

EMC Test Report

Project Number: 4022869

Report Number: 4022869EMC01

Revision Level: 0

Client: Continental Automotive Systems, Inc.

Equipment Under Test: Wireless Modem Module

Model: BL28NA-001

FCC ID: LHJ-BL28NA001

IC ID: 2807E-BL28NA001

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

RSS-199, Issue 2

Report issued on: 12 September 2016

Test Result: Compliant

Tested by:



Fabian Nica, Senior Engineering Technician

Reviewed by:



Jeremy Pickens, Senior EMC Engineer

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) RSS-199 (4.2)	Occupied Bandwidth	N/A		Reported
2.1051 22.917(a) 24.238(a) 27.53(c)(2) 27.53(h) 27.53(m)(4)	RSS-130 (4.6.1) RSS-132 (5.5) RSS-133 (6.5.1) RSS-139 (6.5.1) RSS-199 (4.6)	Band Edge / Conducted Spurious Emissions	$< 43 + 10\log_{10}(P_{\text{Watts}})$ at band edge and for all out of band emissions		Pass
22.913(a)(2)	--	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) 27.50(h)	RSS-132 (5.4) RSS-133 (6.4) RSS-139 (6.4) RSS-199 (4.4)	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) RSS-199 (4.6)	Radiated Spurious Emissions	$< 43 + 10\log_{10}(P_{\text{Watts}})$ 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) RSS-199 (4.3)	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: BL28NA-001
Serial Number: Not Labeled

FCC ID: LHJ- BL28NA001
IC ID: 2807E- BL28NA001

IMEI Number: 004401810126587
IMEI Number: 004401810126637

Rated Voltage: 10.2 – 13.8 Vdc,
Test Voltage: 12 Vdc,
1850 - 1910 MHz (LTE Band 2)
1710 – 1755 MHz (LTE Band 4)
824 – 849 MHz (LTE Band 5)
Tx Frequency Range: 2500 – 2570 MHz (LTE Band 7)
699 – 746MHz (LTE Band 12)
777 – 787MHz (LTE Band 13)
704 – 716 MHz (LTE Band 17)

FCC Classification: PCS Licensed Transmitter PCB
Type: Pre Production

Sample Received Date: 05 August 2016
Dates of testing: 05 – 26 August 2016

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: 23.3 °C
Relative Humidity: 42.5%
Atmospheric Pressure: 98.2 kPa

3.4 Test Equipment

Test Date: 8-Aug-2016

Tester: JOP

Equipment	Model	Manufacturer	Asset Number	Cal Due Date
WIDEBAND RADIO COMMUNICATION TESTER	CMW500	ROHDE & SCHWARZ	B094874	19-Jan-2018
RF CABLE	141	HUBER & SUHNER	B095585	26-Jul-2017

- Unless otherwise noted, equipment is on a 1 year calibration cycle.
- Based on manufacturer's specifications, the CMW-500 is on a 2 year calibration cycle.

3.5 Test Data - LTE Band 2

Max Power: 24.17 dBm / 0.262W

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)	23.36	0.53	23.89
18607	1850.7	1.4	1	(RB_Pos:5)	23.48	0.53	24.01
18607	1850.7	1.4	4	(RB_Pos:0)	23.20	0.53	23.73
18607	1850.7	1.4	4	(RB_Pos:2)	23.26	0.53	23.79
18607	1850.7	1.4	6	(RB_Pos:0)	22.26	0.53	22.79
18900	1880	1.4	1	(RB_Pos:0)	23.59	0.53	24.12
18900	1880	1.4	1	(RB_Pos:5)	23.54	0.53	24.07
18900	1880	1.4	4	(RB_Pos:0)	23.52	0.53	24.05
18900	1880	1.4	4	(RB_Pos:2)	23.57	0.53	24.1
18900	1880	1.4	6	(RB_Pos:0)	22.58	0.53	23.11
19193	1909.3	1.4	1	(RB_Pos:0)	23.52	0.53	24.05
19193	1909.3	1.4	1	(RB_Pos:5)	23.46	0.53	23.99
19193	1909.3	1.4	4	(RB_Pos:0)	23.33	0.53	23.86
19193	1909.3	1.4	4	(RB_Pos:2)	23.34	0.53	23.87
19193	1909.3	1.4	6	(RB_Pos:0)	22.37	0.53	22.9
18615	1851.5	3	1	(RB_Pos:0)	23.32	0.53	23.85
18615	1851.5	3	1	(RB_Pos:14)	23.26	0.53	23.79
18615	1851.5	3	8	(RB_Pos:0)	22.31	0.53	22.84
18615	1851.5	3	8	(RB_Pos:7)	22.36	0.53	22.89
18615	1851.5	3	15	(RB_Pos:0)	22.36	0.53	22.89
18900	1880	3	1	(RB_Pos:0)	23.55	0.53	24.08
18900	1880	3	1	(RB_Pos:14)	23.59	0.53	24.12
18900	1880	3	8	(RB_Pos:0)	22.59	0.53	23.12
18900	1880	3	8	(RB_Pos:7)	22.58	0.53	23.11
18900	1880	3	15	(RB_Pos:0)	22.60	0.53	23.13
19185	1909.9	3	1	(RB_Pos:0)	23.41	0.53	23.94
19185	1909.9	3	1	(RB_Pos:14)	23.44	0.53	23.97
19185	1909.9	3	8	(RB_Pos:0)	22.34	0.53	22.87
19185	1909.9	3	8	(RB_Pos:7)	22.30	0.53	22.83
19185	1909.9	3	15	(RB_Pos:0)	22.42	0.53	22.95
18625	1852.5	5	1	(RB_Pos:0)	23.12	0.53	23.65
18625	1852.5	5	1	(RB_Pos:24)	23.23	0.53	23.76
18625	1852.5	5	12	(RB_Pos:0)	22.32	0.53	22.85
18625	1852.5	5	12	(RB_Pos:13)	22.31	0.53	22.84
18625	1852.5	5	25	(RB_Pos:0)	22.35	0.53	22.88
18900	1880	5	1	(RB_Pos:0)	23.54	0.53	24.07
18900	1880	5	1	(RB_Pos:24)	23.47	0.53	24
18900	1880	5	12	(RB_Pos:0)	22.61	0.53	23.14
18900	1880	5	12	(RB_Pos:13)	22.60	0.53	23.13
18900	1880	5	25	(RB_Pos:0)	22.64	0.53	23.17
19175	1907.5	5	1	(RB_Pos:0)	23.29	0.53	23.82
19175	1907.5	5	1	(RB_Pos:24)	23.35	0.53	23.88
19175	1907.5	5	12	(RB_Pos:0)	22.39	0.53	22.92
19175	1907.5	5	12	(RB_Pos:13)	22.31	0.53	22.84
19175	1907.5	5	25	(RB_Pos:0)	22.40	0.53	22.93
18650	1855	10	1	(RB_Pos:0)	23.52	0.53	24.05
18650	1855	10	1	(RB_Pos:49)	23.47	0.53	24
18650	1855	10	25	(RB_Pos:0)	22.34	0.53	22.87
18650	1855	10	25	(RB_Pos:25)	22.40	0.53	22.93
18650	1855	10	50	(RB_Pos:0)	22.41	0.53	22.94
18900	1880	10	1	(RB_Pos:0)	23.77	0.53	24.3
18900	1880	10	1	(RB_Pos:49)	23.64	0.53	24.17
18900	1880	10	25	(RB_Pos:0)	22.66	0.53	23.19
18900	1880	10	25	(RB_Pos:25)	22.63	0.53	23.16
18900	1880	10	50	(RB_Pos:0)	22.66	0.53	23.19
19150	1905	10	1	(RB_Pos:0)	23.66	0.53	24.19
19150	1905	10	1	(RB_Pos:49)	23.51	0.53	24.04
19150	1905	10	25	(RB_Pos:0)	22.47	0.53	23
19150	1905	10	25	(RB_Pos:25)	22.41	0.53	22.94

3.6 Test Data - LTE Band 4

Max Power: 24.31 dBm / 0.270

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)	23.65	0.51	24.16
19957	1710.7	1.4	1	(RB_Pos:5)	23.72	0.51	24.23
19957	1710.7	1.4	4	(RB_Pos:0)	23.59	0.51	24.1
19957	1710.7	1.4	4	(RB_Pos:2)	23.6	0.51	24.11
19957	1710.7	1.4	6	(RB_Pos:0)	22.57	0.51	23.08
20175	1732.5	1.4	1	(RB_Pos:0)	23.5	0.51	24.01
20175	1732.5	1.4	1	(RB_Pos:5)	23.56	0.51	24.07
20175	1732.5	1.4	4	(RB_Pos:0)	23.61	0.51	24.12
20175	1732.5	1.4	4	(RB_Pos:2)	23.6	0.51	24.11
20175	1732.5	1.4	6	(RB_Pos:0)	22.61	0.51	23.12
20393	1754.3	1.4	1	(RB_Pos:0)	23.38	0.51	23.89
20393	1754.3	1.4	1	(RB_Pos:5)	23.42	0.51	23.93
20393	1754.3	1.4	4	(RB_Pos:0)	23.33	0.51	23.84
20393	1754.3	1.4	4	(RB_Pos:2)	23.31	0.51	23.82
20393	1754.3	1.4	6	(RB_Pos:0)	22.35	0.51	22.86
19965	1711.5	3	1	(RB_Pos:0)	23.6	0.51	24.11
19965	1711.5	3	1	(RB_Pos:14)	23.64	0.51	24.15
19965	1711.5	3	8	(RB_Pos:0)	22.68	0.51	23.19
19965	1711.5	3	8	(RB_Pos:7)	22.67	0.51	23.18
19965	1711.5	3	15	(RB_Pos:0)	22.59	0.51	23.1
20175	1732.5	3	1	(RB_Pos:0)	23.59	0.51	24.1
20175	1732.5	3	1	(RB_Pos:14)	23.56	0.51	24.07
20175	1732.5	3	8	(RB_Pos:0)	22.62	0.51	23.13
20175	1732.5	3	8	(RB_Pos:7)	22.62	0.51	23.13
20175	1732.5	3	15	(RB_Pos:0)	22.63	0.51	23.14
20385	1753.5	3	1	(RB_Pos:0)	23.47	0.51	23.98
20385	1753.5	3	1	(RB_Pos:14)	23.41	0.51	23.92
20385	1753.5	3	8	(RB_Pos:0)	22.34	0.51	22.85
20385	1753.5	3	8	(RB_Pos:7)	22.33	0.51	22.84
20385	1753.5	3	15	(RB_Pos:0)	22.38	0.51	22.89
19975	1712.5	5	1	(RB_Pos:0)	23.45	0.51	23.96
19975	1712.5	5	1	(RB_Pos:24)	23.5	0.51	24.01
19975	1712.5	5	12	(RB_Pos:0)	22.57	0.51	23.08
19975	1712.5	5	12	(RB_Pos:13)	22.55	0.51	23.06
19975	1712.5	5	25	(RB_Pos:0)	22.56	0.51	23.07
20175	1732.5	5	1	(RB_Pos:0)	23.58	0.51	24.09
20175	1732.5	5	1	(RB_Pos:24)	23.46	0.51	23.97
20175	1732.5	5	12	(RB_Pos:0)	22.61	0.51	23.12
20175	1732.5	5	12	(RB_Pos:13)	22.62	0.51	23.13
20175	1732.5	5	25	(RB_Pos:0)	22.61	0.51	23.12
20375	1752.5	5	1	(RB_Pos:0)	23.62	0.51	24.13
20375	1752.5	5	1	(RB_Pos:24)	23.47	0.51	23.98
20375	1752.5	5	12	(RB_Pos:0)	22.61	0.51	23.12
20375	1752.5	5	12	(RB_Pos:13)	22.43	0.51	22.94
20375	1752.5	5	25	(RB_Pos:0)	22.55	0.51	23.06
20000	1715	10	1	(RB_Pos:0)	23.74	0.51	24.25
20000	1715	10	1	(RB_Pos:49)	23.79	0.51	24.3
20000	1715	10	25	(RB_Pos:0)	22.71	0.51	23.22
20000	1715	10	25	(RB_Pos:25)	22.74	0.51	23.25
20000	1715	10	50	(RB_Pos:0)	22.72	0.51	23.23
20175	1732.5	10	1	(RB_Pos:0)	23.6	0.51	24.11
20175	1732.5	10	1	(RB_Pos:49)	23.62	0.51	24.13
20175	1732.5	10	25	(RB_Pos:0)	22.69	0.51	23.2
20175	1732.5	10	25	(RB_Pos:25)	22.63	0.51	23.14
20175	1732.5	10	50	(RB_Pos:0)	22.62	0.51	23.13
20350	1750	10	1	(RB_Pos:0)	23.71	0.51	24.22
20350	1750	10	1	(RB_Pos:49)	23.62	0.51	24.13
20350	1750	10	25	(RB_Pos:0)	22.64	0.51	23.15
20350	1750	10	25	(RB_Pos:25)	22.6	0.51	23.11

3.7 Test Data - LTE Band 5

Max Power: 24.01dBm / 0.252W

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)	23.56	0.34	23.9
20407	824.7	1.4	1	(RB_Pos:5)	23.6	0.34	23.94
20407	824.7	1.4	4	(RB_Pos:0)	23.49	0.34	23.83
20407	824.7	1.4	4	(RB_Pos:2)	23.54	0.34	23.88
20407	824.7	1.4	6	(RB_Pos:0)	22.47	0.34	22.81
20525	836.5	1.4	1	(RB_Pos:0)	23.4	0.34	23.74
20525	836.5	1.4	1	(RB_Pos:5)	23.51	0.34	23.85
20525	836.5	1.4	4	(RB_Pos:0)	23.4	0.34	23.74
20525	836.5	1.4	4	(RB_Pos:2)	23.48	0.34	23.82
20525	836.5	1.4	6	(RB_Pos:0)	22.52	0.34	22.86
20643	848.5	1.4	1	(RB_Pos:0)	23.56	0.34	23.9
20643	848.5	1.4	1	(RB_Pos:5)	23.51	0.34	23.85
20643	848.5	1.4	4	(RB_Pos:0)	23.45	0.34	23.79
20643	848.5	1.4	4	(RB_Pos:2)	23.51	0.34	23.85
20643	848.5	1.4	6	(RB_Pos:0)	22.45	0.34	22.79
20415	825.5	3	1	(RB_Pos:0)	23.44	0.34	23.78
20415	825.5	3	1	(RB_Pos:14)	23.5	0.34	23.84
20415	825.5	3	8	(RB_Pos:0)	22.5	0.34	22.84
20415	825.5	3	8	(RB_Pos:7)	22.47	0.34	22.81
20415	825.5	3	15	(RB_Pos:0)	22.5	0.34	22.84
20525	836.5	3	1	(RB_Pos:0)	23.49	0.34	23.83
20525	836.5	3	1	(RB_Pos:14)	23.36	0.34	23.7
20525	836.5	3	8	(RB_Pos:0)	22.5	0.34	22.84
20525	836.5	3	8	(RB_Pos:7)	22.48	0.34	22.82
20525	836.5	3	15	(RB_Pos:0)	22.53	0.34	22.87
20635	847.5	3	1	(RB_Pos:0)	23.54	0.34	23.88
20635	847.5	3	1	(RB_Pos:14)	23.6	0.34	23.94
20635	847.5	3	8	(RB_Pos:0)	22.44	0.34	22.78
20635	847.5	3	8	(RB_Pos:7)	22.43	0.34	22.77
20635	847.5	3	15	(RB_Pos:0)	22.48	0.34	22.82
20425	826.5	5	1	(RB_Pos:0)	23.34	0.34	23.68
20425	826.5	5	1	(RB_Pos:24)	23.37	0.34	23.71
20425	826.5	5	12	(RB_Pos:0)	22.43	0.34	22.77
20425	826.5	5	12	(RB_Pos:13)	22.47	0.34	22.81
20425	826.5	5	25	(RB_Pos:0)	22.46	0.34	22.8
20525	836.5	5	1	(RB_Pos:0)	23.41	0.34	23.75
20525	836.5	5	1	(RB_Pos:24)	23.45	0.34	23.79
20525	836.5	5	12	(RB_Pos:0)	22.54	0.34	22.88
20525	836.5	5	12	(RB_Pos:13)	22.5	0.34	22.84
20525	836.5	5	25	(RB_Pos:0)	22.49	0.34	22.83
20625	846.5	5	1	(RB_Pos:0)	23.43	0.34	23.77
20625	846.5	5	1	(RB_Pos:24)	23.33	0.34	23.67
20625	846.5	5	12	(RB_Pos:0)	22.46	0.34	22.8
20625	846.5	5	12	(RB_Pos:13)	22.46	0.34	22.8
20625	846.5	5	25	(RB_Pos:0)	22.53	0.34	22.87
20450	829	10	1	(RB_Pos:0)	23.62	0.34	23.96
20450	829	10	1	(RB_Pos:49)	23.59	0.34	23.93
20450	829	10	25	(RB_Pos:0)	22.51	0.34	22.85
20450	829	10	25	(RB_Pos:25)	22.61	0.34	22.95
20450	829	10	50	(RB_Pos:0)	22.53	0.34	22.87
20525	836.5	10	1	(RB_Pos:0)	23.56	0.34	23.9
20525	836.5	10	1	(RB_Pos:49)	23.6	0.34	23.94
20525	836.5	10	25	(RB_Pos:0)	22.56	0.34	22.9
20525	836.5	10	25	(RB_Pos:25)	22.56	0.34	22.9
20525	836.5	10	50	(RB_Pos:0)	22.56	0.34	22.9
20600	844	10	1	(RB_Pos:0)	23.67	0.34	24.01
20600	844	10	1	(RB_Pos:49)	23.57	0.34	23.91
20600	844	10	25	(RB_Pos:0)	22.41	0.34	22.75
20600	844	10	25	(RB_Pos:25)	22.52	0.34	22.86

3.8 Test Data - LTE Band 7

Max Power: 24.22dBm / 0.264W

UpLink Channel	UL Frequency (MHz)	BW (MHz)	# RB	Position	Measured Power (dBm)	Cable Loss (dB)	Conducted Power (dBm)
20775	2502.5	5	1	(RB_Pos:0)	23.33	0.62	23.95
20775	2502.5	5	1	(RB_Pos:24)	23.19	0.62	23.81
20775	2502.5	5	12	(RB_Pos:0)	22.45	0.62	23.07
20775	2502.5	5	12	(RB_Pos:13)	22.37	0.62	22.99
20775	2502.5	5	25	(RB_Pos:0)	22.43	0.62	23.05
21100	2535	5	1	(RB_Pos:0)	23.23	0.62	23.85
21100	2535	5	1	(RB_Pos:24)	23.27	0.62	23.89
21100	2535	5	12	(RB_Pos:0)	22.35	0.62	22.97
21100	2535	5	12	(RB_Pos:13)	22.3	0.62	22.92
21100	2535	5	25	(RB_Pos:0)	22.36	0.62	22.98
21425	2567.5	5	1	(RB_Pos:0)	23.32	0.63	23.95
21425	2567.5	5	1	(RB_Pos:24)	23.27	0.63	23.9
21425	2567.5	5	12	(RB_Pos:0)	22.4	0.63	23.03
21425	2567.5	5	12	(RB_Pos:13)	22.31	0.63	22.94
21425	2567.5	5	25	(RB_Pos:0)	22.41	0.63	23.04
20800	2505	10	1	(RB_Pos:0)	23.44	0.62	24.06
20800	2505	10	1	(RB_Pos:49)	23.41	0.62	24.03
20800	2505	10	25	(RB_Pos:0)	22.47	0.62	23.09
20800	2505	10	25	(RB_Pos:25)	22.32	0.62	22.94
20800	2505	10	50	(RB_Pos:0)	22.46	0.62	23.08
21100	2535	10	1	(RB_Pos:0)	23.42	0.62	24.04
21100	2535	10	1	(RB_Pos:49)	23.37	0.62	23.99
21100	2535	10	25	(RB_Pos:0)	22.32	0.62	22.94
21100	2535	10	25	(RB_Pos:25)	22.37	0.62	22.99
21100	2535	10	50	(RB_Pos:0)	22.43	0.62	23.05
21400	2565	10	1	(RB_Pos:0)	23.59	0.63	24.22
21400	2565	10	1	(RB_Pos:49)	23.45	0.63	24.08
21400	2565	10	25	(RB_Pos:0)	22.5	0.63	23.13
21400	2565	10	25	(RB_Pos:25)	22.41	0.63	23.04
21400	2565	10	50	(RB_Pos:0)	22.48	0.63	23.11
20825	2507.5	15	1	(RB_Pos:0)	23.53	0.62	24.15
20825	2507.5	15	1	(RB_Pos:74)	23.38	0.62	24
20825	2507.5	15	36	(RB_Pos:0)	22.39	0.62	23.01
20825	2507.5	15	36	(RB_Pos:39)	22.35	0.62	22.97
20825	2507.5	15	75	(RB_Pos:0)	22.3	0.62	22.92
21100	2535	15	1	(RB_Pos:0)	23.33	0.62	23.95
21100	2535	15	1	(RB_Pos:74)	23.32	0.62	23.94
21100	2535	15	36	(RB_Pos:0)	22.33	0.62	22.95
21100	2535	15	36	(RB_Pos:39)	22.31	0.62	22.93
21100	2535	15	75	(RB_Pos:0)	22.37	0.62	22.99
21375	2562.5	15	1	(RB_Pos:0)	23.39	0.63	24.02
21375	2562.5	15	1	(RB_Pos:74)	23.33	0.63	23.96
21375	2562.5	15	36	(RB_Pos:0)	22.52	0.63	23.15
21375	2562.5	15	36	(RB_Pos:39)	22.3	0.63	22.93
21375	2562.5	15	75	(RB_Pos:0)	22.42	0.63	23.05
20850	2510	20	1	(RB_Pos:0)	23.37	0.62	23.99
20850	2510	20	1	(RB_Pos:99)	23.05	0.62	23.67
20850	2510	20	50	(RB_Pos:0)	22.38	0.62	23
20850	2510	20	50	(RB_Pos:50)	22.4	0.62	23.02
20850	2510	20	100	(RB_Pos:0)	22.39	0.62	23.01
21100	2535	20	1	(RB_Pos:0)	23.44	0.62	24.06
21100	2535	20	1	(RB_Pos:99)	23.4	0.62	24.02
21100	2535	20	50	(RB_Pos:0)	22.45	0.62	23.07
21100	2535	20	50	(RB_Pos:50)	22.35	0.62	22.97
21100	2535	20	100	(RB_Pos:0)	22.43	0.62	23.05
21350	2560	20	1	(RB_Pos:0)	23.23	0.63	23.86
21350	2560	20	1	(RB_Pos:99)	23.24	0.63	23.87
21350	2560	20	50	(RB_Pos:0)	22.52	0.63	23.15
21350	2560	20	50	(RB_Pos:50)	22.41	0.63	23.04

3.9 Test Data - LTE Band 12

Max Power: 23.95dBm / 0.248W

UpLink Channel	UL Frequency (MHz)	BW (MHz)	# RB	Position	Measured Power (dBm)	Cable Loss (dB)	Conducted Power (dBm)
23017	699.7	1.4	1	(RB_Pos:0)	23.36	0.31	23.67
23017	699.7	1.4	1	(RB_Pos:5)	23.26	0.31	23.57
23017	699.7	1.4	4	(RB_Pos:0)	23.18	0.31	23.49
23017	699.7	1.4	4	(RB_Pos:2)	23.25	0.31	23.56
23017	699.7	1.4	6	(RB_Pos:0)	22.23	0.31	22.54
23095	707.5	1.4	1	(RB_Pos:0)	23.46	0.31	23.77
23095	707.5	1.4	1	(RB_Pos:5)	23.51	0.31	23.82
23095	707.5	1.4	4	(RB_Pos:0)	23.47	0.31	23.78
23095	707.5	1.4	4	(RB_Pos:2)	23.49	0.31	23.8
23095	707.5	1.4	6	(RB_Pos:0)	22.53	0.31	22.84
23173	715.3	1.4	1	(RB_Pos:0)	23.52	0.31	23.83
23173	715.3	1.4	1	(RB_Pos:5)	23.52	0.31	23.83
23173	715.3	1.4	4	(RB_Pos:0)	23.46	0.31	23.77
23173	715.3	1.4	4	(RB_Pos:2)	23.45	0.31	23.76
23173	715.3	1.4	6	(RB_Pos:0)	22.5	0.31	22.81
23025	700.5	3	1	(RB_Pos:0)	23.24	0.31	23.55
23025	700.5	3	1	(RB_Pos:14)	23.41	0.31	23.72
23025	700.5	3	8	(RB_Pos:0)	22.48	0.31	22.79
23025	700.5	3	8	(RB_Pos:7)	22.4	0.31	22.71
23025	700.5	3	15	(RB_Pos:0)	22.41	0.31	22.72
23095	707.5	3	1	(RB_Pos:0)	23.46	0.31	23.77
23095	707.5	3	1	(RB_Pos:14)	23.56	0.31	23.87
23095	707.5	3	8	(RB_Pos:0)	22.53	0.31	22.84
23095	707.5	3	8	(RB_Pos:7)	22.49	0.31	22.8
23095	707.5	3	15	(RB_Pos:0)	22.53	0.31	22.84
23165	714.5	3	1	(RB_Pos:0)	23.51	0.31	23.82
23165	714.5	3	1	(RB_Pos:14)	23.54	0.31	23.85
23165	714.5	3	8	(RB_Pos:0)	22.5	0.31	22.81
23165	714.5	3	8	(RB_Pos:7)	22.48	0.31	22.79
23165	714.5	3	15	(RB_Pos:0)	22.54	0.31	22.85
23035	701.5	5	1	(RB_Pos:0)	23.13	0.31	23.44
23035	701.5	5	1	(RB_Pos:24)	23.34	0.31	23.65
23035	701.5	5	12	(RB_Pos:0)	22.26	0.31	22.57
23035	701.5	5	12	(RB_Pos:13)	22.39	0.31	22.7
23035	701.5	5	25	(RB_Pos:0)	22.42	0.31	22.73
23095	707.5	5	1	(RB_Pos:0)	23.39	0.31	23.7
23095	707.5	5	1	(RB_Pos:24)	23.43	0.31	23.74
23095	707.5	5	12	(RB_Pos:0)	22.4	0.31	22.71
23095	707.5	5	12	(RB_Pos:13)	22.53	0.31	22.84
23095	707.5	5	25	(RB_Pos:0)	22.56	0.31	22.87
23155	713.5	5	1	(RB_Pos:0)	23.46	0.31	23.77
23155	713.5	5	1	(RB_Pos:24)	23.28	0.31	23.59
23155	713.5	5	12	(RB_Pos:0)	22.52	0.31	22.83
23155	713.5	5	12	(RB_Pos:13)	22.44	0.31	22.75
23155	713.5	5	25	(RB_Pos:0)	22.46	0.31	22.77
23060	704	10	1	(RB_Pos:0)	23.29	0.31	23.6
23060	704	10	1	(RB_Pos:49)	23.64	0.31	23.95
23060	704	10	25	(RB_Pos:0)	22.42	0.31	22.73
23060	704	10	25	(RB_Pos:25)	22.47	0.31	22.78
23060	704	10	50	(RB_Pos:0)	22.43	0.31	22.74
23095	707.5	10	1	(RB_Pos:0)	23.26	0.31	23.57
23095	707.5	10	1	(RB_Pos:49)	23.46	0.31	23.77
23095	707.5	10	25	(RB_Pos:0)	22.41	0.31	22.72
23095	707.5	10	25	(RB_Pos:25)	22.53	0.31	22.84
23095	707.5	10	50	(RB_Pos:0)	22.56	0.31	22.87
23130	711	10	1	(RB_Pos:0)	23.63	0.31	23.94
23130	711	10	1	(RB_Pos:49)	23.47	0.31	23.78
23130	711	10	25	(RB_Pos:0)	22.61	0.31	22.92
23130	711	10	25	(RB_Pos:25)	22.48	0.31	22.79

