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

CERTIFICATION TEST REPORT

FOR

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

MODEL NUMBER: SM-G850S; SM-G850K; SM-G850L

FCC ID: A3LSMG850KOR
IC: 649E-SMG850KOR

REPORT NUMBER: 14U17914-1 REVISION A

ISSUE DATE: AUG 7, 2014

Prepared for

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NVLAP LAB CODE 200065-0

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: SAMSUNG ELECTRONICS CO., LTD.

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

MODEL: SM-G850S; SM-G850K; SM-G850L

SERIAL NUMBER: 1883968 (Conducted), 1883967(Radiated)

DATE TESTED: MAY 27 – JUNE 20, 2014

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
FCC PART 22H, 24E and 27H	PASS

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

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

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2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with TIA-603-C, FCC CFR 47 Part 22, FCC CFR Part 24, FCC CFR 47 Part 27.

3. FACILITIES AND ACCREDITATION

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

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

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

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

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

4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

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

ERP = PSA reading with EUT worst orientation (dBm) + Path loss (dB) – cable loss(between the SG and substitution antenna)

(Path loss = Signal generator output – PSA reading with substitution antenna)

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4.3. MEASUREMENT UNCERTAINTY

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

PARAMETER	UNCERTAINTY
Conducted Disturbance, 0.15 to 30 MHz	3.52 dB
Radiated Disturbance, 30 to 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 & ANT+.

SM-G850S, SM-G850K, SM-G850L are same hardware but for different carrier.

5.2. MAXIMUM OUTPUT POWER

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

FCC Part 24						
Band	Frequency Range(MHz)	Modulation Peak	Conducted		Radiated	
			Peak (dBm)	Peak(mW)	Peak (dBm)	Peak(mW)
GSM1900	1850~1910	GMSK	29.4	870.96		
	1850~1910	GPRS	29.5	891.25	28.6788	737.7

FCC Part 24						
Band	Frequency Range(MHz)	Modulation Peak	Conducted		Radiated	
			Avg (dBm)	Avg(mW)	Avg (dBm)	Avg(mW)
Band 2	1850~1910	REL99	22.9	194.98	21.6595	146.54
	1850~1910	HSDPA	22.3	169.82	20.5295	112.97
	1850~1910	HSUPA	20.5	112.20		

FCC Part 22						
Band	Frequency Range(MHz)	Modulation Peak	Conducted		Radiated	
			Avg (dBm)	Avg(mW)	Avg (dBm)	Avg(mW)
Band 5	824 ~ 849	REL99	23.0	199.53	20.241	105.71
	824 ~ 849	HSDPA	22.5	177.83	18.931	78.18
	824 ~ 849	HSUPA	22.5	177.83		

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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	24.50	281.84	11.151	13.03
	704~716	10MHz	16QAM	23.38	217.77	10.681	11.7

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	24.40	275.42	10.881	12.25
	704~716	5MHz	16QAM	23.28	212.81	10.501	11.22

FCC Part 22/2 4/27							
Band	Frequency Range(MHz)	BandWidth (MHz)	Modulation	Conducted		Radiated	
			Peak	Avg (dBm)	Avg(mW)	Avg (dBm)	Avg(mW)
LTE5	824~849	10MHz	QPSK	23.80	239.88	21.111	129.15
	824~849	10MHz	16QAM	23.00	199.53	20.651	116.17

FCC Part 22/2 4/27							
Band	Frequency Range(MHz)	BandWidth (MHz)	Modulation	Conducted		Radiated	
			Peak	Avg (dBm)	Avg(mW)	Avg (dBm)	Avg(mW)
LTE5	824~849	5MHz	QPSK	24.00	251.19	21.821	152.09
	824~849	5MHz	16QAM	22.80	190.55	20.781	119.7

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5.4. DESCRIPTION OF AVAILABLE ANTENNAS

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

Frequency (MHz)	Peak Gain (dBi)
Band 2, 1850~1910MHz	1.63
Band 5, 824~849MHz	-2.69
LTE17, 704~716MHz	-7.64

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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	EP-TA11KWK	N/A	N/A
Earphone	SAMSUNG	N/A	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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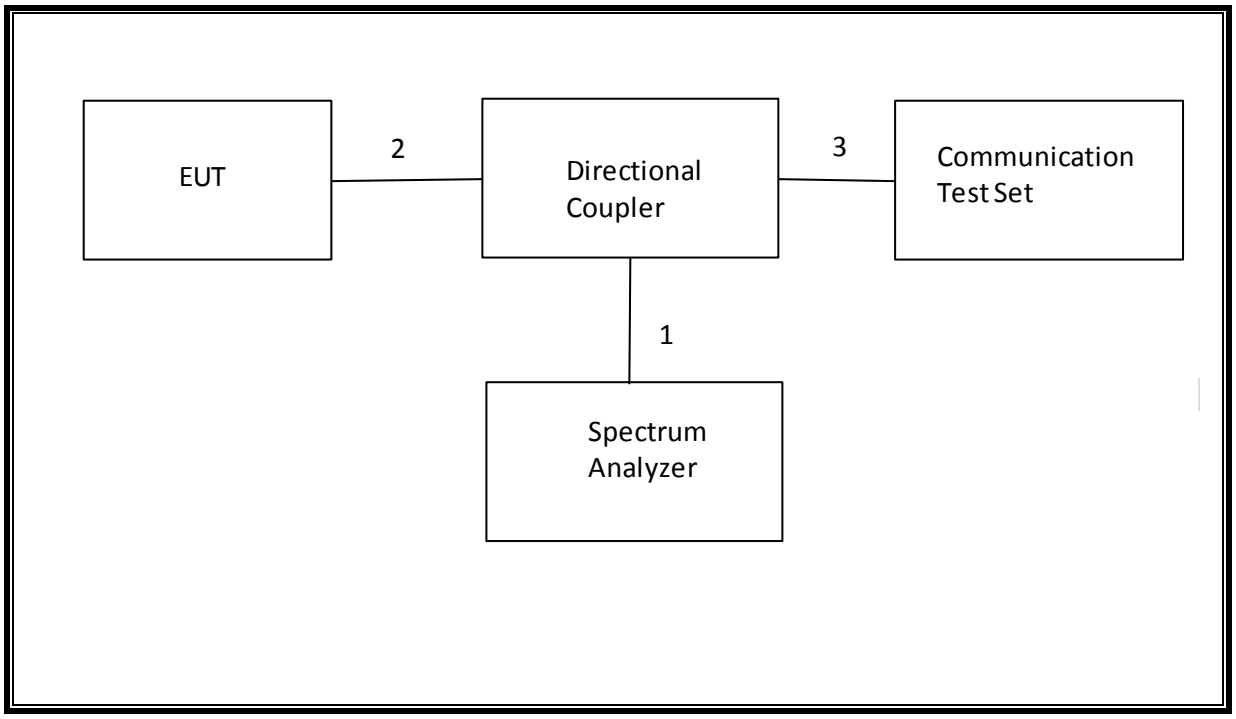
SETUP DIAGRAM FOR TESTS (CONDUCTED TEST SETUP)



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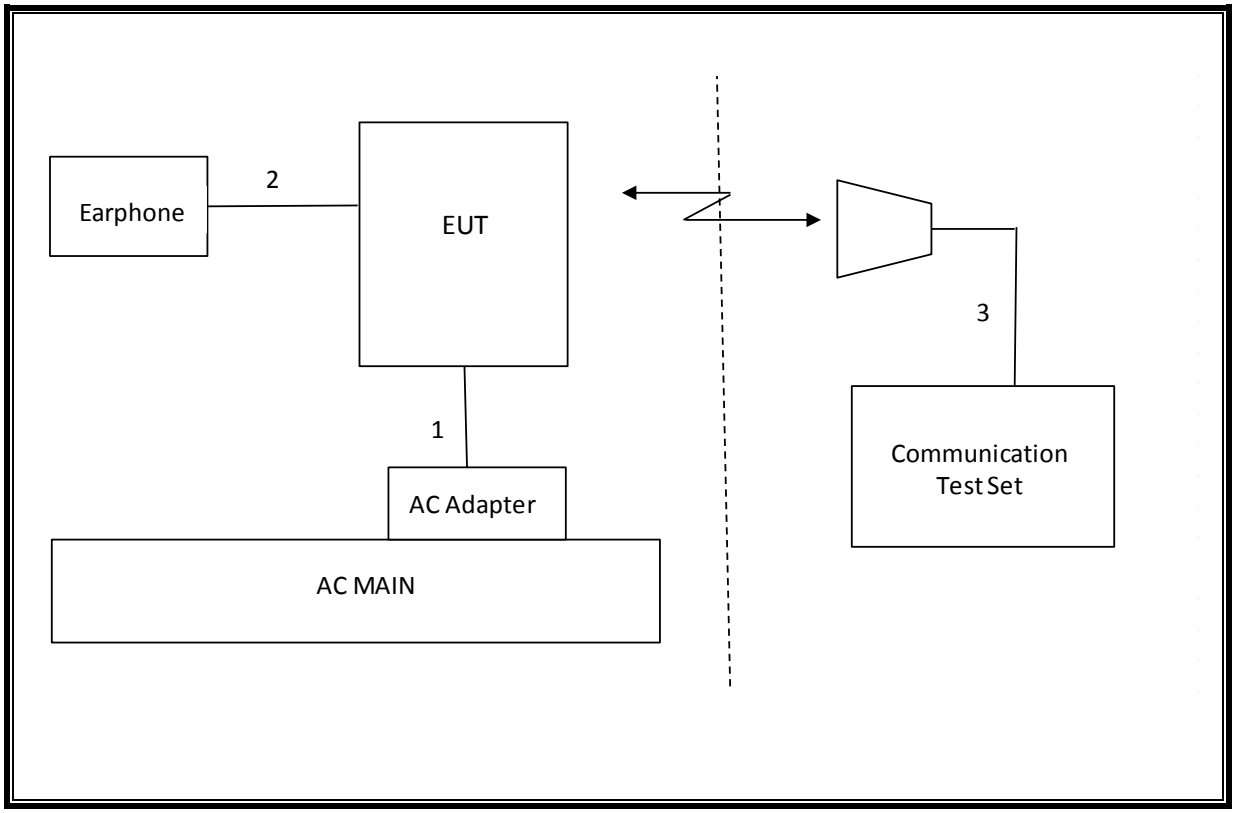
SETUP DIAGRAM FOR TESTS (RADIATED TEST SETUP)



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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	02/26/15
Antenna, Bilog, 2 GHz	Sunol Sciences	JB1	C01011	08/14/14
Antenna, Horn, 18 GHz	EMCO	3115	C00783	10/25/14
Antenna, Horn, 18 GHz	EMCO	3115	C00784	10/25/14
Highpass Filter, 2.7 GHz	Micro-Tronics	HPM13194	N02687	CNR
Highpass Filter, 1.5 GHz	Micro-Tronics	HPM13193	N02688	CNR
Temperature / Humidity Chamber	Thermotron	SE 600-10-10	C00930	01/09/15
Communications Test Set	R&S	CMW500	T159	07/02/14
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	02/14/15
Directional Coupler	RF-Lambda	RFDC5M06G15	None	CNR
Antenna, Horn, 26.5 GHz	ARA	MWH-1826/B	C00589	12/17/14

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7. Summary Table

FCC Part Section	RSS Section(s)	Test Description	Test Limit	Test Condition	Test Result	Worst Case
2.1049	N/A	Occupied Band width (99%)	N/A	Conducted	Pass	9.05MHz
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	-17.437dBm
2.1046	N/A	Conducted output power	N/A		Pass	29.5dBm
22.355 24.235 27.54	RSS-132(4.3) RSS-133(6.3) RSS-130(4.2)	Frequency Stability	2.5PPM		Pass	0.013PPM
22.913(a)(2)	RSS-132(4.4)	Effective Radiated Power	38 dBm	Radiated	Pass	21.821dBm
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	28.6788dBm
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	-27.4dBm

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8. RF POWER OUTPUT VERIFICATION

8.1. GSM/GPRS/EDGE

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

Press Connection control to choose the different menus

Press RESET > choose all to reset all settings

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

Network Support > GSM+GPRS or GSM+EGPRS

Main Service > Packet Data

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

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

> Slot configuration > Uplink/Gamma

> 33 dBm for GPRS 850/900

> 30 dBm for GPRS1800/1900

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

Frequency Offset > + 0 Hz

Mode > BCCH and TCH

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

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

Channel Type > Off

P0> 4 dB

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

TCH > choose desired test channel

Hopping > Off

Main Timeslot > 3 (Default)

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

Bit Stream > 2E9-1PSR Bit Pattern

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

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

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8.1.1. GSM OUTPUT POWER RESULT

Band	Mode	Ch.	f(MHz)	1 time slot	2 time slot
				Peak (dBm)	Peak (dBm)
GSM1900	GMSK	512	1850.2	29.2	
		661	1880	29.4	
		810	1909.8	29.2	
	GPRS	512	1850.2	29.3	27.0
		661	1880	29.5	27.0
		810	1909.8	29.3	26.8

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8.2. UMTS REL 99

TEST PROCEDURE

The following summary of these settings are illustrated below:

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

8.2.1. UMTS REL 99 OUTPUT POWER RESULT

Band	Mode	Ch.	f(MHz)	Conducted Power (dBm) Avg (dBm)
Band 5	REL99	4132	826.4	23.0
		4183	836.6	23.0
		4233	846.6	23.0
Band 2	REL99	9262	1852.4	22.9
		9400	1880	22.9
		9538	1907.6	22.8

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8.3. UMTS HSDPA

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

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

8.3.1. UMTS HSDPA OUTPUT POWER RESULT

Band	Mode	Subset	Ch.	f(MHz)	Conducted Power (dBm) Avg (dBm)
Band 5	HSDPA	1	4132	826.4	22.5
			4183	836.6	22.2
			4233	846.6	22.1
		2	4132	826.4	21.4
			4183	836.6	20.7
			4233	846.6	20.7
		3	4132	826.4	21.3
			4183	836.6	20.6
			4233	846.6	20.6
		4	4132	826.4	20.4
			4183	836.6	20.0
			4233	846.6	20.0
Band 2	HSDPA	1	9262	1852.4	21.6

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			9400	1880	21.7
			9538	1907.6	20.5
		2	9262	1852.4	22.2
			9400	1880	22.3
			9538	1907.6	21.2
		3	9262	1852.4	21.2
			9400	1880	21.3
			9538	1907.6	21.2
		4	9262	1852.4	21.2
			9400	1880	21.3
			9538	1907.6	20.2

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8.3.2. UMTS HSUPA

TEST PROCEDURE

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

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

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

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8.3.3. UMTS HSUPA OUTPUT POWER RESULT

Band	Mode	Subset	Ch.	f(MHz)	Conducted Power (dBm) Avg (dBm)
Band 5	HSUPA	1	4132	826.4	20.5
			4183	836.6	20.5
			4233	846.6	20.8
		2	4132	826.4	18.9
			4183	836.6	19.5
			4233	846.6	18.6
		3	4132	826.4	20.4
			4183	836.6	21.5
			4233	846.6	21.1
		4	4132	826.4	19.0
			4183	836.6	18.5
			4233	846.6	19.0
		5	4132	826.4	22.5
			4183	836.6	22.5
			4233	846.6	22.5
Band 2	HSUPA	1	9262	1852.4	20.1
			9400	1880	20.1
			9538	1907.6	19.7
		2	9262	1852.4	18.5
			9400	1880	18.3
			9538	1907.6	18.2
		3	9262	1852.4	19.4
			9400	1880	19.3
			9538	1907.6	19.1
		4	9262	1852.4	18.2
			9400	1880	18.3
			9538	1907.6	18.5
		5	9262	1852.4	20.5
			9400	1880	20.5
			9538	1907.6	20.5

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8.4. LTE OUTPUT VERIFICATION

8.4.1. LTE OUTPUT RESULT

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Avg Pwr (dBm) 23790 710 MHz
LTE Band 17	10	QPSK	1	0	0	24.50
			1	25	0	24.46
			1	49	0	24.39
			25	0	1	23.02
			25	12	1	23.02
			25	25	1	23.02
			50	0	1	22.98
		16QAM	1	0	1	23.33
			1	25	1	23.32
			1	49	1	23.38
			25	0	2	21.88
			25	12	2	21.80
			25	25	2	21.79
			50	0	2	21.83

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Avg Pwr (dBm) 23790 710 MHz
LTE Band 17	5	QPSK	1	0	0	24.40
			1	12	0	24.33
			1	24	0	24.35
			12	0	1	23.06
			12	7	1	23.05
			12	13	1	23.02
			25	0	1	23.06
		16QAM	1	0	1	23.28
			1	12	1	23.22
			1	24	1	23.14
			12	0	2	21.89
			12	7	2	21.89
			12	13	2	21.89
			25	0	2	22.02

