



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

CERTIFICATION TEST REPORT

FOR

GSM/WCDMA/LTE PHONE + BLUETOOTH + DTS b/g/n + NFC

MODEL NUMBER: SM-G531F and SM-G531F/DD

FCC ID: A3LSMG531F

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: SAMSUNG ELECTRONICS CO., LTD.
EUT DESCRIPTION: GSM/WCDMA/LTE Phone + Bluetooth & WLAN 2.4GHz b/g/n + NFC
MODEL: SM-G531F and SM-G531F/DD
SERIAL NUMBER: R38G40TQMVX (Conducted), R38G40TQM9X (Radiated)
DATE TESTED: MAY 8 – 27, 2015

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, and FCC CFR 47 Part 27.

3. FACILITIES AND ACCREDITATION

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

47173 Benicia Street	47266 Benicia Street
<input type="checkbox"/> Chamber A(IC: 2324B-1)	<input type="checkbox"/> Chamber D(IC: 2324B-4)
<input checked="" type="checkbox"/> Chamber B(IC: 2324B-2)	<input type="checkbox"/> Chamber E(IC: 2324B-5)
<input checked="" type="checkbox"/> Chamber C(IC: 2324B-3)	<input type="checkbox"/> Chamber F(IC: 2324B-6)
	<input type="checkbox"/> Chamber G(IC: 2324B-7)
	<input type="checkbox"/> 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:

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

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

$$(\text{Path loss} = \text{Signal generator output} - \text{PSA reading with substitution antenna})$$

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/LTE Phone + Bluetooth + WLAN 2.4GHz b/g/n + NFC .

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	
			Avg	mW	Avg	mW
GSM850	824~849	GMSK	32.7	1862.09		
	824~849	GPRS	32.7	1862.09	29.74	941.89
	824~849	EGPRS	27.4	549.54	24.76	299.23
GSM1900	1850~1910	GMSK	30.1	1023.29		
	1850~1910	GPRS	30.1	1023.29	31.24	1330.45
	1850~1910	EGPRS	27.1	512.86	27.22	527.23
Band 5	824~849	REL99	23.0	199.53	20.66	116.41
	824~849	HSDPA	23.0	199.53	20.56	113.76
	824~849	HSUPA	23.0	199.53		
Band 2	1850~1910	REL99	23.6	229.09	24.17	261.22
	1850~1910	HSDPA	23.0	199.53	24.04	253.51
	1850~1910	HSUPA	23.0	199.53		

5.3. MAXIMUM OUTPUT POWER (LTE)

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

FCC Part 22							
Band	Frequency Range(MHz)	BandWidth (MHz)	Modulation	Conducted		Radiated	
				AVG(dBm)	AVG(mW)	AVG(dBm)	AVG(mW)
LTE5	824~849	10MHz	QPSK	24.1	257.04	20.97	125.03
	824~849	10MHz	16QAM	23.5	223.87	20.09	102.09

FCC Part 22							
Band	Frequency Range(MHz)	BandWidth (MHz)	Modulation	Conducted		Radiated	
				AVG(dBm)	AVG(mW)	AVG(dBm)	AVG(mW)
LTE5	824~849	5MHz	QPSK	24.2	263.03	20.88	122.46
	824~849	5MHz	16QAM	23.5	223.87	20.0	100.00

FCC Part 22							
Band	Frequency Range(MHz)	BandWidth (MHz)	Modulation	Conducted		Radiated	
				AVG(dBm)	AVG(mW)	AVG(dBm)	AVG(mW)
LTE5	824~849	3MHz	QPSK	24.2	263.03	20.75	118.85
	824~849	3MHz	16QAM	23.5	223.87	19.94	98.63

FCC Part 22							
Band	Frequency Range(MHz)	BandWidth (MHz)	Modulation	Conducted		Radiated	
				AVG(dBm)	AVG(mW)	AVG(dBm)	AVG(mW)
LTE5	824~849	1.4MHz	QPSK	24.2	263.03	20.28	106.66
	824~849	1.4MHz	16QAM	23.5	223.87	19.61	91.41

5.4. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a PIFA antenna for the bands list below with a maximum peak gain as follow:

Frequency (MHz)	Peak Gain (dBi)
Band 5, 824~849MHz	-1.2
Band 2, 1850~1910MHz	1.4

5.5. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

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

I/O CABLES (CONDUCTED SETUP)

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

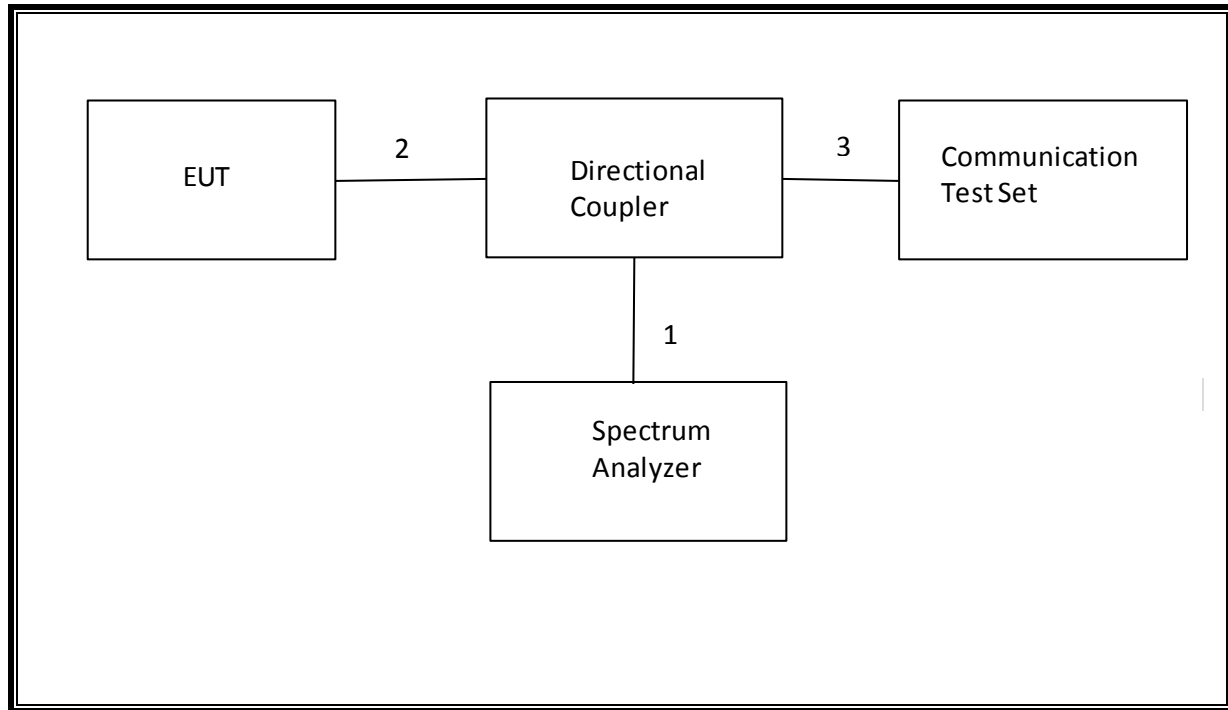
I/O CABLES (RADIATED SETUP)

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

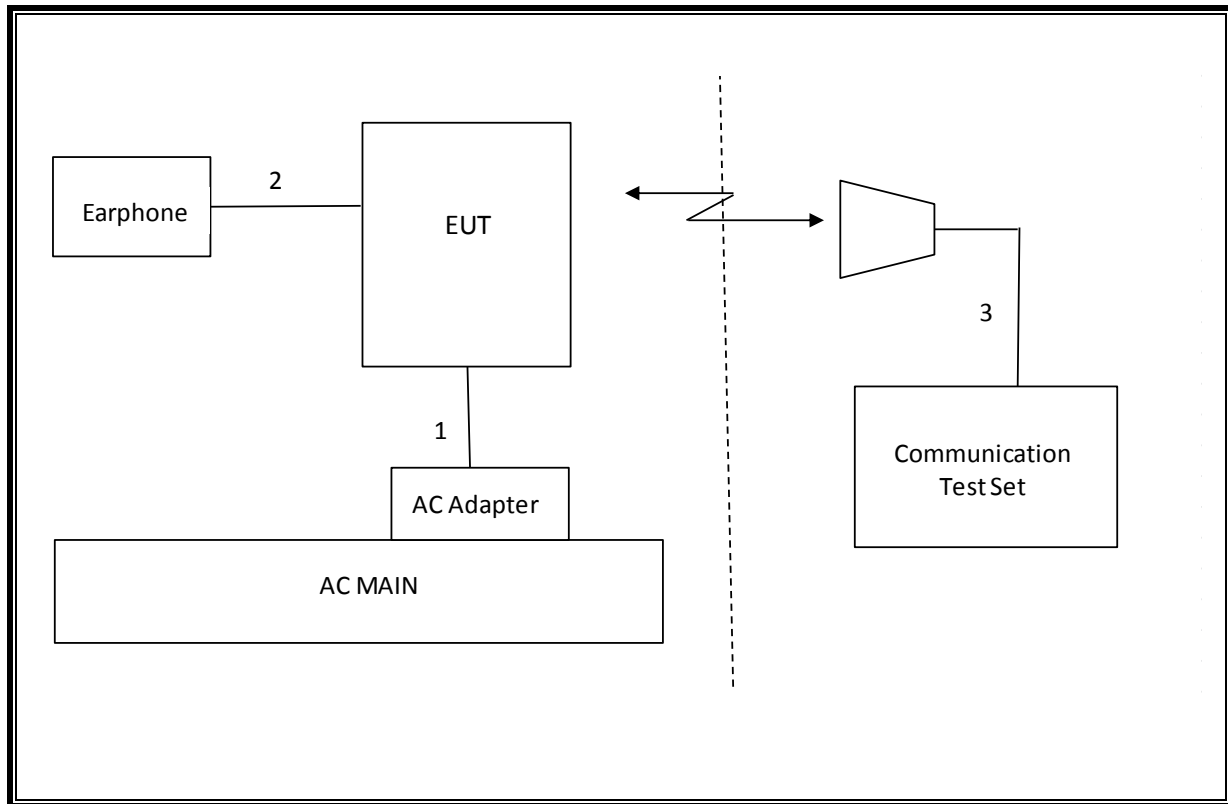
TEST SETUP

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

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	05/01/16
Antenna, Bilog, 2 GHz	Sunol Sciences	JB1	C01011	04/22/16
Antenna, Horn, 18 GHz	EMCO	3115	C00783	10/25/15
Antenna, Horn, 18 GHz	EMCO	3115	C00784	10/25/15
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	05/11/16
Communications Test Set	R&S	CMW500	T159	07/02/16
DC power supply, 8 V @ 3 A or 15 V	Agilent / HP	E3610A	None	CNR
Vector signal generator, 6 GHz	Agilent / HP	E4438C	None	06/18/15
Antenna, Tuned Dipole 400~1000	ETS	3121C DB4	C00993	02/11/16
Directional Coupler	RF-Lambda	RFDC5M06G15	None	CNR
Antenna, Horn, 26.5 GHz	ARA	MWH-1826/B	C00589	12/17/15
Multimeter	Fluke	26111	74320701	4/15/2016

Test Software List			
Description	Manufacturer	Model	Version
Radiated Software	UL	UL EMC	Version 9.5, 07/22/14
Conducted Software	UL	UL EMC	Version 9.5, 05/17/14
CLT Software	UL	UL RF	Version 1.0, 02/02/15
Antenna Port Software	UL	UL RF	Version 2.1.1.1, 1/20/15

7. Summary Table

FCC Part Section	RSS Section(s)	Test Description	Test Limit	Test Condition	Test Result	Worst Case
2.1049	N/A	Occupied Band width (99%)	N/A	Conducted	Pass	9.028 MHz
22.917(a) 24.238(a)	RSS-132(4.5.1) RSS-133(6.5.1)	Band Edge / Conducted Spurious Emission	-13dBm		Pass	-13.441dBm
2.1046	N/A	Conducted output power	N/A		Pass	32.7 dBm
22.355 24.235	RSS-132(4.3) RSS-133(6.3)	Frequency Stability	2.5PPM		Pass	0.040 PPM
22.913(a)(2)	RSS-132(4.4)	Effective Radiated Power	38 dBm	Radiated	Pass	29.74dBm
24.232(c)	RSS-133(6.4)	Equivalent Isotropic Radiated Power	33dBm		Pass	31.24 dBm
22.917(a) 24.238(a)	RSS-132(4.5.1) RSS-133(6.5.1)	Radiated Spurious Emission	-13dBm		Pass	-37.5dBm

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	32.7			
		190	836.6	32.7			
		251	848.8	32.7			
	GPRS	128	824.2	32.7	31.3	29.0	27.0
		190	836.6	32.7	31.4	29.0	27.0
		251	848.8	32.7	31.4	29.0	27.0
	EGPRS	128	824.2	27.2	25.8	23.6	21.5
		190	836.6	27.0	25.6	23.4	21.2
		251	848.8	27.4	25.9	23.8	21.6
GSM1900	GMSK	512	1850.2	29.9			
		661	1880	30.1			
		810	1909.8	29.9			
	GPRS	512	1850.2	29.9	28.5	26.5	24.3
		661	1880	30.1	28.5	26.5	24.4
		810	1909.8	29.9	28.3	26.2	23.9
	EGPRS	512	1850.2	26.3	24.8	22.6	20.2
		661	1880	27.1	25.4	23.0	21.0
		810	1909.8	26.2	24.6	22.3	20.0

8.2. UMTS REL 99

TEST PROCEDURE

The following summary of these settings are illustrated below:

WCDMA General Settings	Mode	Rel99
	Subtest	-
	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	23.0
		4183	836.6	23.0
		4233	846.6	23.0
Band 2	REL99	9262	1852.4	23.0
		9400	1880	23.6
		9538	1907.6	22.9

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	23.0
			4183	836.6	23.0
			4233	846.6	23.0
		2	4132	826.4	22.6
			4183	836.6	22.7
			4233	846.6	22.7
		3	4132	826.4	22.1
			4183	836.6	22.3
			4233	846.6	22.3
		4	4132	826.4	22.1
			4183	836.6	22.3
			4233	846.6	22.3
Band 2	HSDPA	1	9262	1852.4	23.0
			9400	1880	22.8
			9538	1907.6	22.9
		2	9262	1852.4	22.8
			9400	1880	22.8
			9538	1907.6	22.3
		3	9262	1852.4	22.5
			9400	1880	22.4
			9538	1907.6	21.9
		4	9262	1852.4	22.5
			9400	1880	22.4
			9538	1907.6	21.9

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
	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
HSDPA Specific Settings	β_{ed} (note1)	1309/225	94/75	47/15	56/75	134/15
	MPR	0	2	1	2	0
	DACK	8				
	DNAK	8				
	DCQI	8				
	Ack-Nack repetition factor	3				
	CQI Feedback (Table 5.2B.4)	4ms				
HSUPA Specific Settings	CQI Repetition Factor (Table 5.2B.4)	2				
	$A_{hs} = \beta_{hs}/\beta_c$	30/15				
	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.

