FCC CFR47 PART 22 SUBPART H
FCC CFR47 PART 24 SUBPART E
FCC CFR47 PART 27 SUBPART H
INDUSTRY CANADA RSS-130 ISSUE 1
INDUSTRY CANADA RSS-132 ISSUE 3
INDUSTRY CANADA RSS-133 ISSUE 6

CERTIFICATION TEST REPORT

FOR

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

MODEL NUMBER: SM-G710S; SM-G710L; SM-G710K

FCC ID: A3LSMG710S

IC ID: 649E-SMG710S

REPORT NUMBER: 13U16613-1 REV A

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Prepared for

SAMSUNG ELECTRONICS CO., LTD.

416, MAETAN 3-DONG, YEONGTONG-GU

SUWON-CITY, GYEONGGI-DO 443-742, SOUTH KOREA

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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Rev.	Issue Date	Revisions	Revised By
--	12/23/13	Initial	P. Kim
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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: **Samsung**

EUT DESCRIPTION: **GSM/WCDMA/LTE Phone + Bluetooth & DTS/UNII a/b/g/n/ac + NFC**

MODEL: **SM-G710S;SM-G710L; SM-G710K**

SERIAL NUMBER: **FK-366A, FK-366B, FK-366C, FK-366D**

DATE TESTED: **December 2 - 23, 2013**

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
FCC PART 22H, 24E and 27H	PASS
INDUSTRY CANADA RSS-130,132,133	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 By:

PHILIP KIM
WiSE OPERATIONS MANAGER
UL VERIFICATION SERVICES

Tested By:

STEVEN TRAN
WiSE LAB TECHNICIAN
UL VERIFICATION SERVICES

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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, and RSS 130, RSS 132, RSS 133.

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.ccsemc.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:

Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB)

36.5 dBuV + 18.7 dB/m + 0.6 dB – 26.9 dB = 28.9 dBuV/m

4.3. MEASUREMENT UNCERTAINTY

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

PARAMETER	UNCERTAINTY
Conducted Disturbance, 0.15 to 30 MHz	3.52 dB
Radiated Disturbance, 30 to 18000 MHz	4.94 dB

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

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5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a GSM/WCDMA/LTE Phone + Bluetooth & 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 2 4						
Band	Frequency Range(MHz)	Modulation Peak	Conducted		Radiated	
			Peak (dBm)	Peak(mW)	Peak (dBm)	Peak(mW)
GSM1900	1850~1910	GMSK	30.44	1107		
	1850~1910	GPRS	30.46	1112	26.43	439.54

FCC Part 22/2 4						
Band	Frequency Range(MHz)	Modulation Peak	Conducted		Radiated	
			Avg (dBm)	Avg(mW)	Avg (dBm)	Avg(mW)
Band 5	824~849	REL99	23.58	228	18.251	66.85
	824~849	HSDPA	22.59	182	17.29	53.58
	824~849	HSUPA	22.58	181		
Band 2	1850~1910	REL99	23.45	221	19.06	80.54
	1850~1910	HSDPA	22.50	178	18.88	77.27
	1850~1910	HSUPA	22.49	177		

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5.3. MAXIMUM OUTPUT POWER (LTE)

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

FCC Part 27							
Band	Frequency Range(MHz)	BandWidth (MHz)	Modulation	Conducted		Radiated	
			Peak	Avg (dBm)	Avg(mW)	Avg (dBm)	Avg(mW)
LTE17	704~716	10MHz	QPSK	23.27	212.3	20.29	106.9
			16QAM	22.47	176.6	20.66	116.4

FCC Part 27							
Band	Frequency Range(MHz)	BandWidth (MHz)	Modulation	Conducted		Radiated	
			Peak	Avg (dBm)	Avg(mW)	Avg (dBm)	Avg(mW)
LTE17	704~716	5MHz	QPSK	23.34	215.8	19.961	99.11
			16QAM	22.58	181.1	19.101	81.3

FCC Part 22							
Band	Frequency Range(MHz)	BandWidth (MHz)	Modulation	Conducted		Radiated	
			Peak	Avg (dBm)	Avg(mW)	Avg (dBm)	Avg(mW)
LTE5	824~849	10MHz	QPSK	23.27	212.3	20.521	112.75
			16QAM	22.47	176.6	19.601	91.22

FCC Part 22							
Band	Frequency Range(MHz)	BandWidth (MHz)	Modulation	Conducted		Radiated	
			Peak	Avg (dBm)	Avg(mW)	Avg (dBm)	Avg(mW)
LTE5	824~849	5MHz	QPSK	23.31	214.3	20.091	102.12
			16QAM	22.62	182.8	19.401	87.12

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FCC Part 22							
Band	Frequency Range(MHz)	BandWidth (MHz)	Modulation Peak	Conducted		Radiated	
				Avg (dBm)	Avg(mW)	Avg (dBm)	Avg(mW)
LTE5	824~849	3MHz	QPSK	23.27	212.3	20.221	105.22
			16QAM	22.46	176.2	19.501	89.15

FCC Part 22/2 4/27							
Band	Frequency Range(MHz)	BandWidth (MHz)	Modulation Peak	Conducted		Radiated	
				Avg (dBm)	Avg(mW)	Avg (dBm)	Avg(mW)
LTE5	824~849	1.4MHz	QPSK	23.29	213.3	20.841	121.37
			16QAM	22.48	177	19.901	97.75

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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)
GSM1900, 1850~1910MHz	2.9
Band 5, 824~849MHz	-0.2
Band 2, 1850~1910MHz	2.9
LTE5, 824~849MHz	-0.2
LTE17, 704~716MHz	-3.4

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5.5. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
AC Adapter	Samsung	SM-G3518	DK4DA09TS	N/A
Earphone	Samsung	SM-G3518	N/A	N/A

I/O CABLES (CONDUCTED SETUP)

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

I/O CABLES (RADIATED SETUP)

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

TEST SETUP

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

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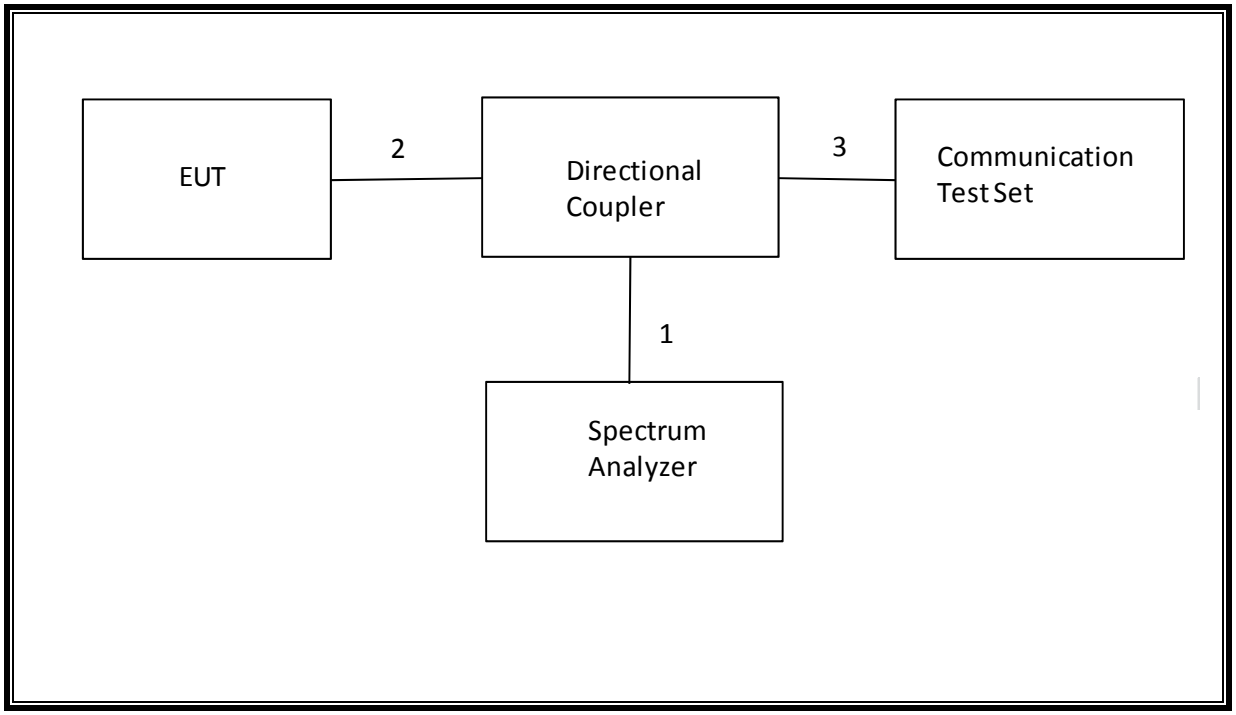
SETUP DIAGRAM FOR TESTS (CONDUCTED TEST SETUP)



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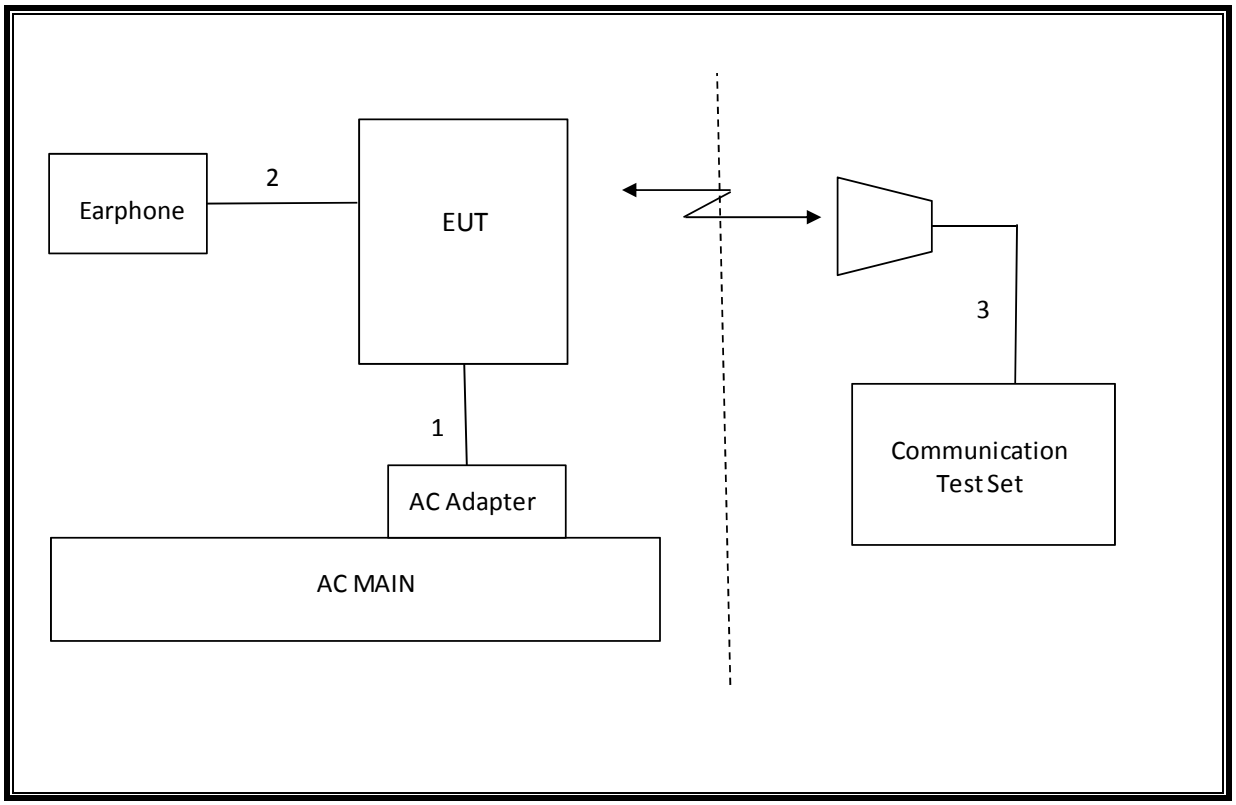
SETUP DIAGRAM FOR TESTS (RADIATED TEST SETUP)



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6. TEST AND MEASUREMENT EQUIPMENT

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

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

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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	8.982MHz
22.917(a) 24.238(a) 27.53(g)	RSS-132(4.5.1) RSS-133(6.5.1) RSS-130(4.6)	Band Edge / Conducted Spurious Emission	-13dBm		Pass	-13.555dBm
2.1046	N/A	Conducted output power	N/A		Pass	30.46dBm
22.355 24.235 27.54	RSS-132(4.3) RSS-133(6.3) RSS-130(4.2)	Frequency Stability	2.5PPM		Pass	0.016PPM
22.913(a)(2)	RSS-132(4.4)	Effective Radiated Power	38 dBm	Radiated	Pass	20.84dBm
27.50(b)(10)	RSS-130(4.4)		34.77 dBm		Pass	
24.232(c)	RSS-133(6.4)	Equivalent Isotropic Radiated Power	33dBm		Pass	26.43dBm
22.917(a) 24.238(a) 27.53(g)	RSS-132(4.5.1) RSS-133(6.5.1) RSS-130(4.6)	Radiated Spurious Emission	-13dBm		Pass	-21.3dBm

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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 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)
GSM1900	GMSK	512	1850.2	30.44			
		661	1880	30.43			
		810	1909.8	30.14			
	GPRS	512	1850.2	30.46	29.69	28.62	26.65
		661	1880	30.43	29.48	28.62	26.70
		810	1909.8	30.09	29.26	28.42	26.58

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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	4145	826.6	23.58
		4183	836.6	23.49
		4220	846.4	23.49
Band 2	REL99	9275	1852.6	23.34
		9400	1880	23.45
		9525	1907.4	23.26

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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	4145	826.6	22.34
			4183	836.6	22.59
			4220	846.4	22.42
		2	4145	826.6	21.96
			4183	836.6	21.90
			4220	846.4	22.07
		3	4145	826.6	21.87
			4183	836.6	21.88
			4220	846.4	22.12
		4	4145	826.6	21.84
			4183	836.6	21.90
			4220	846.4	22.16
Band 2	HSDPA	1	9275	1852.6	22.41
			9400	1880	22.50

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			9525	1907.4	22.29
		2	9275	1852.6	22.02
			9400	1880	22.06
			9525	1907.4	21.89
		3	9275	1852.6	21.90
			9400	1880	21.84
			9525	1907.4	21.79
		4	9275	1852.6	21.84
			9400	1880	21.88
			9525	1907.4	21.79

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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	4145	826.6	22.45
			4183	836.6	22.48
			4220	846.4	22.58
		2	4145	826.6	21.90
			4183	836.6	21.99
			4220	846.4	22.11
		3	4145	826.6	22.41
			4183	836.6	22.49
			4220	846.4	22.57
		4	4145	826.6	22.37
			4183	836.6	22.46
			4220	846.4	22.42
		5	4145	826.6	22.10
			4183	836.6	22.44
			4220	846.4	22.56
Band 2	HSUPA	1	9275	1852.6	22.39
			9400	1880	22.42
			9525	1907.4	22.23
		2	9275	1852.6	21.91
			9400	1880	21.89
			9525	1907.4	21.85
		3	9275	1852.6	22.34
			9400	1880	22.35
			9525	1907.4	22.33
		4	9275	1852.6	22.33
			9400	1880	22.44
			9525	1907.4	22.30
		5	9275	1852.6	22.34
			9400	1880	22.49
			9525	1907.4	22.31

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8.4. LTE OUTPUT VERIFICATION

8.4.1. LTE OUTPUT RESULT

Band	Frequency	Modulation	BW (MHz)	RB Size	RB Offset	Average
LTE17	709	QPSK	10	1	0	23.27
				1	24	23.19
				1	49	23.18
				25	0	22.30
				25	11	22.35
				25	24	22.29
				50	0	22.35
	709	16QAM		1	0	22.21
				1	24	22.07
				1	49	22.10
				25	0	21.25
				25	11	21.27
				25	24	21.28
				50	0	21.31
	710	QPSK		1	0	23.27
				1	24	23.24
				1	49	23.23
				25	0	22.30
				25	11	22.28
				25	24	22.27
				50	0	22.25
	710	16QAM		1	0	22.47
				1	24	22.46
				1	49	22.38
				25	0	21.29
				25	11	21.29
				25	24	21.27
				50	0	21.31
	711	QPSK		1	0	23.25
				1	24	23.18
				1	49	23.19
				25	0	22.28
				25	11	22.30
				25	24	22.27
				50	0	22.34
	711	16QAM		1	0	22.24
				1	24	22.06
				1	49	22.00
				25	0	21.36
				25	11	21.31
				25	24	21.34
				50	0	21.30

Band	Frequency	Modulation	BW (MHz)	RB Size	RB Offset	Average
LTE17	706.5	QPSK	5	1	0	23.26
				1	11	23.21
				1	24	23.22
				12	0	22.33
				12	5	22.35

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				12	11	22.34
				25	0	22.34
	706.5	16QAM		1	0	22.12
				1	11	22.14
				1	24	22.15
				12	0	21.32
				12	5	21.34
				12	11	21.33
				25	0	21.39
	710	QPSK		1	0	23.34
				1	11	23.29
				1	24	23.33
				12	0	22.30
				12	5	22.28
				12	11	22.30
				25	0	22.28
	710	16QAM		1	0	22.28
				1	11	22.23
				1	24	22.24
				12	0	21.30
				12	5	21.28
				12	11	21.24
				25	0	21.20
	713.5	QPSK		1	0	23.24
				1	11	23.25
				1	24	23.24
				12	0	22.31
				12	5	22.23
				12	11	22.22
				25	0	22.26
	713.5	16QAM		1	0	22.58
				1	11	22.51
				1	24	22.54
				12	0	21.24
				12	5	21.20
				12	11	21.21
				25	0	21.20

Band	Frequency	Modulation	BW (MHz)	RB Size	RB Offset	Average
LTE5	829	QPSK	10	1	0	23.19
				1	24	23.06
				1	49	23.17
				25	0	22.21
				25	11	22.35
				25	24	22.30
				50	0	22.40
	829	16QAM		1	0	22.31
				1	24	22.03
				1	49	22.16
				25	0	21.22
				25	11	21.30
				25	24	21.33
				50	0	21.33
	836.5	QPSK		1	0	23.27

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				1	24	23.20
				1	49	23.18
				25	0	22.26
				25	11	22.29
				25	24	22.31
				50	0	22.31
	836.5	16QAM		1	0	22.47
				1	24	22.37
				1	49	22.48
				25	0	21.35
				25	11	21.29
				25	24	21.31
				50	0	21.28
	844	QPSK		1	0	23.14
				1	24	23.12
				1	49	23.11
				25	0	22.28
				25	11	22.21
				25	24	22.22
				50	0	22.26
	844	16QAM		1	0	22.05
				1	24	22.00
				1	49	22.04
				25	0	21.36
				25	11	21.35
				25	24	21.35
				50	0	21.28

Band	Frequency	Modulation	BW (MHz)	RB Size	RB Offset	Average
LTE5	826.5	QPSK	5	1	0	23.22
				1	11	23.08
				1	24	23.11
				12	0	22.36
				12	5	22.28
				12	11	22.27
				25	0	22.25
	826.5	16QAM		1	0	22.14
				1	11	22.00
				1	24	22.07
				12	0	21.37
				12	5	21.28
				12	11	21.29
				25	0	21.36
	836.5	QPSK		1	0	23.31
				1	11	23.24
				1	24	23.23
				12	0	22.26
				12	5	22.31
				12	11	22.26
				25	0	22.24
	836.5	16QAM		1	0	22.62
				1	11	22.55
				1	24	22.60
				12	0	21.29

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				12	5	21.27
				12	11	21.26
				25	0	21.26
	846.5	QPSK		1	0	23.09
				1	11	23.06
				1	24	23.11
				12	0	22.23
				12	5	22.20
				12	11	22.26
				25	0	22.22
	846.5	16QAM		1	0	22.02
				1	11	22.00
				1	24	22.05
				12	0	21.30
				12	5	21.28
				12	11	21.27
				25	0	21.32

Band	Frequency	Modulation	BW (MHz)	RB Size	RB Offset	Average
LTE5	825.5	QPSK	3	1	0	23.24
				1	7	23.07
				1	14	23.15
				7	0	22.41
				7	2	22.35
				7	6	22.29
				15	0	22.35
	825.5	16QAM		1	0	22.19
				1	7	22.00
				1	14	22.02
				7	0	21.43
				7	2	21.41
				7	6	21.33
				15	0	21.28
	836.5	QPSK		1	0	23.27
				1	7	23.21
				1	14	23.27
				7	0	22.28
				7	2	22.28
				7	6	22.29
				15	0	22.31
	836.5	16QAM		1	0	22.45
				1	7	22.38
				1	14	22.46
				7	0	21.11
				7	2	21.07
				7	6	21.07
				15	0	21.34
	847.5	QPSK		1	0	23.15
				1	7	23.09
				1	14	23.16
				7	0	22.26
				7	2	22.30
				7	6	22.27
				15	0	22.31

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	847.5	16QAM		1	0	22.09
				1	7	22.02
				1	14	22.03
				7	0	21.34
				7	2	21.34
				7	6	21.32
				15	0	21.23

Band	Frequency	Modulation	BW (MHz)	RB Size	RB Offset	Average
LTE5	824.7	QPSK	1.4	1	0	23.28
				1	2	23.24
				1	5	23.17
				3	0	23.29
				3	0	23.28
				3	2	23.25
				6	0	22.41
	824.7	16QAM		1	0	22.48
				1	2	22.44
				1	5	22.35
				3	0	22.35
				3	0	22.35
				3	2	22.32
				6	0	21.45
	836.5	QPSK		1	0	23.20
				1	2	23.16
				1	5	23.23
				3	0	23.28
				3	0	23.28
				3	2	23.23
				6	0	22.32
	836.5	16QAM		1	0	22.09
				1	2	22.10
				1	5	22.20
				3	0	22.47
				3	0	22.46
				3	2	22.39
				6	0	21.42
	848.3	QPSK		1	0	23.24
				1	2	23.19
				1	5	23.20
				3	0	23.25
				3	0	23.23
				3	2	23.21
				6	0	22.34
	848.3	16QAM		1	0	22.39
				1	2	22.35
				1	5	22.37
				3	0	22.20
				3	0	22.21
				3	2	22.22
				6	0	21.36

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9. PEAK TO AVERAGE RATIO

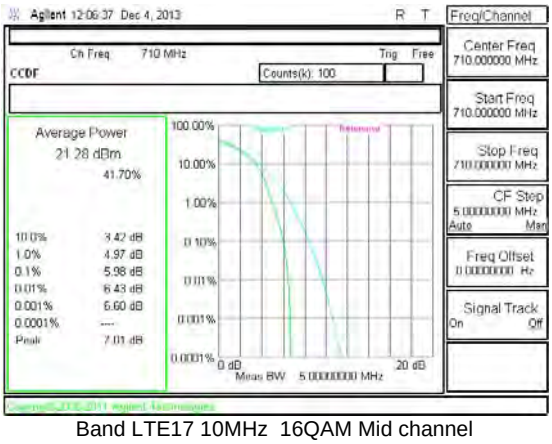
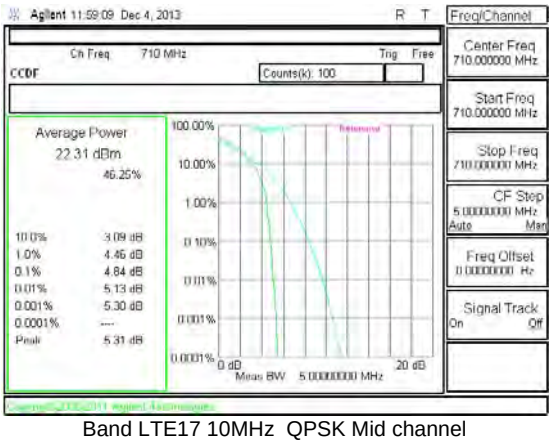
Test Procedure

Per KDB 971168 D01 Power Meas License Digital Systems v02r01

Test Spec

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

9.1. CONDUCTED PEAK TO AVERAGE RESULT

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

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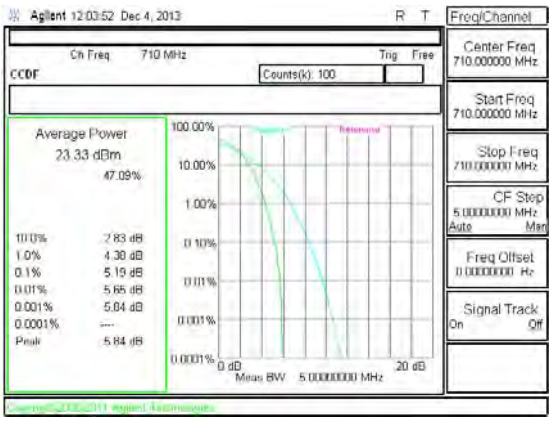
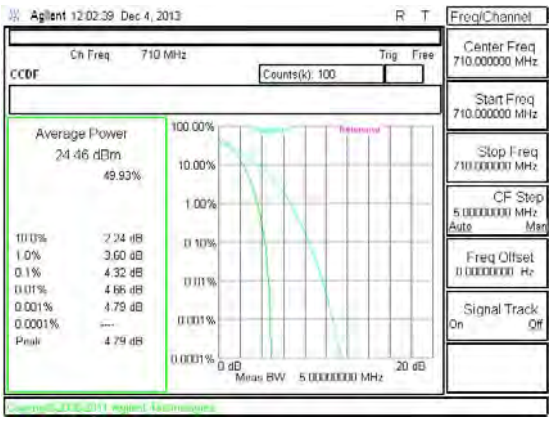
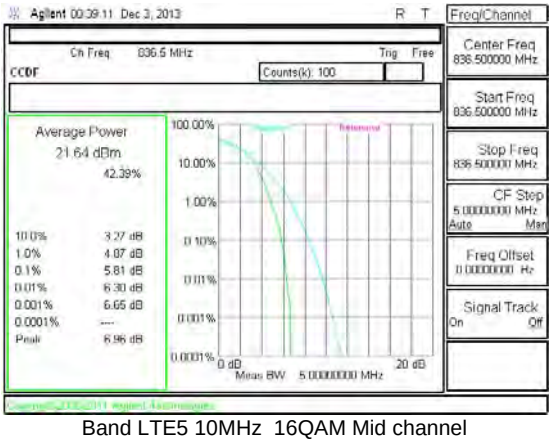
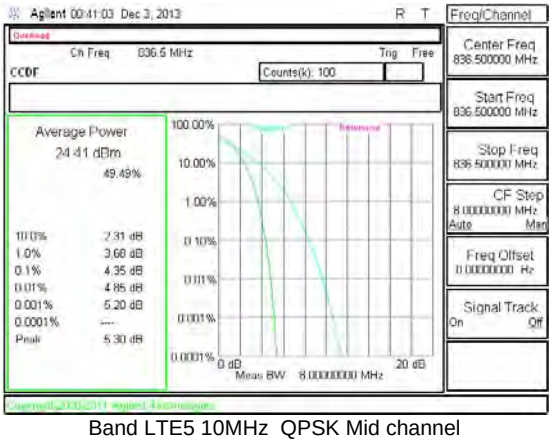
Band LTE17 5MHz	 Band LTE17 5MHz 16QAM Mid channel	 Band LTE17 5MHz QPSK Mid channel
Band LTE5 10MHz	 Band LTE5 10MHz 16QAM Mid channel	 Band LTE5 10MHz QPSK Mid channel

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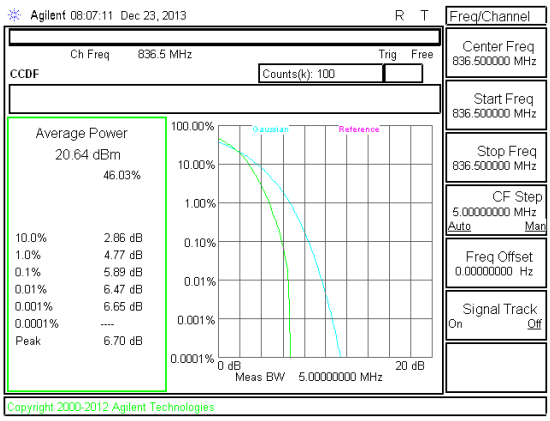
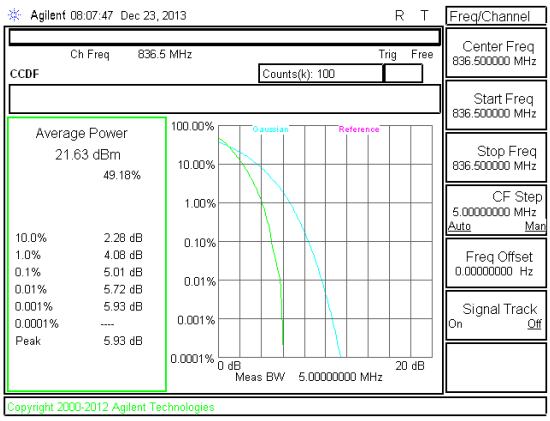
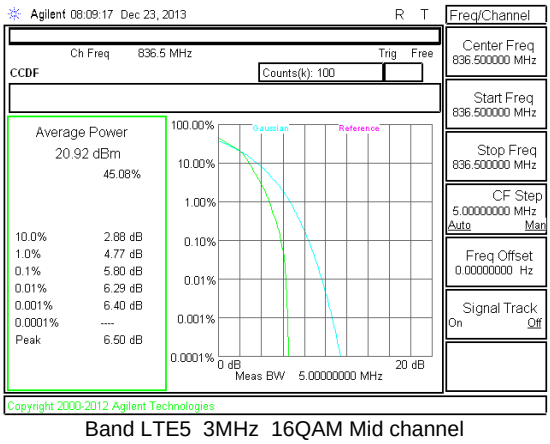
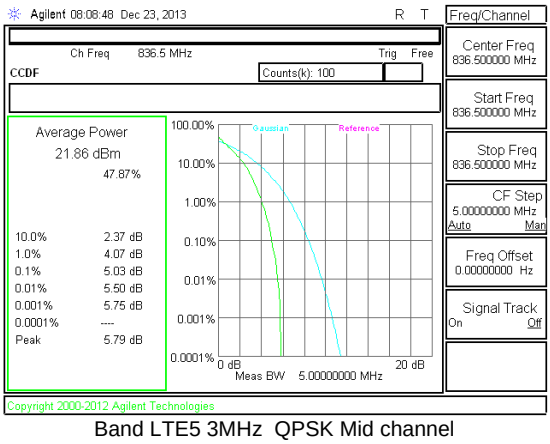
Band LTE5 5MHz	 Band LTE5 5MHz 16QAM Mid channel	 Band LTE5 5MHz QPSK Mid channel
Band LTE5 3MHz	 Band LTE5 3MHz 16QAM Mid channel	 Band LTE5 3MHz QPSK Mid channel