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Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Avg Pwr (dBm)		
						20450	20525	20600
						829 MHz	836.5 MHz	844 MHz
LTE Band 5	10	QPSK	1	0	0	23.80	23.76	23.65
			1	25	0	23.78	23.74	23.64
			1	49	0	23.80	23.71	23.65
			25	0	1	22.30	22.33	22.22
			25	12	1	22.29	22.27	22.19
			25	25	1	22.26	22.26	22.22
			50	0	1	22.25	22.18	22.18
		16QAM	1	0	1	23.00	22.85	22.65
			1	25	1	22.96	22.84	22.58
			1	49	1	22.95	22.80	22.59
			25	0	2	21.14	21.02	21.07
			25	12	2	21.12	21.02	21.07
			25	25	2	21.11	21.00	21.04
			50	0	2	21.08	21.03	21.00

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Avg Pwr (dBm)		
						20425	20525	20625
						826.5 MHz	836.5 MHz	846.5 MHz
LTE Band 5	5	QPSK	1	0	0	24.00	23.86	23.80
			1	12	0	24.00	23.84	23.80
			1	24	0	24.00	23.82	23.80
			12	0	1	22.36	22.36	22.26
			12	7	1	22.33	22.34	22.24
			12	13	1	22.32	22.34	22.25
			25	0	1	22.34	22.36	22.26
		16QAM	1	0	1	22.69	22.70	22.80
			1	12	1	22.64	22.70	22.80
			1	24	1	22.94	22.70	22.77
			12	0	2	21.09	21.16	21.01
			12	7	2	21.04	21.08	21.00
			12	13	2	21.05	21.10	21.00
			25	0	2	21.25	21.22	21.11

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9. PEAK TO AVERAGE RATIO

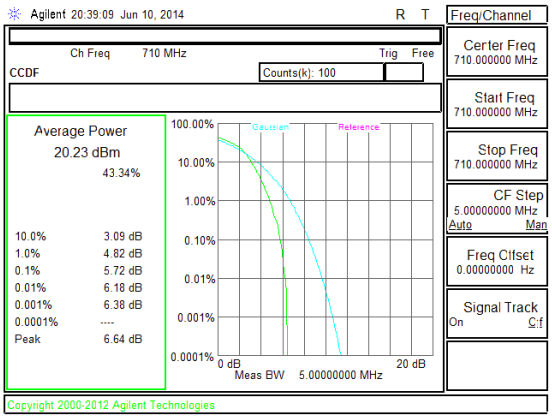
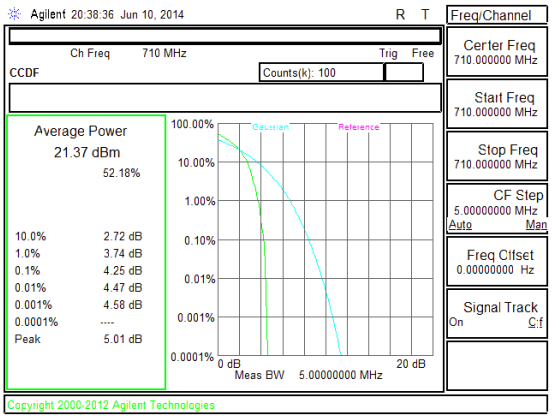
Test Procedure

Per KDB 971168 D01 Power Meas License Digital Systems v02r01

Test Spec

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

9.1. CONDUCTED PEAK TO AVERAGE RESULT

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

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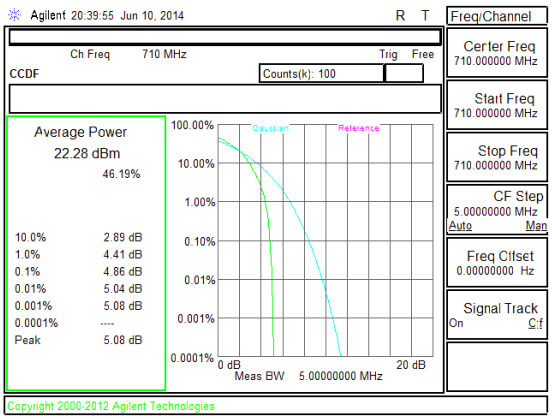
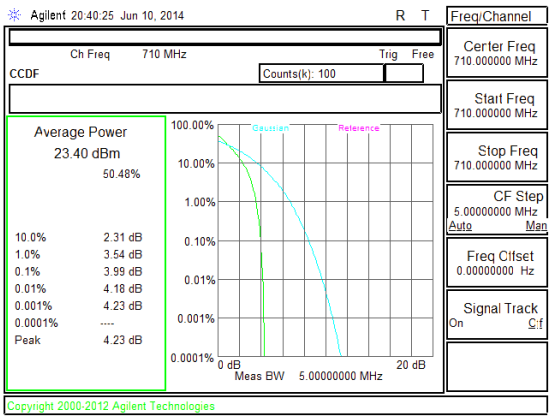
Band LTE17 5MHz 16QAM	 Band LTE17 5MHz 16QAM Mid channel	 Band LTE17 5MHz QPSK Mid channel

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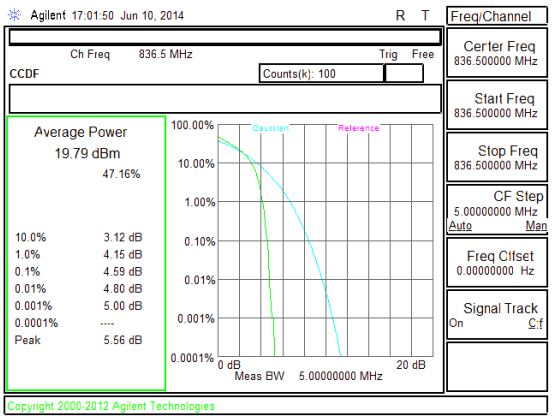
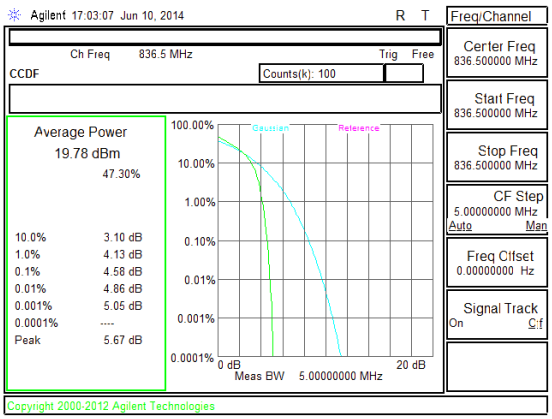
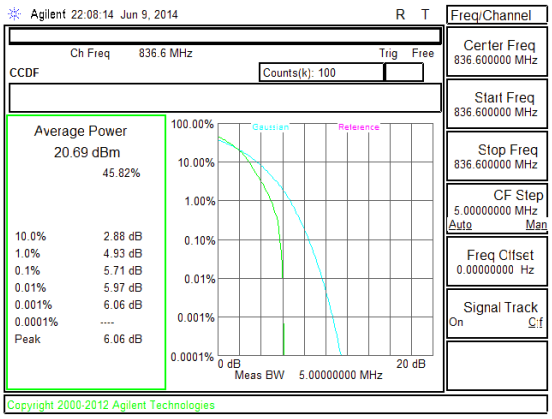
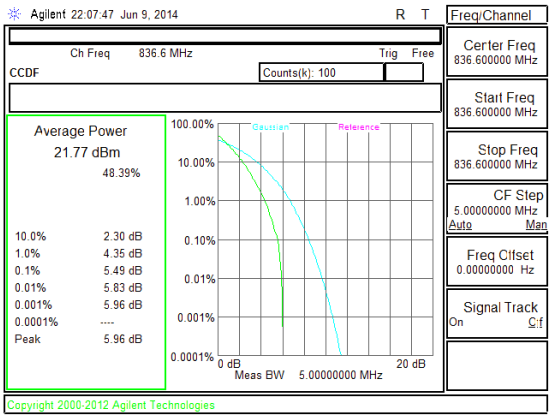
Band LTE5 10MHz 16QAM	 Band LTE5 10MHz 16QAM Mid channel	 Band LTE5 10MHz QPSK Mid channel
Band LTE5 5MHz 16QAM	 Band LTE5 5MHz 16QAM Mid channel	 Band LTE5 5MHz QPSK Mid channel

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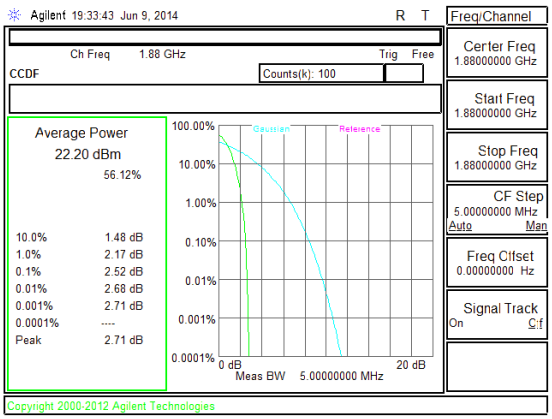
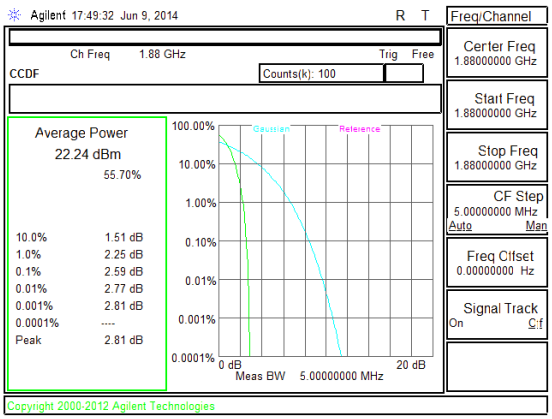
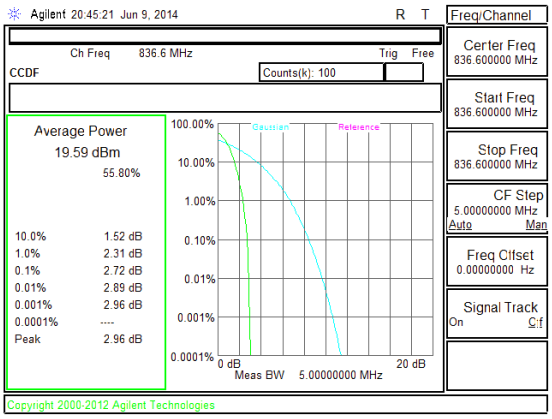
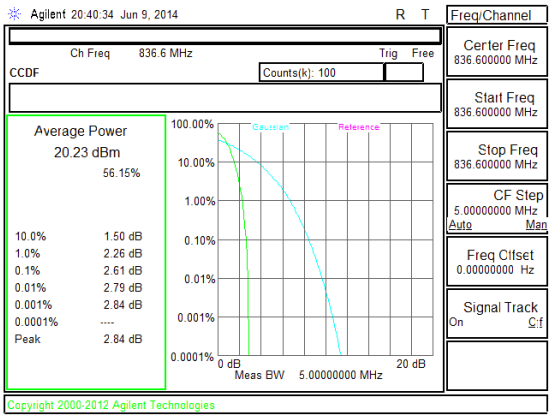
Band Band 2 HSDPA	 Band WCDMA B2 HSDPA	 Band WCDMA B2 REL99
Band Band 5 HSDPA	 Band WCDMA B5 HSDPA	 Band WCDMA B5 REL99

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10. LIMITS AND CONDUCTED RESULTS

10.1. OCCUPIED BANDWIDTH

RULE PART(S)

FCC: §2.1049
IC: RSS-132, 4.5; RSS-133, 6.5

LIMITS

For reporting purposes only

TEST PROCEDURE

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

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

MODES TESTED

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10.1.1. OCCUPIED BANDWIDTH RESULTS

Band	Mode	Channel	f (MHz)	99% BW (KHz)	-26dB BW (KHz)
GSM1900	GPRS	512	1850.2	242.1	323.8
		661	1880	249.8	331.4
		810	1909.8	242.8	319.9
Band	Mode	Channel	f (MHz)	99% BW (MHz)	-26dB BW (MHz)
Band 5	REL99	4132	826.4	4.17	4.79
		4183	836.6	4.17	4.72
		4233	846.6	4.15	4.75
	HSDPA	4132	826.4	4.15	4.71
		4183	836.6	4.17	4.72
		4233	846.6	4.16	4.71
Band 2	REL99	9262	1852.4	4.18	4.78
		9400	1880	4.17	4.74
		9538	1907.6	4.16	4.76
	HSDPA	9262	1852.4	4.17	4.74
		9400	1880	4.18	4.74
		9538	1907.6	4.18	4.79

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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	8.97	13.45
			50/0	710	8.97	12.34
			50/0	711	9.03	14.21
		16QAM	50/0	709	8.96	10.14
			50/0	710	8.96	9.54
			50/0	711	9.05	14.77
Band	BW(MHz)	Mode	RB/RB Size	f (MHz)	99% BW (MHz)	-26dB BW (MHz)
LTE17	5	QPSK	25/0	706.5	4.49	7.39
			25/0	710	4.49	6.18
			25/0	713.5	4.49	5.84
		16QAM	25/0	706.5	4.5	5.66
			25/0	710	4.49	5.45
			25/0	713.5	4.47	4.87

Band	BW(MHz)	Mode	RB/RB Size	f (MHz)	99% BW (MHz)	-26dB BW (MHz)
LTE5	10	QPSK	50/0	829	8.95	9.64
			50/0	836.5	8.93	9.65
			50/0	844	8.94	9.66
		16QAM	50/0	829	8.93	9.63
			50/0	836.5	8.94	9.58
			50/0	844	8.93	9.67
Band	BW(MHz)	Mode	RB/RB Size	f (MHz)	99% BW (MHz)	-26dB BW (MHz)
LTE5	5	QPSK	25/0	826.5	4.49	4.89
			25/0	836.5	4.47	4.84
			25/0	846.5	4.47	4.86
		16QAM	25/0	826.5	4.47	4.85
			25/0	836.5	4.46	4.84
			25/0	846.5	4.47	4.89

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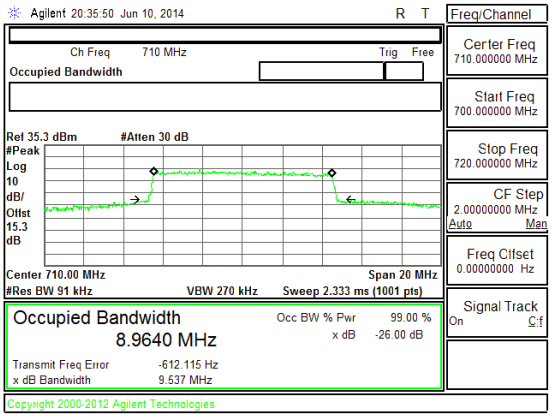
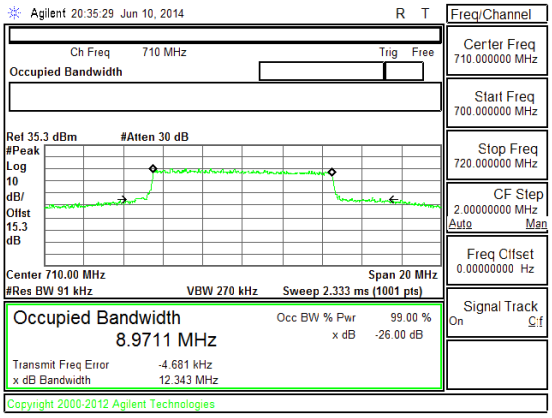
10.1.1. OCCUPIED BANDWIDTH PLOTS

