



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

CERTIFICATION TEST REPORT

FOR

GSM/WCDMA Phone + Bluetooth and WLAN 2.4GHz b/g/n

MODEL NUMBER: SM-G530BT

FCC ID: A3LSMG530BT

REPORT NUMBER: 14I18664-E1

ISSUE DATE: September 5, 2014

Prepared for

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REPORT NO: 14I18664-E1
MODEL NUMER: SM-G530BT

DATE: September 5, 2014
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Revision History

Issue		Revisions	Revised By
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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: SAMSUNG ELECTRONICS CO., LTD.
EUT DESCRIPTION: GSM/WCDMA Phone + Bluetooth and WLAN 2.4GHz b/g/n
MODEL: SM-G530BT
SERIAL NUMBER: R31F800SN4W (RADIATED), R31F800SN2M (CONDUCTED)
DATE TESTED: AUG 27-SEP 5, 2014

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
FCC PART 22H, 24E	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

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(IC: 2324B-1)	☐ Chamber D(IC: 2324B-4)
☒ Chamber B(IC: 2324B-2)	☐ Chamber E(IC: 2324B-5)
☒ Chamber C(IC: 2324B-3)	☐ Chamber F(IC: 2324B-6)
	☐ Chamber G(IC: 2324B-7)
	☐ Chamber H(IC: 2324B-8)

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:

$$\text{EIRP} = \text{PSA reading with EUT worst orientation (dBm)} + \text{Path loss (dB)} - \text{cable loss(between the SG and substitution antenna)} + \text{Substitution Antenna Factor (dBi)}$$

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

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

4.3. MEASUREMENT UNCERTAINTY

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

PARAMETER	UNCERTAINTY
Conducted Disturbance, 0.15 to 30 MHz	3.52 dB
Radiated Disturbance, 30 to 27000 MHz	4.94 dB

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

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a GSM/WCDMA Phone + Bluetooth and WLAN 2.4GHz b/g/n

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 Peak	Conducted		Radiated	
			Peak (dBm)	Peak (mW)	Peak (dBm)	Peak (mW)
GSM850	824~849	GMSK	32.7	1862.1		
	824~849	GPRS	32.8	1905.5	28.3	676.1
	824~849	EGPRS	27.9	616.6	25.4	346.7
GSM1900	1850~1910	GMSK	30.0	1000.0		
	1850~1910	GPRS	30.0	1000.0	28.9	767.4
	1850~1910	EGPRS	26.5	446.7	26.47	443.6

FCC Part 22/24						
Band	Frequency Range(MHz)	Modulation Peak	Conducted		Radiated	
			Avg (dBm)	Avg (mW)	Avg (dBm)	Avg (mW)
Band 5	824~849	REL99	22.3	169.8	19.5	89.1
	824~849	HSDPA	21.9	154.9	18.3	68.3
	824~849	HSUPA	21.5	141.3		
Band 2	1850~1910	REL99	22.5	177.8	22.8	188.5
	1850~1910	HSDPA	21.4	138.0	21.9	154.5
	1850~1910	HSUPA	21.3	134.9		

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

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

Frequency (MHz)	Peak Gain (dBi)
Band 5, 824~849MHz	-2.26
Band 2, 1850~1910MHz	0.54

5.4. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
AC Adapter	Samsung	ETA0U83BWB	N/A	N/A
Earphone	Samsung	EHS61ASFWE	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

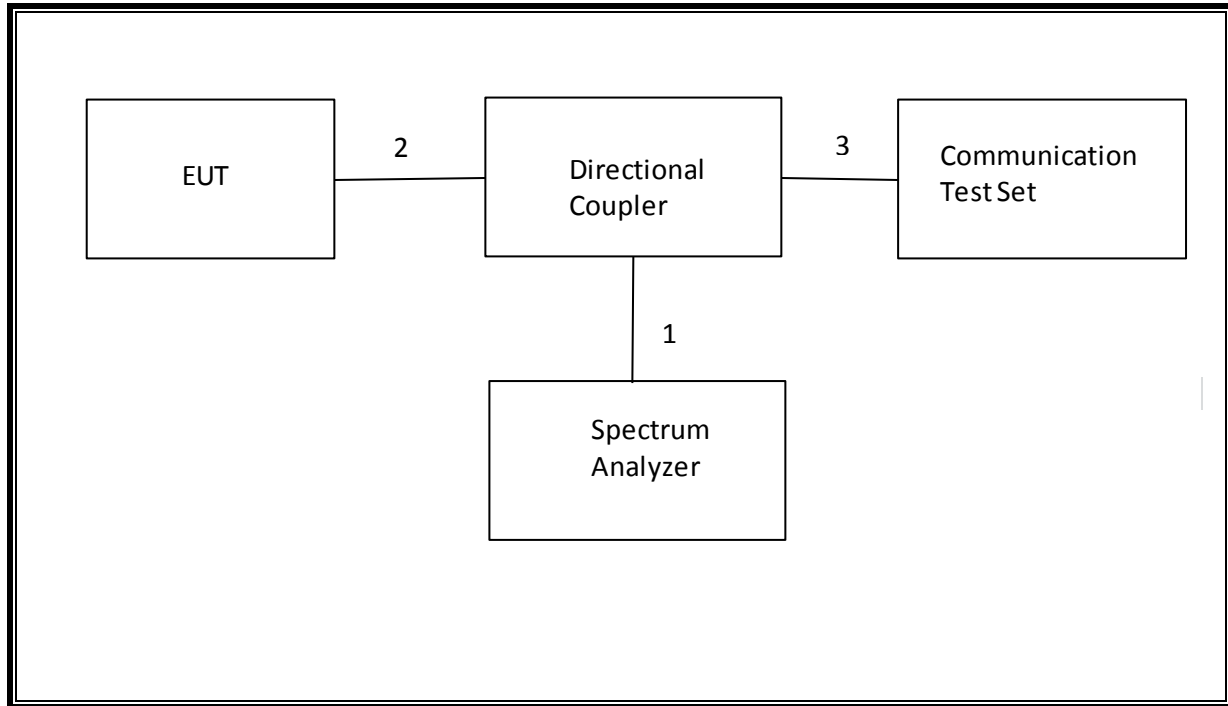
I/O CABLES (RADIATED SETUP)

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

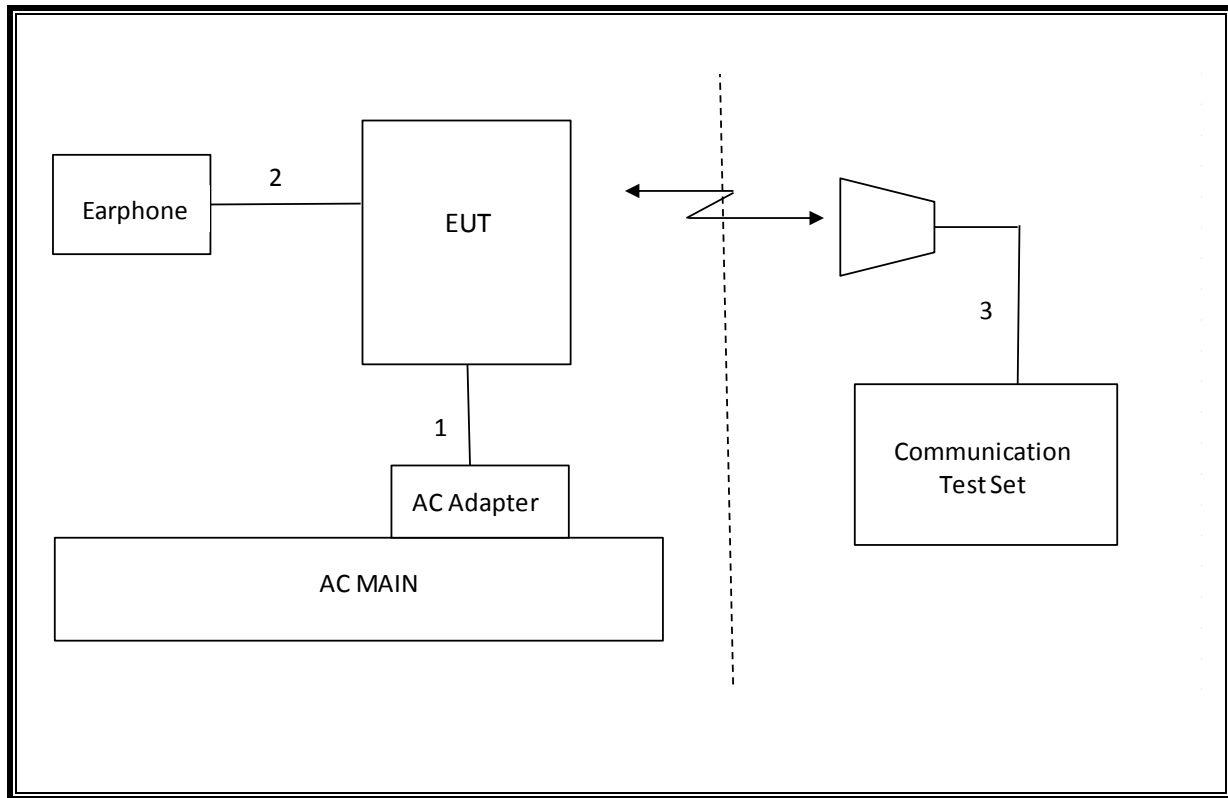
TEST SETUP

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

SETUP DIAGRAM FOR TESTS (CONDUCTED TEST SETUP)



SETUP DIAGRAM FOR TESTS (RADIATED TEST SETUP)



6. TEST AND MEASUREMENT EQUIPMENT

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

TEST EQUIPMENT LIST				
Description	Manufacturer	Model	Asset	Cal Due
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C01179	02/26/15
Antenna, Bilog, 2 GHz	Sunol Sciences	JB1	C01011	08/14/15
Antenna, Horn, 18 GHz	EMCO	3115	C00783	10/25/14
Antenna, Horn, 18 GHz	EMCO	3115	C00784	10/25/14
Highpass Filter, 2.7 GHz	Micro-Tronics	HPM13194	N02687	CNR
Highpass Filter, 1.5 GHz	Micro-Tronics	HPM13193	N02688	CNR
Temperature / Humidity Chamber	Thermotron	SE 600-10-10	C00930	01/09/15
Communications Test Set	R&S	CMW500	T159	07/02/15
DC power supply, 8 V @ 3 A or 15 V	Agilent / HP	E3610A	None	CNR
Vector signal generator, 6 GHz	Agilent / HP	E4438C	None	07/06/15
Antenna, Tuned Dipole 400~1000	ETS	3121C DB4	C00993	02/14/15
Directional Coupler	RF-Lambda	RFDC5M06G15	None	CNR
Antenna, Horn, 26.5 GHz	ARA	MWH-1826/B	C00589	12/17/14