8.4.1. UMTS HSUPA OUTPUT POWER RESULT

Band	Mode	Subset	Ch.	f(MHz)	Conducted Power (dBm)
					Avg (dBm)
Band 5	HSUPA	1	4132	826.4	22.9
			4183	836.6	22.7
			4233	846.6	22.8
		2	4132	826.4	21.7
			4183	836.6	21.5
			4233	846.6	21.6
		3	4132	826.4	22.3
			4183	836.6	22.0
			4233	846.6	22.1
		4	4132	826.4	21.7
			4183	836.6	21.5
			4233	846.6	21.6
		5	4132	826.4	23.0
			4183	836.6	23.0
			4233	846.6	23.0
Band 2	HSUPA	1	9262	1852.4	23.1
			9400	1880	23.1
			9538	1907.6	22.8
		2	9262	1852.4	21.9
			9400	1880	22.0
			9538	1907.6	21.8
		3	9262	1852.4	22.4
			9400	1880	22.5
			9538	1907.6	22.2
		4	9262	1852.4	21.9
			9400	1880	22.0
			9538	1907.6	21.8
		5	9262	1852.4	23.0
			9400	1880	23.0
			9538	1907.6	23.0

8.5. LTE OUTPUT VERIFICATION

8.5.1. LTE OUTPUT RESULT

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Avg Pwr (dBm)		
						20450	20525	20600
						829 MHz	836.5 MHz	844 MHz
LTE Band 5	10	QPSK	1	0	0	24.1	24.1	24.0
			1	25	0	24.1	24.0	24.0
			1	49	0	24.1	24.0	23.9
			25	0	1	23.2	23.1	23.0
			25	12	1	23.2	23.1	23.0
			25	25	1	23.2	23.1	23.0
			50	0	1	23.2	23.1	23.0
		16QAM	1	0	1	23.5	23.5	23.4
			1	25	1	23.5	23.5	23.4
			1	49	1	23.4	23.5	23.3
			25	0	2	22.5	22.4	22.4
			25	12	2	22.5	22.4	22.4
			25	25	2	22.5	22.4	22.4
			50	0	2	22.4	22.3	22.3
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Avg Pwr (dBm)		
						20425	20525	20625
						826.5 MHz	836.5 MHz	846.5 MHz
LTE Band 5	5	QPSK	1	0	0	24.1	24.2	24.1
			1	12	0	24.1	24.2	24.1
			1	24	0	24.2	24.1	24.0
			12	0	1	23.2	23.2	23.1
			12	7	1	23.2	23.2	23.1
			12	13	1	23.2	23.1	23.1
			25	0	1	23.2	23.1	23.0
		16QAM	1	0	1	23.5	23.5	23.5
			1	12	1	23.5	23.5	23.5
			1	24	1	23.5	23.5	23.5
			12	0	2	22.5	22.5	22.4
			12	7	2	22.5	22.5	22.4
			12	13	2	22.5	22.5	22.4
			25	0	2	22.5	22.4	22.3

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Avg Pwr (dBm)		
						20415	20525	20635
						825.5 MHz	836.5 MHz	847.5 MHz
LTE Band 5	3	QPSK	1	0	0	24.1	24.1	24.0
			1	8	0	24.2	24.1	23.9
			1	14	0	24.2	24.0	23.9
			8	0	1	23.3	23.3	23.2
			8	4	1	23.3	23.3	23.1
			8	7	1	23.3	23.3	23.2
			15	0	1	23.2	23.1	23.1
		16QAM	1	0	1	23.4	23.5	23.4
			1	8	1	23.5	23.5	23.3
			1	14	1	23.5	23.5	23.3
			8	0	2	22.5	22.4	22.5
			8	4	2	22.5	22.4	22.5
			8	7	2	22.5	22.4	22.5
			15	0	2	22.5	22.5	22.3
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Avg Pwr (dBm)		
						20407	20525	20643
						824.7 MHz	836.5 MHz	848.3 MHz
LTE Band 5	1.4	QPSK	1	0	0	24.1	24.0	24.0
			1	3	0	24.1	24.0	24.0
			1	5	0	24.1	24.0	23.9
			3	0	0	24.2	24.2	24.1
			3	1	0	24.2	24.2	24.1
			3	3	0	24.2	24.2	24.1
			6	0	1	23.3	23.3	23.1
		16QAM	1	0	1	23.5	23.5	23.4
			1	3	1	23.5	23.5	23.3
			1	5	1	23.5	23.5	23.3
			3	0	1	23.4	23.4	23.4
			3	1	1	23.4	23.4	23.4
			3	3	1	23.5	23.4	23.4
			6	0	2	22.5	22.4	22.5

9. PEAK TO AVERAGE RATIO

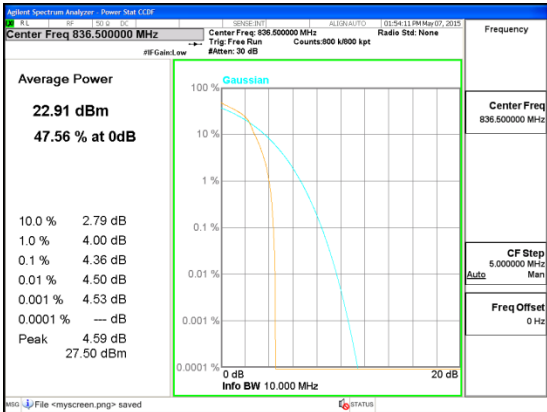
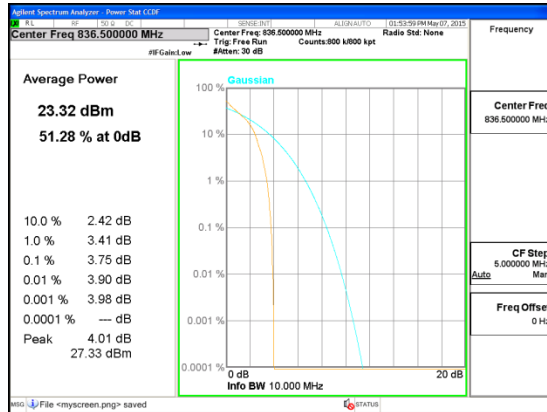
Test Procedure

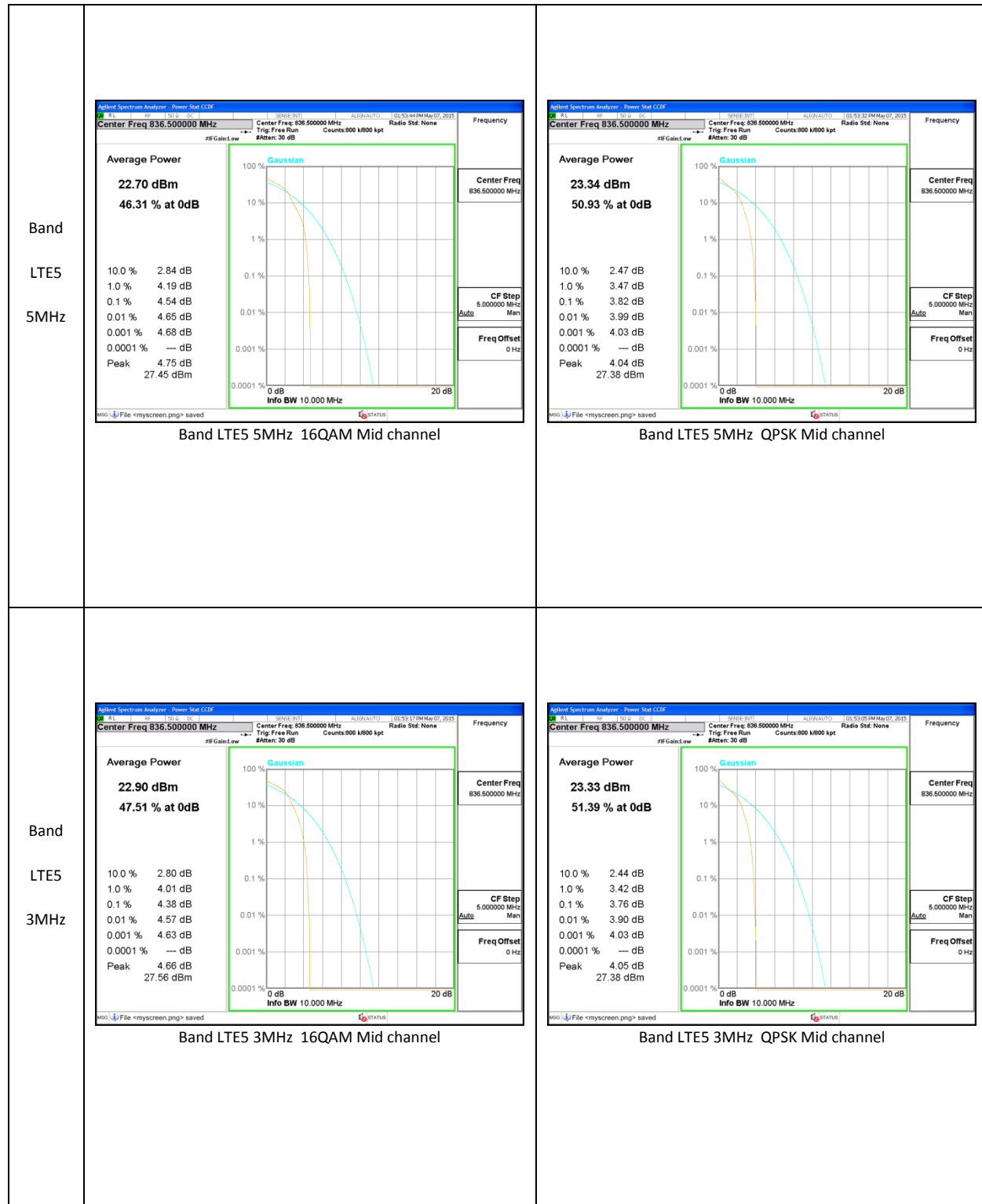
Per KDB 971168 D01 Power Meas License Digital Systems v02r02

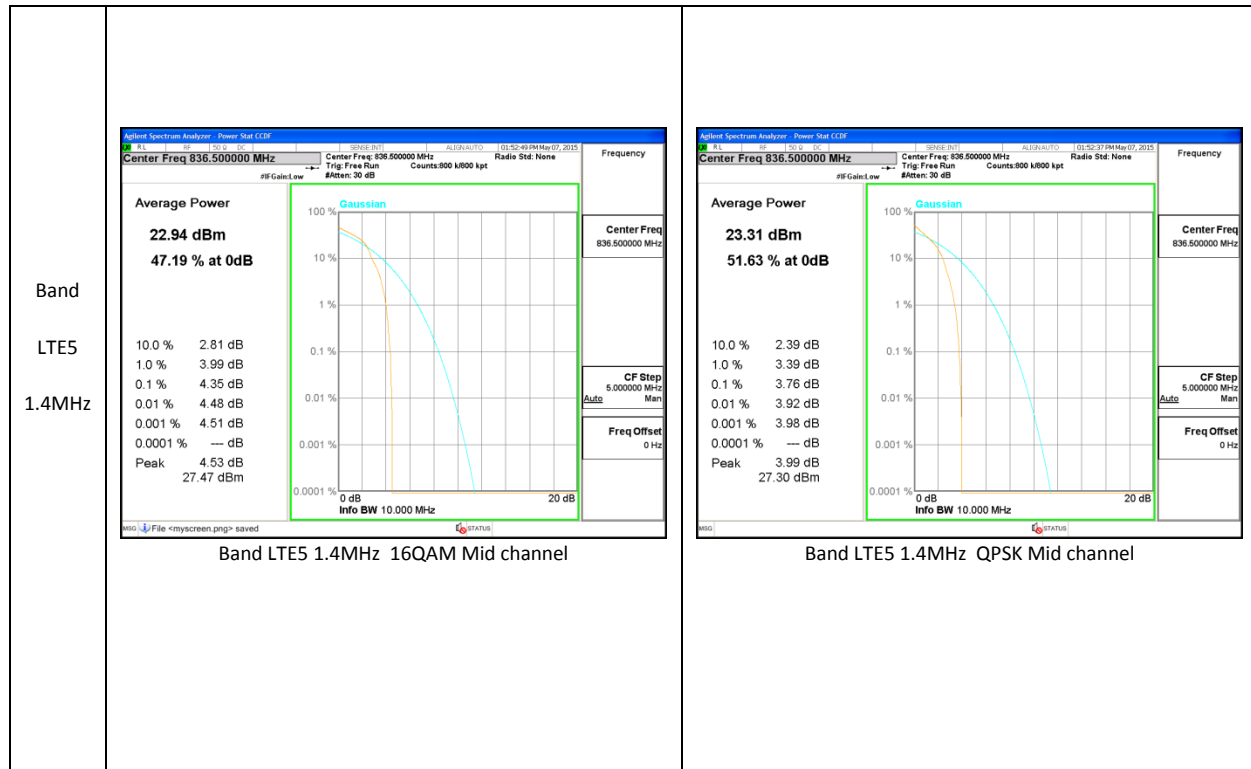
Test Spec

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

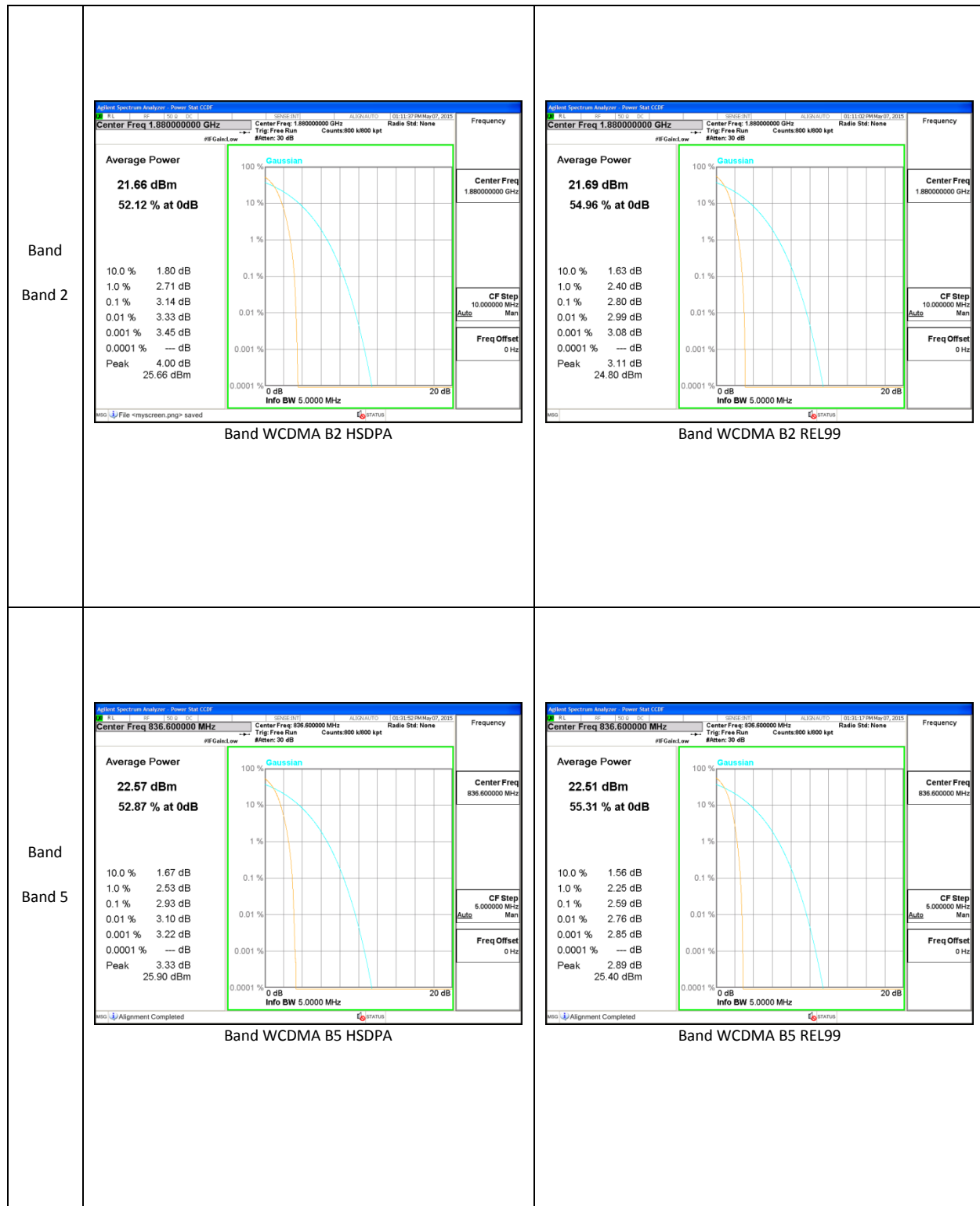
Band LTE5 10MHz	 <p>Average Power 22.91 dBm 47.56 % at 0dB</p> <p>10.0 % 2.79 dB 1.0 % 4.00 dB 0.1 % 4.36 dB 0.01 % 4.50 dB 0.001 % 4.53 dB 0.0001 % — dB Peak 4.59 dB 27.50 dBm</p> <p>Center Freq 836.500000 MHz Info BW 10.000 MHz CF Step 5.000000 MHz Freq Offset 0 Hz</p> <p>Band LTE5 10MHz 16QAM Mid channel</p>	 <p>Average Power 23.32 dBm 51.28 % at 0dB</p> <p>10.0 % 2.42 dB 1.0 % 3.41 dB 0.1 % 3.75 dB 0.01 % 3.90 dB 0.001 % 3.98 dB 0.0001 % — dB Peak 4.01 dB 27.33 dBm</p> <p>Center Freq 836.500000 MHz Info BW 10.000 MHz CF Step 5.000000 MHz Freq Offset 0 Hz</p> <p>Band LTE5 10MHz QPSK Mid channel</p>