3.10 Test Data - LTE Band 13

Max Power: 23.66dBm / 0.232W

UpLink Channel	UL Frequency (MHz)	BW (MHz)	# RB	Position	Measured Power (dBm)	Cable Loss (dB)	Conducted Power (dBm)
23205	779.5	5	1	(RB_Pos:0)	23.09	0.33	23.42
23205	779.5	5	1	(RB_Pos:24)	23.32	0.33	23.65
23205	779.5	5	12	(RB_Pos:0)	21.86	0.33	22.19
23205	779.5	5	12	(RB_Pos:12)	22.36	0.33	22.69
23205	779.5	5	24	(RB_Pos:0)	22.35	0.33	22.68
23230	782	5	1	(RB_Pos:0)	23.24	0.33	23.57
23230	782	5	1	(RB_Pos:24)	23.28	0.33	23.61
23230	782	5	12	(RB_Pos:0)	22.33	0.33	22.66
23230	782	5	12	(RB_Pos:12)	22.23	0.33	22.56
23230	782	5	24	(RB_Pos:0)	22.35	0.33	22.68
23255	784.5	5	1	(RB_Pos:0)	23.30	0.33	23.63
23255	784.5	5	1	(RB_Pos:24)	23.24	0.33	23.57
23255	784.5	5	12	(RB_Pos:0)	22.44	0.33	22.77
23255	784.5	5	12	(RB_Pos:12)	22.25	0.33	22.58
23255	784.5	5	24	(RB_Pos:0)	22.26	0.33	22.59
23230	782	10	1	(RB_Pos:0)	23.33	0.33	23.66
23230	782	10	1	(RB_Pos:49)	23.28	0.33	23.61
23230	782	10	25	(RB_Pos:0)	22.34	0.33	22.67
23230	782	10	25	(RB_Pos:25)	22.65	0.33	22.98
23230	782	10	50	(RB_Pos:0)	22.39	0.33	22.72

3.11 Test Data - LTE Band 17

Max Power: 23.7dBm / 0.244W

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)	23.43	0.31	23.74
23755	706.5	5	1	(RB_Pos:24)	23.31	0.31	23.62
23755	706.5	5	12	(RB_Pos:0)	22.42	0.31	22.73
23755	706.5	5	12	(RB_Pos:13)	22.44	0.31	22.75
23755	706.5	5	25	(RB_Pos:0)	22.43	0.31	22.74
23790	710	5	1	(RB_Pos:0)	23.45	0.31	23.76
23790	710	5	1	(RB_Pos:24)	23.3	0.31	23.61
23790	710	5	12	(RB_Pos:0)	22.41	0.31	22.72
23790	710	5	12	(RB_Pos:13)	22.47	0.31	22.78
23790	710	5	25	(RB_Pos:0)	22.46	0.31	22.77
23825	713.5	5	1	(RB_Pos:0)	23.48	0.31	23.79
23825	713.5	5	1	(RB_Pos:24)	23.37	0.31	23.68
23825	713.5	5	12	(RB_Pos:0)	22.41	0.31	22.72
23825	713.5	5	12	(RB_Pos:13)	22.45	0.31	22.76
23825	713.5	5	25	(RB_Pos:0)	22.46	0.31	22.77
23780	709	10	1	(RB_Pos:0)	23.56	0.31	23.87
23780	709	10	1	(RB_Pos:49)	23.46	0.31	23.77
23780	709	10	25	(RB_Pos:0)	22.52	0.31	22.83
23780	709	10	25	(RB_Pos:25)	22.57	0.31	22.88
23780	709	10	50	(RB_Pos:0)	22.54	0.31	22.85
23790	710	10	1	(RB_Pos:0)	23.55	0.31	23.86
23790	710	10	1	(RB_Pos:49)	23.43	0.31	23.74
23790	710	10	25	(RB_Pos:0)	22.49	0.31	22.8
23790	710	10	25	(RB_Pos:25)	22.44	0.31	22.75
23790	710	10	50	(RB_Pos:0)	22.51	0.31	22.82
23800	711	10	1	(RB_Pos:0)	23.49	0.31	23.8
23800	711	10	1	(RB_Pos:49)	23.46	0.31	23.77
23800	711	10	25	(RB_Pos:0)	22.5	0.31	22.81
23800	711	10	25	(RB_Pos:25)	22.48	0.31	22.79
23800	711	10	50	(RB_Pos:0)	22.47	0.31	22.78

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 1RB (center), and QPSK modulation.

4.3 Test Site

SGS EMC Laboratory, Suwanee, GA

Environmental Conditions

Temperature: 22.7 °C
Relative Humidity: 51.7%
Atmospheric Pressure: 98.6 kPa

4.4 Test Equipment

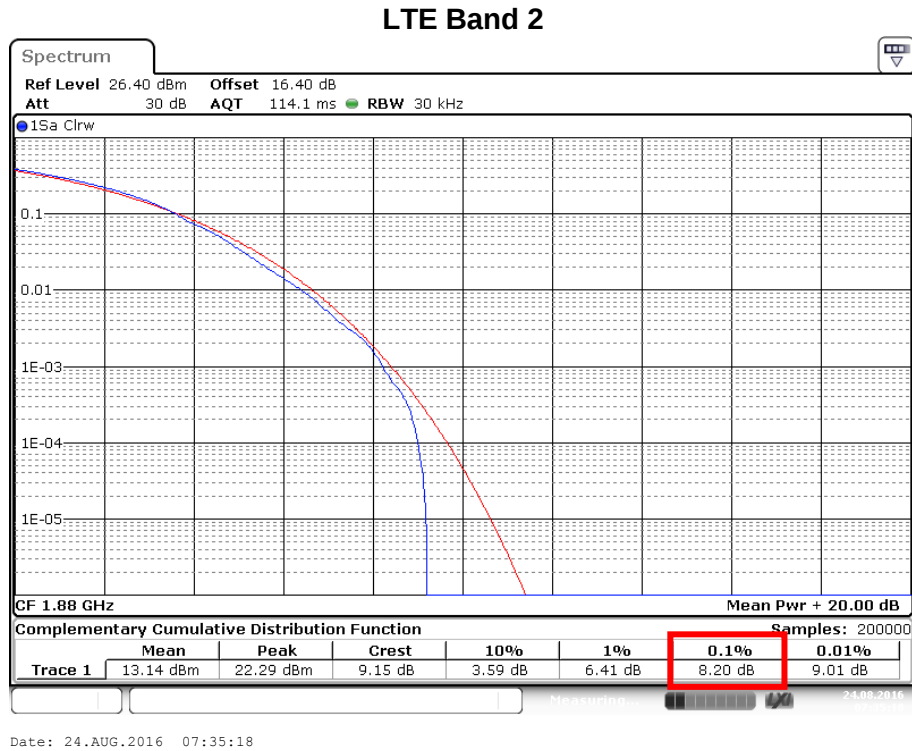
Test Date: 16-Aug-2016

Tester: JOP

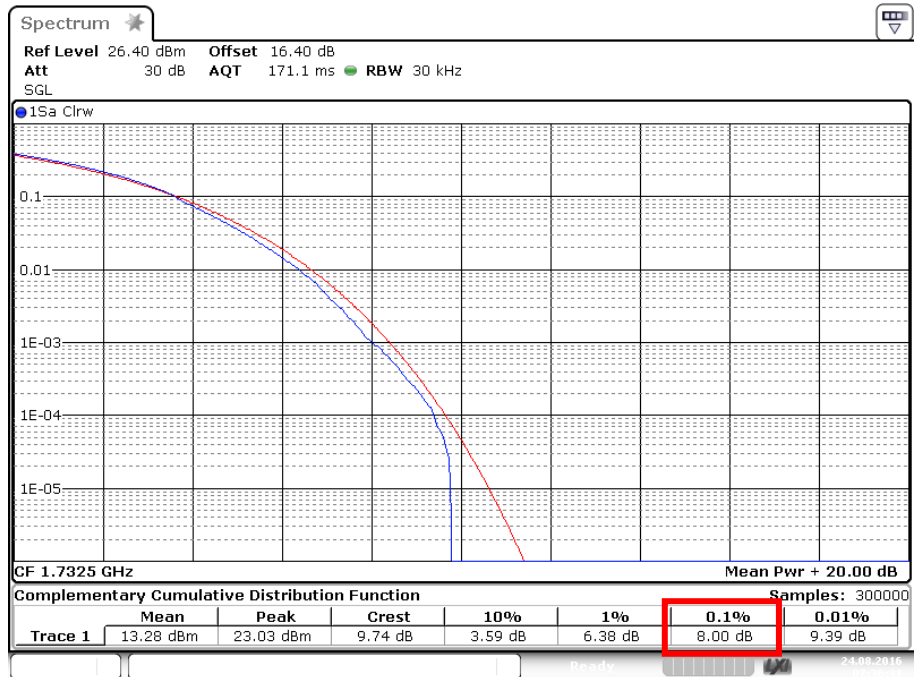
Equipment	Model	Manufacturer	Asset Number	Cal Due Date
WIDEBAND RADIO COMMUNICATION TESTER	CMW500	ROHDE & SCHWARZ	B094874	19-Jan-2018
RF CABLE	141	HUBER & SUHNER	B095587	26-Jul-2017
POWER SPLITTER	ZFRSC-183-S+	MINI-CIRCUITS	B101743	28-Jul-2017
10dB fixed Attenuator	BW-S10W2	MINI-CIRCUITS	15033	CNR
SIGNAL ANALYZER	FSV30	ROHDE & SCHWARZ	B085749	8-Oct-2017

- Unless otherwise noted, equipment is on a 1 year calibration cycle.
- Based on manufacturer's specifications, the CMW-500 and FSV are a 2 year calibration cycle

4.5 Test Data

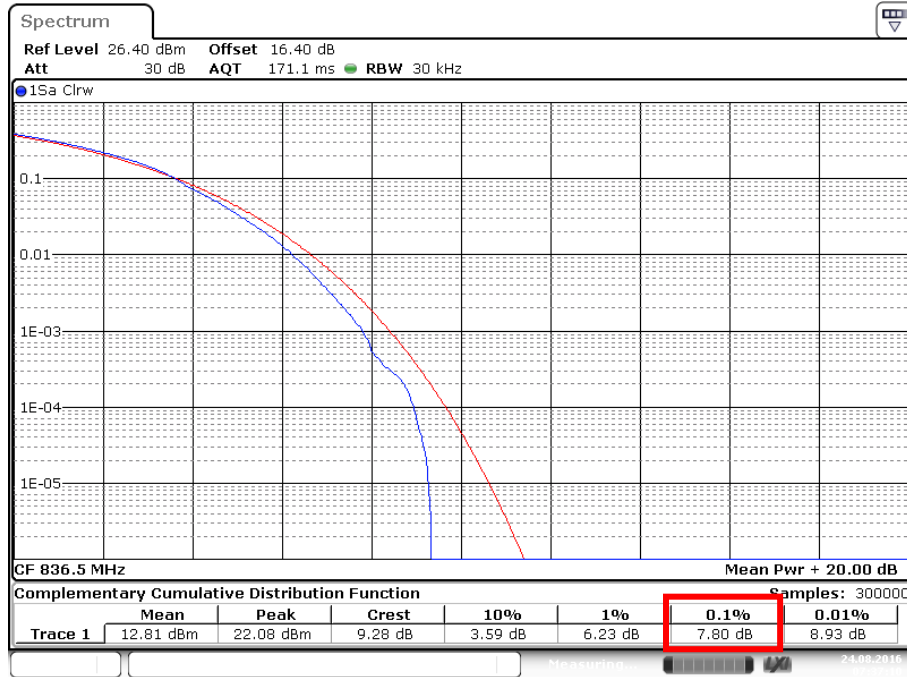


LTE Band 4



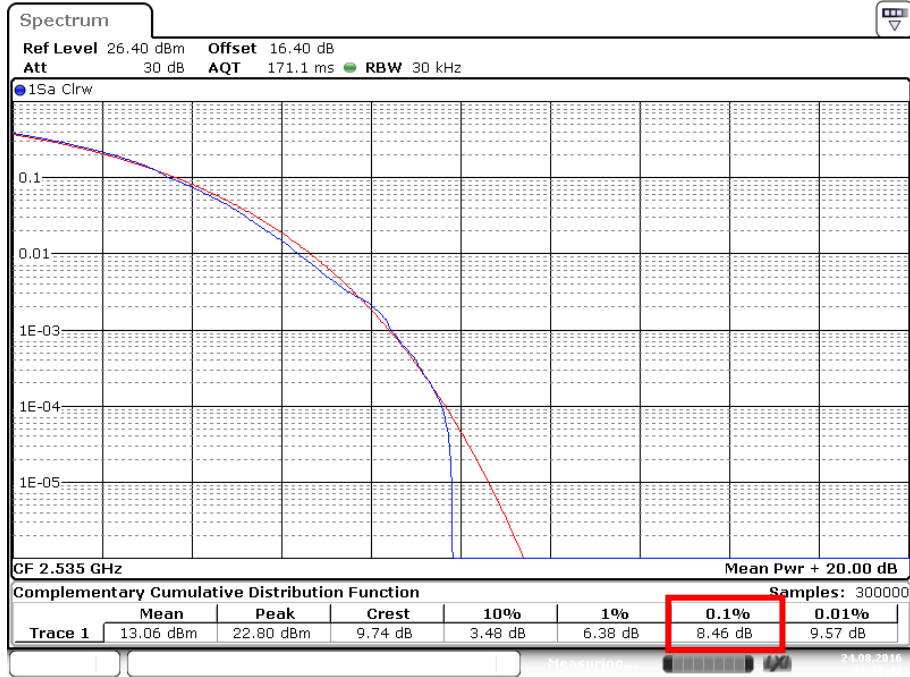
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LTE Band 5



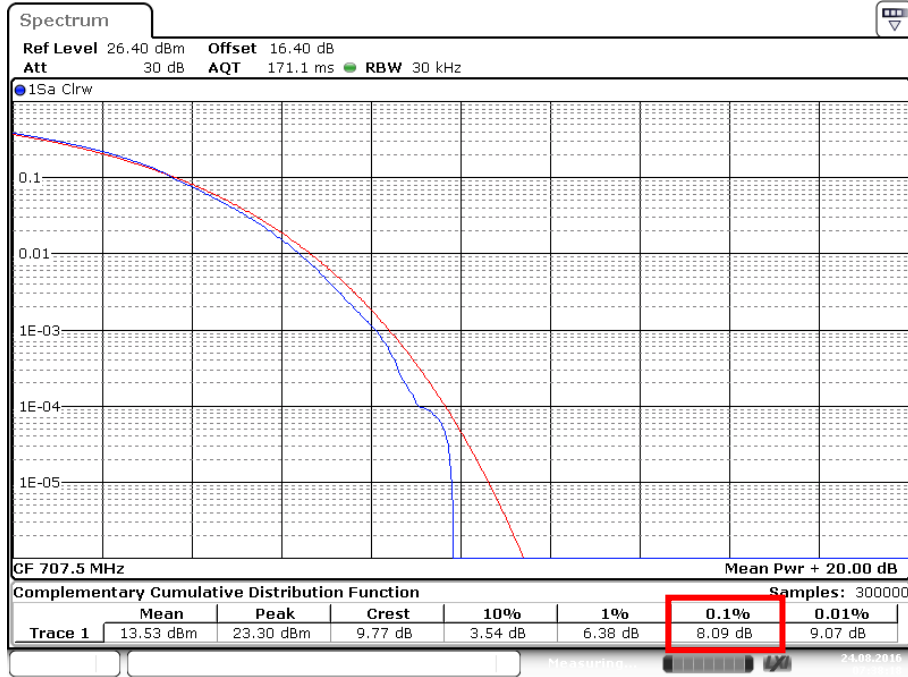
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LTE Band 7



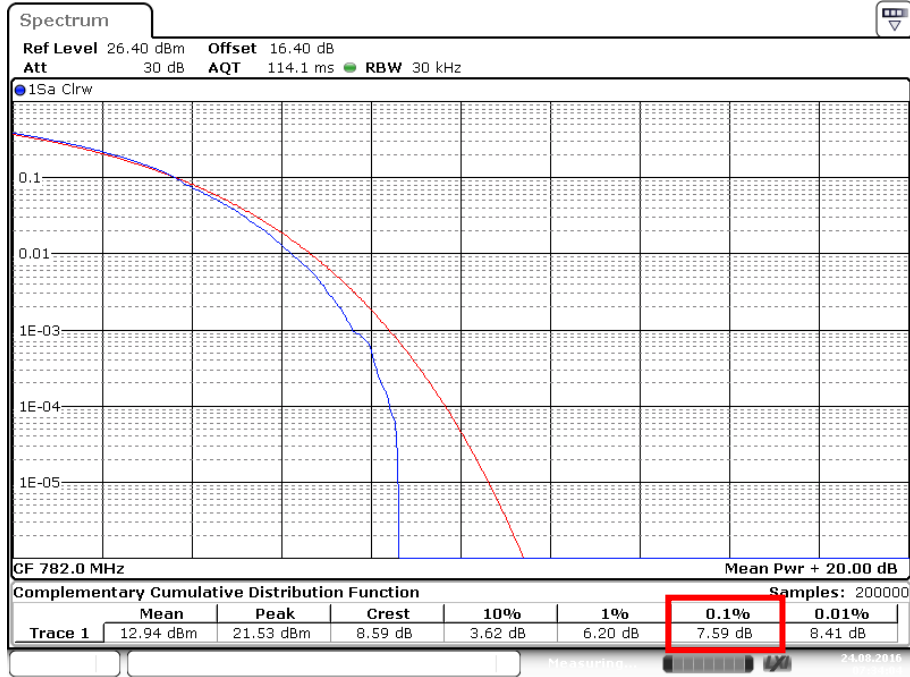
Date: 24.AUG.2016 07:37:42

LTE Band 12



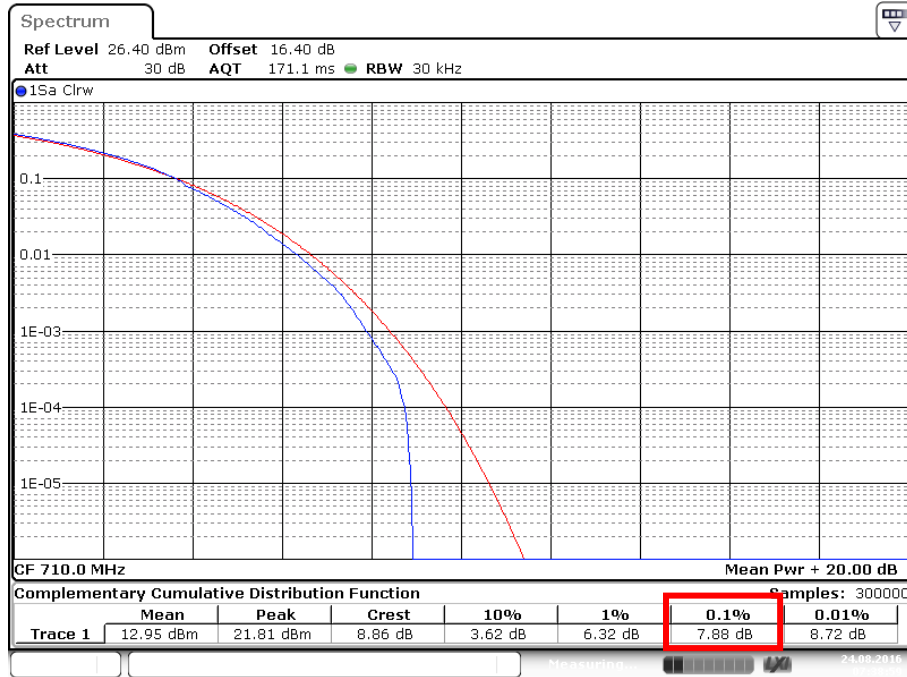
Date: 24.AUG.2016 07:38:18

LTE Band 13



Date: 24.AUG.2016 07:34:04

LTE Band 17



Date: 24.AUG.2016 07:38:59

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.

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: 22.7 °C
Relative Humidity: 51.7%
Atmospheric Pressure: 98.6 kPa

5.4 Test Equipment

Test Date: 24-Aug-2016

Tester: JOP

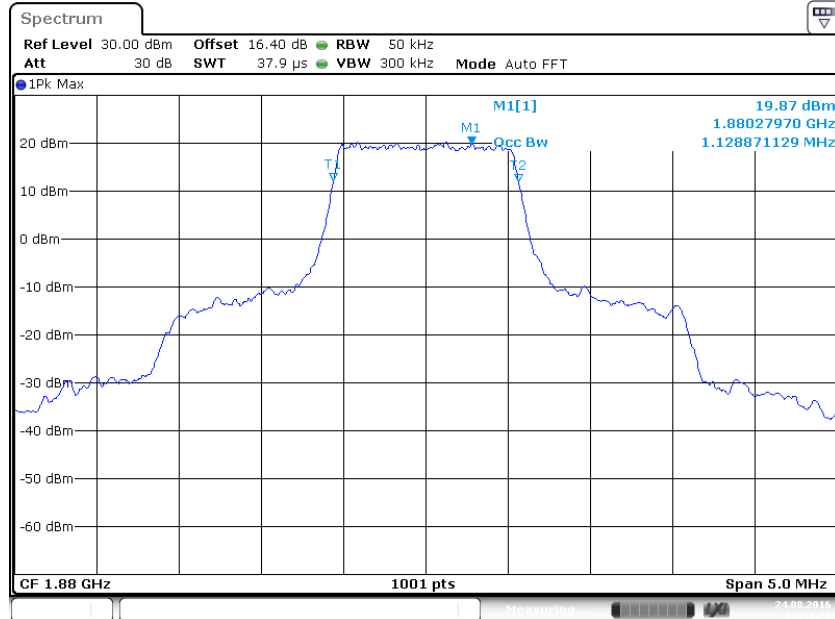
Equipment	Model	Manufacturer	Asset Number	Cal Due Date
WIDEBAND RADIO COMMUNICATION TESTER	CMW500	ROHDE & SCHWARZ	B094874	19-Jan-2018
RF CABLE	141	HUBER & SUHNER	B095587	26-Jul-2017
POWER SPLITTER	ZFRSC-183-S+	MINI-CIRCUITS	B101743	28-Jul-2017
10dB fixed Attenuator	BW-S10W2	MINI-CIRCUITS	15033	CNR
SIGNAL ANALYZER	FSV30	ROHDE & SCHWARZ	B085749	8-Oct-2017

- Unless otherwise noted, equipment is on a 1 year calibration cycle.
- Based on manufacturer's specifications, the CMW-500 and FSV are a 2 year calibration cycle

5.5 Test Data

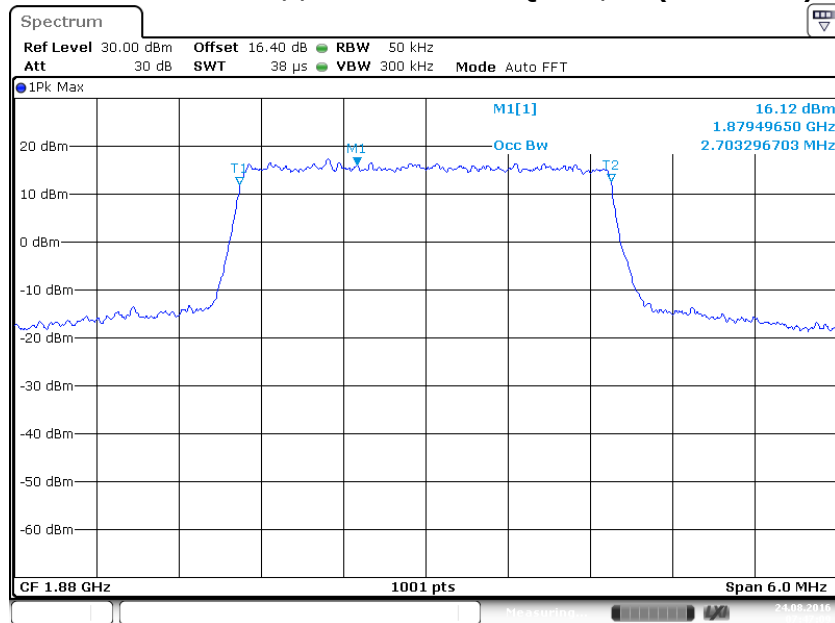
LTE Band 2

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

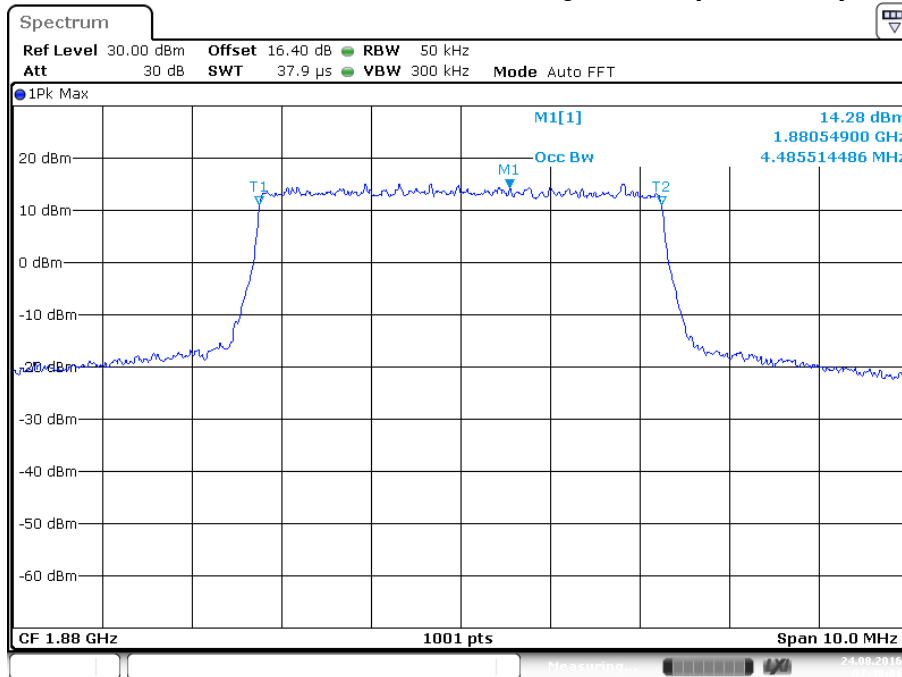


LTE Band 2

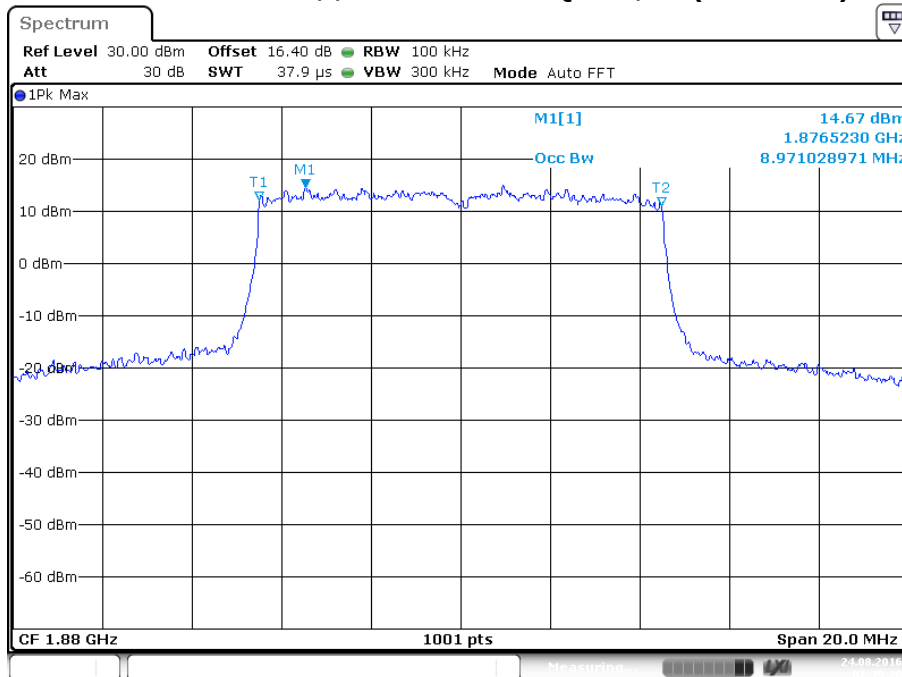
Occupied Bandwidth: :@ULCH: 18900, BW: 3.0 MHz ,
ULPower: 23dBm; ; UL_MOD_RB: QPSK, 15 (RB_Pos:0)