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

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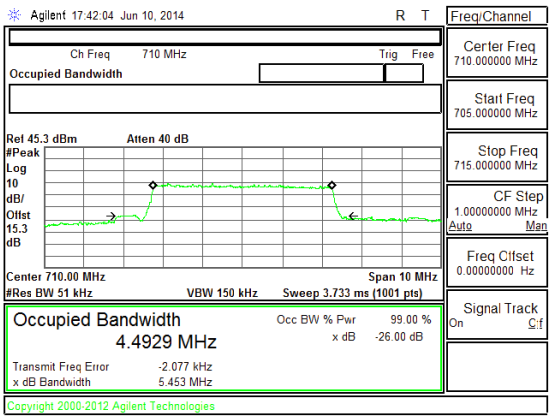
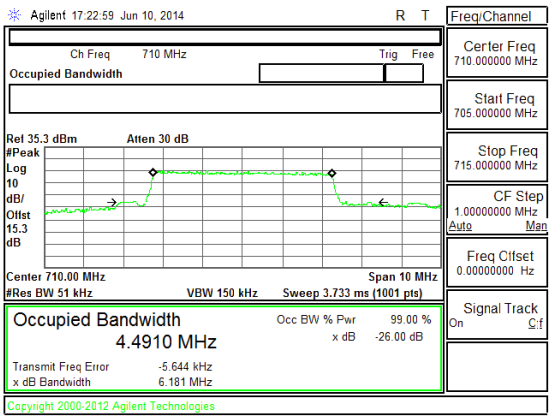
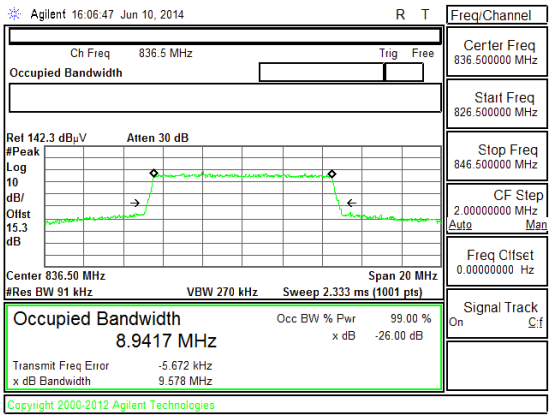
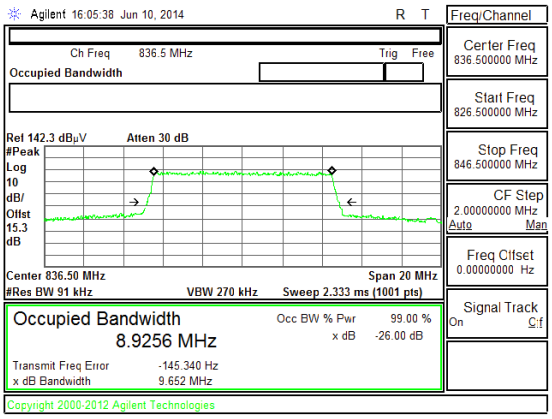
Band LTE17 5MHz 16QAM	 Band LTE17 5MHz OBW 16QAM Mid Channel FRB.gif	 Band LTE17 5MHz OBW QPSK Mid Channel FRB.gif
Band LTE5 10MHz 16QAM	 Band LTE5 10MHz OBW 16QAM Mid Channel FRB.gif	 Band LTE5 10MHz OBW QPSK Mid Channel FRB.gif

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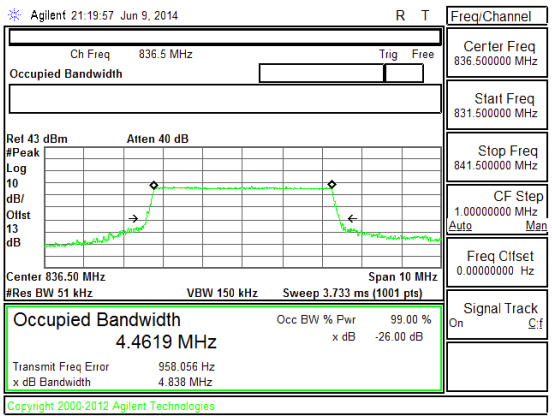
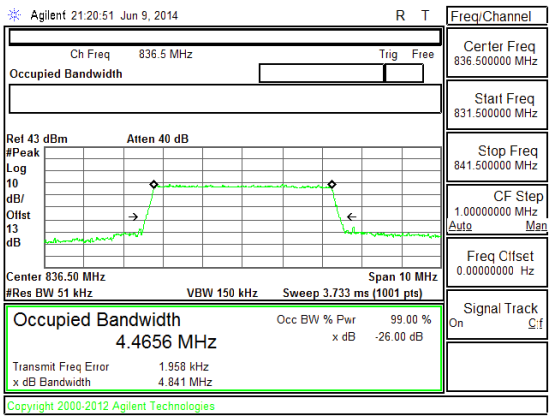
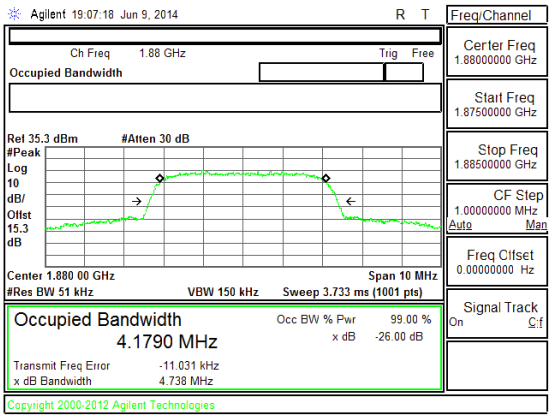
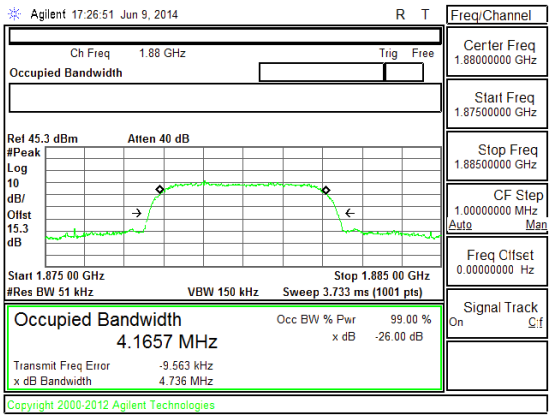
Band LTE5 5MHz 16QAM	 Band LTE5 5MHz OBW 16QAM Mid Channel FRB.gif	 Band LTE5 5MHz OBW QPSK Mid Channel FRB.gif
Band Band 2 HSDPA	 Band WCDMA B2 HSDPA OBW	 Band WCDMA B2 REL99 OBW

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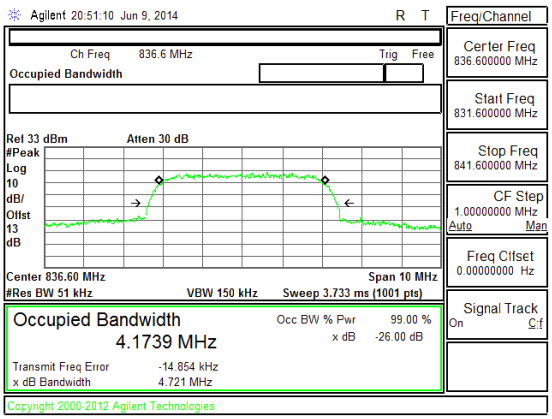
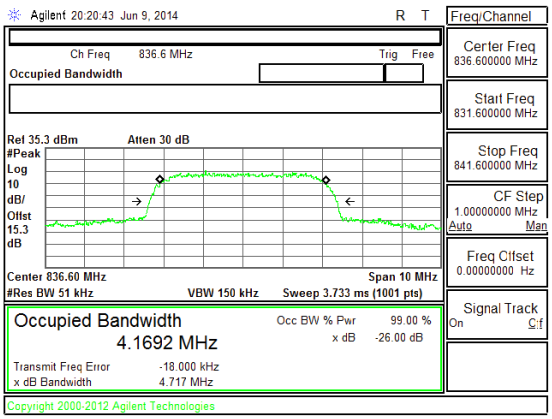
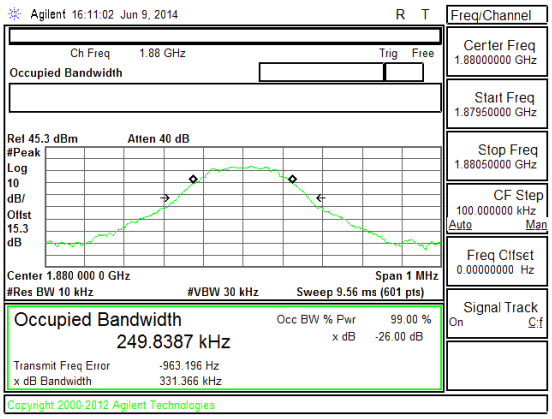
Band Band 5 HSDPA	 Band WCDMA B5 HSDPA OBW	 Band WCDMA B5 REL99 OBW
Band GSM1900 GPRS	 Band GSM1900 GPRS OBW Mid channel	

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10.2. BAND EDGE EMISSIONS

RULE PART(S)

FCC: §22.359, §24.238 and § 27

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.

If screen capture program is not available or unable to locate the emission mask file, please contact PM or PL right away.

RESULTS

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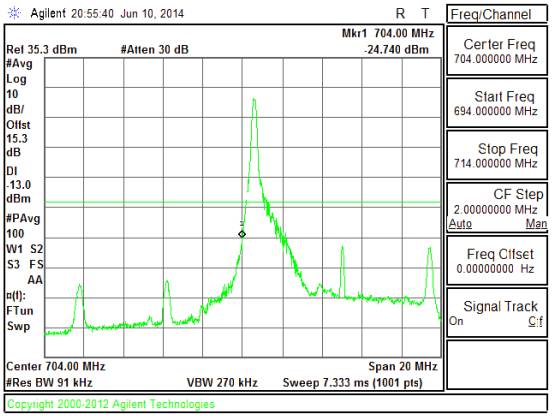
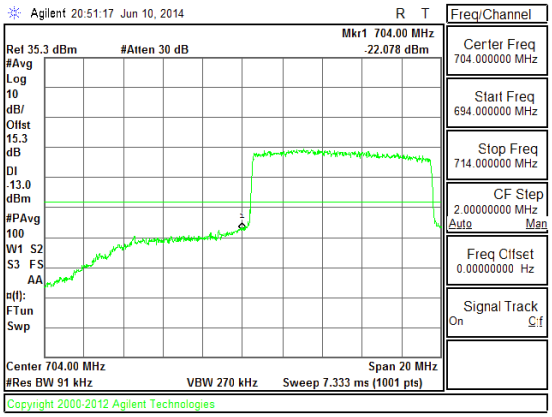
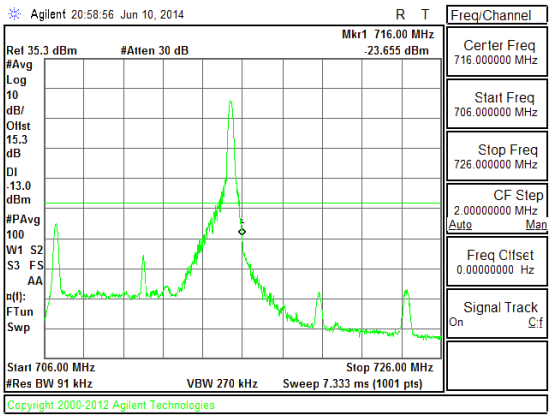
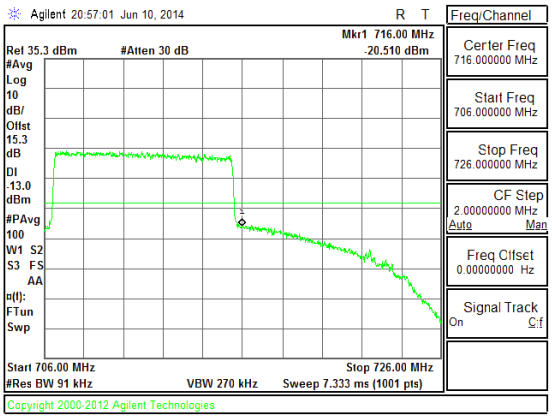
10.2.1. BAND EDGE PLOTS

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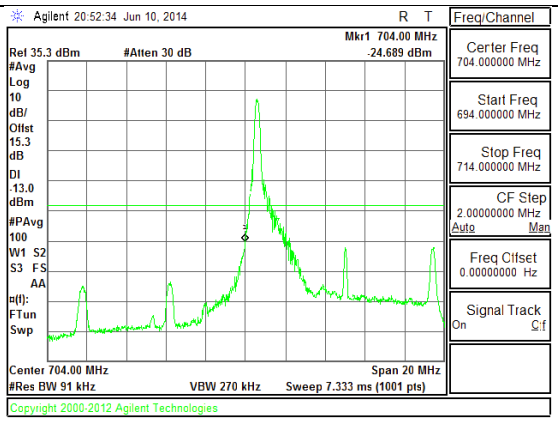
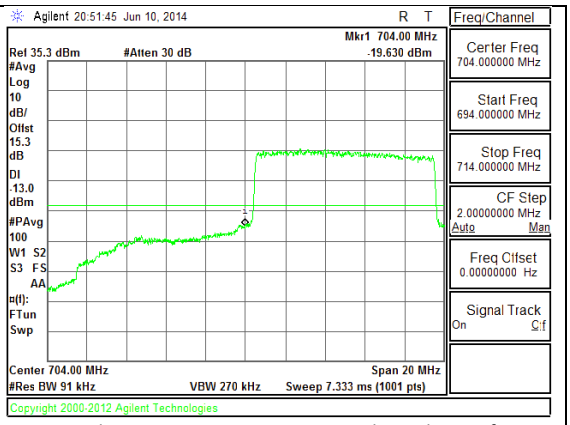
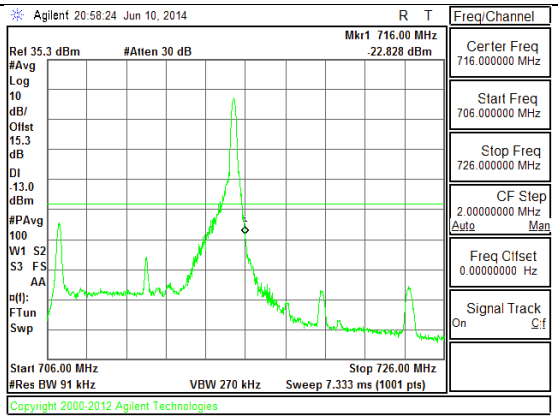
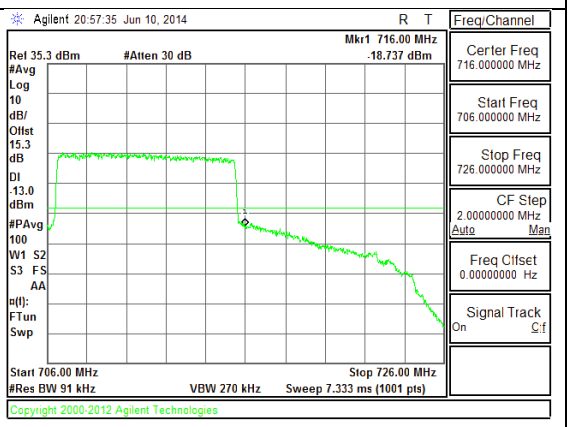
Band LTE17 10MHz QPSK	 Band LTE17 10MHz CBE QPSK Low Channel 1RB.gif	 Band LTE17 10MHz CBE QPSK Low Channel FRB.gif
Band LTE17 10MHz QPSK	 Band LTE17 10MHz CBE QPSK High Channel 1RB.gif	 Band LTE17 10MHz CBE QPSK High Channel FRB.gif

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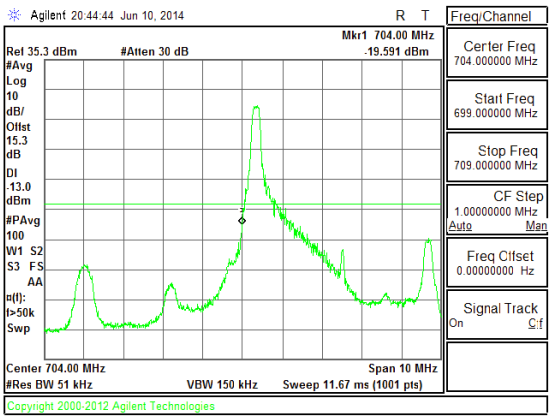
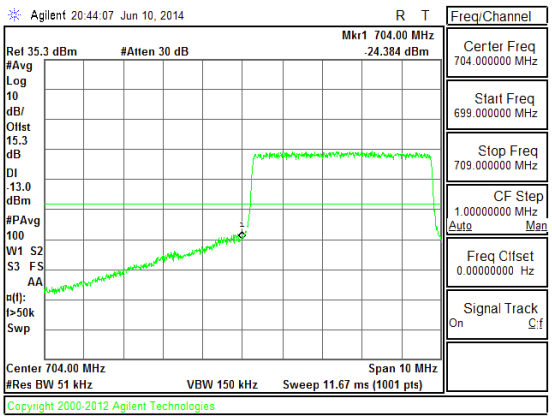
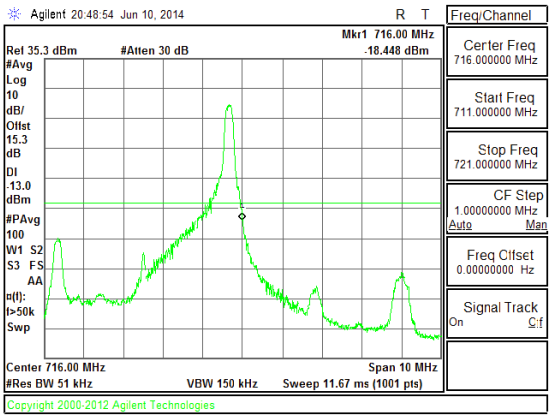
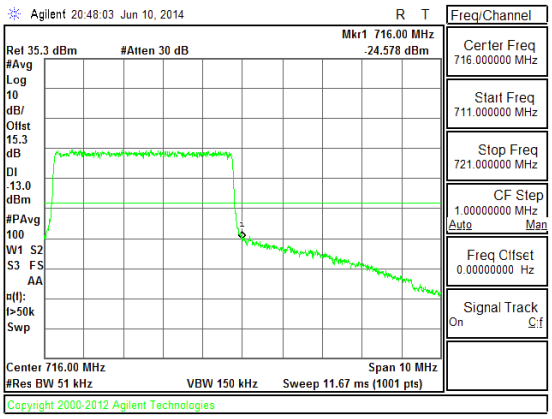
Band LTE17 5MHz 16QAM	 Band LTE17 5MHz CBE 16QAM Low Channel 1RB.gif	 Band LTE17 5MHz CBE 16QAM Low Channel FRB.gif
Band LTE17 5MHz 16QAM	 Band LTE17 5MHz CBE 16QAM High Channel 1RB.gif	 Band LTE17 5MHz CBE 16QAM High Channel FRB.gif

