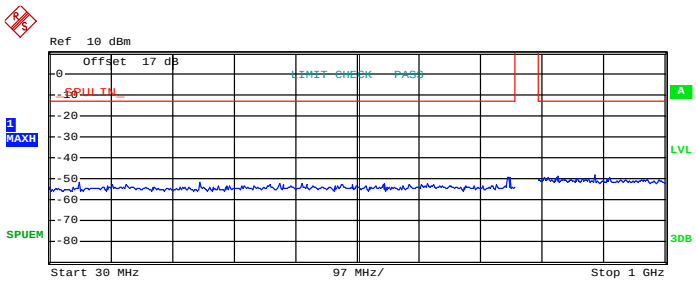


Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	ΔLimit [dB]
1.000 G	3.000 G	1.00 M	2.989000 G	-40.84	-27.84
3.000 G	6.000 G	1.00 M	3.042000 G	-35.93	-22.93
6.000 G	9.000 G	1.00 M	8.485500 G	-35.87	-22.87

Date: 6.SEP.2013 11:13:52

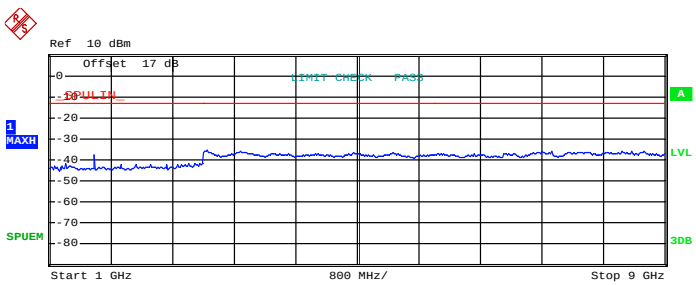
Band :	LTE Band 13	Channel :	CH23255 (High)
Band Width :	5MHz	Frequency :	784.5

QPSK (RB Size 1, RB Offset 24)



Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	ΔLimit [dB]
30.000 M	763.500 M	100.00 k	754.331250 M	-49.26	-36.26
799.500 M	1.000 G	100.00 k	889.023250 M	-47.91	-34.91

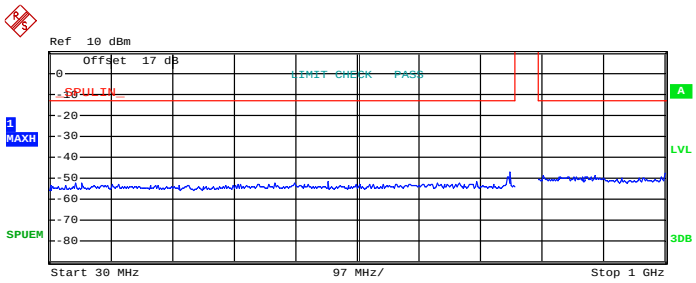
Date: 6.SEP.2013 11:04:29



Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	ΔLimit [dB]
1.000 G	3.000 G	1.00 M	1.573000 G	-37.79	-24.79
3.000 G	6.000 G	1.00 M	3.045000 G	-35.51	-22.51
6.000 G	9.000 G	1.00 M	8.734500 G	-35.73	-22.73

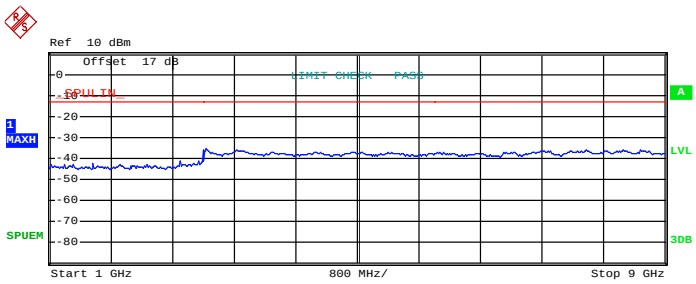
Date: 6.SEP.2013 11:04:55

16QAM (RB Size 1, RB Offset 0)



Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	ΔLimit [dB]
30.000 M	763.500 M	100.00 k	755.431500 M	-47.30	-34.30
799.500 M	1.000 G	100.00 k	999.699250 M	-47.74	-34.74

Date: 6.SEP.2013 11:06:09

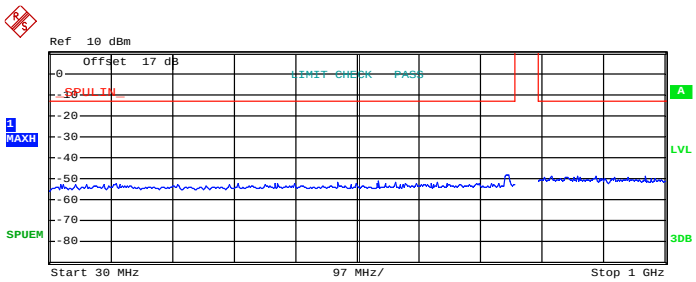


Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	ΔLimit [dB]
1.000 G	3.000 G	1.00 M	2.932000 G	-41.12	-28.12
3.000 G	6.000 G	1.00 M	3.037500 G	-35.46	-22.46
6.000 G	9.000 G	1.00 M	8.458500 G	-35.87	-22.87

Date: 6.SEP.2013 11:05:42

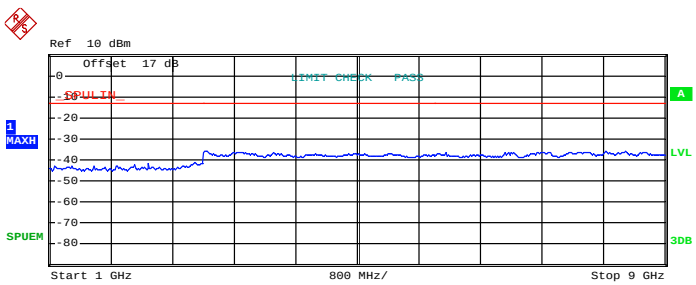
Band :	LTE Band 13	Channel :	CH23230 (Middle)
Band Width :	10MHz	Frequency :	782

QPSK (RB Size 1, RB Offset 49)



Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	ΔLimit [dB]
30.000 M	763.500 M	100.00 k	752.497500 M	-48.11	-35.11
799.500 M	1.000 G	100.00 k	891.128500 M	-48.55	-35.55

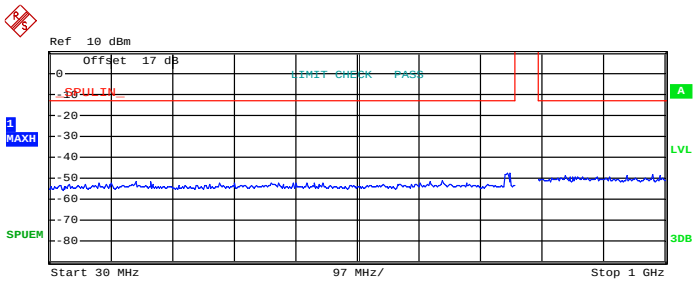
Date: 6.SEP.2013 11:30:29



Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	ΔLimit [dB]
1.000 G	3.000 G	1.00 M	2.888000 G	-41.19	-28.19
3.000 G	6.000 G	1.00 M	3.018000 G	-35.80	-22.80
6.000 G	9.000 G	1.00 M	8.479500 G	-36.04	-23.04

