CERTIFICATION TEST REPORT

Report Number. : 12726919-E1V1

Applicant	:	Samsung Electronics Co., Ltd. 129 Samsung-Ro, Yeongtong-Gu, Suwon-Si, Gyeonggi-Do, 16677, Korea
Model	:	SM-A705MN/DS and SM-A705MN
FCC ID	:	A3LSMA705MN
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 M FCC CFR47 PART 15 SUBPART B

Date Of Issue:
APRIL 03, 2019

Prepared by:
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NVLAP Lab code: 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
V1	4/3/2019	Initial Review	--

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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
Model	SM-A705MN/DS AND SM-A705MN
FCC ID	A3LSMA705MN
EUT Description	GSM/WCDMA/LTE Phone with BT, DTS/UNII a/b/g/n/ac, ANT+ and NFC
Serial Number	R38M106F6BR(CONDUCTED), R38M10CS6GK, R38M10CS2VH(RADIATED)
Date Tested	FEBRUARY 18, 2019 to FEBRUARY 28, 2019
Applicable Standards	FCC CFR 47 PART 22H, 24E, and 27M
Test Results	Complies

UL Verification Services Inc. tested the above equipment in accordance with the requirements set forth in the above standards. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. All samples tested were in good operating condition throughout the entire test program. Measurement Uncertainties are published for informational purposes only and were not taken into account unless noted otherwise.

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 the U.S. government.

Approved & Released For UL Verification Services Inc. By:	Reviewed By:
Dan Coronia Operations Leader Consumer Technology Division UL Verification Services Inc.	Kiya Kedida Project Engineer Consumer Technology Division UL Verification Services Inc.

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2. INTRODUCTION OF TEST DATA REUSE

2.1. INTRODUCTION

According to the manufacturer, FCC ID: A3LSMA705FN and FCC ID: A3LSMA705MN licensed radio is electrically identical. The FCC ID: A3LSMA705FN GSM 850/1900, WCDMA Band 2 & Band 5 and LTE Band 5 test data shall remain representative of FCC ID: A3LSMA705MN.

The applicant takes full responsibility that the test data as referenced in this section represents compliance for this FCC ID

2.2. DIFFERENCES

Difference between A3LSMA705FN and A3LSMA705MN:

Samsung Electronics Co. Ltd. declares that A3LSMA705MN supports the following additional WCDMA and LTE bands: WCDMA Band 4, LTE Band 2, Band 4, Band 12, Band 13, Band 17, Band 41 and Band 66.

After confirming through preliminary radiated emissions that the performance of the FCC ID: A3LSMA705MN remains representative of FCC ID: A3LSMA705FN. Test data of FCC ID: A3LSMA705FN being submitted for this application to cover GSM 850/1900, WCDMA Band 2 & Band 5 and LTE Band 5 WWAN features.

2.3. SPOT CHECK VERIFICATION RESULTS SUMMARY

Spot check verification has been done on device A3LSMA705MN for radiated harmonic spurious. The data from the application has been verified through appropriate spot checks to demonstrate compliance for this device as shown in the summary below.

Comparison of two models, upper deviation is within 3dB range and all tests are under FCC Technical Limits.

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SPOT CHECK DATA

A3LSMA705MN SPOT CHECK RESULTS							
Technology	Mode	Test Item	Channel	Measured Frequency MHz	A3LSMA705FN Peak (dBm)	A3LSMA705MN Peak (dBm)	Delta (dB)
GSM	GPRS 850	RSE	824.2 MHz	1648 MHz	-45.48	-65.88	-20.4
	GPRS 1900	RSE	1880 MHz	3760 MHz	-38.69	-56.73	-18.04
	EGPRS 850	RSE	836.6 MHz	1673 MHz	-51.63	-64.56	-12.93
	EGPRS 1900	RSE	1880 MHz	5640 MHz	-42.24	-55.76	-13.52
WCDMA	REL99 B5	RSE	826.4 MHz	3308 MHz	-56.51	-59.57	-3.06
	REL99 B2	RSE	1880 MHz	3763 MHz	-55.05	-56.22	-1.17
	HSDPA B5	RSE	826.4 MHz	2480 MHz	-55.31	-60.13	-4.82
	HSDPA B2	RSE	1907.6 MHz	7634 MHz	-55.91	-54.8	1.11
LTE 5	QPSK @ 10MHz BW	RSE	836.5 MHz	3333 MHz	-56.98	-58.8	-1.82
	16QAM @ 10MHz BW	RSE	844 MHz	2532 MHz	-56.73	-59.1	-2.37

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SPOT CHECK DATA

HARMONICS AND SPURIOUS EMISSIONS

GSM

Company:	Samsung
Project #:	12726919
Date:	4/01/19
Test Engineer:	16069
Configuration:	EUT+ Support Equipment
Mode:	GPRS 850
Chamber #:	Chamber I

Marker	Frequency (MHz)	Meter Reading (dBm)	Det	AF T862 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	Limit	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
	824.2 MHz											
1	1.649	-73.48	Pk	28.4	-33.3	12.5	-65.88	-13	-52.88	0-360	148	H
2	1.65	-73.46	Pk	28.4	-33.3	11.4	-66.96	-13	-53.96	0-360	148	V

Company:	Samsung
Project #:	12726919
Date:	4/02/19
Test Engineer:	19480
Configuration:	EUT+ Support Equipment
Mode:	EGPRS 850
Chamber #:	Chamber J

Marker	Frequency (MHz)	Meter Reading (dBm)	Det	AF PRE0189055 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	Limit	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
	836.6 MHz											
1	1.673	-66.36	Pk	25.8	-36.1	12.1	-64.56	-13	-51.56	0-360	148	H
2	1.673	-67.35	Pk	25.8	-36.1	11.8	-65.85	-13	-52.85	0-360	148	V

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Company:	Samsung
Project #:	12726919
Date:	3/26/19
Test Engineer:	19498
Configuration:	EUT+ Support Equipment
Mode:	GPRS 1900
Chamber #:	Chamber K

Marker	Frequency (MHz)	Meter Reading (dBm)	Det	AF T344 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	Limit	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
	1880 MHz											
1	3.76	-68.44	Pk	33.3	-32.5	10.4	-57.24	-13	-44.24	0-360	150	H
2	3.76	-68.13	Pk	33.3	-32.5	10.6	-56.73	-13	-43.73	0-360	150	V

Company:	Samsung
Project #:	12726919
Date:	3/26/19
Test Engineer:	19498
Configuration:	EUT+ Support Equipment
Mode:	EGPRS 1900
Chamber #:	Chamber I

Marker	Frequency (MHz)	Meter Reading (dBm)	Det	AF T862 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	Limit	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
	1880 MHz											
1	5.64	-67.09	Pk	35	-28.6	11.8	-48.89	-13	-35.89	0-360	148	H
2	5.64	-74.06	Pk	35	-28.6	11.9	-55.76	-13	-42.76	0-360	148	V

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WCDMA

Company:	Samsung
Project #:	12726919
Date:	3/26/19
Test Engineer:	19498
Configuration:	EUT+ Support Equipment
Mode:	REL99 B5
Chamber #:	Chamber I

Marker	Frequency (MHz)	Meter Reading (dBm)	Det	AF T862 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	Limit	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
	826.4 MHz											
1	3.307	-72.63	Pk	32.7	-30.9	12	-58.83	-13	-45.83	0-360	148	V
2	3.308	-72.97	Pk	32.7	-30.9	11.6	-59.57	-13	-46.57	0-360	148	H

Company:	Samsung
Project #:	12726919
Date:	3/26/19
Test Engineer:	19498
Configuration:	EUT+ Support Equipment
Mode:	HSDPA B5
Chamber #:	Chamber I

Marker	Frequency (MHz)	Meter Reading (dBm)	Det	AF T862 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	Limit	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
	826.4 MHz											
1	2.482	-71.1	Pk	32.4	-32	11.3	-59.4	-13	-46.4	0-360	148	H
2	2.48	-71.83	Pk	32.4	-32	11.3	-60.13	-13	-47.13	0-360	149	V

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Company:	Samsung
Project #:	12726919
Date:	3/26/19
Test Engineer:	19498
Configuration:	EUT+ Support Equipment
Mode:	REL99 B2
Chamber #:	Chamber K

Marker	Frequency (MHz)	Meter Reading (dBm)	Det	AF T344 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	Limit	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
	1880 MHz											
1	3.757	-69.12	Pk	33.3	-32.5	10.4	-57.92	-13	-44.92	0-360	150	H
2	3.761	-67.62	Pk	33.3	-32.5	10.6	-56.22	-13	-43.22	0-360	150	V

Company:	Samsung
Project #:	12726919
Date:	3/26/19
Test Engineer:	19498
Configuration:	EUT+ Support Equipment
Mode:	HSDPA B2
Chamber #:	Chamber K

Marker	Frequency (MHz)	Meter Reading (dBm)	Det	AF T344 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	Limit	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
	1907.6 MHz											
1	7.636	-74.2	Pk	35.6	-26.6	10.4	-54.8	-13	-41.8	0-360	150	H
2	7.633	-74.14	Pk	35.6	-26.6	10.6	-54.54	-13	-41.54	0-360	150	V

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LTE BAND 5

Company:	Samsung
Project #:	12726919
Date:	3/26/19
Test Engineer:	19498
Configuration:	EUT+ Support Equipment
Mode:	LTE 5 QPSK 10MHz
Chamber #:	Chamber I

Marker	Frequency (MHz)	Meter Reading (dBm)	Det	AF T862 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	Limit	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
	836.5 MHz											
1	3.334	-71.47	Pk	32.8	-30.8	11.6	-57.87	-13	-44.87	0-360	148	H
2	3.332	-72.7	Pk	32.8	-30.8	11.9	-58.8	-13	-45.8	0-360	148	V

Company:	Samsung
Project #:	12726919
Date:	3/26/19
Test Engineer:	19498
Configuration:	EUT+ Support Equipment
Mode:	LTE 5 16QAM 10MHz
Chamber #:	Chamber I

Marker	Frequency (MHz)	Meter Reading (dBm)	Det	AF T862 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	Limit	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
	844 MHz											
1	2.532	-72.5	Pk	32.4	-31.7	12.7	-59.1	-13	-46.1	0-360	148	H
2	2.532	-73.08	Pk	32.4	-31.7	11.4	-60.98	-13	-47.98	0-360	149	V

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2.4. REFERENCE DETAIL

Reference application that contains the reused reference data.

Equipment Class	Reference FCC ID	Type Grant/ Permissive Change	Reference Application	Folder Test/RF Exposure	Report Title/Section
PCE	A3LSMA705FN	Grant	12726900-E1	Test	FCC Report WWAN / All Sections except Conducted Power, WCDMA B4, LTE B2/4/12/13/17/41/66 and Appendix A

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3. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.26:2015, ANSI C63.4:2014, TIA-603-E, FCC CFR 47 Part 2, Part 22, Part 24, Part 27, Part 15, and FCC KDB 971168 D01 v03r01.

4. 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
☒ Chamber A (ISED:2324B-1)	☐ Chamber D (ISED:22541-1)	☒ Chamber I (ISED:2324A-5)
☐ Chamber B (ISED:2324B-2)	☐ Chamber E (ISED:22541-2)	☒ Chamber J (ISED:2324A-6)
☐ Chamber C (ISED:2324B-3)	☐ Chamber F (ISED:22541-3)	☒ Chamber K (ISED:2324A-1)
	☐ Chamber G (ISED:22541-4)	☐ Chamber L (ISED:2324A-3)
	☐ Chamber H (ISED: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

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5. CALIBRATION AND UNCERTAINTY

5.1. 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.

5.2. SAMPLE CALCULATION

RADIATED EMISSIONS

Where relevant, the following sample calculation is provided:
Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB)
36.5 dBuV + 18.7 dB/m + 0.6 dB – 26.9 dB = 28.9 dBuV/m

MAINS CONDUCTED EMISSIONS

Where relevant, the following sample calculation is provided:
Final Voltage (dBuV) = Measured Voltage (dBuV) + Cable Loss (dB) + Limiter Factor (dB) + LISN Insertion Loss.
36.5 dBuV + 0 dB +10.1 dB+ 0 dB = 46.6 dBuV

5.3. 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%.

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6. EQUIPMENT UNDER TEST

6.1. DESCRIPTION OF EUT

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

6.2. MAXIMUM OUTPUT POWER

ERP/EIRP LIMIT

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

EIRP/ERP TEST PROCEDURE

ANSI C63.26:2015 Sub-Clause 5.2.7/ TIA-603-E Clause 2.2.17
KDB 971168 D01Section 5.8
KDB 412172 D01

ERP/EIRP = PMeas + GT − LC
where: ERP/EIRP = effective or equivalent radiated power, respectively (expressed in the same units as PMeas, typically dBW or dBm);
PMeas = 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 radiated ERP / EIRP output powers as follows:

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GSM MODES

Part 22 850MHz					
Frequency range (MHz)	Modulation	Radiated ERP		99% BW (kHz)	Emission Designator
		Average (dBm)	Average (W)		
824.2-848.8	GPRS	26.17	0.4140	241.05	241KGXW
	EGPRS	22.27	0.1687	229.05	229KG7W

Part 24 1900MHz					
Frequency range (MHz)	Modulation	Radiated EIRP		99% BW (kHz)	Emission Designator
		Average (dBm)	Average (W)		
1850.2-1909.8	GPRS	24.31	0.2698	245.13	245KGXW
	EGPRS	21.78	0.1507	244.77	245KG7W

WCDMA MODES

Part 22 Band 5					
Frequency range (MHz)	Modulation	Radiated ERP		99% BW (kHz)	Emission Designator
		Average (dBm)	Average (W)		
826.4-846.6	REL 99	18.33	0.0681	4120	4M12F9W
	HSDPA	17.65	0.0582	4150	4M15F9W
Part 24 Band 2					
Frequency range (MHz)	Modulation	Radiated EIRP		99% BW (kHz)	Emission Designator
		Average (dBm)	Average (W)		
1852.4-1907.6	REL 99	19.73	0.0940	4130	4M13F9W
	HSDPA	18.82	0.0762	4130	4M13F9W
Part 27 Band 4					
Frequency range (MHz)	Modulation	Radiated EIRP		99% BW (kHz)	Emission Designator
		Average (dBm)	Average (W)		
1712.4-1752.6	REL 99	21.87	0.1538	4120	4M12F9W
	HSDPA	20.90	0.1230	4130	4M13F9W

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LTE BAND 2

Part 24

Bandwidth (MHz)	Modulation	Low Frequency (MHz)	Upper Frequency (MHz)	Radiated ERP		99% BW (kHz)	Emission Designator
				Average (dBm)	Average (W)		
1.4	QPSK	1850.7	1909.3	23.23	0.2104	1100	1M10G7W
	16QAM			22.12	0.1629	1080	1M08D7W
3.0	QPSK	1851.5	1908.5	23.35	0.2163	2700	2M70G7W
	16QAM			22.17	0.1648	2700	2M70D7W
5.0	QPSK	1852.5	1907.5	23.24	0.2109	4500	4M50G7W
	16QAM			22.20	0.1660	4490	4M49D7W
10.0	QPSK	1855.0	1905.0	23.51	0.2244	8970	8M97G7W
	16QAM			22.31	0.1702	8960	8M96D7W
15.0	QPSK	1857.5	1902.5	22.98	0.1986	13450	13M5G7W
	16QAM			21.90	0.1549	13440	13M4D7W
20.0	QPSK	1860.0	1900.0	23.01	0.2000	17910	17M9G7W
	16QAM			21.95	0.1567	17890	17M9D7W

LTE BAND 4

Part 27

Bandwidth (MHz)	Modulation	Low Frequency (MHz)	Upper Frequency (MHz)	Radiated ERP		99% BW (kHz)	Emission Designator
				Average (dBm)	Average (W)		
1.4	QPSK	1710.7	1754.3	20.79	0.1199	1100	1M10G7W
	16QAM			20.05	0.1012	1080	1M08D7W
3.0	QPSK	1711.5	1753.5	20.81	0.1205	2700	2M70G7W
	16QAM			20.07	0.1016	2700	2M70D7W
5.0	QPSK	1712.5	1752.5	20.92	0.1236	4500	4M50G7W
	16QAM			20.13	0.1030	4500	4M50D7W
10.0	QPSK	1715.0	1750.0	20.88	0.1225	8960	8M96G7W
	16QAM			19.97	0.0993	8940	8M94D7W
15.0	QPSK	1717.5	1747.5	20.72	0.1180	13440	13M4G7W
	16QAM			20.00	0.1000	13430	13M4D7W
20.0	QPSK	1720.0	1745.0	20.81	0.1205	17930	17M9G7W
	16QAM			20.11	0.1026	17910	17M9D7W

LTE BAND 5

Part 22H

Bandwidth (MHz)	Modulation	Low Frequency (MHz)	Upper Frequency (MHz)	Radiated ERP		99% BW (kHz)	Emission Designator
				Average (dBm)	Average (W)		
1.4	QPSK	824.7	848.3	15.96	0.0394	1100	1M10G7W
	16QAM			15.15	0.0327	1080	1M08D7W
3.0	QPSK	825.5	847.5	16.01	0.0399	2700	2M70G7W
	16QAM			15.25	0.0335	2700	2M70D7W
5.0	QPSK	826.5	846.5	16.53	0.0450	4500	4M50G7W
	16QAM			15.86	0.0385	4500	4M50D7W
10.0	QPSK	829.0	844.0	17.07	0.0509	8960	8M96G7W
	16QAM			16.35	0.0432	8960	8M96D7W

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LTE BAND 12

Part 27							
Bandwidth (MHz)	Modulation	Low Frequency (MHz)	Upper Frequency (MHz)	Radiated ERP		99% BW (kHz)	Emission Designator
				Average (dBm)	Average (W)		
1.4	QPSK	699.7	715.3	16.05	0.0403	1080	1M08G7W
	16QAM			15.20	0.0331	1080	1M08D7W
3.0	QPSK	700.5	714.5	16.34	0.0431	2700	2M70G7W
	16QAM			15.54	0.0358	2700	2M70D7W
5.0	QPSK	701.5	713.5	16.18	0.0415	4510	4M51G7W
	16QAM			15.46	0.0352	4490	4M49D7W
10.0	QPSK	704.0	711.0	15.86	0.0385	8980	8M98G7W
	16QAM			15.02	0.0318	8980	8M98D7W

