FCC CFR47 PART 24 SUBPART E
FCC CFR47 PART 27 SUBPART L
CLASS II PERMISSIVE CHANGE
CERTIFICATION TEST REPORT

FOR

LTE PHONE BLUETOOTH AND WLAN

MODEL NUMBER: US780, LG-US780, LGUS780 AS780
LG-AS780 AND LGAS780

FCC ID: ZNFU780

REPORT NUMBER: 14U18391-E1 REVISION A

ISSUE DATE: AUGUST 16, 2014

Prepared for

LG ELECTRONICS MOBILECOMM U.S.A., INC.
1000 SYLVAN AVE.
ENGLEWOODS CLIFFS, NJ 07632

Prepared by

UL VERIFICATION SERVICES INC
47173 BENICIA STREET
FREMONT, CA 94538, U.S.A.
TEL: (510) 771-1000
FAX: (510) 661-0888

NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--	7/31/14	Initial Issue	D. Coronia
A	8/16/14	Added LTE Band 2 data	D. Coronia

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: LG ELECTRONICS MOBILE COMM U.S.A., INC.

EUT DESCRIPTION: LTE PHONE BLUETOOTH AND WLAN

MODEL: US780, LG-US780, LGUS780 AS780, LG-AS780 AND LGAS780

SERIAL NUMBER: 304KPYR0000506

DATE TESTED: July 29-30 and August 14, 2014

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
FCC PART 24E and 27L	PASS

UL Verification Services Inc. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL Verification Services Inc. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL Verification Services Inc. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Verification Services Inc. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government.

Approved & Released For
UL Verification Services Inc. By:

DAN CORONIA
CONSUMER TECHNOLOGY DIVISION
PROJECT LEAD
UL Verification Services Inc.

Tested By:

STEVEN TRAN
CONSUMER TECHNOLOGY DIVISION
LAB ENGINEER
UL Verification Services Inc.

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2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with TIA-603-C, FCC CFR Part 24, FCC CFR 47 Part 27.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 and 47266 Benicia Street, Fremont, California, USA. Line conducted emissions are measured only at the 47173 address. The following table identifies which facilities were utilized for radiated emission measurements documented in this report. Specific facilities are also identified in the test results sections.

47173 Benicia Street	47266 Benicia Street
☐ Chamber A	☐ Chamber D
☐ Chamber B	☐ Chamber E
☒ Chamber C	☐ Chamber F

UL Verification Services Inc. is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at http://ts.nist.gov/standards/scopes/2000650.htm.

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards

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4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

EIRP = PSA reading with EUT worst orientation (dBm) + Path loss (dB) – cable loss (between the SG and substitution antenna) + Substitution Antenna Factor (dBi)
ERP = PSA reading with EUT worst orientation (dBm) + Path loss (dB) – cable loss(between the SG and substitution antenna) (Path loss = Signal generator output – PSA reading with substitution antenna)

4.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	UNCERTAINTY
Conducted Disturbance, 0.15 to 30 MHz	3.52 dB
Radiated Disturbance, 30 to 1000 MHz	4.94 dB

Uncertainty figures are valid to a confidence level of 95%.

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5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a LTE Phone with BT and WLAN capability that is manufactured by LG Electronics.

5.1. DESCRIPTION OF CLASS II PERMISSIVE CHANGE

The change filed under this application is by adding bandwidth 15MHz & 20MHz on band 4, 2 & 25.

5.2. MAXIMUM OUTPUT POWER (LTE)

The transmitter has a maximum peak conducted and radiated EIRP output powers as follows:

FCC Part 24							
Band	Frequency Range(MHz)	Bandwidth (MHz)	Modulation	Conducted		Radiated	
			Peak	Avg (dBm)	Avg (mW)	Avg (dBm)	Avg (mW)
LTE25	1850~1915	20MHz	QPSK	23.58	228.03	22.54	179.47
			16QAM	22.57	180.72	22.84	192.31
FCC Part 24							
Band	Frequency Range(MHz)	Bandwidth (MHz)	Modulation	Conducted		Radiated	
			Peak	Avg (dBm)	Avg (mW)	Avg (dBm)	Avg (mW)
LTE25	1850~1915	15MHz	QPSK	23.70	234.42	23.07	202.77
			16QAM	22.57	180.72	23.11	204.64

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FCC Part 24							
Band	Frequency Range(MHz)	Bandwidth (MHz)	Modulation	Conducted		Radiated	
			Peak	Avg (dBm)	Avg (mW)	Avg (dBm)	Avg (mW)
LTE2	1850~1910	20MHz	QPSK	23.58	228.03	22.54	179.47
			16QAM	22.57	180.72	22.84	192.31
FCC Part 24							
Band	Frequency Range(MHz)	Bandwidth (MHz)	Modulation	Conducted		Radiated	
			Peak	Avg (dBm)	Avg (mW)	Avg (dBm)	Avg (mW)
LTE2	1850~1910	15MHz	QPSK	23.70	234.42	23.07	202.77
			16QAM	22.57	180.72	23.11	204.64

FCC Part 27							
Band	Frequency Range(MHz)	BandWidth (MHz)	Modulation	Conducted		Radiated	
			Peak	mW	Peak	mW	Peak
LTE4	1710~1755	20MHz	QPSK	23.60	229.09	21.06	127.64
			16QAM	22.50	177.83	20.82	120.78
FCC Part 27							
Band	Frequency Range(MHz)	BandWidth (MHz)	Modulation	Conducted		Radiated	
			Peak	mW	Peak	mW	Peak
LTE4	1710~1755	15MHz	QPSK	23.52	224.91	21.23	132.74
			16QAM	22.53	179.06	21.28	134.28

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5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a PIFA antenna for the [List the bands supported] with a maximum peak gain as follow:

Frequency (MHz)	Peak Gain (dBi)
LTE4, 1710 ~ 1755MHz	-5.83
LTE25, 1850 ~ 1915MHz	-5.10
LTE2, 1850 ~ 1910MHz	-5.10

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5.4. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
AC Adapter	LG	MCS-02WR	190000054	NA
Headset	LG	NA	NA	NA

I/O CABLES (CONDUCTED SETUP)

I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	RF Out	1	Spectrum Analyzer	Shielded	None	NA
2	Antenna Port	1	EUT	Shielded	0.1m	NA
3	RF In/Out	1	Communication Test Set	Shielded	1m	NA

I/O CABLES (RADIATED SETUP)

I/O CABLE LIST						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length	Remarks
1	USB	1	AC Adapter	Un-shielded	1.2m	No
2	Jack	1	Headset	Shielded	1m	No
3	RF In/out	1	Communication Test Set	Un-shielded	2m	Yes

TEST SETUP

The EUT is continuously communicated to the call box during the tests.

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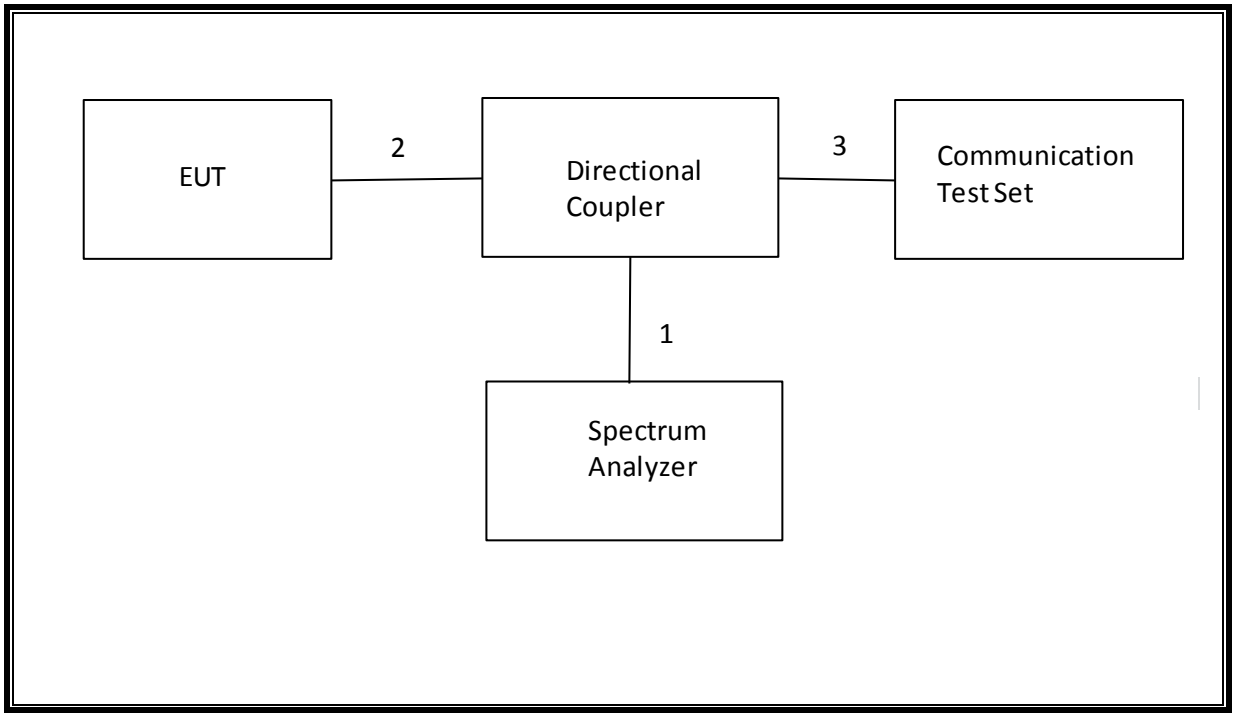
SETUP DIAGRAM FOR TESTS (CONDUCTED TEST SETUP)



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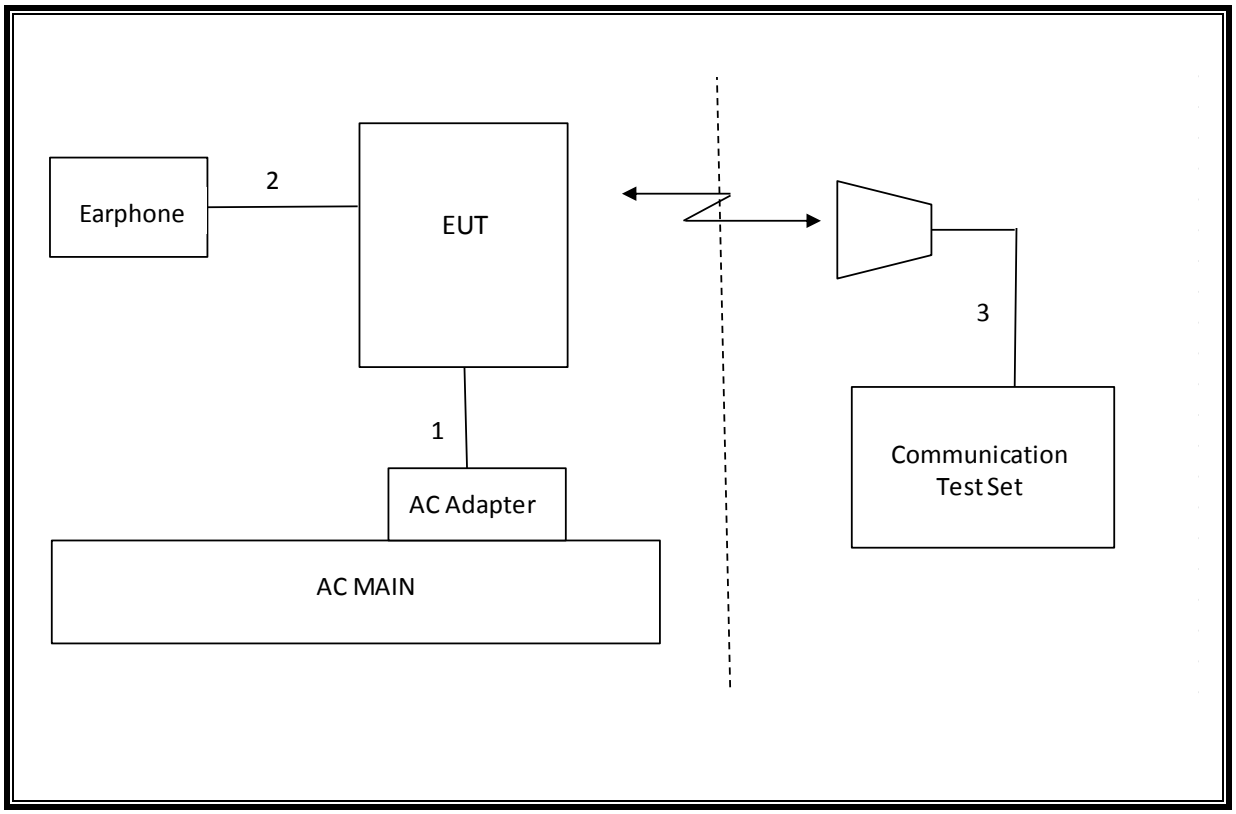
SETUP DIAGRAM FOR TESTS (RADIATED TEST SETUP)



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6. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

TEST EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**Asset**	**Cal Due**
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C01179	02/26/15
Antenna, Bilog, 2 GHz	Sunol Sciences	JB1	C01011	08/14/14
Antenna, Horn, 18 GHz	EMCO	3115	C00783	10/25/14
Antenna, Horn, 18 GHz	EMCO	3115	C00784	10/25/14
Highpass Filter, 2.7 GHz	Micro-Tronics	HPM13194	N02687	CNR
Highpass Filter, 1.5 GHz	Micro-Tronics	HPM13193	N02688	CNR
Temperature / Humidity Chamber	Thermotron	SE 600-10-10	C00930	01/09/15
Communications Test Set	R&S	CMW500	T159	07/02/15
DC power supply, 8 V @ 3 A or 15 V	Agilent / HP	E3610A	None	CNR
Vector signal generator, 6 GHz	Agilent / HP	E4438C	None	07/06/15
Antenna, Tuned Dipole 400~1000	ETS	3121C DB4	C00993	02/14/15
Directional Coupler	RF-Lambda	RFDC5M06G15	None	CNR
Antenna, Horn,18- 26 GHz	ARA	MWH-1826/B	C00946	11/12/14
Antenna, Horn,18- 26 GHz	ARA	MWH-1826/B	C00947	11/12/14

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7. Summary Table

FCC Part Section	RSS Section(s)	Test Description	Test Limit	Test Condition	Test Result	Worst Case
2.1049	N/A	Occupied Band width (99%)	N/A	Conducted	Pass	17.90MHz
24.238(a) 27.53(g)	N/A	Band Edge / Conducted Spurious Emission	-13dBm		Pass	-32.40dBm
2.1046	N/A	Conducted output power	N/A		Pass	23.70dBm
24.235 27.54	N/A	Frequency Stability	2.5PPM		Pass	0.002PPM
24.232(c) 27.50(h)(2)	N/A	Equivalent Isotropic Radiated Power	33dBm	Radiated	Pass	22.91dBm
27.50(d)(4)	N/A		30dBm		Pass	21.28dBm
24.238(a) 27.53(g)	N/A	Radiated Spurious Emission	-13dBm		Pass	-29.0dBm

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7.1. LTE OUTPUT VERIFICATION

7.1.1. LTE OUTPUT RESULT

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Avg Pwr (dBm)		
						26140	26365	26590
						1860 MHz	1882.5 MHz	1905 MHz
LTE Band 25	20	QPSK	1	0	0	23.53	23.51	23.39
			1	49	0	23.53	23.58	23.45
			1	99	0	23.40	23.49	23.40
			50	0	1	22.55	22.49	22.37
			50	24	1	22.36	22.35	22.29
			50	50	1	22.27	22.34	22.34
			100	0	1	22.52	22.40	22.43
		16QAM	1	0	1	22.57	22.50	22.45
			1	49	1	22.50	22.50	22.48
			1	99	1	22.40	22.50	22.38
			50	0	2	21.27	21.18	21.09
			50	24	2	21.10	21.10	21.02
			50	50	2	21.02	21.10	21.50
			100	0	2	21.29	21.23	21.07
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Avg Pwr (dBm)		
						26115	26365	26615
						1857.5 MHz	1882.5 MHz	1907.5 MHz
LTE Band 25	15	QPSK	1	0	0	23.70	23.52	23.63
			1	37	0	23.51	23.53	23.52
			1	74	0	23.39	23.47	23.47
			36	0	1	22.55	22.42	22.39
			36	20	1	22.40	22.38	22.30
			36	39	1	22.34	22.42	22.39
			75	0	1	22.40	22.34	22.36
		16QAM	1	0	1	22.25	22.48	22.57
			1	37	1	22.04	22.55	22.54
			1	74	1	21.97	22.55	22.40
			36	0	2	21.33	21.23	21.24
			36	20	2	21.18	21.16	21.20
			36	39	2	21.13	21.18	21.10
			75	0	2	21.11	21.60	21.12

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Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Avg Pwr (dBm)		
						18700	18900	19100
						1860 MHz	1880 MHz	1900 MHz
LTE Band 2	20	QPSK	1	0	0	23.52	23.44	23.50
			1	49	0	23.64	23.54	23.49
			1	99	0	23.43	23.53	23.56
			50	0	1	22.53	22.38	22.44
			50	24	1	22.46	22.41	22.40
			50	50	1	22.34	22.60	22.49
			100	0	1	22.43	22.38	22.43
		16QAM	1	0	1	22.40	22.48	22.60
			1	49	1	22.47	22.52	22.55
			1	99	1	22.30	22.60	22.68
			50	0	2	21.15	21.04	21.05
			50	24	2	21.15	21.19	21.10
			50	50	2	21.00	21.25	21.15
			100	0	2	21.16	21.13	21.05

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Avg Pwr (dBm)		
						18675	18900	19125
						1857.5 MHz	1880 MHz	1902.5 MHz
LTE Band 2	15	QPSK	1	0	0	23.40	23.15	23.27
			1	37	0	23.30	23.31	23.43
			1	74	0	23.15	23.43	23.38
			36	0	1	22.40	22.33	22.37
			36	20	1	22.44	22.41	22.40
			36	39	1	22.37	22.39	22.39
			75	0	1	22.32	22.37	22.36
		16QAM	1	0	1	22.44	22.32	22.20
			1	37	1	22.48	22.42	22.33
			1	74	1	22.40	22.55	22.37
			36	0	2	21.10	21.00	21.00
			36	20	2	21.08	21.20	21.08
			36	39	2	21.03	21.18	21.09
			75	0	2	21.11	21.60	21.12

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Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Avg Pwr (dBm)		
						20050	20175	20300
						1720 MHz	1732.5 MHz	1745 MHz
LTE Band 4	20	QPSK	1	0	0	23.39	23.35	23.60
			1	49	0	23.26	23.30	23.53
			1	99	0	23.33	23.41	23.50
			50	0	1	22.24	22.26	22.30
			50	24	1	22.23	22.22	22.29
			50	50	1	22.13	22.20	22.20
			100	0	1	22.20	22.25	22.26
		16QAM	1	0	1	22.36	22.39	22.50
			1	49	1	22.20	22.34	22.44
			1	99	1	22.25	22.45	22.31
			50	0	2	20.91	20.97	21.00
			50	24	2	20.90	20.98	21.05
			50	50	2	20.85	20.92	20.88
			100	0	2	20.90	21.00	20.99

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Avg Pwr (dBm)		
						20025	20175	20325
						1717.5 MHz	1732.5 MHz	1747.5 MHz
LTE Band 4	15	QPSK	1	0	0	23.33	23.19	23.52
			1	37	0	23.26	23.18	23.51
			1	74	0	23.15	23.23	23.33
			36	0	1	22.18	22.19	22.36
			36	20	1	22.25	22.21	22.24
			36	39	1	22.10	22.16	22.15
			75	0	1	22.18	22.20	22.22
		16QAM	1	0	1	21.75	21.75	22.45
			1	37	1	21.80	21.70	22.53
			1	74	1	21.73	21.74	22.38
			36	0	2	20.89	20.92	20.97
			36	20	2	20.95	20.94	20.92
			36	39	2	20.88	20.88	20.85
			75	0	2	20.92	20.92	20.92

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8. PEAK TO AVERAGE RATIO

Test Procedure

Per KDB 971168 D01 Power Meas License Digital Systems v02r01

Test Spec

In addition, when the transmitter power is measured in terms of average value, the peak-to-average ratio of the power shall not exceed 13 dB.

