FCC RF Test Report

APPLICANT	:	**Hewlett-Packard Company**
EQUIPMENT	:	**Notebook PC**
BRAND NAME	:	**HP**
MODEL NAME	:	**HSTNN-W03C**
FCC ID	:	**B94HNW03CFX468**
STANDARD	:	**47 CFR Part 2, 22(H), 24(E), 27**
CLASSIFICATION	:	**PCS Licensed Transmitter (PCB)**

The product was received on May 22, 2014 and completely tested on Sep. 28, 2014. 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 Hsiang, Tao Yuan Hsien, Taiwan, R.O.C.

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APPENDIX A. TEST RESULTS OF CONDUCTED TEST

APPENDIX B. TEST RESULTS OF RADIATED TEST

APPENDIX C. SETUP PHOTOGRAPHS

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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FG452204-02B	Rev. 01	Initial issue of report	Oct. 14, 2014

SUMMARY OF TEST RESULT

Report Section	FCC Rule	IC Rule	Description	Limit	Result	Remark
3.4	§2.1046	RSS-Gen(4.8) RSS-130(4.4) RSS-132 (5.4) RSS-133 (6.4) RSS-139 (6.4)	Conducted Output Power	Reporting Only	PASS	-
3.5	§24.232(d)	RSS-130(4.4) RSS-132 (5.4) RSS-133 (6.4) RSS-139 (6.4)	Peak-to-Average Ratio	<13 dB	PASS	-
3.6	§2.1049 §22.917(b) §24.238(b) §27.53(h)(3)	RSS-GEN(4.6.1) RSS-132 (3.1) RSS-133 (3.1) RSS-139 (3.1)	Occupied Bandwidth	Reporting Only	PASS	-
3.7	§2.1051 §22.917(a) §24.238(a) §27.53(c)(2) §27.53(c)(4) §27.53(f) §27.53(g)	RSS-GEN(4.9) RSS-132 (5.5) RSS-133 (6.5.1) RSS-130(4.6) RSS-139 (6.5)	Conducted Band Edge Measurement (Band 2) (Band 4) (Band 5) (Band 13) (Band 17) (Band 25)	$< 43+10\log10(P[\text{Watts}])$	PASS	-
3.8	§2.1053 §22.917(a) §24.238(a) §27.53(c)(2) §27.53(f) §27.53(g)	RSS-GEN(4.9) RSS-132 (5.5) RSS-133 (6.5.1) RSS-130(4.6) RSS-139 (6.5)	Conducted Spurious Emission (Band 2) (Band 4) (Band 5) (Band 13) (Band 17) (Band 25)	$< 43+10\log10(P[\text{Watts}])$	PASS	-

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Report Section	FCC Rule	IC Rule	Description	Limit	Result	Remark
3.9	§2.1055 §22.355 §24.235 §27.54	RSS-GEN(4.7) RSS-132(5.3) RSS-133(6.3) RSS-130(4.3) RSS-139 (6.3)	Frequency Stability Temperature & Voltage	< 2.5 ppm	PASS	
4.4	§2.1053 §22.917(a) §24.238(a) §27.53(c)(2) §27.53(f) §27.53(g) §27.53(h)	RSS-GEN(4.9) RSS-132 (5.5) RSS-133 (6.5.1) RSS-130(4.6) RSS-139 (6.5)	Radiated Spurious Emission (Band 2) (Band 4) (Band 5) (Band 13) (Band 17) (Band 25)	$< 43+10\log_{10}(P[Watts])$	PASS	Under limit 19.90 dB at 2496.000 MHz
4.5	§22.913(a)(2)	RSS-132(5.4) SRSP-503(5.1.3)	Effective Radiated Power (Band 5)	ERP < 7 Watt	PASS	
	§27.50(b)(10) §27.50(c)(10)	N/A	Effective Radiated Power (Band 12) (Band 13) (Band 17)	ERP < 3 Watt		
	N/A	RSS-130(4.4)	Equivalent Isotropic Radiated Power (Band 12) (Band 13) (Band 17)	EIRP < 5 Watt		
	§24.232(c)	RSS-133 (6.4) SRSP-510(5.1.2)	Equivalent Isotropic Radiated Power (Band 2)(Band 25)	EIRP < 2Watt		
	§27.50(d)(4)	RSS-139 (6.4) SRSP-513(5.1.2)	Equivalent Isotropic Radiated Power (Band 4)	EIRP < 1Watt		

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1 General Description

1.1 Applicant

Hewlett-Packard Company

3000 Hanover Street, Palo Alto, California 94304, USA

1.2 Manufacturer

Wistron Corporation

21F., No.88, Sec.1, Xintai 5th Rd., Xizhi Dist., New Taipei City 22181, Taiwan (R.O.C)

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	Notebook PC
Brand Name	HP
Model Name	HSTNN-W03C
FCC ID	B94HNW03CFX468
EUT supports Radios application	CDMA/EV-DO/GSM/EGPRS/WCDMA/HSPA/LTE/NFC
EUT Stage	Identical Prototype

1.4 Product Specification subjective to this standard

Product Specification subjective to this standard	
Tx Frequency	LTE Band 2 : 1850.7 MHz ~ 1909.3 MHz LTE Band 4 : 1710.7 MHz ~ 1754.3 MHz LTE Band 5 : 824.7 MHz ~ 848.3 MHz LTE Band 13 : 779.5 MHz ~ 784.5 MHz LTE Band 17 : 706.5 MHz ~ 713.5 MHz LTE Band 25 : 1850.7MHz ~ 1914.3 MHz
Rx Frequency	LTE Band 2 : 1930.7 MHz ~ 1989.3 MHz LTE Band 4 : 2110.7 MHz ~ 2154.3 MHz LTE Band 5 : 869.7 MHz ~ 893.3 MHz LTE Band 13 : 748.5 MHz ~ 753.5 MHz LTE Band 17 : 736.5 MHz ~ 743.5 MHz LTE Band 25 : 1930.7MHz ~ 1994.3 MHz
Bandwidth	LTE Band 2 : 1.4MHz / 3MHz / 5MHz / 10MHz / 15MHz / 20MHz LTE Band 4 : 1.4MHz / 3MHz / 5MHz / 10MHz / 15MHz / 20MHz LTE Band 5 : 1.4MHz / 3MHz / 5MHz / 10MHz LTE Band 13 : 5MHz / 10MHz LTE Band 17 : 5MHz / 10MHz LTE Band 25 : 1.4MHz / 3MHz / 5MHz / 10MHz / 15MHz / 20MHz

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Product Specification subjective to this standard	
Maximum Output Power to Antenna	LTE Band 2 : 23.62 dBm LTE Band 4 : 23.71 dBm LTE Band 5 : 23.49 dBm LTE Band 13 : 23.36 dBm LTE Band 17 : 23.51 dBm LTE Band 25 : 23.76 dBm
Antenna Gain	LTE Band 2 : -3.21 dBi LTE Band 4 : -5.56 dBi LTE Band 5 : -1.92 dBi LTE Band 13 : 0.81 dBi LTE Band 17 : 0.81 dBi LTE Band 25 : -3.21 dBi
Type of Modulation	QPSK / 16QAM

1.5 Modification of EUT

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

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1.6 Emission Designator

LTE Band 2	QPSK			16QAM		
BW(MHz)	Emission Designator (99%OBW)	Frequency Tolerance (ppm)	Maximum EIRP(W)	Emission Designator (99%OBW)	Frequency Tolerance (ppm)	Maximum EIRP(W)
1.4	1.10	-	0.107	1.10	-	0.086
3	2.73	-	0.107	2.73	-	0.088
5	4.49	-	0.107	4.50	-	0.086
10	9.10	0.001	0.109	9.04	-	0.086
15	13.44	-	0.110	13.47	-	0.085
20	18.52	-	0.110	18.52	-	0.088
LTE Band 4	QPSK			16QAM		
BW(MHz)	Emission Designator (99%OBW)	Frequency Tolerance (ppm)	Maximum EIRP(W)	Emission Designator (99%OBW)	Frequency Tolerance (ppm)	Maximum EIRP(W)
1.4	1.10	-	0.065	1.11	-	0.052
3	2.74	-	0.065	2.74	-	0.051
5	4.51	-	0.065	4.49	-	0.051
10	9.10	0.001	0.065	9.06	-	0.052
15	13.50	-	0.065	13.50	-	0.052
20	18.56	-	0.065	18.52	-	0.053
LTE Band 5	QPSK			16QAM		
BW(MHz)	Emission Designator (99%OBW)	Frequency Tolerance (ppm)	Maximum ERP(W)	Emission Designator (99%OBW)	Frequency Tolerance (ppm)	Maximum ERP(W)
1.4	1.11	-	0.087	1.11	-	0.069
3	2.72	-	0.085	2.73	-	0.070
5	4.50	-	0.086	4.50	-	0.069
10	9.08	0.002	0.087	9.04	-	0.068

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LTE Band 13	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	4.51	-	0.158	4.51	-	0.129
10	9.12	0.003	0.159	9.10	-	0.126

LTE Band 17	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	4.51	-	0.127	4.50	-	0.101
10	9.02	0.019	0.128	9.00	-	0.101

LTE Band 25	QPSK			16QAM		
BW(MHz)	Emission Designator (99%OBW)	Frequency Tolerance (ppm)	Maximum EIRP(W)	Emission Designator (99%OBW)	Frequency Tolerance (ppm)	Maximum EIRP(W)
1.4	1.11	-	0.111	1.11	-	0.089
3	2.74	-	0.111	2.72	-	0.088
5	4.51	-	0.111	4.49	-	0.094
10	9.10	0.001	0.112	9.06	-	0.093
15	13.44	-	0.111	13.44	-	0.089
20	18.36	-	0.114	18.32	-	0.094

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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 Hsiang, Tao Yuan Hsien, Taiwan, R.O.C. TEL: +886-3-327-3456 FAX: +886-3-328-4978	
Test Site No.	**Sporton Site No.**	
	TH02-HY	03CH05-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, 22(H), 24(E), 27
- ANSI / TIA / EIA-603-C-2004
- FCC KDB 971168 D01 Power Meas. License Digital Systems v02r01
- 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.

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2   Test Configuration of Equipment Under Test

2.1   Test Mode

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

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

Test Items	Band	Bandwidth (MHz)						Modulation		RB #			Test Channel		
		1.4	3	5	10	15	20	QPSK	16QAM	1	Half	Full	L	M	H
Max. Output Power	2	v	v	v	v	v	v	v	v	v	v	v	v	v	v
	4	v	v	v	v	v	v	v	v	v	v	v	v	v	v
	5	v	v	v	v	-	-	v	v	v	v	v	v	v	v
	13	-	-	v	v	-	-	v	v	v	v	v	v	v	v
	17	-	-	v	v	-	-	v	v	v	v	v	v	v	v
	25	v	v	v	v	v	v	v	v	v	v	v	v	v	v
Peak-to-Average Ratio	2						v		v	v		v	v	v	v
	4						v		v	v		v	v	v	v
	5				v	-	-		v	v		v	v	v	v
	13	-	-		v	-	-		v	v		v	v	v	v
	17	-	-		v	-	-		v	v		v	v	v	v
	25						v		v	v		v	v	v	v
26dB and 99% Bandwidth	2	v	v	v	v	v	v	v	v			v	v	v	v
	4	v	v	v	v	v	v	v	v			v	v	v	v
	5	v	v	v	v	-	-	v	v			v	v	v	v
	13	-	-	v	v	-	-	v	v			v	v	v	v
	17	-	-	v	v	-	-	v	v			v	v	v	v
	25	v	v	v	v	v	v	v	v			v	v	v	v
Conducted Band Edge	2	v	v	v	v	v	v	v	v	v		v	v	v	v
	4	v	v	v	v	v	v	v	v	v		v	v	v	v
	5	v	v	v	v	-	-	v	v	v		v	v	v	v
	13	-	-	v	v	-	-	v	v	v		v	v	v	v
	17	-	-	v	v	-	-	v	v	v		v	v	v	v
	25	v	v	v	v	v	v	v	v	v		v	v	v	v

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Test Items	Band	Bandwidth (MHz)						Modulation		RB #			Test Channel		
		1.4	3	5	10	15	20	QPSK	16QAM	1	Half	Full	L	M	H
Conducted Spurious Emission	2	ν	ν	ν	ν	ν	ν	ν	ν	ν			ν	ν	ν
	4	ν	ν	ν	ν	ν	ν	ν	ν	ν			ν	ν	ν
	5	ν	ν	ν	ν	-	-	ν	ν	ν			ν	ν	ν
	13	-	-	ν	ν	-	-	ν	ν	ν			ν	ν	ν
	17	-	-	ν	ν	-	-	ν	ν	ν			ν	ν	ν
	25	ν	ν	ν	ν	ν	ν	ν	ν	ν			ν	ν	ν
Frequency Stability	2	ν			ν			ν				ν		ν	
	4	ν			ν			ν				ν		ν	
	5	ν			ν	-	-	ν				ν		ν	
	13	-	-	ν	ν	-	-	ν				ν		ν	
	17	-	-	ν	ν	-	-	ν				ν		ν	
	25	ν			ν			ν				ν		ν	
E.R.P./ E.I.R.P.	2	ν					ν	ν	ν	ν			ν	ν	ν
	4	ν					ν	ν	ν	ν			ν	ν	ν
	5	ν			ν	-	-	ν	ν	ν			ν	ν	ν
	13	-	-	ν			ν	ν	ν	ν			ν	ν	ν
	17	-	-	ν	ν	-		ν	ν	ν			ν	ν	ν
	25	ν					ν	ν	ν	ν			ν	ν	ν
Radiated Spurious Emission	2	ν	ν	ν	ν	ν	ν	ν		ν				ν	
	4	ν	ν	ν	ν	ν	ν	ν		ν				ν	
	5	ν	ν	ν	ν	-	-	ν		ν				ν	
	13	-	-	ν	ν	-	-	ν		ν				ν	
	17	-	-	ν	ν	-	-	ν		ν				ν	
	25	ν	ν	ν	ν	ν	ν	ν		ν				ν	ν
Note	1. The mark "ν " 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.														

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2.2 Connection Diagram of Test System

ERP/EIRP
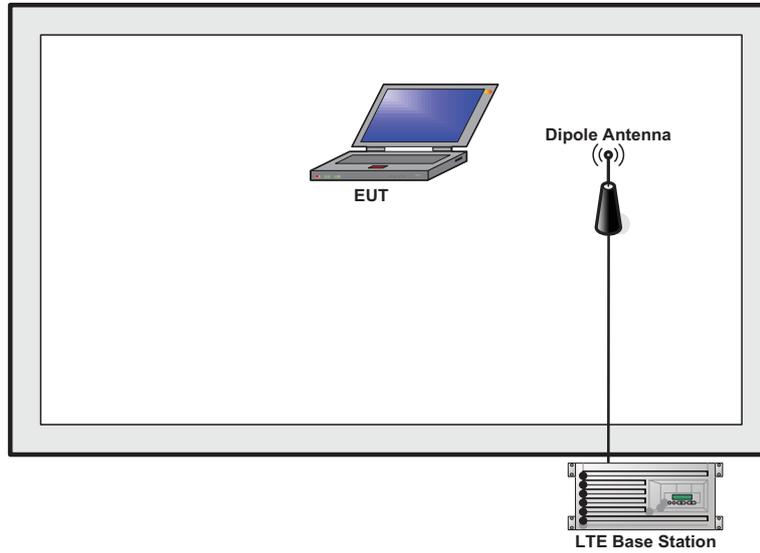
Radiated Spurious Emission
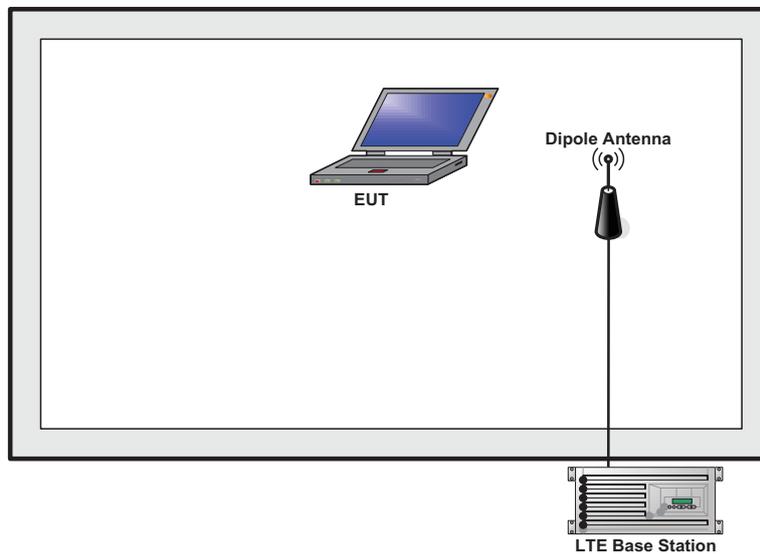
2.3   Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model No.	FCC ID	Data Cable	Power Cord
1.	System Simulator	R&S	CMU 200	N/A	N/A	Unshielded, 1.8 m
2.	System Simulator	R&S	CMW 500	N/A	N/A	Unshielded, 1.8 m

2.4 Measurement Results Explanation Example

For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuator factor between EUT conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

The spectrum analyzer offset is derived from RF cable loss and attenuator factor.
Offset = RF cable loss + attenuator factor.
Following shows an offset computation example with cable loss 4.2 dB and 10dB attenuator.

Example :
Offset(dB) = RF cable loss(dB) + attenuator factor(dB).
            = 4.2 + 10 = 14.2 (dB)

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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
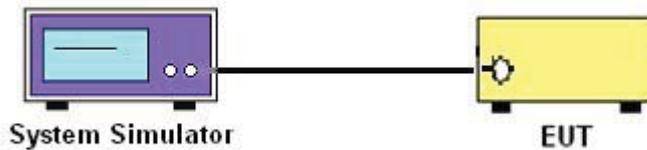
3.2.2 Peak-to-Average Ratio, Occupied Bandwidth ,Conducted Band-Edge and Conducted Spurious Emission
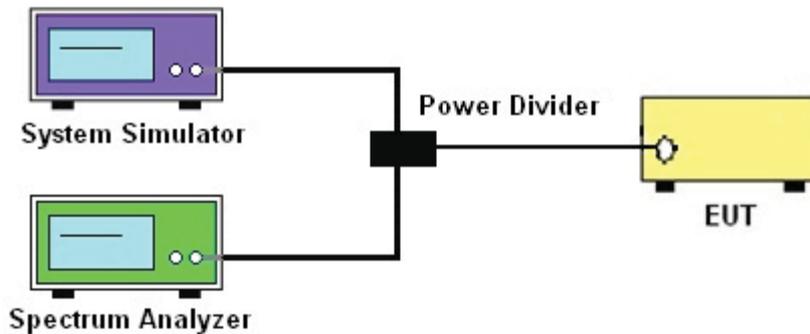
3.2.3 Frequency Stability
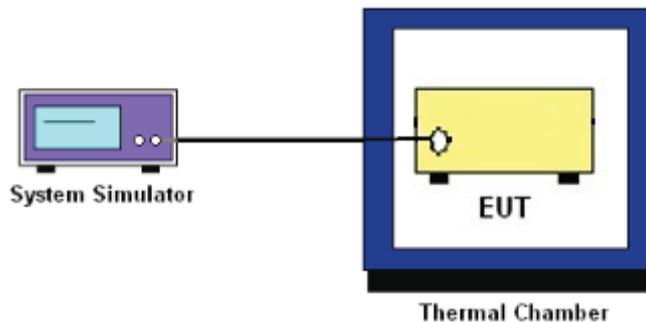
3.3 Test Result of Conducted Test

Please refer to Appendix A.

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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 7 Watts for LTE Band 5.

The ERP of mobile transmitters must not exceed 3 Watts for LTE Band 12, Band 13 and Band 17. (FCC Only)

The EIRP of mobile transmitters must not exceed 5 Watts for LTE Band 12, Band 13 and Band 17. (IC Only)

The EIRP of mobile transmitters must not exceed 2 Watts for LTE Band 2 and Band 25 and Band 7.

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 v02r01 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 v02r01 Section 4.2.
2. The EUT was connected to spectrum analyzer and system simulator via a power divider.

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3.7   Conducted Band Edge

3.7.1   Description of Conducted Band Edge Measurement

22.917(a) and RSS – 132 For operations in the 824 – 849 MHz band, the FCC limit is 43 + $10\log_{10}$(P[Watts]) dB below the transmitter power P(Watts) in a 100kHz 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.

24.238 (a) and RSS – 133

For operations in the 1850-1910 and 1930-1990 MHz band, the FCC limit is 43 + $10\log_{10}$(P[Watts]) dB below the transmitter power P(Watts) in a 1MHz bandwidth. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.

27.53 (c) and RSS – 130

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 (g) and RSS – 130

For operations in the 698 -746 MHz band, the FCC limit is 43 + 10log10(P[Watts]) dB below the transmitter power P(Watts) in a 100 kHz bandwidth. However, in the 100 kilohertz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed.

27.53 (h) and RSS – 139

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.

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3.7.2 Test Procedures

1. The testing follows FCC KDB 971168 v02r01 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.

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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 10th harmonic.

3.8.2　Test Procedures

1. The testing follows FCC KDB 971168 v02r01 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 v02r01 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.

3.9.4   Test Procedures for Frequency Stability (IC)

1.   The testing follows FCC KDB 971168 v02r01 Section 9.0.
2.   The EUT was connected to spectrum analyzer and system simulator via a power divider.
3.   The EUT was operated at the lowest and highest channel
4.   Using RBW= 1% OBW and displaying line = -13dBm.
5.   The frequency at these points shall be recorded as f_L and f_H respectively.
6.   Calculate frequency stability within the 779.5~ 784.5MHz and 706.5 – 713.5 band.

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
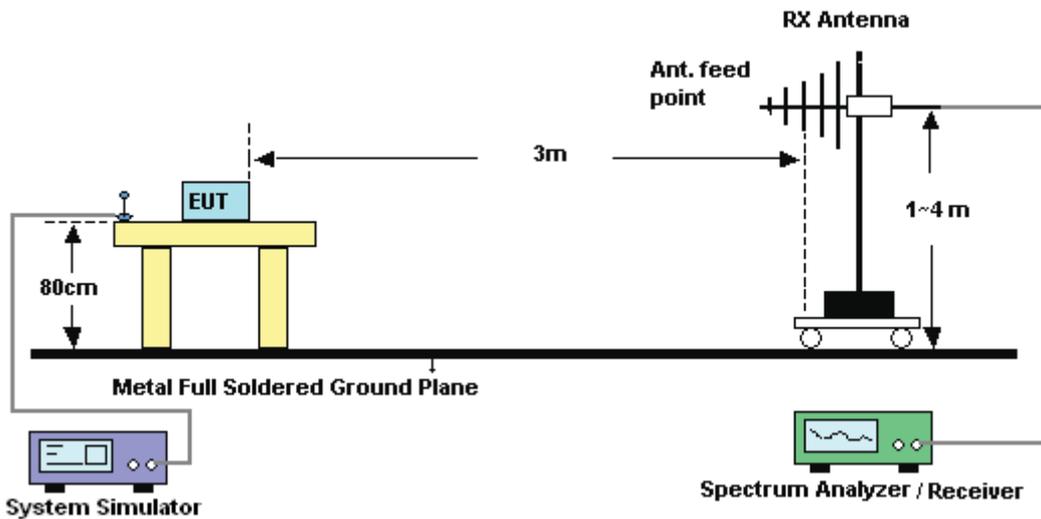
4.2.2   For radiated test above 1GHz
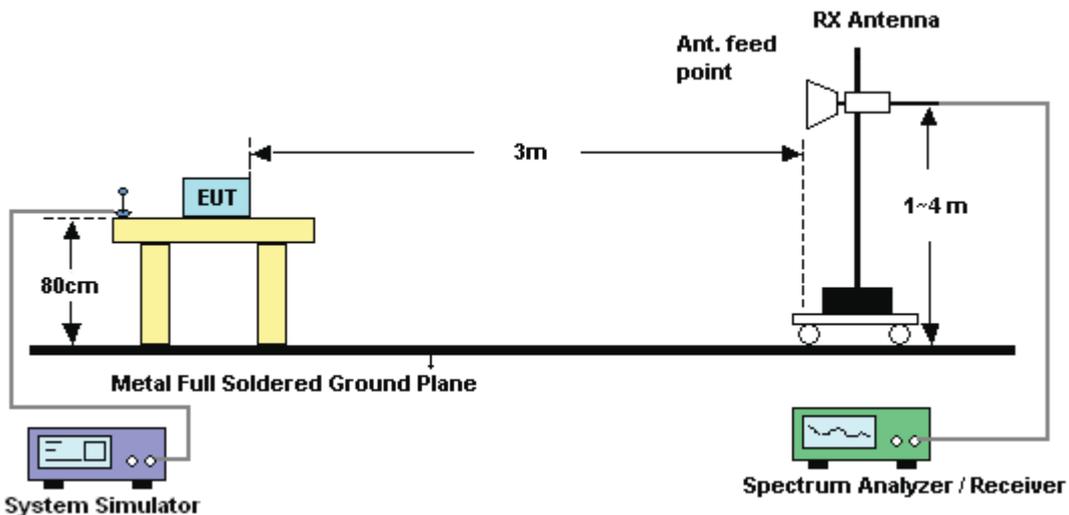
4.3   Test Result of Radiated Test

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 v01r02. Mobile and portable (hand-held) stations operating are limited to average ERP of 7 watts with LTE band 5 and 3 watts with LTE band 13 / 17.

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 v01r02. Mobile and portable (hand-held) stations operating are limited to average EIRP of 2 watts with LTE band 2 / 25 and 1 watt with LTE band 4.

4.4.2 Test Procedures

1. The testing follows FCC KDB 971168 v02r01 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.

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 13,17

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 v02r01 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	Sep. 27, 2014~ Sep. 28, 2014	Jun. 08, 2015	Conducted (TH02-HY)
Thermal Chamber	Ten Billion	TTH-D3SP	TBN-930701	N/A	Jul. 17, 2014	Sep. 27, 2014~ Sep. 28, 2014	Jul. 16, 2015	Conducted (TH02-HY)
LTE Base Station	Anritsu	MT8820C	6201026480	30MHz~2.7GHz SISO	Jan. 07, 2014	Sep. 27, 2014~ Sep. 28, 2014	Jan. 06, 2015	Conducted (TH02-HY)
Spectrum Analyzer	Rohde & Schwarz	FSP40	100055	9kHz~40GHz	Jun. 09, 2014	Sep. 18, 2014~ Sep. 22, 2014	Jun. 08, 2015	Radiation (03CH05-HY)
Bilog Antenna	Schaffner	CBL6111C	2725	30MHz~1GHz	Oct. 10, 2013	Sep. 18, 2014~ Sep. 22, 2014	Oct. 09, 2014	Radiation (03CH05-HY)
Double Ridged Guide Horn	SCHWARZBECK	BBHA 9120 D	9120D-1241	1GHz~18GHz	Apr. 16, 2014	Sep. 18, 2014~ Sep. 22, 2014	Apr. 15, 2015	Radiation (03CH05-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170251	18GHz~40GHz	Oct. 03, 2013	Sep. 18, 2014~ Sep. 22, 2014	Oct. 02, 2014	Radiation (03CH05-HY)
Preamplifier	MITEQ	AMF-7D-00 101800-30-1	1590074	100kHz~18GHz	Jul. 07, 2014	Sep. 18, 2014~ Sep. 22, 2014	Jul. 06, 2015	Radiation (03CH05-HY)
Preamplifier	EMCI	EMC011830	980148	DC~18GHz	Jun. 23, 2014	Sep. 18, 2014~ Sep. 22, 2014	Jun. 22, 2015	Radiation (03CH05-HY)
Preamplifier	COM-POWER	PA-103	161075	9kHz~30MHz	Apr. 15, 2014	Sep. 18, 2014~ Sep. 22, 2014	Apr. 14, 2015	Radiation (03CH05-HY)
Preamplifier	Miteq	TTA0204	1872107	18GHz~40GHz	May 23, 2014	Sep. 18, 2014~ Sep. 22, 2014	May 22, 2015	Radiation (03CH05-HY)
Turn Table	HD	HD100	420/611	0 - 360 degree	N/A	Sep. 18, 2014~ Sep. 22, 2014	N/A	Radiation (03CH05-HY)
Antenna Mast	HD	HD100	240/666	1 m - 4 m	N/A	Sep. 18, 2014~ Sep. 22, 2014	N/A	Radiation (03CH05-HY)

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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))	5.10

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	5.40

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Appendix A. Test Results of Conducted Test

Conducted Output Power(Average power)

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\multicolumn{7}{c}{LTE Band 2 Maximum Average Power [dBm]}						
BW [MHz]	RB Size	RB Offset	Mod	Lowest	Middle	Highest
1.4	1	0	QPSK	23.48	23.41	23.19
1.4	1	2		23.44	23.49	23.14
1.4	1	5		23.47	23.42	23.04
1.4	3	0		23.44	23.45	23.16
1.4	3	1		23.47	23.39	23.10
1.4	3	2		23.45	23.48	23.01
1.4	6	0		22.54	22.46	22.17
1.4	1	0	16-QAM	22.44	22.48	22.26
1.4	1	2		22.41	22.51	22.19
1.4	1	5		22.37	22.53	22.10
1.4	3	0		22.54	22.50	22.25
1.4	3	1		22.50	22.54	22.25
1.4	3	2		22.50	22.53	22.17
1.4	6	0		21.58	21.71	21.22
3	1	0	QPSK	23.51	23.46	23.47
3	1	7		23.46	23.44	23.27
3	1	14		23.39	23.48	23.01
3	8	0		22.55	22.69	22.51
3	8	4		22.49	22.63	22.31
3	8	7		22.46	22.68	22.20
3	15	0		22.36	22.58	22.26
3	1	0	16-QAM	22.50	22.52	22.50
3	1	7		22.47	22.62	22.40
3	1	14		22.38	22.65	22.21
3	8	0		21.45	21.73	21.48
3	8	4		21.39	21.62	21.37
3	8	7		21.36	21.69	21.22
3	15	0		21.38	21.64	21.33