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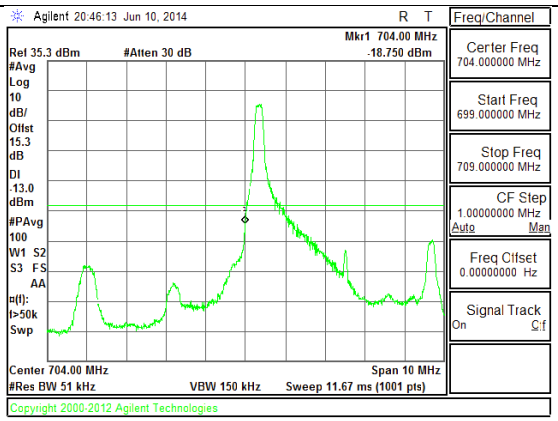
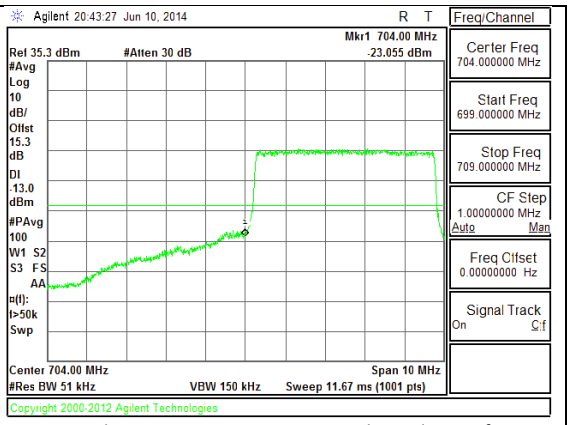
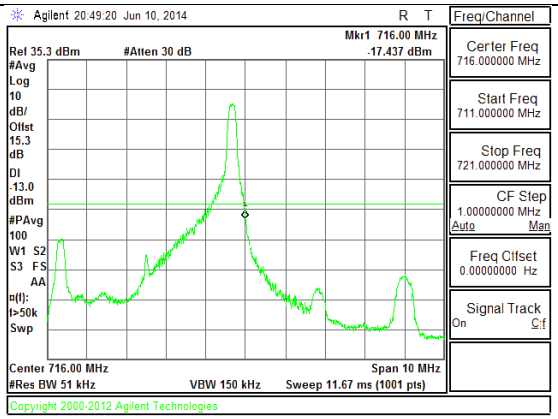
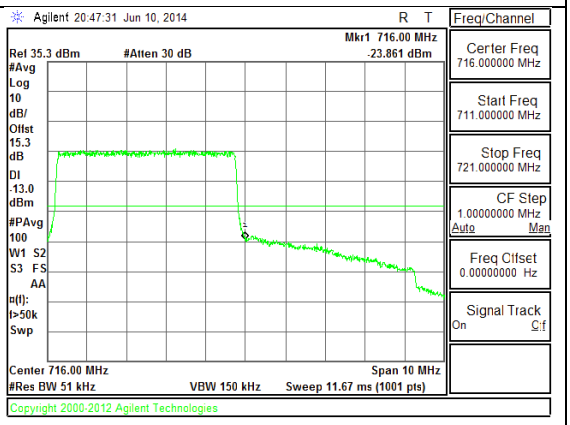
Band LTE17 5MHz QPSK	 Band LTE17 5MHz CBE QPSK Low Channel 1RB.gif	 Band LTE17 5MHz CBE QPSK Low Channel FRB.gif
Band LTE17 5MHz QPSK	 Band LTE17 5MHz CBE QPSK High Channel 1RB.gif	 Band LTE17 5MHz CBE QPSK High Channel FRB.gif

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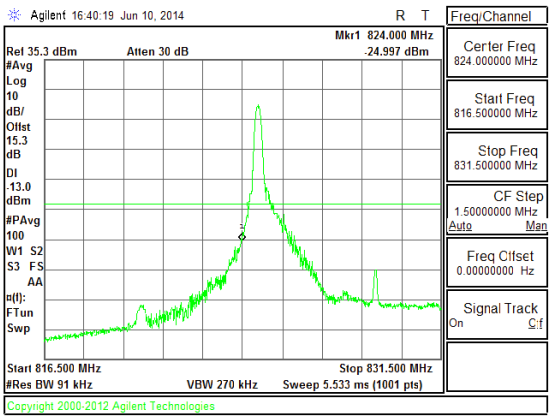
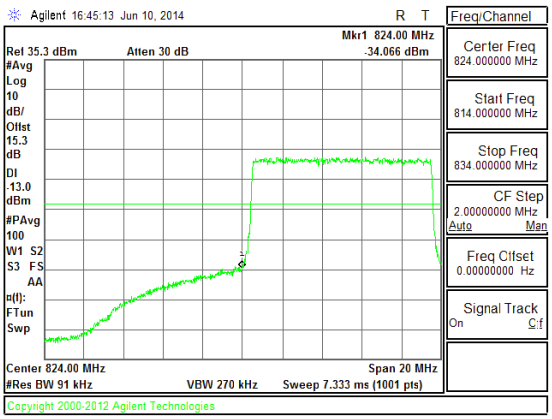
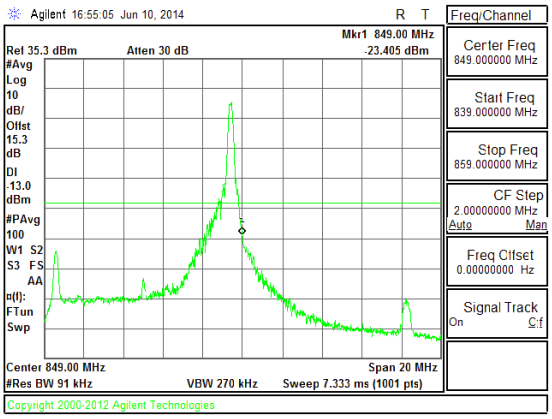
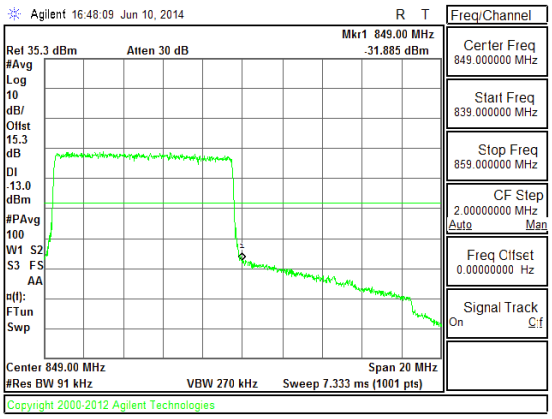
Band LTE5 10MHz 16QAM	 Band LTE5 10MHz CBE 16QAM Low Channel 1RB.gif	 Band LTE5 10MHz CBE 16QAM Low Channel FRB.gif
Band LTE5 10MHz 16QAM	 Band LTE5 10MHz CBE 16QAM High Channel 1RB.gif	 Band LTE5 10MHz CBE 16QAM High Channel FRB.gif

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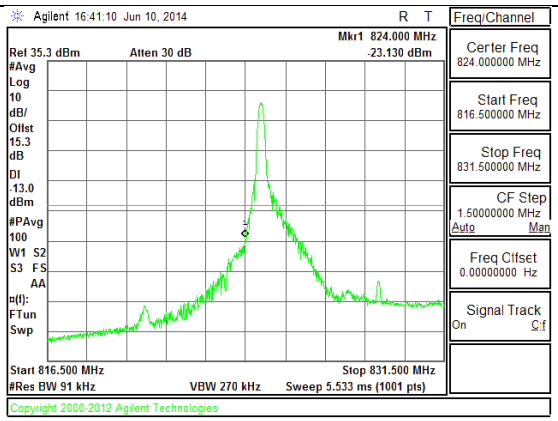
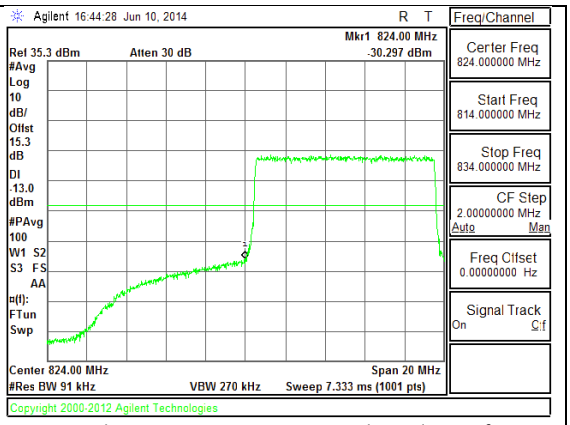
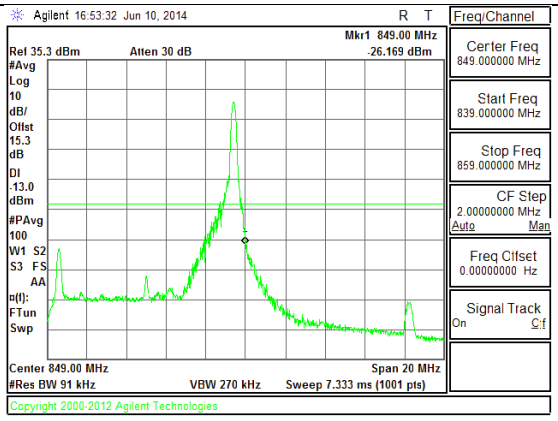
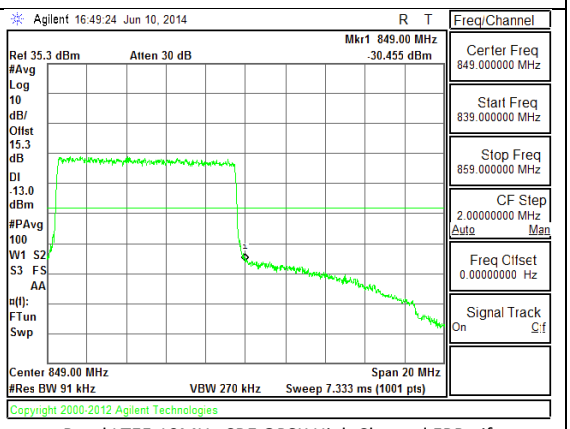
Band LTE5 10MHz QPSK	 Band LTE5 10MHz CBE QPSK Low Channel 1RB.gif	 Band LTE5 10MHz CBE QPSK Low Channel FRB.gif
Band LTE5 10MHz QPSK	 Band LTE5 10MHz CBE QPSK High Channel 1RB.gif	 Band LTE5 10MHz CBE QPSK High Channel FRB.gif

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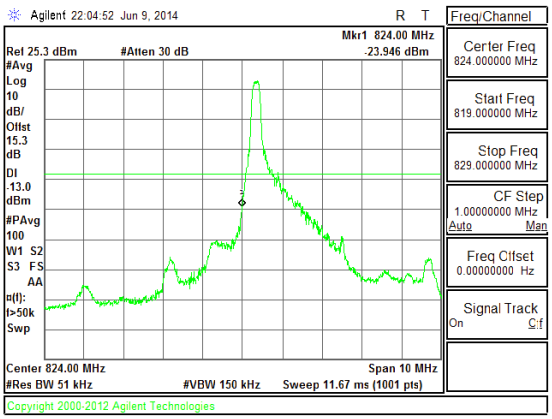
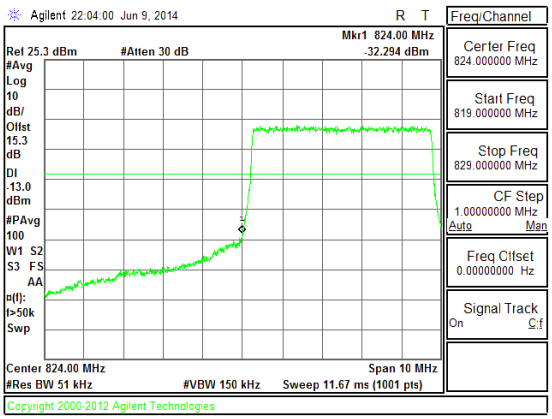
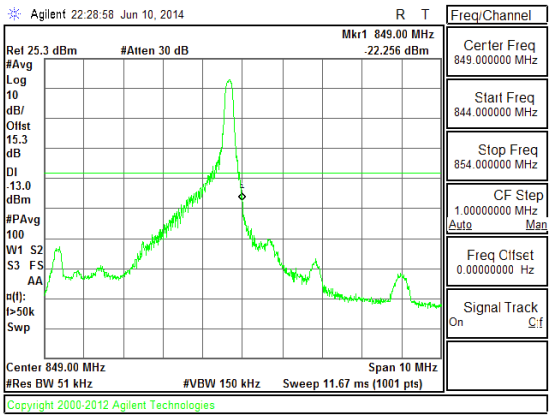
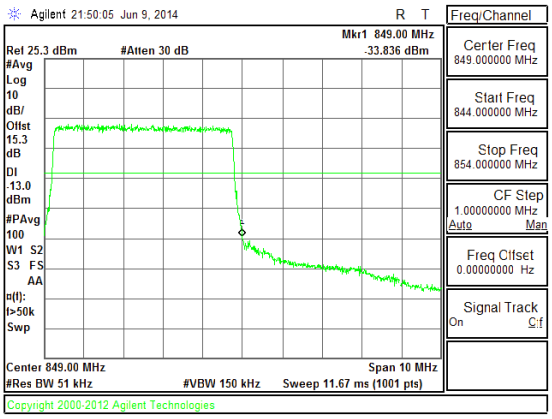
Band LTE5 5MHz 16QAM	 Band LTE5 5MHz CBE 16QAM Low Channel 1RB.gif	 Band LTE5 5MHz CBE 16QAM Low Channel FRB.gif
Band LTE5 5MHz 16QAM	 Band LTE5 5MHz CBE 16QAM High Channel 1RB.gif	 Band LTE5 5MHz CBE 16QAM High Channel FRB.gif

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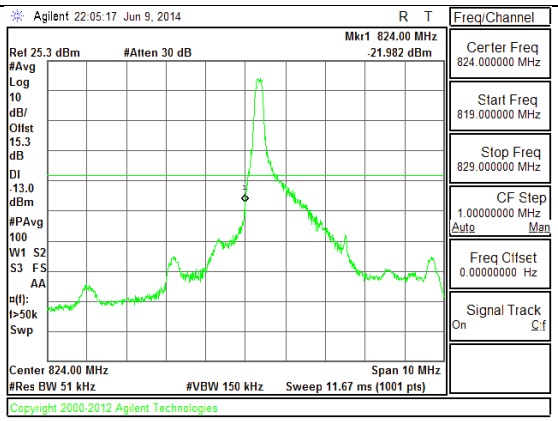
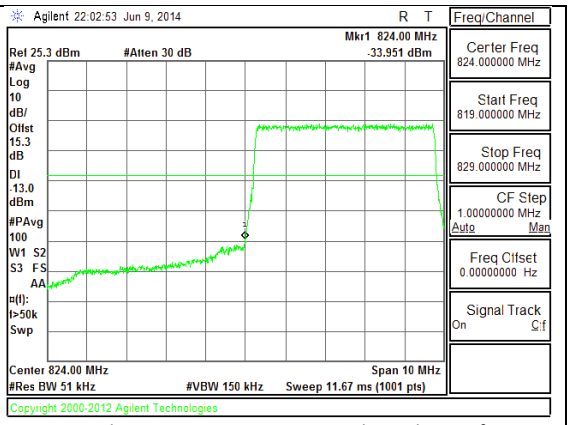
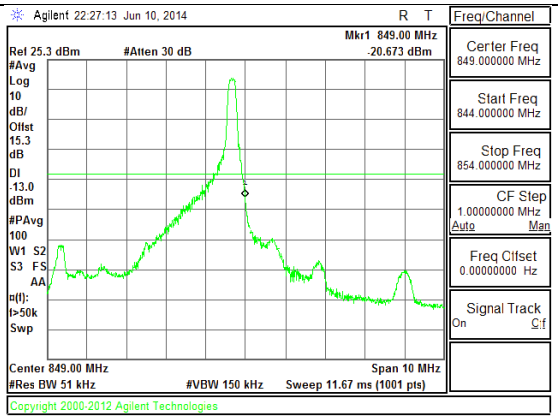
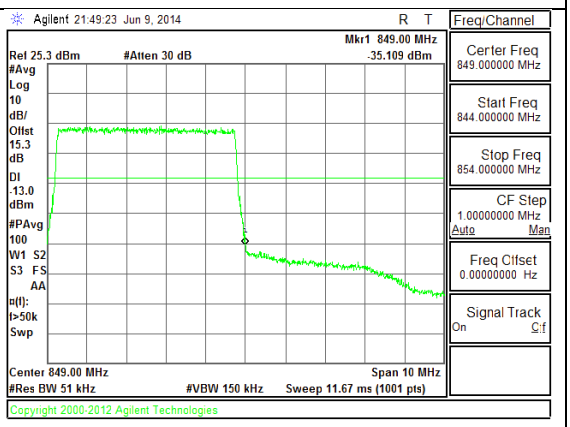
Band LTE5 5MHz QPSK	 Band LTE5 5MHz CBE QPSK Low Channel 1RB.gif	 Band LTE5 5MHz CBE QPSK Low Channel FRB.gif
Band LTE5 5MHz QPSK	 Band LTE5 5MHz CBE QPSK High Channel 1RB.gif	 Band LTE5 5MHz CBE QPSK High Channel FRB.gif