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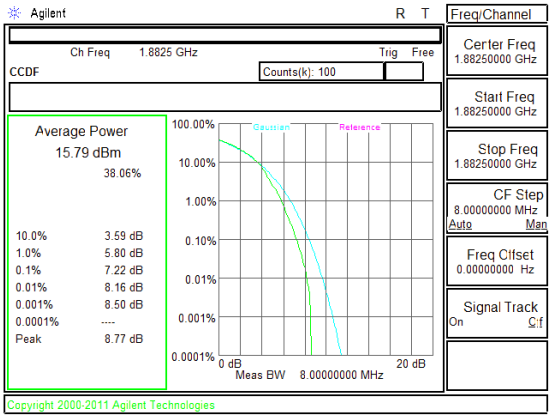
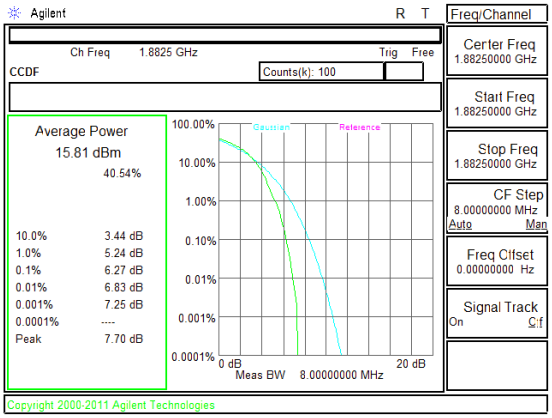
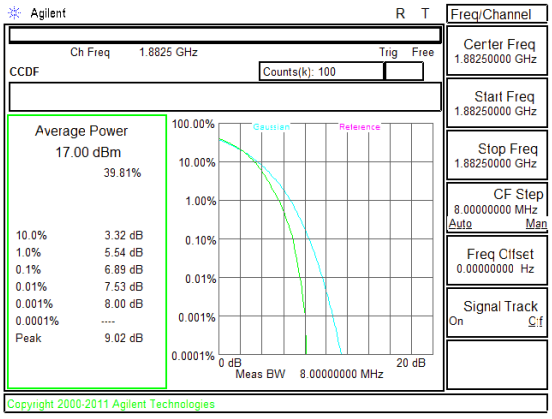
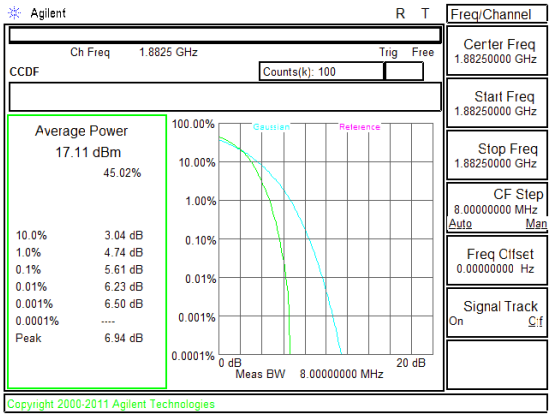
8.1. CONDUCTED PEAK TO AVERAGE RESULT

Band LTE25 20MHz	 Band LTE25 20MHz 16QAM Mid channel	 Band LTE25 20MHz QPSK Mid channel
Band LTE25 15MHz	 Band LTE25 15MHz 16QAM Mid channel	 Band LTE25 15MHz QPSK Mid channel

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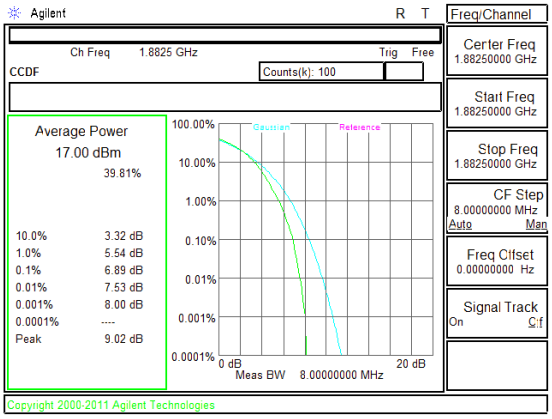
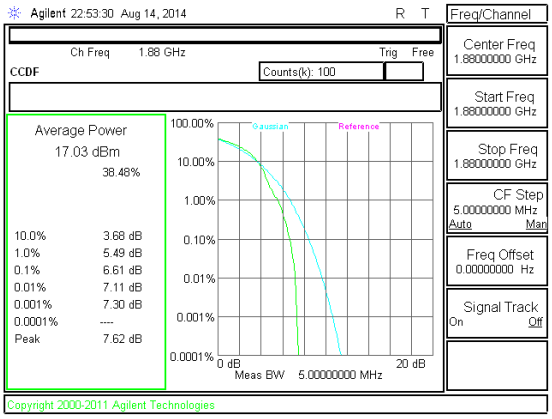
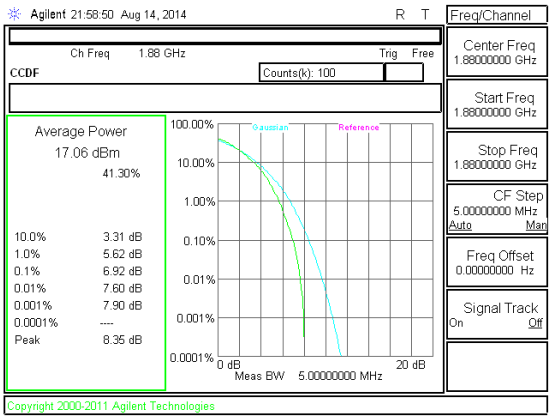
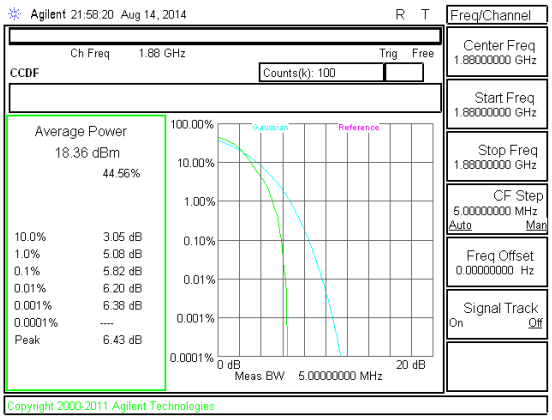
Band LTE2 20MHz	 Band LTE2 20MHz 16QAM Mid channel	 Band LTE2 20MHz QPSK Mid channel
Band LTE2 15MHz	 Band LTE2 15MHz 16QAM Mid channel	 Band LTE2 15MHz QPSK Mid channel

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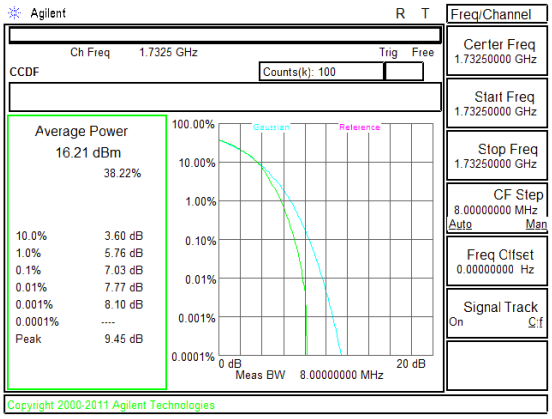
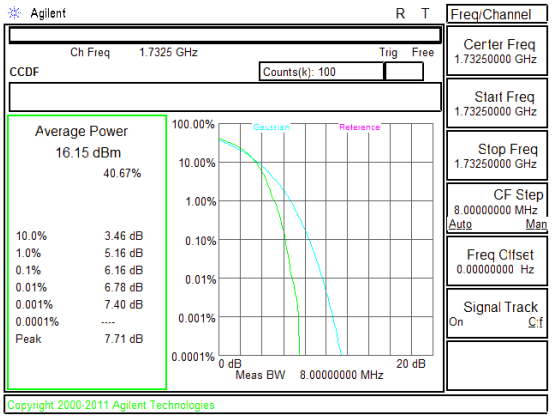
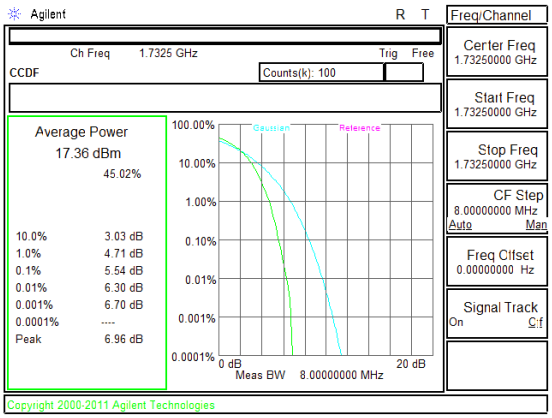
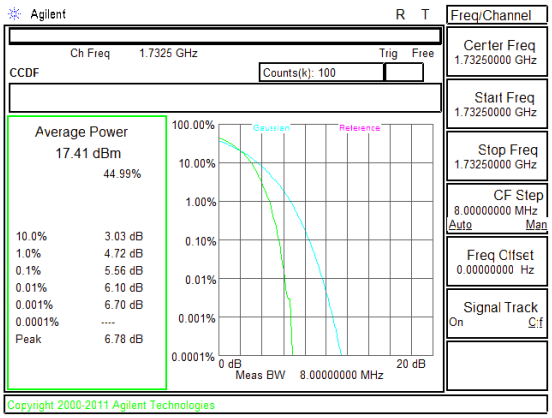
Band LTE4 20MHz	 Band LTE4 20MHz 16QAM Mid channel	 Band LTE4 20MHz QPSK Mid channel
Band LTE4 15MHz	 Band LTE4 15MHz 16QAM Mid channel	 Band LTE4 15MHz QPSK Mid channel

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9. LIMITS AND CONDUCTED RESULTS

9.1. OCCUPIED BANDWIDTH

RULE PART(S)

FCC: §2.1049

LIMITS

For reporting purposes only

TEST PROCEDURE

The transmitter output was connected to a calibrated coaxial cable and coupler, the other end of which was connected to a spectrum analyzer. The occupied bandwidth was measured with the spectrum analyzer at the low, middle and high channel in each band. The -26dB bandwidth was also measured and recorded.

(KDB 971168 D01 Power Meas License Digital Systems v02r01 - 06/07/2013)

RESULTS

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9.1.1. LTE OCCUPIED BANDWIDTH RESULTS

Band	BW(MHz)	Mode	RB/RB Size	f (MHz)	99% BW (MHz)	-26dB BW (KHz)
LTE25	20	QPSK	100/0	1860	17.86	19.19
			100/0	1882.5	17.90	19.34
			100/0	1905	17.85	19.27
		16QAM	100/0	1860	17.83	19.38
			100/0	1882.5	17.85	19.28
			100/0	1905	17.86	19.20
Band	BW(MHz)	Mode	RB/RB Size	f (MHz)	99% BW (MHz)	-26dB BW (KHz)
LTE25	15	QPSK	75/0	1857.5	13.37	14.93
			75/0	1882.5	13.42	14.52
			75/0	1907.5	13.38	14.47
		16QAM	75/0	1857.5	13.39	14.55
			75/0	1882.5	13.40	13.40
			75/0	1907.5	13.37	14.49

Band	BW(MHz)	Mode	RB/RB Size	f (MHz)	99% BW (MHz)	-26dB BW (KHz)
LTE2	20	QPSK	100/0	1860	17.87	19.37
			100/0	1880	17.91	19.21
			100/0	1900	17.83	19.31
		16QAM	100/0	1860	17.83	19.46
			100/0	1880	17.93	19.29
			100/0	1900	17.88	19.56
Band	BW(MHz)	Mode	RB/RB Size	f (MHz)	99% BW (MHz)	-26dB BW (KHz)
LTE2	15	QPSK	75/0	1857.5	13.36	14.47
			75/0	1880	13.41	14.55
			75/0	1902.5	13.40	14.31
		16QAM	75/0	1857.5	13.40	14.35
			75/0	1880	13.40	13.25
			75/0	1902.5	13.39	14.49

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Band	BW(MHz)	Mode	RB/RB Size	f (MHz)	99% BW (MHz)	-26dB BW (KHz)
LTE4	20	QPSK	100/0	1720	17.80	19.19
			100/0	1732.5	17.68	19.41
			100/0	1745	17.87	19.19
		16QAM	100/0	1720	17.87	19.45
			100/0	1732.5	17.86	19.29
			100/0	1745	17.84	19.12
Band	BW(MHz)	Mode	RB/RB Size	f (MHz)	99% BW (MHz)	-26dB BW (KHz)
LTE4	15	QPSK	75/0	1717.5	13.41	14.50
			75/0	1732.5	13.41	14.40
			75/0	1747.5	13.40	14.46
		16QAM	75/0	1717.5	13.39	14.48
			75/0	1732.5	13.39	14.50
			75/0	1747.5	13.39	14.44

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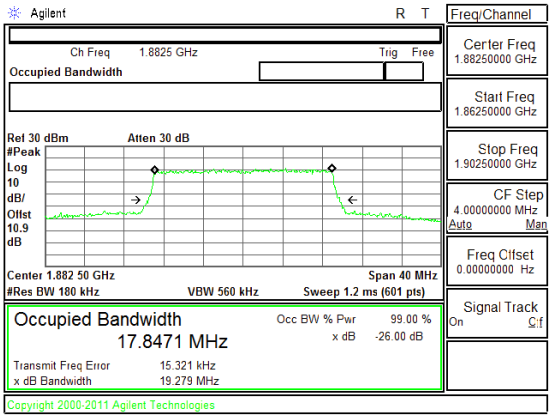
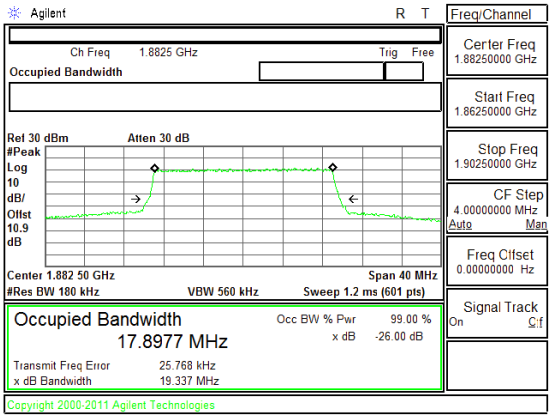
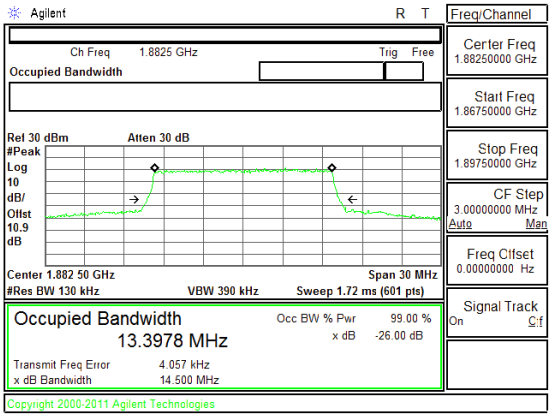
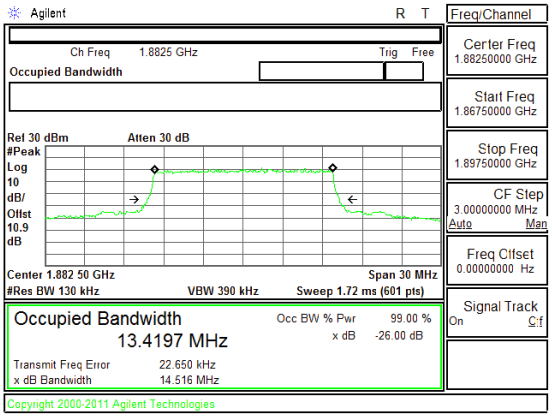
9.1.1. OCCUPIED BANDWIDTH PLOTS

Band LTE25 20MHz	 Band LTE25 20MHz OBW 16QAM Mid Channel FRB.gif	 Band LTE25 20MHz OBW QPSK Mid Channel FRB.gif
Band LTE25 15MHz	 Band LTE25 15MHz OBW 16QAM Mid Channel FRB.gif	 Band LTE25 15MHz OBW QPSK Mid Channel FRB.gif

