EMC Test Report

Project Number: 3807621

Report Number: 3807621EMC01 **Revision Level:** 2

Client: Continental Automotive Systems, Inc.

Equipment Under Test: Wireless Modem Module

Model: FAN

FCC Rule Parts: Part 2, Part 27, Part 22H, Part 24E

Industry Canada: RSS-GEN, Issue 4

RSS-130, Issue 1

RSS-132, Issue 3

RSS-133, Issue 6

RSS-139, Issue 3

Report issued on: 25 September 2015

Test Result: Compliant

Tested by: _____
Jeremy O. Pickens, Senior EMC Engineer

Reviewed by: _____
David Schramm, EMC/RF/SAR/HAC Manager

Remarks:
This report details the results of the testing carried out on one sample, the results contained in this test report do not relate to other samples of the same product. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.

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1 Summary of Test Results

Reference Sections		Test Description	Test Limit	Test Condition	Test Result
FCC	IC				
2.1046	RSS-GEN (6.12)	Conducted Output Power	N/A	Conducted	Pass
24.232(d) 27.50(d)(5)	RSS-130 (4.4) RSS-132 (5.4) RSS-133 (6.4) RSS-139 (6.4)	Peak-to-Average Ratio	<13 dB		Pass
2.1049 22.917(a) 24.238(a)	RSS-GEN(6.6) RSS-133 (2.3) RSS-139(2.3)	Occupied Bandwidth	N/A		Reported
2.1051 22.917(a) 24.238(a) 27.53(c)(2) 27.53(h)	RSS-130 (4.6.1) RSS-132 (5.5) RSS-133 (6.5.1) RSS-139(6.5.1)	Band Edge / Conducted Spurious Emissions	< 43 +10log$_{10}$ ($P_{[Watts]}$) at band edge and for all out of band emissions		Pass
22.913(a)(2) 27.55(b)(10)	--	Effective Radiated Power	< 3 Watts max ERP	Radiated	Pass
--	RSS-130 (4.4)	Effective Radiated Power	< 5 Watts max ERP		Pass
24.232(c) 27.50(d)(4)	RSS-132 (5.4) RSS-133 (6.4) RSS-139 (6.4)	Effective Isotropic Radiated Power	< 1 Watts max EIRP		Pass
2.1053 22.917(a) 24.238(a) 27.53(c)(2) 27.53(h)	RSS-GEN (6.13) RSS-130 (4.6) RSS-132 (5.5) RSS-133 (6.5.1) RSS-139 (6.5.1)	Radiated Spurious Emissions	< 43 +10log$_{10}$ ($P_{[Watts]}$) at band edge and for all out of band emissions		Pass
2.1055 22.917(a) 24.238(a) 27.5(b) 27.5(h) 27.54	RSS-GEN (6.11) RSS-130 (4.3) RSS-132 (5.3) RSS-133 (6.3) RSS-139 (6.3)	Frequency Stability	<2.5 ppm		Pass

1.1 *Modifications Required to Compliance*

None

2 General Information

2.1 *Client Information*

Name:	Continental Automotive System, Inc.
Address:	21440 West Lake Cook Road
City, State, Zip, Country:	Deer Park, IL 60010, USA

2.2 *Test Laboratory*

Name:	SGS North America, Inc.
Address:	620 Old Peachtree Road NW, Suite 100
City, State, Zip, Country:	Suwanee, GA 30024, USA

2.3 *General Information of EUT*

Type of Product:	Wireless Modem Module
Model Number:	FAN
FCC ID:	LHJ-FAN
IC ID:	2807E-FAN
IMEI Number:	352598070013450
Rated Voltage:	10.2 – 13.8 Vdc,
Test Voltage:	12 Vdc,
Tx Frequency Range:	1850 - 1910 MHz (LTE Band 2) 1710 – 1755 MHz (LTE Band 4) 824 – 849 MHz (LTE Band 5) 704 – 716 MHz (LTE Band 17)
FCC Classification:	PCS Licensed Transmitter PCB
Type:	Pre Production
Sample Received Date:	28 July 2015
Dates of testing:	17 Aug - 31 Aug 2015

2.4 *Operating Modes and Conditions*

The EUT was exercised by connecting a CMW communications tester to the device. The CMW was used to control signaling and channel during testing.

3 RF Output Power

3.1 *Test Result*

Test Description	Basic Standards	Test Result
RF Output Power	FCC Part 2.1046 RSS-GEN (6.12)	Compliant

3.2 *Test Method*

The EUT was directly connected to a Radio Communication Tester (CMW 500) and a radio link was established. The output power of the EUT was set to maximum value by using the maximum power setting on the CMW. The output power was measured using the CMW internal measurement functions.

3.3 *Test Site*

SGS EMC Laboratory, Suwanee, GA

Environmental Conditions

Temperature:	24.2 °C
Relative Humidity:	44.6 %
Atmospheric Pressure:	97.8 kPa

3.4 *Test Equipment*

Test Date: 13 August 2015

Equipment	Model	Manufacturer	Asset Number	Cal Due Date
CMW500 WIDEBAND	CMW500	ROHDE & SCHWARZ	B094874	6-Dec-2015

- Based on manufacturer's specifications, the CMW-500 is on a 3 year calibration cycle.

3.5 *Test Data - LTE Band 2*

Max Power: 23.99dBm

UpLink Channel	UL Frequency (MHz)	BW (MHz)	# RB	Position	Measured Power (dBm)	Cable Loss (dB)	Conducted Power (dBm)
18607	1850.7	1.4	1	(RB_Pos:0)	23.33	0.53	23.86
18607	1850.7	1.4	1	(RB_Pos:5)	23.35	0.53	23.88
18607	1850.7	1.4	4	(RB_Pos:0)	23.46	0.53	23.99
18607	1850.7	1.4	4	(RB_Pos:2)	23.43	0.53	23.96
18607	1850.7	1.4	6	(RB_Pos:0)	23.38	0.53	23.91
18900	1880	1.4	1	(RB_Pos:0)	23.3	0.53	23.83
18900	1880	1.4	1	(RB_Pos:5)	23.32	0.53	23.85
18900	1880	1.4	4	(RB_Pos:0)	23.41	0.53	23.94
18900	1880	1.4	4	(RB_Pos:2)	23.36	0.53	23.89
18900	1880	1.4	6	(RB_Pos:0)	22.44	0.53	22.97
19193	1909.3	1.4	1	(RB_Pos:0)	22.9	0.54	23.44
19193	1909.3	1.4	1	(RB_Pos:5)	22.83	0.54	23.37
19193	1909.3	1.4	4	(RB_Pos:0)	22.9	0.54	23.44
19193	1909.3	1.4	4	(RB_Pos:2)	22.83	0.54	23.37
19193	1909.3	1.4	6	(RB_Pos:0)	21.92	0.54	22.46
18615	1851.5	3	1	(RB_Pos:0)	22.18	0.53	22.71
18615	1851.5	3	1	(RB_Pos:14)	23.26	0.53	23.79
18615	1851.5	3	8	(RB_Pos:0)	23.37	0.53	23.9
18615	1851.5	3	8	(RB_Pos:7)	23.38	0.53	23.91
18615	1851.5	3	15	(RB_Pos:0)	22.43	0.53	22.96
18900	1880	3	1	(RB_Pos:0)	23.34	0.53	23.87
18900	1880	3	1	(RB_Pos:14)	23.32	0.53	23.85
18900	1880	3	8	(RB_Pos:0)	22.37	0.53	22.9
18900	1880	3	8	(RB_Pos:7)	22.36	0.53	22.89
18900	1880	3	15	(RB_Pos:0)	22.36	0.53	22.89
19185	1909.9	3	1	(RB_Pos:0)	22.95	0.54	23.49
19185	1909.9	3	1	(RB_Pos:14)	22.84	0.54	23.38
19185	1909.9	3	8	(RB_Pos:0)	21.97	0.54	22.51
19185	1909.9	3	8	(RB_Pos:7)	21.87	0.54	22.41
19185	1909.9	3	15	(RB_Pos:0)	21.92	0.54	22.46
18625	1852.5	5	1	(RB_Pos:0)	23.1	0.53	23.63
18625	1852.5	5	1	(RB_Pos:24)	23.18	0.53	23.71
18625	1852.5	5	12	(RB_Pos:0)	22.19	0.53	22.72
18625	1852.5	5	12	(RB_Pos:13)	22.17	0.53	22.7
18625	1852.5	5	25	(RB_Pos:0)	22.08	0.53	22.61
18900	1880	5	1	(RB_Pos:0)	23.46	0.53	23.99
18900	1880	5	1	(RB_Pos:24)	23.31	0.53	23.84
18900	1880	5	12	(RB_Pos:0)	22.36	0.53	22.89
18900	1880	5	12	(RB_Pos:13)	22.37	0.53	22.9
18900	1880	5	25	(RB_Pos:0)	22.33	0.53	22.86
19175	1907.5	5	1	(RB_Pos:0)	23.01	0.54	23.55
19175	1907.5	5	1	(RB_Pos:24)	22.88	0.54	23.42
19175	1907.5	5	12	(RB_Pos:0)	21.97	0.54	22.51
19175	1907.5	5	12	(RB_Pos:13)	21.9	0.54	22.44
19175	1907.5	5	25	(RB_Pos:0)	21.9	0.54	22.44
18650	1855	10	1	(RB_Pos:0)	23.12	0.53	23.65
18650	1855	10	1	(RB_Pos:49)	23.21	0.53	23.74
18650	1855	10	25	(RB_Pos:0)	22.06	0.53	22.59
18650	1855	10	25	(RB_Pos:25)	22.35	0.53	22.88
18650	1855	10	50	(RB_Pos:0)	22.07	0.53	22.6
18900	1880	10	1	(RB_Pos:0)	23.29	0.53	23.82
18900	1880	10	1	(RB_Pos:49)	23.21	0.53	23.74
18900	1880	10	25	(RB_Pos:0)	22.26	0.53	22.79
18900	1880	10	25	(RB_Pos:25)	22.29	0.53	22.82
18900	1880	10	50	(RB_Pos:0)	22.18	0.53	22.71
19150	1905	10	1	(RB_Pos:0)	23.03	0.54	23.57
19150	1905	10	1	(RB_Pos:49)	22.84	0.54	23.38
19150	1905	10	25	(RB_Pos:0)	21.91	0.54	22.45
19150	1905	10	25	(RB_Pos:25)	21.83	0.54	22.37

3.6 *Test Data - LTE Band 4*

Max Power: 23.72dBm

UpLink Channel	UL Frequency (MHz)	BW (MHz)	# RB	Position	Measured Power (dBm)	Cable Loss (dB)	Conducted Power (dBm)
19957	1710.7	1.4	1	(RB_Pos:0)	23	0.52	23.52
19957	1710.7	1.4	1	(RB_Pos:5)	22.9	0.52	23.42
19957	1710.7	1.4	4	(RB_Pos:0)	22.96	0.52	23.48
19957	1710.7	1.4	4	(RB_Pos:2)	22.95	0.52	23.47
19957	1710.7	1.4	6	(RB_Pos:0)	21.96	0.52	22.48
20175	1732.5	1.4	1	(RB_Pos:0)	22.92	0.52	23.44
20175	1732.5	1.4	1	(RB_Pos:5)	22.85	0.52	23.37
20175	1732.5	1.4	4	(RB_Pos:0)	22.87	0.52	23.39
20175	1732.5	1.4	4	(RB_Pos:2)	22.85	0.52	23.37
20175	1732.5	1.4	6	(RB_Pos:0)	21.97	0.52	22.49
20393	1754.3	1.4	1	(RB_Pos:0)	23.13	0.53	23.66
20393	1754.3	1.4	1	(RB_Pos:5)	23.15	0.53	23.68
20393	1754.3	1.4	4	(RB_Pos:0)	23.1	0.53	23.63
20393	1754.3	1.4	4	(RB_Pos:2)	23.16	0.53	23.69
20393	1754.3	1.4	6	(RB_Pos:0)	22.17	0.53	22.7
19965	1711.5	3	1	(RB_Pos:0)	22.89	0.52	23.41
19965	1711.5	3	1	(RB_Pos:14)	22.84	0.52	23.36
19965	1711.5	3	8	(RB_Pos:0)	21.98	0.52	22.5
19965	1711.5	3	8	(RB_Pos:7)	21.89	0.52	22.41
19965	1711.5	3	15	(RB_Pos:0)	21.88	0.52	22.4
20175	1732.5	3	1	(RB_Pos:0)	22.79	0.52	23.31
20175	1732.5	3	1	(RB_Pos:14)	22.73	0.52	23.25
20175	1732.5	3	8	(RB_Pos:0)	21.88	0.52	22.4
20175	1732.5	3	8	(RB_Pos:7)	21.89	0.52	22.41
20175	1732.5	3	15	(RB_Pos:0)	21.92	0.52	22.44
20385	1753.5	3	1	(RB_Pos:0)	23.08	0.53	23.61
20385	1753.5	3	1	(RB_Pos:14)	23.08	0.53	23.61
20385	1753.5	3	8	(RB_Pos:0)	22.18	0.53	22.71
20385	1753.5	3	8	(RB_Pos:7)	22.08	0.53	22.61
20385	1753.5	3	15	(RB_Pos:0)	22.12	0.53	22.65
19975	1712.5	5	1	(RB_Pos:0)	22.87	0.52	23.39
19975	1712.5	5	1	(RB_Pos:24)	22.82	0.52	23.34
19975	1712.5	5	12	(RB_Pos:0)	21.94	0.52	22.46
19975	1712.5	5	12	(RB_Pos:13)	21.91	0.52	22.43
19975	1712.5	5	25	(RB_Pos:0)	21.81	0.52	22.33
20175	1732.5	5	1	(RB_Pos:0)	22.76	0.52	23.28
20175	1732.5	5	1	(RB_Pos:24)	22.79	0.52	23.31
20175	1732.5	5	12	(RB_Pos:0)	21.87	0.52	22.39
20175	1732.5	5	12	(RB_Pos:13)	21.84	0.52	22.36
20175	1732.5	5	25	(RB_Pos:0)	21.76	0.52	22.28
20375	1752.5	5	1	(RB_Pos:0)	23.13	0.53	23.66
20375	1752.5	5	1	(RB_Pos:24)	23.13	0.53	23.66
20375	1752.5	5	12	(RB_Pos:0)	22.26	0.53	22.79
20375	1752.5	5	12	(RB_Pos:13)	22.19	0.53	22.72
20375	1752.5	5	25	(RB_Pos:0)	22.16	0.53	22.69
20000	1715	10	1	(RB_Pos:0)	22.96	0.52	23.48
20000	1715	10	1	(RB_Pos:49)	22.9	0.52	23.42
20000	1715	10	25	(RB_Pos:0)	21.95	0.52	22.47
20000	1715	10	25	(RB_Pos:25)	21.87	0.52	22.39
20000	1715	10	50	(RB_Pos:0)	21.8	0.52	22.32
20175	1732.5	10	1	(RB_Pos:0)	22.94	0.52	23.46
20175	1732.5	10	1	(RB_Pos:49)	22.98	0.52	23.5
20175	1732.5	10	25	(RB_Pos:0)	21.85	0.52	22.37
20175	1732.5	10	25	(RB_Pos:25)	21.93	0.52	22.45
20175	1732.5	10	50	(RB_Pos:0)	21.72	0.52	22.24
20350	1750	10	1	(RB_Pos:0)	23.03	0.53	23.56
20350	1750	10	1	(RB_Pos:49)	23.17	0.53	23.7
20350	1750	10	25	(RB_Pos:0)	22.06	0.53	22.59
20350	1750	10	25	(RB_Pos:25)	22.13	0.53	22.66

3.7 *Test Data - LTE Band 5*

Max Power: 23.70dBm

UpLink Channel	UL Frequency (MHz)	BW (MHz)	# RB	Position	Measured Power (dBm)	Cable Loss (dB)	Conducted Power (dBm)
20407	824.7	1.4	1	(RB_Pos:0)	23.11	0.35	23.46
20407	824.7	1.4	1	(RB_Pos:5)	23.13	0.35	23.48
20407	824.7	1.4	4	(RB_Pos:0)	23.1	0.35	23.45
20407	824.7	1.4	4	(RB_Pos:2)	23.15	0.35	23.5
20407	824.7	1.4	6	(RB_Pos:0)	22.08	0.35	22.43
20525	836.5	1.4	1	(RB_Pos:0)	23.31	0.35	23.66
20525	836.5	1.4	1	(RB_Pos:5)	23.35	0.35	23.7
20525	836.5	1.4	4	(RB_Pos:0)	23.3	0.35	23.65
20525	836.5	1.4	4	(RB_Pos:2)	23.29	0.35	23.64
20525	836.5	1.4	6	(RB_Pos:0)	22.33	0.35	22.68
20643	848.5	1.4	1	(RB_Pos:0)	23.18	0.35	23.53
20643	848.5	1.4	1	(RB_Pos:5)	23.16	0.35	23.51
20643	848.5	1.4	4	(RB_Pos:0)	23.24	0.35	23.59
20643	848.5	1.4	4	(RB_Pos:2)	23.2	0.35	23.55
20643	848.5	1.4	6	(RB_Pos:0)	22.21	0.35	22.56
20415	825.5	3	1	(RB_Pos:0)	23.08	0.35	23.43
20415	825.5	3	1	(RB_Pos:14)	23.06	0.35	23.41
20415	825.5	3	8	(RB_Pos:0)	22.1	0.35	22.45
20415	825.5	3	8	(RB_Pos:7)	22.15	0.35	22.5
20415	825.5	3	15	(RB_Pos:0)	22.02	0.35	22.37
20525	836.5	3	1	(RB_Pos:0)	23.28	0.35	23.63
20525	836.5	3	1	(RB_Pos:14)	23.28	0.35	23.63
20525	836.5	3	8	(RB_Pos:0)	22.38	0.35	22.73
20525	836.5	3	8	(RB_Pos:7)	22.36	0.35	22.71
20525	836.5	3	15	(RB_Pos:0)	22.32	0.35	22.67
20635	847.5	3	1	(RB_Pos:0)	23.14	0.35	23.49
20635	847.5	3	1	(RB_Pos:14)	23.17	0.35	23.52
20635	847.5	3	8	(RB_Pos:0)	22.25	0.35	22.6
20635	847.5	3	8	(RB_Pos:7)	22.17	0.35	22.52
20635	847.5	3	15	(RB_Pos:0)	22.21	0.35	22.56
20425	826.5	5	1	(RB_Pos:0)	23.05	0.35	23.4
20425	826.5	5	1	(RB_Pos:24)	23.17	0.35	23.52
20425	826.5	5	12	(RB_Pos:0)	22.14	0.35	22.49
20425	826.5	5	12	(RB_Pos:13)	22.13	0.35	22.48
20425	826.5	5	25	(RB_Pos:0)	22.09	0.35	22.44
20525	836.5	5	1	(RB_Pos:0)	23.33	0.35	23.68
20525	836.5	5	1	(RB_Pos:24)	23.35	0.35	23.7
20525	836.5	5	12	(RB_Pos:0)	22.31	0.35	22.66
20525	836.5	5	12	(RB_Pos:13)	22.28	0.35	22.63
20525	836.5	5	25	(RB_Pos:0)	22.25	0.35	22.6
20625	846.5	5	1	(RB_Pos:0)	23.26	0.35	23.61
20625	846.5	5	1	(RB_Pos:24)	23.23	0.35	23.58
20625	846.5	5	12	(RB_Pos:0)	22.41	0.35	22.76
20625	846.5	5	12	(RB_Pos:13)	22.17	0.35	22.52
20625	846.5	5	25	(RB_Pos:0)	22.2	0.35	22.55
20450	829	10	1	(RB_Pos:0)	23.04	0.35	23.39
20450	829	10	1	(RB_Pos:49)	23.23	0.35	23.58
20450	829	10	25	(RB_Pos:0)	22.09	0.35	22.44
20450	829	10	25	(RB_Pos:25)	22.26	0.35	22.61
20450	829	10	50	(RB_Pos:0)	22.06	0.35	22.41
20525	836.5	10	1	(RB_Pos:0)	23.33	0.35	23.68
20525	836.5	10	1	(RB_Pos:49)	23.34	0.35	23.69
20525	836.5	10	25	(RB_Pos:0)	22.24	0.35	22.59
20525	836.5	10	25	(RB_Pos:25)	22.31	0.35	22.66
20525	836.5	10	50	(RB_Pos:0)	22.12	0.35	22.47
20600	844	10	1	(RB_Pos:0)	23.24	0.35	23.59
20600	844	10	1	(RB_Pos:49)	23.15	0.35	23.5
20600	844	10	25	(RB_Pos:0)	22.31	0.35	22.66
20600	844	10	25	(RB_Pos:25)	22.24	0.35	22.59

3.8 *Test Data - LTE Band 17*

Max Power: 24.09dBm

UpLink Channel	UL Frequency (MHz)	BW (MHz)	# RB	Position	Measured Power (dBm)	Cable Loss (dB)	Conducted Power (dBm)
23755	706.5	5	1	(RB_Pos:0)	23.2	0.32	23.52
23755	706.5	5	1	(RB_Pos:24)	23.11	0.32	23.43
23755	706.5	5	12	(RB_Pos:0)	22.29	0.32	22.61
23755	706.5	5	12	(RB_Pos:12)	22.21	0.32	22.53
23755	706.5	5	24	(RB_Pos:0)	22.2	0.32	22.52
23790	710	5	1	(RB_Pos:0)	23.26	0.32	23.58
23790	710	5	1	(RB_Pos:24)	23.27	0.32	23.59
23790	710	5	12	(RB_Pos:0)	22.22	0.32	22.54
23790	710	5	12	(RB_Pos:12)	22.24	0.32	22.56
23790	710	5	24	(RB_Pos:0)	22.1	0.32	22.42
23825	713.5	5	1	(RB_Pos:0)	23.16	0.32	23.48
23825	713.5	5	1	(RB_Pos:24)	23.77	0.32	24.09
23825	713.5	5	12	(RB_Pos:0)	22.17	0.32	22.49
23825	713.5	5	12	(RB_Pos:12)	22.45	0.32	22.77
23825	713.5	5	24	(RB_Pos:0)	22.12	0.32	22.44
23780	709	10	50	(RB_Pos:0)	22.06	0.32	22.38
23780	709	10	1	(RB_Pos:0)	23.18	0.32	23.5
23780	709	10	1	(RB_Pos:25)	23.13	0.32	23.45
23780	709	10	1	(RB_Pos:49)	23.21	0.32	23.53
23780	709	10	25	(RB_Pos:0)	22.14	0.32	22.46
23780	709	10	25	(RB_Pos:24)	22.09	0.32	22.41
23790	710	10	50	(RB_Pos:0)	21.97	0.32	22.29
23790	710	10	1	(RB_Pos:0)	23.13	0.32	23.45
23790	710	10	1	(RB_Pos:25)	23.23	0.32	23.55
23790	710	10	1	(RB_Pos:49)	23.28	0.32	23.6
23790	710	10	25	(RB_Pos:0)	22.12	0.32	22.44
23790	710	10	25	(RB_Pos:24)	22.14	0.32	22.46
23800	711	10	50	(RB_Pos:0)	21.85	0.32	22.17
23800	711	10	1	(RB_Pos:0)	23.13	0.32	23.45
23800	711	10	1	(RB_Pos:25)	23.19	0.32	23.51
23800	711	10	1	(RB_Pos:49)	23.56	0.32	23.88
23800	711	10	25	(RB_Pos:0)	22.13	0.32	22.45
23800	711	10	25	(RB_Pos:24)	22.08	0.32	22.4

4 Peak to Average Ratio

4.1 *Test Result*

Test Description	Basic Standards	Test Result
Peak to Average Ratio	24.232(d) 27.50(d)(5) RSS-130 (4.4) RSS-132 (5.4) RSS-133 (6.4) RSS-139 (6.4)	Pass

4.2 *Test Method*

KDB document 971168 D01 Power Meas License Digital Systems v02r02 was used to determine peak-to-average ratio. For the LTE measurements, Clause 5.7.1 was used which defined the measurement method using the CCDF function of the spectrum analyzer. Measurements were recorded at the mid channels and the worst-case setting was determined to be 3MHz cell bandwidth, 1RB (center), and QPSK modulation except for Band 17 where a 5MHz cell bandwidth was used.

