CERTIFICATION TEST REPORT

Report Number. : 16U23816-E10V2

Applicant	:	APPLE, INC. 1 INFINITE LOOP CUPERTINO, CA 95014, U.S.A.
Model	:	A1671, A1821
FCC ID	:	BCGA1671
EUT Description	:	TABLET DEVICE
Test Standard(s)	:	FCC CFR47 PART 22H, 24E, 27 AND 90S

Date Of Issue:
March 07, 2017

Prepared by:
UL Verification Services Inc.
47173 Benicia Street
Fremont, CA 94538, U.S.A.
TEL: (510) 771-1000
FAX: (510) 661-0888

NVLAP TESTING
NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
V1	02/21/2017	Initial Review	Mengistu Mekuria
V2	03/07/2017	Lowering Band 41 Antenna C powers	Mengistu Mekuria

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

TABLE OF CONTENTS

1. ATTESTATION OF TEST RESULTS 5

2. TEST METHODOLOGY 6

3. FACILITIES AND ACCREDITATION 6

4. CALIBRATION AND UNCERTAINTY 7

4.1. MEASURING INSTRUMENT CALIBRATION 7

4.2. SAMPLE CALCULATION 7

4.3. MEASUREMENT UNCERTAINTY 7

5. EQUIPMENT UNDER TEST 8

5.1. DESCRIPTION OF EUT 8

5.2. DESCRIPTION OF MODELS DIFFERENCES 8

5.3. MAXIMUM OUTPUT POWER 9

5.3.1. ANTENNA C 9

5.3.2. ANTENNA D 10

5.4. SOFTWARE AND FIRMWARE 11

5.5. MAXIMUM ANTENNA GAIN 11

5.6. WORST-CASE CONFIGURATION AND MODE 11

5.7. DESCRIPTION OF TEST SETUP 12

6. TEST AND MEASUREMENT EQUIPMENT 14

7. TRANSMITTER OUTPUT POWER (CONDUCTED AND EIRP) 15

7.1. ANTENNA C 16

7.1.1. LTE BAND 7 16

7.1.2. LTE BAND 41 21

7.2. ANTENNA D 27

7.2.1. LTE BAND 7 27

7.2.2. LTE BAND 41 32

8. CONDUCTED TEST RESULTS 38

8.1. OCCUPIED BANDWIDTH 38

8.1.1. LTE BAND 7 43

8.1.2. LTE BAND 41 53

8.2. EMISSION MASK 65

8.2.1. LTE BAND 7 66

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

8.2.2. LTE BAND 41 82
8.3. OUT OF BAND EMISSIONS 98
8.3.1. LTE BAND 7 99
8.3.2. LTE BAND 41 105
9. FREQUENCY STABILITY 111
9.1. LTE BAND 7 112
9.2. LTE BAND 41 114
10. PEAK-TO-AVERAGE RATIO 116
10.1.1. LTE BAND 7 116
10.1.2. LTE BAND 41 117
11. RADIATED TEST RESULTS 118
11.1. FIELD STRENGTH OF SPURIOUS RADIATION (ANTENNA C) 118
11.1.1. LTE BAND 7 120
11.1.2. LTE BAND 41 124
11.2. FIELD STRENGTH OF SPURIOUS RADIATION (ANTENNA D) 128
11.2.1. LTE BAND 7 128
11.2.2. LTE BAND 41 132
12. SETUP PHOTOS 136

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

1. ATTESTATION OF TEST RESULTS

COMPANY NAME: APPLE
1 INFINITE LOOP
CUPERTINO, CA 95014, U.S.A.

EUT DESCRIPTION: TABLET DEVICE

MODEL: A1671, A1821

SERIAL NUMBER: DLX645701 (CONDUCTED); DLXST00NHPJQ (RADIATED)

DATE TESTED: DECEMBER 7, 2016 – FEBRUARY 21, 2017

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
FCC CFR47 PART 27	Pass

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

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

Approved & Released For
UL Verification Services Inc. By:

Mengistu Mekuria

MENGISTU MEKURIA
SENIOR ENGINEER
UL VERIFICATION SERVICES INC.

Prepared By:

TINA CHU
EMC LAB ENGINEER
UL VERIFICATION SERVICES INC.

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.26:2015, FCC CFR 47 Part 2, FCC KDB 971168 D01 v02r02, Part 27.

3. FACILITIES AND ACCREDITATION

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

47173 Benicia Street	47266 Benicia Street
☐ Chamber A	☐ Chamber D
☐ Chamber B	☐ Chamber E
☐ Chamber C	☐ Chamber F
	☐ Chamber G
	☒ Chamber H

The above test sites and facilities are covered under FCC Test Firm Registration # 208313. Chambers A through H are covered under Industry Canada company address code 2324B with site numbers 2324B -1 through 2324B-8, respectively.

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

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

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:

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

4.3. MEASUREMENT UNCERTAINTY

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

PARAMETER	UNCERTAINTY
Conducted Disturbance, 9KHz to 0.15 MHz	3.84 dB
Conducted Disturbance, 0.15 to 30 MHz	3.65 dB
Radiated Disturbance, 9KHz to 30 MHz	3.15 dB
Radiated Disturbance, 30 to 1000 MHz	5.36 dB
Radiated Disturbance,1000 to 18000 MHz	4.32 dB
Radiated Disturbance,18000 to 26000 MHz	4.45 dB
Radiated Disturbance,26000 to 40000 MHz	5.24 dB

Uncertainty figures are valid to a confidence level of 95%.

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a tablet with multimedia functions (music, application support, and video), Cellular GSM/GPRS/EGPRS/CDMA2000 1xRTT/1x Advanced/EVDO Rev.A/WCDMA /HSPA+/DC-HSDPA/LTE FDD & Carrier Aggregation/TDD/TD-SCDMA radio, IEEE 802.11a/b/g/n/ac radio, and Bluetooth radio. The rechargeable battery is not user accessible.

5.2. DESCRIPTION OF MODELS DIFFERENCES

Both Model A1671 and A1821 have identical PCB layout, design and functionality, except that A1671 supports second electronic-UICC based SIM or “soft SIM” (called eSIM) beside the regular UICC based SIM and A1821 will come with eSIM removed. RF and electromagnetic characteristic are independent of the eSIM element. Both Models have exactly same technology and band support. Model A1671 is used for EMC/RSE Testing and that data will be used for both Models.

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

5.3. MAXIMUM OUTPUT POWER

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

5.3.1. ANTENNA C

OUTPUT POWER FOR LTE BAND 7

Part 27 / RSS199 LTE Band 7				
Bandwidth (MHz)	Frequency Range (MHz)	Modulation	EIRP (Average)	
			dBm	mW
10+20	2500 - 2570	QPSK	22.8	190.5
		16QAM	21.7	147.9
20+10		QPSK	22.9	195.0
		16QAM	21.8	151.4
15+15		QPSK	22.9	195.0
		16QAM	21.8	151.4
15+20		QPSK	22.9	195.0
		16QAM	22.1	162.2
20+15		QPSK	23.0	199.5
		16QAM	21.9	154.9
20+20		QPSK	22.9	195.0
		16QAM	21.8	151.4

OUTPUT POWER FOR LTE BAND 41

Part 27 / RSS199 LTE Band 41				
Bandwidth (MHz)	Frequency Range (MHz)	Modulation	EIRP (Average)	
			dBm	mW
5+20	2496-2690	QPSK	21.3	134.9
		16QAM	20.3	107.2
20+5		QPSK	21.4	138.0
		16QAM	20.3	107.2
10+20		QPSK	21.5	141.3
		16QAM	20.4	109.6
20+10		QPSK	21.3	134.9
		16QAM	20.4	109.6
15+15		QPSK	21.4	138.0
		16QAM	20.3	107.2
15+20		QPSK	21.5	141.3
		16QAM	20.3	107.2
20+15		QPSK	21.6	144.5
		16QAM	20.3	107.2
20+20		QPSK	21.5	141.3
		16QAM	20.4	109.6

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

5.3.2. ANTENNA D

OUTPUT POWER FOR LTE BAND 7

Part 27 / RSS199 LTE Band 7				
Bandwidth (MHz)	Frequency Range (MHz)	Modulation	EIRP (Average)	
			dBm	mW
10+20	2500 - 2570	QPSK	21.0	125.9
		16QAM	20.0	100.0
20+10		QPSK	21.1	128.8
		16QAM	20.0	100.0
15+15		QPSK	21.2	131.8
		16QAM	20.0	100.0
15+20		QPSK	21.3	134.9
		16QAM	20.3	107.2
20+15		QPSK	21.2	131.8
		16QAM	20.3	107.2
20+20		QPSK	21.2	131.8
		16QAM	20.4	109.6

OUTPUT POWER FOR LTE BAND 41

Part 27 / RSS199 LTE Band 41				
Bandwidth (MHz)	Frequency Range (MHz)	Modulation	EIRP (Average)	
			dBm	mW
5+20	2496-2690	QPSK	21.2	131.8
		16QAM	20.0	100.0
20+5		QPSK	20.9	123.0
		16QAM	19.7	93.3
10+20		QPSK	21.0	125.9
		16QAM	20.2	104.7
20+10		QPSK	21.0	125.9
		16QAM	20.2	104.7
15+15		QPSK	21.1	128.8
		16QAM	19.8	95.5
15+20		QPSK	21.0	125.9
		16QAM	19.5	89.1
20+15		QPSK	20.9	123.0
		16QAM	20.0	100.0
20+20		QPSK	21.2	131.8
		16QAM	20.1	102.3

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

5.4. SOFTWARE AND FIRMWARE

The EUT software installed during testing was 14E32020u and firmware was 1.54.09.

5.5. MAXIMUM ANTENNA GAIN

Please see table below:

LTE BANDS	Antenna C Antenna Gain (dBi)	Antenna D Antenna Gain (dBi)
LTE Band 7, 2500 – 2570 MHz	0.12	0.35
LTE Band 41, 2496 – 2690 MHz	0.14	0.35

5.6. WORST-CASE CONFIGURATION AND MODE

The worst-case scenario for all measurements is based on the investigation results.

The device has LTE Bands of: Band 7 and Band 41.

The RB Size was selected to measure for peak or average ERP and EIRP, which was based on the conducted power verification baseline data.

The EUT was investigated in three orthogonal orientations X/Y/Z, it was determined that X (Flatbed) was worst-case orientation for all bands without AC/DC adapter and headset. Radiated spurious emissions were investigated below 30MHz and 30-1GHz and above 1GHz. There were no emissions found on below 30MHz and 30-1GHz.

All of the test modes for each test items are the worst case configuration after investigation.

Note: Originally the Emission Mask and Peak to Average ratio tests have done with the power higher than the EUT Average power. Lowering the Average Power doesn't influence the outcome of those measurements.

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

5.7. DESCRIPTION OF TEST SETUP

TESTS SUPPORT EQUIPMENT

Support Equipment List			
Description	Manufacturer	Model	Serial Number
Laptop AC Adapter	Dell	PA-1900-02D	N/A
Laptop	Dell	Latitude 3540	N/A
DC power supply	Sorensen	XT-20-3	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	AC	3	US 115V	Un-shielded	2m	N/A
2	DC	1	DC	Un-shielded	1.4m	N/A
3	RF In/Out	1	EUT	Un-shielded	0.4m	N/A
4	RF In/Out	1	Barrel	N/A	N/A	N/A
5	RF In/Out	1	Communication Test Set	Un-shielded	1m	N/A

I/O CABLES (RF RADIATED TEST)

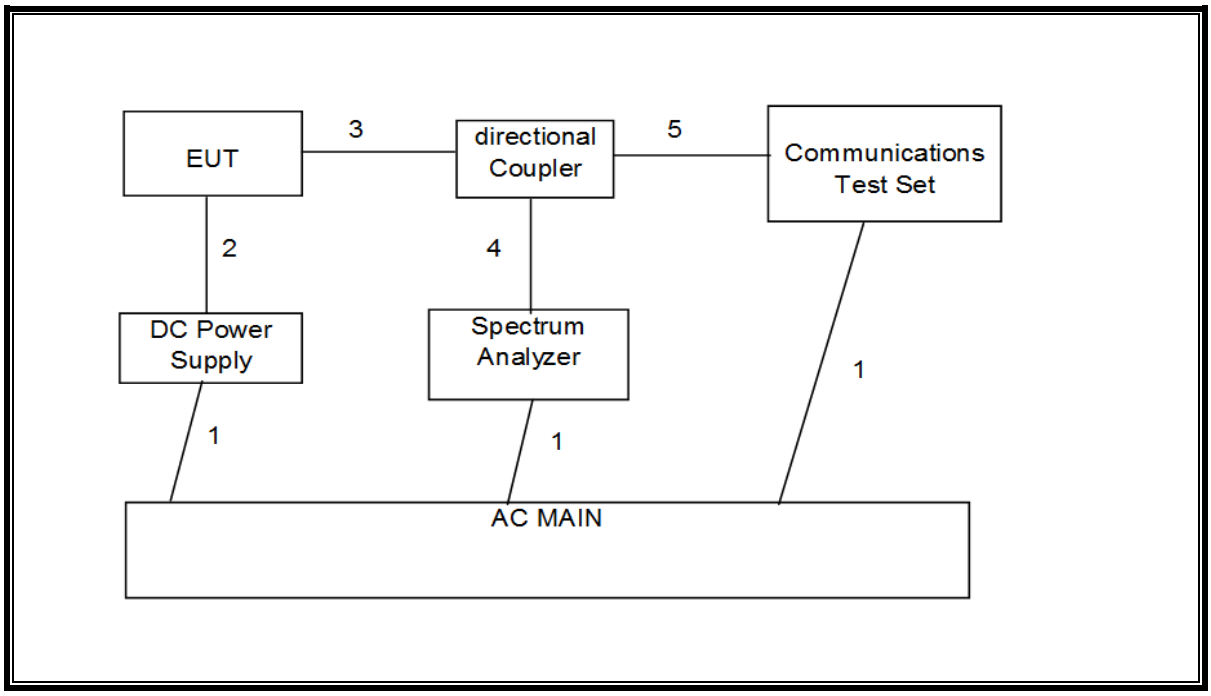
I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	RF In/Out	1	Antenna	Un-shielded	5m	NA

TEST SETUP

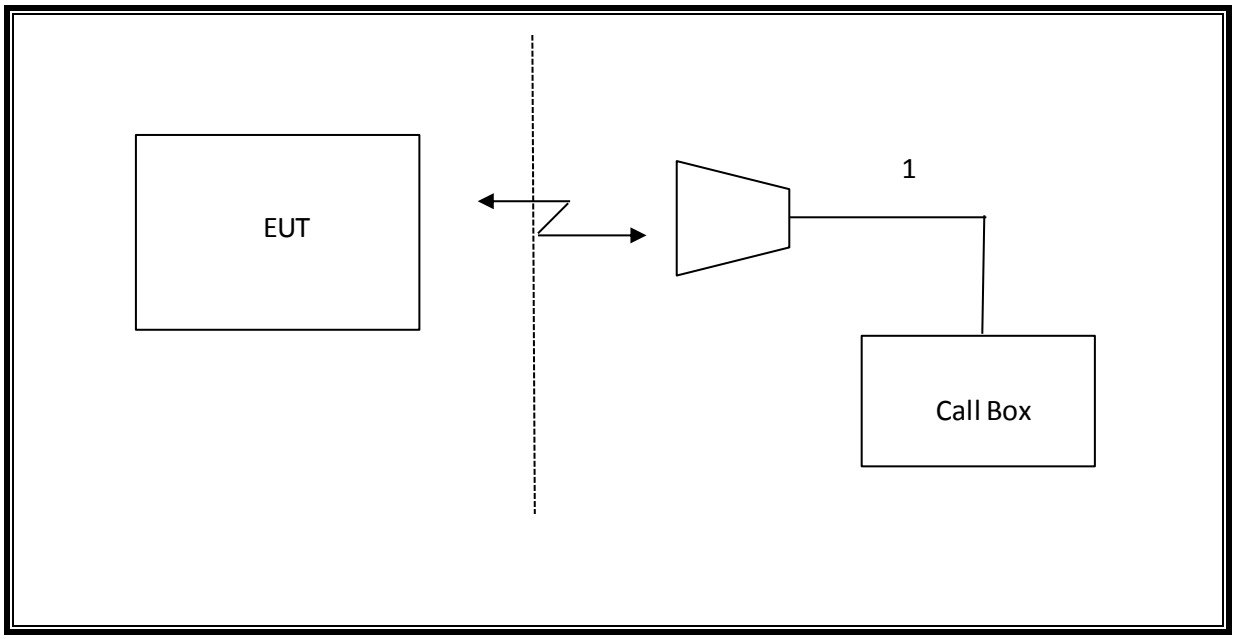
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

SETUP DIAGRAM FOR TESTS

CONDUCTED SETUP



RADIATED SETUP



UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

6. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

TEST EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**Asset**	**Cal Due**
Antenna, Horn 1-18GHz	ETS Lindgren	3117	T863	4/26/2017
Antenna, Broadband Hybrid, 30MHz to 2000MHz	Sunol Sciences	JB3	T900	5/3/2017
Amplifier, 1 to 18GHz, 35dB	Amplical	AMP1G18-35	T1569	9/15/2017
Amplifier, 10KHz to 1GHz, 32dB	Sonoma	310N	T835	6/18/2017
*Spectrum Analyzer, PXA 3Hz to 44GHz	Keysight	N9030A	T906	2/03/2017
Spectrum Analyzer, PSA 3Hz to 44GHz	Keysight	E4446A	T123	10/20/2017
Directional Coupler	KRYTAR	152610	T1536	4/11/2017
Directional Coupler	KRYTAR	152610	T1537	4/11/2017
Power Meter, P-series single channel	Keysight	N1912A	T1245	5/03/2017
Power Sensor, P - series, 50MHz to 18GHz, Wideband	Keysight	N1921A	T1226	5/18/2017
*Filter, HPF 3.0GHz	MICROTRONICS	HPM17543	T487	1/26/2017
Filter, HPF 1.2GHz	Micro-Tronics	WHKX1.2/15G-6ST	T1182	5/31/2017
Spectrum Analyzer, PXA, 3Hz to 44GHz	Keysight	N9030A	T1466	3/09/2017
Wideband Communication Test Set, Call Box	R&S GmbH & Co. KG	CMW500	T959	7/09/2017
Wideband Communication Test Set, Call Box	R&S GmbH & Co. KG	CMW500	T971	8/05/2017
Chamber, Environmental	Cincinnati Sub Zero	ZPHS-8-3.5-SCT/WC	T1154	3/12/2017
Wideband Communication Test Set, Call Box	Rohde & Schwarz	CMW500	T260	7/20/2017
Antenna, Horn 1-18GHz	Emco	3115	T59	11/18/2017
Antenna, Horn 18 to 26.5GHz	ARA	MWH-1826/B	T447	06/16/2017
Amplifier, 1 to 26.5GHz, 23.5dB Gain minimum	Keysight	8449B	T402	07/05/2017
Amplifier, 26.5GHz to 40GHz	Miteq	NSP 4000 SP2	T88	04/07/2017
Antenna, Horn 26.5GHz to 40GHz	ARA	MWH-2640/B	T446	05/25/2017

NOTE: * testing is completed before equipment calibration expiration date.

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

7. TRANSMITTER OUTPUT POWER (CONDUCTED AND EIRP)

RULE PART(S)

FCC: §2.1046, §27.50

EIRP LIMIT

FCC 27.50 (h) The following power limits shall apply in the BRS and EBS:

(2)Mobile and other user stations. Mobile stations are limited to 2.0 watts EIRP. All user stations are limited to 2.0 watts transmitter output power.

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

TEST PROCEDURE

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

3GPP TR 36.827, TR.36 830 and TR 36.831

ANSI C63.26:2015/ TIA / EIA 603-D Clause 2.2.17
KDB 971168 Section 5.6

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.2

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.

MODES TESTED

- LTE Band 7
- LTE Band 41

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

7.1. ANTENNA C

7.1.1. LTE BAND 7

ID:	50820	Date:	1/7/16

OUTPUT POWER FOR LTE BAND 7 (10.0MHz + 20.0MHz)

Antenna Gain (dBi)	0.12

Bandwidth	Frequency (MHz)	Frequency (MHz)	Modulation	PCC RB Size	PCC RB Offset	SCC1 RB Size	SCC1 RB Offset	Conducted Average (dBm)	EIRP Average (dBm)	EIRP Limit (dBm)	Margin (dB)
10MHz / 20MHz	2505.5	2519.9	QPSK	1	49	1	0	22.5	22.6	33.0	-10.4
				1	24	1	49	14.3	14.4	33.0	-18.6
				50	0	100	0	19.9	20.0	33.0	-13.0
			16QAM	1	49	1	0	21.4	21.5	33.0	-11.5
				1	24	1	49	13.4	13.5	33.0	-19.5
				50	0	100	0	19.0	19.1	33.0	-13.9
10MHz / 20MHz	2525.6	2540.0	QPSK	1	49	1	0	**22.7**	**22.8**	33.0	-10.2
				1	24	1	49	14.6	14.7	33.0	-18.3
				50	0	100	0	20.0	20.1	33.0	-12.9
			16QAM	1	49	1	0	**21.6**	**21.7**	33.0	-11.3
				1	24	1	49	13.6	13.7	33.0	-19.3
				50	0	100	0	19.8	19.9	33.0	-13.1
10MHz / 20MHz	2545.6	2560.0	QPSK	1	49	1	0	22.5	22.7	33.0	-10.4
				1	24	1	49	14.5	14.6	33.0	-18.4
				50	0	100	0	20.0	20.1	33.0	-12.9
			16QAM	1	49	1	0	21.4	21.5	33.0	-11.5
				1	24	1	49	13.5	13.6	33.0	-19.4
				50	0	100	0	19.8	19.9	33.0	-13.1

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

OUTPUT POWER FOR LTE BAND 7 (20.0MHz + 10.0MHz)

Antenna Gain (dBi)	0.12

Bandwidth	Frequency (MHz)	Frequency (MHz)	Modulation	PCC RB Size	PCC RB Offset	SCC1 RB Size	SCC1 RB Offset	Conducted Average (dBm)	EIRP Average (dBm)	EIRP Limit (dBm)	Margin (dB)
20MHz / 10MHz	2510.0	2524.4	QPSK	1	0	1	0	14.6	14.7	33.0	-18.3
				1	0	1	49	14.7	14.8	33.0	-18.2
				1	0	50	0	19.2	19.3	33.0	-13.7
				1	99	1	49	14.5	14.6	33.0	-18.4
				1	99	50	0	19.4	19.5	33.0	-13.5
				100	0	1	49	19.6	19.7	33.0	-13.3
				100	0	50	0	19.6	19.7	33.0	-13.3
				1	99	1	0	22.6	22.7	33.0	-10.3
				100	0	1	0	19.1	19.2	33.0	-13.8
			16QAM	1	0	1	0	13.3	13.4	33.0	-19.6
				1	0	1	49	13.2	13.3	33.0	-19.7
				1	0	50	0	18.1	18.2	33.0	-14.8
				1	99	1	49	13.0	13.1	33.0	-19.9
				1	99	50	0	18.4	18.5	33.0	-14.5
				100	0	1	49	18.4	18.5	33.0	-14.5
				100	0	50	0	18.6	18.7	33.0	-14.3
				1	99	1	0	21.5	21.6	33.0	-11.4
				100	0	1	0	17.9	18.1	33.0	-15.0
20MHz / 10MHz	2530.1	2544.5	QPSK	1	0	1	0	14.7	14.8	33.0	-18.2
				1	0	1	49	14.6	14.7	33.0	-18.3
				1	0	50	0	19.1	19.2	33.0	-13.8
				1	99	1	49	14.4	14.5	33.0	-18.5
				1	99	50	0	19.4	19.5	33.0	-13.5
				100	0	1	49	19.6	19.7	33.0	-13.3
				100	0	50	0	20.4	20.5	33.0	-12.5
				1	99	1	0	**22.8**	**22.9**	33.0	-10.1
				100	0	1	0	19.5	19.6	33.0	-13.4
			16QAM	1	0	1	0	13.4	13.6	33.0	-19.5
				1	0	1	49	13.3	13.5	33.0	-19.6
				1	0	50	0	18.9	19.0	33.0	-14.0
				1	99	1	49	13.1	13.3	33.0	-19.8
				1	99	50	0	18.2	18.4	33.0	-14.7
				100	0	1	49	19.5	19.7	33.0	-13.4
				100	0	50	0	19.4	19.5	33.0	-13.5
				1	99	1	0	21.5	21.7	33.0	-11.4
				100	0	1	0	18.1	18.2	33.0	-14.8
20MHz / 10MHz	2550.1	2564.5	QPSK	1	0	1	0	14.6	14.7	33.0	-18.3
				1	0	1	49	14.5	14.6	33.0	-18.4
				1	0	50	0	20.0	20.1	33.0	-12.9
				1	99	1	49	14.2	14.3	33.0	-18.7
				1	99	50	0	19.3	19.4	33.0	-13.6
				100	0	1	49	19.6	19.7	33.0	-13.3
				100	0	50	0	20.4	20.5	33.0	-12.5
				1	99	1	0	22.7	22.8	33.0	-10.2
				100	0	1	0	19.1	19.2	33.0	-13.8
			16QAM	1	0	1	0	13.5	13.6	33.0	-19.4
				1	0	1	49	13.5	13.7	33.0	-19.4
				1	0	50	0	18.9	19.0	33.0	-14.0
				1	99	1	49	14.0	14.1	33.0	-18.9
				1	99	50	0	18.2	18.3	33.0	-14.7
				100	0	1	49	18.6	18.7	33.0	-14.3
				100	0	50	0	19.4	19.6	33.0	-13.5
				1	99	1	0	**21.6**	**21.8**	33.0	-11.3
				100	0	1	0	18.1	18.2	33.0	-14.8

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

OUTPUT POWER FOR LTE BAND 7 (15.0MHz + 15.0MHz)

Antenna Gain (dBi)	0.12

Bandwidth	Frequency (MHz)	Frequency (MHz)	Modulation	PCC RB Size	PCC RB Offset	SCC1 RB Size	SCC1 RB Offset	Conducted Average (dBm)	EIRP Average (dBm)	EIRP Limit (dBm)	Margin (dB)
15MHz / 15MHz	2507.5	2522.5	QPSK	1	74	1	0	22.6	22.7	33.0	-10.3
				75	0	75	0	20.3	20.5	33.0	-12.6
			16QAM	1	74	1	0	21.4	21.6	33.0	-11.5
				75	0	75	0	19.3	19.4	33.0	-13.6
15MHz / 15MHz	2527.5	2542.5	QPSK	1	74	1	0	**22.8**	**22.9**	33.0	-10.1
				75	0	75	0	20.1	20.3	33.0	-12.8
			16QAM	1	74	1	0	21.6	21.7	33.0	-11.3
				75	0	75	0	19.2	19.3	33.0	-13.7
15MHz / 15MHz	2547.5	2562.5	QPSK	1	74	1	0	22.6	22.7	33.0	-10.3
				75	0	75	0	19.9	20.1	33.0	-13.0
			16QAM	1	74	1	0	**21.7**	**21.8**	33.0	-11.2
				75	0	75	0	18.9	19.1	33.0	-14.0

OUTPUT POWER FOR LTE BAND 7 (15.0MHz + 20.0MHz)

Antenna Gain (dBi)	0.12

Bandwidth	Frequency (MHz)	Frequency (MHz)	Modulation	PCC RB Size	PCC RB Offset	SCC1 RB Size	SCC1 RB Offset	Conducted Average (dBm)	EIRP Average (dBm)	EIRP Limit (dBm)	Margin (dB)
15MHz / 20MHz	2507.8	2524.9	QPSK	1	74	1	0	22.5	22.6	33.0	-10.4
				1	36	1	49	14.8	14.9	33.0	-18.1
				75	0	100	0	20.3	20.4	33.0	-12.6
			16QAM	1	74	1	0	21.4	21.5	33.0	-11.5
				1	36	1	49	14.4	14.5	33.0	-18.5
				75	0	100	0	19.3	19.4	33.0	-13.6
15MHz / 20MHz	2525.3	2542.4	QPSK	1	74	1	0	22.7	22.8	33.0	-10.2
				1	36	1	49	14.1	14.3	33.0	-18.8
				75	0	100	0	20.2	20.3	33.0	-12.7
			16QAM	1	74	1	0	**21.9**	**22.1**	33.0	-11.0
				1	36	1	49	13.9	14.0	33.0	-19.0
				75	0	100	0	19.2	19.3	33.0	-13.7
15MHz / 20MHz	2542.9	2560.0	QPSK	1	74	1	0	**22.8**	**22.9**	33.0	-10.1
				1	36	1	49	14.6	14.7	33.0	-18.3
				75	0	100	0	20.1	20.2	33.0	-12.8
			16QAM	1	74	1	0	21.6	21.8	33.0	-11.3
				1	36	1	49	14.3	14.5	33.0	-18.6
				75	0	100	0	19.2	19.3	33.0	-13.7

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

OUTPUT POWER FOR LTE BAND 7 (20.0MHz + 15.0MHz)

Antenna Gain (dBi)	0.12

Bandwidth	Frequency (MHz)	Frequency (MHz)	Modulation	PCC RB Size	PCC RB Offset	SCC1 RB Size	SCC1 RB Offset	Conducted Average (dBm)	EIRP Average (dBm)	EIRP Limit (dBm)	Margin (dB)
20MHz / 15MHz	2510.0	2527.1	QPSK	1	99	1	0	22.8	23.0	33.0	-10.1
				100	0	75	0	20.3	20.4	33.0	-12.6
			16QAM	1	99	1	0	21.8	21.9	33.0	-11.1
				100	0	75	0	20.2	20.4	33.0	-12.7
20MHz / 15MHz	2527.6	2544.7	QPSK	1	99	1	0	**22.9**	**23.0**	33.0	-10.0
				100	0	75	0	20.2	20.3	33.0	-12.7
			16QAM	1	99	1	0	21.6	21.7	33.0	-11.3
				100	0	75	0	19.2	19.3	33.0	-13.7
20MHz / 15MHz	2545.1	2562.2	QPSK	1	99	1	0	22.7	22.8	33.0	-10.2
				100	0	75	0	20.2	20.3	33.0	-12.7
			16QAM	1	99	1	0	**21.8**	**21.9**	33.0	-11.1
				100	0	75	0	19.2	19.3	33.0	-13.7

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

OUTPUT POWER FOR LTE BAND 7 (20.0MHz + 20.0MHz)

Antenna Gain (dBi)	0.12

Bandwidth	Frequency (MHz)	Frequency (MHz)	Modulation	PCC RB Size	PCC RB Offset	SCC1 RB Size	SCC1 RB Offset	Conducted Average (dBm)	EIRP Average (dBm)	EIRP Limit (dBm)	Margin (dB)
20MHz/ 20MHz	2510.0	2529.8	QPSK	1	0	1	0	14.5	14.6	33.0	-18.4
				1	0	1	99	14.5	14.7	33.0	-18.4
				1	0	100	0	19.5	19.6	33.0	-13.4
				1	49	1	49	14.3	14.4	33.0	-18.6
				1	99	1	99	14.2	14.3	33.0	-18.7
				1	99	100	0	20.3	20.4	33.0	-12.6
				100	0	1	99	19.4	19.5	33.0	-13.5
				100	0	100	0	20.4	20.5	33.0	-12.5
				1	99	1	0	**22.7**	**22.9**	33.0	-10.2
				100	0	1	0	20.8	20.9	33.0	-12.1
			16QAM	1	0	1	0	13.5	13.6	33.0	-19.4
				1	0	1	99	13.5	13.6	33.0	-19.4
				1	0	100	0	19.3	19.4	33.0	-13.6
				1	49	1	49	13.9	14.0	33.0	-19.0
				1	99	1	99	13.8	14.0	33.0	-19.1
				1	99	100	0	19.1	19.2	33.0	-13.8
				100	0	1	99	19.2	19.3	33.0	-13.7
				100	0	100	0	19.3	19.4	33.0	-13.6
				1	99	1	0	**21.6**	**21.8**	33.0	-11.3
				100	0	1	0	19.7	19.8	33.0	-13.2
20MHz/ 20MHz	2525.1	2544.9	QPSK	1	0	1	0	14.3	14.4	33.0	-18.6
				1	0	1	99	14.4	14.5	33.0	-18.5
				1	0	100	0	19.4	19.5	33.0	-13.5
				1	49	1	49	14.1	14.3	33.0	-18.8
				1	99	1	99	14.1	14.3	33.0	-18.8
				1	99	100	0	20.1	20.2	33.0	-12.8
				100	0	1	99	19.4	19.5	33.0	-13.5
				100	0	100	0	20.3	20.4	33.0	-12.6
				1	99	1	0	22.6	22.8	33.0	-10.3
				100	0	1	0	20.7	20.8	33.0	-12.2
			16QAM	1	0	1	0	14.0	14.1	33.0	-18.9
				1	0	1	99	14.1	14.3	33.0	-18.8
				1	0	100	0	19.3	19.4	33.0	-13.6
				1	49	1	49	13.9	14.0	33.0	-19.0
				1	99	1	99	13.8	13.9	33.0	-19.1
				1	99	100	0	19.0	19.1	33.0	-13.9
				100	0	1	99	19.1	19.2	33.0	-13.8
				100	0	100	0	19.3	19.4	33.0	-13.6
				1	99	1	0	21.5	21.6	33.0	-11.4
				100	0	1	0	19.5	19.6	33.0	-13.4
20MHz/ 20MHz	2540.2	2560.0	QPSK	1	0	1	0	14.8	14.9	33.0	-18.1
				1	0	1	99	15.8	15.9	33.0	-17.1
				1	0	100	0	19.3	19.5	33.0	-13.6
				1	49	1	49	14.7	14.8	33.0	-18.2
				1	99	1	99	14.2	14.3	33.0	-18.7
				1	99	100	0	20.0	20.2	33.0	-12.9
				100	0	1	99	19.4	19.5	33.0	-13.5
				100	0	100	0	20.2	20.3	33.0	-12.7
				1	99	1	0	22.7	22.8	33.0	-10.2
				100	0	1	0	20.9	21.1	33.0	-12.0
			16QAM	1	0	1	0	14.5	14.6	33.0	-18.4
				1	0	1	99	14.5	14.6	33.0	-18.4
				1	0	100	0	19.2	19.3	33.0	-13.7
				1	49	1	49	14.1	14.2	33.0	-18.8
				1	99	1	99	13.7	13.8	33.0	-19.2
				1	99	100	0	18.8	19.0	33.0	-14.1
				100	0	1	99	19.3	19.5	33.0	-13.6
				100	0	100	0	19.2	19.3	33.0	-13.7
				1	99	1	0	21.6	21.7	33.0	-11.3
				100	0	1	0	19.8	20.0	33.0	-13.1

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

7.1.2. LTE BAND 41

ID:	50820	Date:	1/9/16

OUTPUT POWER FOR LTE BAND 41 (5.0MHz + 20.0MHz)

Antenna Gain (dBi)	0.14

Bandwidth	Frequency (MHz)	Frequency (MHz)	Modulation	PCC RB Size	PCC RB Offset	SCC1 RB Size	SCC1 RB Offset	Conducted Average (dBm)	EIRP Average (dBm)	EIRP Limit (dBm)	Margin (dB)
5MHz / 20MHz	2499.3	2511.0	QPSK	1	24	1	0	**21.2**	**21.3**	33.0	-11.7
				1	12	1	49	13.1	13.2	33.0	-19.8
				25	0	100	0	19.0	19.1	33.0	-13.9
			16QAM	1	24	1	0	20.0	20.1	33.0	-12.9
				1	12	1	49	12.2	12.3	33.0	-20.7
				25	0	100	0	18.1	18.2	33.0	-14.8
5MHz / 20MHz	2583.8	2595.5	QPSK	1	24	1	0	**21.2**	**21.3**	33.0	-11.7
				1	12	1	49	13.1	13.2	33.0	-19.8
				25	0	100	0	18.3	18.4	33.0	-14.6
			16QAM	1	24	1	0	**20.2**	**20.3**	33.0	-12.7
				1	12	1	49	12.2	12.3	33.0	-20.7
				25	0	100	0	17.3	17.4	33.0	-15.6
5MHz / 20MHz	2668.3	2680.0	QPSK	1	24	1	0	**21.2**	**21.3**	33.0	-11.7
				1	12	1	49	13.4	13.5	33.0	-19.5
				25	0	100	0	19.2	19.3	33.0	-13.7
			16QAM	1	24	1	0	19.8	19.9	33.0	-13.1
				1	12	1	49	12.4	12.5	33.0	-20.5
				25	0	100	0	18.3	18.4	33.0	-14.6

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

OUTPUT POWER FOR LTE BAND 41 (20.0MHz + 5.0MHz)

Antenna Gain (dBi)	0.14

Bandwidth	Frequency (MHz)	Frequency (MHz)	Modulation	PCC RB Size	PCC RB Offset	SCC1 RB Size	SCC1 RB Offset	Conducted Average (dBm)	EIRP Average (dBm)	EIRP Limit (dBm)	Margin (dB)
20MHz / 5MHz	2506.0	2517.7	QPSK	1	0	1	0	13.1	13.2	33.0	-19.8
				1	0	1	24	13.1	13.2	33.0	-19.8
				1	0	25	0	17.7	17.8	33.0	-15.2
				1	99	1	24	13.2	13.3	33.0	-19.7
				1	99	25	0	18.0	18.1	33.0	-14.9
				100	0	1	24	18.2	18.3	33.0	-14.7
				100	0	25	0	19.0	19.1	33.0	-13.9
				1	99	1	0	**21.3**	**21.4**	33.0	-11.6
				100	0	1	0	17.7	17.8	33.0	-15.2
			16QAM	1	0	1	0	12.0	12.1	33.0	-20.9
				1	0	1	24	12.1	12.2	33.0	-20.8
				1	0	25	0	17.3	17.4	33.0	-15.6
				1	99	1	24	12.0	12.1	33.0	-20.9
				1	99	25	0	17.2	17.3	33.0	-15.7
				100	0	1	24	17.1	17.2	33.0	-15.8
				100	0	25	0	17.6	17.7	33.0	-15.3
				1	99	1	0	20.1	20.2	33.0	-12.8
				100	0	1	0	16.6	16.7	33.0	-16.3
20MHz / 5MHz	2590.5	2602.2	QPSK	1	0	1	0	13.2	13.3	33.0	-19.7
				1	0	1	24	13.1	13.2	33.0	-19.8
				1	0	25	0	17.8	17.9	33.0	-15.1
				1	99	1	24	13.2	13.3	33.0	-19.7
				1	99	25	0	18.2	18.3	33.0	-14.7
				100	0	1	24	18.1	18.2	33.0	-14.8
				100	0	25	0	18.6	18.7	33.0	-14.3
				1	99	1	0	21.2	21.3	33.0	-11.7
				100	0	1	0	17.5	17.6	33.0	-15.4
			16QAM	1	0	1	0	12.1	12.2	33.0	-20.8
				1	0	1	24	12.1	12.2	33.0	-20.8
				1	0	25	0	16.6	16.7	33.0	-16.3
				1	99	1	24	12.0	12.1	33.0	-20.9
				1	99	25	0	17.1	17.2	33.0	-15.8
				100	0	1	24	17.2	17.3	33.0	-15.7
				100	0	25	0	17.7	17.8	33.0	-15.2
				1	99	1	0	**20.2**	**20.3**	33.0	-12.7
				100	0	1	0	16.7	16.8	33.0	-16.2
20MHz / 5MHz	2675.0	2686.7	QPSK	1	0	1	0	13.1	13.2	33.0	-19.8
				1	0	1	24	13.0	13.1	33.0	-19.9
				1	0	25	0	17.7	17.8	33.0	-15.2
				1	99	1	24	13.1	13.2	33.0	-19.8
				1	99	25	0	18.2	18.3	33.0	-14.7
				100	0	1	24	18.0	18.1	33.0	-14.9
				100	0	25	0	18.5	18.6	33.0	-14.4
				1	99	1	0	21.1	21.2	33.0	-11.8
				100	0	1	0	17.4	17.5	33.0	-15.5
			16QAM	1	0	1	0	12.0	12.1	33.0	-20.9
				1	0	1	24	12.0	12.1	33.0	-20.9
				1	0	25	0	16.5	16.6	33.0	-16.4
				1	99	1	24	11.9	12.0	33.0	-21.0
				1	99	25	0	17.0	17.1	33.0	-15.9
				100	0	1	24	17.1	17.2	33.0	-15.8
				100	0	25	0	17.6	17.7	33.0	-15.3
				1	99	1	0	20.1	20.2	33.0	-12.8
				100	0	1	0	16.5	16.6	33.0	-16.4

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

OUTPUT POWER FOR LTE BAND 41 (10.0MHz + 20.0MHz)

Antenna Gain (dBi)	0.14

Bandwidth	Frequency (MHz)	Frequency (MHz)	Modulation	PCC RB Size	PCC RB Offset	SCC1 RB Size	SCC1 RB Offset	Conducted Average (dBm)	EIRP Average (dBm)	EIRP Limit (dBm)	Margin (dB)
10MHz / 20MHz	2501.5	2515.9	QPSK	1	49	1	0	21.3	21.4	33.0	-11.6
				1	24	1	49	13.1	13.2	33.0	-19.8
				50	0	100	0	19.1	19.2	33.0	-13.8
			16QAM	1	49	1	0	20.2	20.3	33.0	-12.7
				1	24	1	49	11.9	12.0	33.0	-21.0
				50	0	100	0	18.1	18.2	33.0	-14.8
10MHz / 20MHz	2583.6	2598.0	QPSK	1	49	1	0	**21.4**	**21.5**	33.0	-11.5
				1	24	1	49	13.2	13.3	33.0	-19.7
				50	0	100	0	19.1	19.2	33.0	-13.8
			16QAM	1	49	1	0	**20.3**	**20.4**	33.0	-12.6
				1	24	1	49	11.8	11.9	33.0	-21.1
				50	0	100	0	18.2	18.3	33.0	-14.7
10MHz / 20MHz	2665.6	2680.0	QPSK	1	49	1	0	21.3	21.4	33.0	-11.6
				1	24	1	49	13.1	13.2	33.0	-19.8
				50	0	100	0	19.0	19.1	33.0	-13.9
			16QAM	1	49	1	0	20.2	20.3	33.0	-12.7
				1	24	1	49	12.0	12.1	33.0	-20.9
				50	0	100	0	18.1	18.2	33.0	-14.8

OUTPUT POWER FOR LTE BAND 41 (20.0MHz + 10.0MHz)

Antenna Gain (dBi)	0.14

Bandwidth	Frequency (MHz)	Frequency (MHz)	Modulation	PCC RB Size	PCC RB Offset	SCC1 RB Size	SCC1 RB Offset	Conducted Average (dBm)	EIRP Average (dBm)	EIRP Limit (dBm)	Margin (dB)
20MHz / 10MHz	2506.0	2520.4	QPSK	1	99	1	0	**21.2**	**21.3**	33.0	-11.7
				100	0	50	0	18.6	18.7	33.0	-14.3
			16QAM	1	99	1	0	**20.3**	**20.4**	33.0	-12.6
				100	0	50	0	17.7	17.8	33.0	-15.2
20MHz / 10MHz	2588.1	2602.5	QPSK	1	99	1	0	**21.2**	**21.3**	33.0	-11.7
				100	0	50	0	18.6	18.7	33.0	-14.3
			16QAM	1	99	1	0	20.0	20.1	33.0	-12.9
				100	0	50	0	17.6	17.7	33.0	-15.3
20MHz / 10MHz	2670.1	2684.5	QPSK	1	99	1	0	**21.2**	**21.3**	33.0	-11.7
				100	0	50	0	18.6	18.7	33.0	-14.3
			16QAM	1	99	1	0	19.8	19.9	33.0	-13.1
				100	0	50	0	17.4	17.5	33.0	-15.5

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

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

Antenna Gain (dBi)	0.14										
Bandwidth	Frequency (MHz)	Frequency (MHz)	Modulation	PCC RB Size	PCC RB Offset	SCC1 RB Size	SCC1 RB Offset	Conducted Average (dBm)	EIRP Average (dBm)	EIRP Limit (dBm)	Margin (dB)
15MHz / 15MHz	2503.5	2518.5	QPSK	1	74	1	0	**21.3**	**21.4**	33.0	-11.6
				75	0	75	0	18.7	18.8	33.0	-14.2
			16QAM	1	74	1	0	**20.2**	**20.3**	33.0	-12.7
				75	0	75	0	18.5	18.6	33.0	-14.4
15MHz / 15MHz	2585.5	2600.5	QPSK	1	74	1	0	21.2	21.3	33.0	-11.7
				75	0	75	0	19.1	19.2	33.0	-13.8
			16QAM	1	74	1	0	**20.2**	**20.3**	33.0	-12.7
				75	0	75	0	18.0	18.1	33.0	-14.9
15MHz / 15MHz	2667.5	2682.5	QPSK	1	74	1	0	21.1	21.2	33.0	-11.8
				75	0	75	0	18.9	19.0	33.0	-14.0
			16QAM	1	74	1	0	20.0	20.1	33.0	-12.9
				75	0	75	0	18.0	18.1	33.0	-14.9

OUTPUT POWER FOR LTE BAND 41 (15.0MHz + 20.0MHz)

Antenna Gain (dBi)	0.14										
Bandwidth	Frequency (MHz)	Frequency (MHz)	Modulation	PCC RB Size	PCC RB Offset	SCC1 RB Size	SCC1 RB Offset	Conducted Average (dBm)	EIRP Average (dBm)	EIRP Limit (dBm)	Margin (dB)
15MHz / 20MHz	2503.8	2520.9	QPSK	1	74	1	0	21.2	21.3	33.0	-11.7
				1	36	1	49	13.2	13.3	33.0	-19.7
				75	0	100	0	19.1	19.2	33.0	-13.8
			16QAM	1	74	1	0	20.1	20.2	33.0	-12.8
				1	36	1	49	12.1	12.2	33.0	-20.8
				75	0	100	0	18.0	18.1	33.0	-14.9
15MHz / 20MHz	2583.3	2600.4	QPSK	1	74	1	0	**21.4**	**21.5**	33.0	-11.5
				1	36	1	49	13.1	13.2	33.0	-19.8
				75	0	100	0	19.1	19.2	33.0	-13.8
			16QAM	1	74	1	0	**20.2**	**20.3**	33.0	-12.7
				1	36	1	49	12.3	12.4	33.0	-20.6
				75	0	100	0	18.1	18.2	33.0	-14.8
15MHz / 20MHz	2662.9	2680.0	QPSK	1	74	1	0	21.1	21.2	33.0	-11.8
				1	36	1	49	13.5	13.6	33.0	-19.4
				75	0	100	0	18.7	18.8	33.0	-14.2
			16QAM	1	74	1	0	20.1	20.2	33.0	-12.8
				1	36	1	49	12.5	12.6	33.0	-20.4
				75	0	100	0	18.0	18.1	33.0	-14.9

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

OUTPUT POWER FOR LTE BAND 41 (20.0MHz + 15.0MHz)

Antenna Gain (dBi)	0.14

Bandwidth	Frequency (MHz)	Frequency (MHz)	Modulation	PCC RB Size	PCC RB Offset	SCC1 RB Size	SCC1 RB Offset	Conducted Average (dBm)	EIRP Average (dBm)	EIRP Limit (dBm)	Margin (dB)
20MHz / 15MHz	2506.0	2523.1	QPSK	1	99	1	0	**21.5**	**21.6**	33.0	-11.4
				100	0	75	0	19.5	19.6	33.0	-13.4
			16QAM	1	99	1	0	20.0	20.1	33.0	-12.9
				100	0	75	0	18.1	18.2	33.0	-14.8
20MHz / 15MHz	2585.6	2602.7	QPSK	1	99	1	0	21.4	21.5	33.0	-11.5
				100	0	75	0	19.2	19.3	33.0	-13.7
			16QAM	1	99	1	0	**20.2**	**20.3**	33.0	-12.7
				100	0	75	0	18.4	18.5	33.0	-14.5
20MHz / 15MHz	2665.1	2682.2	QPSK	1	99	1	0	21.2	21.3	33.0	-11.7
				100	0	75	0	19.2	19.3	33.0	-13.7
			16QAM	1	99	1	0	20.0	20.1	33.0	-12.9
				100	0	75	0	18.2	18.3	33.0	-14.7

