FCC CFR47 PART 27 SUBPART L
FCC CFR47 PART 27 SUBPART H

C2PC CERTIFICATION TEST REPORT

GSM/WCDMA/LTE Phone + Bluetooth, WLAN 2.4GHz b/g/n & NFC

MODEL NUMBER: SM-G530M

FCC ID: A3LSMG530M

REPORT NUMBER: 14I19179-E1

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NVLAP LAB CODE 200065-0

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TABLE OF CONTENTS

1. ATTESTATION OF TEST RESULTS 5
2. TEST METHODOLOGY 6
3. FACILITIES AND ACCREDITATION 6
4. CALIBRATION AND UNCERTAINTY 6
4.1. MEASURING INSTRUMENT CALIBRATION 6
4.2. SAMPLE CALCULATION 6
4.3. MEASUREMENT UNCERTAINTY 7
5. EQUIPMENT UNDER TEST 8
5.1. DESCRIPTION OF EUT 8
5.2. MAXIMUM OUTPUT POWER (LTE) 8
5.3. DESCRIPTION OF AVAILABLE ANTENNAS 10
5.4. DESCRIPTION OF TEST SETUP 11
6. TEST AND MEASUREMENT EQUIPMENT 14
7. Summary Table 15
8.1. LTE OUTPUT VERIFICATION 16
8.1.1. LTE OUTPUT RESULT 16
9. PEAK TO AVERAGE RATIO 20
9.1. CONDUCTED PEAK TO AVERAGE RESULT 20
10. LIMITS AND CONDUCTED RESULTS 25
10.1. OCCUPIED BANDWIDTH 25
10.1.1. LTE OCCUPIED BANDWIDTH RESULTS 26
10.1.2. OCCUPIED BANDWIDTH PLOTS 28
10.2. BAND EDGE EMISSIONS 32
10.2.1. BAND EDGE PLOTS 33
10.3. OUT OF BAND EMISSIONS 49
10.3.1. OUT OF BAND EMISSIONS RESULT 50
10.3.2. OUT OF BAND EMISSIONS PLOTS 53
10.4. FREQUENCY STABILITY 57
10.4.1. FREQUENCY STABILITY RESULTS 58
11. RADIATED TEST RESULTS 60
11.1. RADIATED POWER (ERP & EIRP) 60
11.1.1. LTE ERP/EIRP Results 61

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11.1.2. ERP/EIRP DATA 64
11.2. FIELD STRENGTH OF SPURIOUS RADIATION 80
11.2.1. SPURIOUS RADIATION DATA 81
12. SETUP PHOTOS 97

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME:	SAMSUNG ELECTRONICS CO., LTD.
EUT DESCRIPTION:	GSM/WCDMA/LTE Phone + Bluetooth, WLAN 2.4GHz b/g/n & NFC
MODEL:	SM-G530M
SERIAL NUMBER:	1935734(Radiated) & 1935735(Conducted)
DATE TESTED:	OCT 20-21, 2014

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
FCC PART 27L, H	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.

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2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with TIA-603-C and 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

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)

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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 26000 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 GSM/WCDMA/LTE Phone + Bluetooth, WLAN 2.4GHz b/g/n & NFC.

5.2. MAXIMUM OUTPUT POWER (LTE)

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

FCC Part 22/2 4/27							
Band	Frequency Range(MHz)	BandWidth (MHz)	Modulation	Conducted		Radiated	
			mW	AVG(dBm)	AVG(mW)	AVG(dBm)	AVG(mW)
LTE17	704~716	10MHz	QPSK	22.00	158.49	20.36	108.67
	704~716	10MHz	16QAM	20.60	114.82	19.07	80.74

FCC Part 22/2 4/27							
Band	Frequency Range(MHz)	BandWidth (MHz)	Modulation	Conducted		Radiated	
			mW	AVG(dBm)	AVG(mW)	AVG(dBm)	AVG(mW)
LTE17	704~716	5MHz	QPSK	22.10	162.18	20.69	117.25
	704~716	5MHz	16QAM	20.50	112.20	19.80	95.52

FCC Part 22/2 4/27							
Band	Frequency Range(MHz)	BandWidth (MHz)	Modulation	Conducted		Radiated	
			mW	AVG(dBm)	AVG(mW)	AVG(dBm)	AVG(mW)
LTE4	1710~1755	20MHz	QPSK	22.70	186.21	22.71	186.64
	1710~1755	20MHz	16QAM	21.80	151.36	21.28	134.28

FCC Part 22/2 4/27							
Band	Frequency Range(MHz)	BandWidth (MHz)	Modulation	Conducted		Radiated	
			mW	AVG(dBm)	AVG(mW)	AVG(dBm)	AVG(mW)
LTE4	1710~1755	15MHz	QPSK	22.60	181.97	22.74	187.93
	1710~1755	15MHz	16QAM	21.60	144.54	21.63	145.55

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FCC Part 22/2 4/27							
Band	Frequency Range(MHz)	BandWidth (MHz)	Modulation	Conducted		Radiated	
			mW	AVG(dBm)	AVG(mW)	AVG(dBm)	AVG(mW)
LTE4	1710~1755	10MHz	QPSK	22.60	181.97	22.97	198.15
	1710~1755	10MHz	16QAM	21.80	151.36	22.06	160.69

FCC Part 22/2 4/27							
Band	Frequency Range(MHz)	BandWidth (MHz)	Modulation	Conducted		Radiated	
			mW	AVG(dBm)	AVG(mW)	AVG(dBm)	AVG(mW)
LTE4	1710~1755	5MHz	QPSK	22.70	186.21	22.92	195.88
	1710~1755	5MHz	16QAM	21.70	147.91	21.63	145.55

FCC Part 22/2 4/27							
Band	Frequency Range(MHz)	BandWidth (MHz)	Modulation	Conducted		Radiated	
			mW	AVG(dBm)	AVG(mW)	AVG(dBm)	AVG(mW)
LTE4	1710~1755	3MHz	QPSK	22.60	181.97	22.57	180.72
	1710~1755	3MHz	16QAM	21.80	151.36	21.48	140.6

FCC Part 22/2 4/27							
Band	Frequency Range(MHz)	BandWidth (MHz)	Modulation	Conducted		Radiated	
			mW	AVG(dBm)	AVG(mW)	AVG(dBm)	AVG(mW)
LTE4	1710~1755	1.4MHz	QPSK	22.60	181.97	22.83	191.87
	1710~1755	1.4MHz	16QAM	21.70	147.91	21.4	138.04

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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	-1.83
LTE17, 704~716MHz	-2.68

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5.4. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
AC Adapter	Samsung	SM-G530M	ETA0U83EWE	N/A
Headset	Samsung	SM-G530M	EHS61ASWE	N/A

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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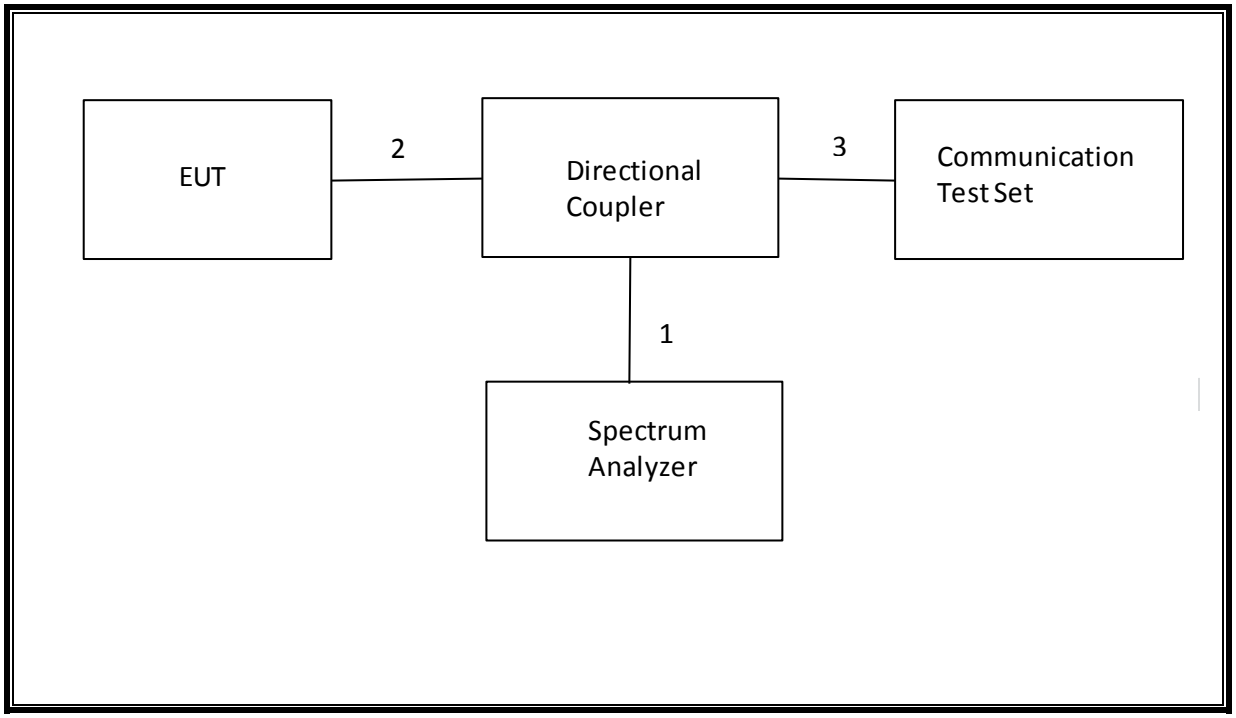
SETUP DIAGRAM FOR TESTS (CONDUCTED TEST SETUP)



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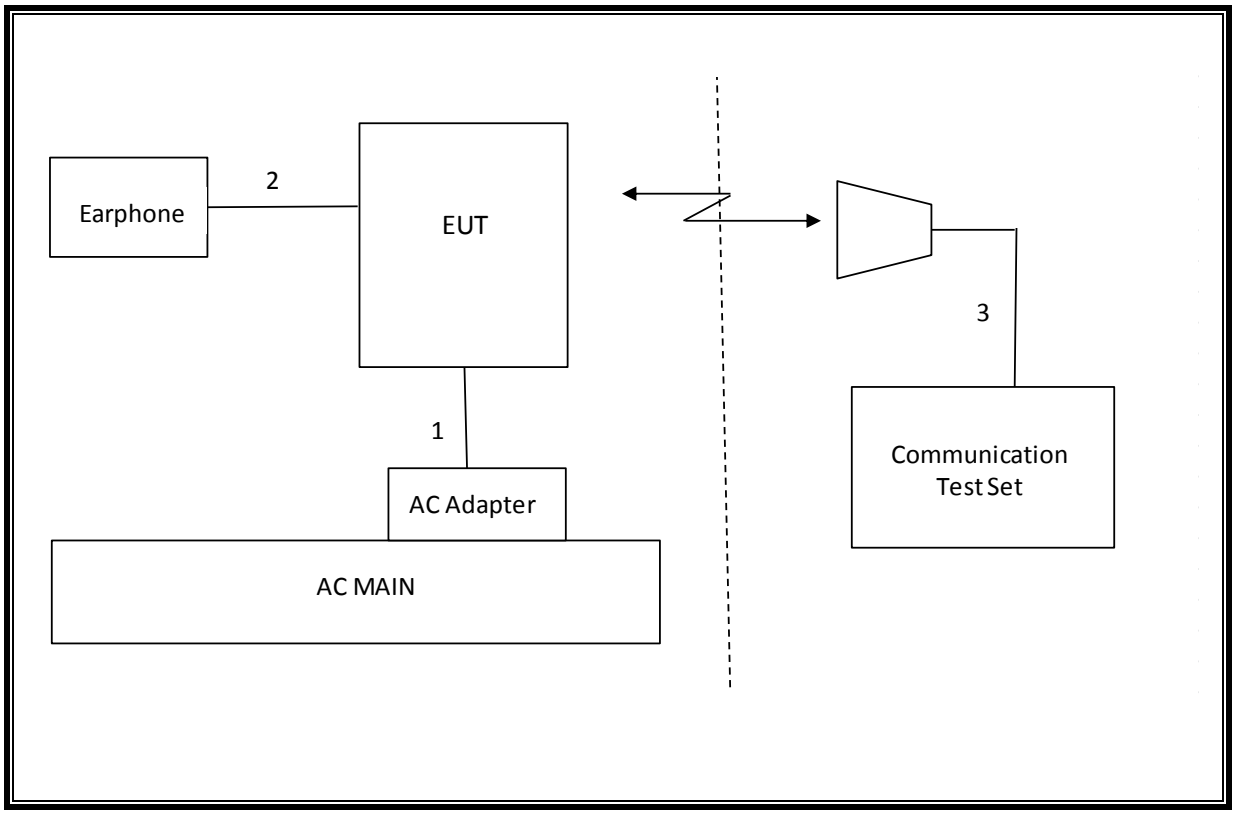
SETUP DIAGRAM FOR TESTS (RADIATED TEST SETUP)



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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	08/14/15
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, 26.5 GHz	ARA	MWH-1826/B	C00589	12/17/14

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7. Summary Table

FCC Part Section	RSS Section(s)	Test Description	Test Limit	Test Condition	Test Result	Note
2.1049	N/A	Occupied Band width (99%)	N/A	Conducted	Pass	17.8374MHz
22.917(a) 24.238(a) 27.53(g) 90.691	RSS-132(4.5.1) RSS-133(6.5.1) RSS-139(6.5.1)	Band Edge / Conducted Spurious Emission	-13dBm		Pass	-19.2dBm
2.1046	N/A	Conducted output power	N/A		Pass	22.70dBm
22.355 24.235 27.54 90.213	RSS-132(4.3) RSS-133(6.3) RSS-139(6.3) RSS-199(4.3)	Frequency Stability	2.5PPM		Pass	0.004PPM
27.50(b)(10)	N/A	Effective Radiated Power	34.77 dBm		Pass	20.69dBm
27.50(d)(4)	RSS-139(6.4)	Equivalent Isotropic Radiated Power	30dBm		Pass	22.97dBm
22.917(a) 24.238(a) 27.53(g)	RSS-132(4.5.1) RSS-133(6.5.1) RSS-139(6.5.1)	Radiated Spurious Emission	-13dBm		Pass	-38.6dBm

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8.1. LTE OUTPUT VERIFICATION

8.1.1. LTE OUTPUT RESULT

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Avg Pwr (dBm)
						23790
						710 MHz
LTE Band 17	10	QPSK	1	0	0	22.00
			1	25	0	22.00
			1	49	0	22.00
			25	0	1	20.90
			25	12	1	21.00
			25	25	1	21.10
			50	0	1	21.00
		16QAM	1	0	1	20.50
			1	25	1	20.60
			1	49	1	20.50
			25	0	2	20.00
			25	12	2	20.00
			25	25	2	20.10
			50	0	2	20.00

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Avg Pwr (dBm)
						23790
						710 MHz
LTE Band 17	5	QPSK	1	0	0	22.10
			1	12	0	22.00
			1	24	0	22.00
			12	0	1	21.00
			12	7	1	21.00
			12	13	1	21.00
			25	0	1	21.00
		16QAM	1	0	1	20.50
			1	12	1	20.50
			1	24	1	20.50
			12	0	2	20.00
			12	7	2	20.00
			12	13	2	20.00
			25	0	2	20.10

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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	22.40	22.50	22.60
			1	49	0	22.30	22.60	22.70
			1	99	0	22.50	22.70	22.50
			50	0	1	21.20	21.30	21.50
			50	24	1	21.20	21.40	21.50
			50	50	1	21.20	21.40	21.40
			100	0	1	21.30	21.40	21.50
		16QAM	1	0	1	21.50	21.50	21.80
			1	49	1	21.50	21.70	21.80
			1	99	1	21.50	21.70	21.80
			50	0	2	20.30	20.30	20.50
			50	24	2	20.30	20.40	20.40
			50	50	2	20.20	20.50	20.40
			100	0	2	20.30	20.30	20.40
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	22.40	22.50	22.60
			1	37	0	22.30	22.60	22.60
			1	74	0	22.40	22.70	22.40
			36	0	1	21.20	21.30	21.50
			36	20	1	21.20	21.40	21.50
			36	39	1	21.30	21.50	21.50
			75	0	1	21.10	21.50	21.40
		16QAM	1	0	1	21.60	21.50	21.30
			1	37	1	21.50	21.50	21.30
			1	74	1	21.60	21.60	21.10
			36	0	2	20.30	20.30	20.60
			36	20	2	20.30	20.40	20.40
			36	39	2	20.30	20.40	20.50
			75	0	2	20.20	20.30	20.40
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Avg Pwr (dBm)		
						20000	20175	20350
						1715 MHz	1732.5 MHz	1750 MHz
LTE Band 4	10	QPSK	1	0	0	22.30	22.50	22.60
			1	25	0	22.30	22.60	22.50
			1	49	0	22.40	22.60	22.50

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			25	0	1	21.30	21.50	21.50
			25	12	1	21.30	21.50	21.60
			25	25	1	21.40	21.50	21.50
			50	0	1	21.20	21.40	21.50
		16QAM	1	0	1	21.00	21.60	21.20
			1	25	1	20.90	21.70	21.20
			1	49	1	21.00	21.80	21.00
			25	0	2	20.30	20.50	20.60
			25	12	2	20.40	20.50	20.70
			25	25	2	20.40	20.60	20.60
			50	0	2	20.40	20.30	20.60
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Avg Pwr (dBm)		
						19975	20175	20375
						1712.5 MHz	1732.5 MHz	1752.5 MHz
LTE Band 4	5	QPSK	1	0	0	22.30	22.60	22.60
			1	12	0	22.30	22.60	22.50
			1	24	0	22.30	22.70	22.50
			12	0	1	21.50	21.50	21.60
			12	7	1	21.40	21.50	21.60
			12	13	1	21.40	21.60	21.60
			25	0	1	21.30	21.50	21.60
		16QAM	1	0	1	20.90	21.70	21.20
			1	12	1	20.80	21.70	21.10
			1	24	1	20.80	21.70	21.10
			12	0	2	20.40	20.60	20.70
			12	7	2	20.40	20.60	20.60
			12	13	2	20.40	20.70	20.60
			25	0	2	20.30	20.50	20.60
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Avg Pwr (dBm)		
						19965	20175	20385
						1711.5 MHz	1732.5 MHz	1753.5 MHz
LTE Band 4	3	QPSK	1	0	0	22.30	22.60	22.60
			1	8	0	22.30	22.70	22.50
			1	14	0	22.30	22.70	22.50
			8	0	1	21.40	21.60	21.60
			8	4	1	21.30	21.60	21.50
			8	7	1	21.40	21.60	21.50
			15	0	1	21.30	21.60	21.60
		16QAM	1	0	1	21.00	21.70	21.20
			1	8	1	20.90	21.80	21.10

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			1	14	1	20.90	21.80	21.00
			8	0	2	20.50	20.60	20.60
			8	4	2	20.40	20.50	20.50
			8	7	2	20.40	20.50	20.60
			15	0	2	20.40	20.60	20.50
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Avg Pwr (dBm)		
						19957	20175	20393
						1710.7 MHz	1732.5 MHz	1754.3 MHz
LTE Band 4	1.4	QPSK	1	0	0	22.50	22.60	22.60
			1	3	0	22.30	22.50	22.60
			1	5	0	22.40	22.60	22.50
			3	0	0	22.30	22.60	22.60
			3	1	0	22.40	22.60	22.50
			3	3	0	22.40	22.60	22.60
			6	0	1	21.50	21.55	21.60
		16QAM	1	0	1	21.20	21.10	21.50
			1	3	1	21.20	21.10	21.40
			1	5	1	21.30	21.10	21.40
			3	0	1	21.30	21.70	21.50
			3	1	1	21.30	21.70	21.50
			3	3	1	21.50	21.70	21.50
			6	0	2	20.50	20.70	20.60

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9. PEAK TO AVERAGE RATIO

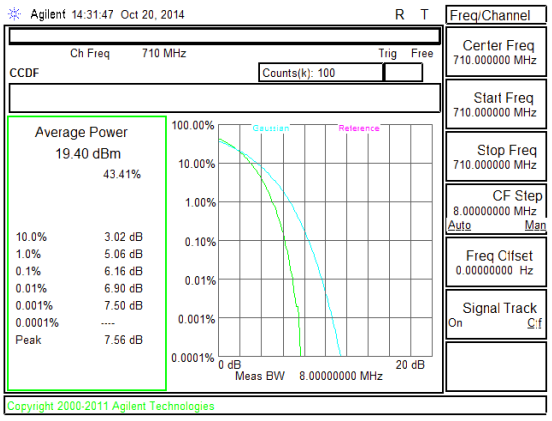
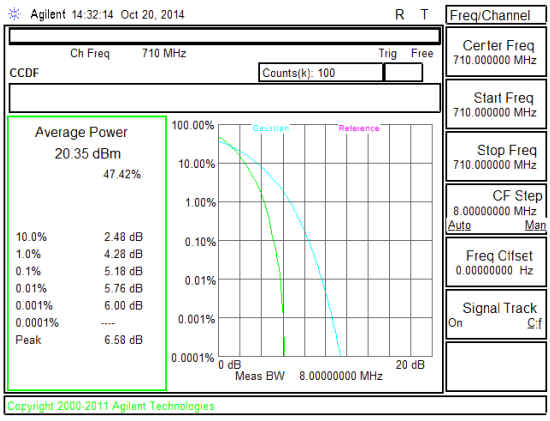
Test Procedure

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.

