FCC CFR47 PART 22H & 24E

CERTIFICATION TEST REPORT

FOR

Tablet with Cellular GSM/GPRS/EGPRS/WCDMA/HSPA+/DC- HSDPA/LTE/IEEE 802.11a/b/g/n (MIMO 2x2) and Bluetooth Radio

MODEL NUMBER: A1476

FCC ID: BCGA1476

REPORT NUMBER: 13U16584-2, REVISION A

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Prepared for
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1 INFINITE LOOP
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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--	02/05/14	Initial Issue	T. Chan
A	02/14/14	Address TCB's Questions	C. Pang

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME:	APPLE, INC. 1 INFINITE LOOP CUPERTINO, CA 95014, U.S.A
EUT DESCRIPTION:	Tablet with Cellular GSM/GPRS/EGPRS/WCDMA/HSPA+/DC-HSDPA/LTE/IEEE 802.11a/b/g/n (MIMO 2x2) and Bluetooth Radio
MODEL:	A1476
SERIAL NUMBER:	10898
DATE TESTED:	NOVEMBER 18, 2013 – FEARUARY 05, 2014

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
FCC CFR47 PART 22H AND 24E	Pass

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

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

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UL Verification Services Inc. By:

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UL Verification Services Inc.

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with TIA-603-C, FCC CFR 47 Part 2, Part 22 and Part 24.

3. FACILITIES AND ACCREDITATION

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

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

UL Verification Services Inc. is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at http://www.ul.com.

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, 0.15 to 30 MHz	3.52 dB
Radiated Disturbance, 30 to 1000 MHz	4.94 dB

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

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a tablet device with cellular GSM/GPRS/EGPRS/WCDMA/HSPA+/DC-HSDPA/LTE/IEEE 802.11a/b/g/n (MIMO 2x2) and bluetooth radio.

5.2. MAXIMUM OUTPUT POWER

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

LTE BAND 2

Part 24 LTE Band 2						
Bandwidth (MHz)	Frequency Range	Modulation	Conducted(Peak)		EIRP(Peak)	
			dBm	mW	dBm	mW
1.4	1850.7 - 1909.3	QPSK	28.00	631.0	29.22	835.6
		16QAM	27.82	605.3	28.24	666.8
3	1851.5 - 1908.5	QPSK	27.55	568.9	29.35	861.0
		16QAM	27.47	558.5	28.34	682.3
5	1852.5 - 1907.5	QPSK	27.93	620.9	29.48	887.2
		16QAM	27.91	618.0	28.58	721.1
10	1855.0 - 1905.0	QPSK	27.90	616.6	29.53	897.4
		16QAM	27.65	582.1	28.78	755.1
15	1857.5 - 1902.5	QPSK	28.00	631.0	29.48	887.2
		16QAM	27.71	590.2	28.68	737.9
20	1860.0 - 1900.0	QPSK	27.81	603.9	29.38	867.0
		16QAM	27.80	602.6	28.68	737.9

LTE BAND 5

Part 22 LTE Band 5						
Bandwidth (MHz)	Frequency Range	Modulation	Conducted(Average)		ERP(Average)	
			dBm	mW	dBm	mW
1.4	824.7 - 848.3	QPSK	24.00	251.2	23.03	200.9
		16QAM	23.36	216.8	22.13	163.3
3	825.5 - 847.5	QPSK	24.00	251.2	23.08	203.2
		16QAM	23.28	212.8	22.18	165.2
5	826.5 - 846.5	QPSK	24.00	251.2	23.12	205.1
		16QAM	23.57	227.5	22.20	166.0
10	829.0 - 844.0	QPSK	23.80	239.9	23.05	201.8
		16QAM	22.70	186.2	22.18	165.2

5.3. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was 4324b5_roml.

The EUT is linked CMW500 Test Set.

5.4. MAXIMUM ANTENNA GAIN

Please see table below:

LTE BANDS	Antenna Gain (dBi)
LTE Band 2, 1850.7-1909.3MHz	1.78
LTE Band 5, 824.7 - 848.3MHz	-1.13

5.5. WORST-CASE CONFIGURATION AND MODE

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

The device has LTE Bands of 2, and 5.

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

For the fundamental investigation of radiated emissions, the EUT is investigated for vertical and horizontal antenna orientations and X, Y, and Z orientation. It was determined that X-position was the worst-case for Cell bands and X-position for PCS bands.

5.6. DESCRIPTION OF TEST SETUP

RADIATED TESTS SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
AC/DC adapter	Apple	A1401	60812	DoC
Earphone	Apple	NA	NA	NA

I/O CABLES (RF Conducted Test)

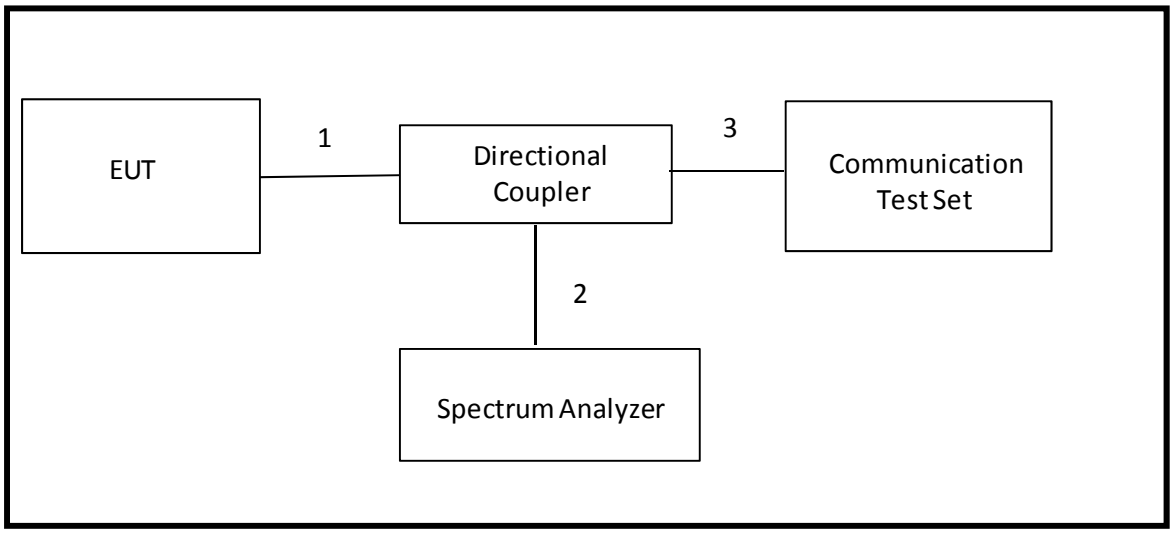
I/O CABLE LIST						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length	Remarks
1	RF Out	1	Directional Coupler	Un-shielded	0.1m	NA
2	RF In/Out	1	Spectrum Analyzer	Un-shielded	None	NA
3	RF In/Out	1	Communications Test Set	Un-shielded	1.2m	NA

I/O CABLES (RF Radiated Test)

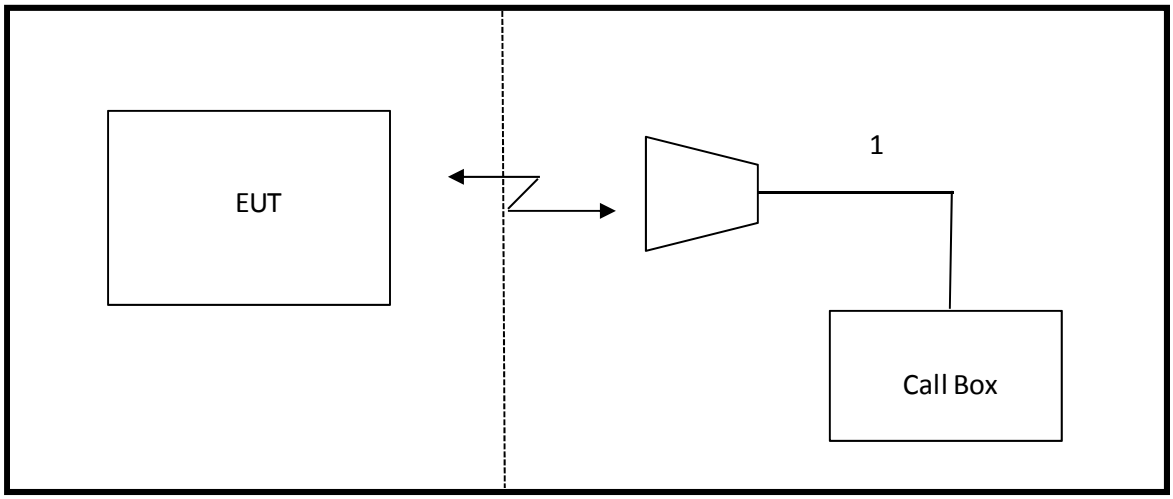
I/O CABLE LIST						
Cable No.	Port	# of Identic Ports	Connector Type	Cable Type	Cable Length	Remarks
1	RF In/Out	1	Antenna	Un-shielded	5m	NA

TEST SETUP

CONDUCTED SETUP DIAGRAM FOR TESTS



RADIATED SETUP DIAGRAM FOR TESTS



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**
Communication Test Set	R & S	CMW500	F00014	02/21/14
Temperature / Humidity Chamber	Thermotron	SE 600-10-10	C00930	06/27/14
Vector signal generator, 6 GHz	Agilent / HP	E4438C	F00037	07/06/14
Horn Antenna	ETS Lindgren	3117	F00131	02/19/14
PreAmp 1-18GHz	Agilent/HP	8449B	C01063	03/18/14
Highpass Filter, 2.7 GHz	Micro-Tronics	HPM13194	N02686	CNR
Highpass Filter, 1.5 GHz	Micro-Tronics	HPM13193	N02688	CNR
Antenna, Tuned Dipole 400~1000 MHz	ETS Lindgren	3121C DB4	C00994	07/12/14
Spectrum Analyzer, 44GHz	Agilent	N9030A	F00129	02/21/14
Directional Coupler	Krytar	1817	N02656	CNR
Bilog, 30-1GHz	Sunol Science	A0222813-1	C01011	03/07/14
Peak Power Meter	Boonton	4541	C01189	06/20/14
Peak Power Sensor	Boonton	57006	C01202	05/29/14
PreAmp 30-1000MHz	Sonama	310	981661	11/06/14

7. RF POWER OUTPUT VERIFICATION

LTE Measurement Procedure:

All LTE bands conducted power peak and average are obtained from the CMW500 telecommunication test set.

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

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

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

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

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

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

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

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

7.1. LTE BAND 2

Output power for LTE Band 2 (1.4 MHz)

Bandwidth	UL Channel	Frequency	Modulation	RB Size	RB Offset	Peak Power (dBm)	Average (dBm)
1.4	18607	1850.7	QPSK	1	0	27.00	**22.30**
				1	2	27.11	22.28
				1	5	27.10	22.27
				3	0	27.45	22.29
				3	1	27.42	22.20
				3	2	27.48	22.17
				6	0	27.70	21.30
			16QAM	1	0	26.86	21.20
				1	2	26.83	21.10
				1	5	26.86	21.20
				3	0	27.38	21.27
				3	1	27.29	**21.30**
				3	2	27.32	21.28
				6	0	27.34	20.48
1.4	18900	1880	QPSK	1	0	27.23	**22.30**
				1	2	27.16	22.29
				1	5	27.25	22.27
				3	0	27.72	22.25
				3	1	27.56	22.26
				3	2	27.55	22.20
				6	0	**28.00**	21.30
			16QAM	1	0	26.76	**21.30**
				1	2	26.77	21.10
				1	5	27.32	21.29
				3	0	27.60	21.29
				3	1	27.65	21.29
				3	2	27.70	21.28
				6	0	**27.82**	20.30
1.4	19193	1909.3	QPSK	1	0	27.20	**22.30**
				1	2	27.14	22.29
				1	5	27.10	22.27
				3	0	27.48	22.25
				3	1	27.50	22.20
				3	2	27.56	22.20
				6	0	27.86	21.30
			16QAM	1	0	26.90	**21.30**
				1	2	26.87	21.20
				1	5	26.86	21.27
				3	0	27.65	21.25
				3	1	27.45	21.20
				3	2	27.58	21.10
				6	0	27.64	20.30

Output power for LTE Band 2 (3.0 MHz)

Bandwidth	UL Channel	Frequency	Modulation	RB Size	RB Offset	Peak Power (dBm)	Average (dBm)
3	18615	1851.5	QPSK	1	0	27.14	**22.30**
				1	7	27.15	22.29
				1	14	27.18	22.27
				8	0	27.52	21.50
				8	4	27.50	21.60
				8	7	27.33	21.69
				15	0	27.10	21.58
			16QAM	1	0	27.00	**21.30**
				1	7	27.12	21.27
				1	14	27.16	21.10
				8	0	27.00	20.88
				8	4	27.18	20.70
				8	7	27.10	20.70
				15	0	27.32	20.56
3	18900	1880	QPSK	1	0	27.00	**22.30**
				1	7	26.94	22.28
				1	14	26.95	22.25
				8	0	27.00	21.40
				8	4	27.30	21.50
				8	7	27.26	21.60
				15	0	**27.55**	21.48
			16QAM	1	0	26.80	21.20
				1	7	26.85	21.00
				1	14	26.84	21.00
				8	0	27.00	20.56
				8	4	27.14	20.60
				8	7	27.12	20.60
				15	0	**27.47**	20.50
3	19185	1908.5	QPSK	1	0	27.00	**22.30**
				1	7	26.90	22.29
				1	14	26.78	22.25
				8	0	27.24	21.70
				8	4	27.26	21.70
				8	7	27.21	21.68
				15	0	27.36	21.70
			16QAM	1	0	26.97	**21.30**
				1	7	27.00	21.20
				1	14	26.90	21.18
				8	0	27.21	20.80
				8	4	27.12	20.80
				8	7	27.12	20.70
				15	0	27.44	20.70

Output power for LTE Band 2 (5.0 MHz)