7. Summary Table

FCC Part Section	RSS Section(s)	Test Description	Test Limit	Test Condition	Test Result	Note
2.1049	N/A	Occupied Band width (99%)	N/A	Conducted	Pass	4.201 Mhz
22.917(a) 24.238(a) 27.53(g) 90.691	RSS-132(4.5.1) RSS-133(6.5.1) RSS-139(6.5.1)	Band Edge / Conducted Spurious Emission	-13dBm		Pass	-14.206dBm
2.1046	N/A	Conducted output power	N/A		Pass	32.8dBm
22.355 24.235 27.54 90.213	RSS-132(4.3) RSS-133(6.3) RSS-139(6.3) RSS-199(4.3)	Frequency Stability	2.5PPM		Pass	.043 PPM
22.913(a)(2)	RSS-132(4.4)	Effective Radiated Power	38 dBm	Radiated	Pass	28.3dBm
24.232(c) 27.50(h)(2)	RSS-133(6.4) RSS-199(4.4)	Equivalent Isotropic Radiated Power	33dBm		Pass	28.9dBm
22.917(a) 24.238(a) 27.53(g)	RSS-132(4.5.1) RSS-133(6.5.1) RSS-139(6.5.1)	Radiated Spurious Emission	-13dBm		Pass	-36dBm

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

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	32.4			
		190	836.6	32.5			
		251	848.8	32.7			
	GPRS	128	824.2	32.4	30.4	28.4	27.5
		190	836.6	32.5	30.4	28.5	27.5
		251	848.8	32.8	30.5	28.7	27.7
	EGPRS	128	824.2	27.8	26.4	25.5	24.2
		190	836.6	27.8	26.5	25.3	24.2
		251	848.8	27.9	26.6	25.6	24.4
GSM1900	GMSK	512	1850.2	30.0			
		661	1880	29.5			
		810	1909.8	29.6			
	GPRS	512	1850.2	30.0	27.5	25.5	24.5
		661	1880	29.5	27.4	25.4	24.5
		810	1909.8	29.6	27.5	25.5	24.5
	EGPRS	512	1850.2	26.5	25.5	24.5	23.5
		661	1880	26.4	25.1	24.1	23.1
		810	1909.8	26.5	25.2	24.3	23.4

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
	β_c	Not Applicable
	β_d	Not Applicable
	β_{ec}	Not Applicable
	β_c/β_d	8/15
	β_{hs}	Not Applicable
	β_{ed}	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	22.2
		4183	836.6	22.2
		4233	846.6	22.3
Band 2	REL99	9262	1852.4	22.5
		9400	1880	22.2
		9538	1907.6	22.2

8.3. UMTS HSDPA

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

	Mode	Rel5 HSDPA			
	Subtest	1	2	3	4
WCDMA General Settings	Loopback Mode	Test Mode 1			
	Rel99 RMC	12.2kbps RMC			
	HSDPA FRC	H-Set1			
	Power Control Algorithm	Algorithm 2			
	β_c	2/15	12/15	15/15	15/15
	β_d	15/15	15/15	8/15	4/15
	Bd (SF)	64			
	β_c/β_d	2/15	12/15	15/8	15/4
	β_{hs}	4/15	24/15	30/15	30/15
HSDPA Specific Settings	MPR (dB)	0	0	0.5	0.5
	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			
	$A_{hs} = \beta_{hs}/\beta_c$	30/15			

8.3.1. UMTS HSDPA OUTPUT POWER RESULT

Band	Mode	Subset	Ch.	f(MHz)	Conducted Power (dBm)
					Avg (dBm)
Band 5	HSDPA	1	4132	826.4	21.3
			4183	836.6	21.1
			4233	846.6	21.2
		2	4132	826.4	21.8
			4183	836.6	21.9
			4233	846.6	21.7
		3	4132	826.4	20.7
			4183	836.6	20.5
			4233	846.6	20.6
		4	4132	826.4	20.5
			4183	836.6	20.8
			4233	846.6	20.9
Band 2	HSDPA	1	9262	1852.4	21.4

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			9400	1880	21.2
			9538	1907.6	21.2
		2	9262	1852.4	20.5
			9400	1880	20.5
			9538	1907.6	20.5
		3	9262	1852.4	20.0
			9400	1880	20.0
			9538	1907.6	20.1
		4	9262	1852.4	20.8
			9400	1880	20.8
			9538	1907.6	21.0

8.3.2. UMTS HSUPA

TEST PROCEDURE

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

	Mode	Rel6 HSUPA	Rel6 HSUPA	Rel6 HSUPA	Rel6 HSUPA	Rel6 HSUPA
	Subtest	1	2	3	4	5
WCDMA General Settings	Loopback Mode	Test Mode 1				
	P-CPICH (dB)	-10				
	P-CCPCH (dB)	-12				
	SCH (dB)	-12				
	PICH(dB)	-15				
	DPCH (dB)	-9				
	HS-SCCH 1 (dB)	-8				
	HS-PDSCH (dB)	-3				
	Rel99 RMC	12.2kbps RMC				
	HSDPA FRC	H-Set1				
	HSUPA Test	HSUPA Loopback				
	Power Control Algorithm	Algorithm2				
	Bc	11/15	6/15	15/15	2/15	15/15
	Bd	15/15	15/15	9/15	15/15	15/15
	Bec	209/225	12/15	30/15	2/15	5/15
	β_c/β_d	11/15	6/15	15/9	2/15	15/15
	Bhs	22/15	12/15	30/15	4/15	30/15
	β_{ed} (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 = β_{hs}/β_c	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: β ed cannot be set directly, it is set by Absolute Grant Value.**8.3.3. UMTS HSUPA OUTPUT POWER RESULT**

Band	Mode	Subset	Ch.	f(MHz)	Conducted Power (dBm)
					Avg (dBm)
Band 5	HSUPA	1	4132	826.4	21.3
			4183	836.6	21.5
			4233	846.6	21.4
		2	4132	826.4	19.7
			4183	836.6	20.3
			4233	846.6	20.1
		3	4132	826.4	20.8
			4183	836.6	20.2
			4233	846.6	20.4
		4	4132	826.4	20.8
			4183	836.6	20.9
			4233	846.6	20.4
		5	4132	826.4	21.3
			4183	836.6	21.5
			4233	846.6	21.4
Band 2	HSUPA	1	9262	1852.4	21.0
			9400	1880	21.3
			9538	1907.6	21.0
		2	9262	1852.4	20.3
			9400	1880	20.2
			9538	1907.6	20.1
		3	9262	1852.4	20.3
			9400	1880	20.0
			9538	1907.6	20.1
		4	9262	1852.4	20.3
			9400	1880	19.9

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			9538	1907.6	20.2
		5	9262	1852.4	21.6
			9400	1880	21.2
			9538	1907.6	21.2

