FCC CFR47 PART 22 SUBPART H
FCC CFR47 PART 24 SUBPART E
FCC CFR47 PART 27 SUBPART L
FCC CFR47 PART 27 SUBPART E

INDUSTRY CANADA RSS-130 ISSUE 1
INDUSTRY CANADA RSS-132 ISSUE 3
INDUSTRY CANADA RSS-133 ISSUE 6
INDUSTRY CANADA RSS-139 ISSUE 2
INDUSTRY CANADA RSS-199 ISSUE 1

CERTIFICATION TEST REPORT

FOR

GSM/WCDMA/CDMA/LTE Phone + Bluetooth & DTS/UNII a/b/g/n/ac + NFC

MODEL NUMBER: LG-VS985, VS985, LGVS985, AS985 LG-AS985 & LGAS985

FCC ID: ZNFVS985

IC: 2703C-VS985

REPORT NUMBER: 14U17502-1 REVISION A

ISSUE DATE: MAY 20, 2014

Prepared for

LG ELECTRONICS MOBILECOMM U.S.A., INC
1000 SYLVAN AVENUE
ENGLEWOOD CLIFFS,
NEW JERSEY, 07632, U.S.A.

Prepared by

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

NVLAP LAB CODE 200065-0

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME:	LG ELECTRONICS MOBILECOMM U.S.A., INC.
EUT DESCRIPTION:	GSM/CDMA/WCDMA/LTE Phone + Bluetooth, DTS/UNII a/b/g/n/ac and NFC.
MODEL:	LG-VS985, VS985, LGVS985, AS985 LG-AS985 & LGAS985
SERIAL NUMBER:	14ZMN (Conducted), 14ZK7 (Radiated)
DATE TESTED:	APRIL 14 – MAY 12, 2014

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
FCC PART 22H, 24E and 27F	PASS
INDUSTRY CANADA RSS-130,132,133,139,199	PASS
INDUSTRY CANADA RSS-GEN ISSUE 3	PASS

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

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

Approved & Released

For UL Verification Services Inc. By:

PENG ZHANG
CONSUMER TECHNOLOGY DIVISION

PROJECT LEAD
UL Verification Services Inc.

Tested By:

CHARLES VERGONIO
CONSUMER TECHNOLOGY DIVISION

LAB ENGINEER
UL Verification Services Inc.

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
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2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with TIA-603-C, FCC CFR 47 Part 22, FCC CFR Part 24, FCC CFR 47 Part 27; RSS-130, RSS-132, RSS-133, RSS-139, RSS-199, and RSS-GEN ISSUE 3.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 Benicia Street, Fremont, California, USA.

UL Verification Services Inc. is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at http://www.ul.com

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)

4.3. MEASUREMENT UNCERTAINTY

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

PARAMETER	UNCERTAINTY
Radiated Disturbance, 30 to 1000 MHz	4.94 dB
Radiated Disturbance, 1GHz to 40GHz	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/CDMA/LTE Phone + Bluetooth & DTS/UNII a/b/g/n/ac + NFC.

5.2. MAXIMUM OUTPUT POWER

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

FCC Part 22/2 4; RSS 132,133						
Band	Frequency Range(MHz)	Modulation Peak	Conducted		Radiated	
			Peak (dBm)	Peak (mW)	Peak (dBm)	Peak (mW)
GSM850	824~849	GMSK	33.0	1995.26		
	824~849	GPRS	33.1	2041.73	27.551	568.98
	824~849	EGPRS	27.7	588.84	25.351	342.85
GSM1900	1850~1910	GMSK	30.6	1148.15		
	1850~1910	GPRS	30.7	1174.89	29.33	857.04
	1850~1910	EGPRS	26.7	467.73	27.09	511.68

FCC Part 22/2 4;RSS 132,133						
Band	Frequency Range(MHz)	Modulation Peak	Conducted		Radiated	
			Avg (dBm)	Avg (mW)	Avg (dBm)	Avg (mW)
Band 5	824~849	REL99	23.5	223.87	18.581	72.13
	824~849	HSDPA	23.7	234.42	18.921	78
	824~849	HSUPA	23.2	214.78		
Band 2	1850~1910	REL99	23.6	229.08	21.4	138.04
	1850~1910	HSDPA	23.6	229.08	22.87	193.64
	1850~1910	HSUPA	23.1	204.17		
BC0	824~849	1xRTT	24.6	288.40	21.831	152.44
	824~849	EVDO REL. 0	24.6	288.40	21.392	137.78

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	824~849	EVDO REV. A	24.6	288.40		
BC1	1850~1910	1xRTT	24.7	295.12	21.084	128.35
	1850~1910	EVDO REL. 0	24.4	275.42	21.8	151.36
	1850~1910	EVDO REV. A	24.4	275.42		

5.3. MAXIMUM OUTPUT POWER (LTE)

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

FCC Part 27;RSS 130							
Band	Frequency Range(MHz)	BandWidth (MHz)	Modulation	Conducted		Radiated	
			Peak	Avg (dBm)	Avg (mW)	Avg (dBm)	Avg (mW)
LTE13	777~787	10MHz	QPSK	24.4	275.42	18.80	63.10
	777~787	10MHz	16QAM	23.3	213.79	17.70	58.88

FCC Part 27; RSS 199							
Band	Frequency Range(MHz)	BandWidth (MHz)	Modulation	Conducted		Radiated	
			Peak	Avg (dBm)	Avg (mW)	Avg (dBm)	Avg (mW)
LTE7	2500~2570	5MHz	QPSK	22.1	162.18	18.62	72.78
	2500~2570	5MHz	16QAM	20.7	117.48	17.82	60.53

FCC Part 27; RSS 199							
Band	Frequency Range(MHz)	BandWidth (MHz)	Modulation	Conducted		Radiated	
			Peak	Avg (dBm)	Avg (mW)	Avg (dBm)	Avg (mW)
LTE7	2500~2570	10MHz	QPSK	22.2	165.95	18.72	74.47
	2500~2570	10MHz	16QAM	20.7	117.48	17.92	61.94

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FCC Part 27; RSS 199							
Band	Frequency Range(MHz)	BandWidth (MHz)	Modulation	Conducted		Radiated	
			Peak	Avg (dBm)	Avg (mW)	Avg (dBm)	Avg (mW)
LTE7	2500~2570	15MHz	QPSK	22.2	165.96	18.80	75.86
	2500~2570	15MHz	16QAM	21.0	125.89	18.80	75.86

FCC Part 27; RSS 199							
Band	Frequency Range(MHz)	BandWidth (MHz)	Modulation	Conducted		Radiated	
			Peak	Avg (dBm)	Avg (mW)	Avg (dBm)	Avg (mW)
LTE7	2500~2570	20MHz	QPSK	22.2	165.96	18.80	75.86
	2500~2570	20MHz	16QAM	21.1	128.82	18.00	63.10

FCC Part 27,RSS 139							
Band	Frequency Range(MHz)	BandWidth (MHz)	Modulation	Conducted		Radiated	
			Peak	Avg (dBm)	Avg (mW)	Avg (dBm)	Avg (mW)
LTE4	1710~1755	5MHz	QPSK	24.2	263.02	22.82	191.43
	1710~1755	5MHz	16QAM	22.8	190.54	21.45	139.64

FCC Part 27,RSS 139							
Band	Frequency Range(MHz)	BandWidth (MHz)	Modulation	Conducted		Radiated	
			Peak	Avg (dBm)	Avg (mW)	Avg (dBm)	Avg (mW)
LTE4	1710~1755	10MHz	QPSK	24.2	263.02	22.65	184.08
	1710~1755	10MHz	16QAM	22.9	194.98	21.85	153.11

FCC Part 27,RSS 139							
Band	Frequency Range(MHz)	BandWidth (MHz)	Modulation	Conducted		Radiated	
			Peak	Avg (dBm)	Avg (mW)	Avg (dBm)	Avg (mW)
LTE4	1710~1755	15MHz	QPSK	24.1	257.03	22.74	187.93
	1710~1755	15MHz	16QAM	22.9	194.98	21.64	145.88

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FCC Part 27,RSS 139							
Band	Frequency Range(MHz)	BandWidth (MHz)	Modulation	Conducted		Radiated	
			Peak	Avg (dBm)	Avg (mW)	Avg (dBm)	Avg (mW)
LTE4	1710~1755	20MHz	QPSK	24.2	263.02	22.84	192.31
	1710~1755	20MHz	16QAM	22.9	194.98	21.94	156.31

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5.4. 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)
Band 5, 824~849MHz	-4.97
Band 2, 1850~1910MHz	-2.06
LTE4, 1710~1755MHz	-4.43
LTE7, 2500~2570MHz	-8.6
LTE13, 777~787MHz	-7.77

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5.5. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
AC Adapter	LG	MCS-04WT2	TA350000050	N/A
Earphone	LG	N/A	N/A	N/A
WPC Cover	LG	N/A	N/A	N/A
WPC Charger	LG	WPC-300	304HYBF00069	BEJWCP300

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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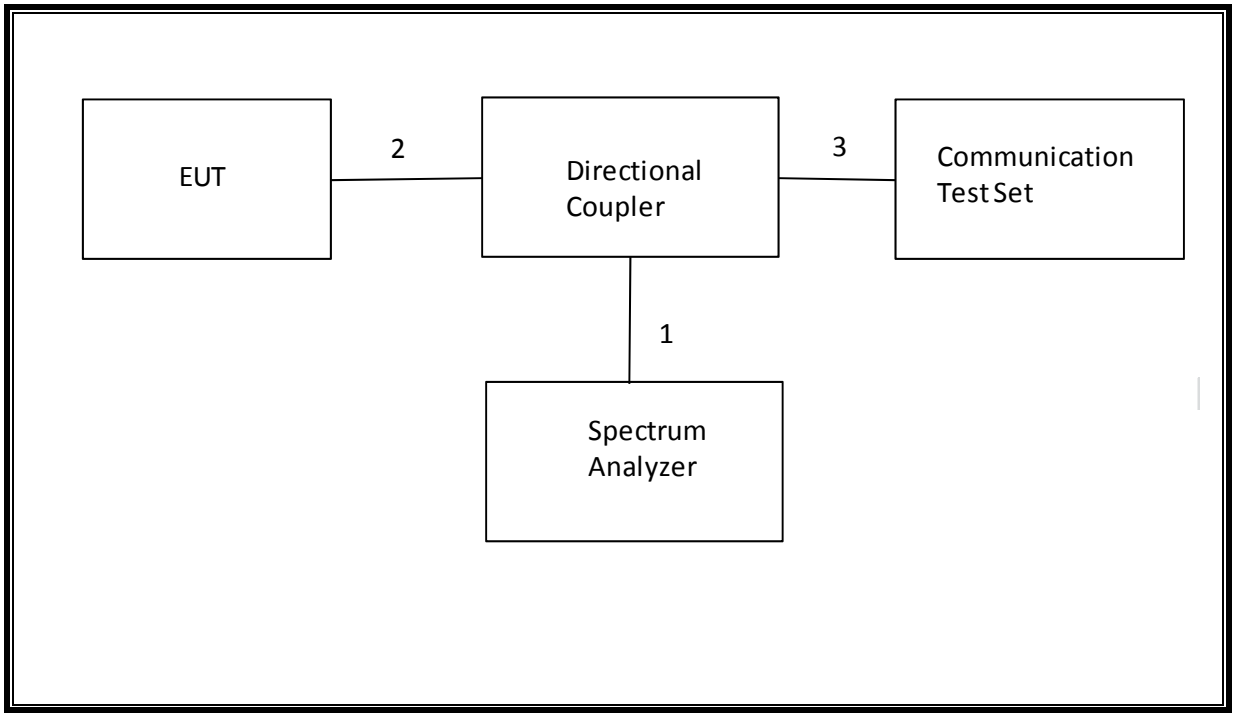
SETUP DIAGRAM FOR TESTS (CONDUCTED TEST SETUP)



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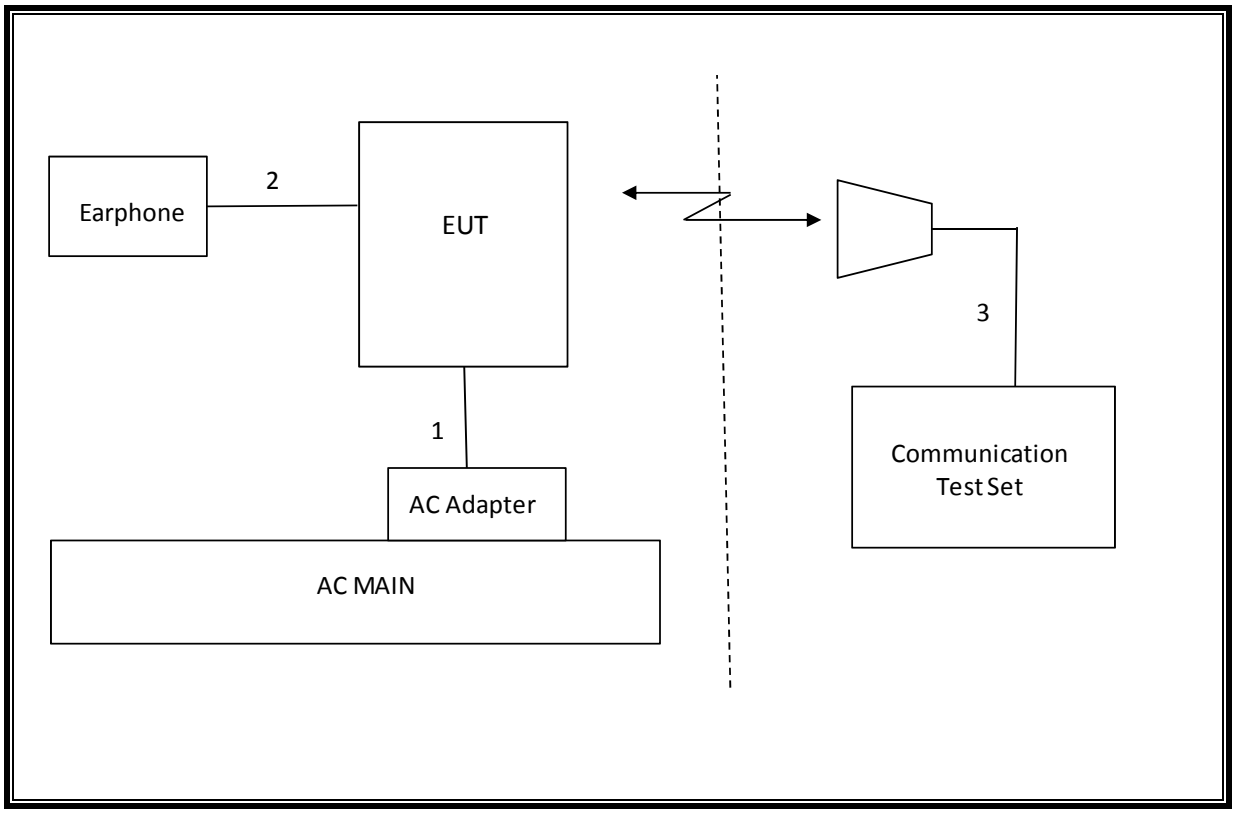
SETUP DIAGRAM FOR TESTS (RADIATED TEST SETUP)



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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**
Antenna, Horn, 18 GHz	EMCO	3115	C00872	10/25/14
Antenna, Horn, 18 GHz	EMCO	3115	C00783	10/25/14
Preamplifier, 1300 MHz	Agilent / HP	8447D	C00885	12/11/14
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C01179	02/26/15
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C01063	10/22/14
Communication Test Set	Agilent / HP	E5515C	C01086	06/20/14
Temperature / Humidity Chamber	Thermotron	SE 600-10-10	C00930	01/09/15
Highpass Filter, 1.5 GHz	Micro-Tronics	HPM13193	N02689	CNR
Highpass Filter, 2.7 GHz	Micro-Tronics	HPM13194	N02687	CNR
Antenna, Biconolog, 30MHz-1 GHz	Sunol Sciences	JB1	C01016	08/14/14
Vector signal generator, 6 GHz	Agilent / HP	E4438C	None	07/06/14

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7. Summary Table

FCC Part Section	RSS Section(s)	Test Description	Test Limit	Test Condition	Test Result	Worst Case
2.1049	N/A	Occupied Band width (99%)	N/A	Conducted	Pass	17.8735MHz
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	-13.545dBm
2.1046	N/A	Conducted output power	N/A		Pass	33.1dBm
22.355 24.235 27.54	RSS-132(4.3) RSS-133(6.3) RSS-139(6.3)	Frequency Stability	2.5PPM		Pass	0.006PPM
22.913(a)(2)	RSS-132(4.4)	Effective Radiated Power	38 dBm	Radiated	Pass	27.551dBm
27.50(b)(10)	RSS-130		34.77 dBm		Pass	19.52dBm
24.232(c)	RSS-133(6.4)	Equivalent Isotropic Radiated Power	33dBm		Pass	29.33dBm
27.50(d)(4)	RSS-139(6.4)		30dBm		Pass	22.06dBm
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	-30.5dBm

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8. RF POWER OUTPUT VERIFICATION

8.1. GSM/GPRS/EDGE

Function: Menu select > GSM Mobile Station > GSM 850/900/1800/1900

Press Connection control to choose the different menus

Press RESET > choose all to reset all settings

Connection Press Signal Off to turn off the signal and change settings

Network Support > GSM+GPRS or GSM+EGPRS

Main Service > Packet Data

Service selection > Test Mode A – Auto Slot Config. off

MS Signal Press Slot Config bottom on the right twice to select and change the number of time slots and power setting

> Slot configuration > Uplink/Gamma

> 33 dBm for GPRS 850/900

> 30 dBm for GPRS1800/1900

BS Signal Enter the same channel number for TCH channel (test channel) and BCCH channel

Frequency Offset > + 0 Hz

Mode > BCCH and TCH

BCCH Level > -85 dBm (May need to adjust if link is not stable)

BCCH Channel > choose desire test channel [Enter the same channel number for TCH channel (test channel) and BCCH channel]

Channel Type > Off

P0> 4 dB

Slot Config > Unchanged (if already set under MS Signal)

TCH > choose desired test channel

Hopping > Off

Main Timeslot > 3 (Default)

Network Coding Scheme > CS4 (GPRS) and MCS5 ~ MCS9 (EGPRS)

Bit Stream > 2E9-1PSR Bit Pattern

AF/RF Enter appropriate offsets for Ext. Att. Output and Ext. Att. Input

Connection Press Signal On to turn on the signal and change settings

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8.1.1. GSM OUTPUT POWER RESULT

Band	Mode	Ch.	f(MHz)	1 time slot	2 time slot	3 time slot	4 time slot
				Peak (dBm)	Peak (dBm)	Peak (dBm)	Peak (dBm)
GSM850	GMSK	128	824.2	33.0			
		190	836.6	33.0			
		251	848.8	32.9			
	GPRS	128	824.2	33.1	30.2		
		190	836.6	33.0	30.1		
		251	848.8	33.0	30.4		
	EGPRS	128	824.2	27.7	27.7		
		190	836.6	27.6	27.6		
		251	848.8	27.7	27.7		
GSM1900	GMSK	512	1850.2	30.6			
		661	1880	30.6			
		810	1909.8	30.5			
	GPRS	512	1850.2	30.7	28.5		
		661	1880	30.6	28.3		
		810	1909.8	30.6	28.5		
	EGPRS	512	1850.2	26.6	26.7		
		661	1880	26.6	26.6		
		810	1909.8	26.6	26.7		

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8.2. UMTS REL 99

TEST PROCEDURE

The following summary of these settings are illustrated below:

	Mode	Rel99
	Subtest	-
WCDMA General Settings	Loopback Mode	Test Mode 1
	Rel99 RMC	12.2kbps RMC
	HSDPA FRC	Not Applicable
	HSUPA Test	Not Applicable
	Power Control Algorithm	Algorithm2
	βc	Not Applicable
	βd	Not Applicable
	βec	Not Applicable
	βc/βd	8/15
	βhs	Not Applicable
	βed	Not Applicable

8.2.1. UMTS REL 99 OUTPUT POWER RESULT

Band	Mode	Ch.	f(MHz)	Conducted Power (dBm) Avg (dBm)
Band 5	REL99	4132	826.4	23.5
		4183	836.6	23.5
		4233	846.6	23.5
Band 2	REL99	9262	1852.4	23.6
		9400	1880	23.5
		9538	1907.6	23.5

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8.3. UMTS HSDPA

The following 4 Sub-tests were completed according to Release 5 procedures in section 5.2 of 3GPP TS34.121. A summary of these settings are illustrated below:

	Mode	Rel5 HSDPA			
	Subtest	1	2	3	4
WCDMA General Settings	Loopback Mode	Test Mode 1			
	Rel99 RMC	12.2kbps RMC			
	HSDPA FRC	H-Set1			
	Power Control Algorithm	Algorithm 2			
	βc	2/15	12/15	15/15	15/15
	βd	15/15	15/15	8/15	4/15
	Bd (SF)	64			
	βc/βd	2/15	12/15	15/8	15/4
	βhs	4/15	24/15	30/15	30/15
	MPR (dB)	0	0	0.5	0.5
HSDPA Specific Settings	D_{ACK}	8			
	D_{NAK}	8			
	DCQI	8			
	Ack-Nack repetition factor	3			
	CQI Feedback (Table 5.2B.4)	4ms			
	CQI Repetition Factor (Table 5.2B.4)	2			
	Ahs =βhs/βc	30/15			

8.3.1. UMTS HSDPA OUTPUT POWER RESULT

Band	Mode	Subset	Ch.	f(MHz)	Conducted Power (dBm) Avg (dBm)
Band 5	HSDPA	1	4132	826.4	23.3
			4183	836.6	23.2
			4233	846.6	23.4
		2	4132	826.4	23.7
			4183	836.6	23.3
			4233	846.6	23.5
		3	4132	826.4	23.2
			4183	836.6	22.8
			4233	846.6	23.0
		4	4132	826.4	23.2
			4183	836.6	22.8
			4233	846.6	23.0
Band 2	HSDPA	1	9262	1852.4	23.6
			9400	1880	23.5

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			9538	1907.6	23.6
		2	9262	1852.4	23.6
			9400	1880	23.5
			9538	1907.6	23.6
		3	9262	1852.4	23.0
			9400	1880	23.0
			9538	1907.6	23.2
		4	9262	1852.4	23.0
			9400	1880	23.0
			9538	1907.6	23.2

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8.3.2. UMTS HSUPA

TEST PROCEDURE

The following summary of these settings are illustrated below: (ETSI TS 134.121-1 Table C.11.1)

	Mode	Rel6 HSUPA	Rel6 HSUPA	Rel6 HSUPA	Rel6 HSUPA	Rel6 HSUPA
	Subtest	1	2	3	4	5
WCDMA General Settings	Loopback Mode	Test Mode 1				
	P-CPICH (dB)	-10				
	P-CCPCH (dB)	-12				
	SCH (dB)	-12				
	PICH(dB)	-15				
	DPCH (dB)	-9				
	HS-SCCH_1 (dB)	-8				
	HS-PDSCH (dB)	-3				
	Rel99 RMC	12.2kbps RMC				
	HSDPA FRC	H-Set1				
	HSUPA Test	HSUPA Loopback				
	Power Control Algorithm	Algorithm2				
	Bc	11/15	6/15	15/15	2/15	15/15
	Bd	15/15	15/15	9/15	15/15	15/15
	Bec	209/225	12/15	30/15	2/15	5/15
	βc/βd	11/15	6/15	15/9	2/15	15/15
	Bhs	22/15	12/15	30/15	4/15	30/15
	βed (note1)	1309/225	94/75	47/15 47/15	56/75	134/15
	MPR	0	2	1	2	0
HSDPA Specific Settings	DACK	8				
	DNAK	8				
	DCQI	8				
	Ack-Nack repetition factor	3				
	CQI Feedback (Table 5.2B.4)	4ms				
	CQI Repetition Factor (Table 5.2B.4)	2				
	Ahs = βhs/βc	30/15				
HSUPA Specific Settings	D E-DPCCH	6	8	8	5	7
	DHARQ	0	0	0	0	0
	AG Index	20	12	15	17	21
	Reference E-TFCIs	5	5	2	5	5
	ETFCI (from 34.121 Table C.11.1.3)	75	67	92	71	81
	Associated Max UL Data Rate kbps	242.1	174.9	482.8	205.8	308.9
	Reference E_TFCIs	E-TFCI 11 E-TFCI PO 4 E-TFCI 67 E-TFCI PO 18 E-TFCI 71 E-TFCI PO 23 E-TFCI 75 E-TFCI PO 26 E-TFCI 81 E-TFCI PO 27		E-TFCI 11 E-TFCI PO 4 E-TFCI 92 E-TFCI PO 18	E-TFCI 11 E-TFCI PO 4 E-TFCI 67 E-TFCI PO 18 E-TFCI 71 E-TFCI PO 23 E-TFCI 75 E-TFCI PO 26 E-TFCI 81 E-TFCI PO 27	

Note1: βed cannot be set directly, it is set by Absolute Grant Value.