4.3 *Test Site*

SGS EMC Laboratory, Suwanee, GA

Environmental Conditions

Temperature:	23.1 °C
Relative Humidity:	51.4 %
Atmospheric Pressure:	98.2 kPa

4.4 *Test Equipment*

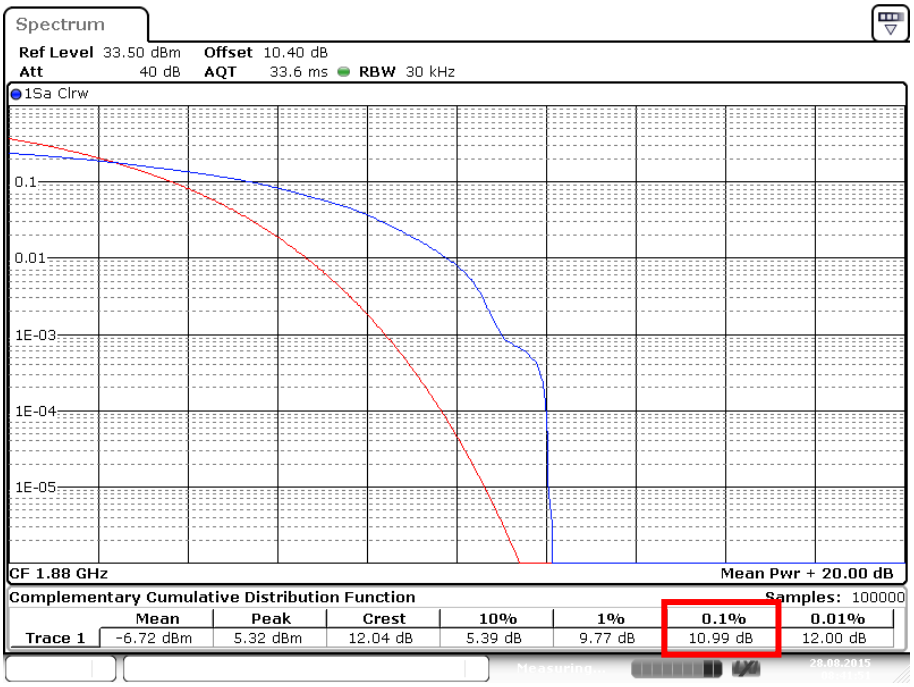
Test Date: 28 August 2015

Equipment	Model	Manufacturer	Asset Number	Cal Due Date
SIGNAL ANALYZER	FSV30	ROHDE & SCHWARZ	B085749	27-Sep-2015
WIDEBAND RADIO COMMUNICATION TESTER	CMW500	ROHDE & SCHWARZ	B079788	17-Oct-2015
POWER SPLITTER	ZFRSC-123-S+	MINI-CIRCUITS	B101739	5-Aug-2016
COAXIAL CABLE	1134	GORE	B094785	4-Aug-2016

- Unless otherwise noted, equipment is on a 1 year calibration cycle.
- Based on manufacturer's specifications, the CMW-500 is on a 3 year calibration cycle.

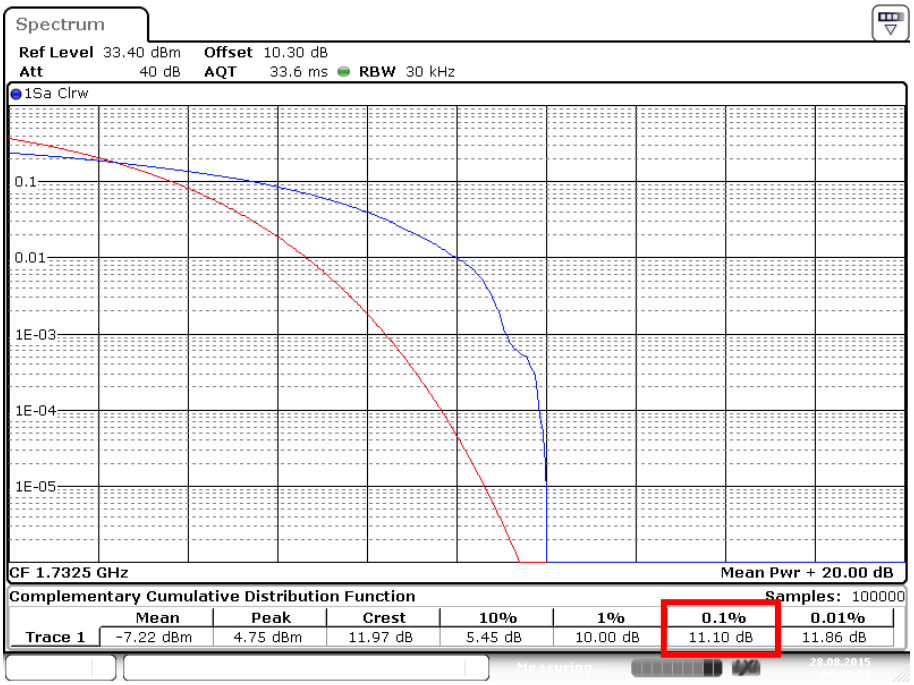
4.5 *Test Data*

LTE Band 2



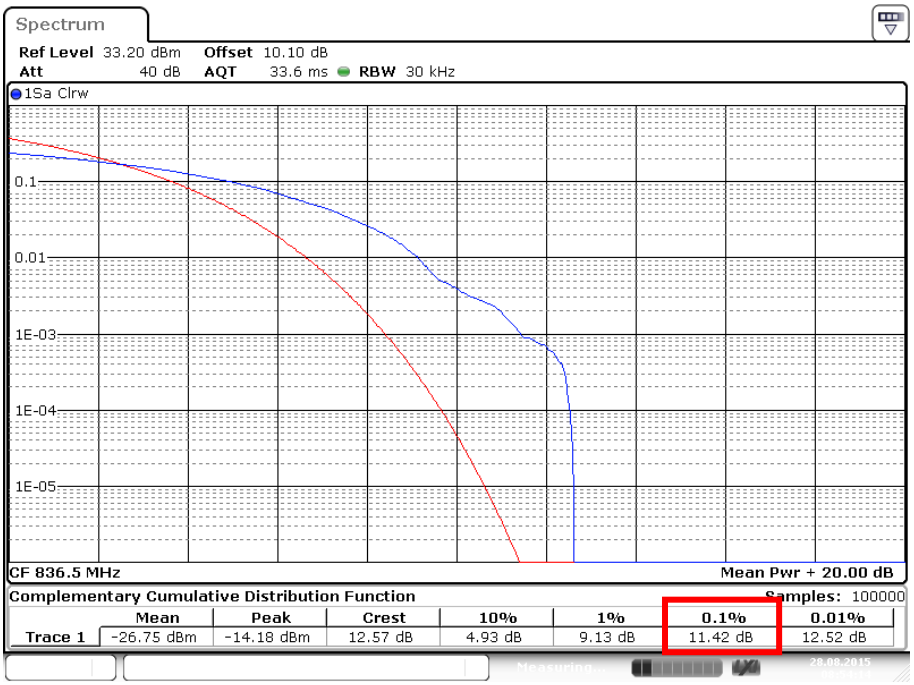
Date: 28.AUG.2015 08:41:51

LTE Band 4



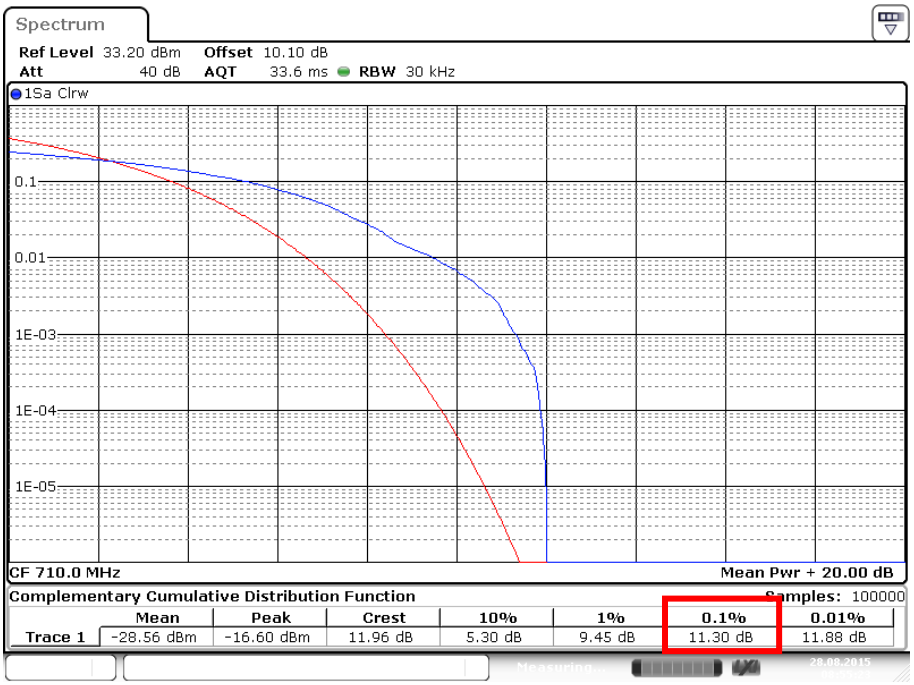
Date: 28.AUG.2015 08:52:59

LTE Band 5



Date: 28.AUG.2015 08:54:14

LTE Band 17



Date: 28.AUG.2015 08:55:23

5 Occupied Bandwidth

5.1 *Test Result*

Test Description	Basic Standards	Test Result
Occupied Bandwidth	2.1049 22.917(a) 24.238(a) RSS-GEN(6.6) RSS-133 (2.3) RSS-139(2.3)	Reported

5.2 *Test Method*

The occupied bandwidth is the frequency bandwidth such that below its lower and above its upper frequency limits, the mean powers are each equal to 0.5% of the total mean power by a given emission. The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts. The resolution bandwidth shall be set to as close to 1% of the selected span without being below 1%. The video bandwidth shall be set to 3 times the resolution bandwidth. Video averaging is not permitted. Where practical, a sample detector shall be used since a peak detector may produce a wider than actual bandwidth.

A radio link was established between EUT and Radio Communications Tester. The output power of the EUT was set to maximum value by using the maximum power setting on the Radio Communications Tester. The occupied bandwidth was measured using spectrum analyzer's occupied bandwidth measurement.

The bandwidth of 99% power can be read on spectrum analyzer.

The measurement was conducted at the center channel of each band. All resource blocks were explored. Worst-case results are reported.

5.3 *Test Site*

SGS EMC Laboratory, Suwanee, GA

Environmental Conditions

Temperature:	23.5 °C
Relative Humidity:	44.9 %
Atmospheric Pressure:	98.1 kPa

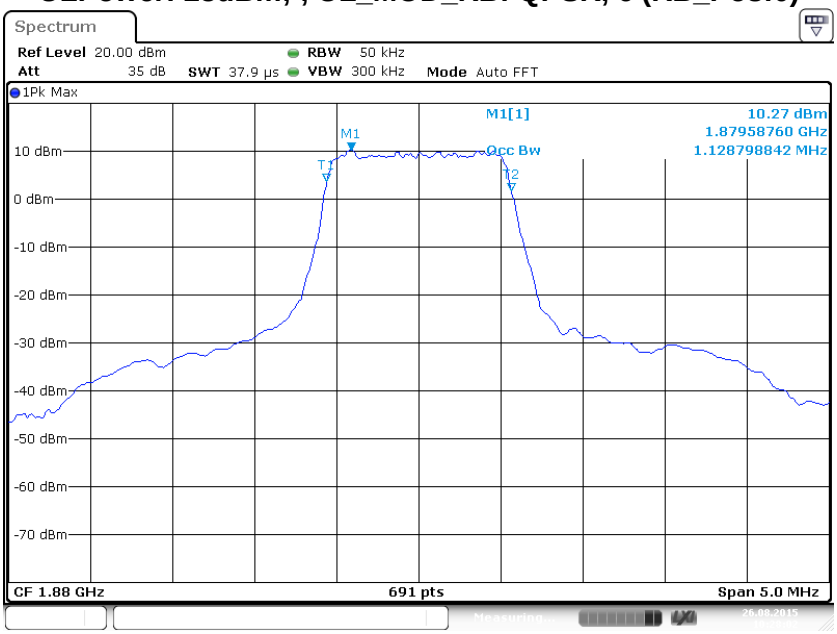
5.4 *Test Equipment*

Equipment	Model	Manufacturer	Asset Number	Cal Due Date
SIGNAL ANALYZER	FSV30	ROHDE & SCHWARZ	B085749	27-Sep-2015
CMW500 WIDEBAND RADIO COMMUNICATIONS TESTER	CMW500	ROHDE & SCHWARZ	B094874	6-Dec-2015
POWER SPLITTER	ZFRSC-183-S+	MINI-CIRCUITS	B101743	5-Aug-2016

- Unless otherwise noted, equipment is on a 1 year calibration cycle.
- Based on manufacturer's specifications, the CMW-500 is on a 3 year calibration cycle.

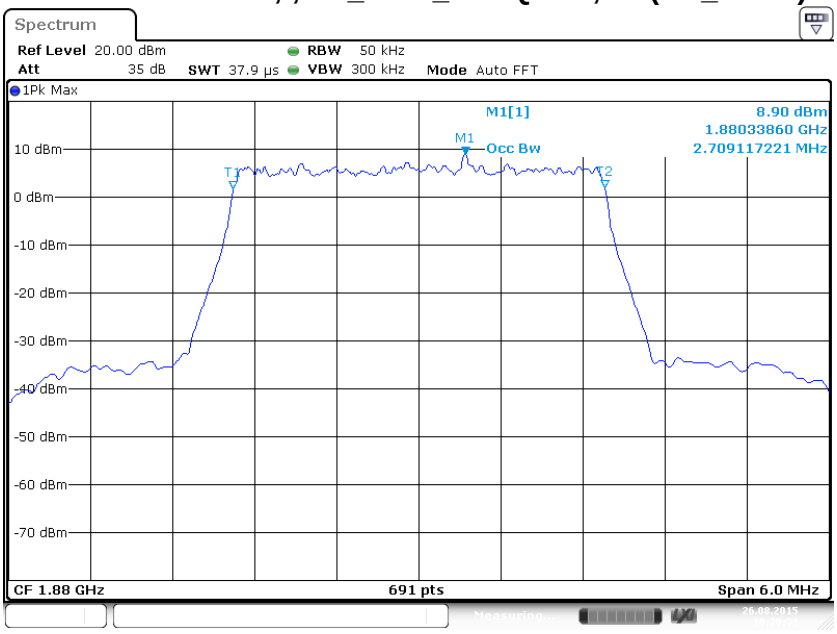
5.5 *Test Data*

LTE Band 2
Occupied Bandwidth: :@ULCH: 18900, BW: 1.4 MHz , ULPower: 23dBm; ; UL_MOD_RB: QPSK, 6 (RB_Pos:0)



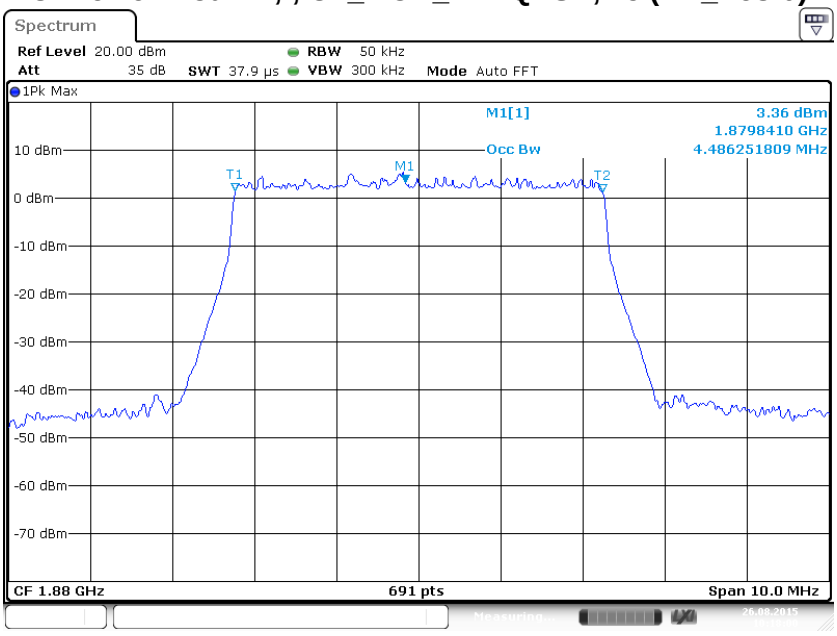
Date: 26.AUG.2015 10:28:02

LTE Band 2
Occupied Bandwidth: :@ULCH: 18900, BW: 3.0 MHz , ULPower: 23dBm; ; UL_MOD_RB: QPSK, 15 (RB_Pos:0)



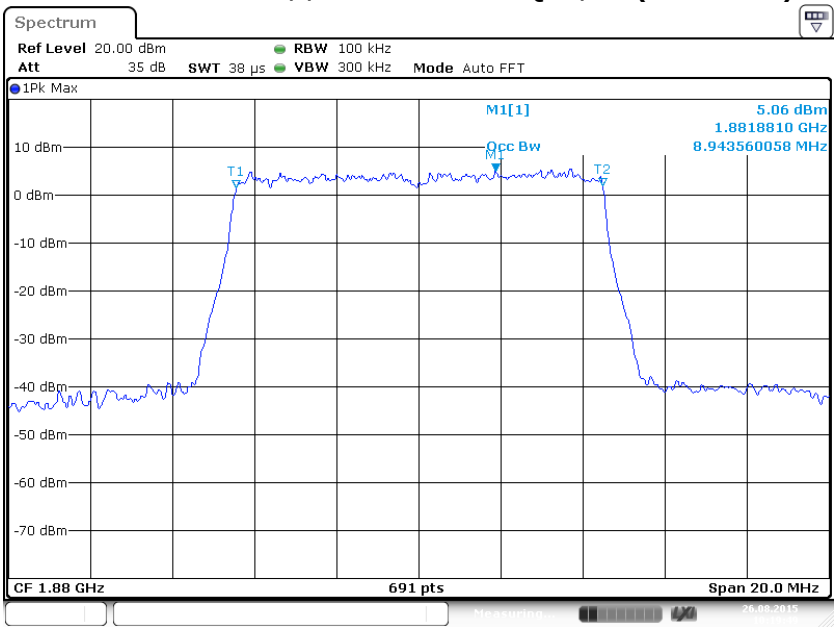
Date: 26.AUG.2015 10:28:31

LTE Band 2
Occupied Bandwidth: :@ULCH: 18900, BW: 5.0 MHz , ULPower: 23dBm; ; UL_MOD_RB: QPSK, 25 (RB_Pos:0)



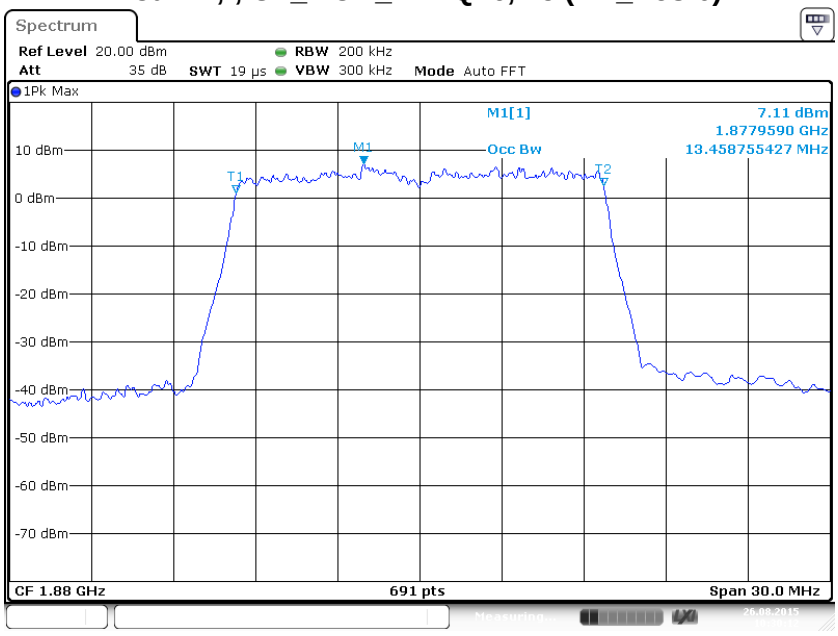
Date: 26.AUG.2015 10:18:00

LTE Band 2
Occupied Bandwidth: :@ULCH: 18900, BW: 10 MHz , ULPower: 23dBm; ; UL_MOD_RB: Q16, 50 (RB_Pos:0)



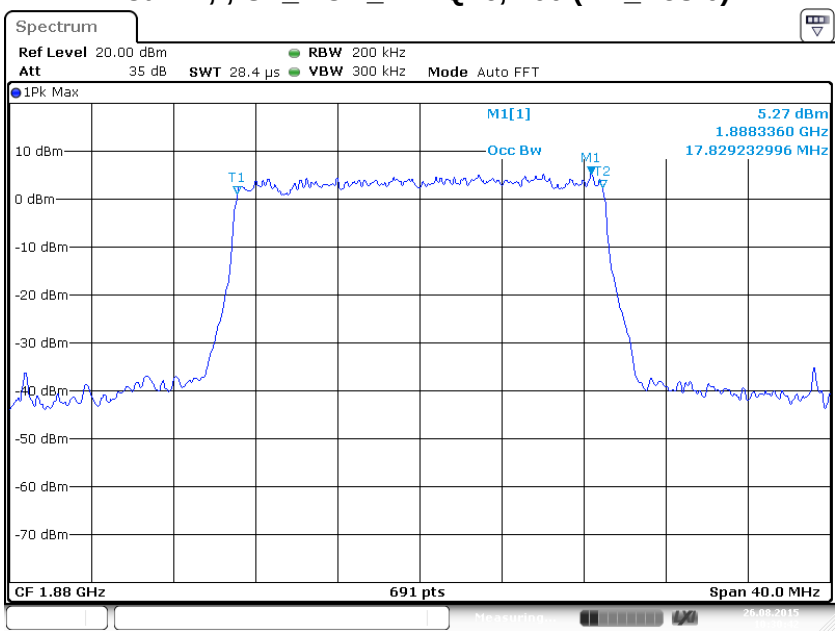
Date: 26.AUG.2015 10:19:49

LTE Band 2
Occupied Bandwidth: :@ULCH: 18900, BW: 15 MHz , ULPower: 23dBm; ; UL_MOD_RB: Q16, 75 (RB_Pos:0)