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

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

Antenna Gain (dBi)	0.14

Bandwidth	Frequency (MHz)	Frequency (MHz)	Modulation	PCC RB Size	PCC RB Offset	SCC1 RB Size	SCC1 RB Offset	Conducted Average (dBm)	EIRP Average (dBm)	EIRP Limit (dBm)	Margin (dB)
20MHz/ 20MHz	2506.0	2525.8	QPSK	1	0	1	0	13.2	13.3	33.0	-19.7
				1	0	1	99	13.4	13.5	33.0	-19.5
				1	0	100	0	18.3	18.5	33.0	-14.5
				1	49	1	49	13.3	13.5	33.0	-19.6
				1	99	1	99	13.3	13.5	33.0	-19.6
				1	99	100	0	19.1	19.2	33.0	-13.8
				100	0	1	99	18.5	18.6	33.0	-14.4
				100	0	100	0	19.2	19.3	33.0	-13.7
				1	99	1	0	21.2	21.3	33.0	-11.7
				100	0	1	0	19.4	19.5	33.0	-13.5
			16QAM	1	0	1	0	13.0	13.1	33.0	-19.9
				1	0	1	99	13.4	13.5	33.0	-19.5
				1	0	100	0	18.2	18.4	33.0	-14.7
				1	49	1	49	13.0	13.2	33.0	-19.9
				1	99	1	99	13.0	13.2	33.0	-19.8
				1	99	100	0	18.0	18.2	33.0	-14.8
				100	0	1	99	18.1	18.3	33.0	-14.8
				100	0	100	0	18.1	18.3	33.0	-14.8
				1	99	1	0	20.0	20.1	33.0	-12.9
				100	0	1	0	18.4	18.6	33.0	-14.4
20MHz/ 20MHz	2583.1	2602.9	QPSK	1	0	1	0	13.1	13.3	33.0	-19.8
				1	0	1	99	20.6	20.7	33.0	-12.3
				1	0	100	0	19.1	19.3	33.0	-13.8
				1	49	1	49	13.1	13.3	33.0	-19.8
				1	99	1	99	13.1	13.2	33.0	-19.8
				1	99	100	0	18.4	18.5	33.0	-14.5
				100	0	1	99	19.5	19.6	33.0	-13.4
				100	0	100	0	19.1	19.2	33.0	-13.8
				1	99	1	0	21.2	21.4	33.0	-11.7
				100	0	1	0	18.1	18.3	33.0	-14.8
			16QAM	1	0	1	0	13.1	13.2	33.0	-19.8
				1	0	1	99	19.9	20.0	33.0	-13.0
				1	0	100	0	18.2	18.4	33.0	-14.6
				1	49	1	49	12.9	13.0	33.0	-20.0
				1	99	1	99	12.9	13.1	33.0	-20.0
				1	99	100	0	18.1	18.3	33.0	-14.7
				100	0	1	99	18.5	18.6	33.0	-14.4
				100	0	100	0	18.2	18.3	33.0	-14.7
				1	99	1	0	20.1	20.3	33.0	-12.8
				100	0	1	0	18.3	18.5	33.0	-14.6
20MHz/ 20MHz	2660.2	2680.0	QPSK	1	0	1	0	13.0	13.2	33.0	-19.8
				1	0	1	99	13.1	13.3	33.0	-19.7
				1	0	100	0	19.0	19.2	33.0	-13.9
				1	49	1	49	13.0	13.2	33.0	-19.8
				1	99	1	99	13.1	13.2	33.0	-19.8
				1	99	100	0	18.2	18.3	33.0	-14.7
				100	0	1	99	19.4	19.5	33.0	-13.5
				100	0	100	0	19.0	19.2	33.0	-13.8
				1	99	1	0	**21.3**	**21.5**	33.0	-11.5
				100	0	1	0	18.3	18.4	33.0	-14.6
			16QAM	1	0	1	0	12.5	12.6	33.0	-20.4
				1	0	1	99	12.9	13.1	33.0	-20.0
				1	0	100	0	17.7	17.9	33.0	-15.1
				1	49	1	49	12.8	13.0	33.0	-20.0
				1	99	1	99	12.9	13.1	33.0	-19.9
				1	99	100	0	18.1	18.2	33.0	-14.8
				100	0	1	99	18.3	18.5	33.0	-14.5
				100	0	100	0	18.1	18.2	33.0	-14.8
				1	99	1	0	**20.2**	**20.4**	33.0	-12.6
				100	0	1	0	18.0	18.1	33.0	-14.9

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

7.2. ANTENNA D

7.2.1. LTE BAND 7

ID:	38806	Date:	1/9/17

OUTPUT POWER FOR LTE BAND 7 (10.0MHz + 20.0MHz)

Antenna Gain (dBi)	0.35

Bandwidth	Frequency (MHz)	Frequency (MHz)	Modulation	PCC RB Size	PCC RB Offset	SCC1 RB Size	SCC1 RB Offset	Conducted Average (dBm)	EIRP Average (dBm)	EIRP Limit (dBm)	Margin (dB)
10MHz / 20MHz	2505.5	2519.9	QPSK	1	49	1	0	**20.7**	**21.0**	33.0	-12.0
				1	24	1	49	12.4	12.7	33.0	-20.3
				50	0	100	0	18.4	18.8	33.0	-14.2
			16QAM	1	74	1	0	19.6	19.9	33.0	-13.1
				1	24	1	49	12.0	12.4	33.0	-20.6
				50	0	100	0	17.4	17.8	33.0	-15.3
10MHz / 20MHz	2525.6	2540.0	QPSK	1	49	1	0	20.6	21.0	33.0	-12.0
				1	24	1	49	12.3	12.7	33.0	-20.3
				50	0	100	0	18.3	18.7	33.0	-14.4
			16QAM	1	49	1	0	**19.6**	**20.0**	33.0	-13.1
				1	24	1	49	12.0	12.3	33.0	-20.7
				50	0	100	0	17.4	17.7	33.0	-15.3
10MHz / 20MHz	2545.6	2560.0	QPSK	1	49	1	0	20.5	20.9	33.0	-12.2
				1	24	1	49	12.2	12.6	33.0	-20.5
				50	0	100	0	18.1	18.5	33.0	-14.5
			16QAM	1	49	1	0	19.5	19.9	33.0	-13.2
				1	24	1	49	11.8	12.2	33.0	-20.9
				50	0	100	0	17.3	17.6	33.0	-15.4

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

OUTPUT POWER FOR LTE BAND 7 (20.0MHz + 10.0MHz)

Antenna Gain (dBi)	0.35

Bandwidth	Frequency (MHz)	Frequency (MHz)	Modulation	PCC RB Size	PCC RB Offset	SCC1 RB Size	SCC1 RB Offset	Conducted Average (dBm)	EIRP Average (dBm)	EIRP Limit (dBm)	Margin (dB)
20MHz / 10MHz	2510.0	2524.4	QPSK	1	0	1	0	12.4	12.7	33.0	-20.3
				1	0	1	49	12.3	12.6	33.0	-20.4
				1	0	50	0	16.9	17.2	33.0	-15.8
				1	99	1	49	12.2	12.6	33.0	-20.4
				1	99	50	0	18.2	18.6	33.0	-14.4
				100	0	1	49	17.2	17.6	33.0	-15.4
				100	0	50	0	18.2	18.6	33.0	-14.5
				1	99	1	0	**20.7**	**21.1**	33.0	-12.0
				100	0	1	0	18.7	19.1	33.0	-13.9
			16QAM	1	0	1	0	11.9	12.3	33.0	-20.8
				1	0	1	49	12.1	12.5	33.0	-20.5
				1	0	50	0	16.7	17.1	33.0	-16.0
				1	99	1	49	11.9	12.2	33.0	-20.8
				1	99	50	0	17.2	17.6	33.0	-15.4
				100	0	1	49	17.1	17.5	33.0	-15.5
				100	0	50	0	17.3	17.6	33.0	-15.4
				1	99	1	0	19.6	20.0	33.0	-13.1
				100	0	1	0	17.7	18.0	33.0	-15.0
20MHz / 10MHz	2530.1	2544.5	QPSK	1	0	1	0	12.3	12.7	33.0	-20.4
				1	0	1	49	12.2	12.5	33.0	-20.5
				1	0	50	0	16.3	16.7	33.0	-16.3
				1	99	1	49	12.3	12.6	33.0	-20.4
				1	99	50	0	16.8	17.1	33.0	-15.9
				100	0	1	49	16.9	17.2	33.0	-15.8
				100	0	50	0	18.3	18.7	33.0	-14.3
				1	99	1	0	20.6	21.0	33.0	-12.1
				100	0	1	0	17.3	17.7	33.0	-15.4
			16QAM	1	0	1	0	12.1	12.4	33.0	-20.6
				1	0	1	49	12.3	12.6	33.0	-20.4
				1	0	50	0	16.3	16.7	33.0	-16.3
				1	99	1	49	11.9	12.3	33.0	-20.8
				1	99	50	0	16.7	17.1	33.0	-16.0
				100	0	1	49	17.5	17.9	33.0	-15.1
				100	0	50	0	17.3	17.7	33.0	-15.4
				1	99	1	0	**19.7**	**20.0**	33.0	-13.0
				100	0	1	0	17.0	17.4	33.0	-15.6
20MHz / 10MHz	2550.1	2564.5	QPSK	1	0	1	0	12.1	12.5	33.0	-20.6
				1	0	1	49	12.0	12.4	33.0	-20.6
				1	0	50	0	16.7	17.0	33.0	-16.0
				1	99	1	49	12.0	12.4	33.0	-20.7
				1	99	50	0	18.0	18.4	33.0	-14.7
				100	0	1	49	17.0	17.4	33.0	-15.7
				100	0	50	0	18.0	18.3	33.0	-14.7
				1	99	1	0	20.6	21.0	33.0	-12.1
				100	0	1	0	18.5	18.9	33.0	-14.2
			16QAM	1	0	1	0	11.7	12.0	33.0	-21.0
				1	0	1	49	11.9	12.2	33.0	-20.8
				1	0	50	0	16.5	16.8	33.0	-16.2
				1	99	1	49	11.7	12.0	33.0	-21.0
				1	99	50	0	17.0	17.4	33.0	-15.6
				100	0	1	49	16.9	17.2	33.0	-15.8
				100	0	50	0	17.1	17.4	33.0	-15.6
				1	99	1	0	19.5	19.9	33.0	-13.2
				100	0	1	0	17.5	17.8	33.0	-15.2

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

OUTPUT POWER FOR LTE BAND 7 (15.0MHz + 15.0MHz)

Antenna Gain (dBi)	0.35

Bandwidth	Frequency (MHz)	Frequency (MHz)	Modulation	PCC RB Size	PCC RB Offset	SCC1 RB Size	SCC1 RB Offset	Conducted Average (dBm)	EIRP Average (dBm)	EIRP Limit (dBm)	Margin (dB)
15MHz / 15MHz	2507.5	2522.5	QPSK	1	74	1	0	20.7	21.1	33.0	-11.9
				75	0	75	0	18.3	18.6	33.0	-14.4
			16QAM	1	74	1	0	19.6	20.0	33.0	-13.0
				75	0	75	0	17.2	17.6	33.0	-15.4
15MHz / 15MHz	2527.5	2542.5	QPSK	1	74	1	0	20.7	21.0	33.0	-12.0
				75	0	75	0	18.4	18.8	33.0	-14.3
			16QAM	1	74	1	0	19.6	19.9	33.0	-13.1
				75	0	75	0	17.4	17.8	33.0	-15.2
15MHz / 15MHz	2547.5	2562.5	QPSK	1	74	1	0	**20.8**	**21.2**	33.0	-11.9
				75	0	75	0	18.4	18.7	33.0	-14.3
			16QAM	1	74	1	0	**19.7**	**20.0**	33.0	-13.0
				75	0	75	0	17.4	17.7	33.0	-15.3

OUTPUT POWER FOR LTE BAND 7 (15.0MHz + 20.0MHz)

Antenna Gain (dBi)	0.35

Bandwidth	Frequency (MHz)	Frequency (MHz)	Modulation	PCC RB Size	PCC RB Offset	SCC1 RB Size	SCC1 RB Offset	Conducted Average (dBm)	EIRP Average (dBm)	EIRP Limit (dBm)	Margin (dB)
15MHz / 20MHz	2507.8	2524.9	QPSK	1	74	1	0	20.7	21.0	33.0	-12.0
				1	36	1	49	12.3	12.6	33.0	-20.4
				75	0	100	0	18.2	18.6	33.0	-14.4
			16QAM	1	74	1	0	19.5	19.9	33.0	-13.2
				1	36	1	49	12.2	12.6	33.0	-20.4
				75	0	100	0	17.4	17.7	33.0	-15.3
15MHz / 20MHz	2525.3	2542.4	QPSK	1	74	1	0	20.6	20.9	33.0	-12.1
				1	36	1	49	12.2	12.5	33.0	-20.5
				75	0	100	0	18.2	18.5	33.0	-14.5
			16QAM	1	74	1	0	19.4	19.7	33.0	-13.3
				1	36	1	49	12.2	12.5	33.0	-20.5
				75	0	100	0	17.3	17.6	33.0	-15.4
15MHz / 20MHz	2542.9	2560.0	QPSK	1	74	1	0	**21.0**	**21.3**	33.0	-11.7
				1	36	1	49	12.2	12.5	33.0	-20.5
				75	0	100	0	18.1	18.4	33.0	-14.6
			16QAM	1	74	1	0	**20.0**	**20.3**	33.0	-12.7
				1	36	1	49	12.1	12.5	33.0	-20.5
				75	0	100	0	17.2	17.6	33.0	-15.4

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

OUTPUT POWER FOR LTE BAND 7 (20.0MHz + 15.0MHz)

Antenna Gain (dBi)	0.35

Bandwidth	Frequency (MHz)	Frequency (MHz)	Modulation	PCC RB Size	PCC RB Offset	SCC1 RB Size	SCC1 RB Offset	Conducted Average (dBm)	EIRP Average (dBm)	EIRP Limit (dBm)	Margin (dB)
20MHz / 15MHz	2510.0	2527.1	QPSK	1	99	1	0	20.8	21.1	33.0	-11.9
				100	0	75	0	18.4	18.7	33.0	-14.3
			16QAM	1	99	1	0	19.7	20.0	33.0	-13.0
				100	0	75	0	17.4	17.7	33.0	-15.3
20MHz / 15MHz	2527.6	2544.7	QPSK	1	99	1	0	20.7	21.1	33.0	-12.0
				100	0	75	0	18.4	18.8	33.0	-14.2
			16QAM	1	99	1	0	19.7	20.1	33.0	-13.0
				100	0	75	0	17.4	17.8	33.0	-15.3
20MHz / 15MHz	2545.1	2562.2	QPSK	1	99	1	0	**20.9**	**21.2**	33.0	-11.8
				100	0	75	0	18.5	18.9	33.0	-14.2
			16QAM	1	99	1	0	**19.9**	**20.3**	33.0	-12.8
				100	0	75	0	17.5	17.8	33.0	-15.2

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

OUTPUT POWER FOR LTE BAND 7 (20.0MHz + 20.0MHz)

Antenna Gain (dBi)	0.35

Bandwidth	Frequency (MHz)	Frequency (MHz)	Modulation	PCC RB Size	PCC RB Offset	SCC1 RB Size	SCC1 RB Offset	Conducted Average (dBm)	EIRP Average (dBm)	EIRP Limit (dBm)	Margin (dB)
20MHz/ 20MHz	2510.0	2529.8	QPSK	1	0	1	0	12.4	12.7	33.0	-20.3
				1	0	1	99	12.5	12.9	33.0	-20.2
				1	0	100	0	17.5	17.8	33.0	-15.2
				1	49	1	49	12.4	12.7	33.0	-20.3
				1	99	1	99	12.4	12.7	33.0	-20.3
				1	99	100	0	18.3	18.7	33.0	-14.3
				100	0	1	99	17.5	17.8	33.0	-15.2
				100	0	100	0	18.4	18.7	33.0	-14.3
				1	99	1	0	20.6	21.0	33.0	-12.0
				100	0	1	0	18.8	19.1	33.0	-13.9
			16QAM	1	0	1	0	12.0	12.3	33.0	-20.7
				1	0	1	99	12.2	12.5	33.0	-20.5
				1	0	100	0	17.4	17.7	33.0	-15.3
				1	49	1	49	12.1	12.4	33.0	-20.6
				1	99	1	99	12.0	12.4	33.0	-20.7
				1	99	100	0	17.2	17.5	33.0	-15.5
				100	0	1	99	17.3	17.6	33.0	-15.4
				100	0	100	0	17.9	18.2	33.0	-14.8
				1	99	1	0	19.6	20.0	33.0	-13.0
				100	0	1	0	17.7	18.1	33.0	-15.0
20MHz/ 20MHz	2525.1	2544.9	QPSK	1	0	1	0	12.3	12.7	33.0	-20.4
				1	0	1	99	12.4	12.8	33.0	-20.2
				1	0	100	0	17.4	17.7	33.0	-15.3
				1	49	1	49	12.3	12.6	33.0	-20.4
				1	99	1	99	12.3	12.7	33.0	-20.4
				1	99	100	0	18.3	18.6	33.0	-14.4
				100	0	1	99	17.4	17.7	33.0	-15.3
				100	0	100	0	18.3	18.6	33.0	-14.4
				1	99	1	0	**20.9**	**21.2**	33.0	-11.8
				100	0	1	0	18.7	19.1	33.0	-13.9
			16QAM	1	0	1	0	12.0	12.3	33.0	-20.7
				1	0	1	99	12.2	12.5	33.0	-20.5
				1	0	100	0	17.3	17.6	33.0	-15.4
				1	49	1	49	12.0	12.4	33.0	-20.7
				1	99	1	99	11.9	12.3	33.0	-20.7
				1	99	100	0	17.1	17.5	33.0	-15.6
				100	0	1	99	17.2	17.6	33.0	-15.5
				100	0	100	0	17.8	18.2	33.0	-14.8
				1	99	1	0	**20.0**	**20.4**	33.0	-12.7
				100	0	1	0	17.6	18.0	33.0	-15.0
20MHz/ 20MHz	2540.2	2560.0	QPSK	1	0	1	0	12.3	12.6	33.0	-20.4
				1	0	1	99	12.4	12.8	33.0	-20.3
				1	0	100	0	17.4	17.7	33.0	-15.3
				1	49	1	49	12.3	12.6	33.0	-20.4
				1	99	1	99	12.3	12.7	33.0	-20.3
				1	99	100	0	18.3	18.6	33.0	-14.4
				100	0	1	99	17.4	17.8	33.0	-15.3
				100	0	100	0	18.3	18.7	33.0	-14.4
				1	99	1	0	20.7	21.0	33.0	-12.0
				100	0	1	0	18.7	19.1	33.0	-13.9
			16QAM	1	0	1	0	11.9	12.3	33.0	-20.7
				1	0	1	99	12.1	12.5	33.0	-20.5
				1	0	100	0	17.3	17.7	33.0	-15.4
				1	49	1	49	12.0	12.4	33.0	-20.7
				1	99	1	99	12.0	12.3	33.0	-20.7
				1	99	100	0	17.1	17.5	33.0	-15.5
				100	0	1	99	17.2	17.5	33.0	-15.5
				100	0	100	0	17.8	18.2	33.0	-14.9
				1	99	1	0	19.7	20.0	33.0	-13.0
				100	0	1	0	17.6	18.0	33.0	-15.0

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

7.2.2. LTE BAND 41

ID:	50820	Date:	1/10/17

OUTPUT POWER FOR LTE BAND 41 (5.0MHz + 20.0MHz)

Antenna Gain (dBi)	0.35

Bandwidth	Frequency (MHz)	Frequency (MHz)	Modulation	PCC RB Size	PCC RB Offset	SCC1 RB Size	SCC1 RB Offset	Conducted Average (dBm)	EIRP Average (dBm)	EIRP Limit (dBm)	Margin (dB)
5MHz / 20MHz	2499.3	2511.0	QPSK	1	24	1	0	**20.9**	**21.2**	33.0	-11.8
				1	12	1	49	12.5	12.8	33.0	-20.2
				25	0	100	0	18.4	18.8	33.0	-14.3
			16QAM	1	24	1	0	19.2	19.5	33.0	-13.5
				1	12	1	49	11.6	12.0	33.0	-21.0
				25	0	100	0	17.5	17.9	33.0	-15.1
5MHz / 20MHz	2583.8	2595.5	QPSK	1	24	1	0	20.7	21.1	33.0	-11.9
				1	12	1	49	12.6	13.0	33.0	-20.0
				25	0	100	0	18.6	18.9	33.0	-14.1
			16QAM	1	24	1	0	19.3	19.7	33.0	-13.3
				1	12	1	49	11.8	12.1	33.0	-20.9
				25	0	100	0	17.6	18.0	33.0	-15.1
5MHz / 20MHz	2668.3	2680.0	QPSK	1	24	1	0	20.8	21.1	33.0	-11.9
				1	12	1	49	12.6	13.0	33.0	-20.1
				25	0	100	0	18.6	18.9	33.0	-14.1
			16QAM	1	24	1	0	**19.7**	**20.0**	33.0	-13.0
				1	12	1	49	11.4	11.8	33.0	-21.2
				25	0	100	0	17.4	17.8	33.0	-15.2

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

OUTPUT POWER FOR LTE BAND 41 (20.0MHz + 5.0MHz)

Antenna Gain (dBi)	0.35										
Bandwidth	Frequency (MHz)	Frequency (MHz)	Modulation	PCC RB Size	PCC RB Offset	SCC1 RB Size	SCC1 RB Offset	Conducted Average (dBm)	EIRP Average (dBm)	EIRP Limit (dBm)	Margin (dB)
20MHz / 5MHz	2506.0	2517.7	QPSK	1	0	1	0	12.7	13.0	33.0	-20.0
				1	0	1	24	12.6	13.0	33.0	-20.0
				1	0	25	0	16.2	16.5	33.0	-16.5
				1	99	1	24	12.6	13.0	33.0	-20.0
				1	99	25	0	18.5	18.9	33.0	-14.1
				100	0	1	24	18.5	18.9	33.0	-14.2
				100	0	25	0	18.5	18.8	33.0	-14.2
				1	99	1	0	**20.6**	**20.9**	33.0	-12.1
				100	0	1	0	19.1	19.5	33.0	-13.5
			16QAM	1	0	1	0	12.5	12.8	33.0	-20.2
				1	0	1	24	12.6	12.9	33.0	-20.1
				1	0	25	0	16.4	16.7	33.0	-16.3
				1	99	1	24	12.5	12.9	33.0	-20.2
				1	99	25	0	17.5	17.8	33.0	-15.2
				100	0	1	24	17.5	17.9	33.0	-15.1
				100	0	25	0	17.6	17.9	33.0	-15.1
				1	99	1	0	**19.4**	**19.7**	33.0	-13.3
				100	0	1	0	18.1	18.4	33.0	-14.6
20MHz / 5MHz	2590.5	2602.2	QPSK	1	0	1	0	12.6	12.9	33.0	-20.1
				1	0	1	24	13.0	13.3	33.0	-19.7
				1	0	25	0	18.6	18.9	33.0	-14.1
				1	99	1	24	12.5	12.8	33.0	-20.2
				1	99	25	0	16.2	16.5	33.0	-16.5
				100	0	1	24	18.9	19.2	33.0	-13.8
				100	0	25	0	18.5	18.9	33.0	-14.2
				1	99	1	0	20.5	20.8	33.0	-12.2
				100	0	1	0	17.5	17.9	33.0	-15.1
			16QAM	1	0	1	0	12.4	12.8	33.0	-20.2
				1	0	1	24	12.3	12.7	33.0	-20.4
				1	0	25	0	17.6	17.9	33.0	-15.1
				1	99	1	24	12.2	12.6	33.0	-20.5
				1	99	25	0	16.1	16.4	33.0	-16.6
				100	0	1	24	17.9	18.2	33.0	-14.8
				100	0	25	0	17.6	18.0	33.0	-15.0
				1	99	1	0	19.3	19.7	33.0	-13.4
				100	0	1	0	17.9	18.3	33.0	-14.8
20MHz / 5MHz	2675.0	2686.7	QPSK	1	0	1	0	12.6	12.9	33.0	-20.1
				1	0	1	24	12.5	12.9	33.0	-20.2
				1	0	25	0	16.1	16.4	33.0	-16.6
				1	99	1	24	12.5	12.9	33.0	-20.1
				1	99	25	0	18.4	18.8	33.0	-14.2
				100	0	1	24	18.4	18.7	33.0	-14.3
				100	0	25	0	18.4	18.7	33.0	-14.3
				1	99	1	0	20.5	20.8	33.0	-12.2
				100	0	1	0	19.0	19.4	33.0	-13.6
			16QAM	1	0	1	0	12.4	12.7	33.0	-20.3
				1	0	1	24	12.5	12.8	33.0	-20.2
				1	0	25	0	16.3	16.6	33.0	-16.4
				1	99	1	24	12.4	12.8	33.0	-20.2
				1	99	25	0	17.3	17.7	33.0	-15.3
				100	0	1	24	17.4	17.8	33.0	-15.2
				100	0	25	0	17.5	17.8	33.0	-15.2
				1	99	1	0	19.3	19.6	33.0	-13.4
				100	0	1	0	18.0	18.3	33.0	-14.7

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

OUTPUT POWER FOR LTE BAND 41 (10.0MHz + 20.0MHz)

Antenna Gain (dBi)	0.35

Bandwidth	Frequency (MHz)	Frequency (MHz)	Modulation	PCC RB Size	PCC RB Offset	SCC1 RB Size	SCC1 RB Offset	Conducted Average (dBm)	EIRP Average (dBm)	EIRP Limit (dBm)	Margin (dB)
10MHz / 20MHz	2501.5	2515.9	QPSK	1	49	1	0	20.2	20.6	33.0	-12.4
				1	24	1	49	12.4	12.8	33.0	-20.3
				50	0	100	0	18.5	18.9	33.0	-14.1
			16QAM	1	49	1	0	**19.8**	**20.2**	33.0	-12.8
				1	24	1	49	11.3	11.7	33.0	-21.4
				50	0	100	0	17.4	17.7	33.0	-15.3
10MHz / 20MHz	2583.6	2598.0	QPSK	1	49	1	0	20.5	20.9	33.0	-12.2
				1	24	1	49	12.2	12.5	33.0	-20.5
				50	0	100	0	18.4	18.8	33.0	-14.3
			16QAM	1	49	1	0	19.1	19.4	33.0	-13.6
				1	24	1	49	11.8	12.1	33.0	-20.9
				50	0	100	0	17.5	17.9	33.0	-15.1
10MHz / 20MHz	2665.6	2680.0	QPSK	1	49	1	0	**20.6**	**21.0**	33.0	-12.1
				1	24	1	49	12.8	13.2	33.0	-19.8
				50	0	100	0	18.4	18.8	33.0	-14.2
			16QAM	1	49	1	0	19.4	19.8	33.0	-13.2
				1	24	1	49	11.3	11.6	33.0	-21.4
				50	0	100	0	17.5	17.8	33.0	-15.2

OUTPUT POWER FOR LTE BAND 41 (20.0MHz + 10.0MHz)

Antenna Gain (dBi)	0.35

Bandwidth	Frequency (MHz)	Frequency (MHz)	Modulation	PCC RB Size	PCC RB Offset	SCC1 RB Size	SCC1 RB Offset	Conducted Average (dBm)	EIRP Average (dBm)	EIRP Limit (dBm)	Margin (dB)
20MHz / 10MHz	2506.0	2520.4	QPSK	1	99	1	0	**20.7**	**21.0**	33.0	-12.0
				100	0	50	0	18.5	18.9	33.0	-14.1
			16QAM	1	99	1	0	19.5	19.9	33.0	-13.1
				100	0	50	0	17.6	17.9	33.0	-15.1
20MHz / 10MHz	2588.1	2602.5	QPSK	1	99	1	0	20.6	20.9	33.0	-12.1
				100	0	50	0	18.2	18.6	33.0	-14.4
			16QAM	1	99	1	0	**19.9**	**20.2**	33.0	-12.8
				100	0	50	0	17.6	17.9	33.0	-15.1
20MHz / 10MHz	2670.1	2684.5	QPSK	1	99	1	0	20.6	20.9	33.0	-12.1
				100	0	50	0	18.4	18.8	33.0	-14.3
			16QAM	1	99	1	0	19.2	19.6	33.0	-13.5
				100	0	50	0	17.4	17.7	33.0	-15.3

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

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

Antenna Gain (dBi)	0.35

Bandwidth	Frequency (MHz)	Frequency (MHz)	Modulation	PCC RB Size	PCC RB Offset	SCC1 RB Size	SCC1 RB Offset	Conducted Average (dBm)	EIRP Average (dBm)	EIRP Limit (dBm)	Margin (dB)
15MHz / 15MHz	2503.5	2518.5	QPSK	1	74	1	0	20.5	20.8	33.0	-12.2
				75	0	75	0	18.6	18.9	33.0	-14.1
			16QAM	1	74	1	0	18.2	18.5	33.0	-14.5
				75	0	75	0	17.4	17.8	33.0	-15.3
15MHz / 15MHz	2585.5	2600.5	QPSK	1	74	1	0	**20.8**	**21.1**	33.0	-11.9
				75	0	75	0	18.5	18.9	33.0	-14.2
			16QAM	1	74	1	0	**19.5**	**19.8**	33.0	-13.2
				75	0	75	0	17.5	17.8	33.0	-15.2
15MHz / 15MHz	2667.5	2682.5	QPSK	1	74	1	0	20.5	20.8	33.0	-12.2
				75	0	75	0	18.5	18.8	33.0	-14.2
			16QAM	1	74	1	0	17.4	17.8	33.0	-15.3
				75	0	75	0	17.6	17.9	33.0	-15.1

OUTPUT POWER FOR LTE BAND 41 (15.0MHz + 20.0MHz)

Antenna Gain (dBi)	0.35

Bandwidth	Frequency (MHz)	Frequency (MHz)	Modulation	PCC RB Size	PCC RB Offset	SCC1 RB Size	SCC1 RB Offset	Conducted Average (dBm)	EIRP Average (dBm)	EIRP Limit (dBm)	Margin (dB)
15MHz / 20MHz	2503.8	2520.9	QPSK	1	74	1	0	**20.7**	**21.0**	33.0	-12.0
				1	36	1	49	12.8	13.1	33.0	-19.9
				75	0	100	0	18.6	18.9	33.0	-14.1
			16QAM	1	74	1	0	**19.2**	**19.5**	33.0	-13.5
				1	36	1	49	11.7	12.0	33.0	-21.0
				75	0	100	0	17.4	17.8	33.0	-15.2
15MHz / 20MHz	2583.3	2600.4	QPSK	1	74	1	0	20.3	20.7	33.0	-12.4
				1	36	1	49	12.7	13.1	33.0	-19.9
				75	0	100	0	18.5	18.9	33.0	-14.1
			16QAM	1	74	1	0	19.1	19.4	33.0	-13.6
				1	36	1	49	11.7	12.0	33.0	-21.0
				75	0	100	0	17.5	17.8	33.0	-15.2
15MHz / 20MHz	2662.9	2680.0	QPSK	1	74	1	0	20.1	20.5	33.0	-12.6
				1	36	1	49	12.0	12.4	33.0	-20.6
				75	0	100	0	18.5	18.8	33.0	-14.2
			16QAM	1	74	1	0	19.1	19.5	33.0	-13.5
				1	36	1	49	11.0	11.3	33.0	-21.7
				75	0	100	0	17.4	17.8	33.0	-15.2

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

OUTPUT POWER FOR LTE BAND 41 (20.0MHz + 15.0MHz)

Antenna Gain (dBi)	0.35

Bandwidth	Frequency (MHz)	Frequency (MHz)	Modulation	PCC RB Size	PCC RB Offset	SCC1 RB Size	SCC1 RB Offset	Conducted Average (dBm)	EIRP Average (dBm)	EIRP Limit (dBm)	Margin (dB)
20MHz / 15MHz	2506.0	2523.1	QPSK	1	99	1	0	20.1	20.4	33.0	-12.6
				100	0	75	0	18.4	18.8	33.0	-14.2
			16QAM	1	99	1	0	19.3	19.6	33.0	-13.4
				100	0	75	0	17.6	17.9	33.0	-15.1
20MHz / 15MHz	2585.6	2602.7	QPSK	1	99	1	0	**20.6**	**20.9**	33.0	-12.1
				100	0	75	0	18.6	18.9	33.0	-14.1
			16QAM	1	99	1	0	19.4	19.8	33.0	-13.3
				100	0	75	0	17.5	17.8	33.0	-15.2
20MHz / 15MHz	2665.1	2682.2	QPSK	1	99	1	0	20.1	20.5	33.0	-12.6
				100	0	75	0	18.5	18.9	33.0	-14.2
			16QAM	1	99	1	0	**19.6**	**20.0**	33.0	-13.0
				100	0	75	0	17.4	17.8	33.0	-15.2

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

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

Antenna Gain (dBi)	0.35

Bandwidth	Frequency (MHz)	Frequency (MHz)	Modulation	PCC RB Size	PCC RB Offset	SCC1 RB Size	SCC1 RB Offset	Conducted Average (dBm)	EIRP Average (dBm)	EIRP Limit (dBm)	Margin (dB)
20MHz/ 20MHz	2506.0	2525.8	QPSK	1	0	1	0	12.6	12.9	33.0	-20.1
				1	0	1	99	12.7	13.1	33.0	-19.9
				1	0	100	0	17.7	18.0	33.0	-15.0
				1	49	1	49	12.7	13.1	33.0	-20.0
				1	99	1	99	12.7	13.1	33.0	-20.0
				1	99	100	0	18.5	18.8	33.0	-14.2
				100	0	1	99	18.7	19.0	33.0	-14.0
				100	0	100	0	18.6	19.0	33.0	-14.1
				1	99	1	0	20.7	21.0	33.0	-12.0
				100	0	1	0	19.0	19.4	33.0	-13.6
			16QAM	1	0	1	0	12.4	12.8	33.0	-20.2
				1	0	1	99	13.0	13.3	33.0	-19.7
				1	0	100	0	17.6	18.0	33.0	-15.0
				1	49	1	49	12.6	13.0	33.0	-20.1
				1	99	1	99	12.0	12.4	33.0	-20.7
				1	99	100	0	17.4	17.8	33.0	-15.3
				100	0	1	99	18.8	19.2	33.0	-13.9
				100	0	100	0	17.7	18.0	33.0	-15.0
				1	99	1	0	19.6	20.0	33.0	-13.0
				100	0	1	0	17.9	18.3	33.0	-14.8
20MHz/ 20MHz	2583.1	2602.9	QPSK	1	0	1	0	12.5	12.9	33.0	-20.2
				1	0	1	99	12.7	13.0	33.0	-20.0
				1	0	100	0	17.6	18.0	33.0	-15.0
				1	49	1	49	12.6	13.0	33.0	-20.0
				1	99	1	99	12.6	13.0	33.0	-20.0
				1	99	100	0	18.4	18.8	33.0	-14.3
				100	0	1	99	18.6	18.9	33.0	-14.1
				100	0	100	0	18.6	18.9	33.0	-14.1
				1	99	1	0	20.6	21.0	33.0	-12.1
				100	0	1	0	19.0	19.3	33.0	-13.7
			16QAM	1	0	1	0	12.3	12.7	33.0	-20.3
				1	0	1	99	12.9	13.3	33.0	-19.8
				1	0	100	0	17.5	17.9	33.0	-15.1
				1	49	1	49	12.5	12.9	33.0	-20.1
				1	99	1	99	11.9	12.3	33.0	-20.7
				1	99	100	0	17.3	17.7	33.0	-15.3
				100	0	1	99	18.8	19.1	33.0	-13.9
				100	0	100	0	17.6	18.0	33.0	-15.0
				1	99	1	0	19.6	19.9	33.0	-13.1
				100	0	1	0	17.9	18.2	33.0	-14.8
20MHz/ 20MHz	2660.2	2680.0	QPSK	1	0	1	0	12.5	12.9	33.0	-20.1
				1	0	1	99	12.7	13.0	33.0	-20.0
				1	0	100	0	17.6	18.0	33.0	-15.0
				1	49	1	49	12.6	13.0	33.0	-20.0
				1	99	1	99	12.6	13.0	33.0	-20.0
				1	99	100	0	18.4	18.7	33.0	-14.3
				100	0	1	99	18.6	18.9	33.0	-14.1
				100	0	100	0	18.5	18.9	33.0	-14.1
				1	99	1	0	**20.8**	**21.2**	33.0	-11.8
				100	0	1	0	19.0	19.3	33.0	-13.7
			16QAM	1	0	1	0	12.4	12.7	33.0	-20.3
				1	0	1	99	12.9	13.3	33.0	-19.7
				1	0	100	0	17.6	17.9	33.0	-15.1
				1	49	1	49	12.6	12.9	33.0	-20.1
				1	99	1	99	12.0	12.3	33.0	-20.7
				1	99	100	0	17.4	17.7	33.0	-15.3
				100	0	1	99	18.8	19.1	33.0	-13.9
				100	0	100	0	17.6	18.0	33.0	-15.0
				1	99	1	0	**19.8**	**20.1**	33.0	-12.9
				100	0	1	0	17.9	18.2	33.0	-14.8

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

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 low, middle and high channel in each band. The -26dB bandwidth was also measured and recorded.

MODES TESTED

- LTE Band 7
- LTE Band 41

RESULTS

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

LTE BAND 7

BAND	MODE	RB SIZE/ RB OFFSET	f (MHz)	99% BW (MHz)	- 26dB BW (MHz)
LTE BAND 7	20MHz + 10MHz BAND QPSK	100/0 + 50/0	2535	**28.0523**	29.898
	20MHz + 10MHz BAND 16QAM	100/0 + 50/0	2535	28.0022	**30.015**
	10.0 MHz BAND QPSK	50/0	2544.5	9.0245	9.810
	10.0 MHz BAND 16QAM	50/0	2544.5	8.9699	9.849
	10.0 MHz BAND QPSK	1/0	2544.5	0.2340	0.3410
	10.0 MHz BAND 16QAM	1/0	2544.5	0.2376	0.4080
	20MHz + 20MHz BAND QPSK	100/0 + 100/0	2535	37.4793	39.859
	20MHz + 20MHz BAND 16QAM	100/0 + 100/0	2535	**37.5167**	**39.914**
	20.0 MHz BAND QPSK	100/0	2525.1	17.8585	19.409
	20.0 MHz BAND 16QAM	100/0	2525.1	17.8840	19.340
	20.0 MHz BAND QPSK	1/0	2525.1	0.2640	0.4175
	20.0 MHz BAND 16QAM	1/0	2525.1	0.2671	0.4346

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

BAND	MODE	RB SIZE/ RB OFFSET	f (MHz)	99% BW (MHz)	- 26dB BW (MHz)
LTE BAND 7	10MHz + 20MHz BAND QPSK	50/0 + 100/0	2535	27.9670	30.015
	10MHz + 20MHz BAND 16QAM	50/0 + 100/0	2535	28.0141	29.941
	15MHz + 15MHz BAND QPSK	75/0 + 75/0	2535	28.6047	30.466
	15MHz + 15MHz BAND 16QAM	75/0 + 75/0	2535	28.5789	30.578
	15MHz + 20MHz BAND QPSK	75/0 + 100/0	2535	**32.8018**	**35.125**
	15MHz + 20MHz BAND 16QAM	75/0 + 100/0	2535	32.6436	34.82
	20MHz + 15MHz BAND QPSK	100/0 + 75/0	2535	32.7843	34.867
	20MHz + 15MHz BAND 16QAM	100/0 + 75/0	2535	32.7396	34.803

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

LTE BAND 41

BAND	MODE	RB SIZE/ RB OFFSET	f (MHz)	99% BW (MHz)	- 26dB BW (MHz)
LTE BAND 41 (FCC)	20MHz + 5MHz BAND QPSK	100/0 + 25/0	2593	**23.3719**	**25.287**
	20MHz + 5MHz BAND 16QAM	100/0 + 25/0	2593	23.2215	24.967
	5.0 MHz BAND QPSK	25/0	2602.2	4.5379	4.884
	5.0 MHz BAND 16QAM	25/0	2602.2	4.5291	4.863
	5.0 MHz BAND QPSK	1/0	2602.2	0.2301	0.3045
	5.0 MHz BAND 16QAM	1/0	2602.2	0.2204	0.3221
	20MHz + 20MHz BAND QPSK	100/0 + 100/0	2593	37.4208	39.733
	20MHz + 20MHz BAND 16QAM	100/0 + 100/0	2593	**37.4529**	**40.019**
	20.0 MHz BAND QPSK	100/0	2583.1	17.8796	18.665
	20.0 MHz BAND 16QAM	100/0	2583.1	17.8369	18.765
	20.0 MHz BAND QPSK	1/0	2583.1	0.2514	0.3800
	20.0 MHz BAND 16QAM	1/0	2583.1	0.3114	0.4003

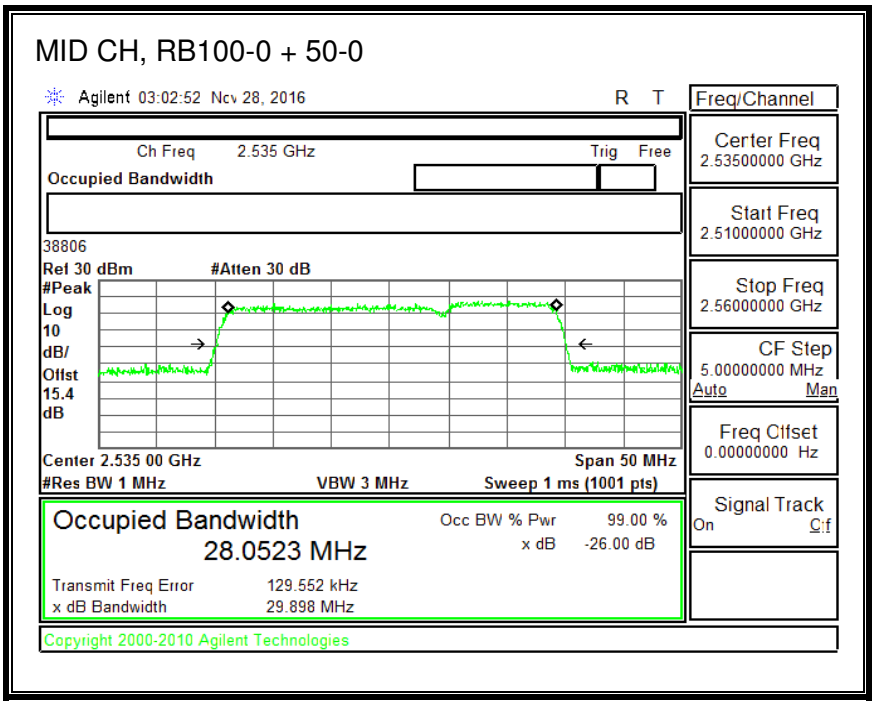
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

BAND	MODE	RB SIZE/ RB OFFSET	f (MHz)	99% BW (MHz)	- 26dB BW (MHz)
LTE BAND 41 (FCC)	5MHz + 20MHz BAND QPSK	25/0 + 100/0	2593	22.9857	24.826
	5MHz + 20MHz BAND 16QAM	25/0 + 100/0	2593	23.2097	24.879
	10MHz + 20MHz BAND QPSK	50/0 + 100/0	2593	27.9550	29.822
	10MHz + 20MHz BAND 16QAM	50/0 + 100/0	2593	27.8617	29.642
	20MHz + 10MHz BAND QPSK	100/0 + 50/0	2593	27.9870	29.912
	20MHz + 10MHz BAND 16QAM	100/0 + 50/0	2593	27.8669	29.992
	15MHz + 15MHz BAND QPSK	75/0 + 75/0	2593	28.4774	30.454
	15MHz + 15MHz BAND 16QAM	75/0 + 75/0	2593	28.6549	30.605
	15MHz + 20MHz BAND QPSK	75/0 + 100/0	2593	32.4537	34.788
	15MHz + 20MHz BAND 16QAM	75/0 + 100/0	2593	32.5010	34.709
	20MHz + 15MHz BAND QPSK	100/0 + 75/0	2593	32.6795	**34.901**
	20MHz + 15MHz BAND 16QAM	100/0 + 75/0	2593	**32.8387**	34.820

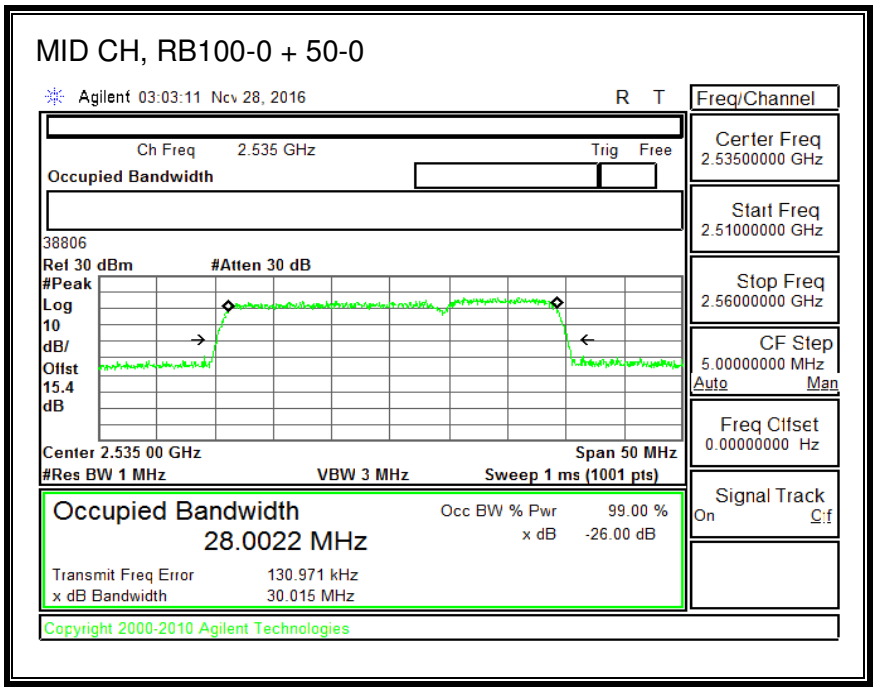
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

8.1.1. LTE BAND 7

QPSK, (20.0MHz + 10.0MHz BAND WIDTH)

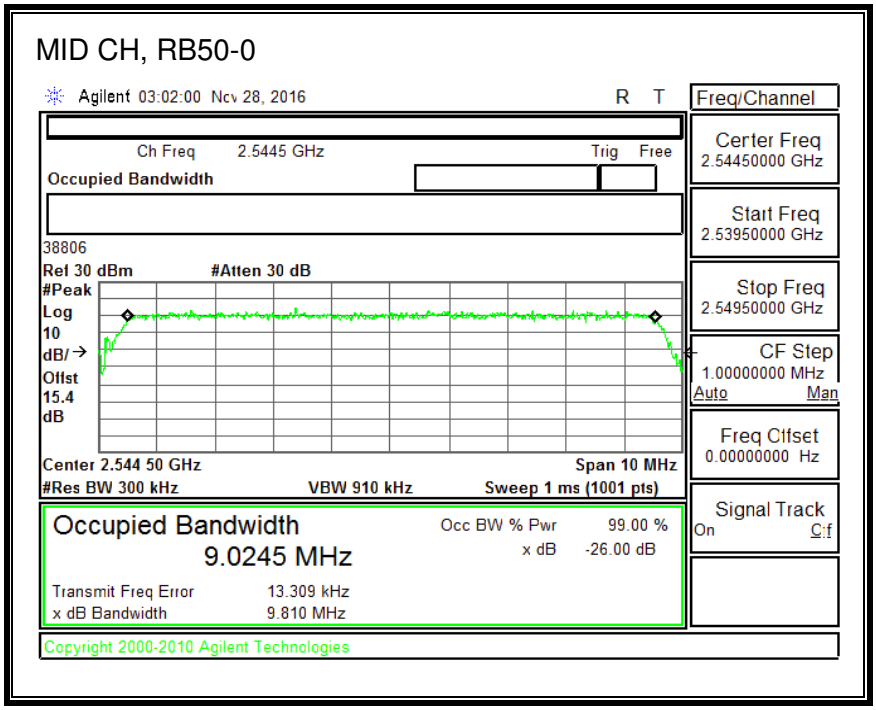


16QAM, (20.0MHz + 10.0MHz BAND WIDTH)

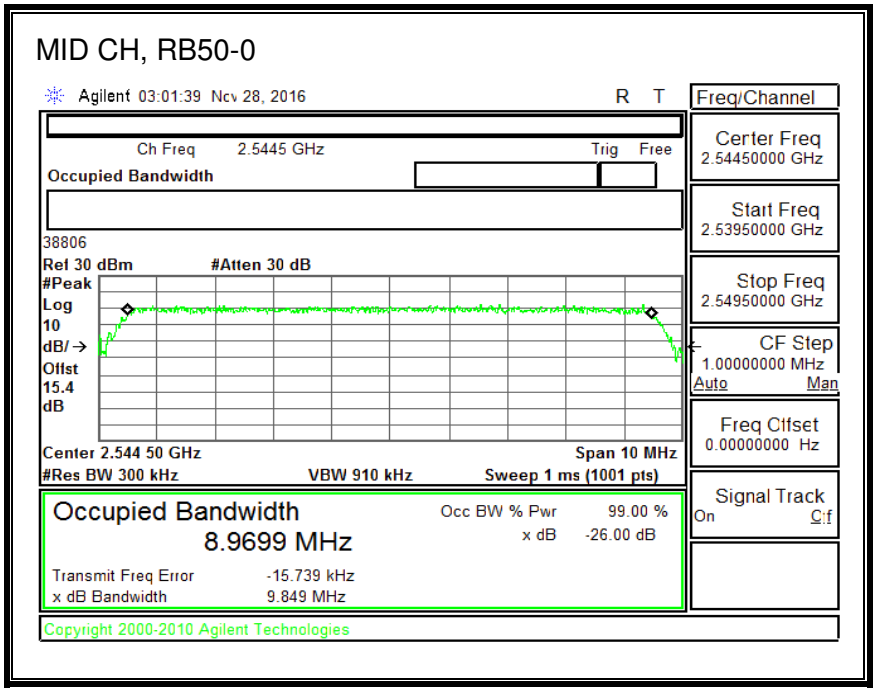


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

QPSK, (10.0MHz BAND WIDTH)