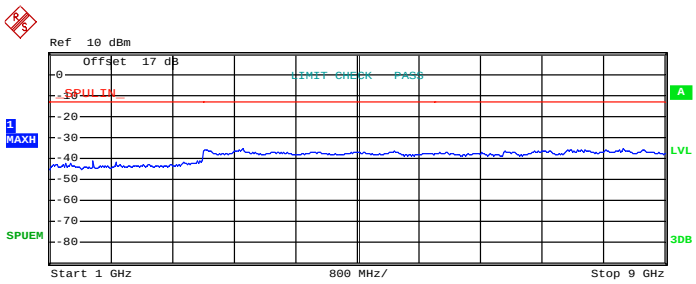
Date: 6.SEP.2013 11:29:55

16QAM (RB Size 1, RB Offset 0)



Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	ΔLimit [dB]
30.000 M	763.500 M	100.00 k	755.431500 M	-47.71	-34.71
799.500 M	1.000 G	100.00 k	979.950000 M	-48.06	-35.06

Date: 6.SEP.2013 11:28:43



Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	ΔLimit [dB]
1.000 G	3.000 G	1.00 M	2.993000 G	-40.77	-27.77
3.000 G	6.000 G	1.00 M	3.510000 G	-35.55	-22.55
6.000 G	9.000 G	1.00 M	8.460000 G	-35.36	-22.36

Date: 6.SEP.2013 11:29:16

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

3.7.2 Measuring Instruments

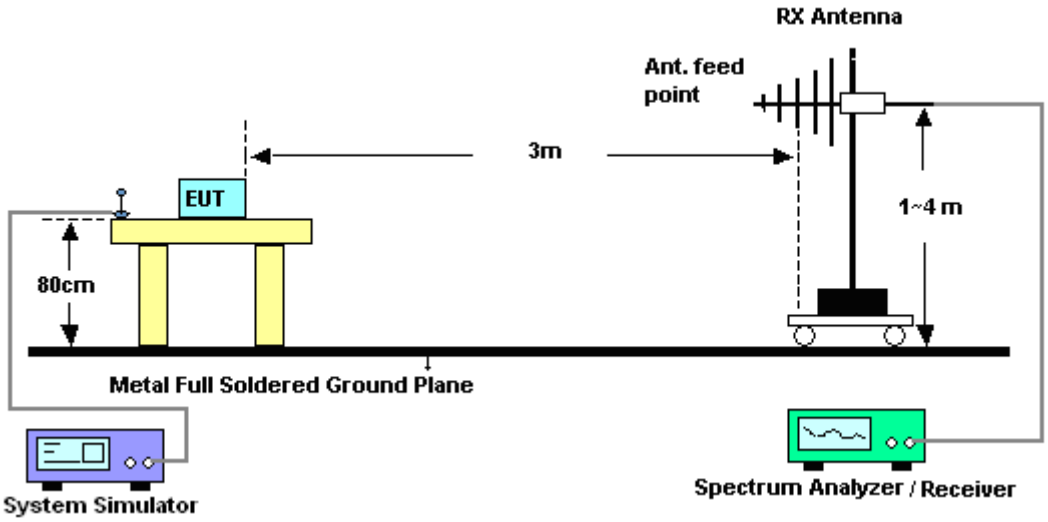
See list of measuring instruments of this test report.

