



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

CERTIFICATION TEST REPORT

GSM/WCDMA/LTE PHONE + BLUETOOTH and WLAN 2.4GHz b/g/n

MODEL NUMBER: SM-J110F, SM-J110F/DS, and SM-J110G/DS

FCC ID: A3LSMJ110F

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: SAMSUNG ELECTRONICS CO., LTD.
EUT DESCRIPTION: GSM/WCDMA/LTE Phone + Bluetooth and WLAN 2.4GHz b/g/n
MODEL: SM-J110F , SM-J110F/DS, and SM-J110G/DS
SERIAL NUMBER: 2152667
DATE TESTED: JUNE 29 – JULY 9, 2015

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
FCC PART 22H and 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 and 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:

$$\text{EIRP} = \text{PSA reading with EUT worst orientation (dBm)} + \text{Path loss (dB)} - \text{cable loss (dB)}$$

between the SG and substitution antenna) + Substitution Antenna Factor (dBi)

$$\text{ERP} = \text{PSA reading with EUT worst orientation (dBm)} + \text{Path loss (dB)} - \text{cable loss (dB)}$$

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 18000 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 and WLAN 2.4GHz b/g/n

5.2. MAXIMUM OUTPUT POWER

FCC Part 22/24						
Band	Frequency Range(MHz)	Modulation	Conducted		Radiated	
			AVG(dBm)	AVG(mW)	AVG(dBm)	AVG(mW)
GSM850	824~849	GMSK	31.8	1513.56		
	824~849	GPRS	31.8	1513.56	29.049	803.34
	824~849	EGPRS	27.6	575.44	24.221	264.3
GSM1900	1850~1910	GMSK	29.9	977.24		
	1850~1910	GPRS	29.9	977.24	32.538	1793.91
	1850~1910	EGPRS	25.4	346.74	28.65	732.82
Band 5	824~849	REL99	22.7	186.21	19.221	83.58
	824~849	HSDPA	22.6	181.97	19.171	82.62
	824~849	HSUPA	22.5	177.83		

5.3. MAXIMUM OUTPUT POWER (LTE)

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

FCC Part 22/24							
Band	Frequency Range(MHz)	BandWidth (MHz)	Modulation	Conducted		Radiated	
				AVG(dBm)	AVG(mW)	AVG(dBm)	AVG(mW)
LTE5	824~849	10MHz	QPSK	22.2	165.96	18.27	67.14
			16QAM	21.79	151.01	17.62	57.81
		5MHz	QPSK	22.25	167.88	18.30	67.61
			16QAM	21.63	145.55	17.65	58.21
		3MHz	QPSK	22.23	167.11	18.72	74.47
			16QAM	21.78	150.66	17.76	59.70
		1.4MHz	QPSK	22.18	165.20	18.70	74.13
			16QAM	21.84	152.76	17.74	59.43

5.4. DESCRIPTION OF AVAILABLE ANTENNAS

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

Frequency (MHz)	Peak Gain (dBi)
GSM1900, 1850~1910MHz	0.03
Band 5, 824~849MHz	-0.77

5.5. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
AC Adapter	Samsung	ETA810EBE	N/A	N/A
Earphone	Samsung	N/A	N/A	N/A

I/O CABLES (CONDUCTED SETUP)

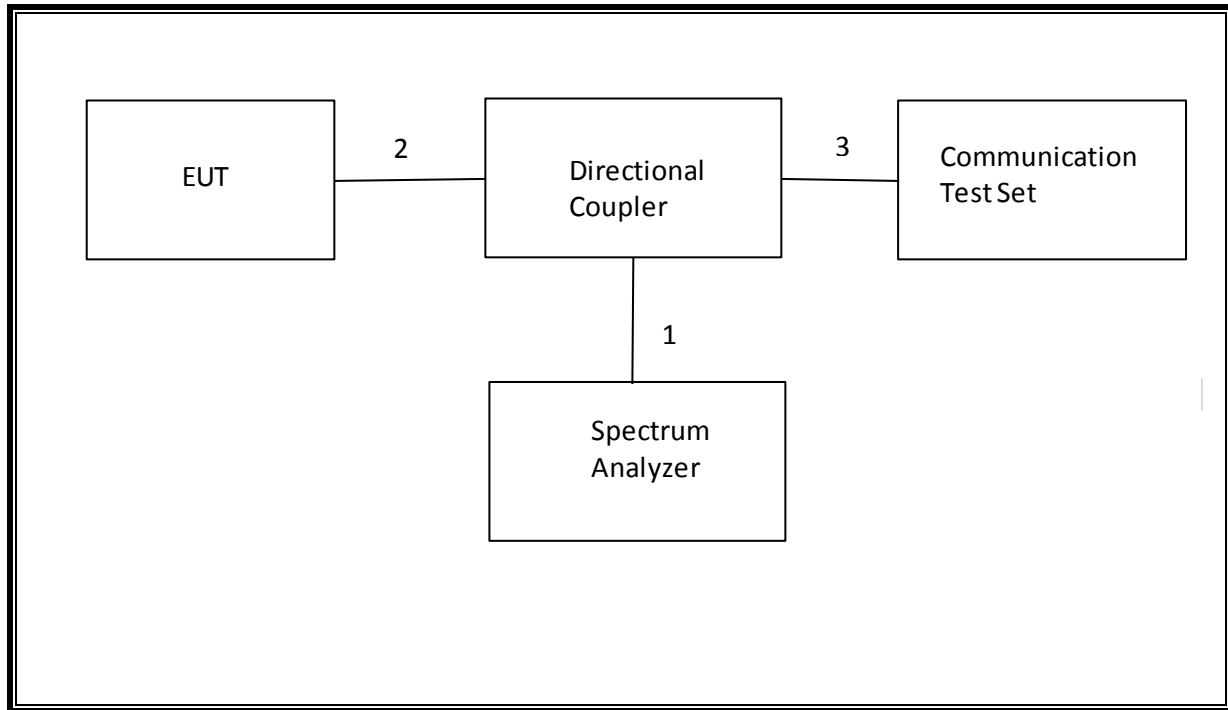
I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	RF Out	1	Spectrum Analyzer	Shielded	None	NA
2	Antenna Port	1	EUT	Shielded	0.1m	NA
3	RF In/Out	1	Communication Test Set	Shielded	1m	NA

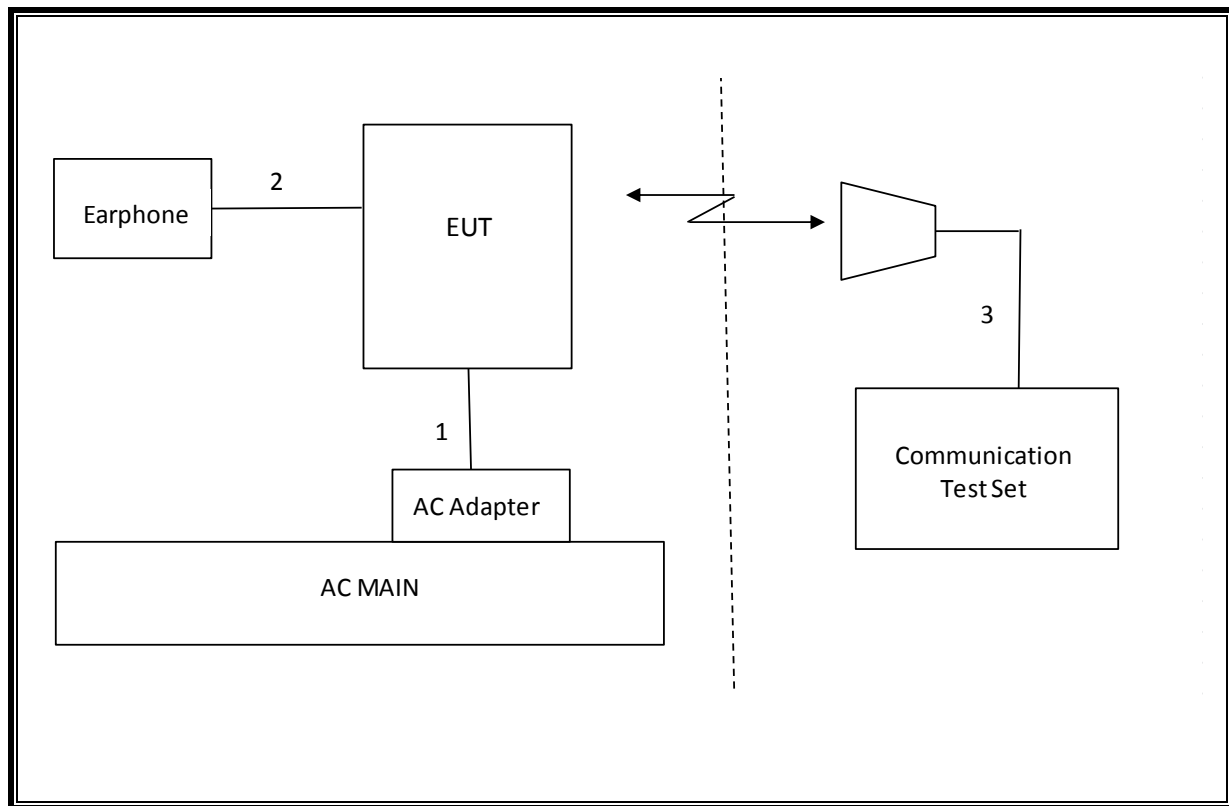
I/O CABLES (RADIATED SETUP)

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	02/26/16
Antenna, Bilog, 2 GHz	Sunol Sciences	JB1	C01011	08/14/15
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	01/09/16
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	07/06/16
Antenna, Tuned Dipole 400~1000	ETS	3121C DB4	C00993	02/14/16
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

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	9 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	-13.76 dBm
2.1046	N/A	Conducted output power	N/A		Pass	31.8 dBm
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	0.005 PPM
22.913(a)(2)	RSS-132(4.4)	Effective Radiated Power	38 dBm	Radiated	Pass	29.1 dBm
24.232(c) 27.50(h)(2)	RSS-133(6.4) RSS-199(4.4)	Equivalent Isotropic Radiated Power	33dBm		Pass	32.5 dBm
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	-43.9 dBm

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

Mode	Coding Scheme	Time Slots	Ch No.	Freq. (MHz)	Burst Pwr (dBm)
GSM (Voice)	CS1	1	128	824.2	31.8
			190	836.6	31.8
			251	848.8	31.8
GPRS (GMSK)	CS1	1	128	824.2	31.8
			190	836.6	31.8
			251	848.8	31.8
EGPRS (8PSK)	MCS5	1	128	824.2	27.3
			190	836.6	27.5
			251	848.8	27.6

Note: Above conducted power are the worst cases for each mode.

Mode	Coding Scheme	Time Slots	Ch No.	Freq. (MHz)	Burst Pwr (dBm)
GSM (Voice)	CS1	1	512	1850.2	29.8
			661	1880.0	29.9
			810	1909.8	29.8
GPRS (GMSK)	CS1	1	512	1850.2	29.8
			661	1880.0	29.9
			810	1909.8	29.8
EGPRS (8PSK)	MCS5	1	512	1850.2	25.0
			661	1880.0	25.3
			810	1909.8	25.4

Note: Above conducted power are the worst cases for each mode.

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	UL Ch No.	Freq. (MHz)	MPR	Avg Pwr (dBm)
W-CDMA Band V	Rel 99 (RMC, 12.2 kbps)	4132	826.4	0	22.7
		4183	836.6	0	22.7
		4233	846.6	0	22.6

8.3. UMTS HSDPA

TEST PROCEDURE

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

	Mode	Rel5 HSDPA			
	Subtest	1	2	3	4
WCDMA General Settings	Loopback Mode	Test Mode 1			
	Rel99 RMC	12.2kbps RMC			
	HSDPA FRC	H-Set1			
	Power Control Algorithm	Algorithm 2			
	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	UL Ch No.	Freq. (MHz)	MPR	Avg Pwr (dBm)
W-CDMA Band V	Subtest 1	4132	826.4	0	22.3
		4183	836.6	0	22.6
		4233	846.6	0	22.5
	Subtest 2	4132	826.4	0	22.3
		4183	836.6	0	22.6
		4233	846.6	0	22.5
	Subtest 3	4132	826.4	0.5	21.4
		4183	836.6	0.5	21.8
		4233	846.6	0.5	21.7
	Subtest 4	4132	826.4	0.5	21.4
		4183	836.6	0.5	21.8
		4233	846.6	0.5	21.7

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
HSDPA Specific Settings	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
	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				
HSUPA Specific Settings	$A_{hs} = \beta_{hs}/\beta_c$	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	UL Ch No.	Freq. (MHz)	MPR	Avg Pwr (dBm)
W-CDMA Band V	Subtest 1	4132	826.4	0	22.2
		4183	836.6	0	22.5
		4233	846.6	0	22.5
	Subtest 2	4132	826.4	2	21.0
		4183	836.6	2	21.0
		4233	846.6	2	21.0
	Subtest 3	4132	826.4	1	21.9
		4183	836.6	1	22.0
		4233	846.6	1	22.0
	Subtest 4	4132	826.4	2	21.0
		4183	836.6	2	21.0
		4233	846.6	2	21.0
	Subtest 5	4132	826.4	0	22.2
		4183	836.6	0	22.5
		4233	846.6	0	22.5

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	22.10	22.20	22.18
			1	25	0	22.11	22.15	22.07
			1	49	0	22.17	22.16	22.01
			25	0	1	20.15	20.15	20.11
			25	12	1	20.11	20.14	20.03
			25	25	1	20.13	20.13	20.04
			50	0	1	20.11	20.10	20.02
		16QAM	1	0	1	21.39	21.42	21.79
			1	25	1	21.42	21.33	21.70
			1	49	1	21.35	21.36	21.64
			25	0	2	19.26	19.32	19.28
			25	12	2	19.26	19.31	19.22
			25	25	2	19.30	19.29	19.19
			50	0	2	19.19	19.25	19.15
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	22.18	22.25	22.13
			1	12	0	22.20	22.24	22.09
			1	24	0	22.23	22.23	22.01
			12	0	1	20.15	20.15	20.07
			12	7	1	20.17	20.16	20.03
			12	13	1	20.17	20.19	20.01
			25	0	1	20.16	20.18	20.01
		16QAM	1	0	1	21.41	21.63	21.47
			1	12	1	21.45	21.62	21.37
			1	24	1	21.51	21.64	21.38
			12	0	2	19.28	19.46	19.22
			12	7	2	19.29	19.47	19.23
			12	13	2	19.32	19.48	19.22
			25	0	2	19.22	19.36	19.20

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	22.09	22.23	22.00
			1	8	0	22.07	22.16	22.00
			1	14	0	22.11	22.21	21.92
			8	0	1	20.26	20.30	20.15
			8	4	1	20.24	20.31	20.17
			8	7	1	20.26	20.32	20.15
			15	0	1	20.13	20.17	20.00
		16QAM	1	0	1	21.34	21.78	21.40
			1	8	1	21.32	21.78	21.34
			1	14	1	21.38	21.83	21.29
			8	0	2	19.40	19.32	19.60
			8	4	2	19.41	19.34	19.58
			8	7	2	19.41	19.32	19.55
			15	0	2	19.27	19.39	19.18
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	22.13	22.18	21.96
			1	3	0	22.09	22.16	21.97
			1	5	0	22.12	22.22	21.94
			3	0	0	22.19	22.26	22.12
			3	1	0	22.19	22.27	22.11
			3	3	0	22.19	22.26	22.10
			6	0	1	20.26	20.32	20.14
		16QAM	1	0	1	21.68	21.84	21.35
			1	3	1	21.68	21.76	21.30
			1	5	1	21.73	21.83	21.35
			3	0	1	21.34	21.42	21.42
			3	1	1	21.34	21.38	21.43
			3	3	1	21.36	21.40	21.36
			6	0	2	19.50	19.37	19.52

9. PEAK TO AVERAGE RATIO

Test Procedure

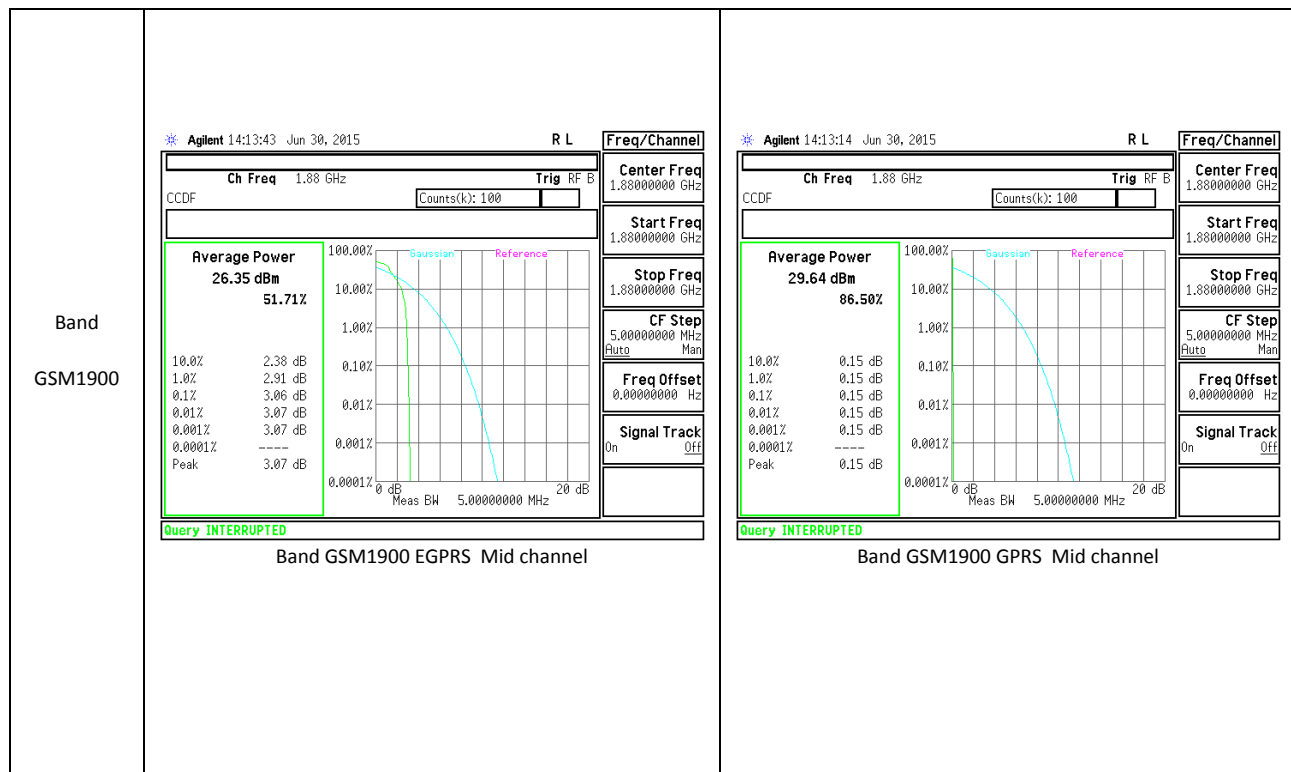
Per KDB 971168 D01 Power Meas License Digital Systems v02r02

