FCC RF Test Report

APPLICANT	:	**Samsung Electronics Co Ltd**
EQUIPMENT	:	**Verizon 4G LTE Network Extender**
BRAND NAME	:	**SAMSUNG**
MODEL NAME	:	**SLS-BU103**
FCC ID	:	**A3LSLS-BU103**
STANDARD	:	**47 CFR Part 2, 27**
CLASSIFICATION	:	**Licensed Non-Broadcast Station Transmitter (TNB)**

The product was received on Apr. 21, 2015 and completely tested on Jun. 05, 2015. We, SPORTON INTERNATIONAL INC., would like to declare that the tested sample has been evaluated in accordance with the test procedures given in ANSI / TIA / EIA-603-C-2004 and the testing has shown the tested sample to be in compliance with the applicable technical standards.

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

Reviewed by: Joseph Lin / Supervisor

Approved by: Jones Tsai / Manager

Testing Laboratory
1190

SPORTON INTERNATIONAL INC.
No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan District, Tao Yuan City, Taiwan, R.O.C.

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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FG542147	Rev. 01	Initial issue of report	Jun. 09, 2015
FG542147	Rev. 02	Adding the antenna used for radiated emissions above 18 GHz in section 5.	Jun. 10, 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	N/A	Peak-to-Average Ratio	<13 dB	PASS	-
3.6	§2.1049	Occupied Bandwidth	Reporting Only	PASS	-
3.7	§2.1051 §27.53(c)(2) §27.53(c)(4) §27.53(f) §27.53(g)	Conducted Band Edge Measurement (Band 4) (Band 13)	< 43+10log10(P[Watts])	PASS	-
3.8	§2.1051 §27.53(c)(2) §27.53(f) §27.53(g)	Conducted Spurious Emission (Band 4) (Band 13)	< 43+10log10(P[Watts])	PASS	-
3.9	§2.1055 §27.54	Frequency Stability Temperature & Voltage	< 2.5 ppm for Part 22 Within Authorized Band	PASS	-
4.4	§27.50(b)(10)	Effective Radiated Power (Band 13)	ERP < 3 Watt	PASS	-
	§27.50(d)(4)	Equivalent Isotropic Radiated Power (Band 4)	EIRP < 1Watt		
4.5	§2.1053 §27.53(c)(2) §27.53(f) §27.53(h)	Radiated Spurious Emission (Band 4) (Band 13)	< 43+10log$_{10}$(P[Watts])	PASS	Under limit 20.46 dB at 8530.000 MHz

1 General Description

1.1 Applicant

Samsung Electronics Co Ltd
19 Chapin Rd., Building D, Pine Brook, NJ 07058

1.2 Manufacturer

MitraStar Technology Corporation
No. 6, Innovation Rd II, Hsinchu Science Park, Hsinchu 30076, Taiwan

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	Verizon 4G LTE Network Extender
Brand Name	SAMSUNG
Model Name	SLS-BU103
FCC ID	A3LSLS-BU103
EUT supports Radios application	LTE
EUT Stage	Production Unit

1.4 Product Specification subjective to this standard

Product Specification subjective to this standard	
Tx Frequency	LTE Band 4 : 2110 MHz ~ 2155 MHz LTE Band 13 : 746 MHz ~ 756 MHz
Rx Frequency	LTE Band 4 : 1710 MHz ~ 1755 MHz LTE Band 13 : 777 MHz ~ 787 MHz
Bandwidth	LTE Band 4 : 10MHz LTE Band 13 : 10MHz
Maximum Output Power to Antenna	**<Long Antenna>** LTE Band 4 : 18.86 dBm LTE Band 13 : 17.32 dBm **<Short Antenna>** TE Band 4 : 18.98 dBm LTE Band 13 : 16.97 dBm **<MIMO Antenna>** TE Band 4 : 21.20 dBm LTE Band 13 : 20.16 dBm
Antenna Gain	LTE Band 4 : Long Antenna : 5.0 dBi (Peak Gain) Short Antenna : 2.5 dBi (Peak Gain) LTE Band 13 : Long Antenna : 2.5 dBi (Peak Gain) Short Antenna : 2.5 dBi (Peak Gain)
Type of Modulation	QPSK / 16QAM / 64QAM

1.5 Modification of EUT

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

1.6 Emission Designator

LTE Band 4	Test QPSK for Long Antenna			Test QPSK for Short Antenna			
BW(MHz)	Emission Designator (99%OBW)	Frequency Tolerance (ppm)	Maximum EIRP(W)	Emission Designator (99%OBW)	Frequency Tolerance (ppm)	Maximum EIRP(W)	MIMO Maximum EIRP(W)
10	9M12G7D	0.6143	0.0531	9M09G7D	0.6143	0.0780	0.4150
LTE Band 4	Test 16QAM for Long Antenna			Test 16QAM for Short Antenna			
BW(MHz)	Emission Designator (99%OBW)	Frequency Tolerance (ppm)	Maximum EIRP(W)	Emission Designator (99%OBW)	Frequency Tolerance (ppm)	Maximum EIRP(W)	MIMO Maximum EIRP(W)
10	9M12W7D	-	0.0769	9M09W7D	-	0.0524	0.4093
LTE Band 4	Test 64QAM for Long Antenna			Test 64QAM for Short Antenna			
BW(MHz)	Emission Designator (99%OBW)	Frequency Tolerance (ppm)	Maximum EIRP(W)	Emission Designator (99%OBW)	Frequency Tolerance (ppm)	Maximum EIRP(W)	MIMO Maximum EIRP(W)
10	9M06W7D	-	0.0527	9M06W7D	-	0.0791	0.4169
LTE Band 13	Test QPSK for Long Antenna			Test QPSK for Short Antenna			
BW(MHz)	Emission Designator (99%OBW)	Frequency Tolerance (ppm)	Maximum ERP(W)	Emission Designator (99%OBW)	Frequency Tolerance (ppm)	Maximum ERP(W)	MIMO Maximum ERP(W)
10	9M12G7D	0.5859	0.0540	9M03G7D	0.5859	0.0498	0.1125
LTE Band 13	Test 16QAM for Long Antenna			Test 16QAM for Short Antenna			
BW(MHz)	Emission Designator (99%OBW)	Frequency Tolerance (ppm)	Maximum ERP(W)	Emission Designator (99%OBW)	Frequency Tolerance (ppm)	Maximum ERP(W)	MIMO Maximum ERP(W)
10	9M15W7D	-	0.0526	9M18W7D	-	0.0474	0.1084
LTE Band 13	Test 64QAM for Long Antenna			Test 64QAM for Short Antenna			
BW(MHz)	Emission Designator (99%OBW)	Frequency Tolerance (ppm)	Maximum ERP(W)	Emission Designator (99%OBW)	Frequency Tolerance (ppm)	Maximum ERP(W)	MIMO Maximum ERP(W)
10	9M09W7D	-	0.0540	9M06W7D	-	0.0491	0.1117

1.7 Testing Location

Sporton Lab is accredited to ISO 17025 by Taiwan Accreditation Foundation (TAF code : 1190) and the FCC designation No. TW1022 under the FCC 2.948(e) by Mutual Recognition Agreement (MRA) in FCC Test.

Test Site	SPORTON INTERNATIONAL INC.
Test Site Location	No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan District, Tao Yuan City, Taiwan, R.O.C. TEL: +886-3-327-3456 FAX: +886-3-328-4978
Test Site No.	**Sporton Site No.**
	TH02-HY

Test Site	SPORTON INTERNATIONAL INC.
Test Site Location	No.58, Aly. 75, Ln. 564, Wenhua 3rd Rd. Guishan District, Taoyuan City, Taiwan (R.O.C.) TEL: +886-3-327-0855
Test Site No.	**Sporton Site No.**
	03CH11-HY

1.8 Applicable Standards

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

- 47 CFR Part 2, 27
- ANSI / TIA / EIA-603-C-2004
- FCC KDB 971168 D01 Power Meas. License Digital Systems v02r02
- FCC KDB 412172 D01 Determining ERP and EIRP v01

Remark:

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

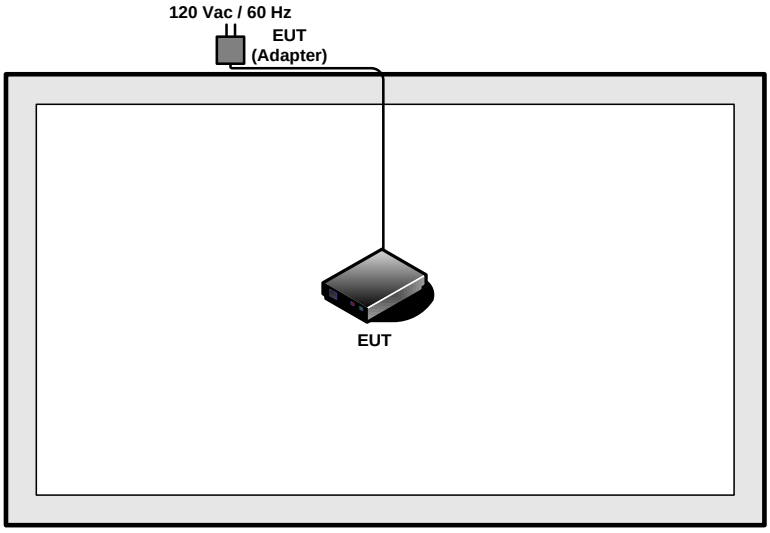
2 Test Configuration of Equipment Under Test

2.1 Test Mode

Antenna port conducted and radiated test items listed below are performed according to KDB 971168 D01 Power Meas. License Digital Systems v02r02 with maximum output power.

Test Items	Band	Bandwidth (MHz)						Modulation			RB #			Test Channel		
		1.4	3	5	10	15	20	QPSK	16QAM	64QAM	1	Half	Full	L	M	H
Max. Output Power	4	-	-	-	v	-	-	v	v	v			v	v	v	v
	13	-	-	-	v	-	-	v	v	v			v		v	
Peak-to-Average Ratio	4	-	-	-	v	-	-	v	v	v			v	v	v	v
	13	-	-	-	v	-	-	v	v	v			v		v	
26dB and 99% Bandwidth	4	-	-	-	v	-	-	v	v	v			v	v	v	v
	13	-	-	-	v	-	-	v	v	v			v		v	
Conducted Band Edge	4	-	-	-	v	-	-	v	v	v			v	v		v
	13	-	-	-	v	-	-	v	v	v			v			v
Conducted Spurious Emission	4	-	-	-	v	-	-	v	v	v			v	v	v	v
	13	-	-	-	v	-	-	v	v	v			v		v	
Frequency Stability	4	-	-	-	v	-	-	v					v		v	
	13	-	-	-	v	-	-	v					v		v	
E.R.P/ E.I.R.P.	4	-	-	-	v	-	-	v	v	v			v	v	v	v
	13	-	-	-	v	-	-	v	v	v			v		v	
Radiated Spurious Emission	4	-	-	-	v	-	-	v	v	v			v	v	v	v
	13	-	-	-	v	-	-	v	v	v			v		v	
Note	1. The mark "v " means that this configuration is chosen for testing 2. The mark "-" means that this bandwidth is not supported. 3. For E.R.P/E.I.R.P. measurement, the widest bandwidth of each band is chosen for testing due to highest conducted power. Besides, the lowest bandwidth of each band is also measured for reporting only. 4. 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 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 4.2 dB and 10dB attenuator.

Example :

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

= 4.2 + 10 = 14.2 (dB)

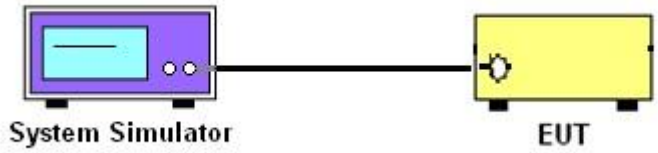
3 Conducted Test Items

3.1 Measuring Instruments

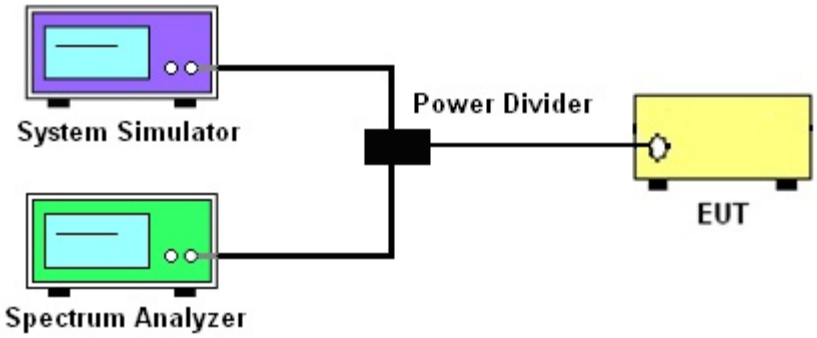
See list of measuring instruments of this test report.

3.2 Test Setup

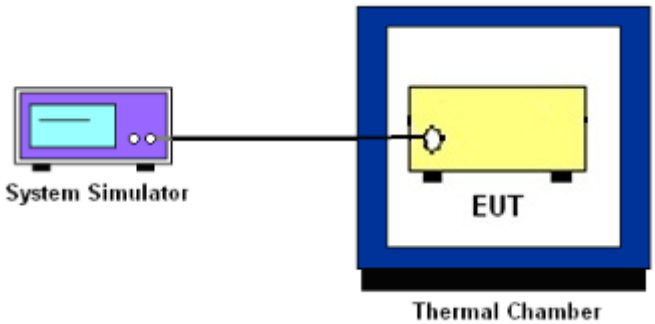
3.2.1 Conducted Output Power



3.2.2 Peak-to-Average Ratio, Occupied Bandwidth ,Conducted 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 and ERP/EIRP

3.4.1 Description of the Conducted Output Power Measurement and ERP/EIRP Measurement

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

The ERP of mobile transmitters must not exceed 3 Watts for Band 13.

The EIRP of mobile transmitters must not exceed 1 Watts for LTE Band 4.

According to KDB 412172 D01 Power Approach,

EIRP = $P_T + G_T – L_C$, ERP = EIRP -2.15, where

P_T = transmitter output power in dBm

G_T = gain of the transmitting antenna in dBi

L_C = signal attenuation in the connecting cable between the transmitter and antenna in dB

3.4.2 Test Procedures

1. The transmitter output port was connected to the system simulator.
2. Set EUT at maximum power through the system simulator.
3. Select lowest, middle, and highest channels for each band and different modulation.
4. Measure and record the power level from the system simulator.

3.5 Peak-to-Average Ratio

3.5.1 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.

3.5.2 Test Procedures

1. The testing follows FCC KDB 971168 v02r02 Section 5.7.1.
2. The EUT was connected to spectrum and system simulator via a power divider.
3. Set the CCDF (Complementary Cumulative Distribution Function) option in spectrum analyzer.
4. The highest RF powers were measured and recorded the maximum PAPR level associated with a probability of 0.1 %.
5. Record the deviation as Peak to Average Ratio.

3.6 Occupied Bandwidth

3.6.1 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.

3.6.2 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.

3.7 Conducted Band Edge

3.7.1 Description of Conducted Band Edge Measurement

27.53 (c) for Band 13

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

27.53 (h) for Band 4

For operations in the 1710 – 1755 MHz band, the FCC limit is 43 + $10\log_{10}$(P[Watts]) dB below the transmitter power P(Watts) in a 1 MHz bandwidth. However, in the 1MHz bands immediately outside and adjacent to the licensee's frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.

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

3.8 Conducted Spurious Emission

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

3.8.2 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 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.
4. The middle channel for the highest RF power within the transmitting frequency was measured.
5. The conducted spurious emission for the whole frequency range was taken.
6. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, taking the record of maximum spurious emission.
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

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 ±0.00025% (±2.5ppm) 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 system simulator.
2. With power OFF, the temperature was decreased to -30°C and the EUT was stabilized before testing. Power was applied and the maximum change in frequency was recorded within one minute.
3. With power OFF, the temperature was raised in 10°C step up to 50°C. The EUT was stabilized at each step for at least half an hour. Power was applied and the maximum frequency change was recorded within one minute.

3.9.3 Test Procedures for Voltage Variation

1. The testing follows FCC KDB 971168 v02r02 Section 9.0.
2. The EUT was placed in a temperature chamber at 25±5° C and connected with the system simulator.
3. The power supply voltage to the EUT was varied from 85% to 115% of the nominal value measured at the input to the EUT.
4. The variation in frequency was measured for the worst case.

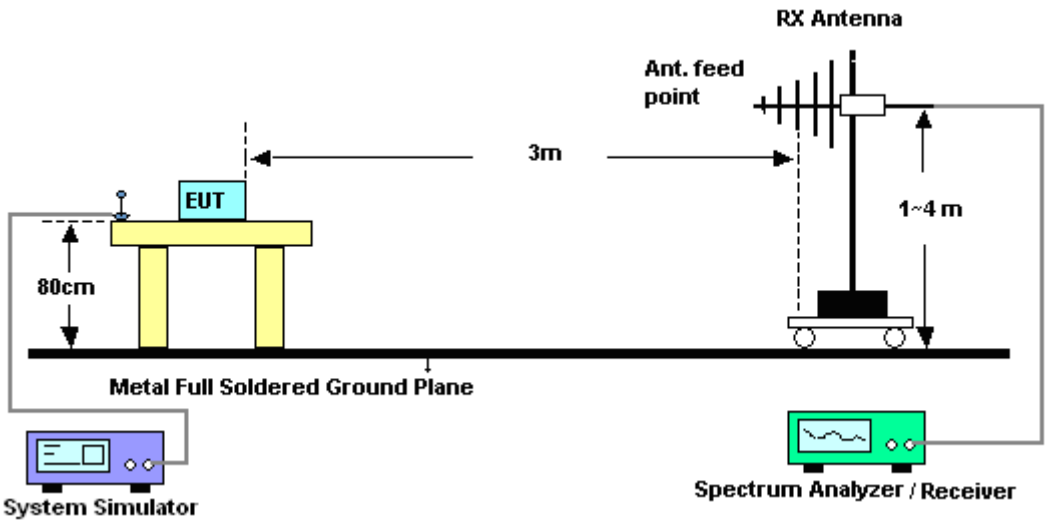
4 Radiated Test Items

4.1 Measuring Instruments

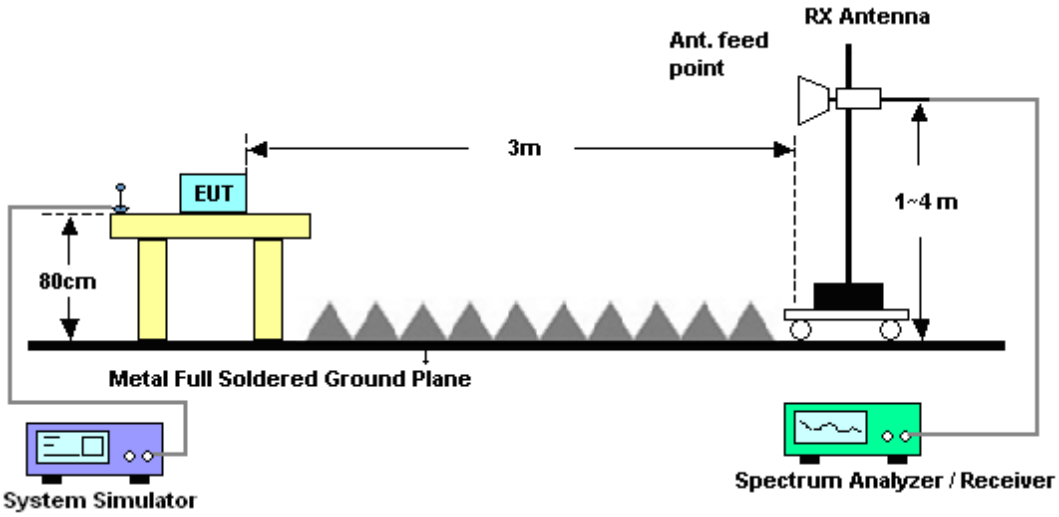
See list of measuring instruments of this test report.