9.1. CONDUCTED PEAK TO AVERAGE RESULT

Band LTE17 10MHz 16QAM	 Band LTE17 10MHz 16QAM Mid channel	 Band LTE17 10MHz QPSK Mid channel

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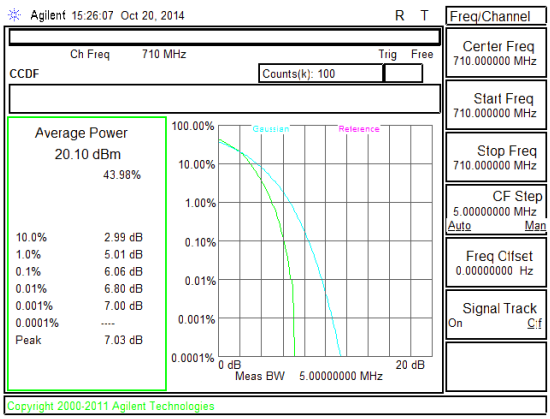
Band

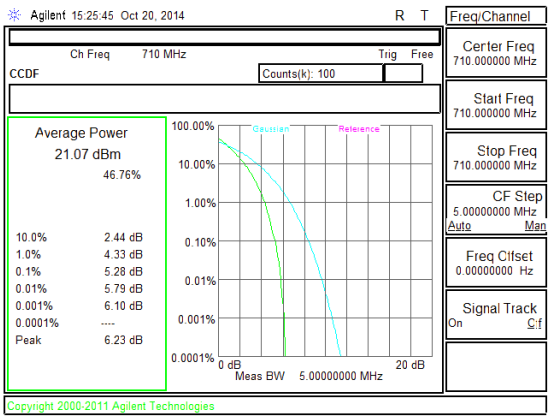
LTE17

5MHz

16QAM



Band LTE17 5MHz 16QAM Mid channel



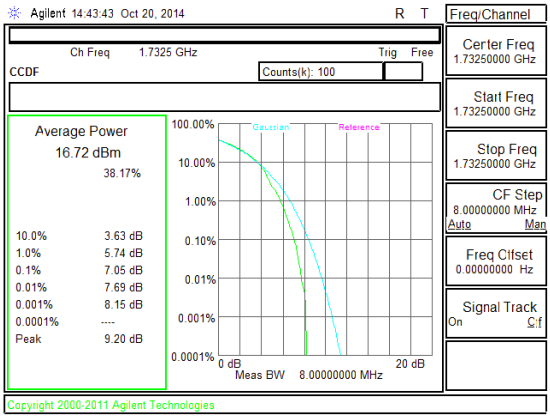
Band LTE17 5MHz QPSK Mid channel

Band

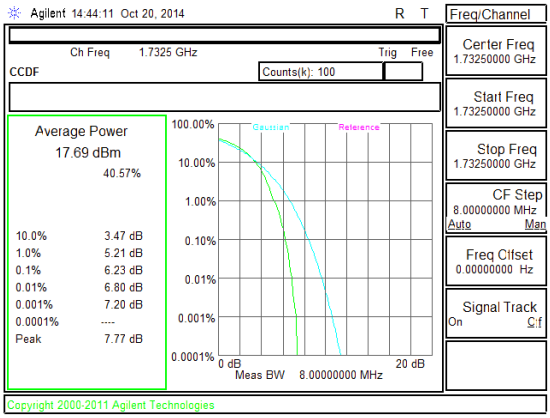
LTE4

20MHz

16QAM



Band LTE4 20MHz 16QAM Mid channel



Band LTE4 20MHz QPSK Mid channel

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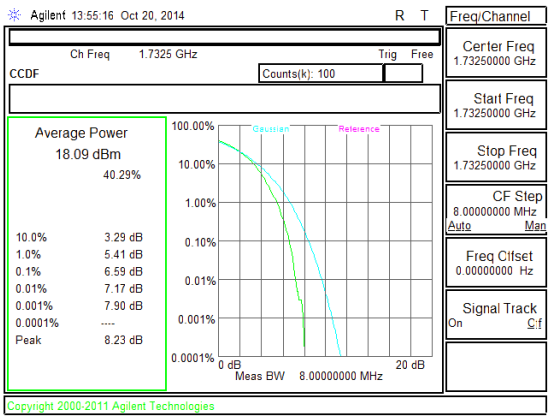
Band

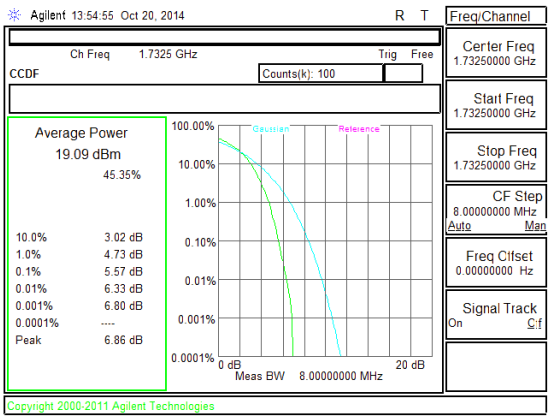
LTE4

15MHz

16QAM



Band LTE4 15MHz 16QAM Mid channel



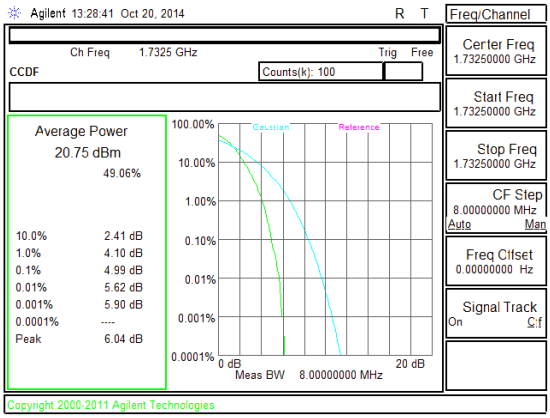
Band LTE4 15MHz QPSK Mid channel

Band

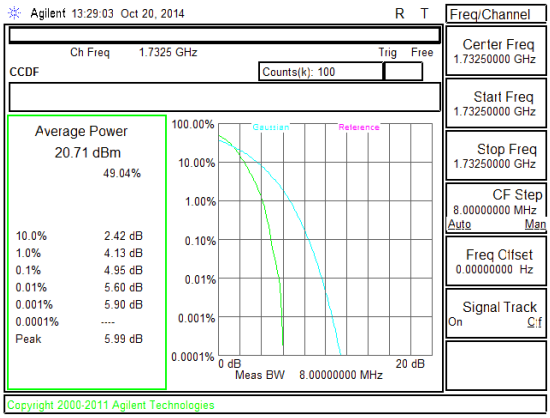
LTE4

10MHz

16QAM



Band LTE4 10MHz 16QAM Mid channel



Band LTE4 10MHz QPSK Mid channel

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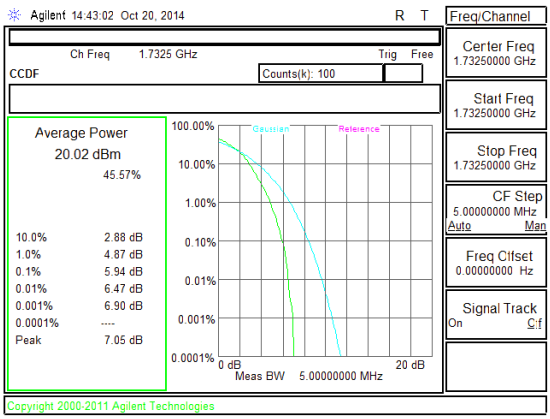
Band

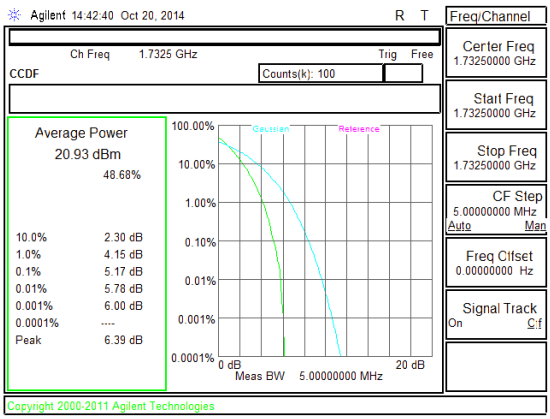
LTE4

5MHz

16QAM



Band LTE4 5MHz 16QAM Mid channel



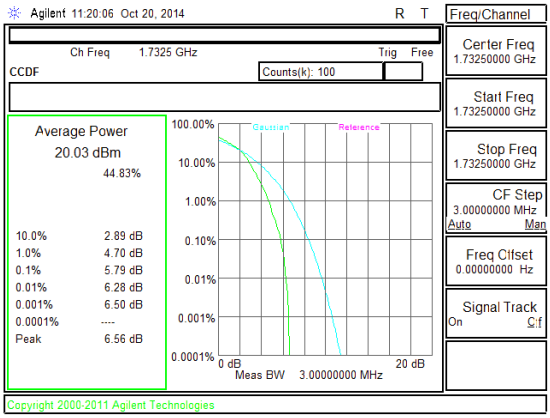
Band LTE4 5MHz QPSK Mid channel

Band

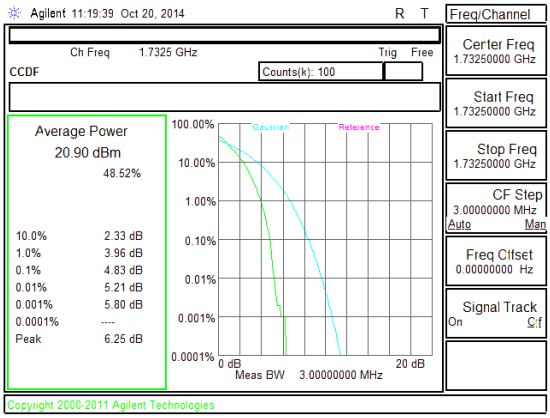
LTE4

3MHz

16QAM



Band LTE4 3MHz 16QAM Mid channel



Band LTE4 3MHz QPSK Mid channel

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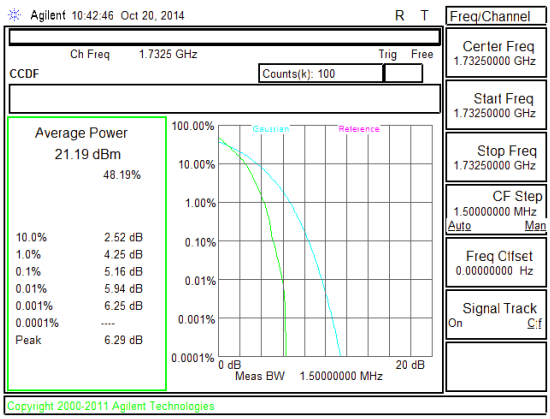
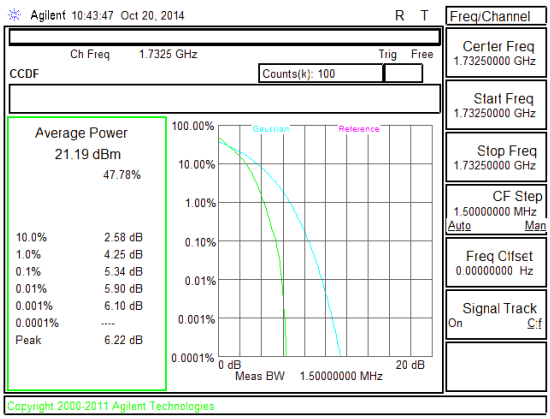
Band LTE4 1.4MHz 16QAM	 Band LTE4 1.4MHz 16QAM Mid channel	 Band LTE4 1.4MHz QPSK Mid channel

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10. LIMITS AND CONDUCTED RESULTS

10.1. OCCUPIED BANDWIDTH

RULE PART(S)

FCC: §2.1049

IC: RSS-132, 4.5; RSS-133, 6.5

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)

MODES TESTED

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10.1.1. LTE OCCUPIED BANDWIDTH RESULTS

Band	BW(MHz)	Mode	RB/RB Size	f (MHz)	99% BW (MHz)	-26dB BW (MHz)
LTE17	10	QPSK	50/0	709	8.9684	9.769
			50/0	710	8.9762	9.833
			50/0	711	8.95	9.695
		16QAM	50/0	709	8.9747	9.802
			50/0	710	8.9841	9.779
			50/0	711	8.9805	9.665

Band	BW(MHz)	Mode	RB/RB Size	f (MHz)	99% BW (MHz)	-26dB BW (MHz)
LTE17	5	QPSK	25/0	706.5	4.4749	4.923
			25/0	710	4.4752	4.88
			25/0	713.5	4.4641	4.902
		16QAM	25/0	706.5	4.4775	4.956
			25/0	710	4.4786	4.921
			25/0	713.5	4.4583	4.889

Band	BW(MHz)	Mode	RB/RB Size	f (MHz)	99% BW (MHz)	-26dB BW (MHz)
LTE4	20	QPSK	100/0	1720	17.8065	18.975
			100/0	1732.5	17.8158	19.19
			100/0	1745	17.7664	19.072
		16QAM	100/0	1720	17.807	18.727
			100/0	1732.5	17.8374	19.001
			100/0	1745	17.8135	18.994

Band	BW(MHz)	Mode	RB/RB Size	f (MHz)	99% BW (MHz)	-26dB BW (MHz)
LTE4	15	QPSK	75/0	1717.5	12.2924	14.483
			75/0	1732.5	13.4165	14.402
			75/0	1747.5	13.3577	14.325
		16QAM	75/0	1717.5	13.3743	14.431
			75/0	1732.5	13.4058	14.312
			75/0	1747.5	13.3763	14.249

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Band	BW(MHz)	Mode	RB/RB Size	f (MHz)	99% BW (MHz)	-26dB BW (MHz)
LTE4	10	QPSK	50/0	1715	8.9354	9.802
			50/0	1732.5	8.9462	9.726
			50/0	1750	8.924	9.591
		16QAM	50/0	1715	8.9429	9.699
			50/0	1732.5	8.9204	9.648
			50/0	1750	8.9257	9.635

Band	BW(MHz)	Mode	RB/RB Size	f (MHz)	99% BW (MHz)	-26dB BW (MHz)
LTE4	5	QPSK	25/0	1712.5	4.4671	4.93
			25/0	1732.5	4.4682	4.901
			25/0	1752.5	4.4676	4.898
		16QAM	25/0	1712.5	4.48	4.915
			25/0	1732.5	4.4724	4.914
			25/0	1752.5	4.4702	4.854

Band	BW(MHz)	Mode	RB/RB Size	f (MHz)	99% BW (MHz)	-26dB BW (MHz)
LTE4	3	QPSK	15/0	1711.5	2.6813	2.945
			15/0	1732.5	2.6838	2.946
			15/0	1753.5	2.6796	2.931
		16QAM	15/0	1711.5	2.686	2.953
			15/0	1732.5	2.6811	2.939
			15/0	1753.5	2.6832	2.939

Band	BW(MHz)	Mode	RB/RB Size	f (MHz)	99% BW (MHz)	-26dB BW (MHz)
LTE4	1.4	QPSK	6/0	1710.7	1.0902	1.299
			6/0	1732.5	1.0856	1.266
			6/0	1754.3	1.0847	1.274
		16QAM	6/0	1710.7	1.0882	1.273
			6/0	1732.5	1.0902	1.288
			6/0	1754.3	1.0853	1.279

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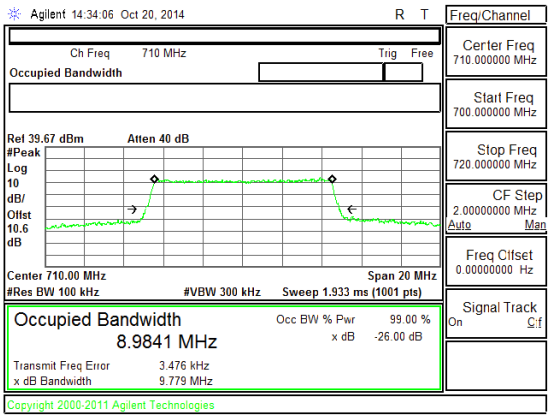
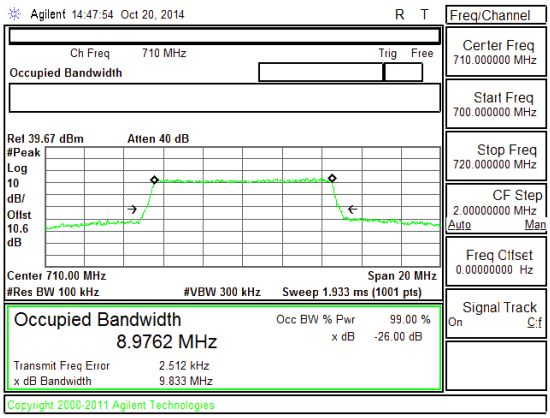
10.1.2. OCCUPIED BANDWIDTH PLOTS

Band LTE17 10MHz 16QAM

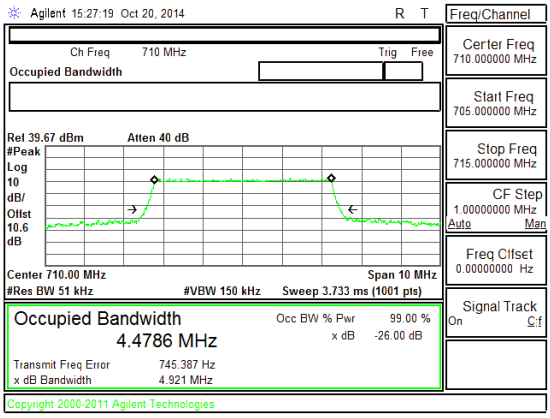


Band LTE17 10MHz OBW 16QAM Mid Channel FRB.gif

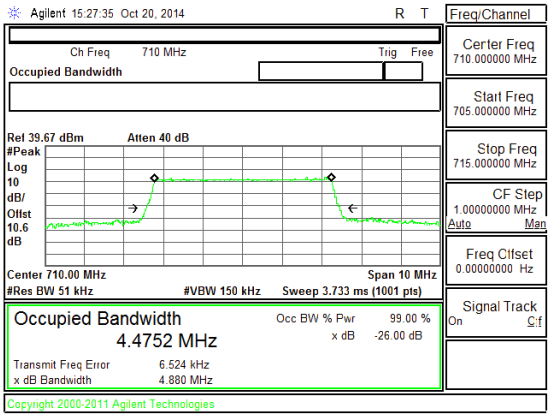


Band LTE17 10MHz OBW QPSK Mid Channel FRB.gif

Band LTE17 5MHz 16QAM



Band LTE17 5MHz OBW 16QAM Mid Channel FRB.gif



Band LTE17 5MHz OBW QPSK Mid Channel FRB.gif

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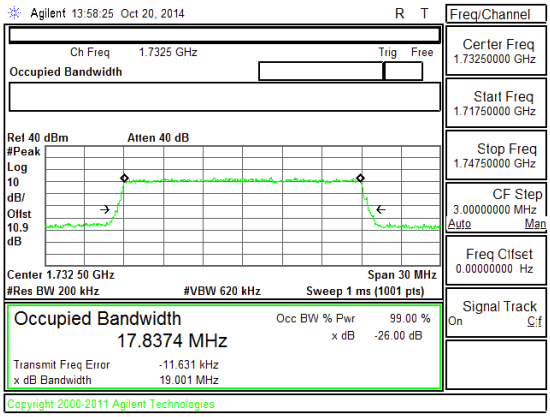
Band

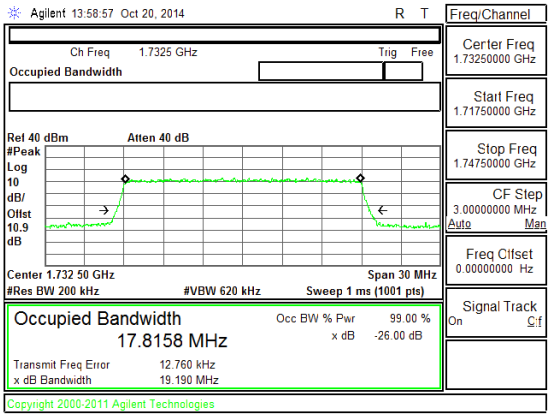
LTE4

20MHz

16QAM



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



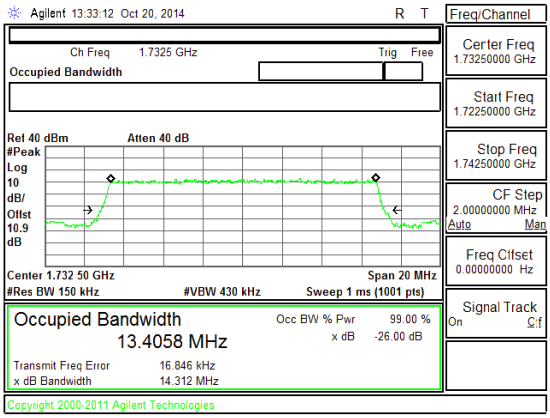
Band LTE4 20MHz OBW QPSK Mid Channel FRB.gif

Band

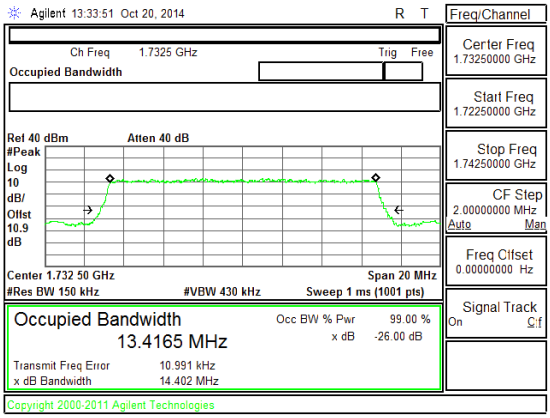
LTE4

15MHz

16QAM



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



Band LTE4 15MHz OBW QPSK Mid Channel FRB.gif

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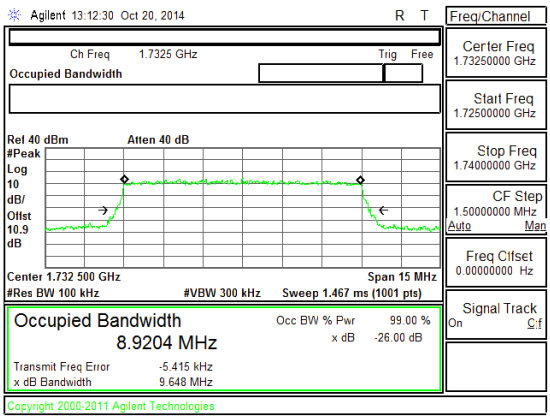
Band