GSM

<div>GSM</div> <div>850</div>	<div><div><div><div><div>Volant Spectrum Analyzer - Rouse Syst C&F</div><div><div>AL</div><div>RS</div><div>RS</div><div>120 S</div><div>DC</div></div><div>1</div><div>NEWSP-BUS</div><div>ALUS/AUTO</div><div>11:42:49 AM Mar 07, 2023</div><div>Frequency</div></div><div><div>Center Freq 836.600000 MHz</div><div>Center Freq: 836.600000 MHz</div><div>Trig: RF Burst</div><div>Counts: 900 M/000 kpt</div><div>Radio Std: None</div></div><div><div>#F Gain: Low</div><div>#Atrn: 34 dB</div></div></div><div><div>Average Power</div><div>26.49 dBm</div><div>50.40 % at 0dB</div><div>10.0 % 2.42 dB</div><div>1.0 % 3.06 dB</div><div>0.1 % 3.18 dB</div><div>0.01 % 3.25 dB</div><div>0.001 % 3.30 dB</div><div>0.0001 % --- dB</div><div>Peak 3.32 dB</div><div>29.81 dBm</div></div><div><div>Center Freq</div><div>836.600000 MHz</div><div>CF Step</div><div>5.000000 MHz</div><div>Auto</div><div>Man</div><div>Freq Offset</div><div>0 Hz</div></div><div><div>Info BW 10.000 MHz</div><div>0 dB</div><div>20 dB</div><div>100 %</div><div>10 %</div><div>1 %</div><div>0.1 %</div><div>0.01 %</div><div>0.001 %</div><div>0.0001 %</div><div>Gaussian</div><div>STATUS</div></div><div><div>File <myscreen.png> saved</div></div></div><div>EGPRS</div></div>	<div><div><div><div><div>Volant Spectrum Analyzer - Rouse Syst C&F</div><div><div>AL</div><div>RS</div><div>RS</div><div>120 S</div><div>DC</div></div><div>1</div><div>NEWSP-BUS</div><div>ALUS/AUTO</div><div>11:42:50 AM Mar 07, 2023</div><div>Frequency</div></div><div><div>Center Freq 836.600000 MHz</div><div>Center Freq: 836.600000 MHz</div><div>Trig: RF Burst</div><div>Counts: 900 M/000 kpt</div><div>Radio Std: None</div></div><div><div>#F Gain: Low</div><div>#Atrn: 34 dB</div></div></div><div><div>Average Power</div><div>31.79 dBm</div><div>96.25 % at 0dB</div><div>10.0 % 0.13 dB</div><div>1.0 % 0.13 dB</div><div>0.1 % 0.13 dB</div><div>0.01 % 0.13 dB</div><div>0.001 % 0.13 dB</div><div>0.0001 % --- dB</div><div>Peak 0.13 dB</div><div>31.92 dBm</div></div><div><div>Center Freq</div><div>836.600000 MHz</div><div>CF Step</div><div>5.000000 MHz</div><div>Auto</div><div>Man</div><div>Freq Offset</div><div>0 Hz</div></div><div><div>Info BW 10.000 MHz</div><div>0 dB</div><div>20 dB</div><div>100 %</div><div>10 %</div><div>1 %</div><div>0.1 %</div><div>0.01 %</div><div>0.001 %</div><div>0.0001 %</div><div>Gaussian</div><div>STATUS</div></div><div><div>MIG</div></div></div><div>GPRS</div></div>
<div>GSM</div> <div>1900</div>	<div><div><div><div><div>Volant Spectrum Analyzer - Rouse Syst C&F</div><div><div>AL</div><div>RS</div><div>RS</div><div>120 S</div><div>DC</div></div><div>1</div><div>NEWSP-BUS</div><div>ALUS/AUTO</div><div>12:40:45 PM Mar 07, 2023</div><div>Frequency</div></div><div><div>Center Freq 1.880000000 GHz</div><div>Center Freq: 1.880000000 GHz</div><div>Trig: RF Burst</div><div>Counts: 900 M/000 kpt</div><div>Radio Std: None</div></div><div><div>#F Gain: Low</div><div>#Atrn: 34 dB</div></div></div><div><div>Average Power</div><div>25.02 dBm</div><div>51.76 % at 0dB</div><div>10.0 % 2.33 dB</div><div>1.0 % 3.15 dB</div><div>0.1 % 3.16 dB</div><div>0.01 % 3.16 dB</div><div>0.001 % 3.16 dB</div><div>0.0001 % --- dB</div><div>Peak 3.24 dB</div><div>28.26 dBm</div></div><div><div>Center Freq</div><div>1.880000000 GHz</div><div>CF Step</div><div>10.000000 MHz</div><div>Auto</div><div>Man</div><div>Freq Offset</div><div>0 Hz</div></div><div><div>Info BW 10.000 MHz</div><div>0 dB</div><div>20 dB</div><div>100 %</div><div>10 %</div><div>1 %</div><div>0.1 %</div><div>0.01 %</div><div>0.001 %</div><div>0.0001 %</div><div>Gaussian</div><div>STATUS</div></div><div><div>File <Alignment Completed></div></div></div><div>EGPRS</div></div> <div><div><div><div><div>Volant Spectrum Analyzer - Rouse Syst C&F</div><div><div>AL</div><div>RS</div><div>RS</div><div>120 S</div><div>DC</div></div><div>1</div><div>NEWSP-BUS</div><div>ALUS/AUTO</div><div>12:40:53 PM Mar 07, 2023</div><div>Frequency</div></div><div><div>Center Freq 1.880000000 GHz</div><div>Center Freq: 1.880000000 GHz</div><div>Trig: RF Burst</div><div>Counts: 900 M/000 kpt</div><div>Radio Std: None</div></div><div><div>#F Gain: Low</div><div>#Atrn: 34 dB</div></div></div><div><div>Average Power</div><div>28.08 dBm</div><div>96.40 % at 0dB</div><div>10.0 % 0.12 dB</div><div>1.0 % 0.13 dB</div><div>0.1 % 0.13 dB</div><div>0.01 % 0.13 dB</div><div>0.001 % 0.13 dB</div><div>0.0001 % --- dB</div><div>Peak 0.13 dB</div><div>28.21 dBm</div></div><div><div>Center Freq</div><div>1.880000000 GHz</div><div>CF Step</div><div>10.000000 MHz</div><div>Auto</div><div>Man</div><div>Freq Offset</div><div>0 Hz</div></div><div><div>Info BW 10.000 MHz</div><div>0 dB</div><div>20 dB</div><div>100 %</div><div>10 %</div><div>1 %</div><div>0.1 %</div><div>0.01 %</div><div>0.001 %</div><div>0.0001 %</div><div>Gaussian</div><div>STATUS</div></div><div><div>MIG</div></div></div><div>GPRS</div></div>	

WCDMA

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 v02r02)

MODES TESTED

GSM 850, GSM 1900, WCDMA Band 2, WCDMA Band 5

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	244.2	318.1
		190	836.6	245.1	326.4
		251	848.8	244.2	320.4
	EGPRS	128	824.2	248.5	315.6
		190	836.6	245.3	308.5
		251	848.8	239.7	290.9
GSM1900	GMSK	512	1850.2		
		661	1880		
		810	1909.8		
	GPRS	512	1850.2	246.5	321.2
		661	1880	245.9	317.7
		810	1909.8	243.4	322.9
	EGPRS	512	1850.2	245.7	319.6
		661	1880	240.6	315.9
		810	1909.8	242.8	301.8

Band	Mode	Channel	f (MHz)	99% BW (MHz)	-26dB BW (MHz)
Band 5	REL99	4132	826.4	4.118	4.686
		4183	836.6	4.142	4.745
		4233	846.6	4.138	4.686
	HSDPA	4132	826.4	4.129	4.688
		4183	836.6	4.143	4.685
		4233	846.6	4.126	4.67
	HSUPA	4132	826.4		
		4183	836.6		
		4233	846.6		
Band 2	REL99	9262	1852.4	4.139	4.728
		9400	1880	4.127	4.704
		9538	1907.6	4.138	4.708
	HSDPA	9262	1852.4	4.118	4.702
		9400	1880	4.118	4.702
		9538	1907.6	4.136	4.67
	HSUPA	9262	1852.4		
		9400	1880		
		9538	1907.6		

10.1.2. LTE OCCUPIED BANDWIDTH RESULTS

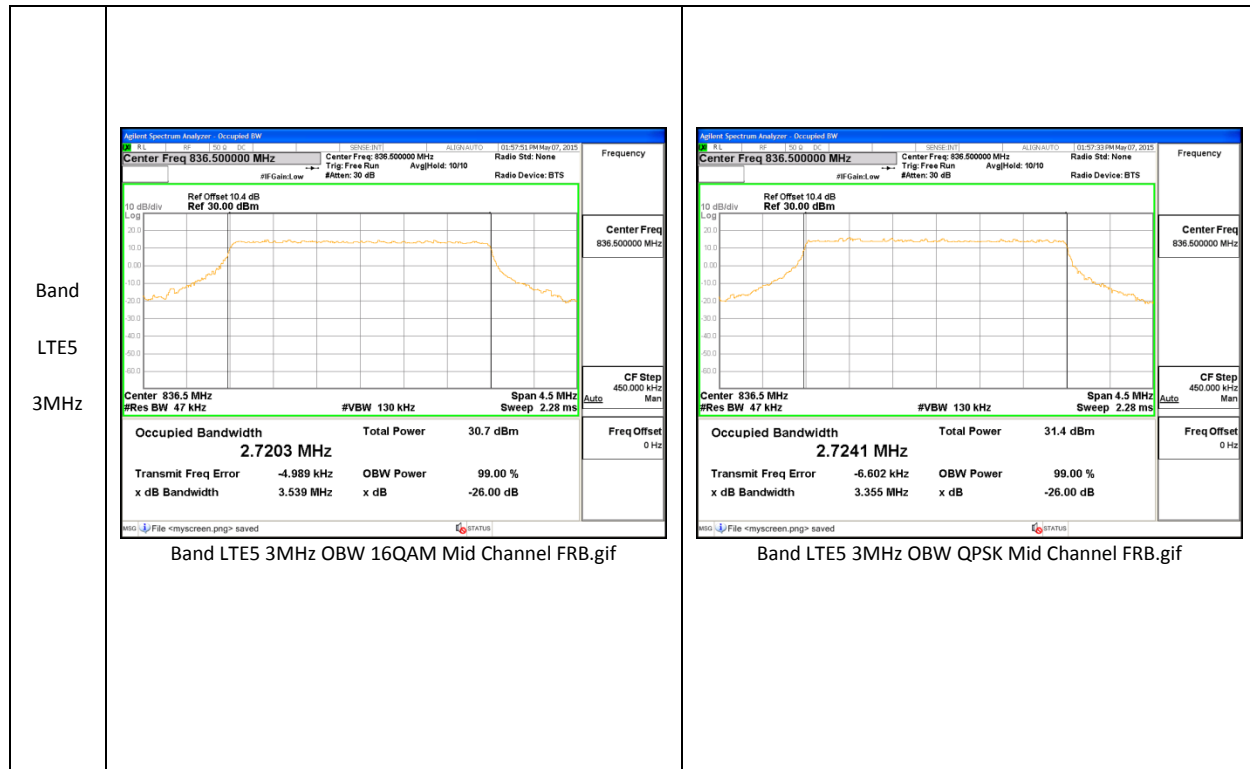
Band	BW(MHz)	Mode	RB/RB Size	f (MHz)	99% BW (MHz)	-26dB BW (MHz)
LTE5	10	QPSK	50/0	829	9.004	10.392
			50/0	836.5	8.997	10.345
			50/0	844	9.021	10.394
		16QAM	50/0	829	8.971	10.57
			50/0	836.5	9.025	10.44
			50/0	844	9.028	10.566

Band	BW(MHz)	Mode	RB/RB Size	f (MHz)	99% BW (MHz)	-26dB BW (MHz)
LTE5	5	QPSK	25/0	826.5	4.515	5.256
			25/0	836.5	4.498	5.276
			25/0	846.5	4.52	5.232
		16QAM	25/0	826.5	4.51	5.249
			25/0	836.5	4.504	5.217
			25/0	846.5	4.525	5.43

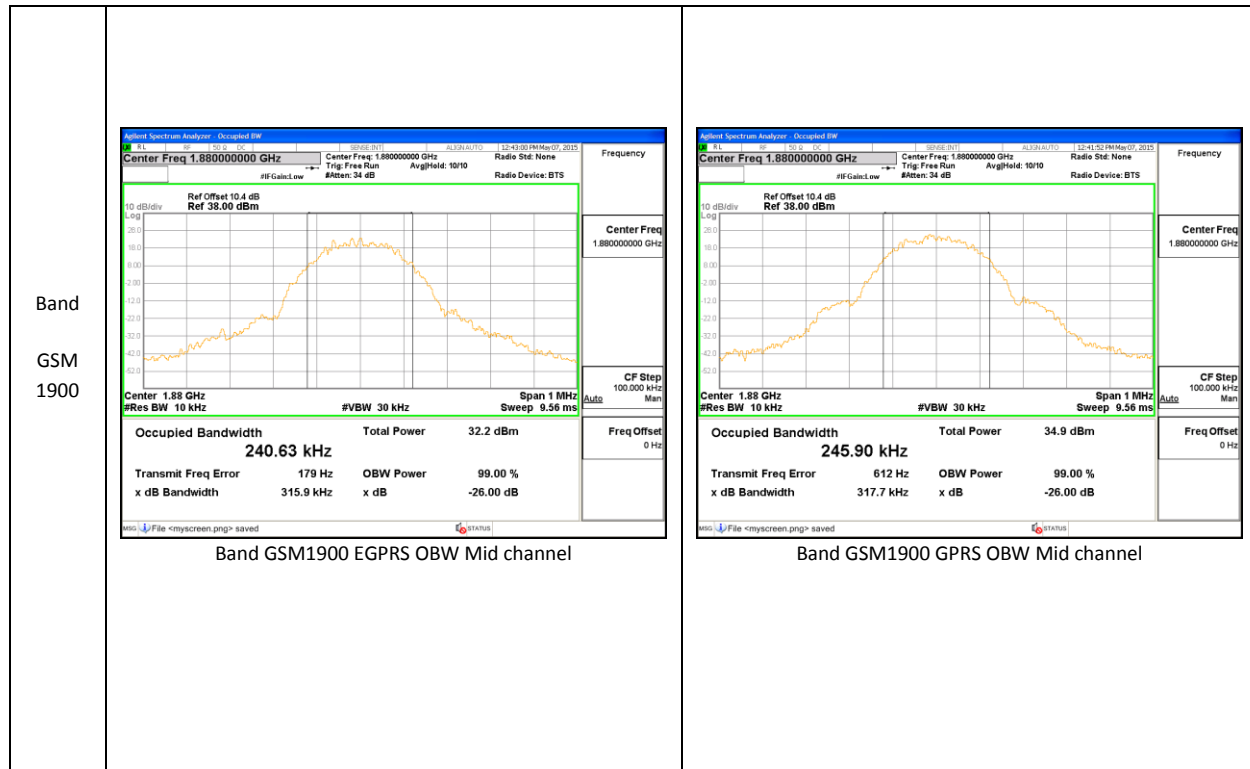
Band	BW(MHz)	Mode	RB/RB Size	f (MHz)	99% BW (MHz)	-26dB BW (MHz)
LTE5	3	QPSK	15/0	825.5	2.716	3.417
			15/0	836.5	2.724	3.355
			15/0	847.5	2.715	3.325
		16QAM	15/0	825.5	2.723	3.476
			15/0	836.5	2.72	3.539
			15/0	847.5	2.715	3.491

Band	BW(MHz)	Mode	RB/RB Size	f (MHz)	99% BW (MHz)	-26dB BW (MHz)
LTE5	1.4	QPSK	6/0	824.7	1.106	1.553
			6/0	836.5	1.096	1.507
			6/0	848.3	1.104	1.522
		16QAM	6/0	824.7	1.1	1.545
			6/0	836.5	1.105	1.581
			6/0	848.3	1.112	1.595

10.1.1. OCCUPIED BANDWIDTH PLOTS







10.2. BAND EDGE EMISSIONS

RULE PART(S)

FCC: §22.359, §24.238, §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.

TEST PROCEDURE

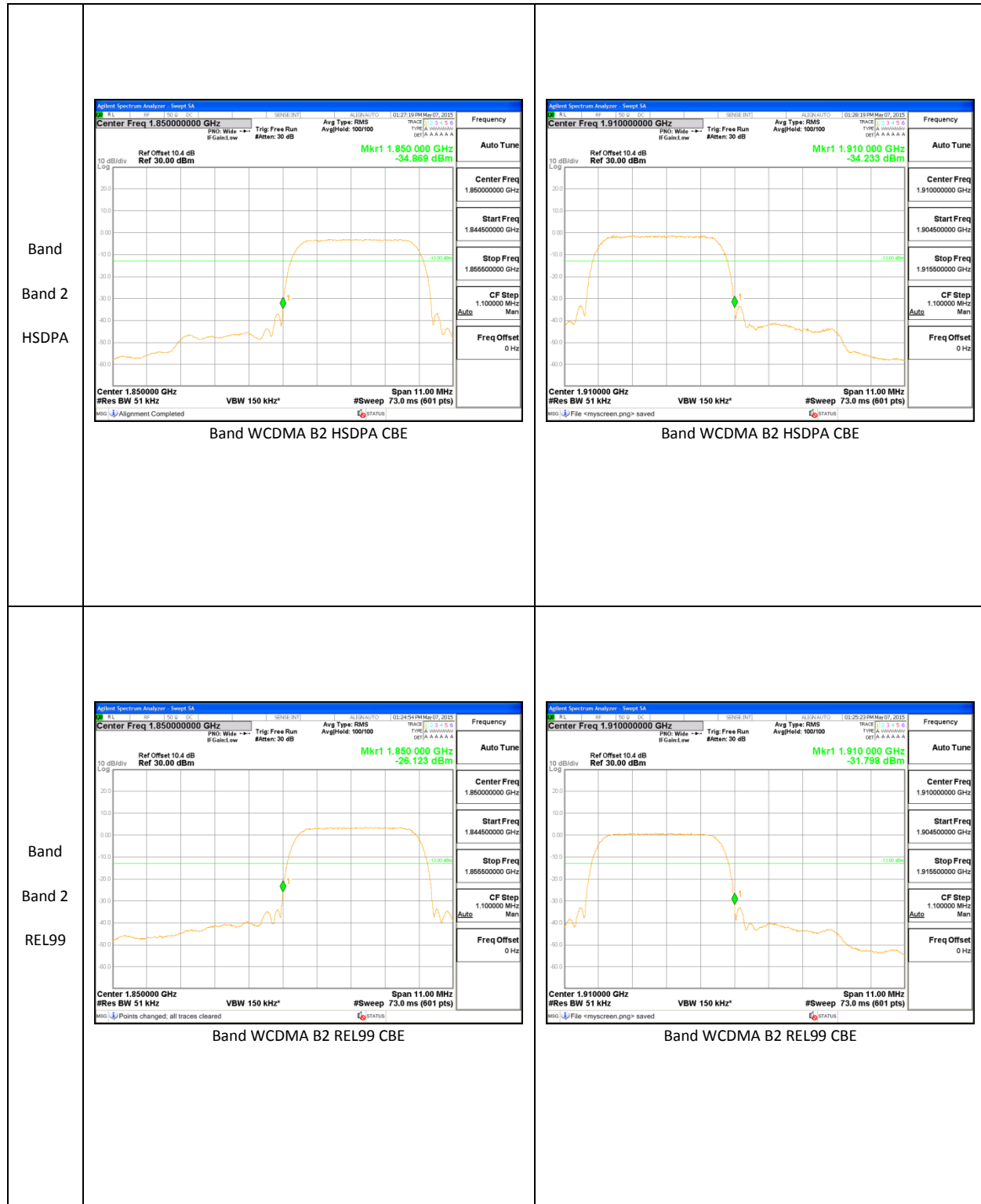
Per KDB 971168 D01 Power Meas License Digital Systems v02r02