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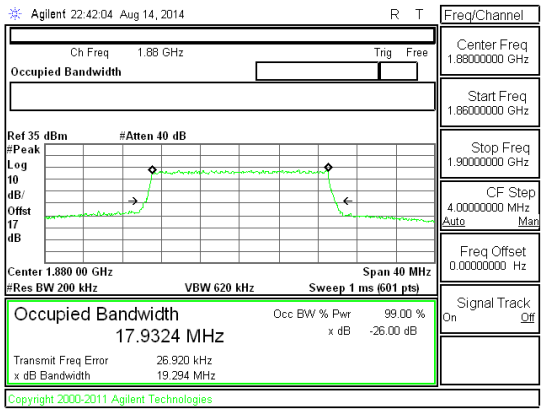
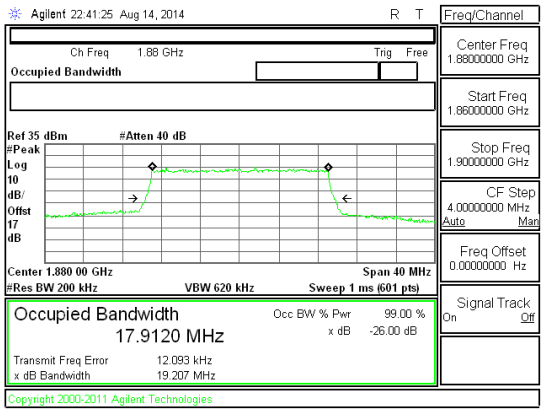
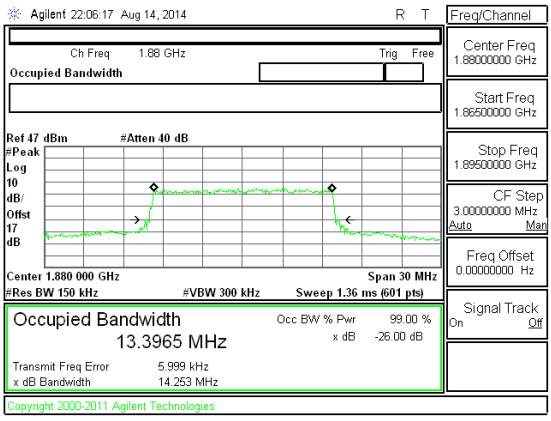
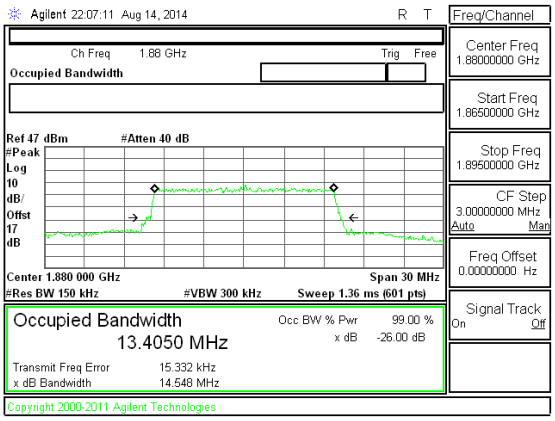
Band LTE2 20MHz	 Band LTE2 20MHz OBW 16QAM Mid Channel FRB.gif	 Band LTE2 20MHz OBW QPSK Mid Channel FRB.gif
Band LTE2 15MHz	 Band LTE2 15MHz OBW 16QAM Mid Channel FRB.gif	 Band LTE2 15MHz OBW QPSK Mid Channel FRB.gif

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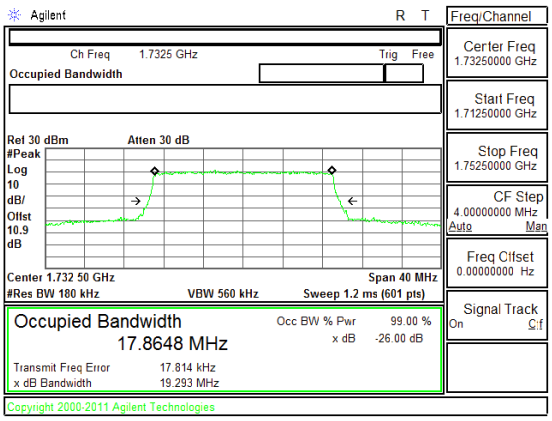
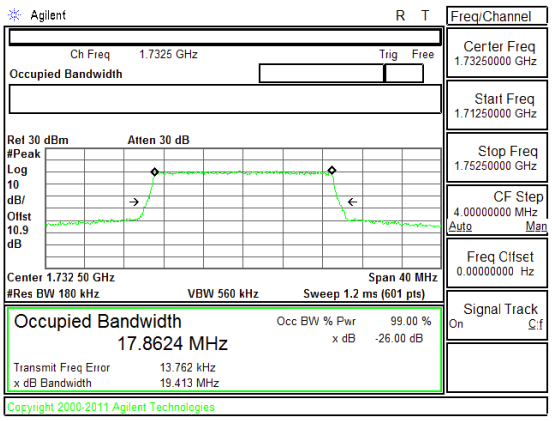
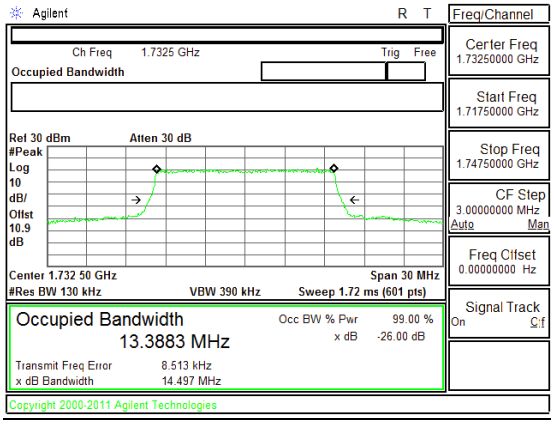
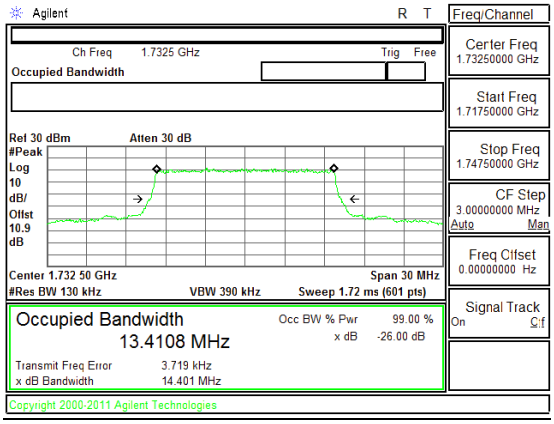
Band LTE4 20MHz	 Band LTE4 20MHz OBW 16QAM Mid Channel FRB.gif	 Band LTE4 20MHz OBW QPSK Mid Channel FRB.gif
Band LTE4 15MHz	 Band LTE4 15MHz OBW 16QAM Mid Channel FRB.gif	 Band LTE4 15MHz OBW QPSK Mid Channel FRB.gif

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9.2. BAND EDGE EMISSIONS

RULE PART(S)

FCC: §24.238, §27.53

LIMITS

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log (P) dB.

TEST PROCEDURE

Per KDB 971168 D01 Power Meas License Digital Systems v02r01
The transmitter output was connected to an Agilent 8960 or a CMW500 Test Set and configured to operate at maximum power. The band edge emissions were measured at the required operating frequencies in each band on the Spectrum Analyzer.

RESULTS

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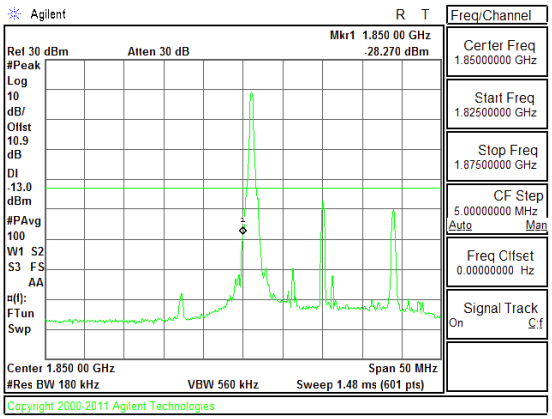
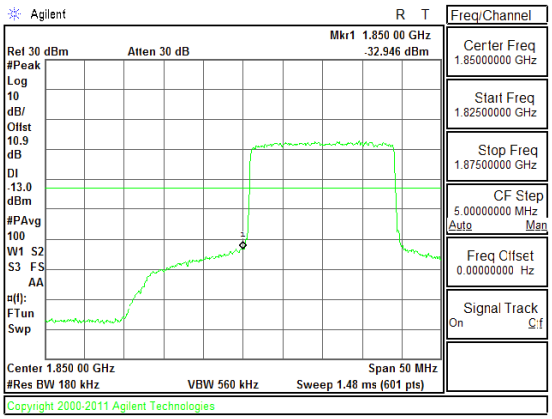
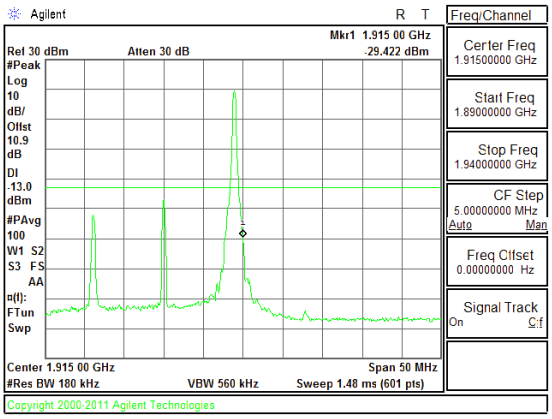
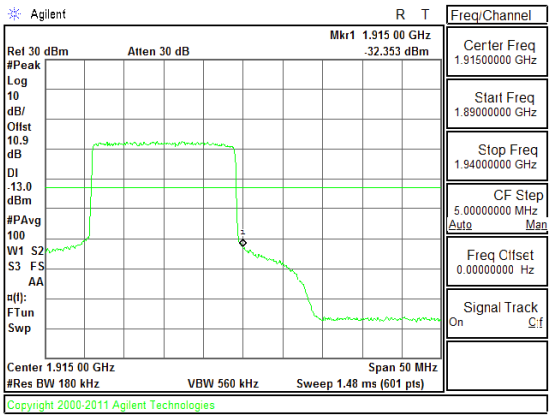
9.2.1. BAND EDGE PLOTS

Band LTE25 20MHz 16QAM	 Band LTE25 20MHz CBE 16QAM Low Channel 1RB.gif	 Band LTE25 20MHz CBE 16QAM Low Channel FRB.gif
Band LTE25 20MHz 16QAM	 Band LTE25 20MHz CBE 16QAM High Channel 1RB.gif	 Band LTE25 20MHz CBE 16QAM High Channel FRB.gif

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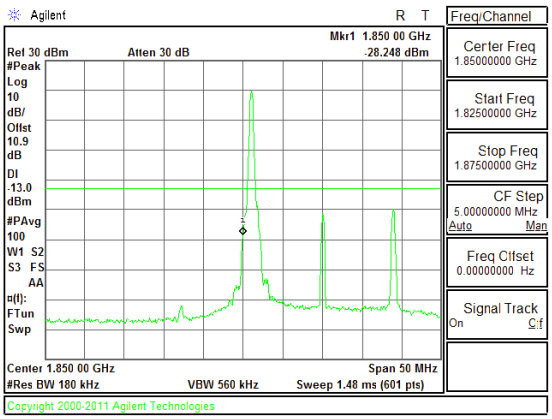
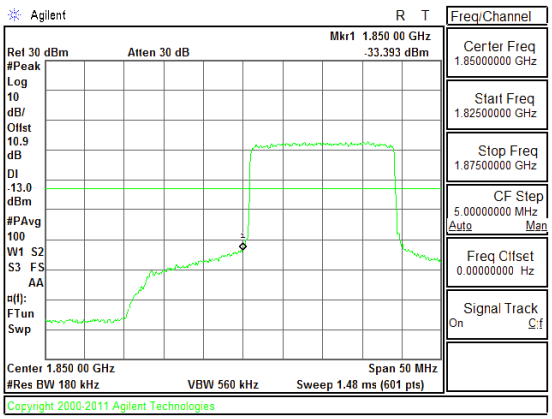
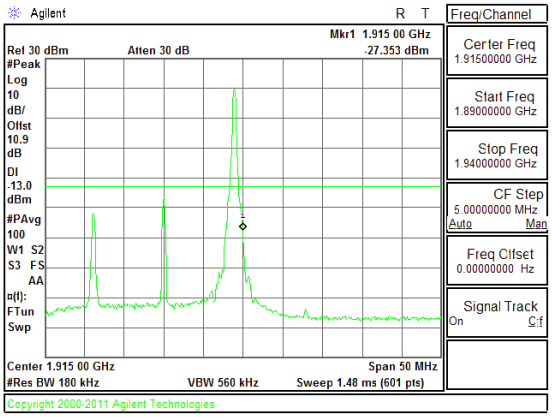
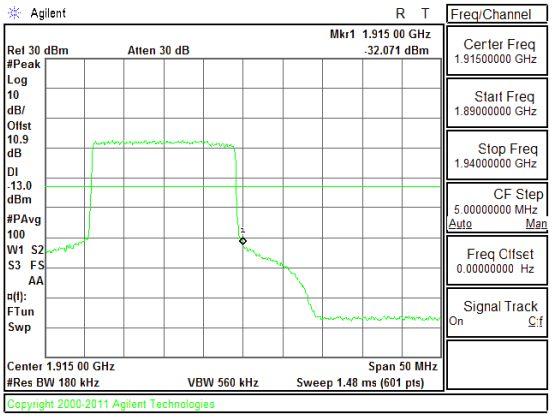
Band LTE25 20MHz QPSK	 Band LTE25 20MHz CBE QPSK Low Channel 1RB.gif	 Band LTE25 20MHz CBE QPSK Low Channel FRB.gif
Band LTE25 20MHz QPSK	 Band LTE25 20MHz CBE QPSK High Channel 1RB.gif	 Band LTE25 20MHz CBE QPSK High Channel FRB.gif

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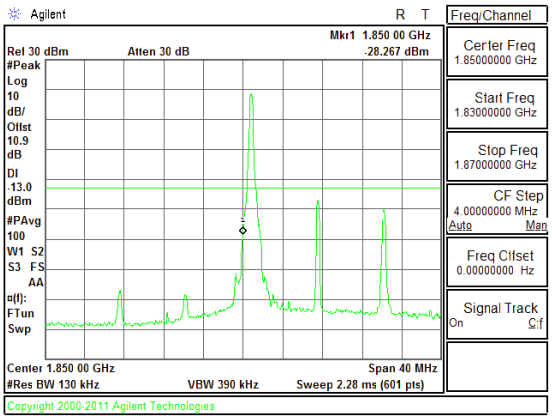
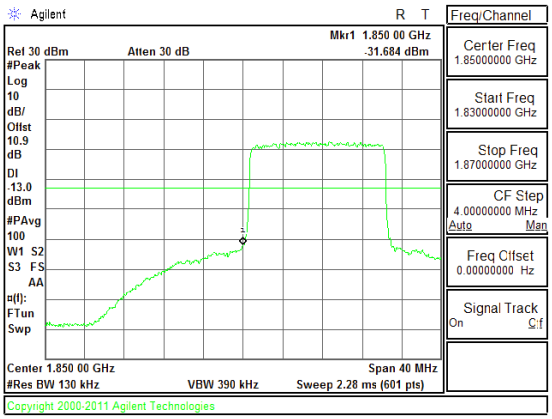
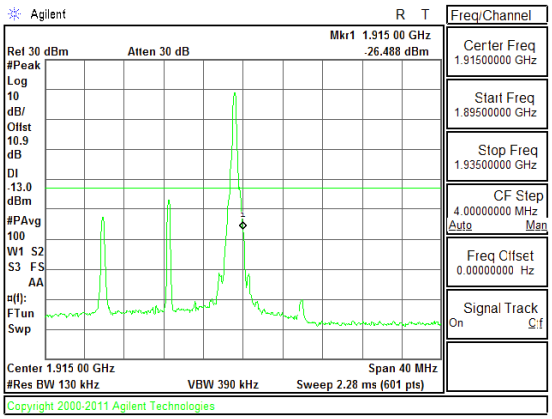
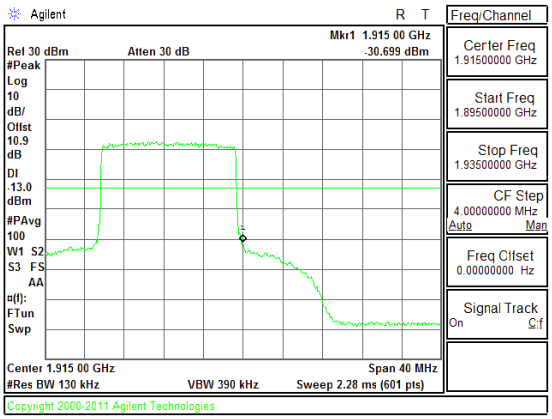
Band LTE25 15MHz 16QAM	 Band LTE25 15MHz CBE 16QAM Low Channel 1RB.gif	 Band LTE25 15MHz CBE 16QAM Low Channel FRB.gif
Band LTE25 15MHz 16QAM	 Band LTE25 15MHz CBE 16QAM High Channel 1RB.gif	 Band LTE25 15MHz CBE 16QAM High Channel FRB.gif