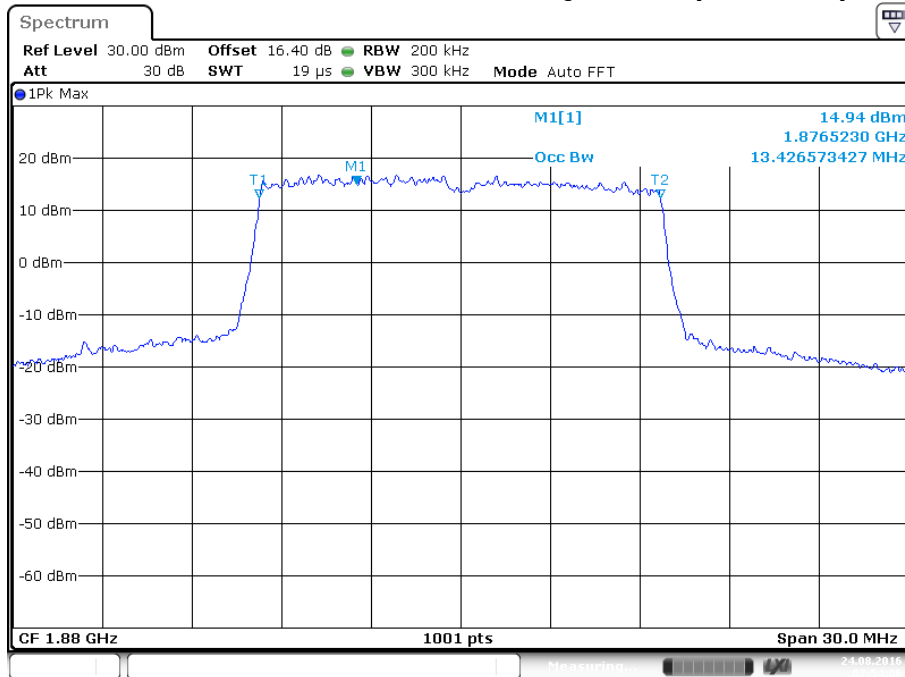
LTE Band 2
Occupied Bandwidth: :@ULCH: 18900, BW: 5.0 MHz ,
ULPower: 23dBm; ; UL_MOD_RB: QPSK, 25 (RB_Pos:0)



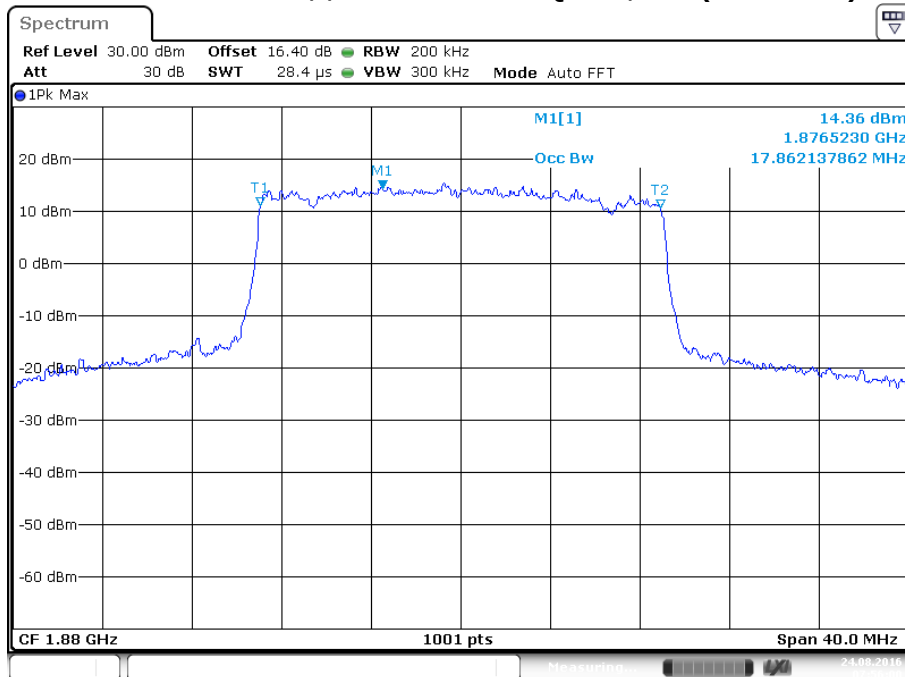
LTE Band 2
Occupied Bandwidth: :@ULCH: 18900, BW: 10 MHz ,
ULPower: 23dBm; ; UL_MOD_RB: QPSK, 50 (RB_Pos:0)



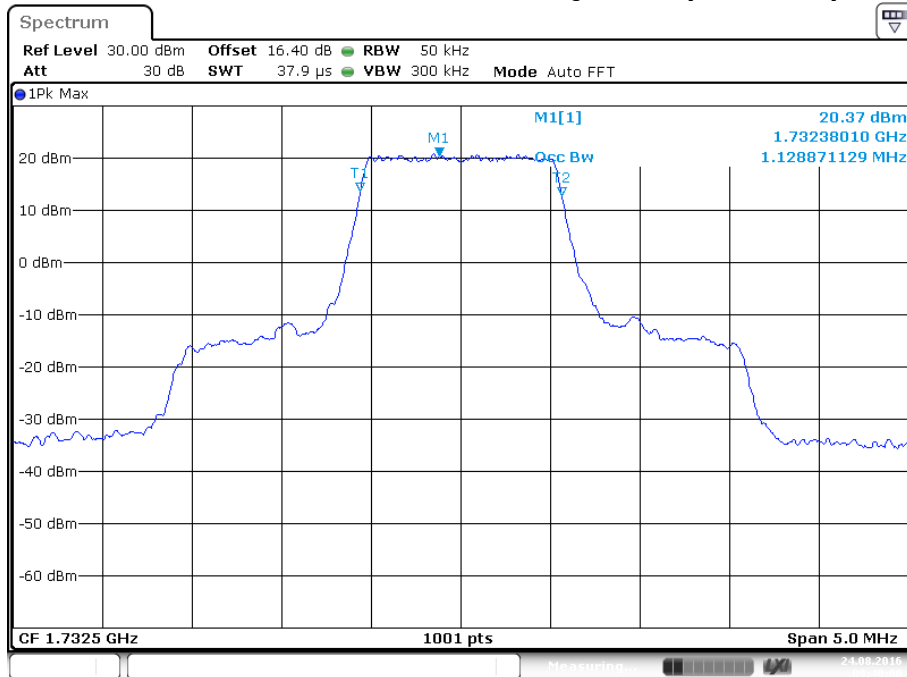
LTE Band 2
Occupied Bandwidth: :@ULCH: 18900, BW: 15 MHz ,
ULPower: 23dBm; ; UL_MOD_RB: QPSK, 75 (RB_Pos:0)



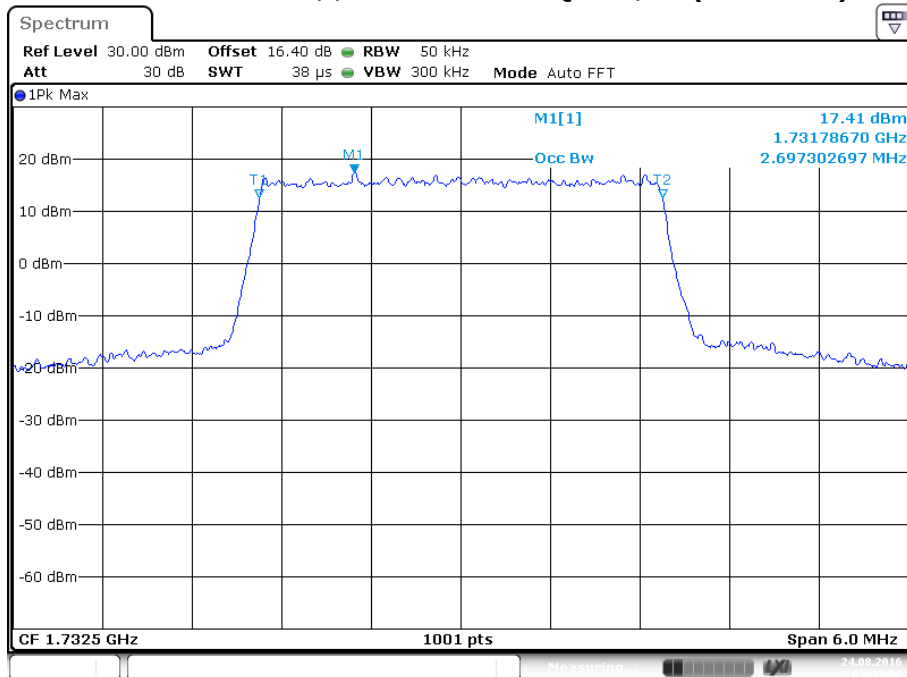
LTE Band 2
Occupied Bandwidth: :@ULCH: 18900, BW: 20 MHz ,
ULPower: 23dBm; ; UL_MOD_RB: QPSK, 100 (RB_Pos:0)



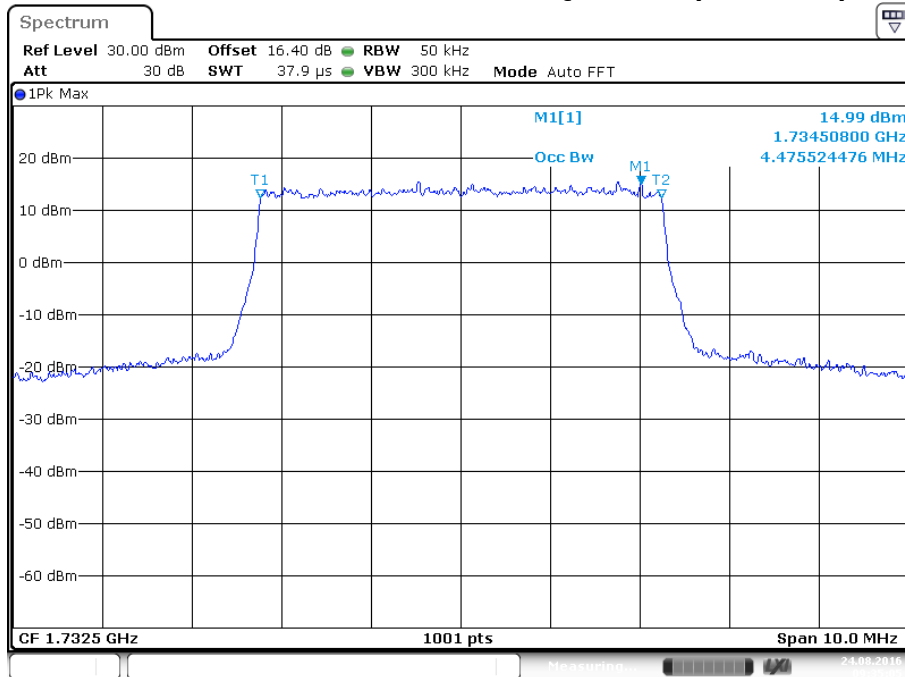
LTE Band 4
Occupied Bandwidth: :@ULCH: 20175, BW: 1.4 MHz ,
ULPower: 23dBm; ; UL_MOD_RB: QPSK, 6 (RB_Pos:0)



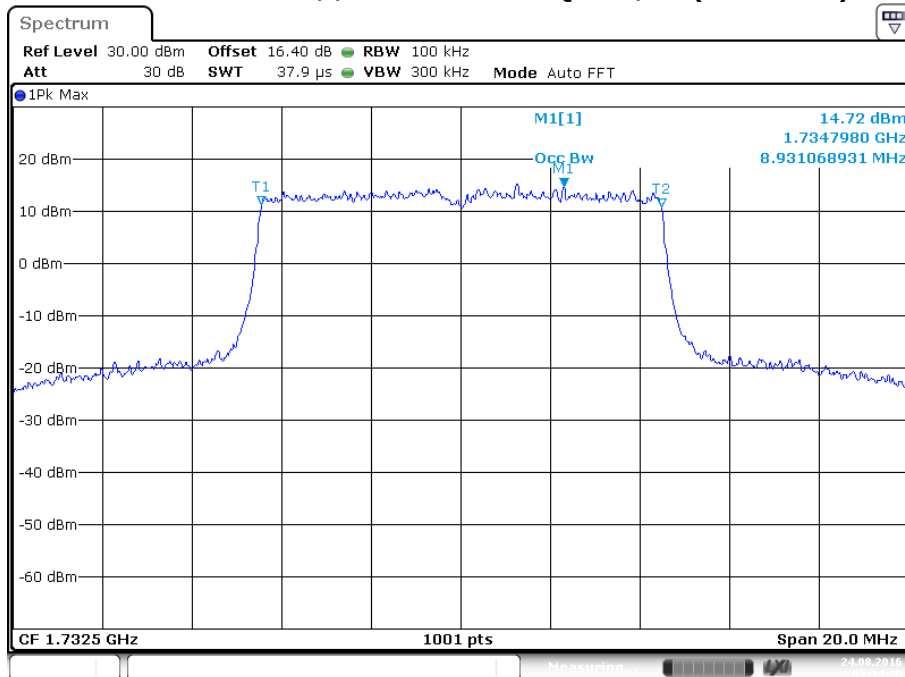
LTE Band 4
Occupied Bandwidth: :@ULCH: 20175, BW: 3.0 MHz ,
ULPower: 23dBm; ; UL_MOD_RB: QPSK, 15 (RB_Pos:0)



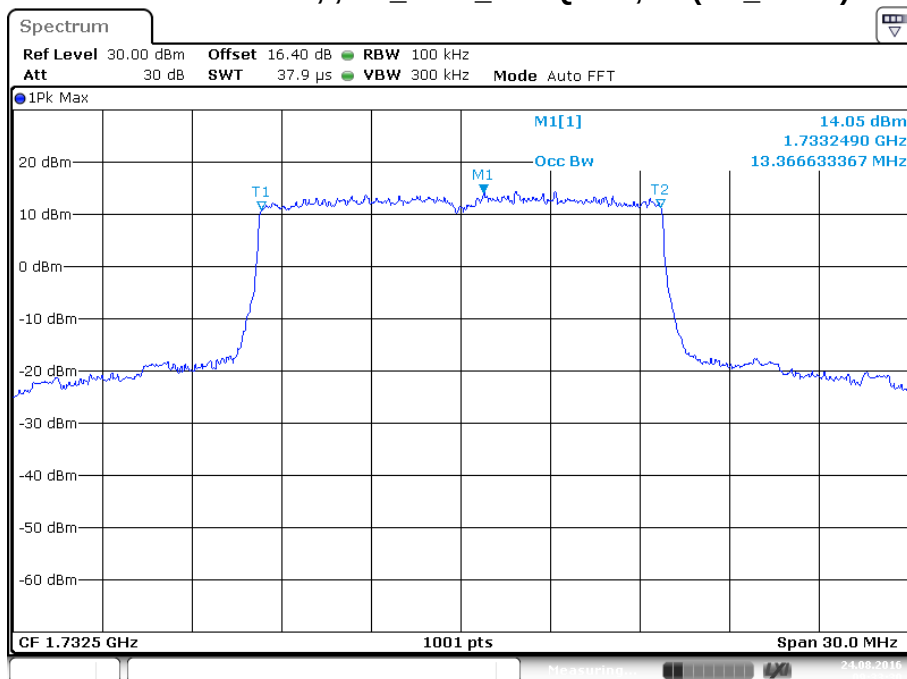
LTE Band 4
Occupied Bandwidth: :@ULCH: 20175, BW: 5.0 MHz ,
ULPower: 23dBm; ; UL_MOD_RB: QPSK, 25 (RB_Pos:0)



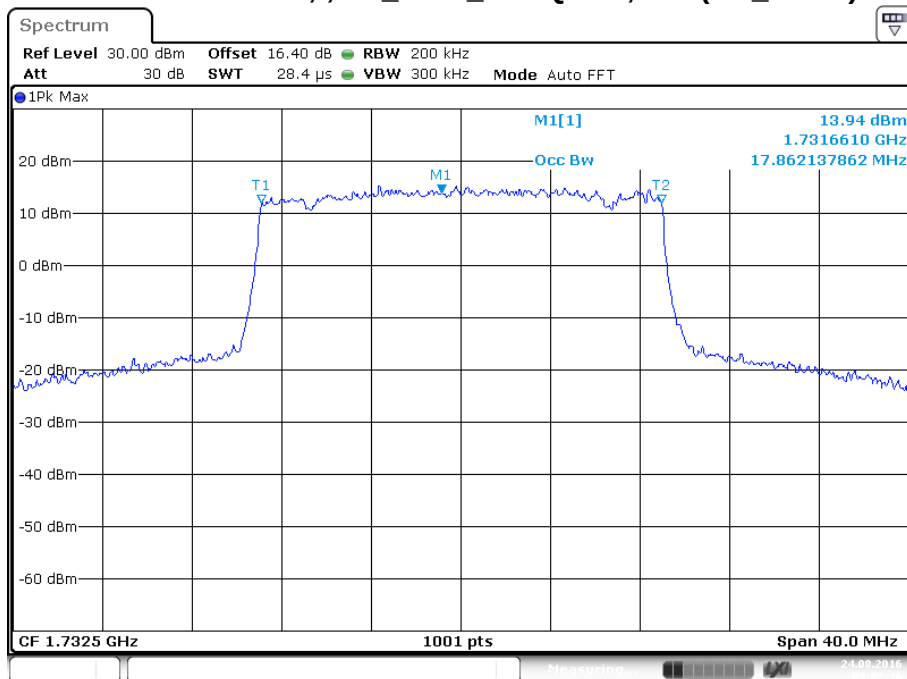
LTE Band 4
Occupied Bandwidth: :@ULCH: 20175, BW: 10 MHz ,
ULPower: 23dBm; ; UL_MOD_RB: QPSK, 50 (RB_Pos:0)



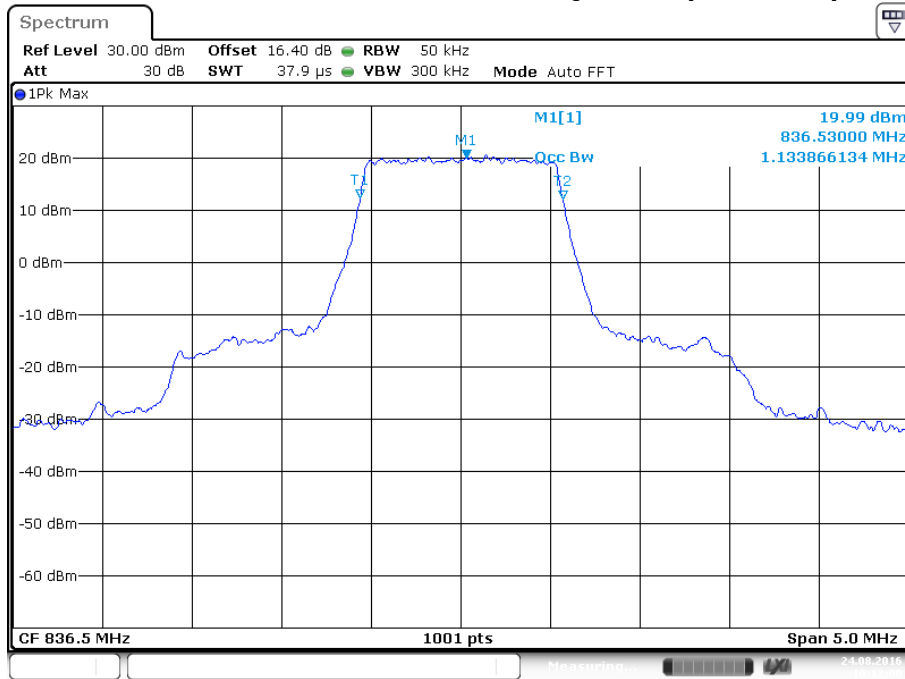
LTE Band 4
Occupied Bandwidth: :@ULCH: 20175, BW: 15 MHz ,
ULPower: 23dBm; ; UL_MOD_RB: QPSK, 75 (RB_Pos:0)



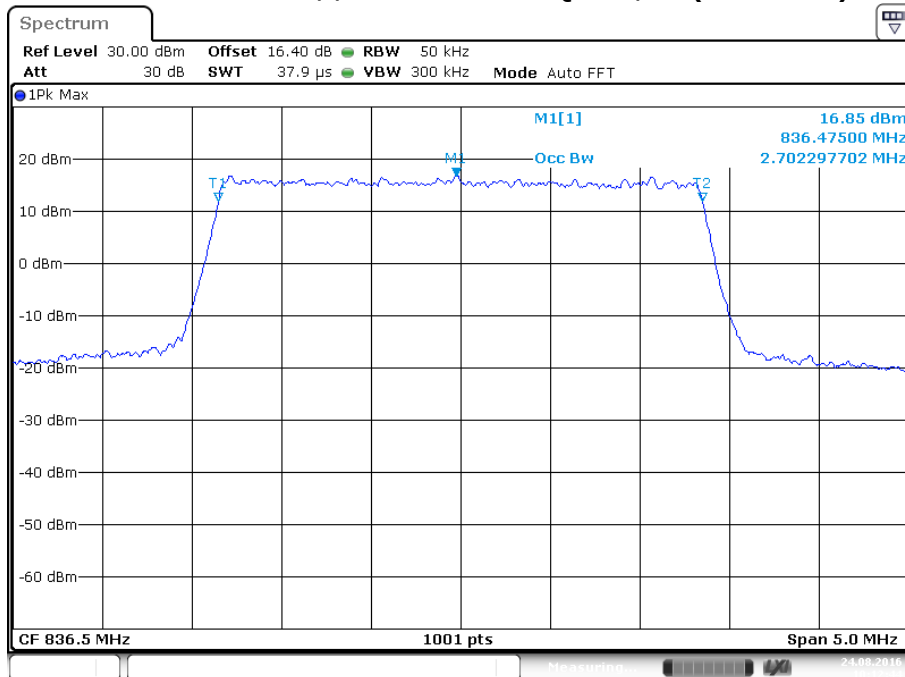
LTE Band 4
Occupied Bandwidth: :@ULCH: 20175, BW: 20 MHz ,
ULPower: 23dBm; ; UL_MOD_RB: QPSK, 100 (RB_Pos:0)



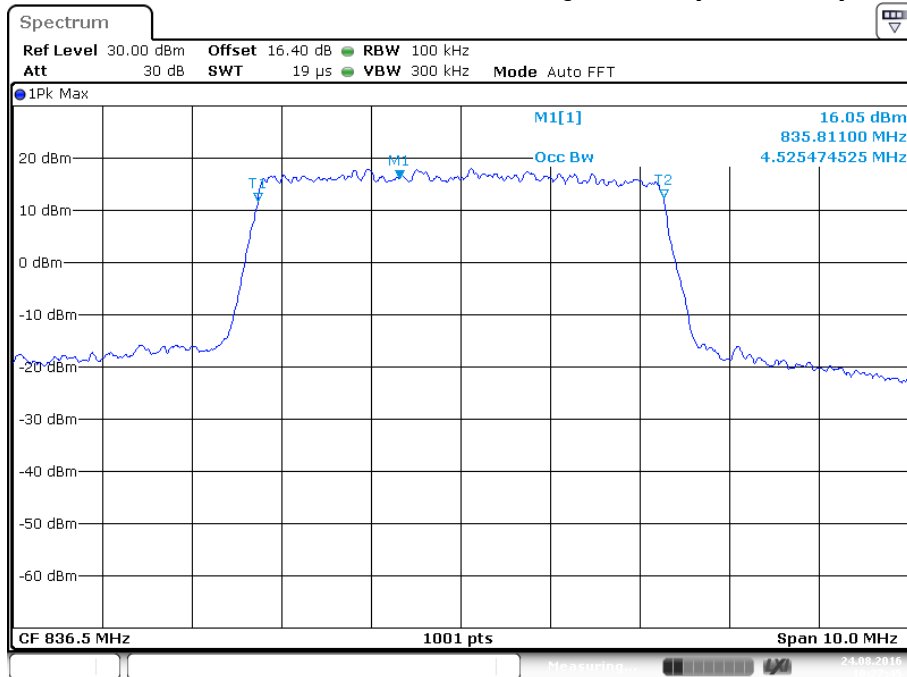
LTE Band 5
Occupied Bandwidth: :@ULCH: 20525, BW: 1.4 MHz ,
ULPower: 23dBm; ; UL_MOD_RB: QPSK, 6 (RB_Pos:0)



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

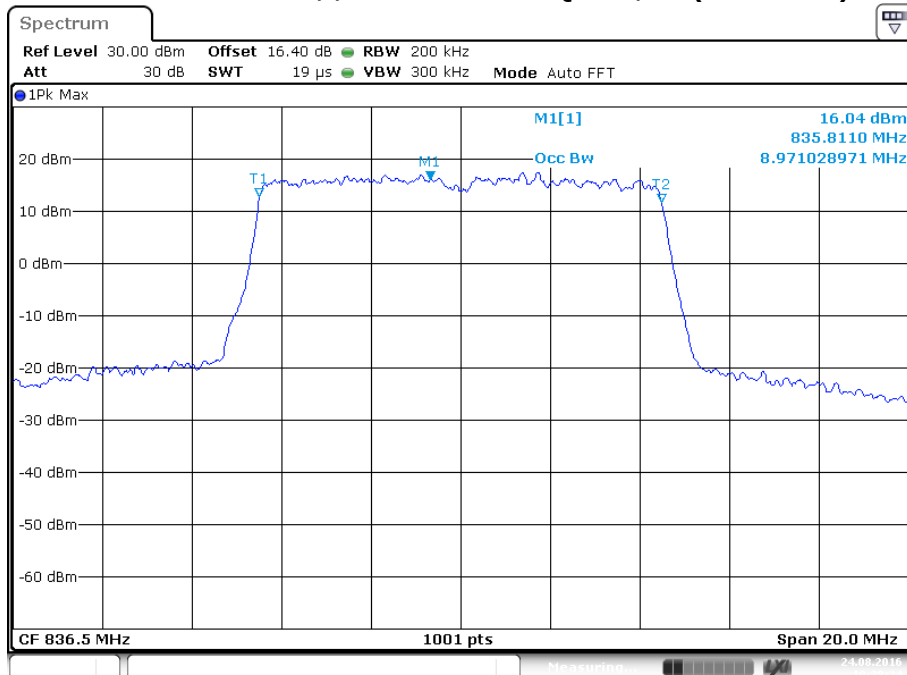


LTE Band 5
Occupied Bandwidth: :@ULCH: 20525, BW: 5.0 MHz ,
ULPower: 23dBm; ; UL_MOD_RB: QPSK, 25 (RB_Pos:0)