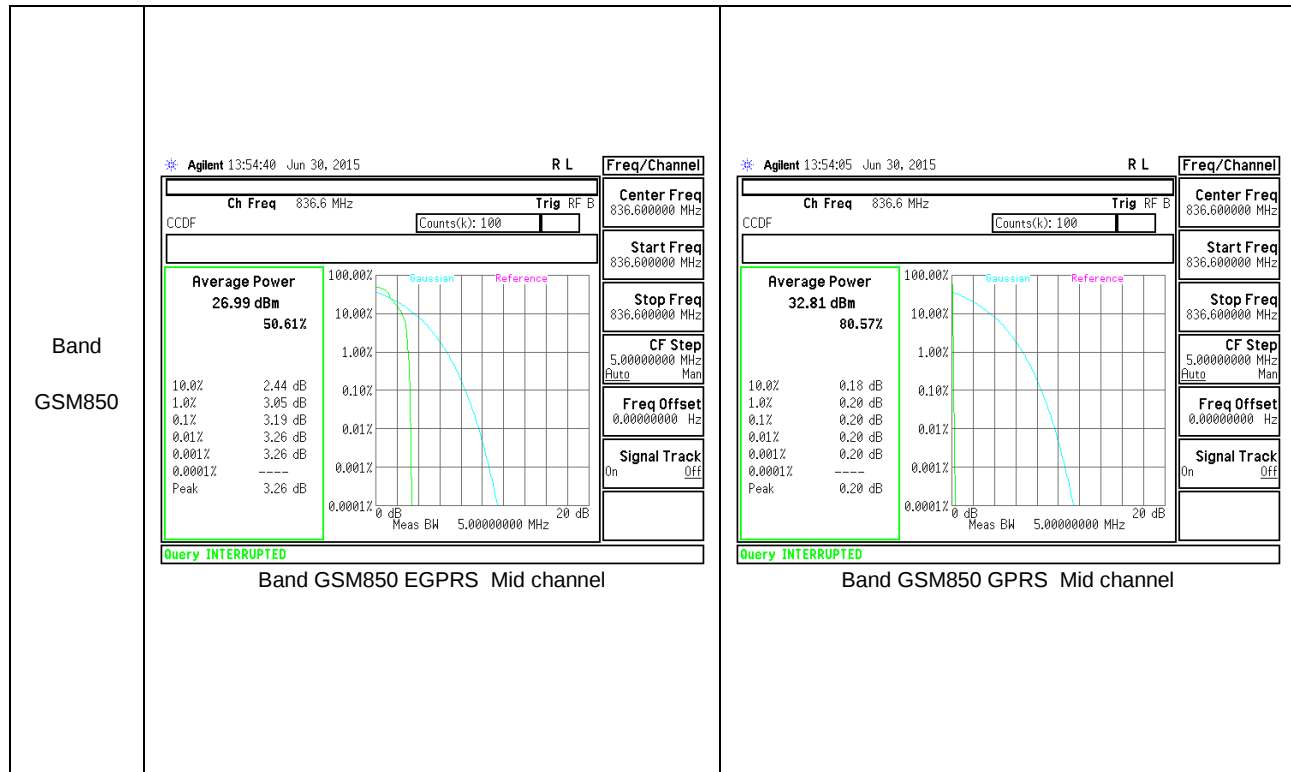
Test Spec

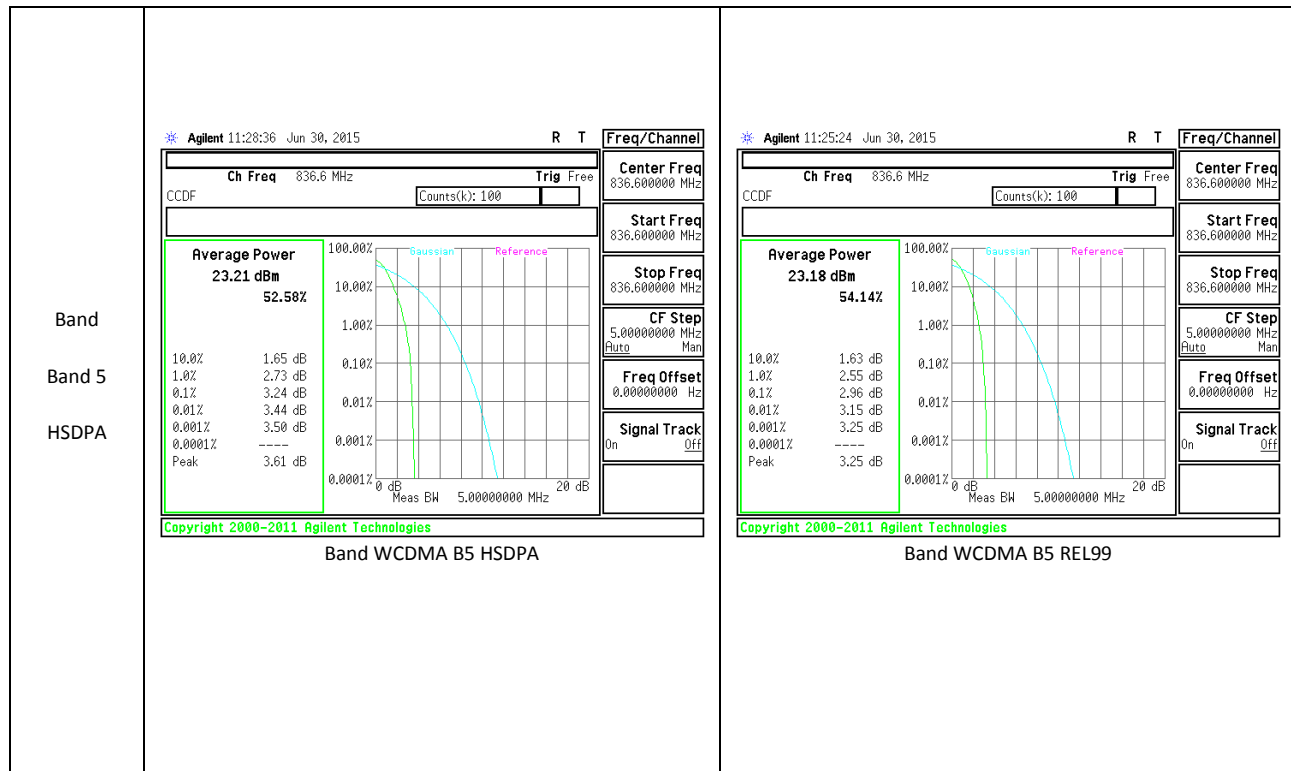
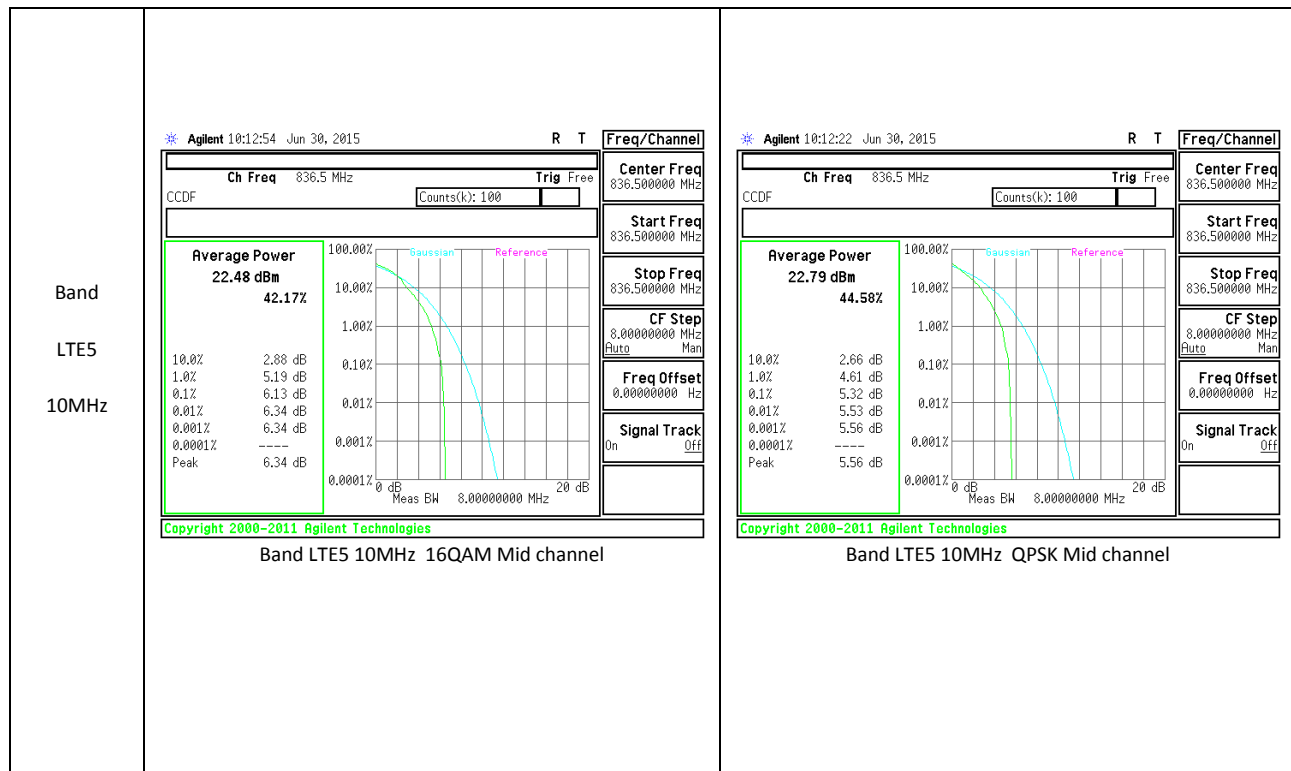
In addition, when the transmitter power is measured in terms of average value, the peak-to-average ratio of the power shall not exceed 13 dB.

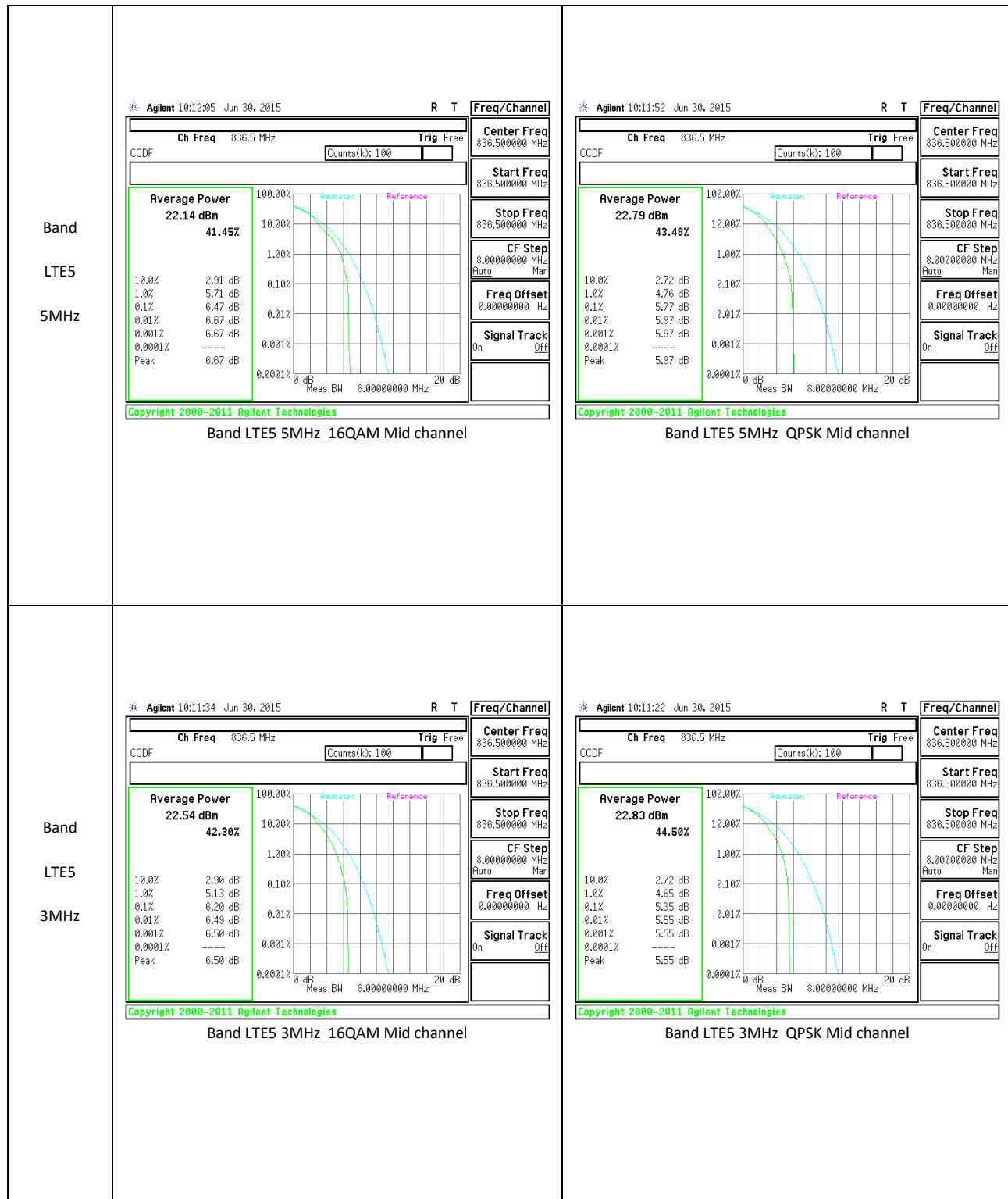
9.1. CONDUCTED PEAK TO AVERAGE RESULT

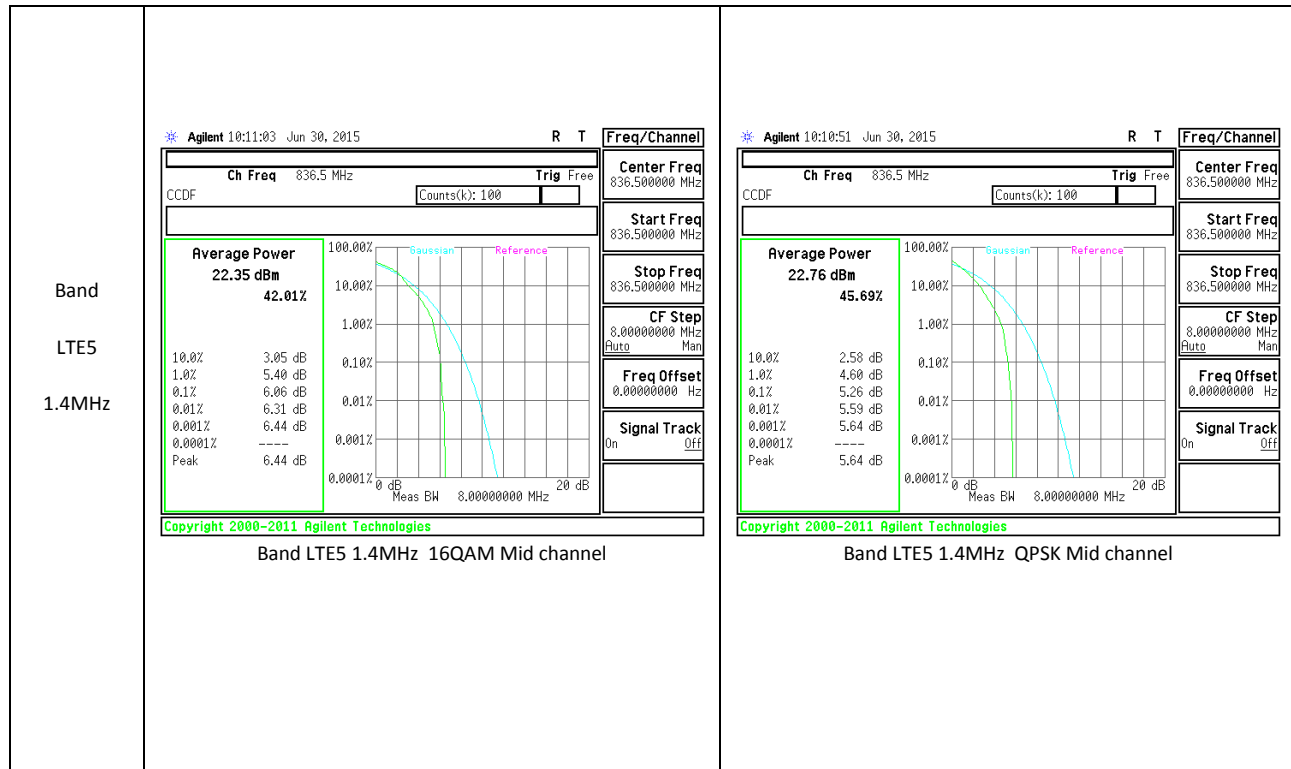
GSM





WCDMA**LTE Band 5**





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

10.1.1. OCCUPIED BANDWIDTH RESULTS**GSM**

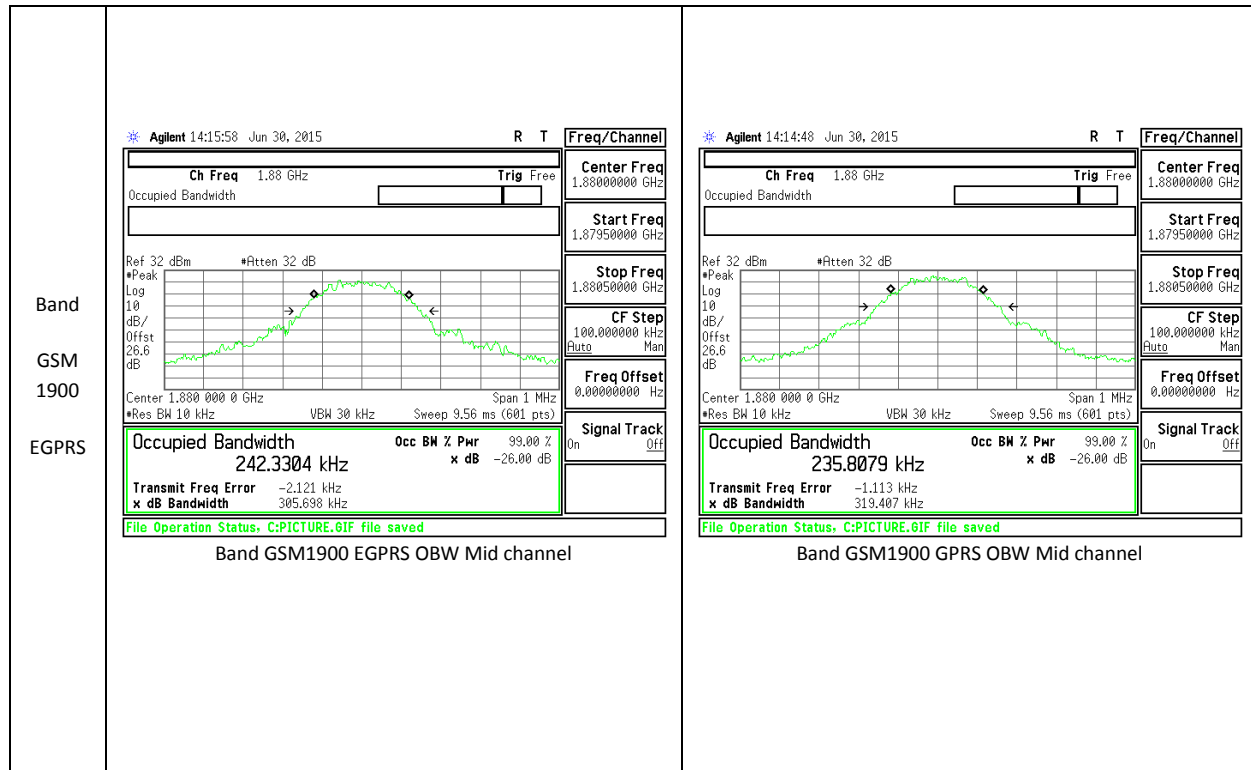
Band	Mode	Channel	f (MHz)	99% BW (kHz)	-26dB (kHz)
GSM 850	GPRS	128	824.2	252.3	317.3
		190	836.6	248.9	316.2
		251	848.8	239.3	309.8
	EGPRS	128	824.2	242.4	318.8
		190	836.6	259.2	329
		251	848.8	246.5	317.2
GSM 1900	GPRS	512	1850.2	246	311.2
		661	1880	235.8	319.4
		810	1909.8	243.5	312.7
	EGPRS	512	1850.2	240.6	307.3
		661	1880	242.3	305.7
		810	1909.8	248.6	317.3