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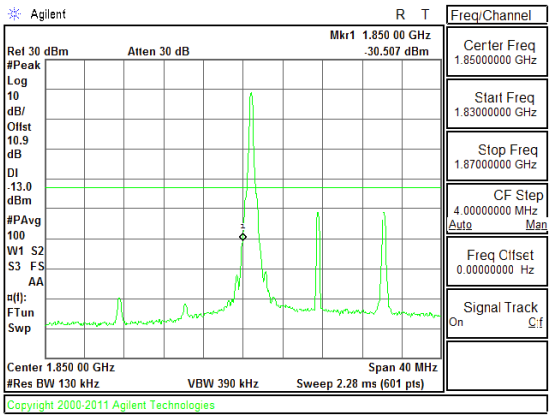
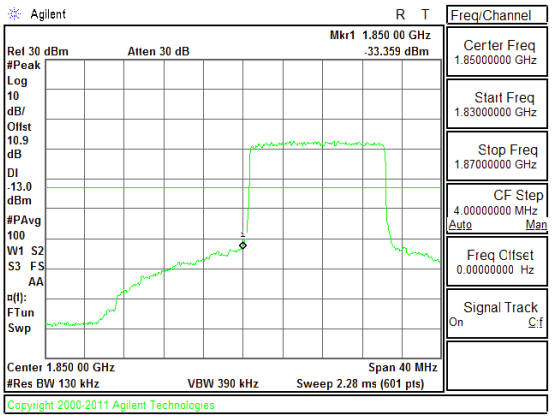
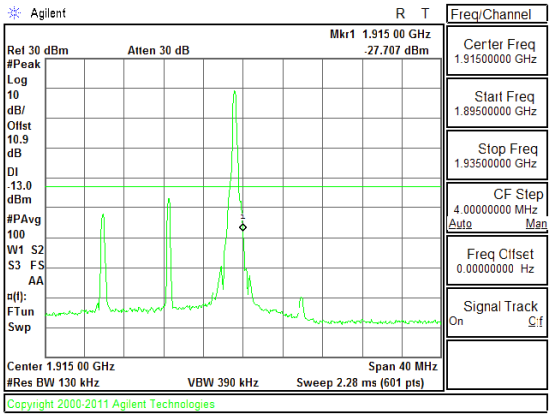
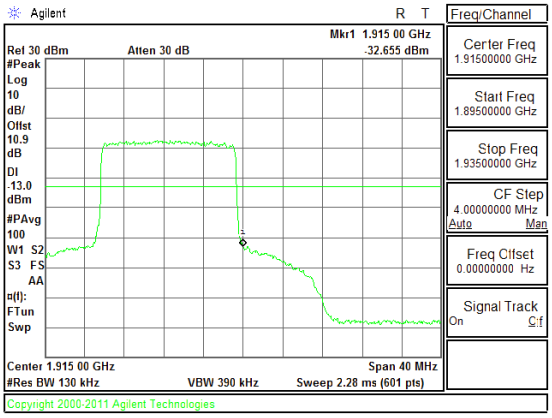
Band LTE25 15MHz QPSK	 Band LTE25 15MHz CBE QPSK Low Channel 1RB.gif	 Band LTE25 15MHz CBE QPSK Low Channel FRB.gif
Band LTE25 15MHz QPSK	 Band LTE25 15MHz CBE QPSK High Channel 1RB.gif	 Band LTE25 15MHz CBE QPSK High Channel FRB.gif

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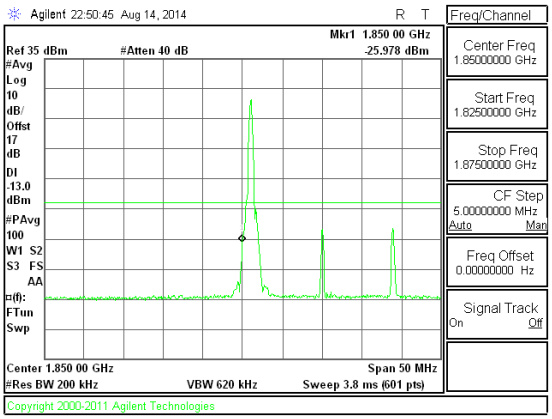
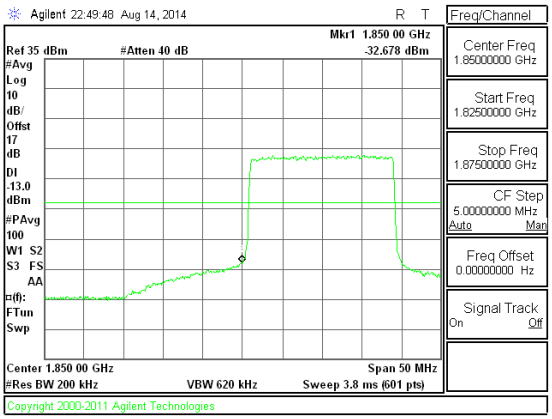
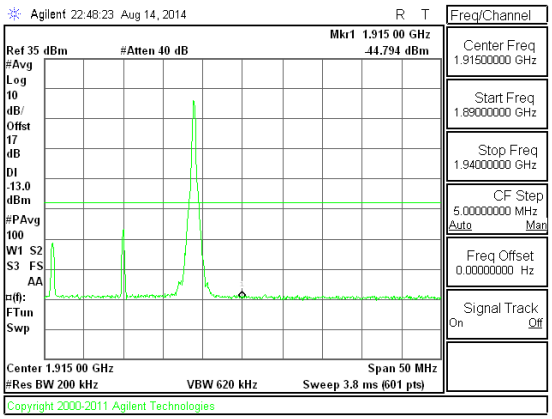
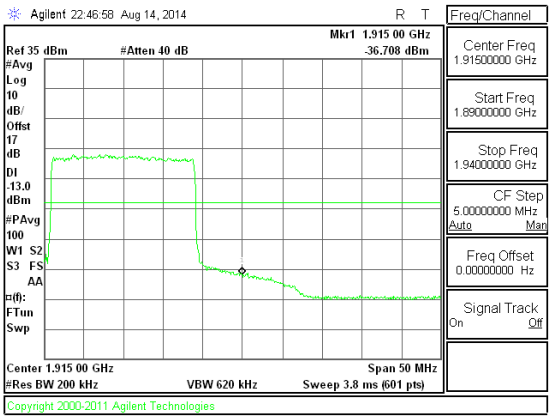
Band LTE2 20MHz 16QAM	 Band LTE2 20MHz CBE 16QAM Low Channel 1RB.gif	 Band LTE2 20MHz CBE 16QAM Low Channel FRB.gif
Band LTE2 20MHz 16QAM	 Band LTE2 20MHz CBE 16QAM High Channel 1RB.gif	 Band LTE2 20MHz CBE 16QAM High Channel FRB.gif

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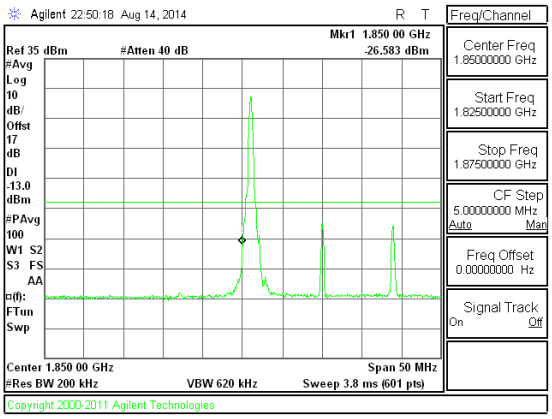
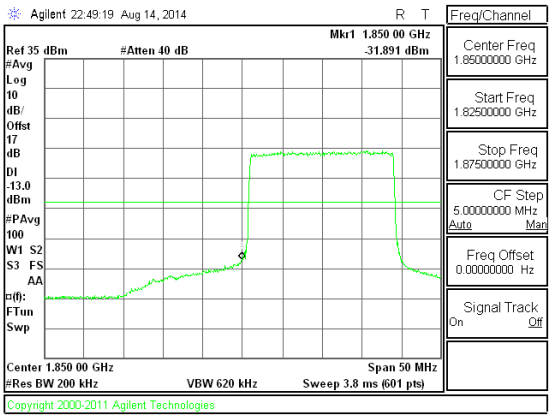
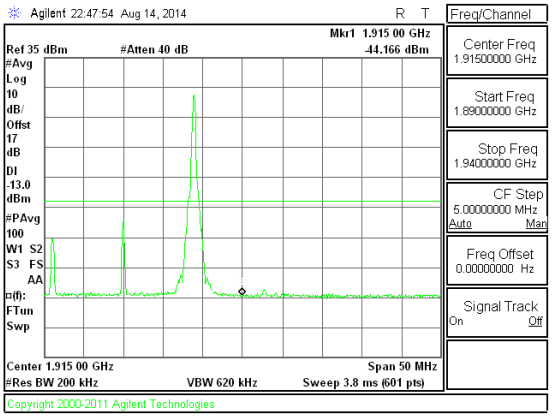
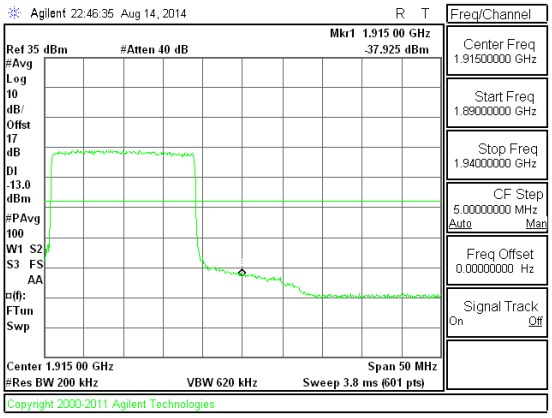
Band LTE2 20MHz QPSK	 Band LTE2 20MHz CBE QPSK Low Channel 1RB.gif	 Band LTE2 20MHz CBE QPSK Low Channel FRB.gif
Band LTE2 20MHz QPSK	 Band LTE2 20MHz CBE QPSK High Channel 1RB.gif	 Band LTE2 20MHz CBE QPSK High Channel FRB.gif

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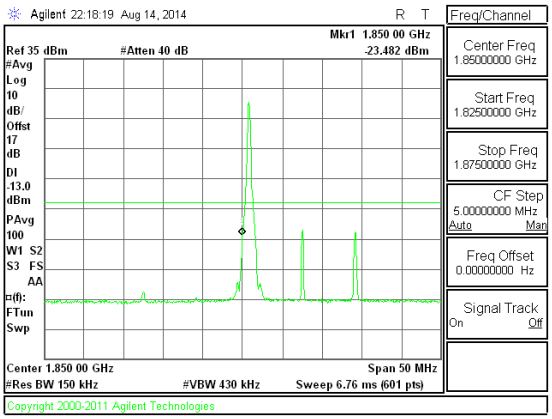
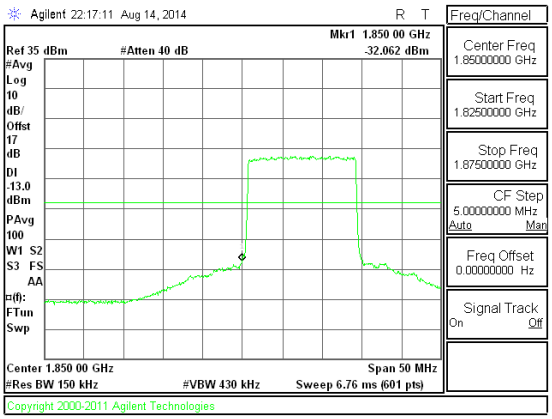
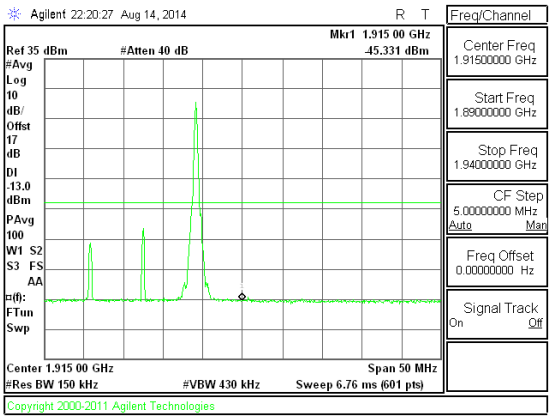
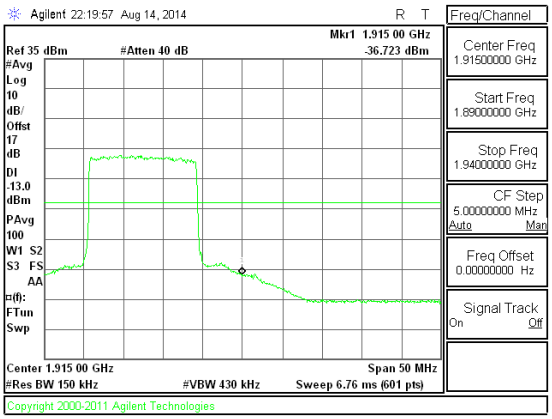
Band LTE2 15MHz 16QAM	 Band LTE2 15MHz CBE 16QAM Low Channel 1RB.gif	 Band LTE2 15MHz CBE 16QAM Low Channel FRB.gif
Band LTE2 15MHz 16QAM	 Band LTE2 15MHz CBE 16QAM High Channel 1RB.gif	 Band LTE2 15MHz CBE 16QAM High Channel FRB.gif

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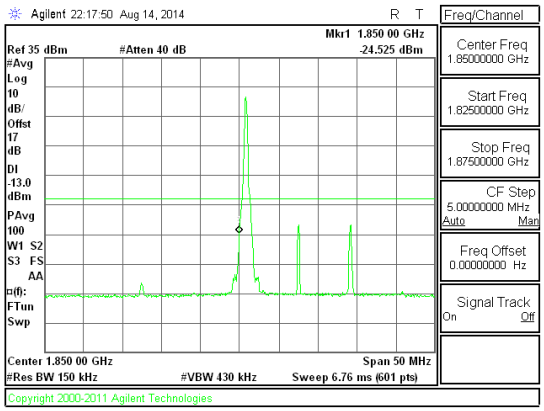
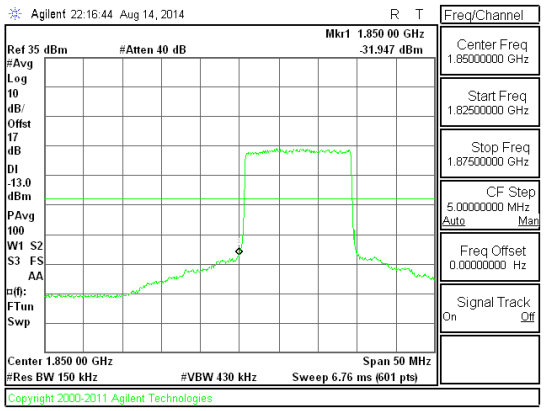
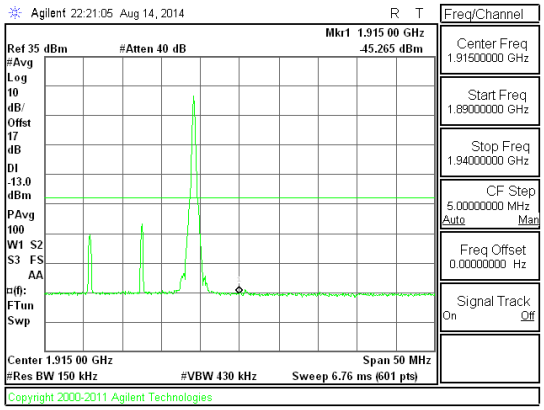
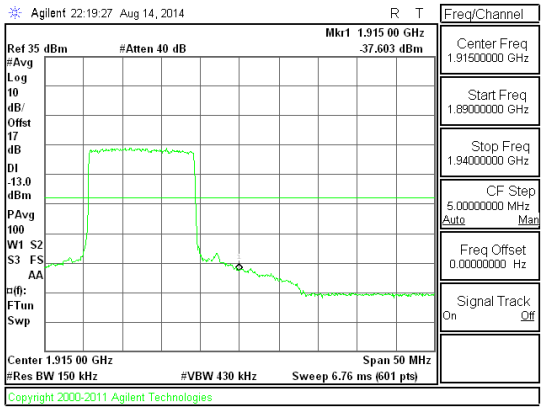
Band LTE2 15MHz QPSK	 Band LTE2 15MHz CBE QPSK Low Channel 1RB.gif	 Band LTE2 15MHz CBE QPSK Low Channel FRB.gif
Band LTE2 15MHz QPSK	 Band LTE2 15MHz CBE QPSK High Channel 1RB.gif	 Band LTE2 15MHz CBE QPSK High Channel FRB.gif

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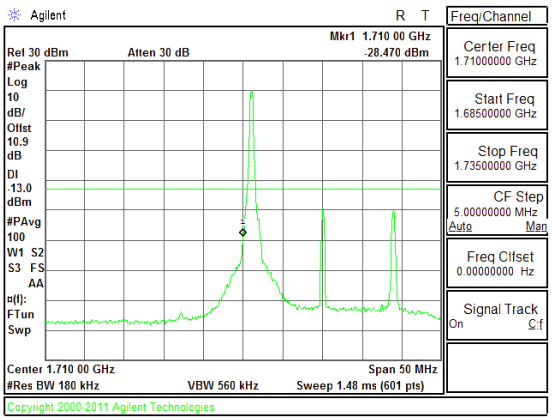
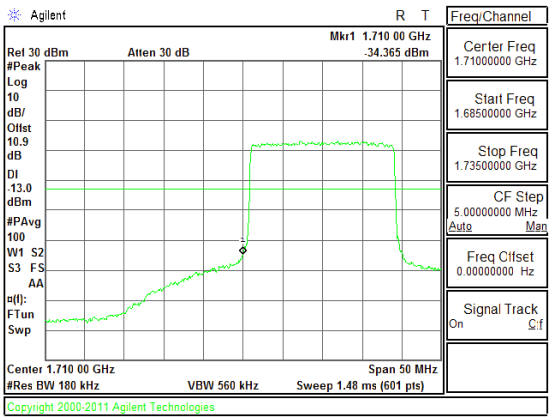
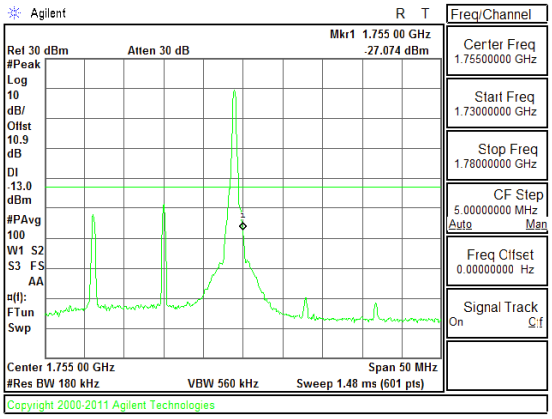
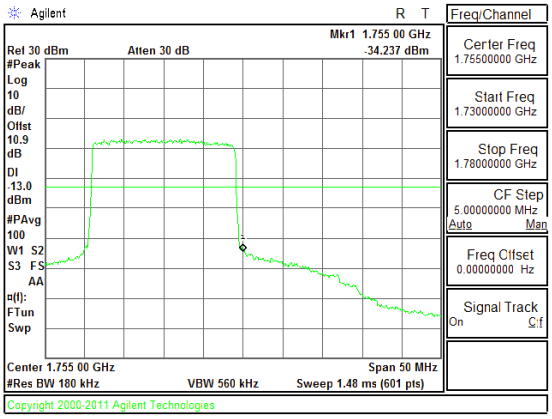
Band LTE4 20MHz 16QAM	 Band LTE4 20MHz CBE 16QAM Low Channel 1RB.gif	 Band LTE4 20MHz CBE 16QAM Low Channel FRB.gif
Band LTE4 20MHz 16QAM	 Band LTE4 20MHz CBE 16QAM High Channel 1RB.gif	 Band LTE4 20MHz CBE 16QAM High Channel FRB.gif