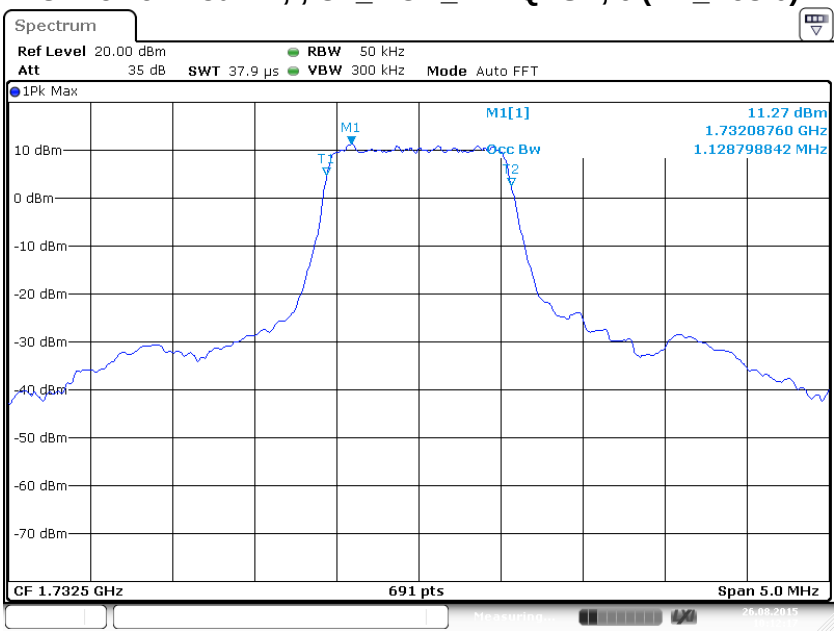
Date: 26.AUG.2015 10:30:12

LTE Band 2
Occupied Bandwidth: :@ULCH: 18900, BW: 20 MHz , ULPower: 23dBm; ; UL_MOD_RB: Q16, 100 (RB_Pos:0)



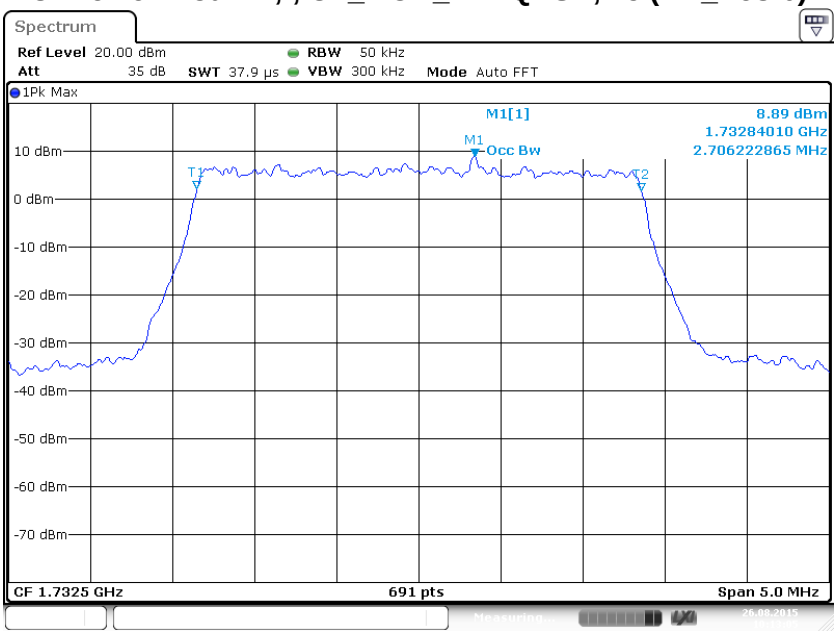
Date: 26.AUG.2015 10:30:42

LTE Band 4
Occupied Bandwidth: :@ULCH: 20175, BW: 1.4 MHz ,
ULPower: 23dBm; ; UL_MOD_RB: QPSK, 6 (RB_Pos:0)



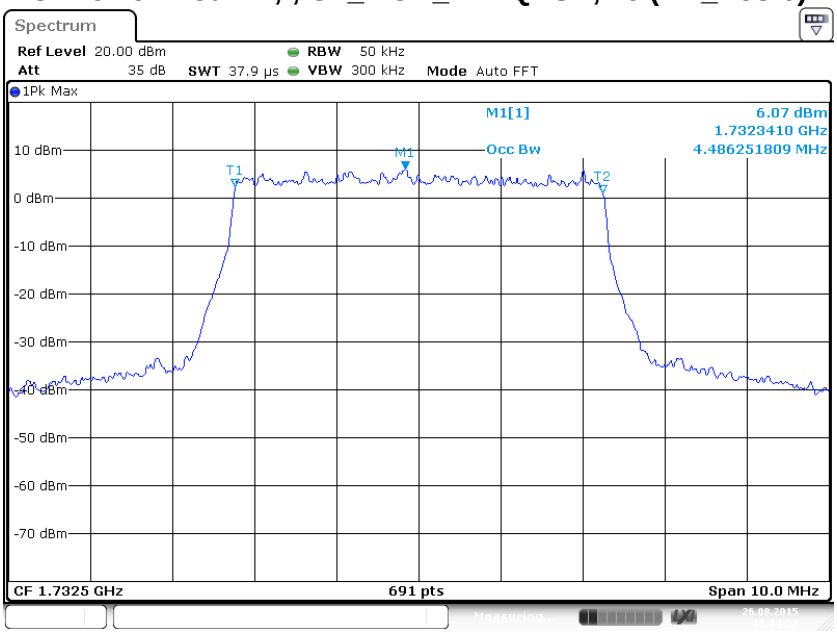
Date: 26.AUG.2015 10:12:17

LTE Band 4
Occupied Bandwidth: :@ULCH: 20175, BW: 3.0 MHz ,
ULPower: 23dBm; ; UL_MOD_RB: QPSK, 15 (RB_Pos:0)



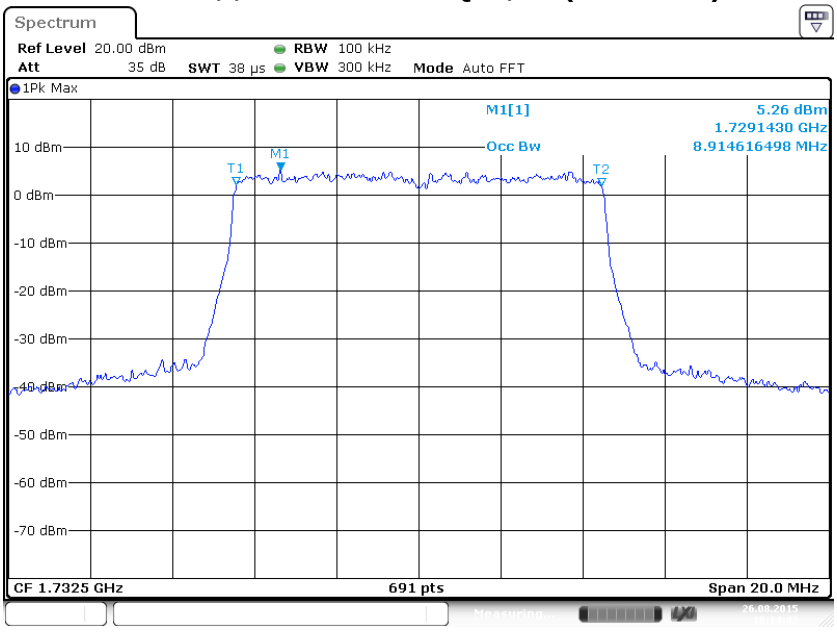
Date: 26.AUG.2015 10:13:05

LTE Band 4
Occupied Bandwidth: :@ULCH: 20175, BW: 5.0 MHz , ULPower: 23dBm; ; UL_MOD_RB: QPSK, 25 (RB_Pos:0)



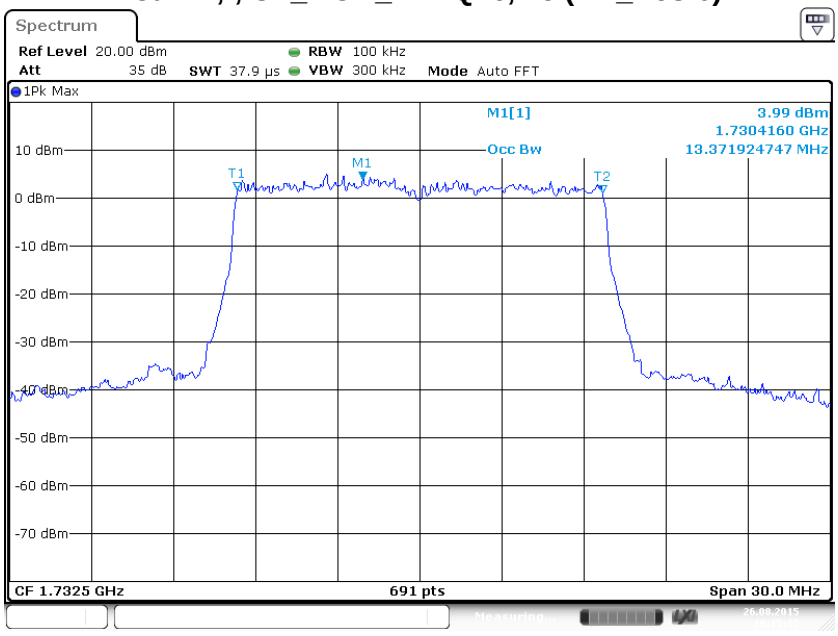
Date: 26.AUG.2015 10:14:07

LTE Band 4
Occupied Bandwidth: :@ULCH: 20175, BW: 10 MHz , ULPower: 23dBm; ; UL_MOD_RB: Q16, 50 (RB_Pos:0)



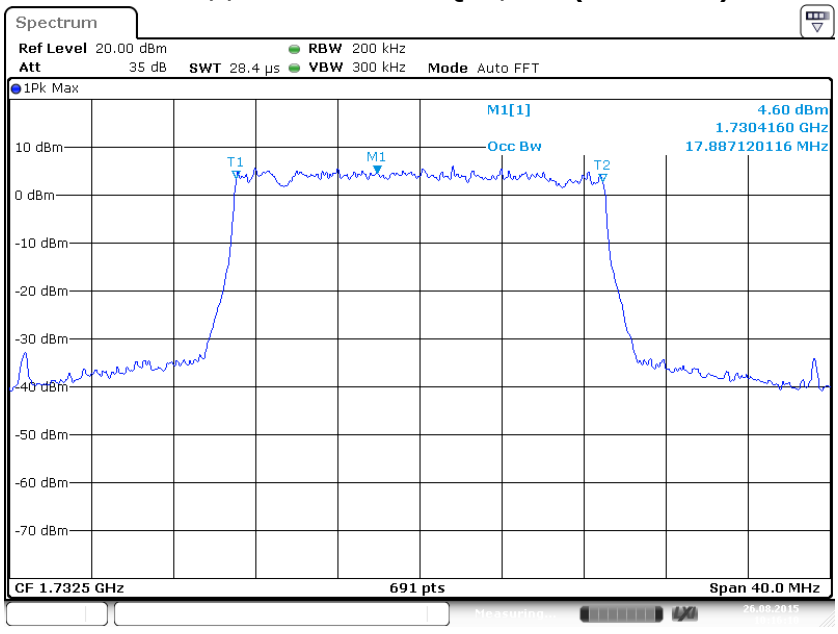
Date: 26.AUG.2015 10:14:42

LTE Band 4
Occupied Bandwidth: :@ULCH: 20175, BW: 15 MHz , ULPower: 23dBm; ; UL_MOD_RB: Q16, 75 (RB_Pos:0)



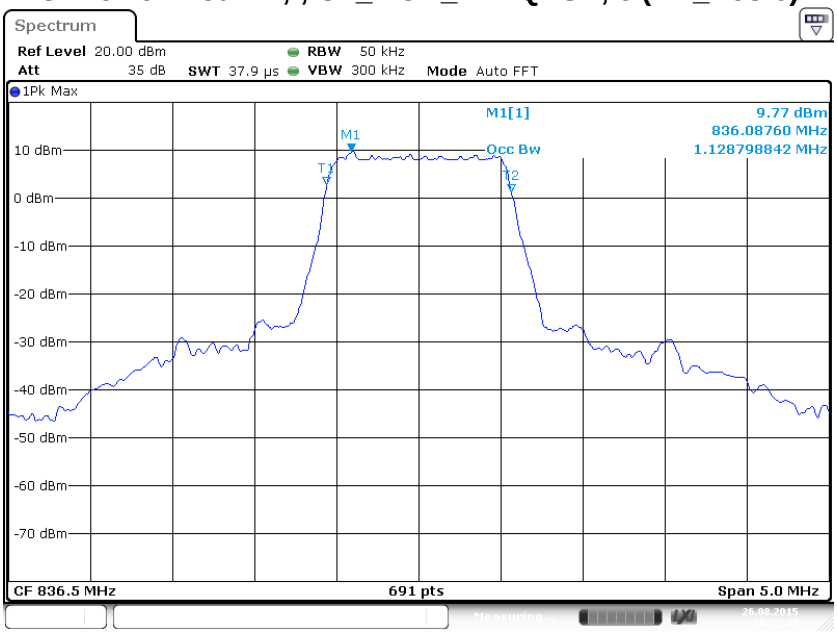
Date: 26.AUG.2015 10:15:15

LTE Band 4
Occupied Bandwidth: :@ULCH: 20175, BW: 20 MHz , ULPower: 23dBm; ; UL_MOD_RB: Q16, 100 (RB_Pos:0)



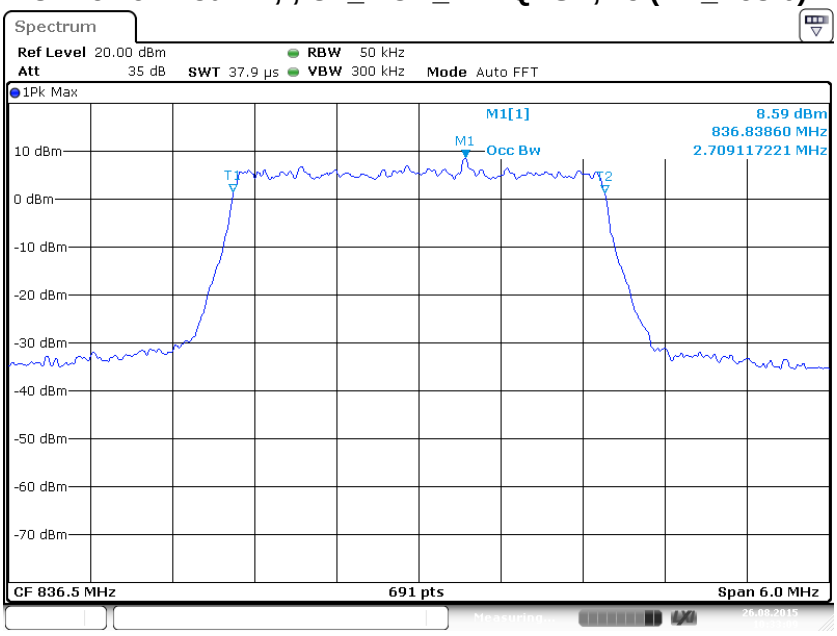
Date: 26.AUG.2015 10:16:10

LTE Band 5
Occupied Bandwidth: :@ULCH: 20525, BW: 1.4 MHz ,
ULPower: 23dBm; ; UL_MOD_RB: QPSK, 6 (RB_Pos:0)



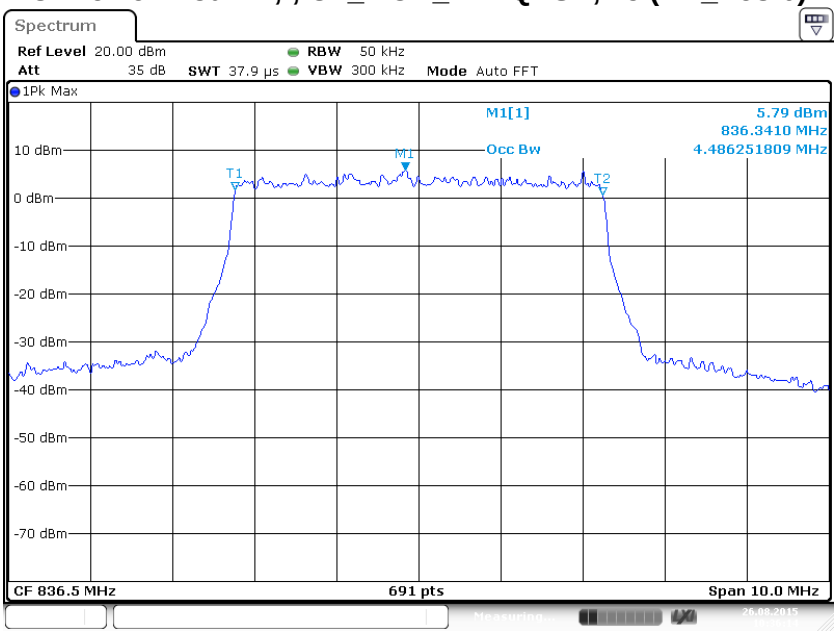
Date: 26.AUG.2015 10:32:49

LTE Band 5
Occupied Bandwidth: :@ULCH: 20525, BW: 3.0 MHz ,
ULPower: 23dBm; ; UL_MOD_RB: QPSK, 15 (RB_Pos:0)



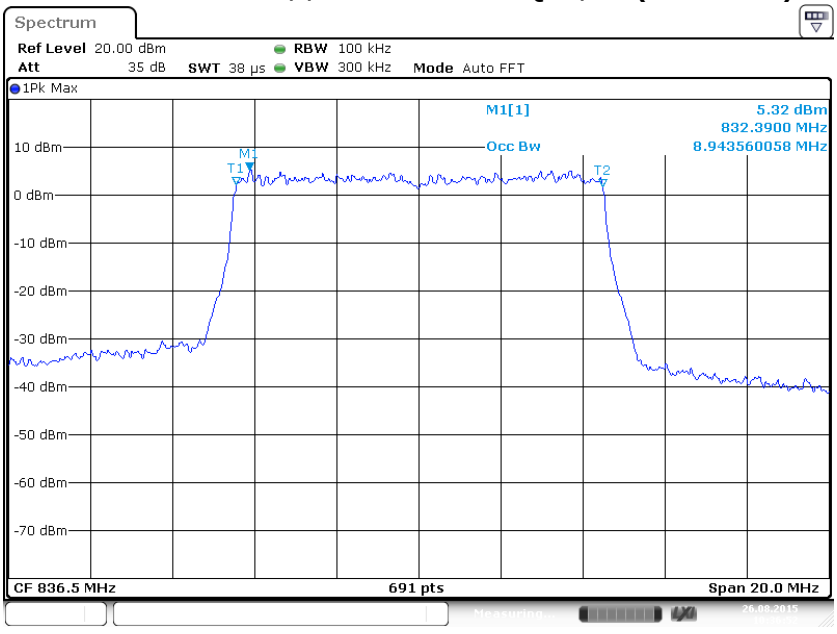
Date: 26.AUG.2015 10:33:09

LTE Band 5
Occupied Bandwidth: :@ULCH: 20525, BW: 5.0 MHz ,
ULPower: 23dBm; ; UL_MOD_RB: QPSK, 25 (RB_Pos:0)



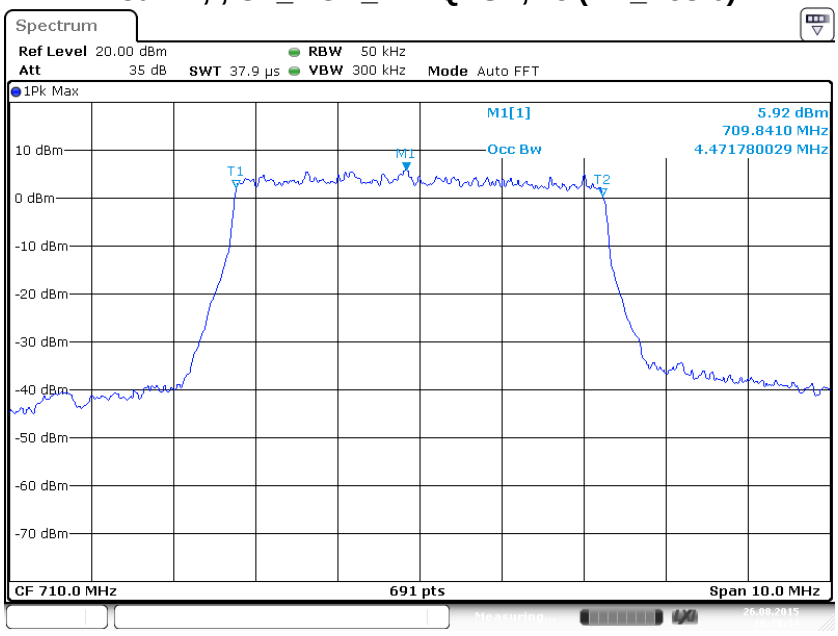
Date: 26.AUG.2015 10:36:14

LTE Band 5
Occupied Bandwidth: :@ULCH: 20525, BW: 10 MHz ,
ULPower: 23dBm; ; UL_MOD_RB: Q16, 50 (RB_Pos:0)



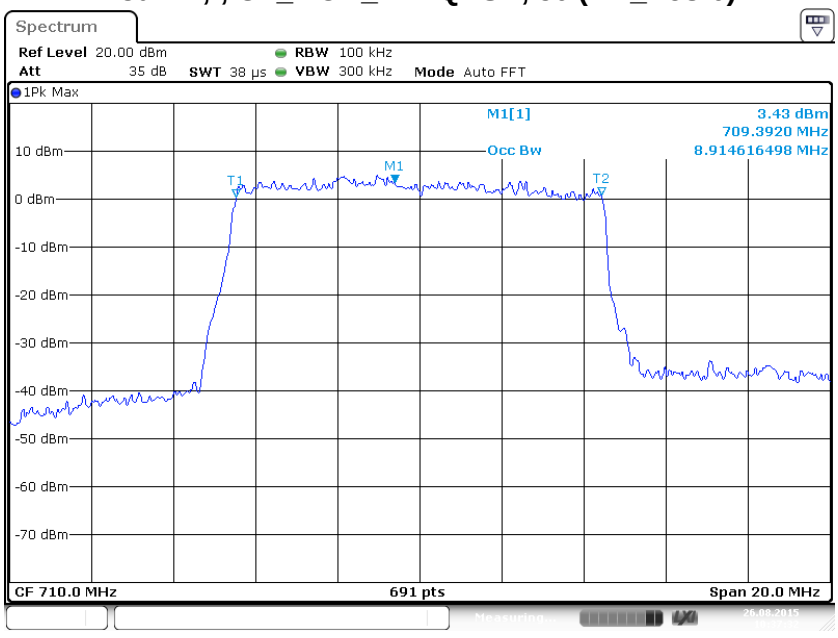
Date: 26.AUG.2015 10:36:51

LTE Band 17
Occupied Bandwidth: :@ULCH: 23230, BW: 5 MHz , ULPower: 23dBm; ; UL_MOD_RB: QPSK, 25 (RB_Pos:0)



Date: 26.AUG.2015 10:38:34

LTE Band 17
Occupied Bandwidth: :@ULCH: 23230, BW: 10 MHz , ULPower: 23dBm; ; UL_MOD_RB: QPSK, 50 (RB_Pos:0)



Date: 26.AUG.2015 10:37:32

6 Band Edge and Conducted Spurious Emissions

6.1 *Test Result*

Test Description	Basic Standards	Test Result
Conducted spurious emissions and Band Edge	2.1051 22.917(a) 24.238(a) 27.53(c)(2) 27.53(h) RSS-130 (4.6.1) RSS-132 (5.5) RSS-133 (6.5.1) RSS-139(6.5.1)	Pass