Bandwidth	UL Channel	Frequency	Modulation	RB Size	RB Offset	Peak Power (dBm)	Average (dBm)
5	18625	1852.5	QPSK	1	0	26.98	**22.30**
				1	12	27.00	22.28
				1	24	27.00	22.25
				12	0	27.30	21.60
				12	6	27.24	21.70
				12	11	27.29	21.60
				25	0	27.88	21.60
			16QAM	1	0	26.69	21.30
				1	12	26.80	21.10
				1	24	26.74	21.20
				12	0	27.25	20.60
				12	6	27.27	20.60
				12	11	27.31	20.80
				25	0	**27.91**	20.80
5	18900	1880	QPSK	1	0	27.23	**22.30**
				1	12	27.10	22.29
				1	24	27.00	22.27
				12	0	27.25	21.70
				12	6	27.14	21.60
				12	11	27.18	21.70
				25	0	27.60	21.60
			16QAM	1	0	26.77	21.30
				1	12	26.70	21.29
				1	24	26.62	21.20
				12	0	27.00	20.60
				12	6	26.87	20.66
				12	11	27.17	20.67
				25	0	27.85	20.70
5	19175	1907.5	QPSK	1	0	27.12	**22.30**
				1	12	27.00	**22.30**
				1	24	26.95	22.27
				12	0	27.78	21.57
				12	6	27.61	21.69
				12	11	27.49	21.70
				25	0	**27.93**	21.66
			16QAM	1	0	27.00	**21.88**
				1	12	26.89	21.70
				1	24	26.66	21.67
				12	0	27.39	20.60
				12	6	27.31	20.70
				12	11	27.25	20.70
				25	0	27.72	20.60

Output power for LTE Band 2 (10 MHz)

Bandwidth	UL Channel	Frequency	Modulation	RB Size	RB Offset	Peak Power (dBm)	Average (dBm)
10	18650	1855	QPSK	1	0	26.92	**22.30**
				1	24	26.81	22.29
				1	49	26.90	22.27
				25	0	27.23	21.50
				25	12	27.06	21.40
				25	24	27.14	21.37
				50	0	**27.90**	21.50
			16QAM	1	0	26.87	20.95
				1	24	26.71	20.95
				1	49	26.78	20.97
				25	0	27.12	20.50
				25	12	27.34	20.40
				25	24	27.35	20.68
				50	0	27.24	20.35
10	18900	1880	QPSK	1	0	27.35	22.29
				1	24	27.20	22.29
				1	49	27.15	**22.30**
				25	0	27.00	21.50
				25	12	27.30	21.40
				25	24	27.21	21.50
				50	0	27.64	21.37
			16QAM	1	0	27.50	21.10
				1	24	27.30	21.10
				1	49	27.04	21.17
				25	0	27.57	20.40
				25	12	27.50	20.80
				25	24	27.40	20.36
				50	0	27.62	20.19
10	19150	1905	QPSK	1	0	27.40	22.28
				1	24	27.82	22.29
				1	49	27.29	22.29
				25	0	27.60	21.30
				25	12	27.72	21.28
				25	24	27.68	21.40
				50	0	27.54	21.20
			16QAM	1	0	27.37	21.37
				1	24	27.47	**21.60**
				1	49	27.23	21.57
				25	0	27.32	20.30
				25	12	**27.65**	20.30
				25	24	27.53	20.60
				50	0	27.59	20.20

Output power for LTE Band 2 (15 MHz)

Bandwidth	UL Channel	Frequency	Modulation	RB Size	RB Offset	Peak Power (dBm)	Average (dBm)
15	18675	1857.5	QPSK	1	0	27.14	**22.30**
				1	37	26.92	22.27
				1	74	27.20	22.27
				36	0	27.27	21.50
				36	16	27.23	21.50
				36	35	27.36	21.47
				75	0	27.85	21.40
			16-QAM	1	0	27.10	21.15
				1	37	26.89	21.10
				1	74	27.18	20.96
				36	0	27.37	20.60
				36	16	27.23	20.58
				36	35	27.33	20.48
				75	0	27.65	20.57
15	18900	1880	QPSK	1	0	27.51	**22.30**
				1	37	27.40	22.28
				1	74	27.10	22.26
				36	0	27.70	21.60
				36	16	27.64	21.58
				36	35	27.22	21.69
				75	0	**28.00**	21.50
			16-QAM	1	0	27.40	21.00
				1	37	27.20	21.20
				1	74	27.00	21.17
				36	0	27.60	20.66
				36	16	27.40	20.56
				36	35	27.25	20.75
				75	0	**27.71**	20.50
15	19125	1902.5	QPSK	1	0	27.20	**22.30**
				1	37	27.30	22.29
				1	74	27.00	22.26
				36	0	27.37	21.27
				36	16	27.62	21.37
				36	35	27.52	21.46
				75	0	27.85	21.40
			16-QAM	1	0	27.00	21.60
				1	37	27.40	21.39
				1	74	27.38	**21.66**
				36	0	27.46	20.30
				36	16	27.70	20.35
				36	35	27.56	20.50
				75	0	27.70	20.45

Output power for LTE Band 2 (20 MHz)

Bandwidth	UL Channel	Frequency	Modulation	RB Size	RB Offset	Peak Power (dBm)	Average (dBm)
20	18700	1860	QPSK	1	0	26.70	**22.30**
				1	49	27.20	22.20
				1	99	27.23	22.26
				50	0	27.34	21.30
				50	24	27.38	21.20
				50	49	27.56	21.20
				100	0	**27.73**	21.20
			16-QAM	1	0	26.50	21.30
				1	49	26.42	21.30
				1	99	26.94	21.30
				50	0	27.26	20.30
				50	24	27.38	20.30
				50	49	27.59	20.30
				100	0	**27.80**	20.30
20	18900	1880	QPSK	1	0	27.13	**22.30**
				1	49	27.30	22.27
				1	99	27.22	22.26
				50	0	27.60	22.26
				50	24	27.36	21.40
				50	49	27.50	21.40
				100	0	27.73	21.40
			16-QAM	1	0	26.83	21.70
				1	49	26.84	21.70
				1	99	27.33	21.50
				50	0	27.30	20.60
				50	24	27.41	20.56
				50	49	27.27	20.68
				100	0	27.47	20.55
20	19100	1900	QPSK	1	0	27.60	**22.30**
				1	49	27.31	22.28
				1	99	27.50	22.10
				50	0	27.50	21.30
				50	24	27.60	21.30
				50	49	27.77	21.20
				100	0	**27.81**	21.30
			16-QAM	1	0	27.49	**21.78**
				1	49	27.60	21.47
				1	99	27.40	21.70
				50	0	27.50	20.60
				50	24	27.50	20.30
				50	49	27.31	20.30
				100	0	27.52	20.50

7.2. LTE BAND 5

Output power for LTE Band 5 (1.4 MHz)

Bandwidth	UL Channel	Frequency	Mode	RB Size	RB Offset	Peak Power (dBm)	Average (dBm)
1.4	20407	824.7	QPSK	1	0	28.16	**24.00**
				1	2	28.27	23.97
				1	5	28.21	23.86
				3	0	28.25	23.90
				3	1	28.26	23.90
				3	2	28.30	23.90
				6	0	28.30	22.90
			16QAM	1	0	27.78	22.90
				1	2	27.94	22.85
				1	5	27.88	22.70
				3	0	28.24	22.90
				3	1	28.22	22.90
				3	2	**28.28**	22.90
				6	0	28.19	22.00
1.4	20525	836.5	QPSK	1	0	27.50	**24.00**
				1	2	27.51	23.99
				1	5	27.58	23.99
				3	0	27.85	23.99
				3	1	27.72	23.98
				3	2	27.74	23.99
				6	0	**28.44**	22.97
			16QAM	1	0	27.39	22.91
				1	2	27.38	22.49
				1	5	27.49	22.60
				3	0	27.93	22.85
				3	1	27.77	22.85
				3	2	27.80	22.90
				6	0	27.92	22.15
1.4	20643	848.3	QPSK	1	0	27.56	23.98
				1	2	27.57	23.88
				1	5	27.31	23.87
				3	0	27.86	23.88
				3	1	27.60	23.80
				3	2	27.50	23.78
				6	0	27.71	22.89
			16QAM	1	0	27.58	**23.36**
				1	2	27.40	23.07
				1	5	27.30	23.00
				3	0	27.80	22.97
				3	1	27.61	22.89
				3	2	27.46	22.80
				6	0	27.80	21.77

Output power for LTE Band 5 (3.0 MHz)

Bandwidth	UL Channel	Frequency	Mode	RB Size	RB Offset	Peak Power (dBm)	Average (dBm)
3	20415	825.5	QPSK	1	0	27.82	23.90
				1	7	27.80	23.77
				1	14	27.62	23.70
				8	0	28.14	22.90
				8	4	28.16	22.80
				8	7	28.27	22.95
				15	0	**28.38**	22.80
			16QAM	1	0	28.00	**23.28**
				1	7	27.99	22.36
				1	14	27.63	22.26
				8	0	27.96	21.95
				8	4	27.99	21.94
				8	7	27.96	21.93
				15	0	28.11	21.86
3	20525	836.5	QPSK	1	0	27.58	**24.00**
				1	7	27.55	23.99
				1	14	27.72	23.94
				8	0	28.00	23.03
				8	4	28.08	23.02
				8	7	28.00	23.02
				15	0	28.09	22.93
			16QAM	1	0	27.65	22.75
				1	7	27.60	22.56
				1	14	27.64	22.53
				8	0	27.98	22.19
				8	4	27.99	22.13
				8	7	28.14	22.11
				15	0	**28.34**	22.00
3	20635	847.5	QPSK	1	0	27.68	23.99
				1	7	27.58	23.99
				1	14	27.26	23.88
				8	0	28.15	23.14
				8	4	27.99	23.13
				8	7	27.97	23.03
				15	0	28.23	23.01
			16QAM	1	0	27.57	22.74
				1	7	27.55	22.72
				1	14	27.21	22.55
				8	0	27.72	22.12
				8	4	27.56	22.10
				8	7	27.44	22.00
				15	0	28.27	21.97

Output power for LTE Band 5 (5.0 MHz)

Bandwidth	UL Channel	Frequency	Mode	RB Size	RB Offset	Peak Power (dBm)	Average (dBm)
5	20425	826.5	QPSK	1	0	27.85	23.97
				1	12	27.80	23.86
				1	24	27.87	23.90
				12	0	28.25	22.83
				12	6	28.20	22.90
				12	11	28.31	22.87
				25	0	28.56	22.80
			16QAM	1	0	27.75	22.65
				1	12	27.71	22.50
				1	24	27.86	22.49
				12	0	28.03	21.80
				12	6	27.84	21.80
				12	11	28.15	21.90
				25	0	**28.81**	21.90
5	20525	836.5	QPSK	1	0	27.52	23.99
				1	12	27.53	23.99
				1	24	27.59	23.88
				12	0	27.98	23.00
				12	6	27.87	23.00
				12	11	27.94	23.00
				25	0	28.45	22.90
			16QAM	1	0	27.43	22.60
				1	12	27.52	22.56
				1	24	27.47	22.48
				12	0	27.73	22.05
				12	6	27.59	22.10
				12	11	27.70	22.05
				25	0	28.62	22.00
5	20625	846.5	QPSK	1	0	28.10	**24.00**
				1	12	27.85	23.99
				1	24	27.45	23.89
				12	0	28.20	23.30
				12	6	28.05	23.15
				12	11	28.08	23.10
				25	0	**28.74**	23.00
			16QAM	1	0	27.76	**23.57**
				1	12	27.56	23.40
				1	24	27.20	23.28
				12	0	28.03	21.97
				12	6	27.92	22.00
				12	11	27.78	22.00
				25	0	28.50	21.90

Output power for LTE Band 5 (10 MHz)

Bandwidth	UL Channel	Frequency	Mode	RB Size	RB Offset	Max Peak Power (dBm)	Average
10.00	20450	829.00	QPSK	1	0	27.97	23.60
				1	24	27.92	23.60
				1	49	27.45	23.50
				25	0	28.36	23.10
				25	12	28.24	23.10
				25	24	28.21	23.20
				50	0	**28.48**	23.00
			16QAM	1	0	28.05	22.68
				1	24	28.00	22.60
				1	49	27.51	22.60
				25	0	28.49	21.95
				25	12	28.29	21.90
				25	24	28.26	21.90
				50	0	**28.70**	21.85
10.00	20525	836.50	QPSK	1	0	27.73	23.60
				1	24	27.53	23.50
				1	49	27.60	23.70
				25	0	28.11	22.90
				25	12	27.91	23.00
				25	24	28.11	23.10
				50	0	28.38	22.90
			16QAM	1	0	27.81	**22.70**
				1	24	27.57	22.60
				1	49	27.66	22.58
				25	0	28.08	21.95
				25	12	27.97	21.95
				25	24	28.08	22.00
				50	0	28.35	21.80
10.00	20600	844.00	QPSK	1	0	27.67	23.70
				1	24	27.82	**23.80**
				1	49	27.34	23.60
				25	0	28.21	23.20
				25	12	28.13	23.20
				25	24	28.17	23.10
				50	0	28.35	23.10
			16QAM	1	0	27.57	22.50
				1	24	27.67	22.50
				1	49	27.29	22.50
				25	0	28.26	22.00
				25	12	28.19	22.10
				25	24	28.25	22.00
				50	0	28.40	21.90

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 2
- LTE Band 5

RESULTS

Band	Mode	RB SIZE / RB OFFSET	f (MHz)	99% BW (MHz)	-26dB BW (MHz)
LTE Band 2	1.4 MHz BAND	3/2	1850.7		
	QPSK	6/0		1.0873	1.235
	1.4 MHz BAND	3/2	1880		
	QPSK	6/0		1.0732	1.16
	1.4 MHz BAND	3/2	1909.3		
	QPSK	6/0		1.0936	1.332
	1.4 MHz BAND	3/2	1850.7		
	16QAM	6/0		1.073	1.212
	1.4 MHz BAND	3/2	1880		
	16QAM	6/0		1.0717	1.278
	1.4 MHz BAND	3/2	1909.3		
	16QAM	6/0		1.0832	1.213
	3.0 MHz BAND	8/4	1851.5		
	QPSK	15/0		2.6992	3.008
	3.0 MHz BAND	8/4	1880		
	QPSK	15/0		2.7047	2.904
	3.0 MHz BAND	8/4	1908.5		
	QPSK	15/0		2.7156	2.919
	3.0 MHz BAND	8/4	1851.5		
	16QAM	15/0		2.7316	2.899
	3.0 MHz BAND	8/4	1880		
	16QAM	15/0		2.657	2.901
	3.0 MHz BAND	8/4	1908.5		
	16QAM	15/0		2.6946	2.941
	5.0 MHz BAND	12/6	1852.5		
	QPSK	25/0		4.412	4.815
	5.0 MHz BAND	12/6	1880		
	QPSK	25/0		4.489	4.763
	5.0 MHz BAND	12/6	1907.5		
	QPSK	25/0		4.4945	4.72
	5.0 MHz BAND	12/6	1852.5		
	16QAM	25/0		4.4969	4.805
	5.0 MHz BAND	12/6	1880		
	16QAM	25/0		4.4689	4.779
	5.0 MHz BAND	12/6	1907.5		
	16QAM	25/0		4.4838	4.821