LTE Band 2 Maximum Average Power [dBm]						
BW [MHz]	RB Size	RB Offset	Mod	Lowest	Middle	Highest
5	1	0	QPSK	23.49	23.40	23.47
5	1	12		23.41	23.39	23.45
5	1	24		23.32	23.36	22.97
5	12	0		22.45	22.68	22.59
5	12	6		22.36	22.57	22.49
5	12	11		22.40	22.59	22.30
5	25	0		22.23	22.46	22.29
5	1	0	16-QAM	22.46	22.51	22.40
5	1	12		22.38	22.55	22.50
5	1	24		22.29	22.52	22.22
5	12	0		21.48	21.76	21.61
5	12	6		21.49	21.65	21.53
5	12	11		21.45	21.68	21.42
5	25	0		21.17	21.51	21.27
10	1	0	QPSK	23.56	23.42	23.12
10	1	24		23.35	23.58	23.43
10	1	49		23.16	23.56	23.13
10	25	0		22.19	22.51	22.09
10	25	12		22.08	22.43	22.29
10	25	24		22.06	22.43	22.41
10	50	0		21.93	22.37	22.06
10	1	0	16-QAM	22.49	22.52	22.04
10	1	24		22.32	22.55	22.31
10	1	49		22.20	22.57	22.10
10	25	0		21.30	21.50	21.08
10	25	12		21.15	21.47	21.37
10	25	24		21.05	21.48	21.39
10	50	0		20.94	21.36	21.03

LTE Band 2 Maximum Average Power [dBm]						
BW [MHz]	RB Size	RB Offset	Mod	Lowest	Middle	Highest
15	1	0	QPSK	23.39	23.24	22.95
15	1	37		23.26	23.61	23.11
15	1	74		23.01	23.50	23.09
15	36	0		22.06	22.40	22.20
15	36	18		21.96	22.31	22.14
15	36	37		22.08	22.36	22.25
15	75	0		21.97	22.30	21.99
15	1	0	16-QAM	22.30	22.21	22.04
15	1	37		22.20	22.47	22.16
15	1	74		22.10	22.50	22.15
15	36	0		21.16	21.43	20.94
15	36	18		21.13	21.39	21.08
15	36	37		21.14	21.44	21.25
15	75	0		20.95	21.34	20.87
20	1	0	QPSK	23.48	23.19	23.16
20	1	49		23.56	23.62	23.54
20	1	99		23.17	23.14	23.48
20	50	0		22.17	22.35	22.04
20	50	24		21.98	22.46	22.29
20	50	49		21.96	22.19	22.36
20	100	0		22.05	22.35	22.39
20	1	0	16-QAM	22.30	22.16	22.30
20	1	49		22.33	22.67	22.18
20	1	99		22.10	22.00	22.20
20	50	0		21.15	21.18	20.95
20	50	24		20.91	21.35	21.17
20	50	49		20.89	21.19	21.10
20	100	0		20.93	21.30	21.23

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LTE Band 4 Maximum Average Power [dBm]						
BW [MHz]	RB Size	RB Offset	Mod	Lowest	Middle	Highest
1.4	1	0	QPSK	23.68	23.41	23.61
1.4	1	2		23.67	23.32	23.60
1.4	1	5		23.65	23.40	23.57
1.4	3	0		23.63	23.32	23.60
1.4	3	1		23.62	23.33	23.59
1.4	3	2		23.62	23.32	23.60
1.4	6	0		22.64	22.41	22.63
1.4	1	0	16-QAM	22.69	22.45	22.68
1.4	1	2		22.64	22.36	22.56
1.4	1	5		22.67	22.44	22.57
1.4	3	0		22.67	22.44	22.67
1.4	3	1		22.67	22.44	22.64
1.4	3	2		22.68	22.43	22.64
1.4	6	0		21.67	21.45	21.64
3	1	0	QPSK	23.69	23.45	23.56
3	1	7		23.58	23.43	23.54
3	1	14		23.65	23.44	23.53
3	8	0		22.64	22.45	22.51
3	8	4		22.70	22.37	22.57
3	8	7		22.60	22.46	22.57
3	15	0		22.62	22.31	22.51
3	1	0	16-QAM	22.65	22.53	22.61
3	1	7		22.62	22.52	22.60
3	1	14		22.64	22.43	22.58
3	8	0		21.61	21.42	21.47
3	8	4		21.65	21.38	21.54
3	8	7		21.61	21.46	21.57
3	15	0		21.63	21.38	21.53

**LTE Band 4 Maximum Average Power [dBm]**						
BW [MHz]	**RB Size**	**RB Offset**	**Mod**	**Lowest**	**Middle**	**Highest**
5	1	0	QPSK	23.67	23.48	23.55
5	1	12		23.64	23.45	23.47
5	1	24		23.60	23.44	23.54
5	12	0		22.62	22.38	22.42
5	12	6		22.60	22.33	22.52
5	12	11		22.73	22.45	22.51
5	25	0		22.40	22.22	22.39
5	1	0	16-QAM	22.65	22.51	22.61
5	1	12		22.63	22.50	22.54
5	1	24		22.64	22.43	22.60
5	12	0		21.67	21.43	21.53
5	12	6		21.64	21.38	21.49
5	12	11		21.67	21.51	21.59
5	25	0		21.43	21.26	21.36
10	1	0	QPSK	23.69	23.53	23.54
10	1	24		23.65	23.36	23.46
10	1	49		23.64	23.40	23.53
10	25	0		22.50	22.35	22.37
10	25	12		22.53	22.22	22.34
10	25	24		22.49	22.25	22.29
10	50	0		22.37	22.10	22.18
10	1	0	16-QAM	22.73	22.58	22.62
10	1	24		22.68	22.42	22.52
10	1	49		22.63	22.44	22.61
10	25	0		21.43	21.33	21.27
10	25	12		21.42	21.25	21.27
10	25	24		21.43	21.28	21.31
10	50	0		21.28	21.12	21.12

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LTE Band 4 Maximum Average Power [dBm]						
BW [MHz]	RB Size	RB Offset	Mod	Lowest	Middle	Highest
15	1	0	QPSK	23.70	23.50	23.53
15	1	37		23.59	23.46	23.52
15	1	74		23.51	23.41	23.51
15	36	0		22.49	22.34	22.16
15	36	18		22.32	22.21	22.19
15	36	37		22.42	22.14	22.21
15	75	0		22.39	22.11	22.19
15	1	0	16-QAM	22.74	22.54	22.55
15	1	37		22.59	22.51	22.52
15	1	74		22.54	22.44	22.54
15	36	0		21.48	21.25	21.19
15	36	18		21.39	21.21	21.24
15	36	37		21.39	21.17	21.23
15	75	0		21.41	21.10	21.11
20	1	0	QPSK	**23.71**	23.58	23.51
20	1	49		23.60	23.36	23.42
20	1	99		23.39	23.33	23.50
20	50	0		22.33	22.24	22.14
20	50	24		22.30	22.11	22.04
20	50	49		22.26	22.09	22.08
20	100	0		22.27	22.20	22.12
20	1	0	16-QAM	22.79	22.68	22.53
20	1	49		22.69	22.40	22.48
20	1	99		22.46	22.43	22.52
20	50	0		21.35	21.18	21.06
20	50	24		21.33	21.06	21.03
20	50	49		21.29	21.04	21.11
20	100	0		21.32	21.19	21.07

LTE Band 5   Maximum Average Power [dBm]

BW [MHz]	RB Size	RB Offset	Mod	Lowest	Middle	Highest
1.4	1	0	QPSK	23.36	23.39	23.48
1.4	1	2		23.41	23.38	23.47
1.4	1	5		23.43	23.34	23.35
1.4	3	0		23.41	23.38	23.44
1.4	3	1		23.41	23.38	23.45
1.4	3	2		23.40	23.37	23.42
1.4	6	0		22.39	22.35	22.40
1.4	1	0	16-QAM	22.39	22.36	22.42
1.4	1	2		22.38	22.37	22.41
1.4	1	5		22.39	22.30	22.29
1.4	3	0		22.46	22.42	22.48
1.4	3	1		22.44	22.44	22.40
1.4	3	2		22.44	22.43	22.38
1.4	6	0		21.48	21.43	21.43
3	1	0	QPSK	23.38	23.35	23.34
3	1	7		23.36	23.38	23.29
3	1	14		23.35	23.33	23.33
3	8	0		22.45	22.45	22.37
3	8	4		22.37	22.40	22.36
3	8	7		22.42	22.34	22.36
3	15	0		22.38	22.35	22.28
3	1	0	16-QAM	22.38	22.44	22.39
3	1	7		22.39	22.37	22.49
3	1	14		22.49	22.28	22.29
3	8	0		21.36	21.70	21.65
3	8	4		21.39	21.73	21.66
3	8	7		21.38	21.80	21.65
3	15	0		21.34	21.30	21.34

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BW [MHz]	RB Size	RB Offset	Mod	Lowest	Middle	Highest
LTE Band 5 Maximum Average Power [dBm]						
5	1	0	QPSK	23.38	23.37	23.22
5	1	12		23.41	23.33	23.28
5	1	24		23.37	23.15	23.26
5	12	0		22.30	22.39	22.23
5	12	6		22.40	22.37	22.30
5	12	11		22.41	22.35	22.24
5	25	0		22.21	22.17	22.18
5	1	0	16-QAM	22.28	22.39	22.19
5	1	12		22.42	22.34	22.32
5	1	24		22.44	22.09	22.30
5	12	0		21.42	21.72	21.75
5	12	6		21.51	21.76	21.62
5	12	11		21.47	21.70	21.68
5	25	0		21.26	21.18	21.12
10	1	0	QPSK	**23.49**	23.33	23.22
10	1	24		23.30	23.26	23.07
10	1	49		23.33	23.01	23.21
10	25	0		22.28	22.24	21.83
10	25	12		22.25	22.20	21.75
10	25	24		22.23	21.99	22.09
10	50	0		22.11	22.02	21.86
10	1	0	16-QAM	22.35	22.42	22.28
10	1	24		22.34	22.33	22.03
10	1	49		22.30	21.98	22.26
10	25	0		21.79	21.66	21.65
10	25	12		21.53	21.63	21.57
10	25	24		21.56	21.64	21.62
10	50	0		21.26	21.01	20.81

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LTE Band 13 Maximum Average Power [dBm]						
BW [MHz]	RB Size	RB Offset	Mod	Lowest	Middle	Highest
5	1	0	QPSK	23.23	23.34	23.24
5	1	12		23.20	23.32	23.21
5	1	24		23.25	23.15	23.30
5	12	0		22.37	22.34	22.24
5	12	6		22.37	22.30	22.24
5	12	11		22.34	22.23	22.30
5	25	0		22.32	21.98	22.10
5	1	0	16-QAM	22.34	22.45	22.29
5	1	12		22.39	22.30	22.25
5	1	24		22.27	22.25	22.30
5	12	0		21.33	21.46	21.29
5	12	6		21.31	21.37	21.28
5	12	11		21.33	21.36	21.26
5	25	0		21.07	21.05	21.03
10	1	0	QPSK		23.36	
10	1	24			23.33	
10	1	49			23.21	
10	25	0			22.21	
10	25	12			21.97	
10	25	24			22.01	
10	50	0			21.92	
10	1	0	16-QAM		22.05	
10	1	24			22.36	
10	1	49			22.19	
10	25	0			21.04	
10	25	12			20.92	
10	25	24			20.89	
10	50	0			20.96	

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\multicolumn{6}{c}{LTE Band 17 Maximum Average Power [dBm]}					
BW [MHz]	RB Size	RB Offset	Mod	Lowest	Middle	Highest
5	1	0	QPSK	23.45	23.34	23.44
5	1	12		23.41	23.49	23.37
5	1	24		23.37	23.39	23.35
5	12	0		22.36	22.50	22.39
5	12	6		22.41	22.48	22.39
5	12	11		22.20	22.51	22.37
5	25	0		22.30	22.36	22.08
5	1	0	16-QAM	22.28	22.33	22.38
5	1	12		22.40	22.48	22.41
5	1	24		22.50	22.45	22.29
5	12	0		21.40	21.46	21.36
5	12	6		21.44	21.44	21.38
5	12	11		21.39	21.55	21.40
5	25	0		21.12	21.23	21.05
10	1	0	QPSK	**23.51**	23.48	23.36
10	1	24		23.42	23.43	23.30
10	1	49		23.41	23.39	23.32
10	25	0		22.25	22.17	22.13
10	25	12		22.13	22.12	22.11
10	25	24		22.22	22.09	22.09
10	50	0		22.00	21.97	21.96
10	1	0	16-QAM	22.21	22.29	22.22
10	1	24		22.45	22.37	22.41
10	1	49		22.51	22.46	22.28
10	25	0		21.05	20.99	21.03
10	25	12		21.15	21.04	21.13
10	25	24		21.25	21.19	21.10
10	50	0		20.93	20.89	20.88

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LTE Band 25　Maximum Average Power [dBm]						
BW [MHz]	RB Size	RB Offset	Mod	Lowest	Middle	Highest
1.4	1	0	QPSK	23.41	23.68	22.76
1.4	1	2		23.40	23.61	22.64
1.4	1	5		23.36	23.58	22.73
1.4	3	0		23.35	23.65	22.66
1.4	3	1		23.40	23.60	22.66
1.4	3	2		23.38	23.61	22.68
1.4	6	0		22.48	22.69	22.02
1.4	1	0	16-QAM	22.49	22.72	21.98
1.4	1	2		22.39	22.69	21.81
1.4	1	5		22.35	22.64	21.78
1.4	3	0		22.48	22.61	21.84
1.4	3	1		22.48	22.71	21.86
1.4	3	2		22.45	22.68	21.89
1.4	6	0		21.51	21.78	21.13
3	1	0	QPSK	23.40	23.67	23.10
3	1	7		23.33	23.62	22.69
3	1	14		23.15	23.58	22.77
3	8	0		22.45	22.73	22.13
3	8	4		22.36	22.70	22.05
3	8	7		22.34	22.60	22.02
3	15	0		22.38	22.62	22.03
3	1	0	16-QAM	22.44	22.67	22.19
3	1	7		22.39	22.63	21.89
3	1	14		22.23	22.63	21.84
3	8	0		21.41	21.72	21.20
3	8	4		21.36	21.70	21.14
3	8	7		21.30	21.69	21.14
3	15	0		21.40	21.69	21.17

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LTE Band 25 Maximum Average Power [dBm]						
BW [MHz]	RB Size	RB Offset	Mod	Lowest	Middle	Highest
5	1	0	QPSK	23.41	23.66	23.61
5	1	12		23.16	23.63	23.01
5	1	24		23.23	23.53	22.71
5	12	0		22.36	22.67	22.71
5	12	6		22.29	22.67	22.32
5	12	11		22.23	22.61	22.16
5	25	0		22.17	22.51	22.29
5	1	0	16-QAM	22.36	22.69	22.96
5	1	12		22.26	22.62	22.13
5	1	24		22.21	22.53	21.85
5	12	0		21.42	21.76	21.81
5	12	6		21.35	21.76	21.40
5	12	11		21.29	21.74	21.20
5	25	0		21.23	21.59	21.40
10	1	0	QPSK	23.36	23.66	23.66
10	1	24		23.16	23.58	23.72
10	1	49		22.92	23.28	22.37
10	25	0		22.13	22.54	22.91
10	25	12		22.17	22.50	22.77
10	25	24		22.14	22.45	21.89
10	50	0		21.95	22.38	22.44
10	1	0	16-QAM	22.42	22.72	22.89
10	1	24		22.24	22.71	22.81
10	1	49		21.98	22.40	21.50
10	25	0		21.23	21.61	21.93
10	25	12		21.20	21.57	21.76
10	25	24		21.16	21.53	20.97
10	50	0		20.90	21.46	21.42

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BW [MHz]	RB Size	RB Offset	Mod	Lowest	Middle	Highest
			LTE Band 25 Maximum Average Power [dBm]			
15	1	0	QPSK	23.40	23.68	23.66
15	1	37		23.36	23.51	22.71
15	1	74		22.81	23.12	22.65
15	36	0		21.99	22.56	22.58
15	36	18		21.91	22.40	22.89
15	36	37		21.94	22.24	22.68
15	75	0		21.93	22.32	22.72
15	1	0	16-QAM	22.43	22.68	22.31
15	1	37		22.19	22.46	21.76
15	1	74		21.84	22.04	21.74
15	36	0		21.09	21.55	21.62
15	36	18		20.95	21.47	21.88
15	36	37		20.94	21.32	21.81
15	75	0		20.97	21.32	21.81
20	1	0	QPSK	23.01	23.11	22.59
20	1	49		23.58	23.76	23.68
20	1	99		22.88	23.10	22.65
20	50	0		22.14	22.33	22.64
20	50	24		21.95	22.69	22.56
20	50	49		21.97	22.34	21.82
20	100	0		22.09	22.40	22.32
20	1	0	16-QAM	22.64	22.76	22.94
20	1	49		22.11	22.21	21.62
20	1	99		22.01	22.08	21.77
20	50	0		21.11	21.36	20.88
20	50	24		20.97	21.55	21.76
20	50	49		20.94	21.32	21.91
20	100	0		21.08	21.44	21.60

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Peak-to-Average Ratio

Mode	LTE Band 2 / 20MHz / 16QAM		Limit: 13dB
RB Size	1RB	Full RB	Result
Lowest CH	5.1	6.44	
Middle CH	5.38	6.31	PASS
Highest CH	4.49	6.09	

Mode	LTE Band 25 / 20MHz / 16QAM		Limit: 13dB
RB Size	1RB	Full RB	Result
Lowest CH	-	-	
Middle CH	-	-	PASS
Highest CH	4.36	6.15	

Mode	LTE Band 4 / 20MHz / 16QAM		Limit: 13dB
RB Size	1RB	Full RB	Result
Lowest CH	5.58	6.09	
Middle CH	4.94	5.9	PASS
Highest CH	4.49	6.41	

Mode	LTE Band 5 / 10MHz / 16QAM		Limit: 13dB
RB Size	1RB	Full RB	Result
Lowest CH	5.54	6.51	
Middle CH	6.38	6.28	PASS
Highest CH	5.58	6.31	

Mode	LTE Band 13 / 10MHz / 16QAM		Limit: 13dB
RB Size	1RB	Full RB	Result
Lowest CH	-	-	
Middle CH	5.87	6.86	PASS
Highest CH	-	-	

Mode	LTE Band 17 / 10MHz / 16QAM		Limit: 13dB
RB Size	1RB	Full RB	Result
Lowest CH	6.47	6.44	
Middle CH	6.47	6.44	PASS
Highest CH	6.38	6.38	

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LTE Band 2 / 20MHz / 16QAM	
Lowest Channel / 1RB	**Lowest Channel / Full RB**

Ref 30 dBm   *Att 30 dB   AQT 3.125 ms
Offset 12.2 dB

Center 1.86 GHz   2 dB/   Mean Pwr + 20 dB

Complementary Cumulative Distribution Function
NOF samples: 100000, Usable BW: 23.7MHz

              Trace 1
Mean   21.48 dBm
Peak   26.76 dBm
Crest   5.29 dB

  10 %   3.01 dB
   1 %   4.90 dB
  .1 %   5.10 dB
 .01 %   5.19 dB

Date: 27.SEP.2014 08:46:58

Ref 30 dBm   *Att 30 dB   AQT 3.125 ms
Offset 12.2 dB

Center 1.86 GHz   2 dB/   Mean Pwr + 20 dB

Complementary Cumulative Distribution Function
NOF samples: 100000, Usable BW: 23.7MHz

              Trace 1
Mean   19.93 dBm
Peak   27.75 dBm
Crest   7.82 dB

  10 %   3.04 dB
   1 %   5.19 dB
  .1 %   6.44 dB
 .01 %   7.21 dB

Date: 27.SEP.2014 08:47:10

Middle Channel / 1RB	**Middle Channel / Full RB**

Ref 30 dBm   *Att 30 dB   AQT 3.125 ms
Offset 12.2 dB

Center 1.88 GHz   2 dB/   Mean Pwr + 20 dB

Complementary Cumulative Distribution Function
NOF samples: 100000, Usable BW: 23.7MHz

              Trace 1
Mean   20.63 dBm
Peak   26.15 dBm
Crest   5.52 dB

  10 %   2.88 dB
   1 %   4.87 dB
  .1 %   5.38 dB
 .01 %   5.48 dB

Date: 27.SEP.2014 08:47:24

Ref 30 dBm   *Att 30 dB   AQT 3.125 ms
Offset 12.2 dB

Center 1.88 GHz   2 dB/   Mean Pwr + 20 dB

Complementary Cumulative Distribution Function
NOF samples: 100000, Usable BW: 23.7MHz

              Trace 1
Mean   20.01 dBm
Peak   27.78 dBm
Crest   7.76 dB

  10 %   2.98 dB
   1 %   5.06 dB
  .1 %   6.31 dB
 .01 %   7.21 dB

Date: 27.SEP.2014 08:47:37

Highest Channel / 1RB	**Highest Channel / Full RB**

Ref 30 dBm   *Att 30 dB   AQT 3.125 ms
Offset 12.2 dB

Center 1.9 GHz   2 dB/   Mean Pwr + 20 dB

Complementary Cumulative Distribution Function
NOF samples: 100000, Usable BW: 23.7MHz

              Trace 1
Mean   20.94 dBm
Peak   26.06 dBm
Crest   5.13 dB

  10 %   3.01 dB
   1 %   4.68 dB
  .1 %   4.94 dB
 .01 %   5.06 dB

Date: 27.SEP.2014 08:48:18

Ref 30 dBm   *Att 30 dB   AQT 3.125 ms
Offset 12.2 dB

Center 1.9 GHz   2 dB/   Mean Pwr + 20 dB

Complementary Cumulative Distribution Function
NOF samples: 100000, Usable BW: 23.7MHz

              Trace 1
Mean   20.16 dBm
Peak   27.26 dBm
Crest   7.10 dB

  10 %   3.01 dB
   1 %   4.97 dB
  .1 %   6.09 dB
 .01 %   6.73 dB

Date: 27.SEP.2014 08:48:38

LTE Band 25 / 20MHz / 16QAM	
Highest Channel / 1RB	**Highest Channel / Full RB**

Complementary Cumulative Distribution Function
NOF samples: 100000, Usable BW: 23.7MHz
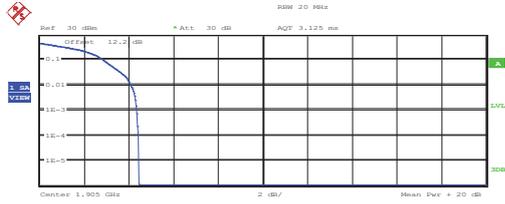
Trace 1
Mean   20.57 dBm
Peak   25.01 dBm
Crest   4.44 dB

10 %   2.85 dB
1 %   4.07 dB
.1 %   4.36 dB
.01 %   4.42 dB

Date: 28.SEP.2014 10:32:02

Complementary Cumulative Distribution Function
NOF samples: 100000, Usable BW: 23.7MHz

Trace 1
Mean   19.84 dBm
Peak   26.99 dBm
Crest   7.14 dB

10 %   2.98 dB
1 %   4.94 dB
.1 %   6.15 dB
.01 %   6.86 dB

Date: 28.SEP.2014 10:32:22

LTE Band 4 / 20MHz / 16QAM

Lowest Channel / 1RB

Complementary Cumulative Distribution Function
NOF samples: 100000, Usable BW: 23.7MHz

Trace 1	
Mean	21.43 dBm
Peak	27.25 dBm
Crest	5.82 dB
10 %	3.04 dB
1 %	5.19 dB
.1 %	5.58 dB
.01 %	5.67 dB
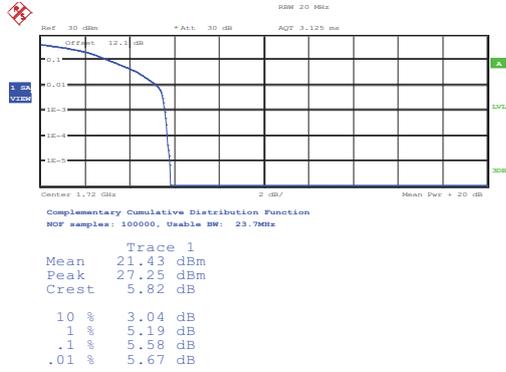
Date: 27.SEP.2014 09:49:25

Lowest Channel / Full RB

Complementary Cumulative Distribution Function
NOF samples: 100000, Usable BW: 23.7MHz

Trace 1	
Mean	20.13 dBm
Peak	27.32 dBm
Crest	7.19 dB
10 %	3.04 dB
1 %	5.06 dB
.1 %	6.09 dB
.01 %	6.73 dB
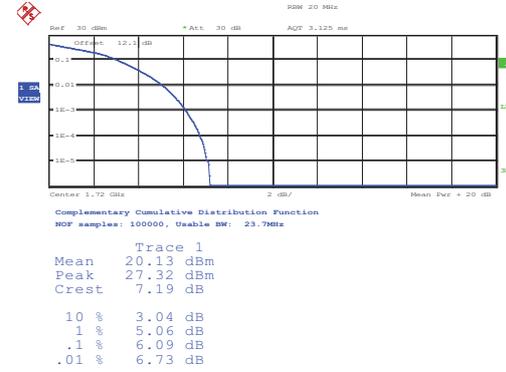
Date: 27.SEP.2014 09:49:40

Middle Channel / 1RB

Complementary Cumulative Distribution Function
NOF samples: 100000, Usable BW: 23.7MHz

Trace 1	
Mean	21.12 dBm
Peak	26.14 dBm
Crest	5.02 dB
10 %	2.92 dB
1 %	4.42 dB
.1 %	4.94 dB
.01 %	5.00 dB
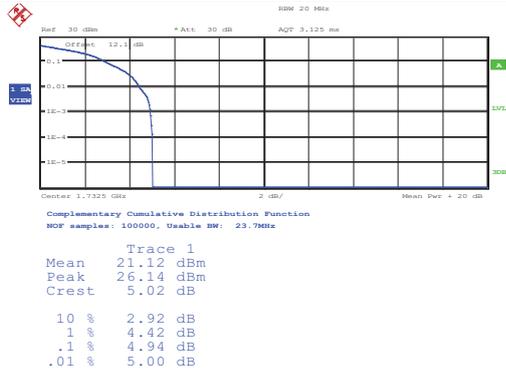
Date: 27.SEP.2014 09:49:52

Middle Channel / Full RB

Complementary Cumulative Distribution Function
NOF samples: 100000, Usable BW: 23.7MHz

Trace 1	
Mean	20.00 dBm
Peak	26.99 dBm
Crest	6.99 dB
10 %	2.98 dB
1 %	4.90 dB
.1 %	5.90 dB
.01 %	6.51 dB
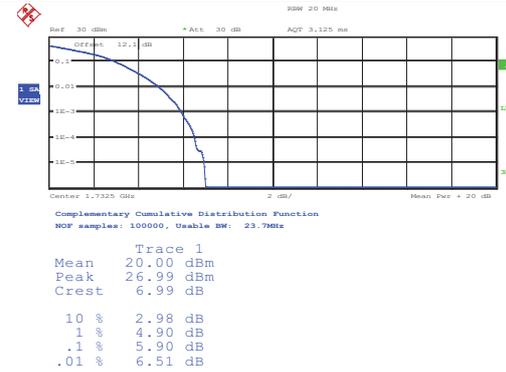
Date: 27.SEP.2014 09:50:07

Highest Channel / 1RB

Complementary Cumulative Distribution Function
NOF samples: 100000, Usable BW: 23.7MHz

Trace 1	
Mean	21.14 dBm
Peak	25.79 dBm
Crest	4.64 dB
10 %	2.92 dB
1 %	4.23 dB
.1 %	4.49 dB
.01 %	4.58 dB
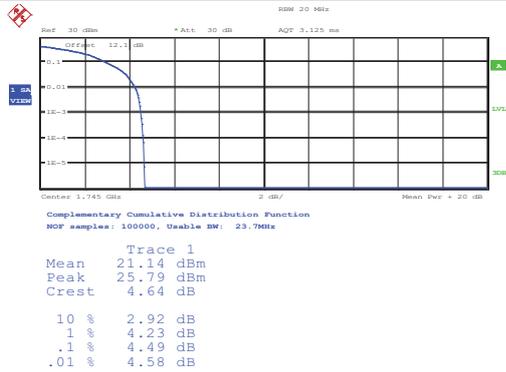
Date: 27.SEP.2014 09:50:20

Highest Channel / Full RB

Complementary Cumulative Distribution Function
NOF samples: 100000, Usable BW: 23.7MHz

Trace 1	
Mean	19.69 dBm
Peak	27.27 dBm
Crest	7.58 dB
10 %	3.01 dB
1 %	5.16 dB
.1 %	6.41 dB
.01 %	7.12 dB

Date: 27.SEP.2014 09:50:33

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LTE Band 5 / 10MHz / 16QAM	
Lowest Channel / 1RB	**Lowest Channel / Full RB**

Complementary Cumulative Distribution Function
NOF samples: 100000, Usable BW: 11.2MHz

Trace 1
Mean   20.10 dBm
Peak   25.87 dBm
Crest   5.77 dB

10 %   2.92 dB
1 %   5.00 dB
.1 %   5.54 dB
.01 %   5.67 dB

Date: 27.SEP.2014 10:59:29

Complementary Cumulative Distribution Function
NOF samples: 100000, Usable BW: 11.2MHz

Trace 1
Mean   18.78 dBm
Peak   26.57 dBm
Crest   7.79 dB

10 %   2.95 dB
1 %   5.22 dB
.1 %   6.51 dB
.01 %   7.31 dB

Date: 27.SEP.2014 10:59:41

Middle Channel / 1RB	**Middle Channel / Full RB**

Complementary Cumulative Distribution Function
NOF samples: 100000, Usable BW: 11.2MHz

Trace 1
Mean   20.18 dBm
Peak   26.72 dBm
Crest   6.54 dB

10 %   2.92 dB
1 %   5.54 dB
.1 %   6.38 dB
.01 %   6.47 dB

Date: 27.SEP.2014 10:59:54

Complementary Cumulative Distribution Function
NOF samples: 100000, Usable BW: 11.2MHz

Trace 1
Mean   18.97 dBm
Peak   26.44 dBm
Crest   7.47 dB

10 %   2.92 dB
1 %   5.00 dB
.1 %   6.28 dB
.01 %   7.05 dB
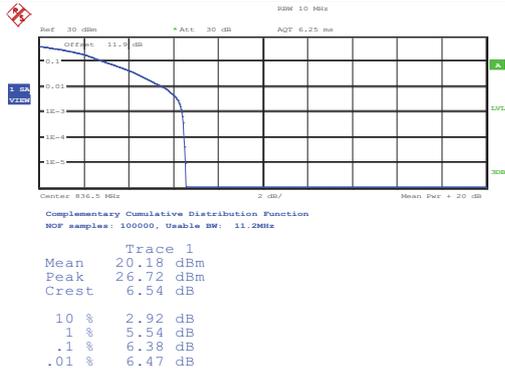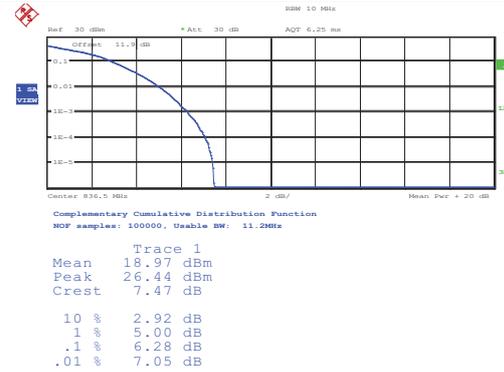
Date: 27.SEP.2014 11:00:07

