



CERTIFICATION TEST REPORT

Report Number. : 12440940-E1V2

Applicant : Samsung Electronics Co., Ltd.
129 Samsung-Ro, Yeongtong-Gu,
Suwon-Si, Gyeonggi-Do, 16677, Korea

Models : SM-A750N

FCC ID : A3LSMA750N

EUT Description : GSM/WCDMA/LTE Phone with BT, DTS/UNII a/b/g/n/ac, ANT+ and NFC

Test Standard(s) : FCC CFR47 PART 22 SUBPART H
FCC CFR47 PART 24 SUBPART E
FCC CFR47 PART 27 SUBPART F, H, L, and M
FCC CFR47 PART 90 SUBPART S

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Revision History

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V1	9/6/2018	Initial Review	--
V2	9/11/2018	Updated Sections 5.2, 7.3, 8.5, and 9.1	Steven Tran



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1. ATTESTATION OF TEST RESULTS

Applicant Name and Address	Samsung Electronics Co., Ltd. 129 Samsung-Ro, Yeongtong-Gu, Suwon-Si, Gyeonggi-Do, 16677, Korea	
Models	SM-A750N	
FCC ID	A3LSMA750N	
EUT Description	GSM/WCDMA/LTE phone with BT, DTS/UNII a/b/g/n/ac, ANT+ and NFC	
Date Tested	AUGUST 27, 2018 to SEPTEMBER 05, 2018	
Applicable Standards	FCC CFR 47 PART 22H, 24E, 27F,H,L,M and 90S	
Test Results	COMPLIES	
<p>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.</p> <p>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 (NIST Handbook 150, Annex A). This report is written to support regulatory compliance of the applicable standards stated above.</p>		
Approved & Released By:		Reviewed By:
Dan Corona Operations Leader UL Verification Services Inc.		 Steven Tran Project Engineer UL Verification Services Inc.

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.26:2015, TIA-603-E, FCC CFR 47 Part 2, Part 22, Part 24, Part 27, Part 90, FCC KDB 971168 D01 v3r1.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 and 47266 Benicia Street, and 47658 Kato Road, 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	47658 Kato Rd.
<input type="checkbox"/> Chamber A (IC:2324B-1)	<input type="checkbox"/> Chamber D (IC:22541-1)	<input type="checkbox"/> Chamber I (IC: 2324A-5)
<input type="checkbox"/> Chamber B (IC:2324B-2)	<input type="checkbox"/> Chamber E (IC:22541-2)	<input type="checkbox"/> Chamber J (IC: 2324A-6)
<input type="checkbox"/> Chamber C (IC:2324B-3)	<input type="checkbox"/> Chamber F (IC:22541-3)	<input checked="" type="checkbox"/> Chamber K (IC: 2324A-1)
	<input type="checkbox"/> Chamber G (IC:22541-4)	<input checked="" type="checkbox"/> Chamber L (IC: 2324A-3)
	<input type="checkbox"/> Chamber H (IC:22541-5)	

The above test sites and facilities are covered under FCC Test Firm Registration # 208313. Chambers above are covered under Industry Canada company address and respective code

UL Verification Services Inc. is accredited by NVLAP, Laboratory Code 200065-0

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:

$$\begin{aligned} \text{Field Strength (dBuV/m)} &= \text{Measured Voltage (dBuV)} + \text{Antenna Factor (dB/m)} + \text{Cable Loss (dB)} - \\ &\text{Preamp Gain (dB)} \\ 36.5 \text{ dBuV} + 18.7 \text{ dB/m} + 0.6 \text{ dB} - 26.9 \text{ dB} &= 28.9 \text{ dBuV/m} \end{aligned}$$

4.3. MEASUREMENT UNCERTAINTY

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

PARAMETER	UNCERTAINTY
Worst Case Conducted Disturbance, 9KHz to 0.15 MHz	3.84 dB
Worst Case Conducted Disturbance, 0.15 to 30 MHz	3.65 dB
Worst Case Radiated Disturbance, 9KHz to 30 MHz	3.15 dB
Worst Case Radiated Disturbance, 30 to 1000 MHz	5.36 dB
Worst Case Radiated Disturbance, 1000 to 18000 MHz	4.32 dB
Worst Case Radiated Disturbance, 18000 to 26000 MHz	4.45 dB
Worst Case Radiated Disturbance, 26000 to 40000 MHz	5.24 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 with BT, DTS/UNII a/b/g/n/ac, ANT+ and NFC.

5.2. MAXIMUM OUTPUT POWER

ERP/EIRP LIMIT

FCC: §2.1046, §22.913, §24.232, §27.50, §90.635

EIRP/ERP TEST PROCEDURE

ANSI C63.26:2015/ TIA-603-E Clause 2.2.17

KDB 971168 D01 Section 5.6

KDB 412172 D01

$ERP/EIRP = P_{Meas} + GT - LC$

where: ERP/EIRP = effective or equivalent radiated power, respectively (expressed in the same units as P_{Meas} , typically dBW or dBm);

P_{Meas} = measured transmitter output power or PSD, in dBm or dBW;

GT = gain of the transmitting antenna, in dBd (ERP) or dBi (EIRP);

LC = signal attenuation in the connecting cable between the transmitter and antenna, in dB.

For devices utilizing multiple antennas, KDB 662911 provides guidance for determining the effective array transmit antenna gain term to be used in the above equation.

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

GSM MODES

Part 24 1900MHz								
Frequency range (MHz)	Modulation	Conducted (Average) (dBm)	Antenna Gain (dBi)	Limit (W)	EIRP		99% BW (kHz)	Emission Designator
					(dBm)	(W)		
1850.2-1909.8	GPRS	29.7	2.59	2.0	32.29	1.694	236.86	237KGXW
	EGPRS	25.3			27.89	0.615	248.56	249KG7W

WCDMA MODE

Part 22 Band 5								
Frequency range (MHz)	Modulation	Conducted (Average) (dBm)	Antenna Gain (dBi)	Limit (W)	ERP		99% BW (kHz)	Emission Designator
					(dBm)	(W)		
826.4-846.6	REL 99	24.1	-3.10	7.0	18.85	0.077	4140	4M14F9W
	HSDPA	23.1			17.85	0.061	4130	4M13F9W

Part 24 Band 2								
Frequency range (MHz)	Modulation	Conducted (Average) (dBm)	Antenna Gain (dBi)	Limit (W)	ERP		99% BW (kHz)	Emission Designator
					(dBm)	(W)		
1852.4-1907.6	REL 99	23.4	2.59	2.0	25.99	0.397	4184	4M18F9W
	HSDPA	23.6			26.19	0.416	4180	4M18F9W

Part 27 Band 4								
Frequency range (MHz)	Modulation	Conducted (Average) (dBm)	Antenna Gain (dBi)	Limit (W)	EIRP		99% BW (kHz)	Emission Designator
					(dBm)	(W)		
1712.4-1752.6	REL 99	23.3	0.15	1.0	23.45	0.221	4202	4M20F9W
	HSDPA	22.8			22.95	0.197	4168	4M17F9W

LTE BAND 4

Part 27								
EIRP Limit (W)		1.00						
Antenna Gain (dBi)		0.15						
Bandwidth (MHz)	Modulation	Low Frequency (MHz)	Upper Frequency (MHz)	Conducted Average (dBm)	EIRP Average (dBm)	EIRP Average (W)	99% BW (kHz)	Emission Designator
1.4	QPSK	1710.7	1754.3	22.2	22.35	0.172	1080	1M08G7W
	16QAM			21.0	21.15	0.130	1090	1M09D7W
3.0	QPSK	1711.5	1753.5	22.1	22.25	0.168	2700	2M70G7W
	16QAM			21.1	21.25	0.133	2690	2M69D7W
5.0	QPSK	1712.5	1752.5	22.1	22.25	0.168	4510	4M51G7W
	16QAM			20.8	20.95	0.124	4520	4M52D7W
10.0	QPSK	1715.0	1750.0	22.6	22.75	0.188	8950	8M95G7W
	16QAM			21.6	21.75	0.150	8980	8M98D7W
15.0	QPSK	1717.5	1747.5	22.1	22.25	0.168	13450	13M5G7W
	16QAM			21.0	21.15	0.130	13420	13M4D7W
20.0	QPSK	1720.0	1745.0	22.6	22.75	0.188	17840	17M8G7W
	16QAM			21.3	21.45	0.140	17800	17M8D7W

LTE BAND 5

Part 22H								
ERP Limit (W)		7.00						
Antenna Gain (dBi)		-3.10						
Bandwidth (MHz)	Modulation	Low Frequency (MHz)	Upper Frequency (MHz)	Conducted Average (dBm)	ERP Average (dBm)	ERP Average (W)	99% BW (kHz)	Emission Designator
1.4	QPSK	824.7	848.3	23.4	18.15	0.065	1090	1M09G7W
	16QAM			22.4	17.15	0.052	1090	1M09D7W
3.0	QPSK	825.5	847.5	23.5	18.25	0.067	2710	2M71G7W
	16QAM			22.4	17.15	0.052	2710	2M71D7W
5.0	QPSK	826.5	846.5	23.4	18.15	0.065	4520	4M52G7W
	16QAM			22.2	16.95	0.050	4510	4M51D7W
10.0	QPSK	829.0	844.0	24.0	18.75	0.075	9000	9M00G7W
	16QAM			23.0	17.75	0.060	9000	9M00D7W

LTE BAND 17

Part 27								
ERP Limit (W)		3.00						
Antenna Gain (dBi)		-5.75						
Bandwidth (MHz)	Modulation	Low Frequency (MHz)	Upper Frequency (MHz)	Conducted Average (dBm)	ERP Average (dBm)	ERP Average (W)	99% BW (kHz)	Emission Designator
5.0	QPSK	706.5	713.5	23.3	15.40	0.035	4510	4M51G7W
	16QAM			22.0	14.10	0.026	4510	4M51D7W
10.0	QPSK	709.0	711.0	23.7	15.80	0.038	9010	9M01G7W
	16QAM			22.6	14.70	0.030	9000	9M00D7W

LTE BAND 26 (FCC Part 90S)

Part 90S								
ERP Limit (W)		100.00						
Antenna Gain (dBi)		-3.10						
Bandwidth (MHz)	Modulation	Low Frequency (MHz)	Upper Frequency (MHz)	Conducted Average (dBm)	ERP Average (dBm)	ERP Average (W)	99% BW (kHz)	Emission Designator
1.4	QPSK	814.7	823.3	23.8	18.55	0.072	1090	1M09G7W
	16QAM			22.6	17.35	0.054	1090	1M09D7W
3.0	QPSK	815.5	822.5	23.9	18.65	0.073	2700	2M70G7W
	16QAM			22.7	17.45	0.056	2710	2M71D7W
5.0	QPSK	816.5	821.5	23.8	18.55	0.072	4500	4M50G7W
	16QAM			22.7	17.45	0.056	4510	4M51D7W
10.0	QPSK	819.0	819.0	23.9	18.65	0.073	8960	8M96G7W
	16QAM			22.7	17.45	0.056	8976	8M98D7W

LTE BAND 26 (FCC Part 22)

Part 22								
ERP Limit (W)		7.00						
Antenna Gain (dBi)		-3.10						
Bandwidth (MHz)	Modulation	Low Frequency (MHz)	Upper Frequency (MHz)	Conducted Average (dBm)	ERP Average (dBm)	ERP Average (W)	99% BW (kHz)	Emission Designator
1.4	QPSK	824.7	848.3	23.5	18.25	0.067	1080	1M08G7W
	16QAM			22.4	17.15	0.052	1090	1M09D7W
3.0	QPSK	825.5	847.5	23.5	18.25	0.067	2710	2M71G7W
	16QAM			22.3	17.05	0.051	2700	2M70D7W
5.0	QPSK	826.5	846.5	23.5	18.25	0.067	4520	4M52G7W
	16QAM			22.2	16.95	0.050	4510	4M51D7W
10.0	QPSK	829.0	844.0	24.0	18.75	0.075	8990	8M99G7W
	16QAM			22.9	17.65	0.058	8970	8M97D7W
15.0	QPSK	831.5	841.5	23.5	18.25	0.067	13400	13M4G7W
	16QAM			22.5	17.25	0.053	13420	13M4D7W

LTE BAND 41

Part 27								
EIRP Limit (W)		2.00						
Antenna Gain (dBi)		-0.31						
Bandwidth (MHz)	Modulation	Low Frequency (MHz)	Upper Frequency (MHz)	Conducted Average (dBm)	EIRP Average (dBm)	EIRP Average (W)	99% BW (kHz)	Emission Designator
5.0	QPSK	2498.5	2687.5	23.2	22.89	0.195	4480	4M48G7W
	16QAM			22.0	21.69	0.148	4510	4M51D7W
10.0	QPSK	2501.0	2685.0	23.7	23.39	0.218	8950	8M95G7W
	16QAM			22.5	22.19	0.166	8980	8M98D7W
15.0	QPSK	2503.5	2682.5	23.2	22.89	0.195	13420	13M4G7W
	16QAM			22.0	21.69	0.148	13440	13M4D7W
20.0	QPSK	2506.0	2680.0	23.8	23.49	0.223	17870	17M9G7W
	16QAM			22.5	22.19	0.166	17870	17M9D7W

5.3. SOFTWARE AND FIRMWARE

The test utility software used during testing was A750GN.001

5.4. MAXIMUM ANTENNA GAIN

Please see table below:

LTE Bands	Antenna Gain (dBi)
GSM1900, 1850-1910MHz	2.59
WCDMA Band 2, 1850-1910 MHz	2.59
WCDMA Band 4, 1710-1755 MHz	0.15
WCDMA Band 5, 824-849 MHz	-3.10
LTE BAND 4, 1710 - 1755 MHz	0.15
LTE BAND 5, 824 - 849 MHz	-3.10
LTE BAND 17, 704 - 716 MHz	-5.75
LTE BAND 26 (FCC PART 22), 824 - 849 MHz	-3.10
LTE BAND 26 (FCC PART 90S), 814 - 824 MHz	-3.10
LTE BAND 41 (FCC), 2496 - 2690 MHz	-0.31

5.5. WORST-CASE CONFIGURATION AND MODE

The EUT supports LTE Bands of:
Band 4, Band 5, Band 17, Band 26, and Band 41.

The worst-case scenario for all measurements is based on the average conducted output power measurement investigation results. Output power measurements were measured on QPSK and 16QAM modulations. All testing was performed using QPSK, and 16QAM modulations to represent the worst case.

The fundamental of the EUT was investigated in three orthogonal orientations X, Y, & Z, and it was determined that X-Axis with AC/DC Adapter and headset was worst-case orientation; therefore, all final radiated testing was performed with the EUT in X-Axis with AC/DC Adapter and headset orientation.

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
AC Adapter	Samsung	EP-TA50EWE	DW3J719AS/A-E	N/A
Earphone	Samsung	N/A	N/A	N/A

I/O CABLES (RF Conducted Test)

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

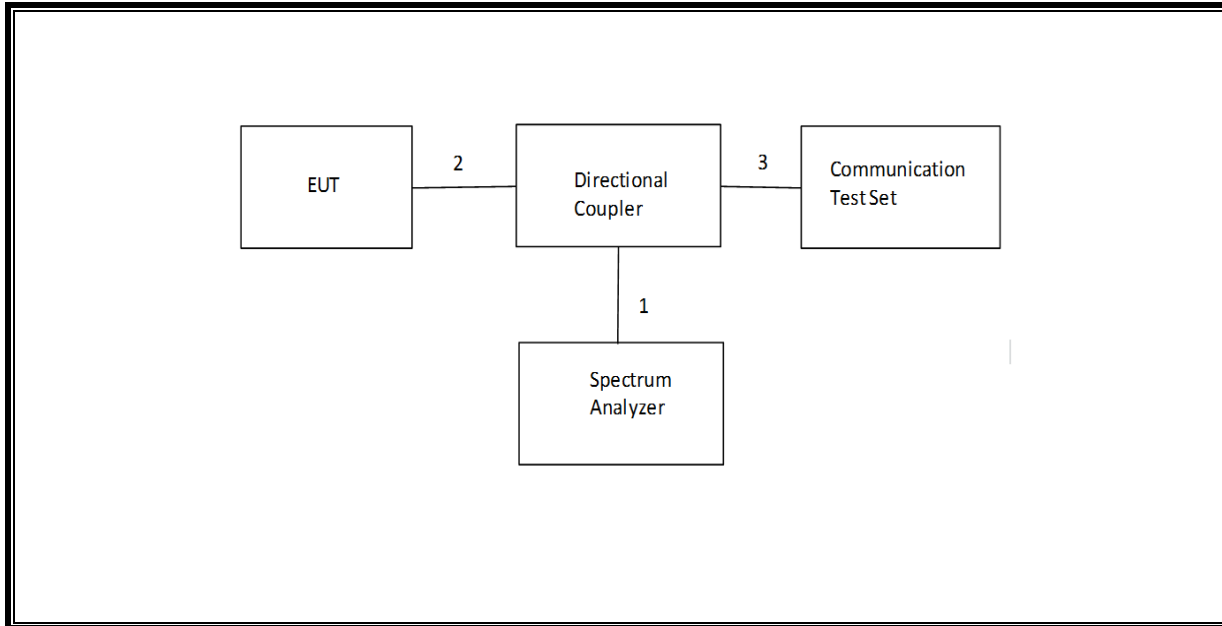
I/O CABLES (RF Radiated Test)

I/O Cable List						
Cable No	Port	# of identic	Connector Type	Cable Type	Cable Length	Remarks
1	USB	1	AC Adapter	Un-shielded	1.2m	No
2	Earphone	1	USB	Un-shielded	1m	No
3	RF In/out	1	Communication Test Set	Un-shielded	2m	No