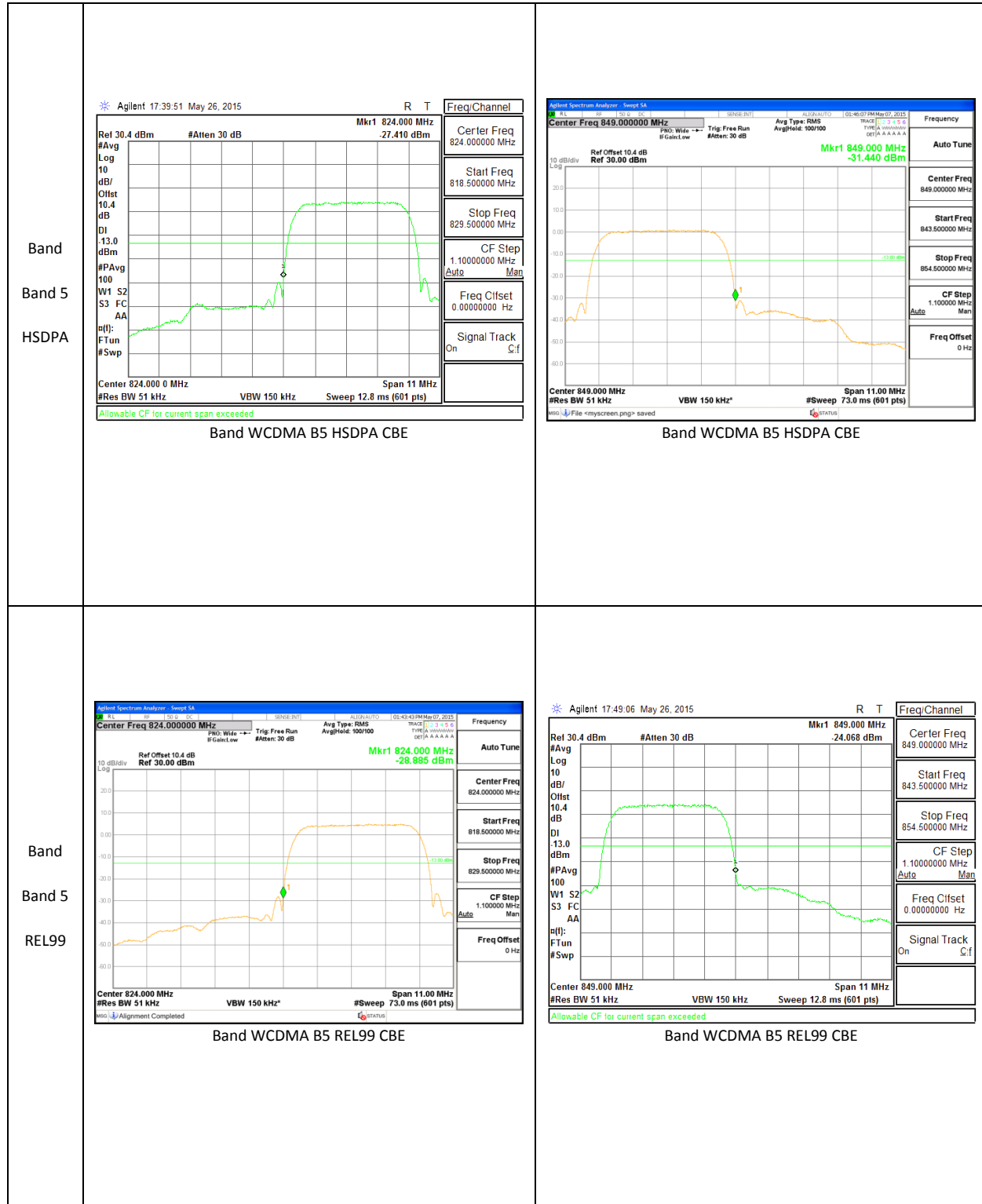
The transmitter output was connected to an Agilent 8960 or a CMW500 Test Set and configured to operate at maximum power. The band edge emissions were measured at the required operating frequencies in each band on the Spectrum Analyzer.

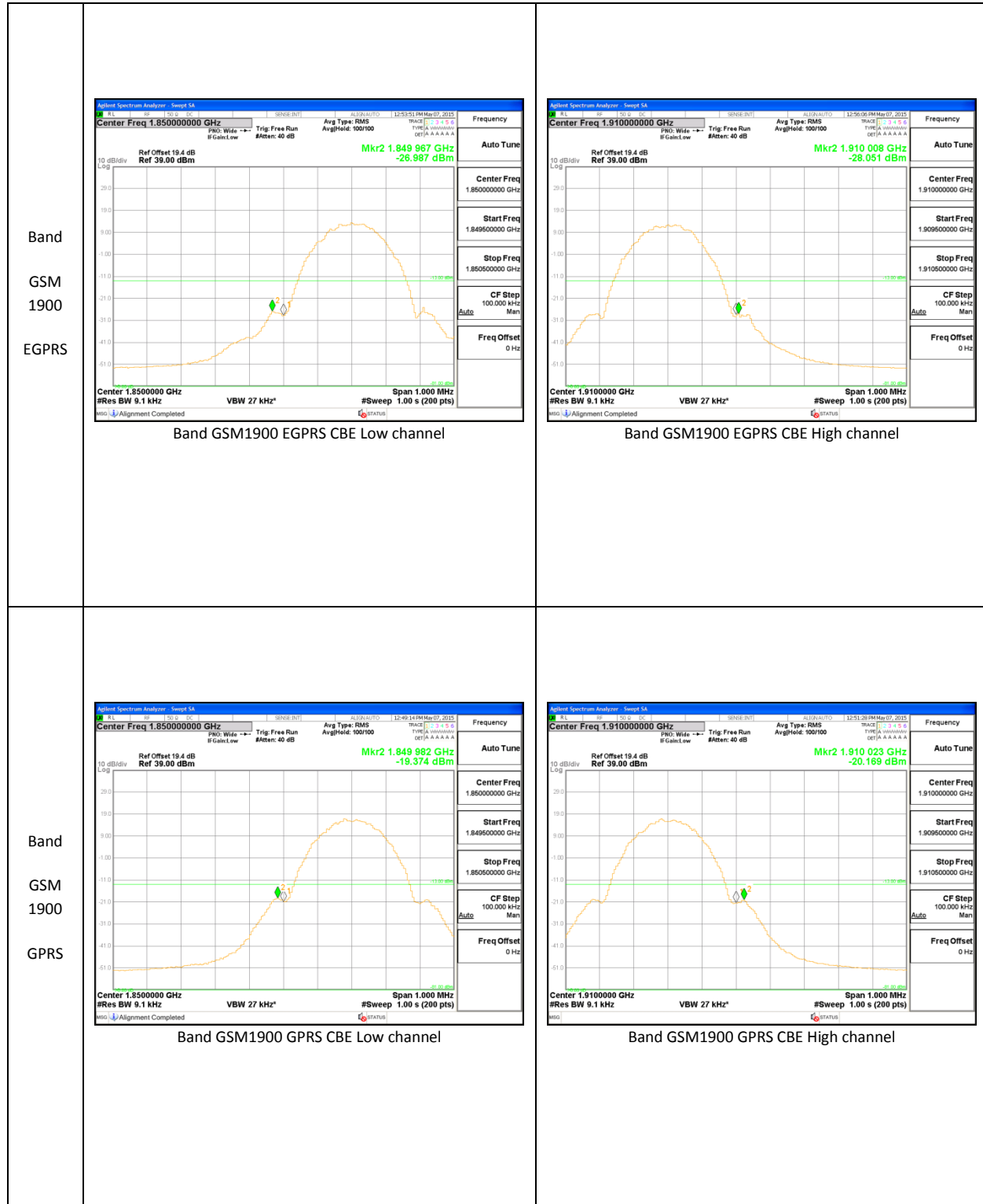
MODES TESTED

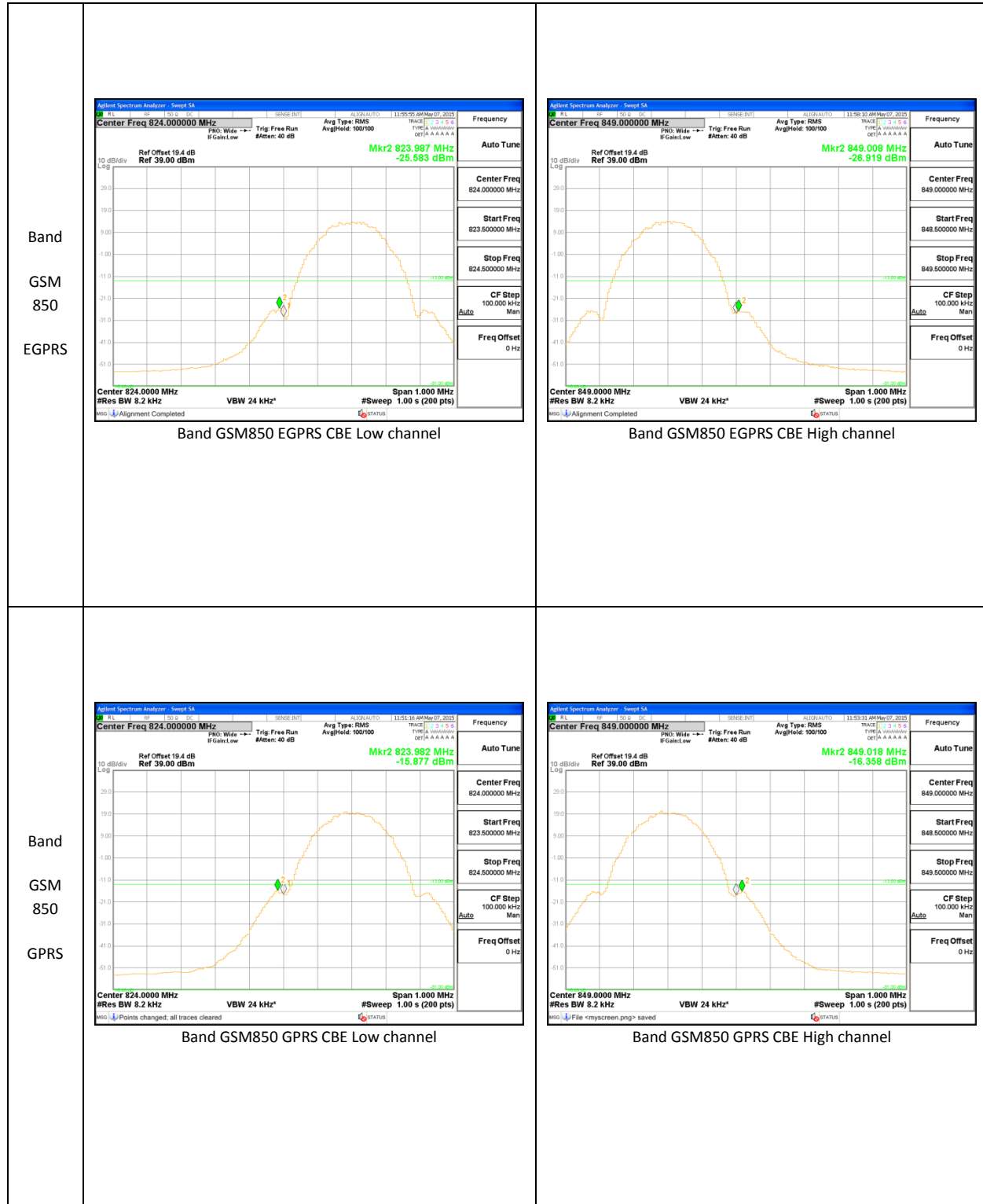
GSM 850, GSM 1900, WCDMA Band 2, WCDMA Band 5