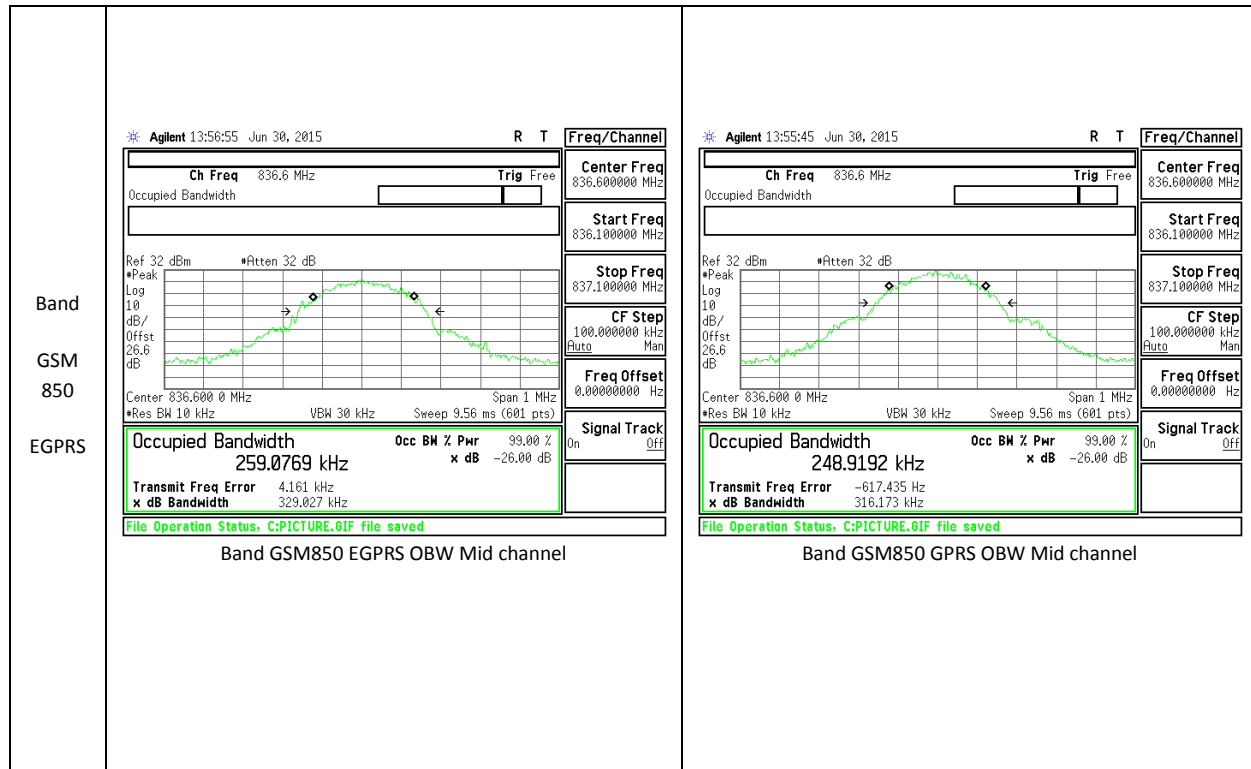
WCDMA

Band	Mode	Channel	f (MHz)	99% BW (MHz)	-26dB (MHz)
Band 5	REL99	4132	826.4	4.104	4.693
		4183	836.6	4.133	4.71
		4233	846.6	4.119	4.689
	HSDPA	4132	826.4	4.11	4.679
		4183	836.6	4.145	4.691
		4233	846.6	4.273	4.689

10.1.2. LTE OCCUPIED BANDWIDTH RESULTS**LTE Band 5**

Band	BW(MHz)	Mode	RB/RB Size	f (MHz)	99% BW (MHz)	-26dB BW (MHz)
LTE5	10	16QAM	50/0	829	8.945	10.14
			50/0	836.5	9.007	10.36
			50/0	844	8.984	10.41
		QPSK	50/0	829	8.982	10.46
			50/0	836.5	9.004	10.2
			50/0	844	8.967	10.24
	5	16QAM	25/0	826.5	4.505	5.149
			25/0	836.5	4.5	5.054
			25/0	846.5	4.518	5.238
		QPSK	25/0	826.5	4.495	5.003
			25/0	836.5	4.503	5.029
			25/0	846.5	4.5	5.092
	3	16QAM	15/0	825.5	2.696	3.119
			15/0	836.5	2.689	3.123
			15/0	847.5	2.696	3.024
		QPSK	15/0	825.5	2.693	3.070
			15/0	836.5	2.695	3.135
			15/0	847.5	2.690	3.056
	1.4	16QAM	6/0	824.7	1.112	1.428
			6/0	836.5	1.085	1.358
			6/0	848.3	1.092	1.381
		QPSK	6/0	824.7	1.092	1.366
			6/0	836.5	1.092	1.398
			6/0	848.3	1.085	1.356

10.1.1. OCCUPIED BANDWIDTH PLOTS**GSM**



WCDMA

Band LTE5 5MHz 16QAM	Agilent 10:14:28 Jun 30, 2015 R T Ch Freq 836.5 MHz Trig Free Center Freq 836.500000 MHz Start Freq 832.750000 MHz Stop Freq 840.250000 MHz CF Step 750.000000 kHz Auto Man Freq Offset 0.00000000 Hz Signal Track On Off Ref 30 dBm •Atten 30 dB Peak Log 10 dB/ Offst 16.6 dB Center 836.500 0 MHz Span 7.5 MHz Res BW 75 kHz VBW 220 kHz Sweep 1.28 ms (601 pts) Occupied Bandwidth 4.4995 MHz Transmit Freq Error -6.533 kHz x dB Bandwidth 5.054 MHz Occ BW % Pwr 99.00 % x dB -26.00 dB File Operation Status: C:PICTURE.GIF file saved Band LTE5 5MHz OBW 16QAM Mid Channel FRB.gif
Band Band 5 HSDPA	Agilent 11:33:25 Jun 30, 2015 R T Ch Freq 836.6 MHz Trig Free Center Freq 836.600000 MHz Start Freq 831.600000 MHz Stop Freq 841.600000 MHz CF Step 1.00000000 MHz Auto Man Freq Offset 0.00000000 Hz Signal Track On Off Ref 40 dBm •Atten 40 dB Peak Log 10 dB/ Offst 16.6 dB Start 831.600 MHz Stop 841.600 MHz Res BW 51 kHz VBW 150 kHz Sweep 3.68 ms (601 pts) Occupied Bandwidth 4.1453 MHz Transmit Freq Error -12.696 kHz x dB Bandwidth 4.691 MHz Occ BW % Pwr 99.00 % x dB -26.00 dB File Operation Status: C:PICTURE.GIF file saved Band WCDMA B5 HSDPA OBW
	Agilent 10:14:10 Jun 30, 2015 R T Ch Freq 836.5 MHz Trig Free Center Freq 836.500000 MHz Start Freq 832.750000 MHz Stop Freq 840.250000 MHz CF Step 750.000000 kHz Auto Man Freq Offset 0.00000000 Hz Signal Track On Off Ref 30 dBm •Atten 30 dB Peak Log 10 dB/ Offst 16.6 dB Center 836.500 0 MHz Span 7.5 MHz Res BW 75 kHz VBW 220 kHz Sweep 1.28 ms (601 pts) Occupied Bandwidth 4.5038 MHz Transmit Freq Error -1.870 kHz x dB Bandwidth 5.029 MHz Occ BW % Pwr 99.00 % x dB -26.00 dB File Operation Status: C:PICTURE.GIF file saved Band LTE5 5MHz OBW QPSK Mid Channel FRB.gif
	Agilent 11:31:31 Jun 30, 2015 R T Ch Freq 836.6 MHz Trig Free Center Freq 836.600000 MHz Start Freq 831.600000 MHz Stop Freq 841.600000 MHz CF Step 1.00000000 MHz Auto Man Freq Offset 0.00000000 Hz Signal Track On Off Ref 40 dBm •Atten 40 dB Peak Log 10 dB/ Offst 16.6 dB Start 831.600 MHz Stop 841.600 MHz Res BW 51 kHz VBW 150 kHz Sweep 3.68 ms (601 pts) Occupied Bandwidth 4.1342 MHz Transmit Freq Error -5.463 kHz x dB Bandwidth 4.710 MHz Occ BW % Pwr 99.00 % x dB -26.00 dB File Operation Status: C:PICTURE.GIF file saved Band WCDMA B5 REL99 OBW

LTE Band 5



10.2. BAND EDGE EMISSIONS

RULE PART(S)

FCC: §22.359 and §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

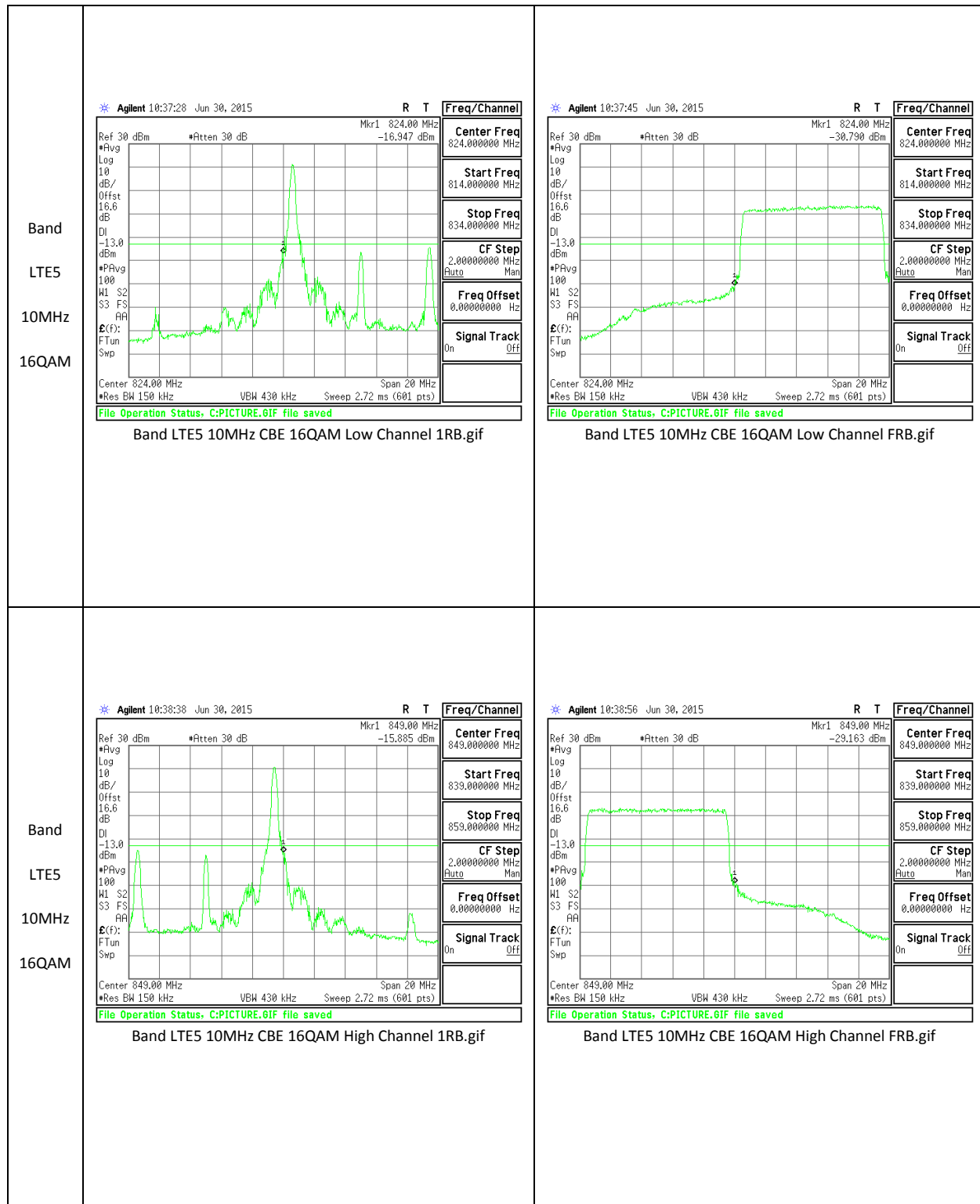
Per KDB 971168 D01 Power Meas License Digital Systems v02r02

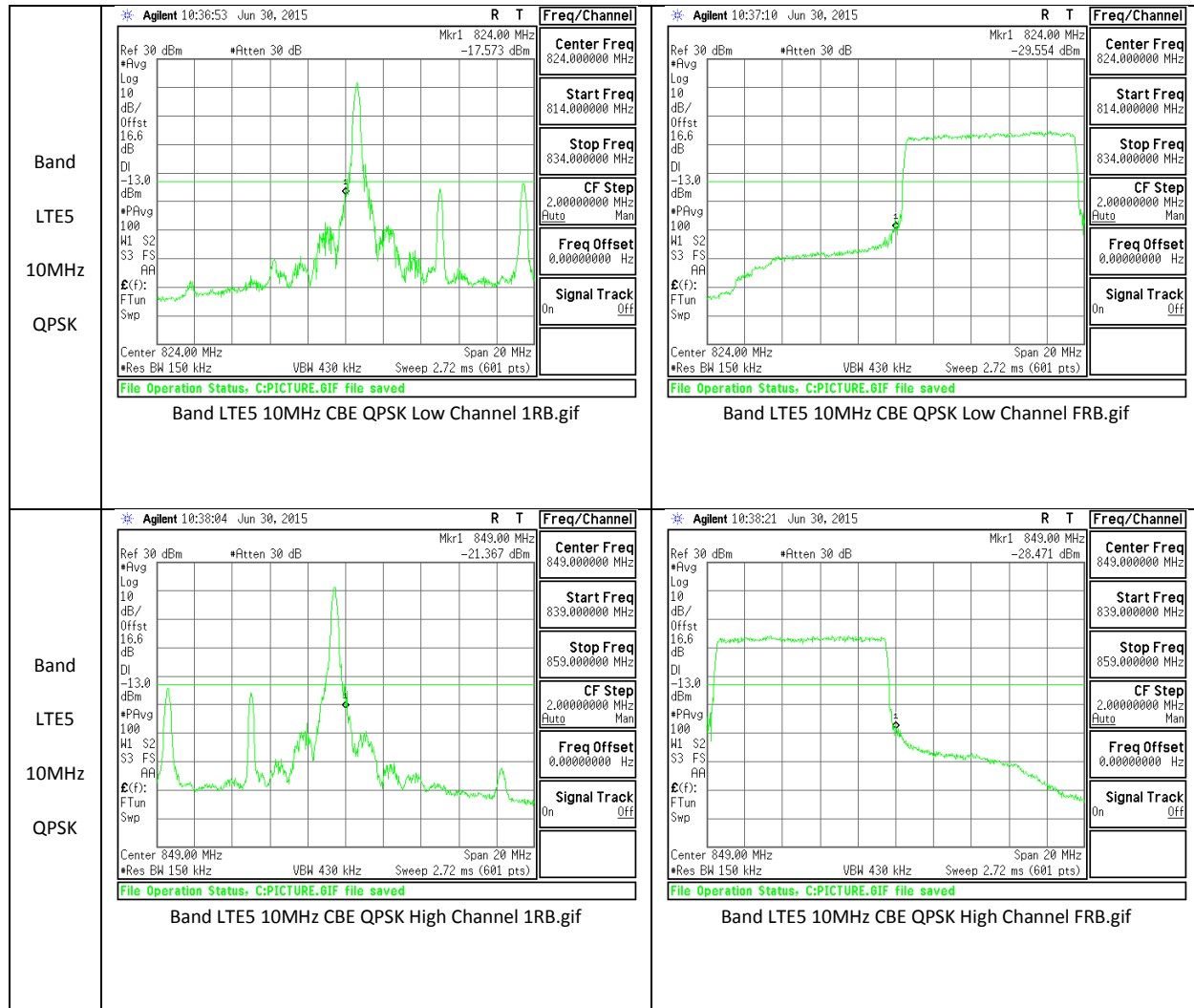
The transmitter output was connected to an Agilent 8960 or a CMW500 Test Set and configured to operate at maximum power. The band edge emissions were measured at the required operating frequencies in each band on the Spectrum Analyzer.

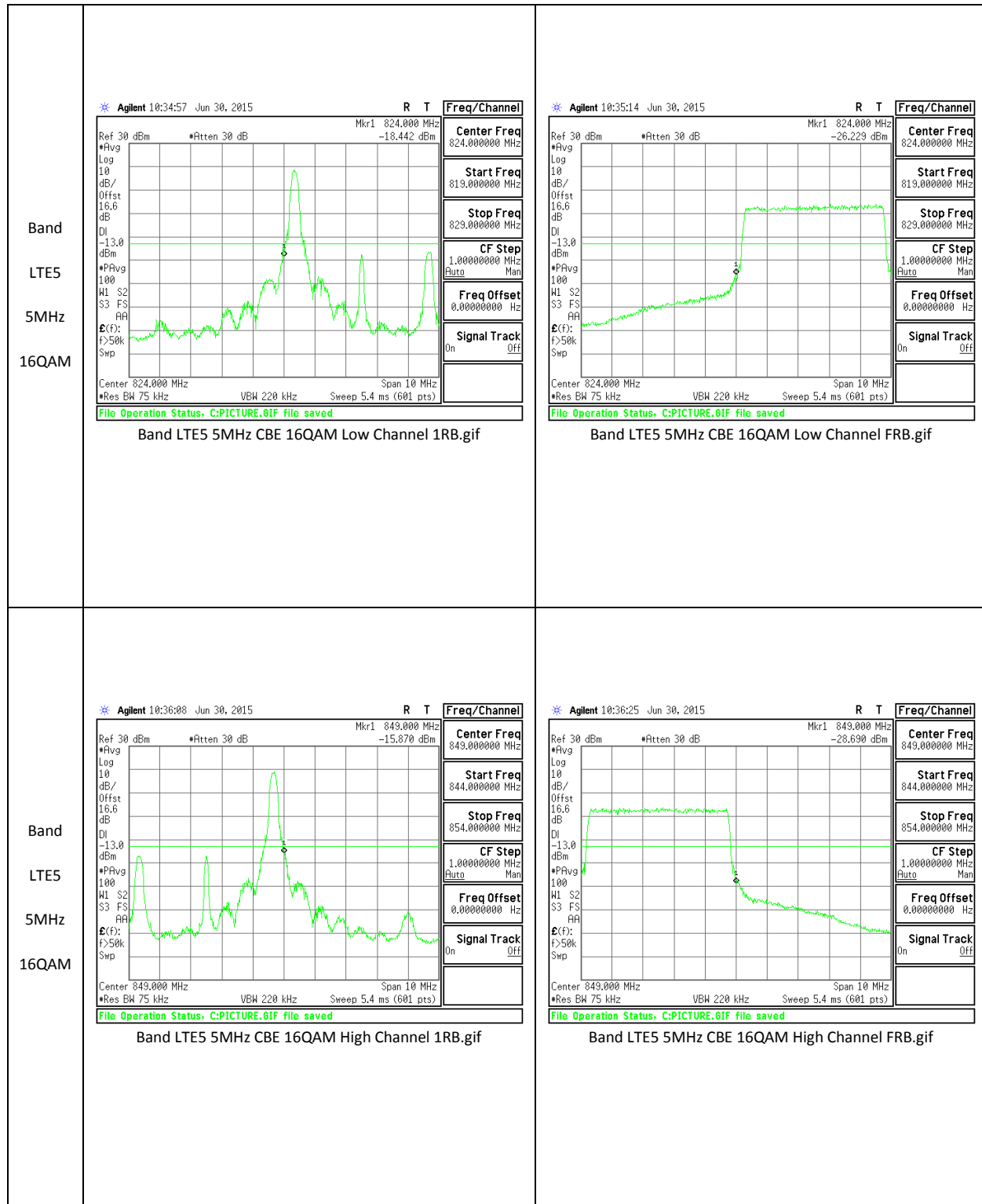
1. Change the center frequency as shown in the table above
2. Set the span to clearly show Lower & Upper frequencies + 1MHz
3. Open screen capture application for PXA/PSA.
4. Load emission mask file
5. Press Run.