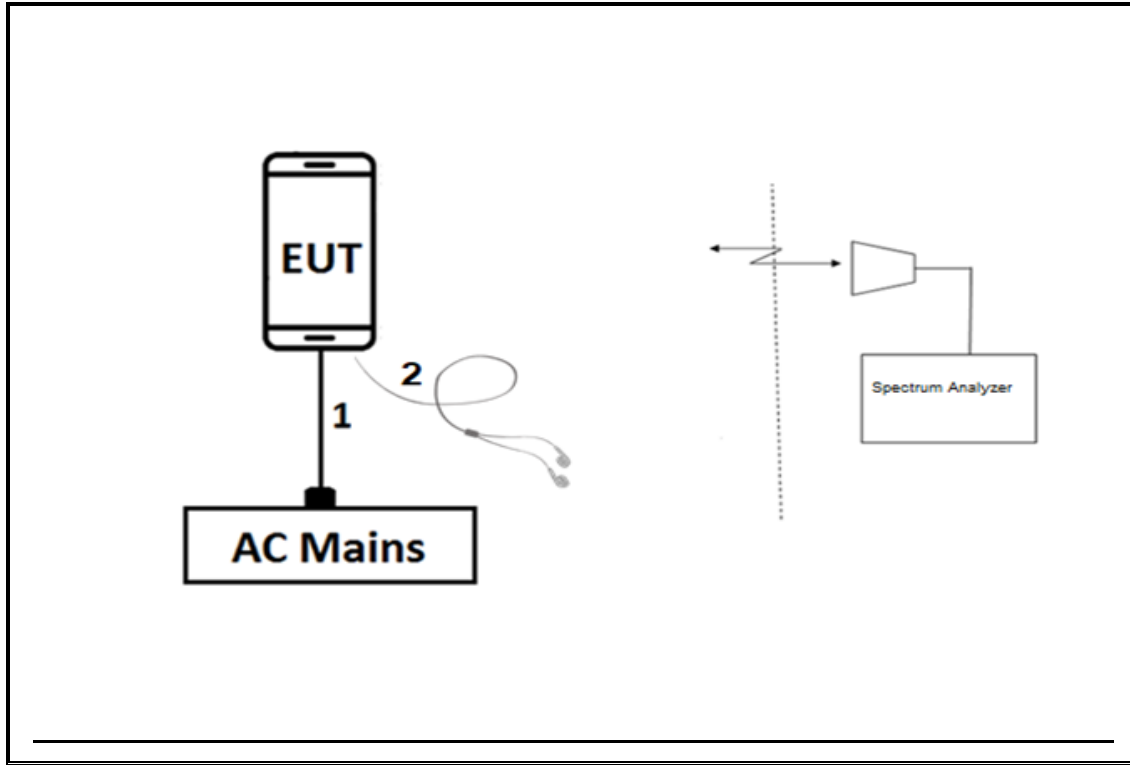
TEST SETUP

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

CONDUCTED TEST SETUP DIAGRAM



RADIATED TEST SETUP DIAGRAM



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	ID Num	Cal Due	Last Cal
Highpass Filter, 2.7 GHz	Micro-Circuits	H2G518G6	T772	07/05/19	07/05/18
Highpass Filter, 1 GHz	Micro-Tronics	HPM18129	T889	02/21/19	02/21/18
Highpass Filter, 1.5 GHz	Micro-Tronics	HPM50114	T1852	07/16/19	07/16/18
Highpass Filter, 4GHz	Micro-Tronics	HPM13351	T1241	07/19/19	07/19/18
Antenna, Horn 1-18GHz	ETS-Lindgren	3117	T4942	04/30/19	04/30/18
Antenna, Horn 1-18GHz	ETS-Lindgren	3117	T344	04/30/19	04/30/18
RF Amplifier	MITEQ	AFS42-00101800-25-S-42	T1568	06/21/19	06/21/18
RF Amplifier	AMPLICAL	AMP1G18-35	T5969	06/03/19	06/03/18
Directional Coupler	Mini-Circuits	ZUDC10-183+	T1136	06/18/19	06/18/18
Wideband Communication Test Set, Call Box	R&S	CMW500	T972	05/29/19	05/29/18
Wideband Communication Test Set, Call Box	R&S	CMW500	T1872	02/15/19	02/15/18
Wideband Communication Test Set, Call Box	R&S	CMW500	T949	02/21/19	02/21/18
Chamber, Environmental	Thermotron	SE-600-10-10	T80	02/22/19	02/22/18
Spectrum Analyzer	Agilent (Keysight) Technologies	E4446A	T146	07/18/19	07/18/18
Spectrum Analyzer	Agilent	CCS01178-1C	T200	10/18/18	10/18/17
Spectrum Analyzer, PXA, 3Hz to 44GHz	Agilent (Keysight) Technologies	N9030A	T1450	02/05/19	02/05/18
EMI TEST RECEIVER	R&S	ESW44	PRE0179522	05/11/19	05/11/18
EMI TEST RECEIVER	R&S	ESW44	PRE0179377	05/03/19	05/03/18
DC power supply, 8 V @ 3 A or 15 V @ 2 A	Agilent / HP	E3610A	None	CNR	CNR
DC power supply 15V	Sprensen	XT15-4	T463	CNR	CNR

UL AUTOMATION SOFTWARE			
CLT Software	UL	UL RF	Ver 7.6, November 11, 2017
Power Measurement Software	UL	UL RF	Ver 2.2, June 2017

NOTES:

- Equipment listed above that calibrated during the testing period was set for test after the calibration.
- Equipment listed above that has a calibration due date during the testing period, the testing is completed before equipment expiration date.

7. RF OUTPUT POWER VERIFICATION

EUT includes different power levels for head use configuration and body use configuration and the below tables contain the highest of all configurations average conducted output powers as follows

7.1. GSM

Using CMW500 Communication Test Set

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 > 27 dBm for EGPRS 850/900 > 30 dBm for GPRS1800/1900 > 26 dBm for EGPRS1800/1900
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 > CS 4 (GPRS) and MCS5 (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

RESULT

7.1.1. GSM GSM1900

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GPRS (GMSK) - Coding Scheme: CS1

Band	Ch No.	Freq. (MHz)	Power	
			1 slot	2 slots
1900.0	512	1850.2	29.6	27.1
	661	1880.0	29.7	27.2
	810	1909.8	29.7	27.1

EGPRS (8PSK) - Coding Scheme: MCS5

Band	Ch No.	Freq. (MHz)	Power	
			1 slot	2 slots
1900.0	512	1850.2	25.2	22.7
	661	1880.0	25.3	22.8
	810	1909.8	25.1	22.6

7.2. WCDMA

TEST PROCEDURE

The transmitter output was connected to the input terminal of Directional Coupler via calibrated coaxial cable. The output coupling terminal of the Directional Coupler was directly connected to a spectrum analyzer while the output through terminal connected to the communication test set via calibrated coaxial cable.

The output power was measured with the spectrum analyzer at the low, middle and high channel in each band.

- Set the spectrum analyzer span wide enough or greater than the modulated signal BW.
- Set a spectrum analyzer at peak detection mode with VBW \geq RBW \geq 26dB BW, typically 5MHz.
- Set a marker to point the corresponding peak value.

REL 99

The following tests were completed according to the test requirements outlined in section 5.2 of the 3GPP TS34.121-1 specification. The DUT supports power Class 3, which has a nominal maximum output power of 24 dBm (+1.7/-3.7).

Mode	Subtest	Rel99
WCDMA General Settings	Loopback Mode	Test Mode 2
	Rel99 RMC	12.2kbps RMC
	Power Control Algorithm	Algorithm2
	β_c/β_d	8/15

HSDPA REL 5

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	HSDPA	HSDPA	HSDPA	HSDPA	
Subtest	1	2	3	4	
W-CDMA General Settings	Loopback Mode	Test Mode 1			
	Rel99 RMC	12.2kbps RMC			
	HSDPA FRC	H-Set 1			
	Power Control Algorithm	Algorithm 2			
	Bc	2/15	11/15	15/15	15/15
	Bd	15/15	15/15	8/15	4/15
	Bd (SF)	64			
	β_c/β_d	2/15	11/15	15/8	15/4
	Bhs	4/15	24/15	30/15	30/15
MPR (dB)	0	0	0.5	0.5	
HSDPA Specific Settings	D _{ACK}	8			
	D _{NAK}	8			
	DCQI	8			
	Ack-Nack repetition factor	3			
	CQI Feedback (Table 5.2B.4)	4ms			
	CQI Repetition Factor (Table 5.2B.4)	2			
Ahs= β_{hs}/β_c	30/15				

HSPA (HSDPA & HSUPA)

The following 5 Sub-tests were completed according to Release 9 procedures in section 5.2 of 3GPP TS34.121. A summary of these settings are illustrated below:

	Mode	HSPA				
	Subtest	1	2	3	4	5
WCDMA General Settings	Loopback Mode	Test Mode 1				
	Rel99 RMC	12.2 kbps RMC				
	HSDPA FRC	H-Set 1				
	HSUPA Test	HSPA				
	Power Control Algorithm	Algorithm 2				Algorithm 1
	β_c	11/15	6/15	15/15	2/15	15/15
	β_d	15/15	15/15	9/15	15/15	0
	β_{ec}	209/225	12/15	30/15	2/15	5/15
	β_c/β_d	11/15	6/15	15/9	2/15	-
	β_{hs}	22/15	12/15	30/15	4/15	5/15
β_{ed}	1309/225	94/75	47/15	56/75	47/15	
CM (dB)	1	3	2	3	1	
MPR (dB)	0	2	1	2	0	
HSDPA Specific Settings	DACK	8				0
	DNAK	8				0
	DCQI	8				0
	Ack-Nack repetition factor	3				
	CQI Feedback (Table 5.2B.4)	4ms				
	CQI Repetition Factor (Table 5.2B.4)	2				
	A _{hs} = β_{hs}/β_c	30/15				
HSUPA Specific Settings	E-DPDCCH	6	8	8	5	0
	DHARQ	0	0	0	0	0
	AG Index	20	12	15	17	12
	ETFCI (from 34.121 Table C.11.1.3)	75	67	92	71	67
	Associated Max UL Data Rate kbps	242.1	174.9	482.8	205.8	308.9
	Reference E-TFCIs	5	5	2	5	1
	Reference E-TFCI	11	11	11	11	67
	Reference E-TFCI PO	4	4	4	4	18
	Reference E-TFCI	67	67	92	67	67
	Reference E-TFCI PO	18	18	18	18	18
	Reference E-TFCI	71	71	71	71	71
	Reference E-TFCI PO	23	23	23	23	23
	Reference E-TFCI	75	75	75	75	75
	Reference E-TFCI PO	26	26	26	26	26
	Reference E-TFCI	81	81	81	81	81
Reference E-TFCI PO	27	27	27	27	27	
Maximum Channelization Codes	2xSF2				SF4	

DUAL CARRIER HSDPA (DC-HSDPA (REL 8, CAT 24))

The following tests were completed according to procedures in section 7.3.13 of 3GPP TS34.108 v9.5.0. A summary of these settings are illustrated below:

Downlink Physical Channels are set as per 3GPP TS34.121-1 v9.0.0 E.5.0

Table E.5.0: Levels for HSDPA connection setup

Parameter During Connection setup	Unit	Value
P-CPICH_Ec/Ior	dB	-10
P-CCPCH and SCH_Ec/Ior	dB	-12
PICH_Ec/Ior	dB	-15
HS-PDSCH	dB	off
HS-SCCH_1	dB	off
DPCH_Ec/Ior	dB	-5
OCNS_Ec/Ior	dB	-3.1

Call is set up as per 3GPP TS34.108 v9.5.0 sub clause 7.3.13

The configurations of the fixed reference channels for HSDPA RF tests are described in 3GPP TS 34.121, annex C for FDD and 3GPP TS 34.122.

Table C.8.1.12: Fixed Reference Channel H-Set 12

Parameter	Unit	Value
Nominal Avg. Inf. Bit Rate	kbps	60
Inter-TTI Distance	TTI's	1
Number of HARQ Processes	Processes	6
Information Bit Payload (N_{INF})	Bits	120
Number Code Blocks	Blocks	1
Binary Channel Bits Per TTI	Bits	960
Total Available SML's in UE	SML's	19200
Number of SML's per HARQ Proc.	SML's	3200
Coding Rate		0.15
Number of Physical Channel Codes	Codes	1
Modulation		QPSK
Note 1: The RMC is intended to be used for DC-HSDPA mode and both cells shall transmit with identical parameters as listed in the table. Note 2: Maximum number of transmission is limited to 1, i.e., retransmission is not allowed. The redundancy and constellation version 0 shall be used.		

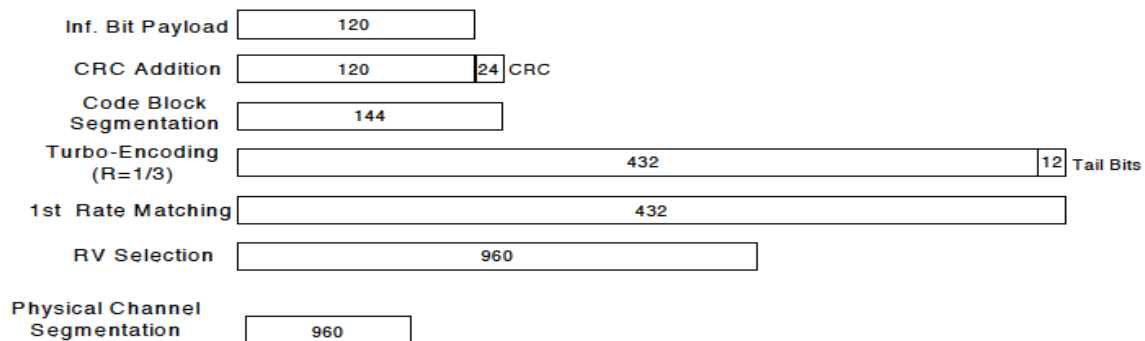


Figure C.8.19: Coding rate for Fixed reference Channel H-Set 12 (QPSK)

The following 4 Sub-tests for HSDPA were completed according to Release 8 procedures in section 5.2 of 3GPP TS34.121. A summary of subtest settings are illustrated below:

Mode	HSDPA	HSDPA	HSDPA	HSDPA
Subtest	1	2	3	4
WCDMA General Settings	Loopback Mode			
	Test Mode 1			
	Rel99 RMC			
	12.2kbps RMC			
	HSDPA FRC			
	H-Set 1			
	Power Control Algorithm			
	Algorithm2			
	β_c	2/15	11/15	15/15
β_d	15/15	15/15	8/15	4/15
β_d (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	DACK			
	8			
	DNAK			
	8			
	DCQI			
	8			
	Ack-Nack Repetition factor			
3				
CQI Feedback				
4ms				
CQI Repetition Factor				
2				
Ahs = β_{hs}/β_c				
30/15				

HSPA+

The following 1 Sub-test was completed according to Release 9 procedures in section 5.2 of 3GPP TS34.121. A summary of these settings are illustrated below:

Table C.11.1.4: β values for transmitter characteristics tests with HS-DPCCH and E-DCH with 16QAM

Sub-test	β_c (Note3)	β_d	β_{HS} (Note1)	β_{ec}	β_{ed} (2xSF2) (Note 4)	β_{ed} (2xSF4) (Note 4)	CM (dB) (Note 2)	MPR (dB) (Note 2)	AG Index (Note 4)	E-TFCI (Note 5)	E-TFCI (boost)
1	1	0	30/15	30/15	β_{ed1} : 30/15 β_{ed2} : 30/15	β_{ed3} : 24/15 β_{ed4} : 24/15	3.5	2.5	14	105	105
Note 1: $\Delta_{ACK}, \Delta_{NACK}$ and $\Delta_{CQI} = 30/15$ with $\beta_{hs} = 30/15 * \beta_c$. Note 2: CM = 3.5 and the MPR is based on the relative CM difference, MPR = MAX(CM-1,0). Note 3: DPDCH is not configured, therefore the β_c is set to 1 and $\beta_d = 0$ by default. Note 4: β_{ed} can not be set directly; it is set by Absolute Grant Value. Note 5: All the sub-tests require the UE to transmit 2SF2+2SF4 16QAM EDCH and they apply for UE using E-DPDCH category 7. E-DCH TTI is set to 2ms TTI and E-DCH table index = 2. To support these E-DCH configurations DPDCH is not allocated. The UE is signalled to use the extrapolation algorithm.											

RESULT

7.2.1. WCDMA BAND5

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Band	Mode		UL Ch No.	Freq. (MHz)	MPR (dB)	Average	
						(dBm)	
W-CDMA Band 5 (850MHz)	Rel 99	RMC, 12.2 kbps	4132	826.4	N/A	24.1	
			4183	836.6	N/A	24.1	
			4233	846.6	N/A	24.1	
	HSDPA	Subtest 1	4132	826.4	0	23.1	
			4183	836.6	0	23.1	
			4233	846.6	0	23.1	
		Subtest 2	4132	826.4	0	22.5	
			4183	836.6	0	22.6	
			4233	846.6	0	22.5	
		Subtest 3	4132	826.4	0.5	21.9	
			4183	836.6	0.5	21.8	
			4233	846.6	0.5	21.9	
		Subtest 4	4132	826.4	0.5	21.9	
			4183	836.6	0.5	21.8	
			4233	846.6	0.5	21.9	
		HSPA (HSDPA & HSUPA)	Subtest 1	4132	826.4	0	20.0
				4183	836.6	0	20.0
				4233	846.6	0	20.1
	Subtest 2		4132	826.4	2	18.0	
			4183	836.6	2	18.0	
			4233	846.6	2	18.0	
	Subtest 3		4132	826.4	1	21.1	
			4183	836.6	1	21.0	
			4233	846.6	1	21.1	
	Subtest 4		4132	826.4	2	18.0	
			4183	836.6	2	18.0	
			4233	846.6	2	18.0	
	Subtest 5		4132	826.4	0	20.0	
			4183	836.6	0	20.1	
			4233	846.6	0	20.1	

7.2.2. WCDMA BAND2

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Band	Mode		UL Ch No.	Freq. (MHz)	MPR (dB)	Average (dBm)	
W-CDMA Band 2 (1900MHz)	Rel 99	RMC, 12.2 kbps	9262	1852.4	N/A	23.3	
			9400	1880.0	N/A	23.4	
			9538	1907.6	N/A	23.4	
	HSDPA	Subtest 1	9262	1852.4	0	23.5	
			9400	1880.0	0	23.6	
			9538	1907.6	0	23.5	
		Subtest 2	9262	1852.4	0	22.6	
			9400	1880.0	0	22.6	
			9538	1907.6	0	22.5	
		Subtest 3	9262	1852.4	0.5	21.6	
			9400	1880.0	0.5	21.7	
			9538	1907.6	0.5	21.8	
		Subtest 4	9262	1852.4	0.5	21.5	
			9400	1880.0	0.5	21.6	
			9538	1907.6	0.5	21.6	
		HSPA (HSDPA & HSUPA)	Subtest 1	9262	1852.4	0	21.5
				9400	1880.0	0	21.5
				9538	1907.6	0	21.5
	Subtest 2		9262	1852.4	2	19.6	
			9400	1880.0	2	19.7	
			9538	1907.6	2	19.7	
	Subtest 3		9262	1852.4	1	20.7	
			9400	1880.0	1	20.7	
			9538	1907.6	1	20.7	
	Subtest 4		9262	1852.4	2	19.7	
			9400	1880.0	2	19.7	
			9538	1907.6	2	19.7	
	Subtest 5		9262	1852.4	0	21.5	
			9400	1880.0	0	21.5	
			9538	1907.6	0	21.5	

7.2.3. WCDMA BAND4

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Band	Mode		UL Ch No.	Freq. (MHz)	MPR (dB)	Average	
						(dBm)	
W-CDMA Band 4 (1700MHz)	Rel 99	RMC, 12.2 kbps	1312	1712.4	N/A	23.3	
			1413	1732.6	N/A	22.7	
			1513	1752.6	N/A	23.0	
	HSDPA	Subtest 1	1312	1712.4	0	22.8	
			1413	1732.6	0	22.3	
			1513	1752.6	0	22.5	
		Subtest 2	1312	1712.4	0	22.3	
			1413	1732.6	0	21.9	
			1513	1752.6	0	22.1	
		Subtest 3	1312	1712.4	0.5	21.8	
			1413	1732.6	0.5	21.4	
			1513	1752.6	0.5	21.5	
		Subtest 4	1312	1712.4	0.5	21.8	
			1413	1732.6	0.5	21.4	
			1513	1752.6	0.5	21.6	
		HSPA (HSDPA & HSUPA)	Subtest 1	1312	1712.4	0	19.9
				1413	1732.6	0	19.4
				1513	1752.6	0	19.6
	Subtest 2		1312	1712.4	2	17.8	
			1413	1732.6	2	17.4	
			1513	1752.6	2	17.6	
	Subtest 3		1312	1712.4	1	20.5	
			1413	1732.6	1	20.4	
			1513	1752.6	1	20.5	
	Subtest 4		1312	1712.4	2	17.9	
			1413	1732.6	2	17.3	
			1513	1752.6	2	17.6	
	Subtest 5		1312	1712.4	0	19.9	
			1413	1732.6	0	19.4	
			1513	1752.6	0	19.6	

7.3. LTE

CONDUCTED OUTPUT POWER MEASUREMENT PROCEDURE

All LTE bands conducted average power is obtained from the CMW500 telecommunication test set.