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 Effective Radiated Power and Effective Isotropic Radiated Power

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

Equivalent isotropic 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. Mobile and portable (hand-held) stations operating are limited to average EIRP of 1 watt with LTE band 4.

4.4.2 Test Procedures

1. The testing follows FCC KDB 971168 v02r02 Section 5.2.1. (for CDMA/WCDMA), Section 5.2.2.2 (for GSM/GPRS/EDGE) and ANSI / TIA-603-C-2004 Section 2.2.17.
2. The EUT was placed on a non-conductive rotating platform 0.8 meters high in a semi-anechoic chamber. The radiated emission at the fundamental frequency was measured at 3 m with a test antenna and a spectrum analyzer with RMS detector.
3. During the measurement, the system simulator parameters were set to force the EUT transmitting at maximum output power. The maximum emission was recorded from analyzer power level (LVL) from the 360 degrees rotation of the turntable and the test antenna raised and lowered over a range from 1 to 4 meters in both horizontally and vertically polarized orientations.
4. Effective Isotropic Radiated Power (EIRP) was measured by substitution method according to TIA/EIA-603-C. The EUT was replaced by dipole antenna (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.

	LTE					
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

4.5 Radiated Spurious Emission

4.5.1 Description of Radiated Spurious Emission

The radiated spurious emission was measured by substitution method according to ANSI / TIA / EIA-603-C-2004. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitter power (P) by a factor of at least 43 + 10 log (P) dB.

For LTE Band 13

For operations in the 746-758 MHz, 775-788 MHz, and 805-806 MHz bands, emissions in the band 1559-1610 MHz shall be limited to −70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and −80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth.

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

4.5.2 Test Procedures

1. The testing follows FCC KDB 971168 v02r02 Section 5.8 and ANSI / TIA-603-C-2004 Section 2.2.12.
2. The EUT was placed on a rotatable wooden table with 0.8 meter above ground.
3. The EUT was set 3 meters from the receiving antenna, which was mounted on the antenna tower.
4. The table was rotated 360 degrees to determine the position of the highest spurious emission.
5. The height of the receiving antenna is varied between one meter and four meters to search the maximum spurious emission for both horizontal and vertical polarizations.
6. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, taking the record of maximum spurious emission.
7. A horn antenna was substituted in place of the EUT and was driven by a signal generator.
8. Tune the output power of signal generator to the same emission level with EUT maximum spurious emission.
9. Taking the record of output power at antenna port.
10. Repeat step 7 to step 8 for another polarization.
11. 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.
12. EIRP (dBm) = S.G. Power – Tx Cable Loss + Tx Antenna Gain
13. ERP (dBm) = EIRP - 2.15

5 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	Rohde & Schwarz	FSP40	100055	9kHz~40GHz	Jun. 09, 2014	May 25, 2015 ~ Jun. 05, 2015	Jun. 08, 2015	Conducted (TH02-HY)
Thermal Chamber	Ten Billion	TTH-D3SP	TBN-930701	N/A	Jul. 17, 2014	May 25, 2015 ~ Jun. 05, 2015	Jul. 16, 2015	Conducted (TH02-HY)
Bilog Antenna	TESEQ	CBL 6111D	35413	30MHz~1GHz	Oct. 24, 2014	May 31, 2015 ~ Jun. 05, 2015	Oct. 23, 2015	Radiation (03CH11-HY)
EMI Test Receiver	Keysight	N9038A	MY54130085	20Hz ~ 8.4GHz	Nov. 05, 2014	May 31, 2015 ~ Jun. 05, 2015	Nov. 04, 2015	Radiation (03CH11-HY)
Horn Antenna	SCHWARZBECK	BBHA 9120 D	9120D-1325	1GHz ~ 18GHz	Oct. 03, 2014	May 31, 2015 ~ Jun. 05, 2015	Oct. 02, 2015	Radiation (03CH11-HY)
Amplifier	SONOMA	310N	187312	9kHz~1GHz	Nov. 24, 2014	May 31, 2015 ~ Jun. 05, 2015	Nov. 23, 2015	Radiation (03CH11-HY)
Bilog Antenna	TESEQ	CBL 6111D	35414	30MHz~1GHz	Oct. 24, 2014	May 31, 2015 ~ Jun. 05, 2015	Oct. 23, 2015	Radiation (03CH11-HY)
Horn Antenna	SCHWARZBECK	BBHA 9120 D	9120D-1326	1GHz ~ 18GHz	Oct. 03, 2014	May 31, 2015 ~ Jun. 05, 2015	Oct. 02, 2015	Radiation (03CH11-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170251	18GHz- 40GHz	Oct. 02, 2014	May 31, 2015 ~ Jun. 05, 2015	Oct. 01, 2015	Radiation (03CH11-HY)
Preamplifier	Keysight	83017A	MY53270080	1GHz~26.5GHz	Nov. 20, 2014	May 31, 2015 ~ Jun. 05, 2015	Nov. 19, 2015	Radiation (03CH11-HY)
Spectrum Analyzer	Keysight	N9010A	MY54200486	10Hz ~ 44GHZ	Sep. 24, 2014	May 31, 2015 ~ Jun. 05, 2015	Sep. 23, 2015	Radiation (03CH11-HY)
Controller	EMEC	EM 1000	N/A	Control Turn table & Ant Mast	NA	May 31, 2015 ~ Jun. 05, 2015	NA	Radiation (03CH11-HY)
Antenna Mast	EMEC	AM-BS-4500-B	N/A	1~4m	NA	May 31, 2015 ~ Jun. 05, 2015	NA	Radiation (03CH11-HY)
Turn Table	EMEC	TT 2000	N/A	0-360 degree	NA	May 31, 2015 ~ Jun. 05, 2015	NA	Radiation (03CH11-HY)
Signal Generator	Rohde & Schwarz	SMF100A	101107	100kHz~40GHz	May 22, 2015	May 31, 2015 ~ Jun. 05, 2015	May 21, 2016	Radiation (03CH11-HY)

6 Uncertainty of Evaluation

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**4.90**

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**5.20**

Appendix A. Test Results of Conducted Test

Conducted Output Power(Average power)

<Long Antenna>

LTE Band 4 Maximum Average Power [dBm]						
BW [MHz]	RB Size	RB Offset	Mod	Lowest	Middle	Highest
10	50	0	QPSK	17.25	16.42	16.58

LTE Band 4 Maximum Average Power [dBm]						
BW [MHz]	RB Size	RB Offset	Mod	Lowest	Middle	Highest
10	50	0	16QAM	18.86	18.03	18.32

LTE Band 4 Maximum Average Power [dBm]						
BW [MHz]	RB Size	RB Offset	Mod	Lowest	Middle	Highest
10	50	0	64QAM	17.22	16.41	16.71

LTE Band 13 Maximum Average Power [dBm]				
BW [MHz]	RB Size	RB Offset	Mod	Middle
10	25	0	QPSK	17.32

LTE Band 13 Maximum Average Power [dBm]				
BW [MHz]	RB Size	RB Offset	Mod	Middle
10	25	0	16QAM	17.21

LTE Band 13 Maximum Average Power [dBm]				
BW [MHz]	RB Size	RB Offset	Mod	Middle
10	25	0	64QAM	17.32

<Short Antenna>

LTE Band 4 Maximum Average Power [dBm]						
BW [MHz]	RB Size	RB Offset	Mod	Lowest	Middle	Highest
10	50	0	QPSK	18.92	18.22	18.51

LTE Band 4 Maximum Average Power [dBm]						
BW [MHz]	RB Size	RB Offset	Mod	Lowest	Middle	Highest
10	50	0	16QAM	17.19	16.32	16.73

LTE Band 4 Maximum Average Power [dBm]						
BW [MHz]	RB Size	RB Offset	Mod	Lowest	Middle	Highest
10	50	0	64QAM	18.98	17.98	18.39

LTE Band 13 Maximum Average Power [dBm]				
BW [MHz]	RB Size	RB Offset	Mod	Middle
10	25	0	QPSK	16.97

LTE Band 13 Maximum Average Power [dBm]				
BW [MHz]	RB Size	RB Offset	Mod	Middle
10	25	0	16QAM	16.76

LTE Band 13 Maximum Average Power [dBm]				
BW [MHz]	RB Size	RB Offset	Mod	Middle
10	25	0	64QAM	16.91

<MIMO Antenna>

LTE Band 4 Maximum Average Power [dBm] for QPSK						
BW [MHz]	RB Size	RB Offset	Mod	Lowest	Middle	Highest
10	50	0	Signal I	21.18	20.42	20.66

LTE Band 4 Maximum Average Power [dBm] for 16QAM						
BW [MHz]	RB Size	RB Offset	Mod	Lowest	Middle	Highest
10	50	0	Signal I	21.12	20.27	20.61

LTE Band 4 Maximum Average Power [dBm] for 64QAM						
BW [MHz]	RB Size	RB Offset	Mod	Lowest	Middle	Highest
10	50	0	Signal I	21.20	20.28	20.64

LTE Band 13 Maximum Average Power [dBm] for QPSK				
BW [MHz]	RB Size	RB Offset	Mod	Middle
10	25	0	Signal I	20.16

LTE Band 13 Maximum Average Power [dBm] for 16QAM				
BW [MHz]	RB Size	RB Offset	Mod	Middle
10	25	0	Signal I	20.00

LTE Band 13 Maximum Average Power [dBm] for 64QAM				
BW [MHz]	RB Size	RB Offset	Mod	Middle
10	25	0	Signal I	20.13

ERP/EIRP

Modes	LTE Band 4 (QPSK,BW=10M)		
Antenna	MIMO Antenna		
Channel	2000 (Low)	2175 (Mid)	2350 (High)
Frequency (MHz)	2115.0	2132.5	2150.0
Conducted Power P_T (dBm)	21.18	20.42	20.66
Conducted Power P_T (Watts)	0.1312	0.1102	0.1164
EIRP(dBm)	26.18	25.42	25.66
EIRP(Watts)	0.4150	0.3483	0.3681

Modes	LTE Band 4 (16QAM,BW=10M)		
Antenna	MIMO Antenna		
Channel	2000 (Low)	2175 (Mid)	2350 (High)
Frequency (MHz)	2115.0	2132.5	2150.0
Conducted Power P_T (dBm)	21.12	20.27	20.61
Conducted Power P_T (Watts)	0.1294	0.1064	0.1151
EIRP(dBm)	26.12	25.27	25.61
EIRP(Watts)	0.4093	0.3365	0.3639

Modes	LTE Band 4 (64QAM,BW=10M)		
Antenna	MIMO Antenna		
Channel	2000 (Low)	2175 (Mid)	2350 (High)
Frequency (MHz)	2115.0	2132.5	2150.0
Conducted Power P_T (dBm)	21.20	20.28	20.64
Conducted Power P_T (Watts)	0.1318	0.1067	0.1159
EIRP(dBm)	26.20	25.28	25.64
EIRP(Watts)	0.4169	0.3373	0.3664

Modes	LTE Band 13 (QPSK,BW=10M)
Antenna	MIMO Antenna
Channel	5230 (Mid)
Frequency (MHz)	751
Conducted Power P_T (dBm)	20.16
Conducted Power P_T (Watts)	0.1038
EIRP(dBm)	20.51
EIRP(Watts)	0.1125

Modes	LTE Band 13 (16QAM,BW=10M)
Antenna	MIMO Antenna
Channel	5230 (Mid)
Frequency (MHz)	751
Conducted Power P_T (dBm)	20.00
Conducted Power P_T (Watts)	0.1000
EIRP(dBm)	20.35
EIRP(Watts)	0.1084

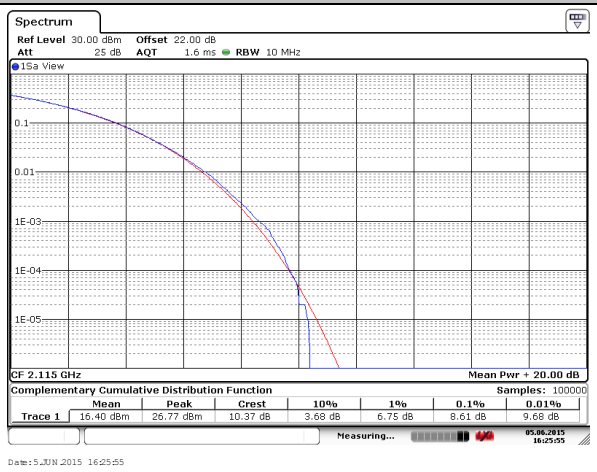
Modes	LTE Band 13 (64QAM,BW=10M)
Antenna	MIMO Antenna
Channel	5230 (Mid)
Frequency (MHz)	751
Conducted Power P_T (dBm)	20.13
Conducted Power P_T (Watts)	0.1030
EIRP(dBm)	20.48
EIRP(Watts)	0.1117

Peak-to-Average Ratio

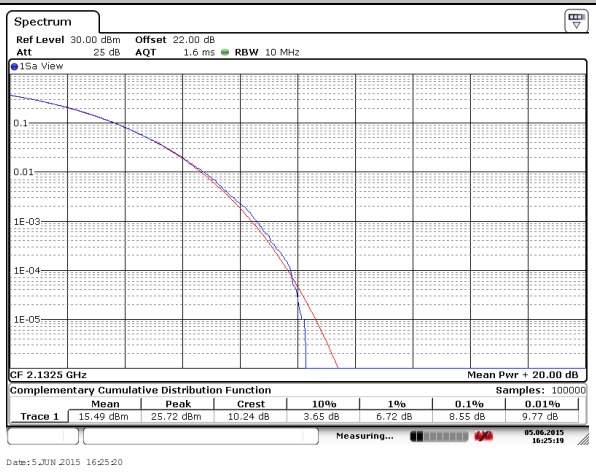
Mode	LTE Band 4 / 10MHz		
Antenna	Long Antenna	Short Antenna	
Mod.	QPSK	QPSK	Limit: 13dB
RB Size	Full RB	Full RB	Result
Lowest CH	8.61	8.52	PASS
Middle CH	8.55	8.49	
Highest CH	8.64	8.55	

LTE Band 4 / 10MHz / QPSK for Long Antenna

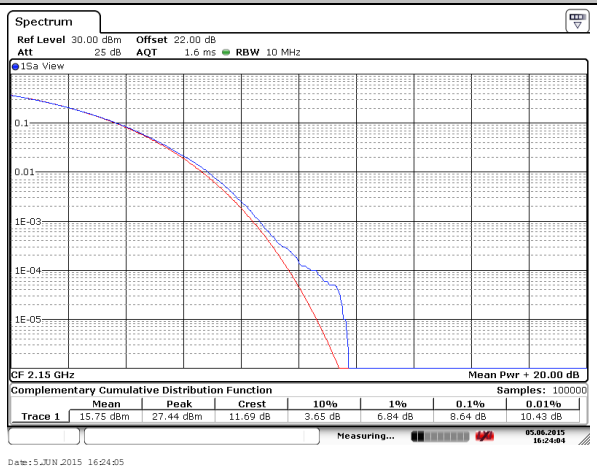
Lowest Channel / Full RB

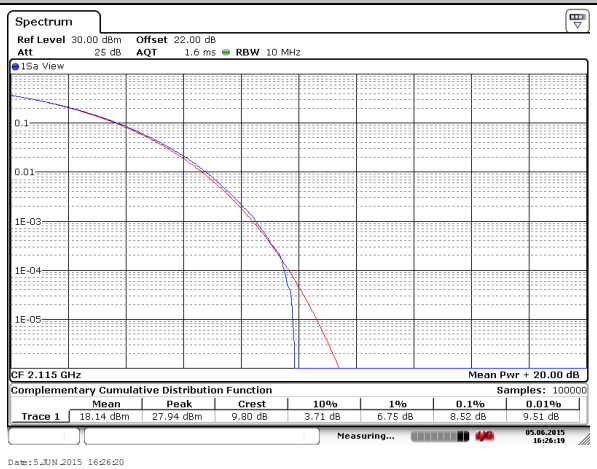
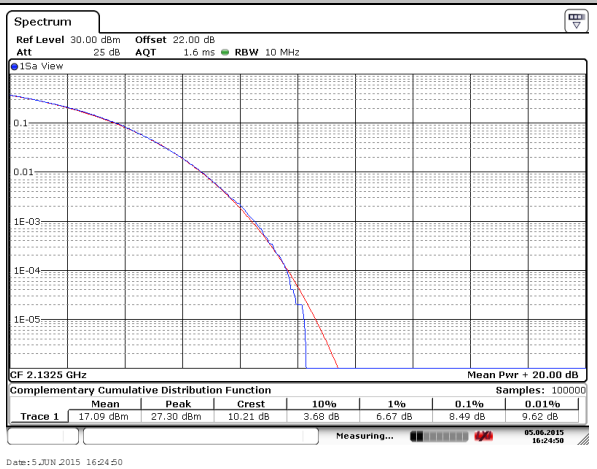
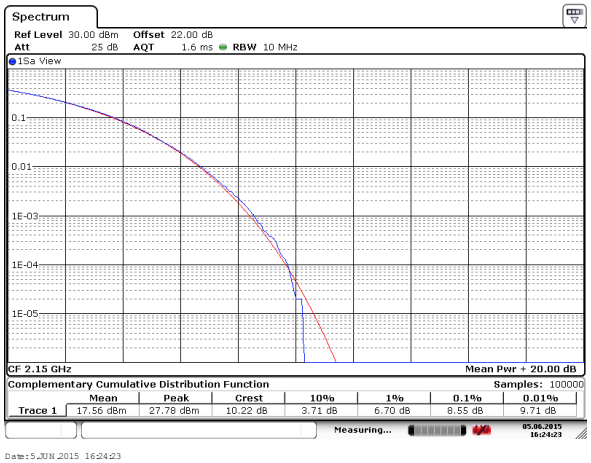


Middle Channel / Full RB



Highest Channel / Full RB

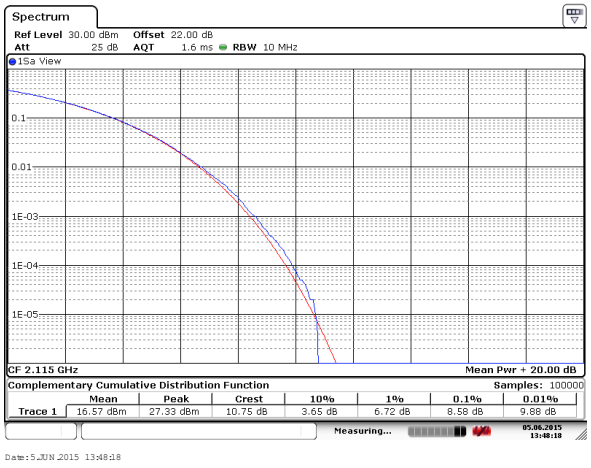


LTE Band 4 / 10MHz / QPSK for Short Antenna	
Lowest Channel / Full RB	**Middle Channel / Full RB**
	
Highest Channel / Full RB	
	

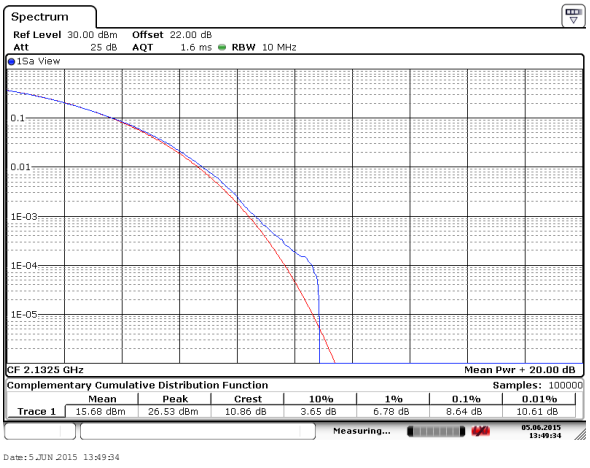
Mode	LTE Band 4 / 10MHz		
Antenna	Long Antenna	Short Antenna	
Mod.	16QAM	16QAM	Limit: 13dB
RB Size	Full RB	Full RB	Result
Lowest CH	8.58	8.38	PASS
Middle CH	8.64	8.38	
Highest CH	8.46	8.55	