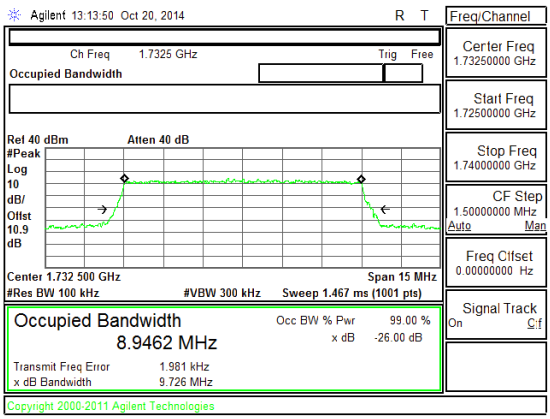
LTE4

10MHz

16QAM



Band LTE4 10MHz OBW 16QAM Mid Channel FRB.gif



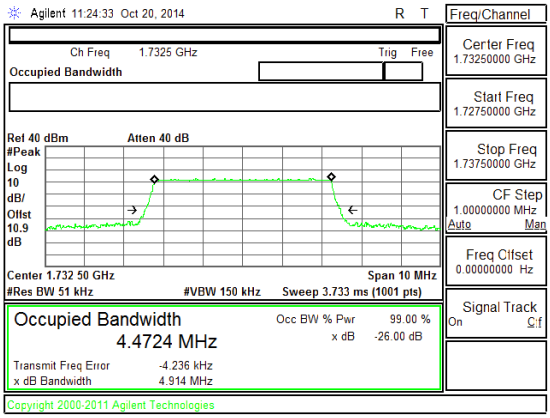
Band LTE4 10MHz OBW QPSK Mid Channel FRB.gif

Band

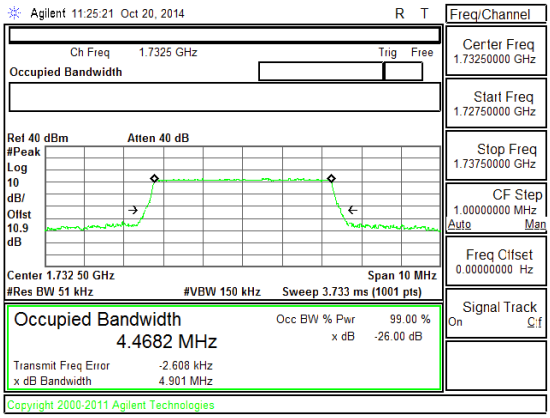
LTE4

5MHz

16QAM



Band LTE4 5MHz OBW 16QAM Mid Channel FRB.gif



Band LTE4 5MHz OBW QPSK Mid Channel FRB.gif

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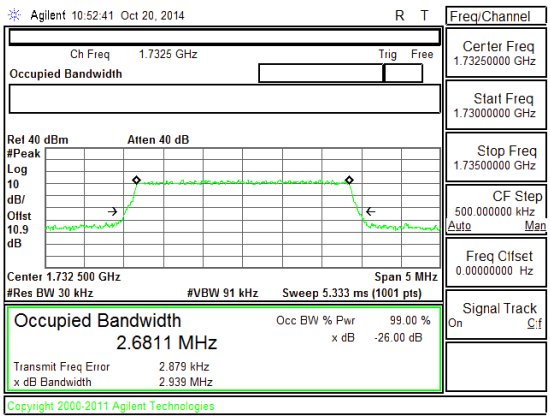
Band

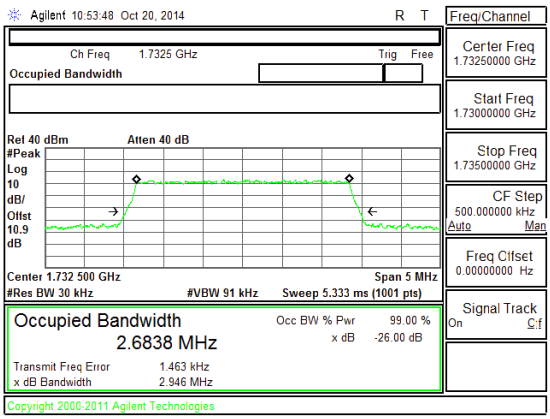
LTE4

3MHz

16QAM



Band LTE4 3MHz OBW 16QAM Mid Channel FRB.gif



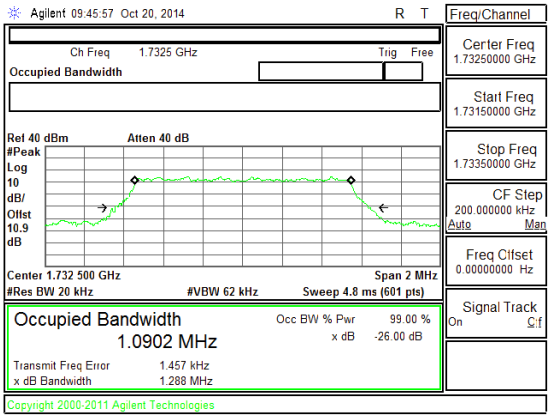
Band LTE4 3MHz OBW QPSK Mid Channel FRB.gif

Band

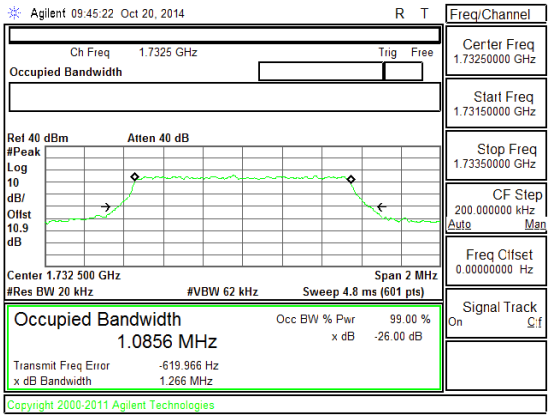
LTE4

1.4MHz

16QAM



Band LTE4 1.4MHz OBW 16QAM Mid Channel FRB.gif



Band LTE4 1.4MHz OBW QPSK Mid Channel FRB.gif

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10.2. BAND EDGE EMISSIONS

RULE PART(S)

FCC: §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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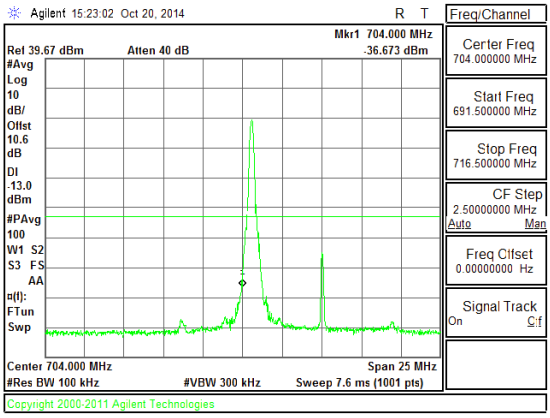
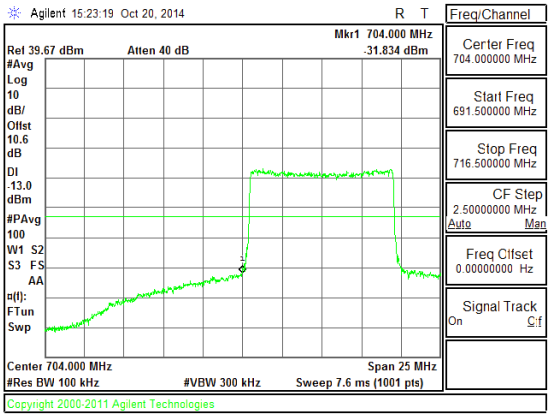
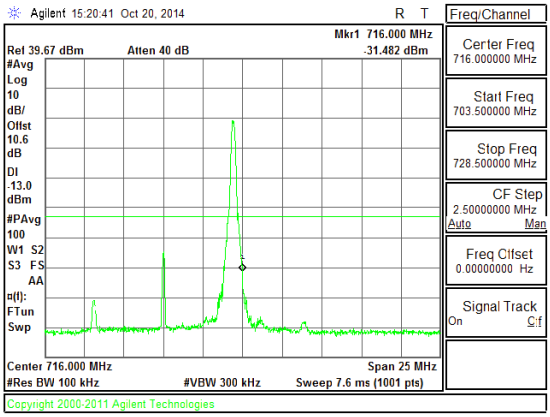
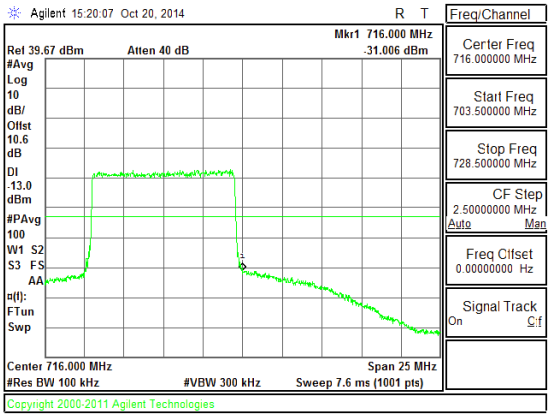
10.2.1. BAND EDGE PLOTS

Band LTE17 10MHz 16QAM	 Band LTE17 10MHz CBE 16QAM Low Channel 1RB.gif	 Band LTE17 10MHz CBE 16QAM Low Channel FRB.gif
Band LTE17 10MHz 16QAM	 Band LTE17 10MHz CBE 16QAM High Channel 1RB.gif	 Band LTE17 10MHz CBE 16QAM High Channel FRB.gif

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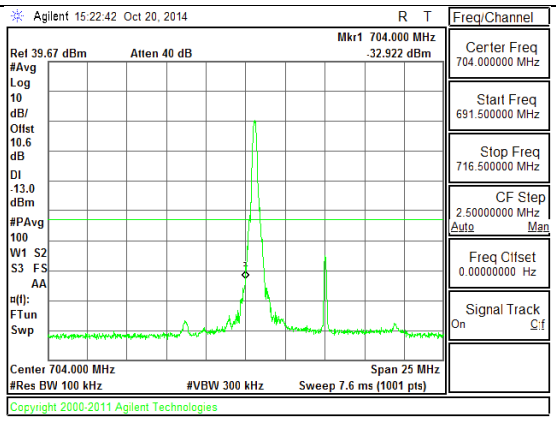
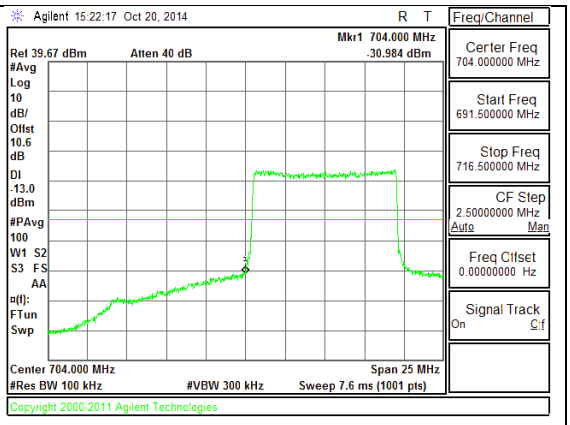
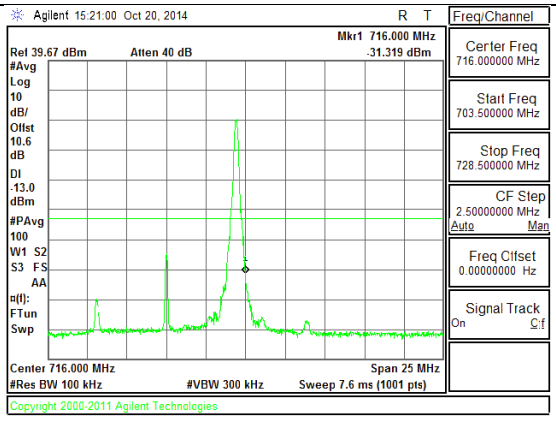
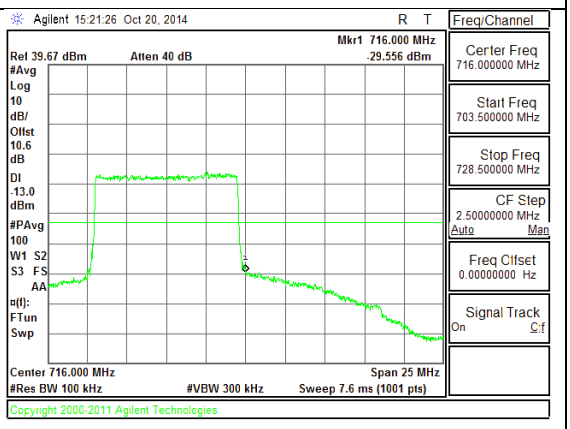
Band LTE17 10MHz QPSK	 Band LTE17 10MHz CBE QPSK Low Channel 1RB.gif	 Band LTE17 10MHz CBE QPSK Low Channel FRB.gif
Band LTE17 10MHz QPSK	 Band LTE17 10MHz CBE QPSK High Channel 1RB.gif	 Band LTE17 10MHz CBE QPSK High Channel FRB.gif

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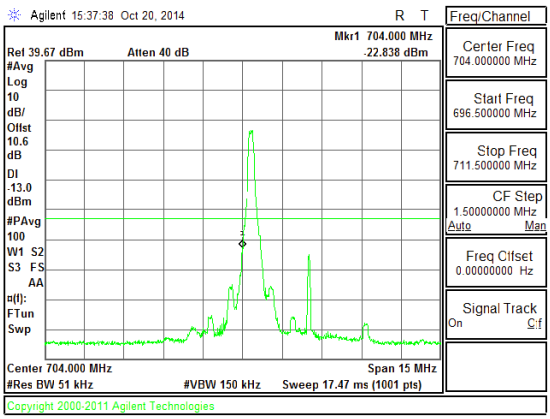
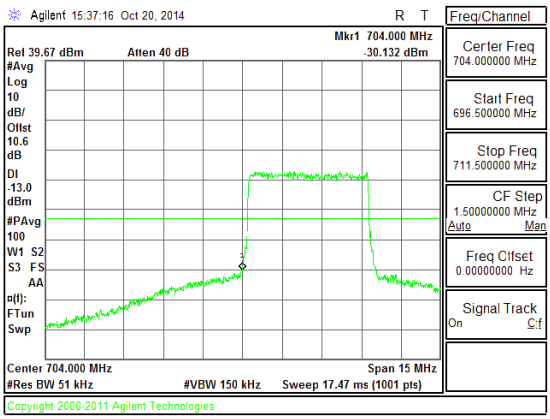
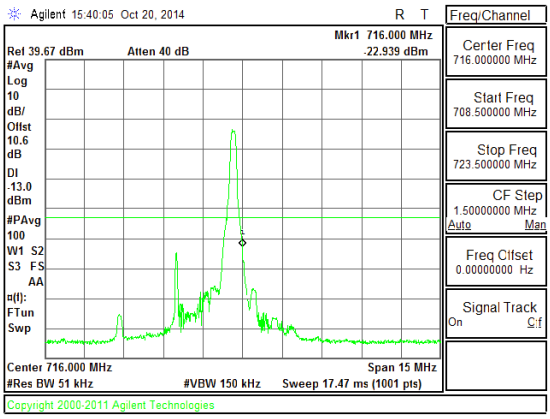
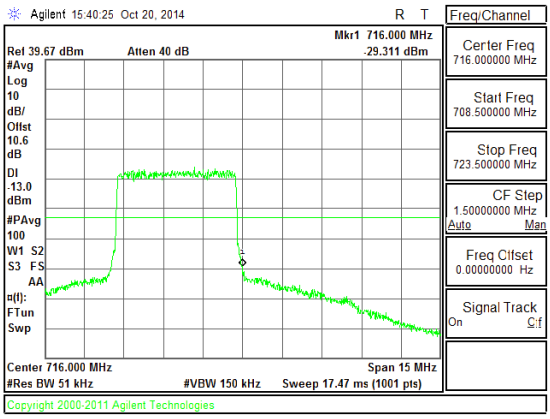
Band LTE17 5MHz 16QAM	 Band LTE17 5MHz CBE 16QAM Low Channel 1RB.gif	 Band LTE17 5MHz CBE 16QAM Low Channel FRB.gif
Band LTE17 5MHz 16QAM	 Band LTE17 5MHz CBE 16QAM High Channel 1RB.gif	 Band LTE17 5MHz CBE 16QAM High Channel FRB.gif

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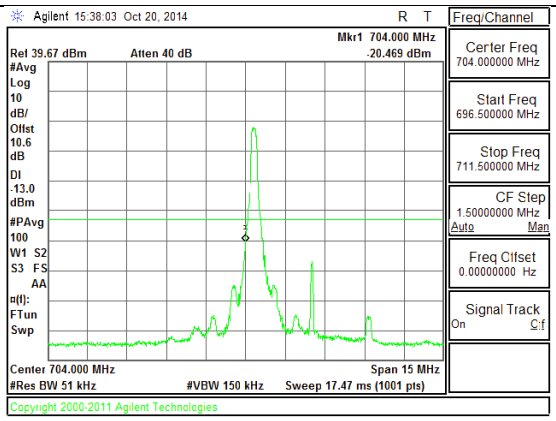
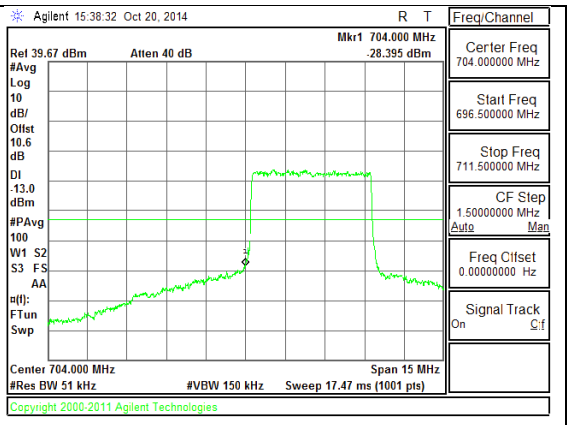
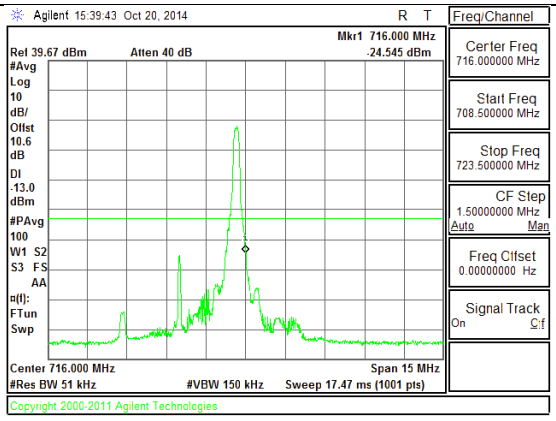
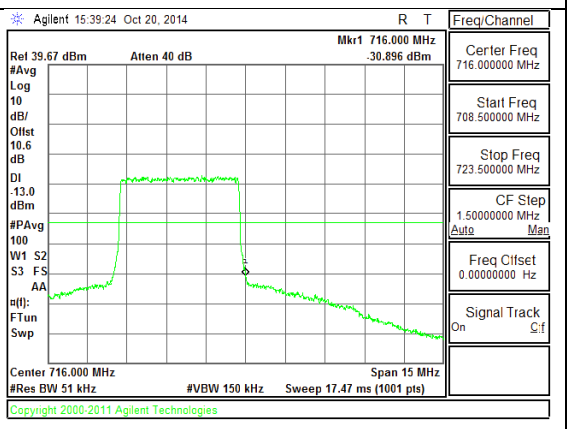
Band LTE17 5MHz QPSK	 Band LTE17 5MHz CBE QPSK Low Channel 1RB.gif	 Band LTE17 5MHz CBE QPSK Low Channel FRB.gif
Band LTE17 5MHz QPSK	 Band LTE17 5MHz CBE QPSK High Channel 1RB.gif	 Band LTE17 5MHz CBE QPSK High Channel FRB.gif

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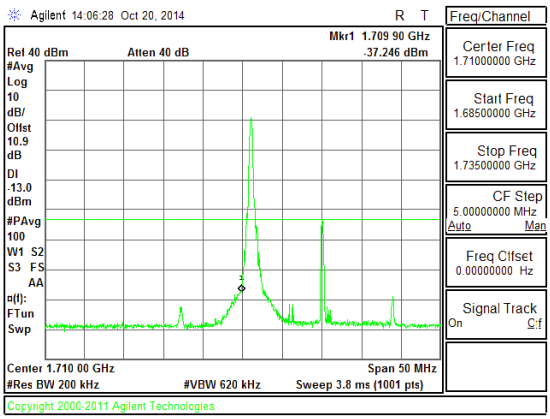
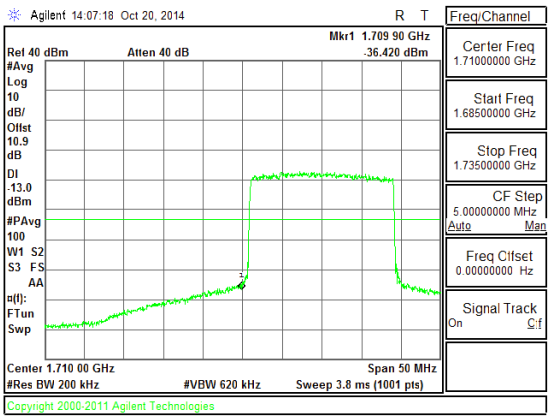
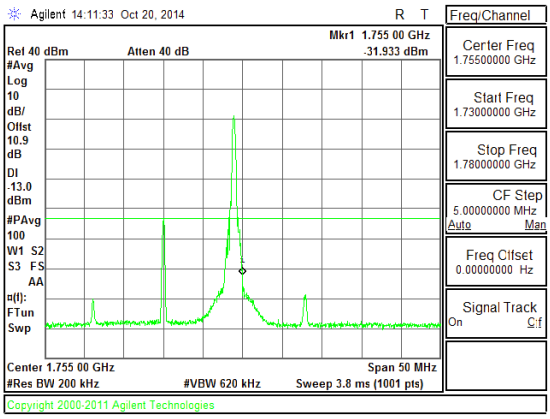
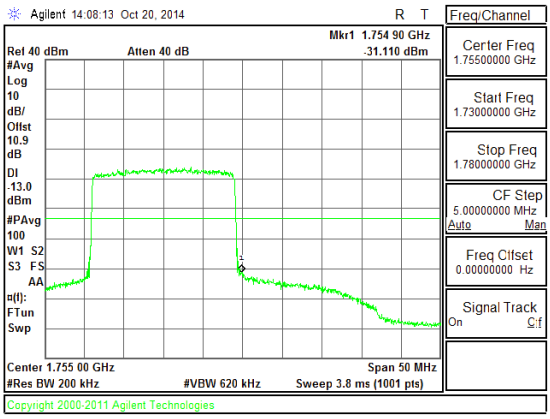
Band LTE4 20MHz 16QAM	 Band LTE4 20MHz CBE 16QAM Low Channel 1RB.gif	 Band LTE4 20MHz CBE 16QAM Low Channel FRB.gif
Band LTE4 20MHz 16QAM	 Band LTE4 20MHz CBE 16QAM High Channel 1RB.gif	 Band LTE4 20MHz CBE 16QAM High Channel FRB.gif