The following tests were conducted according to the test requirements outlined in section 6.2 of the 3GPP TS36.101 specification.

UE Power Class: 3 (23 +/- 2dBm). The allowed Maximum Power Reduction (MPR) for the maximum output power due to higher order modulation and transmit bandwidth configuration (resource blocks) is specified in Table 6.2.3-1 of the 3GPP TS36.101.

Table 6.2.3-1: Maximum Power Reduction (MPR) for Power Class 1, 2 and 3

Modulation	Channel bandwidth / Transmission bandwidth (N_{RB})						MPR (dB)
	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz	
QPSK	> 5	> 4	> 8	> 12	> 16	> 18	≤ 1
16 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 1
16 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 2
64 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 2
64 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 3

The allowed A-MPR values specified below in Table 6.2.4.-1 of 3GPP TS36.101 are in addition to the allowed MPR requirements. All the measurements below were performed with A-MPR disabled, by using Network Signaling Value of "NS_01".3

Table 6.2.4-1: Additional Maximum Power Reduction (A-MPR)

Network Signalling value	Requirements (sub-clause)	E-UTRA Band	Channel bandwidth (MHz)	Resources Blocks (N_{RB})	A-MPR (dB)
NS_01	6.6.2.1.1	Table 5.5-1	1.4, 3, 5, 10, 15, 20	Table 5.6-1	NA
NS_03	6.6.2.2.1	2, 4, 10, 23, 25, 35, 36	3	>5	≤ 1
			5	>6	≤ 1
			10	>6	≤ 1
			15	>8	≤ 1
			20	>10	≤ 1
NS_04	6.6.2.2.2	41	5	>6	≤ 1
			10, 15, 20	See Table 6.2.4-4	
NS_05	6.6.3.3.1	1	10, 15, 20	≥ 50	≤ 1
NS_06	6.6.2.2.3	12, 13, 14, 17	1.4, 3, 5, 10	Table 5.6-1	n/a
NS_07	6.6.2.2.3	13	10	Table 6.2.4-2	Table 6.2.4-2
	6.6.3.3.2				
NS_08	6.6.3.3.3	19	10, 15	> 44	≤ 3
NS_09	6.6.3.3.4	21	10, 15	> 40	≤ 1
				> 55	≤ 2
NS_10		20	15, 20	Table 6.2.4-3	Table 6.2.4-3
NS_11	6.6.2.2.1	23 ¹	1.4, 3, 5, 10	Table 6.2.4-5	Table 6.2.4-5
...					
NS_32	-	-	-	-	-

Note 1: Applies to the lower block of Band 23, i.e. a carrier placed in the 2000-2010 MHz region.

MODES TESTED

- LTE 4
- LTE 5
- LTE 17
- LTE 26
- LTE 41
-

RESULTS

EUT includes different power levels for head use configuration and body use configuration and the below tables contain the highest of all configurations average conducted output powers as follows:

7.3.1. LTE 4

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OUTPUT POWER FOR LTE BAND 4 (1.4 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Antenna 1		
				Conducted Average (dBm)		
				19957 1710.7 MHz	20175 1732.5 MHz	20393 1754.3 MHz
1.4	QPSK	1	0	22.2	21.6	21.9
		1	2	22.2	21.5	21.9
		1	5	22.2	21.5	21.9
		3	0	22.1	21.5	21.8
		3	1	22.1	21.5	21.8
		3	2	22.1	21.5	21.8
	16QAM	6	0	21.0	20.5	20.8
		1	0	21.0	20.5	20.6
		1	2	21.0	20.5	20.6
		1	5	21.0	20.5	20.6
		3	0	21.0	20.5	20.8
		3	1	21.0	20.5	20.8
		3	2	21.0	20.5	20.8
		6	0	20.0	19.6	19.8

OUTPUT POWER FOR LTE BAND 4 (3.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Antenna 1		
				Conducted Average (dBm)		
				19965 1711.5 MHz	20175 1732.5 MHz	20385 1753.5 MHz
3.0	QPSK	1	0	22.1	21.5	22.0
		1	7	22.1	21.5	21.9
		1	14	22.0	21.5	21.8
		8	0	20.9	20.5	20.7
		8	4	20.9	20.5	20.7
		8	7	20.9	20.5	20.7
		15	0	20.9	20.5	20.7
	16QAM	1	0	20.9	20.5	20.8
		1	7	21.1	20.5	20.6
		1	14	21.0	20.5	20.5
		8	0	20.1	19.5	19.7
		8	4	20.1	19.5	19.7
		8	7	20.1	19.5	19.7
		15	0	20.0	19.5	19.7

OUTPUT POWER FOR LTE BAND 4 (5.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Antenna 1		
				Conducted Average (dBm)		
				19975	20175	20375
				1712.5 MHz	1732.5 MHz	1752.5 MHz
5.0	QPSK	1	0	22.1	21.5	21.9
		1	12	22.1	21.5	21.9
		1	24	22.0	21.5	21.9
		12	0	20.9	20.5	20.7
		12	6	20.9	20.5	20.7
		12	11	20.9	20.5	20.7
		25	0	20.9	20.5	20.7
	16QAM	1	0	20.7	20.5	20.8
		1	12	20.8	20.5	20.8
		1	24	20.7	20.5	20.7
		12	0	20.0	19.5	19.8
		12	6	20.0	19.5	19.8
		12	11	20.0	19.5	19.8
		25	0	20.0	19.5	19.8

OUTPUT POWER FOR LTE BAND 4 (10.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Antenna 1		
				Conducted Average (dBm)		
				20000	20175	20350
				1715.0 MHz	1732.5 MHz	1750.0 MHz
10.0	QPSK	1	0	22.6	22.2	22.5
		1	24	22.5	22.1	22.4
		1	49	22.5	22.1	22.4
		25	0	21.4	20.9	21.3
		25	12	21.4	20.9	21.2
		25	24	21.4	20.9	21.2
		50	0	21.4	20.9	21.2
	16QAM	1	0	21.6	20.8	21.1
		1	24	21.6	20.8	21.1
		1	49	21.6	20.8	21.1
		25	0	20.5	20.0	20.3
		25	12	20.4	20.0	20.3
		25	24	20.4	20.0	20.3
		50	0	20.4	20.0	20.2

OUTPUT POWER FOR LTE BAND 4 (15.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Antenna 1		
				Conducted Average (dBm)		
				20025	20175	20325
				1717.5 MHz	1732.5 MHz	1747.5 MHz
15.0	QPSK	1	0	22.1	21.6	21.9
		1	37	22.0	21.6	21.8
		1	74	22.0	21.5	21.8
		36	0	21.0	20.5	20.7
		36	16	20.9	20.5	20.7
		36	35	20.9	20.5	20.7
		75	0	20.9	20.5	20.7
	16QAM	1	0	21.0	20.5	20.7
		1	37	21.0	20.5	20.7
		1	74	20.9	20.5	20.6
		36	0	20.0	19.5	19.8
		36	16	20.0	19.5	19.7
		36	35	20.0	19.5	19.7
		75	0	20.0	19.5	19.7

OUTPUT POWER FOR LTE BAND 4 (20.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Antenna 1		
				Conducted Average (dBm)		
				20050	20175	20300
				1720.0 MHz	1732.5 MHz	1745.0 MHz
20.0	QPSK	1	0	22.6	22.1	22.5
		1	49	22.5	22.1	22.4
		1	99	22.4	22.0	22.3
		50	0	21.3	21.0	21.2
		50	24	21.3	21.0	21.2
		50	49	21.2	20.9	21.2
		100	0	21.3	21.0	21.2
	16QAM	1	0	21.2	20.8	21.3
		1	49	21.1	20.8	21.2
		1	99	21.0	20.7	21.1
		50	0	20.3	20.0	20.2
		50	24	20.3	20.0	20.2
		50	49	20.2	20.0	20.2
		100	0	20.3	20.0	20.3

7.3.2. LTE 5

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OUTPUT POWER FOR LTE BAND 5 (1.4 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Antenna 1		
				Conducted Average (dBm)		
				20407	20525	20643
				824.7 MHz	836.5 MHz	848.3 MHz
1.4	QPSK	1	0	23.4	23.3	23.3
		1	2	23.4	23.3	23.3
		1	5	23.4	23.3	23.3
		3	0	23.4	23.4	23.3
		3	1	23.4	23.4	23.3
		3	2	23.4	23.4	23.3
		6	0	22.4	22.3	22.2
	16QAM	1	0	22.2	22.4	22.2
		1	2	22.2	22.4	22.2
		1	5	22.2	22.3	22.2
		3	0	22.3	22.4	22.1
		3	1	22.3	22.3	22.2
		3	2	22.2	22.3	22.2
		6	0	21.4	21.5	21.3

OUTPUT POWER FOR LTE BAND 5 (3.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Antenna 1		
				Conducted Average (dBm)		
				20415	20525	20635
				825.5 MHz	836.5 MHz	847.5 MHz
3.0	QPSK	1	0	23.4	23.4	23.4
		1	7	23.4	23.5	23.4
		1	14	23.4	23.4	23.3
		8	0	22.4	22.4	22.3
		8	4	22.4	22.4	22.3
		8	7	22.4	22.4	22.2
		15	0	22.4	22.3	22.2
	16QAM	1	0	22.4	22.0	22.2
		1	7	22.4	22.0	22.1
		1	14	22.4	22.1	22.1
		8	0	21.5	21.4	21.4
		8	4	21.5	21.4	21.4
		8	7	21.5	21.4	21.4
		15	0	21.4	21.4	21.3

OUTPUT POWER FOR LTE BAND 5 (5.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Antenna 1		
				Conducted Average (dBm)		
				20425	20525	20625
				826.5 MHz	836.5 MHz	846.5 MHz
5.0	QPSK	1	0	23.4	23.4	23.3
		1	12	23.4	23.4	23.2
		1	24	23.4	23.4	23.2
		12	0	22.4	22.4	22.2
		12	6	22.4	22.3	22.2
		12	11	22.4	22.3	22.2
		25	0	22.4	22.3	22.2
	16QAM	1	0	22.2	22.2	22.0
		1	12	22.2	22.1	22.0
		1	24	22.2	22.1	22.0
		12	0	21.5	21.4	21.3
		12	6	21.5	21.4	21.3
		12	11	21.5	21.4	21.3
		25	0	21.4	21.4	21.3

OUTPUT POWER FOR LTE BAND 5 (10.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Antenna 1		
				Conducted Average (dBm)		
				20450	20525	20600
				829.0 MHz	836.5 MHz	844.0 MHz
10.0	QPSK	1	0	24.0	24.0	23.9
		1	24	24.0	23.9	23.8
		1	49	24.0	23.9	23.8
		25	0	22.8	22.9	22.7
		25	12	22.8	22.8	22.6
		25	24	22.9	22.8	22.6
		50	0	22.9	22.8	22.7
	16QAM	1	0	22.7	23.0	22.7
		1	24	22.7	23.0	22.6
		1	49	22.6	22.9	22.6
		25	0	21.9	21.9	21.7
		25	12	21.9	21.8	21.6
		25	24	21.9	21.8	21.6
		50	0	21.8	21.8	21.7

7.3.3. LTE 17

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OUTPUT POWER FOR LTE BAND 17 (5.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Antenna 1		
				Conducted Average (dBm)		
				23755	23790	23825
				706.5 MHz	710.0 MHz	713.5 MHz
5.0	QPSK	1	0	23.2	23.3	23.3
		1	12	23.2	23.3	23.2
		1	24	23.2	23.3	23.2
		12	0	22.1	22.3	22.2
		12	6	22.1	22.2	22.2
		12	11	22.2	22.2	22.2
		25	0	22.2	22.2	22.2
	16QAM	1	0	22.0	22.0	22.0
		1	12	22.0	22.0	22.0
		1	24	22.0	22.0	21.9
		12	0	21.1	21.1	21.1
		12	6	21.0	21.1	21.0
		12	11	21.1	21.1	21.1
		25	0	21.1	21.1	21.1

OUTPUT POWER FOR LTE BAND 17 (10.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Antenna 1		
				Conducted Average (dBm)		
				23780	23790	23800
				709.0 MHz	710.0 MHz	711.0 MHz
10.0	QPSK	1	0	23.7	23.7	23.7
		1	24	23.7	23.7	23.7
		1	49	23.7	23.7	23.7
		25	0	22.7	22.7	22.7
		25	12	22.7	22.7	22.6
		25	24	22.7	22.7	22.6
		50	0	22.7	22.7	22.7
	16QAM	1	0	22.5	22.5	22.5
		1	24	22.5	22.5	22.5
		1	49	22.4	22.5	22.4
		25	0	21.7	21.7	21.7
		25	12	21.6	21.7	21.7
		25	24	21.6	21.7	21.7
		50	0	21.6	21.7	21.7

7.3.4. LTE 26 (FCC PART 90S)

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OUTPUT POWER FOR LTE BAND 26 (FCC PART 90S) (1.4 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Antenna 1		
				Conducted Average (dBm)		
				26697	26740	26783
				814.7 MHz	819.0 MHz	823.3 MHz
1.4	QPSK	1	0	23.4	23.8	23.4
		1	2	23.4	23.8	23.3
		1	5	23.4	23.8	23.3
		3	0	23.4	22.8	22.4
		3	1	23.3	22.8	22.4
		3	2	23.4	22.8	22.4
		6	0	22.4	22.8	22.3
	16QAM	1	0	22.2	22.6	22.1
		1	2	22.1	22.6	22.1
		1	5	22.1	22.6	22.0
		3	0	22.3	21.9	21.4
		3	1	22.3	21.9	21.4
		3	2	22.3	21.8	21.4
		6	0	21.3	21.8	21.4

OUTPUT POWER FOR LTE BAND 26 (FCC PART 90S) (3.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Antenna 1		
				Conducted Average (dBm)		
				26705	26740	26775
				815.5 MHz	819.0 MHz	822.5 MHz
3.0	QPSK	1	0	23.4	23.9	23.4
		1	7	23.4	23.9	23.4
		1	14	23.4	23.9	23.4
		8	0	22.4	22.9	22.4
		8	4	22.4	22.9	22.4
		8	7	22.4	22.8	22.4
		15	0	22.4	22.9	22.3
	16QAM	1	0	22.2	22.7	22.1
		1	7	22.2	22.7	22.1
		1	14	22.2	22.6	22.1
		8	0	21.4	21.9	21.4
		8	4	21.4	21.9	21.4
		8	7	21.4	21.8	21.4
		15	0	21.4	21.8	21.4

OUTPUT POWER FOR LTE BAND 26 (FCC PART 90S) (5.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Antenna 1		
				Conducted Average (dBm)		
				26715	26740	26765
				816.5 MHz	819.0 MHz	821.5 MHz
5.0	QPSK	1	0	23.4	23.8	23.4
		1	12	23.4	23.8	23.4
		1	24	23.4	23.8	23.4
		12	0	22.4	22.8	22.4
		12	6	22.4	22.9	22.4
		12	11	22.4	22.8	22.4
		25	0	22.4	22.9	22.3
	16QAM	1	0	22.3	22.7	22.1
		1	12	22.3	22.7	22.1
		1	24	22.2	22.6	22.1
		12	0	21.4	21.9	21.4
		12	6	21.4	21.9	21.4
		12	11	21.3	21.8	21.4
		25	0	21.4	21.8	21.3

OUTPUT POWER FOR LTE BAND 26 (FCC PART 90S) (10.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Antenna 1		
				Conducted Average (dBm)		
				N/A	26740	N/A
				N/A	819.0 MHz	N/A
10.0	QPSK	1	0		23.9	
		1	24		23.9	
		1	49		23.9	
		25	0		22.9	
		25	12		22.9	
		25	24		22.9	
		50	0		22.9	
	16QAM	1	0		22.7	
		1	24		22.7	
		1	49		22.7	
		25	0		21.9	
		25	12		21.9	
		25	24		21.9	
		50	0		21.9	

7.3.5. LTE 26 (FCC PART 22)

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OUTPUT POWER FOR LTE BAND 26 (FCC PART 22) (1.4 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Antenna 1		
				Conducted Average (dBm)		
				26797	26915	27033
				824.7 MHz	836.5 MHz	848.3 MHz
1.4	QPSK	1	0	23.4	23.4	23.4
		1	2	23.4	23.4	23.4
		1	5	23.4	23.5	23.4
		3	0	22.4	23.4	23.3
		3	1	22.4	23.4	23.3
		3	2	22.4	23.4	23.3
		6	0	22.4	22.5	22.3
	16QAM	1	0	22.1	22.4	22.3
		1	2	22.1	22.3	22.3
		1	5	22.1	22.3	22.3
		3	0	21.4	22.3	22.2
		3	1	21.4	22.3	22.2
		3	2	21.4	22.3	22.2
		6	0	21.4	21.6	21.4

OUTPUT POWER FOR LTE BAND 26 (FCC PART 22) (3.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Antenna 1		
				Conducted Average (dBm)		
				26805	26915	27025
				825.5 MHz	836.5 MHz	847.5 MHz
3.0	QPSK	1	0	23.4	23.5	23.3
		1	7	23.4	23.5	23.3
		1	14	23.4	23.4	23.2
		8	0	22.4	22.5	22.4
		8	4	22.4	22.5	22.3
		8	7	22.4	22.5	22.3
		15	0	22.4	22.4	22.3
	16QAM	1	0	22.1	22.3	22.0
		1	7	22.1	22.3	22.2
		1	14	22.1	22.3	22.2
		8	0	21.4	21.5	21.3
		8	4	21.4	21.5	21.3
		8	7	21.4	21.5	21.3
		15	0	21.4	21.3	21.4

OUTPUT POWER FOR LTE BAND 26 (FCC PART 22) (5.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Antenna 1		
				Conducted Average (dBm)		
				26815	26915	27015
				826.5 MHz	836.5 MHz	846.5 MHz
5.0	QPSK	1	0	23.4	23.5	23.4
		1	12	23.4	23.5	23.4
		1	24	23.4	23.5	23.3
		12	0	22.4	22.5	22.4
		12	6	22.4	22.5	22.3
		12	11	22.4	22.5	22.3
	16QAM	25	0	22.4	22.5	22.3
		1	0	22.1	22.2	22.1
		1	12	22.1	22.2	22.1
		1	24	22.1	22.2	22.1
		12	0	21.4	21.5	21.4
		12	6	21.4	21.4	21.4
		12	11	21.4	21.5	21.3
		25	0	21.4	21.5	21.3