9. PEAK TO AVERAGE RATIO

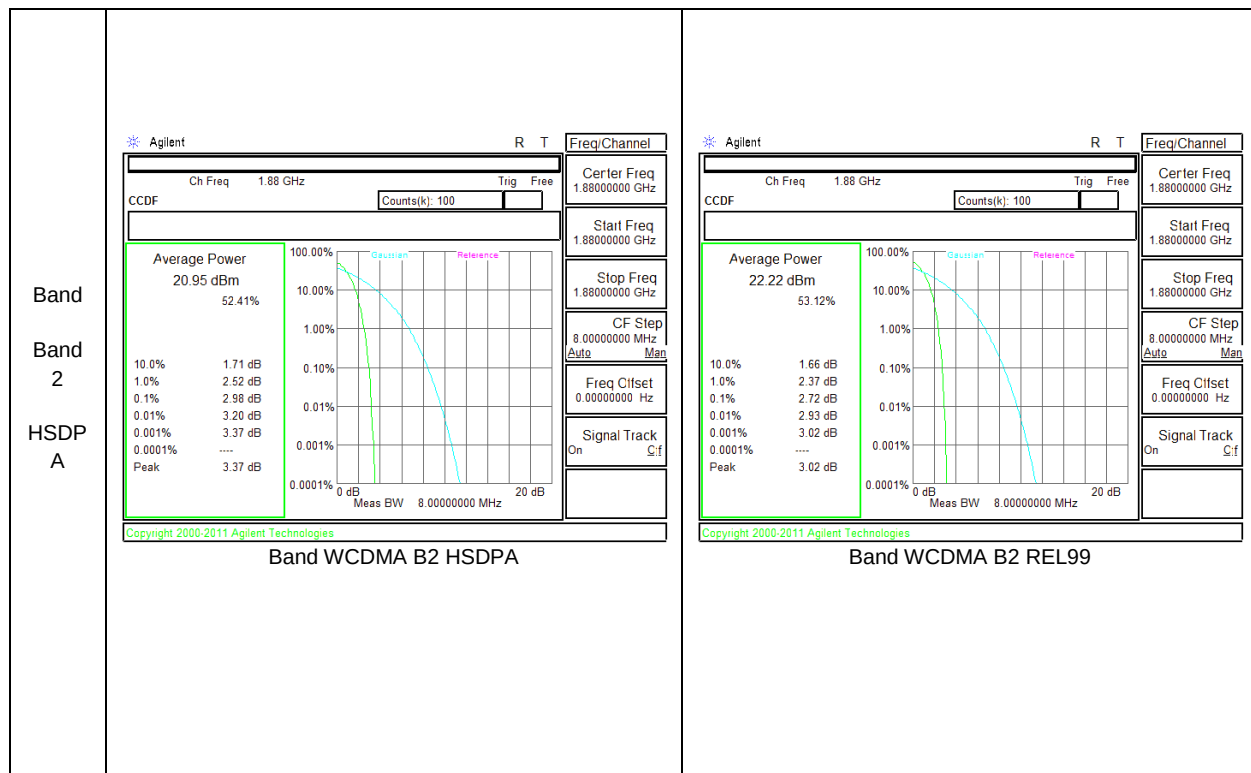
Test Procedure

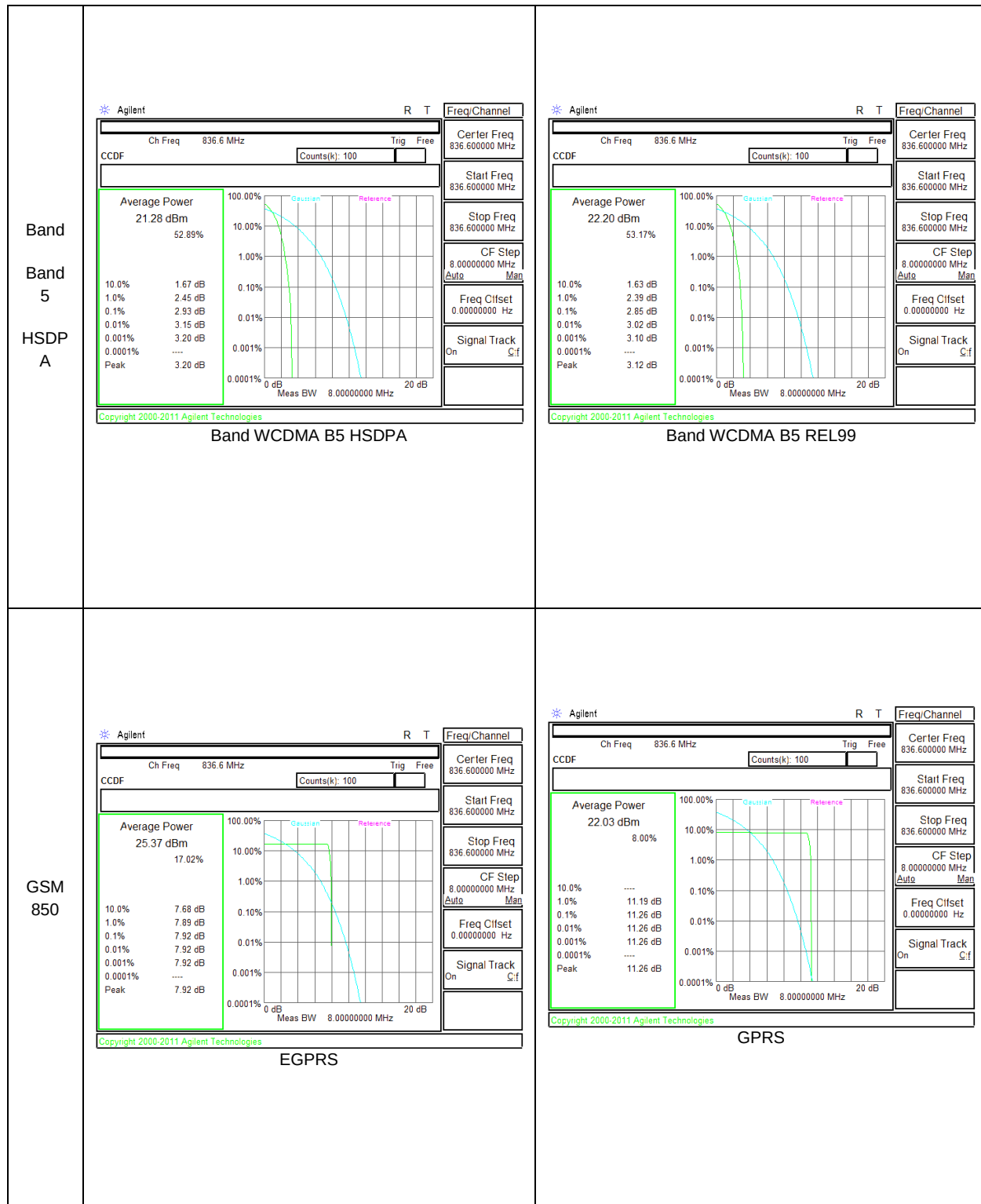
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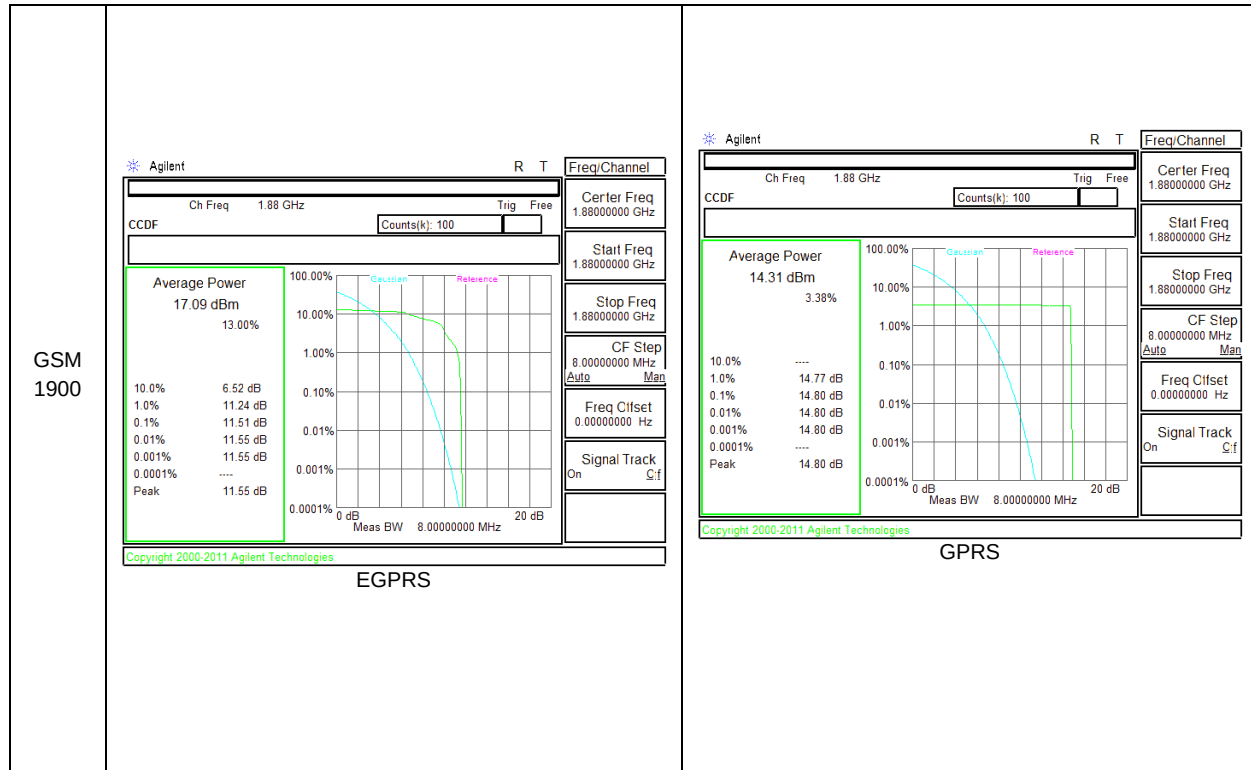
Test Spec

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







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)