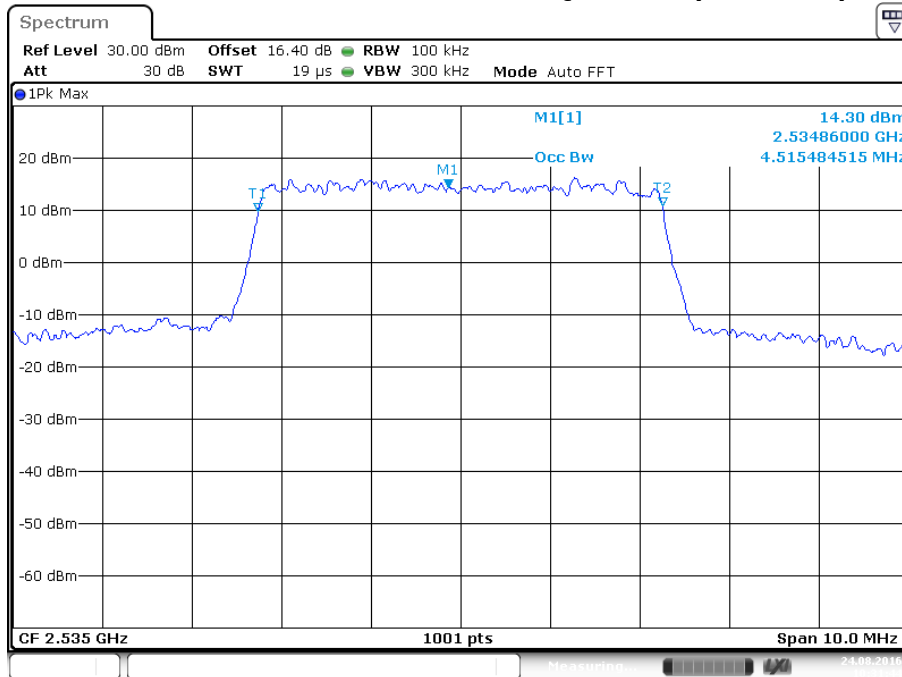
Date: 24.AUG.2016 10:27:45

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

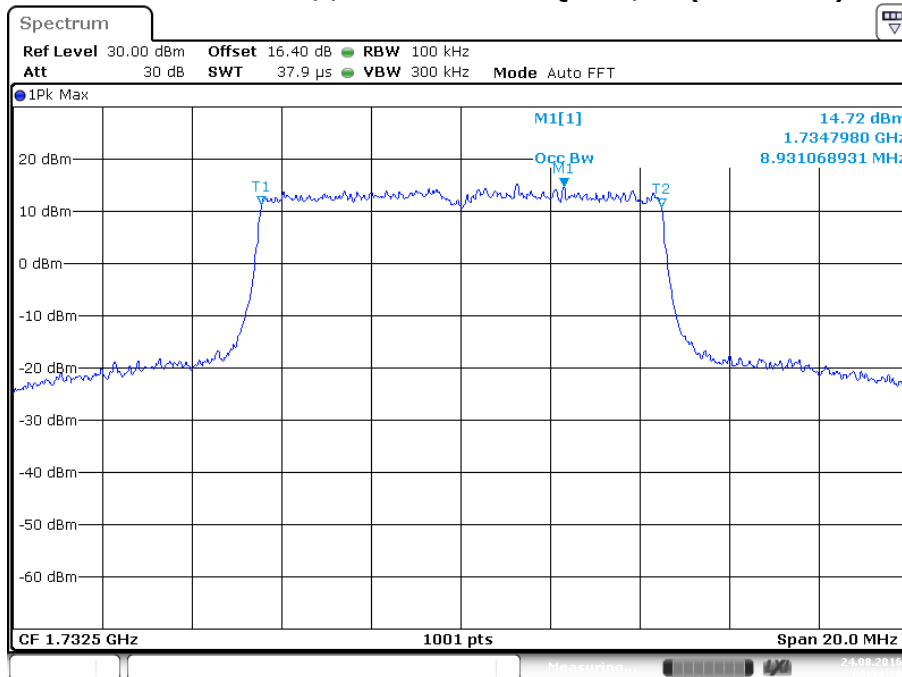


Date: 24.AUG.2016 10:28:24

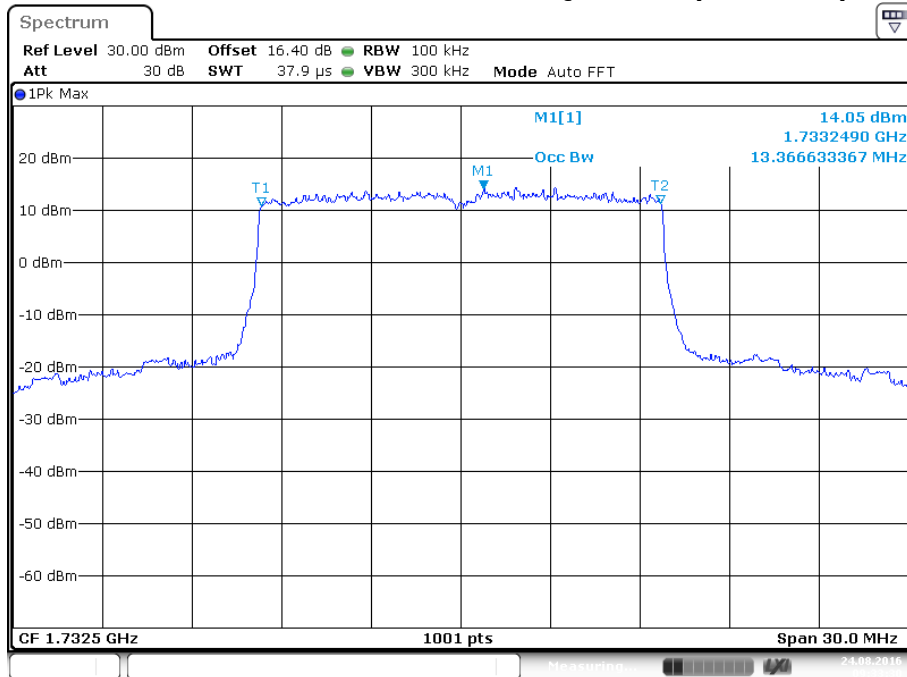
LTE Band 7
Occupied Bandwidth: :@ULCH: 21100, BW: 5.0 MHz ,
ULPower: 23dBm; ; UL_MOD_RB: QPSK, 25 (RB_Pos:0)



LTE Band 7
Occupied Bandwidth: :@ULCH: 21100, BW: 10 MHz ,
ULPower:23dBm; ; UL_MOD_RB: QPSK, 50 (RB_Pos:0)

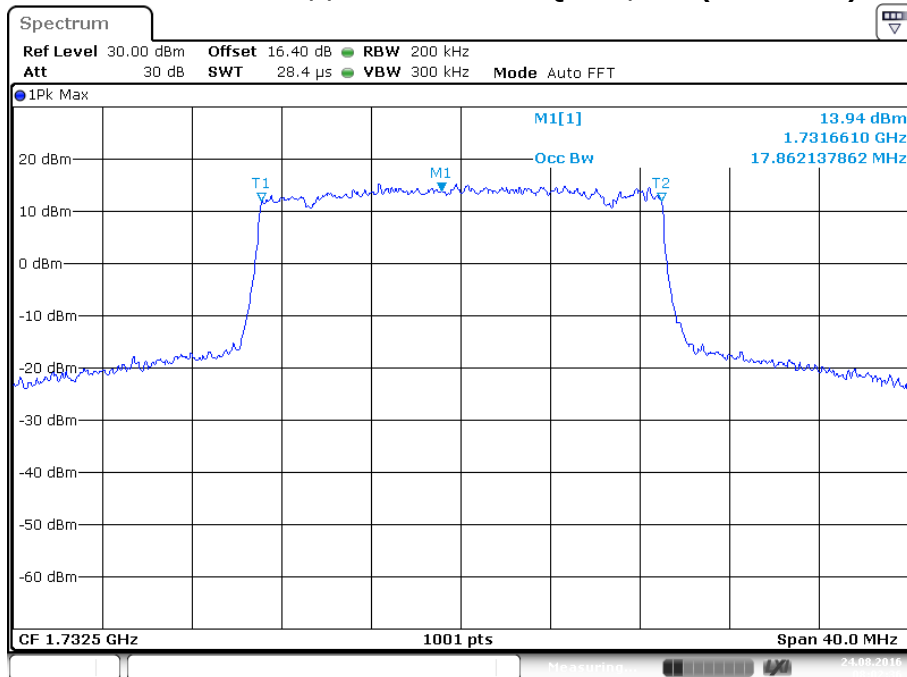


LTE Band 7
Occupied Bandwidth: :@ULCH: 21100, BW: 15 MHz ,
ULPower: 23dBm; ; UL_MOD_RB: QPSK, 75 (RB_Pos:0)



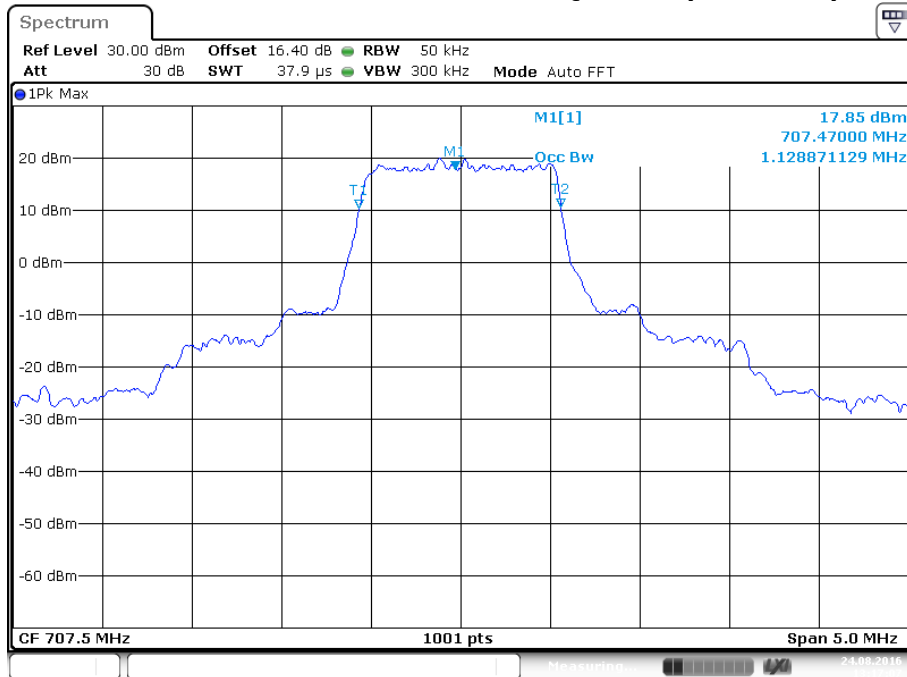
Date: 24.AUG.2016 09:33:30

LTE Band 7
Occupied Bandwidth: :@ULCH: 21100, BW: 20 MHz ,
ULPower: 23dBm; ; UL_MOD_RB: QPSK, 100 (RB_Pos:0)



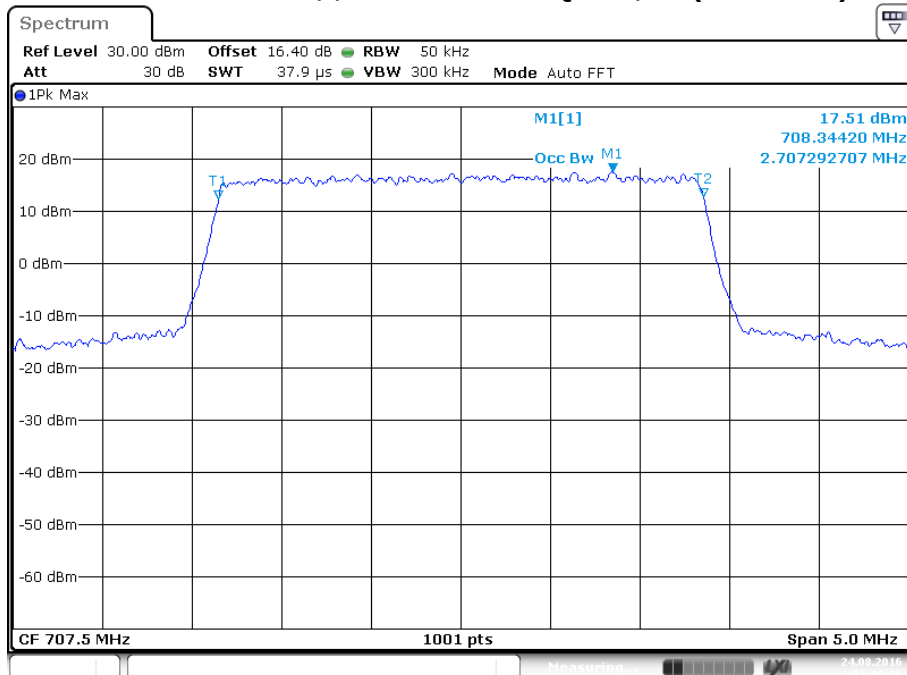
Date: 24.AUG.2016 08:02:36

LTE Band 12
Occupied Bandwidth: :@ULCH: 23095, BW: 1.4 MHz ,
ULPower: 23dBm; ; UL_MOD_RB: QPSK, 6 (RB_Pos:0)



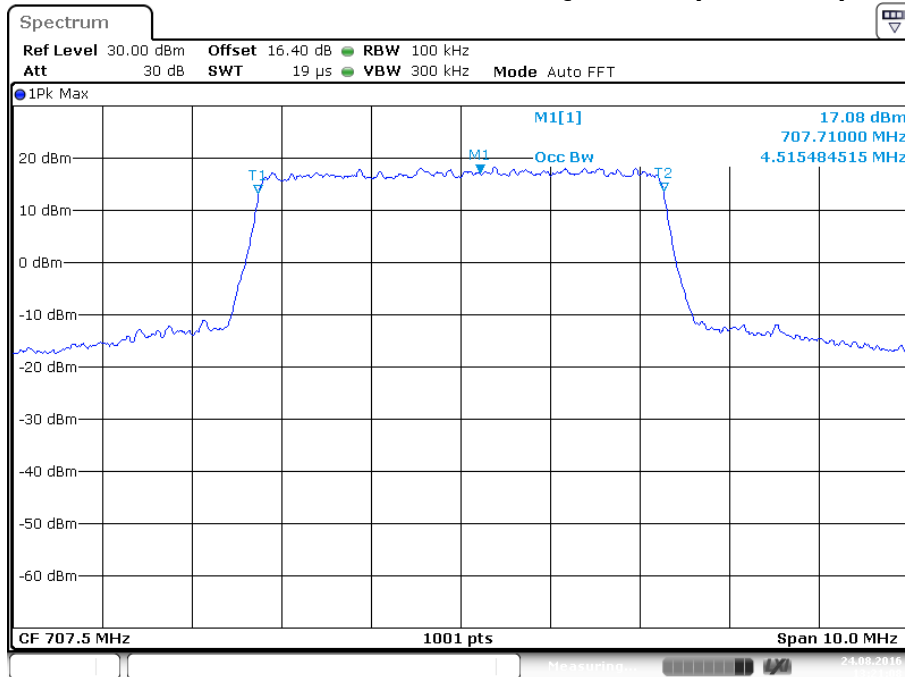
Date: 24.AUG.2016 13:17:07

LTE Band 12
Occupied Bandwidth: :@ULCH: 23095, BW: 3.0 MHz ,
ULPower: 23dBm; ; UL_MOD_RB: QPSK, 15 (RB_Pos:0)



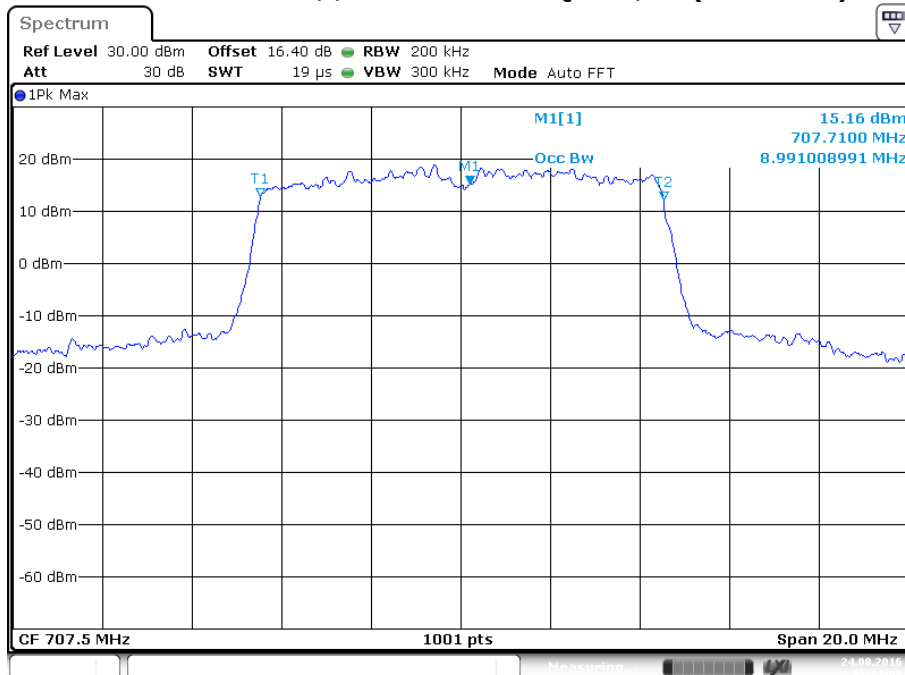
Date: 24.AUG.2016 13:18:26

LTE Band 12
Occupied Bandwidth: :@ULCH: 23095, BW: 5.0 MHz ,
ULPower: 23dBm; ; UL_MOD_RB: QPSK, 25 (RB_Pos:0)



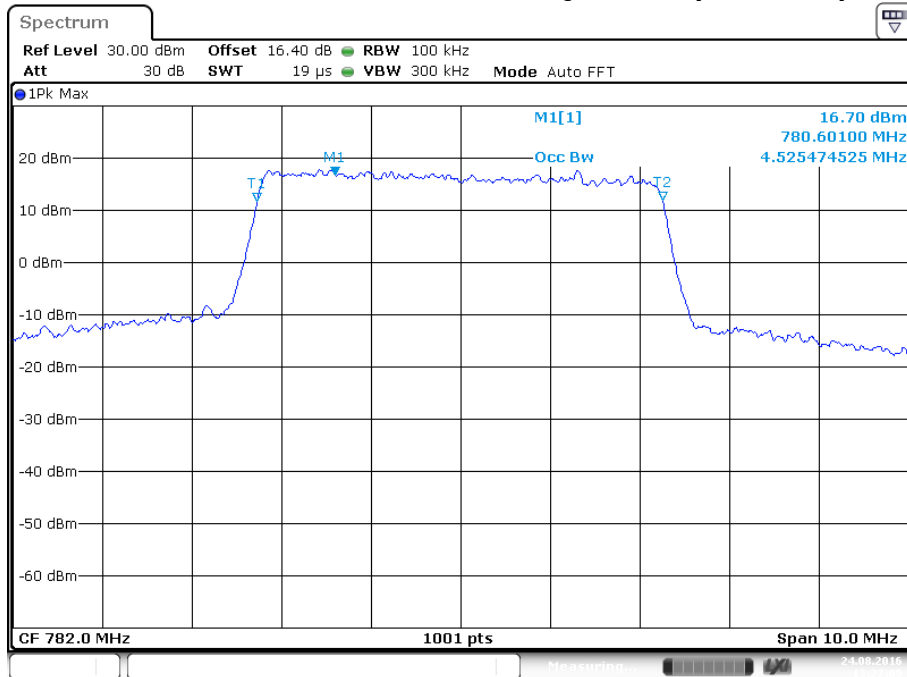
Date: 24.AUG.2016 13:21:08

LTE Band 12
Occupied Bandwidth: :@ULCH: 23095, BW: 10 MHz ,
ULPower: 23dBm; ; UL_MOD_RB: QPSK, 50 (RB_Pos:0)



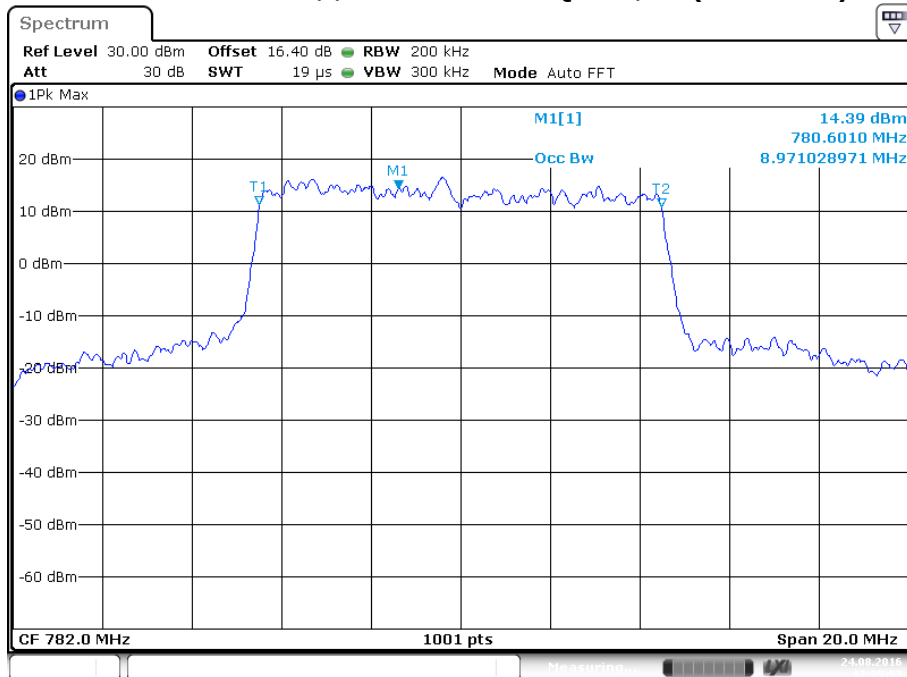
Date: 24.AUG.2016 13:22:03

LTE Band 13
Occupied Bandwidth: :@ULCH: 23230, BW: 5 MHz ,
ULPower: 23dBm; ; UL_MOD_RB: QPSK, 25 (RB_Pos:0)



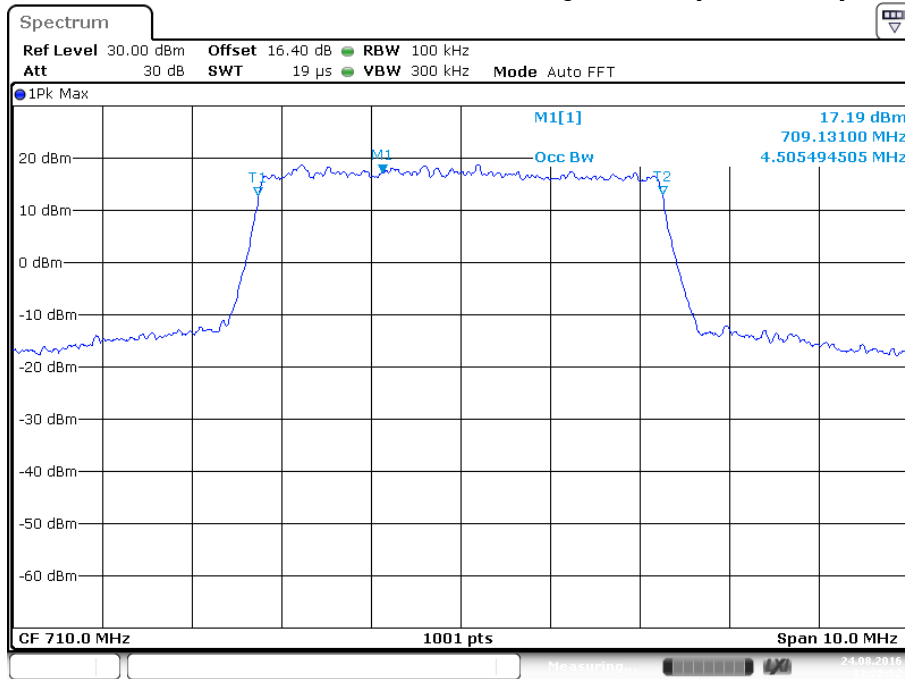
Date: 24.AUG.2016 13:27:09

LTE Band 13
Occupied Bandwidth: :@ULCH: 23230, BW: 10 MHz ,
ULPower: 23dBm; ; UL_MOD_RB: QPSK, 50 (RB_Pos:0)



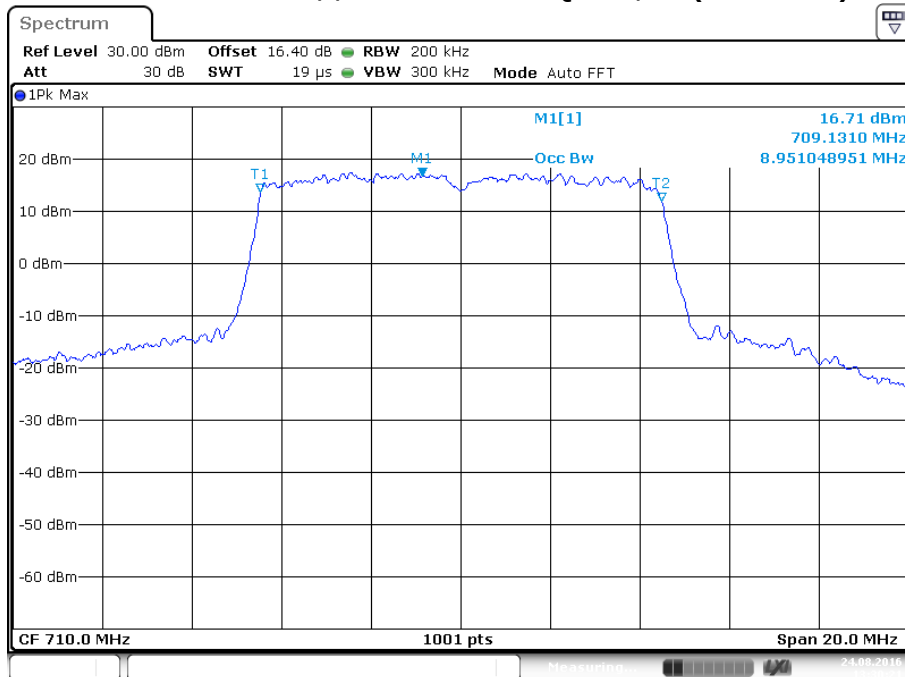
Date: 24.AUG.2016 13:25:57

LTE Band 17
Occupied Bandwidth: :@ULCH: 23790, BW: 5 MHz ,
ULPower: 23dBm; ; UL_MOD_RB: QPSK, 25 (RB_Pos:0)



Date: 24.AUG.2016 13:28:52

LTE Band 17
Occupied Bandwidth: :@ULCH: 23790, BW: 10 MHz ,
ULPower: 23dBm; ; UL_MOD_RB: QPSK, 50 (RB_Pos:0)



Date: 24.AUG.2016 13:30:21

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.

Every bandwidth was investigated for each LTE band, but only the worst-case is presented.