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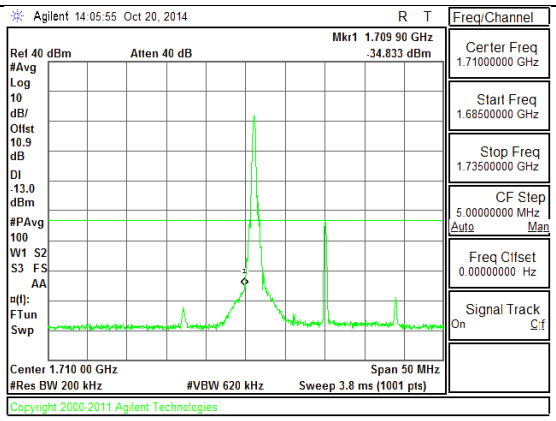
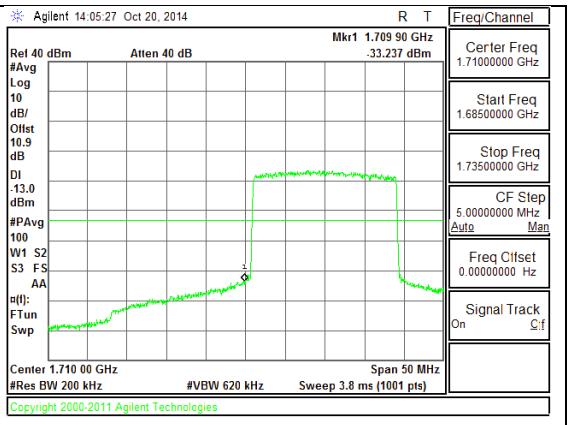
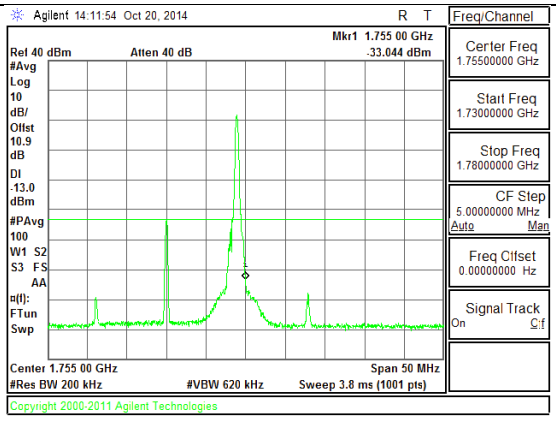
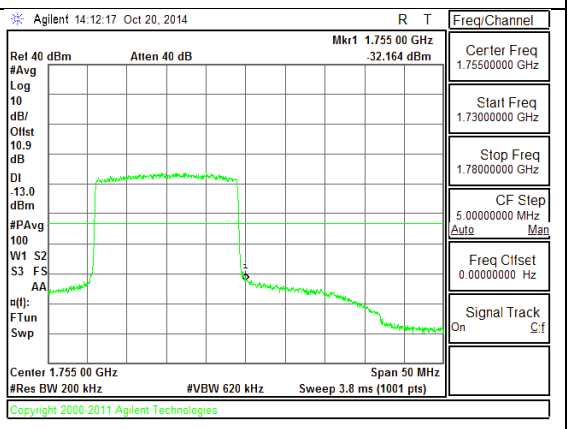
Band LTE4 20MHz QPSK	 Band LTE4 20MHz CBE QPSK Low Channel 1RB.gif	 Band LTE4 20MHz CBE QPSK Low Channel FRB.gif
Band LTE4 20MHz QPSK	 Band LTE4 20MHz CBE QPSK High Channel 1RB.gif	 Band LTE4 20MHz CBE QPSK High Channel FRB.gif

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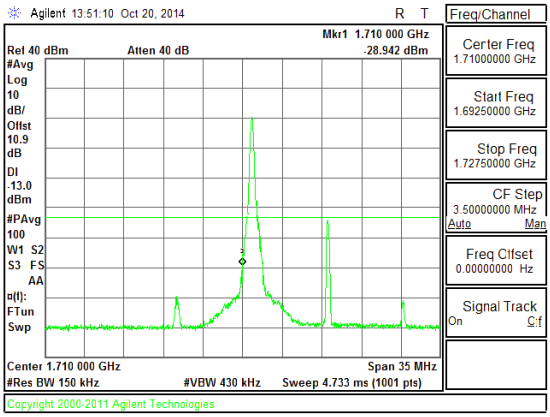
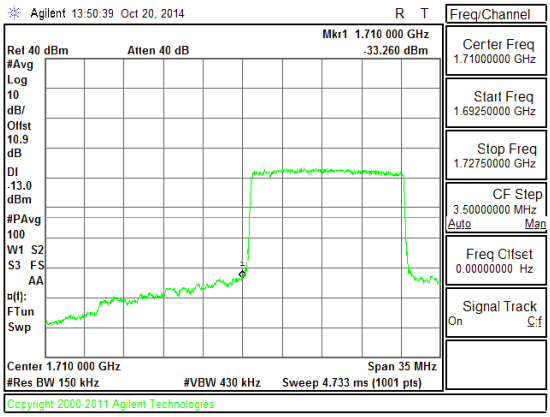
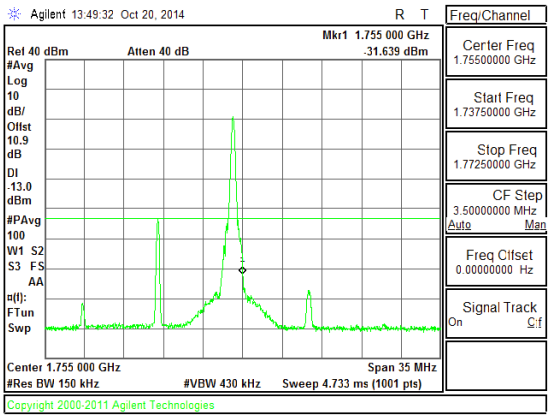
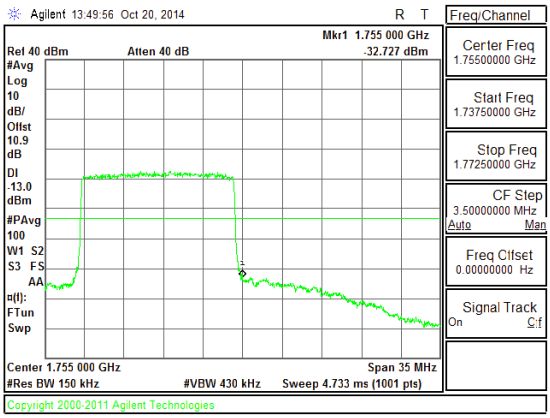
Band LTE4 15MHz 16QAM	 Band LTE4 15MHz CBE 16QAM Low Channel 1RB.gif	 Band LTE4 15MHz CBE 16QAM Low Channel FRB.gif
Band LTE4 15MHz 16QAM	 Band LTE4 15MHz CBE 16QAM High Channel 1RB.gif	 Band LTE4 15MHz CBE 16QAM High Channel FRB.gif

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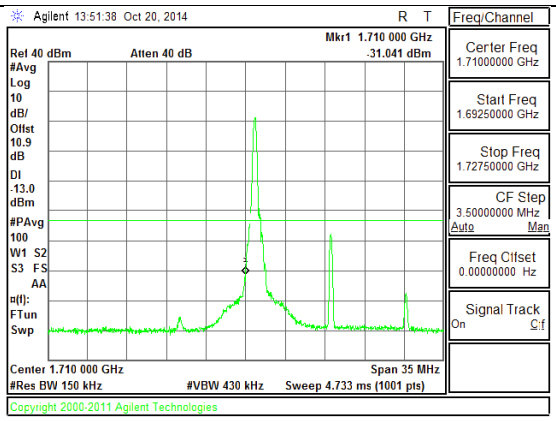
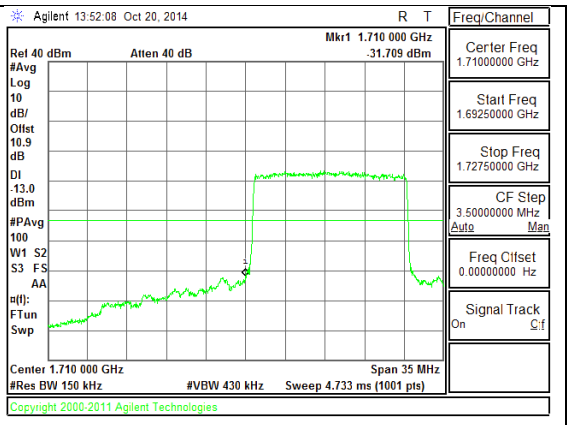
Band LTE4 15MHz QPSK

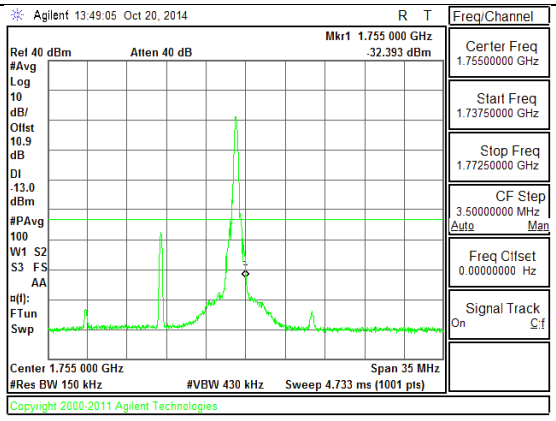


Band LTE4 15MHz CBE QPSK Low Channel 1RB.gif

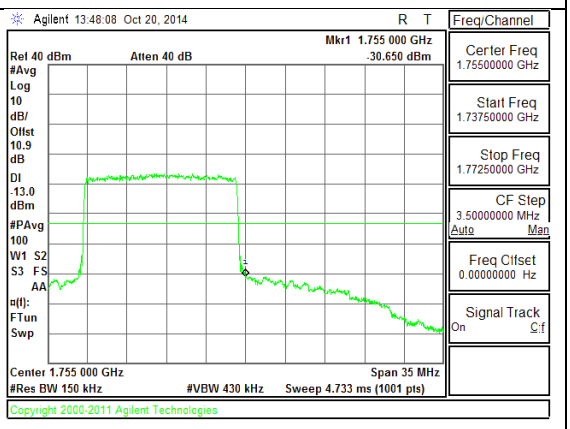


Band LTE4 15MHz CBE QPSK Low Channel FRB.gif

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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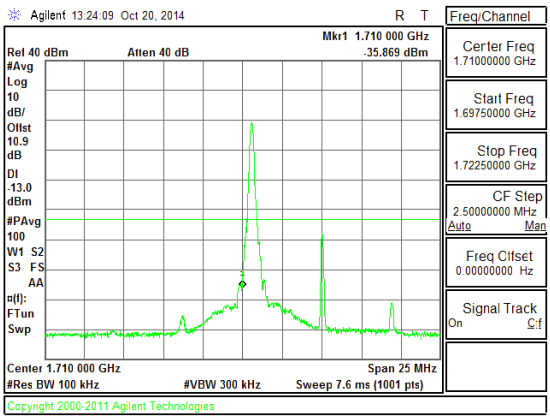
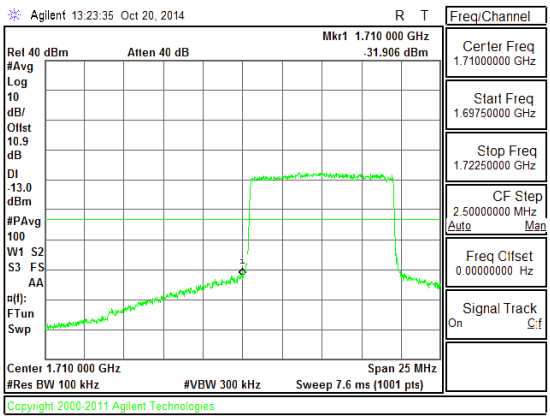
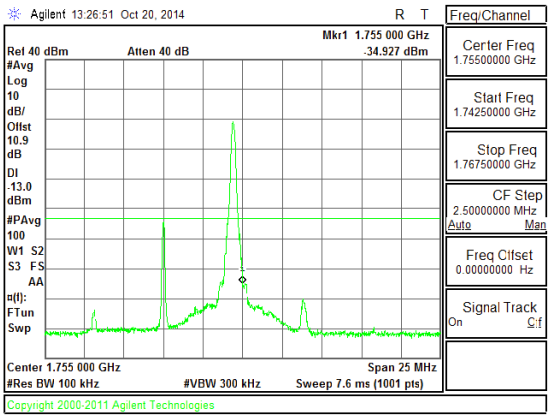
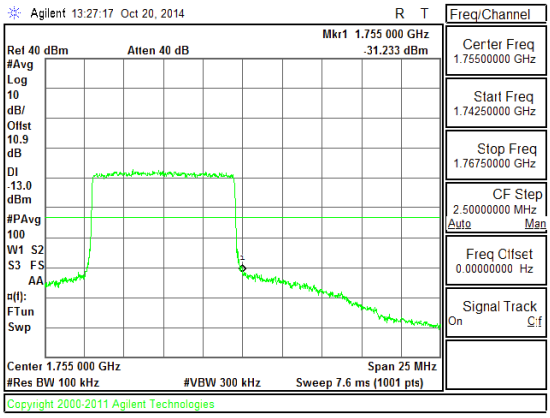
Band LTE4 10MHz 16QAM	 Band LTE4 10MHz CBE 16QAM Low Channel 1RB.gif	 Band LTE4 10MHz CBE 16QAM Low Channel FRB.gif
Band LTE4 10MHz 16QAM	 Band LTE4 10MHz CBE 16QAM High Channel 1RB.gif	 Band LTE4 10MHz CBE 16QAM High Channel FRB.gif

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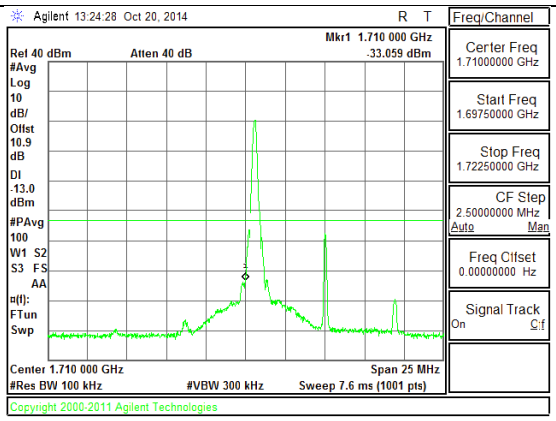
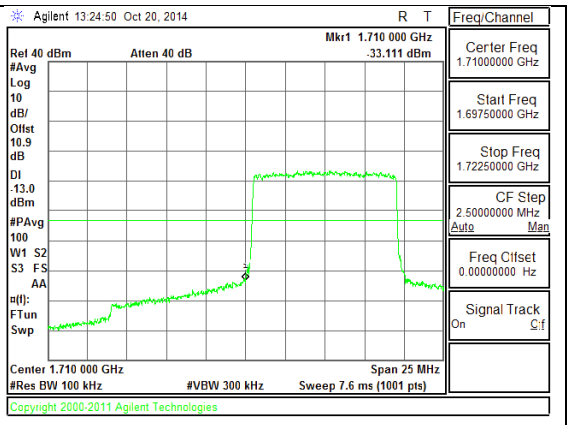
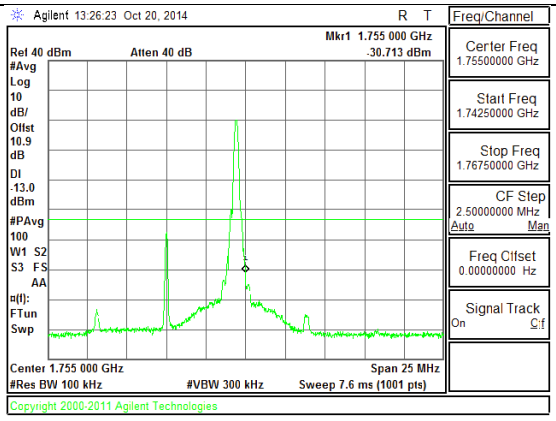
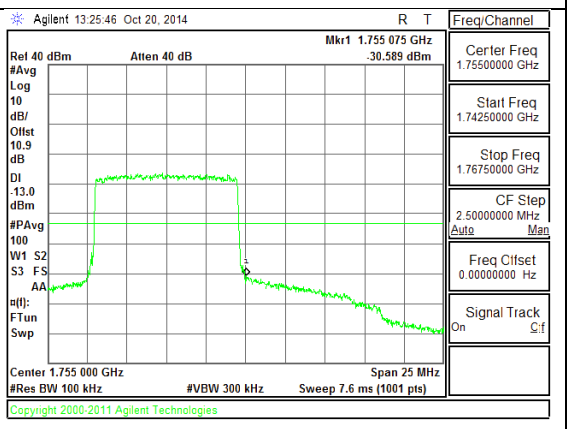
Band LTE4 10MHz QPSK	 Band LTE4 10MHz CBE QPSK Low Channel 1RB.gif	 Band LTE4 10MHz CBE QPSK Low Channel FRB.gif
Band LTE4 10MHz QPSK	 Band LTE4 10MHz CBE QPSK High Channel 1RB.gif	 Band LTE4 10MHz CBE QPSK High Channel FRB.gif

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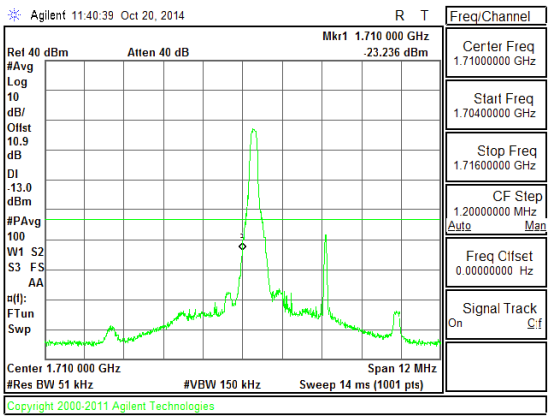
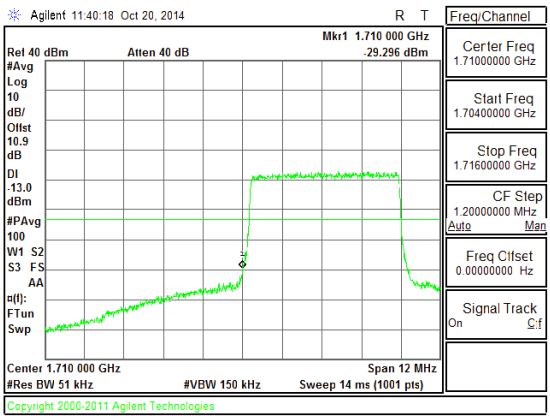
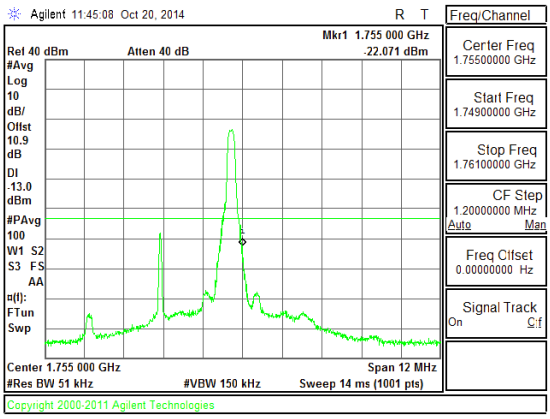
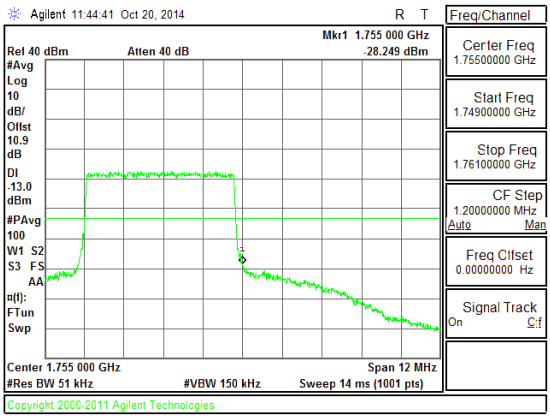
Band LTE4 5MHz 16QAM	 Band LTE4 5MHz CBE 16QAM Low Channel 1RB.gif	 Band LTE4 5MHz CBE 16QAM Low Channel FRB.gif
Band LTE4 5MHz 16QAM	 Band LTE4 5MHz CBE 16QAM High Channel 1RB.gif	 Band LTE4 5MHz CBE 16QAM High Channel FRB.gif