OUTPUT POWER FOR LTE BAND 26 (FCC PART 22) (10.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Antenna 1		
				Conducted Average (dBm)		
				26840	26915	26990
				829.0 MHz	836.5 MHz	844.0 MHz
10.0	QPSK	1	0	24.0	24.0	23.9
		1	24	23.9	24.0	23.8
		1	49	23.9	24.0	23.7
		25	0	22.9	23.0	22.8
		25	12	22.9	23.0	22.8
		25	24	22.9	22.9	22.8
	16QAM	50	0	22.9	22.9	22.8
		1	0	22.8	22.9	22.9
		1	24	22.8	22.9	22.8
		1	49	22.7	22.8	22.8
		25	0	21.9	22.0	21.9
		25	12	21.9	22.0	21.8
		25	24	21.9	22.0	21.8
		50	0	21.9	21.9	21.8

OUTPUT POWER FOR LTE BAND 26 (FCC PART 22) (15.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Antenna 1		
				Conducted Average (dBm)		
				26865	26915	26965
				831.5 MHz	836.5 MHz	841.5 MHz
15.0	QPSK	1	0	23.5	23.5	23.4
		1	37	23.5	23.5	23.3
		1	74	23.4	23.4	23.2
		36	0	22.5	22.5	22.4
		36	16	22.5	22.4	22.4
		36	35	22.5	22.4	22.3
		75	0	22.5	22.4	22.4
	16QAM	1	0	22.5	22.2	22.5
		1	37	22.3	22.2	22.4
		1	74	22.3	22.1	22.2
		36	0	21.5	21.4	21.4
		36	16	21.5	21.4	21.4
		36	35	21.4	21.4	21.3
		75	0	21.5	21.5	21.4

7.3.6. LTE 41

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OUTPUT POWER FOR LTE BAND 41 (FCC) (5.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Antenna 2		
				Conducted Average (dBm)		
				39675	40620	41565
				2498.5 MHz	2593.0 MHz	2687.5 MHz
5.0	QPSK	1	0	22.7	23.1	22.0
		1	12	22.7	23.2	22.0
		1	24	22.8	23.2	22.0
		12	0	21.9	22.2	21.0
		12	6	21.9	22.2	21.0
		12	11	21.9	22.2	21.0
	16QAM	25	0	21.9	22.2	21.0
		1	0	21.6	22.0	21.0
		1	12	21.6	21.9	21.0
		1	24	21.6	22.0	21.0
		12	0	20.8	21.2	20.0
		12	6	20.8	21.2	20.0
		12	11	20.8	21.2	20.0
		25	0	20.8	21.2	20.0

OUTPUT POWER FOR LTE BAND 41 (FCC) (10.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Antenna 2		
				Conducted Average (dBm)		
				39700	40620	41540
				2501.0 MHz	2593.0 MHz	2685.0 MHz
10.0	QPSK	1	0	23.2	23.6	22.4
		1	24	23.2	23.7	22.4
		1	49	23.2	23.7	22.5
		25	0	22.3	22.7	21.5
		25	12	22.3	22.7	21.5
		25	24	22.3	22.8	21.5
	16QAM	50	0	22.3	22.8	21.5
		1	0	22.3	22.4	21.1
		1	24	22.4	22.4	21.1
		1	49	22.4	22.5	21.1
		25	0	21.3	21.7	20.4
		25	12	21.3	21.7	20.4
		25	24	21.3	21.7	20.4
		50	0	21.3	21.7	20.4

OUTPUT POWER FOR LTE BAND 41 (FCC) (15.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Antenna 2		
				Conducted Average (dBm)		
				39725	40620	41515
				2503.5 MHz	2593.0 MHz	2682.5 MHz
15.0	QPSK	1	0	22.7	23.2	22.0
		1	37	22.8	23.2	22.0
		1	74	22.8	23.2	22.0
		36	0	21.8	22.2	21.0
		36	16	21.9	22.2	21.0
		36	35	21.8	22.2	21.0
		75	0	21.8	22.2	21.0
	16QAM	1	0	21.7	22.0	21.0
		1	37	21.8	21.8	21.0
		1	74	21.8	22.0	21.0
		36	0	20.8	21.2	20.0
		36	16	20.8	21.1	20.0
		36	35	20.8	21.3	20.0
		75	0	20.8	21.2	20.0

OUTPUT POWER FOR LTE BAND 41 (FCC) (20.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Antenna 2		
				Conducted Average (dBm)		
				39750	40620	41490
				2506.0 MHz	2593.0 MHz	2680.0 MHz
20.0	QPSK	1	0	23.3	23.6	22.4
		1	49	23.2	23.7	22.5
		1	99	23.3	23.8	22.5
		50	0	22.3	22.7	21.5
		50	24	22.3	22.8	21.6
		50	49	22.4	22.8	21.6
		100	0	22.4	22.8	21.6
	16QAM	1	0	22.4	22.3	21.2
		1	49	22.2	22.5	21.0
		1	99	22.2	22.5	21.3
		50	0	21.3	21.7	20.4
		50	24	21.3	21.8	20.4
		50	49	21.4	21.8	20.5
		100	0	21.3	21.7	20.4

8. CONDUCTED TEST RESULTS

8.1. OCCUPIED BANDWIDTH

RULE PART(S)

FCC: §2.1049

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 middle channel in each band. The 99% and -26dB bandwidths was also measured and recorded.

MODES TESTED

- GSM 1900
- WCDM Band 5
- WCDM Band 2
- WCDM Band 4
- LTE Band 4
- LTE Band 5
- LTE Band 17
- LTE Band 26
- LTE Band 41

RESULTS

There is no limit required and power is the same for low, middle and high channel; therefore, only middle channel was tested.

GSM

Band	Modulation	Channel	f(MHz)	99% BW (KHz)	-26dB BW (KHz)
GSM1900	GPRS	661	1880.0	236.86	307.20
	EGPRS			248.56	318.10

WCDMA

Band	Modulation	Channel	f(MHz)	99% BW (MHz)	-26dB BW (MHz)
BAND5	REL 99	4408	836.6	4.14	4.7
	HSDPA			4.13	4.7
BAND2	REL 99	9800	1880.0	4.184	4.803
	HSDPA			4.18	4.77
BAND4	REL 99	1638	1732.6	4.202	4.848
	HSDPA			4.168	4.767

LTE4

Band	Mode	RB Allocation/RB Offset	f(MHz)	99% BW (MHz)	-26dB BW (MHz)
LTE BAND 4	1.4 MHz, QPSK	6/0	1732.5	1.08	1.31
	1.4 MHz, 16QAM			1.09	1.3
	3 MHz, QPSK	15/0		2.7	3.06
	3 MHz, 16QAM			2.69	3.03
	5 MHz, QPSK	25/0		4.51	5.28
	5 MHz, 16QAM			4.52	5.22
	10 MHz, QPSK	50/0		8.95	10.13
	10 MHz, 16QAM			8.98	9.91
	15 MHz, QPSK	75/0		13.45	15.05
	15 MHz, 16QAM			13.42	15.05
	20 MHz, QPSK	100/0		17.84	19.56
	20 MHz, 16QAM			17.8	19.39

LTE5

Band	Mode	RB Allocation/RB Offset	f(MHz)	99% BW (MHz)	-26dB BW (MHz)
LTE BAND 5	1.4 MHz, QPSK	6/0	836.5	1.09	1.33
	1.4 MHz, 16QAM			1.09	1.32
	3 MHz, QPSK	15/0		2.71	3.12
	3 MHz, 16QAM			2.71	3.07
	5 MHz, QPSK	25/0		4.52	5.3
	5 MHz, 16QAM			4.51	5.26
	10 MHz, QPSK	50/0		9	10.33
	10 MHz, 16QAM			9	10.36

LTE17

Band	Mode	RB Allocation/RB Offset	f(MHz)	99% BW (MHz)	-26dB BW (MHz)
LTE BAND 17	5 MHz, QPSK	25/0	710.0	4.51	5.37
	5 MHz, 16QAM			4.51	5.19
	10 MHz, QPSK	50/0		9.01	10.43
	10 MHz, 16QAM			9	10.38

LTE26 (FCC PART 90S)

Band	Mode	RB Allocation/RB Offset	f(MHz)	99% BW (MHz)	-26dB BW (MHz)
	1.4 MHz, QPSK	6/0	819.0	1.09	1.29
	1.4 MHz, 16QAM			1.09	1.28
	3 MHz, QPSK	15/0		2.70	3.01
	3 MHz, 16QAM			2.71	3.06
	5 MHz, QPSK	25/0		4.50	5.27
	5 MHz, 16QAM			4.51	5.23
	10 MHz, QPSK	50/0		8.96	10.13
	10 MHz, 16QAM			8.98	10.11

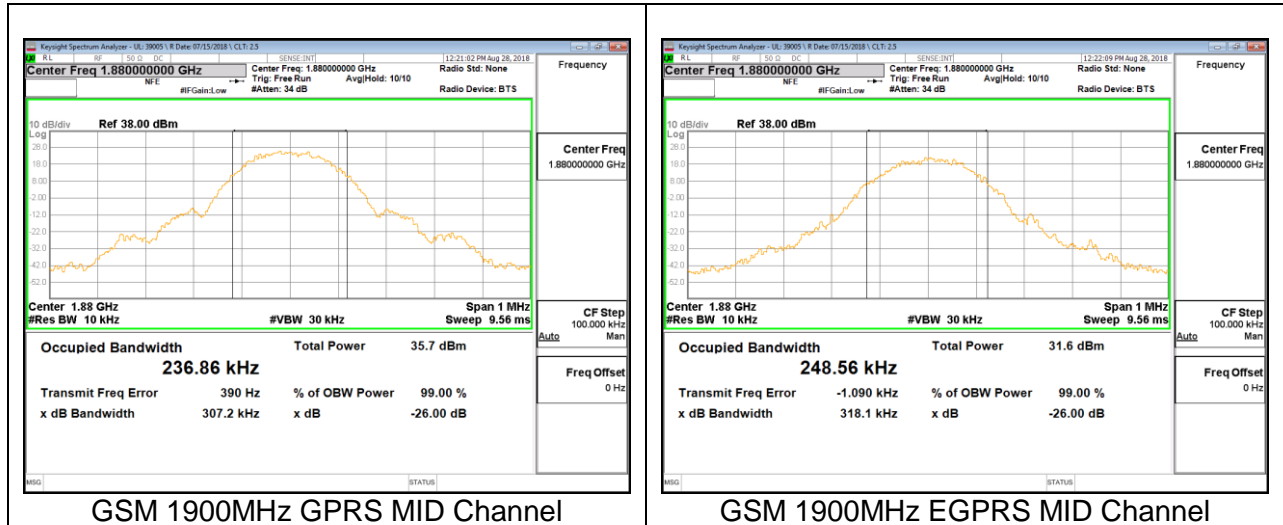
LTE26 (FCC PART 22)

Band	Mode	RB Allocation/RB Offset	f(MHz)	99% BW (MHz)	-26dB BW (MHz)
	1.4 MHz, QPSK	6/0	836.5(15MHz)	1.08	1.30
	1.4 MHz, 16QAM			1.09	1.32
	3 MHz, QPSK	15/0		2.71	3.10
	3 MHz, 16QAM			2.70	3.08
	5 MHz, QPSK	25/0		4.52	5.31
	5 MHz, 16QAM			4.51	5.28
	10 MHz, QPSK	50/0		8.99	10.41
	10 MHz, 16QAM			8.97	10.38
	15 MHz, QPSK	75/0		13.40	14.96
	15 MHz, 16QAM			13.42	14.96

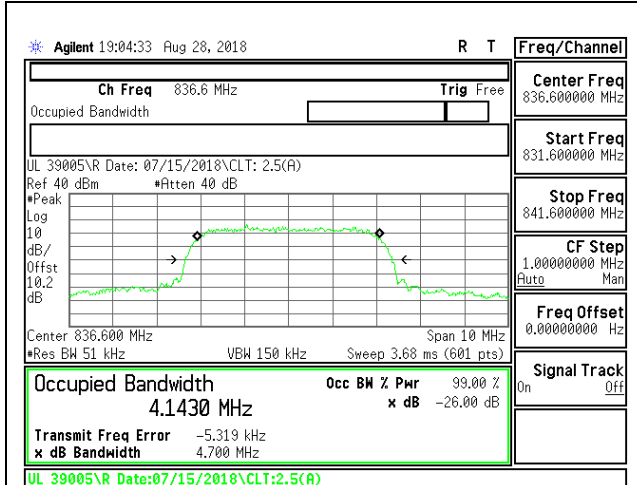
LTE41 (FCC)

Band	Mode	RB Allocation/RB Offset	f(MHz)	99% BW (MHz)	-26dB BW (MHz)
LTE BAND 41	5 MHz, QPSK	25/0	2593.0	4.48	5.17
	5 MHz, 16QAM			4.51	5.23
	10 MHz, QPSK	50/0		8.95	10.18
	10 MHz, 16QAM			8.98	10.43
	15 MHz, QPSK	75/0		13.42	14.93
	15 MHz, 16QAM			13.44	15.07
	20 MHz, QPSK	100/0		17.87	19.47
	20 MHz, 16QAM			17.87	19.38