LTE Band 4 / 10MHz / 16QAM for Long Antenna

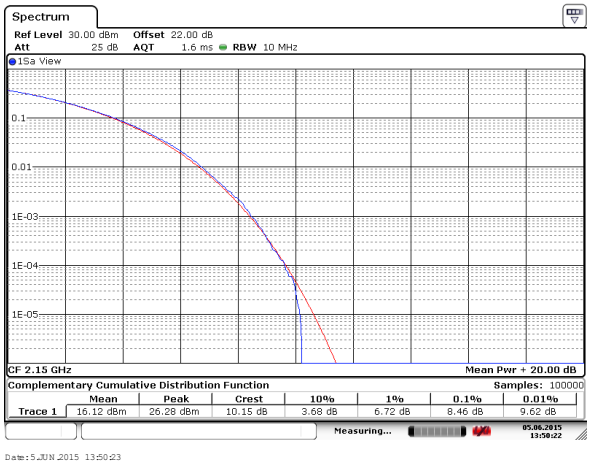
Lowest Channel / Full RB

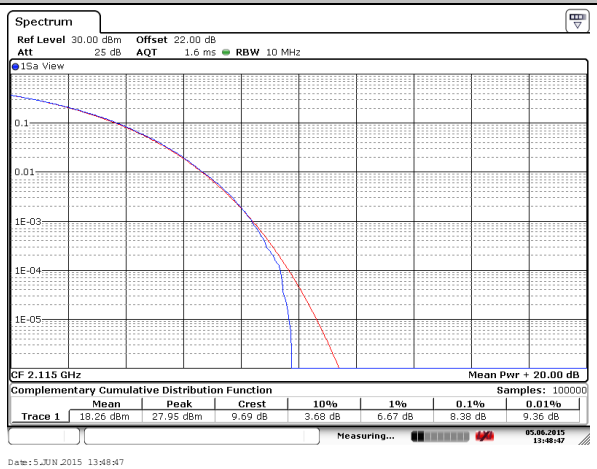
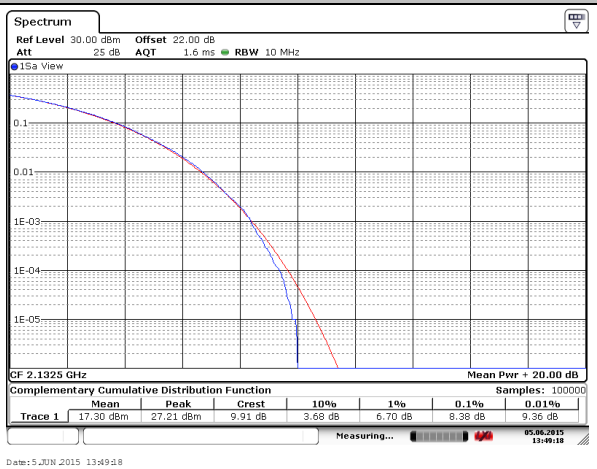
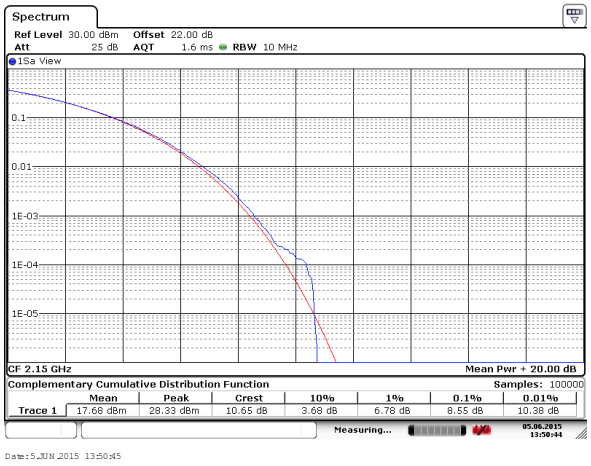


Middle Channel / Full RB



Highest Channel / Full RB

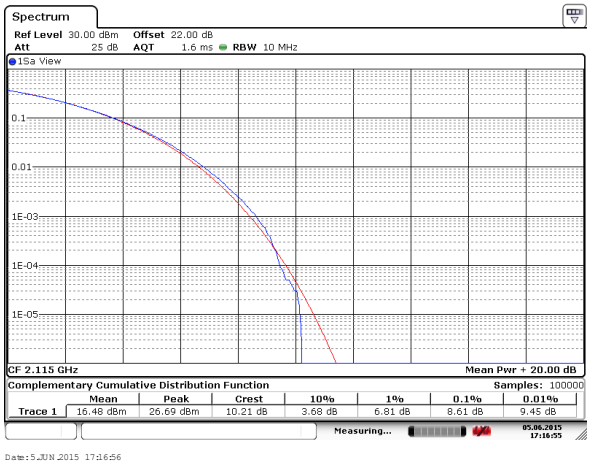


LTE Band 4 / 10MHz / 16QAM for Short Antenna	
Lowest Channel / Full RB	**Middle Channel / Full RB**
	
Highest Channel / Full RB	
	

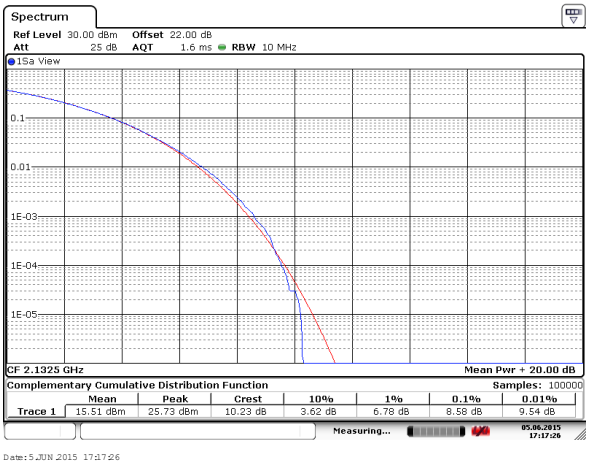
Mode	LTE Band 4 / 10MHz		
Antenna	Long Antenna	Short Antenna	
Mod.	64QAM	64QAM	Limit: 13dB
RB Size	Full RB	Full RB	Result
Lowest CH	8.61	8.52	PASS
Middle CH	8.58	8.55	
Highest CH	8.46	8.52	

LTE Band 4 / 10MHz / 64QAM for Long Antenna

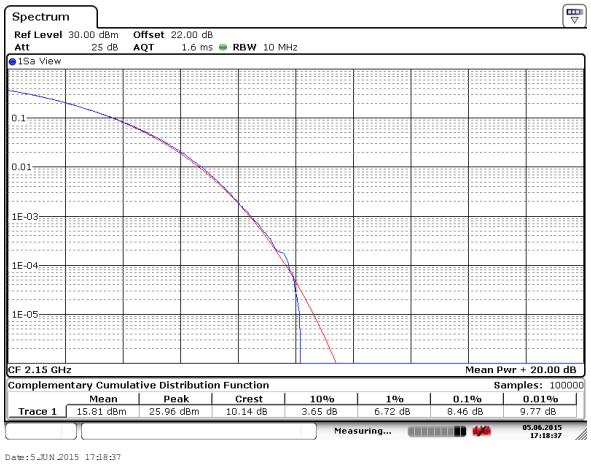
Lowest Channel / Full RB

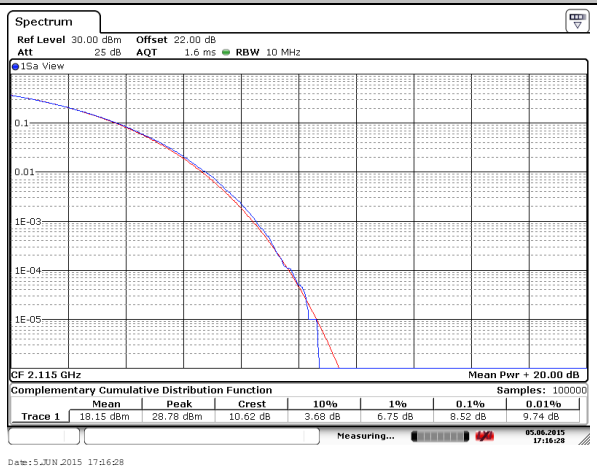
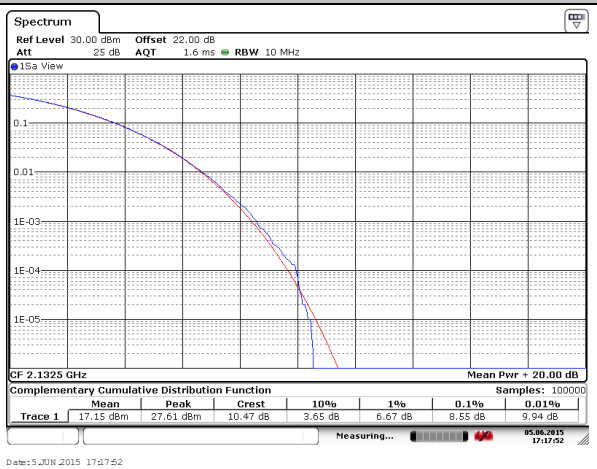
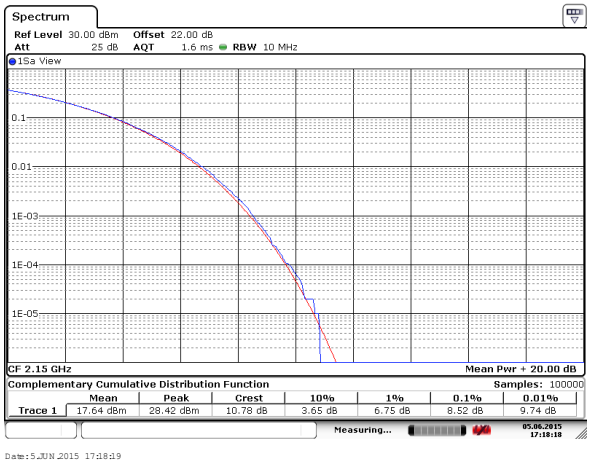


Middle Channel / Full RB

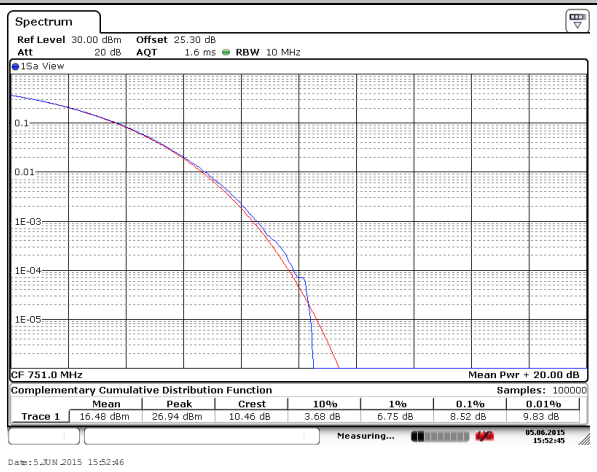
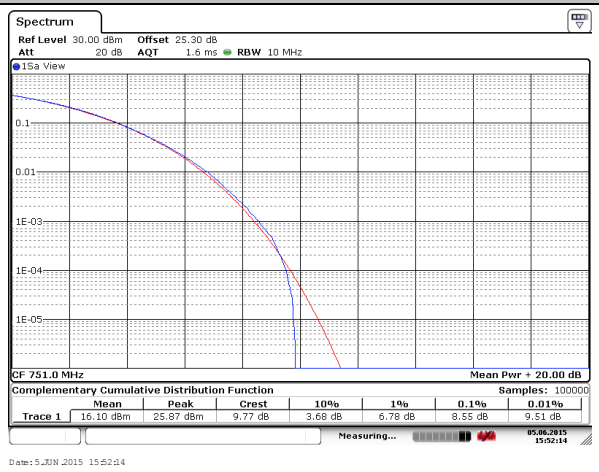


Highest Channel / Full RB

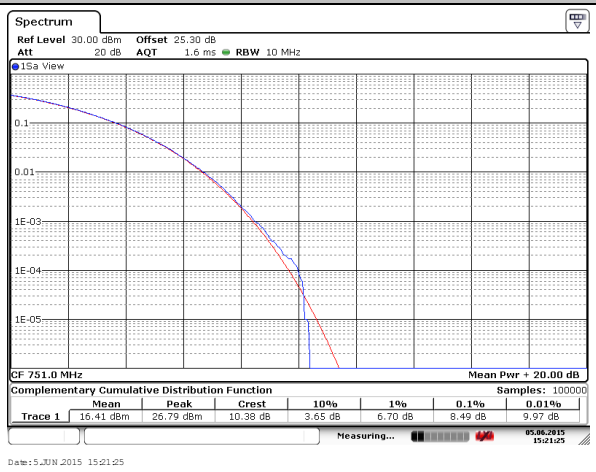
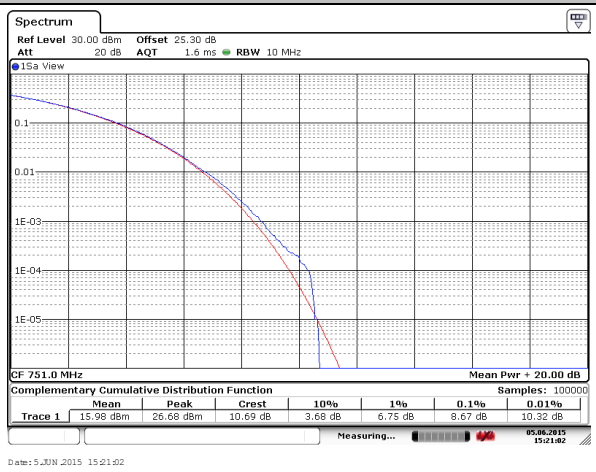


LTE Band 4 / 10MHz / 64QAM for Short Antenna	
Lowest Channel / Full RB	**Middle Channel / Full RB**
	
Highest Channel / Full RB	
	

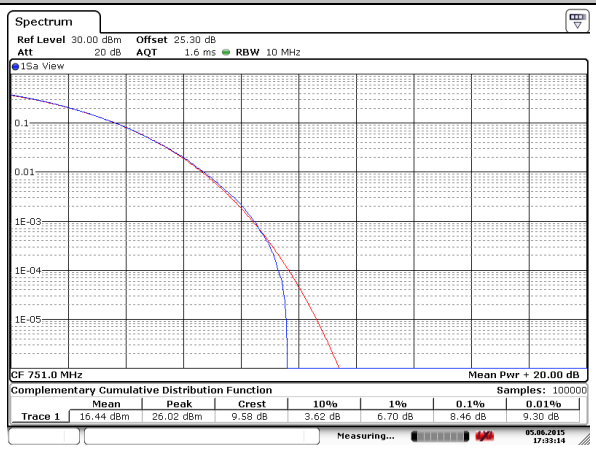
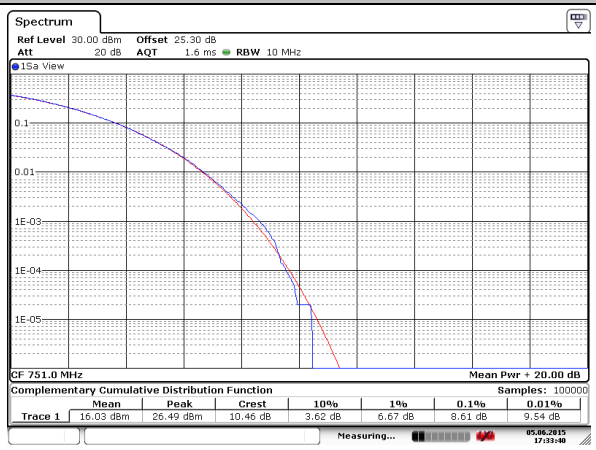
Mode	LTE Band 13 / 10MHz		
Antenna	Long Antenna	Short Antenna	
Mod.	QPSK	QPSK	Limit: 13dB
RB Size	Full RB	Full RB	Result
Middle CH	8.52	8.55	PASS

LTE Band 13 / 10MHz / QPSK for Long Antenna	LTE Band 13 / 10MHz / QPSK for Short Antenna
Middle Channel / Full RB	Middle Channel / Full RB
	

Mode	LTE Band 13 / 10MHz		
Antenna	Long Antenna	Short Antenna	
Mod.	16QAM	16QAM	Limit: 13dB
RB Size	Full RB	Full RB	Result
Middle CH	8.49	8.67	PASS

LTE Band 13 / 10MHz / 16QAM for Long Antenna	LTE Band 13 / 10MHz / 16QAM for Short Antenna
Middle Channel / Full RB	Middle Channel / Full RB
	

Mode	LTE Band 13 / 10MHz		
Antenna	Long Antenna	Short Antenna	
Mod.	64QAM	64QAM	Limit: 13dB
RB Size	Full RB	Full RB	Result
Middle CH	8.46	8.61	PASS

LTE Band 13 / 10MHz / 64QAM for Long Antenna	LTE Band 13 / 10MHz / 64QAM for Short Antenna
Middle Channel / Full RB	Middle Channel / Full RB
	

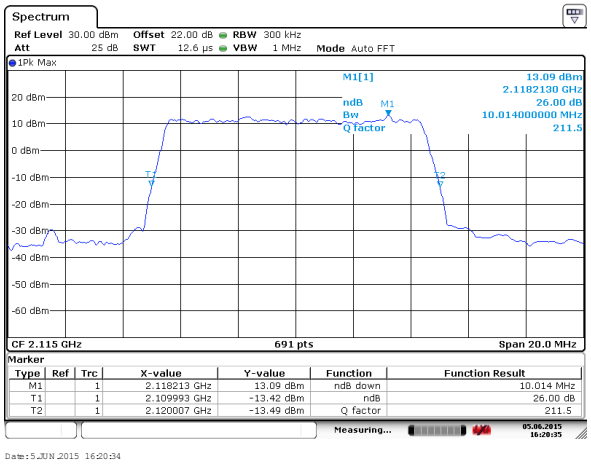
26dB Bandwidth

Mode	LTE Band 4 : 26dB BW(MHz)	
BW	10MHz	10MHz
Antenna	Long Antenna	Short Antenna
Mod.	QPSK	QPSK
Lowest CH	10.01	10.01
Middle CH	10.01	10.01
Highest CH	10.04	10.07