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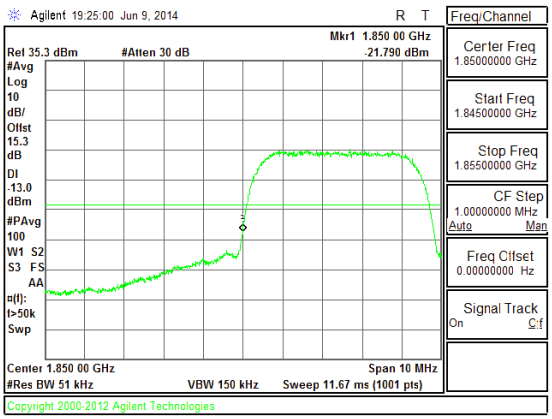
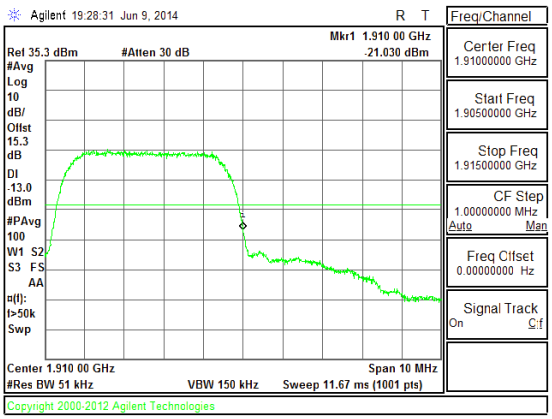
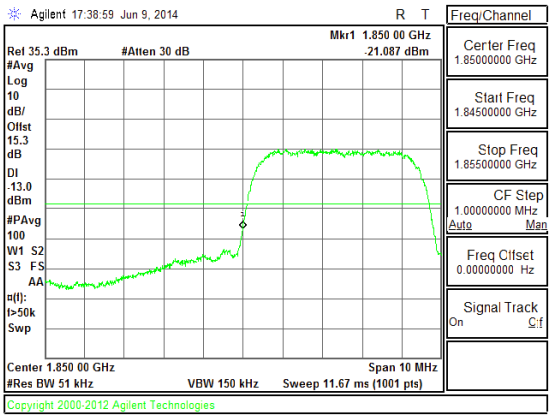
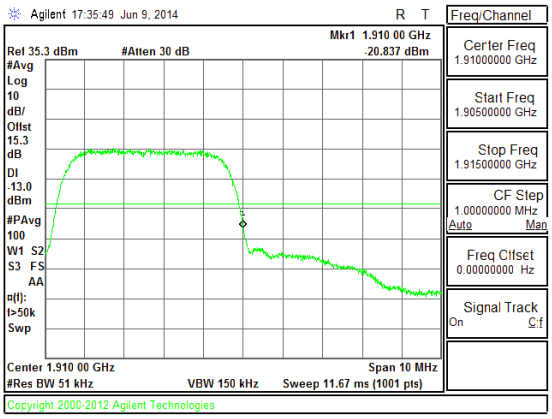
Band Band 2 HSDPA	 Band WCDMA B2 HSDPA CBE	 Band WCDMA B2 HSDPA CBE
Band Band 2 REL99	 Band WCDMA B2 REL99 CBE	 Band WCDMA B2 REL99 CBE

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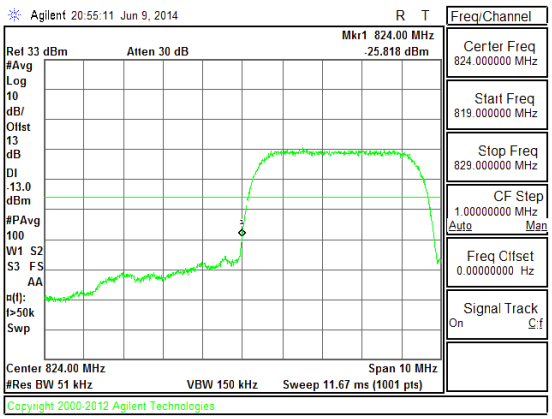
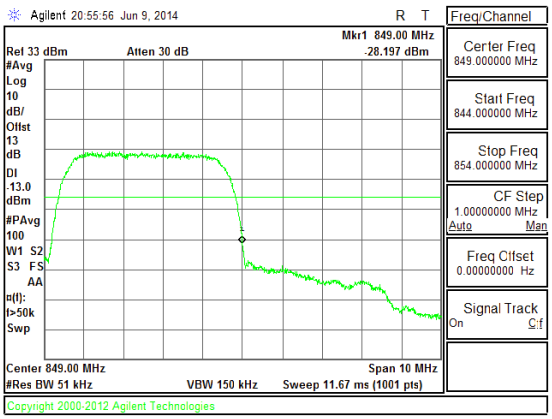
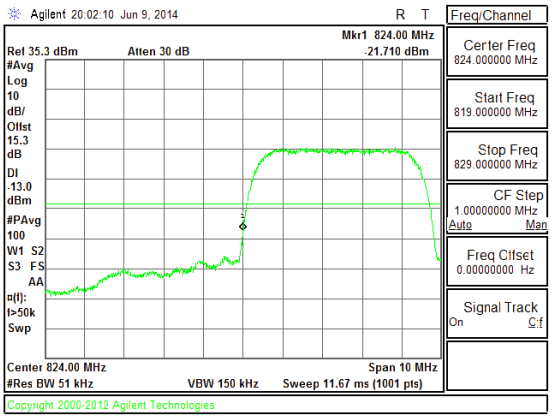
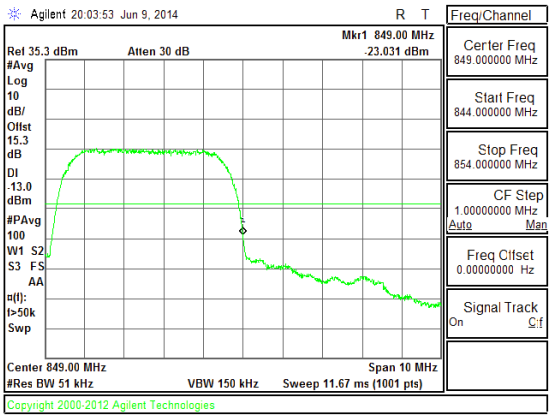
Band Band 5 HSDPA	 Band WCDMA B5 HSDPA CBE	 Band WCDMA B5 HSDPA CBE
Band Band 5 REL99	 Band WCDMA B5 REL99 CBE	 Band WCDMA B5 REL99 CBE

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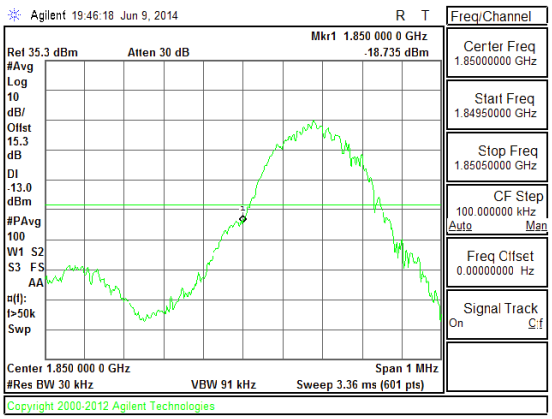
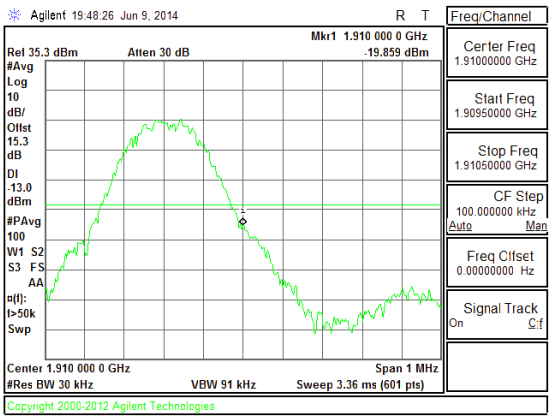
Band GSM1900 GPRS	 Band GSM1900 GPRS CBE Low channel	 Band GSM1900 GPRS CBE High channel

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10.3. OUT OF BAND EMISSIONS

RULE PART(S)

FCC: §2.1051, §22.901, §22.917, §24.238 and §27

LIMITS

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

TEST PROCEDURE

Per KDB 971168 D01 Power Meas License Digital Systems v02r01

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

RESULTS

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10.3.1. OUT OF BAND EMISSIONS RESULT

Band	BW (MHz)	Mode	f (MHz)	Spur (dBm)	Spec (dBm)	Delta (dB)
LTE17	10	QPSK	709	-28.86	-13	-15.86
			710	-28.95	-13	-15.95
			711	-28.32	-13	-15.32
		16QAM	709	-29.37	-13	-16.37
			710	-28.47	-13	-15.47
			711	-27.76	-13	-14.76
Band	BW (MHz)	Mode	f (MHz)	Spur (dBm)	Spec (dBm)	Delta (dB)
LTE17	5	QPSK	706.5	-28.73	-13	-15.73
			710	-28.48	-13	-15.48
			713.5	-28.55	-13	-15.55
		16QAM	706.5	-28.65	-13	-15.65
			710	-28.79	-13	-15.79
			713.5	-29.38	-13	-16.38

Band	BW (MHz)	Mode	f (MHz)	Spur (dBm)	Spec (dBm)	Delta (dB)
LTE5	10	QPSK	829	-27.74	-13	-14.74
			836.5	-28.53	-13	-15.53
			844	-29.9	-13	-16.9
		16QAM	829	-27.74	-13	-14.74
			836.5	-28.53	-13	-15.53
			844	-29.9	-13	-16.9
Band	BW (MHz)	Mode	f (MHz)	Spur (dBm)	Spec (dBm)	Delta (dB)
LTE5	5	QPSK	826.5	-24.34	-13	-11.34
			836.5	-23.58	-13	-10.58
			846.5	-23.78	-13	-10.78
		16QAM	826.5	-23.73	-13	-10.73
			836.5	-24.12	-13	-11.12
			846.5	-23.6	-13	-10.6

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Band	Mode	f (MHz)	Spur (dBm)	Spec (dBm)	Delta (dB)
GSM1900	GPRS	1850.2	-19.48	-13	-6.48
		1880	-18.05	-13	-5.05
		1909.8	-18.69	-13	-5.69
Band 5	REL99	826.4	-31.91	-13	-18.91
		836.6	-27.8	-13	-14.8
		846.6	-29.56	-13	-16.56
	HSDPA	826.4	-30.28	-13	-17.28
		836.6	-30.69	-13	-17.69
		846.6	-31.19	-13	-18.19
Band 2	REL99	1852.4	-29.57	-13	-16.57
		1880	-29.96	-13	-16.96
		1907.6	-30.19	-13	-17.19
	HSDPA	1852.4	-29.25	-13	-16.25
		1880	-29.67	-13	-16.67
		1907.6	-29.33	-13	-16.33

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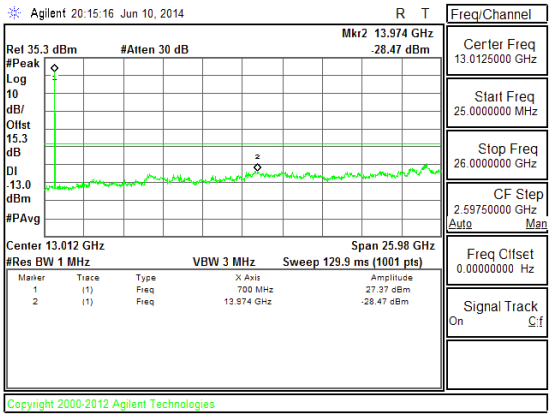
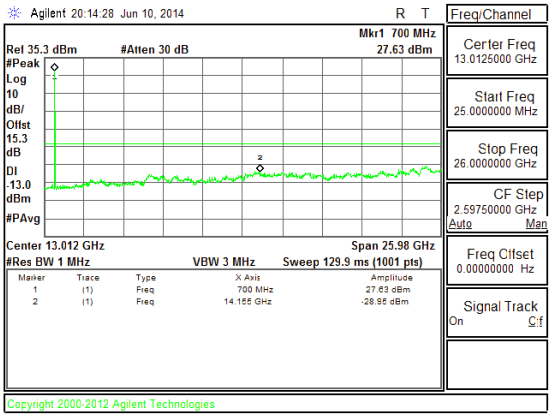
10.3.2. OUT OF BAND EMISSIONS PLOTS

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

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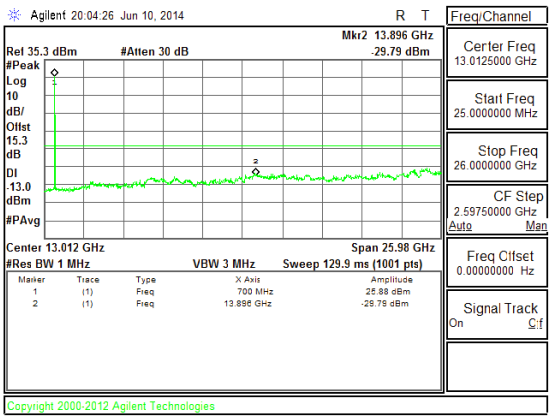
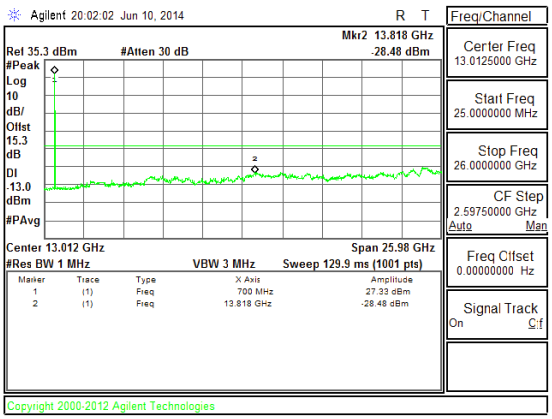
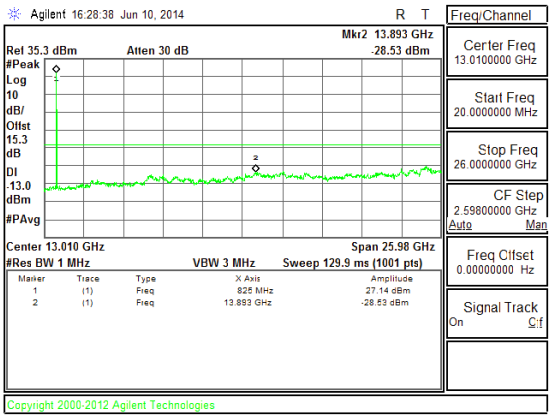
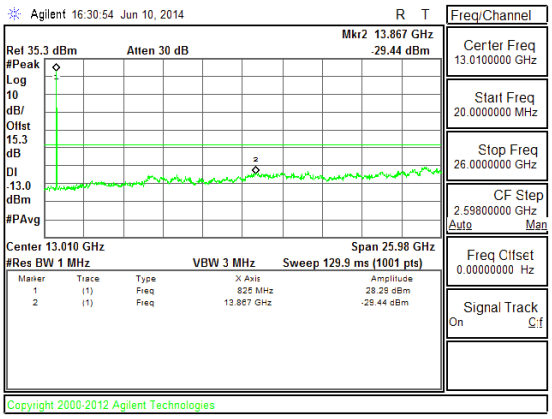
Band LTE17 5MHz 16QAM	 Band LTE17 5MHz CSE 16QAM Mid channel	 Band LTE17 5MHz CSE QPSK Mid channel
Band LTE5 10MHz 16QAM	 Band LTE5 10MHz CSE 16QAM Mid channel	 Band LTE5 10MHz CSE QPSK Mid channel