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8.3.3. UMTS HSUPA OUTPUT POWER RESULT

Band	Mode	Subset	Ch.	f(MHz)	Conducted Power (dBm) Avg (dBm)
Band 5	HSUPA	1	4132	826.4	22.9
			4183	836.6	23.1
			4233	846.6	23.2
		2	4132	826.4	21.5
			4183	836.6	21.5
			4233	846.6	21.8
		3	4132	826.4	22.8
			4183	836.6	22.6
			4233	846.6	22.5
		4	4132	826.4	21.9
			4183	836.6	22.2
			4233	846.6	22.2
		5	4132	826.4	22.6
			4183	836.6	22.5
			4233	846.6	23.1
Band 2	HSUPA	1	9262	1852.4	22.8
			9400	1880	23.1
			9538	1907.6	22.5
		2	9262	1852.4	21.7
			9400	1880	20.5
			9538	1907.6	21.7
		3	9262	1852.4	22.8
			9400	1880	23.1
			9538	1907.6	22.9
		4	9262	1852.4	21.9
			9400	1880	22.2
			9538	1907.6	21.8
		5	9262	1852.4	22.7
			9400	1880	22.9
			9538	1907.6	23.7

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8.4. CDMA2000

8.4.1. 1xRTT

TEST PROCEDURE

This procedure assumes the Agilest 8960 Test Set has the following applications installed and with valid license.

Application	Rev, License
CDMA2000 Mobile Test	B.13.08, L

- Call Setup > Shift & Preset
- Cell Info > Cell Parameters > System ID (SID) > 7
  > Network ID (NID) > 1
- Protocol Rev > 6 (IS-2000-0)
- Radio Config (RC) > Please see following table or details
- FCH Service Option (SO) Setup > Please see following table or details
- Traffic Data Rate > Full
- TDSO SCH Info > F-SCH Parameters > F-SCH Data Rate > 153.6 kbps
  > R-SCH Parameters > R-SCH Data Rate > 153.6 kbps
- Rvs Power Ctrl > Active bits
  - Rvs Power Ctrl > All Up bits (Maximum TxPout)

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8.4.2. CDMA2000 OUTPUT POWER RESULT

1xRTT **Full Power**

Band	Mode	Ch	Freq. (MHz)	Avg Pwr (dBm)
BC 0	RC1, SO55 (Loopback)	1013	824.70	24.4
		384	836.52	24.6
		777	848.31	24.5
	RC3, SO55 (Loopback)	1013	824.70	24.4
		384	836.52	24.6
		777	848.31	24.5
	RC3, SO32 (+F-SCH)	1013	824.70	24.4
		384	836.52	24.6
		777	848.31	24.5

1xRTT **Full Power**

Band	Mode	Ch	Freq. (MHz)	Avg Pwr (dBm)
BC 1	RC1 SO55 (Loopback)	25	1851.25	24.6
		600	1880.00	24.6
		1175	1908.75	24.7
	RC3 SO55 (Loopback)	25	1851.25	24.6
		600	1880.00	24.6
		1175	1908.75	24.6
	RC3 SO32 (+F-SCH)	25	1851.25	24.6
		600	1880.00	24.6
		1175	1908.75	24.7

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8.4.3. 1xEV-DO Release 0

TEST PROCEDURE

This procedure assumes the Agilent 8960 Test Set has the following applications installed and with valid license.

Application	Rev, License
1xEV-DO Terminal Test	A.09.13

EVDO Release 0 - RTAP

- Call Setup > Shift & Preset
- Call Control:
  - Access Network Info > Cell Parameters > Sector ID > 00000000 > Subnet Mask > 0
  - Generator Info > Termination Parameters > Max Forward Packet Duration > 16 Slots
- Call Parms:
  - Cell Power > -105.5 dBm/1.23 MHz
  - Cell Band > (Select US Cellular or US PCS)
  - Channel > (Enter channel number)
  - Application Config > Enhanced Test Application Protocol > RTAP
  - RTAP Rate > 153.6 kbps
  - Rvs Power Ctrl > Active bits
  - Protocol Rel > 0 (1xEV-DO)
- Press “Start Data Connection” when “Session Open” appear in “Active Cell”
- Rvs Power Ctrl > All Up bits (Maximum TxPout)

EVDO Release 0 - FTAP

- Call Setup > Shift & Preset
- Call Control:
  - Access Network Info > Cell Parameters > Sector ID > 00000000 > Subnet Mask > 0
  - Generator Info > Termination Parameters > Max Forward Packet Duration > 16 Slots
- Call Parms:
  - Cell Power > -105.5 dBm/1.23 MHz
  - Cell Band > (Select US Cellular or US PCS)
  - Channel > (Enter channel number)
  - Application Config > Enhanced Test Application Protocol > FTAP (default)
  - FTAP Rate > 307.2 kbps (2 Slot, QPSK)
  - Rvs Power Ctrl > Active bits
  - Protocol Rel > 0 (1xEV-DO)
- Press “Start Data Connection” when “Session Open” appear in “Active Cell”
- Rvs Power Ctrl > All Up bits (Maximum TxPout)

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8.4.4. 1XEVDO REL 0 OUTPUT POWER RESULT

1xEv-Do Rel. 0

Band	FTAP Rate	Channel	f (MHz)	Avg Pwr (dBm)
BC0	307.2 kbps (2 slot, QPSK)	1013	824.70	24.5
		384	836.52	24.6
		777	848.31	24.5

1xEv-Do Rel. 0

Band	FTAP Rate	Channel	f (MHz)	Avg Pwr (dBm)
BC 1	307.2 kbps (2 slot, QPSK)	25	1851.25	24.3
		600	1880.00	24.3
		1175	1908.75	24.4

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8.4.5. 1xEV-DO Rev. A

TEST PROCEDURE

This procedure assumes the Agilent 8960 Test Set has the following applications installed and with valid license.

Application	Rev, License
1xEV-DO Terminal Test	A.09.13

EVDO Release A – RETAP

- Call Setup > Shift & Preset
- Cell Power > -60 dBm/1.23 MHz
- Protocol Rev > A (1xEV-DO-A)
- Application Config > Enhanced Test Application Protocol > RETAP
- R-Data Pkt Size > 4096
- Protocol Subtype Config > Release A Physical Layer Subtype > Subtype 2

> PL Subtype 2 Access Channel MAC Subtype > Default (Subtype 0)

- Access Network Info > Cell Parameters > Sector ID > 00000000 > Subnet Mask > 0
- Generator Info > Termination Parameters > Max Forward Packet Duration >16 Slots > ACK R-Data After > Subpacket 0 (All ACK)
- Rvs Power Ctrl > All Up bits (to get the maximum power)

EVDO Release A - FETAP

- Call Setup > Shift & Preset
- Cell Power > -60 dBm/1.23 MHz
- Protocol Rev > A (1xEV-DO-A)
- Application Config > Enhanced Test Application Protocol > FETAP
- F-Traffic Format > 4 (1024, 2,128) Canonical (307.2k, QPSK)
- Protocol Subtype Config > Release A Physical Layer Subtype > Subtype 2

> PL Subtype 2 Access Channel MAC Subtype > Default (Subtype 0)

- Access Network Info > Cell Parameters > Sector ID > 00000000 > Subnet Mask > 0
- Generator Info > Termination Parameters > Max Forward Packet Duration >16 Slots > ACK R-Data After > Subpacket 0 (All ACK)
- Rvs Power Ctrl > All Up bits (to get the maximum power)

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8.4.6. 1xEVDO REV A OUTPUT RESULT

1xEv-Do Rev. A

Band	FETAP Traffic Format	Channel	f (MHz)	Avg Pwr (dBm)
BC0	307.2k, QPSK/ ACK channel is transmitted at all the slots	1013	824.70	24.5
		384	836.52	24.7
		777	848.31	24.5

1xEv-Do Rev. A

Band	FETAP Traffic Format	Channel	f (MHz)	Avg Pwr (dBm)
BC 1	307.2k, QPSK/ ACK channel is transmitted at all the slots	25	1851.25	24.2
		600	1880	24.3
		1175	1908.75	24.4

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8.5. LTE OUTPUT VERIFICATION

8.5.1. LTE OUTPUT RESULT

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Avg Pwr (dBm)
						23230
						782 MHz
LTE Band 13	10	QPSK	1	0	0	24.2
			1	25	0	24.2
			1	49	0	24.2
			25	0	1	23.3
			25	12	1	23.3
			25	25	1	23.3
			50	0	1	23.4
		16QAM	1	0	1	23.3
			1	25	1	23.3
			1	49	1	23.3
			25	0	2	22.3
			25	12	2	22.3
			25	25	2	22.3
			50	0	2	22.4

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Avg Pwr (dBm)		
						20850	21100	21350
						2510 MHz	2535 MHz	2560 MHz
LTE Band 7	20	QPSK	1	0	0	22.1	22.2	22.1
			1	49	0	22.0	22.2	22.1
			1	99	0	22.0	22.2	22.1
			50	0	1	21.0	21.2	21.1
			50	24	1	21.0	21.2	21.1
			50	50	1	21.0	21.2	21.1
			100	0	1	21.0	21.2	21.1
		16QAM	1	0	1	21.0	21.1	21.0
			1	49	1	20.8	21.1	21.0
			1	99	1	20.8	21.1	20.8
			50	0	2	20.0	20.2	20.0
			50	24	2	20.0	20.1	20.0
			50	50	2	20.0	20.1	20.0
			100	0	2	20.0	20.1	20.0
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Avg Pwr (dBm)		
						20825	21100	21375

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						2507.5 MHz	2535 MHz	2562.5 MHz
LTE Band 7	15	QPSK	1	0	0	22.1	22.2	22.2
			1	37	0	22.0	22.2	22.2
			1	74	0	22.0	22.2	22.1
			36	0	1	21.0	21.1	21.1
			36	20	1	20.9	21.1	21.1
			36	39	1	20.9	21.1	21.0
			75	0	1	21.0	21.1	21.1
		16QAM	1	0	1	21.0	20.7	20.6
			1	37	1	20.9	20.7	20.7
			1	74	1	20.9	20.7	20.6
			36	0	2	20.0	20.0	20.0
			36	20	2	19.8	20.0	20.0
			36	39	2	19.8	20.0	19.9
			75	0	2	19.9	20.0	19.9
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Avg Pwr (dBm)		
						20800	21100	21400
						2505 MHz	2535 MHz	2565 MHz
LTE Band 7	10	QPSK	1	0	0	22.1	22.2	22.2
			1	25	0	22.0	22.2	22.2
			1	49	0	22.0	22.2	22.1
			25	0	1	21.1	21.2	21.2
			25	12	1	21.0	21.2	21.1
			25	25	1	21.0	21.2	21.1
			50	0	1	21.1	21.2	21.1
		16QAM	1	0	1	20.6	20.7	20.7
			1	25	1	20.6	20.7	20.6
			1	49	1	20.5	20.7	20.6
			25	0	2	20.0	20.0	20.1
			25	12	2	20.0	20.1	20.1
			25	25	2	19.9	20.1	20.0
			50	0	2	20.0	20.1	20.0
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Avg Pwr (dBm)		
						20775	21100	21425
						2502.5 MHz	2535 MHz	2567.5 MHz
LTE Band 7	5	QPSK	1	0	0	22.0	22.1	22.1
			1	12	0	22.0	22.1	22.1
			1	24	0	22.0	22.1	22.1
			12	0	1	21.1	21.2	21.0
			12	7	1	21.1	21.2	21.1
			12	13	1	21.1	21.2	21.1
			25	0	1	21.1	21.2	21.1
		16QAM	1	0	1	20.6	20.7	20.6
			1	12	1	20.5	20.6	20.5

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			1	24	1	20.6	20.7	20.6
			12	0	2	20.0	20.1	20.1
			12	7	2	20.0	20.1	20.0
			12	13	2	20.0	20.1	20.0
			25	0	2	20.1	20.2	20.1

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	24.1	24.1	24.1
			1	49	0	24.1	24.2	24.2
			1	99	0	24.2	24.2	24.1
			50	0	1	23.0	23.0	23.1
			50	24	1	23.0	23.0	23.1
			50	50	1	23.0	23.0	23.2
			100	0	1	23.0	23.0	23.2
		16QAM	1	0	1	22.7	22.8	22.8
			1	49	1	22.8	22.8	22.8
			1	99	1	22.8	22.9	22.7
			50	0	2	22.0	22.0	22.1
			50	24	2	22.0	22.0	22.1
			50	50	2	22.0	22.0	22.1
			100	0	2	22.0	22.0	22.1
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	24.0	24.0	24.1
			1	37	0	23.9	24.1	24.1
			1	74	0	24.0	24.1	24.1
			36	0	1	23.0	23.1	23.1
			36	20	1	22.9	23.0	23.1
			36	39	1	22.9	23.0	23.0
			75	0	1	23.0	23.0	23.1
		16QAM	1	0	1	22.4	22.5	22.9
			1	37	1	22.4	22.5	22.9
			1	74	1	22.4	22.5	22.9
			36	0	2	21.7	22.0	22.0
			36	20	2	21.7	21.8	22.0
			36	39	2	21.8	21.8	22.0
			75	0	2	21.8	21.9	22.1
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Avg Pwr (dBm)		
						20000	20175	20350
						1715 MHz	1732.5 MHz	1750 MHz

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LTE Band 4	10	QPSK	1	0	0	23.9	24.2	24.2
			1	25	0	24.0	24.1	24.2
			1	49	0	24.1	24.1	24.1
			25	0	1	23.0	23.0	23.0
			25	12	1	23.0	23.0	23.1
			25	25	1	22.9	23.0	23.1
			50	0	1	23.1	23.1	23.1
		16QAM	1	0	1	22.4	22.8	22.6
			1	25	1	22.4	22.6	22.6
			1	49	1	22.4	22.6	22.5
			25	0	2	21.8	22.0	22.1
			25	12	2	22.0	22.0	22.1
			25	25	2	21.8	22.0	22.0
			50	0	2	22.0	22.0	22.1
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	24.0	24.1	24.2
			1	12	0	24.0	24.1	24.2
			1	24	0	24.0	24.1	24.2
			12	0	1	23.0	23.0	23.2
			12	7	1	23.0	23.0	23.2
			12	13	1	23.0	23.0	23.0
			25	0	1	23.0	23.0	23.2
		16QAM	1	0	1	22.4	22.6	22.8
			1	12	1	22.4	22.6	22.9
			1	24	1	22.5	22.6	22.7
			12	0	2	22.0	22.0	22.1
			12	7	2	22.0	22.0	22.1
			12	13	2	22.0	22.0	22.0
			25	0	2	22.0	22.1	22.0

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9. PEAK TO AVERAGE RATIO

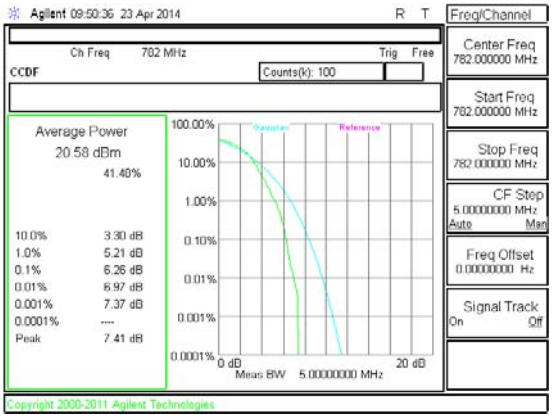
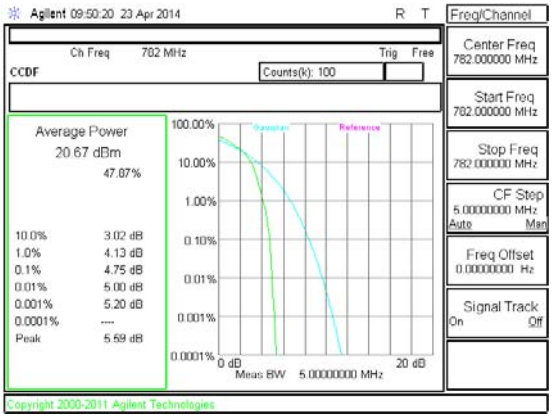
Test Procedure

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 LTE13 10MHz 16QAM	 Band LTE13 10MHz 16QAM High channel	 Band LTE13 10MHz QPSK High channel

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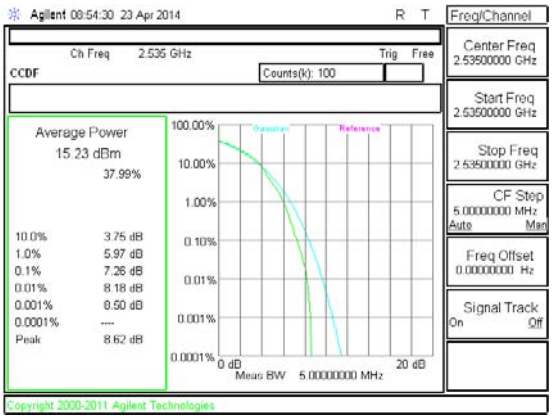
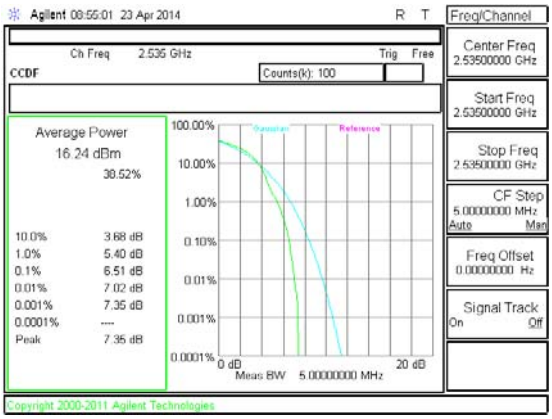
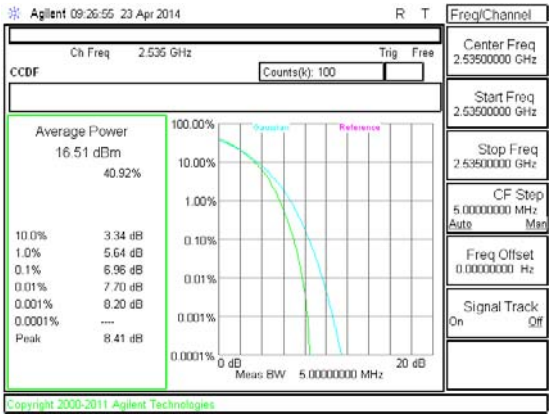
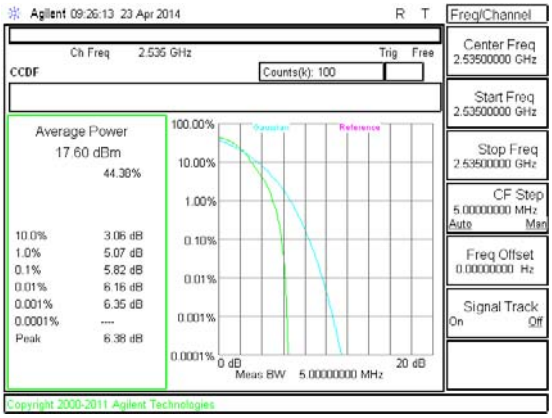
Band LTE7 20MHz 16QAM	 Band LTE7 20MHz 16QAM Mid channel	 Band LTE7 20MHz QPSK Mid channel

Band LTE7 15MHz 16QAM	 Band LTE7 15MHz 16QAM Mid channel	 Band LTE7 15MHz QPSK Mid channel

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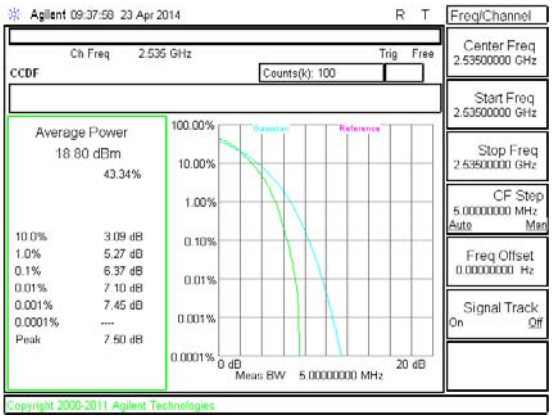
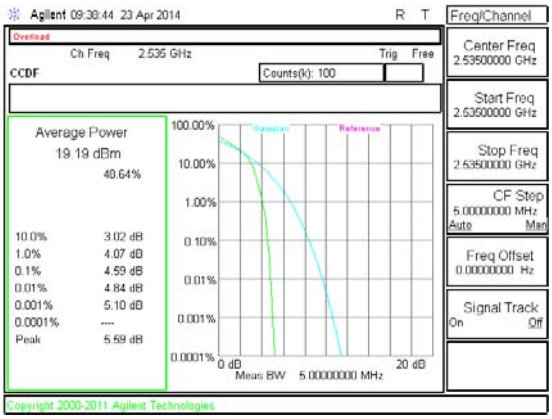
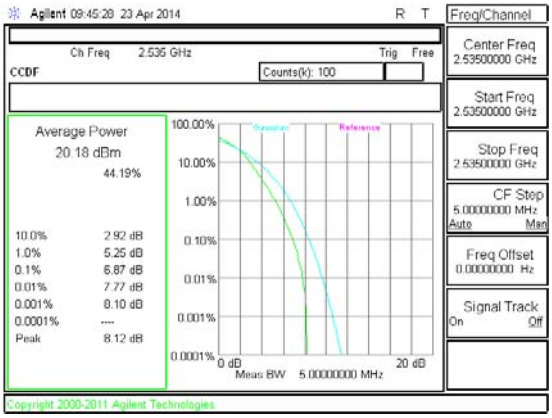
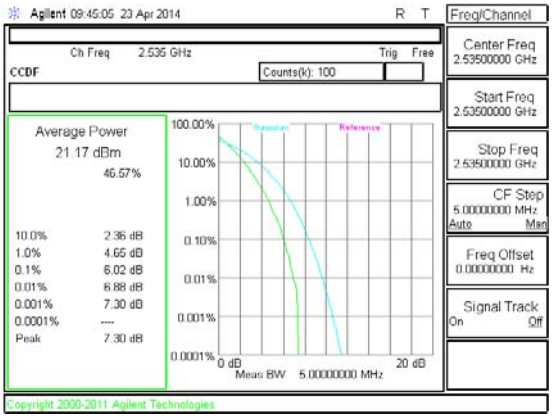
Band LTE7 10MHz 16QAM	 Band LTE7 10MHz 16QAM Mid channel	 Band LTE7 10MHz QPSK Mid channel
Band LTE7 5MHz 16QAM	 Band LTE7 5MHz 16QAM Mid channel	 Band LTE7 5MHz QPSK Mid channel