LTE BAND 13

Part 27							
Bandwidth (MHz)	Modulation	Low Frequency (MHz)	Upper Frequency (MHz)	Radiated ERP		99% BW (kHz)	Emission Designator
				Average (dBm)	Average (W)		
5.0	QPSK	779.5	784.5	20.61	0.1151	4500	4M50G7W
	16QAM			19.65	0.0923	4490	4M49D7W
10.0	QPSK	782.0	782.0	20.27	0.1064	8970	8M97G7W
	16QAM			19.28	0.0847	8980	8M98D7W

LTE BAND 41

Part 27							
Bandwidth (MHz)	Modulation	Low Frequency (MHz)	Upper Frequency (MHz)	Radiated EIRP		99% BW (kHz)	Emission Designator
				Average (dBm)	Average (W)		
5.0	QPSK	2498.5	2687.5	16.13	0.0410	4510	4M51G7W
	16QAM			15.49	0.0354	4491	4M49D7W
10.0	QPSK	2501.0	2685.0	16.58	0.0455	8970	8M97G7W
	16QAM			15.74	0.0375	8953	8M95D7W
15.0	QPSK	2503.5	2682.5	16.47	0.0444	13400	13M4G7W
	16QAM			15.66	0.0368	13409	13M4D7W
20.0	QPSK	2506.0	2680.0	17.06	0.0508	17871	17M9G7W
	16QAM			16.38	0.0435	17842	17M8D7W

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LTE BAND 66

Part 27

Bandwidth (MHz)	Modulation	Low Frequency (MHz)	Upper Frequency (MHz)	Radiated ERP		99% BW (kHz)	Emission Designator
				Average (dBm)	Average (W)		
1.4	QPSK	1710.7	1779.3	21.33	0.1358	1080	1M08G7W
	16QAM			20.27	0.1064	1090	1M09D7W
3.0	QPSK	1711.5	1778.5	21.18	0.1312	2700	2M70G7W
	16QAM			20.39	0.1094	2700	2M70D7W
5.0	QPSK	1712.5	1777.5	21.73	0.1489	4500	4M50G7W
	16QAM			21.18	0.1312	4490	4M49D7W
10.0	QPSK	1715.0	1775.0	21.44	0.1393	8990	8M99G7W
	16QAM			20.80	0.1202	8980	8M98D7W
15.0	QPSK	1717.5	1772.5	21.60	0.1445	13420	13M4G7W
	16QAM			21.06	0.1276	13410	13M4D7W
20.0	QPSK	1720.0	1770.0	21.89	0.1545	17870	17M9G7W
	16QAM			21.32	0.1355	17880	17M9D7W

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6.3. SOFTWARE AND FIRMWARE

The test utility software used during testing was A705MN.001

6.4. MAXIMUM ANTENNA GAIN

Please see table below:

LTE Bands	Antenna Gain (dBi)
GSM850, 824-849MHz	-7.39
GSM1900, 1850-1910MHz	-6.07
WCDMA Band 2, 1850-1910 MHz	-6.07
WCDMA Band 4, 1710-1755 MHz	-7.60
WCDMA Band 5, 824-849 MHz	-7.39
LTE BAND 2, 1850-1910 MHz	-6.37
LTE BAND 4, 1710-1755 MHz	-7.60
LTE BAND 5, 824-849 MHz	-7.39
LTE BAND 12, 699-716 MHz	-9.13
LTE BAND 13, 777-787 MHz	-8.39
LTE BAND 17, 704-716 MHz	-9.13
LTE BAND 41, 2496-2690 MHz	-5.80
LTE BAND 66, 1710-1780 MHz	-7.60

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6.5. WORST-CASE CONFIGURATION AND MODE

The EUT supports LTE Bands of band 2, band 4, band 5, band 12, band 13, band 17, band 41 and band 66.

LTE Band 17 (704 - 716 MHz, 5/10 MHz bandwidth) is covered by LTE Band 12 because it is a subset of LTE band 12 and they have same output power and channel bandwidth.

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, 16QAM, and 64QAM modulations. All other 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 for 1700MHz, Y-Axis for 1900MHz, X-Axis for 850/700MHz, and X-Axis for 2500MHz with AC/DC Adapter and headset was worst-case orientation.

All radios that can be transmitted simultaneously have been evaluated for radiated for all possible combinations of transmission and found to be in compliance.

For check the Part15B receiver mode (Appendix A):

For LTE B5, LTE B12 and LTE B13, the spurious emissions was investigated in three orthogonal orientations X, Y and Z. It was determined that X orientation was worst-case orientation.

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6.6. 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

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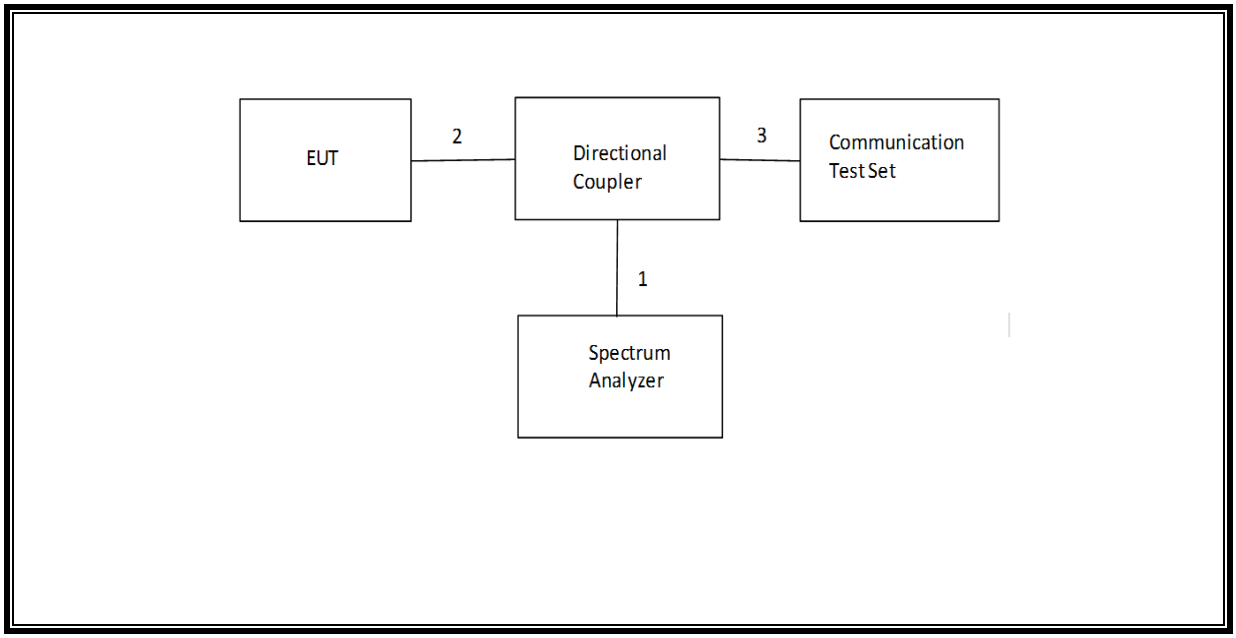
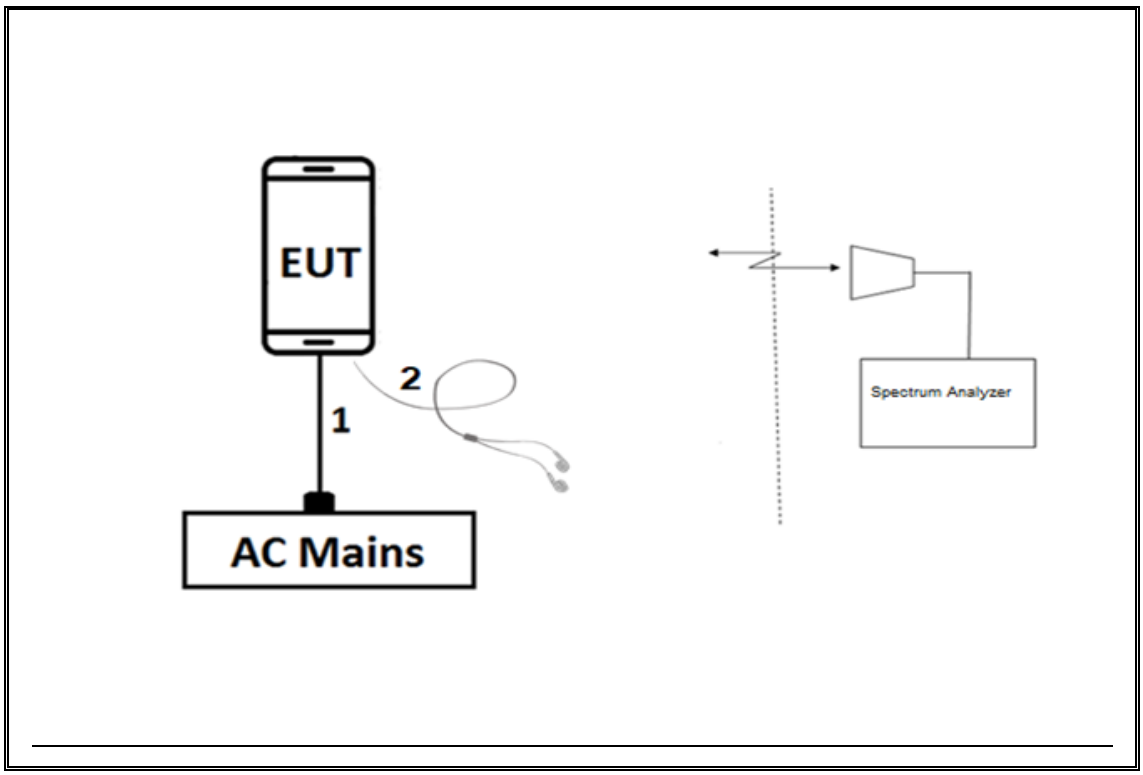
CONDUCTED TEST SETUP DIAGRAM



RADIATED TEST SETUP DIAGRAM



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7. 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, 1.5 GHz	Micro-Tronics	HPM50114	T1852	07/31/19	07/31/18
Highpass Filter, 4GHz	Micro-Tronics	HPM13351	T1240	08/31/19	08/31/18
Antenna, Horn 1-18GHz	ETS-Lindgren	3117	T344	04/30/19	04/30/18
Antenna, Horn 1-18GHz	ETS-Lindgren	3117	T862	05/24/19	05/24/18
Antenna, Horn 1-18GHz	ETS-Lindgren	3117	AT0067	04/26/19	04/26/18
Antenna, Horn 1-18GHz	ETS-Lindgren	3117	T345	04/25/19	04/25/18
Ant., Horn 18 - 26.5 GHz	ARA	MWH-1826/B	T477	06/16/2019	06/16/2018
Hybrid Antenna	SunAR rf motion	JB3	PRE0184052	10/24/19	10/24/18
Hybrid Antenna	SunAR rf motion	JB3	PRE0184971	11/13/19	11/13/18
Hybrid Antenna	SunAR rf motion	JB3	PRE0181575	08/01/19	08/01/18
Hybrid Antenna	SunAR rf motion	JB3	PRE0181574	08/01/19	08/01/18
RF Amplifier	MITEQ	AFS42-00101800-25-S-42	174060	08/01/19	08/01/18
RF Amplifier	AMPLICAL	AMP1G18-35	T1571	07/30/19	07/30/18
RF Amplifier	AMPLICAL	AMP1G18-35	T1569	06/03/19	06/03/18
RF Amplifier	MITEQ	AFS42-00101800-25-S-42	T1165	02/20/20	02/20/19
RF Amplifier 9KHz – 1GHz	SONOMA INSTR	310	PRE0180175	07/09/19	07/09/18
RF Amplifier 9KHz – 1GHz	SONOMA INSTR	310	PRE0180174	05/31/19	05/31/18
RF Amplifier 9KHz – 1GHz	SONOMA INSTR	310	175953	12/13/19	12/13/18
Amplifier 100kHz – 1GHz	Agilent	8447D	T15	10/20/19	10/20/18
Directional Coupler	KRYTAR	T922	PRE0078321	06/18/19	06/18/18
Wideband Communication Test Set, Call Box	R&S	CMW500	T375	02/18/20	02/18/19
Wideband Communication Test Set, Call Box	R&S	CMW500	T1871	02/18/20	02/18/19
Wideband Communication Test Set, Call Box	R&S	CMW500	T949	02/21/20	02/21/19
Chamber, Environmental	Thermotron	SE-600-10-10	T80	05/01/19	11/01/18
Spectrum Analyzer	Agilent (Keysight) Technologies	E4440A	T200	01/28/20	01/28/19
EMI TEST RECEIVER	Rohde & Schwarz	ESW44	PRE0179375	05/08/19	05/08/18
EMI TEST RECEIVER	Rohde & Schwarz	ESW44	PRE0179372	05/04/19	05/04/18
Spectrum Analyzer, PXA, 3Hz to 44GHz	Agilent (Keysight) Technologies	N9030A	T1454	01/25/20	01/25/19
Spectrum Analyzer, PXA, 3Hz to 44GHz	Agilent (Keysight) Technologies	N9030A	T917	01/24/20	01/24/19
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
Power Meter	Keysight	N1911A	T1265	01/29/20	01/29/19
Power Sensor	Keysight	N1921A	T1227	02/05/20	02/05/19

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

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NOTES:

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

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8. 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

8.1. 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

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8.1.1. GSM850

ID:	38206	Date:	2/18/19

GPRS (GMSK) - Coding Scheme: CS1

Band	Ch No.	Freq. (MHz)	Power			
			1 slot	2 slots	3 slots	4 slots
850.0	128	824.2	33.9	30.7	28.4	27.4
	190	836.6	34.0	31.0	28.6	27.6
	251	848.8	33.9	30.6	28.7	26.9

EGPRS (8PSK) - Coding Scheme: MCS5

Band	Ch No.	Freq. (MHz)	Power			
			1 slot	2 slots	3 slots	4 slots
850.0	128	824.2	26.9	24.5	23.2	21.4
	190	836.6	27.0	24.5	23.2	21.6
	251	848.8	26.9	24.5	23.0	21.4

8.1.2. GSM1900

ID:	38206	Date:	2/18/19

GPRS (GMSK) - Coding Scheme: CS1

Band	Ch No.	Freq. (MHz)	Power			
			1 slot	2 slots	3 slots	4 slots
1900.0	512	1850.2	29.9	27.9	25.6	24.7
	661	1880.0	30.3	28.0	26.0	25.0
	810	1909.8	30.2	28.0	25.9	25.0

EGPRS (8PSK) - Coding Scheme: MCS5

Band	Ch No.	Freq. (MHz)	Power			
			1 slot	2 slots	3 slots	4 slots
1900.0	512	1850.2	25.4	23.0	22.3	20.2
	661	1880.0	25.5	23.5	22.7	20.8
	810	1909.8	25.5	23.4	22.6	20.8

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8.2. 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 ≥ RBW.≥ 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
	βc/βd	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	12/15	15/15	15/15
	Bd	15/15	15/15	8/15	4/15
	Bd (SF)	64			
	βc/βd	2/15	12/15	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=βhs/βc	30/15			

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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
	βc	11/15	6/15	15/15	2/15	15/15
	βd	15/15	15/15	9/15	15/15	0
	βec	209/225	12/15	30/15	2/15	5/15
	βc/βd	11/15	6/15	15/9	2/15	-
	βhs	22/15	12/15	30/15	4/15	5/15
	βed	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				
	Ahs = βhs/βc	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

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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.		

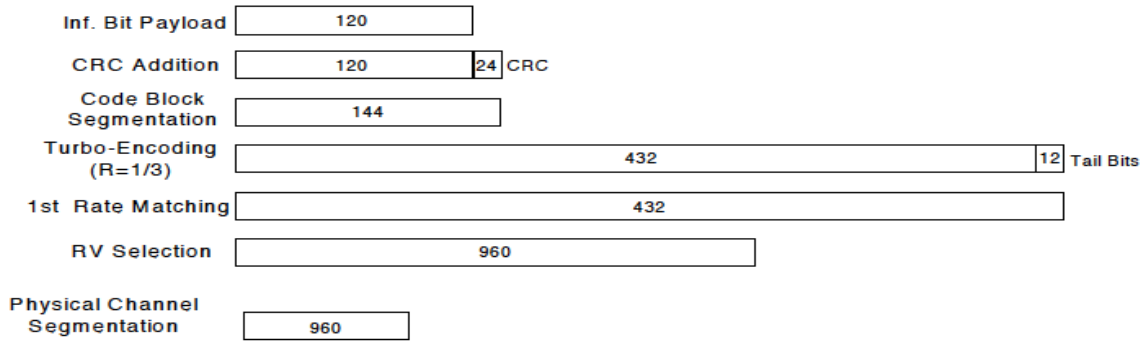

Figure C.8.19: Coding rate for Fixed reference Channel H-Set 12 (QPSK)

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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			
	βc	2/15	11/15	15/15	15/15
	βd	15/15	15/15	8/15	4/15
	βd (SF)	64			
	βc/βd	2/15	12/15	15/8	15/4
	βhs	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 = βhs/ βc	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	$\beta_{ed}1$: 30/15 $\beta_{ed}2$: 30/15	$\beta_{ed}3$: 24/15 $\beta_{ed}4$: 24/15	3.5	2.5	14	105	105

Note 1: Δ_{ACK}, Δ_{NACK} and Δ_{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 β_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