3.7.3 Test Procedures

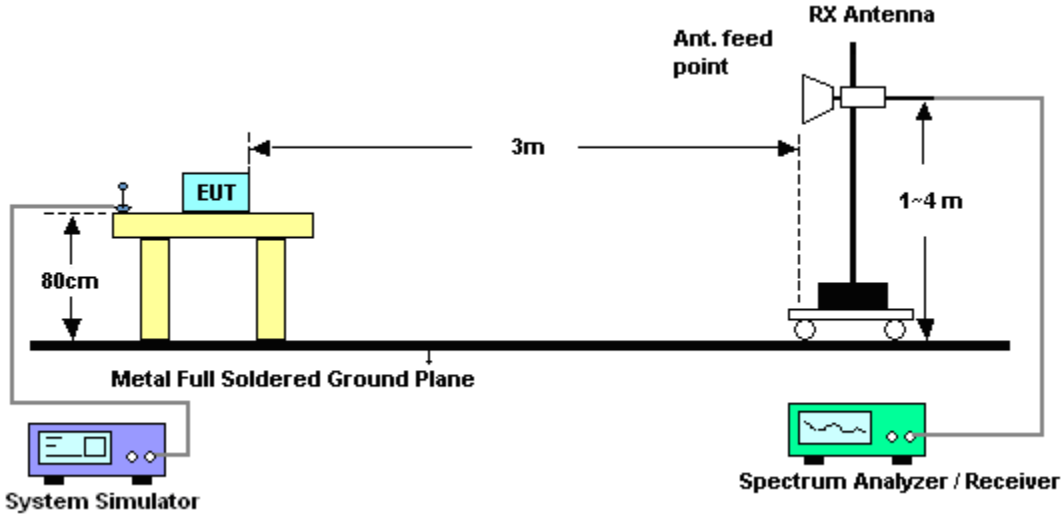
1. The EUT was placed on a rotatable wooden table with 0.8 meter about ground.
2. The EUT was set 3 meters from the receiving antenna, which was mounted on the antenna tower.
3. The table was rotated 360 degrees to determine the position of the highest spurious emission.
4. The height of the receiving 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. 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

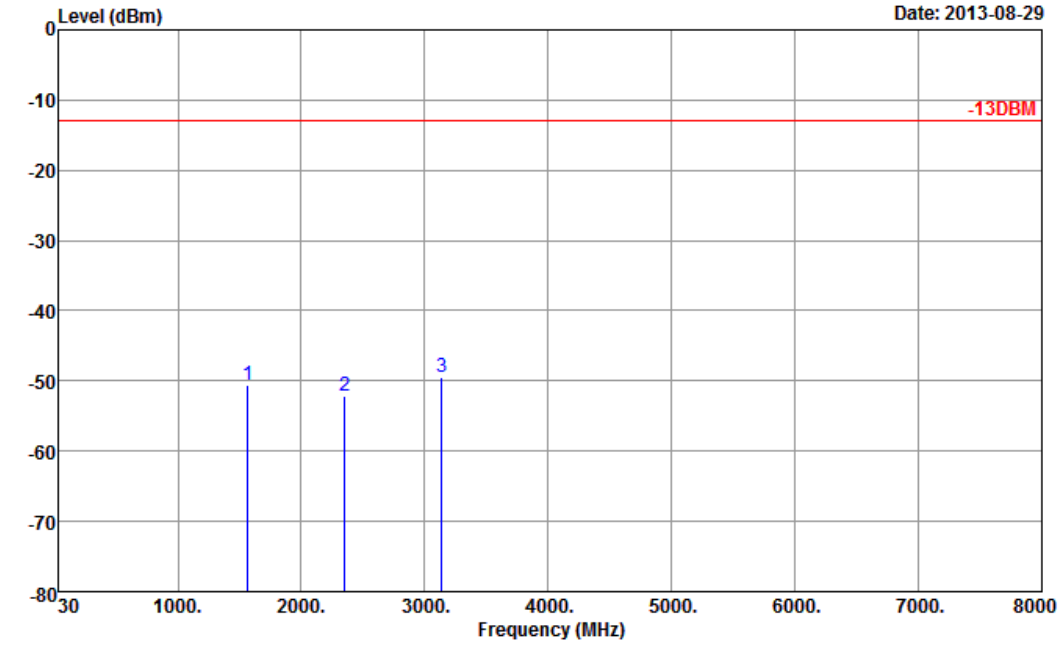


For radiated emissions above 1GHz



3.7.5 Test Result of Field Strength of Spurious Radiated

Band :	LTE Band 13	**Temperature :**	24~25°C
Test Mode :	5MHz QPSK RB Size 1 Offset 24	**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.		