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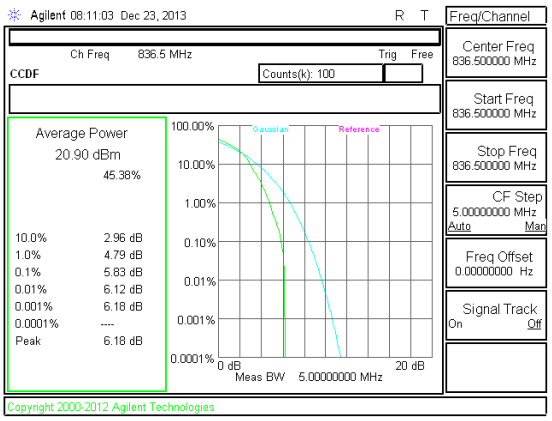
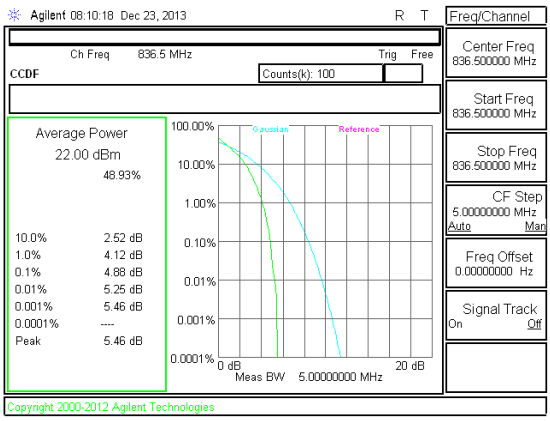
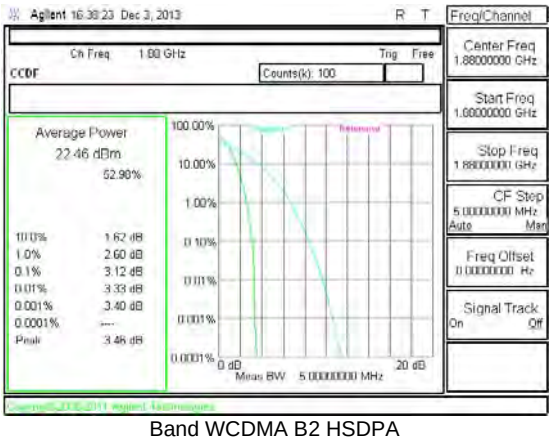
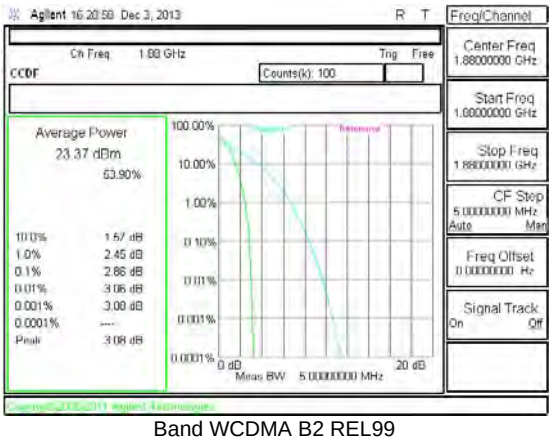
Band LTE5 1.4MHz	 Band LTE5 1.4MHz 16QAM Mid channel	 Band LTE5 1.4MHz QPSK Mid channel
Band Band 2	 Band WCDMA B2 HSDPA	 Band WCDMA B2 REL99

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Band Band 5	 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-130, 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)

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10.1.1. OCCUPIED BANDWIDTH RESULTS

Band	Mode	Channel	f (MHz)	99% BW (MHz)	-26dB BW (MHz)
GSM1900	GPRS	512	1850.2	0.242	0.300
		661	1880	0.239	0.315
		810	1909.8	0.241	0.306
Band 5	REL99	4145	826.6	4.1574	4.641
		4183	836.6	4.15	4.636
		4220	846.4	4.1522	4.645
	HSDPA	4145	826.6	4.1391	4.613
		4183	836.6	4.1328	4.647
		4220	846.4	4.1487	4.624
Band 2	REL99	9275	1852.6	4.2482	5.198
		9400	1880	4.1775	4.655
		9525	1907.4	4.1494	4.658
	HSDPA	9275	1852.6	4.1937	4.715
		9400	1880	4.1458	4.605
		9525	1907.4	4.1456	4.665

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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)
LTE17	10	QPSK	50/0	709	8.940	9.656
			50/0	710	8.970	9.715
			50/0	711	8.924	9.665
		16QAM	50/0	709	8.972	10.988
			50/0	710	8.950	11.045
			50/0	711	8.960	9.991

Band	BW(MHz)	Mode	RB/RB Size	f (MHz)	99% BW (MHz)	-26dB BW (MHz)
LTE17	5	QPSK	25/0	706.5	4.540	5.040
			25/0	710	4.478	5.178
			25/0	713.5	4.457	5.534
		16QAM	25/0	706.5	4.469	4.937
			25/0	710	4.477	4.929
			25/0	713.5	4.471	5.139

Band	BW(MHz)	Mode	RB/RB Size	f (MHz)	99% BW (MHz)	-26dB BW (MHz)
LTE5	10	QPSK	50/0	829	8.928	11.215
			50/0	836.5	8.873	11.308
			50/0	844	8.982	14.235
		16QAM	50/0	829	8.977	13.569
			50/0	836.5	8.915	10.531
			50/0	844	8.931	13.599

Band	BW(MHz)	Mode	RB/RB Size	f (MHz)	99% BW (MHz)	-26dB BW (MHz)
LTE5	5	QPSK	25/0	826.5	4.450	4.935
			25/0	836.5	4.470	4.746
			25/0	846.5	4.422	4.622
		16QAM	25/0	826.5	4.484	4.894

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			25/0	836.5	4.455	4.938
			25/0	846.5	4.468	4.621

Band	BW(MHz)	Mode	RB/RB Size	f (MHz)	99% BW (MHz)	-26dB BW (MHz)
LTE5	3	QPSK	15/0	825.5	2.683	3.383
			15/0	836.5	2.683	3.257
			15/0	847.5	2.774	4.995
		16QAM	15/0	825.5	2.666	2.991
			15/0	836.5	2.690	3.674
			15/0	847.5	2.747	4.997

Band	BW(MHz)	Mode	RB/RB Size	f (MHz)	99% BW (MHz)	-26dB BW (MHz)
LTE5	1.4	QPSK	6/0	824.7	1.096	1.968
			6/0	836.5	1.112	1.981
			6/0	848.3	1.428	2.000
		16QAM	6/0	824.7	1.103	1.642
			6/0	836.5	1.105	1.642
			6/0	848.3	1.370	2.000

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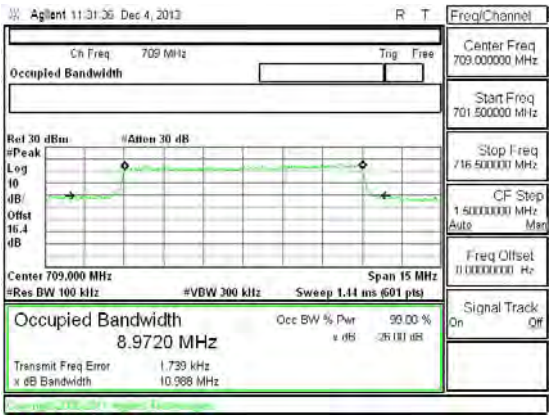
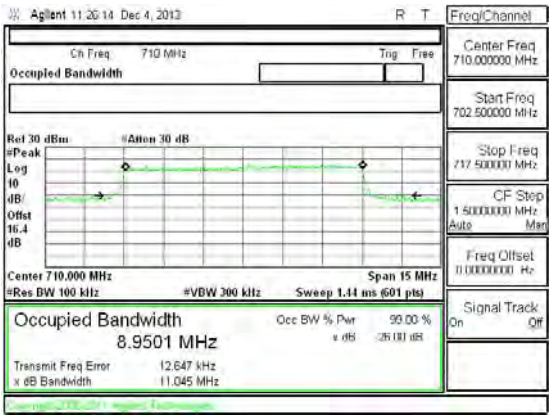
10.1.1. OCCUPIED BANDWIDTH PLOTS

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

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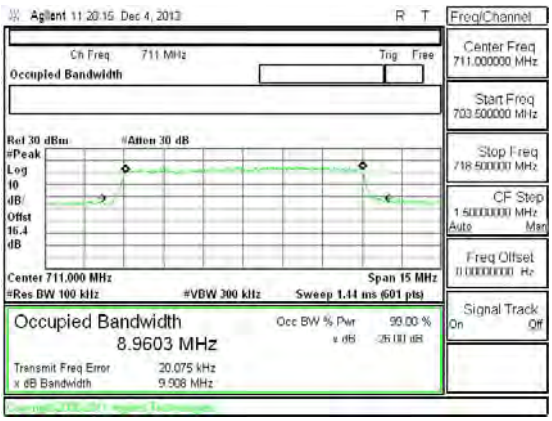
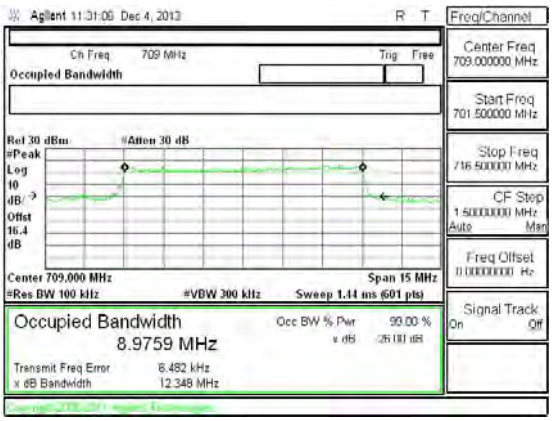
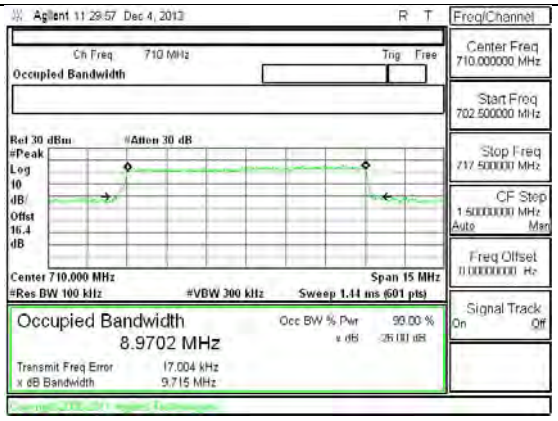
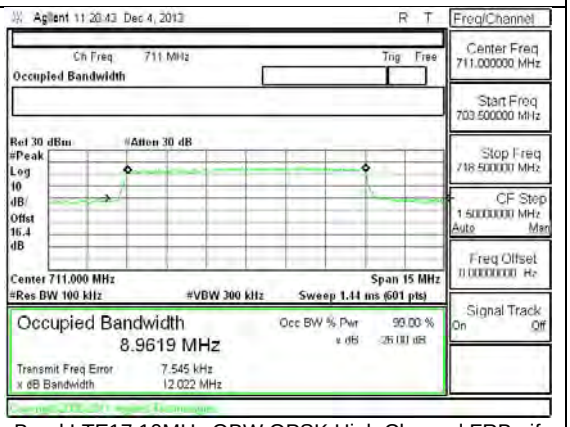
Band LTE17 10MHz 16QAM	 Band LTE17 10MHz OBW 16QAM High Channel FRB.gif	 Band LTE17 10MHz OBW QPSK Low Channel FRB.gif
Band LTE17 10MHz QPSK	 Band LTE17 10MHz OBW QPSK Mid Channel FRB.gif	 Band LTE17 10MHz OBW QPSK High Channel FRB.gif

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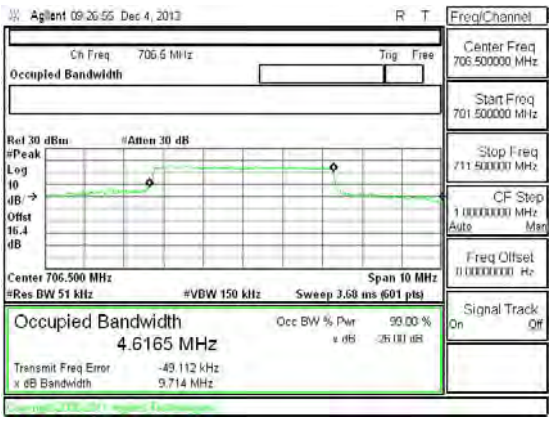
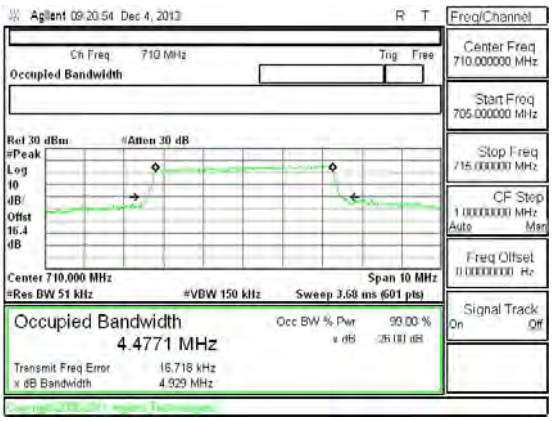
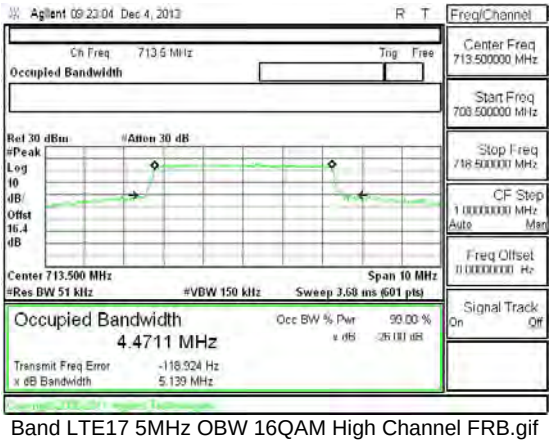
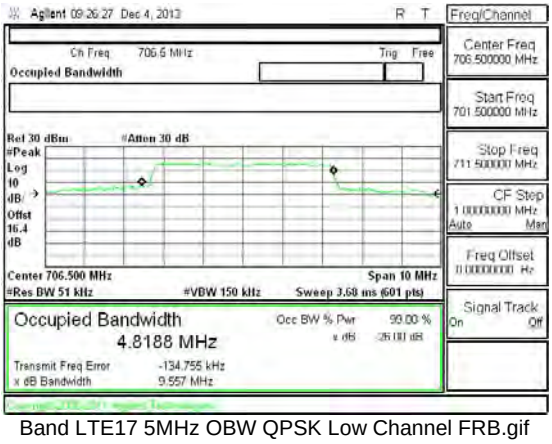
Band LTE17 5MHz 16QAM	 Band LTE17 5MHz OBW 16QAM Low Channel FRB.gif	 Band LTE17 5MHz OBW 16QAM Mid Channel FRB.gif
Band LTE17 5MHz 16QAM	 Band LTE17 5MHz OBW 16QAM High Channel FRB.gif	 Band LTE17 5MHz OBW QPSK Low Channel FRB.gif

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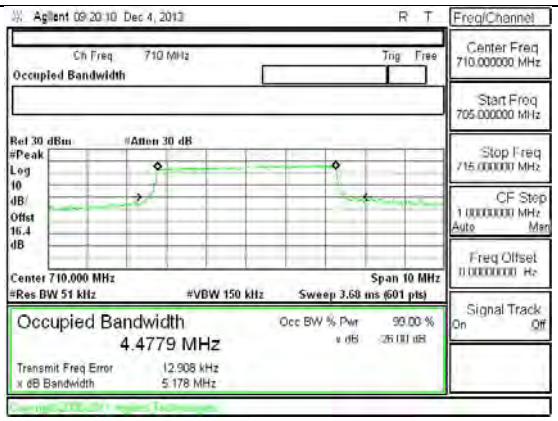
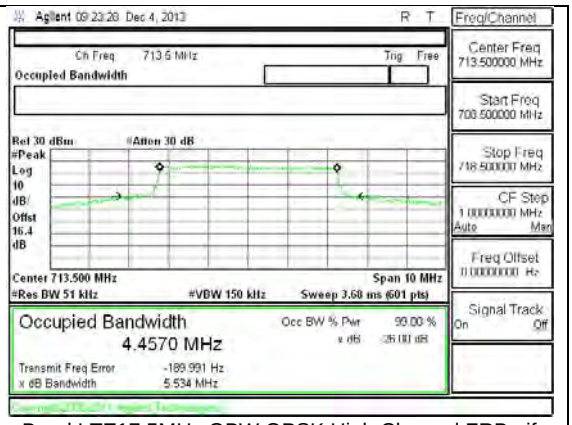
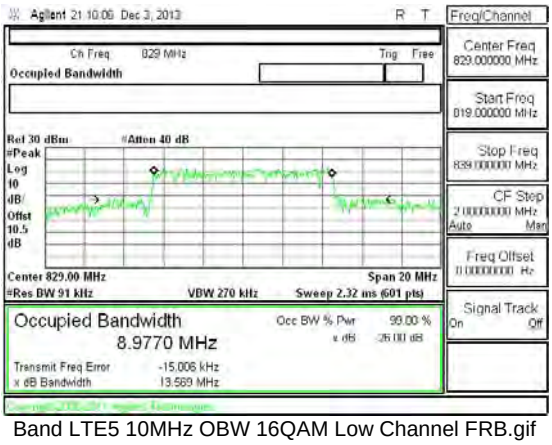
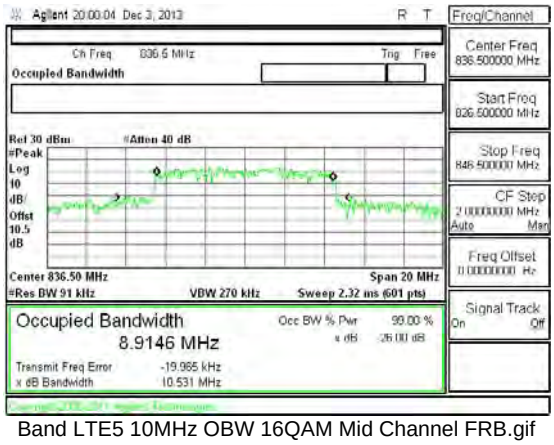
Band LTE17 5MHz QPSK	 Band LTE17 5MHz OBW QPSK Mid Channel FRB.gif	 Band LTE17 5MHz OBW QPSK High Channel FRB.gif

Band LTE5 10MHz 16QAM	 Band LTE5 10MHz OBW 16QAM Low Channel FRB.gif	 Band LTE5 10MHz OBW 16QAM Mid Channel FRB.gif

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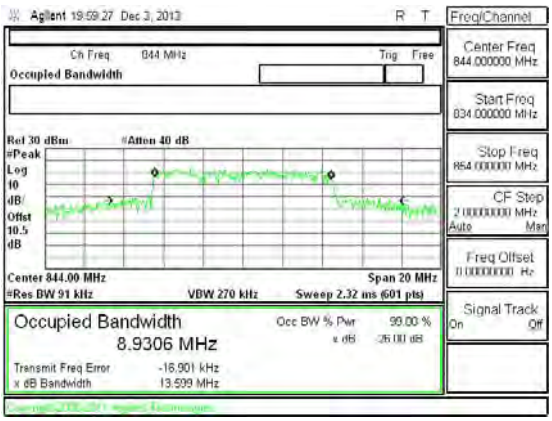
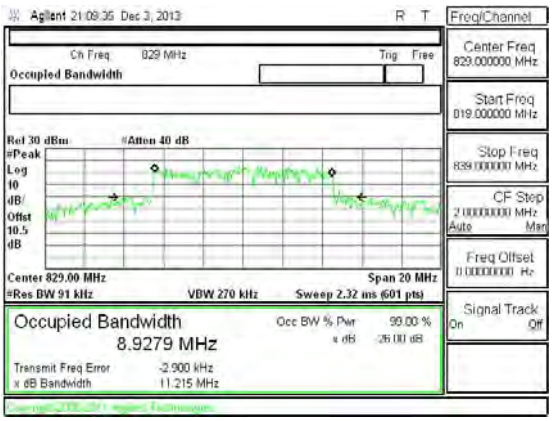
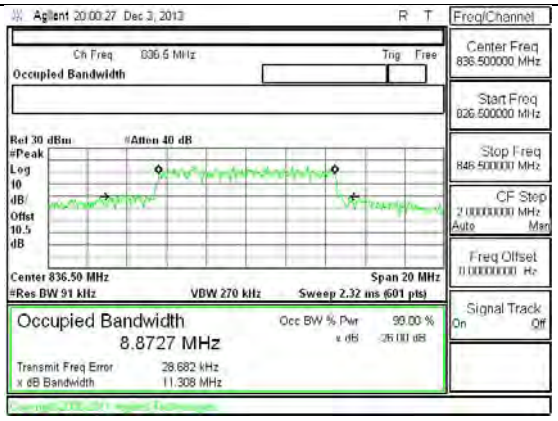
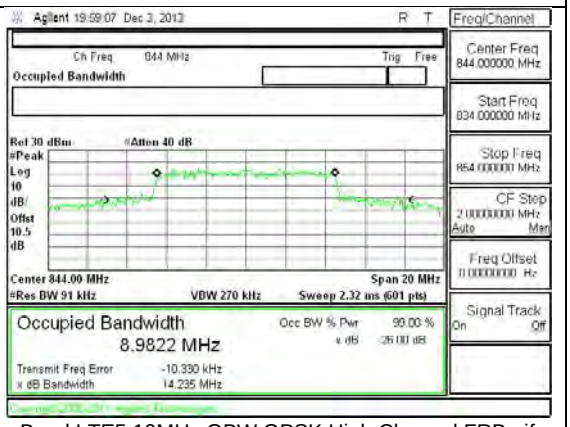
Band LTE5 10MHz 16QAM	 Band LTE5 10MHz OBW 16QAM High Channel FRB.gif	 Band LTE5 10MHz OBW QPSK Low Channel FRB.gif
Band LTE5 10MHz QPSK	 Band LTE5 10MHz OBW QPSK Mid Channel FRB.gif	 Band LTE5 10MHz OBW QPSK High Channel FRB.gif

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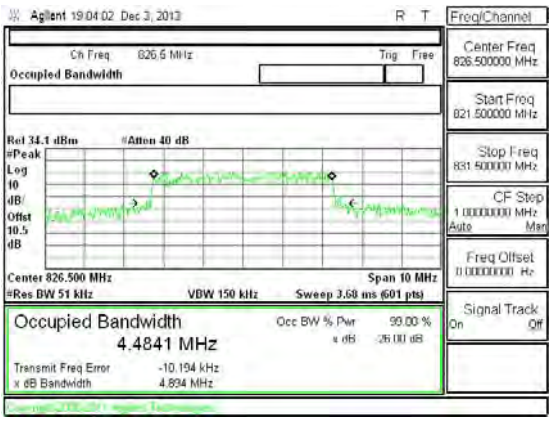
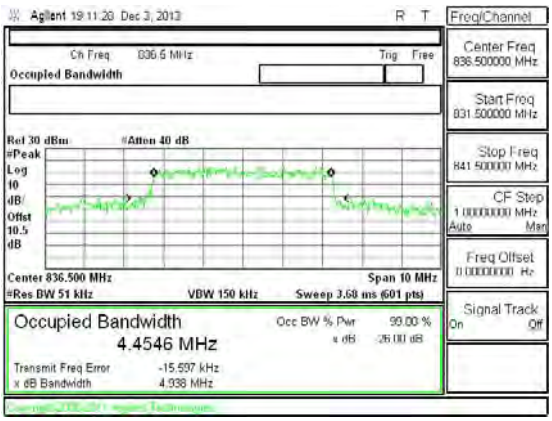
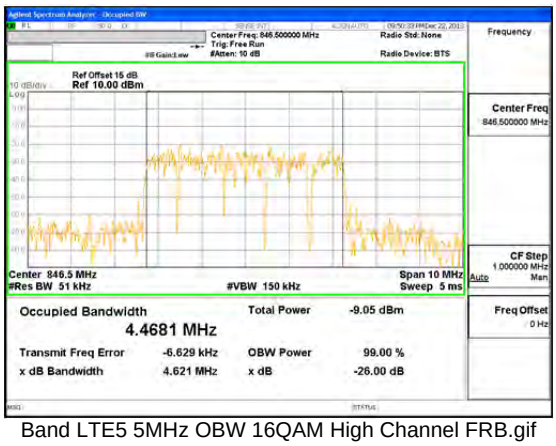
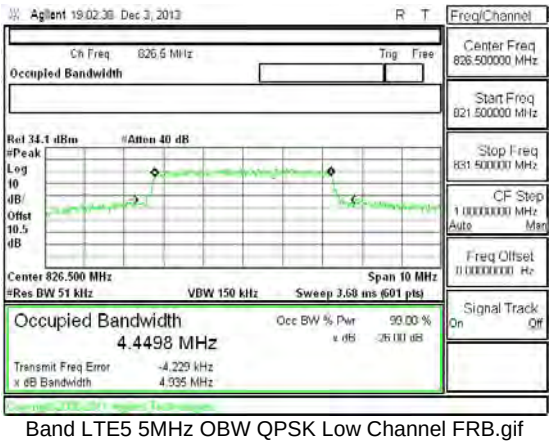
Band LTE5 5MHz 16QAM	 Band LTE5 5MHz OBW 16QAM Low Channel FRB.gif	 Band LTE5 5MHz OBW 16QAM Mid Channel FRB.gif
Band LTE5 5MHz 16QAM	 Band LTE5 5MHz OBW 16QAM High Channel FRB.gif	 Band LTE5 5MHz OBW QPSK Low Channel FRB.gif

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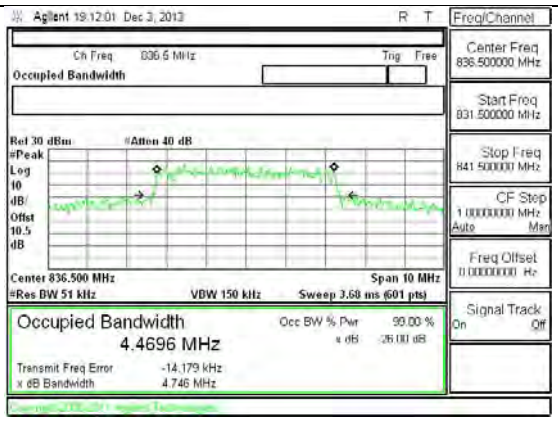
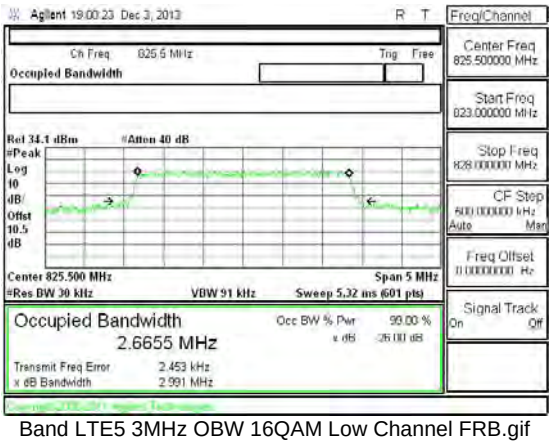
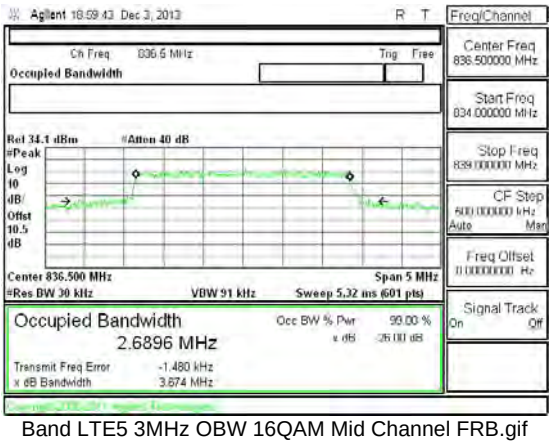
Band LTE5 5MHz QPSK	 Band LTE5 5MHz OBW QPSK Mid Channel FRB.gif	 Band LTE5 5MHz OBW QPSK High Channel FRB.gif

Band LTE5 3MHz 16QAM	 Band LTE5 3MHz OBW 16QAM Low Channel FRB.gif	 Band LTE5 3MHz OBW 16QAM Mid Channel FRB.gif

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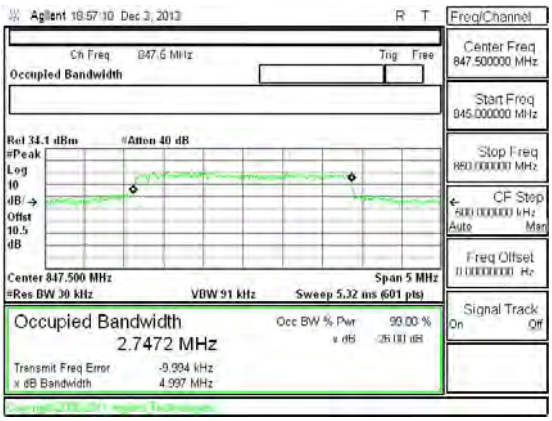
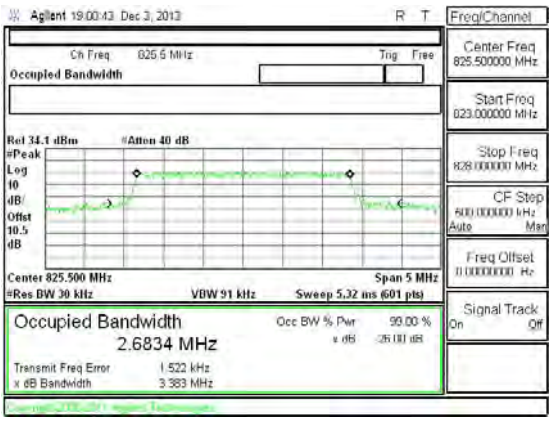
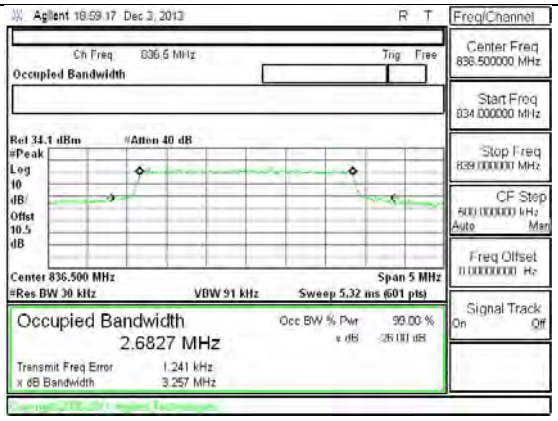
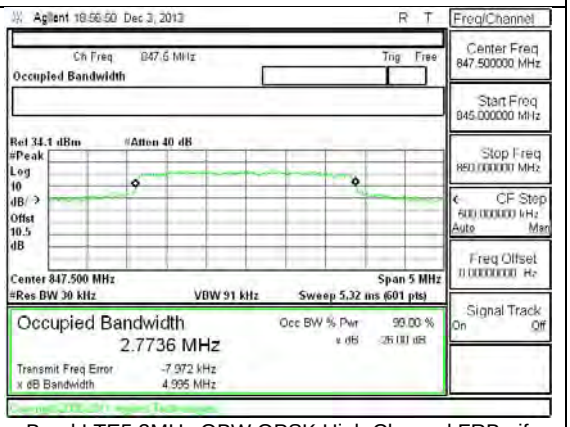
Band LTE5 3MHz 16QAM	 Band LTE5 3MHz OBW 16QAM High Channel FRB.gif	 Band LTE5 3MHz OBW QPSK Low Channel FRB.gif
Band LTE5 3MHz QPSK	 Band LTE5 3MHz OBW QPSK Mid Channel FRB.gif	 Band LTE5 3MHz OBW QPSK High Channel FRB.gif