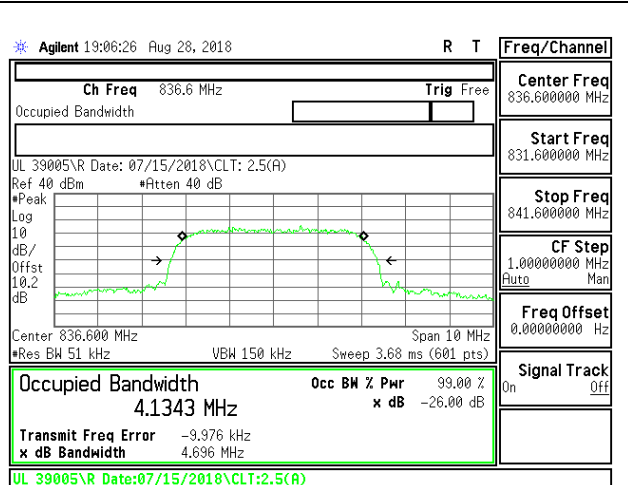
8.1.1. GSM



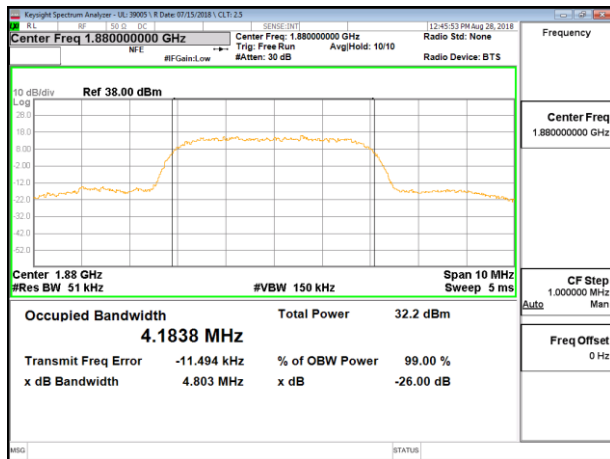
8.1.2. WCDMA



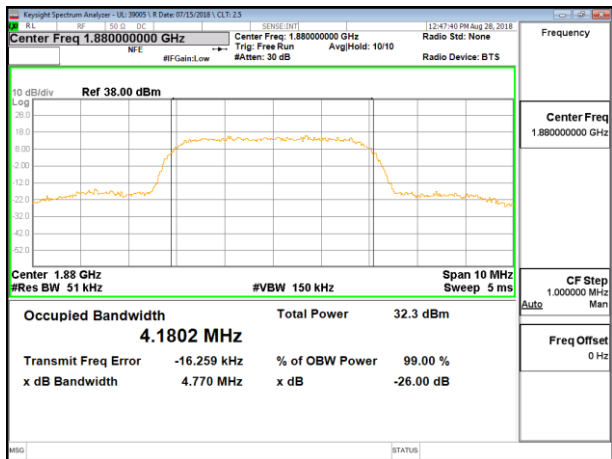
WCDMA BAND5 Rel99 MID Channel



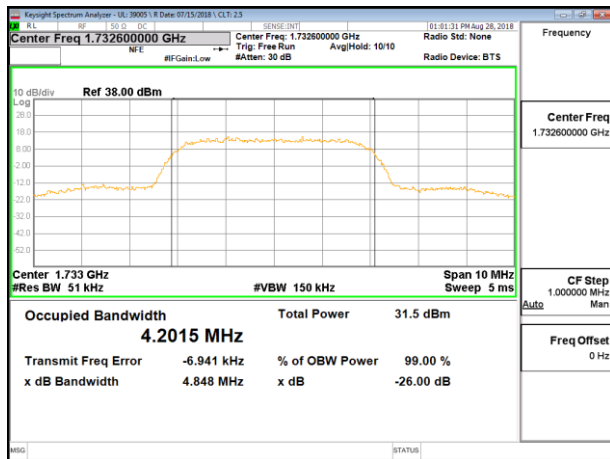
WCDMA BAND5 HSDPA MID Channel



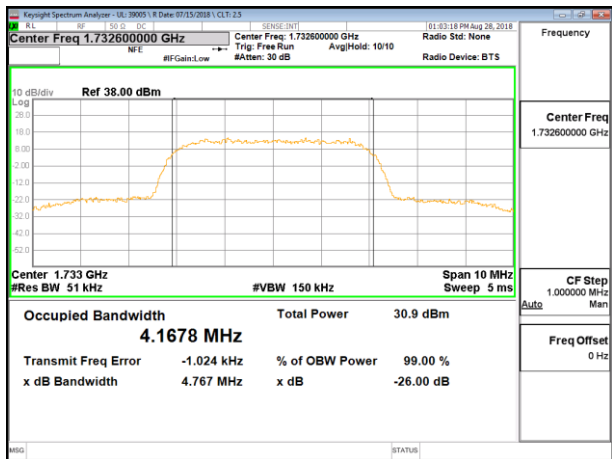
WCDMA BAND2 Rel99 MID Channel



WCDMA BAND2 HSDPA MID Channel

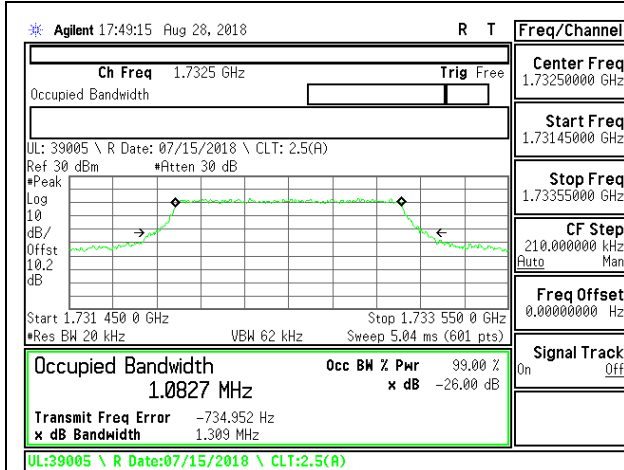


WCDMA BAND4 Rel99 MID Channel

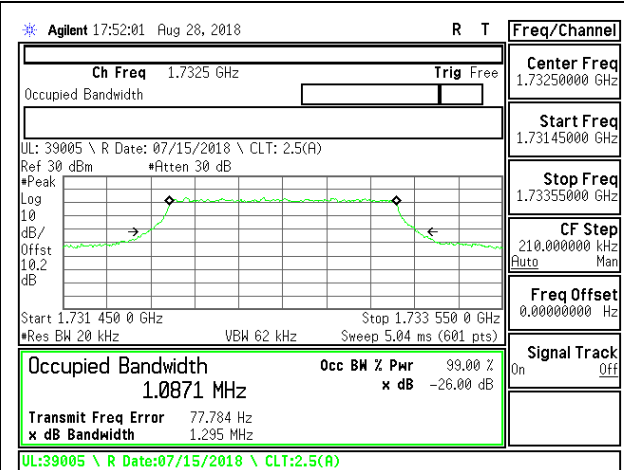


WCDMA BAND4 HSDPA MID Channel

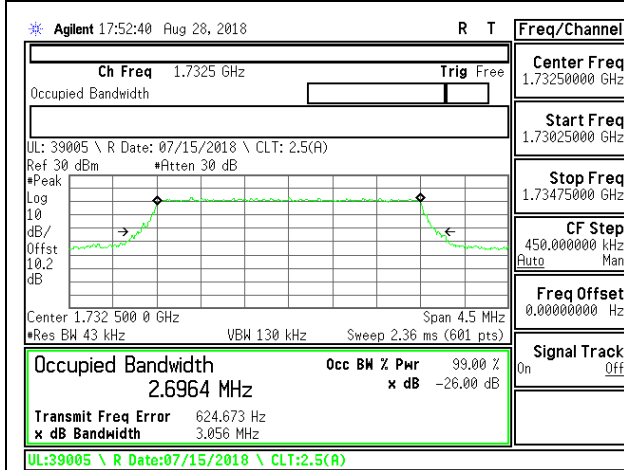
8.1.3. LTE BAND 4



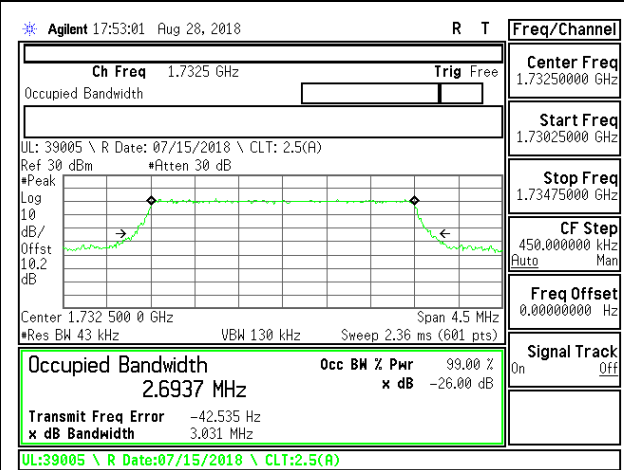
LTE B4 1.4MHz QPSK Mid Channel RB6-0



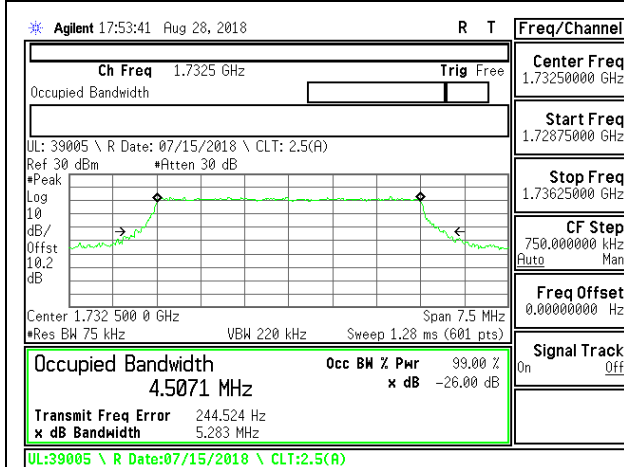
LTE B4 1.4MHz 16QAM Mid Channel RB6-0



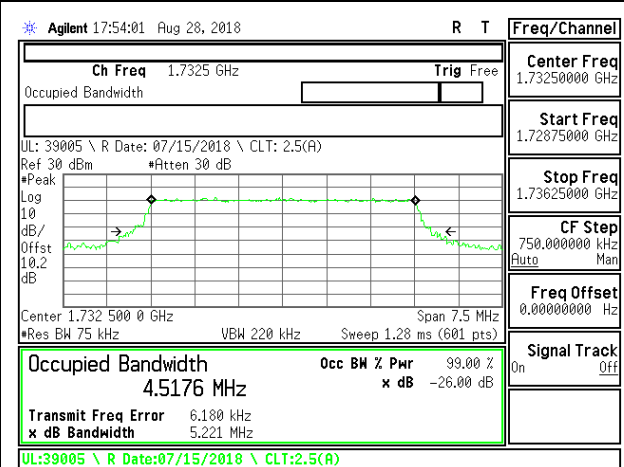
LTE B4 3MHz QPSK Mid Channel RB15-0



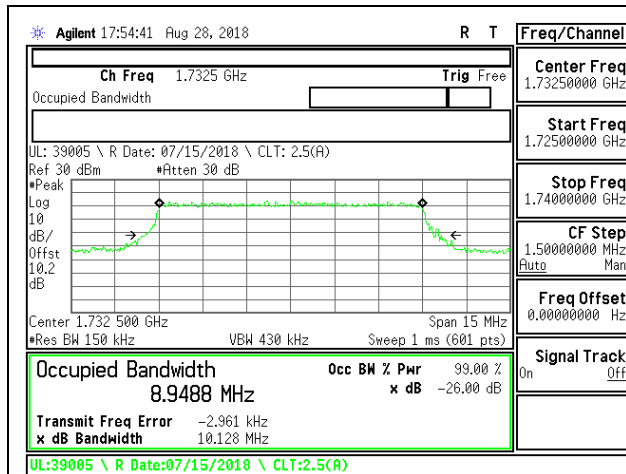
LTE B4 3MHz 16QAM Mid Channel RB15-0



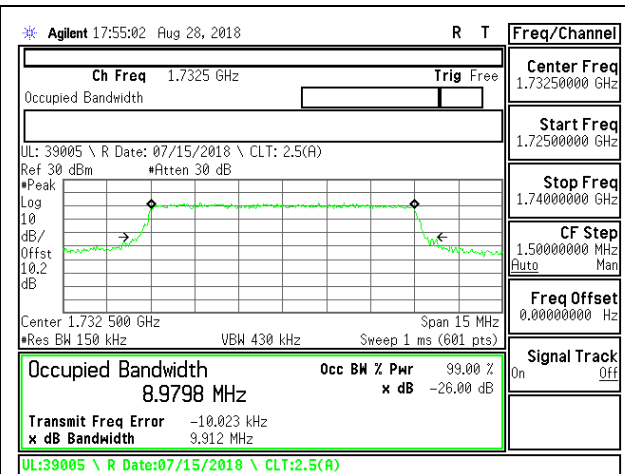
LTE B4 5MHz QPSK Mid Channel RB25-0



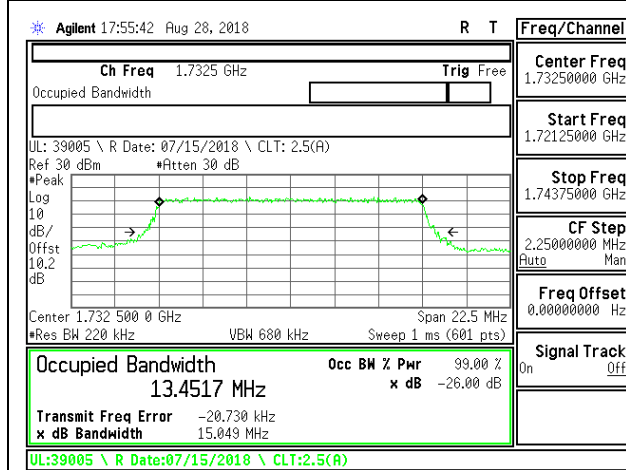
LTE B4 5MHz 16QAM Mid Channel RB25-0



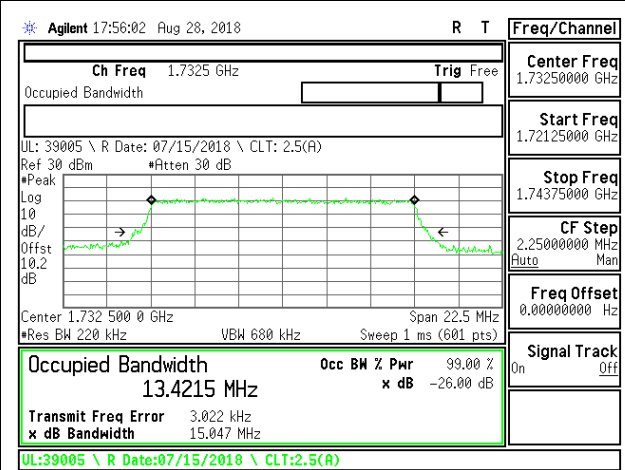
LTE B4 10MHz QPSK Mid Channel RB50-0



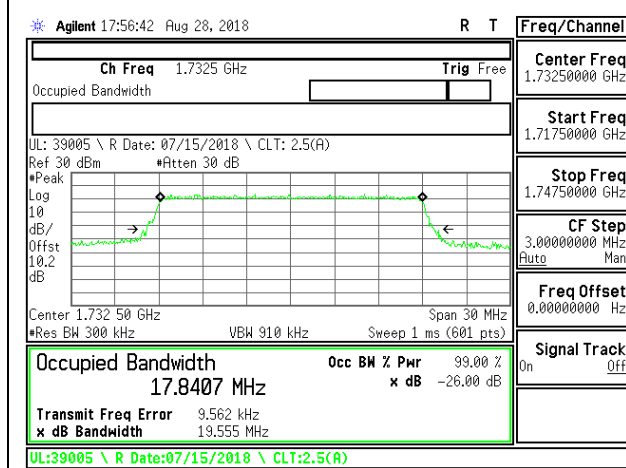
LTE B4 10MHz 16QAM Mid Channel RB50-0



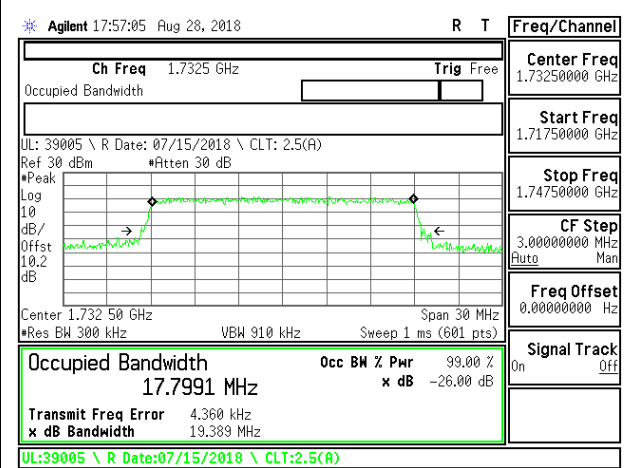
LTE B4 15MHz QPSK Mid Channel RB75-0



LTE B4 15MHz 16QAM Mid Channel RB75-0

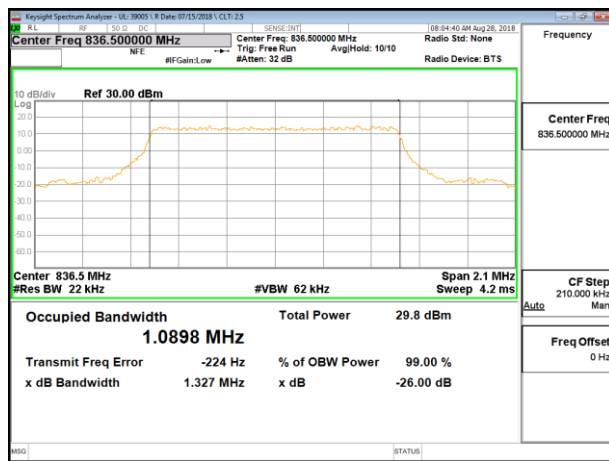


LTE B4 20MHz QPSK Mid Channel RB100-0

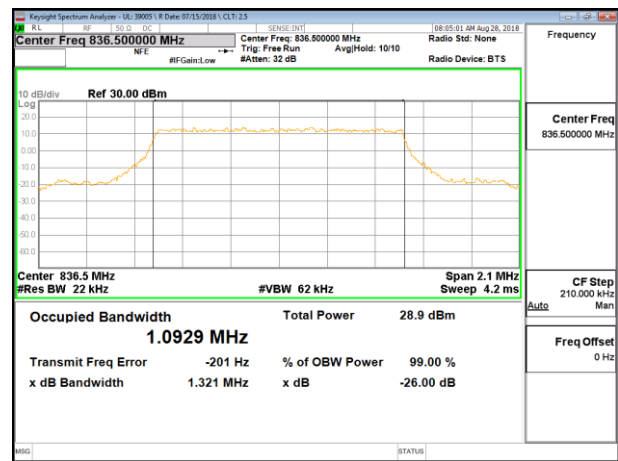


LTE B4 20MHz 16QAM Mid Channel RB100-0

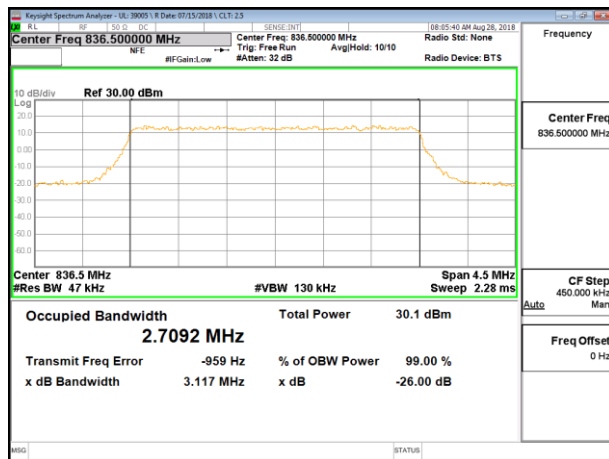
8.1.4. LTE BAND 5