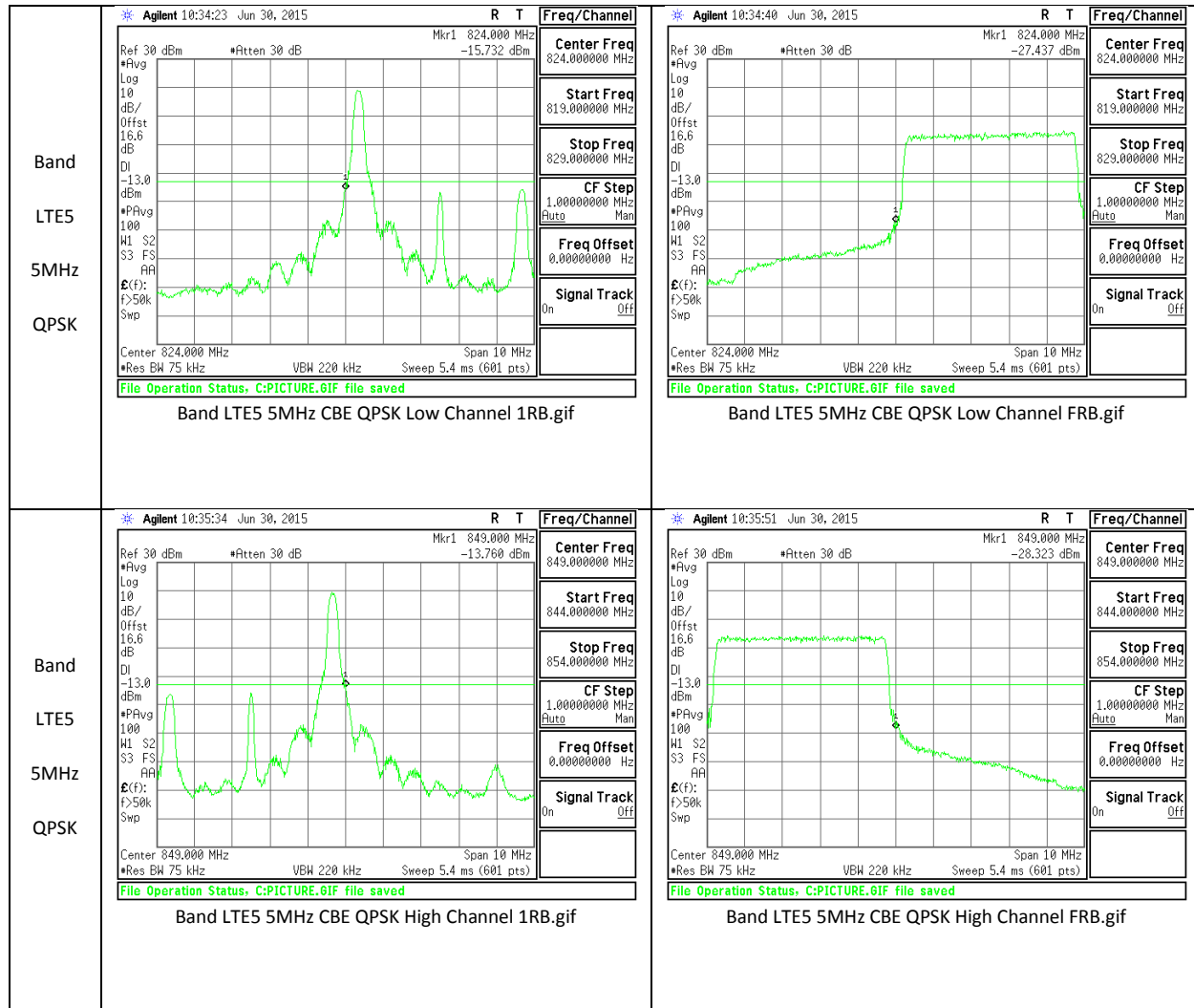
If screen capture program is not available or unable to locate the emission mask file, please contact PM or PL right away.