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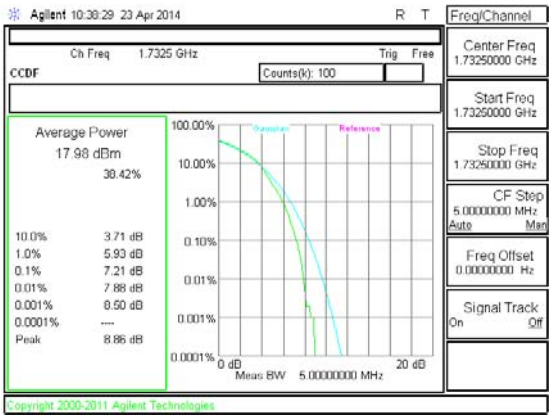
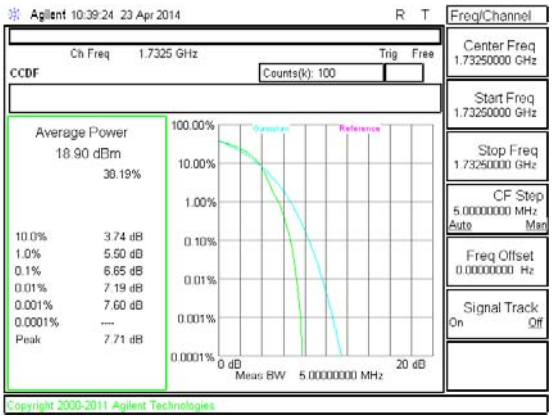
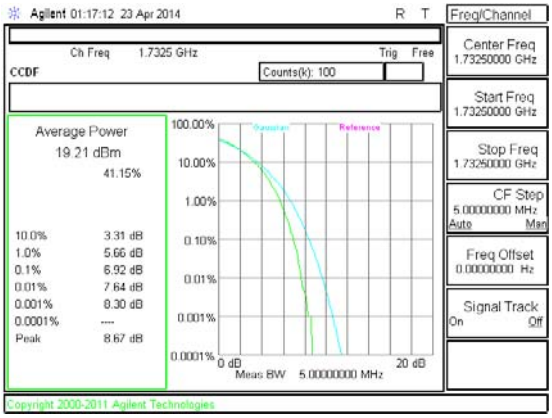
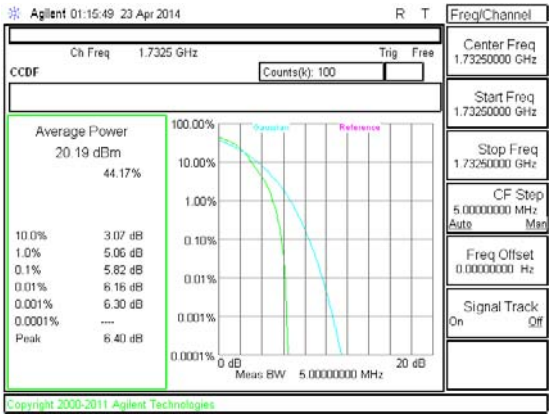
Band LTE4 20MHz 16QAM	 Band LTE4 20MHz 16QAM Mid channel	 Band LTE4 20MHz QPSK Mid channel

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

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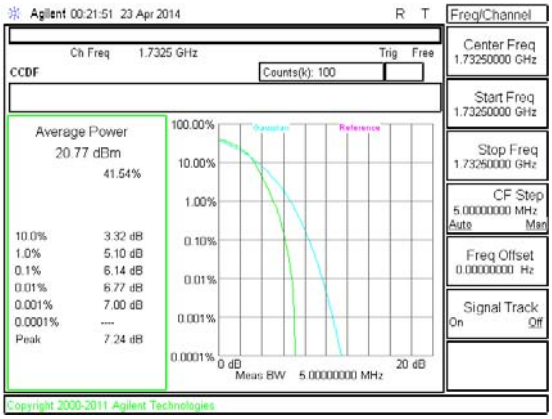
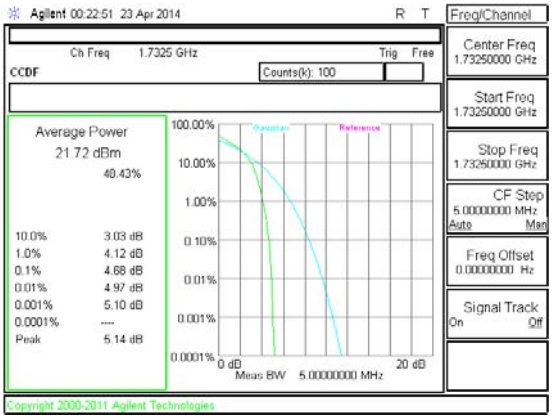
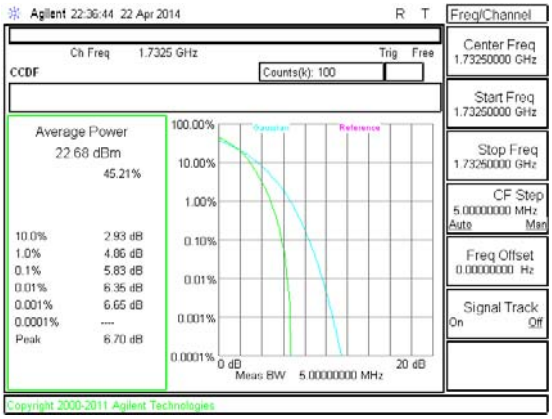
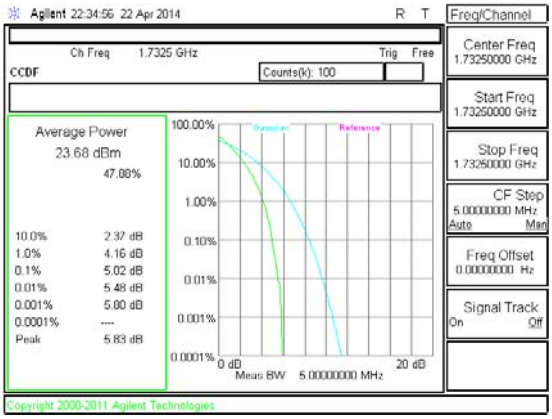
Band LTE4 10MHz 16QAM	 Band LTE4 10MHz 16QAM Mid channel	 Band LTE4 10MHz QPSK Mid channel
Band LTE4 5MHz 16QAM	 Band LTE4 5MHz 16QAM Mid channel	 Band LTE4 5MHz QPSK Mid channel

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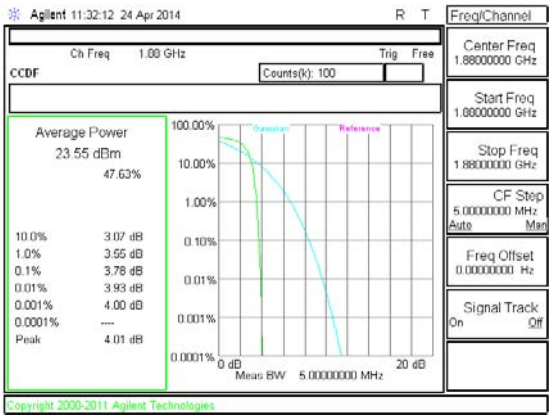
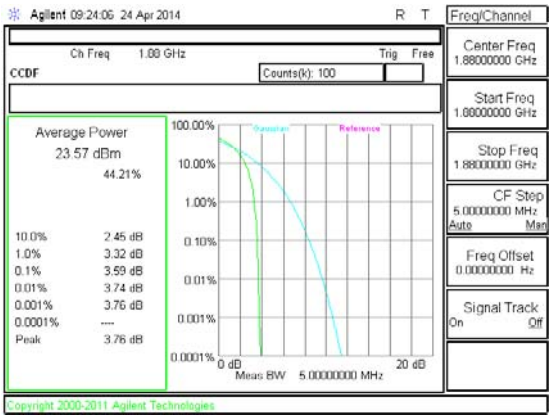
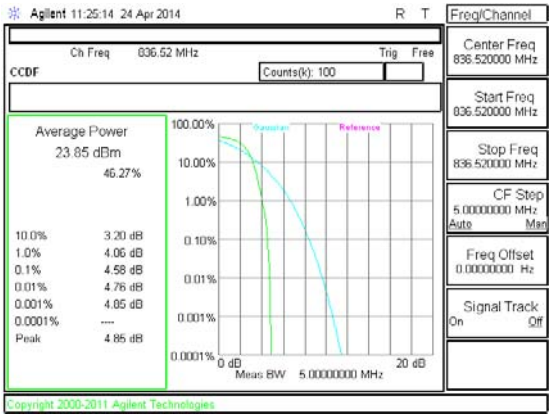
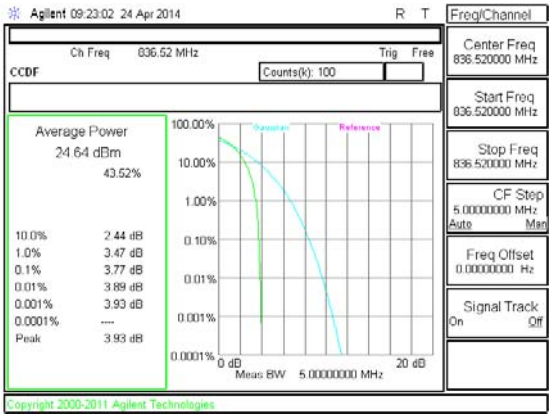
Band BC1 EVDO REL. 0	 Band BC1 EVDO Rel. 0 Mid channel	 Band BC1 1xRTT Mid channel
Band BC0 EVDO REL. 0	 Band BC0 EVDO Rel. 0 Mid channel	 Band BC0 1xRTT Mid channel

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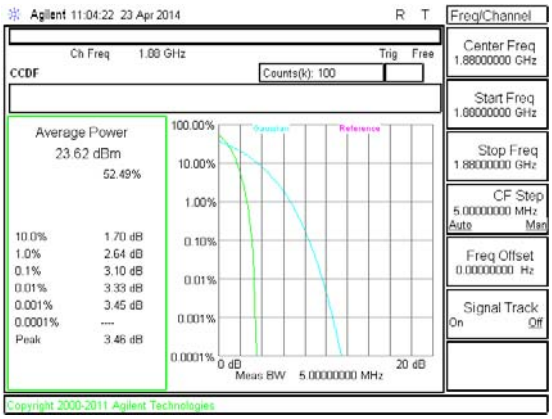
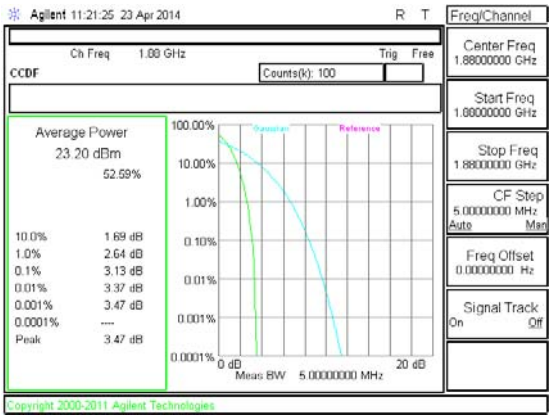
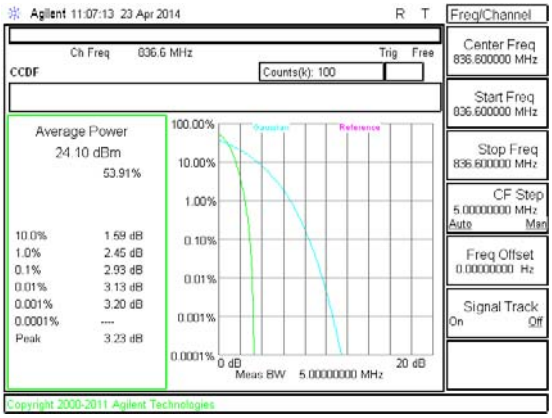
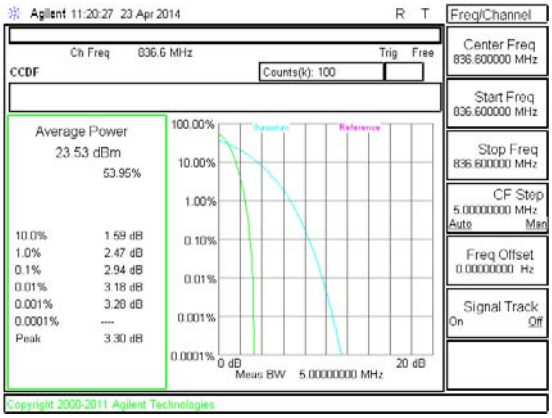
Band Band 2 HSDPA	 Band WCDMA B2 HSDPA	 Band WCDMA B2 REL99
Band Band 5 HSDPA	 Band WCDMA B5 HSDPA	 Band WCDMA B5 REL99

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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

CDMA2000 BC0/BC1; GSM850/1900; WCDMA B2/B5; LTE B4/B7/B13

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10.1.1. OCCUPIED BANDWIDTH RESULTS

Band	Mode	Channel	f (MHz)	99% BW (KHz)	-26dB BW (KHz)
GSM850	GMSK	128	824.2		
		190	836.6		
		251	848.8		
	GPRS	128	824.2	250.3547	334.102
		190	836.6	250.4108	333.071
		251	848.8	250.3432	333.489
	EGPRS	128	824.2	252.2316	331.763
		190	836.6	249.8843	334.198
		251	848.8	253.1078	329.564
GSM1900	GMSK	512	1850.2		
		661	1880		
		810	1909.8		
	GPRS	512	1850.2	252.6565	333.973
		661	1880	247.9873	333.621
		810	1909.8	253.7443	330.43
	EGPRS	512	1850.2	247.2914	333.822
		661	1880	247.3673	333.454
		810	1909.8	247.2593	332.397

Band	Mode	Channel	f (MHz)	99% BW (MHz)	-26dB BW (MHz)
Band 5	REL99	4132	826.4	4.1845	4.635
		4183	836.6	4.1662	4.645
		4233	846.6	4.1655	4.643
	HSDPA	4132	826.4	4.168	4.624
		4183	836.6	4.1768	4.644
		4233	846.6	4.1598	4.661
	HSUPA	4132	826.4		
		4183	836.6		
		4233	846.6		
Band 2	REL99	9262	1852.4	4.1638	4.665
		9400	1880	4.1695	4.632

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		9538	1907.6	4.1873	4.647
	HSDPA	9262	1852.4	4.1745	4.643
		9400	1880	4.1654	4.638
		9538	1907.6	4.1596	4.653
	HSUPA	9262	1852.4		
		9400	1880		
		9538	1907.6		
BC0	1xRTT	1013	824.7	1.281	1.429
		384	836.52	1.2768	1.438
		777	848.31	1.2818	1.444
	EVDO REL. 0	1013	824.7	1.2731	1.434
		384	836.52	1.2716	1.43
		777	848.31	1.2752	1.435
	EVDO REV. A	1013	824.7		
		384	836.52		
		777	848.31		
BC1	1xRTT	25	1851.25	1.2924	1.453
		600	1880	1.2726	1.442
		1175	1908.75	1.2973	1.456
	EVDO REL. 0	25	1851.25	1.2835	1.43
		600	1880	1.2734	1.432
		1175	1908.75	1.2947	1.956
	EVDO REV. A	25	1851.25		
		600	1880		
		1175	1908.75		

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10.1.2. LTE OCCUPIED BANDWIDTH RESULTS

Band	BW(MHz)	Mode	RB/RB Size	f (MHz)	99% BW (MHz)	-26dB BW (MHz)
LTE13	10	QPSK	50/0	782	8.9409	9.759
			50/0	782	8.9409	9.759
			50/0	782	8.9409	9.759
		16QAM	50/0	782	8.9429	9.702
			50/0	782	8.9429	9.702
			50/0	782	8.9429	9.702

Band	BW(MHz)	Mode	RB/RB Size	f (MHz)	99% BW (MHz)	-26dB BW (MHz)
LTE7	10	QPSK	50/0	2505	8.9683	9.678
			50/0	2535	8.9513	9.786
			50/0	2565	8.9577	9.723
		16QAM	50/0	2505	8.9675	9.668
			50/0	2535	8.9545	9.841
			50/0	2565	8.9414	9.6

Band	BW(MHz)	Mode	RB/RB Size	f (MHz)	99% BW (MHz)	-26dB BW (MHz)
LTE7	5	QPSK	25/0	2502.5	4.4659	4.933
			25/0	2535	4.4785	4.876
			25/0	2567.5	4.4704	4.947
		16QAM	25/0	2502.5	4.4752	4.932
			25/0	2535	4.4738	4.914
			25/0	2567.5	4.4751	4.951

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Band	BW(MHz)	Mode	RB/RB Size	f (MHz)	99% BW (KHz)	-26dB BW
LTE7	15	QPSK	75/0	2507.5	13.364	14.27
			75/0	2535	13.4053	14.436
			75/0	2562.5	13.3989	14.37
		16QAM	75/0	2507.5	13.4026	14.464
			75/0	2535	13.3835	14.325
			75/0	2562.5	13.3778	14.506

Band	BW(MHz)	Mode	RB/RB Size	f (MHz)	99% BW (KHz)	-26dB BW
LTE7	20	QPSK	100/0	2510	17.8632	18.979
			100/0	2535	17.8535	19.056
			100/0	2560	17.7498	18.915
		16QAM	100/0	2510	17.848	19.007
			100/0	2535	17.825	19.173
			100/0	2560	17.7827	18.969

Band	BW(MHz)	Mode	RB/RB Size	f (MHz)	99% BW (KHz)	-26dB BW
LTE4	20	QPSK	100/0	1720	17.8106	19.089
			100/0	1732.5	17.8045	19.088
			100/0	1745	17.8479	19.142
		16QAM	100/0	1720	17.846	19.139
			100/0	1732.5	17.7598	18.803
			100/0	1745	17.8735	19.03

Band	BW(MHz)	Mode	RB/RB Size	f (MHz)	99% BW (KHz)	-26dB BW
LTE4	15	QPSK	75/0	1717.5	13.3866	14.312
			75/0	1732.5	13.3546	14.315
			75/0	1747.5	13.3941	14.216
		16QAM	75/0	1717.5	13.412	14.374

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			75/0	1732.5	13.3776	14.383
			75/0	1747.5	13.3862	14.239

Band	BW(MHz)	Mode	RB/RB Size	f (MHz)	99% BW (KHz)	-26dB BW
LTE4	10	QPSK	50/0	1715	8.937	9.73
			50/0	1732.5	8.9569	9.594
			50/0	1750	8.9482	9.772
		16QAM	50/0	1715	8.9368	9.626
			50/0	1732.5	8.9363	9.594
			50/0	1750	8.9221	9.663

Band	BW(MHz)	Mode	RB/RB Size	f (MHz)	99% BW (KHz)	-26dB BW
LTE4	5	QPSK	25/0	1712.5	4.4932	4.952
			25/0	1732.5	4.4695	4.846
			25/0	1752.5	4.4717	4.877
		16QAM	25/0	1712.5	4.4714	4.911
			25/0	1732.5	4.473	4.848
			25/0	1752.5	4.4597	4.86

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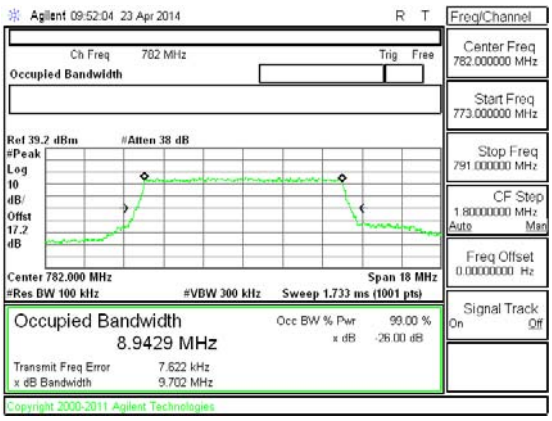
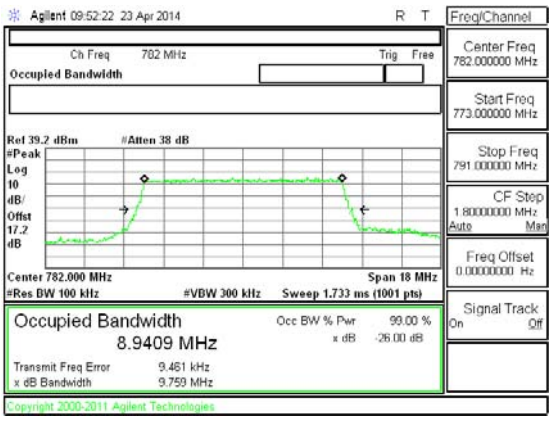
10.1.1. OCCUPIED BANDWIDTH PLOTS

Band LTE13 10MHz 16QAM	 Band LTE13 10MHz OBW 16QAM High Channel FRB.gif	 Band LTE13 10MHz OBW QPSK High Channel FRB.gif

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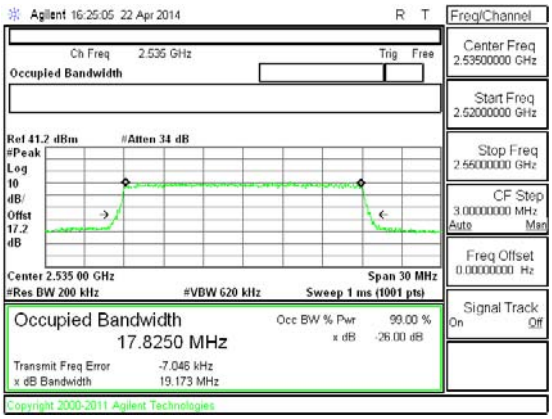
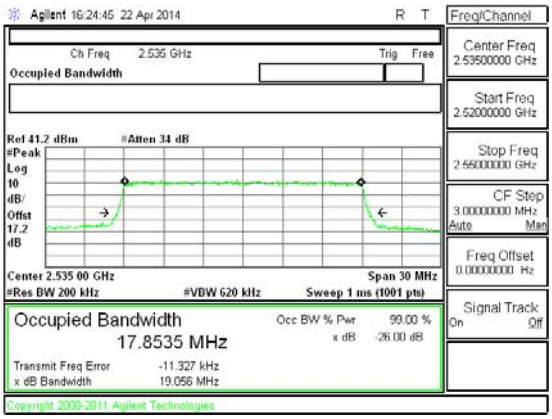
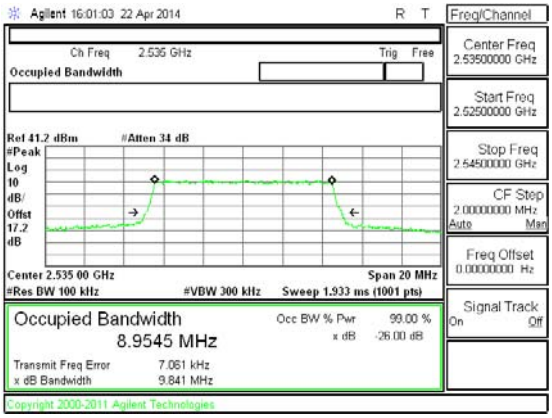
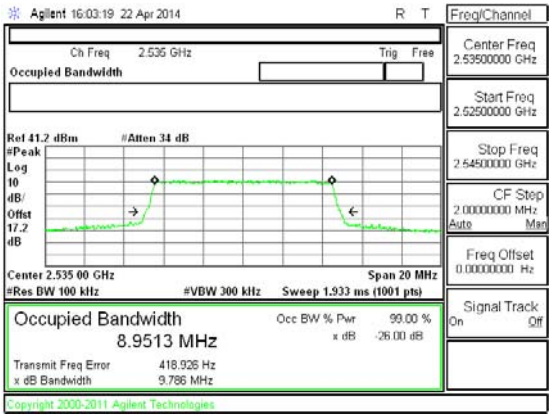
Band LTE7 20MHz 16QAM	 Band LTE7 20MHz OBW 16QAM Mid Channel FRB.gif	 Band LTE7 20MHz OBW QPSK Mid Channel FRB.gif

Band LTE7 10MHz 16QAM	 Band LTE7 10MHz OBW 16QAM Mid Channel FRB.gif	 Band LTE7 10MHz OBW QPSK Mid Channel FRB.gif