Highest Channel / 1RB	**Highest Channel / Full RB**

Complementary Cumulative Distribution Function
NOF samples: 100000, Usable BW: 11.2MHz

Trace 1
Mean   20.26 dBm
Peak   26.05 dBm
Crest   5.78 dB

10 %   2.85 dB
1 %   5.06 dB
.1 %   5.58 dB
.01 %   5.67 dB

Date: 27.SEP.2014 11:00:19

Complementary Cumulative Distribution Function
NOF samples: 100000, Usable BW: 11.2MHz

Trace 1
Mean   18.78 dBm
Peak   26.54 dBm
Crest   7.76 dB

10 %   2.92 dB
1 %   5.13 dB
.1 %   6.31 dB
.01 %   7.21 dB

Date: 27.SEP.2014 11:00:33

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LTE Band 13 / 10MHz / 16QAM	
Middle Channel/ 1RB	**Middle Channel / Full RB**

<table>
<tr><td>

RBW 10 MHz
Ref 30 dBm   *Att 30 dB   AQT 6.25 ms
Offset 11.9 dB

Center 782 MHz   2 dB/   Mean Pwr + 20 dB

Complementary Cumulative Distribution Function
NOF samples: 100000, Usable BW: 11.2MHz

```
              Trace 1
Mean    20.57  dBm
Peak    26.67  dBm
Crest    6.10  dB

  10 %    3.08  dB
   1 %    5.26  dB
  .1 %    5.87  dB
 .01 %    6.03  dB
```

Date: 28.SEP.2014 11:55:11

</td><td>

RBW 10 MHz
Ref 30 dBm   *Att 30 dB   AQT 6.25 ms
Offset 11.9 dB

Center 782 MHz   2 dB/   Mean Pwr + 20 dB

Complementary Cumulative Distribution Function
NOF samples: 100000, Usable BW: 11.2MHz

```
              Trace 1
Mean    19.25  dBm
Peak    27.52  dBm
Crest    8.27  dB

  10 %    3.17  dB
   1 %    5.51  dB
  .1 %    6.86  dB
 .01 %    7.63  dB
```

Date: 28.SEP.2014 11:56:32

</td></tr>
</table>

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LTE Band 17 / 10MHz / 16QAM	
Lowest Channel / 1RB	**Lowest Channel / Full RB**

Complementary Cumulative Distribution Function
NOF samples: 100000, Usable BW: 11.2MHz

```
           Trace 1
Mean    19.05 dBm
Peak    25.72 dBm
Crest    6.68 dB

  10 %    2.98 dB
   1 %    5.61 dB
  .1 %    6.47 dB
 .01 %    6.63 dB
```

Date: 27.SEP.2014 11:35:10

Complementary Cumulative Distribution Function
NOF samples: 100000, Usable BW: 11.2MHz

```
           Trace 1
Mean    17.56 dBm
Peak    25.51 dBm
Crest    7.95 dB

  10 %    2.98 dB
   1 %    5.13 dB
  .1 %    6.44 dB
 .01 %    7.28 dB
```

Date: 27.SEP.2014 11:35:23

Middle Channel/ 1RB	**Middle Channel / Full RB**

Complementary Cumulative Distribution Function
NOF samples: 100000, Usable BW: 11.2MHz

```
           Trace 1
Mean    18.99 dBm
Peak    25.95 dBm
Crest    6.95 dB

  10 %    2.98 dB
   1 %    5.54 dB
  .1 %    6.47 dB
 .01 %    6.79 dB
```

Date: 27.SEP.2014 11:35:35

Complementary Cumulative Distribution Function
NOF samples: 100000, Usable BW: 11.2MHz

```
           Trace 1
Mean    17.55 dBm
Peak    25.52 dBm
Crest    7.97 dB

  10 %    2.98 dB
   1 %    5.13 dB
  .1 %    6.44 dB
 .01 %    7.37 dB
```
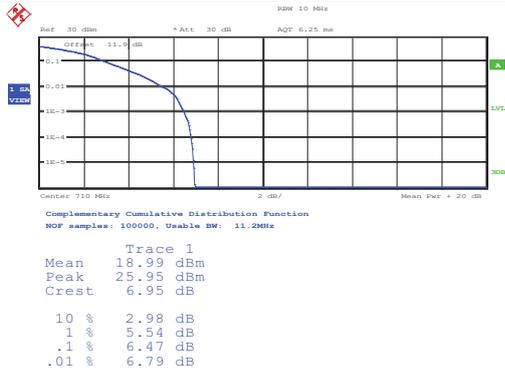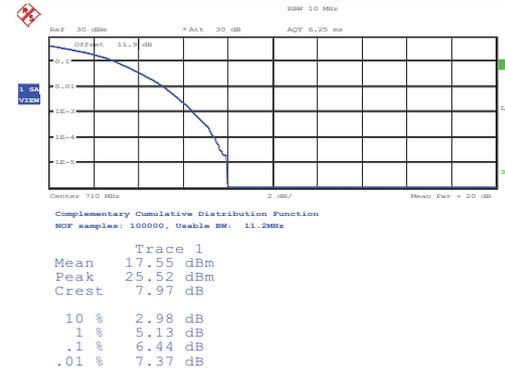
Date: 27.SEP.2014 11:35:50

Highest Channel/ 1RB	**Highest Channel / Full RB**

Complementary Cumulative Distribution Function
NOF samples: 100000, Usable BW: 11.2MHz

```
           Trace 1
Mean    18.78 dBm
Peak    25.67 dBm
Crest    6.89 dB

  10 %    2.95 dB
   1 %    5.45 dB
  .1 %    6.38 dB
 .01 %    6.79 dB
```

Date: 27.SEP.2014 11:36:03

Complementary Cumulative Distribution Function
NOF samples: 100000, Usable BW: 11.2MHz

```
           Trace 1
Mean    17.56 dBm
Peak    25.46 dBm
Crest    7.90 dB

  10 %    2.98 dB
   1 %    5.10 dB
  .1 %    6.38 dB
 .01 %    7.37 dB
```

Date: 27.SEP.2014 11:36:18

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26dB Bandwidth

Mode	LTE Band 2 : 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	1.3	1.29	3.08	3.1	5.02	5.03	10.14	10.04	14.85	14.76	21.08	21.04
Middle CH	1.3	1.29	3.07	3.1	5.05	5	10.04	10.1	14.79	14.82	20.96	20.92
Highest CH	1.3	1.29	3.05	3.04	5	4.97	10.08	10.06	14.67	14.7	20.88	20.84

Mode	LTE Band 25 : 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	-	-	-	-	-	-	-	-	-	-	-	-
Middle CH	-	-	-	-	-	-	-	-	-	-	-	-
Highest CH	1.28	1.3	3.05	3.07	5.09	4.95	10.16	10.08	14.76	14.67	20.88	20.76

Mode	LTE Band 4 : 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	1.29	1.29	3.05	3.09	4.99	5	10.02	9.92	14.76	14.79	20.92	20.92
Middle CH	1.32	1.32	3.13	3.11	5	5	10.12	10.16	14.82	14.85	21	21.2
Highest CH	1.29	1.28	3.11	3.1	5.03	5.02	10.04	10.08	14.73	14.7	21.16	21.08

Mode	LTE Band 5 : 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	1.29	1.29	3.08	3.1	4.99	4.96	10.06	10.12	-	-	-	-
Middle CH	1.28	1.28	3.06	3.08	4.9	4.94	10	10.06	-	-	-	-
Highest CH	1.3	1.3	3.08	3.08	5.04	4.93	10.18	10.02	-	-	-	-

Mode	LTE Band 13 : 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	-	-	-	-	5.07	5.06	-	-	-	-	-	-
Middle CH	-	-	-	-	5.08	5	10.06	10.16	-	-	-	-
Highest CH	-	-	-	-	5.05	5.01	-	-	-	-	-	-

Mode	LTE Band 17 : 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	-	-	-	-	4.89	5	10.1	9.96	-	-	-	-
Middle CH	-	-	-	-	5.07	4.96	10.1	10.06	-	-	-	-
Highest CH	-	-	-	-	5.1	4.96	10	9.98	-	-	-	-

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LTE Band 2

Lowest Channel / 1.4MHz / QPSK
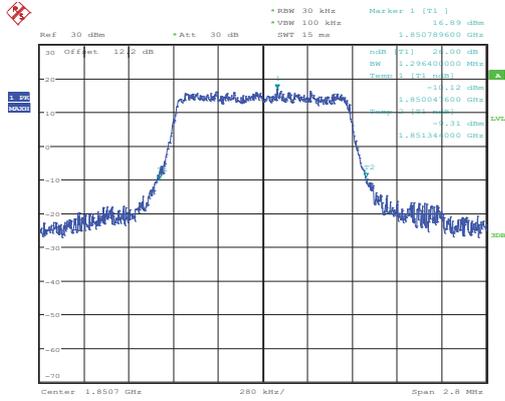
Date: 27.SEP.2014 07:00:41

Lowest Channel / 1.4MHz / 16QAM
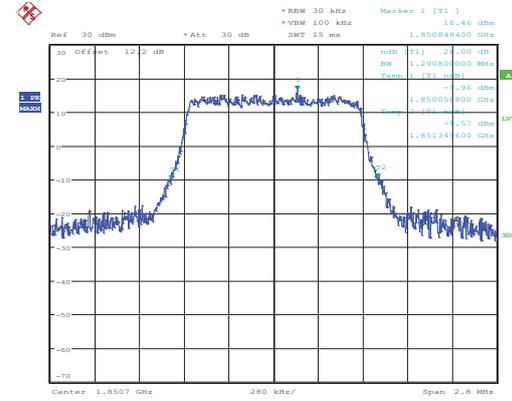
Date: 27.SEP.2014 07:00:58

Middle Channel / 1.4MHz / QPSK
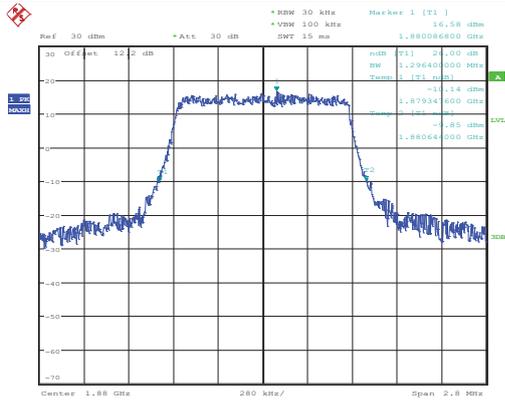
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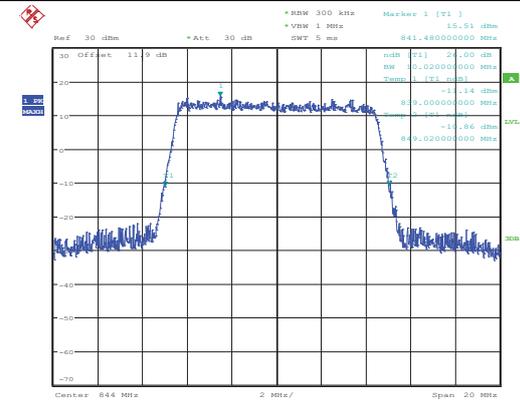
Middle Channel / 1.4MHz / 16QAM
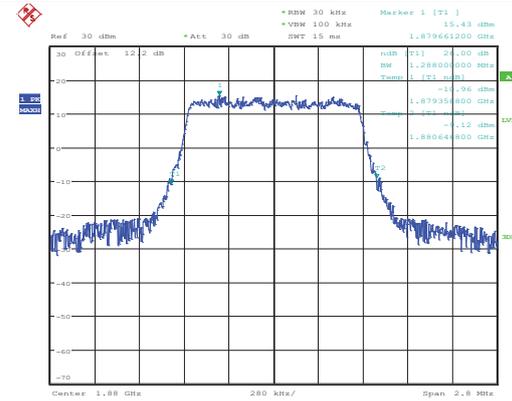
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Highest Channel / 1.4MHz / QPSK
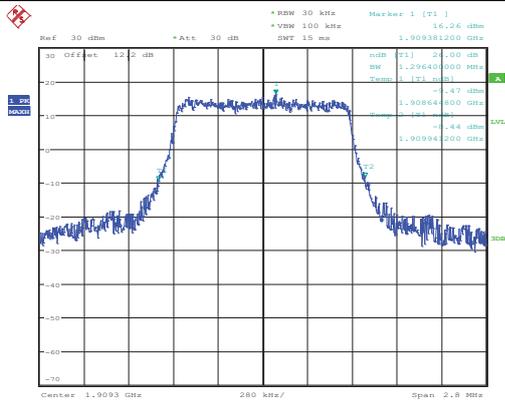
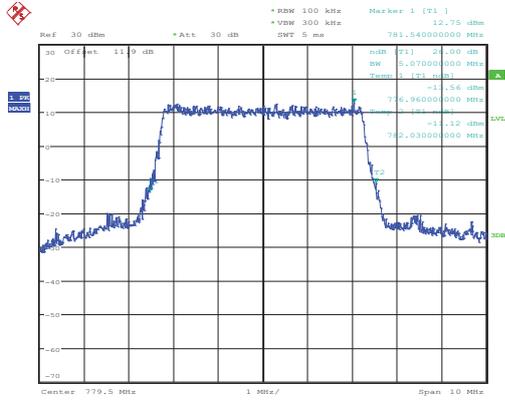Date: 27.SEP.2014 07:09:19

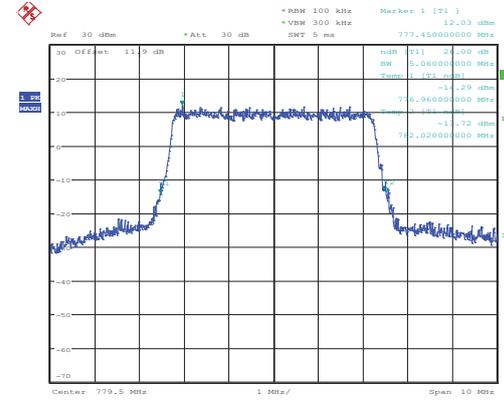### Highest Channel / 1.4MHz / 16QAM

Date: 27.SEP.2014 07:09:35

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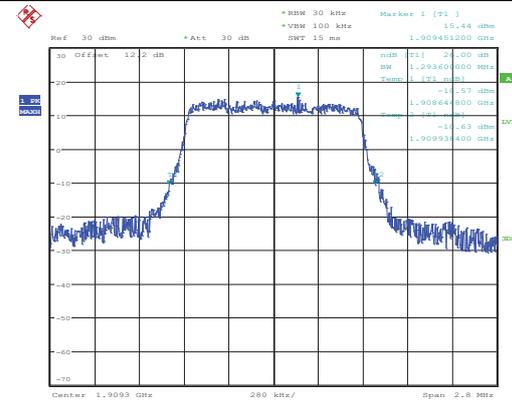
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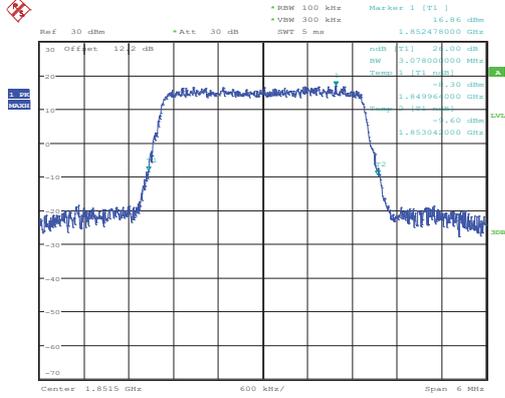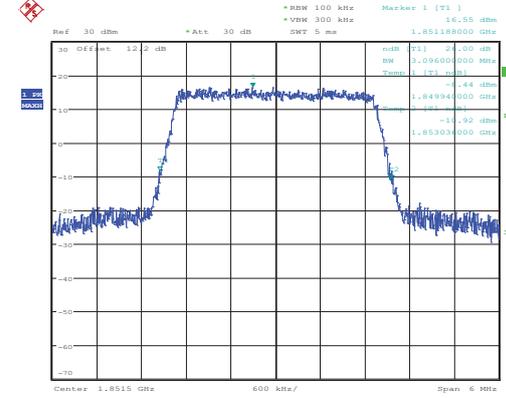
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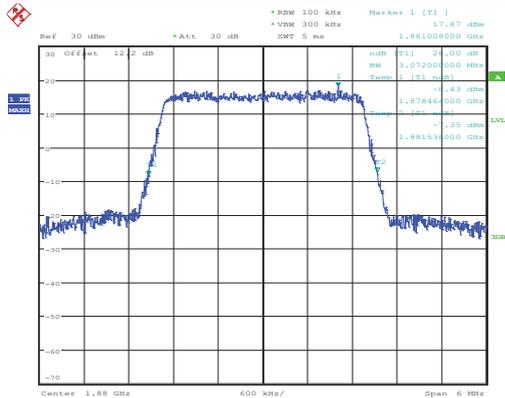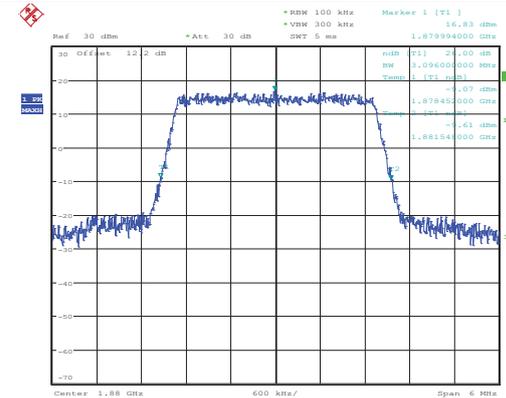
Middle Channel / 3MHz / QPSK	Middle Channel /3MHz / 16QAM
Date: 27.SEP.2014 07:21:00	Date: 27.SEP.2014 07:21:16

Highest Channel /3MHz / QPSK	Highest Channel /3MHz / 16QAM
Date: 27.SEP.2014 07:23:49	Date: 27.SEP.2014 07:24:05
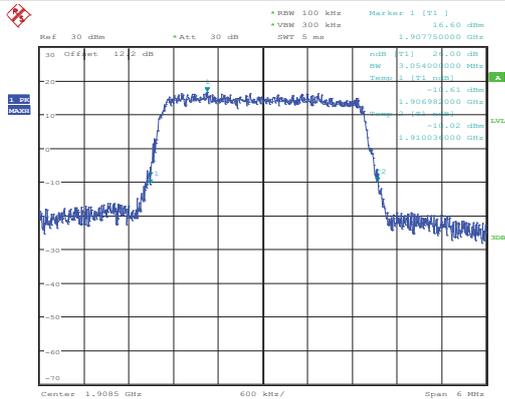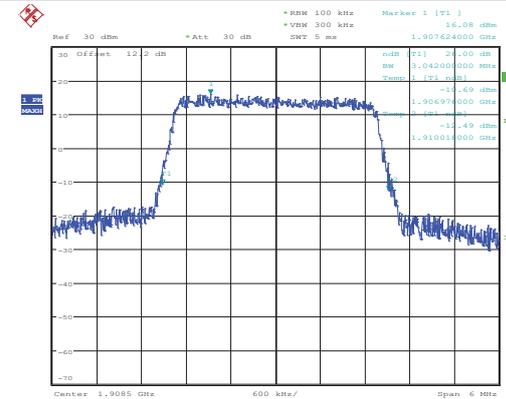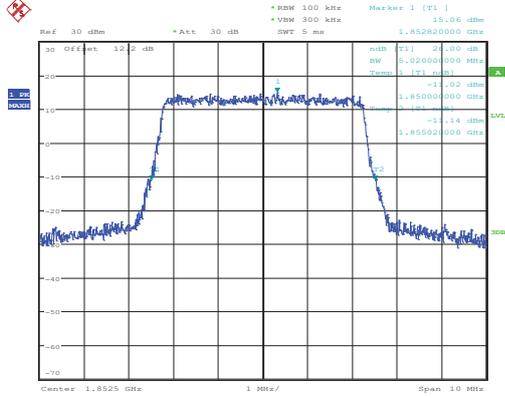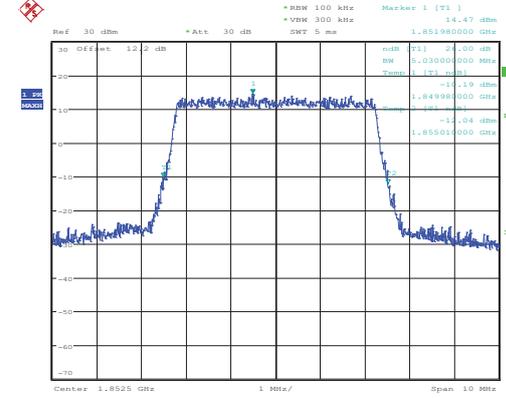
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LTE Band 2	
Lowest Channel / 5MHz / QPSK	**Lowest Channel / 5MHz / 16QAM**
Date: 27.SEP.2014 07:29:41	Date: 27.SEP.2014 07:29:57
Middle Channel / 5MHz / QPSK	**Middle Channel / 5MHz / 16QAM**
Date: 27.SEP.2014 07:35:30	Date: 27.SEP.2014 07:35:46
Highest Channel / 5MHz / QPSK	**Highest Channel / 5MHz / 16QAM**
Date: 27.SEP.2014 07:38:18	Date: 27.SEP.2014 07:38:34

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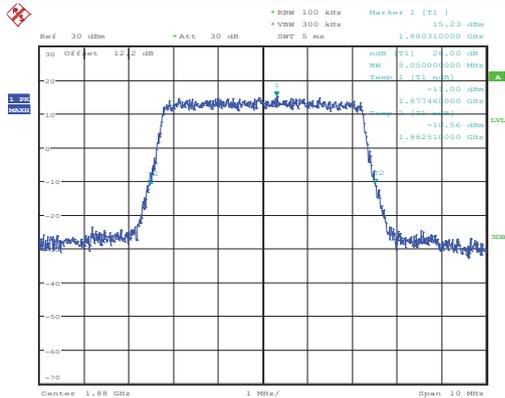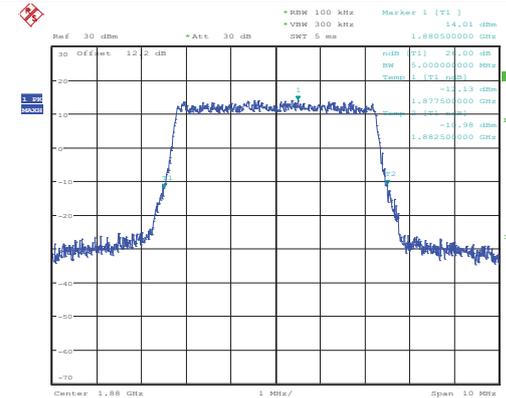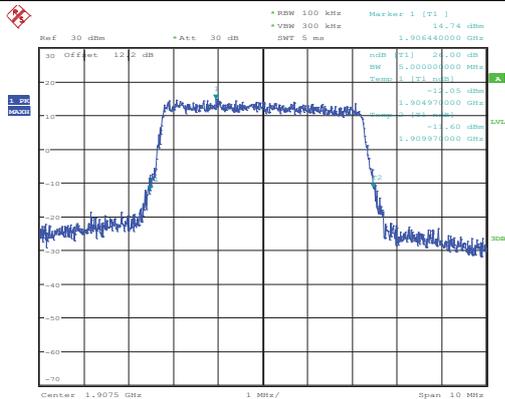
LTE Band 2	
Lowest Channel / 10MHz / QPSK	**Lowest Channel / 10MHz / 16QAM**
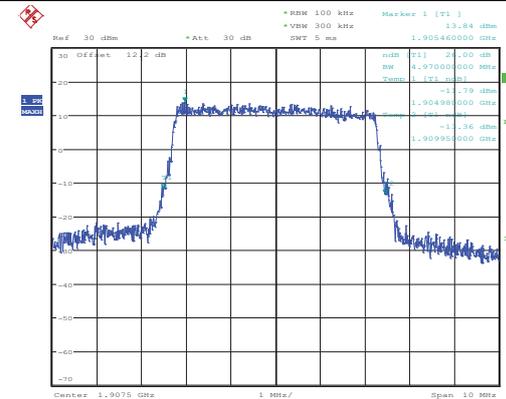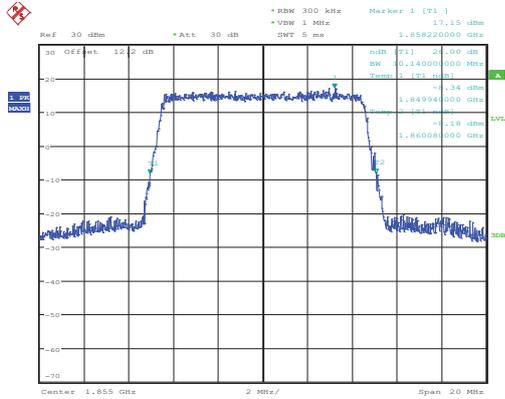
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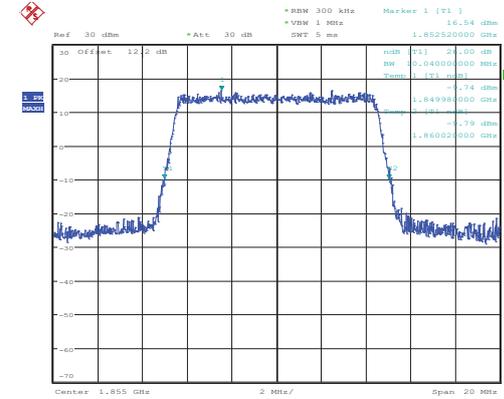
Date: 27.SEP.2014 08:03:19

Middle Channel / 10MHz / QPSK	**Middle Channel / 10MHz / 16QAM**
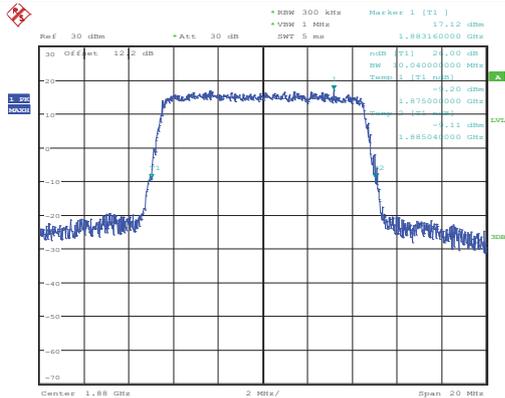
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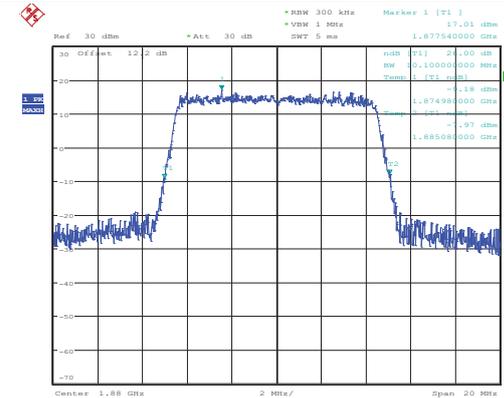
Date: 27.SEP.2014 08:09:08

Highest Channel / 10MHz / QPSK	**Highest Channel / 10MHz / 16QAM**
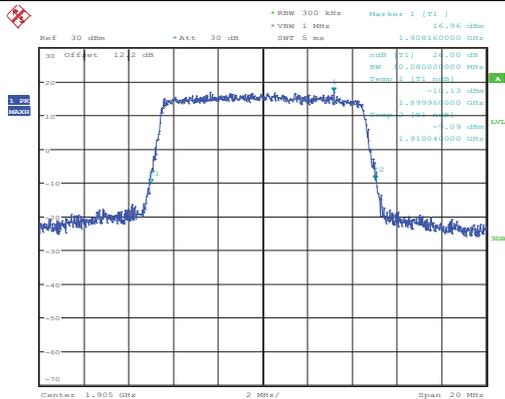
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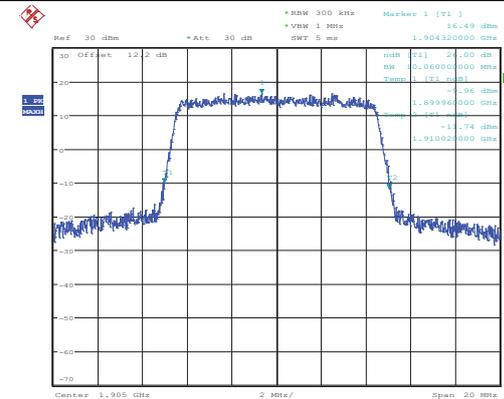
Date: 27.SEP.2014 08:11:56

LTE Band 2	
Lowest Channel / 15MHz / QPSK	**Lowest Channel / 15MHz / 16QAM**
Date: 27.SEP.2014 08:17:32	Date: 27.SEP.2014 08:17:48
Middle Channel / 15MHz / QPSK	**Middle Channel / 15MHz / 16QAM**
Date: 27.SEP.2014 08:23:20	Date: 27.SEP.2014 08:23:36
Highest Channel / 15MHz / QPSK	**Highest Channel / 15MHz / 16QAM**
Date: 27.SEP.2014 08:26:08	Date: 27.SEP.2014 08:26:25
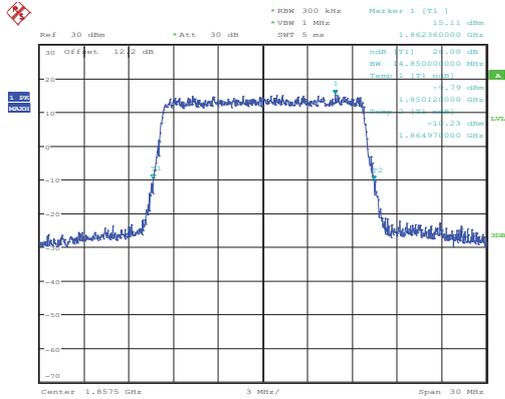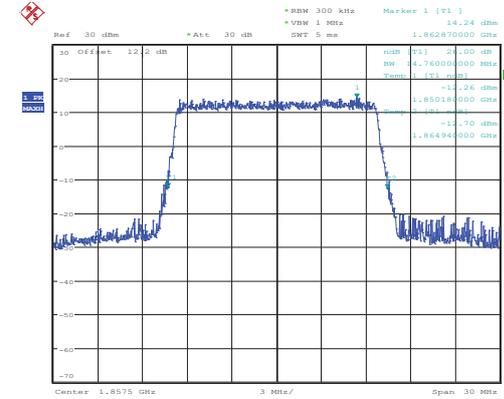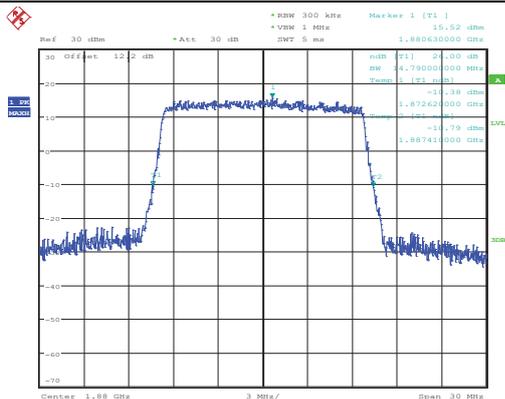
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FCC ID : B94HNW03CFX468