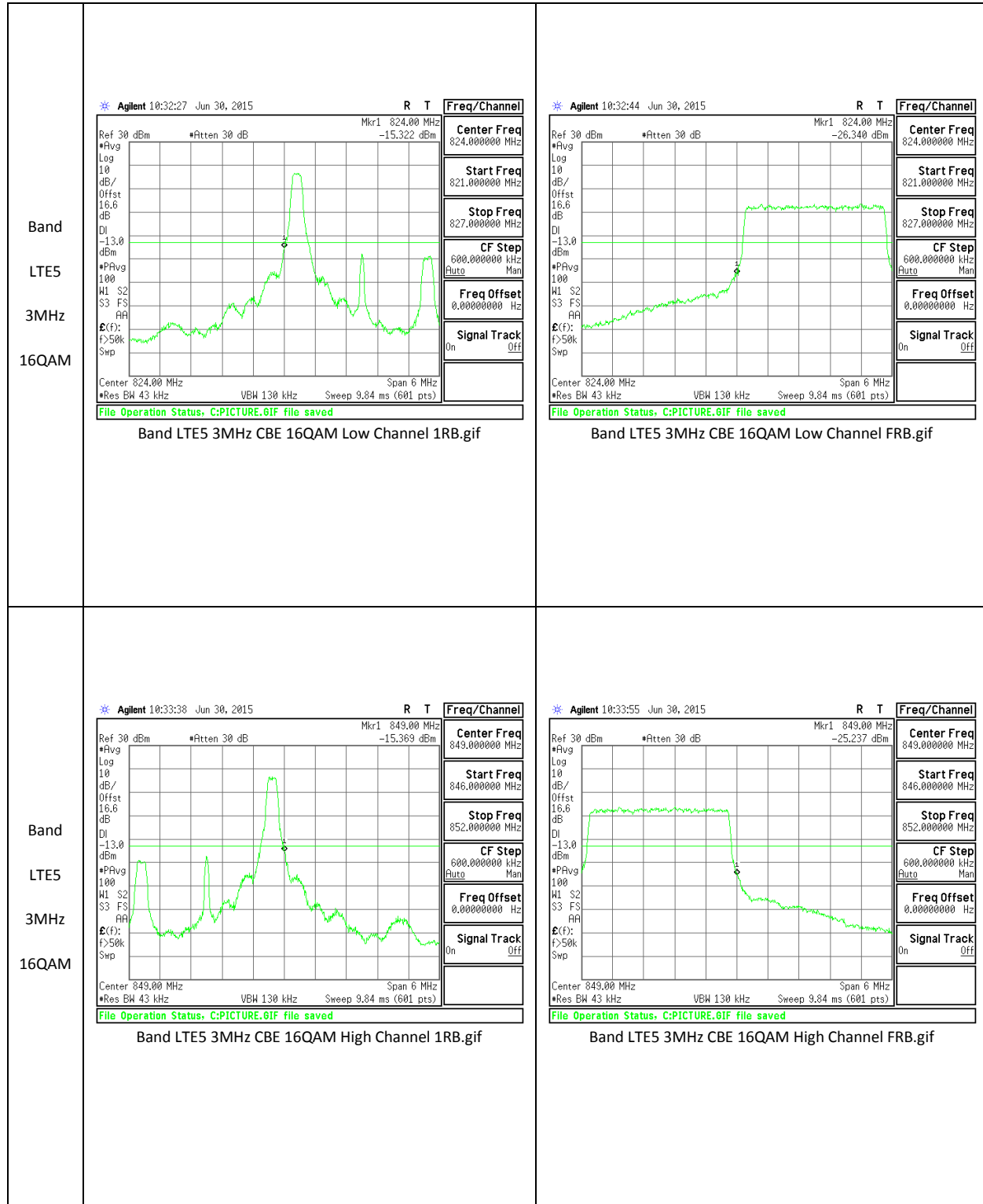
RESULTS

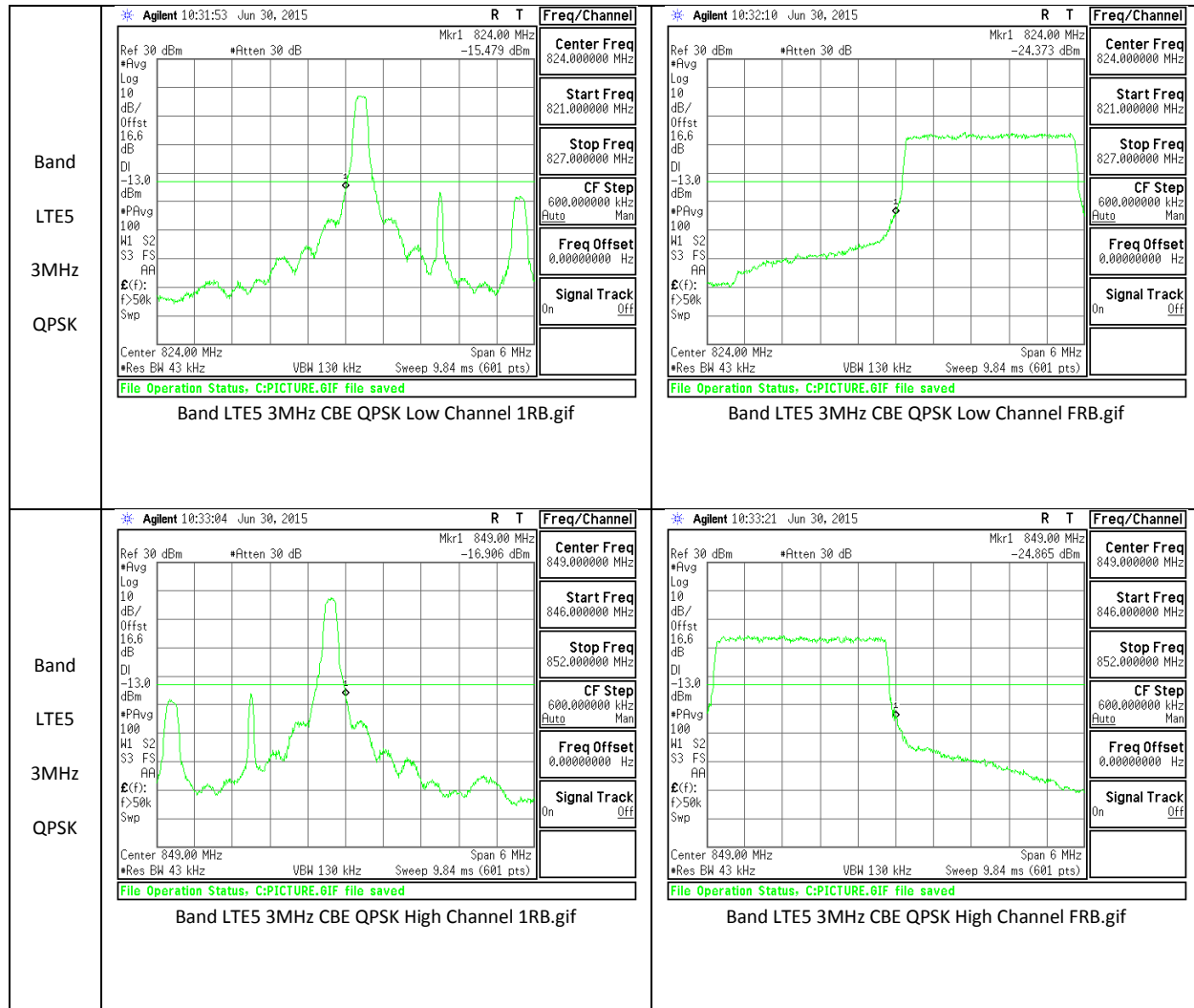
10.2.1. BAND EDGE PLOTS

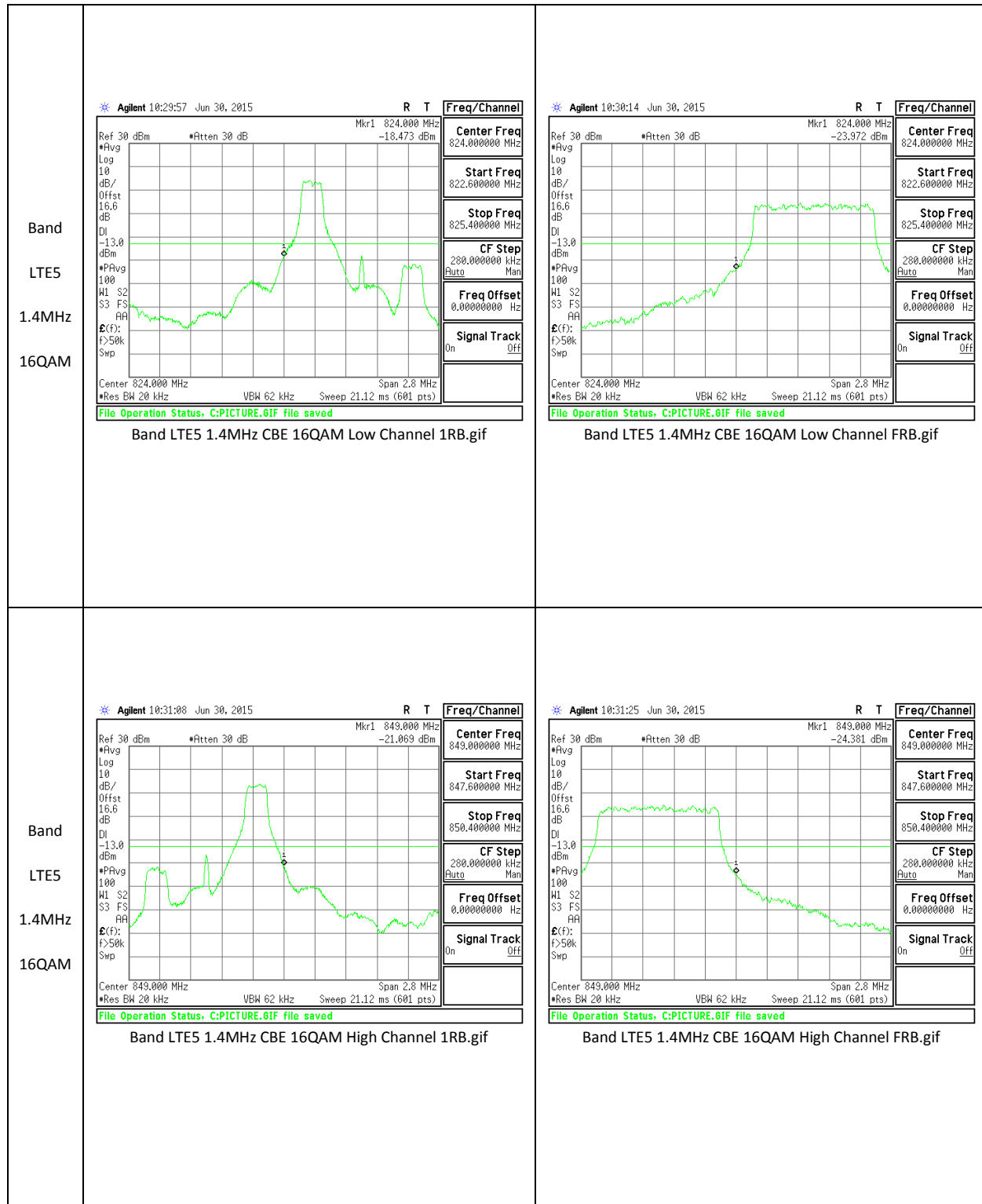


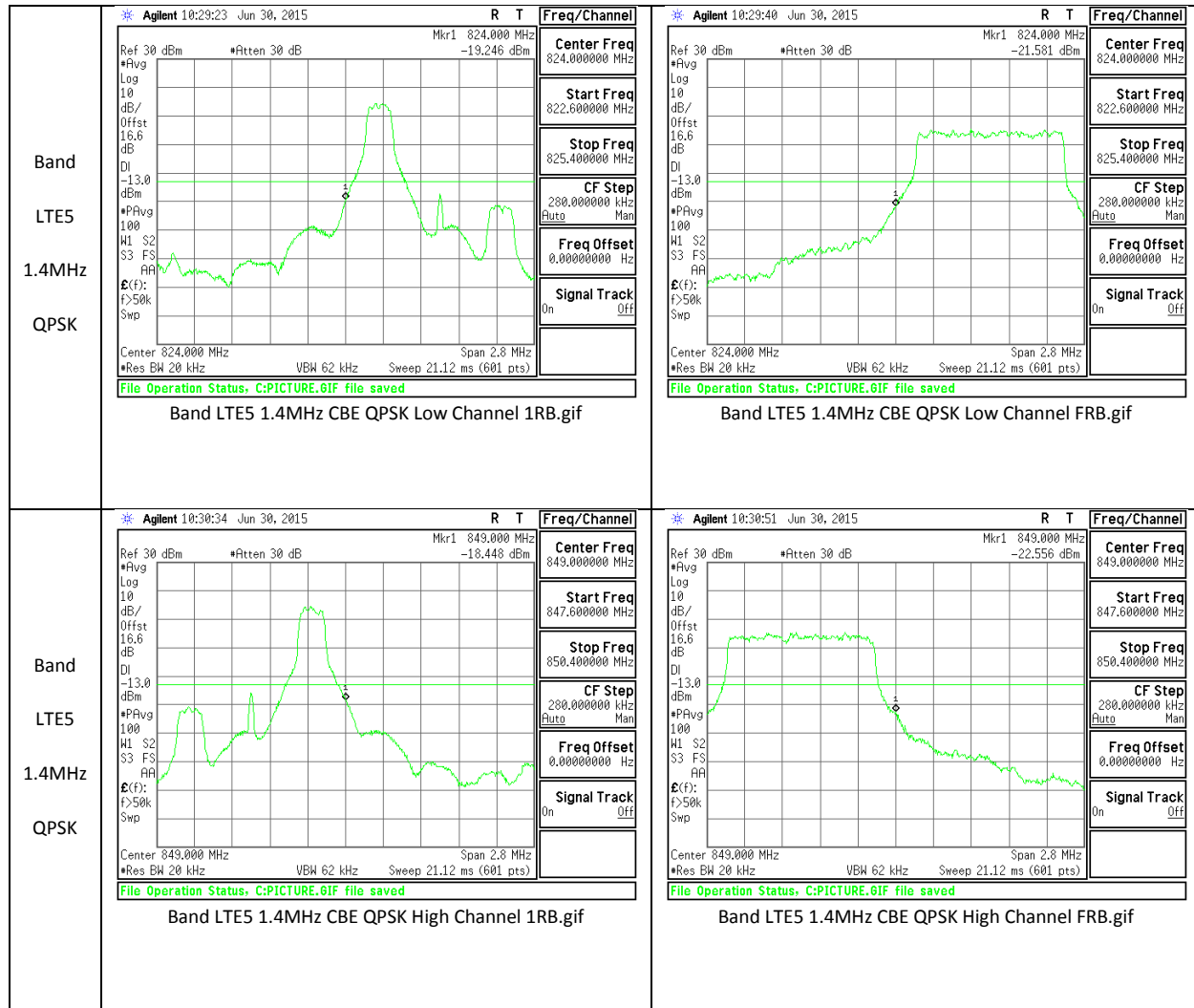


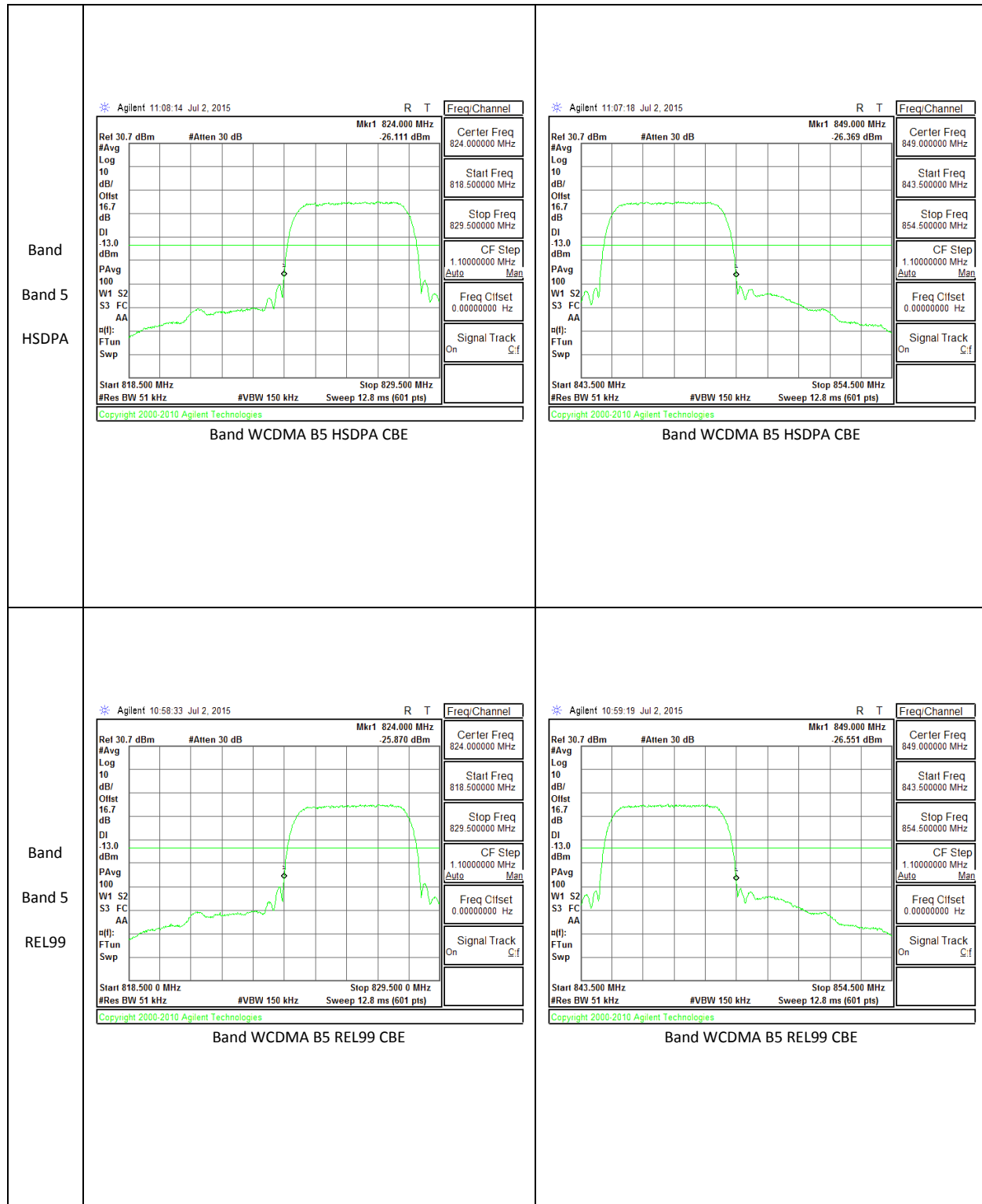


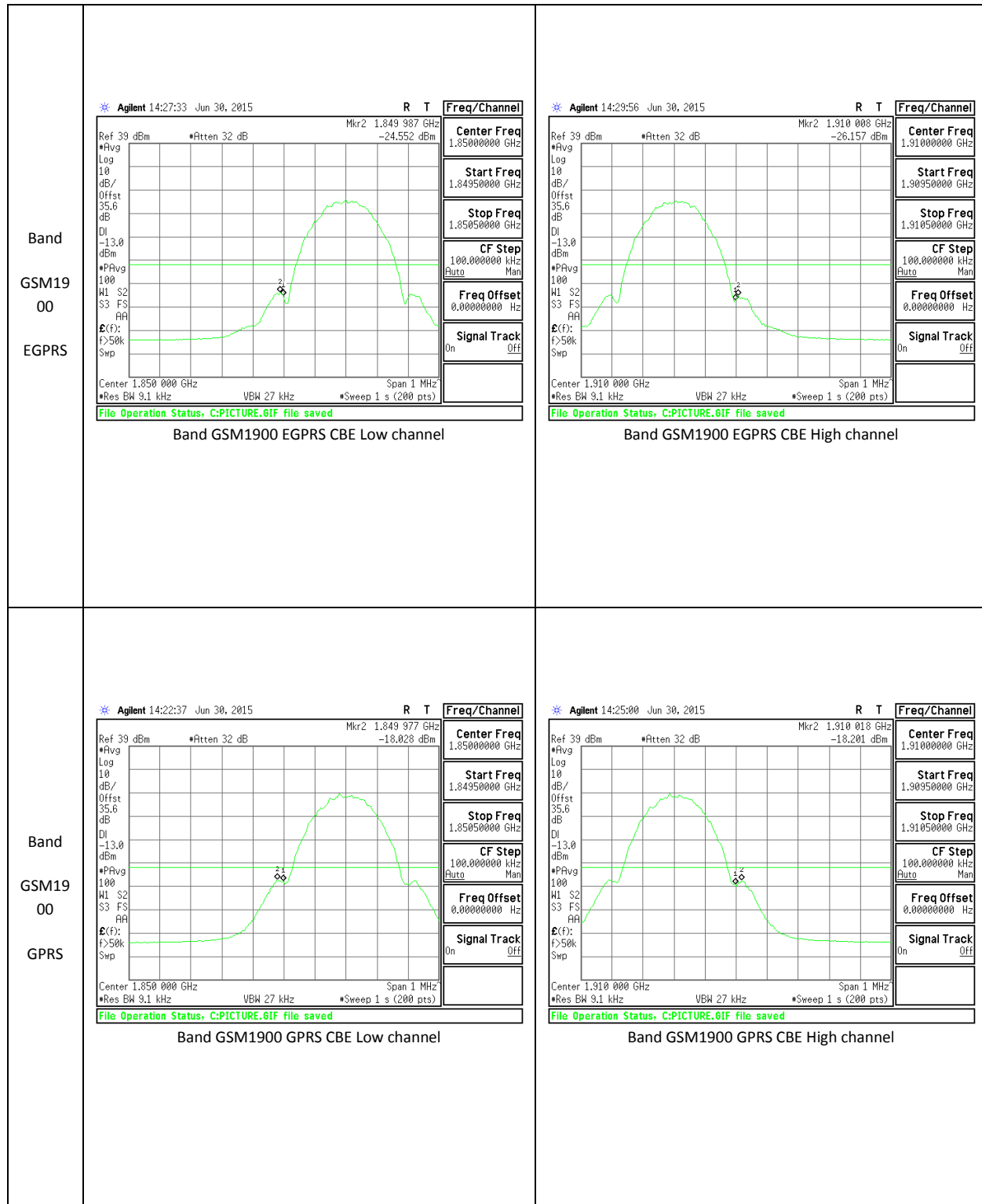


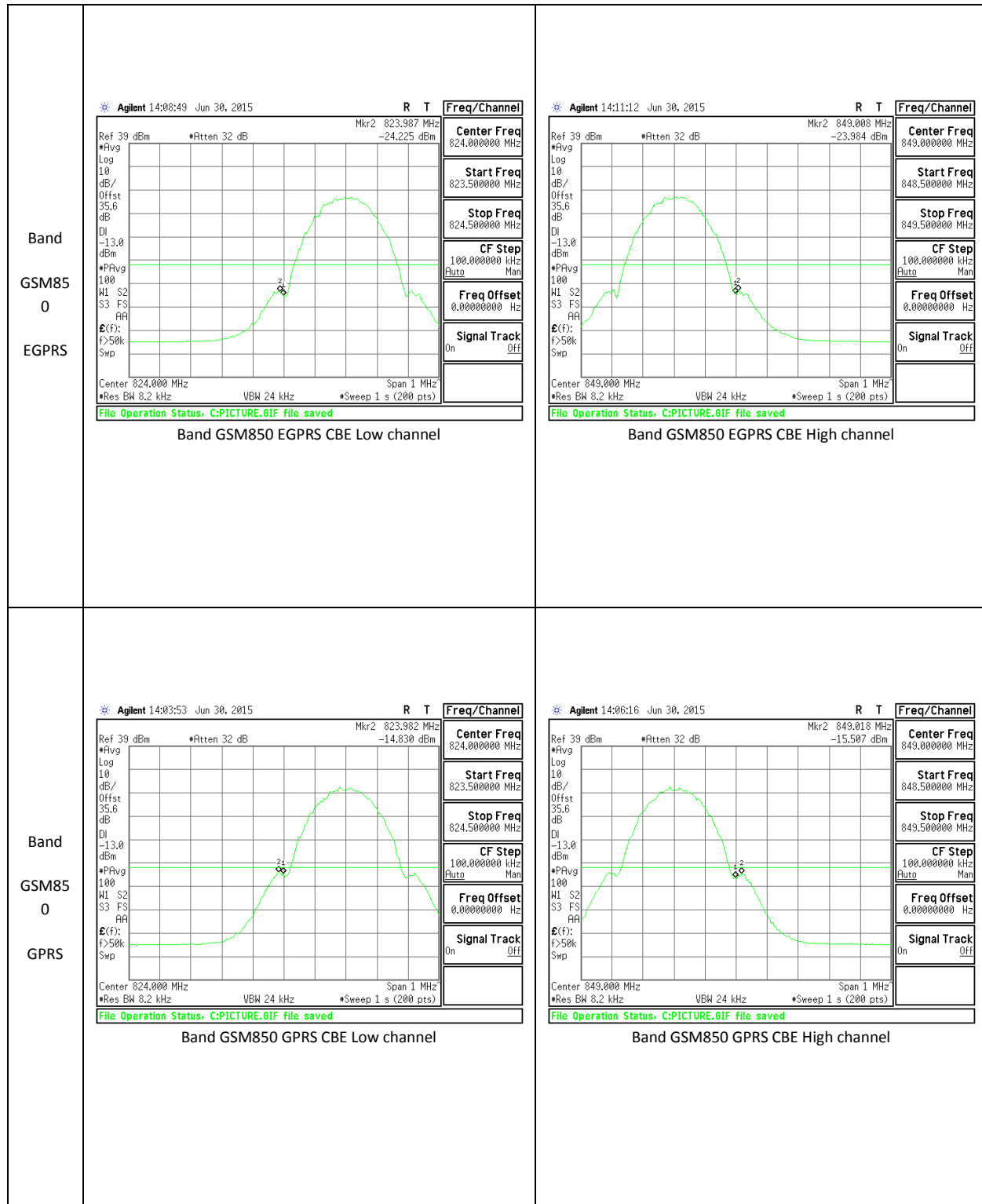












10.3. OUT OF BAND EMISSIONS

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.

RESULTS

10.3.1. OUT OF BAND EMISSIONS RESULT**GSM**

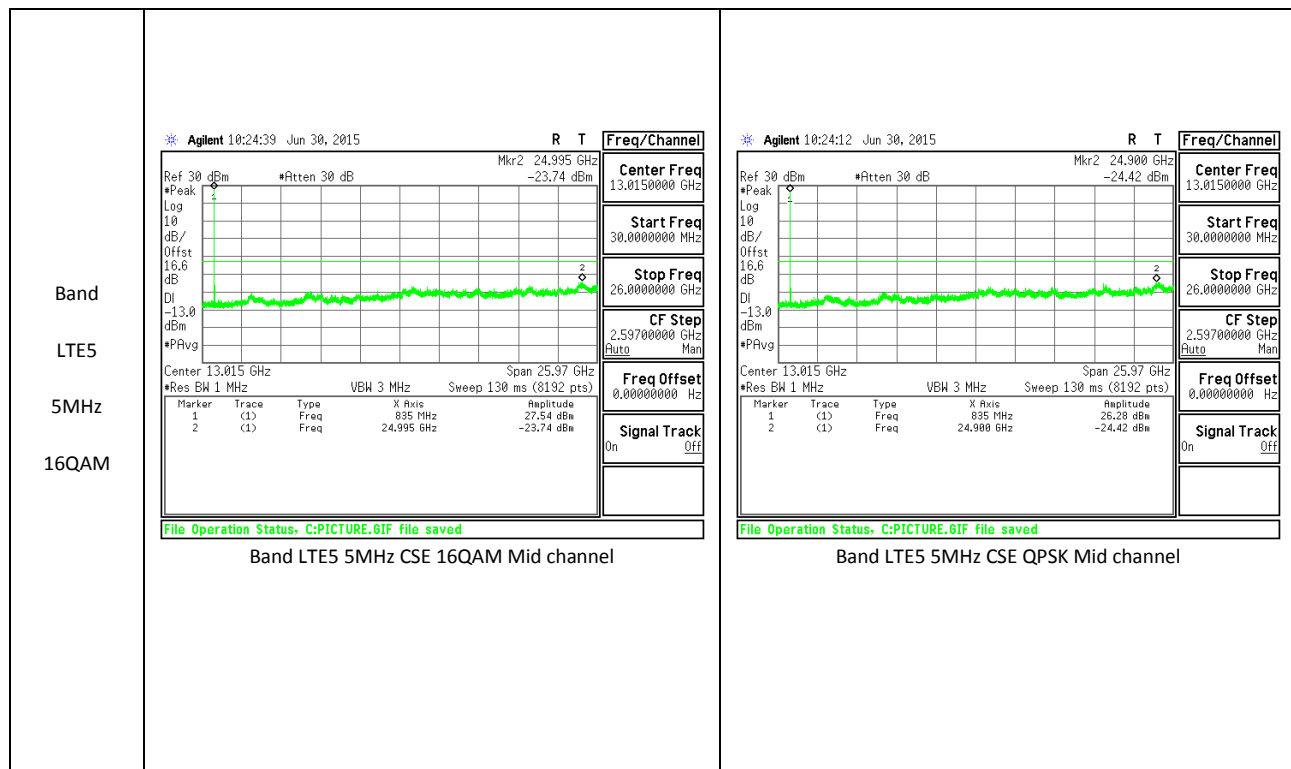
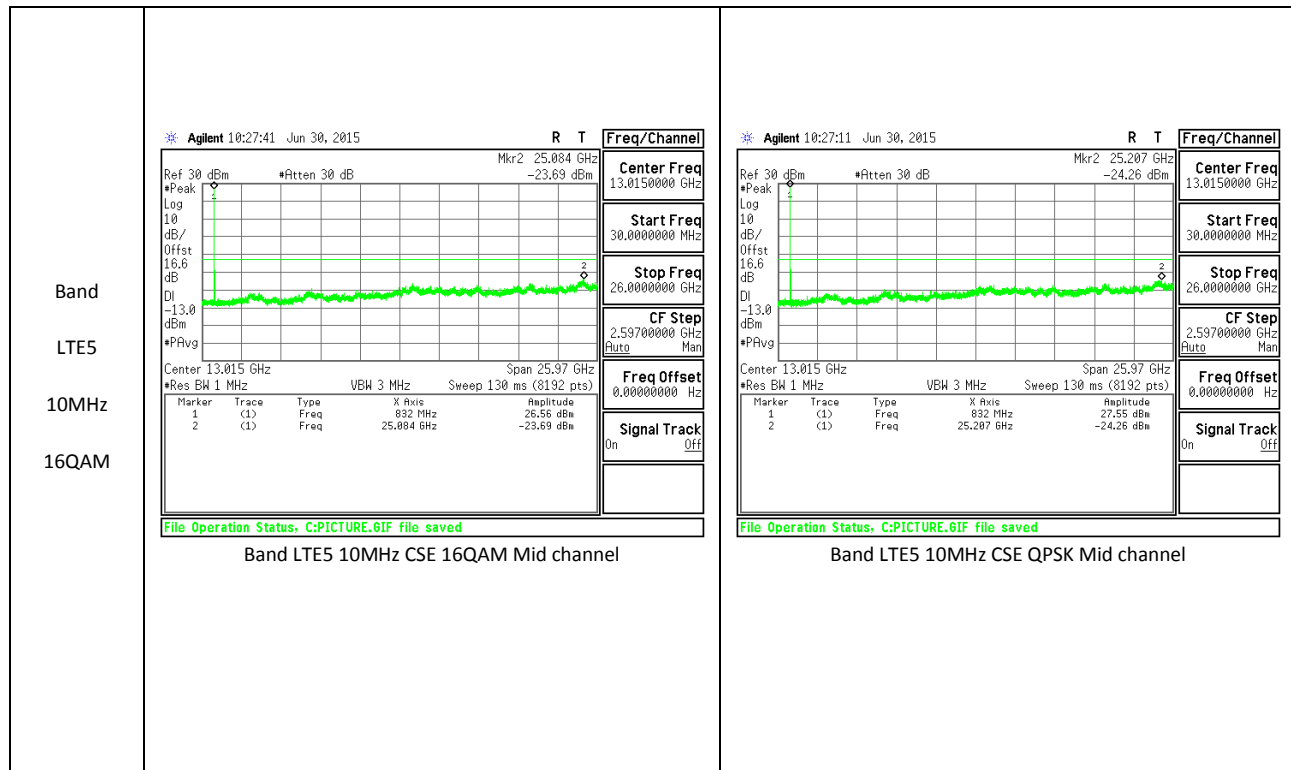
Band	Mode	f (MHz)	Spur (dBm)	Spec (dBm)	Delta (dB)
GSM 850	GPRS	824.2	-27.21	-13	-14.21
		836.6	-27.01	-13	-14.01
		848.8	-26.52	-13	-13.52
	EGPRS	824.2	-25.33	-13	-12.33
		836.6	-26.86	-13	-13.86
		848.8	-26.46	-13	-13.46
GSM 1900	GPRS	1850.2	-25.53	-13	-12.53
		1880	-26.46	-13	-13.46
		1909.8	-26.67	-13	-13.67
	EGPRS	1850.2	-25.39	-13	-12.39
		1880	-25.60	-13	-12.60
		1909.8	-25.26	-13	-12.26