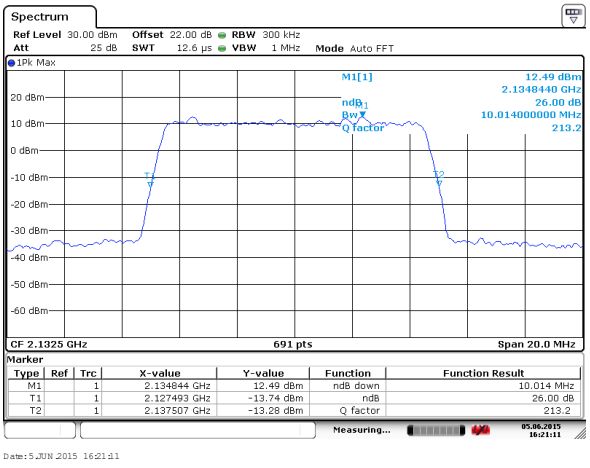
LTE Band 4

Long Antenna

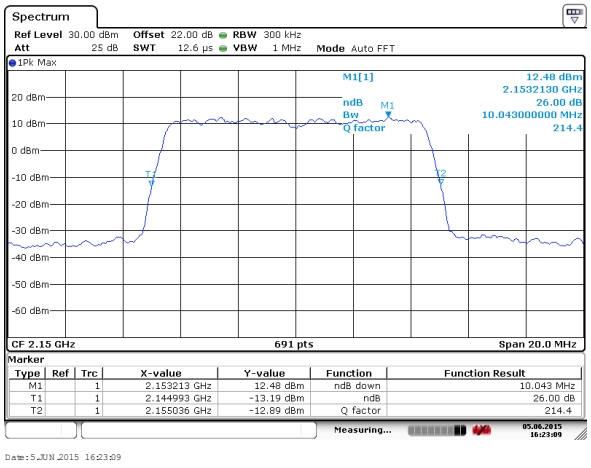
Lowest Channel / 10MHz / QPSK



Middle Channel / 10MHz / QPSK



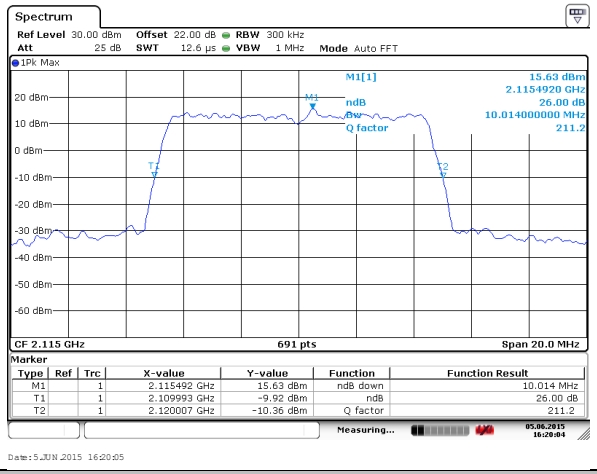
Highest Channel / 10MHz / QPSK



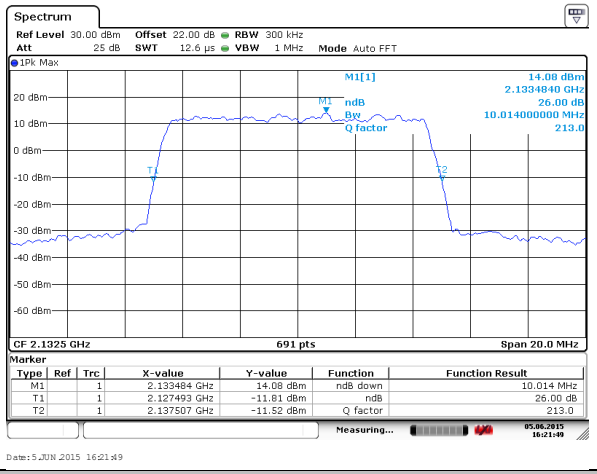
LTE Band 4

Short Antenna

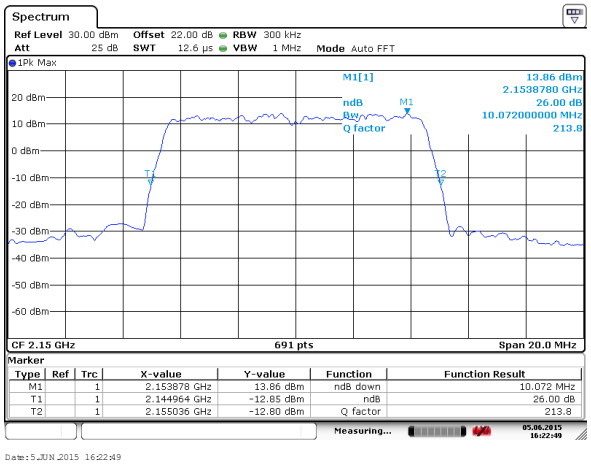
Lowest Channel / 10MHz / QPSK



Middle Channel / 10MHz / QPSK



Highest Channel / 10MHz / QPSK

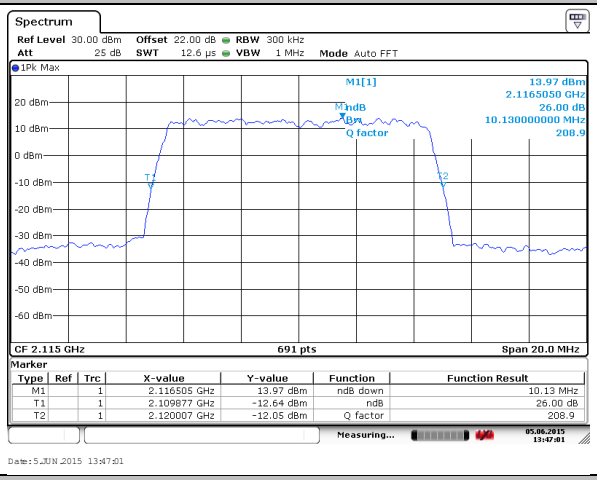


Mode	LTE Band 4 : 26dB BW(MHz)	
BW	10MHz	10MHz
Antenna	Long Antenna	Short Antenna
Mod.	16QAM	16QAM
Lowest CH	10.13	9.93
Middle CH	10.01	9.90
Highest CH	10.07	9.93

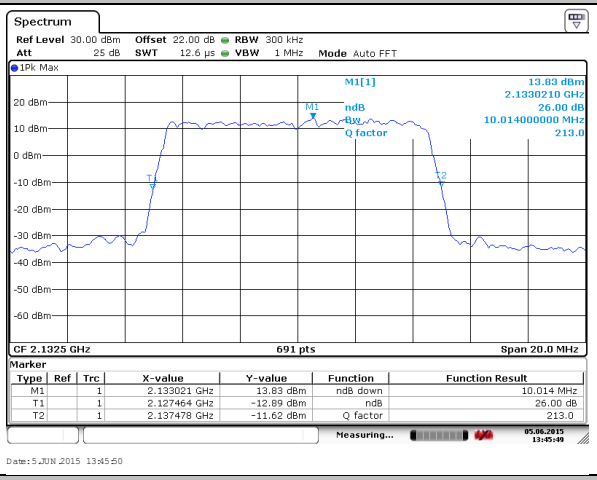
LTE Band 4

Long Antenna

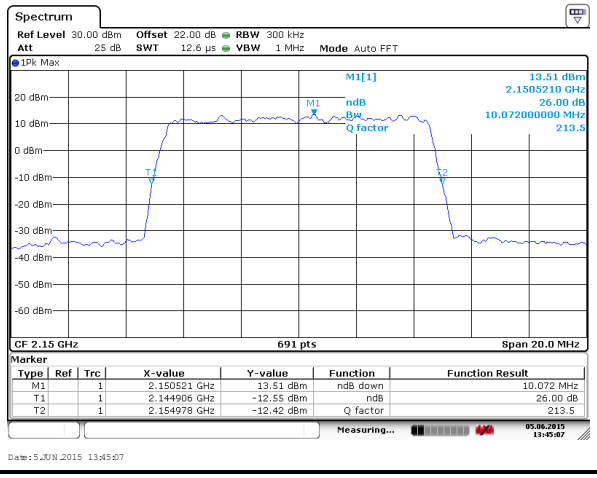
Lowest Channel / 10MHz / 16QAM



Middle Channel / 10MHz / 16QAM



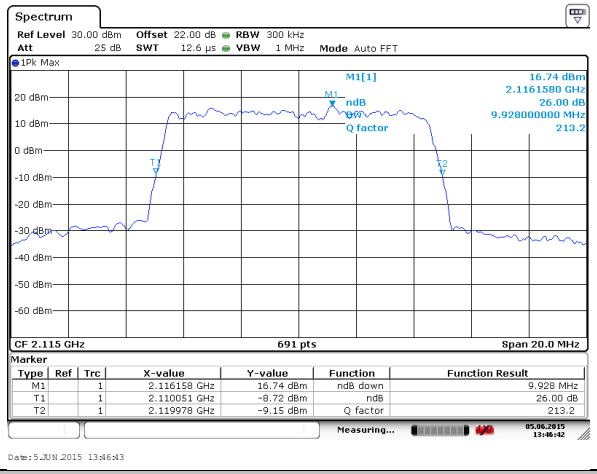
Highest Channel / 10MHz / 16QAM



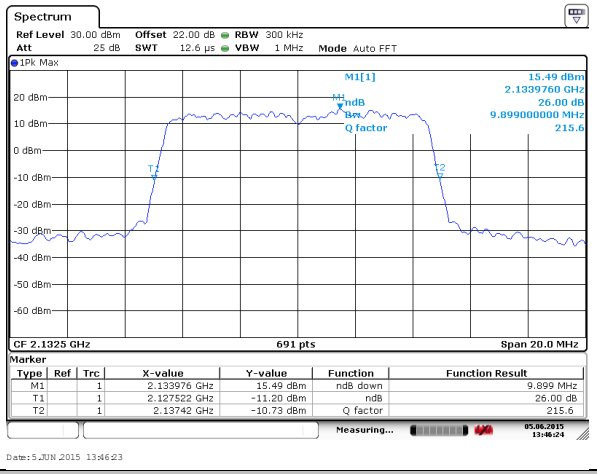
LTE Band 4

Short Antenna

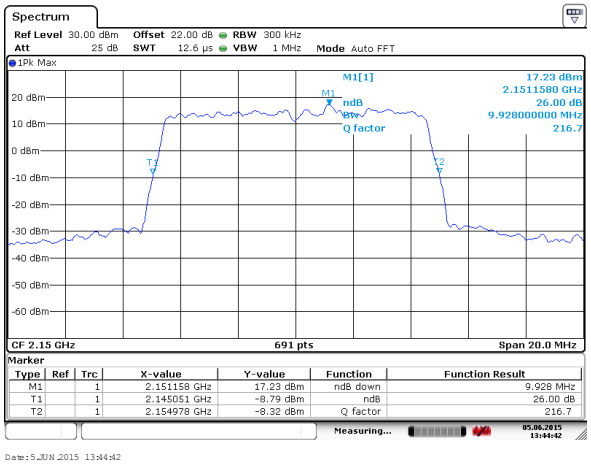
Lowest Channel / 10MHz / 16QAM



Middle Channel / 10MHz / 16QAM



Highest Channel / 10MHz / 16QAM

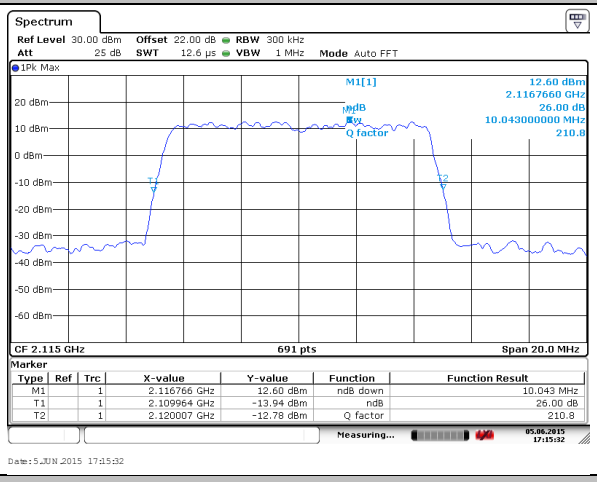


Mode	LTE Band 4 : 26dB BW(MHz)	
BW	10MHz	10MHz
Antenna	Long Antenna	Short Antenna
Mod.	64QAM	64QAM
Lowest CH	10.04	10.04
Middle CH	10.04	10.01
Highest CH	10.01	10.07

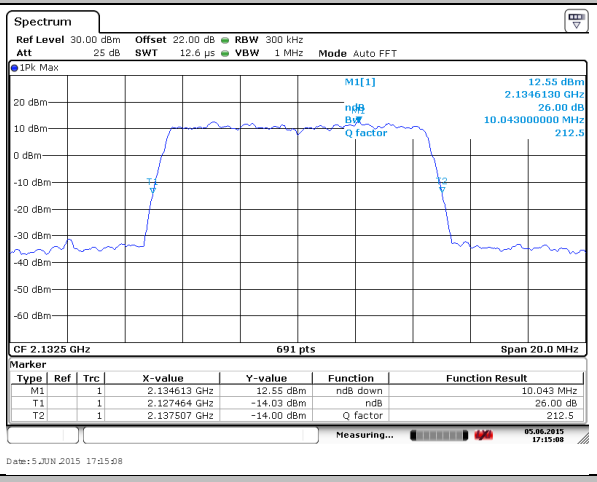
LTE Band 4

Long Antenna

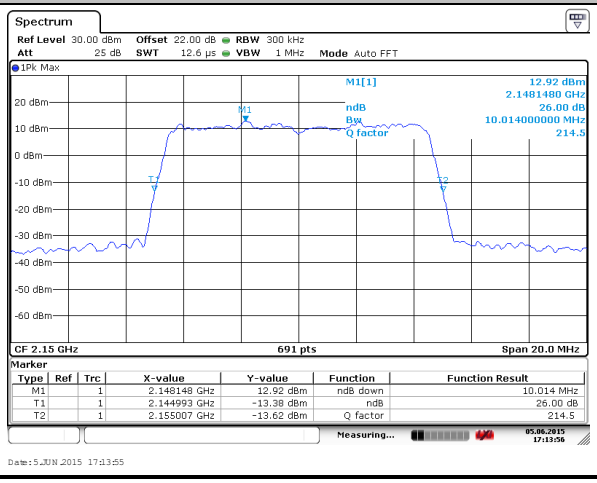
Lowest Channel / 10MHz / 64QAM



Middle Channel / 10MHz / 64QAM



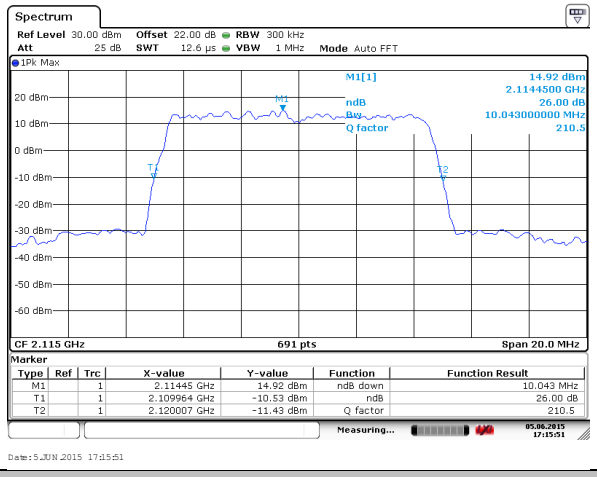
Highest Channel / 10MHz / 64QAM



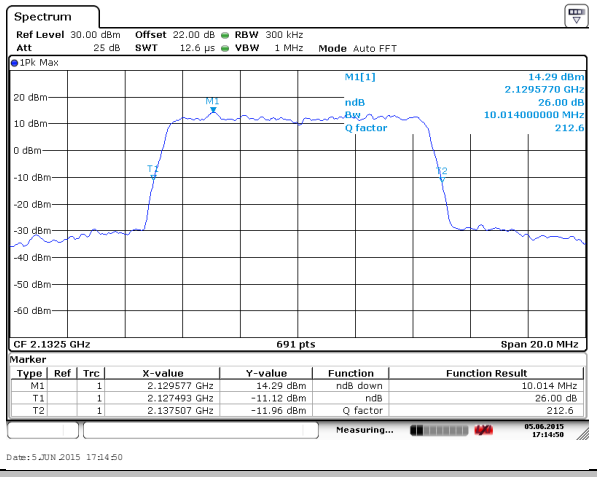
LTE Band 4

Short Antenna

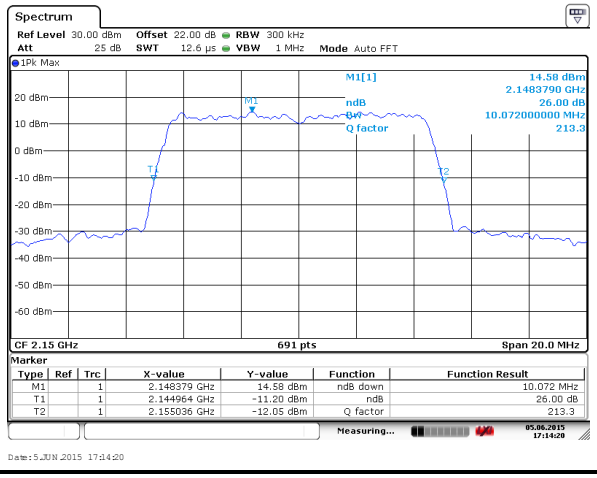
Lowest Channel / 10MHz / 64QAM



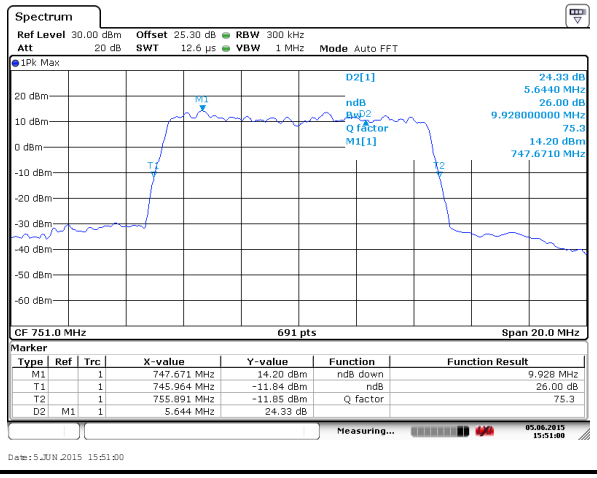
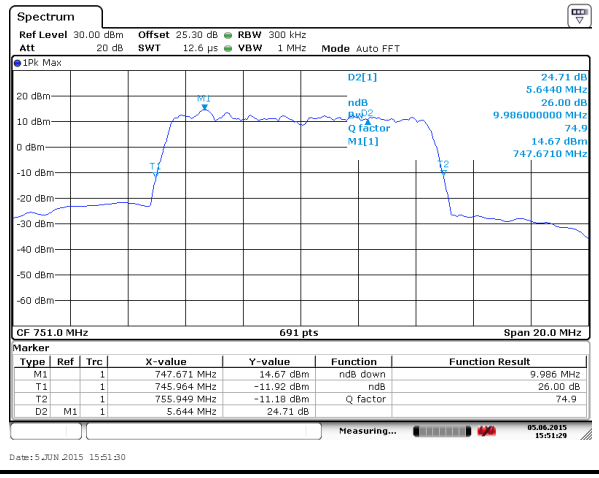
Middle Channel / 10MHz / 64QAM



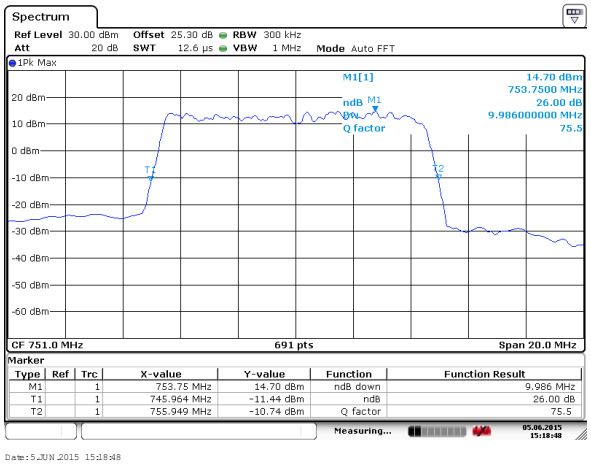
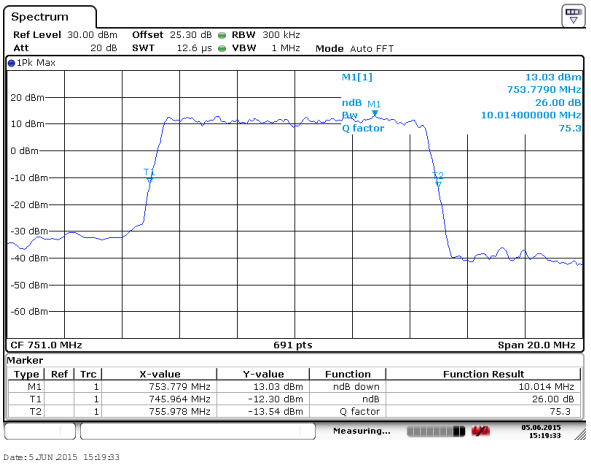
Highest Channel / 10MHz / 64QAM