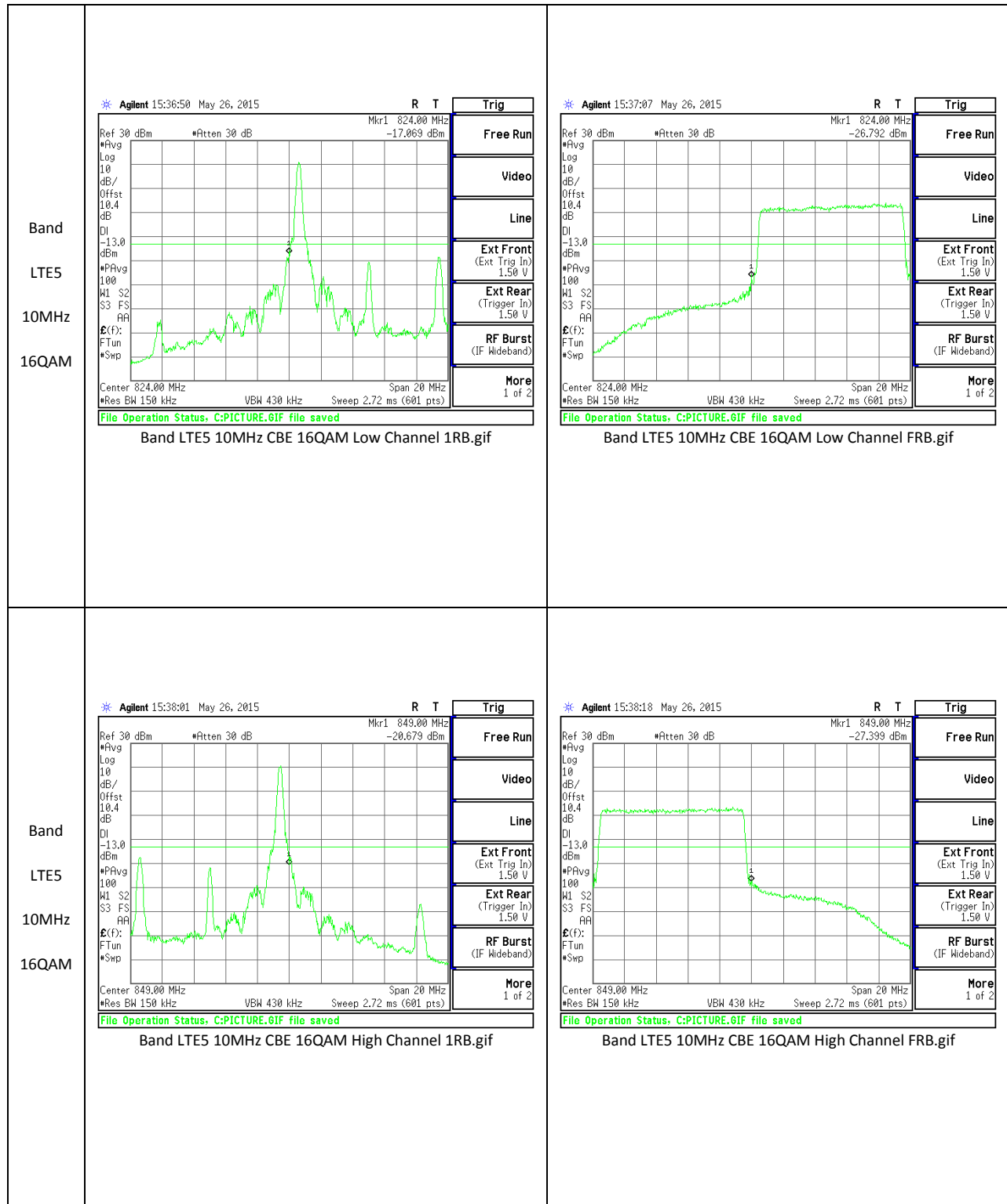
RESULTS

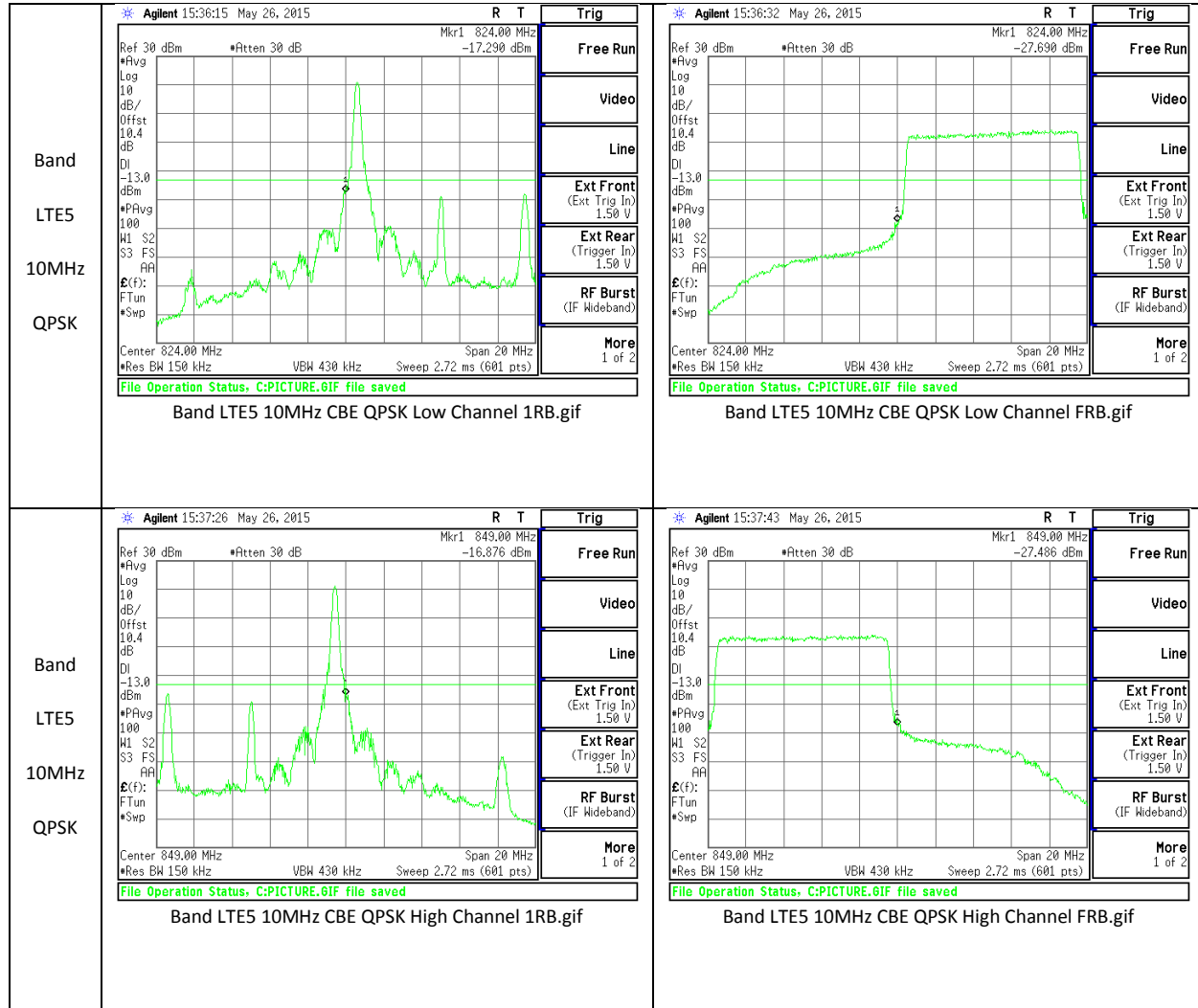
10.2.1. BAND EDGE PLOTS

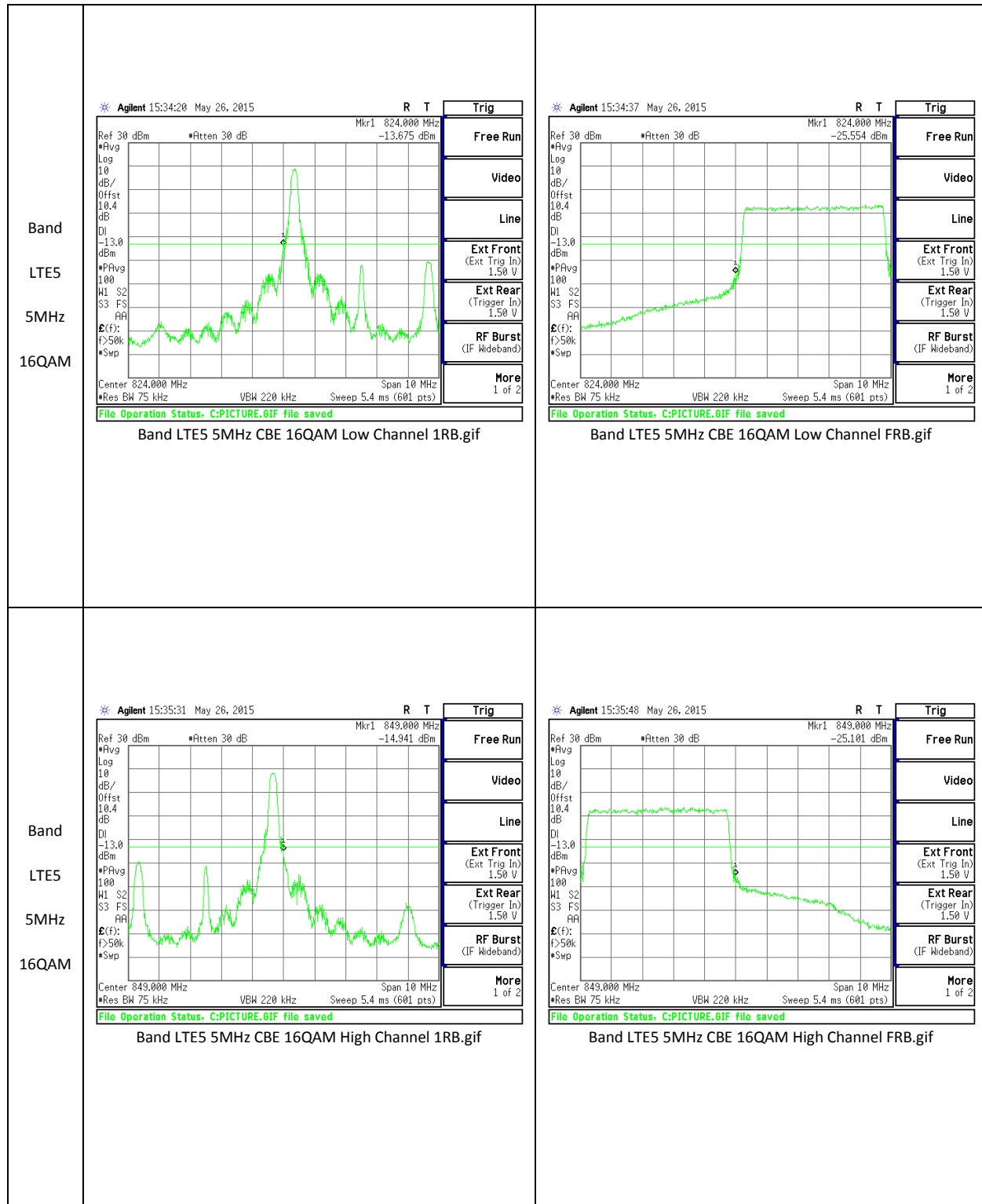


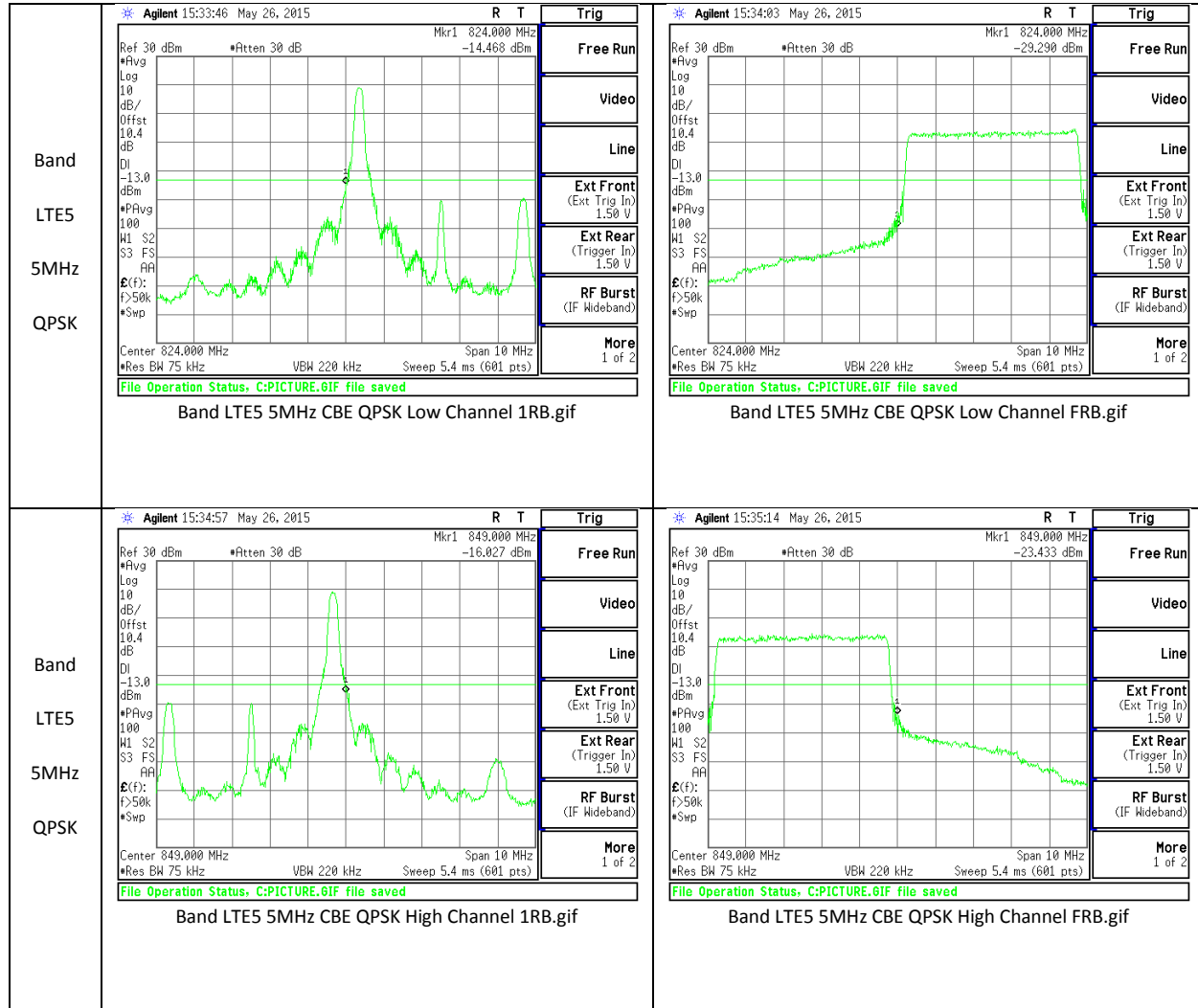


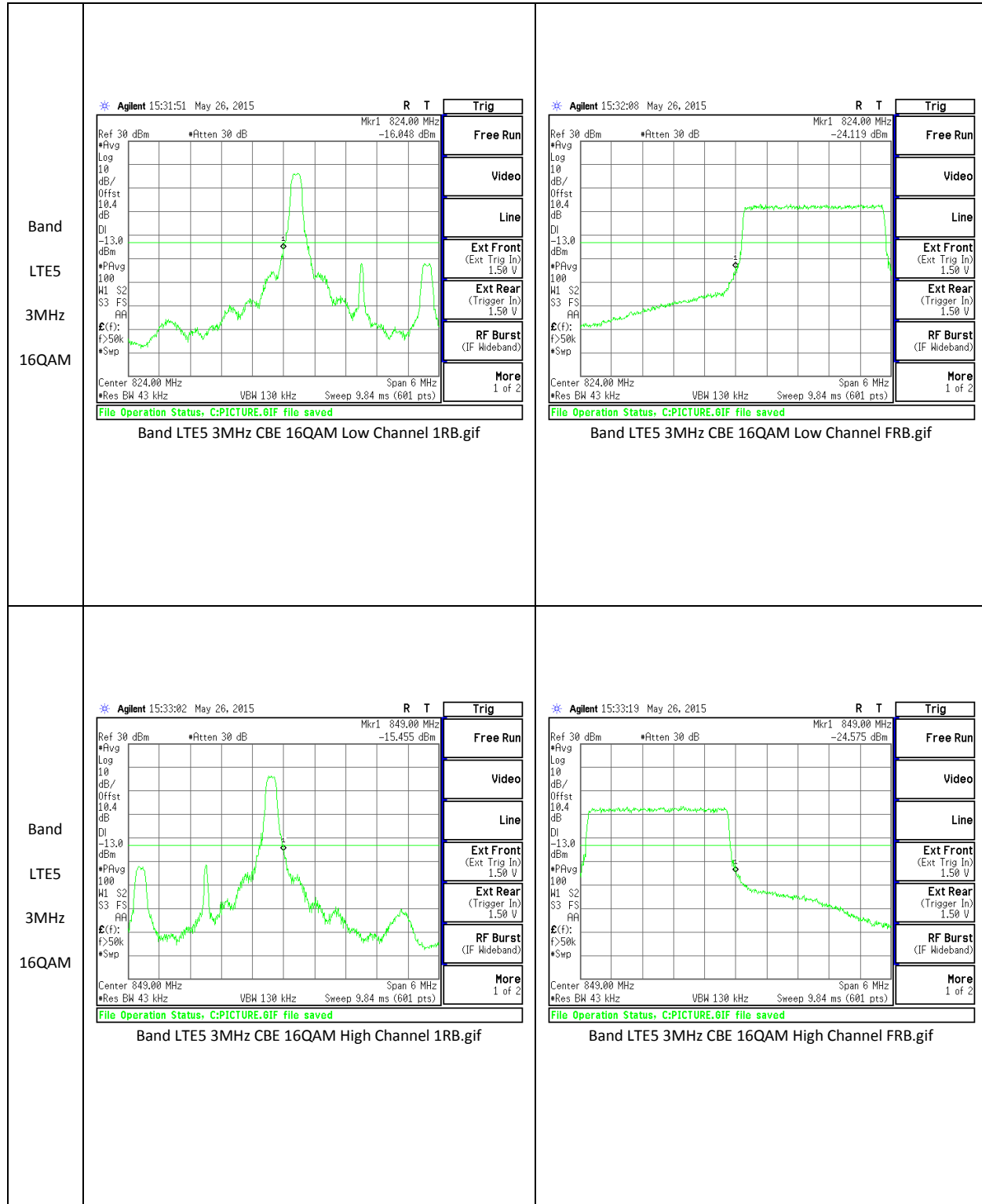


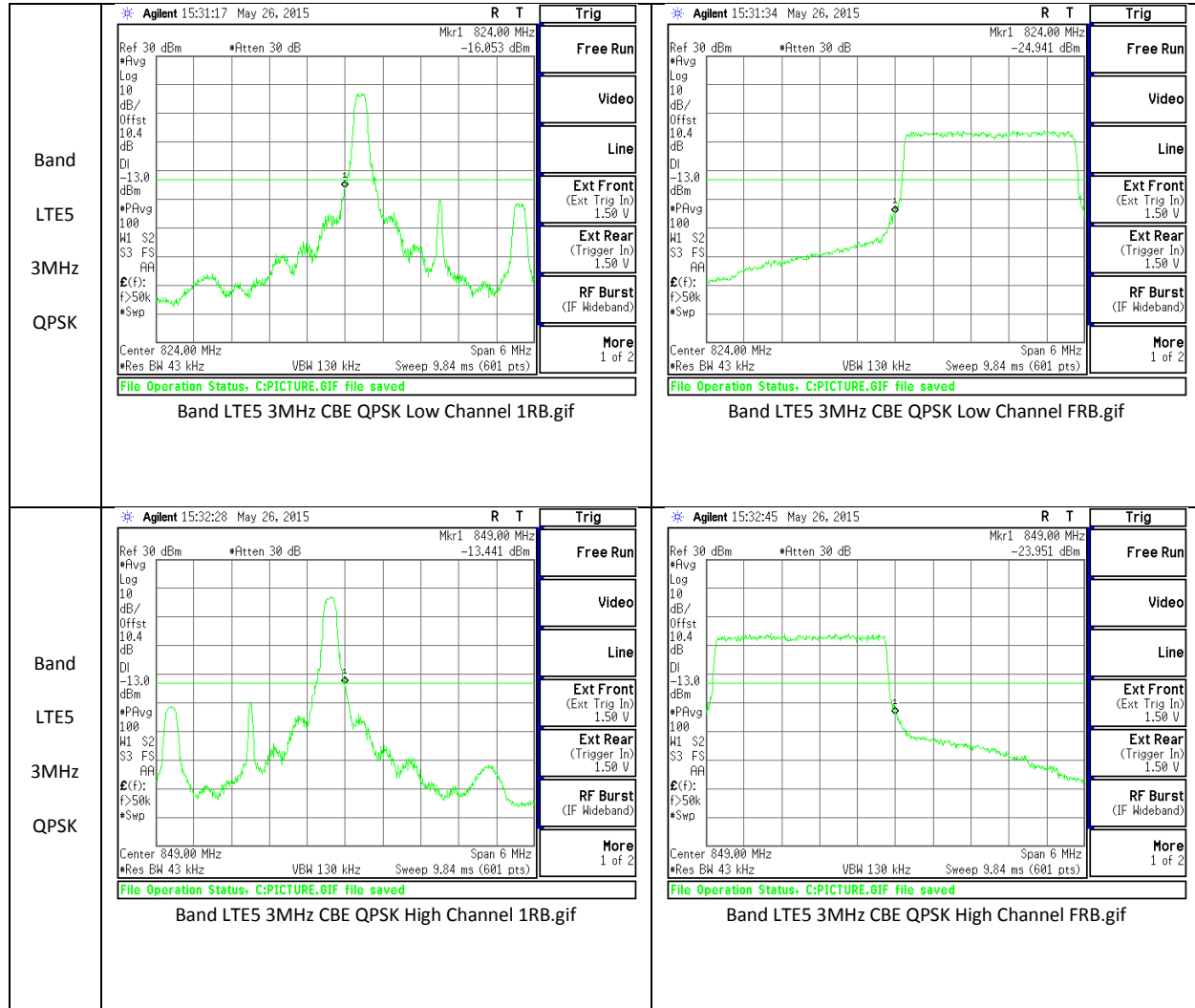


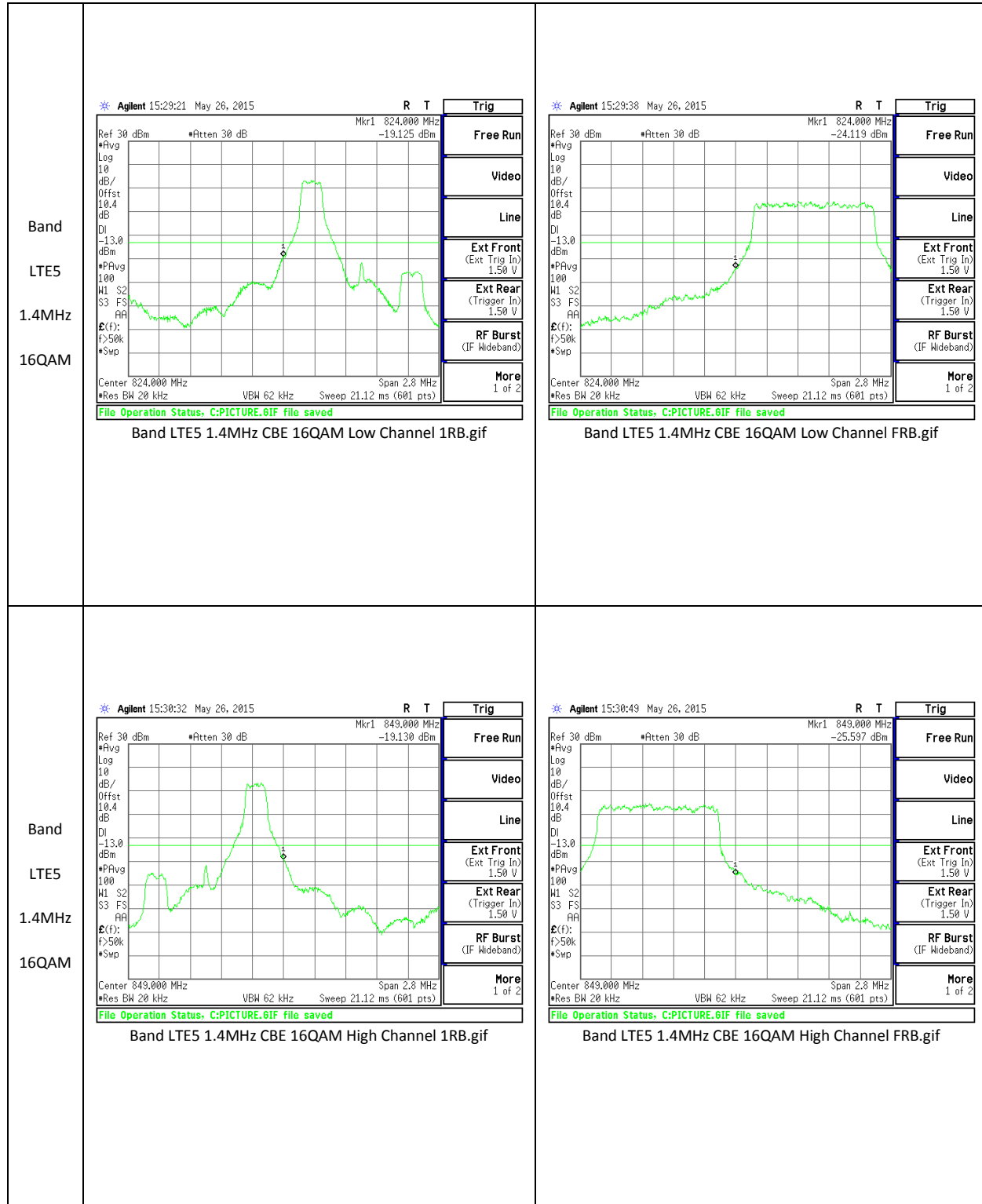


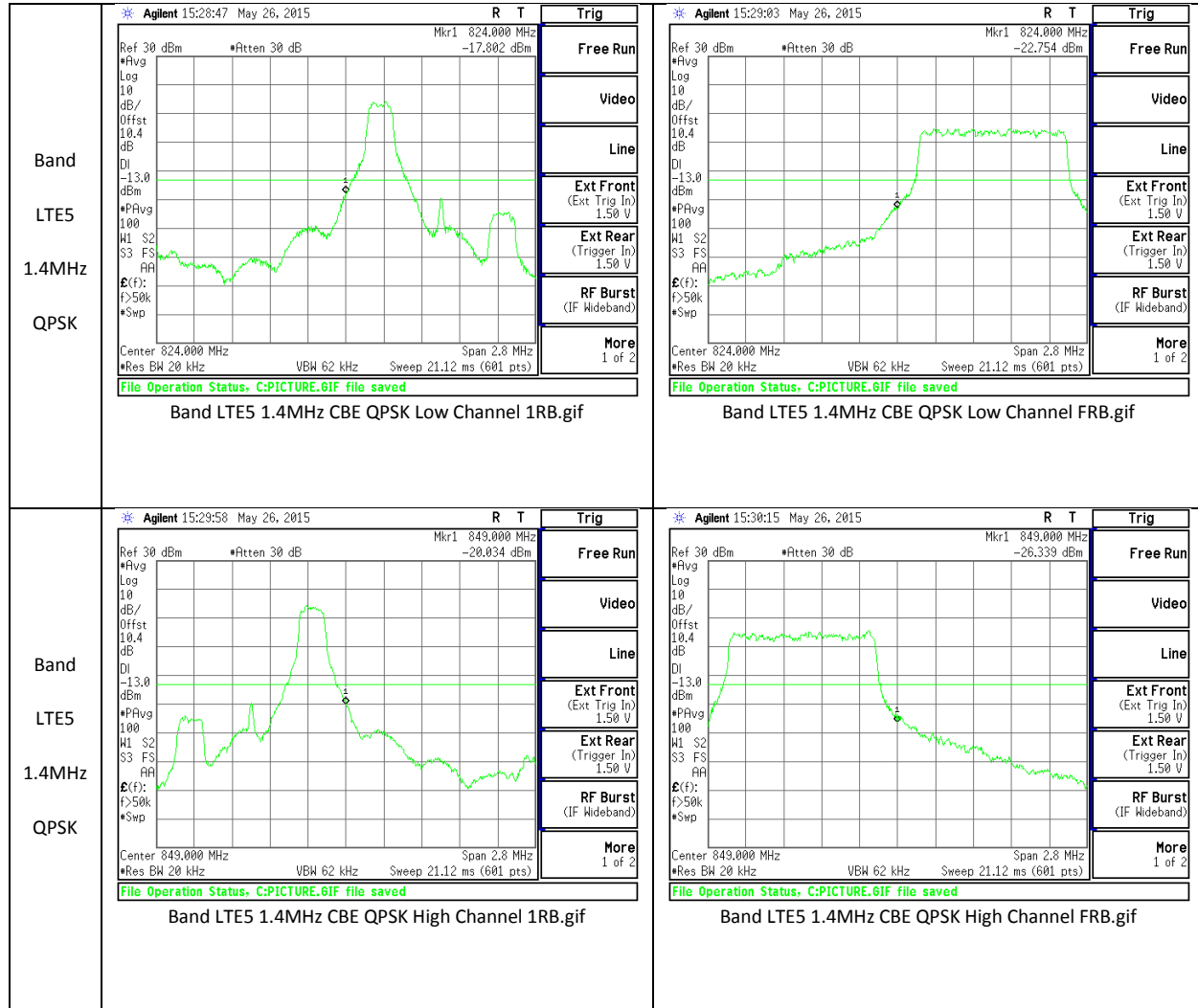












10.3. OUT OF BAND EMISSIONS

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 v02r02

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, GSM 1900, WCDMA Band 2, WCDMA Band 5

RESULTS

10.3.1. OUT OF BAND EMISSIONS RESULT

Band	BW (MHz)	Mode	f (MHz)	Spur (dBm)	Spec (dBm)	Delta (dB)
LTE5	10	QPSK	829	-28.49	-13	-15.49
			836.5	-28.20	-13	-15.2
			844	-28.33	-13	-15.33
		16QAM	829	-27.88	-13	-14.88
			836.5	-27.87	-13	-14.87