10.1.1. OCCUPIED BANDWIDTH RESULTS

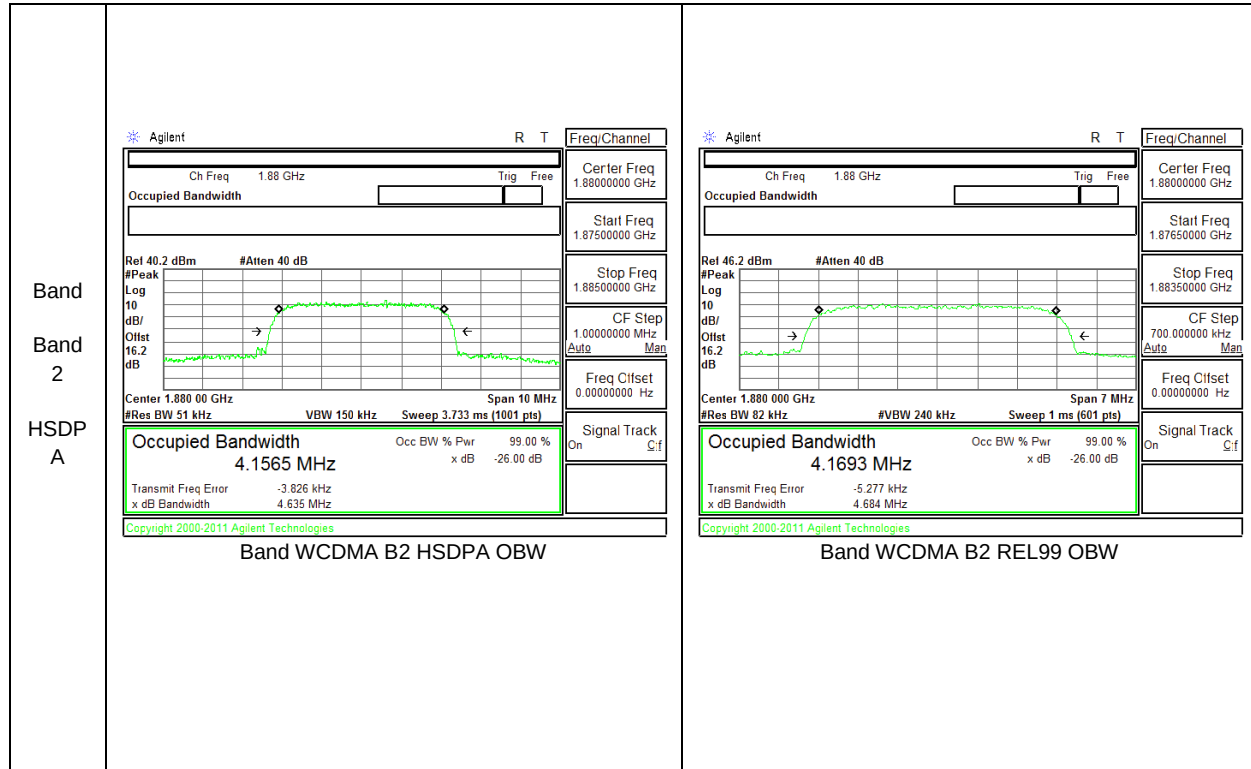
GSM OCCUPIED BANDWIDTH RESULTS

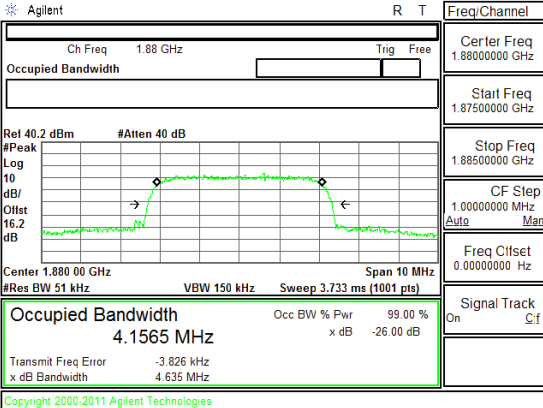
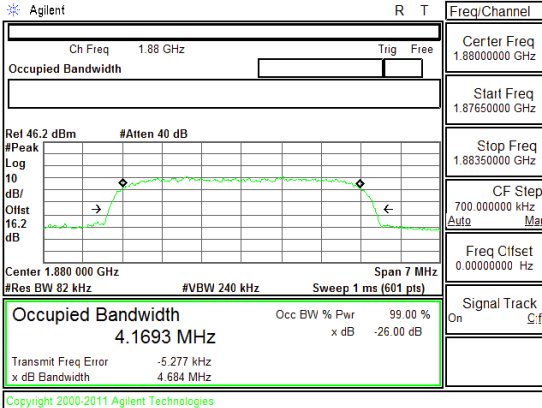
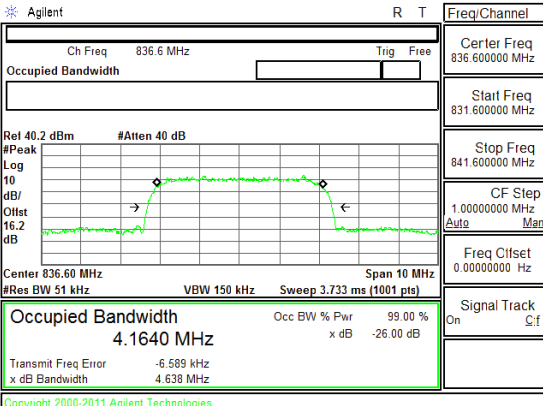
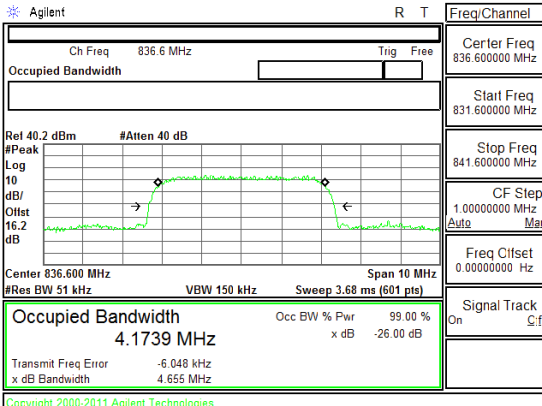
Band	Mode	Channel	f (MHz)	99% BW (MHz)	-26dB BW (MHz)
GSM850	GMSK	128	824.2		
		190	836.6		
		251	848.8		
	GPRS	128	824.2	0.2654	0.3576
		190	836.6	0.2646	0.3589
		251	848.8	0.2662	0.3638
	EGPRS	128	824.2	0.2645	0.3625
		190	836.6	0.2669	0.3616
		251	848.8	0.2668	0.3594
GSM1900	GMSK	512	1850.2		
		661	1880		
		810	1909.8		
	GPRS	512	1850.2	0.2429	0.3128
		661	1880	0.2439	0.317
		810	1909.8	0.2394	0.308
	EGPRS	512	1850.2	0.2652	0.363
		661	1880	0.2639	0.3568
		810	1909.8	0.2626	0.3575

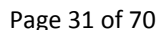
WCDMA OCCUPIED BANDWIDTH RESULTS

Band	Mode	Channel	f (MHz)	99% BW (MHz)	-26dB BW (MHz)
Band 5	REL99	4132	826.4	4.183	4.651
		4183	836.6	4.174	4.655
		4233	846.6	4.174	4.634
	HSDPA	4132	826.4	4.17	4.654
		4183	836.6	4.164	4.638
		4233	846.6	4.164	4.638
	HSUPA	4132	826.4		
		4183	836.6		
		4233	846.6		
Band 2	REL99	9262	1852.4	4.201	4.684
		9400	1880	4.169	4.684
		9538	1907.6	4.177	4.695
	HSDPA	9262	1852.4	4.185	4.618
		9400	1880	4.157	4.635
		9538	1907.6	4.181	4.625
	HSUPA	9262	1852.4		
		9400	1880		
		9538	1907.6		

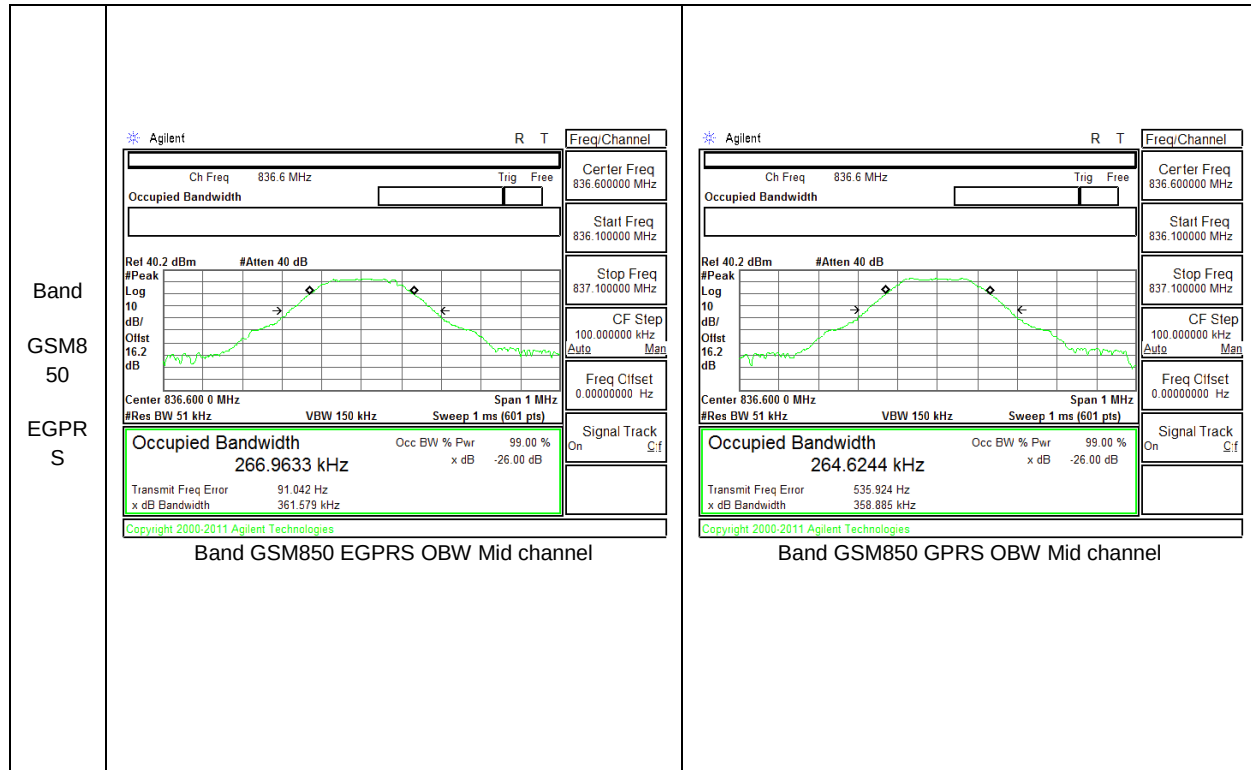
10.1.2. OCCUPIED BANDWIDTH PLOTS



Band 2 HSDPA	A	 Copyright 2000-2011 Agilent Technologies Band WCDMA B2 HSDPA OBW	 Copyright 2000-2011 Agilent Technologies Band WCDMA B2 REL99 OBW
		 Copyright 2000-2011 Agilent Technologies Band WCDMA B5 HSDPA OBW	 Copyright 2000-2011 Agilent Technologies Band WCDMA B5 REL99 OBW



Band GSM1 900 EGPRS	Agilent R T Freq/Channel Ch Freq 1.88 GHz Trig Free Center Freq 1.8800000 GHz Occupied Bandwidth Start Freq 1.87950000 GHz Stop Freq 1.88050000 GHz Rel 40.2 dBm #Atten 40 dB #Peak Log 10 dB/ Offset 16.2 dB Center 1.880 000 0 GHz #Res BW 51 kHz VBW 150 kHz Sweep 1 ms (601 pts) Span 1 MHz Occupied Bandwidth 263.9415 kHz Occ BW % Pwr 99.00 % x dB -26.00 dB Transmit Freq Error -742.464 Hz x dB Bandwidth 356.815 kHz Copyright 2000-2011 Agilent Technologies Band GSM1900 EGPRS OBW Mid channel
Band GSM8 50 EGPRS	Agilent R T Freq/Channel Ch Freq 836.6 MHz Trig Free Center Freq 836.600000 MHz Occupied Bandwidth Start Freq 836.100000 MHz Stop Freq 837.100000 MHz Rel 40.2 dBm #Atten 40 dB #Peak Log 10 dB/ Offset 16.2 dB Center 836.600 0 MHz #Res BW 51 kHz VBW 150 kHz Sweep 1 ms (601 pts) Span 1 MHz Occupied Bandwidth 266.9633 kHz Occ BW % Pwr 99.00 % x dB -26.00 dB Transmit Freq Error 91.042 Hz x dB Bandwidth 361.579 kHz Copyright 2000-2011 Agilent Technologies Band GSM850 EGPRS OBW Mid channel
	Agilent R T Freq/Channel Ch Freq 1.88 GHz Trig Free Center Freq 1.8800000 GHz Occupied Bandwidth Start Freq 1.87950000 GHz Stop Freq 1.88050000 GHz Rel 46.2 dBm #Atten 40 dB #Peak Log 10 dB/ Offset 16.2 dB Center 1.880 000 0 GHz #Res BW 5.1 kHz VBW 15 kHz Sweep 36.8 ms (601 pts) Span 1 MHz Occupied Bandwidth 243.8602 kHz Occ BW % Pwr 99.00 % x dB -26.00 dB Transmit Freq Error -664.909 Hz x dB Bandwidth 316.969 kHz Copyright 2000-2011 Agilent Technologies Band GSM1900 GPRS OBW Mid channel
	Agilent R T Freq/Channel Ch Freq 836.6 MHz Trig Free Center Freq 836.600000 MHz Occupied Bandwidth Start Freq 836.100000 MHz Stop Freq 837.100000 MHz Rel 40.2 dBm #Atten 40 dB #Peak Log 10 dB/ Offset 16.2 dB Center 836.600 0 MHz #Res BW 51 kHz VBW 150 kHz Sweep 1 ms (601 pts) Span 1 MHz Occupied Bandwidth 264.6244 kHz Occ BW % Pwr 99.00 % x dB -26.00 dB Transmit Freq Error 535.924 Hz x dB Bandwidth 358.885 kHz Copyright 2000-2011 Agilent Technologies Band GSM850 GPRS OBW Mid channel



10.2. BAND EDGE EMISSIONS

RULE PART(S)