6.2 *Test Method*

The levels of the carrier and the various conducted spurious and harmonics frequencies are measured by means of a calibrated spectrum analyzer. The emissions spectrum emanating from the EUT transmit antenna port is scanned from the lowest frequency generated in the equipment up to a frequency including its 10th harmonic. On any frequency outside a licensee's frequency block, the power of any emission shall be attenuated below the transmitter power (P) by at least 43 + 10 log (P) dB. Compliance is based on the use of a spectrum analyzer employing a resolution bandwidth of 1 MHz or greater. In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of a least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. The emissions bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

6.3 *Test Site*

SGS EMC Laboratory, Suwanee, GA

Environmental Conditions

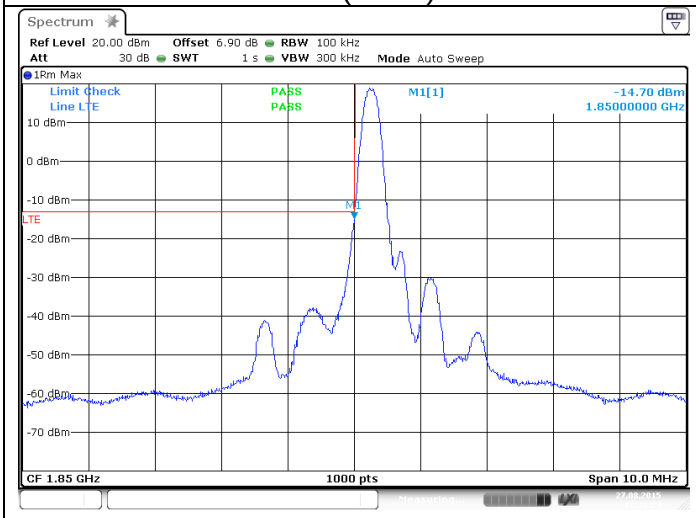
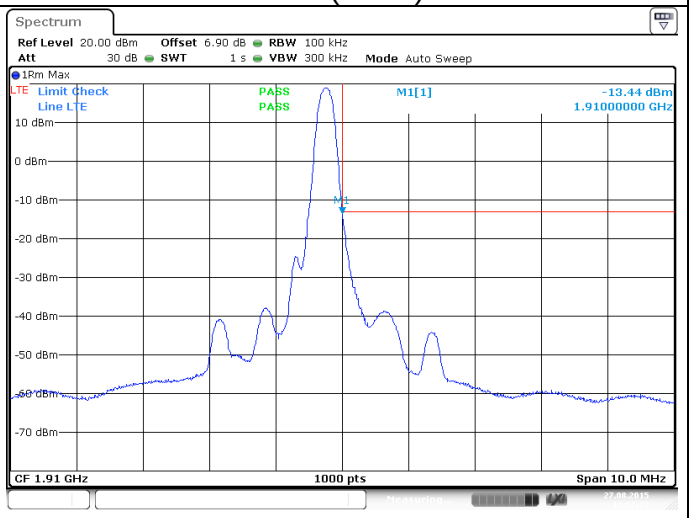
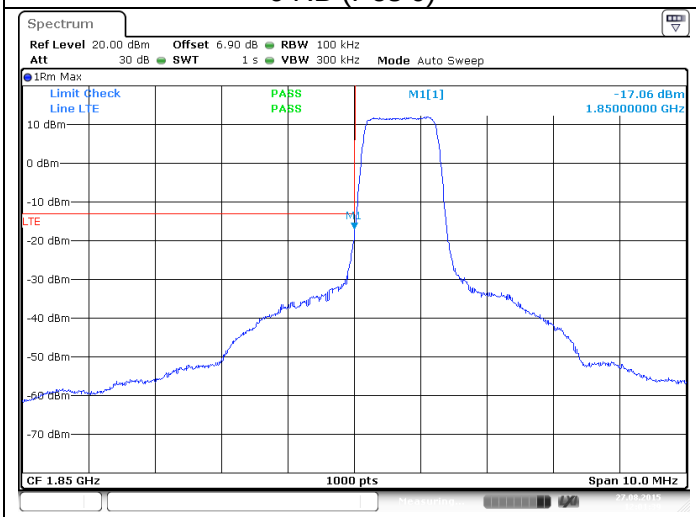
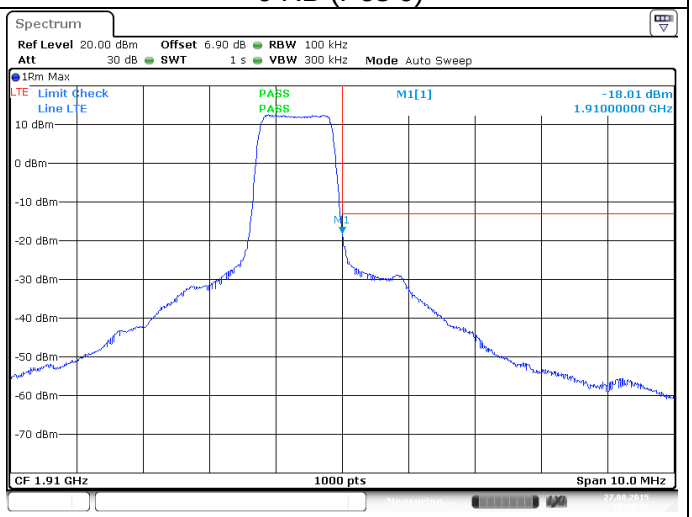
Temperature:	23.8 °C
Relative Humidity:	45.2 %
Atmospheric Pressure:	97.8 kPa

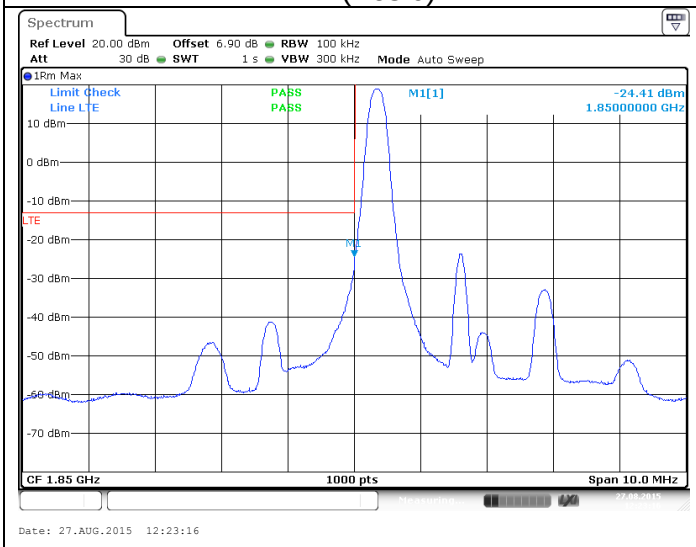
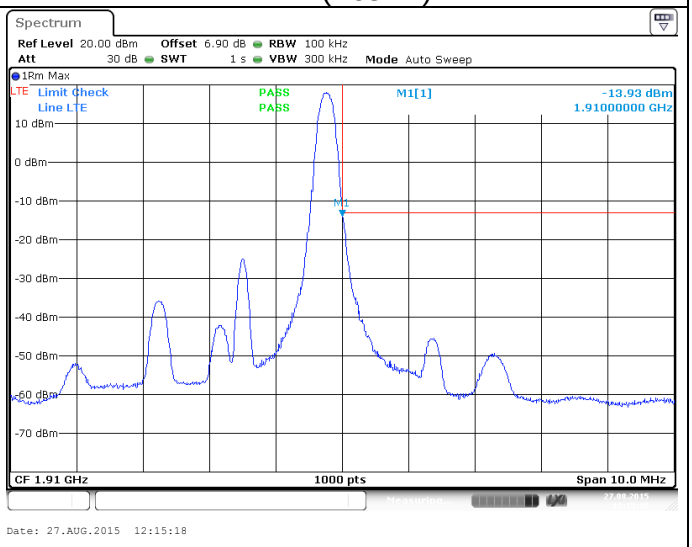
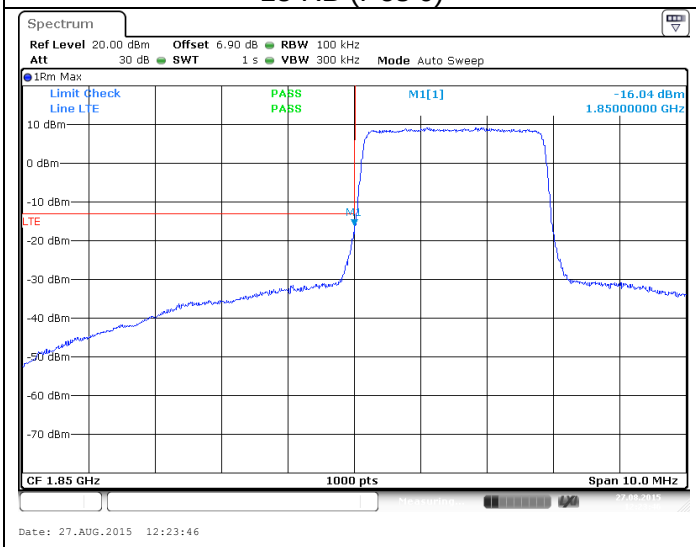
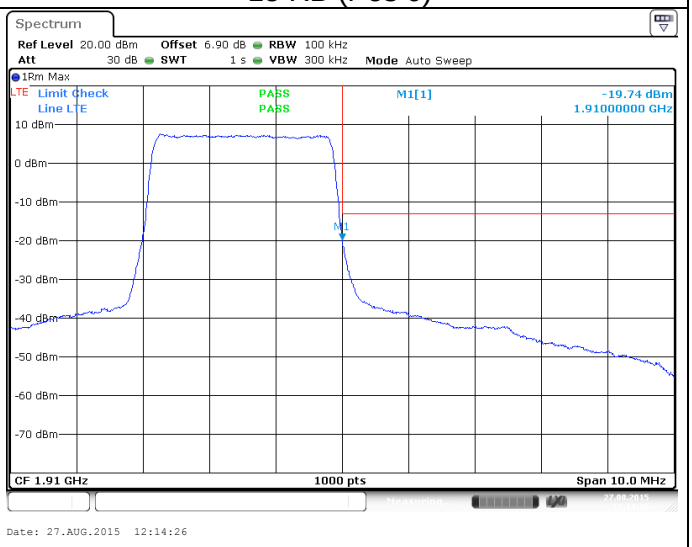
6.4 *Test Equipment*

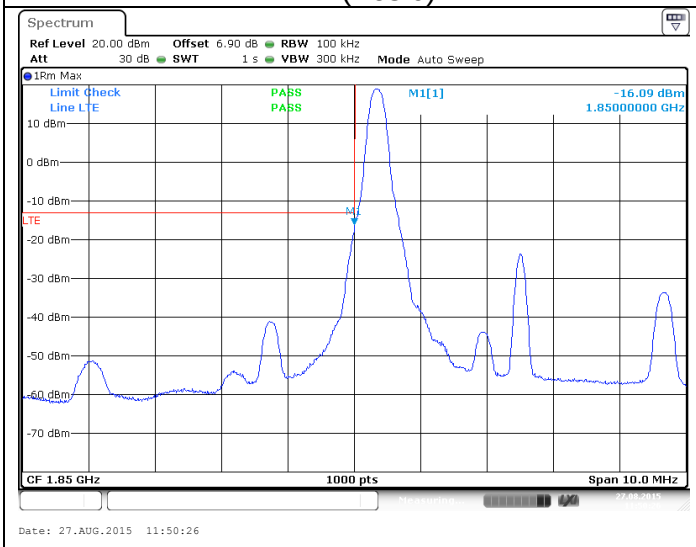
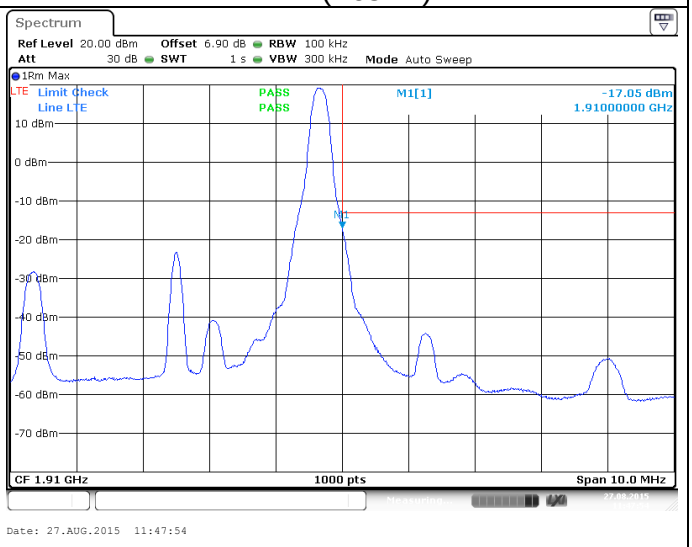
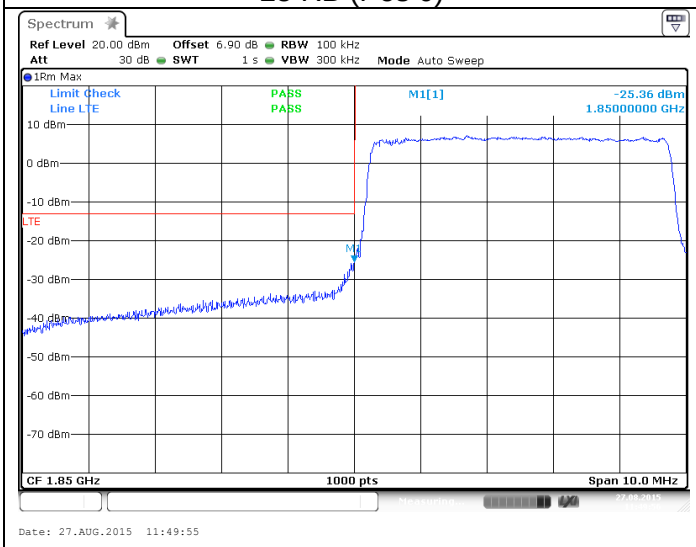
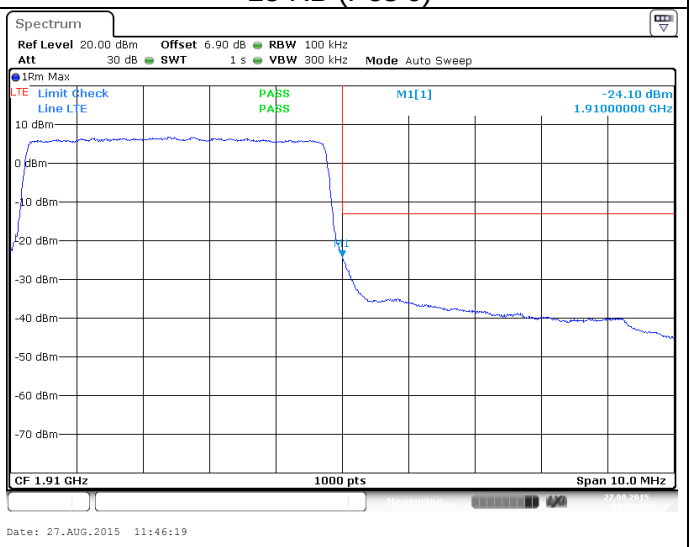
Equipment	Model	Manufacturer	Asset Number	Cal Due Date
SIGNAL ANALYZER	FSV30	ROHDE & SCHWARZ	B085749	27-Sep-2015
CMW500 WIDEBAND RADIO COMMUNICATIONS TESTER	CMW500	ROHDE & SCHWARZ	B094874	6-Dec-2015
POWER SPLITTER	ZFRSC-183-S+	MINI-CIRCUITS	B101743	5-Aug-2016

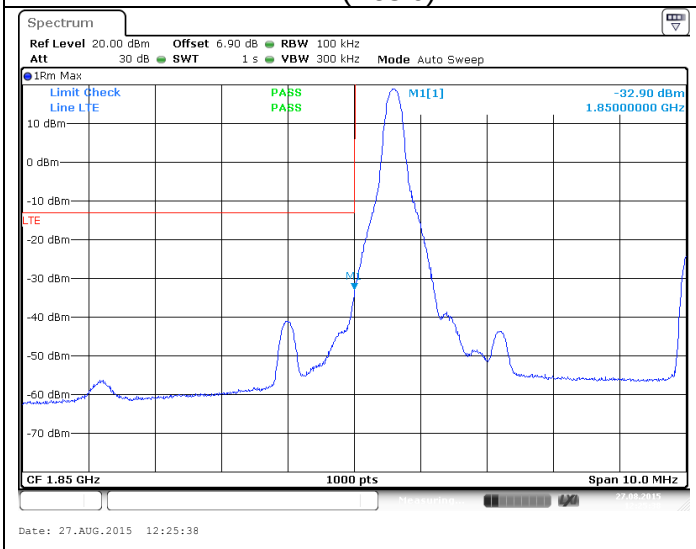
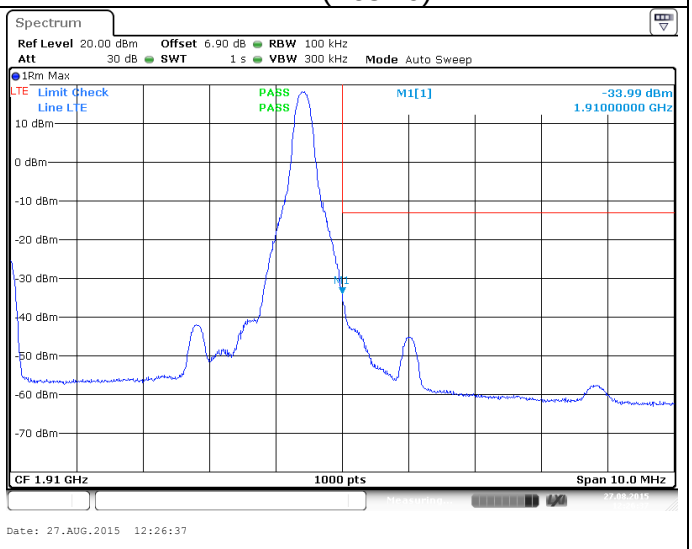
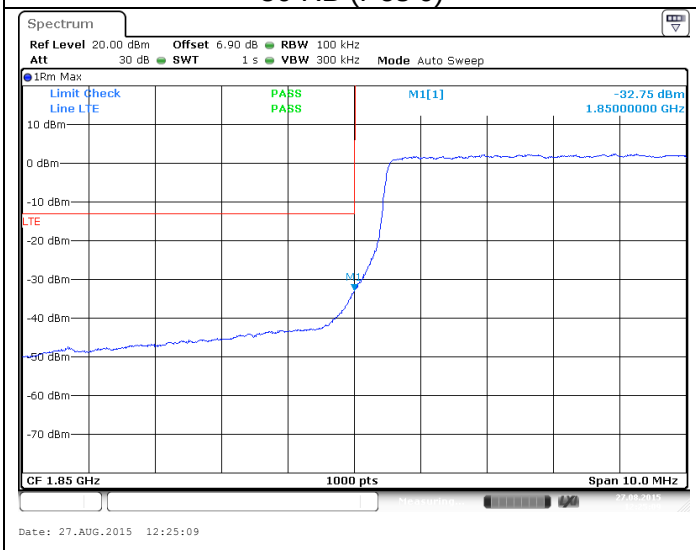
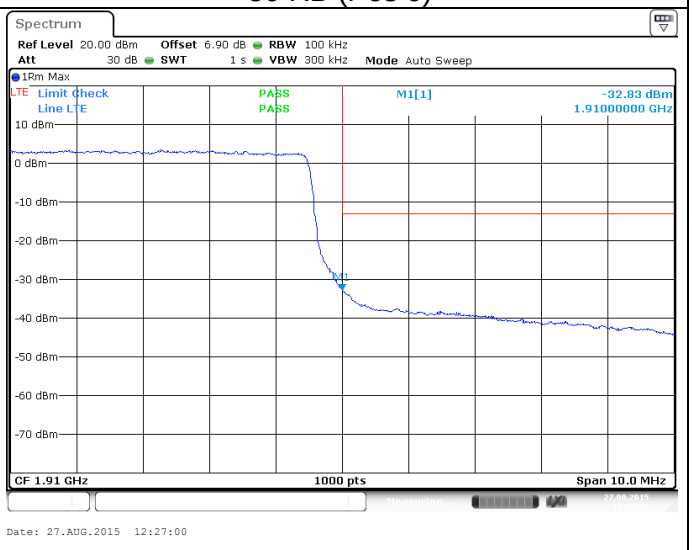
- Unless otherwise noted, equipment is on a 1 year calibration cycle.
- Based on manufacturer's specifications, the CMW-500 is on a 3 year calibration cycle.