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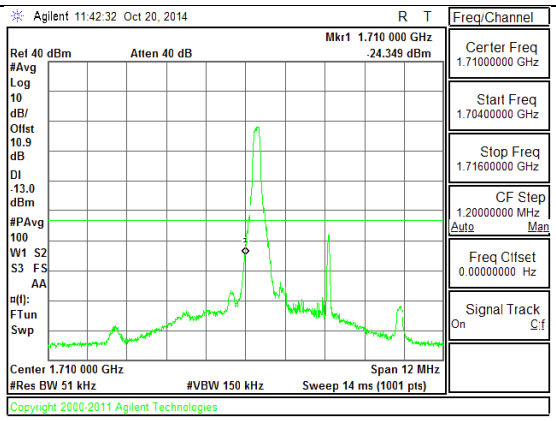
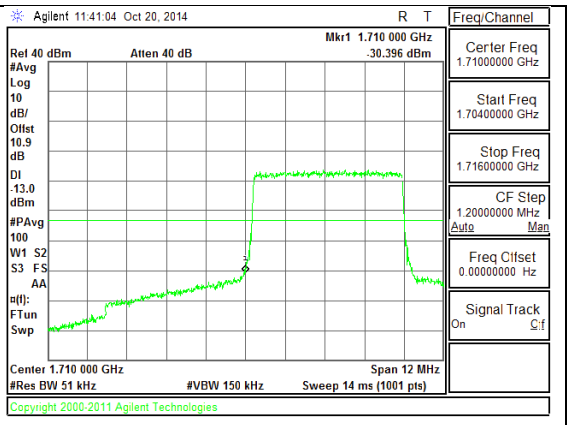
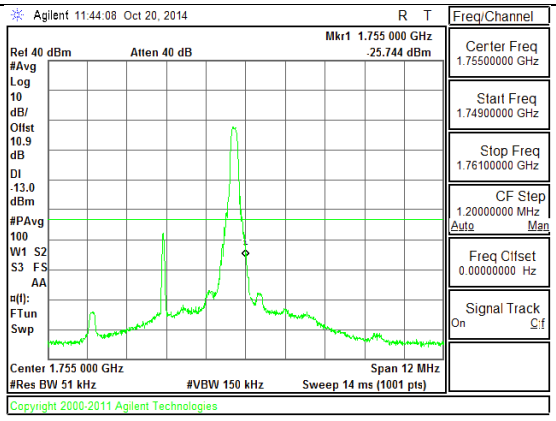
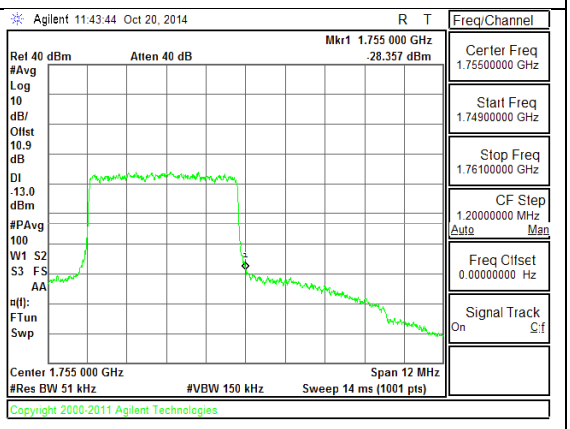
Band LTE4 5MHz QPSK	 Band LTE4 5MHz CBE QPSK Low Channel 1RB.gif	 Band LTE4 5MHz CBE QPSK Low Channel FRB.gif
Band LTE4 5MHz QPSK	 Band LTE4 5MHz CBE QPSK High Channel 1RB.gif	 Band LTE4 5MHz CBE QPSK High Channel FRB.gif

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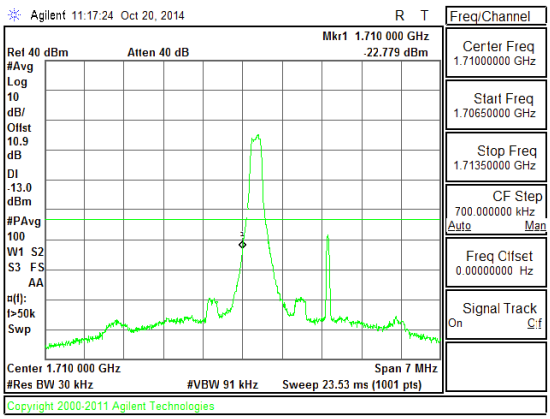
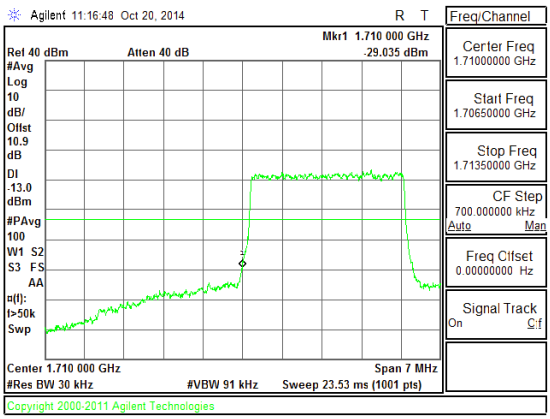
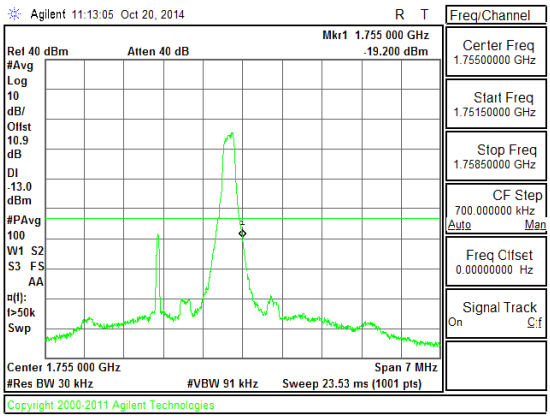
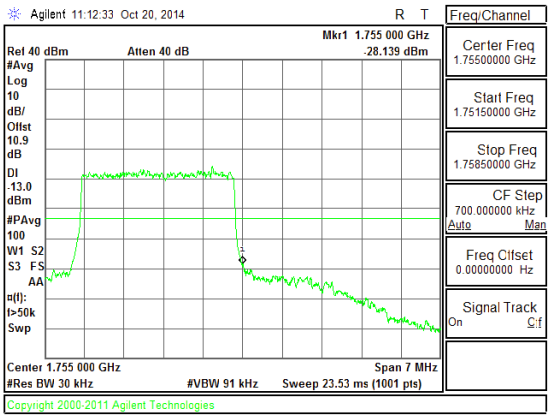
Band LTE4 3MHz 16QAM	 Band LTE4 3MHz CBE 16QAM Low Channel 1RB.gif	 Band LTE4 3MHz CBE 16QAM Low Channel FRB.gif
Band LTE4 3MHz 16QAM	 Band LTE4 3MHz CBE 16QAM High Channel 1RB.gif	 Band LTE4 3MHz CBE 16QAM High Channel FRB.gif

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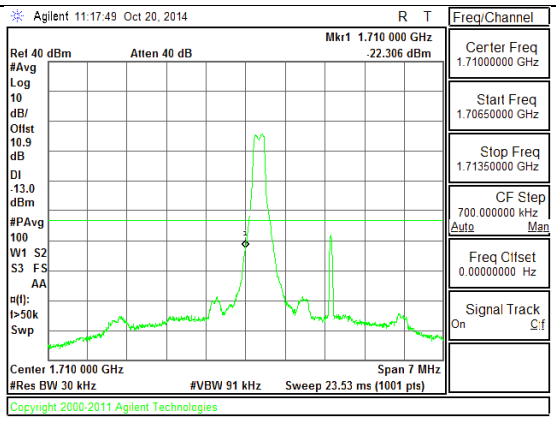
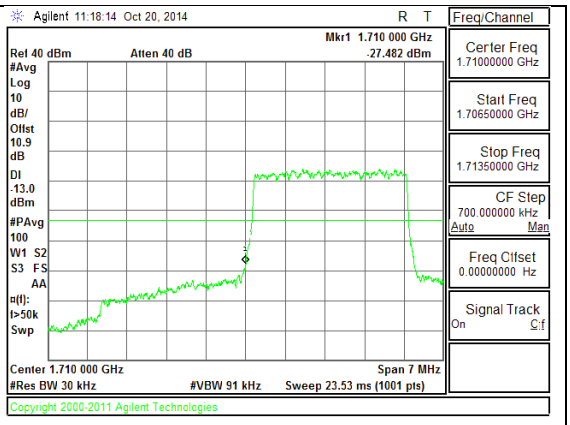
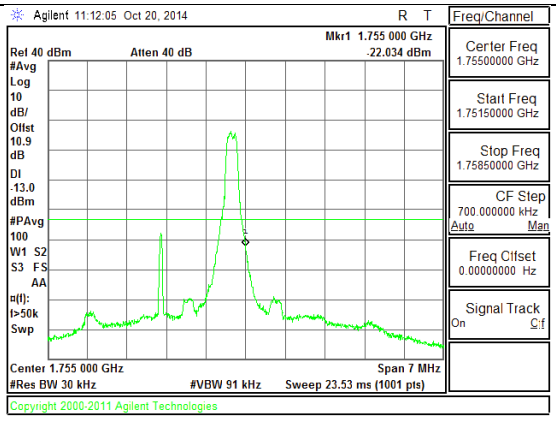
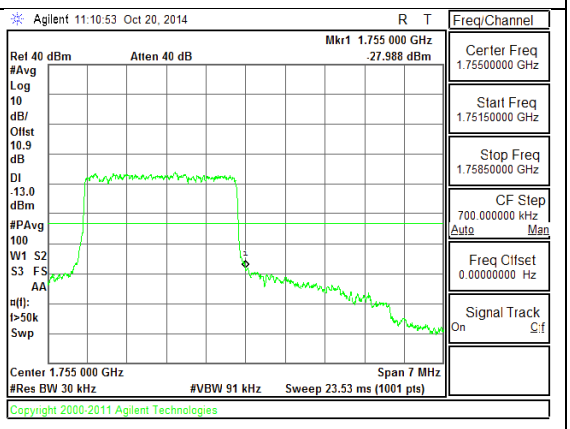
Band LTE4 3MHz QPSK	 Band LTE4 3MHz CBE QPSK Low Channel 1RB.gif	 Band LTE4 3MHz CBE QPSK Low Channel FRB.gif
Band LTE4 3MHz QPSK	 Band LTE4 3MHz CBE QPSK High Channel 1RB.gif	 Band LTE4 3MHz CBE QPSK High Channel FRB.gif

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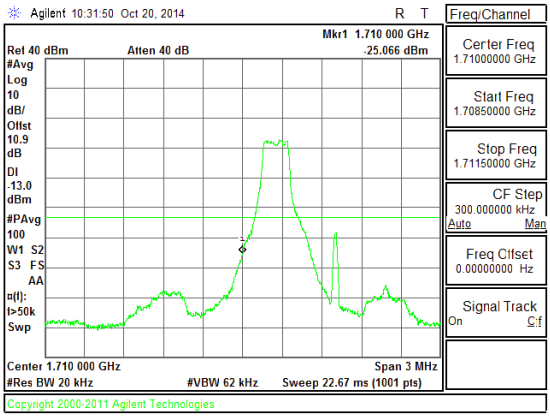
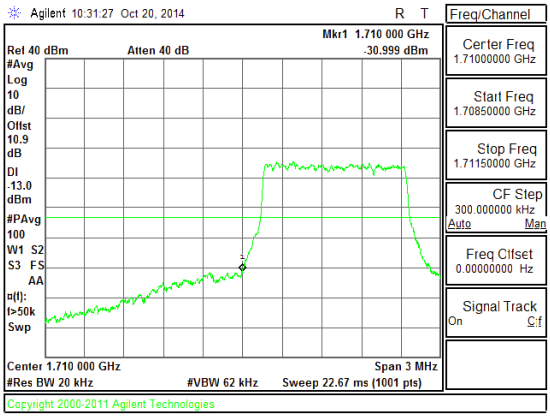
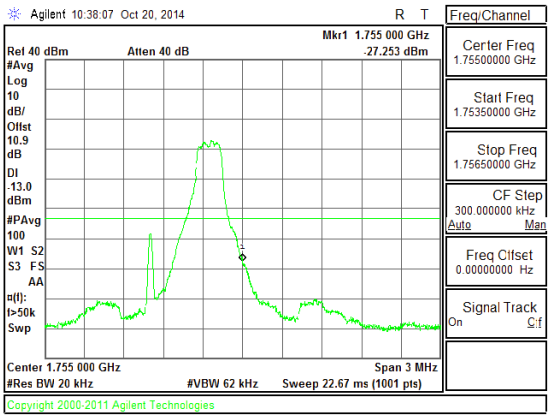
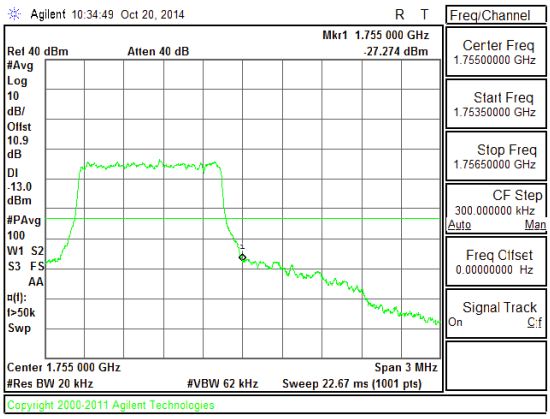
Band LTE4 1.4MHz 16QAM	 Band LTE4 1.4MHz CBE 16QAM Low Channel 1RB.gif	 Band LTE4 1.4MHz CBE 16QAM Low Channel FRB.gif
Band LTE4 1.4MHz 16QAM	 Band LTE4 1.4MHz CBE 16QAM High Channel 1RB.gif	 Band LTE4 1.4MHz CBE 16QAM High Channel FRB.gif

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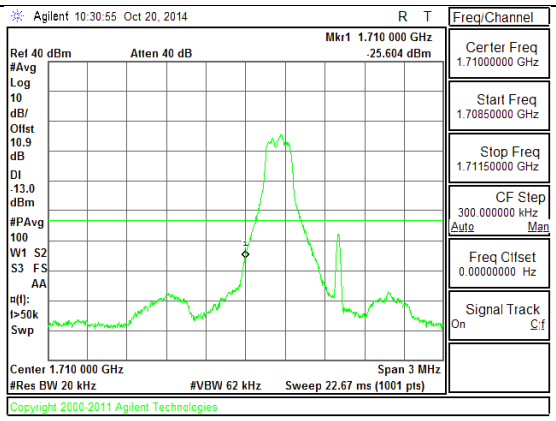
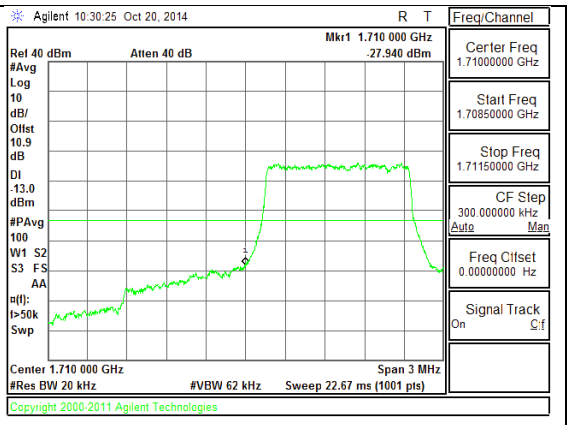
Band LTE4 1.4MHz QPSK

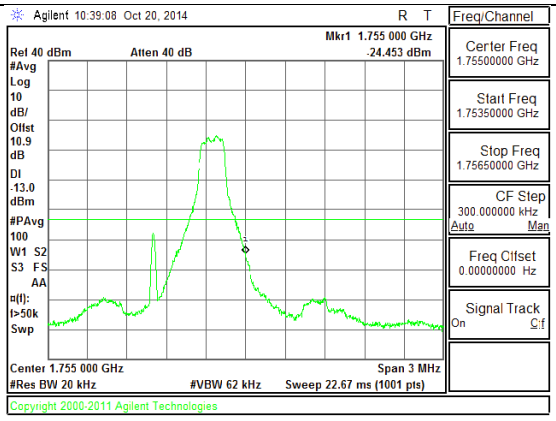


Band LTE4 1.4MHz CBE QPSK Low Channel 1RB.gif

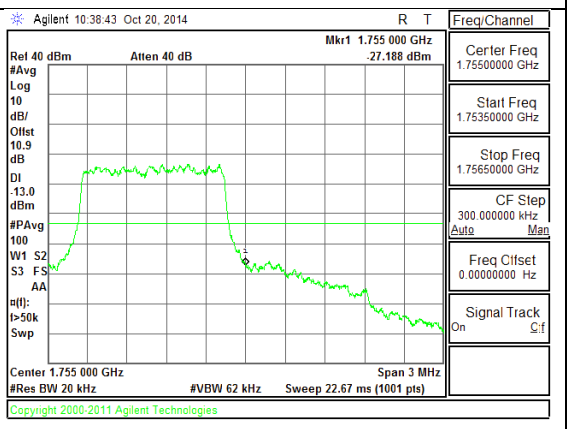


Band LTE4 1.4MHz CBE QPSK Low Channel FRB.gif

Band LTE4 1.4MHz QPSK



Band LTE4 1.4MHz CBE QPSK High Channel 1RB.gif



Band LTE4 1.4MHz CBE QPSK High Channel FRB.gif

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10.3. OUT OF BAND EMISSIONS

RULE PART(S)

FCC: §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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10.3.1. OUT OF BAND EMISSIONS RESULT

Band	BW (MHz)	Mode	f (MHz)	Spur (dBm)	Spec (dBm)	Delta (dB)
LTE17	10	QPSK	709	-22.93	-13	-9.93
			710	-23.01	-13	-10.01
			711	-21.75	-13	-8.75
		16QAM	709	-23.49	-13	-10.49
			710	-22.64	-13	-9.64
			711	-25.62	-13	-12.62

Band	BW (MHz)	Mode	f (MHz)	Spur (dBm)	Spec (dBm)	Delta (dB)
LTE17	5	QPSK	706.5	-22.28	-13	-9.28
			710	-25.76	-13	-12.76
			713.5	-21.69	-13	-8.69
		16QAM	706.5	-22.91	-13	-9.91
			710	-25.81	-13	-12.81
			713.5	-26.71	-13	-13.71

Band	BW (MHz)	Mode	f (MHz)	Spur (dBm)	Spec (dBm)	Delta (dB)
LTE4	20	QPSK	1720	-22.71	-13	-9.71
			1732.5	-22.71	-13	-9.71
			1745	-25.82	-13	-12.82
		16QAM	1720	-22.69	-13	-9.69
			1732.5	-22.37	-13	-9.37
			1745	-22.74	-13	-9.74

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Band	BW (MHz)	Mode	f (MHz)	Spur (dBm)	Spec (dBm)	Delta (dB)
LTE4	15	QPSK	1717.5	-24.64	-13	-11.64
			1732.5	-24.56	-13	-11.56
			1747.5	-23.27	-13	-10.27
		16QAM	1717.5	-23.2	-13	-10.2
			1732.5	-25.54	-13	-12.54
			1747.5	-24.1	-13	-11.1

Band	BW (MHz)	Mode	f (MHz)	Spur (dBm)	Spec (dBm)	Delta (dB)
LTE4	10	QPSK	1715	-24.98	-13	-11.98
			1732.5	-22.3	-13	-9.3
			1750	-23.38	-13	-10.38
		16QAM	1715	-22.35	-13	-9.35
			1732.5	-22.48	-13	-9.48
			1750	-22.56	-13	-9.56

Band	BW (MHz)	Mode	f (MHz)	Spur (dBm)	Spec (dBm)	Delta (dB)
LTE4	5	QPSK	1712.5	-24.14	-13	-11.14
			1732.5	-26.1	-13	-13.1
			1752.5	-28.62	-13	-15.62
		16QAM	1712.5	-22.86	-13	-9.86
			1732.5	-25.81	-13	-12.81
			1752.5	-22.56	-13	-9.56

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Band	BW (MHz)	Mode	f (MHz)	Spur (dBm)	Spec (dBm)	Delta (dB)
LTE4	3	QPSK	1711.5	-22.59	-13	-9.59
			1732.5	-23.11	-13	-10.11
			1753.5	-26.26	-13	-13.26
		16QAM	1711.5	-25.12	-13	-12.12
			1732.5	-22.38	-13	-9.38
			1753.5	-25.08	-13	-12.08

Band	BW (MHz)	Mode	f (MHz)	Spur (dBm)	Spec (dBm)	Delta (dB)
LTE4	1.4	QPSK	1710.7	-25.33	-13	-12.33
			1732.5	-25.52	-13	-12.52
			1754.3	-23.05	-13	-10.05
		16QAM	1710.7	-25.32	-13	-12.32
			1732.5	-22.61	-13	-9.61
			1754.3	-22.2	-13	-9.2

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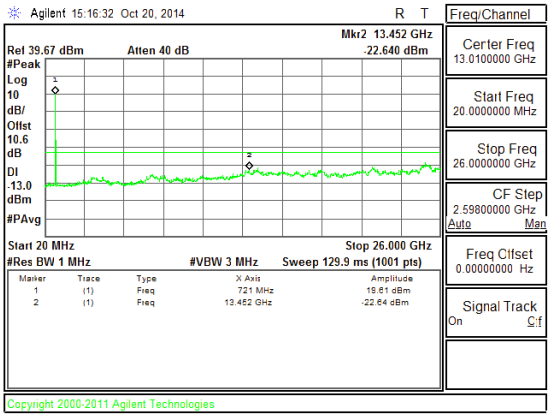
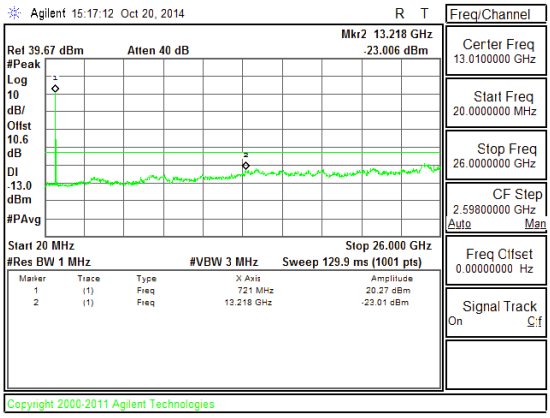
10.3.2. OUT OF BAND EMISSIONS PLOTS

Band LTE17 10MHz 16QAM

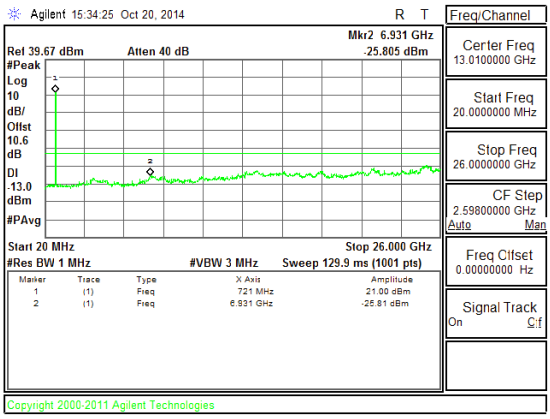


Band LTE17 10MHz CSE 16QAM Mid channel

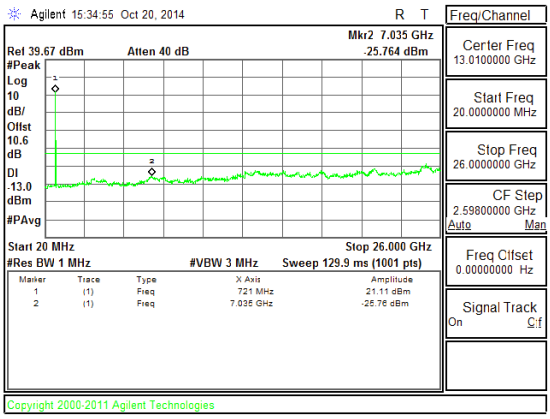


Band LTE17 10MHz CSE QPSK Mid channel

Band LTE17 5MHz 16QAM



Band LTE17 5MHz CSE 16QAM Mid channel



Band LTE17 5MHz CSE QPSK Mid channel

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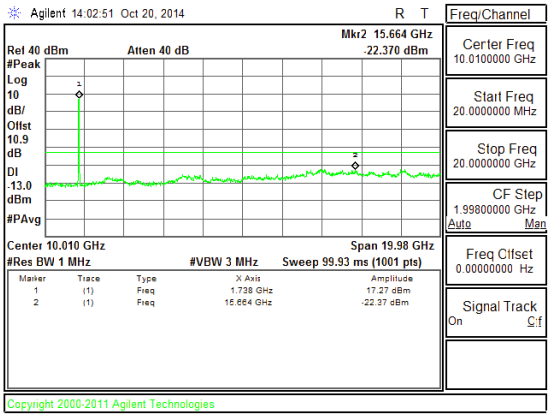
Band