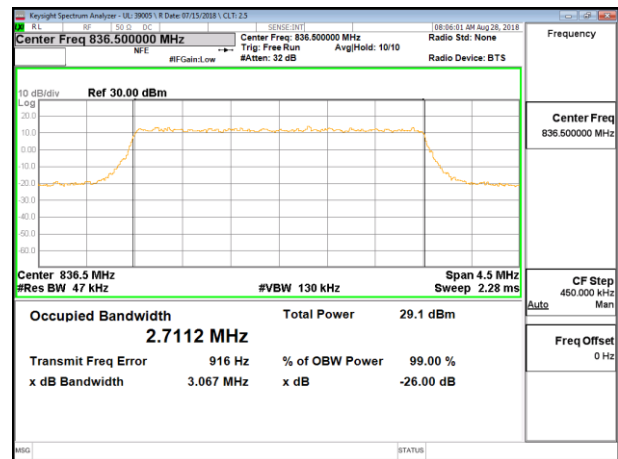
LTE B5 1.4MHz QPSK Mid Channel RB6-0



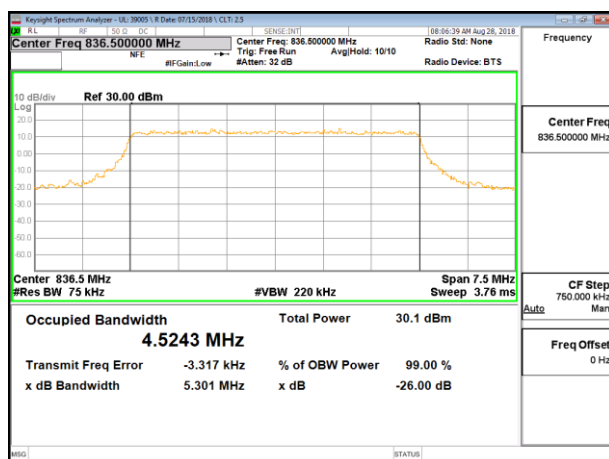
LTE B5 1.4MHz 16QAM Mid Channel RB6-0



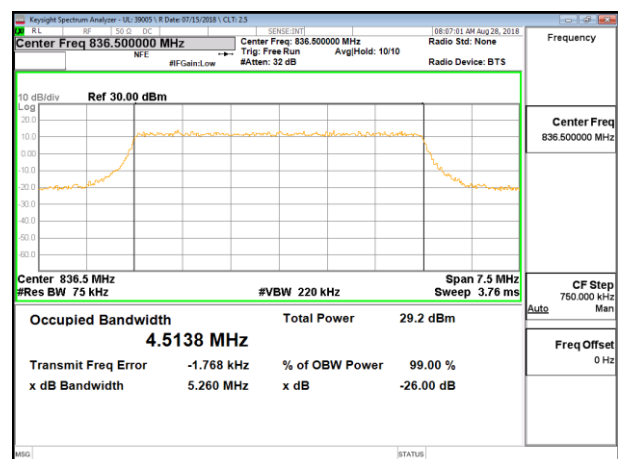
LTE B5 3MHz QPSK Mid Channel RB15-0



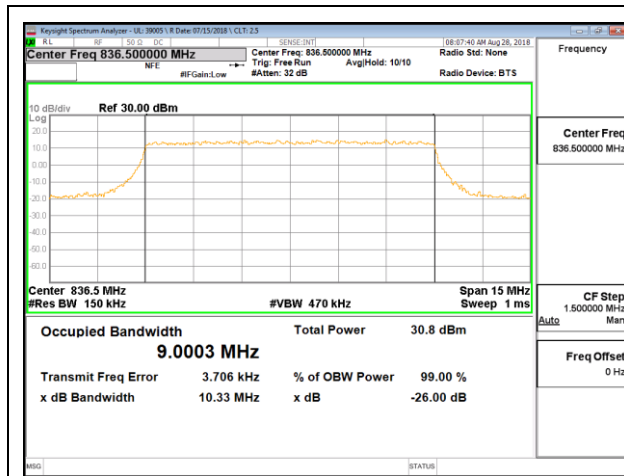
LTE B5 3MHz 16QAM Mid Channel RB15-0



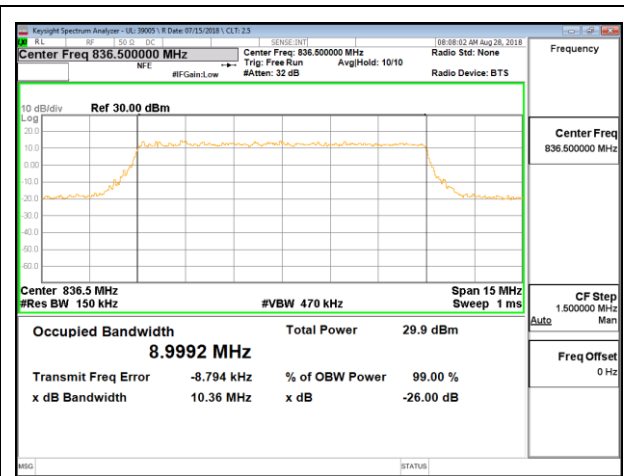
LTE B5 5MHz QPSK Mid Channel RB25-0



LTE B5 5MHz 16QAM Mid Channel RB25-0

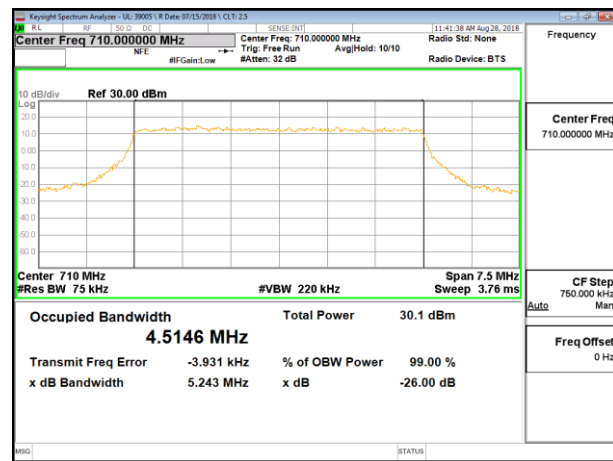


LTE B5 10MHz QPSK Mid Channel RB50-0

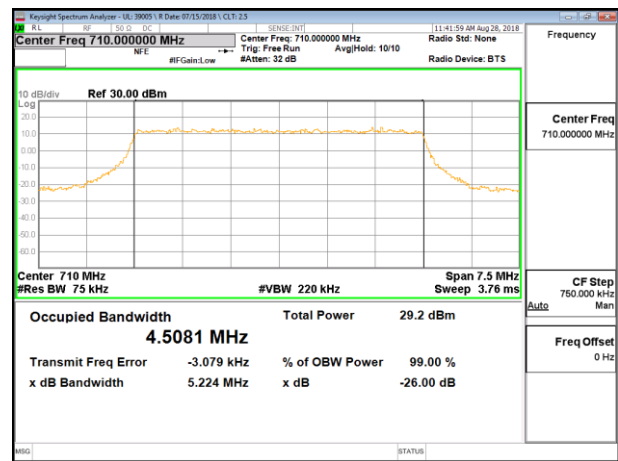


LTE B5 10MHz 16QAM Mid Channel RB50-0

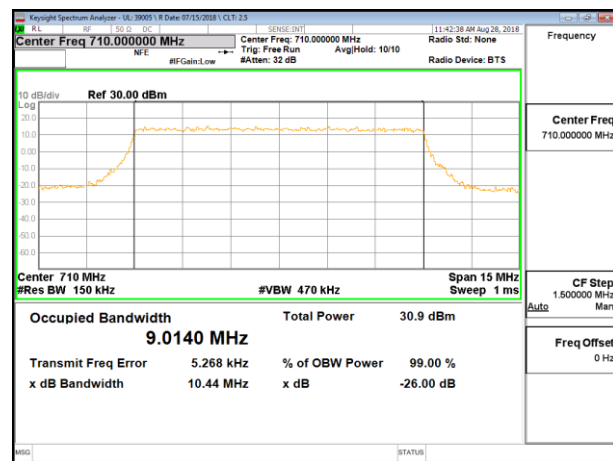
8.1.5. LTE BAND 17



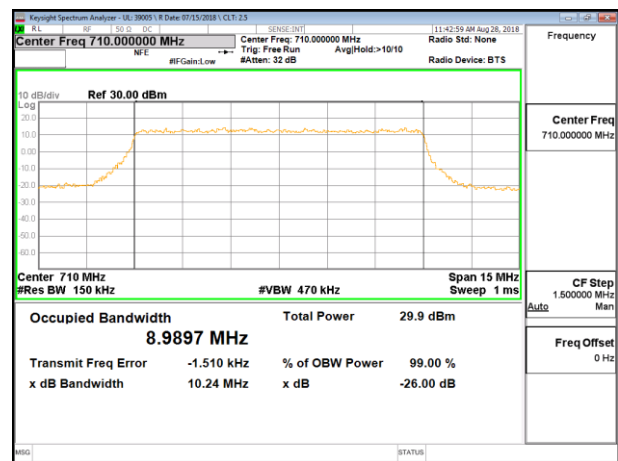
LTE B17 5MHz QPSK Mid Channel RB25-0



LTE B17 5MHz 16QAM Mid Channel RB25-0

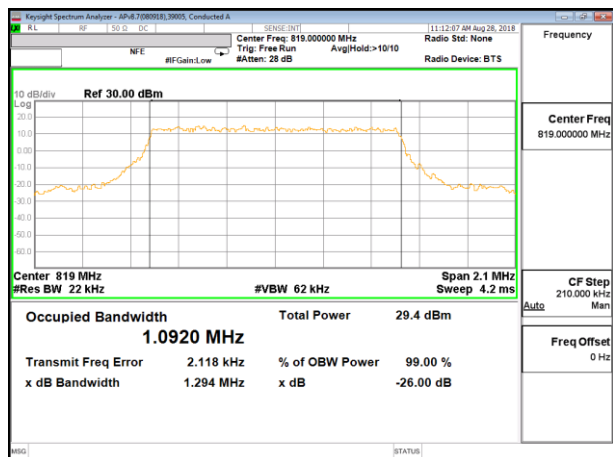


LTE B17 10MHz QPSK Mid Channel RB50-0

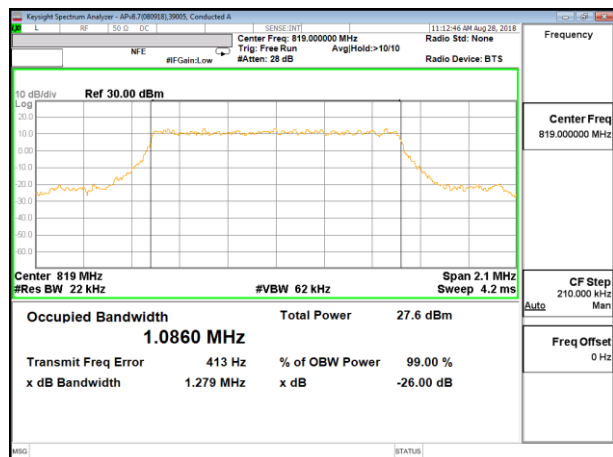


LTE B17 10MHz 16QAM Mid Channel RB50-0

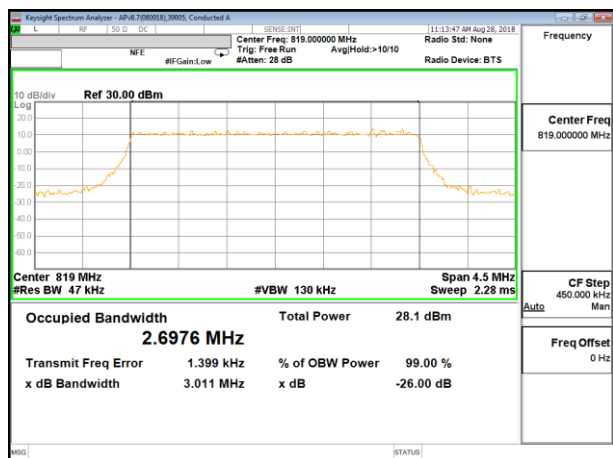
8.1.6. LTE BAND 26 (FCC PART 90S)



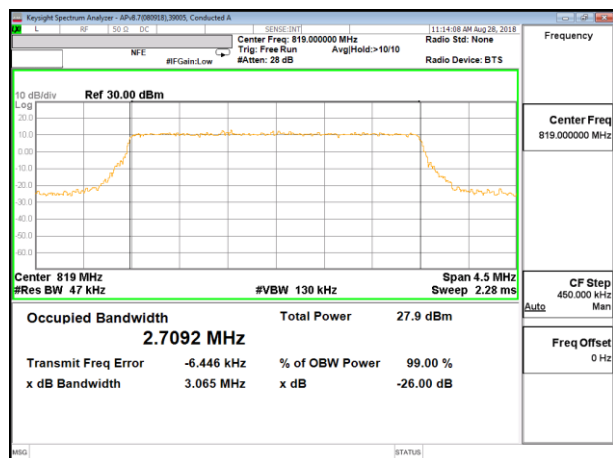
LTE B26 1.4MHz QPSK Mid Channel RB6-0



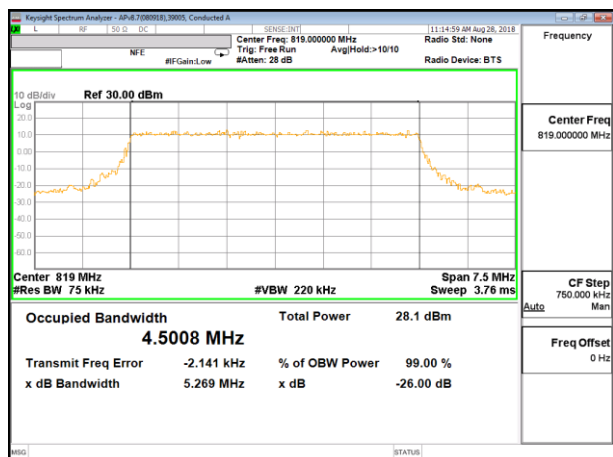
LTE B26 1.4MHz 16QAM Mid Channel RB6-0



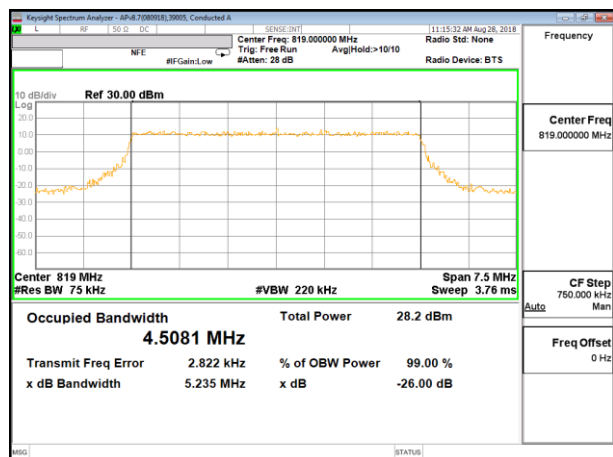
LTE B26 3MHz QPSK Mid Channel RB15-0



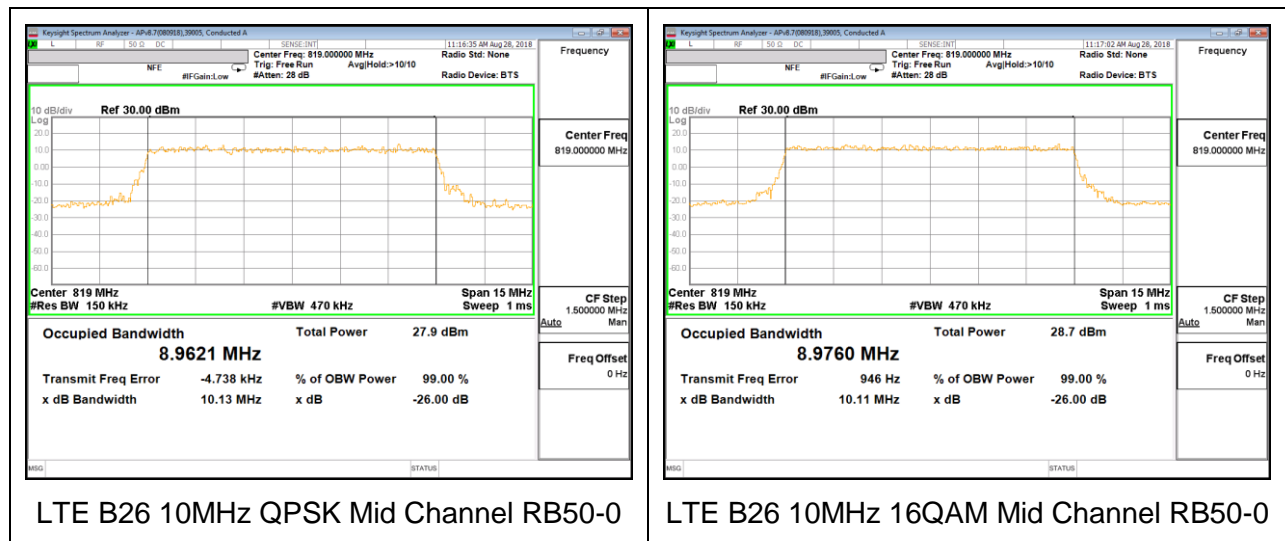
LTE B26 3MHz 16QAM Mid Channel RB15-0



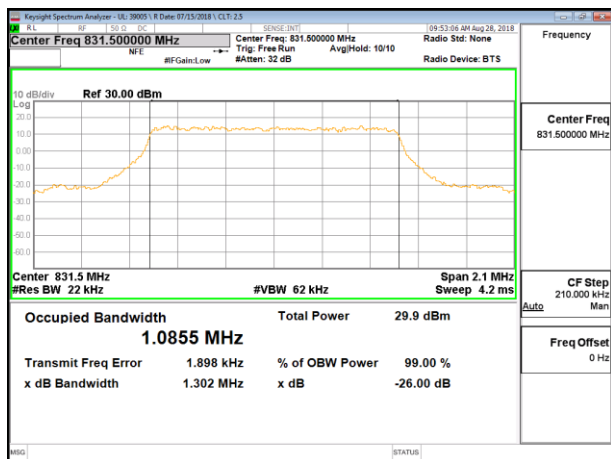
LTE B26 5MHz QPSK Mid Channel RB25-0



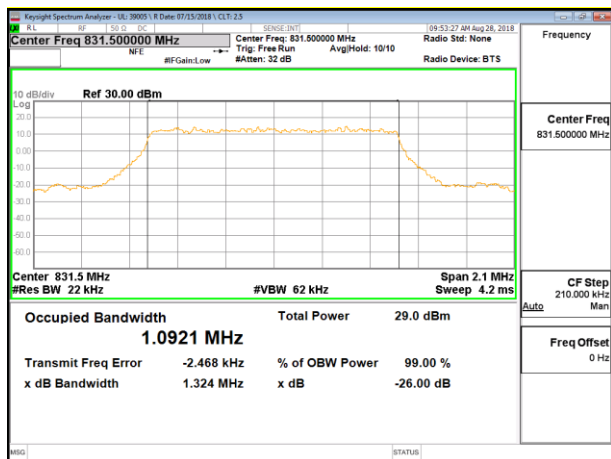
LTE B26 5MHz 16QAM Mid Channel RB25-0



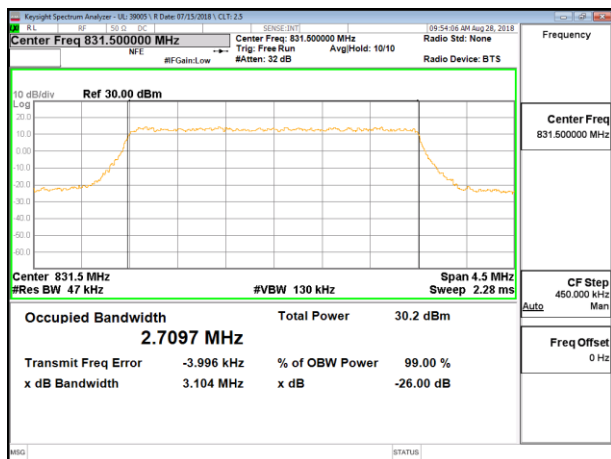
8.1.7. LTE BAND 26 (FCC PART 22)