Mode	LTE Band 13 : 26dB BW(MHz)	
BW	10MHz	10MHz
Antenna	Long Antenna	Short Antenna
Mod.	QPSK	QPSK
Middle CH	9.93	9.99

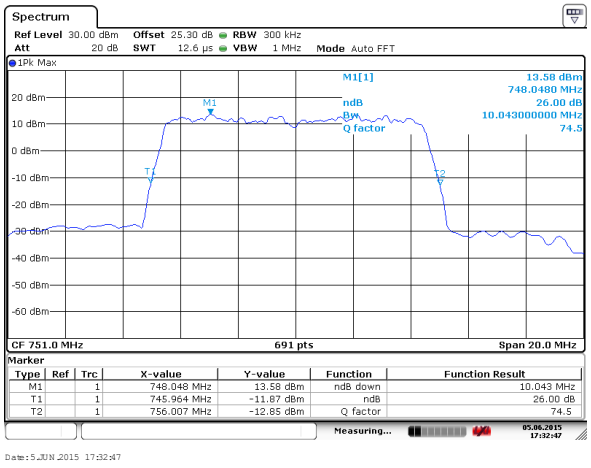
LTE Band 13	
Long Antenna	Short Antenna
Lowest Channel / 10MHz / QPSK	Middle Channel / 10MHz / QPSK
	

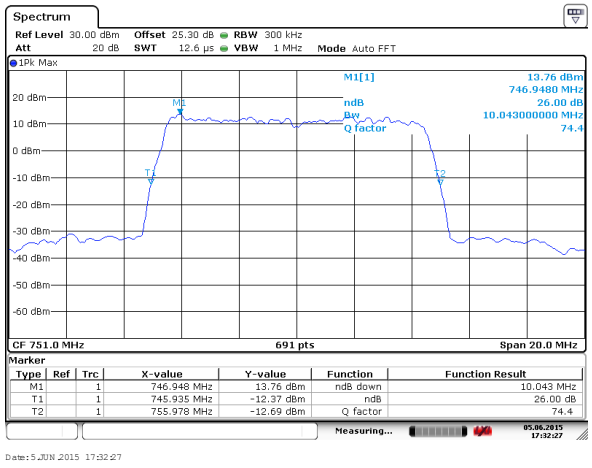
Mode	LTE Band 13 : 26dB BW(MHz)	
BW	10MHz	10MHz
Antenna	Long Antenna	Short Antenna
Mod.	16QAM	16QAM
Middle CH	9.99	10.01

LTE Band 13	
Long Antenna	Short Antenna
Lowest Channel / 10MHz / 16QAM	Middle Channel / 10MHz / 16QAM
	

Mode	LTE Band 13 : 26dB BW(MHz)	
BW	10MHz	10MHz
Antenna	Long Antenna	Short Antenna
Mod.	64QAM	64QAM
Middle CH	10.04	10.04

LTE Band 13	
Long Antenna	Short Antenna
Lowest Channel / 10MHz / 64QAM	Middle Channel / 10MHz / 64QAM





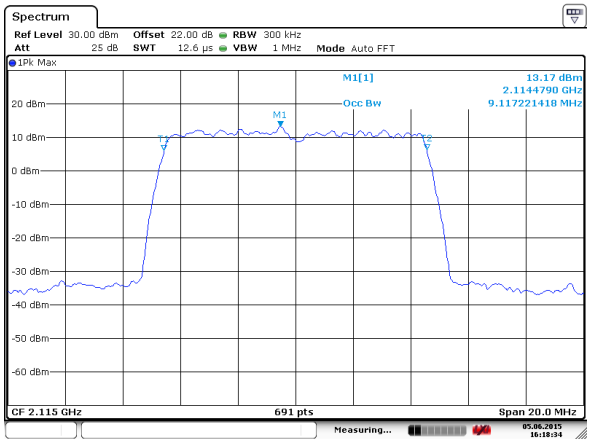
Occupied Bandwidth

Mode	LTE Band 4 : 99%OBW(MHz)	
BW	10MHz	10MHz
Antenna	Long Antenna	Short Antenna
Mod.	QPSK	QPSK
Lowest CH	9.12	9.06
Middle CH	9.06	9.09
Highest CH	9.12	9.06

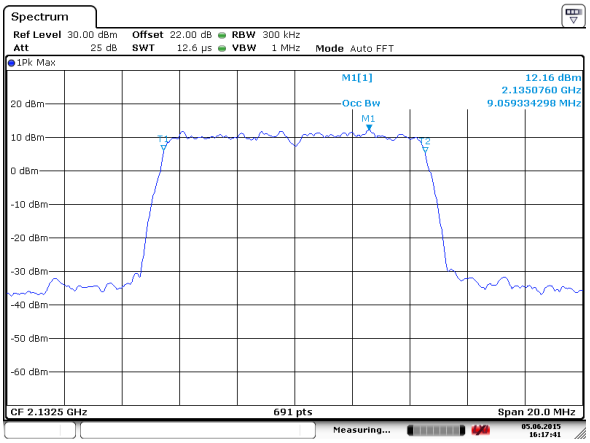
LTE Band 4

Long Antenna

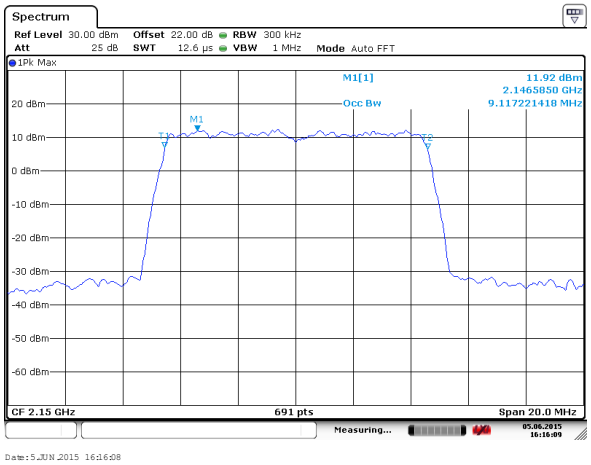
Lowest Channel / 10MHz / QPSK

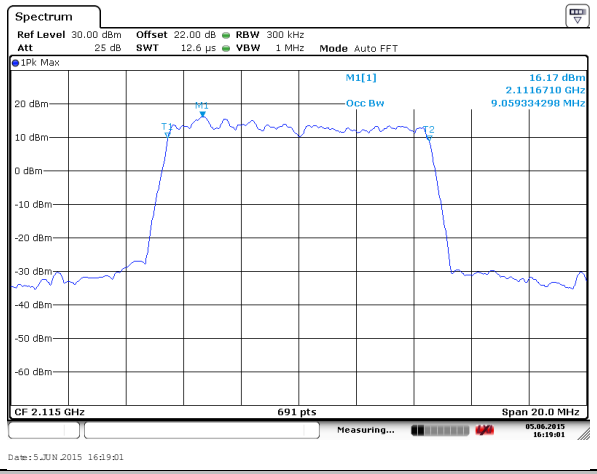
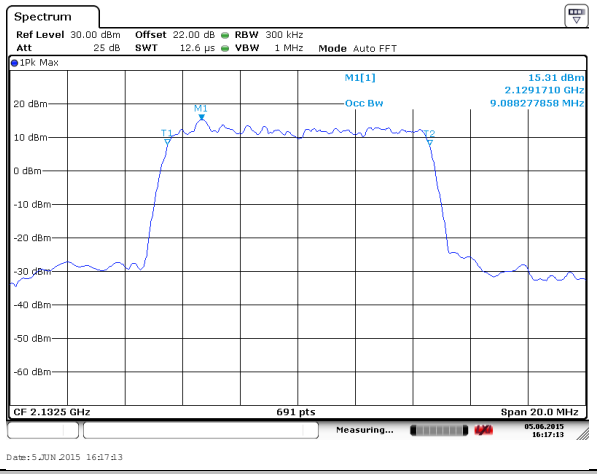
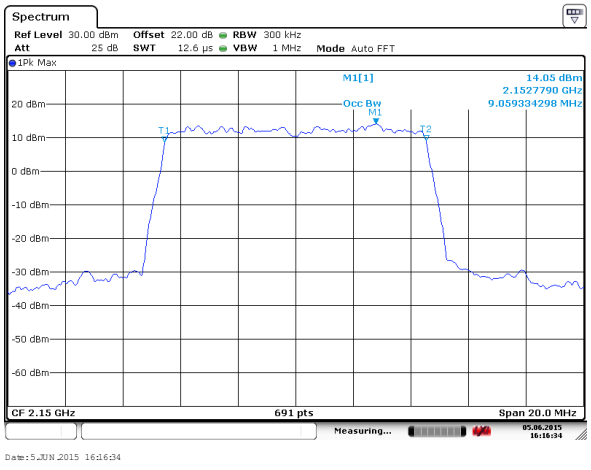


Middle Channel / 10MHz / QPSK



Highest Channel / 10MHz / QPSK



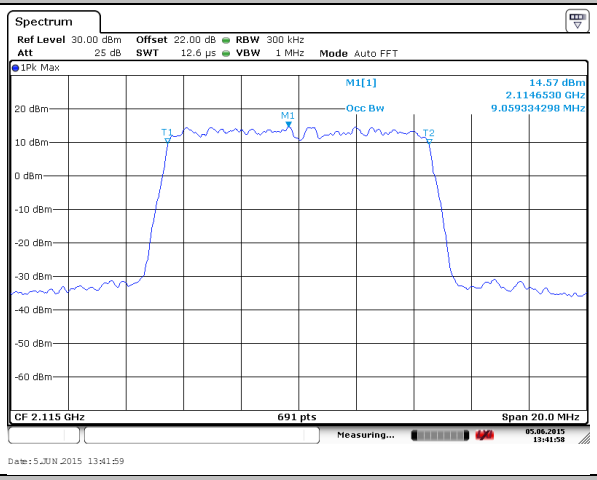
LTE Band 4	
Short Antenna	
Lowest Channel / 10MHz / QPSK	**Middle Channel / 10MHz / QPSK**
	
Highest Channel / 10MHz / QPSK	
	

Mode	LTE Band 4 : 99%OBW(MHz)	
BW	10MHz	10MHz
Antenna	Long Antenna	Short Antenna
Mod.	16QAM	16QAM
Lowest CH	9.06	9.09
Middle CH	9.12	9.09
Highest CH	9.06	9.09

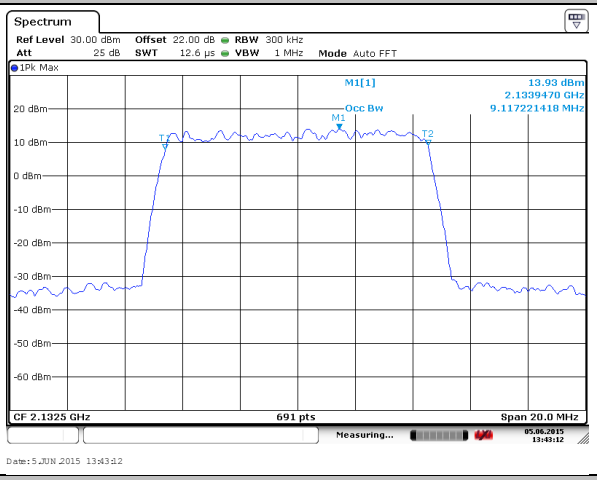
LTE Band 4

Long Antenna

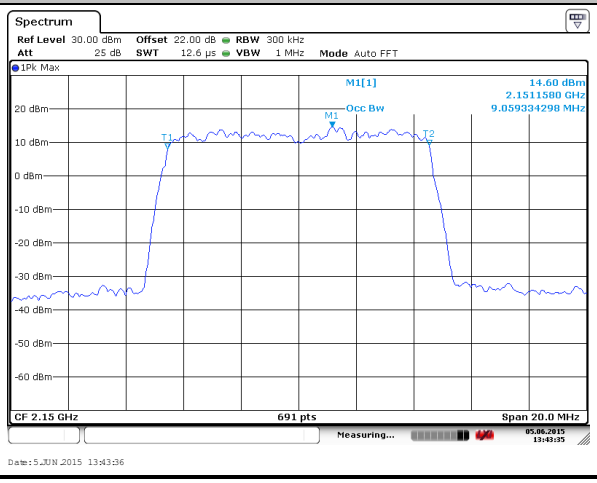
Lowest Channel / 10MHz / 16QAM

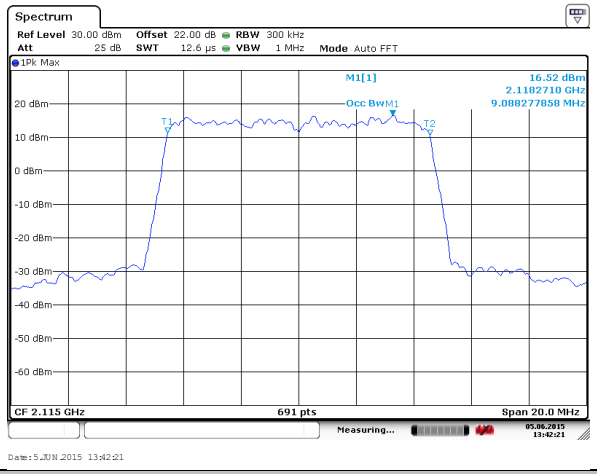
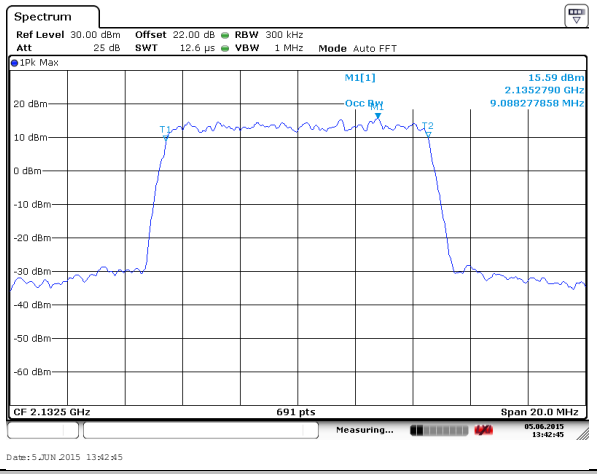
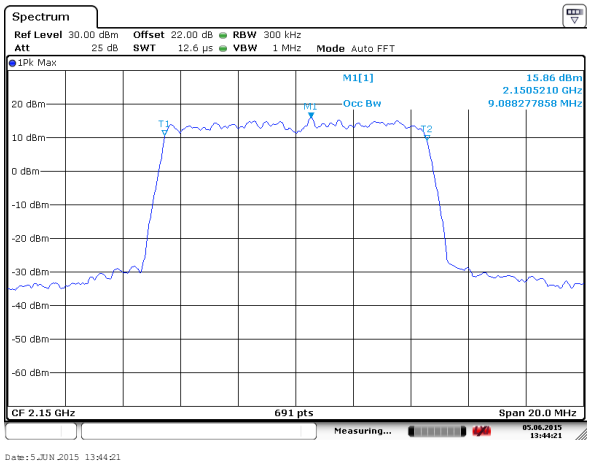


Middle Channel / 10MHz / 16QAM



Highest Channel / 10MHz / 16QAM



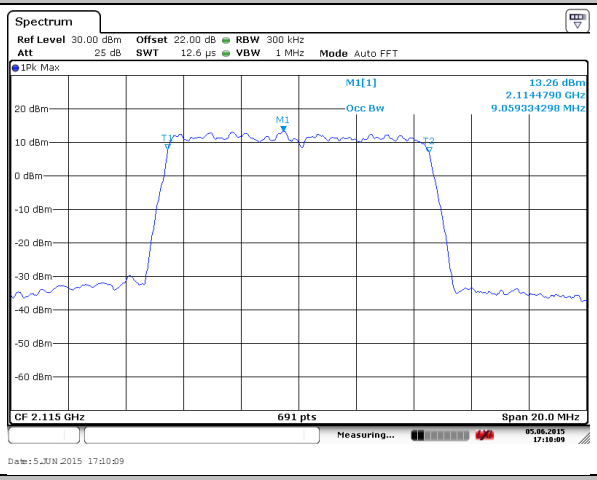
LTE Band 4	
Short Antenna	
Lowest Channel / 10MHz / 16QAM	Middle Channel / 10MHz / 16QAM
	
Highest Channel / 10MHz / 16QAM	
	

Mode	LTE Band 4 : 99%OBW(MHz)	
BW	10MHz	10MHz
Antenna	Long Antenna	Short Antenna
Mod.	64QAM	64QAM
Lowest CH	9.06	9.06
Middle CH	9.03	9.06
Highest CH	9.06	9.06

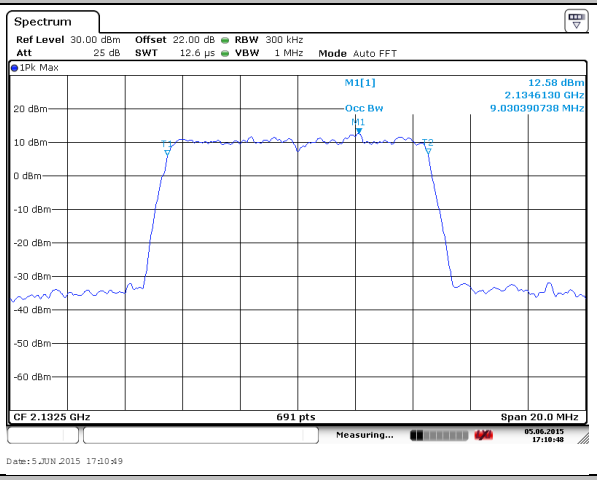
LTE Band 4

Long Antenna

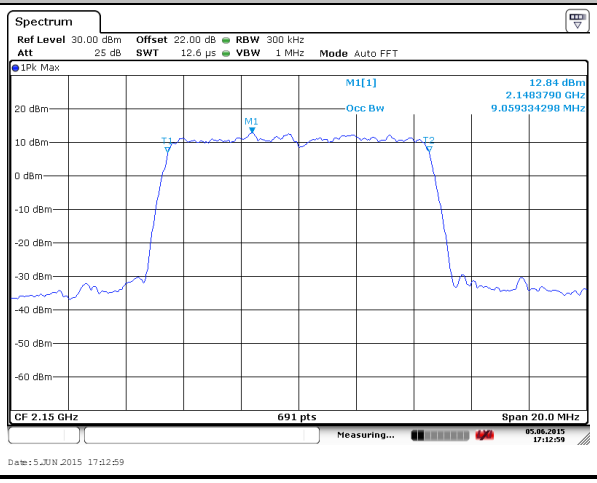
Lowest Channel / 10MHz / 64QAM

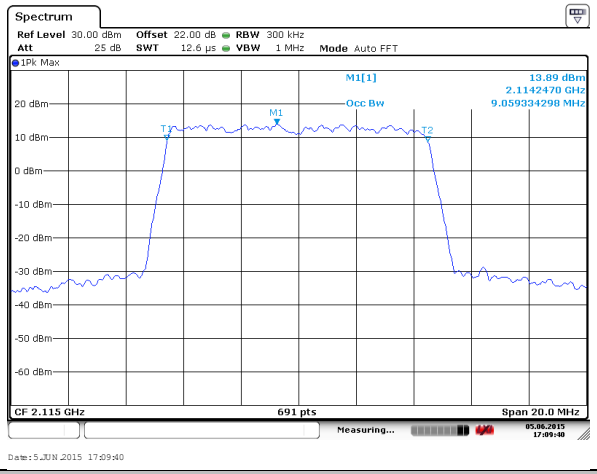
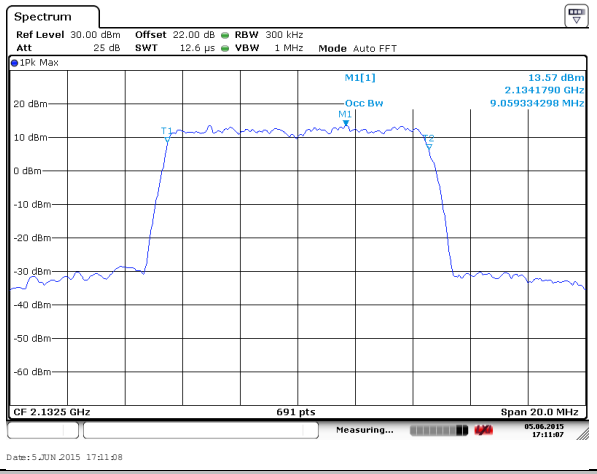
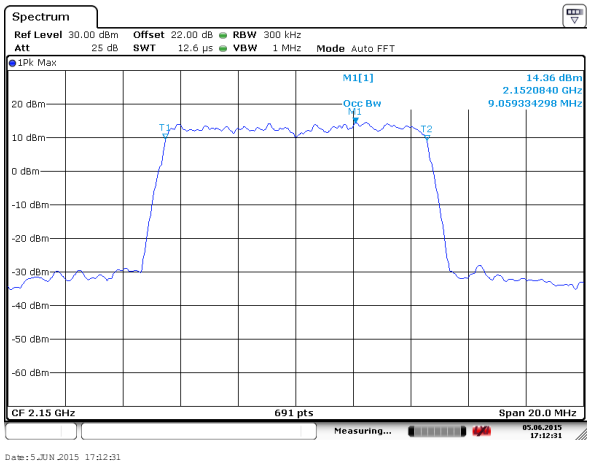


