



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

CERTIFICATION TEST REPORT

FOR

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

MODEL NUMBER: SM-A500K, SM-A500L, SM-A500S

FCC ID: A3LSMA500KOR

REPORT NUMBER: 14U19262-E1

ISSUE DATE: NOVEMBER 18, 2014

Prepared for
SAMSUNG ELECTRONICS CO., LTD.
416, MAETAN 3-DONG, YEONGTONG-GU
SUWON-CITY, GYEONGGI-DO 443-742, SOUTH KOREA

Prepared by
UL VERIFICATION SERVICES INC.
47173 BENICIA STREET
FREMONT, CA 94538, U.S.A.
TEL: (510) 771-1000
FAX: (510) 661-0888



NVLAP LAB CODE 200065-0

Revision History

Issue			
Rev.	Date	Revisions	Revised By
--	11/18/14	Initial issue	P. Zhang

TABLE OF CONTENTS

1.	ATTESTATION OF TEST RESULT	5
2.	TEST METHODOLOGY	6
3.	FACILITIES AND ACCREDITATION	6
4.	CALIBRATION AND UNCERTAINTY	7
4.1.	MEASURING INSTRUMENT CALIBRATION	7
4.2.	SAMPLE CALCULATION	7
4.3.	MEASUREMENT UNCERTAINTY	7
5.	EQUIPMENT UNDER TEST	8
5.1.	DESCRIPTION OF EUT	8
5.2.	MAXIMUM OUTPUT POWER.....	8
5.3.	MAXIMUM OUTPUT POWER (LTE).....	9
5.4.	DESCRIPTION OF AVAILABLE ANTENNAS	11
5.5.	DESCRIPTION OF TEST SETUP.....	12
6.	TEST AND MEASUREMENT EQUIPMENT.....	15
7.	Summary Table.....	16
8.	RF POWER OUTPUT VERIFICATION.....	17
8.1.	GSM/GPRS/EDGE	17
8.1.1.	GSM OUTPUT POWER RESULT	18
8.2.	UMTS REL 99.....	19
8.2.1.	UMTS REL 99 OUTPUT POWER RESULT	19
8.3.	UMTS HSDPA	20
8.3.1.	UMTS HSDPA OUTPUT POWER RESULT.....	21
8.4.	UMTS HSUPA	22
8.4.1.	UMTS HSUPA OUTPUT POWER RESULT.....	23
8.5.	LTE OUTPUT VERIFICATION.....	24
8.5.1.	LTE OUTPUT RESULT	24
9.	PEAK TO AVERAGE RATIO	27
9.1.	CONDUCTED PEAK TO AVERAGE RESULT.....	27
10.	LIMITS AND CONDUCTED RESULTS.....	33
10.1.	OCCUPIED BANDWIDTH.....	33
10.1.1.	OCCUPIED BANDWIDTH RESULTS.....	34
10.1.2.	LTE OCCUPIED BANDWIDTH RESULTS	35

10.1.1.	OCCUPIED BANDWIDTH PLOTS	37
10.2.	BAND EDGE EMISSIONS	43
10.2.1.	BAND EDGE PLOTS	44
10.3.	OUT OF BAND EMISSIONS	59
10.3.1.	OUT OF BAND EMISSIONS RESULT	60
	OUT OF BAND EMISSIONS RESULT	63
10.4.	FREQUENCY STABILITY	69
10.4.1.	FREQUENCY STABILITY RESULTS	70
11.	RADIATED TEST RESULTS	73
11.1.	RADIATED POWER (ERP & EIRP).....	73
11.1.1.	ERP/EIRP Results.....	74
11.1.2.	LTE ERP/EIRP Results	75
11.1.3.	ERP/EIRP DATA.....	77
11.2.	FIELD STRENGTH OF SPURIOUS RADIATION	94
11.2.1.	SPURIOUS RADIATION DATA.....	95
12.	SETUP PHOTOS	112

1. ATTESTATION OF TEST RESULT

COMPANY NAME: SAMSUNG ELECTRONICS CO., LTD.
EUT DESCRIPTION: GSM/WCDMA/LTE Phone + Bluetooth, DTS/UNII a/b/g/n, ANT+ & NFC
MODEL: SM-A500K, SM-A500L, SM-A500S
SERIAL NUMBER: 1992967 (Radiated); 1992964 (Conducted)
DATE TESTED: NOVEMBER 7-18, 2014

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

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

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

Approved & Released For
UL Verification Services Inc. By:



PENG ZHANG
CONSUMER TECHNOLOGY DIVISION
PROJECT LEAD
UL Verification Services Inc.

Tested By:



STEVEN TRAN
CONSUMER TECHNOLOGY DIVISION
LAB ENGINEER
UL Verification Services Inc.

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

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

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

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

4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

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

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

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

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 1000 MHz	4.94 dB
Radiated Disturbance, 1GHz to 40GHz	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, DTS/UNII a/b/g/n, ANT+ & NFC.

5.2. MAXIMUM OUTPUT POWER

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

FCC Part 22/2 4/27						
Band	Frequency Range(MHz)	Modulation	Conducted		Radiated	
			AVG	mW	AVG	mW
GSM1900	1850~1910	GMSK	30.1	1023.29		
	1850~1910	GPRS	30.1	1023.29	28.29	674.53
Band 5	824~849	REL99	22.4	173.78	19.34	85.92
	824~849	HSDPA	21.4	138.04	18.24	66.7
	824~849	HSUPA	21.3	134.90		
Band 2	1850~1910	REL99	23.2	208.93	20.83	121.03
	1850~1910	HSDPA	21.5	141.25	19.48	88.8
	1850~1910	HSUPA	21.3	134.90		

5.3. MAXIMUM OUTPUT POWER (LTE)

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

FCC Part 22/2 4/27							
Band	Frequency Range(MHz)	BandWidth (MHz)	Modulation	Conducted		Radiated	
				AVG	mW	AVG	mW
LTE17	704~716	10MHz	QPSK	22.7	186.21	6.91	4.91
	704~716	10MHz	16QAM	21.5	141.25	6.43	4.40

FCC Part 22/2 4/27							
Band	Frequency Range(MHz)	BandWidth (MHz)	Modulation	Conducted		Radiated	
				AVG	mW	AVG	mW
LTE17	704~716	5MHz	QPSK	22.6	181.97	7.23	5.28
	704~716	5MHz	16QAM	21.7	147.91	6.05	4.02

FCC Part 22/2 4/27							
Band	Frequency Range(MHz)	BandWidth (MHz)	Modulation	Conducted		Radiated	
				AVG	mW	AVG	mW
LTE5	824~849	10MHz	QPSK	23.3	213.80	20.14	103.3
	824~849	10MHz	16QAM	22.3	169.82	19.29	84.94

FCC Part 22/2 4/27							
Band	Frequency Range(MHz)	BandWidth (MHz)	Modulation	Conducted		Radiated	
				AVG	mW	AVG	mW
LTE5	824~849	5MHz	QPSK	23.5	223.87	20.25	105.95
	824~849	5MHz	16QAM	22.5	177.83	19.60	91.22

FCC Part 22/2 4/27							
Band	Frequency Range(MHz)	BandWidth (MHz)	Modulation	Conducted		Radiated	
				AVG	mW	AVG	mW
LTE5	824~849	3MHz	QPSK	23.4	218.78	20.31	107.42
	824~849	3MHz	16QAM	22.5	177.83	19.74	94.21

FCC Part 22/2 4/27							
Band	Frequency Range(MHz)	BandWidth (MHz)	Modulation	Conducted		Radiated	
				AVG	mW	AVG	mW
LTE5	824~849	1.4MHz	QPSK	23.2	208.93	20.32	107.67
	824~849	1.4MHz	16QAM	22.5	177.83	19.81	95.74

5.4. DESCRIPTION OF AVAILABLE ANTENNAS

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

Frequency (MHz)	Peak Gain (dBi)
Band 5, 824~849MHz	-1.52
Band 2, 1850~1910MHz	3.81
LTE17, 704~716MHz	-5.77

5.5. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
AC Adapter	SAMSUNG	EP-TA50KWK	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

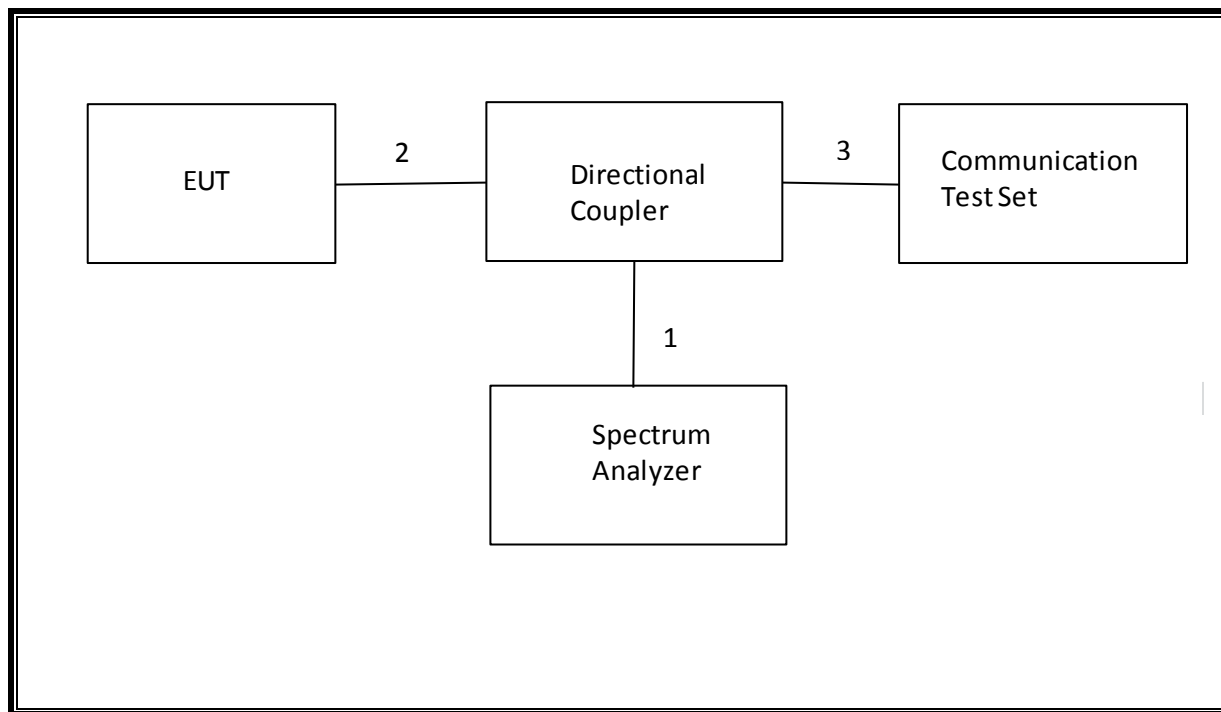
I/O CABLES (RADIATED SETUP)

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

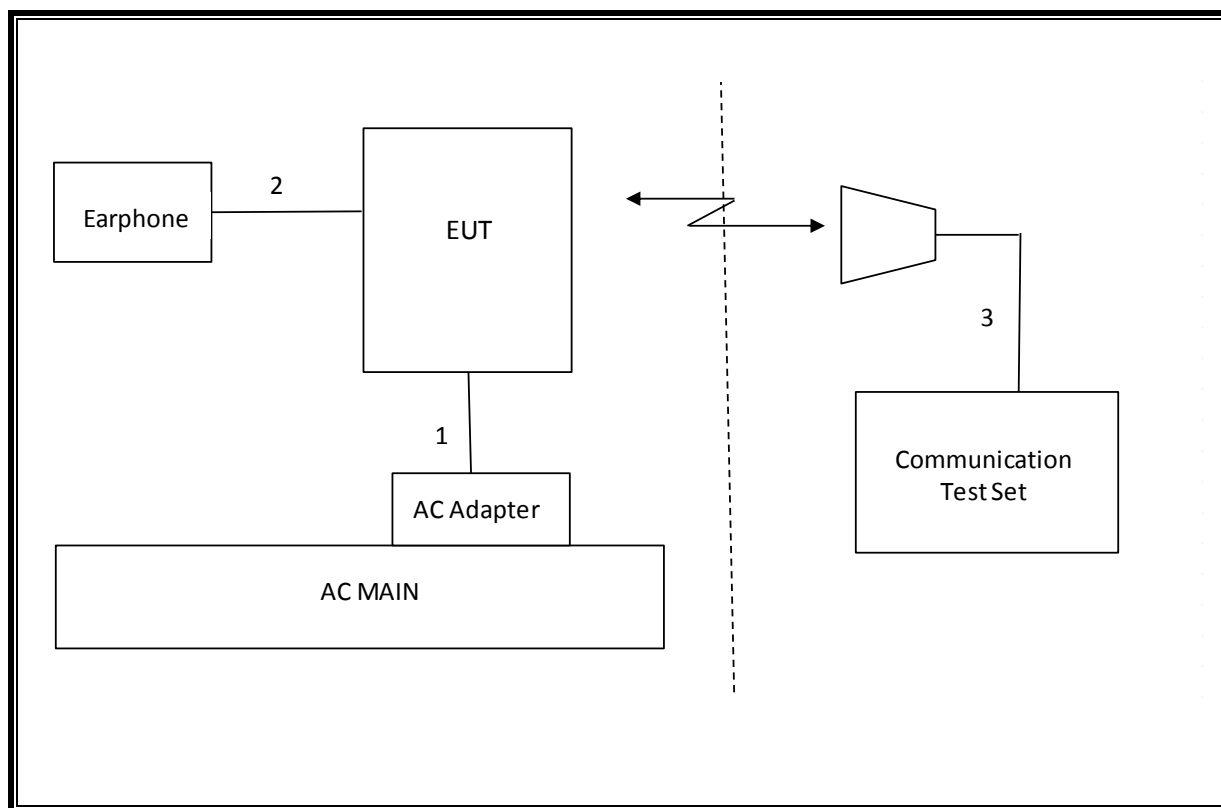
TEST SETUP

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	02/26/15
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	01/09/15
Communications Test Set	R&S	CMW500	T159	07/02/15
DC power supply, 8 V @ 3 A or 15 V	Agilent / HP	E3610A	None	CNR
Vector signal generator, 6 GHz	Agilent / HP	E4438C	None	07/06/15
Antenna, Tuned Dipole 400~1000	ETS	3121C DB4	C00993	02/14/15
Directional Coupler	Pasternack	PE2213-10	None	CNR
Antenna, Horn, 26.5 GHz	ARA	MWH-1826/B	C00589	12/17/14

7. Summary Table

FCC Part Section	RSS Section(s)	Test Description	Test Limit	Test Condition	Test Result	Worst Case
2.1049	N/A	Occupied Band width (99%)	N/A	Conducted	Pass	8.99 MHz
22.917(a) 24.238(a) 27.53(g) 90.691	RSS-132(4.5.1) RSS-133(6.5.1) RSS-139(6.5.1)	Band Edge / Conducted Spurious Emission	-13dBm		Pass	-14.62 dBm
2.1046	N/A	Conducted output power	N/A		Pass	30.1 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	0.017 PPM
22.913(a)(2)	RSS-132(4.4)	Effective Radiated Power	38 dBm	Radiated	Pass	20.32dBm
27.50(b)(10)	N/A		34.77 dBm		Pass	7.23 dBm
24.232(c) 27.50(h)(2)	RSS-133(6.4) RSS-199(4.4)	Equivalent Isotropic Radiated Power	33dBm		Pass	28.29dBm
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	-29.5 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

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)
GSM1900	GMSK	512	1850.2	29.7			
		661	1880	30.1			
		810	1909.8	30.1			
	GPRS	512	1850.2	29.7	28.0	27.0	24.3
		661	1880	30.1	28.0	27.3	24.5
		810	1909.8	30.1	28.0	27.4	24.4

8.2. UMTS REL 99

TEST PROCEDURE

The following summary of these settings are illustrated below:

	Mode	Rel99
	Subtest	-
WCDMA General Settings	Loopback Mode	Test Mode 1
	Rel99 RMC	12.2kbps RMC
	HSDPA FRC	Not Applicable
	HSUPA Test	Not Applicable
	Power Control Algorithm	Algorithm2
	β_c	Not Applicable
	β_d	Not Applicable
	β_{ec}	Not Applicable
	β_c/β_d	8/15
	β_{hs}	Not Applicable
	β_{ed}	Not Applicable

8.2.1. UMTS REL 99 OUTPUT POWER RESULT

Band	Mode	Ch.	f(MHz)	Conducted Power (dBm)
				Avg (dBm)
Band 5	REL99	4132	826.4	22.2
		4183	836.6	22.4
		4233	846.6	22.4
Band 2	REL99	9262	1852.4	23.1
		9400	1880	23.1
		9538	1907.6	23.2

8.3. UMTS HSDPA

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

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

8.3.1. UMTS HSDPA OUTPUT POWER RESULT

Band	Mode	Subset	Ch.	f(MHz)	Conducted Power (dBm)
					Avg (dBm)
Band 5	HSDPA	1	4132	826.4	21.2
			4183	836.6	21.3
			4233	846.6	21.4
		2	4132	826.4	21.2
			4183	836.6	21.3
			4233	846.6	21.3
		3	4132	826.4	20.5
			4183	836.6	20.7
			4233	846.6	20.8
		4	4132	826.4	20.8
			4183	836.6	20.9
			4233	846.6	20.8
Band 2	HSDPA	1	9262	1852.4	21.2
			9400	1880	21.2
			9538	1907.6	21.5
		2	9262	1852.4	21.2
			9400	1880	21.5
			9538	1907.6	21.3
		3	9262	1852.4	21.2
			9400	1880	21.3
			9538	1907.6	21.3
		4	9262	1852.4	21.3
			9400	1880	21.0
			9538	1907.6	21.1

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				
	CQI Repetition Factor (Table 5.2B.4)	2				
HSUPA Specific Settings	Ahs = β_{hs}/β_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	21.0
			4183	836.6	21.3
			4233	846.6	21.2
		2	4132	826.4	19.6
			4183	836.6	19.7
			4233	846.6	19.7
		3	4132	826.4	20.1
			4183	836.6	20.3
			4233	846.6	20.3
		4	4132	826.4	20.0
			4183	836.6	20.4
			4233	846.6	20.5
		5	4132	826.4	21.2
			4183	836.6	21.3
			4233	846.6	21.2
Band 2	HSUPA	1	9262	1852.4	20.6
			9400	1880	20.5
			9538	1907.6	21.1
		2	9262	1852.4	20.2
			9400	1880	20.2
			9538	1907.6	20.2
		3	9262	1852.4	20.8
			9400	1880	20.7
			9538	1907.6	20.8
		4	9262	1852.4	20.4
			9400	1880	20.4
			9538	1907.6	20.4
		5	9262	1852.4	21.2
			9400	1880	21.3
			9538	1907.6	21.3

8.5. LTE OUTPUT VERIFICATION

8.5.1. LTE OUTPUT RESULT

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Avg Pwr (dBm)
						23790
						710 MHz
LTE Band 17	10	QPSK	1	0	0	22.7
			1	24	0	22.3
			1	49	0	22.5
			25	0	1	21.5
			25	12	1	21.5
			25	24	1	21.5
			50	0	1	21.5
		16QAM	1	0	1	21.5
			1	24	1	21.5
			1	49	1	21.5
			25	0	2	20.5
			25	12	2	20.6
			25	24	2	20.6
			50	0	2	20.5
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Avg Pwr (dBm)
						23790
						710 MHz
LTE Band 17	5	QPSK	1	0	0	22.0
			1	12	0	22.6
			1	24	0	22.4
			12	0	1	21.3
			12	6	1	21.4
			12	11	1	21.4
			25	0	1	21.4
		16QAM	1	0	1	21.2
			1	12	1	21.7
			1	24	1	21.2
			12	0	2	20.4
			12	6	2	20.6
			12	11	2	20.6
			25	0	2	20.6

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Avg Pwr (dBm)		
						20450	20525	20600
						829 MHz	836.5 MHz	844 MHz
LTE Band 5	10	QPSK	1	0	0	23.2	23.3	23.3
			1	24	0	23.3	23.2	23.2
			1	49	0	23.1	23.1	23.0
			25	0	1	22.3	22.3	22.2
			25	12	1	22.2	22.3	22.2
			25	24	1	22.3	22.2	22.2
			50	0	1	22.3	22.3	22.1
		16QAM	1	0	1	22.3	22.3	22.1
			1	24	1	22.1	22.2	22.0
			1	49	1	22.5	22.3	22.1
			25	0	2	21.2	21.3	21.3
			25	12	2	21.2	21.3	21.3
			25	24	2	21.2	21.3	21.3
			50	0	2	21.2	21.3	21.2
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	23.0	23.4	23.3
			1	12	0	23.0	23.3	23.5
			1	24	0	23.0	23.2	23.0
			12	0	1	22.1	22.3	22.3
			12	6	1	22.2	22.2	22.1
			12	11	1	22.3	22.2	22.1
			25	0	1	22.3	22.3	22.2
		16QAM	1	0	1	22.3	22.5	22.5
			1	12	1	22.4	22.5	22.5
			1	24	1	22.4	22.3	22.5
			12	0	2	21.2	21.4	21.3
			12	6	2	21.2	21.3	21.2
			12	11	2	21.3	21.3	21.1
			25	0	2	21.3	21.3	21.2

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	23.1	23.0	23.1
			1	7	0	23.3	23.4	23.4
			1	14	0	23.1	23.1	23.0
			6	0	1	22.2	22.3	22.0
			6	3	1	22.1	22.2	22.0
			6	5	1	22.0	22.2	22.2
			15	0	1	22.1	22.3	22.0
		16QAM	1	0	1	22.4	22.5	22.2
			1	7	1	22.4	22.2	22.4
			1	14	1	22.2	22.5	22.4
			6	0	2	21.2	21.3	21.2
			6	3	2	21.2	21.0	21.2
			6	5	2	21.1	21.0	21.4
			15	0	2	21.2	21.3	21.1
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	23.1	23.1	23.0
			1	2	0	23.2	23.2	23.1
			1	5	0	23.2	23.1	23.0
			3	0	0	23.2	23.1	23.2
			3	1	0	23.1	23.2	23.2
			3	2	0	23.1	23.1	23.2
			6	0	1	22.1	22.1	22.1
		16QAM	1	0	1	22.5	22.5	22.4
			1	2	1	22.5	22.5	22.3
			1	5	1	22.5	22.5	22.0
			3	0	1	22.0	22.0	22.1
			3	1	1	22.0	22.1	22.2
			3	2	1	22.1	22.1	22.5
			6	0	2	21.4	21.1	21.4

9. PEAK TO AVERAGE RATIO

Test Procedure

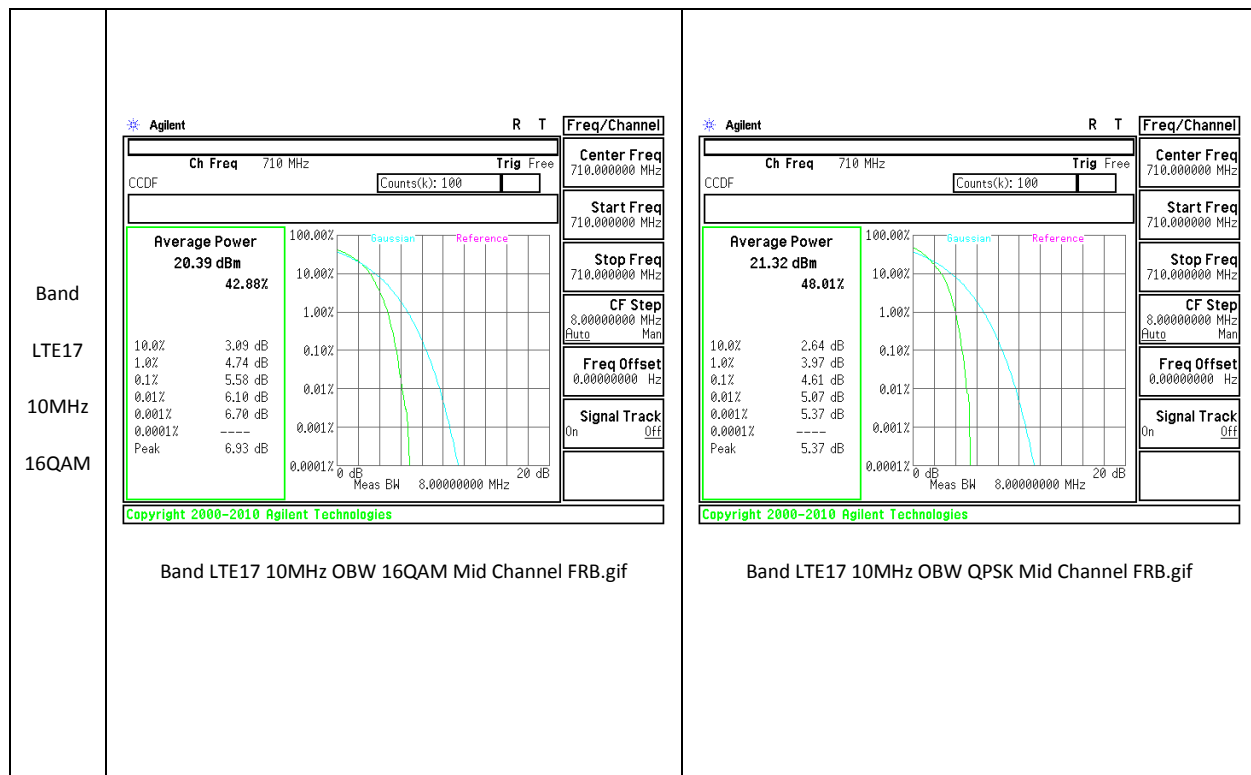
Per KDB 971168 D01 Power Meas License Digital Systems v02r01