			844	-28.10	-13	-15.1

Band	BW (MHz)	Mode	f (MHz)	Spur (dBm)	Spec (dBm)	Delta (dB)
LTE5	5	QPSK	826.5	-34.92	-13	-21.92
			836.5	-28.19	-13	-15.19
			846.5	-27.91	-13	-14.91
		16QAM	826.5	-35.37	-13	-22.37
			836.5	-28.21	-13	-15.21
			846.5	-28.21	-13	-15.21

Band	BW (MHz)	Mode	f (MHz)	Spur (dBm)	Spec (dBm)	Delta (dB)
LTE5	3	QPSK	825.5	-34.50	-13	-21.5
			836.5	-27.64	-13	-14.64
			847.5	-27.13	-13	-14.13
		16QAM	825.5	-35.43	-13	-22.43
			836.5	-27.45	-13	-14.45
			847.5	-28.24	-13	-15.24

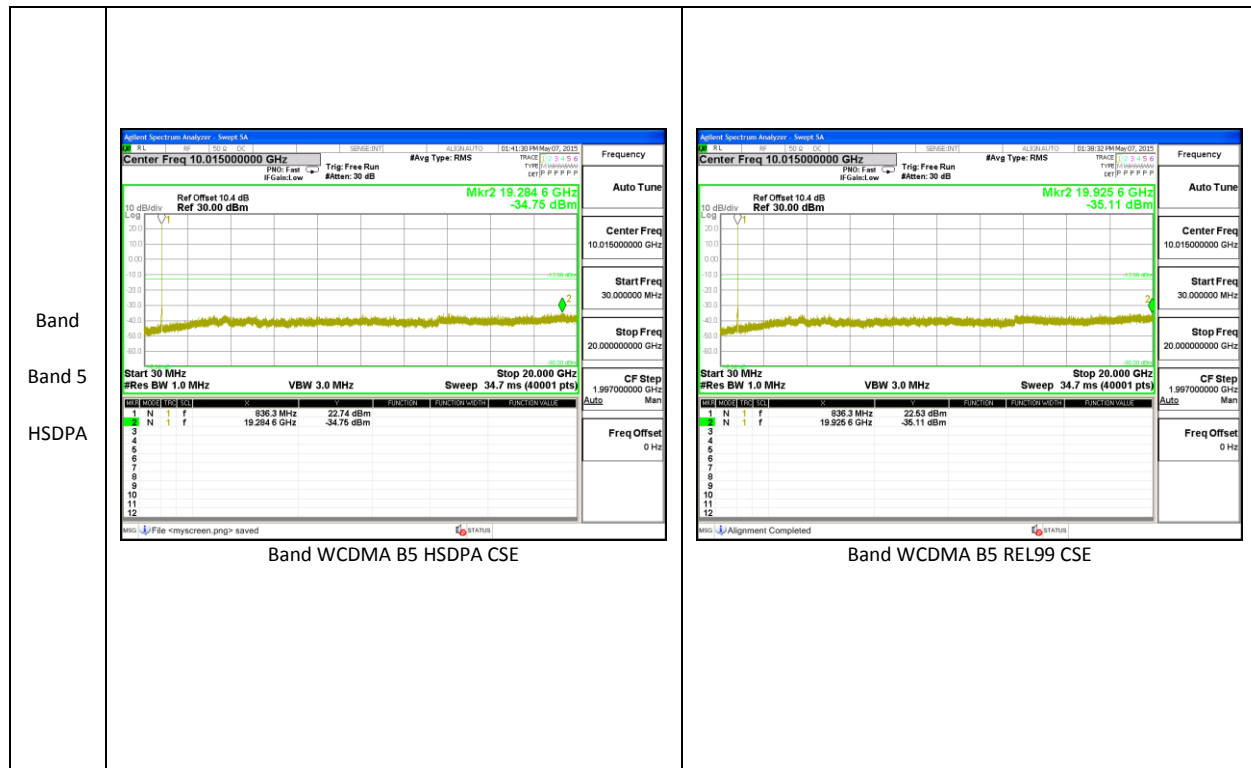
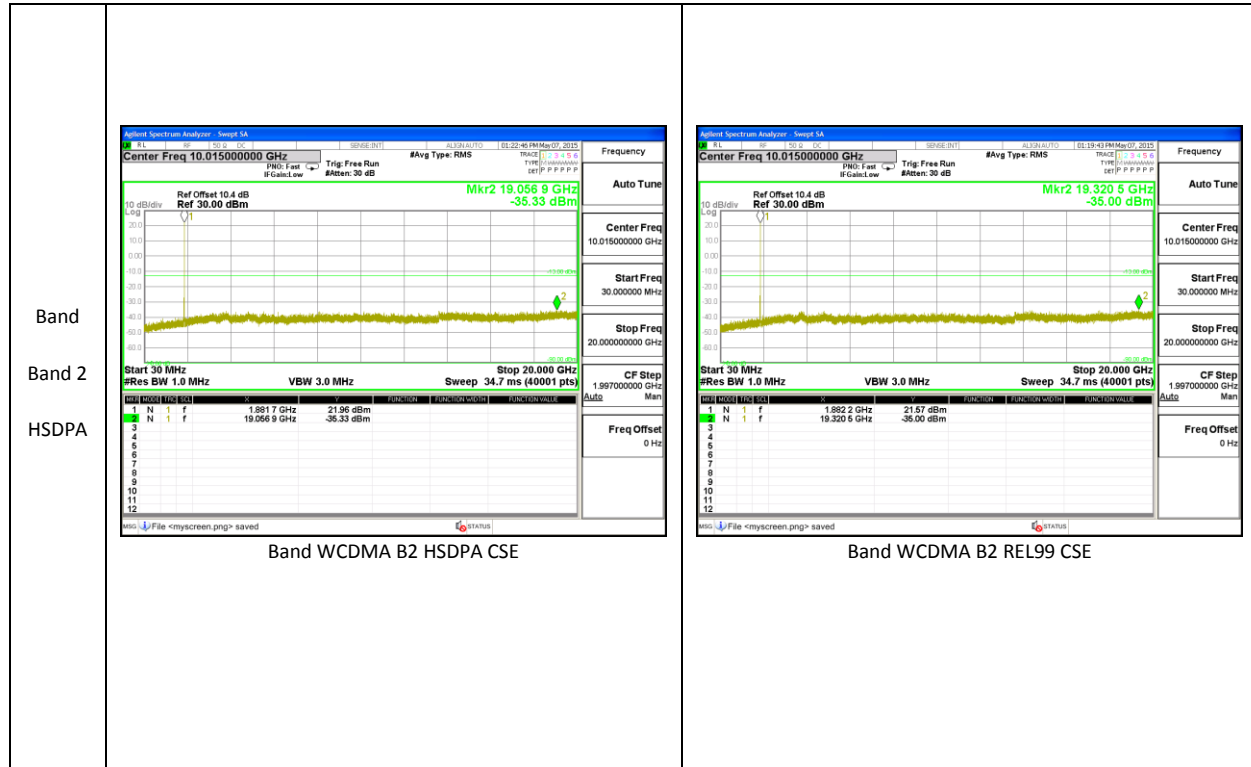
Band	BW (MHz)	Mode	f (MHz)	Spur (dBm)	Spec (dBm)	Delta (dB)
LTE5	1.4	QPSK	824.7	-34.40	-13	-21.4
			836.5	-27.68	-13	-14.68
			848.3	-34.98	-13	-21.98
		16QAM	824.7	-34.75	-13	-21.75
			836.5	-27.60	-13	-14.6
			848.3	-35.17	-13	-22.17