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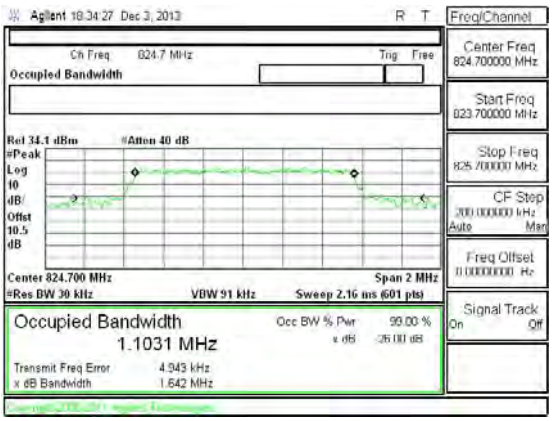
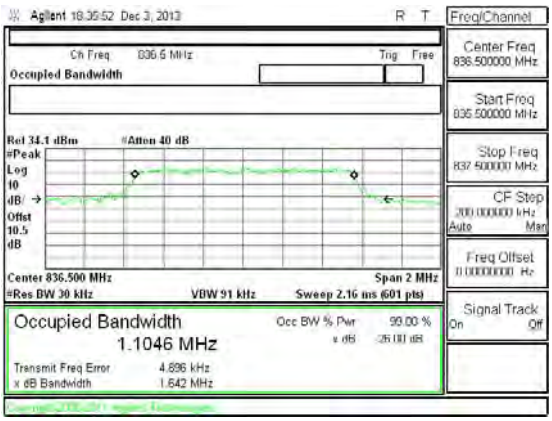
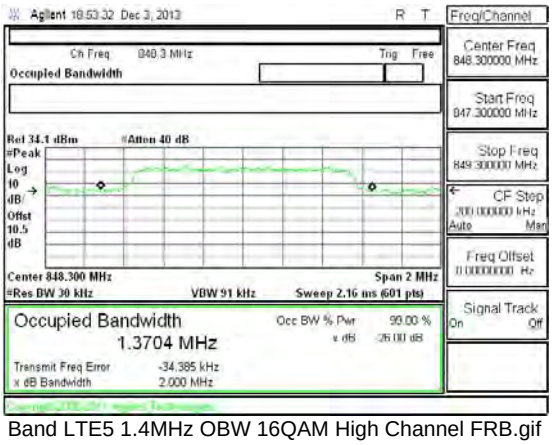
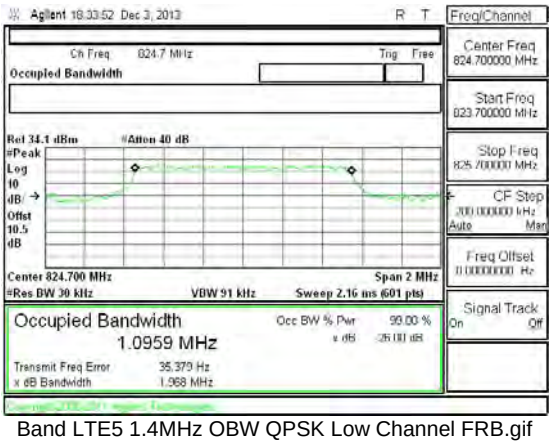
Band LTE5 1.4MHz 16QAM	 Band LTE5 1.4MHz OBW 16QAM Low Channel FRB.gif	 Band LTE5 1.4MHz OBW 16QAM Mid Channel FRB.gif
Band LTE5 1.4MHz 16QAM	 Band LTE5 1.4MHz OBW 16QAM High Channel FRB.gif	 Band LTE5 1.4MHz OBW QPSK Low Channel FRB.gif

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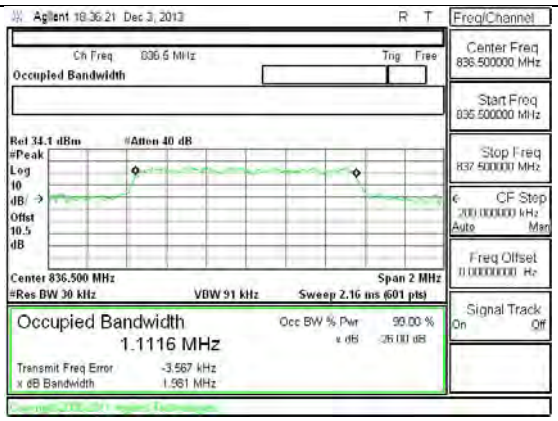
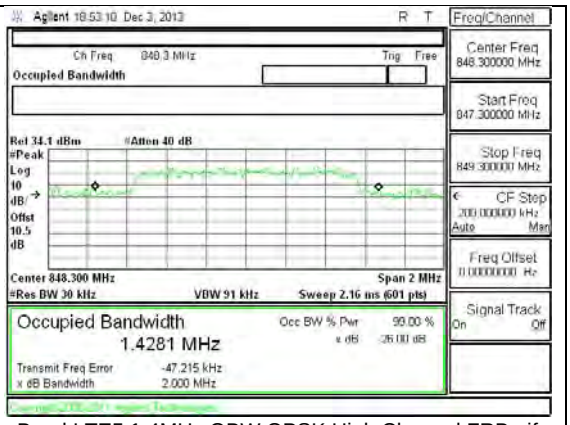
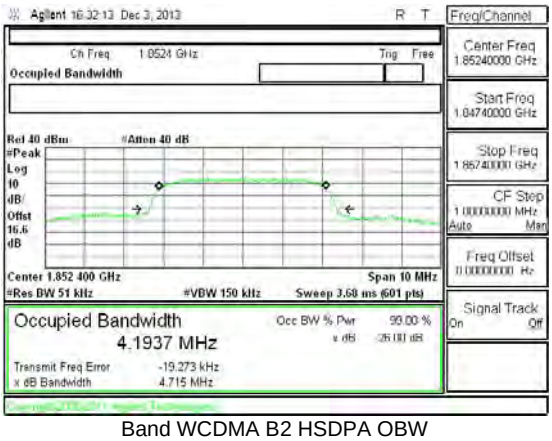
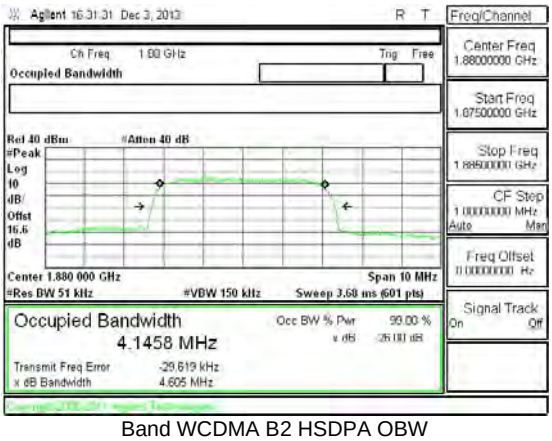
Band LTE5 1.4MHz QPSK	 Band LTE5 1.4MHz OBW QPSK Mid Channel FRB.gif	 Band LTE5 1.4MHz OBW QPSK High Channel FRB.gif

Band Band 2 HSDPA	 Band WCDMA B2 HSDPA OBW	 Band WCDMA B2 HSDPA OBW

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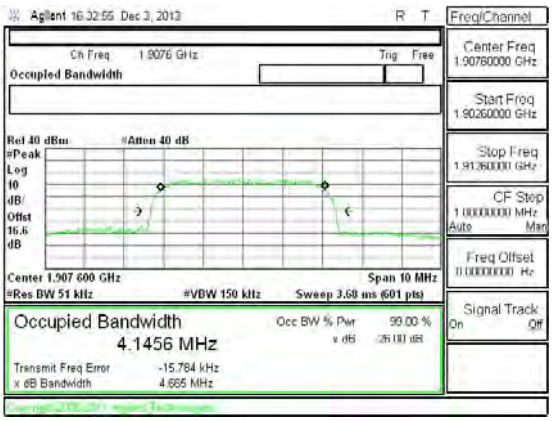
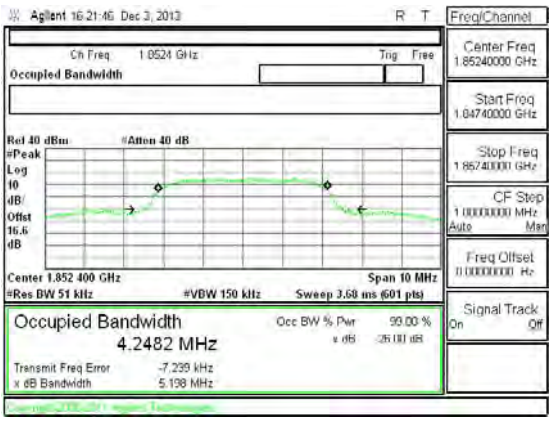
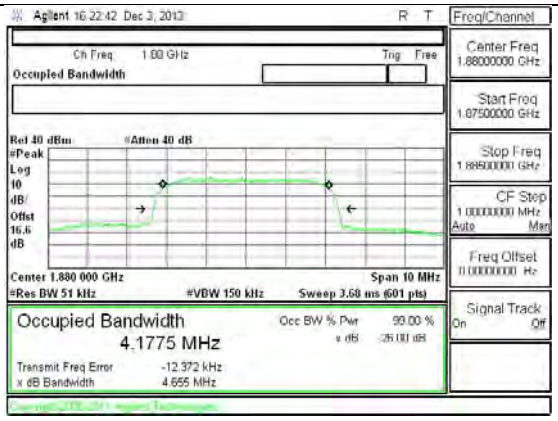
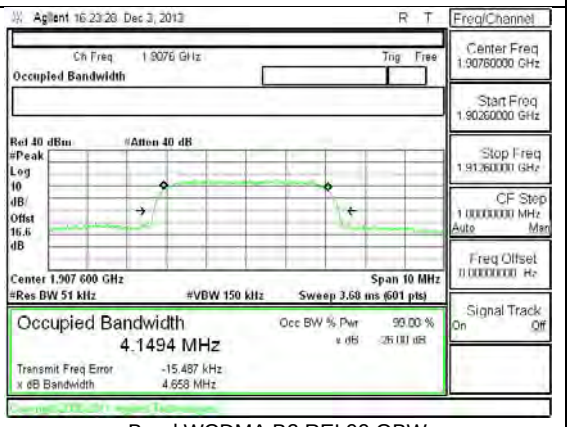
Band Band 2 HSDPA	 Band WCDMA B2 HSDPA OBW	 Band WCDMA B2 REL99 OBW
Band Band 2 REL99	 Band WCDMA B2 REL99 OBW	 Band WCDMA B2 REL99 OBW

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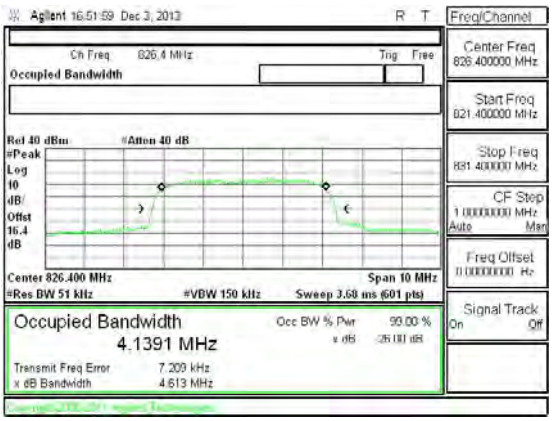
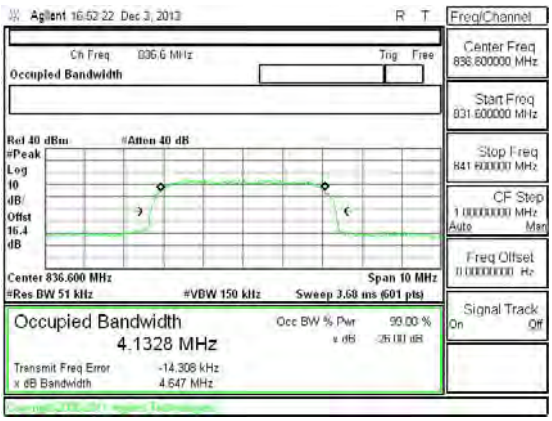
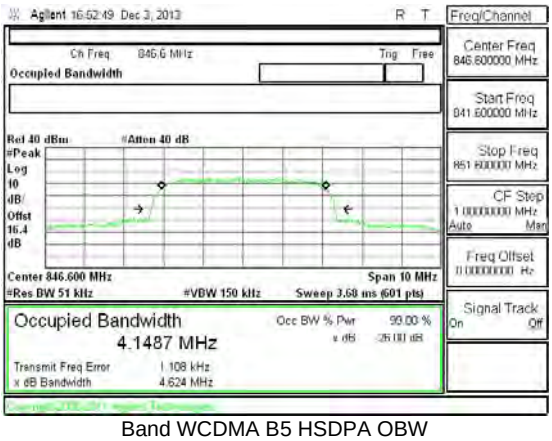
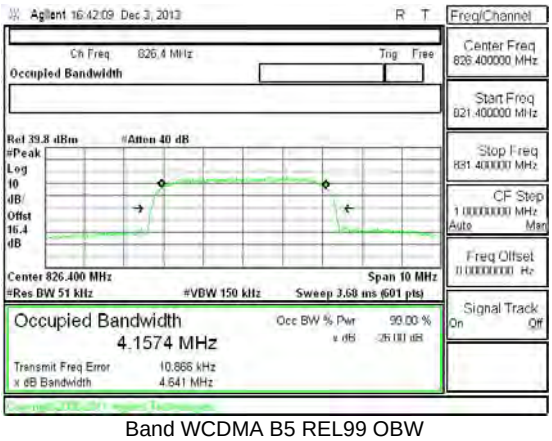
Band Band 5 HSDPA	 Band WCDMA B5 HSDPA OBW	 Band WCDMA B5 HSDPA OBW
Band Band 5 HSDPA	 Band WCDMA B5 HSDPA OBW	 Band WCDMA B5 REL99 OBW

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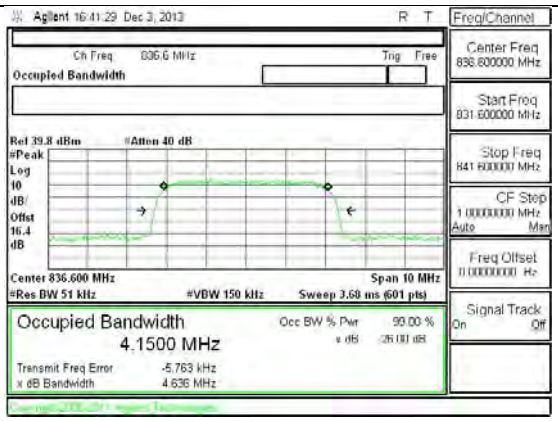
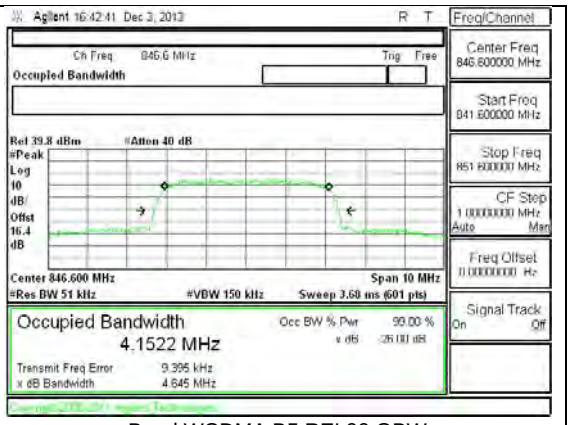
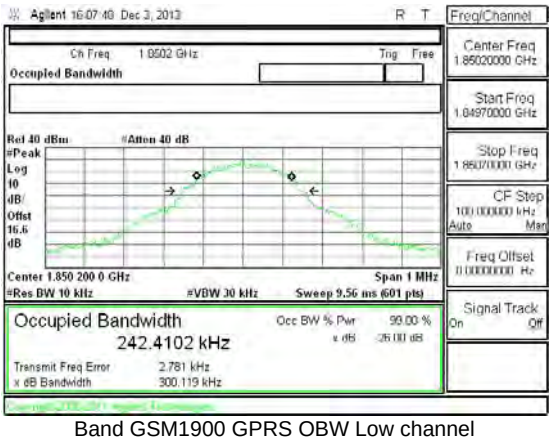
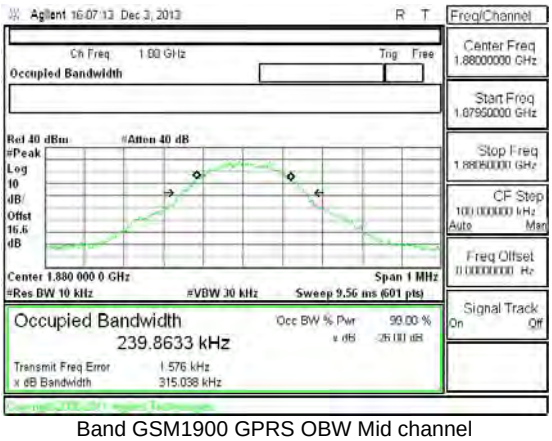
Band Band 5 REL99	 Band WCDMA B5 REL99 OBW	 Band WCDMA B5 REL99 OBW

Band GSM1900 GPRS	 Band GSM1900 GPRS OBW Low channel	 Band GSM1900 GPRS OBW Mid channel

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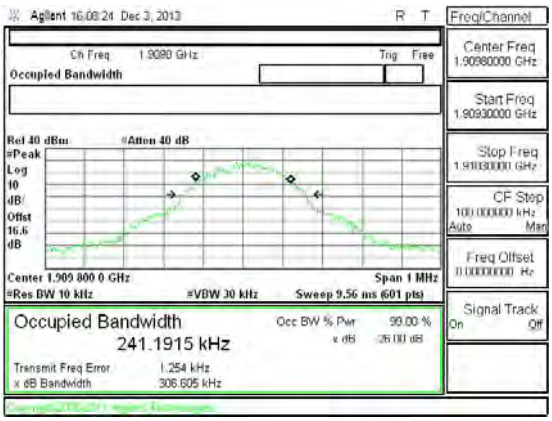
Band GSM1 900 GPRS	 Band GSM1900 GPRS OBW High channel	

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10.2. BAND EDGE EMISSIONS

RULE PART(S)

FCC: §22.359, §24.238

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.
For each band edge measurement:

- Set the spectrum analyzer span to include the block edge frequency (824, 849, 1850, 1910 and 1915MHz)
- Set a marker to point the corresponding band edge frequency in each test case.
- Set display line at -13 dBm.
- Set resolution bandwidth to at least 1% of emission bandwidth.

MODES TESTED

GSM 1900 / WCDMA B2&B5 / LTE B5 & 17

RESULTS

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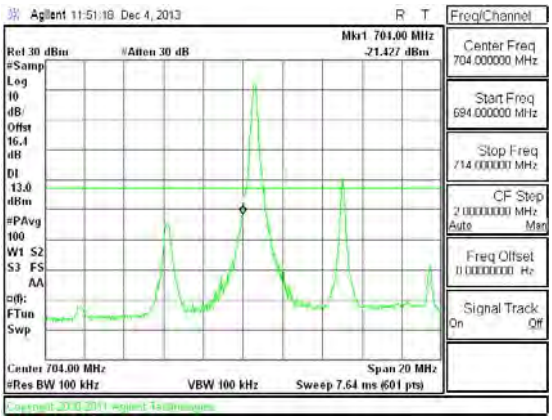
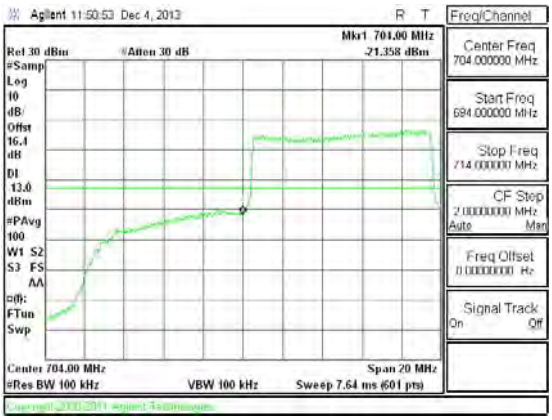
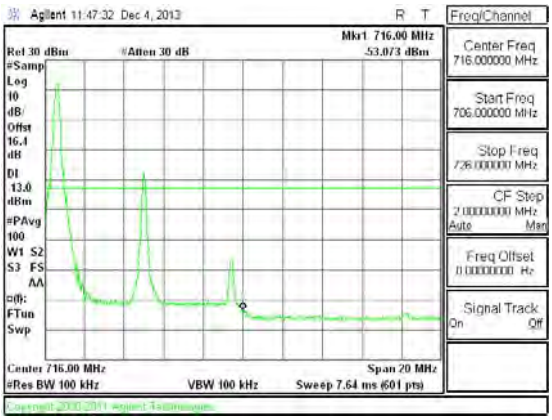
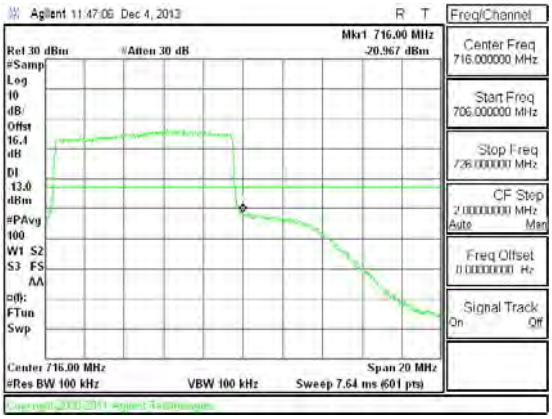
10.2.1. BAND EDGE PLOTS

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

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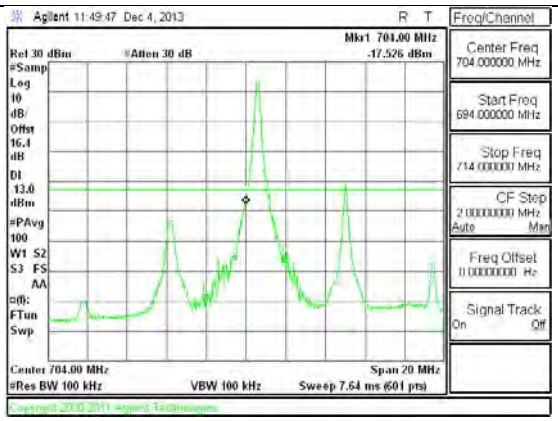
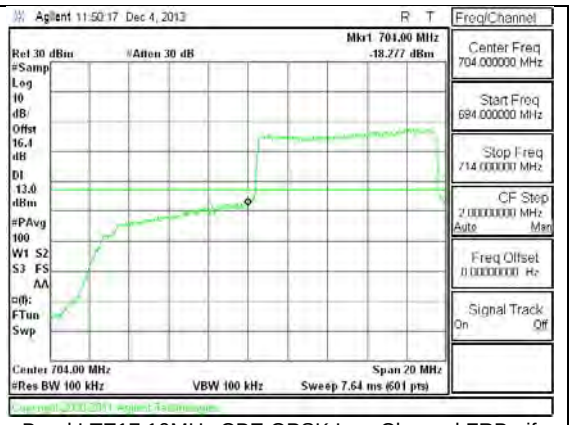
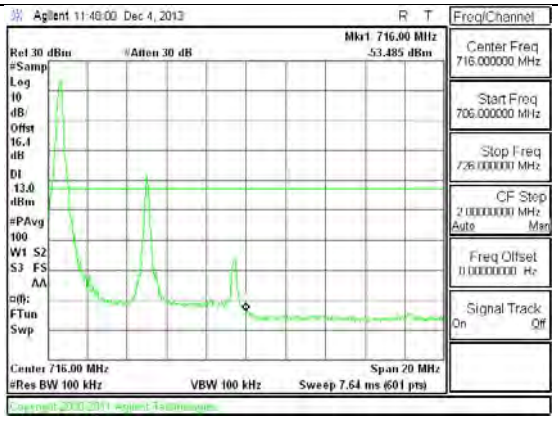
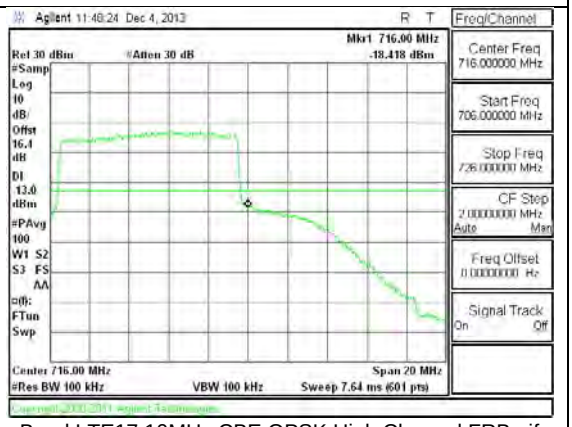
Band LTE17 10MHz QPSK	 Band LTE17 10MHz CBE QPSK Low Channel 1RB.gif	 Band LTE17 10MHz CBE QPSK Low Channel FRB.gif
Band LTE17 10MHz QPSK	 Band LTE17 10MHz CBE QPSK High Channel 1RB.gif	 Band LTE17 10MHz CBE QPSK High Channel FRB.gif

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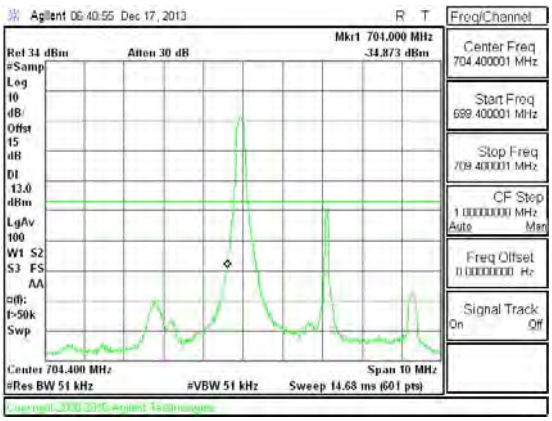
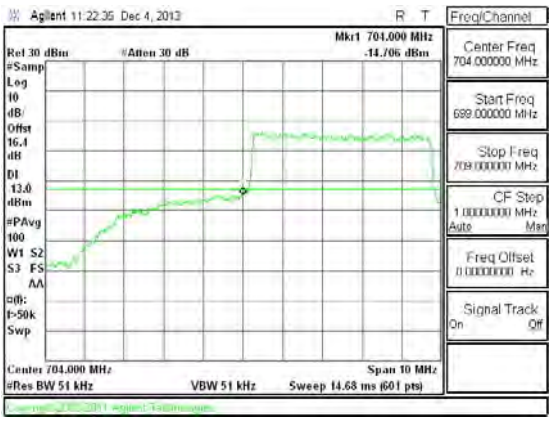
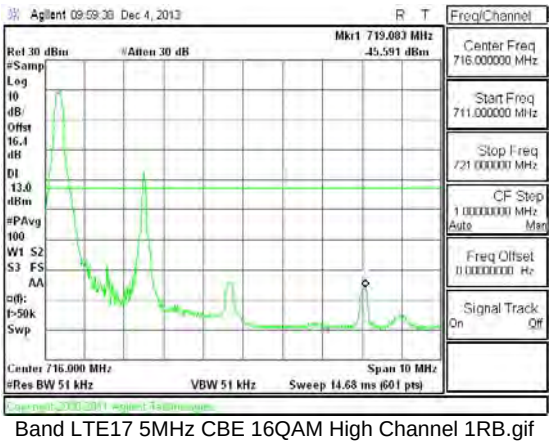
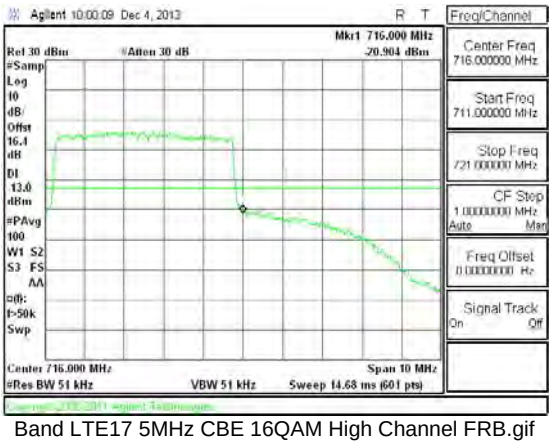
Band LTE17 5MHz 16QAM	 Band LTE17 5MHz CBE 16QAM Low Channel 1RB.gif	 Band LTE17 5MHz CBE 16QAM Low Channel FRB.gif
Band LTE17 5MHz 16QAM	 Band LTE17 5MHz CBE 16QAM High Channel 1RB.gif	 Band LTE17 5MHz CBE 16QAM High Channel FRB.gif

