FCC RF Test Report

APPLICANT	:	Sonim Technologies, Inc.
EQUIPMENT	:	LTE Smartphone
BRAND NAME	:	Sonim
MODEL NAME	:	XP7700
MARKETING NAME	:	XP7
FCC ID	:	WYPL22V012AA
STANDARD	:	FCC 47 CFR Part 2, 90(R)
CLASSIFICATION	:	PCS Licensed Transmitter Held to Ear (PCE)

The product was received on Jul. 13, 2015 and completely tested on Aug. 04, 2015. 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

SPORTON INTERNATIONAL (SHENZHEN) INC.

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APPENDIX B. TEST RESULTS OF RADIATED TEST

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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FG571301C	Rev. 01	Initial issue of report	Sep. 21, 2015

SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.4	§2.1046	Conducted Output Power	Reporting only	PASS	-
3.5	§2.1049	Occupied Bandwidth	Reporting only	PASS	-
3.6	§2.1053 §90.543 (e)(2)(3)	Conducted Band Edge Measurement	Refer standard	PASS	-
3.7	§2.1051 §90.210(n)	Emission Mask	Mask B	PASS	
3.8	§2.1053 §90.543 (e)(3)	Conducted Spurious Emission	< $43+10\log_{10}$(P[Watts])	PASS	
3.9	§2.1055 §90.539 (e)	Frequency Stability Temperature & Voltage	< ±1.25 ppm	PASS	
4.4	§2.1053 §90.543 (e)(3) §90.543 (f)	Radiated Spurious Emission	< $43+10\log_{10}$(P[Watts])	PASS	Under limit 16.11 dB at 1577.180 MHz
4.5	§90.542 (a)(7)	Effective Radiated Power	ERP < 3Watt	PASS	-

1 General Description

1.1 Applicant

Sonim Technologies, Inc.
1825 S. Grant St., Suite 200., San Mateo, CA, 94402

1.2 Manufacturer

Sonim Technologies (Shenzhen) Limited
2nd Floor, No. 2 Building Phase B, Daqian Industrial park, Longchang Road, 67 District, Baoan, Shenzhen, P. R. China

1.3 Feature of Equipment Under Test

Product Feature	
Equipment	LTE Smartphone
Brand Name	Sonim
Model Name	XP7700
Marketing Name	XP7
FCC ID	WYPL22V012AA
Tx Frequency	LTE Band 14: 790.5 MHz ~ 795.5 MHz
Rx Frequency	LTE Band 14: 760.5 MHz ~ 765.5 MHz
Bandwidth	5MHz / 10MHz
Maximum Output Power to Antenna	LTE Band 14: 22.73dBm
Type of Modulation	QPSK / 16QAM / 64QAM(Downlink only)
MEID Code	Conducted: 99000516020337 Radiation: 99000516020332 ERP: NA
Type Number	L22V012AA
HW Version	A
SW Version	7A.0.0-00-4.4.4-15.01.07
EUT Stage	Identical Prototype

Remark:

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

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

1.4 Emission Designator

LTE Band 14	QPSK			16QAM		
BW(MHz)	Emission Designator (99%OBW)	Frequency Tolerance (ppm)	Maximum ERP(W)	Emission Designator (99%OBW)	Frequency Tolerance (ppm)	Maximum ERP(W)
5	4M52G7D	-	0.0935	4M51W7D	-	0.0771
10	9M11G7D	0.0038	0.0571	9M03W7D	-	0.0420

1.5 Testing Site

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

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

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

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, Part 90(R)
- ANSI / TIA / EIA-603-C-2004
- FCC KDB 971168 Measurement Guidance of License Digital Systems v02r02

Remark:

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.

2 Test Configuration of Equipment Under Test

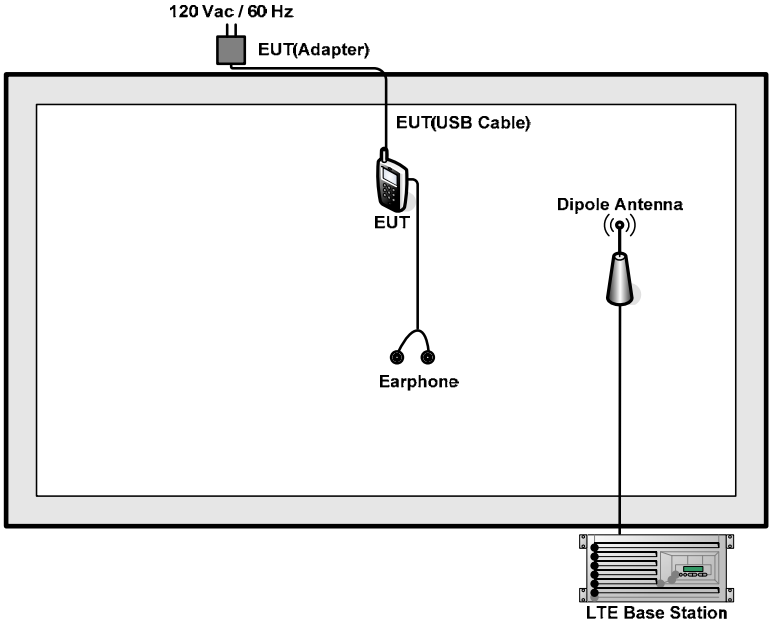
2.1 Test Mode

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.

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

Conducted Test Cases	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	14	-	-	V	-	-	-	V	V	V	V	V	V	V	V
	14	-	-		V	-	-	V	V	V	V	V		V	
26dB and 99% Bandwidth	14	-	-	V		-	-	V	V			V	V	V	V
	14	-	-		V	-	-	V	V			V		V	
Conducted Band Edge	14	-	-	V		-	-	V	V	V		V	V		V
	14	-	-		V	-	-	V	V	V		V		V	
Emission Mask	14	-	-	V		-	-	V	V	V		V	V	V	V
	14	-	-		V	-	-	V	V	V		V		V	
Conducted Spurious Emission	14	-	-	V		-	-	V	V	V			V	V	V
	14	-	-		V	-	-	V	V	V				V	
Frequency Stability	14	-	-		V	-	-	V	V			V		V	
E.R.P	14	-	-	V		-	-	V	V	V			V	V	V
	14	-	-		V	-	-	V	V	V				V	
Radiated Spurious Emission	14	-	-	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.	Power Supply	GW INSTEK	GPD-2303S	N/A	N/A	Unshielded, 1.8 m
2.	LTE Base Station	Anritsu	MT8820C	N/A	N/A	Unshielded, 1.8 m
3.	Earphone	Lenovo	SH100	N/A	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 4.5 dB and 10dB attenuator.

Example :

Offset(dB) = RF cable loss(dB) + attenuator factor(dB).

= 4.5 + 10 = 14.5 (dB)

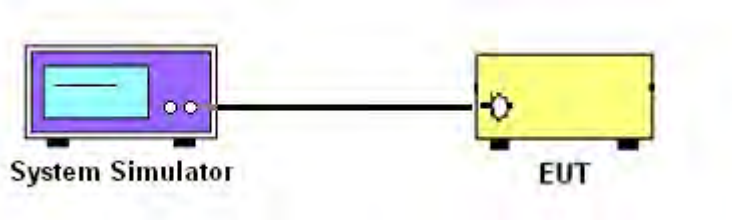
3 Conducted Test Items

3.1 Measuring Instruments

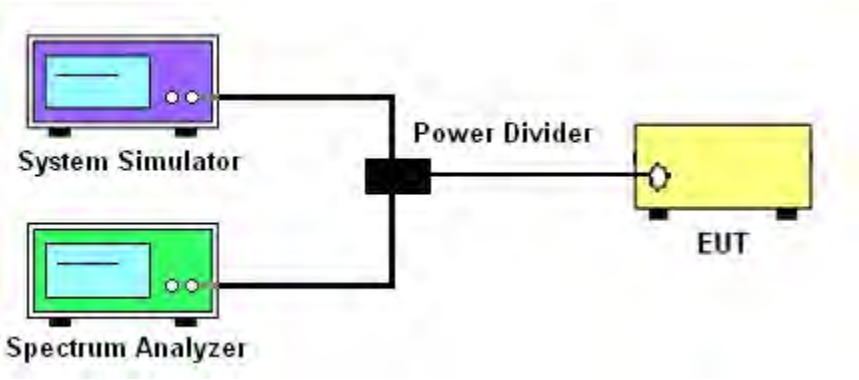
See list of measuring instruments of this test report.

3.2 Test Setup

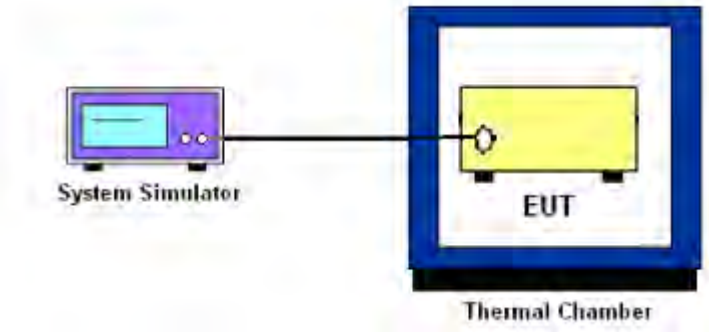
3.2.1 Conducted Output Power



3.2.2 Occupied / 26dB Bandwidth ,Band-Edge and Conducted Spurious Emission



3.2.3 Frequency Stability



3.3 Test Result of Conducted Test

Please refer to Appendix A.

3.4 Conducted Output Power Measurement

3.4.1 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.

3.4.2 Test Procedures

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.
4. Measure and record the power level from the system simulator.

3.5 Occupied Bandwidth

3.5.1 Description of 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 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.

3.5.2 Test Procedures

1. The testing follows FCC KDB 971168 v02r02 Section 4.2.
2. The EUT was connected to spectrum analyzer and system simulator via a power divider.

3.6 Conducted Band Edge Measurement

3.6.1 Description of Conducted Band Edge Measurement

For operations in the 758-768 MHz and the 788-798 MHz bands

(1) On all frequencies between 769-775 MHz and 799-805 MHz, by a factor not less than 76 + 10 log (P) dB in a 6.25 kHz band segment, for base and fixed stations.

(2) On all frequencies between 769-775 MHz and 799-805 MHz, by a factor not less than 65 + 10 log (P) dB in a 6.25 kHz band segment, for mobile and portable stations.

(3) On any frequency between 775-788 MHz, above 805 MHz, and below 758 MHz, by at least 43 + 10 log (P) dB.

3.6.2 Test Procedures

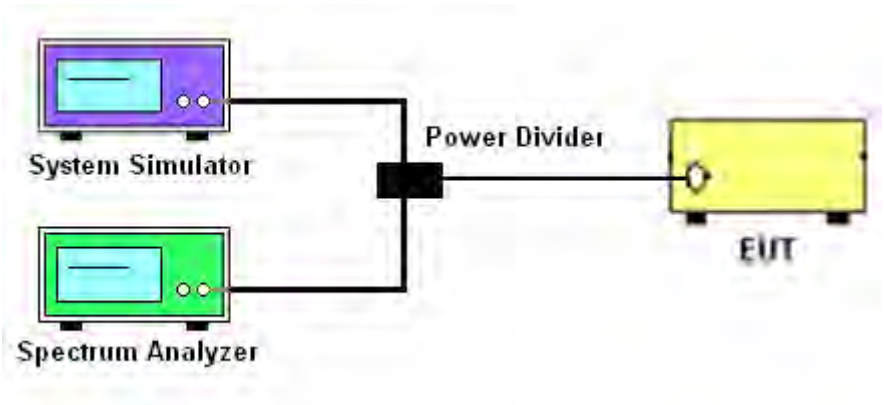
1. The EUT was connected to Spectrum Analyzer and Base Station via power divider.
2. Set spectrum analyzer with RMS detector.
3. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
4. The limit line is derived from 43 + 10log(P)dB below the transmitter power P(Watts)
   = P(W)- [43 + 10log(P)] (dB)
   = [30 + 10log(P)] (dBm) - [43 + 10log(P)] (dB)
   = -13dBm.

3.7 Emission Mask

3.7.1 Test Procedures

1. The testing follows FCC KDB 971168 v02r02 Section 6.0.
2. The EUT was connected to spectrum analyzer and system simulator via a power divider.
3. The power of the modulated signal was measured on a spectrum analyzer using an RMS and 10 second sweep time in order to maximize the level.
4. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.

3.7.2 Test Setup



3.8 Conducted Spurious Emission Measurement

3.8.1 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 10th harmonic.

3.8.2 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, for under 1GHz RBW = 100kHz, VBW = 300kHz and for above 1GHz RBW = 1MHz, VBW = 3MHz, taking the record of maximum spurious emission.
6. Set spectrum analyzer with RMS detector.
7. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
8. 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.

3.9 Frequency Stability Measurement

3.9.1 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 ±1.25 ppm of the center frequency.

3.9.2 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.

3.9.3 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.