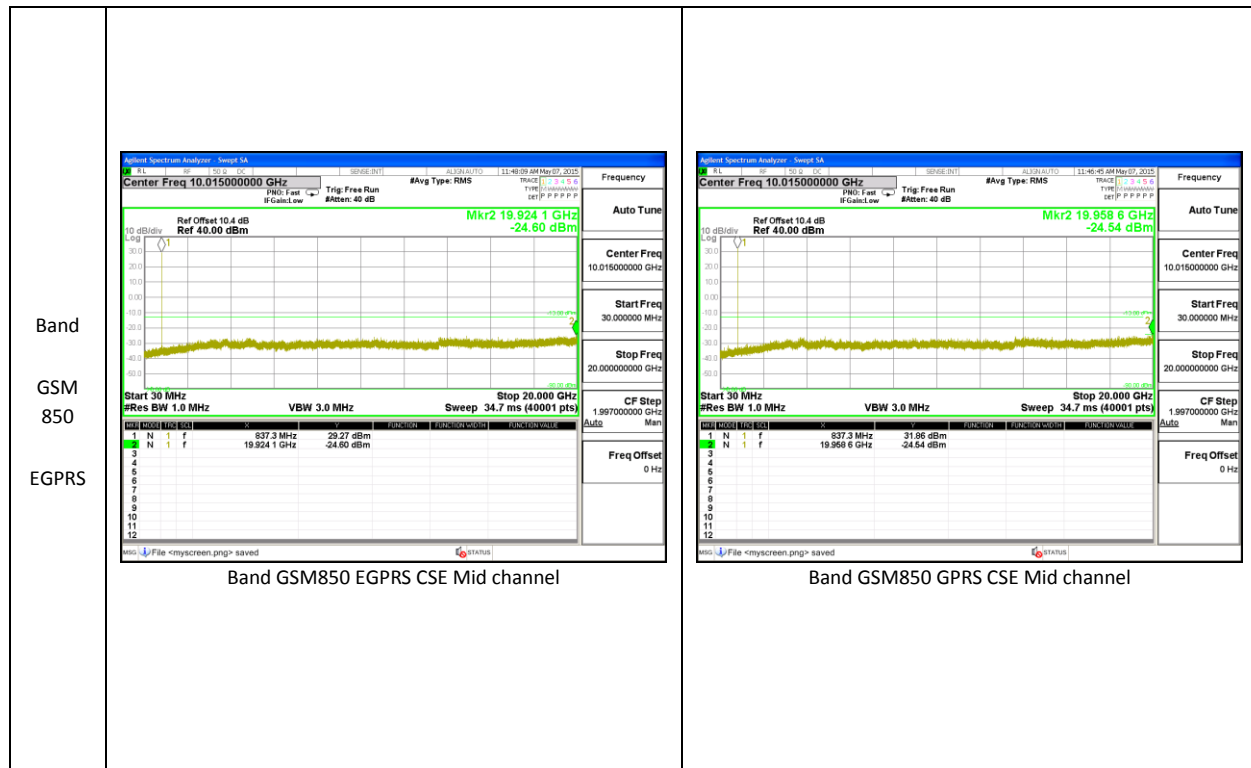
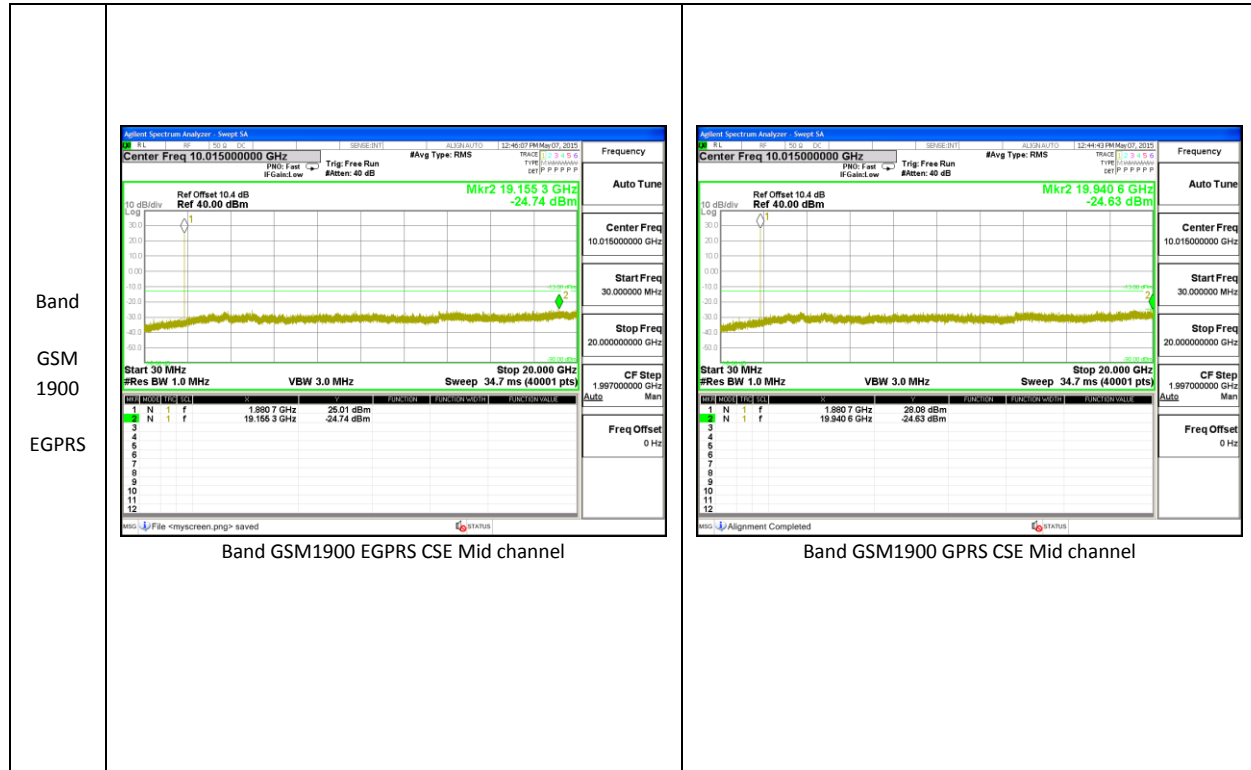
Band	Mode	f (MHz)	Spur (dBm)	Spec (dBm)	Delta (dB)
GSM 850	GPRS	824.2	-24.486	-13	-11.486
		836.6	-24.544	-13	-11.544
		848.8	-25.308	-13	-12.308
	EGPRS	824.2	-24.376	-13	-11.376
		836.6	-24.603	-13	-11.603
		848.8	-25.227	-13	-12.227
GSM 1900	GPRS	1850.2	-24.568	-13	-11.568
		1880	-24.628	-13	-11.628
		1909.8	-24.871	-13	-11.871
	EGPRS	1850.2	-24.93	-13	-11.93
		1880	-24.744	-13	-11.744
		1909.8	-24.753	-13	-11.753

Band	Mode	f (MHz)	Spur (dBm)	Spec (dBm)	Delta (dB)
Band 5	REL99	826.4	-34.274	-13	-21.274
		836.6	-35.109	-13	-22.109
		846.6	-33.773	-13	-20.773
	HSDPA	826.4	-34.174	-13	-21.174
		836.6	-34.752	-13	-21.752
		846.6	-34.322	-13	-21.322
Band 2	REL99	1852.4	-35.034	-13	-22.034
		1880	-34.996	-13	-21.996
		1907.6	-34.558	-13	-21.558
	HSDPA	1852.4	-33.927	-13	-20.927
		1880	-35.332	-13	-22.332
		1907.6	-34.041	-13	-21.041

10.3.2. OUT OF BAND EMISSIONS PLOTS







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.

§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 v02r02

MODES TESTED

GSM 850, GSM 1900, LTE Band 41

RESULTS

See the following pages.

10.4.1. FREQUENCY STABILITY RESULTS**GPRS 850, Channel 190 Freq: 836.6MHz– MID CHANNEL**

Reference Frequency: Cell 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	836.599991	0.032	2.5
3.80	40	836.599985	0.040	2.5
3.80	30	836.599992	0.031	2.5
3.80	20	836.600018	0	2.5
3.80	10	836.600006	0.014	2.5
3.80	0	836.599989	0.035	2.5
3.80	-10	836.600004	0.017	2.5
3.80	-20	836.600018	0.001	2.5
3.80	-30	836.600008	0.012	2.5

Reference Frequency: Cell 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	836.600018	0	2.5
4.37	20	836.6000069	0.013	2.5
3.23(End of volt)	20	836.6000113	0.008	2.5

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

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	50	1879.999988	0.000	2.5
3.80	40	1879.999990	-0.001	2.5
3.80	30	1879.999985	0.002	2.5
3.80	20	1879.999988	0	2.5
3.80	10	1879.999984	0.002	2.5
3.80	0	1879.999984	0.002	2.5
3.80	-10	1879.999983	0.003	2.5
3.80	-20	1879.999988	0.000	2.5
3.80	-30	1879.999989	0.000	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	1879.999988	0	2.5
4.37	20	1879.999988	0.000	2.5
3.23(End of volt)	20	1879.999983	0.003	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 v02r02

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.

MODES TESTED

GSM 850, GSM 1900, WCDMA Band 2, WCDMA Band 5, LTE Band 41

TEST RESULTS

11.1.1. ERP/EIRP Results

Band	Mode	Channel	f(MHz)	ERP / EIRP	
				dBm	mW
Band 2	REL99	9262	1852.4	23.86	243.22
		9400	1880	23.99	250.61
		9538	1907.6	24.17	261.22
	HSDPA	9262	1852.4	23.70	234.42
		9400	1880	23.90	245.47
		9538	1907.6	24.04	253.51
	HSUPA	9262	1852.4		
		9400	1880		
		9538	1907.6		

Band	Mode	Channel	f(MHz)	ERP / EIRP	
				dBm	mW
Band 5	REL99	4132	826.4	20.41	109.90
		4183	836.6	20.66	116.41
		4233	846.6	20.33	107.89
	HSDPA	4132	826.4	20.37	108.89
		4183	836.6	20.56	113.76
		4233	846.6	20.19	104.47
	HSUPA	4132	826.4		
		4183	836.6		
		4233	846.6		

Band	Mode	Channel	f(MHz)	ERP / EIRP	
				dBm	mW
GSM1900	GMSK	512	1850.2		
		661	1880		
		810	1909.8		
	GPRS	512	1850.2	31.24	1330.45
		661	1880	30.14	1032.76
		810	1909.8	31.0	1258.93
	EGPRS	512	1850.2	27.21	526.02
		661	1880	26.84	483.06
		810	1909.8	27.22	527.23

Band	Mode	Channel	f(MHz)	ERP / EIRP	
				dBm	mW
GSM850	GMSK	128	824.2		
		190	836.6		
		251	848.8		
	GPRS	128	824.2	29.74	941.89
		190	836.6	29.20	831.76
		251	848.8	29.33	857.04
	EGPRS	128	824.2	24.76	299.23
		190	836.6	24.66	292.42
		251	848.8	24.58	287.08

11.1.2. LTE ERP/EIRP Results

Band	BW (MHz)	Mode	RB/RB Size	f (MHz)	ERP / EIRP	
					dBm	mW
LTE5	10	QPSK	1/0	829	20.97	125.03
			1/0	836.5	20.88	122.46
			1/0	844	20.65	116.14
		16QAM	1/0	829	20.07	101.62
			1/0	836.5	20.09	102.09
			1/0	844	19.78	95.06

Band	BW (MHz)	Mode	RB/RB Size	f (MHz)	ERP / EIRP	
					dBm	mW
LTE5	5	QPSK	1/0	826.5	20.88	122.46
			1/0	836.5	20.68	116.95
			1/0	846.5	20.51	112.46
		16QAM	1/0	826.5	19.98	99.54
			1/0	836.5	20.0	100.00
			1/0	846.5	19.74	94.19

Band	BW (MHz)	Mode	RB/RB Size	f (MHz)	ERP / EIRP	
					dBm	mW
LTE5	3	QPSK	1/0	825.5	20.59	114.55
			1/0	836.5	20.75	118.85
			1/0	847.5	20.17	103.99
		16QAM	1/0	825.5	19.94	98.63
			1/0	836.5	19.88	97.27
			1/0	847.5	19.31	85.31

Band	BW (MHz)	Mode	RB/RB Size	f (MHz)	ERP / EIRP	
					dBm	mW
LTE5	1.4	QPSK	1/0	824.7	20.22	105.20
			1/0	836.5	20.28	106.66
			1/0	848.3	19.84	96.38
		16QAM	1/0	824.7	19.61	91.41
			1/0	836.5	19.57	90.57
			1/0	848.3	19.17	82.60

Band LTE5 10MHz QPSK	High Frequency Substitution Measurement UL Verification Services, Inc.																																																																																																
	Company:		Samsung																																																																																														
	Project #:		15I20736																																																																																														
	Date:		5/16/2015																																																																																														
	Test Engineer:		Charles Vergonio																																																																																														
	Configuration:		EUT only																																																																																														
	Location:		Chamber B																																																																																														
	Mode:		LTE_QPSK Band 5 Fundamentals, 10MHz Bandwidth																																																																																														
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f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes																																																																																									
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Band LTE5 5MHz 16QAM	High Frequency Substitution Measurement UL Verification Services, Inc.								
	Company:		Samsung						
	Project #:		15I20736						
	Date:		5/16/2015						
	Test Engineer:		Charles Vergonio						
	Configuration:		EUT only						
	Location:		Chamber B						
	Mode:		LTE_16QAM Band 5 Fundamentals, 5MHz Bandwidth						
	Test Equipment:								
	Receiving: Hybrid T243, and Chamber B SMA Cables								
Substitution: Dipole T416, Xft SMA Cable (SN # SERIALNUMBER) Warehouse									
	f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
	Low Ch								
	826.50	20.88	V	0.9	0.0	19.98	38.5	-18.5	
	826.50	3.16	H	0.9	0.0	2.26	38.5	-36.2	
	Mid Ch								
	836.50	20.90	V	0.9	0.0	20.00	38.5	-18.5	
	836.50	3.59	H	0.9	0.0	2.69	38.5	-35.8	
	High Ch								
	846.50	20.64	V	0.9	0.0	19.74	38.5	-18.8	
	846.50	2.62	H	0.9	0.0	1.72	38.5	-36.8	

Band LTE5 5MHz QPSK	High Frequency Substitution Measurement UL Verification Services, Inc.																																																																																																
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Band

LTE5

3MHz

16QAM

High Frequency Substitution Measurement

UL Verification Services, Inc.

Company: Samsung

Project #: 15I20736

Date: 05/16/15

Test Engineer: Charles Vergonio

Configuration: EUT only

Location: Chamber B

Mode: LTE_16QAM Band 5 Fundamentals, 3MHz Bandwidth

Test Equipment:

Receiving: Hybrid T243, and Chamber B SMA Cables

Substitution: Dipole T273, 3ft SMA Cable Warehouse

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
825.50	20.84	V	0.9	0.0	19.94	38.5	-18.6	
825.50	3.12	H	0.9	0.0	2.22	38.5	-36.3	
Mid Ch								
836.50	20.78	V	0.9	0.0	19.88	38.5	-18.6	
836.50	3.44	H	0.9	0.0	2.54	38.5	-36.0	
High Ch								
847.50	20.21	V	0.9	0.0	19.31	38.5	-19.2	
847.50	2.59	H	0.9	0.0	1.69	38.5	-36.8	

Band LTE5 3MHz QPSK	High Frequency Substitution Measurement UL Verification Services, Inc.																																																																																																	
	Company:		Samsung																																																																																															
	Project #:		15I20736																																																																																															
	Date:		05/16/15																																																																																															
	Test Engineer:		Charles Vergonio																																																																																															
	Configuration:		EUT only																																																																																															
	Location:		Chamber B																																																																																															
	Mode:		LTE_QPSK Band 5 Fundamentals, 3MHz Bandwidth																																																																																															
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f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes																																																																																										
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Band

LTE5

1.4MHz

16QAM

High Frequency Substitution Measurement

UL Verification Services, Inc.

Company:

Project #:

Date:

Test Engineer:

Configuration:

Location:

Mode:

Test Equipment:

Receiving: Hybrid T899, and Chamber G SMA Cables

Substitution: Dipole T273, 6ft SMA Cable Warehouse

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
824.70	20.51	V	0.9	0.0	19.61	38.5	-18.9	
824.70	2.69	H	0.9	0.0	1.79	38.5	-36.7	
Mid Ch								
836.50	20.47	V	0.9	0.0	19.57	38.5	-18.9	
836.50	2.85	H	0.9	0.0	1.95	38.5	-36.6	
High Ch								
848.30	20.07	V	0.9	0.0	19.17	38.5	-19.3	
848.30	2.18	H	0.9	0.0	1.28	38.5	-37.2	

Band

LTE5

1.4MHz

QPSK

High Frequency Substitution Measurement

UL Verification Services, Inc.