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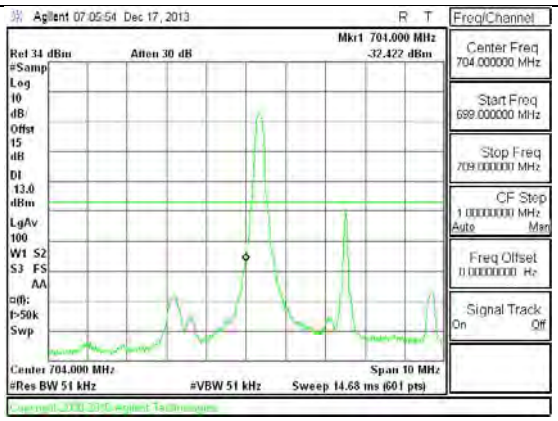
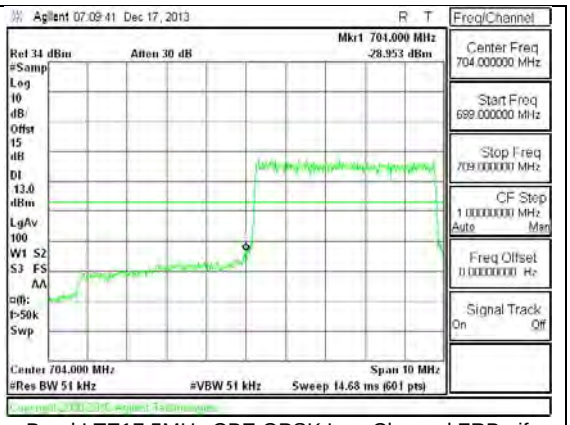
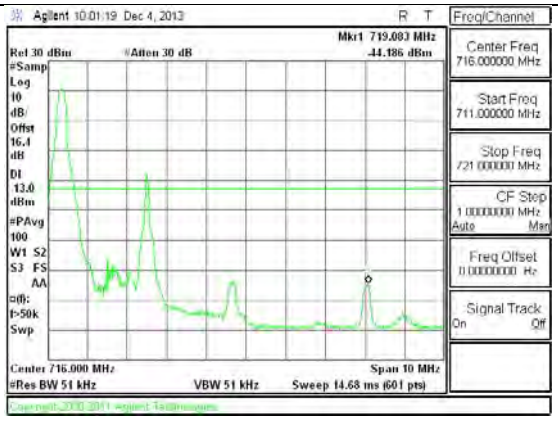
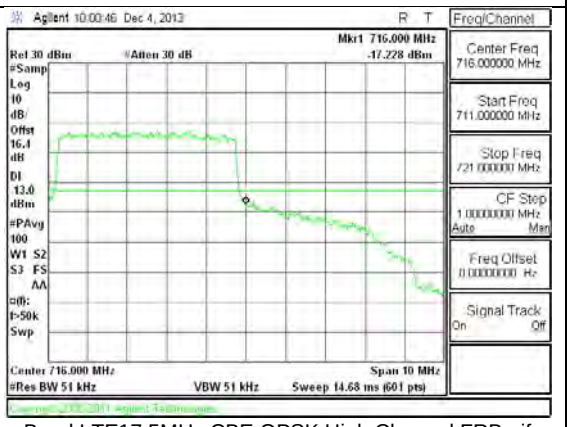
Band LTE17 5MHz QPSK	 Band LTE17 5MHz CBE QPSK Low Channel 1RB.gif	 Band LTE17 5MHz CBE QPSK Low Channel FRB.gif
Band LTE17 5MHz QPSK	 Band LTE17 5MHz CBE QPSK High Channel 1RB.gif	 Band LTE17 5MHz CBE QPSK High Channel FRB.gif

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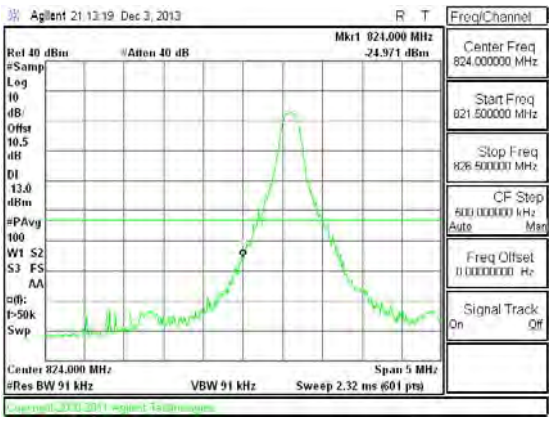
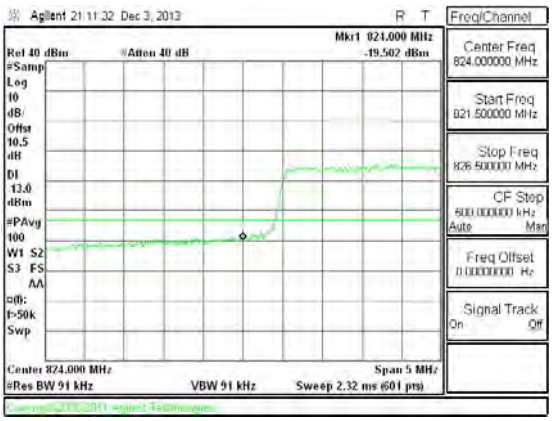
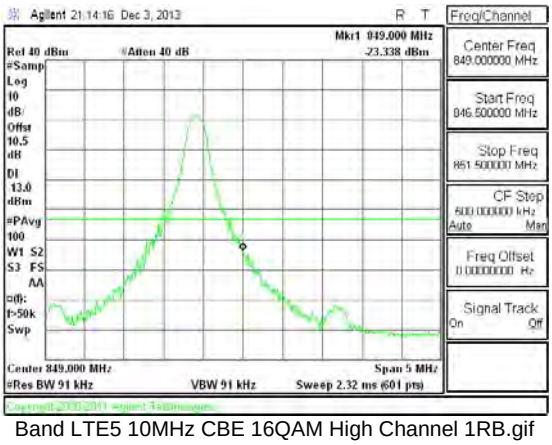
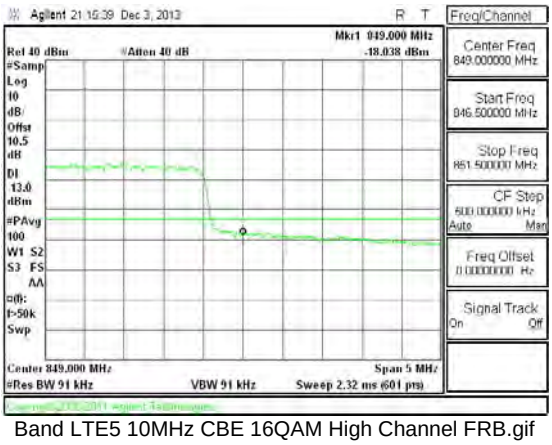
Band LTE5 10MHz 16QAM	 Band LTE5 10MHz CBE 16QAM Low Channel 1RB.gif	 Band LTE5 10MHz CBE 16QAM Low Channel FRB.gif
Band LTE5 10MHz 16QAM	 Band LTE5 10MHz CBE 16QAM High Channel 1RB.gif	 Band LTE5 10MHz CBE 16QAM High Channel FRB.gif

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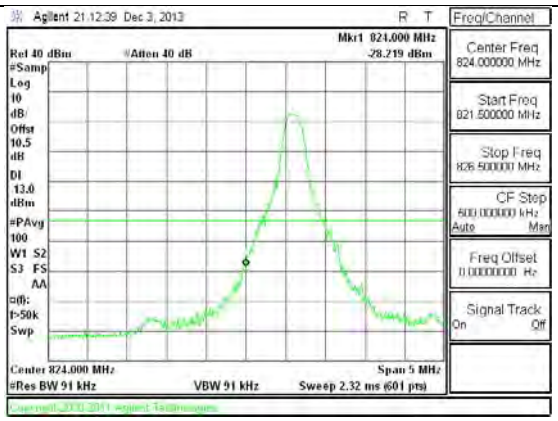
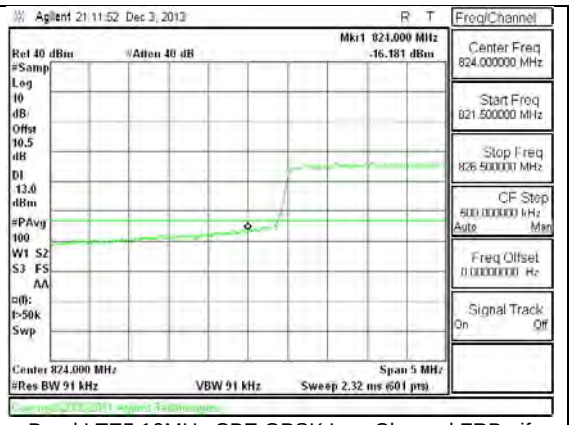
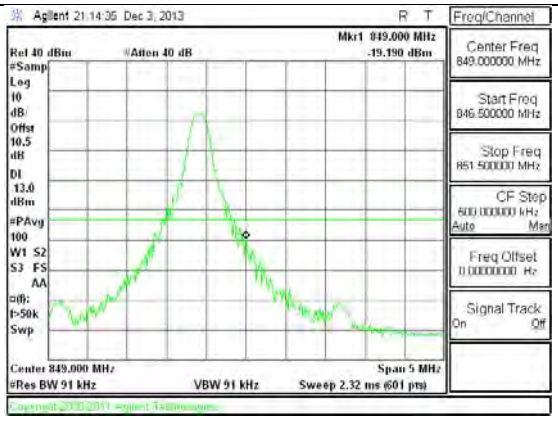
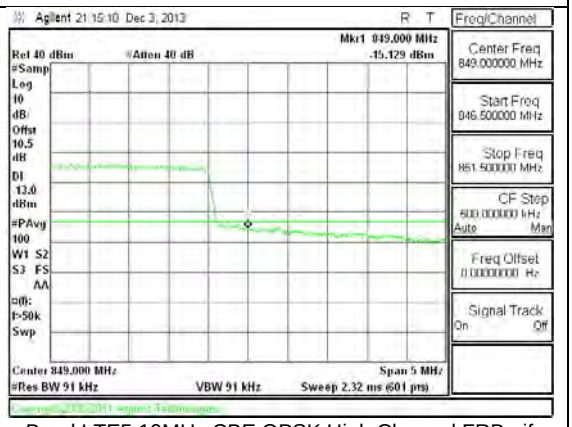
Band LTE5 10MHz QPSK	 Band LTE5 10MHz CBE QPSK Low Channel 1RB.gif	 Band LTE5 10MHz CBE QPSK Low Channel FRB.gif
Band LTE5 10MHz QPSK	 Band LTE5 10MHz CBE QPSK High Channel 1RB.gif	 Band LTE5 10MHz CBE QPSK High Channel FRB.gif

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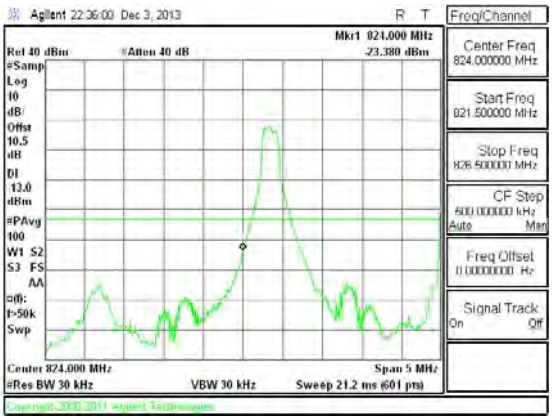
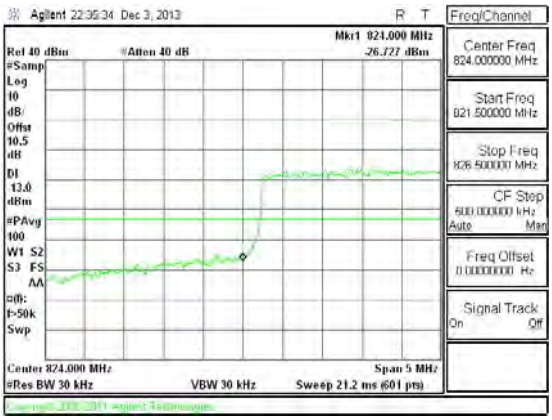
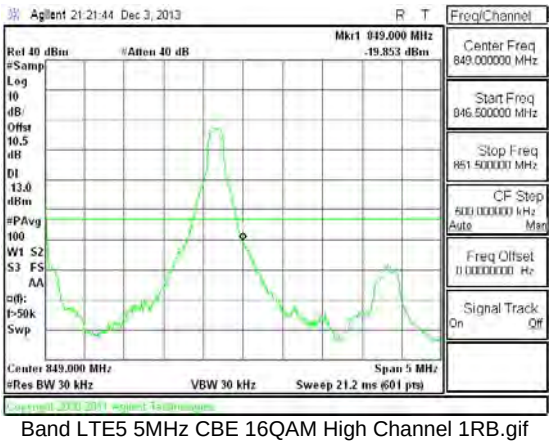
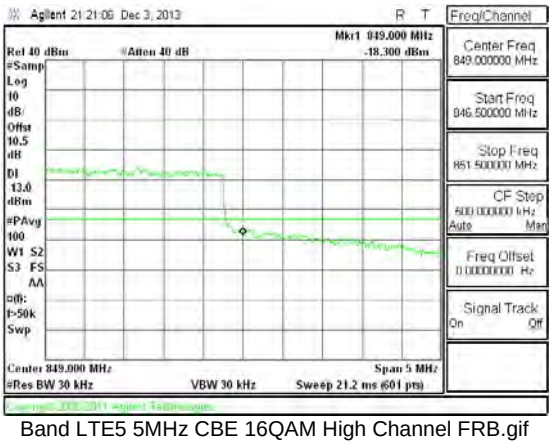
Band LTE5 5MHz 16QAM	 Band LTE5 5MHz CBE 16QAM Low Channel 1RB.gif	 Band LTE5 5MHz CBE 16QAM Low Channel FRB.gif
Band LTE5 5MHz 16QAM	 Band LTE5 5MHz CBE 16QAM High Channel 1RB.gif	 Band LTE5 5MHz CBE 16QAM High Channel FRB.gif

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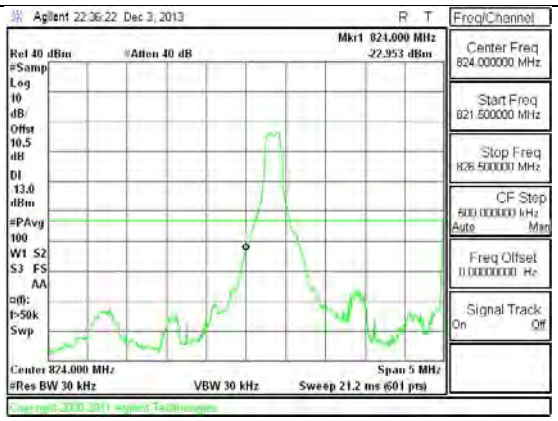
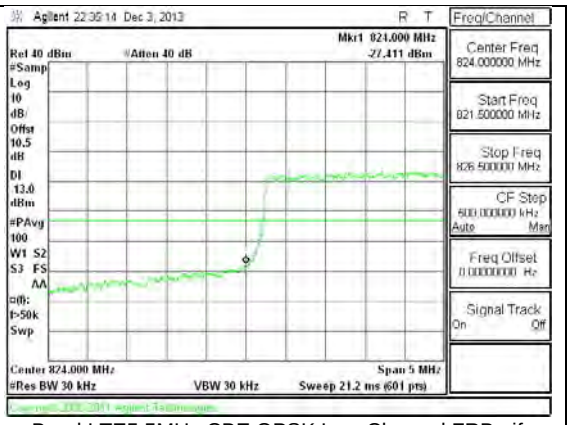
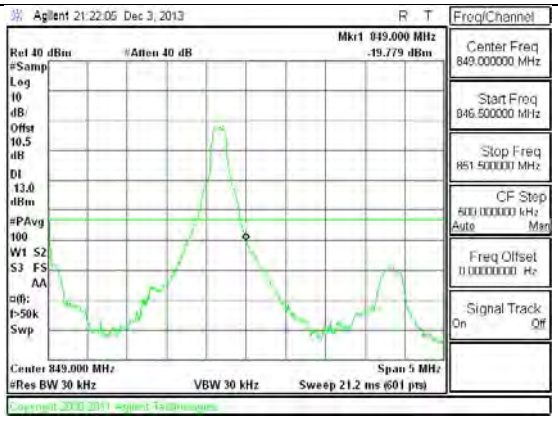
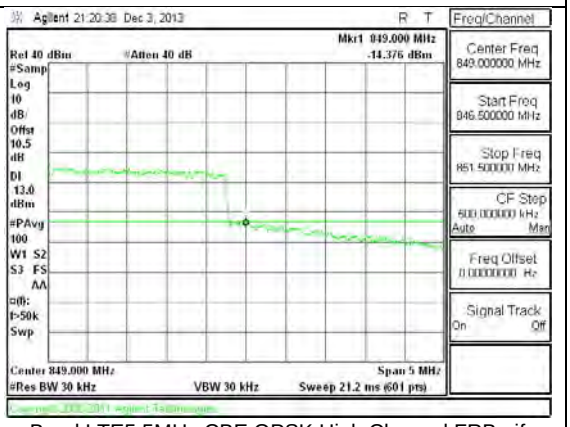
Band LTE5 5MHz QPSK	 Band LTE5 5MHz CBE QPSK Low Channel 1RB.gif	 Band LTE5 5MHz CBE QPSK Low Channel FRB.gif
Band LTE5 5MHz QPSK	 Band LTE5 5MHz CBE QPSK High Channel 1RB.gif	 Band LTE5 5MHz CBE QPSK High Channel FRB.gif

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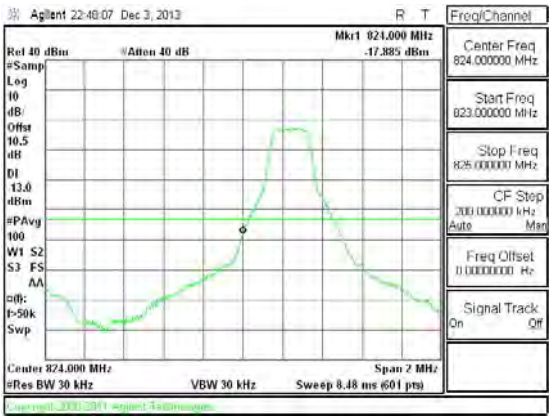
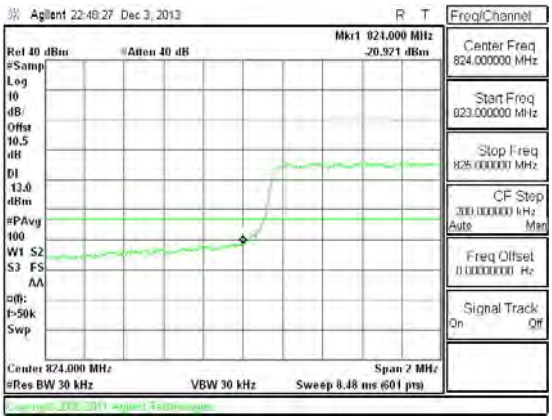
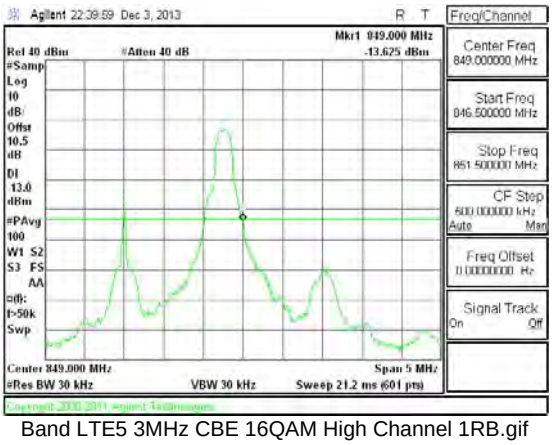
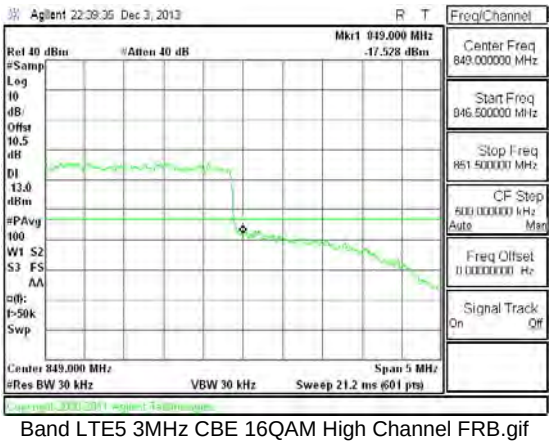
Band LTE5 3MHz 16QAM	 Band LTE5 3MHz CBE 16QAM Low Channel 1RB.gif	 Band LTE5 3MHz CBE 16QAM Low Channel FRB.gif
Band LTE5 3MHz 16QAM	 Band LTE5 3MHz CBE 16QAM High Channel 1RB.gif	 Band LTE5 3MHz CBE 16QAM High Channel FRB.gif

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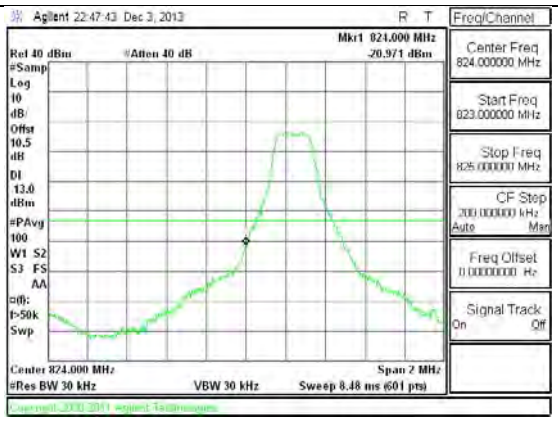
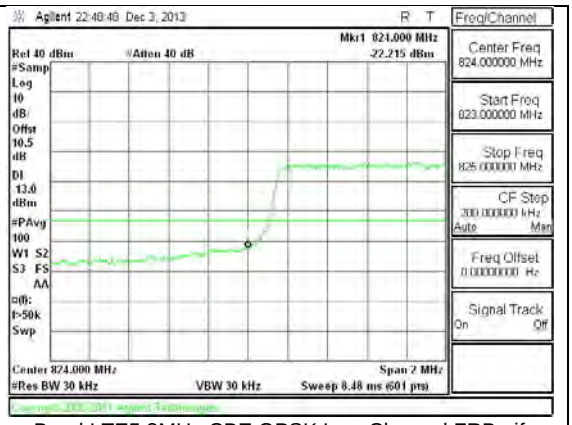
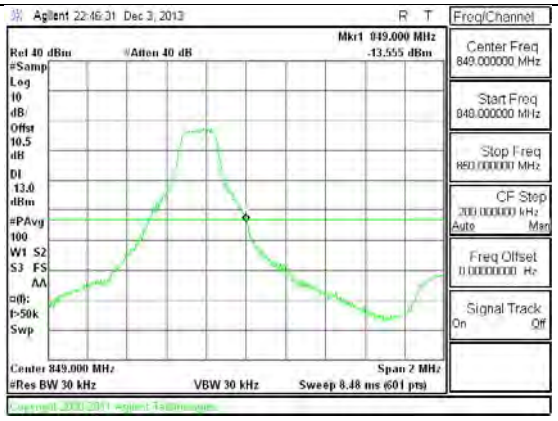
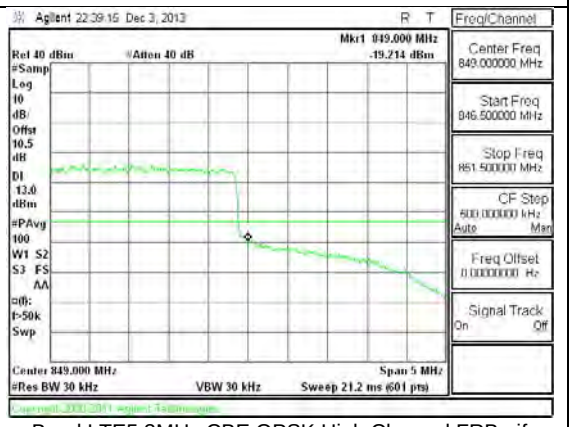
Band LTE5 3MHz QPSK	 Band LTE5 3MHz CBE QPSK Low Channel 1RB.gif	 Band LTE5 3MHz CBE QPSK Low Channel FRB.gif
Band LTE5 3MHz QPSK	 Band LTE5 3MHz CBE QPSK High Channel 1RB.gif	 Band LTE5 3MHz CBE QPSK High Channel FRB.gif

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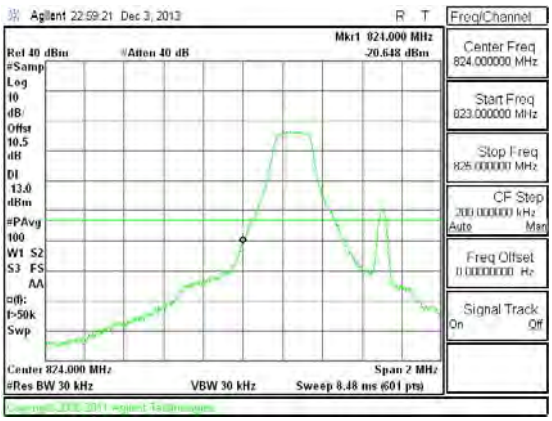
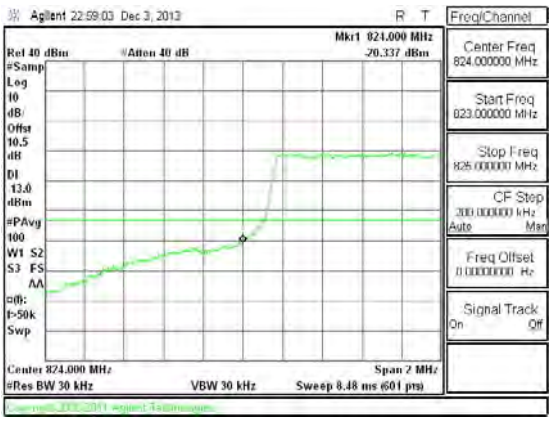
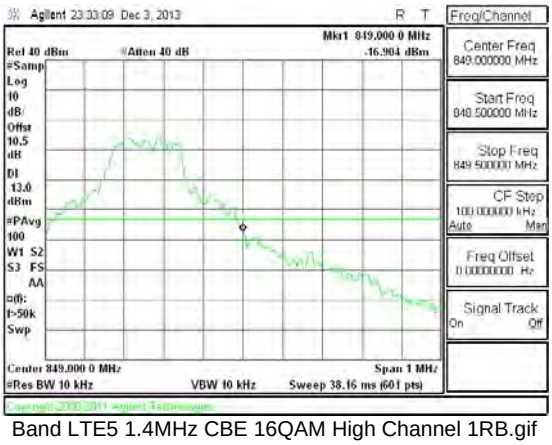
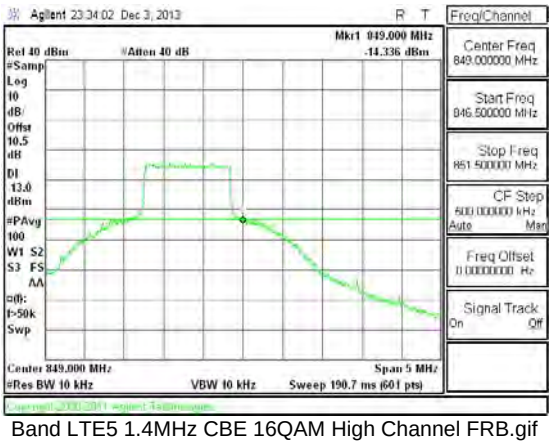
Band LTE5 1.4MHz 16QAM	 Band LTE5 1.4MHz CBE 16QAM Low Channel 1RB.gif	 Band LTE5 1.4MHz CBE 16QAM Low Channel FRB.gif
Band LTE5 1.4MHz 16QAM	 Band LTE5 1.4MHz CBE 16QAM High Channel 1RB.gif	 Band LTE5 1.4MHz CBE 16QAM High Channel FRB.gif

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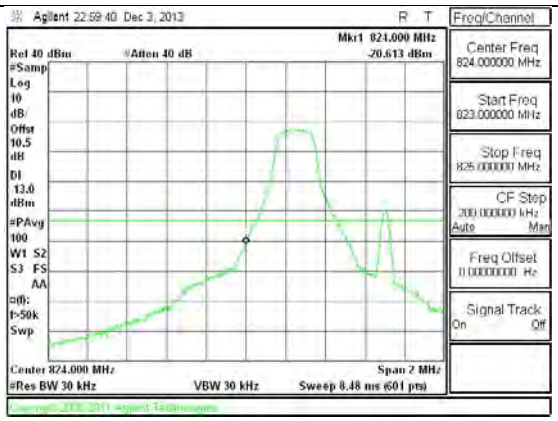
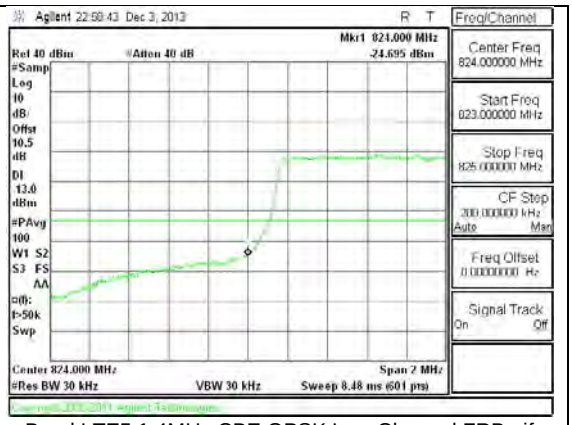
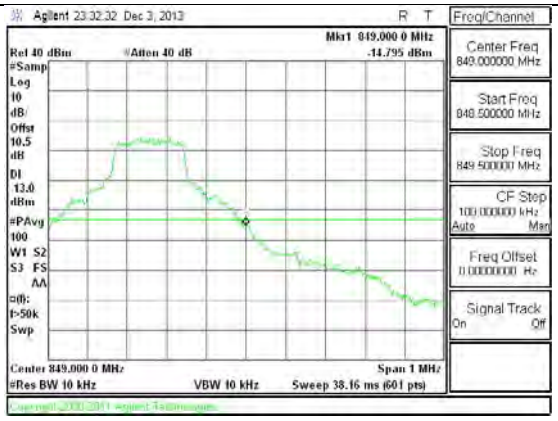
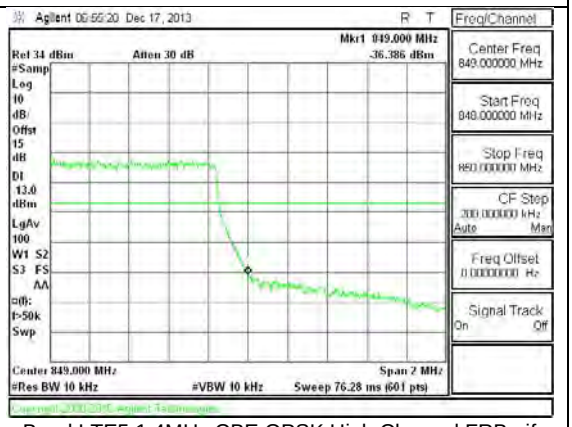
Band LTE5 1.4MHz QPSK	 Band LTE5 1.4MHz CBE QPSK Low Channel 1RB.gif	 Band LTE5 1.4MHz CBE QPSK Low Channel FRB.gif
Band LTE5 1.4MHz QPSK	 Band LTE5 1.4MHz CBE QPSK High Channel 1RB.gif	 Band LTE5 1.4MHz CBE QPSK High Channel FRB.gif