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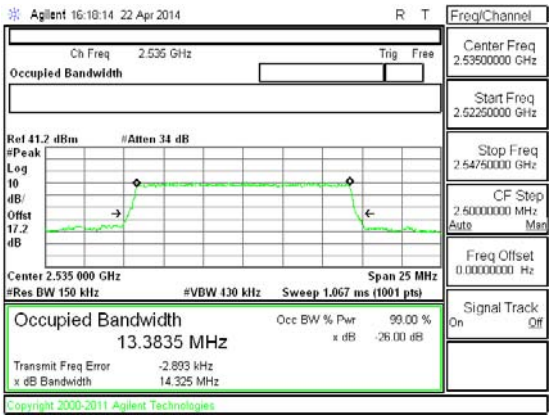
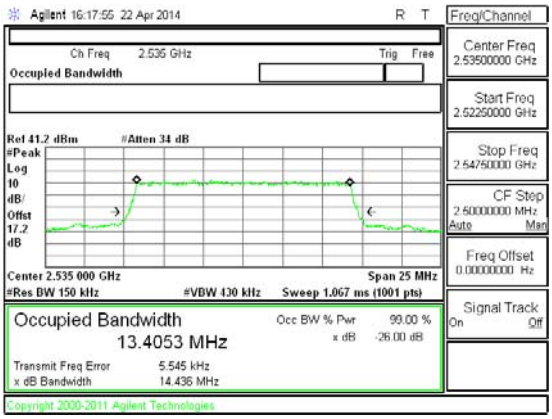
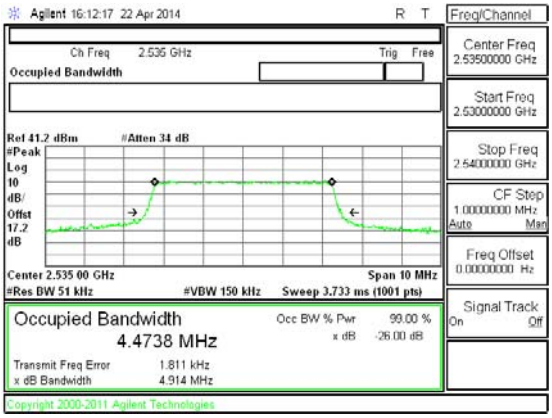
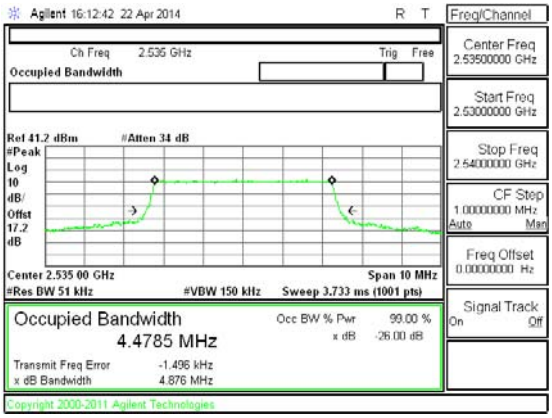
Band LTE7 15MHz 16QAM	 Band LTE7 15MHz OBW 16QAM Mid Channel FRB.gif	 Band LTE7 15MHz OBW QPSK Mid Channel FRB.gif

Band LTE7 5MHz 16QAM	 Band LTE7 5MHz OBW 16QAM Mid Channel FRB.gif	 Band LTE7 5MHz OBW QPSK Mid Channel FRB.gif

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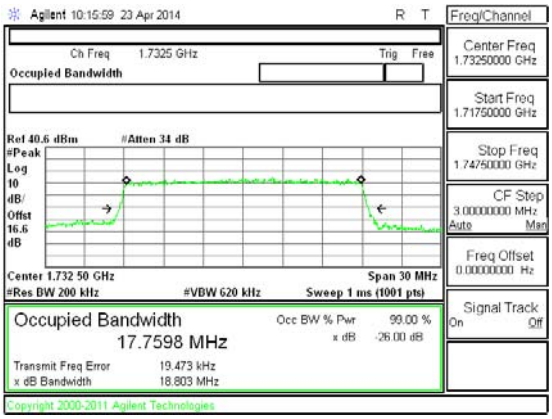
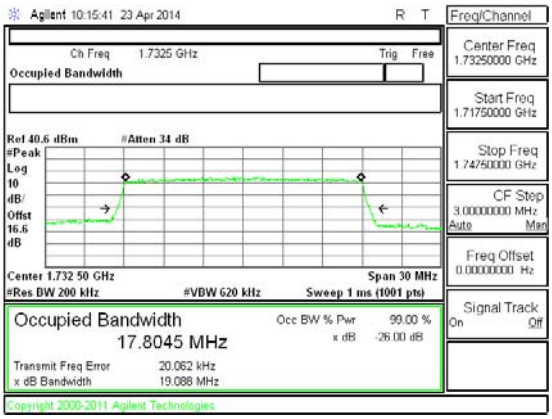
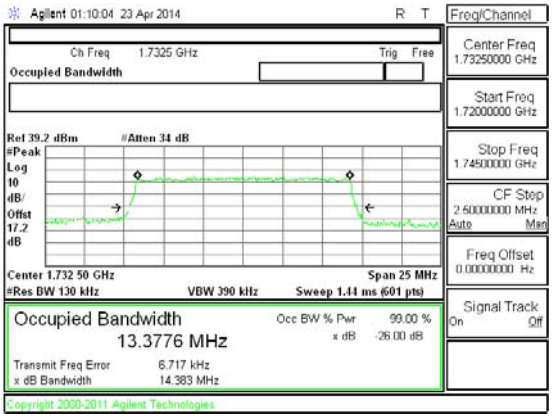
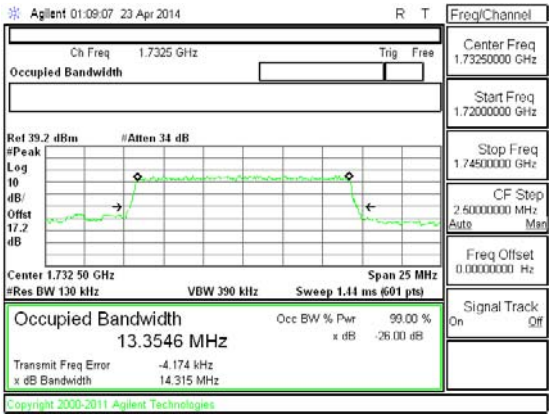
Band LTE4 20MHz 16QAM	 Band LTE4 20MHz OBW 16QAM Mid Channel FRB.gif	 Band LTE4 20MHz OBW QPSK Mid Channel FRB.gif
Band LTE4 15MHz 16QAM	 Band LTE4 15MHz OBW 16QAM Mid Channel FRB.gif	 Band LTE4 15MHz OBW QPSK Mid Channel FRB.gif

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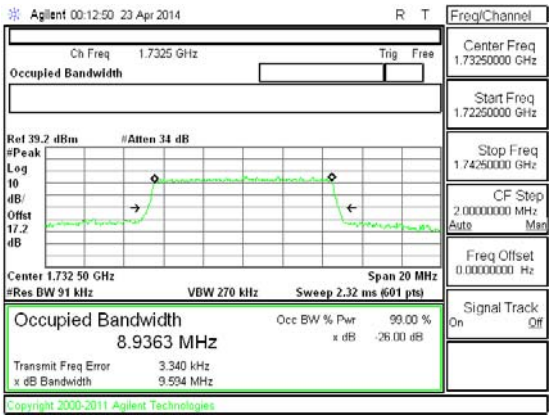
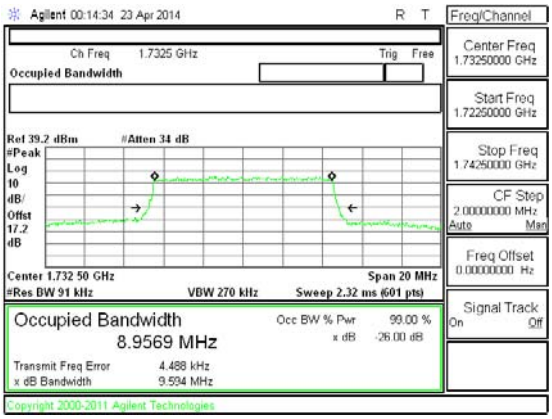
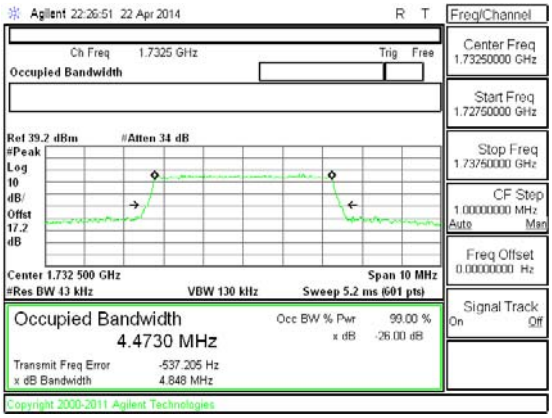
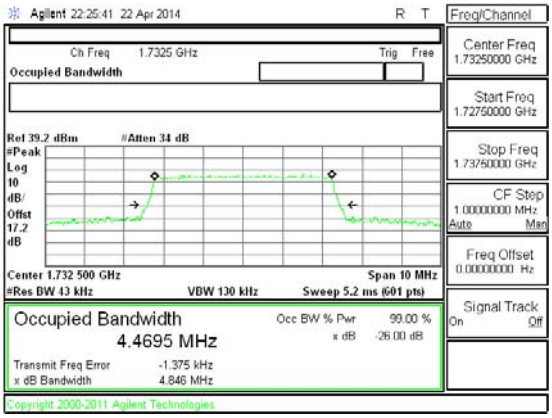
Band LTE4 10MHz 16QAM	 Band LTE4 10MHz OBW 16QAM Mid Channel FRB.gif	 Band LTE4 10MHz OBW QPSK Mid Channel FRB.gif
Band LTE4 5MHz 16QAM	 Band LTE4 5MHz OBW 16QAM Mid Channel FRB.gif	 Band LTE4 5MHz OBW QPSK Mid Channel FRB.gif

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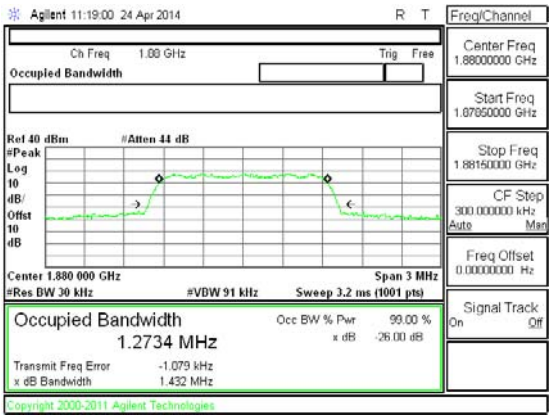
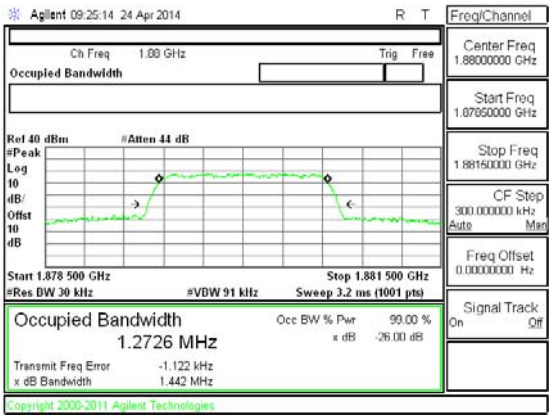
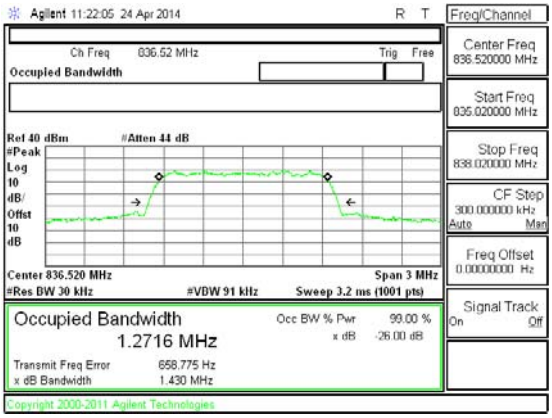
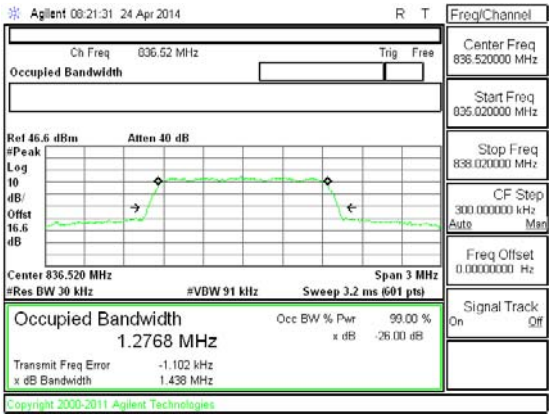
Band BC1 EVDO REL. 0	 Band BC1 EVDO Rel. 0 OBW Mid channel	 Band BC1 1xRTT OBW Mid channel
Band BC0 EVDO REL. 0	 Band BC0 EVDO Rel. 0 OBW Mid channel	 Band BC0 1xRTT OBW Mid channel

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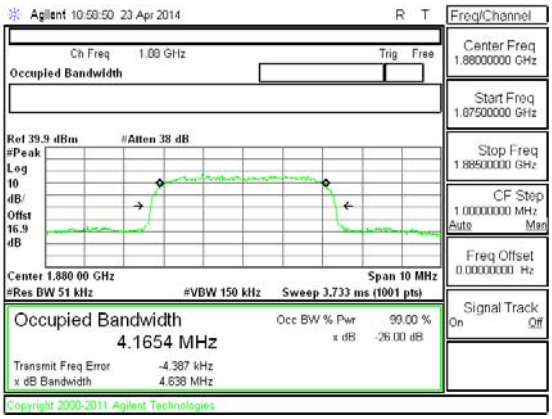
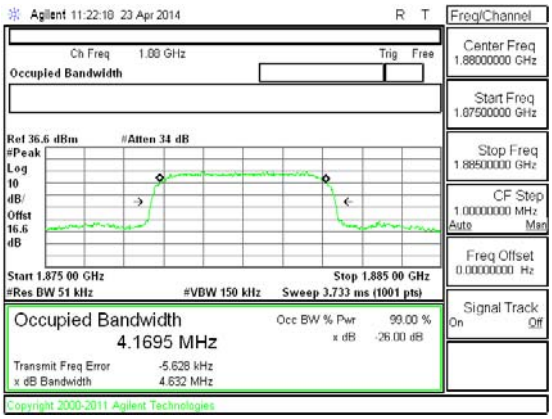
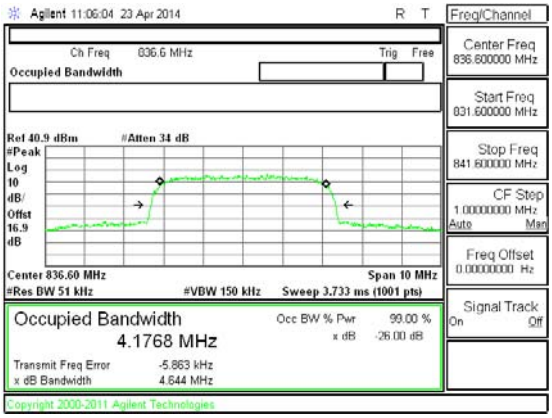
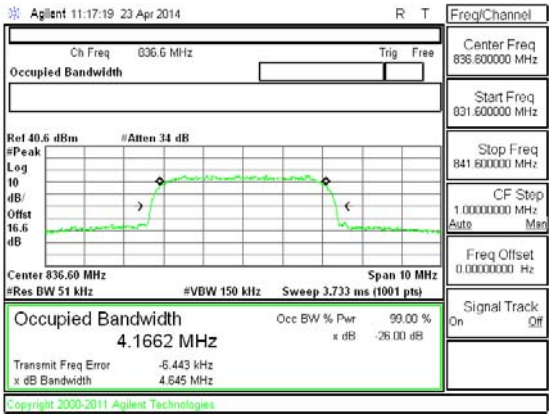
Band Band 2 HSDPA	 Band WCDMA B2 HSDPA OBW	 Band WCDMA B2 REL99 OBW
Band Band 5 HSDPA	 Band WCDMA B5 HSDPA OBW	 Band WCDMA B5 REL99 OBW

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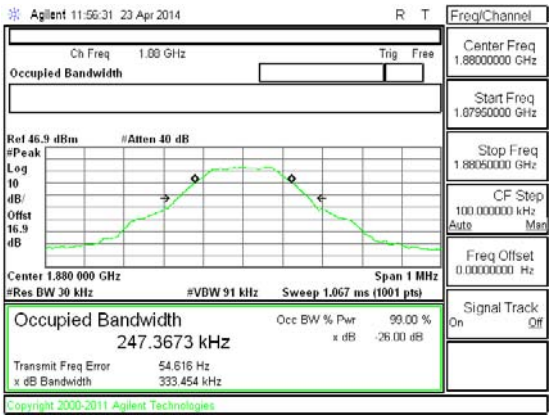
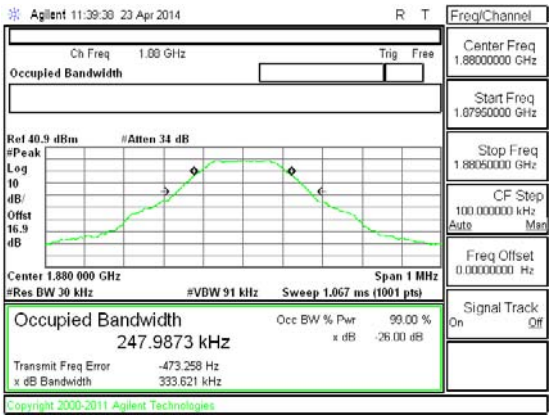
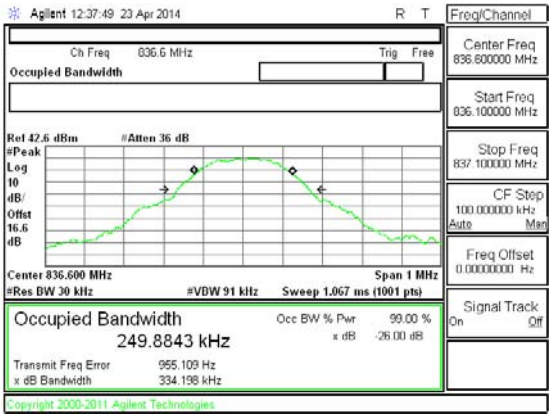
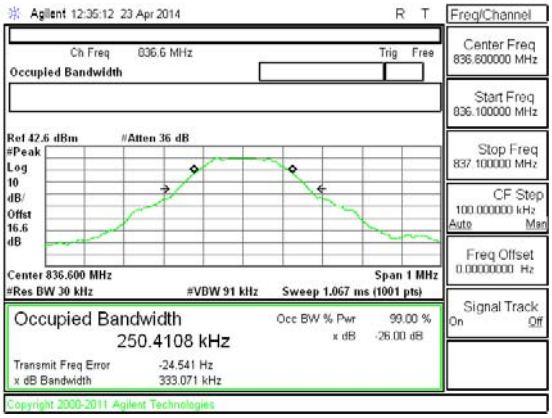
Band GSM1900 EGPRS	 Band GSM1900 EGPRS OBW Mid channel	 Band GSM1900 GPRS OBW Mid channel
Band GSM850 EGPRS	 Band GSM850 EGPRS OBW Mid channel	 Band GSM850 GPRS OBW Mid channel

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10.2. BAND EDGE EMISSIONS

RULE PART(S)

FCC: §22.359, §24.238 and § 90.691

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.

MODES TESTED

CDMA2000 BC0/BC1; GSM850/1900; WCDMA B2/B5; LTE B4/B7/B13

RESULTS

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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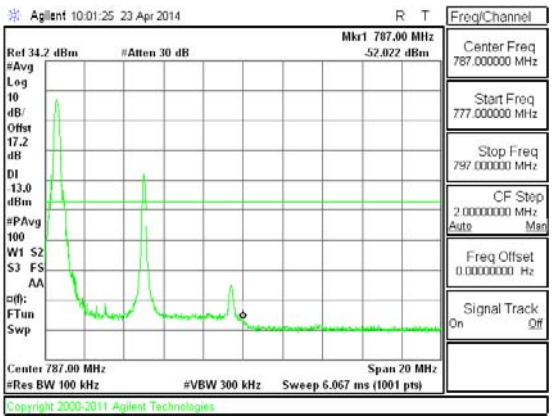
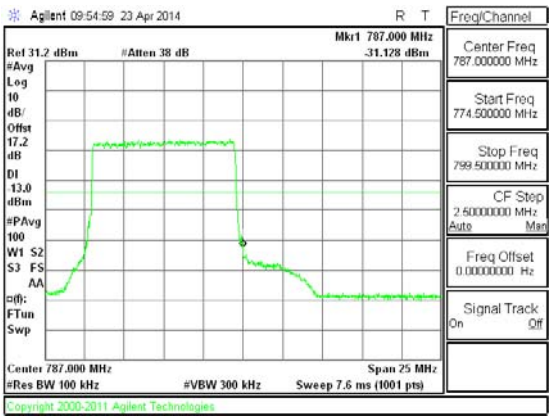
10.2.1. BAND EDGE PLOTS

Band LTE13 10MHz 16QAM	 Band LTE13 10MHz CBE 16QAM High Channel 1RB.gif	 Band LTE13 10MHz CBE 16QAM High Channel FRB.gif

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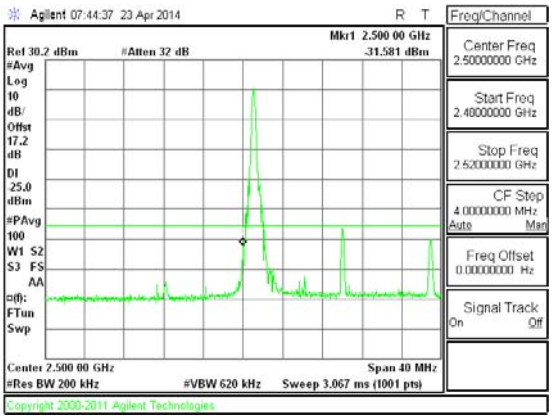
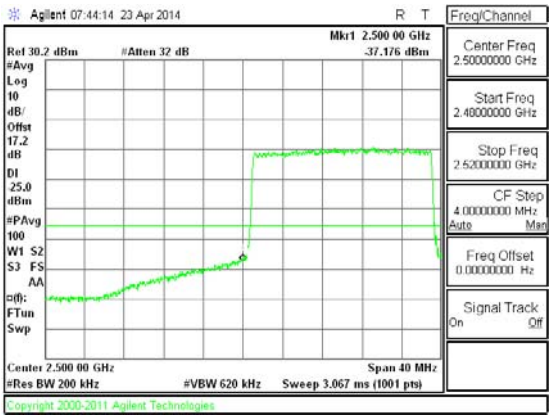
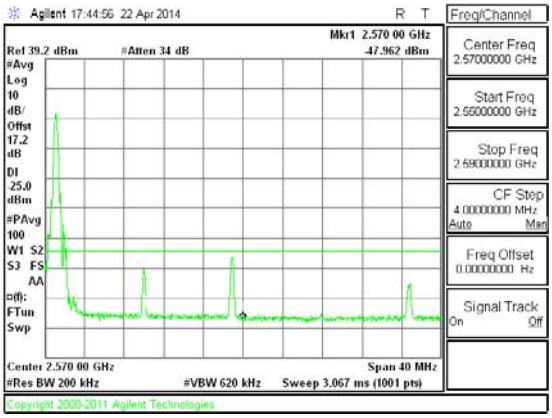
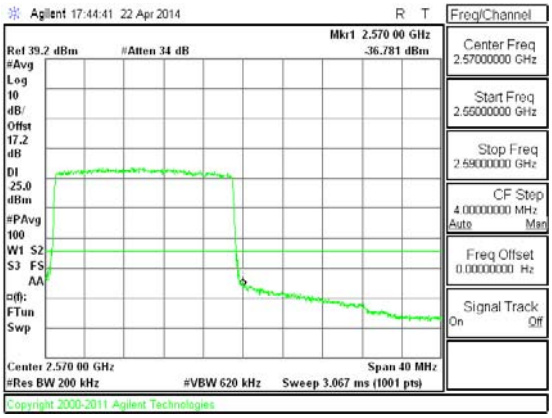
Band LTE7 20MHz 16QAM	 Band LTE7 20MHz CBE 16QAM Low Channel 1RB.gif	 Band LTE7 20MHz CBE 16QAM Low Channel FRB.gif
Band LTE7 20MHz 16QAM	 Band LTE7 20MHz CBE 16QAM High Channel 1RB.gif	 Band LTE7 20MHz CBE 16QAM High Channel FRB.gif