Middle Channel / 10MHz / 64QAM

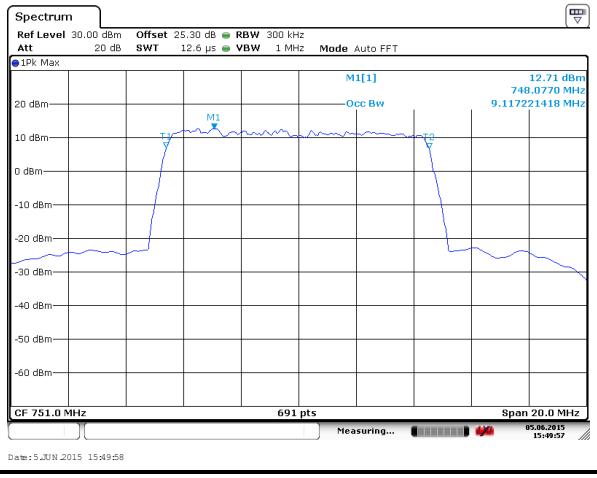
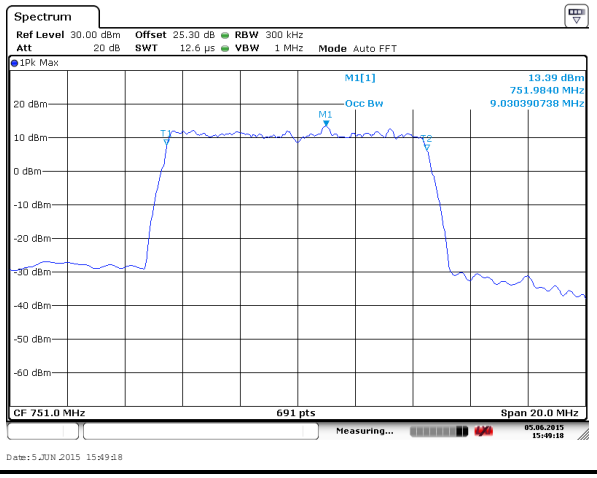


Highest Channel / 10MHz / 64QAM

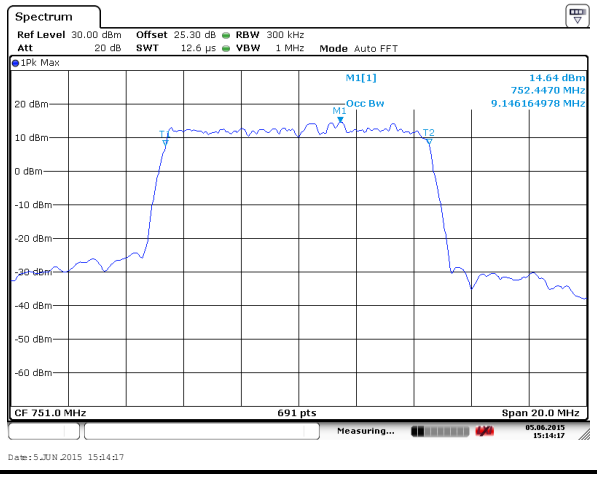
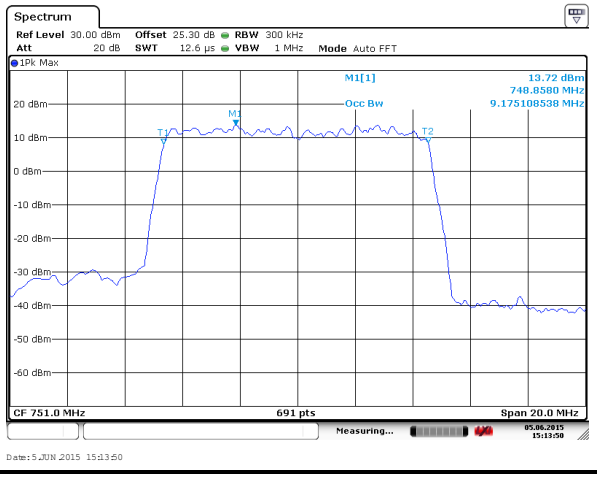


LTE Band 4	
Short Antenna	
Lowest Channel / 10MHz / 64QAM	Middle Channel / 10MHz / 64QAM
	
Highest Channel / 10MHz / 64QAM	
	

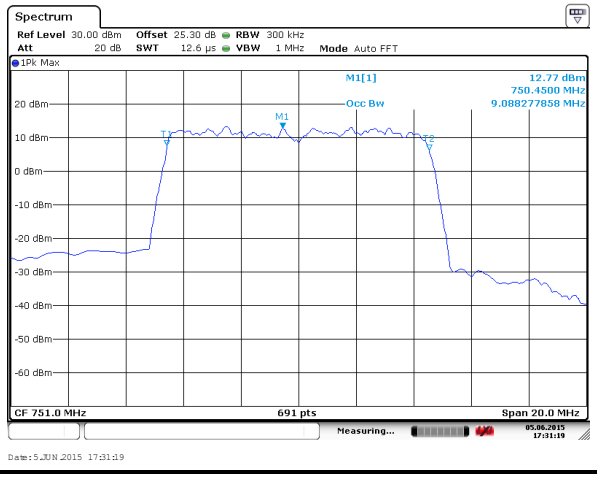
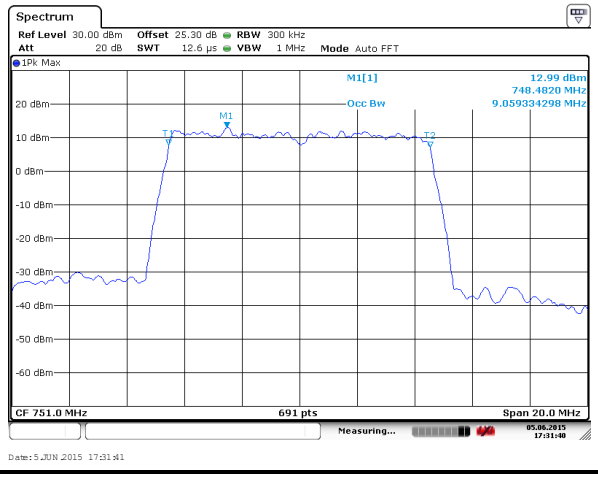
Mode	LTE Band 13 : 99%OBW(MHz)	
BW	10MHz	10MHz
Antenna	Long Antenna	Short Antenna
Mod.	QPSK	QPSK
Middle CH	9.12	9.03

LTE Band 13	
Long Antenna	Short Antenna
Lowest Channel / 10MHz / QPSK	Middle Channel / 10MHz / QPSK
	

Mode	LTE Band 13 : 99%OBW(MHz)	
BW	10MHz	10MHz
Antenna	Long Antenna	Short Antenna
Mod.	16QAM	16QAM
Middle CH	9.15	9.18

LTE Band 13	
Long Antenna	Short Antenna
Lowest Channel / 10MHz / 16QAM	Middle Channel / 10MHz / 16QAM
	

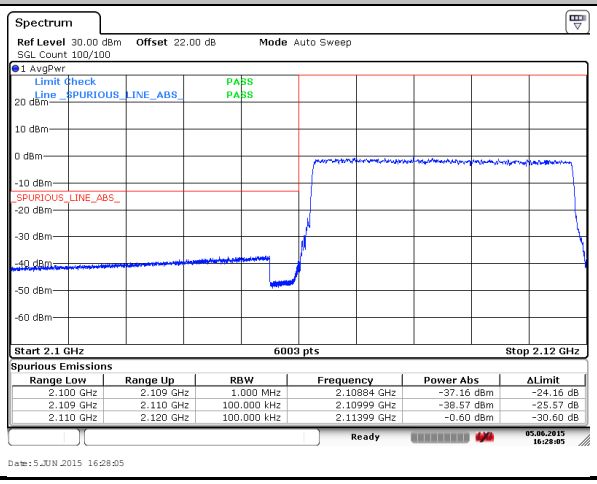
Mode	LTE Band 13 : 99%OBW(MHz)	
BW	10MHz	10MHz
Antenna	Long Antenna	Short Antenna
Mod.	64QAM	64QAM
Middle CH	9.09	9.06

LTE Band 13	
Long Antenna	Short Antenna
Lowest Channel / 10MHz / 64QAM	Middle Channel / 10MHz / 64QAM
	