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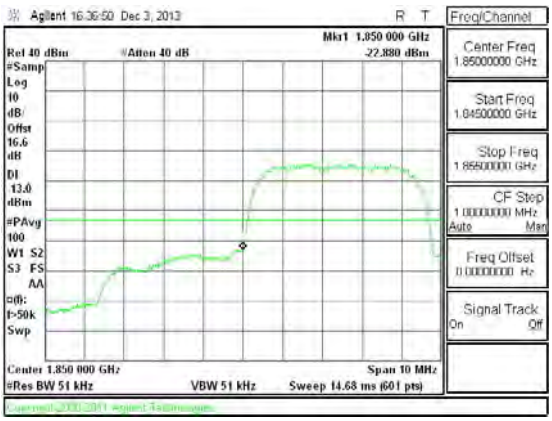
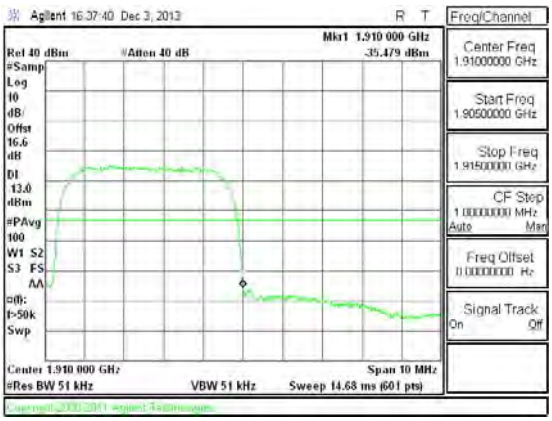
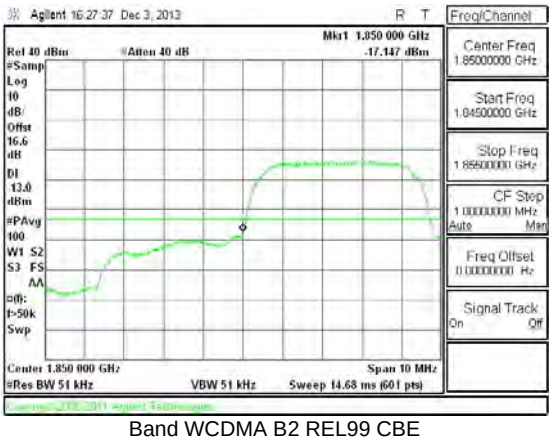
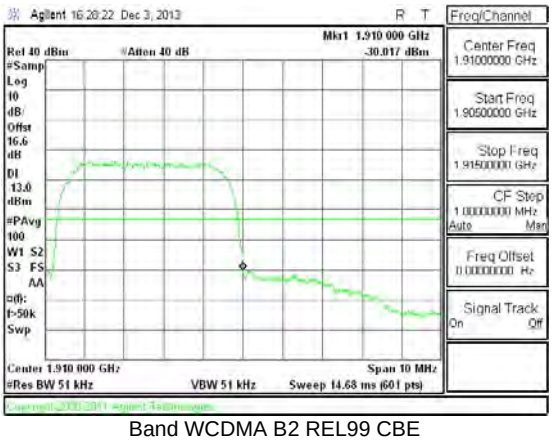
Band Band 2 HSDPA	 Band WCDMA B2 HSDPA CBE	 Band WCDMA B2 HSDPA CBE
Band Band 2 REL99	 Band WCDMA B2 REL99 CBE	 Band WCDMA B2 REL99 CBE

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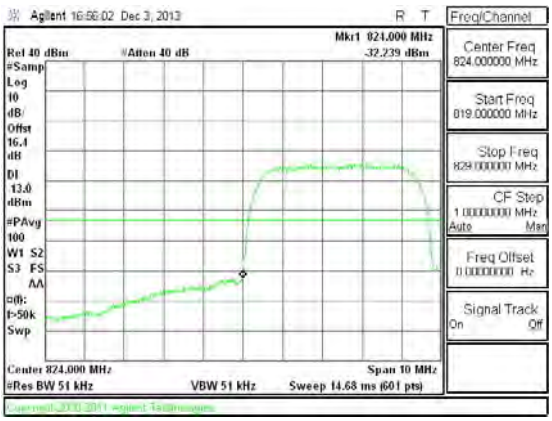
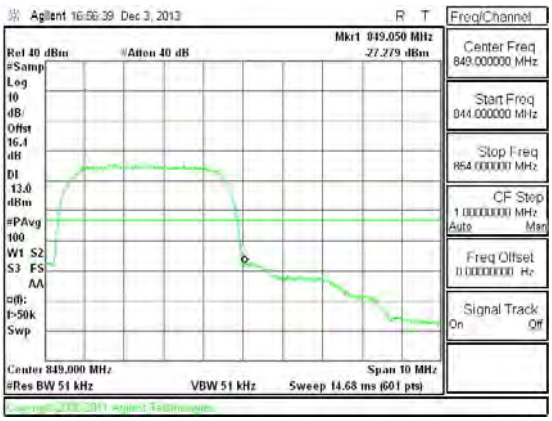
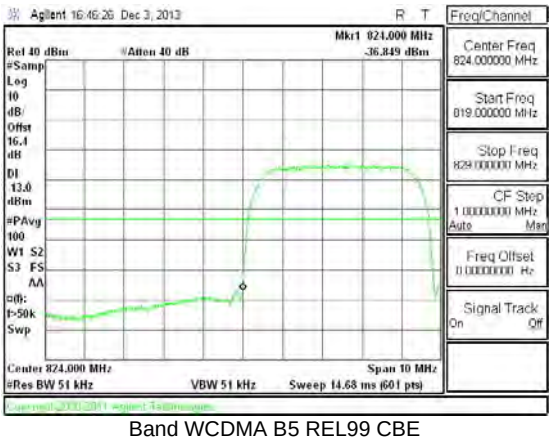
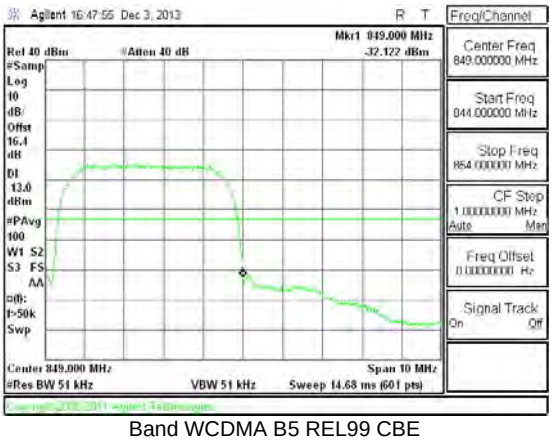
Band Band 5 HSDPA	 Band WCDMA B5 HSDPA CBE	 Band WCDMA B5 HSDPA CBE
Band Band 5 REL99	 Band WCDMA B5 REL99 CBE	 Band WCDMA B5 REL99 CBE

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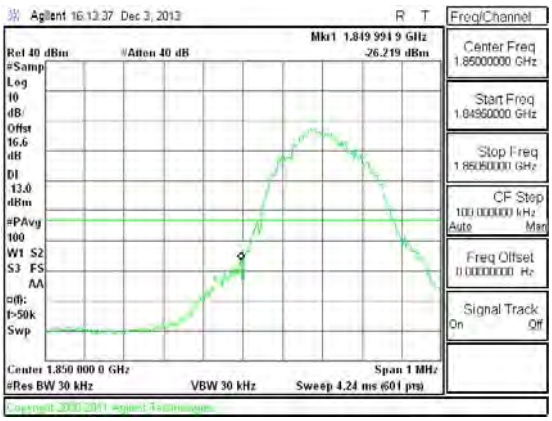
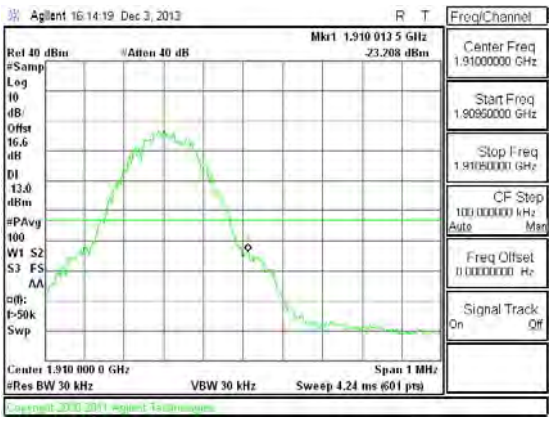
Band GSM1 900 GPRS	 Band GSM1900 GPRS CBE Low channel	 Band GSM1900 GPRS CBE High channel

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10.3. OUT OF BAND EMISSIONS

RULE PART(S)

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

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.

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

GSM 1900 / WCDMA B2&B5 / LTE B5 & 17

RESULTS

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10.3.1. OUT OF BAND EMISSIONS RESULT

Band	BW (MHz)	Mode	f (MHz)	Spur (dBm)	Spec (dBm)	Delta (dB)
LTE17	10	QPSK	709	-22.84	-13	-9.84
			710	-21.42	-13	-8.42
			711	-22.57	-13	-9.57
		16QAM	709	-22.1	-13	-9.1
			710	-22.48	-13	-9.48
			711	-23.02	-13	-10.02

Band	BW (MHz)	Mode	f (MHz)	Spur (dBm)	Spec (dBm)	Delta (dB)
LTE17	5	QPSK	706.5	-27.89	-13	-14.89
			710	-23.42	-13	-10.42
			713.5	-27.9	-13	-14.9
		16QAM	706.5	-28.25	-13	-15.25
			710	-22.79	-13	-9.79
			713.5	-29.62	-13	-16.62

Band	BW (MHz)	Mode	f (MHz)	Spur (dBm)	Spec (dBm)	Delta (dB)
LTE5	10	QPSK	829	-27.47	-13	-14.47
			836.5	-27.15	-13	-14.15
			844	-24.64	-13	-11.64
		16QAM	829	-26.45	-13	-13.45
			836.5	-28.25	-13	-15.25
			844	-26.34	-13	-13.34

Band	BW (MHz)	Mode	f (MHz)	Spur (dBm)	Spec (dBm)	Delta (dB)
LTE5	5	QPSK	826.5	-27.9	-13	-14.9
			836.5	-26.9	-13	-13.9
			846.5	-26.04	-13	-13.04
		16QAM	826.5	-27.42	-13	-14.42
			836.5	-25.33	-13	-12.33
			846.5	-26.7	-13	-13.7

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Band	BW (MHz)	Mode	f (MHz)	Spur (dBm)	Spec (dBm)	Delta (dB)
LTE5	3	QPSK	825.5	-28.01	-13	-15.01
			836.5	-28.44	-13	-15.44
			847.5	-27.04	-13	-14.04
		16QAM	825.5	-26.27	-13	-13.27
			836.5	-27.89	-13	-14.89
			847.5	-26.04	-13	-13.04

Band	BW (MHz)	Mode	f (MHz)	Spur (dBm)	Spec (dBm)	Delta (dB)
LTE5	1.4	QPSK	824.7	-25.19	-13	-12.19
			836.5	-26.06	-13	-13.06
			848.3	-23.64	-13	-10.64
		16QAM	824.7	-26.48	-13	-13.48
			836.5	-24.23	-13	-11.23
			848.3	-26.53	-13	-13.53

Band	Mode	f (MHz)	Spur (dBm)	Spec (dBm)	Delta (dB)
GSM1900	GPRS	1850.2	-17.28	-13	-4.28
		1880	-17.34	-13	-4.34
		1909.8	-16.14	-13	-3.14
Band 5	REL 99	826.6	-17.23	-13	-4.23
		836.6	-17.65	-13	-4.65
		846.4	-17.56	-13	-4.56
	HSDPA	826.6	-17.61	-13	-4.61
		836.6	-17.98	-13	-4.98
		846.4	-17.46	-13	-4.46
Band 2	REL 99	1852.6	-17.73	-13	-4.73
		1880	-17.27	-13	-4.27
		1907.4	-16.65	-13	-3.65
	HSDPA	1852.6	-16.38	-13	-3.38
		1880	-17.11	-13	-4.11
		1907.4	-17.28	-13	-4.28

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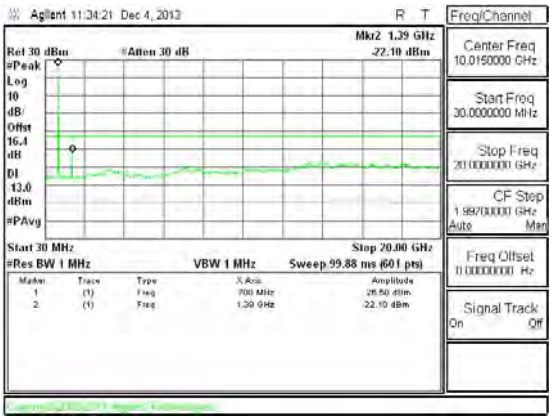
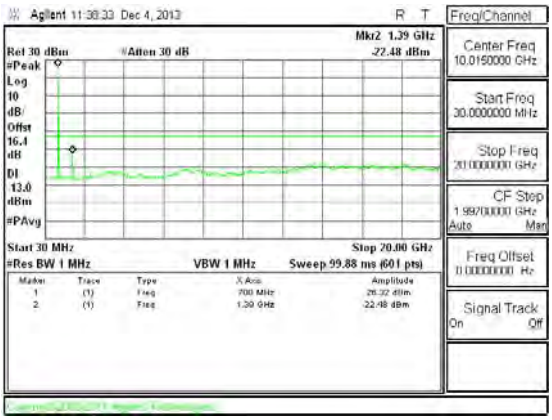
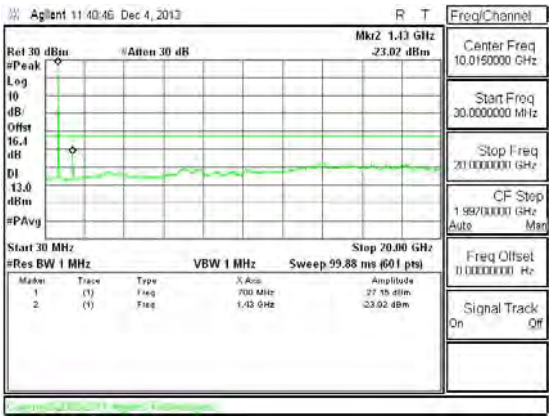
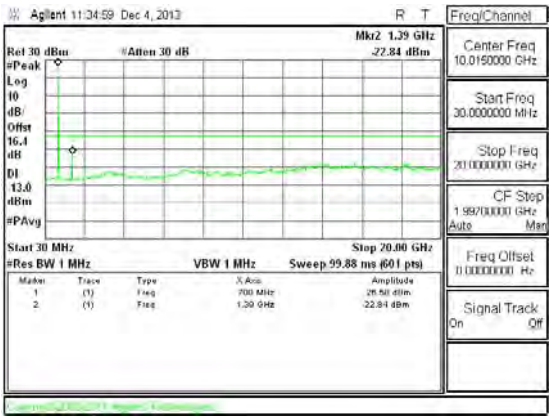
10.3.2. OUT OF BAND EMISSIONS PLOTS

Band LTE17 10MHz 16QAM	 Band LTE17 10MHz CSE 16QAM Low channel	 Band LTE17 10MHz CSE 16QAM Mid channel
Band LTE17 10MHz 16QAM	 Band LTE17 10MHz CSE 16QAM High channel	 Band LTE17 10MHz CSE QPSK Low channel

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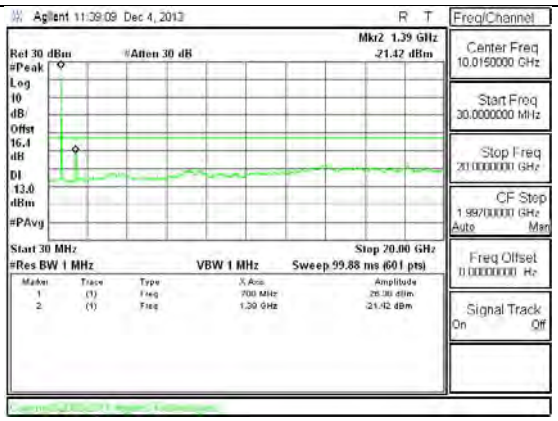
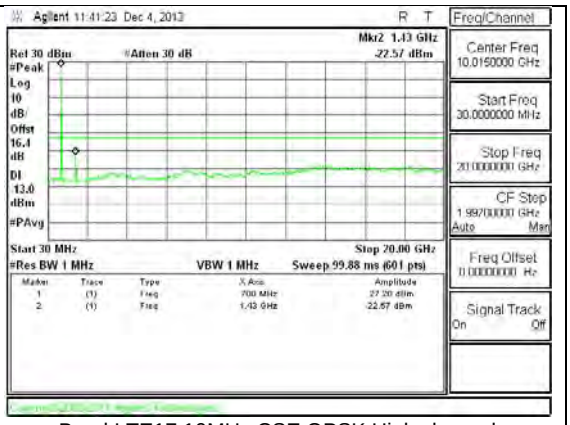
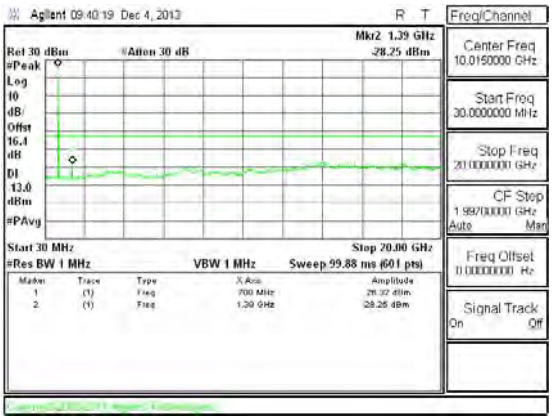
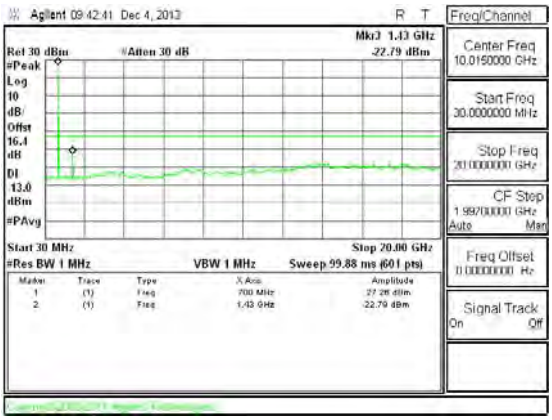
Band LTE17 10MHz QPSK	 Band LTE17 10MHz CSE QPSK Mid channel	 Band LTE17 10MHz CSE QPSK High channel

Band LTE17 5MHz 16QAM	 Band LTE17 5MHz CSE 16QAM Low channel	 Band LTE17 5MHz CSE 16QAM Mid channel

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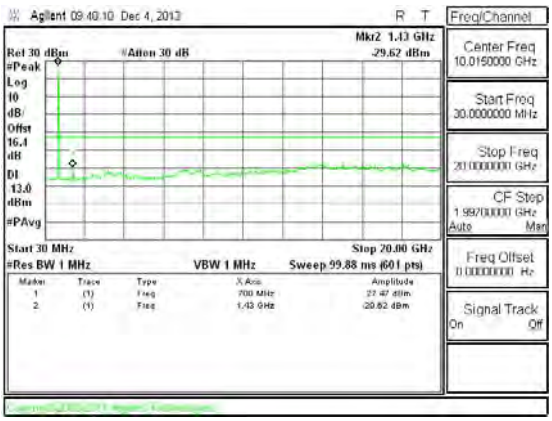
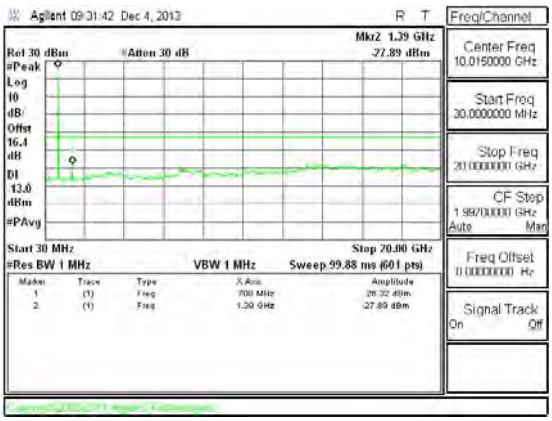
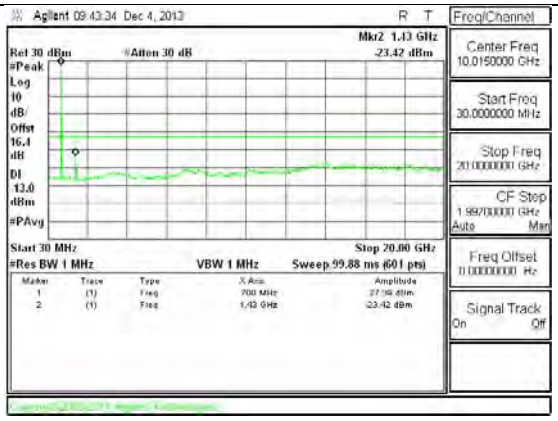
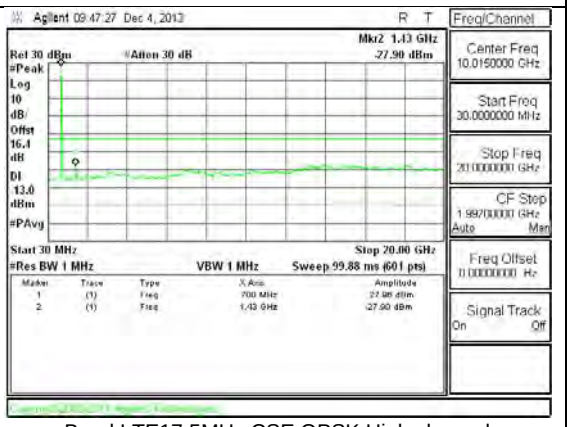
Band LTE17 5MHz 16QAM	 Band LTE17 5MHz CSE 16QAM High channel	 Band LTE17 5MHz CSE QPSK Low channel
Band LTE17 5MHz QPSK	 Band LTE17 5MHz CSE QPSK Mid channel	 Band LTE17 5MHz CSE QPSK High channel

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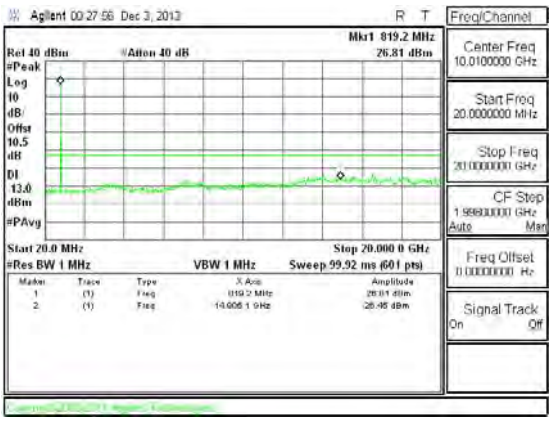
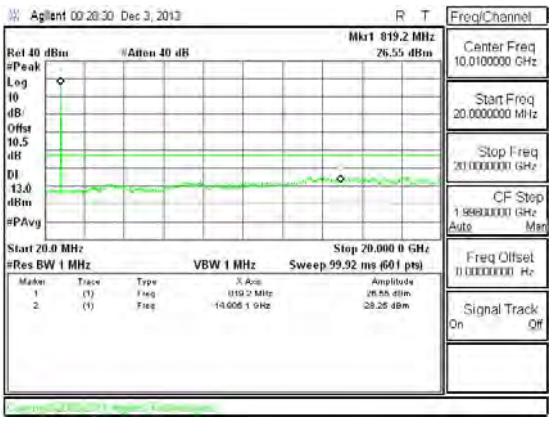
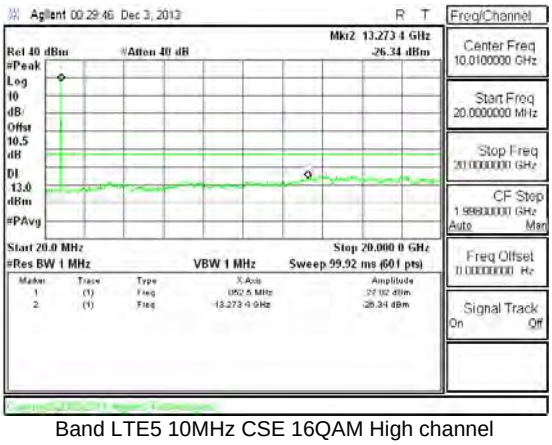
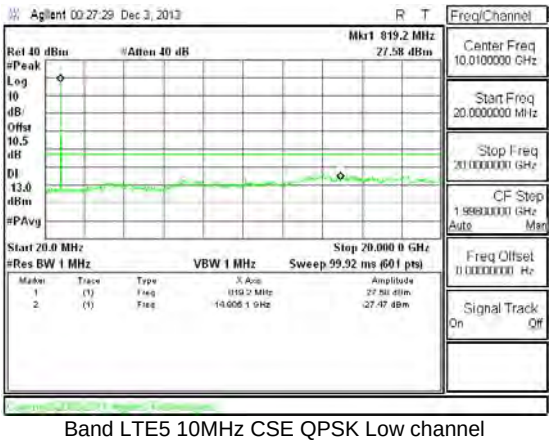
Band LTE5 10MHz 16QAM	 Band LTE5 10MHz CSE 16QAM Low channel	 Band LTE5 10MHz CSE 16QAM Mid channel
Band LTE5 10MHz 16QAM	 Band LTE5 10MHz CSE 16QAM High channel	 Band LTE5 10MHz CSE QPSK Low channel

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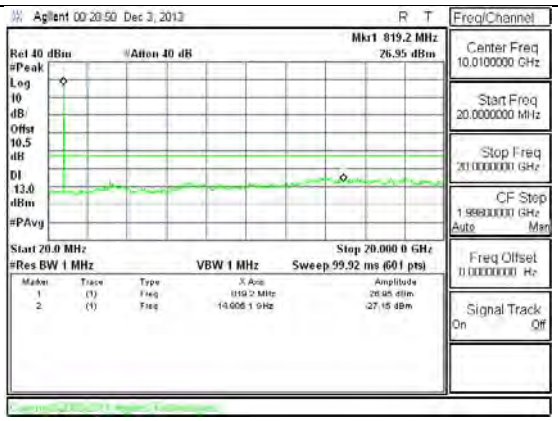
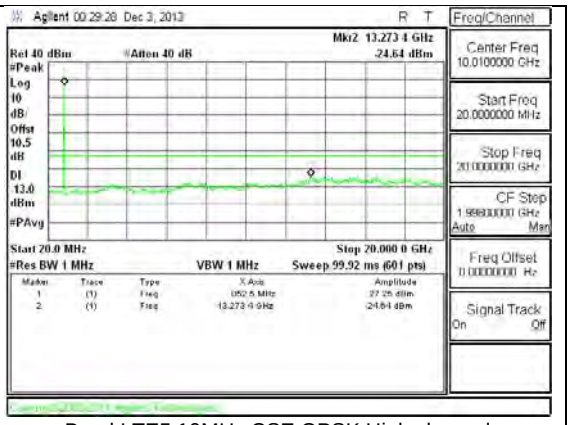
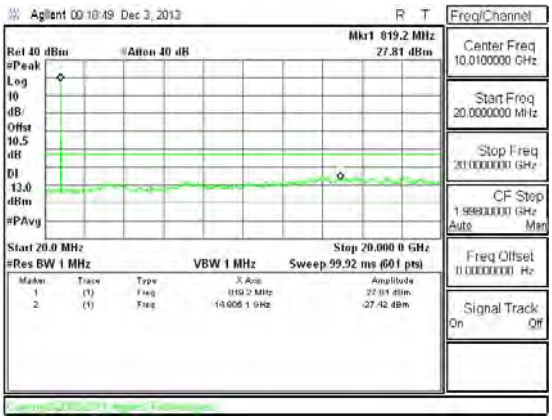
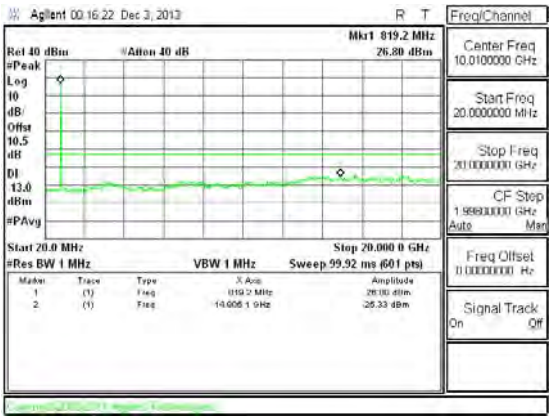
Band LTE5 10MHz QPSK	 Band LTE5 10MHz CSE QPSK Mid channel	 Band LTE5 10MHz CSE QPSK High channel

Band LTE5 5MHz 16QAM	 Band LTE5 5MHz CSE 16QAM Low channel	 Band LTE5 5MHz CSE 16QAM Mid channel