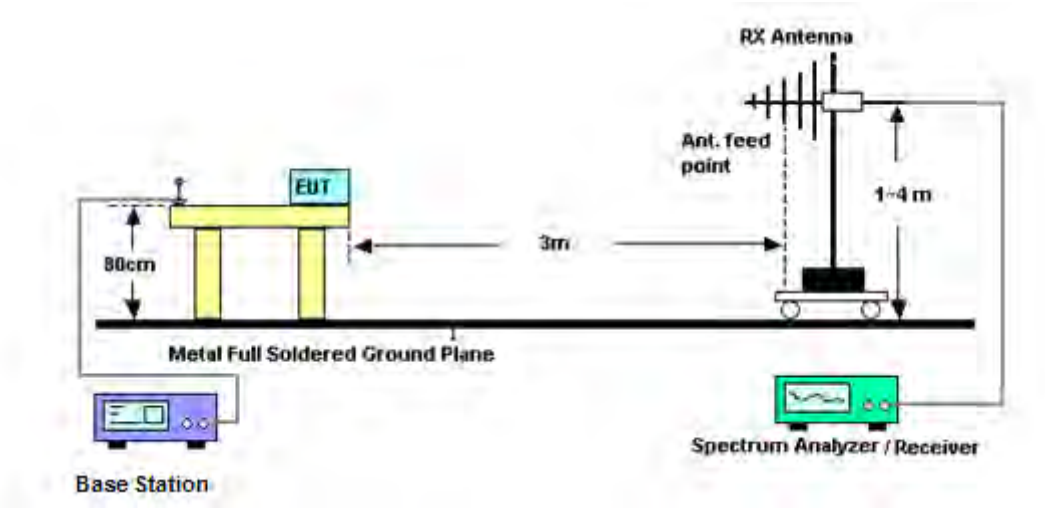
4 Radiated Test Items

4.1 Measuring Instruments

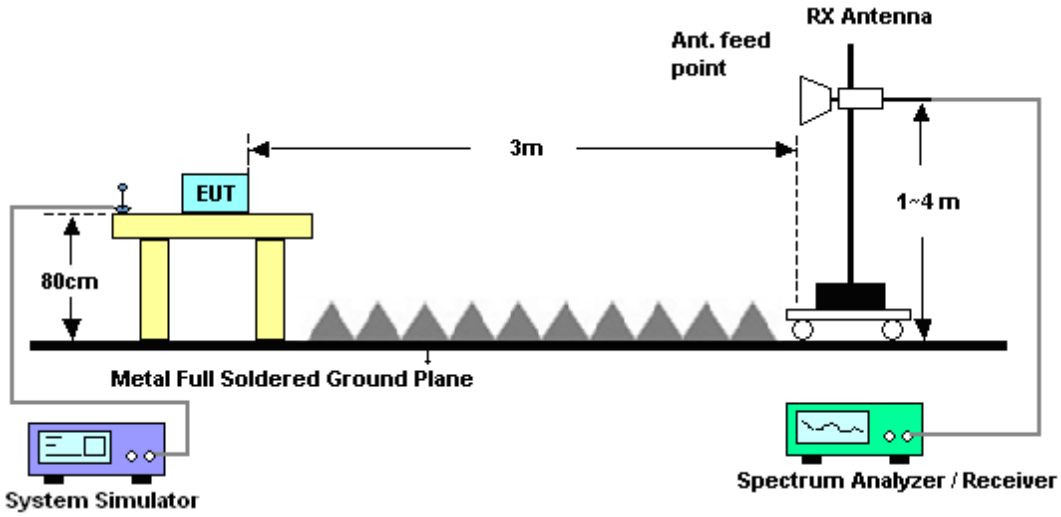
See list of measuring instruments of this test report.

4.2 Test Setup

4.2.1 For radiated test from 30MHz to 1GHz



4.2.2 For radiated test above 1GHz



4.3 Test Result of Radiated Test

Please refer to Appendix B.

4.4 Radiated Spurious Emission Measurement

4.4.1 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 operations in the 758-775 MHz and 788-805 MHz bands, all emissions including harmonics 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. For the purpose of equipment authorization, a transmitter shall be tested with an antenna that is representative of the type that will be used with the equipment in normal operation.

4.4.2 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. 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
    ERP (dBm) = EIRP – 2.15

4.5 Effective Radiated Power

4.5.1 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 v02r02. The ERP of mobile transmitters must not exceed 3 Watts for Part90R.

4.5.2 Test Procedures

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

	LTE Average					
LTE BW	1.4M	3M	5M	10M	15M	20M
Span	3MHz	6MHz	10MHz	20MHz	30MHz	40MHz
RBW	30kHz	100kHz	100kHz	300kHz	300kHz	300kHz
VBW	100kHz	300kHz	300kHz	1MHz	1MHz	1MHz
Detector	RMS	RMS	RMS	RMS	RMS	RMS
Trace	Average	Average	Average	Average	Average	Average
Average Type	Power	Power	Power	Power	Power	Power
Sweep Count	100	100	100	100	100	100

5 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	R&S	FSV40	101078	9kHz~40GHz	May 05, 2015	Aug. 03, 2015~ Aug. 04, 2015	May 04, 2016	Conducted (TH01-SZ)
Thermal Chamber	Ten Billion Hongzhangroup	LP-150U	H2014081803	-40~+150°C	Sep. 16, 2014	Aug. 03, 2015~ Aug. 04, 2015	Sep. 15, 2015	Conducted (TH01-SZ)
EMI Test Receiver&SA	Agilent Technologies	N9038A	MY52260185	20Hz~26.5GHz	May 26, 2015	Jul. 25, 2015	May 25, 2016	Radiation (03CH01-SZ)
Spectrum Analyzer	R&S	FSV40	101041	10kHz~40GHz;Max 30dBm	Sep. 25, 2014	Jul. 25, 2015	Sep. 24, 2015	Radiation (03CH01-SZ)
Bilog Antenna	TeseQ	CBL6112D	23188	30MHz~2GHz	Nov. 07, 2014	Jul. 25, 2015	Nov. 06, 2015	Radiation (03CH01-SZ)
Double Ridge Horn Antenna	ETS-Lindgren	3117	00119436	1GHz~18GHz	Oct. 15, 2014	Jul. 25, 2015	Oct. 14, 2015	Radiation (03CH01-SZ)
SHF-EHF Horn	com-power	AH-840	101071	18GHz~40GHz	Sep. 04, 2014	Jul. 25, 2015	Sep. 03, 2015	Radiation (03CH01-SZ)
Amplifier	ADVANTEST	BB525C	E9007003	9kHz~3000MHz / 30 dB	Jan. 28, 2015	Jul. 25, 2015	Jan. 27, 2016	Radiation (03CH01-SZ)
Amplifier	Yiai	AV3860B	04030	2GHz~26.5GHz	May 05, 2015	Jul. 25, 2015	May 04, 2016	Radiation (03CH01-SZ)
Amplifier	Agilent Technologies	83017A	MY39501302	500MHz~26.5GHz	Jan. 28, 2015	Jul. 25, 2015	Jan. 27, 2016	Radiation (03CH01-SZ)
AC Power Source	Chroma	61601	616010001985	N/A	NCR	Jul. 25, 2015	NCR	Radiation (03CH01-SZ)
Turn Table	EM	EM1000	N/A	0~360 degree	NCR	Jul. 25, 2015	NCR	Radiation (03CH01-SZ)
Antenna Mast	EM	EM1000	N/A	1 m~4 m	NCR	Jul. 25, 2015	NCR	Radiation (03CH01-SZ)

6 Uncertainty of Evaluation

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

Measuring Uncertainty for a Levxel of Confidence of 95% (U = 2Uc(y))	**3.9 dB**

Appendix A. Test Results of Conducted Test

Conducted Output Power(Average power)

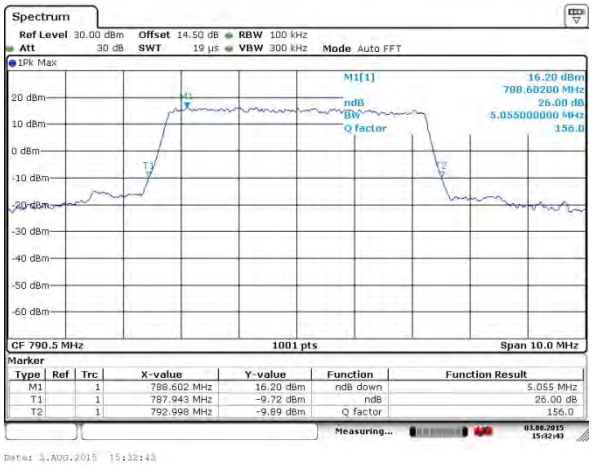
LTE Band 14 Maximum Average Power [dBm]						
BW [MHz]	RB Size	RB Offset	Mod	Lowest	Middle	Highest
5	1	0	QPSK	22.55	22.50	22.61
5	1	12		22.58	22.56	22.63
5	1	24		22.60	22.63	22.64
5	12	0		21.57	21.62	21.63
5	12	6		21.59	21.63	21.67
5	12	11		21.67	21.72	21.69
5	25	0		21.63	21.63	21.65
5	1	0	16-QAM	21.28	21.30	21.36
5	1	12		21.30	21.42	21.13
5	1	24		21.41	21.37	21.26
5	12	0		20.52	20.68	20.59
5	12	6		20.54	20.60	20.71
5	12	11		20.57	20.59	20.66
5	25	0		20.61	20.64	20.59
10	1	0	QPSK		22.65	
10	1	24			22.66	
10	1	49			22.73	
10	25	0			21.64	
10	25	12			21.68	
10	25	24			21.72	
10	50	0			21.71	
10	1	0	16-QAM		21.21	
10	1	24			21.26	
10	1	49			21.35	
10	25	0			20.59	
10	25	12			20.64	
10	25	24			20.59	
10	50	0			20.68	

26dB Bandwidth

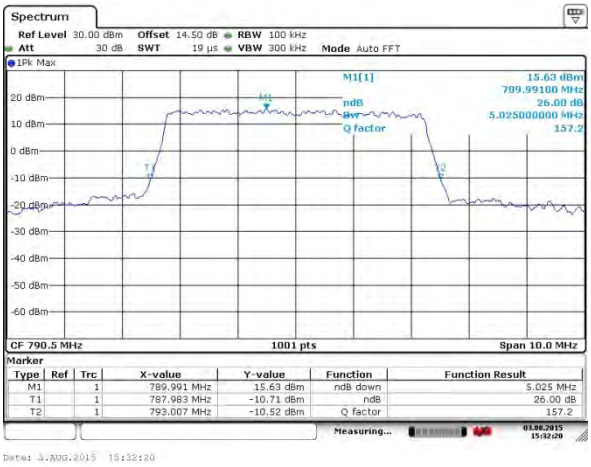
Mode	LTE Band 14: 26dB BW(MHz)											
BW	1.4MHz		3MHz		5MHz		10MHz		15MHz		20MHz	
Mod.	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Lowest CH	-	-	-	-	5.06	5.03	-	-	-	-	-	-
Middle CH	-	-	-	-	5.07	5.06	10.01	9.99	-	-	-	-
Highest CH	-	-	-	-	5.09	5.03	-	-	-	-	-	-