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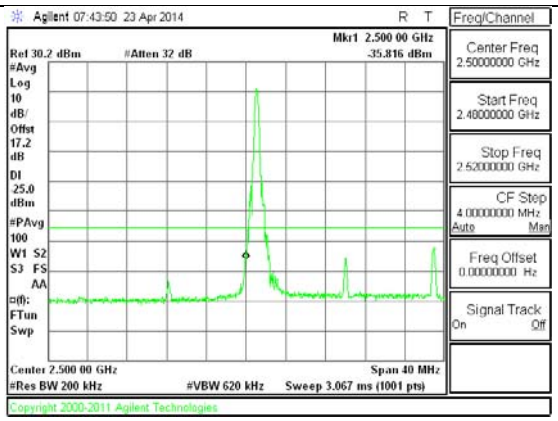
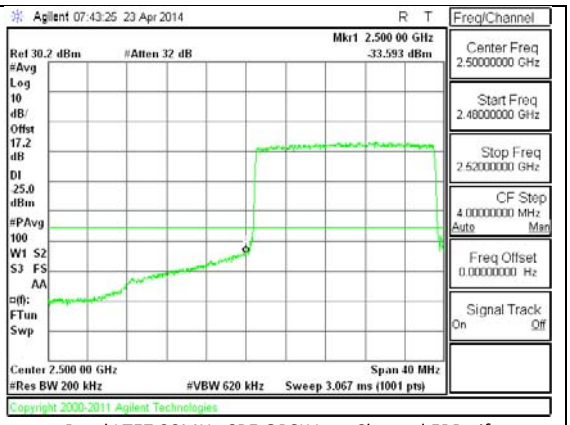
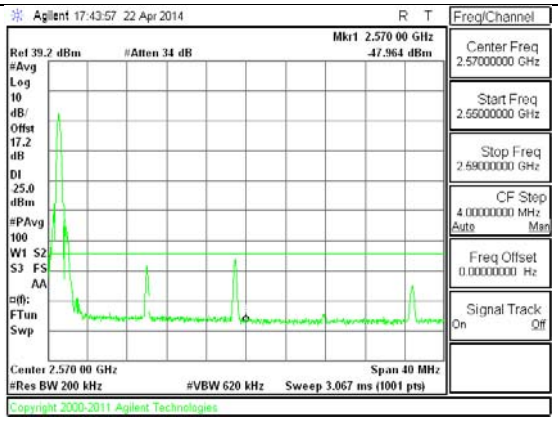
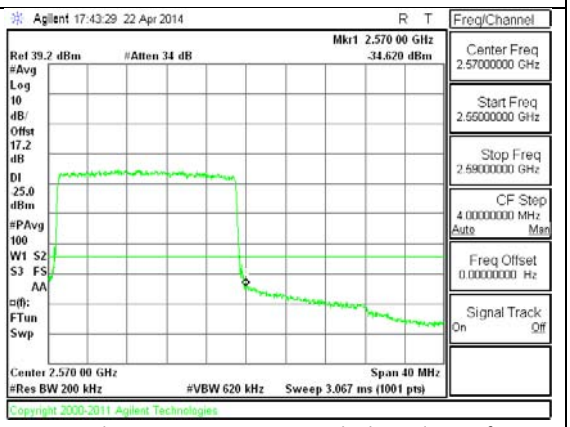
Band LTE7 20MHz QPSK	 Band LTE7 20MHz CBE QPSK Low Channel 1RB.gif	 Band LTE7 20MHz CBE QPSK Low Channel FRB.gif
Band LTE7 20MHz QPSK	 Band LTE7 20MHz CBE QPSK High Channel 1RB.gif	 Band LTE7 20MHz CBE QPSK High Channel FRB.gif

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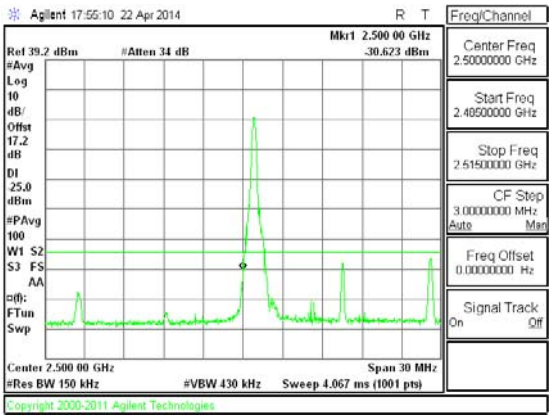
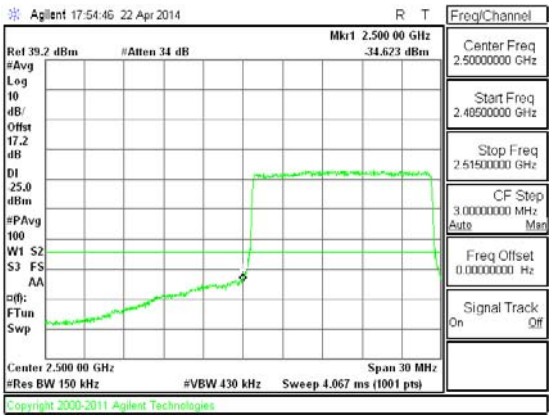
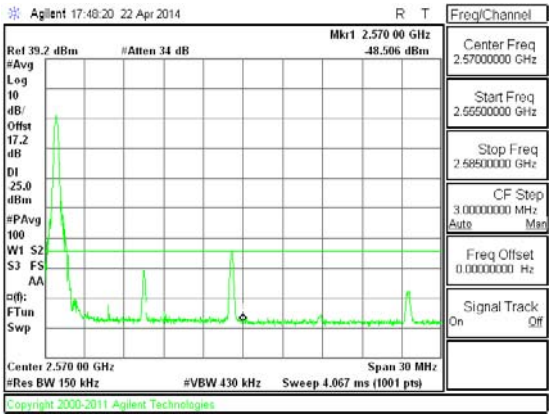
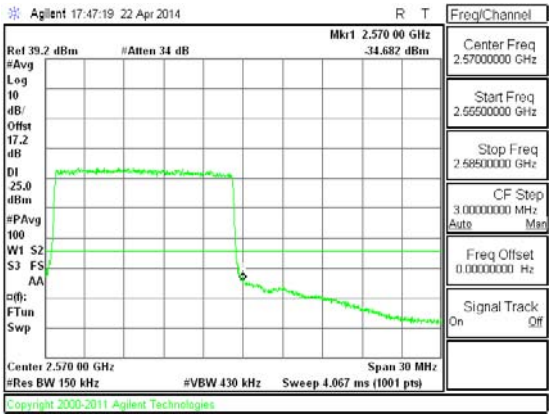
Band LTE7 15MHz 16QAM	 Band LTE7 15MHz CBE 16QAM Low Channel 1RB.gif	 Band LTE7 15MHz CBE 16QAM Low Channel FRB.gif
Band LTE7 15MHz 16QAM	 Band LTE7 15MHz CBE 16QAM High Channel 1RB.gif	 Band LTE7 15MHz CBE 16QAM High Channel FRB.gif

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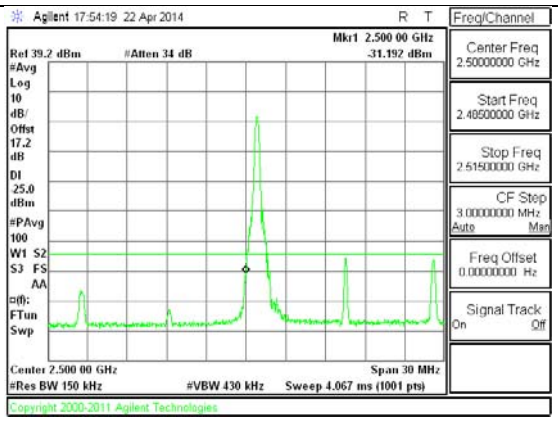
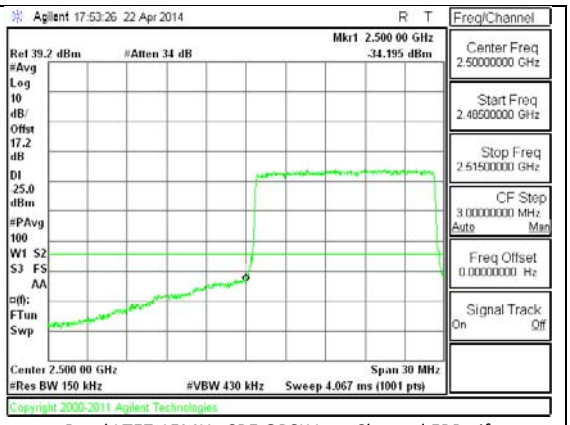
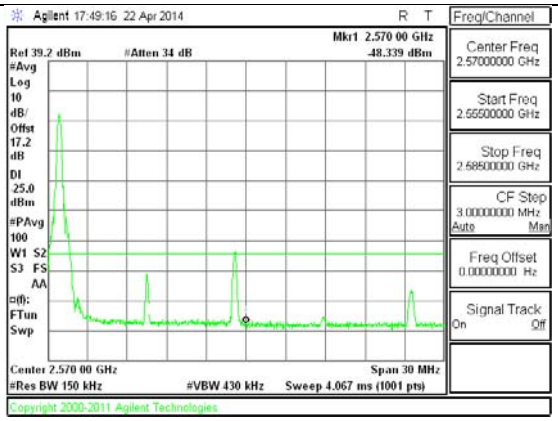
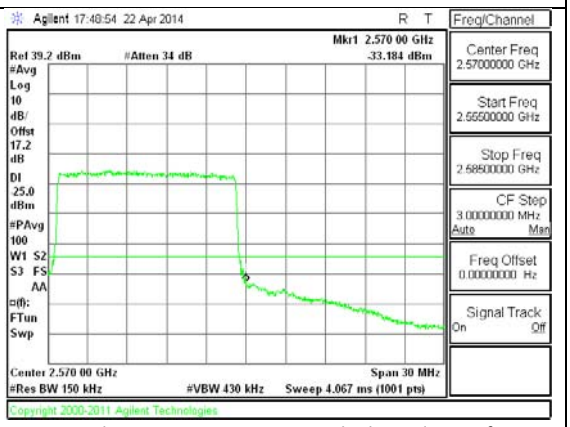
Band LTE7 15MHz QPSK	 Band LTE7 15MHz CBE QPSK Low Channel 1RB.gif	 Band LTE7 15MHz CBE QPSK Low Channel FRB.gif
Band LTE7 15MHz QPSK	 Band LTE7 15MHz CBE QPSK High Channel 1RB.gif	 Band LTE7 15MHz CBE QPSK High Channel FRB.gif

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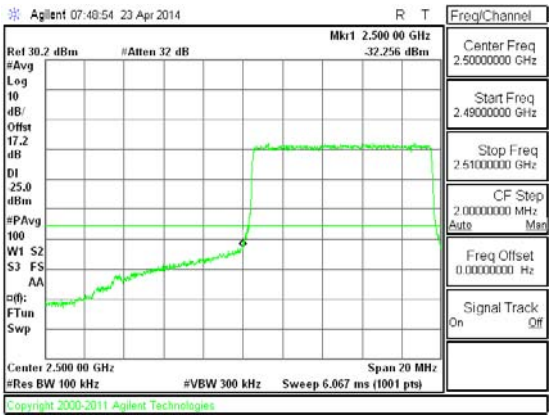
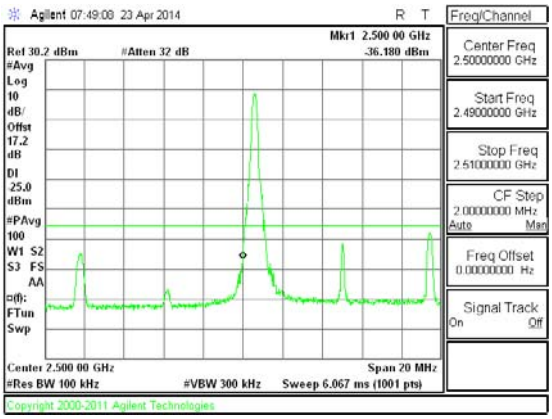
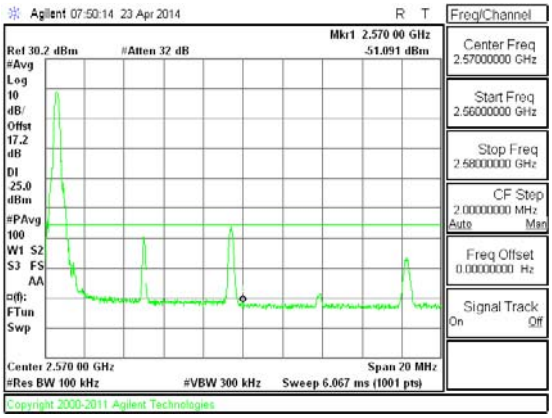
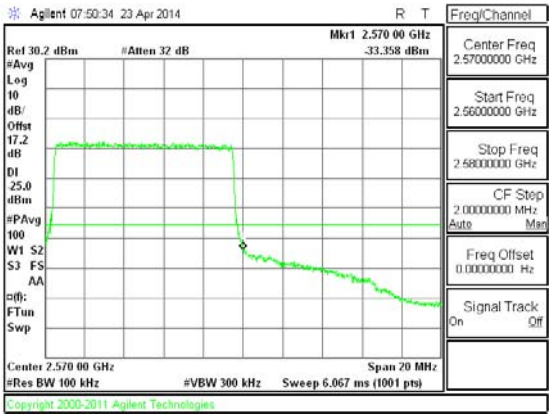
Band LTE7 10MHz 16QAM	 Band LTE7 10MHz CBE 16QAM Low Channel 1RB.gif	 Band LTE7 10MHz CBE 16QAM Low Channel FRB.gif
Band LTE7 10MHz 16QAM	 Band LTE7 10MHz CBE 16QAM High Channel 1RB.gif	 Band LTE7 10MHz CBE 16QAM High Channel FRB.gif

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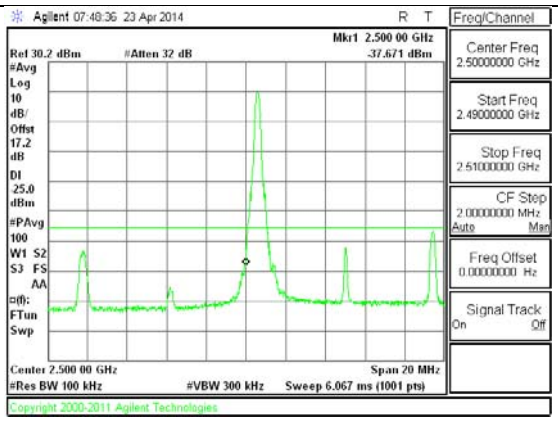
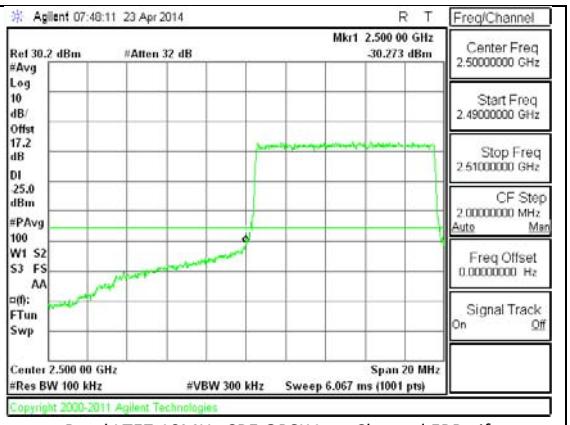
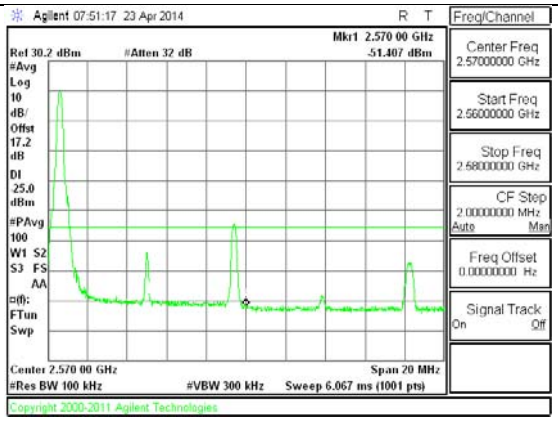
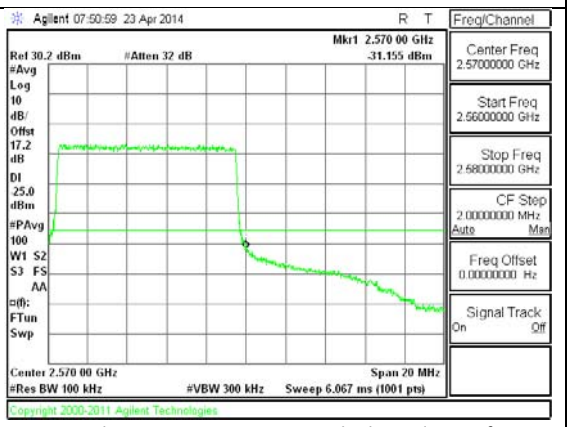
Band LTE7 10MHz QPSK	 Band LTE7 10MHz CBE QPSK Low Channel 1RB.gif	 Band LTE7 10MHz CBE QPSK Low Channel FRB.gif
Band LTE7 10MHz QPSK	 Band LTE7 10MHz CBE QPSK High Channel 1RB.gif	 Band LTE7 10MHz CBE QPSK High Channel FRB.gif

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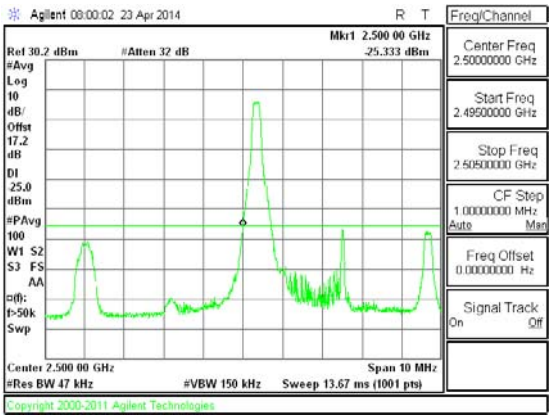
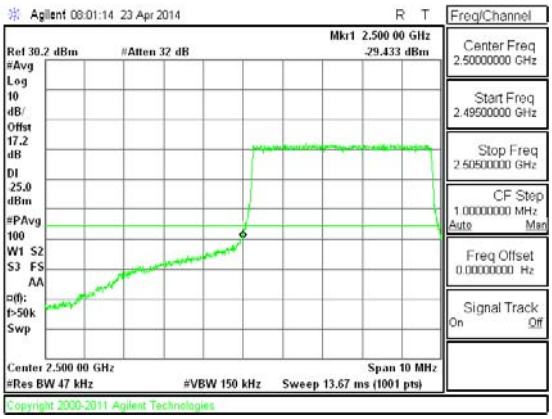
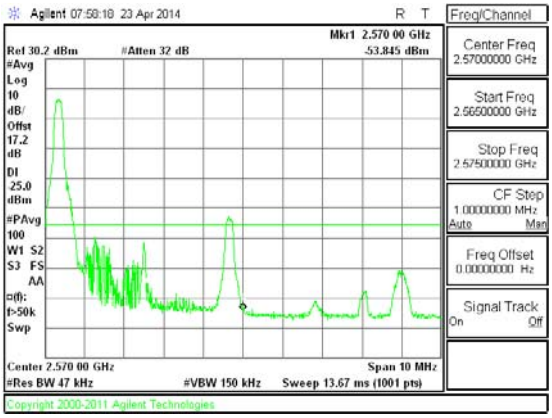
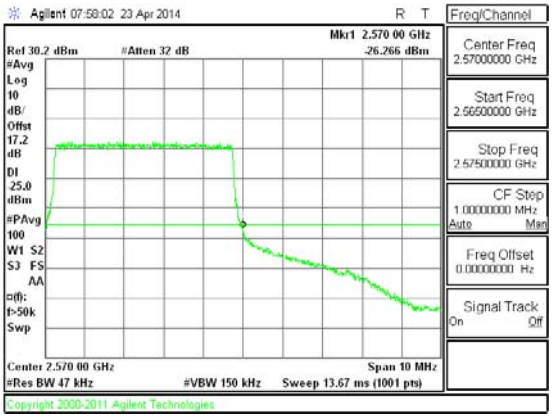
Band LTE7 5MHz 16QAM	 Band LTE7 5MHz CBE 16QAM Low Channel 1RB.gif	 Band LTE7 5MHz CBE 16QAM Low Channel FRB.gif
Band LTE7 5MHz 16QAM	 Band LTE7 5MHz CBE 16QAM High Channel 1RB.gif	 Band LTE7 5MHz CBE 16QAM High Channel FRB.gif

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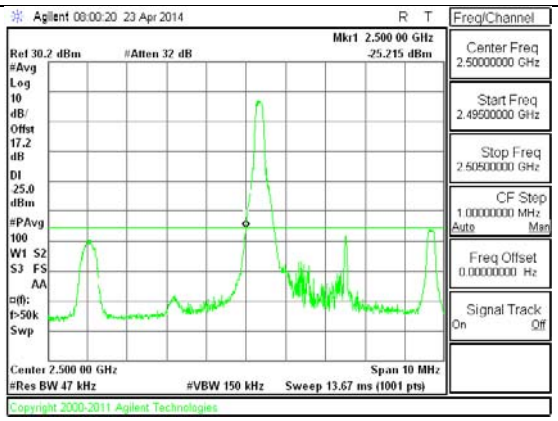
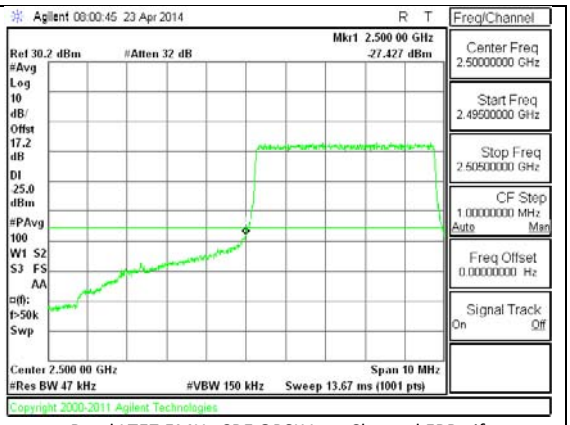
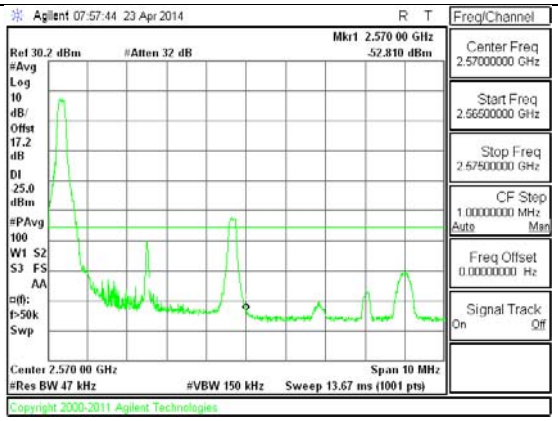
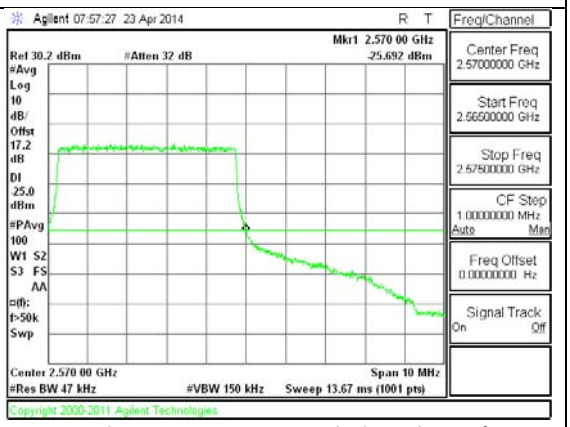
Band LTE7 5MHz QPSK	 Band LTE7 5MHz CBE QPSK Low Channel 1RB.gif	 Band LTE7 5MHz CBE QPSK Low Channel FRB.gif
Band LTE7 5MHz QPSK	 Band LTE7 5MHz CBE QPSK High Channel 1RB.gif	 Band LTE7 5MHz CBE QPSK High Channel FRB.gif