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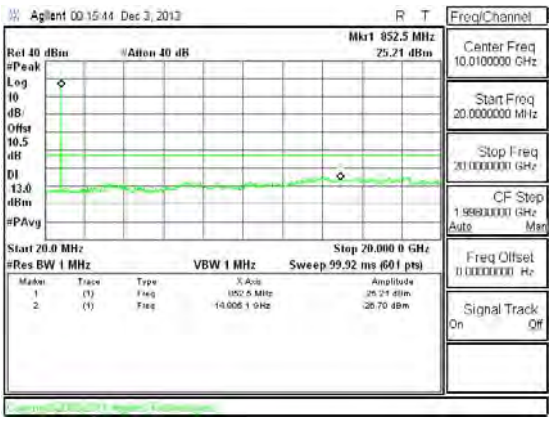
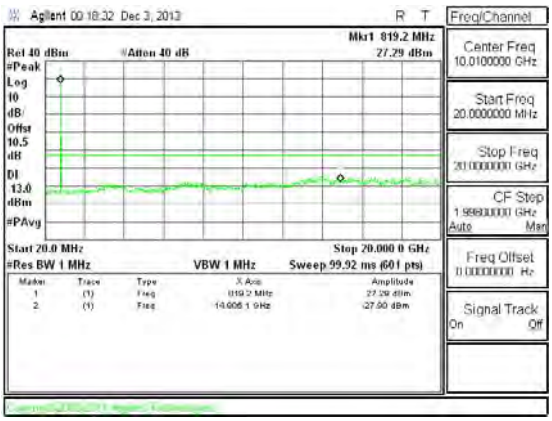
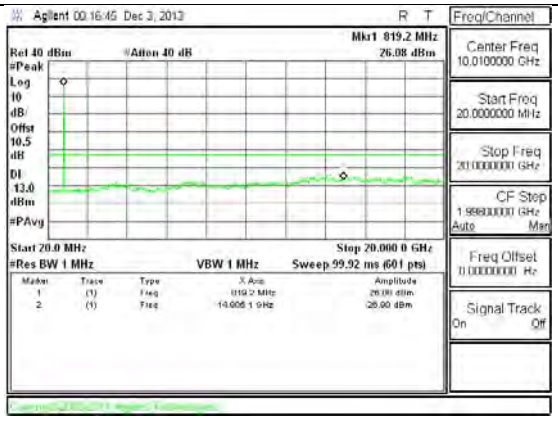
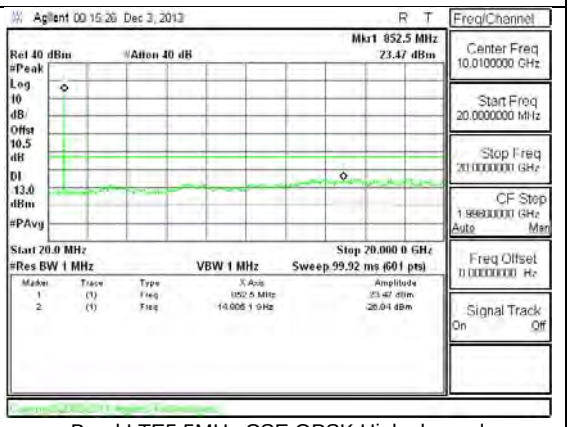
Band LTE5 5MHz 16QAM	 Band LTE5 5MHz CSE 16QAM High channel	 Band LTE5 5MHz CSE QPSK Low channel
Band LTE5 5MHz QPSK	 Band LTE5 5MHz CSE QPSK Mid channel	 Band LTE5 5MHz CSE QPSK High channel

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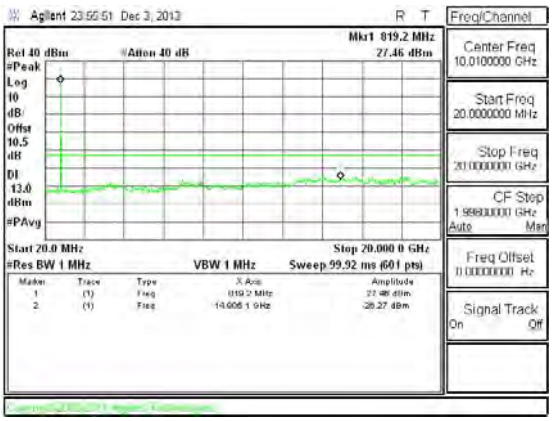
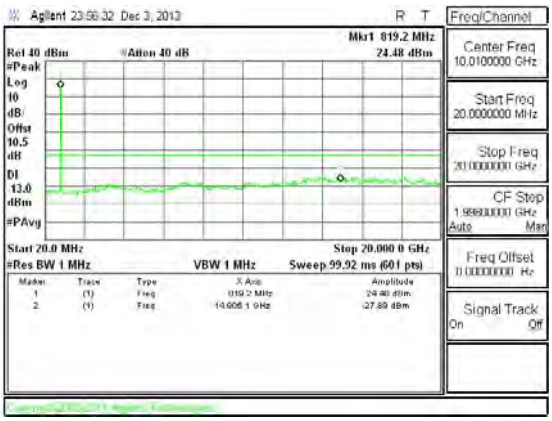
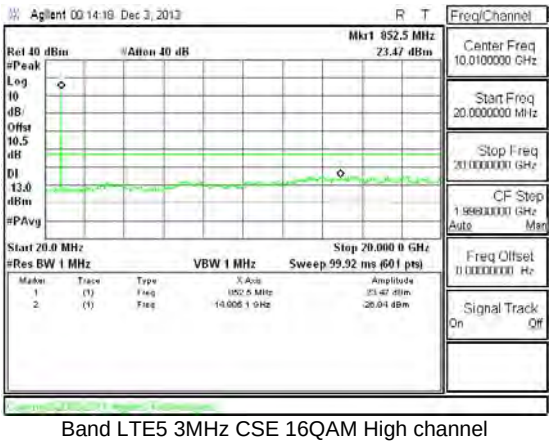
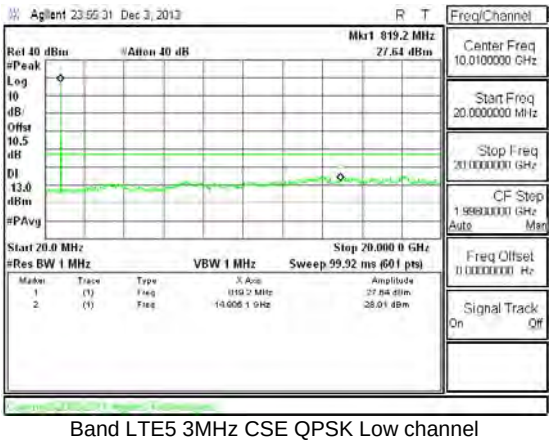
Band LTE5 3MHz 16QAM	 Band LTE5 3MHz CSE 16QAM Low channel	 Band LTE5 3MHz CSE 16QAM Mid channel
Band LTE5 3MHz 16QAM	 Band LTE5 3MHz CSE 16QAM High channel	 Band LTE5 3MHz CSE QPSK Low channel

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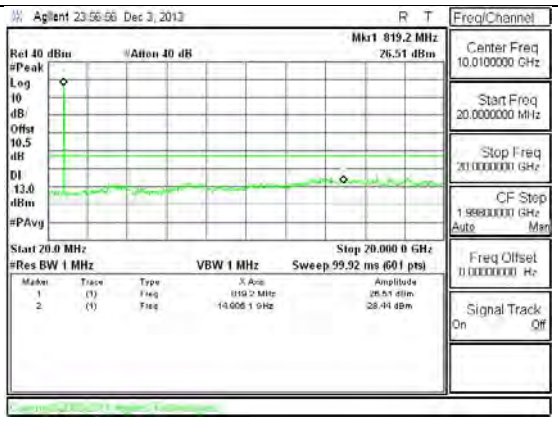
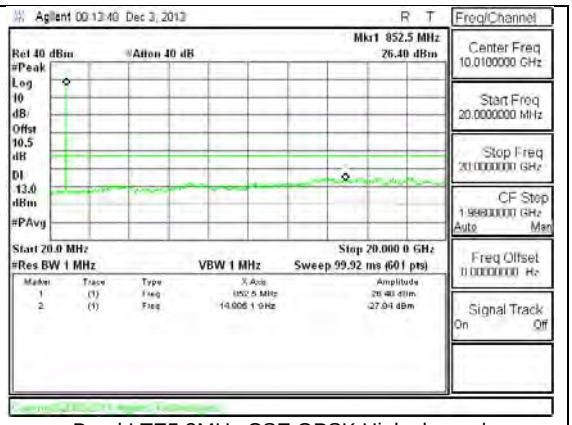
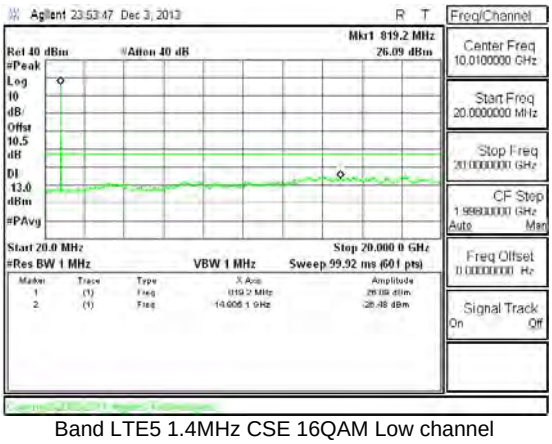
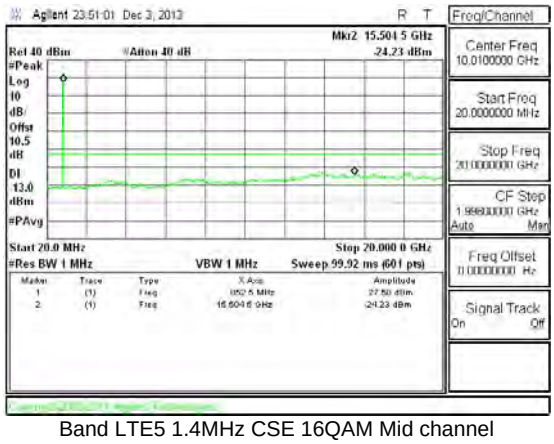
Band LTE5 3MHz QPSK	 Band LTE5 3MHz CSE QPSK Mid channel	 Band LTE5 3MHz CSE QPSK High channel

Band LTE5 1.4MHz 16QAM	 Band LTE5 1.4MHz CSE 16QAM Low channel	 Band LTE5 1.4MHz CSE 16QAM Mid channel

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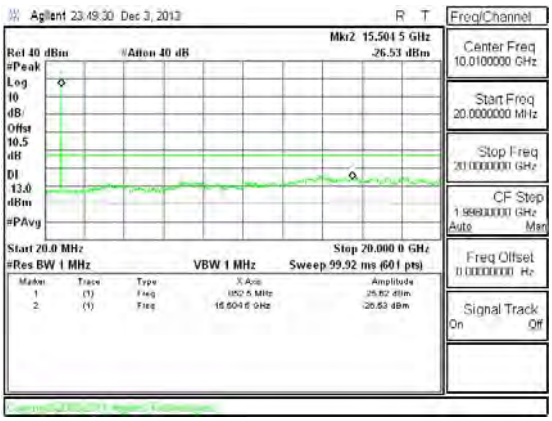
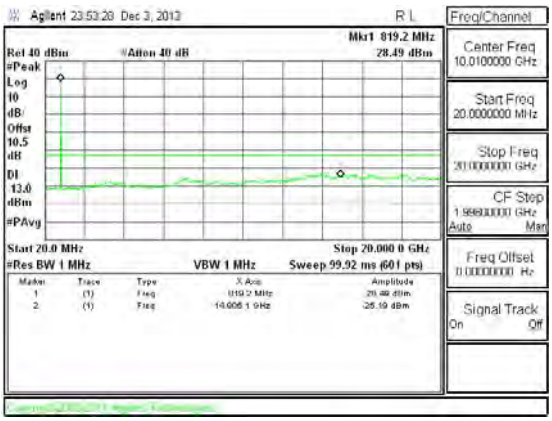
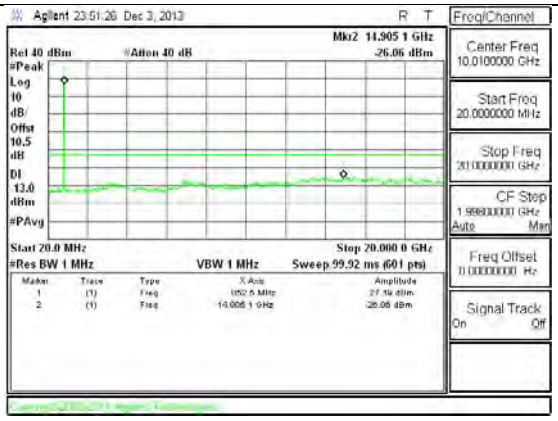
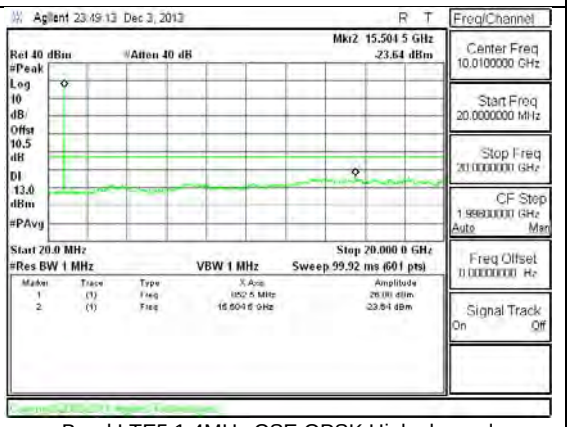
Band LTE5 1.4MHz 16QAM	 Band LTE5 1.4MHz CSE 16QAM High channel	 Band LTE5 1.4MHz CSE QPSK Low channel
Band LTE5 1.4MHz QPSK	 Band LTE5 1.4MHz CSE QPSK Mid channel	 Band LTE5 1.4MHz CSE QPSK High channel

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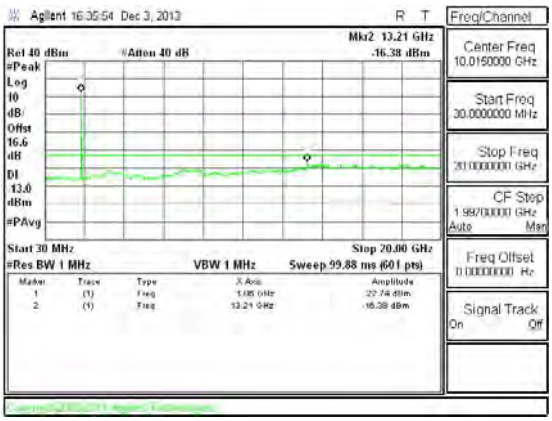
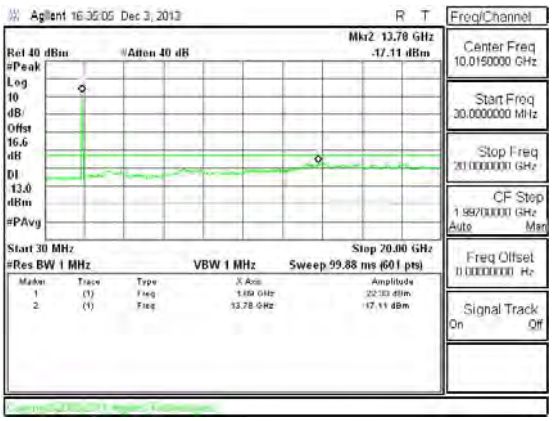
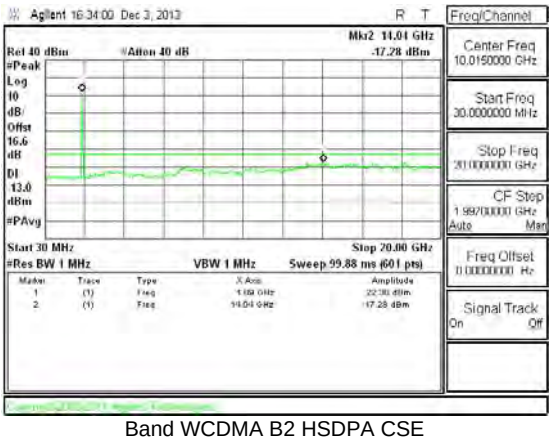
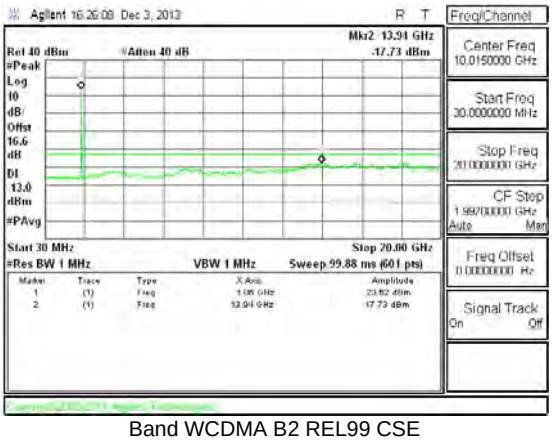
Band Band 2 HSDPA	 Band WCDMA B2 HSDPA CSE	 Band WCDMA B2 HSDPA CSE
Band Band 2 HSDPA	 Band WCDMA B2 HSDPA CSE	 Band WCDMA B2 REL99 CSE

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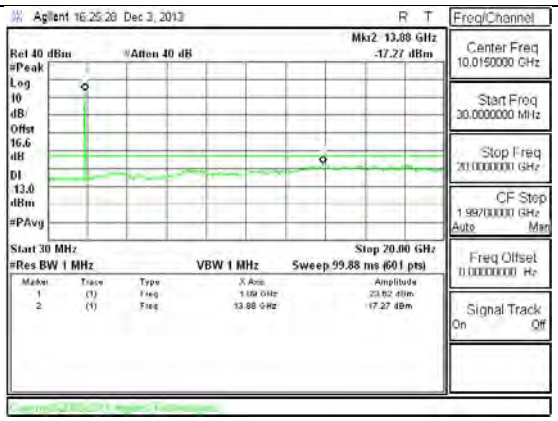
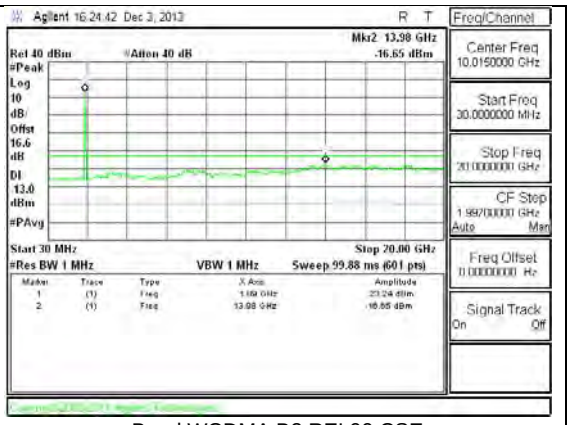
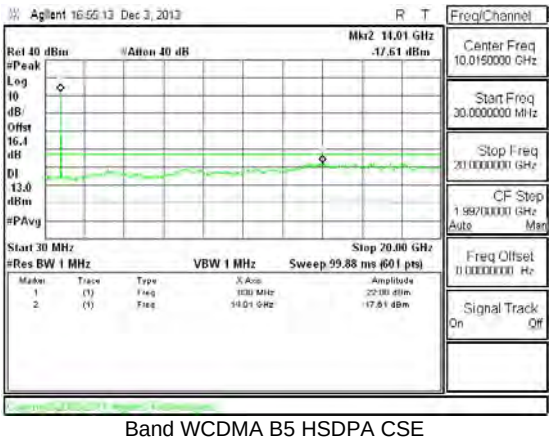
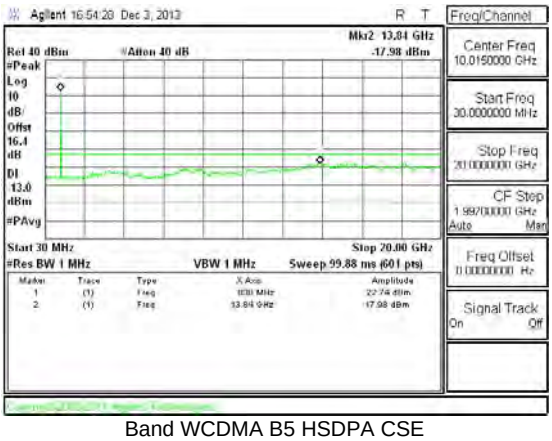
Band Band 2 REL99	 Band WCDMA B2 REL99 CSE	 Band WCDMA B2 REL99 CSE

Band Band 5 HSDPA	 Band WCDMA B5 HSDPA CSE	 Band WCDMA B5 HSDPA CSE

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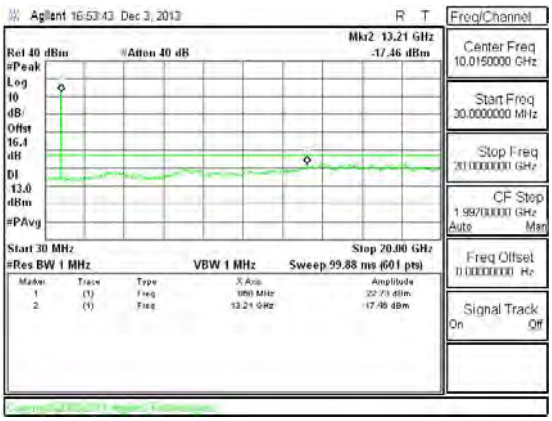
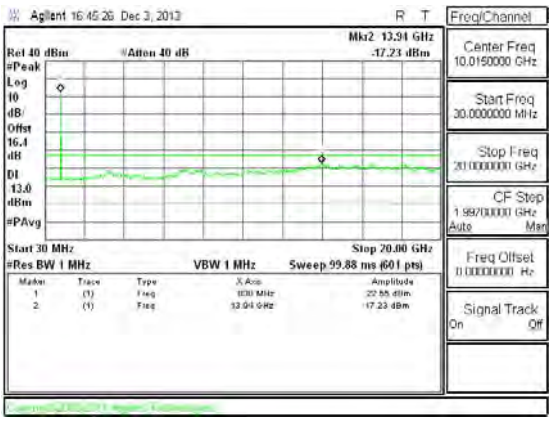
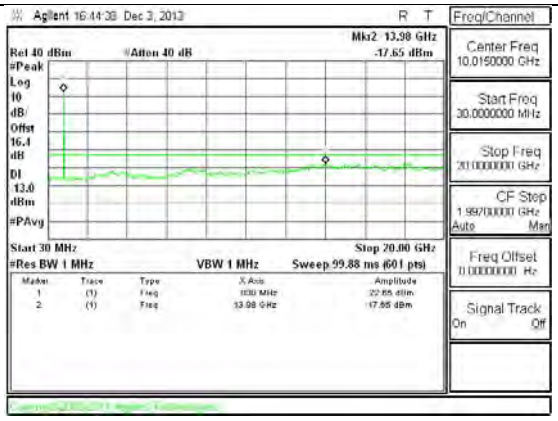
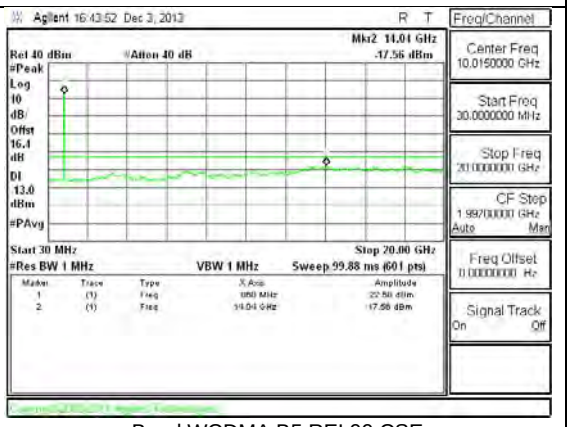
Band Band 5 HSDPA	 Band WCDMA B5 HSDPA CSE	 Band WCDMA B5 REL99 CSE
Band Band 5 REL99	 Band WCDMA B5 REL99 CSE	 Band WCDMA B5 REL99 CSE

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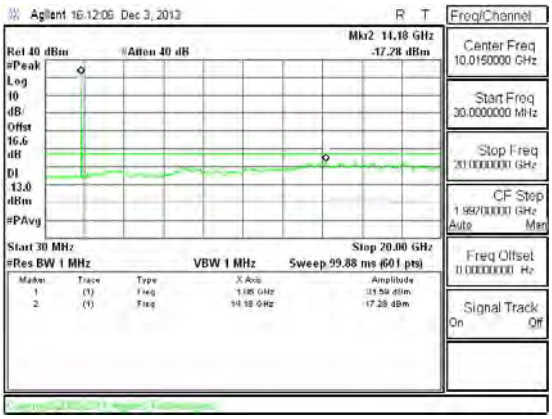
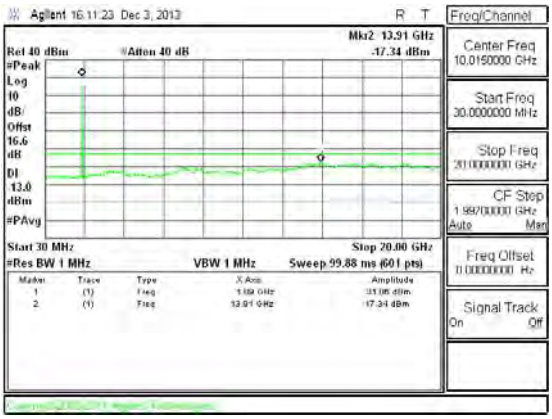
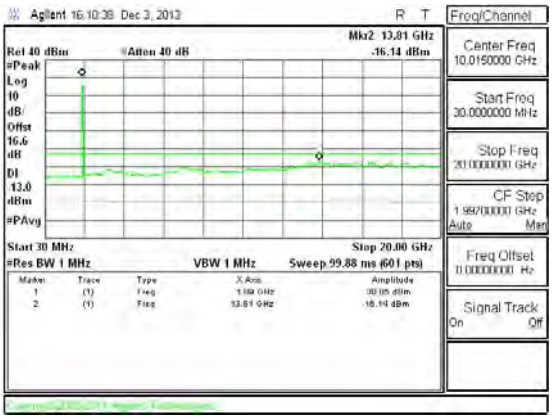
Band GSM1900 GPRS	 Band GSM1900 GPRS CSE Low channel	 Band GSM1900 GPRS CSE Mid channel
Band GSM1900 GPRS	 Band GSM1900 GPRS CSE High channel	

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10.4. FREQUENCY STABILITY

RULE PART(S)

FCC: §2.1055, §22.355, §24.235, and §27.54

LIMITS

§22.355 - The carrier frequency shall not depart from the reference frequency in excess of ±2.5 ppm for mobile stations.

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

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

TEST PROCEDURE

Per KDB 971168 D01 Power Meas License Digital Systems v02r01

Frequency Stability vs Temperature:

The EUT is place inside a temperature chamber. The temperature is set to 20ºC and allowed to stabilize. After sufficient soak time, the transmitting frequency error is measured. The temperature is increased by 10 degrees, allowed to stabilize and soak, and then the measurement is repeated. This is repeated until +50ºC is reached. Reference power supply voltage for these tests is 3.7Vdc.

Frequency Stability vs Voltage:

The peak frequency error is recorded (worst-case). The test voltage ranges from 3.20 to 4.2 VDC.

MODES TESTED

GSM 1900 / WCDMA B2&B5 / LTE B5 & 17

RESULTS

See the following pages.

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10.4.1. FREQUENCY STABILITY RESULTS

LTE 17

Reference Frequency: Cellular Mid Channel 710.000056 MHz @ 20°C Limit: to stay +- 2.5 ppm = 1775.000 Hz				
Power Supply (Vdc)	Environment Temperature (°C)	Frequency Deviation Measureed with Time Elapse (MHz)	Delta (ppm)	Limit (ppm)
3.80	50	710.000002	0.005	2.5
3.80	40	710.000008	-0.004	2.5
3.80	30	710.000010	-0.006	2.5
3.80	***20***	***710.000006***	***0***	2.5
3.80	10	710.000007	-0.002	2.5
3.80	0	710.000006	0.000	2.5
3.80	-10	710.000006	-0.001	2.5
3.80	-20	710.000002	0.005	2.5
3.80	-30	710.000009	-0.005	2.5

Reference Frequency: Cellular Mid Channel 710.000056 MHz @ 20°C Limit: to stay +- 2.5 ppm = 1775.000 Hz				
Power Supply (Vdc)	Environment Temperature (°C)	Frequency Deviation Measureed with Time Elapse (MHz)	Delta (ppm)	Limit (ppm)
3.80	***20***	***710.000006***	***0***	***2.5***
4.30	20	710.000000	*0.008*	2.5
3.30	20	710.000008	*-0.003*	2.5

LTE 5

Reference Frequency: Cellular Mid Channel 836.500002 MHz @ 20°C Limit: to stay +- 2.5 ppm = 2091.250 Hz				
Power Supply (Vdc)	Environment Temperature (°C)	Frequency Deviation Measureed with Time Elapse (MHz)	Delta (ppm)	Limit (ppm)
3.80	50	836.500001	0.001	2.5
3.80	40	836.500000	0.002	2.5
3.80	30	836.500007	-0.006	2.5
3.80	***20***	***836.500002***	***0***	2.5
3.80	10	836.500001	0.001	2.5
3.80	0	836.500001	0.002	2.5
3.80	-10	836.500009	-0.008	2.5
3.80	-20	836.500008	-0.007	2.5
3.80	-30	836.500010	-0.009	2.5

Reference Frequency: Cellular Mid Channel 710.000056 MHz @ 20°C Limit: to stay +- 2.5 ppm = 2091.250 Hz				
Power Supply (Vdc)	Environment Temperature (°C)	Frequency Deviation Measureed with Time Elapse (MHz)	Delta (ppm)	Limit (ppm)
3.80	***20***	***836.500002***	***0***	***2.5***
4.30	20	836.500015	*-0.016*	2.5
3.30	20	836.500011	*-0.011*	2.5

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GSM1900

Reference Frequency: PCS Mid Channel 1880. MHz @ 20°C Limit: to stay +- 2.5 ppm = 4700.000 Hz				
Power Supply (Vdc)	Environment Temperature (°C)	Frequency Deviation Measureed with Time Elapse (MHz)	Delta (ppm)	Limit (ppm)
3.80	50	1880.000058	-0.003	2.5
3.80	40	1880.000054	-0.001	2.5
3.80	30	1880.000060	-0.004	2.5
3.80	***20***	***1880.000052***	***0***	2.5
3.80	10	1880.000044	0.004	2.5
3.80	0	1880.000064	-0.007	2.5
3.80	-10	1880.000071	-0.010	2.5
3.80	-20	1880.000076	-0.013	2.5
3.80	-30	1880.000060	-0.004	2.5

Reference Frequency: PCS Mid Channel 1880.000056 MHz @ 20°C Limit: to stay +- 2.5 ppm = 1775.000 Hz				
Power Supply (Vdc)	Environment Temperature (°C)	Frequency Deviation Measureed with Time Elapse (MHz)	Delta (ppm)	Limit (ppm)
3.80	***20***	***1880.000046***	***0***	***2.5***
4.30	20	1880.000053	*-0.010*	2.5
3.30	20	1880.000051	*-0.007*	2.5

Band 5

Reference Frequency: Cell Mid Channel 836.6 MHz @ 20ºC Limit: +- 2.5 ppm = 2091.500 Hz				
Power Supply (Vdc)	Environment Temperature (*C)	Frequency Deviation Measureed with Time Elapse (MHz)	Delta (ppm)	Limit (ppm)
3.80	50	836.600021	0.010	2.5
3.80	40	836.600025	0.005	2.5
3.80	30	836.600031	-0.002	2.5
3.80	***20***	***836.600029***	***0***	***2.5***
3.80	10	836.600026	0.004	2.5
3.80	0	836.600037	-0.010	2.5
3.80	-10	836.600030	-0.001	2.5
3.80	-20	836.600036	-0.008	2.5
3.80	-30	836.600027	0.002	2.5
Reference Frequency: Cell Mid Channel 836.6 MHz @ 20ºC Limit: +- 2.5 ppm = 2091.500 Hz				
Power Supply (Vdc)	Environment Temperature (*C)	Frequency Deviation Measureed with Time Elapse	Delta (ppm)	Limit (ppm)
3.80	***20***	***836.600029***	***0.00000***	***2.5***
4.30	20	836.600035	*-0.00717*	2.5
3.30	20	836.600025	*0.00478*	2.5

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Band 2

Reference Frequency: PCS Mid Channel 1880MHz @ 20°C Limit: to stay +- 2.5 ppm = 4700.000 Hz				
Power Supply (Vdc)	**Environment Temperature (°C)**	**Frequency Deviation Measureed with Time Elapse**		
		(MHz)	**Delta (ppm)**	**Limit (ppm)**
3.80	50	1880.000021	0.002	2.5
3.80	40	1880.000026	-0.001	2.5
3.80	30	1880.000028	-0.002	2.5
3.80	***20***	***1880.000025***	***0***	***2.5***
3.80	10	1880.000032	-0.004	2.5
3.80	0	1880.000034	-0.005	2.5
3.80	-10	1880.000022	0.002	2.5
3.80	-20	1880.000021	0.002	2.5
3.80	-30	1880.000024	0.001	2.5

Reference Frequency: PCS Mid Channel 1880 MHz @ 20°C Limit: to stay +- 2.5 ppm = 4700.000 Hz				
Power Supply (Vdc)	**Environment Temperature (°C)**	**Frequency Deviation Measureed with Time Elapse**		
		(MHz)	**Delta (ppm)**	**Limit (ppm)**
3.80	***20***	***1880.000028***	***0***	***2.5***
4.30	20	1880.000025	*0.002*	2.5
3.30	20	1880.000029	*-0.001*	2.5

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11. RADIATED TEST RESULTS

11.1. RADIATED POWER (ERP & EIRP)

RULE PART(S)

FCC: §2.1046, §22.913, §24.232, §27.53.