FCC: §22.359, §24.238

LIMITS

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

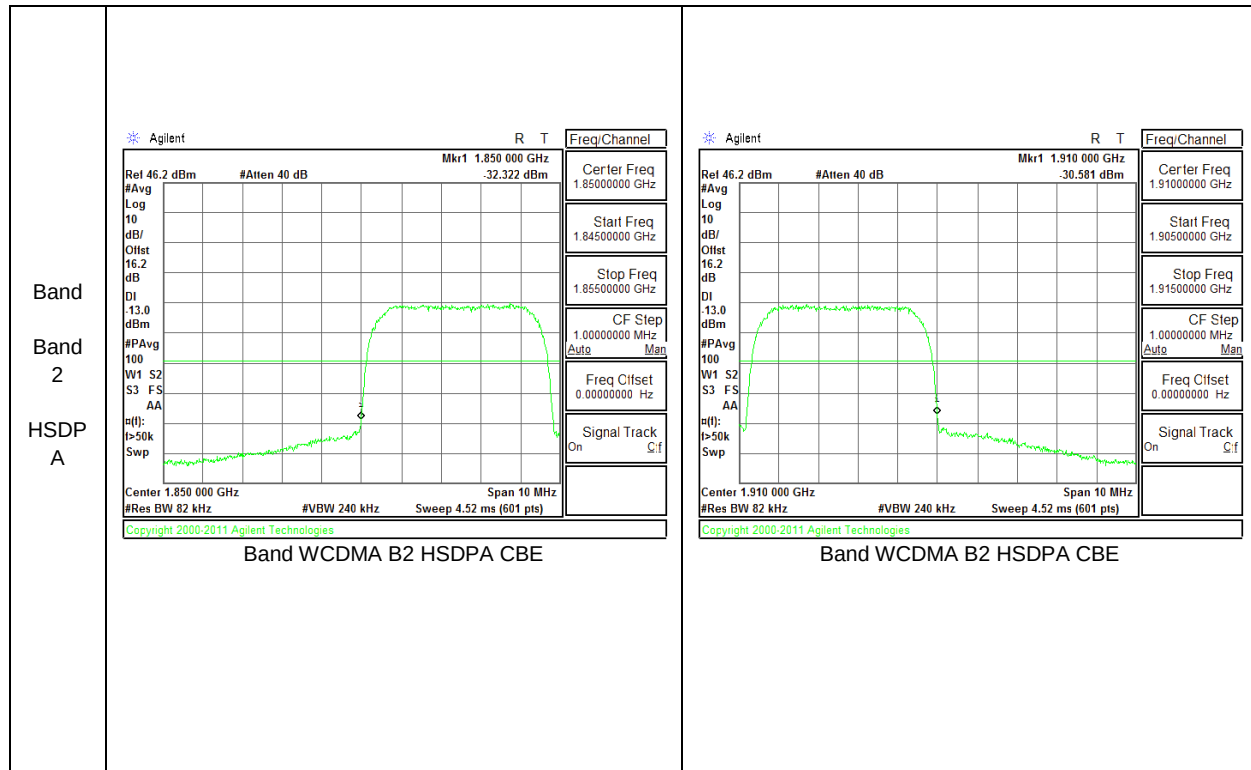
TEST PROCEDURE

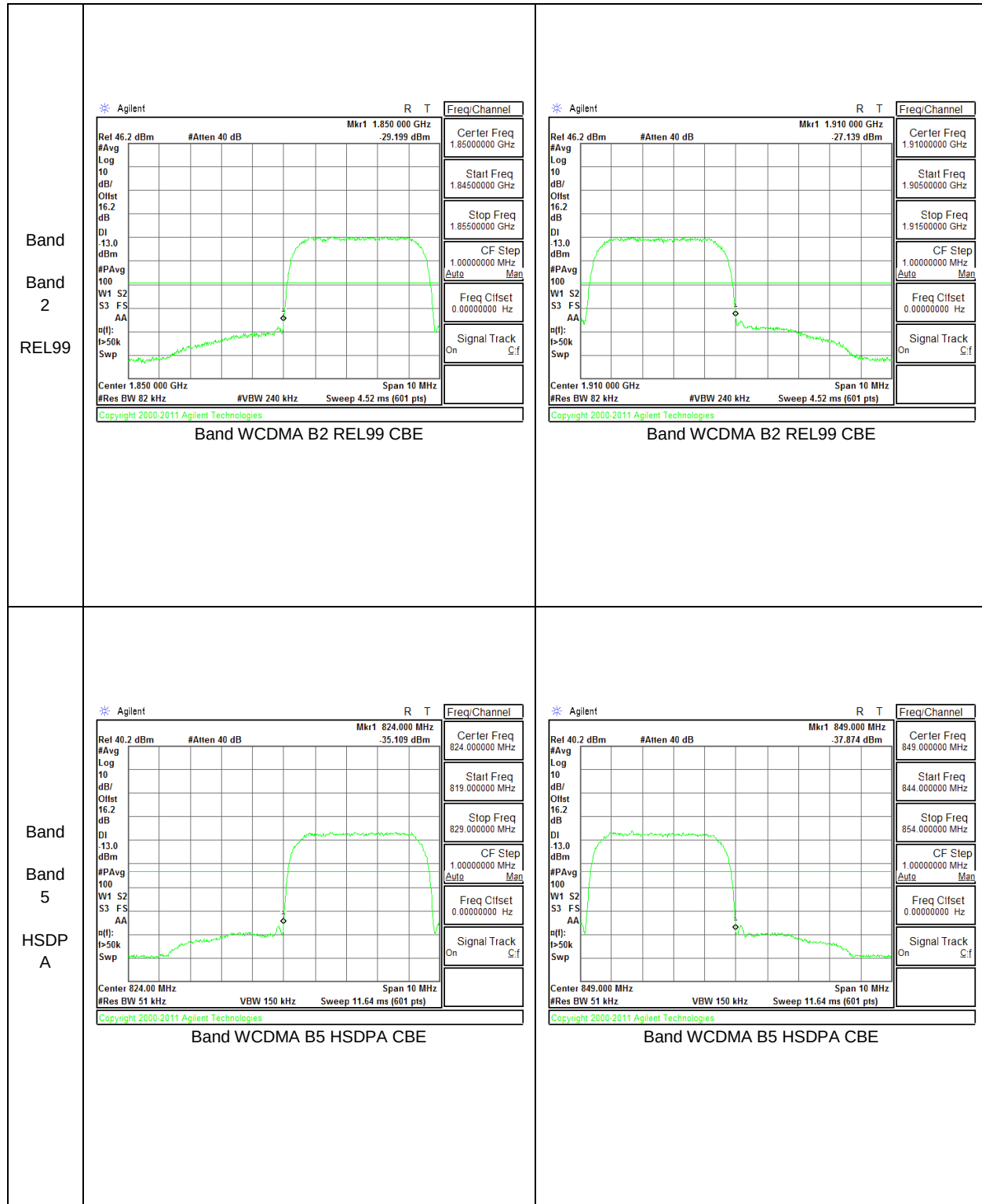
Per KDB 971168 D01 Power Meas License Digital Systems v02r01

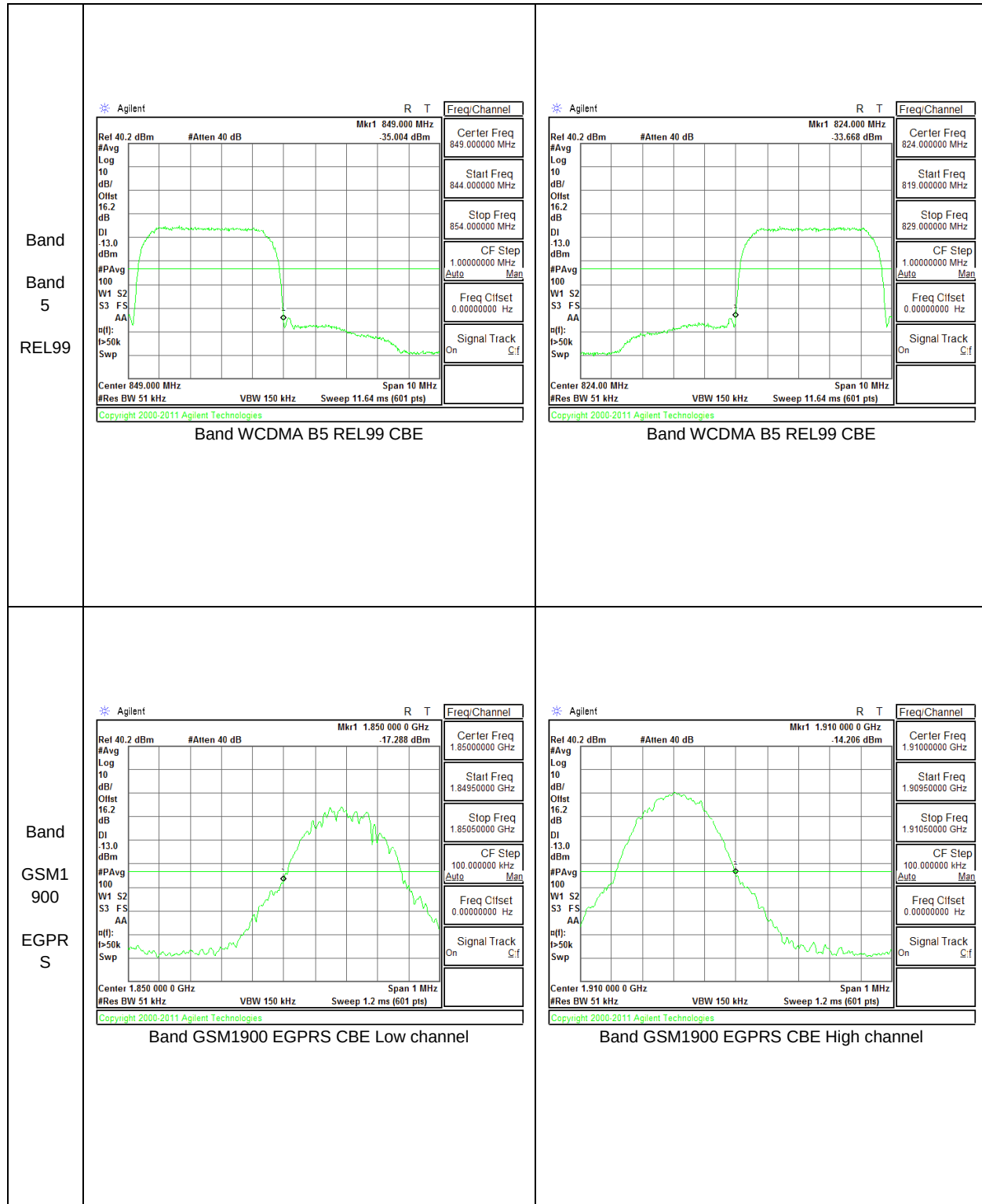
The transmitter output was connected to an Agilent 8960 or a CMW500 Test Set and configured to operate at maximum power. The band edge emissions were measured at the required operating frequencies in each band on the Spectrum Analyzer.