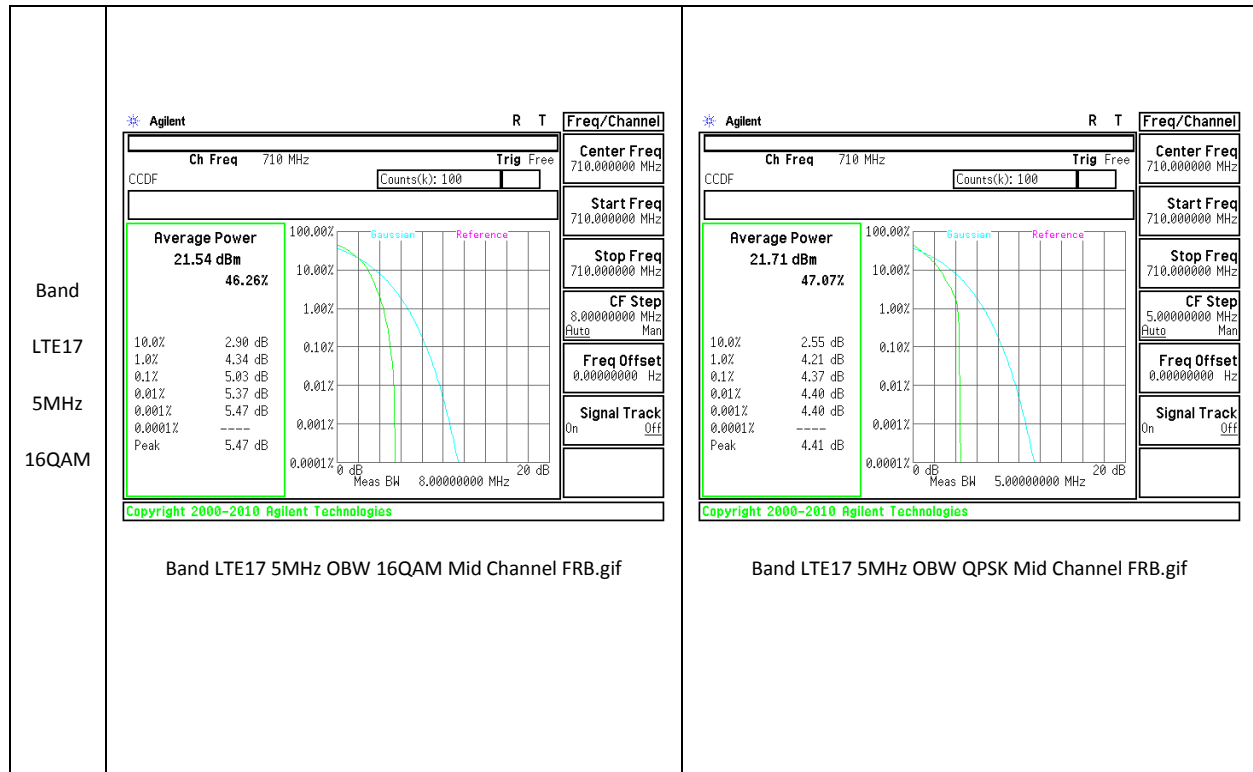
Test Spec

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

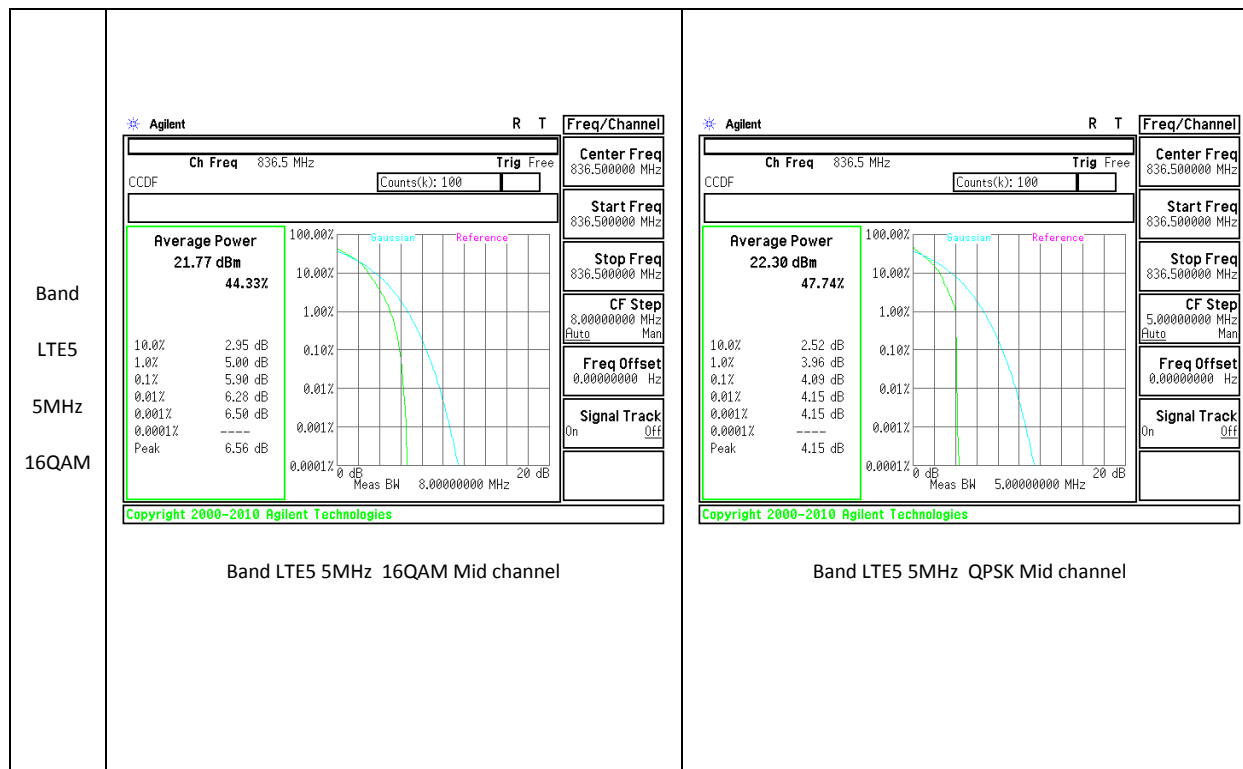
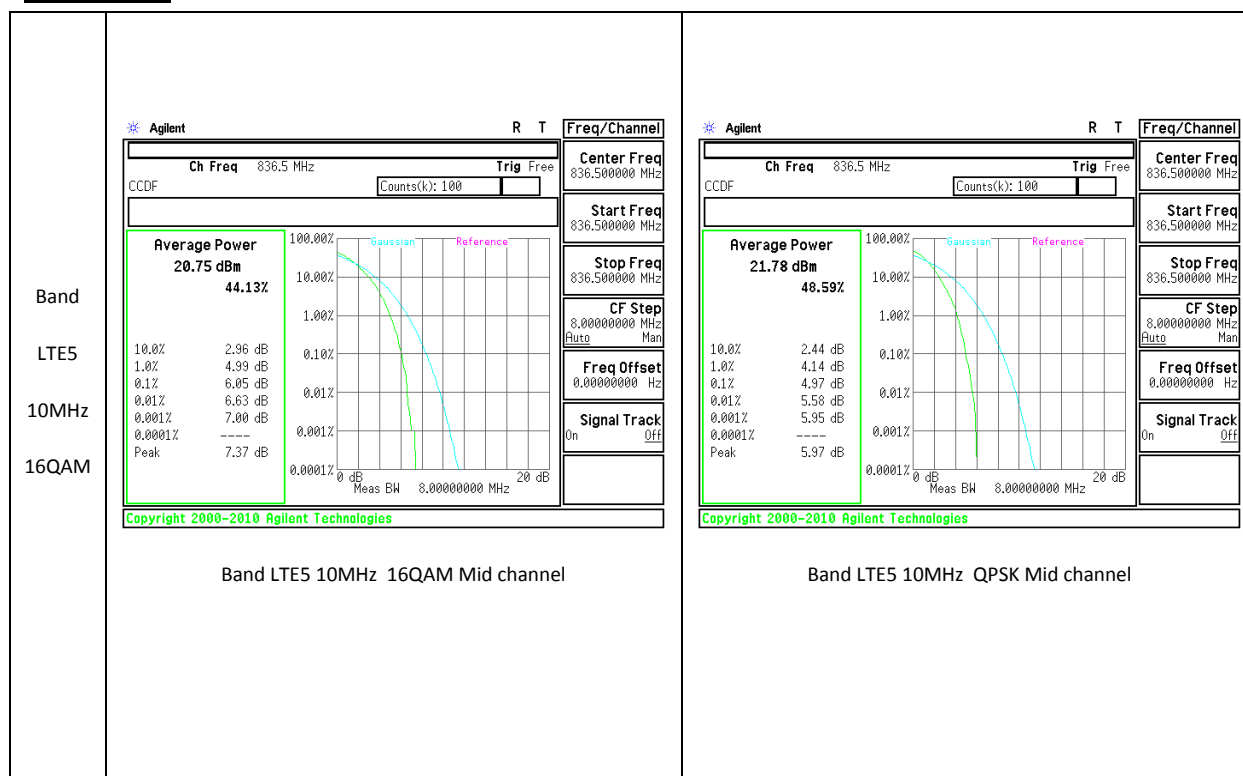
9.1. CONDUCTED PEAK TO AVERAGE RESULT

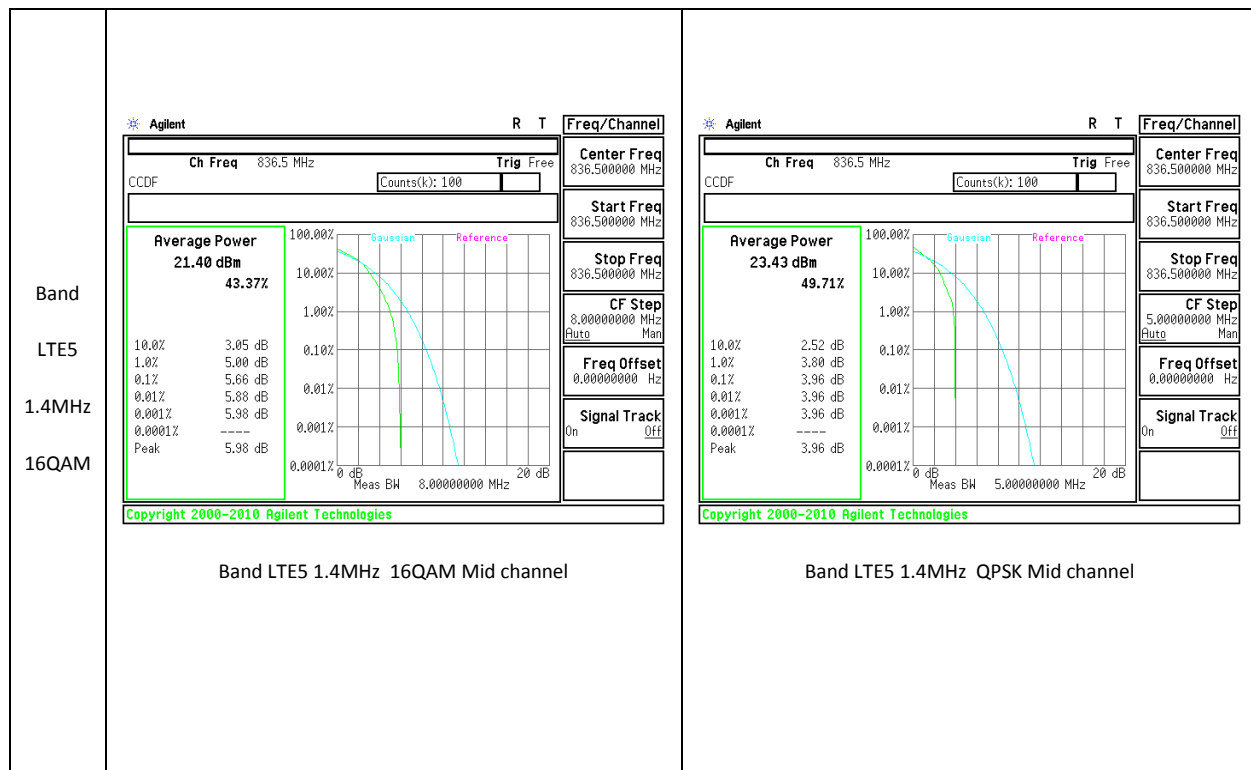
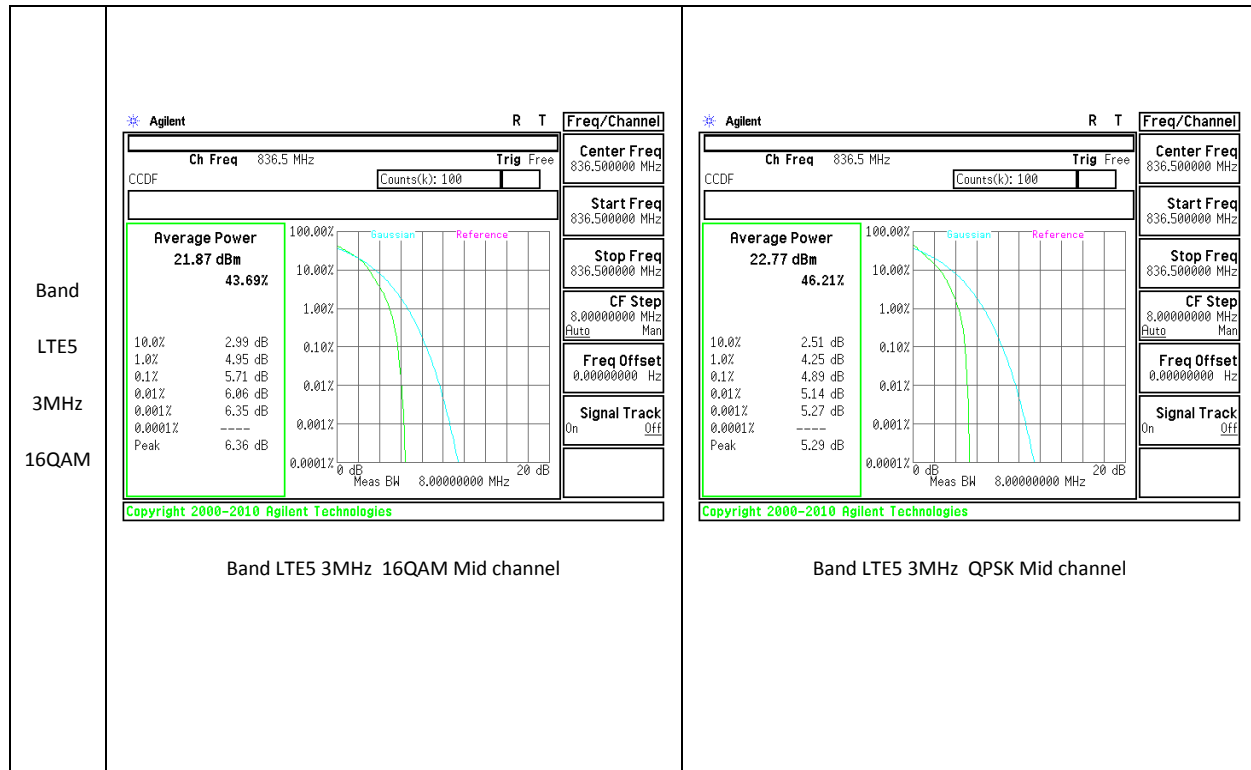
LTE Band 17



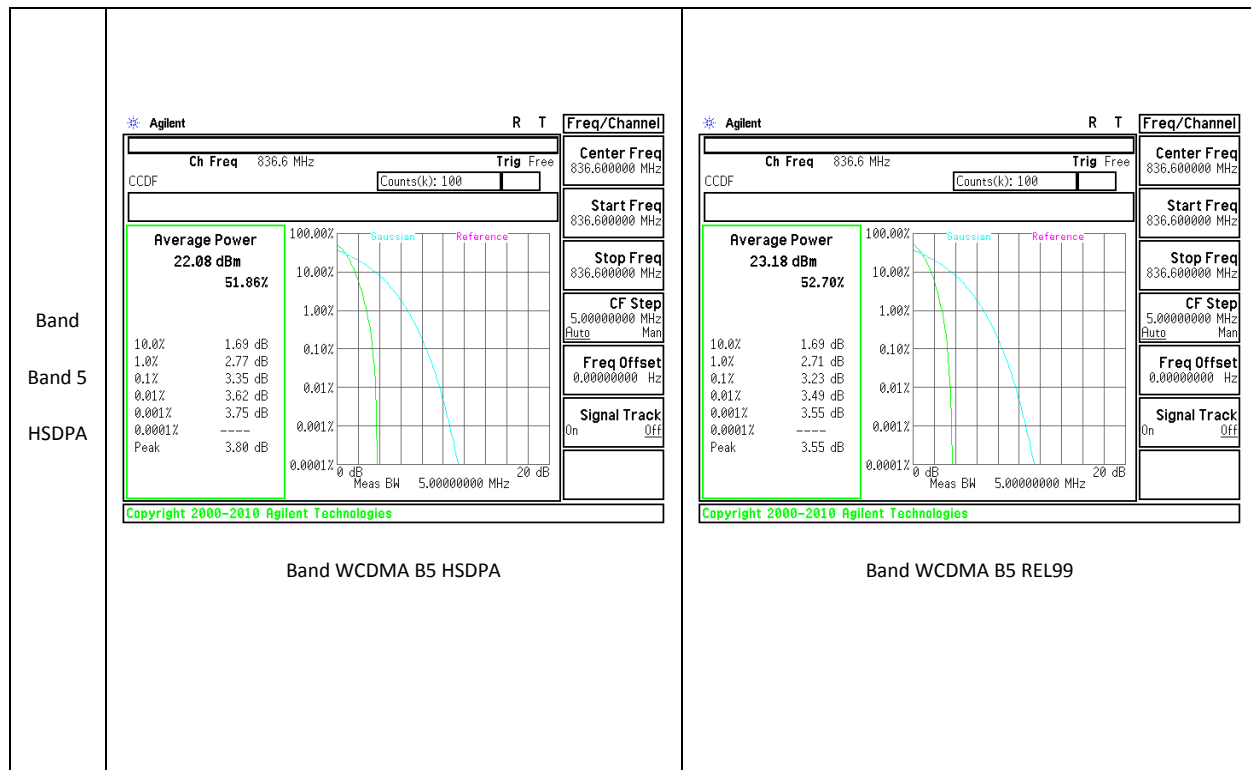
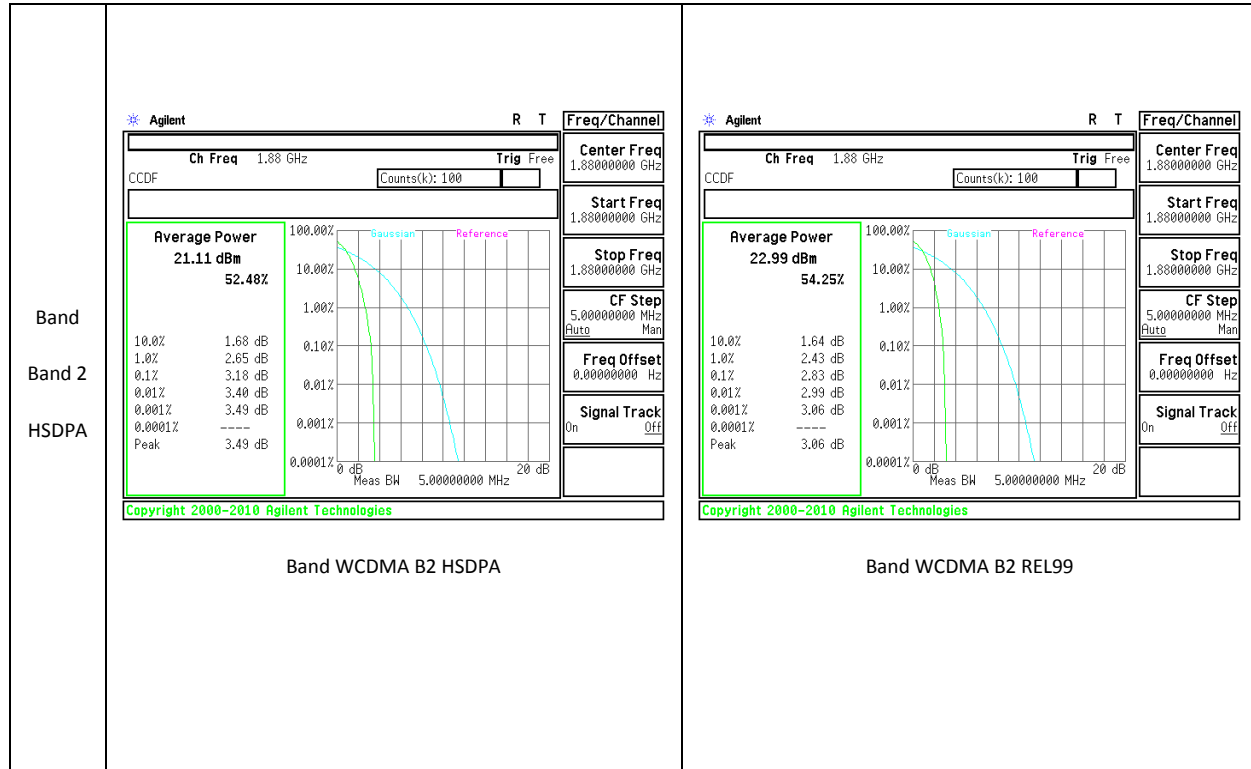


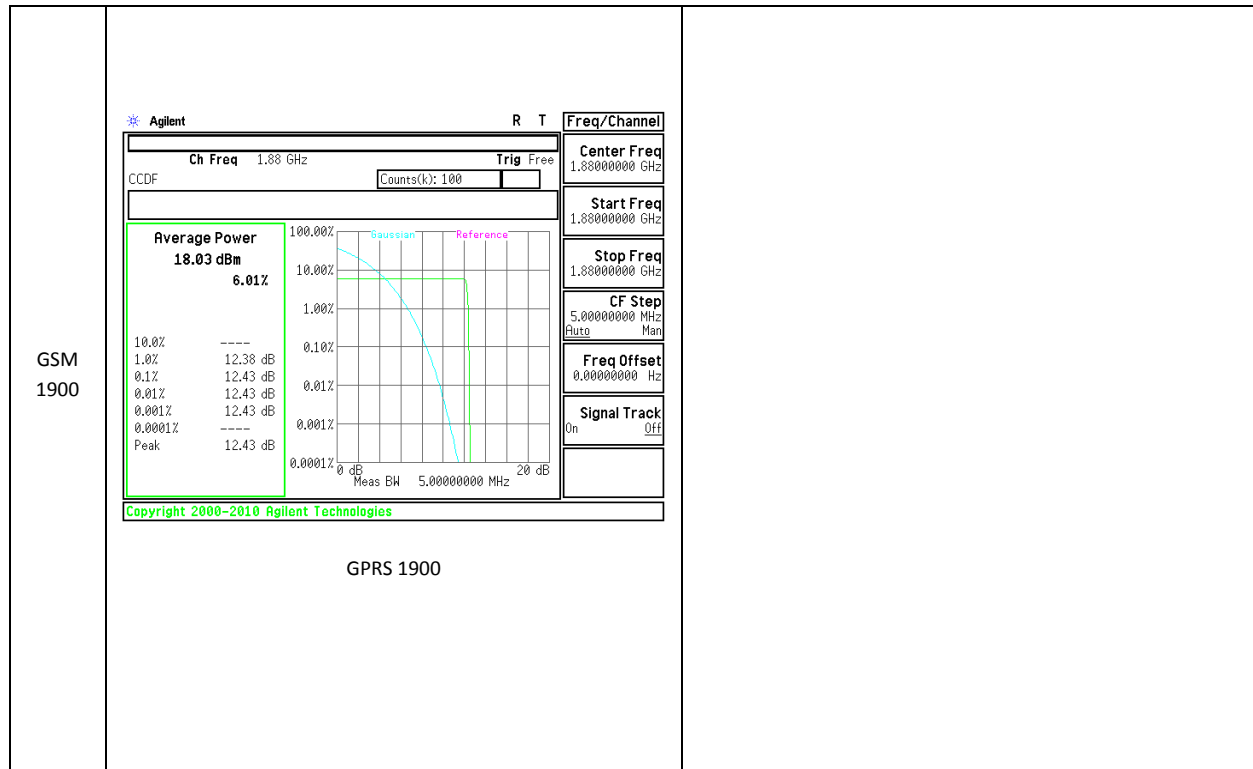
LTE Band 5





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 v02r01 - 06/07/2013)

MODES TESTED

WCDMA, GSM, LTE

10.1.1. OCCUPIED BANDWIDTH RESULTS

Band	Mode	Channel	f (MHz)	99% BW (kHz)	-26dB BW (kHz)
GSM 1900	GPRS	512	1850.2	247.0	315.9
		661	1880	249.6	327.5
		810	1909.8	251.1	317.5
Band	Mode	Channel	f (MHz)	99% BW (MHz)	-26dB BW (MHz)
WCDMA Band 5	REL99	4132	826.4	4.153	4.631
		4183	836.6	4.137	4.635
		4233	846.6	4.153	4.641
	HSDPA	4132	826.4	4.155	4.637
		4183	836.6	4.140	4.632
		4233	846.6	4.173	4.646
WCDMA Band 2	REL99	9262	1852.4	4.195	4.653
		9400	1880	4.186	4.657
		9538	1907.6	4.197	4.650
	HSDPA	9262	1852.4	4.163	4.655
		9400	1880	4.198	4.635
		9538	1907.6	4.183	4.651

10.1.2. LTE OCCUPIED BANDWIDTH RESULTS

Band	BW(MHz)	Mode	RB/RB Size	f (MHz)	99% BW (MHz)	-26dB BW
LTE17	10	QPSK	50/0	709	8.978	9.927
			50/0	710	8.99	9.79
			50/0	711	8.958	9.843
		16QAM	50/0	709	8.954	9.63
			50/0	710	8.933	9.663
			50/0	711	8.943	9.634

Band	BW(MHz)	Mode	RB/RB Size	f (MHz)	99% BW (MHz)	-26dB BW
LTE17	5	QPSK	25/0	706.5	4.507	4.926
			25/0	710	4.532	5.004
			25/0	713.5	4.497	4.977
		16QAM	25/0	706.5	4.514	4.986
			25/0	710	4.5	4.931
			25/0	713.5	4.5	4.956

Band	BW(MHz)	Mode	RB/RB Size	f (MHz)	99% BW (MHz)	-26dB BW
LTE5	10	QPSK	50/0	829	8.973	9.913
			50/0	836.5	8.96	9.77
			50/0	844	8.977	9.704
		16QAM	50/0	829	8.963	9.817
			50/0	836.5	8.963	9.662
			50/0	844	8.962	9.893

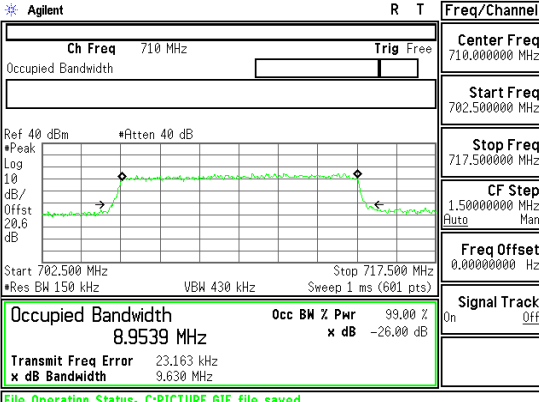
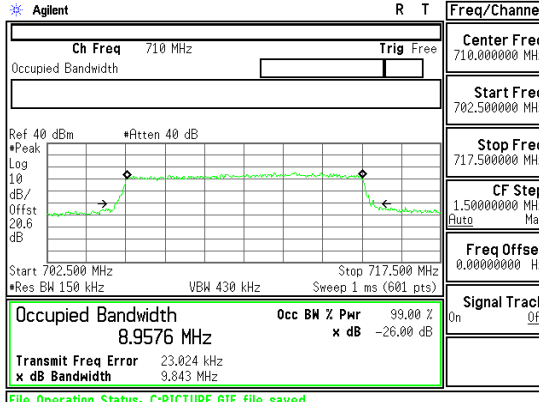
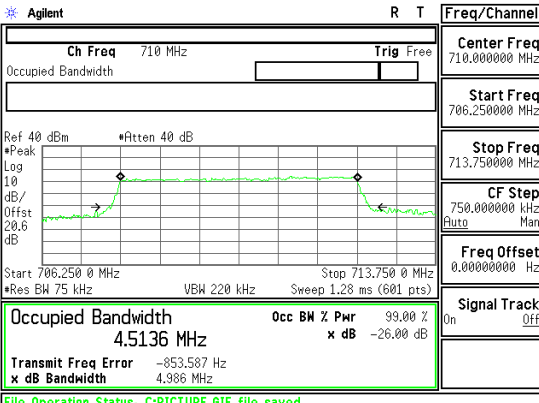
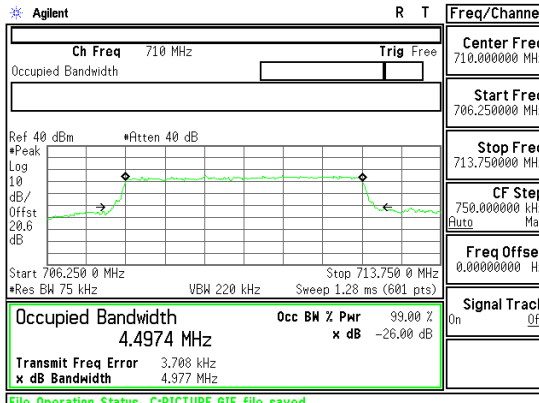
Band	BW(MHz)	Mode	RB/RB Size	f (MHz)	99% BW (MHz)	-26dB BW
LTE5	5	QPSK	25/0	826.5	4.500	4.932
			25/0	836.5	4.520	4.966
			25/0	846.5	4.503	5.009
		16QAM	25/0	826.5	4.511	4.947
			25/0	836.5	4.498	4.950
			25/0	846.5	4.508	5.014

Band	BW(MHz)	Mode	RB/RB Size	f (MHz)	99% BW (MHz)	-26dB BW
LTE5	3	QPSK	15/0	825.5	2.695	2.918
			15/0	836.5	2.685	2.95
			15/0	847.5	2.683	2.977
		16QAM	15/0	825.5	2.679	2.963
			15/0	836.5	2.686	2.953
			15/0	847.5	2.68	2.978