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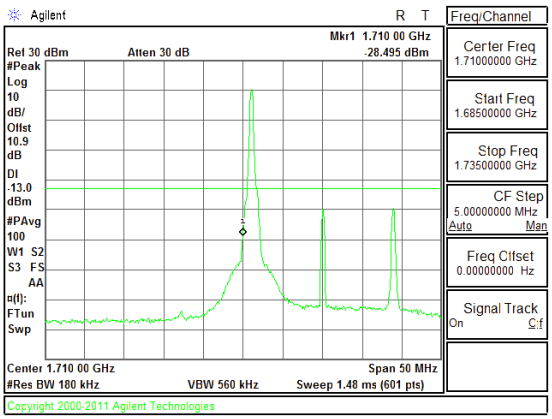
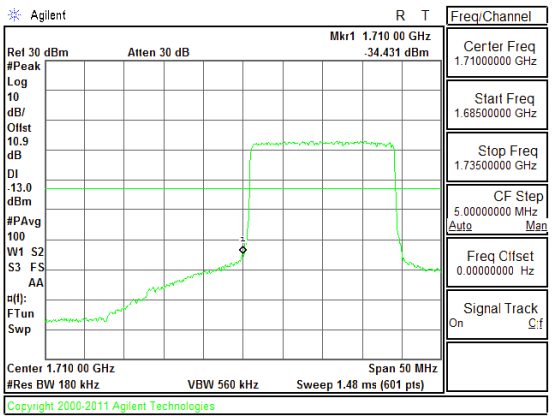
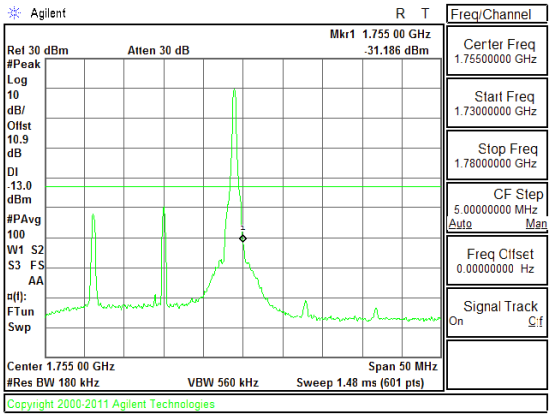
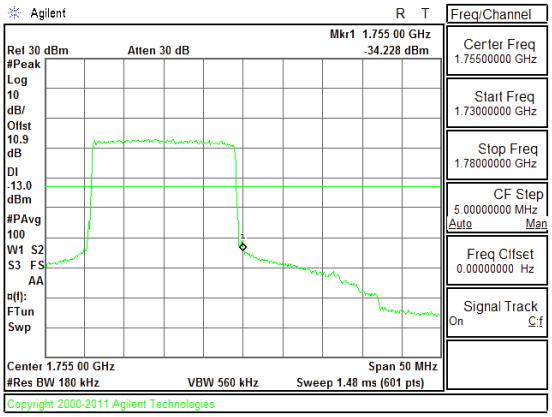
Band LTE4 20MHz QPSK	 Band LTE4 20MHz CBE QPSK Low Channel 1RB.gif	 Band LTE4 20MHz CBE QPSK Low Channel FRB.gif
Band LTE4 20MHz QPSK	 Band LTE4 20MHz CBE QPSK High Channel 1RB.gif	 Band LTE4 20MHz CBE QPSK High Channel FRB.gif

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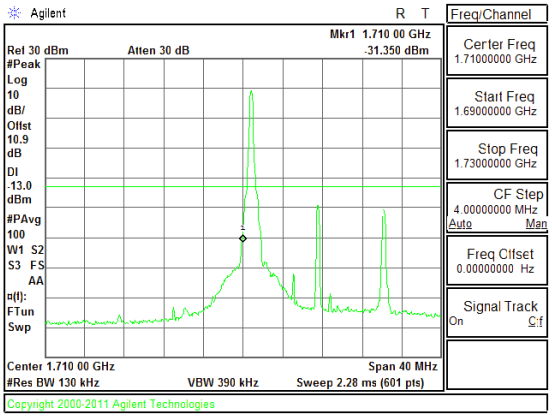
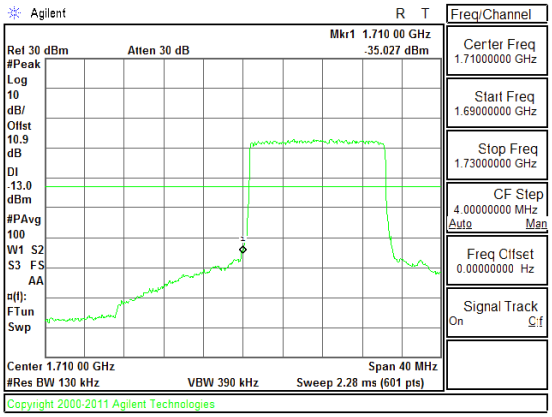
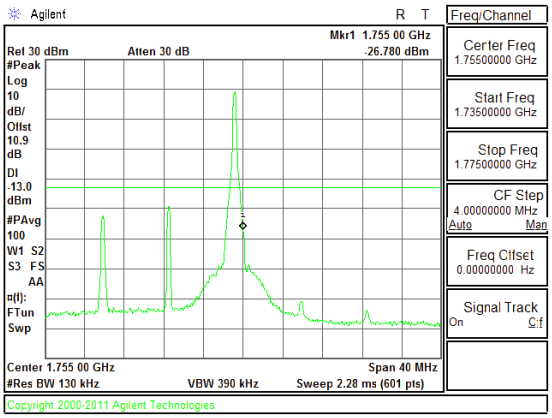
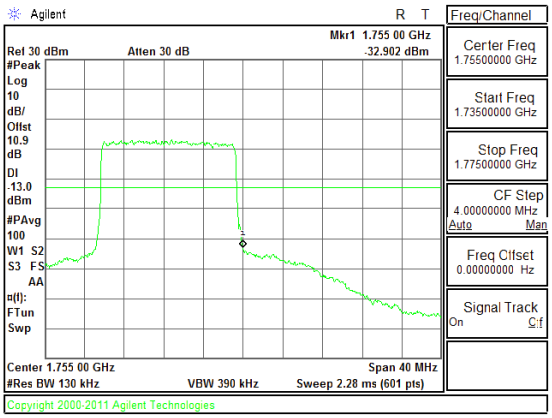
Band LTE4 15MHz 16QAM	 Band LTE4 15MHz CBE 16QAM Low Channel 1RB.gif	 Band LTE4 15MHz CBE 16QAM Low Channel FRB.gif
Band LTE4 15MHz 16QAM	 Band LTE4 15MHz CBE 16QAM High Channel 1RB.gif	 Band LTE4 15MHz CBE 16QAM High Channel FRB.gif

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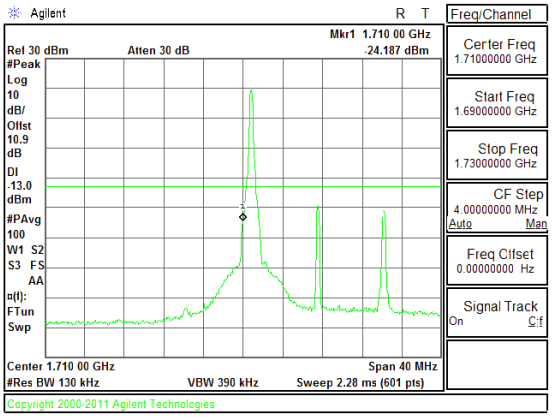
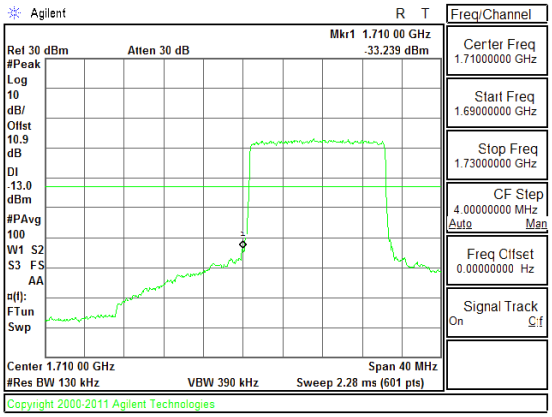
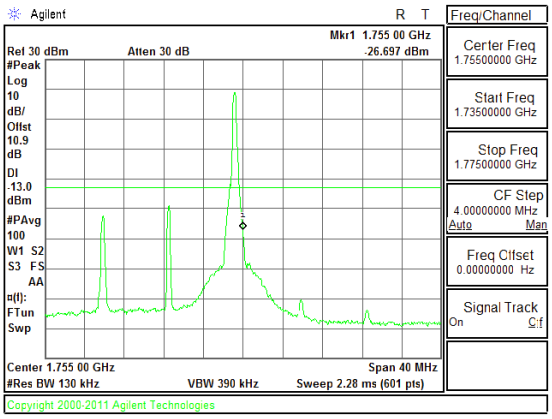
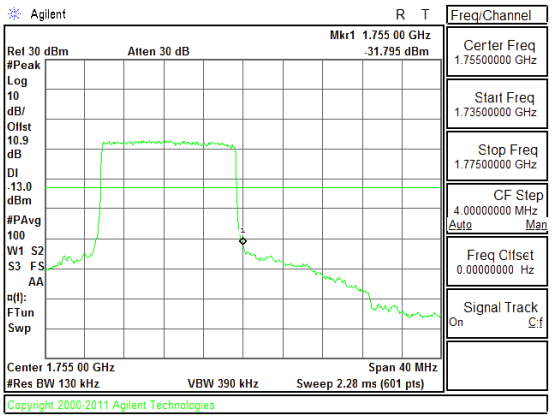
Band LTE4 15MHz QPSK	 Band LTE4 15MHz CBE QPSK Low Channel 1RB.gif	 Band LTE4 15MHz CBE QPSK Low Channel FRB.gif
Band LTE4 15MHz QPSK	 Band LTE4 15MHz CBE QPSK High Channel 1RB.gif	 Band LTE4 15MHz CBE QPSK High Channel FRB.gif

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9.3. OUT OF BAND EMISSIONS

RULE PART(S)

FCC: §2.1051, §24.238, §27.53

LIMITS

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log (P) dB.

TEST PROCEDURE

Per KDB 971168 D01 Power Meas License Digital Systems v02r01

The RF output of the transmitter was connected to a spectrum analyzer through a calibrated coaxial cable. Sufficient scans were taken to show the out-of-band Emissions, if any, up to 10th harmonic. Multiple sweeps were recorded in maximum hold mode using a peak detector to ensure that the worst-case emissions were caught.

RESULTS

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9.3.1. OUT OF BAND EMISSIONS RESULT

Band	BW (MHz)	Mode	f (MHz)	Spur (dBm)	Spec (dBm)	Delta (dB)
LTE25	20	QPSK	1860	-36.25	-13	-23.25
			1882.5	-35.94	-13	-22.94
			1905	-37.41	-13	-24.41
		16QAM	1860	-34.48	-13	-21.48
			1882.5	-35	-13	-22.00
			1905	-33.53	-13	-20.53
Band	BW (MHz)	Mode	f (MHz)	Spur (dBm)	Spec (dBm)	Delta (dB)
LTE25	15	QPSK	1857.5	-33.03	-13	-20.03
			1882.5	-33.31	-13	-20.31
			1907.5	-35.1	-13	-22.1
		16QAM	1857.5	-33.79	-13	-20.79
			1882.5	-34.48	-13	-21.48
			1907.5	-32.86	-13	-19.86

Band	BW (MHz)	Mode	f (MHz)	Spur (dBm)	Spec (dBm)	Delta (dB)
LTE2	20	QPSK	1860	-36.25	-13	-23.25
			1880	-35.94	-13	-22.94
			1900	-37.41	-13	-24.41
		16QAM	1860	-34.48	-13	-21.48
			1880	-35.00	-13	-22.00
			1900	-33.53	-13	-20.53
Band	BW (MHz)	Mode	f (MHz)	Spur (dBm)	Spec (dBm)	Delta (dB)
LTE2	15	QPSK	1857.5	-33.03	-13	-20.03
			1880	-33.31	-13	-20.31
			1902.5	-35.10	-13	-22.10
		16QAM	1857.5	-33.79	-13	-20.79
			1880	-34.48	-13	-21.48
			1902.5	-32.86	-13	-19.86

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Band	BW (MHz)	Mode	f (MHz)	Spur (dBm)	Spec (dBm)	Delta (dB)
LTE4	20	QPSK	1720	-32.73	-13	-19.73
			1732.5	-32.97	-13	-19.97
			1745	-36.44	-13	-23.44
		16QAM	1720	-33.52	-13	-20.52
			1732.5	-35.79	-13	-22.79
			1745	-33.13	-13	-20.13
Band	BW (MHz)	Mode	f (MHz)	Spur (dBm)	Spec (dBm)	Delta (dB)
LTE4	15	QPSK	1717.5	-34.43	-13	-21.43
			1732.5	-34.88	-13	-21.88
			1747.5	-32.46	-13	-19.46
		16QAM	1717.5	-32.41	-13	-19.41
			1732.5	-35.74	-13	-22.74
			1747.5	-35.08	-13	-22.08

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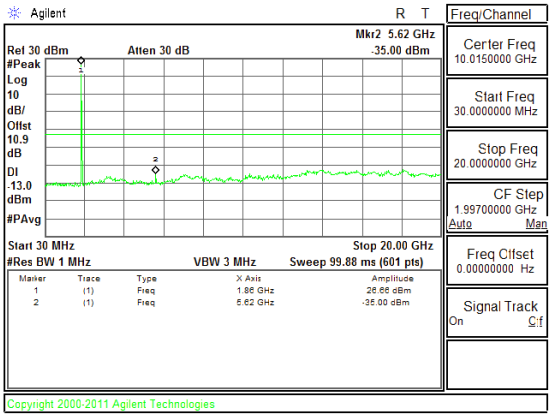
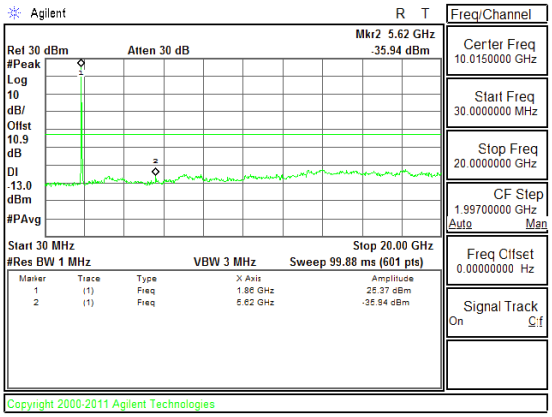
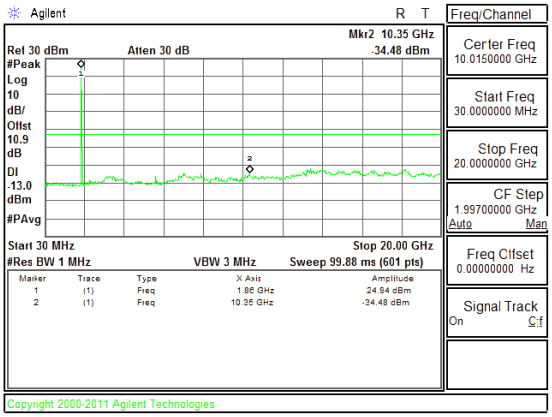
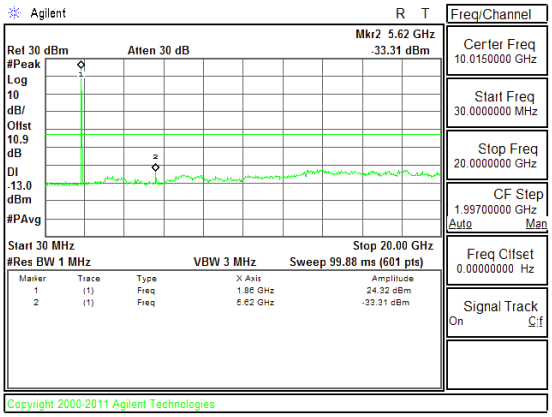
9.3.2. OUT OF BAND EMISSIONS PLOTS

Band LTE25 20MHz	 Band LTE25 20MHz CSE 16QAM Mid channel	 Band LTE25 20MHz CSE QPSK Mid channel
Band LTE25 15MHz	 Band LTE25 15MHz CSE 16QAM Mid channel	 Band LTE25 15MHz CSE QPSK Mid channel