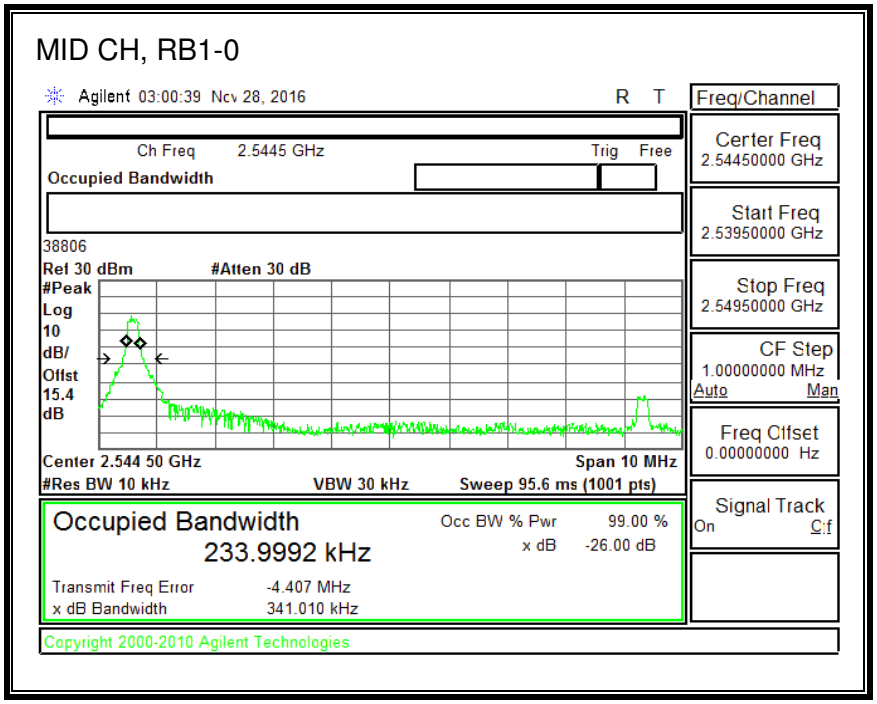


16QAM, (10.0MHz BAND WIDTH)

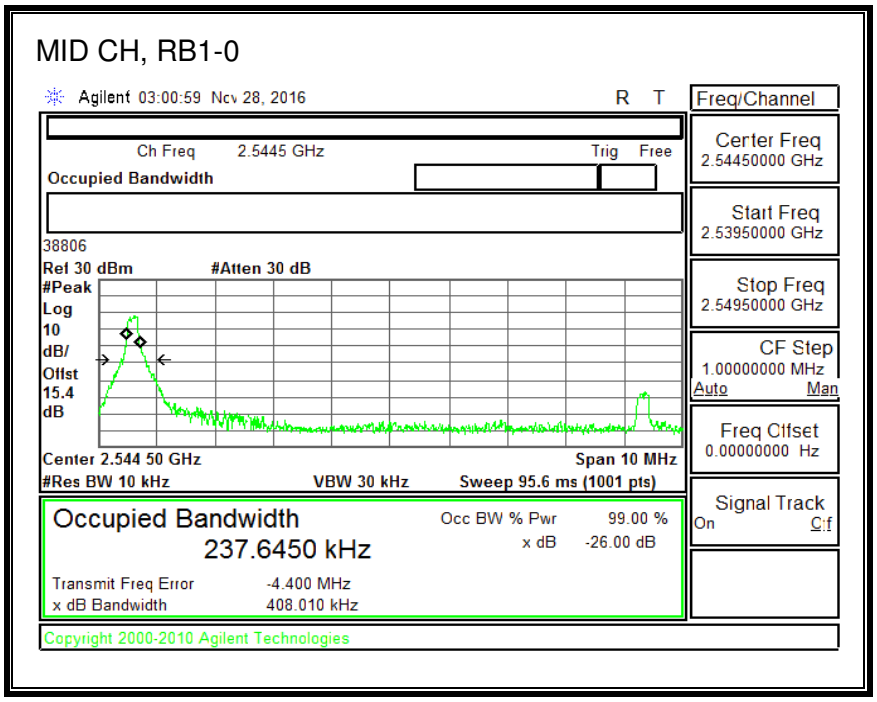


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

QPSK, (10.0MHz BAND WIDTH)

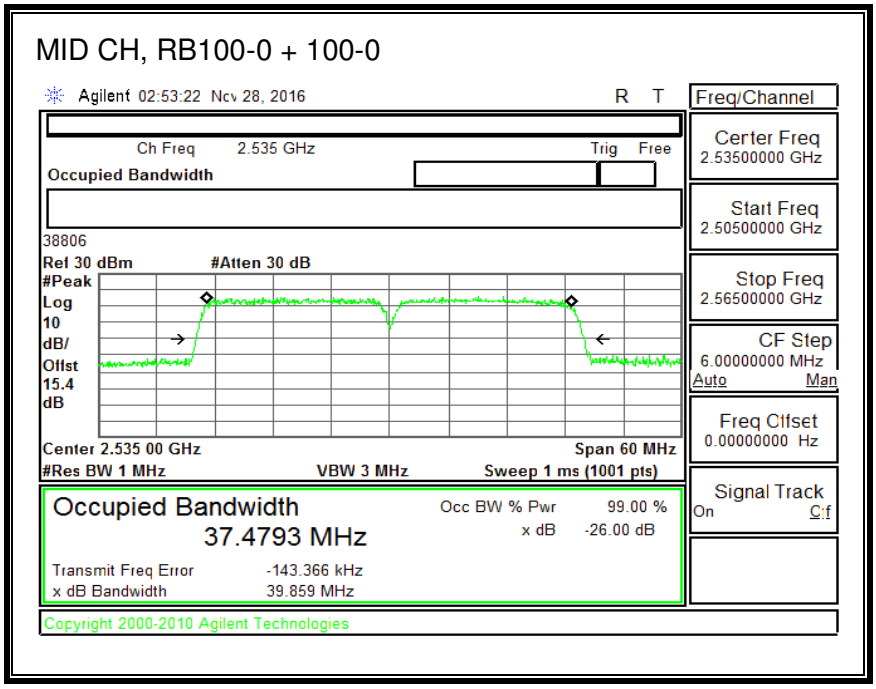


16QAM, (10.0MHz BAND WIDTH)

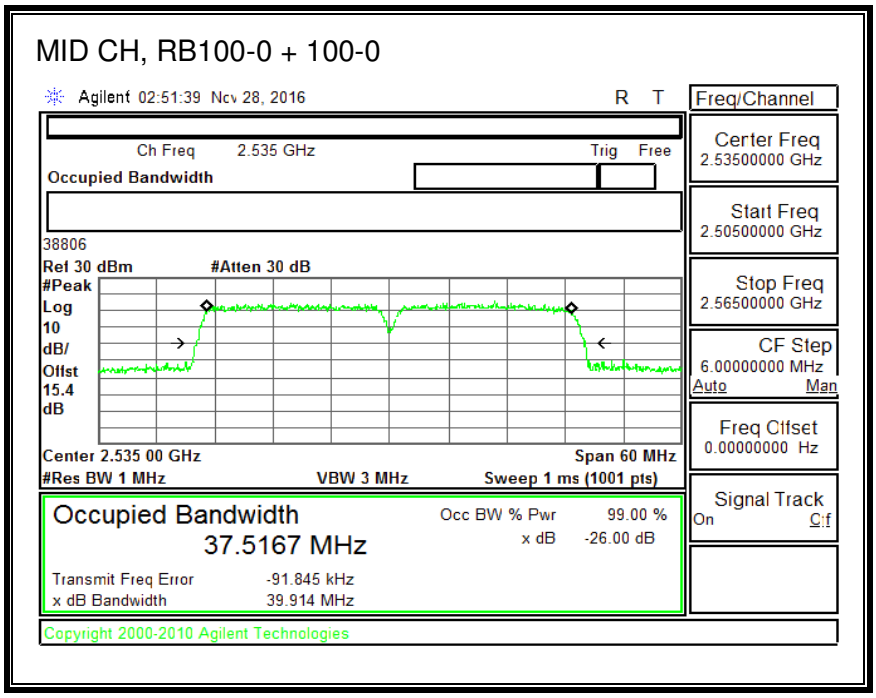


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

QPSK, (20.0MHz + 20.0MHz BAND WIDTH)

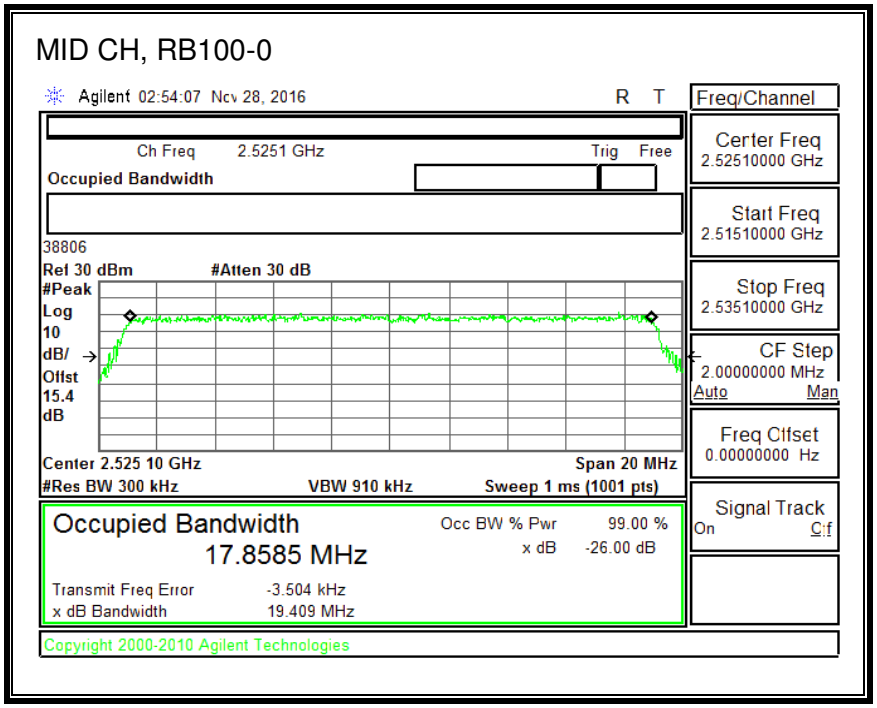


16QAM, (20.0MHz + 20.0MHz BAND WIDTH)

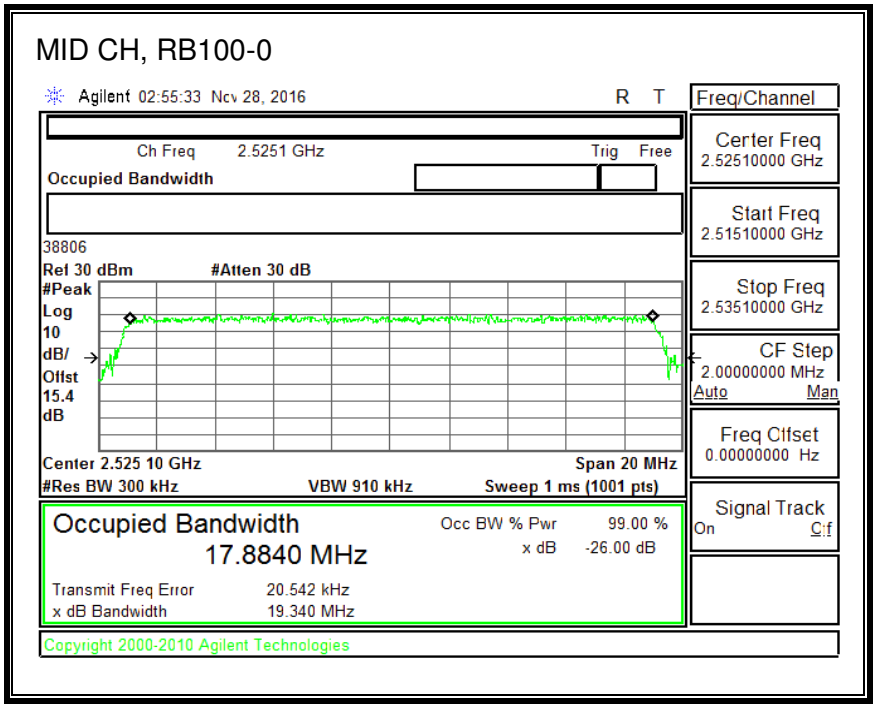


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

QPSK, (20.0MHz BAND WIDTH)

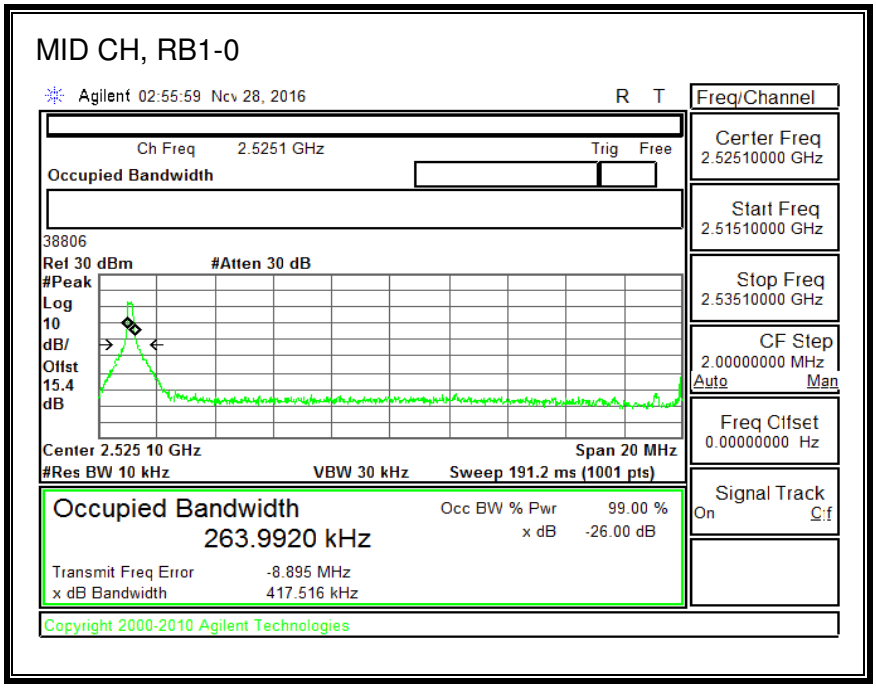


16QAM, (20.0MHz BAND WIDTH)

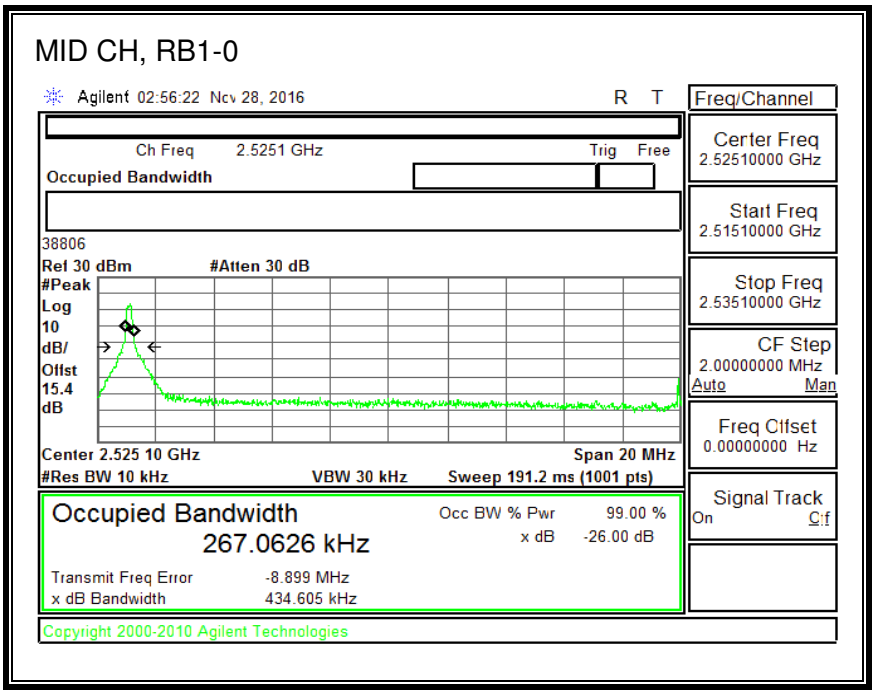


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

QPSK, (20.0MHz BAND WIDTH)

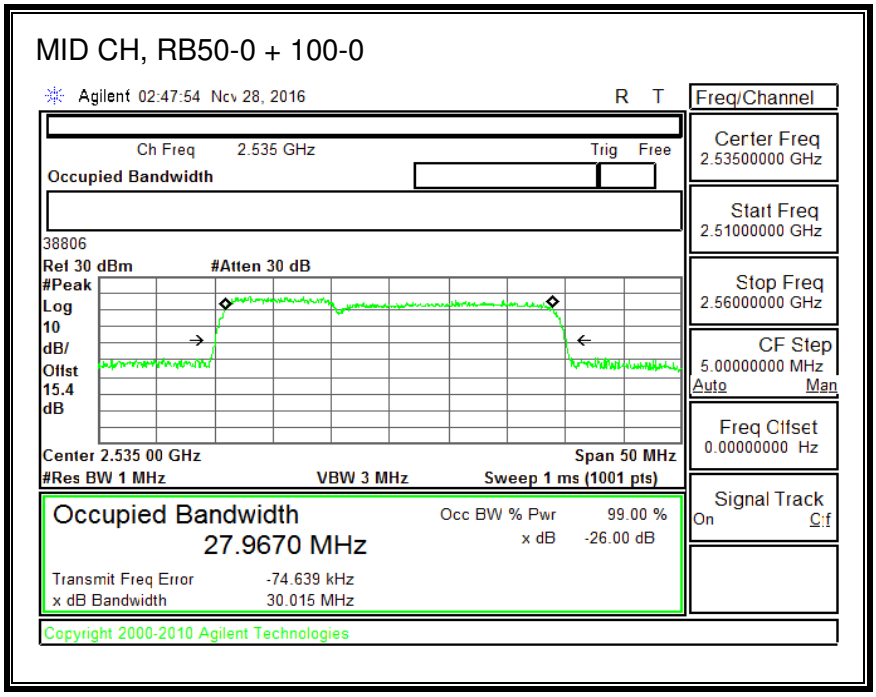


16QAM, (20.0MHz BAND WIDTH)

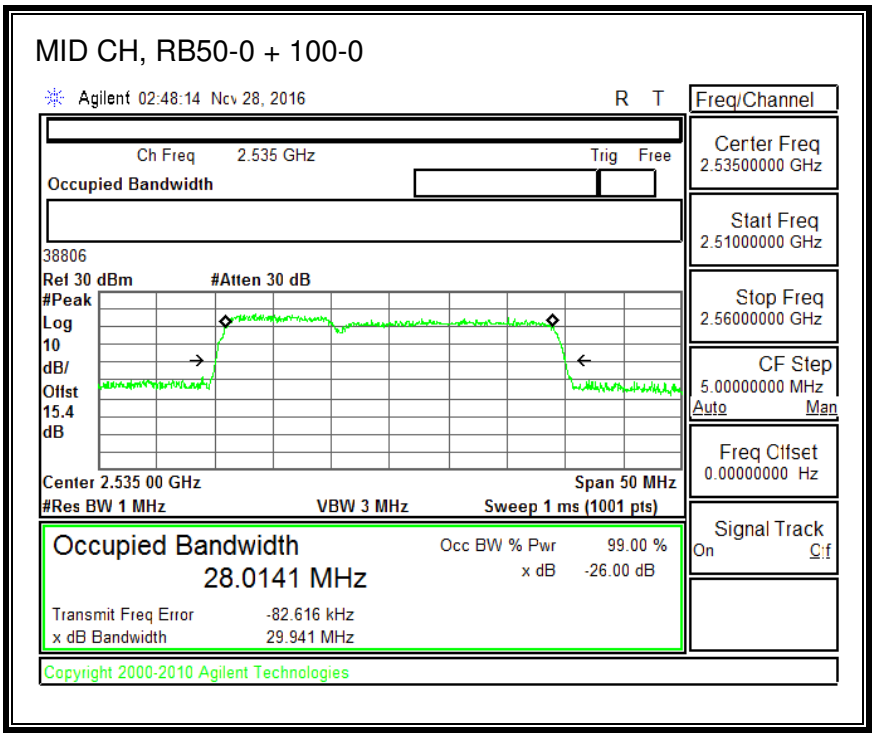


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

QPSK, (10.0MHz + 20.0MHz BAND WIDTH)

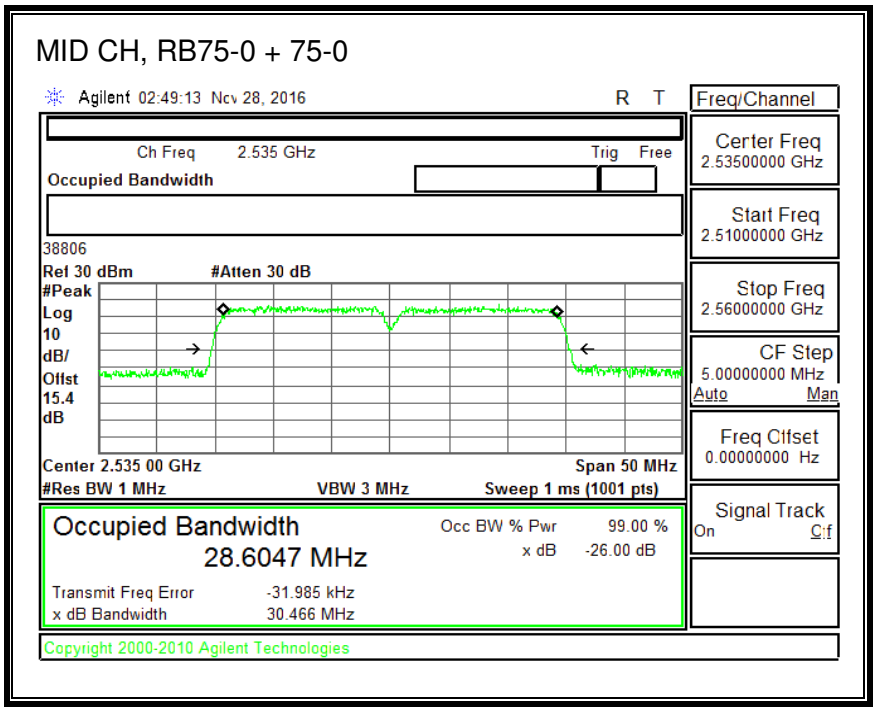


16QAM, (10.0MHz + 20.0MHz BAND WIDTH)

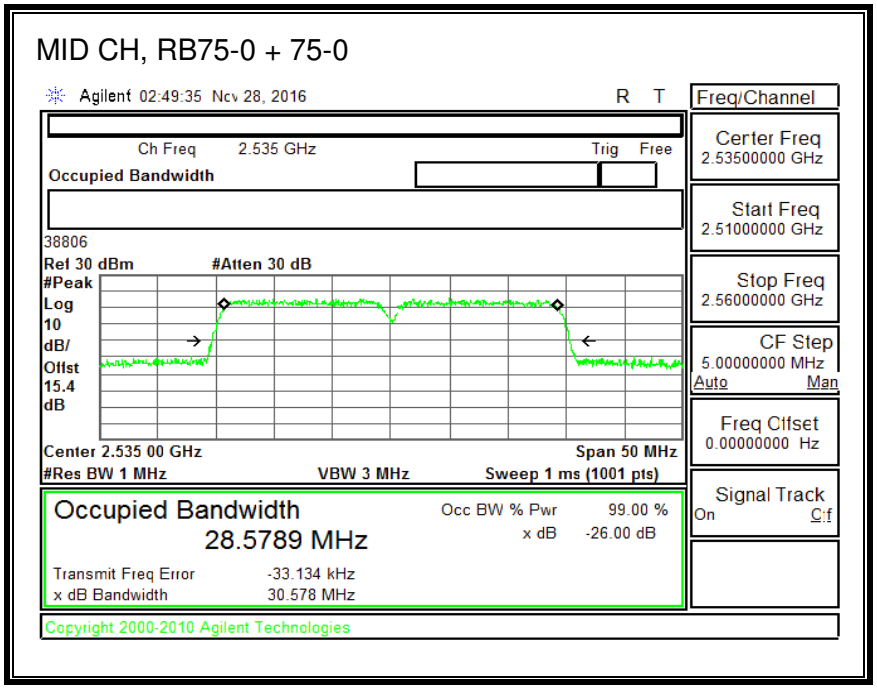


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

QPSK, (15.0MHz + 15.0MHz BAND WIDTH)

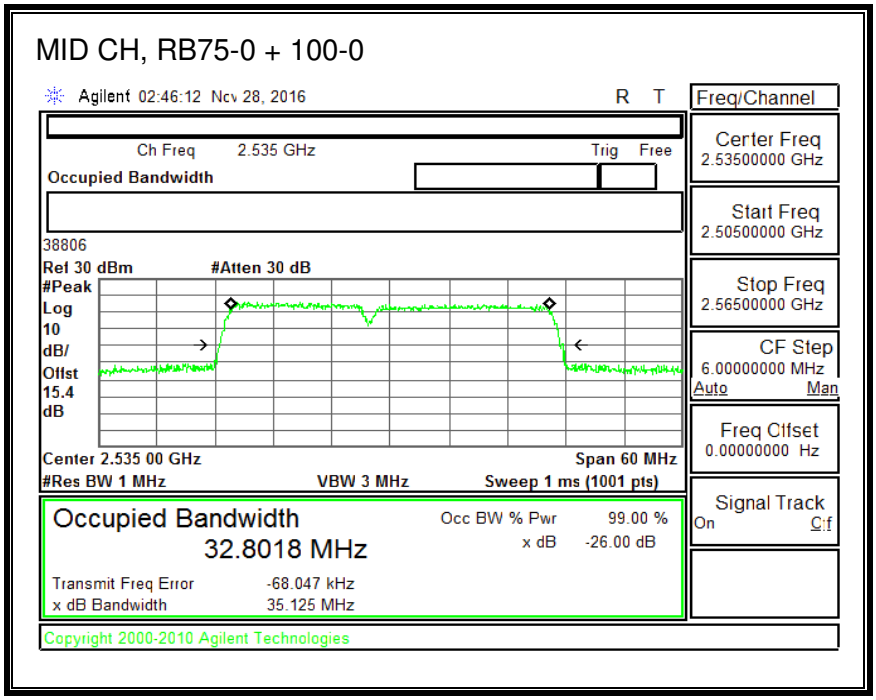


16QAM, (15.0MHz + 15.0MHz BAND WIDTH)

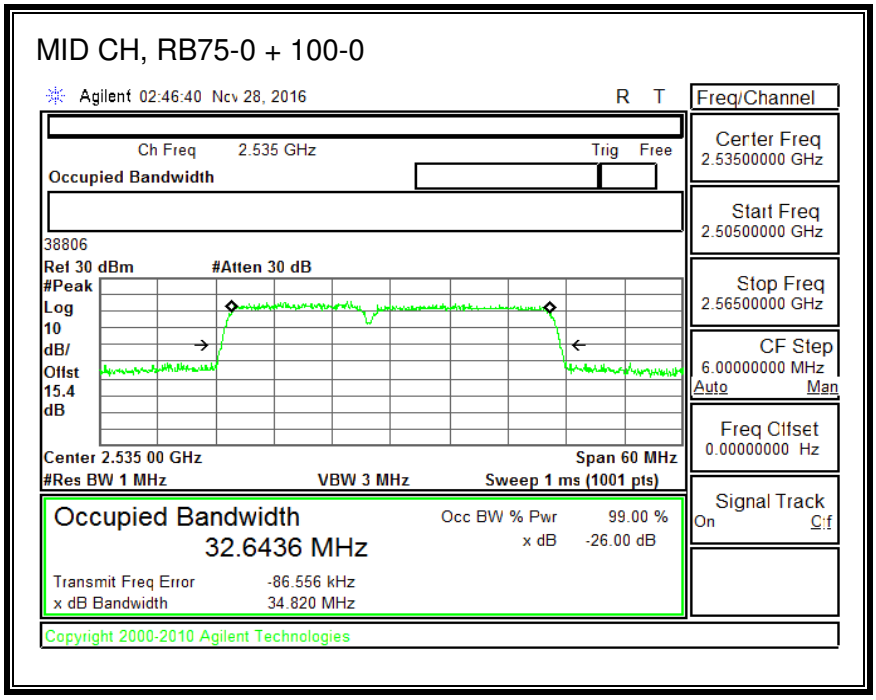


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

QPSK, (15.0MHz + 20.0MHz BAND WIDTH)

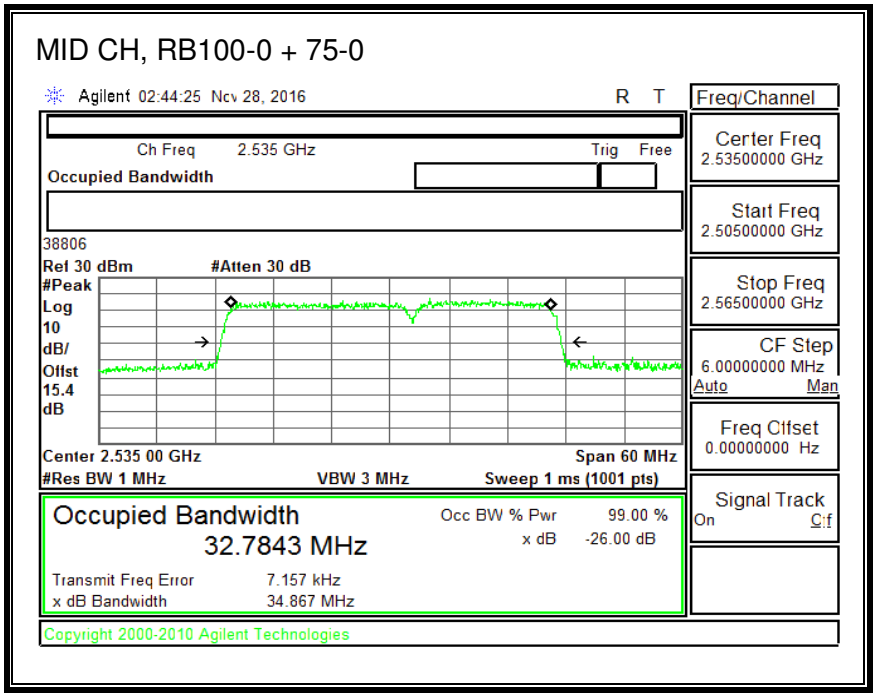


16QAM, (15.0MHz + 20.0MHz BAND WIDTH)

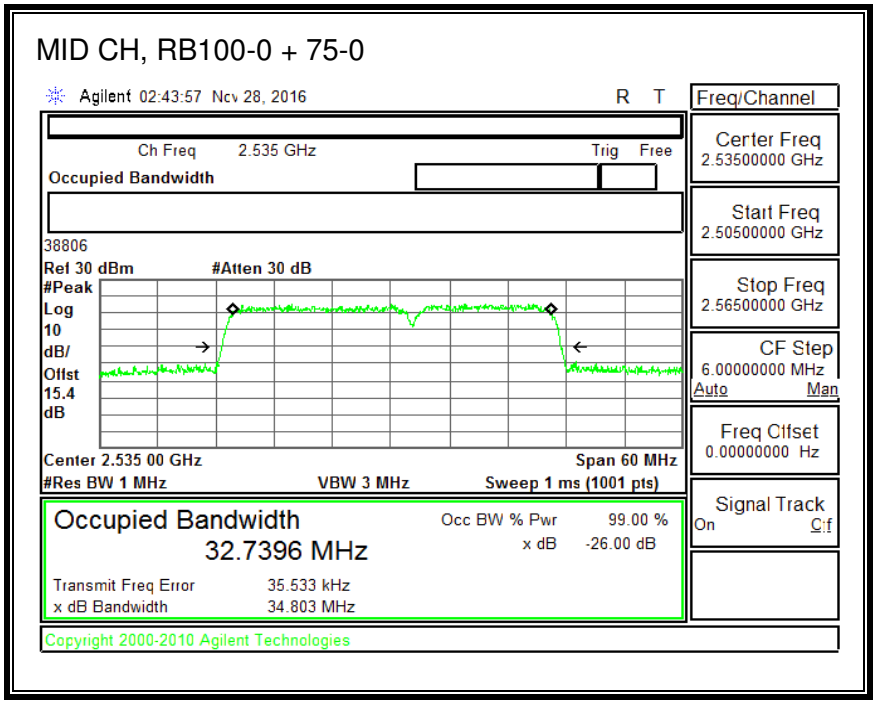


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

QPSK, (20.0MHz + 15.0MHz BAND WIDTH)



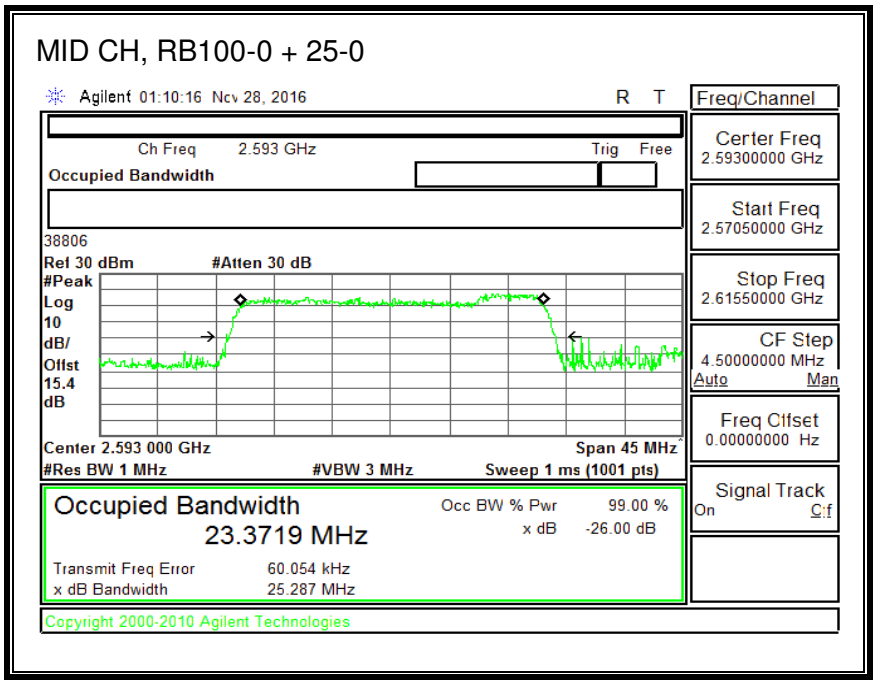
16QAM, (20.0MHz + 15.0MHz BAND WIDTH)



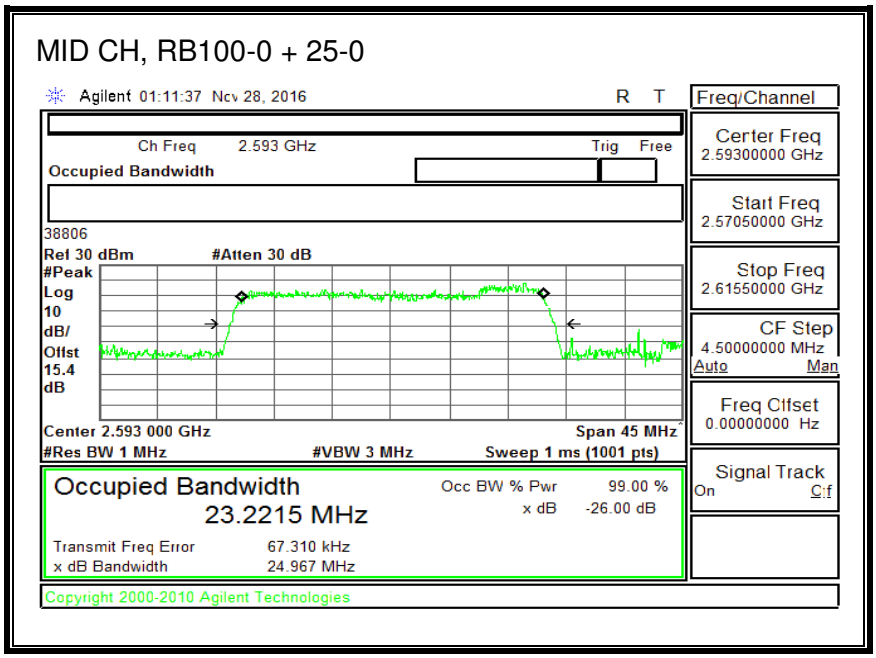
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

8.1.2. LTE BAND 41

QPSK, (20.0MHz + 5.0MHz BAND WIDTH)

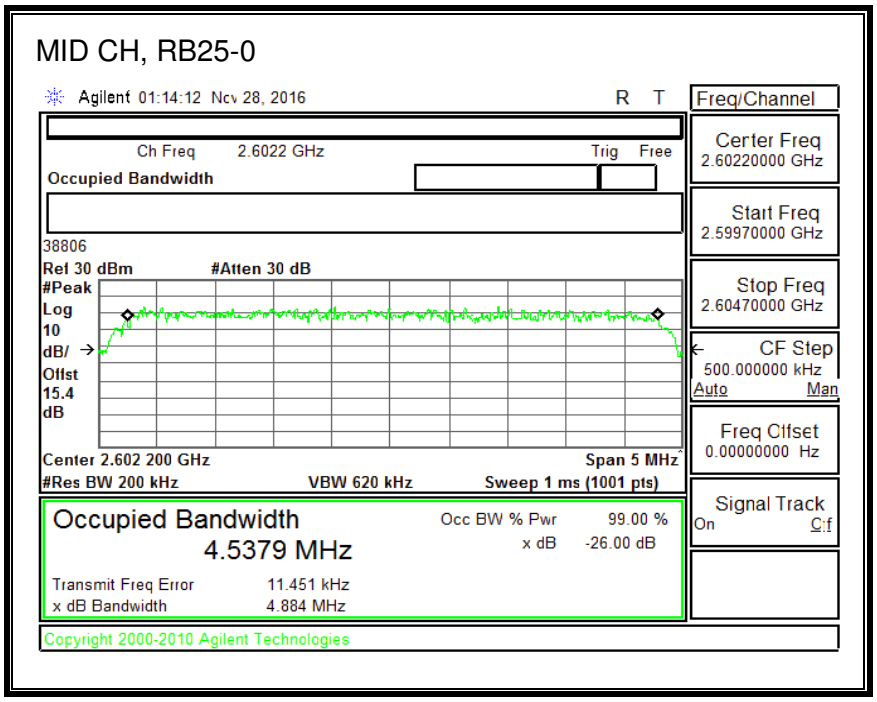


16QAM, (20.0MHz + 5.0MHz BAND WIDTH)

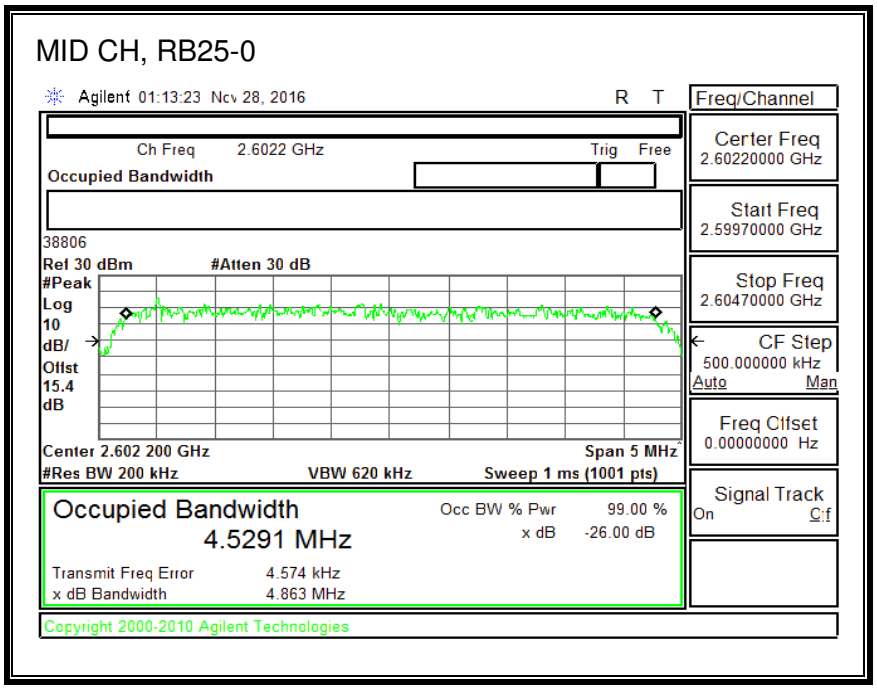


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

QPSK, (5.0MHz BAND WIDTH)

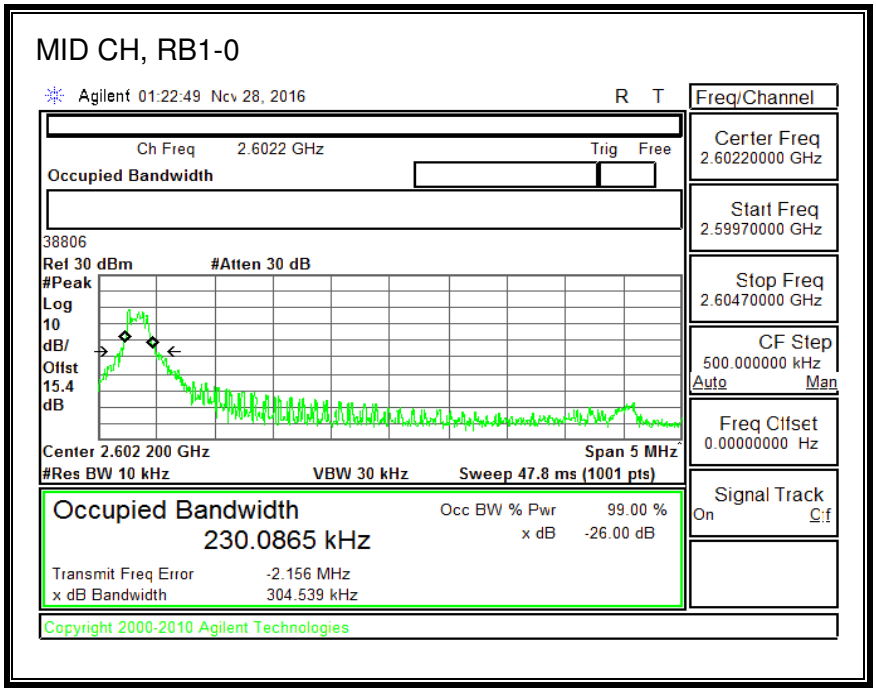


16QAM, (5.0MHz BAND WIDTH)

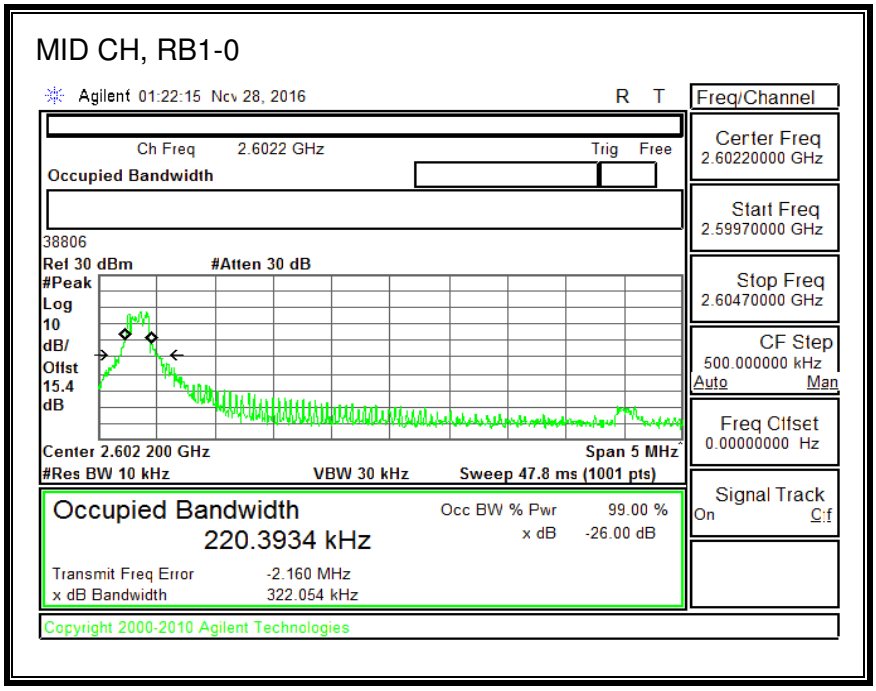


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

QPSK, (5.0MHz BAND WIDTH)

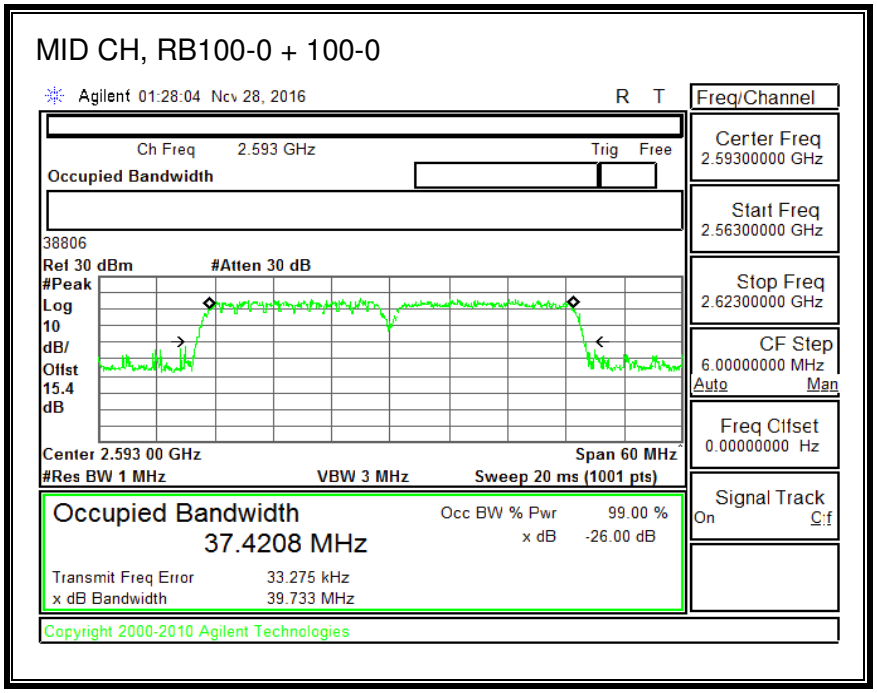


16QAM, (5.0MHz BAND WIDTH)

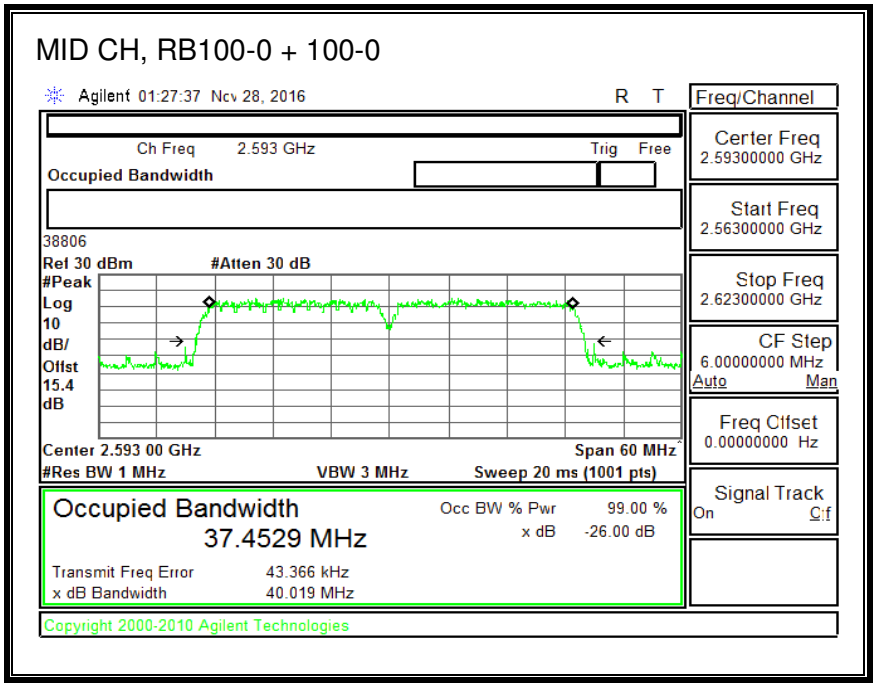


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

QPSK, (20.0MHz + 20.0MHz BAND WIDTH)

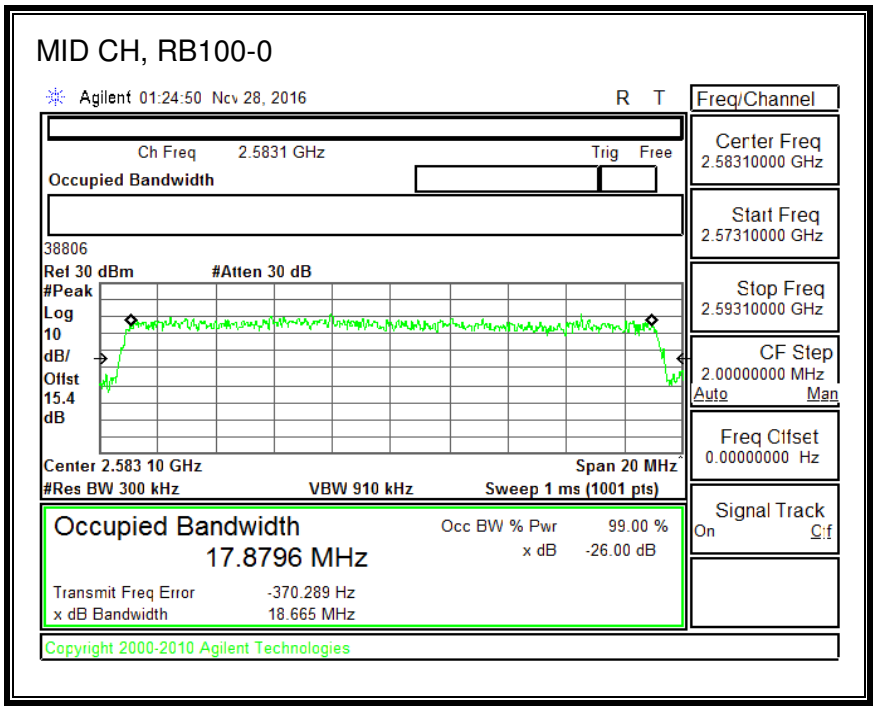


16QAM, (20.0MHz + 20.0MHz BAND WIDTH)