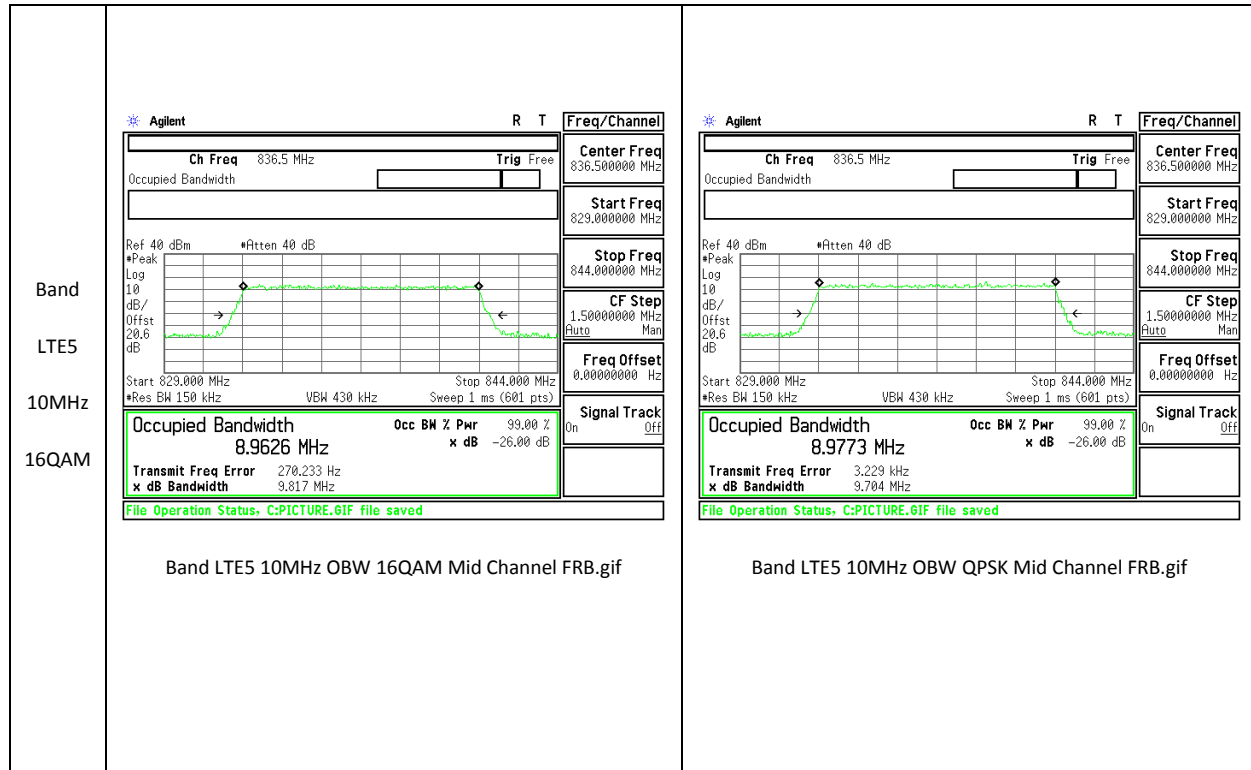
Band	BW(MHz)	Mode	RB/RB Size	f (MHz)	99% BW (MHz)	-26dB BW
LTE5	1.4	QPSK	6/0	824.7	1.083	1.260
			6/0	836.5	1.083	1.286
			6/0	848.3	1.080	1.253
		16QAM	6/0	824.7	1.089	1.280
			6/0	836.5	1.081	1.263
			6/0	848.3	1.086	1.280

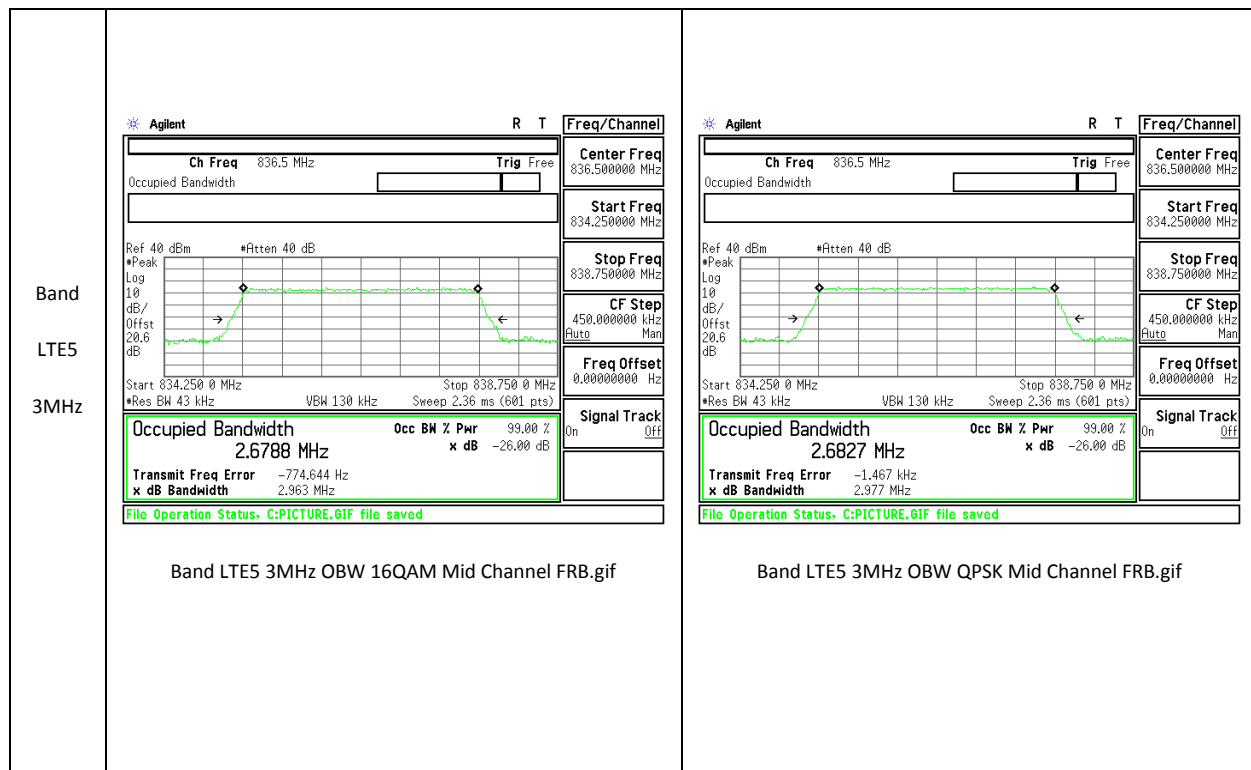
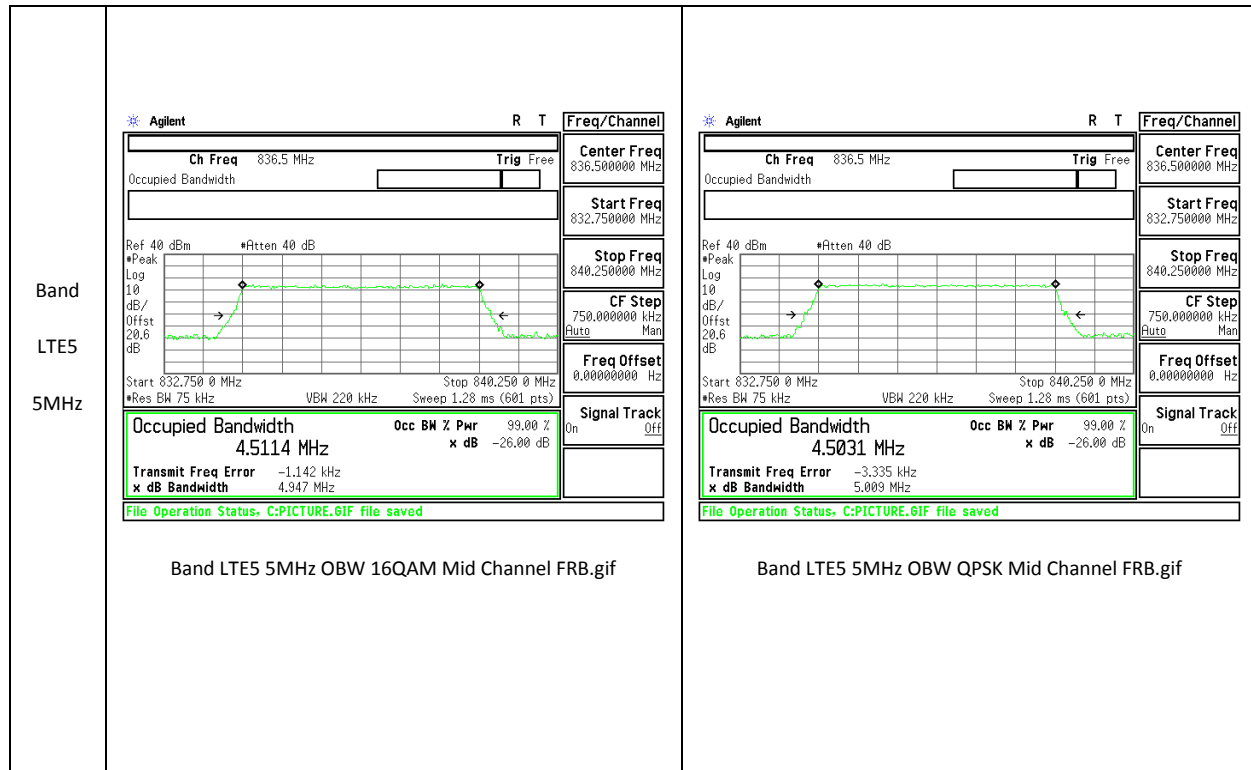
10.1.1. OCCUPIED BANDWIDTH PLOTS

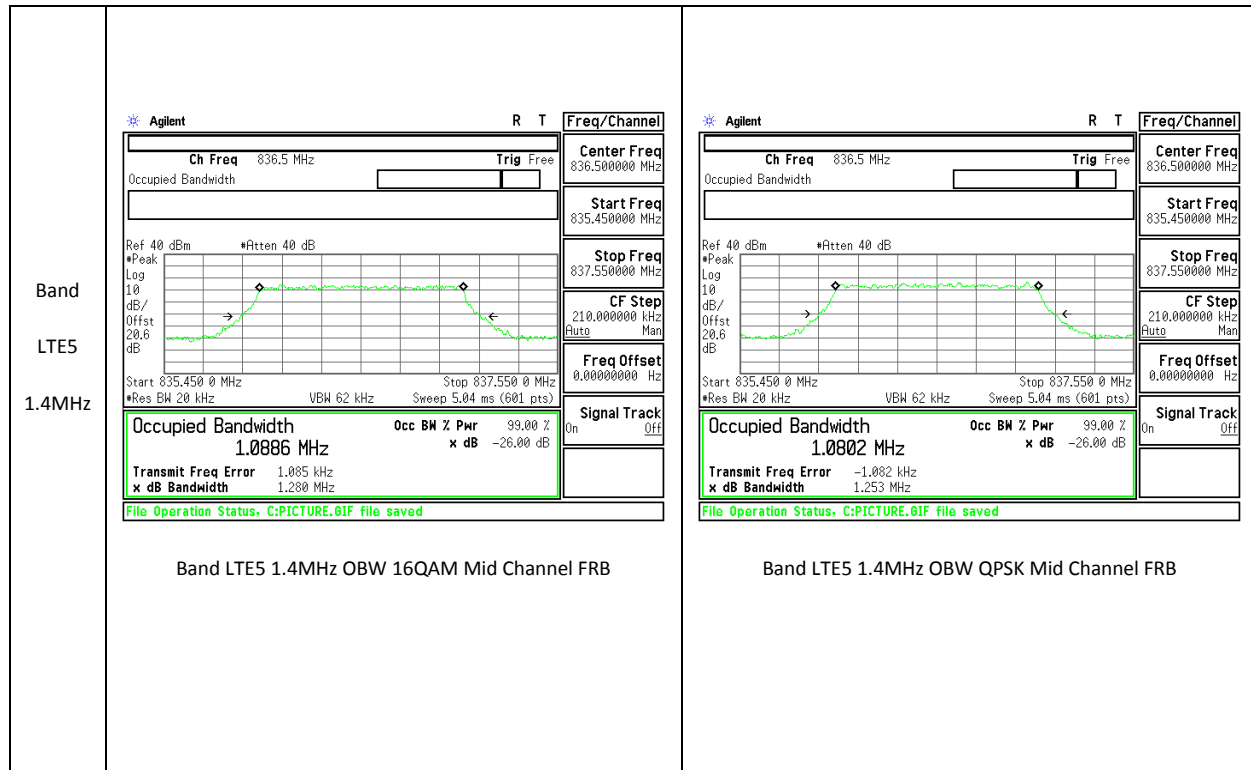
LTE Band 17

Band LTE17 10MHz 16QAM	 Agilent R T Freq/Channel Ch Freq 710 MHz Trig Free Center Freq 710.000000 MHz Start Freq 702.500000 MHz Stop Freq 717.500000 MHz CF Step 1.50000000 MHz Auto Man Freq Offset 0.00000000 Hz Signal Track On Off Ref 40 dBm *Atten 40 dB Peak Log 10 dB/Offst 20.6 dB Start 702.500 MHz *Res BW 150 kHz VBW 430 kHz Sweep 1 ms (601 pts) Stop 717.500 MHz Occupied Bandwidth 8.9539 MHz Occ BW % Pwr 99.00 % -26.00 dB Transmit Freq Error 23.163 kHz x dB Bandwidth 9.630 MHz File Operation Status, C:PICTURE.6IF file saved	 Agilent R T Freq/Channel Ch Freq 710 MHz Trig Free Center Freq 710.000000 MHz Start Freq 702.500000 MHz Stop Freq 717.500000 MHz CF Step 1.50000000 MHz Auto Man Freq Offset 0.00000000 Hz Signal Track On Off Ref 40 dBm *Atten 40 dB Peak Log 10 dB/Offst 20.6 dB Start 702.500 MHz *Res BW 150 kHz VBW 430 kHz Sweep 1 ms (601 pts) Stop 717.500 MHz Occupied Bandwidth 8.9576 MHz Occ BW % Pwr 99.00 % -26.00 dB Transmit Freq Error 23.024 kHz x dB Bandwidth 9.843 MHz File Operation Status, C:PICTURE.6IF file saved
Band LTE17 5MHz 16QAM	 Agilent R T Freq/Channel Ch Freq 710 MHz Trig Free Center Freq 710.000000 MHz Start Freq 706.250000 MHz Stop Freq 713.750000 MHz CF Step 750.000000 kHz Auto Man Freq Offset 0.00000000 Hz Signal Track On Off Ref 40 dBm *Atten 40 dB Peak Log 10 dB/Offst 20.6 dB Start 706.250 MHz *Res BW 75 kHz VBW 220 kHz Sweep 1.28 ms (601 pts) Stop 713.750 MHz Occupied Bandwidth 4.5136 MHz Occ BW % Pwr 99.00 % -26.00 dB Transmit Freq Error -853.587 Hz x dB Bandwidth 4.906 MHz File Operation Status, C:PICTURE.6IF file saved	 Agilent R T Freq/Channel Ch Freq 710 MHz Trig Free Center Freq 710.000000 MHz Start Freq 706.250000 MHz Stop Freq 713.750000 MHz CF Step 750.000000 kHz Auto Man Freq Offset 0.00000000 Hz Signal Track On Off Ref 40 dBm *Atten 40 dB Peak Log 10 dB/Offst 20.6 dB Start 706.250 MHz *Res BW 75 kHz VBW 220 kHz Sweep 1.28 ms (601 pts) Stop 713.750 MHz Occupied Bandwidth 4.4974 MHz Occ BW % Pwr 99.00 % -26.00 dB Transmit Freq Error 3.708 kHz x dB Bandwidth 4.977 MHz File Operation Status, C:PICTURE.6IF file saved

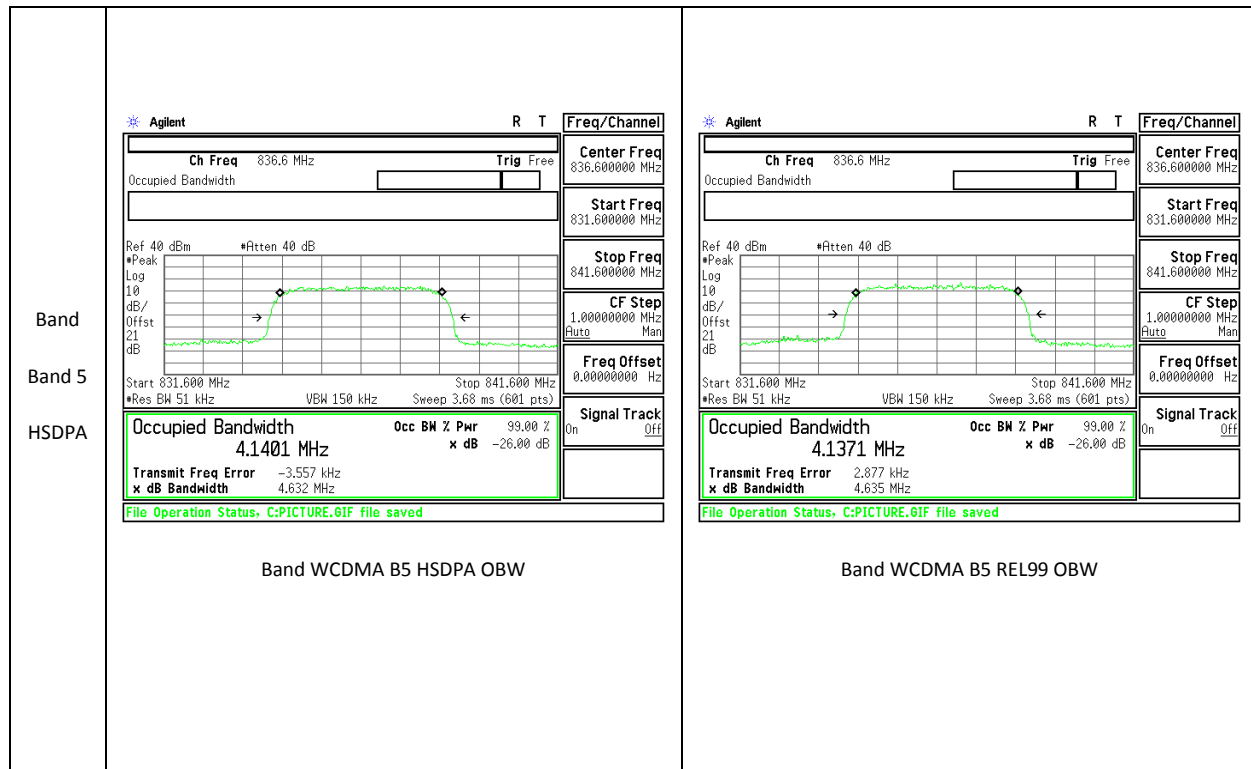
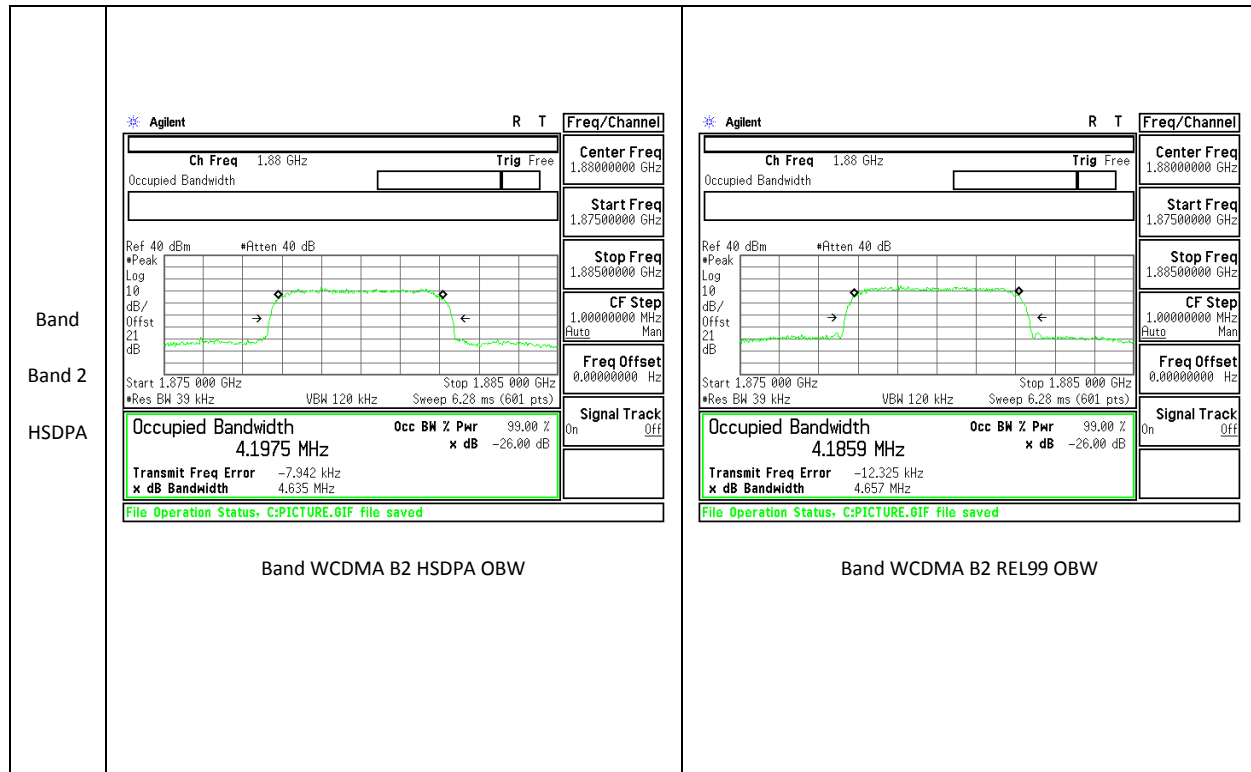
LTE Band 5



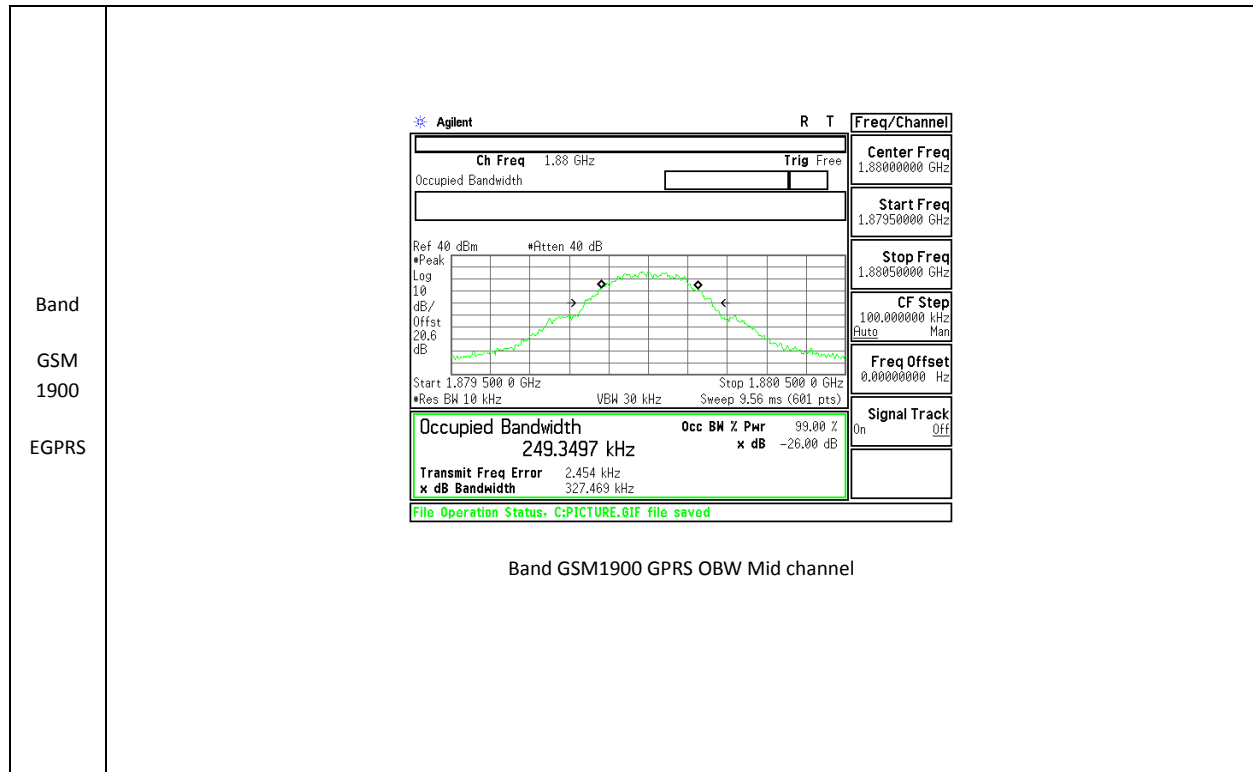




WCDMA



GSM



10.2. BAND EDGE EMISSIONS

RULE PART(S)

FCC: §22.359, §24.238, and §27.53

LIMITS

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

TEST PROCEDURE

Per KDB 971168 D01 Power Meas License Digital Systems v02r01

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

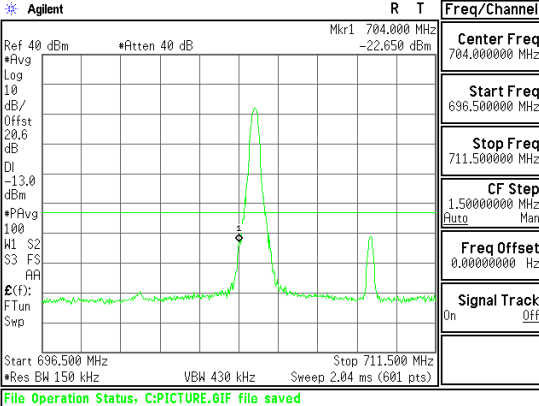
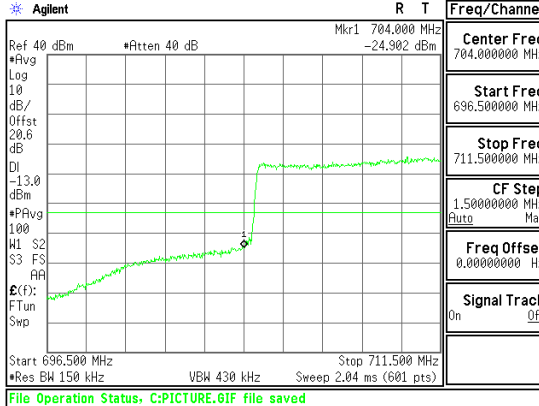
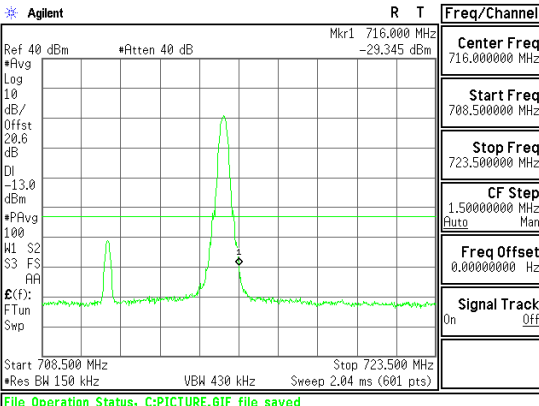
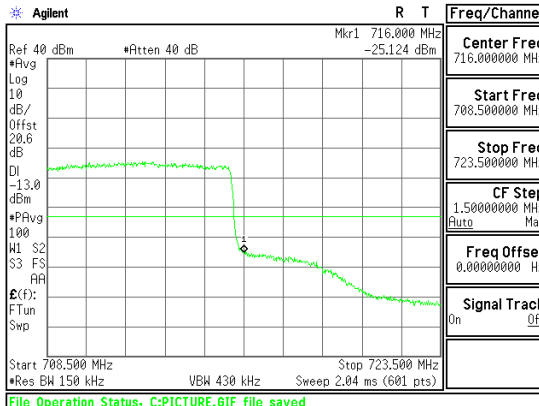
MODES TESTED