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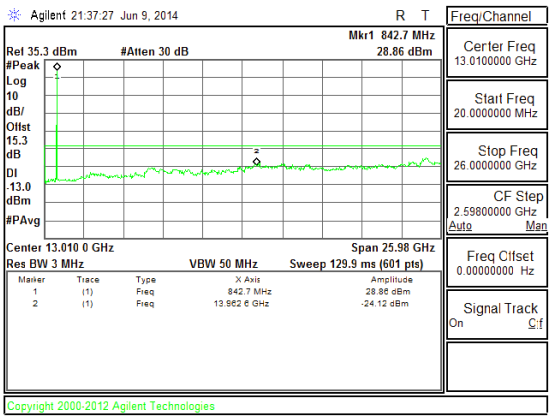
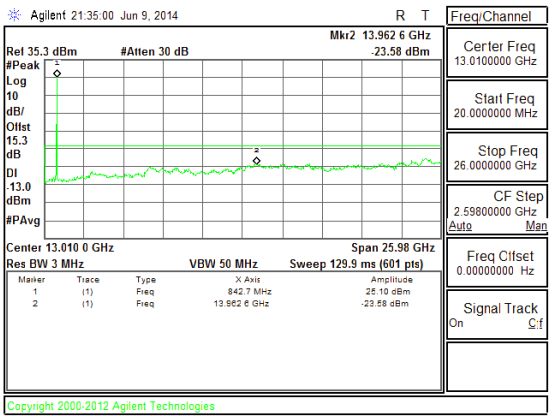
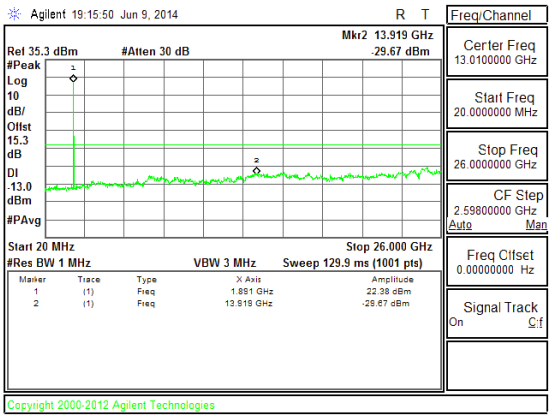
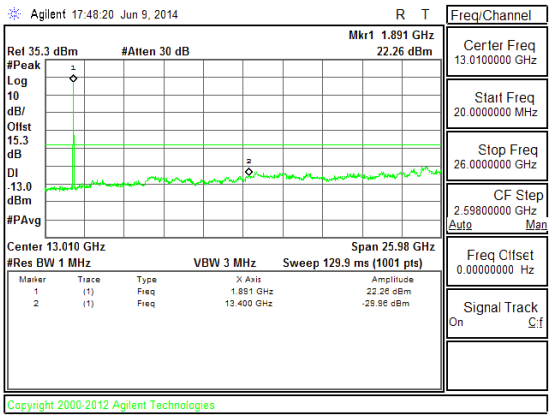
Band LTE5 5MHz 16QAM	 Band LTE5 5MHz CSE 16QAM Mid channel	 Band LTE5 5MHz CSE QPSK Mid channel
Band Band 2 HSDPA	 Band WCDMA B2 HSDPA CSE	 Band WCDMA B2 REL99 CSE

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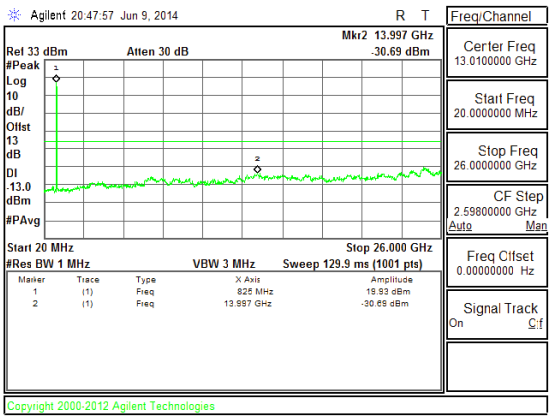
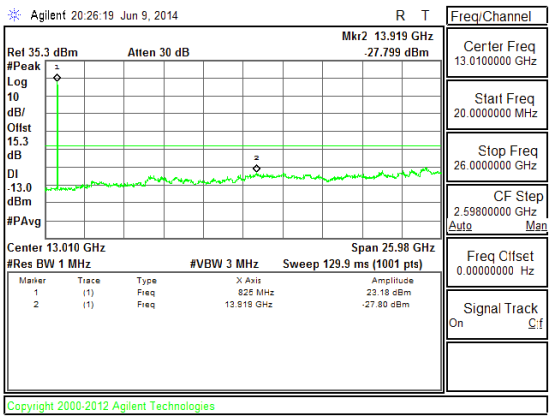
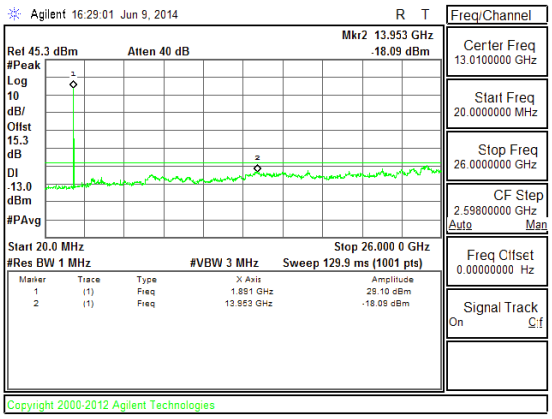
Band Band 5 HSDPA	 Band WCDMA B5 HSDPA CSE	 Band WCDMA B5 REL99 CSE
Band GSM1900 GPRS	 Band GSM1900 GPRS CSE Mid channel	

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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

RESULTS

See the following pages.

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10.4.1. FREQUENCY STABILITY RESULTS

BAND V, Channel 4183, Freq: 836.6MHz – MID CHANNEL

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	836.600004	-0.001	2.5
3.80	40	836.600002	0.001	2.5
3.80	30	836.599996	0.008	2.5
3.80	***20***	***836.600003***	***0***	***2.5***
3.80	10	836.600002	0.001	2.5
3.80	0	836.600004	-0.001	2.5
3.80	-10	836.599997	0.007	2.5
3.80	-20	836.600005	-0.002	2.5
3.80	-30	836.600004	-0.001	2.5

Reference Frequency: 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***	***836.600003***	***0.00000***	***2.5***
4.30	20	836.599997	*0.00717*	2.5
3.40	20	836.600002	*0.00120*	2.5

BAND II, Channel 9400 Freq: 1880MHz– MID CHANNEL

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Reference Frequency: PC S 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	1880.000004	-0.006	2.5
3.80	40	1880.000006	-0.007	2.5
3.80	30	1879.999994	-0.001	2.5
3.80	***20***	***1879.999993***	***0***	***2.5***
3.80	10	1879.999991	0.001	2.5
3.80	0	1879.999994	-0.001	2.5
3.80	-10	1879.999992	0.001	2.5
3.80	-20	1880.000006	-0.007	2.5
3.80	-30	1880.000007	-0.007	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***	***1879.999993***	***0***	***2.5***
4.30	20	1879.999992	*0.001*	2.5
3.40	20	1879.999991	*0.001*	2.5

LTE BAND 17 – MID CHANNEL

Power Supply (Vdc)	Environment Temperature (*C)	Frequency Deviation Measureed with Time Elapse		
		(MHz)	Delta (ppm)	Limit (ppm)
3.80	50	709.999988	0.011	2.5
3.80	40	709.999987	0.013	2.5
3.80	30	709.999995	0.001	2.5
3.80	***20***	***709.999996***	***0***	***2.5***
3.80	10	709.999994	0.003	2.5
3.80	0	709.999994	0.003	2.5
3.80	-10	709.999994	0.003	2.5
3.80	-20	709.999996	0.000	2.5
3.80	-30	709.999995	0.001	2.5

Reference Frequency: Mid Channel 710.000010 MHz @ 20ºC Limit: within the authorized block or +- 2.5 ppm = 1775.000 Hz				
Power Supply (Vdc)	Environment Temperature (*C)	Frequency Deviation Measureed with Time Elapse		
			Delta (ppm)	Limit (ppm)
3.80	***20***	***709.999996***	***0.00000***	***2.5***
4.30	20	709.999996	*0.00000*	2.5
3.40	20	710.000004	*-0.01127*	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, and § 27.

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

TEST RESULTS

11.1.1. ERP/EIRP Results

Band	Mode	Channel	f(MHz)	ERP / EIRP	
				dBm	mW
Band 2	REL99	9262	1852.4	21.6595	146.54
		9400	1880	20.7688	119.37
		9538	1907.6	21.4539	139.76
	HSDPA	9262	1852.4	20.5295	112.97
		9400	1880	19.8888	97.47
		9538	1907.6	20.0739	101.72

Band	Mode	Channel	f(MHz)	ERP / EIRP	
				dBm	mW
Band 5	REL99	4132	826.4	20.241	105.71
		4183	836.6	18.381	68.88
		4233	846.6	17.991	62.97
	HSDPA	4132	826.4	18.821	76.23
		4183	836.6	18.931	78.18
		4233	846.6	18.351	68.41

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Band	Mode	Channel	f(MHz)	ERP / EIRP	
				dBm	mW
GSM1900	GPRS	512	1850.2	27.9395	622.23
		661	1880	28.6788	737.7
		810	1909.8	28.0339	635.9

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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	10.631	11.56
			1/0	710	11.151	13.03
			1/0	711	10.711	11.78
		16QAM	1/0	709	10.201	10.47
			1/0	710	10.681	11.7
			1/0	711	10.211	10.5

Band	BW (MHz)	Mode	RB/RB Size	f (MHz)	ERP / EIRP	
					dBm	mW
LTE17	5	QPSK	1/0	706.5	10.421	11.02
			1/0	710	10.881	12.25
			1/0	713.5	10.611	11.51
		16QAM	1/0	706.5	9.961	9.91
			1/0	710	10.501	11.22
			1/0	713.5	10.041	10.09

Band	BW (MHz)	Mode	RB/RB Size	f (MHz)	ERP / EIRP	
					dBm	mW
LTE5	10	QPSK	1/0	829	20.771	119.43
			1/0	836.5	21.111	129.15
			1/0	844	19.991	99.79
		16QAM	1/0	829	19.171	82.62
			1/0	836.5	20.651	116.17
			1/0	844	19.291	84.94

Band	BW (MHz)	Mode	RB/RB Size	f (MHz)	ERP / EIRP	
					dBm	mW
LTE5	5	QPSK	1/0	826.5	20.091	102.12

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			1/0	836.5	21.821	152.09
			1/0	846.5	20.031	100.72
		16QAM	1/0	826.5	19.041	80.19
			1/0	836.5	20.781	119.7
			1/0	846.5	18.941	78.36

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11.1.3. ERP/EIRP DATA

Band

LTE17

10MHz

16QAM

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

Company: SAMSUNG
Project #: 14I17914
Date: 06/10/14
Test Engineer: Charles Vergonio
Configuration: EUT ONLY/ X Orientation
Mode: LTE17 10MHz FUND 16QAM

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								
709.00	-1.01	V	0.9	0.0	-1.91	34.8	-36.7	
709.00	11.10	H	0.9	0.0	10.20	34.8	-24.6	
Mid Ch								
710.00	-0.99	V	0.9	0.0	-1.89	34.8	-36.7	
710.00	11.58	H	0.9	0.0	10.68	34.8	-24.1	
High Ch								
711.00	-1.46	V	0.9	0.0	-2.36	34.8	-37.1	
711.00	11.11	H	0.9	0.0	10.21	34.8	-24.6	

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

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Band

LTE17

10MHz

QPSK

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

Company: SAMSUNG
Project #: 14I17914
Date: 06/10/14
Test Engineer: Charles Vergonio
Configuration: EUT ONLY/ X Orientation
Mode: LTE17 10MHz FUND QPSK

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								
709.00	-0.36	V	0.9	0.0	-1.26	34.8	-36.0	
709.00	11.53	H	0.9	0.0	10.63	34.8	-24.1	
Mid Ch								
710.00	-0.41	V	0.9	0.0	-1.31	34.8	-36.1	
710.00	12.05	H	0.9	0.0	11.15	34.8	-23.6	
High Ch								
711.00	-0.35	V	0.9	0.0	-1.25	34.8	-36.0	
711.00	11.61	H	0.9	0.0	10.71	34.8	-24.1	

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

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Band

LTE17

5MHz

16QAM

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

Company: SAMSUNG
Project #: 14I17914
Date: 06/10/14
Test Engineer: Charles Vergonio
Configuration: EUT ONLY/ X Orientation
Mode: LTE17 5MHz FUND 16QAM

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								
706.50	-1.21	V	0.9	0.0	-2.11	34.8	-36.9	
706.50	10.86	H	0.9	0.0	9.96	34.8	-24.8	
Mid Ch								
710.00	-1.21	V	0.9	0.0	-2.11	34.8	-36.9	
710.00	11.40	H	0.9	0.0	10.50	34.8	-24.3	
High Ch								
713.50	-1.15	V	0.9	0.0	-2.05	34.8	-36.8	
713.50	10.94	H	0.9	0.0	10.04	34.8	-24.7	

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

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Band

LTE17

5MHz

QPSK

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

Company: SAMSUNG
Project #: 14I17914
Date: 06/10/14
Test Engineer: Charles Vergonio
Configuration: EUT ONLY/ X Orientation
Mode: LTE17 5MHz FUND QPSK

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								
706.50	-0.48	V	0.9	0.0	-1.38	34.8	-36.1	
706.50	11.32	H	0.9	0.0	10.42	34.8	-24.3	
Mid Ch								
710.00	-0.32	V	0.9	0.0	-1.22	34.8	-36.0	
710.00	11.78	H	0.9	0.0	10.88	34.8	-23.9	
High Ch								
713.50	-0.54	V	0.9	0.0	-1.44	34.8	-36.2	
713.50	11.51	H	0.9	0.0	10.61	34.8	-24.2	

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

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Band

LTE5

10MHz

16QAM

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

Company: SAMSUNG
Project #: 14U17914
Date: 06/10/14
Test Engineer: Charles Vergonio
Configuration: EUT ONLY/ X Orientation
Mode: LTE5 10MHz FUND 16QAM

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								
829.00	8.77	V	0.9	0.0	7.87	38.5	-30.6	
829.00	20.07	H	0.9	0.0	19.17	38.5	-19.3	
Mid Ch								
836.50	9.56	V	0.9	0.0	8.66	38.5	-29.8	
836.50	21.55	H	0.9	0.0	20.65	38.5	-17.8	
High Ch								
844.00	8.44	V	0.9	0.0	7.54	38.5	-30.9	
844.00	20.19	H	0.9	0.0	19.29	38.5	-19.2	

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

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Band

LTE5

10MHz

QPSK

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

Company: SAMSUNG
Project #: 14U17914
Date: 06/10/14
Test Engineer: Charles Vergonio
Configuration: EUT ONLY/ X Orientation
Mode: LTE5 10MHz FUND QPSK

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								
829.00	10.14	V	0.9	0.0	9.24	38.5	-29.2	
829.00	21.67	H	0.9	0.0	20.77	38.5	-17.7	
Mid Ch								
836.50	10.54	V	0.9	0.0	9.64	38.5	-28.8	
836.50	22.01	H	0.9	0.0	21.11	38.5	-17.3	
High Ch								
844.00	8.87	V	0.9	0.0	7.97	38.5	-30.5	
844.00	20.89	H	0.9	0.0	19.99	38.5	-18.5	

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

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Band

LTE5

5MHz

16QAM

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

Company: SAMSUNG
Project #: 14U17914
Date: 06/10/14
Test Engineer: Charles Vergonio
Configuration: EUT ONLY/ X Orientation
Mode: LTE5 5MHz FUND 16QAM

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								
826.50	9.14	V	0.9	0.0	8.24	38.5	-30.2	
826.50	19.94	H	0.9	0.0	19.04	38.5	-19.4	
Mid Ch								
836.50	9.93	V	0.9	0.0	9.03	38.5	-29.4	
836.50	21.68	H	0.9	0.0	20.78	38.5	-17.7	
High Ch								
846.50	8.16	V	0.9	0.0	7.26	38.5	-31.2	
846.50	19.84	H	0.9	0.0	18.94	38.5	-19.5	

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

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Band

LTE5

5MHz

QPSK

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

Company: SAMSUNG
Project #: 14U17914
Date: 06/10/14
Test Engineer: Charles Vergonio
Configuration: EUT ONLY/ X Orientation
Mode: LTE5 5MHz FUND QPSK