LIMITS

22.913(a) - The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.

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

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

TEST PROCEDURE

ANSI / TIA / EIA 603C Clause 2.2.17

MODES TESTED

GSM 1900 / WCDMA B2&B5 / LTE B5 & 17

TEST RESULTS

UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
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11.1.1. ERP/EIRP Results

Band	Mode	Channel	f(MHz)	ERP / EIRP	
				dBm	mW
Band 2	REL99	9275	1852.6	19.06	80.54
		9400	1880	18.4	69.18
		9525	1907.4	17.7	58.88
	HSDPA	9275	1852.6	18.82	76.21
		9400	1880	18.88	77.3
		9525	1907.4	18.27	67.1

Band	Mode	Channel	f(MHz)	ERP / EIRP	
				dBm	mW
Band 5	REL99	4145	826.6	17.421	55.22
		4183	836.6	18.251	66.85
		4220	846.4	17.371	54.59
	HSDPA	4145	826.6	16.86	48.53
		4183	836.6	17.29	53.58
		4220	846.4	17.20	52.48

Band	Mode	Channel	f(MHz)	ERP / EIRP	
				dBm	mW
GSM1900	GPRS	512	1850.2	25.76	376.7
		661	1880	26.43	439.54
		810	1909.8	26.34	430.33

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11.1.2. LTE ERP/EIRP Results

Band	BW (MHz)	Mode	RB/RB Size	f (MHz)	ERP / EIRP	
					dBm	mW
LTE17	10	QPSK	1/0	709	19.14	82.04
			1/0	710	19.97	99.31
			1/0	711	20.29	106.9
		16QAM	1/0	709	20.41	109.9
			1/0	710	20.66	116.4
			1/0	711	19.78	95.1

Band	BW (MHz)	Mode	RB/RB Size	f (MHz)	ERP / EIRP	
					dBm	mW
LTE17	5	QPSK	1/0	706.5	18.401	69.2
			1/0	710	19.961	99.11
			1/0	713.5	18.98	79.07
		16QAM	1/0	706.5	17.401	54.97
			1/0	710	19.101	81.3
			1/0	713.5	18.30	67.61

Band	BW (MHz)	Mode	RB/RB Size	f (MHz)	ERP / EIRP	
					dBm	mW
LTE5	10	QPSK	1/0	829	20.201	104.74
			1/0	836.5	20.521	112.75
			1/0	844	19.801	95.52
		16QAM	1/0	829	19.401	87.12
			1/0	836.5	19.601	91.22
			1/0	844	19.001	79.45

Band	BW (MHz)	Mode	RB/RB Size	f (MHz)	ERP / EIRP

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					dBm	mW
LTE5	5	QPSK	1/0	826.5	19.781	95.08
			1/0	836.5	20.091	102.12
			1/0	846.5	19.701	93.35
		16QAM	1/0	826.5	18.901	77.64
			1/0	836.5	19.401	87.12
			1/0	846.5	18.901	77.64

Band	BW (MHz)	Mode	RB/RB Size	f (MHz)	ERP / EIRP	
					dBm	mW
LTE5	3	QPSK	1/0	825.5	20.221	105.22
			1/0	836.5	19.891	97.52
			1/0	847.5	19.921	98.2
		16QAM	1/0	825.5	19.501	89.15
			1/0	836.5	18.901	77.64
			1/0	847.5	19.201	83.2

Band	BW (MHz)	Mode	RB/RB Size	f (MHz)	ERP / EIRP	
					dBm	mW
LTE5	1.4	QPSK	1/0	824.7	20.361	108.67
			1/0	836.5	20.841	121.37
			1/0	848.3	20.301	107.18
		16QAM	1/0	824.7	19.501	89.15
			1/0	836.5	19.901	97.75
			1/0	848.3	19.201	83.2

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11.1.3. ERP/EIRP PLOTS

Band

LTE17

10MHz

16QAM

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

Company: Samsung
Project #: 13U16613
Date: 12/23/13
Test Engineer: Isadore N.
Configuration: EUT
Mode: LTE17, 10MHz BW, 16QAM

Test Equipment:
Receiving: Hybrid T185, and Chamber C SMA Cables
Substitution: Dipole T416 Substitution, 4ft SMA Cable Warehouse

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
709.00	11.16	V	0.5	0.0	10.66	33.0	-22.3	
709.00	20.91	H	0.5	0.0	20.41	33.0	-12.6	
Mid Ch								
710.00	11.37	V	0.5	0.0	10.87	33.0	-22.1	
710.00	21.16	H	0.5	0.0	20.66	33.0	-12.3	
High Ch								
711.00	9.34	V	0.5	0.0	8.84	33.0	-24.2	
711.00	20.28	H	0.5	0.0	19.78	33.0	-13.2	

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

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Band

LTE17

10MHz

QPSK

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

Company: Samsung
Project #: 13U16613
Date: 12/23/13
Test Engineer: Daniel S.
Configuration: EUT
Mode: LTE17, 10MHz BW, QPSK

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

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
709.00	8.78	V	0.5	0.0	8.28	33.0	-24.7	
709.00	19.64	H	0.5	0.0	19.14	33.0	-13.9	
Mid Ch								
710.00	9.42	V	0.5	0.0	8.92	33.0	-24.1	
710.00	20.47	H	0.5	0.0	19.97	33.0	-13.0	
High Ch								
711.00	9.84	V	0.5	0.0	9.34	33.0	-23.7	
711.00	20.79	H	0.5	0.0	20.29	33.0	-12.7	

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

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Band

LTE17

5MHz

16QAM

High Frequency Substitution Measurement
Compliance Certification Services Chamber B

Company: SAMSUNG
Project #: 13U16613
Date: 12/16/13
Test Engineer: Kiya Kedida
Configuration: EUT Only
Mode: LTE Band 17_5MHz_16QAM

Test Equipment:
Receiving: Sunol T345, and 3m Chamber N-type Cable (Setup this one for testing EUT)
Substitution: Dipole S/N: 00022117, 4ft SMA Cable (SN # 245200 001) Warehouse.

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
706.50	8.20	V	0.5	0.0	7.70	38.5	-30.7	
706.50	17.90	H	0.5	0.0	17.40	38.5	-21.0	
Mid Ch								
710.00	9.30	V	0.5	0.0	8.80	38.5	-29.6	
710.00	19.60	H	0.5	0.0	19.10	38.5	-19.3	
High Ch								
713.50	18.80	V	0.5	0.0	18.30	38.5	-20.1	
713.50	9.20	H	0.5	0.0	8.70	38.5	-29.7	

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Band

LTE17

5MHz

QPSK

High Frequency Substitution Measurement
Compliance Certification Services Chamber B

Company: SAMSUNG
Project #: 13U16613
Date: 12/16/13
Test Engineer: Kiya Kedida
Configuration: EUT Only
Mode: LTE Band 17_5MHz_QPSK

Test Equipment:
Receiving: Sunol T345, and 3m Chamber N-type Cable (Setup this one for testing EUT)
Substitution: Dipole S/N: 00022117, 4ft SMA Cable (SN # 245200 001) Warehouse.

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
706.50	8.91	V	0.5	0.0	8.41	38.5	-30.0	
706.50	18.90	H	0.5	0.0	18.40	38.5	-20.0	
Mid Ch								
710.00	10.00	V	0.5	0.0	9.50	38.5	-28.9	
710.00	20.46	H	0.5	0.0	19.96	38.5	-18.5	
High Ch								
713.50	19.48	V	0.5	0.0	18.98	38.5	-19.5	
713.50	9.93	H	0.5	0.0	9.43	38.5	-29.0	

Rev. 3.17.11

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Band

LTE5

10MHz

16QAM

High Frequency Substitution Measurement
Compliance Certification Services Chamber B

Company: SAMSUNG
Project #: 13U16613
Date: 12/16/13
Test Engineer: Kiya Kedida
Configuration: EUT Only
Mode: LTE Band 5_10MHz_ 16QAM

Test Equipment:
Receiving: Sunol T345, and 3m Chamber N-type Cable (Setup this one for testing EUT)
Substitution: Dipole S/N: 00022117, 4ft SMA Cable (SN # 245200 001) Warehouse.

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
829.00	12.15	V	0.5	0.0	11.65	38.5	-26.8	
829.00	19.90	H	0.5	0.0	19.40	38.5	-19.0	
Mid Ch								
836.50	1.47	V	0.5	0.0	0.97	38.5	-37.5	
836.50	20.10	H	0.5	0.0	19.60	38.5	-18.8	
High Ch								
844.00	10.93	V	0.5	0.0	10.43	38.5	-28.0	
844.00	19.50	H	0.5	0.0	19.00	38.5	-19.4	

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Band

LTE5

10MHz

QPSK

High Frequency Substitution Measurement
Compliance Certification Services Chamber B

Company: SAMSUNG
Project #: 13U16613
Date: 12/16/13
Test Engineer: Kiya Kedida
Configuration: EUT Only
Mode: LTE Band 5_10MHz_ QPSK,

Test Equipment:
Receiving: Sunol T345, and 3m Chamber N-type Cable (Setup this one for testing EUT)
Substitution: Dipole S/N: 00022117, 4ft SMA Cable (SN # 245200 001) Warehouse.

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
829.00	12.84	V	0.5	0.0	12.34	38.5	-26.1	
829.00	20.70	H	0.5	0.0	20.20	38.5	-18.2	
Mid Ch								
836.50	12.21	V	0.5	0.0	11.71	38.5	-26.7	
836.50	21.02	H	0.5	0.0	20.52	38.5	-17.9	
High Ch								
844.00	11.63	V	0.5	0.0	11.13	38.5	-27.3	
844.00	20.30	H	0.5	0.0	19.80	38.5	-18.6	

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Band

LTE5

5MHz

16QAM

High Frequency Substitution Measurement
Compliance Certification Services Chamber C

Company: SAMSUNG
Project #: 13U16613
Date: 12/16/13
Test Engineer: Kiya Kedida
Configuration: EUT Only
Mode: LTE Band 5_5MHz_ 16QAM

Test Equipment:
Receiving: Sunol T345, and 3m Chamber N-type Cable (Setup this one for testing EUT)
Substitution: Dipole S/N: 00022117, 4ft SMA Cable (SN # 245200 001) Warehouse.

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
826.50	12.25	V	0.5	0.0	11.75	38.5	-26.7	
826.50	19.40	H	0.5	0.0	18.90	38.5	-19.5	
Mid Ch								
836.50	10.97	V	0.5	0.0	10.47	38.5	-28.0	
836.50	19.90	H	0.5	0.0	19.40	38.5	-19.0	
High Ch								
846.50	11.03	V	0.5	0.0	10.53	38.5	-27.9	
846.50	19.40	H	0.5	0.0	18.90	38.5	-19.5	

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Band

LTE5

5MHz

QPSK

High Frequency Substitution Measurement
Compliance Certification Services Chamber C

Company: SAMSUNG
Project #: 13U16613
Date: 12/16/13
Test Engineer: Kiya Kedida
Configuration: EUT Only
Mode: LTE Band 5_5MHz_ QPSK,

Test Equipment:
Receiving: Sunol T345, and 3m Chamber N-type Cable (Setup this one for testing EUT)
Substitution: Dipole S/N: 00022117, 4ft SMA Cable (SN # 245200 001) Warehouse.

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
826.50	13.05	V	0.5	0.0	12.55	38.5	-25.9	
826.50	20.28	H	0.5	0.0	19.78	38.5	-18.7	
Mid Ch								
836.50	11.75	V	0.5	0.0	11.25	38.5	-27.2	
836.50	20.59	H	0.5	0.0	20.09	38.5	-18.4	
High Ch								
846.50	11.86	V	0.5	0.0	11.36	38.5	-27.1	
846.50	20.20	H	0.5	0.0	19.70	38.5	-18.7	

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Band

LTE5

3MHz

16QAM

High Frequency Substitution Measurement
Compliance Certification Services Chamber B

Company: SAMSUNG
Project #: 13U16613
Date: 12/16/13
Test Engineer: Kiya Kedida
Configuration: EUT Only
Mode: LTE Band 5_3MHz_ 16QAM

Test Equipment:
Receiving: Sunol T345, and 3m Chamber N-type Cable (Setup this one for testing EUT)
Substitution: Dipole S/N: 00022117, 4ft SMA Cable (SN # 245200 001) Warehouse.

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
825.50	11.25	V	0.5	0.0	10.75	38.5	-27.7	
825.50	20.00	H	0.5	0.0	19.50	38.5	-18.9	
Mid Ch								
836.50	9.67	V	0.5	0.0	9.17	38.5	-29.3	
836.50	19.40	H	0.5	0.0	18.90	38.5	-19.5	
High Ch								
847.50	10.13	V	0.5	0.0	9.63	38.5	-28.8	
847.50	19.70	H	0.5	0.0	19.20	38.5	-19.2	

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Band

LTE5

3MHz

QPSK

High Frequency Substitution Measurement
Compliance Certification Services Chamber B

Company: SAMSUNG
Project #: 13U16613
Date: 12/16/13
Test Engineer: Kiya Kedida
Configuration: EUT Only
Mode: LTE Band 5_3MHz_ QPSK

Test Equipment:
Receiving: Sunol T345, and 3m Chamber N-type Cable (Setup this one for testing EUT)
Substitution: Dipole S/N: 00022117, 4ft SMA Cable (SN # 245200 001) Warehouse.

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
825.50	11.96	V	0.5	0.0	11.46	38.5	-27.0	
825.50	20.72	H	0.5	0.0	20.22	38.5	-18.2	
Mid Ch								
836.50	10.58	V	0.5	0.0	10.08	38.5	-28.4	
836.50	20.39	H	0.5	0.0	19.89	38.5	-18.6	
High Ch								
847.50	11.01	V	0.5	0.0	10.51	38.5	-27.9	
847.50	20.42	H	0.5	0.0	19.92	38.5	-18.5	

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Band

LTE5

1.4MHz

16QAM

High Frequency Substitution Measurement
Compliance Certification Services Chamber B

Company: SAMSUNG
Project #: 13U16613
Date: 12/16/13
Test Engineer: Kiya Kedida
Configuration: EUT Only
Mode: LTE Band 5_1.4MHz_16QAM

Test Equipment:
Receiving: Sunol T345, and 3m Chamber N-type Cable (Setup this one for testing EUT)
Substitution: Dipole S/N: 00022117, 4ft SMA Cable (SN # 245200 001) Warehouse.

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
824.70	11.15	V	0.5	0.0	10.65	38.5	-27.8	
824.70	20.00	H	0.5	0.0	19.50	38.5	-18.9	
Mid Ch								
836.50	9.67	V	0.5	0.0	9.17	38.5	-29.3	
836.50	20.40	H	0.5	0.0	19.90	38.5	-18.5	
High Ch								
848.30	9.43	V	0.5	0.0	8.93	38.5	-29.5	
848.30	19.70	H	0.5	0.0	19.20	38.5	-19.2	

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Band

LTE5

1.4MHz

QPSK

High Frequency Substitution Measurement
Compliance Certification Services Chamber B

Company: SAMSUNG
Project #: 13U16613
Date: 12/16/13
Test Engineer: Kiya Kedida
Configuration: EUT Only
Mode: LTE Band 5_1.4MHz_QPSK

Test Equipment:
Receiving: Sunol T345, and 3m Chamber N-type Cable (Setup this one for testing EUT)
Substitution: Dipole S/N: 00022117, 4ft SMA Cable (SN # 245200 001) Warehouse.

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
824.70	11.91	V	0.5	0.0	11.41	38.5	-27.0	
824.70	20.86	H	0.5	0.0	20.36	38.5	-18.1	
Mid Ch								
836.50	10.60	V	0.5	0.0	10.10	38.5	-28.3	
836.50	21.34	H	0.5	0.0	20.84	38.5	-17.6	
High Ch								
848.30	10.57	V	0.5	0.0	10.07	38.5	-28.4	
848.30	20.80	H	0.5	0.0	20.30	38.5	-18.1	

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Band

Band 2

REL99

High Frequency Fundamental Measurement
Compliance Certification Services Chamber B

Company: Samsung
Project #: 13I16613
Date: 12/16/13
Test Engineer: Kiya Kedida
Configuration: EUT, x position
Mode: WCDMA_REL99_ 1900

Test Equipment:
Receiving: Horn T345, and Chamber B SMA Cables
Substitution: Horn T711 Substitution, 4ft SMA Cable (244639001) Warehouse

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1.852	14.3	V	0.85	5.58	18.99	33.0	-14.0	
1.852	14.3	H	0.85	5.58	19.06	33.0	-13.9	
Mid Ch								
1.880	12.4	V	0.85	5.60	17.12	33.0	-15.9	
1.880	13.7	H	0.85	5.60	18.40	33.0	-14.6	
High Ch								
1.908	12.9	V	0.85	5.63	17.69	33.0	-15.3	
1.908	12.9	H	0.85	5.63	17.70	33.0	-15.3	

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Band

Band 2

HSDPA

High Frequency Fundamental Measurement
Compliance Certification Services Chamber C

Company: Samsung
Project #: 13I16613
Date: 12/16/13
Test Engineer: Daniel S.
Configuration: EUT w/ charger and HS, x position
Mode: WCDMA_HSDPA_ 1900

Test Equipment:
Receiving: Horn T119, and Chamber C SMA Cables
Substitution: Horn T711 Substitution, 4ft SMA Cable (244639001) Warehouse

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1.852	14.1	V	0.85	5.58	18.85	33.0	-14.2	
1.852	4.7	H	0.85	5.58	9.40	33.0	-23.6	
Mid Ch								
1.880	14.1	V	0.85	5.60	18.88	33.0	-14.1	
1.880	9.7	H	0.85	5.60	14.41	33.0	-18.6	
High Ch								
1.908	13.5	V	0.85	5.63	18.27	33.0	-14.7	
1.908	6.7	H	0.85	5.63	11.51	33.0	-21.5	

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Band

Band 5

HSDPA

High Frequency Substitution Measurement
Compliance Certification Services Chamber C

Company: Samsung
Project #: 13I16613
Date: 12/16/13
Test Engineer: Daniel S.
Configuration: EUT w/ charger and HS, X position
Mode: WCDMA_HSDPA_ 850

Test Equipment:
Receiving: Sunol T185, and 3m Chamber N-type Cable (Setup this one for testing EUT)
Substitution: Dipole S/N: 00022117, 4ft SMA Cable (SN # 245200 001) Warehouse.

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
826.60	13.83	V	0.9	0.0	12.93	38.5	-25.5	
826.60	17.76	H	0.9	0.0	16.86	38.5	-21.6	
Mid Ch								
836.60	12.78	V	0.9	0.0	11.88	38.5	-26.6	
836.60	18.19	H	0.9	0.0	17.29	38.5	-21.2	
High Ch								
846.40	14.48	V	0.9	0.0	13.58	38.5	-24.9	
846.40	18.10	H	0.9	0.0	17.20	38.5	-21.2	

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Band

Band 5

REL99

High Frequency Substitution Measurement
Compliance Certification Services Chamber C

Company: Samsung
Project #: 13I16613
Date: 12/16/13
Test Engineer: Kiya Kedida
Configuration: EUT, X position
Mode: WCDMA_Rel 99_850

Test Equipment:
Receiving: Sunol T243, and 3m Chamber N-type Cable (Setup this one for testing EUT)
Substitution: Dipole S/N: 00022117, 4ft SMA Cable (SN # 245200 001) Warehouse.

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
826.60	11.62	V	0.9	0.0	10.72	38.5	-27.7	
826.60	18.32	H	0.9	0.0	17.42	38.5	-21.0	
Mid Ch								
836.60	11.42	V	0.9	0.0	10.52	38.5	-27.9	
836.60	19.15	H	0.9	0.0	18.25	38.5	-20.2	
High Ch								
846.40	11.79	V	0.9	0.0	10.89	38.5	-27.6	
846.40	18.27	H	0.9	0.0	17.37	38.5	-21.1	

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Band

GSM1 900

GPRS

High Frequency Fundamental Measurement
Compliance Certification Services Chamber C

Company: Samsung
Project #: 13I16613
Date: 12/13/13
Test Engineer: Kiya Kedida
Configuration: X Position, EUT only
Mode: GPRS 1900MHz

Test Equipment:
Receiving: Horn T119, and Chamber C SMA Cables
Substitution: Horn T711 Substitution, 4ft SMA Cable (244639001) Warehouse

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1.850	18.1	V	0.85	5.58	22.78	33.0	-10.2	
1.850	21.0	H	0.85	5.58	25.76	33.0	-7.2	
Mid Ch								
1.880	17.7	V	0.85	5.60	22.44	33.0	-10.6	
1.880	21.7	H	0.85	5.60	26.43	33.0	-6.6	
High Ch								
1.910	18.6	V	0.85	5.63	23.36	33.0	-9.6	
1.910	21.6	H	0.85	5.63	26.34	33.0	-6.7	

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11.2. FIELD STRENGTH OF SPURIOUS RADIATION

RULE PART(S)

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

LIMIT

§22.917 (e) and §24.238 (a): Out of band emissions. 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

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TEST PROCEDURE

For Cellular equipment - Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e. 100 kHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

For PCS equipment - Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e. 1 MHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

MODES TESTED

GSM 1900 / WCDMA B2&B5 / LTE B5 & 17

RESULTS

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11.2.1. SPURIOUS RADIATION PLOTS

UL Verification Services
Above 1GHz High Frequency Substitution Measurement

Company: Samsung
Project #: 13U16613
Date: 12/23/13
Test Engineer: Daniel S.
Configuration: EUT w/ charger and HS
Mode: TX, LTE BAND 17, 10MHz BW,16QAM

Chamber	Pre-amplifer	Filter	Limit
3m Chamber	T145 8449B	Filter 1	FCC Part 22

Band

LTE17

10MHz

16QAM

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Channel (709MHz)									
1.418	-21.2	V	3.0	35.7	1.0	-55.9	-13.0	-42.9	
2.127	-19.6	V	3.0	35.4	1.0	-53.9	-13.0	-40.9	
2.836	-13.1	V	3.0	35.6	1.0	-47.7	-13.0	-34.7	
1.418	-21.7	H	3.0	35.7	1.0	-56.4	-13.0	-43.4	
2.127	-20.6	H	3.0	35.4	1.0	-55.0	-13.0	-42.0	
2.836	-19.8	H	3.0	35.6	1.0	-54.4	-13.0	-41.4	
Mid Channel (710MHz)									
1.410	-13.7	V	3.0	35.8	1.0	-48.4	-13.0	-35.4	
2.130	-9.7	V	3.0	35.4	1.0	-44.0	-13.0	-31.0	
2.840	-8.8	V	3.0	35.6	1.0	-43.4	-13.0	-30.4	
1.410	-17.2	H	3.0	35.8	1.0	-52.0	-13.0	-39.0	
2.130	-13.9	H	3.0	35.4	1.0	-48.3	-13.0	-35.3	
2.840	-15.8	H	3.0	35.6	1.0	-50.4	-13.0	-37.4	
High Channel (711MHz)									
1.422	-14.7	V	3.0	35.7	1.0	-49.4	-13.0	-36.4	
2.133	-13.2	V	3.0	35.4	1.0	-47.6	-13.0	-34.6	
2.844	-11.9	V	3.0	35.6	1.0	-46.5	-13.0	-33.5	
1.422	-16.0	H	3.0	35.7	1.0	-50.8	-13.0	-37.8	
2.133	-16.1	H	3.0	35.4	1.0	-50.5	-13.0	-37.5	
2.844	-19.5	H	3.0	35.6	1.0	-54.1	-13.0	-41.1	

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

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UL Verification Services
Above 1GHz High Frequency Substitution Measurement

Company:	Samsung
Project #:	13U16613
Date:	12/23/13
Test Engineer:	Daniel S.
Configuration:	EUT w/ charger and HS
Mode:	TX, LTE BAND 17, 10MHz BW,QPSK

Chamber	Pre-amplifer	Filter	Limit
3m Chamber	T145 8449B	Filter 1	FCC Part 22

Band

LTE17

10MHz

QPSK

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Channel (709MHz)									
1.418	-11.7	V	3.0	35.7	1.0	-46.4	-13.0	-33.4	
2.127	-4.3	V	3.0	35.4	1.0	-38.6	-13.0	-25.6	
2.836	-5.5	V	3.0	35.6	1.0	-40.1	-13.0	-27.1	
1.418	-7.9	H	3.0	35.7	1.0	-42.7	-13.0	-29.7	
2.127	-5.1	H	3.0	35.4	1.0	-39.4	-13.0	-26.4	
2.836	-9.6	H	3.0	35.6	1.0	-44.1	-13.0	-31.1	
Mid Channel (710MHz)									
1.410	-10.9	V	3.0	35.8	1.0	-45.6	-13.0	-32.6	
2.130	-9.1	V	3.0	35.4	1.0	-43.5	-13.0	-30.5	
2.840	-5.0	V	3.0	35.6	1.0	-39.6	-13.0	-26.6	
1.410	-9.3	H	3.0	35.8	1.0	-44.0	-13.0	-31.0	
2.130	-12.8	H	3.0	35.4	1.0	-47.2	-13.0	-34.2	
2.840	-13.3	H	3.0	35.6	1.0	-47.9	-13.0	-34.9	
High Channel (711MHz)									
1.422	-24.6	V	3.0	35.7	1.0	-59.4	-13.0	-46.4	
2.133	-18.7	V	3.0	35.4	1.0	-53.1	-13.0	-40.1	
2.844	-18.4	V	3.0	35.6	1.0	-53.0	-13.0	-40.0	
1.422	-11.1	H	3.0	35.7	1.0	-45.9	-13.0	-32.9	
2.133	-13.6	H	3.0	35.4	1.0	-48.0	-13.0	-35.0	
2.844	-15.6	H	3.0	35.6	1.0	-50.2	-13.0	-37.2	

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

UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

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UL Verification Services
Above 1GHz High Frequency Substitution Measurement

Company:	Samsung
Project #:	13U16613
Date:	12/18/13
Test Engineer:	Daniel Soper
Configuration:	EUT w/ charger and HS, X position
Mode:	TX, LTE BAND 17, 5MHz BW,16QAM

Chamber	Pre-amplifer	Filter	Limit
3m Chamber	T145 8449B	Filter 1	FCC Part 22

Band: LTE17 5MHz 16QAM

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Channel (706.5MHz)									
1.413	-24.7	V	3.0	35.8	1.0	-59.5	-13.0	-46.5	
2.119	-13.5	V	3.0	35.4	1.0	-47.8	-13.0	-34.8	
2.826	-17.2	V	3.0	35.6	1.0	-51.8	-13.0	-38.8	
1.413	-20.4	H	3.0	35.8	1.0	-55.1	-13.0	-42.1	
2.119	-7.5	H	3.0	35.4	1.0	-41.9	-13.0	-28.9	
2.826	-19.2	H	3.0	35.6	1.0	-53.8	-13.0	-40.8	
Mid Channel (710MHz)									
1.420	-25.4	V	3.0	35.7	1.0	-60.1	-13.0	-47.1	
2.130	10.7	V	3.0	35.4	1.0	-23.6	-13.0	-10.6	
2.840	-20.3	V	3.0	35.6	1.0	-54.9	-13.0	-41.9	
1.420	-17.4	H	3.0	35.7	1.0	-52.1	-13.0	-39.1	
2.130	13.1	H	3.0	35.4	1.0	-21.3	-13.0	-8.3	
2.840	-25.7	H	3.0	35.6	1.0	-60.3	-13.0	-47.3	
High Channel (713.5MHz)									
1.427	-32.6	V	3.0	35.7	1.0	-67.4	-13.0	-54.4	
2.140	-2.8	V	3.0	35.4	1.0	-37.2	-13.0	-24.2	
2.854	-25.7	V	3.0	35.6	1.0	-60.2	-13.0	-47.2	
1.427	-20.0	H	3.0	35.7	1.0	-54.7	-13.0	-41.7	
2.140	4.5	H	3.0	35.4	1.0	-29.8	-13.0	-16.8	
2.854	-20.9	H	3.0	35.6	1.0	-55.5	-13.0	-42.5	

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

UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

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Band

LTE17

5MHz

QPSK

UL Verification Services
Above 1GHz High Frequency Substitution Measurement

Company:	Samsung
Project #:	13U16613
Date:	12/18/13
Test Engineer:	Daniel Soper
Configuration:	EUT w/ charger and HS, X Position
Mode:	TX, LTE BAND 17, 5MHz BW,QPSK