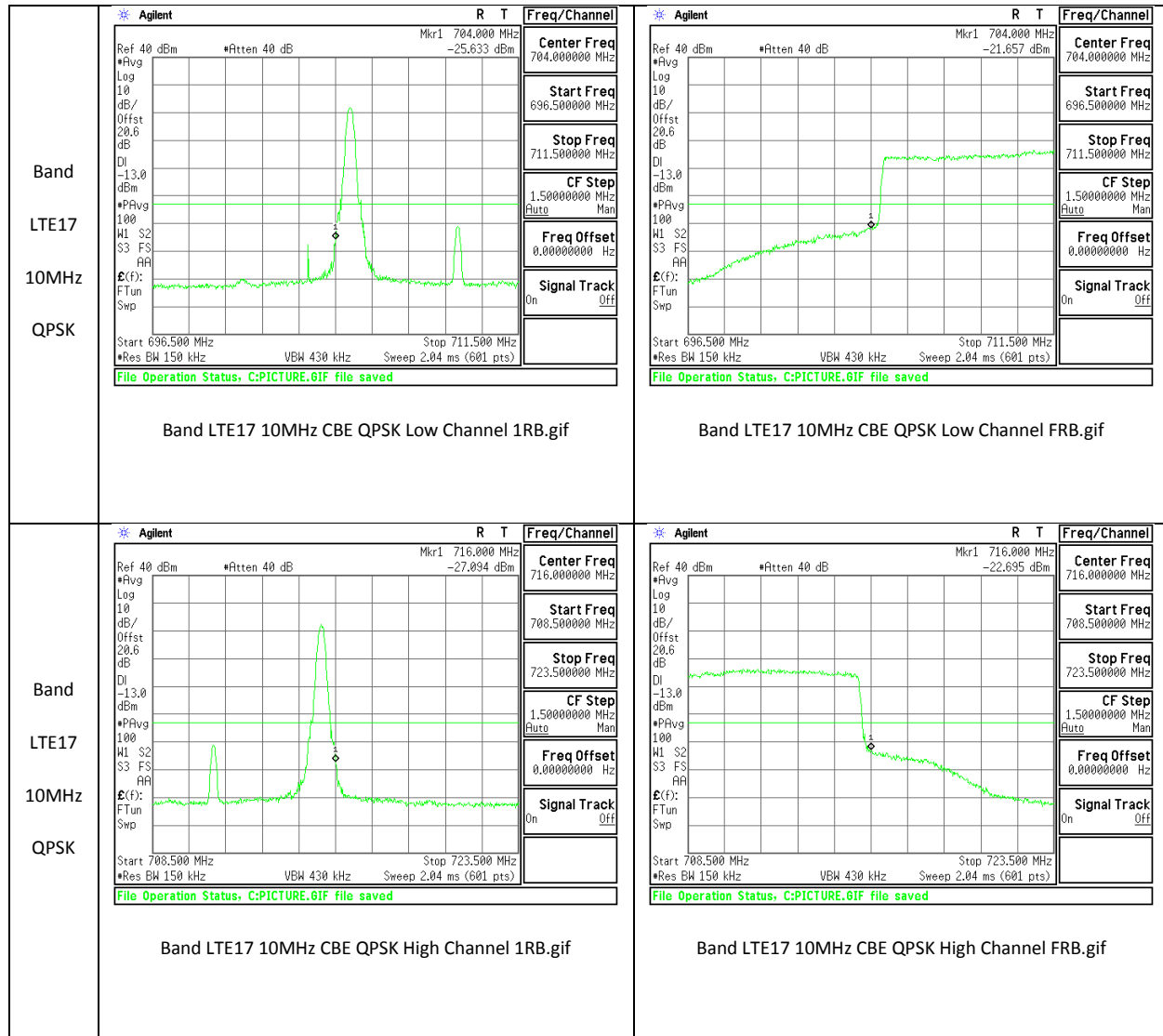
WCDMA, GSM, LTE

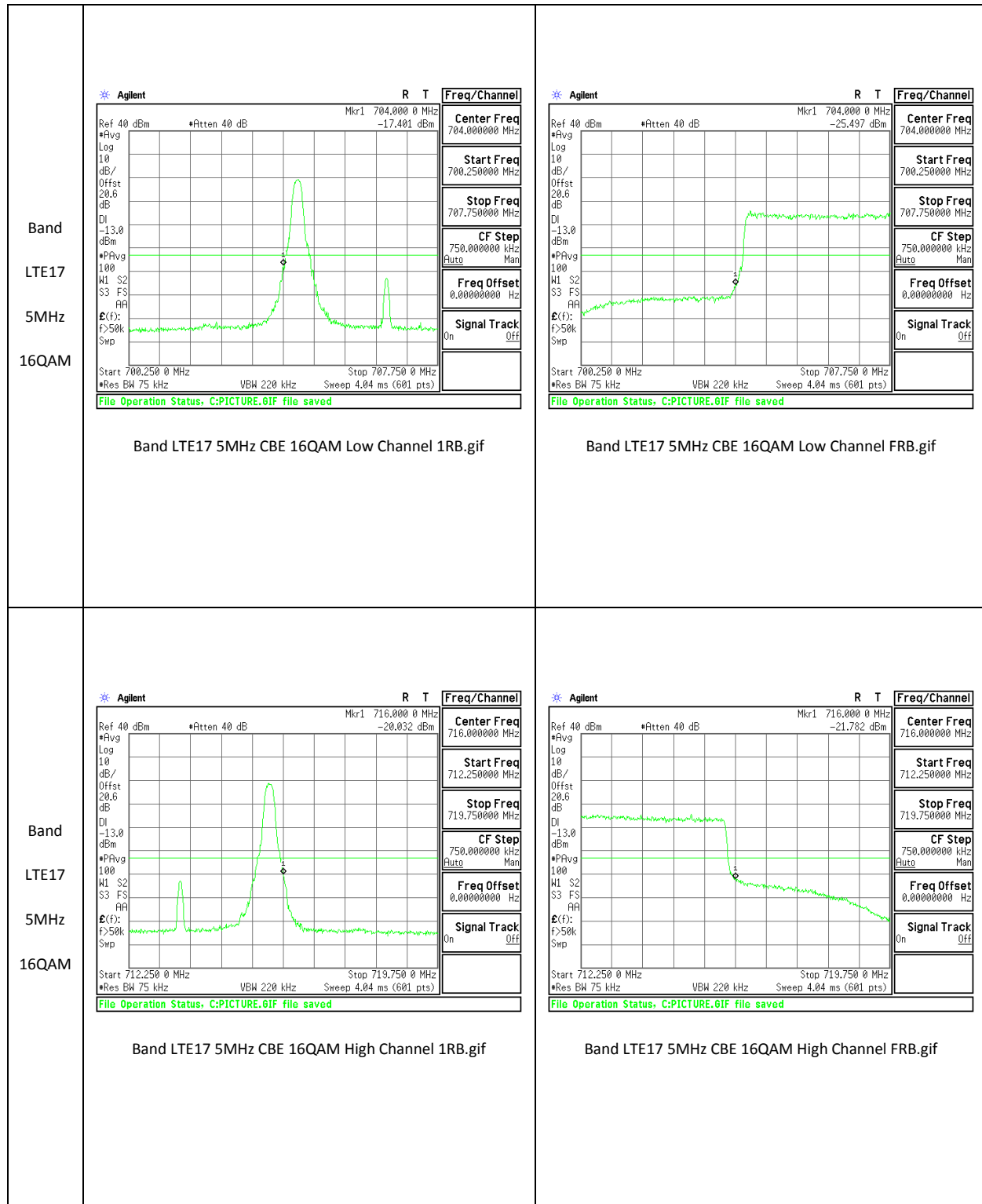
RESULTS

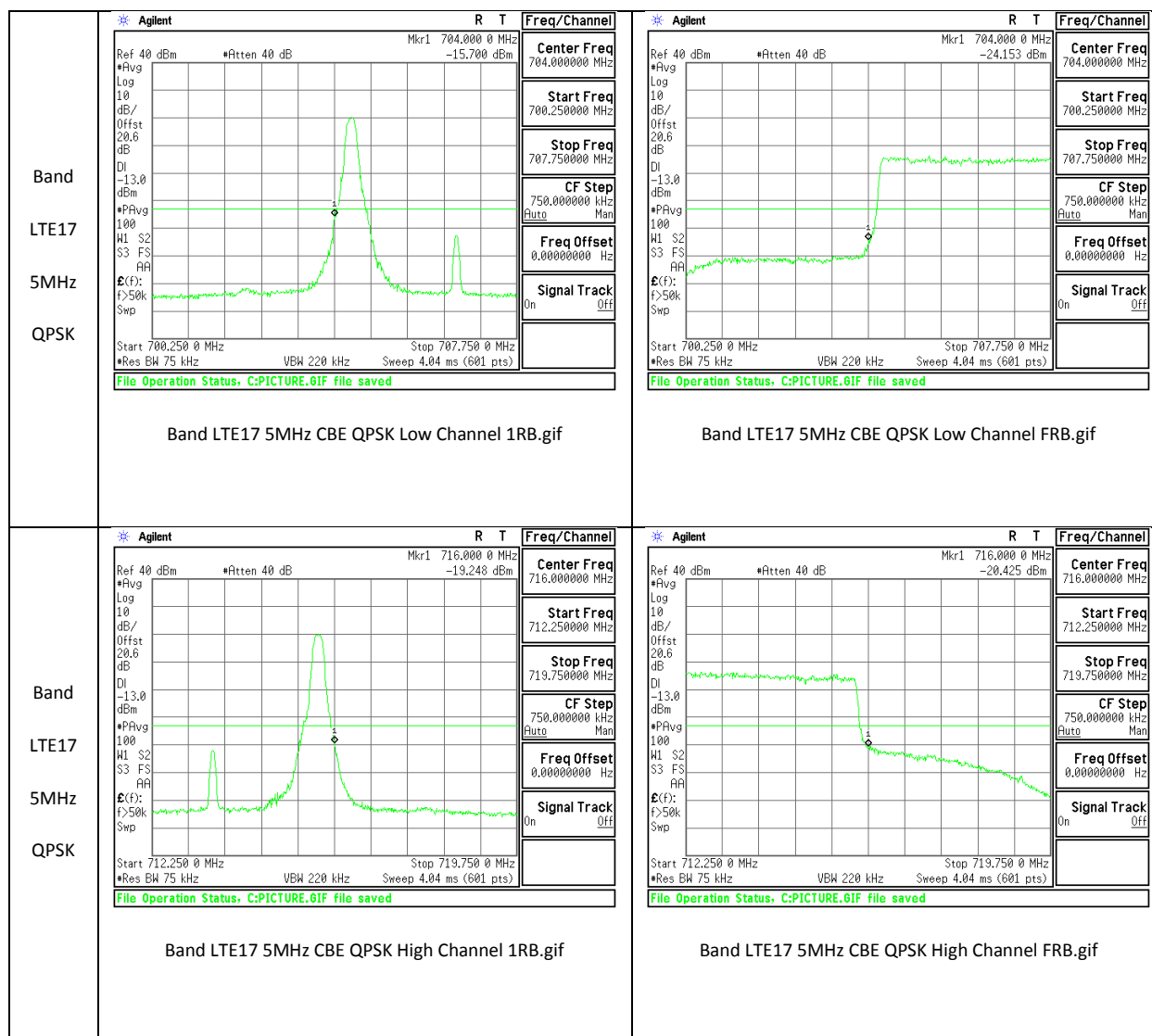
10.2.1. BAND EDGE PLOTS

LTE Band 17

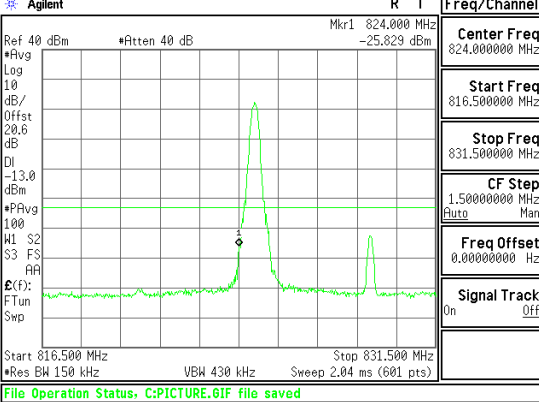
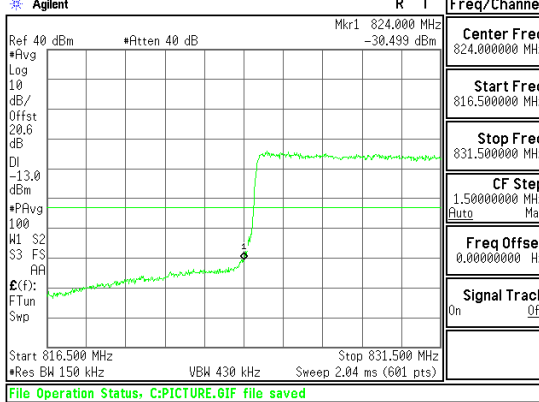
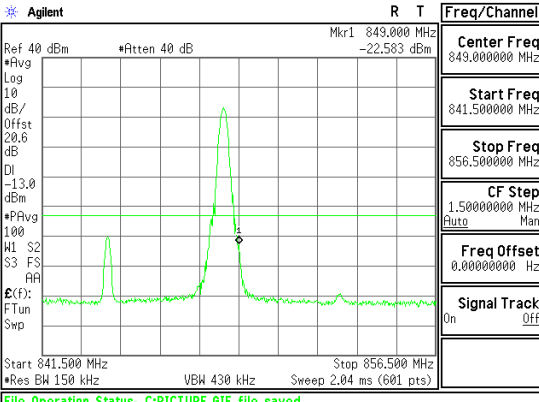
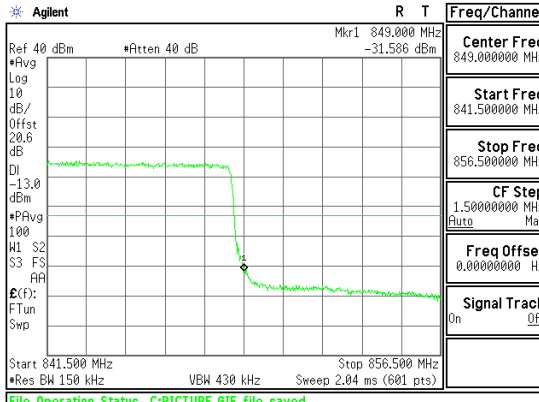
Band LTE17 10MHz 16QAM	 Band LTE17 10MHz CBE 16QAM Low Channel 1RB.gif	 Band LTE17 10MHz CBE 16QAM Low Channel FRB.gif
Band LTE17 10MHz 16QAM	 Band LTE17 10MHz CBE 16QAM High Channel 1RB.gif	 Band LTE17 10MHz CBE 16QAM High Channel FRB.gif