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								
826.50	10.15	V	0.9	0.0	9.25	38.5	-29.2	
826.50	20.99	H	0.9	0.0	20.09	38.5	-18.4	
Mid Ch								
836.50	10.87	V	0.9	0.0	9.97	38.5	-28.5	
836.50	22.72	H	0.9	0.0	21.82	38.5	-16.6	
High Ch								
846.50	9.15	V	0.9	0.0	8.25	38.5	-30.2	
846.50	20.93	H	0.9	0.0	20.03	38.5	-18.4	

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

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High Frequency Fundamental Measurement
Compliance Certification Services Chamber C

Company: Samsung
Project #: 14U17914
Date: 06/10/14
Test Engineer: D. Soper/ D. Sblendorio
Configuration: EUT ONLY, X Position
Mode: HSDPA 1900MHz

Test Equipment:
Receiving: T119, and Chamber C SMA Cables
Substitution: Horn T59 Substitution, 4ft SMA Cable (227086002) Warehouse

Band

Band 2

HSDPA

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	7.0	V	0.85	7.89	13.99	33.0	-19.0	
1.852	13.5	H	0.85	7.89	20.53	33.0	-12.5	
Mid Ch								
1.880	9.4	V	0.85	7.87	16.37	33.0	-16.6	
1.880	12.9	H	0.85	7.87	19.89	33.0	-13.1	
High Ch								
1.908	7.2	V	0.85	7.88	14.19	33.0	-18.8	
1.908	13.0	H	0.85	7.88	20.07	33.0	-12.9	

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Band

Band 2

REL99

High Frequency Fundamental Measurement
Compliance Certification Services Chamber C

Company: Samsung
Project #: 14U17914
Date: 06/10/14
Test Engineer: D. Soper/ D. Sblendorio
Configuration: EUT ONLY, X Position
Mode: WCDMA_1900 MHz_Rel 99

Test Equipment:
Receiving: T119, and Chamber C SMA Cables
Substitution: Horn T59 Substitution, 4ft SMA Cable (227086002) Warehouse

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
1852.40	10.22	V	0.85	7.89	17.26	33.0	-15.7	
1852.40	14.62	H	0.85	7.89	21.66	33.0	-11.3	
Mid Ch								
1880.00	11.80	V	0.85	7.87	18.82	33.0	-14.2	
1880.00	13.75	H	0.85	7.87	20.77	33.0	-12.2	
High Ch								
1907.60	7.16	V	0.85	7.88	14.19	33.0	-18.8	
1907.60	14.42	H	0.85	7.88	21.45	33.0	-11.5	

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

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Band

Band 5

HSDPA

High Frequency Substitution Measurement
Compliance Certification Services Chamber C

Company: Samsung
Project #: 14U17914
Date: 06/11/14
Test Engineer: R. Alegre
Configuration: EUT ONLY, X Position
Mode: HSDPA 850MHz

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								
826.40	11.41	V	0.4	0.0	11.01	38.5	-27.4	
826.40	19.22	H	0.4	0.0	18.82	38.5	-19.6	
Mid Ch								
836.60	11.93	V	0.4	0.0	11.53	38.5	-26.9	
836.60	19.33	H	0.4	0.0	18.93	38.5	-19.5	
High Ch								
846.60	11.48	V	0.4	0.0	11.08	38.5	-27.4	
846.60	18.75	H	0.4	0.0	18.35	38.5	-20.1	

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Band

Band 5

REL99

High Frequency Substitution Measurement
Compliance Certification Services Chamber C

Company: Samsung
Project #: 14U17914
Date: 06/11/14
Test Engineer: R.Alegre
Configuration: EUT ONLY, X position
Mode: REL99 850MHz

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								
826.40	11.76	V	0.4	0.0	11.36	38.5	-27.1	
826.40	20.64	H	0.4	0.0	20.24	38.5	-18.2	
Mid Ch								
836.60	12.31	V	0.4	0.0	11.91	38.5	-26.5	
836.60	18.78	H	0.4	0.0	18.38	38.5	-20.1	
High Ch								
846.60	10.92	V	0.4	0.0	10.52	38.5	-27.9	
846.60	18.39	H	0.4	0.0	17.99	38.5	-20.5	

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Band

GSM1900

GPRS

High Frequency Fundamental Measurement
Compliance Certification Services Chamber C

Company: Samsung
Project #: 14U17914
Date: 06/10/14
Test Engineer: D. Soper / D. Sblendorio
Configuration: EUT ONLY, X Position
Mode: GPRS 1900MHz

Test Equipment:
Receiving: T119, and Chamber C SMA Cables
Substitution: Horn T59 Substitution, 4ft SMA Cable (247217006) 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	15.6	V	0.85	7.89	22.62	33.0	-10.4	
1.850	20.9	H	0.85	7.89	27.94	33.0	-5.1	
Mid Ch								
1.880	18.2	V	0.85	7.87	25.19	33.0	-7.8	
1.880	21.7	H	0.85	7.87	28.68	33.0	-4.3	
High Ch								
1.910	17.1	V	0.85	7.88	24.13	33.0	-8.9	
1.910	21.0	H	0.85	7.88	28.03	33.0	-5.0	

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Band

GSM1900

GPRS

High Frequency Fundamental Measurement
Compliance Certification Services Chamber C

Company: Samsung
Project #: 14U17914
Date: 06/10/14
Test Engineer: D. Soper / D. Sblendorio
Configuration: EUT ONLY, X Position
Mode: GPRS 1900MHz

Test Equipment:
Receiving: T119, and Chamber C SMA Cables
Substitution: Horn T59 Substitution, 4ft SMA Cable (247217006) 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	15.6	V	0.85	7.89	22.62	33.0	-10.4	
1.850	20.9	H	0.85	7.89	27.94	33.0	-5.1	
Mid Ch								
1.880	18.2	V	0.85	7.87	25.19	33.0	-7.8	
1.880	21.7	H	0.85	7.87	28.68	33.0	-4.3	
High Ch								
1.910	17.1	V	0.85	7.88	24.13	33.0	-8.9	
1.910	21.0	H	0.85	7.88	28.03	33.0	-5.0	

Rev. 3.17.11

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11.2. FIELD STRENGTH OF SPURIOUS RADIATION

RULE PART(S)

FCC: §2.1053, §22.917, §24.238, and §27

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

TEST PROCEDURE

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

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

RESULTS

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

Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company: Samsung
Project #: 14U17914
Date: 06/13/14
Test Engineer: D. Sblendorio
Configuration: X Position, EUT and AC Adapter
Mode: TX, LTE B17 10MHz 16QAM

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

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 Ch, (709MHz)									
1.418	-19.3	V	3.0	33.1	1.0	-51.3	-13.0	-38.3	
2.127	-29.3	V	3.0	31.6	1.0	-59.9	-13.0	-46.9	
2.836	-29.4	V	3.0	31.0	1.0	-59.4	-13.0	-46.4	
1.418	-17.1	H	3.0	33.1	1.0	-49.2	-13.0	-36.2	
2.127	-27.0	H	3.0	31.6	1.0	-57.6	-13.0	-44.6	
2.836	-30.4	H	3.0	31.0	1.0	-60.4	-13.0	-47.4	
Mid Ch, (710MHz)									
1.420	-15.9	V	3.0	33.1	1.0	-47.9	-13.0	-34.9	
2.130	-25.3	V	3.0	31.6	1.0	-55.9	-13.0	-42.9	
2.840	-29.4	V	3.0	31.0	1.0	-59.4	-13.0	-46.4	
1.420	-4.9	H	3.0	33.1	1.0	-37.0	-13.0	-24.0	
2.130	-19.6	H	3.0	31.6	1.0	-50.2	-13.0	-37.2	
2.840	-19.9	H	3.0	31.0	1.0	-50.0	-13.0	-37.0	
High Ch, (711MHz)									
1.422	-28.4	V	3.0	33.1	1.0	-60.4	-13.0	-47.4	
2.133	-29.4	V	3.0	31.6	1.0	-60.0	-13.0	-47.0	
2.844	-29.5	V	3.0	31.0	1.0	-59.5	-13.0	-46.5	
1.422	-21.7	H	3.0	33.1	1.0	-53.7	-13.0	-40.7	
2.133	-27.4	H	3.0	31.6	1.0	-57.9	-13.0	-44.9	
2.844	-29.7	H	3.0	31.0	1.0	-59.7	-13.0	-46.7	

Rev. 03.03.09

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

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Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company: Samsung
Project #: 14U17914
Date: 06/16/14
Test Engineer: D. Sblendorio / N. Sheridan
Configuration: X Position, EUT and AC Adapter
Mode: TX, LTE B17 10MHz QPSK

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

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 Ch, (709MHz)									
1.418	-15.5	V	3.0	31.0	1.0	-45.4	-13.0	-32.4	
2.127	-17.8	V	3.0	29.5	1.0	-46.3	-13.0	-33.3	
2.836	-21.5	V	3.0	27.4	1.0	-47.9	-13.0	-34.9	
1.418	-14.1	H	3.0	31.0	1.0	-44.1	-13.0	-31.1	
2.127	-23.1	H	3.0	29.5	1.0	-51.7	-13.0	-38.7	
2.836	-22.2	H	3.0	27.4	1.0	-48.6	-13.0	-35.6	
Mid Ch, (710MHz)									
1.420	-23.5	V	3.0	31.0	1.0	-53.5	-13.0	-40.5	
2.130	-10.0	V	3.0	29.5	1.0	-38.6	-13.0	-25.6	
2.840	-22.7	V	3.0	27.4	1.0	-49.0	-13.0	-36.0	
1.420	-12.7	H	3.0	31.0	1.0	-42.7	-13.0	-29.7	
2.130	-22.6	H	3.0	29.5	1.0	-51.1	-13.0	-38.1	
2.840	-22.8	H	3.0	27.4	1.0	-49.2	-13.0	-36.2	
High Ch, (711MHz)									
1.422	-13.1	V	3.0	31.0	1.0	-43.1	-13.0	-30.1	
2.133	-21.0	V	3.0	29.5	1.0	-49.5	-13.0	-36.5	
2.844	-22.0	V	3.0	27.3	1.0	-48.4	-13.0	-35.4	
1.422	-12.5	H	3.0	31.0	1.0	-42.5	-13.0	-29.5	
2.133	-22.2	H	3.0	29.5	1.0	-50.7	-13.0	-37.7	
2.844	-21.8	H	3.0	27.3	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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Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company: Samsung
Project #: 14U17914
Date: 06/16/14
Test Engineer: D. Sblendorio / N. Sheridan
Configuration: X Position, EUT and AC Adapter
Mode: TX, LTE B17 5MHz 16QAM

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

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 Ch, (709MHz)									
1.418	-17.1	V	3.0	31.0	1.0	-47.1	-13.0	-34.1	
2.127	-22.1	V	3.0	29.5	1.0	-50.6	-13.0	-37.6	
2.836	-21.0	V	3.0	27.4	1.0	-47.4	-13.0	-34.4	
1.418	-26.5	H	3.0	31.0	1.0	-56.5	-13.0	-43.5	
2.127	-30.7	H	3.0	29.5	1.0	-59.3	-13.0	-46.3	
2.836	-29.5	H	3.0	27.4	1.0	-55.9	-13.0	-42.9	
Mid Ch, (710MHz)									
1.420	-16.0	V	3.0	31.0	1.0	-46.0	-13.0	-33.0	
2.130	-21.4	V	3.0	29.5	1.0	-50.0	-13.0	-37.0	
2.840	-22.0	V	3.0	27.4	1.0	-48.3	-13.0	-35.3	
1.420	-26.5	H	3.0	31.0	1.0	-56.5	-13.0	-43.5	
2.130	-30.6	H	3.0	29.5	1.0	-59.1	-13.0	-46.1	
2.840	-29.3	H	3.0	27.4	1.0	-55.7	-13.0	-42.7	
High Ch, (711MHz)									
1.422	-18.7	V	3.0	31.0	1.0	-48.6	-13.0	-35.6	
2.133	-22.1	V	3.0	29.5	1.0	-50.6	-13.0	-37.6	
2.844	-22.0	V	3.0	27.3	1.0	-48.3	-13.0	-35.3	
1.422	-28.9	H	3.0	31.0	1.0	-58.8	-13.0	-45.8	
2.133	-30.6	H	3.0	29.5	1.0	-59.1	-13.0	-46.1	
2.844	-29.3	H	3.0	27.3	1.0	-55.7	-13.0	-42.7	

Rev. 03.03.09

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

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Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company: Samsung
Project #: 14U17914
Date: 06/16/14
Test Engineer: D. Sblendorio / N. Sheridan
Configuration: X Position, EUT and AC Adapter
Mode: TX, LTE B17 5MHz QPSK

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

Band: LTE17 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 Ch, (709MHz)									
1.418	-15.7	V	3.0	31.0	1.0	-45.6	-13.0	-32.6	
2.127	-22.7	V	3.0	29.5	1.0	-51.3	-13.0	-38.3	
2.836	-22.3	V	3.0	27.4	1.0	-48.6	-13.0	-35.6	
1.418	-13.1	H	3.0	31.0	1.0	-43.1	-13.0	-30.1	
2.127	-22.7	H	3.0	29.5	1.0	-51.2	-13.0	-38.2	
2.836	-23.8	H	3.0	27.4	1.0	-50.1	-13.0	-37.1	
Mid Ch, (710MHz)									
1.420	-23.6	V	3.0	31.0	1.0	-53.5	-13.0	-40.5	
2.130	-22.7	V	3.0	29.5	1.0	-51.3	-13.0	-38.3	
2.840	-22.0	V	3.0	27.4	1.0	-48.3	-13.0	-35.3	
1.420	-16.0	H	3.0	31.0	1.0	-45.9	-13.0	-32.9	
2.130	-22.6	H	3.0	29.5	1.0	-51.1	-13.0	-38.1	
2.840	-22.3	H	3.0	27.4	1.0	-48.7	-13.0	-35.7	
High Ch, (711MHz)									
1.422	-24.9	V	3.0	31.0	1.0	-54.9	-13.0	-41.9	
2.133	-22.9	V	3.0	29.5	1.0	-51.4	-13.0	-38.4	
2.844	-22.6	V	3.0	27.3	1.0	-48.9	-13.0	-35.9	
1.422	-25.4	H	3.0	31.0	1.0	-55.3	-13.0	-42.3	
2.133	-24.0	H	3.0	29.5	1.0	-52.6	-13.0	-39.6	
2.844	-23.0	H	3.0	27.3	1.0	-49.4	-13.0	-36.4	

Rev. 03.03.09

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

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Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company: Samsung
Project #: 14U17914
Date: 06/12/14
Test Engineer: K.Kedida
Configuration: EUT with AC charger and headset
Mode: TX, LTE BAND 5, 10MHz BW,16QAM

Chamber	Pre-amplifer	Filter	Limit
5m Chamber A	T34 8449B	Filter 1	

Band: LTE5 10MHz 16QAM

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Channel (829MHz)									
1.658	-20.1	V	3.0	37.4	1.0	-56.4	-13.0	-43.4	
2.487	-24.6	V	3.0	36.4	1.0	-59.9	-13.0	-46.9	
3.316	-22.7	V	3.0	35.8	1.0	-57.4	-13.0	-44.4	
1.658	-21.5	H	3.0	37.4	1.0	-57.9	-13.0	-44.9	
2.487	-22.4	H	3.0	36.4	1.0	-57.8	-13.0	-44.8	
3.316	-22.7	H	3.0	35.8	1.0	-57.5	-13.0	-44.5	
Mid Channel (836.5MHz)									
1.673	-22.9	V	3.0	37.3	1.0	-59.2	-13.0	-46.2	
2.509	-22.1	V	3.0	36.4	1.0	-57.5	-13.0	-44.5	
3.346	-22.2	V	3.0	35.8	1.0	-56.9	-13.0	-43.9	
1.673	-21.4	H	3.0	37.3	1.0	-57.7	-13.0	-44.7	
2.509	-24.8	H	3.0	36.4	1.0	-60.2	-13.0	-47.2	
3.346	-22.4	H	3.0	35.8	1.0	-57.2	-13.0	-44.2	
High Channel (844MHz)									
1.688	-21.8	V	3.0	37.3	1.0	-58.1	-13.0	-45.1	
2.532	-22.8	V	3.0	36.3	1.0	-58.2	-13.0	-45.2	
3.376	-22.5	V	3.0	35.7	1.0	-57.2	-13.0	-44.2	
1.688	-19.3	H	3.0	37.3	1.0	-55.6	-13.0	-42.6	
2.532	-25.9	H	3.0	36.3	1.0	-61.3	-13.0	-48.3	
3.376	-22.0	H	3.0	35.7	1.0	-56.7	-13.0	-43.7	