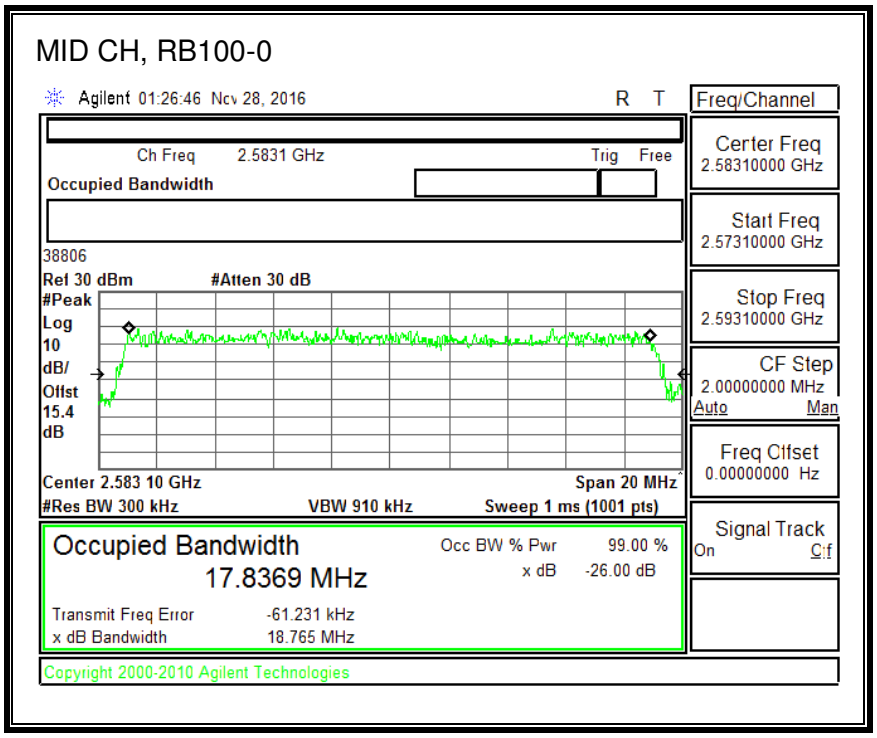


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

QPSK, (20.0MHz BAND WIDTH)

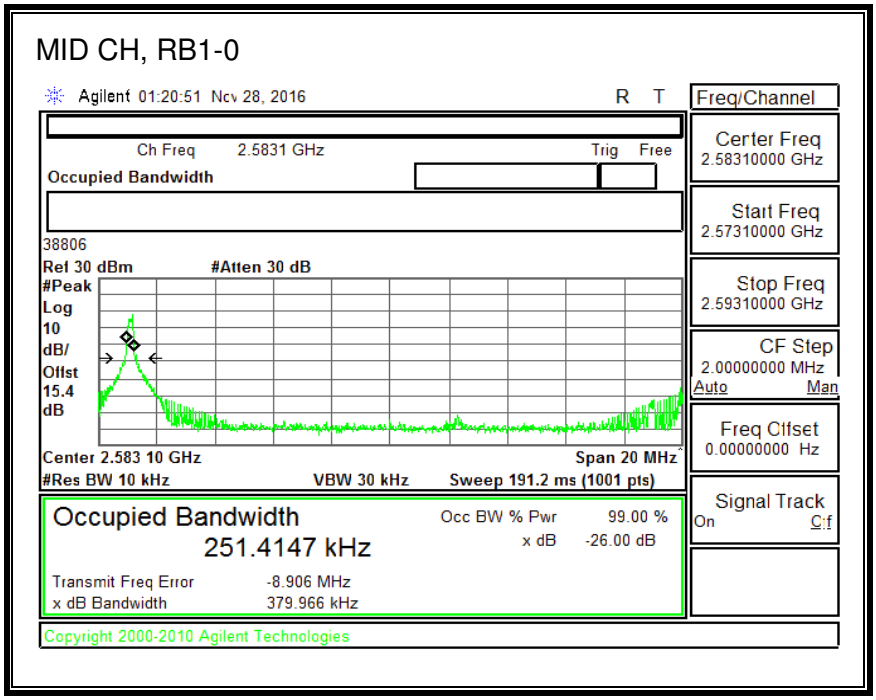


16QAM, (20.0MHz BAND WIDTH)

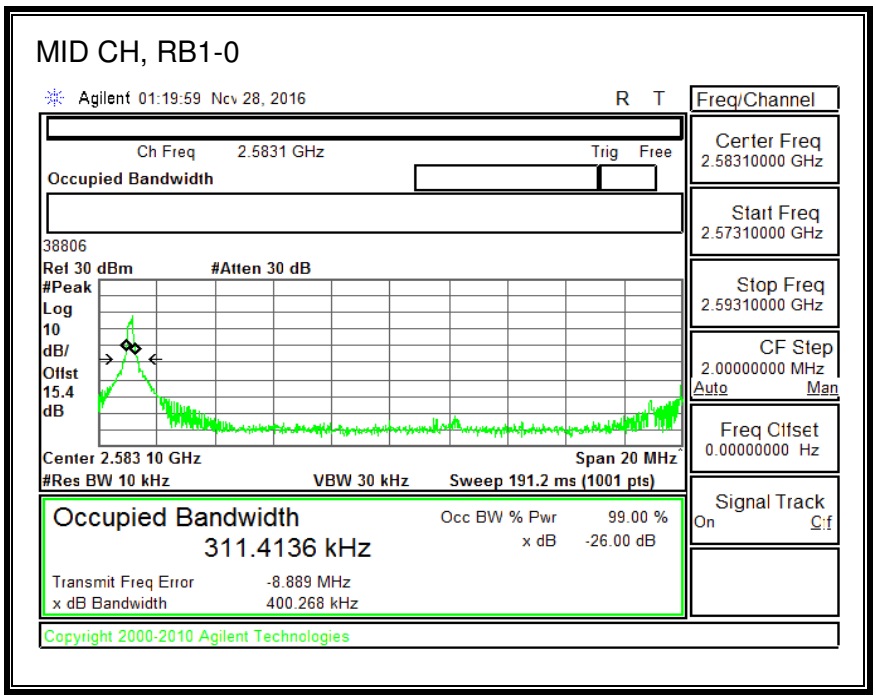


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

QPSK, (20.0MHz BAND WIDTH)

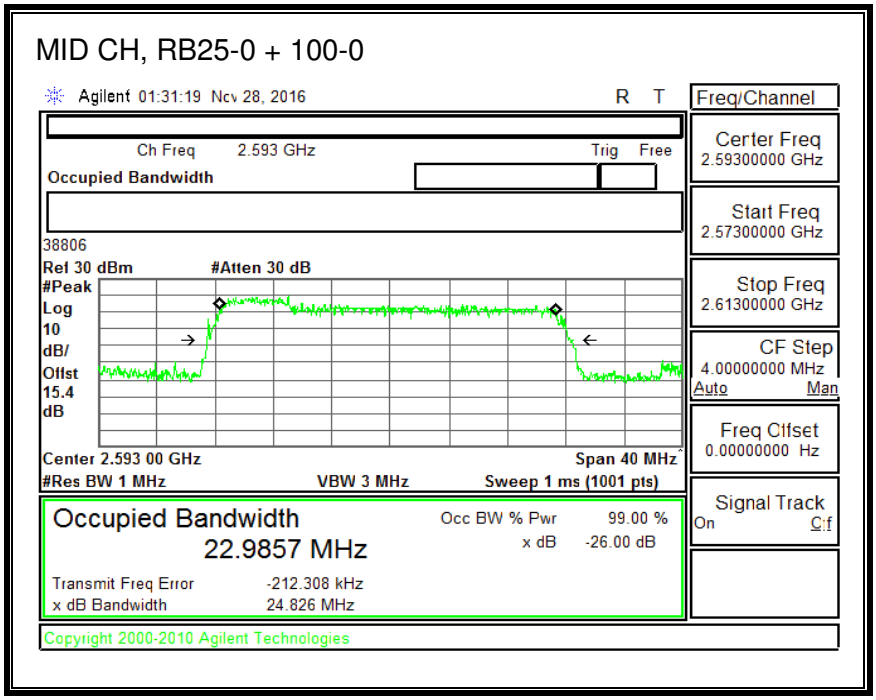


16QAM, (20.0MHz BAND WIDTH)

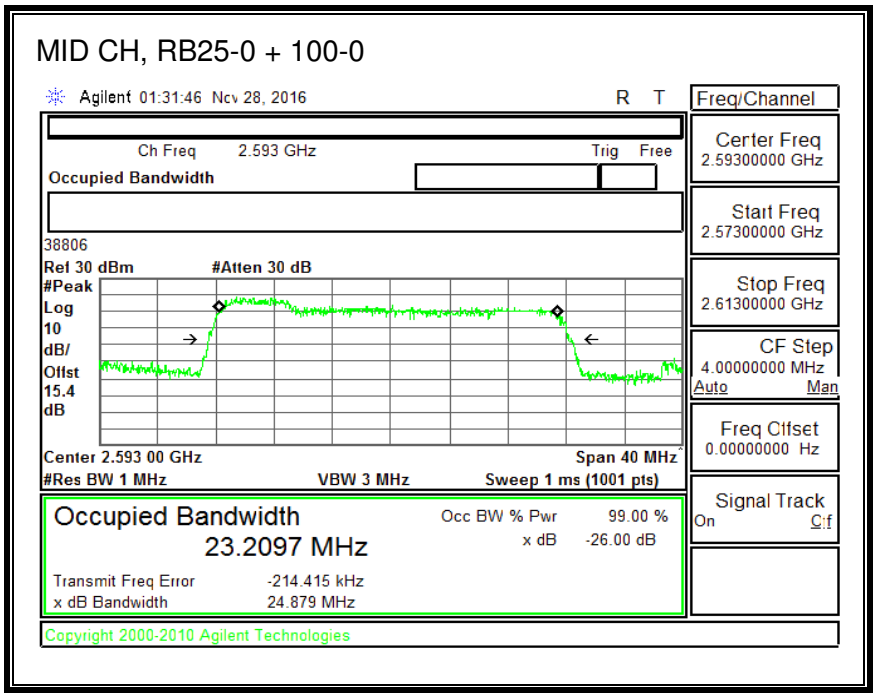


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

QPSK, (5.0MHz + 20.0MHz BAND WIDTH)

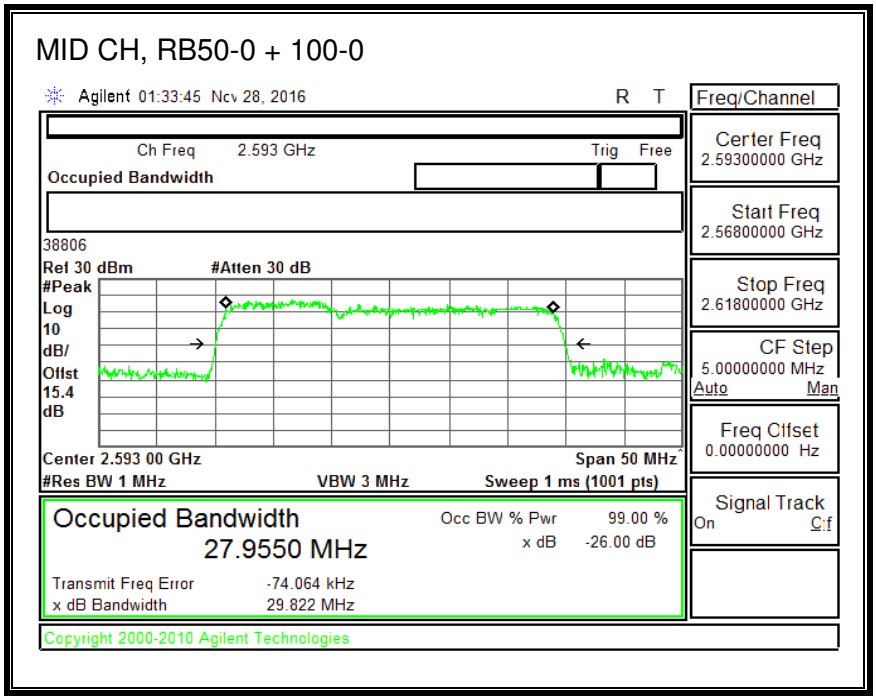


16QAM, (5.0MHz + 20.0MHz BAND WIDTH)

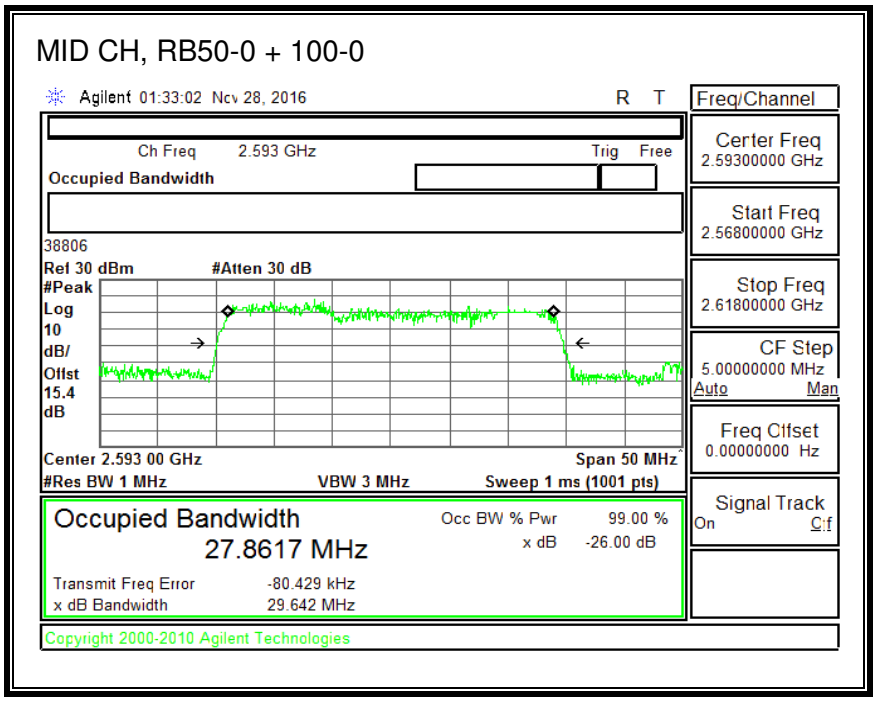


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

QPSK, (10.0MHz + 20.0MHz BAND WIDTH)

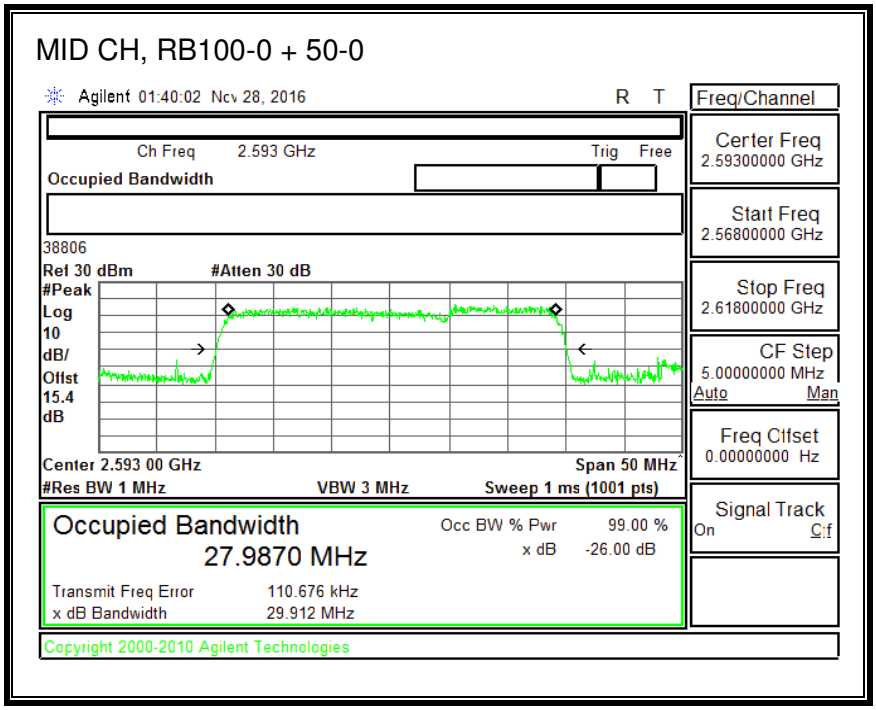


16QAM, (10.0MHz + 20.0MHz BAND WIDTH)

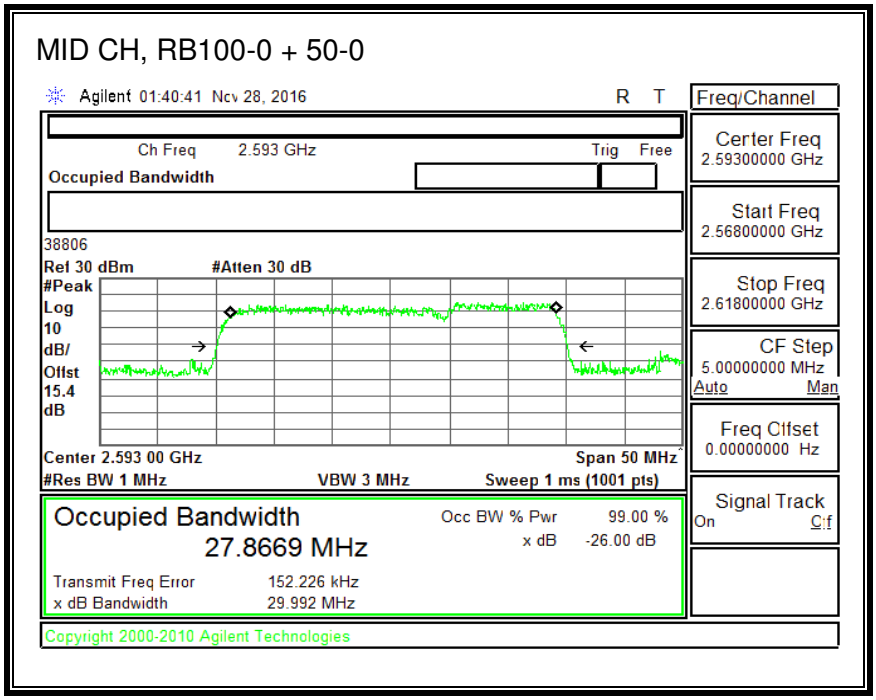


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

QPSK, (20.0MHz + 10.0MHz BAND WIDTH)

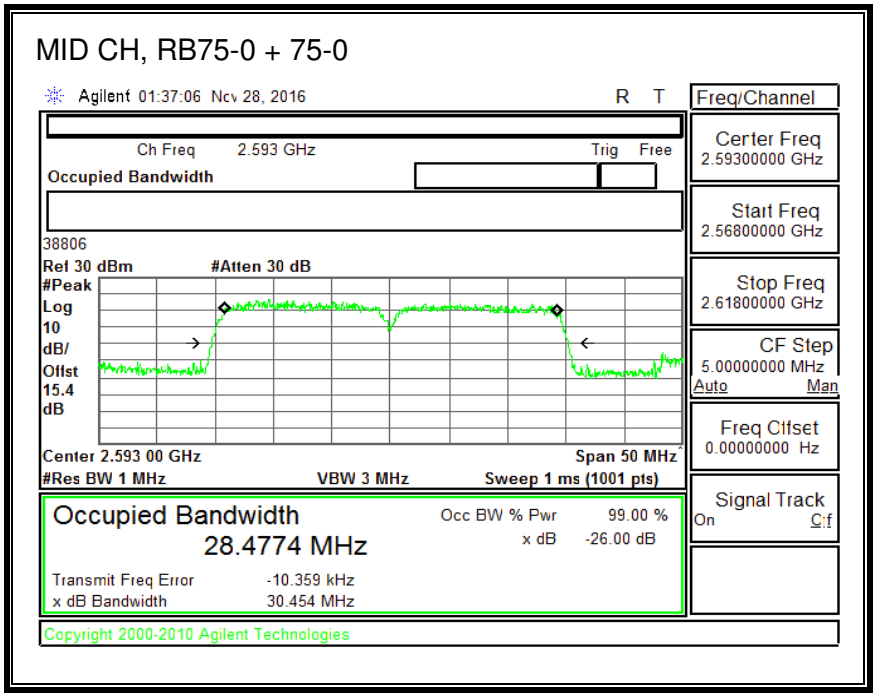


16QAM, (20.0MHz + 10.0MHz BAND WIDTH)

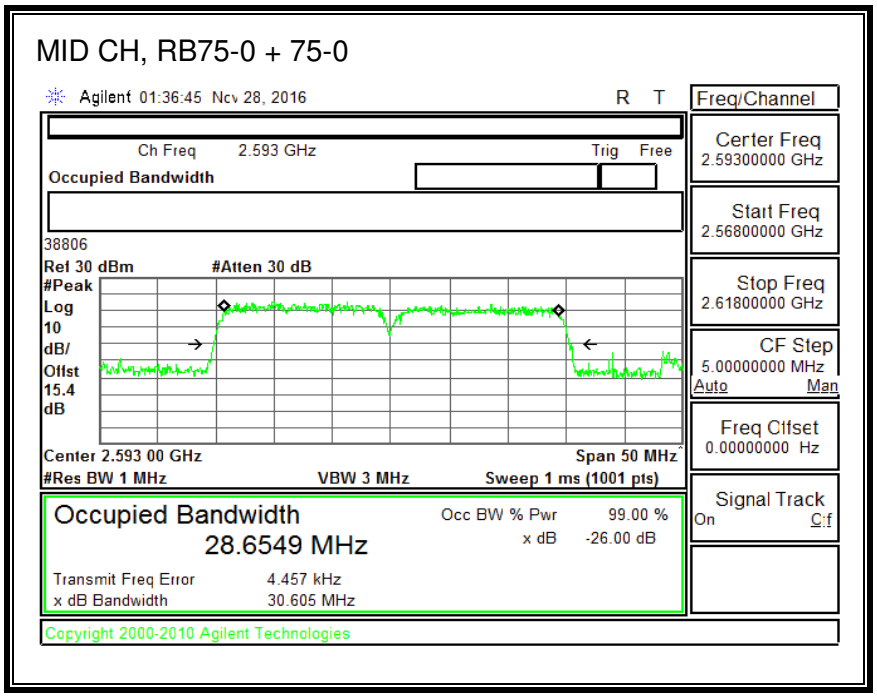


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

QPSK, (15.0MHz + 15.0MHz BAND WIDTH)

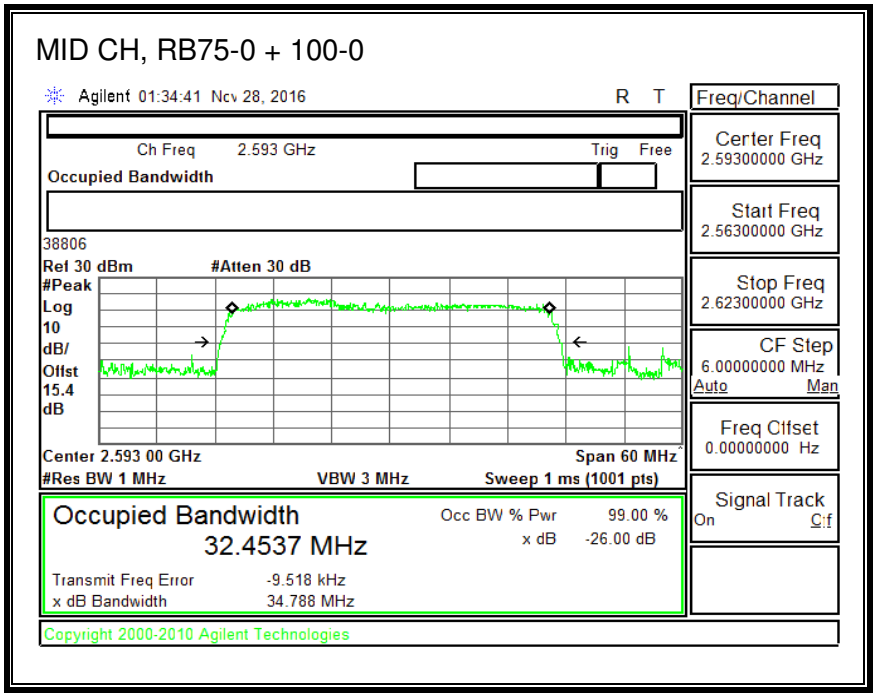


16QAM, (15.0MHz + 15.0MHz BAND WIDTH)

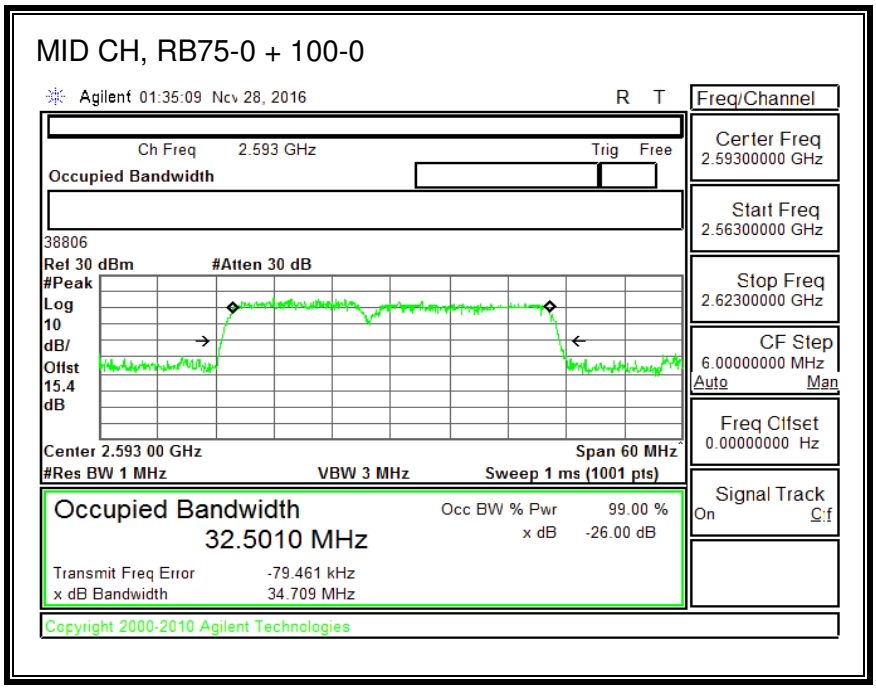


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

QPSK, (15.0MHz + 20.0MHz BAND WIDTH)

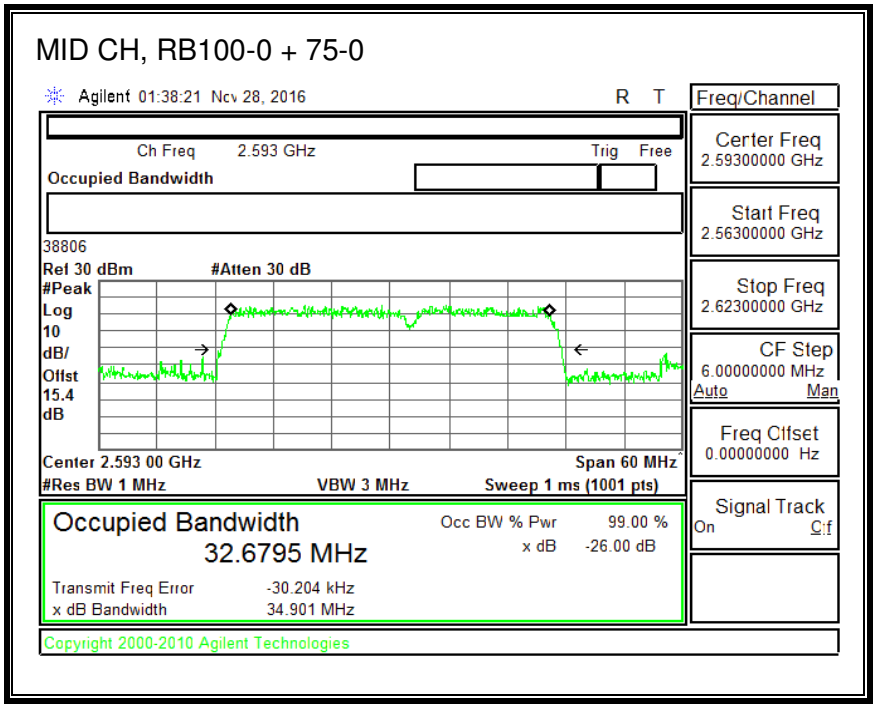


16QAM, (15.0MHz + 20.0MHz BAND WIDTH)

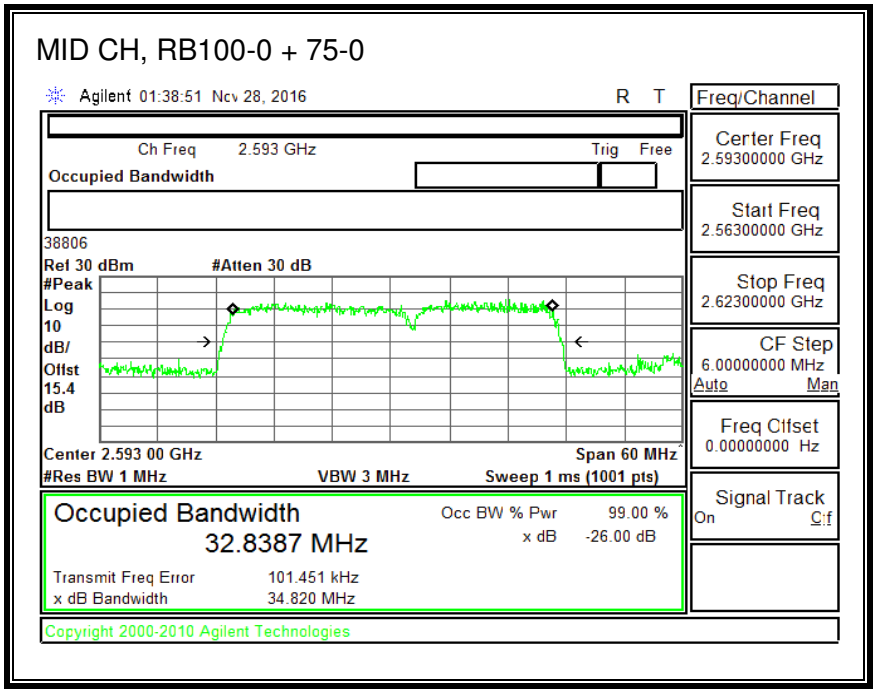


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

QPSK, (20.0MHz + 15.0MHz BAND WIDTH)



16QAM, (20.0MHz + 15.0MHz BAND WIDTH)



This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

8.2. EMISSION MASK

RULE PART(S)

FCC: §2.1051, §27.53

LIMITS

FCC: §27.53
(m)(6) Measurement procedure. Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed; for mobile digital stations, in the 1 megahertz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least two percent may be employed, except when the 1 megahertz band is 2495-2496 MHz, in which case a resolution bandwidth of at least one percent may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e. 1 megahertz or 1 percent of emission bandwidth, as specified; or 1 megahertz or 2 percent for mobile digital stations, except in the band 2495-2496 MHz). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power. With respect to television operations, measurements must be made of the separate visual and aural operating powers at sufficiently frequent intervals to ensure compliance with the rules.

(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 that 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.Show citation box.

TEST PROCEDURE FOR FCC PART 27

The transmitter output was connected to a CMW500Test 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.

Set resolution bandwidth to at least 1% of emission bandwidth.

MODES TESTED

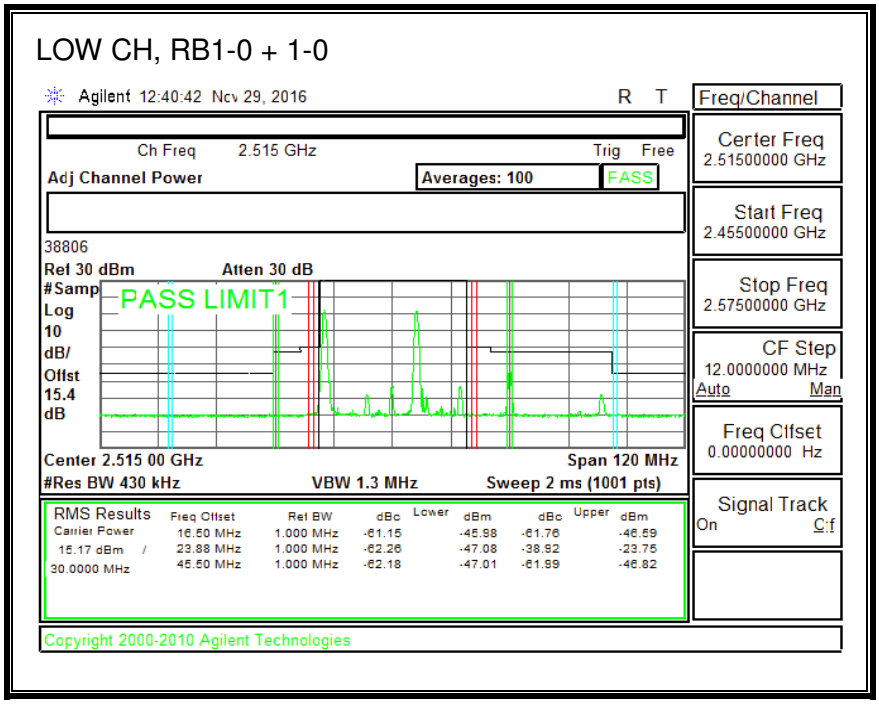
- LTE Band 7
- LTE Band 41

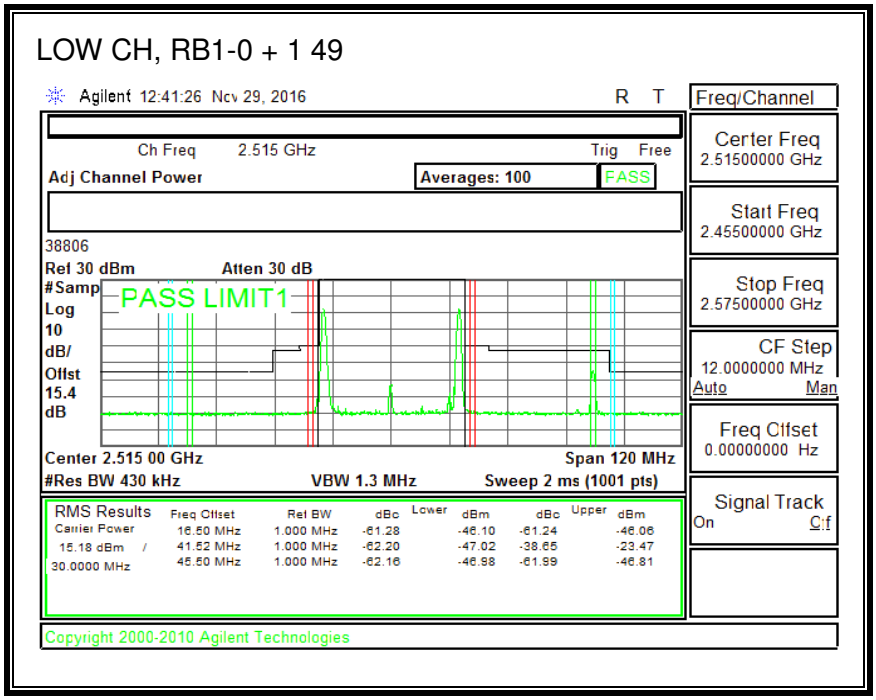
UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

RESULTS

8.2.1. LTE BAND 7

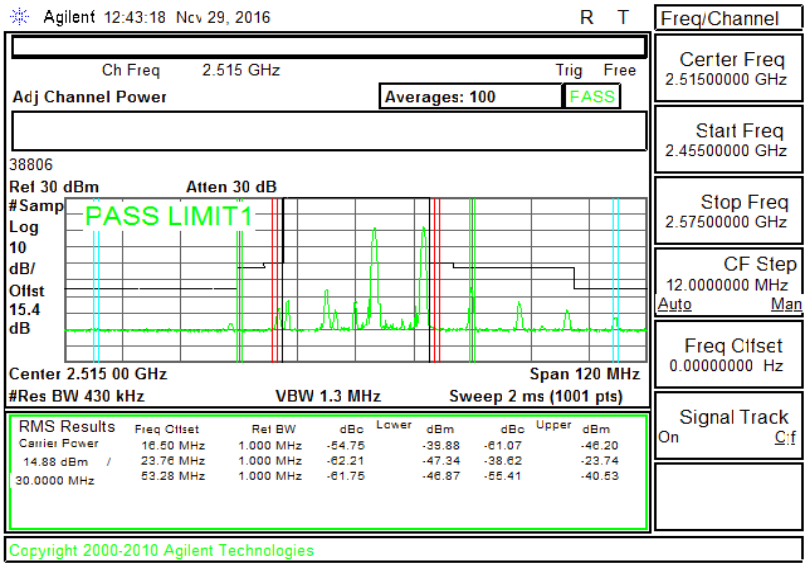
QPSK, (20.0 MHz + 10.0 MHz BAND WIDTH)



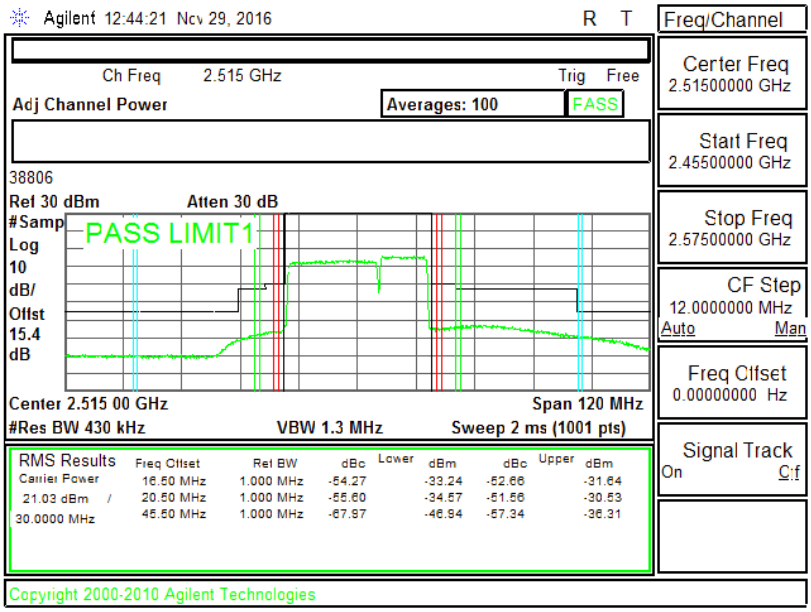


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

LOW CH, RB1-99 + 1-49

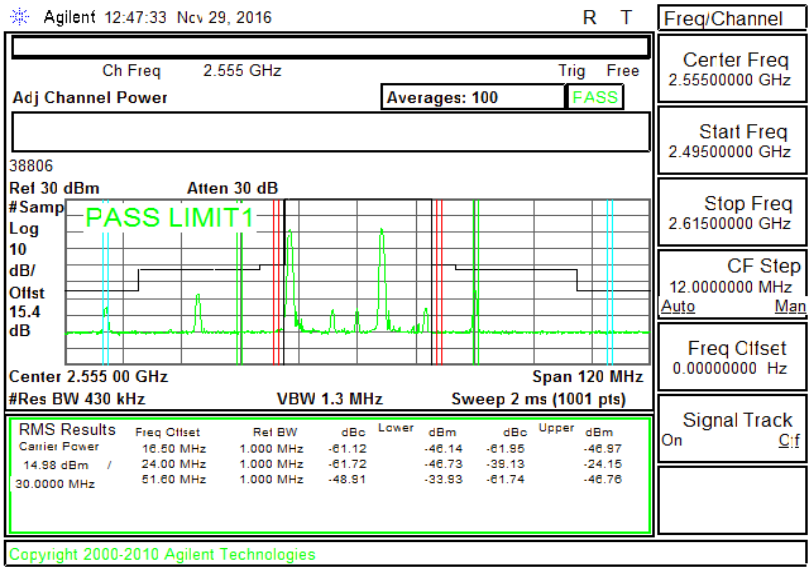


LOW CH, RB100-0 + 50-0

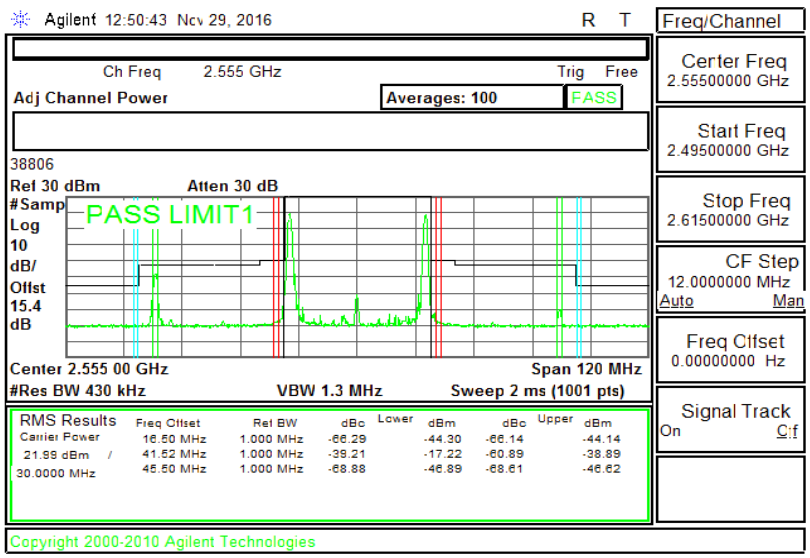


UL VERIFICATION SERVICES INC.
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888
FORM NO: CCSUP4031B
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

HIGH CH, RB1-0 + 1-0

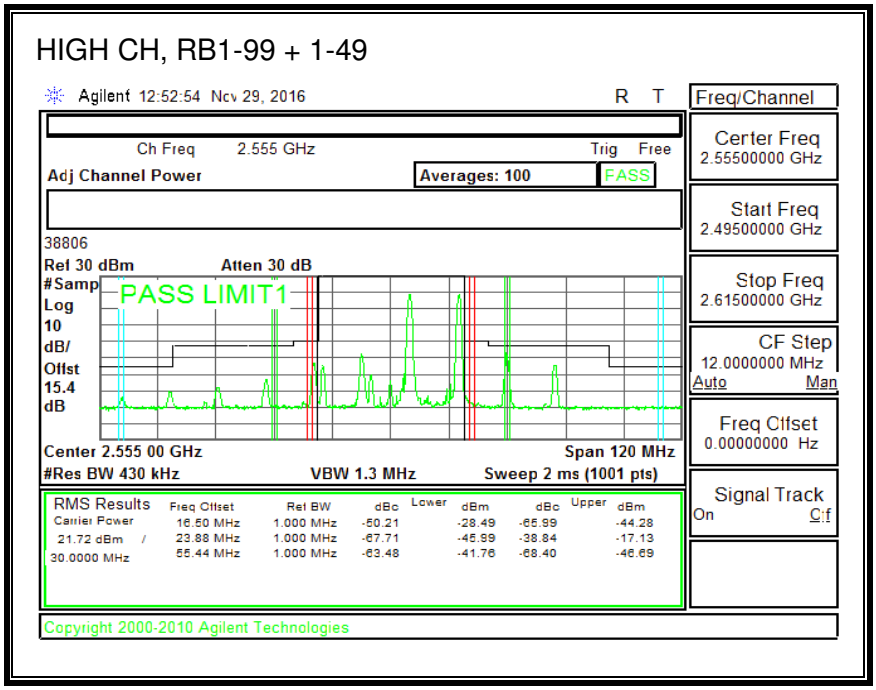


HIGH CH, RB1-0 + 1 49

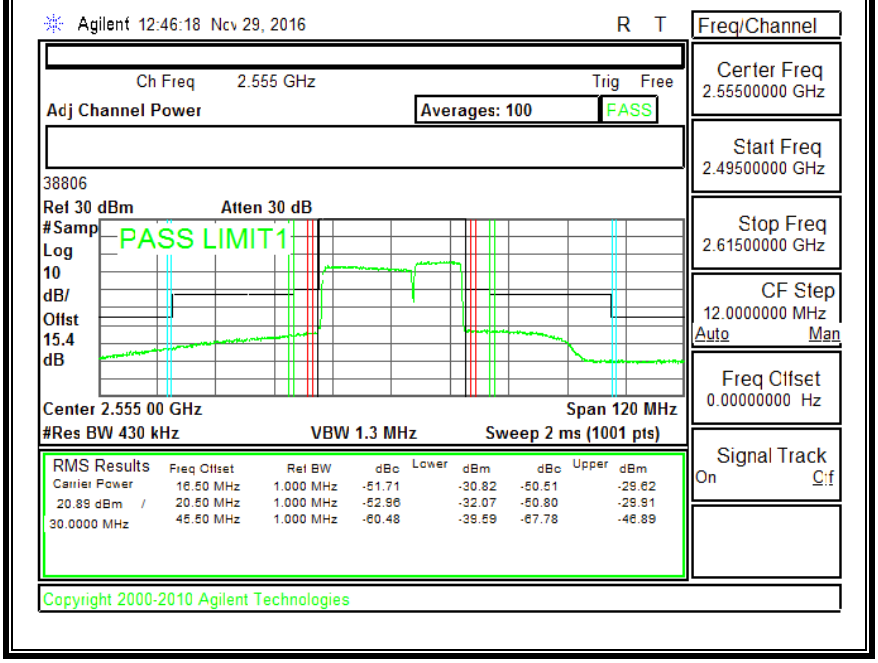


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

HIGH CH, RB1-99 + 1-49

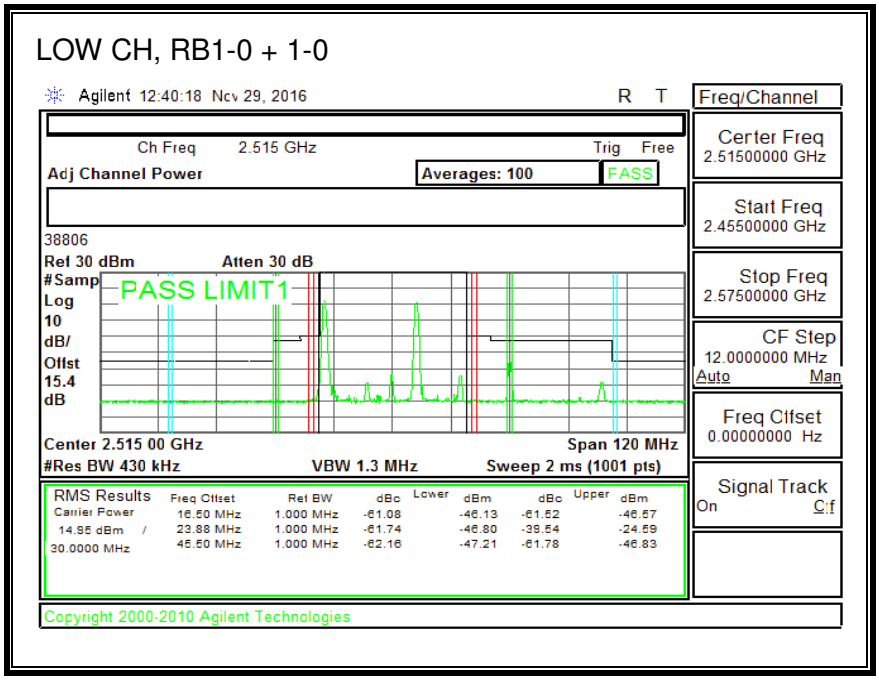


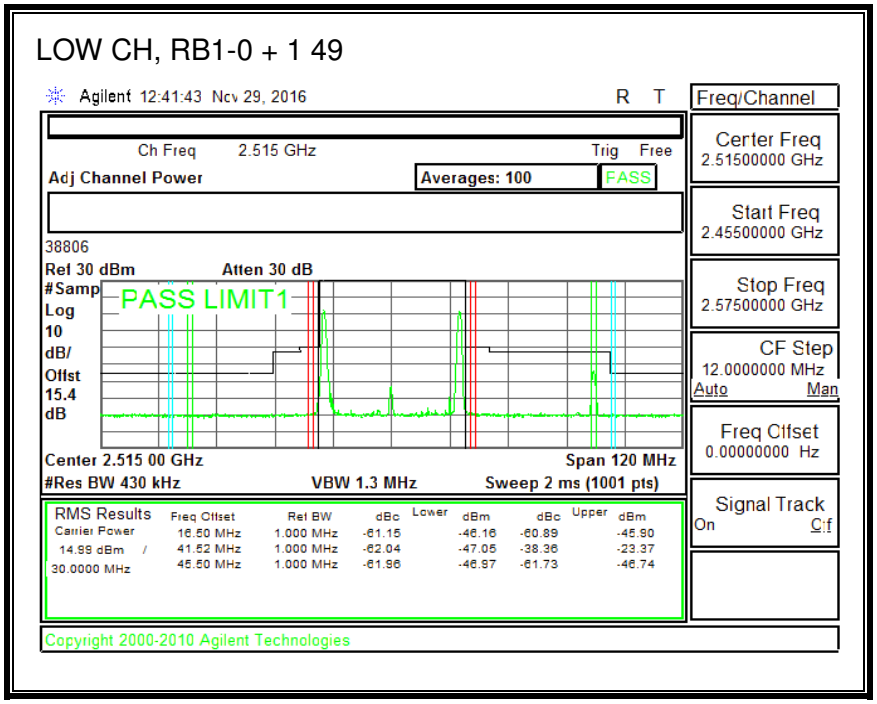
HIGH CH, RB100-0 + 50-0



This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

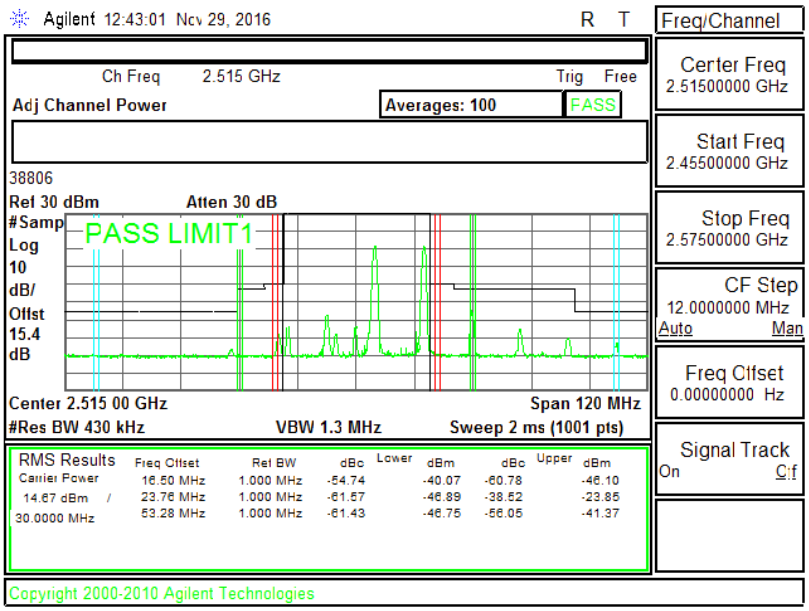
16QAM (20.0 MHz + 10.0 MHz BAND WIDTH)