6.3 Test Site

SGS EMC Laboratory, Suwanee, GA

Environmental Conditions

Temperature: 22.7 °C
 Relative Humidity: 51.7%
 Atmospheric Pressure: 98.6 kPa

6.4 Test Equipment

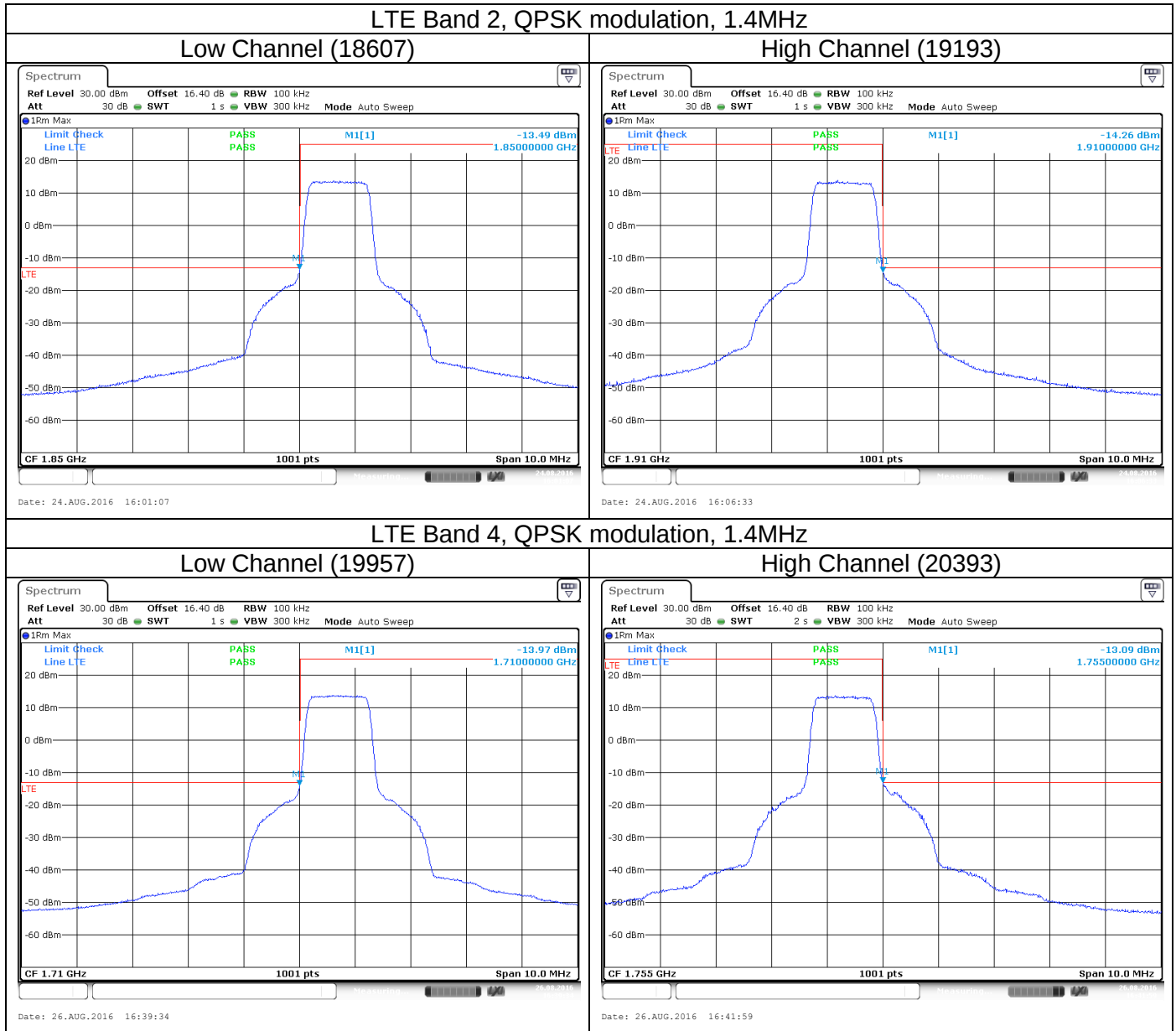
Test Date: 24-Aug-2016

Tester: JOP

Equipment	Model	Manufacturer	Asset Number	Cal Due Date
WIDEBAND RADIO COMMUNICATION TESTER	CMW500	ROHDE & SCHWARZ	B094874	19-Jan-2018
RF CABLE	141	HUBER & SUHNER	B095587	26-Jul-2017
POWER SPLITTER	ZFRSC-183-S+	MINI-CIRCUITS	B101743	28-Jul-2017
10dB fixed Attenuator	BW-S10W2	MINI-CIRCUITS	15033	CNR
SIGNAL ANALYZER	FSV30	ROHDE & SCHWARZ	B085749	8-Oct-2017

- Unless otherwise noted, equipment is on a 1 year calibration cycle.
- Based on manufacturer's specifications, the CMW-500 and FSV are a 2 year calibration cycle

6.5 Test Data - Band Edge



LTE Band 5, QPSK modulation, 1.4MHz

Low Channel (20407)

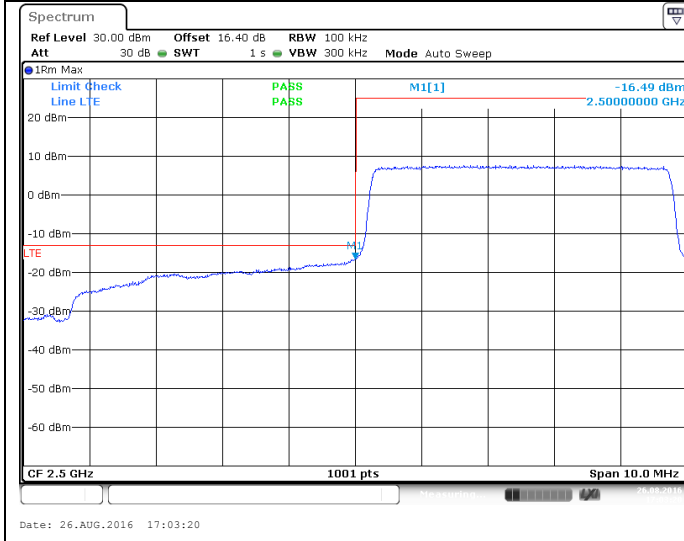


High Channel (20643)



LTE Band 7, QPSK modulation, 5MHz

Low Channel (20775)



High Channel (21425)

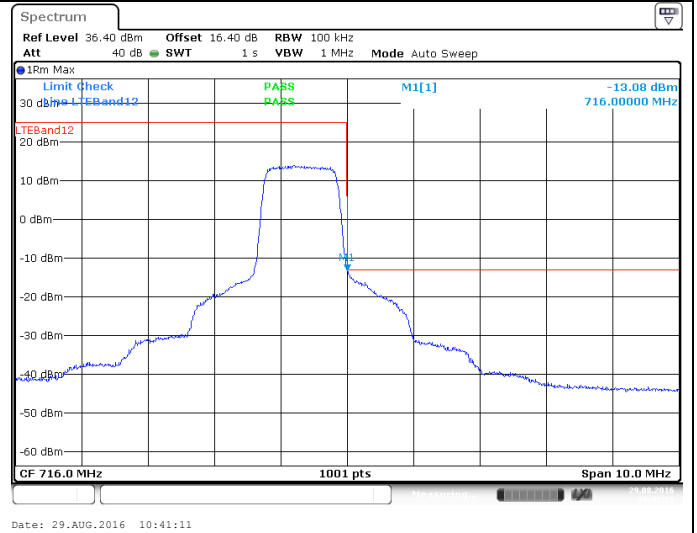


LTE Band 12, QPSK modulation, 1.4MHz

Low Channel (23017)



High Channel (23173)



LTE Band13, QPSK modulation, 5MHz / 10MHz

Low Channel (23205)

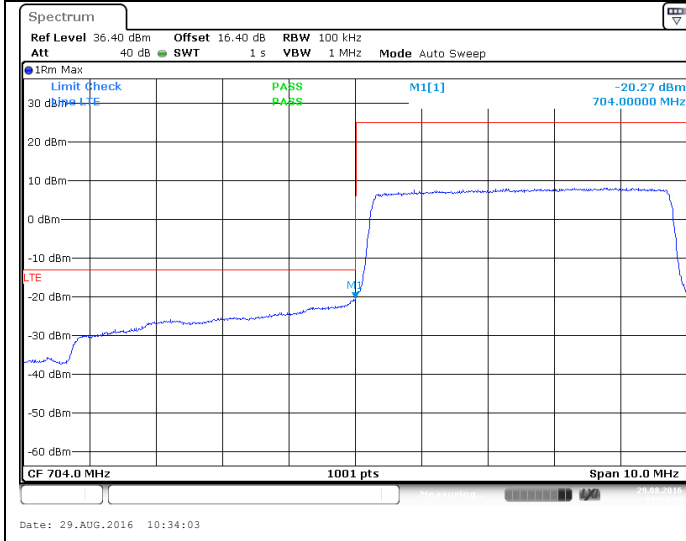


High Channel (23230)

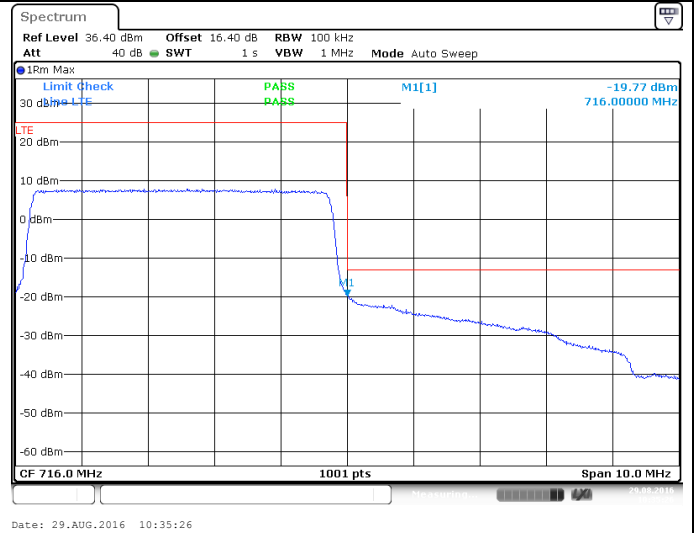


LTE Band17, QPSK modulation, 5MHz

Low Channel (23755)



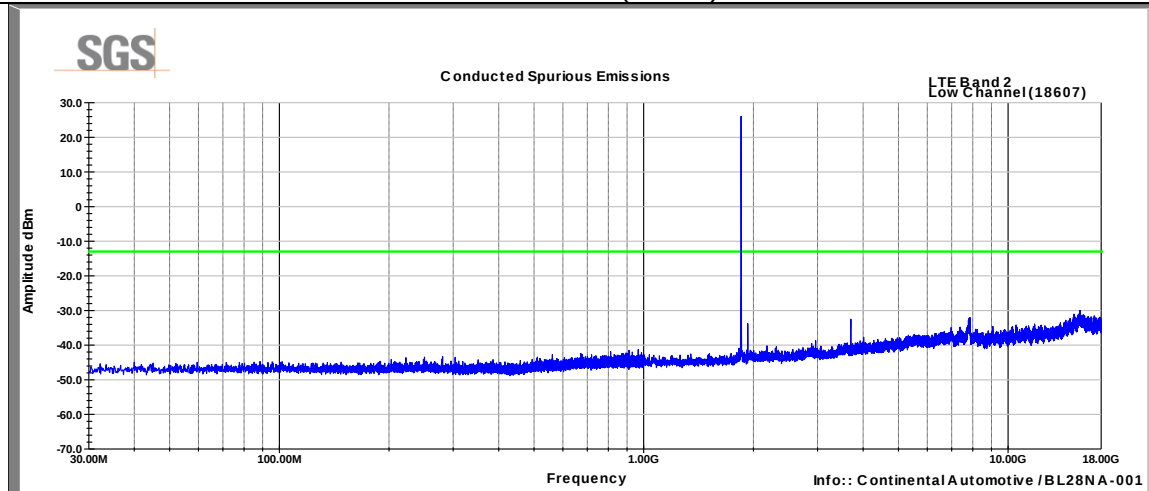
High Channel (23825)



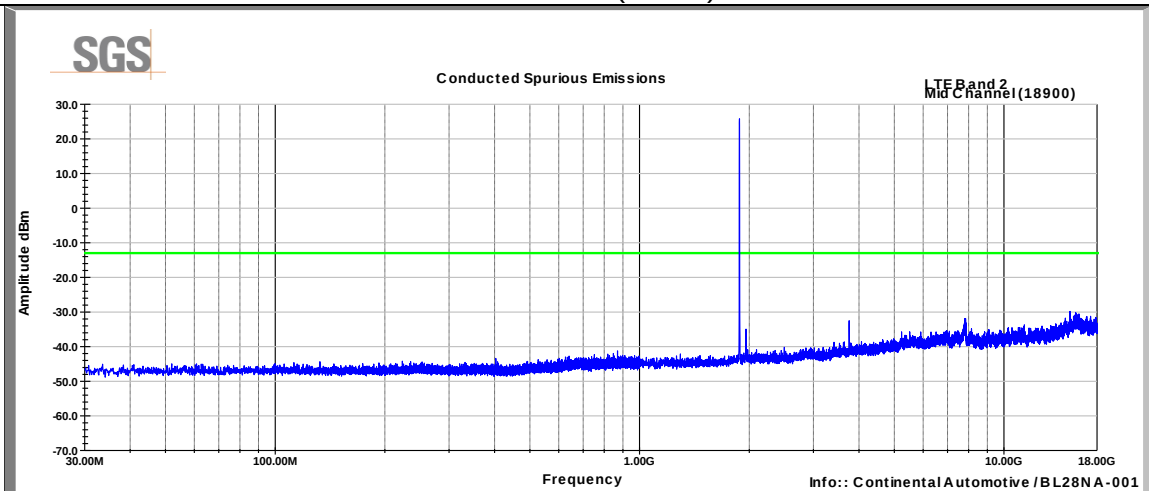
6.6 Test Data - Conducted Spurious Emissions

LTE Band 2, QPSK modulation, 1.4MHz

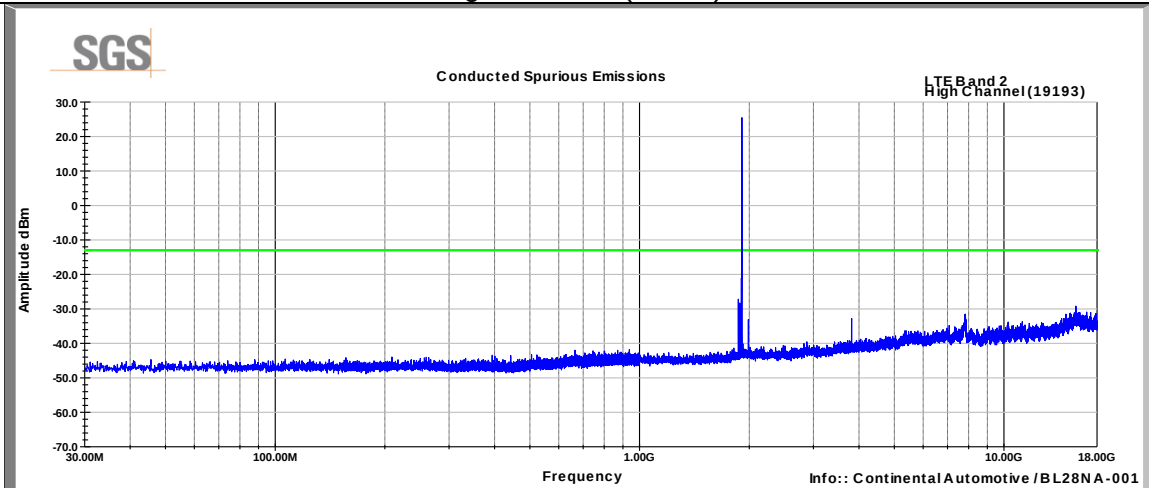
Low Channel (18607)



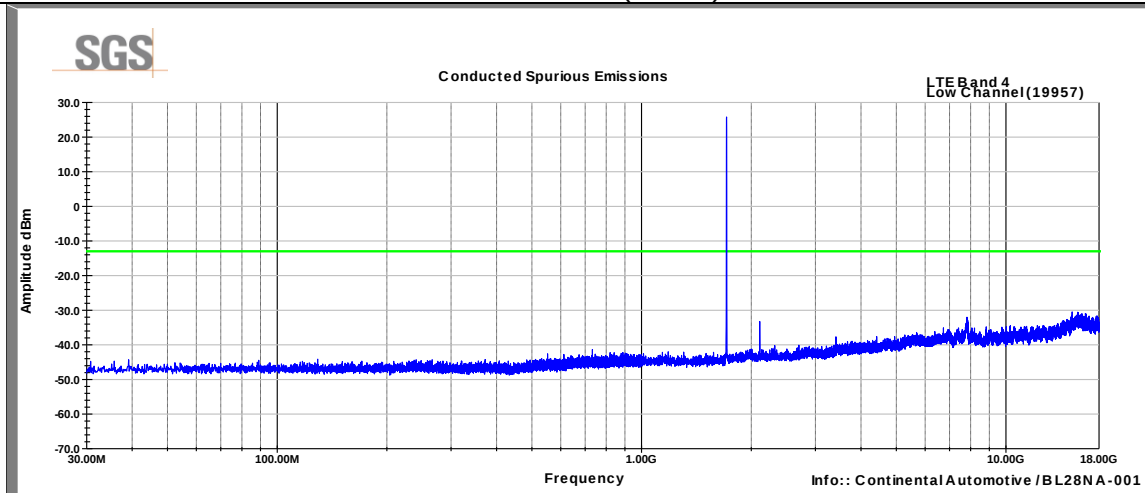
Mid Channel (18900)



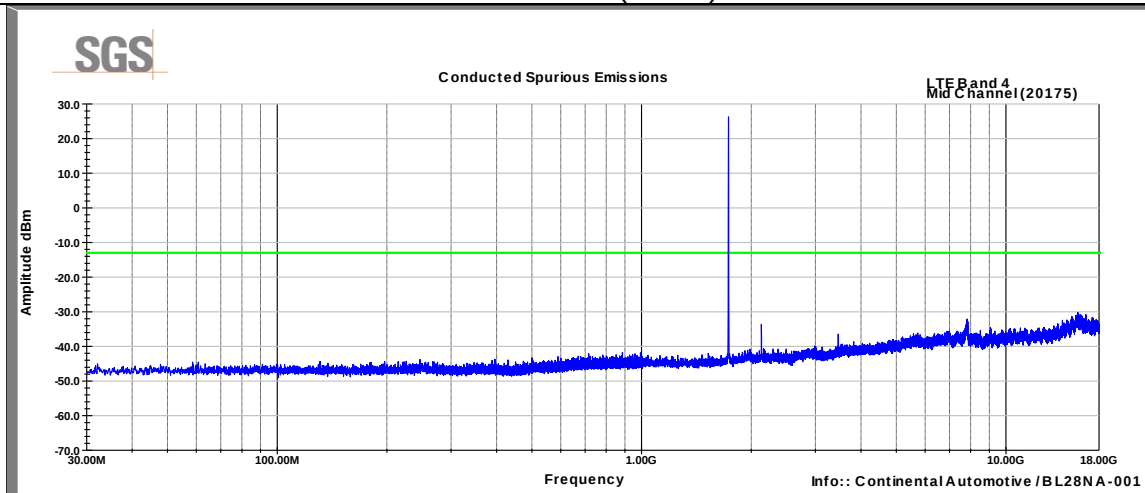
High Channel (19193)



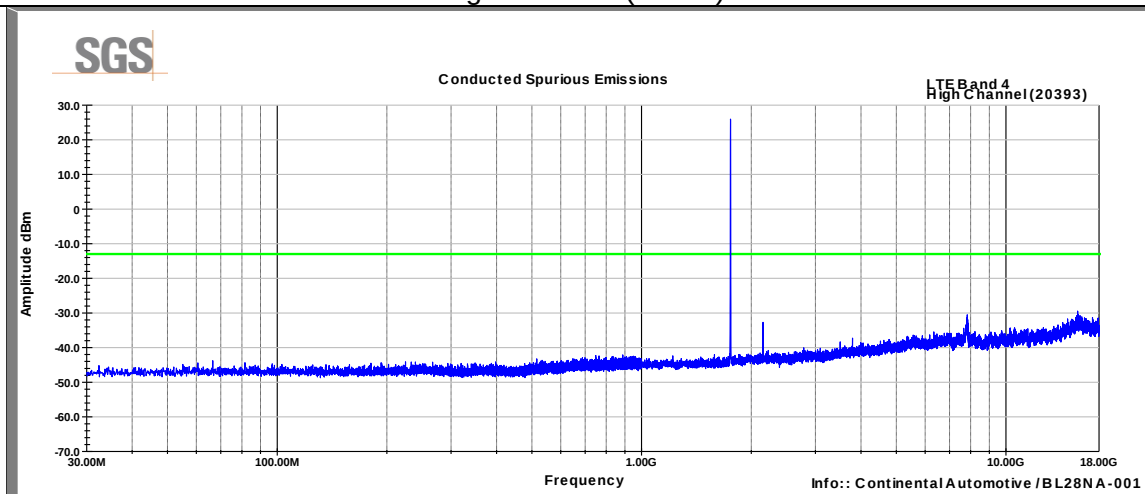
LTE Band 4, QPSK modulation, 1.4MHz
Low Channel (19957)



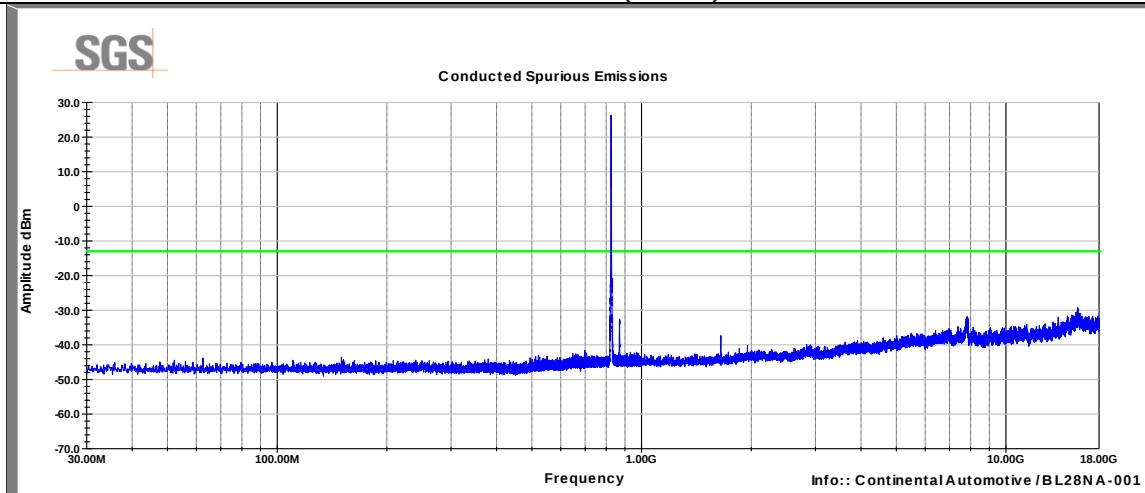
Mid Channel (20175)



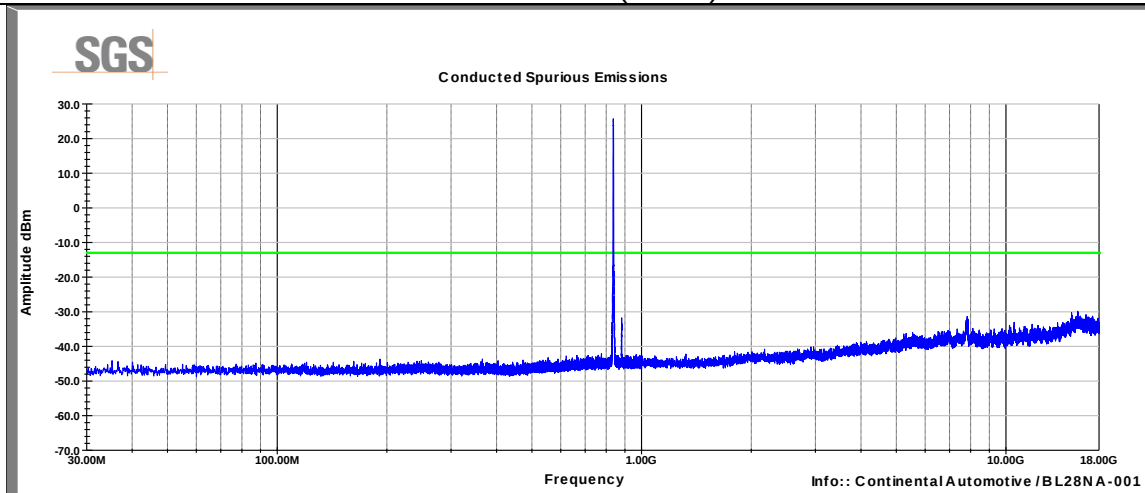
High Channel (20393)



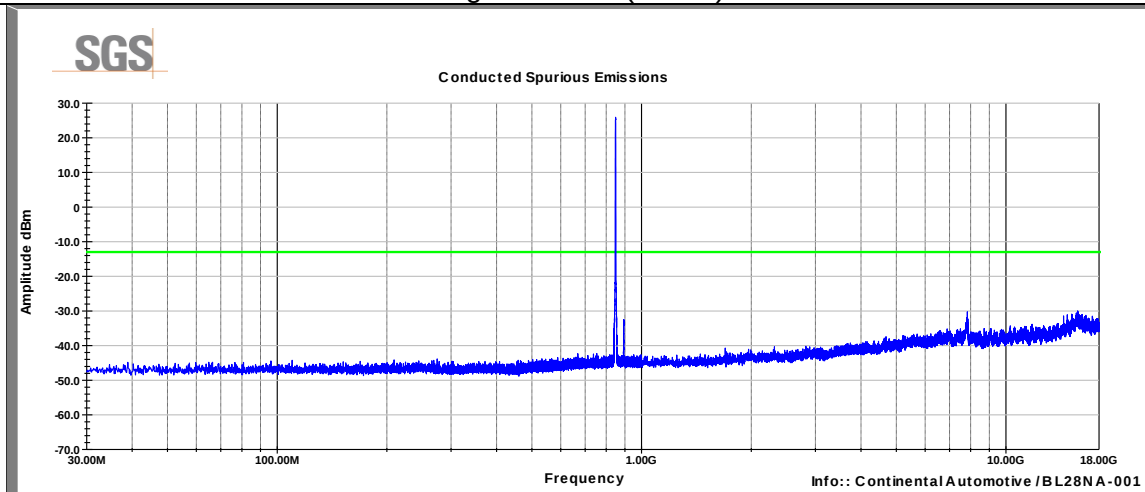
LTE Band 5, QPSK modulation, 1.4MHz
 Low Channel (20407)



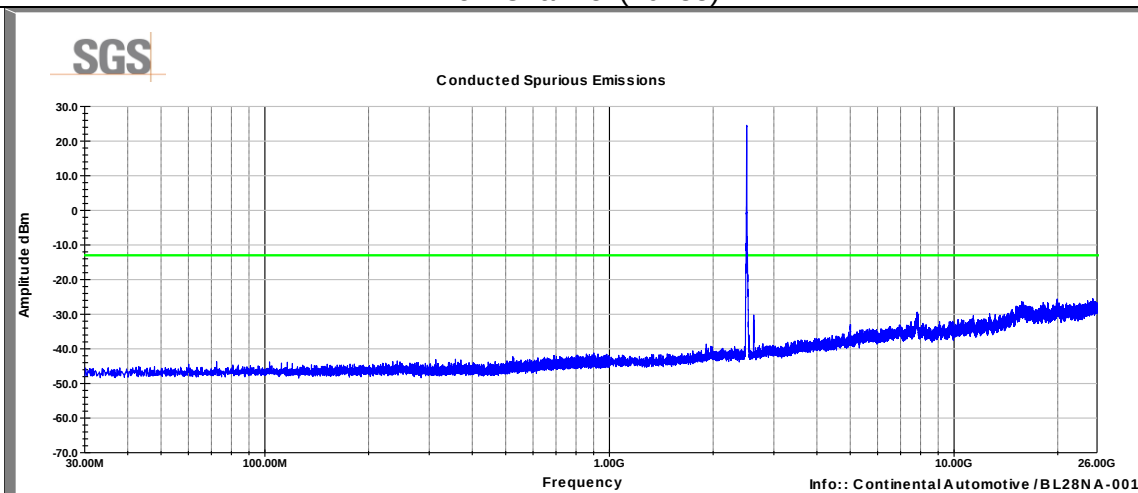
Mid Channel (20525)