LTE Band 14

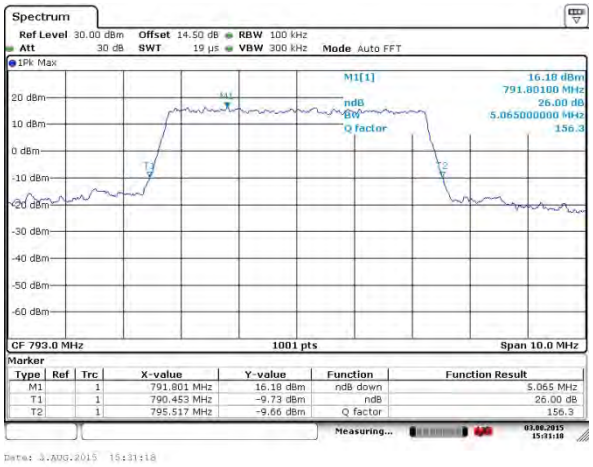
Lowest Channel / 5MHz / QPSK



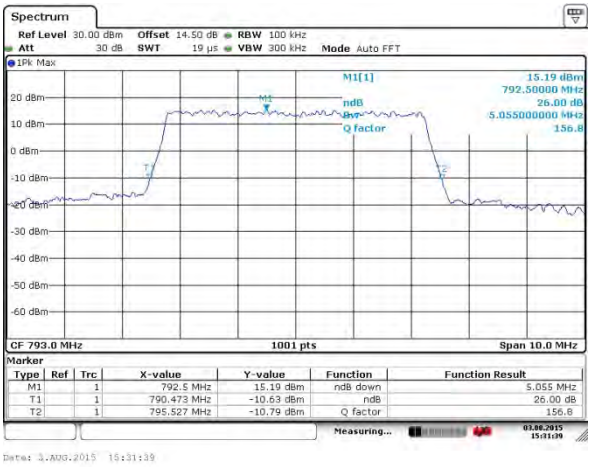
Lowest Channel / 5MHz / 16QAM



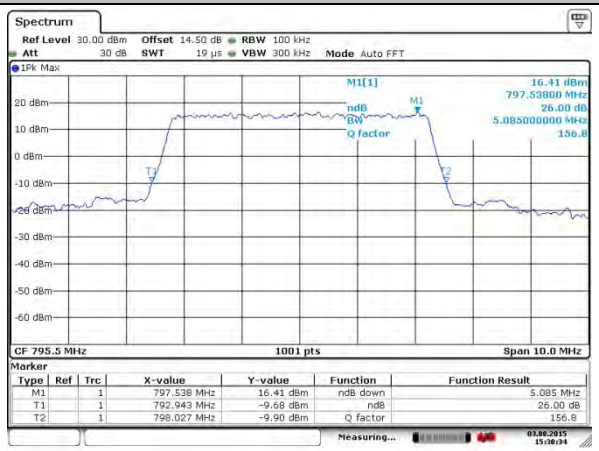
Middle Channel / 5MHz / QPSK



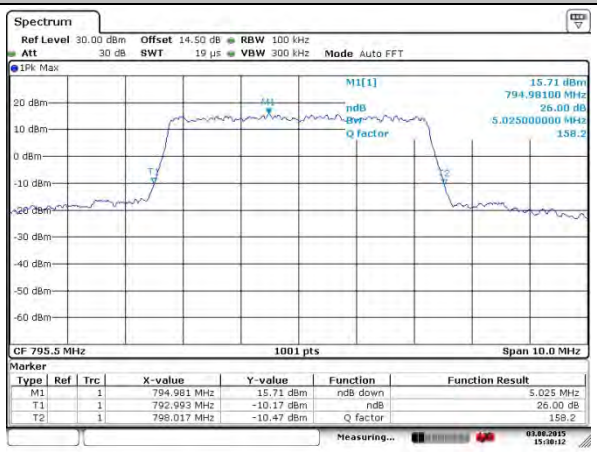
Middle Channel / 5MHz / 16QAM



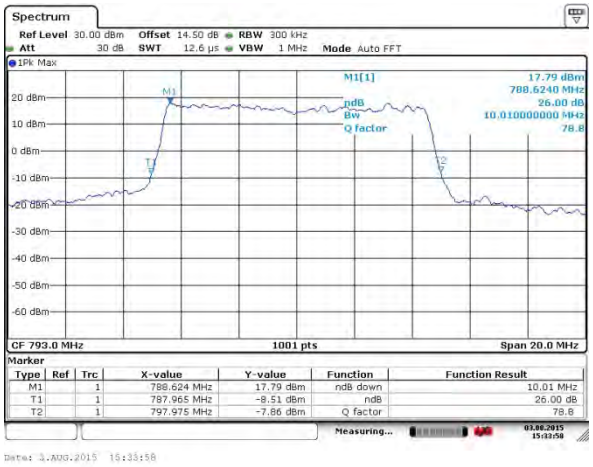
Highest Channel / 5MHz / QPSK

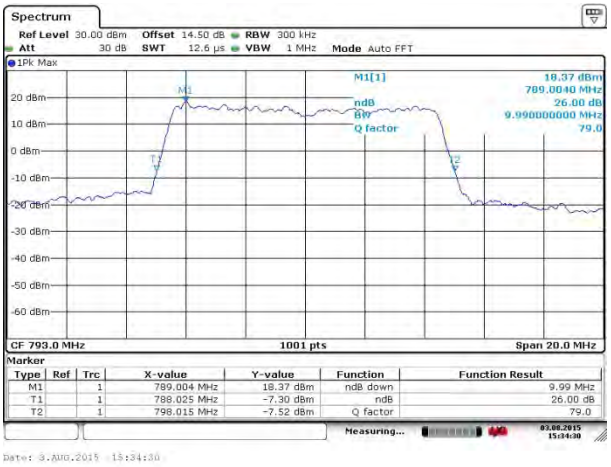


Highest Channel / 5MHz / 16QAM



LTE Band 14	
Middle Channel / 10MHz / QPSK	**Middle Channel / 10MHz / 16QAM**



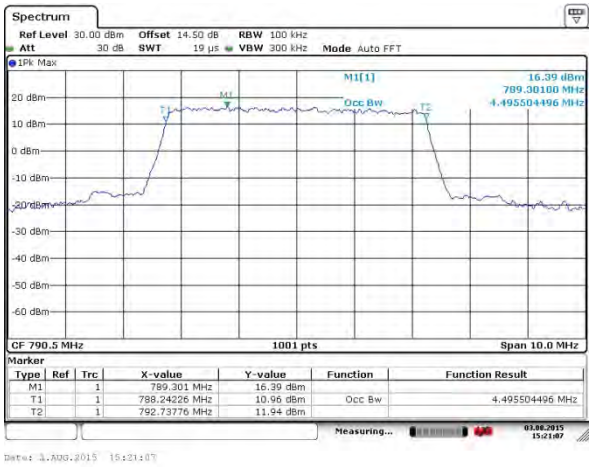


Occupied Bandwidth

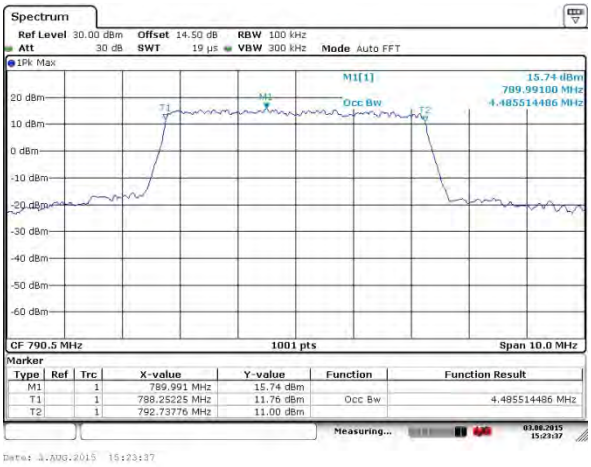
Mode	LTE Band 14: 99%OBW(MHz)											
BW	1.4MHz		3MHz		5MHz		10MHz		15MHz		20MHz	
Mod.	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Lowest CH	-	-	-	-	4.50	4.49	-	-	-	-	-	-
Middle CH	-	-	-	-	4.52	4.51	9.11	9.03	-	-	-	-
Highest CH	-	-	-	-	4.51	4.50	-	-	-	-	-	-

LTE Band 14

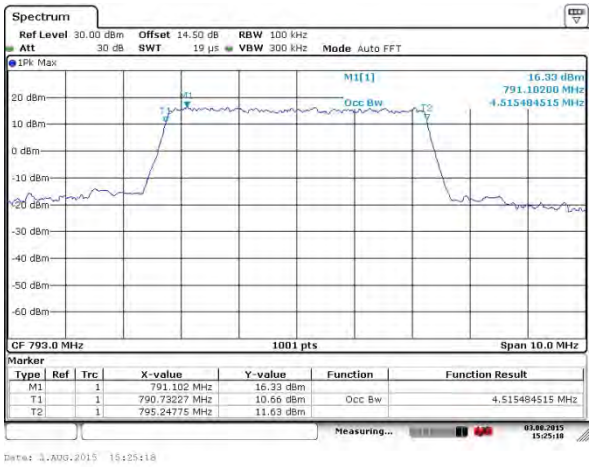
Lowest Channel / 5MHz / QPSK



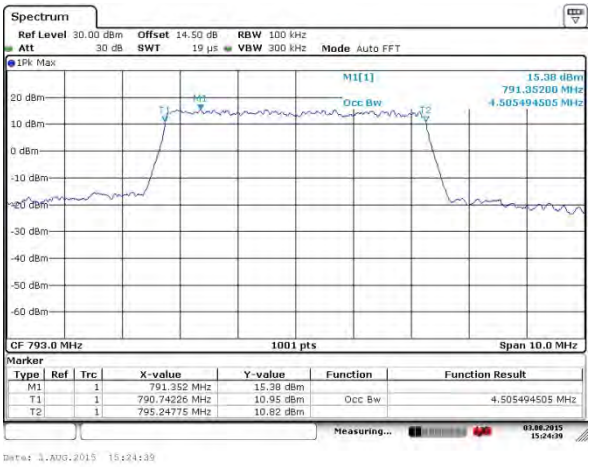
Lowest Channel / 5MHz / 16QAM



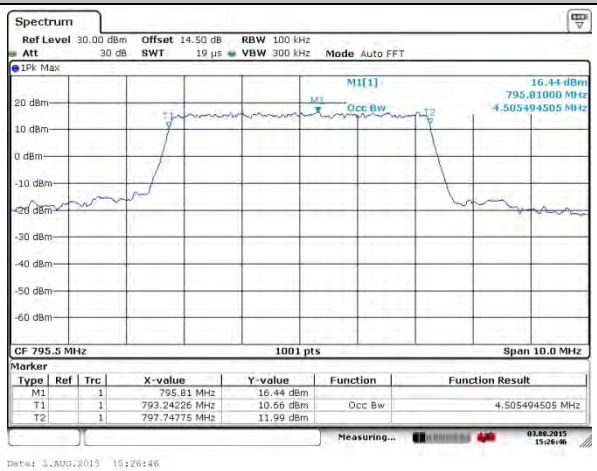
Middle Channel / 5MHz / QPSK



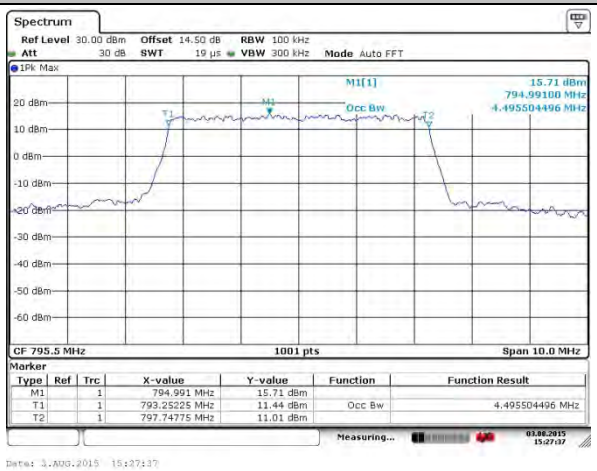
Middle Channel / 5MHz / 16QAM



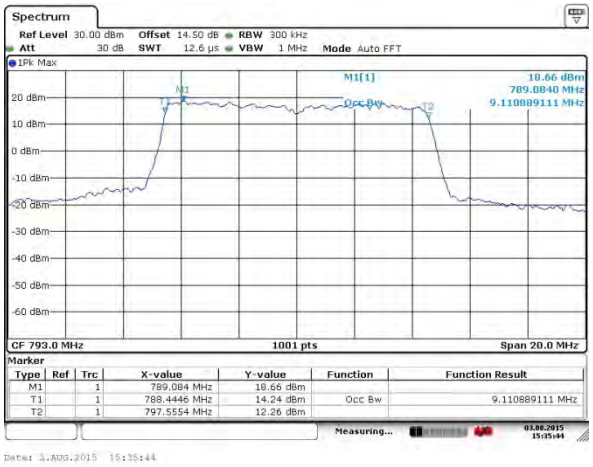
Highest Channel / 5MHz / QPSK

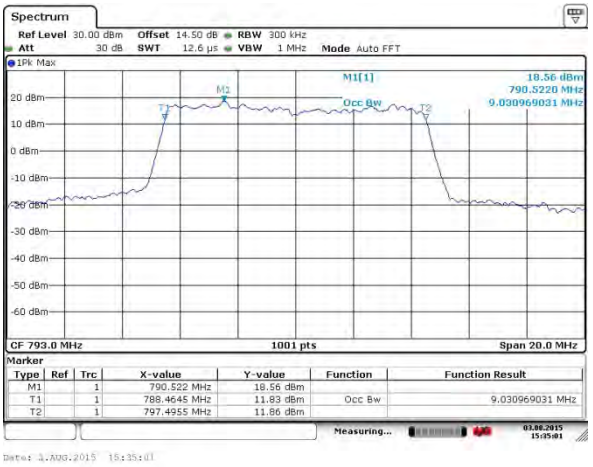


Highest Channel / 5MHz / 16QAM



LTE Band 14	
Middle Channel / 10MHz / QPSK	Middle Channel / 10MHz / 16QAM

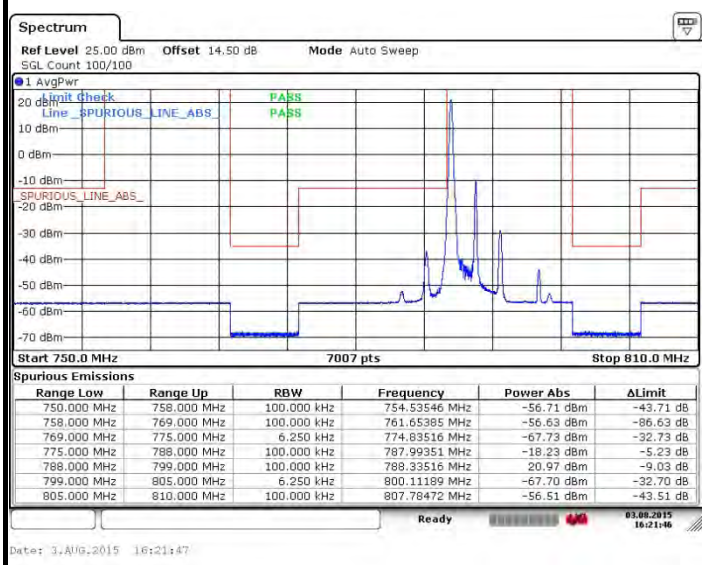




Conducted Band Edge

LTE Band 14/ 5MHz / QPSK

Lowest Band Edge / 1 RB

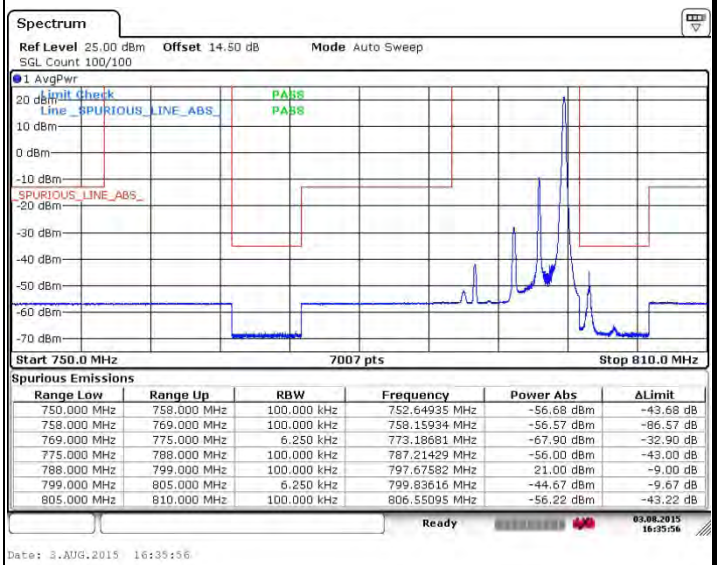


Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
750.000 MHz	758.000 MHz	100.000 kHz	754.53546 MHz	-56.71 dBm	-43.71 dB
758.000 MHz	769.000 MHz	100.000 kHz	761.65385 MHz	-56.63 dBm	-86.63 dB
769.000 MHz	775.000 MHz	6.250 kHz	774.83516 MHz	-67.73 dBm	-32.73 dB
775.000 MHz	788.000 MHz	100.000 kHz	787.99351 MHz	-18.23 dBm	-5.23 dB
788.000 MHz	799.000 MHz	100.000 kHz	788.33516 MHz	20.97 dBm	-9.03 dB
799.000 MHz	805.000 MHz	6.250 kHz	800.11189 MHz	-67.70 dBm	-32.70 dB
805.000 MHz	810.000 MHz	100.000 kHz	807.78472 MHz	-56.51 dBm	-43.51 dB