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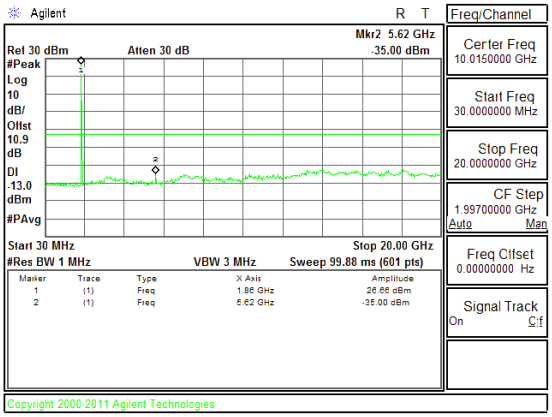
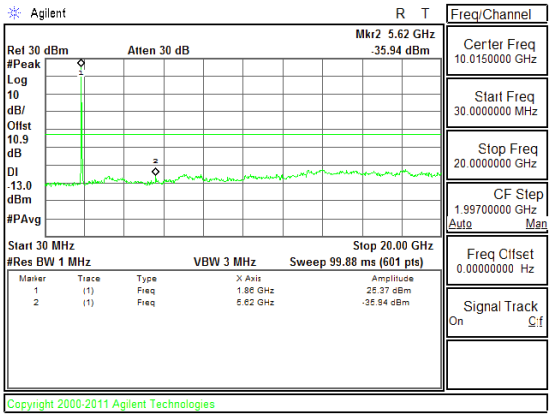
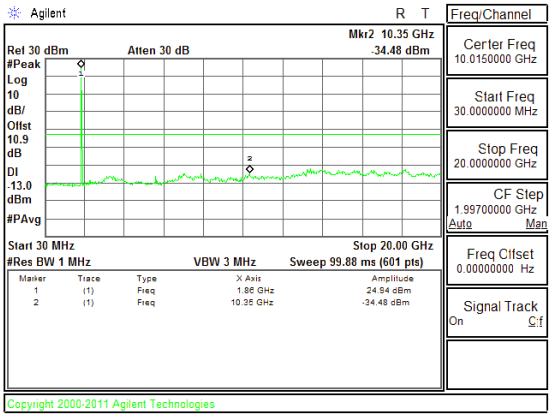
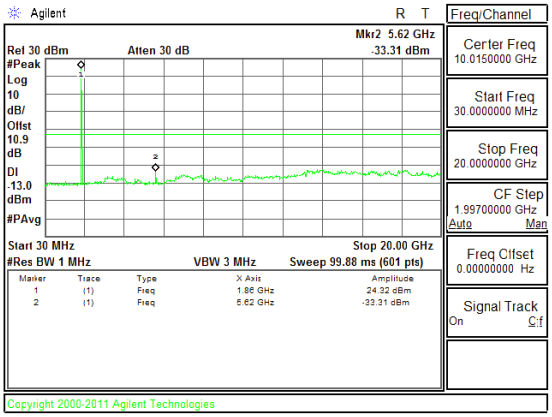
Band LTE2 20MHz	 Band LTE2 20MHz CSE 16QAM Mid channel	 Band LTE2 20MHz CSE QPSK Mid channel
Band LTE2 15MHz	 Band LTE2 15MHz CSE 16QAM Mid channel	 Band LTE2 15MHz CSE QPSK Mid channel

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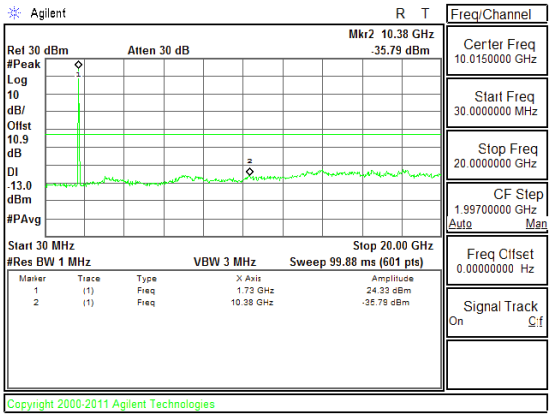
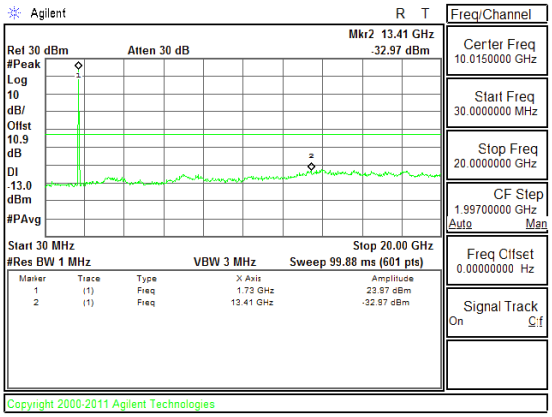
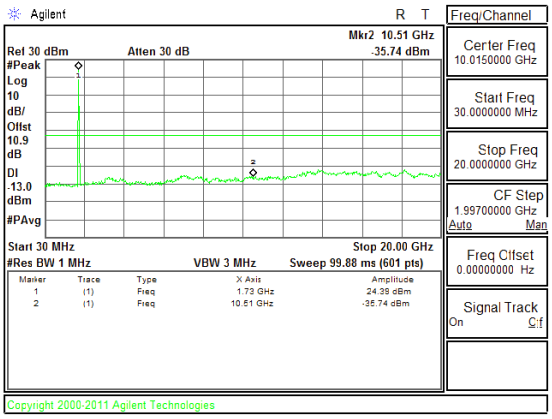
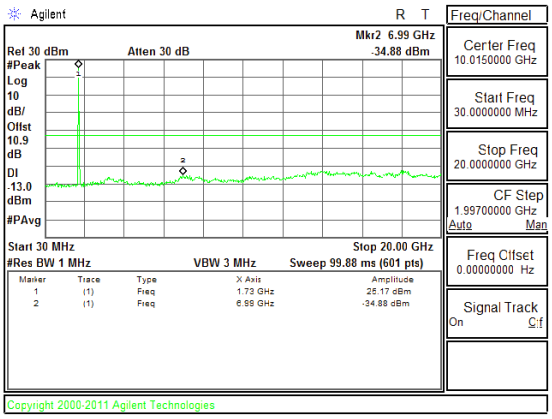
Band LTE4 20MHz	 Band LTE4 20MHz CSE 16QAM Mid channel	 Band LTE4 20MHz CSE QPSK Mid channel
Band LTE4 15MHz	 Band LTE4 15MHz CSE 16QAM Mid channel	 Band LTE4 15MHz CSE QPSK Mid channel

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9.4. FREQUENCY STABILITY

RULE PART(S)

FCC: §2.1055, §24.235, §27.54.

LIMITS

§24.235 & §27.54 - The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

TEST PROCEDURE

Use Agilent 8960 and CMW 500 with Frequency Error measurement capability.

- Temp. = −30° to +50°C
- Voltage = Normal, 3.7Vdc, Low, 3.5Vdc and High, 4.26Vdc.

Frequency Stability vs Temperature:

The EUT is place inside a temperature chamber. The temperature is set to 20ºC and allowed to stabilize. After sufficient soak time, the transmitting frequency error is measured. The temperature is increased by 10 degrees, allowed to stabilize and soak, and then the measurement is repeated. This is repeated until +50ºC is reached.

RESULTS

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LTE BAND 4 – MID CHANNEL (1732.5 MHz)

Reference Frequency: Cellular Mid Channel 1732.500012MHz @ 20°C Limit: to stay +- 2.5 ppm = 4331.250 Hz				
Power Supply (Vdc)	Environment Temperature (°C)	Frequency Deviation Measureed with Time Elapse		
		(MHz)	Delta (ppm)	Limit (ppm)
3.70	50	1732.500010	0.001	2.5
3.70	40	1732.500010	0.001	2.5
3.70	30	1732.500011	0.001	2.5
3.70	***20***	***1732.500012***	***0***	2.5
3.70	10	1732.500011	0.000	2.5
3.70	0	1732.500011	0.000	2.5
3.70	-10	1732.500009	0.002	2.5
3.70	-20	1732.500011	0.001	2.5
3.70	-30	1732.500011	0.001	2.5

Reference Frequency: Cellular Mid Channel 1732.500012MHz @ 20°C Limit: to stay +- 2.5 ppm = 4331.250 Hz				
Power Supply (Vdc)	Environment Temperature (°C)	Frequency Deviation Measureed with Time Elapse		
		(MHz)	Delta (ppm)	Limit (ppm)
3.70	***20***	***1732.500012***	***0***	***2.5***
3.15	20	1732.500010	*0.001*	2.5
4.26	20	1732.500011	*0.001*	2.5

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LTE BAND 25 – MID CHANNEL (1882.5MHz)

Reference Frequency: Cellular Mid Channel 1882.499981MHz @ 20°C Limit: to stay +- 2.5 ppm = 4706.250 Hz				
Power Supply (Vdc)	Environment Temperature (°C)	Frequency Deviation Measureed with Time Elapse		
		(MHz)	Delta (ppm)	Limit (ppm)
3.70	50	1882.499987	-0.003	2.5
3.70	40	1882.499981	0.000	2.5
3.70	30	1882.499981	0.000	2.5
3.70	***20***	***1882.499981***	***0***	***2.5***
3.70	10	1882.499981	0.000	2.5
3.70	0	1882.499980	0.001	2.5
3.70	-10	1882.499985	-0.002	2.5
3.70	-20	1882.499982	0.000	2.5
3.70	-30	1882.499983	-0.001	2.5

Reference Frequency: Cellular Mid Channel 1882.499981MHz @ 20°C Limit: to stay +- 2.5 ppm = 4706.250 Hz				
Power Supply (Vdc)	Environment Temperature (°C)	Frequency Deviation Measureed with Time Elapse		
		(MHz)	Delta (ppm)	Limit (ppm)
3.70	***20***	***1882.499981***	***0***	***2.5***
3.15	20	1882.499979	*0.001*	2.5
4.26	20	1882.499981	*0.000*	2.5

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LTE BAND 2 – MID CHANNEL (1880.0 MHz)

Reference Frequency: Cellular Mid Channel 1880.000004MHz @ 20°C Limit: to stay +- 2.5 ppm = 4700.000 Hz				
Power Supply (Vdc)	Environment Temperature (°C)	Frequency Deviation Measureed with Time Elapse		
		(MHz)	Delta (ppm)	Limit (ppm)
3.70	50	1880.000006	-0.001	2.5
3.70	40	1880.000005	-0.001	2.5
3.70	30	1880.000003	0.001	2.5
3.70	***20***	***1880.000004***	***0***	2.5
3.70	10	1880.000007	-0.002	2.5
3.70	0	1880.000006	-0.001	2.5
3.70	-10	1880.000006	-0.001	2.5
3.70	-20	1880.000005	-0.001	2.5
3.70	-30	1880.000004	0.000	2.5

Reference Frequency: Cellular Mid Channel 1880.000004MHz @ 20°C Limit: to stay +- 2.5 ppm = 4700.000 Hz				
Power Supply (Vdc)	Environment Temperature (°C)	Frequency Deviation Measureed with Time Elapse		
		(MHz)	Delta (ppm)	Limit (ppm)
3.70	***20***	***1880.000004***	***0.00000***	***2.5***
3.15	20	1880.000005	*-0.00053*	2.5
4.26	20	1880.000003	*0.00053*	2.5

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10. RADIATED TEST RESULTS

10.1. RADIATED POWER (ERP & EIRP)

RULE PART(S)

FCC: §2.1046, §24.232, §27

LIMITS

24.232(c) - Mobile/portable stations are limited to 2 watts e.i.r.p. peak power and the equipment must employ means to limit the power to the minimum necessary for successful communications.

27.50(d) - (4) Fixed, mobile, and portable (hand-held) stations operating in the 1710-1755 MHz band and mobile and portable stations operating in the 1695-1710 MHz and 1755-1780 MHz bands are limited to 1 watt EIRP.

In addition, when the transmitter power is measured in terms of average value, the peak-to-average ratio of the power shall not exceed 13dB.

TEST PROCEDURE

ANSI / TIA / EIA 603C Clause 2.2.17; PSA setting reference to 971168 D01 v02r01

For peak power measurement with a PSA:

a) Set the RBW ≥ OBW; b) Set VBW ≥ 3 × RBW; c) Set span ≥ 2 x RBW; d) Sweep time = auto couple; e) Detector = peak; f) Ensure that the number of measurement points ≥ span/RBW; g) Trace mode = max hold;

For average power measurement with a PSA:

a) Set span to at least 1.5 times the OBW; b) Set RBW = 1-5% of the OBW, not to exceed 1 MHz; c) Set VBW ≥ 3 x RBW; d) Set number of points in sweep ≥ 2 × span / RBW; e) Sweep time = auto-couple; f) Detector = RMS (power averaging); g) Use free run trigger If burst duty cycle ≥ 98; h) Use trigger to capture bursts If burst duty cycle < 98; i) Trace average at least 100 traces in power averaging (*i.e.*, RMS) mode. j) Compute the power by integrating the spectrum across the OBW of the signal using the instrument's band power measurement function.

TEST RESULTS

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10.1.1. LTE EIRP Results

Band	BW (MHz)	Mode	RB/RB Size	f (MHz)	EIRP	
					dBm	mW
LTE25	20	QPSK	1/0	1860	21.13	129.72
			1/0	1882.5	22.54	179.47
			1/0	1905	21.88	154.17
		16QAM	1/0	1860	22.31	170.22
			1/0	1882.5	22.84	192.31
			1/0	1905	22.23	167.11
Band	BW (MHz)	Mode	RB/RB Size	f (MHz)	EIRP	
					dBm	mW
LTE25	15	QPSK	1/0	1857.5	22.6	181.97
			1/0	1882.5	23.07	202.77
			1/0	1907.5	22.2	165.96
		16QAM	1/0	1857.5	23.11	204.64
			1/0	1882.5	22.91	195.43
			1/0	1907.5	22.22	166.72

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Band	BW (MHz)	Mode	RB/RB Size	f (MHz)	EIRP	
					dBm	mW
LTE2	20	QPSK	1/0	1860	21.13	129.72
			1/0	1880	22.54	179.47
			1/0	1900	21.88	154.17
		16QAM	1/0	1860	22.31	170.22
			1/0	1880	22.84	192.31
			1/0	1900	22.23	167.11
Band	BW (MHz)	Mode	RB/RB Size	f (MHz)	EIRP	
					dBm	mW
LTE2	15	QPSK	1/0	1857.5	22.60	181.97
			1/0	1882.5	23.07	202.77
			1/0	1907.5	22.20	165.96
		16QAM	1/0	1857.5	23.11	204.64
			1/0	1882.5	22.91	195.43
			1/0	1907.5	22.22	166.72

Band	BW (MHz)	Mode	RB/RB Size	f (MHz)	EIRP	
					dBm	mW
LTE4	20	QPSK	1/0	1720	21.06	127.64
			1/0	1732.5	20.32	107.65
			1/0	1745	19.44	87.9
		16QAM	1/0	1720	20.82	120.78
			1/0	1732.5	20.78	119.67
			1/0	1745	19.1	81.28
Band	BW (MHz)	Mode	RB/RB Size	f (MHz)	EIRP	
					dBm	mW
LTE4	15	QPSK	1/0	1717.5	20.96	124.74
			1/0	1732.5	21.23	132.74
			1/0	1747.5	19.33	85.7
		16QAM	1/0	1717.5	21.28	134.28
			1/0	1732.5	21.12	129.42
			1/0	1747.5	19.87	97.05

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10.1.2. EIRP PLOTS

Band

LTE25

20MHz

16QAM

High Frequency Substitution Measurement
UL Verification Services, Inc. Chamber C

Company: LG
Project #: 14U18931
Date: 07/29/14
Test Engineer: K. Huynh, T. Oeur
Configuration: EUT
Mode: LTE25 B20 16QAM FUND

Test Equipment:
Receiving: Horn T119, and Chamber C SMA Cables
Substitution: Horn T59 Substitution, 4ft SMA Cable Warehouse

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
1860.00	12.86	V	0.5	7.9	20.26	33.0	-12.7	
1860.00	14.91	H	0.5	7.9	22.31	33.0	-10.7	
Mid Ch								
1882.50	12.95	V	0.5	7.9	20.35	33.0	-12.7	
1882.50	15.44	H	0.5	7.9	22.84	33.0	-10.2	
High Ch								
1905.00	14.12	V	0.5	7.9	21.52	33.0	-11.5	
1905.00	14.83	H	0.5	7.9	22.23	33.0	-10.8	

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Band

LTE25

20MHz

QPSK

High Frequency Substitution Measurement
UL Verification Services, Inc. Chamber C

Company: LG
Project #: 14U18931
Date: 07/29/14
Test Engineer: K. Huynh, T. Oeur
Configuration: EUT
Mode: LTE25 B20 QPSK FUND

Test Equipment:
Receiving: Horn T119, and Chamber C SMA Cables
Substitution: Horn T59 Substitution, 4ft SMA Cable Warehouse

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
1860.00	12.34	V	0.5	7.9	19.74	33.0	-13.3	
1860.00	13.73	H	0.5	7.9	21.13	33.0	-11.9	
Mid Ch								
1882.50	12.88	V	0.5	7.9	20.28	33.0	-12.7	
1882.50	15.14	H	0.5	7.9	22.54	33.0	-10.5	
High Ch								
1905.00	14.16	V	0.5	7.9	21.56	33.0	-11.4	
1905.00	14.48	H	0.5	7.9	21.88	33.0	-11.1	

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Band

LTE25

15MHz

16QAM

High Frequency Substitution Measurement
UL Verification Services, Inc. Chamber C

Company: LG
Project #: 14U18931
Date: 07/29/14
Test Engineer: K. Huynh, T. Oeur
Configuration: EUT
Mode: LTE25 B15 16QAM FUND

Test Equipment:
Receiving: Horn T119, and Chamber C SMA Cables
Substitution: Horn T59 Substitution, 4ft SMA Cable Warehouse

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
1857.50	12.58	V	0.5	7.9	19.98	33.0	-13.0	
1857.50	15.71	H	0.5	7.9	23.11	33.0	-9.9	
Mid Ch								
1882.50	13.69	V	0.5	7.9	21.09	33.0	-11.9	
1882.50	15.51	H	0.5	7.9	22.91	33.0	-10.1	
High Ch								
1907.50	14.45	V	0.5	7.9	21.85	33.0	-11.2	
1907.50	14.82	H	0.5	7.9	22.22	33.0	-10.8	

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Band

LTE25

15MHz

QPSK

High Frequency Substitution Measurement
UL Verification Services, Inc. Chamber C

Company: LG
Project #: 14U18931
Date: 07/29/14
Test Engineer: K. Huynh, T. Oeur
Configuration: EUT
Mode: LTE25 B15 QPSK FUND