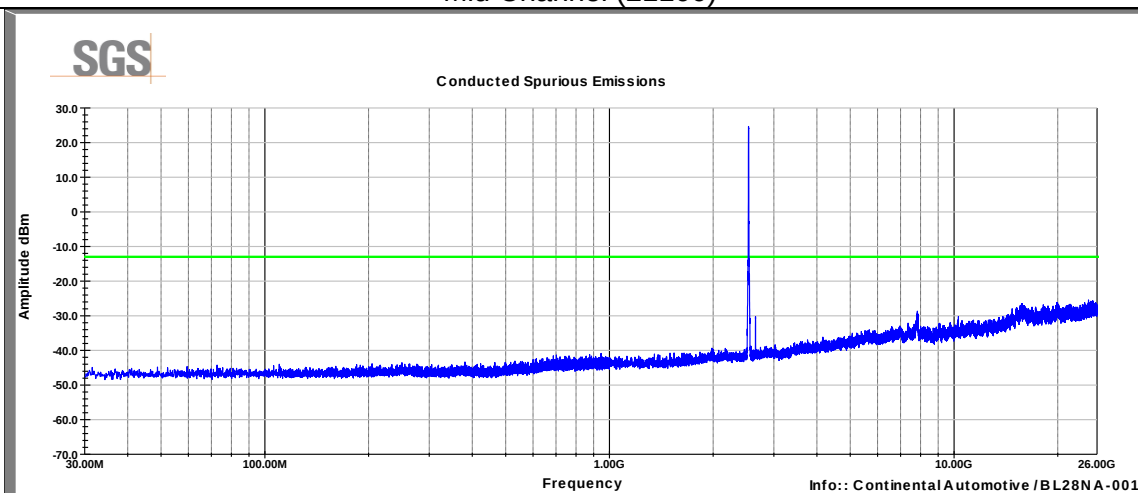
High Channel (20643)



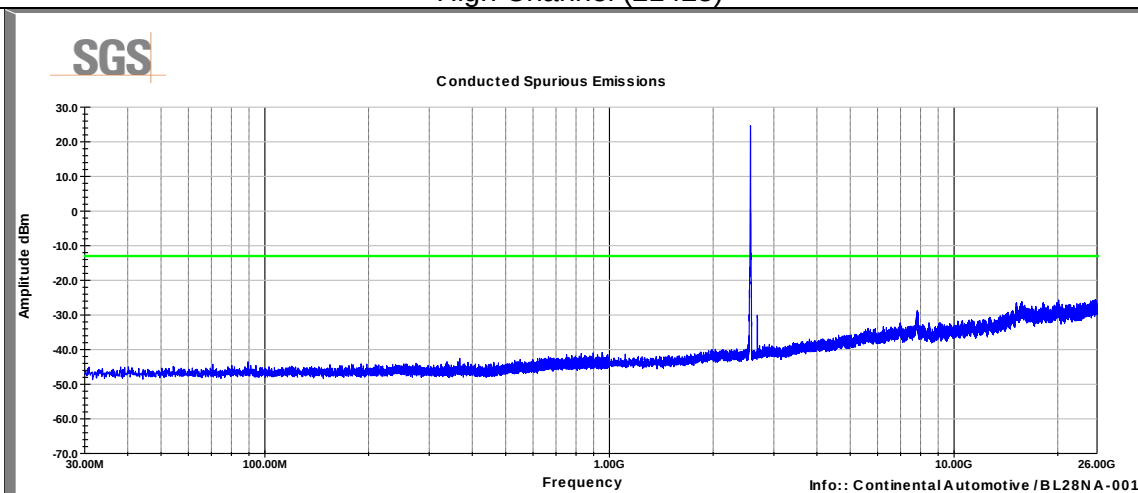
LTE Band 7, QPSK modulation, 5MHz
 Low Channel (20755)



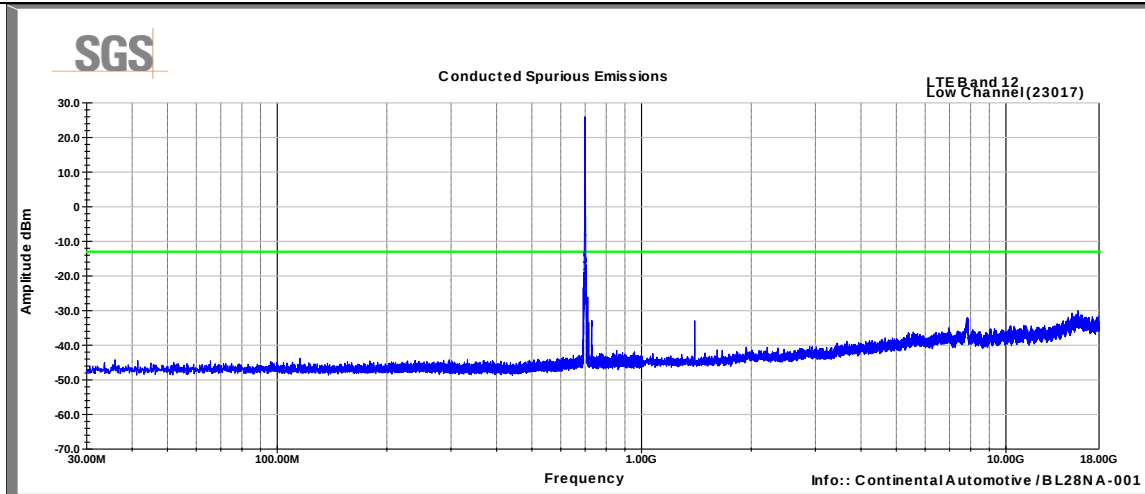
Mid Channel (21100)



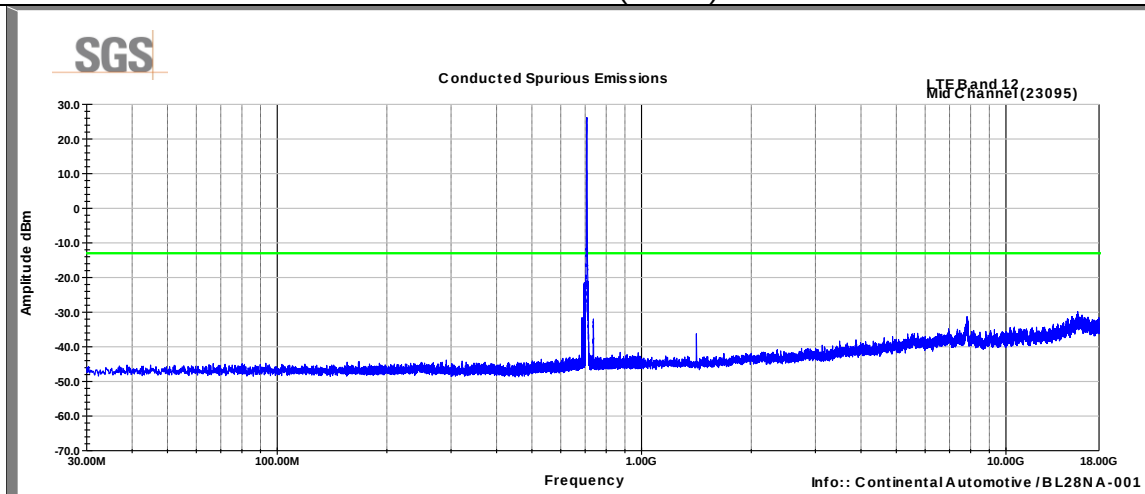
High Channel (21425)



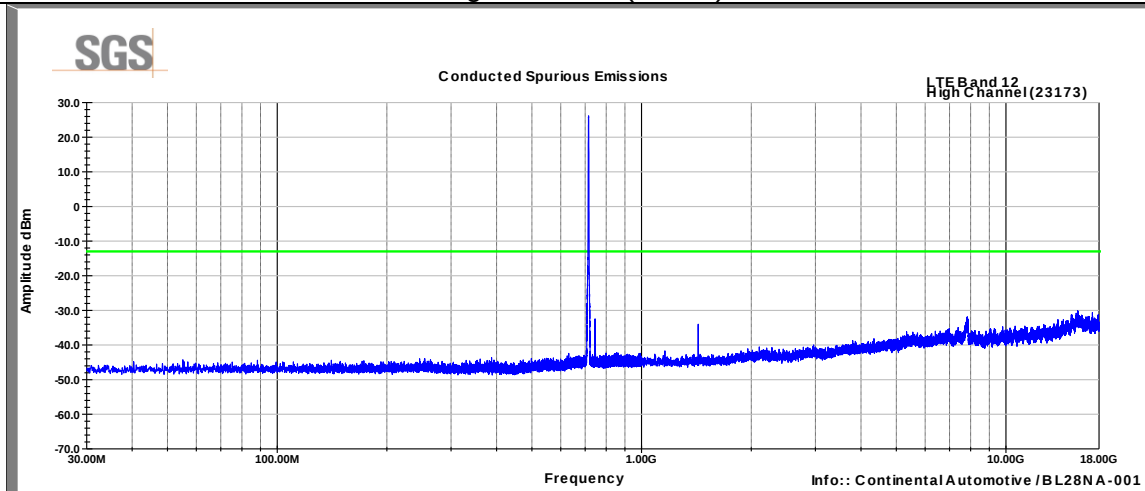
LTE Band 12, QPSK modulation, 1.4MHz
 Low Channel (23017)



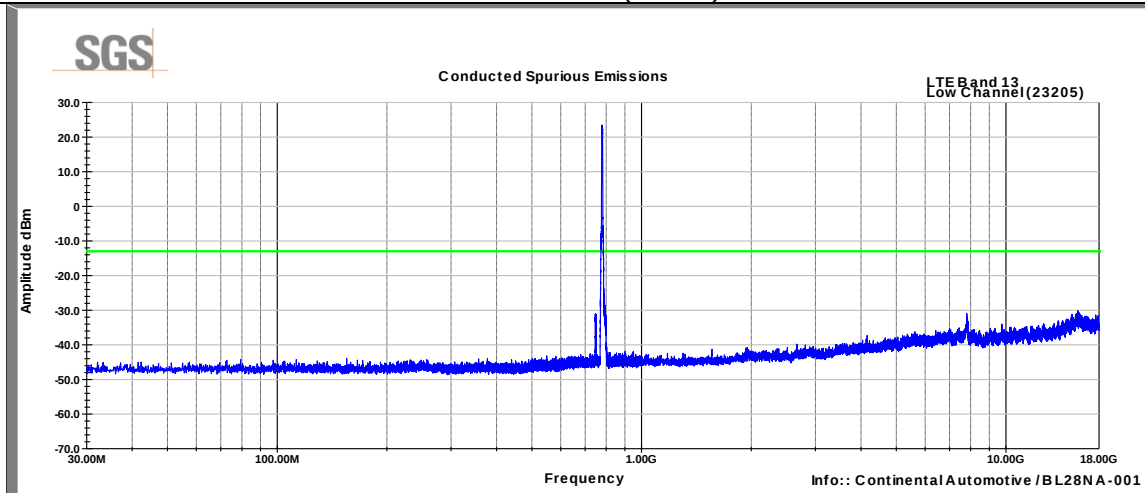
Mid Channel (23095)



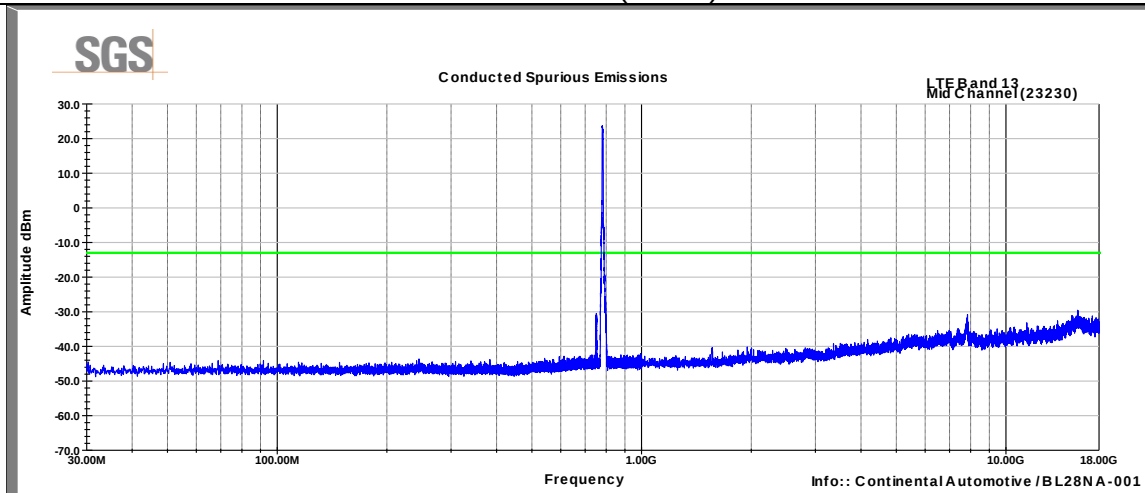
High Channel (23173)



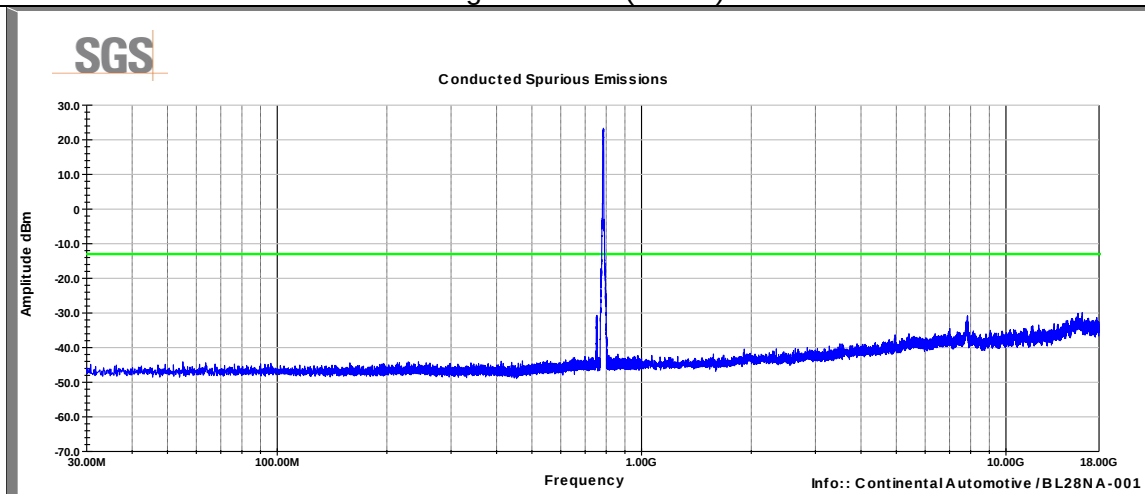
LTE Band 13, QPSK modulation, 5MHz
 Low Channel (23205)



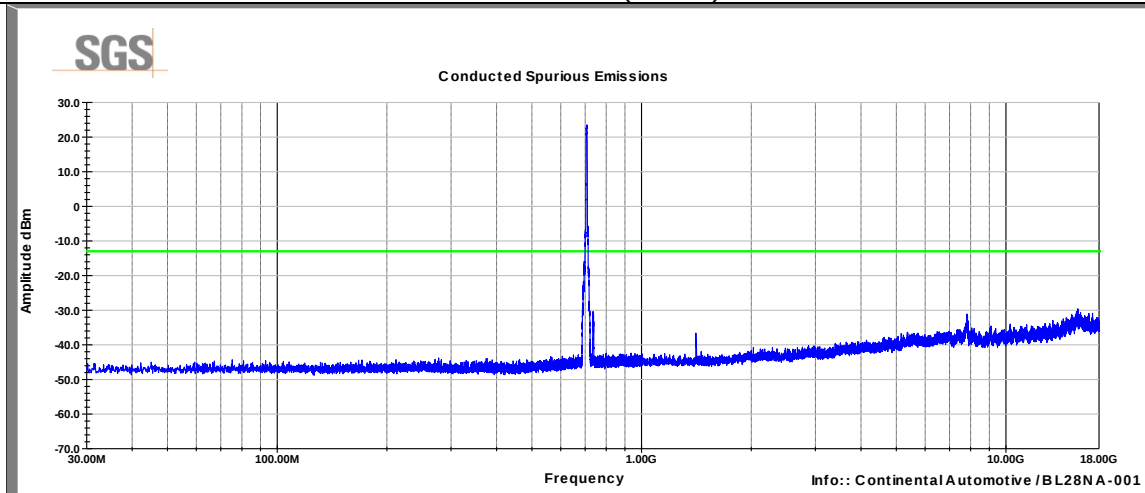
Mid Channel (23230)



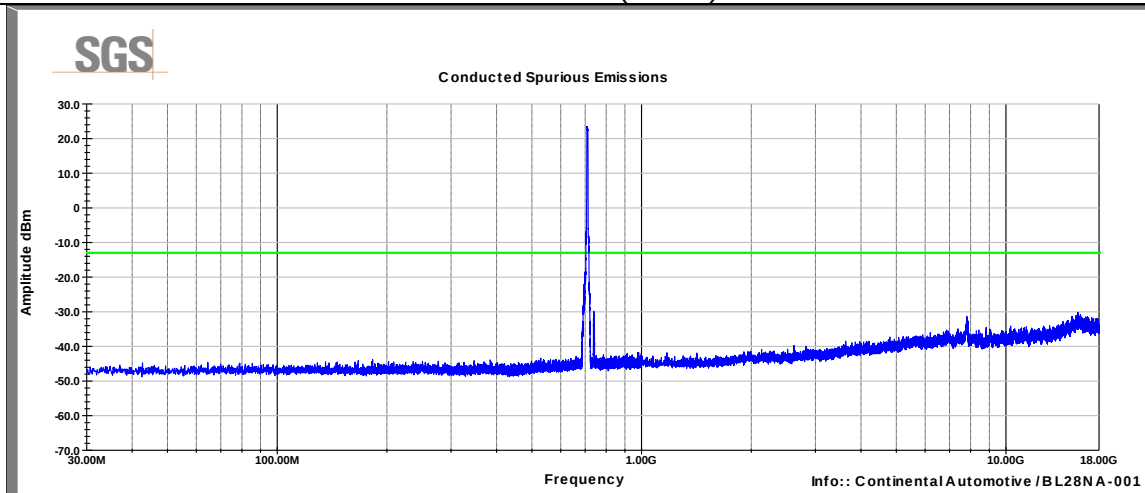
High Channel (23255)



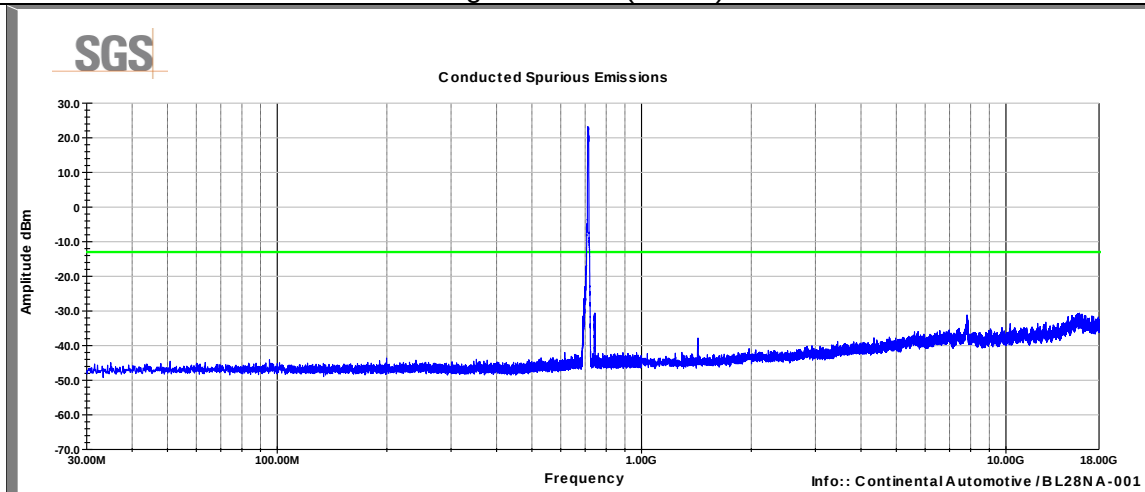
LTE Band 17, QPSK modulation, 5MHz
 Low Channel (23755)



Mid Channel (23790)



High Channel (23825)



7 Effective Radiated Power

7.1.1 Test Result

Test Description	Basic Standards	Test Result
Effective Radiated Power	22.913(a)(2) 27.50 RSS-130 (4.4)	Pass
Effective Isotropic Radiated Power	24.232(c) 27.50(d)(4) RSS-132 (5.4) RSS-133 (6.4) RSS-139 (6.4)	Pass

7.1.2 Test Method

Because the BL28NA-001 is provided with a coaxial port but no antenna, ERP/EIRP measurements were taken by measuring the conducted output power and defining the maximum gain antenna that may be used while maintaining compliance with the applicable limits.

7.2 Test Site

SGS EMC Laboratory, Suwanee, GA

7.3 Test Equipment

None

7.4 Test Data

Band of Operation		Conducted Power w/tolerance	Antenna Gain	Cable Loss	Average EIRP		Distance (R)	Power Density EIRP _{avg} /(4πR ²)	FCC	% of Limit	Verdict
Type	MHz	dBm			dBm	mW	cm	mW	mW/cm ²		
LTE Band 2	1850-1910	24.3	7.0	1.0	30.3	1072	20	0.213	1.00	21%	Pass
LTE Band 4	1710-1755	24.3	7.0	1.0	30.3	1072	20	0.213	1.00	21%	Pass
LTE Band 5	824-849	24.0	7.0	1.0	30.0	1000	20	0.199	0.55	36%	Pass
LTE Band 7	2500-2570	24.2	7.0	1.0	30.2	1047	20	0.208	1.00	21%	Pass
LTE Band 12	699-716	24.0	7.0	1.0	30.0	1000	20	0.199	0.47	43%	Pass
LTE Band 13	777-787	23.7	7.0	1.0	29.7	933	20	0.186	0.52	36%	Pass
LTE Band 17	704-716	23.9	7.0	1.0	29.9	977	20	0.194	0.47	41%	Pass

Band of Operation		Conducted Power w/tolerance	Antenna Gain	Cable Loss	Average EIRP		Distance (R)	Power Density EIRP _{avg} /(4πR ²)	IC	% of Limit	Verdict
Type	MHz	dBm			dBm	mW	cm	mW	mW/cm ²		
LTE Band 2	1850-1910	24.3	7.0	1.0	30.3	1072	20	0.213	0.45	48%	Pass
LTE Band 4	1710-1755	24.3	7.0	1.0	30.3	1072	20	0.213	0.42	50%	Pass
LTE Band 5	824-849	24.0	7.0	1.0	30.0	1000	20	0.199	0.26	77%	Pass
LTE Band 7	2500-2570	24.2	7.0	1.0	30.2	1047	20	0.208	0.55	38%	Pass
LTE Band 12	699-716	24.0	7.0	1.0	30.0	1000	20	0.199	0.23	86%	Pass
LTE Band 13	777-787	23.7	7.0	1.0	29.7	933	20	0.186	0.25	75%	Pass
LTE Band 17	704-716	23.9	7.0	1.0	29.9	977	20	0.194	0.23	84%	Pass

Note: Antenna gain was determined from maximum gain while still meeting the RF exposure requirements at 20cm.

8 Radiated Spurious Emissions

8.1 Test Result

Test Description	Basic Standards		Test Result
Radiated Spurious Emissions	2.1053 22.917(a) 24.238(a) 27.53(c)(2) 27.53(h) ANSI/TIA-603-D-2010	RSS-GEN (6.13) RSS-130 (4.6) RSS-132 (5.5) RSS-133 (6.5.1) RSS-139 (6.5.1)	Pass

8.2 Test Method

The levels are measured by means of a calibrated spectrum analyzer. The spectrum 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.

The EUT was manipulated through each of its three orthogonal axes with the measurement oriented in both vertical and horizontal polarizations.

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 measurements were performed at the low, middle, and high channels.

8.3 Test Site

SGS 3m Chamber, Suwanee, GA (validated to ANS C63.4: 2014 below and above 1GHz)

Environmental Conditions

Temperature: 23.30 °C
 Relative Humidity: 43.2 %
 Atmospheric Pressure: 98.1 kPa

8.4 Test Equipment

Equipment	Model	Manufacturer	Asset Number	Cal Due Date
ANTENNA, BILOG	CBL 6143A	TESEQ	B085931	1-Dec-2016
RF CABLE	SF106	HUBER & SUHNER	B079716	27-Jul-2017
WIDEBAND RADIO COMMUNICATION TESTER	CMW500	ROHDE & SCHWARZ	B085757	3-Nov-2016
RF CABLE	SF106	HUBER & SUHNER	B079713	27-Jul-2017
EMI TEST RECEIVER	ESU40	ROHDE & SCHWARZ	B079629	20-Jun-2017
RF CABLE	SF106	HUBER & SUHNER	B079712	27-Jul-2017
LOW NOISE AMPLIFIER	TS-PR18	ROHDE & SCHWARZ	B094463	16-Feb-2017
RF CABLE	SF102	HUBER & SUHNER	B079822	27-Jul-2017
RF CABLE	SF102	HUBER & SUHNER	B079824	27-Jul-2017
DRG HORN (SMALL)	3116B	ETS LINDGREN	B079695	15-Jul-2017
LOW NOISE AMPLIFIER	NSP1840-HG	MITEQ	B087572	29-Jul-2017
RF CABLE	SF106	HUBER & SUHNER	B085892	27-Jul-2017
DRG HORN (MEDIUM)	3117	ETS LINDGREN	B079699	26-Apr-2017
RF CABLE	SUCOFLEX 100	HUBER & SUHNER	B108523	4-Aug-2017

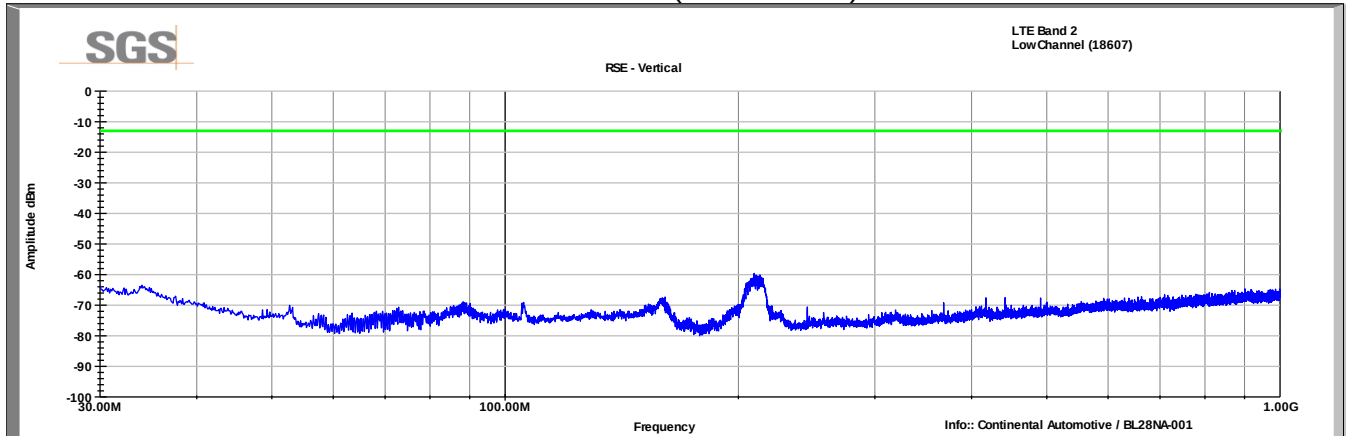
- Unless otherwise noted, equipment is on a 1 year calibration cycle.