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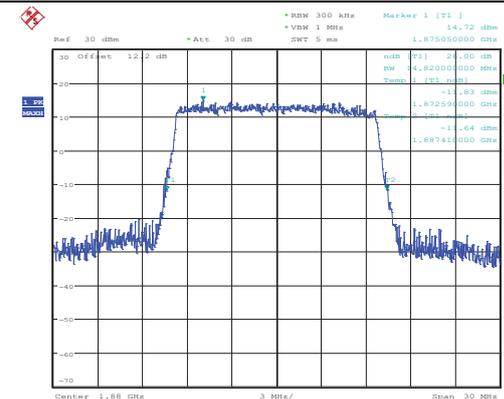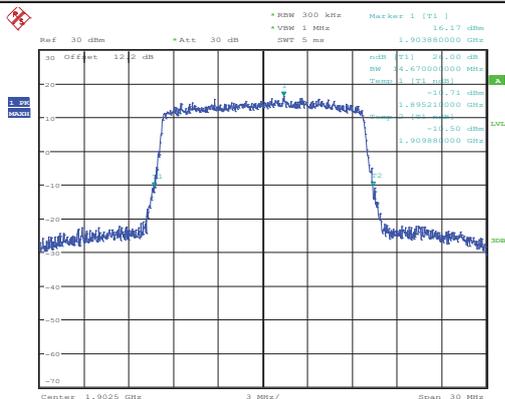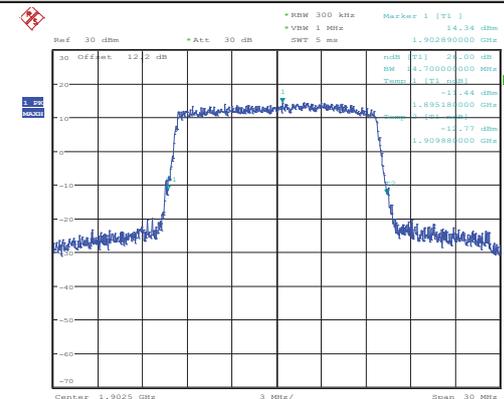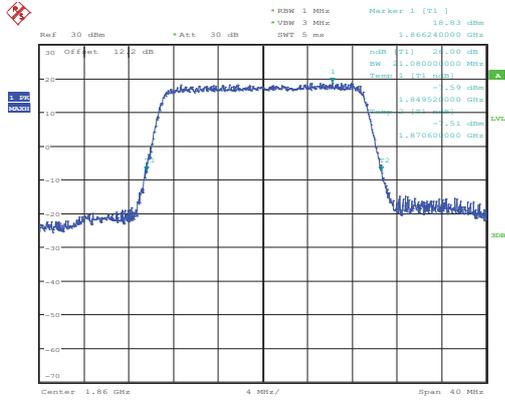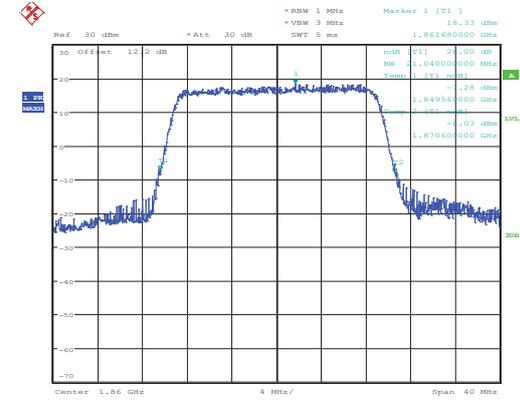
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Middle Channel / 20MHz / QPSK	**Middle Channel / 20MHz / 16QAM**
Date: 27.SEP.2014 08:37:48	Date: 27.SEP.2014 08:38:05
Highest Channel / 20MHz / QPSK	**Highest Channel / 20MHz / 16QAM**
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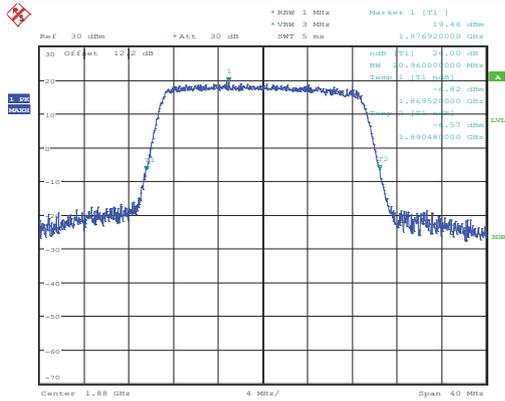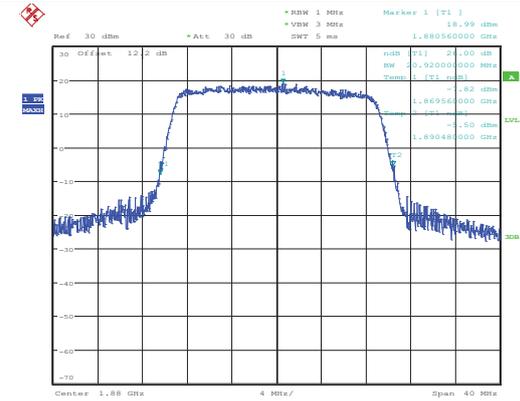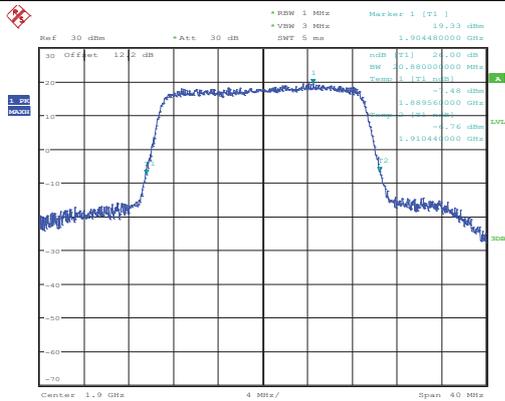
SPORTON INTERNATIONAL INC.

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FAX : 886-3-328-4978

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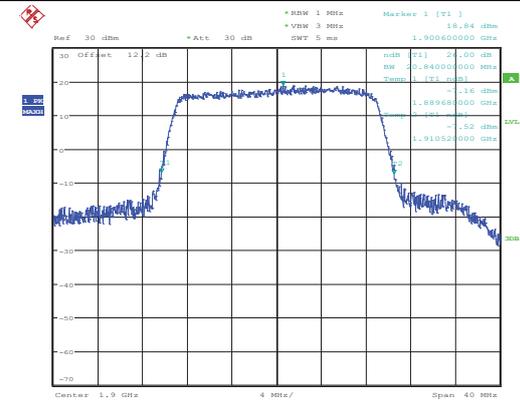
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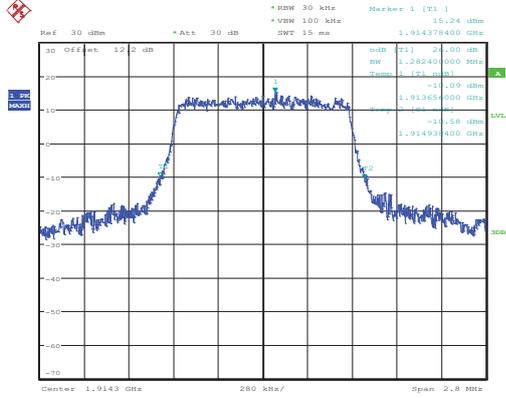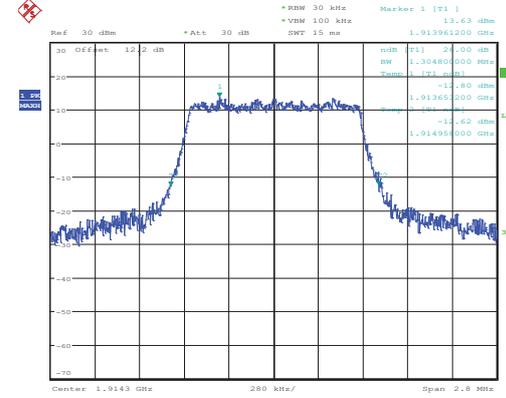
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Date: 28.SEP.2014 09:56:32	Date: 28.SEP.2014 09:56:16
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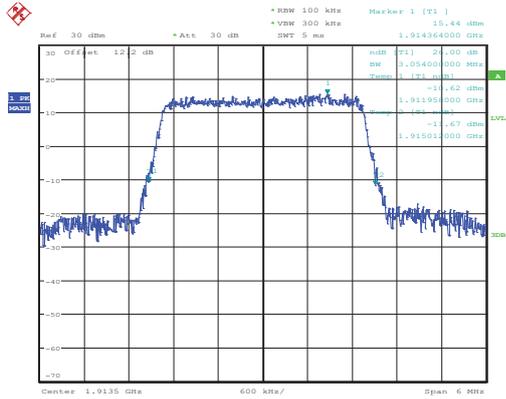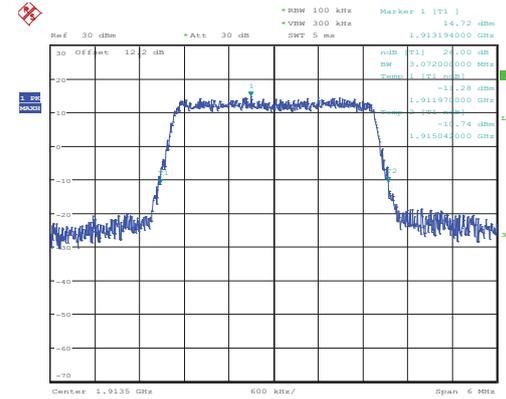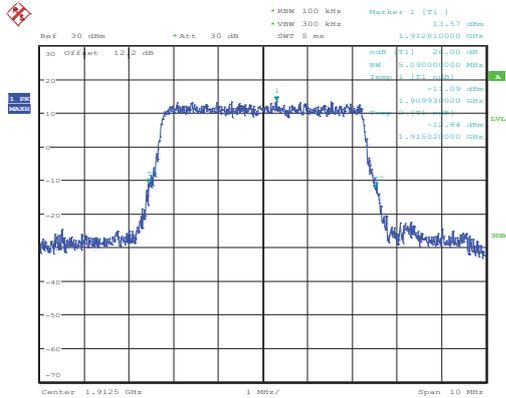
SPORTON INTERNATIONAL INC.
TEL : 886-3-327-3456
FAX : 886-3-328-4978
FCC ID : B94HNW03CFX468

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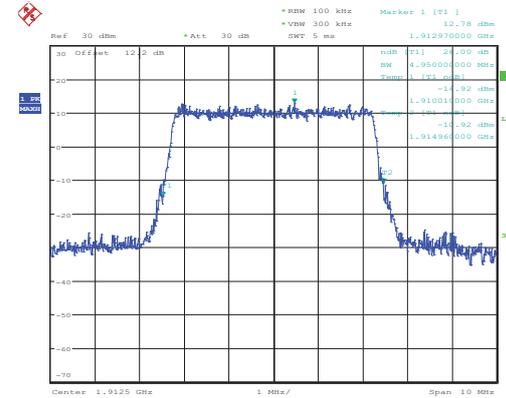
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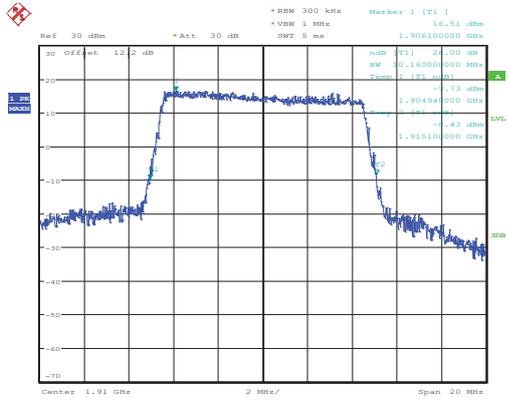
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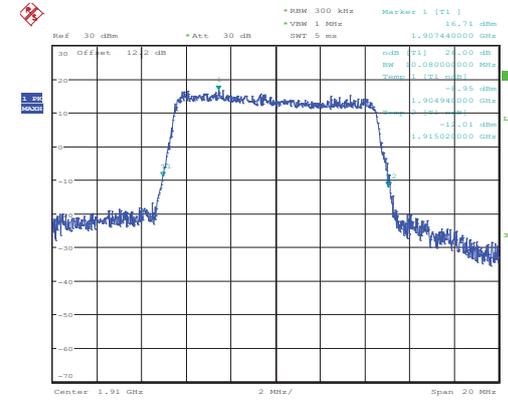
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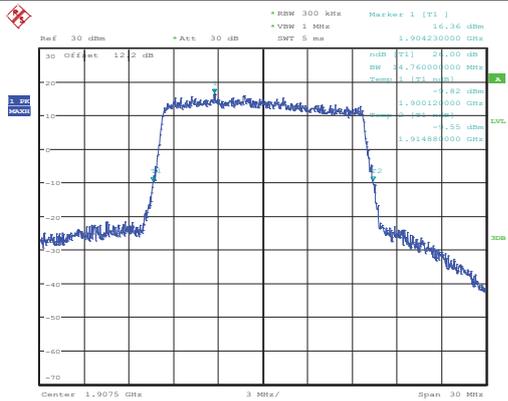
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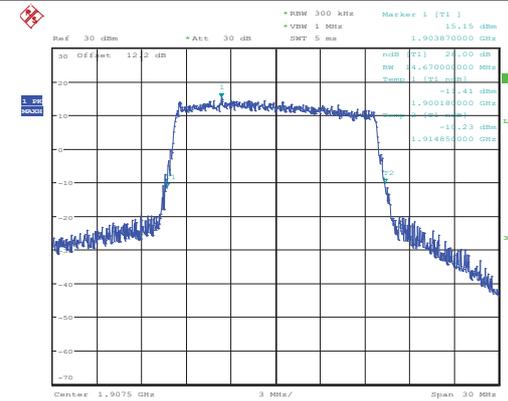
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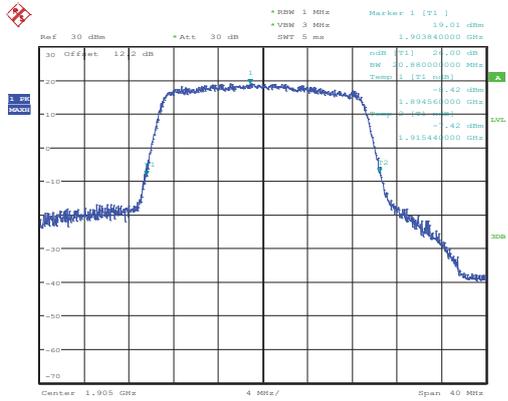
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Date: 28.SEP.2014 10:20:11

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TEL : 886-3-327-3456
FAX : 886-3-328-4978
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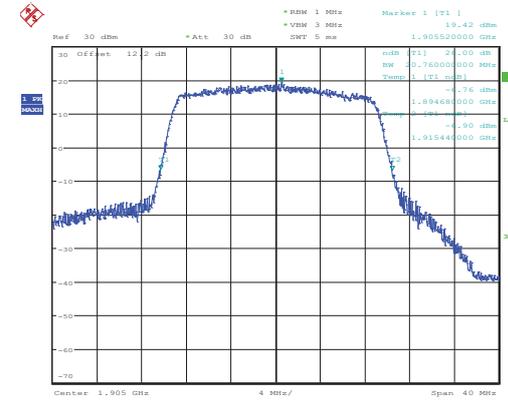
LTE Band 4

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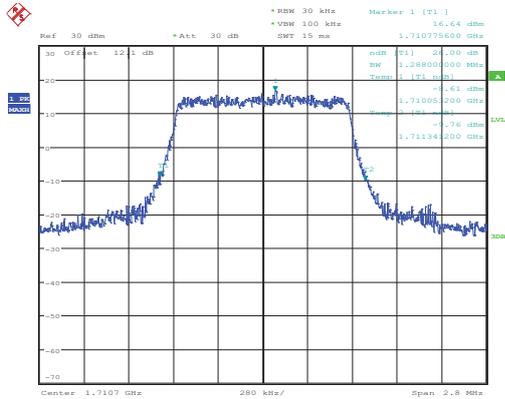
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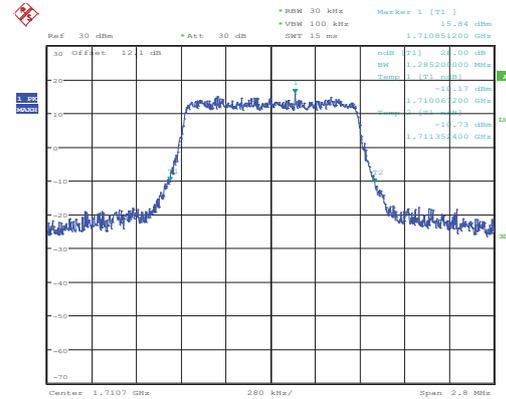
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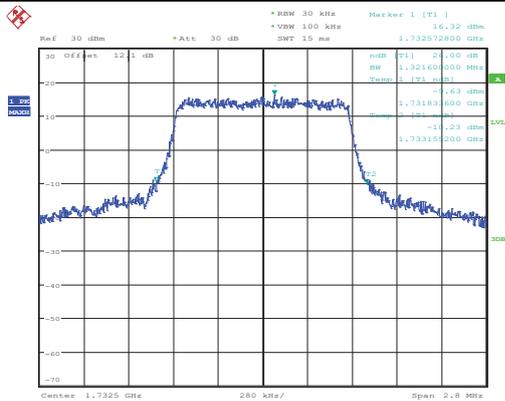
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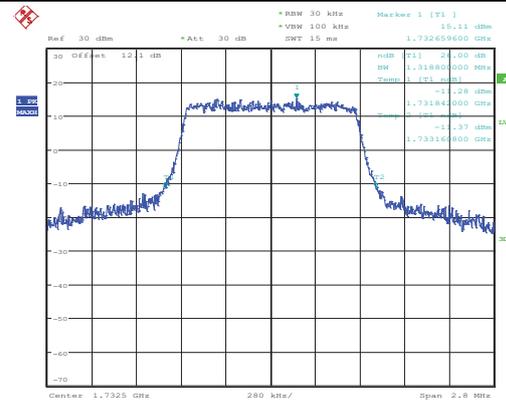
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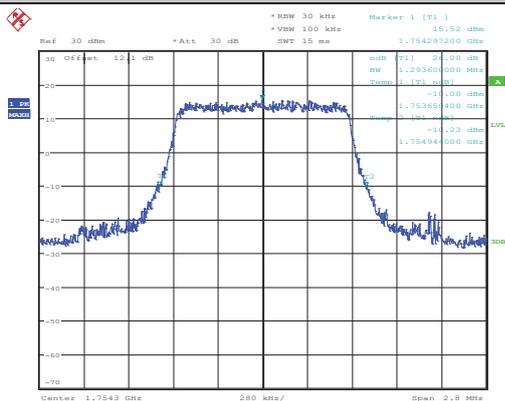
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Date: 28.SEP.2014 09:42:10

SPORTON INTERNATIONAL INC.
TEL : 886-3-327-3456
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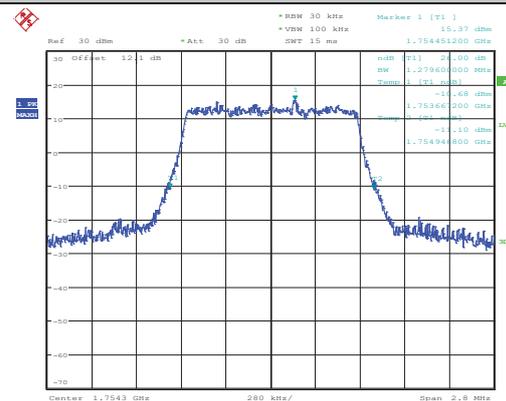
LTE Band 4	
Lowest Channel / 3MHz / QPSK	**Lowest Channel / 3MHz / 16QAM**
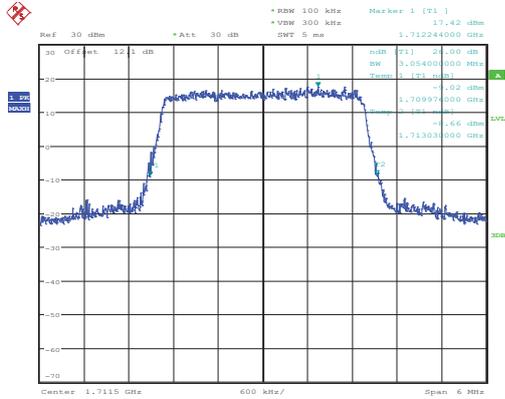
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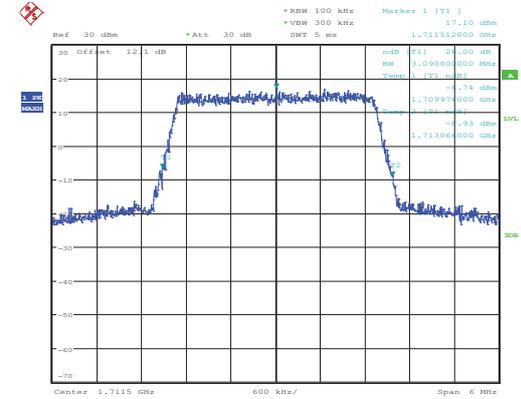
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Middle Channel / 3MHz / QPSK	**Middle Channel /3MHz / 16QAM**
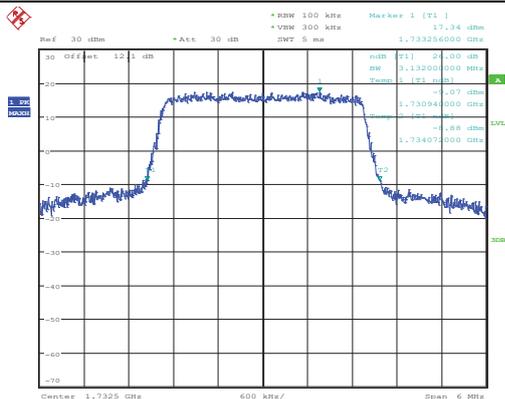
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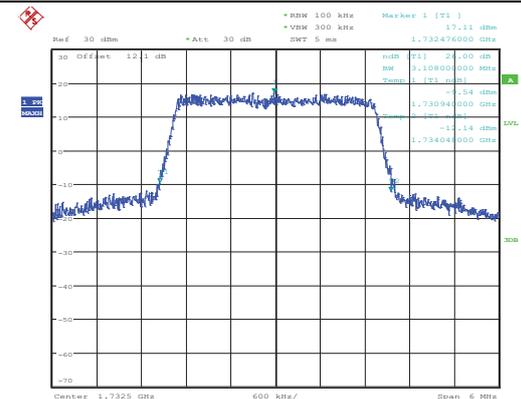
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Highest Channel /3MHz / QPSK	**Highest Channel /3MHz / 16QAM**
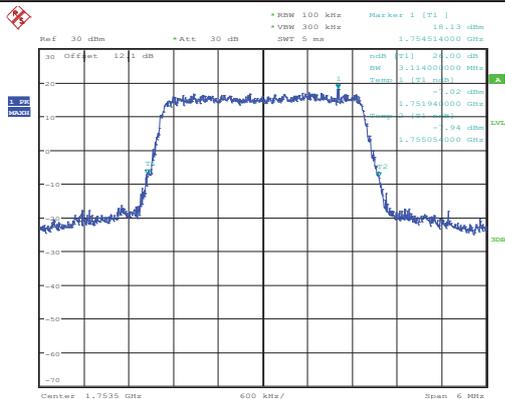
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Date: 28.SEP.2014 11:36:55

SPORTON INTERNATIONAL INC.
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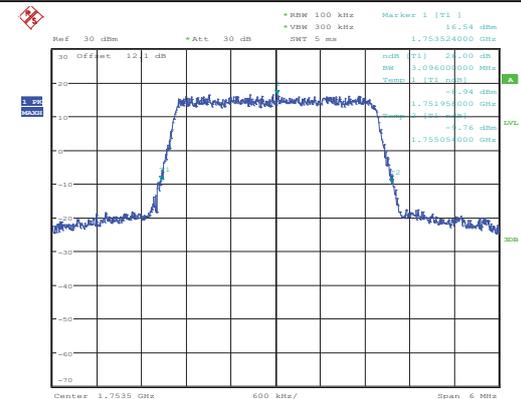
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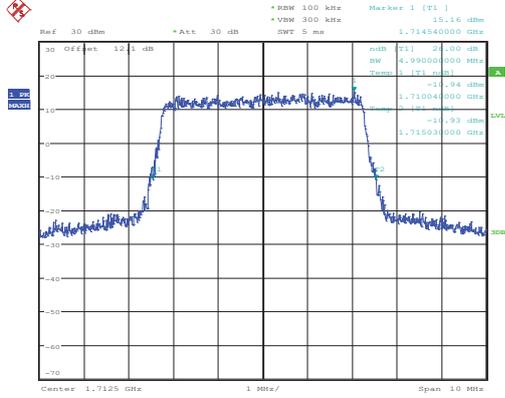
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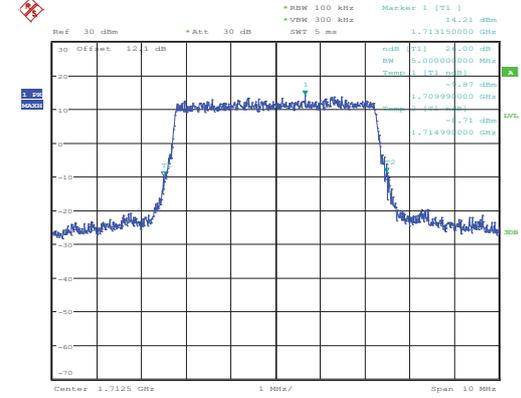
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Middle Channel / 5MHz / QPSK	**Middle Channel / 5MHz / 16QAM**
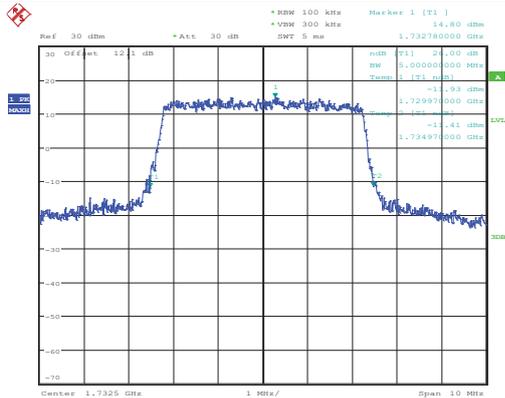
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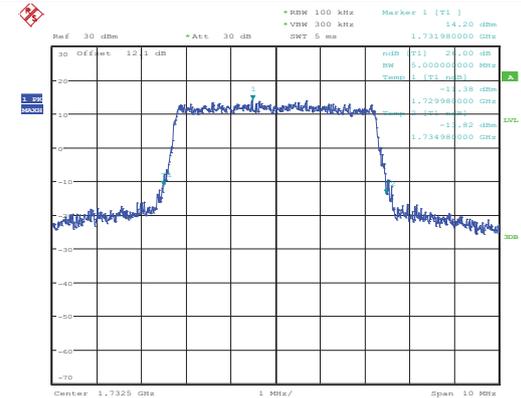
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Highest Channel / 5MHz / QPSK	**Highest Channel / 5MHz / 16QAM**
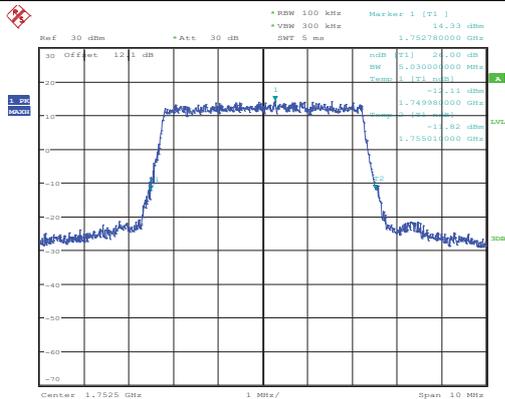
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Date: 27.SEP.2014 09:00:48

SPORTON INTERNATIONAL INC.