Test Equipment:
Receiving: Horn T119, and Chamber C SMA Cables
Substitution: Horn T217 Substitution, 4ft SMA Cable Warehouse

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
1857.50	12.55	V	0.5	7.9	19.95	33.0	-13.1	
1857.50	15.20	H	0.5	7.9	22.60	33.0	-10.4	
Mid Ch								
1882.50	13.31	V	0.5	7.9	20.71	33.0	-12.3	
1882.50	15.67	H	0.5	7.9	23.07	33.0	-9.9	
High Ch								
1907.50	14.13	V	0.5	7.9	21.53	33.0	-11.5	
1907.50	14.80	H	0.5	7.9	22.20	33.0	-10.8	

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Band

LTE2

20MHz

16QAM

High Frequency Substitution Measurement
UL Verification Services, Inc. Chamber C

Company: LG
Project #: 14U18931
Date: 41849.00
Test Engineer: K. Huynh, T. Oeur
Configuration: EUT
Mode: LTE2 20MHz 16QAM FUND

Test Equipment:
Receiving: Horn T119, and Chamber C SMA Cables
Substitution: Horn T59 Substitution, 4ft SMA Cable Warehouse

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
1860.00	12.86	V	0.50	7.90	20.26	33.00	-12.74	
1860.00	14.91	H	0.50	7.90	22.31	33.00	-10.69	
Mid Ch								
1880.00	12.95	V	0.50	7.90	20.35	33.00	-12.65	
1880.00	15.44	H	0.50	7.90	22.84	33.00	-10.16	
High Ch								
1900.00	14.12	V	0.50	7.90	21.52	33.00	-11.48	
1900.00	14.83	H	0.50	7.90	22.23	33.00	-10.77	

Rev. 3.17.11

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
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Band

LTE2

20MHz

QPSK

High Frequency Substitution Measurement
UL Verification Services, Inc. Chamber C

Company: LG
Project #: 14U18931
Date: 07/29/14
Test Engineer: K. Huynh, T. Oeur
Configuration: EUT
Mode: LTE2 20MHz QPSK FUND

Test Equipment:
Receiving: Horn T119, and Chamber C SMA Cables
Substitution: Horn T59 Substitution, 4ft SMA Cable Warehouse

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
1860.00	12.34	V	0.5	7.9	19.74	33.0	-13.3	
1860.00	13.73	H	0.5	7.9	21.13	33.0	-11.9	
Mid Ch								
1880.00	12.88	V	0.5	7.9	20.28	33.0	-12.7	
1880.00	15.14	H	0.5	7.9	22.54	33.0	-10.5	
High Ch								
1900.00	14.16	V	0.5	7.9	21.56	33.0	-11.4	
1900.00	14.48	H	0.5	7.9	21.88	33.0	-11.1	

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Band

LTE2

15MHz

16QAM

High Frequency Substitution Measurement
UL Verification Services, Inc. Chamber C

Company: LG
Project #: 14U18931
Date: 07/29/14
Test Engineer: K. Huynh, T. Oeur
Configuration: EUT
Mode: LTE2 15MHz 16QAM FUND

Test Equipment:
Receiving: Horn T119, and Chamber C SMA Cables
Substitution: Horn T59 Substitution, 4ft SMA Cable Warehouse

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
1857.50	12.58	V	0.5	7.9	19.98	33.0	-13.0	
1857.50	15.71	H	0.5	7.9	23.11	33.0	-9.9	
Mid Ch								
1880.00	13.69	V	0.5	7.9	21.09	33.0	-11.9	
1880.00	15.51	H	0.5	7.9	22.91	33.0	-10.1	
High Ch								
1902.50	14.45	V	0.5	7.9	21.85	33.0	-11.2	
1902.50	14.82	H	0.5	7.9	22.22	33.0	-10.8	

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Band

LTE2

15MHz

QPSK

High Frequency Substitution Measurement
UL Verification Services, Inc. Chamber C

Company: LG
Project #: 14U18931
Date: 07/29/14
Test Engineer: K. Huynh, T. Oeur
Configuration: EUT
Mode: LTE2 15MHz QPSK FUND

Test Equipment:
Receiving: Horn T119, and Chamber C SMA Cables
Substitution: Horn T217 Substitution, 4ft SMA Cable Warehouse

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
1857.50	12.55	V	0.5	7.9	19.95	33.0	-13.1	
1857.50	15.20	H	0.5	7.9	22.60	33.0	-10.4	
Mid Ch								
1880.00	13.31	V	0.5	7.9	20.71	33.0	-12.3	
1880.00	15.67	H	0.5	7.9	23.07	33.0	-9.9	
High Ch								
1902.50	14.13	V	0.5	7.9	21.53	33.0	-11.5	
1902.50	14.80	H	0.5	7.9	22.20	33.0	-10.8	

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Band

LTE4

20MHz

16QAM

High Frequency Substitution Measurement
UL Verification Services, Inc. Chamber C

Company: LG
Project #: 14U18931
Date: 07/31/14
Test Engineer: K. Huynh, T. Oeur
Configuration: EUT
Mode: LTE4 B20 16QAM FUND

Test Equipment:
Receiving: Horn T119, and Chamber C SMA Cables
Substitution: Horn T59 Substitution, 4ft SMA Cable Warehouse

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
1720.00	11.76	V	0.5	8.1	19.36	30.0	-10.6	
1720.00	13.22	H	0.5	8.1	20.82	30.0	-9.2	
Mid Ch								
1732.50	10.95	V	0.5	8.1	18.55	30.0	-11.5	
1732.50	13.18	H	0.5	8.1	20.78	30.0	-9.2	
High Ch								
1745.00	10.72	V	0.5	8.0	18.22	30.0	-11.8	
1745.00	11.60	H	0.5	8.0	19.10	30.0	-10.9	

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Band

LTE4

20MHz

QPSK

High Frequency Substitution Measurement
UL Verification Services, Inc. Chamber C

Company: LG
Project #: 14U18931
Date: 07/29/14
Test Engineer: K. Huynh, T. Oeur
Configuration: EUT
Mode: LTE4 B20 QPSK FUND

Test Equipment:
Receiving: Horn T119, and Chamber C SMA Cables
Substitution: Horn T59 Substitution, 4ft SMA Cable Warehouse

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
1720.00	9.26	V	0.5	8.1	16.86	30.0	-13.1	
1720.00	13.46	H	0.5	8.1	21.06	30.0	-8.9	
Mid Ch								
1732.50	10.43	V	0.5	8.1	18.03	30.0	-12.0	
1732.50	12.72	H	0.5	8.1	20.32	30.0	-9.7	
High Ch								
1745.00	10.71	V	0.5	8.0	18.21	30.0	-11.8	
1745.00	11.94	H	0.5	8.0	19.44	30.0	-10.6	

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Band

LTE4

15MHz

16QAM

High Frequency Substitution Measurement
UL Verification Services, Inc. Chamber C

Company: LG
Project #: 14U18931
Date: 07/29/14
Test Engineer: K. Huynh, T. Oeur
Configuration: EUT
Mode: LTE4 B15 16QAM FUND

Test Equipment:
Receiving: Horn T119, and Chamber C SMA Cables
Substitution: Horn T59 Substitution, 4ft SMA Cable Warehouse

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
1717.50	12.05	V	0.5	8.1	19.65	30.0	-10.4	
1717.50	13.68	H	0.5	8.1	21.28	30.0	-8.7	
Mid Ch								
1732.50	11.17	V	0.5	8.1	18.77	30.0	-11.2	
1732.50	13.52	H	0.5	8.1	21.12	30.0	-8.9	
High Ch								
1747.50	10.63	V	0.5	8.0	18.13	30.0	-11.9	
1747.50	12.37	H	0.5	8.0	19.87	30.0	-10.1	

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Band

LTE4

15MHz

QPSK

Company: LG
Project #: 14U18931
Date: 07/31/14
Test Engineer: K. Huynh, T. Oeur
Configuration: EUT
Mode: LTE4 B15 QPSK FUND

Test Equipment:
Receiving: Horn T119, and Chamber C SMA Cables
Substitution: Horn T59 Substitution, 4ft SMA Cable Warehouse

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
1717.50	11.72	V	0.5	8.1	19.32	30.0	-10.7	
1717.50	13.36	H	0.5	8.1	20.96	30.0	-9.0	
Mid Ch								
1732.50	11.19	V	0.5	8.1	18.79	30.0	-11.2	
1732.50	13.63	H	0.5	8.1	21.23	30.0	-8.8	
High Ch								
1747.50	11.53	V	0.5	8.0	19.03	30.0	-11.0	
1747.50	11.83	H	0.5	8.0	19.33	30.0	-10.7	

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10.2. FIELD STRENGTH OF SPURIOUS RADIATION

RULE PART(S)

FCC: §2.1053, §24.238, §27.53

LIMIT

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log (P) dB.

Part 27: (m)(4) For mobile station, the attenuation factor shall be not less than 43+10Log(P)dB at the channel edge and (55+10Log(P)dB) at 5.5MHz from the channel edges.

TEST PROCEDURE

For Cellular equipment - Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e. 100 kHz or 1 percent of emission bandwidth, as specified). The emission 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.

For PCS equipment - Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e. 1 MHz or 1 percent of emission bandwidth, as specified). The emission 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.

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10.2.1. SPURIOUS RADIATION PLOTS

Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company: Samsung
Project #: 14U18391
Date: 07/30/14
Test Engineer: Day Shift Interns
Configuration: X-Pos EUT w/ AC Charger, Headset
Mode: LTE25 B20 16QAM HARM

Chamber	Pre-amplifer	Filter	Limit
3m Chamber	T34 8449B	Filter 1	Part 24

Band

LTE25

20MHz

16QAM

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 1860.0MHz									
3.720	-9.1	V	3.0	35.4	1.0	-43.5	-13.0	-30.5	
5.580	-8.1	V	3.0	34.7	1.0	-41.8	-13.0	-28.8	
7.440	-2.9	V	3.0	34.9	1.0	-36.8	-13.0	-23.8	
3.720	-9.4	H	3.0	35.4	1.0	-43.8	-13.0	-30.8	
5.580	-8.4	H	3.0	34.7	1.0	-42.1	-13.0	-29.1	
7.440	-2.8	H	3.0	34.9	1.0	-36.7	-13.0	-23.7	
Mid Ch, 1882.5MHz									
3.765	-10.8	V	3.0	35.3	1.0	-45.1	-13.0	-32.1	
5.648	-7.8	V	3.0	34.7	1.0	-41.5	-13.0	-28.5	
7.530	-2.9	V	3.0	34.9	1.0	-36.9	-13.0	-23.9	
3.765	-18.0	H	3.0	35.3	1.0	-52.3	-13.0	-39.3	
5.648	-16.7	H	3.0	34.7	1.0	-50.4	-13.0	-37.4	
7.530	-14.2	H	3.0	34.9	1.0	-48.1	-13.0	-35.1	
High Ch, 1905.0MHz									
3.810	-10.4	V	3.0	35.3	1.0	-44.7	-13.0	-31.7	
5.715	-7.4	V	3.0	34.7	1.0	-41.1	-13.0	-28.1	
7.620	-2.1	V	3.0	34.9	1.0	-36.0	-13.0	-23.0	
3.810	-13.3	H	3.0	35.3	1.0	-47.6	-13.0	-34.6	
5.715	-8.5	H	3.0	34.7	1.0	-42.3	-13.0	-29.3	
7.620	-2.6	H	3.0	34.9	1.0	-36.5	-13.0	-23.5	

Rev. 03.03.09
Note: No other emissions were detected above the system noise floor.

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Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company: Samsung
Project #: 14U18391
Date: 07/30/14
Test Engineer: Day Shift Interns
Configuration: X-Pos EUT w/ AC Charger, Headset
Mode: LTE25 B20 QPSK HARM

Chamber	Pre-amplifer	Filter	Limit
3m Chamber	T34 8449B	Filter 1	Part 24

Band

LTE25

20MHz

QPSK

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 1860.0MHz									
3.720	-8.0	V	3.0	35.4	1.0	-42.3	-13.0	-29.3	
5.580	-8.0	V	3.0	34.7	1.0	-41.7	-13.0	-28.7	
7.440	-2.9	V	3.0	34.9	1.0	-36.8	-13.0	-23.8	
3.720	-12.5	H	3.0	35.4	1.0	-46.8	-13.0	-33.8	
5.580	-8.6	H	3.0	34.7	1.0	-42.4	-13.0	-29.4	
7.440	-2.9	H	3.0	34.9	1.0	-36.8	-13.0	-23.8	
Mid Ch, 1882.5MHz									
3.765	-10.5	V	3.0	35.3	1.0	-44.8	-13.0	-31.8	
5.648	-7.8	V	3.0	34.7	1.0	-41.5	-13.0	-28.5	
7.530	-3.1	V	3.0	34.9	1.0	-37.1	-13.0	-24.1	
3.765	-16.5	H	3.0	35.3	1.0	-50.8	-13.0	-37.8	
5.648	-16.4	H	3.0	34.7	1.0	-50.2	-13.0	-37.2	
7.530	-14.3	H	3.0	34.9	1.0	-48.2	-13.0	-35.2	
High Ch, 1905.0MHz									
3.810	-10.6	V	3.0	35.3	1.0	-44.9	-13.0	-31.9	
5.715	-7.4	V	3.0	34.7	1.0	-41.1	-13.0	-28.1	
7.620	-2.0	V	3.0	34.9	1.0	-35.9	-13.0	-22.9	
3.810	-11.1	H	3.0	35.3	1.0	-45.4	-13.0	-32.4	
5.715	-8.3	H	3.0	34.7	1.0	-42.1	-13.0	-29.1	
7.620	-2.5	H	3.0	34.9	1.0	-36.5	-13.0	-23.5	

Rev. 03.03.09
Note: No other emissions were detected above the system noise floor.

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Band

LTE25

15MHz

16QAM

Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company: LG
Project #: 14U18391
Date: 07/30/14
Test Engineer: O. Stoelting
Configuration: EUT X position, AC Charger, Headphones
Mode: TX, LTE band 25, 15MHz BW, 16QAM

Chamber	Pre-amplifer	Filter	Limit
3m Chamber	T145 8449B	Filter 1	Part 24

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, (1857.5 MHz)									
3.715	-3.4	V	3.0	30.2	1.0	-32.6	-13.0	-19.6	
5.573	-17.3	V	3.0	28.3	1.0	-44.6	-13.0	-31.6	
7.430	-25.9	V	3.0	26.4	1.0	-51.3	-13.0	-38.3	
3.715	-14.1	H	3.0	30.2	1.0	-43.3	-13.0	-30.3	
5.573	-16.4	H	3.0	28.3	1.0	-43.8	-13.0	-30.8	
7.430	-24.6	H	3.0	26.4	1.0	-50.0	-13.0	-37.0	
Mid Ch, (1882.5 MHz)									
3.765	-14.6	V	3.0	30.1	1.0	-43.7	-13.0	-30.7	
5.648	-15.7	V	3.0	28.3	1.0	-43.0	-13.0	-30.0	
7.530	-24.3	V	3.0	26.3	1.0	-49.6	-13.0	-36.6	
3.765	0.2	H	3.0	30.1	1.0	-29.0	-13.0	-16.0	
5.648	-16.4	H	3.0	28.3	1.0	-43.6	-13.0	-30.6	
7.530	-24.9	H	3.0	26.3	1.0	-50.2	-13.0	-37.2	
High Ch, (1907.5 MHz)									
3.815	-6.9	V	3.0	30.1	1.0	-36.0	-13.0	-23.0	
5.723	-22.0	V	3.0	28.2	1.0	-49.2	-13.0	-36.2	
7.630	-26.3	V	3.0	26.2	1.0	-51.5	-13.0	-38.5	
3.815	-13.0	H	3.0	30.1	1.0	-42.1	-13.0	-29.1	
5.723	-17.5	H	3.0	28.2	1.0	-44.7	-13.0	-31.7	
7.630	-23.8	H	3.0	26.2	1.0	-49.0	-13.0	-36.0	

Rev. 03.03.09

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Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company: LG
Project #: 14U18391
Date: 07/30/14
Test Engineer: O. Stoelting
Configuration: EUT X position, AC Charger, Headphones
Mode: TX, LTE band 25, 15MHz BW, QPSK

Chamber	Pre-amplifer	Filter	Limit
3m Chamber	T145 8449B	Filter 1	Part 24

Band
LTE25
15MHz
QPSK

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, (1857.5 MHz)									
3.715	-3.4	V	3.0	30.2	1.0	-32.6	-13.0	-19.6	
5.573	-17.1	V	3.0	28.3	1.0	-44.5	-13.0	-31.5	
7.430	-25.8	V	3.0	26.4	1.0	-51.3	-13.0	-38.3	
3.715	-13.5	H	3.0	30.2	1.0	-42.7	-13.0	-29.7	
5.573	-16.2	H	3.0	28.3	1.0	-43.5	-13.0	-30.5	
7.430	-24.1	H	3.0	26.4	1.0	-49.6	-13.0	-36.6	
Mid Ch, (1882.5 MHz)									
3.765	-14.3	V	3.0	30.1	1.0	-43.4	-13.0	-30.4	
5.648	-15.5	V	3.0	28.3	1.0	-42.8	-13.0	-29.8	
7.530	-24.1	V	3.0	26.3	1.0	-49.5	-13.0	-36.5	
3.765	0.2	H	3.0	30.1	1.0	-28.9	-13.0	-15.9	
5.648	-15.9	H	3.0	28.3	1.0	-43.2	-13.0	-30.2	
7.530	-24.6	H	3.0	26.3	1.0	-49.9	-13.0	-36.9	
High Ch, (1907.5 MHz)									
3.815	-6.8	V	3.0	30.1	1.0	-35.9	-13.0	-22.9	
5.723	-21.7	V	3.0	28.2	1.0	-48.9	-13.0	-35.9	
7.630	-26.6	V	3.0	26.2	1.0	-51.7	-13.0	-38.7	
3.815	-12.5	H	3.0	30.1	1.0	-41.6	-13.0	-28.6	
5.723	-17.6	H	3.0	28.2	1.0	-44.8	-13.0	-31.8	
7.630	-23.6	H	3.0	26.2	1.0	-48.8	-13.0	-35.8	

Rev. 03.03.09

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

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Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company: LG
Project #: 14U18391
Date: 08/15/14
Test Engineer: G. Chan, L. Lee
Configuration: X-Pos EUT
Mode: LTE2 20MHz 16QAM

Chamber	Pre-amplifer	Filter	Limit
3m Chamber	T145 8449B	Filter 1	Part 24

Band: LTE2 20MHz 16QAM

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, (1860 MHz)									
3.720	-13.2	V	3.0	30.2	1.0	-42.4	-13.0	-29.4	
5.580	-25.3	V	3.0	28.3	1.0	-52.6	-13.0	-39.6	
7.440	-23.4	V	3.0	26.4	1.0	-48.8	-13.0	-35.8	
3.720	-7.5	H	3.0	30.2	1.0	-36.7	-13.0	-23.7	
5.580	-19.9	H	3.0	28.3	1.0	-47.2	-13.0	-34.2	
7.440	-22.6	H	3.0	26.4	1.0	-48.0	-13.0	-35.0	
Mid Ch, (1880 MHz)									
3.760	-8.1	V	3.0	30.1	1.0	-37.3	-13.0	-24.3	
5.640	-22.6	V	3.0	28.3	1.0	-49.9	-13.0	-36.9	
7.520	-22.7	V	3.0	26.3	1.0	-48.0	-13.0	-35.0	
3.760	-10.6	H	3.0	30.1	1.0	-39.7	-13.0	-26.7	
5.640	-25.2	H	3.0	28.3	1.0	-52.5	-13.0	-39.5	
7.520	-21.5	H	3.0	26.3	1.0	-46.8	-13.0	-33.8	
High Ch, (1900 MHz)									
3.800	-12.1	V	3.0	30.1	1.0	-41.2	-13.0	-28.2	
5.700	-17.5	V	3.0	28.2	1.0	-44.7	-13.0	-31.7	
7.600	-20.3	V	3.0	26.2	1.0	-45.5	-13.0	-32.5	
3.800	-11.9	H	3.0	30.1	1.0	-41.0	-13.0	-28.0	
5.700	-24.2	H	3.0	28.2	1.0	-51.5	-13.0	-38.5	
7.600	-22.3	H	3.0	26.2	1.0	-47.5	-13.0	-34.5	

Rev. 03.03.09
Note: No other emissions were detected above the system noise floor.