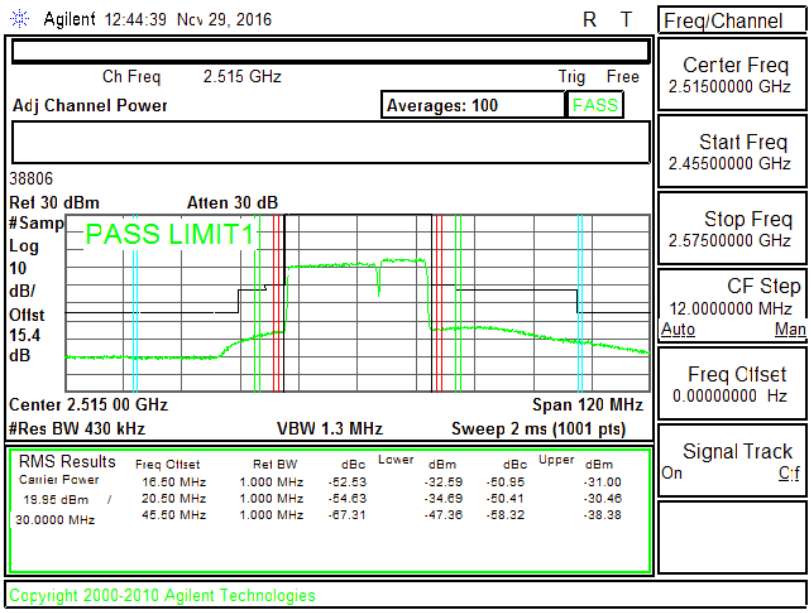


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

LOW CH, RB1-99 + 1-49

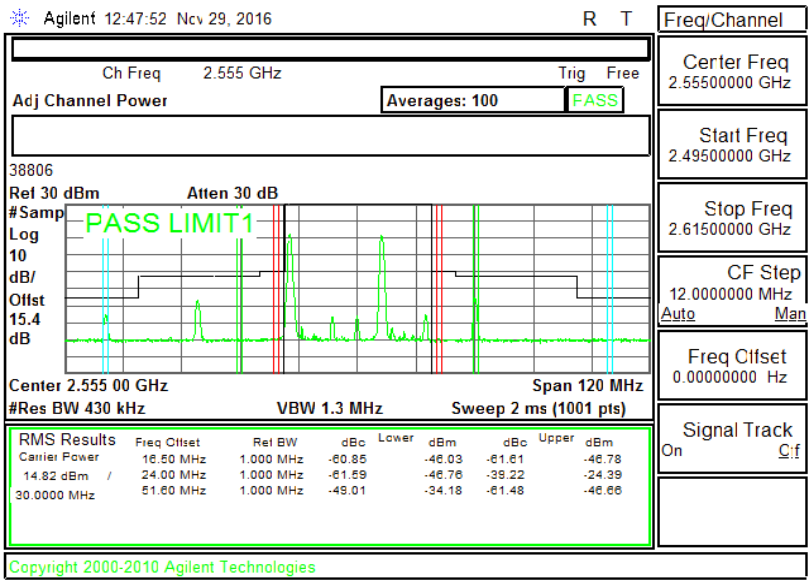


LOW CH, RB100-0 + 50-0

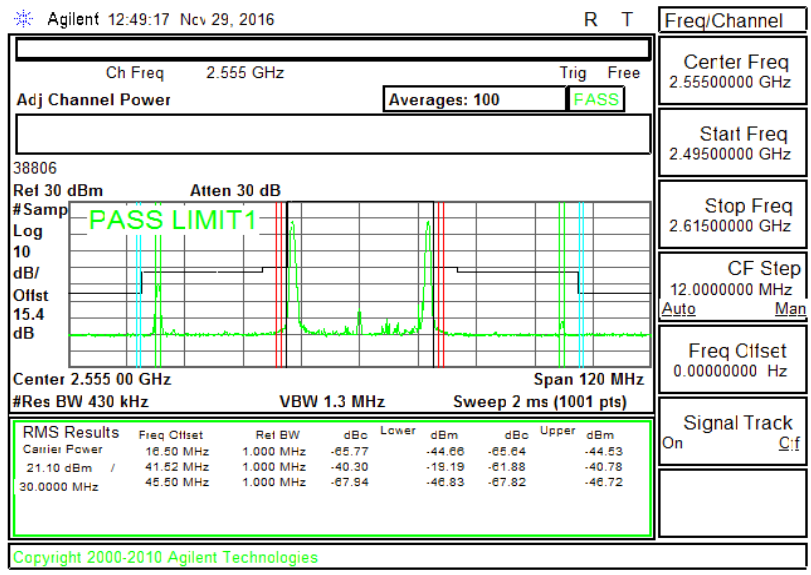


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

HIGH CH, RB1-0 + 1-0

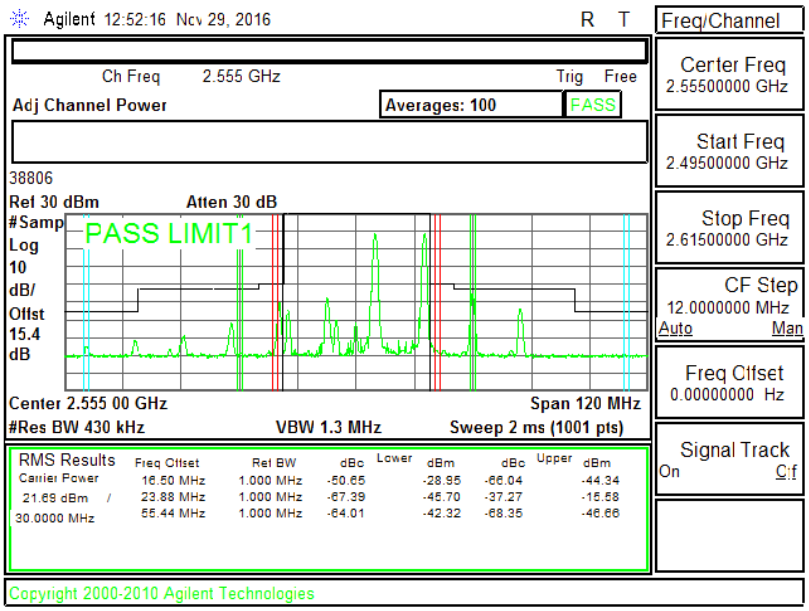


HIGH CH, RB1-0 + 1 49

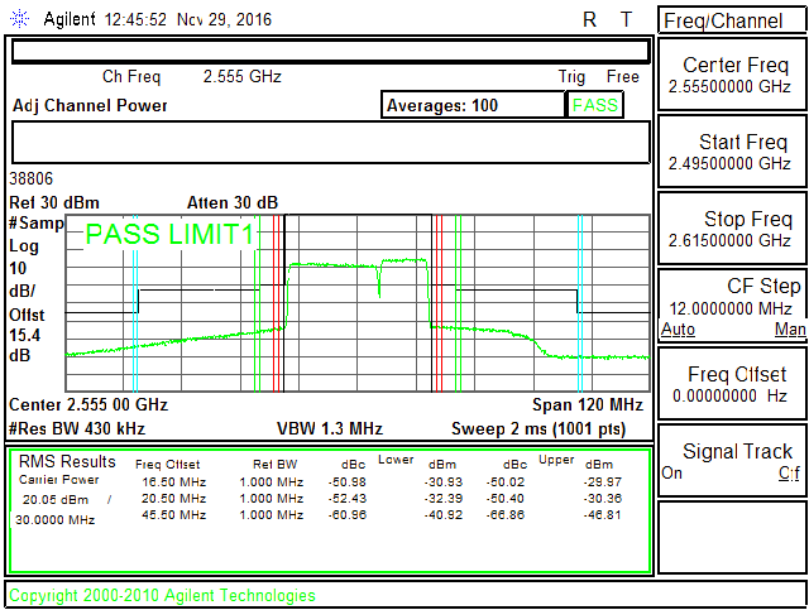


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

HIGH CH, RB1-99 + 1-49

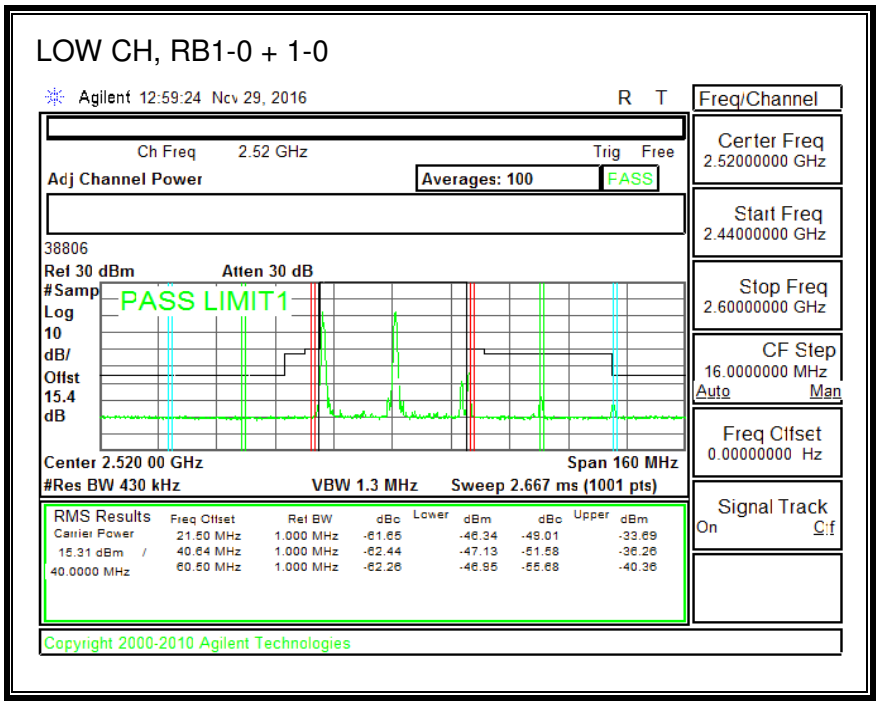


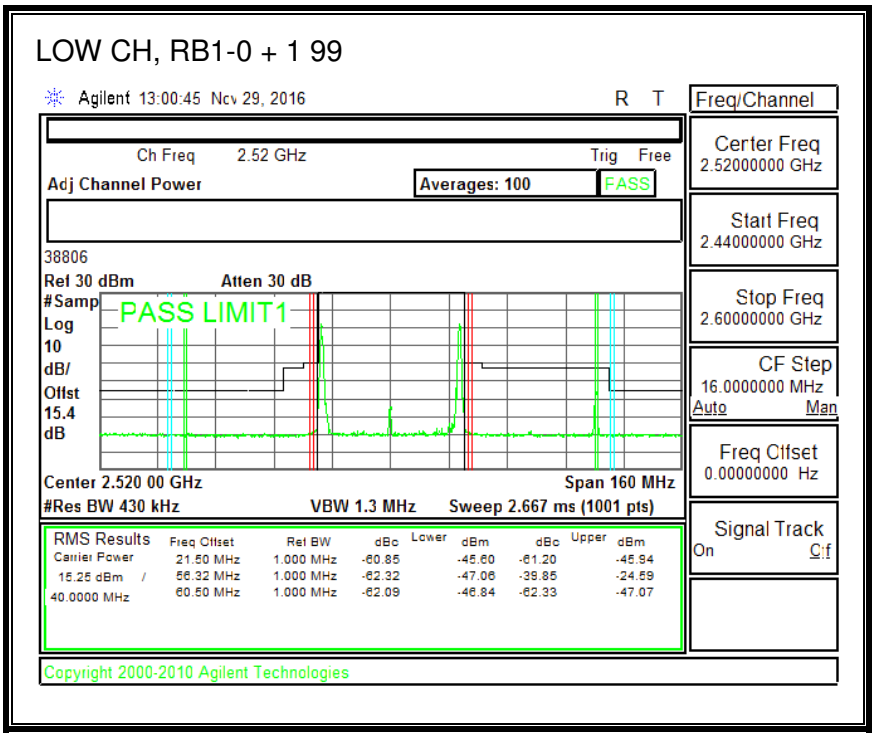
HIGH CH, RB100-0 + 50-0



This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

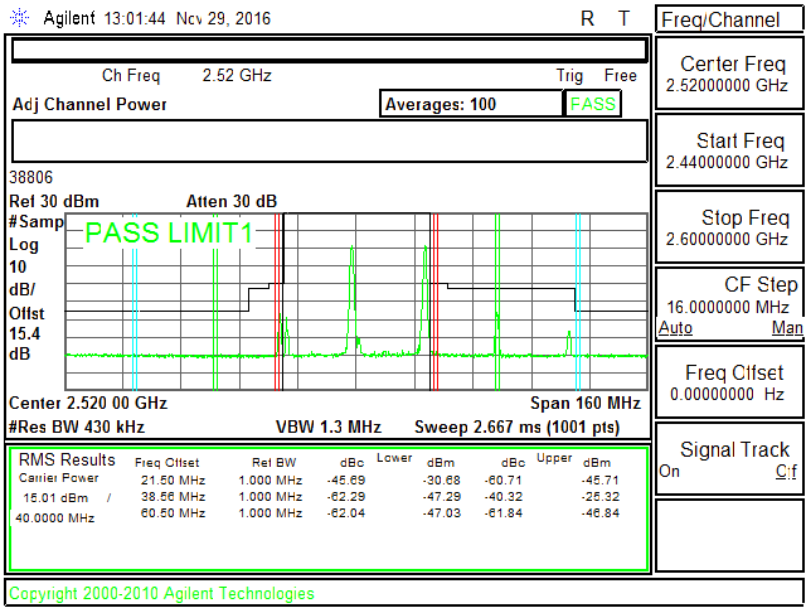
QPSK, (20.0 MHz + 20.0 MHz BAND WIDTH)



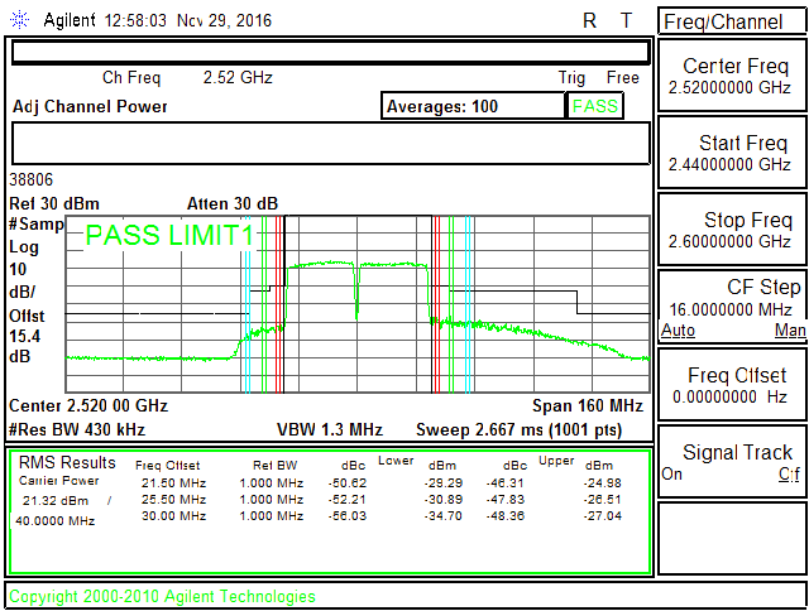


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

LOW CH, RB1-99 + 1-99

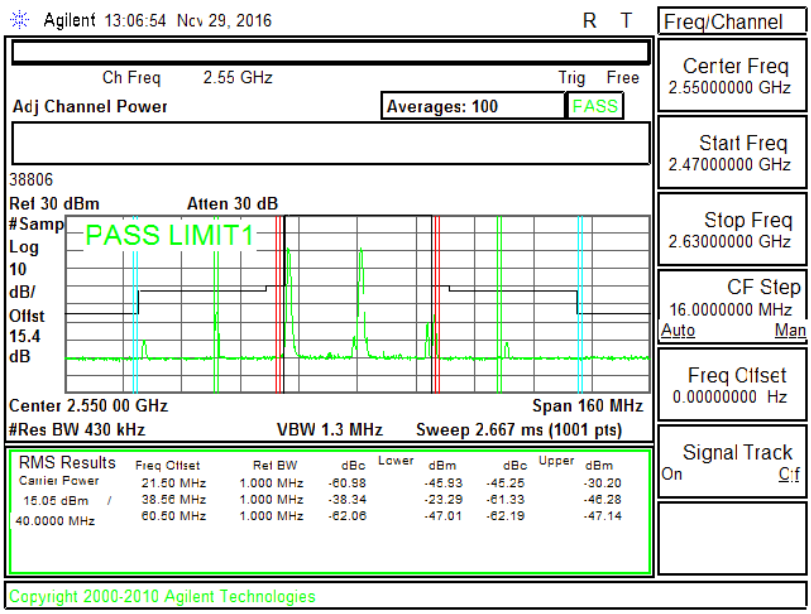


LOW CH, RB100-0 + 100-0

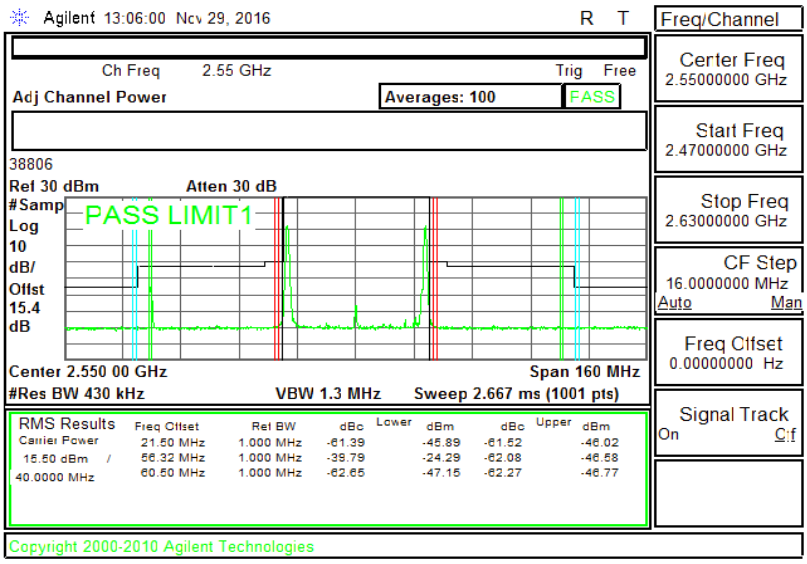


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

HIGH CH, RB1-0 + 1-0

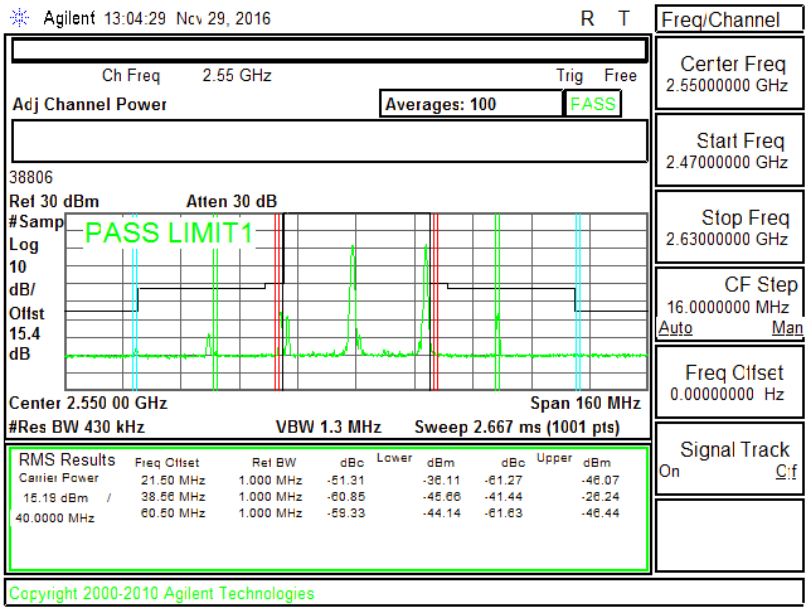


HIGH CH, RB1-0 + 1 99

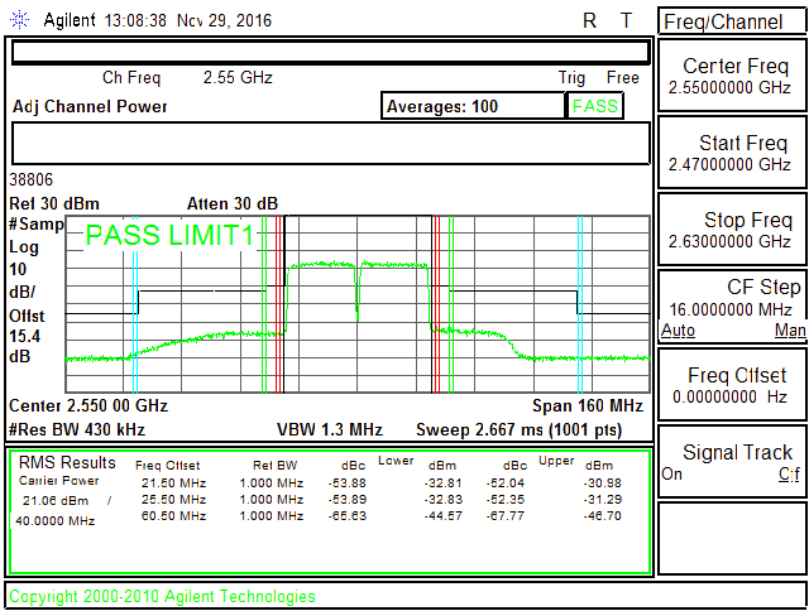


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

HIGH CH, RB1-99 + 1-99

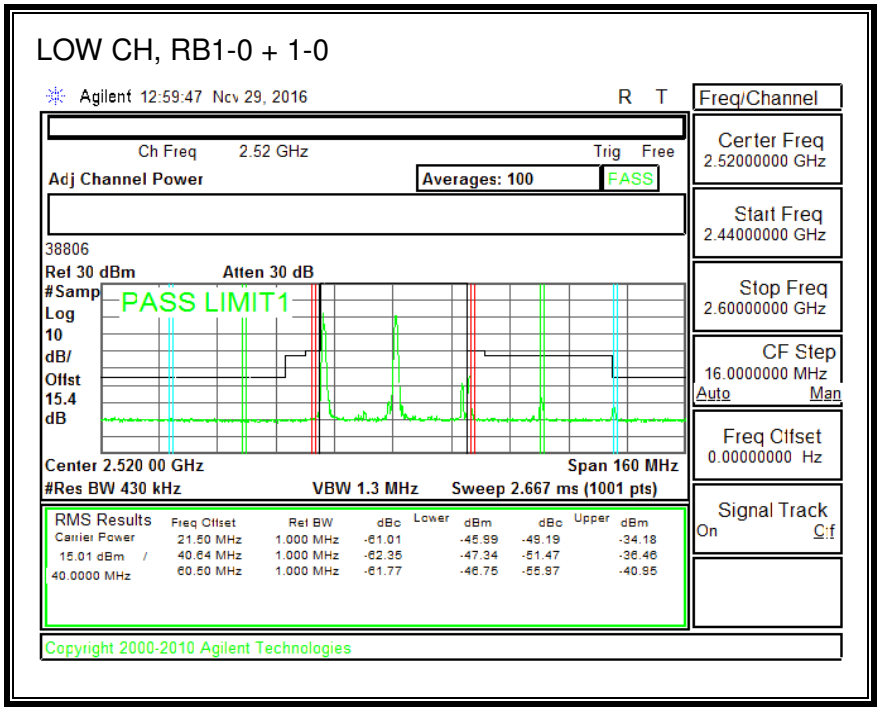


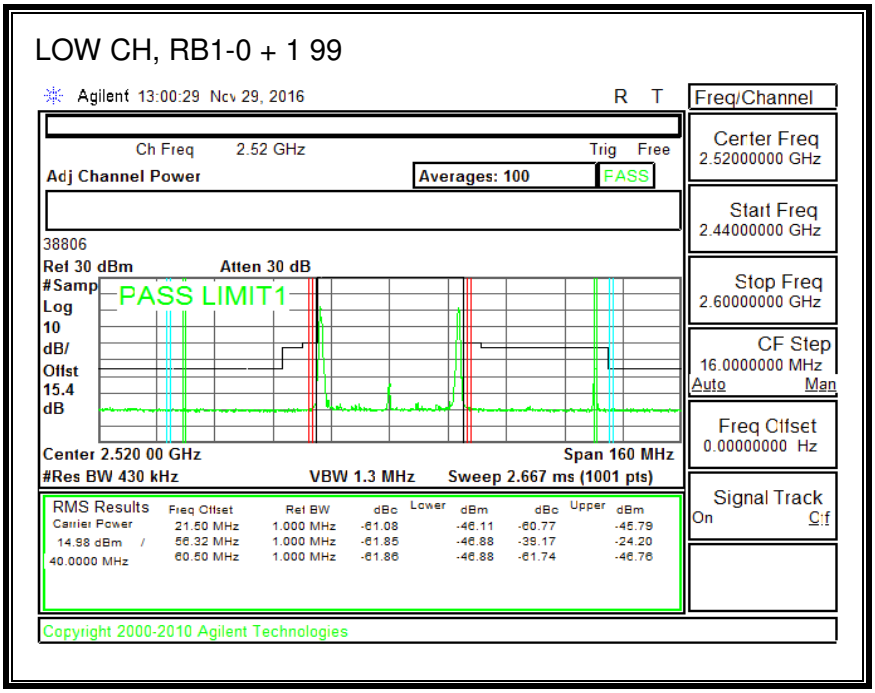
HIGH CH, RB100-0 + 100-0



This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

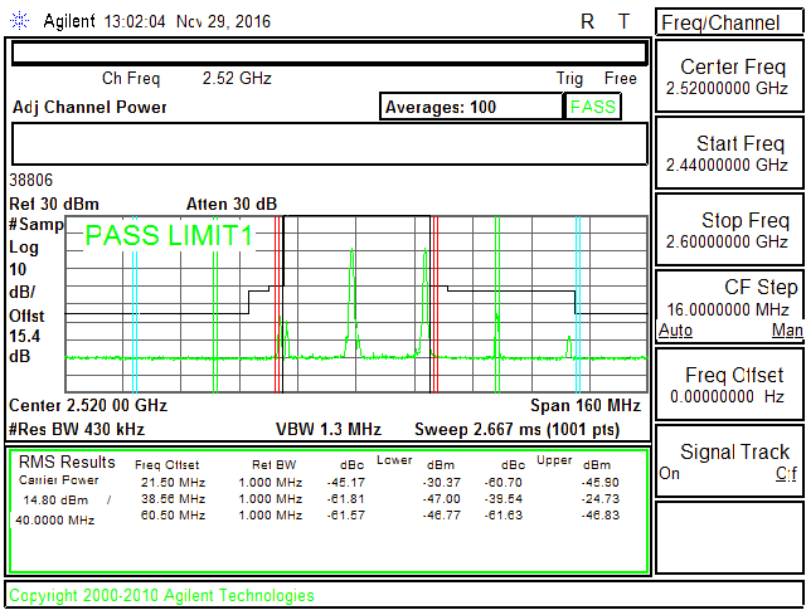
16QAM (20.0 MHz + 20.0 MHz BAND WIDTH)



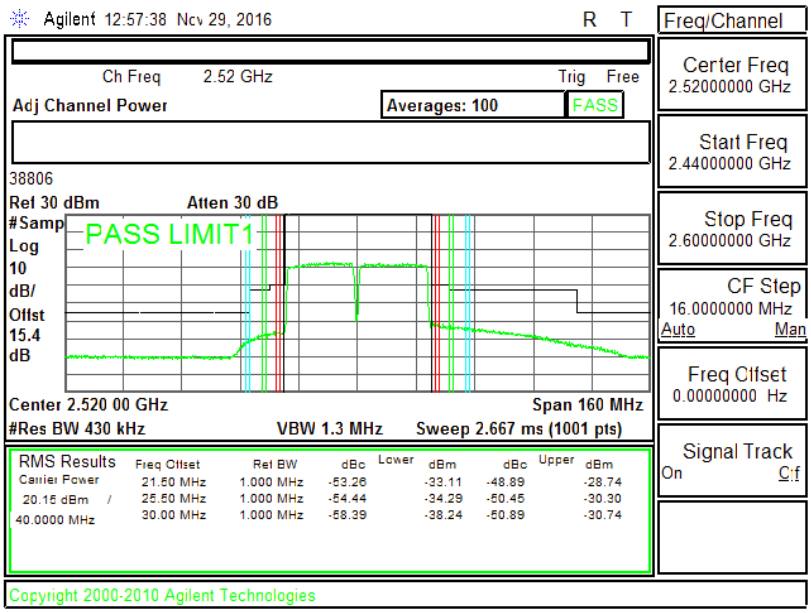


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

LOW CH, RB1-99 + 1-99

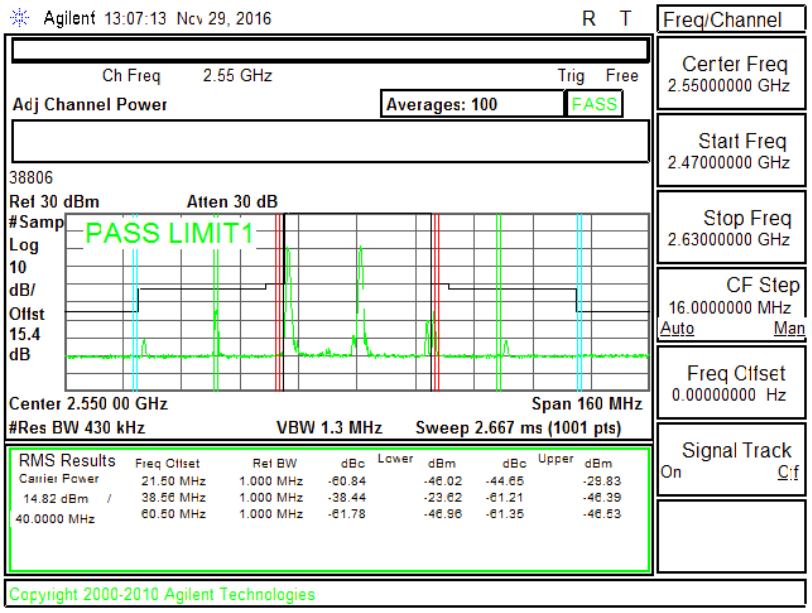


LOW CH, RB100-0 + 100-0

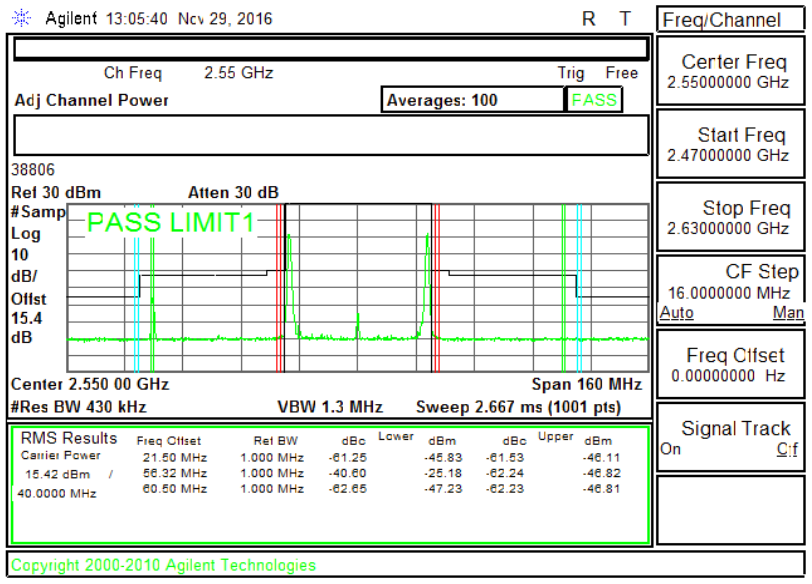


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

HIGH CH, RB1-0 + 1-0

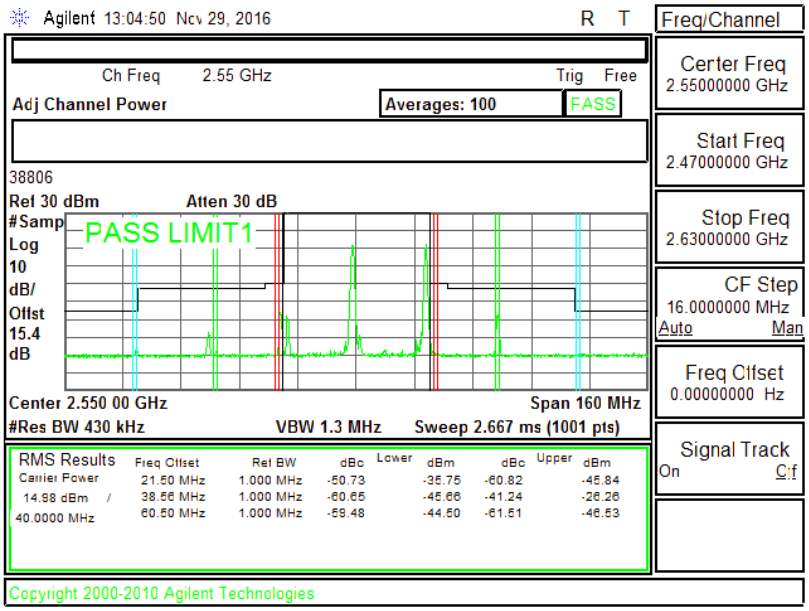


HIGH CH, RB1-0 + 1 99

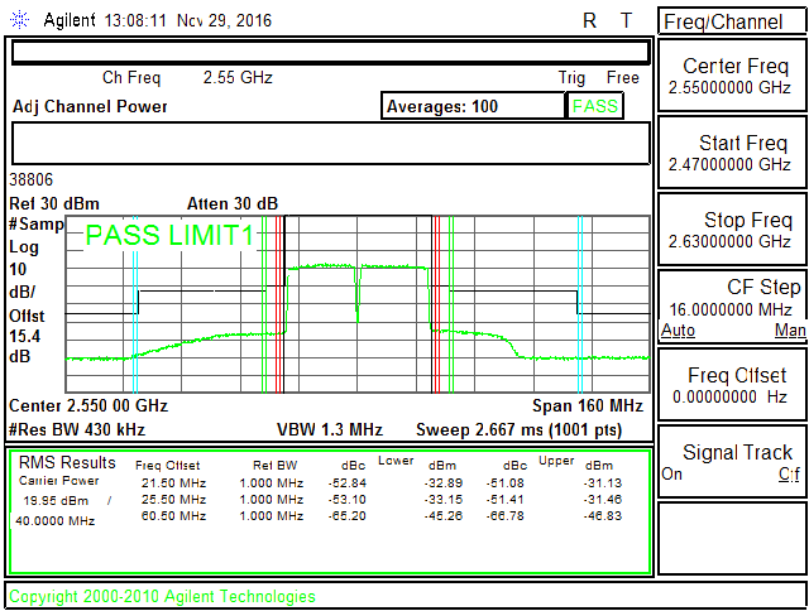


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

HIGH CH, RB1-99 + 1-99



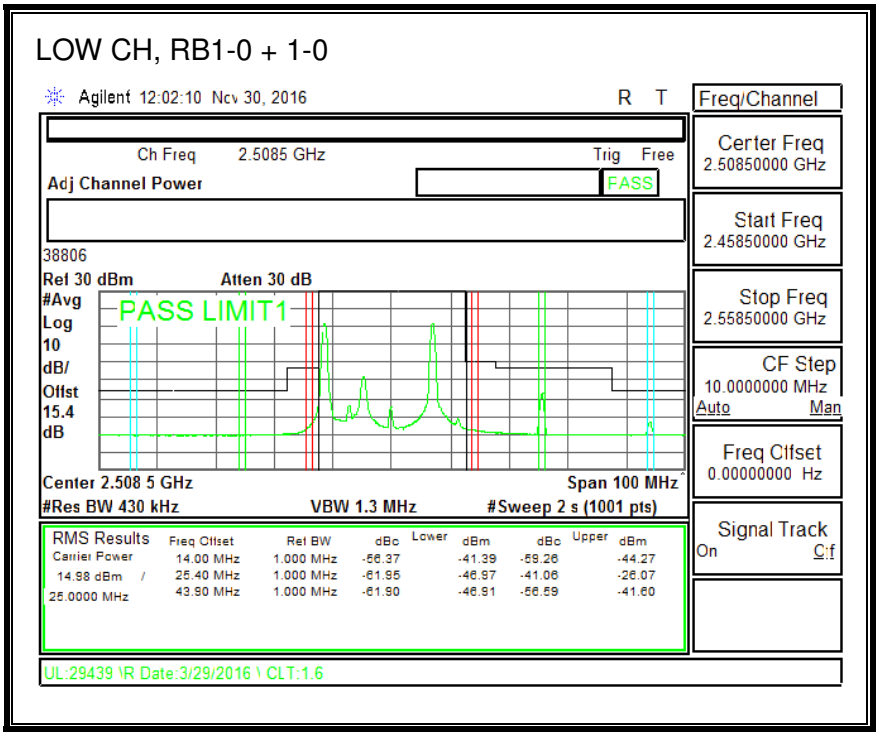
HIGH CH, RB100-0 + 100-0

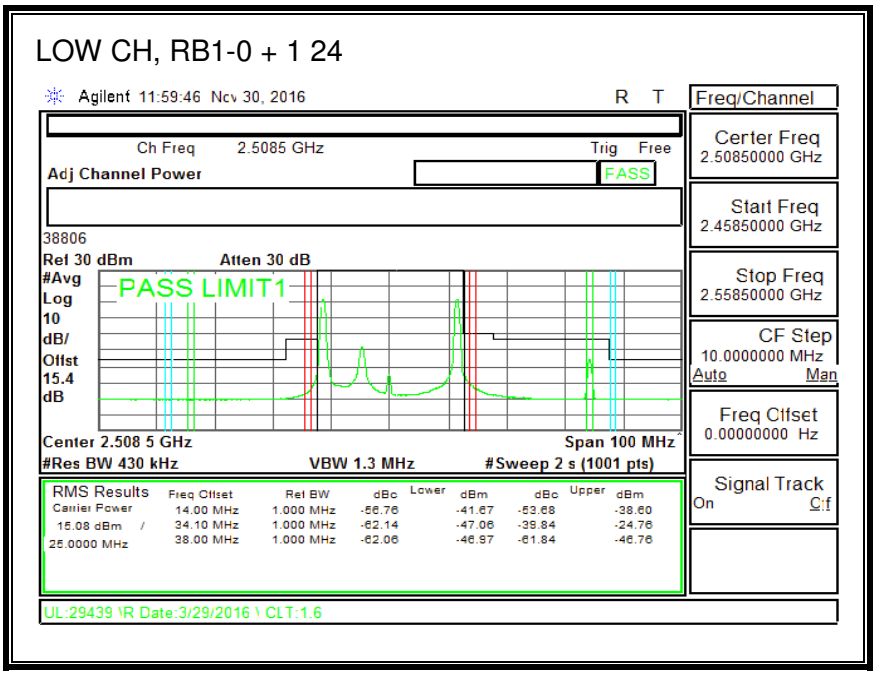


UL VERIFICATION SERVICES INC.
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888
FORM NO: CCSUP4031B
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

8.2.2. LTE BAND 41

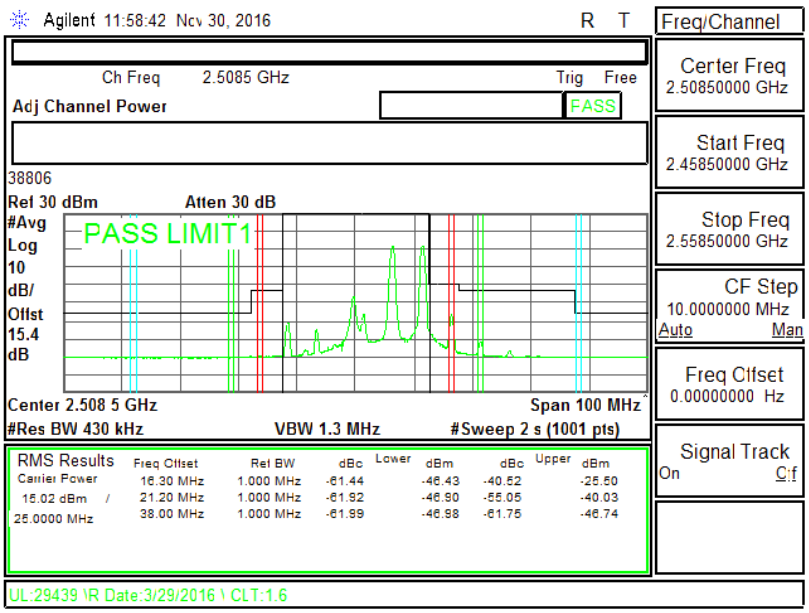
QPSK, (20.0 MHz + 5.0 MHz BAND WIDTH)



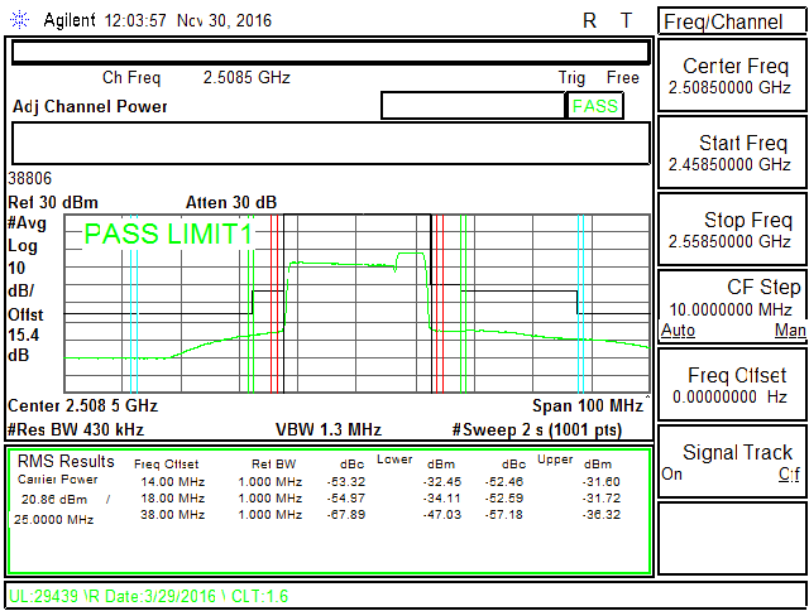


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

LOW CH, RB1-99 + 1-24

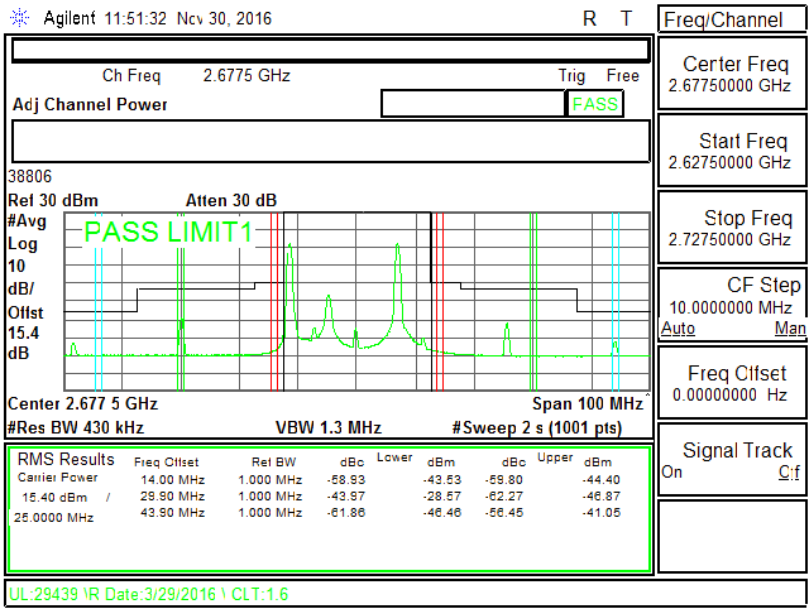


LOW CH, RB100-0 + 25-0

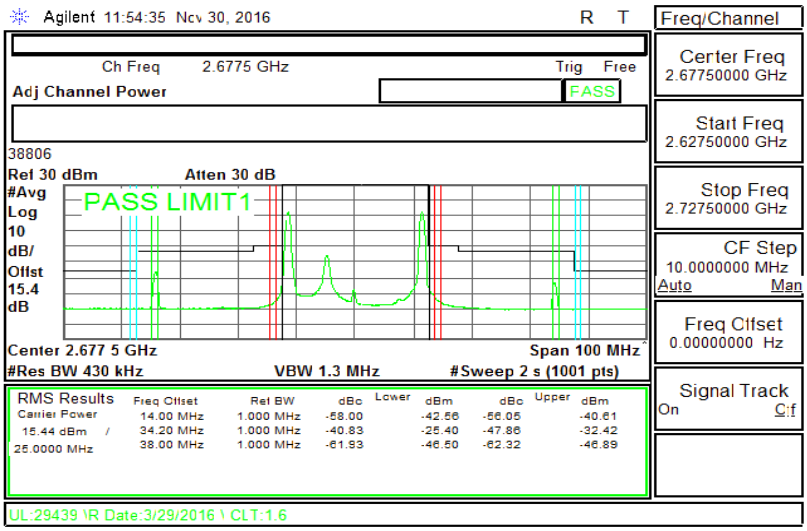


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

HIGH CH, RB1-0 + 1-0

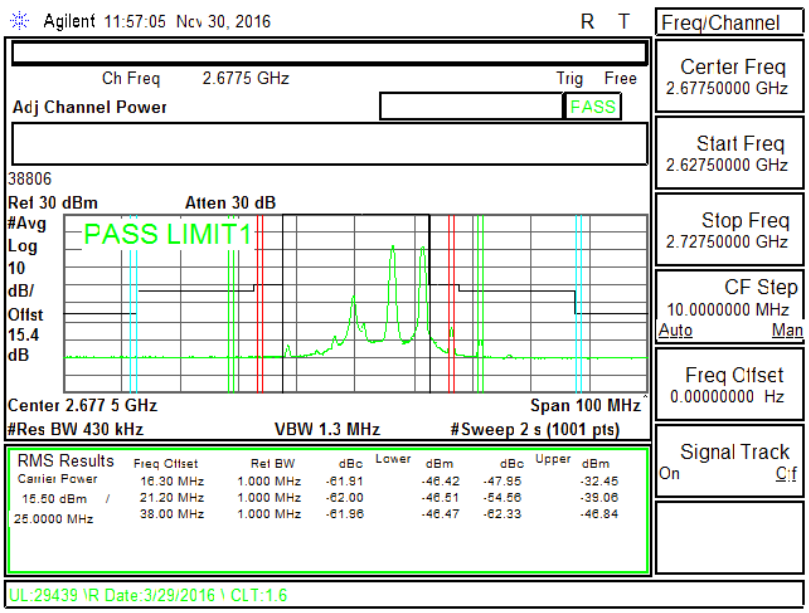


HIGH CH, RB1-0 + 1 24

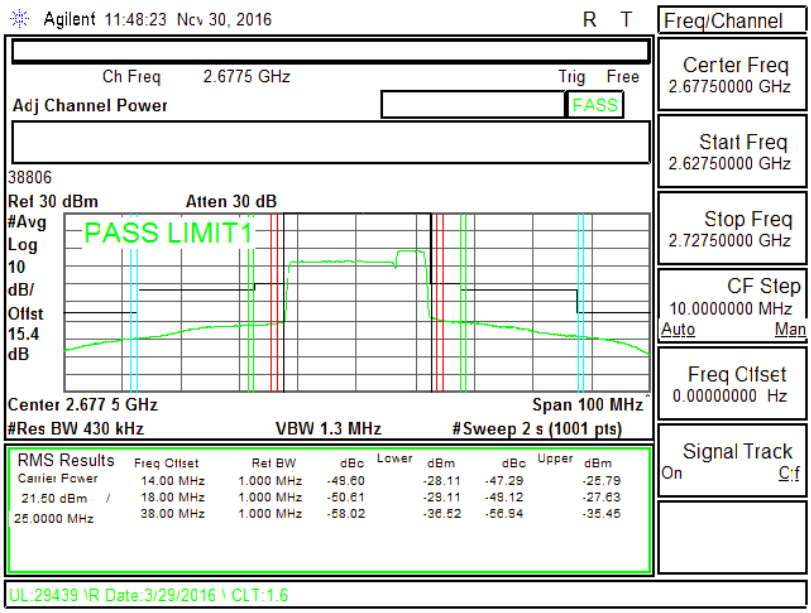


UL VERIFICATION SERVICES INC.
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888
FORM NO: CCSUP4031B
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