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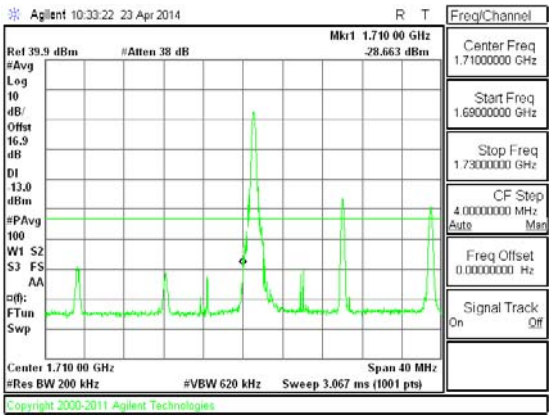
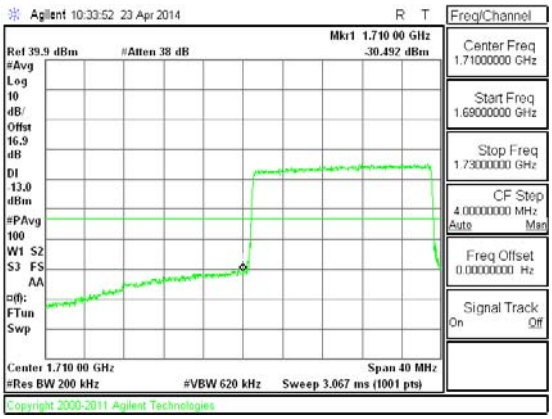
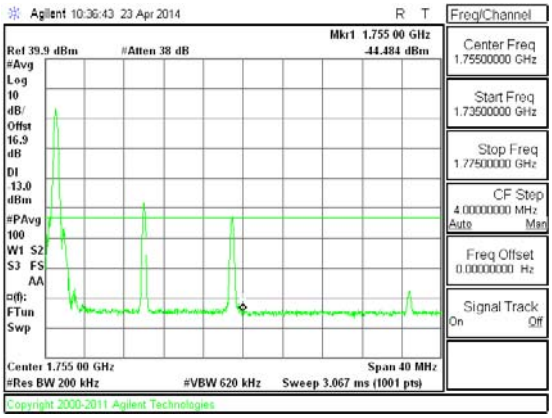
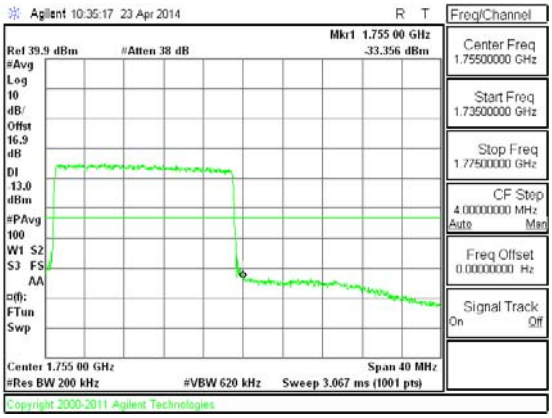
Band LTE4 20MHz 16QAM	 Band LTE4 20MHz CBE 16QAM Low Channel 1RB.gif	 Band LTE4 20MHz CBE 16QAM Low Channel FRB.gif
Band LTE4 20MHz 16QAM	 Band LTE4 20MHz CBE 16QAM High Channel 1RB.gif	 Band LTE4 20MHz CBE 16QAM High Channel FRB.gif

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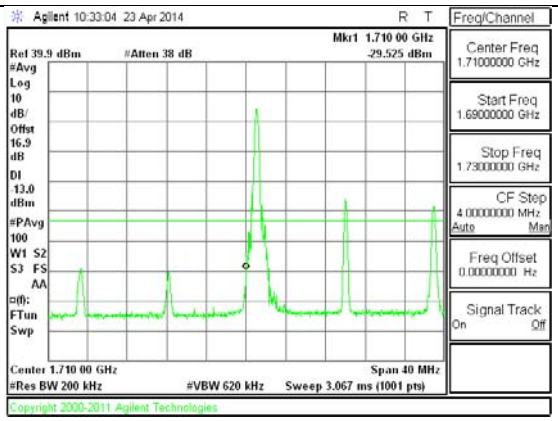
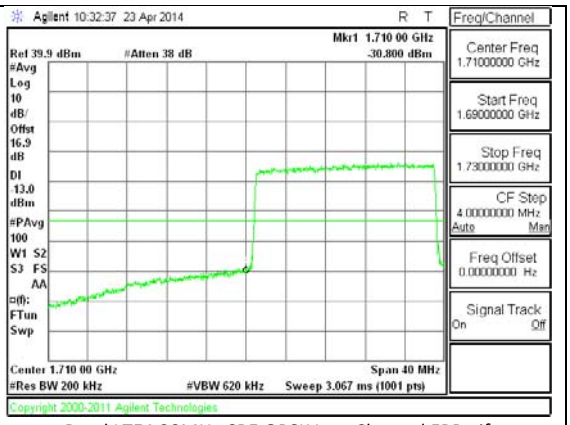
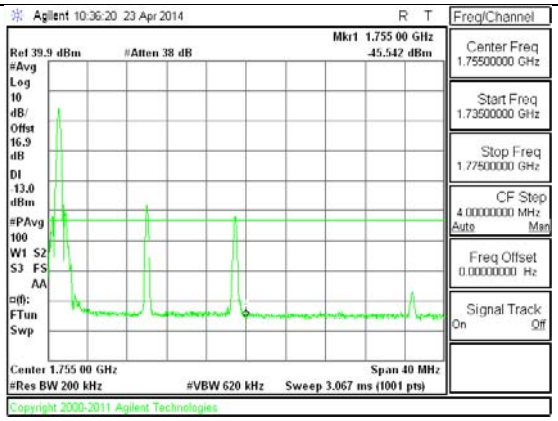
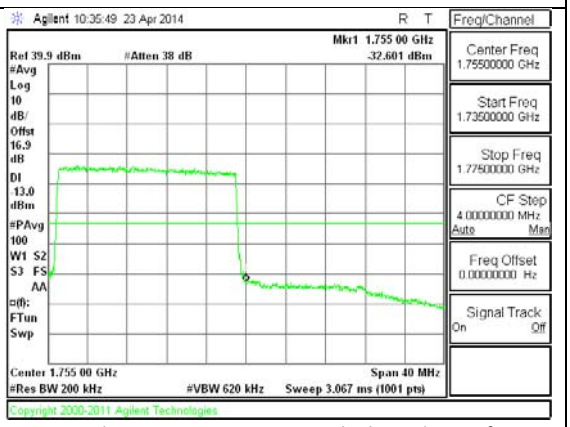
Band LTE4 20MHz QPSK	 Band LTE4 20MHz CBE QPSK Low Channel 1RB.gif	 Band LTE4 20MHz CBE QPSK Low Channel FRB.gif
Band LTE4 20MHz QPSK	 Band LTE4 20MHz CBE QPSK High Channel 1RB.gif	 Band LTE4 20MHz CBE QPSK High Channel FRB.gif

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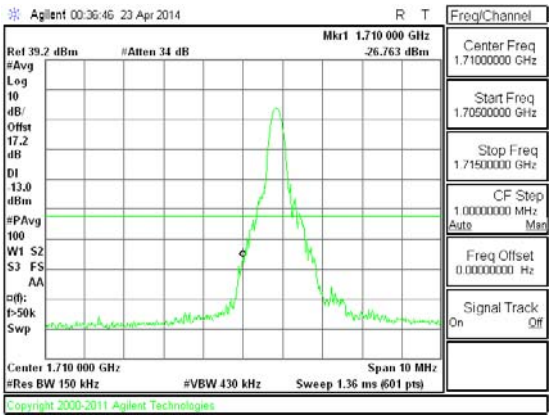
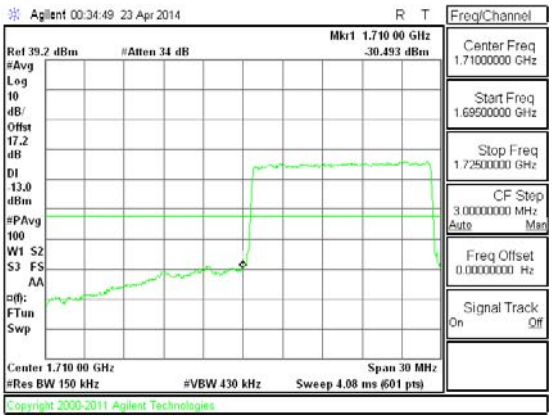
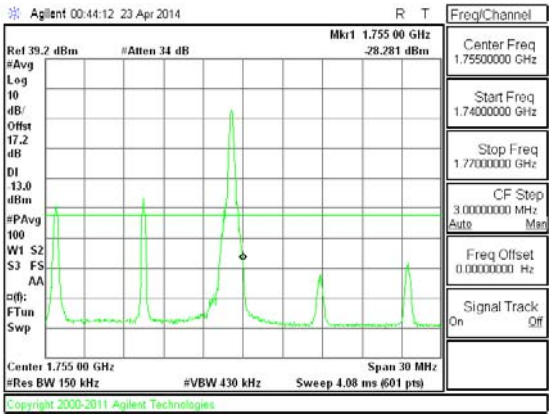
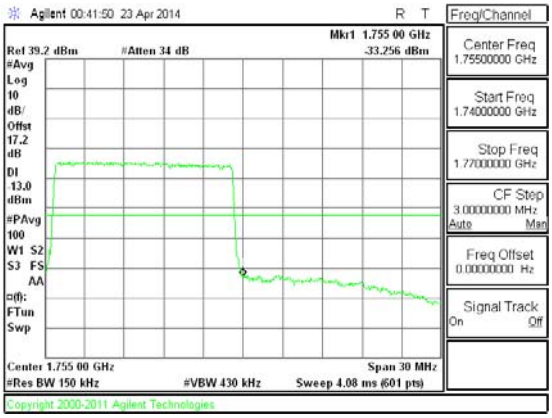
Band LTE4 15MHz 16QAM	 Band LTE4 15MHz CBE 16QAM Low Channel 1RB.gif	 Band LTE4 15MHz CBE 16QAM Low Channel FRB.gif
Band LTE4 15MHz 16QAM	 Band LTE4 15MHz CBE 16QAM High Channel 1RB.gif	 Band LTE4 15MHz CBE 16QAM High Channel FRB.gif

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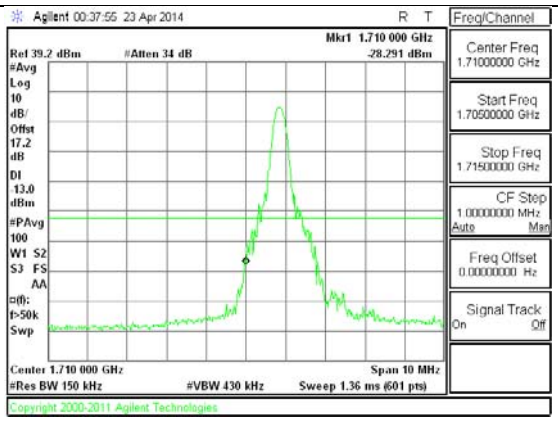
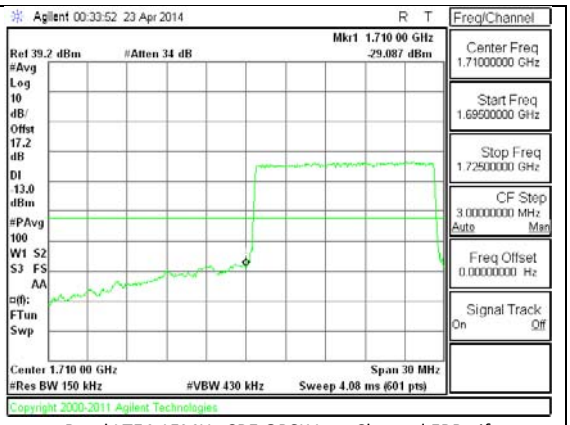
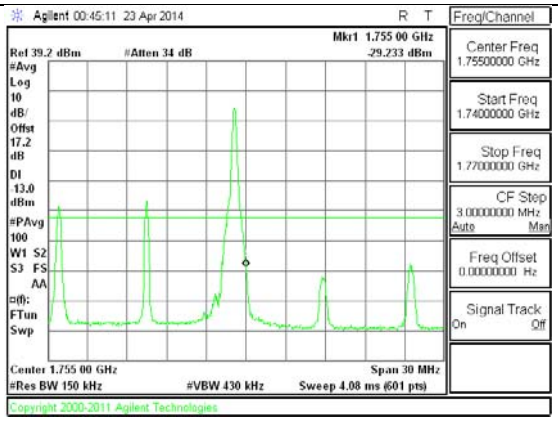
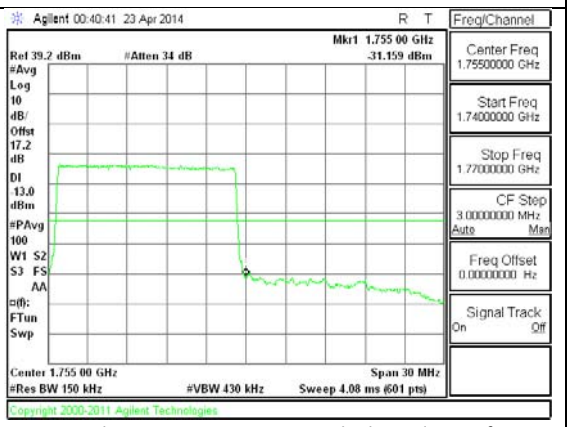
Band LTE4 15MHz QPSK	 Band LTE4 15MHz CBE QPSK Low Channel 1RB.gif	 Band LTE4 15MHz CBE QPSK Low Channel FRB.gif
Band LTE4 15MHz QPSK	 Band LTE4 15MHz CBE QPSK High Channel 1RB.gif	 Band LTE4 15MHz CBE QPSK High Channel FRB.gif

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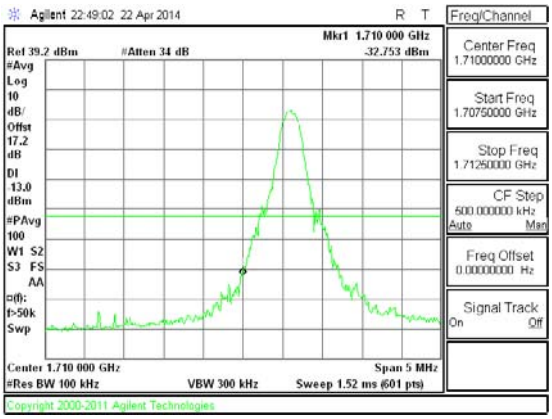
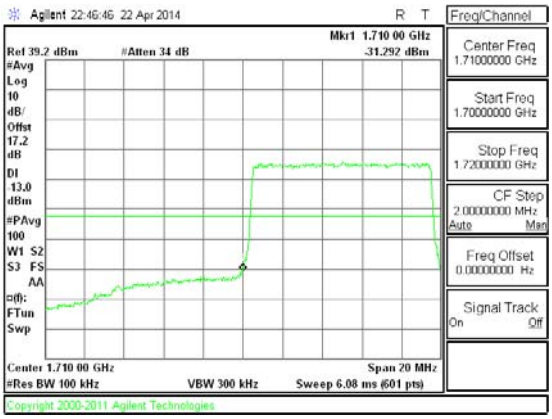
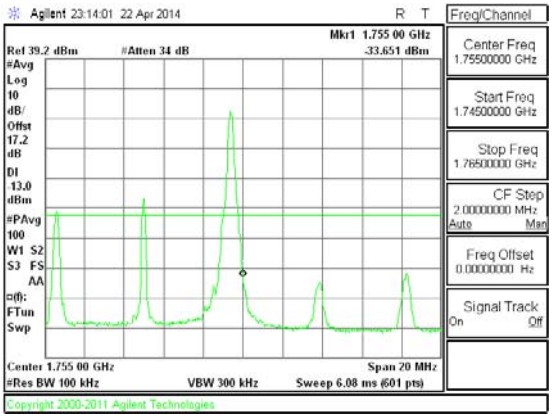
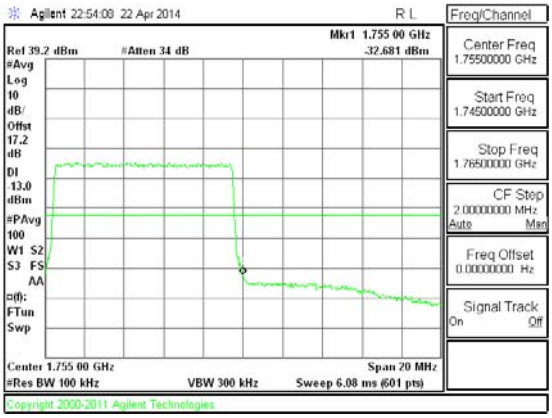
Band LTE4 10MHz 16QAM	 Band LTE4 10MHz CBE 16QAM Low Channel 1RB.gif	 Band LTE4 10MHz CBE 16QAM Low Channel FRB.gif
Band LTE4 10MHz 16QAM	 Band LTE4 10MHz CBE 16QAM High Channel 1RB.gif	 Band LTE4 10MHz CBE 16QAM High Channel FRB.gif

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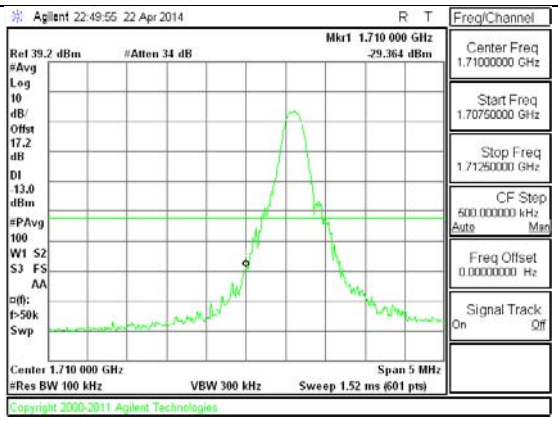
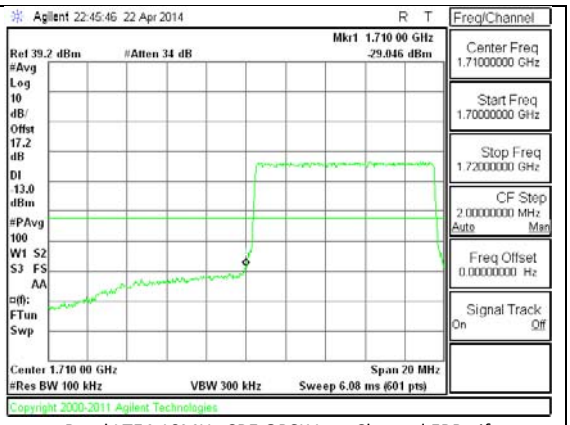
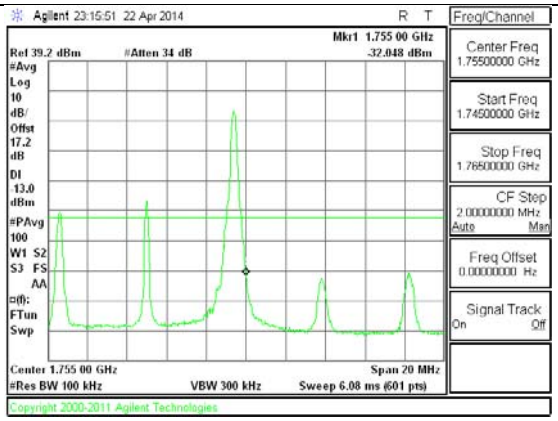
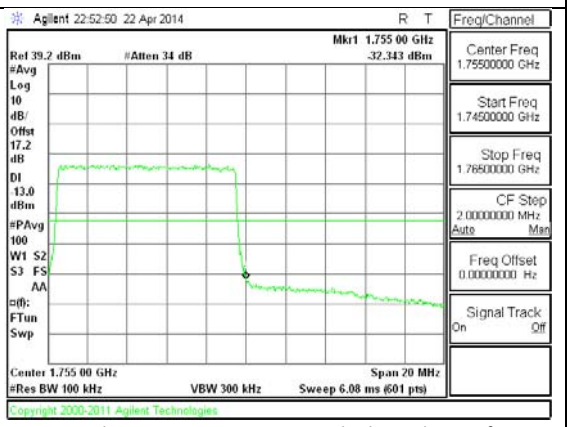
Band LTE4 10MHz QPSK	 Band LTE4 10MHz CBE QPSK Low Channel 1RB.gif	 Band LTE4 10MHz CBE QPSK Low Channel FRB.gif
Band LTE4 10MHz QPSK	 Band LTE4 10MHz CBE QPSK High Channel 1RB.gif	 Band LTE4 10MHz CBE QPSK High Channel FRB.gif

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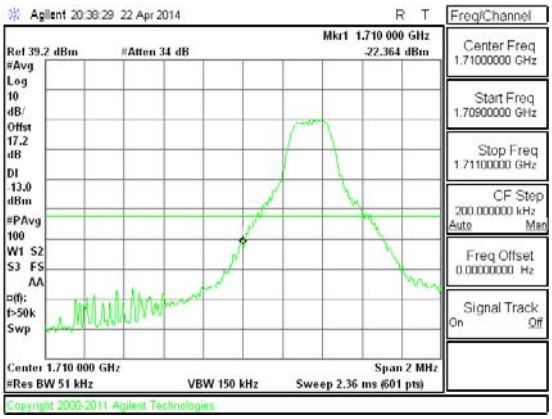
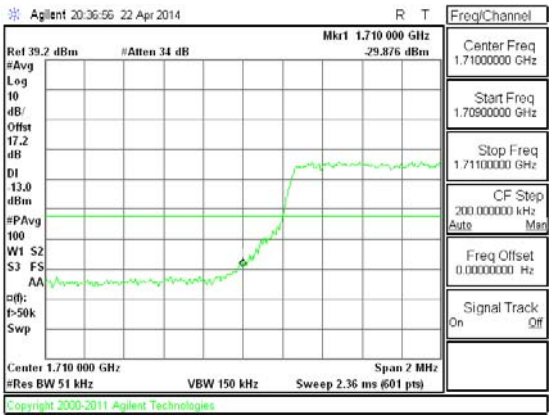
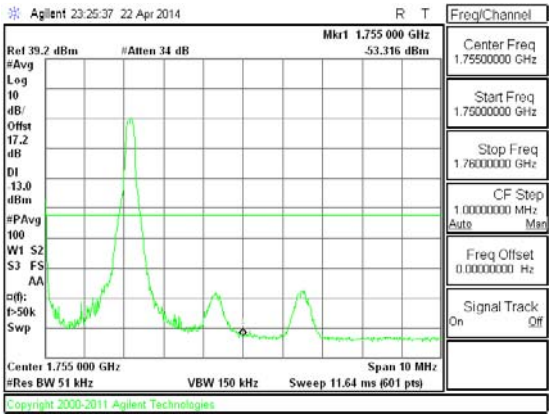
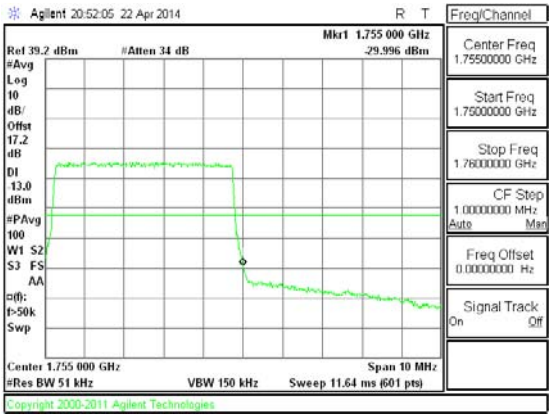
Band LTE4 5MHz 16QAM	 Band LTE4 5MHz CBE 16QAM Low Channel 1RB.gif	 Band LTE4 5MHz CBE 16QAM Low Channel FRB.gif
Band LTE4 5MHz 16QAM	 Band LTE4 5MHz CBE 16QAM High Channel 1RB.gif	 Band LTE4 5MHz CBE 16QAM High Channel FRB.gif