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8.2.1. WCDMA BAND5

ID:	38206	Date:	2/18/19

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	**24.7**
			4183	836.6	N/A	**24.7**
			4233	846.6	N/A	**24.7**
	HSDPA	Subtest 1	4132	826.4	0	23.7
			4183	836.6	0	23.7
			4233	846.6	0	23.7
		Subtest 2	4132	826.4	0.5	23.7
			4183	836.6	0.5	23.7
			4233	846.6	0.5	23.7
		Subtest 3	4132	826.4	0.5	23.2
			4183	836.6	0.5	23.2
			4233	846.6	0.5	23.2
		Subtest 4	4132	826.4	0.5	23.2
			4183	836.6	0.5	23.2
			4233	846.6	0.5	23.2
	HSUPA	Subtest 1	4132	826.4	0.5	23.6
			4183	836.6	0.5	23.7
			4233	846.6	0.5	**23.8**
		Subtest 2	4132	826.4	1.5	21.6
			4183	836.6	1.5	21.7
			4233	846.6	1.5	21.7
		Subtest 3	4132	826.4	1.5	22.6
			4183	836.6	1.5	22.7
			4233	846.6	1.5	22.7
		Subtest 4	4132	826.4	1.5	21.7
			4183	836.6	1.5	21.6
			4233	846.6	1.5	21.7
		Subtest 5	4132	826.4	0.5	23.7
			4183	836.6	0.5	**23.8**
			4233	846.6	0.5	**23.8**
	DC-HSDPA	Subtest 1	4132	826.4	0.5	23.4
			4183	836.6	0.5	23.3
			4233	846.6	0.5	23.1
		Subtest 2	4132	826.4	1.5	**23.4**
			4183	836.6	1.5	23.3
			4233	846.6	1.5	23.1
		Subtest 3	4132	826.4	1.5	22.9
			4183	836.6	1.5	22.8
			4233	846.6	1.5	22.6
		Subtest 4	4132	826.4	1.5	22.9
			4183	836.6	1.5	22.8
			4233	846.6	1.5	22.6

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8.2.2. WCDMA BAND2

ID:	38206	Date:	2/18/19

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	24.5
			9400	1880.0	N/A	**24.6**
			9538	1907.6	N/A	24.3
	HSDPA	Subtest 1	9262	1852.4	0	23.5
			9400	1880.0	0	23.6
			9538	1907.6	0	23.3
		Subtest 2	9262	1852.4	0	23.6
			9400	1880.0	0	23.6
			9538	1907.6	0	23.3
		Subtest 3	9262	1852.4	0.5	23.0
			9400	1880.0	0.5	23.1
			9538	1907.6	0.5	22.8
		Subtest 4	9262	1852.4	0.5	23.0
			9400	1880.0	0.5	23.1
			9538	1907.6	0.5	22.8
	HSUPA	Subtest 1	9262	1852.4	0	23.5
			9400	1880.0	0	23.6
			9538	1907.6	0	23.3
		Subtest 2	9262	1852.4	2	21.5
			9400	1880.0	2	21.6
			9538	1907.6	2	21.3
		Subtest 3	9262	1852.4	1	22.5
			9400	1880.0	1	22.6
			9538	1907.6	1	22.3
		Subtest 4	9262	1852.4	2	21.5
			9400	1880.0	2	21.6
			9538	1907.6	2	21.3
		Subtest 5	9262	1852.4	1	23.5
			9400	1880.0	1	23.6
			9538	1907.6	1	**23.7**
	DC-HSDPA	Subtest 1	9262	1852.4	0	22.6
			9400	1880.0	0	22.8
			9538	1907.6	0	22.7
		Subtest 2	9262	1852.4	2	22.6
			9400	1880.0	2	22.8
			9538	1907.6	2	22.7
		Subtest 3	9262	1852.4	1	22.1
			9400	1880.0	1	22.3
			9538	1907.6	1	22.2
		Subtest 4	9262	1852.4	2	22.1
			9400	1880.0	2	22.3
			9538	1907.6	2	22.2

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8.2.3. WCDMA BAND4

ID:	52300	Date:	3/26/19

Band	Mode		UL Ch No.	Freq. (MHz)	MPR (dB)	Average (dBm)
W-CDMA Band 4 (1900MHz)	Rel 99	RMC, 12.2 kbps	1312	1712.4	N/A	24.2
			1413	1732.6	N/A	**24.4**
			1513	1752.6	N/A	24.3
	HSDPA	Subtest 1	1312	1712.4	0	22.2
			1413	1732.6	0	22.3
			1513	1752.6	0	22.3
		Subtest 2	1312	1712.4	0	21.7
			1413	1732.6	0	21.8
			1513	1752.6	0	21.7
		Subtest 3	1312	1712.4	0.5	21.0
			1413	1732.6	0.5	21.1
			1513	1752.6	0.5	21.0
		Subtest 4	1312	1712.4	0.5	21.0
			1413	1732.6	0.5	21.2
			1513	1752.6	0.5	21.0
	HSUPA	Subtest 1	1312	1712.4	0	22.5
			1413	1732.6	0	22.7
			1513	1752.6	0	**22.7**
		Subtest 2	1312	1712.4	2	20.5
			1413	1732.6	2	20.8
			1513	1752.6	2	20.7
		Subtest 3	1312	1712.4	1	21.6
			1413	1732.6	1	21.8
			1513	1752.6	1	21.8
		Subtest 4	1312	1712.4	2	20.6
			1413	1732.6	2	20.8
			1513	1752.6	2	20.8
		Subtest 5	1312	1712.4	0	22.6
			1413	1732.6	0	22.7
			1513	1752.6	0	22.6
	DC-HSDPA	Subtest 1	1312	1712.4	0	22.0
			1413	1732.6	0	22.2
			1513	1752.6	0	22.0
		Subtest 2	1312	1712.4	0	22.0
			1413	1732.6	0	22.2
			1513	1752.6	0	22.0
		Subtest 3	1312	1712.4	1	21.4
			1413	1732.6	1	21.8
			1513	1752.6	1	21.6
		Subtest 4	1312	1712.4	1	21.4
			1413	1732.6	1	21.8
			1513	1752.6	1	21.6

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8.3. 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 6.6.3.3.2	13	10	Table 6.2.4-2	Table 6.2.4-2
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.					

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MODES TESTED

- LTE 2
- LTE 4
- LTE 5
- LTE 12
- LTE 13
- LTE 17
- LTE 41 (FCC)
- LTE 66

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:

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8.3.1. LTE 2

ID:	52300	Date:	3/27/19

OUTPUT POWER FOR LTE BAND 2 (1.4 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Power Conducted Average (dBm)		
				18607	18900	19193
				1850.7 MHz	1880.0 MHz	1909.3 MHz
1.4	QPSK	1	0	23.2	23.5	23.0
		1	2	23.3	**23.6**	23.0
		1	5	23.2	23.5	22.9
		3	0	23.2	23.4	23.0
		3	1	23.3	23.5	23.0
		3	2	23.2	23.5	23.0
		6	0	22.3	22.5	22.0
	16QAM	1	0	22.2	22.6	22.3
		1	2	22.3	**22.6**	22.4
		1	5	22.3	22.5	22.3
		3	0	22.4	22.5	22.1
		3	1	22.5	22.6	22.2
		3	2	22.4	22.6	22.2
		6	0	21.5	21.6	21.0
	64QAM	1	0	21.5	21.9	21.2
		1	2	21.5	**22.0**	21.3
		1	5	21.5	21.8	21.1
		3	0	21.3	21.8	21.1
		3	1	21.4	21.9	21.2
		3	2	21.4	21.8	21.2
		6	0	20.5	20.5	20.3

OUTPUT POWER FOR LTE BAND 2 (3.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Power Conducted Average (dBm)		
				18615	18900	19185
				1851.5 MHz	1880.0 MHz	1908.5 MHz
3.0	QPSK	1	0	23.3	23.5	23.0
		1	7	23.4	**23.7**	23.1
		1	14	23.3	23.5	23.0
		8	0	22.3	22.5	22.1
		8	4	22.3	22.6	22.1
		8	7	22.4	22.6	22.1
		15	0	22.3	22.5	22.1
	16QAM	1	0	22.2	22.9	22.1
		1	7	22.3	**23.0**	22.1
		1	14	22.2	22.9	22.0
		8	0	21.5	21.7	21.1
		8	4	21.5	21.7	21.2
		8	7	21.5	21.6	21.2
		15	0	21.4	21.6	21.1
	64QAM	1	0	21.6	21.8	21.1
		1	7	21.6	**22.0**	21.3
		1	14	21.5	21.8	21.2
		8	0	20.3	20.6	20.1
		8	4	20.3	20.7	20.2
		8	7	20.3	20.6	20.2
		15	0	20.4	20.6	20.1

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OUTPUT POWER FOR LTE BAND 2 (5.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Power Conducted Average (dBm)		
				18625	18900	19175
				1852.5 MHz	1880.0 MHz	1907.5 MHz
5.0	QPSK	1	0	23.4	23.6	23.0
		1	12	23.4	**23.7**	23.0
		1	24	23.3	23.6	23.0
		12	0	22.3	22.5	22.1
		12	6	22.3	22.5	22.1
		12	11	22.3	22.5	22.1
		25	0	21.8	22.0	21.6
	16QAM	1	0	22.4	22.7	22.5
		1	12	22.4	**22.7**	22.6
		1	24	22.4	22.7	22.5
		12	0	21.4	21.7	21.3
		12	6	21.4	21.7	21.3
		12	11	21.4	21.7	21.3
		25	0	21.3	21.6	21.2
	64QAM	1	0	21.5	21.5	21.3
		1	12	**21.6**	21.5	21.4
		1	24	21.5	21.5	21.3
		12	0	20.4	20.7	20.1
		12	6	20.4	20.6	20.1
		12	11	20.4	20.6	20.1
		25	0	20.4	20.6	20.1

OUTPUT POWER FOR LTE BAND 2 (10.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Power Conducted Average (dBm)		
				18650	18900	19150
				1855.0 MHz	1880.0 MHz	1905.0 MHz
10.0	QPSK	1	0	23.5	**23.7**	23.1
		1	24	23.3	23.6	23.0
		1	49	23.4	23.5	22.9
		25	0	21.8	22.0	21.7
		25	12	21.9	22.1	21.7
		25	24	21.9	22.1	21.6
		50	0	21.9	22.0	21.7
	16QAM	1	0	22.3	**23.0**	22.2
		1	24	22.2	22.9	22.0
		1	49	22.3	22.8	22.0
		25	0	21.9	22.1	21.8
		25	12	22.0	22.1	21.8
		25	24	21.9	22.1	21.7
		50	0	21.9	22.1	21.7
	64QAM	1	0	21.6	**22.0**	21.3
		1	24	21.5	21.9	21.2
		1	49	21.6	21.8	21.1
		25	0	20.4	20.7	20.3
		25	12	20.6	20.7	20.3
		25	24	20.5	20.6	20.2
		50	0	20.5	20.6	20.2

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OUTPUT POWER FOR LTE BAND 2 (15.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Power Conducted Average (dBm)		
				18675	18900	19125
				1857.5 MHz	1880.0 MHz	1902.5 MHz
15.0	QPSK	1	0	23.3	23.4	23.2
		1	37	23.4	**23.6**	23.2
		1	74	23.3	23.3	23.0
		36	0	22.4	22.6	22.2
		36	16	22.4	22.6	22.2
		36	35	22.3	22.6	22.2
		75	0	22.4	22.5	22.1
	16QAM	1	0	22.7	22.3	22.6
		1	37	**22.7**	22.4	22.5
		1	74	22.7	22.3	22.4
		36	0	21.5	21.6	21.3
		36	16	21.5	21.7	21.3
		36	35	21.4	21.6	21.3
		75	0	21.5	21.6	21.2
	64QAM	1	0	21.9	21.7	21.4
		1	37	**22.0**	21.8	21.3
		1	74	21.9	21.7	21.1
		36	0	20.5	20.6	20.3
		36	16	20.5	20.6	20.3
		36	35	20.4	20.6	20.3
		75	0	20.5	20.6	20.2

OUTPUT POWER FOR LTE BAND 2 (20.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Power Conducted Average (dBm)		
				18700	18900	19100
				1860.0 MHz	1880.0 MHz	1900.0 MHz
20.0	QPSK	1	0	23.3	23.5	23.2
		1	49	23.3	**23.5**	23.1
		1	99	23.4	23.4	22.9
		50	0	22.4	22.5	22.2
		50	24	22.4	22.5	22.3
		50	49	22.4	22.5	22.2
		100	0	22.3	22.5	22.2
	16QAM	1	0	22.7	**23.0**	22.6
		1	49	22.7	**23.0**	22.5
		1	99	22.7	22.9	22.4
		50	0	21.4	21.6	21.3
		50	24	21.5	21.7	21.3
		50	49	21.5	21.6	21.2
		100	0	21.4	21.7	21.3
	64QAM	1	0	21.9	21.7	21.5
		1	49	21.9	21.7	21.4
		1	99	**22.0**	21.6	21.3
		50	0	20.4	20.6	20.3
		50	24	20.4	20.7	20.3
		50	49	20.4	20.6	20.2
		100	0	20.4	20.6	20.3

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8.3.2. LTE 4

ID:	52300	Date:	3/27/19

OUTPUT POWER FOR LTE BAND 4 (1.4 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Power		
				Conducted Average (dBm)		
				19957	20175	20393
				1710.7 MHz	1732.5 MHz	1754.3 MHz
1.4	QPSK	1	0	23.3	23.7	23.7
		1	2	23.4	23.7	**23.7**
		1	5	23.3	23.6	23.7
		3	0	23.1	23.6	23.5
		3	1	23.2	23.7	23.6
		3	2	23.2	23.6	23.6
		6	0	22.3	22.6	22.7
	16QAM	1	0	22.2	22.7	22.9
		1	2	22.3	22.8	**22.9**
		1	5	22.2	22.7	22.9
		3	0	22.4	22.7	22.7
		3	1	22.5	22.8	22.8
		3	2	22.4	22.7	22.8
		6	0	21.5	21.8	21.5
	64QAM	1	0	21.3	21.6	21.8
		1	2	21.3	21.7	**21.8**
		1	5	21.2	21.7	21.7
		3	0	21.3	21.5	21.7
		3	1	21.4	21.6	21.8
		3	2	21.3	21.6	21.8
		6	0	20.5	20.6	20.4

OUTPUT POWER FOR LTE BAND 4 (3.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Power		
				Conducted Average (dBm)		
				19965	20175	20385
				1711.5 MHz	1732.5 MHz	1753.5 MHz
3.0	QPSK	1	0	23.3	23.7	23.8
		1	7	23.4	23.7	**23.9**
		1	14	23.3	23.7	23.8
		8	0	22.4	22.7	22.7
		8	4	22.4	22.7	22.8
		8	7	22.4	22.7	22.7
		15	0	22.3	22.7	22.7
	16QAM	1	0	22.3	22.6	22.9
		1	7	22.4	22.7	**23.0**
		1	14	22.3	22.5	22.9
		8	0	21.4	21.8	21.7
		8	4	21.4	21.8	21.8
		8	7	21.4	21.8	21.8
		15	0	21.4	21.8	21.7
	64QAM	1	0	21.4	21.9	21.6
		1	7	21.4	**22.0**	21.6
		1	14	21.3	21.8	21.6
		8	0	20.2	20.6	20.6
		8	4	20.3	20.7	20.6
		8	7	20.3	20.7	20.6
		15	0	20.3	20.6	20.6

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OUTPUT POWER FOR LTE BAND 4 (5.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Power Conducted Average (dBm)		
				19975	20175	20375
				1712.5 MHz	1732.5 MHz	1752.5 MHz
5.0	QPSK	1	0	23.4	23.9	**23.9**
		1	12	23.4	23.8	23.7
		1	24	23.6	23.8	23.8
		12	0	22.4	22.7	22.7
		12	6	22.4	22.7	22.7
		12	11	22.5	22.6	22.7
		25	0	22.4	22.7	22.7
	16QAM	1	0	22.4	22.9	**23.1**
		1	12	22.4	22.8	23.1
		1	24	22.5	22.8	23.1
		12	0	21.5	21.8	21.8
		12	6	21.5	21.8	21.8
		12	11	21.5	21.8	21.8
		25	0	21.4	21.7	21.7
	64QAM	1	0	21.5	21.6	**21.8**
		1	12	21.4	21.5	21.8
		1	24	21.5	21.5	21.7
		12	0	20.4	20.7	20.5
		12	6	20.4	20.6	20.5
		12	11	20.5	20.6	20.5
		25	0	20.4	20.6	20.6

OUTPUT POWER FOR LTE BAND 4 (10.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Power Conducted Average (dBm)		
				20000	20175	20350
				1715.0 MHz	1732.5 MHz	1750.0 MHz
10.0	QPSK	1	0	23.4	**23.8**	23.8
		1	24	23.4	23.7	23.8
		1	49	23.5	23.7	23.8
		25	0	22.5	22.7	22.6
		25	12	22.5	22.7	22.6
		25	24	22.5	22.6	22.7
		50	0	22.5	22.7	22.6
	16QAM	1	0	22.4	22.7	**23.0**
		1	24	22.4	22.5	22.9
		1	49	22.4	22.5	22.9
		25	0	22.5	22.5	22.5
		25	12	22.5	22.5	22.5
		25	24	22.5	22.5	22.5
		50	0	22.5	22.5	22.5
	64QAM	1	0	21.4	**22.0**	21.6
		1	24	21.5	21.9	21.5
		1	49	21.4	21.8	21.6
		25	0	21.0	21.2	21.0
		25	12	21.0	21.1	20.9
		25	24	20.9	21.1	21.0
		50	0	20.9	21.1	20.9

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OUTPUT POWER FOR LTE BAND 4 (15.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Power		
				Conducted Average (dBm)		
				20025	20175	20325
				1717.5 MHz	1732.5 MHz	1747.5 MHz
15.0	QPSK	1	0	23.7	23.8	**23.9**
		1	37	23.7	23.7	23.7
		1	74	23.7	23.7	23.8
		36	0	22.7	22.8	22.8
		36	16	22.7	22.7	22.7
		36	35	22.7	22.7	22.7
		75	0	22.7	22.7	22.7
	16QAM	1	0	22.9	22.6	**23.1**
		1	37	22.7	22.6	22.8
		1	74	22.9	22.6	22.9
		36	0	21.7	21.9	21.9
		36	16	21.7	21.8	21.8
		36	35	21.7	21.7	21.7
		75	0	21.8	21.8	21.8
	64QAM	1	0	22.0	21.9	21.8
		1	37	21.9	21.9	21.5
		1	74	**22.1**	21.9	21.6
		36	0	20.6	20.7	20.7
		36	16	20.6	20.6	20.7
		36	35	20.6	20.6	20.6
		75	0	20.7	20.6	20.6