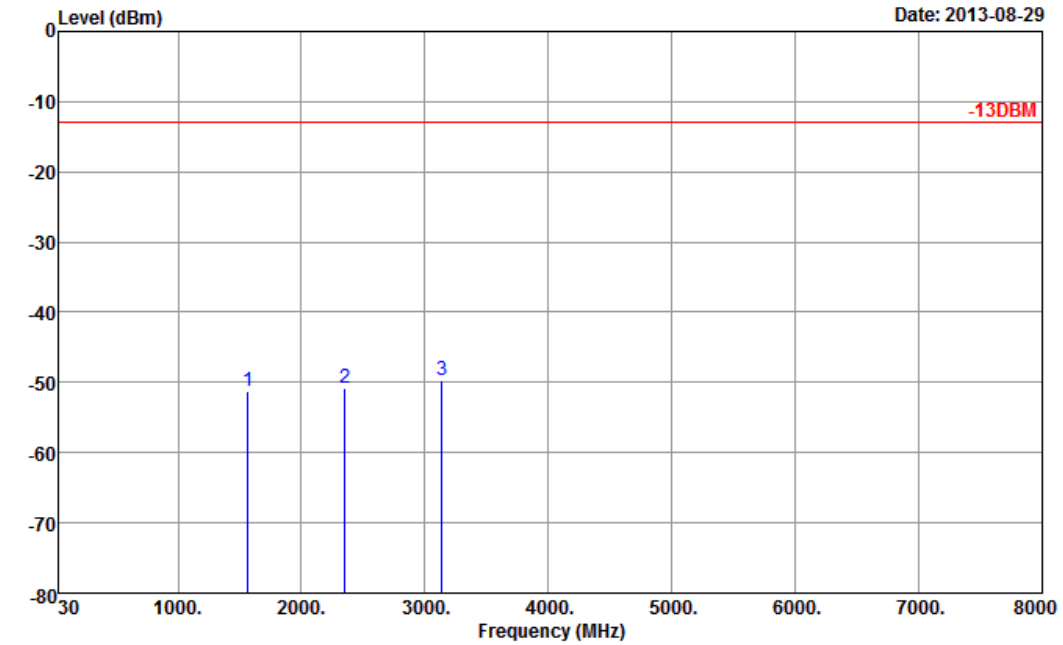


Site : 03CH01-SZ
Condition : -13DBM HF_EIRP_H_130101 HORIZONTAL

Plane : X

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
1569.00	-50.59	-13	-37.59	-61.67	-38.20	12.82	7.54	H	Pass
2353.50	-52.16	-13	-39.16	-71.12	-68.60	1.58	9.80	H	Pass
3138.00	-49.36	-13	-36.36	-72.98	-67.90	1.69	11.51	H	Pass

Band :	LTE Band 13	Temperature :	24~25°C
Test Mode :	5MHz QPSK RB Size 1 Offset 24	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.		