HIGH CH, RB1-99 + 1-24

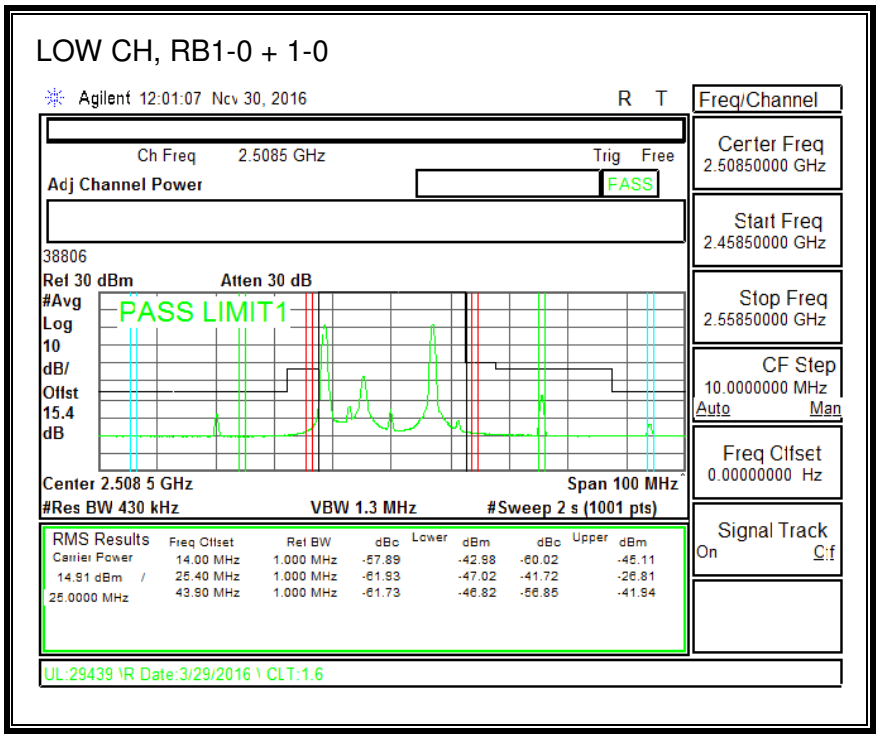


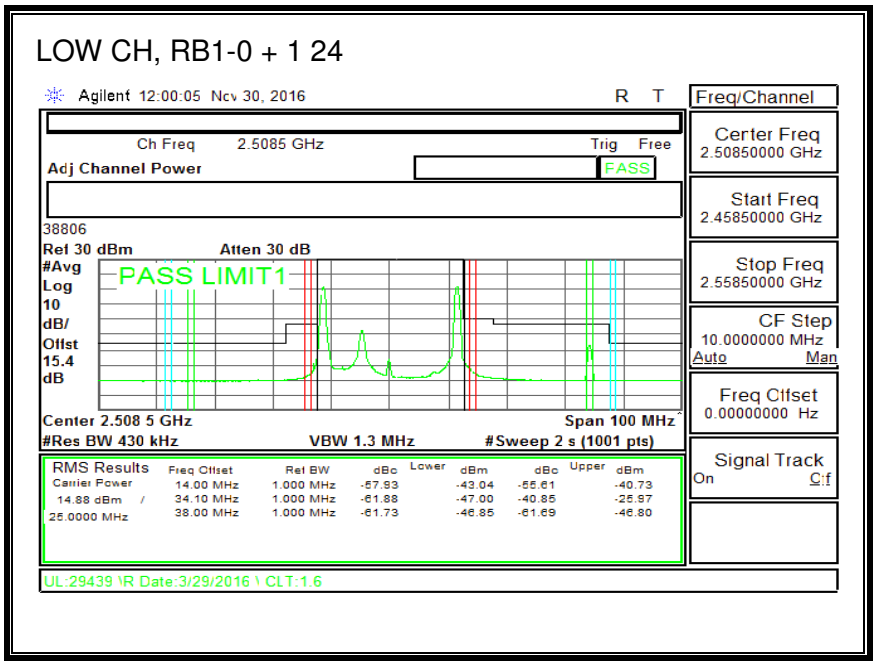
HIGH CH, RB100-0 + 25-0



This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

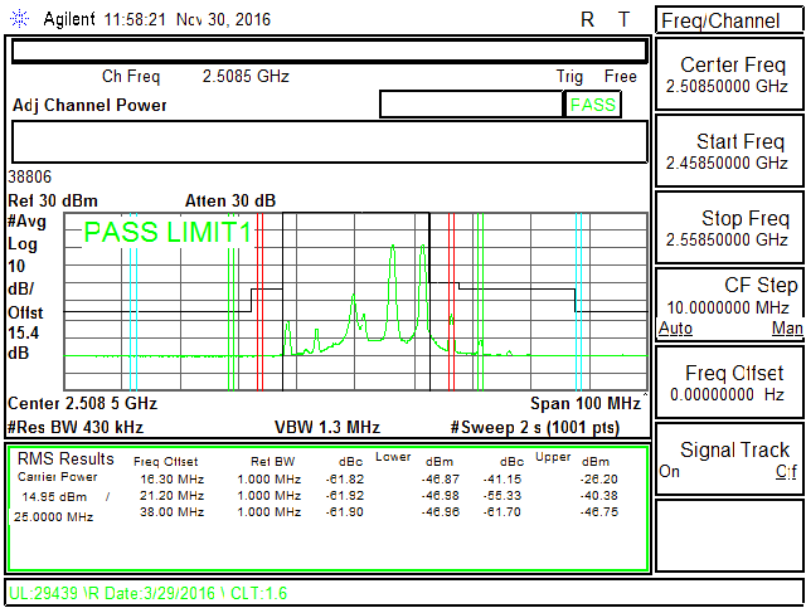
16QAM (20.0 MHz + 5.0 MHz BAND WIDTH)



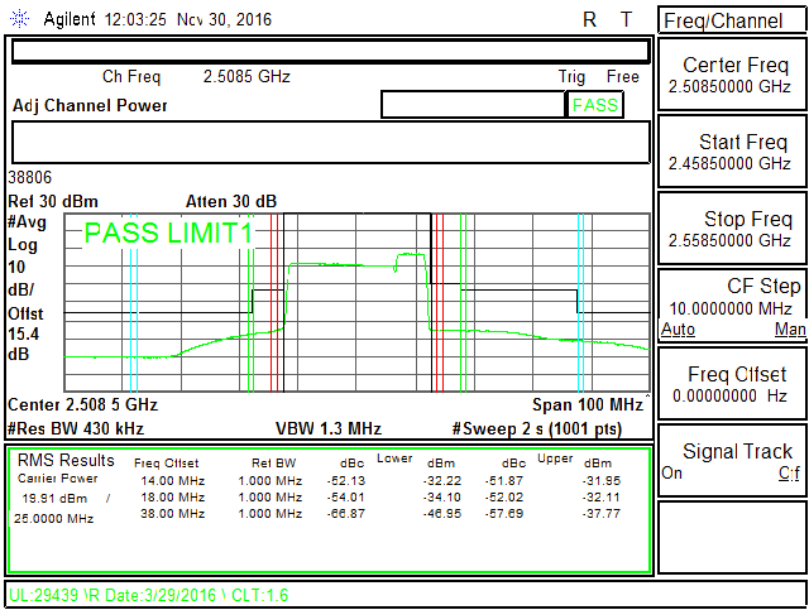


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

LOW CH, RB1-99 + 1-24

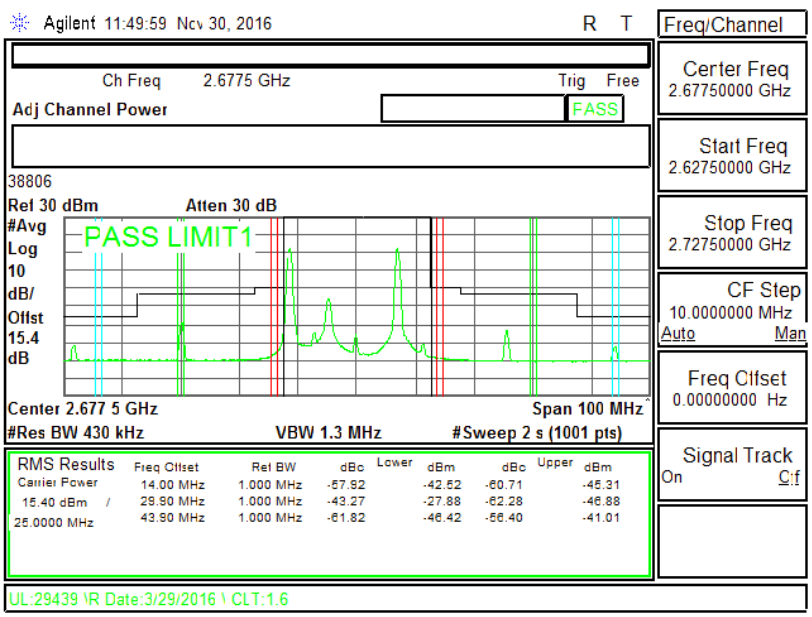


LOW CH, RB100-0 + 25-0

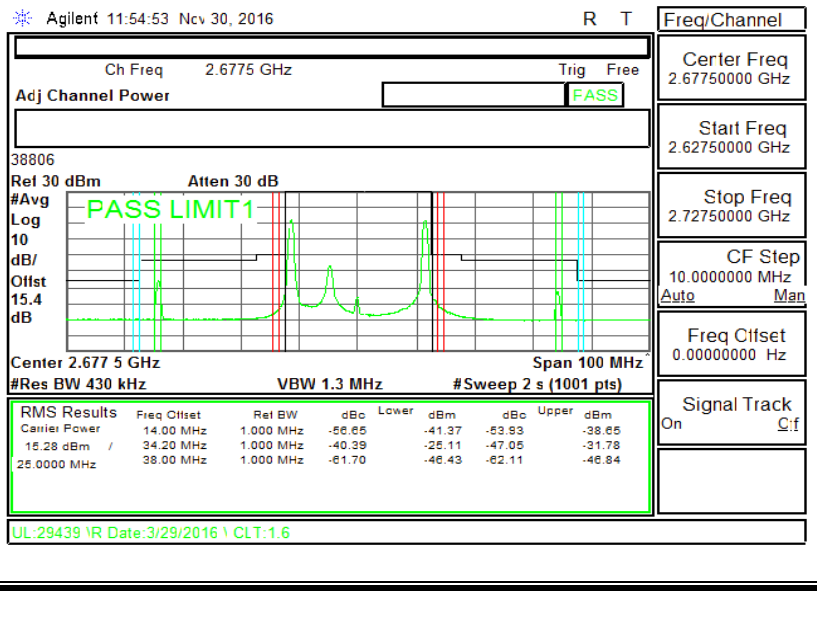


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

HIGH CH, RB1-0 + 1-0

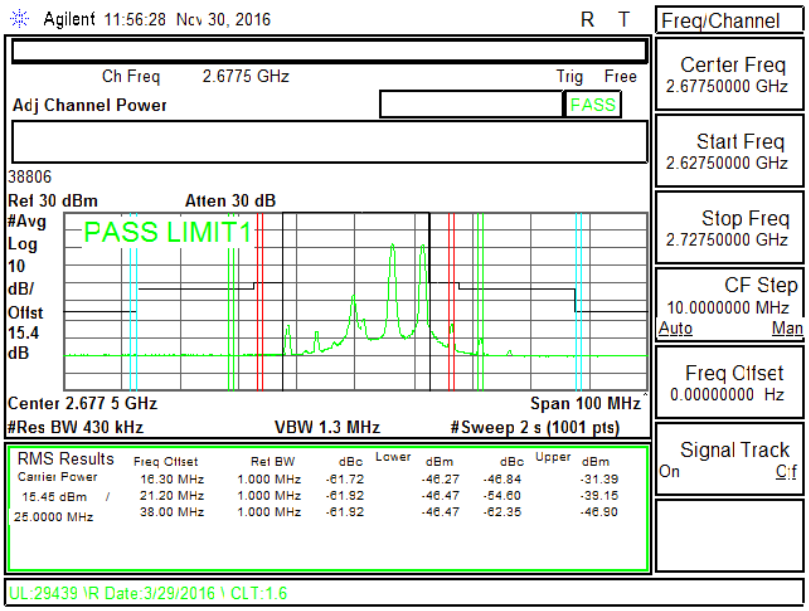


HIGH CH, RB1-0 + 1 24

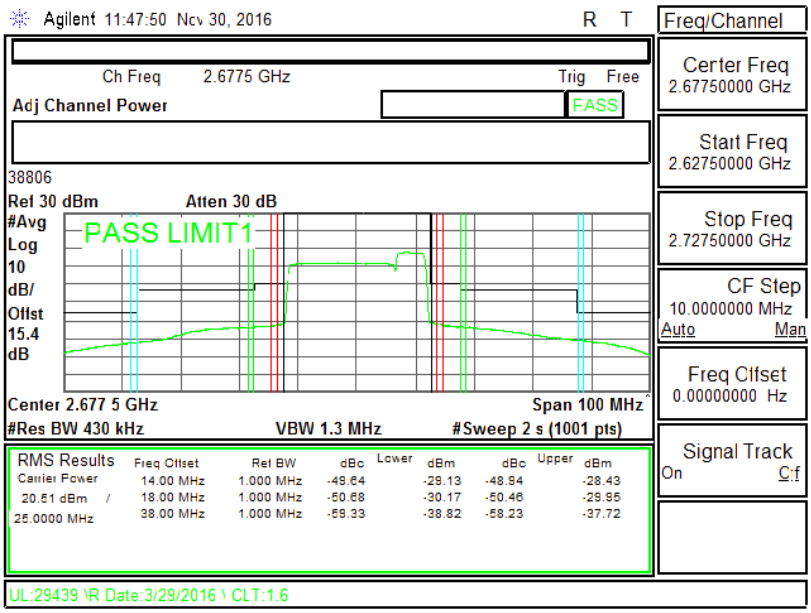


UL VERIFICATION SERVICES INC.
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888
FORM NO: CCSUP4031B
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

HIGH CH, RB1-99 + 1-24

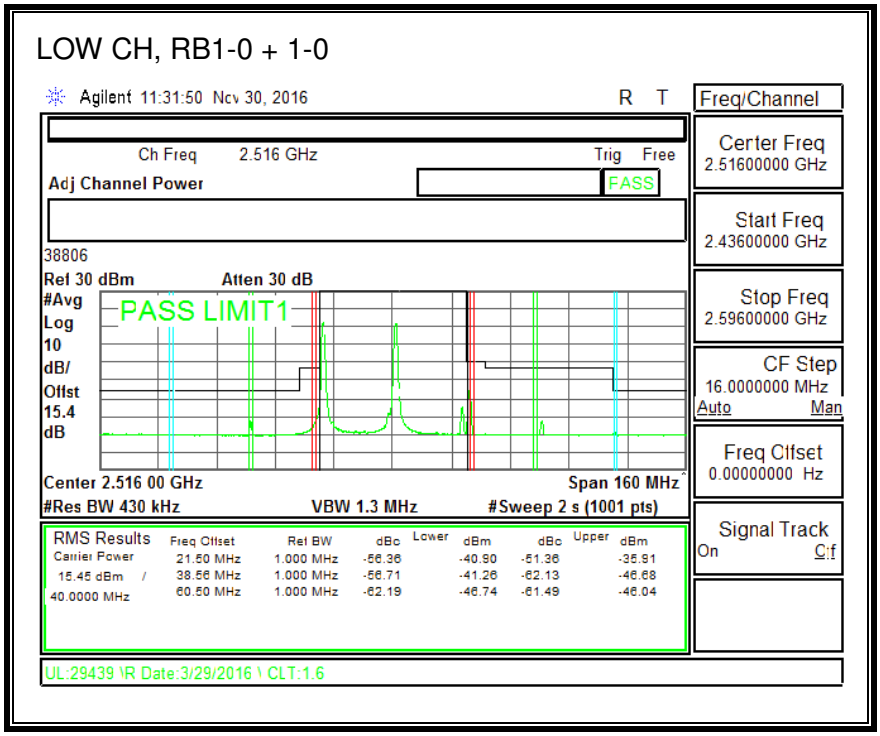


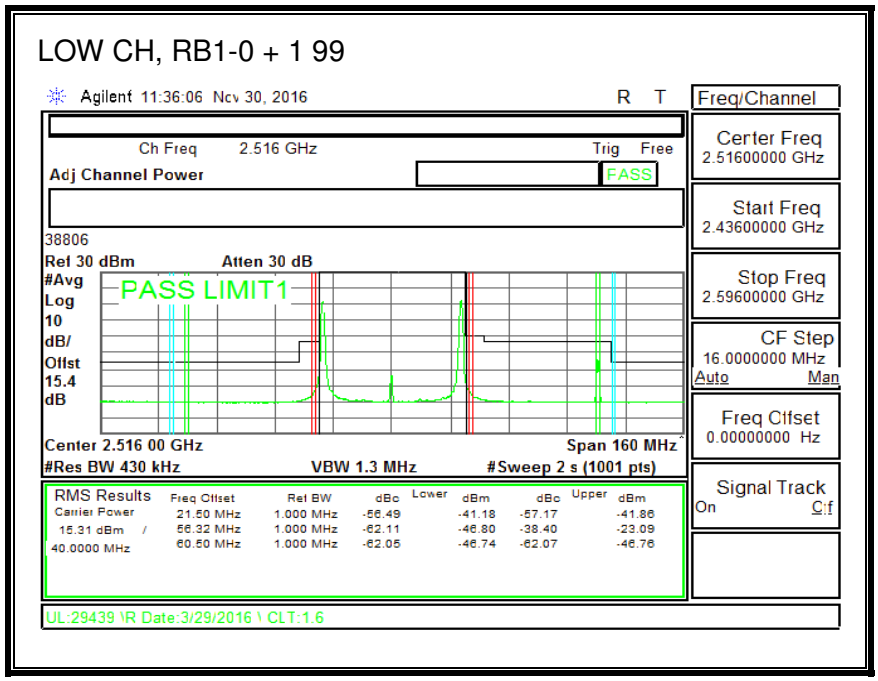
HIGH CH, RB100-0 + 25-0



This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

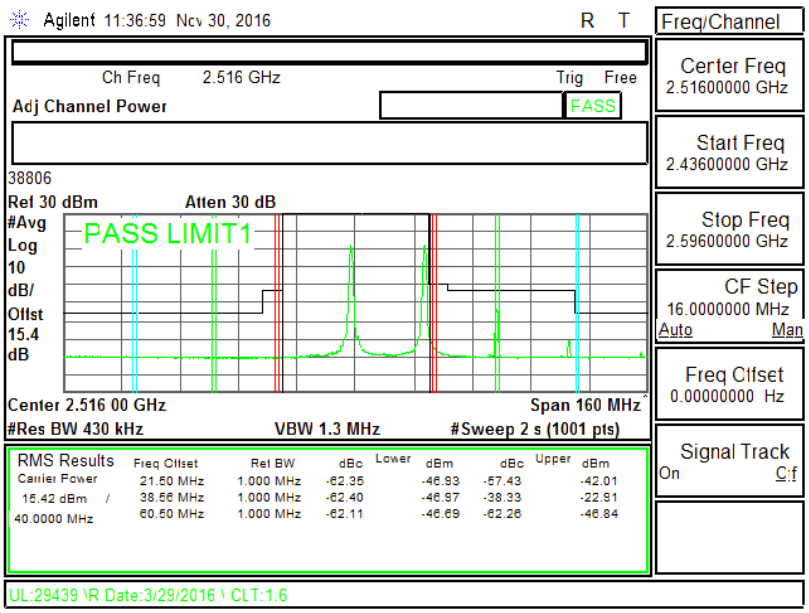
QPSK, (20.0 MHz + 20.0 MHz BAND WIDTH)



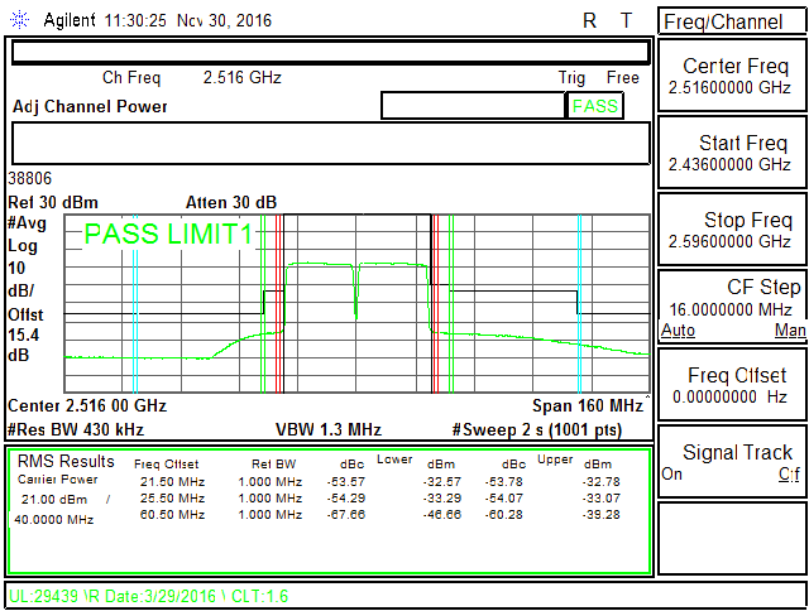


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

LOW CH, RB1-99 + 1-99

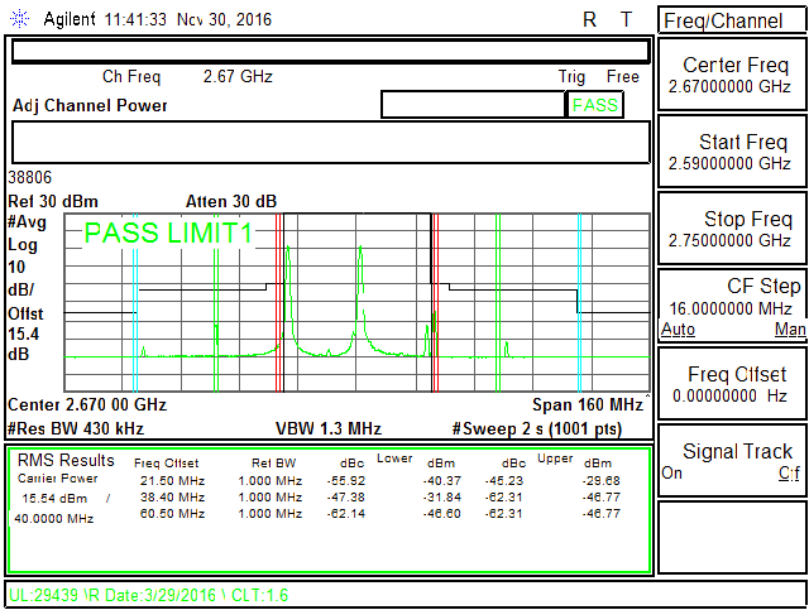


LOW CH, RB100-0 + 100-0

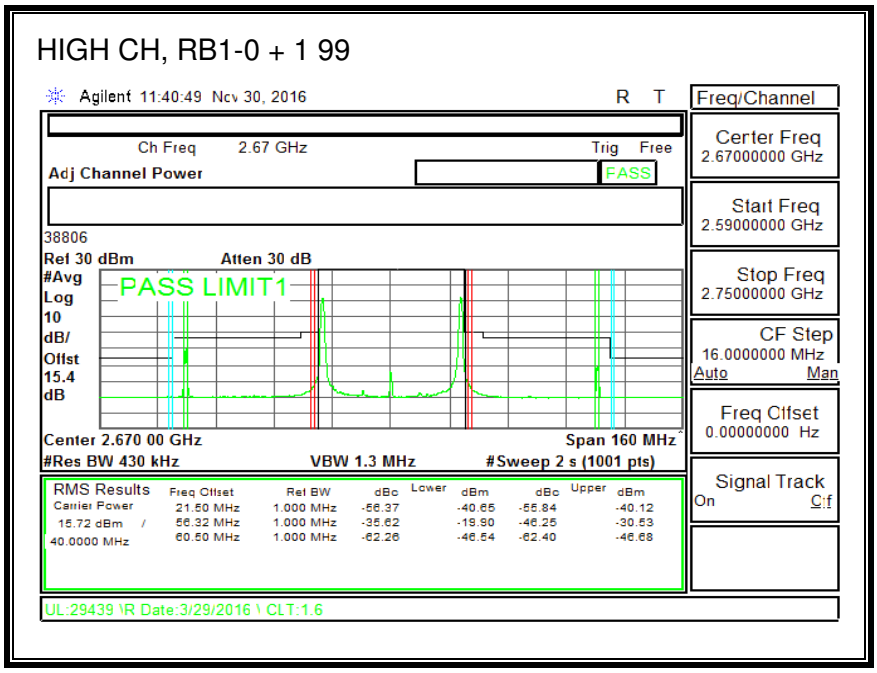


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

HIGH CH, RB1-0 + 1-0

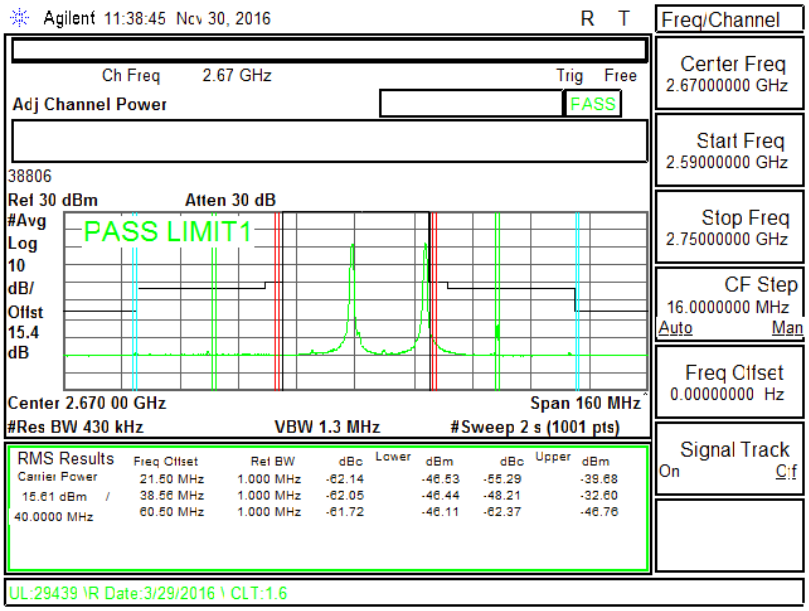


HIGH CH, RB1-0 + 1 99

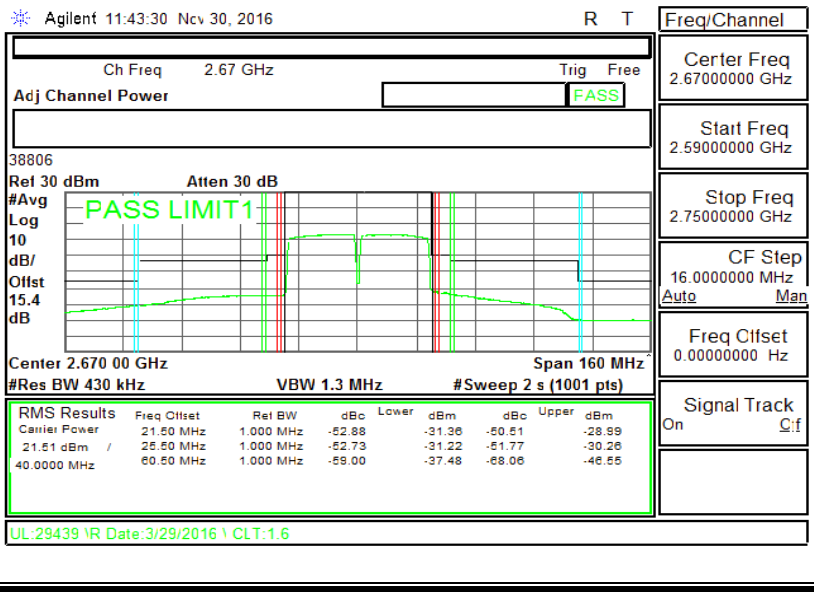


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

HIGH CH, RB1-99 + 1-99

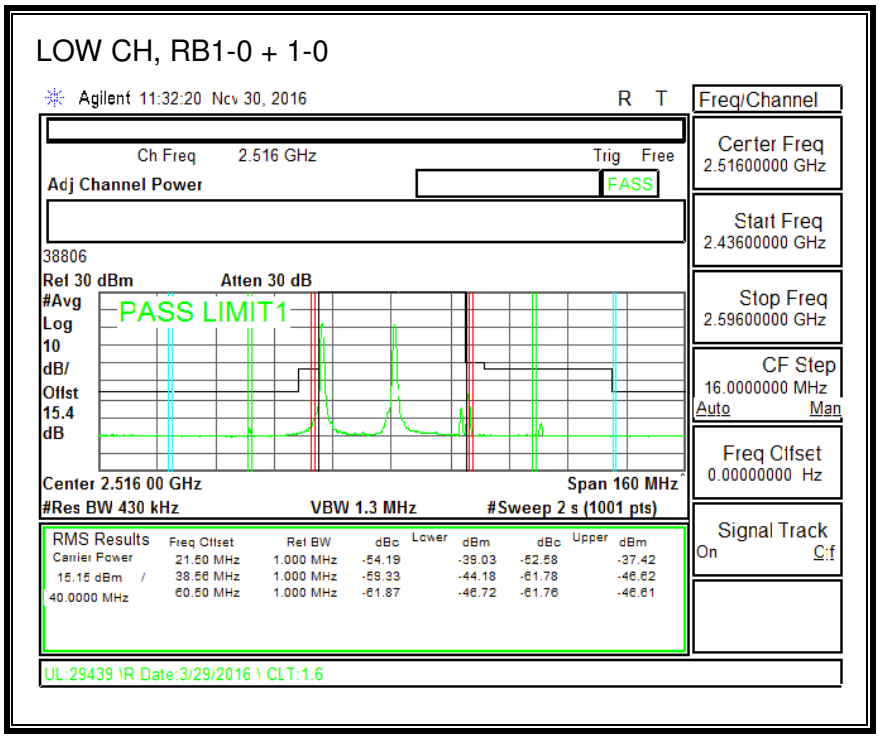


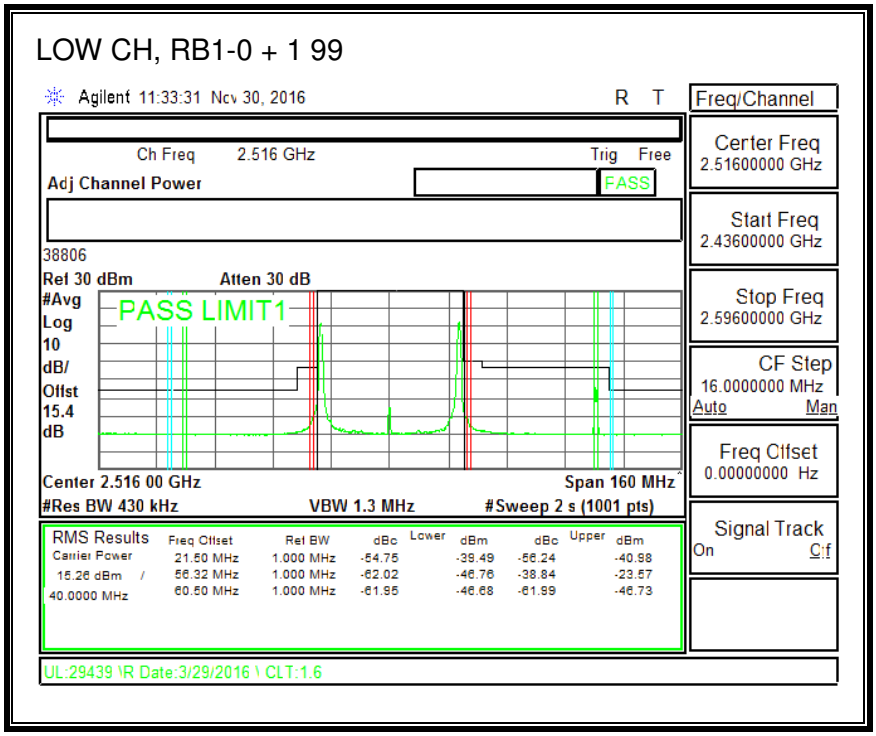
HIGH CH, RB100-0 + 100-0



This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

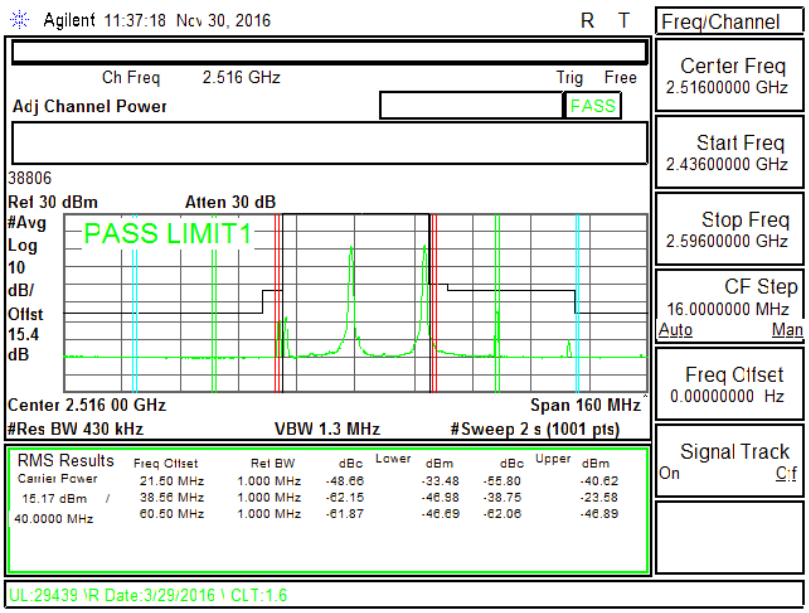
16QAM (20.0 MHz + 20.0 MHz BAND WIDTH)



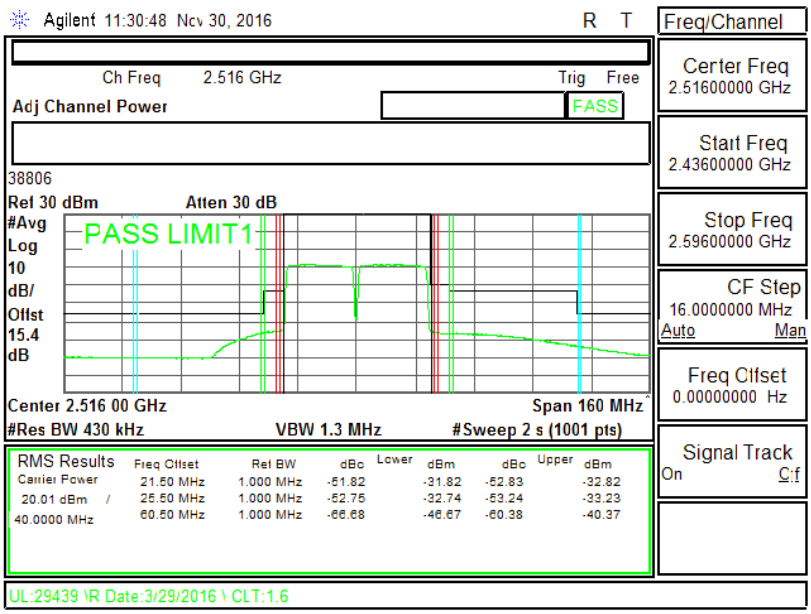


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

LOW CH, RB1-99 + 1-99

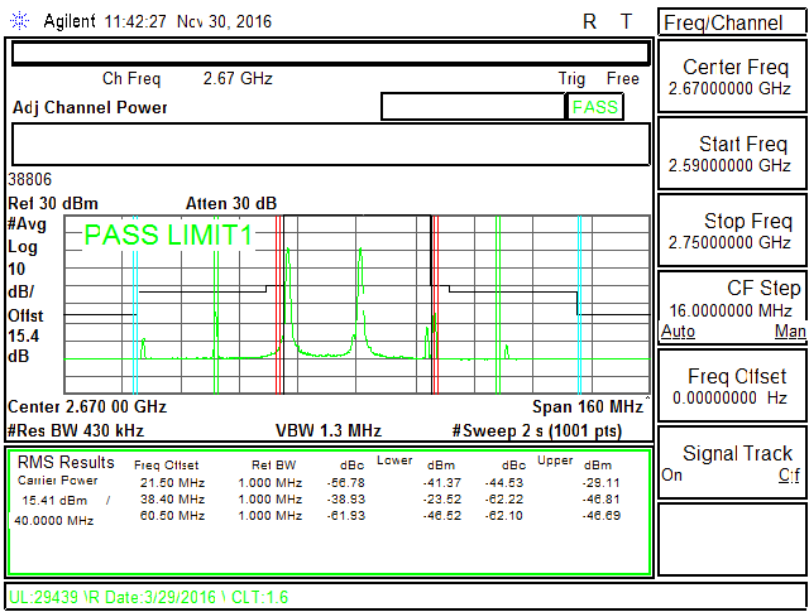


LOW CH, RB100-0 + 100-0

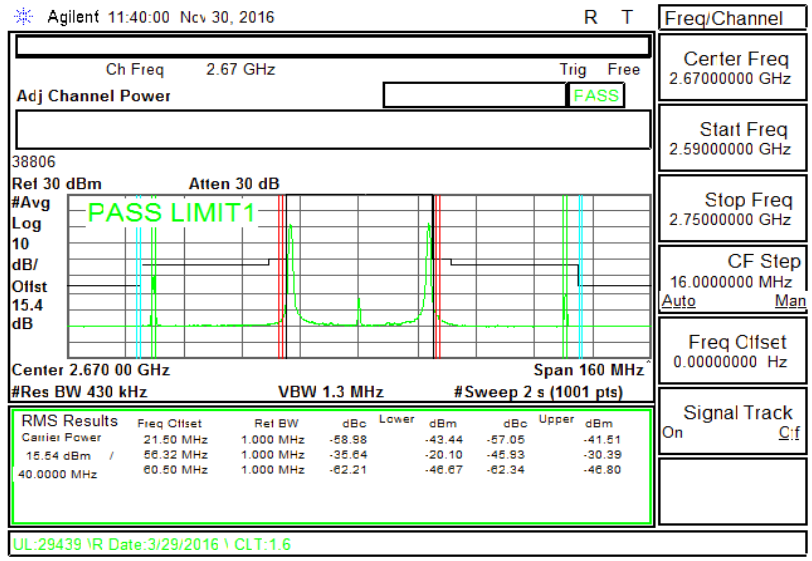


UL VERIFICATION SERVICES INC.
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888
FORM NO: CCSUP4031B
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

HIGH CH, RB1-0 + 1-0

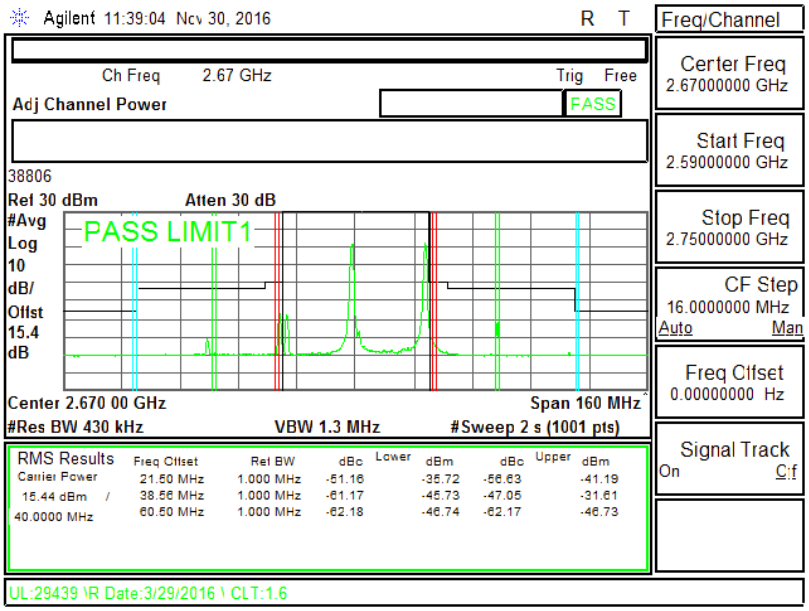


HIGH CH, RB1-0 + 1 99

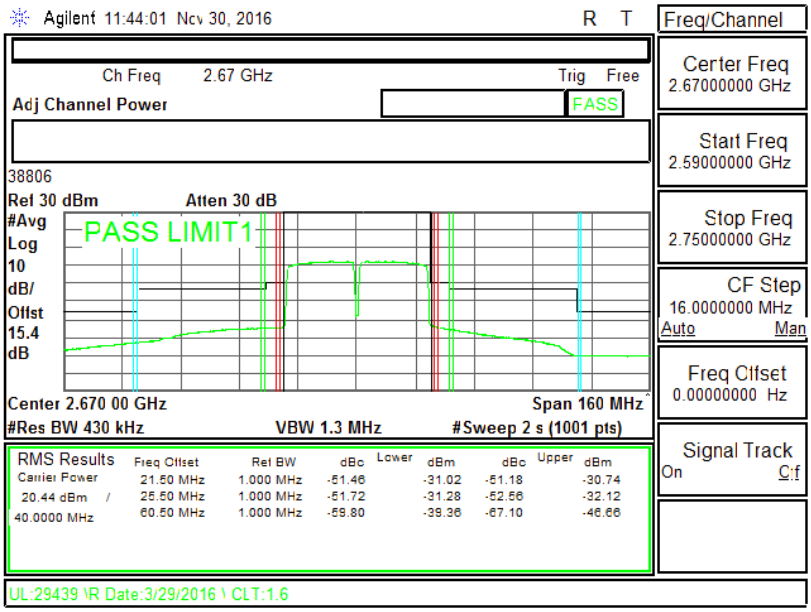


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

HIGH CH, RB1-99 + 1-99



HIGH CH, RB100-0 + 100-0



UL VERIFICATION SERVICES INC.
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888
FORM NO: CCSUP4031B
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

8.3. OUT OF BAND EMISSIONS

RULE PART(S)

FCC: §2.1051, §27.53

LIMITS

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

TEST PROCEDURE

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

For each out of band emissions measurement:

- Set display line at -25 dBm
- Set RBW & VBW to 100 kHz for the measurement below 1 GHz, and 1 MHz for the measurement above 1 GHz. (NOTE: Worst case set RBW/VBW to 1MHz/3MHz)

MODES TESTED

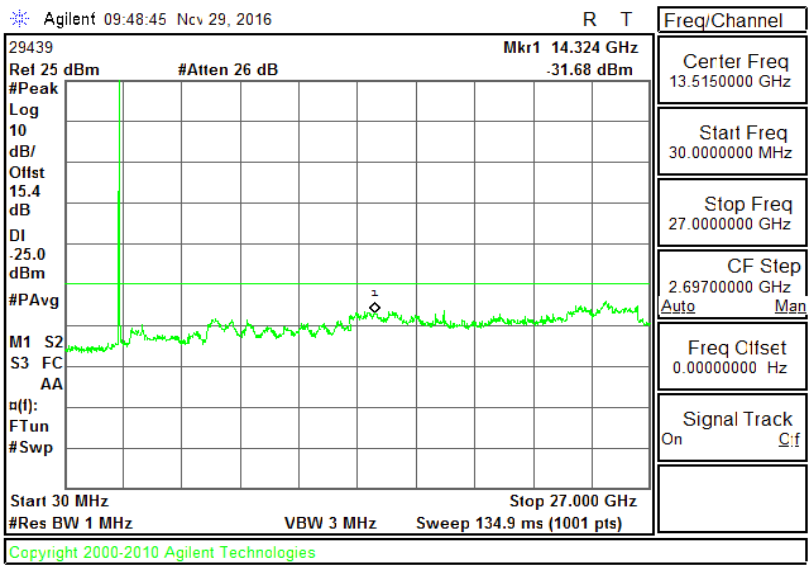
- LTE Band 7
- LTE Band 41

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

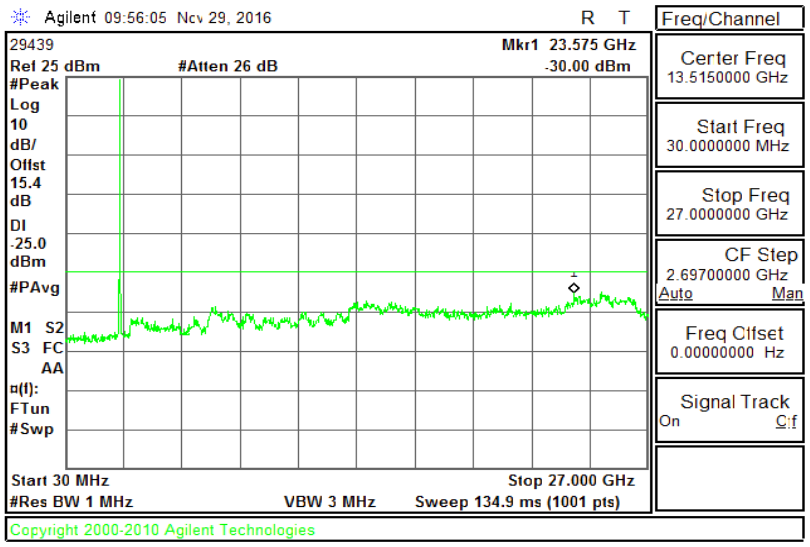
8.3.1. LTE BAND 7

QPSK, (20.0 MHz+ 10.0 MHz BAND WIDTH)

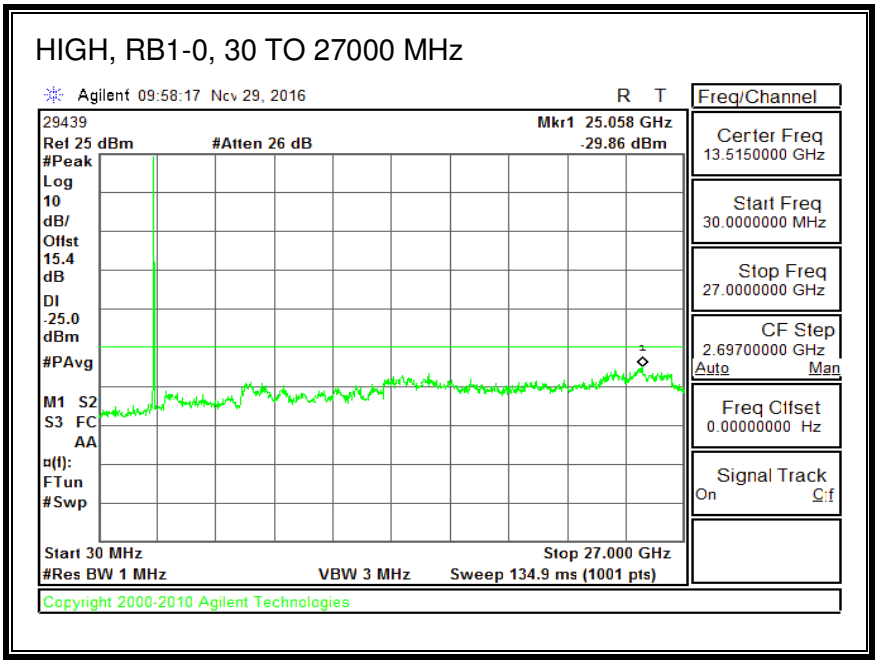
LOW, RB1-0, 30 TO 27000 MHz



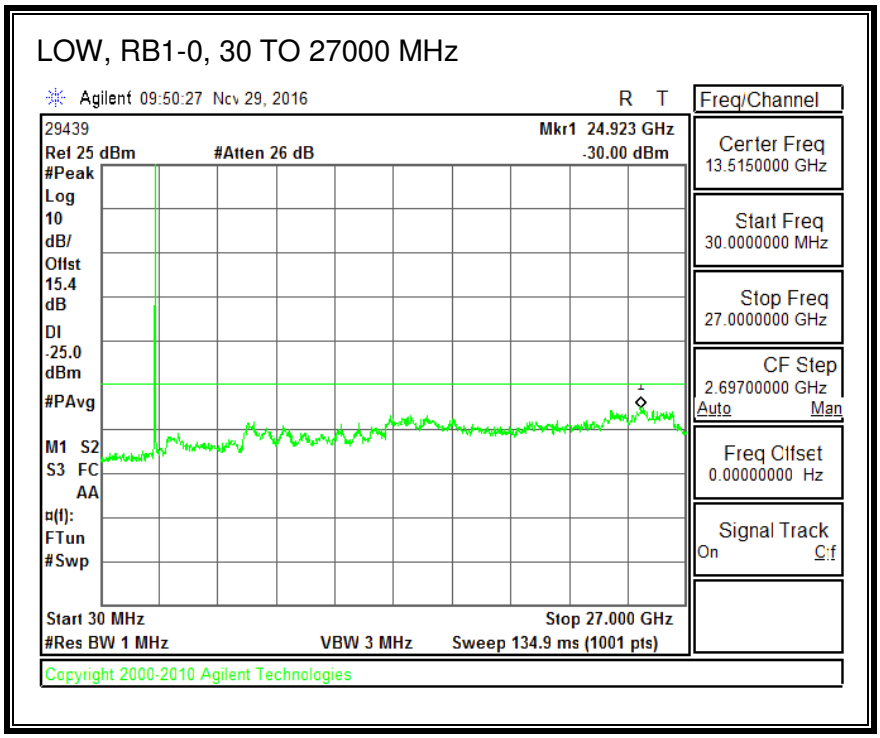
MID, RB1-0, 30 TO 27000 MHz



This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

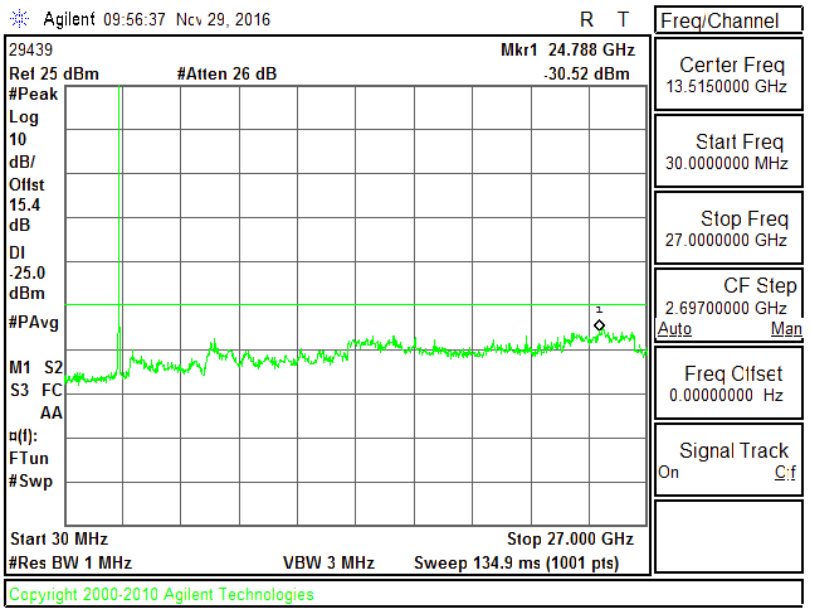


16QAM, (20.0 MHz+ 10.0 MHz BAND WIDTH)