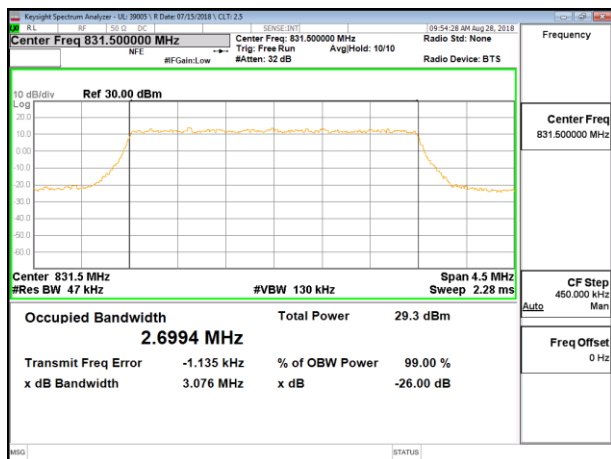
LTE B26 1.4MHz QPSK Mid Channel RB6-0



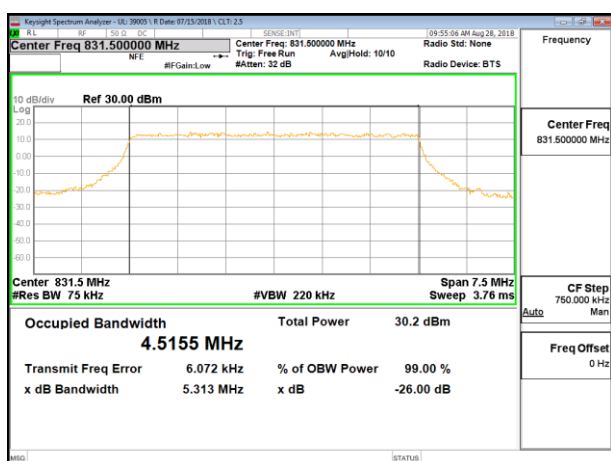
LTE B26 1.4MHz 16QAM Mid Channel RB6-0



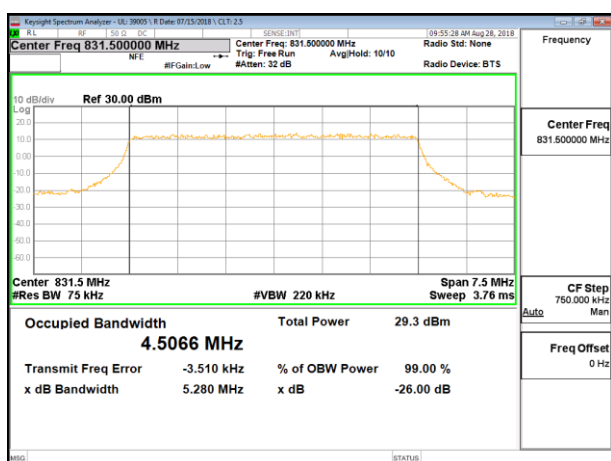
LTE B26 3MHz QPSK Mid Channel RB15-0



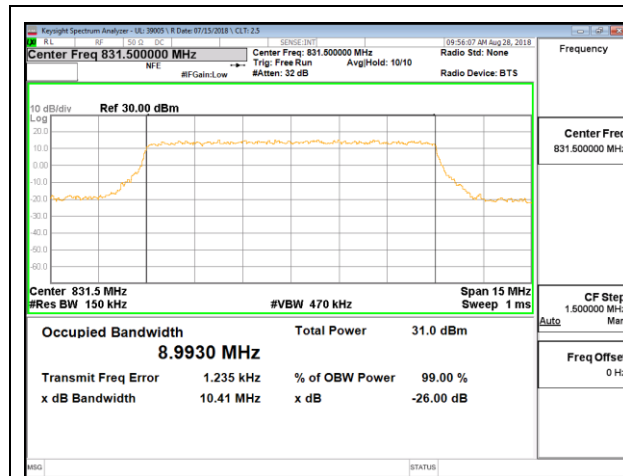
LTE B26 3MHz 16QAM Mid Channel RB15-0



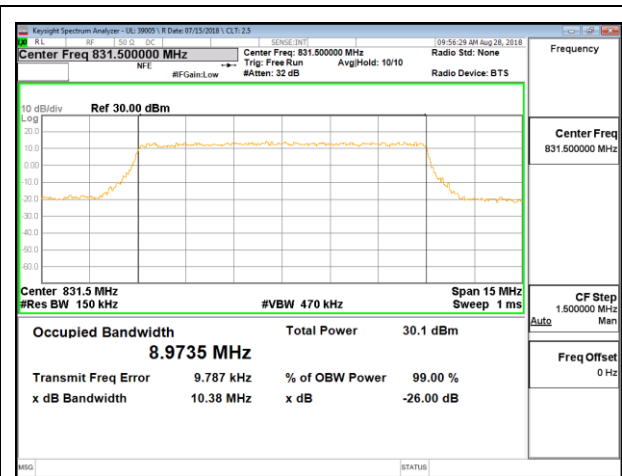
LTE B26 5MHz QPSK Mid Channel RB25-0



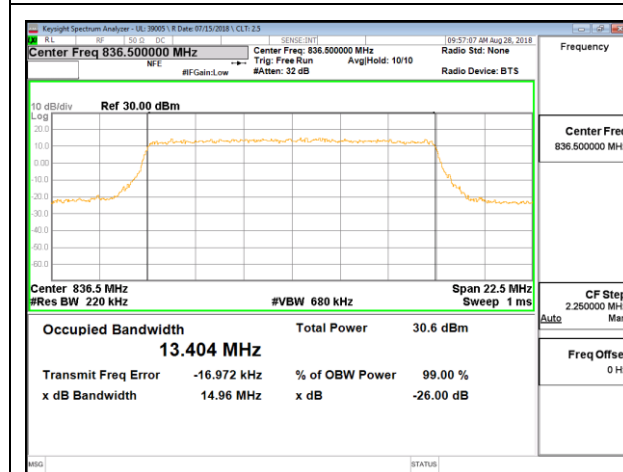
LTE B26 5MHz 16QAM Mid Channel RB25-0



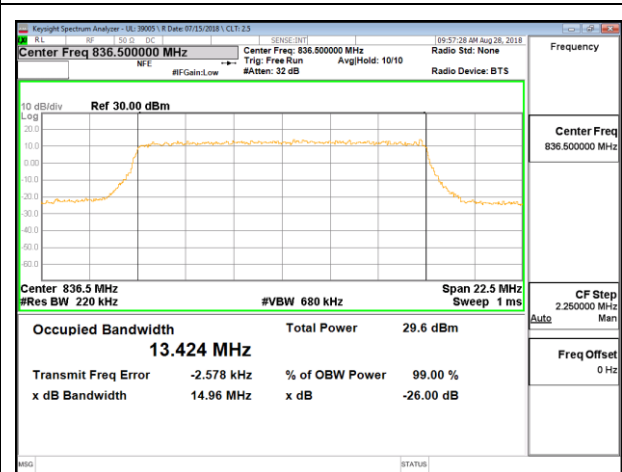
LTE B26 10MHz QPSK Mid Channel RB50-0



LTE B26 10MHz 16QAM Mid Channel RB50-0

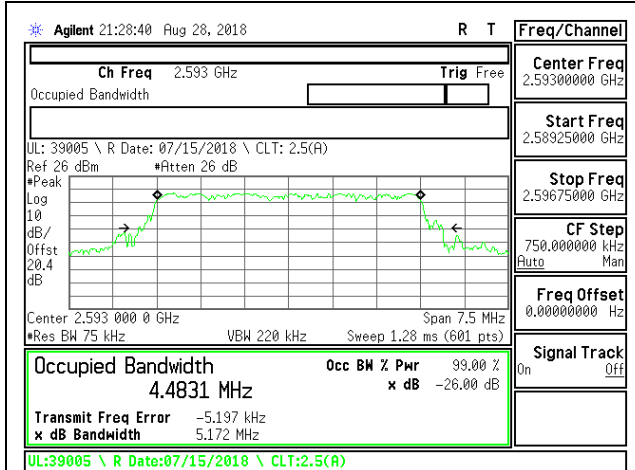


LTE B26 15MHz QPSK Mid Channel RB75-0

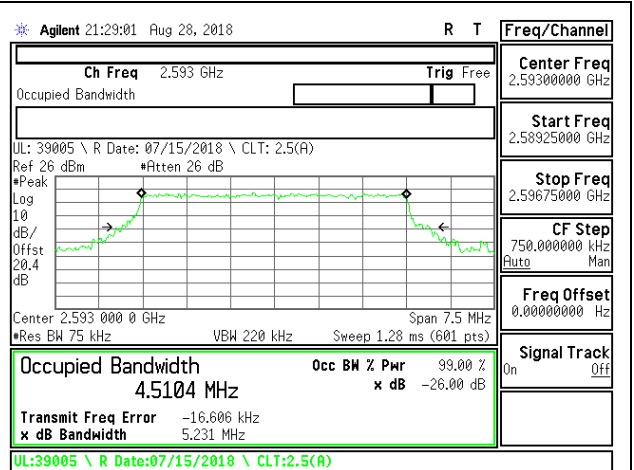


LTE B26 15MHz 16QAM Mid Channel RB75-0

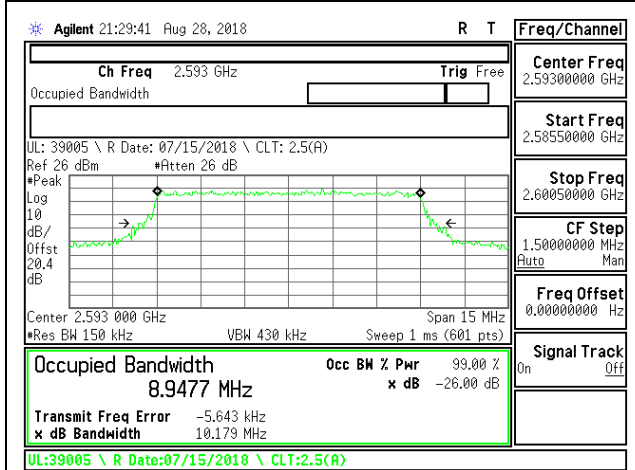
8.1.8. LTE BAND 41



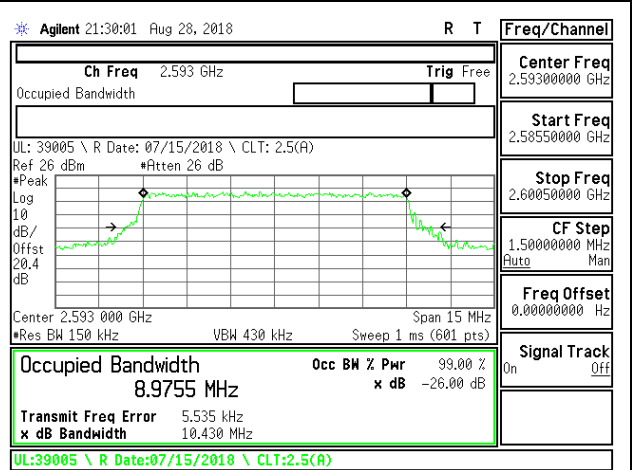
LTE B41 5MHz QPSK Mid Channel RB25-0



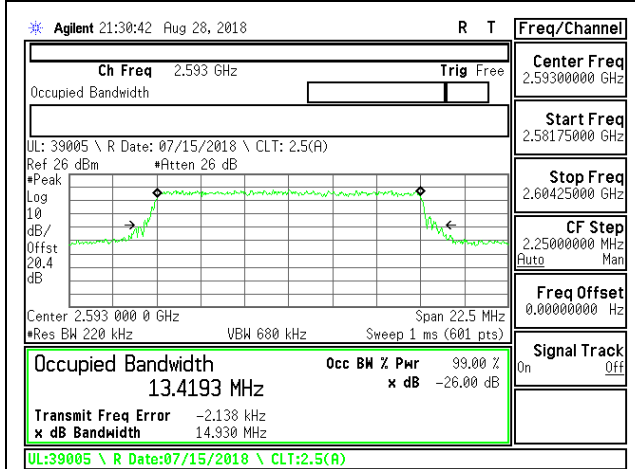
LTE B41 5MHz 16QAM Mid Channel RB25-0



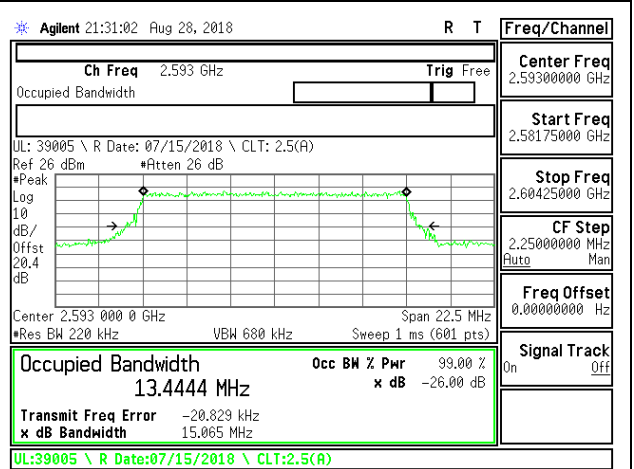
LTE B41 10MHz QPSK Mid Channel RB50-0



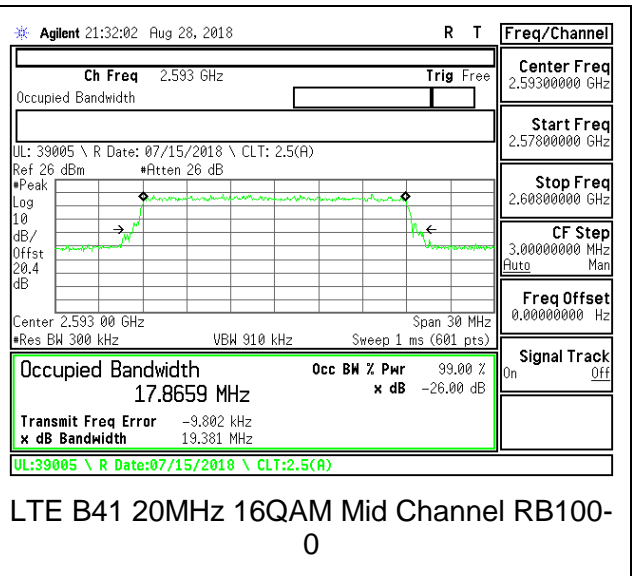
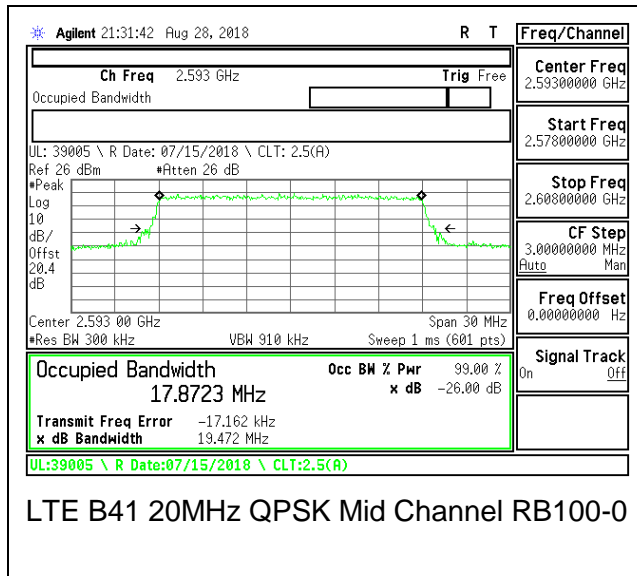
LTE B41 10MHz 16QAM Mid Channel RB50-0



LTE B41 15MHz QPSK Mid Channel RB75-0



LTE B41 15MHz 16QAM Mid Channel RB75-0



8.2. BAND EDGE AND EMISSION MASK

RULE PART(S)

FCC: §2.1051, §22.917, §24.238, §27.53, §90.691

LIMITS

FCC: §22.917, §24.238, §27.53(h)

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.

FCC: §90.691 Emission mask requirements for EA-based systems.

(a) Out-of-band emission requirement shall apply only to the "outer" channels included in an EA license and to spectrum adjacent to interior channels used by incumbent licensees. The emission limits are as follows:

(1) For any frequency removed from the EA licensee's frequency block by up to and including 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least $116 \log_{10}(f/6.1)$ decibels or $50 + 10 \log_{10}(P)$ decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 12.5 kHz.

(2) For any frequency removed from the EA licensee's frequency block greater than 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least $43 + 10 \log_{10}(P)$ decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 37.5 kHz.

FCC: §27.53 (17)

(g) For operations in the 600 MHz band and the 698-746 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least $43 + 10 \log (P)$ dB. Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kilohertz or greater. However, in the 100 kilohertz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed.

FCC: §27.53 (41)

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

TEST PROCEDURE

The transmitter output was connected to 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.

For each band edge measurement:

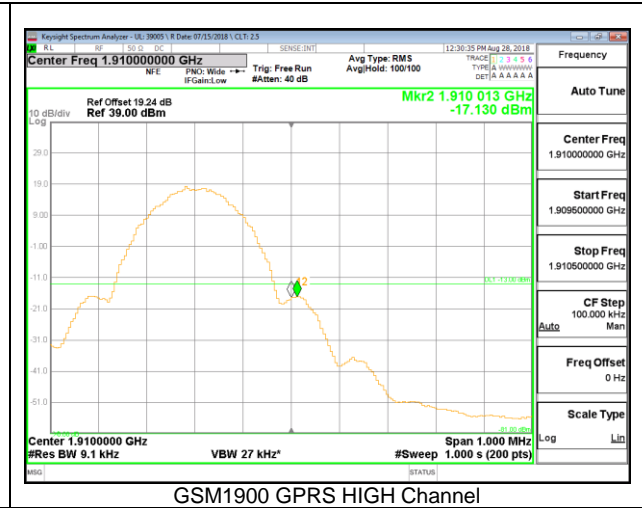
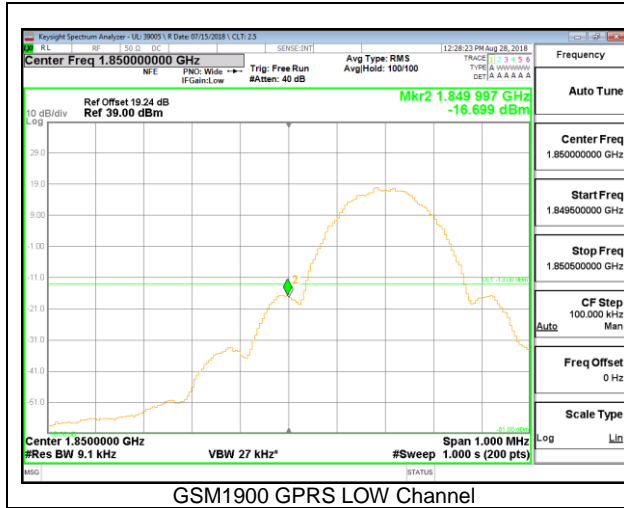
1. Set the spectrum analyzer span to include the block edge frequency.
2. Set a marker to point the corresponding band edge frequency in each test case.
3. Set display line at -13 dBm
4. Set resolution bandwidth to at least 1% of emission bandwidth.

MODES TESTED

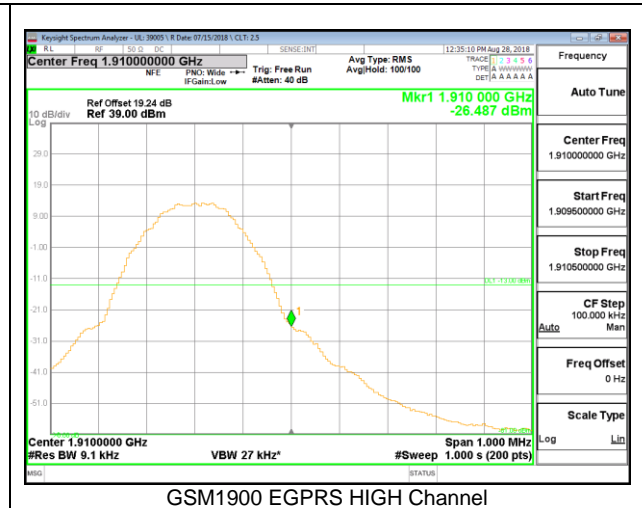
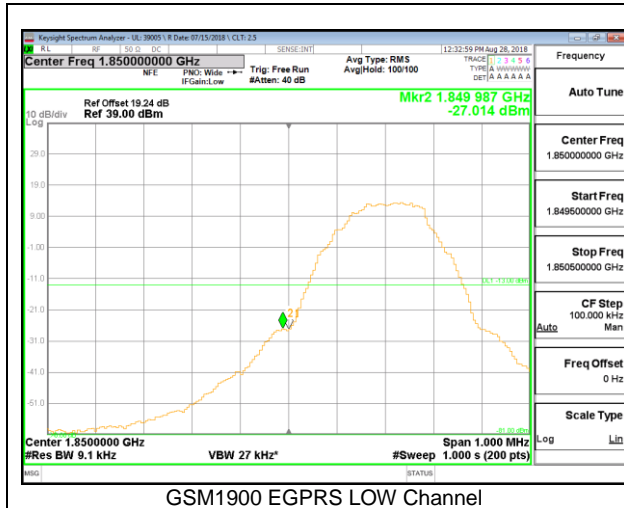
- GSM 1900
- WCDM Band 5
- WCDM Band 2
- WCDM Band 4
- LTE Band 4
- LTE Band 5
- LTE Band 17
- LTE Band 26
- LTE Band 41

RESULTS

**8.2.1. GSM GSM1900
 GPRS**

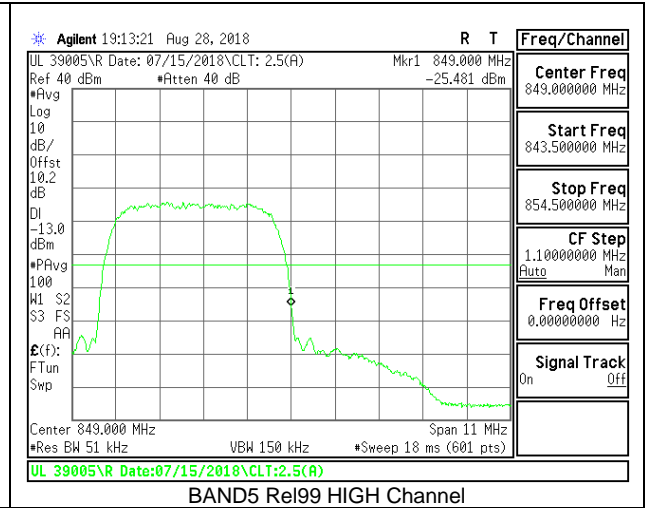
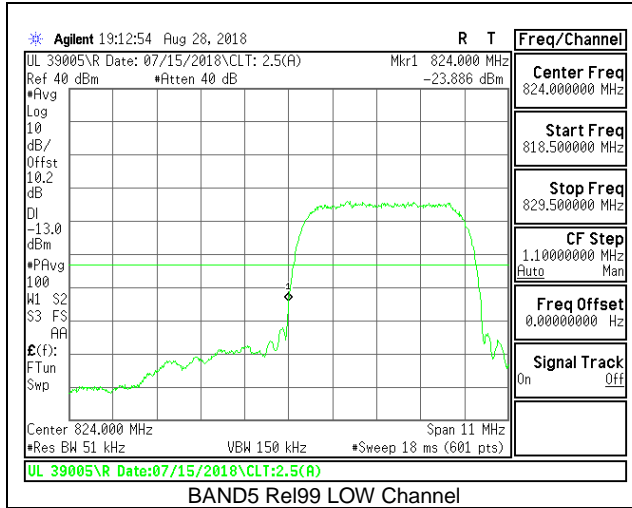