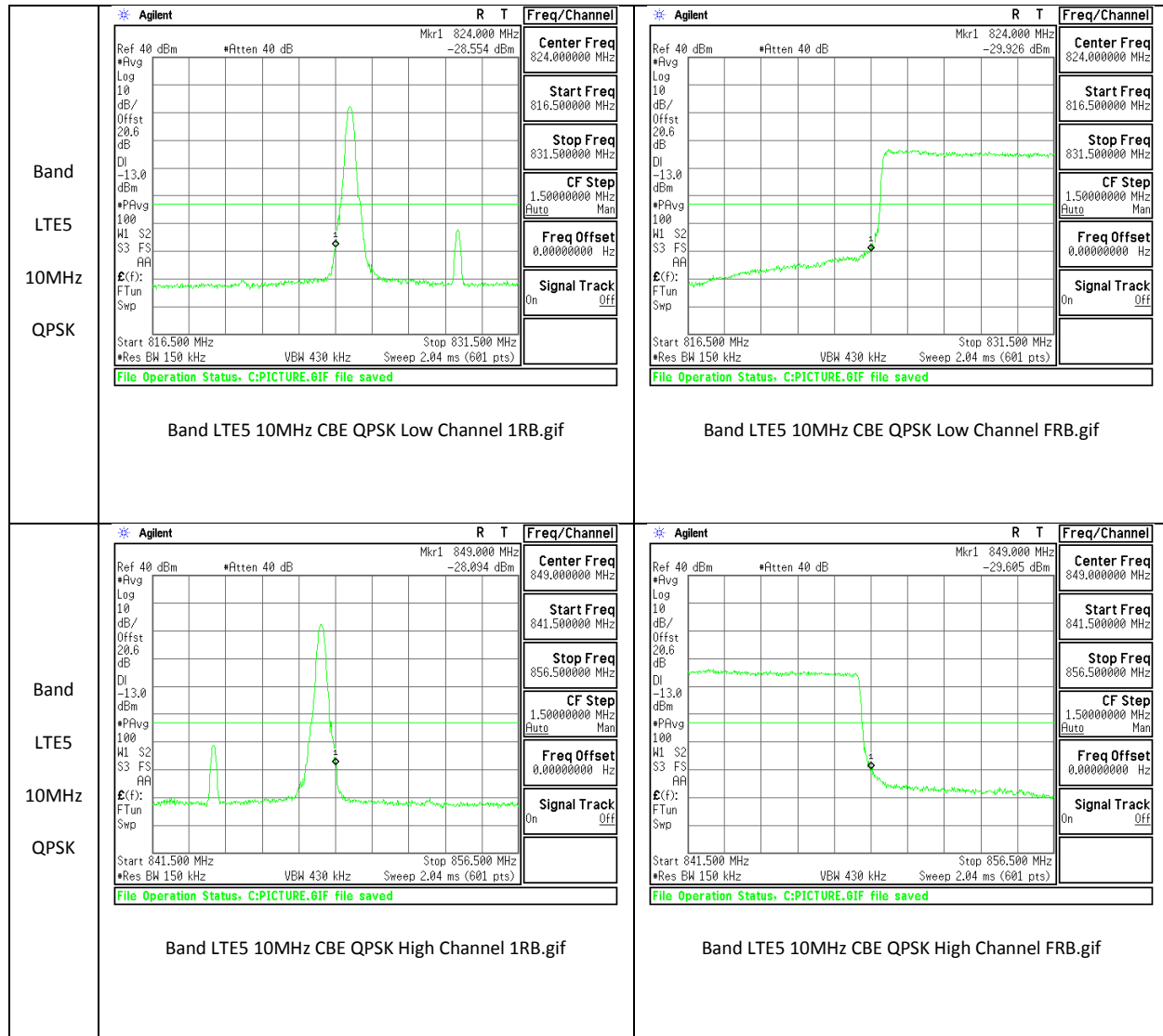


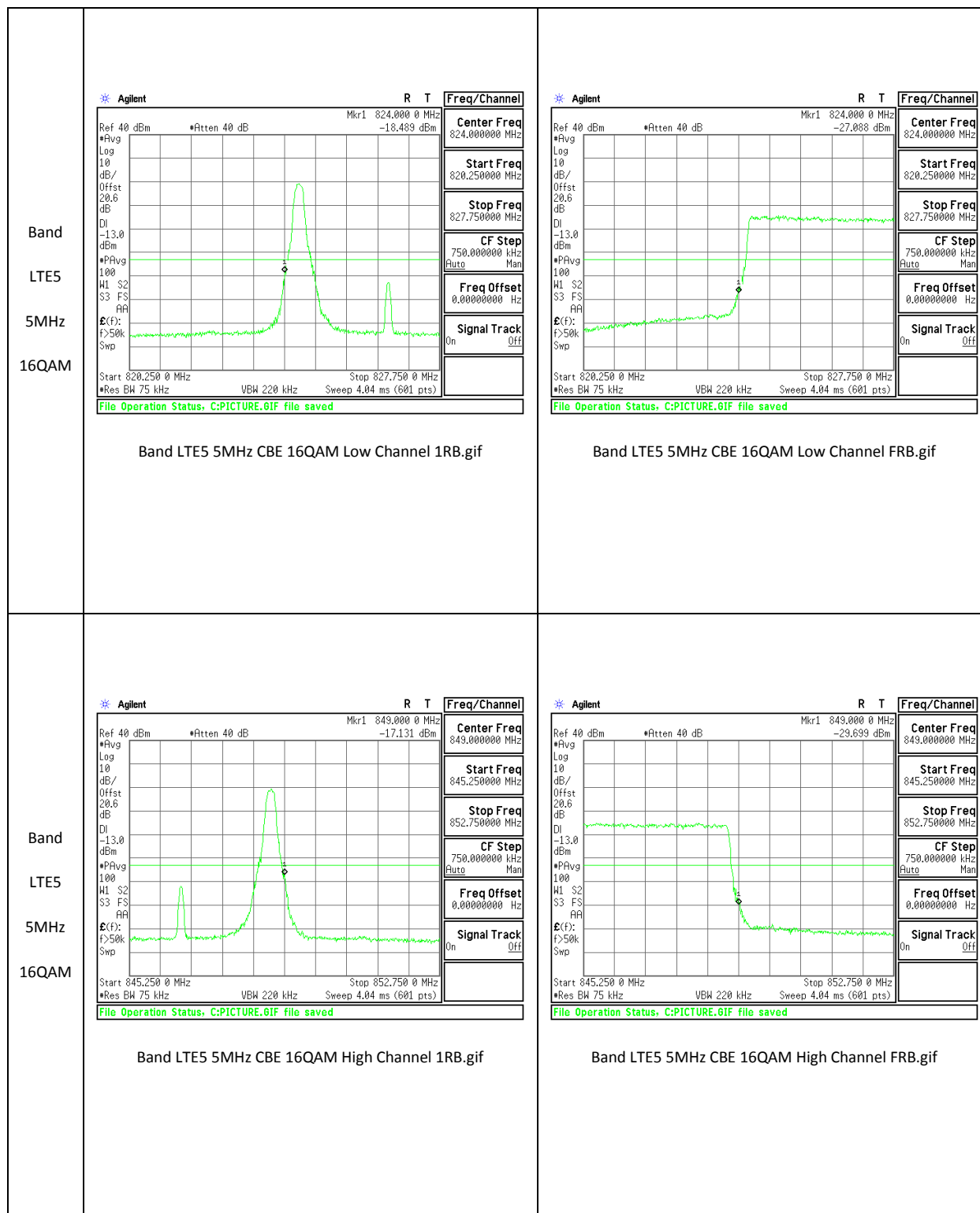


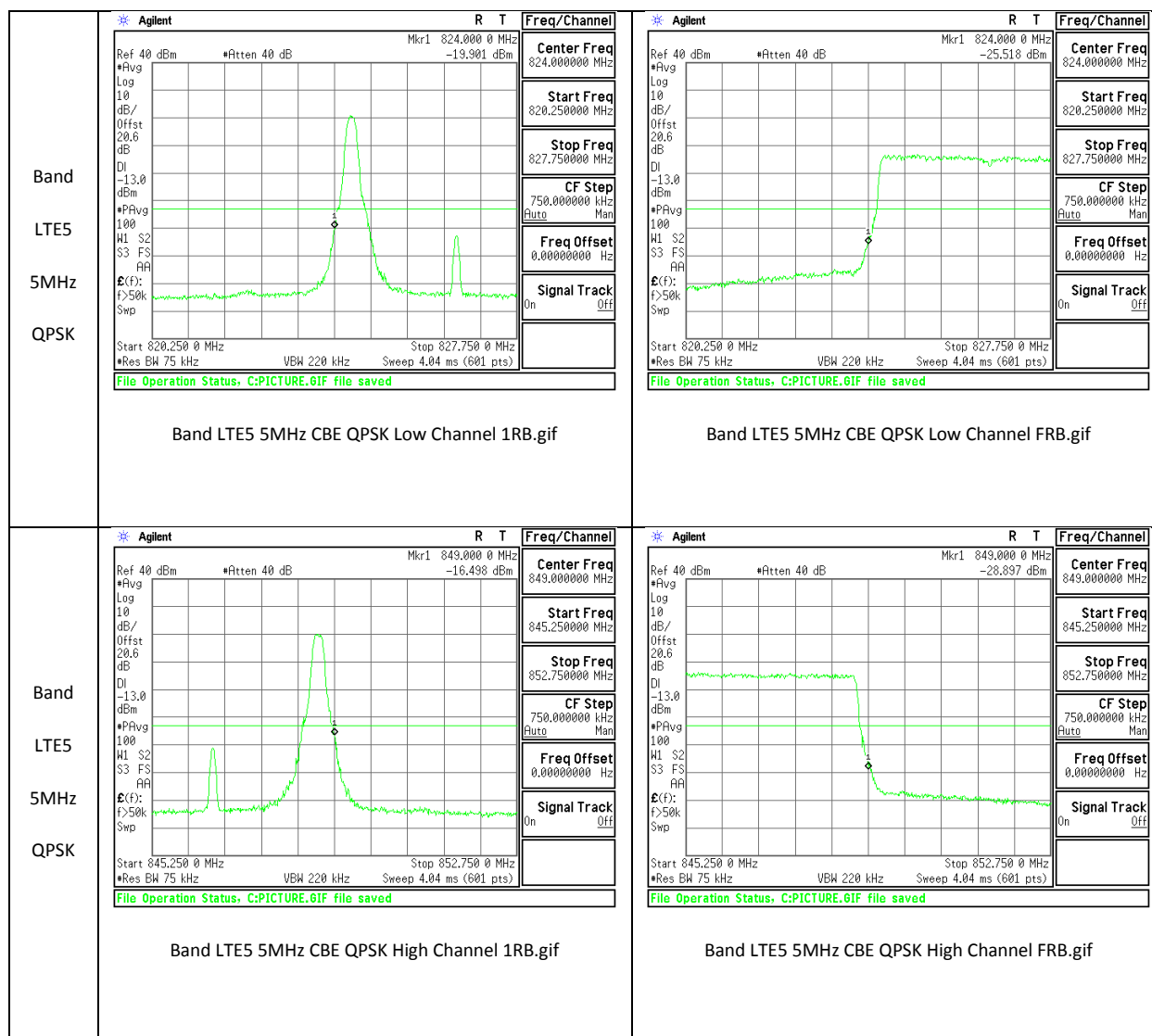


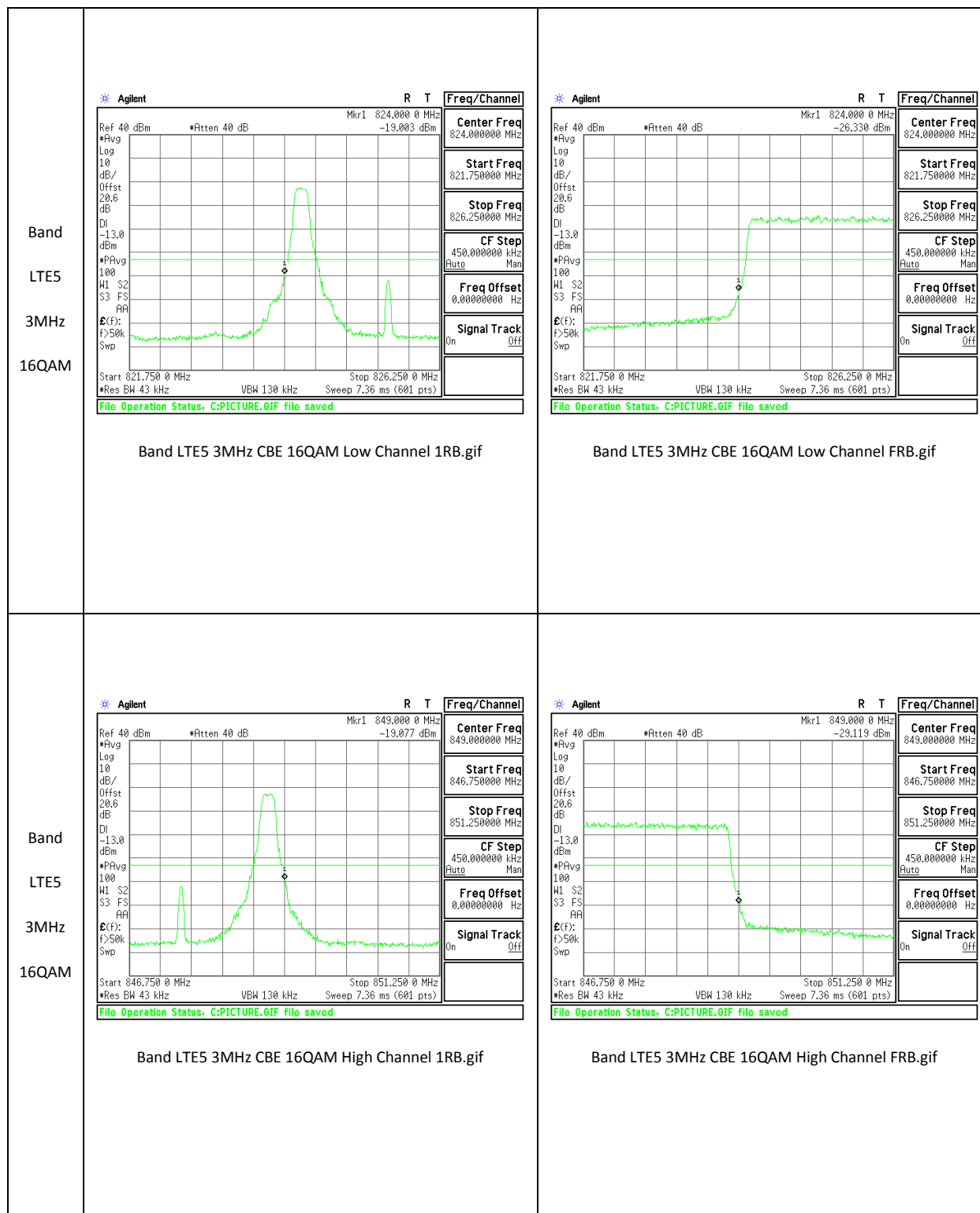
LTE Band 5

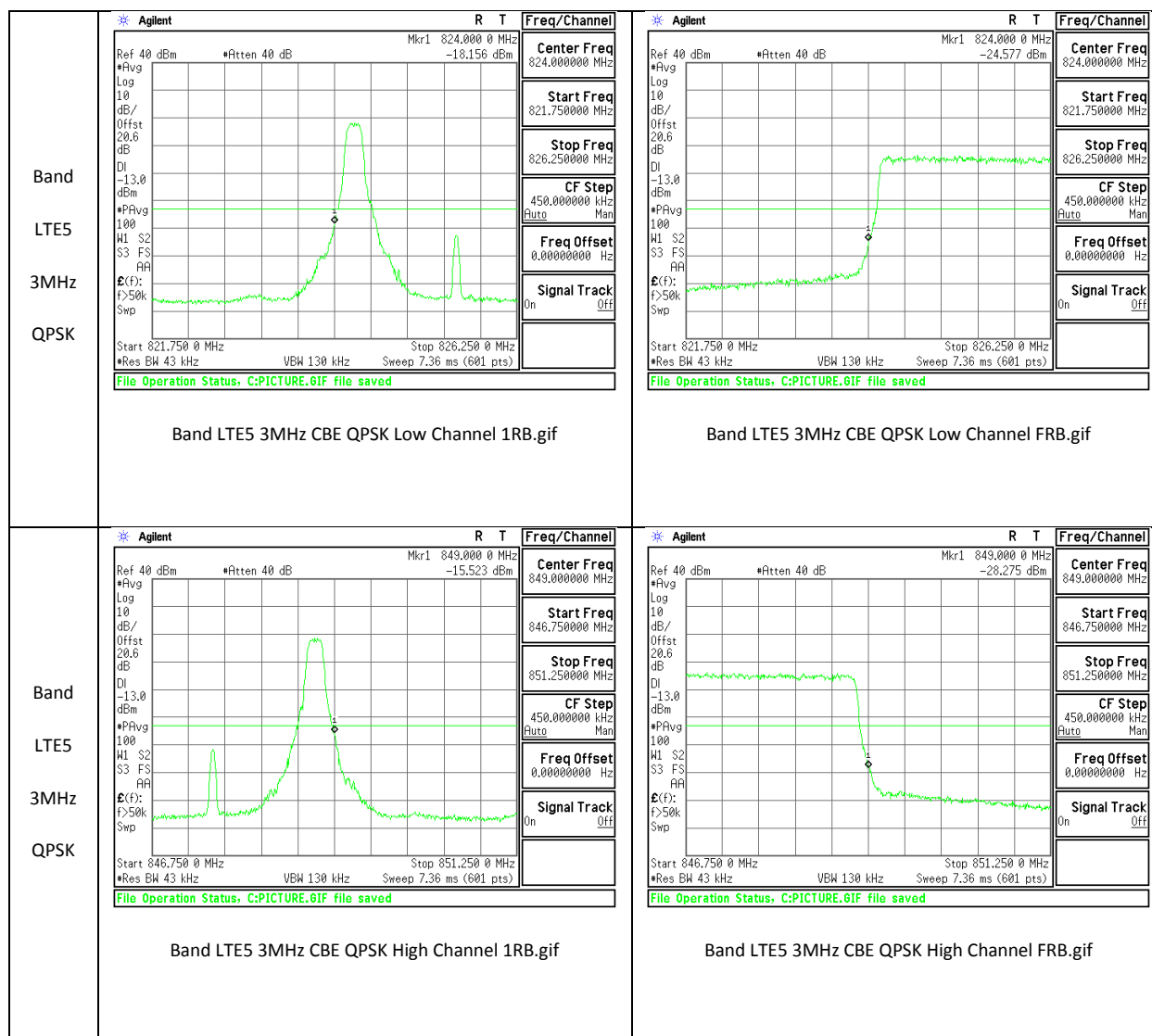
Band LTE5 10MHz 16QAM	 Agilent R T Freq/Channel Ref 40 dBm *Atten 40 dB Mkr1 824.000 MHz -25.829 dBm Center Freq 824.000000 MHz Start Freq 816.500000 MHz Stop Freq 831.500000 MHz CF Step 1.50000000 MHz Auto Man Freq Offset 0.00000000 Hz Signal Track On Off Start 816.500 MHz Stop 831.500 MHz *Res BW 150 kHz VBW 430 kHz Sweep 2.04 ms (601 pts) File Operation Status: C:PICTURE.GIF file saved Band LTE5 10MHz CBE 16QAM Low Channel 1RB.gif	 Agilent R T Freq/Channel Ref 40 dBm *Atten 40 dB Mkr1 824.000 MHz -30.439 dBm Center Freq 824.000000 MHz Start Freq 816.500000 MHz Stop Freq 831.500000 MHz CF Step 1.50000000 MHz Auto Man Freq Offset 0.00000000 Hz Signal Track On Off Start 816.500 MHz Stop 831.500 MHz *Res BW 150 kHz VBW 430 kHz Sweep 2.04 ms (601 pts) File Operation Status: C:PICTURE.GIF file saved Band LTE5 10MHz CBE 16QAM Low Channel FRB.gif
Band LTE5 10MHz 16QAM	 Agilent R T Freq/Channel Ref 40 dBm *Atten 40 dB Mkr1 843.000 MHz -22.583 dBm Center Freq 843.000000 MHz Start Freq 841.500000 MHz Stop Freq 856.500000 MHz CF Step 1.50000000 MHz Auto Man Freq Offset 0.00000000 Hz Signal Track On Off Start 841.500 MHz Stop 856.500 MHz *Res BW 150 kHz VBW 430 kHz Sweep 2.04 ms (601 pts) File Operation Status: C:PICTURE.GIF file saved Band LTE5 10MHz CBE 16QAM High Channel 1RB.gif	 Agilent R T Freq/Channel Ref 40 dBm *Atten 40 dB Mkr1 843.000 MHz -31.586 dBm Center Freq 843.000000 MHz Start Freq 841.500000 MHz Stop Freq 856.500000 MHz CF Step 1.50000000 MHz Auto Man Freq Offset 0.00000000 Hz Signal Track On Off Start 841.500 MHz Stop 856.500 MHz *Res BW 150 kHz VBW 430 kHz Sweep 2.04 ms (601 pts) File Operation Status: C:PICTURE.GIF file saved Band LTE5 10MHz CBE 16QAM High Channel FRB.gif

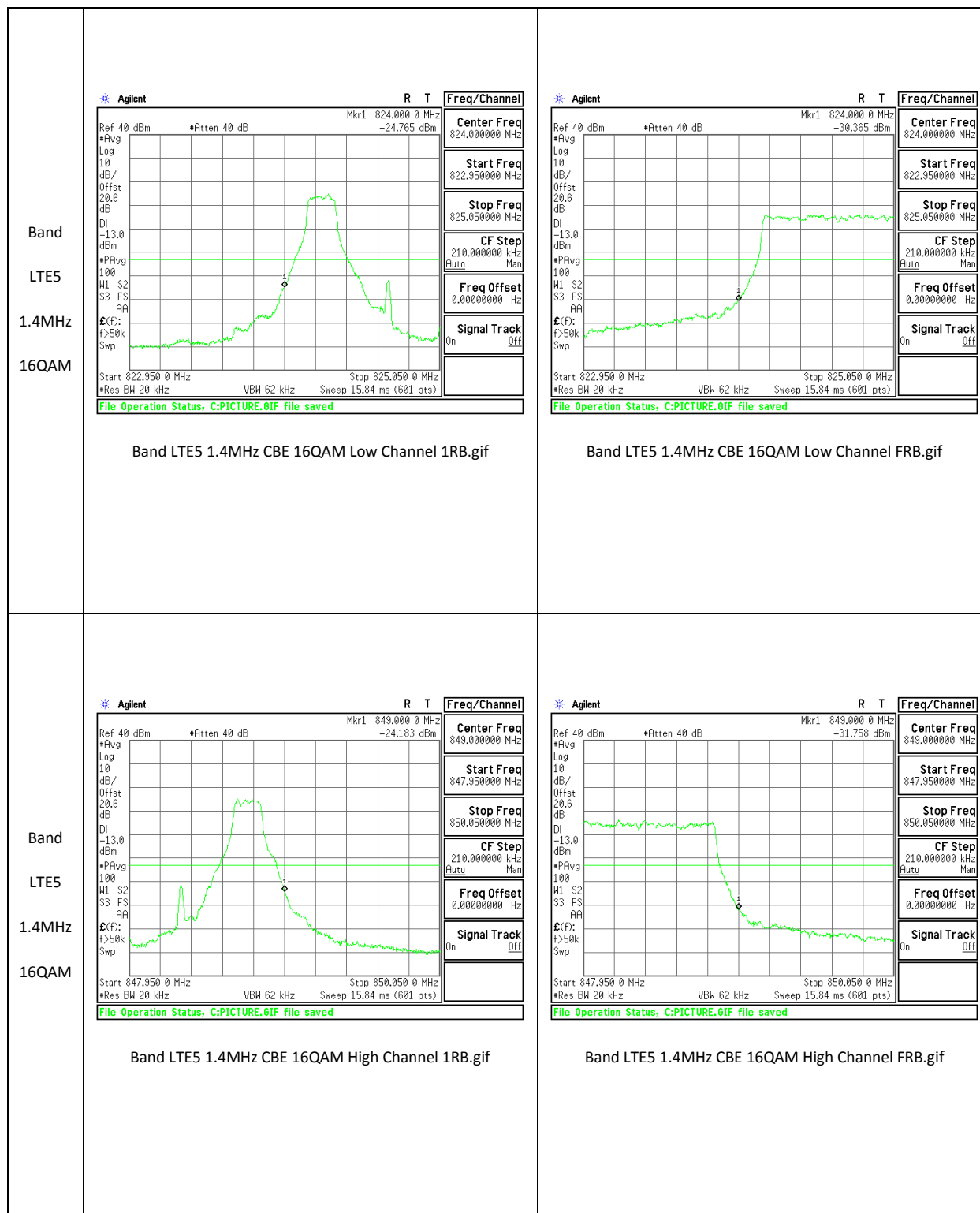


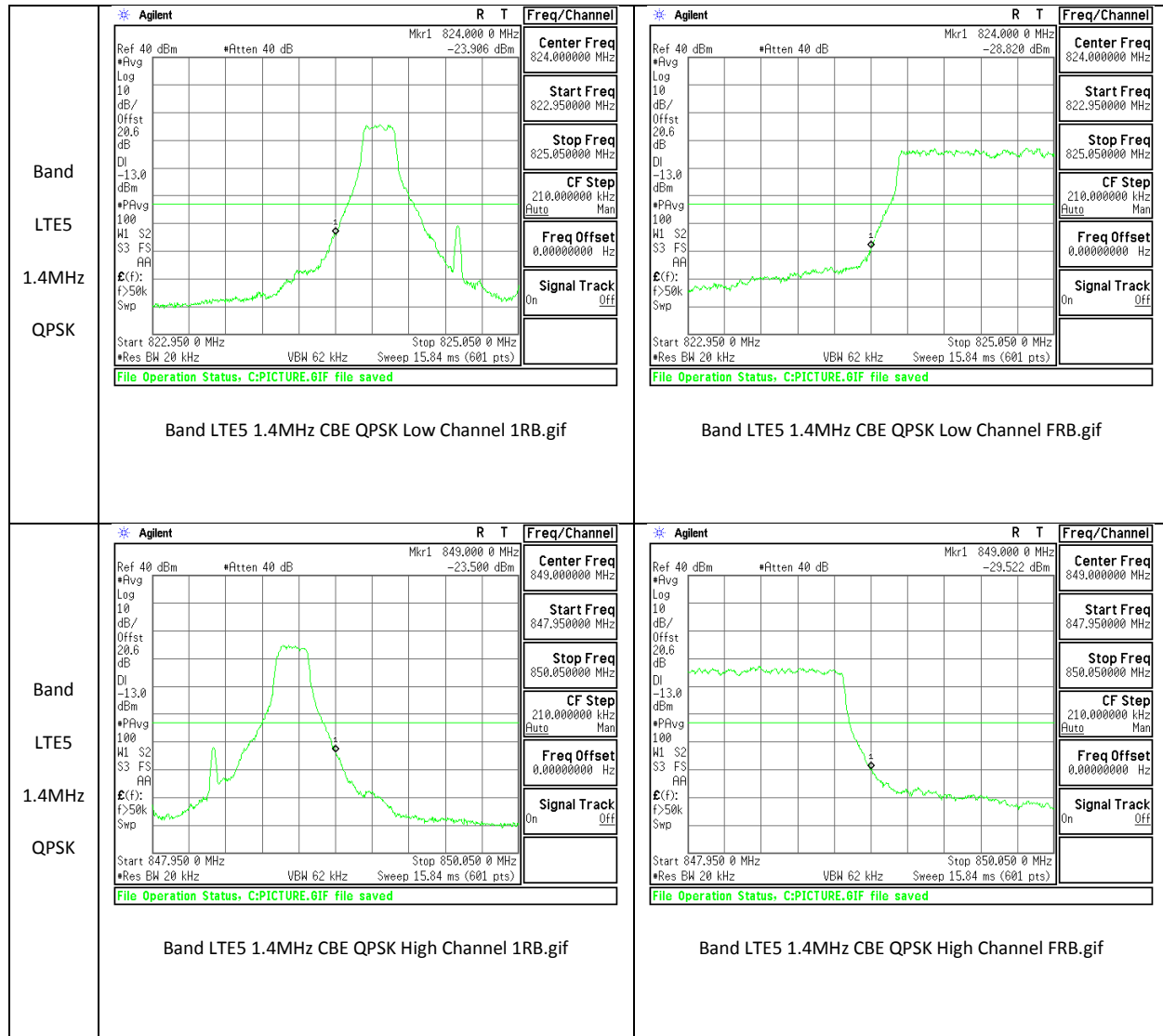




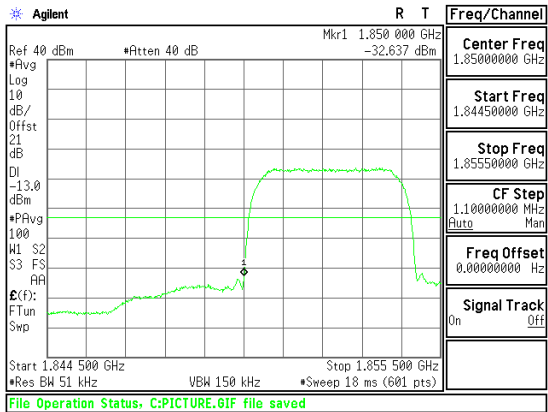
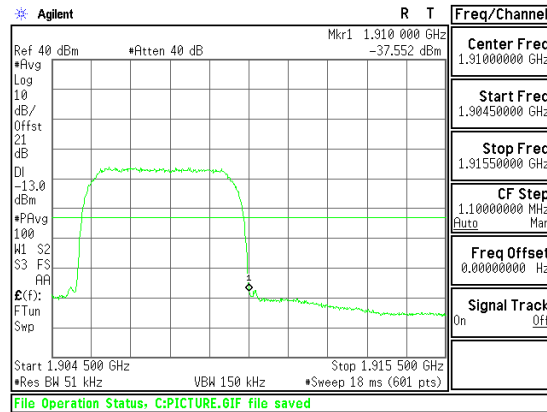
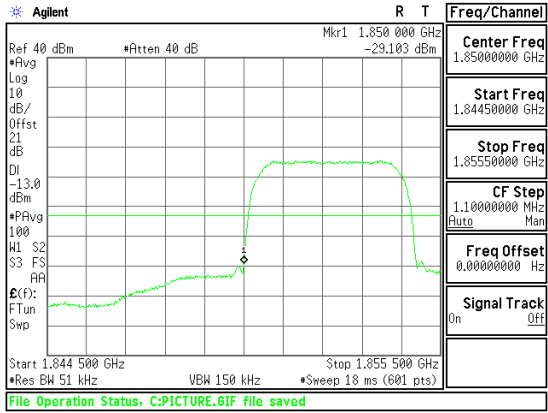
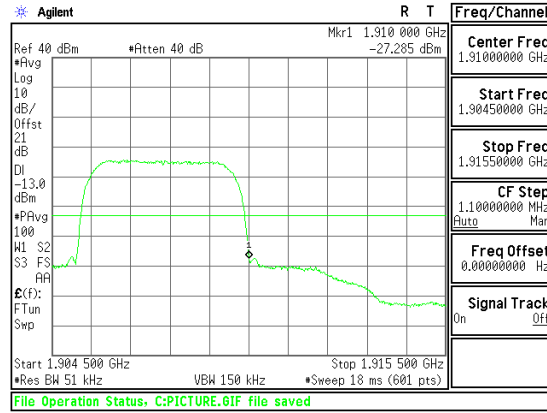


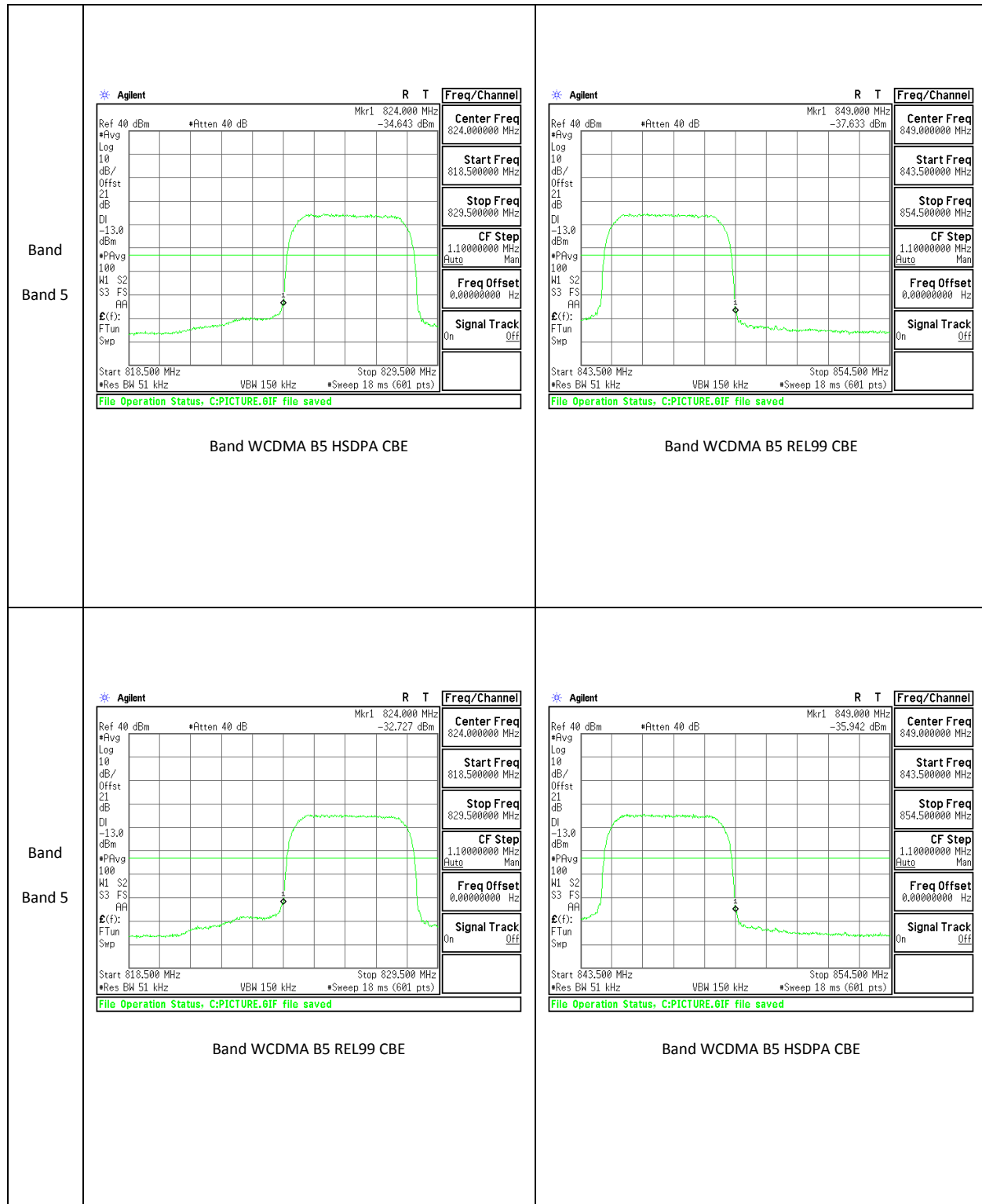


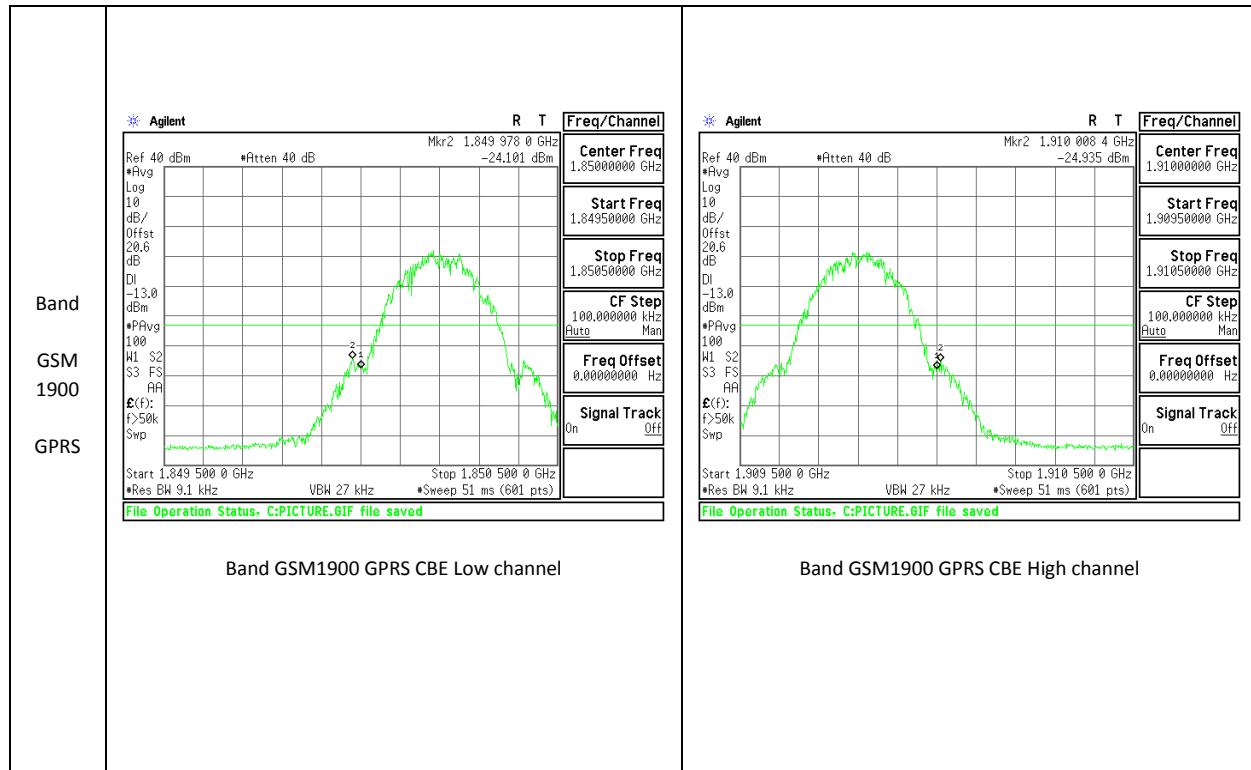




WCDMA

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





10.3. OUT OF BAND EMISSIONS

RULE PART(S)

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

LIMITS

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

TEST PROCEDURE

Per KDB 971168 D01 Power Meas License Digital Systems v02r01

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

MODES TESTED

WCDMA, GSM, LTE

RESULTS

10.3.1. OUT OF BAND EMISSIONS RESULT

Band	BW (MHz)	Mode	f (MHz)	Spur (dBm)	Spec (dBm)	Delta (dB)
LTE17	10	QPSK	709	-25.16	-13	-12.16
			710	-24.34	-13	-11.34
			711	-25.48	-13	-12.48
		16QAM	709	-24.34	-13	-11.34
			710	-25.48	-13	-12.48
			711	-24.4	-13	-11.4

Band	BW (MHz)	Mode	f (MHz)	Spur (dBm)	Spec (dBm)	Delta (dB)
LTE17	5	QPSK	706.5	-24.6	-13	-11.6
			710	-24.76	-13	-11.76
			713.5	-25.36	-13	-12.36
		16QAM	706.5	-24.76	-13	-11.76
			710	-25.36	-13	-12.36
			713.5	-24.57	-13	-11.57

Band	BW (MHz)	Mode	f (MHz)	Spur (dBm)	Spec (dBm)	Delta (dB)
LTE5	10	QPSK	829	-24.4	-13	-11.4
			836.5	-25.14	-13	-12.14
			844	-24.22	-13	-11.22
		16QAM	829	-25.14	-13	-12.14
			836.5	-24.22	-13	-11.22
			844	-24.12	-13	-11.12

Band	BW (MHz)	Mode	f (MHz)	Spur (dBm)	Spec (dBm)	Delta (dB)
LTE5	5	QPSK	826.5	-24.78	-13	-11.78
			836.5	-24.83	-13	-11.83
			846.5	-24.97	-13	-11.97
		16QAM	826.5	-24.83	-13	-11.83
			836.5	-24.97	-13	-11.97
			846.5	-25.07	-13	-12.07

Band	BW (MHz)	Mode	f (MHz)	Spur (dBm)	Spec (dBm)	Delta (dB)
LTE5	3	QPSK	825.5	-25.36	-13	-12.36
			836.5	-23.9	-13	-10.9
			847.5	-25.22	-13	-12.22
		16QAM	825.5	-23.9	-13	-10.9
			836.5	-25.22	-13	-12.22
			847.5	-25.28	-13	-12.28

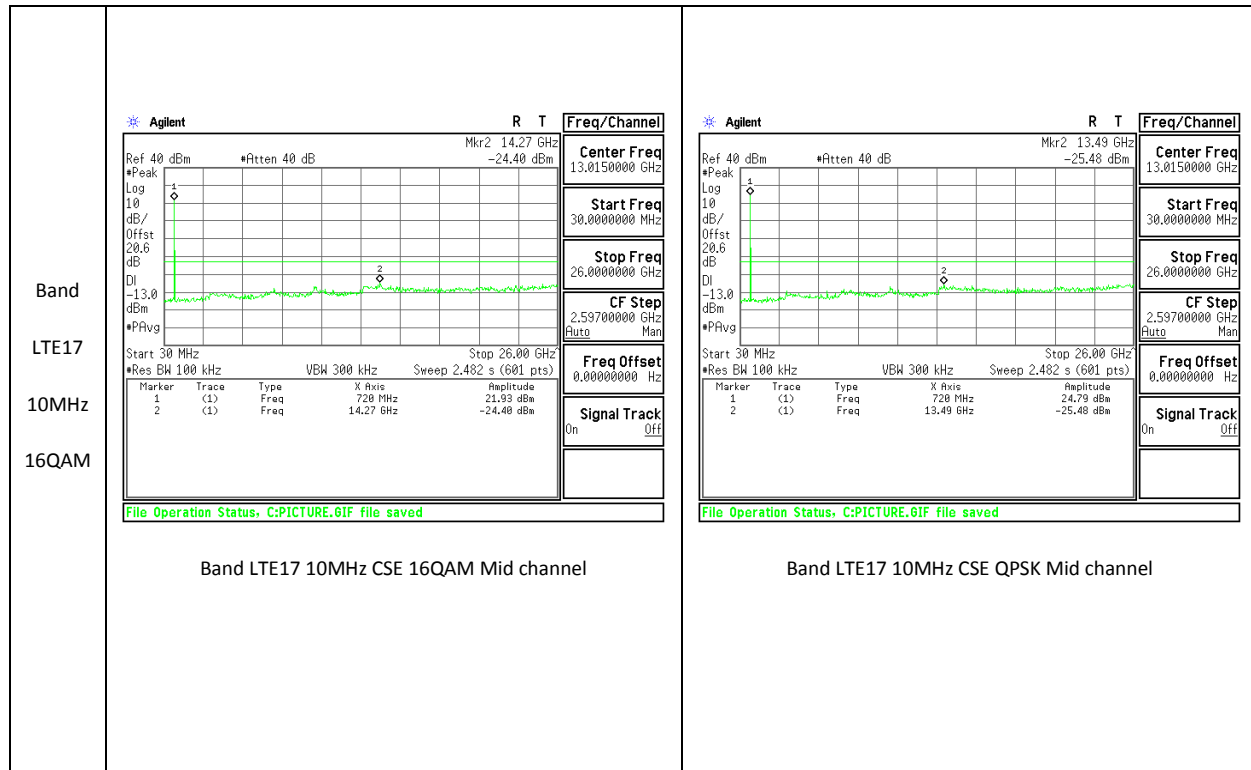
Band	BW (MHz)	Mode	f (MHz)	Spur (dBm)	Spec (dBm)	Delta (dB)
LTE5	1.4	QPSK	824.7	-24.68	-13	-11.68
			836.5	-24.65	-13	-11.65
			848.3	-24.2	-13	-11.2
		16QAM	824.7	-24.65	-13	-11.65
			836.5	-24.2	-13	-11.2
			848.3	-24.77	-13	-11.77