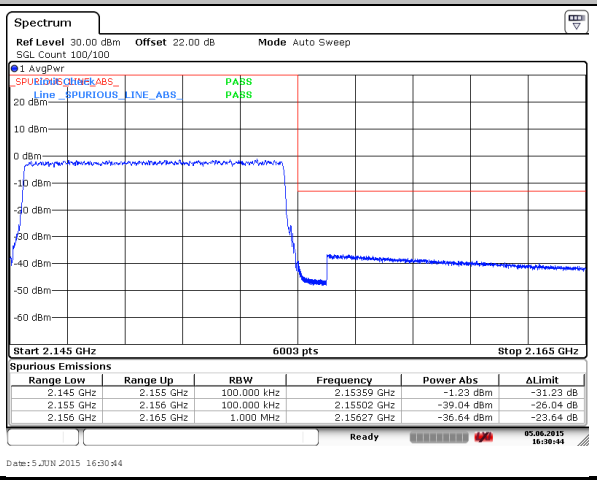
Conducted Band Edge

LTE Band 4 / 10MHz / QPSK for Long Antenna

Lowest Band Edge

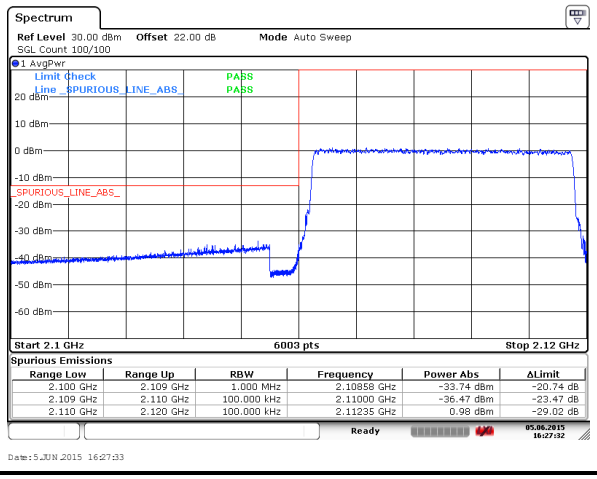


Highest Band Edge

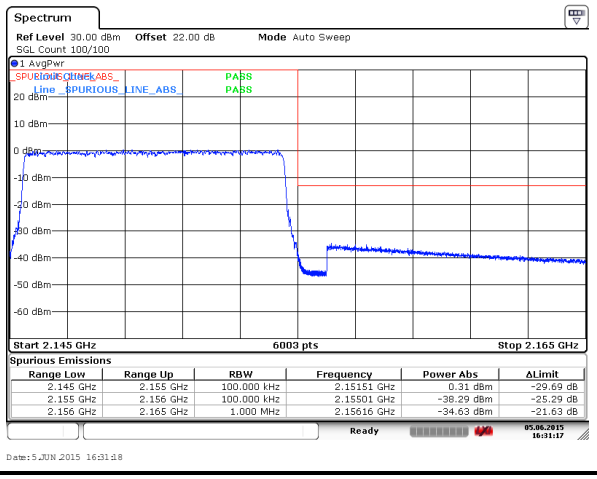


LTE Band 4 / 10MHz / QPSK for Short Antenna

Lowest Band Edge

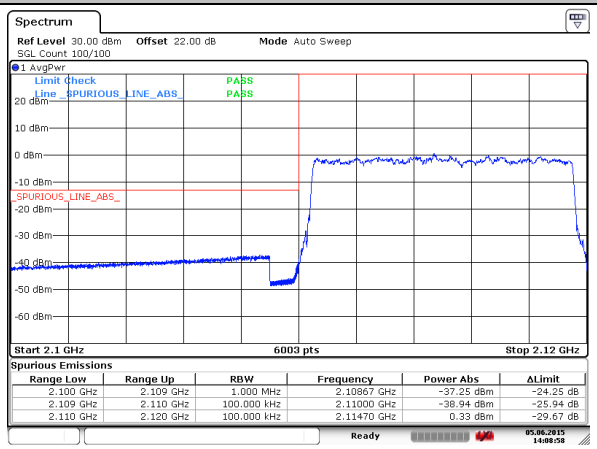


Highest Band Edge

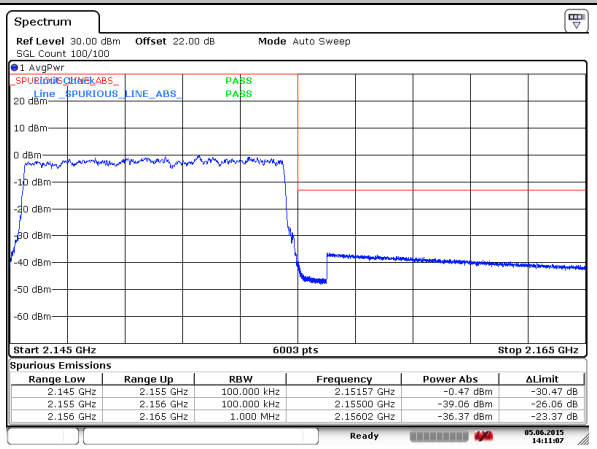


LTE Band 4 / 10MHz / 16QAM for Long Antenna

Lowest Band Edge

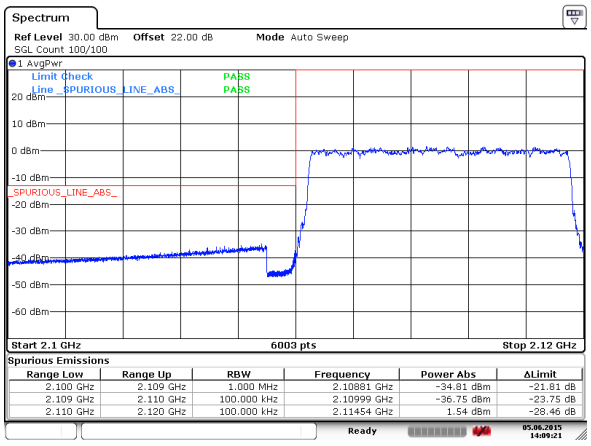


Highest Band Edge

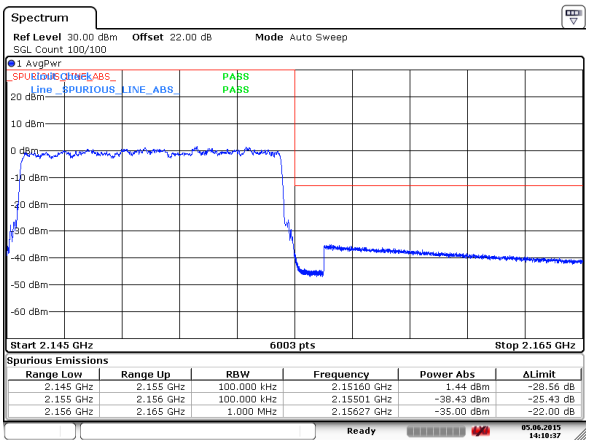


LTE Band 4 / 10MHz / 16QAM for Short Antenna

Lowest Band Edge

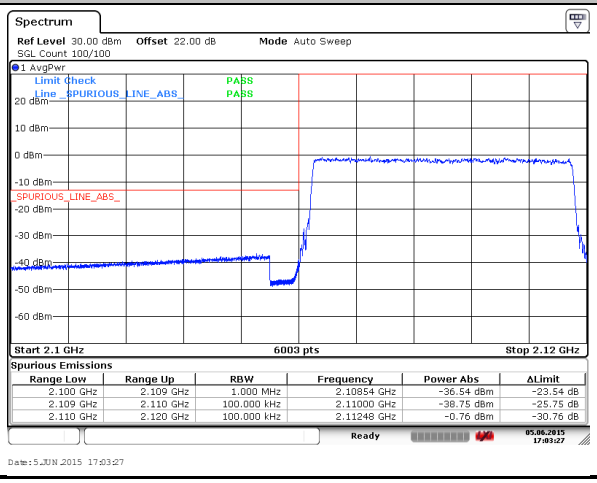


Highest Band Edge

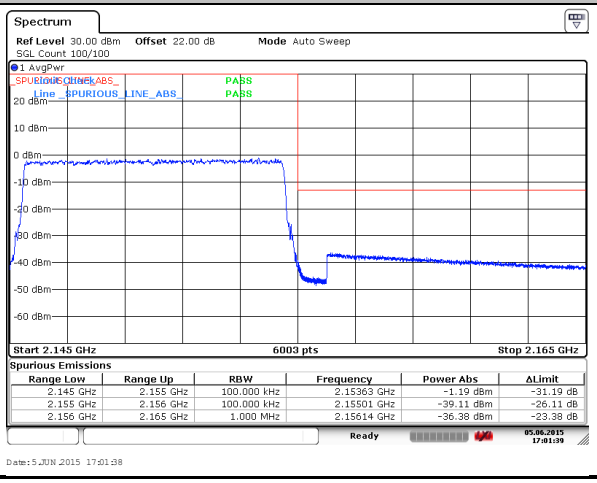


LTE Band 4 / 10MHz / 64QAM for Long Antenna

Lowest Band Edge

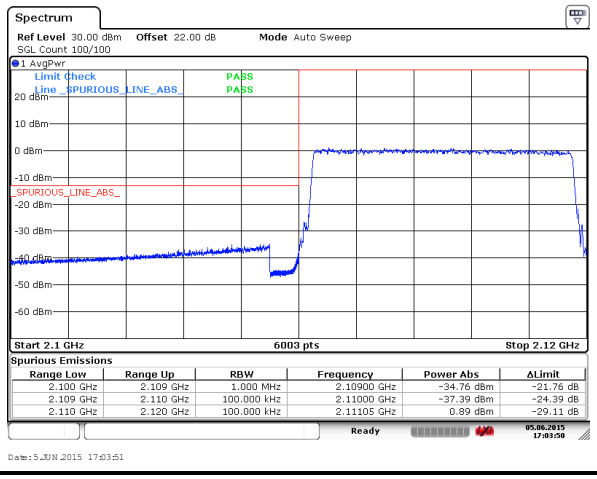


Highest Band Edge

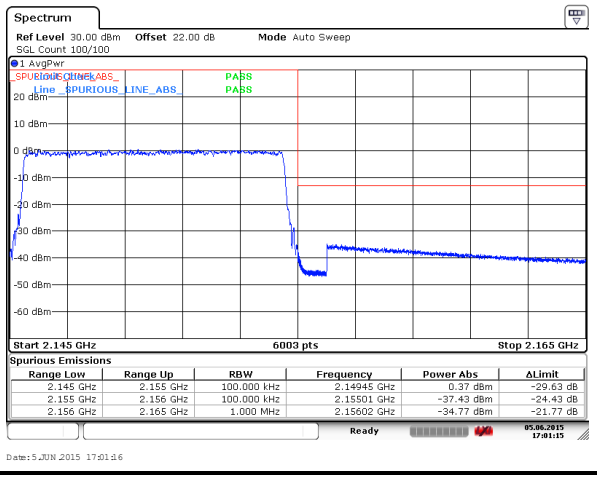


LTE Band 4 / 10MHz / 64QAM for Short Antenna

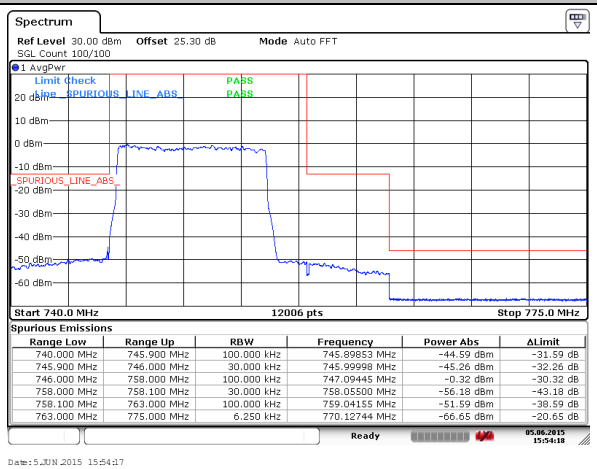
Lowest Band Edge

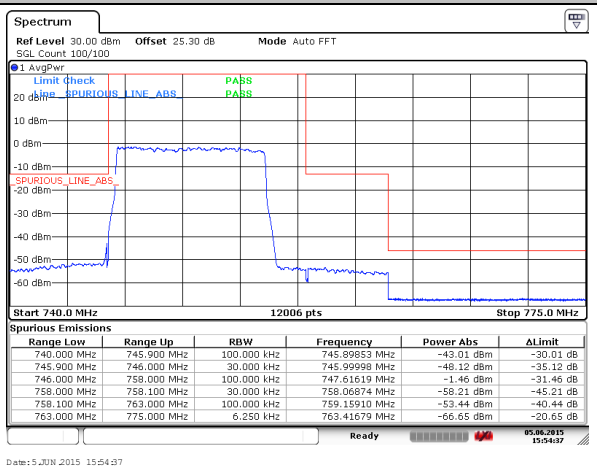


Highest Band Edge

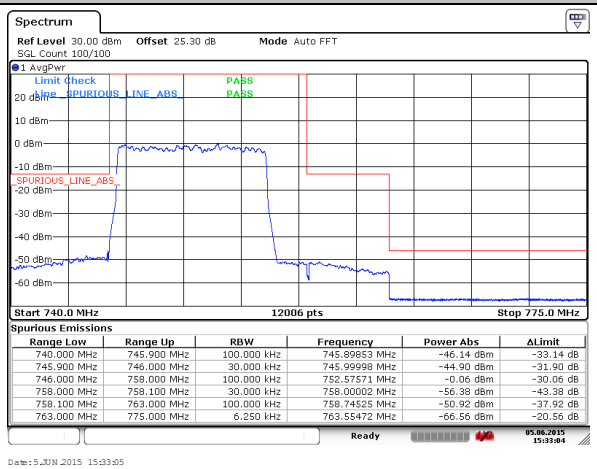


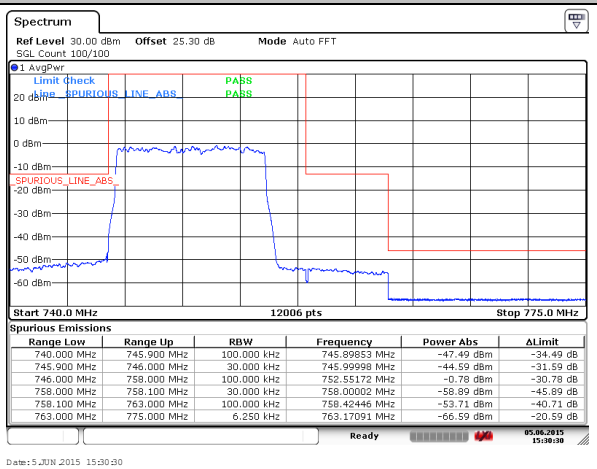
LTE Band 13 / 10MHz / QPSK	
Band Edge for Long Antenna	**Band Edge for Short Antenna**



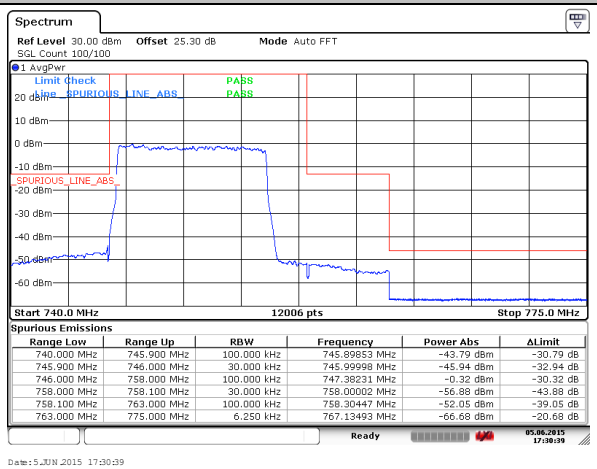


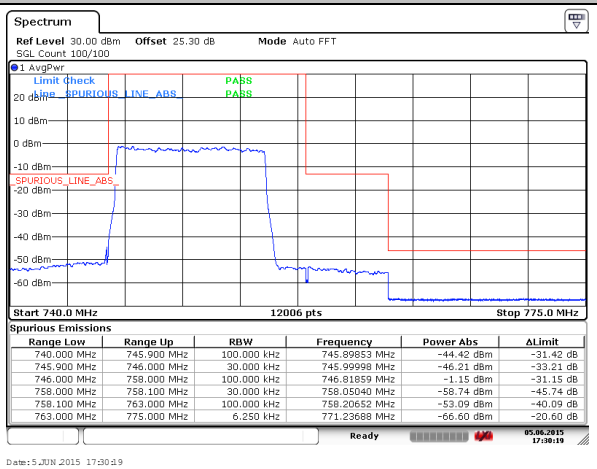
LTE Band 13 / 10MHz / 16QAM	
Band Edge for Long Antenna	**Band Edge for Short Antenna**





LTE Band 13 / 10MHz / 64QAM	
Band Edge for Long Antenna	**Band Edge for Short Antenna**