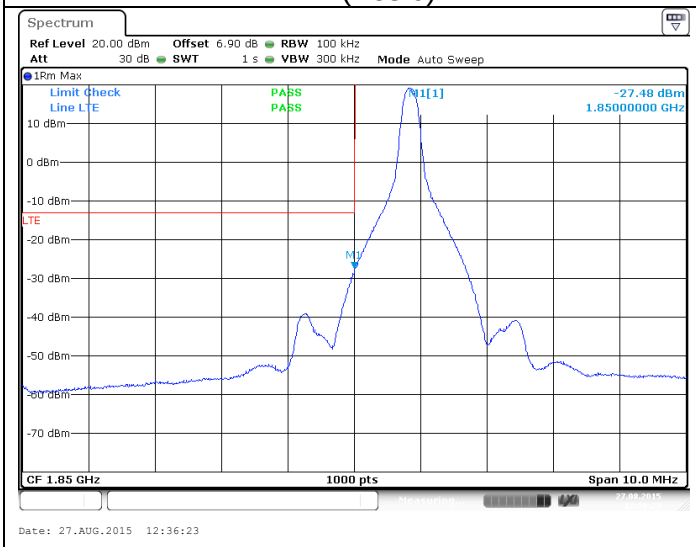
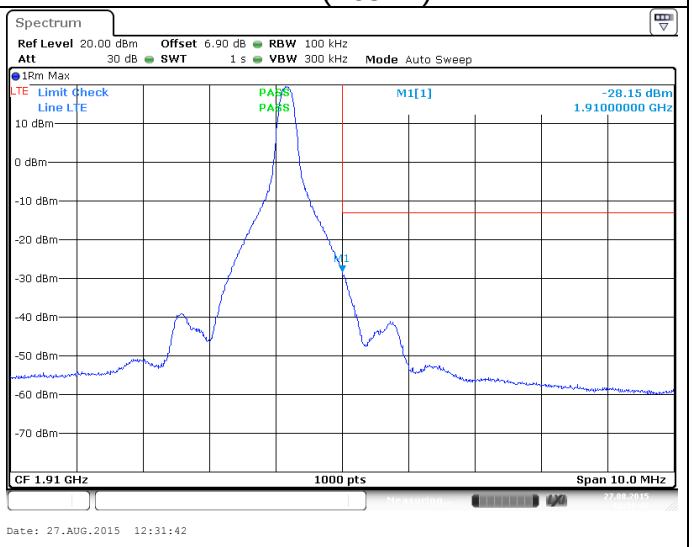
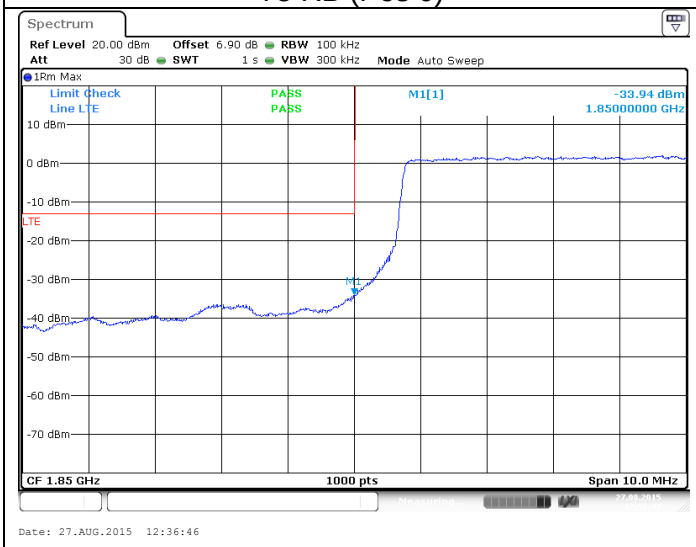
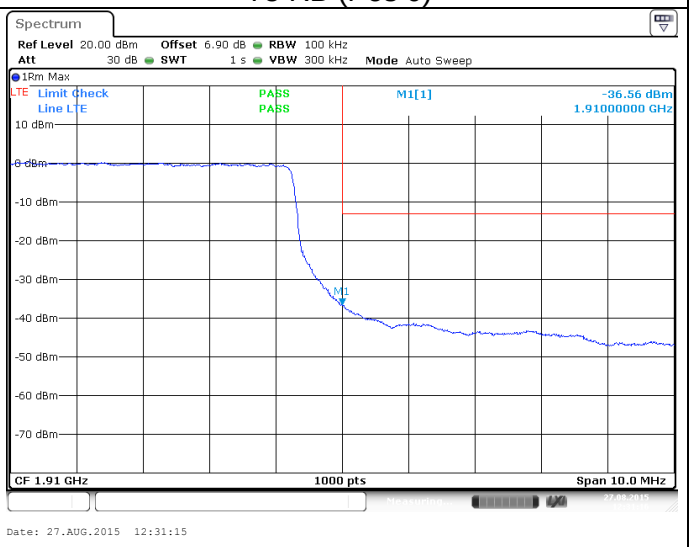
6.5 *Test Data - Band Edge*

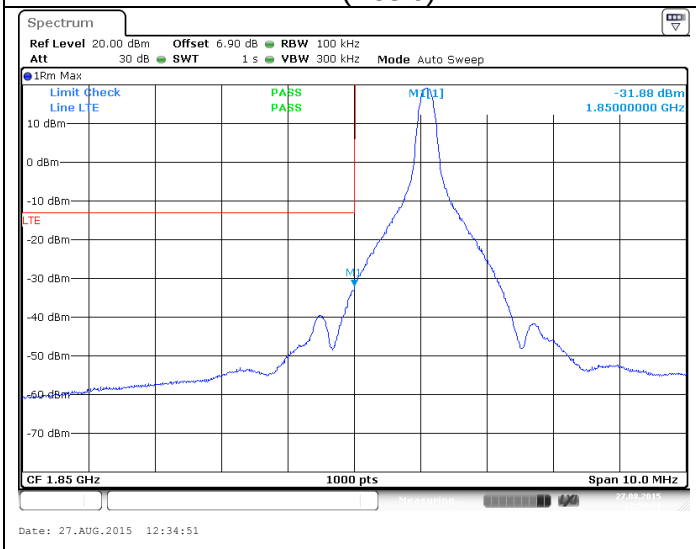
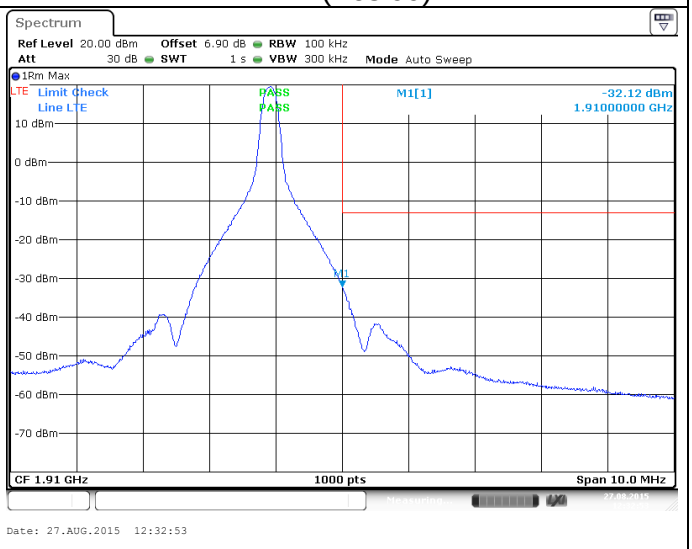
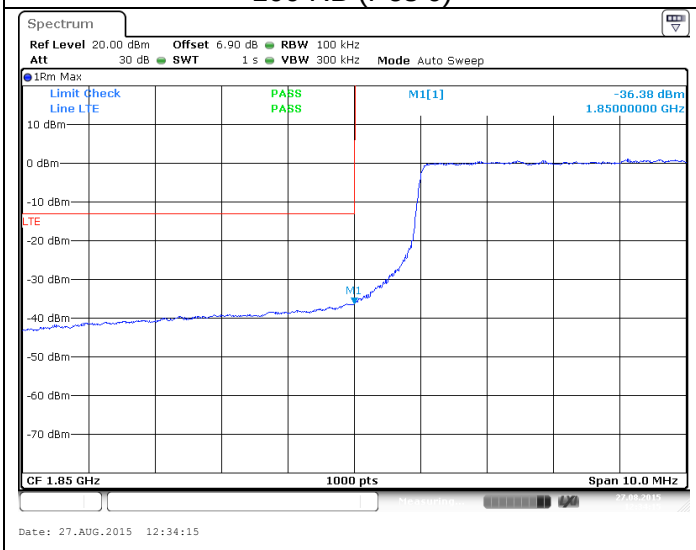
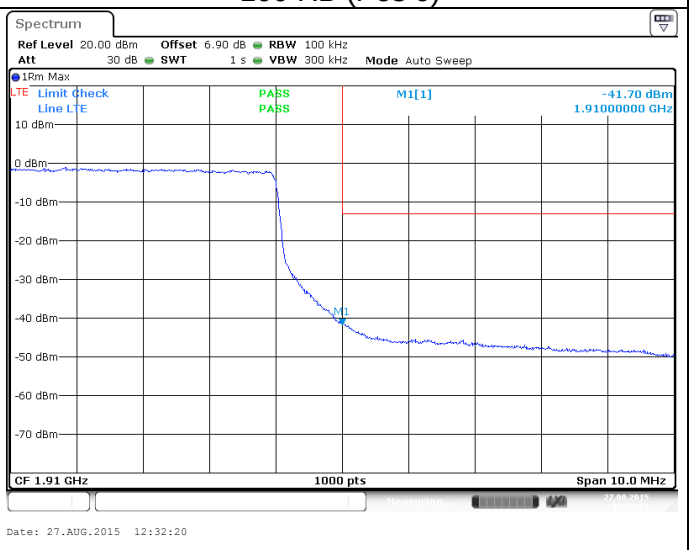
<table>
<tr><th colspan="2">LTE Band 2, QPSK modulation, 1.4MHz</th></tr>
<tr><th>Low Channel (18607)</th><th>High Channel (19193)</th></tr>
<tr><th>1 RB (Pos 0)</th><th>1 RB (Pos 5)</th></tr>
<tr><td> 
</td><td> 
</td></tr>
<tr><th>6 RB (Pos 0)</th><th>6 RB (Pos 0)</th></tr>
<tr><td> 
</td><td> 
</td></tr>
</table>

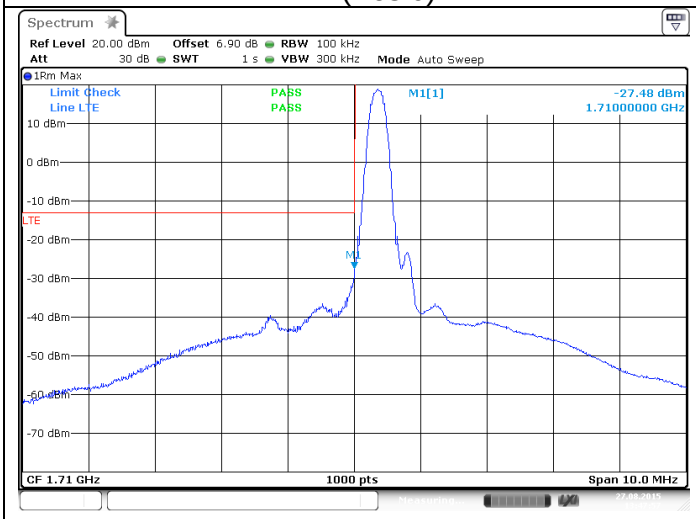
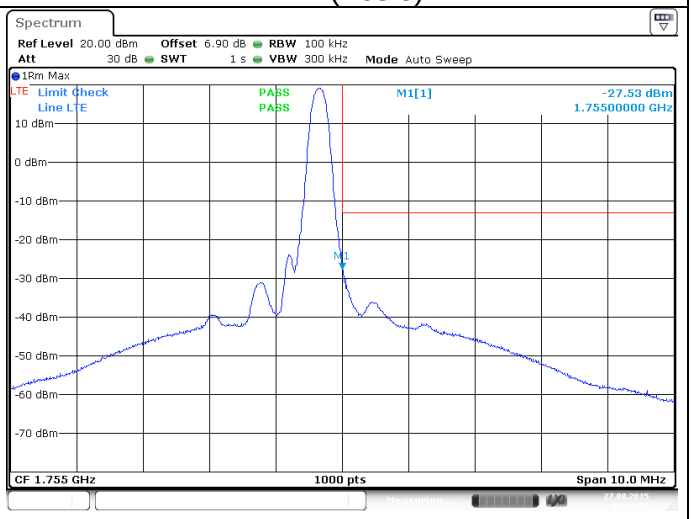
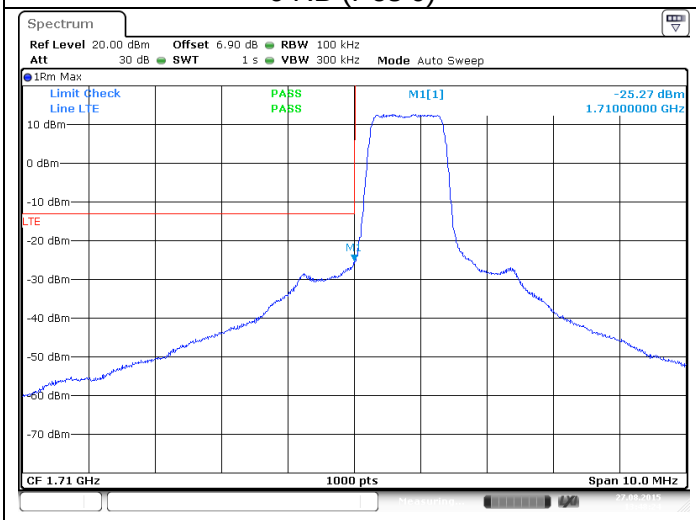
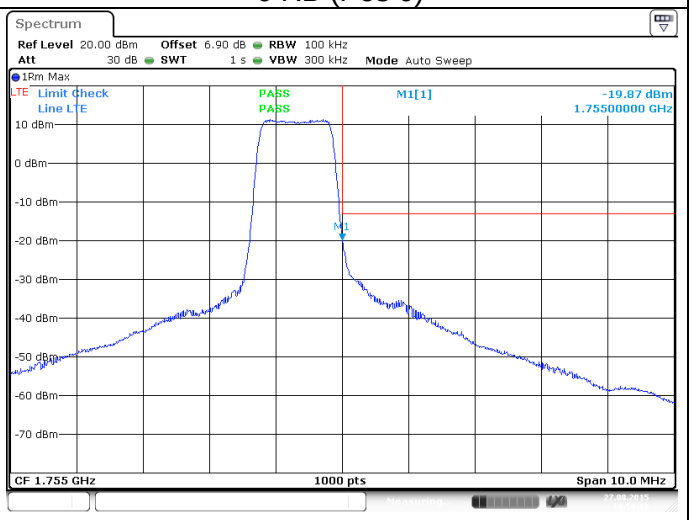
LTE Band 2, QPSK modulation, 3MHz	
Low Channel (18615)	High Channel (19185)
1 RB (Pos 0)	1 RB (Pos 14)
	
15 RB (Pos 0)	15 RB (Pos 0)
	

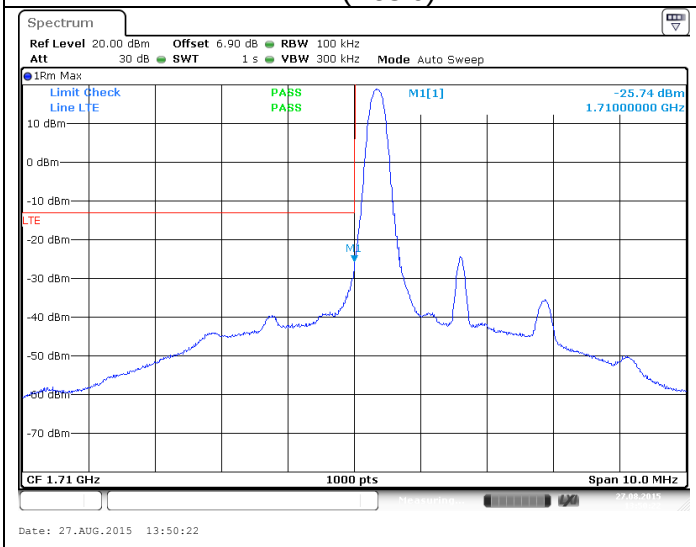
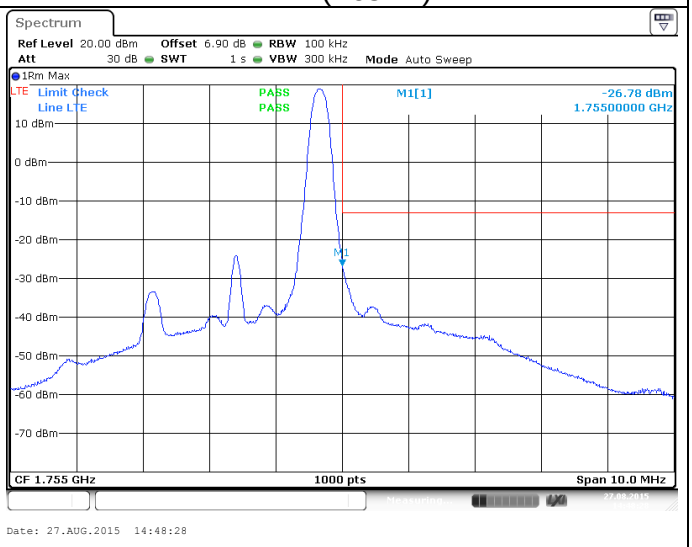
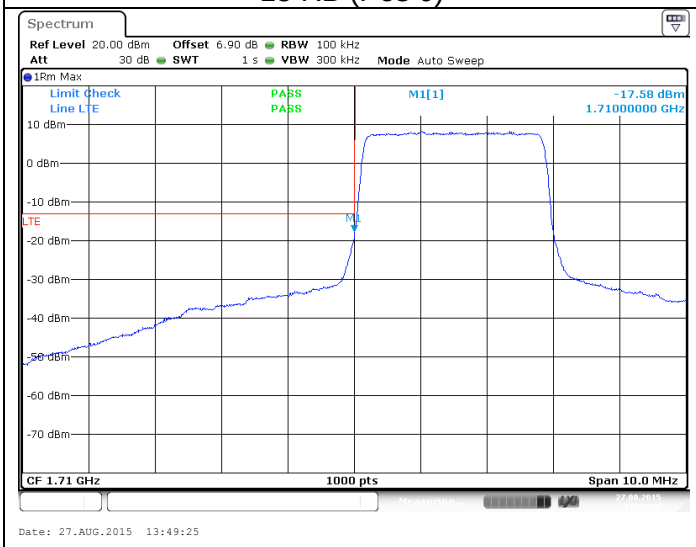
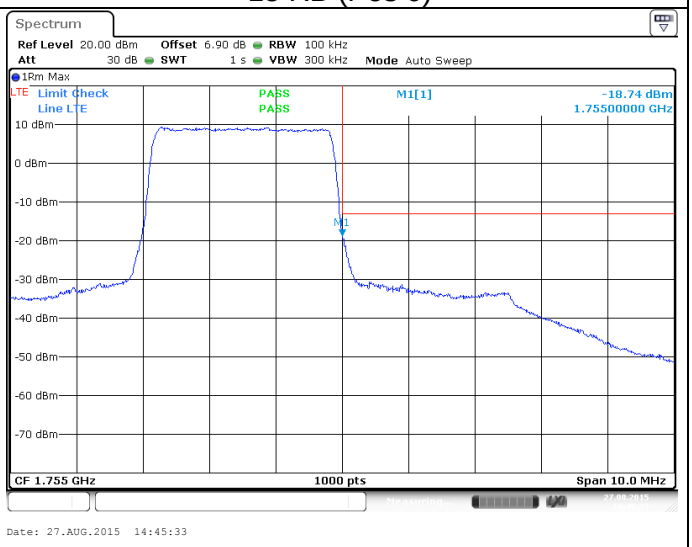
LTE Band 2, QPSK modulation, 5MHz	
Low Channel (18625)	High Channel (19175)
1 RB (Pos 0)	1 RB (Pos 24)
 Date: 27.AUG.2015 11:50:26	 Date: 27.AUG.2015 11:47:54
25 RB (Pos 0)	25 RB (Pos 0)
 Date: 27.AUG.2015 11:49:55	 Date: 27.AUG.2015 11:46:19

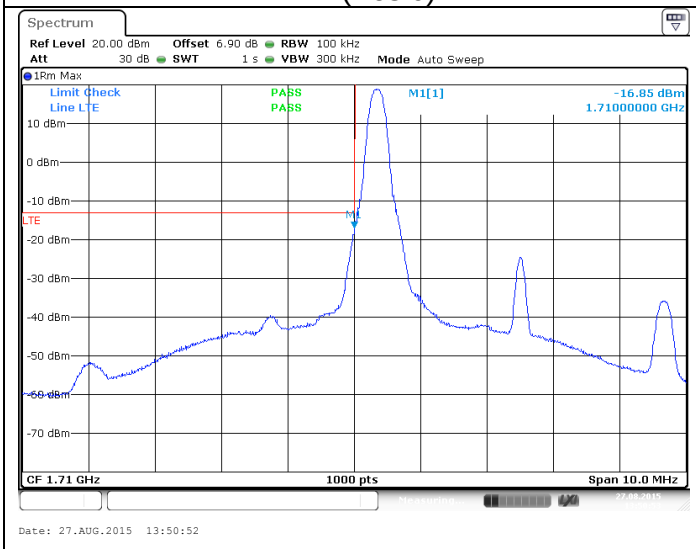
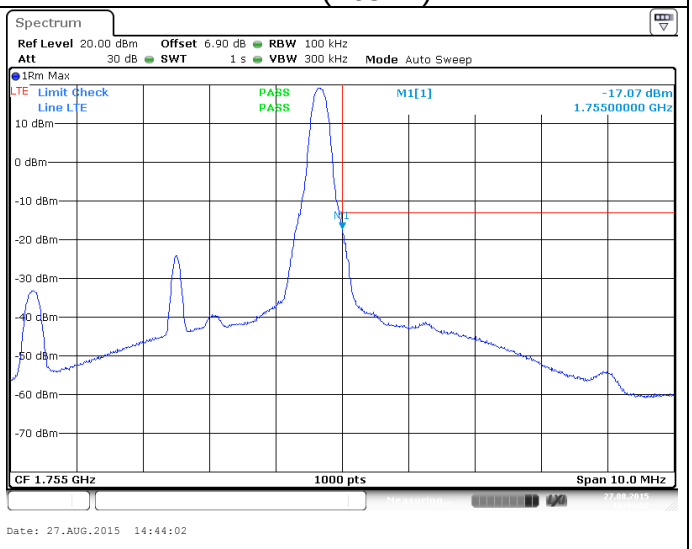
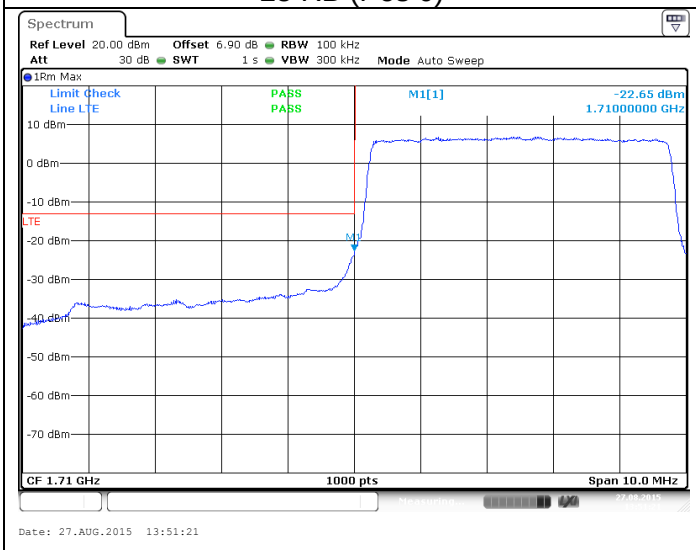
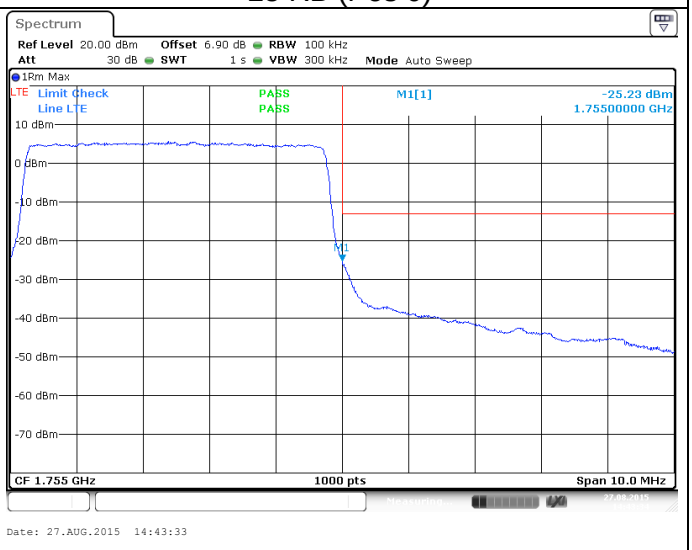
LTE Band 2, QPSK modulation, 10MHz	
Low Channel (18650)	High Channel (19150)
1 RB (Pos 0)	1 RB (Pos 49)
	