8.5 Test Data

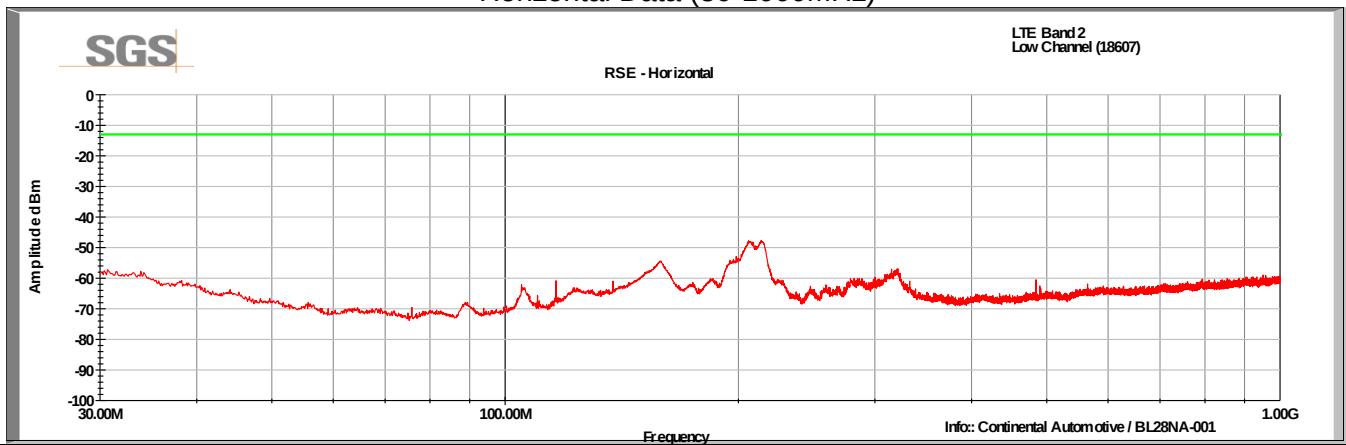
LTE Band 2, QPSK modulation, 1.4MHz

Low Channel (18607)

Vertical Data (30-1000MHz)



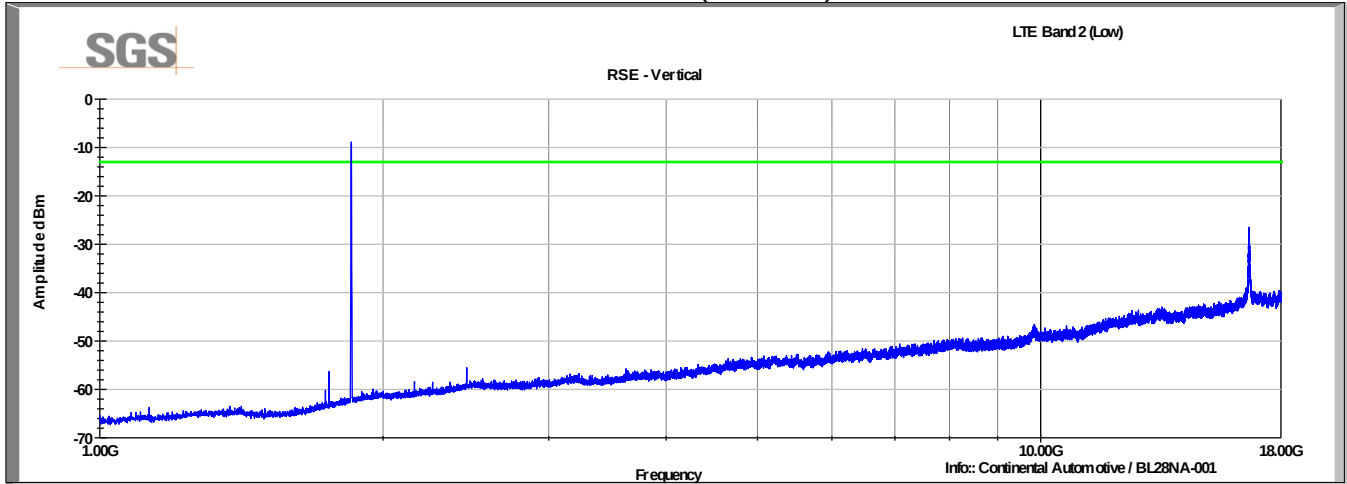
Horizontal Data (30-1000MHz)



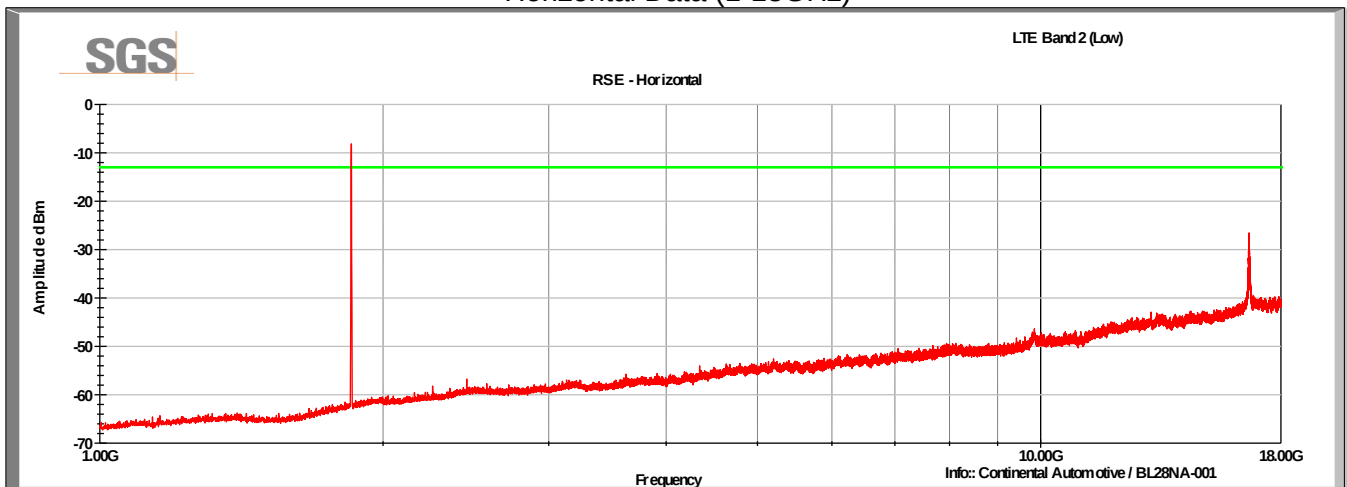
LTE Band 2, QPSK modulation, 1.4MHz

Low Channel (18607)

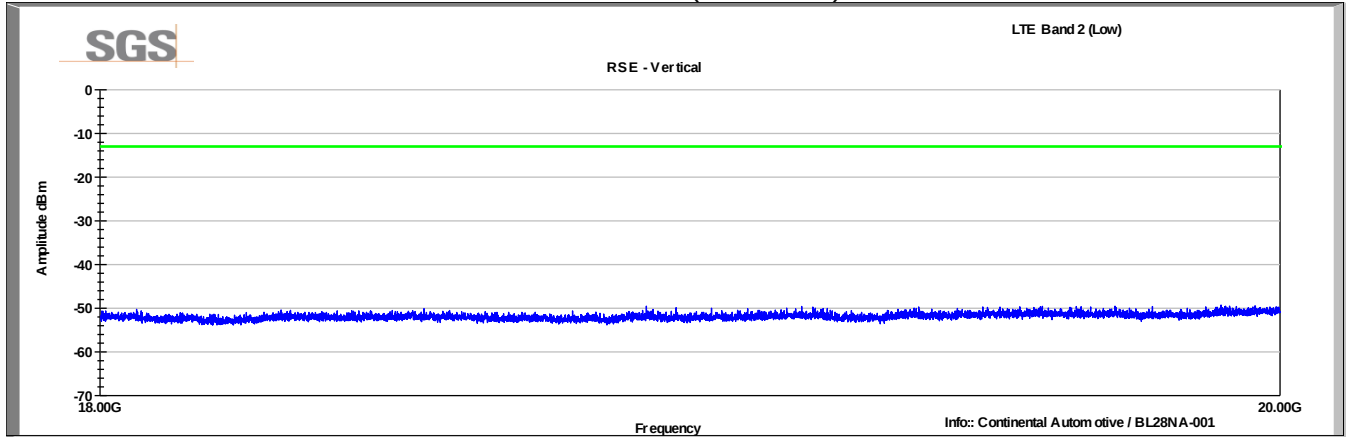
Vertical Data (1-18GHz)



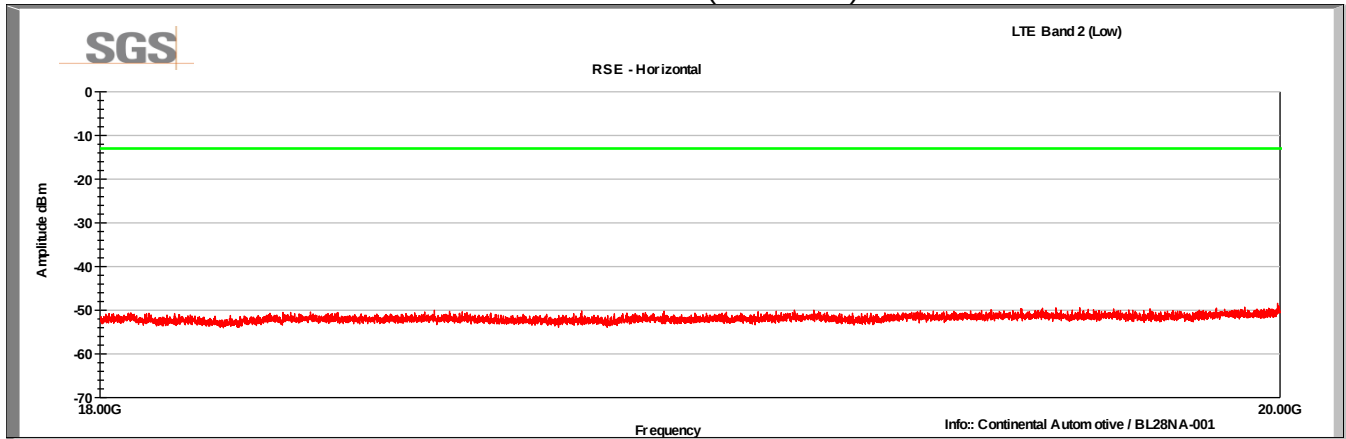
Horizontal Data (1-18GHz)



LTE Band 2, QPSK modulation, 1.4MHz
 Low Channel (18607)
 Vertical Data (18-20GHz)



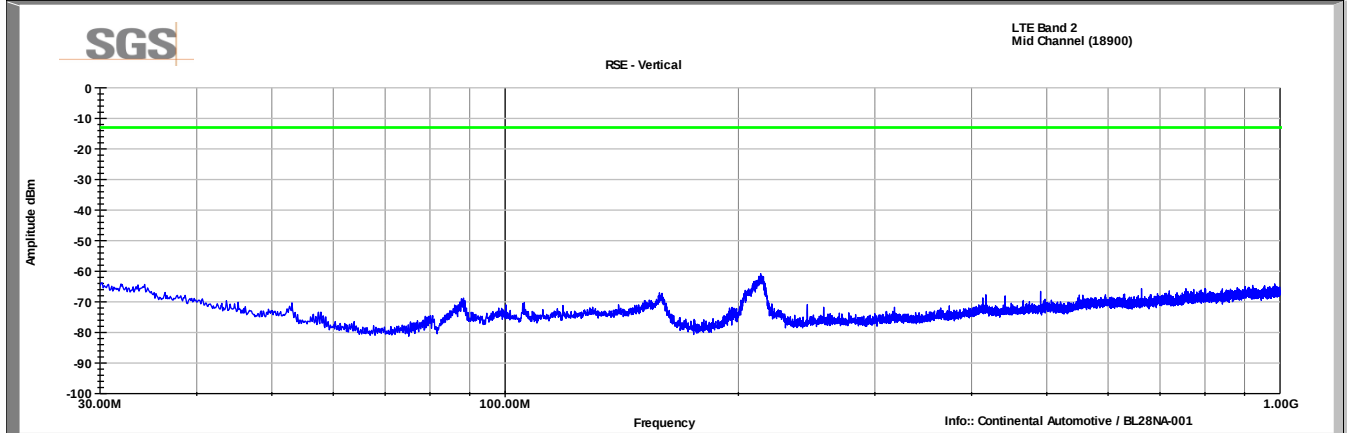
Horizontal Data (18-20GHz)



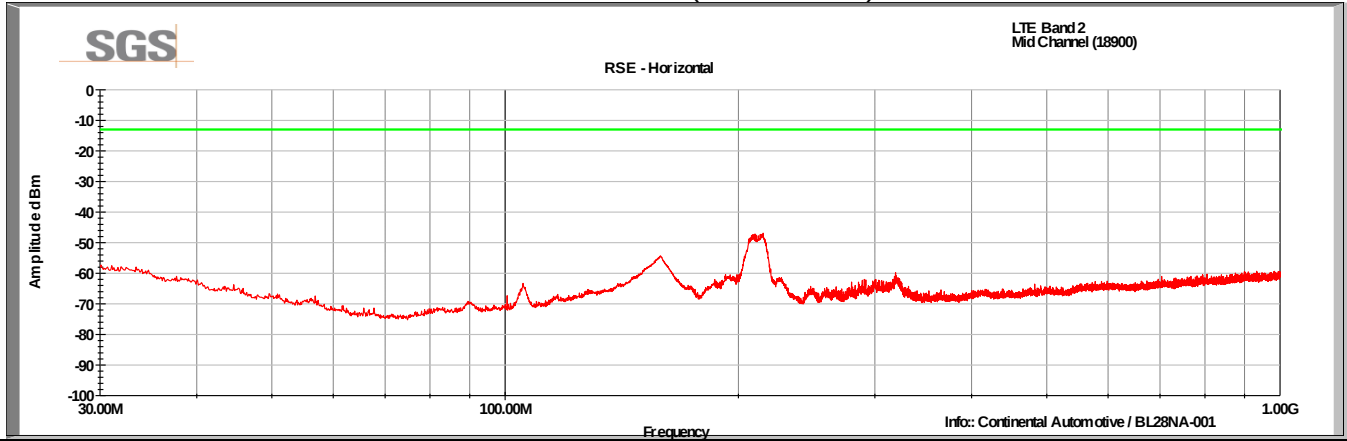
LTE Band 2, QPSK modulation, 1.4MHz

Mid Channel (18900)

Vertical Data (30-1000MHz)



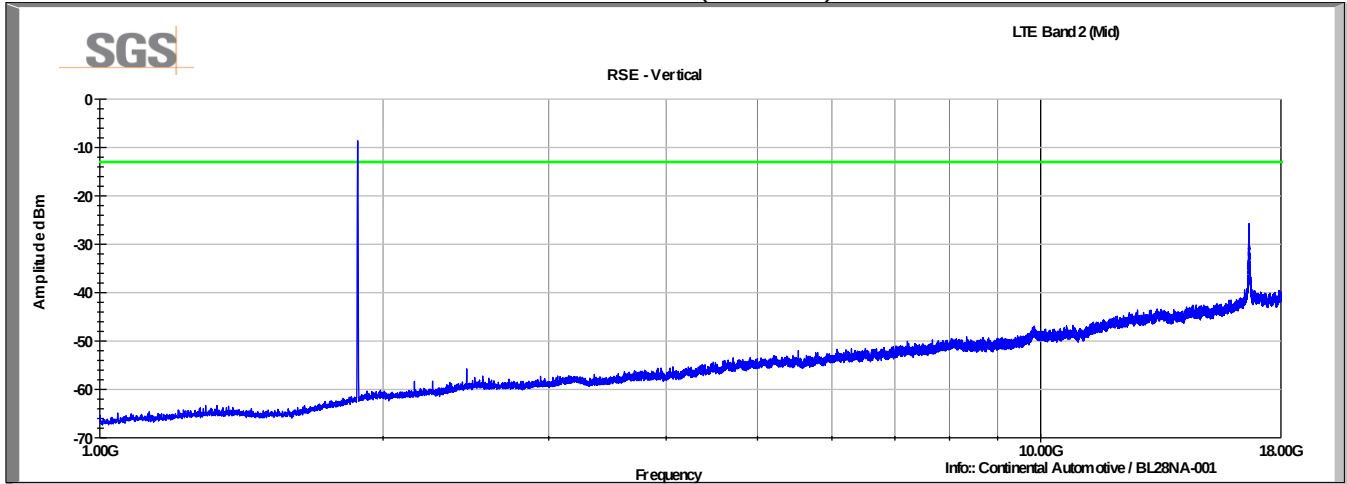
Horizontal Data (30-1000MHz)



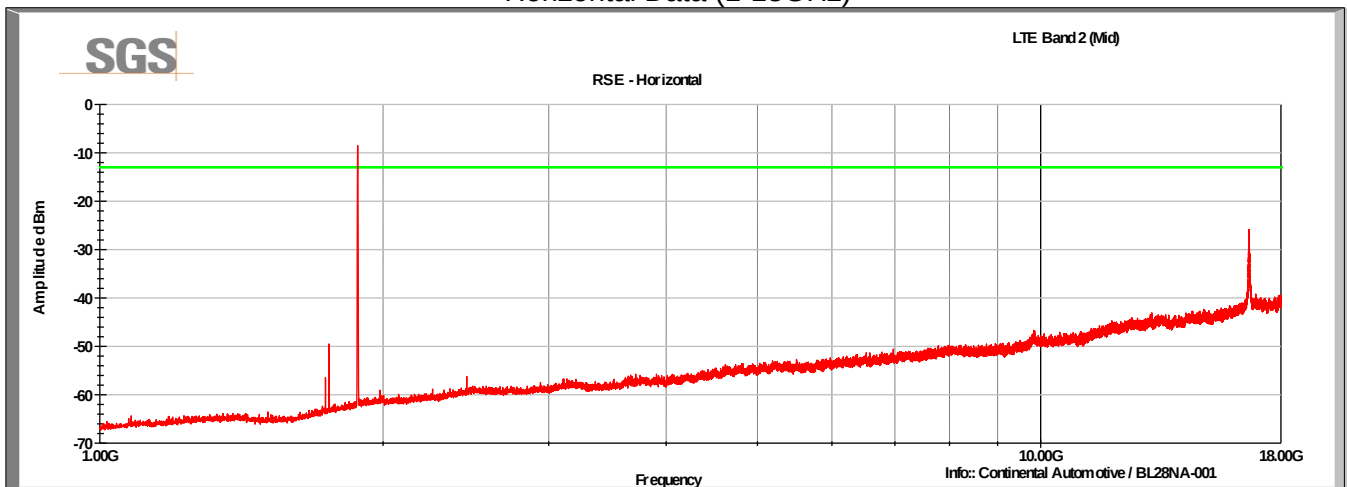
LTE Band 2, QPSK modulation, 1.4MHz

Mid Channel (18900)

Vertical Data (1-18GHz)



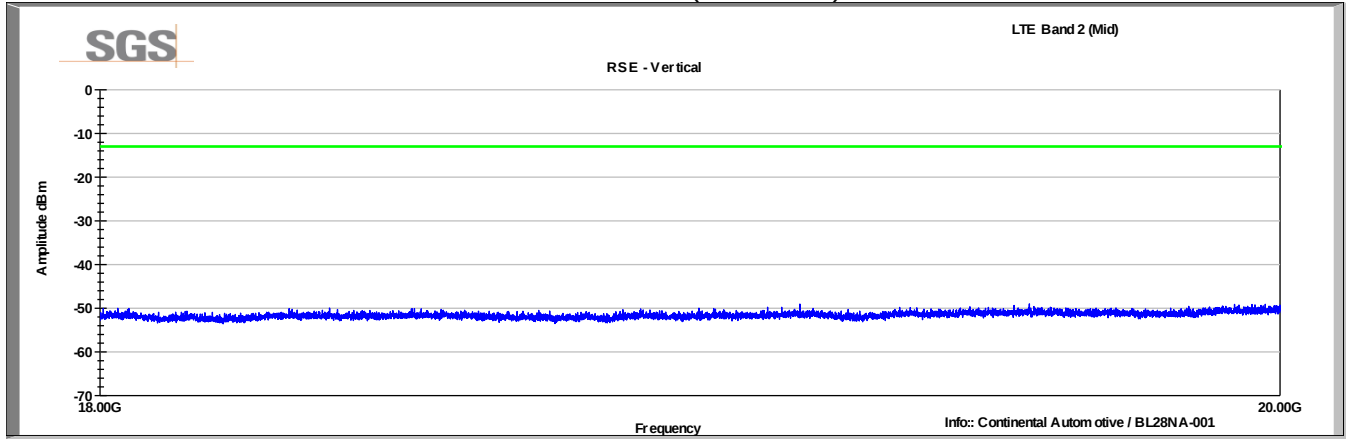
Horizontal Data (1-18GHz)



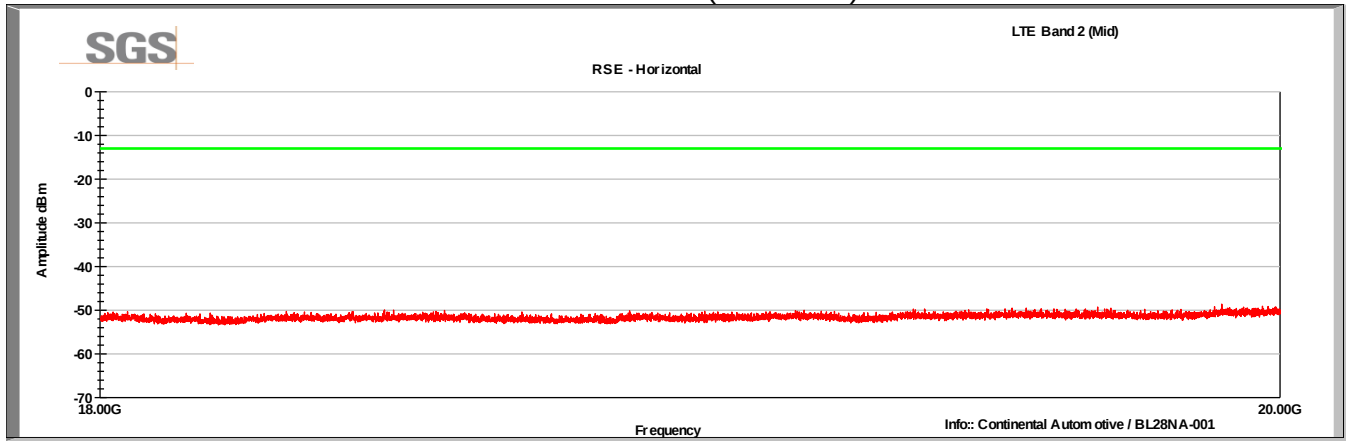
LTE Band 2, QPSK modulation, 1.4MHz

Mid Channel (18900)

Vertical Data (18-20GHz)



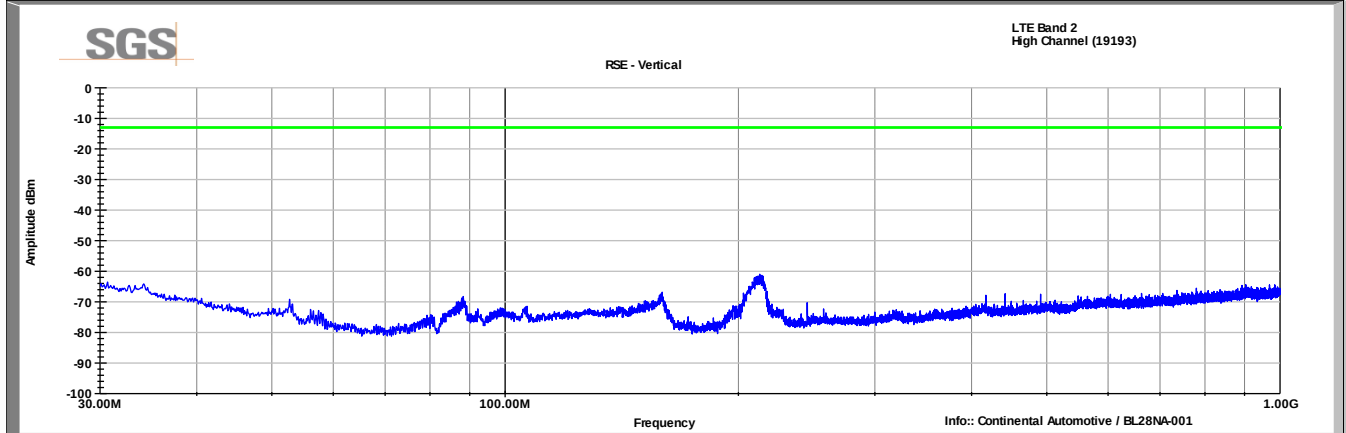
Horizontal Data (18-20GHz)



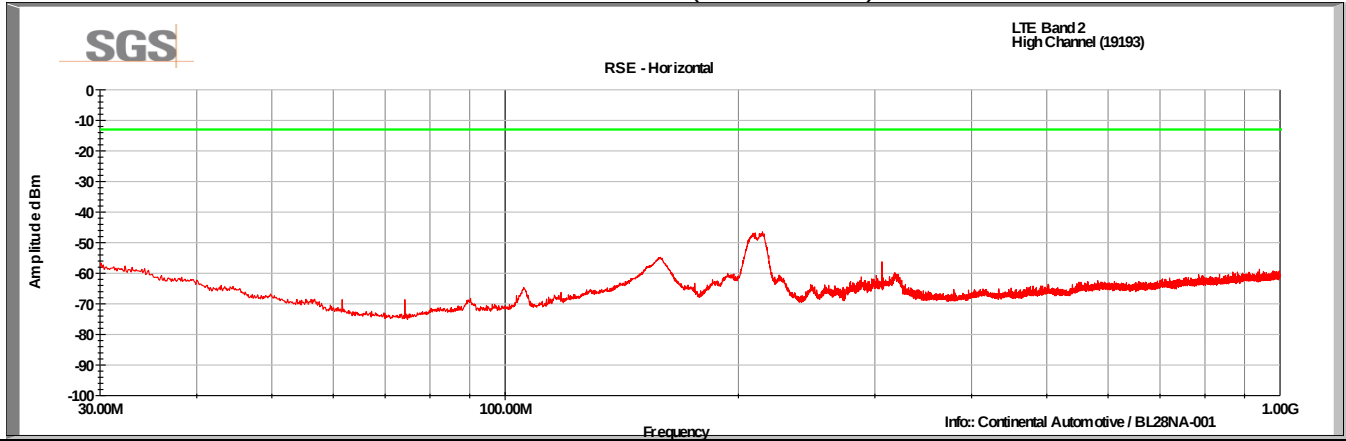
LTE Band 2, QPSK modulation, 1.4MHz

High Channel (19193)