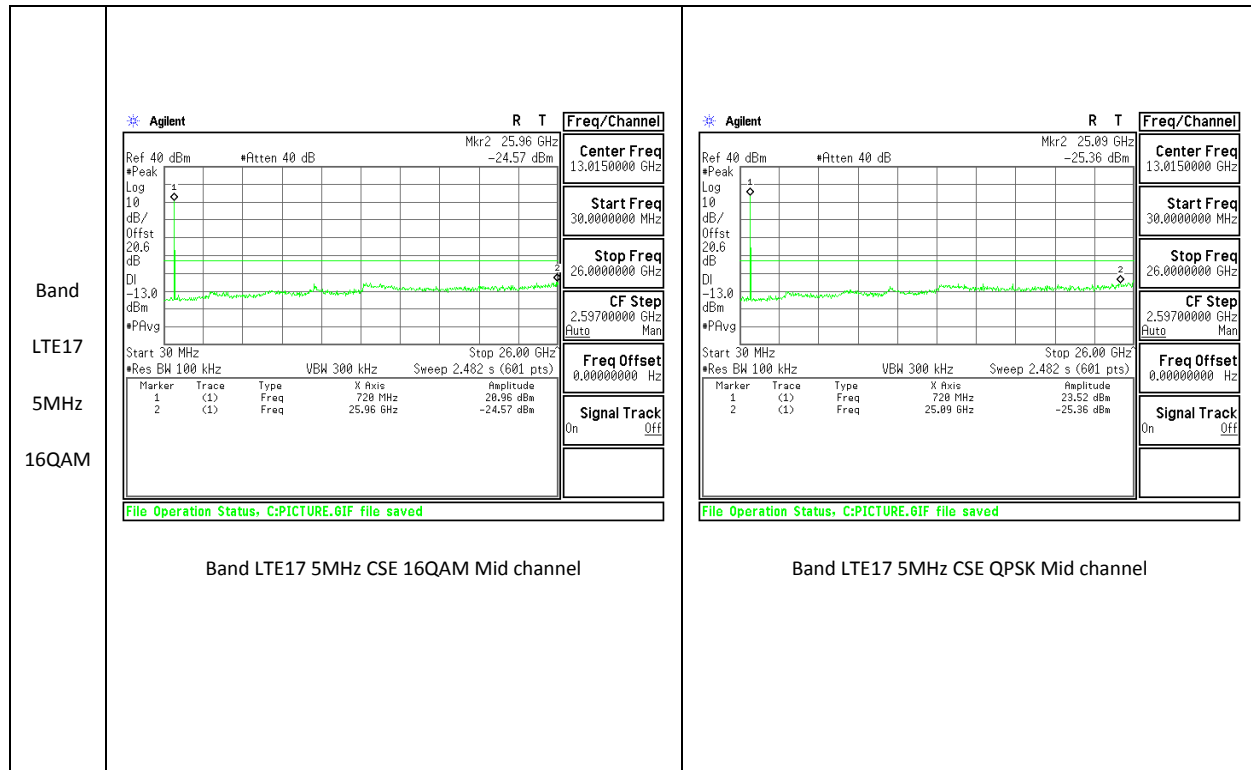
Band	Mode	f (MHz)	Spur (dBm)	Spec (dBm)	Delta (dB)
WCDMA Band 5	REL99	826.4	-15.44	-13	-2.44
		836.6	-15.2	-13	-2.2
		846.6	-15.84	-13	-2.84
	HSDPA	826.4	-15.05	-13	-2.05
		836.6	-15.2	-13	-2.2
		846.6	-15.41	-13	-2.41
WCDMA Band 2	REL99	1852.4	-14.59	-13	-1.59
		1880	-15.4	-13	-2.4
		1907.6	-14.62	-13	-1.62
	HSDPA	1852.4	-15.36	-13	-2.36
		1880	-15.2	-13	-2.2
		1907.6	-15.07	-13	-2.07

Band	Mode	f (MHz)	Spur (dBm)	Spec (dBm)	Delta (dB)
GSM 1900	GPRS	1850.2	-15.96	-13	-2.96
		1880	-15.83	-13	-2.83
		1909.8	-15.56	-13	-2.56

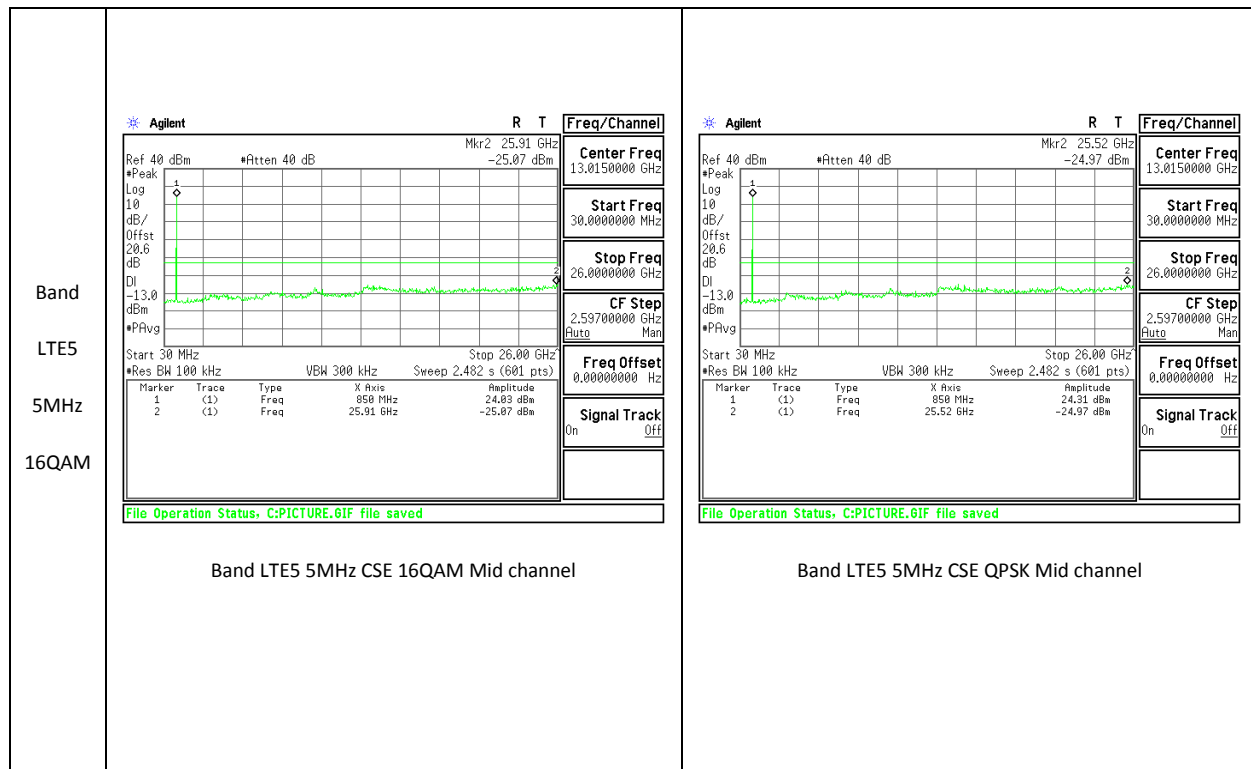
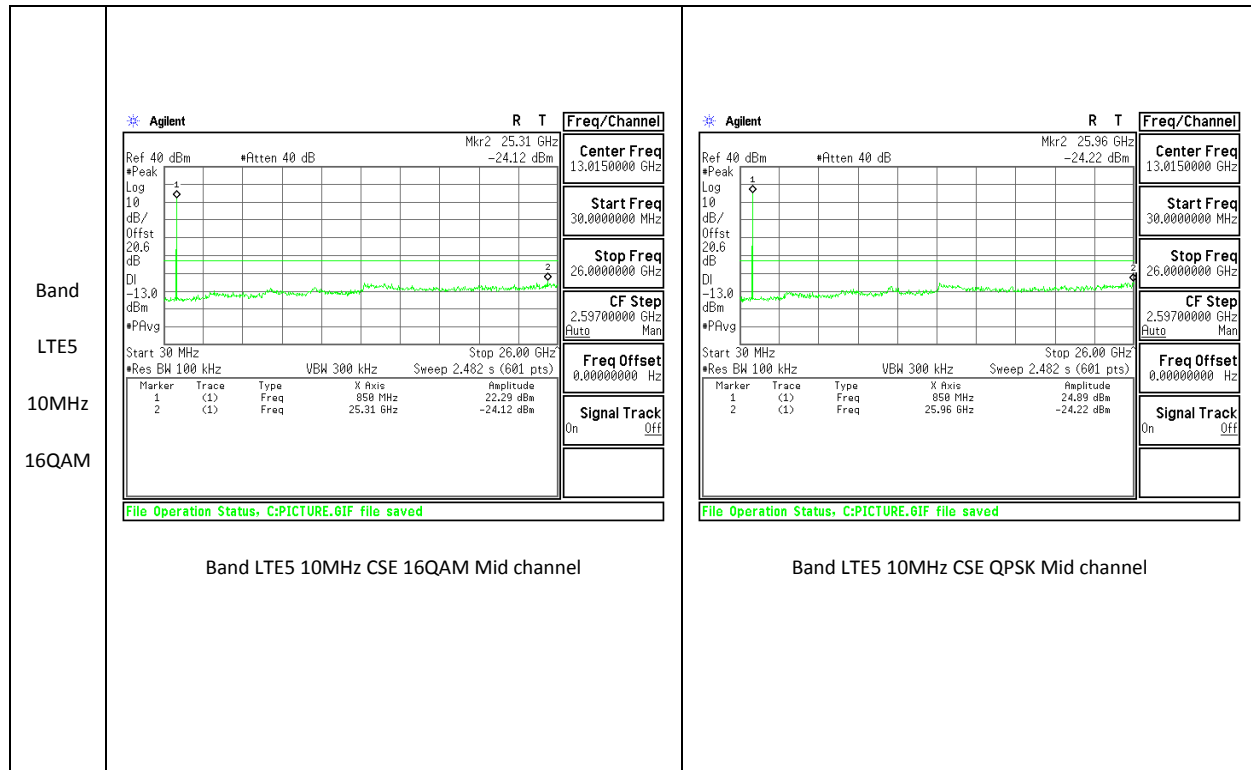
OUT OF BAND EMISSIONS RESULT

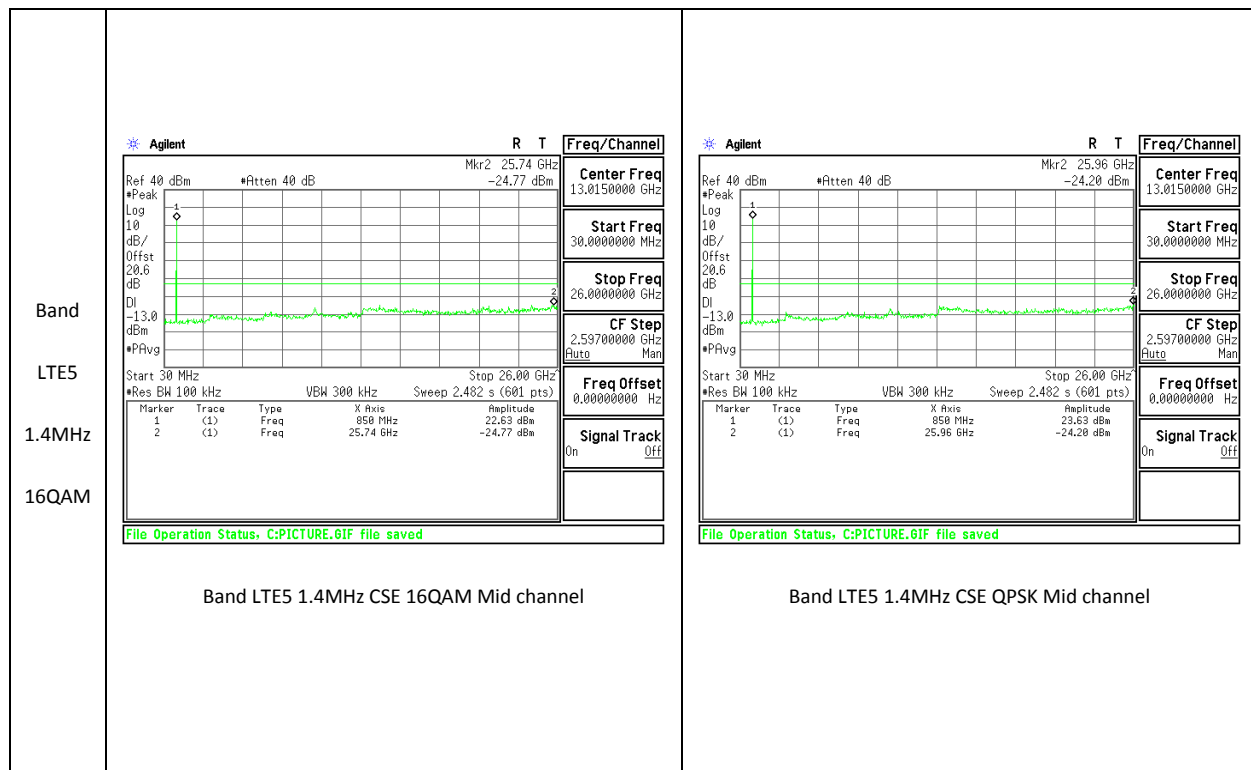
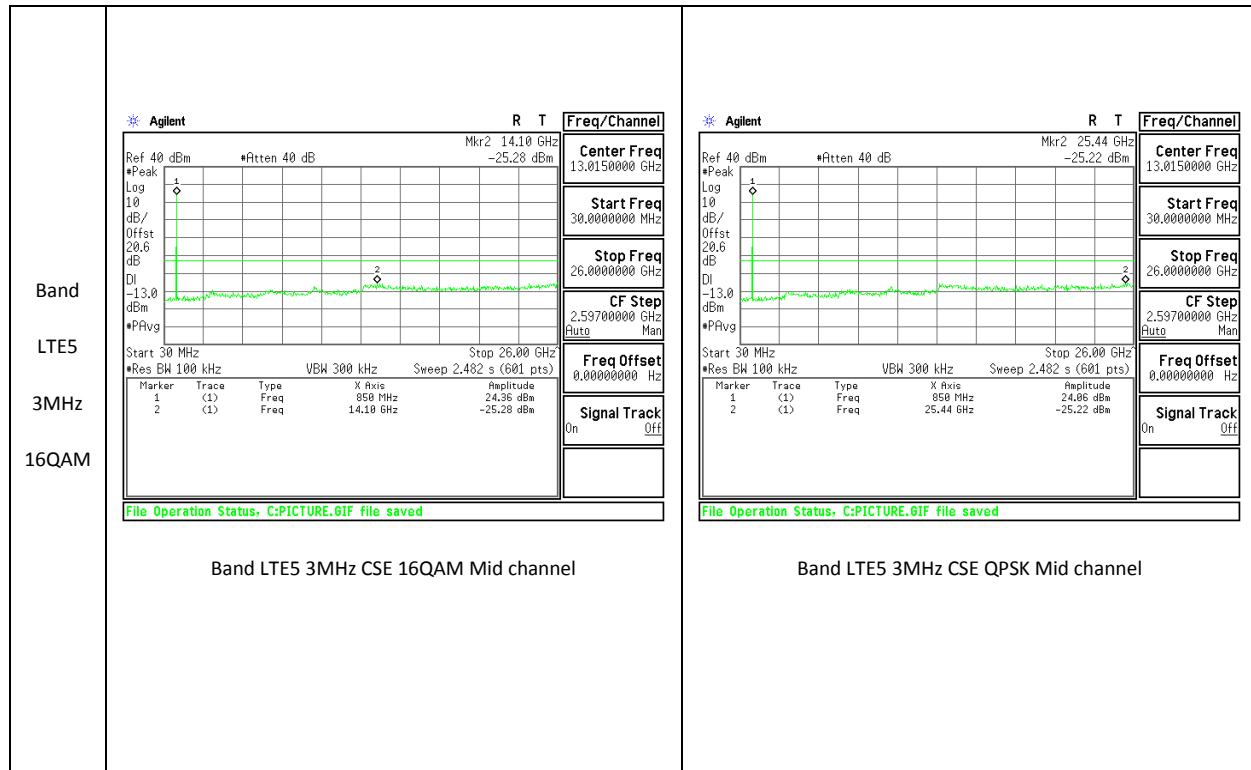
LTE Band 17



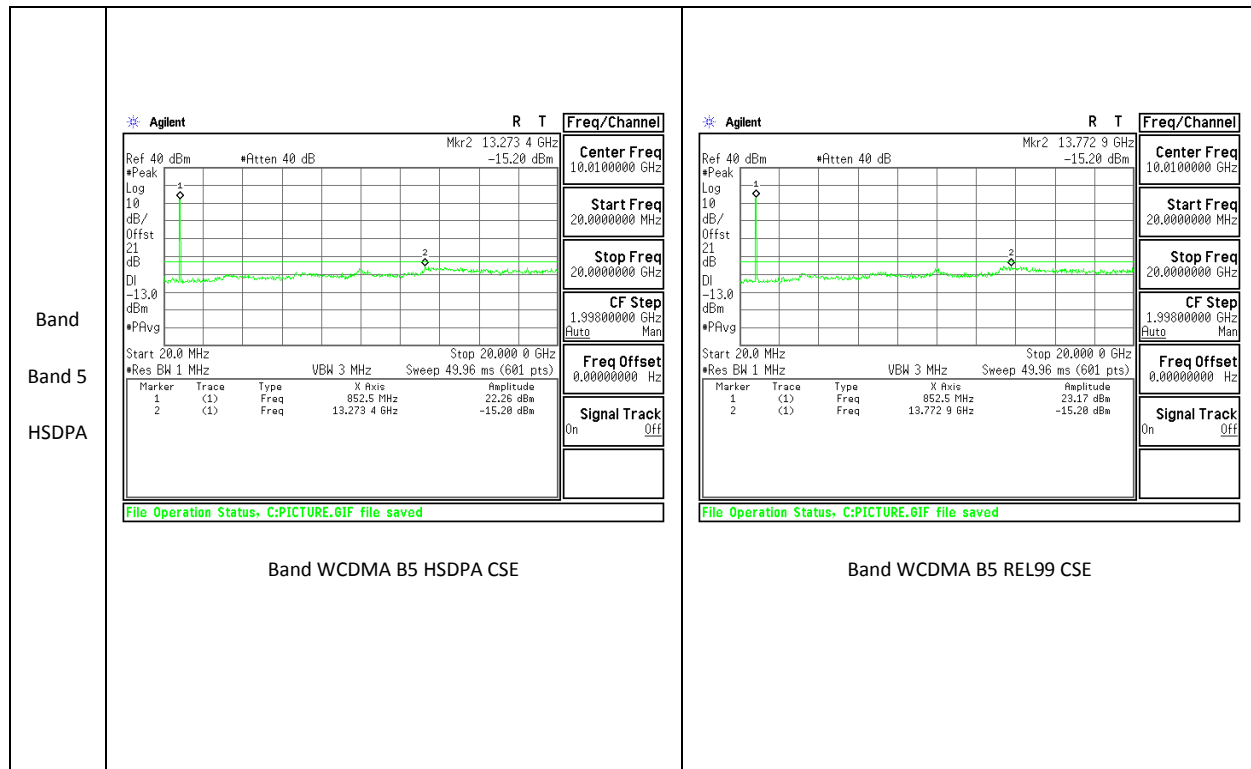
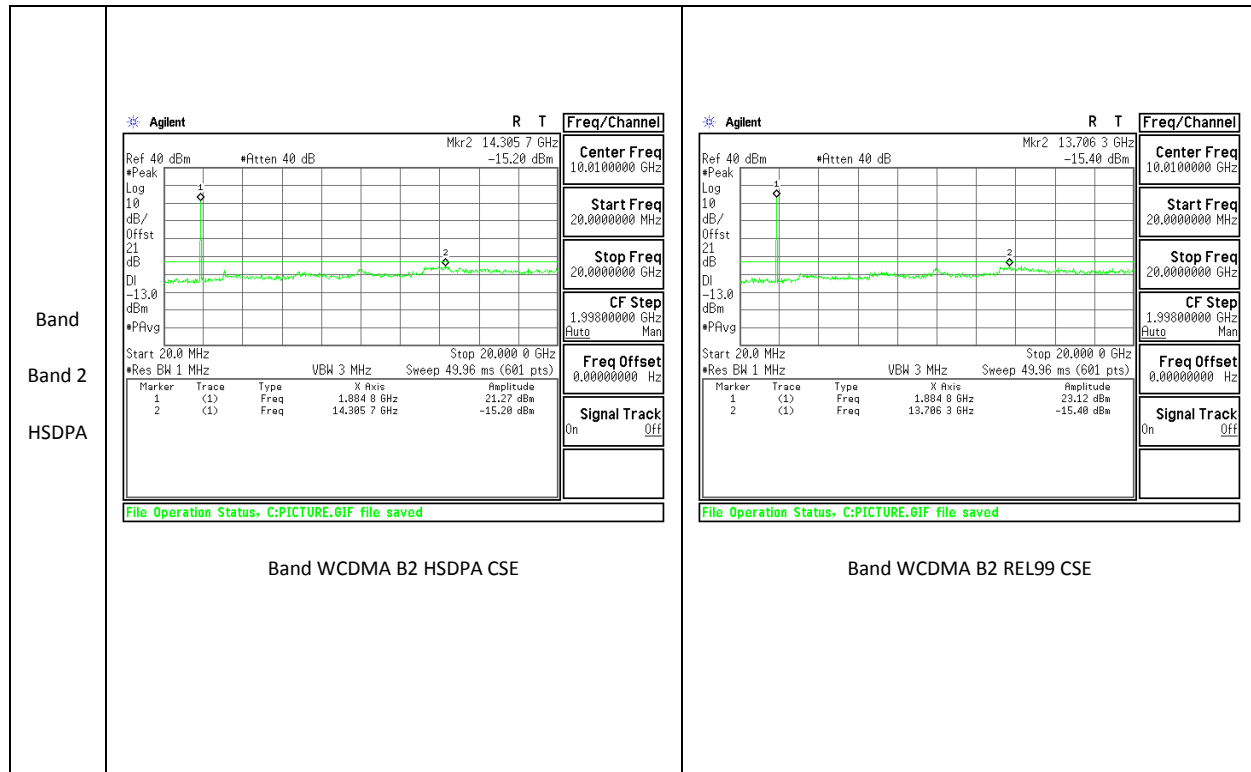


LTE Band 5

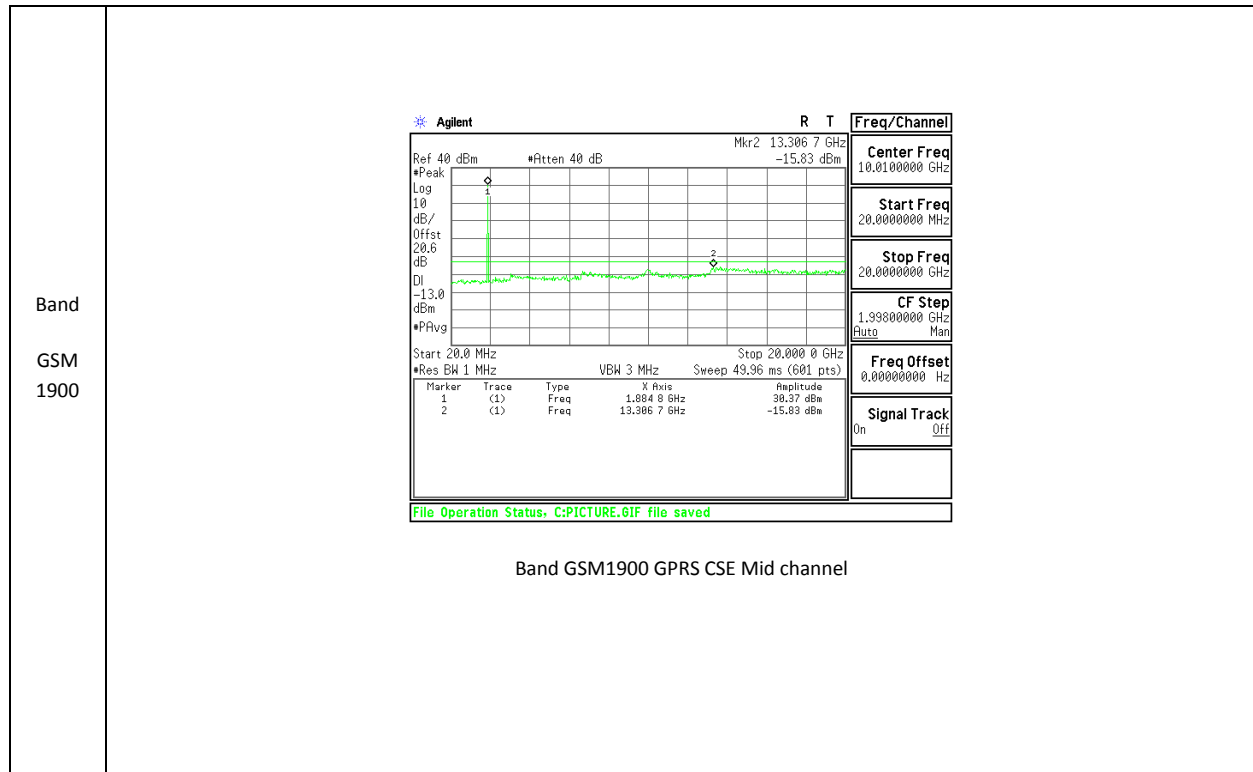




WCDMA



GSM



10.4. FREQUENCY STABILITY

RULE PART(S)

FCC: §2.1055, §22.355, §24.235, §27.54 and §90.213

LIMITS

§22.355 - The carrier frequency shall not depart from the reference frequency in excess of ± 2.5 ppm for mobile stations.

§24.235 - The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

§27.54 - The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

TEST PROCEDURE

Per KDB 971168 D01 Power Meas License Digital Systems v02r01

MODES TESTED

WCDMA and, LTE

RESULTS

See the following pages.