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

1.0

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

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Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company: Samsung
Project #: 14U17914
Date: 06/12/14
Test Engineer: K.Kedida
Configuration: EUT with AC charger and headset
Mode: TX, LTE BAND 5, 10MHz BW,QPSK

Chamber	Pre-amplifer	Filter	Limit
5m Chamber A	T34 8449B	Filter 1	

Band
LTE5
10MHz
QPSK

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Channel (829MHz)									
1.658	-19.8	V	3.0	37.4	1.0	-56.2	-13.0	-43.2	
2.487	-24.1	V	3.0	36.4	1.0	-59.5	-13.0	-46.5	
3.316	-22.4	V	3.0	35.8	1.0	-57.2	-13.0	-44.2	
1.658	-20.1	H	3.0	37.4	1.0	-56.4	-13.0	-43.4	
2.487	-25.4	H	3.0	36.4	1.0	-60.8	-13.0	-47.8	
3.316	-22.4	H	3.0	35.8	1.0	-57.2	-13.0	-44.2	
Mid Channel (836.5MHz)									
1.673	-22.1	V	3.0	37.3	1.0	-58.5	-13.0	-45.5	
2.509	-22.1	V	3.0	36.4	1.0	-57.4	-13.0	-44.4	
3.346	-22.3	V	3.0	35.8	1.0	-57.1	-13.0	-44.1	
1.673	-21.0	H	3.0	37.3	1.0	-57.4	-13.0	-44.4	
2.509	-24.2	H	3.0	36.4	1.0	-59.6	-13.0	-46.6	
3.346	-22.2	H	3.0	35.8	1.0	-57.0	-13.0	-44.0	
High Channel (844MHz)									
1.688	-20.1	V	3.0	37.3	1.0	-56.4	-13.0	-43.4	
2.532	-22.4	V	3.0	36.3	1.0	-57.7	-13.0	-44.7	
3.376	-22.1	V	3.0	35.7	1.0	-56.8	-13.0	-43.8	
1.688	-19.1	H	3.0	37.3	1.0	-55.4	-13.0	-42.4	
2.532	-25.4	H	3.0	36.3	1.0	-60.8	-13.0	-47.8	
3.376	-22.1	H	3.0	35.7	1.0	-56.8	-13.0	-43.8	

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

1.0

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

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Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company: Samsung
Project #: 14U17914
Date: 06/12/14
Test Engineer: K.Kedida
Configuration: EUT with AC charger and headset
Mode: TX, LTE BAND 5, 5MHz BW,16QAM

Chamber	Pre-amplifer	Filter	Limit
5m Chamber A	T34 8449B	Filter 1	

Band: LTE5 5MHz 16QAM

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Channel (826.5MHz)									
1.653	-18.0	V	3.0	37.4	1.0	-54.4	-13.0	-41.4	
2.479	-24.1	V	3.0	36.4	1.0	-59.5	-13.0	-46.5	
3.306	-22.7	V	3.0	35.8	1.0	-57.5	-13.0	-44.5	
1.653	-21.4	H	3.0	37.4	1.0	-57.7	-13.0	-44.7	
2.479	-26.4	H	3.0	36.4	1.0	-61.8	-13.0	-48.8	
3.306	-23.1	H	3.0	35.8	1.0	-57.9	-13.0	-44.9	
Mid Channel (836.5MHz)									
1.673	-17.7	V	3.0	37.3	1.0	-54.1	-13.0	-41.1	
2.509	-22.5	V	3.0	36.4	1.0	-57.9	-13.0	-44.9	
3.346	-22.1	V	3.0	35.8	1.0	-56.8	-13.0	-43.8	
1.673	-21.6	H	3.0	37.3	1.0	-57.9	-13.0	-44.9	
2.509	-25.2	H	3.0	36.4	1.0	-60.5	-13.0	-47.5	
3.346	-22.6	H	3.0	35.8	1.0	-57.4	-13.0	-44.4	
High Channel (846.5MHz)									
1.693	-23.6	V	3.0	37.3	1.0	-59.9	-13.0	-46.9	
2.539	-24.2	V	3.0	36.3	1.0	-59.5	-13.0	-46.5	
3.386	-22.8	V	3.0	35.7	1.0	-57.5	-13.0	-44.5	
1.693	-20.0	H	3.0	37.3	1.0	-56.3	-13.0	-43.3	
2.539	-20.3	H	3.0	36.3	1.0	-55.6	-13.0	-42.6	
3.386	-22.6	H	3.0	35.7	1.0	-57.3	-13.0	-44.3	

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

1.0

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

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Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company: Samsung
Project #: 14U17914
Date: 06/12/14
Test Engineer: K.Kedida
Configuration: EUT with AC charger and headset
Mode: TX, LTE BAND 5, 5MHz BW,QPSK

Chamber	Pre-amplifer	Filter	Limit
5m Chamber A	T34 8449B	Filter 1	

Band: LTE5 5MHz QPSK

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Channel (826.5MHz)									
1.653	-17.6	V	3.0	37.4	1.0	-53.9	-13.0	-40.9	
2.479	-24.0	V	3.0	36.4	1.0	-59.4	-13.0	-46.4	
3.306	-21.9	V	3.0	35.8	1.0	-56.7	-13.0	-43.7	
1.653	-20.1	H	3.0	37.4	1.0	-56.5	-13.0	-43.5	
2.479	-26.1	H	3.0	36.4	1.0	-61.4	-13.0	-48.4	
3.306	-23.1	H	3.0	35.8	1.0	-57.9	-13.0	-44.9	
Mid Channel (836.5MHz)									
1.673	-18.0	V	3.0	37.3	1.0	-54.3	-13.0	-41.3	
2.509	-22.3	V	3.0	36.4	1.0	-57.6	-13.0	-44.6	
3.346	-22.3	V	3.0	35.8	1.0	-57.1	-13.0	-44.1	
1.673	-19.5	H	3.0	37.3	1.0	-55.9	-13.0	-42.9	
2.509	-25.6	H	3.0	36.4	1.0	-61.0	-13.0	-48.0	
3.346	-22.8	H	3.0	35.8	1.0	-57.6	-13.0	-44.6	
High Channel (846.5MHz)									
1.693	-20.5	V	3.0	37.3	1.0	-56.8	-13.0	-43.8	
2.539	-24.1	V	3.0	36.3	1.0	-59.5	-13.0	-46.5	
3.386	-22.7	V	3.0	35.7	1.0	-57.4	-13.0	-44.4	
1.693	-20.0	H	3.0	37.3	1.0	-56.3	-13.0	-43.3	
2.539	-18.6	H	3.0	36.3	1.0	-54.0	-13.0	-41.0	
3.386	-12.5	H	3.0	35.7	1.0	-47.2	-13.0	-34.2	

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

1.0

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

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Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company: Samsung
Project #: 14U17914
Date: 06/12/14
Test Engineer: K.Kedida
Configuration: X-pos. EUT with AC charger & HS
Mode: Tx, 1900MHz HSDPA

Chamber	Pre-amplifer	Filter	Limit
5m Chamber A	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	-7.3	V	3.0	35.4	1.0	-41.7	-13.0	-28.7	
5.557	-17.4	V	3.0	34.7	1.0	-51.1	-13.0	-38.1	
7.409	-8.3	V	3.0	34.9	1.0	-42.2	-13.0	-29.2	
3.705	-9.2	H	3.0	35.4	1.0	-43.6	-13.0	-30.6	
5.557	-16.5	H	3.0	34.7	1.0	-50.2	-13.0	-37.2	
7.409	-6.3	H	3.0	34.9	1.0	-40.2	-13.0	-27.2	
Mid Ch, 1880MHz									
3.760	-11.6	V	3.0	35.3	1.0	-45.9	-13.0	-32.9	
5.640	-15.7	V	3.0	34.7	1.0	-49.5	-13.0	-36.5	
7.520	-15.1	V	3.0	34.9	1.0	-49.0	-13.0	-36.0	
3.760	-12.1	H	3.0	35.3	1.0	-46.4	-13.0	-33.4	
5.640	-17.0	H	3.0	34.7	1.0	-50.8	-13.0	-37.8	
7.520	-13.7	H	3.0	34.9	1.0	-47.6	-13.0	-34.6	
High Ch, 1907.6MHz									
3.815	-10.2	V	3.0	35.3	1.0	-44.5	-13.0	-31.5	
5.723	-17.3	V	3.0	34.7	1.0	-51.0	-13.0	-38.0	
7.630	-14.5	V	3.0	34.9	1.0	-48.5	-13.0	-35.5	
3.815	-12.5	H	3.0	35.3	1.0	-46.8	-13.0	-33.8	
5.723	-14.3	H	3.0	34.7	1.0	-48.0	-13.0	-35.0	
7.630	-13.9	H	3.0	34.9	1.0	-47.9	-13.0	-34.9	

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Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company: Samsung
Project #: 14U17914
Date: 06/12/14
Test Engineer: K.Kedida
Configuration: X-pos. EUT with AC charger & HS
Mode: Tx, 1900MHz HSDPA

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

Band

Band 2

REL99

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	-4.4	V	3.0	35.4	1.0	-38.8	-13.0	-25.8	
5.557	-14.4	V	3.0	34.7	1.0	-48.1	-13.0	-35.1	
7.409	-9.4	V	3.0	34.9	1.0	-43.3	-13.0	-30.3	
3.705	-7.4	H	3.0	35.4	1.0	-41.8	-13.0	-28.8	
5.557	-15.4	H	3.0	34.7	1.0	-49.1	-13.0	-36.1	
7.409	-5.8	H	3.0	34.9	1.0	-39.7	-13.0	-26.7	
Mid Ch, 1880MHz									
3.760	-7.5	V	3.0	35.3	1.0	-41.9	-13.0	-28.9	
5.640	-14.1	V	3.0	34.7	1.0	-47.8	-13.0	-34.8	
7.520	-14.2	V	3.0	34.9	1.0	-48.2	-13.0	-35.2	
3.760	-10.4	H	3.0	35.3	1.0	-44.8	-13.0	-31.8	
5.640	-16.0	H	3.0	34.7	1.0	-49.8	-13.0	-36.8	
7.520	-12.4	H	3.0	34.9	1.0	-46.3	-13.0	-33.3	
High Ch, 1907.6MHz									
3.815	-5.3	V	3.0	35.3	1.0	-39.5	-13.0	-26.5	
5.723	-16.4	V	3.0	34.7	1.0	-50.1	-13.0	-37.1	
7.630	-13.3	V	3.0	34.9	1.0	-47.2	-13.0	-34.2	
3.815	-9.0	H	3.0	35.3	1.0	-43.3	-13.0	-30.3	
5.723	-12.1	H	3.0	34.7	1.0	-45.8	-13.0	-32.8	
7.630	-11.1	H	3.0	34.9	1.0	-45.1	-13.0	-32.1	

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Band

Band 5

HSDPA

Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company: Samsung
Project #: 14U17914
Date: 06/13/14
Test Engineer: O. Stoelting, N. Sheridan
Configuration: X-position EUT and AC Adapter w/ Headphones
Mode: WCDMA_HSDPA_ 850

Chamber	Pre-amplifer	Filter	Limit
5m Chamber A	T34 8449B	Filter 1	Part 22

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	-21.5	V	3.0	37.4	1.0	-57.9	-13.0	-44.9	
2.479	-24.2	V	3.0	36.4	1.0	-59.6	-13.0	-46.6	
3.306	-22.0	V	3.0	35.8	1.0	-56.8	-13.0	-43.8	
1.652	-24.6	H	3.0	37.4	1.0	-61.0	-13.0	-48.0	
2.479	-25.9	H	3.0	36.4	1.0	-61.3	-13.0	-48.3	
3.306	-22.1	H	3.0	35.8	1.0	-56.9	-13.0	-43.9	
Mid Ch, 836.6MHz									
1.673	-19.4	V	3.0	37.3	1.0	-55.7	-13.0	-42.7	
2.510	-23.6	V	3.0	36.4	1.0	-58.9	-13.0	-45.9	
3.346	-22.3	V	3.0	35.8	1.0	-57.0	-13.0	-44.0	
1.673	-22.5	H	3.0	37.3	1.0	-58.8	-13.0	-45.8	
2.510	-24.6	H	3.0	36.4	1.0	-59.9	-13.0	-46.9	
3.346	-22.2	H	3.0	35.8	1.0	-57.0	-13.0	-44.0	
High Ch, 846.6MHz									
1.693	-21.9	V	3.0	37.3	1.0	-58.2	-13.0	-45.2	
2.539	-24.0	V	3.0	36.3	1.0	-59.4	-13.0	-46.4	
3.386	-22.0	V	3.0	35.7	1.0	-56.7	-13.0	-43.7	
1.693	-22.5	H	3.0	37.3	1.0	-58.8	-13.0	-45.8	
2.539	-25.6	H	3.0	36.3	1.0	-61.0	-13.0	-48.0	
3.386	-22.1	H	3.0	35.7	1.0	-56.8	-13.0	-43.8	

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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 #: 14U17914
Date: 06/13/14
Test Engineer: O. Stoelting
Configuration: X-pos. EUT with AC charger & HS
Mode: WCDMA_Rel 99_ 850

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

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	-16.8	V	3.0	37.4	1.0	-53.1	-13.0	-40.1	
2.479	-23.8	V	3.0	36.4	1.0	-59.2	-13.0	-46.2	
3.306	-22.0	V	3.0	35.8	1.0	-56.7	-13.0	-43.7	
1.652	-19.1	H	3.0	37.4	1.0	-55.4	-13.0	-42.4	
2.479	-25.9	H	3.0	36.4	1.0	-61.3	-13.0	-48.3	
3.306	-22.1	H	3.0	35.8	1.0	-56.9	-13.0	-43.9	
Mid Ch, 836.6MHz									
1.673	-18.3	V	3.0	37.3	1.0	-54.6	-13.0	-41.6	
2.510	-23.5	V	3.0	36.4	1.0	-58.8	-13.0	-45.8	
3.346	-21.9	V	3.0	35.8	1.0	-56.7	-13.0	-43.7	
1.673	-22.7	H	3.0	37.3	1.0	-59.1	-13.0	-46.1	
2.510	-25.3	H	3.0	36.4	1.0	-60.7	-13.0	-47.7	
3.346	-22.1	H	3.0	35.8	1.0	-56.8	-13.0	-43.8	
High Ch, 846.6MHz									
1.693	-19.1	V	3.0	37.3	1.0	-55.4	-13.0	-42.4	
2.539	-23.5	V	3.0	36.3	1.0	-58.9	-13.0	-45.9	
3.386	-21.6	V	3.0	35.7	1.0	-56.4	-13.0	-43.4	
1.693	-19.6	H	3.0	37.3	1.0	-55.9	-13.0	-42.9	
2.539	-25.0	H	3.0	36.3	1.0	-60.3	-13.0	-47.3	
3.386	-22.0	H	3.0	35.7	1.0	-56.7	-13.0	-43.7	

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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 #: 14U17914
Date: 06/12/14
Test Engineer: K.Kedida
Configuration: X-pos. EUT w/ ac charger & HS
Mode: GPRS 1900

Chamber	Pre-amplifer	Filter	Limit
5m Chamber A	T343 8449B	Filter 1	Part 24

Band

GSM1900

GPRS

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									
3.700	5.7	V	3.0	35.4	1.0	-28.7	-13.0	-15.7	
5.550	-1.6	V	3.0	34.7	1.0	-35.4	-13.0	-22.4	
7.400	-10.5	V	3.0	34.9	1.0	-44.4	-13.0	-31.4	
3.700	0.8	H	3.0	35.4	1.0	-33.6	-13.0	-20.6	
5.550	-5.8	H	3.0	34.7	1.0	-39.5	-13.0	-26.5	
7.400	-1.0	H	3.0	34.9	1.0	-34.9	-13.0	-21.9	
Mid Ch, 1880.0MHz									
3.760	5.6	V	3.0	35.3	1.0	-28.7	-13.0	-15.7	
5.640	3.1	V	3.0	34.7	1.0	-30.6	-13.0	-17.6	
7.520	-10.5	V	3.0	34.9	1.0	-44.5	-13.0	-31.5	
3.760	1.5	H	3.0	35.3	1.0	-32.9	-13.0	-19.9	
5.640	2.3	H	3.0	34.7	1.0	-31.4	-13.0	-18.4	
7.520	1.4	H	3.0	34.9	1.0	-32.5	-13.0	-19.5	
High Ch, 1909.8 MHz									
3.820	6.9	V	3.0	35.3	1.0	-27.4	-13.0	-14.4	
5.729	-2.7	V	3.0	34.7	1.0	-36.4	-13.0	-23.4	
7.639	-8.8	V	3.0	35.0	1.0	-42.8	-13.0	-29.8	
3.820	2.4	H	3.0	35.3	1.0	-31.9	-13.0	-18.9	
5.729	2.5	H	3.0	34.7	1.0	-31.2	-13.0	-18.2	
7.639	0.6	H	3.0	35.0	1.0	-33.3	-13.0	-20.3	

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