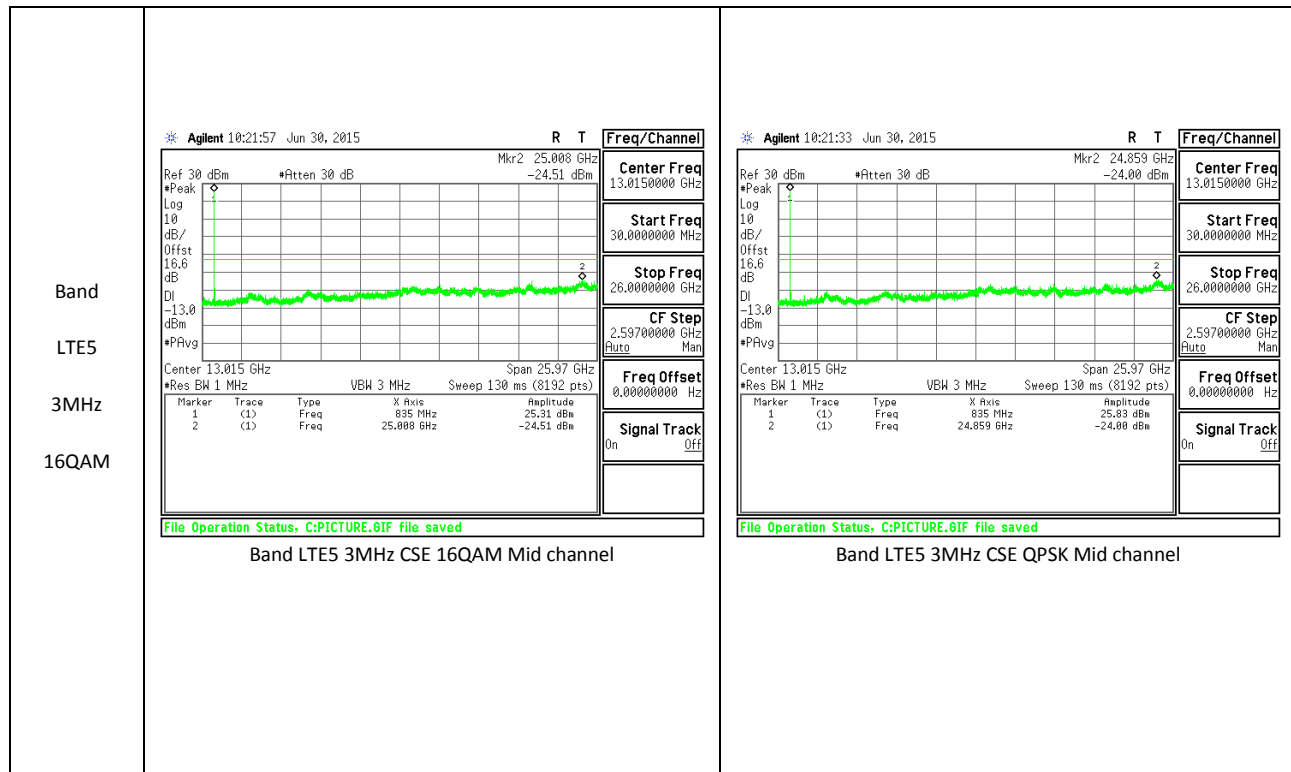
WCDMA

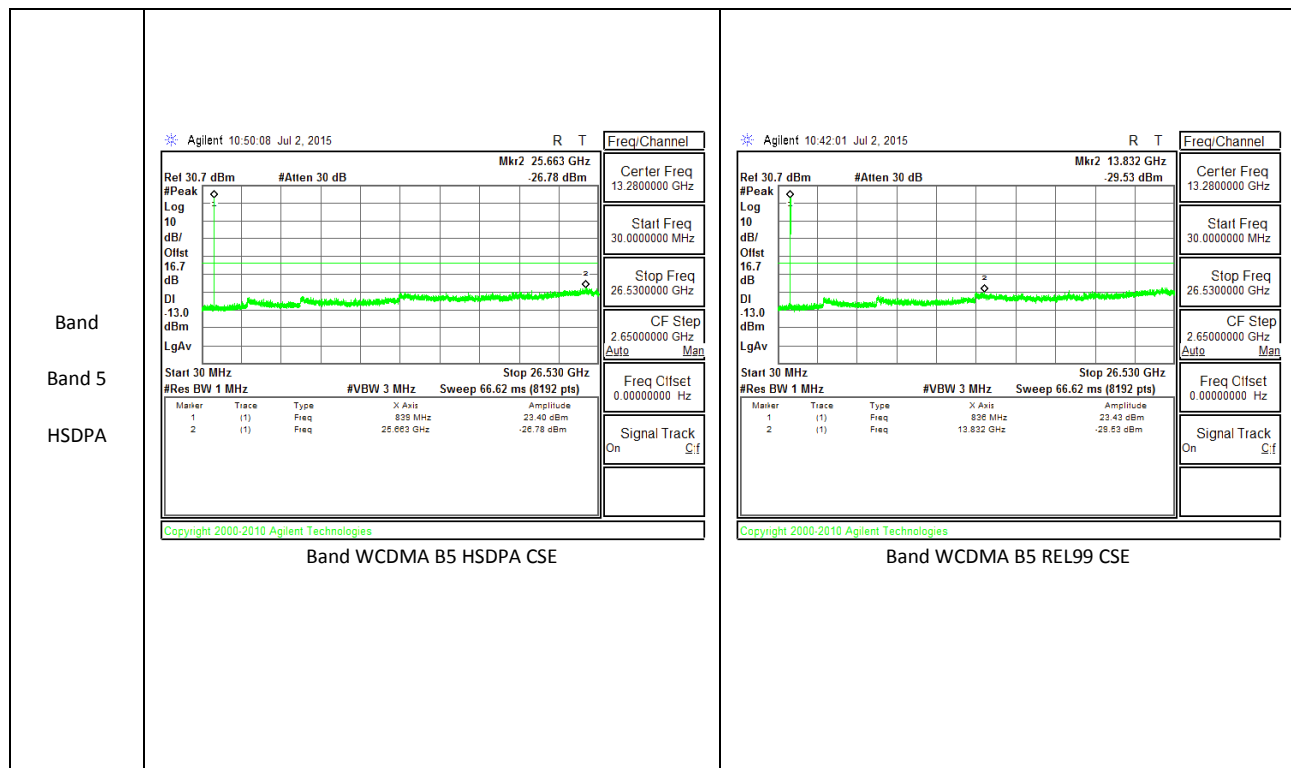
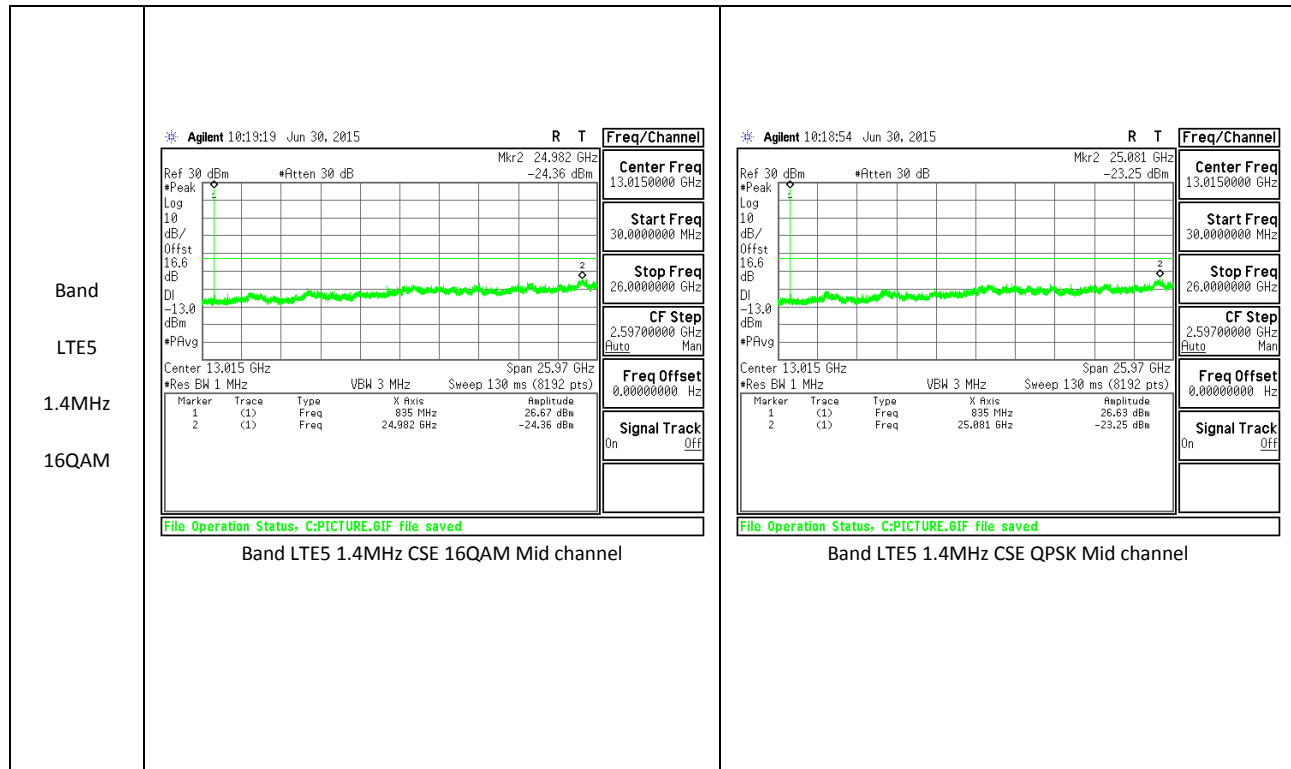
Band	Mode	f (MHz)	Spur (dBm)	Spec (dBm)	Delta (dB)
Band 5	REL99	826.4	-30.08	-13	-17.08
		836.6	-29.53	-13	-16.53
		846.6	-30.03	-13	-17.03
	HSDPA	826.4	-29.79	-13	-16.79
		836.6	-26.78	-13	-13.78
		846.6	-26.98	-13	-13.98

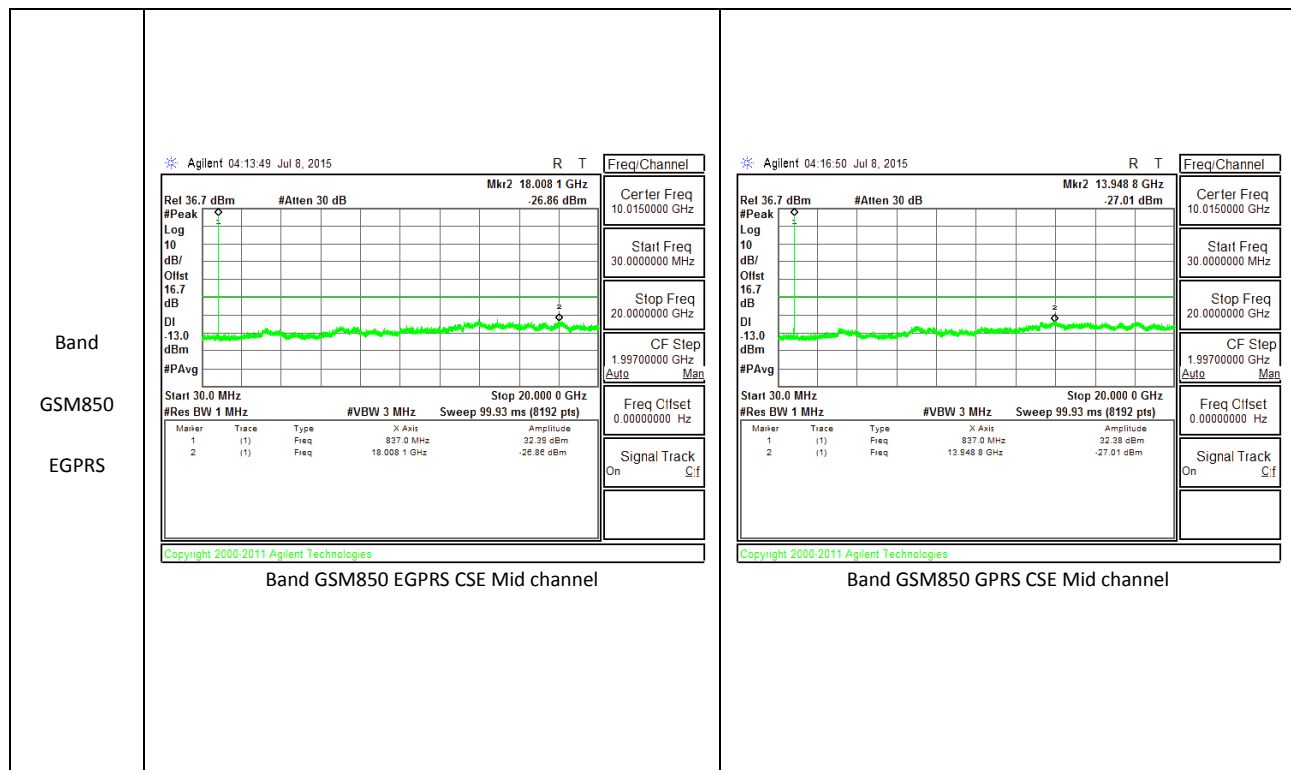
LTE Band 5

Band	BW (MHz)	Mode	f (MHz)	Spur (dBm)	Spec (dBm)	Delta (dB)
LTE5	10	16QAM	829	-24.49	-13	-11.49
			836.5	-23.69	-13	-10.69
			844	-24.31	-13	-11.31
		QPSK	829	-24.55	-13	-11.55
			836.5	-24.26	-13	-11.26
			844	-23.04	-13	-10.04
	5	16QAM	826.5	-27.74	-13	-14.74
			836.5	-23.74	-13	-10.74
			846.5	-24.14	-13	-11.14
		QPSK	826.5	-26.71	-13	-13.71
			836.5	-24.42	-13	-11.42
			846.5	-24.27	-13	-11.27
	3	16QAM	825.5	-24.81	-13	-11.81
			836.5	-24.52	-13	-11.52
			847.5	-23.62	-13	-10.62
		QPSK	825.5	-24.62	-13	-11.62
			836.5	-24.00	-13	-11.00
			847.5	-24.04	-13	-11.04
	1.4	16QAM	824.7	-24.54	-13	-11.54
			836.5	-24.36	-13	-11.36
			848.3	-24.20	-13	-11.20
		QPSK	824.7	-24.44	-13	-11.44
			836.5	-23.25	-13	-10.25
			848.3	-23.57	-13	-10.57

10.3.2. OUT OF BAND EMISSIONS PLOTS







10.4. FREQUENCY STABILITY

RULE PART(S)

FCC: §2.1055, §22.355 and §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 v02r02

MODES TESTED

RESULTS

See the following pages.

10.4.1. FREQUENCY STABILITY RESULTS**GSM850 Frequency 836.6MHz**

Reference Frequency: Cell Mid Channel Limit: to stay +/- 2.5 ppm =				
		836.6	MHz @ 20°C	
		2091.500	Hz	
Power Supply (Vdc)	Environment Temperature (°C)	Frequency Deviation Measured with Time Elapse		
		(MHz)	Delta (ppm)	Limit (ppm)
3.80	50	836.600013	0.005	2.5
3.80	40	836.600015	0.003	2.5
3.80	30	836.600016	0.001	2.5
3.80	20	836.600018	0	2.5
3.80	10	836.600016	0.002	2.5
3.80	0	836.600014	0.004	2.5
3.80	-10	836.600015	0.003	2.5
3.80	-20	836.600013	0.005	2.5
3.80	-30	836.600016	0.002	2.5

Reference Frequency: Cell Mid Channel Limit: to stay +/- 2.5 ppm =				
		836.6	MHz @ 20°C	
		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	836.6000156	0.002	2.5
3.23(End of volt)	20	836.6000149	0.003	2.5

GSM1900 Frequency 1880MHz

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	1879.999979	-0.003	2.5
3.80	40	1879.999973	0.001	2.5
3.80	30	1879.999971	0.001	2.5
3.80	20	1879.999974	0	2.5
3.80	10	1879.999977	-0.001	2.5
3.80	0	1879.999979	-0.003	2.5
3.80	-10	1879.999980	-0.003	2.5
3.80	-20	1879.999978	-0.002	2.5
3.80	-30	1879.999978	-0.002	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	1879.999974	0	2.5
4.37	20	1879.999972	0.001	2.5
3.23(End of volt)	20	1879.999972	0.001	2.5

11. RADIATED TEST RESULTS

11.1. RADIATED POWER (ERP & EIRP)

RULE PART(S)

FCC: §2.1046, §22.913 and §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.

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.

TEST RESULTS

11.1.1. ERP/EIRP Results

Band	Mode	Channel	f(MHz)	ERP / EIRP	
				dBm	mW
Band 5	REL99	4132	826.4	19.221	83.58
		4183	836.6	18.512	70.99
		4233	846.6	18.171	65.63
	HSDPA	4132	826.4	19.171	82.62
		4183	836.6	18.448	69.95
		4233	846.6	18.191	65.93

Band	Mode	Channel	f(MHz)	ERP / EIRP	
				dBm	mW
GSM1900	GPRS	512	1850.2	31.843	1528.62
		661	1880	31.867	1537.09
		810	1909.8	32.538	1793.91
	EGPRS	512	1850.2	27.698	588.57
		661	1880	27.929	620.73
		810	1909.8	28.65	732.82

Band	Mode	Channel	f(MHz)	ERP / EIRP	
				dBm	mW
GSM850	GPRS	128	824.2	29.049	803.34
		190	836.6	28.177	657.2
		251	848.8	28.244	667.42
	EGPRS	128	824.2	24.221	264.3
		190	836.6	23.811	240.49
		251	848.8	23.761	237.74

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	18.27	67.14
			1/0	836.5	18.14	65.16
			1/0	844	18.21	66.22
		16QAM	1/0	829	17.62	57.81
			1/0	836.5	17.56	57.02
			1/0	844	17.42	55.21
	5	QPSK	1/0	826.5	18.3	67.61
			1/0	836.5	18.17	65.61
			1/0	846.5	18.25	66.83
		16QAM	1/0	826.5	17.65	58.21
			1/0	836.5	17.58	57.28
			1/0	846.5	17.44	55.46
	3	QPSK	1/0	825.5	17.79	60.12
			1/0	836.5	18.15	65.31
			1/0	847.5	18.72	74.47
		16QAM	1/0	825.5	17.19	52.36
			1/0	836.5	17.58	57.28
			1/0	847.5	17.76	59.7
	1.4	QPSK	1/0	824.7	17.76	59.7
			1/0	836.5	18.16	65.46
			1/0	848.3	18.7	74.13
		16QAM	1/0	824.7	17.23	52.84
			1/0	836.5	17.56	57.02
			1/0	848.3	17.74	59.43

11.1.3. ERP/EIRP DATA**GSM**

Band

GSM

1900

EGPRS

High Frequency Substitution Measurement

UL Verification Services, Inc.

Company: Samsung

Project #: 15I21198

Date: 07/06/15

Test Engineer: R. Alegre

Configuration: EUT only

Mode: EGPRS 1900

Test Equipment:

Receiving: Horn T345, and Chamber B SMA Cables

Substitution: Horn T60 Substitution, 4ft SMA Cable Warehouse

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
1850.20	12.88	V	0.9	8.1	20.13	33.0	-12.9	
1850.20	20.45	H	0.9	8.1	27.70	33.0	-5.3	
Mid Ch								
1880.00	12.87	V	0.9	8.1	20.12	33.0	-12.9	
1880.00	20.68	H	0.9	8.1	27.93	33.0	-5.1	
High Ch								
1909.80	12.82	V	0.9	8.1	20.07	33.0	-12.9	
1909.80	21.40	H	0.9	8.1	28.65	33.0	-4.4	

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 #: 15I21198

Date: 07/06/15

Test Engineer: R. Alegre

Configuration: EUT only

Mode: GPRS 1900

Test Equipment:

Receiving: Horn T345, and Chamber B SMA Cables

Substitution: Horn T60 Substitution, 4ft SMA Cable Warehouse

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
1850.20	16.67	V	0.9	8.1	23.91	33.0	-9.1	
1850.20	24.60	H	0.9	8.1	31.84	33.0	-1.2	
Mid Ch								
1880.00	16.48	V	0.9	8.1	23.73	33.0	-9.3	
1880.00	24.62	H	0.9	8.1	31.87	33.0	-1.1	
High Ch								
1909.80	16.67	V	0.9	8.1	23.92	33.0	-9.1	
1909.80	25.29	H	0.9	8.1	32.54	33.0	-0.5	

Rev. 3.17.11

Note: For Band 4 EIRP limit is 30dBm

Band GSM 850 EGPRS	High Frequency Substitution Measurement UL Verification Services, Inc. Chamber B Company: Samsung Project #: 15I21198 Date: 07/02/15 Test Engineer: R. Alegre Configuration: EUT Only Mode: EGPRS850 Test Equipment: Receiving: Sunol T243, and 5m Chamber B N-type Cable Substitution: Dipole S/N: 00022117, 4ft SMA Cable (SN # 245200 001) Warehouse.								
	f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
	Low Ch								
	824.20	15.91	V	0.9	0.0	15.01	38.5	-23.4	
	824.20	25.12	H	0.9	0.0	24.22	38.5	-14.2	
	Mid Ch								
	836.60	15.69	V	0.9	0.0	14.79	38.5	-23.7	
	836.60	24.71	H	0.9	0.0	23.81	38.5	-14.6	
	High Ch								
	848.80	15.63	V	0.9	0.0	14.73	38.5	-23.7	
	848.80	24.66	H	0.9	0.0	23.76	38.5	-14.7	
Rev. 3.17.11 Note: For Band 13/17 ERP limit is 34.77dBm; For Band 26 limit is 50dBm									

WCDMA

Band Band 5 HSDPA	High Frequency Substitution Measurement UL Verification Services, Inc. Company: Samsung Project #: 15I21198 Date: 07/02/15 Test Engineer: R. Alegre Configuration: EUT only Mode: WCDMA Band 5 HSDPA Test Equipment: Receiving: Sunol T243, and 3m Chamber B N-type Cable Substitution: Dipole T273, 4ft 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	11.80	V	0.9	0.0	10.95	38.5	-27.5	
	826.40	20.02	H	0.9	0.0	19.17	38.5	-19.3	
	Mid Ch								
	836.60	10.93	V	0.9	0.0	10.08	38.5	-28.4	
	836.60	19.30	H	0.9	0.0	18.45	38.5	-20.0	
	High Ch								
	846.60	11.27	V	0.9	0.0	10.42	38.5	-28.0	
846.60	19.04	H	0.9	0.0	18.19	38.5	-20.3		
Rev. 3.17.11 Note: For Band 13/17 ERP limit is 34.77dBm; For Band 26 limit is 50dBm									

Band Band 5 REL99	High Frequency Substitution Measurement UL Verification Services, Inc. Company: Samsung Project #: 15I21198 Date: 07/02/15 Test Engineer: R. Alegre Configuration: EUT only Mode: REL99 B5 FUND Test Equipment: Receiving: Sunol T243, and 3m Chamber B N-type Cable Substitution: Dipole T273, 4ft 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	11.85	V	0.9	0.0	11.00	38.5	-27.4	
	826.40	20.07	H	0.9	0.0	19.22	38.5	-19.2	
	Mid Ch								
	836.60	10.95	V	0.9	0.0	10.10	38.5	-28.3	
	836.60	19.36	H	0.9	0.0	18.51	38.5	-19.9	
	High Ch								
	846.60	11.21	V	0.9	0.0	10.36	38.5	-28.1	
	846.60	19.02	H	0.9	0.0	18.17	38.5	-20.3	
Rev. 3.17.11 Note: For Band 13/17 ERP limit is 34.77dBm; For Band 26 limit is 50dBm									

LTE Band 5

Band

LTE5

10MHz

16QAM

High Frequency Substitution Measurement

UL Verification Services, Inc.