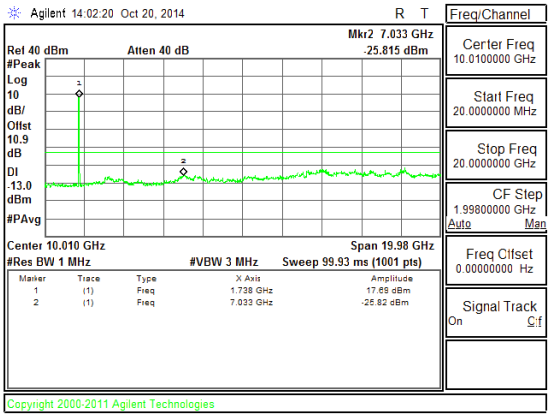
LTE4

20MHz

16QAM



Band LTE4 20MHz CSE 16QAM Mid channel



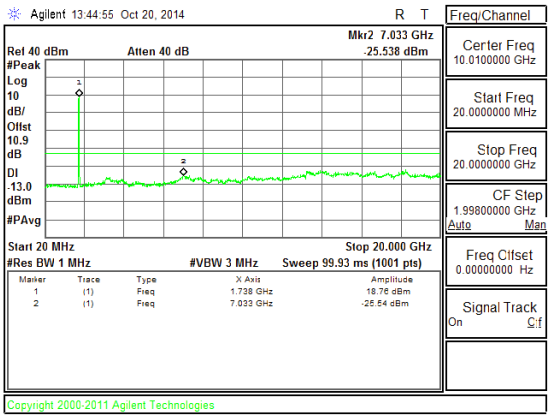
Band LTE4 20MHz CSE QPSK Mid channel

Band

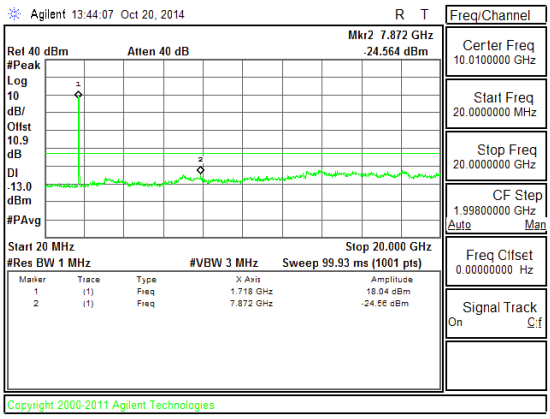
LTE4

15MHz

16QAM



Band LTE4 15MHz CSE 16QAM Mid channel



Band LTE4 15MHz CSE QPSK Mid channel

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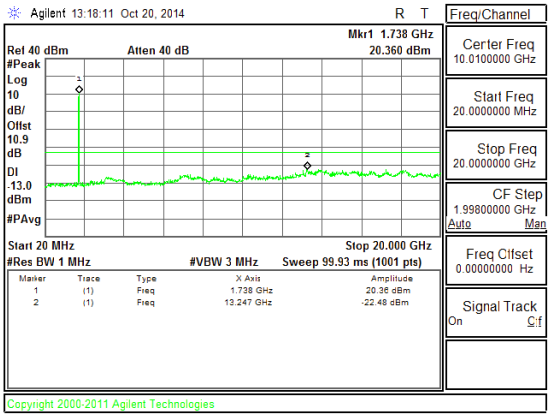
Band

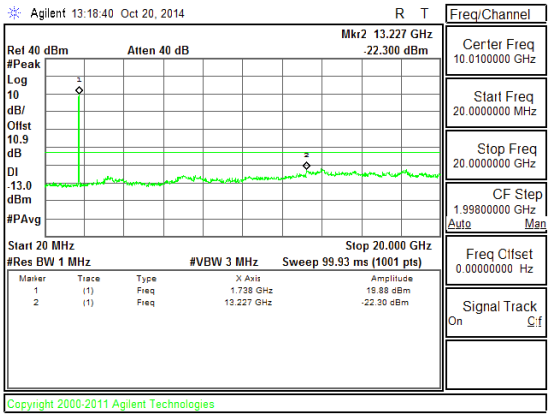
LTE4

10MHz

16QAM



Band LTE4 10MHz CSE 16QAM Mid channel



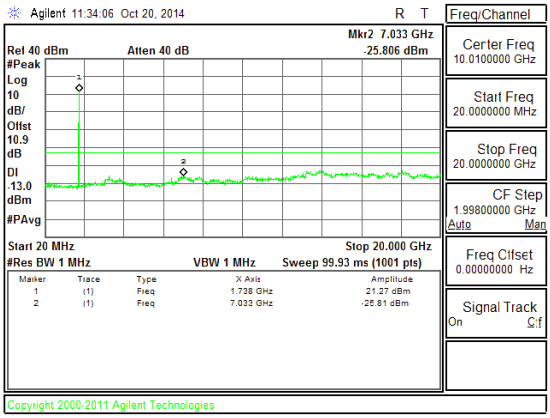
Band LTE4 10MHz CSE QPSK Mid channel

Band

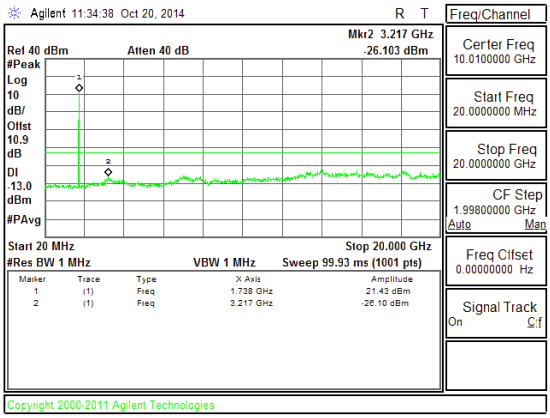
LTE4

5MHz

16QAM



Band LTE4 5MHz CSE 16QAM Mid channel



Band LTE4 5MHz CSE QPSK Mid channel

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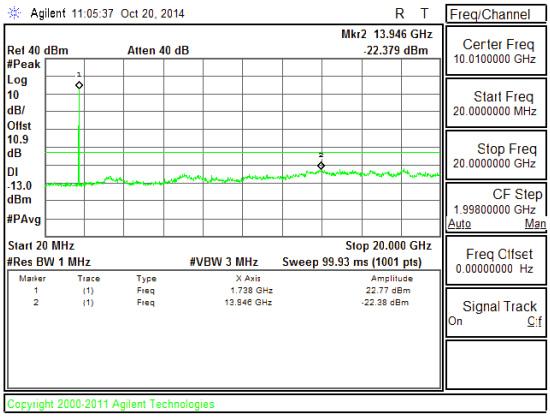
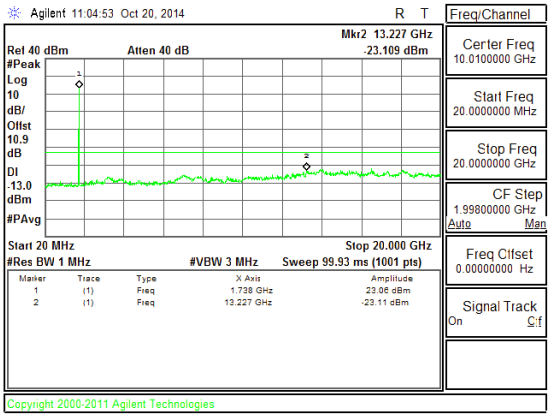
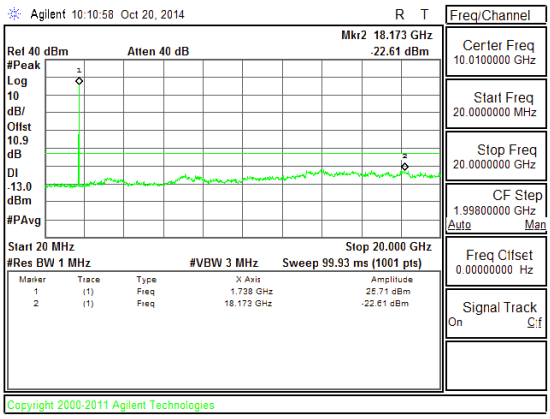
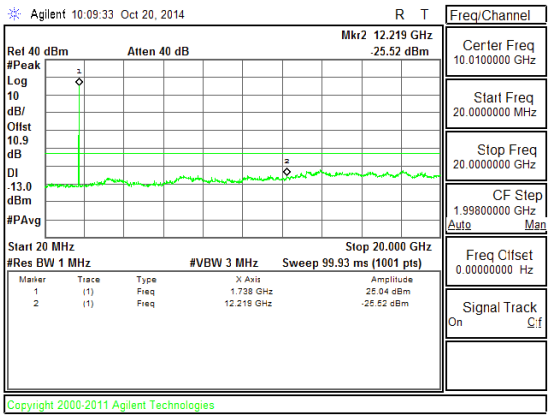
Band LTE4 3MHz 16QAM	 Band LTE4 3MHz CSE 16QAM Mid channel	 Band LTE4 3MHz CSE QPSK Mid channel
Band LTE4 1.4MHz 16QAM	 Band LTE4 1.4MHz CSE 16QAM Mid channel	 Band LTE4 1.4MHz CSE QPSK Mid channel

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10.4. FREQUENCY STABILITY

RULE PART(S)

FCC: §27.54

LIMITS

§27.54 - The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

TEST PROCEDURE

Per KDB 971168 D01 Power Meas License Digital Systems v02r01

MODES TESTED

- LTE Bands 4, 17

RESULTS

See the following pages.

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10.4.1. FREQUENCY STABILITY RESULTS

LTE BAND 17 – MID CHANNEL

Reference Frequency: PCS Mid Channel 709.999998 MHz @ 20ºC Limit: within the authorized block or +- 2.5 ppm = 1775.000 Hz				
Power Supply (Vdc)	Environment Temperature (*C)	Frequency Deviation Measureed with Time Elapse		
		(MHz)	Delta (ppm)	Limit (ppm)
3.80	50	709.999999	-0.001	2.5
3.80	40	709.999999	-0.001	2.5
3.80	30	710.000001	-0.004	2.5
3.80	***20***	***709.999998***	***0***	***2.5***
3.80	10	709.999998	0.000	2.5
3.80	0	709.999999	-0.001	2.5
3.80	-10	710.000001	-0.004	2.5
3.80	-20	709.999999	-0.001	2.5
3.80	-30	709.999999	-0.001	2.5

Reference Frequency: PCS Mid Channel 709.999998 MHz @ 20ºC Limit: within the authorized block or +- 2.5 ppm = 1775.000 Hz				
Power Supply (Vdc)	Environment Temperature (*C)	Frequency Deviation Measureed with Time Elapse		
			Delta (ppm)	Limit (ppm)
3.80	***20***	***709.999998***	***0.00000***	***2.5***
4.30	20	709.999997	*0.00141*	2.5
3.20	20	709.999998	*0.00000*	2.5

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LTE BAND 4 – MID CHANNEL

Reference Frequency: PCS Mid Channel 1732.500002MHz @ 20ºC Limit: within the authorized block or +- 2.5 ppm = 4331.250 Hz				
Power Supply (Vdc)	Environment Temperature (*C)	Frequency Deviation Measureed with Time Elapse		
		(MHz)	Delta (ppm)	Limit (ppm)
3.80	50	1732.500004	-0.001	2.5
3.80	40	1732.500003	-0.001	2.5
3.80	30	1732.500002	0.000	2.5
3.80	***20***	***1732.500002***	***0***	***2.5***
3.80	10	1732.500002	0.000	2.5
3.80	0	1732.500003	-0.001	2.5
3.80	-10	1732.500005	-0.002	2.5
3.80	-20	1732.500003	-0.001	2.5
3.80	-30	1732.500002	0.000	2.5

Reference Frequency: PCS Mid Channel 1732.500002 MHz @ 20ºC Limit: within the authorized block or +- 2.5 ppm = 4331.250 Hz				
Power Supply (Vdc)	Environment Temperature (*C)	Frequency Deviation Measureed with Time Elapse		
			Delta (ppm)	Limit (ppm)
3.80	***20***	***1732.500002***	***0.00000***	***2.5***
4.30	20	1732.500004	*-0.00115*	2.5
3.20	20	1732.500006	*-0.00231*	2.5

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11. RADIATED TEST RESULTS

11.1. RADIATED POWER (ERP & EIRP)

RULE PART(S)

FCC: §27

LIMITS

27.50(c) - (10) Portable stations (hand-held devices) are limited to 3 watts ERP; (LTE B17)

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.(Band 4)

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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11.1.1. LTE ERP/EIRP Results

Band	BW (MHz)	Mode	RB/RB Size	f (MHz)	ERP / EIRP	
					dBm	mW
LTE17	10	QPSK	1/0	709	19.49	88.94
			1/0	710	19.29	84.94
			1/0	711	20.36	108.67
		16QAM	1/0	709	18.40	69.2
			1/0	710	18.30	67.62
			1/0	711	19.07	80.74

Band	BW (MHz)	Mode	RB/RB Size	f (MHz)	ERP / EIRP	
					dBm	mW
LTE17	5	QPSK	1/0	706.5	19.67	92.7
			1/0	710	19.54	89.97
			1/0	713.5	20.69	117.25
		16QAM	1/0	706.5	18.65	73.3
			1/0	710	18.28	67.31
			1/0	713.5	19.80	95.52

Band	BW (MHz)	Mode	RB/RB Size	f (MHz)	ERP / EIRP	
					dBm	mW
LTE4	20	QPSK	1/0	1720	21.24	133.05
			1/0	1732.5	22.71	186.64
			1/0	1745	22.14	163.68
		16QAM	1/0	1720	20.15	103.51
			1/0	1732.5	21.28	134.28
			1/0	1745	21.11	129.12

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Band	BW (MHz)	Mode	RB/RB Size	f (MHz)	ERP / EIRP	
					dBm	mW
LTE4	15	QPSK	1/0	1717.5	21.45	139.64
			1/0	1732.5	22.74	187.93
			1/0	1747.5	22.21	166.34
		16QAM	1/0	1717.5	20.27	106.41
			1/0	1732.5	21.63	145.55
			1/0	1747.5	21.12	129.42

Band	BW (MHz)	Mode	RB/RB Size	f (MHz)	ERP / EIRP	
					dBm	mW
LTE4	10	QPSK	1/0	1715	21.63	145.55
			1/0	1732.5	22.97	198.15
			1/0	1750	22.45	175.79
		16QAM	1/0	1715	20.93	123.88
			1/0	1732.5	22.06	160.69
			1/0	1750	21.68	147.23

Band	BW (MHz)	Mode	RB/RB Size	f (MHz)	ERP / EIRP	
					dBm	mW
LTE4	5	QPSK	1/0	1712.5	21.55	142.89
			1/0	1732.5	22.92	195.88
			1/0	1752.5	22.59	181.55
		16QAM	1/0	1712.5	20.66	116.41
			1/0	1732.5	21.61	144.88
			1/0	1752.5	21.63	145.55

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Band	BW (MHz)	Mode	RB/RB Size	f (MHz)	ERP / EIRP	
					dBm	mW
LTE4	3	QPSK	1/0	1711.5	21.29	134.59
			1/0	1732.5	22.57	180.72
			1/0	1753.5	22.06	160.69
		16QAM	1/0	1711.5	20.36	108.64
			1/0	1732.5	21.48	140.6
			1/0	1753.5	21.26	133.66

Band	BW (MHz)	Mode	RB/RB Size	f (MHz)	ERP / EIRP	
					dBm	mW
LTE4	1.4	QPSK	1/0	1710.7	21.19	131.52
			1/0	1732.5	22.83	191.87
			1/0	1754.3	22.13	163.31
		16QAM	1/0	1710.7	20.17	103.99
			1/0	1732.5	21.4	138.04
			1/0	1754.3	21.07	127.94

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11.1.2. ERP/EIRP DATA

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

Company: Samsung
Project #: 14I19179
Date: 10/20/14
Test Engineer: R. Alegre
Configuration: EUT only
Mode: LTE17 10MHz 16QAM

Band
LTE17
10MHz
16QAM

Test Equipment:
Receiving: Hybrid T185, and Chamber C SMA Cables
Substitution: Dipole S/N: 00022117, 4ft SMA Cable (SN # 245200 001) Warehouse.

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
709.00	8.74	V	0.9	0.0	7.84	34.8	-26.9	
709.00	19.30	H	0.9	0.0	18.40	34.8	-16.4	
Mid Ch								
710.00	8.62	V	0.9	0.0	7.72	34.8	-27.0	
710.00	19.20	H	0.9	0.0	18.30	34.8	-16.5	
High Ch								
711.00	8.36	V	0.9	0.0	7.46	34.8	-27.3	
711.00	19.97	H	0.9	0.0	19.07	34.8	-15.7	

Rev. 3.17.11
Note: For Band 13/17 ERP limit is 34.77dBm; For Band 26 limit is 50dBm

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Band

LTE17

10MHz

QPSK

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

Company: Samsung
Project #: 14I19179
Date: 10/20/14
Test Engineer: R. Alegre
Configuration: EUT only
Mode: LTE17 10MHz QPSK

Test Equipment:
Receiving: Hybrid T185, and Chamber C SMA Cables
Substitution: Dipole S/N: 00022117, 4ft SMA Cable (SN # 245200 001) Warehouse.

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
709.00	9.90	V	0.9	0.0	9.00	34.8	-25.8	
709.00	20.39	H	0.9	0.0	19.49	34.8	-15.3	
Mid Ch								
710.00	9.56	V	0.9	0.0	8.66	34.8	-26.1	
710.00	20.19	H	0.9	0.0	19.29	34.8	-15.5	
High Ch								
711.00	9.30	V	0.9	0.0	8.40	34.8	-26.4	
711.00	21.26	H	0.9	0.0	20.36	34.8	-14.4	

Rev. 3.17.11
Note: For Band 13/17 ERP limit is 34.77dBm; For Band 26 limit is 50dBm

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Band

LTE17

5MHz

16QAM

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

Company: Samsung
Project #: 14I19179
Date: 10/20/14
Test Engineer: R. Alegre
Configuration: EUT only
Mode: LTE17 5MHz 16QAM

Test Equipment:
Receiving: Hybrid T185, and Chamber C SMA Cables
Substitution: Dipole S/N: 00022117, 4ft SMA Cable (SN # 245200 001) Warehouse.

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
706.50	8.90	V	0.9	0.0	8.00	34.8	-26.8	
706.50	19.55	H	0.9	0.0	18.65	34.8	-16.1	
Mid Ch								
710.00	9.20	V	0.9	0.0	8.30	34.8	-26.5	
710.00	19.18	H	0.9	0.0	18.28	34.8	-16.5	
High Ch								
713.50	8.90	V	0.9	0.0	8.00	34.8	-26.8	
713.50	20.70	H	0.9	0.0	19.80	34.8	-15.0	

Rev. 3.17.11
Note: For Band 13/17 ERP limit is 34.77dBm; For Band 26 limit is 50dBm

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Band

LTE17

5MHz

QPSK

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

Company: Samsung
Project #: 14I19179
Date: 10/20/14
Test Engineer: R. Alegre
Configuration: EUT only
Mode: LTE17 5MHz QPSK

Test Equipment:
Receiving: Hybrid T185, and Chamber C SMA Cables
Substitution: Dipole S/N: 00022117, 4ft SMA Cable (SN # 245200 001) Warehouse.