50 RB (Pos 0)	50 RB (Pos 0)
	

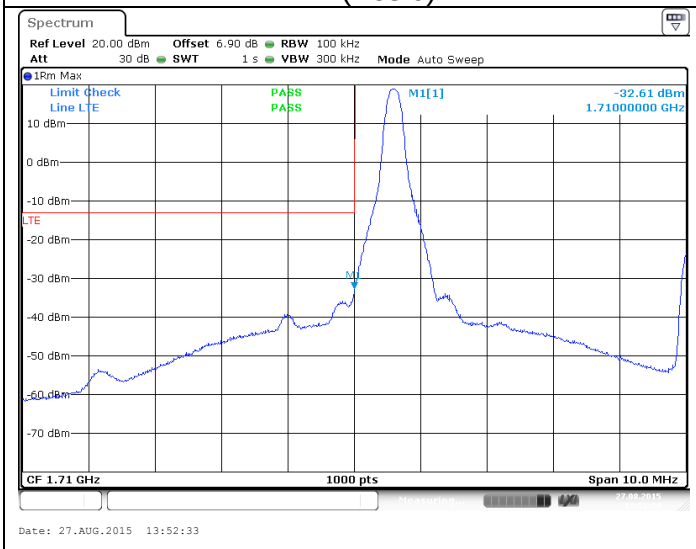
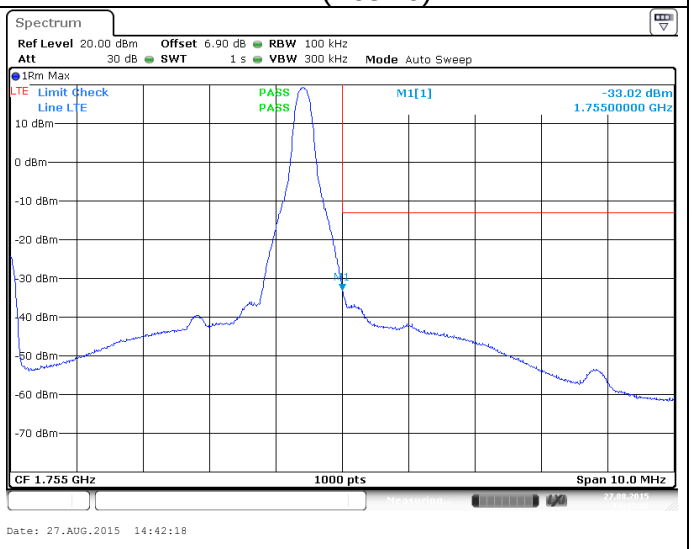
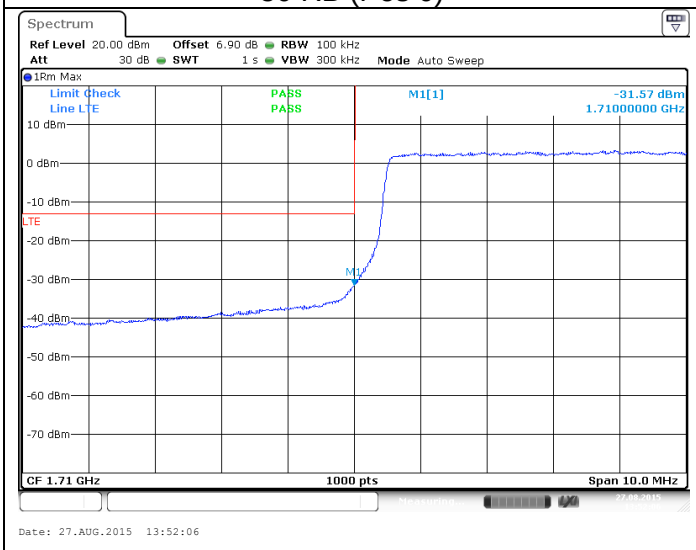
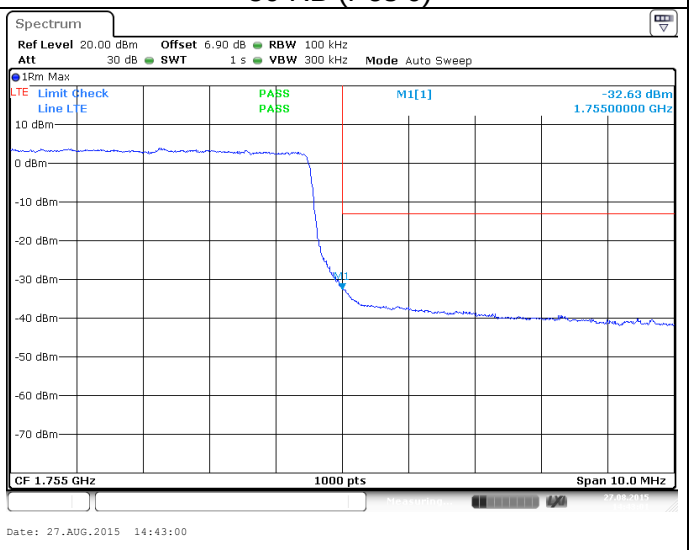
LTE Band 2, QPSK modulation, 15MHz	
Low Channel (18675)	High Channel (19125)
1 RB (Pos 0)	1 RB (Pos 74)
	
75 RB (Pos 0)	75 RB (Pos 0)
	

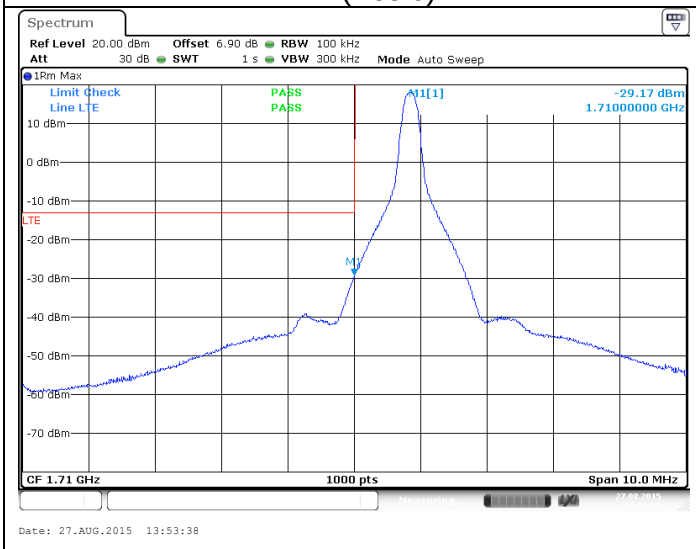
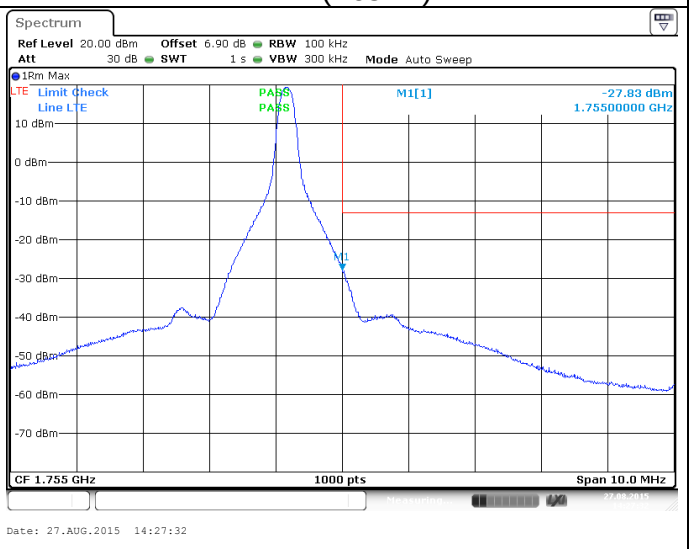
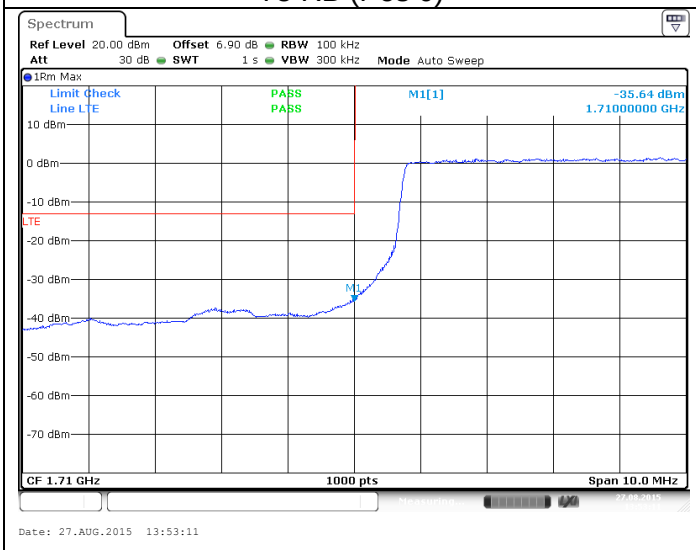
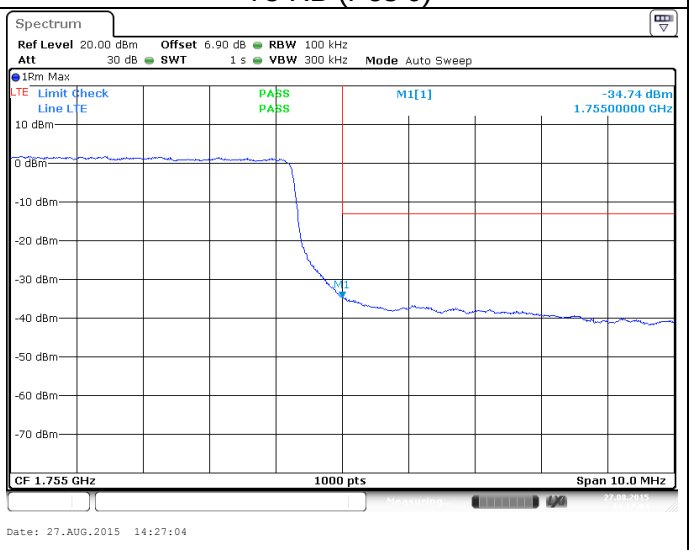
LTE Band 2, QPSK modulation, 20MHz	
Low Channel (18700)	High Channel (19100)
1 RB (Pos 0)	1 RB (Pos 99)
	
100 RB (Pos 0)	100 RB (Pos 0)
	

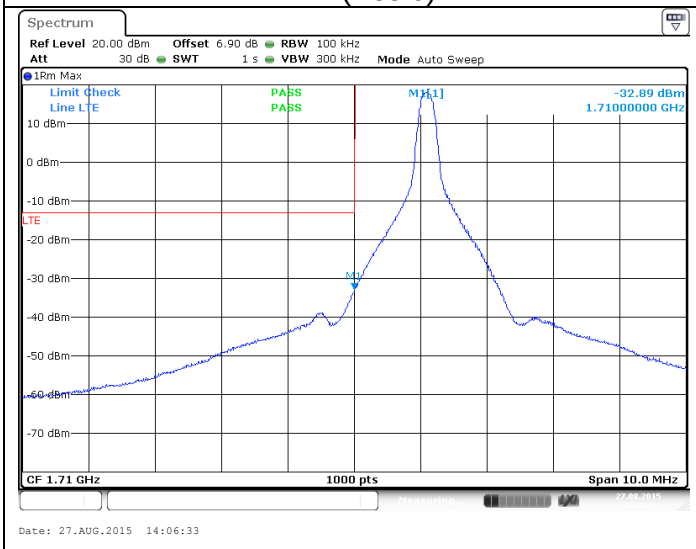
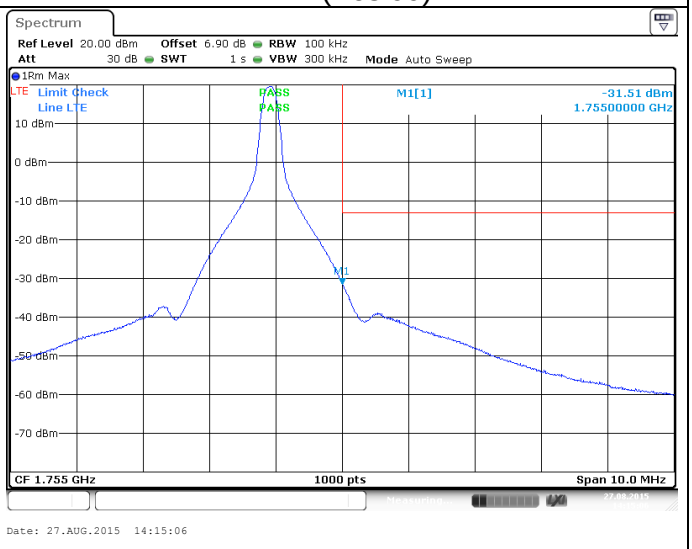
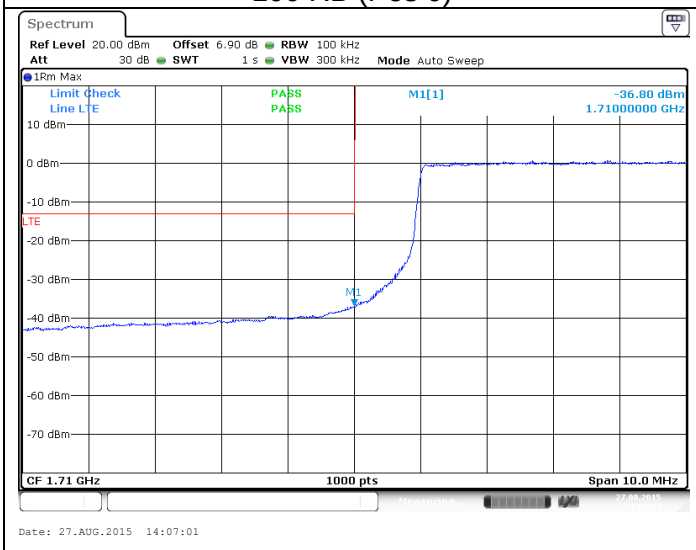
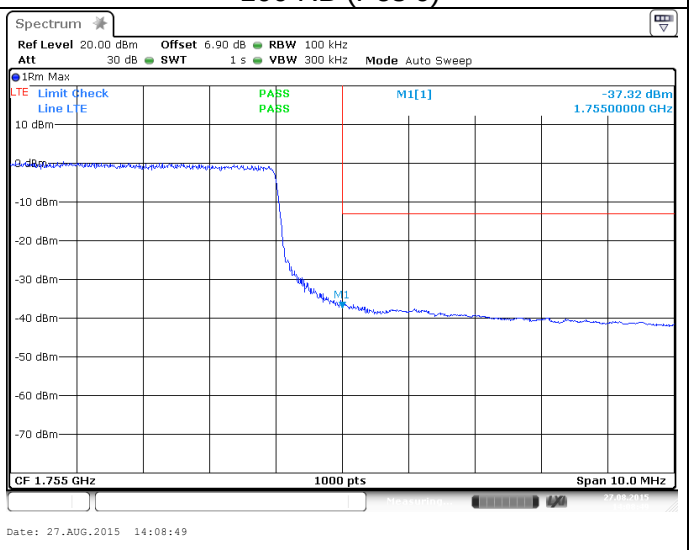
LTE Band 4, QPSK modulation, 1.4MHz	
Low Channel (19957)	High Channel (20393)
1 RB (Pos 0)	1 RB (Pos 5)
	
6 RB (Pos 0)	6 RB (Pos 0)
	

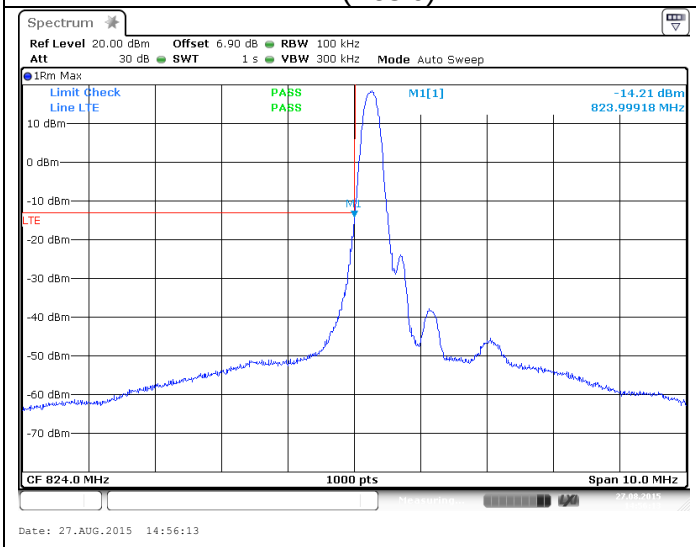
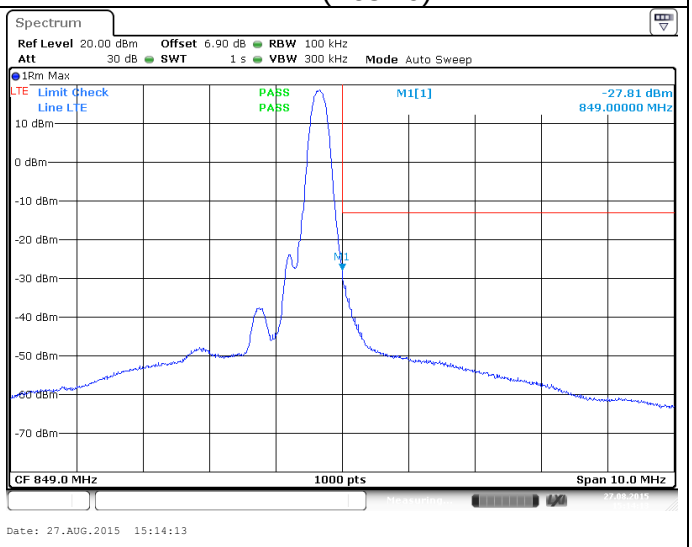
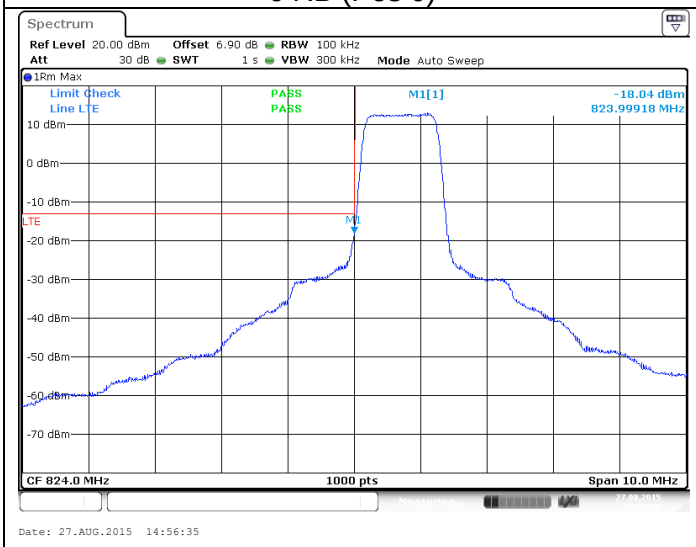
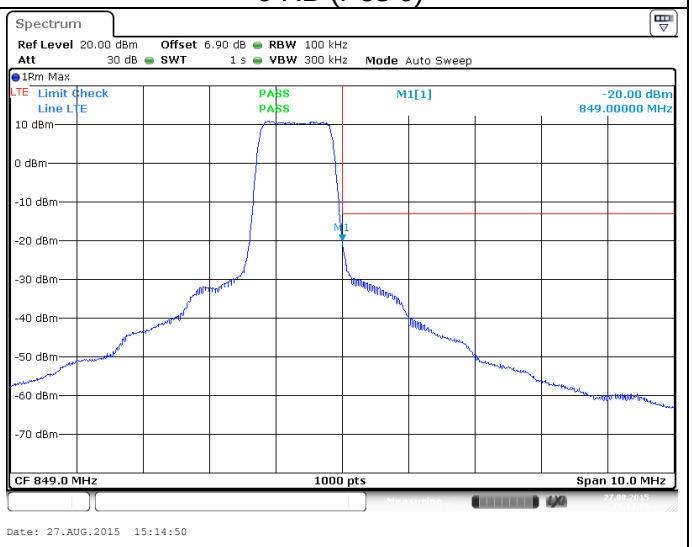
LTE Band 4, QPSK modulation, 3MHz	
Low Channel (19965)	High Channel (20385)
1 RB (Pos 0)	1 RB (Pos 14)
	
15 RB (Pos 0)	15 RB (Pos 0)
	

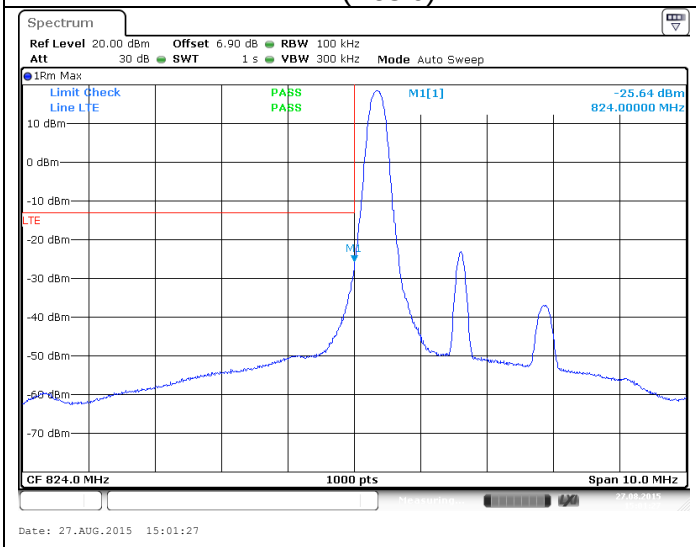
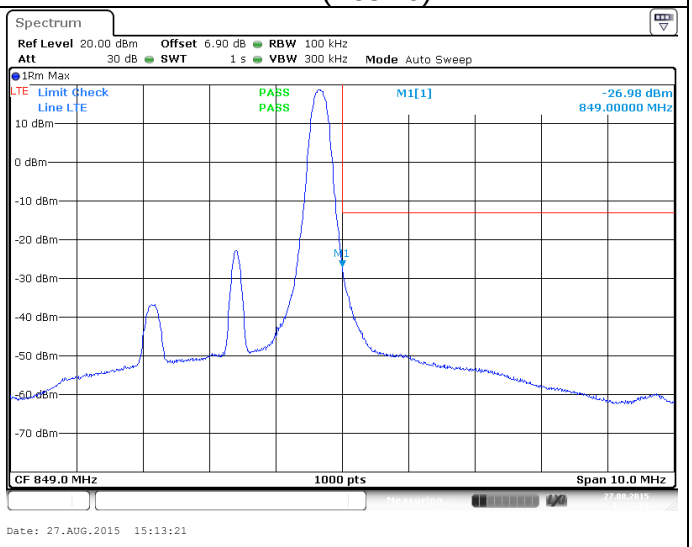
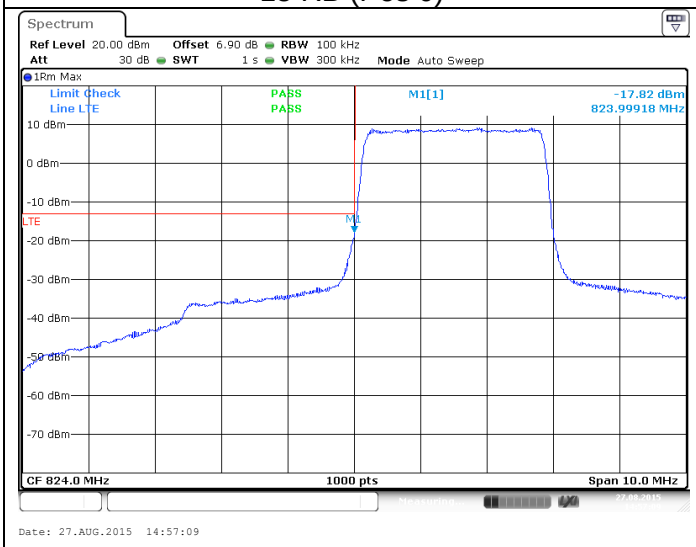
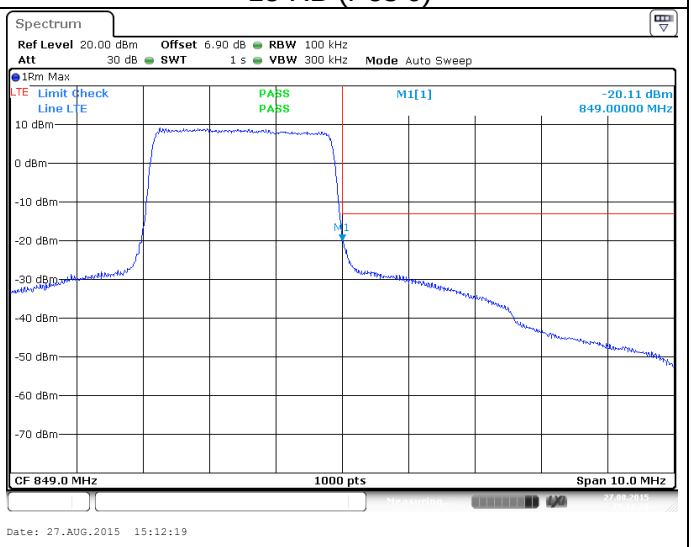
LTE Band 4, QPSK modulation, 5MHz	
Low Channel (19975)	High Channel (20375)
1 RB (Pos 0)	1 RB (Pos 24)
	