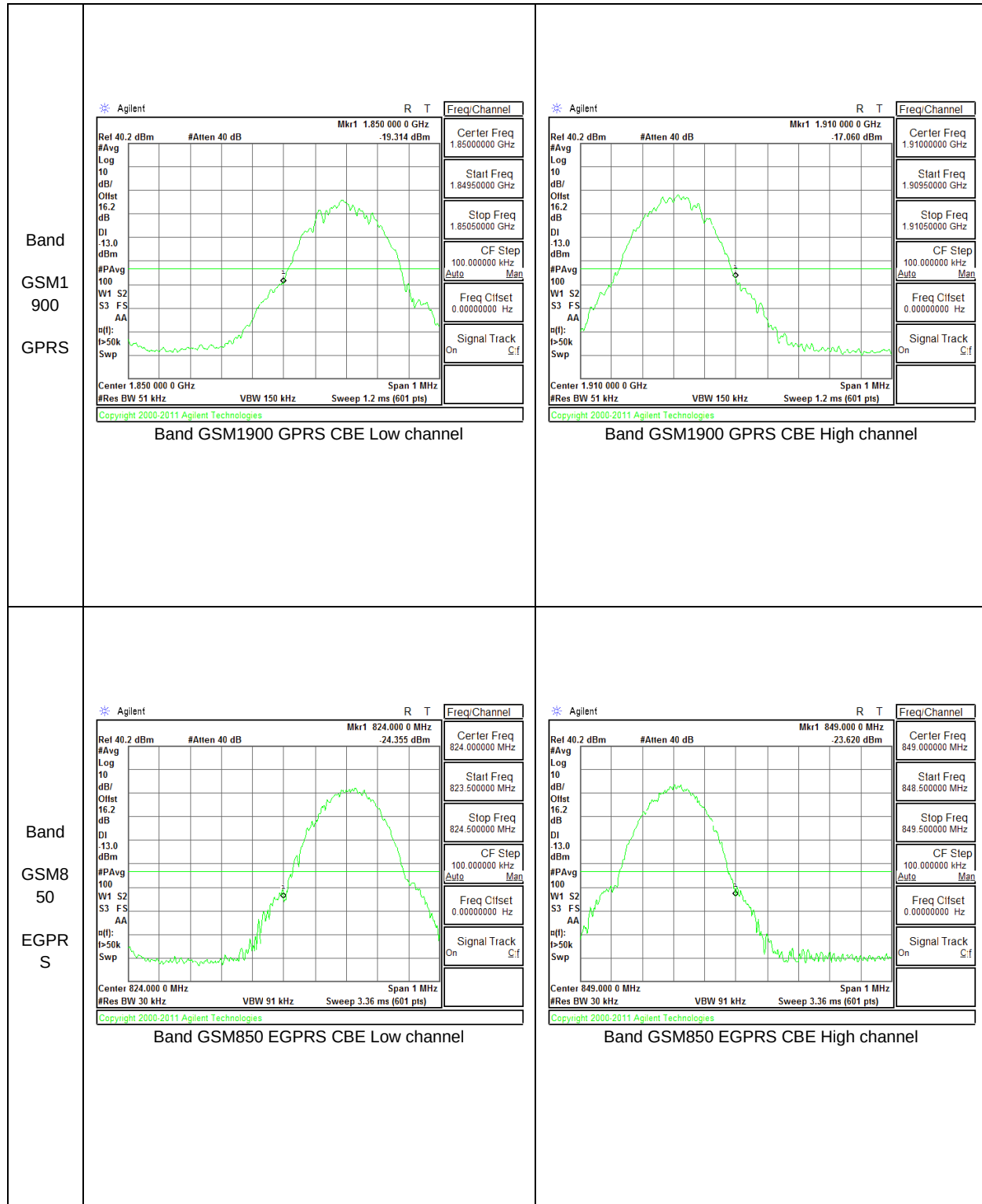
RESULTS

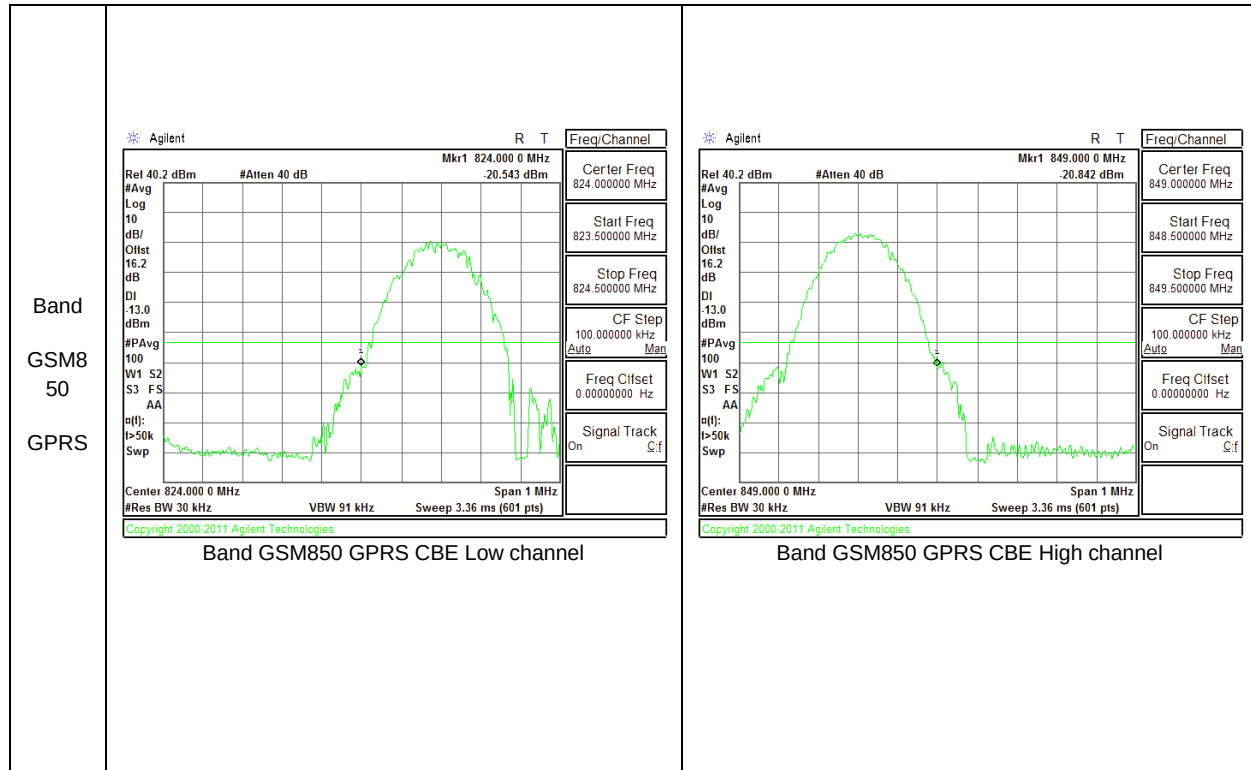
10.2.1. BAND EDGE PLOTS











10.3. OUT OF BAND EMISSIONS

RULE PART(S)