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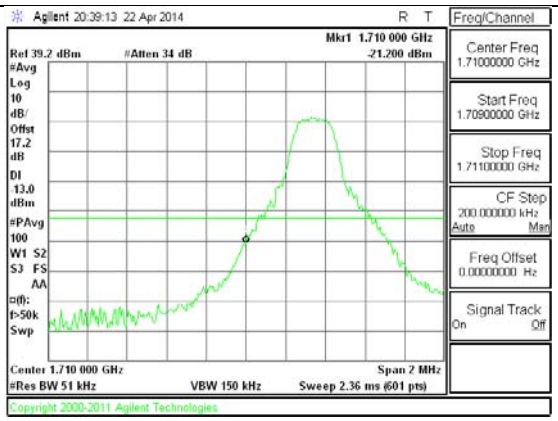
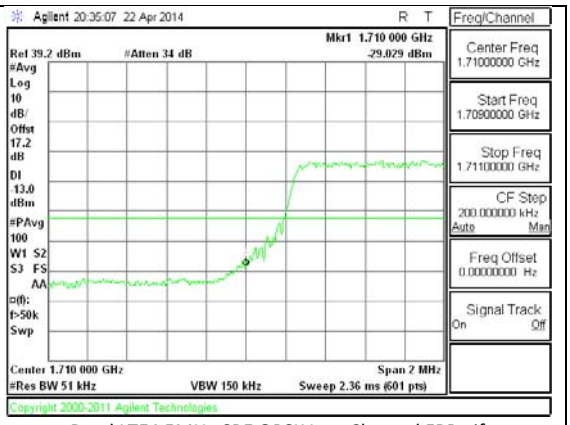
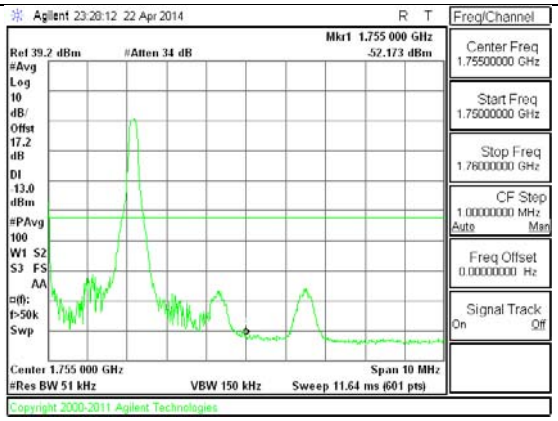
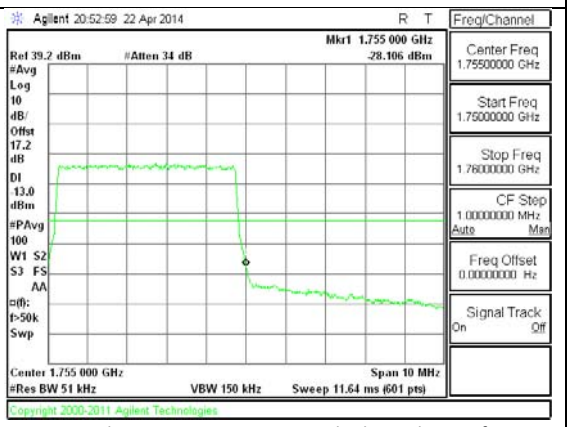
Band LTE4 5MHz QPSK	 Band LTE4 5MHz CBE QPSK Low Channel 1RB.gif	 Band LTE4 5MHz CBE QPSK Low Channel FRB.gif
Band LTE4 5MHz QPSK	 Band LTE4 5MHz CBE QPSK High Channel 1RB.gif	 Band LTE4 5MHz CBE QPSK High Channel FRB.gif

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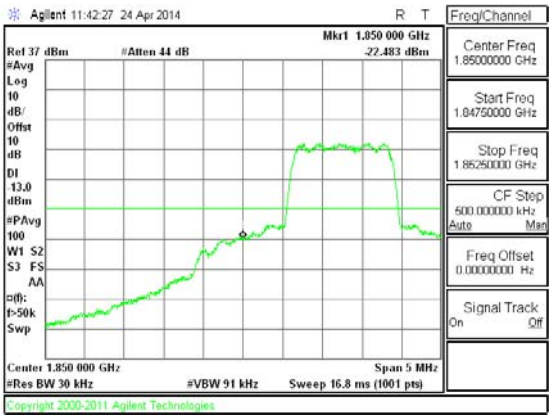
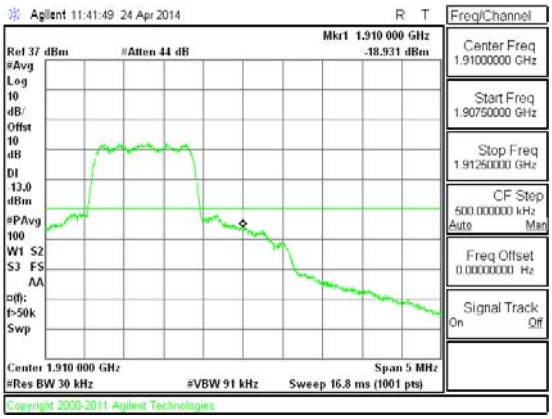
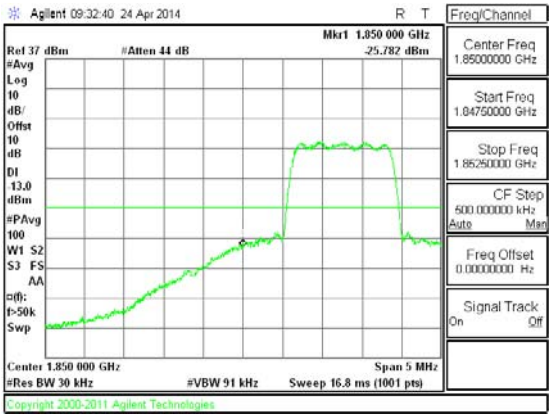
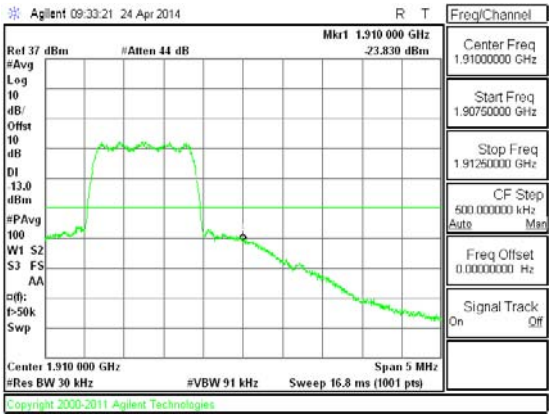
Band BC1 EVDO REL. 0	 Band BC1 EVDO Rel. 0 CBE Low channel	 Band BC1 EVDO Rel. 0 CBE High channel
Band BC1 1xRTT	 Band BC1 1xRTT CBE Low channel	 Band BC1 1xRTT CBE High channel

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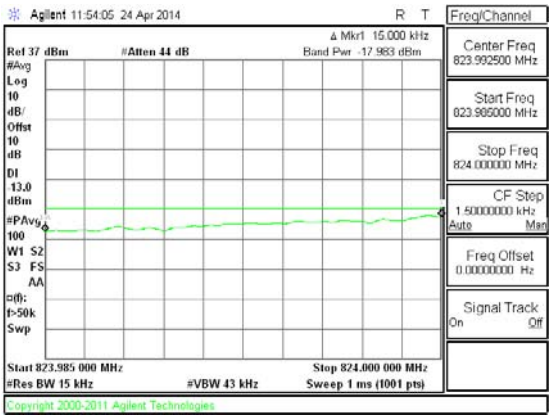
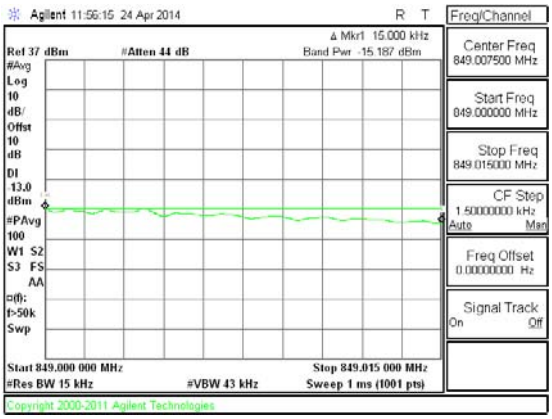
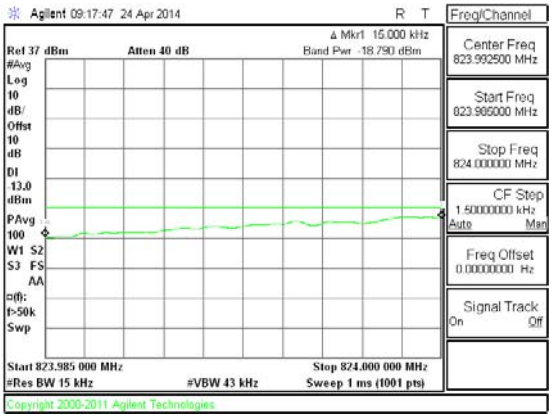
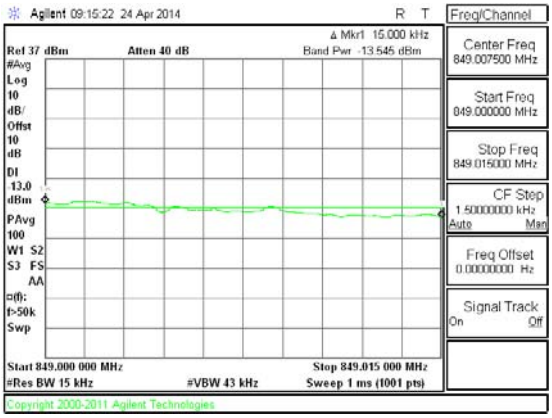
Band BC0 EVDO REL. 0	 Band BC0 EVDO Rel. 0 CBE Low channel	 Band BC0 EVDO Rel. 0 CBE High channel
Band BC0 1xRTT	 Band BC0 1xRTT CBE Low channel	 Band BC0 1xRTT CBE High channel

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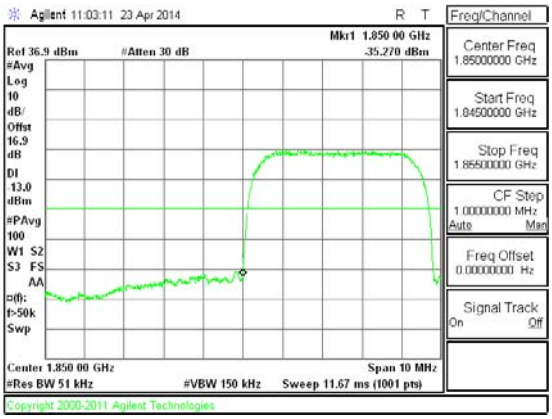
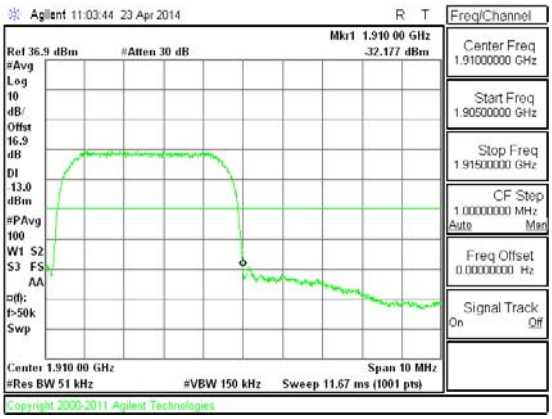
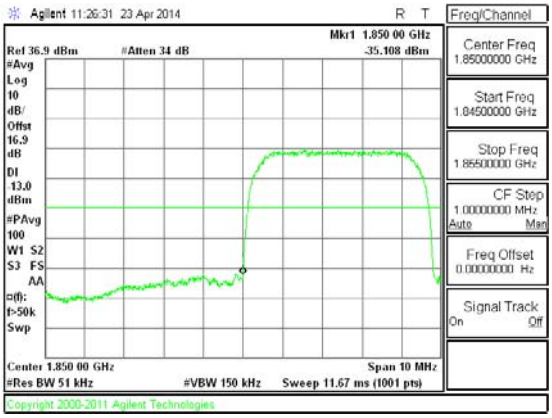
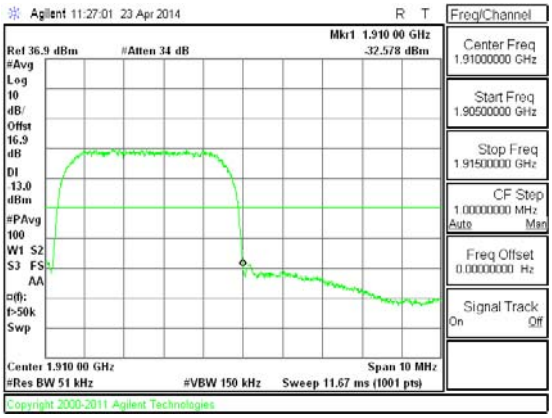
Band Band 2 HSDPA	 Band WCDMA B2 HSDPA CBE	 Band WCDMA B2 HSDPA CBE
Band Band 2 REL99	 Band WCDMA B2 REL99 CBE	 Band WCDMA B2 REL99 CBE

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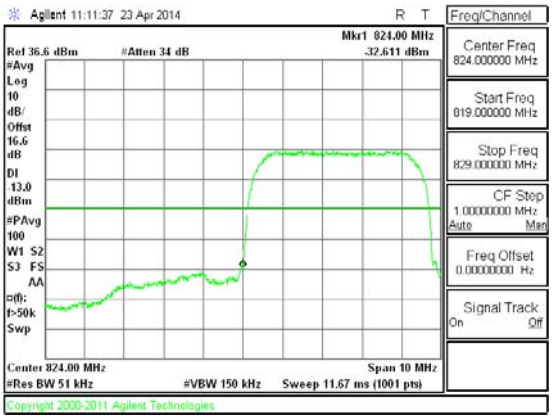
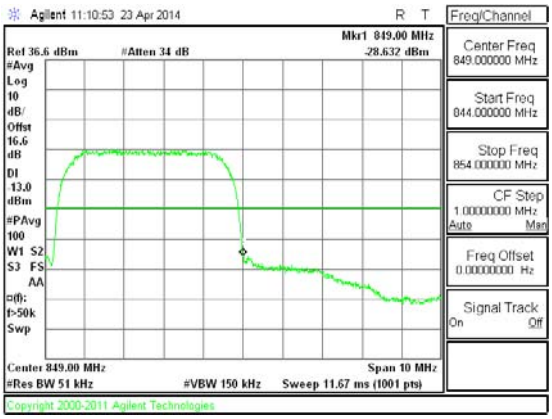
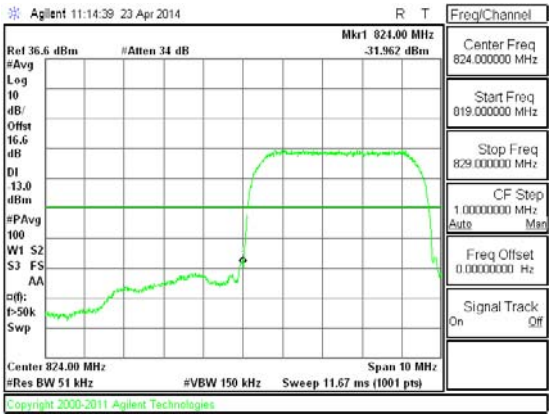
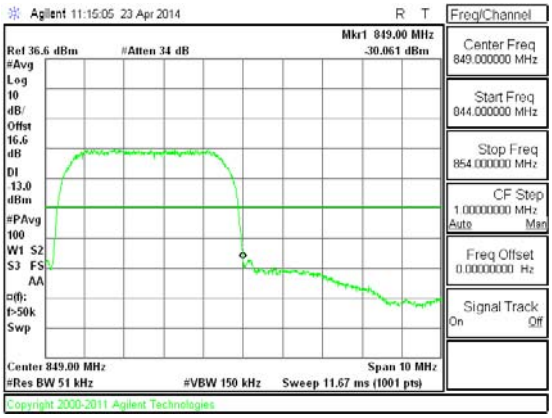
Band Band 5 HSDPA	 Band WCDMA B5 HSDPA CBE	 Band WCDMA B5 HSDPA CBE
Band Band 5 REL99	 Band WCDMA B5 REL99 CBE	 Band WCDMA B5 REL99 CBE

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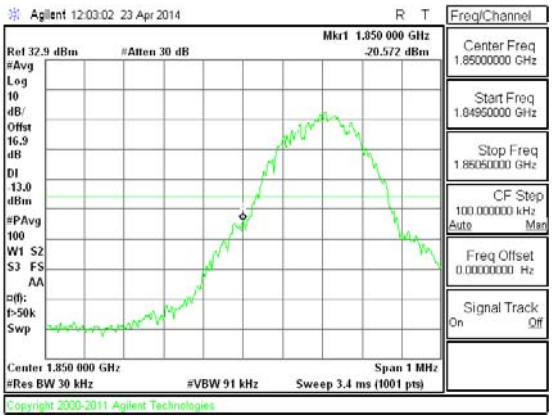
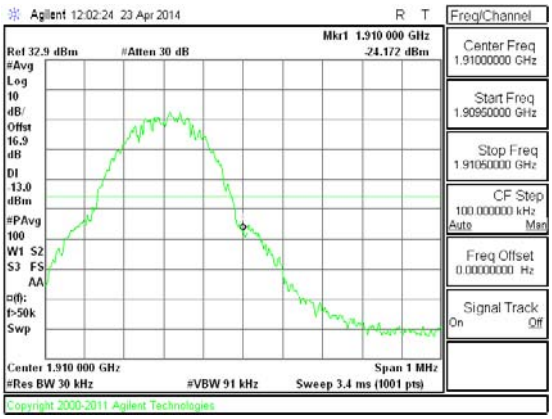
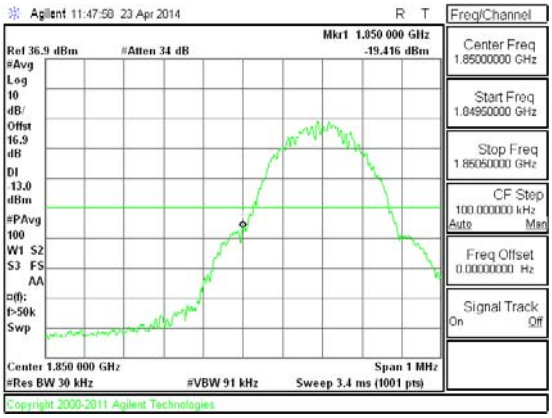
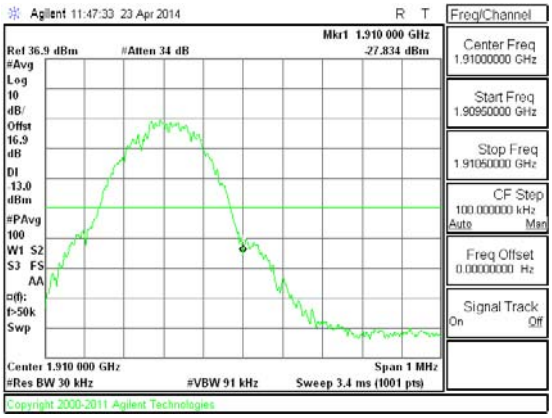
Band GSM1900 EGPRS	 Band GSM1900 EGPRS CBE Low channel	 Band GSM1900 EGPRS CBE High channel
Band GSM1900 GPRS	 Band GSM1900 GPRS CBE Low channel	 Band GSM1900 GPRS CBE High channel

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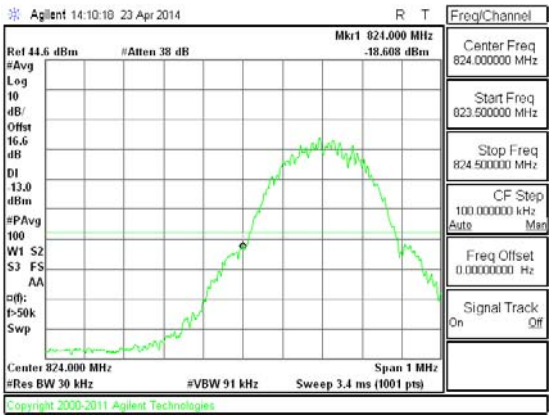
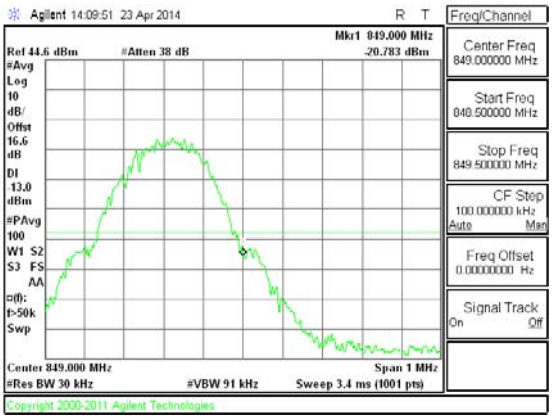
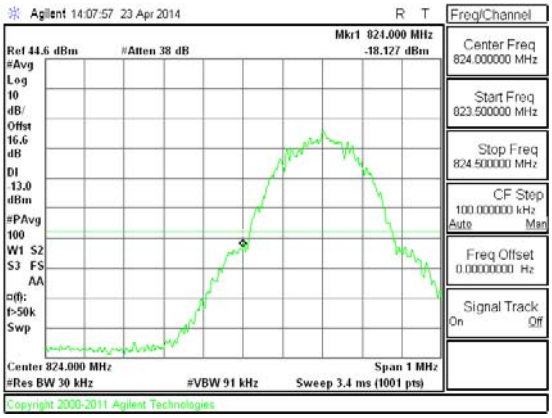
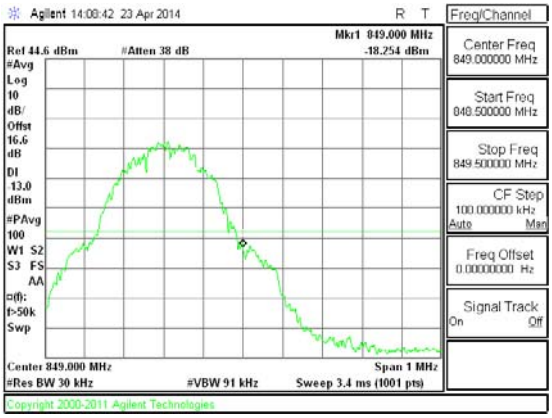
Band GSM850 EGPRS	 Band GSM850 EGPRS CBE Low channel	 Band GSM850 EGPRS CBE High channel
Band GSM850 GPRS	 Band GSM850 GPRS CBE Low channel	 Band GSM850 GPRS CBE High channel