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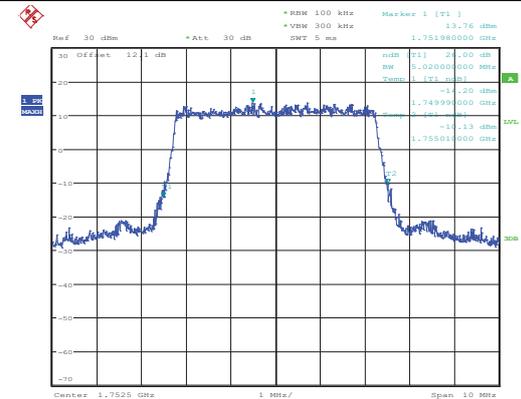
LTE Band 4

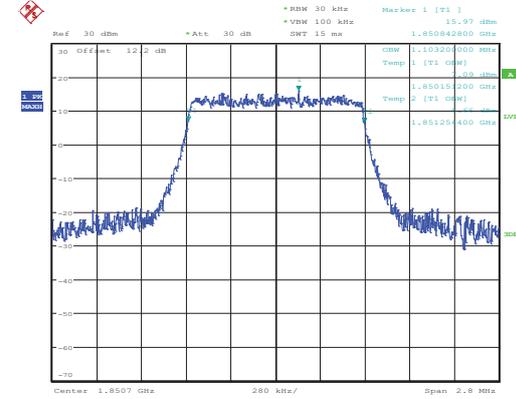### Lowest Channel / 10MHz / QPSK
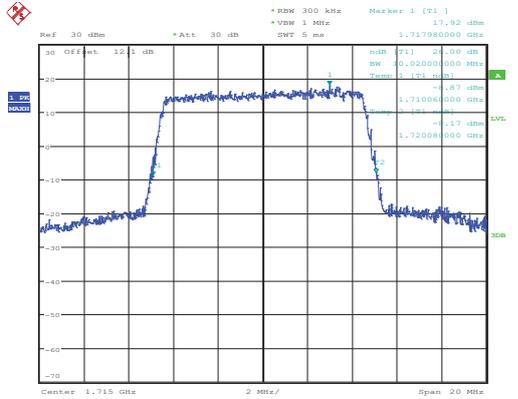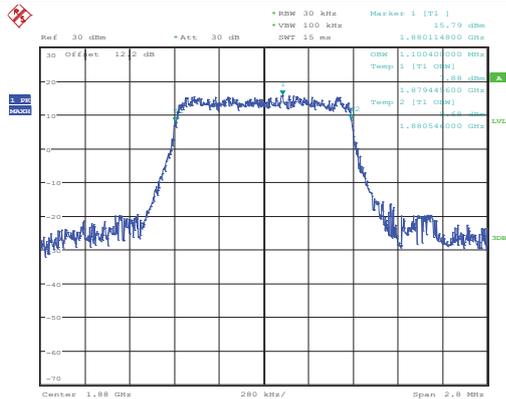

Date: 27.SEP.2014 09:06:24

Lowest Channel / 10MHz / 16QAM
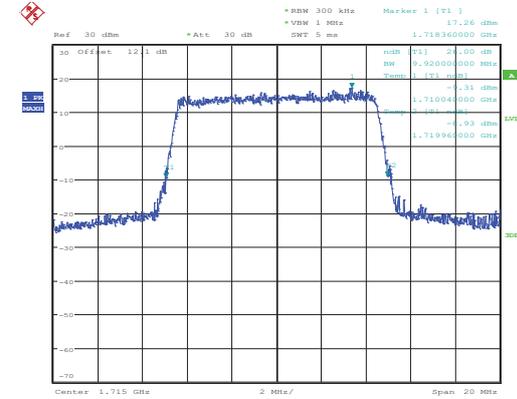
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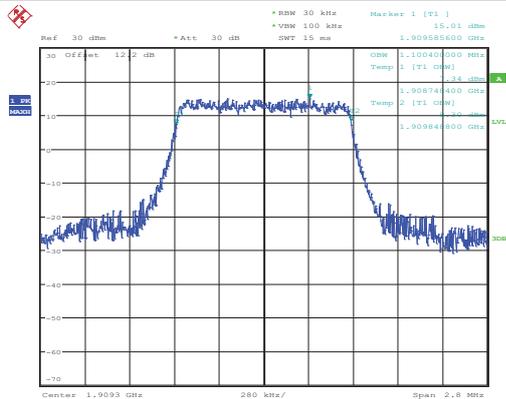
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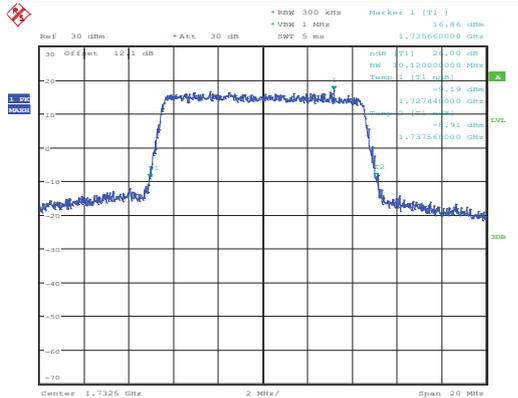
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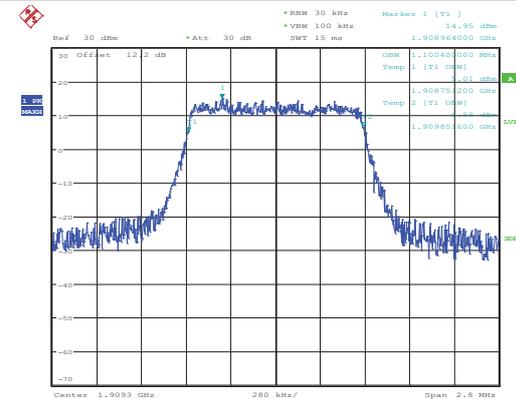
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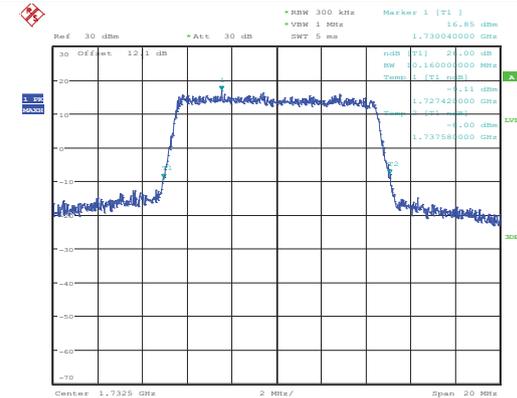
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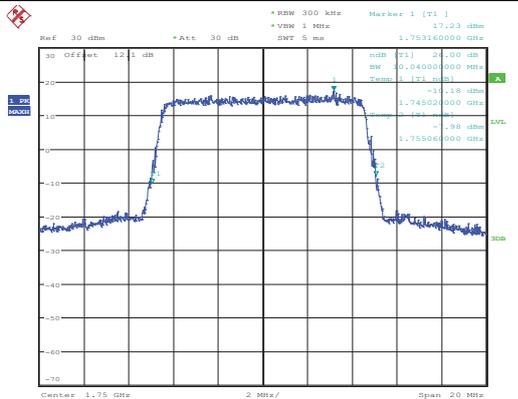
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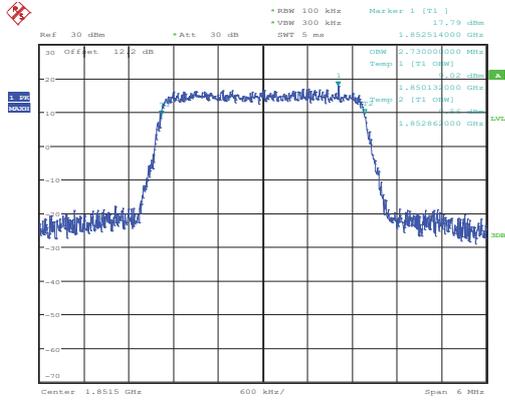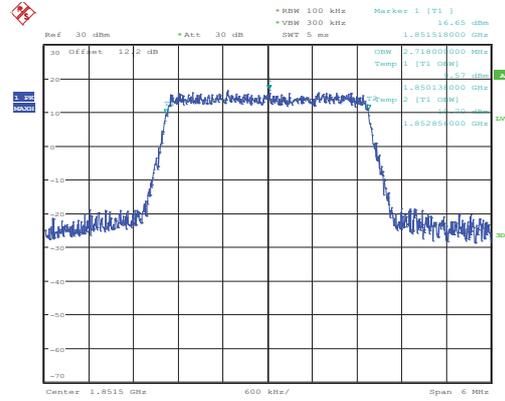### Highest Channel / 10MHz / 16QAM

Date: 27.SEP.2014 09:15:14

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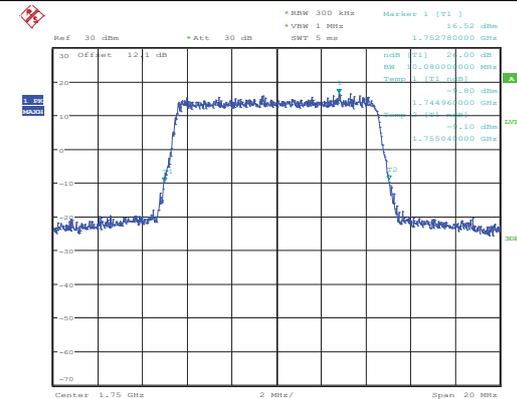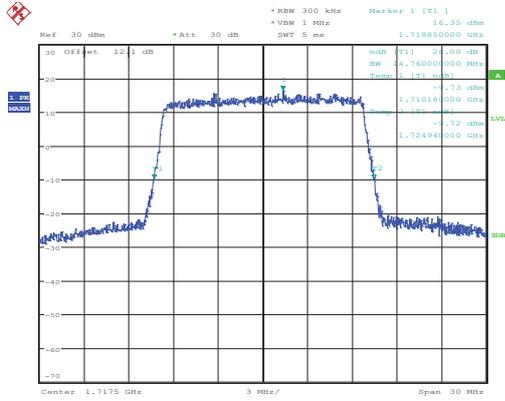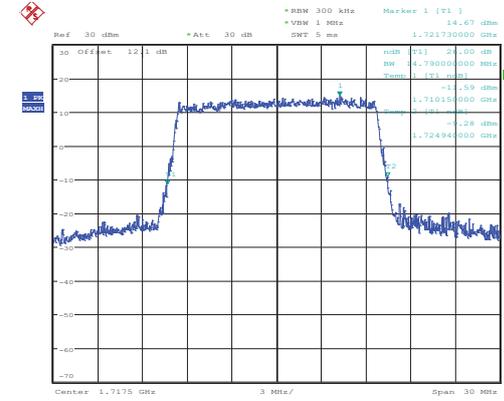
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Middle Channel / 15MHz / QPSK	**Middle Channel / 15MHz / 16QAM**
Date: 27.SEP.2014 09:26:36	Date: 27.SEP.2014 09:26:52
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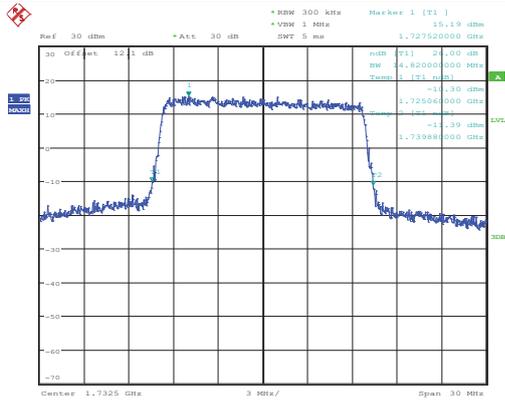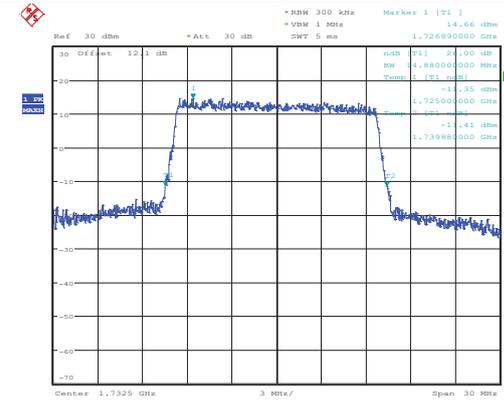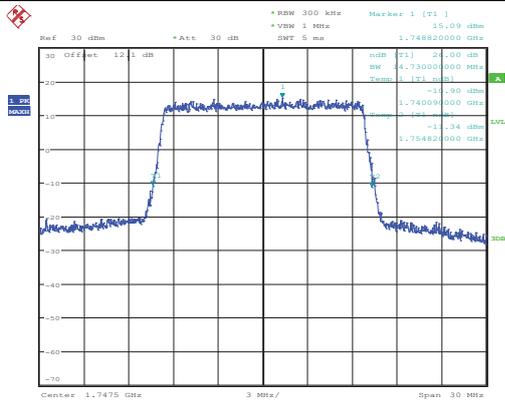
SPORTON INTERNATIONAL INC.
TEL : 886-3-327-3456
FAX : 886-3-328-4978
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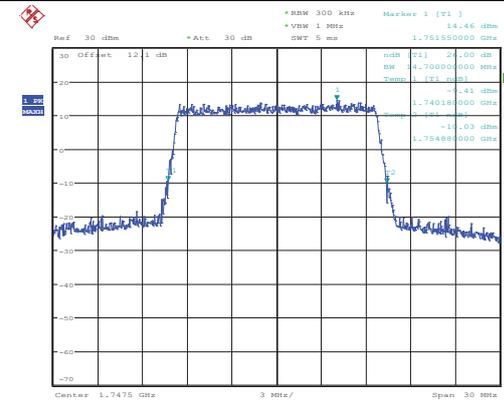
LTE Band 4
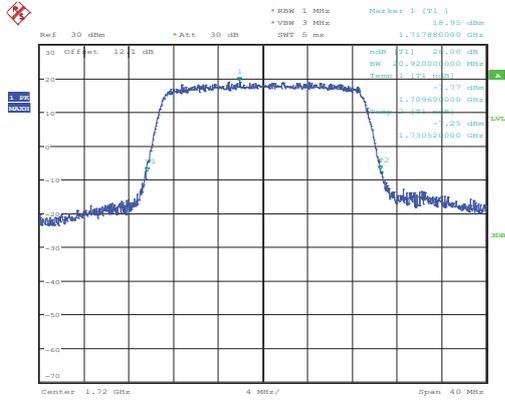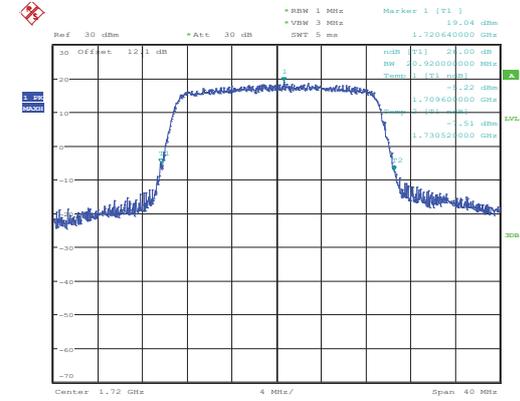
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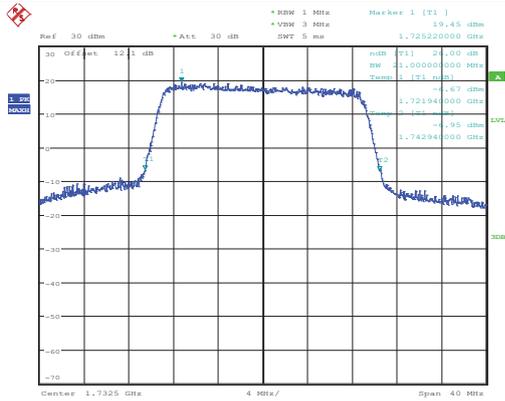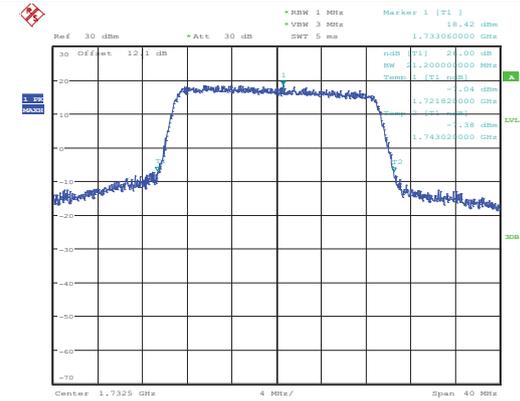
Middle Channel / 20MHz / QPSK	Middle Channel / 20MHz / 16QAM
Date: 27.SEP.2014 09:41:01	Date: 27.SEP.2014 09:41:17

Highest Channel / 20MHz / QPSK	Highest Channel / 20MHz / 16QAM
Date: 27.SEP.2014 09:43:48	Date: 27.SEP.2014 09:44:04
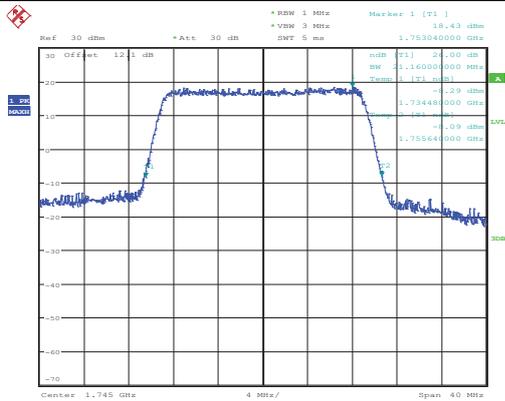
SPORTON INTERNATIONAL INC.
TEL : 886-3-327-3456
FAX : 886-3-328-4978
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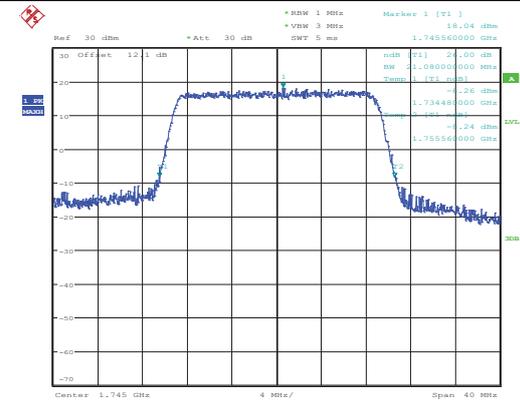
LTE Band 5

Lowest Channel / 1.4MHz / QPSK	Lowest Channel / 1.4MHz / 16QAM
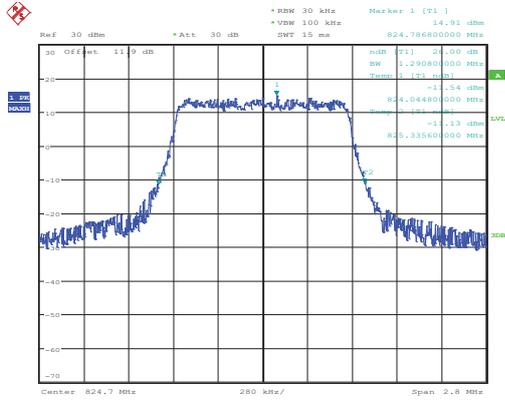
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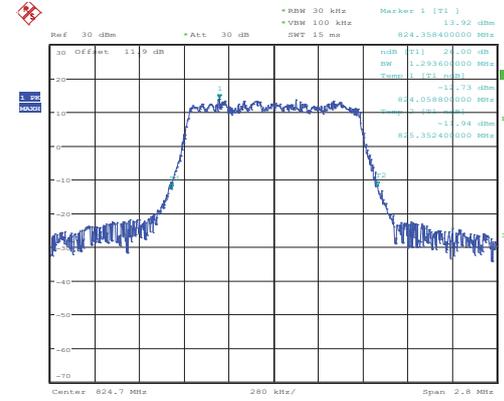
Date: 27.SEP.2014 10:01:12

Middle Channel / 1.4MHz / QPSK	Middle Channel / 1.4MHz / 16QAM
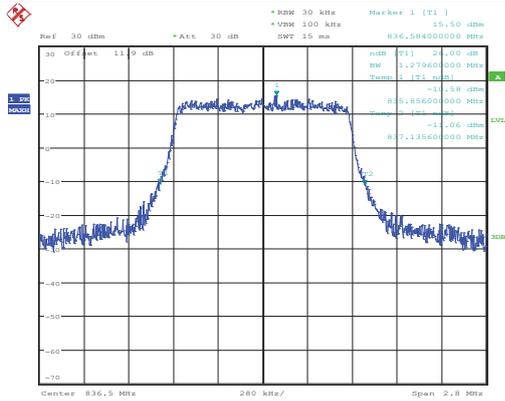
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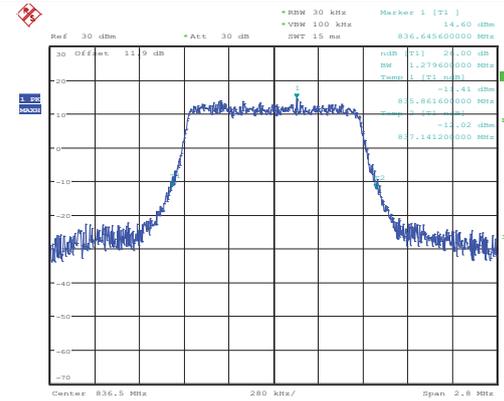
Date: 27.SEP.2014 10:07:09

Highest Channel / 1.4MHz / QPSK	Highest Channel / 1.4MHz / 16QAM
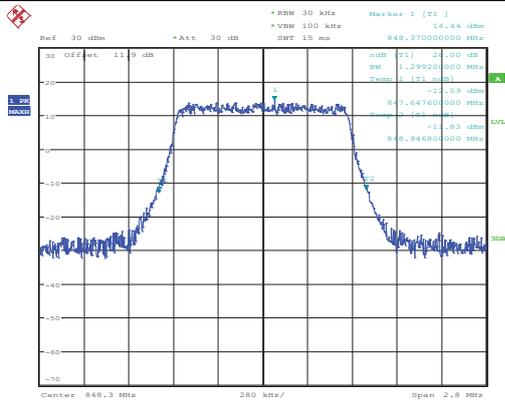
Date: 27.SEP.2014 10:09:32

Date: 27.SEP.2014 10:09:49

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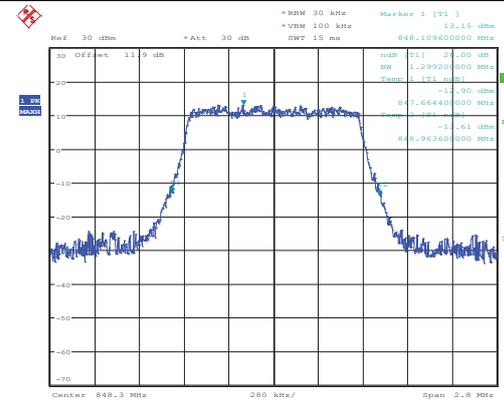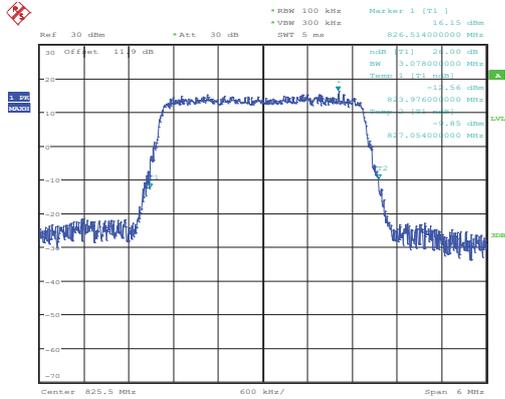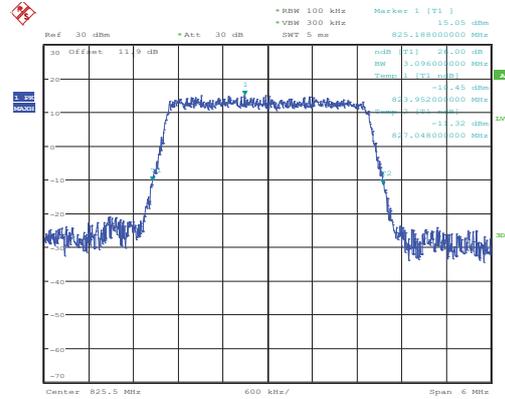
LTE Band 5	
Lowest Channel / 3MHz / QPSK	**Lowest Channel / 3MHz / 16QAM**
Date: 27.SEP.2014 10:15:16	Date: 27.SEP.2014 10:15:32
Middle Channel / 3MHz / QPSK	**Middle Channel /3MHz / 16QAM**
Date: 27.SEP.2014 10:20:55	Date: 27.SEP.2014 10:21:11
Highest Channel /3MHz / QPSK	**Highest Channel /3MHz / 16QAM**
Date: 27.SEP.2014 10:23:35	Date: 27.SEP.2014 10:23:51
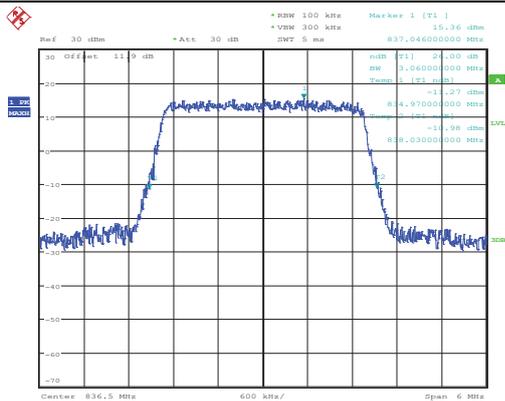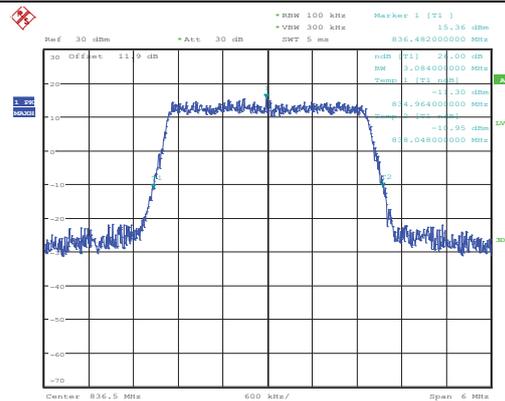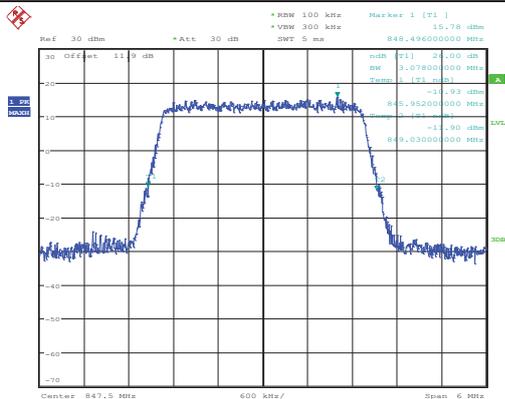
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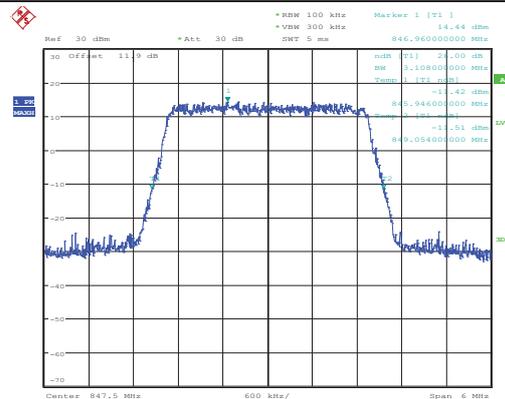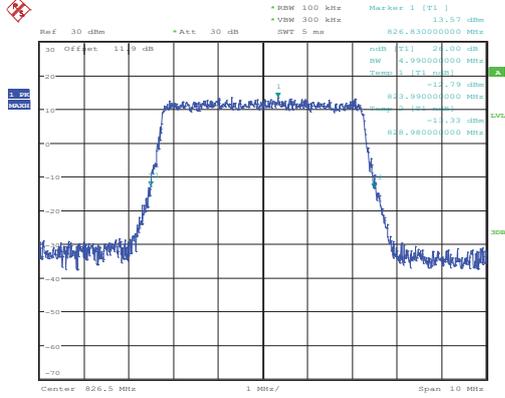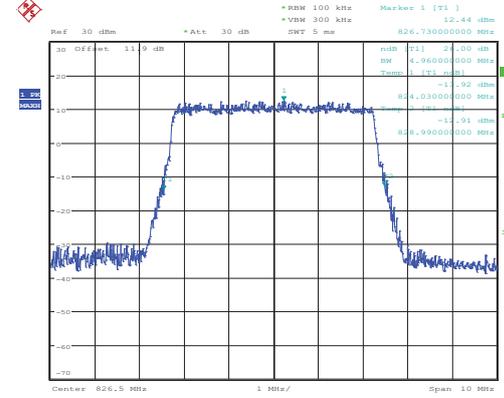
LTE Band 5	
Lowest Channel / 5MHz / QPSK	**Lowest Channel / 5MHz / 16QAM**
Date: 27.SEP.2014 10:29:18	Date: 27.SEP.2014 10:29:35
Middle Channel / 5MHz / QPSK	**Middle Channel / 5MHz / 16QAM**
Date: 27.SEP.2014 10:34:57	Date: 27.SEP.2014 10:35:13
Highest Channel / 5MHz / QPSK	**Highest Channel / 5MHz / 16QAM**
Date: 27.SEP.2014 10:37:37	Date: 27.SEP.2014 10:37:53
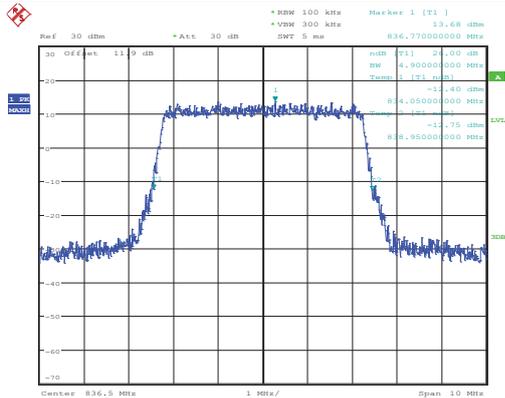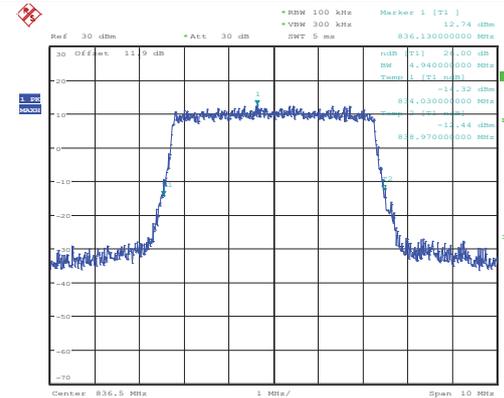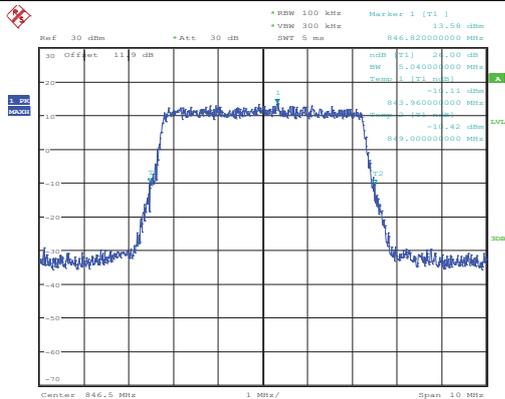
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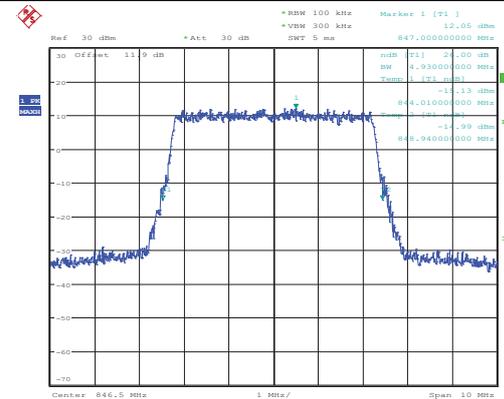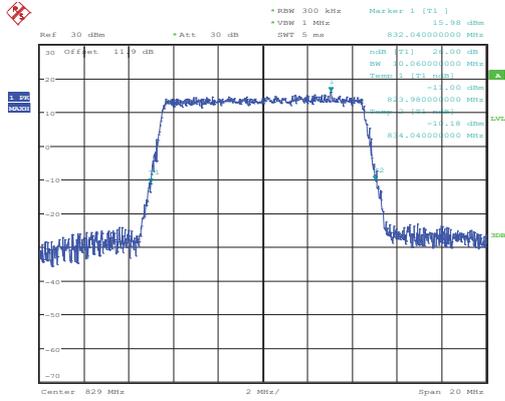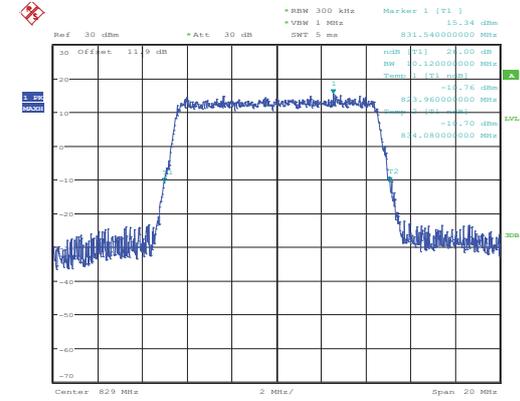
LTE Band 5	
Lowest Channel / 10MHz / QPSK	**Lowest Channel / 10MHz / 16QAM**
Date: 27.SEP.2014 10:43:21	Date: 27.SEP.2014 10:43:37
Middle Channel / 10MHz / QPSK	**Middle Channel / 10MHz / 16QAM**
Date: 27.SEP.2014 10:49:00	Date: 27.SEP.2014 10:49:16
Highest Channel / 10MHz / QPSK	**Highest Channel / 10MHz / 16QAM**
Date: 27.SEP.2014 10:51:39	Date: 27.SEP.2014 10:51:56
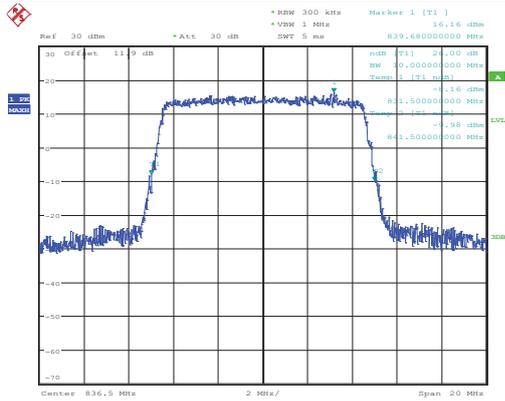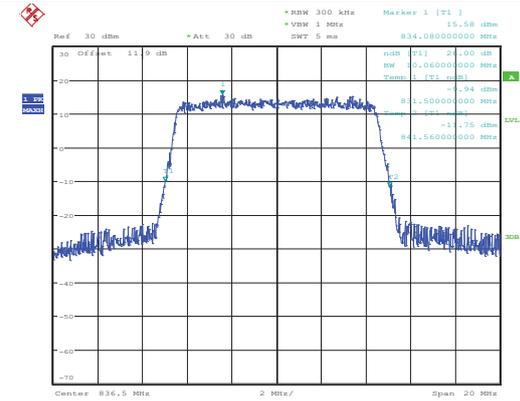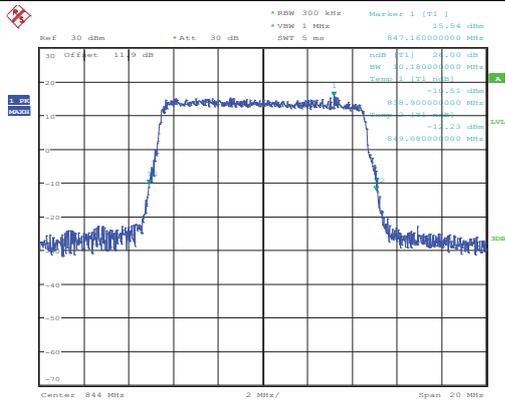
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LTE Band 13