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

LIMITS

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

TEST PROCEDURE

Per KDB 971168 D01 Power Meas License Digital Systems v02r01

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

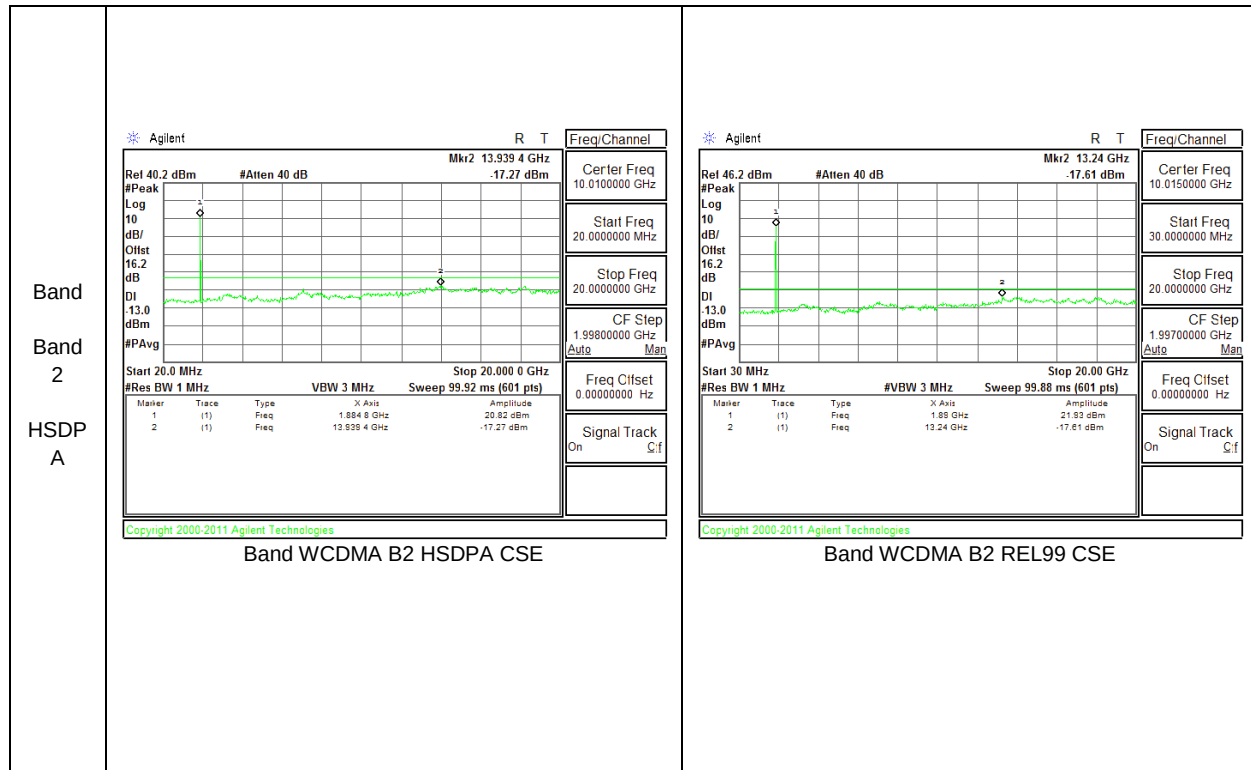
RESULTS

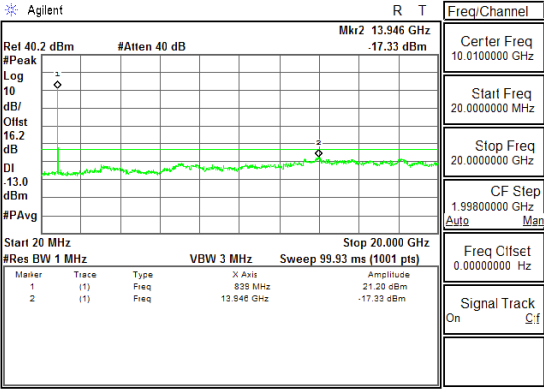
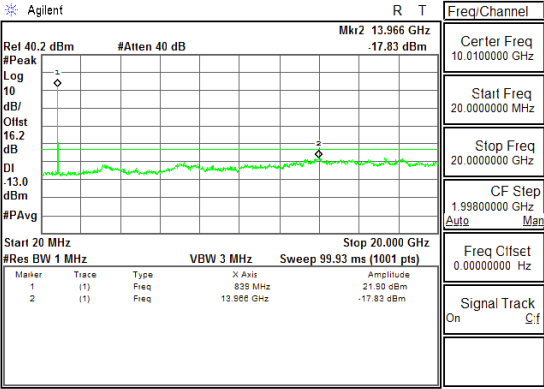
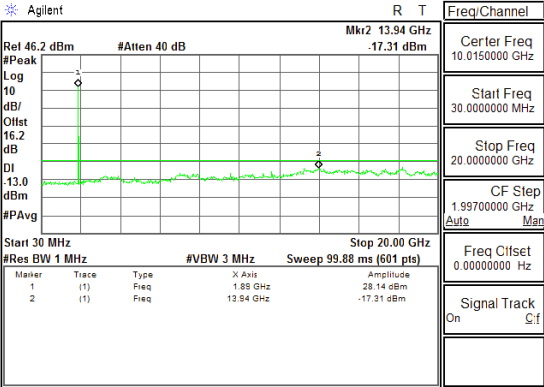
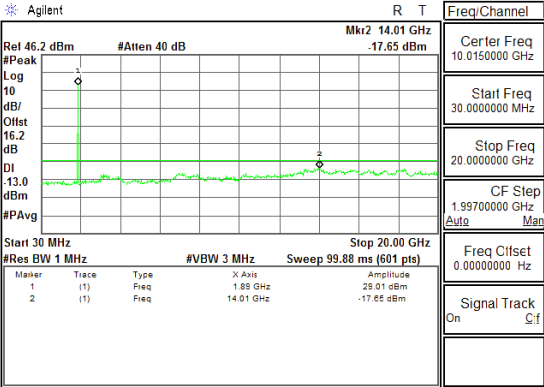
10.3.1. OUT OF BAND EMISSIONS RESULT

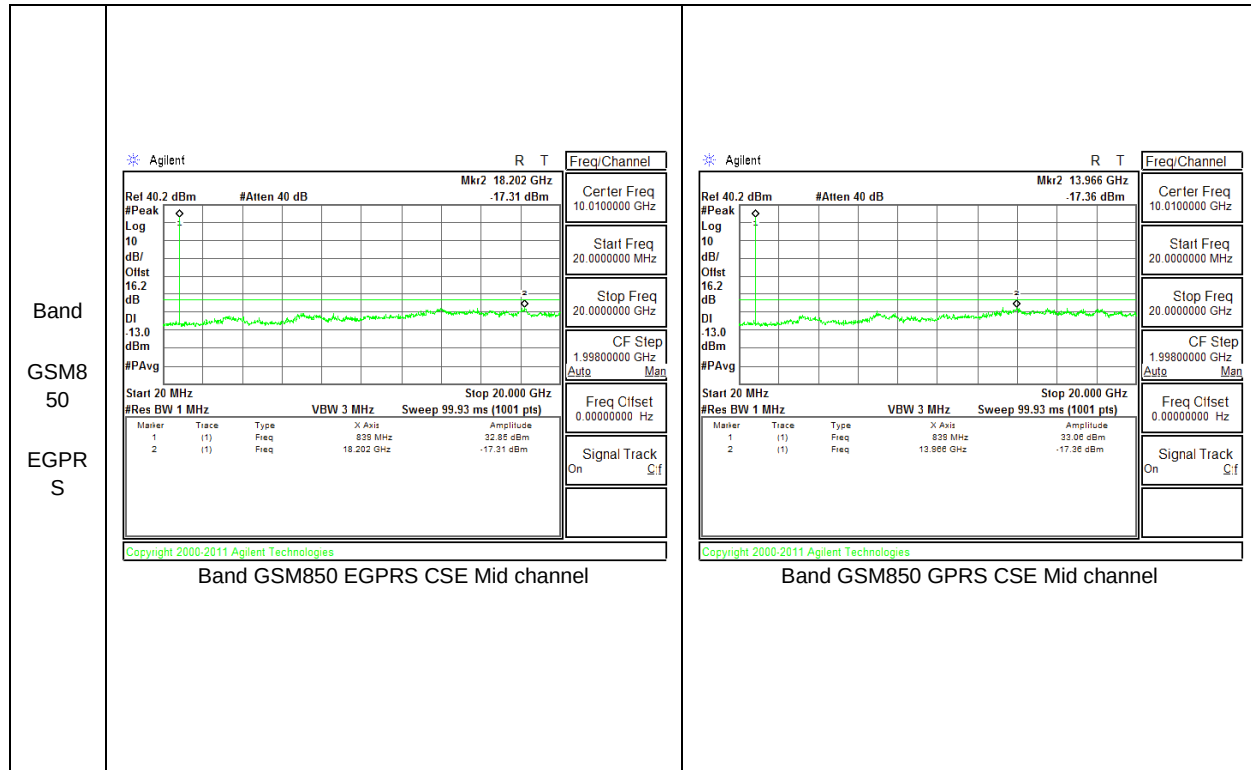
Band	Mode	f (MHz)	Spur (dBm)	Spec (dBm)	Delta (dB)
GSM850	GMSK	824.2			
		836.6			
		848.8			
	GPRS	824.2	-17.93	-13	-4.93
		836.6	-17.36	-13	-4.36
		848.8	-18.65	-13	-5.65
	EGPRS	824.2	-17.81	-13	-4.81
		836.6	-17.31	-13	-4.31
		848.8	-17.23	-13	-4.23
GSM1900	GMSK	1850.2			
		1880			
		1909.8			
	GPRS	1850.2	-17.53	-13	-4.53
		1880	-17.65	-13	-4.65
		1909.8	-18.09	-13	-5.09
	EGPRS	1850.2	-17.45	-13	-4.45
		1880	-17.31	-13	-4.31
		1909.8	-16.73	-13	-3.73

Band	Mode	f (MHz)	Spur (dBm)	Spec (dBm)	Delta (dB)
Band 5	REL99	826.4	-17.87	-13	-4.87
		836.6	-17.83	-13	-4.83
		846.6	-17.16	-13	-4.16
	HSDPA	826.4	-18.27	-13	-5.27
		836.6	-17.33	-13	-4.33
		846.6	-17.4	-13	-4.4
Band 2	REL99	1852.4	-16.88	-13	-3.88
		1880	-17.07	-13	-4.07
		1907.6	-17.61	-13	-4.61
	HSDPA	1852.4	-17.22	-13	-4.22
		1880	-17.27	-13	-4.27
		1907.6	-18.15	-13	-5.15

10.3.2. OUT OF BAND EMISSIONS PLOTS



Band 5 HSDPA	 Copyright 2000-2011 Agilent Technologies Band WCDMA B5 HSDPA CSE	 Copyright 2000-2011 Agilent Technologies Band WCDMA B5 REL99 CSE
	 Copyright 2000-2011 Agilent Technologies Band GSM1900 EGPRS CSE Mid channel	 Copyright 2000-2011 Agilent Technologies Band GSM1900 GPRS CSE Mid channel



10.4. FREQUENCY STABILITY

RULE PART(S)

FCC: §2.1055, §22.355, §24.235

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.

TEST PROCEDURE

Per KDB 971168 D01 Power Meas License Digital Systems v02r01

RESULTS

See the following pages.

10.4.1. FREQUENCY STABILITY RESULTS

GPRS 1900, Channel 661 Freq: 1880MHz– MID CHANNEL

Reference Frequency: PCS Mid Channel Limit: to stay +/- 2.5 ppm =			1880 4700.000	MHz @ 20°C Hz
Power Supply (Vdc)	Environment Temperature (°C)	Frequency Deviation Measured with Time Elapse		
		(MHz)	Delta (ppm)	Limit (ppm)
3.80	50	1879.999984	0.017	2.5
3.80	40	1879.999986	0.016	2.5
3.80	30	1880.000015	0.001	2.5
3.80	20	1880.000017	0	2.5
3.80	10	1880.000013	0.002	2.5
3.80	0	1880.000020	-0.002	2.5
3.80	-10	1880.000018	-0.001	2.5
3.80	-20	1880.000016	0.000	2.5
3.80	-30	1880.000021	-0.003	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 Measured with Time Elapse		
		(MHz)	Delta (ppm)	Limit (ppm)
3.80	20	1880.000021	0	2.5
4.30	20	1880.000025	-0.004	2.5
3.20	20	1880.000024	-0.004	2.5

GPRS 850 CELL BAND, – MID CHANNEL190, 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 Measured with Time Elapse		
		(MHz)	Delta (ppm)	Limit (ppm)
3.80	50	836.600009	0.015	2.5
3.80	40	836.599991	0.037	2.5
3.80	30	836.599992	0.036	2.5
3.80	20	836.600022	0	2.5
3.80	10	836.599994	0.034	2.5
3.80	0	836.599992	0.036	2.5
3.80	-10	836.599990	0.038	2.5
3.80	-20	836.599988	0.041	2.5
3.80	-30	836.599986	0.043	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 Measured with Time Elapse		
		(MHz)	Delta (ppm)	Limit (ppm)
3.80	20	836.600009	0	2.5
4.30	20	836.5999885	0.040	2.5
3.20	20	836.6000125	0.011	2.5

11. RADIATED TEST RESULTS

11.1. RADIATED POWER (ERP & EIRP)

RULE PART(S)

FCC: §2.1046, §22.913, §24.232

LIMITS

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

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

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

TEST PROCEDURE

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

For peak power measurement with a PSA:

a) Set the RBW $\geq$ OBW; b) Set VBW $\geq 3 \times$ RBW; c) Set span $\geq 2 \times$ RBW; d) Sweep time = auto couple; e) Detector = peak; f) Ensure that the number of measurement points $\geq$ 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 $\geq 3 \times$ RBW; d) Set number of points in sweep $\geq 2 \times$ span / RBW; e) Sweep time = auto-couple; f) Detector = RMS (power averaging); g) Use free run trigger If burst duty cycle ≥ 98 ; h) Use trigger to capture bursts If burst duty cycle < 98 ; i) Trace average at least 100 traces in power averaging (*i.e.*, RMS) mode. j) Compute the power by integrating the spectrum across the OBW of the signal using the instrument's band power measurement function.