25 RB (Pos 0)	25 RB (Pos 0)
	

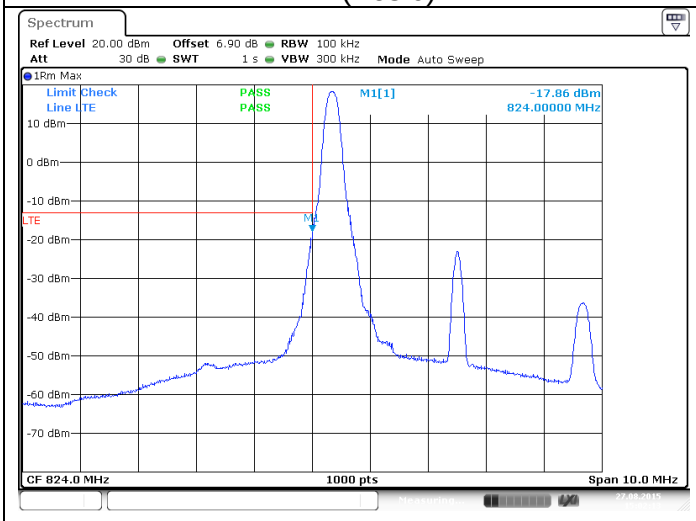
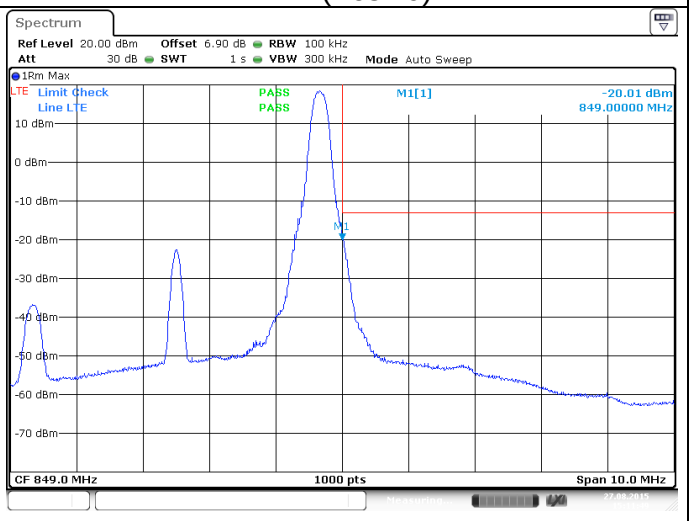
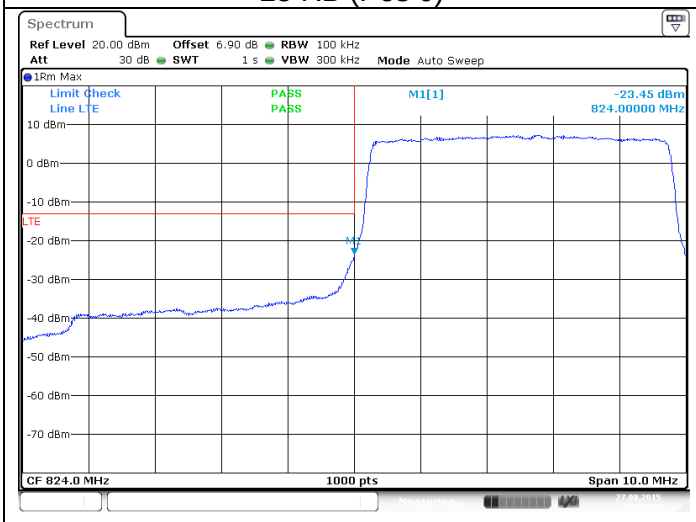
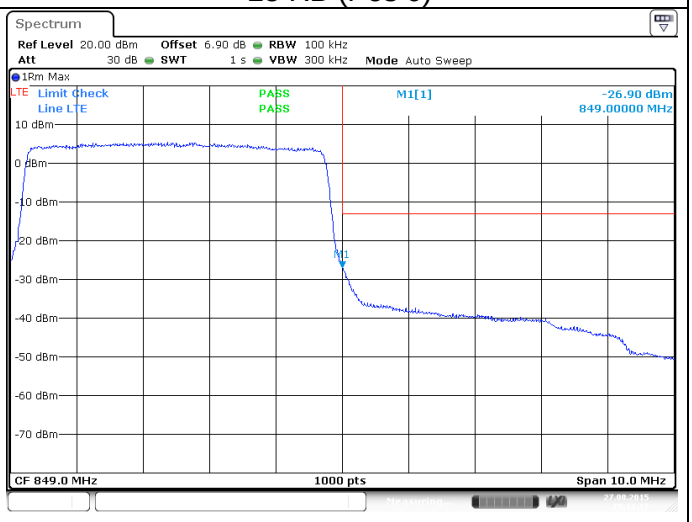
LTE Band 4, QPSK modulation, 10MHz	
Low Channel (20000)	High Channel (20350)
1 RB (Pos 0)	1 RB (Pos 49)
	
50 RB (Pos 0)	50 RB (Pos 0)
	

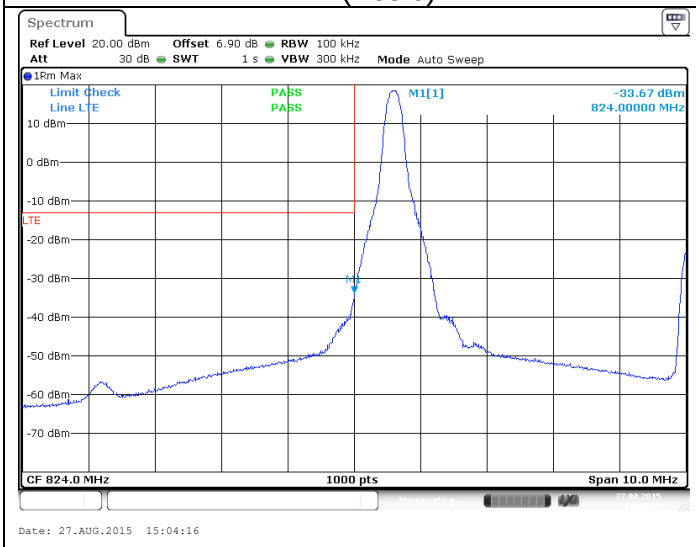
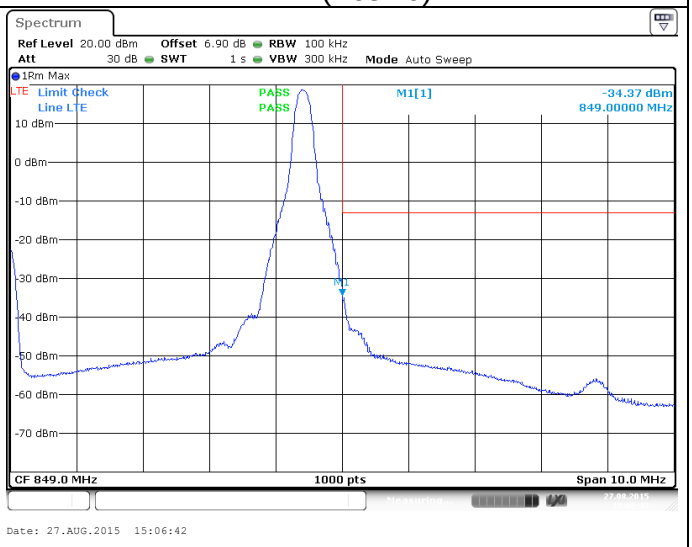
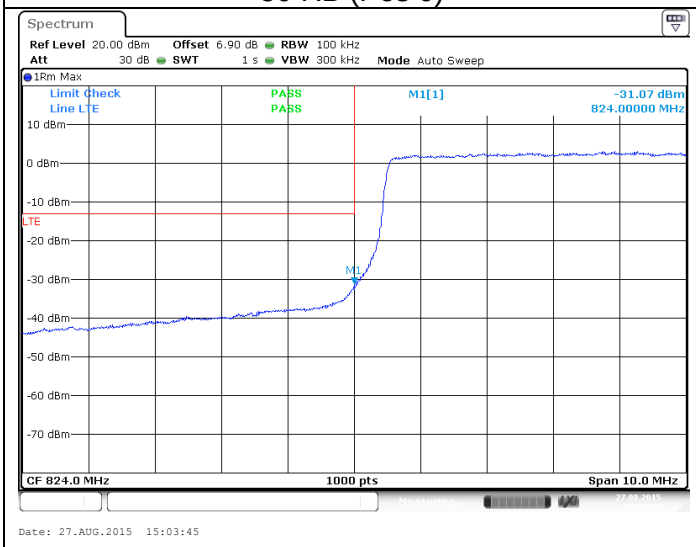
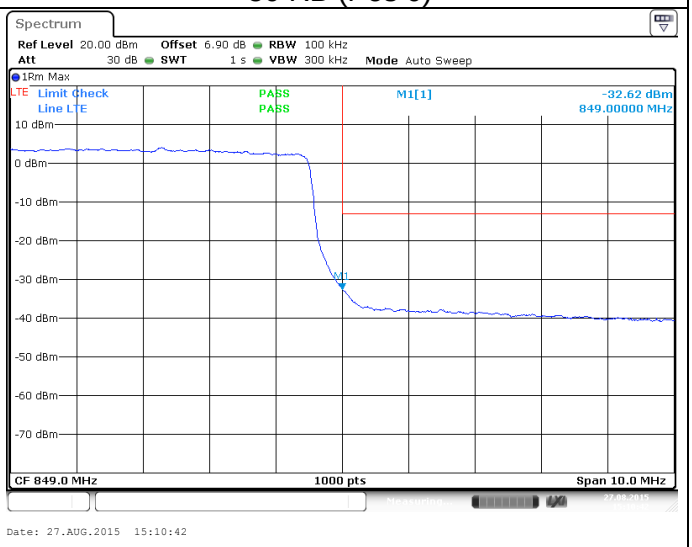
LTE Band 4, QPSK modulation, 15MHz	
Low Channel (20025)	High Channel (20325)
1 RB (Pos 0)	1 RB (Pos 74)
	
75 RB (Pos 0)	75 RB (Pos 0)
	

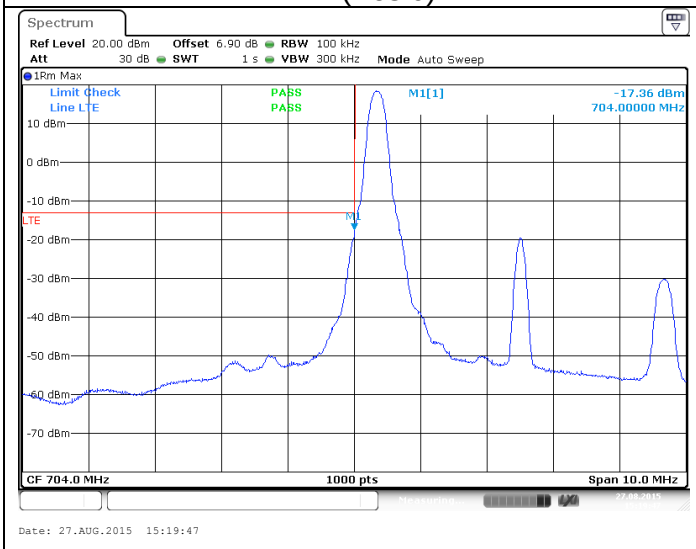
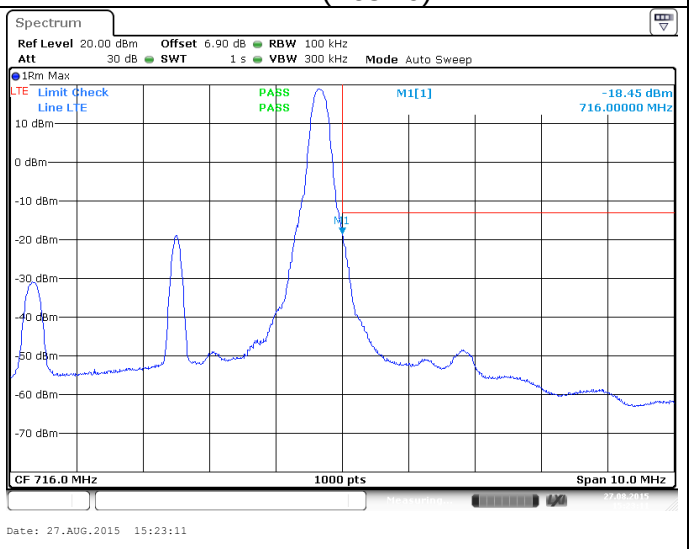
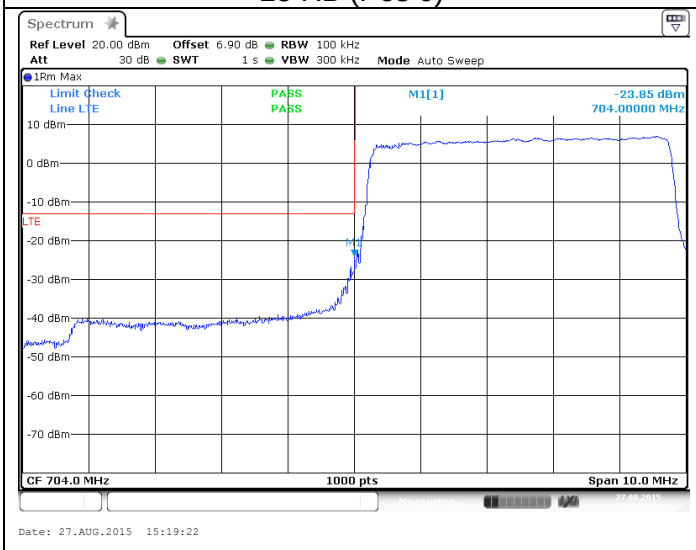
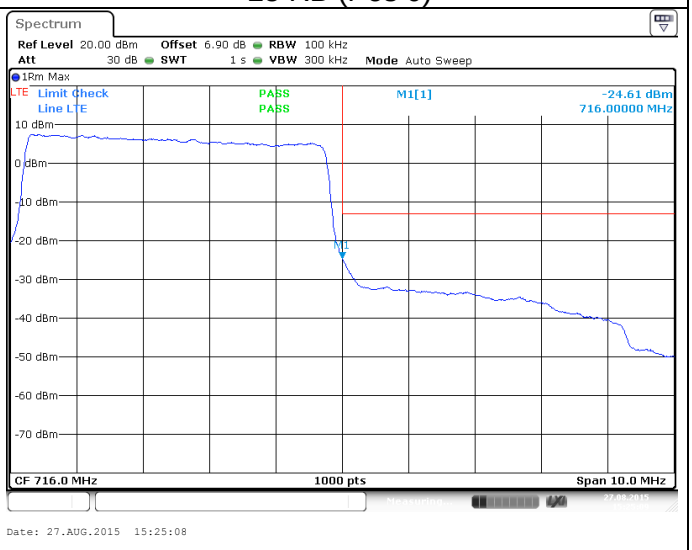
LTE Band 4, QPSK modulation, 20MHz	
Low Channel (20050)	High Channel (20300)
1 RB (Pos 0)	1 RB (Pos 99)
	
100 RB (Pos 0)	100 RB (Pos 0)
	

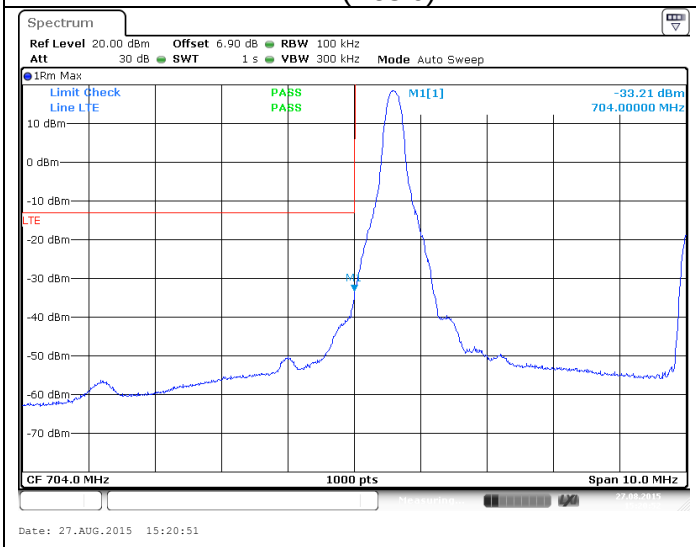
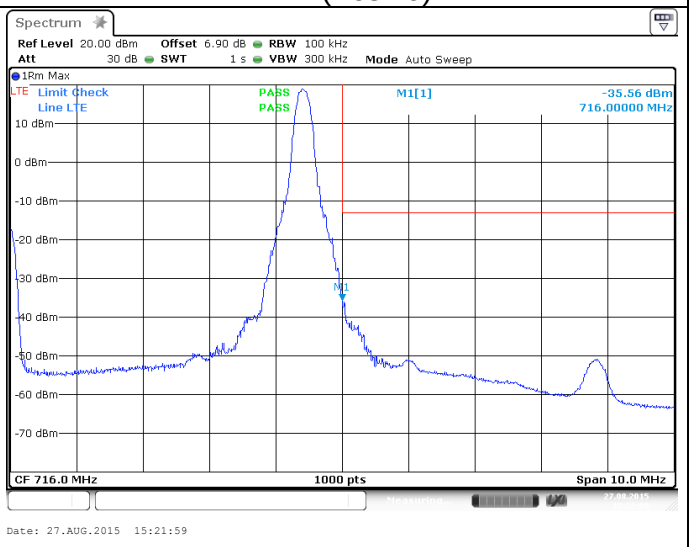
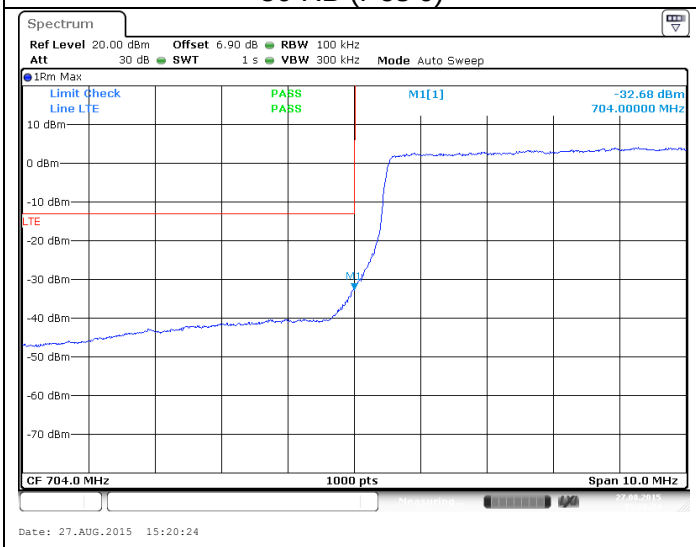
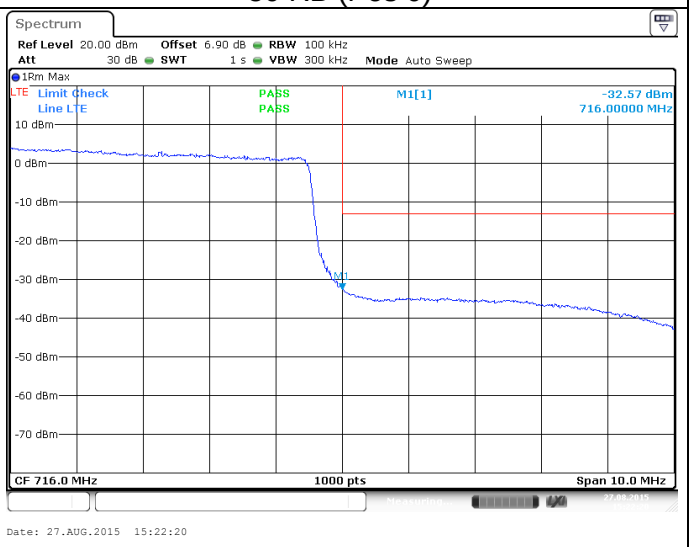
LTE Band 5, QPSK modulation, 1.4MHz	
Low Channel (20407)	High Channel (20643)
1 RB (Pos 0)	1 RB (Pos 49)
	
6 RB (Pos 0)	6 RB (Pos 0)
	

LTE Band 5, QPSK modulation, 3MHz	
Low Channel (20415)	High Channel (20635)
1 RB (Pos 0)	1 RB (Pos 49)
	
15 RB (Pos 0)	15 RB (Pos 0)
	

LTE Band 5, QPSK modulation, 5MHz	
Low Channel (20425)	High Channel (20625)
1 RB (Pos 0)	1 RB (Pos 49)
	
25 RB (Pos 0)	25 RB (Pos 0)
	

LTE Band 5, QPSK modulation, 10MHz	
Low Channel (20450)	High Channel (20600)
1 RB (Pos 0)	1 RB (Pos 49)
	
50 RB (Pos 0)	50 RB (Pos 0)
	

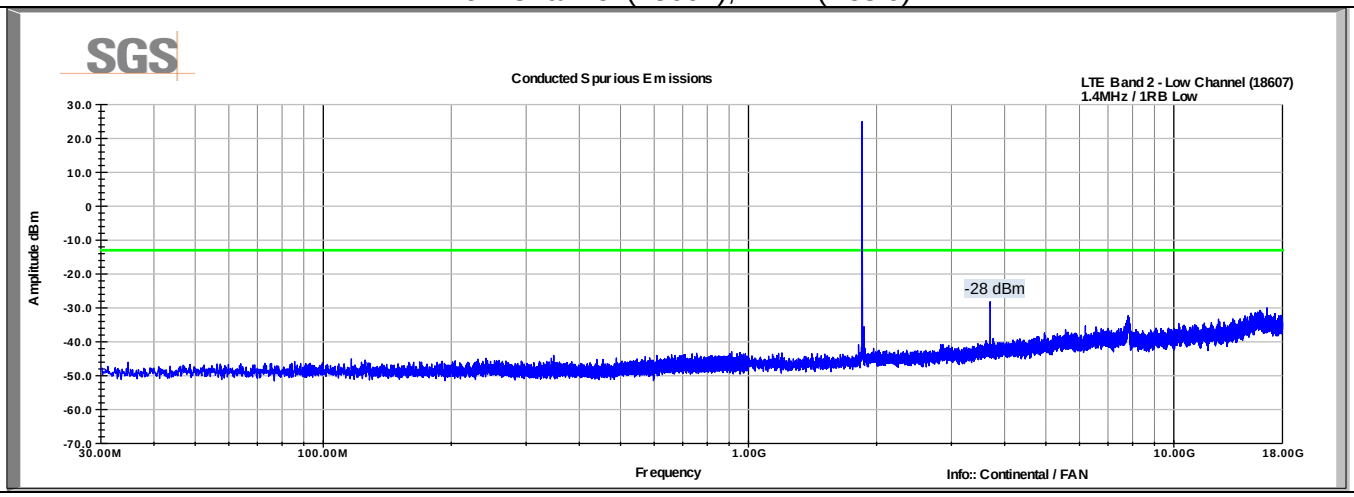
LTE Band17, QPSK modulation, 5MHz	
Low Channel (23755)	High Channel (23825)
1 RB (Pos 0)	1 RB (Pos 49)
	