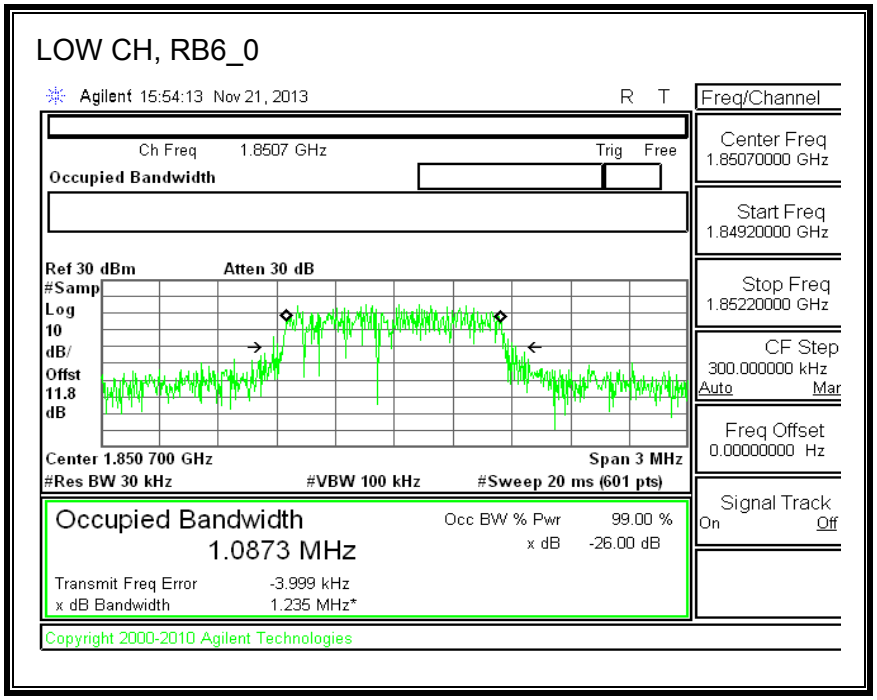
Band	Mode	RB SIZE / RB OFFSET	f (MHz)	99% BW (MHz)	-26dB BW (MHz)
LTE Band 2	10 MHz BAND	25/12	1855		
	QPSK	50/0		8.8904	9.351
	10 MHz BAND	25/12	1880		
	QPSK	50/0		8.9136	9.396
	10 MHz BAND	25/12	1905		
	QPSK	50/0		8.9438	9.428
	10 MHz BAND	25/12	1855		
	16QAM	50/0		8.9141	9.407
	10 MHz BAND	25/12	1880		
	16QAM	50/0		8.847	9.588
	10 MHz BAND	25/12	1905		
	16QAM	50/0		8.9323	9.391
	15 MHz BAND	36/18	1857.5		
	QPSK	75/0		13.3245	13.867
	15 MHz BAND	36/18	1880		
	QPSK	75/0		13.3259	13.885
	15 MHz BAND	36/18	1902.5		
	QPSK	75/0		13.3621	14.057
	15 MHz BAND	36/18	1857.5		
	16QAM	75/0		13.3252	13.841
	15 MHz BAND	36/18	1880		
	16QAM	75/0		13.4061	13.824
	15 MHz BAND	36/18	1902.5		
	16QAM	75/0		13.3257	13.822
	20 MHz BAND	50/19	1860		
	QPSK	100/0		17.8713	18.808
	20 MHz BAND	50/19	1880		
	QPSK	100/0		17.6061	18.932
	20 MHz BAND	50/19	1900		
	QPSK	100/0		17.8509	18.559
	20 MHz BAND	50/19	1860		
	16QAM	100/0		17.744	18.855
	20 MHz BAND	50/19	1880		
	16QAM	100/0		17.7876	18.827
	20 MHz BAND	50/19	1900		
	16QAM	100/0		17.9299	19.001

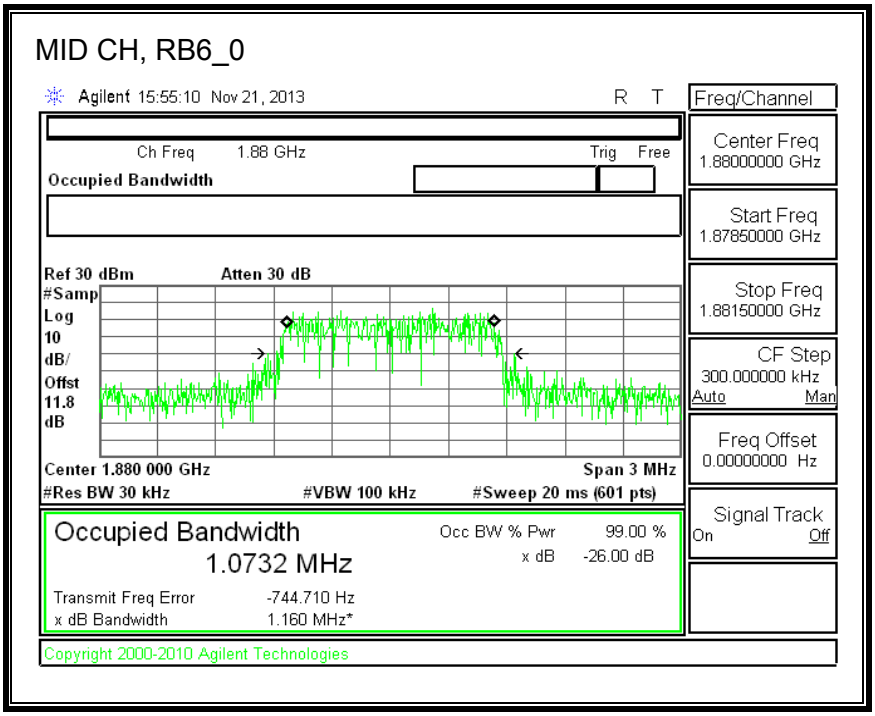
Band	Mode	RB SIZE/ RB OFFSET	f (MHz)	99% BW (MHz)	(-) 26dB BW (MHz)
LTE BAND 5	1.4 MHz BAND QPSK	3/2	824.7		
		6/0		1.0845	1.2350
	1.4 MHz BAND QPSK	3/2	836.5		
		6/0		1.0909	1.2250
	1.4 MHz BAND QPSK	3/2	848.3		
		6/0		1.0703	1.2480
	1.4 MHz BAND 16QAM	3/2	824.7		
		6/0		1.066	1.2040
	1.4 MHz BAND 16QAM	3/2	836.5		
		6/0		1.0651	1.1480
	1.4 MHz BAND 16QAM	3/2	848.3		
		6/0		1.082	1.2060
	3.0 MHz BAND QPSK	8/4	825.5		
		15/0		2.6784	2.7810
	3.0 MHz BAND QPSK	8/4	836.5		
		15/0		2.6695	2.8050
	3.0 MHz BAND QPSK	8/4	847.5		
		15/0		2.6973	2.7840
	3.0 MHz BAND 16QAM	8/4	825.5		
		15/0		2.6549	2.9250
	3.0 MHz BAND 16QAM	8/4	836.5		
		15/0		2.6539	2.7870
	3.0 MHz BAND 16QAM	8/4	847.5		
		15/0		2.6764	2.8860
	5.0 MHz BAND QPSK	12/6	821.5		
		25/0		4.4484	4.7150
	5.0 MHz BAND QPSK	12/6	836.5		
		25/0		4.4328	4.7670
	5.0 MHz BAND QPSK	12/6	846.5		
		25/0		4.4829	4.6810
	5.0 MHz BAND 16QAM	12/6	821.5		
		25/0		4.4323	4.8350
	5.0 MHz BAND 16QAM	12/6	836.5		
		25/0		4.4639	4.7770
	5.0 MHz BAND 16QAM	12/6	846.5		
		25/0		4.4223	4.6950
	10.0 MHz BAND QPSK	25/12	829.0		
		50/0		9.0032	9.3470
	10.0 MHz BAND QPSK	25/12	836.5		
		50/0		8.9457	9.3390
	10.0 MHz BAND QPSK	25/12	844.0		
		50/0		8.9463	9.4030
	10.0 MHz BAND 16QAM	25/12	829.0		
		50/0		8.9385	9.3590
	10.0 MHz BAND 16QAM	25/12	836.5		
		50/0		8.8899	9.3200
	10.0 MHz BAND 16QAM	25/12	844.0		
		50/0		8.9944	9.3450

8.1.1. LTE BAND 2

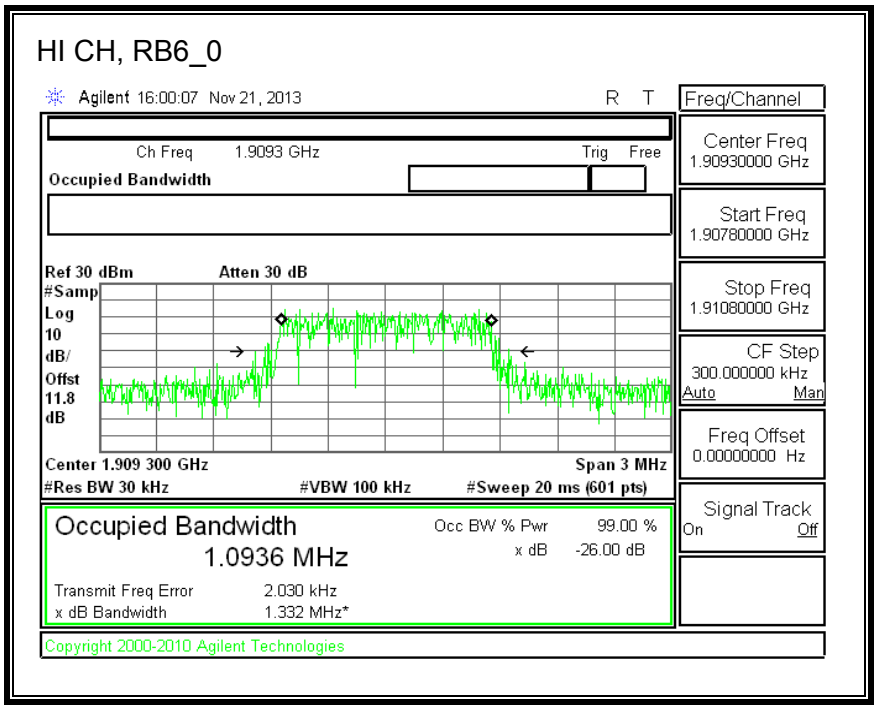
Band 2 (1.4 MHz Bandwidth)