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
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Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company: LG
Project #: 14U18391
Date: 08/15/14
Test Engineer: G. Chan, L. Lee
Configuration: X-Pos EUT
Mode: LTE2 20MHz QPSK

Chamber	Pre-amplifer	Filter	Limit
3m Chamber	T145 8449B	Filter 1	Part 24

Band	f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
	Low Ch, (1860 MHz)									
LTE2	3.720	-11.9	V	3.0	30.2	1.0	-41.1	-13.0	-28.1	
	5.580	-24.6	V	3.0	28.3	1.0	-51.9	-13.0	-38.9	
	7.440	-23.0	V	3.0	26.4	1.0	-48.5	-13.0	-35.5	
20MHz	3.720	-5.9	H	3.0	30.2	1.0	-35.1	-13.0	-22.1	
	5.580	-19.5	H	3.0	28.3	1.0	-46.8	-13.0	-33.8	
QPSK	7.440	-22.5	H	3.0	26.4	1.0	-47.9	-13.0	-34.9	
	Mid Ch, (1880 MHz)									
	3.760	-7.0	V	3.0	30.1	1.0	-36.1	-13.0	-23.1	
	5.640	-20.5	V	3.0	28.3	1.0	-47.8	-13.0	-34.8	
	7.520	-22.6	V	3.0	26.3	1.0	-47.9	-13.0	-34.9	
	3.760	-8.9	H	3.0	30.1	1.0	-38.1	-13.0	-25.1	
	5.640	-24.5	H	3.0	28.3	1.0	-51.8	-13.0	-38.8	
	7.520	-21.3	H	3.0	26.3	1.0	-46.6	-13.0	-33.6	
	High Ch, (1900 MHz)									
	3.800	-10.4	V	3.0	30.1	1.0	-39.5	-13.0	-26.5	
	5.700	-15.5	V	3.0	28.2	1.0	-42.8	-13.0	-29.8	
	7.600	-19.5	V	3.0	26.2	1.0	-44.7	-13.0	-31.7	
	3.800	-10.6	H	3.0	30.1	1.0	-39.7	-13.0	-26.7	
	5.700	-21.8	H	3.0	28.2	1.0	-49.0	-13.0	-36.0	
	7.600	-21.4	H	3.0	26.2	1.0	-46.6	-13.0	-33.6	

Rev. 03.03.09
Note: No other emissions were detected above the system noise floor.

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
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Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company: LG
Project #: 14U18391
Date: 08/15/14
Test Engineer: G. Chan, L. Lee
Configuration: X-Pos EUT
Mode: LTE2 15MHz 16QAM

Chamber	Pre-amplifer	Filter	Limit
3m Chamber	T145 8449B	Filter 1	Part 24

Band: LTE2 15MHz 16QAM

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, (1857.5 MHz)									
3.715	-4.7	V	3.0	30.2	1.0	-33.9	-13.0	-20.9	
5.573	-15.9	V	3.0	28.3	1.0	-43.3	-13.0	-30.3	
7.430	-23.0	V	3.0	26.4	1.0	-48.4	-13.0	-35.4	
3.715	-16.0	H	3.0	30.2	1.0	-45.2	-13.0	-32.2	
5.573	-26.9	H	3.0	28.3	1.0	-54.2	-13.0	-41.2	
7.430	-22.7	H	3.0	26.4	1.0	-48.1	-13.0	-35.1	
Mid Ch, (1880 MHz)									
3.760	-19.3	V	3.0	30.1	1.0	-48.4	-13.0	-35.4	
5.640	-13.7	V	3.0	28.3	1.0	-41.0	-13.0	-28.0	
7.520	-19.5	V	3.0	26.3	1.0	-44.8	-13.0	-31.8	
3.760	-10.3	H	3.0	30.1	1.0	-39.4	-13.0	-26.4	
5.640	-26.5	H	3.0	28.3	1.0	-53.8	-13.0	-40.8	
7.520	-20.8	H	3.0	26.3	1.0	-46.2	-13.0	-33.2	
High Ch, (1902.5 MHz)									
3.805	-11.6	V	3.0	30.1	1.0	-40.7	-13.0	-27.7	
5.708	-10.8	V	3.0	28.2	1.0	-38.0	-13.0	-25.0	
7.610	-23.4	V	3.0	26.2	1.0	-48.6	-13.0	-35.6	
3.805	-18.3	H	3.0	30.1	1.0	-47.4	-13.0	-34.4	
5.708	-16.1	H	3.0	28.2	1.0	-43.3	-13.0	-30.3	
7.610	-22.3	H	3.0	26.2	1.0	-47.5	-13.0	-34.5	

Rev. 03.03.09
Note: No other emissions were detected above the system noise floor.

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
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Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company: LG
Project #: 14U18391
Date: 08/15/14
Test Engineer: G. Chan, L. Lee
Configuration: X-Pos EUT
Mode: LTE2 15MHz QPSK

Chamber	Pre-amplifer	Filter	Limit
3m Chamber	T145 8449B	Filter 1	Part 24

Band: LTE2 15MHz QPSK

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, (1857.5 MHz)									
3.715	-3.8	V	3.0	30.2	1.0	-33.0	-13.0	-20.0	
5.573	-14.0	V	3.0	28.3	1.0	-41.3	-13.0	-28.3	
7.430	-23.4	V	3.0	26.4	1.0	-48.9	-13.0	-35.9	
3.715	-14.0	H	3.0	30.2	1.0	-43.2	-13.0	-30.2	
5.573	-26.6	H	3.0	28.3	1.0	-54.0	-13.0	-41.0	
7.430	-22.3	H	3.0	26.4	1.0	-47.8	-13.0	-34.8	
Mid Ch, (1880 MHz)									
3.760	-18.4	V	3.0	30.1	1.0	-47.5	-13.0	-34.5	
5.640	-12.2	V	3.0	28.3	1.0	-39.5	-13.0	-26.5	
7.520	-16.9	V	3.0	26.3	1.0	-42.2	-13.0	-29.2	
3.760	-9.6	H	3.0	30.1	1.0	-38.7	-13.0	-25.7	
5.640	-26.7	H	3.0	28.3	1.0	-53.9	-13.0	-40.9	
7.520	-18.7	H	3.0	26.3	1.0	-44.1	-13.0	-31.1	
High Ch, (1902.5 MHz)									
3.805	-10.4	V	3.0	30.1	1.0	-39.5	-13.0	-26.5	
5.708	-9.6	V	3.0	28.2	1.0	-36.8	-13.0	-23.8	
7.610	-23.1	V	3.0	26.2	1.0	-48.3	-13.0	-35.3	
3.805	-15.8	H	3.0	30.1	1.0	-44.9	-13.0	-31.9	
5.708	-14.3	H	3.0	28.2	1.0	-41.5	-13.0	-28.5	
7.610	-22.3	H	3.0	26.2	1.0	-47.5	-13.0	-34.5	

Rev. 03.03.09
Note: No other emissions were detected above the system noise floor.

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

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Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company: LG
Project #: 14U18391
Date: 07/30/14
Test Engineer: O. Stoelting
Configuration: EUT X position, AC Charger, Headphones
Mode: TX, LTE band 4, 20MHz BW, 16QAM

Chamber	Pre-amplifer	Filter	Limit
3m Chamber	T145 8449B	Filter 1	Part 27

Band
LTE4
20MHz
16QAM

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, (1720 MHz)									
3.440	-16.9	V	3.0	30.4	1.0	-46.4	-13.0	-33.4	
5.160	-23.6	V	3.0	28.7	1.0	-51.4	-13.0	-38.4	
6.880	-26.3	V	3.0	27.1	1.0	-52.4	-13.0	-39.4	
3.440	-16.7	H	3.0	30.4	1.0	-46.1	-13.0	-33.1	
5.160	-25.1	H	3.0	28.7	1.0	-52.9	-13.0	-39.9	
6.880	-24.9	H	3.0	27.1	1.0	-51.0	-13.0	-38.0	
Mid Ch, (1732.5 MHz)									
3.465	-7.3	V	3.0	30.4	1.0	-36.7	-13.0	-23.7	
5.198	-21.4	V	3.0	28.7	1.0	-49.1	-13.0	-36.1	
6.930	-27.0	V	3.0	27.1	1.0	-53.1	-13.0	-40.1	
3.465	-15.3	H	3.0	30.4	1.0	-44.7	-13.0	-31.7	
5.198	-23.4	H	3.0	28.7	1.0	-51.1	-13.0	-38.1	
6.930	-24.5	H	3.0	27.1	1.0	-50.6	-13.0	-37.6	
High Ch, (1745 MHz)									
3.490	-10.6	V	3.0	30.4	1.0	-39.9	-13.0	-26.9	
5.235	-26.7	V	3.0	28.7	1.0	-54.3	-13.0	-41.3	
6.980	-25.7	V	3.0	27.0	1.0	-51.7	-13.0	-38.7	
3.490	-12.0	H	3.0	30.4	1.0	-41.4	-13.0	-28.4	
5.235	-27.4	H	3.0	28.7	1.0	-55.1	-13.0	-42.1	
6.980	-25.1	H	3.0	27.0	1.0	-51.1	-13.0	-38.1	

Rev. 03.03.09
Note: No other emissions were detected above the system noise floor.

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
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Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company: LG
Project #: 14U18391
Date: 07/30/14
Test Engineer: O. Stoelting
Configuration: EUT X position, AC Charger, Headphones
Mode: TX, LTE band 4, 20MHz BW, QPSK

Chamber	Pre-amplifer	Filter	Limit
3m Chamber	T145 8449B	Filter 1	Part 27

Band: LTE4 20MHz QPSK

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, (1720 MHz)									
3.440	-17.2	V	3.0	30.4	1.0	-46.6	-13.0	-33.6	
5.160	-23.4	V	3.0	28.7	1.0	-51.1	-13.0	-38.1	
6.880	-25.9	V	3.0	27.1	1.0	-52.0	-13.0	-39.0	
3.440	-16.5	H	3.0	30.4	1.0	-45.9	-13.0	-32.9	
5.160	-24.7	H	3.0	28.7	1.0	-52.5	-13.0	-39.5	
6.880	-24.2	H	3.0	27.1	1.0	-50.3	-13.0	-37.3	
Mid Ch, (1732.5 MHz)									
3.465	-6.5	V	3.0	30.4	1.0	-35.9	-13.0	-22.9	
5.198	-20.9	V	3.0	28.7	1.0	-48.6	-13.0	-35.6	
6.930	-27.1	V	3.0	27.1	1.0	-53.2	-13.0	-40.2	
3.465	-14.9	H	3.0	30.4	1.0	-44.3	-13.0	-31.3	
5.198	-27.9	H	3.0	28.7	1.0	-55.6	-13.0	-42.6	
6.930	-27.3	H	3.0	27.1	1.0	-53.4	-13.0	-40.4	
High Ch, (1745 MHz)									
3.490	-9.1	V	3.0	30.4	1.0	-38.4	-13.0	-25.4	
5.235	-26.3	V	3.0	28.7	1.0	-54.0	-13.0	-41.0	
6.980	-25.5	V	3.0	27.0	1.0	-51.6	-13.0	-38.6	
3.490	-11.0	H	3.0	30.4	1.0	-40.3	-13.0	-27.3	
5.235	-27.0	H	3.0	28.7	1.0	-54.7	-13.0	-41.7	
6.980	-24.7	H	3.0	27.0	1.0	-50.7	-13.0	-37.7	

Rev. 03.03.09
Note: No other emissions were detected above the system noise floor.

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

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Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company: LG
Project #: 14U18391
Date: 07/30/14
Test Engineer: O. Stoelting
Configuration: EUT X position, AC Charger, Headphones
Mode: TX, LTE band 4, 15MHz BW, 16QAM

Chamber	Pre-amplifer	Filter	Limit
3m Chamber	T145 8449B	Filter 1	Part 27

Band
LTE4
15MHz
16QAM

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, (1717.5 MHz)									
3.435	-10.9	V	3.0	30.4	1.0	-40.3	-13.0	-27.3	
5.153	-24.0	V	3.0	28.7	1.0	-51.8	-13.0	-38.8	
6.870	-25.9	V	3.0	27.1	1.0	-52.0	-13.0	-39.0	
3.435	-15.5	H	3.0	30.4	1.0	-45.0	-13.0	-32.0	
5.153	-23.8	H	3.0	28.7	1.0	-51.5	-13.0	-38.5	
6.870	-24.1	H	3.0	27.1	1.0	-50.2	-13.0	-37.2	
Mid Ch, (1732.5 MHz)									
3.465	-15.1	V	3.0	30.4	1.0	-44.5	-13.0	-31.5	
5.198	-26.5	V	3.0	28.7	1.0	-54.2	-13.0	-41.2	
6.930	-27.0	V	3.0	27.1	1.0	-53.0	-13.0	-40.0	
3.465	-12.9	H	3.0	30.4	1.0	-42.3	-13.0	-29.3	
5.198	-25.9	H	3.0	28.7	1.0	-53.6	-13.0	-40.6	
6.930	-26.1	H	3.0	27.1	1.0	-52.2	-13.0	-39.2	
High Ch, (1747.5 MHz)									
3.495	-15.1	V	3.0	30.4	1.0	-44.5	-13.0	-31.5	
5.243	-27.3	V	3.0	28.7	1.0	-54.9	-13.0	-41.9	
6.990	-20.7	V	3.0	27.0	1.0	-46.7	-13.0	-33.7	
3.495	-15.6	H	3.0	30.4	1.0	-45.0	-13.0	-32.0	
5.243	-25.0	H	3.0	28.7	1.0	-52.7	-13.0	-39.7	
6.990	-24.3	H	3.0	27.0	1.0	-50.3	-13.0	-37.3	

Rev. 03.03.09
Note: No other emissions were detected above the system noise floor.

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

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Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company: LG
Project #: 14U18391
Date: 07/30/14
Test Engineer: O. Stoelting
Configuration: EUT X position, AC Charger, Headphones
Mode: TX, LTE band 4, 15MHz BW, QPSK

Chamber	Pre-amplifer	Filter	Limit
3m Chamber	T145 8449B	Filter 1	Part 27

Band
LTE4
15MHz
QPSK

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, (1717.5 MHz)									
3.435	-10.9	V	3.0	30.4	1.0	-40.4	-13.0	-27.4	
5.153	-24.1	V	3.0	28.7	1.0	-51.9	-13.0	-38.9	
6.870	-26.4	V	3.0	27.1	1.0	-52.5	-13.0	-39.5	
3.435	-15.1	H	3.0	30.4	1.0	-44.5	-13.0	-31.5	
5.153	-23.6	H	3.0	28.7	1.0	-51.4	-13.0	-38.4	
6.870	-24.6	H	3.0	27.1	1.0	-50.7	-13.0	-37.7	
Mid Ch, (1732.5 MHz)									
3.465	-14.2	V	3.0	30.4	1.0	-43.6	-13.0	-30.6	
5.198	-25.8	V	3.0	28.7	1.0	-53.5	-13.0	-40.5	
6.930	-26.3	V	3.0	27.1	1.0	-52.3	-13.0	-39.3	
3.465	-12.1	H	3.0	30.4	1.0	-41.5	-13.0	-28.5	
5.198	-25.3	H	3.0	28.7	1.0	-53.0	-13.0	-40.0	
6.930	-26.1	H	3.0	27.1	1.0	-52.2	-13.0	-39.2	
High Ch, (1747.5 MHz)									
3.495	-15.0	V	3.0	30.4	1.0	-44.4	-13.0	-31.4	
5.243	-27.2	V	3.0	28.7	1.0	-54.8	-13.0	-41.8	
6.990	-20.7	V	3.0	27.0	1.0	-46.7	-13.0	-33.7	
3.495	-14.9	H	3.0	30.4	1.0	-44.3	-13.0	-31.3	
5.243	-23.8	H	3.0	28.7	1.0	-51.5	-13.0	-38.5	
6.990	-24.1	H	3.0	27.0	1.0	-50.1	-13.0	-37.1	

Rev. 03.03.09
Note: No other emissions were detected above the system noise floor.

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

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