EGPRS

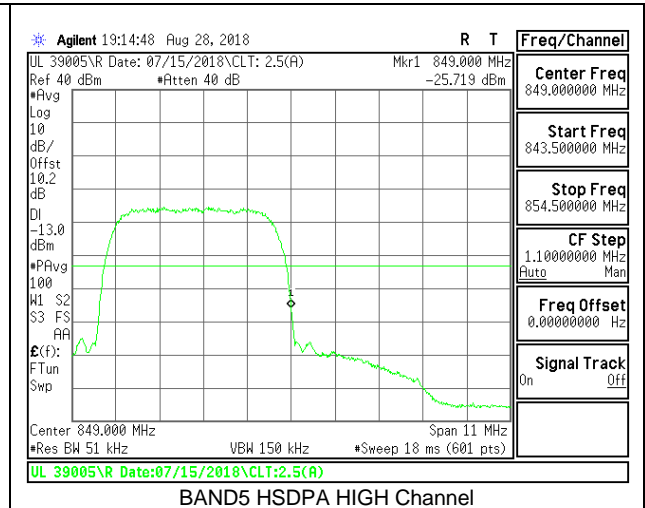
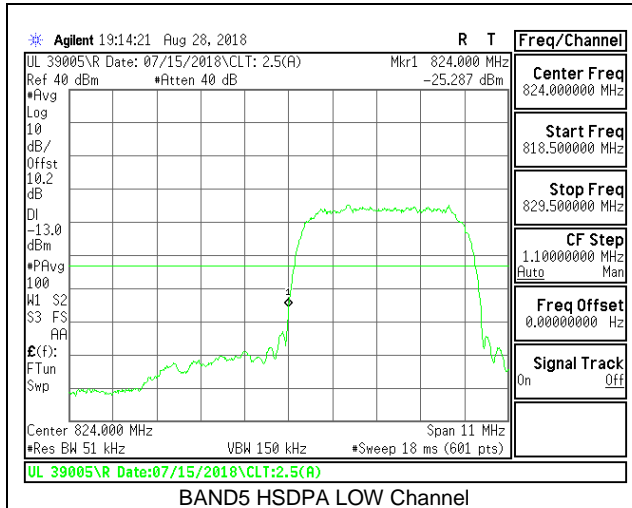


8.2.2. WCDMA BAND5

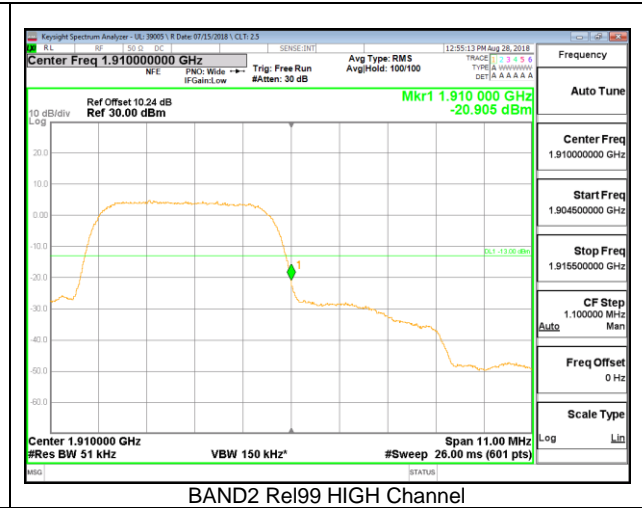
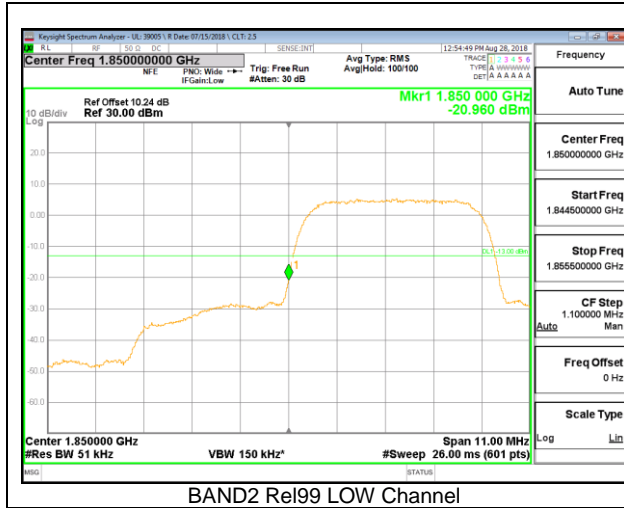
Rel99



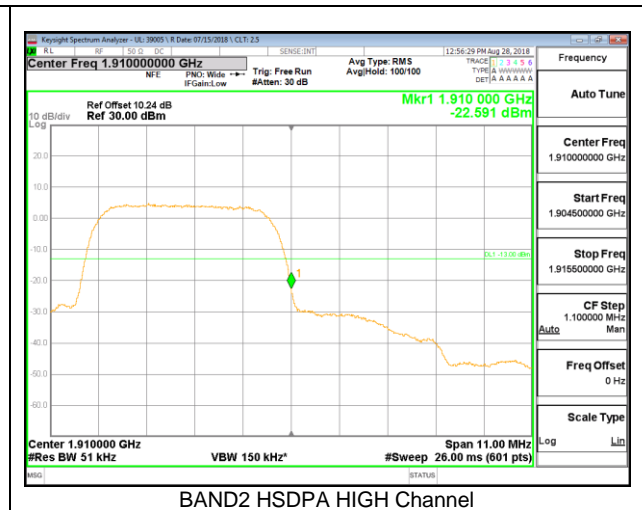
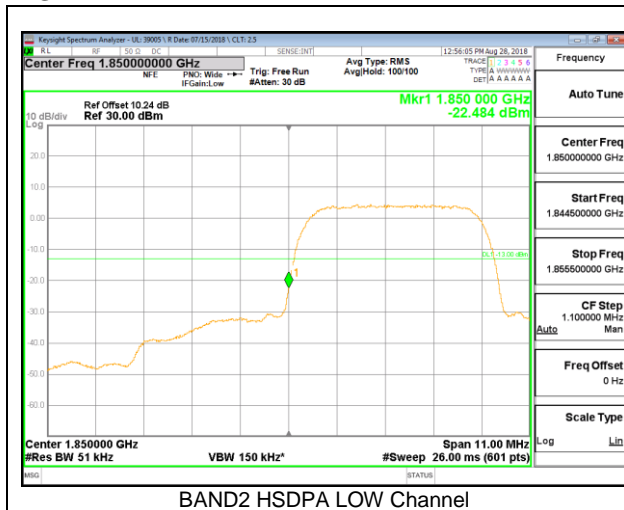
HSDPA



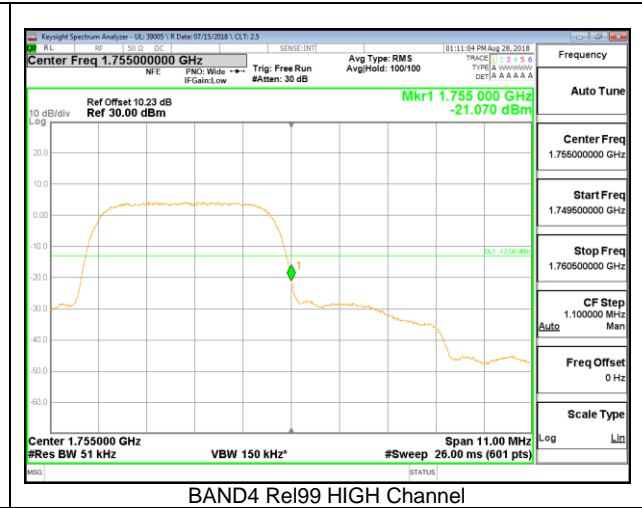
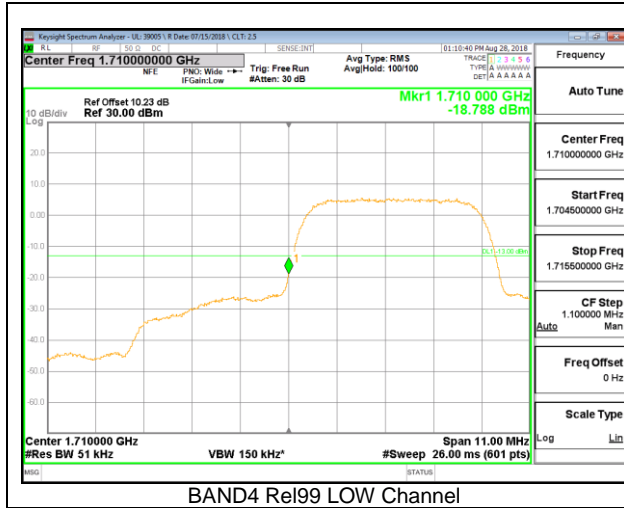
8.2.3. WCDMA BAND2 Rel99



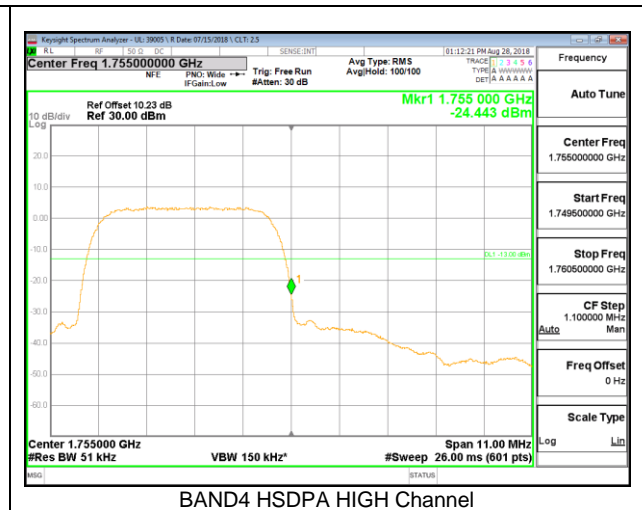
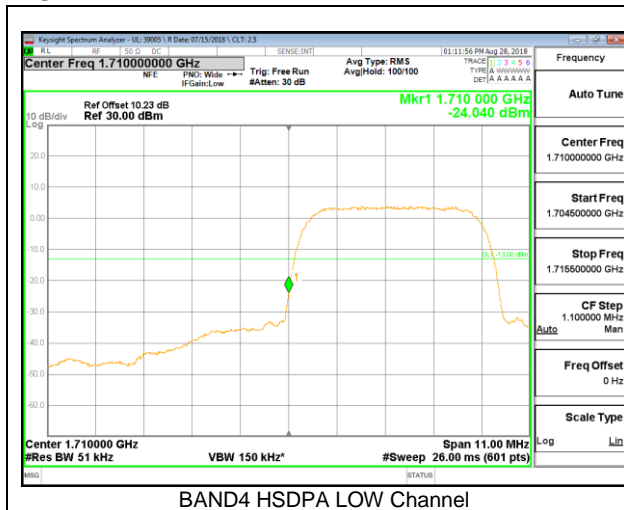
HSDPA



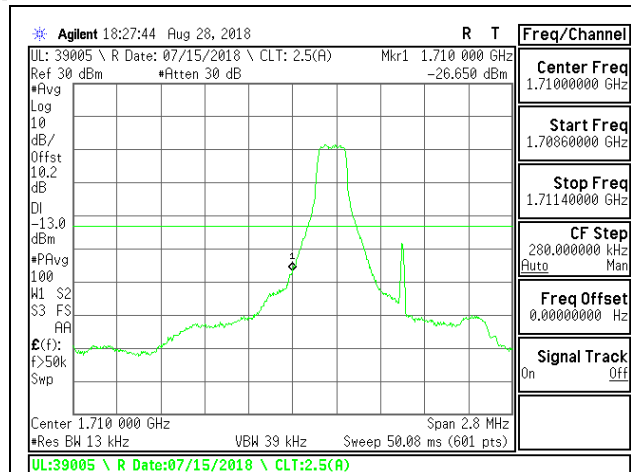
8.2.4. WCDMA BAND4 Rel99



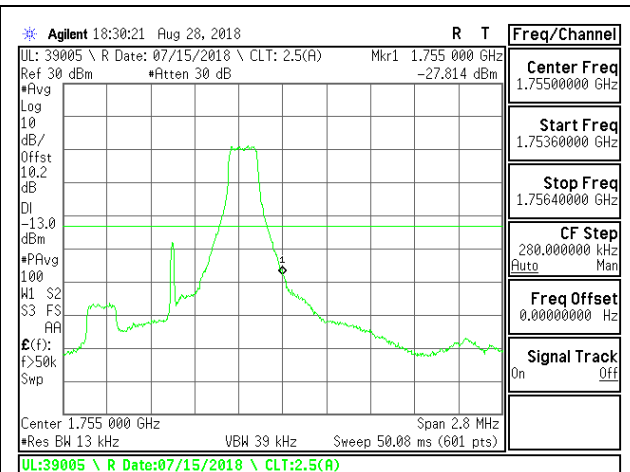
HSDPA



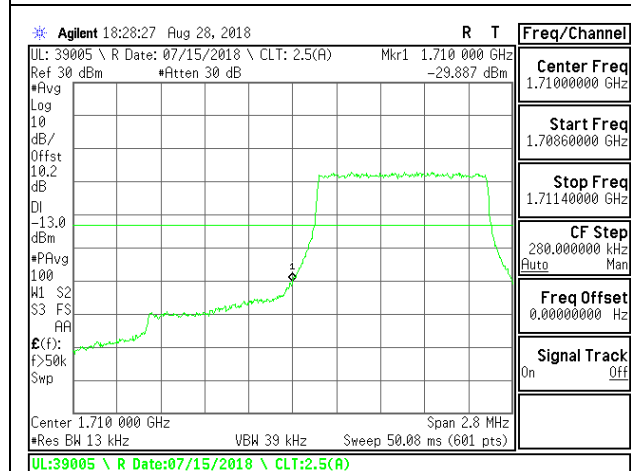
8.2.5. LTE BAND 4 BANDEDGE



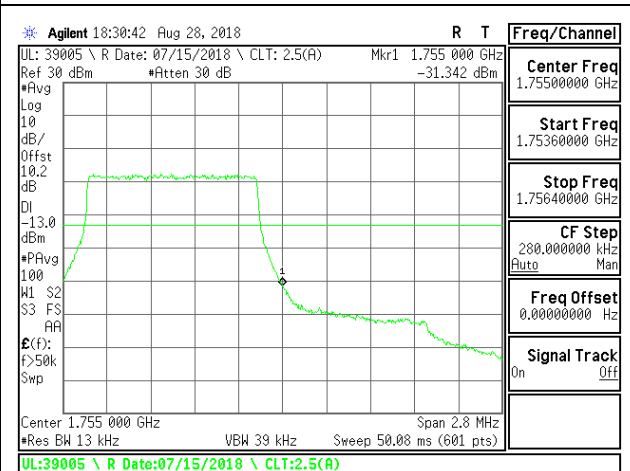
LTE B4 1.4MHz QPSK Low Channel RB1-0



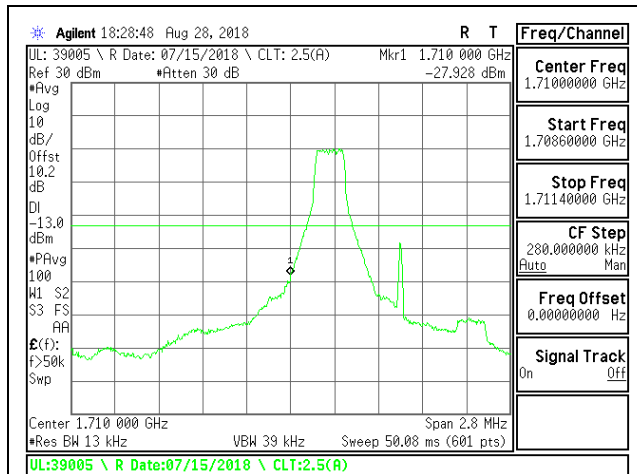
LTE B4 1.4MHz QPSK High Channel RB1-0



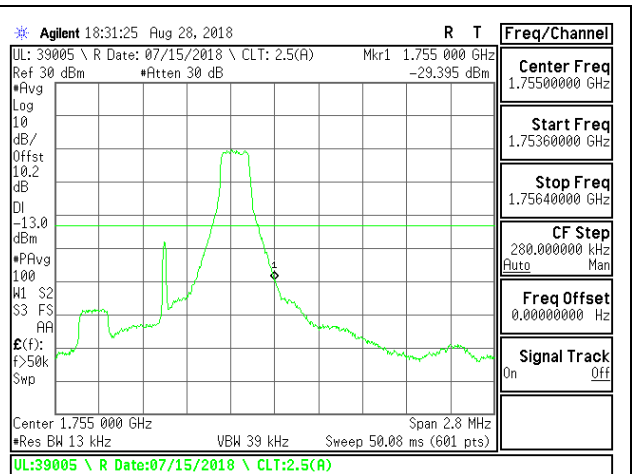
LTE B4 1.4MHz QPSK Low Channel RB6-0



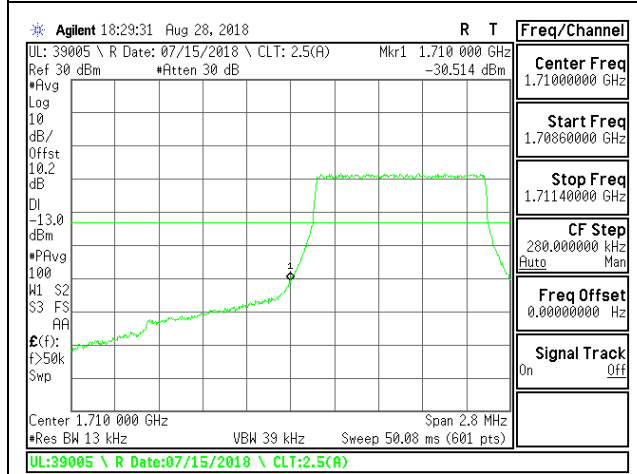
LTE B4 1.4MHz QPSK High Channel RB6-0



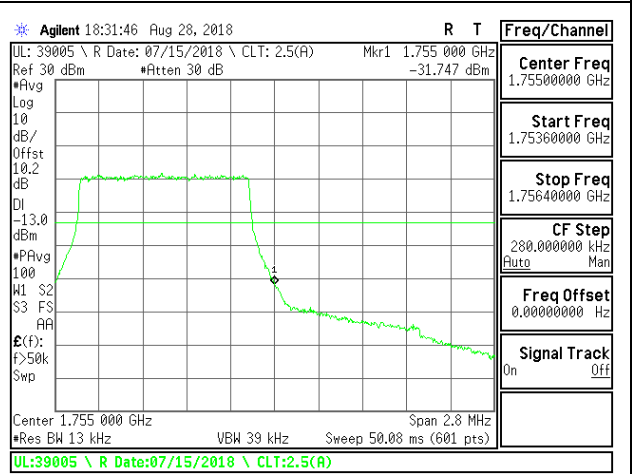
LTE B4 1.4MHz 16QAM Low Channel RB1-0



LTE B4 1.4MHz 16QAM High Channel RB1-0



LTE B4 1.4MHz 16QAM Low Channel RB6-0



LTE B4 1.4MHz 16QAM High Channel RB6-0