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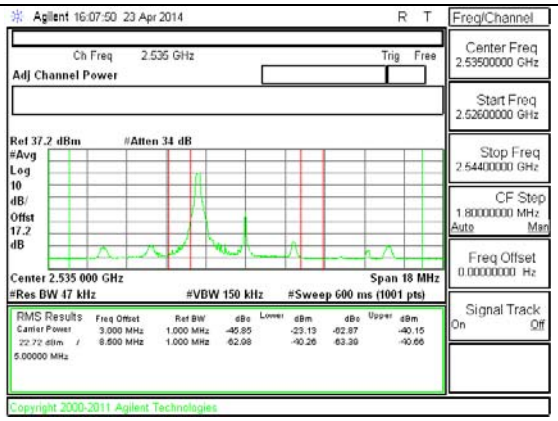
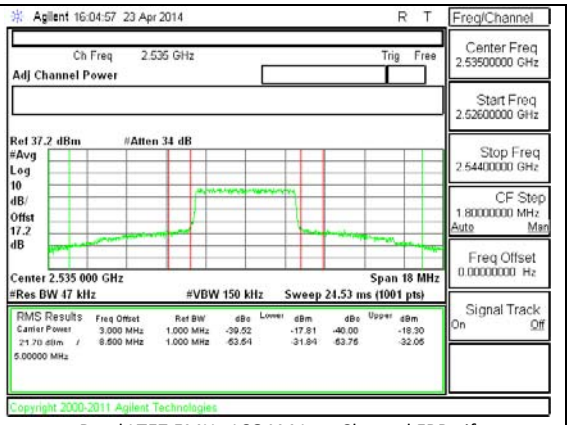
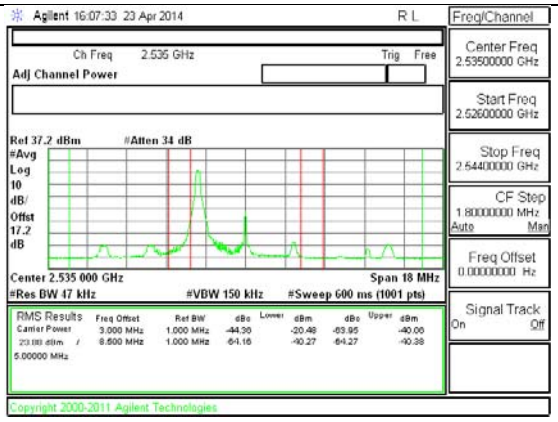
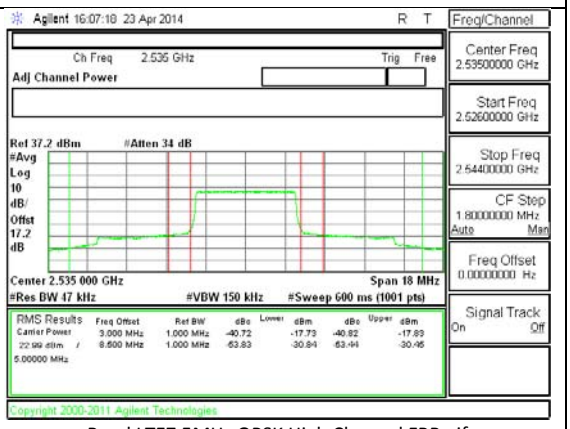
10.2.2. EMISSION MASK PLOTS

Band LTE7 5MHz 16QAM	 Band LTE7 5MHz 16QAM Low Channel 1RB.gif	 Band LTE7 5MHz 16QAM Low Channel FRB.gif
Band LTE7 5MHz QPSK	 Band LTE7 5MHz QPSK High Channel 1RB.gif	 Band LTE7 5MHz QPSK High Channel FRB.gif

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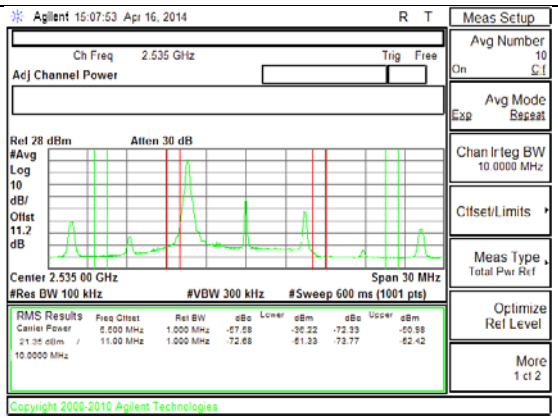
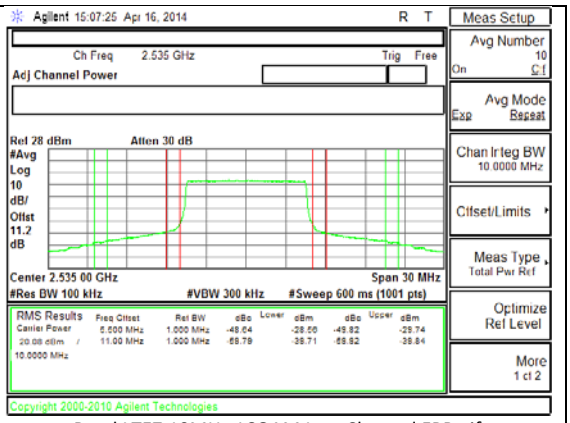
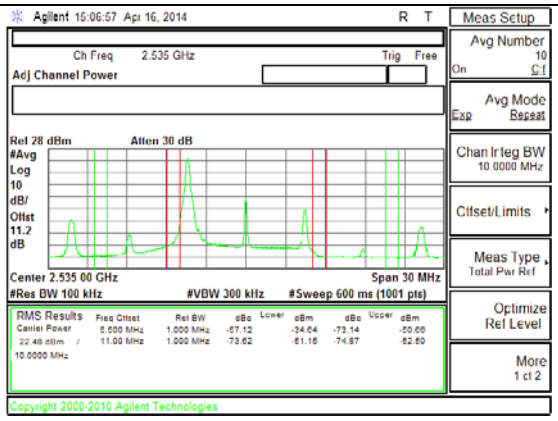
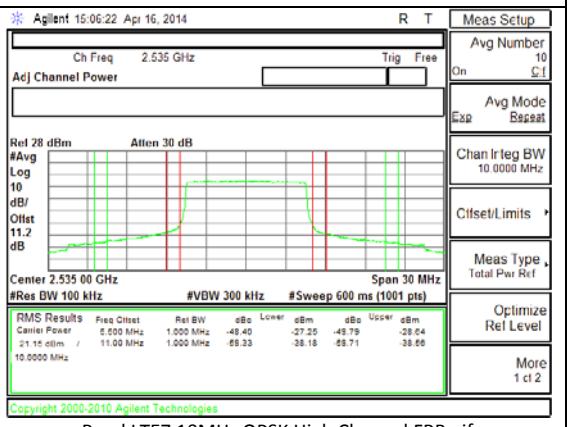
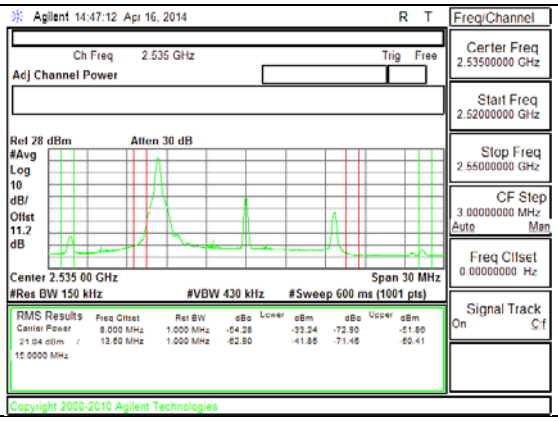
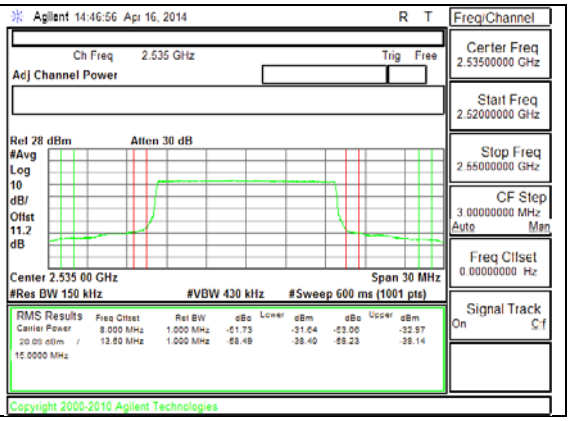
Band LTE7 10MHz 16QAM	 Band LTE7 10MHz 16QAM Low Channel 1RB.gif	 Band LTE7 10MHz 16QAM Low Channel FRB.gif
Band LTE7 10MHz QPSK	 Band LTE7 10MHz QPSK High Channel 1RB.gif	 Band LTE7 10MHz QPSK High Channel FRB.gif

Band LTE7 15MHz 16QAM		

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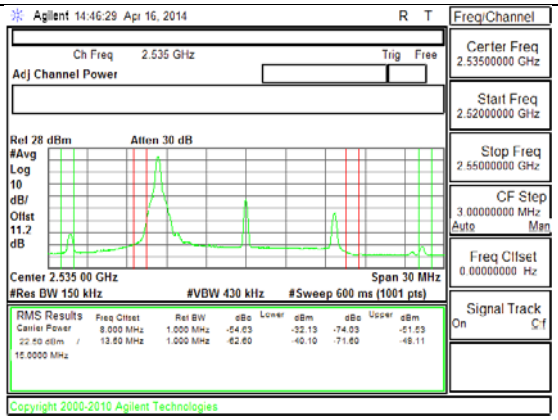
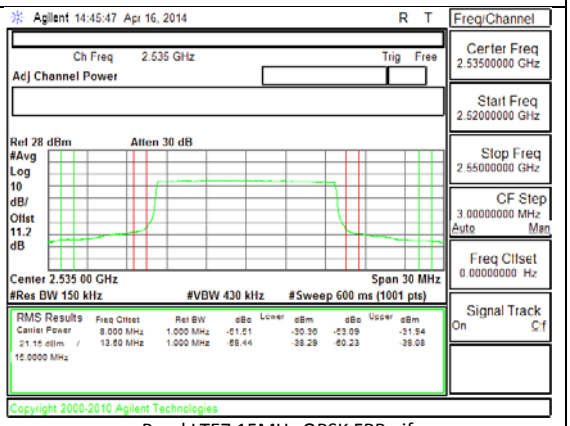
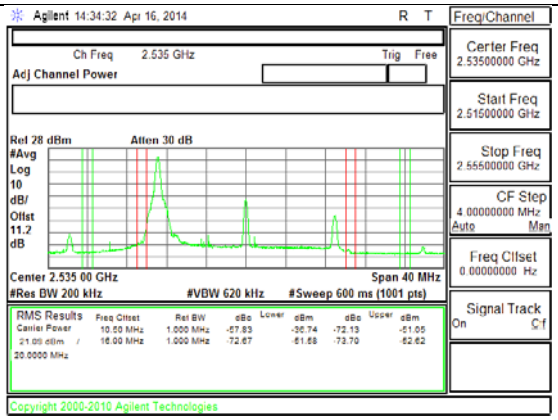
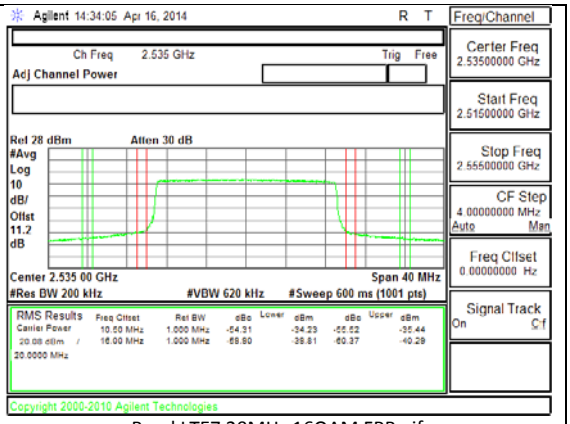
	Band LTE7 15MHz 16QAM 1RB.gif	Band LTE7 15MHz 16QAM FRB.gif
Band LTE7 15MHz QPSK	 Band LTE7 15MHz QPSK 1RB.gif	 Band LTE7 15MHz QPSK FRB.gif

Band LTE7 20MHz 16QAM	 Band LTE7 20MHz 16QAM 1RB.gif	 Band LTE7 20MHz 16QAM FRB.gif

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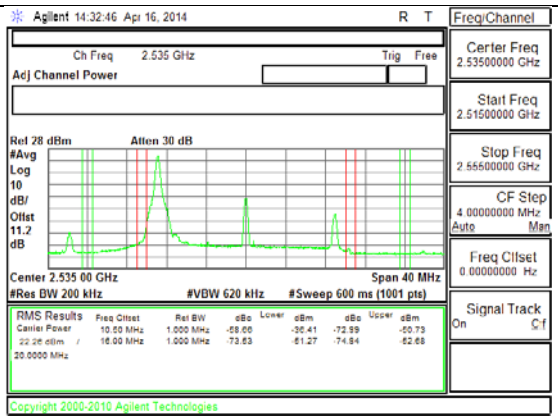
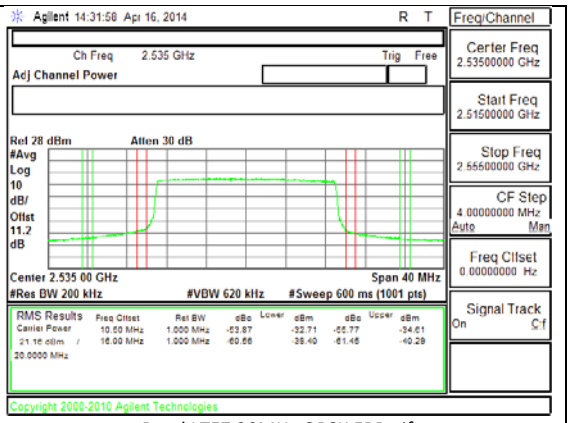
Band LTE7 20MHz QPSK	 Band LTE7 20MHz QPSK 1RB.gif	 Band LTE7 20MHz QPSK FRB.gif

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10.3. OUT OF BAND EMISSIONS

RULE PART(S)

FCC: §2.1051, §22.901, §22.917, §24.238 and §90.691

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.

SOP

For each out of band emissions measurement:

- Set display line at -13 dBm
- Set RBW & VBW to 100 kHz for the measurement below 1 GHz, and 1 MHz for the measurement above 1 GHz.

MODES TESTED

CDMA2000 BC0/BC1; GSM850/1900; WCDMA B2/B5; LTE B4/B7/B13

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)
LTE13	10	QPSK	782	-27.14	-13	-14.14
			782	-27.14	-13	-14.14
			782	-27.14	-13	-14.14
		16QAM	782	-26.63	-13	-13.63
			782	-26.63	-13	-13.63
			782	-26.63	-13	-13.63
Band	BW (MHz)	Mode	f (MHz)	Spur (dBm)	Spec (dBm)	Delta (dB)
LTE7	20	QPSK	2510	-30.22	-25	-5.22
			2535	-30.25	-25	-5.25
			2560	-32	-25	-7
		16QAM	2510	-29.86	-25	-4.86
			2535	-29.27	-25	-4.27
			2560	-31.66	-25	-6.66
Band	BW (MHz)	Mode	f (MHz)	Spur (dBm)	Spec (dBm)	Delta (dB)
LTE7	15	QPSK	2507.5	-28.36	-25	-3.36
			2535	-29.61	-25	-4.61
			2562.5	-30.14	-25	-5.14
		16QAM	2507.5	-30.69	-25	-5.69
			2535	-28.46	-25	-3.46
			2562.5	-30.21	-25	-5.21

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Band	BW (MHz)	Mode	f (MHz)	Spur (dBm)	Spec (dBm)	Delta (dB)
LTE7	10	QPSK	2505	-30.91	-25	-5.91
			2535	-32.15	-25	-7.15
			2565	-29.76	-25	-4.76
		16QAM	2505	-30.05	-25	-5.05
			2535	-29.07	-25	-4.07
			2565	-30.66	-25	-5.66
Band	BW (MHz)	Mode	f (MHz)	Spur (dBm)	Spec (dBm)	Delta (dB)
LTE7	5	QPSK	2502.5	-33.23	-25	-8.23
			2535	-33.9	-25	-8.9
			2567.5	-33.65	-25	-8.65
		16QAM	2502.5	-32.79	-25	-7.79
			2535	-33.07	-25	-8.07
			2567.5	-32.94	-25	-7.94
Band	BW (MHz)	Mode	f (MHz)	Spur (dBm)	Spec (dBm)	Delta (dB)
LTE4	20	QPSK	1720	-26.44	-13	-13.44
			1732.5	-24.5	-13	-11.5
			1745	-27.09	-13	-14.09
		16QAM	1720	-25.6	-13	-12.6
			1732.5	-25.19	-13	-12.19
			1745	-26.11	-13	-13.11
Band	BW (MHz)	Mode	f (MHz)	Spur (dBm)	Spec (dBm)	Delta (dB)
LTE4	15	QPSK	1717.5	-22.07	-13	-9.07
			1732.5	-22.43	-13	-9.43
			1747.5	-23.22	-13	-10.22
		16QAM	1717.5	-23.54	-13	-10.54
			1732.5	-22.94	-13	-9.94
			1747.5	-22.54	-13	-9.54
Band	BW (MHz)	Mode	f (MHz)	Spur (dBm)	Spec (dBm)	Delta (dB)
LTE4	10	QPSK	1715	-23.14	-13	-10.14
			1732.5	-22.52	-13	-9.52
			1750	-21.52	-13	-8.52
		16QAM	1715	-21.68	-13	-8.68

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			1732.5	-22.46	-13	-9.46
			1750	-22.72	-13	-9.72
Band	BW (MHz)	Mode	f (MHz)	Spur (dBm)	Spec (dBm)	Delta (dB)
LTE4	5	QPSK	1712.5	-22.35	-13	-9.35
			1732.5	-21.95	-13	-8.95
			1752.5	-22.67	-13	-9.67
		16QAM	1712.5	-24.92	-13	-11.92
			1732.5	-22.18	-13	-9.18
			1752.5	-22.78	-13	-9.78

Band	Mode	f (MHz)	Spur (dBm)	Spec (dBm)	Delta (dB)
GSM850	GMSK	824.2			
		836.6			
		848.8			
	GPRS	824.2	-22.79	-13	-9.79
		836.6	-22.67	-13	-9.67
		848.8	-22.95	-13	-9.95
	EGPRS	824.2	-24.64	-13	-11.64
		836.6	-23.11	-13	-10.11
		848.8	-24.85	-13	-11.85
GSM1900	GMSK	1850.2			
		1880			
		1909.8			
	GPRS	1850.2	-21.804	-13	-8.804
		1880	-23.873	-13	-10.873
		1909.8	-23.606	-13	-10.606
	EGPRS	1850.2	-23.08	-13	-10.08
		1880	-23.07	-13	-10.07
		1909.8	-23.35	-13	-10.35
Band 5	REL99	826.4	-22.56	-13	-9.56
		836.6	-22.58	-13	-9.58
		846.6	-23.34	-13	-10.34
	HSDPA	826.4	-24.17	-13	-11.17
		836.6	-23.58	-13	-10.58

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		846.6	-24.17	-13	-11.17
Band 2	REL99	1852.4	-24.28	-13	-11.28
		1880	-23.07	-13	-10.07
		1907.6	-24.74	-13	-11.74
	HSDPA	1852.4	-29.18	-13	-16.18
		1880	-28.97	-13	-15.97
		1907.6	-27.4	-13	-14.4
BC0	1xRTT	824.7	-27.52	-13	-14.52
		836.52	-27.33	-13	-14.33
		848.31	-24.87	-13	-11.87
	EVDO Rel.0	824.7	-19.81	-13	-6.81
		836.52	-19.54	-13	-6.54
		848.31	-20.61	-13	-7.61
BC1	1xRTT	1851.25	-18.812	-13	-5.812
		1880	-18.983	-13	-5.983
		1908.75	-20.736	-13	-7.736
	EVDO Rel. 0	1851.25	-23.638	-13	-10.638
		1880	-22.904	-13	-9.904
		1908.75	-22.167	-13	-9.167

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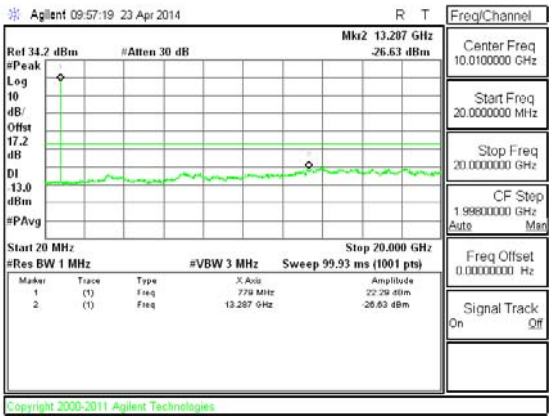
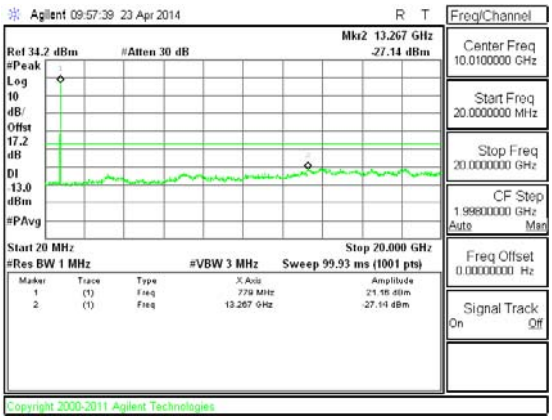
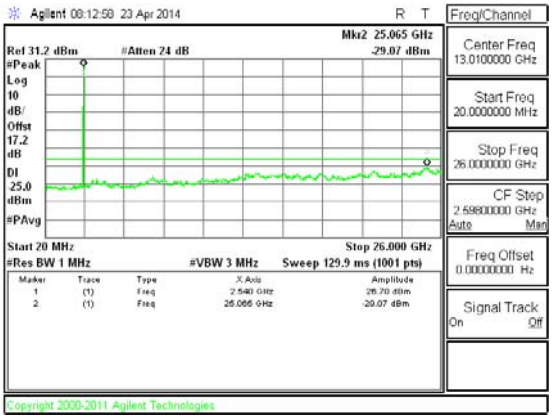
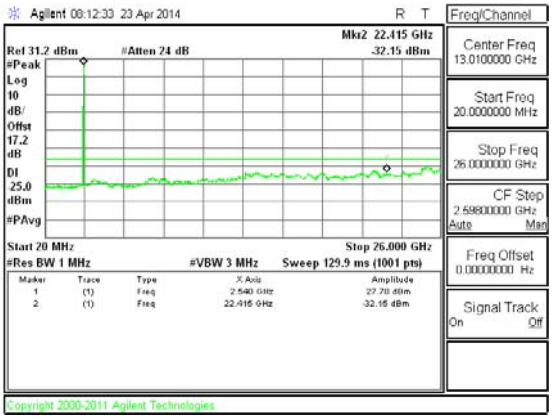
10.3.2. OUT OF BAND EMISSIONS PLOTS

Band LTE13 10MHz 16QAM	 Band LTE13 10MHz CSE 16QAM High channel	 Band LTE13 10MHz CSE QPSK High channel
Band LTE7 10MHz 16QAM	 Band LTE7 10MHz CSE 16QAM Mid channel	 Band LTE7 10MHz CSE QPSK Mid channel

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