Date: 3.AUG.2015 16:21:47

Highest Band Edge / 1 RB

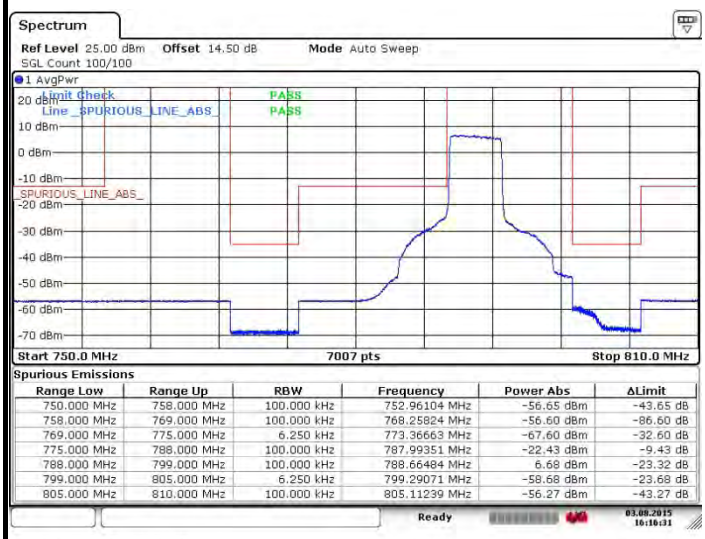


Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
750.000 MHz	758.000 MHz	100.000 kHz	752.64935 MHz	-56.68 dBm	-43.68 dB
758.000 MHz	769.000 MHz	100.000 kHz	758.15934 MHz	-56.57 dBm	-86.57 dB
769.000 MHz	775.000 MHz	6.250 kHz	773.18681 MHz	-67.90 dBm	-32.90 dB
775.000 MHz	788.000 MHz	100.000 kHz	787.21429 MHz	-56.00 dBm	-43.00 dB
788.000 MHz	799.000 MHz	100.000 kHz	797.67582 MHz	21.00 dBm	-9.00 dB
799.000 MHz	805.000 MHz	6.250 kHz	799.83616 MHz	-44.67 dBm	-9.67 dB
805.000 MHz	810.000 MHz	100.000 kHz	806.55095 MHz	-56.22 dBm	-43.22 dB

Date: 3.AUG.2015 16:35:56

Lowest Band Edge / Full RB

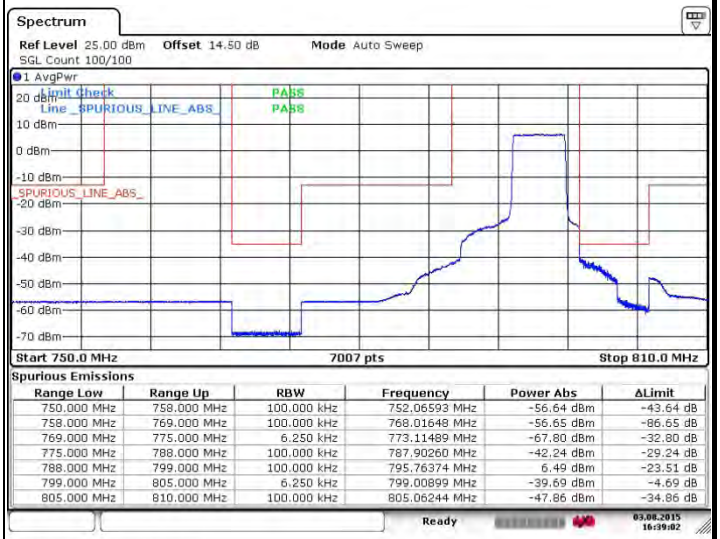


Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
750.000 MHz	758.000 MHz	100.000 kHz	752.96104 MHz	-56.65 dBm	-43.65 dB
758.000 MHz	769.000 MHz	100.000 kHz	768.25824 MHz	-56.60 dBm	-86.60 dB
769.000 MHz	775.000 MHz	6.250 kHz	773.36663 MHz	-67.60 dBm	-32.60 dB
775.000 MHz	788.000 MHz	100.000 kHz	787.99351 MHz	-22.43 dBm	-9.43 dB
788.000 MHz	799.000 MHz	100.000 kHz	788.66484 MHz	6.68 dBm	-23.32 dB
799.000 MHz	805.000 MHz	6.250 kHz	799.29071 MHz	-58.68 dBm	-23.68 dB
805.000 MHz	810.000 MHz	100.000 kHz	805.11239 MHz	-56.27 dBm	-43.27 dB

Date: 3.AUG.2015 16:16:32

Highest Band Edge / Full RB



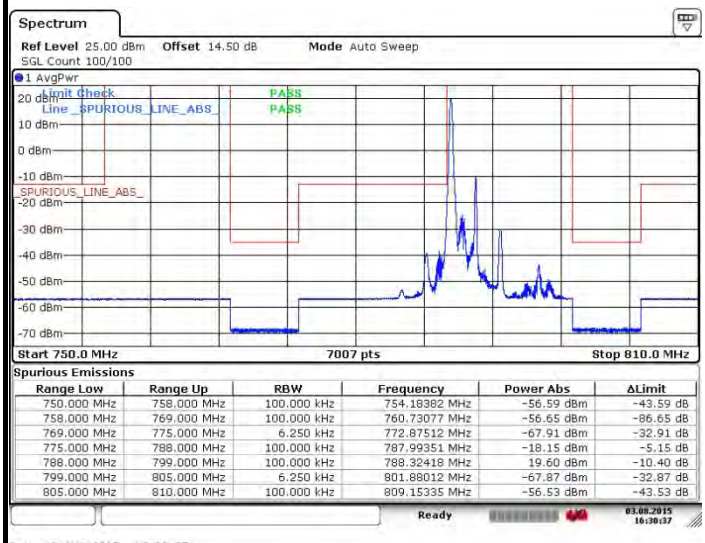
Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
750.000 MHz	758.000 MHz	100.000 kHz	752.06593 MHz	-56.64 dBm	-43.64 dB
758.000 MHz	769.000 MHz	100.000 kHz	768.01648 MHz	-56.65 dBm	-86.65 dB
769.000 MHz	775.000 MHz	6.250 kHz	773.11489 MHz	-67.80 dBm	-32.80 dB
775.000 MHz	788.000 MHz	100.000 kHz	787.90260 MHz	-42.24 dBm	-29.24 dB
788.000 MHz	799.000 MHz	100.000 kHz	795.76374 MHz	6.49 dBm	-23.51 dB
799.000 MHz	805.000 MHz	6.250 kHz	799.00899 MHz	-39.69 dBm	-4.69 dB
805.000 MHz	810.000 MHz	100.000 kHz	805.06244 MHz	-47.86 dBm	-34.86 dB

Date: 3.AUG.2015 16:39:02

LTE Band 14/ 5MHz / 16QAM

Lowest Band Edge /1 RB

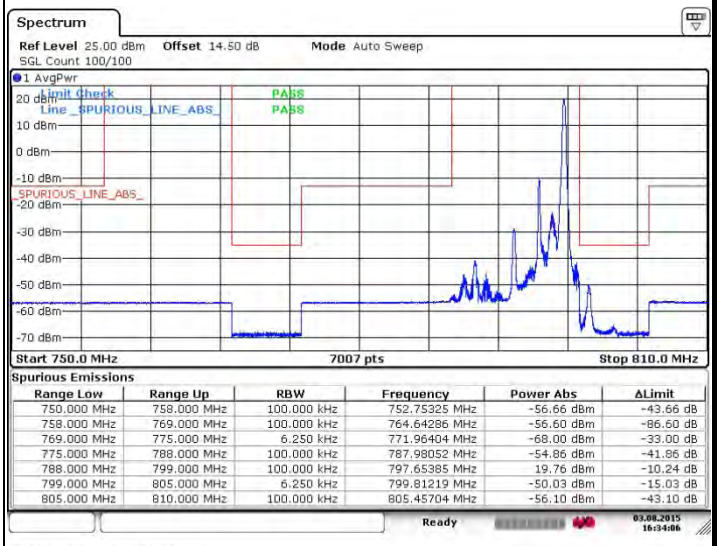


Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
750.000 MHz	758.000 MHz	100.000 kHz	754.18382 MHz	-56.59 dBm	-43.59 dB
758.000 MHz	769.000 MHz	100.000 kHz	760.73077 MHz	-56.65 dBm	-86.65 dB
769.000 MHz	775.000 MHz	6.250 kHz	772.87512 MHz	-67.91 dBm	-32.91 dB
775.000 MHz	788.000 MHz	100.000 kHz	787.99351 MHz	-18.15 dBm	-5.15 dB
788.000 MHz	799.000 MHz	100.000 kHz	788.32418 MHz	19.60 dBm	-10.40 dB
799.000 MHz	805.000 MHz	6.250 kHz	801.88012 MHz	-67.87 dBm	-32.87 dB
805.000 MHz	810.000 MHz	100.000 kHz	809.15335 MHz	-56.53 dBm	-43.53 dB

Date: 3.AUG.2015 16:30:37

Highest Band Edge / 1 RB

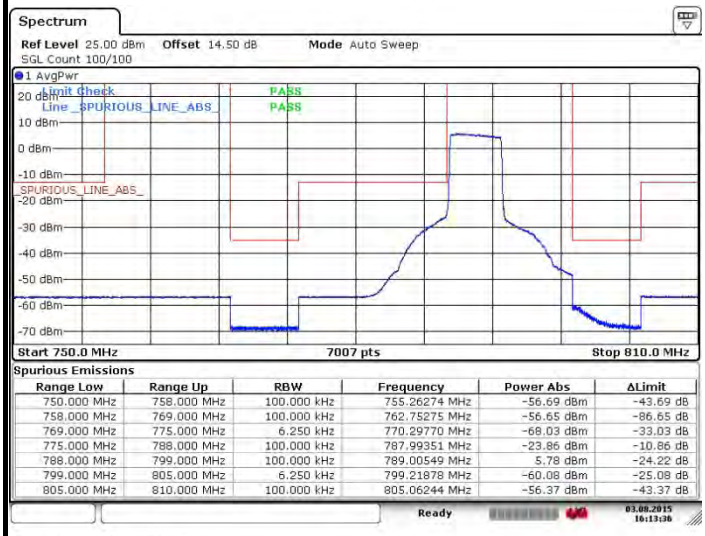


Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
750.000 MHz	758.000 MHz	100.000 kHz	752.75325 MHz	-56.66 dBm	-43.66 dB
758.000 MHz	769.000 MHz	100.000 kHz	764.64286 MHz	-56.60 dBm	-86.60 dB
769.000 MHz	775.000 MHz	6.250 kHz	771.96404 MHz	-68.00 dBm	-33.00 dB
775.000 MHz	788.000 MHz	100.000 kHz	787.98052 MHz	-54.86 dBm	-41.86 dB
788.000 MHz	799.000 MHz	100.000 kHz	797.65385 MHz	19.76 dBm	-10.24 dB
799.000 MHz	805.000 MHz	6.250 kHz	799.81219 MHz	-50.03 dBm	-15.03 dB
805.000 MHz	810.000 MHz	100.000 kHz	805.45704 MHz	-56.10 dBm	-43.10 dB

Date: 3.AUG.2015 16:34:07

Lowest Band Edge / Full RB

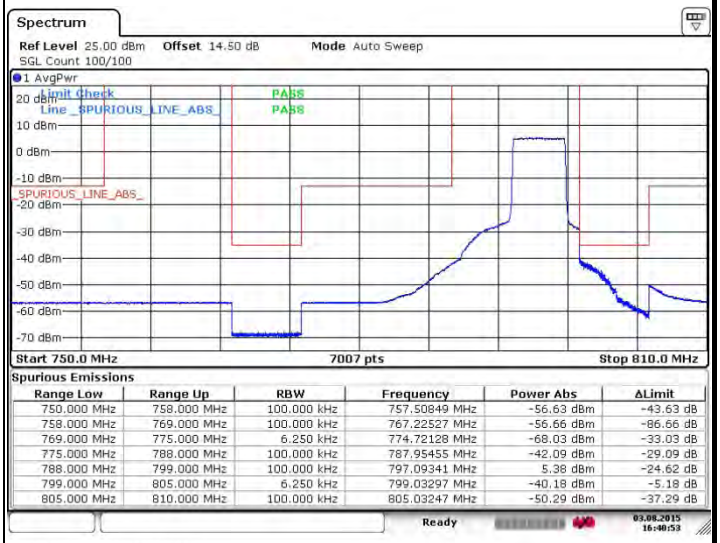


Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
750.000 MHz	758.000 MHz	100.000 kHz	755.26274 MHz	-56.69 dBm	-43.69 dB
758.000 MHz	769.000 MHz	100.000 kHz	762.75275 MHz	-56.65 dBm	-86.65 dB
769.000 MHz	775.000 MHz	6.250 kHz	770.29770 MHz	-68.03 dBm	-33.03 dB
775.000 MHz	788.000 MHz	100.000 kHz	787.99351 MHz	-23.86 dBm	-10.86 dB
788.000 MHz	799.000 MHz	100.000 kHz	789.00549 MHz	5.78 dBm	-24.22 dB
799.000 MHz	805.000 MHz	6.250 kHz	799.21878 MHz	-60.08 dBm	-25.08 dB
805.000 MHz	810.000 MHz	100.000 kHz	805.06244 MHz	-56.37 dBm	-43.37 dB

