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

CERTIFICATION TEST REPORT

FOR

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

MODEL NUMBER: SM-G5108Q

FCC ID: A3LSMG5108Q

REPORT NUMBER: 14U18462-E1 REVISION A

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NVLAP LAB CODE 200065-0

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Rev.	Issue Date	Revisions	Revised By
-	8/26/14	Initial issue	P. Zhang
A	9/3/14	Updated LTE B41 test data	P. Zhang

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME:	SAMSUNG ELECTRONICS CO., LTD.
EUT DESCRIPTION:	GSM/WCDMA Phone + Bluetooth, WLAN 2.4GHz b/g/n & ANT+
MODEL:	SM-G5108Q
SERIAL NUMBER:	FL-311-A, FL-311-B, FL-311-C (Radiated & Conducted)
DATE TESTED:	AUGUST 4-SEP 3, 2014

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
FCC PART 22H, 24E, and 27M	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, and FCC CFR Part 27.

3. FACILITIES AND ACCREDITATION

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

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

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

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

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

4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

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

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

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

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4.3. MEASUREMENT UNCERTAINTY

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

PARAMETER	UNCERTAINTY
Conducted Disturbance, 0.15 to 30 MHz	3.52 dB
Radiated Disturbance, 30 to 26000 MHz	4.94 dB

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

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5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a GSM/WCDMA Phone + Bluetooth, WLAN 2.4GHz b/g/n & ANT+.

5.2. MAXIMUM OUTPUT POWER

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

FCC Part 22/24						
Band	Frequency Range(MHz)	Modulation	Conducted		Radiated	
		Peak	Avg	mW	Avg	mW
GSM850	824~849	GMSK	33.0	1995.26		
	824~849	GPRS	33.0	1995.26	32.1	1614.73
	824~849	EGPRS	27.1	512.86	27.8	603.95
GSM1900	1850~1910	GMSK	30.5	1122.02		
	1850~1910	GPRS	29.5	1122.02	31.6	1458.81
	1850~1910	EGPRS	26.3	426.58	28.0	629.51
Band 5	824~849	REL99	22.7	186.21	22.5	176.64
	824~849	HSDPA	21.6	141.25	21.4	138.71
	824~849	HSUPA	21.8	151.36		
Band 2	1850~1910	REL99	22.2	165.96	26.7	472.06
	1850~1910	HSDPA	21.2	131.83	25.5	350.75
	1850~1910	HSUPA	21.2	131.83		

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5.1. 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	mW	Avg	mW
LTE41	2496~2690	20MHz	QPSK	22.8	190.55	18.803	75.91
	2496~2690	20MHz	16QAM	21.8	151.36	17.991	62.97

FCC Part 27							
Band	Frequency Range(MHz)	BandWidth (MHz)	Modulation	Conducted		Radiated	
			Peak	Avg	mW	Avg	mW
LTE41	2496~2690	15MHz	QPSK	22.7	186.21	19.011	79.63
	2496~2690	15MHz	16QAM	21.8	151.36	17.911	61.82

FCC Part 27							
Band	Frequency Range(MHz)	BandWidth (MHz)	Modulation	Conducted		Radiated	
			Peak	Avg	mW	Avg	mW
LTE41	2496~2690	10MHz	QPSK	22.7	186.21	18.971	78.9
	2496~2690	10MHz	16QAM	21.8	151.36	18.383	68.91

FCC Part 27							
Band	Frequency Range(MHz)	BandWidth (MHz)	Modulation	Conducted		Radiated	
			Peak	Avg	mW	Avg	mW
LTE41	2496~2690	5MHz	QPSK	22.9	194.98	19.011	79.63
	2496~2690	5MHz	16QAM	21.8	151.36	18.073	64.17

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5.2. DESCRIPTION OF AVAILABLE ANTENNAS

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

Frequency (MHz)	Peak Gain (dBi)
Band 5, 824~849MHz	-2.78
Band 2, 1850~1910MHz	-0.35
LTE Band 41 2496~2680MHz	1.79

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5.3. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
AC Adapter	Samsung	SM-G5108Q	ETA0U93CBC	N/A
Earphone	Samsung	SM-G5108Q	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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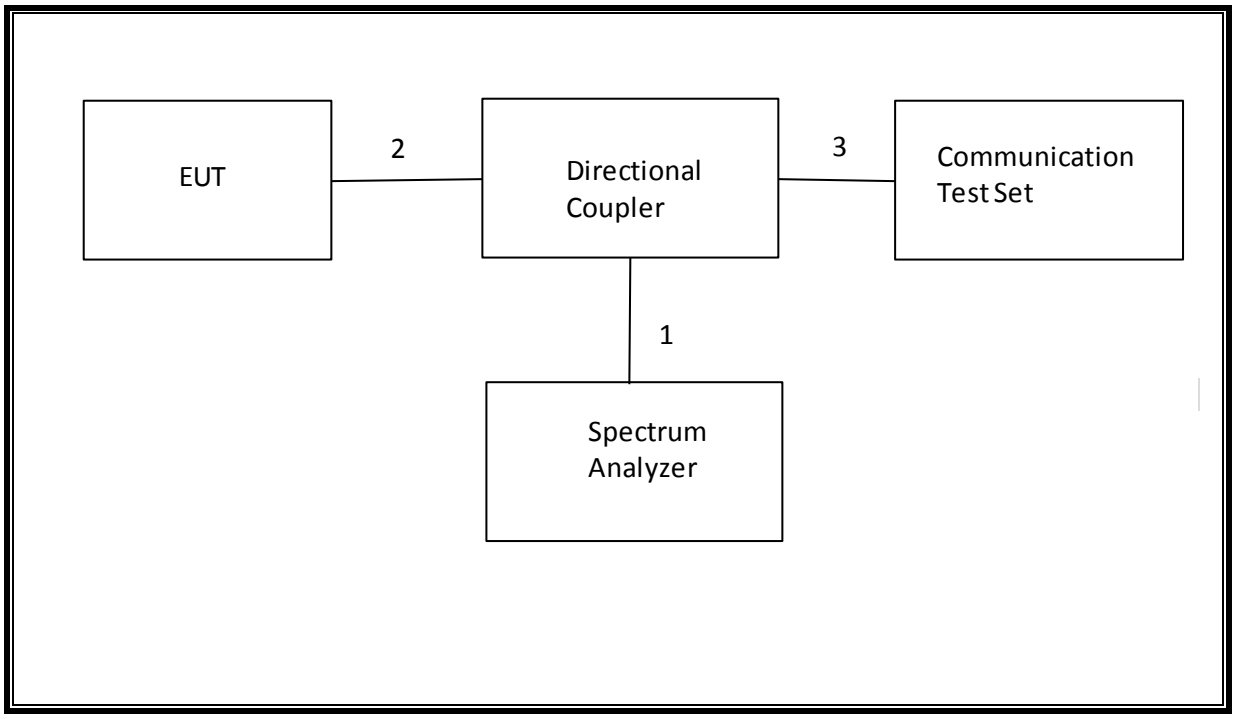
SETUP DIAGRAM FOR TESTS (CONDUCTED TEST SETUP)



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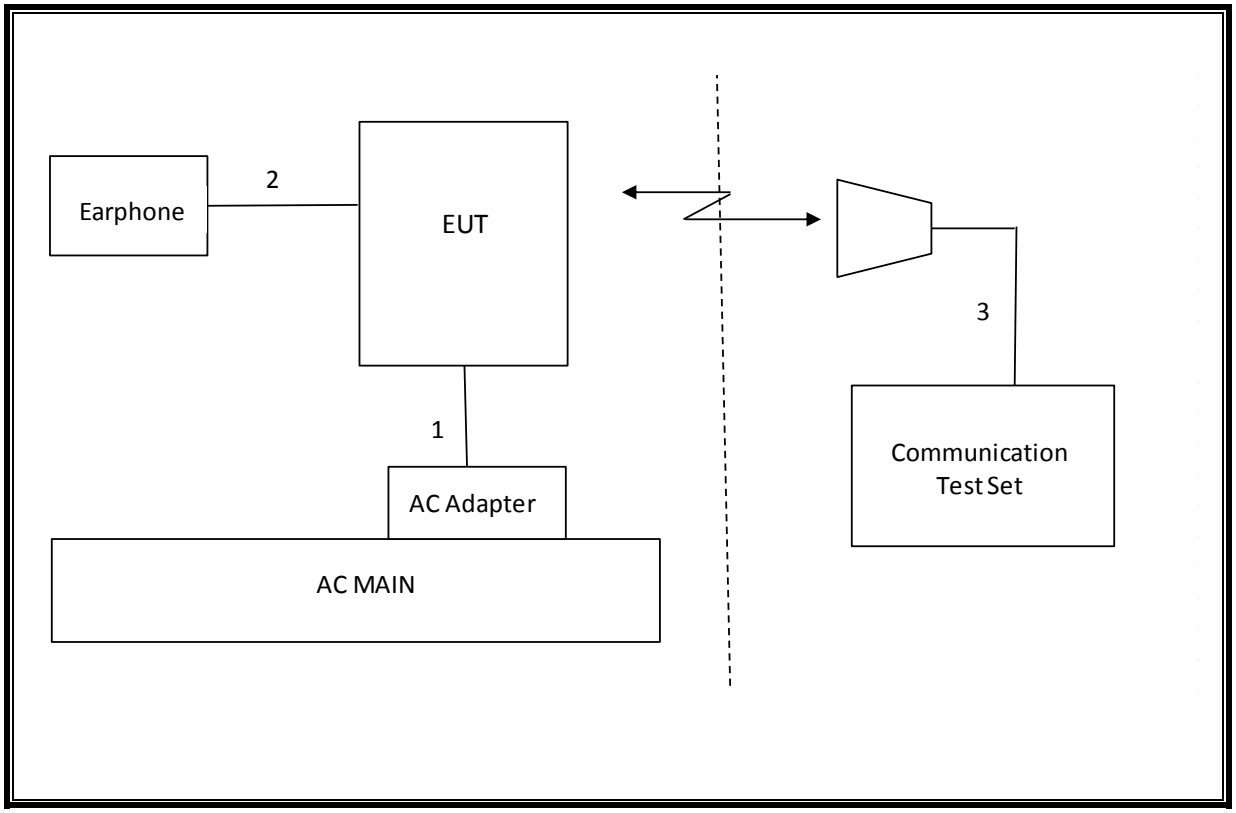
SETUP DIAGRAM FOR TESTS (RADIATED TEST SETUP)



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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	08/14/15
Antenna, Horn, 18 GHz	EMCO	3115	C00783	10/25/14
Antenna, Horn, 18 GHz	EMCO	3115	C00784	10/25/14
Highpass Filter, 2.7 GHz	Micro-Tronics	HPM13194	N02687	CNR
Highpass Filter, 1.5 GHz	Micro-Tronics	HPM13193	N02688	CNR
Temperature / Humidity Chamber	Thermotron	SE 600-10-10	C00930	01/09/15
Communications Test Set	R&S	CMW500	T970	07/25/15
DC power supply, 8 V @ 3 A or 15 V	Agilent / HP	E3610A	None	CNR
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	4.222MHz
22.917(a) 24.238(a)	RSS-132(4.5.1) RSS-133(6.5.1)	Band Edge / Conducted Spurious Emission	-13dBm		Pass	-27.487dBm
27.53(m)	RSS-199(4.5)		-25dBm		Pass	-30.06dBm
2.1046	N/A	Conducted output power	N/A		Pass	33dBm
27.53(m)	RSS-199(4.5)	Emission Mask			Pass	
22.355 24.235 27.54	RSS-132(4.3) RSS-133(6.3) RSS-199(4.3)	Frequency Stability	2.5PPM		Pass	0.019PPM
22.913(a)(2)	RSS-132(4.4)	Effective Radiated Power	38 dBm	Radiated	Pass	32.1dBm
24.232(c) 27.50(h)(2)	RSS-133(6.4) RSS-199(4.4)	Equivalent Isotropic Radiated Power	33dBm		Pass	31.64dBm
22.917(a) 24.238(a)	RSS-132(4.5.1) RSS-133(6.5.1)	Radiated Spurious Emission	-13dBm		Pass	-29.9dBm
27.53(m)	RSS-199(4.5)		-25dBm		Pass	-32.9dBm

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8. RF POWER OUTPUT VERIFICATION

8.1. GSM/GPRS/EDGE

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

Press Connection control to choose the different menus

Press RESET > choose all to reset all settings

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

Network Support > GSM+GPRS or GSM+EGPRS

Main Service > Packet Data

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

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

> Slot configuration > Uplink/Gamma

> 33 dBm for GPRS 850/900

> 30 dBm for GPRS1800/1900

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

Frequency Offset > + 0 Hz

Mode > BCCH and TCH

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

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

Channel Type > Off

P0> 4 dB

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

TCH > choose desired test channel

Hopping > Off

Main Timeslot > 3 (Default)

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

Bit Stream > 2E9-1PSR Bit Pattern

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

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

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8.1.1. GSM OUTPUT POWER RESULT

Band	Mode	Ch.	f(MHz)	1 time slot	2 time slot	3 time slot	4 time slot
				Peak (dBm)	Peak (dBm)	Peak (dBm)	Peak (dBm)
GSM850	GMSK	128	824.2	33.0			
		190	836.6	32.9			
		251	848.8	32.8			
	GPRS	128	824.2	33.0	28.6	27.3	25.5
		190	836.6	32.9	28.8	27.5	25.5
		251	848.8	32.8	29.0	27.5	25.7
	EGPRS	128	824.2	26.9	25.1	22.5	22.3
		190	836.6	27.0	25.2	22.6	22.3
		251	848.8	27.1	25.3	22.8	22.5
GSM1900	GMSK	512	1850.2	29.3			
		661	1880	29.5			
		810	1909.8	29.4			
	GPRS	512	1850.2	29.3	26.4	24.0	22.8
		661	1880	29.5	26.4	24.3	22.9
		810	1909.8	29.4	26.5	24.4	22.9
	EGPRS	512	1850.2	26.3	24.3	22.3	22.0
		661	1880	26.3	24.3	22.4	22.1
		810	1909.8	26.3	24.4	22.4	22.2

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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	22.6
		4183	836.6	22.6
		4233	846.6	22.7
Band 2	REL99	9262	1852.4	22.2
		9400	1880	22.1
		9538	1907.6	22.2

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8.3. UMTS HSDPA

TEST PROCEDURE

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			

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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	21.6
			4183	836.6	21.6
			4233	846.6	21.6
		2	4132	826.4	21.2
			4183	836.6	21.1
			4233	846.6	21.4
		3	4132	826.4	21.0
			4183	836.6	21.0
			4233	846.6	21.1
		4	4132	826.4	21.0
			4183	836.6	21.0
			4233	846.6	21.1
Band 2	HSDPA	1	9262	1852.4	21.2
			9400	1880	21.0
			9538	1907.6	21.2
		2	9262	1852.4	20.2
			9400	1880	20.0
			9538	1907.6	20.2
		3	9262	1852.4	20.5
			9400	1880	20.3
			9538	1907.6	20.8
		4	9262	1852.4	20.6
			9400	1880	20.5
			9538	1907.6	20.1

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8.4. 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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8.4.1. UMTS HSUPA OUTPUT POWER RESULT

Band	Mode	Subset	Ch.	f(MHz)	Conducted Power (dBm) Avg (dBm)
Band 5	HSUPA	1	4132	826.4	21.4
			4183	836.6	21.8
			4233	846.6	21.0
		2	4132	826.4	20.1
			4183	836.6	20.2
			4233	846.6	20.1
		3	4132	826.4	20.3
			4183	836.6	20.1
			4233	846.6	20.6
		4	4132	826.4	20.3
			4183	836.6	20.6
			4233	846.6	20.6
		5	4132	826.4	21.7
			4183	836.6	21.6
			4233	846.6	21.7
Band 2	HSUPA	1	9262	1852.4	21.1
			9400	1880	20.5
			9538	1907.6	21.2
		2	9262	1852.4	20.5
			9400	1880	19.6
			9538	1907.6	19.8
		3	9262	1852.4	20.2
			9400	1880	19.8
			9538	1907.6	20.0
		4	9262	1852.4	20.4
			9400	1880	20.2
			9538	1907.6	20.0
		5	9262	1852.4	21.2
			9400	1880	21.0
			9538	1907.6	21.1

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8.1. LTE OUTPUT VERIFICATION

8.1.1. LTE OUTPUT RESULT

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Avg Pwr (dBm)		
						39750	40620	41490
						2506 MHz	2593 MHz	2680 MHz
LTE Band 41	20	QPSK	1	0	0	22.4	22.5	22.0
			1	49	0	**22.8**	**22.8**	**22.6**
			1	99	0	22.5	22.4	22.0
			50	0	1	**21.8**	21.9	21.5
			50	24	1	21.8	**22.0**	**21.7**
			50	50	1	21.7	21.8	21.5
			100	0	1	21.8	21.9	21.5
		16QAM	1	0	1	21.5	21.5	21.0
			1	49	1	21.8	21.8	21.4
			1	99	1	21.6	21.4	21.0
			50	0	2	20.8	21.0	20.6
			50	24	2	20.8	21.0	20.9
			50	50	2	20.7	20.8	20.7
			100	0	2	20.8	21.0	20.7
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Avg Pwr (dBm)		
						39725	40620	41515
						2503.5 MHz	2593 MHz	2682.5 MHz
LTE Band 41	15	QPSK	1	0	0	22.1	22.7	22.2
			1	37	0	22.4	22.7	22.2
			1	74	0	22.3	22.6	22.0
			36	0	1	21.5	21.9	21.7
			36	20	1	21.6	21.0	21.7
			36	39	1	21.7	21.9	21.7
			75	0	1	21.6	21.9	21.6
		16QAM	1	0	1	21.2	21.8	21.4
			1	37	1	21.4	21.8	21.5
			1	74	1	21.4	21.7	21.0
			36	0	2	20.6	20.8	20.9
			36	20	2	20.7	20.9	20.9
			36	39	2	20.8	21.0	20.8
			75	0	2	20.7	21.0	20.7
Band	BW	Mode	RB	RB	Target	Avg Pwr (dBm)		