25 RB (Pos 0)	25 RB (Pos 0)
	

LTE Band 17, QPSK modulation, 10MHz	
Low Channel (23780)	High Channel (23800)
1 RB (Pos 0)	1 RB (Pos 49)
	
50 RB (Pos 0)	50 RB (Pos 0)
	

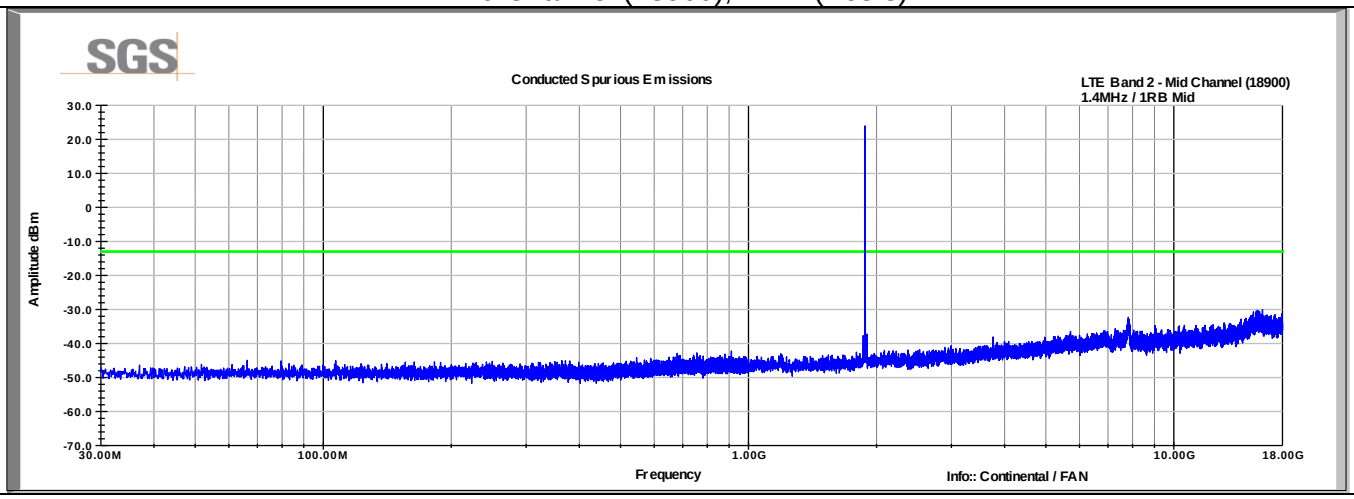
6.6 *Test Data - Conducted Spurious Emissions*

LTE Band 2, QPSK modulation, 1.4MHz

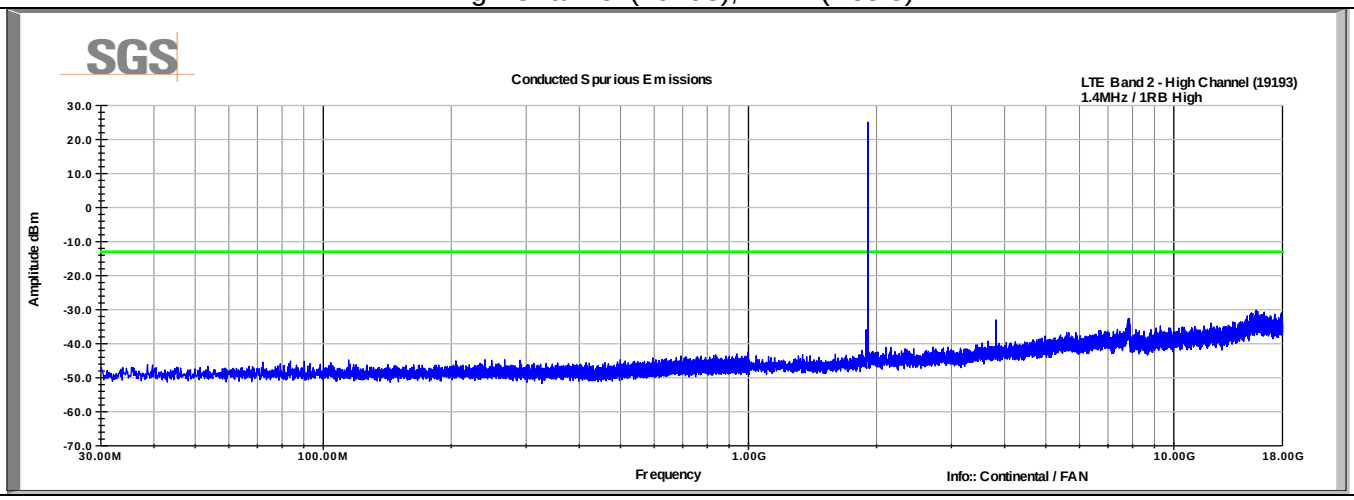
Low Channel (18607), 1 RB (Pos 0)



Mid Channel (18900), 1 RB (Pos 3)

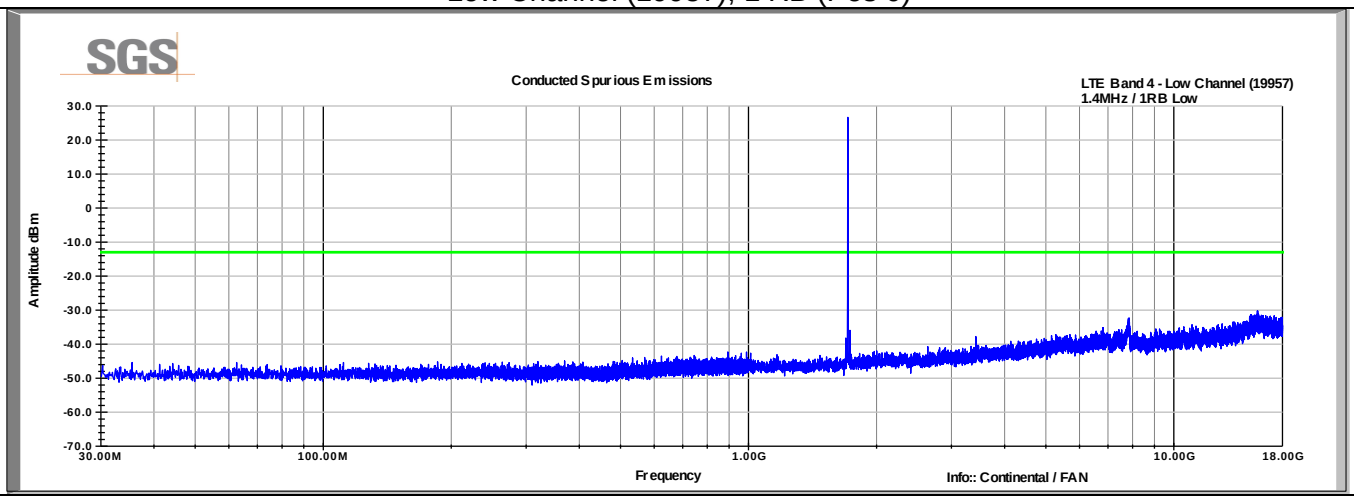


High Channel (19193), 1 RB (Pos 5)

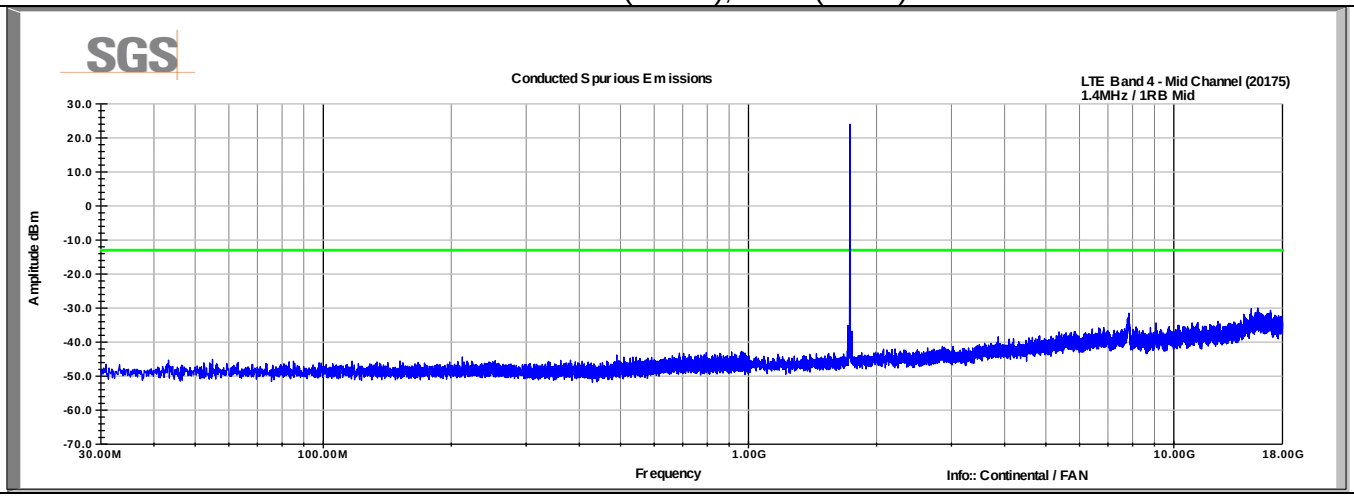


LTE Band 4, QPSK modulation, 1.4MHz

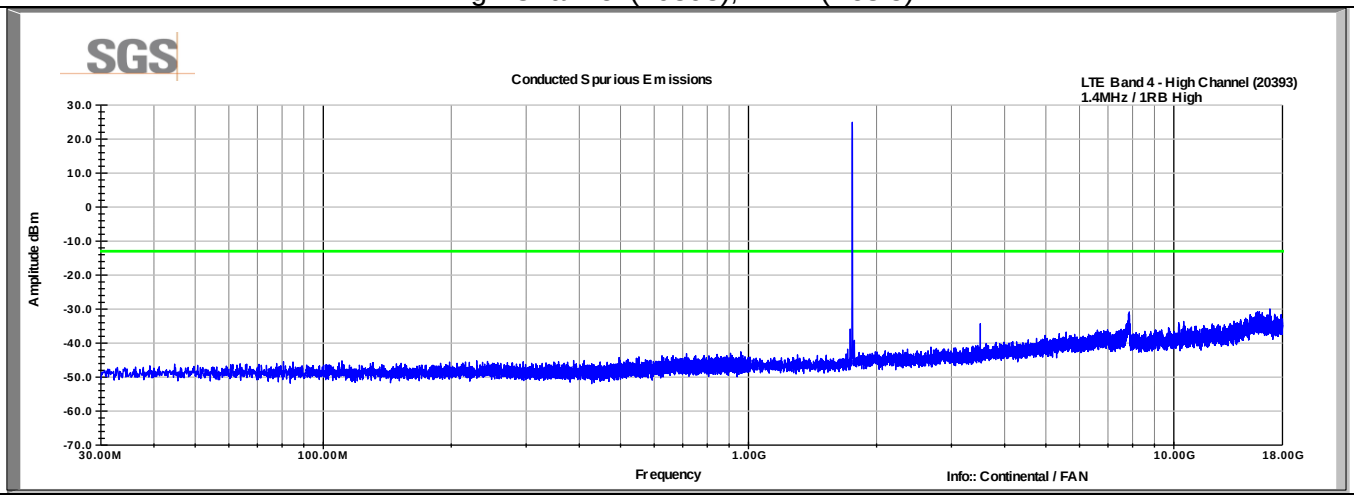
Low Channel (19957), 1 RB (Pos 0)



Mid Channel (20175), 1 RB (Pos 3)

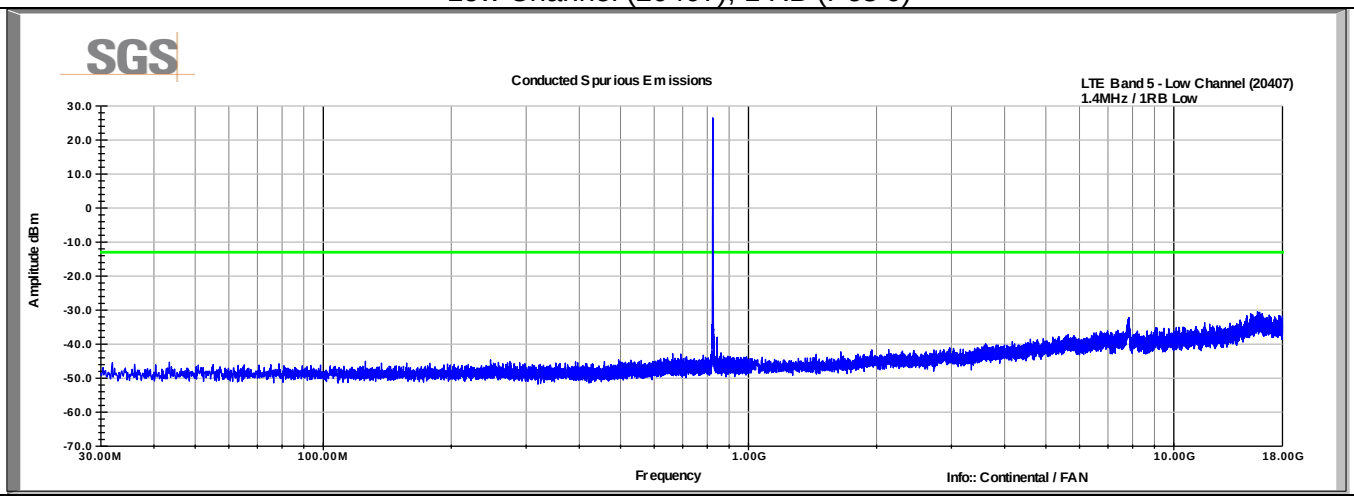


High Channel (20393), 1 RB (Pos 5)

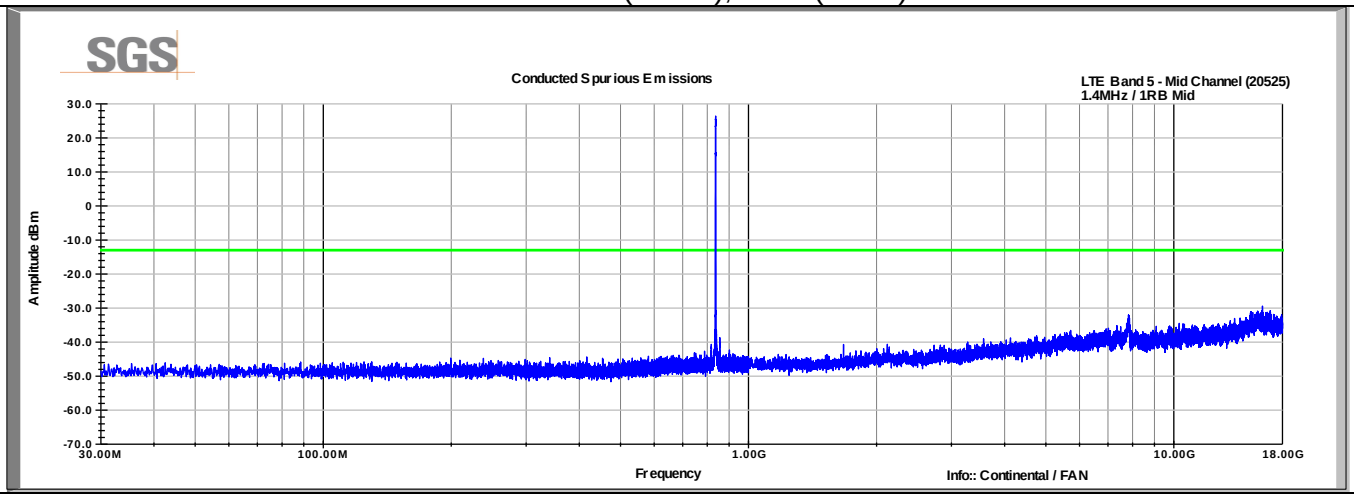


LTE Band 5, QPSK modulation, 1.4MHz

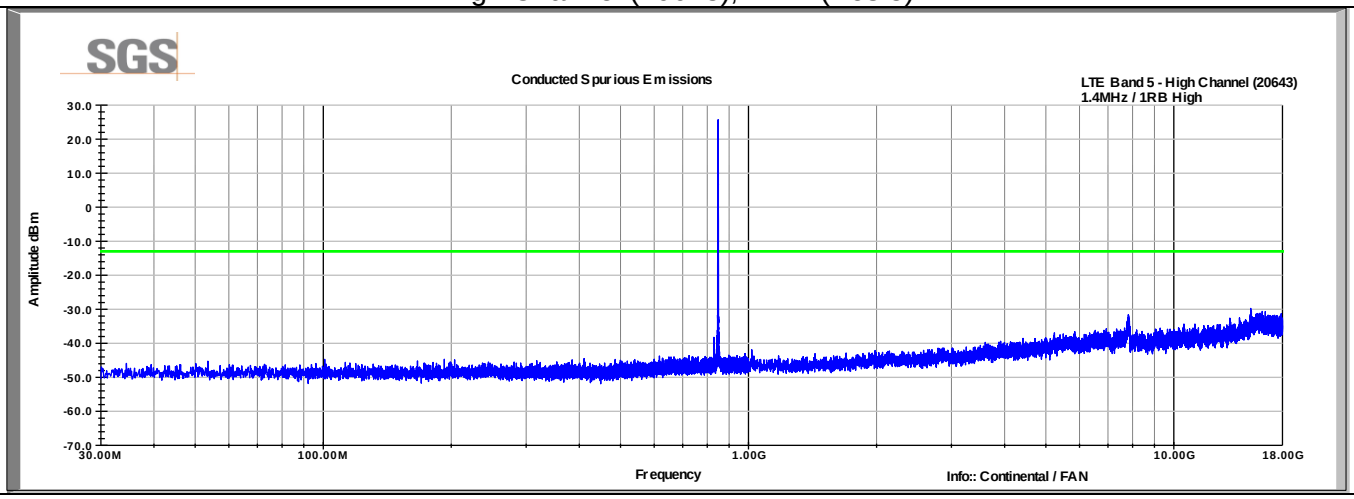
Low Channel (20407), 1 RB (Pos 0)



Mid Channel (20525), 1 RB (Pos 3)

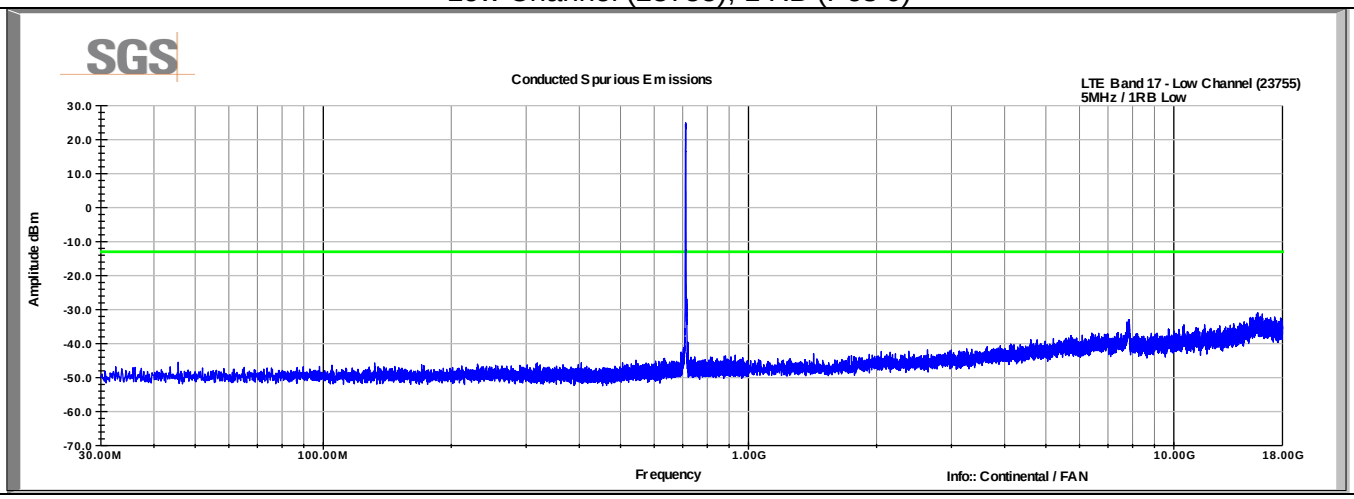


High Channel (20643), 1 RB (Pos 5)

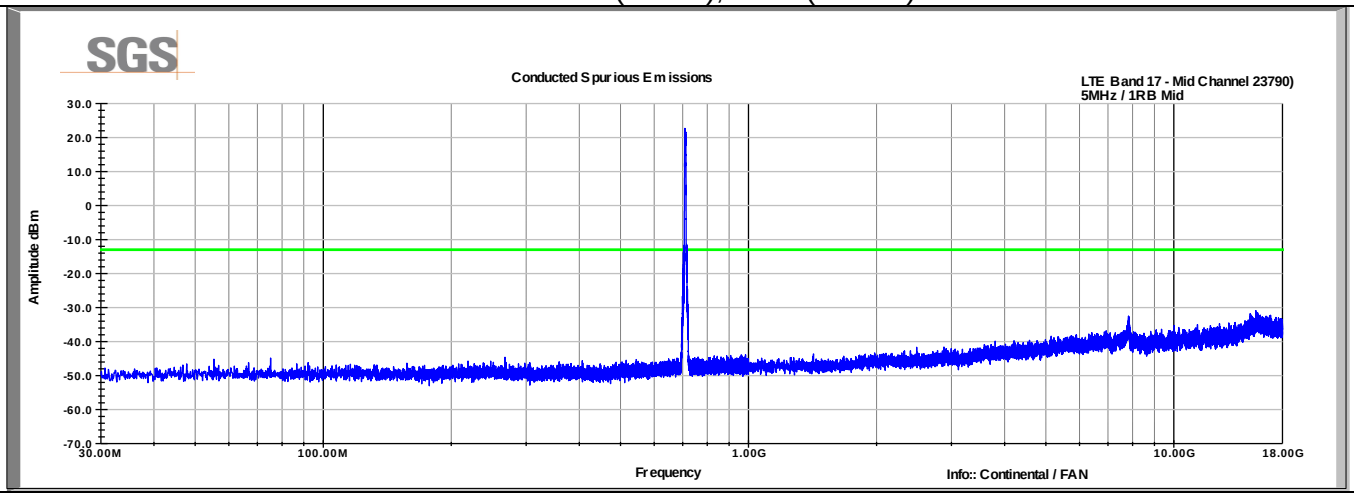


LTE Band 17, QPSK modulation, 5MHz

Low Channel (23755), 1 RB (Pos 0)



Mid Channel (23790), 1 RB (Pos 12)



High Channel (23825), 1 RB (Pos 24)