OUTPUT POWER FOR LTE BAND 4 (20.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Power		
				Conducted Average (dBm)		
				20050	20175	20300
				1720.0 MHz	1732.5 MHz	1745.0 MHz
20.0	QPSK	1	0	23.6	**23.8**	23.8
		1	49	23.6	23.6	23.7
		1	99	23.7	23.7	23.7
		50	0	22.7	22.8	22.7
		50	24	22.7	22.7	22.7
		50	49	22.7	22.6	22.6
		100	0	22.7	22.7	22.7
	16QAM	1	0	22.9	23.2	23.2
		1	49	22.8	**23.2**	22.9
		1	99	23.0	23.1	22.9
		50	0	21.7	21.9	21.7
		50	24	21.7	21.8	21.7
		50	49	21.8	21.7	21.6
		100	0	21.7	21.8	21.7
	64QAM	1	0	21.7	21.9	**22.3**
		1	49	21.5	21.9	22.0
		1	99	21.8	21.8	22.0
		50	0	20.6	20.8	20.6
		50	24	20.7	20.7	20.6
		50	49	20.7	20.6	20.5
		100	0	20.6	20.6	20.6

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8.3.3. LTE 5

ID:	38206	Date:	2/18/19

OUTPUT POWER FOR LTE BAND 5 (1.4 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Power Conducted Average (dBm)		
				20407	20525	20643
				824.7 MHz	836.5 MHz	848.3 MHz
1.4	QPSK	1	0	24.2	24.2	24.2
		1	2	24.2	24.3	**24.3**
		1	5	24.2	24.2	24.2
		3	0	24.0	24.2	24.2
		3	1	24.1	24.3	24.2
		3	2	24.1	24.3	24.3
		6	0	23.2	23.3	23.3
	16QAM	1	0	23.2	23.2	23.6
		1	2	23.2	23.3	**23.6**
		1	5	23.2	23.3	23.5
		3	0	23.2	23.4	23.4
		3	1	23.2	23.5	23.4
		3	2	23.2	23.5	23.4
		6	0	22.3	22.5	22.2
	64QAM	1	0	22.3	22.7	22.5
		1	2	22.4	**22.8**	22.5
		1	5	22.3	22.7	22.5
		3	0	22.3	22.6	22.3
		3	1	22.4	22.7	22.3
		3	2	22.4	22.7	22.4
		6	0	21.6	21.3	21.4

OUTPUT POWER FOR LTE BAND 5 (3.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Power Conducted Average (dBm)		
				20415	20525	20635
				825.5 MHz	836.5 MHz	847.5 MHz
3.0	QPSK	1	0	24.2	24.3	**24.4**
		1	7	24.3	24.4	24.4
		1	14	24.2	24.3	24.3
		8	0	23.2	23.3	23.4
		8	4	23.2	23.3	23.4
		8	7	23.2	23.4	23.4
		15	0	23.2	23.3	23.4
	16QAM	1	0	23.6	23.2	23.4
		1	7	**23.6**	23.3	23.4
		1	14	23.5	23.2	23.3
		8	0	22.3	22.5	22.4
		8	4	22.3	22.5	22.5
		8	7	22.3	22.5	22.5
		15	0	22.3	22.4	22.4
	64QAM	1	0	22.4	22.7	22.6
		1	7	22.4	**22.7**	22.6
		1	14	22.3	22.7	22.5
		8	0	21.4	21.4	21.4
		8	4	21.4	21.5	21.4
		8	7	21.4	21.5	21.4
		15	0	21.3	21.4	21.5

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OUTPUT POWER FOR LTE BAND 5 (5.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Power Conducted Average (dBm)		
				20425	20525	20625
				826.5 MHz	836.5 MHz	846.5 MHz
5.0	QPSK	1	0	24.2	24.5	**24.5**
		1	12	24.2	24.4	24.4
		1	24	24.3	24.4	24.2
		12	0	23.2	23.3	23.3
		12	6	23.3	23.3	23.3
		12	11	23.3	23.3	23.3
		25	0	23.3	23.4	23.3
	16QAM	1	0	23.7	23.5	23.4
		1	12	23.6	23.4	23.3
		1	24	**23.7**	23.5	23.3
		12	0	22.4	22.5	22.4
		12	6	22.5	22.5	22.4
		12	11	22.5	22.5	22.4
		25	0	22.4	22.4	22.3
	64QAM	1	0	22.6	22.3	**22.7**
		1	12	22.5	22.3	22.6
		1	24	22.6	22.3	22.6
		12	0	21.3	21.5	21.5
		12	6	21.4	21.5	21.5
		12	11	21.3	21.5	21.5
		25	0	21.4	21.5	21.5

OUTPUT POWER FOR LTE BAND 5 (10.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Power Conducted Average (dBm)		
				20450	20525	20600
				829.0 MHz	836.5 MHz	844.0 MHz
10.0	QPSK	1	0	24.3	24.3	24.2
		1	24	24.3	24.3	24.2
		1	49	**24.3**	24.3	24.1
		25	0	23.4	23.4	23.3
		25	12	23.3	23.4	23.3
		25	24	23.4	23.3	23.2
		50	0	23.3	23.4	23.2
	16QAM	1	0	23.6	23.1	23.3
		1	24	23.6	23.2	23.2
		1	49	**23.7**	23.2	23.1
		25	0	21.9	22.0	21.9
		25	12	21.9	22.0	22.0
		25	24	21.9	21.9	21.9
		50	0	21.9	21.9	21.8
	64QAM	1	0	22.6	22.4	22.4
		1	24	22.6	22.5	22.4
		1	49	**22.7**	22.4	22.3
		25	0	21.9	22.0	21.8
		25	12	21.9	22.0	21.9
		25	24	22.0	22.0	21.8
		50	0	21.9	21.9	21.8

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8.3.4. LTE 12

ID:	52300	Date:	3/12/19

OUTPUT POWER FOR LTE BAND 12 (1.4 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Power Conducted Average (dBm)		
				23017	23095	23173
				699.7 MHz	707.5 MHz	715.3 MHz
1.4	QPSK	1	0	24.3	24.1	23.7
		1	2	**24.3**	24.2	23.8
		1	5	24.2	24.1	23.8
		3	0	24.1	24.1	23.7
		3	1	24.2	24.2	23.8
		3	2	24.2	24.1	23.8
		6	0	23.2	23.1	22.8
	16QAM	1	0	23.3	23.5	22.8
		1	2	23.3	**23.5**	22.8
		1	5	23.3	23.5	22.8
		3	0	23.3	23.3	23.0
		3	1	23.3	23.4	23.1
		3	2	23.3	23.4	23.0
		6	0	22.4	22.1	22.0
	64QAM	1	0	22.4	22.3	22.4
		1	2	22.5	22.4	22.4
		1	5	22.4	22.4	22.3
		3	0	22.4	22.2	22.3
		3	1	**22.5**	22.3	22.4
		3	2	22.5	22.2	22.4
		6	0	21.6	21.3	21.0

OUTPUT POWER FOR LTE BAND 12 (3.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Power Conducted Average (dBm)		
				23025	23095	23165
				700.5 MHz	707.5 MHz	714.5 MHz
3.0	QPSK	1	0	24.3	24.2	23.9
		1	7	**24.3**	24.2	24.0
		1	14	24.2	24.2	23.9
		8	0	23.3	23.2	22.9
		8	4	23.3	23.2	23.0
		8	7	23.2	23.2	23.0
		15	0	23.3	23.2	22.9
	16QAM	1	0	23.3	23.1	23.3
		1	7	**23.3**	23.1	23.3
		1	14	23.2	23.0	23.2
		8	0	22.3	22.3	22.0
		8	4	22.3	22.4	22.0
		8	7	22.3	22.4	22.0
		15	0	22.2	22.3	22.0
	64QAM	1	0	22.5	22.6	22.2
		1	7	22.6	**22.6**	22.3
		1	14	22.5	22.5	22.2
		8	0	21.3	21.3	21.1
		8	4	21.4	21.4	21.2
		8	7	21.3	21.4	21.2
		15	0	21.4	21.3	21.2

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OUTPUT POWER FOR LTE BAND 12 (5.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Power Conducted Average (dBm)		
				23035	23095	23155
				701.5 MHz	707.5 MHz	713.5 MHz
5.0	QPSK	1	0	**24.3**	24.3	24.0
		1	12	24.3	24.3	23.8
		1	24	**24.3**	24.2	23.9
		12	0	23.3	23.2	23.1
		12	6	23.3	23.2	23.0
		12	11	23.2	23.2	22.9
		25	0	23.3	23.2	23.0
	16QAM	1	0	23.4	23.4	**23.5**
		1	12	23.3	23.3	23.4
		1	24	23.4	23.3	23.4
		12	0	22.4	22.4	22.3
		12	6	22.4	22.4	22.1
		12	11	22.3	22.3	22.1
		25	0	22.3	22.3	22.2
	64QAM	1	0	22.6	22.2	22.5
		1	12	22.5	22.2	22.4
		1	24	**22.6**	22.2	22.3
		12	0	21.4	21.4	21.2
		12	6	21.4	21.4	21.1
		12	11	21.4	21.3	21.1
		25	0	21.5	21.3	21.2

OUTPUT POWER FOR LTE BAND 12 (10.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Power Conducted Average (dBm)		
				23060	23095	23130
				704.0 MHz	707.5 MHz	711.0 MHz
10.0	QPSK	1	0	**24.2**	24.1	**24.2**
		1	24	24.2	24.2	24.1
		1	49	24.1	24.1	24.0
		25	0	23.3	23.2	23.2
		25	12	23.3	23.2	23.2
		25	24	23.2	23.2	23.1
		50	0	23.3	23.2	23.1
	16QAM	1	0	23.3	23.1	**23.5**
		1	24	23.2	23.1	23.5
		1	49	23.2	23.0	23.3
		25	0	22.5	22.3	22.3
		25	12	22.5	22.3	22.3
		25	24	22.4	22.3	22.2
		50	0	22.4	22.3	22.2
	64QAM	1	0	21.4	22.4	22.4
		1	24	**22.6**	22.4	22.4
		1	49	22.5	22.3	22.1
		25	0	21.5	21.5	21.4
		25	12	21.5	21.5	21.3
		25	24	21.4	21.4	21.3
		50	0	21.4	21.4	21.3

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8.3.5. LTE 13

ID:	43576	Date:	3/20/19

OUTPUT POWER FOR LTE BAND 13 (5.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Power		
				Conducted Average (dBm)		
				23205	23230	23255
				779.5 MHz	782.0 MHz	784.5 MHz
5.0	QPSK	1	0	22.8	**24.3**	22.9
		1	12	23.9	24.2	24.0
		1	24	23.8	24.2	24.1
		12	0	23.8	23.2	22.8
		12	6	23.9	23.2	22.9
		12	11	23.9	23.1	22.9
		25	0	22.8	23.2	22.9
	16QAM	1	0	22.6	23.2	23.0
		1	12	22.7	**23.3**	23.0
		1	24	22.7	23.2	23.1
		12	0	22.8	22.2	21.9
		12	6	22.9	22.2	22.0
		12	11	22.9	22.2	22.0
		25	0	21.9	22.1	21.9
	64QAM	1	0	22.0	**22.0**	22.0
		1	12	22.0	**22.0**	22.0
		1	24	21.9	**22.0**	**22.0**
		12	0	21.2	21.2	21.2
		12	6	21.2	21.2	21.1
		12	11	21.1	21.2	21.1
		25	0	21.1	21.1	21.1

OUTPUT POWER FOR LTE BAND 13 (10.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Power		
				Conducted Average (dBm)		
				N/A	23230	N/A
				N/A	782.0 MHz	N/A
10.0	QPSK	1	0		24.3	
		1	24		**24.4**	
		1	49		24.2	
		25	0		23.2	
		25	12		23.2	
		25	24		23.2	
		50	0		23.2	
	16QAM	1	0		22.9	
		1	24		**23.0**	
		1	49		22.9	
		25	0		22.1	
		25	12		22.2	
		25	24		22.2	
		50	0		22.2	
	64QAM	1	0		22.3	
		1	24		**22.4**	
		1	49		**22.4**	
		25	0		21.2	
		25	12		21.3	
		25	24		21.3	
		50	0		21.3	

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8.3.6. LTE 17

ID:	52300	Date:	3/14/19

OUTPUT POWER FOR LTE BAND 17 (5.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Power Conducted Average (dBm)		
				23755	23790	23825
				706.5 MHz	710.0 MHz	713.5 MHz
5.0	QPSK	1	0	**24.3**	24.0	23.9
		1	12	24.1	23.9	23.7
		1	24	24.1	23.8	23.7
		12	0	23.2	23.0	22.8
		12	6	23.1	23.0	22.8
		12	11	23.0	23.0	22.8
		25	0	23.1	23.0	22.9
	16QAM	1	0	23.4	**23.5**	23.0
		1	12	23.2	23.5	22.8
		1	24	23.2	23.3	22.8
		12	0	22.4	22.2	22.0
		12	6	22.3	22.2	21.9
		12	11	22.2	22.2	22.0
		25	0	22.2	22.1	22.0
	64QAM	1	0	**22.6**	22.2	22.5
		1	12	22.5	22.1	22.3
		1	24	22.5	21.9	22.2
		12	0	21.5	21.3	21.1
		12	6	21.4	21.3	21.0
		12	11	21.4	21.2	21.0
		25	0	21.3	21.2	21.2

OUTPUT POWER FOR LTE BAND 17 (10.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Power Conducted Average (dBm)		
				23780	23790	23800
				709.0 MHz	710.0 MHz	711.0 MHz
10.0	QPSK	1	0	**24.1**	24.1	24.0
		1	24	24.0	23.9	24.0
		1	49	23.8	23.7	23.8
		25	0	23.3	23.3	23.3
		25	12	23.3	23.3	23.3
		25	24	23.3	23.2	23.2
		50	0	23.3	23.3	23.2
	16QAM	1	0	23.2	23.1	**23.4**
		1	24	23.0	22.9	23.3
		1	49	22.8	22.6	23.1
		25	0	22.7	22.6	22.6
		25	12	22.7	22.6	22.6
		25	24	22.6	22.5	22.5
		50	0	22.6	22.5	22.6
	64QAM	1	0	22.5	22.6	22.3
		1	24	22.4	22.4	22.2
		1	49	22.1	22.2	22.0
		25	0	**22.9**	22.0	22.7
		25	12	22.8	22.0	22.7
		25	24	22.7	22.0	22.7
		50	0	22.7	22.0	22.7

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8.3.7. LTE 41

ID:	52300	Date:	3/13/19

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

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Power		
				Conducted Average (dBm)		
				39675	40620	41565
				2498.5 MHz	2593.0 MHz	2687.5 MHz
5.0	QPSK	1	0	**23.8**	23.5	23.5
		1	12	23.7	23.4	23.5
		1	24	**23.8**	23.4	23.5
		12	0	22.8	22.5	22.6
		12	6	22.8	22.5	22.6
		12	11	22.8	22.5	22.7
		25	0	22.8	22.5	22.7
	16QAM	1	0	**22.9**	22.4	22.6
		1	12	**22.9**	22.4	22.7
		1	24	**22.9**	22.4	22.6
		12	0	21.9	21.5	21.8
		12	6	21.9	21.5	21.9
		12	11	21.9	21.5	21.8
		25	0	21.8	21.5	21.8
	64QAM	1	0	**22.0**	21.8	21.4
		1	12	21.9	21.8	21.4
		1	24	21.9	21.8	21.3
		12	0	20.8	20.6	20.8
		12	6	20.8	20.6	20.8
		12	11	20.8	20.6	20.8
		25	0	20.8	20.5	20.8

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

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Power		
				Conducted Average (dBm)		
				39700	40620	41540
				2501.0 MHz	2593.0 MHz	2685.0 MHz
10.0	QPSK	1	0	**23.8**	23.5	23.6
		1	24	**23.8**	23.4	23.5
		1	49	23.7	23.4	23.6
		25	0	22.3	22.0	22.2
		25	12	22.3	22.0	22.2
		25	24	22.3	21.9	22.2
		50	0	22.3	21.9	22.2
	16QAM	1	0	**23.0**	22.5	22.7
		1	24	22.9	22.5	22.6
		1	49	22.9	22.4	22.6
		25	0	21.9	21.5	21.9
		25	12	21.9	21.5	21.9
		25	24	21.8	21.5	21.8
		50	0	21.9	21.6	21.9
	64QAM	1	0	**22.0**	21.1	21.9
		1	24	**22.0**	21.0	21.8
		1	49	**22.0**	21.0	21.8
		25	0	20.8	20.5	20.8
		25	12	20.8	20.6	20.8
		25	24	20.8	20.5	20.8
		50	0	20.8	20.5	20.8

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

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Power		
				Conducted Average (dBm)		
				39725	40620	41515
				2503.5 MHz	2593.0 MHz	2682.5 MHz
15.0	QPSK	1	0	22.8	23.5	23.7
		1	37	23.7	23.4	23.6
		1	74	**23.8**	23.4	23.5
		36	0	22.9	22.5	22.6
		36	16	22.9	22.5	22.6
		36	35	22.8	22.5	22.6
		75	0	22.9	22.5	22.6
	16QAM	1	0	**22.9**	22.6	22.8
		1	37	22.8	22.5	22.7
		1	74	22.8	22.5	22.7
		36	0	21.9	21.6	21.7
		36	16	21.9	21.6	21.7
		36	35	21.8	21.6	21.7
		75	0	21.9	21.6	21.7
	64QAM	1	0	**22.0**	21.1	21.7
		1	37	**22.0**	21.0	21.6
		1	74	**22.0**	21.0	21.6
		36	0	20.9	20.6	20.8
		36	16	20.9	20.6	20.7
		36	35	20.9	20.6	20.7
		75	0	20.9	20.6	20.7

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

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Power		
				Conducted Average (dBm)		
				39750	40620	41490
				2506.0 MHz	2593.0 MHz	2680.0 MHz
20.0	QPSK	1	0	**24.0**	23.6	23.8
		1	49	23.8	23.4	23.6
		1	99	23.8	23.5	23.6
		50	0	22.9	22.5	22.8
		50	24	22.9	22.5	22.8
		50	49	22.8	22.5	22.7
		100	0	22.9	22.5	22.7
	16QAM	1	0	**23.0**	22.5	22.8
		1	49	22.9	22.3	22.7
		1	99	**23.0**	22.3	22.6
		50	0	21.9	21.6	21.9
		50	24	21.9	21.6	21.9
		50	49	21.9	21.5	21.8
		100	0	21.9	21.5	21.9
	64QAM	1	0	21.9	21.5	**22.0**
		1	49	21.8	21.4	**22.0**
		1	99	21.8	21.3	**22.0**
		50	0	20.9	20.6	20.9
		50	24	20.9	20.6	20.9
		50	49	20.9	20.5	20.9
		100	0	20.9	20.5	20.9