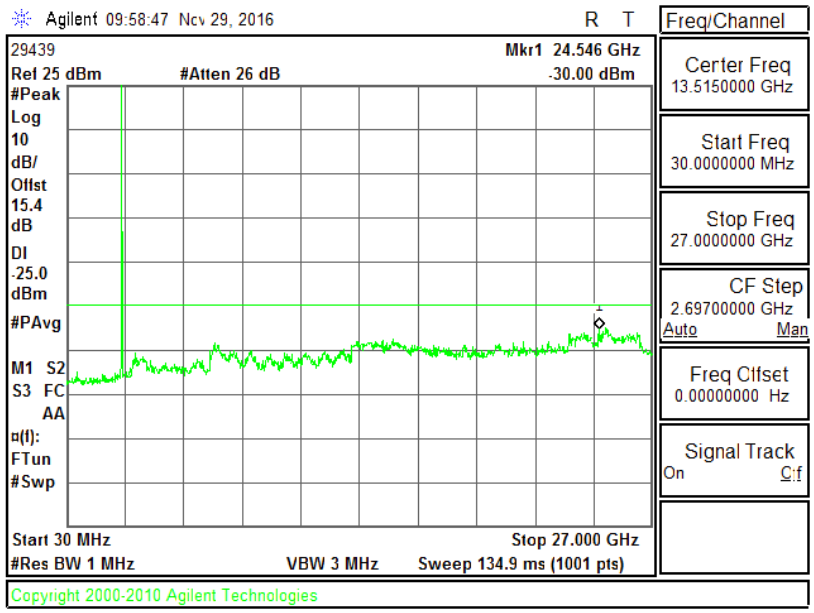


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

MID, RB1-0, 30 TO 27000 MHz

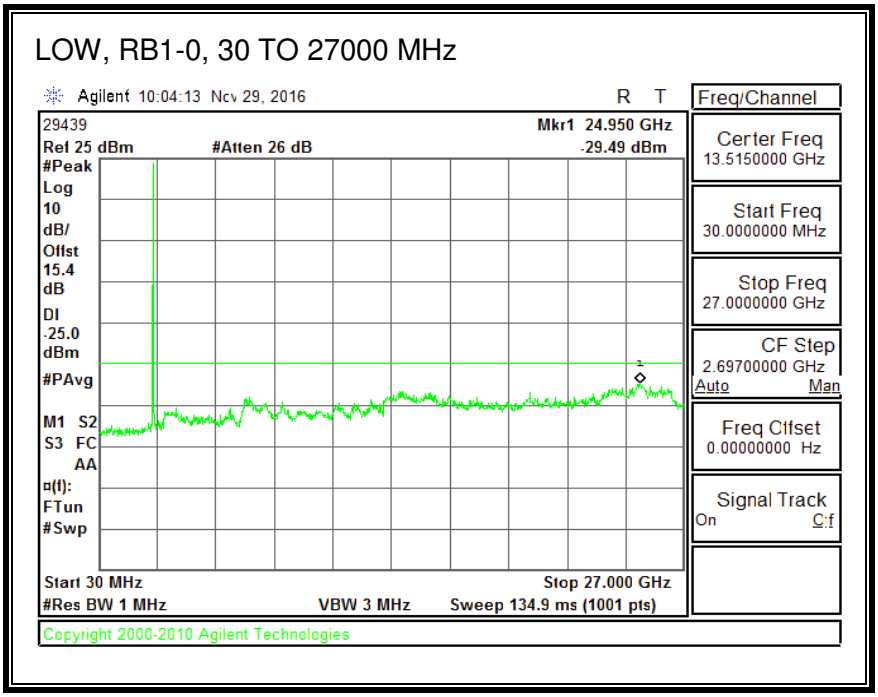


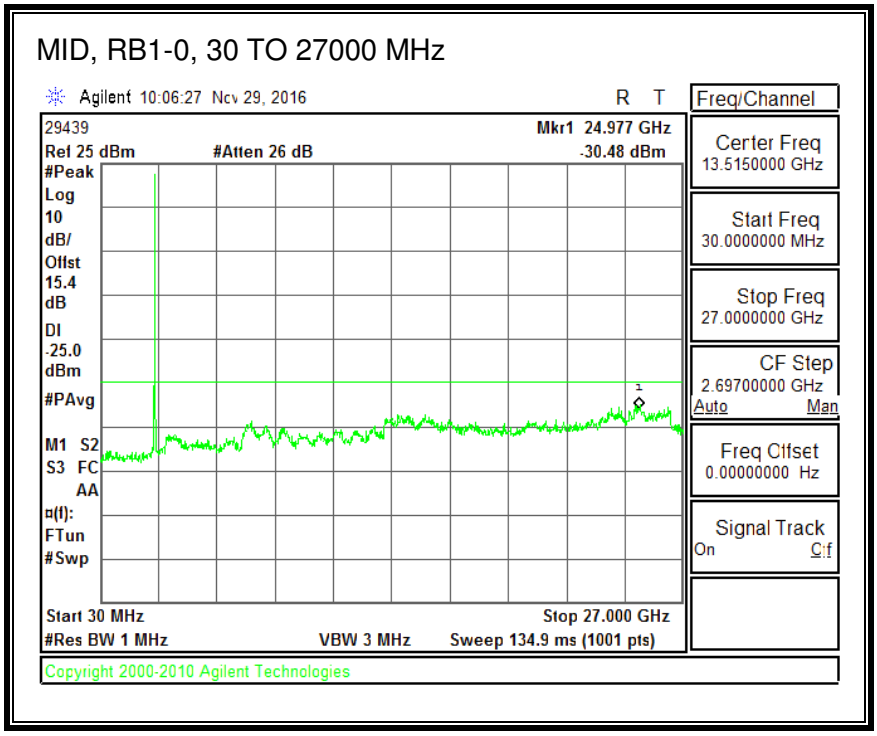
HIGH, RB1-0, 30 TO 27000 MHz



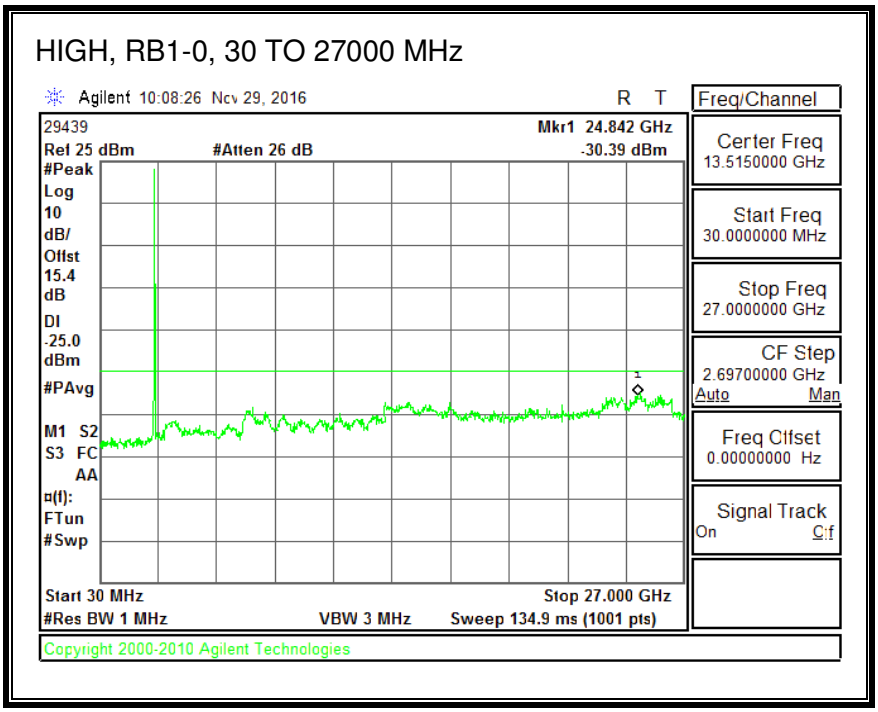
UL VERIFICATION SERVICES INC.
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888
FORM NO: CCSUP4031B
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

QPSK, (20.0 MHz+ 20.0 MHz BAND WIDTH)

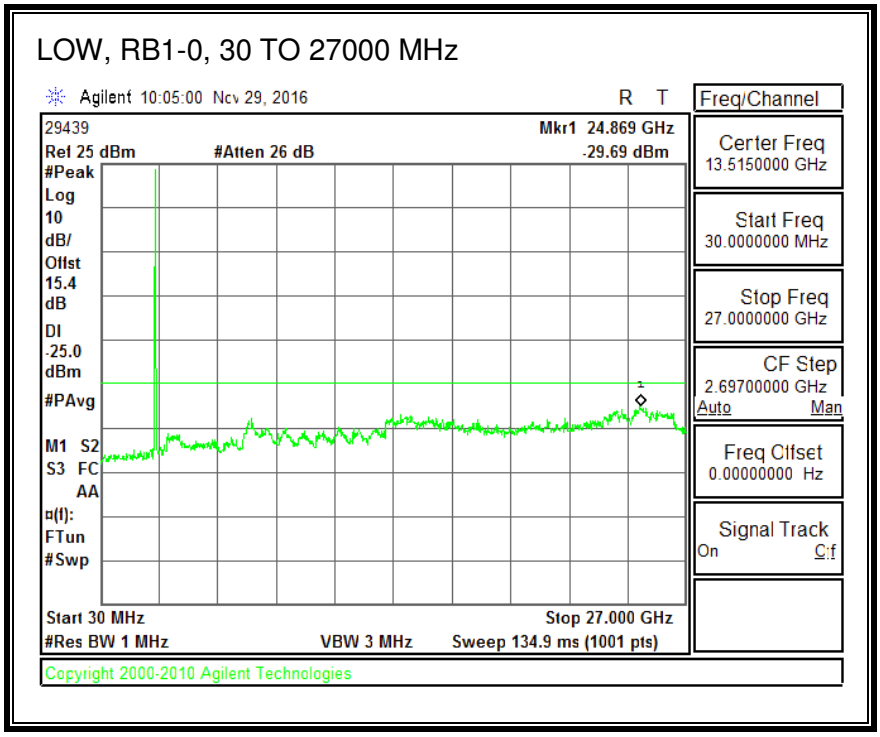




This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

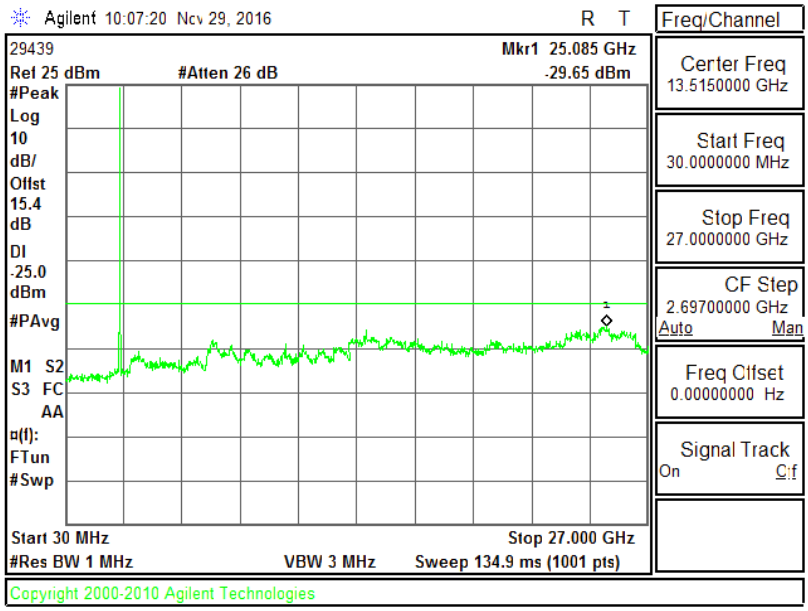


16QAM, (20.0 MHz+ 20.0 MHz BAND WIDTH)

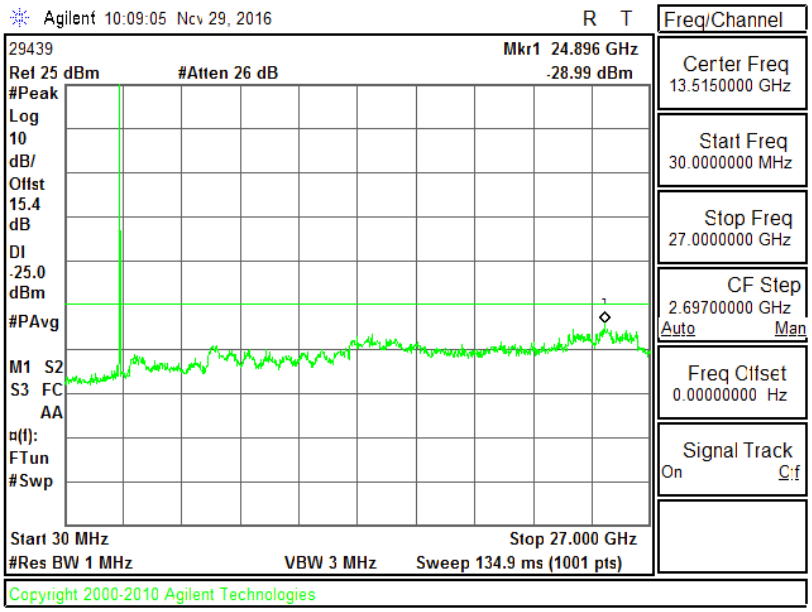


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

MID, RB1-0, 30 TO 27000 MHz



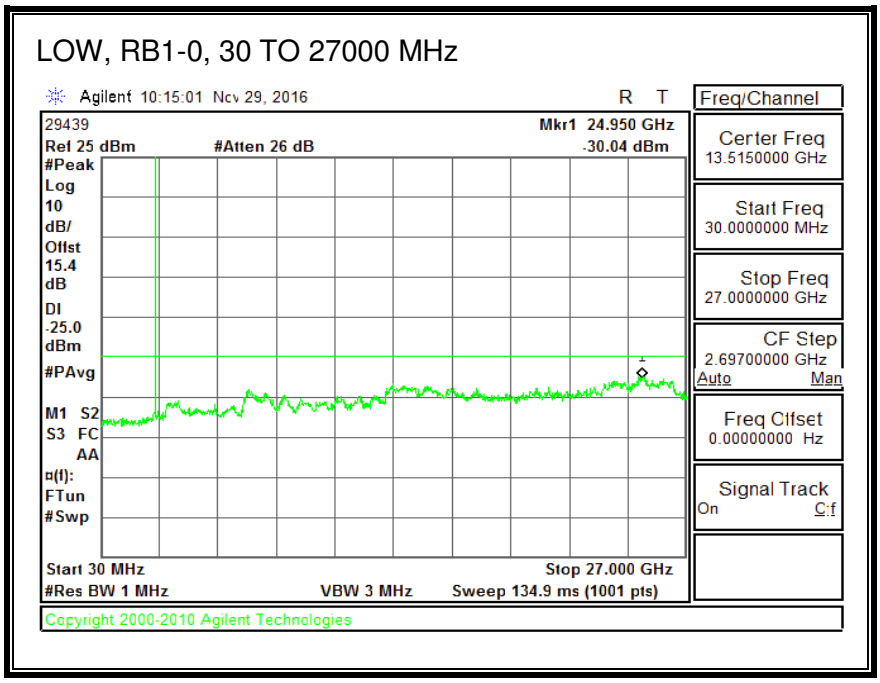
HIGH, RB1-0, 30 TO 27000 MHz

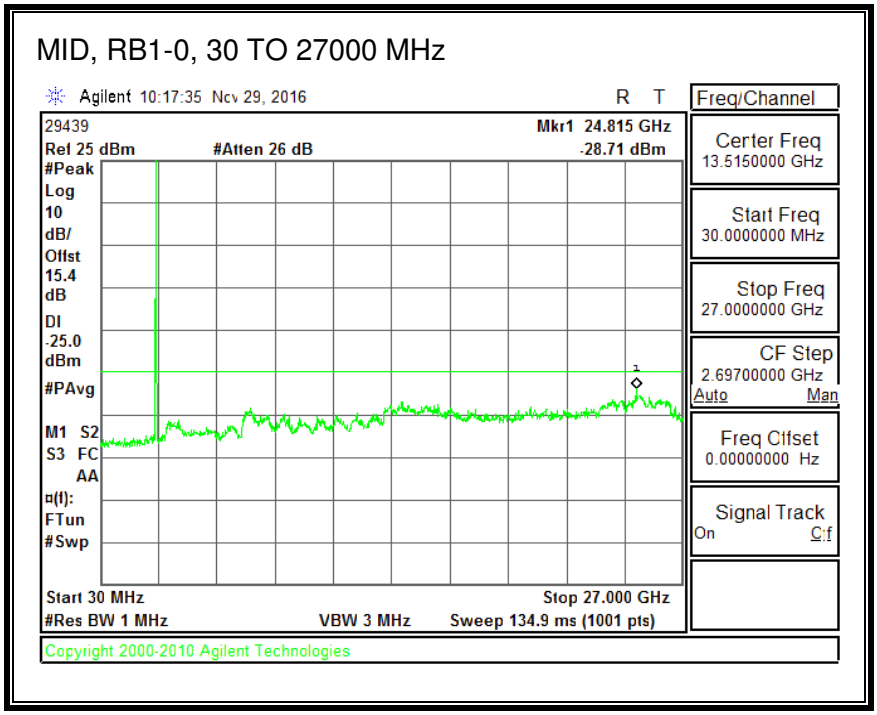


UL VERIFICATION SERVICES INC.
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888
FORM NO: CCSUP4031B
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

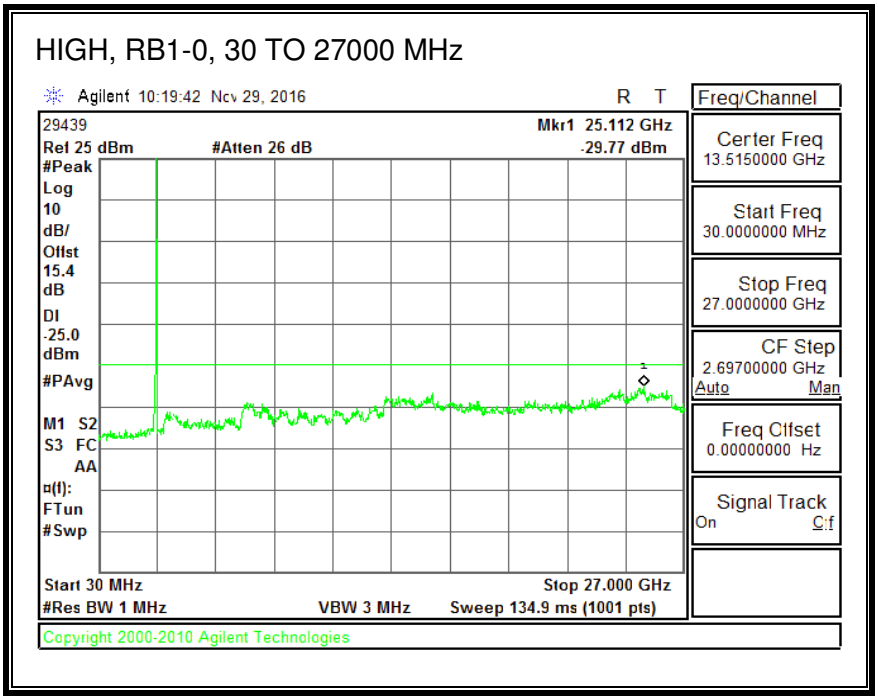
8.3.2. LTE BAND 41

QPSK, (20.0 MHz+ 5.0 MHz BAND WIDTH)

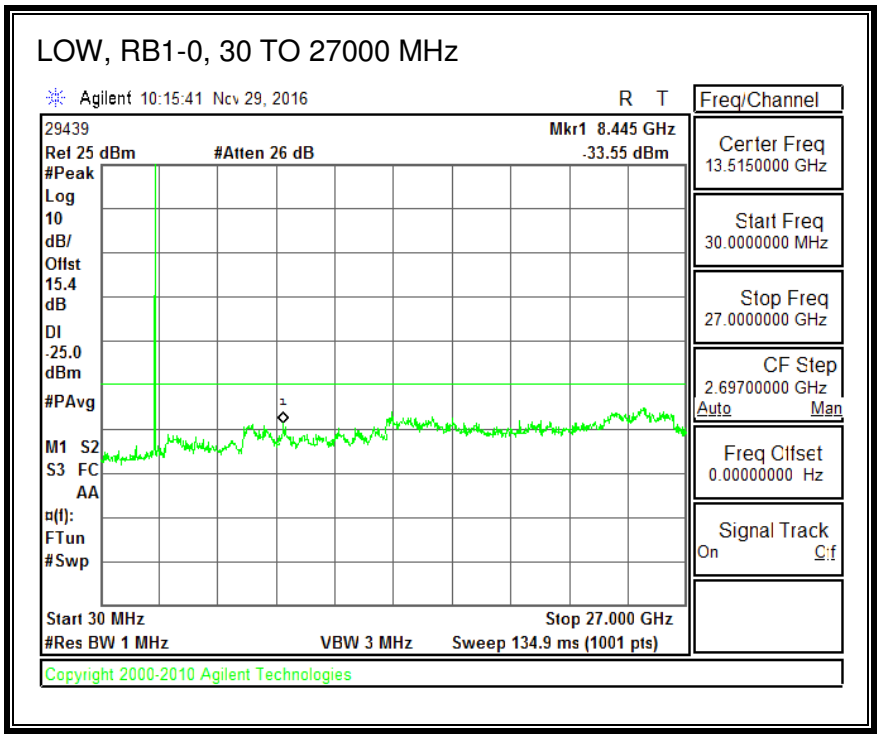




This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

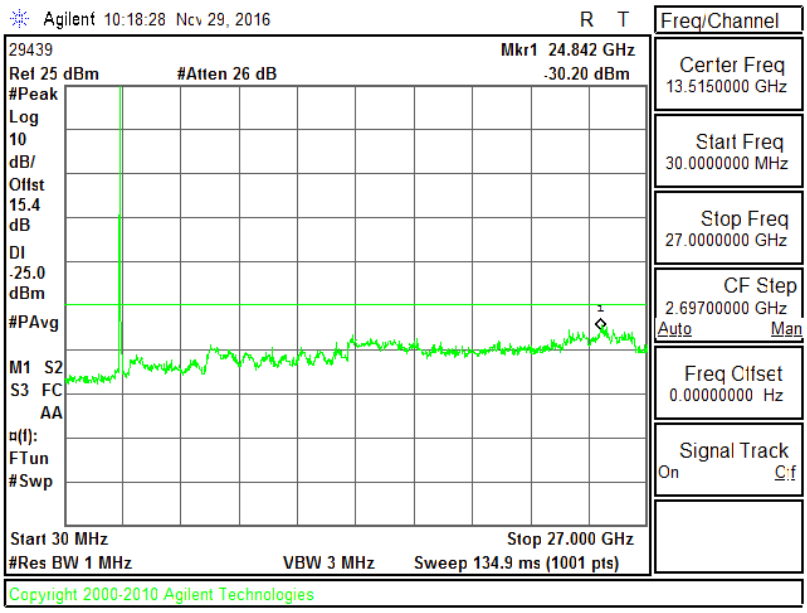


16QAM, (20.0 MHz+ 5.0 MHz BAND WIDTH)

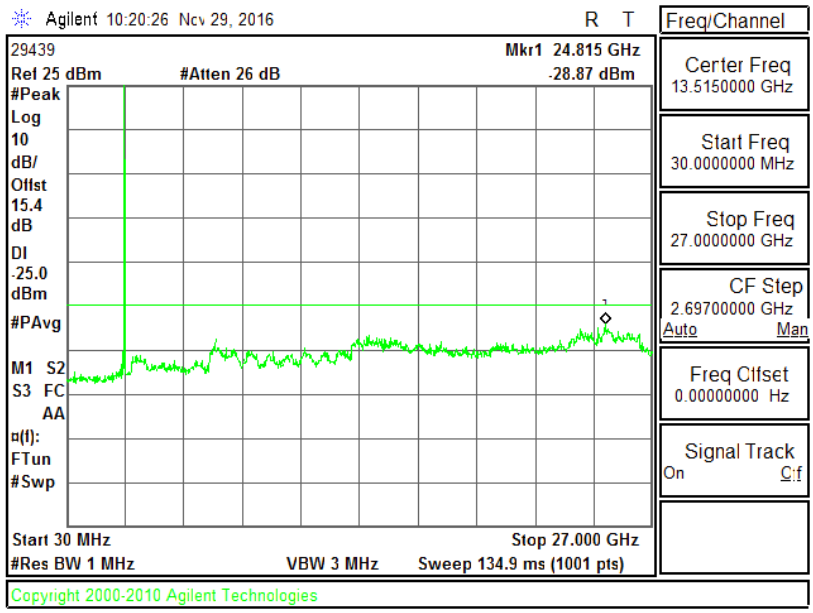


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

MID, RB1-0, 30 TO 27000 MHz

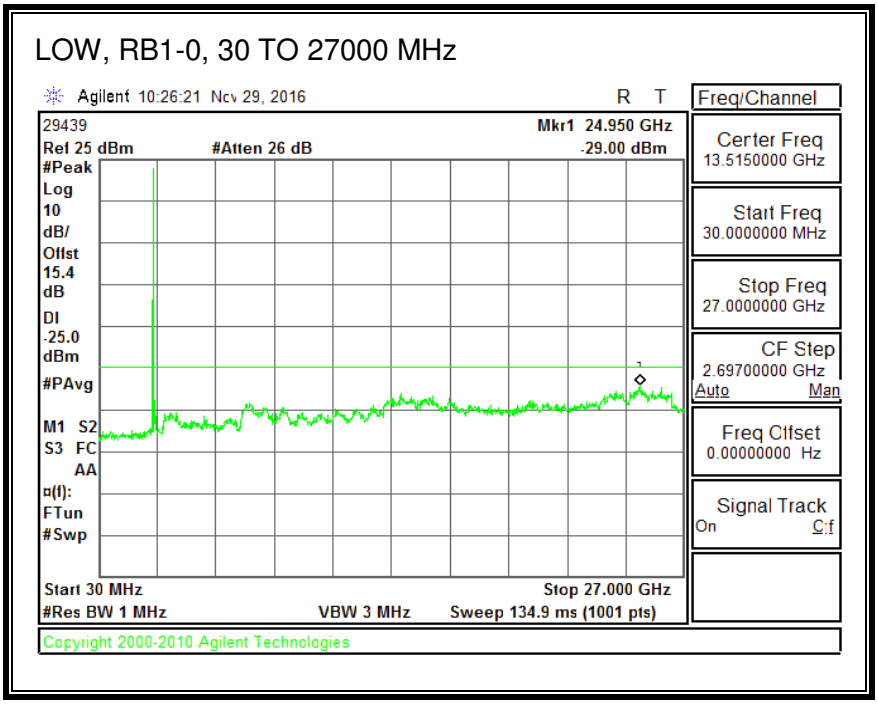


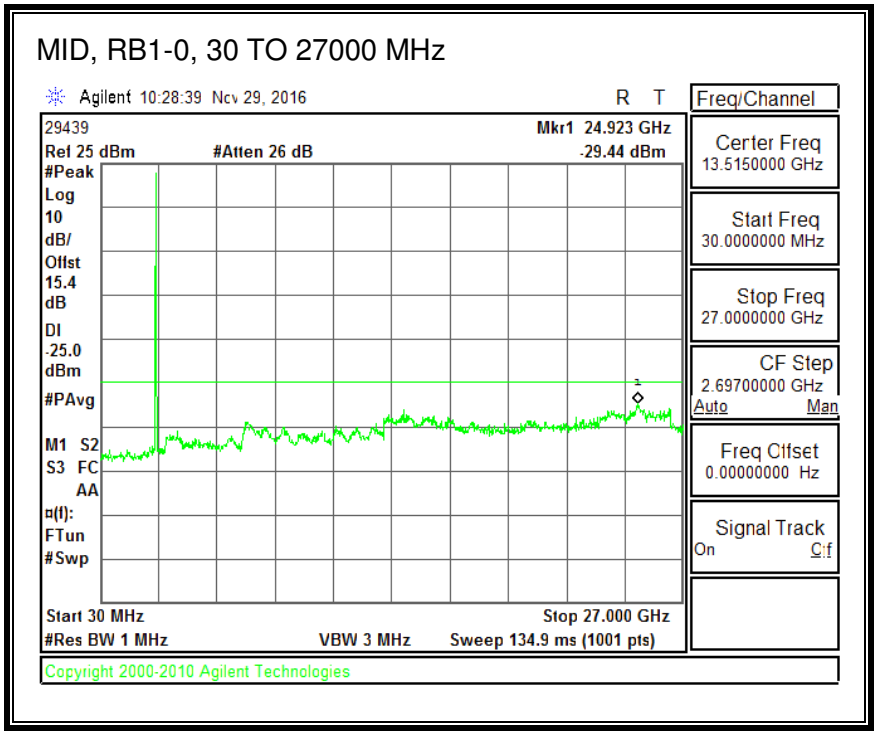
HIGH, RB1-0, 30 TO 27000 MHz



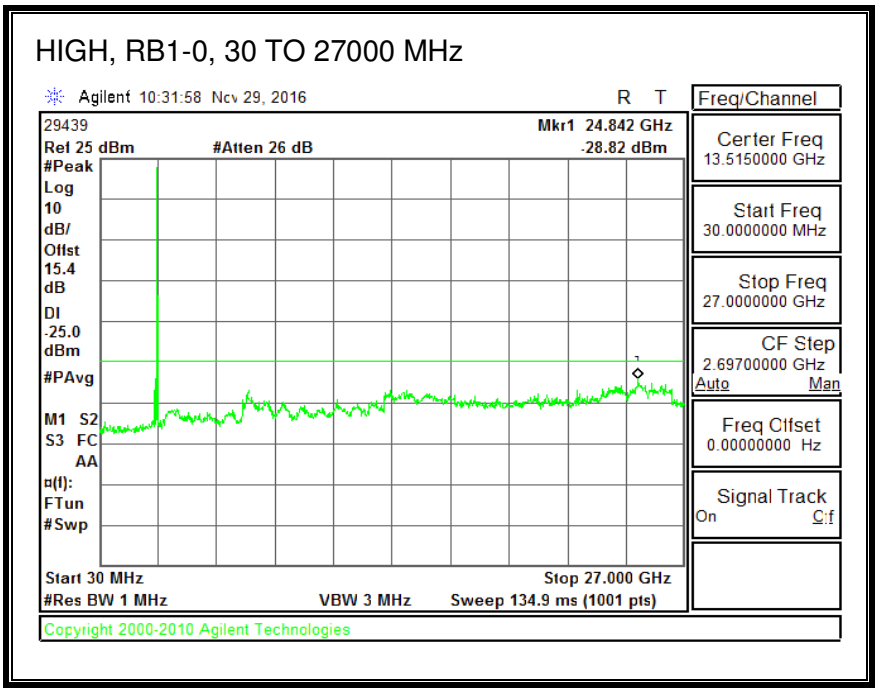
UL VERIFICATION SERVICES INC.
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888
FORM NO: CCSUP4031B
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

QPSK, (20.0 MHz+ 20.0 MHz BAND WIDTH)

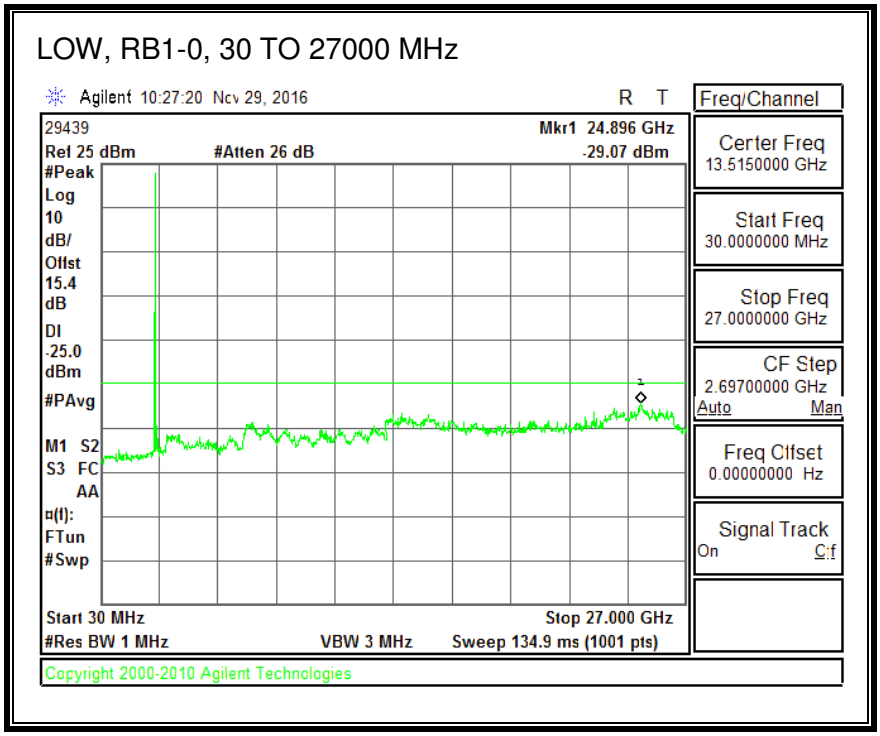




This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

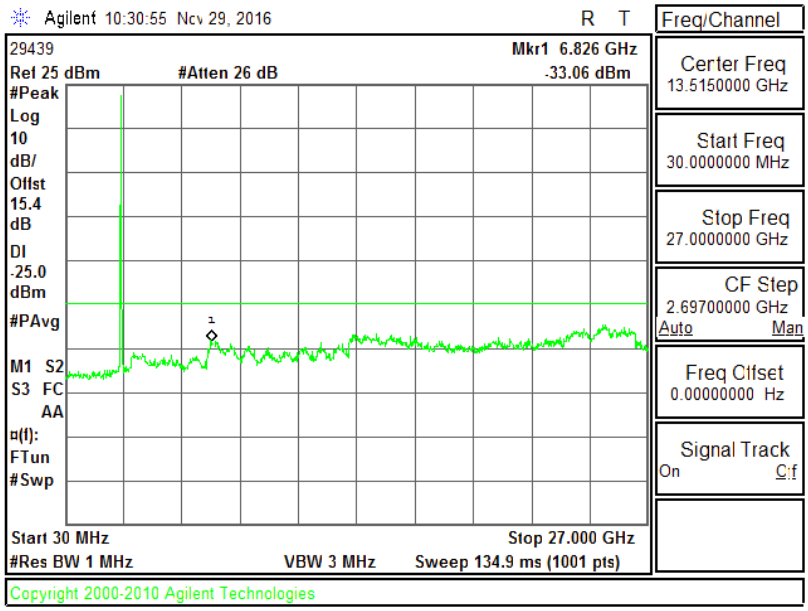


16QAM, (20.0 MHz+ 20.0 MHz BAND WIDTH)

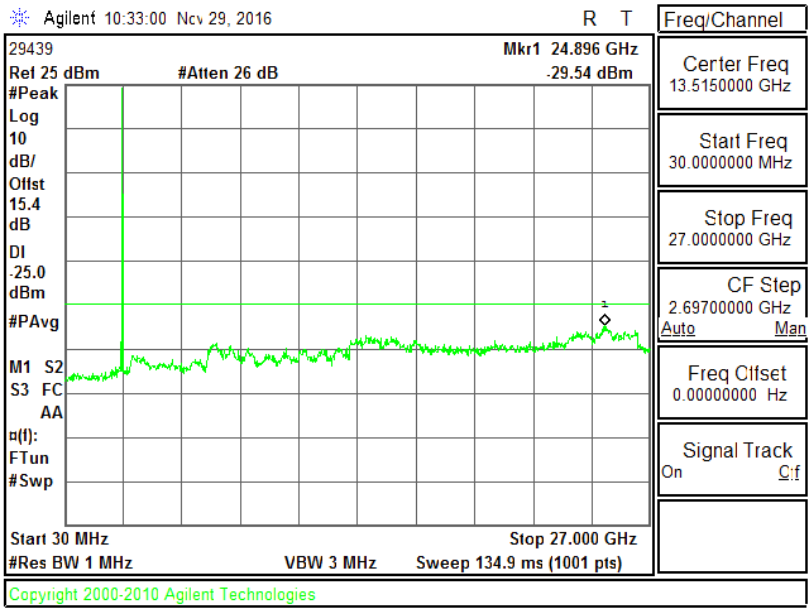


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

MID, RB1-0, 30 TO 27000 MHz



HIGH, RB1-0, 30 TO 27000 MHz



This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

9. FREQUENCY STABILITY

RULE PART(S)

FCC: §2.1055, §27.54

LIMITS

§27.54
The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

TEST PROCEDURE

Use CMW 500 with Frequency Error measurement capability.

- Temp. = −30° to +50°C
- Voltage = (85% - 115%)

  Low voltage, 3.23VDC, Normal, 3.8VDC and High voltage, 4.37VDC.
  End Voltage, 3.2VDC.

Frequency Stability vs Temperature:
The EUT is place inside a temperature chamber. The temperature is set to 20ºC and allowed to stabilize. After sufficient soak time, the transmitting frequency error is measured. The temperature is increased by 10 degrees, allowed to stabilize and soak, and then the measurement is repeated. This is repeated until +50ºC is reached.

Frequency Stability vs Voltage:
The peak frequency error is recorded (worst-case).

MODES TESTED

- LTE Band 7
- LTE Band 41

RESULTS
See the following pages.

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

9.1. LTE BAND 7

ID:	39005	Date:	12/6/16

QPSK, (20MHz + 10MHz BANDWIDTH)

Limit		2500	2570	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm (MHz)	F high @ -13dBm (MHz)		
Temperature	Voltage				
Normal (20C)	Normal	2501.0295	2568.9784		
Extreme (50C)		2501.0295	2568.9784	-12.4	-0.005
Extreme (40C)		2501.0295	2568.9784	-11.6	-0.005
Extreme (30C)		2501.0295	2568.9784	-12.6	-0.005
Extreme (10C)		2501.0295	2568.9784	-12.1	-0.005
Extreme (0C)		2501.0295	2568.9784	-10.4	-0.004
Extreme (-10C)		2501.0295	2568.9784	-5.9	-0.002
Extreme (-20C)		2501.0295	2568.9784	-5.3	-0.002
Extreme (-30C)		2501.0295	2568.9784	-6.2	-0.002
20C	15%	2501.0295	2568.9784	-11.0	-0.004
	-15%	2501.0295	2568.9784	-9.0	-0.004
	End Point	2501.0295	2568.9784	-10.0	-0.004

16QAM, (20MHz + 10MHz BANDWIDTH)

Limit		2500	2570	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm (MHz)	F high @ -13dBm (MHz)		
Temperature	Voltage				
Normal (20C)	Normal	2501.0330	2568.9748		
Extreme (50C)		2501.0330	2568.9747	-12.8	-0.005
Extreme (40C)		2501.0330	2568.9747	-10.8	-0.004
Extreme (30C)		2501.0330	2568.9747	-11.8	-0.005
Extreme (10C)		2501.0330	2568.9747	-12.6	-0.005
Extreme (0C)		2501.0330	2568.9747	-9.7	-0.004
Extreme (-10C)		2501.0330	2568.9747	-8.8	-0.003
Extreme (-20C)		2501.0330	2568.9747	-7.5	-0.003
Extreme (-30C)		2501.0330	2568.9747	-7.5	-0.003
20C	15%	2501.0330	2568.9747	-10.6	-0.004
	-15%	2501.0330	2568.9747	-9.2	-0.004
	End Point	2501.0330	2568.9747	-12.6	-0.005

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

QPSK, (20MHz + 20MHz BANDWIDTH)

Limit		2500	2570	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm (MHz)	F high @ -13dBm (MHz)		
Temperature	Voltage				
Normal (20C)	Normal	2501.0302	2568.9708		
Extreme (50C)		2501.0302	2568.9708	-12.2	-0.005
Extreme (40C)		2501.0302	2568.9708	-11.4	-0.005
Extreme (30C)		2501.0302	2568.9708	-10.6	-0.004
Extreme (10C)		2501.0302	2568.9707	-13.4	-0.005
Extreme (0C)		2501.0302	2568.9708	-9.9	-0.004
Extreme (-10C)		2501.0302	2568.9708	-7.8	-0.003
Extreme (-20C)		2501.0302	2568.9708	-12.4	-0.005
Extreme (-30C)		2501.0302	2568.9708	-6.4	-0.003
20C	15%	2501.0302	2568.9707	-13.5	-0.005
	-15%	2501.0302	2568.9708	-9.4	-0.004
	End Point	2501.0302	2568.9708	-10.2	-0.004

16QAM, (20MHz + 20MHz BANDWIDTH)

Limit		2500	2570	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm (MHz)	F high @ -13dBm (MHz)		
Temperature	Voltage				
Normal (20C)	Normal	2501.0344	2568.9663		
Extreme (50C)		2501.0344	2568.9663	-13.9	-0.005
Extreme (40C)		2501.0344	2568.9663	-12.1	-0.005
Extreme (30C)		2501.0344	2568.9663	-13.7	-0.005
Extreme (10C)		2501.0344	2568.9663	-12.0	-0.005
Extreme (0C)		2501.0344	2568.9663	-10.2	-0.004
Extreme (-10C)		2501.0344	2568.9663	-6.6	-0.003
Extreme (-20C)		2501.0344	2568.9663	-12.7	-0.005
Extreme (-30C)		2501.0344	2568.9663	-6.4	-0.003
20C	15%	2501.0344	2568.9663	-12.6	-0.005
	-15%	2501.0344	2568.9663	-9.5	-0.004
	End Point	2501.0344	2568.9663	-11.8	-0.005

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

9.2. LTE BAND 41

ID:	34314	Date:	12/7/16

QPSK, (20MHz + 5MHz BANDWIDTH)

Limit		2496	2690	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm (MHz)	F high @ -13dBm (MHz)		
Temperature	Voltage				
Normal (20C)	Normal	2496.9045	2689.0800		
Extreme (50C)		2496.9045	2689.0800	49.8	0.019
Extreme (40C)		2496.9045	2689.0800	52.7	0.020
Extreme (30C)		2496.9045	2689.0800	50.1	0.019
Extreme (10C)		2496.9045	2689.0800	48.3	0.019
Extreme (0C)		2496.9045	2689.0800	47.6	0.018
Extreme (-10C)		2496.9045	2689.0800	48.5	0.019
Extreme (-20C)		2496.9045	2689.0800	48.0	0.019
Extreme (-30C)		2496.9045	2689.0800	46.1	0.018
20C	15%	2496.9045	2689.0800	50.2	0.019
	-15%	2496.9045	2689.0800	52.3	0.020
	End Point	2496.9045	2689.0800	52.0	0.020

16QAM, (20MHz + 5MHz BANDWIDTH)

Limit		2496	2690	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm (MHz)	F high @ -13dBm (MHz)		
Temperature	Voltage				
Normal (20C)	Normal	2496.9306	2689.0790		
Extreme (50C)		2496.9307	2689.0790	50.5	0.019
Extreme (40C)		2496.9307	2689.0790	50.9	0.020
Extreme (30C)		2496.9307	2689.0790	50.1	0.019
Extreme (10C)		2496.9306	2689.0790	49.0	0.019
Extreme (0C)		2496.9306	2689.0790	48.6	0.019
Extreme (-10C)		2496.9306	2689.0790	47.8	0.018
Extreme (-20C)		2496.9306	2689.0790	48.0	0.019
Extreme (-30C)		2496.9306	2689.0790	48.7	0.019
20C	15%	2496.9307	2689.0790	50.3	0.019
	-15%	2496.9307	2689.0790	51.0	0.020
	End Point	2496.9306	2689.0790	49.2	0.019

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

QPSK, (20MHz + 20MHz BANDWIDTH)

Limit		2496	2690	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm	F high @ -13dBm		
Temperature	Voltage	(MHz)	(MHz)		
Normal (20C)	Normal	2497.0065	2688.9330		
Extreme (50C)		2497.0066	2688.9330	52.7	0.020
Extreme (40C)		2497.0066	2688.9330	51.8	0.020
Extreme (30C)		2497.0066	2688.9330	47.6	0.018
Extreme (10C)		2497.0066	2688.9330	50.2	0.019
Extreme (0C)		2497.0066	2688.9330	48.1	0.019
Extreme (-10C)		2497.0066	2688.9330	49.0	0.019
Extreme (-20C)		2497.0066	2688.9330	49.8	0.019
Extreme (-30C)		2497.0066	2688.9330	50.0	0.019
20C	15%	2497.0066	2688.9330	51.3	0.020
	-15%	2497.0066	2688.9330	50.1	0.019
	End Point	2497.0066	2688.9330	48.2	0.019

16QAM, (20MHz + 20MHz BANDWIDTH)

Limit		2496	2690	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm	F high @ -13dBm		
Temperature	Voltage	(MHz)	(MHz)		
Normal (20C)	Normal	2497.0322	2688.9451		
Extreme (50C)		2497.0322	2688.9452	52.1	0.020
Extreme (40C)		2497.0322	2688.9452	53.2	0.021
Extreme (30C)		2497.0322	2688.9452	48.9	0.019
Extreme (10C)		2497.0322	2688.9452	50.9	0.020
Extreme (0C)		2497.0322	2688.9452	48.9	0.019
Extreme (-10C)		2497.0322	2688.9452	49.0	0.019
Extreme (-20C)		2497.0322	2688.9452	49.5	0.019
Extreme (-30C)		2497.0322	2688.9452	51.0	0.020
20C	15%	2497.0322	2688.9452	51.2	0.020
	-15%	2497.0322	2688.9452	50.8	0.020
	End Point	2497.0322	2688.9452	49.6	0.019

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

10. PEAK-TO-AVERAGE RATIO

In addition, the peak-to-average power ratio (PAPR) of the transmitter shall not exceed 13 dB for more than 0.1% of the time and shall use a signal corresponding to the highest PAPR during periods of continuous transmission.

RESULT

Antenna C was used to measure as the worst case. The results from all CCDF plots are passed with 13dB peak-to-average ratio criteria.