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	(MHz)		Allocation	offset	MPR	39700	40620	41540
						2501 MHz	2593 MHz	2685 MHz
LTE Band 41	10	QPSK	1	0	0	22.2	22.7	22.3
			1	25	0	22.3	22.7	22.3
			1	49	0	22.2	22.5	22.0
			25	0	1	21.5	21.9	21.7
			25	12	1	21.6	22.0	21.8
			25	25	1	21.6	21.9	21.6
			50	0	1	21.6	22.0	21.7
		16QAM	1	0	1	21.2	21.7	21.5
			1	25	1	21.4	21.8	21.6
			1	49	1	21.2	21.6	21.1
			25	0	2	20.6	20.9	20.9
			25	12	2	20.7	20.9	20.9
			25	25	2	20.7	21.0	20.8
			50	0	2	20.7	20.9	20.9
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Avg Pwr (dBm)		
						39675	40620	41565
						2498.5 MHz	2593 MHz	2687.5 MHz
LTE Band 41	5	QPSK	1	0	0	22.4	22.9	22.3
			1	12	0	22.4	22.6	22.2
			1	24	0	22.4	22.7	22.0
			12	0	1	21.6	21.9	21.7
			12	7	1	21.5	21.9	21.6
			12	13	1	21.6	22.0	21.6
			25	0	1	21.5	21.9	21.7
		16QAM	1	0	1	21.5	21.8	21.5
			1	12	1	21.5	21.7	21.4
			1	24	1	21.5	21.7	21.2
			12	0	2	20.7	20.9	21.0
			12	7	2	20.7	20.9	20.9
			12	13	2	20.7	20.9	20.8
			25	0	2	20.6	20.9	20.8

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9. PEAK TO AVERAGE RATIO

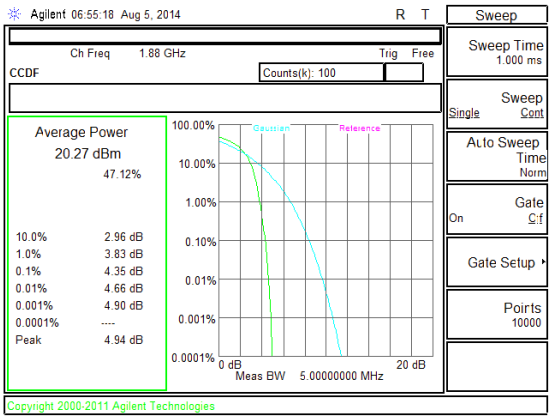
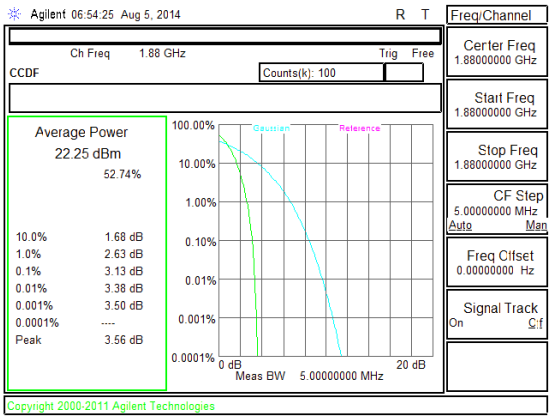
Test Procedure

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 Band 2 HSDPA	 Band WCDMA B2 HSDPA	 Band WCDMA B2 REL99

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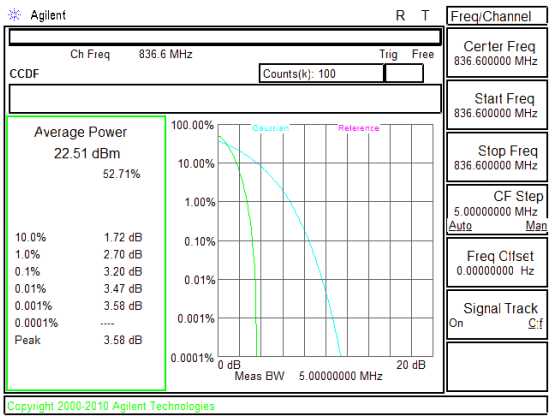
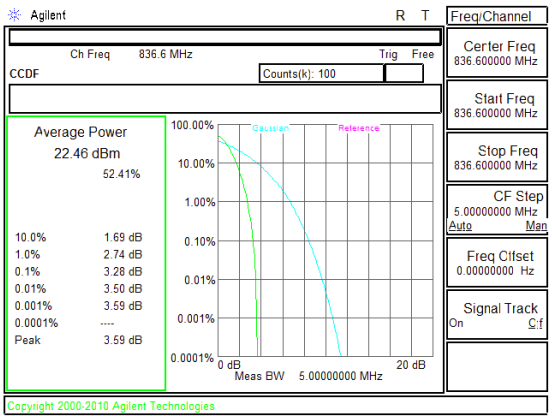
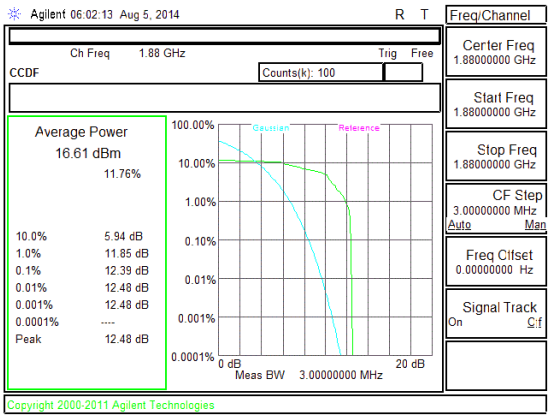
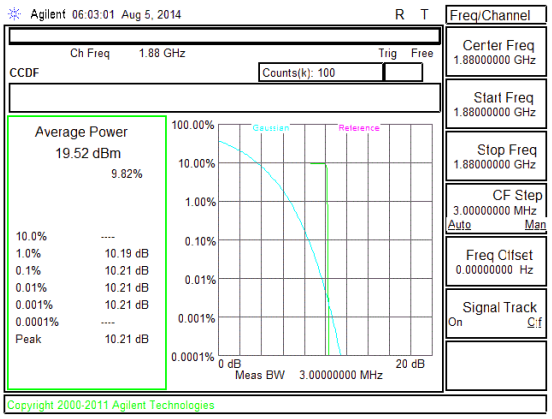
Band Band 5 HSDPA	 Band WCDMA B5 HSDPA	 Band WCDMA B5 REL99
Band GSM1900	 EGPRS	 GPRS

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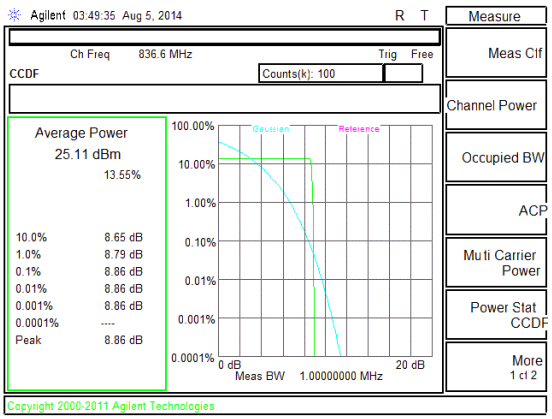
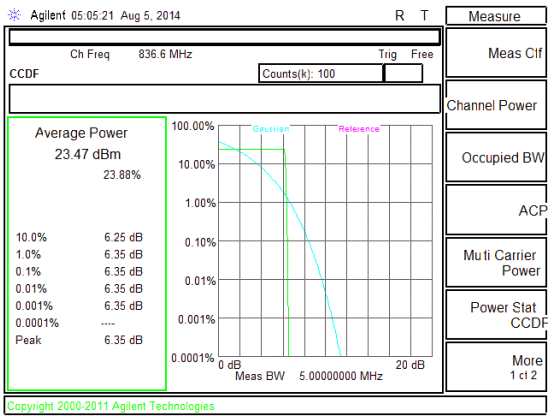
Band GSM850	 EGPRS	 GPRS

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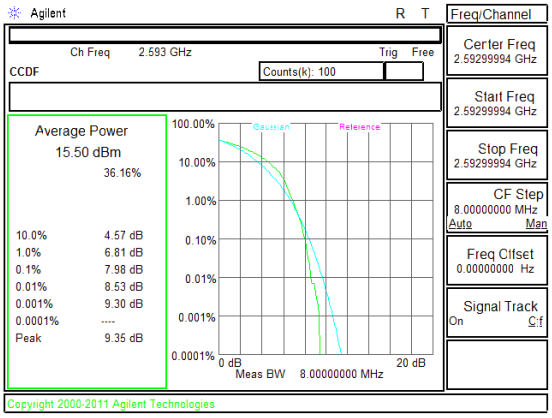
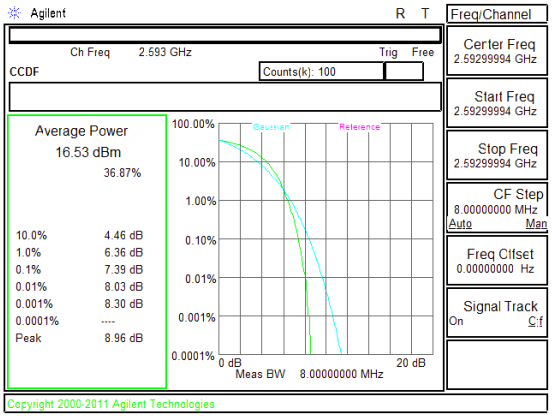
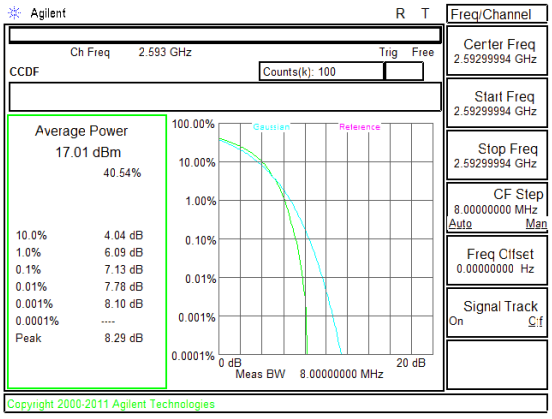
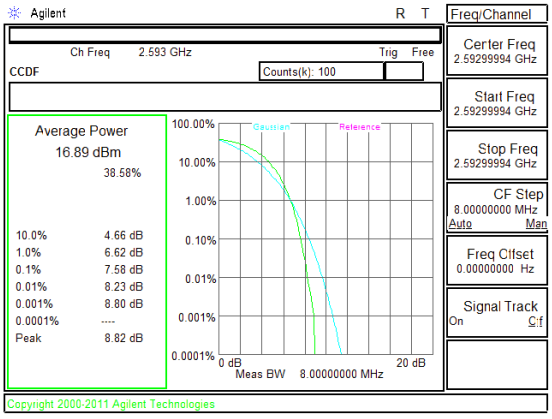
LTE Band 41

Band LTE41 20MHz 16QAM	 Band LTE41 20MHz 16QAM Mid channel	 Band LTE41 20MHz QPSK Mid channel
Band LTE41 15MHz 16QAM	 Band LTE41 15MHz 16QAM Mid channel	 Band LTE41 15MHz QPSK Mid channel

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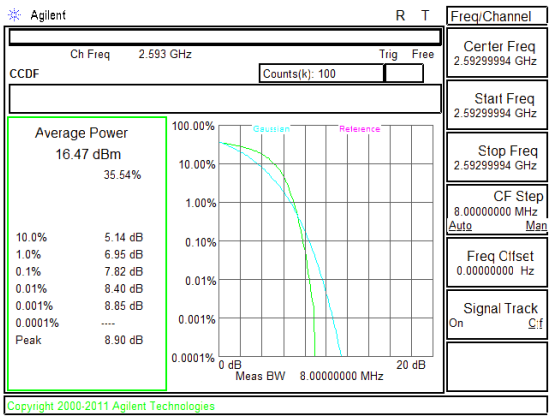
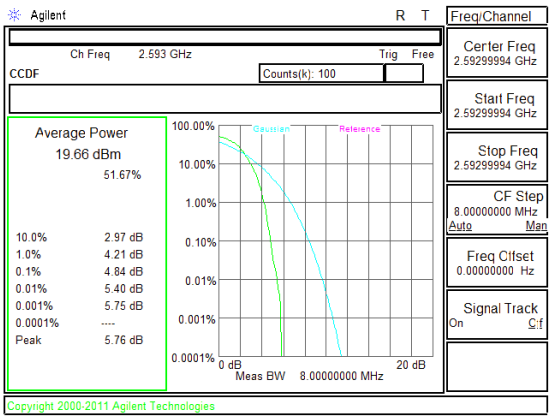
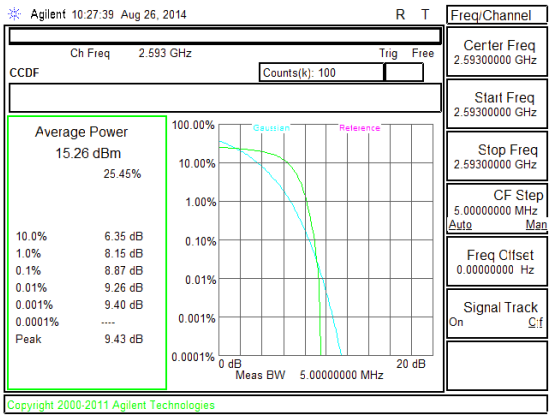
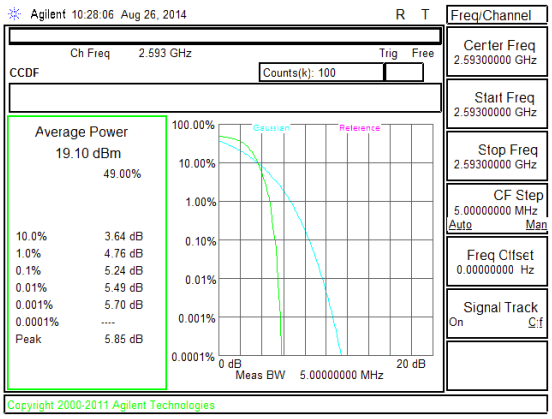
Band LTE41 10MHz 16QAM	 Band LTE41 10MHz 16QAM Mid channel	 Band LTE41 10MHz QPSK Mid channel
Band LTE41 5MHz 16QAM	 Band LTE41 5MHz 16QAM Mid channel	 Band LTE41 5MHz QPSK Mid channel

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10. LIMITS AND CONDUCTED RESULTS

10.1. OCCUPIED BANDWIDTH

RULE PART(S)

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

LIMITS

For reporting purposes only

TEST PROCEDURE

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

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

MODES TESTED

GSM 850, GSM1900, WCDMA Band 2 and Band 5, LTE Band 41

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10.1.1. OCCUPIED BANDWIDTH RESULTS

Band	Mode	Channel	f (MHz)	99% BW (KHz)	-26dB BW (KHz)
GSM850	GMSK	128	824.2		
		190	836.6		
		251	848.8		
	GPRS	128	824.2	252.6	325.3
		190	836.6	251.4	328.4
		251	848.8	249.3	336.4
	EGPRS	128	824.2	243.9	329
		190	836.6	244.7	329.5
		251	848.8	245.2	327.2
GSM1900	GMSK	512	1850.2		
		661	1880		
		810	1909.8		
	GPRS	512	1850.2	252.1	338.5
		661	1880	251.9	338
		810	1909.8	248.1	335.3
	EGPRS	512	1850.2	251	336.5
		661	1880	253.6	335.8
		810	1909.8	248.7	333.7

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Band	Mode	Channel	f (MHz)	99% BW (MHz)	-26dB BW (MHz)
Band 5	REL99	4132	826.4	4.14	4.495
		4183	836.6	4.119	4.585
		4233	846.6	4.222	4.538
	HSDPA	4132	826.4	4.149	4.604
		4183	836.6	4.12	4.502
		4233	846.6	4.175	4.493
	HSUPA	4132	826.4		
		4183	836.6		
		4233	846.6		
Band 2	REL99	9262	1852.4	4.141	4.634
		9400	1880	4.145	4.628
		9538	1907.6	4.138	4.649
	HSDPA	9262	1852.4	4.156	4.633
		9400	1880	4.161	4.632
		9538	1907.6	4.144	4.64
	HSUPA	9262	1852.4		
		9400	1880		
		9538	1907.6		

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10.1.1. LTE OCCUPIED BANDWIDTH RESULTS

Band	BW(MHz)	Mode	RB/RB Size	f (MHz)	99% BW (MHz)	-26dB BW (MHz)
LTE41	20	QPSK	100/0	2506	18.193	30.00
			100/0	2593	17.907	29.69
			100/0	2680	17.931	29.57
		16QAM	100/0	2506	18.229	30.00
			100/0	2593	17.978	29.94
			100/0	2680	17.903	29.28

Band	BW(MHz)	Mode	RB/RB Size	f (MHz)	99% BW (MHz)	-26dB BW (MHz)
LTE41	15	QPSK	75/0	2503.5	13.595	20.00
			75/0	2593	13.467	20.00
			75/0	2682.5	13.429	20.00
		16QAM	75/0	2503.5	13.632	20.00
			75/0	2593	13.477	20.00
			75/0	2682.5	13.467	19.97

Band	BW(MHz)	Mode	RB/RB Size	f (MHz)	99% BW (MHz)	-26dB BW (MHz)
LTE41	10	QPSK	50/0	2501	9.733	15.00
			50/0	2593	9.021	15.00
			50/0	2685	8.970	14.84
		16QAM	50/0	2501	9.618	15.00
			50/0	2593	8.989	15.00
			50/0	2685	9.007	14.93

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Band	BW(MHz)	Mode	RB/RB Size	f (MHz)	99% BW (MHz)	-26dB BW (MHz)
LTE41	5	QPSK	25/0	2498.5	4.518	6.00
			25/0	2593	4.677	9.94
			25/0	2687.5	4.530	9.75
		16QAM	25/0	2498.5	4.534	6.00
			25/0	2593	4.587	10.00
			25/0	2687.5	4.515	9.39