Vertical Data (30-1000MHz)



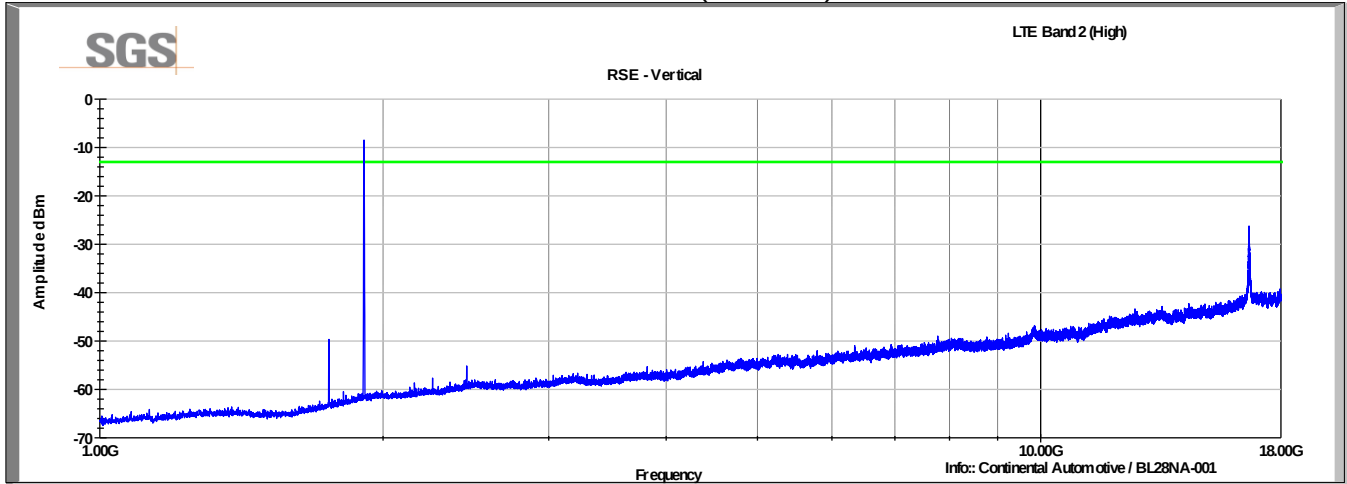
Horizontal Data (30-1000MHz)



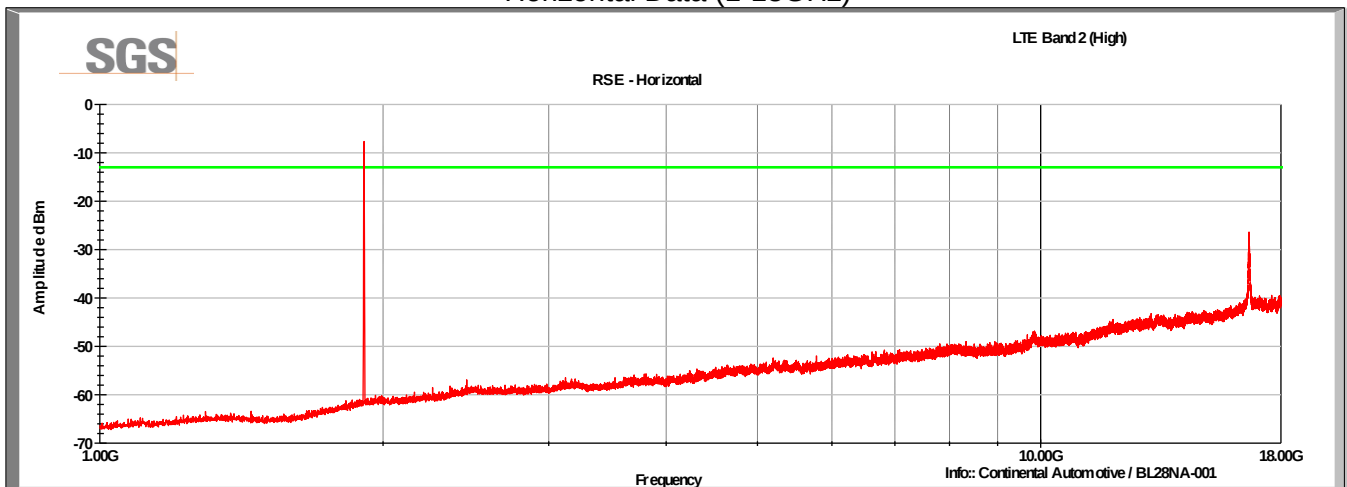
LTE Band 2, QPSK modulation, 1.4MHz

High Channel (19193)

Vertical Data (1-18GHz)



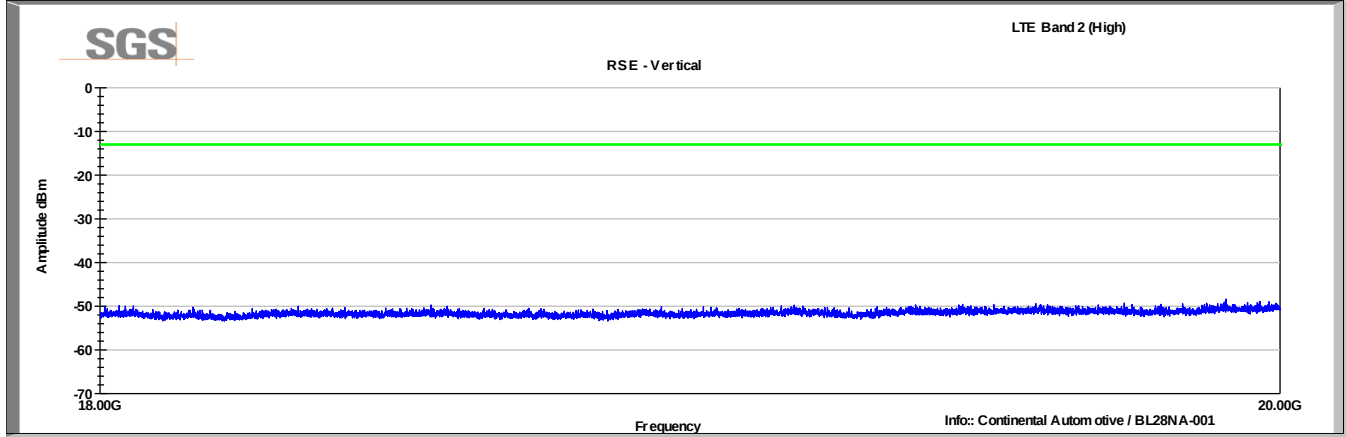
Horizontal Data (1-18GHz)



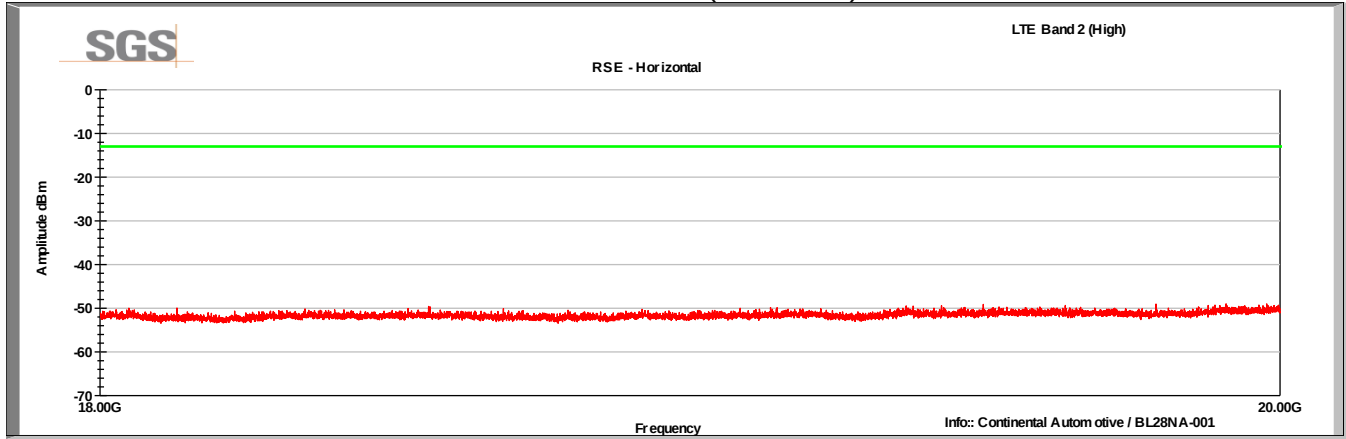
LTE Band 2, QPSK modulation, 1.4MHz

High Channel (19193)

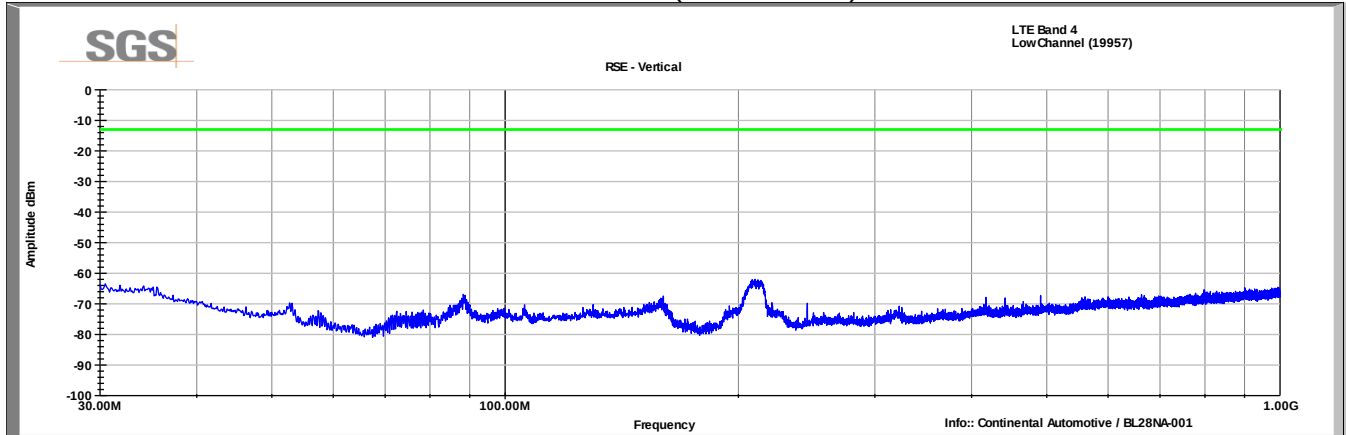
Vertical Data (18-20GHz)



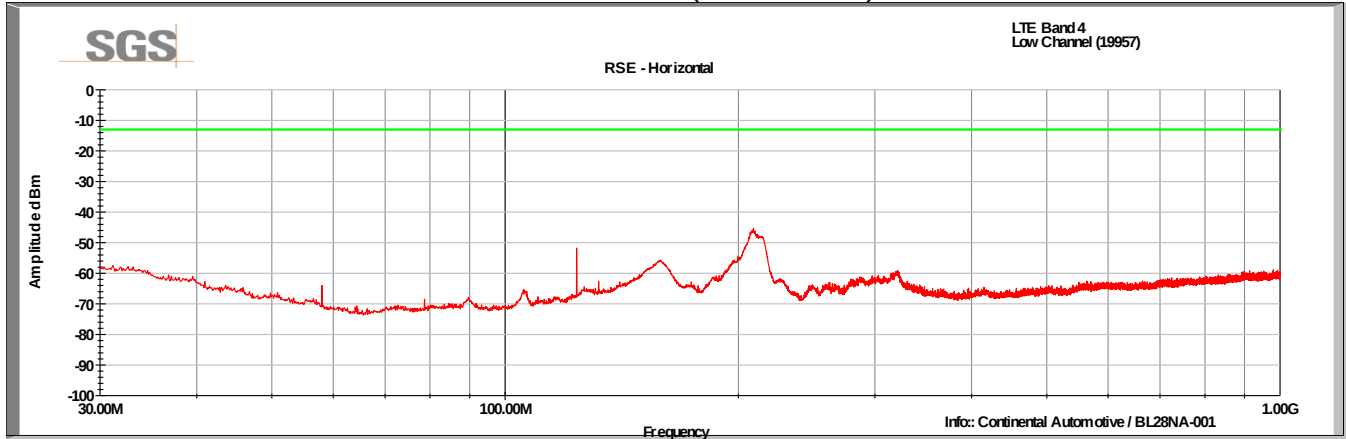
Horizontal Data (18-20GHz)



LTE Band 4, QPSK modulation, 1.4MHz
 Low Channel (19957)
 Vertical Data (30-1000MHz)



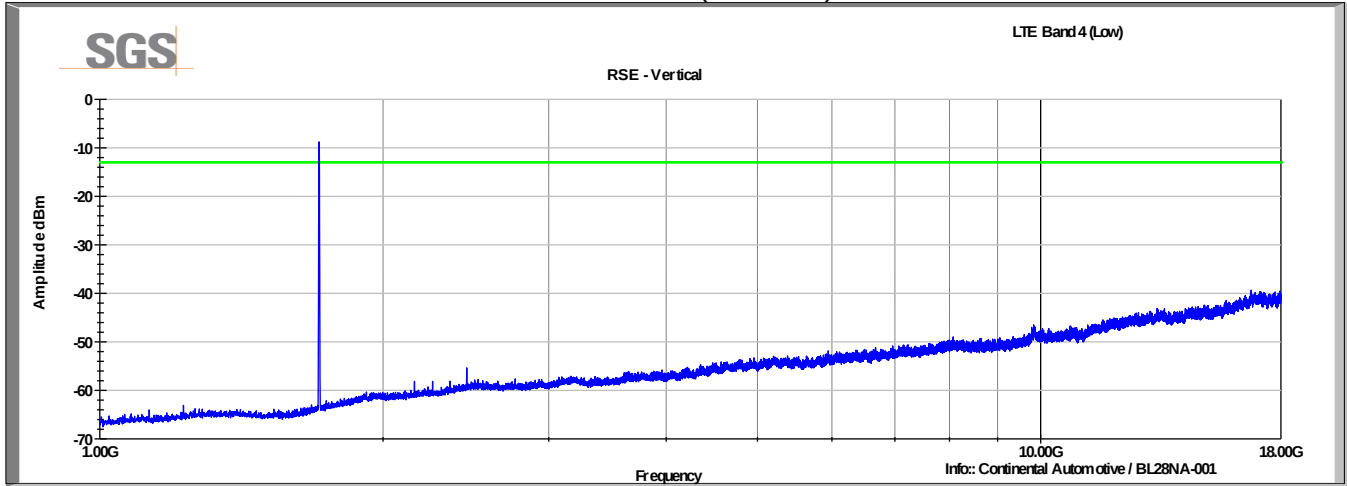
Horizontal Data (30-1000MHz)



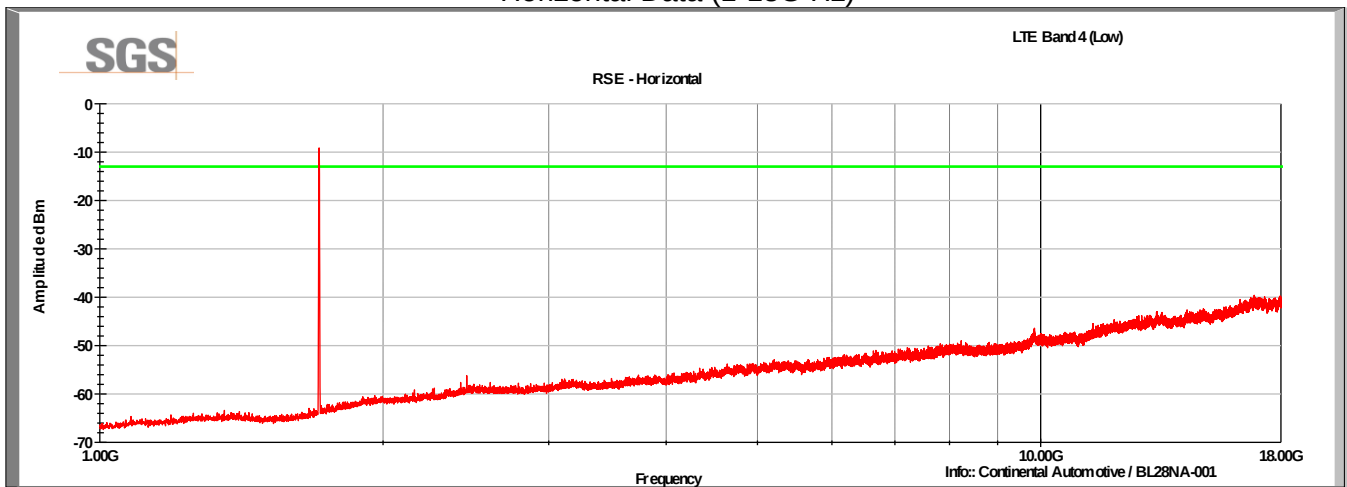
LTE Band 4, QPSK modulation, 1.4MHz

Low Channel (19957)

Vertical Data (1-18GHz)



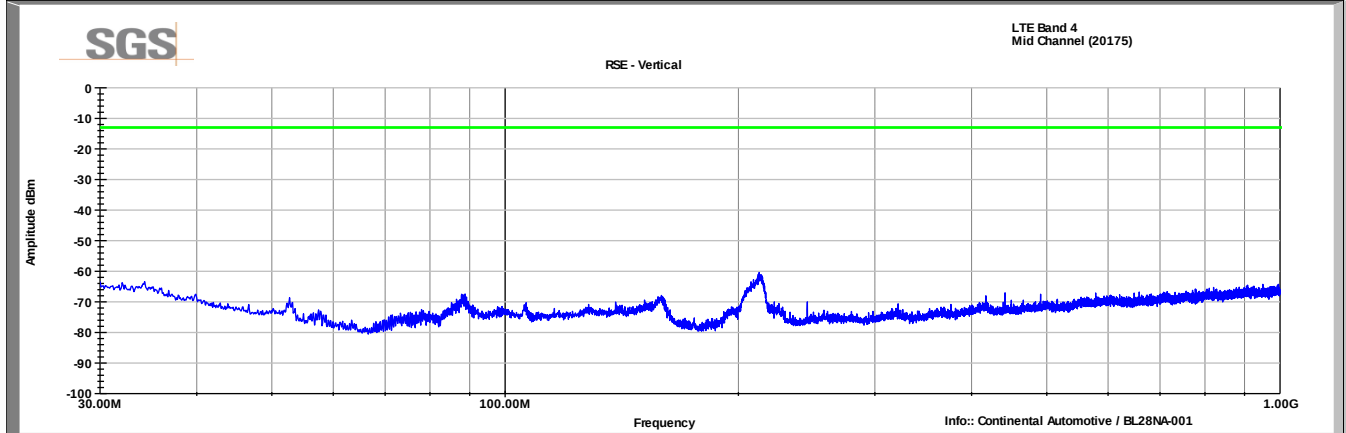
Horizontal Data (1-18G Hz)



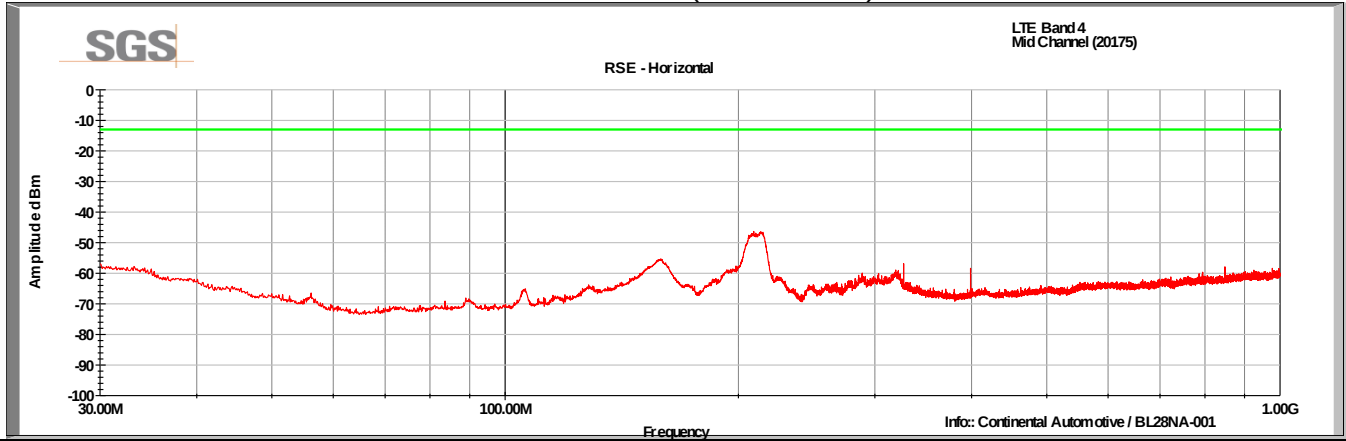
LTE Band 4, QPSK modulation, 1.4MHz

Mid Channel (20175)

Vertical Data (30-1000MHz)



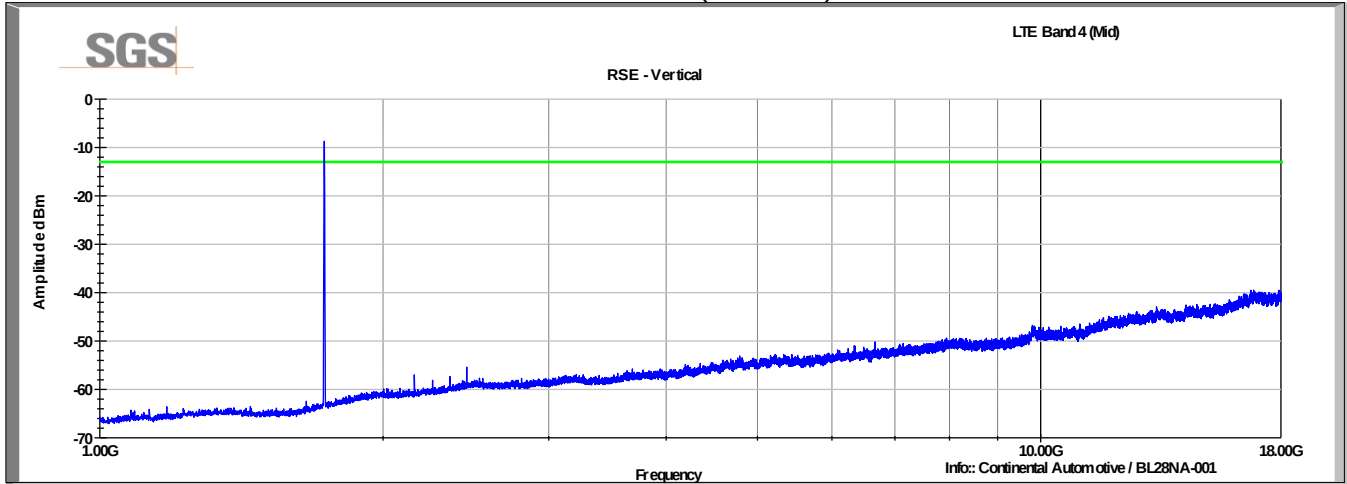
Horizontal Data (30-1000MHz)



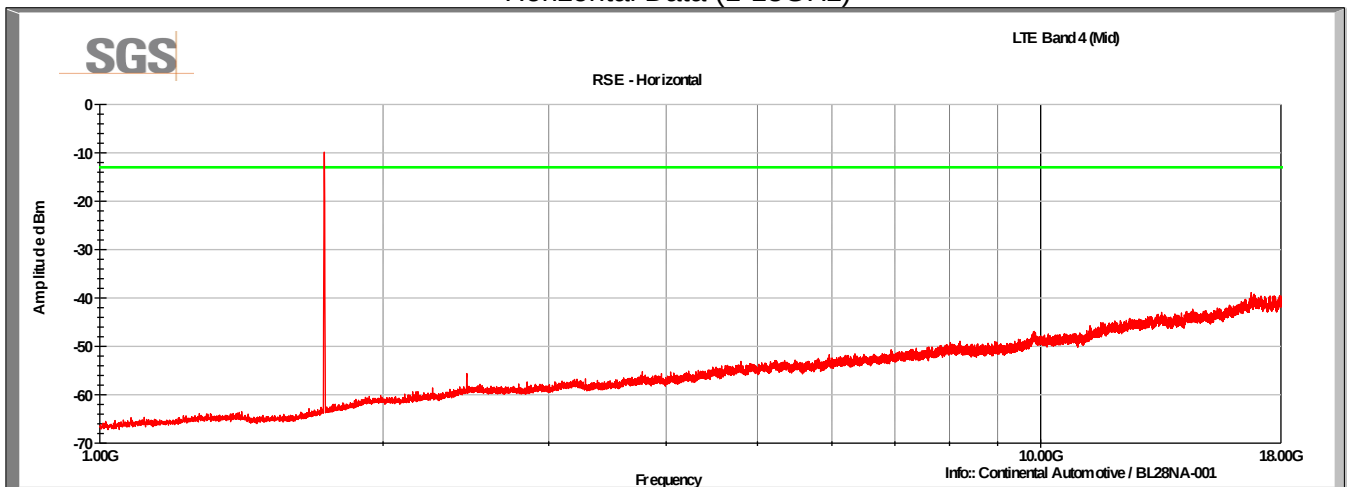
LTE Band 4, QPSK modulation, 1.4MHz

Mid Channel (20175)

Vertical Data (1-18GHz)



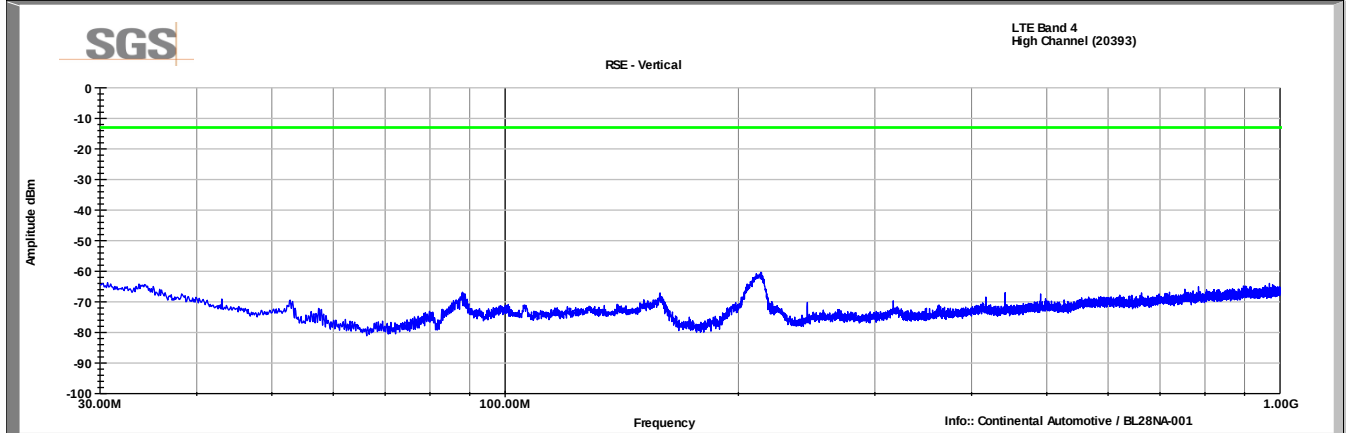
Horizontal Data (1-18GHz)



LTE Band 4, QPSK modulation, 1.4MHz

High Channel (20393)

Vertical Data (30-1000MHz)



Horizontal Data (30-1000MHz)