Company:

Project #:

Date:

Test Engineer:

Configuration:

Location:

Mode:

Test Equipment:

Receiving: Hybrid T899, and Chamber G SMA Cables

Substitution: Dipole T273, 6ft SMA Cable Warehouse

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
824.70	21.12	V	0.9	0.0	20.22	38.5	-18.3	
824.70	3.70	H	0.9	0.0	2.80	38.5	-35.7	
Mid Ch								
836.50	21.18	V	0.9	0.0	20.28	38.5	-18.2	
836.50	3.92	H	0.9	0.0	3.02	38.5	-35.5	
High Ch								
848.30	20.74	V	0.9	0.0	19.84	38.5	-18.7	
848.30	3.21	H	0.9	0.0	2.31	38.5	-36.2	

WCDMA

Band Band 2 HSDPA	High Frequency Substitution Measurement UL Verification Services, Inc.																																																																																																	
	Company:		Samsung																																																																																															
	Project #:		15I20736																																																																																															
	Date:		5/11/2015																																																																																															
	Test Engineer:		D. Mun																																																																																															
	Configuration:		X-Pos EUT Only																																																																																															
	Location:		Chamber B																																																																																															
	Mode:		HSDPA B2																																																																																															
	Test Equipment:																																																																																																	
	Receiving: Horn T345, and Chamber B SMA Cables Substitution: Horn T59 Substitution, 4ft SMA Cable Warehouse																																																																																																	
<table border="1"> <thead> <tr> <th>f MHz</th> <th>SG reading (dBm)</th> <th>Ant. Pol. (H/V)</th> <th>Cable Loss (dB)</th> <th>Antenna Gain (dBi)</th> <th>EIRP (dBm)</th> <th>Limit (dBm)</th> <th>Margin (dB)</th> <th>Notes</th> </tr> </thead> <tbody> <tr> <td colspan="9">Low Ch</td> </tr> <tr> <td>1852.40</td> <td>2.12</td> <td>V</td> <td>0.9</td> <td>8.0</td> <td>9.23</td> <td>33.0</td> <td>-23.8</td> <td></td> </tr> <tr> <td>1852.40</td> <td>16.59</td> <td>H</td> <td>0.9</td> <td>8.0</td> <td>23.70</td> <td>33.0</td> <td>-9.3</td> <td></td> </tr> <tr> <td colspan="9">Mid Ch</td> </tr> <tr> <td>1880.00</td> <td>3.36</td> <td>V</td> <td>0.9</td> <td>8.0</td> <td>10.47</td> <td>33.0</td> <td>-22.5</td> <td></td> </tr> <tr> <td>1880.00</td> <td>16.79</td> <td>H</td> <td>0.9</td> <td>8.0</td> <td>23.90</td> <td>33.0</td> <td>-9.1</td> <td></td> </tr> <tr> <td colspan="9">High Ch</td> </tr> <tr> <td>1907.60</td> <td>6.45</td> <td>V</td> <td>0.9</td> <td>8.0</td> <td>13.56</td> <td>33.0</td> <td>-19.4</td> <td></td> </tr> <tr> <td>1907.60</td> <td>16.93</td> <td>H</td> <td>0.9</td> <td>8.0</td> <td>24.04</td> <td>33.0</td> <td>-9.0</td> <td></td> </tr> </tbody> </table>									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	2.12	V	0.9	8.0	9.23	33.0	-23.8		1852.40	16.59	H	0.9	8.0	23.70	33.0	-9.3		Mid Ch									1880.00	3.36	V	0.9	8.0	10.47	33.0	-22.5		1880.00	16.79	H	0.9	8.0	23.90	33.0	-9.1		High Ch									1907.60	6.45	V	0.9	8.0	13.56	33.0	-19.4		1907.60	16.93	H	0.9	8.0	24.04	33.0	-9.0	
f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes																																																																																										
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Rev. 3.17.11 Note: For Band 4 EIRP limit is 30dBm																																																																																																		

High Frequency Substitution Measurement UL Verification Services, Inc. Chamber B								
Company:	LG							
Project #:	15I20736							
Date:	05/11/15							
Test Engineer:	D. Mun							
Configuration:	Z-pos EUT							
Mode:	WCDMA Band 5 HSDPA							
Test Equipment:								
Receiving: Sunol T243, and 3m Chamber B N-type Cable								
Substitution: Dipole T416, 6ft SMA Cable 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	21.27	V	0.9	0.0	20.37	38.5	-18.1	
826.40	4.49	H	0.9	0.0	3.59	38.5	-34.9	
Mid Ch								
836.60	21.46	V	0.9	0.0	20.56	38.5	-17.9	
836.60	4.34	H	0.9	0.0	3.44	38.5	-35.0	
High Ch								
846.60	21.09	V	0.9	0.0	20.19	38.5	-18.3	
846.60	3.91	H	0.9	0.0	3.01	38.5	-35.4	
Rev. 3.17.11								
Note: For Band 13/17 ERP limit is 34.77dBm; For Band 26 limit is 50dBm								

High Frequency Substitution Measurement UL Verification Services, Inc. Chamber B									
Company:		LG							
Project #:		15I20736							
Date:		05/11/15							
Test Engineer:		D. Mun							
Configuration:		Z-pos EUT							
Mode:		REL99 B5 FUND							
Test Equipment:									
Receiving: Sunol T243, and 3m Chamber B N-type Cable									
Substitution: Dipole T416, 6ft SMA Cable 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	21.31	V	0.9	0.0	20.41	38.5	-18.0		
826.40	4.56	H	0.9	0.0	3.66	38.5	-34.8		
Mid Ch									
836.60	21.56	V	0.9	0.0	20.66	38.5	-17.8		
836.60	4.49	H	0.9	0.0	3.59	38.5	-34.9		
High Ch									
846.60	21.23	V	0.9	0.0	20.33	38.5	-18.1		
846.60	4.11	H	0.9	0.0	3.21	38.5	-35.2		
Rev. 3.17.11									
Note: For Band 13/17 ERP limit is 34.77dBm; For Band 26 limit is 50dBm									

GSM

Band

GSM

1900

EGPRS

High Frequency Substitution Measurement

UL Verification Services, Inc.

Company: Samsung

Project #: 15I20736

Date: 5/11/2015

Test Engineer: D. Mun

Configuration: EUT X-pos only

Mode: EGPRS 1900

Test Equipment:

Receiving: Horn T345, and Chamber B SMA Cables

Substitution: Horn T59 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	8.72	V	0.9	8.0	15.88	33.0	-17.1	
1850.20	20.05	H	0.9	8.0	27.21	33.0	-5.8	
Mid Ch								
1880.00	3.70	V	0.9	8.0	10.86	33.0	-22.1	
1880.00	19.68	H	0.9	8.0	26.84	33.0	-6.2	
High Ch								
1909.80	9.23	V	0.9	8.0	16.39	33.0	-16.6	
1909.80	20.06	H	0.9	8.0	27.22	33.0	-5.8	

Rev. 3.17.11

Note: For Band 4 EIRP limit is 30dBm

Band

GSM

1900

GPRS

High Frequency Substitution Measurement

UL Verification Services, Inc.

Company: Samsung

Project #: 15I20736

Date: 5/11/2015

Test Engineer: D. Mun

Configuration: EUT X-pos

Mode: GPRS 1900

Test Equipment:

Receiving: Horn T345, and Chamber B SMA Cables

Substitution: Horn T59 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	10.02	V	0.9	8.0	17.18	33.0	-15.8	
1850.20	24.08	H	0.9	8.0	31.24	33.0	-1.8	
Mid Ch								
1880.00	9.47	V	0.9	8.0	16.63	33.0	-16.4	
1880.00	22.98	H	0.9	8.0	30.14	33.0	-2.9	
High Ch								
1909.80	10.29	V	0.9	8.0	17.45	33.0	-15.6	
1909.80	23.84	H	0.9	8.0	31.00	33.0	-2.0	

Rev. 3.17.11

Note: For Band 4 EIRP limit is 30dBm

High Frequency Substitution Measurement UL Verification Services, Inc. Chamber B								
Company:	Sony							
Project #:	15I20736							
Date:	05/11/15							
Test Engineer:	David Mun							
Configuration:	EUT Z-Position							
Mode:	EGPRS850							
Test Equipment:								
Receiving: Hybrid T243, and Chamber B N-type Cable								
Substitution: Dipole T273, 8ft SMA Cable 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	25.66	V	0.9	0.0	24.76	38.5	-13.7	
824.20	8.25	H	0.9	0.0	7.35	38.5	-31.1	
Mid Ch								
836.60	25.56	V	0.9	0.0	24.66	38.5	-13.8	
836.60	8.38	H	0.9	0.0	7.48	38.5	-31.0	
High Ch								
848.80	25.48	V	0.9	0.0	24.58	38.5	-13.9	
848.80	8.01	H	0.9	0.0	7.11	38.5	-31.3	
Rev. 3.17.11								
Note: For Band 13/17 ERP limit is 34.77dBm; For Band 26 limit is 50dBm								

Band GSM 850 GPRS	High Frequency Substitution Measurement UL Verification Services, Inc. Chamber B								
	Company:		Sony						
	Project #:		15I20736						
	Date:		05/11/15						
	Test Engineer:		David Mun						
	Configuration:		EUT Z-Position						
	Mode:		GPRS850						
	Test Equipment:								
	Receiving: Hybrid T243, and Chamber B N-type Cable								
	Substitution: Dipole T273, 8ft SMA Cable 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	30.64	V	0.9	0.0	29.74	38.5	-8.7		
824.20	13.02	H	0.9	0.0	12.12	38.5	-26.3		
Mid Ch									
836.60	30.10	V	0.9	0.0	29.20	38.5	-9.2		
836.60	12.81	H	0.9	0.0	11.91	38.5	-26.5		
High Ch									
848.80	30.23	V	0.9	0.0	29.33	38.5	-9.1		
848.80	12.39	H	0.9	0.0	11.49	38.5	-27.0		
Rev. 3.17.11 Note: For Band 13/17 ERP limit is 34.77dBm; For Band 26 limit is 50dBm									

11.2. FIELD STRENGTH OF SPURIOUS RADIATION**RULE PART(S)**

FCC: §2.1053, §22.917, §24.238, §27.53 and §90.691

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.

MODES TESTED

GSM 850, GSM 1900, WCDMA Band 2, WCDMA Band 5, LTE Band 41

<p style="text-align: center;">UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement</p> <p>Company: Samsung Project #: 15I20736 Date: 5/16/2015 Test Engineer: Charles Vergonio Configuration: EUT/ AC Charger/ Headset Location: Chamber B Mode: LTE_16QAM Band 5 Harmonics, 1.4MHz Bandwidth</p>									
f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Band									
Low Ch, 824.7									
1649.40	-27.5	V	3.0	37.0	1.0	-63.5	-13.0	-50.5	
2474.10	-22.9	V	3.0	36.4	1.0	-58.3	-13.0	-45.3	
3298.80	-20.4	V	3.0	36.2	1.0	-55.6	-13.0	-42.6	
1649.40	-27.1	H	3.0	37.0	1.0	-63.1	-13.0	-50.1	
2474.10	-24.5	H	3.0	36.4	1.0	-59.9	-13.0	-46.9	
3298.80	-20.2	H	3.0	36.2	1.0	-55.3	-13.0	-42.3	
Mid Ch, 836.5									
1673.00	-27.0	V	3.0	37.0	1.0	-63.0	-13.0	-50.0	
2509.50	-22.7	V	3.0	36.4	1.0	-58.1	-13.0	-45.1	
3346.00	-20.4	V	3.0	36.1	1.0	-55.5	-13.0	-42.5	
1673.00	-27.0	H	3.0	37.0	1.0	-63.0	-13.0	-50.0	
2509.50	-24.4	H	3.0	36.4	1.0	-59.8	-13.0	-46.8	
3346.00	-20.4	H	3.0	36.1	1.0	-55.5	-13.0	-42.5	
High Ch, 848.3									
1696.60	-26.8	V	3.0	37.0	1.0	-62.7	-13.0	-49.7	
2544.90	-22.4	V	3.0	36.4	1.0	-57.8	-13.0	-44.8	
3393.20	-20.4	V	3.0	36.1	1.0	-55.4	-13.0	-42.4	
1696.60	-26.8	H	3.0	37.0	1.0	-62.8	-13.0	-49.8	
2544.90	-24.2	H	3.0	36.4	1.0	-59.6	-13.0	-46.6	
3393.20	-20.0	H	3.0	36.1	1.0	-55.1	-13.0	-42.1	

WCDMA

<p style="text-align: center;">UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement</p> <p>Company: Samsung Project #: 15I20736 Date: 5/16/2015 Test Engineer: Charles Vergonio Configuration: EUT only Location: Chamber B Mode: HSDPA Band 2 Harmonics</p>									
f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamplifier (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 1852.4									
3704.80	-13.2	V	3.0	35.9	1.0	-48.1	-13.0	-35.1	
5557.20	-7.7	V	3.0	35.5	1.0	-42.2	-13.0	-29.2	
7409.60	-7.2	V	3.0	35.7	1.0	-42.0	-13.0	-29.0	
Band 2									
3704.80	-12.2	H	3.0	35.9	1.0	-47.1	-13.0	-34.1	
5557.20	-7.7	H	3.0	35.5	1.0	-42.1	-13.0	-29.1	
7409.60	-7.3	H	3.0	35.7	1.0	-42.1	-13.0	-29.1	
HSDPA									
Mid Ch, 1880									
3760.00	-13.1	V	3.0	35.8	1.0	-47.9	-13.0	-34.9	
5640.00	-9.0	V	3.0	35.5	1.0	-43.4	-13.0	-30.4	
7520.00	-7.2	V	3.0	35.7	1.0	-41.9	-13.0	-28.9	
3760.00	-12.3	H	3.0	35.8	1.0	-47.1	-13.0	-34.1	
5640.00	-7.2	H	3.0	35.5	1.0	-41.6	-13.0	-28.6	
7520.00	-7.1	H	3.0	35.7	1.0	-41.8	-13.0	-28.8	
High Ch, 1907.6									
3815.20	-12.8	V	3.0	35.8	1.0	-47.6	-13.0	-34.6	
5722.80	-5.9	V	3.0	35.5	1.0	-40.4	-13.0	-27.4	
7630.40	-6.7	V	3.0	35.8	1.0	-41.4	-13.0	-28.4	
3815.20	-11.9	H	3.0	35.8	1.0	-46.7	-13.0	-33.7	
5722.80	-6.9	H	3.0	35.5	1.0	-41.4	-13.0	-28.4	
7630.40	-6.1	H	3.0	35.8	1.0	-40.9	-13.0	-27.9	

UL Verification Services, Inc.									
Above 1GHz High Frequency Substitution Measurement									
Company:		Samsung							
Project #:		15120736							
Date:		5/16/2015							
Test Engineer:		Charles Vergonio							
Configuration:		EUT only							
Location:		Chamber B							
Mode:		Rel99 Band 2 Harmonics							
f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 1852.4									
3704.80	-13.2	V	3.0	35.9	1.0	-48.0	-13.0	-35.0	
5557.20	-7.5	V	3.0	35.5	1.0	-42.0	-13.0	-29.0	
7409.60	-7.4	V	3.0	35.7	1.0	-42.2	-13.0	-29.2	
3704.80	-12.5	H	3.0	35.9	1.0	-47.4	-13.0	-34.4	
5557.20	-7.4	H	3.0	35.5	1.0	-41.9	-13.0	-28.9	
7409.60	-7.3	H	3.0	35.7	1.0	-42.0	-13.0	-29.0	
Mid Ch, 1880									
3760.00	-12.9	V	3.0	35.8	1.0	-47.8	-13.0	-34.8	
5640.00	-7.1	V	3.0	35.5	1.0	-41.6	-13.0	-28.6	
7520.00	-7.3	V	3.0	35.7	1.0	-42.1	-13.0	-29.1	
3760.00	-12.4	H	3.0	35.8	1.0	-47.2	-13.0	-34.2	
5640.00	-7.3	H	3.0	35.5	1.0	-41.8	-13.0	-28.8	
7520.00	-8.1	H	3.0	35.7	1.0	-42.9	-13.0	-29.9	
High Ch, 1907.6									
3815.20	-13.2	V	3.0	35.8	1.0	-48.0	-13.0	-35.0	
5722.80	-6.9	V	3.0	35.5	1.0	-41.4	-13.0	-28.4	
7630.40	-7.1	V	3.0	35.8	1.0	-41.9	-13.0	-28.9	
3815.20	-12.1	H	3.0	35.8	1.0	-46.9	-13.0	-33.9	
5722.80	-7.3	H	3.0	35.5	1.0	-41.8	-13.0	-28.8	
7630.40	-7.1	H	3.0	35.8	1.0	-41.8	-13.0	-28.8	

GSM

<p style="text-align: center;">UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement</p> <p>Company: Samsung Project #: 15I20736 Date: 5/16/2015 Test Engineer: Charles Vergonio Configuration: EUT only Location: Chamber B Mode: EGPRS 1900 MHz Harmonics</p>									
f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamplifier (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 1850.2									
3700.40	-10.6	V	3.0	35.9	1.0	-45.4	-13.0	-32.4	
5550.60	-5.7	V	3.0	35.5	1.0	-40.2	-13.0	-27.2	
7400.80	-8.4	V	3.0	35.7	1.0	-43.1	-13.0	-30.1	
GSM 1900									
3700.40	-10.4	H	3.0	35.9	1.0	-45.2	-13.0	-32.2	
5550.60	-5.4	H	3.0	35.5	1.0	-39.9	-13.0	-26.9	
7400.80	-6.0	H	3.0	35.7	1.0	-40.7	-13.0	-27.7	
EGPRS									
Mid Ch, 1880									
3760.00	-10.4	V	3.0	35.8	1.0	-45.2	-13.0	-32.2	
5640.00	-5.9	V	3.0	35.5	1.0	-40.4	-13.0	-27.4	
7520.00	-4.2	V	3.0	35.7	1.0	-39.0	-13.0	-26.0	
3760.00	-11.5	H	3.0	35.8	1.0	-46.3	-13.0	-33.3	
5640.00	-5.5	H	3.0	35.5	1.0	-40.0	-13.0	-27.0	
7520.00	-2.8	H	3.0	35.7	1.0	-37.5	-13.0	-24.5	
High Ch, 1909.8									
3819.60	-10.2	V	3.0	35.8	1.0	-45.0	-13.0	-32.0	
5729.40	-5.8	V	3.0	35.5	1.0	-40.3	-13.0	-27.3	
7639.20	-6.8	V	3.0	35.8	1.0	-41.6	-13.0	-28.6	
3819.60	-10.3	H	3.0	35.8	1.0	-45.0	-13.0	-32.0	
5729.40	-5.0	H	3.0	35.5	1.0	-39.5	-13.0	-26.5	
7639.20	-4.2	H	3.0	35.8	1.0	-39.0	-13.0	-26.0	