Lowest Channel / 5MHz / QPSK	Lowest Channel / 5MHz / 16QAM
Date: 27.SEP.2014 11:38:50	Date: 27.SEP.2014 11:39:06
Middle Channel / 5MHz / QPSK	**Middle Channel / 5MHz / 16QAM**
Date: 27.SEP.2014 11:39:50	Date: 27.SEP.2014 11:40:06
Highest Channel / 5MHz / QPSK	**Highest Channel / 5MHz / 16QAM**
Date: 27.SEP.2014 11:40:50	Date: 27.SEP.2014 11:41:07
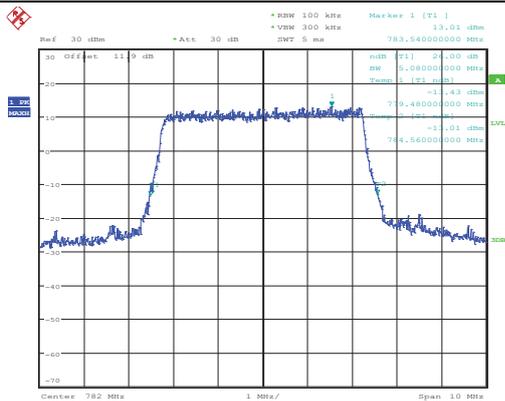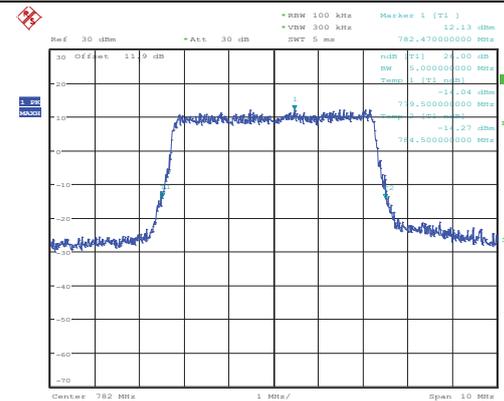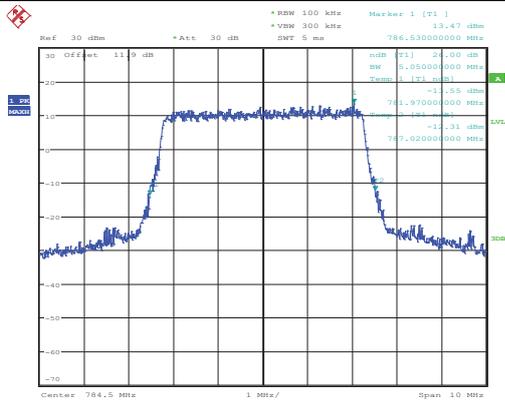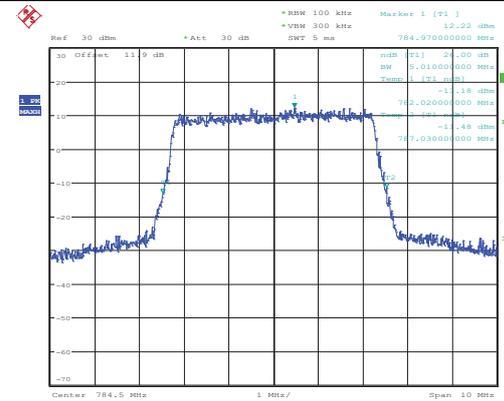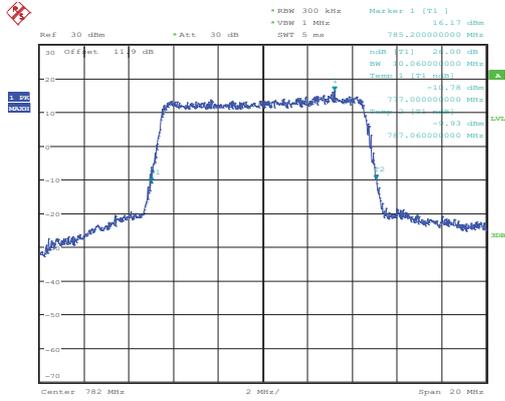
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LTE Band 13	
Middle Channel / 10MHz / QPSK	**Middle Channel / 10MHz / 16QAM**

Date: 27.SEP.2014 11:41:55

Date: 27.SEP.2014 11:42:11

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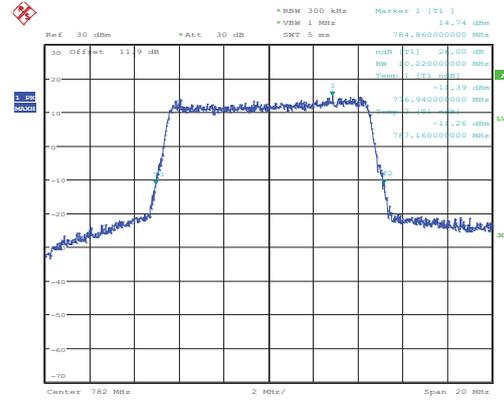
LTE Band 17

Lowest Channel / 5MHz / QPSK	Lowest Channel / 5MHz / 16QAM
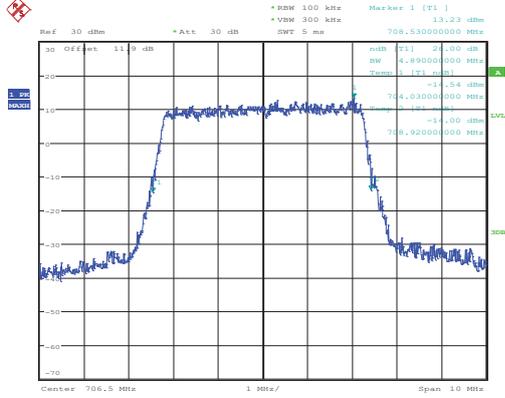
Date: 27.SEP.2014 11:01:48
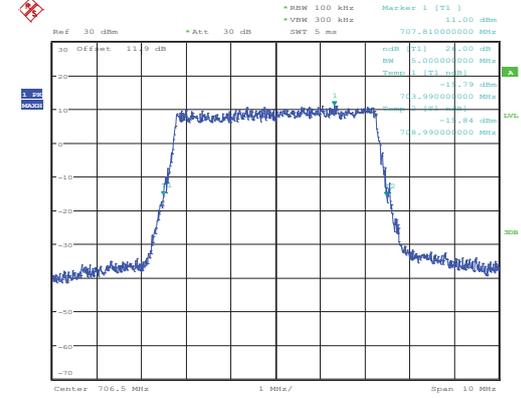
Date: 27.SEP.2014 11:02:04

Middle Channel / 5MHz / QPSK	Middle Channel / 5MHz / 16QAM
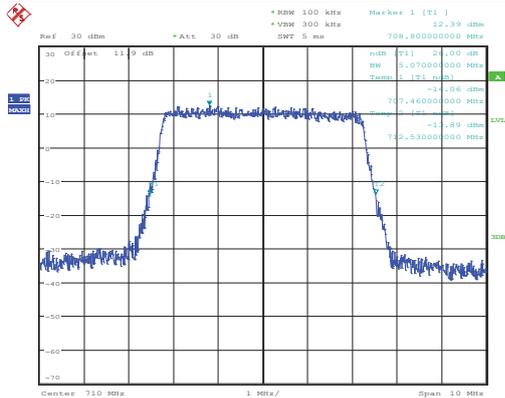
Date: 27.SEP.2014 11:07:28
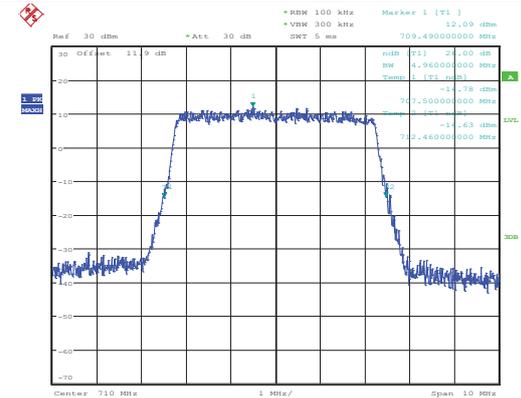
Date: 27.SEP.2014 11:07:44

Highest Channel / 5MHz / QPSK	Highest Channel / 5MHz / 16QAM
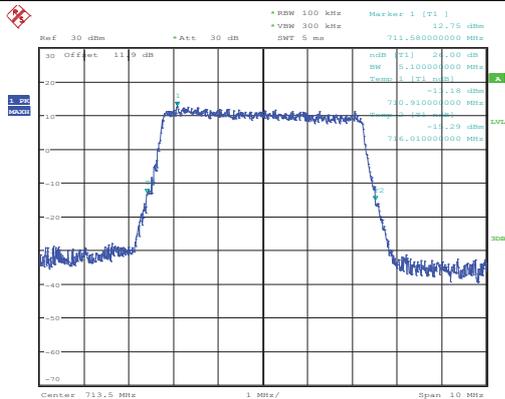
Date: 27.SEP.2014 11:10:08

Date: 27.SEP.2014 11:10:24

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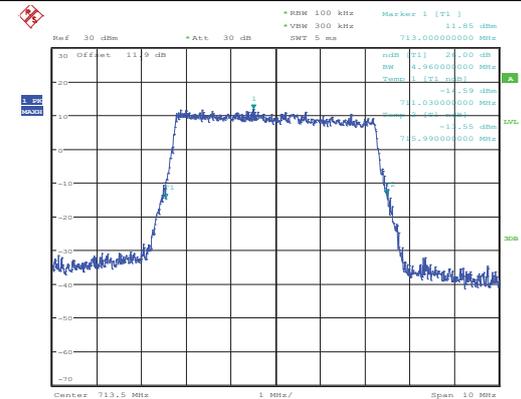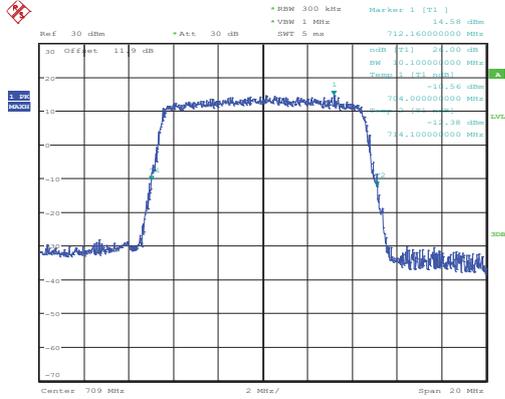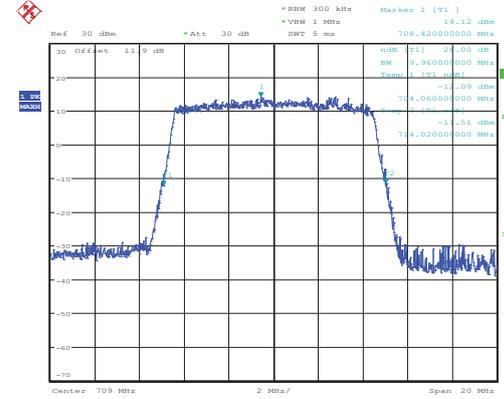
LTE Band 17	
Lowest Channel / 10MHz / QPSK	**Lowest Channel / 10MHz / 16QAM**
Date: 27.SEP.2014 11:15:52	Date: 27.SEP.2014 11:16:08
Middle Channel / 10MHz / QPSK	**Middle Channel / 10MHz / 16QAM**
Date: 27.SEP.2014 11:21:32	Date: 27.SEP.2014 11:21:48
Highest Channel / 10MHz / QPSK	**Highest Channel / 10MHz / 16QAM**
Date: 27.SEP.2014 11:24:12	Date: 27.SEP.2014 11:24:28
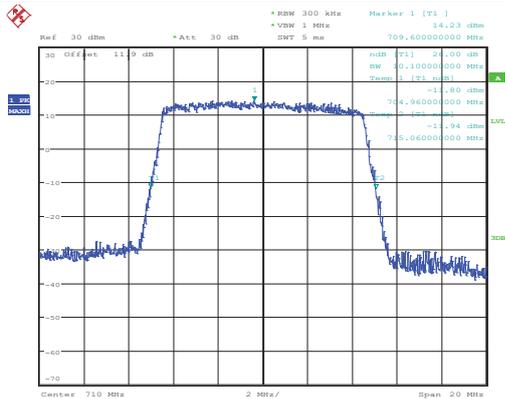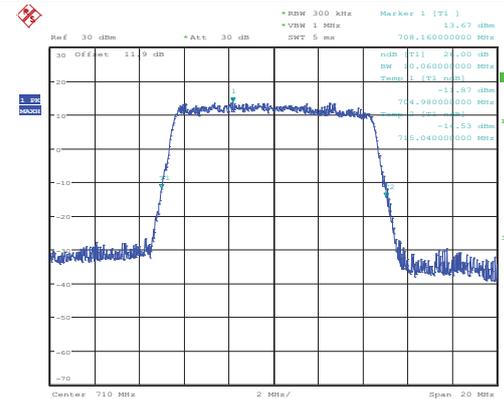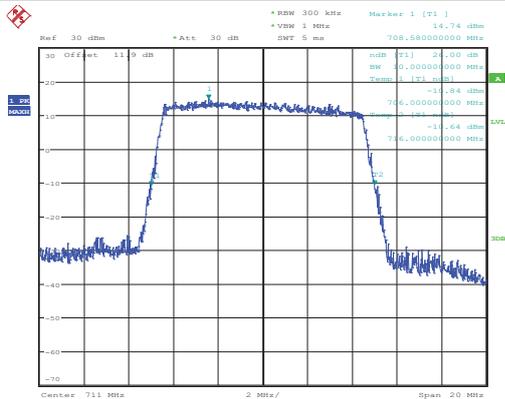
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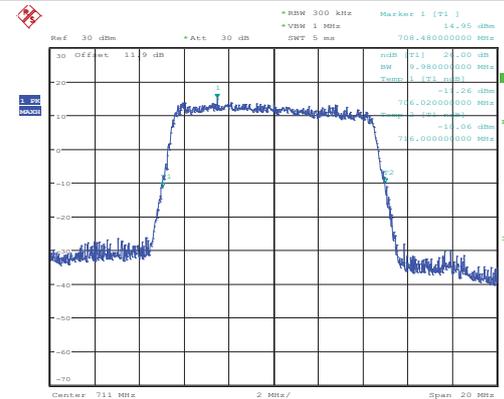
Occupied Bandwidth

Mode	LTE Band 2 : 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	1.1	1.1	2.73	2.72	4.49	4.49	9.1	9.04	13.44	13.47	18.52	18.52
Middle CH	1.1	1.1	2.73	2.72	4.49	4.5	9.04	9.02	13.44	13.44	18.36	18.36
Highest CH	1.1	1.1	2.72	2.73	4.49	4.49	9.04	9.02	13.41	13.41	18.4	18.4

Mode	LTE Band 25 : 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	-	-	-	-	-	-	-	-	-	-	-	-
Middle CH	-	-	-	-	-	-	-	-	-	-	-	-
Highest CH	1.1	1.1	2.74	2.72	4.51	4.49	9.1	9.06	13.44	13.44	18.36	18.32

Mode	LTE Band 4 : 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	1.09	1.1	2.72	2.72	4.49	4.49	9.06	9.04	13.44	13.41	18.4	18.4
Middle CH	1.1	1.11	2.74	2.74	4.51	4.49	9.1	9.06	13.47	13.47	18.56	18.52
Highest CH	1.1	1.1	2.73	2.72	4.5	4.49	9.08	9.04	13.5	13.5	18.56	18.52

Mode	LTE Band 5 : 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	1.11	1.11	2.72	2.72	4.5	4.49	9.08	9.04	-	-	-	-
Middle CH	1.1	1.1	2.72	2.72	4.49	4.5	9.04	8.98	-	-	-	-
Highest CH	1.1	1.1	2.72	2.73	4.5	4.49	9.06	9.04	-	-	-	-

Mode	LTE Band 13 : 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	-	-	-	-	4.51	4.51	-	-	-	-	-	-
Middle CH	-	-	-	-	4.51	4.51	9.12	9.1	-	-	-	-
Highest CH	-	-	-	-	4.5	4.5	-	-	-	-	-	-

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Mode	LTE Band 17 : 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	-	-	-	-	4.51	4.48	9	8.98	-	-	-	-
Middle CH	-	-	-	-	4.49	4.49	9.02	8.98	-	-	-	-
Highest CH	-	-	-	-	4.5	4.5	9.02	9	-	-	-	-

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LTE Band 2
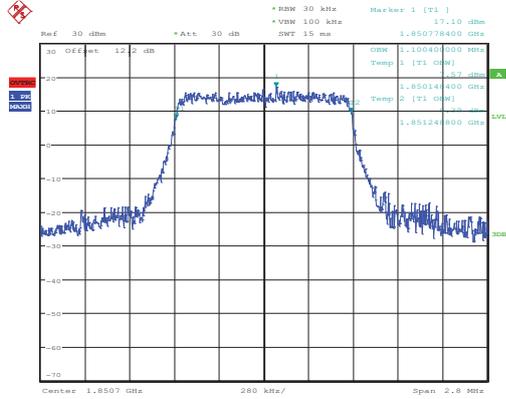
Lowest Channel / 1.4MHz / QPSK	Lowest Channel / 1.4MHz / 16QAM
 Date: 27.SEP.2014 07:00:11	 Date: 27.SEP.2014 07:00:25
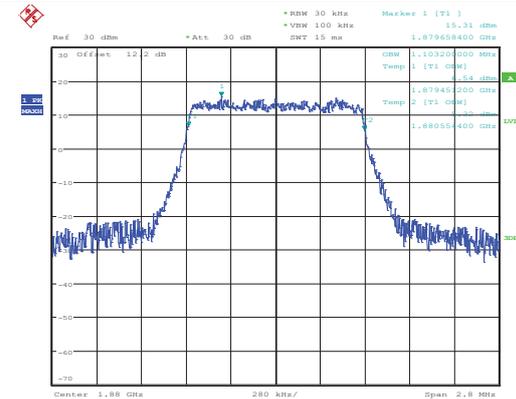
Middle Channel / 1.4MHz / QPSK	Middle Channel / 1.4MHz / 16QAM
 Date: 27.SEP.2014 07:05:59	 Date: 27.SEP.2014 07:06:13

Highest Channel / 1.4MHz / QPSK	Highest Channel / 1.4MHz / 16QAM
 Date: 27.SEP.2014 07:08:49	 Date: 27.SEP.2014 07:09:03

LTE Band 2	
Lowest Channel / 3MHz / QPSK	**Lowest Channel / 3MHz / 16QAM**

Date: 27.SEP.2014 07:14:42

Date: 27.SEP.2014 07:14:56

Middle Channel / 3MHz / QPSK	**Middle Channel / 3MHz / 16QAM**
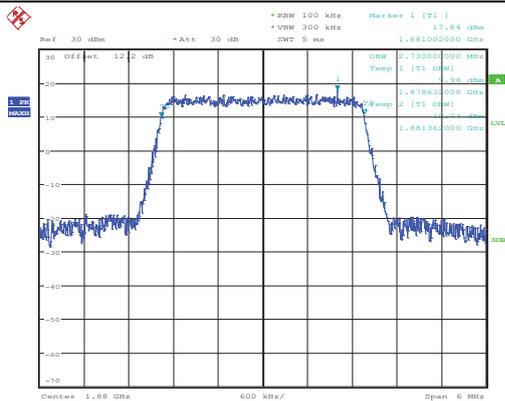
Date: 27.SEP.2014 07:20:30
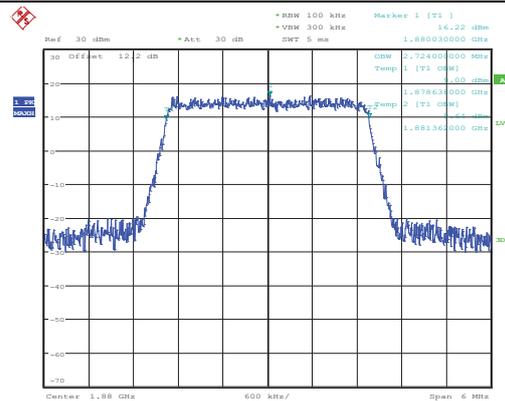
Date: 27.SEP.2014 07:20:44

Highest Channel / 3MHz / QPSK	**Highest Channel / 3MHz / 16QAM**
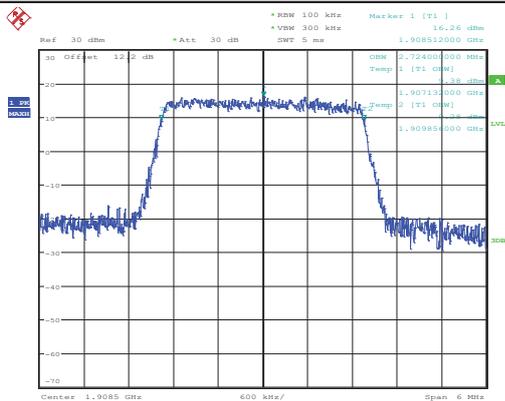
Date: 27.SEP.2014 07:23:18

Date: 27.SEP.2014 07:23:32

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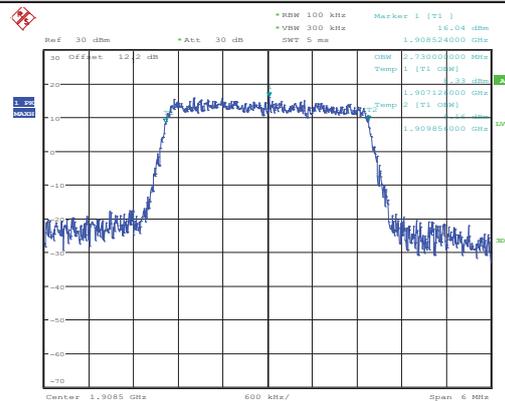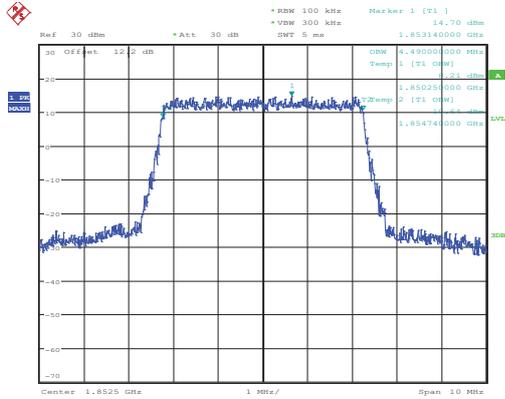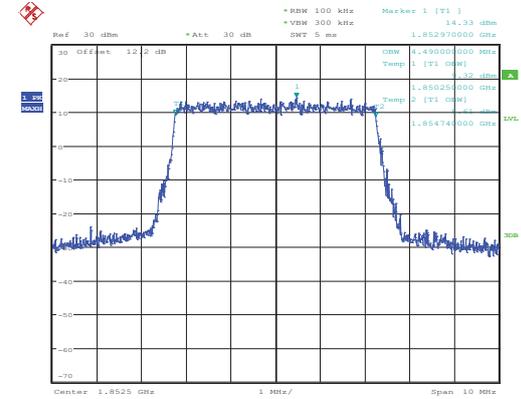
LTE Band 2	
Lowest Channel / 5MHz / QPSK	**Lowest Channel / 5MHz / 16QAM**
Date: 27.SEP.2014 07:29:11	Date: 27.SEP.2014 07:29:25
Middle Channel / 5MHz / QPSK	**Middle Channel / 5MHz / 16QAM**
Date: 27.SEP.2014 07:34:59	Date: 27.SEP.2014 07:35:14
Highest Channel / 5MHz / QPSK	**Highest Channel / 5MHz / 16QAM**
Date: 27.SEP.2014 07:37:48	Date: 27.SEP.2014 07:38:02
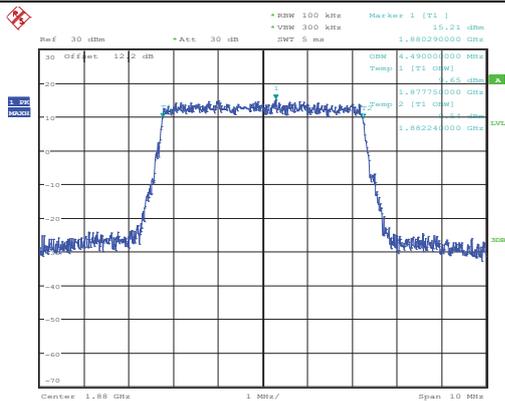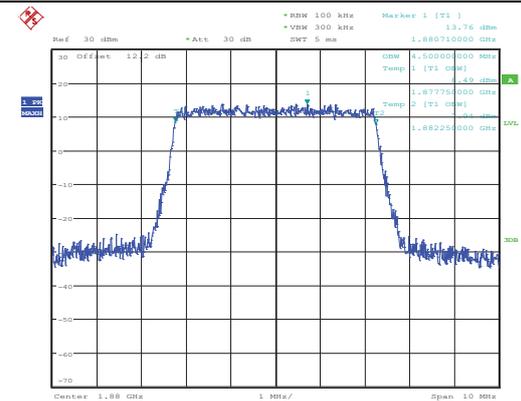
SPORTON INTERNATIONAL INC.
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LTE Band 2