Date: 3.AUG.2015 16:13:36

Highest Band Edge / Full RB



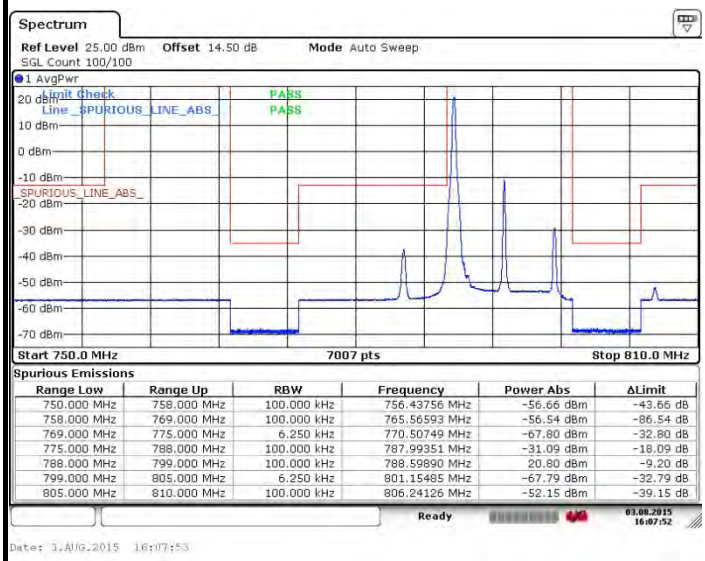
Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
750.000 MHz	758.000 MHz	100.000 kHz	757.50849 MHz	-56.63 dBm	-43.63 dB
758.000 MHz	769.000 MHz	100.000 kHz	767.22527 MHz	-56.66 dBm	-86.66 dB
769.000 MHz	775.000 MHz	6.250 kHz	774.72128 MHz	-68.03 dBm	-33.03 dB
775.000 MHz	788.000 MHz	100.000 kHz	787.95455 MHz	-42.09 dBm	-29.09 dB
788.000 MHz	799.000 MHz	100.000 kHz	797.09341 MHz	5.38 dBm	-24.62 dB
799.000 MHz	805.000 MHz	6.250 kHz	799.03297 MHz	-40.18 dBm	-5.18 dB
805.000 MHz	810.000 MHz	100.000 kHz	805.03247 MHz	-50.29 dBm	-37.29 dB

Date: 3.AUG.2015 16:40:54

LTE Band 14/ 10MHz / QPSK

Lowest Band Edge / 1 RB



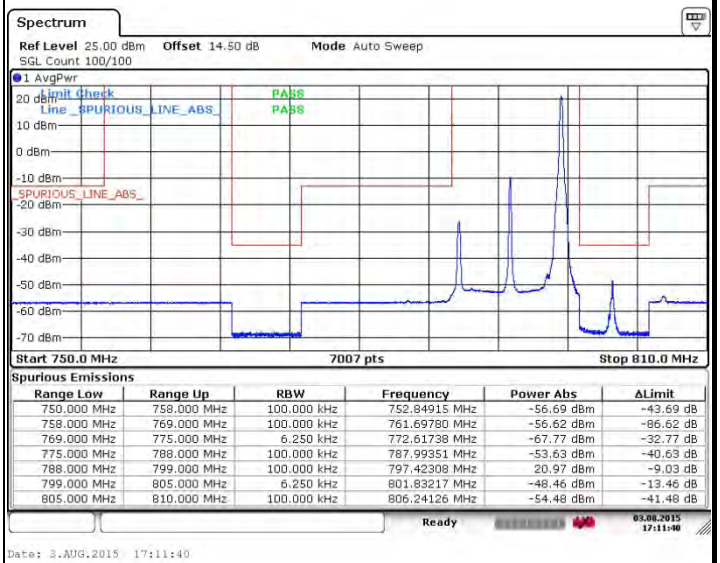
Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
750.000 MHz	758.000 MHz	100.000 kHz	756.43756 MHz	-56.66 dBm	-43.66 dB
758.000 MHz	769.000 MHz	100.000 kHz	765.56593 MHz	-56.54 dBm	-86.54 dB
769.000 MHz	775.000 MHz	6.250 kHz	770.50749 MHz	-67.80 dBm	-32.80 dB
775.000 MHz	788.000 MHz	100.000 kHz	787.99351 MHz	-31.09 dBm	-18.09 dB
788.000 MHz	799.000 MHz	100.000 kHz	788.59890 MHz	20.80 dBm	-9.20 dB
799.000 MHz	805.000 MHz	6.250 kHz	801.15485 MHz	-67.79 dBm	-32.79 dB
805.000 MHz	810.000 MHz	100.000 kHz	806.24126 MHz	-52.15 dBm	-39.15 dB

Ready 03.08.2015 16:07:52

Date: 3.AUG.2015 16:07:53

Highest Band Edge / 1 RB



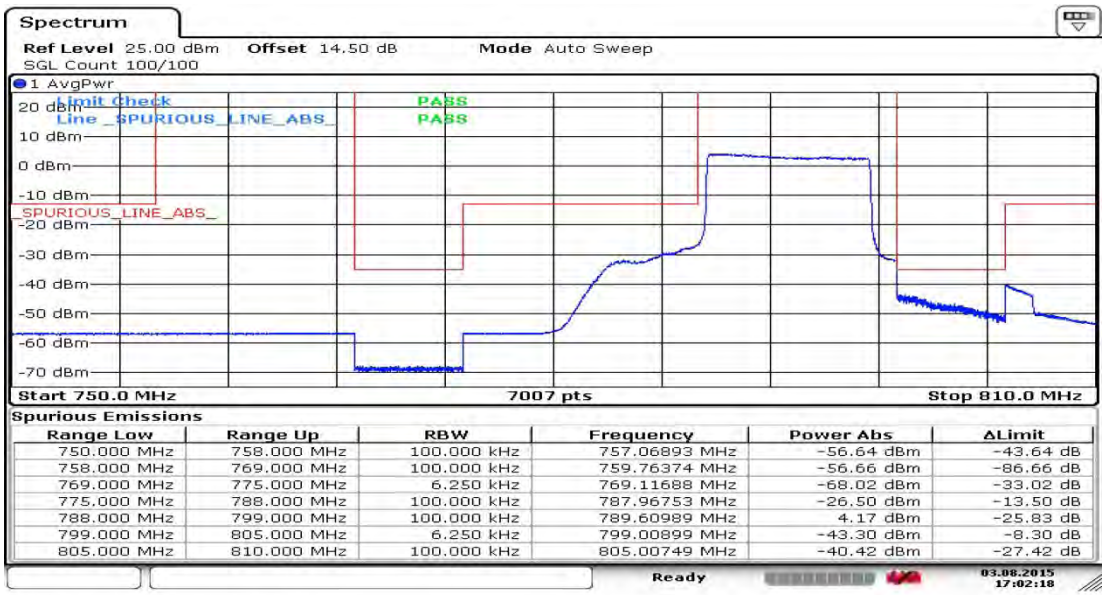
Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
750.000 MHz	758.000 MHz	100.000 kHz	752.84915 MHz	-56.69 dBm	-43.69 dB
758.000 MHz	769.000 MHz	100.000 kHz	761.69780 MHz	-56.62 dBm	-86.62 dB
769.000 MHz	775.000 MHz	6.250 kHz	772.61738 MHz	-67.77 dBm	-32.77 dB
775.000 MHz	788.000 MHz	100.000 kHz	787.99351 MHz	-53.63 dBm	-40.63 dB
788.000 MHz	799.000 MHz	100.000 kHz	797.42308 MHz	20.97 dBm	-9.03 dB
799.000 MHz	805.000 MHz	6.250 kHz	801.83217 MHz	-48.46 dBm	-13.46 dB
805.000 MHz	810.000 MHz	100.000 kHz	806.24126 MHz	-54.48 dBm	-41.48 dB

Ready 03.08.2015 17:11:40

Date: 3.AUG.2015 17:11:40

Band Edge / Full RB



Spurious Emissions

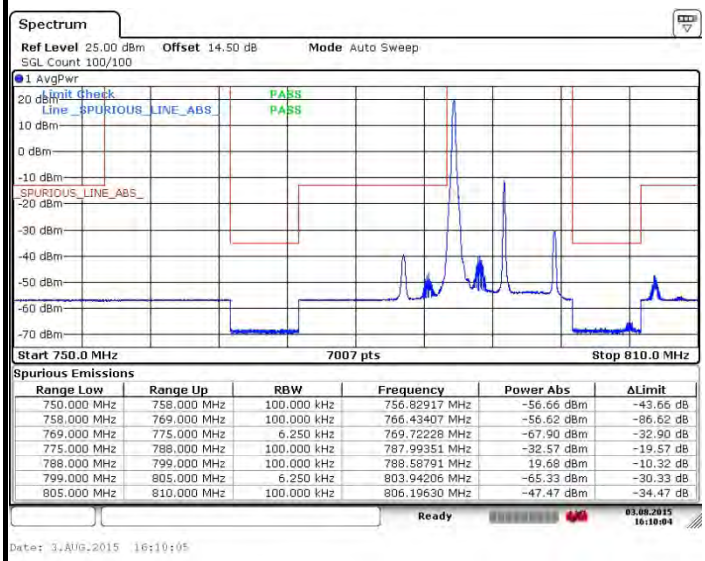
Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
750.000 MHz	758.000 MHz	100.000 kHz	757.06893 MHz	-56.64 dBm	-43.64 dB
758.000 MHz	769.000 MHz	100.000 kHz	759.76374 MHz	-56.66 dBm	-86.66 dB
769.000 MHz	775.000 MHz	6.250 kHz	769.11688 MHz	-68.02 dBm	-33.02 dB
775.000 MHz	788.000 MHz	100.000 kHz	787.96753 MHz	-26.50 dBm	-13.50 dB
788.000 MHz	799.000 MHz	100.000 kHz	789.60989 MHz	4.17 dBm	-25.83 dB
799.000 MHz	805.000 MHz	6.250 kHz	799.00899 MHz	-43.30 dBm	-8.30 dB
805.000 MHz	810.000 MHz	100.000 kHz	805.00749 MHz	-40.42 dBm	-27.42 dB

Ready 03.08.2015 17:02:18

Date: 3.AUG.2015 17:02:18

LTE Band 14/ 10MHz / 16QAM

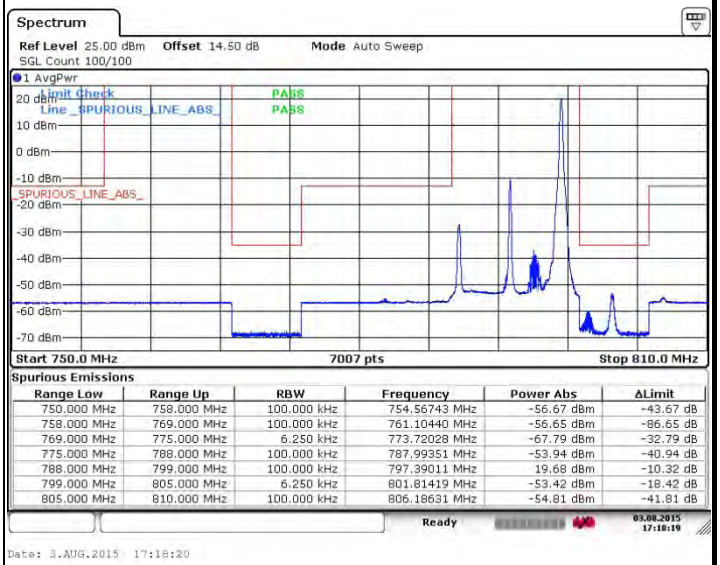
Lowest Band Edge / 1 RB



Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
750.000 MHz	758.000 MHz	100.000 kHz	756.82917 MHz	-56.66 dBm	-43.66 dB
758.000 MHz	769.000 MHz	100.000 kHz	766.43407 MHz	-56.62 dBm	-86.62 dB
769.000 MHz	775.000 MHz	6.250 kHz	769.72228 MHz	-67.90 dBm	-32.90 dB
775.000 MHz	788.000 MHz	100.000 kHz	787.99351 MHz	-32.57 dBm	-19.57 dB
788.000 MHz	799.000 MHz	100.000 kHz	788.58791 MHz	19.68 dBm	-10.32 dB
799.000 MHz	805.000 MHz	6.250 kHz	803.94206 MHz	-65.33 dBm	-30.33 dB
805.000 MHz	810.000 MHz	100.000 kHz	806.19630 MHz	-47.47 dBm	-34.47 dB

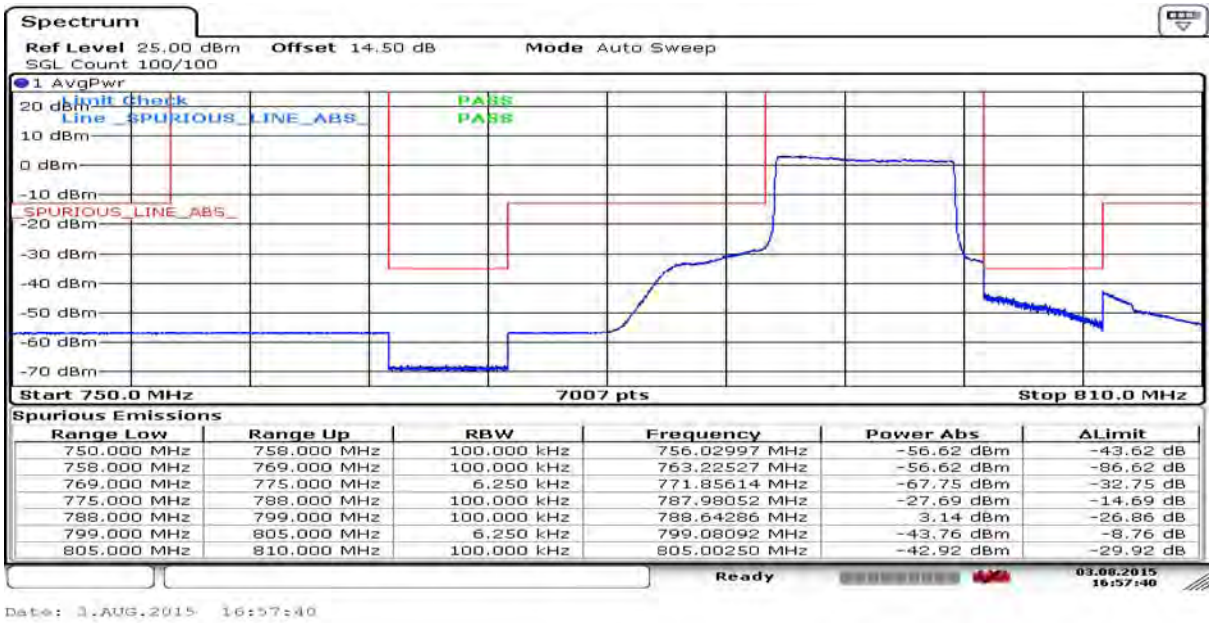
Highest Band Edge / 1 RB



Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
750.000 MHz	758.000 MHz	100.000 kHz	754.56743 MHz	-56.67 dBm	-43.67 dB
758.000 MHz	769.000 MHz	100.000 kHz	761.10440 MHz	-56.65 dBm	-86.65 dB
769.000 MHz	775.000 MHz	6.250 kHz	773.72028 MHz	-67.79 dBm	-32.79 dB
775.000 MHz	788.000 MHz	100.000 kHz	787.99351 MHz	-53.94 dBm	-40.94 dB
788.000 MHz	799.000 MHz	100.000 kHz	797.39011 MHz	19.68 dBm	-10.32 dB
799.000 MHz	805.000 MHz	6.250 kHz	801.81419 MHz	-53.42 dBm	-18.42 dB
805.000 MHz	810.000 MHz	100.000 kHz	806.18631 MHz	-54.81 dBm	-41.81 dB