Company:

Project #:

Date:

Test Engineer:

Configuration:

Location:

Mode:

Samsung

15I21198

07/01/15

R.Alegre

EUT only

Chamber B

LTE_16QAM Band 5 Fundamentals, 10MHz 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								
829.00	9.29	V	0.9	0.0	8.39	38.5	-30.1	
829.00	18.52	H	0.9	0.0	17.62	38.5	-20.9	
Mid Ch								
836.50	9.31	V	0.9	0.0	8.41	38.5	-30.1	
836.50	18.46	H	0.9	0.0	17.56	38.5	-20.9	
High Ch								
844.00	9.60	V	0.9	0.0	8.70	38.5	-29.8	
844.00	18.32	H	0.9	0.0	17.42	38.5	-21.1	

High Frequency Substitution Measurement UL Verification Services, Inc.								
Company:	Samsung							
Project #:	15I21198							
Date:	07/01/15							
Test Engineer:	R.Alegre							
Configuration:	EUT only							
Location:	Chamber B							
Mode:	LTE_QPSK Band 5 Fundamentals, 10MHz 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								
829.00	9.95	V	0.9	0.0	9.05	38.5	-29.5	
829.00	19.17	H	0.9	0.0	18.27	38.5	-20.2	
Mid Ch								
836.50	10.28	V	0.9	0.0	9.38	38.5	-29.1	
836.50	19.04	H	0.9	0.0	18.14	38.5	-20.4	
High Ch								
844.00	10.32	V	0.9	0.0	9.42	38.5	-29.1	
844.00	19.11	H	0.9	0.0	18.21	38.5	-20.3	

Band LTE5 5MHz 16QAM	High Frequency Substitution Measurement UL Verification Services, Inc.																																																																																																	
	Company:		Samsung																																																																																															
	Project #:		15I21198																																																																																															
	Date:		07/01/15																																																																																															
	Test Engineer:		R.Alegre																																																																																															
	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 T273, 3ft 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 (dBd)</th> <th>ERP (dBm)</th> <th>Limit (dBm)</th> <th>Delta (dB)</th> <th>Notes</th> </tr> </thead> <tbody> <tr> <td colspan="9">Low Ch</td> </tr> <tr> <td>826.50</td> <td>9.33</td> <td>V</td> <td>0.9</td> <td>0.0</td> <td>8.43</td> <td>38.5</td> <td>-30.1</td> <td></td> </tr> <tr> <td>826.50</td> <td>18.55</td> <td>H</td> <td>0.9</td> <td>0.0</td> <td>17.65</td> <td>38.5</td> <td>-20.9</td> <td></td> </tr> <tr> <td colspan="9">Mid Ch</td> </tr> <tr> <td>836.50</td> <td>9.32</td> <td>V</td> <td>0.9</td> <td>0.0</td> <td>8.42</td> <td>38.5</td> <td>-30.1</td> <td></td> </tr> <tr> <td>836.50</td> <td>18.48</td> <td>H</td> <td>0.9</td> <td>0.0</td> <td>17.58</td> <td>38.5</td> <td>-20.9</td> <td></td> </tr> <tr> <td colspan="9">High Ch</td> </tr> <tr> <td>846.50</td> <td>9.60</td> <td>V</td> <td>0.9</td> <td>0.0</td> <td>8.70</td> <td>38.5</td> <td>-29.8</td> <td></td> </tr> <tr> <td>846.50</td> <td>18.34</td> <td>H</td> <td>0.9</td> <td>0.0</td> <td>17.44</td> <td>38.5</td> <td>-21.1</td> <td></td> </tr> </tbody> </table>									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	9.33	V	0.9	0.0	8.43	38.5	-30.1		826.50	18.55	H	0.9	0.0	17.65	38.5	-20.9		Mid Ch									836.50	9.32	V	0.9	0.0	8.42	38.5	-30.1		836.50	18.48	H	0.9	0.0	17.58	38.5	-20.9		High Ch									846.50	9.60	V	0.9	0.0	8.70	38.5	-29.8		846.50	18.34	H	0.9	0.0	17.44	38.5	-21.1	
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	9.33	V	0.9	0.0	8.43	38.5	-30.1																																																																																											
826.50	18.55	H	0.9	0.0	17.65	38.5	-20.9																																																																																											
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High Frequency Substitution Measurement UL Verification Services, Inc.								
Company:	Samsung							
Project #:	15I21198							
Date:	07/01/15							
Test Engineer:	R.Alegre							
Configuration:	EUT only							
Location:	Chamber B							
Mode:	LTE_QPSK Band 5 Fundamentals, 5MHz 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								
826.50	9.93	V	0.9	0.0	9.03	38.5	-29.5	
826.50	19.20	H	0.9	0.0	18.30	38.5	-20.2	
Mid Ch								
836.50	10.26	V	0.9	0.0	9.36	38.5	-29.1	
836.50	19.07	H	0.9	0.0	18.17	38.5	-20.3	
High Ch								
846.50	10.37	V	0.9	0.0	9.47	38.5	-29.0	
846.50	19.15	H	0.9	0.0	18.25	38.5	-20.3	

Band LTE5 3MHz 16QAM	High Frequency Substitution Measurement UL Verification Services, Inc.																																																																																																	
	Company:		Samsung																																																																																															
	Project #:		15I21198																																																																																															
	Date:		07/01/15																																																																																															
	Test Engineer:		R.Alegre																																																																																															
	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																																																																																																	
<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 (dBd)</th> <th>ERP (dBm)</th> <th>Limit (dBm)</th> <th>Delta (dB)</th> <th>Notes</th> </tr> </thead> <tbody> <tr> <td colspan="9">Low Ch</td> </tr> <tr> <td>825.50</td> <td>9.06</td> <td>V</td> <td>0.9</td> <td>0.0</td> <td>8.16</td> <td>38.5</td> <td>-30.3</td> <td></td> </tr> <tr> <td>825.50</td> <td>18.09</td> <td>H</td> <td>0.9</td> <td>0.0</td> <td>17.19</td> <td>38.5</td> <td>-21.3</td> <td></td> </tr> <tr> <td colspan="9">Mid Ch</td> </tr> <tr> <td>836.50</td> <td>9.27</td> <td>V</td> <td>0.9</td> <td>0.0</td> <td>8.37</td> <td>38.5</td> <td>-30.1</td> <td></td> </tr> <tr> <td>836.50</td> <td>18.48</td> <td>H</td> <td>0.9</td> <td>0.0</td> <td>17.58</td> <td>38.5</td> <td>-20.9</td> <td></td> </tr> <tr> <td colspan="9">High Ch</td> </tr> <tr> <td>847.50</td> <td>9.50</td> <td>V</td> <td>0.9</td> <td>0.0</td> <td>8.60</td> <td>38.5</td> <td>-29.9</td> <td></td> </tr> <tr> <td>847.50</td> <td>18.66</td> <td>H</td> <td>0.9</td> <td>0.0</td> <td>17.76</td> <td>38.5</td> <td>-20.7</td> <td></td> </tr> </tbody> </table>									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	9.06	V	0.9	0.0	8.16	38.5	-30.3		825.50	18.09	H	0.9	0.0	17.19	38.5	-21.3		Mid Ch									836.50	9.27	V	0.9	0.0	8.37	38.5	-30.1		836.50	18.48	H	0.9	0.0	17.58	38.5	-20.9		High Ch									847.50	9.50	V	0.9	0.0	8.60	38.5	-29.9		847.50	18.66	H	0.9	0.0	17.76	38.5	-20.7	
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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825.50	9.06	V	0.9	0.0	8.16	38.5	-30.3																																																																																											
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High Frequency Substitution Measurement UL Verification Services, Inc.								
Company:	Samsung							
Project #:	15I21198							
Date:	07/01/15							
Test Engineer:	R.Alegre							
Configuration:	EUT only							
Location:	Chamber B							
Mode:	LTE_QPSK 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	9.91	V	0.9	0.0	9.01	38.5	-29.5	
825.50	18.69	H	0.9	0.0	17.79	38.5	-20.7	
Mid Ch								
836.50	9.90	V	0.9	0.0	9.00	38.5	-29.5	
836.50	19.05	H	0.9	0.0	18.15	38.5	-20.4	
High Ch								
847.50	10.40	V	0.9	0.0	9.50	38.5	-29.0	
847.50	19.62	H	0.9	0.0	18.72	38.5	-19.8	

Band LTE5 1.4MHz 16QAM	High Frequency Substitution Measurement UL Verification Services, Inc.																																																																																																	
	Company:		Samsung																																																																																															
	Project #:		15I21198																																																																																															
	Date:		07/01/15																																																																																															
	Test Engineer:		R.Alegre																																																																																															
	Configuration:		EUT only																																																																																															
	Location:		Chamber B																																																																																															
	Mode:		LTE_16QAM Band 5 Fundamentals, 1.4MHz Bandwidth																																																																																															
	Test Equipment:																																																																																																	
	Receiving: Hybrid T243, and Chamber B SMA Cables Substitution: Dipole T273, 3ft SMA Cable Warehouse																																																																																																	
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Band LTE5 1.4MHz QPSK	High Frequency Substitution Measurement UL Verification Services, Inc.																																																																																																	
	Company:		Samsung																																																																																															
	Project #:		15I21198																																																																																															
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11.2. FIELD STRENGTH OF SPURIOUS RADIATION

RULE PART(S)

FCC: §2.1053, §22.917 and §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

11.2.1. SPURIOUS RADIATION DATA**GSM**

UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement									
Company:		Samsung							
Project #:		15I21198							
Date:		07/06/15							
Test Engineer:		R.Alegre							
Configuration:		EUT w/ AC Adaptor and HS							
Mode:		EGPRS1900 Harm							
Chamber		Pre-amplifier		Filter		Limit			
5m Chamber B		T34 8449B		Filter 1		Part 24			
f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 1850.2MHz									
3.700	-18.2	V	3.0	35.4	1.0	-52.6	-13.0	-39.6	
5.551	-11.0	V	3.0	34.7	1.0	-44.8	-13.0	-31.8	
7.401	-13.6	V	3.0	34.9	1.0	-47.6	-13.0	-34.6	
3.700	-16.9	H	3.0	35.4	1.0	-51.3	-13.0	-38.3	
5.551	-13.4	H	3.0	34.7	1.0	-47.1	-13.0	-34.1	
7.401	-11.3	H	3.0	34.9	1.0	-45.2	-13.0	-32.2	
Mid Ch, 1880.0MHz									
3.760	-18.0	V	3.0	35.3	1.0	-52.4	-13.0	-39.4	
5.640	-13.3	V	3.0	34.7	1.0	-47.0	-13.0	-34.0	
7.520	-14.4	V	3.0	34.9	1.0	-48.3	-13.0	-35.3	
3.760	-16.9	H	3.0	35.3	1.0	-51.2	-13.0	-38.2	
5.640	-14.8	H	3.0	34.7	1.0	-48.5	-13.0	-35.5	
7.520	-12.4	H	3.0	34.9	1.0	-46.3	-13.0	-33.3	
High Ch, 1909.8MHz									
3.820	-13.2	V	3.0	35.3	1.0	-47.4	-13.0	-34.4	
5.729	-16.0	V	3.0	34.7	1.0	-49.8	-13.0	-36.8	
7.639	-12.9	V	3.0	35.0	1.0	-46.9	-13.0	-33.9	
3.820	-16.8	H	3.0	35.3	1.0	-51.1	-13.0	-38.1	
5.729	-13.2	H	3.0	34.7	1.0	-46.9	-13.0	-33.9	
7.639	-11.0	H	3.0	35.0	1.0	-44.9	-13.0	-31.9	

UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement										
Company:	Samsung									
Project #:	15I21198									
Date:	07/06/15									
Test Engineer:	R.Alegre									
Configuration:	EUT w/ AC Adaptor and HS									
Mode:	GPRS1900 Harm									
Chamber 5m Chamber B Pre-amplifier T34 8449B Filter Filter 1 Limit Part 24										
Band	f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
GSM 1900 GPRS	Low Ch, 1850.2MHz									
	3.700	-17.0	V	3.0	35.4	1.0	-51.4	-13.0	-38.4	
	5.551	-10.4	V	3.0	34.7	1.0	-44.1	-13.0	-31.1	
	7.401	-13.7	V	3.0	34.9	1.0	-47.7	-13.0	-34.7	
	3.700	-15.8	H	3.0	35.4	1.0	-50.2	-13.0	-37.2	
	5.551	-13.7	H	3.0	34.7	1.0	-47.4	-13.0	-34.4	
	7.401	-11.8	H	3.0	34.9	1.0	-45.7	-13.0	-32.7	
	Mid Ch, 1880.0MHz									
	3.760	-17.2	V	3.0	35.3	1.0	-51.5	-13.0	-38.5	
	5.640	-12.2	V	3.0	34.7	1.0	-46.0	-13.0	-33.0	
	7.520	-13.8	V	3.0	34.9	1.0	-47.7	-13.0	-34.7	
	3.760	-15.0	H	3.0	35.3	1.0	-49.3	-13.0	-36.3	
	5.640	-14.2	H	3.0	34.7	1.0	-47.9	-13.0	-34.9	
	7.520	-12.8	H	3.0	34.9	1.0	-46.8	-13.0	-33.8	
	High Ch, 1909.8MHz									
	3.820	-12.4	V	3.0	35.3	1.0	-46.7	-13.0	-33.7	
	5.729	-15.7	V	3.0	34.7	1.0	-49.4	-13.0	-36.4	
	7.639	-13.4	V	3.0	35.0	1.0	-47.4	-13.0	-34.4	
3.820	-16.0	H	3.0	35.3	1.0	-50.3	-13.0	-37.3		
5.729	-13.3	H	3.0	34.7	1.0	-47.1	-13.0	-34.1		
7.639	-10.0	H	3.0	35.0	1.0	-43.9	-13.0	-30.9		

UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement									
Company:	Samsung								
Project #:	15I21198								
Date:	07/06/15								
Test Engineer:	R.Alegre								
Configuration:	EUT w/ AC Charger + HS								
Mode:	EGPRS850 Harm								
Chamber Pre-amplifier Filter Limit 5m Chamber B 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, 824.2MHz									
1.648	-28.0	V	3.0	37.4	1.0	-64.4	-13.0	-51.4	
2.473	-13.1	V	3.0	36.4	1.0	-48.5	-13.0	-35.5	
3.297	-21.3	V	3.0	35.8	1.0	-56.2	-13.0	-43.2	
1.648	-21.9	H	3.0	37.4	1.0	-58.3	-13.0	-45.3	
2.473	-14.2	H	3.0	36.4	1.0	-49.6	-13.0	-36.6	
3.297	-21.0	H	3.0	35.8	1.0	-55.8	-13.0	-42.8	
Mid Ch, 836.6MHz									
1.673	-27.8	V	3.0	37.3	1.0	-64.1	-13.0	-51.1	
2.510	-17.5	V	3.0	36.4	1.0	-52.9	-13.0	-39.9	
3.346	-21.1	V	3.0	35.8	1.0	-55.8	-13.0	-42.8	
1.673	-26.5	H	3.0	37.3	1.0	-62.9	-13.0	-49.9	
2.510	-20.5	H	3.0	36.4	1.0	-55.8	-13.0	-42.8	
3.346	-21.9	H	3.0	35.8	1.0	-56.6	-13.0	-43.6	
High Ch, 848.8MHz									
1.698	-27.4	V	3.0	37.3	1.0	-63.7	-13.0	-50.7	
2.547	-20.4	V	3.0	36.3	1.0	-55.7	-13.0	-42.7	
3.395	-21.3	V	3.0	35.7	1.0	-56.0	-13.0	-43.0	
1.698	-22.4	H	3.0	37.3	1.0	-58.7	-13.0	-45.7	
2.547	-22.4	H	3.0	36.3	1.0	-57.8	-13.0	-44.8	
3.395	-21.3	H	3.0	35.7	1.0	-56.0	-13.0	-43.0	
Rev. 03.03.09 Note: No other emissions were detected above the system noise floor.									

UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement									
Company:		Samsung							
Project #:		15I21198							
Date:		07/06/15							
Test Engineer:		R. Alegre							
Configuration:		EUT w/ AC Charger + HS							
Mode:		GPRS850 Harm							
Chamber 5m Chamber B Pre-amplifier T34 8449B Filter Filter 1 Limit 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, 824.2MHz									
1.648	-27.5	V	3.0	37.4	1.0	-63.9	-13.0	-50.9	
2.473	-11.0	V	3.0	36.4	1.0	-46.4	-13.0	-33.4	
3.297	-21.2	V	3.0	35.8	1.0	-56.0	-13.0	-43.0	
1.648	-20.2	H	3.0	37.4	1.0	-56.6	-13.0	-43.6	
2.473	-12.5	H	3.0	36.4	1.0	-47.9	-13.0	-34.9	
3.297	-20.7	H	3.0	35.8	1.0	-55.5	-13.0	-42.5	
Mid Ch, 836.6MHz									
1.673	-27.1	V	3.0	37.3	1.0	-63.5	-13.0	-50.5	
2.510	-15.5	V	3.0	36.4	1.0	-50.9	-13.0	-37.9	
3.346	-20.8	V	3.0	35.8	1.0	-55.5	-13.0	-42.5	
1.673	-25.9	H	3.0	37.3	1.0	-62.2	-13.0	-49.2	
2.510	-17.0	H	3.0	36.4	1.0	-52.3	-13.0	-39.3	
3.346	-21.8	H	3.0	35.8	1.0	-56.6	-13.0	-43.6	
High Ch, 848.8MHz									
1.698	-26.4	V	3.0	37.3	1.0	-62.7	-13.0	-49.7	
2.547	-19.0	V	3.0	36.3	1.0	-54.4	-13.0	-41.4	
3.395	-20.9	V	3.0	35.7	1.0	-55.6	-13.0	-42.6	
1.698	-21.1	H	3.0	37.3	1.0	-57.4	-13.0	-44.4	
2.547	-20.3	H	3.0	36.3	1.0	-55.6	-13.0	-42.6	
3.395	-20.5	H	3.0	35.7	1.0	-55.2	-13.0	-42.2	
Rev. 03.03.09 Note: No other emissions were detected above the system noise floor.									