LTE QPSK



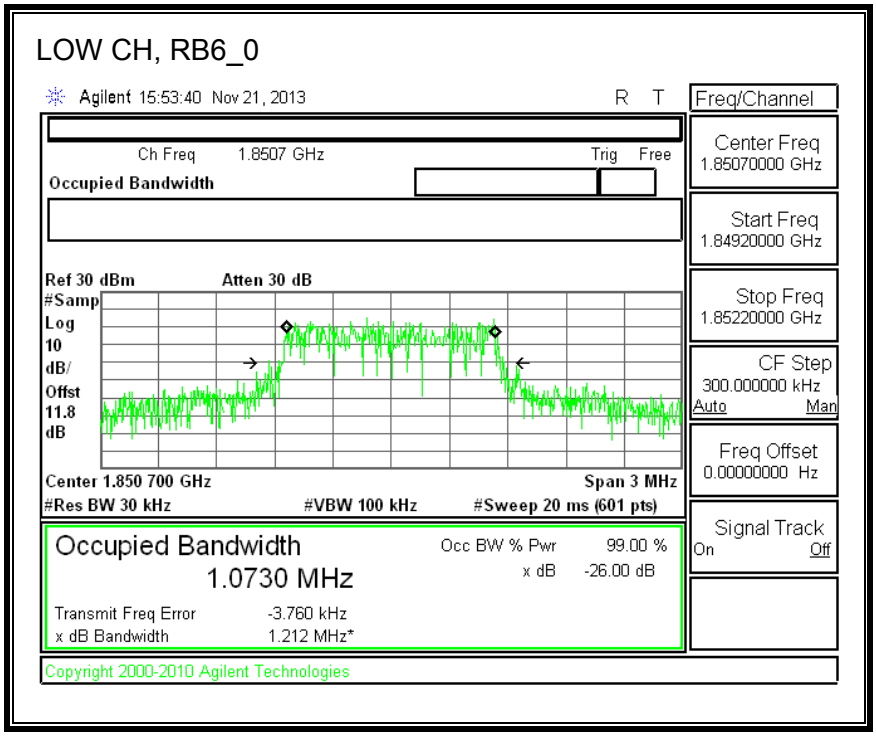


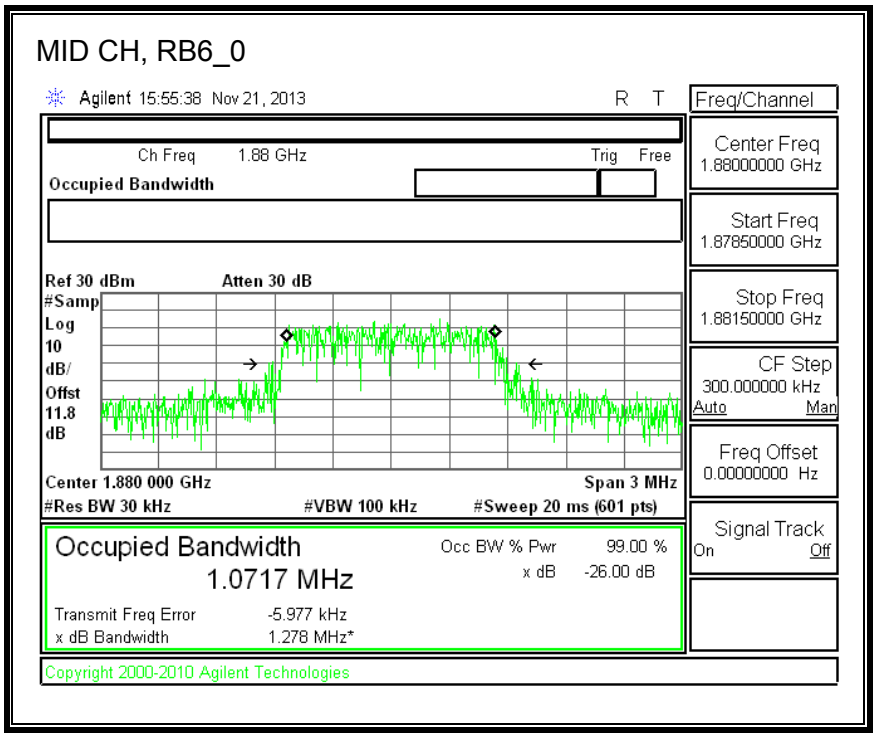
HI CH, RB6_0

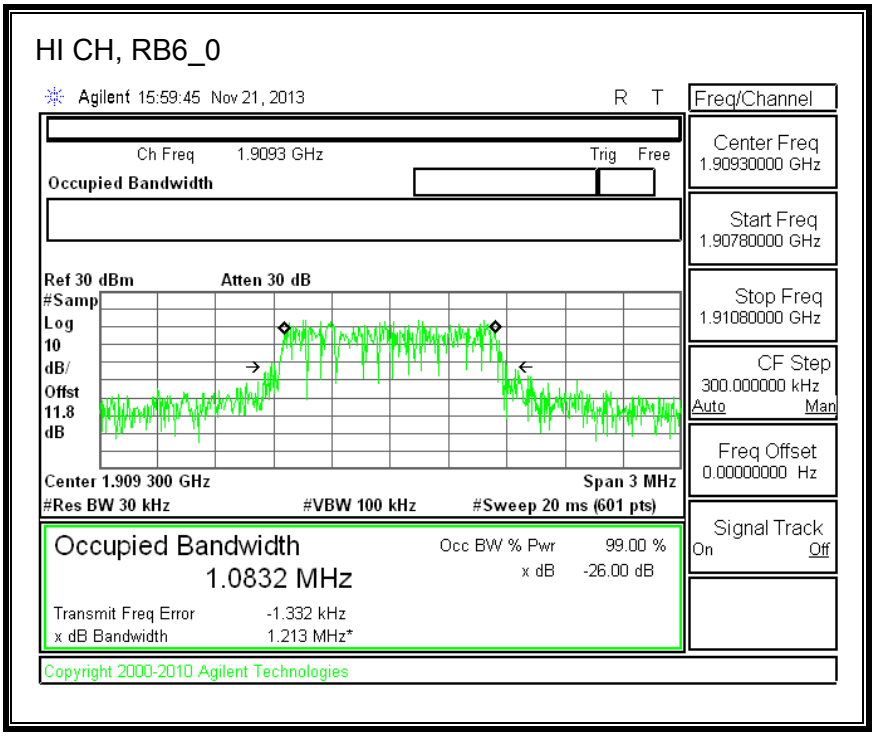


Band 2 (1.4 MHz Bandwidth)

LTE 16QAM

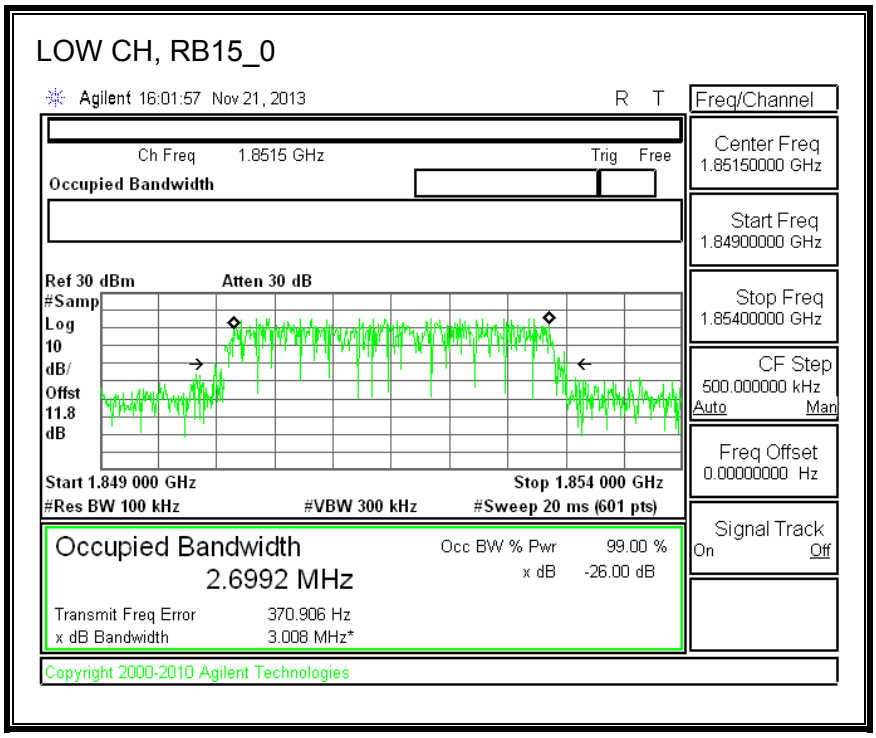


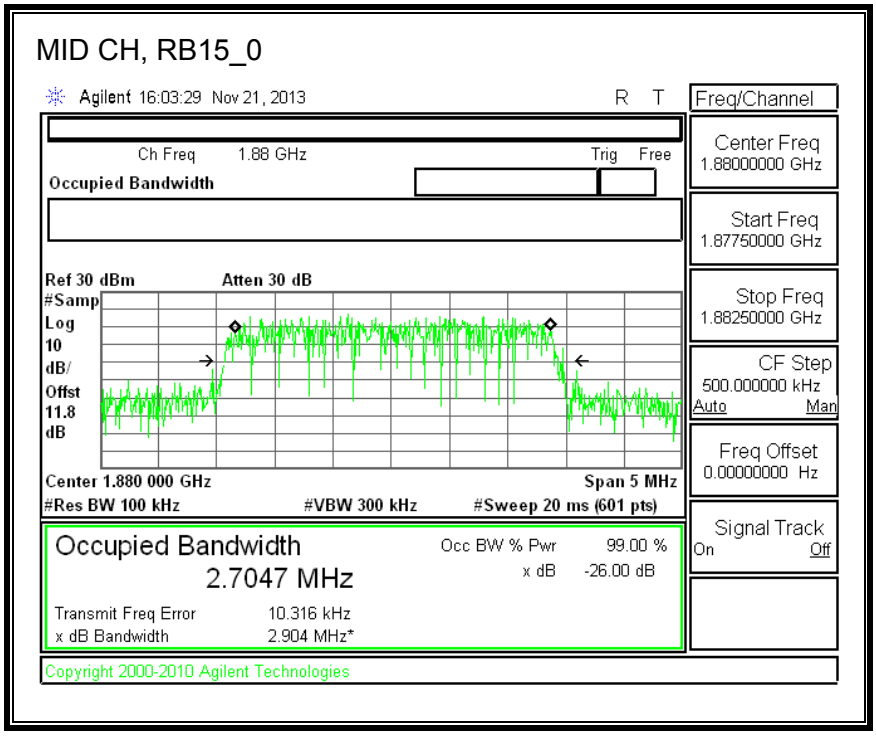


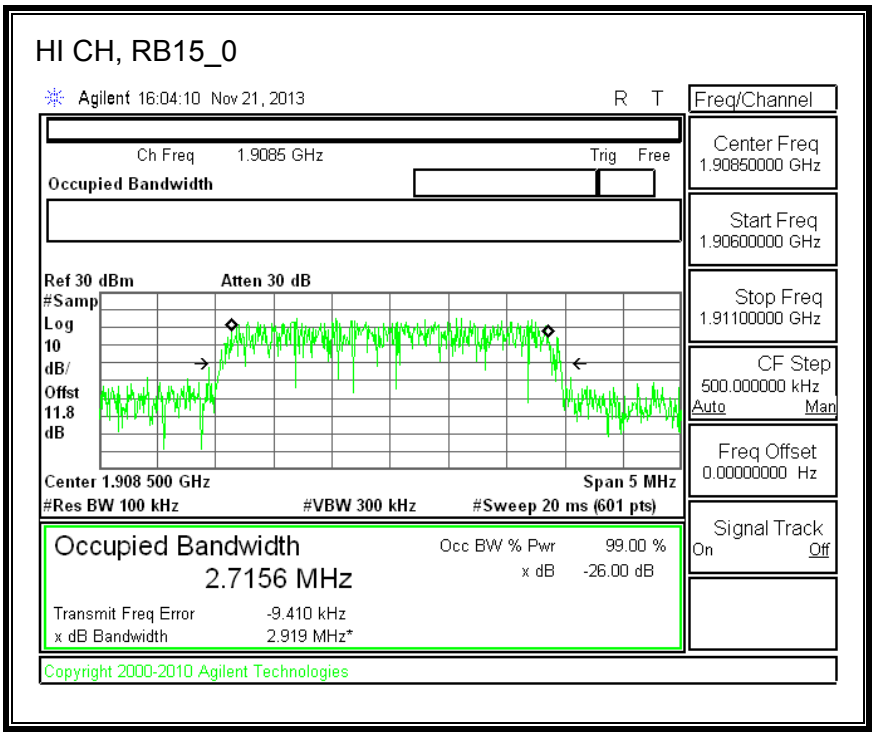


Band 2 (3MHz Bandwidth)

LTE QPSK

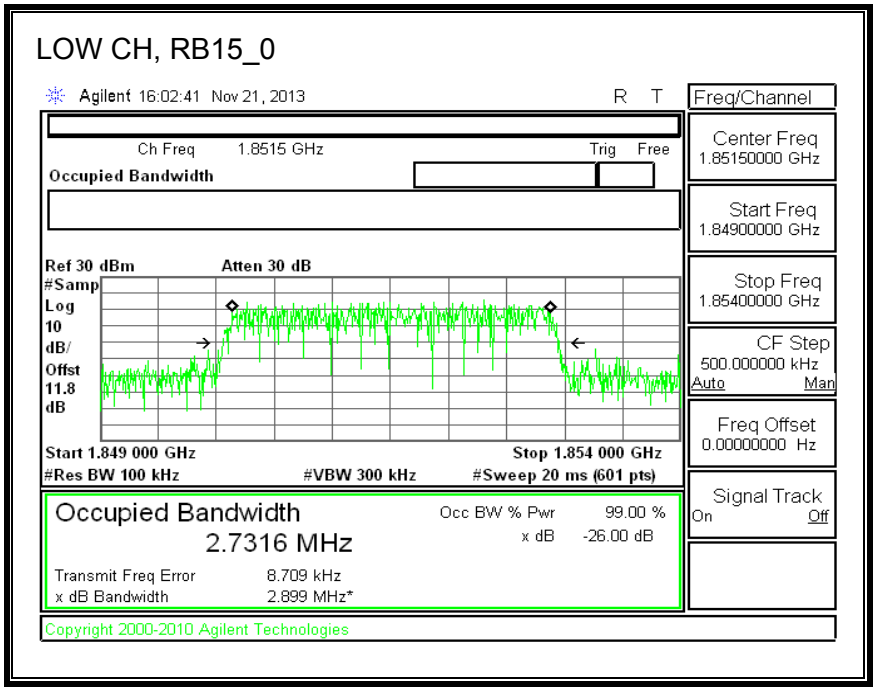


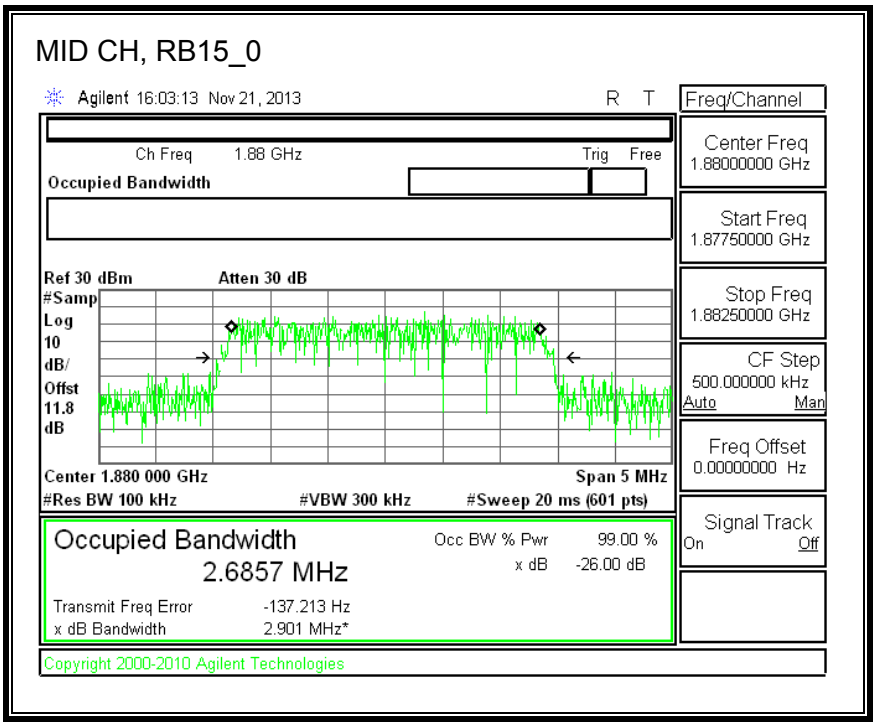




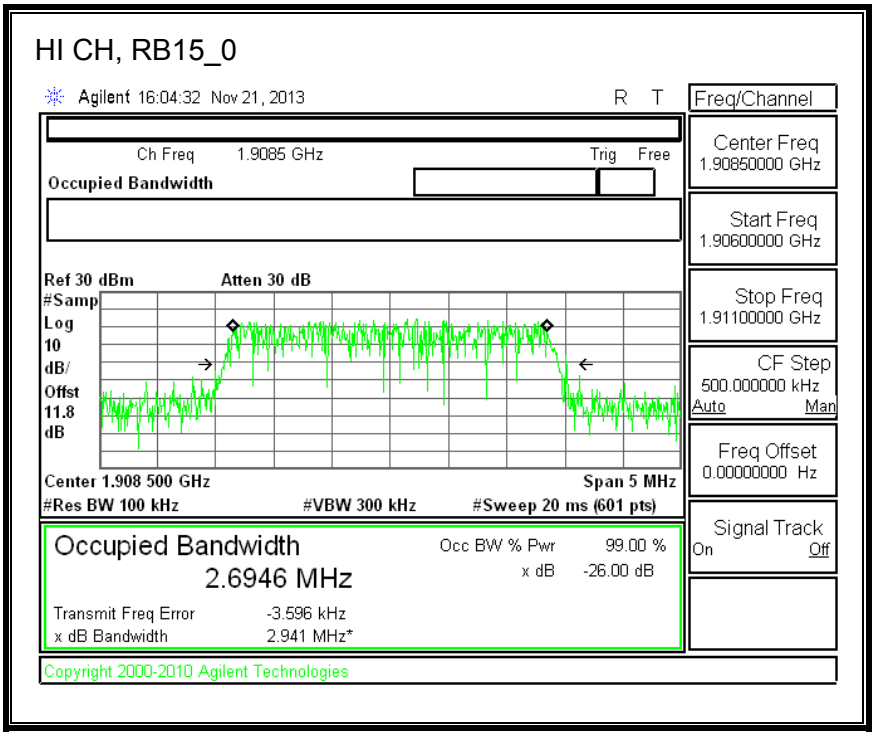
Band 2 (3MHz Bandwidth)