10.1.1. LTE BAND 7

ID:	50820	Date:	2/21/17

Mode	Channel Band-	PCC f (MHz)	SCC1 f (MHz)	Modulation	Conducted Power (dBm)		Peak-to-Average Ratio
					Peak	Average	
LTE Band 7	10MHz / 20MHz	2525.6	2540.0	QPSK	27.37	20.00	7.37
				16QAM	27.21	18.97	8.24
	15 MHz / 15MHz	2527.5	2542.5	QPSK	27.53	19.99	7.54
				16QAM	27.37	18.98	8.39
	15MHz / 20MHz	2525.3	2542.4	QPSK	27.53	19.98	7.55
				16QAM	27.73	18.97	8.76
	20MHz / 10MHz	2530.1	2544.5	QPSK	27.33	19.96	7.37
				16QAM	27.02	19.00	8.02
	20MHz / 15MHz	2527.6	2544.7	QPSK	27.55	19.96	7.59
				16QAM	27.07	18.98	8.09
	20MHz / 20MHz	2525.1	2544.9	QPSK	27.39	20.00	7.39
				16QAM	27.41	18.98	8.43
Duty Cycle Correction Factor			0				
Peak to Average Ratio= Peak Reading - Average Reading - Duty Cycle Correction Factor							

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

10.1.2. LTE BAND 41

ID:	37290	Date:	1/3/17

Mode	Channel Band-	PCC f (MHz)	SCC1 f (MHz)	Modulation	Conducted Power (dBm)		Peak-to-Average Ratio
					Peak	Average	
LTE Band 41 (FCC)	5MHz / 20MHz	2583.8	2595.5	QPSK	28.84	15.13	8.45
				16QAM	28.80	14.39	9.15
	10MHz / 20MHz	2583.6	2598.0	QPSK	28.71	15.40	8.05
				16QAM	28.45	14.35	8.84
	15MHz / 15MHz	2585.5	2600.5	QPSK	28.49	15.32	7.91
				16QAM	28.40	14.28	8.86
	15MHz / 20MHz	2583.3	2600.4	QPSK	28.40	15.30	7.84
				16QAM	28.50	14.26	8.98
	20MHz / 5MHz	2590.5	2602.2	QPSK	28.38	15.27	7.85
				16QAM	28.48	14.36	8.86
	20MHz / 10MHz	2588.1	2602.5	QPSK	28.30	15.32	7.72
				16QAM	28.50	14.46	8.78
	20MHz / 15MHz	2585.6	2602.7	QPSK	28.57	15.41	7.90
				16QAM	28.40	14.40	8.74
	20MHz / 20MHz	2583.1	2602.9	QPSK	28.54	15.48	7.80
				16QAM	28.94	14.43	9.25
Duty Cycle Correction Factor			5.26				
Peak to Average Ratio= Peak Reading - Average Reading - Duty Cycle Correction Factor							

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

11. RADIATED TEST RESULTS

11.1. FIELD STRENGTH OF SPURIOUS RADIATION (ANTENNA C)

RULE PART(S)

FCC: §2.1053, §27.53

LIMIT

§27.53 (h) For operations in the 1710–1755 MHz and 2110–2155 MHz bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) by at least 43 + 10 log10(P) dB.

TEST PROCEDURE

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

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

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

The unwanted emission power shall be measured with a resolution bandwidth of at least 1% of the occupied bandwidth in the 1 MHz band immediately outside and adjacent to the channel edge of the equipment. Beyond the 1 MHz band immediately outside the channel edge of the equipment, a resolution bandwidth of 1 MHz shall be employed. A narrower resolution bandwidth is allowed to be used provided that the measured power is integrated over the full required measurement bandwidth of 1 MHz or 1% of the occupied bandwidth as applicable.

The power of any unwanted emissions measured from the channel edge of the equipment shall be attenuated below the transmitter power, P (dBW), as follows:

a. for base station and subscriber equipment, other than mobile subscriber equipment, the attenuation shall not be less than 43 + 10 Log10 (p), dB; and

b. for mobile subscriber equipment, the attenuation shall not be less than 43 + 10 Log10 (p), dB at the channel edges and 55 + 10 Log10 (p) at 5.5 MHz away and beyond the channel edges where p in (a) and (b) is the transmitter power measured in watts.

MODES TESTED

- LTE Band 7
- LTE Band 41

RESULTS

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

11.1.1. LTE BAND 7

QPSK LTE BAND 7 (20.0MHZ + 10.0MHZ BANDWIDTH)

High Frequency Substitution Measurement
UL Fremont Radiated Chamber

Company:
Project #: 16U23816
Date: 12/09/16
Test Engineer: 39005
Configuration: EUT only
Mode: LTE Band 7, 10MHz QPSK UL CA 20/10

Test Equipment:
Substitution: Horn T59 Substitution, and 8ft SMA Cable

Chamber	Pre-amplifer	Filter	Limit
3m Chamber H	3m Chamber H	Filter	LTE B7

Frequency (GHz)	SA reading (dBm)	Ant. Pol. (H/V)	Distance	EIRP @ TX Ant End (dBm)	Preamp	Attenuator	EIRP	Limit	Delta	Notes
Low Channel (2510MHz)+2524.4MHz 1-99 1-0										
5.15	-64.6	H	3.0	-14.3	36.8	1.0	-50.2	-25.0	-25.2	
7.56	-65.9	H	3.0	-12.1	35.9	1.0	-46.9	-25.0	-21.9	
9.63	-66.5	H	3.0	-10.4	34.0	1.0	-43.4	-25.0	-18.4	
5.15	-64.5	V	3.0	-14.0	36.8	1.0	-49.9	-25.0	-24.9	
7.56	-66.1	V	3.0	-12.5	35.9	1.0	-47.4	-25.0	-22.4	
9.62	-67.0	V	3.0	-11.2	34.0	1.0	-44.2	-25.0	-19.2	
Mid Channel (2530.1MHz)+2544.5MHz 1-99 1-0										
5.13	-64.4	H	3.0	-14.2	36.8	1.0	-50.0	-25.0	-25.0	
7.78	-66.7	H	3.0	-12.6	35.7	1.0	-47.2	-25.0	-22.2	
9.45	-67.6	H	3.0	-11.7	34.2	1.0	-44.9	-25.0	-19.9	
5.05	-64.4	V	3.0	-14.2	36.9	1.0	-50.0	-25.0	-25.0	
7.65	-66.1	V	3.0	-12.3	35.8	1.0	-47.1	-25.0	-22.1	
9.82	-67.0	V	3.0	-11.0	33.8	1.0	-43.8	-25.0	-18.8	
High Channel (2550.1MHz)+2564.5MHz 1-99 1-0										
5.14	-65.2	H	3.0	-15.0	36.8	1.0	-50.8	-25.0	-25.8	
7.28	-65.9	H	3.0	-12.3	36.1	1.0	-47.4	-25.0	-22.4	
9.68	-66.5	H	3.0	-10.3	34.0	1.0	-43.2	-25.0	-18.2	
5.18	-65.1	V	3.0	-14.6	36.8	1.0	-50.4	-25.0	-25.4	
7.28	-65.8	V	3.0	-12.4	36.1	1.0	-47.5	-25.0	-22.5	
9.68	-66.4	V	3.0	-10.5	34.0	1.0	-43.5	-25.0	-18.5	

Rev. 05.21.15

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

16QAM LTE BAND 7 (20.0MHZ + 10.0MHZ BANDWIDTH)

High Frequency Substitution Measurement
UL Fremont Radiated Chamber

Company:
Project #: 16U23816
Date: 12/09/16
Test Engineer: 39005
Configuration: EUT only
Mode: LTE Band 7, 10MHz 16QAM UL CA 20/10

Test Equipment:
Substitution: Horn T59 Substitution, and 8ft SMA Cable

Chamber	Pre-amplifer	Filter	Limit
3m Chamber H	3m Chamber H	Filter	LTE B7

Frequency (GHz)	SA reading (dBm)	Ant. Pol. (H/V)	Distance	EIRP @ TX Ant End (dBm)	Preamp	Attenuator	EIRP	Limit	Delta	Notes
Low Channel (2510MHz)+2524.4MHz 1-99 1-0										
5.15	-64.2	H	3.0	-14.0	36.8	1.0	-49.8	-25.0	-24.8	
7.56	-65.8	H	3.0	-11.9	35.9	1.0	-46.8	-25.0	-21.8	
9.63	-66.6	H	3.0	-10.5	34.0	1.0	-43.5	-25.0	-18.5	
5.15	-64.4	V	3.0	-14.0	36.8	1.0	-49.8	-25.0	-24.8	
7.56	-66.3	V	3.0	-12.6	35.9	1.0	-47.5	-25.0	-22.5	
9.62	-66.9	V	3.0	-11.1	34.0	1.0	-44.1	-25.0	-19.1	
Mid Channel (2530.1MHz)+2544.5MHz 1-99 1-0										
5.13	-64.3	H	3.0	-14.1	36.8	1.0	-49.9	-25.0	-24.9	
7.78	-66.6	H	3.0	-12.5	35.7	1.0	-47.2	-25.0	-22.2	
9.45	-67.5	H	3.0	-11.6	34.2	1.0	-44.8	-25.0	-19.8	
5.05	-64.4	V	3.0	-14.1	36.9	1.0	-50.0	-25.0	-25.0	
7.65	-66.3	V	3.0	-12.5	35.8	1.0	-47.3	-25.0	-22.3	
9.82	-66.9	V	3.0	-10.9	33.8	1.0	-43.7	-25.0	-18.7	
High Channel (2550.1MHz)+2564.5MHz 1-99 1-0										
5.14	-65.1	H	3.0	-14.9	36.8	1.0	-50.7	-25.0	-25.7	
7.28	-65.9	H	3.0	-12.3	36.1	1.0	-47.5	-25.0	-22.5	
9.68	-66.2	H	3.0	-10.0	34.0	1.0	-43.0	-25.0	-18.0	
5.18	-65.6	V	3.0	-15.1	36.8	1.0	-51.0	-25.0	-26.0	
7.28	-65.7	V	3.0	-12.3	36.1	1.0	-47.5	-25.0	-22.5	
9.68	-66.6	V	3.0	-10.7	34.0	1.0	-43.7	-25.0	-18.7	

Rev. 05.21.15

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

QPSK LTE BAND 7 (20.0MHZ + 20.0MHZ BANDWIDTH)

High Frequency Substitution Measurement
UL Fremont Radiated Chamber

Company:
Project #: 16U23816
Date: 12/09/16
Test Engineer: 39005
Configuration: EUT only
Mode: LTE Band 7, 20MHz QPSK UL CA 20/20

Test Equipment:
Substitution: Horn T59 Substitution, and 8ft SMA Cable

Chamber	Pre-amplifer	Filter	Limit
3m Chamber H	3m Chamber H	Filter	LTE B7

Frequency (GHz)	SA reading (dBm)	Ant. Pol. (H/V)	Distance	EIRP @ TX Ant End (dBm)	Preamp	Attenuator	EIRP	Limit	Delta	Notes
Low Channel (2510MHz)+ 2529.8MHz 1-99 1-0										
5.04	-64.3	H	3.0	-16.2	36.1	1.0	-51.3	-25.0	-26.3	
7.78	-66.7	H	3.0	-17.0	36.3	1.0	-52.3	-25.0	-27.3	
9.35	-67.8	H	3.0	-12.4	33.4	1.0	-44.8	-25.0	-19.8	
5.09	-64.1	V	3.0	-14.5	36.3	1.0	-49.8	-25.0	-24.8	
7.78	-66.6	V	3.0	-13.0	34.8	1.0	-46.8	-25.0	-21.8	
9.35	-68.0	V	3.0	-12.0	33.4	1.0	-44.4	-25.0	-19.4	
Mid Channel (2525.1MHz)+2544.9MHz 1-99 1-0										
5.25	-65.8	H	3.0	-14.8	36.0	1.0	-49.8	-25.0	-24.8	
7.42	-66.8	H	3.0	-13.8	35.2	1.0	-48.0	-25.0	-23.0	
8.96	-68.5	H	3.0	-12.2	34.0	1.0	-45.2	-25.0	-20.2	
5.19	-64.7	V	3.0	-17.0	36.1	1.0	-52.1	-25.0	-27.1	
7.01	-65.6	V	3.0	-12.5	36.4	1.0	-47.9	-25.0	-22.9	
9.21	-67.5	V	3.0	-12.2	34.4	1.0	-45.5	-25.0	-20.5	
High Channel (2540.2MHz)+2560Mhz 1-99 1-0										
5.08	-65.0	H	3.0	-15.9	36.2	1.0	-51.1	-25.0	-26.1	
6.88	-65.1	H	3.0	-14.4	36.0	1.0	-49.5	-25.0	-24.5	
8.96	-68.6	H	3.0	-12.3	32.0	1.0	-43.3	-25.0	-18.3	
5.16	-64.8	V	3.0	-17.8	36.3	1.0	-53.0	-25.0	-28.0	
7.72	-65.2	V	3.0	-13.9	35.8	1.0	-48.7	-25.0	-23.7	
9.46	-67.2	V	3.0	-11.6	34.2	1.0	-44.8	-25.0	-19.8	

Rev. 05.21.15

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

16QAM LTE BAND 7 (20.0MHZ + 20.0MHZ BANDWIDTH)

High Frequency Substitution Measurement
UL Fremont Radiated Chamber

Company:
Project #: 16U23816
Date: 12/09/16
Test Engineer: 39005
Configuration: EUT only
Mode: LTE Band 7, 20MHz 16QAM UL CA 20/20

Test Equipment:
Substitution: Horn T59 Substitution, and 8ft SMA Cable

Chamber	Pre-amplifer	Filter	Limit
3m Chamber H	3m Chamber H	Filter	LTE B7

Frequency (GHz)	SA reading (dBm)	Ant. Pol. (H/V)	Distance	EIRP @ TX Ant End (dBm)	Preamp	Attenuator	EIRP	Limit	Delta	Notes
Low Channel (2510MHz)+ 2529.8MHz 1-99 1-0										
5.04	-64.6	H	3.0	-14.5	36.9	1.0	-50.4	-25.0	-25.4	
7.78	-66.6	H	3.0	-12.5	35.7	1.0	-47.2	-25.0	-22.2	
9.35	-67.7	H	3.0	-11.9	34.3	1.0	-45.2	-25.0	-20.2	
5.09	-64.2	V	3.0	-13.9	36.9	1.0	-49.7	-25.0	-24.7	
7.78	-66.7	V	3.0	-12.8	35.7	1.0	-47.5	-25.0	-22.5	
9.35	-67.9	V	3.0	-12.4	34.3	1.0	-45.7	-25.0	-20.7	
Mid Channel (2525.1MHz)+2544.9MHz 1-99 1-0										
5.25	-65.7	H	3.0	-15.3	36.8	1.0	-51.1	-25.0	-26.1	
7.42	-66.8	H	3.0	-13.1	36.0	1.0	-48.1	-25.0	-23.1	
8.96	-68.5	H	3.0	-13.1	34.6	1.0	-46.7	-25.0	-21.7	
5.19	-64.3	V	3.0	-13.8	36.8	1.0	-49.6	-25.0	-24.6	
7.01	-65.8	V	3.0	-12.8	36.4	1.0	-48.1	-25.0	-23.1	
9.21	-67.5	V	3.0	-12.2	34.4	1.0	-45.6	-25.0	-20.6	
High Channel (2540.2MHz)+2560Mhz 1-99 1-0										
5.08	-65.3	H	3.0	-15.2	36.9	1.0	-51.0	-25.0	-26.0	
6.88	-65.5	H	3.0	-12.4	36.4	1.0	-47.9	-25.0	-22.9	
8.96	-68.4	H	3.0	-13.0	34.6	1.0	-46.6	-25.0	-21.6	
5.16	-64.7	V	3.0	-14.2	36.8	1.0	-50.1	-25.0	-25.1	
7.72	-65.3	V	3.0	-11.5	35.7	1.0	-46.2	-25.0	-21.2	
9.46	-67.5	V	3.0	-11.9	34.2	1.0	-45.0	-25.0	-20.0	

Rev. 05.21.15

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

11.1.2. LTE BAND 41

QPSK LTE BAND 41 (20.0MHZ + 5.0MHZ BANDWIDTH)

High Frequency Substitution Measurement
UL Fremont Radiated Chamber

Company:
Project #: 16U23816
Date: 12/09/16
Test Engineer: 39005
Configuration: EUT only
Mode: LTE Band 41, 5MHz QPSK UL CA 20/5

Test Equipment:
Substitution: Horn T59 Substitution, and 8ft SMA Cable

Chamber	Pre-amplifer	Filter	Limit
3m Chamber H	3m Chamber H	Filter	LTE B41

Frequency (GHz)	SA reading (dBm)	Ant. Pol. (H/V)	Distance	EIRP @ TX Ant End (dBm)	Preamp	Attenuator	EIRP	Limit	Delta	Notes
Low Channel (2506MHz) +2517.7MHz 1-99, 1-0										
4.88	-64.6	H	3.0	-14.8	36.9	1.0	-50.7	-25.0	-25.7	
6.13	-66.4	H	3.0	-14.5	36.6	1.0	-50.1	-25.0	-25.1	
8.41	-66.9	H	3.0	-12.1	35.1	1.0	-46.2	-25.0	-21.2	
4.88	-64.4	V	3.0	-14.4	36.9	1.0	-50.3	-25.0	-25.3	
6.13	-66.0	V	3.0	-14.1	36.6	1.0	-49.7	-25.0	-24.7	
8.41	-67.0	V	3.0	-12.4	35.1	1.0	-46.5	-25.0	-21.5	
Mid Channel (2590.5MHz)+2602.2MHz 1-99, 1-0										
5.12	-65.3	H	3.0	-15.0	36.8	1.0	-50.9	-25.0	-25.9	
7.02	-66.2	H	3.0	-12.9	36.4	1.0	-48.3	-25.0	-23.3	
8.25	-66.0	H	3.0	-11.3	35.3	1.0	-45.6	-25.0	-20.6	
5.44	-64.9	V	3.0	-14.0	36.8	1.0	-49.7	-25.0	-24.7	
6.41	-65.8	V	3.0	-13.5	36.5	1.0	-49.1	-25.0	-24.1	
7.71	-66.3	V	3.0	-12.5	35.7	1.0	-47.2	-25.0	-22.2	
High Channel (2675MHz)+2686.7MHz 1-99, 1-0										
5.08	-65.5	H	3.0	-15.4	36.9	1.0	-51.2	-25.0	-26.2	
7.24	-64.9	H	3.0	-11.3	36.2	1.0	-46.5	-25.0	-21.5	
9.05	-67.3	H	3.0	-11.8	34.5	1.0	-45.3	-25.0	-20.3	
5.16	-64.8	V	3.0	-14.3	36.8	1.0	-50.2	-25.0	-25.2	
7.18	-65.6	V	3.0	-12.3	36.2	1.0	-47.6	-25.0	-22.6	
9.25	-67.5	V	3.0	-12.1	34.4	1.0	-45.5	-25.0	-20.5	

Rev. 05.21.15

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

16QAM LTE BAND 41 (20.0MHZ + 5.0MHZ BANDWIDTH)

High Frequency Substitution Measurement
UL Fremont Radiated Chamber

Company:
Project #: 16U23816
Date: 12/09/16
Test Engineer: 39005
Configuration: EUT only
Mode: LTE Band 41, 5MHz 16QAM UL CA 20/5

Test Equipment:
Substitution: Horn T59 Substitution, and 8ft SMA Cable

Chamber	Pre-amplifer	Filter	Limit
3m Chamber H	3m Chamber H	Filter	LTE B41

Frequency (GHz)	SA reading (dBm)	Ant. Pol. (H/V)	Distance	EIRP @ TX Ant End (dBm)	Preamp	Attenuator	EIRP	Limit	Delta	Notes
Low Channel (2506MHz) +2517.7MHz 1-99, 1-0										
4.88	-64.3	H	3.0	-14.5	36.9	1.0	-50.4	-25.0	-25.4	
6.13	-66.3	H	3.0	-14.4	36.6	1.0	-50.0	-25.0	-25.0	
8.41	-66.8	H	3.0	-12.0	35.1	1.0	-46.1	-25.0	-21.1	
4.88	-64.2	V	3.0	-14.2	36.9	1.0	-50.1	-25.0	-25.1	
6.13	-66.3	V	3.0	-14.5	36.6	1.0	-50.1	-25.0	-25.1	
8.41	-67.2	V	3.0	-12.6	35.1	1.0	-46.7	-25.0	-21.7	
Mid Channel (2590.5MHz)+2602.2MHz 1-99, 1-0										
5.12	-65.2	H	3.0	-15.0	36.8	1.0	-50.8	-25.0	-25.8	
7.02	-66.3	H	3.0	-13.0	36.4	1.0	-48.4	-25.0	-23.4	
8.25	-65.9	H	3.0	-11.3	35.3	1.0	-45.5	-25.0	-20.5	
5.44	-64.3	V	3.0	-13.4	36.8	1.0	-49.2	-25.0	-24.2	
6.41	-65.7	V	3.0	-13.4	36.5	1.0	-49.0	-25.0	-24.0	
7.71	-66.4	V	3.0	-12.6	35.7	1.0	-47.4	-25.0	-22.4	
High Channel (2675MHz)+2686.7MHz 1-99, 1-0										
5.08	-65.6	H	3.0	-15.5	36.9	1.0	-51.3	-25.0	-26.3	
7.24	-64.9	H	3.0	-11.3	36.2	1.0	-46.5	-25.0	-21.5	
9.05	-67.1	H	3.0	-11.6	34.5	1.0	-45.2	-25.0	-20.2	
5.16	-64.9	V	3.0	-14.4	36.8	1.0	-50.2	-25.0	-25.2	
7.18	-65.6	V	3.0	-12.3	36.2	1.0	-47.6	-25.0	-22.6	
9.25	-67.7	V	3.0	-12.3	34.4	1.0	-45.7	-25.0	-20.7	

Rev. 05.21.15

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

QPSK LTE BAND 41 (20.0MHZ + 20.0MHZ BANDWIDTH)

High Frequency Substitution Measurement
UL Fremont Radiated Chamber

Company:
Project #: 16U23816
Date: 12/09/16
Test Engineer: 39005
Configuration: EUT only
Mode: LTE Band 41, 20MHz QPSK UL CA 20/20

Test Equipment:
Substitution: Horn T59 Substitution, and 8ft SMA Cable

Chamber	Pre-amplifer	Filter	Limit
3m Chamber H	3m Chamber H	Filter	LTE B41

Frequency (GHz)	SA reading (dBm)	Ant. Pol. (H/V)	Distance	EIRP @ TX Ant End (dBm)	Preamp	Attenuator	EIRP	Limit	Delta	Notes
Low Channel (2506MHz) + 2525.8MHz 1-99 1-0										
5.01	-65.2	H	3.0	-15.2	36.9	1.0	-51.1	-25.0	-26.1	
6.39	-65.6	H	3.0	-13.3	36.5	1.0	-48.9	-25.0	-23.9	
8.59	-66.2	H	3.0	-11.2	34.9	1.0	-45.2	-25.0	-20.2	
4.87	-65.0	V	3.0	-15.1	36.9	1.0	-51.0	-25.0	-26.0	
6.42	-65.2	V	3.0	-13.0	36.5	1.0	-48.5	-25.0	-23.5	
8.40	-66.1	V	3.0	-11.6	35.1	1.0	-45.8	-25.0	-20.8	
Mid Channel (2583.1MHz) + 2602.9MHz 1-99 1-0										
4.99	-64.9	H	3.0	-15.0	36.9	1.0	-50.8	-25.0	-25.8	
5.66	-64.4	H	3.0	-13.3	36.7	1.0	-49.0	-25.0	-24.0	
9.05	-67.0	H	3.0	-11.5	34.5	1.0	-45.0	-25.0	-20.0	
5.13	-64.9	V	3.0	-14.5	36.8	1.0	-50.3	-25.0	-25.3	
6.49	-65.5	V	3.0	-13.2	36.5	1.0	-48.7	-25.0	-23.7	
8.35	-66.1	V	3.0	-11.6	35.2	1.0	-45.8	-25.0	-20.8	
High Channel (2660.2MHz) + 2680MHz 1-99 1-0										
5.08	-64.0	H	3.0	-13.8	36.9	1.0	-49.7	-25.0	-24.7	
6.24	-65.1	H	3.0	-13.1	36.6	1.0	-48.6	-25.0	-23.6	
8.90	-66.6	H	3.0	-11.3	34.7	1.0	-45.0	-25.0	-20.0	
5.02	-64.0	V	3.0	-13.8	36.9	1.0	-49.6	-25.0	-24.6	
7.07	-65.0	V	3.0	-11.9	36.3	1.0	-47.2	-25.0	-22.2	
8.89	-66.3	V	3.0	-11.3	34.7	1.0	-45.0	-25.0	-20.0	

Rev. 05.21.15

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

16QAM LTE BAND 41 (20.0MHZ + 20.0MHZ BANDWIDTH)

High Frequency Substitution Measurement
UL Fremont Radiated Chamber

Company:
Project #: 16U23816
Date: 12/09/16
Test Engineer: 39005
Configuration: EUT only
Mode: LTE Band 41, 20MHz 16QAM UL CA 20/20

Test Equipment:
Substitution: Horn T59 Substitution, and 8ft SMA Cable

Chamber	Pre-amplifer	Filter	Limit
3m Chamber H	3m Chamber H	Filter	LTE B41

Frequency (GHz)	SA reading (dBm)	Ant. Pol. (H/V)	Distance	EIRP @ TX Ant End (dBm)	Preamp	Attenuator	EIRP	Limit	Delta	Notes
Low Channel (2506MHz) + 2525.8MHz 1-99 1-0										
5.01	-65.2	H	3.0	-15.2	36.9	1.0	-51.0	-25.0	-26.0	
6.39	-65.4	H	3.0	-13.1	36.5	1.0	-48.6	-25.0	-23.6	
8.59	-66.2	H	3.0	-11.2	34.9	1.0	-45.2	-25.0	-20.2	
4.87	-65.2	V	3.0	-15.3	36.9	1.0	-51.2	-25.0	-26.2	
6.42	-65.1	V	3.0	-12.8	36.5	1.0	-48.4	-25.0	-23.4	
8.40	-65.6	V	3.0	-11.1	35.1	1.0	-45.2	-25.0	-20.2	
Mid Channel (2583.1MHz) + 2602.9MHz 1-99 1-0										
4.99	-64.9	H	3.0	-15.0	36.9	1.0	-50.8	-25.0	-25.8	
5.66	-64.3	H	3.0	-13.1	36.7	1.0	-48.9	-25.0	-23.9	
9.05	-67.1	H	3.0	-11.6	34.5	1.0	-45.2	-25.0	-20.2	
5.13	-64.9	V	3.0	-14.5	36.8	1.0	-50.4	-25.0	-25.4	
6.49	-65.6	V	3.0	-13.2	36.5	1.0	-48.7	-25.0	-23.7	
8.35	-66.3	V	3.0	-11.8	35.2	1.0	-46.0	-25.0	-21.0	
High Channel (2660.2MHz) + 2680MHz 1-99 1-0										
5.08	-64.4	H	3.0	-14.3	36.9	1.0	-50.2	-25.0	-25.2	
6.24	-65.3	H	3.0	-13.2	36.6	1.0	-48.8	-25.0	-23.8	
8.90	-66.7	H	3.0	-11.4	34.7	1.0	-45.0	-25.0	-20.0	
5.02	-64.2	V	3.0	-14.0	36.9	1.0	-49.9	-25.0	-24.9	
7.07	-65.1	V	3.0	-12.0	36.3	1.0	-47.3	-25.0	-22.3	
8.89	-66.4	V	3.0	-11.4	34.7	1.0	-45.1	-25.0	-20.1	

Rev. 05.21.15

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

11.2. FIELD STRENGTH OF SPURIOUS RADIATION (ANTENNA D)

11.2.1. LTE BAND 7

QPSK LTE BAND 7 (20.0MHZ + 10.0MHZ BANDWIDTH)

High Frequency Substitution Measurement
UL Fremont Radiated Chamber

Company:
Project #: 16U23816
Date: 12/10/16
Test Engineer: 50820
Configuration: EUT only
Mode: LTE Band 7, 10MHz QPSK UL CA 20/10

Test Equipment:
Substitution: Horn T59 Substitution, and 8ft SMA Cable

Chamber	Pre-amplifer	Filter	Limit
3m Chamber H	3m Chamber H	Filter	LTE B7

Frequency (GHz)	SA reading (dBm)	Ant. Pol. (H/V)	Distance	EIRP @ TX Ant End (dBm)	Preamp	Attenuator	EIRP	Limit	Delta	Notes
Low Channel (2510MHz)+2524.4MHz 1-99 1-0										
5.15	-68.3	H	3.0	-18.1	36.8	1.0	-53.9	-25.0	-28.9	
7.56	-67.5	H	3.0	-13.6	35.9	1.0	-48.5	-25.0	-23.5	
9.63	-68.3	H	3.0	-12.2	34.0	1.0	-45.2	-25.0	-20.2	
5.15	-68.3	V	3.0	-17.9	36.8	1.0	-53.7	-25.0	-28.7	
7.56	-68.4	V	3.0	-14.7	35.9	1.0	-49.6	-25.0	-24.6	
9.62	-67.5	V	3.0	-11.8	34.0	1.0	-44.8	-25.0	-19.8	
Mid Channel (2530.1MHz)+2544.5MHz 1-99 1-0										
5.13	-68.5	H	3.0	-18.2	36.8	1.0	-54.1	-25.0	-29.1	
7.78	-68.0	H	3.0	-13.9	35.7	1.0	-48.6	-25.0	-23.6	
9.45	-67.7	H	3.0	-11.8	34.2	1.0	-45.0	-25.0	-20.0	
5.05	-68.8	V	3.0	-18.5	36.9	1.0	-54.4	-25.0	-29.4	
7.65	-68.4	V	3.0	-14.7	35.8	1.0	-49.5	-25.0	-24.5	
9.82	-67.1	V	3.0	-11.1	33.8	1.0	-44.0	-25.0	-19.0	
High Channel (2550.1MHz)+2564.5MHz 1-99 1-0										
5.14	-68.1	H	3.0	-17.9	36.8	1.0	-53.7	-25.0	-28.7	
7.28	-68.0	H	3.0	-14.4	36.1	1.0	-49.5	-25.0	-24.5	
9.68	-67.7	H	3.0	-11.5	34.0	1.0	-44.5	-25.0	-19.5	
5.18	-69.1	V	3.0	-18.6	36.8	1.0	-54.4	-25.0	-29.4	
7.28	-68.3	V	3.0	-15.0	36.1	1.0	-50.1	-25.0	-25.1	
9.68	-68.3	V	3.0	-12.4	34.0	1.0	-45.4	-25.0	-20.4	

Rev. 05.21.15

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

16QAM LTE BAND 7 (20.0MHZ + 10.0MHZ BANDWIDTH)

High Frequency Substitution Measurement
UL Fremont Radiated Chamber

Company:
Project #: 16U23816
Date: 12/10/16
Test Engineer: 50820
Configuration: EUT only
Mode: LTE Band 7, 10MHz 16QAM UL CA 20/10

Test Equipment:
Substitution: Horn T59 Substitution, and 8ft SMA Cable

Chamber	Pre-amplifer	Filter	Limit
3m Chamber H	3m Chamber H	Filter	LTE B7

Frequency (GHz)	SA reading (dBm)	Ant. Pol. (H/V)	Distance	EIRP @ TX Ant End (dBm)	Preamp	Attenuator	EIRP	Limit	Delta	Notes
Low Channel (2510MHz)+2524.4MHz 1-99 1-0										
5.15	-69.9	H	3.0	-19.6	36.8	1.0	-55.5	-25.0	-30.5	
7.56	-68.6	H	3.0	-14.7	35.9	1.0	-49.6	-25.0	-24.6	
9.63	-67.4	H	3.0	-11.3	34.0	1.0	-44.3	-25.0	-19.3	
5.15	-67.7	V	3.0	-17.2	36.8	1.0	-53.1	-25.0	-28.1	
7.56	-68.0	V	3.0	-14.3	35.9	1.0	-49.2	-25.0	-24.2	
9.62	-66.9	V	3.0	-11.1	34.0	1.0	-44.1	-25.0	-19.1	
Mid Channel (2530.1MHz)+2544.5MHz 1-99 1-0										
5.13	-68.8	H	3.0	-18.5	36.8	1.0	-54.4	-25.0	-29.4	
7.78	-68.3	H	3.0	-14.2	35.7	1.0	-48.9	-25.0	-23.9	
9.45	-67.9	H	3.0	-12.0	34.2	1.0	-45.2	-25.0	-20.2	
5.05	-69.3	V	3.0	-19.0	36.9	1.0	-54.9	-25.0	-29.9	
7.65	-68.2	V	3.0	-14.4	35.8	1.0	-49.2	-25.0	-24.2	
9.82	-68.0	V	3.0	-12.0	33.8	1.0	-44.8	-25.0	-19.8	
High Channel (2550.1MHz)+2564.5MHz 1-99 1-0										
5.14	-68.0	H	3.0	-17.7	36.8	1.0	-53.6	-25.0	-28.6	
7.28	-68.2	H	3.0	-14.6	36.1	1.0	-49.8	-25.0	-24.8	
9.68	-67.7	H	3.0	-11.5	34.0	1.0	-44.4	-25.0	-19.4	
5.18	-68.8	V	3.0	-18.3	36.8	1.0	-54.1	-25.0	-29.1	
7.28	-67.9	V	3.0	-14.5	36.1	1.0	-49.6	-25.0	-24.6	
9.68	-67.3	V	3.0	-11.4	34.0	1.0	-44.4	-25.0	-19.4	

Rev. 05.21.15

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

QPSK LTE BAND 7 (20.0MHZ + 20.0MHZ BANDWIDTH)

High Frequency Substitution Measurement
UL Fremont Radiated Chamber

Company:
Project #: 16U23816
Date: 12/10/16
Test Engineer: 50820
Configuration: EUT only
Mode: LTE Band 7, 20MHz QPSK UL CA 20/20

Test Equipment:
Substitution: Horn T59 Substitution, and 8ft SMA Cable

Chamber	Pre-amplifer	Filter	Limit
3m Chamber H	3m Chamber H	Filter	LTE B7

Frequency (GHz)	SA reading (dBm)	Ant. Pol. (H/V)	Distance	EIRP @ TX Ant End (dBm)	Preamp	Attenuator	EIRP	Limit	Delta	Notes
Low Channel (2510MHz)+ 2529.8MHz 1-99 1-0										
5.04	-65.9	H	3.0	-17.8	36.1	1.0	-52.9	-25.0	-27.9	
7.78	-65.7	H	3.0	-16.0	36.3	1.0	-51.3	-25.0	-26.3	
9.35	-66.1	H	3.0	-10.7	33.4	1.0	-43.2	-25.0	-18.2	
5.09	-67.5	V	3.0	-18.0	36.3	1.0	-53.2	-25.0	-28.2	
7.78	-66.0	V	3.0	-12.5	34.8	1.0	-46.2	-25.0	-21.2	
9.35	-65.9	V	3.0	-9.9	33.4	1.0	-42.4	-25.0	-17.4	
Mid Channel (2525.1MHz)+2544.9MHz 1-99 1-0										
5.25	-66.2	H	3.0	-15.2	36.0	1.0	-50.1	-25.0	-25.1	
7.42	-66.5	H	3.0	-13.5	35.2	1.0	-47.7	-25.0	-22.7	
8.96	-67.5	H	3.0	-11.2	34.0	1.0	-44.2	-25.0	-19.2	
5.19	-65.7	V	3.0	-18.0	36.1	1.0	-53.1	-25.0	-28.1	
7.01	-67.1	V	3.0	-14.0	36.4	1.0	-49.4	-25.0	-24.4	
9.21	-66.9	V	3.0	-11.6	34.4	1.0	-45.0	-25.0	-20.0	
High Channel (2540.2MHz)+2560Mhz 1-99 1-0										
5.08	-65.4	H	3.0	-16.2	36.2	1.0	-51.4	-25.0	-26.4	
6.88	-66.2	H	3.0	-15.5	36.0	1.0	-50.5	-25.0	-25.5	
8.96	-67.2	H	3.0	-10.9	32.0	1.0	-41.9	-25.0	-16.9	
5.16	-66.1	V	3.0	-19.1	36.3	1.0	-54.4	-25.0	-29.4	
7.72	-66.1	V	3.0	-14.9	35.8	1.0	-49.7	-25.0	-24.7	
9.46	-66.9	V	3.0	-11.3	34.2	1.0	-44.5	-25.0	-19.5	

Rev. 05.21.15

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

16QAM LTE BAND 7 (20.0MHZ + 20.0MHZ BANDWIDTH)

High Frequency Substitution Measurement
UL Fremont Radiated Chamber

Company:
Project #: 16U23816
Date: 12/10/16
Test Engineer: 50820
Configuration: EUT only
Mode: LTE Band 7, 20MHz 16QAM UL CA 20/20

Test Equipment:
Substitution: Horn T59 Substitution, and 8ft SMA Cable

Chamber	Pre-amplifer	Filter	Limit
3m Chamber H	3m Chamber H	Filter	LTE B7

Frequency (GHz)	SA reading (dBm)	Ant. Pol. (H/V)	Distance	EIRP @ TX Ant End (dBm)	Preamp	Attenuator	EIRP	Limit	Delta	Notes
Low Channel (2510MHz)+ 2529.8MHz 1-99 1-0										
5.04	-66.1	H	3.0	-16.0	36.9	1.0	-51.9	-25.0	-26.9	
7.78	-65.4	H	3.0	-11.3	35.7	1.0	-46.0	-25.0	-21.0	
9.35	-66.1	H	3.0	-10.2	34.3	1.0	-43.5	-25.0	-18.5	
5.09	-66.9	V	3.0	-16.6	36.9	1.0	-52.4	-25.0	-27.4	
7.78	-67.2	V	3.0	-13.3	35.7	1.0	-48.0	-25.0	-23.0	
9.35	-66.6	V	3.0	-11.1	34.3	1.0	-44.3	-25.0	-19.3	
Mid Channel (2525.1MHz)+2544.9MHz 1-99 1-0										
5.25	-67.1	H	3.0	-16.6	36.8	1.0	-52.5	-25.0	-27.5	
7.42	-66.9	H	3.0	-13.1	36.0	1.0	-48.1	-25.0	-23.1	
8.96	-67.6	H	3.0	-12.2	34.6	1.0	-45.9	-25.0	-20.9	
5.19	-66.0	V	3.0	-15.4	36.8	1.0	-51.3	-25.0	-26.3	
7.01	-67.3	V	3.0	-14.2	36.4	1.0	-49.6	-25.0	-24.6	
9.21	-67.2	V	3.0	-11.8	34.4	1.0	-45.2	-25.0	-20.2	
High Channel (2540.2MHz)+2560Mhz 1-99 1-0										
5.08	-66.1	H	3.0	-16.0	36.9	1.0	-51.8	-25.0	-26.8	
6.88	-65.7	H	3.0	-12.6	36.4	1.0	-48.0	-25.0	-23.0	
8.96	-66.6	H	3.0	-11.2	34.6	1.0	-44.8	-25.0	-19.8	
5.16	-66.4	V	3.0	-16.0	36.8	1.0	-51.8	-25.0	-26.8	
7.72	-66.9	V	3.0	-13.1	35.7	1.0	-47.8	-25.0	-22.8	
9.46	-66.8	V	3.0	-11.2	34.2	1.0	-44.4	-25.0	-19.4	

Rev. 05.21.15

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

11.2.2. LTE BAND 41

QPSK LTE BAND 41 (20.0MHZ + 5.0MHZ BANDWIDTH)

High Frequency Substitution Measurement
UL Fremont Radiated Chamber

Company:
Project #: 16U23816
Date: 12/10/16
Test Engineer: 50820
Configuration: EUT only
Mode: LTE Band 41, 5MHz QPSK UL CA 20/5

Test Equipment:
Substitution: Horn T59 Substitution, and 8ft SMA Cable

Chamber	Pre-amplifer	Filter	Limit
3m Chamber H	3m Chamber H	Filter	LTE B41

Frequency (GHz)	SA reading (dBm)	Ant. Pol. (H/V)	Distance	EIRP @ TX Ant End (dBm)	Preamp	Attenuator	EIRP	Limit	Delta	Notes
Low Channel (2506MHz) +2517.7MHz 1-99, 1-0										
4.88	-68.7	H	3.0	-19.0	36.9	1.0	-54.8	-25.0	-29.8	
6.13	-69.1	H	3.0	-17.2	36.6	1.0	-52.8	-25.0	-27.8	
8.41	-69.2	H	3.0	-14.4	35.1	1.0	-48.5	-25.0	-23.5	
4.88	-67.9	V	3.0	-17.9	36.9	1.0	-53.8	-25.0	-28.8	
6.13	-66.9	V	3.0	-15.1	36.6	1.0	-50.7	-25.0	-25.7	
8.41	-67.7	V	3.0	-13.1	35.1	1.0	-47.3	-25.0	-22.3	
Mid Channel (2590.5MHz)+2602.2MHz 1-99, 1-0										
5.12	-64.1	H	3.0	-13.9	36.8	1.0	-49.7	-25.0	-24.7	
7.02	-65.7	H	3.0	-12.3	36.4	1.0	-47.7	-25.0	-22.7	
8.25	-66.0	H	3.0	-11.4	35.3	1.0	-45.6	-25.0	-20.6	
5.44	-65.3	V	3.0	-14.4	36.8	1.0	-50.2	-25.0	-25.2	
6.41	-65.0	V	3.0	-12.8	36.5	1.0	-48.3	-25.0	-23.3	
7.71	-65.8	V	3.0	-12.0	35.7	1.0	-46.8	-25.0	-21.8	
High Channel (2675MHz)+2686.7MHz 1-99, 1-0										
5.08	-64.9	H	3.0	-14.7	36.9	1.0	-50.6	-25.0	-25.6	
7.24	-65.3	H	3.0	-11.8	36.2	1.0	-46.9	-25.0	-21.9	
9.05	-66.1	H	3.0	-10.6	34.5	1.0	-44.1	-25.0	-19.1	
5.16	-63.8	V	3.0	-13.3	36.8	1.0	-49.1	-25.0	-24.1	
7.18	-65.3	V	3.0	-12.1	36.2	1.0	-47.3	-25.0	-22.3	
9.25	-66.2	V	3.0	-10.8	34.4	1.0	-44.2	-25.0	-19.2	

Rev. 05.21.15

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

16QAM LTE BAND 41 (20.0MHZ + 5.0MHZ BANDWIDTH)

High Frequency Substitution Measurement
UL Fremont Radiated Chamber

Company:
Project #: 16U23816
Date: 12/10/16
Test Engineer: 50820
Configuration: EUT only
Mode: LTE Band 41, 5MHz 16QAM UL CA 20/5

Test Equipment:
Substitution: Horn T59 Substitution, and 8ft SMA Cable

Chamber	Pre-amplifer	Filter	Limit
3m Chamber H	3m Chamber H	Filter	LTE B41

Frequency (GHz)	SA reading (dBm)	Ant. Pol. (H/V)	Distance	EIRP @ TX Ant End (dBm)	Preamp	Attenuator	EIRP	Limit	Delta	Notes
Low Channel (2506MHz) +2517.7MHz 1-99, 1-0										
4.88	-64.2	H	3.0	-14.4	36.9	1.0	-50.3	-25.0	-25.3	
6.13	-65.4	H	3.0	-13.5	36.6	1.0	-49.1	-25.0	-24.1	
8.41	-66.3	H	3.0	-11.5	35.1	1.0	-45.6	-25.0	-20.6	
4.88	-63.3	V	3.0	-13.3	36.9	1.0	-49.2	-25.0	-24.2	
6.13	-65.8	V	3.0	-14.0	36.6	1.0	-49.6	-25.0	-24.6	
8.41	-65.7	V	3.0	-11.1	35.1	1.0	-45.2	-25.0	-20.2	
Mid Channel (2590.5MHz)+2602.2MHz 1-99, 1-0										
5.12	-63.1	H	3.0	-12.9	36.8	1.0	-48.7	-25.0	-23.7	
7.02	-66.0	H	3.0	-12.7	36.4	1.0	-48.1	-25.0	-23.1	
8.25	-67.2	H	3.0	-12.6	35.3	1.0	-46.8	-25.0	-21.8	
5.44	-65.3	V	3.0	-14.4	36.8	1.0	-50.2	-25.0	-25.2	
6.41	-64.8	V	3.0	-12.6	36.5	1.0	-48.1	-25.0	-23.1	
7.71	-65.5	V	3.0	-11.7	35.7	1.0	-46.4	-25.0	-21.4	
High Channel (2675MHz)+2686.7MHz 1-99, 1-0										
5.08	-63.9	H	3.0	-13.7	36.9	1.0	-49.6	-25.0	-24.6	
7.24	-66.1	H	3.0	-12.5	36.2	1.0	-47.7	-25.0	-22.7	
9.05	-66.0	H	3.0	-10.5	34.5	1.0	-44.1	-25.0	-19.1	
5.16	-62.4	V	3.0	-11.9	36.8	1.0	-47.7	-25.0	-22.7	
7.18	-66.1	V	3.0	-12.8	36.2	1.0	-48.0	-25.0	-23.0	
9.25	-67.9	V	3.0	-12.5	34.4	1.0	-45.8	-25.0	-20.8	

Rev. 05.21.15

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

QPSK LTE BAND 41 (20.0MHZ + 20.0MHZ BANDWIDTH)

High Frequency Substitution Measurement
UL Fremont Radiated Chamber

Company:
Project #: 16U23816
Date: 12/10/16
Test Engineer: 50820
Configuration: EUT only
Mode: LTE Band 41, 20MHz QPSK UL CA 20/20

Test Equipment:
Substitution: Horn T59 Substitution, and 8ft SMA Cable

Chamber	Pre-amplifer	Filter	Limit
3m Chamber H	3m Chamber H	Filter	LTE B41

Frequency (GHz)	SA reading (dBm)	Ant. Pol. (H/V)	Distance	EIRP @ TX Ant End (dBm)	Preamp	Attenuator	EIRP	Limit	Delta	Notes
Low Channel (2506MHz) + 2525.8MHz 1-99 1-0										
5.01	-64.1	H	3.0	-14.1	36.9	1.0	-50.0	-25.0	-25.0	
6.39	-64.4	H	3.0	-12.1	36.5	1.0	-47.6	-25.0	-22.6	
8.59	-66.3	H	3.0	-11.3	34.9	1.0	-45.2	-25.0	-20.2	
4.87	-62.3	V	3.0	-12.3	36.9	1.0	-48.2	-25.0	-23.2	
6.42	-64.5	V	3.0	-12.3	36.5	1.0	-47.8	-25.0	-22.8	
8.40	-66.5	V	3.0	-12.0	35.1	1.0	-46.1	-25.0	-21.1	
Mid Channel (2583.1MHz) + 2602.9MHz 1-99 1-0										
4.99	-63.7	H	3.0	-13.8	36.9	1.0	-49.6	-25.0	-24.6	
5.66	-64.1	H	3.0	-13.0	36.7	1.0	-48.7	-25.0	-23.7	
9.05	-65.5	H	3.0	-9.9	34.5	1.0	-43.5	-25.0	-18.5	
5.13	-63.9	V	3.0	-13.4	36.8	1.0	-49.3	-25.0	-24.3	
6.49	-65.3	V	3.0	-12.9	36.5	1.0	-48.4	-25.0	-23.4	
8.35	-66.1	V	3.0	-11.6	35.2	1.0	-45.8	-25.0	-20.8	
High Channel (2660.2MHz) + 2680MHz 1-99 1-0										
5.08	-63.1	H	3.0	-12.9	36.9	1.0	-48.8	-25.0	-23.8	
6.24	-63.5	H	3.0	-11.5	36.6	1.0	-47.0	-25.0	-22.0	
8.90	-65.0	H	3.0	-9.6	34.7	1.0	-43.3	-25.0	-18.3	
5.02	-62.9	V	3.0	-12.6	36.9	1.0	-48.5	-25.0	-23.5	
7.07	-64.5	V	3.0	-11.4	36.3	1.0	-46.7	-25.0	-21.7	
8.89	-66.1	V	3.0	-11.1	34.7	1.0	-44.7	-25.0	-19.7	

Rev. 05.21.15

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

16QAM LTE BAND 41 (20.0MHZ + 20.0MHZ BANDWIDTH)

High Frequency Substitution Measurement
UL Fremont Radiated Chamber

Company:
Project #: 16U23816
Date: 12/10/16
Test Engineer: 50820
Configuration: EUT only
Mode: LTE Band 41, 20MHz 16QAM UL CA 20/20

Test Equipment:
Substitution: Horn T59 Substitution, and 8ft SMA Cable

Chamber	Pre-amplifer	Filter	Limit
3m Chamber H	3m Chamber H	Filter	LTE B41

Frequency (GHz)	SA reading (dBm)	Ant. Pol. (H/V)	Distance	EIRP @ TX Ant End (dBm)	Preamp	Attenuator	EIRP	Limit	Delta	Notes
Low Channel (2506MHz) + 2525.8MHz 1-99 1-0										
5.01	-63.1	H	3.0	-13.1	36.9	1.0	-48.9	-25.0	-23.9	
6.39	-64.4	H	3.0	-12.0	36.5	1.0	-47.6	-25.0	-22.6	
8.59	-66.6	H	3.0	-11.6	34.9	1.0	-45.6	-25.0	-20.6	
4.87	-64.1	V	3.0	-14.2	36.9	1.0	-50.1	-25.0	-25.1	
6.42	-64.1	V	3.0	-11.8	36.5	1.0	-47.3	-25.0	-22.3	
8.40	-66.2	V	3.0	-11.7	35.1	1.0	-45.8	-25.0	-20.8	
Mid Channel (2583.1MHz) + 2602.9MHz 1-99 1-0										
4.99	-63.8	H	3.0	-13.9	36.9	1.0	-49.7	-25.0	-24.7	
5.66	-63.1	H	3.0	-12.0	36.7	1.0	-47.7	-25.0	-22.7	
9.05	-66.4	H	3.0	-10.9	34.5	1.0	-44.5	-25.0	-19.5	
5.13	-63.4	V	3.0	-12.9	36.8	1.0	-48.8	-25.0	-23.8	
6.49	-65.0	V	3.0	-12.6	36.5	1.0	-48.1	-25.0	-23.1	
8.35	-65.3	V	3.0	-10.8	35.2	1.0	-45.0	-25.0	-20.0	
High Channel (2660.2MHz) + 2680MHz 1-99 1-0										
5.08	-62.9	H	3.0	-12.7	36.9	1.0	-48.6	-25.0	-23.6	
6.24	-64.0	H	3.0	-12.0	36.6	1.0	-47.5	-25.0	-22.5	
8.90	-66.0	H	3.0	-10.7	34.7	1.0	-44.4	-25.0	-19.4	
5.02	-62.6	V	3.0	-12.4	36.9	1.0	-48.3	-25.0	-23.3	
7.07	-64.9	V	3.0	-11.8	36.3	1.0	-47.1	-25.0	-22.1	
8.89	-64.8	V	3.0	-9.7	34.7	1.0	-43.4	-25.0	-18.4	

Rev. 05.21.15

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.