Band Edge / Full RB



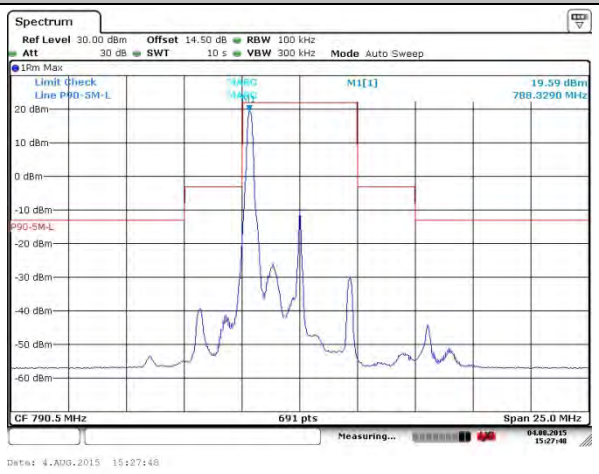
Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
750.000 MHz	758.000 MHz	100.000 kHz	756.02997 MHz	-56.62 dBm	-43.62 dB
758.000 MHz	769.000 MHz	100.000 kHz	763.22527 MHz	-56.62 dBm	-86.62 dB
769.000 MHz	775.000 MHz	6.250 kHz	771.85614 MHz	-67.75 dBm	-32.75 dB
775.000 MHz	788.000 MHz	100.000 kHz	787.98052 MHz	-27.69 dBm	-14.69 dB
788.000 MHz	799.000 MHz	100.000 kHz	788.64286 MHz	3.14 dBm	-26.86 dB
799.000 MHz	805.000 MHz	6.250 kHz	799.08092 MHz	-43.76 dBm	-8.76 dB
805.000 MHz	810.000 MHz	100.000 kHz	805.00250 MHz	-42.92 dBm	-29.92 dB

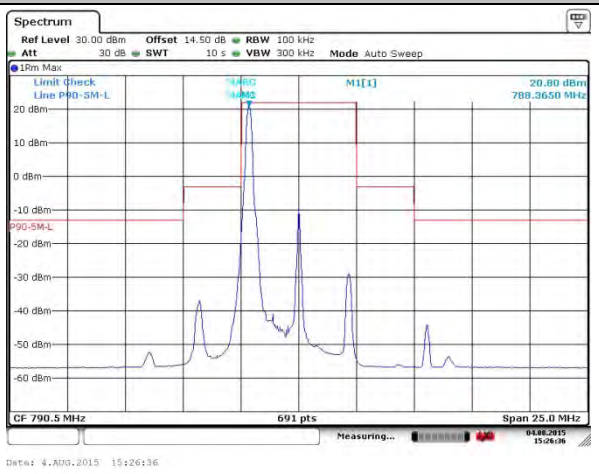
Emission Mask

LTE Band 14/ 5MHz / (1RB0)

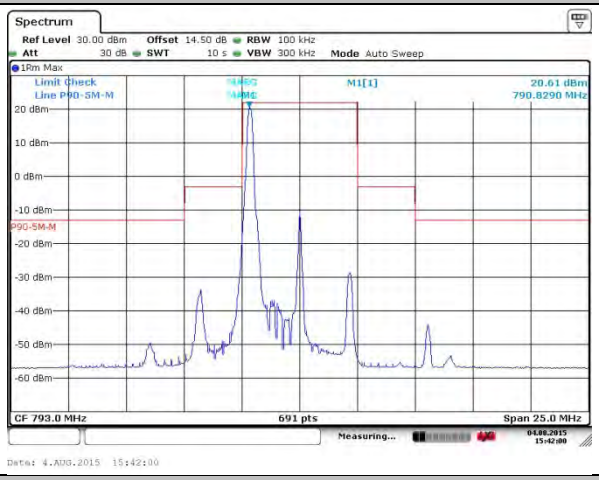
Lowest Channel / 5MHz / QPSK



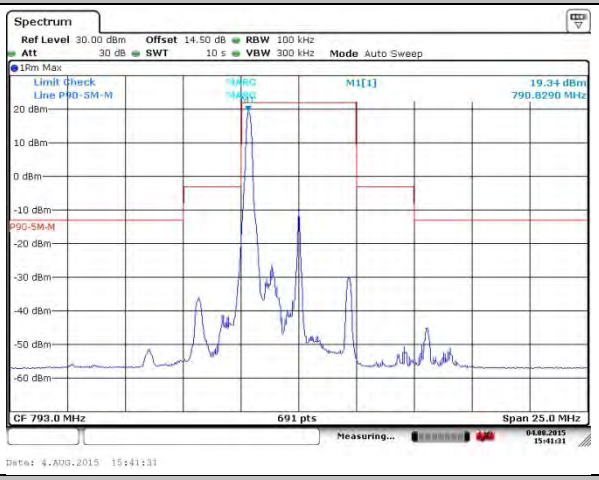
Lowest Channel / 5MHz / 16QAM



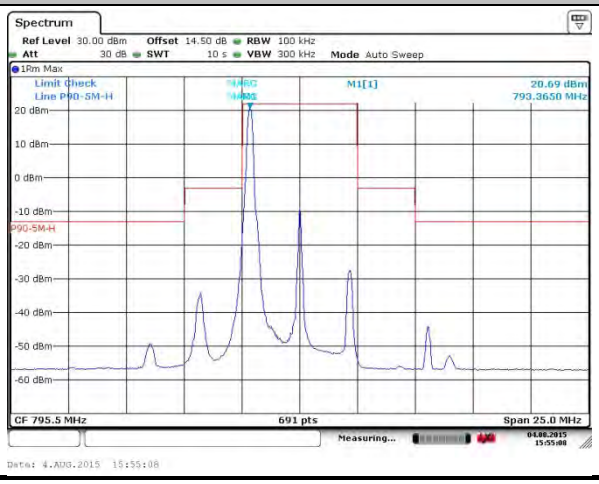
Middle Channel / 5MHz / QPSK



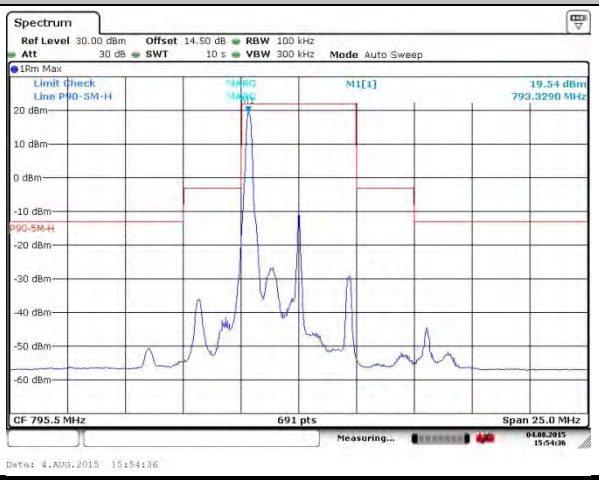
Middle Channel / 5MHz / 16QAM

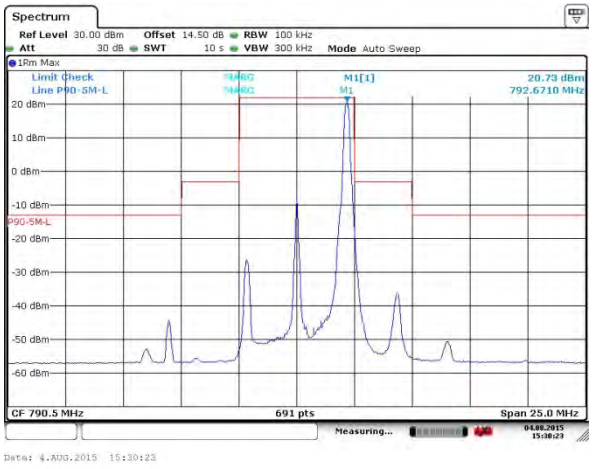
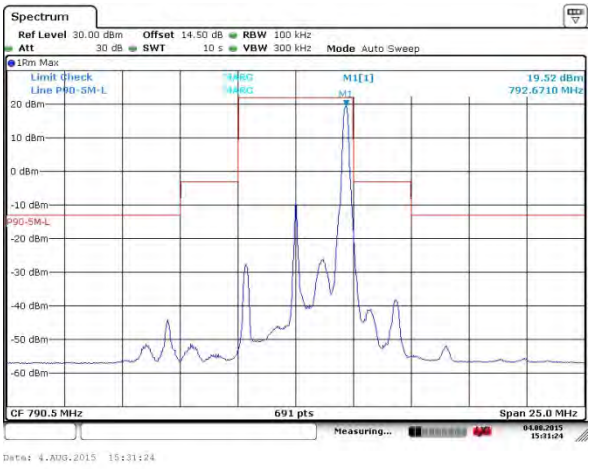
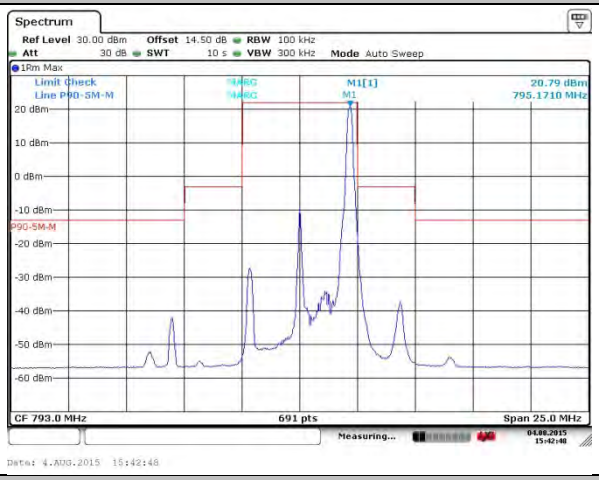
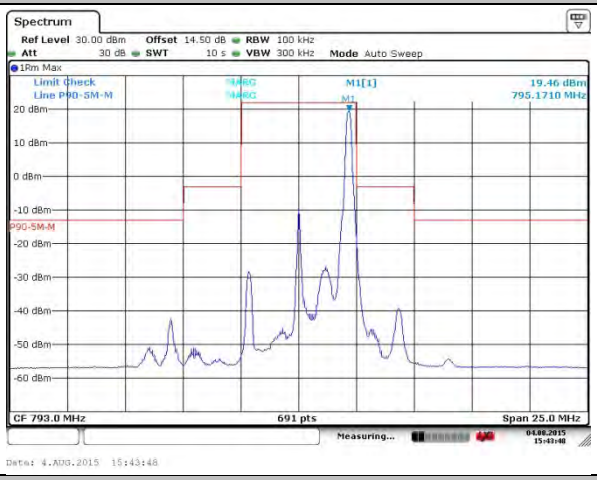
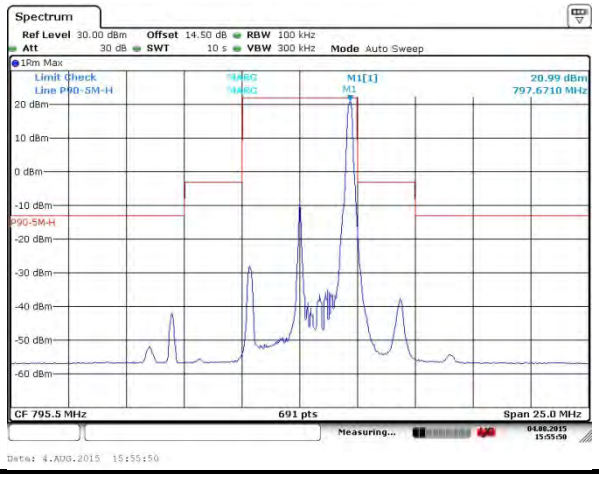
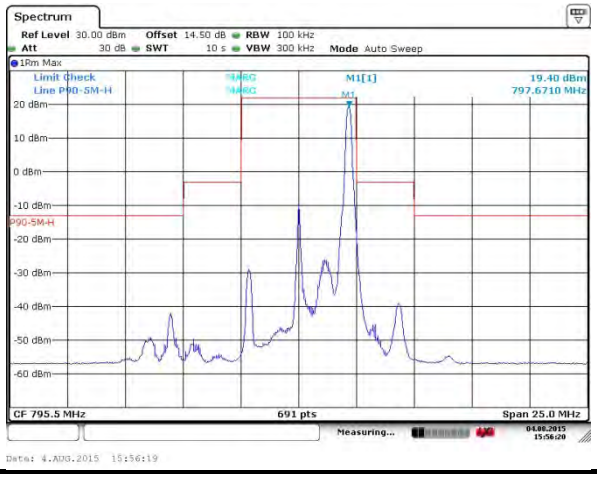