WCDMA

UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement										
Company:		Samsung								
Project #:		15I21198								
Date:		07/06/15								
Test Engineer:		R.Alegre								
Configuration:		EUT w/ AC Charger + HS								
Mode:		HSDPA_B5								
		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)	Notes
Band 5	Low Ch, 826.4MHz									
HSDPA	1.653	-27.2	V	3.0	37.4	1.0	-63.6	-13.0	-50.6	
	2.479	-22.2	V	3.0	36.4	1.0	-57.6	-13.0	-44.6	
	3.306	-20.4	V	3.0	35.8	1.0	-55.2	-13.0	-42.2	
	1.653	-26.9	H	3.0	37.4	1.0	-63.3	-13.0	-50.3	
	2.479	-25.1	H	3.0	36.4	1.0	-60.4	-13.0	-47.4	
	3.306	-20.8	H	3.0	35.8	1.0	-55.6	-13.0	-42.6	
	Mid Ch, 836.6MHz									
	1.673	-27.2	V	3.0	37.3	1.0	-63.5	-13.0	-50.5	
	2.510	-22.6	V	3.0	36.4	1.0	-58.0	-13.0	-45.0	
	3.346	-19.6	V	3.0	35.8	1.0	-54.3	-13.0	-41.3	
	1.673	-27.1	H	3.0	37.3	1.0	-63.4	-13.0	-50.4	
	2.510	-25.3	H	3.0	36.4	1.0	-60.7	-13.0	-47.7	
3.346	-20.7	H	3.0	35.8	1.0	-55.5	-13.0	-42.5		
High Ch, 846.6MHz										
1.693	-26.5	V	3.0	37.3	1.0	-62.9	-13.0	-49.9		
2.540	-21.8	V	3.0	36.3	1.0	-57.2	-13.0	-44.2		
3.386	-20.9	V	3.0	35.7	1.0	-55.7	-13.0	-42.7		
1.693	-26.5	H	3.0	37.3	1.0	-62.8	-13.0	-49.8		
2.540	-25.0	H	3.0	36.3	1.0	-60.3	-13.0	-47.3		
3.386	-21.2	H	3.0	35.7	1.0	-55.9	-13.0	-42.9		

UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement										
Company:		Samsung								
Project #:		15I21198								
Date:		07/06/15								
Test Engineer:		R.Alegre								
Configuration:		EUT w/ AC Charger + HS								
Mode:		REL99_B5								
Chamber		Pre-amplifier		Filter		Limit				
5m Chamber B		T348449B		Filter 1		Part 22				
Band	f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Band 5 REL99	Low Ch, 826.4MHz									
	1.653	-27.4	V	3.0	37.4	1.0	-63.7	-13.0	-50.7	
	2.479	-22.5	V	3.0	36.4	1.0	-57.9	-13.0	-44.9	
	3.306	-20.6	V	3.0	35.8	1.0	-55.4	-13.0	-42.4	
	1.653	-26.6	H	3.0	37.4	1.0	-62.9	-13.0	-49.9	
	2.479	-25.0	H	3.0	36.4	1.0	-60.4	-13.0	-47.4	
	3.306	-20.8	H	3.0	35.8	1.0	-55.6	-13.0	-42.6	
	Mid Ch, 836.6MHz									
	1.673	-27.1	V	3.0	37.3	1.0	-63.4	-13.0	-50.4	
	2.510	-22.7	V	3.0	36.4	1.0	-58.1	-13.0	-45.1	
	3.346	-20.6	V	3.0	35.8	1.0	-55.3	-13.0	-42.3	
	1.673	-26.7	H	3.0	37.3	1.0	-63.0	-13.0	-50.0	
	2.510	-25.2	H	3.0	36.4	1.0	-60.6	-13.0	-47.6	
	3.346	-20.6	H	3.0	35.8	1.0	-55.4	-13.0	-42.4	
	High Ch, 846.6MHz									
	1.693	-26.7	V	3.0	37.3	1.0	-63.0	-13.0	-50.0	
	2.540	-22.0	V	3.0	36.3	1.0	-57.3	-13.0	-44.3	
	3.386	-20.8	V	3.0	35.7	1.0	-55.5	-13.0	-42.5	
	1.693	-26.6	H	3.0	37.3	1.0	-62.9	-13.0	-49.9	
	2.540	-25.1	H	3.0	36.3	1.0	-60.5	-13.0	-47.5	
	3.386	-21.0	H	3.0	35.7	1.0	-55.8	-13.0	-42.8	

UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement									
Company:		Samsung							
Project #:		15I21198							
Date:		07/06/15							
Test Engineer:		R.Alegre							
Configuration:		EUT/ AC Charger/ Headset							
Location:		Chamber C							
Mode:		LTE_QPSK Band 5 Harmonics, 10MHz Bandwidth							
f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 829									
1658.00	-27.4	V	3.0	37.0	1.0	-63.5	-13.0	-50.5	
2487.00	-22.9	V	3.0	36.4	1.0	-58.4	-13.0	-45.4	
3316.00	-21.4	V	3.0	36.1	1.0	-56.5	-13.0	-43.5	
1658.00	-28.3	H	3.0	37.0	1.0	-64.3	-13.0	-51.3	
2487.00	-24.5	H	3.0	36.4	1.0	-59.9	-13.0	-46.9	
3316.00	-20.4	H	3.0	36.1	1.0	-55.5	-13.0	-42.5	
Mid Ch, 836.5									
1673.00	-26.8	V	3.0	37.0	1.0	-62.8	-13.0	-49.8	
2509.50	-23.2	V	3.0	36.4	1.0	-58.6	-13.0	-45.6	
3346.00	-20.6	V	3.0	36.1	1.0	-55.7	-13.0	-42.7	
1673.00	-26.9	H	3.0	37.0	1.0	-62.9	-13.0	-49.9	
2509.50	-24.4	H	3.0	36.4	1.0	-59.8	-13.0	-46.8	
3346.00	-21.1	H	3.0	36.1	1.0	-56.2	-13.0	-43.2	
High Ch, 844									
1688.00	-27.7	V	3.0	37.0	1.0	-63.7	-13.0	-50.7	
2532.00	-23.7	V	3.0	36.4	1.0	-59.1	-13.0	-46.1	
3376.00	-20.6	V	3.0	36.1	1.0	-55.7	-13.0	-42.7	
1688.00	-26.5	H	3.0	37.0	1.0	-62.5	-13.0	-49.5	
2532.00	-25.3	H	3.0	36.4	1.0	-60.7	-13.0	-47.7	
3376.00	-21.0	H	3.0	36.1	1.0	-56.1	-13.0	-43.1	

UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement									
Company:		Samsung							
Project #:		15I21198							
Date:		07/06/15							
Test Engineer:		R.Alegre							
Configuration:		EUT/ AC Charger/ Headset							
Location:		Chamber C							
Mode:		LTE_16QAM Band 5 Harmonics, 5MHz Bandwidth							
f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 826.5									
1653.00	-28.0	V	3.0	37.0	1.0	-64.0	-13.0	-51.0	
2479.50	-23.1	V	3.0	36.4	1.0	-58.6	-13.0	-45.6	
3306.00	-20.9	V	3.0	36.1	1.0	-56.0	-13.0	-43.0	
1653.00	-26.8	H	3.0	37.0	1.0	-62.8	-13.0	-49.8	
2479.50	-24.1	H	3.0	36.4	1.0	-59.5	-13.0	-46.5	
3306.00	-20.6	H	3.0	36.1	1.0	-55.7	-13.0	-42.7	
Mid Ch, 836.5									
1673.00	-27.4	V	3.0	37.0	1.0	-63.4	-13.0	-50.4	
2509.50	-23.3	V	3.0	36.4	1.0	-58.7	-13.0	-45.7	
3346.00	-21.9	V	3.0	36.1	1.0	-57.0	-13.0	-44.0	
1673.00	-27.3	H	3.0	37.0	1.0	-63.3	-13.0	-50.3	
2509.50	-25.1	H	3.0	36.4	1.0	-60.5	-13.0	-47.5	
3346.00	-21.2	H	3.0	36.1	1.0	-56.3	-13.0	-43.3	
High Ch, 846.5									
1693.00	-28.1	V	3.0	37.0	1.0	-64.0	-13.0	-51.0	
2539.50	-22.6	V	3.0	36.4	1.0	-58.1	-13.0	-45.1	
3386.00	-20.8	V	3.0	36.1	1.0	-55.9	-13.0	-42.9	
1693.00	-27.5	H	3.0	37.0	1.0	-63.5	-13.0	-50.5	
2539.50	-25.3	H	3.0	36.4	1.0	-60.7	-13.0	-47.7	
3386.00	-21.0	H	3.0	36.1	1.0	-56.1	-13.0	-43.1	

UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement									
Company:		Samsung							
Project #:		15I21198							
Date:		07/06/15							
Test Engineer:		R.Alegre							
Configuration:		EUT/ AC Charger/ Headset							
Location:		Chamber C							
Mode:		LTE_QPSK Band 5 Harmonics, 5MHz Bandwidth							
f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 826.5									
1653.00	-27.7	V	3.0	37.0	1.0	-63.7	-13.0	-50.7	
2479.50	-23.5	V	3.0	36.4	1.0	-58.9	-13.0	-45.9	
3306.00	-21.2	V	3.0	36.1	1.0	-56.4	-13.0	-43.4	
1653.00	-27.0	H	3.0	37.0	1.0	-63.1	-13.0	-50.1	
2479.50	-25.1	H	3.0	36.4	1.0	-60.6	-13.0	-47.6	
3306.00	-20.9	H	3.0	36.1	1.0	-56.0	-13.0	-43.0	
Mid Ch, 836.5									
1673.00	-27.4	V	3.0	37.0	1.0	-63.4	-13.0	-50.4	
2509.50	-23.6	V	3.0	36.4	1.0	-59.0	-13.0	-46.0	
3346.00	-21.2	V	3.0	36.1	1.0	-56.3	-13.0	-43.3	
1673.00	-27.0	H	3.0	37.0	1.0	-63.0	-13.0	-50.0	
2509.50	-25.1	H	3.0	36.4	1.0	-60.5	-13.0	-47.5	
3346.00	-21.8	H	3.0	36.1	1.0	-56.9	-13.0	-43.9	
High Ch, 846.5									
1693.00	-27.7	V	3.0	37.0	1.0	-63.6	-13.0	-50.6	
2539.50	-22.8	V	3.0	36.4	1.0	-58.3	-13.0	-45.3	
3386.00	-20.7	V	3.0	36.1	1.0	-55.8	-13.0	-42.8	
1693.00	-27.0	H	3.0	37.0	1.0	-63.0	-13.0	-50.0	
2539.50	-24.3	H	3.0	36.4	1.0	-59.7	-13.0	-46.7	
3386.00	-21.0	H	3.0	36.1	1.0	-56.1	-13.0	-43.1	

UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement									
Company:		Samsung							
Project #:		15I21198							
Date:		07/06/15							
Test Engineer:		R.Alegre							
Configuration:		EUT/ AC Charger/ Headset							
Location:		Chamber C							
Mode:		LTE_16QAM Band 5 Harmonics, 3MHz Bandwidth							
f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 825.5									
1651.00	-26.5	V	3.0	37.0	1.0	-62.6	-13.0	-49.6	
2476.50	-22.6	V	3.0	36.4	1.0	-58.1	-13.0	-45.1	
3302.00	-20.7	V	3.0	36.2	1.0	-55.8	-13.0	-42.8	
1651.00	-22.3	H	3.0	37.0	1.0	-58.3	-13.0	-45.3	
2476.50	-23.8	H	3.0	36.4	1.0	-59.2	-13.0	-46.2	
3302.00	-21.4	H	3.0	36.2	1.0	-56.6	-13.0	-43.6	
Mid Ch, 836.5									
1673.00	-27.8	V	3.0	37.0	1.0	-63.8	-13.0	-50.8	
2509.50	-23.7	V	3.0	36.4	1.0	-59.1	-13.0	-46.1	
3346.00	-14.4	V	3.0	36.1	1.0	-49.5	-13.0	-36.5	
1673.00	-24.8	H	3.0	37.0	1.0	-60.8	-13.0	-47.8	
2509.50	-25.0	H	3.0	36.4	1.0	-60.4	-13.0	-47.4	
3346.00	-20.3	H	3.0	36.1	1.0	-55.4	-13.0	-42.4	
High Ch, 847.5									
1695.00	-25.9	V	3.0	37.0	1.0	-61.9	-13.0	-48.9	
2542.50	-23.2	V	3.0	36.4	1.0	-58.6	-13.0	-45.6	
3390.00	-19.6	V	3.0	36.1	1.0	-54.6	-13.0	-41.6	
1695.00	-23.9	H	3.0	37.0	1.0	-59.9	-13.0	-46.9	
2542.50	-24.1	H	3.0	36.4	1.0	-59.5	-13.0	-46.5	
3390.00	-21.2	H	3.0	36.1	1.0	-56.3	-13.0	-43.3	

UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement									
Company:		Samsung							
Project #:		15I21198							
Date:		07/06/15							
Test Engineer:		R. Alegre							
Configuration:		EUT/ AC Charger/ Headset							
Location:		Chamber C							
Mode:		LTE_QPSK Band 5 Harmonics, 3MHz Bandwidth							
f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 825.5									
1651.00	-27.5	V	3.0	37.0	1.0	-63.5	-13.0	-50.5	
2476.50	-17.2	V	3.0	36.4	1.0	-52.6	-13.0	-39.6	
3302.00	-20.3	V	3.0	36.2	1.0	-55.5	-13.0	-42.5	
1651.00	-26.2	H	3.0	37.0	1.0	-62.3	-13.0	-49.3	
2476.50	-13.3	H	3.0	36.4	1.0	-48.7	-13.0	-35.7	
3302.00	-21.2	H	3.0	36.2	1.0	-56.4	-13.0	-43.4	
Mid Ch, 836.5									
1673.00	-27.4	V	3.0	37.0	1.0	-63.4	-13.0	-50.4	
2509.50	-22.4	V	3.0	36.4	1.0	-57.8	-13.0	-44.8	
3346.00	-19.0	V	3.0	36.1	1.0	-54.1	-13.0	-41.1	
1673.00	-26.9	H	3.0	37.0	1.0	-62.9	-13.0	-49.9	
2509.50	-18.7	H	3.0	36.4	1.0	-54.1	-13.0	-41.1	
3346.00	-21.3	H	3.0	36.1	1.0	-56.4	-13.0	-43.4	
High Ch, 847.5									
1695.00	-26.1	V	3.0	37.0	1.0	-62.1	-13.0	-49.1	
2542.50	-22.9	V	3.0	36.4	1.0	-58.3	-13.0	-45.3	
3390.00	-20.8	V	3.0	36.1	1.0	-55.9	-13.0	-42.9	
1695.00	-25.8	H	3.0	37.0	1.0	-61.8	-13.0	-48.8	
2542.50	-24.1	H	3.0	36.4	1.0	-59.5	-13.0	-46.5	
3390.00	-20.1	H	3.0	36.1	1.0	-55.2	-13.0	-42.2	

UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement									
Company:		Samsung							
Project #:		15I21198							
Date:		07/06/15							
Test Engineer:		R.Alegre							
Configuration:		EUT/ AC Charger/ Headset							
Location:		Chamber C							
Mode:		LTE_16QAM Band 5 Harmonics, 1.4MHz Bandwidth							
f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 824.7									
1649.40	-26.6	V	3.0	37.0	1.0	-62.6	-13.0	-49.6	
2474.10	-22.7	V	3.0	36.4	1.0	-58.1	-13.0	-45.1	
3298.80	-20.8	V	3.0	36.2	1.0	-56.0	-13.0	-43.0	
1649.40	-22.3	H	3.0	37.0	1.0	-58.3	-13.0	-45.3	
2474.10	-24.0	H	3.0	36.4	1.0	-59.5	-13.0	-46.5	
3298.80	-21.4	H	3.0	36.2	1.0	-56.5	-13.0	-43.5	
Mid Ch, 836.5									
1673.00	-27.8	V	3.0	37.0	1.0	-63.8	-13.0	-50.8	
2509.50	-23.5	V	3.0	36.4	1.0	-58.9	-13.0	-45.9	
3346.00	-14.7	V	3.0	36.1	1.0	-49.8	-13.0	-36.8	
1673.00	-24.8	H	3.0	37.0	1.0	-60.8	-13.0	-47.8	
2509.50	-25.0	H	3.0	36.4	1.0	-60.4	-13.0	-47.4	
3346.00	-20.3	H	3.0	36.1	1.0	-55.5	-13.0	-42.5	
High Ch, 848.3									
1696.60	-25.5	V	3.0	37.0	1.0	-61.5	-13.0	-48.5	
2544.90	-23.1	V	3.0	36.4	1.0	-58.5	-13.0	-45.5	
3393.20	-19.5	V	3.0	36.1	1.0	-54.5	-13.0	-41.5	
1696.60	-23.7	H	3.0	37.0	1.0	-59.7	-13.0	-46.7	
2544.90	-24.1	H	3.0	36.4	1.0	-59.5	-13.0	-46.5	
3393.20	-21.4	H	3.0	36.1	1.0	-56.4	-13.0	-43.4	

UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement									
Company:		Samsung							
Project #:		15I21198							
Date:		07/06/15							
Test Engineer:		R.Alegre							
Configuration:		EUT/ AC Charger/ Headset							
Location:		Chamber C							
Mode:		LTE_QPSK Band 5 Harmonics, 1.4MHz Bandwidth							
f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 824.7									
1649.40	-27.7	V	3.0	37.0	1.0	-63.7	-13.0	-50.7	
2474.10	-16.9	V	3.0	36.4	1.0	-52.3	-13.0	-39.3	
3298.80	-20.5	V	3.0	36.2	1.0	-55.7	-13.0	-42.7	
1649.40	-26.3	H	3.0	37.0	1.0	-62.3	-13.0	-49.3	
2474.10	-12.2	H	3.0	36.4	1.0	-47.6	-13.0	-34.6	
3298.80	-21.4	H	3.0	36.2	1.0	-56.5	-13.0	-43.5	
Mid Ch, 836.5									
1673.00	-27.2	V	3.0	37.0	1.0	-63.2	-13.0	-50.2	
2509.50	-22.4	V	3.0	36.4	1.0	-57.8	-13.0	-44.8	
3346.00	-19.2	V	3.0	36.1	1.0	-54.3	-13.0	-41.3	
1673.00	-27.0	H	3.0	37.0	1.0	-63.0	-13.0	-50.0	
2509.50	-18.3	H	3.0	36.4	1.0	-53.7	-13.0	-40.7	
3346.00	-21.2	H	3.0	36.1	1.0	-56.3	-13.0	-43.3	
High Ch, 848.3									
1696.60	-26.0	V	3.0	37.0	1.0	-62.0	-13.0	-49.0	
2544.90	-22.9	V	3.0	36.4	1.0	-58.3	-13.0	-45.3	
3393.20	-20.7	V	3.0	36.1	1.0	-55.8	-13.0	-42.8	
1696.60	-25.6	H	3.0	37.0	1.0	-61.6	-13.0	-48.6	
2544.90	-24.0	H	3.0	36.4	1.0	-59.4	-13.0	-46.4	
3393.20	-20.2	H	3.0	36.1	1.0	-55.3	-13.0	-42.3	