Lowest Channel / 10MHz / QPSK	Lowest Channel / 10MHz / 16QAM

Date: 27.SEP.2014 08:02:33

Date: 27.SEP.2014 08:02:47

Middle Channel / 10MHz / QPSK	Middle Channel / 10MHz / 16QAM

Date: 27.SEP.2014 08:08:21

Date: 27.SEP.2014 08:08:35

Highest Channel / 10MHz / QPSK	Highest Channel / 10MHz / 16QAM

Date: 27.SEP.2014 08:11:09

Date: 27.SEP.2014 08:11:23

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LTE Band 2

Lowest Channel / 15MHz / QPSK	Lowest Channel / 15MHz / 16QAM
Date: 27.SEP.2014 08:17:02	Date: 27.SEP.2014 08:17:16
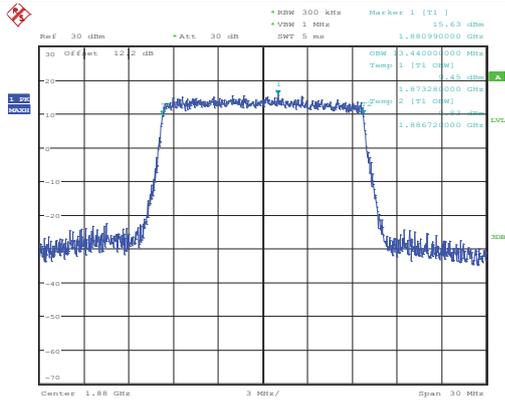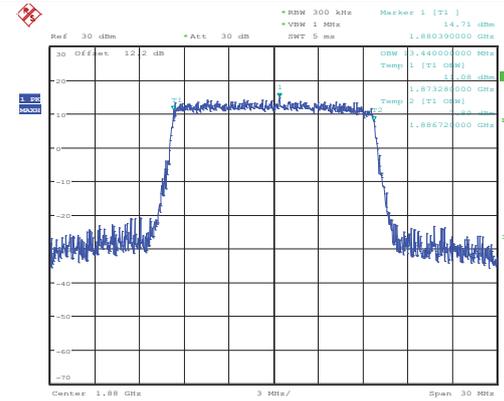
Middle Channel / 15MHz / QPSK	Middle Channel / 15MHz / 16QAM
Date: 27.SEP.2014 08:22:50	Date: 27.SEP.2014 08:23:04

Highest Channel / 15MHz / QPSK	Highest Channel / 15MHz / 16QAM
Date: 27.SEP.2014 08:25:38	Date: 27.SEP.2014 08:25:52
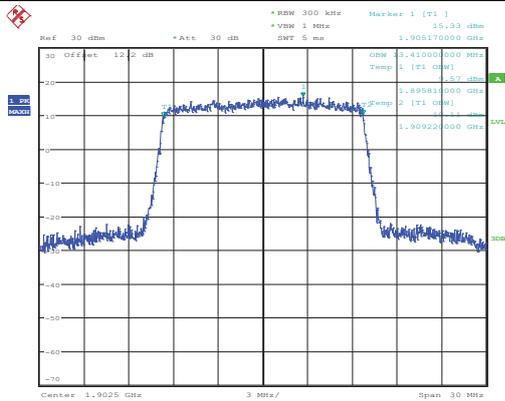
SPORTON INTERNATIONAL INC.
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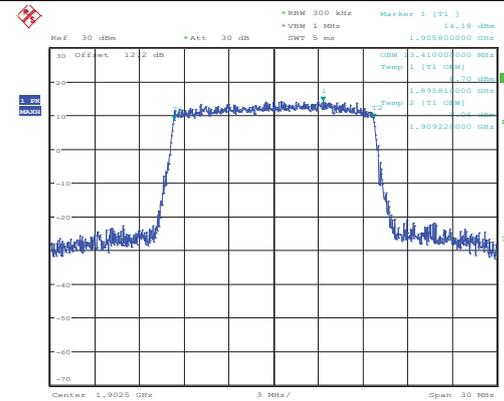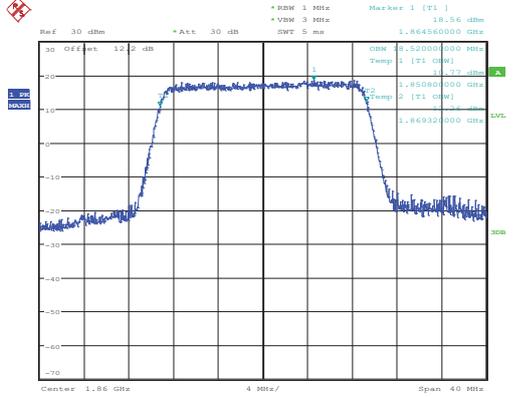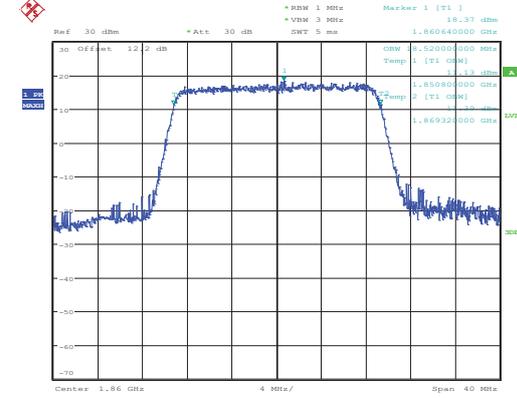
LTE Band 2	
Lowest Channel / 20MHz / QPSK	**Lowest Channel / 20MHz / 16QAM**
 Date: 27.SEP.2014 08:31:31	 Date: 27.SEP.2014 08:31:45
Middle Channel / 20MHz / QPSK	**Middle Channel / 20MHz / 16QAM**
 Date: 27.SEP.2014 08:37:18	 Date: 27.SEP.2014 08:37:32
Highest Channel / 20MHz / QPSK	**Highest Channel / 20MHz / 16QAM**
 Date: 27.SEP.2014 08:40:07	 Date: 27.SEP.2014 08:40:21
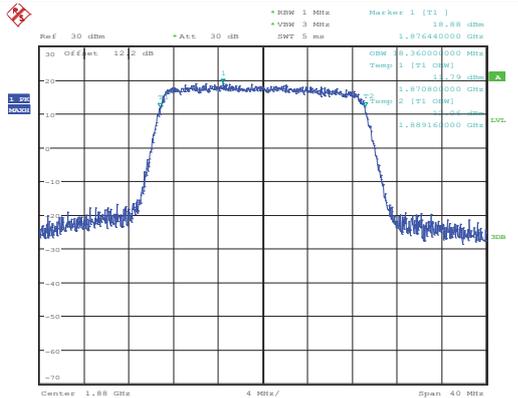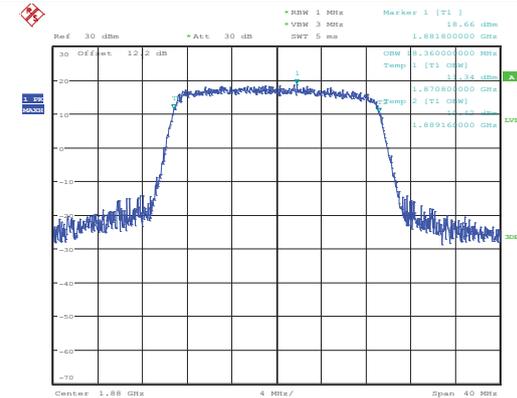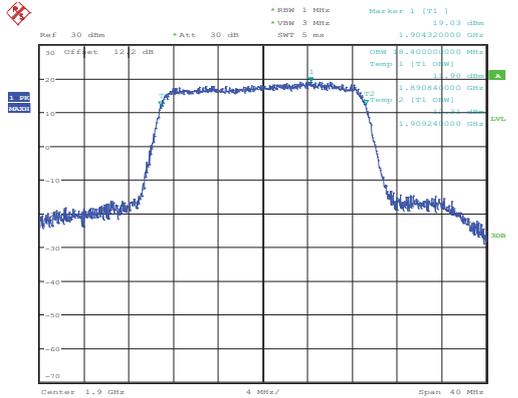
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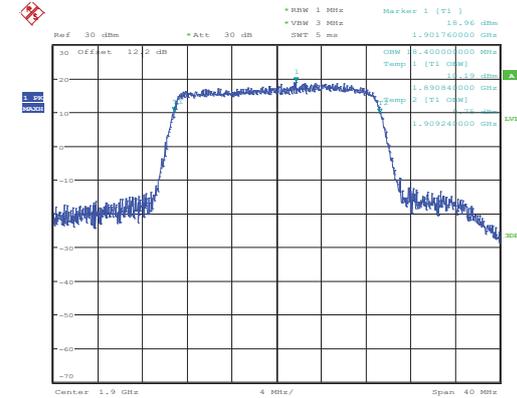
LTE Band 25	
Highest Channel / 1.4MHz / QPSK	**Highest Channel / 1.4MHz / 16QAM**
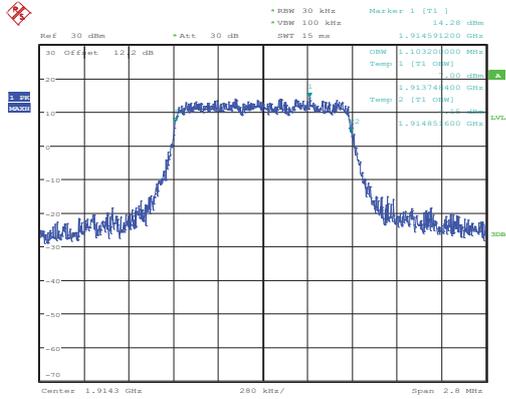
Date: 28.SEP.2014 09:49:47
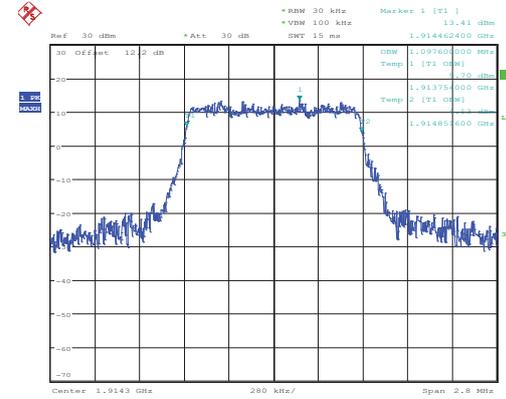
Date: 28.SEP.2014 09:50:01

Highest Channel / 3MHz / QPSK	**Highest Channel / 3MHz / 16QAM**
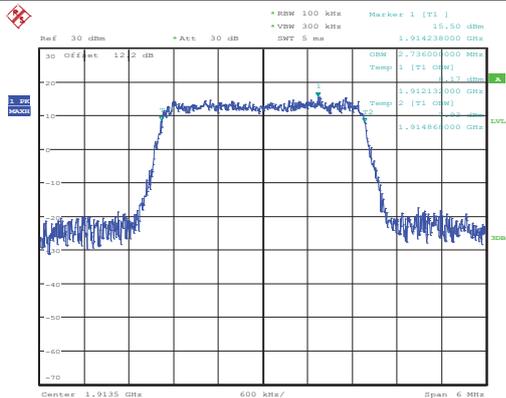
Date: 28.SEP.2014 09:55:46
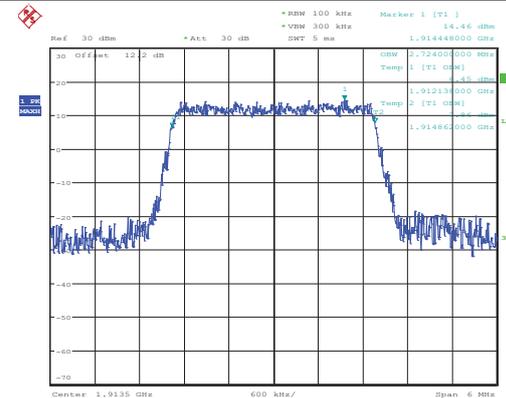
Date: 28.SEP.2014 09:56:00

Highest Channel / 5MHz / QPSK	**Highest Channel / 5MHz / 16QAM**
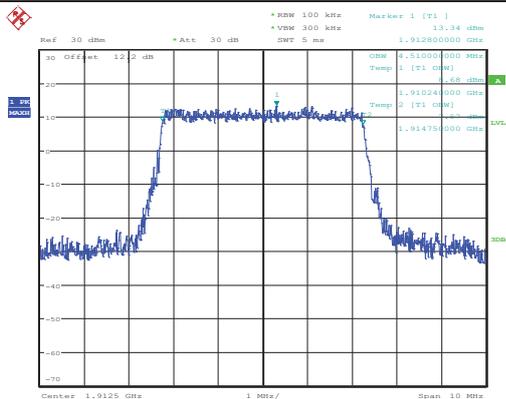
Date: 28.SEP.2014 10:01:43

Date: 28.SEP.2014 10:01:57

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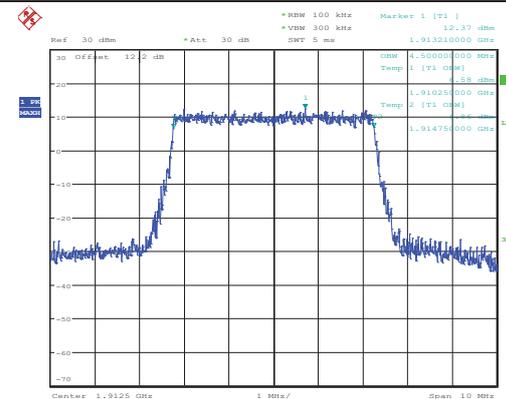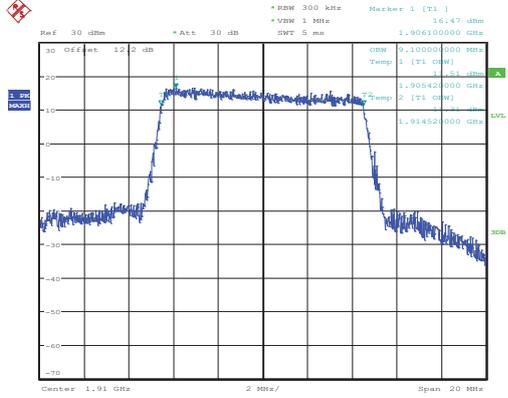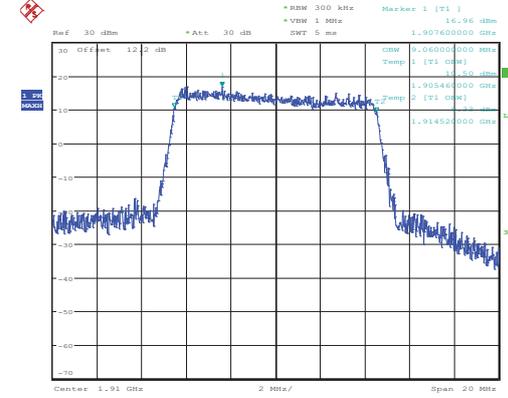
LTE Band 25	
Highest Channel / 10MHz / QPSK	**Highest Channel / 10MHz / 16QAM**
Date: 28.SEP.2014 10:07:41	Date: 28.SEP.2014 10:07:55
Highest Channel / 15MHz / QPSK	**Highest Channel / 15MHz / 16QAM**
Date: 28.SEP.2014 10:13:43	Date: 28.SEP.2014 10:13:57
Highest Channel / 20MHz / QPSK	**Highest Channel / 20MHz / 16QAM**
Date: 28.SEP.2014 10:19:55	Date: 28.SEP.2014 10:19:41
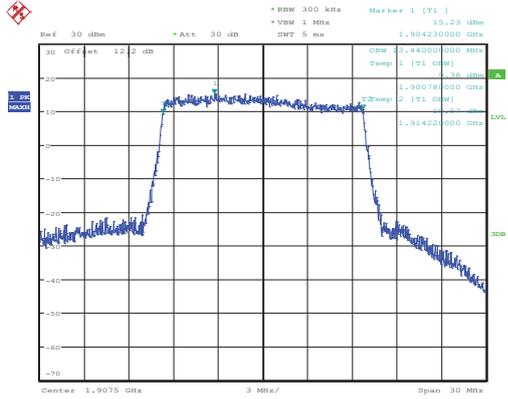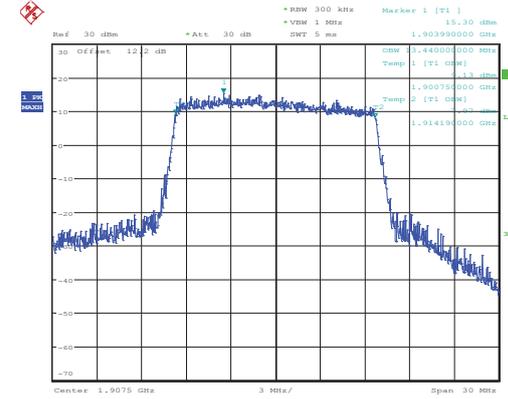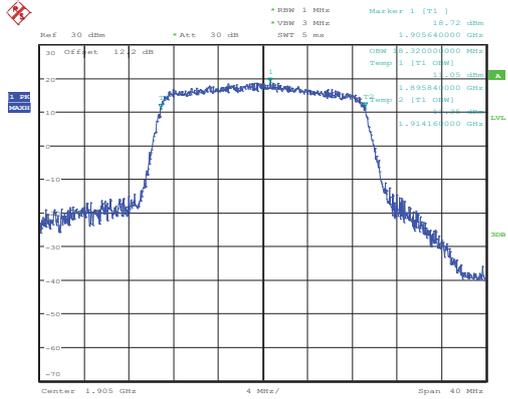
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TEL : 886-3-327-3456
FAX : 886-3-328-4978
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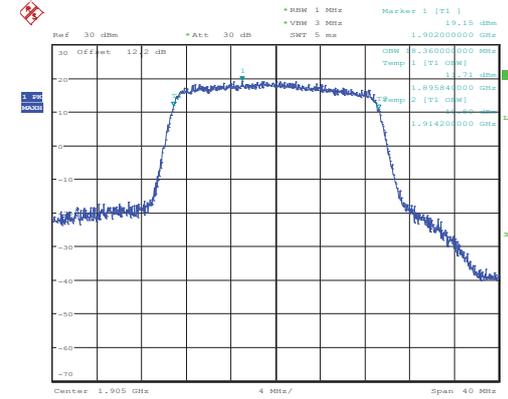
LTE Band 4	
Lowest Channel / 1.4MHz / QPSK	**Lowest Channel / 1.4MHz / 16QAM**
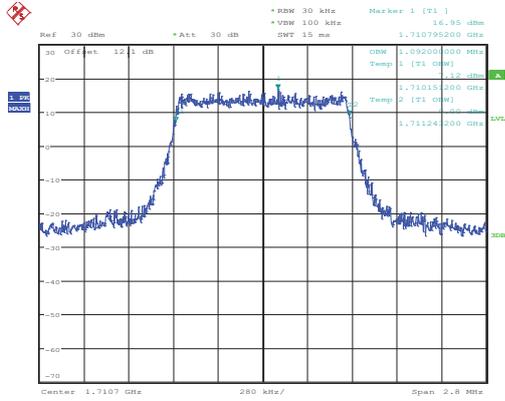
Date: 28.SEP.2014 09:32:42
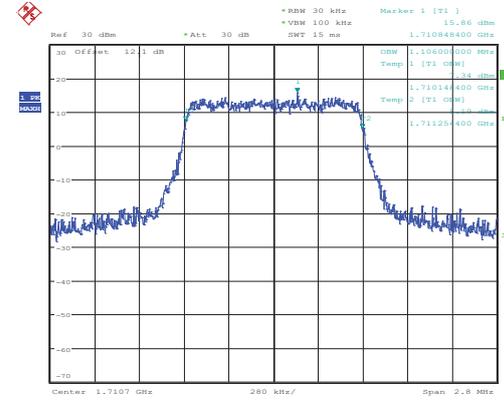
Date: 28.SEP.2014 09:32:57

Middle Channel / 1.4MHz / QPSK	**Middle Channel / 1.4MHz / 16QAM**
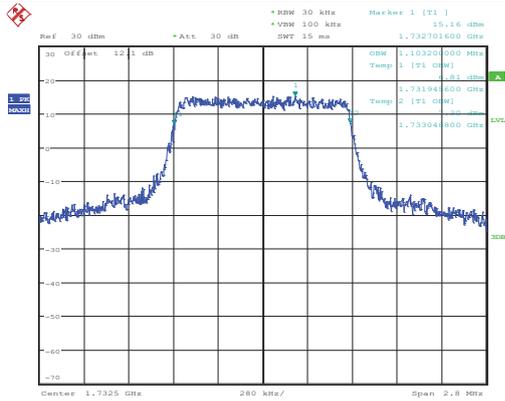
Date: 28.SEP.2014 09:38:34
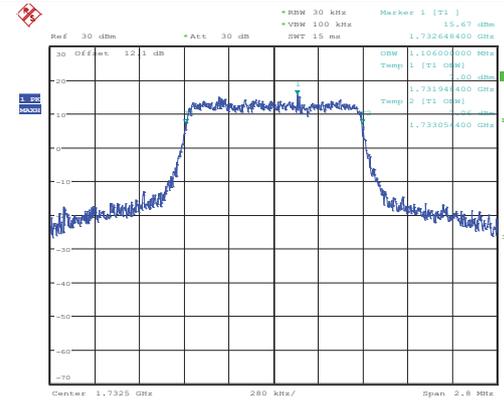
Date: 28.SEP.2014 09:38:48

Highest Channel / 1.4MHz / QPSK	**Highest Channel / 1.4MHz / 16QAM**

Date: 28.SEP.2014 09:41:23

Date: 28.SEP.2014 09:41:38

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LTE Band 4

Lowest Channel / 3MHz / QPSK	Lowest Channel / 3MHz / 16QAM

Date: 28.SEP.2014 11:27:33

Date: 28.SEP.2014 11:27:47

Middle Channel / 3MHz / QPSK	Middle Channel / 3MHz / 16QAM

Date: 28.SEP.2014 11:33:20

Date: 28.SEP.2014 11:33:35

Highest Channel / 3MHz / QPSK	Highest Channel / 3MHz / 16QAM

Date: 28.SEP.2014 11:36:08

Date: 28.SEP.2014 11:36:23

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LTE Band 4

Lowest Channel / 5MHz / QPSK	Lowest Channel / 5MHz / 16QAM

Date: 27.SEP.2014 08:51:28

Date: 27.SEP.2014 08:51:42

Middle Channel / 5MHz / QPSK	Middle Channel / 5MHz / 16QAM
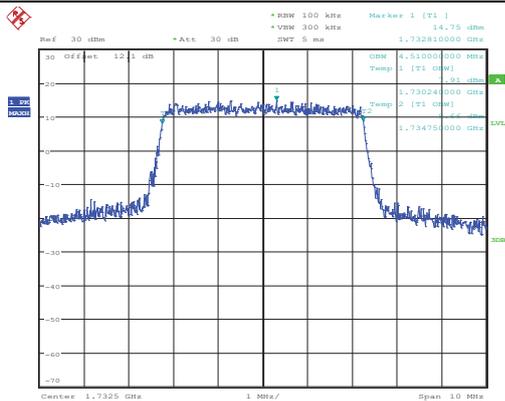
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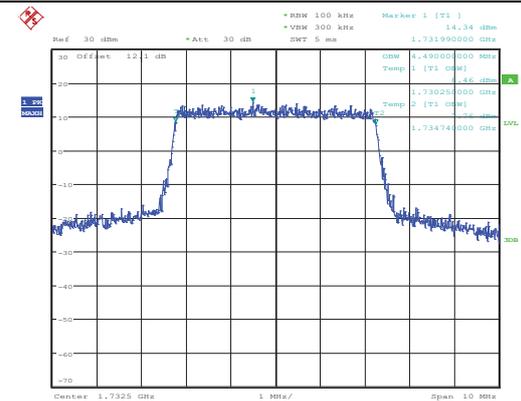
Date: 27.SEP.2014 08:57:29

Highest Channel / 5MHz / QPSK	Highest Channel / 5MHz / 16QAM
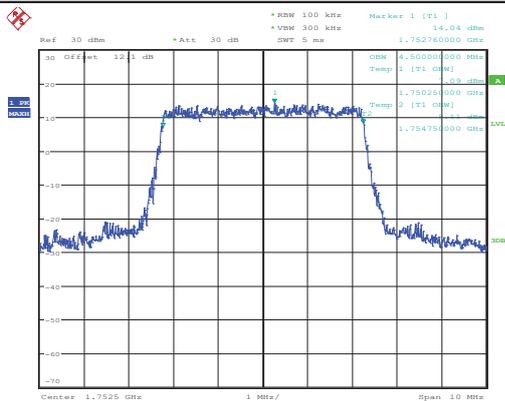
Date: 27.SEP.2014 09:00:02

Date: 27.SEP.2014 09:00:16

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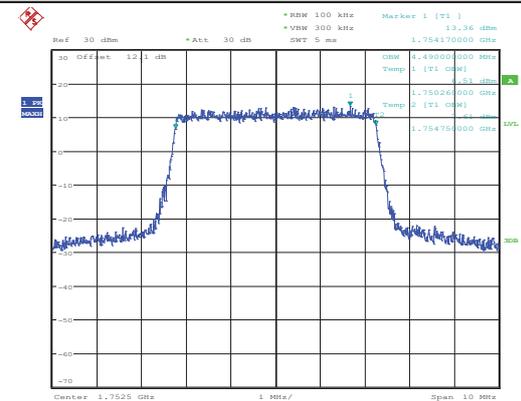
LTE Band 4

Lowest Channel / 10MHz / QPSK	Lowest Channel / 10MHz / 16QAM
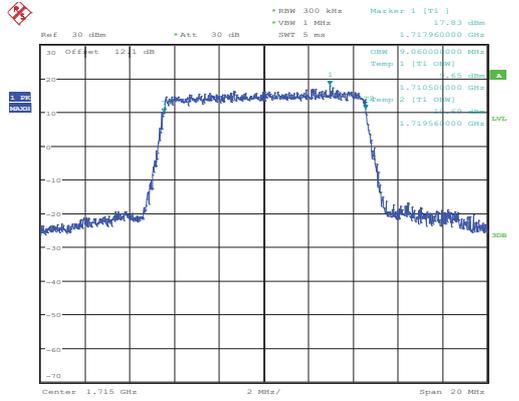
Date: 27.SEP.2014 09:05:54
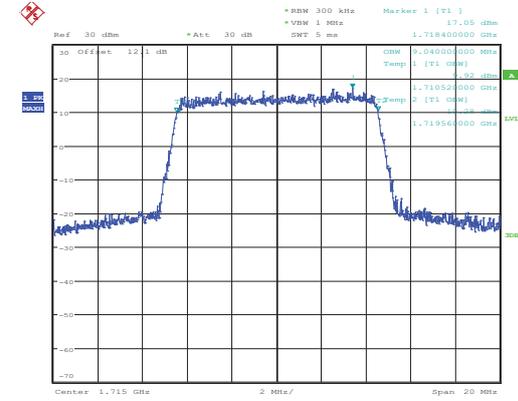
Date: 27.SEP.2014 09:06:08

Middle Channel / 10MHz / QPSK	Middle Channel / 10MHz / 16QAM
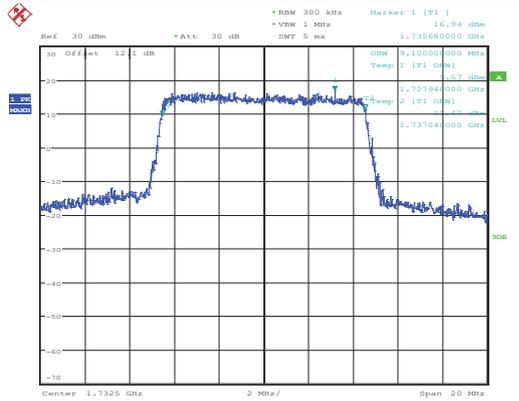
Date: 27.SEP.2014 09:11:41
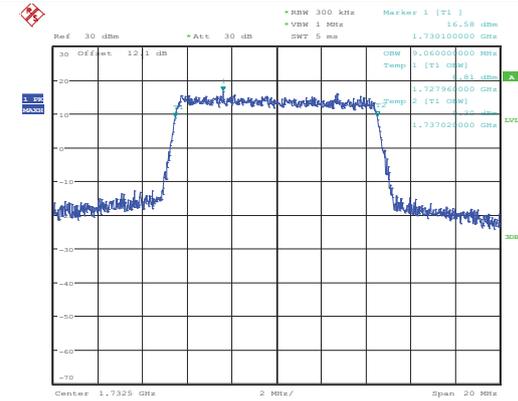
Date: 27.SEP.2014 09:11:55

Highest Channel / 10MHz / QPSK	Highest Channel / 10MHz / 16QAM
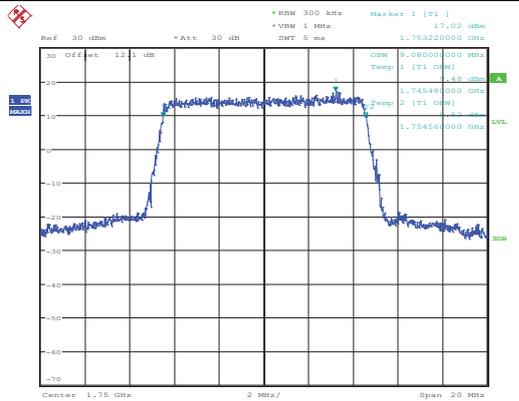
Date: 27.SEP.2014 09:14:28