Highest Channel / 5MHz / QPSK



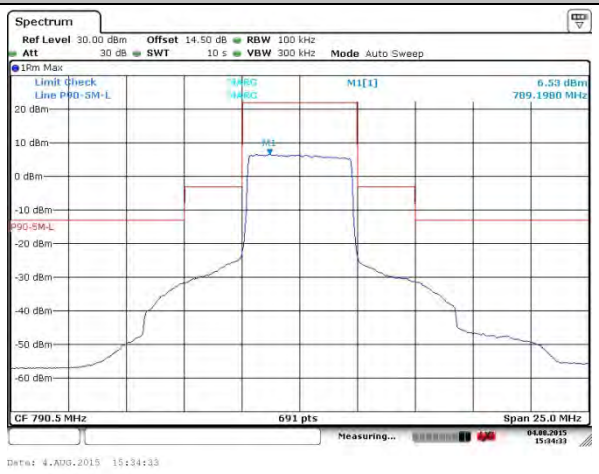
Highest Channel / 5MHz / 16QAM



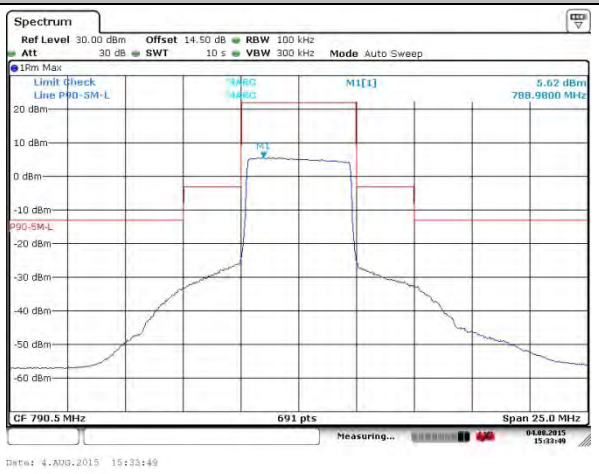
LTE Band 14/ 5MHz / (1RBMax)	
Lowest Channel / 5MHz / QPSK	**Lowest Channel / 5MHz / 16QAM**
	
Middle Channel / 5MHz / QPSK	**Middle Channel / 5MHz / 16QAM**
	
Highest Channel / 5MHz / QPSK	**Highest Channel / 5MHz / 16QAM**
	

LTE Band 14/ 5MHz / (Full RB)

Lowest Channel / 5MHz / QPSK

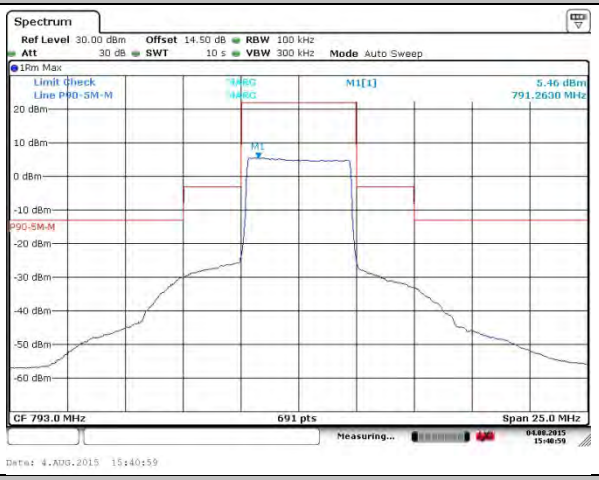


Lowest Channel / 5MHz / 16QAM

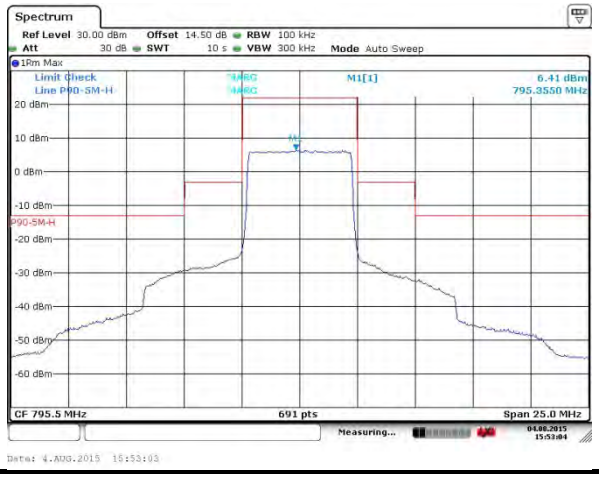


Middle Channel / 5MHz / QPSK

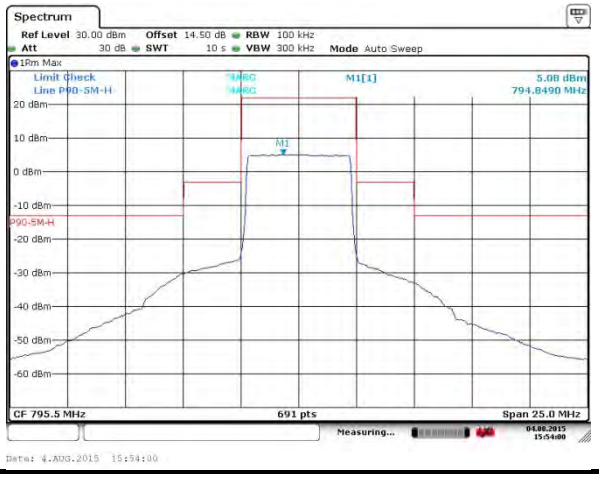
Middle Channel / 5MHz / 16QAM



Highest Channel / 5MHz / QPSK

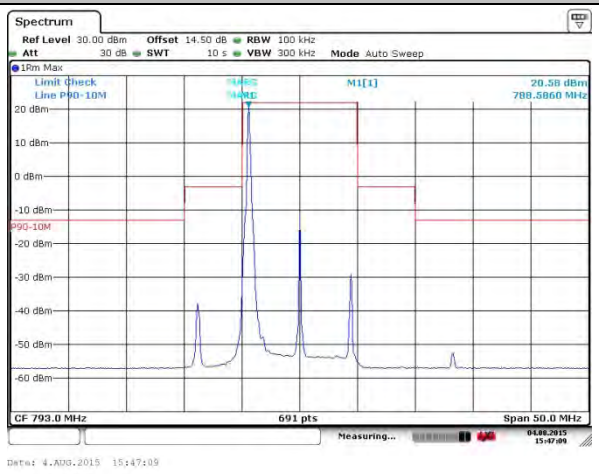


Highest Channel / 5MHz / 16QAM

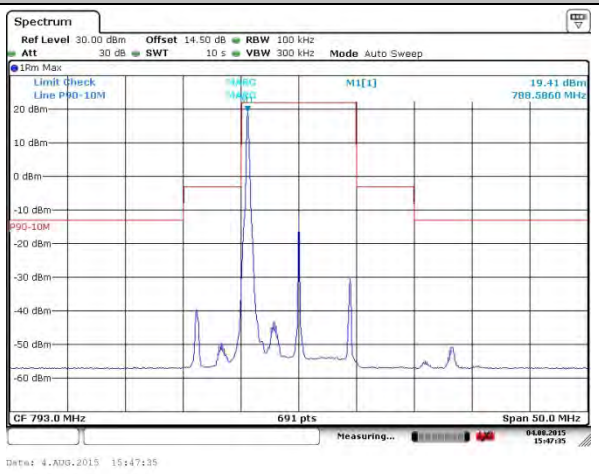


LTE Band 14/ 10MHz

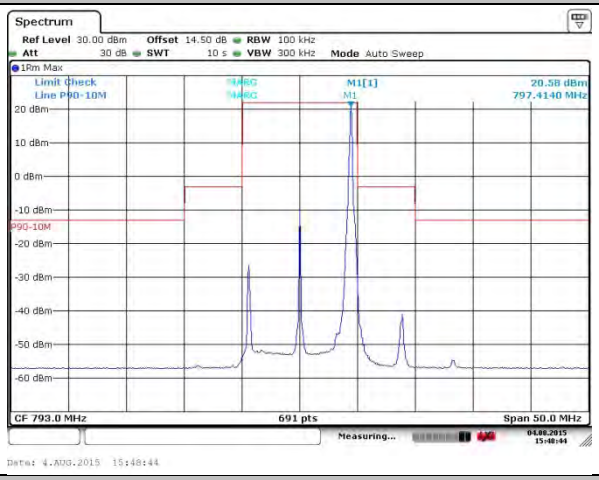
Middle Channel / 1RB0 / QPSK



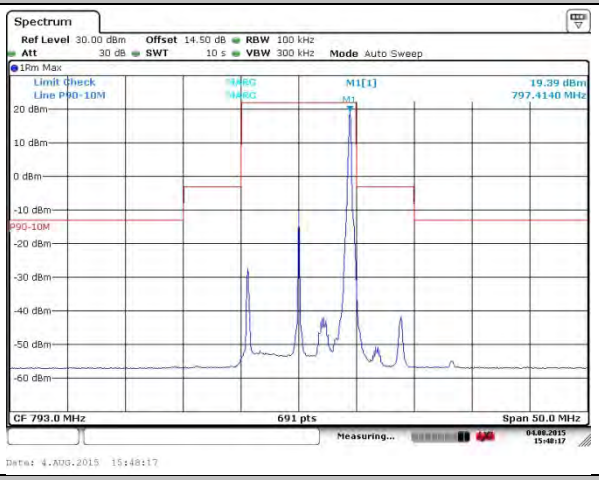
Middle Channel / 1RB0 / 16QAM



Middle Channel / 1RBMax / QPSK

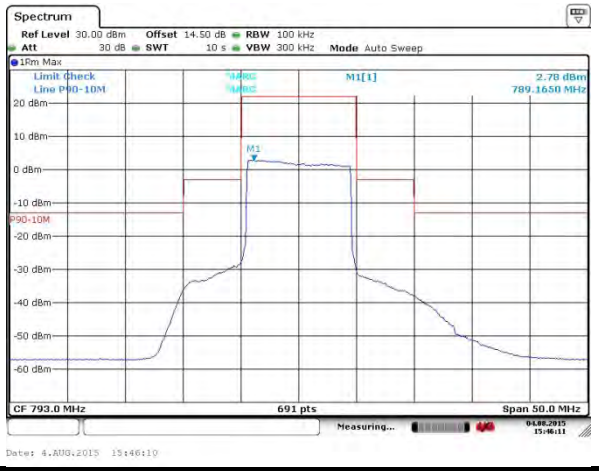


Middle Channel / 1RBMax / 16QAM



Middle Channel / Full RB / QPSK

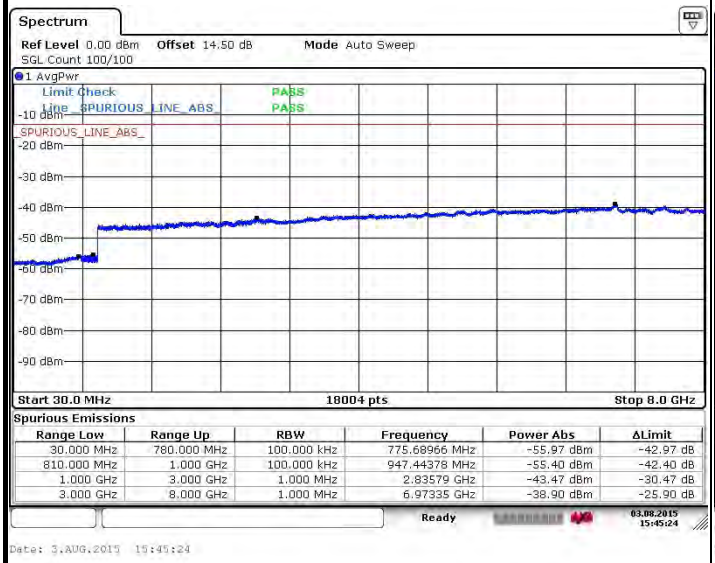
Middle Channel / Full RB / 16QAM



Conducted Emission

LTE Band 14/ 5MHz

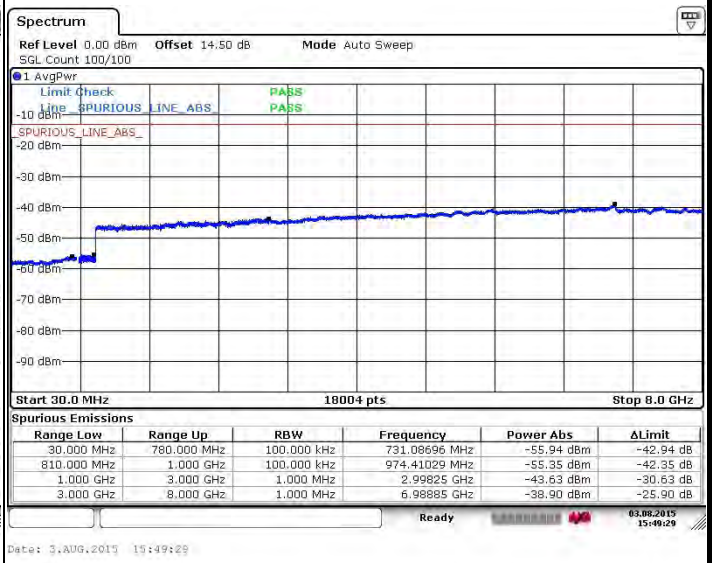
Lowest Channel / QPSK



Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	780.000 MHz	100.000 kHz	775.68966 MHz	-55.97 dBm	-42.97 dB
810.000 MHz	1.000 GHz	100.000 kHz	947.44378 MHz	-55.40 dBm	-42.40 dB
1.000 GHz	3.000 GHz	1.000 MHz	2.83579 GHz	-43.47 dBm	-30.47 dB
3.000 GHz	8.000 GHz	1.000 MHz	6.97335 GHz	-38.90 dBm	-25.90 dB

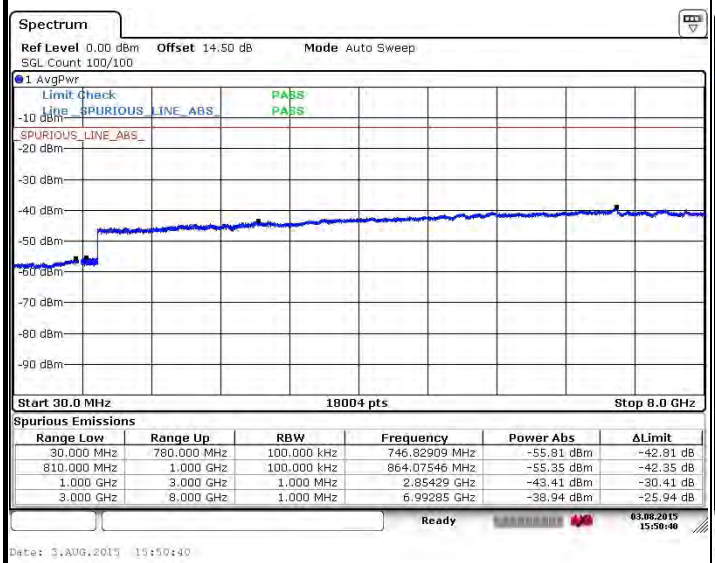
Lowest Channel / 16QAM



Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	780.000 MHz	100.000 kHz	731.08696 MHz	-55.94 dBm	-42.94 dB
810.000 MHz	1.000 GHz	100.000 kHz	974.41029 MHz	-55.35 dBm	-42.35 dB
1.000 GHz	3.000 GHz	1.000 MHz	2.99825 GHz	-43.63 dBm	-30.63 dB
3.000 GHz	8.000 GHz	1.000 MHz	6.98885 GHz	-38.90 dBm	-25.90 dB