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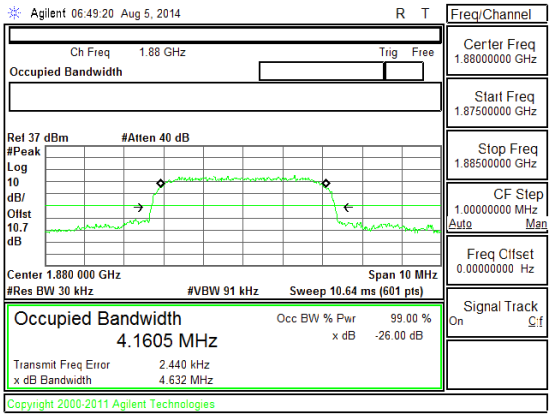
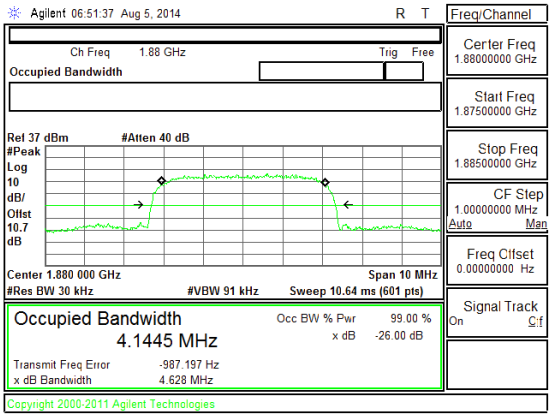
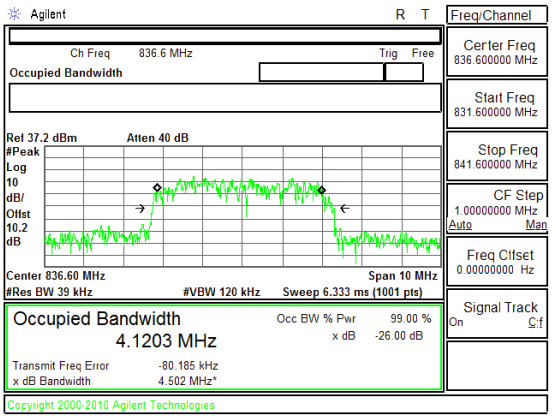
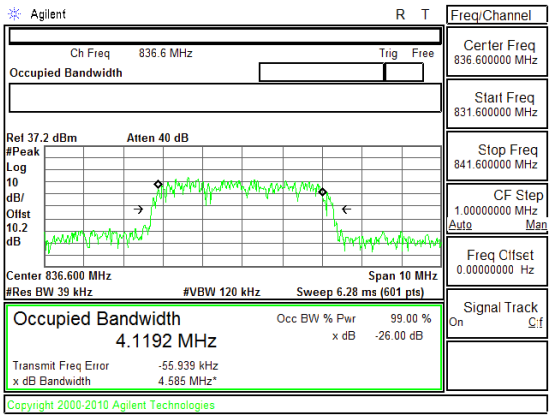
10.1.1. OCCUPIED BANDWIDTH PLOTS

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

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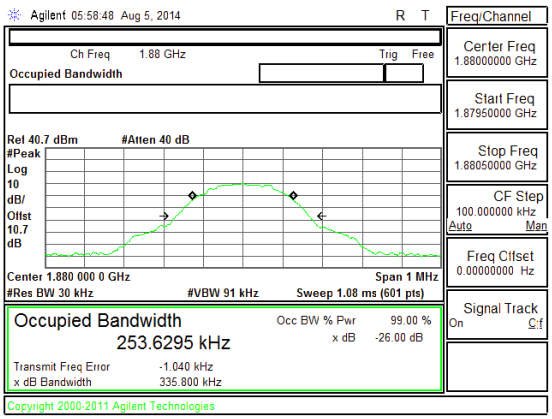
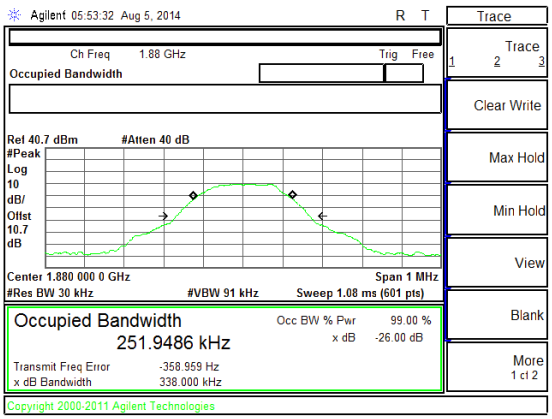
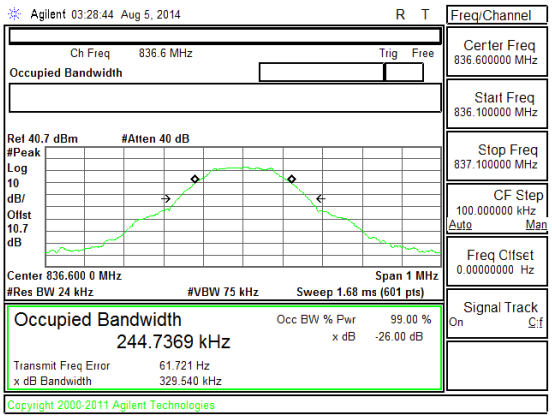
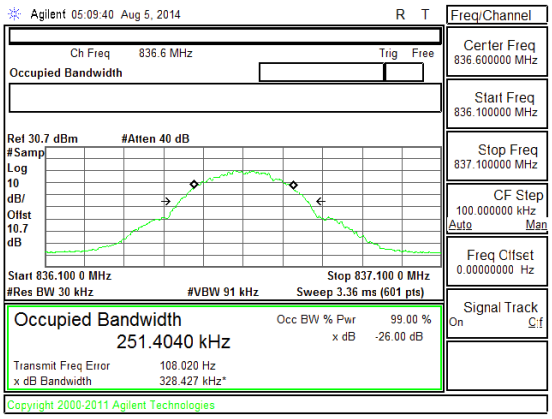
Band GSM 1900 EGPRS	 Band GSM1900 EGPRS OBW Mid channel	 Band GSM1900 GPRS OBW Mid channel
Band GSM 850 EGPRS	 Band GSM850 EGPRS OBW Mid channel	 Band GSM850 GPRS OBW Mid channel

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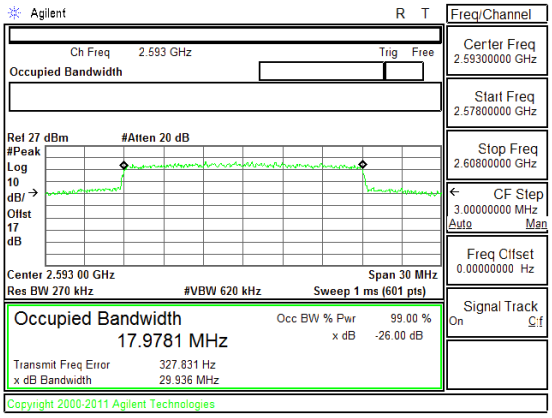
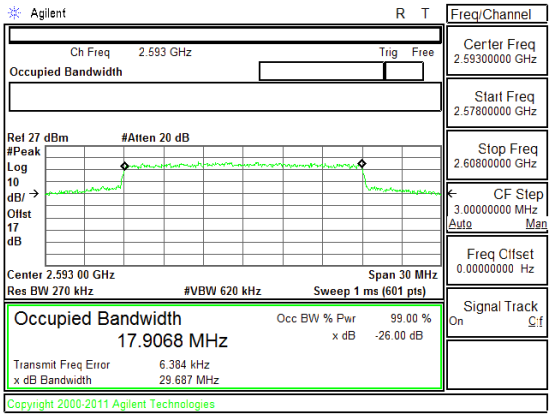
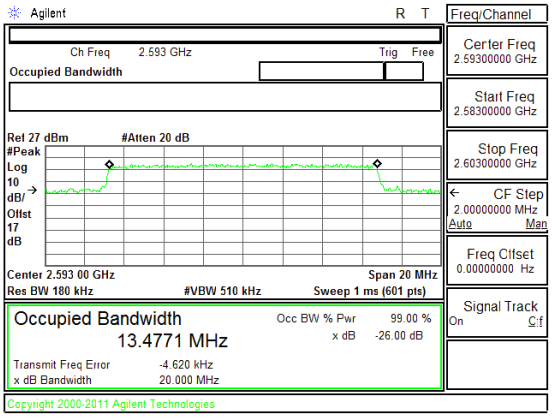
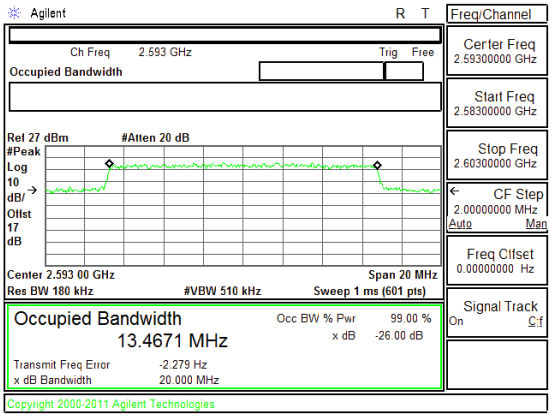
LTE Band 41

Band LTE41 20MHz 16QAM	 Band LTE41 20MHz OBW 16QAM Mid Channel FRB.gif	 Band LTE41 20MHz OBW QPSK Mid Channel FRB.gif
Band LTE41 15MHz 16QAM	 Band LTE41 15MHz OBW 16QAM Mid Channel FRB.gif	 Band LTE41 15MHz OBW QPSK Mid Channel FRB.gif

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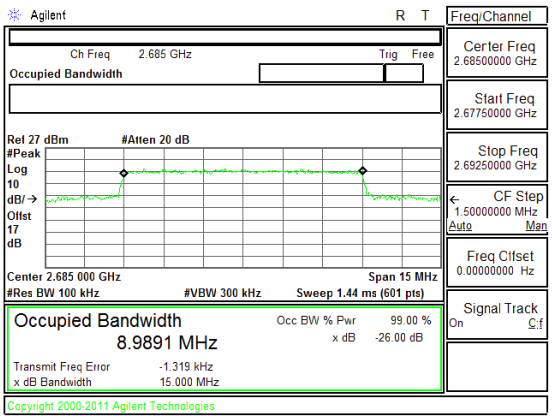
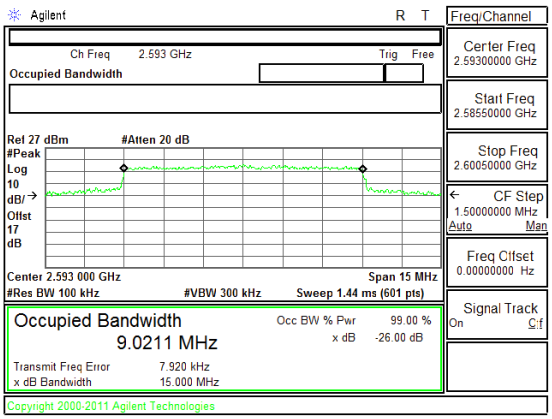
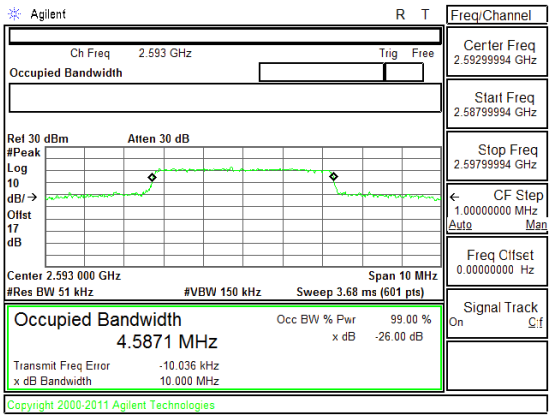
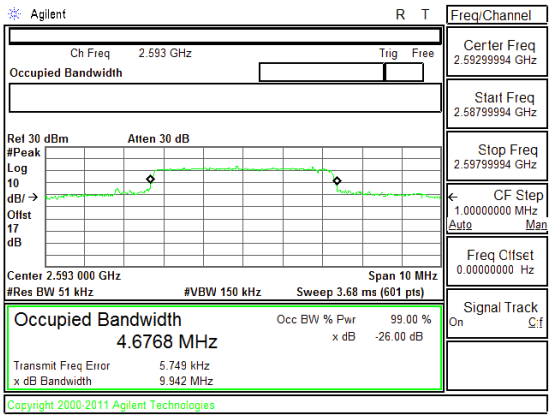
Band LTE41 10MHz 16QAM	 Band LTE41 10MHz OBW 16QAM Mid Channel FRB.gif	 Band LTE41 10MHz OBW QPSK Mid Channel FRB.gif
Band LTE41 5MHz 16QAM	 Band LTE41 5MHz OBW 16QAM Mid Channel FRB.gif	 Band LTE41 5MHz OBW QPSK Mid Channel FRB.gif

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10.2. BAND EDGE EMISSIONS

RULE PART(S)

FCC: §22.359, §24.238, and §27. 53

LIMITS

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

Part 27: (m)(4) For mobile digital stations, the attenuation factor shall be not less than 40 + 10 log (P) dB on all frequencies between the channel edge and 5 megahertz from the channel edge, 43 + 10 log (P) dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and 55 + 10 log (P) dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section. In addition, the attenuation factor shall not be less that 43 + 10 log (P) dB on all frequencies between 2490.5 MHz and 2496 MHz and 55 + 10 log (P) dB at or below 2490.5 MHz. Mobile Satellite Service licensees operating on frequencies below 2495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or EBS licensees.

TEST PROCEDURE

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

MODES TESTED

GSM 850, GSM1900, WCDMA Band 2 and Band 5, LTE Band 41

RESULTS

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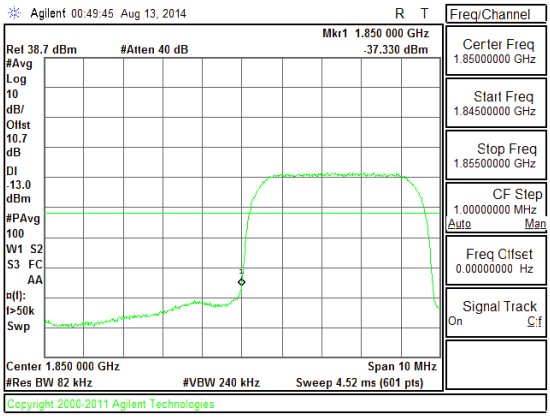
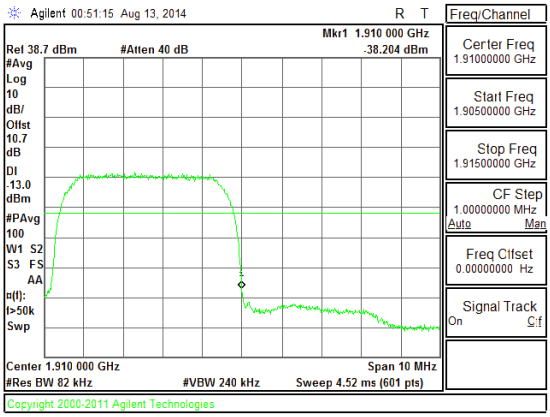
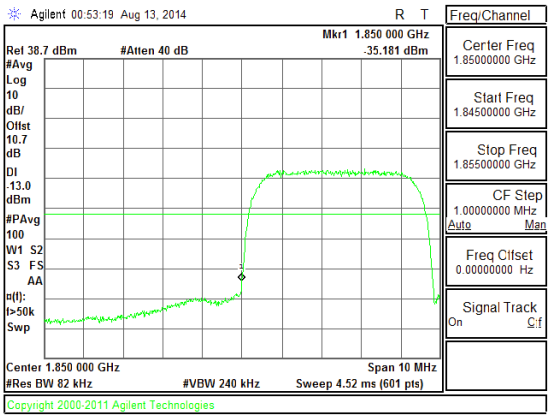
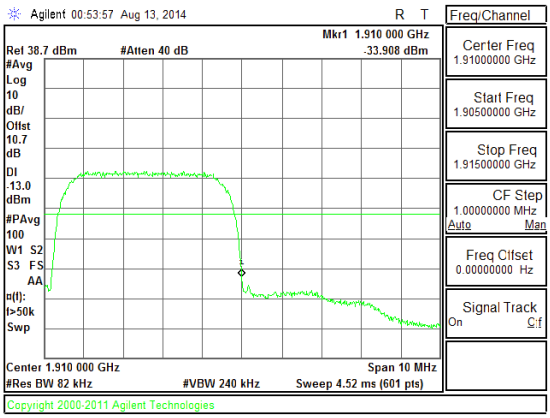
10.2.1. BAND EDGE PLOTS

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

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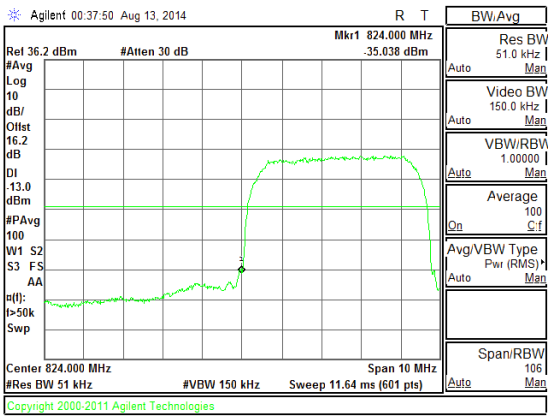
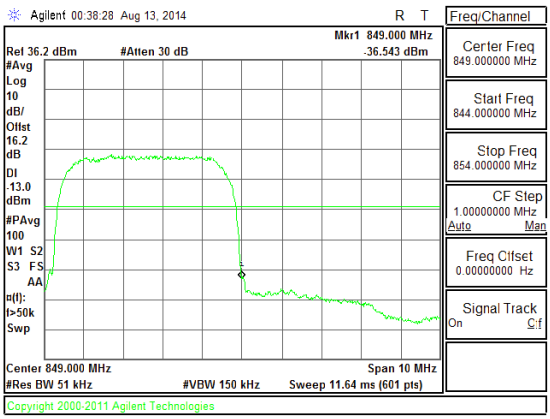
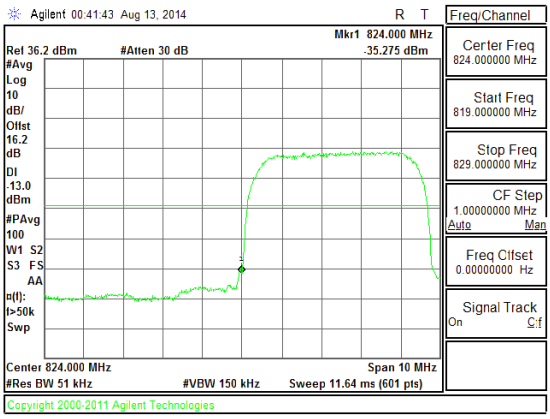
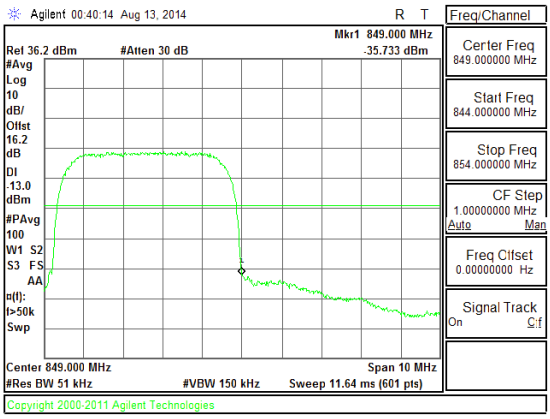
Band Band 5 HSDPA	 Band WCDMA B5 HSDPA CBE	 Band WCDMA B5 HSDPA CBE
Band Band 5 REL99	 Band WCDMA B5 REL99 CBE	 Band WCDMA B5 REL99 CBE