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8.3.8. LTE 66

ID:	52300	Date:	3/27/19

OUTPUT POWER FOR LTE BAND 66 (1.4 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Power		
				Conducted Average (dBm)		
				131979	132322	132665
				1710.7 MHz	1745.0 MHz	1779.3 MHz
1.4	QPSK	1	0	22.8	**23.0**	22.5
		1	2	22.8	**23.0**	22.6
		1	5	22.7	22.9	22.6
		3	0	22.6	22.9	22.5
		3	1	22.7	22.9	22.6
		3	2	22.7	22.9	22.6
		6	0	21.7	21.9	21.6
	16QAM	1	0	21.8	**22.3**	21.6
		1	2	21.8	22.2	21.7
		1	5	21.8	22.2	21.6
		3	0	21.8	22.1	21.8
		3	1	21.8	22.2	21.9
		3	2	21.8	22.1	21.8
		6	0	20.8	20.9	20.8
	64QAM	1	0	20.9	21.2	21.1
		1	2	21.0	21.2	**21.2**
		1	5	20.9	21.2	21.1
		3	0	21.0	21.0	21.1
		3	1	21.1	21.1	21.1
		3	2	21.0	21.1	21.1
		6	0	20.1	20.2	19.7

OUTPUT POWER FOR LTE BAND 66 (3.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Power		
				Conducted Average (dBm)		
				131987	132322	132657
				1711.5 MHz	1745.0 MHz	1778.5 MHz
3.0	QPSK	1	0	22.7	23.0	22.7
		1	7	22.7	**23.1**	22.7
		1	14	22.7	23.0	22.7
		8	0	21.7	22.0	21.7
		8	4	21.8	22.0	21.7
		8	7	21.7	22.0	21.7
		15	0	21.7	22.0	21.6
	16QAM	1	0	21.8	21.9	22.1
		1	7	21.8	21.9	**22.1**
		1	14	21.7	21.8	22.0
		8	0	20.8	21.1	20.8
		8	4	20.9	21.2	20.8
		8	7	20.8	21.2	20.8
		15	0	20.7	21.1	20.7
	64QAM	1	0	21.1	21.4	20.9
		1	7	21.1	**21.5**	21.0
		1	14	21.0	21.4	20.9
		8	0	19.8	20.2	19.9
		8	4	19.9	20.2	19.9
		8	7	19.9	20.2	19.9
		15	0	20.0	20.2	19.9

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OUTPUT POWER FOR LTE BAND 66 (5.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Power		
				Conducted Average (dBm)		
				131997	132322	132647
				1712.5 MHz	1745.0 MHz	1777.5 MHz
5.0	QPSK	1	0	22.9	**23.2**	22.7
		1	12	22.8	23.1	22.7
		1	24	22.9	23.1	22.7
		12	0	21.8	22.1	21.7
		12	6	21.8	22.1	21.7
		12	11	21.9	22.0	21.7
		25	0	21.9	22.1	21.7
	16QAM	1	0	21.9	22.2	**22.3**
		1	12	21.9	22.1	22.3
		1	24	22.0	22.2	22.3
		12	0	21.0	21.2	20.9
		12	6	20.9	21.2	20.9
		12	11	21.0	21.2	20.9
		25	0	20.9	21.1	20.8
	64QAM	1	0	21.1	21.1	21.1
		1	12	21.1	21.0	21.1
		1	24	**21.2**	21.1	21.1
		12	0	20.0	20.3	19.8
		12	6	20.0	20.2	19.8
		12	11	20.1	20.2	19.8
		25	0	20.1	20.2	19.8

OUTPUT POWER FOR LTE BAND 66 (10.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Power		
				Conducted Average (dBm)		
				132022	132322	132622
				1715.0 MHz	1745.0 MHz	1775.0 MHz
10.0	QPSK	1	0	22.8	**23.0**	22.8
		1	24	22.8	23.0	22.7
		1	49	22.8	23.0	22.7
		25	0	21.9	22.1	21.8
		25	12	21.9	22.1	21.8
		25	24	21.9	22.1	21.7
		50	0	21.9	22.1	21.8
	16QAM	1	0	21.9	21.9	**22.3**
		1	24	21.9	21.9	22.0
		1	49	21.9	21.8	22.1
		25	0	21.1	21.2	20.9
		25	12	21.1	21.2	20.9
		25	24	21.1	21.1	20.8
		50	0	21.0	21.1	20.9
	64QAM	1	0	21.1	**21.4**	21.1
		1	24	21.1	21.4	20.9
		1	49	21.1	21.3	20.9
		25	0	20.2	20.3	20.1
		25	12	20.2	20.2	20.0
		25	24	20.1	20.2	19.9
		50	0	20.1	20.3	20.0

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OUTPUT POWER FOR LTE BAND 66 (15.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Power Conducted Average (dBm)		
				132047	132322	132597
				1717.5 MHz	1745.0 MHz	1772.5 MHz
15.0	QPSK	1	0	23.0	**23.2**	23.0
		1	37	22.9	23.1	22.8
		1	74	23.0	22.9	22.7
		36	0	22.0	22.2	21.8
		36	16	21.9	22.1	21.8
		36	35	22.0	22.1	21.8
		75	0	22.0	22.1	21.8
	16QAM	1	0	22.3	22.0	22.3
		1	37	22.2	21.9	22.2
		1	74	**22.4**	21.8	22.1
		36	0	21.0	21.2	21.0
		36	16	21.0	21.2	21.0
		36	35	21.0	21.1	20.9
		75	0	21.1	21.2	21.0
	64QAM	1	0	21.6	21.5	21.2
		1	37	21.5	21.4	21.0
		1	74	**21.7**	21.3	20.9
		36	0	20.1	20.3	20.0
		36	16	20.0	20.2	20.0
		36	35	20.1	20.2	20.0
		75	0	20.2	20.3	20.0

OUTPUT POWER FOR LTE BAND 66 (20.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Power Conducted Average (dBm)		
				132072	132322	132572
				1720.0 MHz	1745.0 MHz	1770.0 MHz
20.0	QPSK	1	0	23.0	23.0	23.0
		1	49	22.8	**23.1**	**23.1**
		1	99	23.0	22.8	22.6
		50	0	22.0	22.2	22.0
		50	24	22.0	22.1	22.1
		50	49	22.0	22.0	21.8
		100	0	22.0	22.1	21.8
	16QAM	1	0	22.3	**22.7**	22.4
		1	49	22.2	22.5	22.2
		1	99	22.4	22.3	22.1
		50	0	21.1	21.3	21.1
		50	24	21.1	21.2	21.0
		50	49	21.1	21.1	20.9
		100	0	21.1	21.2	20.9
	64QAM	1	0	21.2	21.6	**21.7**
		1	49	21.1	21.4	21.5
		1	99	21.3	21.3	21.4
		50	0	20.2	20.4	20.2
		50	24	20.2	20.3	20.0
		50	49	20.2	20.3	20.0
		100	0	20.2	20.3	20.0

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9. CONDUCTED TEST RESULTS

9.1. 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 850
- GSM 1900
- WCDMA Band 5
- WCDMA Band 2
- WCDMA Band 4
- LTE 2
- LTE 4
- LTE 5
- LTE 12
- LTE 13
- LTE 41
- LTE 66

RESULTS

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

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GSM

Band	Modulation	Channel	f(MHz)	99% BW (KHz)	-26dB BW (KHz)
GSM850	GPRS	190	836.6	241.05	319.80
	EGPRS			229.05	302.60
GSM1900	GPRS	661	1880.0	245.13	319.50
	EGPRS			244.77	316.20

WCDMA

Band	Modulation	Channel	f(MHz)	99% BW (MHz)	-26dB BW (MHz)
BAND5	REL 99	4408	836.6	4.12	4.71
	HSDPA			4.15	4.71
BAND2	REL 99	9800	1880.0	4.13	4.71
	HSDPA			4.13	4.70
BAND4	REL 99	1638	1732.6	4.121	4.691
	HSDPA			4.127	4.688

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LTE2

Band	Mode	RB Allocation/RB Offset	f(MHz)	99% BW (MHz)	-26dB BW (MHz)
LTE BAND 2	1.4 MHz, QPSK	6/0	1880.0	1.10	1.26
	1.4 MHz, 16QAM			1.08	1.24
	3 MHz, QPSK	15/0		2.70	3.01
	3 MHz, 16QAM			2.70	3.01
	5 MHz, QPSK	25/0		4.50	4.94
	5 MHz, 16QAM			4.49	4.93
	10 MHz, QPSK	50/0		8.96	9.87
	10 MHz, 16QAM			8.96	9.85
	15 MHz, QPSK	75/0		13.44	14.59
	15 MHz, 16QAM			13.44	14.64
	20 MHz, QPSK	100/0		17.91	19.32
	20 MHz, 16QAM			17.89	19.32

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	1.10	1.25
	1.4 MHz, 16QAM			1.08	1.23
	3 MHz, QPSK	15/0		2.70	2.99
	3 MHz, 16QAM			2.70	3.00
	5 MHz, QPSK	25/0		4.50	4.93
	5 MHz, 16QAM			4.50	4.95
	10 MHz, QPSK	50/0		8.96	9.83
	10 MHz, 16QAM			8.94	9.77
	15 MHz, QPSK	75/0		13.44	14.56
	15 MHz, 16QAM			13.43	14.47
	20 MHz, QPSK	100/0		17.93	19.28
	20 MHz, 16QAM			17.91	19.36

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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	1.10	1.25
	1.4 MHz, 16QAM			1.08	1.29
	3 MHz, QPSK	15/0		2.70	3.00
	3 MHz, 16QAM			2.70	3.00
	5 MHz, QPSK	25/0		4.50	4.94
	5 MHz, 16QAM			4.50	4.95
	10 MHz, QPSK	50/0		8.96	9.85
	10 MHz, 16QAM			8.96	9.77

LTE12

Band	Mode	RB Allocation/RB Offset	f(MHz)	99% BW (MHz)	-26dB BW (MHz)
LTE BAND 12	1.4 MHz, QPSK	6/0	707.5	1.08	1.23
	1.4 MHz, 16QAM			1.08	1.23
	3 MHz, QPSK	15/0		2.70	2.99
	3 MHz, 16QAM			2.70	3.00
	5 MHz, QPSK	25/0		4.51	4.93
	5 MHz, 16QAM			4.49	4.91
	10 MHz, QPSK	50/0		8.98	9.83
	10 MHz, 16QAM			8.98	9.69

LTE13

Band	Mode	RB Allocation/RB Offset	f(MHz)	99% BW (MHz)	-26dB BW (MHz)
LTE BAND 13	5 MHz, QPSK	25/0	782.0	4.50	4.96
	5 MHz, 16QAM			4.49	4.90
	10 MHz, QPSK	50/0		8.97	9.88
	10 MHz, 16QAM			8.98	9.81

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LTE41

Band	Mode	RB Allocation/RB Offset	f(MHz)	99% BW (MHz)	-26dB BW (MHz)
LTE BAND 41	5 MHz, QPSK	25/0	2593.0	4.5	4.9
	5 MHz, 16QAM			4.5	4.9
	10 MHz, QPSK	50/0		9.0	9.8
	10 MHz, 16QAM			9.0	9.7
	15 MHz, QPSK	75/0		13.4	14.5
	15 MHz, 16QAM			13.4	14.6
	20 MHz, QPSK	100/0		17.9	19.2
	20 MHz, 16QAM			17.8	19.2

LTE66

Band	Mode	RB Allocation/RB Offset	f(MHz)	99% BW (MHz)	-26dB BW (MHz)
LTE BAND 66	1.4 MHz, QPSK	6/0	1745.0	1.08	1.24
	1.4 MHz, 16QAM			1.08	1.24
	3 MHz, QPSK	15/0		2.7	3
	3 MHz, 16QAM			2.7	3.02
	5 MHz, QPSK	25/0		4.5	4.92
	5 MHz, 16QAM			4.49	4.93
	10 MHz, QPSK	50/0		8.99	9.81
	10 MHz, 16QAM			8.98	9.76
	15 MHz, QPSK	75/0		13.42	14.68
	15 MHz, 16QAM			13.41	14.59
	20 MHz, QPSK	100/0		17.87	19.31
	20 MHz, 16QAM			17.88	19.32

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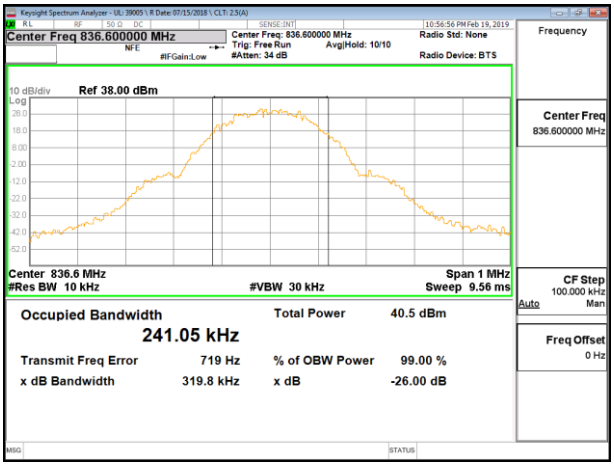
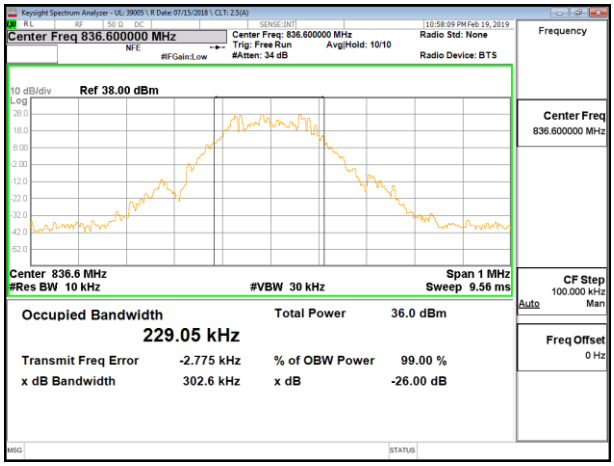
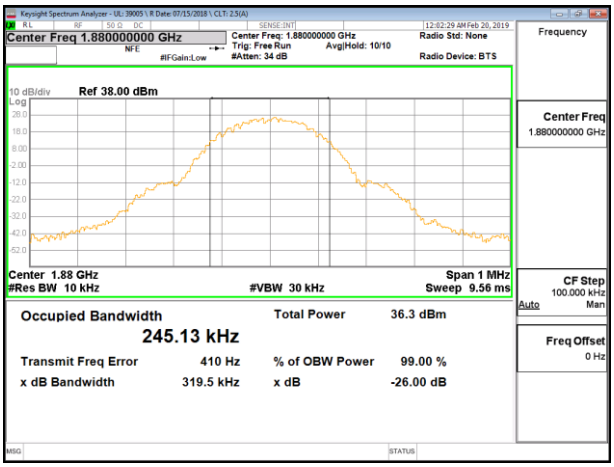
9.1.1. GSM



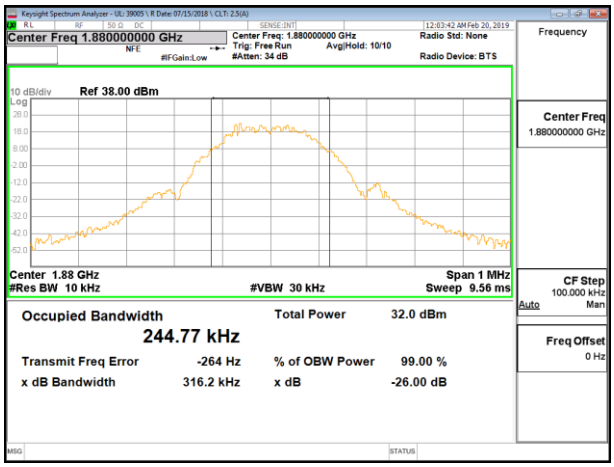
GSM 850MHz GPRS MID Channel



GSM 850MHz EGPRS MID Channel



GSM 1900MHz GPRS MID Channel



GSM 1900MHz EGPRS MID Channel

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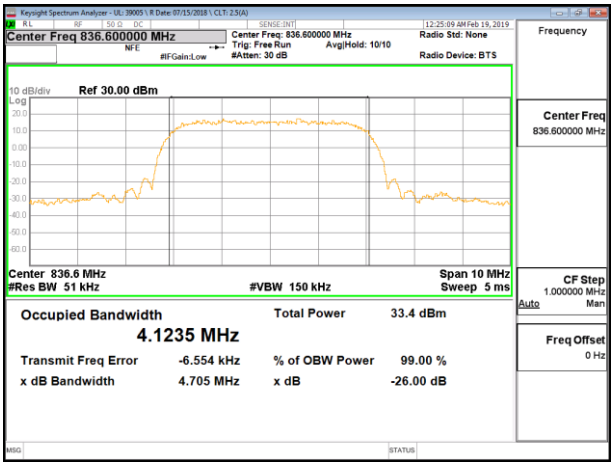
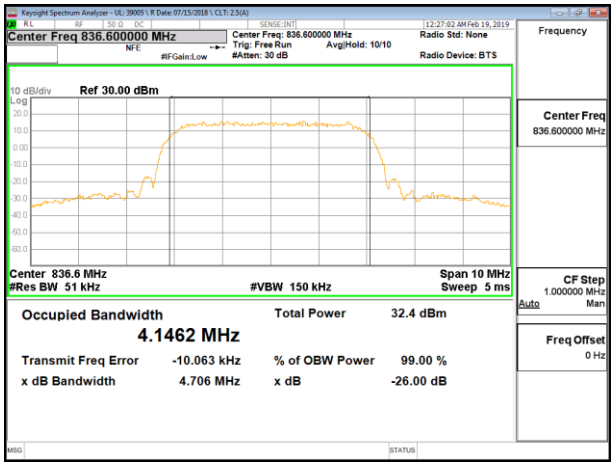
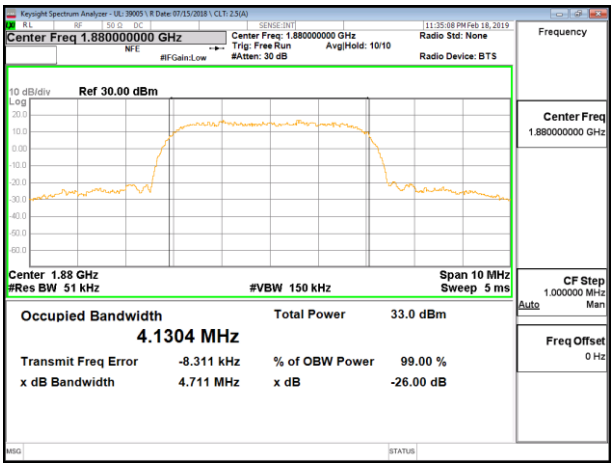
9.1.2. WCDMA