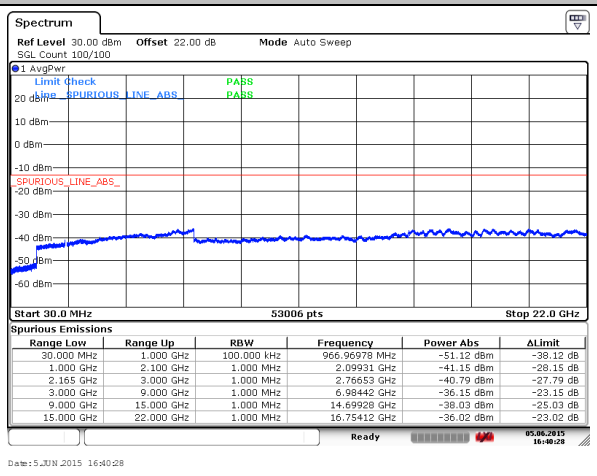




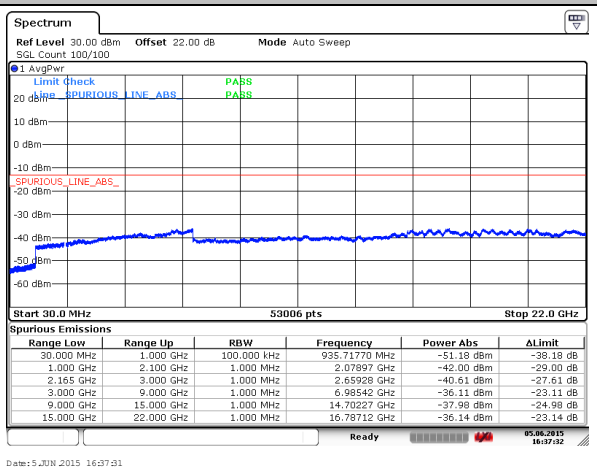
Conducted Spurious Emission

LTE Band 4 / 10MHz for Long Antenna

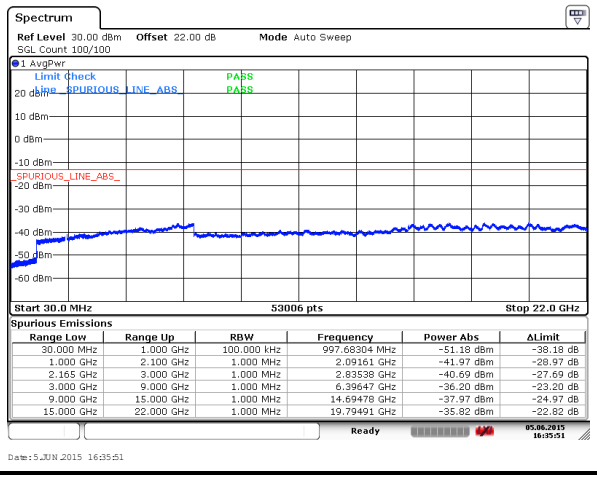
Lowest Channel / QPSK



Middle Channel / QPSK

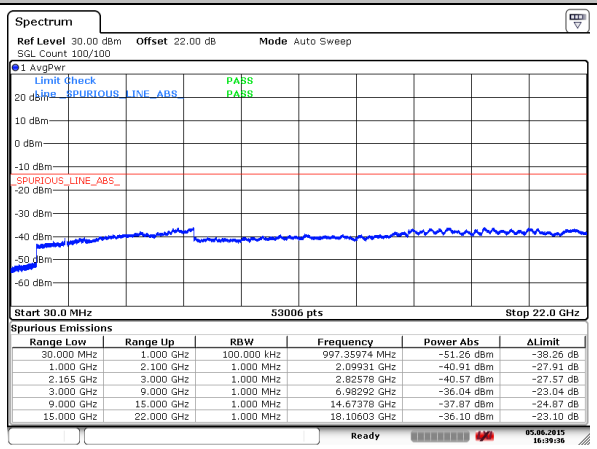


Highest Channel / QPSK

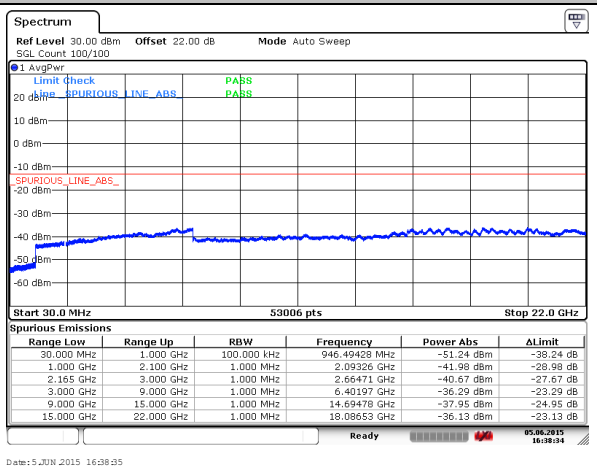


LTE Band 4 / 10MHz for Short Antenna

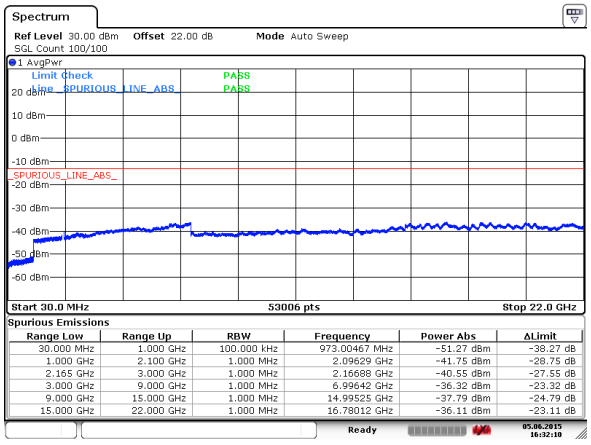
Lowest Channel / QPSK



Middle Channel / QPSK

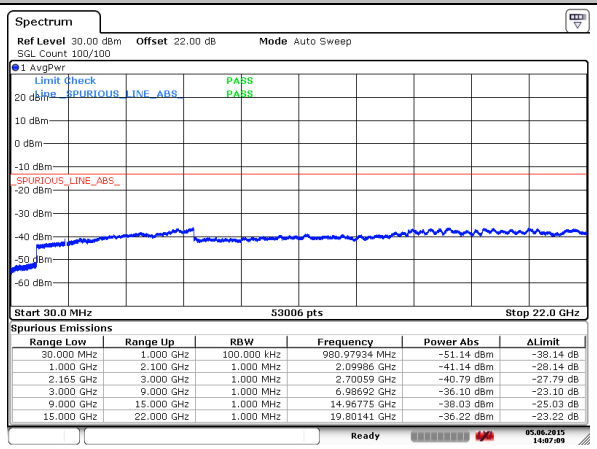


Highest Channel / QPSK

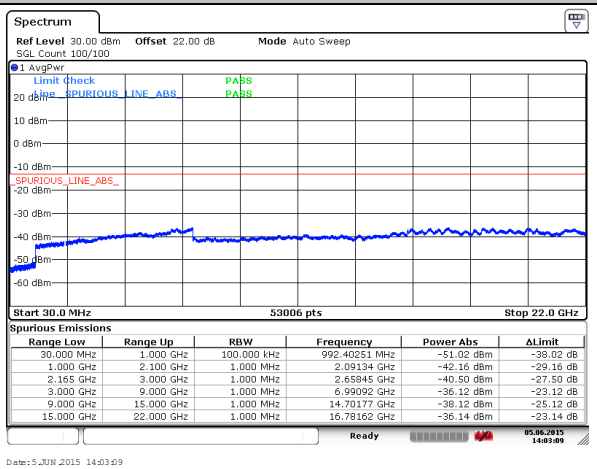


LTE Band 4 / 10MHz for Long Antenna

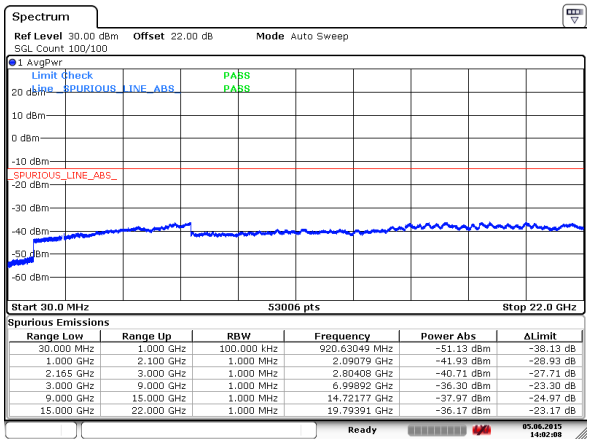
Lowest Channel / 16QAM



Middle Channel / 16QAM

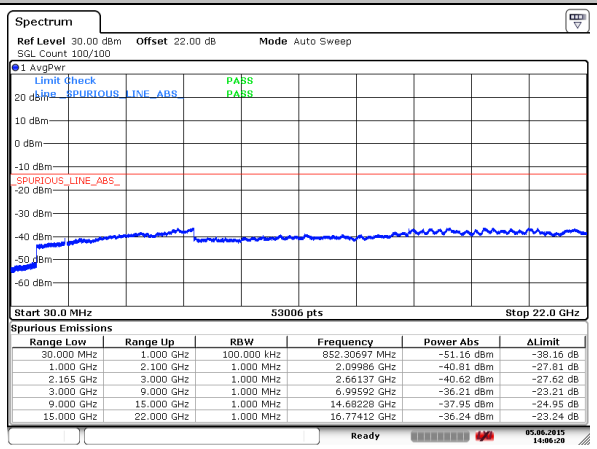


Highest Channel / 16QAM

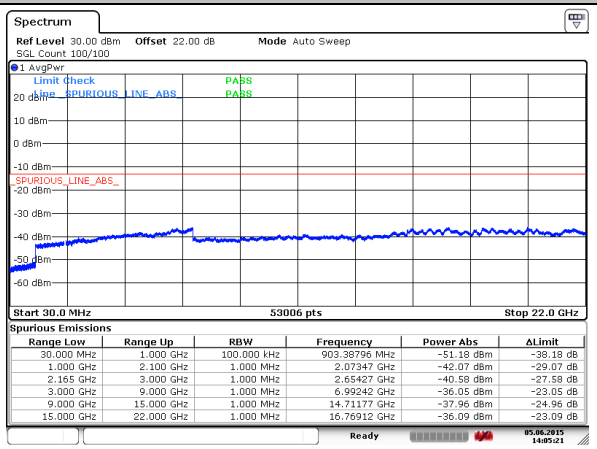


LTE Band 4 / 10MHz for Short Antenna

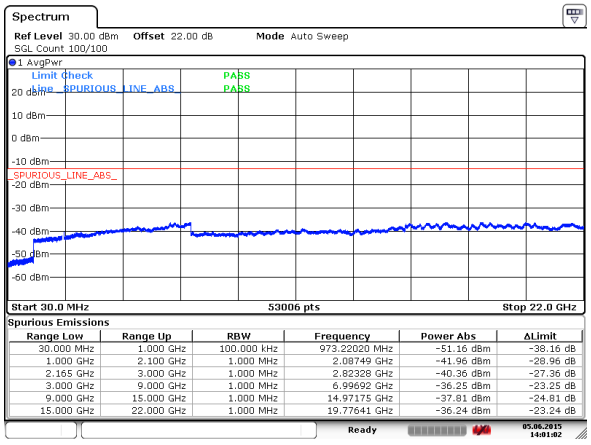
Lowest Channel / 16QAM



Middle Channel / 16QAM

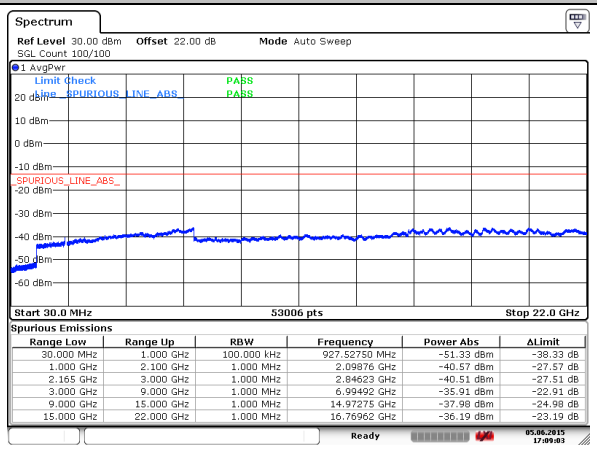


Highest Channel / 16QAM

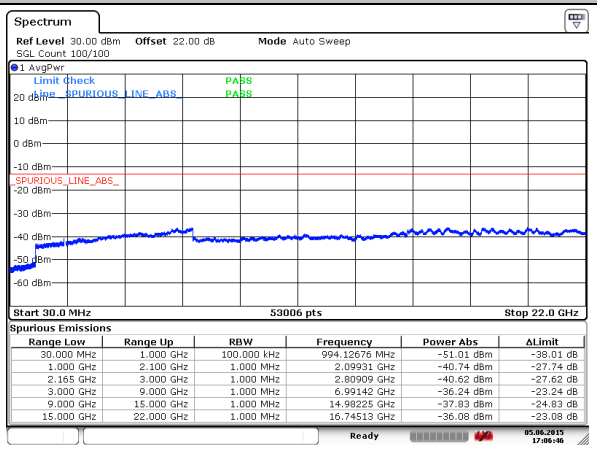


LTE Band 4 / 10MHz for Long Antenna

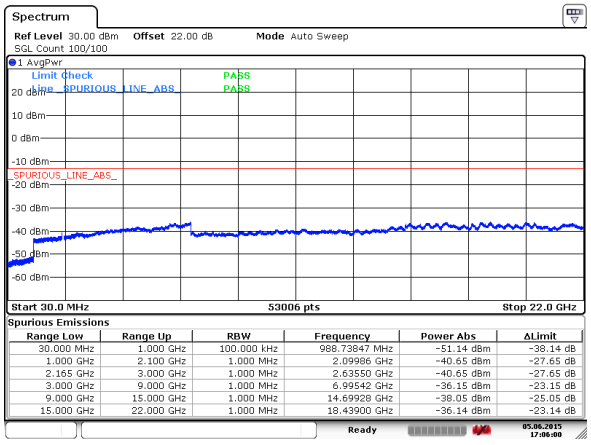
Lowest Channel / 64QAM



Middle Channel / 64QAM

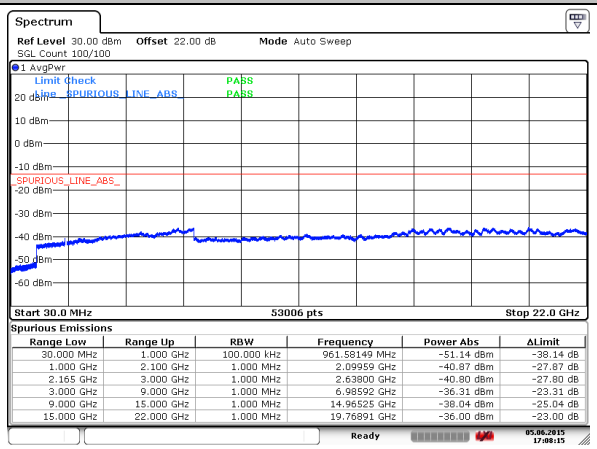


Highest Channel / 64QAM

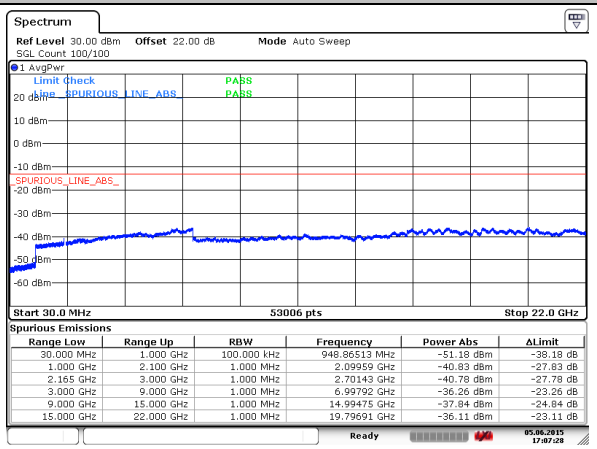


LTE Band 4 / 10MHz for Short Antenna

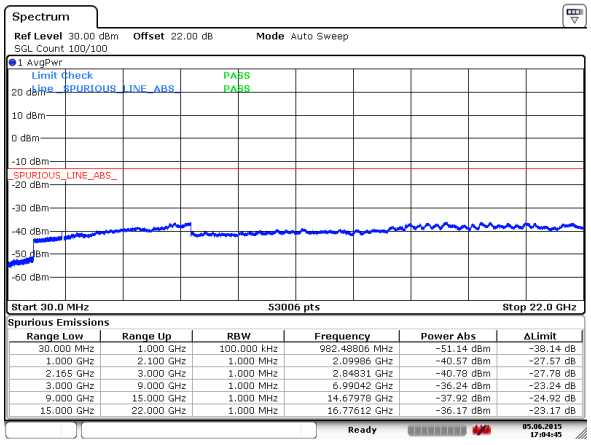
Lowest Channel / 64QAM



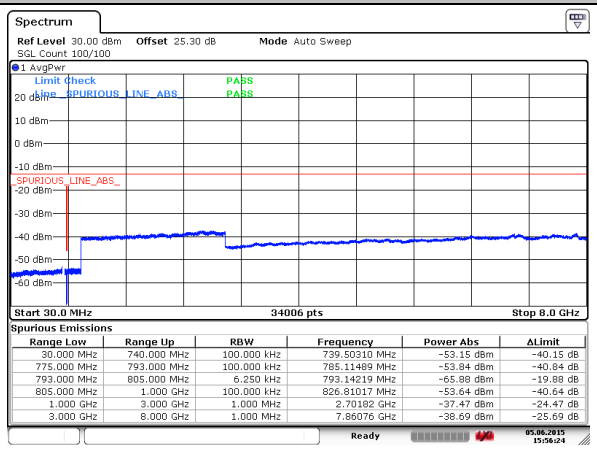
Middle Channel / 64QAM

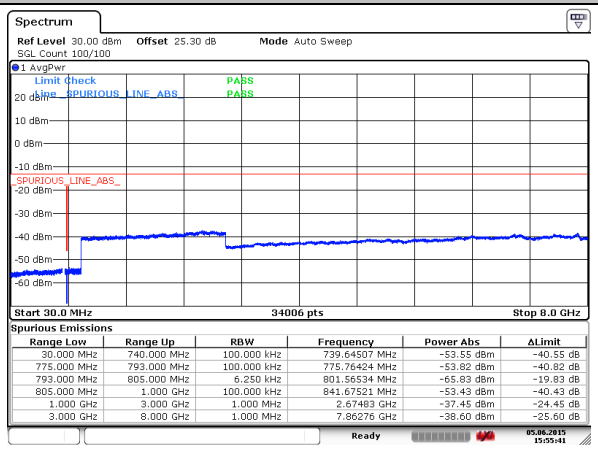


Highest Channel / 64QAM

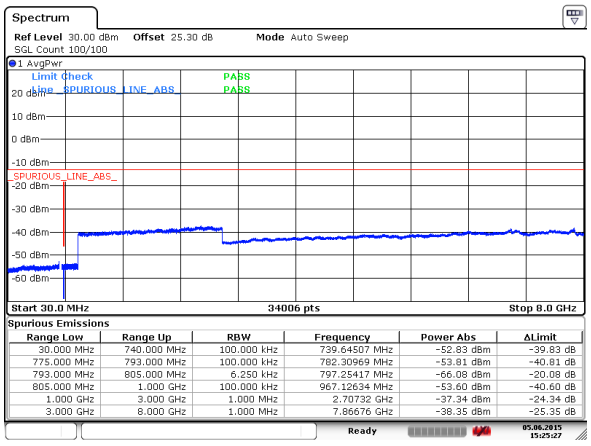


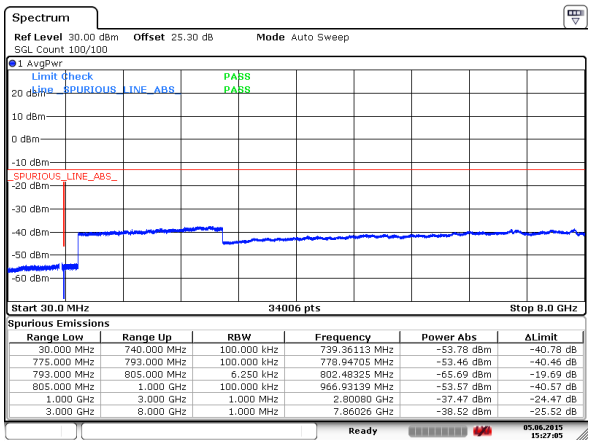
LTE Band 13 / 10MHz for Long Antenna	LTE Band 13 / 10MHz for Short Antenna
Middle Channel / QPSK	Middle Channel / QPSK



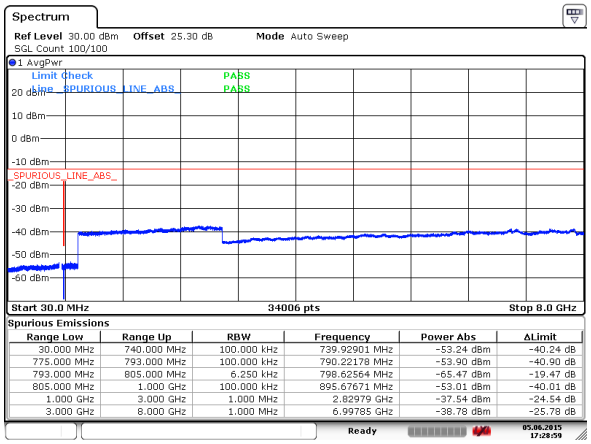


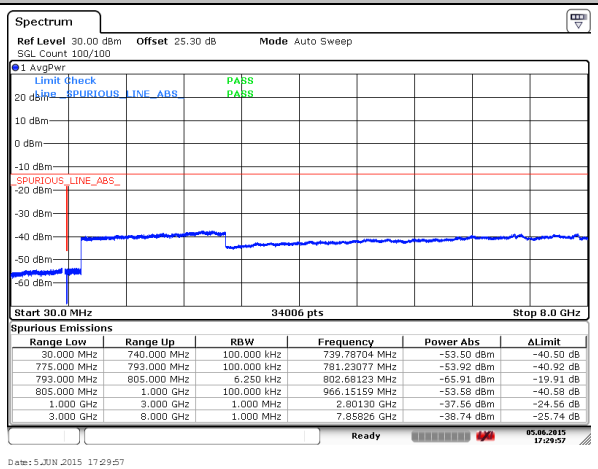
LTE Band 13 / 10MHz for Long Antenna	LTE Band 13 / 10MHz for Short Antenna
Middle Channel / 16QAM	Middle Channel / 16QAM





LTE Band 13 / 10MHz for Long Antenna	LTE Band 13 / 10MHz for Short Antenna
Middle Channel / 64QAM	Middle Channel / 64QAM





Frequency Stability

Test Conditions		LTE Band 4 (QPSK) / Middle Channel		Limit
Temperature (°C)	Voltage (Volt)	BW 10MHz		Note 2.
		Deviation (ppm)		Result
		Long Antenna	Short Antenna	
50	Normal Voltage	0.0000	0.0000	PASS
40	Normal Voltage	0.0000	0.0000	
30	Normal Voltage	0.0000	0.0000	
20(Ref.)	Normal Voltage	0.0000	0.0000	
10	Normal Voltage	0.2063	0.0000	
0	Normal Voltage	0.0000	0.0000	
-10	Normal Voltage	0.0000	0.0000	
-20	Normal Voltage	0.0000	0.0000	
-30	Normal Voltage	0.6143	0.6143	
20	Maximum Voltage	0.0000	0.0000	
20	Normal Voltage	0.0000	0.2063	
20	Battery End Point	0.0000	0.0000	

Note:

1. Normal Voltage = 110 V. ；Battery End Point (BEP) = 102 V.；Maximum Voltage =138 V
2. Note: The frequency fundamental emissions stay within the authorized frequency block based on the frequency deviation measured is small.

Test Conditions		LTE Band 13 (QPSK) / Middle Channel		Limit
Temperature (°C)	Voltage (Volt)	BW 10MHz		Note 2.
		Deviation (ppm)		Result
		Long Antenna	Short Antenna	
50	Normal Voltage	0.0000	0.0000	PASS
40	Normal Voltage	0.0000	0.0000	
30	Normal Voltage	0.0000	0.0000	
20(Ref.)	Normal Voltage	0.0000	0.0000	
10	Normal Voltage	0.0000	0.0000	
0	Normal Voltage	0.0000	0.0000	
-10	Normal Voltage	0.0000	0.0000	
-20	Normal Voltage	0.0000	0.0000	
-30	Normal Voltage	0.5859	0.5859	
20	Maximum Voltage	0.0000	0.0000	
20	Normal Voltage	0.0000	0.0000	
20	Battery End Point	0.0000	0.0000	

Note:

1. Normal Voltage = 110 V. ；Battery End Point (BEP) = 102 V.；Maximum Voltage =138 V
2. Note: The frequency fundamental emissions stay within the authorized frequency block based on the frequency deviation measured is small.

Appendix B. Test Results of Radiated Test

Radiated Spurious Emission

LTE Band 4 / 10MHz / QPSK / Full RB									
Channel	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)
Lowest	4232	-58.11	-13	-45.11	-73.88	-64.86	1.89	8.65	H
	6346	-54.98	-13	-41.98	-76.39	-62.29	2.80	10.11	H
	8460	-45.03	-13	-32.03	-70.8	-55.13	2.37	12.47	H
	4232	-58.52	-13	-45.52	-74.27	-65.27	1.89	8.65	V
	6346	-52.84	-13	-39.84	-73.75	-60.15	2.80	10.11	V
	8460	-38.36	-13	-25.36	-63.46	-48.46	2.37	12.47	V
Middle	4267	-56.86	-13	-43.86	-72.74	-63.6	1.91	8.65	H
	6395	-55.92	-13	-42.92	-77.46	-63.27	2.79	10.14	H
	8530	-41.84	-13	-28.84	-68.19	-51.97	2.38	12.51	H
	4267	-57.41	-13	-44.41	-72.9	-64.15	1.91	8.65	V
	6395	-54.52	-13	-41.52	-75.7	-61.87	2.79	10.14	V
	8530	-33.89	-13	-20.89	-59.21	-44.02	2.38	12.51	V
Highest	4290	-55.12	-13	-42.12	-71.05	-61.85	1.93	8.66	H
	6435	-55.91	-13	-42.91	-77.55	-63.3	2.77	10.16	H
	8580	-40.98	-13	-27.98	-67.94	-51.12	2.39	12.53	H
	4290	-54.77	-13	-41.77	-70.16	-61.5	1.93	8.66	V
	6435	-51.69	-13	-38.69	-73.37	-59.08	2.77	10.16	V
	8580	-34.91	-13	-21.91	-60.36	-45.05	2.39	12.53	V

Remark: Spurious emissions within 30-1000MHz were found more than 20dB below limit line.

LTE Band 4 / 10MHz / 16QAM / Full RB									
Channel	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)
Lowest	4232	-57.77	-13	-44.77	-73.6	-64.52	1.89	8.65	H
	6346	-55.41	-13	-42.41	-76.87	-62.72	2.80	10.11	H
	8460	-45.33	-13	-32.33	-71.05	-55.43	2.37	12.47	H
	4232	-57.98	-13	-44.98	-73.63	-64.73	1.89	8.65	V
	6346	-52.84	-13	-39.84	-73.67	-60.15	2.80	10.11	V
	8460	-38.28	-13	-25.28	-63.33	-48.38	2.37	12.47	V
Middle	4267	-57.31	-13	-44.31	-73.2	-64.05	1.91	8.65	H
	6395	-56.14	-13	-43.14	-77.58	-63.49	2.79	10.14	H
	8530	-41.68	-13	-28.68	-68.01	-51.81	2.38	12.51	H
	4267	-56.58	-13	-43.58	-72.09	-63.32	1.91	8.65	V
	6395	-54.17	-13	-41.17	-75.38	-61.52	2.79	10.14	V
	8530	-33.46	-13	-20.46	-58.75	-43.59	2.38	12.51	V
Highest	4290	-51.96	-13	-38.96	-70.95	-58.69	1.93	8.66	H
	6435	-55.71	-13	-42.71	-77.34	-63.1	2.77	10.16	H
	8580	-41.19	-13	-28.19	-68.15	-51.33	2.39	12.53	H
	4290	-54.88	-13	-41.88	-70.25	-61.61	1.93	8.66	V
	6435	-51.96	-13	-38.96	-73.67	-59.35	2.77	10.16	V
	8580	-34.51	-13	-21.51	-59.91	-44.65	2.39	12.53	V

Remark: Spurious emissions within 30-1000MHz were found more than 20dB below limit line.

LTE Band 4 / 10MHz / 64QAM / Full RB									
Channel	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)
Lowest	4232	-55.38	-13	-42.38	-71.14	-62.13	1.89	8.65	H
	6346	-50.42	-13	-37.42	-71.78	-57.73	2.80	10.11	H
	8460	-43.55	-13	-30.55	-69.33	-53.65	2.37	12.47	H
	4232	-52.26	-13	-39.26	-67.89	-59.01	1.89	8.65	V
	6346	-49.51	-13	-36.51	-70.31	-56.82	2.80	10.11	V
	8460	-37.35	-13	-24.35	-62.34	-47.45	2.37	12.47	V
Middle	4267	-55.33	-13	-42.33	-71.24	-62.07	1.91	8.65	H
	6395	-53.58	-13	-40.58	-75.14	-60.93	2.79	10.14	H
	8530	-39.11	-13	-26.11	-65.43	-49.24	2.38	12.51	H
	4267	-54.76	-13	-41.76	-70.21	-61.5	1.91	8.65	V
	6395	-50.97	-13	-37.97	-72.17	-58.32	2.79	10.14	V
	8530	-33.48	-13	-20.48	-58.67	-43.61	2.38	12.51	V
Highest	4290	-53.76	-13	-40.76	-69.66	-60.49	1.93	8.66	H
	6435	-53.21	-13	-40.21	-74.71	-60.6	2.77	10.16	H
	8580	-39.02	-13	-26.02	-66.08	-49.16	2.39	12.53	H
	4290	-51.36	-13	-38.36	-66.65	-58.09	1.93	8.66	V
	6435	-49.78	-13	-36.78	-74.42	-57.17	2.77	10.16	V
	8580	-33.73	-13	-20.73	-59.18	-43.87	2.39	12.53	V

Remark: Spurious emissions within 30-1000MHz were found more than 20dB below limit line.

LTE Band 13 / 10MHz / QPSK / Full RB									
Channel	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)
Middle	1504	-48.96	-13	-35.96	-54.38	-51.19	0.91	5.29	H
	2256	-62.94	-13	-49.94	-72.07	-64.24	1.21	4.67	H
	3004	-61.43	-13	-48.43	-72.97	-63.65	1.45	5.82	H
	1504	-58.13	-13	-45.13	-61.77	-60.36	0.91	5.29	V
	2256	-63.16	-13	-50.16	-74.06	-64.46	1.21	4.67	V
	3004	-59.94	-13	-46.94	-71.56	-62.16	1.45	5.82	V

LTE Band 13 / 10MHz / 16QAM / Full RB									
Channel	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)
Middle	1504	-50.38	-13	-37.38	-55.76	-52.61	0.91	5.29	H
	2256	-64.24	-13	-51.24	-73.36	-65.54	1.21	4.67	H
	3004	-61.47	-13	-48.47	-72.95	-63.69	1.45	5.82	H
	1504	-59.18	-13	-46.18	-62.82	-61.41	0.91	5.29	V
	2256	-63.53	-13	-50.53	-74.52	-64.83	1.21	4.67	V
	3004	-60.24	-13	-47.24	-71.78	-62.46	1.45	5.82	V

LTE Band 13 / 10MHz / 64QAM / Full RB									
Channel	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)
Middle	1504	-37.46	-13	-24.46	-42.76	-39.69	0.91	5.29	H
	2256	-55.59	-13	-42.59	-64.54	-56.89	1.21	4.67	H
	3004	-62.04	-13	-49.04	-73.59	-64.26	1.45	5.82	H
	1504	-47.38	-13	-34.38	-50.89	-49.61	0.91	5.29	V
	2256	-58.67	-13	-45.67	-69.54	-59.97	1.21	4.67	V
	3004	-63.57	-13	-50.57	-75.14	-65.79	1.45	5.82	V

Remark: Spurious emissions within 30-1000MHz were found more than 20dB below limit line.