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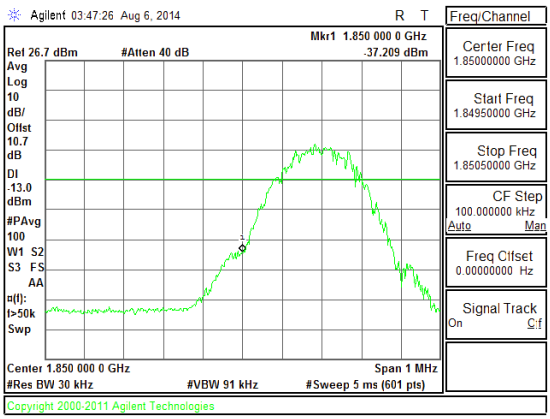
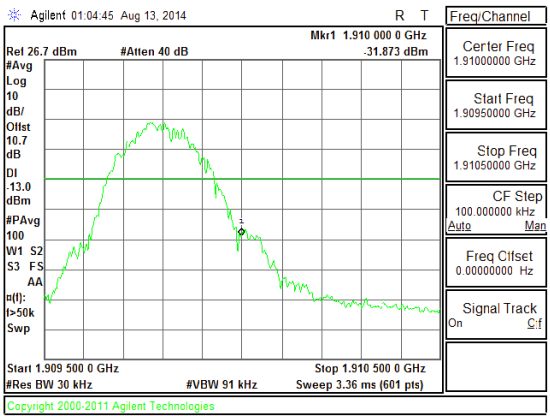
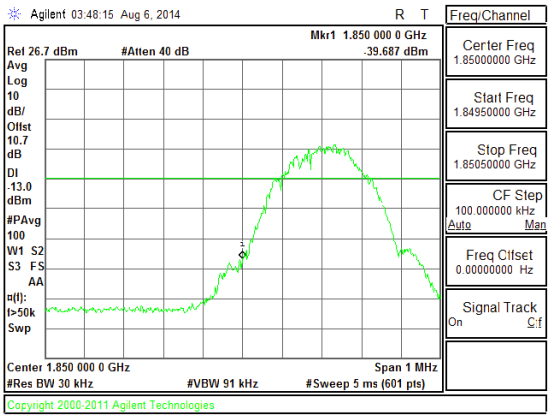
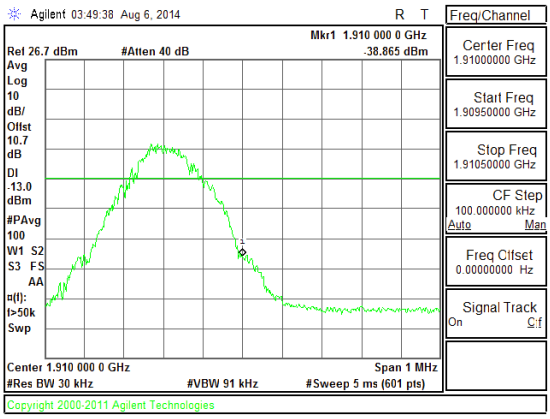
Band GSM1900 EGPRS	 Band GSM1900 EGPRS CBE Low channel	 Band GSM1900 EGPRS CBE High channel
Band GSM1900 GPRS	 Band GSM1900 GPRS CBE Low channel	 Band GSM1900 GPRS CBE High channel

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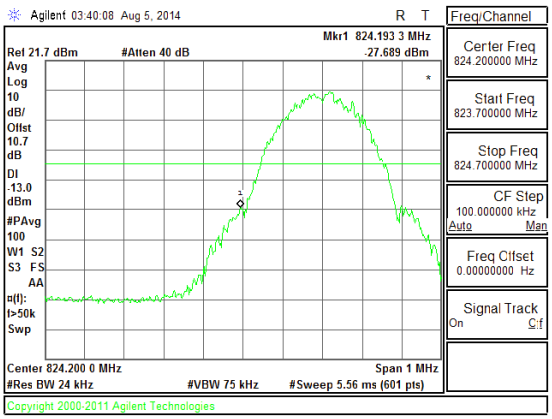
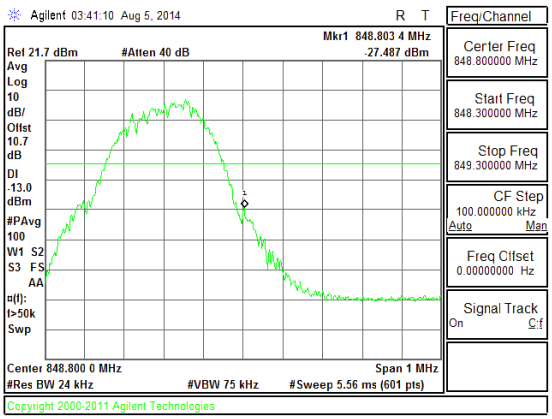
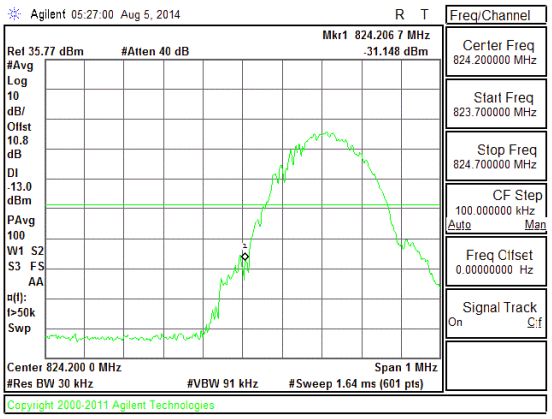
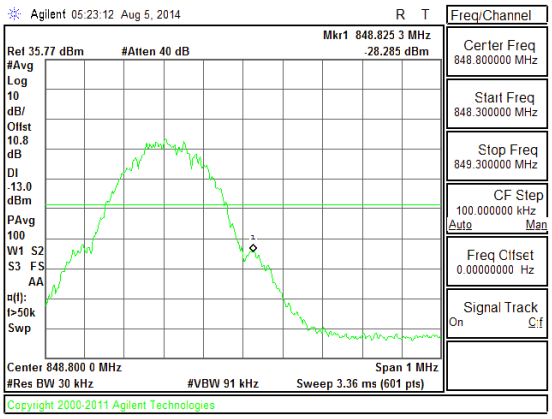
Band GSM850 EGPRS	 Band GSM850 EGPRS CBE Low channel	 Band GSM850 EGPRS CBE High channel
Band GSM850 GPRS	 Band GSM850 GPRS CBE Low channel	 Band GSM850 GPRS CBE High channel

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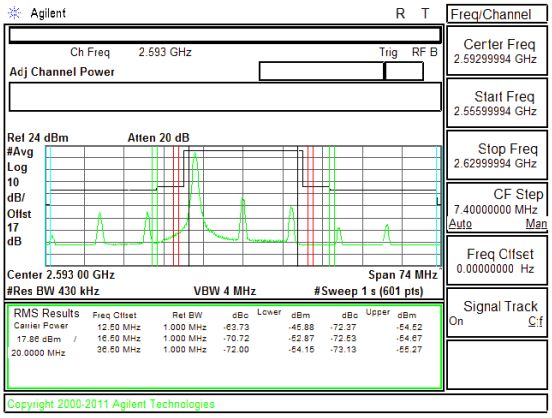
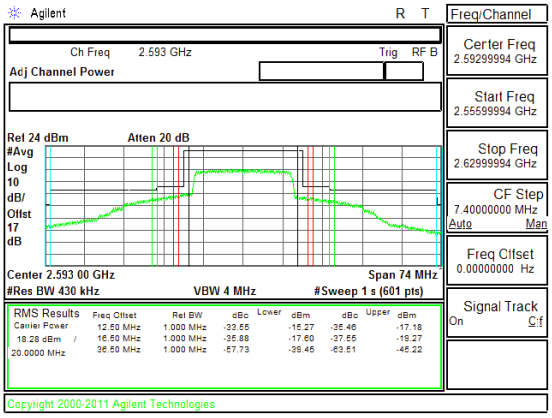
10.2.1. EMISSION MASK PLOTS

Band LTE41 20MHz 16QAM	 Band LTE41 20MHz EM 16QAM Mid Channel 1RB.gif	 Band LTE41 20MHz EM 16QAM Mid Channel FRB.gif

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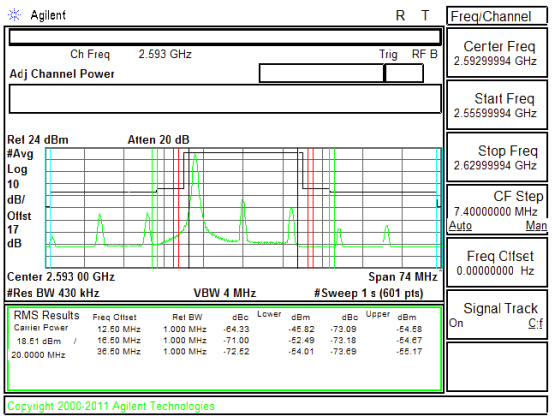
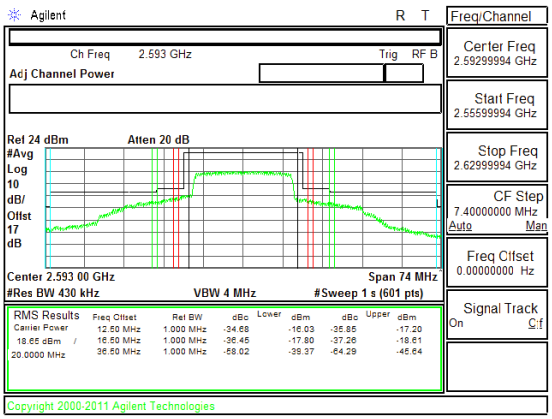
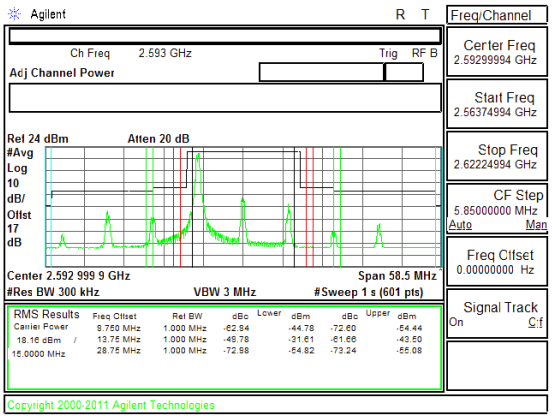
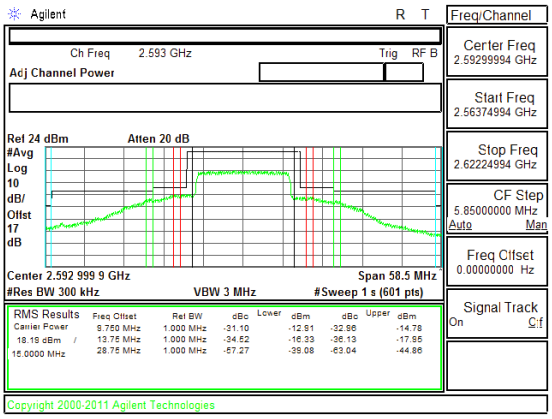
Band LTE41 20MHz QPSK	 Band LTE41 20MHz EM QPSK 1RB.gif	 Band LTE41 20MHz EM QPSK FRB.gif
Band LTE41 15MHz 16QAM	 Band LTE41 15MHz EM 16QAM Mid Channel 1RB.gif	 Band LTE41 15MHz EM 16QAM Mid Channel FRB.gif

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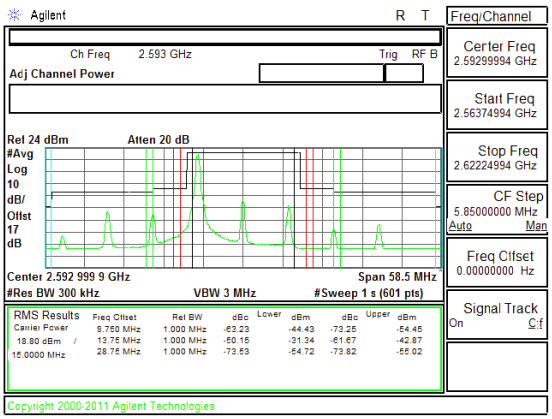
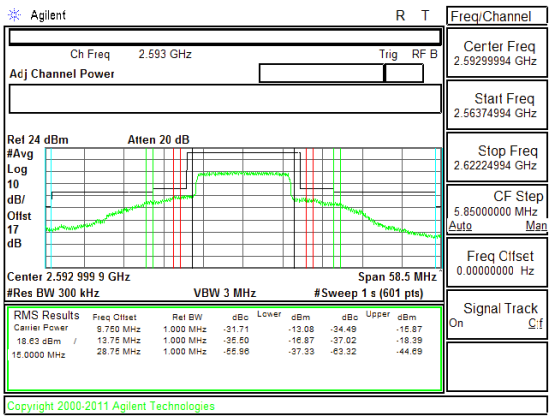
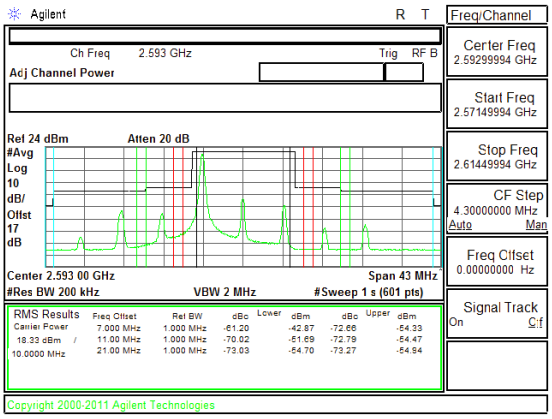
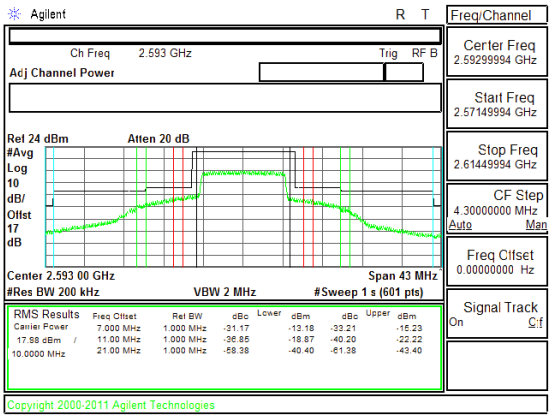
Band LTE41 15MHz QPSK	 Band LTE41 15MHz EM QPSK 1RB.gif	 Band LTE41 15MHz EM QPSK FRB.gif
Band LTE41 10MHz 16QAM	 Band LTE41 10MHz EM 16QAM Mid Channel 1RB.gif	 Band LTE41 10MHz EM 16QAM Mid Channel FRB.gif

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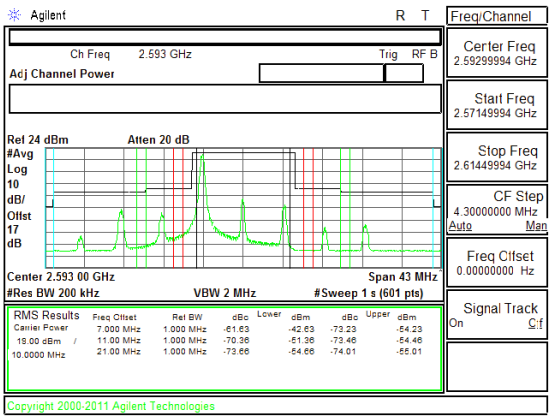
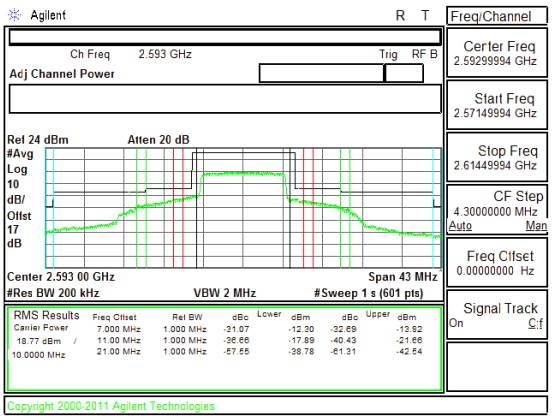
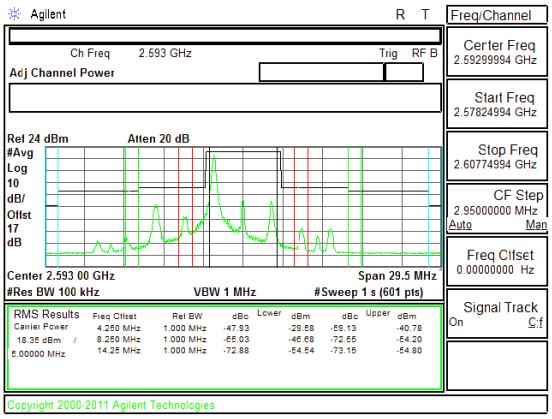
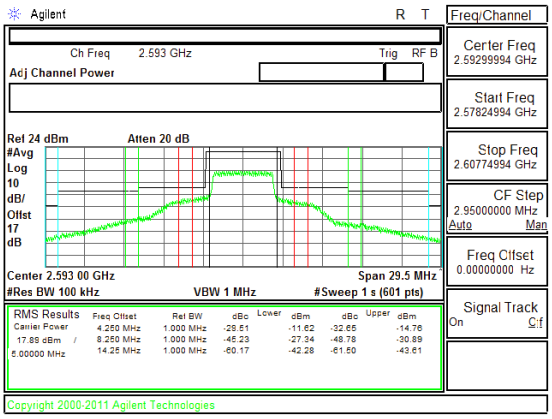
Band LTE41 10MHz QPSK	 Band LTE41 10MHz EM QPSK 1RB.gif	 Band LTE41 10MHz EM QPSK FRB.gif
Band LTE41 5MHz 16QAM	 Band LTE41 5MHz EM 16QAM Mid Channel 1RB.gif	 Band LTE41 5MHz EM 16QAM Mid Channel FRB.gif