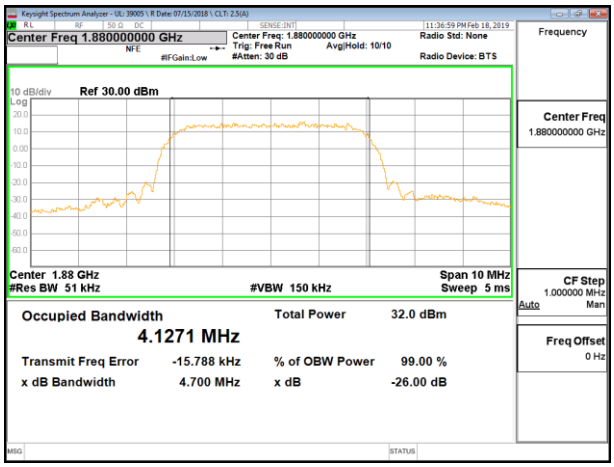
WCDMA BAND5 Rel99 MID Channel



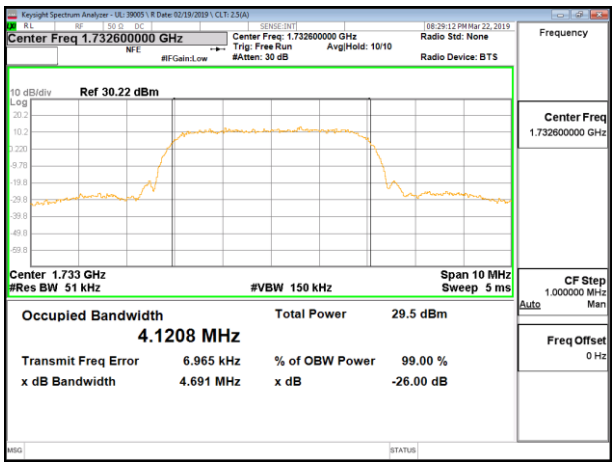
WCDMA BAND5 HSDPA MID Channel



WCDMA BAND2 Rel99 MID Channel



WCDMA BAND2 HSDPA MID Channel



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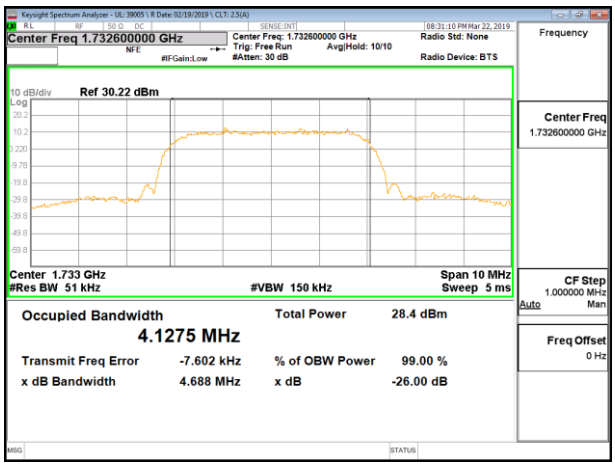

WCDMA BAND4 HSDPA MID Channel

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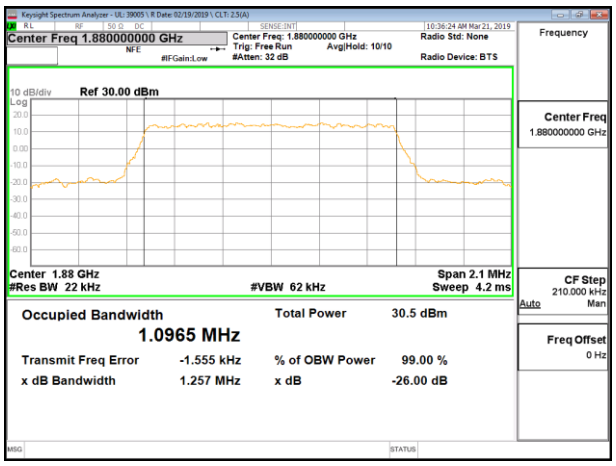
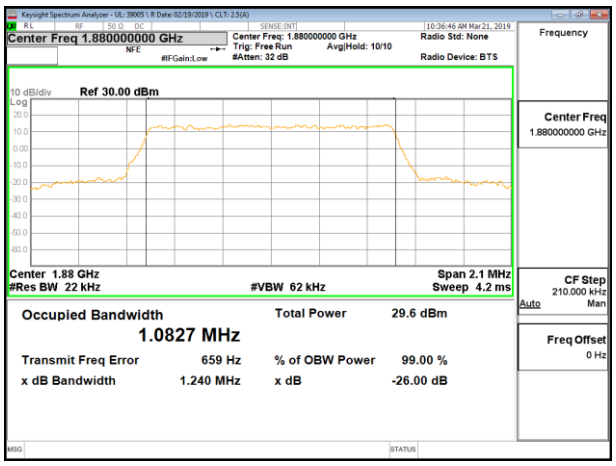
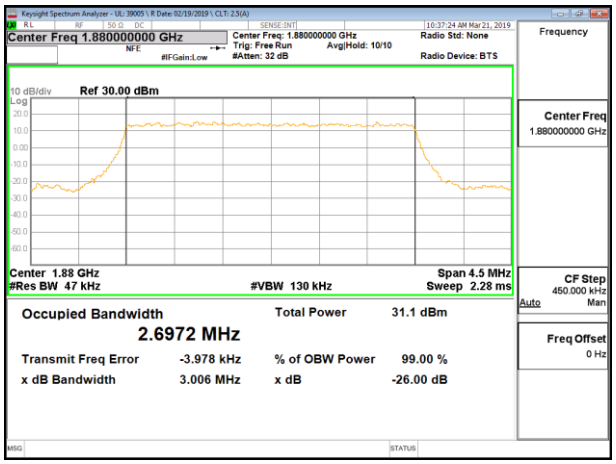
9.1.3. LTE BAND 2



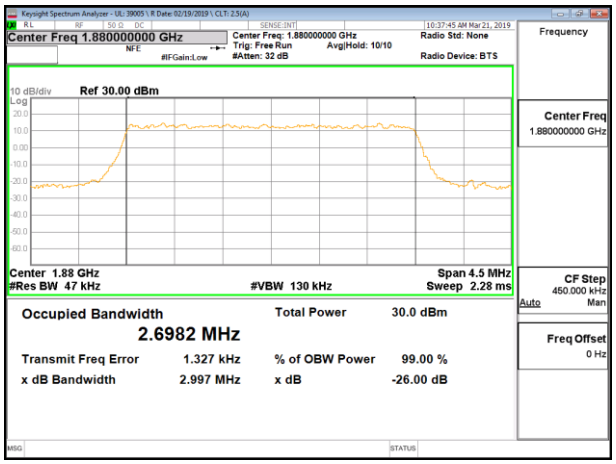
LTE B2 1.4MHz QPSK Mid Channel RB6-0



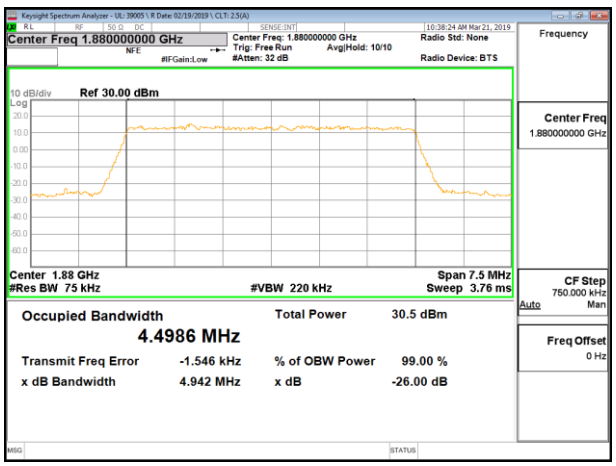
LTE B2 1.4MHz 16QAM Mid Channel RB6-0



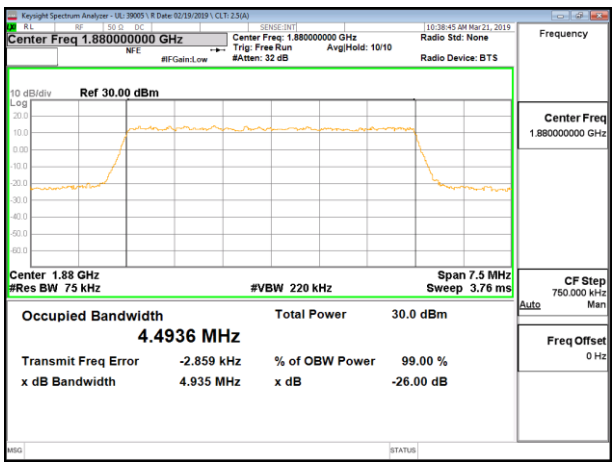
LTE B2 3MHz QPSK Mid Channel RB15-0



LTE B2 3MHz 16QAM Mid Channel RB15-0



LTE B2 5MHz QPSK Mid Channel RB25-0



LTE B2 5MHz 16QAM Mid Channel RB25-0

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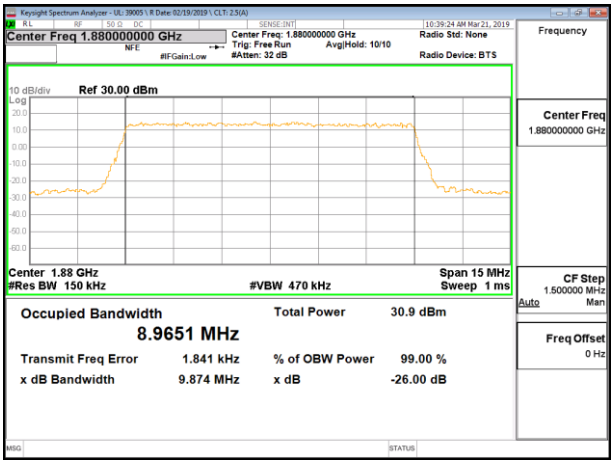
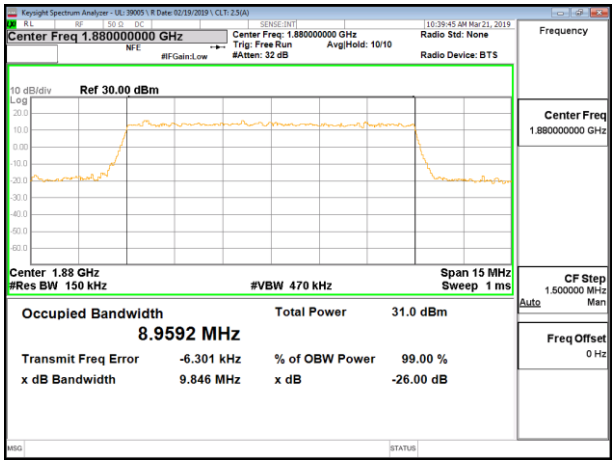
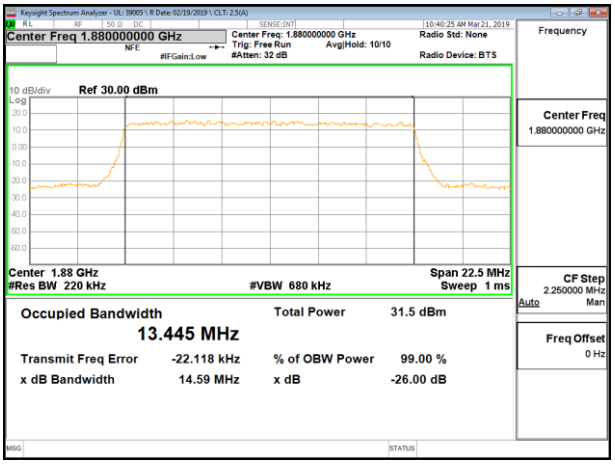


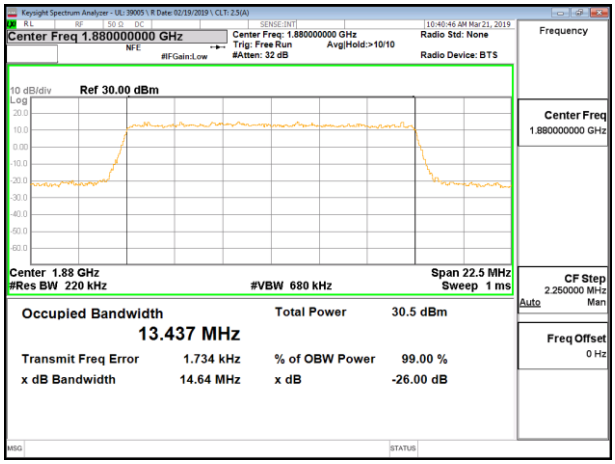
LTE B2 10MHz QPSK Mid Channel RB50-0



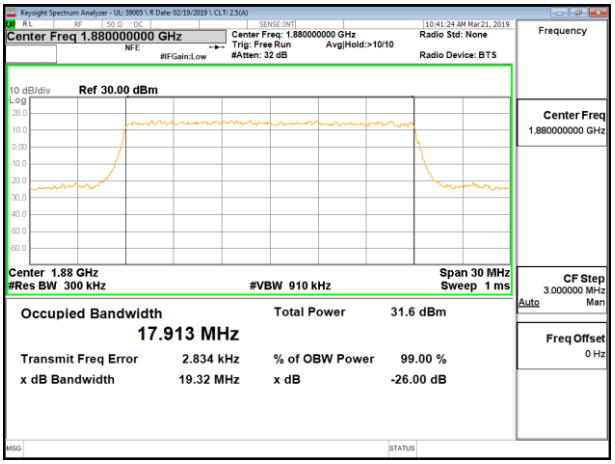
LTE B2 10MHz 16QAM Mid Channel RB50-0



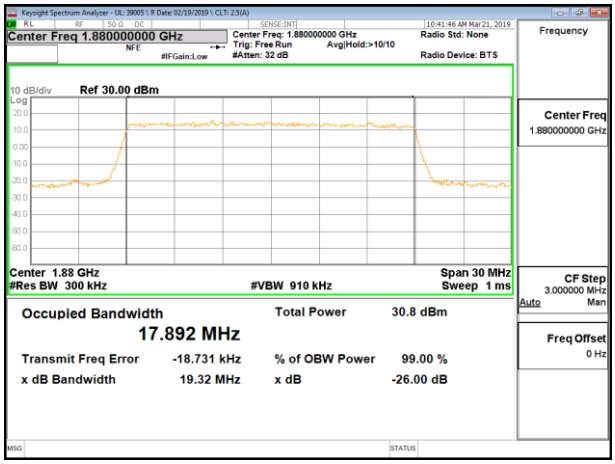
LTE B2 15MHz QPSK Mid Channel RB75-0



LTE B2 15MHz 16QAM Mid Channel RB75-0



LTE B2 20MHz QPSK Mid Channel RB100-0



LTE B2 20MHz 16QAM Mid Channel RB100-0

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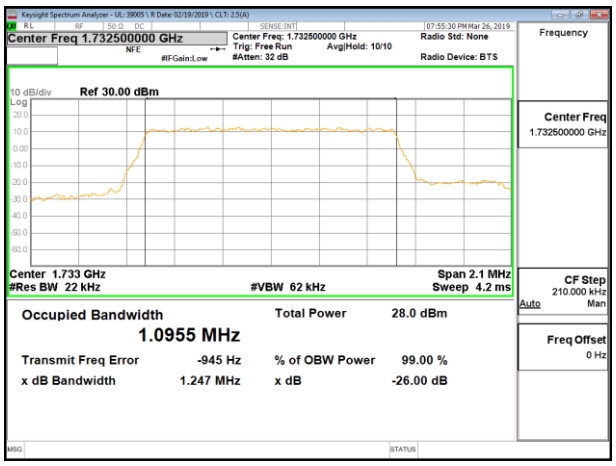
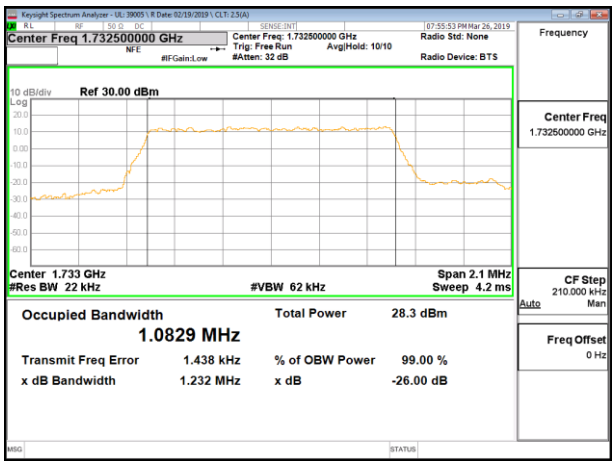
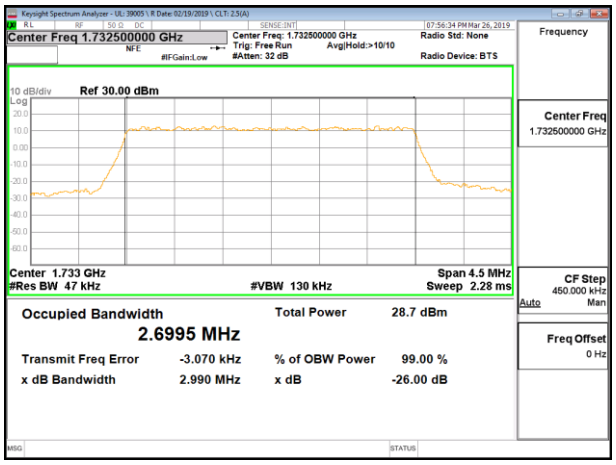
9.1.4. LTE BAND 4