Chamber	Pre-amplifer	Filter	Limit
3m Chamber	T34 8449B	Filter 1	FCC Part 22

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Channel (706.5MHz)									
1.413	-21.4	V	3.0	37.8	1.0	-58.1	-13.0	-45.1	
2.119	-14.6	V	3.0	36.7	1.0	-50.3	-13.0	-37.3	
2.826	-14.7	V	3.0	36.2	1.0	-49.9	-13.0	-36.9	
1.413	-17.5	H	3.0	37.8	1.0	-54.3	-13.0	-41.3	
2.119	-12.6	H	3.0	36.7	1.0	-48.3	-13.0	-35.3	
2.826	-16.3	H	3.0	36.2	1.0	-51.5	-13.0	-38.5	
Mid Channel (710MHz)									
1.420	-20.7	V	3.0	37.8	1.0	-57.4	-13.0	-44.4	
2.130	-4.8	V	3.0	36.7	1.0	-40.5	-13.0	-27.5	
2.840	-22.3	V	3.0	36.2	1.0	-57.5	-13.0	-44.5	
1.420	-16.7	H	3.0	37.8	1.0	-53.4	-13.0	-40.4	
2.130	-0.2	H	3.0	36.7	1.0	-35.9	-13.0	-22.9	
2.840	-23.0	H	3.0	36.2	1.0	-58.2	-13.0	-45.2	
High Channel (713.5MHz)									
1.427	-26.4	V	3.0	37.7	1.0	-63.2	-13.0	-50.2	
2.140	-5.7	V	3.0	36.7	1.0	-41.3	-13.0	-28.3	
2.854	-20.2	V	3.0	36.2	1.0	-55.4	-13.0	-42.4	
1.427	-23.4	H	3.0	37.7	1.0	-60.2	-13.0	-47.2	
2.140	2.3	H	3.0	36.7	1.0	-33.4	-13.0	-20.4	
2.854	-19.5	H	3.0	36.2	1.0	-54.6	-13.0	-41.6	

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

UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

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UL Verification Services
Above 1GHz High Frequency Substitution Measurement

Company:	Samsung
Project #:	13U16613
Date:	12/17/13
Test Engineer:	Daniel Soper
Configuration:	EUT.W CHAGER and HS -X Position
Mode:	TX, LTE BAND 5, 10MHz BW,16QAM

Chamber	Pre-amplifer	Filter	Limit
3m Chamber	T145 8449B	Filter 1	FCC Part 22

Band

LTE5

10MHz

16QAM

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Channel (829MHz)									
1.658	-28.5	V	3.0	35.5	1.0	-63.0	-13.0	-50.0	
2.487	-18.8	V	3.0	35.4	1.0	-53.2	-13.0	-40.2	
3.316	-27.5	V	3.0	35.5	1.0	-62.1	-13.0	-49.1	
1.658	-30.9	H	3.0	35.5	1.0	-65.5	-13.0	-52.5	
2.487	-16.0	H	3.0	35.4	1.0	-50.4	-13.0	-37.4	
3.316	-27.6	H	3.0	35.5	1.0	-62.1	-13.0	-49.1	
Mid Channel (836.5MHz)									
1.673	-28.8	V	3.0	35.5	1.0	-63.3	-13.0	-50.3	
2.509	-19.0	V	3.0	35.4	1.0	-53.4	-13.0	-40.4	
3.346	-17.0	V	3.0	35.5	1.0	-51.6	-13.0	-38.6	
1.673	-10.8	H	3.0	35.5	1.0	-45.3	-13.0	-32.3	
2.509	-13.3	H	3.0	35.4	1.0	-47.7	-13.0	-34.7	
3.346	-28.2	H	3.0	35.5	1.0	-62.7	-13.0	-49.7	
High Channel (844MHz)									
1.688	-30.3	V	3.0	35.5	1.0	-64.8	-13.0	-51.8	
2.532	-15.6	V	3.0	35.4	1.0	-50.0	-13.0	-37.0	
3.376	-27.7	V	3.0	35.5	1.0	-62.2	-13.0	-49.2	
1.688	-12.6	H	3.0	35.5	1.0	-47.1	-13.0	-34.1	
2.532	-9.8	H	3.0	35.4	1.0	-44.2	-13.0	-31.2	
3.376	-28.3	H	3.0	35.5	1.0	-62.8	-13.0	-49.8	

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

UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

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UL Verification Services
Above 1GHz High Frequency Substitution Measurement

Company:	Samsung
Project #:	13U16613
Date:	12/17/13
Test Engineer:	Daniel Soper
Configuration:	EUT w/ charger and HS, X Position
Mode:	TX, LTE BAND 5, 10MHz BW,QPSK

Chamber	Pre-amplifer	Filter	Limit
3m Chamber	T145 8449B	Filter 1	FCC Part 22

Band: LTE5 10MHz QPSK

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Channel (829MHz)									
1.658	-30.0	V	3.0	35.5	1.0	-64.6	-13.0	-51.6	
2.487	-16.9	V	3.0	35.4	1.0	-51.3	-13.0	-38.3	
3.316	-27.2	V	3.0	35.5	1.0	-61.7	-13.0	-48.7	
1.658	-30.5	H	3.0	35.5	1.0	-65.1	-13.0	-52.1	
2.487	-12.7	H	3.0	35.4	1.0	-47.1	-13.0	-34.1	
3.316	-27.9	H	3.0	35.5	1.0	-62.5	-13.0	-49.5	
Mid Channel (836.5MHz)									
1.673	-29.0	V	3.0	35.5	1.0	-63.5	-13.0	-50.5	
2.509	-23.9	V	3.0	35.4	1.0	-58.3	-13.0	-45.3	
3.346	-28.1	V	3.0	35.5	1.0	-62.6	-13.0	-49.6	
1.673	-29.1	H	3.0	35.5	1.0	-63.6	-13.0	-50.6	
2.509	-16.9	H	3.0	35.4	1.0	-51.3	-13.0	-38.3	
3.346	-27.6	H	3.0	35.5	1.0	-62.1	-13.0	-49.1	
High Channel (844MHz)									
1.688	-29.8	V	3.0	35.5	1.0	-64.3	-13.0	-51.3	
2.532	-27.0	V	3.0	35.4	1.0	-61.4	-13.0	-48.4	
3.376	-27.1	V	3.0	35.5	1.0	-61.6	-13.0	-48.6	
1.688	-30.3	H	3.0	35.5	1.0	-64.8	-13.0	-51.8	
2.532	-6.8	H	3.0	35.4	1.0	-41.2	-13.0	-28.2	
3.376	-27.2	H	3.0	35.5	1.0	-61.7	-13.0	-48.7	

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

UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

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UL Verification Services
Above 1GHz High Frequency Substitution Measurement

Company:	Samsung
Project #:	13U16613
Date:	12/17/13
Test Engineer:	Isadore Netto
Configuration:	EUT.W CHAGER and HS -X Position
Mode:	TX, LTE BAND 5, 5MHz BW,16QAM

Chamber	Pre-amplifer	Filter	Limit
3m Chamber	T145 8449B	Filter 1	FCC Part 22

Band	f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
	Low Channel (826.5MHz)									
LTE5	1.653	-23.3	V	3.0	35.5	1.0	-57.8	-13.0	-44.8	
	2.480	-12.8	V	3.0	35.4	1.0	-47.2	-13.0	-34.2	
	3.306	-19.1	V	3.0	35.5	1.0	-53.6	-13.0	-40.6	
5MHz	1.653	-21.7	H	3.0	35.5	1.0	-56.3	-13.0	-43.3	
	2.480	-6.2	H	3.0	35.4	1.0	-40.6	-13.0	-27.6	
16QAM	3.306	-19.1	H	3.0	35.5	1.0	-53.7	-13.0	-40.7	
	Mid Channel (836.5MHz)									
	1.673	-21.5	V	3.0	35.5	1.0	-56.0	-13.0	-43.0	
	2.510	-10.8	V	3.0	35.4	1.0	-45.2	-13.0	-32.2	
	3.346	-19.1	V	3.0	35.5	1.0	-53.6	-13.0	-40.6	
	1.673	-21.9	H	3.0	35.5	1.0	-56.4	-13.0	-43.4	
	2.510	-6.9	H	3.0	35.4	1.0	-41.3	-13.0	-28.3	
	3.346	-19.4	H	3.0	35.5	1.0	-53.9	-13.0	-40.9	
	High Channel (846.5MHz)									
	1.693	-22.5	V	3.0	35.5	1.0	-57.1	-13.0	-44.1	
	2.540	-12.8	V	3.0	35.4	1.0	-47.2	-13.0	-34.2	
	3.386	-19.4	V	3.0	35.5	1.0	-53.9	-13.0	-40.9	
	1.693	-22.0	H	3.0	35.5	1.0	-56.5	-13.0	-43.5	
	2.540	-9.5	H	3.0	35.4	1.0	-43.9	-13.0	-30.9	
	3.386	-18.7	H	3.0	35.5	1.0	-53.2	-13.0	-40.2	

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

UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
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UL Verification Services
Above 1GHz High Frequency Substitution Measurement

Company:	Samsung
Project #:	13U16613
Date:	12/17/13
Test Engineer:	Daniel Soper
Configuration:	EUT w/ charger and HS, X Position
Mode:	TX, LTE BAND 5, 5MHz BW,QPSK

Chamber	Pre-amplifer	Filter	Limit
3m Chamber	T145 8449B	Filter 1	FCC Part 22

Band LTE5 5MHz QPSK

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Channel (826.5MHz)									
1.653	-29.9	V	3.0	35.5	1.0	-64.4	-13.0	-51.4	
2.480	-29.7	V	3.0	35.4	1.0	-64.1	-13.0	-51.1	
3.306	-27.1	V	3.0	35.5	1.0	-61.6	-13.0	-48.6	
1.653	-29.5	H	3.0	35.5	1.0	-64.1	-13.0	-51.1	
2.480	-12.8	H	3.0	35.4	1.0	-47.3	-13.0	-34.3	
3.306	-28.1	H	3.0	35.5	1.0	-62.6	-13.0	-49.6	
Mid Channel (836.5MHz)									
1.673	-28.8	V	3.0	35.5	1.0	-63.3	-13.0	-50.3	
2.510	-20.0	V	3.0	35.4	1.0	-54.4	-13.0	-41.4	
3.346	-28.2	V	3.0	35.5	1.0	-62.7	-13.0	-49.7	
1.673	-29.3	H	3.0	35.5	1.0	-63.8	-13.0	-50.8	
2.510	-10.3	H	3.0	35.4	1.0	-44.7	-13.0	-31.7	
3.346	-28.3	H	3.0	35.5	1.0	-62.8	-13.0	-49.8	
High Channel (846.5MHz)									
1.693	-29.4	V	3.0	35.5	1.0	-63.9	-13.0	-50.9	
2.540	-20.2	V	3.0	35.4	1.0	-54.7	-13.0	-41.7	
3.386	-27.6	V	3.0	35.5	1.0	-62.1	-13.0	-49.1	
1.693	-31.3	H	3.0	35.5	1.0	-65.8	-13.0	-52.8	
2.540	-14.2	H	3.0	35.4	1.0	-48.6	-13.0	-35.6	
3.386	-28.3	H	3.0	35.5	1.0	-62.8	-13.0	-49.8	

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

UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

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UL Verification Services
Above 1GHz High Frequency Substitution Measurement

Company:	Samsung
Project #:	13U16613
Date:	12/17/13
Test Engineer:	Isadore Netto
Configuration:	EUT.W CHAGER and HS -X Position
Mode:	TX, LTE BAND 5, 3MHz BW,16QAM

Chamber	Pre-amplifer	Filter	Limit
3m Chamber	T145 8449B	Filter 1	FCC Part 22

Band: LTE5 3MHz 16QAM

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Channel (825.5MHz)									
1.651	-20.6	V	3.0	35.5	1.0	-55.1	-13.0	-42.1	
2.477	-12.6	V	3.0	35.4	1.0	-47.0	-13.0	-34.0	
3.302	-18.6	V	3.0	35.5	1.0	-53.2	-13.0	-40.2	
1.651	-21.3	H	3.0	35.5	1.0	-55.8	-13.0	-42.8	
2.477	-9.7	H	3.0	35.4	1.0	-44.1	-13.0	-31.1	
3.302	-18.8	H	3.0	35.5	1.0	-53.3	-13.0	-40.3	
Mid Channel (836.5MHz)									
1.673	-20.7	V	3.0	35.5	1.0	-55.2	-13.0	-42.2	
2.510	-13.0	V	3.0	35.4	1.0	-47.4	-13.0	-34.4	
3.346	-18.9	V	3.0	35.5	1.0	-53.4	-13.0	-40.4	
1.673	-21.9	H	3.0	35.5	1.0	-56.4	-13.0	-43.4	
2.510	-12.0	H	3.0	35.4	1.0	-46.4	-13.0	-33.4	
3.346	-19.0	H	3.0	35.5	1.0	-53.5	-13.0	-40.5	
High Channel (847.5MHz)									
1.695	-21.8	V	3.0	35.5	1.0	-56.4	-13.0	-43.4	
2.543	-17.0	V	3.0	35.4	1.0	-51.4	-13.0	-38.4	
3.390	-18.8	V	3.0	35.5	1.0	-53.3	-13.0	-40.3	
1.695	-21.7	H	3.0	35.5	1.0	-56.2	-13.0	-43.2	
2.543	-12.9	H	3.0	35.4	1.0	-47.3	-13.0	-34.3	
3.390	-18.8	H	3.0	35.5	1.0	-53.3	-13.0	-40.3	

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

UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
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Band

LTE5

3MHz

QPSK

UL Verification Services
Above 1GHz High Frequency Substitution Measurement

Company: Samsung
Project #: 13U16613
Date: 12/17/13
Test Engineer: Isadore Netto
Configuration: EUT.W CHAGER and HS -X Position
Mode: TX, LTE BAND 5, 3MHz BW,QPSK

Chamber	Pre-amplifer	Filter	Limit
3m Chamber	T145 8449B	Filter 1	FCC Part 22

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Channel (825.5MHz)									
1.651	-20.9	V	3.0	35.5	1.0	-55.4	-13.0	-42.4	
2.477	-13.6	V	3.0	35.4	1.0	-48.0	-13.0	-35.0	
3.302	-17.5	V	3.0	35.5	1.0	-52.1	-13.0	-39.1	
1.651	-21.2	H	3.0	35.5	1.0	-55.8	-13.0	-42.8	
2.477	-15.1	H	3.0	35.4	1.0	-49.5	-13.0	-36.5	
3.302	-18.3	H	3.0	35.5	1.0	-52.8	-13.0	-39.8	
Mid Channel (836.5MHz)									
1.673	-21.1	V	3.0	35.5	1.0	-55.6	-13.0	-42.6	
2.510	-12.8	V	3.0	35.4	1.0	-47.2	-13.0	-34.2	
3.346	-18.7	V	3.0	35.5	1.0	-53.2	-13.0	-40.2	
1.673	-21.7	H	3.0	35.5	1.0	-56.2	-13.0	-43.2	
2.510	-12.0	H	3.0	35.4	1.0	-46.4	-13.0	-33.4	
3.346	-18.7	H	3.0	35.5	1.0	-53.2	-13.0	-40.2	
High Channel (847.5MHz)									
1.695	-21.6	V	3.0	35.5	1.0	-56.1	-13.0	-43.1	
2.543	-14.6	V	3.0	35.4	1.0	-49.1	-13.0	-36.1	
3.390	-18.7	V	3.0	35.5	1.0	-53.2	-13.0	-40.2	
1.695	-22.4	H	3.0	35.5	1.0	-57.0	-13.0	-44.0	
2.543	-13.0	H	3.0	35.4	1.0	-47.4	-13.0	-34.4	
3.390	-19.3	H	3.0	35.5	1.0	-53.8	-13.0	-40.8	

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

UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
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Band

LTE5

1.4MHz

16QAM

UL Verification Services
Above 1GHz High Frequency Substitution Measurement

Company: Samsung
Project #: 13U16613
Date: 12/17/13
Test Engineer: Isadore Netto
Configuration: EUT.W CHAGER and HS -X Position
Mode: TX, LTE BAND 5, 1.4MHz BW,16QAM

Chamber	Pre-amplifer	Filter	Limit
3m Chamber	T145 8449B	Filter 1	FCC Part 22

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Channel (824.7MHz)									
1.649	-20.2	V	3.0	35.5	1.0	-54.8	-13.0	-41.8	
2.474	-10.5	V	3.0	35.4	1.0	-44.9	-13.0	-31.9	
3.299	-18.5	V	3.0	35.5	1.0	-53.1	-13.0	-40.1	
1.649	-21.0	H	3.0	35.5	1.0	-55.6	-13.0	-42.6	
2.474	-21.7	H	3.0	35.4	1.0	-56.1	-13.0	-43.1	
3.299	-18.0	H	3.0	35.5	1.0	-52.5	-13.0	-39.5	
Mid Channel (836.5MHz)									
1.673	-24.1	V	3.0	35.5	1.0	-58.6	-13.0	-45.6	
2.510	-13.0	V	3.0	35.4	1.0	-47.4	-13.0	-34.4	
3.346	-21.6	V	3.0	35.5	1.0	-56.1	-13.0	-43.1	
1.673	-24.4	H	3.0	35.5	1.0	-58.9	-13.0	-45.9	
2.510	-10.2	H	3.0	35.4	1.0	-44.6	-13.0	-31.6	
3.346	-22.1	H	3.0	35.5	1.0	-56.7	-13.0	-43.7	
High Channel (848.3MHz)									
1.697	-24.4	V	3.0	35.5	1.0	-59.0	-13.0	-46.0	
2.545	-17.1	V	3.0	35.4	1.0	-51.5	-13.0	-38.5	
3.393	-21.4	V	3.0	35.5	1.0	-55.8	-13.0	-42.8	
1.697	-25.0	H	3.0	35.5	1.0	-59.5	-13.0	-46.5	
2.545	-15.2	H	3.0	35.4	1.0	-49.6	-13.0	-36.6	
3.393	-22.4	H	3.0	35.5	1.0	-56.9	-13.0	-43.9	

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

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UL Verification Services
Above 1GHz High Frequency Substitution Measurement

Company:	Samsung
Project #:	13U16613
Date:	12/17/13
Test Engineer:	Isadore Netto
Configuration:	EUT.W CHAGER and HS -X Position
Mode:	TX, LTE BAND 5, 1.4MHz BW,QPSK

Chamber	Pre-amplifer	Filter	Limit
3m Chamber	T145 8449B	Filter 1	FCC Part 22

Band: LTE5 1.4MHz QPSK

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Channel (824.7MHz)									
1.649	-21.1	V	3.0	35.5	1.0	-55.7	-13.0	-42.7	
2.474	-9.4	V	3.0	35.4	1.0	-43.8	-13.0	-30.8	
3.299	-18.3	V	3.0	35.5	1.0	-52.9	-13.0	-39.9	
1.649	-21.4	H	3.0	35.5	1.0	-56.0	-13.0	-43.0	
2.474	-6.6	H	3.0	35.4	1.0	-41.0	-13.0	-28.0	
3.299	-18.4	H	3.0	35.5	1.0	-52.9	-13.0	-39.9	
Mid Channel (836.5MHz)									
1.673	-22.2	V	3.0	35.5	1.0	-56.8	-13.0	-43.8	
2.510	-12.0	V	3.0	35.4	1.0	-46.4	-13.0	-33.4	
3.346	-19.2	V	3.0	35.5	1.0	-53.7	-13.0	-40.7	
1.673	-21.3	H	3.0	35.5	1.0	-55.8	-13.0	-42.8	
2.510	-8.8	H	3.0	35.4	1.0	-43.2	-13.0	-30.2	
3.346	-19.3	H	3.0	35.5	1.0	-53.8	-13.0	-40.8	
High Channel (848.3MHz)									
1.697	-22.3	V	3.0	35.5	1.0	-56.8	-13.0	-43.8	
2.545	-14.7	V	3.0	35.4	1.0	-49.2	-13.0	-36.2	
3.393	-18.7	V	3.0	35.5	1.0	-53.1	-13.0	-40.1	
1.697	-22.0	H	3.0	35.5	1.0	-56.5	-13.0	-43.5	
2.545	-14.3	H	3.0	35.4	1.0	-48.8	-13.0	-35.8	
3.393	-19.3	H	3.0	35.5	1.0	-53.8	-13.0	-40.8	

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

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Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company: Samsung
Project #: 13I16613
Date: 12/14/13
Test Engineer: Trina Noor
Configuration: EUT/ w AC Charger
Mode: Tx, 1900MHz HSDPA

Chamber	Pre-amplifer	Filter	Limit
5m Chamber C	T34 8449B	Filter 1	Part 24

Band

Band 2

HSDPA

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 1852.4MHz									
3.705	-13.7	V	3.0	35.4	1.0	-48.1	-13.0	-35.1	
5.557	-9.3	V	3.0	34.7	1.0	-43.0	-13.0	-30.0	
7.409	-4.1	V	3.0	34.9	1.0	-38.0	-13.0	-25.0	
3.705	-13.5	H	3.0	35.4	1.0	-47.9	-13.0	-34.9	
5.557	-8.4	H	3.0	34.7	1.0	-42.2	-13.0	-29.2	
7.409	-4.8	H	3.0	34.9	1.0	-38.7	-13.0	-25.7	
Mid Ch, 1880MHz									
3.760	-12.7	V	3.0	35.3	1.0	-47.1	-13.0	-34.1	
5.640	-8.3	V	3.0	34.7	1.0	-42.1	-13.0	-29.1	
7.520	-4.8	V	3.0	34.9	1.0	-38.7	-13.0	-25.7	
3.760	-12.0	H	3.0	35.3	1.0	-46.3	-13.0	-33.3	
5.640	-8.5	H	3.0	34.7	1.0	-42.2	-13.0	-29.2	
7.520	-4.4	H	3.0	34.9	1.0	-38.3	-13.0	-25.3	
High Ch, 1907.6MHz									
3.815	-13.0	V	3.0	35.3	1.0	-47.3	-13.0	-34.3	
5.723	-8.2	V	3.0	34.7	1.0	-42.0	-13.0	-29.0	
7.630	-4.2	V	3.0	34.9	1.0	-38.2	-13.0	-25.2	
3.815	-12.0	H	3.0	35.3	1.0	-46.3	-13.0	-33.3	
5.723	-7.0	H	3.0	34.7	1.0	-40.7	-13.0	-27.7	
7.630	-5.6	H	3.0	34.9	1.0	-39.5	-13.0	-26.5	

Rev. 03.03.09

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Band

Band 2

REL99

Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company: Samsung
Project #: 13I16613
Date: 12/14/13
Test Engineer: Trina Noor
Configuration: EUT w/AC Charger
Mode: Tx, 1900MHz Rel 99

Chamber	Pre-amplifer	Filter	Limit
5m Chamber C	T34 8449B	Filter 1	Part 24

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 1852.4MHz									
3.705	-12.0	V	3.0	35.4	1.0	-46.4	-13.0	-33.4	
5.557	-7.7	V	3.0	34.7	1.0	-41.4	-13.0	-28.4	
7.409	-6.6	V	3.0	34.9	1.0	-40.6	-13.0	-27.6	
3.705	-10.5	H	3.0	35.4	1.0	-44.9	-13.0	-31.9	
5.557	-8.3	H	3.0	34.7	1.0	-42.0	-13.0	-29.0	
7.409	-6.4	H	3.0	34.9	1.0	-40.4	-13.0	-27.4	
Mid Ch, 1880MHz									
3.760	-12.7	V	3.0	35.3	1.0	-47.0	-13.0	-34.0	
5.640	-7.8	V	3.0	34.7	1.0	-41.5	-13.0	-28.5	
7.520	-7.0	V	3.0	34.9	1.0	-40.9	-13.0	-27.9	
3.760	-10.5	H	3.0	35.3	1.0	-44.9	-13.0	-31.9	
5.640	-6.6	H	3.0	34.7	1.0	-40.3	-13.0	-27.3	
7.520	-5.4	H	3.0	34.9	1.0	-39.3	-13.0	-26.3	
High Ch, 1907.6MHz									
3.815	-12.4	V	3.0	35.3	1.0	-46.7	-13.0	-33.7	
5.723	-9.3	V	3.0	34.7	1.0	-43.0	-13.0	-30.0	
7.630	-8.1	V	3.0	34.9	1.0	-42.1	-13.0	-29.1	
3.815	-12.1	H	3.0	35.3	1.0	-46.4	-13.0	-33.4	
5.723	-9.8	H	3.0	34.7	1.0	-43.6	-13.0	-30.6	
7.630	-6.8	H	3.0	34.9	1.0	-40.7	-13.0	-27.7	

Rev. 03.03.09

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Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company: Samsung
Project #: 13I16613
Date: 12/17/13
Test Engineer: Daniel Soper
Configuration: X Position w/ AC Charger and HS
Mode: WCDMA_HSDPA_ 850

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

Band

Band 5

HSDPA

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 826.40MHz									
1.652	-23.2	V	3.0	37.4	1.0	-59.6	-13.0	-46.6	
2.479	-6.7	V	3.0	36.4	1.0	-42.0	-13.0	-29.0	
3.306	-14.7	V	3.0	35.8	1.0	-49.5	-13.0	-36.5	
1.652	-23.6	H	3.0	37.4	1.0	-60.0	-13.0	-47.0	
2.479	-7.3	H	3.0	36.4	1.0	-42.7	-13.0	-29.7	
3.306	-13.2	H	3.0	35.8	1.0	-48.0	-13.0	-35.0	
Mid Ch, 836.6MHz									
1.673	-29.2	V	3.0	37.3	1.0	-65.6	-13.0	-52.6	
2.510	-16.2	V	3.0	36.4	1.0	-51.5	-13.0	-38.5	
3.346	-16.4	V	3.0	35.8	1.0	-51.1	-13.0	-38.1	
1.673	-28.6	H	3.0	37.3	1.0	-65.0	-13.0	-52.0	
2.510	-10.0	H	3.0	36.4	1.0	-45.4	-13.0	-32.4	
3.346	-18.7	H	3.0	35.8	1.0	-53.4	-13.0	-40.4	
High Ch, 846.6MHz									
1.683	-29.5	V	3.0	37.3	1.0	-65.8	-13.0	-52.8	
2.519	-15.0	V	3.0	36.4	1.0	-50.3	-13.0	-37.3	
3.356	-13.0	V	3.0	35.7	1.0	-47.7	-13.0	-34.7	
1.683	-21.1	H	3.0	37.3	1.0	-57.4	-13.0	-44.4	
2.519	1.8	H	3.0	36.4	1.0	-33.6	-13.0	-20.6	
3.356	-13.5	H	3.0	35.7	1.0	-48.2	-13.0	-35.2	

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

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Band

Band 5

REL99

Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company: Samsung
Project #: 13I16613
Date: 12/23/13
Test Engineer: Daniel S.
Configuration: x pos. with Hs and charger
Mode: Tx, 850Hz Rel 99

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

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 826.40MHz									
1.652	-9.7	V	3.0	37.4	1.0	-46.1	-13.0	-33.1	
2.479	-14.7	V	3.0	36.4	1.0	-50.1	-13.0	-37.1	
3.306	-12.1	V	3.0	35.8	1.0	-46.9	-13.0	-33.9	
1.652	-4.7	H	3.0	37.4	1.0	-41.1	-13.0	-28.1	
2.479	-6.4	H	3.0	36.4	1.0	-41.8	-13.0	-28.8	
3.306	-14.2	H	3.0	35.8	1.0	-49.0	-13.0	-36.0	
Mid Ch, 836.6MHz									
1.673	-7.4	V	3.0	37.3	1.0	-43.7	-13.0	-30.7	
2.510	-16.3	V	3.0	36.4	1.0	-51.6	-13.0	-38.6	
3.346	-14.0	V	3.0	35.8	1.0	-48.8	-13.0	-35.8	
1.673	-2.6	H	3.0	37.3	1.0	-38.9	-13.0	-25.9	
2.510	-8.5	H	3.0	36.4	1.0	-43.9	-13.0	-30.9	
3.346	-15.4	H	3.0	35.8	1.0	-50.1	-13.0	-37.1	
High Ch, 846.6MHz									
1.683	-11.0	V	3.0	37.3	1.0	-47.3	-13.0	-34.3	
2.519	-17.1	V	3.0	36.4	1.0	-52.5	-13.0	-39.5	
3.356	-13.5	V	3.0	35.7	1.0	-48.2	-13.0	-35.2	
1.683	-4.2	H	3.0	37.3	1.0	-40.5	-13.0	-27.5	
2.519	-14.4	H	3.0	36.4	1.0	-49.8	-13.0	-36.8	
3.356	-18.4	H	3.0	35.7	1.0	-53.1	-13.0	-40.1	

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

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Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company: Samsung
Project #: 13U16613
Date: 12/17/13
Test Engineer: Daniel Soper
Configuration: X Position, AC Charger and HS
Mode: GPRS 1900

Chamber	Pre-amplifer	Filter	Limit
3m Chamber	T343 8449B	Filter 1	Part 24

Band	f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
	Low Ch, 1850MHz									
GSM1 900	3.700	-14.7	V	3.0	35.4	1.0	-49.1	-13.0	-36.1	
	5.550	-12.6	V	3.0	34.7	1.0	-46.4	-13.0	-33.4	
	7.400	-7.3	V	3.0	34.9	1.0	-41.2	-13.0	-28.2	
GPRS	3.700	-15.0	H	3.0	35.4	1.0	-49.4	-13.0	-36.4	
	5.550	-11.0	H	3.0	34.7	1.0	-44.8	-13.0	-31.8	
	7.400	-5.3	H	3.0	34.9	1.0	-39.2	-13.0	-26.2	
	Mid Ch, 1880.0MHz									
	3.760	-14.9	V	3.0	35.3	1.0	-49.2	-13.0	-36.2	
	5.640	-12.8	V	3.0	34.7	1.0	-46.5	-13.0	-33.5	
	7.520	-6.9	V	3.0	34.9	1.0	-40.8	-13.0	-27.8	
	3.760	-14.9	H	3.0	35.3	1.0	-49.3	-13.0	-36.3	
	5.640	-12.0	H	3.0	34.7	1.0	-45.8	-13.0	-32.8	
	7.520	-5.6	H	3.0	34.9	1.0	-39.5	-13.0	-26.5	
	High Ch, 1909.8 MHz									
	3.822	-14.4	V	3.0	35.3	1.0	-48.7	-13.0	-35.7	
	5.729	-11.9	V	3.0	34.7	1.0	-45.6	-13.0	-32.6	
	7.640	-6.5	V	3.0	35.0	1.0	-40.4	-13.0	-27.4	
	3.822	-15.3	H	3.0	35.3	1.0	-49.5	-13.0	-36.5	
	5.729	-11.7	H	3.0	34.7	1.0	-45.5	-13.0	-32.5	
	7.640	-6.0	H	3.0	35.0	1.0	-40.0	-13.0	-27.0	

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UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

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