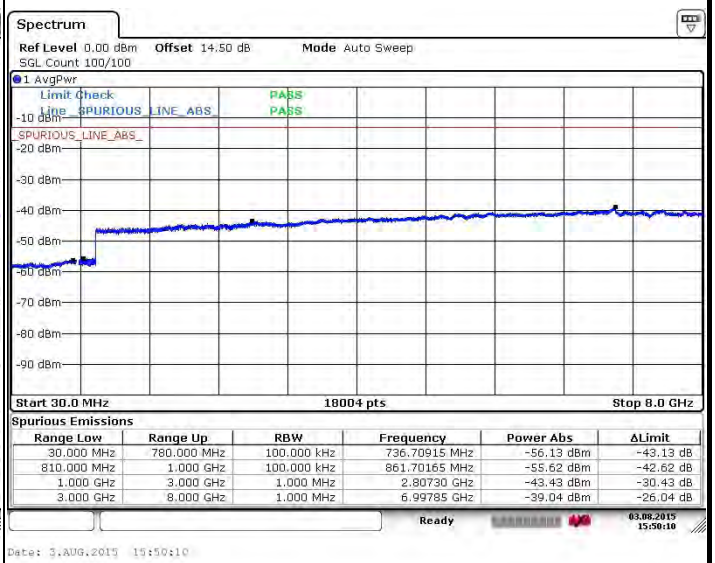
Middle Channel / QPSK



Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	780.000 MHz	100.000 kHz	746.82909 MHz	-55.81 dBm	-42.81 dB
810.000 MHz	1.000 GHz	100.000 kHz	864.07546 MHz	-55.35 dBm	-42.35 dB
1.000 GHz	3.000 GHz	1.000 MHz	2.85429 GHz	-43.41 dBm	-30.41 dB
3.000 GHz	8.000 GHz	1.000 MHz	6.99285 GHz	-38.94 dBm	-25.94 dB

Middle Channel / 16QAM

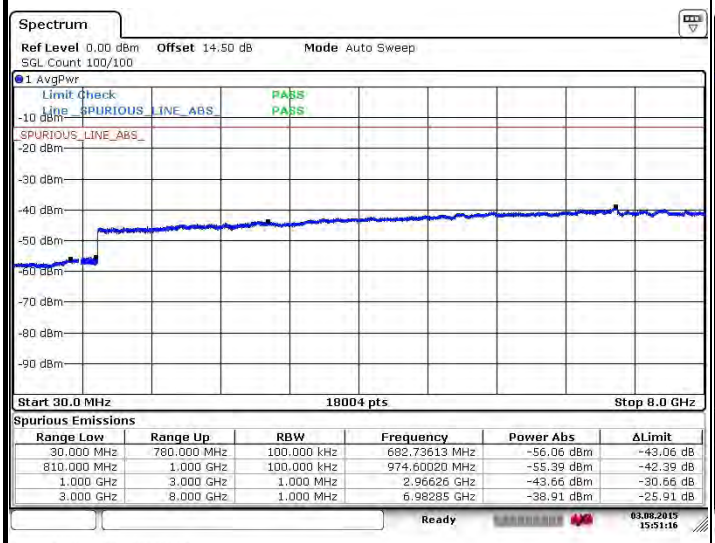


Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	780.000 MHz	100.000 kHz	736.70915 MHz	-56.13 dBm	-43.13 dB
810.000 MHz	1.000 GHz	100.000 kHz	861.70165 MHz	-55.62 dBm	-42.62 dB
1.000 GHz	3.000 GHz	1.000 MHz	2.80730 GHz	-43.43 dBm	-30.43 dB
3.000 GHz	8.000 GHz	1.000 MHz	6.99785 GHz	-39.04 dBm	-26.04 dB

LTE Band 14/ 5MHz

Highest Channel / QPSK

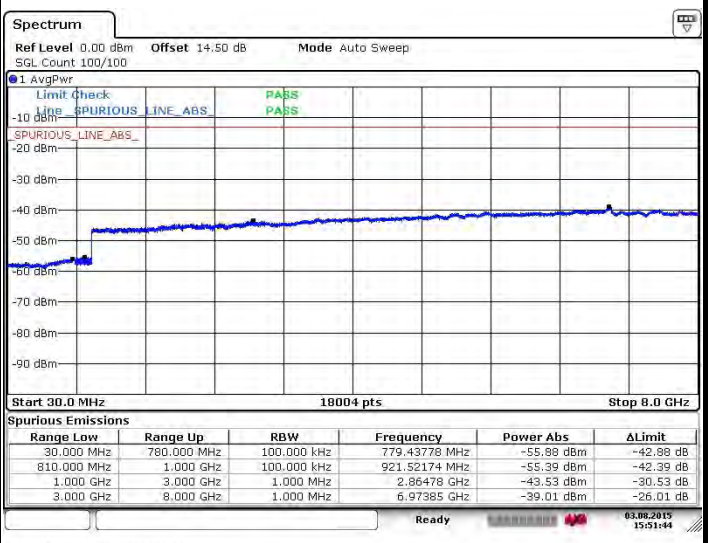


Date: 3.AUG.2015 15:51:16

Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	780.000 MHz	100.000 kHz	682.73613 MHz	-56.06 dBm	-43.06 dB
810.000 MHz	1.000 GHz	100.000 kHz	974.60020 MHz	-55.39 dBm	-42.39 dB
1.000 GHz	3.000 GHz	1.000 MHz	2.96626 GHz	-43.66 dBm	-30.66 dB
3.000 GHz	8.000 GHz	1.000 MHz	6.98285 GHz	-38.91 dBm	-25.91 dB

Highest Channel / 16QAM



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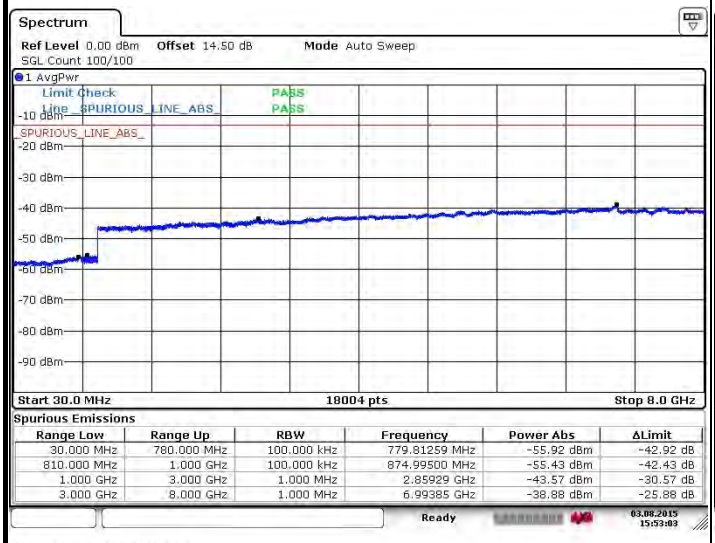
Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	780.000 MHz	100.000 kHz	779.43778 MHz	-55.88 dBm	-42.88 dB
810.000 MHz	1.000 GHz	100.000 kHz	921.52174 MHz	-55.39 dBm	-42.39 dB
1.000 GHz	3.000 GHz	1.000 MHz	2.86478 GHz	-43.53 dBm	-30.53 dB
3.000 GHz	8.000 GHz	1.000 MHz	6.97385 GHz	-39.01 dBm	-26.01 dB

LTE Band 14/ 10MHz

Middle Channel / QPSK



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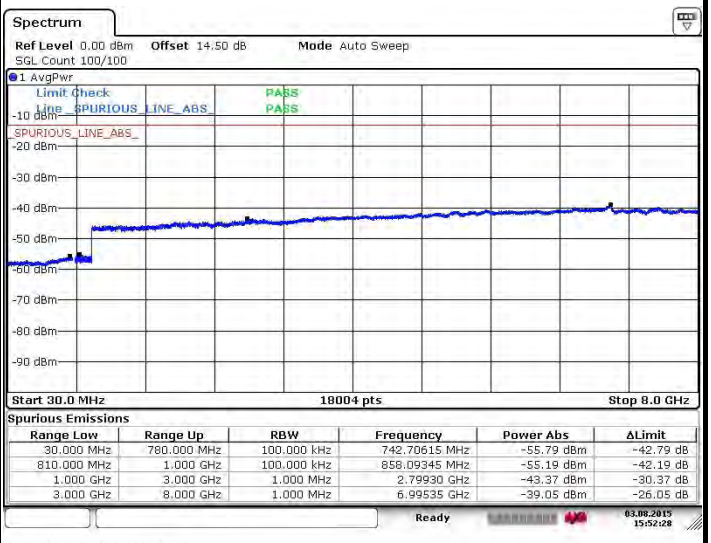
Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	780.000 MHz	100.000 kHz	779.81259 MHz	-55.92 dBm	-42.92 dB
810.000 MHz	1.000 GHz	100.000 kHz	874.99500 MHz	-55.43 dBm	-42.43 dB
1.000 GHz	3.000 GHz	1.000 MHz	2.85929 GHz	-43.57 dBm	-30.57 dB
3.000 GHz	8.000 GHz	1.000 MHz	6.99385 GHz	-38.88 dBm	-25.88 dB

Middle Channel / 16QAM



Date: 3.AUG.2015 15:52:28

Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	780.000 MHz	100.000 kHz	742.70615 MHz	-55.79 dBm	-42.79 dB
810.000 MHz	1.000 GHz	100.000 kHz	858.09345 MHz	-55.19 dBm	-42.19 dB
1.000 GHz	3.000 GHz	1.000 MHz	2.79930 GHz	-43.37 dBm	-30.37 dB
3.000 GHz	8.000 GHz	1.000 MHz	6.99535 GHz	-39.05 dBm	-26.05 dB

Frequency Stability

Test Conditions		LTE Band 14(QPSK) / Middle Channel	Limit
Temperature (°C)	Voltage (Volt)	BW 10MHz	1.25ppm
		Deviation (ppm)	Result
50	Normal Voltage	0.0038	PASS
40	Normal Voltage	0.0013	
30	Normal Voltage	0.0013	
20(Ref.)	Normal Voltage	0.0000	
10	Normal Voltage	0.0000	
0	Normal Voltage	0.0025	
-10	Normal Voltage	0.0013	
-20	Normal Voltage	0.0025	
-30	Normal Voltage	0.0013	
20	Maximum Voltage	0.0025	
20	Normal Voltage	0.0013	
20	Battery End Point	0.0000	

Note: Normal Voltage = 3.8 V. ；Battery End Point (BEP) = 3.5 V.；Maximum Voltage =4.35 V

Appendix B. Test Results of Radiated Test

ERP

LTE Band 14 / 5MHz							
Channel	Modulation	RB		Horizontal		Vertical	
		Size	Offset	ERP(dBm)	ERP(W)	ERP(dBm)	ERP(W)
Lowest	QPSK	1	24	18.05	0.0638	9.95	0.0099
Middle		1	24	17.77	0.0598	9.80	0.0095
Highest		1	24	19.71	0.0935	11.94	0.0156
Lowest	16QAM	1	24	16.75	0.0473	9.29	0.0085
Middle		1	12	16.70	0.0468	9.29	0.0085
Highest		1	0	18.87	0.0771	11.49	0.0141
Limit	ERP < 3W			Result		PASS	

LTE Band 14 / 10MHz							
Channel	Modulation	RB		Horizontal		Vertical	
		Size	Offset	ERP(dBm)	ERP(W)	ERP(dBm)	ERP(W)
Lowest	QPSK	-	-	-	-	-	-
Middle		1	49	17.57	0.0571	9.78	0.0095
Highest		-	-	-	-	-	-
Lowest	16QAM	-	-	-	-	-	-
Middle		1	49	16.23	0.0420	9.07	0.0081
Highest		-	-	-	-	-	-
Limit	ERP < 3W			Result		PASS	

Field Strength of Spurious Radiated

LTE Band 14 / QPSK / RB Size 1 Offset 0									
Bandwidth	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)
5MHz	1581.86	-56.68	-40	-16.68	-69.60	-59.65	0.88	6.00	H
	2372.79	-49.69	-13	-36.69	-71.21	-52.30	1.08	5.84	H
	3163.72	-60.26	-13	-47.26	-70.86	-64.63	1.14	7.66	H
	1581.86	-56.59	-40	-16.59	-67.22	-59.56	0.88	6.00	V
	2372.79	-52.52	-13	-39.52	-71.36	-55.13	1.08	5.84	V
	3163.72	-60.40	-13	-47.40	-72.23	-64.77	1.14	7.66	V
10MHz	1577.18	-56.11	-40	-16.11	-69.03	-59.08	0.88	6.00	H
	2365.77	-49.22	-13	-36.22	-70.68	-51.83	1.08	5.84	H
	3154.36	-59.66	-13	-46.66	-70.26	-64.03	1.14	7.66	H
	1577.18	-56.19	-40	-16.19	-66.82	-59.16	0.88	6.00	V
	2365.77	-49.76	-13	-36.76	-69.75	-52.37	1.08	5.84	V
	3154.36	-58.92	-13	-45.92	-70.75	-63.29	1.14	7.66	V
	Remark: Spurious emissions within 30-1000MHz were found more than 20dB below limit line.								
Test Result					PASS				