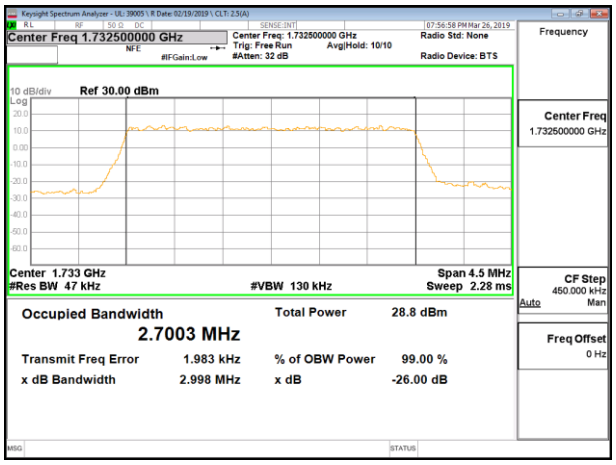
LTE B4 1.4MHz QPSK Mid Channel RB6-0



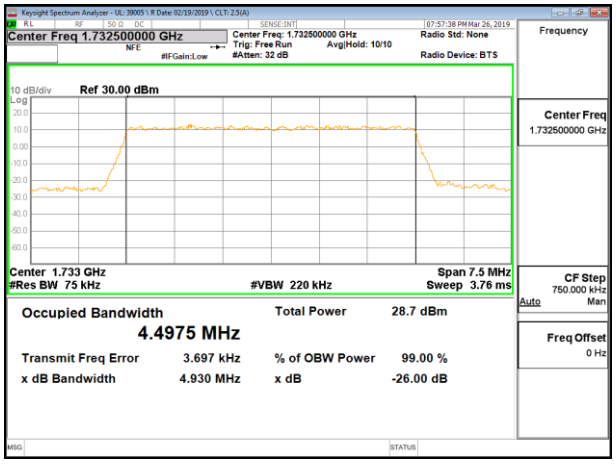
LTE B4 1.4MHz 16QAM Mid Channel RB6-0



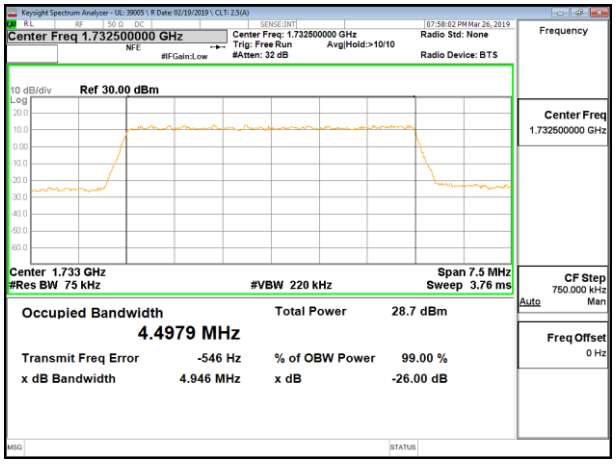
LTE B4 3MHz QPSK Mid Channel RB15-0



LTE B4 3MHz 16QAM Mid Channel RB15-0



LTE B4 5MHz QPSK Mid Channel RB25-0



LTE B4 5MHz 16QAM Mid Channel RB25-0

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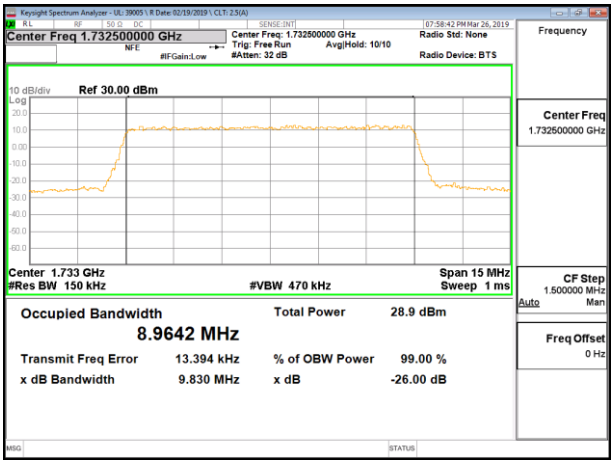
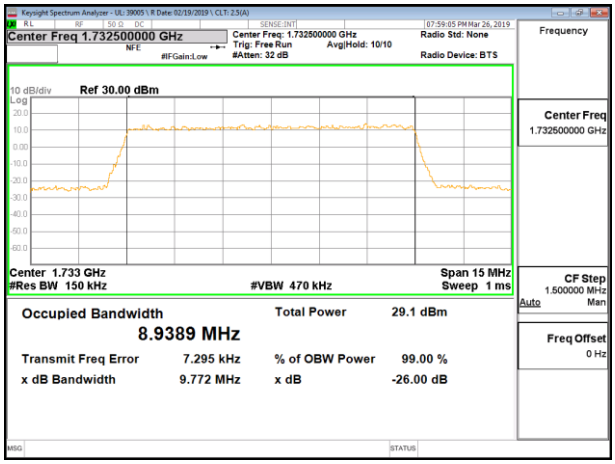
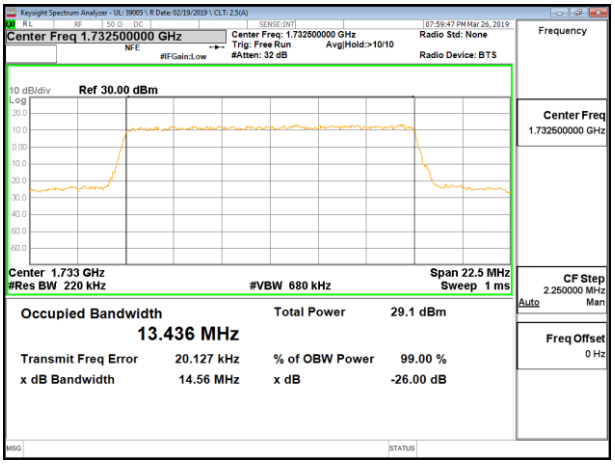


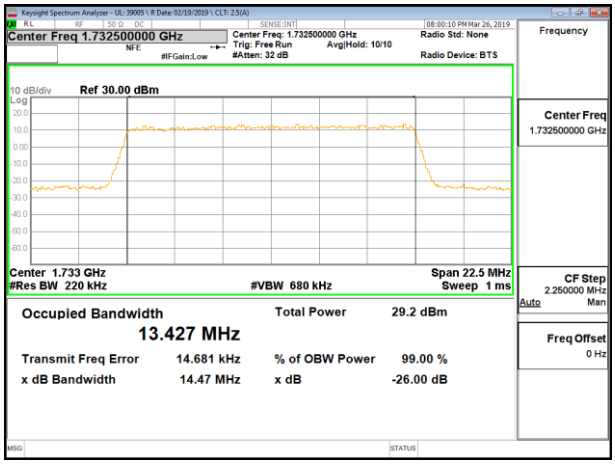
LTE B4 10MHz QPSK Mid Channel RB50-0



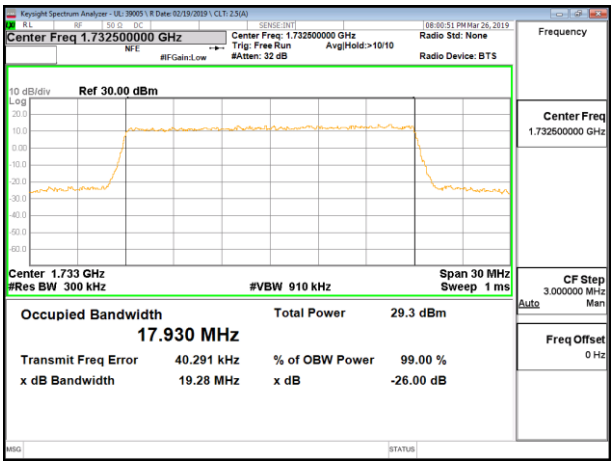
LTE B4 10MHz 16QAM Mid Channel RB50-0



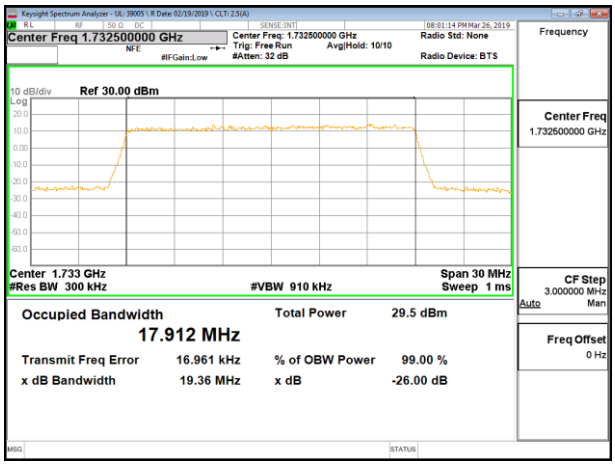
LTE B4 15MHz QPSK Mid Channel RB75-0



LTE B4 15MHz 16QAM Mid Channel RB75-0



LTE B4 20MHz QPSK Mid Channel RB100-0



LTE B4 20MHz 16QAM Mid Channel RB100-0

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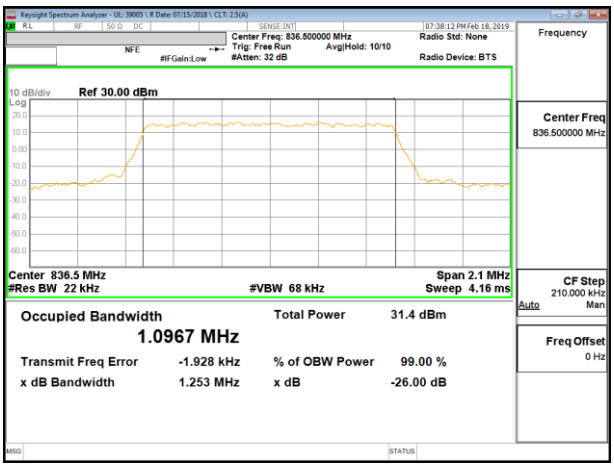
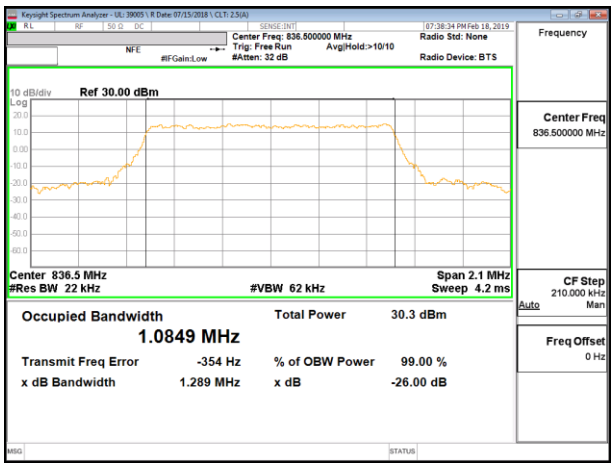
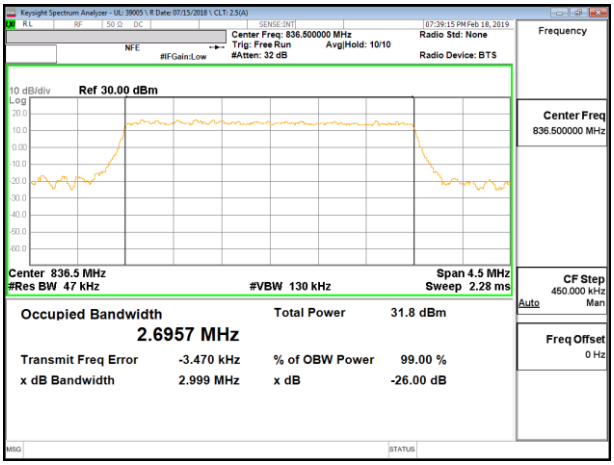
9.1.5. LTE BAND 5



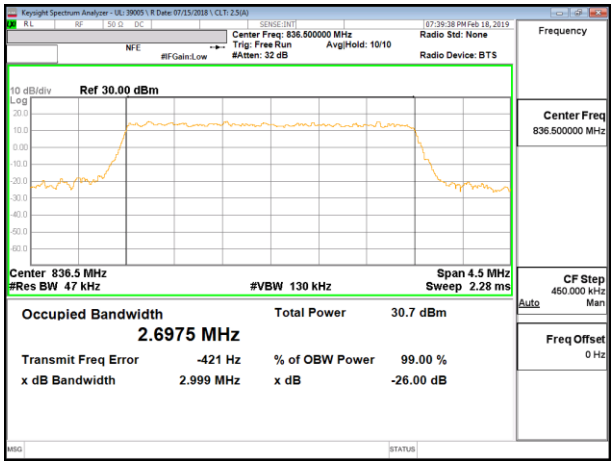
LTE B5 1.4MHz QPSK Mid Channel RB6-0



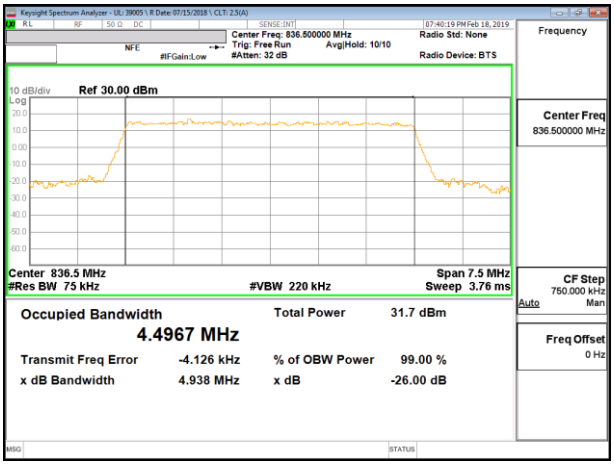
LTE B5 1.4MHz 16QAM Mid Channel RB6-0



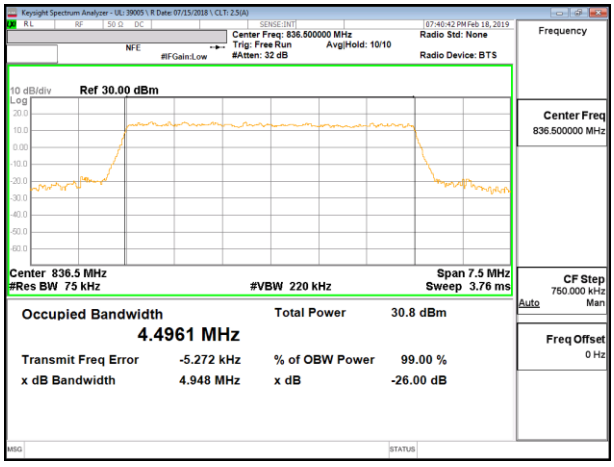
LTE B5 3MHz QPSK Mid Channel RB15-0



LTE B5 3MHz 16QAM Mid Channel RB15-0



LTE B5 5MHz QPSK Mid Channel RB25-0



LTE B5 5MHz 16QAM Mid Channel RB25-0

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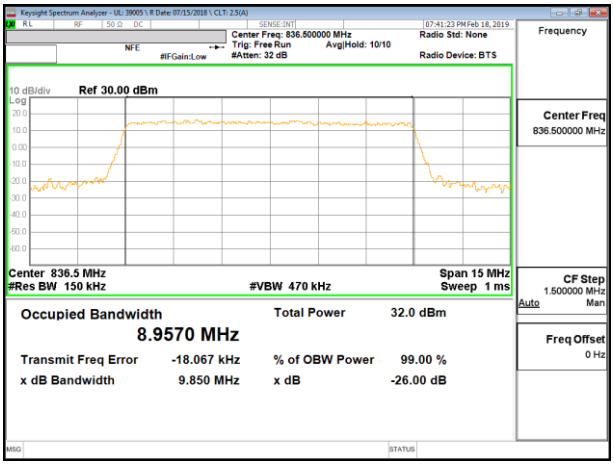
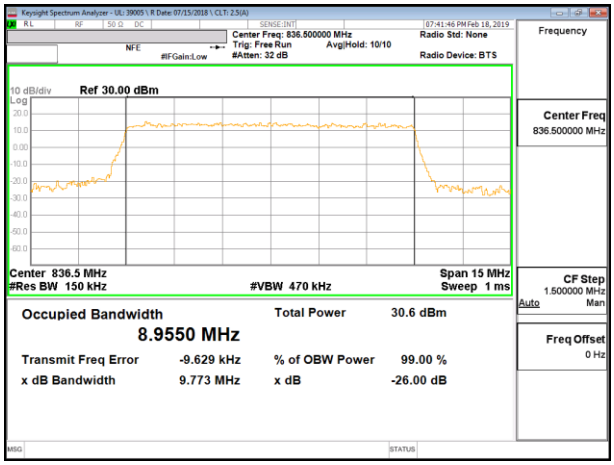


LTE B5 10MHz QPSK Mid Channel RB50-0



LTE B5 10MHz 16QAM Mid Channel RB50-0

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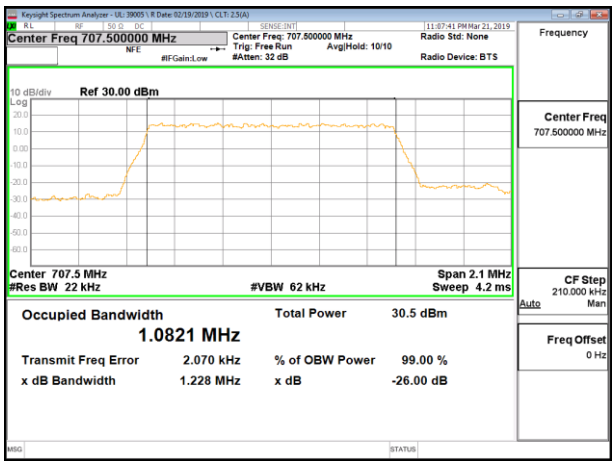
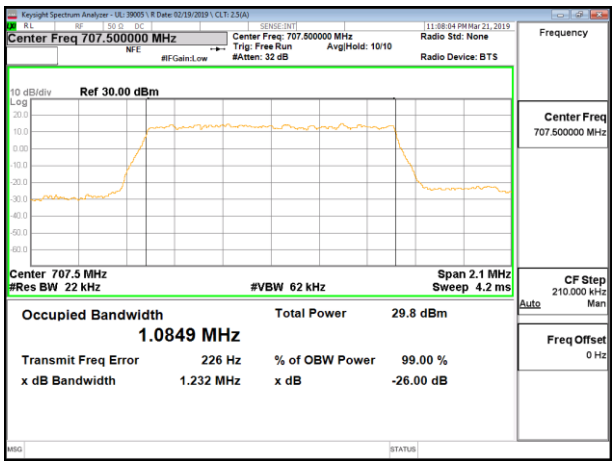
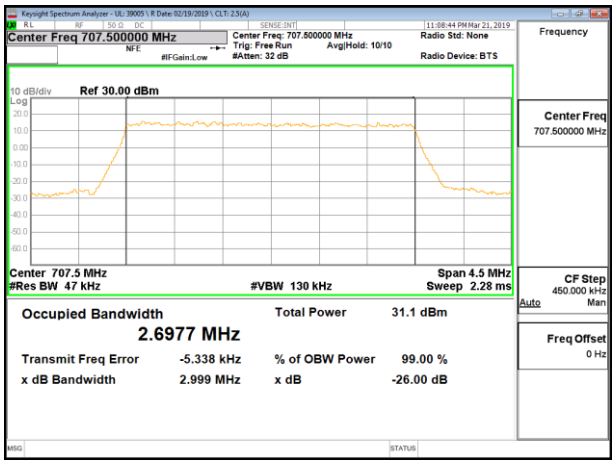
9.1.6. LTE BAND 12