Date: 27.SEP.2014 09:14:42

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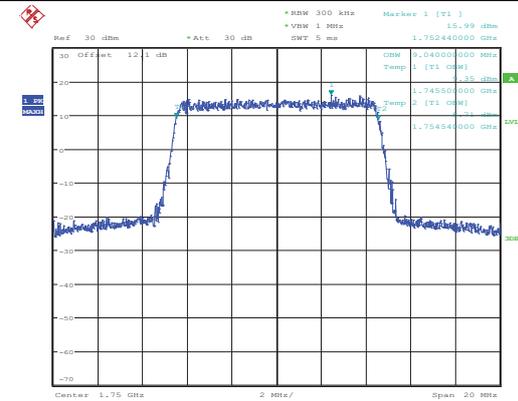
LTE Band 4	
Lowest Channel / 15MHz / QPSK	**Lowest Channel / 15MHz / 16QAM**
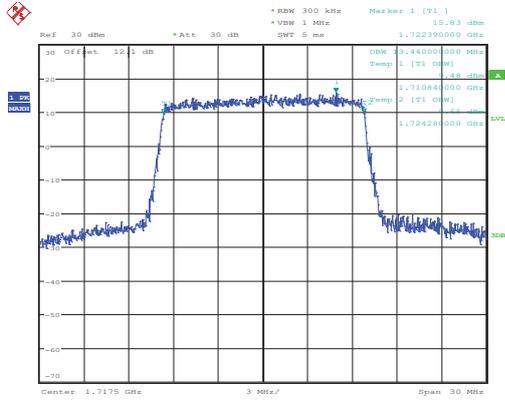
Date: 27.SEP.2014 09:20:19 |
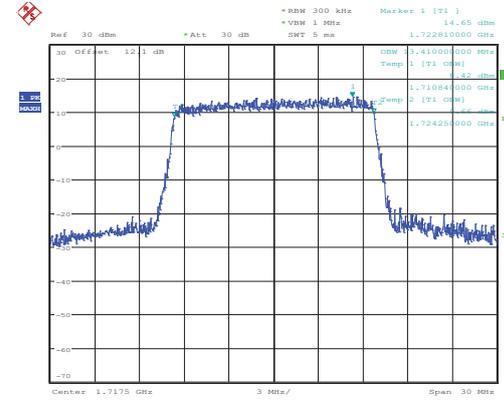
Date: 27.SEP.2014 09:20:33 |
| **Middle Channel / 15MHz / QPSK** | **Middle Channel / 15MHz / 16QAM** |
|
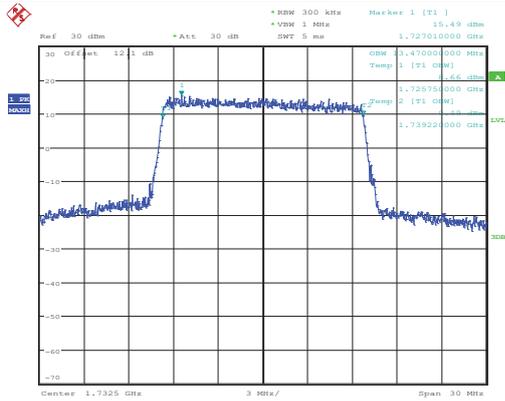
Date: 27.SEP.2014 09:26:06 |
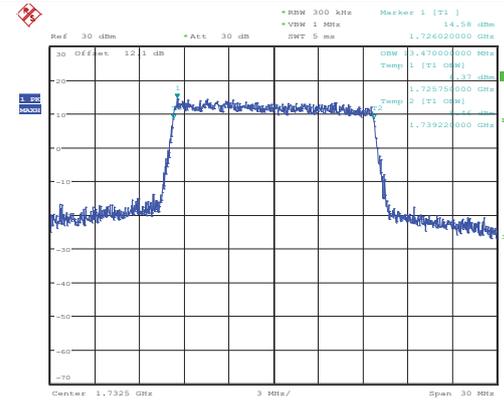
Date: 27.SEP.2014 09:26:20 |
| **Highest Channel / 15MHz / QPSK** | **Highest Channel / 15MHz / 16QAM** |
|
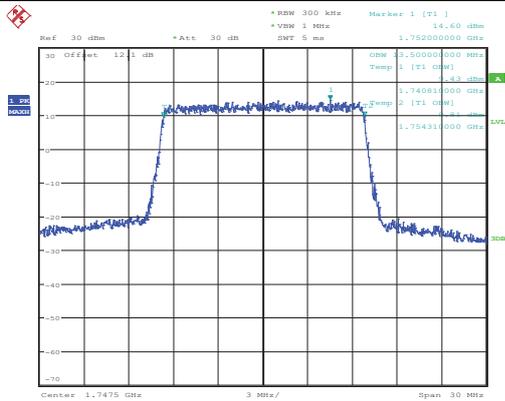
Date: 27.SEP.2014 09:28:53 |

Date: 27.SEP.2014 09:29:07 |

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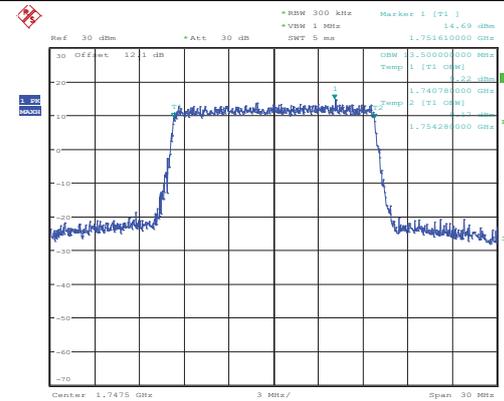
LTE Band 4	
Lowest Channel / 20MHz / QPSK	**Lowest Channel / 20MHz / 16QAM**
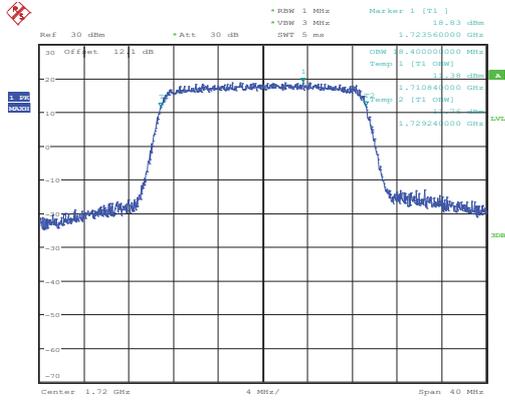
Date: 27.SEP.2014 09:34:44
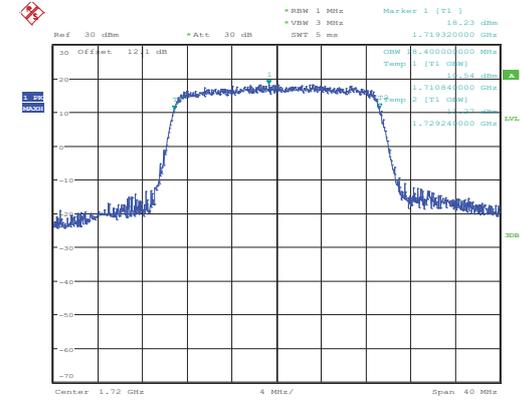
Date: 27.SEP.2014 09:34:58

Middle Channel / 20MHz / QPSK	**Middle Channel / 20MHz / 16QAM**
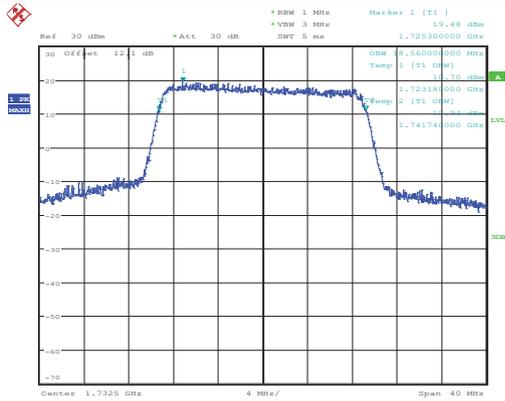
Date: 27.SEP.2014 09:40:31
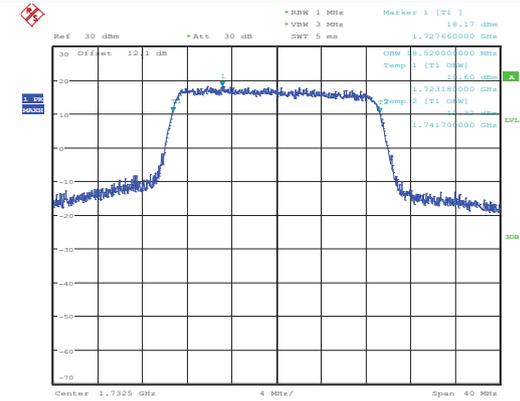
Date: 27.SEP.2014 09:40:45

Highest Channel / 20MHz / QPSK	**Highest Channel / 20MHz / 16QAM**
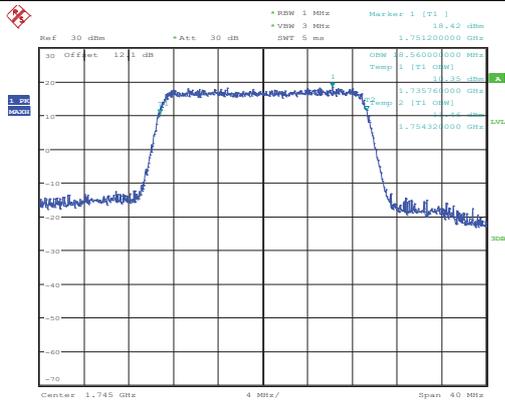
Date: 27.SEP.2014 09:43:18
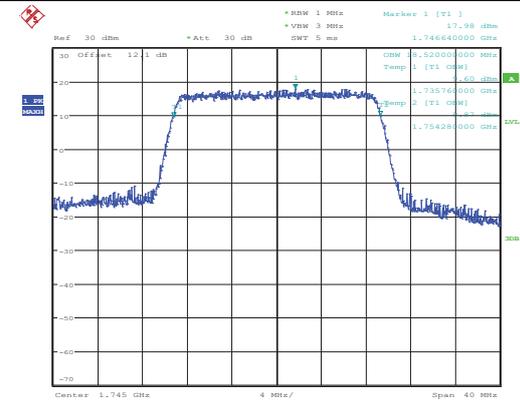
Date: 27.SEP.2014 09:43:32
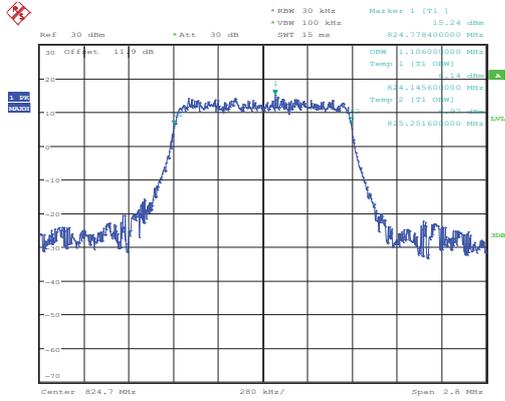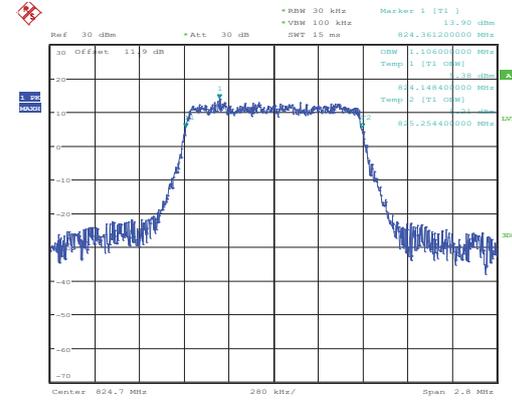
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LTE Band 5

Lowest Channel / 1.4MHz / QPSK	Lowest Channel / 1.4MHz / 16QAM

Date: 27.SEP.2014 10:00:42

Date: 27.SEP.2014 10:00:56

Middle Channel / 1.4MHz / QPSK	Middle Channel / 1.4MHz / 16QAM

Date: 27.SEP.2014 10:06:22

Date: 27.SEP.2014 10:06:36

Highest Channel / 1.4MHz / QPSK	Highest Channel / 1.4MHz / 16QAM

Date: 27.SEP.2014 10:09:02

Date: 27.SEP.2014 10:09:16

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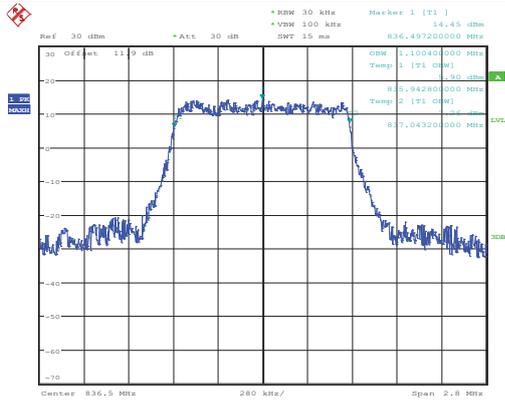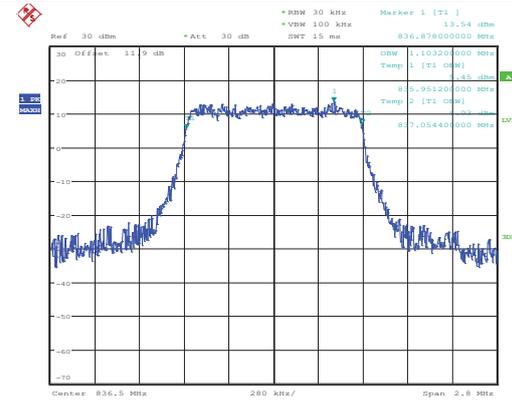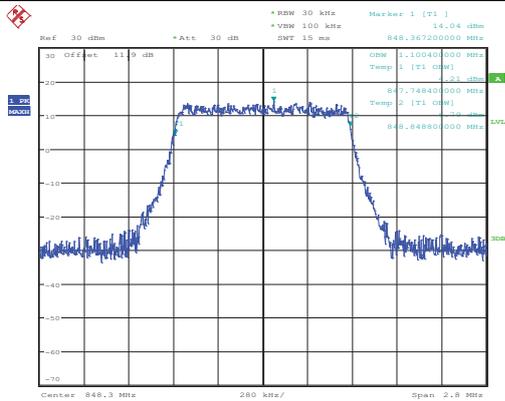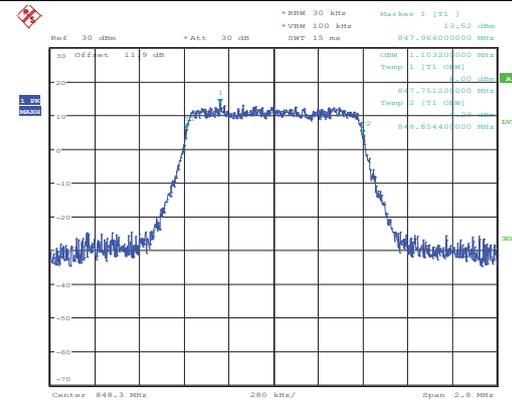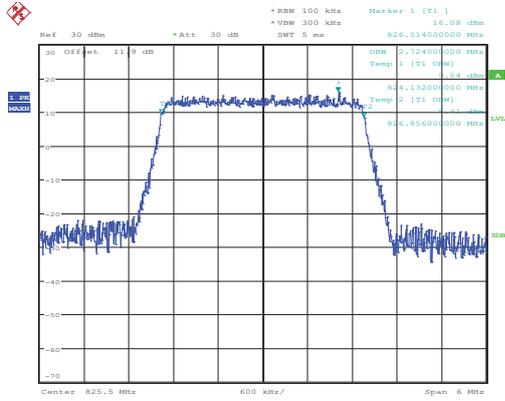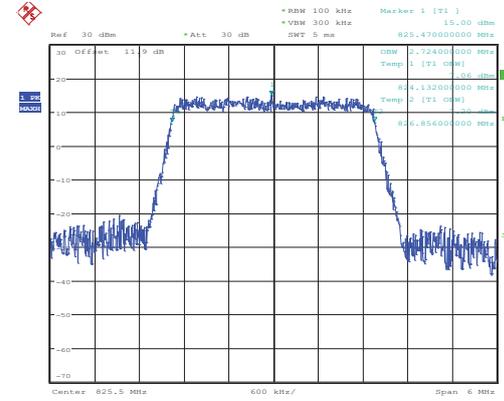
LTE Band 5	
Lowest Channel / 3MHz / QPSK	**Lowest Channel / 3MHz / 16QAM**
Date: 27.SEP.2014 10:14:46	Date: 27.SEP.2014 10:15:00
Middle Channel / 3MHz / QPSK	**Middle Channel / 3MHz / 16QAM**
Date: 27.SEP.2014 10:20:25	Date: 27.SEP.2014 10:20:39
Highest Channel / 3MHz / QPSK	**Highest Channel / 3MHz / 16QAM**
Date: 27.SEP.2014 10:23:05	Date: 27.SEP.2014 10:23:19
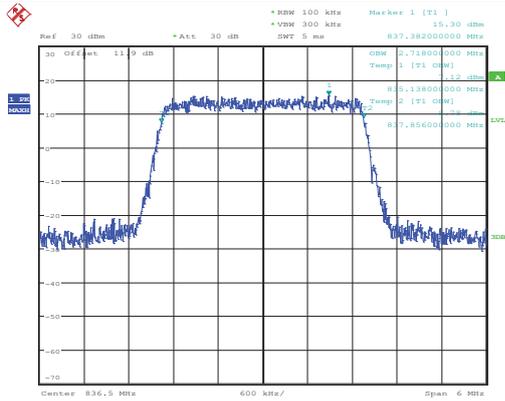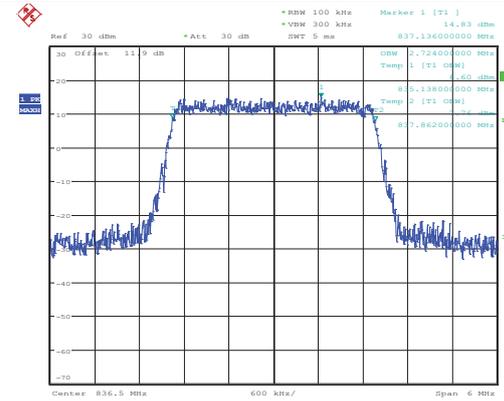
SPORTON INTERNATIONAL INC.

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LTE Band 5	
Lowest Channel / 5MHz / QPSK	**Lowest Channel / 5MHz / 16QAM**
Date: 27.SEP.2014 10:28:48	Date: 27.SEP.2014 10:29:02
Middle Channel / 5MHz / QPSK	**Middle Channel / 5MHz / 16QAM**
Date: 27.SEP.2014 10:34:27	Date: 27.SEP.2014 10:34:41
Highest Channel / 5MHz / QPSK	**Highest Channel / 5MHz / 16QAM**
Date: 27.SEP.2014 10:37:07	Date: 27.SEP.2014 10:37:21

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Lowest Channel / 10MHz / QPSK	**Lowest Channel / 10MHz / 16QAM**
Date: 27.SEP.2014 10:42:50	Date: 27.SEP.2014 10:43:05
Middle Channel / 10MHz / QPSK	**Middle Channel / 10MHz / 16QAM**
Date: 27.SEP.2014 10:48:30	Date: 27.SEP.2014 10:48:44
Highest Channel / 10MHz / QPSK	**Highest Channel / 10MHz / 16QAM**
Date: 27.SEP.2014 10:51:09	Date: 27.SEP.2014 10:51:23

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LTE Band 13

Lowest Channel / 5MHz / QPSK	Lowest Channel / 5MHz / 16QAM
Date: 27.SEP.2014 11:38:19	Date: 27.SEP.2014 11:38:34
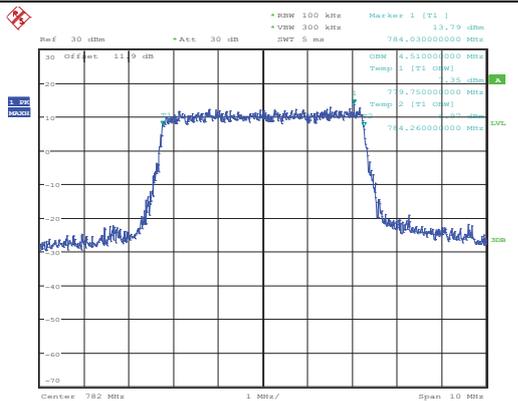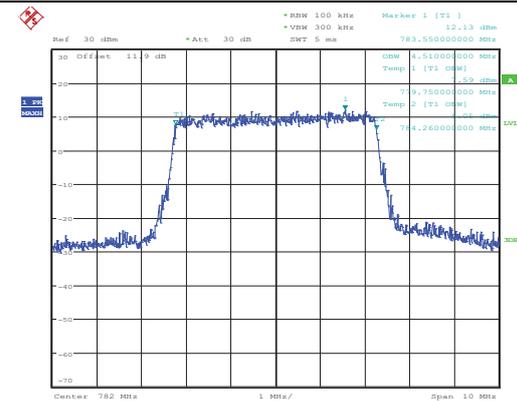
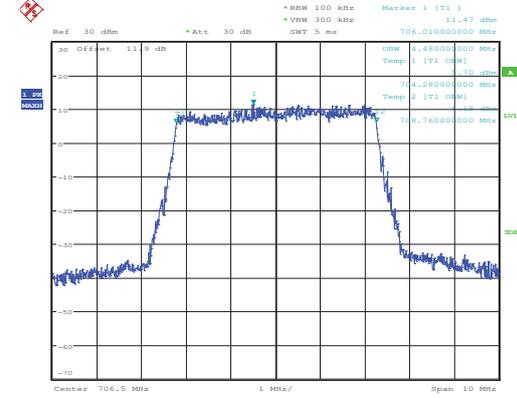| Middle Channel / 5MHz / QPSK	Middle Channel / 5MHz / 16QAM
Date: 27.SEP.2014 11:39:20	Date: 27.SEP.2014 11:39:34

Highest Channel / 5MHz / QPSK	Highest Channel / 5MHz / 16QAM
Date: 27.SEP.2014 11:40:20	Date: 27.SEP.2014 11:40:34
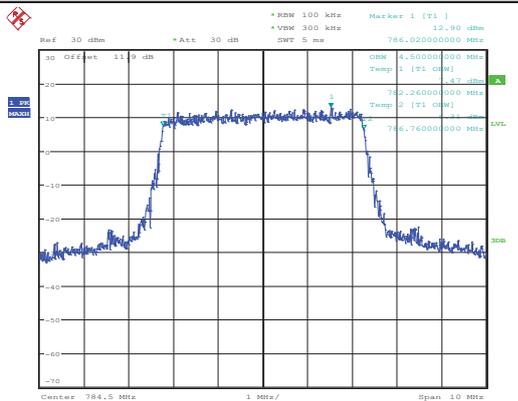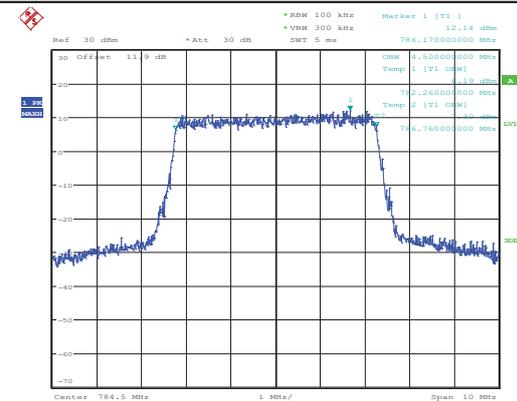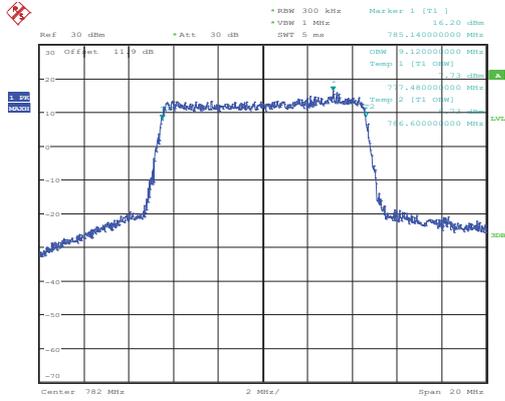
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LTE Band 13

Middle Channel / 10MHz / QPSK	Middle Channel / 10MHz / 16QAM

Date: 27.SEP.2014 11:41:25

Date: 27.SEP.2014 11:41:39

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LTE Band 17

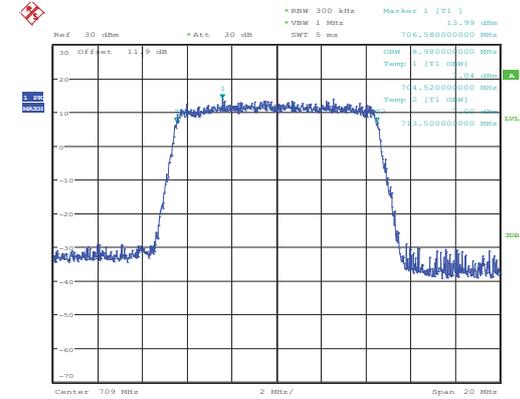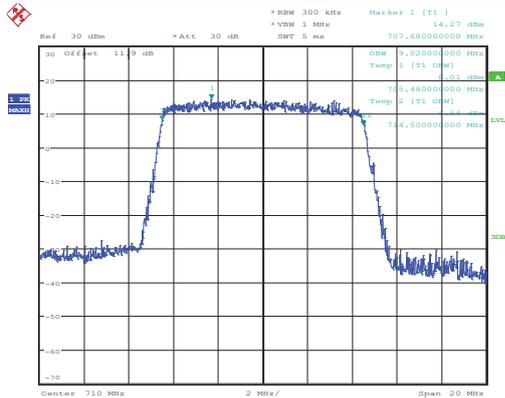## Lowest Channel / 5MHz / QPSK

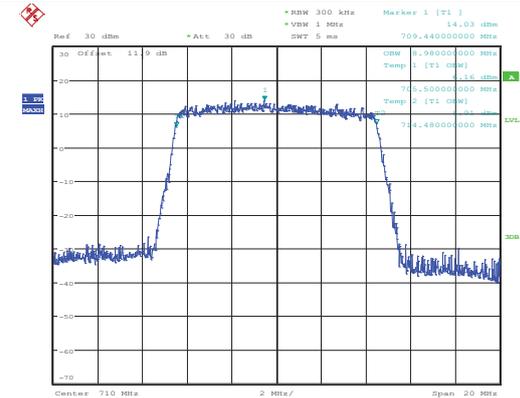Date: 27.SEP.2014 11:01:17

Lowest Channel / 5MHz / 16QAM

Date: 27.SEP.2014 11:01:31

Middle Channel / 5MHz / QPSK

Date: 27.SEP.2014 11:06:57
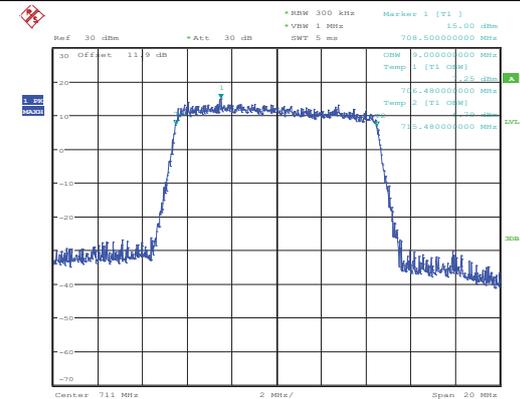
Middle Channel / 5MHz / 16QAM

Date: 27.SEP.2014 11:07:11

Highest Channel / 5MHz / QPSK

Date: 27.SEP.2014 11:09:38

Highest Channel / 5MHz / 16QAM

Date: 27.SEP.2014 11:09:52

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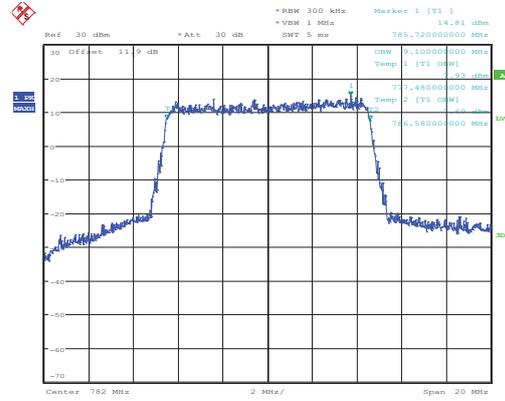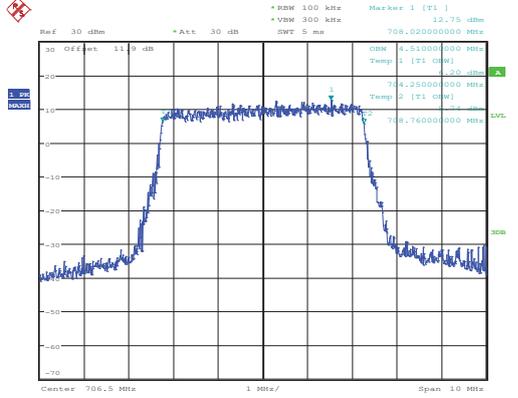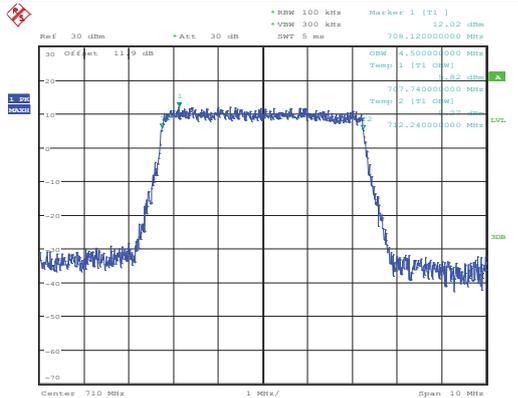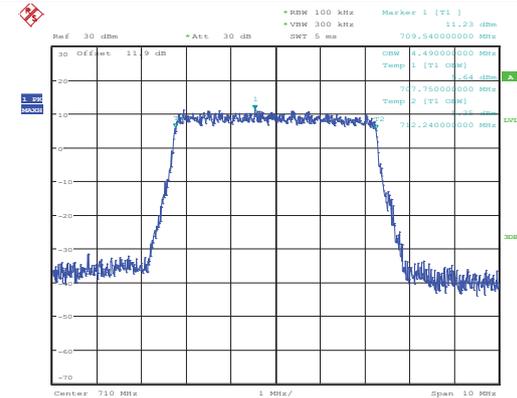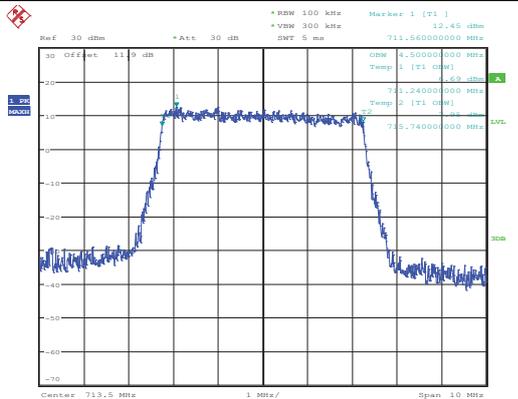
LTE Band 17

Lowest Channel / 10MHz / QPSK	Lowest Channel / 10MHz / 16QAM
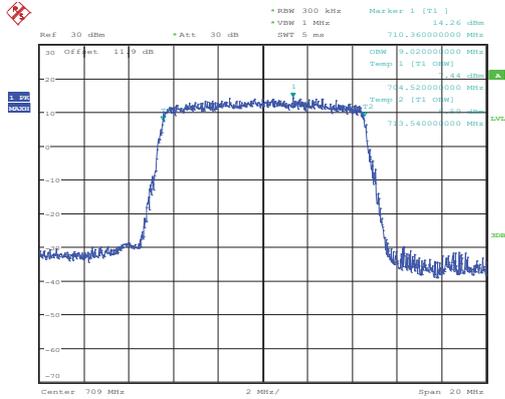
Date: 27.SEP.2014 11:15:22

Date: 27.SEP.2014 11:15:36

Middle Channel / 10MHz / QPSK	Middle Channel / 10MHz / 16QAM

Date: 27.SEP.2014 11:21:02

Date: 27.SEP.2014 11:21:16

Highest Channel / 10MHz / QPSK	Highest Channel / 10MHz / 16QAM

Date: 27.SEP.2014 11:23:41

Date: 27.SEP.2014 11:23:56

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