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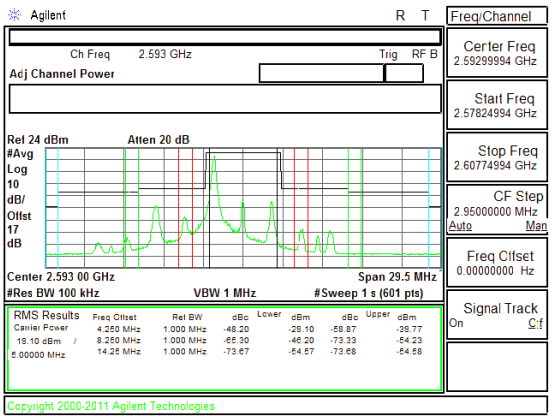
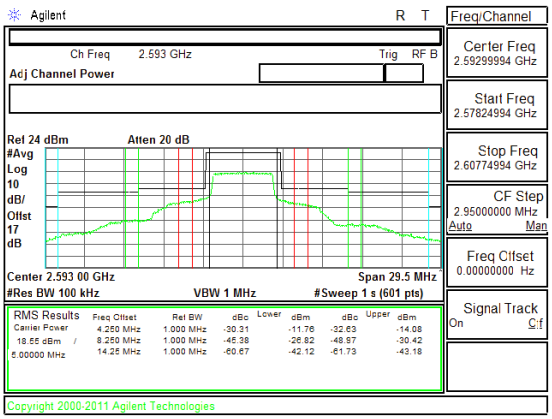
Band LTE41 5MHz QPSK	 Band LTE41 5MHz EM QPSK Mid Channel 1RB.gif	 Band LTE41 5MHz EM QPSK Mid Channel FRB.gif

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10.3. OUT OF BAND EMISSIONS

RULE PART(S)

FCC: §2.1051, §22.901, §22.917, §24.238, and §27.53

LIMITS

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

Part 27: (m)(4) For mobile station, the attenuation factor shall be not less than (55+10Log(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.

MODES TESTED

GSM 850, GSM1900, WCDMA Band 2 and Band 5, LTE Band 41

RESULTS

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10.3.1. OUT OF BAND EMISSIONS RESULT

Band	Mode	f (MHz)	Spur (dBm)	Spec (dBm)	Delta (dB)
GSM850	GPRS	824.2	-35.36	-13	-22.36
		836.6	-36.89	-13	-23.89
		848.8	-35.8	-13	-22.8
	EGPRS	824.2	-35.56	-13	-22.56
		836.6	-35.95	-13	-22.95
		848.8	-35.35	-13	-22.35
GSM1900	GPRS	1850.2	-26.69	-13	-13.69
		1880	-24.84	-13	-11.84
		1909.8	-25.35	-13	-12.35
	EGPRS	1850.2	-25.61	-13	-12.61
		1880	-25.94	-13	-12.94
		1909.8	-25.92	-13	-12.92
Band 5	REL99	826.4	-26.58	-13	-13.58
		836.6	-25.81	-13	-12.81
		846.6	-26.59	-13	-13.59
	HSDPA	826.4	-25.61	-13	-12.61
		836.6	-27.45	-13	-14.45
		846.6	-27.11	-13	-14.11
Band 2	REL99	1852.4	-25.99	-13	-12.99
		1880	-26.08	-13	-13.08
		1907.6	-26.45	-13	-13.45
	HSDPA	1852.4	-26.23	-13	-13.23
		1880	-25.62	-13	-12.62
		1907.6	-26.12	-13	-13.12

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LTE Band 41

Band	BW (MHz)	Mode	f (MHz)	Spur (dBm)	Spec (dBm)	Delta (dB)
LTE41	20	QPSK	2506	-36.94	-25	-11.94
			2593	-39.95	-25	-14.95
			2680	-37.46	-25	-12.46
		16QAM	2506	-38.83	-25	-13.83
			2593	-37.29	-25	-12.29
			2680	-36.14	-25	-11.14

Band	BW (MHz)	Mode	f (MHz)	Spur (dBm)	Spec (dBm)	Delta (dB)
LTE41	15	QPSK	2503.5	-37.62	-25	-12.62
			2593	-39.88	-25	-14.88
			2682.5	-36.18	-25	-11.18
		16QAM	2503.5	-39.52	-25	-14.52
			2593	-39.48	-25	-14.48
			2682.5	-36.96	-25	-11.96

Band	BW (MHz)	Mode	f (MHz)	Spur (dBm)	Spec (dBm)	Delta (dB)
LTE41	10	QPSK	2501	-37.21	-25	-12.21
			2593	-40.55	-25	-15.55
			2685	-37.79	-25	-12.79
		16QAM	2501	-39.88	-25	-14.88
			2593	-41.1	-25	-16.1
			2685	-38.41	-25	-13.41

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Band	BW (MHz)	Mode	f (MHz)	Spur (dBm)	Spec (dBm)	Delta (dB)
LTE41	5	QPSK	2498.5	-41.15	-25	-16.15
			2593	-30.7	-25	-5.7
			2687.5	-36.41	-25	-11.41
		16QAM	2498.5	-30.06	-25	-5.06
			2593	-34.83	-25	-9.83
			2687.5	-33.66	-25	-8.66

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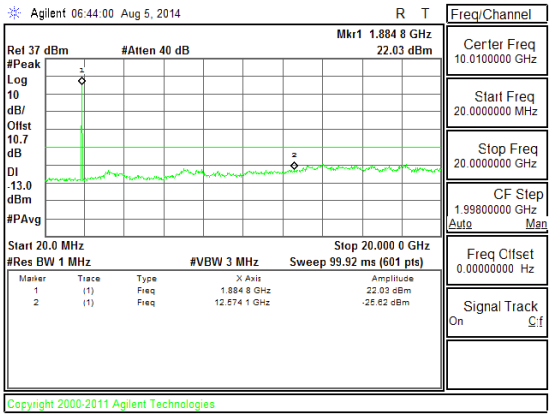
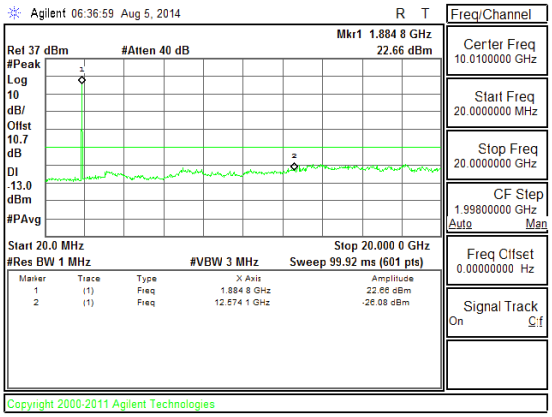
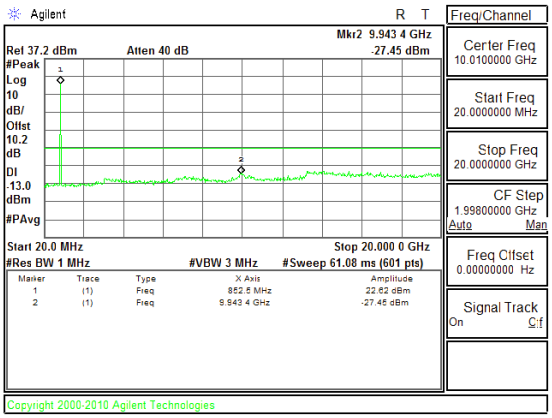
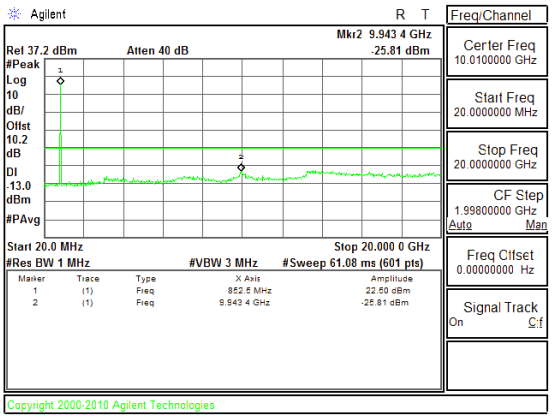
10.3.2. OUT OF BAND EMISSIONS PLOTS

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

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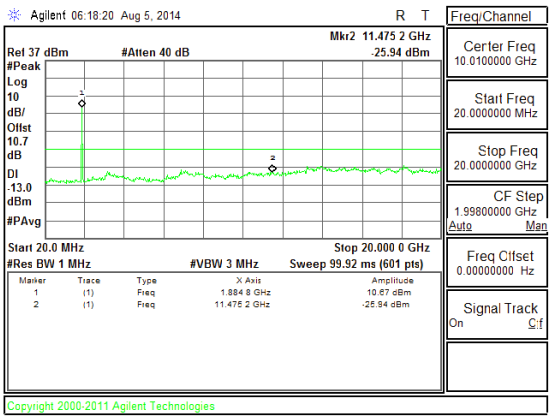
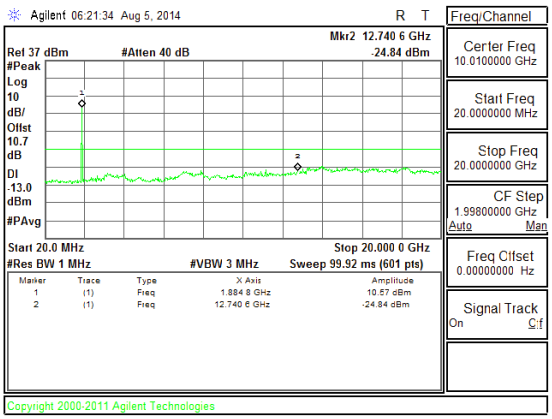
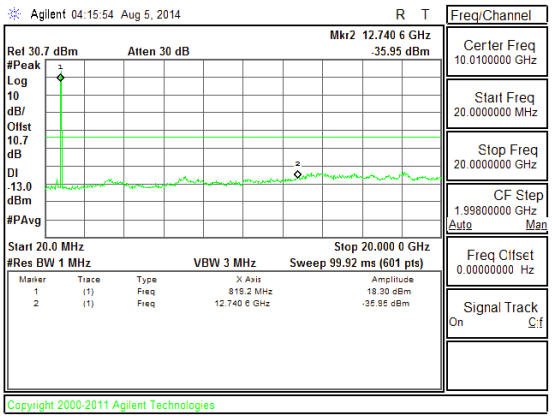
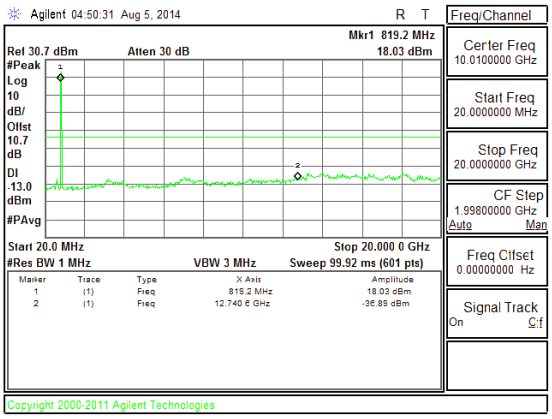
Band GSM 1900 EGPRS	 Band GSM1900 EGPRS CSE Mid channel	 Band GSM1900 GPRS CSE Mid channel
Band GSM 850 EGPRS	 Band GSM850 EGPRS CSE Mid channel	 Band GSM850 GPRS CSE Mid channel

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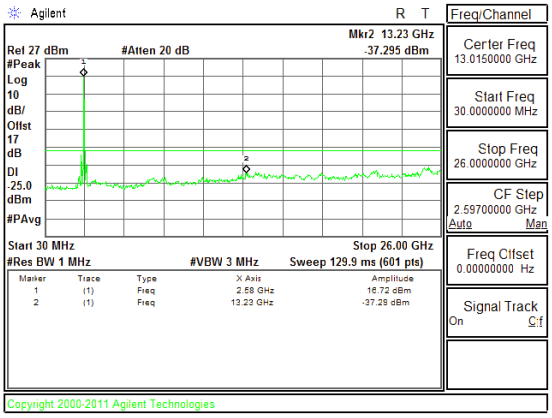
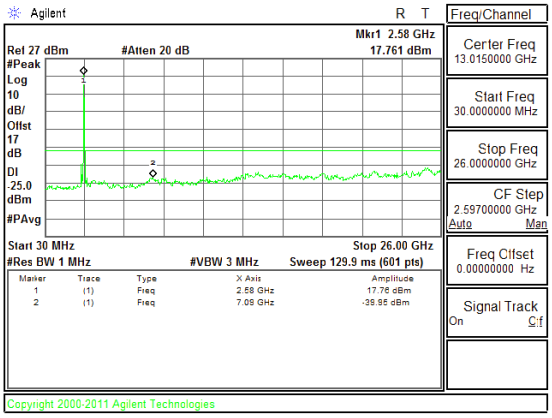
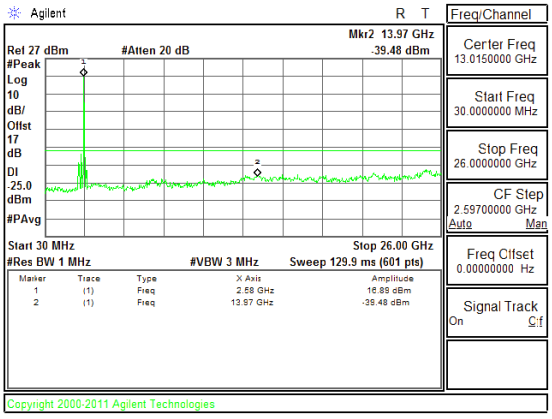
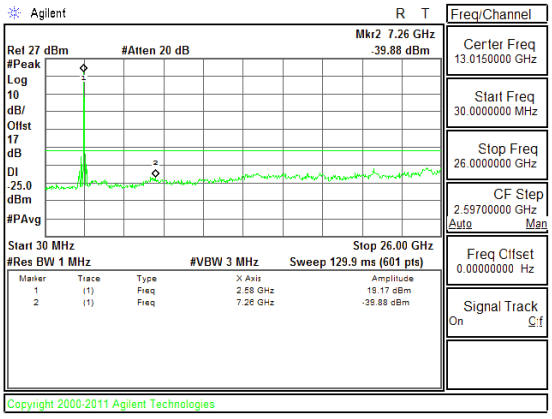
LTE Band 41

Band LTE41 20MHz 16QAM	 Band LTE41 20MHz CSE 16QAM Mid channel	 Band LTE41 20MHz CSE QPSK Mid channel
Band LTE41 15MHz 16QAM	 Band LTE41 15MHz CSE 16QAM Mid channel	 Band LTE41 15MHz CSE QPSK Mid channel

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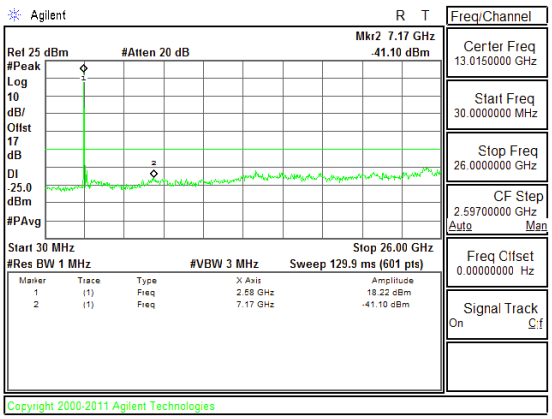
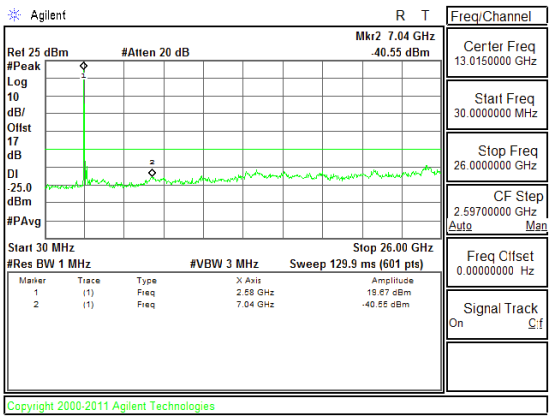
Band LTE41 10MHz 16QAM

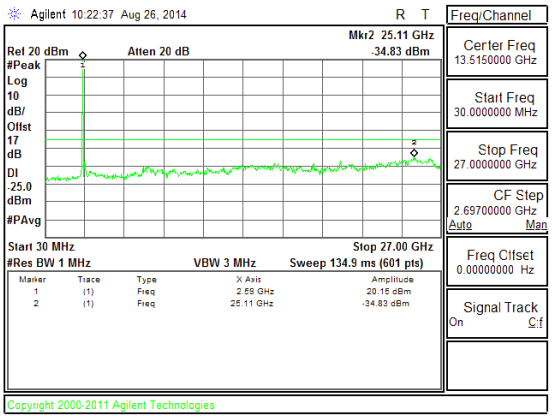


Band LTE41 10MHz CSE 16QAM Mid channel

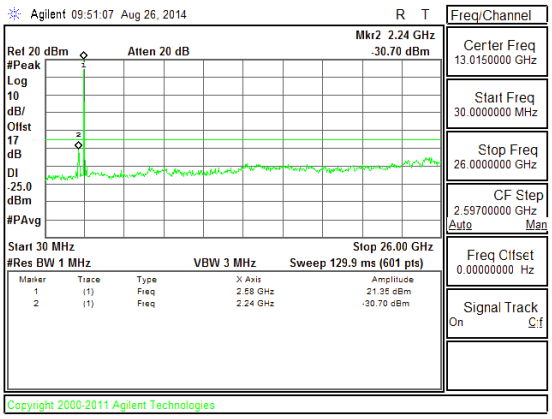


Band LTE41 10MHz CSE QPSK Mid channel

Band LTE41 5MHz 16QAM



Band LTE41 5MHz CSE 16QAM Mid channel



Band LTE41 5MHz CSE QPSK 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

MODES TESTED

GSM 850, GSM1900, LTE Band 41

RESULTS

See the following pages.