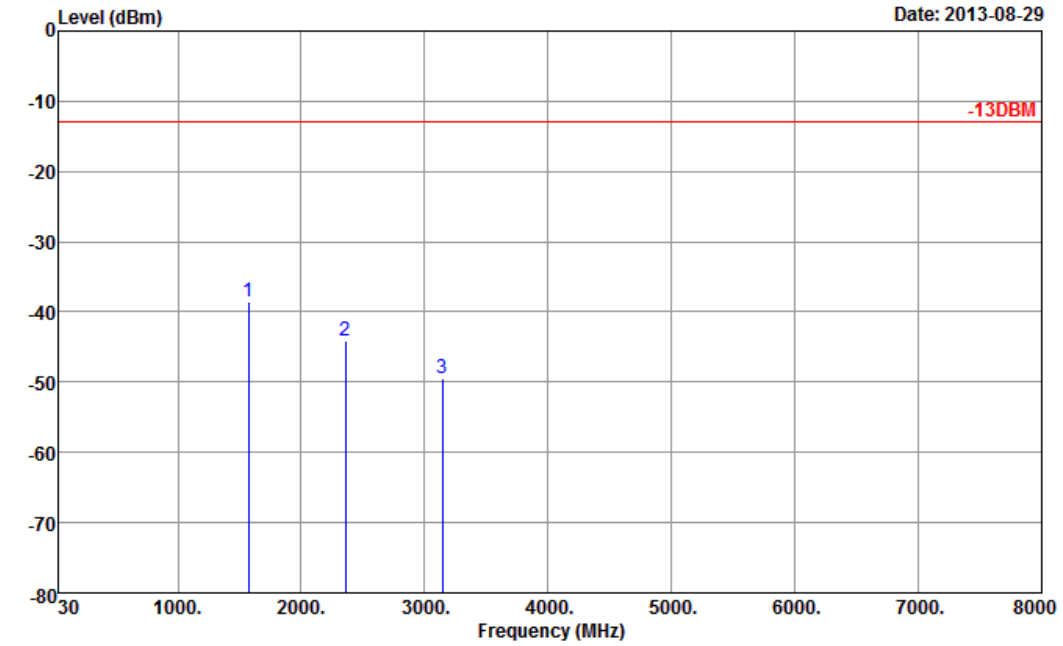


Site : 03CH01-SZ
Condition : -13DBM HF_EIRP_V_130101 VERTICAL

Plane : X

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
1569	-51.32	-13	-38.32	-64.18	-43.20	1.42	7.54	V	Pass
2353.5	-50.87	-13	-37.87	-70.27	-70.30	1.58	9.80	V	Pass
3138	-49.72	-13	-36.72	-73.05	-64.60	1.69	11.51	V	Pass

Band :	LTE Band 13	Temperature :	24~25°C
Test Mode :	10MHz QPSK RB Size 1 Offset 49	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.		

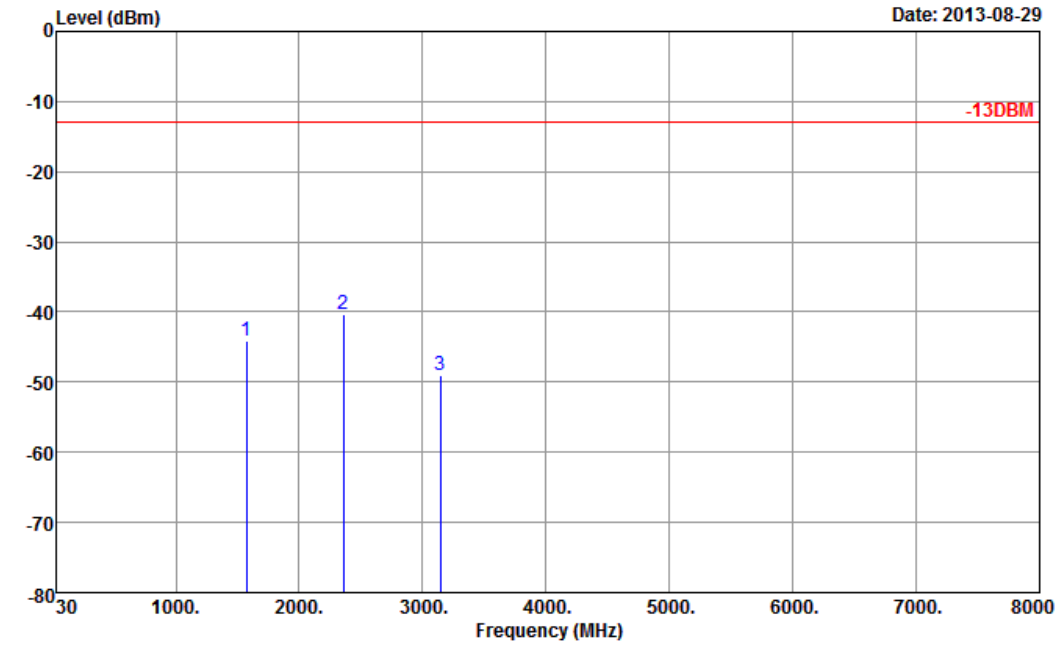


Site : 03CH01-SZ
Condition : -13DBM HF_EIRP_H_130101 HORIZONTAL

Plane : X

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
1572.00	-38.48	-13	-25.48	-52.44	-38.20	12.82	7.54	H	Pass
2358.00	-44.17	-13	-31.17	-63.13	-68.60	1.58	9.80	H	Pass
3144.00	-49.56	-13	-36.56	-73.18	-67.90	1.69	11.51	H	Pass