10.4.1. FREQUENCY STABILITY RESULTS

WCMDA BAND 5-MID CHANNEL

Reference Frequency: Cell Mid Channel 836.6 MHz @ 20°C				
Limit: +- 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	836.599997	-0.001	2.5
3.80	40	836.599994	0.002	2.5
3.80	30	836.599996	0.000	2.5
3.80	20	836.599996	0	2.5
3.80	10	836.599995	0.001	2.5
3.80	0	836.599998	-0.002	2.5
3.80	-10	836.599994	0.002	2.5
3.80	-20	836.599995	0.001	2.5
3.80	-30	836.599996	0.000	2.5

Reference Frequency: Mid Channel 836.6 MHz @ 20°C				
Limit: +- 2.5 ppm = 2091.500 Hz				
Power Supply (Vdc)	Environment Temperature (*C)	Frequency Deviation Measured with Time Elapse		
			Delta (ppm)	Limit (ppm)
3.80	20	836.599996	0.00000	2.5
4.37	20	836.599995	0.00120	2.5
3.23(end volt)	20	836.599996	0.00000	2.5

WCDMA BAND 2-MID CHANNEL

Reference Frequency: PC S Mid Channel 1880MHz @ 20°C Limit: to stay +/- 2.5 ppm = 4700.000 Hz				
Power Supply (Vdc)	Environment Temperature (°C)	Frequency Deviation Measured with Time Elapse		
		(MHz)	Delta (ppm)	Limit (ppm)
3.80	50	1879.999995	0.000	2.5
3.80	40	1879.999995	0.000	2.5
3.80	30	1879.999994	0.001	2.5
3.80	20	1879.999995	0	2.5
3.80	10	1879.999996	-0.001	2.5
3.80	0	1879.999991	0.002	2.5
3.80	-10	1879.999989	0.003	2.5
3.80	-20	1879.999994	0.001	2.5
3.80	-30	1879.999987	0.004	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	1879.999995	0	2.5
4.37	20	1879.999990	0.003	2.5
3.23(end volt)	20	1879.999987	0.004	2.5

LTE BAND 17-MID CHANNEL

Reference Frequency: Mid Channel 710 MHz @ 20°C Limit: within the authorized block or +/- 2.5 ppm = 1775.000 Hz				
Power Supply (Vdc)	Environment Temperature (*C)	Frequency Deviation Measured with Time Elapse		
		(MHz)	Delta (ppm)	Limit (ppm)
3.80	50	709.999962	0.006	2.5
3.80	40	709.999978	-0.017	2.5
3.80	30	709.999967	-0.001	2.5
3.80	20	709.999966	0	2.5
3.80	10	709.999967	-0.001	2.5
3.80	0	709.999968	-0.003	2.5
3.80	-10	709.999971	-0.007	2.5
3.80	-20	709.999977	-0.015	2.5
3.80	-30	709.999975	-0.013	2.5

Reference Frequency: Mid Channel 710.000010 MHz @ 20°C Limit: within the authorized block or +/- 2.5 ppm = 1775.000 Hz				
Power Supply (Vdc)	Environment Temperature (*C)	Frequency Deviation Measured with Time Elapse		
			Delta (ppm)	Limit (ppm)
3.80	20	709.999966	0.00000	2.5
4.37	20	709.999977	-0.01549	2.5
3.23(end volt)	20	709.999969	-0.00423	2.5

11. RADIATED TEST RESULTS

11.1. RADIATED POWER (ERP & EIRP)

RULE PART(S)

FCC: §2.1046, §22.913, §24.232, and §27

LIMITS

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

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

27.50(c) - (10) Portable stations (hand-held devices) are limited to 3 watts ERP; (LTE B17)

TEST PROCEDURE

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

For peak power measurement with a PSA:

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

For average power measurement with a PSA:

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

MODES TESTED

WCDMA, GSM, LTE

TEST RESULTS

11.1.1. ERP/EIRP Results

Band	Mode	Channel	f(MHz)	ERP / EIRP	
				dBm	mW
Band 2	REL99	9262	1852.4	20.50	112.1
		9400	1880	20.83	121.03
		9538	1907.6	20.48	111.63
	HSDPA	9262	1852.4	18.97	78.94
		9400	1880	19.48	88.8
		9538	1907.6	18.38	68.91

Band	Mode	Channel	f(MHz)	ERP / EIRP	
				dBm	mW
Band 5	REL99	4132	826.4	19.34	85.92
		4183	836.6	18.84	76.58
		4233	846.6	19.14	82.05
	HSDPA	4132	826.4	18.04	63.69
		4183	836.6	18.24	66.7
		4233	846.6	18.23	66.54

Band	Mode	Channel	f(MHz)	ERP / EIRP	
				dBm	mW
GSM1900	GPRS	512	1850.2	27.90	616.60
		661	1880	28.23	665.27
		810	1909.8	28.29	674.53

11.1.2. LTE ERP/EIRP Results

Band	BW (MHz)	Mode	RB/RB Size	f (MHz)	ERP / EIRP	
					dBm	mW
LTE17	10	QPSK	1/0	709		
			1/0	710	6.91	4.91
			1/0	711		
		16QAM	1/0	709		
			1/0	710	6.43	4.4
			1/0	711		

Band	BW (MHz)	Mode	RB/RB Size	f (MHz)	ERP / EIRP	
					dBm	mW
LTE17	5	QPSK	1/0	706.5	6.71	4.68
			1/0	710	6.61	4.58
			1/0	713.5	7.23	5.28
		16QAM	1/0	706.5	5.55	3.59
			1/0	710	5.58	3.62
			1/0	713.5	6.05	4.02

Band	BW (MHz)	Mode	RB/RB Size	f (MHz)	ERP / EIRP	
					dBm	mW
LTE5	10	QPSK	1/0	829	19.78	95.08
			1/0	836.5	19.88	97.3
			1/0	844	20.14	103.3
		16QAM	1/0	829	18.55	71.63
			1/0	836.5	19.18	82.81
			1/0	844	19.29	84.94

Band	BW (MHz)	Mode	RB/RB Size	f (MHz)	ERP / EIRP	
					dBm	mW
LTE5	5	QPSK	1/0	826.5	19.86	96.85
			1/0	836.5	19.79	95.3
			1/0	846.5	20.25	105.95
		16QAM	1/0	826.5	18.74	74.83
			1/0	836.5	19.09	81.11
			1/0	846.5	19.60	91.22

Band	BW (MHz)	Mode	RB/RB Size	f (MHz)	ERP / EIRP	
					dBm	mW
LTE5	3	QPSK	1/0	825.5	19.85	96.63
			1/0	836.5	19.98	99.56
			1/0	847.5	20.31	107.42
		16QAM	1/0	825.5	18.79	75.7
			1/0	836.5	19.11	81.49
			1/0	847.5	19.74	94.21

Band	BW (MHz)	Mode	RB/RB Size	f (MHz)	ERP / EIRP	
					dBm	mW
LTE5	1.4	QPSK	1/0	824.7	19.75	94.43
			1/0	836.5	19.92	98.2
			1/0	848.3	20.32	107.67
		16QAM	1/0	824.7	18.99	79.27
			1/0	836.5	19.27	84.55
			1/0	848.3	19.81	95.74

11.1.3. ERP/EIRP DATA

Band LTE17 10MHz 16QAM	High Frequency Substitution Measurement UL Verification Services, Inc. Company: Samsung Project #: 14U19262 Date: 11/13/2014 Test Engineer: O. Stoelting, D. Sblendorio Configuration: X-pos EUT only Location: Chamber B Mode: LTE_16QAM Band 17 Fundamentals, 10MHz Bandwidth Test Equipment: Receiving: Hybrid T243, and Chamber B SMA Cables Substitution: Dipole T273, 8ft SMA Cable Warehouse								
	f	SG reading	Ant. Pol.	Cable Loss	Antenna Gain	ERP	Limit	Delta	Notes
	MHz	(dBm)	(H/V)	(dB)	(dBd)	(dBm)	(dBm)	(dB)	
	Low Ch								
	709.00	0.00	V	0.9	0.0	0.00	34.8	0.0	
	709.00	0.00	H	0.9	0.0	0.00	34.8	0.0	
	Mid Ch								
	710.00	-2.75	V	0.9	0.0	-3.65	34.8	-38.4	
	710.00	7.33	H	0.9	0.0	6.43	34.8	-28.3	
	High Ch								
	711.00	0.00	V	0.9	0.0	0.00	34.8	0.0	
	711.00	0.00	H	0.9	0.0	0.00	34.8	0.0	

Band

LTE17

10MHz

QPSK

High Frequency Substitution Measurement

UL Verification Services, Inc.

Company:

Project #:

Date:

Test Engineer:

Configuration:

Location:

Mode:

Test Equipment:

Receiving: Hybrid T243, and Chamber B SMA Cables

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)	Delta (dB)	Notes
Low Ch								
709.00	0.00	V	0.9	0.0	0.00	34.8	0.0	
709.00	0.00	H	0.9	0.0	0.00	34.8	0.0	
Mid Ch								
710.00	-1.88	V	0.9	0.0	-2.78	34.8	-37.6	
710.00	7.81	H	0.9	0.0	6.91	34.8	-27.9	
High Ch								
711.00	0.00	V	0.9	0.0	0.00	34.8	0.0	
711.00	0.00	H	0.9	0.0	0.00	34.8	0.0	

Band

LTE17

5MHz

16QAM

High Frequency Substitution Measurement

UL Verification Services, Inc.

Company:

Project #:

Date:

Test Engineer:

Configuration:

Location:

Mode:

Samsung

14U19262

11/13/2014

O. Stoelting, D. Sblendorio

X-pos EUT only

Chamber B

LTE_16QAM Band 17 Fundamentals, 5MHz Bandwidth

Test Equipment:

Receiving: Hybrid T243, and Chamber B SMA Cables

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)	Delta (dB)	Notes
Low Ch								
706.50	-4.82	V	0.9	0.0	-5.72	34.8	-40.5	
706.50	6.45	H	0.9	0.0	5.55	34.8	-29.2	
Mid Ch								
710.00	-5.76	V	0.9	0.0	-6.66	34.8	-41.4	
710.00	6.48	H	0.9	0.0	5.58	34.8	-29.2	
High Ch								
713.50	-2.36	V	0.9	0.0	-3.26	34.8	-38.0	
713.50	6.95	H	0.9	0.0	6.05	34.8	-28.7	

Band

LTE5

10MHz

16QAM

High Frequency Substitution Measurement

UL Verification Services, Inc. Chamber B

Company:

Project #:

Date:

Test Engineer:

Configuration:

Mode:

Test Equipment:

Receiving: Sunol T243, and 5m Chamber B N-type Cable

Substitution: Dipole T273, 4ft SMA Cable Warehouse.

f	SG reading	Ant. Pol.	Cable Loss	Antenna Gain	ERP	Limit	Margin	Notes
MHz	(dBm)	(H/V)	(dB)	(dBd)	(dBm)	(dBm)	(dB)	
Low Ch								
829.00	11.56	V	0.9	0.0	10.66	38.5	-27.8	
829.00	19.45	H	0.9	0.0	18.55	38.5	-19.9	
Mid Ch								
836.50	11.32	V	0.9	0.0	10.42	38.5	-28.0	
836.50	20.08	H	0.9	0.0	19.18	38.5	-19.3	
High Ch								
844.00	11.61	V	0.9	0.0	10.71	38.5	-27.7	
844.00	20.19	H	0.9	0.0	19.29	38.5	-19.2	

Rev. 3.17.11

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

Band

LTE5

10MHz

QPSK

High Frequency Substitution Measurement

UL Verification Services, Inc. Chamber B

Company:

Project #:

Date:

Test Engineer:

Configuration:

Mode:

Samsung

14U19262

11/13/14

R. Alegre

X-pos EUT Only

LTE5 10MHz QPSK

Test Equipment:

Receiving: Sunol T243, and 5m 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								
829.00	12.73	V	0.9	0.0	11.83	38.5	-26.6	
829.00	20.68	H	0.9	0.0	19.78	38.5	-18.7	
Mid Ch								
836.50	12.46	V	0.9	0.0	11.56	38.5	-26.9	
836.50	20.78	H	0.9	0.0	19.88	38.5	-18.6	
High Ch								
844.00	12.64	V	0.9	0.0	11.74	38.5	-26.7	
844.00	21.04	H	0.9	0.0	20.14	38.5	-18.3	

Rev. 3.17.11

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

Band

LTE5

5MHz

16QAM

High Frequency Substitution Measurement

UL Verification Services, Inc. Chamber B

Company:

Project #:

Date:

Test Engineer:

Configuration:

Mode:

Test Equipment:

Receiving: Sunol T243, and 5m 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								
826.50	11.67	V	0.9	0.0	10.77	38.5	-27.7	
826.50	19.64	H	0.9	0.0	18.74	38.5	-19.7	
Mid Ch								
836.50	11.57	V	0.9	0.0	10.67	38.5	-27.8	
836.50	19.99	H	0.9	0.0	19.09	38.5	-19.4	
High Ch								
846.50	11.44	V	0.9	0.0	10.54	38.5	-27.9	
846.50	20.50	H	0.9	0.0	19.60	38.5	-18.8	

Rev. 3.17.11

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

Band LTE5 5MHz QPSK	High Frequency Substitution Measurement UL Verification Services, Inc. Chamber B																																																																																																
	Company: Samsung																																																																																																
	Project #: 14U19262																																																																																																
	Date: 11/13/14																																																																																																
	Test Engineer: R. Alegre																																																																																																
	Configuration: X-pos EUT Only																																																																																																
	Mode: LTE5 5MHz QPSK																																																																																																
	Test Equipment:																																																																																																
	Receiving: Sunol T243, and 5m Chamber B N-type Cable Substitution: Dipole T273, 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 (dBd)</th> <th>ERP (dBm)</th> <th>Limit (dBm)</th> <th>Margin (dB)</th> <th>Notes</th> </tr> </thead> <tbody> <tr> <td>Low Ch</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>826.50</td> <td>12.60</td> <td>V</td> <td>0.9</td> <td>0.0</td> <td>11.70</td> <td>38.5</td> <td>-26.7</td> <td></td> </tr> <tr> <td>826.50</td> <td>20.76</td> <td>H</td> <td>0.9</td> <td>0.0</td> <td>19.86</td> <td>38.5</td> <td>-18.6</td> <td></td> </tr> <tr> <td>Mid Ch</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>836.50</td> <td>12.67</td> <td>V</td> <td>0.9</td> <td>0.0</td> <td>11.77</td> <td>38.5</td> <td>-26.7</td> <td></td> </tr> <tr> <td>836.50</td> <td>20.69</td> <td>H</td> <td>0.9</td> <td>0.0</td> <td>19.79</td> <td>38.5</td> <td>-18.7</td> <td></td> </tr> <tr> <td>High Ch</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>846.50</td> <td>12.31</td> <td>V</td> <td>0.9</td> <td>0.0</td> <td>11.41</td> <td>38.5</td> <td>-27.0</td> <td></td> </tr> <tr> <td>846.50</td> <td>21.15</td> <td>H</td> <td>0.9</td> <td>0.0</td> <td>20.25</td> <td>38.5</td> <td>-18.2</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)	Margin (dB)	Notes	Low Ch									826.50	12.60	V	0.9	0.0	11.70	38.5	-26.7		826.50	20.76	H	0.9	0.0	19.86	38.5	-18.6		Mid Ch									836.50	12.67	V	0.9	0.0	11.77	38.5	-26.7		836.50	20.69	H	0.9	0.0	19.79	38.5	-18.7		High Ch									846.50	12.31	V	0.9	0.0	11.41	38.5	-27.0		846.50	21.15	H	0.9	0.0	20.25	38.5	-18.2
f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes																																																																																									
Low Ch																																																																																																	
826.50	12.60	V	0.9	0.0	11.70	38.5	-26.7																																																																																										
826.50	20.76	H	0.9	0.0	19.86	38.5	-18.6																																																																																										
Mid Ch																																																																																																	
836.50	12.67	V	0.9	0.0	11.77	38.5	-26.7																																																																																										
836.50	20.69	H	0.9	0.0	19.79	38.5	-18.7																																																																																										
High Ch																																																																																																	
846.50	12.31	V	0.9	0.0	11.41	38.5	-27.0																																																																																										
846.50	21.15	H	0.9	0.0	20.25	38.5	-18.2																																																																																										
Rev. 3.17.11 Note: For Band 13/17 ERP limit is 34.77dBm; For Band 26 limit is 50dBm																																																																																																	

Band

LTE5

3MHz

16QAM

High Frequency Substitution Measurement

UL Verification Services, Inc. Chamber B

Company:

Project #:

Date:

Test Engineer:

Configuration:

Mode:

Test Equipment:

Receiving: Sunol T243, and 5m 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								
825.50	11.59	V	0.9	0.0	10.69	38.5	-27.8	
825.50	19.69	H	0.9	0.0	18.79	38.5	-19.7	
Mid Ch								
836.50	11.66	V	0.9	0.0	10.76	38.5	-27.7	
836.50	20.01	H	0.9	0.0	19.11	38.5	-19.3	
High Ch								
847.50	11.48	V	0.9	0.0	10.58	38.5	-27.9	
847.50	20.64	H	0.9	0.0	19.74	38.5	-18.7	

Rev. 3.17.11

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

Band

LTE5

1.4MHz

16QAM

High Frequency Substitution Measurement

UL Verification Services, Inc. Chamber B

Company:

Project #:

Date:

Test Engineer:

Configuration:

Mode:

Test Equipment:

Receiving: Sunol T243, and 5m 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								
824.70	11.74	V	0.9	0.0	10.84	38.5	-27.6	
824.70	19.89	H	0.9	0.0	18.99	38.5	-19.5	
Mid Ch								
836.50	11.82	V	0.9	0.0	10.92	38.5	-27.5	
836.50	20.17	H	0.9	0.0	19.27	38.5	-19.2	
High Ch								
848.30	11.81	V	0.9	0.0	10.91	38.5	-27.5	
848.30	20.71	H	0.9	0.0	19.81	38.5	-18.6	

Rev. 3.17.11

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

Band

LTE5

1.4MHz

QPSK

High Frequency Substitution Measurement

UL Verification Services, Inc. Chamber B

Company:

Samsung

Project #:

14U19262

Date:

11/13/14

Test Engineer:

R. Alegre

Configuration:

X-pos EUT Only

Mode:

LTE5 1.4MHz QPSK

Test Equipment:

Receiving: Sunol T243, and 5m 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								
824.70	12.85	V	0.9	0.0	11.95	38.5	-26.5	
824.70	20.65	H	0.9	0.0	19.75	38.5	-18.7	
Mid Ch								
836.50	12.79	V	0.9	0.0	11.89	38.5	-26.6	
836.50	20.82	H	0.9	0.0	19.92	38.5	-18.5	
High Ch								
848.30	12.76	V	0.9	0.0	11.86	38.5	-26.6	
848.30	21.22	H	0.9	0.0	20.32	38.5	-18.1	

Rev. 3.17.11

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

Band Band 2 HSDPA	High Frequency Substitution Measurement UL Verification Services, Inc. Chamber B								
	Company:		SAMSUNG						
	Project #:		14U19262						
	Date:		11/11/14						
	Test Engineer:		J. Hsu						
	Configuration:		X-Pos EUT 1992967						
	Mode:		HSDPA Band 2						
	Test Equipment:								
	Receiving: Horn T345, and Chamber B SMA Cables								
	Substitution: Horn T962 Substitution, 8ft SMA Cable Warehouse								
	f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
	Low Ch								
	1852.40	4.22	V	0.9	10.4	13.72	33.0	-19.3	
	1852.40	9.47	H	0.9	10.4	18.97	33.0	-14.0	
	Mid Ch								
	1880.00	7.07	V	0.9	10.8	16.97	33.0	-16.0	
	1880.00	9.58	H	0.9	10.8	19.48	33.0	-13.5	
	High Ch								
	1907.60	3.72	V	0.9	11.1	13.92	33.0	-19.1	
	1907.60	8.18	H	0.9	11.1	18.38	33.0	-14.6	
Rev. 3.17.11 Note: For Band 4 EIRP limit is 30dBm									

Band Band 5 HSDPA	High Frequency Substitution Measurement UL Verification Services, Inc. Chamber B Company: Samsung Project #: 14U19262 Date: 11/12/14 Test Engineer: Jude Semana Configuration: X-pos EUT Only (SN: 1992967) Mode: WCDMA_HSDPA_850 Test Equipment: Receiving: Sunol T243, and 5m Chamber N-type Cable (Setup this one for testing EUT) Substitution: Dipole S/N: 00022117, 4ft SMA Cable (SN # 245200 001) Warehouse.								
	f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
	Low Ch								
	826.40	15.76	V	0.9	0.0	14.86	38.5	-23.6	
	826.40	18.94	H	0.9	0.0	18.04	38.5	-20.4	
	Mid Ch								
	836.60	15.24	V	0.9	0.0	14.34	38.5	-24.1	
	836.60	19.14	H	0.9	0.0	18.24	38.5	-20.2	
	High Ch								
	846.60	13.96	V	0.9	0.0	13.06	38.5	-25.4	
	846.60	19.13	H	0.9	0.0	18.23	38.5	-20.2	
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. Chamber B Company: Samsung Project #: 14U19262 Date: 11/12/14 Test Engineer: Jude Semana Configuration: X-pos EUT Only (SN: 1992967) Mode: WCDMA_REL99_850 Test Equipment: Receiving: Sunol T243, and 5m Chamber N-type Cable (Setup this one for testing EUT) Substitution: Dipole S/N: 00022117, 4ft SMA Cable (SN # 245200 001) Warehouse. <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <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>Margin (dB)</th> <th>Notes</th> </tr> </thead> <tbody> <tr> <td colspan="9">Low Ch</td> </tr> <tr> <td>826.40</td> <td>16.90</td> <td>V</td> <td>0.9</td> <td>0.0</td> <td>16.00</td> <td>38.5</td> <td>-22.5</td> <td></td> </tr> <tr> <td>826.40</td> <td>20.24</td> <td>H</td> <td>0.9</td> <td>0.0</td> <td>19.34</td> <td>38.5</td> <td>-19.1</td> <td></td> </tr> <tr> <td colspan="9">Mid Ch</td> </tr> <tr> <td>836.60</td> <td>15.80</td> <td>V</td> <td>0.9</td> <td>0.0</td> <td>14.91</td> <td>38.5</td> <td>-23.5</td> <td></td> </tr> <tr> <td>836.60</td> <td>19.74</td> <td>H</td> <td>0.9</td> <td>0.0</td> <td>18.84</td> <td>38.5</td> <td>-19.6</td> <td></td> </tr> <tr> <td colspan="9">High Ch</td> </tr> <tr> <td>846.60</td> <td>14.74</td> <td>V</td> <td>0.9</td> <td>0.0</td> <td>13.84</td> <td>38.5</td> <td>-24.6</td> <td></td> </tr> <tr> <td>846.60</td> <td>20.04</td> <td>H</td> <td>0.9</td> <td>0.0</td> <td>19.14</td> <td>38.5</td> <td>-19.3</td> <td></td> </tr> </tbody> </table> Rev. 3.17.11 Note: For Band 13/17 ERP limit is 34.77dBm; For Band 26 limit is 50dBm	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	16.90	V	0.9	0.0	16.00	38.5	-22.5		826.40	20.24	H	0.9	0.0	19.34	38.5	-19.1		Mid Ch									836.60	15.80	V	0.9	0.0	14.91	38.5	-23.5		836.60	19.74	H	0.9	0.0	18.84	38.5	-19.6		High Ch									846.60	14.74	V	0.9	0.0	13.84	38.5	-24.6		846.60	20.04	H	0.9	0.0	19.14	38.5	-19.3	
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	16.90	V	0.9	0.0	16.00	38.5	-22.5																																																																																				
826.40	20.24	H	0.9	0.0	19.34	38.5	-19.1																																																																																				
Mid Ch																																																																																											
836.60	15.80	V	0.9	0.0	14.91	38.5	-23.5																																																																																				
836.60	19.74	H	0.9	0.0	18.84	38.5	-19.6																																																																																				
High Ch																																																																																											
846.60	14.74	V	0.9	0.0	13.84	38.5	-24.6																																																																																				
846.60	20.04	H	0.9	0.0	19.14	38.5	-19.3																																																																																				

Band GSM19 00 GPRS	High Frequency Substitution Measurement UL Verification Services, Inc. Chamber B								
	Company: SAMSUNG Project #: 14U19262 Date: 11/11/14 Test Engineer: J. Hsu Configuration: X-Pos EUT 1992967 Mode: GPRS1900								
	Test Equipment: Receiving: Horn T345, and Chamber B SMA Cables Substitution: Horn T962 Substitution, 8ft 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								
	1850.20	15.85	V	0.9	10.4	25.35	33.0	-7.6	
	1850.20	18.40	H	0.9	10.4	27.90	33.0	-5.1	
	Mid								
	1880.00	17.71	V	0.9	10.8	27.61	33.0	-5.4	
	1880.00	18.33	H	0.9	10.8	28.23	33.0	-4.8	
High									
1909.80	15.24	V	0.9	11.1	25.44	33.0	-7.6		
1909.80	18.09	H	0.9	11.1	28.29	33.0	-4.7		
Rev. 3.17.11 Note: For Band 4 EIRP limit is 30dBm									

11.2. FIELD STRENGTH OF SPURIOUS RADIATION

RULE PART(S)

FCC: §2.1053, §22.917, §24.238

LIMIT

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

TEST PROCEDURE

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

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

MODES TESTED

WCDMA, GSM, LTE

RESULTS

11.2.1. SPURIOUS RADIATION DATA

Band	UL Verification Services, Inc Above 1GHz High Frequency Substitution Measurement Company: Samsung Project #: 14U19262 Date: 11/13/2014 Test Engineer: O. Stoelting, D. Sblendorio Configuration: X-Pos EUT, AC Charger, Headset Location: Chamber B Mode: LTE_16QAM Band 17 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, 709									
LTE17	1418.00	0.0	V	3.0	37.4	1.0	-36.4	-13.0	-23.4	
	2127.00	0.0	V	3.0	36.6	1.0	-35.6	-13.0	-22.6	
	2836.00	0.0	V	3.0	36.4	1.0	-35.4	-13.0	-22.4	
	1418.00	0.0	H	3.0	37.4	1.0	-36.4	-13.0	-23.4	
	2127.00	0.0	H	3.0	36.6	1.0	-35.6	-13.0	-22.6	
	2836.00	0.0	H	3.0	36.4	1.0	-35.4	-13.0	-22.4	
	Mid Ch, 710									
	1420.00	1.3	V	3.0	37.3	1.0	-35.0	-13.0	-22.0	
	2130.00	-2.9	V	3.0	36.6	1.0	-38.5	-13.0	-25.5	
	2840.00	-16.1	V	3.0	36.4	1.0	-51.5	-13.0	-38.5	
	1420.00	2.4	H	3.0	37.3	1.0	-33.9	-13.0	-20.9	
	2130.00	-4.0	H	3.0	36.6	1.0	-39.6	-13.0	-26.6	
16QAM	2840.00	-15.1	H	3.0	36.4	1.0	-50.5	-13.0	-37.5	
	High Ch, 711									
	1422.00	0.0	V	3.0	37.3	1.0	-36.3	-13.0	-23.3	
	2133.00	0.0	V	3.0	36.6	1.0	-35.6	-13.0	-22.6	
	2844.00	0.0	V	3.0	36.4	1.0	-35.4	-13.0	-22.4	
	1422.00	0.0	H	3.0	37.3	1.0	-36.3	-13.0	-23.3	
	2133.00	0.0	H	3.0	36.6	1.0	-35.6	-13.0	-22.6	
	2844.00	0.0	H	3.0	36.4	1.0	-35.4	-13.0	-22.4	

Band	UL Verification Services, Inc Above 1GHz High Frequency Substitution Measurement Company: Samsung Project #: 14U19262 Date: 11/13/2014 Test Engineer: O. Stoelting, D. Splendorio Configuration: X-Pos EUT, AC Charger, Headset Location: Chamber B Mode: LTE_QPSK Band 17 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
LTE17	Low Ch, 709									
	1418.00	0.0	V	3.0	37.4	1.0	-36.4	-13.0	-23.4	
10MHz	2127.00	0.0	V	3.0	36.6	1.0	-35.6	-13.0	-22.6	
	2836.00	0.0	V	3.0	36.4	1.0	-35.4	-13.0	-22.4	
QPSK	1418.00	0.0	H	3.0	37.4	1.0	-36.4	-13.0	-23.4	
	2127.00	0.0	H	3.0	36.6	1.0	-35.6	-13.0	-22.6	
	2836.00	0.0	H	3.0	36.4	1.0	-35.4	-13.0	-22.4	
	Mid Ch, 710									
	1420.00	0.9	V	3.0	37.3	1.0	-35.4	-13.0	-22.4	
	2130.00	-2.5	V	3.0	36.6	1.0	-38.0	-13.0	-25.0	
	2840.00	-15.8	V	3.0	36.4	1.0	-51.2	-13.0	-38.2	
	1420.00	2.7	H	3.0	37.3	1.0	-33.7	-13.0	-20.7	
	2130.00	-4.5	H	3.0	36.6	1.0	-40.0	-13.0	-27.0	
	2840.00	-15.5	H	3.0	36.4	1.0	-50.9	-13.0	-37.9	
	High Ch, 711									
	1422.00	0.0	V	3.0	37.3	1.0	-36.3	-13.0	-23.3	
	2133.00	0.0	V	3.0	36.6	1.0	-35.6	-13.0	-22.6	
	2844.00	0.0	V	3.0	36.4	1.0	-35.4	-13.0	-22.4	
	1422.00	0.0	H	3.0	37.3	1.0	-36.3	-13.0	-23.3	
	2133.00	0.0	H	3.0	36.6	1.0	-35.6	-13.0	-22.6	
	2844.00	0.0	H	3.0	36.4	1.0	-35.4	-13.0	-22.4	

Band	UL Verification Services, Inc Above 1GHz High Frequency Substitution Measurement Company: Samsung Project #: 14U19262 Date: 11/13/2014 Test Engineer: O. Stoelting, D. Splendorio Configuration: X-Pos EUT, AC Charger, Headset Location: Chamber B Mode: LTE_QPSK Band 17 Harmonics, 5MHz Bandwidth									
	f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamplifier (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
	Low Ch, 706.5									
LTE17	1413.00	0.8	V	3.0	37.4	1.0	-35.5	-13.0	-22.5	
	2119.50	3.5	V	3.0	36.6	1.0	-32.0	-13.0	-19.0	
5MHz	2826.00	-15.9	V	3.0	36.4	1.0	-51.3	-13.0	-38.3	
	1413.00	2.3	H	3.0	37.4	1.0	-34.0	-13.0	-21.0	
QPSK	2119.50	-7.2	H	3.0	36.6	1.0	-42.8	-13.0	-29.8	
	2826.00	-16.3	H	3.0	36.4	1.0	-51.7	-13.0	-38.7	
	Mid Ch, 710									
	1420.00	0.9	V	3.0	37.3	1.0	-35.4	-13.0	-22.4	
	2130.00	-2.5	V	3.0	36.6	1.0	-38.0	-13.0	-25.0	
	2840.00	-15.8	V	3.0	36.4	1.0	-51.2	-13.0	-38.2	
	1420.00	2.7	H	3.0	37.3	1.0	-33.7	-13.0	-20.7	
	2130.00	-4.5	H	3.0	36.6	1.0	-40.0	-13.0	-27.0	
	2840.00	-15.5	H	3.0	36.4	1.0	-50.9	-13.0	-37.9	
	High Ch, 713.5									
	1427.00	1.9	V	3.0	37.3	1.0	-34.4	-13.0	-21.4	
	2140.50	2.5	V	3.0	36.6	1.0	-33.1	-13.0	-20.1	
	2854.00	-12.6	V	3.0	36.4	1.0	-48.0	-13.0	-35.0	
	1427.00	2.7	H	3.0	37.3	1.0	-33.6	-13.0	-20.6	
	2140.50	1.4	H	3.0	36.6	1.0	-34.2	-13.0	-21.2	
	2854.00	-13.9	H	3.0	36.4	1.0	-49.3	-13.0	-36.3	