LTE 16QAM



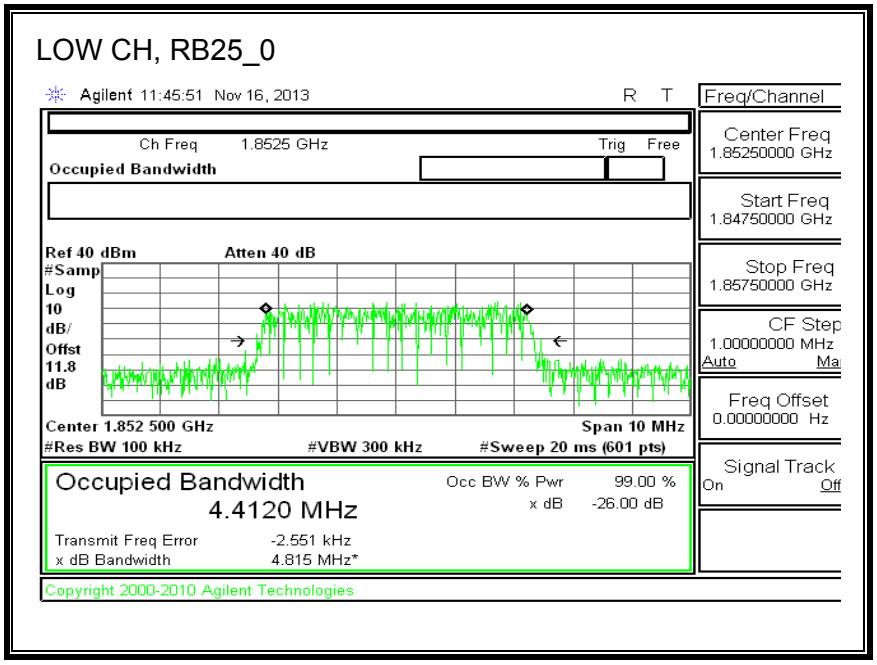


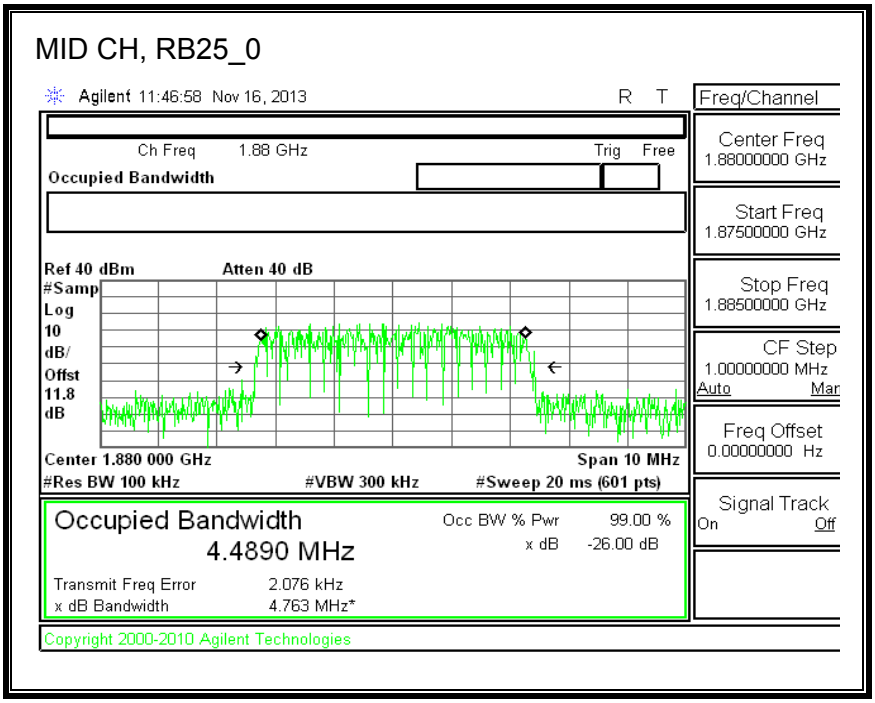
HI CH, RB15_0



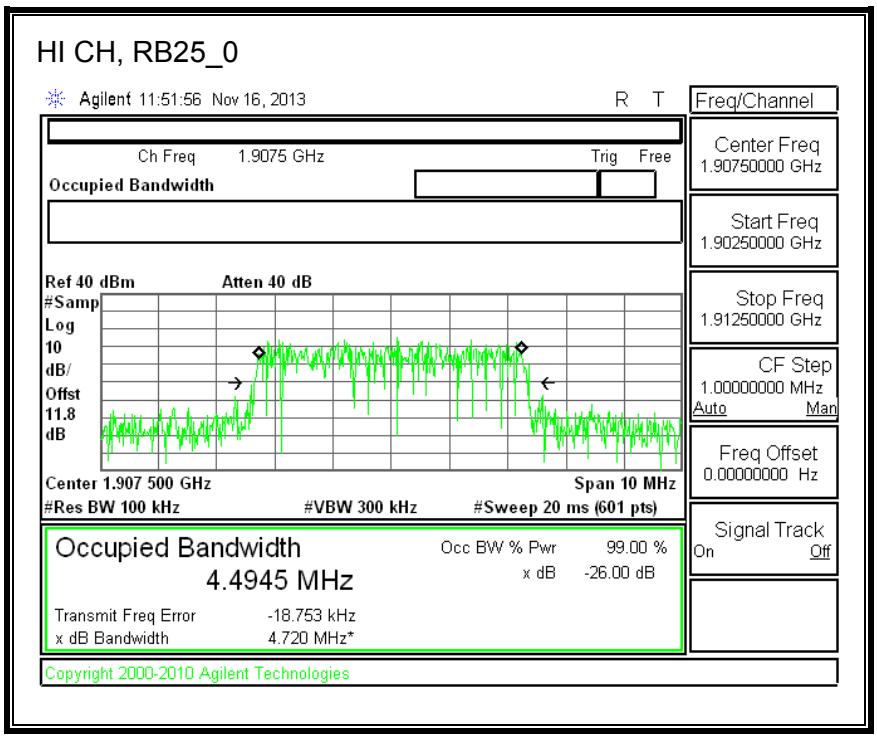
Band 2 (5MHz Bandwidth)

LTE QPSK



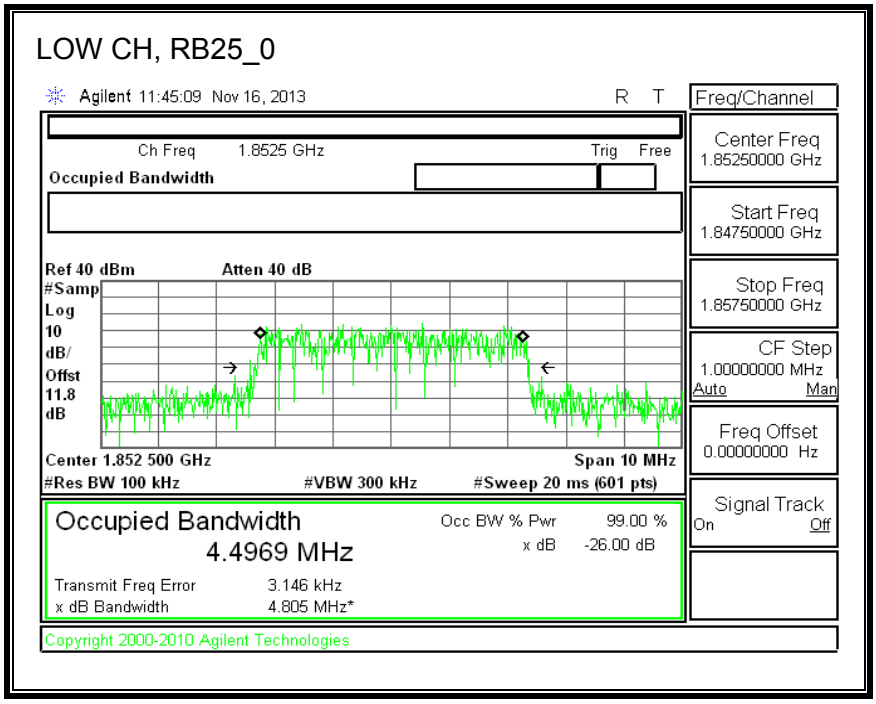


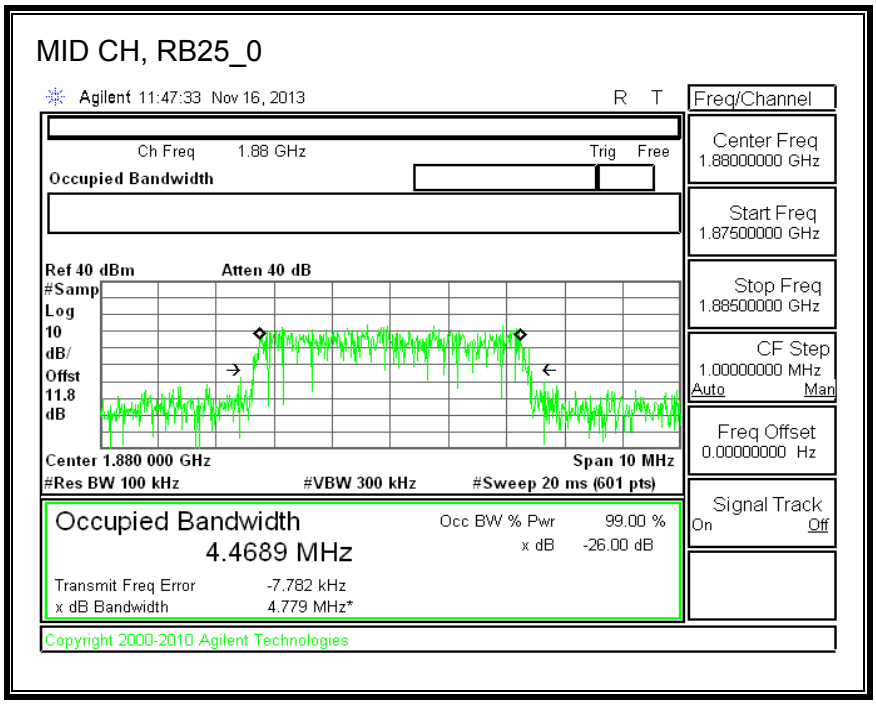
HI CH, RB25_0

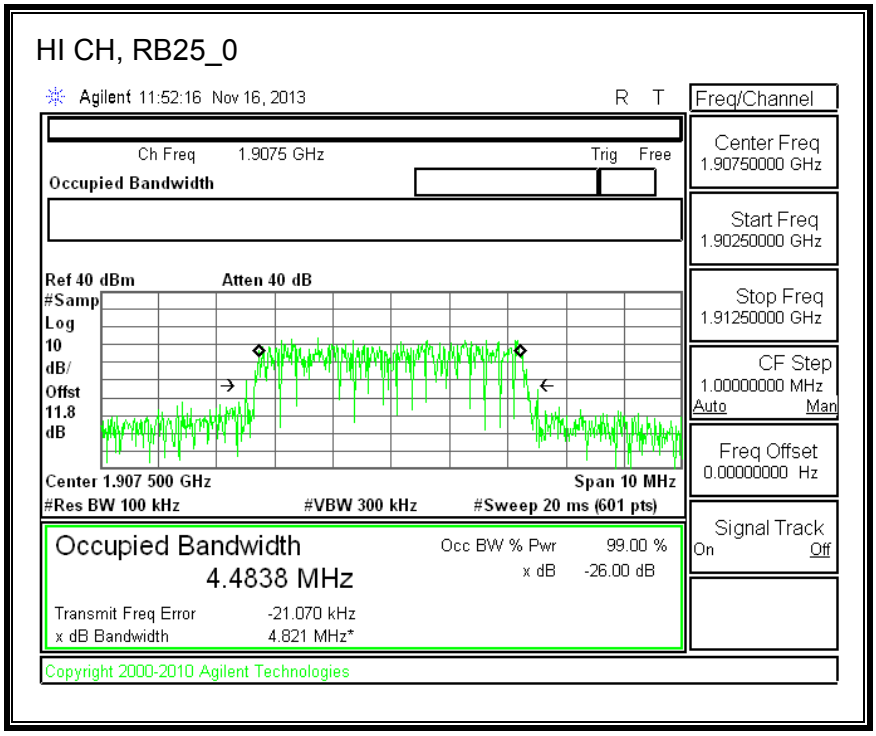


Band 2 (5MHz Bandwidth)