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
706.50	9.70	V	0.9	0.0	8.80	34.8	-26.0	
706.50	20.57	H	0.9	0.0	19.67	34.8	-15.1	
Mid Ch								
710.00	9.87	V	0.9	0.0	8.97	34.8	-25.8	
710.00	20.44	H	0.9	0.0	19.54	34.8	-15.2	
High Ch								
713.50	9.75	V	0.9	0.0	8.85	34.8	-25.9	
713.50	21.59	H	0.9	0.0	20.69	34.8	-14.1	

Rev. 3.17.11
Note: For Band 13/17 ERP limit is 34.77dBm; For Band 26 limit is 50dBm

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Band

LTE4

20MHz

16QAM

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

Company: Samsung
Project #: 14I19179
Date: 10/20/14
Test Engineer: R. Alegre
Configuration: EUT only
Mode: LTE_B4_20MHz_16QAM

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 (dBd)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
1720.00	9.15	V	0.90	8.30	16.55	30.0	-13.5	
1720.00	12.75	H	0.90	8.30	20.15	30.0	-9.9	
Mid Ch								
1732.50	9.74	V	0.90	8.30	17.14	30.0	-12.9	
1732.50	13.88	H	0.90	8.30	21.28	30.0	-8.7	
High Ch								
1745.00	9.48	V	0.90	7.90	16.48	30.0	-13.5	
1745.00	14.11	H	0.90	7.90	21.11	30.0	-8.9	

Rev. 3.17.11
Note: For Band 4 EIRP limit is 30dBm

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Band

LTE4

20MHz

QPSK

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

Company: Samsung
Project #: 14I19179
Date: 10/20/14
Test Engineer: R. Alegre
Configuration: EUT only
Mode: LTE_B4_20MHz_QPSK

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 (dBd)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
1720.00	10.23	V	0.90	8.30	17.63	30.0	-12.4	
1720.00	13.84	H	0.90	8.30	21.24	30.0	-8.8	
Mid Ch								
1732.50	10.86	V	0.90	8.30	18.26	30.0	-11.7	
1732.50	15.31	H	0.90	8.30	22.71	30.0	-7.3	
High Ch								
1745.00	10.34	V	0.90	7.90	17.34	30.0	-12.7	
1745.00	15.14	H	0.90	7.90	22.14	30.0	-7.9	

Rev. 3.17.11
Note: For Band 4 EIRP limit is 30dBm

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Band

LTE4

15MHz

16QAM

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

Company: Samsung
Project #: 14I19179
Date: 10/20/14
Test Engineer: R. Alegre
Configuration: EUT only
Mode: LTE_B4_15MHz_16QAM

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 (dBd)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
1717.50	9.00	V	0.90	8.30	16.40	30.0	-13.6	
1717.50	12.87	H	0.90	8.30	20.27	30.0	-9.7	
Mid Ch								
1732.50	9.94	V	0.90	8.30	17.34	30.0	-12.7	
1732.50	14.23	H	0.90	8.30	21.63	30.0	-8.4	
High Ch								
1747.50	9.40	V	0.90	7.90	16.40	30.0	-13.6	
1747.50	14.12	H	0.90	7.90	21.12	30.0	-8.9	

Rev. 3.17.11
Note: For Band 4 EIRP limit is 30dBm

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Band

LTE4

15MHz

QPSK

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

Company: Samsung
Project #: 14I19179
Date: 10/20/14
Test Engineer: R. Alegre
Configuration: EUT only
Mode: LTE_B4_15MHz_QPSK

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 (dBd)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
1717.50	9.81	V	0.90	8.30	17.21	30.0	-12.8	
1717.50	14.05	H	0.90	8.30	21.45	30.0	-8.6	
Mid Ch								
1732.50	10.86	V	0.90	8.30	18.26	30.0	-11.7	
1732.50	15.34	H	0.90	8.30	22.74	30.0	-7.3	
High Ch								
1747.50	10.22	V	0.90	7.90	17.22	30.0	-12.8	
1747.50	15.21	H	0.90	7.90	22.21	30.0	-7.8	

Rev. 3.17.11
Note: For Band 4 EIRP limit is 30dBm

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Band

LTE4

10MHz

16QAM

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

Company: Samsung
Project #: 14I19179
Date: 10/20/14
Test Engineer: R. Alegre
Configuration: EUT only
Mode: LTE_B4_10MHz_16QAM

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 (dBd)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
1715.00	8.83	V	0.90	8.30	16.23	30.0	-13.8	
1715.00	13.53	H	0.90	8.30	20.93	30.0	-9.1	
Mid Ch								
1732.50	9.97	V	0.90	8.30	17.37	30.0	-12.6	
1732.50	14.66	H	0.90	8.30	22.06	30.0	-7.9	
High Ch								
1750.00	9.67	V	0.90	7.90	16.67	30.0	-13.3	
1750.00	14.68	H	0.90	7.90	21.68	30.0	-8.3	

Rev. 3.17.11
Note: For Band 4 EIRP limit is 30dBm

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Band

LTE4

10MHz

QPSK

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

Company: Samsung
Project #: 14I19179
Date: 10/20/14
Test Engineer: R. Alegre
Configuration: EUT only
Mode: LTE_B4_10MHz_QPSK

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 (dBd)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
1715.00	10.09	V	0.90	8.30	17.49	30.0	-12.5	
1715.00	14.23	H	0.90	8.30	21.63	30.0	-8.4	
Mid Ch								
1732.50	10.63	V	0.90	8.30	18.03	30.0	-12.0	
1732.50	15.57	H	0.90	8.30	22.97	30.0	-7.0	
High Ch								
1750.00	10.52	V	0.90	7.90	17.52	30.0	-12.5	
1750.00	15.45	H	0.90	7.90	22.45	30.0	-7.6	

Rev. 3.17.11
Note: For Band 4 EIRP limit is 30dBm

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Band

LTE4

5MHz

16QAM

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

Company: Samsung
Project #: 14I19179
Date: 10/20/14
Test Engineer: R. Alegre
Configuration: EUT only
Mode: LTE_B4_5MHz_16QAM

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 (dBd)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
1712.50	8.96	V	0.90	8.30	16.36	30.0	-13.6	
1712.50	13.26	H	0.90	8.30	20.66	30.0	-9.3	
Mid Ch								
1732.50	9.74	V	0.90	8.30	17.14	30.0	-12.9	
1732.50	14.21	H	0.90	8.30	21.61	30.0	-8.4	
High Ch								
1752.50	9.33	V	0.90	7.90	16.33	30.0	-13.7	
1752.50	14.63	H	0.90	7.90	21.63	30.0	-8.4	

Rev. 3.17.11
Note: For Band 4 EIRP limit is 30dBm

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Band

LTE4

5MHz

QPSK

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

Company: Samsung
Project #: 14I19179
Date: 10/20/14
Test Engineer: R. Alegre
Configuration: EUT only
Mode: LTE_B4_5MHz_QPSK

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 (dBd)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
1712.50	9.79	V	0.90	8.30	17.19	30.0	-12.8	
1712.50	14.15	H	0.90	8.30	21.55	30.0	-8.5	
Mid Ch								
1732.50	10.50	V	0.90	8.30	17.90	30.0	-12.1	
1732.50	15.52	H	0.90	8.30	22.92	30.0	-7.1	
High Ch								
1752.50	10.29	V	0.90	7.90	17.29	30.0	-12.7	
1752.50	15.59	H	0.90	7.90	22.59	30.0	-7.4	

Rev. 3.17.11
Note: For Band 4 EIRP limit is 30dBm

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Band

LTE4

3MHz

16QAM

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

Company: Samsung
Project #: 14I19179
Date: 10/20/14
Test Engineer: R. Alegre
Configuration: EUT only
Mode: LTE_B4_3MHz_16QAM

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 (dBd)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
1711.50	9.02	V	0.90	8.30	16.42	30.0	-13.6	
1711.50	12.96	H	0.90	8.30	20.36	30.0	-9.6	
Mid Ch								
1732.50	9.78	V	0.90	8.30	17.18	30.0	-12.8	
1732.50	14.08	H	0.90	8.30	21.48	30.0	-8.5	
High Ch								
1753.50	9.55	V	0.90	7.90	16.55	30.0	-13.5	
1753.50	14.26	H	0.90	7.90	21.26	30.0	-8.7	

Rev. 3.17.11
Note: For Band 4 EIRP limit is 30dBm

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Band

LTE4

3MHz

QPSK

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

Company: Samsung
Project #: 14I19179
Date: 10/20/14
Test Engineer: R. Alegre
Configuration: EUT only
Mode: LTE_B4_3MHz_QPSK

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 (dBd)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
1711.50	10.17	V	0.90	8.30	17.57	30.0	-12.4	
1711.50	13.89	H	0.90	8.30	21.29	30.0	-8.7	
Mid Ch								
1732.50	10.73	V	0.90	8.30	18.13	30.0	-11.9	
1732.50	15.17	H	0.90	8.30	22.57	30.0	-7.4	
High Ch								
1753.50	10.30	V	0.90	7.90	17.30	30.0	-12.7	
1753.50	15.06	H	0.90	7.90	22.06	30.0	-7.9	

Rev. 3.17.11
Note: For Band 4 EIRP limit is 30dBm

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Band

LTE4

1.4MHz

16QAM

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

Company: Samsung
Project #: 14I19179
Date: 10/20/14
Test Engineer: R. Alegre
Configuration: EUT only
Mode: LTE_B4_1.4MHz_16QAM

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 (dBd)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
1710.70	8.85	V	0.90	8.30	16.25	30.0	-13.8	
1710.70	12.77	H	0.90	8.30	20.17	30.0	-9.8	
Mid Ch								
1732.50	9.73	V	0.90	8.30	17.13	30.0	-12.9	
1732.50	14.00	H	0.90	8.30	21.40	30.0	-8.6	
High Ch								
1754.30	9.19	V	0.90	7.90	16.19	30.0	-13.8	
1754.30	14.07	H	0.90	7.90	21.07	30.0	-8.9	

Rev. 3.17.11
Note: For Band 4 EIRP limit is 30dBm

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Band

LTE4

1.4MHz

QPSK

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

Company: Samsung
Project #: 14I19179
Date: 10/20/14
Test Engineer: R. Alegre
Configuration: EUT only
Mode: LTE_B4_1.4MHz_QPSK

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 (dBd)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
1710.70	9.78	V	0.90	8.30	17.18	30.0	-12.8	
1710.70	13.79	H	0.90	8.30	21.19	30.0	-8.8	
Mid Ch								
1732.50	10.38	V	0.90	8.30	17.78	30.0	-12.2	
1732.50	15.43	H	0.90	8.30	22.83	30.0	-7.2	
High Ch								
1754.30	10.19	V	0.90	7.90	17.19	30.0	-12.8	
1754.30	15.13	H	0.90	7.90	22.13	30.0	-7.9	

Rev. 3.17.11
Note: For Band 4 EIRP limit is 30dBm

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11.2. FIELD STRENGTH OF SPURIOUS RADIATION

RULE PART(S)

FCC: §2.1053, §22.917, §24.238, §27.53 and §90.691

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.

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.

RESULTS

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
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11.2.1. SPURIOUS RADIATION DATA

UL Verification Services, Inc.
Above 1GHz High Frequency Substitution Measurement

Company: Samsung
Project #: 14I19179
Date: 10/20/14
Test Engineer: O. Stoelting
Configuration: EUT w/ AC charger, headset
Mode: LTE17 10M 16QAM HARM

Chamber	Pre-amplifer	Filter	Limit
3m Chamber	T34 8449B	Filter 1	Part 27

Band: LTE17 10MHz 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,709MHz									
1.418	-21.2	V	3.0	37.8	1.0	-58.0	-13.0	-45.0	
2.127	-28.1	V	3.0	36.7	1.0	-63.8	-13.0	-50.8	
2.836	-27.1	V	3.0	36.2	1.0	-62.3	-13.0	-49.3	
1.418	-20.4	H	3.0	37.8	1.0	-57.1	-13.0	-44.1	
2.127	-29.7	H	3.0	36.7	1.0	-65.4	-13.0	-52.4	
2.836	-27.7	H	3.0	36.2	1.0	-62.9	-13.0	-49.9	
Mid Ch,710MHz									
1.420	-20.1	V	3.0	37.8	1.0	-56.8	-13.0	-43.8	
2.130	-28.8	V	3.0	36.7	1.0	-64.5	-13.0	-51.5	
2.840	-27.2	V	3.0	36.2	1.0	-62.3	-13.0	-49.3	
1.420	-18.2	H	3.0	37.8	1.0	-55.0	-13.0	-42.0	
2.130	-29.9	H	3.0	36.7	1.0	-65.5	-13.0	-52.5	
2.840	-27.8	H	3.0	36.2	1.0	-63.0	-13.0	-50.0	
High Ch, 711MHz									
1.422	-18.9	V	3.0	37.8	1.0	-55.7	-13.0	-42.7	
2.133	-28.9	V	3.0	36.7	1.0	-64.6	-13.0	-51.6	
2.844	-27.4	V	3.0	36.2	1.0	-62.6	-13.0	-49.6	
1.422	-17.1	H	3.0	37.8	1.0	-53.9	-13.0	-40.9	
2.133	-29.7	H	3.0	36.7	1.0	-65.4	-13.0	-52.4	
2.844	-27.9	H	3.0	36.2	1.0	-63.1	-13.0	-50.1	

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

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UL Verification Services, Inc.
Above 1GHz High Frequency Substitution Measurement

Company: Samsung
Project #: 14I19179
Date: 10/20/14
Test Engineer: O. Stoelting
Configuration: EUT w/ AC charger, headset
Mode: LTE17 10M QPSK HARM

Chamber	Pre-amplifer	Filter	Limit
3m Chamber	T34 8449B	Filter 1	Part 27

Band	f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
	Low Ch,709MHz									
LTE17	1.418	-21.6	V	3.0	37.8	1.0	-58.4	-13.0	-45.4	
	2.127	-29.1	V	3.0	36.7	1.0	-64.8	-13.0	-51.8	
10MHz	2.836	-27.6	V	3.0	36.2	1.0	-62.8	-13.0	-49.8	
	1.418	-20.4	H	3.0	37.8	1.0	-57.2	-13.0	-44.2	
QPSK	2.127	-29.7	H	3.0	36.7	1.0	-65.4	-13.0	-52.4	
	2.836	-28.4	H	3.0	36.2	1.0	-63.6	-13.0	-50.6	
	Mid Ch,710MHz									
	1.420	-19.8	V	3.0	37.8	1.0	-56.5	-13.0	-43.5	
	2.130	-28.7	V	3.0	36.7	1.0	-64.4	-13.0	-51.4	
	2.840	-27.5	V	3.0	36.2	1.0	-62.7	-13.0	-49.7	
	1.420	-17.7	H	3.0	37.8	1.0	-54.4	-13.0	-41.4	
	2.130	-29.5	H	3.0	36.7	1.0	-65.2	-13.0	-52.2	
	2.840	-27.9	H	3.0	36.2	1.0	-63.1	-13.0	-50.1	
	High Ch, 711MHz									
	1.422	-18.5	V	3.0	37.8	1.0	-55.2	-13.0	-42.2	
	2.133	-29.0	V	3.0	36.7	1.0	-64.7	-13.0	-51.7	
	2.844	-27.2	V	3.0	36.2	1.0	-62.4	-13.0	-49.4	
	1.422	-17.1	H	3.0	37.8	1.0	-53.9	-13.0	-40.9	
	2.133	-29.7	H	3.0	36.7	1.0	-65.4	-13.0	-52.4	
	2.844	-27.9	H	3.0	36.2	1.0	-63.1	-13.0	-50.1	

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

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UL Verification Services, Inc.
Above 1GHz High Frequency Substitution Measurement

Company: Samsung
Project #: 14I19179
Date: 10/20/14
Test Engineer: O. Stoelting
Configuration: X Position, EUT and AC Adapter
Mode: TX, LTE B17 5MHz 16QAM

Chamber	Pre-amplifer	Filter	Limit
3m Chamber	T345 8449B	Filter 1	Part 27

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, (706.5MHz)									
LTE17	1.413	-20.7	V	3.0	31.0	1.0	-50.7	-13.0	-37.7	
	2.120	-29.3	V	3.0	29.6	1.0	-57.9	-13.0	-44.9	
5MHz	2.826	-27.8	V	3.0	27.4	1.0	-54.2	-13.0	-41.2	
	1.413	-22.0	H	3.0	31.0	1.0	-52.0	-13.0	-39.0	
16QAM	2.120	-30.5	H	3.0	29.6	1.0	-59.1	-13.0	-46.1	
	2.826	-28.6	H	3.0	27.4	1.0	-55.0	-13.0	-42.0	
	Mid Ch, (710MHz)									
	1.420	-17.4	V	3.0	31.0	1.0	-47.4	-13.0	-34.4	
	2.130	-25.9	V	3.0	29.5	1.0	-54.4	-13.0	-41.4	
	2.840	-24.7	V	3.0	27.4	1.0	-51.0	-13.0	-38.0	
	1.420	-18.8	H	3.0	31.0	1.0	-48.8	-13.0	-35.8	
	2.130	-20.3	H	3.0	29.5	1.0	-48.9	-13.0	-35.9	
	2.840	-19.4	H	3.0	27.4	1.0	-45.8	-13.0	-32.8	
	High Ch, (713.5MHz)									
	1.427	-20.6	V	3.0	31.0	1.0	-50.5	-13.0	-37.5	
	2.141	-28.6	V	3.0	29.5	1.0	-57.1	-13.0	-44.1	
	2.854	-26.7	V	3.0	27.3	1.0	-53.0	-13.0	-40.0	
	1.427	-22.0	H	3.0	31.0	1.0	-51.9	-13.0	-38.9	
	2.141	-29.6	H	3.0	29.5	1.0	-58.1	-13.0	-45.1	
	2.854	-27.3	H	3.0	27.3	1.0	-53.6	-13.0	-40.6	

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

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UL Verification Services, Inc.
Above 1GHz High Frequency Substitution Measurement

Company: Samsung
Project #: 14I19179
Date: 10/20/14
Test Engineer: O. Stoelting
Configuration: X Position, EUT and AC Adapter
Mode: TX, LTE B17 5MHz QPSK

Chamber	Pre-amplifer	Filter	Limit
3m Chamber	T345 8449B	Filter 1	Part 27

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, (706.5MHz)									
LTE17	1.413	-17.7	V	3.0	31.0	1.0	-47.6	-13.0	-34.6	
	2.120	-27.3	V	3.0	29.6	1.0	-55.9	-13.0	-42.9	
5MHz	2.826	-25.9	V	3.0	27.4	1.0	-52.3	-13.0	-39.3	
	1.413	-20.5	H	3.0	31.0	1.0	-50.5	-13.0	-37.5	
QPSK	2.120	-30.2	H	3.0	29.6	1.0	-58.7	-13.0	-45.7	
	2.826	-28.5	H	3.0	27.4	1.0	-54.9	-13.0	-41.9	
	Mid Ch, (710MHz)									
	1.420	-17.7	V	3.0	31.0	1.0	-47.6	-13.0	-34.6	
	2.130	-25.5	V	3.0	29.5	1.0	-54.0	-13.0	-41.0	
	2.840	-22.3	V	3.0	27.4	1.0	-48.6	-13.0	-35.6	
	1.420	-20.3	H	3.0	31.0	1.0	-50.3	-13.0	-37.3	
	2.130	-20.6	H	3.0	29.5	1.0	-49.1	-13.0	-36.1	
	2.840	-18.2	H	3.0	27.4	1.0	-44.6	-13.0	-31.6	
	High Ch, (713.5MHz)									
	1.427	-27.7	V	3.0	31.0	1.0	-57.6	-13.0	-44.6	
	2.141	-26.6	V	3.0	29.5	1.0	-55.1	-13.0	-42.1	
	2.854	-23.3	V	3.0	27.3	1.0	-49.6	-13.0	-36.6	
	1.427	-30.4	H	3.0	31.0	1.0	-60.3	-13.0	-47.3	
	2.141	-29.5	H	3.0	29.5	1.0	-58.0	-13.0	-45.0	
	2.854	-28.2	H	3.0	27.3	1.0	-54.5	-13.0	-41.5	

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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UL Verification Services, Inc.
Above 1GHz High Frequency Substitution Measurement

Company: Samsung
Project #: 14I19179
Date: 10/20/14
Test Engineer: Jude Semana
Configuration: X Position w/AC charger and headphones
Mode: TX, LTE band 4, 20MHz BW, 16QAM

Chamber	Pre-amplifer	Filter	Limit
5m Chamber A	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	-35.3	V	3.0	26.4	1.0	-60.8	-13.0	-47.8	
5.160	-38.2	V	3.0	24.3	1.0	-61.5	-13.0	-48.5	
6.880	-37.5	V	3.0	23.2	1.0	-59.7	-13.0	-46.7	
3.440	-31.3	H	3.0	26.4	1.0	-56.8	-13.0	-43.8	
5.160	-36.8	H	3.0	24.3	1.0	-60.1	-13.0	-47.1	
6.880	-36.9	H	3.0	23.2	1.0	-59.1	-13.0	-46.1	
Mid Ch, (1732.5 MHz)									
3.465	-31.0	V	3.0	26.4	1.0	-56.4	-13.0	-43.4	
5.198	-39.1	V	3.0	24.3	1.0	-62.4	-13.0	-49.4	
6.930	-37.9	V	3.0	23.1	1.0	-60.1	-13.0	-47.1	
3.465	-32.5	H	3.0	26.4	1.0	-57.9	-13.0	-44.9	
5.198	-38.1	H	3.0	24.3	1.0	-61.4	-13.0	-48.4	
6.930	-36.9	H	3.0	23.1	1.0	-59.0	-13.0	-46.0	
High Ch, (1745 MHz)									
3.490	-33.7	V	3.0	26.4	1.0	-59.0	-13.0	-46.0	
5.235	-39.4	V	3.0	24.3	1.0	-62.6	-13.0	-49.6	
6.980	-38.2	V	3.0	23.1	1.0	-60.3	-13.0	-47.3	
3.490	-33.4	H	3.0	26.4	1.0	-58.8	-13.0	-45.8	
5.235	-37.6	H	3.0	24.3	1.0	-60.9	-13.0	-47.9	
6.980	-37.4	H	3.0	23.1	1.0	-59.5	-13.0	-46.5	

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

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UL Verification Services, Inc.
Above 1GHz High Frequency Substitution Measurement

Company: Samsung
Project #: 14I19179
Date: 10/20/14
Test Engineer: Jude Semana
Configuration: X Position w/AC charger and headphones
Mode: TX, LTE band 4, 20MHz BW, QPSK

Chamber	Pre-amplifer	Filter	Limit
5m Chamber A	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	-35.0	V	3.0	26.4	1.0	-60.5	-13.0	-47.5	
5.160	-38.0	V	3.0	24.3	1.0	-61.4	-13.0	-48.4	
6.880	-37.2	V	3.0	23.2	1.0	-59.4	-13.0	-46.4	
3.440	-31.2	H	3.0	26.4	1.0	-56.7	-13.0	-43.7	
5.160	-36.6	H	3.0	24.3	1.0	-60.0	-13.0	-47.0	
6.880	-36.7	H	3.0	23.2	1.0	-58.9	-13.0	-45.9	
Mid Ch, (1732.5 MHz)									
3.465	-30.3	V	3.0	26.4	1.0	-55.7	-13.0	-42.7	
5.198	-38.5	V	3.0	24.3	1.0	-61.8	-13.0	-48.8	
6.930	-37.8	V	3.0	23.1	1.0	-59.9	-13.0	-46.9	
3.465	-31.9	H	3.0	26.4	1.0	-57.3	-13.0	-44.3	
5.198	-38.1	H	3.0	24.3	1.0	-61.4	-13.0	-48.4	
6.930	-36.9	H	3.0	23.1	1.0	-59.0	-13.0	-46.0	
High Ch, (1745 MHz)									
3.490	-33.3	V	3.0	26.4	1.0	-58.7	-13.0	-45.7	
5.235	-39.6	V	3.0	24.3	1.0	-62.9	-13.0	-49.9	
6.980	-38.2	V	3.0	23.1	1.0	-60.3	-13.0	-47.3	
3.490	-33.0	H	3.0	26.4	1.0	-58.3	-13.0	-45.3	
5.235	-37.6	H	3.0	24.3	1.0	-60.9	-13.0	-47.9	
6.980	-37.4	H	3.0	23.1	1.0	-59.6	-13.0	-46.6	

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

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UL Verification Services, Inc.
Above 1GHz High Frequency Substitution Measurement