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10.4.1. FREQUENCY STABILITY RESULTS

GPRS 1900 PCS BAND, – MID CHANNEL, Frequency 1880MHz

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	1880.000016	0.003	2.5
3.80	40	1880.000017	0.002	2.5
3.80	30	1880.000023	-0.001	2.5
3.80	***20***	**1880.000021**	**0**	***2.5***
3.80	10	1880.000024	-0.001	2.5
3.80	0	1880.000018	0.002	2.5
3.80	-10	1880.000022	0.000	2.5
3.80	-20	1880.000016	0.003	2.5
3.80	-30	1880.000019	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***	***1880.000021***	***0***	***2.5***
4.30	20	1880.000025	*-0.002*	2.5
3.20	20	1880.000024	*-0.002*	2.5

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GPRS 850 CELL BAND, – MID CHANNEL, Frequency 836.6MHz

Reference Frequency: PCS Mid Channel		836.6	MHz @ 20°C	
Limit: to stay +- 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	836.600027	-0.006	2.5
3.80	40	836.600027	-0.006	2.5
3.80	30	836.600027	-0.006	2.5
3.80	***20***	**836.600022**	**0**	***2.5***
3.80	10	836.600024	-0.002	2.5
3.80	0	836.600022	0.000	2.5
3.80	-10	836.600017	0.006	2.5
3.80	-20	836.600018	0.005	2.5
3.80	-30	836.600027	-0.007	2.5

Reference Frequency: PCS Mid Channel		836.6	MHz @ 20°C	
Limit: to stay +- 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	***20***	***836.600022***	***0***	***2.5***
4.30	20	836.6000224	*-0.001*	2.5
3.20	20	836.6000148	*0.008*	2.5

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LTE41 Channel 40620 Freq: 2593 MHz– MID CHANNEL

Reference Frequency: LTE41 Channel 40620 Freq : 2593 MHz @ 20°C Limit: to stay +- 2.5 ppm = 6482.500 Hz				
Power Supply (Vdc)	Environment Temperature (°C)	Frequency Deviation Measureed with Time Elapse		
		(MHz)	Delta (ppm)	Limit (ppm)
3.80	50	2593.0000500	-0.012	2.5
3.80	40	2593.0000400	-0.008	2.5
3.80	30	2593.0000300	-0.004	2.5
3.80	***20***	2593.0000200	***0***	***2.5***
3.80	10	2593.0000100	0.004	2.5
3.80	0	2593.0000000	0.008	2.5
3.80	-10	2592.9999900	0.012	2.5
3.80	-20	2592.9999800	0.015	2.5
3.80	-30	2592.9999700	0.019	2.5

Reference Frequency: LTE41 Channel 40620 Freq : 2593 MHz @ 20°C Limit: to stay +- 2.5 ppm = 6482.500 Hz				
Power Supply (Vdc)	Environment Temperature (°C)	Frequency Deviation Measureed with Time Elapse		
		(MHz)	Delta (ppm)	Limit (ppm)
3.80	***20***	2593.0000200	***0***	***2.5***
3.20	20	2593.0000200	*0.000*	2.5
4.30	20	2593.0000200	0.000	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.

27.50(h) - (2) Mobile stations are limited to 2.0 watts EIRP. All user stations are limited to 2.0 watts transmitter output power.(LTE B41 & 7)

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

TEST PROCEDURE

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

For peak power measurement with a PSA:

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

For average power measurement with a PSA:

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

MODES TESTED

GSM 850, GSM1900, WCDMA Band 2 and Band 5, LTE Band 41

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TEST RESULTS

11.1.1. ERP/EIRP Results

Band	Mode	Channel	f(MHz)	EIRP	
				dBm	mW
Band 2	REL99	9262	1852.4	26.74	472.06
		9400	1880	25.617	364.5
		9538	1907.6	25.94	392.64
	HSDPA	9262	1852.4	25.03	318.42
		9400	1880	25.45	350.75
		9538	1907.6	25.3	338.84

Band	Mode	Channel	f(MHz)	ERP	
				dBm	mW
Band 5	REL99	4132	826.4	20.411	109.93
		4183	836.6	21.691	147.6
		4233	846.6	22.471	176.64
	HSDPA	4132	826.4	19.391	86.92
		4183	836.6	21.191	131.55
		4233	846.6	21.421	138.71

Band	Mode	Channel	f(MHz)	EIRP	
				dBm	mW
GSM1900	GMSK	512	1850.2		
		661	1880		
		810	1909.8		
	GPRS	512	1850.2	31.19	1315.22
		661	1880	31.61	1448.77
		810	1909.8	31.64	1458.81
	EGPRS	512	1850.2	27.67	584.79
		661	1880	27.90	616.60
		810	1909.8	27.99	629.51

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Band	Mode	Channel	f(MHz)	ERP	
				dBm	mW
GSM850	GMSK	128	824.2		
		190	836.6		
		251	848.8		
	GPRS	128	824.2	31.241	1330.76
		190	836.6	31.781	1506.95
		251	848.8	32.081	1614.73
	EGPRS	128	824.2	27.77	598.41
		190	836.6	27.81	603.95
		251	848.8	27.68	586.14

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11.1.1. LTE ERP/EIRP Results

Band	BW (MHz)	Mode	RB/RB Size	f (MHz)	EIRP	
					dBm	mW
LTE41	20	QPSK	1/0	2506	18.551	71.63
			1/0	2593	18.803	75.91
			1/0	2680	17.936	62.17
		16QAM	1/0	2506	17.991	62.97
			1/0	2593	17.563	57.06
			1/0	2680	16.746	47.27

Band	BW (MHz)	Mode	RB/RB Size	f (MHz)	EIRP	
					dBm	mW
LTE41	15	QPSK	1/0	2503.5	19.011	79.63
			1/0	2593	18.953	78.58
			1/0	2682.5	17.116	51.48
		16QAM	1/0	2503.5	17.911	61.82
			1/0	2593	17.893	61.56
			1/0	2682.5	16.576	45.46

Band	BW (MHz)	Mode	RB/RB Size	f (MHz)	EIRP	
					dBm	mW
LTE41	10	QPSK	1/0	2501	18.971	78.9
			1/0	2593	18.503	70.84
			1/0	2685	17.236	52.92
		16QAM	1/0	2501	18.131	65.03
			1/0	2593	18.383	68.91
			1/0	2685	16.196	41.65

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Band	BW (MHz)	Mode	RB/RB Size	f (MHz)	EIRP	
					dBm	mW
LTE41	5	QPSK	1/0	2498.5	19.011	79.63
			1/0	2593	18.823	76.26
			1/0	2687.5	17.356	54.4
		16QAM	1/0	2498.5	17.651	58.22
			1/0	2593	18.073	64.17
			1/0	2687.5	16.936	49.39

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11.1.2. ERP/EIRP DATA

Band

Band 2

HSDPA

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

Company: Samsung
Project #: 14U18462
Date: 08/04/14
Test Engineer: K. Huynh, T. Oeur
Configuration: EUT (Unit B)
Mode: HSDPA B2

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

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
1852.40	16.24	V	0.9	7.9	23.24	33.0	-9.8	
1852.40	18.03	H	0.9	7.9	25.03	33.0	-8.0	
Mid Ch								
1880.00	15.36	V	0.9	7.9	22.36	33.0	-10.6	
1880.00	18.45	H	0.9	7.9	25.45	33.0	-7.6	
High Ch								
1907.60	16.85	V	0.9	7.9	23.85	33.0	-9.2	
1907.60	18.30	H	0.9	7.9	25.30	33.0	-7.7	

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

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Band

Band 2

REL99

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

Company: Samsung
Project #: 14U18462
Date: 08/04/14
Test Engineer: K. Huynh, T. Oeur
Configuration: EUT (Unit B)
Mode: REL 99 B2

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

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
1852.40	17.87	V	0.9	7.9	24.87	33.0	-8.1	
1852.40	19.74	H	0.9	7.9	26.74	33.0	-6.3	
Mid Ch								
1880.00	17.05	V	0.9	7.9	24.05	33.0	-9.0	
1880.00	18.62	H	0.9	7.9	25.62	33.0	-7.4	
High Ch								
1907.60	17.83	V	0.9	7.9	24.83	33.0	-8.2	
1907.60	18.94	H	0.9	7.9	25.94	33.0	-7.1	

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

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Band

Band 5

HSDPA

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

Company: Samsung
Project #: 14U18462
Date: 08/04/14
Test Engineer: K. Huynh, T. Oeur
Configuration: EUT (Unit B)
Mode: HSDPA Band 5

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	13.25	V	0.9	0.0	12.35	38.5	-26.1	
826.40	20.29	H	0.9	0.0	19.39	38.5	-19.1	
Mid Ch								
836.60	14.62	V	0.9	0.0	13.72	38.5	-24.7	
836.60	22.09	H	0.9	0.0	21.19	38.5	-17.3	
High Ch								
846.60	15.03	V	0.9	0.0	14.13	38.5	-24.3	
846.60	22.32	H	0.9	0.0	21.42	38.5	-17.0	

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

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Band

Band 5

REL99

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

Company: Samsung
Project #: 14U18462
Date: 08/04/14
Test Engineer: K. Huynh, T. Oeur
Configuration: EUT (Unit B)
Mode: REL 99 Band 5

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	12.50	V	0.9	0.0	11.60	38.5	-26.8	
826.40	21.31	H	0.9	0.0	20.41	38.5	-18.0	
Mid Ch								
836.60	15.70	V	0.9	0.0	14.80	38.5	-23.6	
836.60	22.59	H	0.9	0.0	21.69	38.5	-16.8	
High Ch								
846.60	13.15	V	0.9	0.0	12.25	38.5	-26.2	
846.60	23.37	H	0.9	0.0	22.47	38.5	-16.0	

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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

GSM 1900

EGPRS

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

Company: Samsung
Project #: 14U18462
Date: 08/12/14
Test Engineer: Jude Semana
Configuration: EUT new unit
Mode: EGPRS 1900

Test Equipment:
Receiving: Horn T345, and Chamber B SMA Cables
Substitution: Horn T217 Substitution, 4ft SMA Cable Warehouse

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
1850.20	15.93	V	0.9	7.9	22.93	33.0	-10.1	
1850.20	20.67	H	0.9	7.9	27.67	33.0	-5.3	
Mid Ch								
1880.00	14.39	V	0.9	7.9	21.39	33.0	-11.6	
1880.00	20.90	H	0.9	7.9	27.90	33.0	-5.1	
High Ch								
1909.80	16.33	V	0.9	7.9	23.33	33.0	-9.7	
1909.80	20.99	H	0.9	7.9	27.99	33.0	-5.0	

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

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Band

GSM 1900

GPRS

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

Company: Samsung
Project #: 14U18462
Date: 08/12/14
Test Engineer: D. Soper
Configuration: EUT New unit
Mode: GPRS 1900

Test Equipment:
Receiving: Horn T345, and Chamber B SMA Cables
Substitution: Horn T52 Substitution, 4ft SMA Cable Warehouse

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
1850.20	18.10	V	0.7	7.9	25.35	33.0	-7.6	
1850.20	23.94	H	0.7	7.9	31.19	33.0	-1.8	
Mid Ch								
1880.00	17.66	V	0.7	7.9	24.86	33.0	-8.1	
1880.00	24.41	H	0.7	7.9	31.61	33.0	-1.4	
High Ch								
1909.80	18.70	V	0.8	7.9	25.80	33.0	-7.2	
1909.80	24.54	H	0.8	7.9	31.64	33.0	-1.4	

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Note: For Band 4 EIRP limit is 30dBm

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Band

GSM 850

EGPRS

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

Company: Samsung
Project #: 14U18462
Date: 08/04/14
Test Engineer: K. Huynh, T. Oeur
Configuration: EUT (Unit B)
Mode: EGPRS 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								
824.20	23.65	V	0.9	0.0	22.75	38.5	-15.7	
824.20	28.67	H	0.9	0.0	27.77	38.5	-10.7	
Mid Ch								
836.60	23.41	V	0.9	0.0	22.51	38.5	-15.9	
836.60	28.71	H	0.9	0.0	27.81	38.5	-10.6	
High Ch								
848.80	23.46	V	0.9	0.0	22.56	38.5	-15.9	
848.80	28.58	H	0.9	0.0	27.68	38.5	-10.8	

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

GSM 850

GPRS

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

Company: Samsung
Project #: 14U18462
Date: 08/04/14
Test Engineer: K. Huynh, T. Oeur
Configuration: EUT (Unit B)
Mode: GPRS 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								
824.20	25.36	V	0.9	0.0	24.46	38.5	-14.0	
824.20	32.14	H	0.9	0.0	31.24	38.5	-7.2	
Mid Ch								
836.60	25.47	V	0.9	0.0	24.57	38.5	-13.9	
836.60	32.68	H	0.9	0.0	31.78	38.5	-6.7	
High Ch								
848.80	26.06	V	0.9	0.0	25.16	38.5	-13.3	
848.80	32.98	H	0.9	0.0	32.08	38.5	-6.4	

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

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LTE Band 41

Band

LTE41

20MHz

16QAM

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

Company: Samsung
Project #: 14U18462
Date: 08/26/14
Test Engineer: L. Lara
Configuration: EUT ONLY / X-orientation
Mode: LTE B41 20MHz 16QAM

Test Equipment:
Receiving: Horn T119, and Chamber C SMA Cables
Substitution: Horn T60 Substitution, 4ft SMA Cable Warehouse

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
2506.00	10.04	V	0.9	8.8	17.99	33.0	-15.0	
2506.00	8.78	H	0.9	8.8	16.73	33.0	-16.3	
Mid Ch								
2593.00	9.61	V	0.9	8.8	17.56	33.0	-15.4	
2593.00	7.97	H	0.9	8.8	15.92	33.0	-17.1	
High Ch								
2680.00	8.80	V	0.9	8.8	16.75	33.0	-16.3	
2680.00	7.18	H	0.9	8.8	15.13	33.0	-17.9	

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Note: For Band 4 EIRP limit is 30dBm

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Band

LTE41

20MHz

QPSK

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

Company: Samsung
Project #: 14U18462
Date: 08/26/14
Test Engineer: L. Lara
Configuration: EUT ONLY / X-orientation
Mode: LTE B41 20MHz QPSK

Test Equipment:
Receiving: Horn T119, and Chamber C SMA Cables
Substitution: Horn T60 Substitution, 4ft SMA Cable Warehouse

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
2506.00	10.60	V	0.9	8.8	18.55	33.0	-14.4	
2506.00	9.14	H	0.9	8.8	17.09	33.0	-15.9	
Mid Ch								
2593.00	10.85	V	0.9	8.8	18.80	33.0	-14.2	
2593.00	9.05	H	0.9	8.8	17.00	33.0	-16.0	
High Ch								
2680.00	9.99	V	0.9	8.8	17.94	33.0	-15.1	
2680.00	8.17	H	0.9	8.8	16.12	33.0	-16.9	

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

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Band

LTE41

15MHz

16QAM

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

Company: Samsung
Project #: 14U18462
Date: 08/26/14
Test Engineer: L. Lara
Configuration: EUT ONLY / X-orientation
Mode: LTE B41 15MHz 16QAM

Test Equipment:
Receiving: Horn T119, and Chamber C SMA Cables
Substitution: Horn T60 Substitution, 4ft SMA Cable Warehouse

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
2503.50	9.96	V	0.9	8.8	17.91	33.0	-15.1	
2503.50	8.70	H	0.9	8.8	16.65	33.0	-16.4	
Mid Ch								
2593.00	9.94	V	0.9	8.8	17.89	33.0	-15.1	
2593.00	8.28	H	0.9	8.8	16.23	33.0	-16.8	
High Ch								
2682.50	8.63	V	0.9	8.8	16.58	33.0	-16.4	
2682.50	7.01	H	0.9	8.8	14.96	33.0	-18.0	

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

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
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Band

LTE41

15MHz

QPSK

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

Company: Samsung
Project #: 14U18462
Date: 08/26/14
Test Engineer: L. Lara
Configuration: EUT ONLY / X-orientation
Mode: LTE B41 15MHz QPSK

Test Equipment:
Receiving: Horn T119, and Chamber C SMA Cables
Substitution: Horn T60 Substitution, 4ft SMA Cable Warehouse

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
2503.50	11.06	V	0.9	8.8	19.01	33.0	-14.0	
2503.50	9.60	H	0.9	8.8	17.55	33.0	-15.5	
Mid Ch								
2593.00	11.00	V	0.9	8.8	18.95	33.0	-14.0	
2593.00	9.17	H	0.9	8.8	17.12	33.0	-15.9	
High Ch								
2682.50	9.17	V	0.9	8.8	17.12	33.0	-15.9	
2682.50	7.35	H	0.9	8.8	15.30	33.0	-17.7	

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

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Band

LTE41

10MHz

16QAM

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

Company: Samsung
Project #: 14U18462
Date: 08/26/14
Test Engineer: L. Lara
Configuration: EUT X-position
Mode: LTE 41 10M 16QAM

Test Equipment:
Receiving: Horn T345, and Chamber B SMA Cables
Substitution: Horn T961 Substitution, 4ft SMA Cable Warehouse