LTE 16QAM

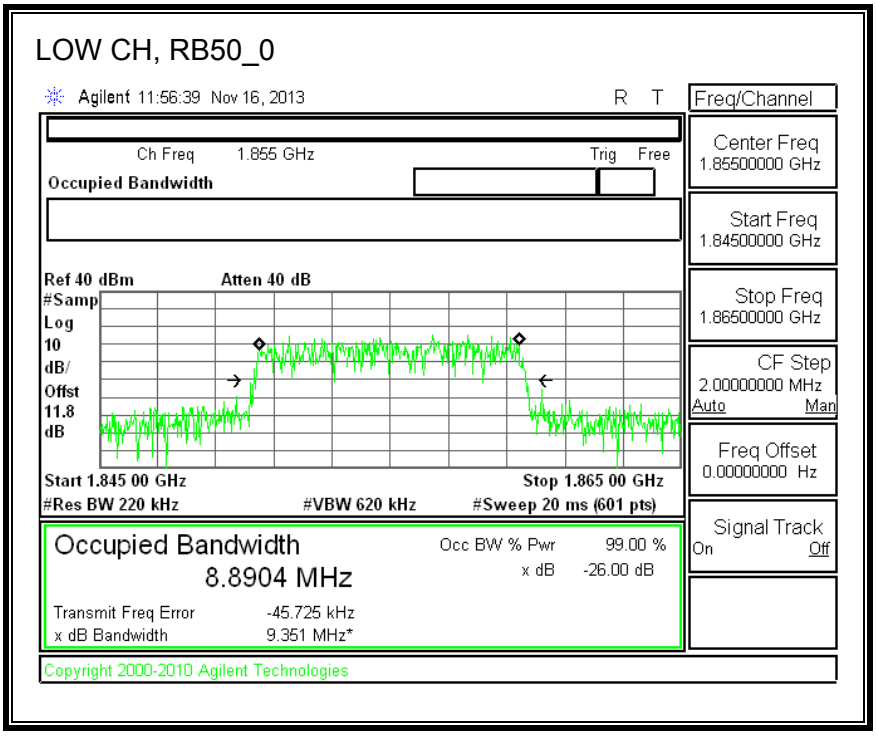


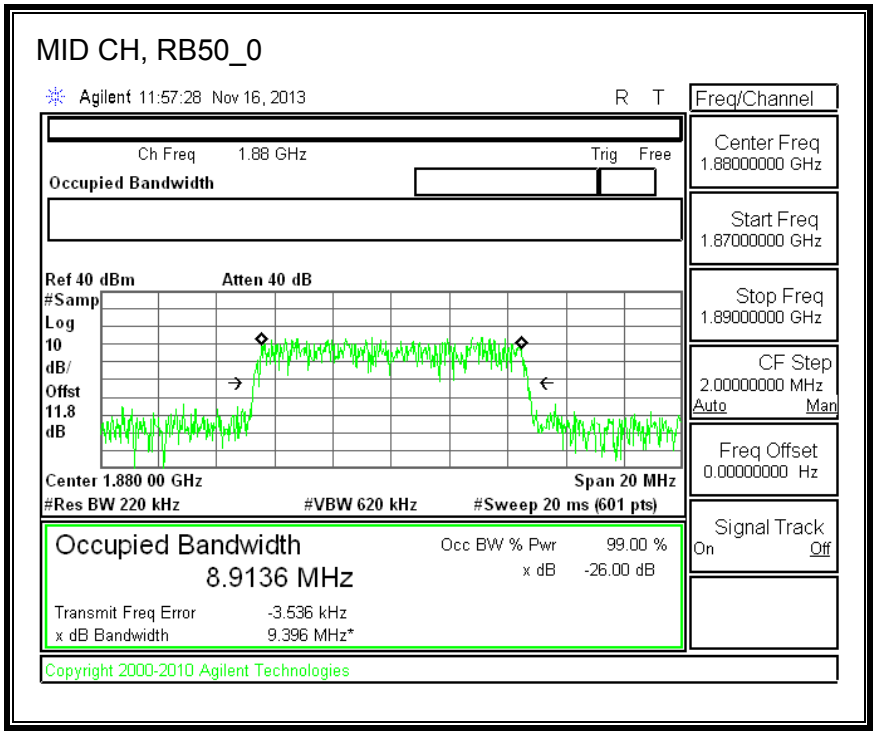


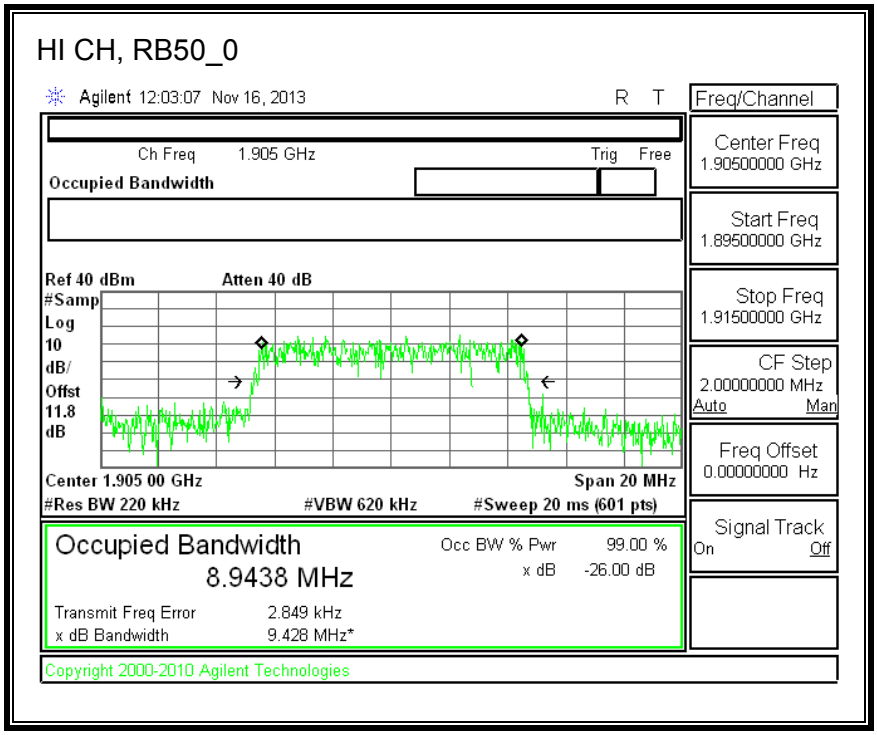


Band 2 (10MHz Bandwidth)

LTE QPSK

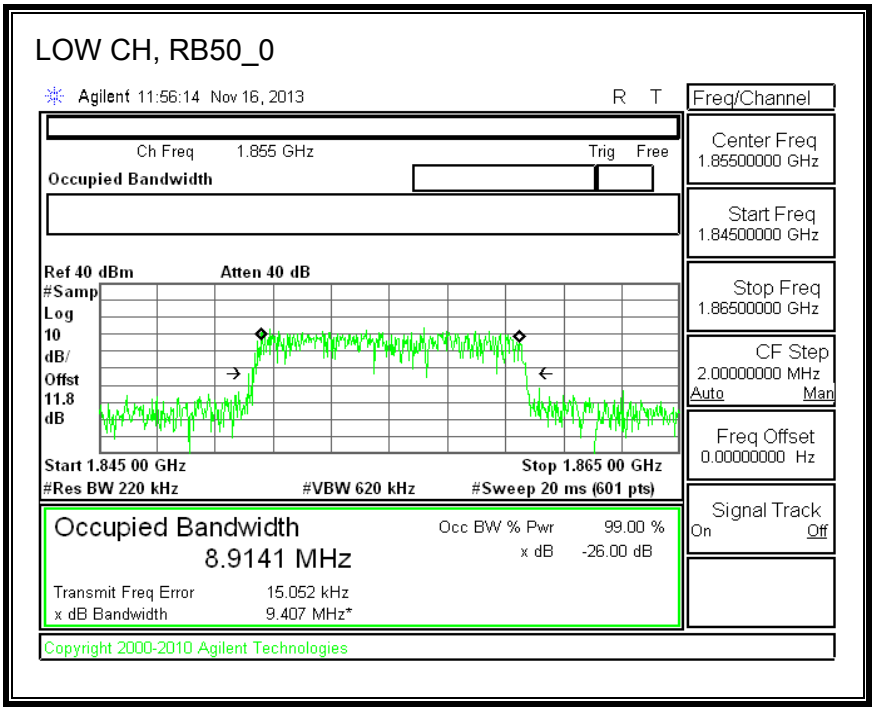


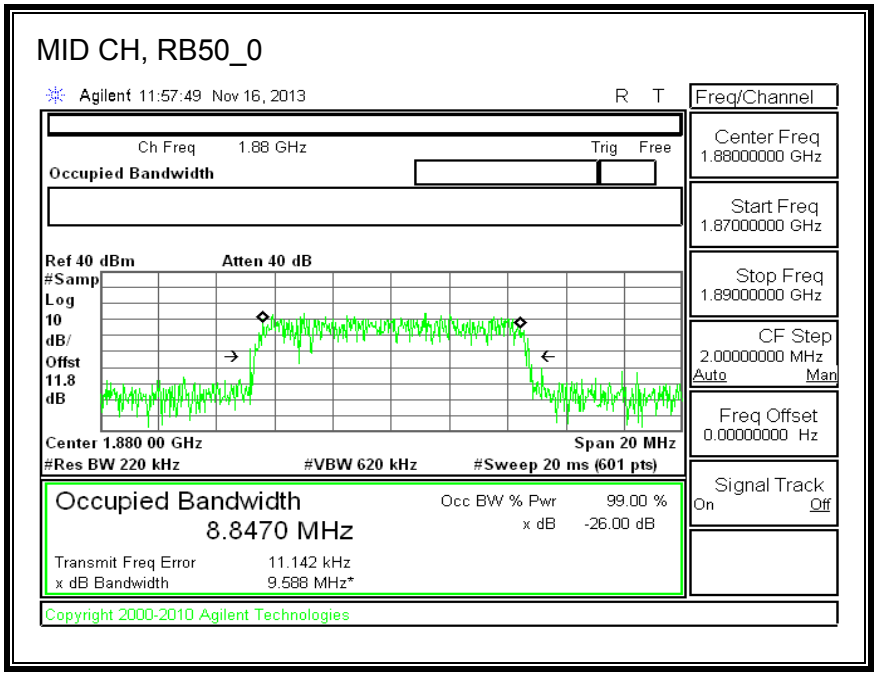




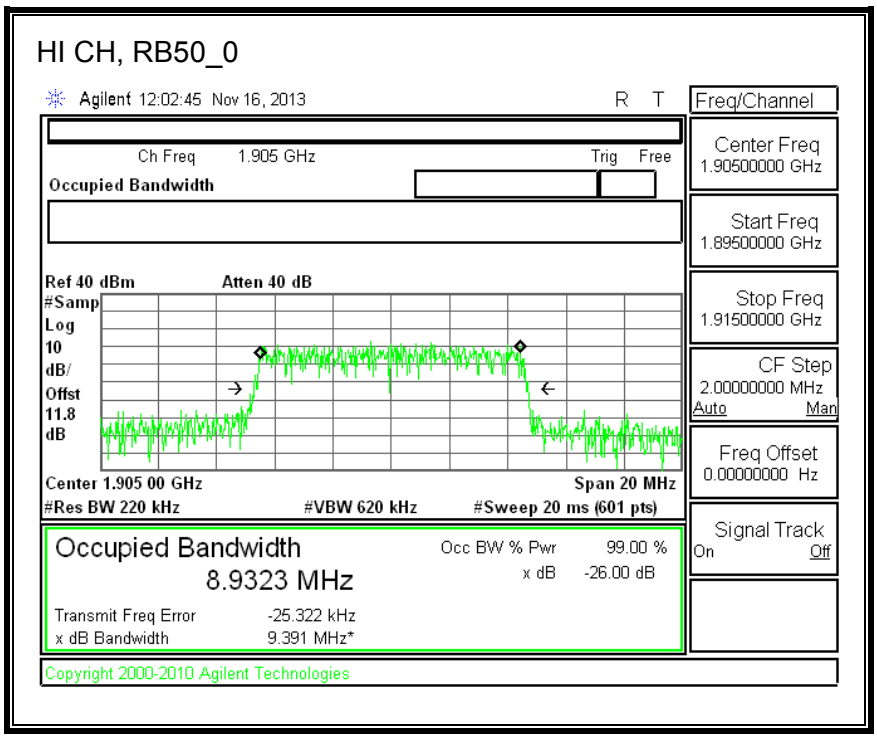
Band 2 (10MHz Bandwidth)