Company: Samsung
Project #: 14I19179
Date: 10/20/14
Test Engineer: Jude Semana
Configuration: X Position w/AC charger and headphones
Mode: TX, LTE band 4, 15MHz BW, 16QAM

Chamber	Pre-amplifer	Filter	Limit
5m Chamber A	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	-35.6	V	3.0	26.5	1.0	-61.0	-13.0	-48.0	
5.153	-37.9	V	3.0	24.3	1.0	-61.3	-13.0	-48.3	
6.870	-38.0	V	3.0	23.2	1.0	-60.1	-13.0	-47.1	
3.435	-33.2	H	3.0	26.5	1.0	-58.6	-13.0	-45.6	
5.153	-37.0	H	3.0	24.3	1.0	-60.3	-13.0	-47.3	
6.870	-36.7	H	3.0	23.2	1.0	-58.9	-13.0	-45.9	
Mid Ch, (1732.5 MHz)									
3.465	-30.1	V	3.0	26.4	1.0	-55.6	-13.0	-42.6	
5.198	-39.8	V	3.0	24.3	1.0	-63.1	-13.0	-50.1	
6.930	-37.5	V	3.0	23.1	1.0	-59.7	-13.0	-46.7	
3.465	-30.7	H	3.0	26.4	1.0	-56.2	-13.0	-43.2	
5.198	-37.8	H	3.0	24.3	1.0	-61.1	-13.0	-48.1	
6.930	-37.1	H	3.0	23.1	1.0	-59.3	-13.0	-46.3	
High Ch, (1747.5 MHz)									
3.495	-33.2	V	3.0	26.4	1.0	-58.5	-13.0	-45.5	
5.243	-39.5	V	3.0	24.3	1.0	-62.8	-13.0	-49.8	
6.990	-38.0	V	3.0	23.1	1.0	-60.1	-13.0	-47.1	
3.495	-35.3	H	3.0	26.4	1.0	-60.6	-13.0	-47.6	
5.243	-37.4	H	3.0	24.3	1.0	-60.6	-13.0	-47.6	
6.990	-37.3	H	3.0	23.1	1.0	-59.4	-13.0	-46.4	

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

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UL Verification Services, Inc.
Above 1GHz High Frequency Substitution Measurement

Company: Samsung
Project #: 14I19179
Date: 10/20/14
Test Engineer: Jude Semana
Configuration: X Position w/AC charger and headphones
Mode: TX, LTE band 4, 15MHz BW, QPSK

Chamber	Pre-amplifer	Filter	Limit
5m Chamber A	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	-35.6	V	3.0	26.5	1.0	-61.1	-13.0	-48.1	
5.153	-37.3	V	3.0	24.3	1.0	-60.7	-13.0	-47.7	
6.870	-37.9	V	3.0	23.2	1.0	-60.0	-13.0	-47.0	
3.435	-32.4	H	3.0	26.5	1.0	-57.8	-13.0	-44.8	
5.153	-33.1	H	3.0	24.3	1.0	-56.5	-13.0	-43.5	
6.870	-31.3	H	3.0	23.2	1.0	-53.5	-13.0	-40.5	
Mid Ch, (1732.5 MHz)									
3.465	-29.5	V	3.0	26.4	1.0	-54.9	-13.0	-41.9	
5.198	-39.8	V	3.0	24.3	1.0	-63.1	-13.0	-50.1	
6.930	-37.3	V	3.0	23.1	1.0	-59.4	-13.0	-46.4	
3.465	-30.0	H	3.0	26.4	1.0	-55.4	-13.0	-42.4	
5.198	-38.0	H	3.0	24.3	1.0	-61.3	-13.0	-48.3	
6.930	-37.2	H	3.0	23.1	1.0	-59.3	-13.0	-46.3	
High Ch, (1747.5 MHz)									
3.495	-33.1	V	3.0	26.4	1.0	-58.5	-13.0	-45.5	
5.243	-39.5	V	3.0	24.3	1.0	-62.8	-13.0	-49.8	
6.990	-37.6	V	3.0	23.1	1.0	-59.7	-13.0	-46.7	
3.495	-35.2	H	3.0	26.4	1.0	-60.5	-13.0	-47.5	
5.243	-37.5	H	3.0	24.3	1.0	-60.7	-13.0	-47.7	
6.990	-37.4	H	3.0	23.1	1.0	-59.5	-13.0	-46.5	

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

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UL Verification Services, Inc.
Above 1GHz High Frequency Substitution Measurement

Company: Samsung
Project #: 14I19179
Date: 10/20/14
Test Engineer: Jude Semana
Configuration: EUT, AC charger, and Earphone
Mode: TX, LTE band 4, 10MHz BW, 16QAM

Chamber	Pre-amplifer	Filter	Limit
5m Chamber A	T145 8449B	Filter 1	Part 27

Band
LTE4
10MHz
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, (1715 MHz)									
3.430	-35.4	V	3.0	30.4	1.0	-64.8	-13.0	-51.8	
5.145	-38.3	V	3.0	28.8	1.0	-66.1	-13.0	-53.1	
6.860	-36.9	V	3.0	27.1	1.0	-63.1	-13.0	-50.1	
3.430	-30.9	H	3.0	30.4	1.0	-60.3	-13.0	-47.3	
5.145	-36.9	H	3.0	28.8	1.0	-64.7	-13.0	-51.7	
6.860	-36.9	H	3.0	27.1	1.0	-63.0	-13.0	-50.0	
Mid Ch, (1732.5 MHz)									
3.465	-32.5	V	3.0	30.4	1.0	-61.9	-13.0	-48.9	
5.198	-38.7	V	3.0	28.7	1.0	-66.4	-13.0	-53.4	
6.930	-37.9	V	3.0	27.1	1.0	-64.0	-13.0	-51.0	
3.465	-34.0	H	3.0	30.4	1.0	-63.4	-13.0	-50.4	
5.198	-37.9	H	3.0	28.7	1.0	-65.6	-13.0	-52.6	
6.930	-37.1	H	3.0	27.1	1.0	-63.1	-13.0	-50.1	
High Ch, (1750 MHz)									
3.500	-33.3	V	3.0	30.4	1.0	-62.7	-13.0	-49.7	
5.250	-40.1	V	3.0	28.7	1.0	-67.8	-13.0	-54.8	
7.000	-38.1	V	3.0	27.0	1.0	-64.1	-13.0	-51.1	
3.500	-31.3	H	3.0	30.4	1.0	-60.7	-13.0	-47.7	
5.250	-37.5	H	3.0	28.7	1.0	-65.2	-13.0	-52.2	
7.000	-37.4	H	3.0	27.0	1.0	-63.4	-13.0	-50.4	

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

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UL Verification Services, Inc.
Above 1GHz High Frequency Substitution Measurement

Company: Samsung
Project #: 14I19179
Date: 10/20/14
Test Engineer: Jude Semana
Configuration: EUT, AC charger, and Earphone
Mode: TX, LTE band 4, 10MHz BW, QPSK

Chamber	Pre-amplifer	Filter	Limit
5m Chamber A	T145 8449B	Filter 1	Part 27

Band: LTE4, 10MHz, 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, (1715 MHz)									
3.430	-35.4	V	3.0	30.4	1.0	-64.8	-13.0	-51.8	
5.145	-38.4	V	3.0	28.8	1.0	-66.1	-13.0	-53.1	
6.860	-36.6	V	3.0	27.1	1.0	-62.7	-13.0	-49.7	
3.430	-30.5	H	3.0	30.4	1.0	-59.9	-13.0	-46.9	
5.145	-36.9	H	3.0	28.8	1.0	-64.7	-13.0	-51.7	
6.860	-36.8	H	3.0	27.1	1.0	-62.9	-13.0	-49.9	
Mid Ch, (1732.5 MHz)									
3.465	-32.1	V	3.0	30.4	1.0	-61.5	-13.0	-48.5	
5.198	-38.7	V	3.0	28.7	1.0	-66.4	-13.0	-53.4	
6.930	-37.8	V	3.0	27.1	1.0	-63.9	-13.0	-50.9	
3.465	-34.2	H	3.0	30.4	1.0	-63.6	-13.0	-50.6	
5.198	-39.2	H	3.0	28.7	1.0	-66.9	-13.0	-53.9	
6.930	-37.6	H	3.0	27.1	1.0	-63.7	-13.0	-50.7	
High Ch, (1750 MHz)									
3.500	-33.0	V	3.0	30.4	1.0	-62.4	-13.0	-49.4	
5.250	-40.2	V	3.0	28.7	1.0	-67.8	-13.0	-54.8	
7.000	-38.3	V	3.0	27.0	1.0	-64.3	-13.0	-51.3	
3.500	-31.4	H	3.0	30.4	1.0	-60.7	-13.0	-47.7	
5.250	-38.3	H	3.0	28.7	1.0	-65.9	-13.0	-52.9	
7.000	-37.3	H	3.0	27.0	1.0	-63.3	-13.0	-50.3	

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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UL Verification Services, Inc.
Above 1GHz High Frequency Substitution Measurement

Company: Samsung
Project #: 14I19179
Date: 10/20/14
Test Engineer: Jude Semana
Configuration: EUT, AC charger, and Earphone
Mode: TX, LTE band 4, 5MHz BW, 16 QAM

Chamber	Pre-amplifer	Filter	Limit
5m Chamber A	T145 8449B	Filter 1	Part 27

Band: LTE4, 5MHz, 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, (1712.5 MHz)									
3.425	-35.2	V	3.0	30.4	1.0	-64.7	-13.0	-51.7	
5.138	-37.9	V	3.0	28.8	1.0	-65.7	-13.0	-52.7	
6.850	-37.8	V	3.0	27.1	1.0	-64.0	-13.0	-51.0	
3.425	-27.8	H	3.0	30.4	1.0	-57.2	-13.0	-44.2	
5.138	-36.9	H	3.0	28.8	1.0	-64.7	-13.0	-51.7	
6.850	-36.6	H	3.0	27.1	1.0	-62.7	-13.0	-49.7	
Mid Ch, (1732.5 MHz)									
3.465	-26.9	V	3.0	30.4	1.0	-56.3	-13.0	-43.3	
5.198	-40.0	V	3.0	28.7	1.0	-67.7	-13.0	-54.7	
6.930	-36.7	V	3.0	27.1	1.0	-62.8	-13.0	-49.8	
3.465	-28.5	H	3.0	30.4	1.0	-57.9	-13.0	-44.9	
5.198	-37.7	H	3.0	28.7	1.0	-65.4	-13.0	-52.4	
6.930	-36.7	H	3.0	27.1	1.0	-62.8	-13.0	-49.8	
High Ch, (1752.5 MHz)									
3.505	-31.6	V	3.0	30.4	1.0	-60.9	-13.0	-47.9	
5.258	-38.1	V	3.0	28.6	1.0	-65.7	-13.0	-52.7	
7.010	-38.2	V	3.0	27.0	1.0	-64.2	-13.0	-51.2	
3.505	-27.4	H	3.0	30.4	1.0	-56.7	-13.0	-43.7	
5.258	-36.4	H	3.0	28.6	1.0	-64.0	-13.0	-51.0	
7.010	-37.6	H	3.0	27.0	1.0	-63.6	-13.0	-50.6	

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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UL Verification Services, Inc.
Above 1GHz High Frequency Substitution Measurement

Company: Samsung
Project #: 14I19179
Date: 10/20/14
Test Engineer: Jude Semana
Configuration: EUT, AC charger, and Earphone
Mode: TX, LTE band 4, 5MHz BW, QPSK

Chamber	Pre-amplifer	Filter	Limit
5m Chamber A	T145 8449B	Filter 1	Part 27

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, (1712.5 MHz)									
LTE4	3.425	-35.1	V	3.0	30.4	1.0	-64.5	-13.0	-51.5	
	5.138	-37.8	V	3.0	28.8	1.0	-65.6	-13.0	-52.6	
5MHz	6.850	-35.2	V	3.0	27.1	1.0	-61.3	-13.0	-48.3	
	3.425	-27.3	H	3.0	30.4	1.0	-56.8	-13.0	-43.8	
QPSK	5.138	-37.8	H	3.0	28.8	1.0	-65.6	-13.0	-52.6	
	6.850	-36.5	H	3.0	27.1	1.0	-62.6	-13.0	-49.6	
	Mid Ch, (1732.5 MHz)									
	3.465	-26.4	V	3.0	30.4	1.0	-55.8	-13.0	-42.8	
	5.198	-39.8	V	3.0	28.7	1.0	-67.5	-13.0	-54.5	
	6.930	-36.5	V	3.0	27.1	1.0	-62.6	-13.0	-49.6	
	3.465	-27.7	H	3.0	30.4	1.0	-57.1	-13.0	-44.1	
	5.198	-37.8	H	3.0	28.7	1.0	-65.5	-13.0	-52.5	
	6.930	-36.9	H	3.0	27.1	1.0	-62.9	-13.0	-49.9	
	High Ch, (1752.5 MHz)									
	3.505	-31.6	V	3.0	30.4	1.0	-61.0	-13.0	-48.0	
	5.258	-38.8	V	3.0	28.6	1.0	-66.4	-13.0	-53.4	
	7.010	-38.4	V	3.0	27.0	1.0	-64.4	-13.0	-51.4	
	3.505	-26.5	H	3.0	30.4	1.0	-55.9	-13.0	-42.9	
	5.258	-36.0	H	3.0	28.6	1.0	-63.6	-13.0	-50.6	
	7.010	-37.5	H	3.0	27.0	1.0	-63.4	-13.0	-50.4	

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

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UL Verification Services, Inc.
Above 1GHz High Frequency Substitution Measurement

Company: Samsung
Project #: 14I18800
Date: 10/20/14
Test Engineer: Jude Semana
Configuration: EUT, AC charger, and Earphone
Mode: TX, LTE band 4, 3MHz BW, 16 QAM

Chamber	Pre-amplifer	Filter	Limit
5m Chamber A	T145 8449B	Filter 1	Part 27

Band
LTE4
3MHz
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, (1711.5 MHz)									
3.423	-33.9	V	3.0	30.4	1.0	-63.4	-13.0	-50.4	
5.135	-38.6	V	3.0	28.8	1.0	-66.3	-13.0	-53.3	
6.846	-34.7	V	3.0	27.1	1.0	-60.9	-13.0	-47.9	
3.423	-26.8	H	3.0	30.4	1.0	-56.3	-13.0	-43.3	
5.135	-35.9	H	3.0	28.8	1.0	-63.7	-13.0	-50.7	
6.846	-35.8	H	3.0	27.1	1.0	-62.0	-13.0	-49.0	
Mid Ch, (1732.5 MHz)									
3.465	-26.9	V	3.0	30.4	1.0	-56.3	-13.0	-43.3	
5.198	-39.9	V	3.0	28.7	1.0	-67.6	-13.0	-54.6	
6.930	-36.0	V	3.0	27.1	1.0	-62.1	-13.0	-49.1	
3.465	-27.6	H	3.0	30.4	1.0	-57.0	-13.0	-44.0	
5.198	-37.6	H	3.0	28.7	1.0	-65.3	-13.0	-52.3	
6.930	-37.1	H	3.0	27.1	1.0	-63.2	-13.0	-50.2	
High Ch, (1753.5 MHz)									
3.507	-35.3	V	3.0	30.4	1.0	-64.6	-13.0	-51.6	
5.261	-38.4	V	3.0	28.6	1.0	-66.0	-13.0	-53.0	
7.014	-38.6	V	3.0	27.0	1.0	-64.6	-13.0	-51.6	
3.507	-28.5	H	3.0	30.4	1.0	-57.9	-13.0	-44.9	
5.261	-37.7	H	3.0	28.6	1.0	-65.4	-13.0	-52.4	
7.014	-37.7	H	3.0	27.0	1.0	-63.7	-13.0	-50.7	

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

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UL Verification Services, Inc.
Above 1GHz High Frequency Substitution Measurement

Company: Samsung
Project #: 14I18800
Date: 10/20/14
Test Engineer: Jude Semana
Configuration: EUT, AC charger, and Earphone
Mode: TX, LTE band 4, 3MHz BW, QPSK

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

Band: LTE4, 3MHz, 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, (1711.5 MHz)									
3.423	-26.7	V	3.0	30.4	1.0	-56.1	-13.0	-43.1	
5.135	-25.0	V	3.0	28.8	1.0	-52.8	-13.0	-39.8	
6.846	-20.8	V	3.0	27.1	1.0	-46.9	-13.0	-33.9	
3.423	-19.2	H	3.0	30.4	1.0	-48.7	-13.0	-35.7	
5.135	-23.3	H	3.0	28.8	1.0	-51.1	-13.0	-38.1	
6.846	-21.7	H	3.0	27.1	1.0	-47.9	-13.0	-34.9	
Mid Ch, (1732.5 MHz)									
3.465	-20.1	V	3.0	30.4	1.0	-49.5	-13.0	-36.5	
5.198	-25.7	V	3.0	28.7	1.0	-53.4	-13.0	-40.4	
6.930	-22.2	V	3.0	27.1	1.0	-48.3	-13.0	-35.3	
3.465	-19.3	H	3.0	30.4	1.0	-48.7	-13.0	-35.7	
5.198	-24.6	H	3.0	28.7	1.0	-52.3	-13.0	-39.3	
6.930	-22.9	H	3.0	27.1	1.0	-48.9	-13.0	-35.9	
High Ch, (1753.5 MHz)									
3.507	-27.9	V	3.0	30.4	1.0	-57.2	-13.0	-44.2	
5.261	-23.5	V	3.0	28.6	1.0	-51.1	-13.0	-38.1	
7.014	-24.3	V	3.0	27.0	1.0	-50.3	-13.0	-37.3	
3.507	-20.7	H	3.0	30.4	1.0	-50.1	-13.0	-37.1	
5.261	-24.1	H	3.0	28.6	1.0	-51.7	-13.0	-38.7	
7.014	-23.3	H	3.0	27.0	1.0	-49.3	-13.0	-36.3	

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

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UL Verification Services, Inc.
Above 1GHz High Frequency Substitution Measurement

Company: Samsung
Project #: 14I18800
Date: 10/20/14
Test Engineer: Jude Semana
Configuration: EUT, AC charger, and Earphone
Mode: TX, LTE band 4, 1.4MHz BW, 16 QAM

Chamber	Pre-amplifer	Filter	Limit
5m Chamber B	T145 8449B	Filter 1	Part 27

Band
LTE4
1.4MHz
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, (1710.7 MHz)									
3.421	-15.7	V	3.0	30.4	1.0	-45.1	-13.0	-32.1	
5.132	-17.0	V	3.0	28.8	1.0	-44.8	-13.0	-31.8	
6.843	-16.3	V	3.0	27.1	1.0	-42.5	-13.0	-29.5	
3.421	-12.6	H	3.0	30.4	1.0	-42.0	-13.0	-29.0	
5.132	-13.8	H	3.0	28.8	1.0	-41.6	-13.0	-28.6	
6.843	-12.9	H	3.0	27.1	1.0	-39.0	-13.0	-26.0	
Mid Ch, (1732.5 MHz)									
3.465	-16.7	V	3.0	30.4	1.0	-46.1	-13.0	-33.1	
5.198	-10.9	V	3.0	28.7	1.0	-38.6	-13.0	-25.6	
6.930	-18.6	V	3.0	27.1	1.0	-44.7	-13.0	-31.7	
3.465	-12.3	H	3.0	30.4	1.0	-41.7	-13.0	-28.7	
5.198	-12.7	H	3.0	28.7	1.0	-40.4	-13.0	-27.4	
6.930	-16.3	H	3.0	27.1	1.0	-42.4	-13.0	-29.4	
High Ch, (1754.3 MHz)									
3.509	-26.0	V	3.0	30.4	1.0	-55.4	-13.0	-42.4	
5.263	-21.6	V	3.0	28.6	1.0	-49.3	-13.0	-36.3	
7.017	-24.9	V	3.0	27.0	1.0	-50.9	-13.0	-37.9	
3.509	-16.5	H	3.0	30.4	1.0	-45.8	-13.0	-32.8	
5.263	-19.1	H	3.0	28.6	1.0	-46.8	-13.0	-33.8	
7.017	-23.4	H	3.0	27.0	1.0	-49.4	-13.0	-36.4	

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

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UL Verification Services, Inc.
Above 1GHz High Frequency Substitution Measurement

Company: Samsung
Project #: 14I18800
Date: 10/20/14
Test Engineer: Jude Semana
Configuration: EUT, AC charger, and Earphone
Mode: TX, LTE band 4, 1.4MHz BW, QPSK

Chamber	Pre-amplifer	Filter	Limit
5m Chamber A	T145 8449B	Filter 1	Part 27

Band: LTE4, 1.4MHz, 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, (1710.7 MHz)									
3.421	-23.8	V	3.0	30.4	1.0	-53.2	-13.0	-40.2	
5.132	-32.0	V	3.0	28.8	1.0	-59.7	-13.0	-46.7	
6.843	-30.2	V	3.0	27.1	1.0	-56.3	-13.0	-43.3	
3.421	-19.6	H	3.0	30.4	1.0	-49.0	-13.0	-36.0	
5.132	-28.3	H	3.0	28.8	1.0	-56.1	-13.0	-43.1	
6.843	-28.4	H	3.0	27.1	1.0	-54.5	-13.0	-41.5	
Mid Ch, (1732.5 MHz)									
3.465	-18.5	V	3.0	30.4	1.0	-47.9	-13.0	-34.9	
5.198	-24.7	V	3.0	28.7	1.0	-52.4	-13.0	-39.4	
6.930	-31.7	V	3.0	27.1	1.0	-57.8	-13.0	-44.8	
3.465	-17.8	H	3.0	30.4	1.0	-47.2	-13.0	-34.2	
5.198	-24.8	H	3.0	28.7	1.0	-52.5	-13.0	-39.5	
6.930	-29.0	H	3.0	27.1	1.0	-55.1	-13.0	-42.1	
High Ch, (1754.3 MHz)									
3.509	-33.4	V	3.0	30.4	1.0	-62.8	-13.0	-49.8	
5.263	-35.4	V	3.0	28.6	1.0	-63.0	-13.0	-50.0	
7.017	-38.3	V	3.0	27.0	1.0	-64.2	-13.0	-51.2	
3.509	-24.7	H	3.0	30.4	1.0	-54.0	-13.0	-41.0	
5.263	-31.5	H	3.0	28.6	1.0	-59.1	-13.0	-46.1	
7.017	-37.4	H	3.0	27.0	1.0	-63.4	-13.0	-50.4	

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

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