Band	UL Verification Services, Inc Above 1GHz High Frequency Substitution Measurement Company: Samsung Project #: 14U19262 Date: 11/13/2014 Test Engineer: O. Stoelting, D. Splendorio Configuration: X-Pos EUT, AC Charger, Headset Location: Chamber B Mode: LTE_16QAM 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									
LTE5	1658.00	-7.1	V	3.0	37.0	1.0	-43.1	-13.0	-30.1	
	2487.00	-11.1	V	3.0	36.4	1.0	-46.5	-13.0	-33.5	
	3316.00	-15.8	V	3.0	36.1	1.0	-50.9	-13.0	-37.9	
10MHz	1658.00	-3.7	H	3.0	37.0	1.0	-39.7	-13.0	-26.7	
	2487.00	-5.9	H	3.0	36.4	1.0	-41.3	-13.0	-28.3	
	3316.00	-15.8	H	3.0	36.1	1.0	-50.9	-13.0	-37.9	
16QAM	Mid Ch, 836.5									
	1673.00	-17.1	V	3.0	37.0	1.0	-53.1	-13.0	-40.1	
	2509.50	-6.9	V	3.0	36.4	1.0	-42.3	-13.0	-29.3	
	3346.00	-14.8	V	3.0	36.1	1.0	-49.9	-13.0	-36.9	
	1673.00	-2.2	H	3.0	37.0	1.0	-38.2	-13.0	-25.2	
	2509.50	-0.3	H	3.0	36.4	1.0	-35.7	-13.0	-22.7	
	3346.00	-15.1	H	3.0	36.1	1.0	-50.2	-13.0	-37.2	
	High Ch, 844									
	1688.00	-7.1	V	3.0	37.0	1.0	-43.1	-13.0	-30.1	
	2532.00	0.2	V	3.0	36.4	1.0	-35.2	-13.0	-22.2	
	3376.00	-14.9	V	3.0	36.1	1.0	-50.0	-13.0	-37.0	
	1688.00	-3.2	H	3.0	37.0	1.0	-39.2	-13.0	-26.2	
	2532.00	1.7	H	3.0	36.4	1.0	-33.7	-13.0	-20.7	
	3376.00	-15.2	H	3.0	36.1	1.0	-50.3	-13.0	-37.3	

Band	UL Verification Services, Inc Above 1GHz High Frequency Substitution Measurement Company: Samsung Project #: 14U19262 Date: 11/13/2014 Test Engineer: O. Stoelting, D. Splendorio Configuration: X-Pos EUT, AC Charger, Headset Location: Chamber B 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
LTE5 10MHz QPSK	Low Ch, 829									
	1658.00	-7.5	V	3.0	37.0	1.0	-43.6	-13.0	-30.6	
	2487.00	-10.6	V	3.0	36.4	1.0	-46.0	-13.0	-33.0	
	3316.00	-15.9	V	3.0	36.1	1.0	-51.1	-13.0	-38.1	
	1658.00	-3.6	H	3.0	37.0	1.0	-39.6	-13.0	-26.6	
	2487.00	-6.2	H	3.0	36.4	1.0	-41.6	-13.0	-28.6	
	3316.00	-15.5	H	3.0	36.1	1.0	-50.7	-13.0	-37.7	
	Mid Ch, 836.5									
	1673.00	2.7	V	3.0	37.0	1.0	-33.3	-13.0	-20.3	
	2509.50	-11.6	V	3.0	36.4	1.0	-47.0	-13.0	-34.0	
	3346.00	-4.6	V	3.0	36.1	1.0	-39.7	-13.0	-26.7	
	1673.00	-2.5	H	3.0	37.0	1.0	-38.5	-13.0	-25.5	
	2509.50	-0.3	H	3.0	36.4	1.0	-35.7	-13.0	-22.7	
	3346.00	-14.7	H	3.0	36.1	1.0	-49.8	-13.0	-36.8	
	High Ch, 844									
	1688.00	-6.7	V	3.0	37.0	1.0	-42.7	-13.0	-29.7	
	2532.00	0.1	V	3.0	36.4	1.0	-35.3	-13.0	-22.3	
	3376.00	-16.2	V	3.0	36.1	1.0	-51.3	-13.0	-38.3	
	1688.00	-6.5	H	3.0	37.0	1.0	-42.4	-13.0	-29.4	
	2532.00	-1.7	H	3.0	36.4	1.0	-37.2	-13.0	-24.2	
	3376.00	-16.3	H	3.0	36.1	1.0	-51.4	-13.0	-38.4	

Band	UL Verification Services, Inc Above 1GHz High Frequency Substitution Measurement Company: Samsung Project #: 14U19262 Date: 11/13/2014 Test Engineer: O. Stoelting, D. Splendorio Configuration: X-Pos EUT, AC Charger, Headset Location: Chamber B Mode: LTE_16QAM Band 5 Harmonics, 5MHz Bandwidth									
	f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamplifier (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
LTE5	Low Ch, 826.5									
	1653.00	-7.0	V	3.0	37.0	1.0	-43.0	-13.0	-30.0	
5MHz	2479.50	2.5	V	3.0	36.4	1.0	-32.9	-13.0	-19.9	
	3306.00	-14.7	V	3.0	36.1	1.0	-49.9	-13.0	-36.9	
16QAM	1653.00	-5.6	H	3.0	37.0	1.0	-41.6	-13.0	-28.6	
	2479.50	-8.5	H	3.0	36.4	1.0	-43.9	-13.0	-30.9	
	3306.00	-15.9	H	3.0	36.1	1.0	-51.1	-13.0	-38.1	
	Mid Ch, 836.5									
	1673.00	-4.4	V	3.0	37.0	1.0	-40.4	-13.0	-27.4	
	2509.50	1.2	V	3.0	36.4	1.0	-34.2	-13.0	-21.2	
	3346.00	-15.3	V	3.0	36.1	1.0	-50.4	-13.0	-37.4	
	1673.00	-5.3	H	3.0	37.0	1.0	-41.3	-13.0	-28.3	
	2509.50	-12.6	H	3.0	36.4	1.0	-48.0	-13.0	-35.0	
	3346.00	-14.2	H	3.0	36.1	1.0	-49.3	-13.0	-36.3	
	High Ch, 846.5									
	1693.00	-5.6	V	3.0	37.0	1.0	-41.5	-13.0	-28.5	
	2539.50	-10.8	V	3.0	36.4	1.0	-46.2	-13.0	-33.2	
	3386.00	-15.0	V	3.0	36.1	1.0	-50.1	-13.0	-37.1	
	1693.00	-2.6	H	3.0	37.0	1.0	-38.6	-13.0	-25.6	
	2539.50	-1.3	H	3.0	36.4	1.0	-36.7	-13.0	-23.7	
	3386.00	-14.9	H	3.0	36.1	1.0	-50.0	-13.0	-37.0	

Band	UL Verification Services, Inc Above 1GHz High Frequency Substitution Measurement Company: Samsung Project #: 14U19262 Date: 11/13/2014 Test Engineer: O. Stoelting, D. Splendorio Configuration: X-Pos EUT, AC Charger, Headset Location: Chamber B 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
LTE5 5MHz QPSK	Low Ch, 826.5									
	1653.00	-7.2	V	3.0	37.0	1.0	-43.2	-13.0	-30.2	
	2479.50	2.6	V	3.0	36.4	1.0	-32.8	-13.0	-19.8	
	3306.00	-13.8	V	3.0	36.1	1.0	-48.9	-13.0	-35.9	
	1653.00	-5.3	H	3.0	37.0	1.0	-41.3	-13.0	-28.3	
	2479.50	-8.4	H	3.0	36.4	1.0	-43.8	-13.0	-30.8	
	3306.00	-15.4	H	3.0	36.1	1.0	-50.6	-13.0	-37.6	
	Mid Ch, 836.5									
	1673.00	-4.3	V	3.0	37.0	1.0	-40.3	-13.0	-27.3	
	2509.50	0.1	V	3.0	36.4	1.0	-35.3	-13.0	-22.3	
	3346.00	-15.5	V	3.0	36.1	1.0	-50.6	-13.0	-37.6	
	1673.00	-5.8	H	3.0	37.0	1.0	-41.7	-13.0	-28.7	
	2509.50	-12.8	H	3.0	36.4	1.0	-48.2	-13.0	-35.2	
	3346.00	-15.7	H	3.0	36.1	1.0	-50.8	-13.0	-37.8	
	High Ch, 846.5									
	1693.00	-5.7	V	3.0	37.0	1.0	-41.7	-13.0	-28.7	
	2539.50	-10.6	V	3.0	36.4	1.0	-46.1	-13.0	-33.1	
	3386.00	-15.3	V	3.0	36.1	1.0	-50.4	-13.0	-37.4	
	1693.00	-2.8	H	3.0	37.0	1.0	-38.8	-13.0	-25.8	
	2539.50	-1.4	H	3.0	36.4	1.0	-36.8	-13.0	-23.8	
	3386.00	-15.3	H	3.0	36.1	1.0	-50.4	-13.0	-37.4	

Band	UL Verification Services, Inc Above 1GHz High Frequency Substitution Measurement Company: Samsung Project #: 14U19262 Date: 11/13/2014 Test Engineer: O. Stoelting, D. Sblendorio Configuration: X-Pos EUT (SN: 1992965), AC Charger, Headset Location: Chamber B Mode: LTE_16QAM Band 5 Harmonics, 3MHz Bandwidth									
	f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamplifier (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
LTE5	Low Ch, 825.5									
	1651.00	-3.1	V	3.0	37.0	1.0	-39.1	-13.0	-26.1	
3MHz	2476.50	5.9	V	3.0	36.4	1.0	-29.5	-13.0	-16.5	
	3302.00	-14.5	V	3.0	36.2	1.0	-49.6	-13.0	-36.6	
16QAM	1651.00	4.5	H	3.0	37.0	1.0	-31.5	-13.0	-18.5	
	2476.50	5.8	H	3.0	36.4	1.0	-29.6	-13.0	-16.6	
	3302.00	-14.7	H	3.0	36.2	1.0	-49.8	-13.0	-36.8	
	Mid Ch, 836.5									
	1673.00	-3.9	V	3.0	37.0	1.0	-39.9	-13.0	-26.9	
	2509.50	-1.7	V	3.0	36.4	1.0	-37.1	-13.0	-24.1	
	3346.00	-15.8	V	3.0	36.1	1.0	-51.0	-13.0	-38.0	
	1673.00	3.4	H	3.0	37.0	1.0	-32.6	-13.0	-19.6	
	2509.50	-2.3	H	3.0	36.4	1.0	-37.7	-13.0	-24.7	
	3346.00	-15.3	H	3.0	36.1	1.0	-50.4	-13.0	-37.4	
	High Ch, 847.5									
	1695.00	-3.1	V	3.0	37.0	1.0	-39.1	-13.0	-26.1	
	2542.50	-4.4	V	3.0	36.4	1.0	-39.8	-13.0	-26.8	
	3390.00	-15.3	V	3.0	36.1	1.0	-50.4	-13.0	-37.4	
	1695.00	4.4	H	3.0	37.0	1.0	-31.6	-13.0	-18.6	
	2542.50	0.7	H	3.0	36.4	1.0	-34.7	-13.0	-21.7	
	3390.00	-12.6	H	3.0	36.1	1.0	-47.7	-13.0	-34.7	

Band	UL Verification Services, Inc Above 1GHz High Frequency Substitution Measurement Company: Samsung Project #: 14U19262 Date: 11/13/2014 Test Engineer: O. Stoelting, D. Sblendorio Configuration: X-Pos EUT (SN: 1992965), AC Charger, Headset Location: Chamber B 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
LTE5	Low Ch, 825.5									
	1651.00	-2.9	V	3.0	37.0	1.0	-39.0	-13.0	-26.0	
3MHz	2476.50	4.8	V	3.0	36.4	1.0	-30.7	-13.0	-17.7	
	3302.00	-14.5	V	3.0	36.2	1.0	-49.7	-13.0	-36.7	
QPSK	1651.00	4.2	H	3.0	37.0	1.0	-31.8	-13.0	-18.8	
	2476.50	2.8	H	3.0	36.4	1.0	-32.6	-13.0	-19.6	
	3302.00	-14.7	H	3.0	36.2	1.0	-49.8	-13.0	-36.8	
	Mid Ch, 836.5									
	1673.00	-4.0	V	3.0	37.0	1.0	-40.0	-13.0	-27.0	
	2509.50	-1.7	V	3.0	36.4	1.0	-37.1	-13.0	-24.1	
	3346.00	-15.7	V	3.0	36.1	1.0	-50.8	-13.0	-37.8	
	1673.00	3.3	H	3.0	37.0	1.0	-32.7	-13.0	-19.7	
	2509.50	-2.6	H	3.0	36.4	1.0	-38.0	-13.0	-25.0	
	3346.00	-14.8	H	3.0	36.1	1.0	-50.0	-13.0	-37.0	
	High Ch, 847.5									
	1695.00	-3.1	V	3.0	37.0	1.0	-39.1	-13.0	-26.1	
	2542.50	-4.3	V	3.0	36.4	1.0	-39.7	-13.0	-26.7	
	3390.00	-15.6	V	3.0	36.1	1.0	-50.7	-13.0	-37.7	
	1695.00	4.4	H	3.0	37.0	1.0	-31.6	-13.0	-18.6	
	2542.50	0.6	H	3.0	36.4	1.0	-34.8	-13.0	-21.8	
	3390.00	-12.5	H	3.0	36.1	1.0	-47.6	-13.0	-34.6	

Band LTE5 1.4MHz 16QAM	UL Verification Services, Inc Above 1GHz High Frequency Substitution Measurement Company: Samsung Project #: 14U19262 Date: 11/13/2014 Test Engineer: O. Stoelting, D. Sblendorio Configuration: X-Pos EUT, AC Charger, Headset Location: Chamber B Mode: LTE_16QAM Band 5 Harmonics, 1.4MHz Bandwidth									
	f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamplifier (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
	Low Ch, 824.7									
	1649.40	-3.2	V	3.0	37.0	1.0	-39.2	-13.0	-26.2	
	2474.10	4.1	V	3.0	36.4	1.0	-31.3	-13.0	-18.3	
	3298.80	-16.1	V	3.0	36.2	1.0	-51.3	-13.0	-38.3	
	1649.40	3.1	H	3.0	37.0	1.0	-32.9	-13.0	-19.9	
	2474.10	2.8	H	3.0	36.4	1.0	-32.6	-13.0	-19.6	
	3298.80	-17.1	H	3.0	36.2	1.0	-52.2	-13.0	-39.2	
	Mid Ch, 836.5									
	1673.00	-4.4	V	3.0	37.0	1.0	-40.4	-13.0	-27.4	
	2509.50	-3.0	V	3.0	36.4	1.0	-38.4	-13.0	-25.4	
	3346.00	-15.8	V	3.0	36.1	1.0	-50.9	-13.0	-37.9	
	1673.00	3.4	H	3.0	37.0	1.0	-32.6	-13.0	-19.6	
	2509.50	-6.7	H	3.0	36.4	1.0	-42.1	-13.0	-29.1	
	3346.00	-15.2	H	3.0	36.1	1.0	-50.3	-13.0	-37.3	
	High Ch, 848.3									
	1696.60	-7.9	V	3.0	37.0	1.0	-43.9	-13.0	-30.9	
	2544.90	-10.4	V	3.0	36.4	1.0	-45.8	-13.0	-32.8	
	3393.20	-15.1	V	3.0	36.1	1.0	-50.2	-13.0	-37.2	
	1696.60	4.7	H	3.0	37.0	1.0	-31.2	-13.0	-18.2	
	2544.90	0.7	H	3.0	36.4	1.0	-34.7	-13.0	-21.7	
	3393.20	-12.0	H	3.0	36.1	1.0	-47.1	-13.0	-34.1	

Band	UL Verification Services, Inc Above 1GHz High Frequency Substitution Measurement Company: Samsung Project #: 14U19262 Date: 11/13/2014 Test Engineer: O. Stoelting, D. Sblendorio Configuration: X-Pos EUT, AC Charger, Headset Location: Chamber B 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
LTE5	Low Ch, 824.7									
	1649.40	-2.5	V	3.0	37.0	1.0	-38.5	-13.0	-25.5	
1.4MHz	2474.10	4.5	V	3.0	36.4	1.0	-30.9	-13.0	-17.9	
	3298.80	-15.5	V	3.0	36.2	1.0	-50.6	-13.0	-37.6	
QPSK	1649.40	2.9	H	3.0	37.0	1.0	-33.1	-13.0	-20.1	
	2474.10	3.0	H	3.0	36.4	1.0	-32.4	-13.0	-19.4	
	3298.80	-16.0	H	3.0	36.2	1.0	-51.2	-13.0	-38.2	
	Mid Ch, 836.5									
	1673.00	-4.6	V	3.0	37.0	1.0	-40.6	-13.0	-27.6	
	2509.50	-3.7	V	3.0	36.4	1.0	-39.1	-13.0	-26.1	
	3346.00	-15.9	V	3.0	36.1	1.0	-51.0	-13.0	-38.0	
	1673.00	3.5	H	3.0	37.0	1.0	-32.5	-13.0	-19.5	
	2509.50	-6.9	H	3.0	36.4	1.0	-42.3	-13.0	-29.3	
	3346.00	-15.0	H	3.0	36.1	1.0	-50.1	-13.0	-37.1	
	High Ch, 848.3									
	1696.60	-7.9	V	3.0	37.0	1.0	-43.8	-13.0	-30.8	
	2544.90	-10.2	V	3.0	36.4	1.0	-45.6	-13.0	-32.6	
	3393.20	-15.7	V	3.0	36.1	1.0	-50.8	-13.0	-37.8	
	1696.60	4.6	H	3.0	37.0	1.0	-31.4	-13.0	-18.4	
	2544.90	0.8	H	3.0	36.4	1.0	-34.6	-13.0	-21.6	
	3393.20	-11.7	H	3.0	36.1	1.0	-46.7	-13.0	-33.7	

UL Verification Services, Inc.									
Above 1GHz High Frequency Substitution Measurement									
Company:		Samsung							
Project #:		14U19262							
Date:		11/14/14							
Test Engineer:		J. Hsu							
Configuration:		EUT w/ AC charger, headset							
Mode:		HSDPA B2							
Chamber 3m Chamber Pre-amplifier T34 8449B Filter Filter 1 Limit Part 24									
f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 1852.4MHz									
3.705	-13.9	V	3.0	35.4	1.0	-48.3	-13.0	-35.3	
5.557	-15.6	V	3.0	34.7	1.0	-49.3	-13.0	-36.3	
7.410	-13.5	V	3.0	34.9	1.0	-47.4	-13.0	-34.4	
3.705	-13.9	H	3.0	35.4	1.0	-48.3	-13.0	-35.3	
5.557	-15.4	H	3.0	34.7	1.0	-49.1	-13.0	-36.1	
7.410	-11.9	H	3.0	34.9	1.0	-45.8	-13.0	-32.8	
Mid Ch, 1880MHz									
3.760	-7.0	V	3.0	35.3	1.0	-41.4	-13.0	-28.4	
5.640	-13.7	V	3.0	34.7	1.0	-47.4	-13.0	-34.4	
7.520	-12.8	V	3.0	34.9	1.0	-46.7	-13.0	-33.7	
3.760	-12.3	H	3.0	35.3	1.0	-46.6	-13.0	-33.6	
5.640	-12.8	H	3.0	34.7	1.0	-46.6	-13.0	-33.6	
7.520	-12.6	H	3.0	34.9	1.0	-46.5	-13.0	-33.5	
High Ch, 1907.6MHz									
3.815	-10.6	V	3.0	35.3	1.0	-44.9	-13.0	-31.9	
5.723	-14.8	V	3.0	34.7	1.0	-48.6	-13.0	-35.6	
7.630	-13.3	V	3.0	34.9	1.0	-47.2	-13.0	-34.2	
3.815	-14.9	H	3.0	35.3	1.0	-49.2	-13.0	-36.2	
5.723	-14.7	H	3.0	34.7	1.0	-48.4	-13.0	-35.4	
7.630	-12.4	H	3.0	34.9	1.0	-46.4	-13.0	-33.4	
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 #:		14U19262							
Date:		11/14/14							
Test Engineer:		J. Hsu							
Configuration:		EUT w/ AC charger, headset							
Mode:		REL99 B2							
Chamber 3m Chamber Pre-amplifier T34 8449B Filter Filter 1 Limit Part 24									
f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 1852.4MHz									
3.705	-10.4	V	3.0	35.4	1.0	-44.8	-13.0	-31.8	
5.557	-11.3	V	3.0	34.7	1.0	-45.0	-13.0	-32.0	
7.410	-13.4	V	3.0	34.9	1.0	-47.3	-13.0	-34.3	
3.705	-12.6	H	3.0	35.4	1.0	-47.0	-13.0	-34.0	
5.557	-14.4	H	3.0	34.7	1.0	-48.1	-13.0	-35.1	
7.410	-12.4	H	3.0	34.9	1.0	-46.3	-13.0	-33.3	
Mid Ch, 1880MHz									
3.760	-7.1	V	3.0	35.3	1.0	-41.4	-13.0	-28.4	
5.640	-9.7	V	3.0	34.7	1.0	-43.4	-13.0	-30.4	
7.520	-14.1	V	3.0	34.9	1.0	-48.0	-13.0	-35.0	
3.760	-12.2	H	3.0	35.3	1.0	-46.6	-13.0	-33.6	
5.640	-13.9	H	3.0	34.7	1.0	-47.6	-13.0	-34.6	
7.520	-12.5	H	3.0	34.9	1.0	-46.5	-13.0	-33.5	
High Ch, 1907.6MHz									
3.815	-7.2	V	3.0	35.3	1.0	-41.4	-13.0	-28.4	
5.723	-14.2	V	3.0	34.7	1.0	-48.0	-13.0	-35.0	
7.630	-12.4	V	3.0	34.9	1.0	-46.3	-13.0	-33.3	
3.815	-12.2	H	3.0	35.3	1.0	-46.5	-13.0	-33.5	
5.723	-14.5	H	3.0	34.7	1.0	-48.3	-13.0	-35.3	
7.630	-12.6	H	3.0	34.9	1.0	-46.5	-13.0	-33.5	
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 #:		14U19262							
Date:		11/12/14							
Test Engineer:		Jude Semana							
Configuration:		X-Pos EUT w/ AC Charger + HS							
Mode:		HSDPA_B5							
Chamber 3m Chamber 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, 826.4MHz									
1.653	-25.9	V	3.0	37.4	1.0	-62.3	-13.0	-49.3	
2.479	-20.6	V	3.0	36.4	1.0	-56.0	-13.0	-43.0	
3.306	-19.2	V	3.0	35.8	1.0	-54.0	-13.0	-41.0	
1.653	-26.9	H	3.0	37.4	1.0	-63.2	-13.0	-50.2	
2.479	-21.6	H	3.0	36.4	1.0	-57.0	-13.0	-44.0	
3.306	-18.5	H	3.0	35.8	1.0	-53.3	-13.0	-40.3	
Mid Ch, 836.6MHz									
1.673	-25.9	V	3.0	37.3	1.0	-62.2	-13.0	-49.2	
2.510	-20.5	V	3.0	36.4	1.0	-55.9	-13.0	-42.9	
3.346	-18.0	V	3.0	35.8	1.0	-52.8	-13.0	-39.8	
1.673	-26.6	H	3.0	37.3	1.0	-63.0	-13.0	-50.0	
2.510	-21.8	H	3.0	36.4	1.0	-57.1	-13.0	-44.1	
3.346	-18.8	H	3.0	35.8	1.0	-53.6	-13.0	-40.6	
High Ch, 846.6MHz									
1.693	-26.1	V	3.0	37.3	1.0	-62.4	-13.0	-49.4	
2.540	-19.5	V	3.0	36.3	1.0	-54.8	-13.0	-41.8	
3.386	-19.3	V	3.0	35.7	1.0	-54.1	-13.0	-41.1	
1.693	-25.7	H	3.0	37.3	1.0	-62.0	-13.0	-49.0	
2.540	-21.8	H	3.0	36.3	1.0	-57.1	-13.0	-44.1	
3.386	-19.5	H	3.0	35.7	1.0	-54.2	-13.0	-41.2	
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 #:		14U19262							
Date:		11/12/14							
Test Engineer:		Jude Semana							
Configuration:		X-Pos EUT w/ AC Charger + HS							
Mode:		REL99_B5							
Chamber Pre-amplifier Filter Limit 3m Chamber ▼ T34 8449B ▼ Filter 1 ▼ Part 22 ▼									
f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 826.4MHz									
1.653	-31.4	V	3.0	37.4	1.0	-67.7	-13.0	-54.7	
2.479	-24.7	V	3.0	36.4	1.0	-60.0	-13.0	-47.0	
3.306	-26.5	V	3.0	35.8	1.0	-61.3	-13.0	-48.3	
Mid Ch, 836.6MHz									
1.673	-30.8	V	3.0	37.3	1.0	-67.2	-13.0	-54.2	
2.510	-24.4	V	3.0	36.4	1.0	-59.8	-13.0	-46.8	
3.346	-25.0	V	3.0	35.8	1.0	-59.8	-13.0	-46.8	
1.673	-30.7	H	3.0	37.3	1.0	-67.0	-13.0	-54.0	
2.510	-27.1	H	3.0	36.4	1.0	-62.5	-13.0	-49.5	
3.346	-26.3	H	3.0	35.8	1.0	-61.1	-13.0	-48.1	
High Ch, 846.6MHz									
1.693	-25.9	V	3.0	37.3	1.0	-62.2	-13.0	-49.2	
2.540	-20.6	V	3.0	36.3	1.0	-55.9	-13.0	-42.9	
3.386	-19.7	V	3.0	35.7	1.0	-54.4	-13.0	-41.4	
1.693	-26.2	H	3.0	37.3	1.0	-62.5	-13.0	-49.5	
2.540	-22.8	H	3.0	36.3	1.0	-58.1	-13.0	-45.1	
3.386	-20.1	H	3.0	35.7	1.0	-54.8	-13.0	-41.8	
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 #:		14U19262								
Date:		11/14/14								
Test Engineer:		J. Hsu								
Configuration:		EUT w/ AC charger, headset								
Mode:		GPRS1900								
Chamber 3m Chamber Pre-amplifier T34 8449B Filter Filter 1 Limit Part 24										
	f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Band GSM 1900 GPRS	Low Ch, 1850.2MHz									
	3.700	-17.7	V	3.0	35.4	1.0	-52.1	-13.0	-39.1	
	5.551	-17.3	V	3.0	34.7	1.0	-51.0	-13.0	-38.0	
	7.401	-11.9	V	3.0	34.9	1.0	-45.9	-13.0	-32.9	
	3.700	-17.7	H	3.0	35.4	1.0	-52.1	-13.0	-39.1	
	5.551	-16.6	H	3.0	34.7	1.0	-50.3	-13.0	-37.3	
	7.401	-10.1	H	3.0	34.9	1.0	-44.0	-13.0	-31.0	
	Mid Ch, 1880.0MHz									
	3.760	-9.8	V	3.0	35.3	1.0	-44.2	-13.0	-31.2	
	5.640	-17.2	V	3.0	34.7	1.0	-51.0	-13.0	-38.0	
	7.520	-6.5	V	3.0	34.9	1.0	-40.4	-13.0	-27.4	
	3.760	-14.6	H	3.0	35.3	1.0	-48.9	-13.0	-35.9	
	5.640	-15.5	H	3.0	34.7	1.0	-49.2	-13.0	-36.2	
	7.520	-7.4	H	3.0	34.9	1.0	-41.4	-13.0	-28.4	
	High Ch, 1909.8MHz									
	3.820	-8.8	V	3.0	35.3	1.0	-43.1	-13.0	-30.1	
	5.729	-15.1	V	3.0	34.7	1.0	-48.9	-13.0	-35.9	
	7.639	-5.0	V	3.0	35.0	1.0	-38.9	-13.0	-25.9	
3.820	-17.0	H	3.0	35.3	1.0	-51.3	-13.0	-38.3		
5.729	-13.2	H	3.0	34.7	1.0	-47.0	-13.0	-34.0		
7.639	-6.5	H	3.0	35.0	1.0	-40.4	-13.0	-27.4		
Rev. 03.03.09 Note: No other emissions were detected above the system noise floor.										