LTE 16QAM



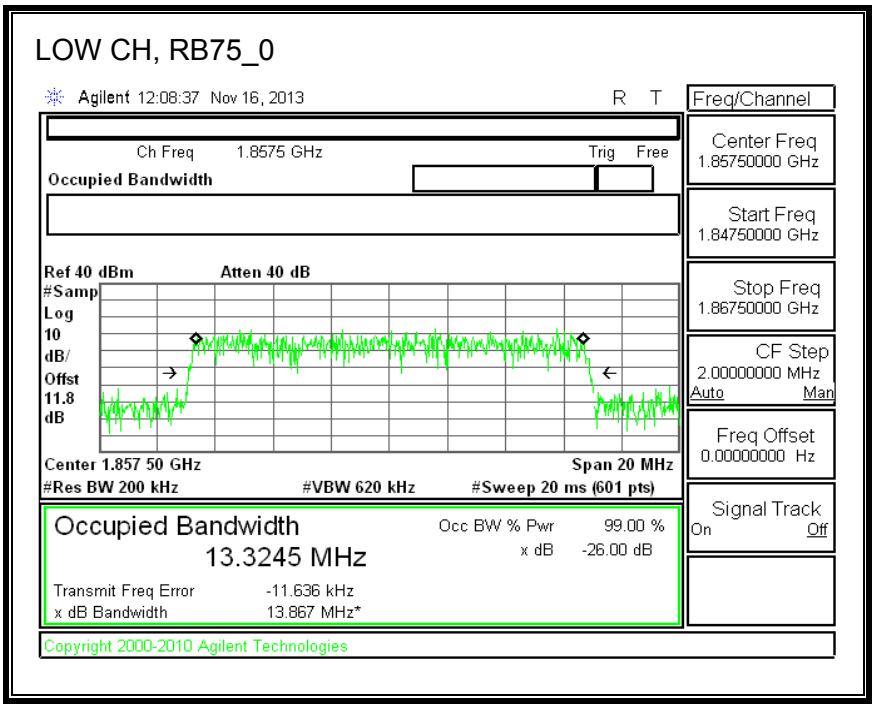


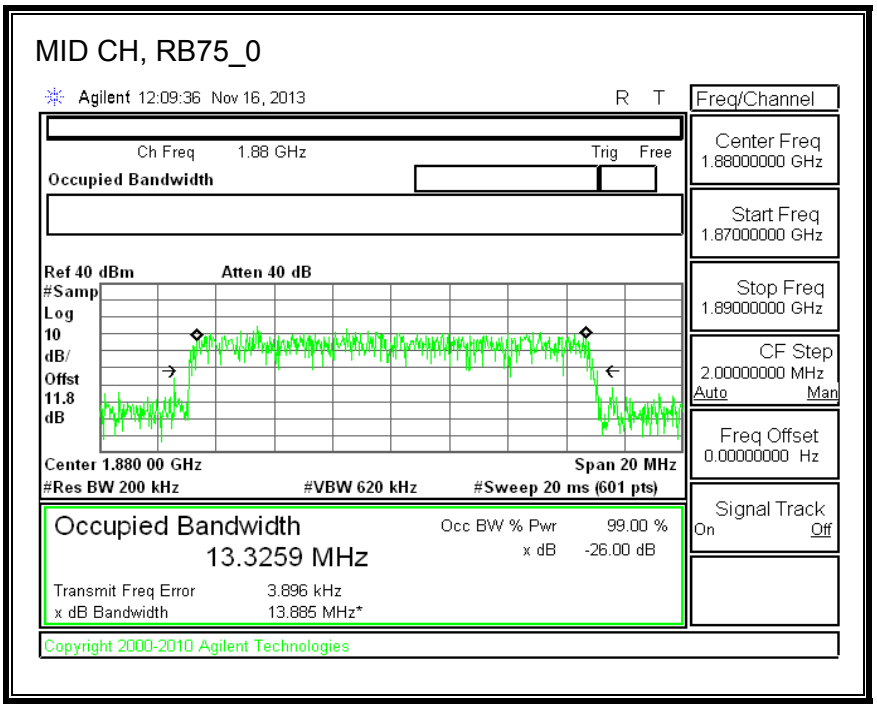
HI CH, RB50_0

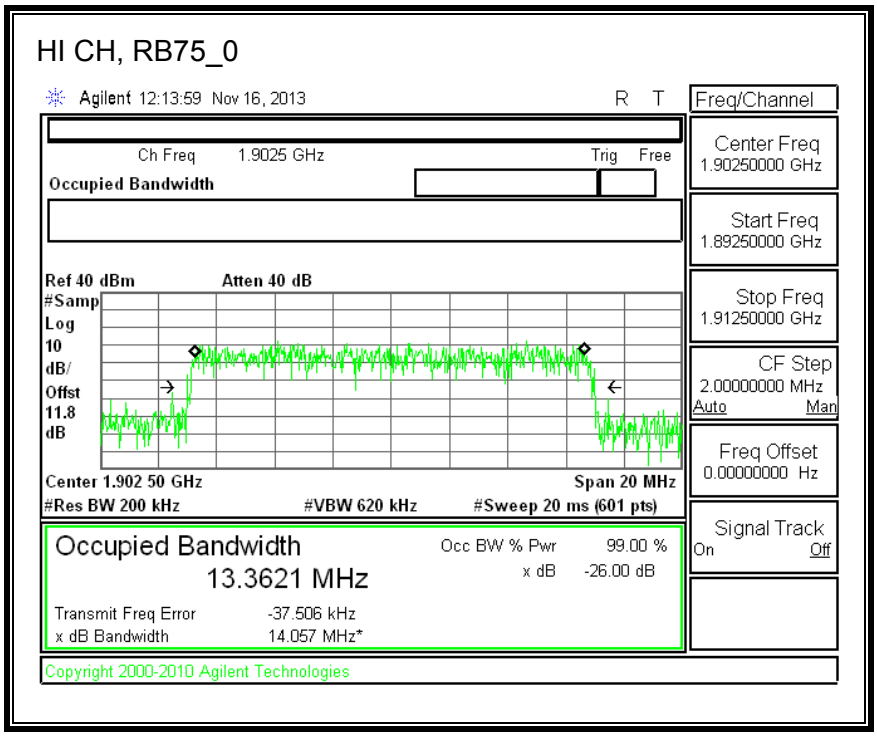


Band 2 (15MHz Bandwidth)

LTE QPSK

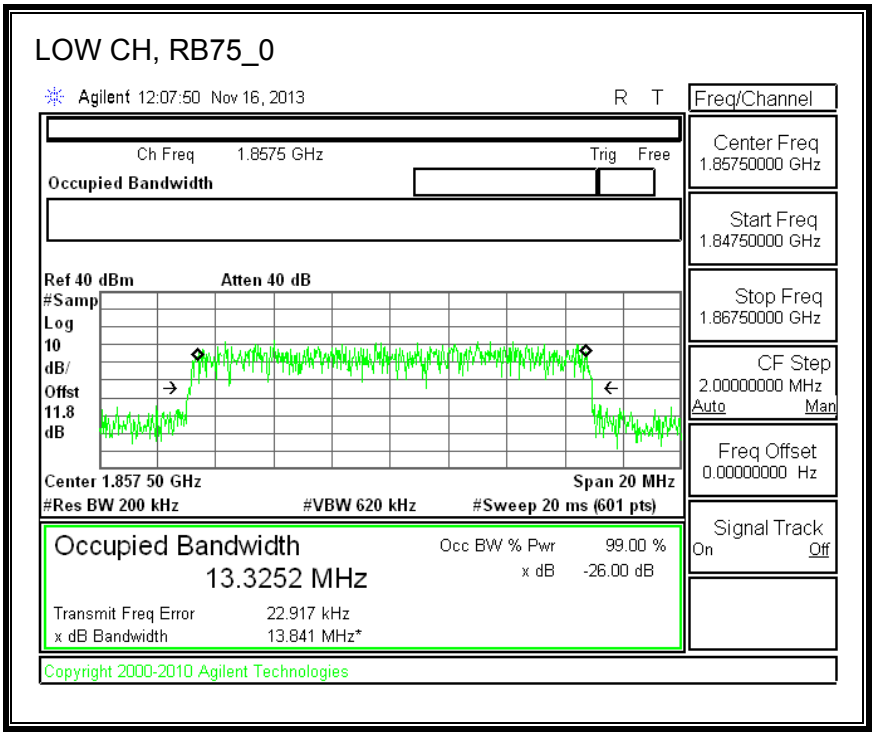


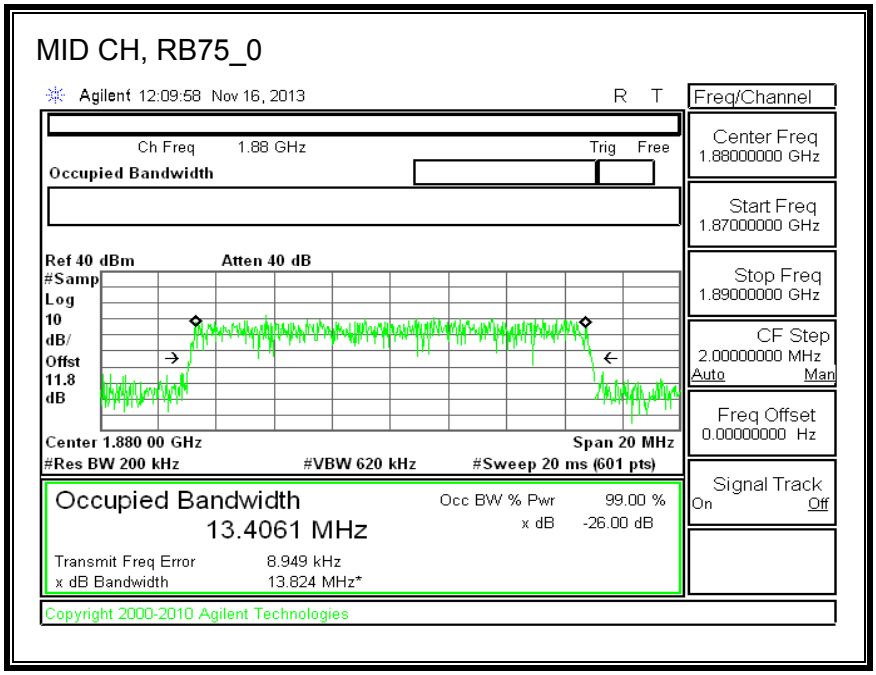




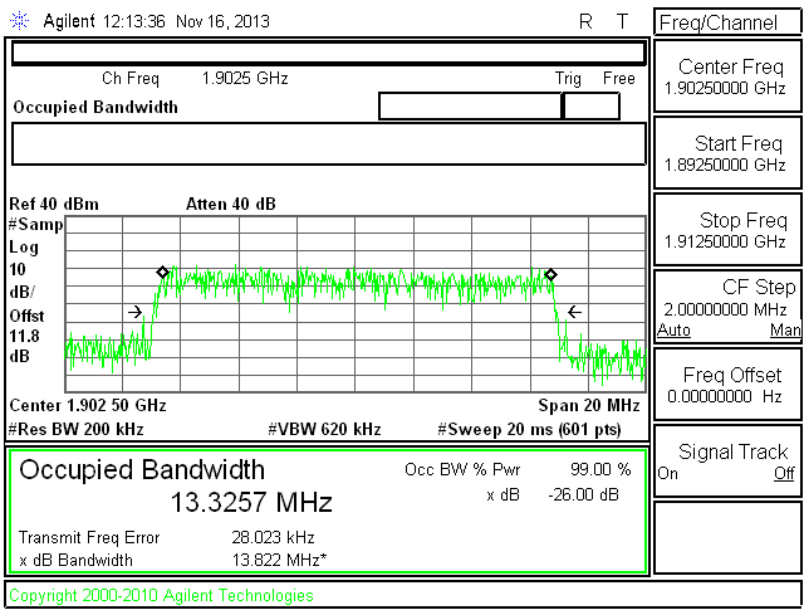
Band 2 (15MHz Bandwidth)

LTE 16QAM



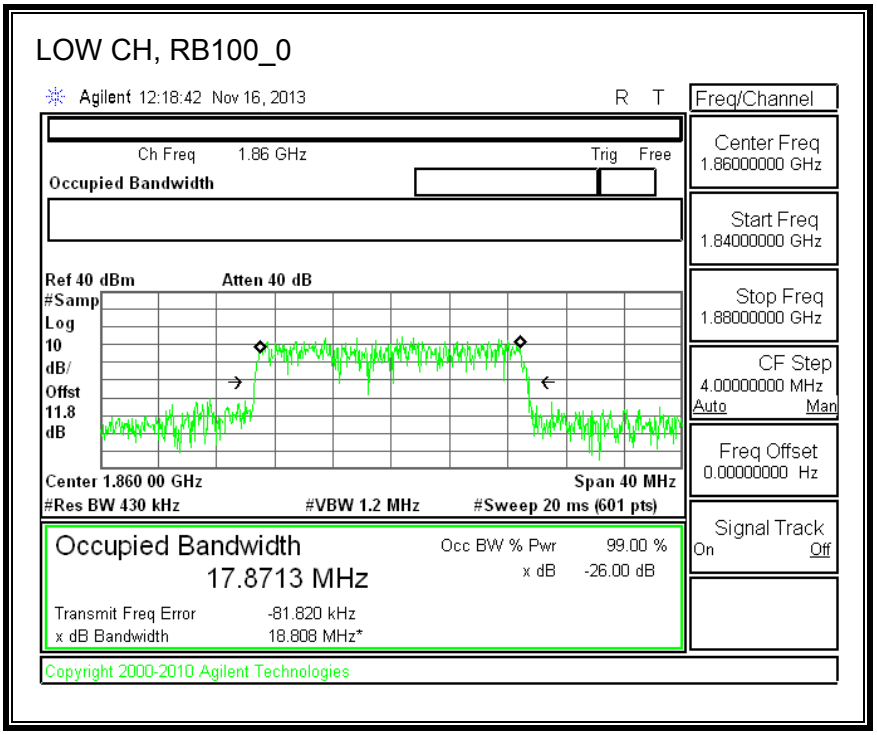


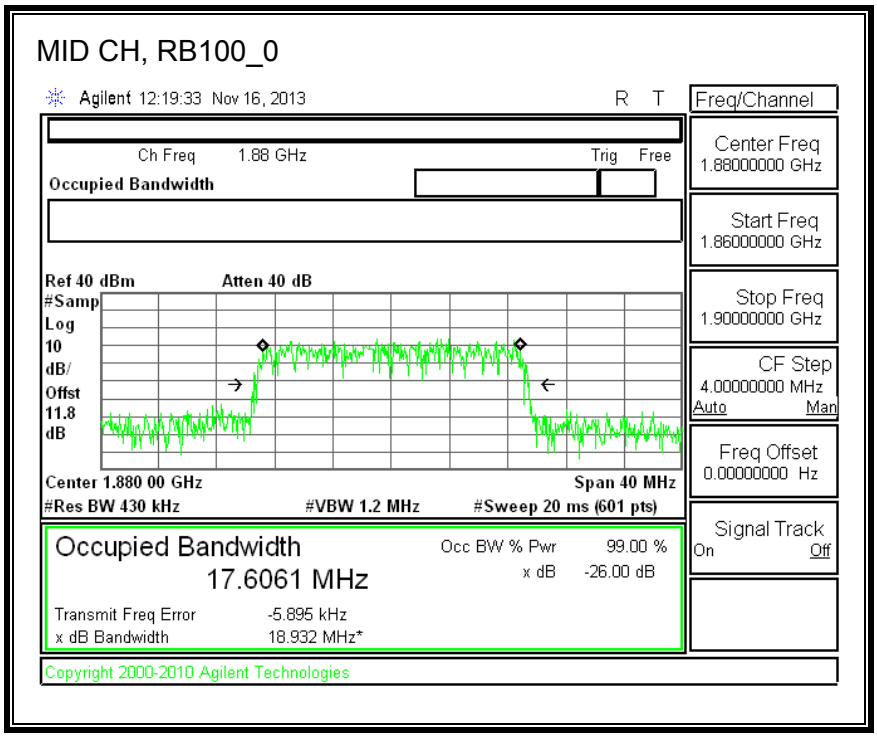
HI CH, RB75_0

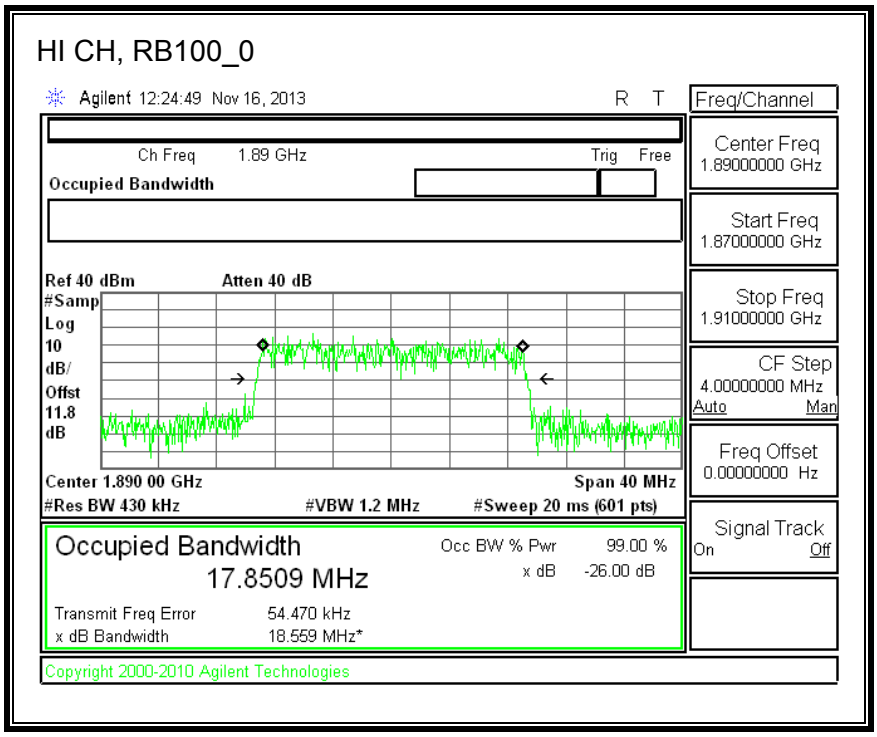


Band 2 (20MHz Bandwidth)