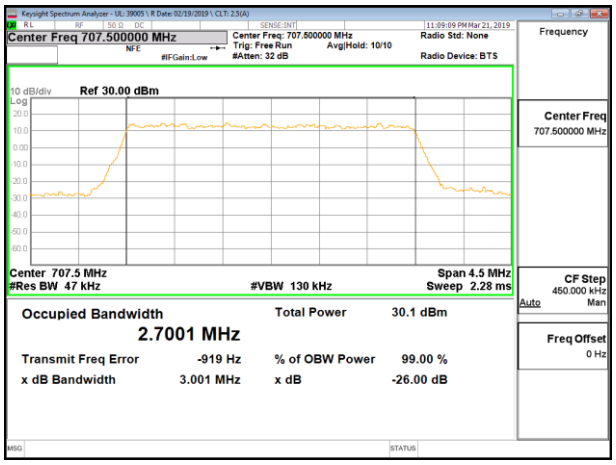
LTE B12 1.4MHz QPSK Mid Channel RB6-0



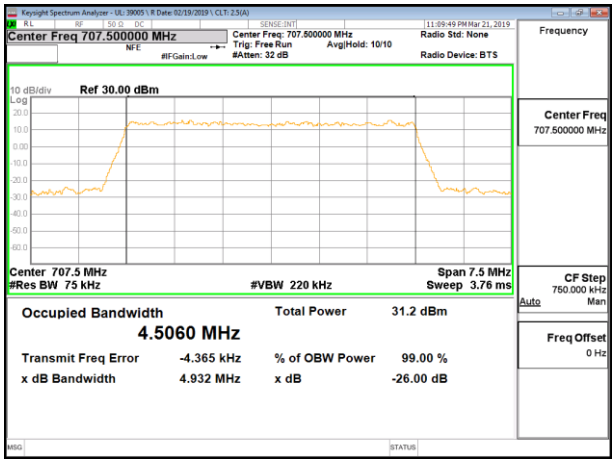
LTE B12 1.4MHz 16QAM Mid Channel RB6-0



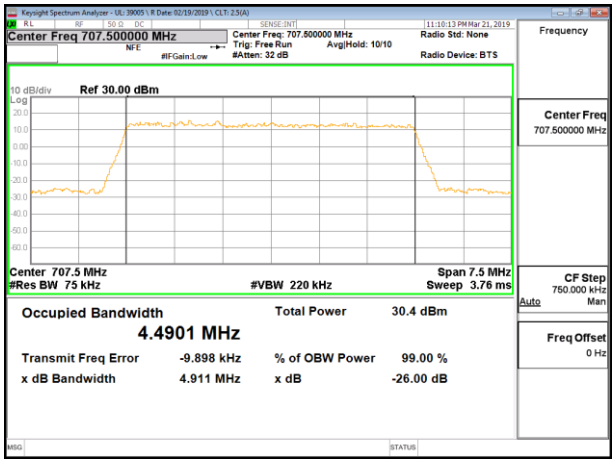
LTE B12 3MHz QPSK Mid Channel RB15-0



LTE B12 3MHz 16QAM Mid Channel RB15-0



LTE B12 5MHz QPSK Mid Channel RB25-0



LTE B12 5MHz 16QAM Mid Channel RB25-0

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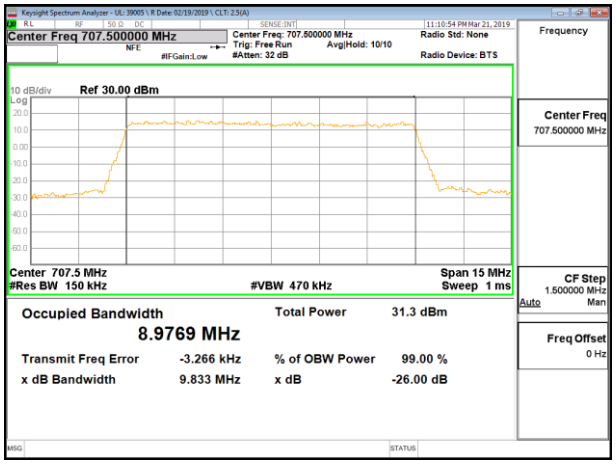
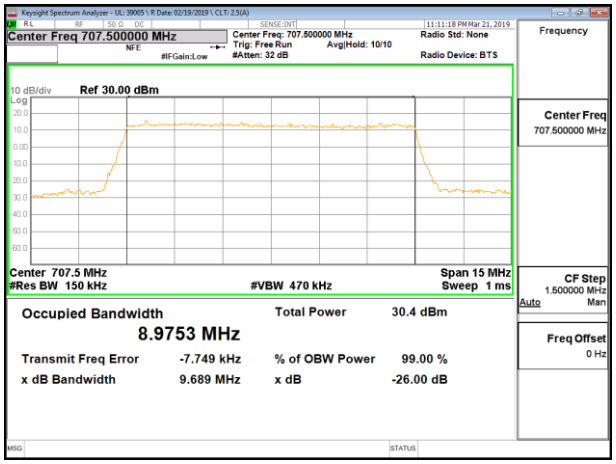


LTE B12 10MHz QPSK Mid Channel RB50-0



LTE B12 10MHz 16QAM Mid Channel RB50-0

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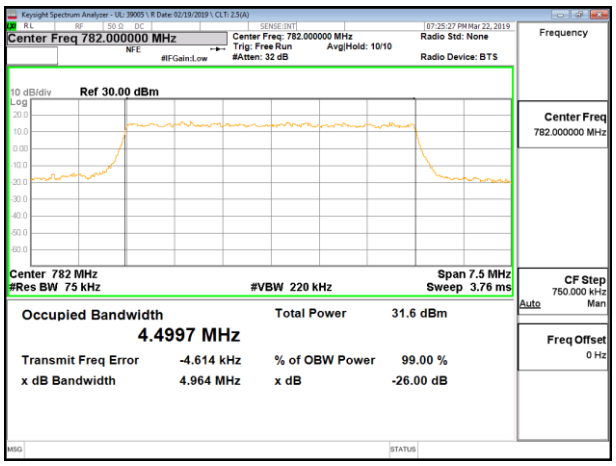
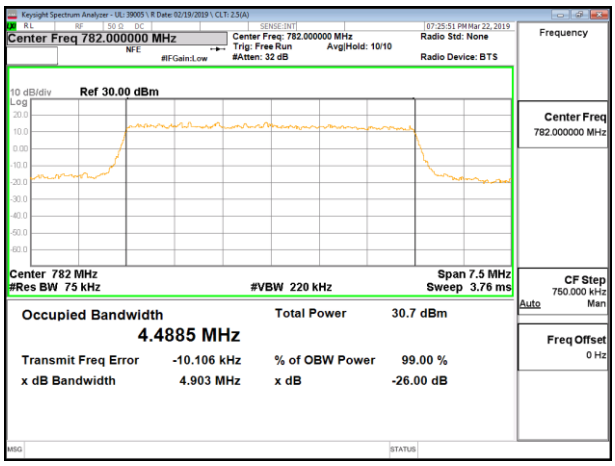
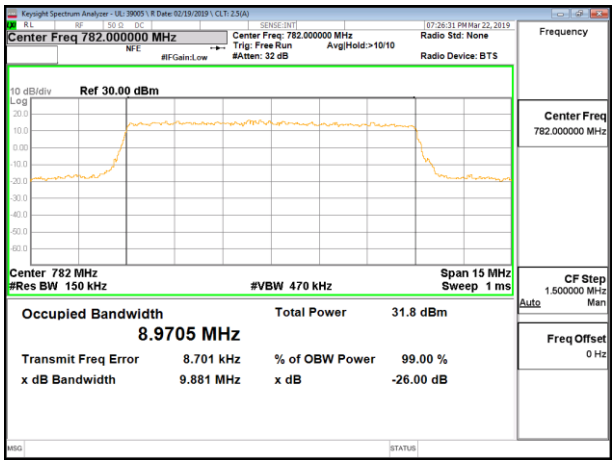
9.1.7. LTE BAND 13



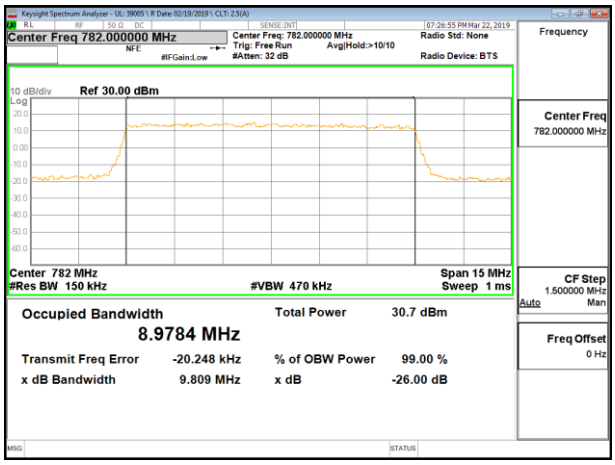
LTE B13 5MHz QPSK Mid Channel RB25-0



LTE B13 5MHz 16QAM Mid Channel RB25-0



LTE B13 10MHz QPSK Mid Channel RB50-0



LTE B13 10MHz 16QAM Mid Channel RB50-0

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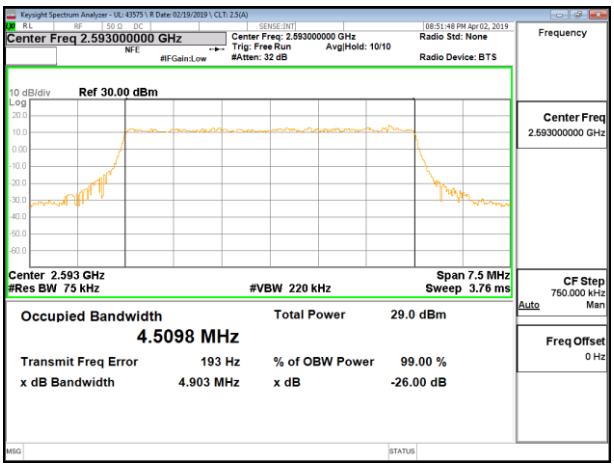
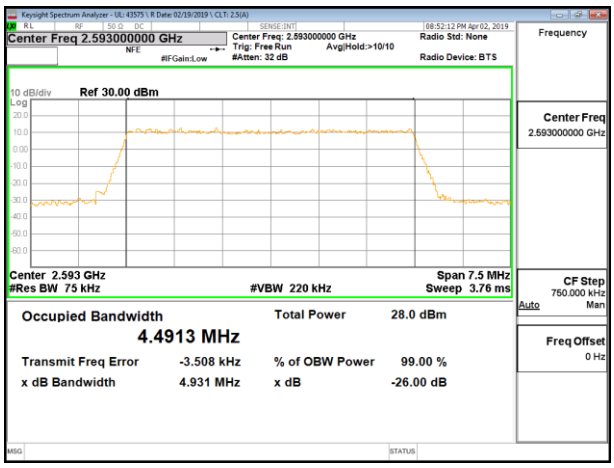
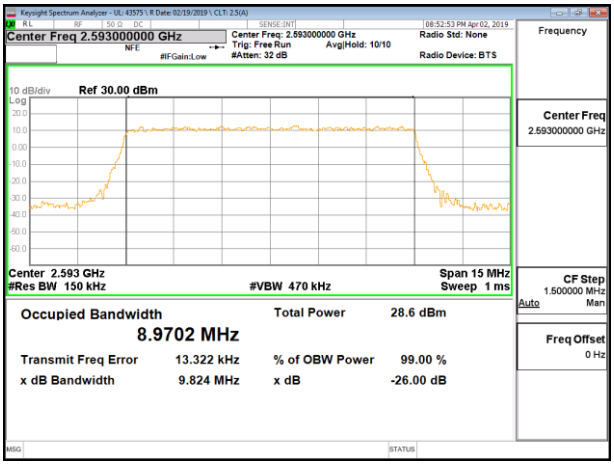
9.1.8. LTE BAND 41



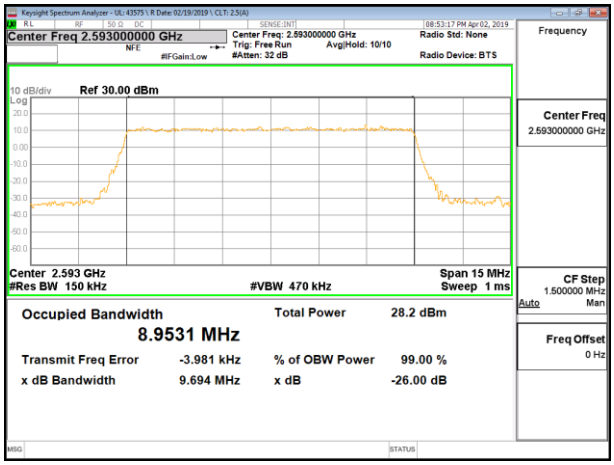
LTE B41 5MHz QPSK Mid Channel RB25-0



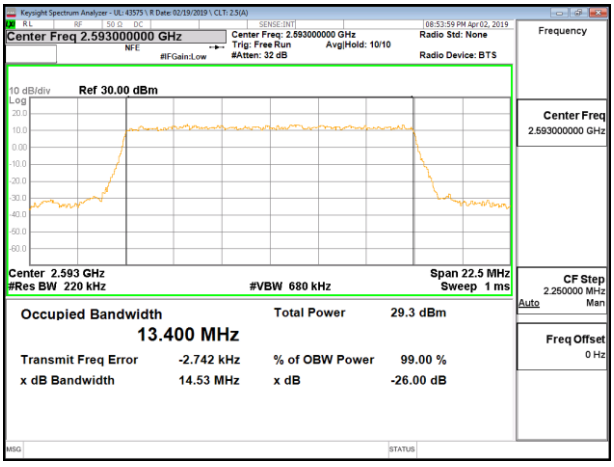
LTE B41 5MHz 16QAM Mid Channel RB25-0



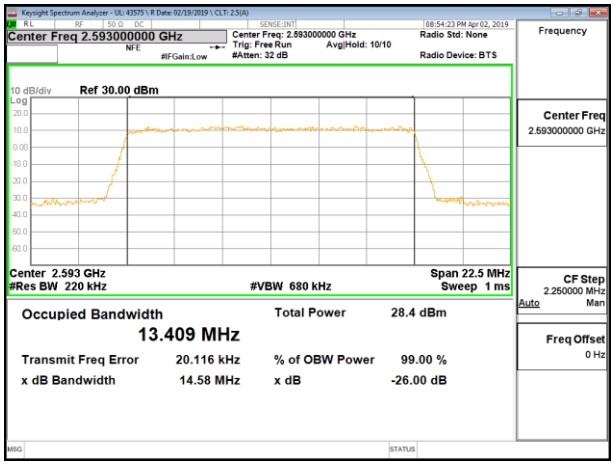
LTE B41 10MHz QPSK Mid Channel RB50-0



LTE B41 10MHz 16QAM Mid Channel RB50-0



LTE B41 15MHz QPSK Mid Channel RB75-0



LTE B41 15MHz 16QAM Mid Channel RB75-0

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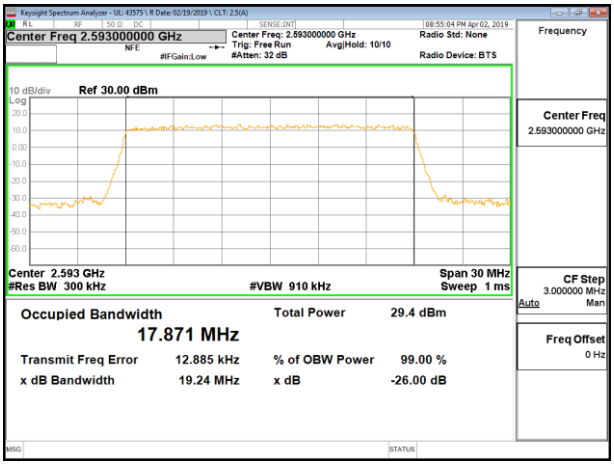
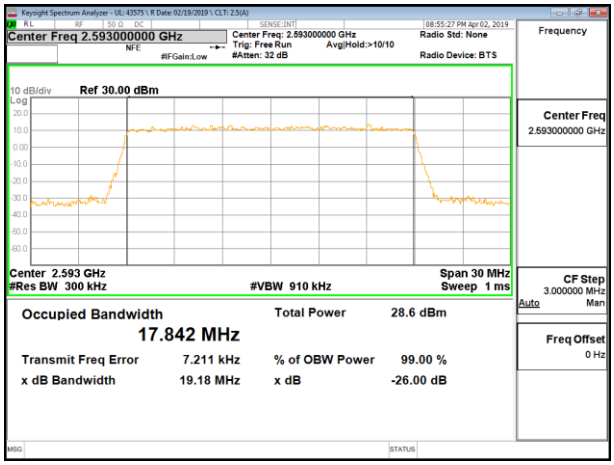


LTE B41 20MHz QPSK Mid Channel RB100-0



LTE B41 20MHz 16QAM Mid Channel RB100-0

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