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
2501.00	10.23	V	0.9	8.8	18.13	33.0	-14.9	
2501.00	8.97	H	0.9	8.8	16.87	33.0	-16.1	
Mid Ch								
2593.00	10.48	V	0.9	8.8	18.38	33.0	-14.6	
2593.00	8.84	H	0.9	8.8	16.74	33.0	-16.3	
High Ch								
2685.00	8.30	V	0.9	8.8	16.20	33.0	-16.8	
2685.00	6.72	H	0.9	8.8	14.62	33.0	-18.4	

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

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Band

LTE41

10MHz

QPSK

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

Company: Samsung
Project #: 14U18462
Date: 08/26/14
Test Engineer: L. Lara
Configuration: EUT X-position
Mode: LTE 41 10M QPSK

Test Equipment:
Receiving: Horn T345, and Chamber B SMA Cables
Substitution: Horn T961 Substitution, 4ft SMA Cable Warehouse

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
2501.00	11.07	V	0.9	8.8	18.97	33.0	-14.0	
2501.00	9.20	H	0.9	8.8	17.10	33.0	-15.9	
Mid Ch								
2593.00	10.60	V	0.9	8.8	18.50	33.0	-14.5	
2593.00	8.35	H	0.9	8.8	16.25	33.0	-16.8	
High Ch								
2685.00	9.34	V	0.9	8.8	17.24	33.0	-15.8	
2685.00	7.11	H	0.9	8.8	15.01	33.0	-18.0	

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

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Band

LTE41

5MHz

16QAM

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

Company: Samsung
Project #: 14U18462
Date: 08/25/14
Test Engineer: T.Oeur
Configuration: EUT
Mode: LTE 41 5M 16QAM

Test Equipment:
Receiving: Horn T345, and Chamber B SMA Cables
Substitution: Horn T961 Substitution, 4ft SMA Cable Warehouse

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
2498.50	9.75	V	0.9	8.8	17.65	33.0	-15.3	
2498.50	9.19	H	0.9	8.8	17.09	33.0	-15.9	
Mid Ch								
2593.00	10.17	V	0.9	8.8	18.07	33.0	-14.9	
2593.00	7.99	H	0.9	8.8	15.89	33.0	-17.1	
High Ch								
2687.50	9.04	V	0.9	8.8	16.94	33.0	-16.1	
2687.50	6.12	H	0.9	8.8	14.02	33.0	-19.0	

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

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Band

LTE41

5MHz

QPSK

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

Company: Samsung
Project #: 14U18462
Date: 08/25/14
Test Engineer: T.Oeur
Configuration: EUT
Mode: LTE 41 5M QPSK

Test Equipment:
Receiving: Horn T345, and Chamber B SMA Cables
Substitution: Horn T961 Substitution, 4ft SMA Cable Warehouse

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
2498.50	11.11	V	0.9	8.8	19.01	33.0	-14.0	
2498.50	10.29	H	0.9	8.8	18.19	33.0	-14.8	
Mid Ch								
2593.00	10.92	V	0.9	8.8	18.82	33.0	-14.2	
2593.00	8.42	H	0.9	8.8	16.32	33.0	-16.7	
High Ch								
2687.50	9.46	V	0.9	8.8	17.36	33.0	-15.6	
2687.50	7.40	H	0.9	8.8	15.30	33.0	-17.7	

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

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11.2. FIELD STRENGTH OF SPURIOUS RADIATION

RULE PART(S)

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

LIMIT

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

TEST P

Part 27: (m)(4) For mobile station, the attenuation factor shall be not less than (55+10Log(P)dB).

ROCEDURE

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 850, GSM1900, WCDMA Band 2 and Band 5, LTE Band 41

RESULTS

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

Band

Band 2

HSDPA

Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company: Samsung
Project #: 14U18462
Date: 08/13/14
Test Engineer: Day Shift Interns
Configuration: X-Pos EUT w/ AC charger, headset
Mode: HSDPA B2

Chamber	Pre-amplifer	Filter	Limit
5m Chamber B	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	-21.7	V	3.0	35.4	1.0	-56.1	-13.0	-43.1	
5.557	-17.6	V	3.0	34.7	1.0	-51.3	-13.0	-38.3	
7.410	-18.3	V	3.0	34.9	1.0	-52.2	-13.0	-39.2	
3.705	-18.1	H	3.0	35.4	1.0	-52.5	-13.0	-39.5	
5.557	-15.8	H	3.0	34.7	1.0	-49.6	-13.0	-36.6	
7.410	-15.4	H	3.0	34.9	1.0	-49.3	-13.0	-36.3	
Mid Ch, 1880MHz									
3.760	-18.4	V	3.0	35.3	1.0	-52.7	-13.0	-39.7	
5.640	-16.7	V	3.0	34.7	1.0	-50.4	-13.0	-37.4	
7.520	-15.3	V	3.0	34.9	1.0	-49.2	-13.0	-36.2	
3.760	-18.0	H	3.0	35.3	1.0	-52.3	-13.0	-39.3	
5.640	-15.0	H	3.0	34.7	1.0	-48.7	-13.0	-35.7	
7.520	-14.6	H	3.0	34.9	1.0	-48.5	-13.0	-35.5	
High Ch, 1907.6MHz									
3.815	-19.5	V	3.0	35.3	1.0	-53.8	-13.0	-40.8	
5.723	-16.3	V	3.0	34.7	1.0	-50.0	-13.0	-37.0	
7.630	-15.7	V	3.0	34.9	1.0	-49.6	-13.0	-36.6	
3.815	-17.3	H	3.0	35.3	1.0	-51.6	-13.0	-38.6	
5.723	-15.0	H	3.0	34.7	1.0	-48.7	-13.0	-35.7	
7.630	-14.4	H	3.0	34.9	1.0	-48.3	-13.0	-35.3	

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 #: 14U18462
Date: 08/05/14
Test Engineer: L. Lee
Configuration: X-Pos EUT w/ AC charger, headset
Mode: REL99 B2

Chamber	Pre-amplifer	Filter	Limit
3m Chamber	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	-20.8	V	3.0	35.4	1.0	-55.2	-13.0	-42.2	
5.557	-18.1	V	3.0	34.7	1.0	-51.8	-13.0	-38.8	
7.410	-12.3	V	3.0	34.9	1.0	-46.2	-13.0	-33.2	
3.705	-19.2	H	3.0	35.4	1.0	-53.6	-13.0	-40.6	
5.557	-17.7	H	3.0	34.7	1.0	-51.4	-13.0	-38.4	
7.410	-11.3	H	3.0	34.9	1.0	-45.3	-13.0	-32.3	
Mid Ch, 1880MHz									
3.760	-21.1	V	3.0	35.3	1.0	-55.4	-13.0	-42.4	
5.640	-17.8	V	3.0	34.7	1.0	-51.5	-13.0	-38.5	
7.520	-12.9	V	3.0	34.9	1.0	-46.8	-13.0	-33.8	
3.760	-20.4	H	3.0	35.3	1.0	-54.7	-13.0	-41.7	
5.640	-17.2	H	3.0	34.7	1.0	-50.9	-13.0	-37.9	
7.520	-11.6	H	3.0	34.9	1.0	-45.6	-13.0	-32.6	
High Ch, 1907.6MHz									
3.815	-20.6	V	3.0	35.3	1.0	-54.9	-13.0	-41.9	
5.723	-16.4	V	3.0	34.7	1.0	-50.1	-13.0	-37.1	
7.630	-11.5	V	3.0	34.9	1.0	-45.4	-13.0	-32.4	
3.815	-20.3	H	3.0	35.3	1.0	-54.6	-13.0	-41.6	
5.723	-16.2	H	3.0	34.7	1.0	-49.9	-13.0	-36.9	
7.630	-10.2	H	3.0	34.9	1.0	-44.2	-13.0	-31.2	

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 #: 14U18462
Date: 08/05/14
Test Engineer: L. Lee
Configuration: X-Pos EUT w/ AC charger, headset
Mode: HSDPA B5

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

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, 826.4MHz									
1.653	-30.2	V	3.0	37.4	1.0	-66.6	-13.0	-53.6	
2.479	-24.3	V	3.0	36.4	1.0	-59.7	-13.0	-46.7	
3.306	-21.3	V	3.0	35.8	1.0	-56.0	-13.0	-43.0	
1.653	-29.9	H	3.0	37.4	1.0	-66.3	-13.0	-53.3	
2.479	-26.1	H	3.0	36.4	1.0	-61.5	-13.0	-48.5	
3.306	-22.2	H	3.0	35.8	1.0	-57.0	-13.0	-44.0	
Mid Ch, 836.6MHz									
1.673	-29.1	V	3.0	37.3	1.0	-65.5	-13.0	-52.5	
2.510	-24.3	V	3.0	36.4	1.0	-59.7	-13.0	-46.7	
3.346	-22.2	V	3.0	35.8	1.0	-57.0	-13.0	-44.0	
1.673	-30.3	H	3.0	37.3	1.0	-66.6	-13.0	-53.6	
2.510	-26.5	H	3.0	36.4	1.0	-61.9	-13.0	-48.9	
3.346	-21.9	H	3.0	35.8	1.0	-56.7	-13.0	-43.7	
High Ch, 846.6MHz									
1.693	-30.1	V	3.0	37.3	1.0	-66.4	-13.0	-53.4	
2.540	-24.3	V	3.0	36.3	1.0	-59.7	-13.0	-46.7	
3.386	-21.4	V	3.0	35.7	1.0	-56.1	-13.0	-43.1	
1.693	-30.1	H	3.0	37.3	1.0	-66.4	-13.0	-53.4	
2.540	-25.7	H	3.0	36.3	1.0	-61.0	-13.0	-48.0	
3.386	-21.6	H	3.0	35.7	1.0	-56.3	-13.0	-43.3	

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 #: 14U18462
Date: 08/05/14
Test Engineer: E. Lee, G. Chan
Configuration: X-Pos EUT w/ AC charger, headset
Mode: REL99 B5

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

Band
Band 5
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, 826.4MHz									
1.653	-7.5	V	3.0	37.4	1.0	-43.9	-13.0	-30.9	
2.479	-19.5	V	3.0	36.4	1.0	-54.9	-13.0	-41.9	
3.306	-17.7	V	3.0	35.8	1.0	-52.5	-13.0	-39.5	
1.653	-7.0	H	3.0	37.4	1.0	-43.4	-13.0	-30.4	
2.479	-19.9	H	3.0	36.4	1.0	-55.3	-13.0	-42.3	
3.306	-17.4	H	3.0	35.8	1.0	-52.2	-13.0	-39.2	
Mid Ch, 836.6MHz									
1.673	-3.2	V	3.0	37.3	1.0	-39.5	-13.0	-26.5	
2.510	-18.9	V	3.0	36.4	1.0	-54.3	-13.0	-41.3	
3.346	-18.6	V	3.0	35.8	1.0	-53.3	-13.0	-40.3	
1.673	-0.9	H	3.0	37.3	1.0	-37.2	-13.0	-24.2	
2.510	-20.5	H	3.0	36.4	1.0	-55.9	-13.0	-42.9	
3.346	-17.9	H	3.0	35.8	1.0	-52.7	-13.0	-39.7	
High Ch, 846.6MHz									
1.693	-16.1	V	3.0	37.3	1.0	-52.4	-13.0	-39.4	
2.540	-19.0	V	3.0	36.3	1.0	-54.3	-13.0	-41.3	
3.386	-18.4	V	3.0	35.7	1.0	-53.1	-13.0	-40.1	
1.693	-5.2	H	3.0	37.3	1.0	-41.5	-13.0	-28.5	
2.540	-19.4	H	3.0	36.3	1.0	-54.8	-13.0	-41.8	
3.386	-18.6	H	3.0	35.7	1.0	-53.3	-13.0	-40.3	

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 #: 14U18462
Date: 08/05/14
Test Engineer: O. Stoelting
Configuration: X-Pos EUT w/ AC Charger + HS
Mode: EGPRS 1900

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

Band: GSM 1900 EGPRS

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 1850.2MHz									
3.700	-11.7	V	3.0	35.4	1.0	-46.1	-13.0	-33.1	
5.551	-9.9	V	3.0	34.7	1.0	-43.6	-13.0	-30.6	
7.401	-23.4	V	3.0	34.9	1.0	-57.3	-13.0	-44.3	
3.700	-27.9	H	3.0	35.4	1.0	-62.3	-13.0	-49.3	
5.551	-18.5	H	3.0	34.7	1.0	-52.2	-13.0	-39.2	
7.401	-21.2	H	3.0	34.9	1.0	-55.1	-13.0	-42.1	
Mid Ch, 1880.0MHz									
3.760	-16.5	V	3.0	35.3	1.0	-50.8	-13.0	-37.8	
5.640	-18.6	V	3.0	34.7	1.0	-52.4	-13.0	-39.4	
7.520	-15.6	V	3.0	34.9	1.0	-49.5	-13.0	-36.5	
3.760	-27.8	H	3.0	35.3	1.0	-62.1	-13.0	-49.1	
5.640	-6.4	H	3.0	34.7	1.0	-40.2	-13.0	-27.2	
7.520	-17.5	H	3.0	34.9	1.0	-51.4	-13.0	-38.4	
High Ch, 1909.8MHz									
3.820	-6.7	V	3.0	35.3	1.0	-41.0	-13.0	-28.0	
5.729	-7.7	V	3.0	34.7	1.0	-41.4	-13.0	-28.4	
7.639	-14.0	V	3.0	35.0	1.0	-47.9	-13.0	-34.9	
3.820	-20.1	H	3.0	35.3	1.0	-54.4	-13.0	-41.4	
5.729	-2.8	H	3.0	34.7	1.0	-36.6	-13.0	-23.6	
7.639	-19.1	H	3.0	35.0	1.0	-53.1	-13.0	-40.1	

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

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

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Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company: Samsung
Project #: 14U18462
Date: 08/05/14
Test Engineer: O. Stoelting
Configuration: X-Pos EUT w/ AC Charger + HS
Mode: GPRS 1900

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

Band: GSM 1900 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, 1850.2MHz									
3.700	-10.1	V	3.0	35.4	1.0	-44.5	-13.0	-31.5	
5.551	-0.2	V	3.0	34.7	1.0	-33.9	-13.0	-20.9	
7.401	-1.5	V	3.0	34.9	1.0	-35.4	-13.0	-22.4	
3.700	-9.7	H	3.0	35.4	1.0	-44.1	-13.0	-31.1	
5.551	-4.4	H	3.0	34.7	1.0	-38.2	-13.0	-25.2	
7.401	-11.9	H	3.0	34.9	1.0	-45.9	-13.0	-32.9	
Mid Ch, 1880.0MHz									
3.760	-16.0	V	3.0	35.3	1.0	-50.4	-13.0	-37.4	
5.640	-15.6	V	3.0	34.7	1.0	-49.3	-13.0	-36.3	
7.520	-19.3	V	3.0	34.9	1.0	-53.3	-13.0	-40.3	
3.760	-7.0	H	3.0	35.3	1.0	-41.4	-13.0	-28.4	
5.640	1.4	H	3.0	34.7	1.0	-32.4	-13.0	-19.4	
7.520	-17.0	H	3.0	34.9	1.0	-50.9	-13.0	-37.9	
High Ch, 1909.8MHz									
3.820	4.4	V	3.0	35.3	1.0	-29.9	-13.0	-16.9	
5.729	-6.6	V	3.0	34.7	1.0	-40.3	-13.0	-27.3	
7.639	-7.7	V	3.0	35.0	1.0	-41.7	-13.0	-28.7	
3.820	-19.2	H	3.0	35.3	1.0	-53.4	-13.0	-40.4	
5.729	2.0	H	3.0	34.7	1.0	-31.7	-13.0	-18.7	
7.639	-12.1	H	3.0	35.0	1.0	-46.1	-13.0	-33.1	

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 #: 14U18462
Date: 08/05/14
Test Engineer: O. Stoelting
Configuration: X-Pos EUT w/ AC Charger + HS
Mode: EGPRS 850

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

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, 824.2MHz									
GSM 850 EGPRS	1.648	-33.5	V	3.0	37.4	1.0	-69.9	-13.0	-56.9	
	2.473	-26.9	V	3.0	36.4	1.0	-62.3	-13.0	-49.3	
	3.297	-30.2	V	3.0	35.8	1.0	-65.0	-13.0	-52.0	
	1.648	-36.1	H	3.0	37.4	1.0	-72.4	-13.0	-59.4	
	2.473	-31.3	H	3.0	36.4	1.0	-66.7	-13.0	-53.7	
	3.297	-31.6	H	3.0	35.8	1.0	-66.4	-13.0	-53.4	
	Mid Ch, 836.6MHz									
	1.673	-34.8	V	3.0	37.3	1.0	-71.1	-13.0	-58.1	
	2.510	-33.0	V	3.0	36.4	1.0	-68.4	-13.0	-55.4	
	3.346	-31.4	V	3.0	35.8	1.0	-66.2	-13.0	-53.2	
	1.673	-28.6	H	3.0	37.3	1.0	-64.9	-13.0	-51.9	
	2.510	-33.1	H	3.0	36.4	1.0	-68.4	-13.0	-55.4	
	3.346	-31.4	H	3.0	35.8	1.0	-66.1	-13.0	-53.1	
	High Ch, 848.8MHz									
	1.698	-33.3	V	3.0	37.3	1.0	-69.6	-13.0	-56.6	
	2.547	-33.6	V	3.0	36.3	1.0	-68.9	-13.0	-55.9	
	3.395	-31.2	V	3.0	35.7	1.0	-65.9	-13.0	-52.9	
	1.698	-36.2	H	3.0	37.3	1.0	-72.5	-13.0	-59.5	
	2.547	-31.3	H	3.0	36.3	1.0	-66.6	-13.0	-53.6	
	3.395	-31.8	H	3.0	35.7	1.0	-66.5	-13.0	-53.5	

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

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

Company: Samsung
Project #: 14U18462
Date: 08/05/14
Test Engineer: O. Stoelting
Configuration: X-Pos EUT w/ AC Charger + HS
Mode: GPRS 850