Band :	LTE Band 13	**Temperature :**	24~25°C
Test Mode :	10MHz QPSK RB Size 1 Offset 49	**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.		



Site : 03CH01-SZ
Condition : -13DBM HF_EIRP_V_130101 VERTICAL

Plane : X

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
1572	-44.10	-13	-31.10	-58.14	-43.20	1.42	7.54	V	Pass
2358	-40.42	-13	-27.42	-60.08	-70.30	1.58	9.80	V	Pass
3144	-49.08	-13	-36.08	-72.41	-64.60	1.69	11.51	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

See list of measuring instruments of this test report.

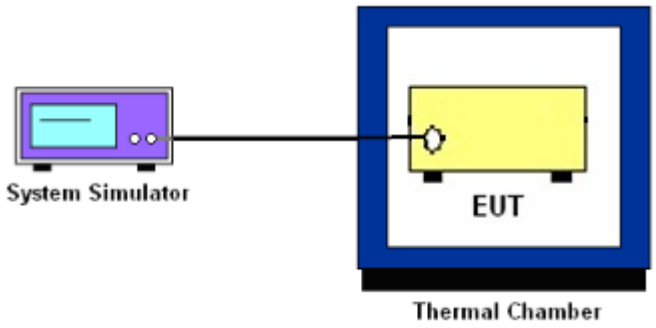
3.8.3 Test Procedures for Temperature Variation

1. The EUT was set up in the thermal chamber and connected with the base station.
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.
4. If the EUT can not be turned on at -30°C, the testing lowest temperature will be raised in 10°C step until the EUT can be turned on.

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 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.

3.8.5 Test Setup



3.8.6 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	-6.4	-0.008	-5.7	-0.007	PASS
-20	-6.2	-0.008	-5.6	-0.007	
-10	-5.9	-0.008	-5.4	-0.007	
0	-6.1	-0.008	-6.1	-0.008	
10	-5.7	-0.007	-6.2	-0.008	
20	-5.4	-0.007	-6.5	-0.008	
30	-5.8	-0.007	-6.3	-0.008	
40	-6.2	-0.008	-6.9	-0.009	
50	-5.9	-0.008	-7.7	-0.010	

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	-7.8	-0.010	-8.2	-0.010	PASS
-20	-7.5	-0.010	-7.6	-0.010	
-10	-7.7	-0.010	-7.3	-0.009	
0	-6.9	-0.009	-6.9	-0.009	
10	-6.5	-0.008	-7.1	-0.009	
20	-6.4	-0.008	-6.5	-0.008	
30	-6.8	-0.009	-7.3	-0.009	
40	-7.2	-0.009	-6.4	-0.008	
50	-6.7	-0.009	-6.8	-0.009	

3.8.7 Test Result of Voltage Variation

Band	Bandwidth	Voltage (Volt)	Freq. Dev. (Hz)	Deviation (ppm)	Limit (ppm)	Result
LTE Band 13 (QPSK)	5M	4.2	-5.4	-0.007	2.5	PASS
		Normal	-5.6	-0.007		
		3.6	-5.9	-0.008		
	10M	4.2	-6.5	-0.008		
		Normal	-6.1	-0.008		
		3.6	-6.6	-0.008		