TEST RESULTS

11.1.1. ERP/EIRP Results

Band	Mode	Channel	f(MHz)	ERP / EIRP	
				dBm	mW
Band 2	REL99	9262	1852.4	22.3	168.1
		9400	1880	21.3	135.8
		9538	1907.6	22.8	188.5
	HSDPA	9262	1852.4	21.6	143.3
		9400	1880	21.6	145.6
		9538	1907.6	21.9	154.5

Band	Mode	Channel	f(MHz)	ERP / EIRP	
				dBm	mW
Band 5	REL99	4132	826.4	18.5	70.0
		4183	836.6	19.5	89.1
		4233	846.6	17.5	56.6
	HSDPA	4132	826.4	17.7	58.9
		4183	836.6	18.3	68.3
		4233	846.6	17.1	51.2

Band	Mode	Channel	f(MHz)	ERP / EIRP	
				dBm	mW
GSM1900	GPRS	512	1850.2	28.9	767.4
		661	1880	28.4	693.4
		810	1909.8	28.3	677.6
	EGPRS	512	1850.2	26.5	443.6
		661	1880	26.4	437.5
		810	1909.8	26.6	452.9

Band	Mode	Channel	f(MHz)	ERP / EIRP	
				dBm	mW
GSM850	GPRS	128	824.2	28.3	676.1
		190	836.6	27.3	537.0
		251	848.8	27.6	575.4
	EGPRS	128	824.2	25.4	346.7
		190	836.6	24.2	263.0
		251	848.8	25.4	346.7

Band 2 REL99	High Frequency Substitution Measurement Compliance Certification Services Chamber A							
	Company: Samsung Project #: 14I18664 Date: 08/29/14 Test Engineer: O. Stoelting Configuration: X-pos EUT Mode: WCDMA_1900 MHz_Rel 99							
	Test Equipment: Receiving: Horn T136, and Chamber A SMA Cables Substitution: Horn T962, 8ft SMA Cable (SN # 245185 003) Warehouse.							
	f	SG reading	Ant. Pol.	Cable Loss	Antenna Gain	EIRP	Limit	Margin
	MHz	(dBm)	(H/V)	(dB)	(dBi)	(dBm)	(dBm)	(dB)
	Notes							
	Low Ch							
	1852.40	8.80	V	0.85	10.41	18.36	33.0	-14.6
	1852.40	12.70	H	0.85	10.41	22.26	33.0	-10.7
	Mid Ch							
	1880.00	3.94	V	0.85	10.81	13.90	33.0	-19.1
	1880.00	11.37	H	0.85	10.81	21.33	33.0	-11.7
	High Ch							
	1907.60	10.44	V	0.85	11.15	20.74	33.0	-12.3
	1907.60	12.45	H	0.85	11.15	22.75	33.0	-10.2
Rev. 3.17.11 Note: For Band 4 EIRP limit is 30dBm								

Band
Band
5
HSDP
A

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

Company: Samsung

Project #: 14I18664

Date: 08/29/14

Test Engineer: O. Stoelting

Configuration: X-pos EUT

Mode: WCDMA_HSDPA_850

Test Equipment:

Receiving: Hybrid T477, and Chamber A SMA Cables

Substitution: Dipole T416, 8ft SMA Cable (SN # 245185 003) Warehouse.

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	No
Low Ch								
826.60	11.23	V	0.9	0.0	10.33	38.5	-28.1	
826.60	18.60	H	0.9	0.0	17.70	38.5	-20.7	
Mid Ch								
836.60	10.32	V	0.9	0.0	9.42	38.5	-29.0	
836.60	19.24	H	0.9	0.0	18.34	38.5	-20.1	
High Ch								
846.60	10.78	V	0.9	0.0	9.88	38.5	-28.6	
846.60	17.99	H	0.9	0.0	17.09	38.5	-21.4	

Rev. 3.17.11

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

Band
5

REL99

High Frequency Substitution Measurement UL Verification Services, Inc. Chamber A								
Company:	Samsung							
Project #:	14I18664							
Date:	08/29/14							
Test Engineer:	O. Stoelting							
Configuration:	Xpos EUT							
Mode:	WCDMA_Rel99_850							
Test Equipment:								
Receiving: Hybrid T477, and Chamber A SMA Cables								
Substitution: Dipole T416, 8ft SMA Cable (SN # 245185 003) Warehouse.								
f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Note
Low Ch								
826.60	11.96	V	0.9	0.0	11.06	38.5	-27.4	
826.60	19.35	H	0.9	0.0	18.45	38.5	-20.0	
Mid Ch								
836.60	12.03	V	0.9	0.0	11.14	38.5	-27.3	
836.60	20.40	H	0.9	0.0	19.50	38.5	-18.9	
High Ch								
846.60	11.94	V	0.9	0.0	11.04	38.5	-27.4	
846.60	18.43	H	0.9	0.0	17.53	38.5	-20.9	
Rev. 3.17.11								
Note: For Band 13/17 ERP limit is 34.77dBm; For Band 26 limit is 50dBm								

Band GSM1 900 EGPRS S	High Frequency Substitution Measurement UL Verification Services, Inc. Chamber B							
	Company: Samsung Project #: 14I18664 Date: 08/28/14 Test Engineer: L. Lara Configuration: EUT X position Mode: EGPRS 1900							
	Test Equipment: Receiving: Horn T345, and Chamber B SMA Cables Substitution: Horn T59 Substitution, 4ft SMA Cable Warehouse							
	f	SG reading	Ant. Pol.	Cable Loss	Antenna Gain	EIRP	Limit	Notes
	MHz	(dBm)	(H/V)	(dB)	(dBi)	(dBm)	(dBm)	
	Low							
	1850.20	16.32	V	0.9	7.9	23.32	33.0	-9.7
	1850.20	20.20	H	0.9	7.9	26.47	33.0	-6.5
	Mid							
	1880.00	15.47	V	0.9	7.9	22.47	33.0	-10.5
	1880.00	19.41	H	0.9	7.9	26.41	33.0	-6.6
	High							
	1909.80	15.91	V	0.9	7.9	22.91	33.0	-10.1
	1909.80	19.56	H	0.9	7.9	26.56	33.0	-6.4
Rev. 3.17.11 Note: For Band 4 EIRP limit is 30dBm								

11.2. FIELD STRENGTH OF SPURIOUS RADIATION

RULE PART(S)

FCC: §2.1053, §22.917, §24.238

LIMIT

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

TEST PROCEDURE

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

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

RESULTS

Compliance Certification Services Above 1GHz High Frequency Substitution Measurement																																																																																																																																																																																																																																					
Band 2 REL99	Company:		Samsung																																																																																																																																																																																																																																		
	Project #:		14I18664																																																																																																																																																																																																																																		
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Compliance Certification Services Above 1GHz High Frequency Substitution Measurement										
Band 5 REL99	Company:		Samsung							
	Project #:		14I18664							
	Date:		08/29/14							
	Test Engineer:		O. Stoelting							
	Configuration:		X-Pos EUT w/ AC Charger and HS							
	Mode:		REL99 B5							
	Chamber		Pre-amplifer		Filter		Limit			
	5m Chamber A		T34 8449B		Filter 1		Part 22			
	f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
	Low Ch, 826.4MHz									
1.653	-16.4	V	3.0	37.4	1.0	-52.8	-13.0	-39.8		
2.479	-22.6	V	3.0	36.4	1.0	-58.0	-13.0	-45.0		
3.306	-20.1	V	3.0	35.8	1.0	-54.9	-13.0	-41.9		
1.653	-16.7	H	3.0	37.4	1.0	-53.1	-13.0	-40.1		
2.479	-24.5	H	3.0	36.4	1.0	-59.9	-13.0	-46.9		
3.306	-20.5	H	3.0	35.8	1.0	-55.3	-13.0	-42.3		
Mid Ch, 836.6MHz										
1.673	-22.2	V	3.0	37.3	1.0	-58.6	-13.0	-45.6		
2.510	-22.2	V	3.0	36.4	1.0	-57.6	-13.0	-44.6		
3.346	-20.8	V	3.0	35.8	1.0	-55.5	-13.0	-42.5		
1.673	-17.5	H	3.0	37.3	1.0	-53.8	-13.0	-40.8		
2.510	-24.5	H	3.0	36.4	1.0	-59.9	-13.0	-46.9		
3.346	-21.8	H	3.0	35.8	1.0	-56.5	-13.0	-43.5		
High Ch, 846.6MHz										
1.693	-18.5	V	3.0	37.3	1.0	-54.8	-13.0	-41.8		
2.540	-22.7	V	3.0	36.3	1.0	-58.0	-13.0	-45.0		
3.386	-20.6	V	3.0	35.7	1.0	-55.3	-13.0	-42.3		
1.693	-18.7	H	3.0	37.3	1.0	-55.0	-13.0	-42.0		
2.540	-23.7	H	3.0	36.3	1.0	-59.0	-13.0	-46.0		
3.386	-19.9	H	3.0	35.7	1.0	-54.6	-13.0	-41.6		
Rev. 03.03.09										
Note: No other emissions were detected above the system noise floor.										

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[illegible]

Compliance Certification Services Above 1GHz High Frequency Substitution Measurement										
Company:	Samsung									
Project #:	14I18664									
Date:	08/28/14									
Test Engineer:	Jude Semana									
Configuration:	Y-Pos EUT w/ AC Charger + HS									
Mode:	GPRS 850									
Chamber Pre-amplifier Filter Limit 5m Chamber B 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)	Note
GSM8 50 GPRS	Low Ch, 824.2MHz									
	1.648	-11.7	V	3.0	37.4	1.5	-47.6	-13.0	-34.6	
	2.473	-5.8	V	3.0	36.4	1.5	-40.7	-13.0	-27.7	
	3.297	-1.7	V	3.0	35.8	1.5	-36.0	-13.0	-23.0	
	1.648	-11.9	H	3.0	37.4	1.5	-47.8	-13.0	-34.8	
	2.473	-7.4	H	3.0	36.4	1.5	-42.3	-13.0	-29.3	
	3.297	-2.6	H	3.0	35.8	1.5	-36.9	-13.0	-23.9	
	Mid Ch, 836.6MHz									
	1.673	-13.1	V	3.0	37.3	1.5	-48.9	-13.0	-35.9	
	2.510	-8.0	V	3.0	36.4	1.5	-42.8	-13.0	-29.8	
	3.346	-5.6	V	3.0	35.8	1.5	-39.8	-13.0	-26.8	
	1.673	-12.1	H	3.0	37.3	1.5	-48.0	-13.0	-35.0	
	2.510	-9.4	H	3.0	36.4	1.5	-44.2	-13.0	-31.2	
	3.346	-6.2	H	3.0	35.8	1.5	-40.4	-13.0	-27.4	
	High Ch, 848.8MHz									
	1.698	-9.1	V	3.0	37.3	1.5	-44.9	-13.0	-31.9	
	2.547	-5.2	V	3.0	36.3	1.5	-40.0	-13.0	-27.0	
	3.395	-2.1	V	3.0	35.7	1.5	-36.3	-13.0	-23.3	
1.698	-10.0	H	3.0	37.3	1.5	-45.8	-13.0	-32.8		
2.547	-6.2	H	3.0	36.3	1.5	-41.0	-13.0	-28.0		
3.395	-3.4	H	3.0	35.7	1.5	-37.6	-13.0	-24.6		
Rev. 03.03.09 Note: No other emissions were detected above the system noise floor.										