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

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, 824.2MHz									
	1.648	-31.3	V	3.0	37.4	1.0	-67.7	-13.0	-54.7	
GSM 850	2.473	-24.0	V	3.0	36.4	1.0	-59.3	-13.0	-46.3	
	3.297	-31.1	V	3.0	35.8	1.0	-65.9	-13.0	-52.9	
	1.648	-35.2	H	3.0	37.4	1.0	-71.5	-13.0	-58.5	
	2.473	-22.7	H	3.0	36.4	1.0	-58.1	-13.0	-45.1	
GPRS	3.297	-30.5	H	3.0	35.8	1.0	-65.3	-13.0	-52.3	
	Mid Ch, 836.6MHz									
	1.673	-28.2	V	3.0	37.3	1.0	-64.5	-13.0	-51.5	
	2.510	-24.5	V	3.0	36.4	1.0	-59.9	-13.0	-46.9	
	3.346	-29.7	V	3.0	35.8	1.0	-64.5	-13.0	-51.5	
	1.673	-28.5	H	3.0	37.3	1.0	-64.9	-13.0	-51.9	
	2.510	-33.1	H	3.0	36.4	1.0	-68.5	-13.0	-55.5	
	3.346	-31.6	H	3.0	35.8	1.0	-66.4	-13.0	-53.4	
	High Ch, 848.8MHz									
	1.698	-22.7	V	3.0	37.3	1.0	-59.0	-13.0	-46.0	
	2.547	-20.3	V	3.0	36.3	1.0	-55.7	-13.0	-42.7	
	3.395	-30.1	V	3.0	35.7	1.0	-64.8	-13.0	-51.8	
	1.698	-21.2	H	3.0	37.3	1.0	-57.5	-13.0	-44.5	
	2.547	-21.4	H	3.0	36.3	1.0	-56.7	-13.0	-43.7	
	3.395	-31.7	H	3.0	35.7	1.0	-66.4	-13.0	-53.4	

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

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
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LTE Band 41

Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company: Samsung
Project #: 14U18462
Date: 08/26/14
Test Engineer: O. Stoelting
Configuration: X-pos EUT/AC Charger/Headphones
Mode: LTE band 41, 20MHz BW 16QAM HARM

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

Band
LTE41
20MHz
16QAM

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, (2506 MHz)									
5.012	-17.9	V	3.0	28.9	1.0	-45.7	-25.0	-20.7	
7.518	-20.7	V	3.0	26.3	1.0	-46.0	-25.0	-21.0	
10.024	-14.4	V	3.0	23.1	1.0	-36.5	-25.0	-11.5	
5.012	-14.3	H	3.0	28.9	1.0	-42.2	-25.0	-17.2	
7.518	-16.1	H	3.0	26.3	1.0	-41.5	-25.0	-16.5	
10.024	-11.1	H	3.0	23.1	1.0	-33.2	-25.0	-8.2	
Mid Ch, (2593 MHz)									
5.186	-18.0	V	3.0	28.7	1.0	-45.8	-25.0	-20.8	
7.779	-13.1	V	3.0	26.0	1.0	-38.1	-25.0	-13.1	
10.372	-18.0	V	3.0	23.0	1.0	-40.0	-25.0	-15.0	
5.186	-15.1	H	3.0	28.7	1.0	-42.8	-25.0	-17.8	
7.779	-15.1	H	3.0	26.0	1.0	-40.0	-25.0	-15.0	
10.372	-19.8	H	3.0	23.0	1.0	-41.8	-25.0	-16.8	
High Ch, (2680 MHz)									
5.360	-16.2	V	3.0	28.5	1.0	-43.8	-25.0	-18.8	
8.040	-16.9	V	3.0	25.6	1.0	-41.6	-25.0	-16.6	
10.720	-17.8	V	3.0	22.9	1.0	-39.7	-25.0	-14.7	
5.360	-16.4	H	3.0	28.5	1.0	-44.0	-25.0	-19.0	
8.040	-10.6	H	3.0	25.6	1.0	-35.3	-25.0	-10.3	
10.720	-18.0	H	3.0	22.9	1.0	-39.9	-25.0	-14.9	

Rev. 03.03.09

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

Company: Samsung
Project #: 14U18462
Date: 08/26/14
Test Engineer: O. Stoelting
Configuration: X-pos EUT/AC Charger/Headphones
Mode: LTE band 41, 20MHz BW QPSK HARM

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

Band
LTE41
20MHz
QPSK

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, (2506 MHz)									
5.012	-17.9	V	3.0	28.9	1.0	-45.8	-25.0	-20.8	
7.518	-20.7	V	3.0	26.3	1.0	-46.0	-25.0	-21.0	
10.024	-14.5	V	3.0	23.1	1.0	-36.6	-25.0	-11.6	
5.012	-14.5	H	3.0	28.9	1.0	-42.4	-25.0	-17.4	
7.518	-16.3	H	3.0	26.3	1.0	-41.6	-25.0	-16.6	
10.024	-10.9	H	3.0	23.1	1.0	-32.9	-25.0	-7.9	
Mid Ch, (2593 MHz)									
5.186	-17.6	V	3.0	28.7	1.0	-45.3	-25.0	-20.3	
7.779	-13.3	V	3.0	26.0	1.0	-38.3	-25.0	-13.3	
10.372	-17.8	V	3.0	23.0	1.0	-39.8	-25.0	-14.8	
5.186	-15.4	H	3.0	28.7	1.0	-43.1	-25.0	-18.1	
7.779	-16.1	H	3.0	26.0	1.0	-41.1	-25.0	-16.1	
10.372	-20.5	H	3.0	23.0	1.0	-42.5	-25.0	-17.5	
High Ch, (2680 MHz)									
5.360	-17.2	V	3.0	28.5	1.0	-44.7	-25.0	-19.7	
8.040	-17.3	V	3.0	25.6	1.0	-41.9	-25.0	-16.9	
10.720	-18.1	V	3.0	22.9	1.0	-40.0	-25.0	-15.0	
5.360	-16.0	H	3.0	28.5	1.0	-43.6	-25.0	-18.6	
8.040	-10.5	H	3.0	25.6	1.0	-35.2	-25.0	-10.2	
10.720	-18.3	H	3.0	22.9	1.0	-40.2	-25.0	-15.2	

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Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company: Samsung
Project #: 14U18462
Date: 08/26/14
Test Engineer: O. Stoelting
Configuration: X-pos EUT/AC Charger/Headphones
Mode: TX, LTE band 41, 15MHz, 16QAM

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

Band
LTE41
15MHz
16QAM

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, (2503.5 MHz)									
5.007	-16.7	V	3.0	28.9	1.0	-44.6	-25.0	-19.6	
7.511	-16.8	V	3.0	26.3	1.0	-42.1	-25.0	-17.1	
10.014	-14.4	V	3.0	23.1	1.0	-36.5	-25.0	-11.5	
5.007	-16.4	H	3.0	28.9	1.0	-44.3	-25.0	-19.3	
7.511	-15.3	H	3.0	26.3	1.0	-40.6	-25.0	-15.6	
10.014	-17.5	H	3.0	23.1	1.0	-39.6	-25.0	-14.6	
Mid Ch, (2593 MHz)									
5.186	-18.3	V	3.0	28.7	1.0	-46.0	-25.0	-21.0	
7.779	-12.9	V	3.0	26.0	1.0	-37.9	-25.0	-12.9	
10.372	-20.1	V	3.0	23.0	1.0	-42.1	-25.0	-17.1	
5.186	-13.8	H	3.0	28.7	1.0	-41.5	-25.0	-16.5	
7.779	-14.2	H	3.0	26.0	1.0	-39.2	-25.0	-14.2	
10.372	-17.9	H	3.0	23.0	1.0	-39.9	-25.0	-14.9	
High Ch, (2682.5 MHz)									
5.365	-17.8	V	3.0	28.5	1.0	-45.3	-25.0	-20.3	
8.052	-15.0	V	3.0	25.6	1.0	-39.7	-25.0	-14.7	
10.730	-15.9	V	3.0	22.9	1.0	-37.8	-25.0	-12.8	
5.365	-15.8	H	3.0	28.5	1.0	-43.4	-25.0	-18.4	
8.052	-11.5	H	3.0	25.6	1.0	-36.1	-25.0	-11.1	
10.730	-18.9	H	3.0	22.9	1.0	-40.8	-25.0	-15.8	

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Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company: Samsung
Project #: 14U18462
Date: 08/26/14
Test Engineer: O. Stoelting
Configuration: X-pos EUT/AC Charger/Headphones
Mode: TX, LTE band 41, 15MHz, QPSK

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

Band
LTE41
15MHz
QPSK

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, (2503.5 MHz)									
5.007	-17.5	V	3.0	28.9	1.0	-45.4	-25.0	-20.4	
7.511	-16.6	V	3.0	26.3	1.0	-41.9	-25.0	-16.9	
10.014	-13.7	V	3.0	23.1	1.0	-35.8	-25.0	-10.8	
5.007	-15.9	H	3.0	28.9	1.0	-43.8	-25.0	-18.8	
7.511	-14.5	H	3.0	26.3	1.0	-39.8	-25.0	-14.8	
10.014	-17.4	H	3.0	23.1	1.0	-39.5	-25.0	-14.5	
Mid Ch, (2593 MHz)									
5.186	-18.3	V	3.0	28.7	1.0	-46.1	-25.0	-21.1	
7.779	-12.9	V	3.0	26.0	1.0	-37.9	-25.0	-12.9	
10.372	-20.3	V	3.0	23.0	1.0	-42.3	-25.0	-17.3	
5.186	-13.5	H	3.0	28.7	1.0	-41.2	-25.0	-16.2	
7.779	-14.5	H	3.0	26.0	1.0	-39.5	-25.0	-14.5	
10.372	-17.7	H	3.0	23.0	1.0	-39.7	-25.0	-14.7	
High Ch, (2682.5 MHz)									
5.365	-18.0	V	3.0	28.5	1.0	-45.5	-25.0	-20.5	
8.052	-14.7	V	3.0	25.6	1.0	-39.3	-25.0	-14.3	
10.730	-15.7	V	3.0	22.9	1.0	-37.6	-25.0	-12.6	
5.365	-16.0	H	3.0	28.5	1.0	-43.5	-25.0	-18.5	
8.052	-11.0	H	3.0	25.6	1.0	-35.7	-25.0	-10.7	
10.730	-18.8	H	3.0	22.9	1.0	-40.7	-25.0	-15.7	

Rev. 03.03.09

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

Company: Samsung
Project #: 14U18462
Date: 08/26/14
Test Engineer: O. Stoelting
Configuration: X-pos EUT/AC Charger/Headphones
Mode: TX, LTE band 41, 10MHz, 16QAM

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

Band
LTE41
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, (2501 MHz)									
5.002	-17.0	V	3.0	28.9	1.0	-44.9	-25.0	-19.9	
7.503	-17.6	V	3.0	26.3	1.0	-43.0	-25.0	-18.0	
10.004	-13.2	V	3.0	23.1	1.0	-35.3	-25.0	-10.3	
5.002	-15.7	H	3.0	28.9	1.0	-43.6	-25.0	-18.6	
7.503	-21.9	H	3.0	26.3	1.0	-47.3	-25.0	-22.3	
10.004	-11.7	H	3.0	23.1	1.0	-33.8	-25.0	-8.8	
Mid Ch, (2593 MHz)									
5.186	-16.5	V	3.0	28.7	1.0	-44.2	-25.0	-19.2	
7.779	-14.5	V	3.0	26.0	1.0	-39.4	-25.0	-14.4	
10.372	-19.0	V	3.0	23.0	1.0	-41.0	-25.0	-16.0	
5.186	-14.0	H	3.0	28.7	1.0	-41.8	-25.0	-16.8	
7.779	-19.3	H	3.0	26.0	1.0	-44.3	-25.0	-19.3	
10.372	-17.9	H	3.0	23.0	1.0	-39.9	-25.0	-14.9	
High Ch, (2685 MHz)									
5.375	-18.0	V	3.0	28.5	1.0	-45.6	-25.0	-20.6	
8.055	-23.8	V	3.0	25.6	1.0	-48.5	-25.0	-23.5	
10.740	-14.0	V	3.0	22.9	1.0	-35.9	-25.0	-10.9	
5.375	-13.8	H	3.0	28.5	1.0	-41.3	-25.0	-16.3	
8.055	-13.9	H	3.0	25.6	1.0	-38.5	-25.0	-13.5	
10.740	-21.3	H	3.0	22.9	1.0	-43.1	-25.0	-18.1	

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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 #: 14U18462
Date: 08/26/14
Test Engineer: O. Stoelting
Configuration: X-pos EUT/AC Charger/Headphones
Mode: TX, LTE band 41, 10MHz, QPSK

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

Band
LTE41
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, (2501 MHz)									
5.002	-17.6	V	3.0	28.9	1.0	-45.5	-25.0	-20.5	
7.503	-17.2	V	3.0	26.3	1.0	-42.6	-25.0	-17.6	
10.004	-13.2	V	3.0	23.1	1.0	-35.3	-25.0	-10.3	
5.002	-14.7	H	3.0	28.9	1.0	-42.6	-25.0	-17.6	
7.503	-22.3	H	3.0	26.3	1.0	-47.6	-25.0	-22.6	
10.004	-11.6	H	3.0	23.1	1.0	-33.7	-25.0	-8.7	
Mid Ch, (2593 MHz)									
5.186	-16.5	V	3.0	28.7	1.0	-44.2	-25.0	-19.2	
7.779	-14.6	V	3.0	26.0	1.0	-39.6	-25.0	-14.6	
10.372	-19.4	V	3.0	23.0	1.0	-41.4	-25.0	-16.4	
5.186	-13.7	H	3.0	28.7	1.0	-41.4	-25.0	-16.4	
7.779	-19.1	H	3.0	26.0	1.0	-44.1	-25.0	-19.1	
10.372	-17.9	H	3.0	23.0	1.0	-39.8	-25.0	-14.8	
High Ch, (2685 MHz)									
5.375	-18.1	V	3.0	28.5	1.0	-45.7	-25.0	-20.7	
8.055	-24.0	V	3.0	25.6	1.0	-48.6	-25.0	-23.6	
10.740	-14.6	V	3.0	22.9	1.0	-36.5	-25.0	-11.5	
5.375	-14.5	H	3.0	28.5	1.0	-42.0	-25.0	-17.0	
8.055	-14.4	H	3.0	25.6	1.0	-39.0	-25.0	-14.0	
10.740	-21.2	H	3.0	22.9	1.0	-43.1	-25.0	-18.1	

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Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company: Samsung
Project #: 14U18462
Date: 08/26/14
Test Engineer: O. Stoelting
Configuration: X-pos EUT/AC Charger/Headphones
Mode: TX, LTE band 41, 5MHz, 16QAM

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

Band
LTE41
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, (2498.5 MHz)									
4.997	-16.8	V	3.0	28.9	1.0	-44.7	-25.0	-19.7	
7.495	-23.2	V	3.0	26.4	1.0	-48.6	-25.0	-23.6	
9.994	-14.2	V	3.0	23.1	1.0	-36.3	-25.0	-11.3	
4.997	-13.6	H	3.0	28.9	1.0	-41.5	-25.0	-16.5	
7.495	-15.6	H	3.0	26.4	1.0	-40.9	-25.0	-15.9	
9.994	-10.5	H	3.0	23.1	1.0	-32.6	-25.0	-7.6	
Mid Ch, (2593 MHz)									
5.186	-13.0	V	3.0	28.7	1.0	-40.7	-25.0	-15.7	
7.779	-26.8	V	3.0	26.0	1.0	-51.8	-25.0	-26.8	
10.372	-22.8	V	3.0	23.0	1.0	-44.8	-25.0	-19.8	
5.186	-15.7	H	3.0	28.7	1.0	-43.5	-25.0	-18.5	
7.779	-22.8	H	3.0	26.0	1.0	-47.8	-25.0	-22.8	
10.372	-25.0	H	3.0	23.0	1.0	-47.0	-25.0	-22.0	
High Ch, (2687.5 MHz)									
5.375	-17.9	V	3.0	28.5	1.0	-45.4	-25.0	-20.4	
8.063	-21.4	V	3.0	25.6	1.0	-46.1	-25.0	-21.1	
10.750	-17.5	V	3.0	22.9	1.0	-39.4	-25.0	-14.4	
5.375	-16.9	H	3.0	28.5	1.0	-44.4	-25.0	-19.4	
8.055	-10.2	H	3.0	25.6	1.0	-34.9	-25.0	-9.9	
10.740	-21.2	H	3.0	22.9	1.0	-43.1	-25.0	-18.1	

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Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company: Samsung
Project #: 14U18462
Date: 08/26/14
Test Engineer: O. Stoelting
Configuration: X-pos EUT/AC Charger/Headphones
Mode: TX, LTE band 41, 5MHz, QPSK

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

Band
LTE41
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, (2498.5 MHz)									
4.997	-17.1	V	3.0	28.9	1.0	-45.0	-25.0	-20.0	
7.495	-22.7	V	3.0	26.4	1.0	-48.0	-25.0	-23.0	
9.994	-14.7	V	3.0	23.1	1.0	-36.8	-25.0	-11.8	
4.997	-14.3	H	3.0	28.9	1.0	-42.2	-25.0	-17.2	
7.495	-15.2	H	3.0	26.4	1.0	-40.5	-25.0	-15.5	
9.994	-10.5	H	3.0	23.1	1.0	-32.6	-25.0	-7.6	
Mid Ch, (2593 MHz)									
5.186	-13.8	V	3.0	28.7	1.0	-41.5	-25.0	-16.5	
7.779	-26.9	V	3.0	26.0	1.0	-51.9	-25.0	-26.9	
10.372	-23.6	V	3.0	23.0	1.0	-45.6	-25.0	-20.6	
5.186	-15.2	H	3.0	28.7	1.0	-42.9	-25.0	-17.9	
7.779	-23.1	H	3.0	26.0	1.0	-48.1	-25.0	-23.1	
10.372	-25.7	H	3.0	23.0	1.0	-47.7	-25.0	-22.7	
High Ch, (2687.5 MHz)									
5.375	-16.9	V	3.0	28.5	1.0	-44.4	-25.0	-19.4	
8.055	-20.4	V	3.0	25.6	1.0	-45.1	-25.0	-20.1	
10.740	-16.5	V	3.0	22.9	1.0	-38.4	-25.0	-13.4	
5.375	-16.9	H	3.0	28.5	1.0	-44.4	-25.0	-19.4	
8.055	-9.8	H	3.0	25.6	1.0	-34.5	-25.0	-9.5	
10.740	-21.8	H	3.0	22.9	1.0	-43.7	-25.0	-18.7	

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