Band	Bandwidth	Voltage (Volt)	Freq. Dev. (Hz)	Deviation (ppm)	Limit (ppm)	Result
LTE Band 13 (16QAM)	5M	4.2	-6.7	-0.009	2.5	PASS
		Normal	-6.4	-0.008		
		3.6	-6.5	-0.008		
	10M	4.2	-6.8	-0.009		
		Normal	-6.5	-0.008		
		3.6	-6.1	-0.008		

Remark:

1. Normal Voltage = 3.7V.
2. The manufacturer declared that the EUT could work properly between voltage 3.6V ~ 4.2V.

4 List of Measuring Equipments

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	R&S	FSP30	101400	9kHz~30GHz	Mar. 28, 2013	Aug. 28, 2013~ Sep. 06, 2013	Mar. 27, 2014	Conducted (TH01-SZ)
Power Meter	Anritsu	ML2495A	1218010	N/A	Mar. 28, 2013	Aug. 28, 2013~ Sep. 06, 2013	Mar. 27, 2014	Conducted (TH01-SZ)
Power Sensor	Anritsu	MA2411B	1207253	N/A	Mar. 28, 2013	Aug. 28, 2013~ Sep. 06, 2013	Mar. 27, 2014	Conducted (TH01-SZ)
Thermal Chamber	Hongzhan	LP-150U	HD20120425	N/A	Mar. 28, 2013	Aug. 28, 2013~ Sep. 06, 2013	Mar. 27, 2014	Conducted (TH01-SZ)
Spectrum Analyzer	Agilent Techonlogies	N9038A	MY52260185	20Hz~26.5GHz	Apr. 04, 2013	Aug. 29, 2013	Apr. 03, 2014	Radiation (03CH01-SZ)
Double Ridge Horn Antenna	ETS Lindgren	3117	00119436	1GHz~18GHz	Oct. 12, 2012	Aug. 29, 2013	Oct. 11, 2013	Radiation (03CH01-SZ)
Bilog Antenna	SCHAFFNER	CBL6112B	2614	30MHz~2GHz	Nov. 03, 2012	Aug. 29, 2013	Nov. 02, 2013	Radiation (03CH01-SZ)
Amplifier	ADVANTEST	BB525C	E9007003	9kHz~3GHz Gain 30dB	Mar. 28, 2013	Aug. 29, 2013	Mar. 27, 2014	Radiation (03CH01-SZ)
Amplifier	Yiai	AV3860B	04030	2GHz~26.5GHz	Mar. 28, 2013	Aug. 29, 2013	Mar. 27, 2014	Radiation (03CH01-SZ)
SHF-EHF-Horn	Schwarzbeck	BBHA9170	BBHA9170249	14GHz~40GHz	Nov. 23, 2012	Aug. 29, 2013	Nov. 22, 2013	Radiation (03CH01-SZ)
Turn Table	EM Electronice	EM 1000	N/A	0 ~ 360 degree	N/A	Aug. 29, 2013	N/A	Radiation (03CH01-SZ)
Antenna Mast	EM Electronice	EM 1000	N/A	1 m ~ 4 m	N/A	Aug. 29, 2013	N/A	Radiation (03CH01-SZ)
Spectrum Analyzer	R&S	FSP 7	100818	9kHz~7GHz	Aug. 21, 2013	Sep. 03, 2013	Aug. 20, 2014	ERP (OTA01-SZ)
Quad-Ridged Horn	ETS-Lindgren	3164-08	00102954	700MHz~10000MHz	N/A	Sep. 03, 2013	N/A	ERP (OTA01-SZ)
Multi-Devices Controller	ETS-Lindgren	2090-OPT1	00108147	N/A	N/A	Sep. 03, 2013	N/A	ERP (OTA01-SZ)
Switch Control Mainframe	Agilent	3499A	MY42005451	N/A	N/A	Sep. 03, 2013	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))	**2.54**

Uncertainty of Radiated Emission Measurement (1 GHz ~ 40 GHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**4.72**