LTE QPSK

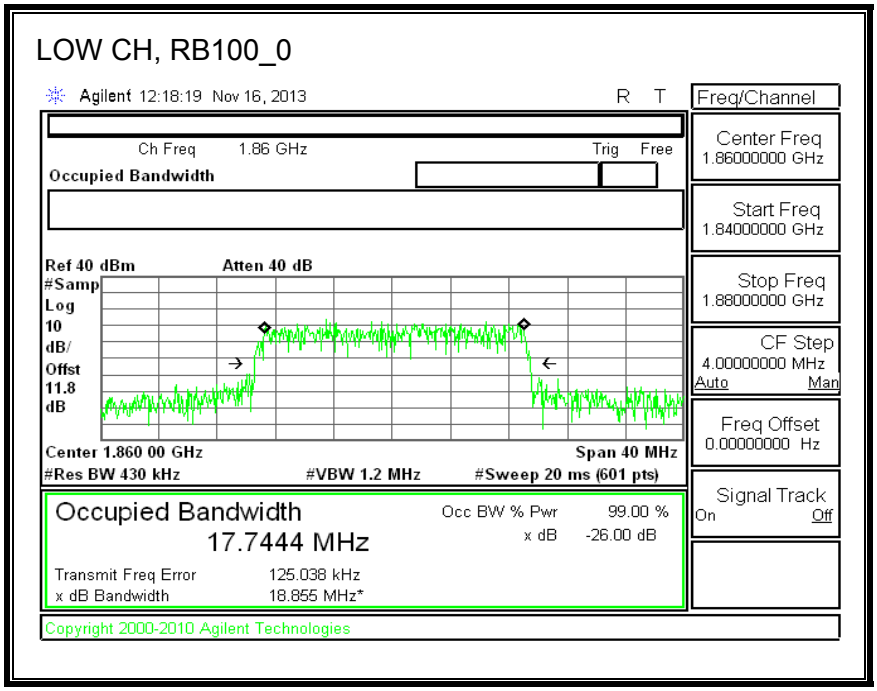


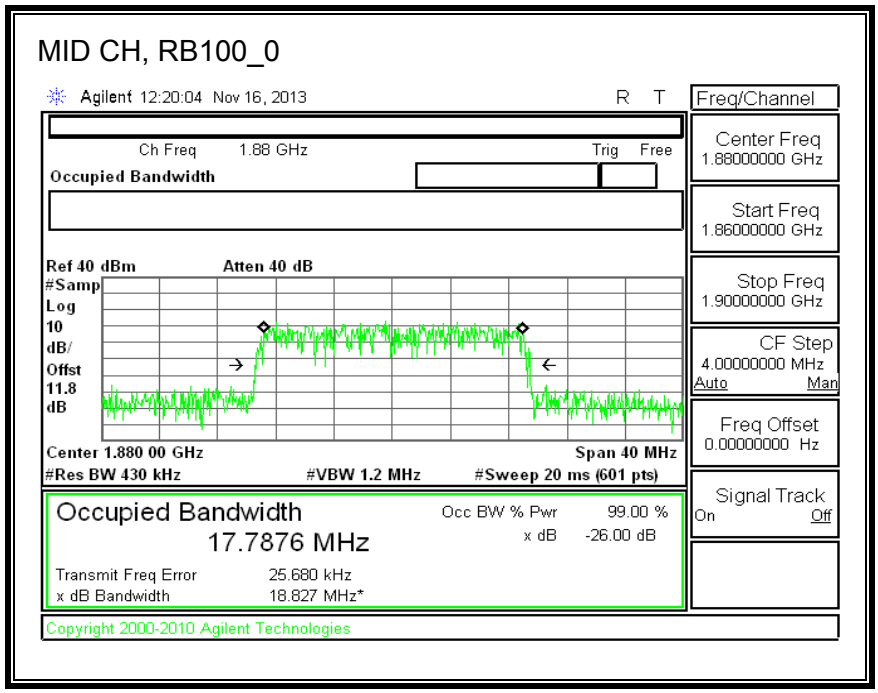


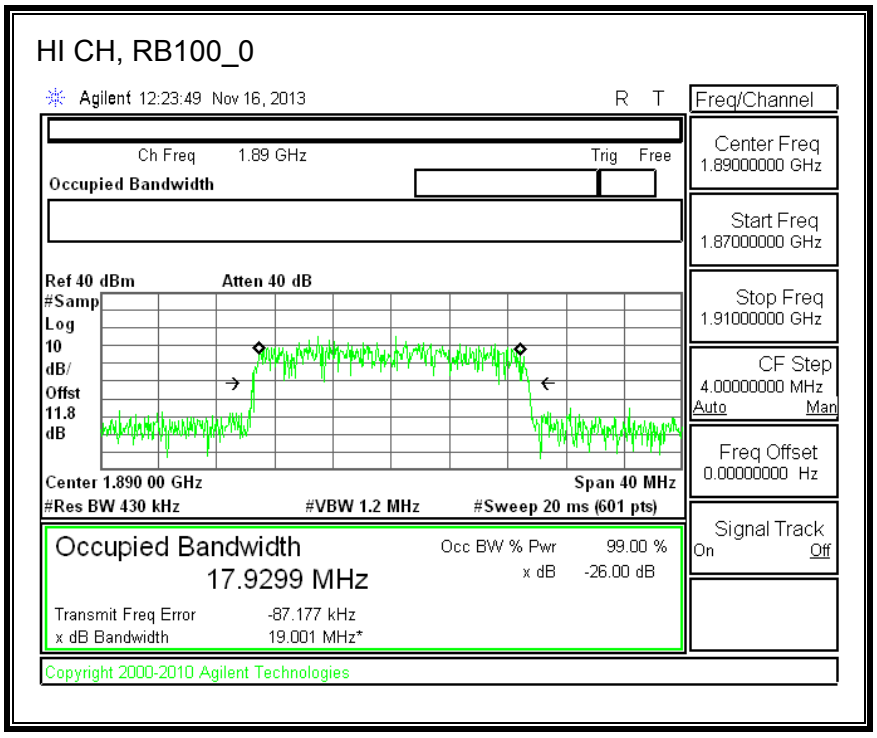


Band 2 (20MHz Bandwidth)

LTE 16QAM



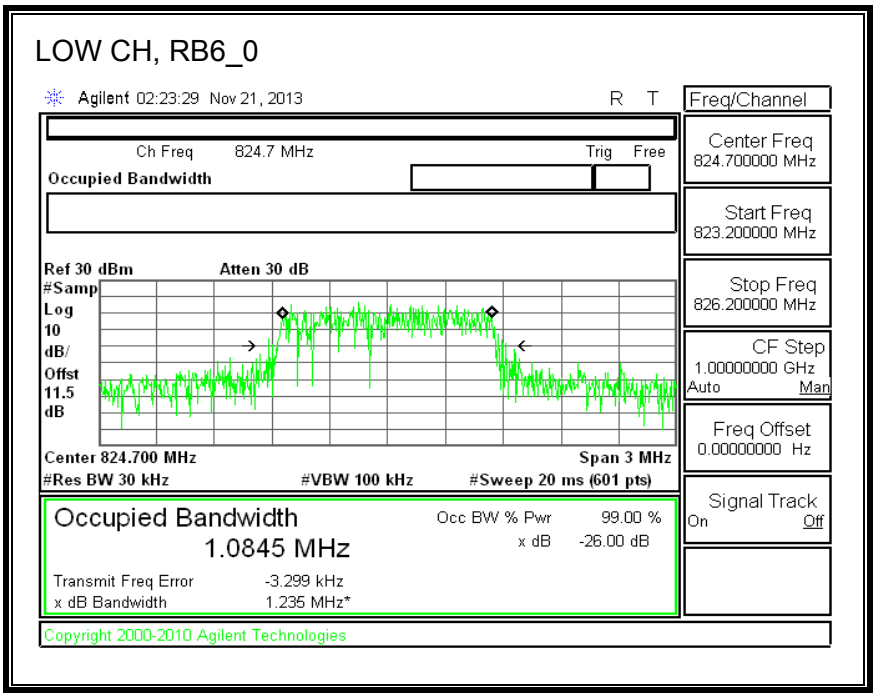


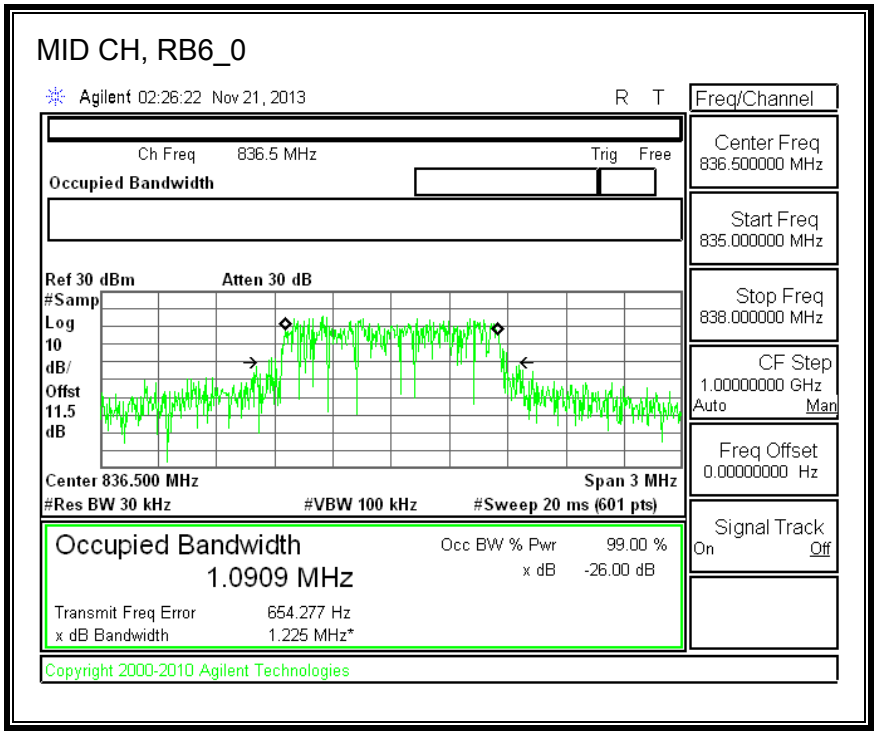


8.1.2. LTE BAND 5

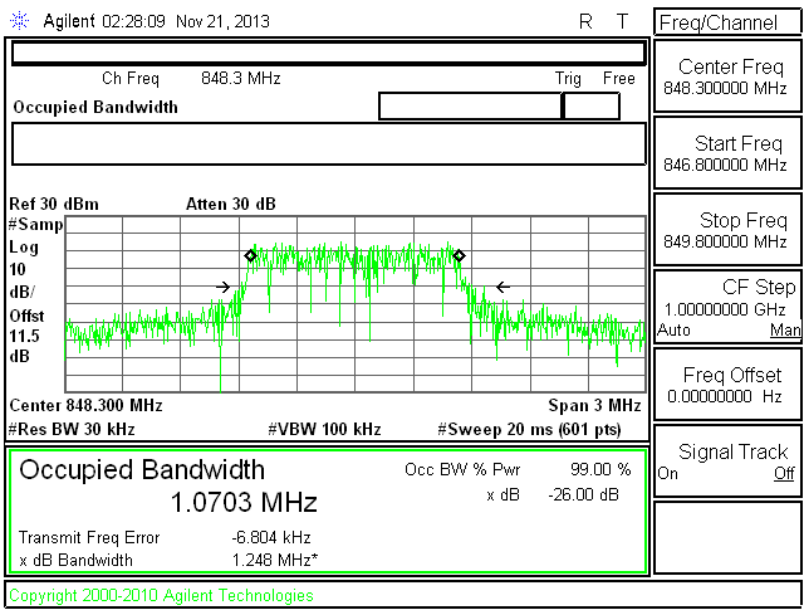
Band 5 (1.4 MHz Bandwidth)

LTE QPSK





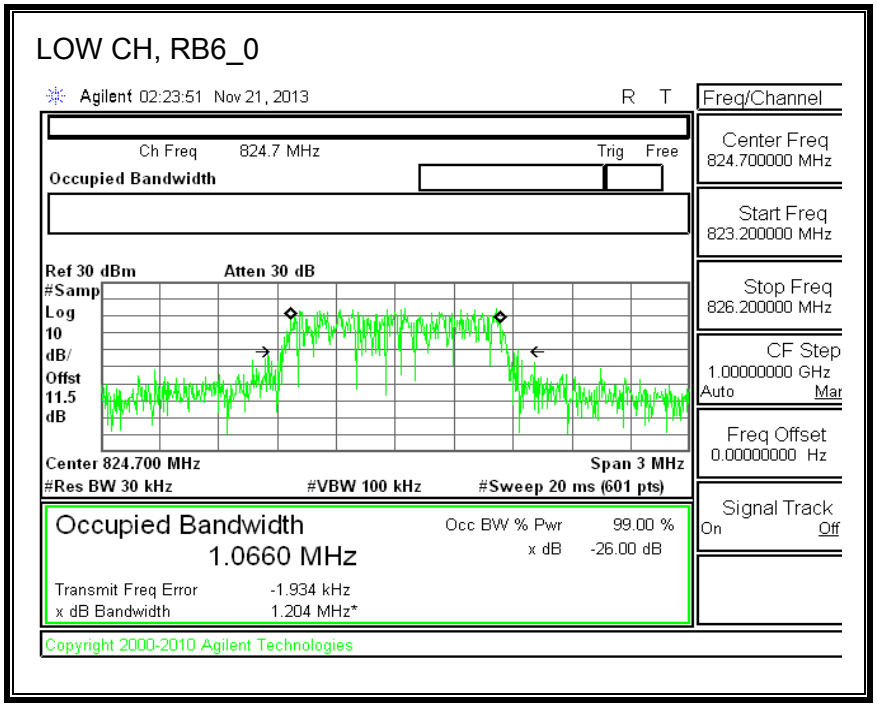
HI CH, RB6_0



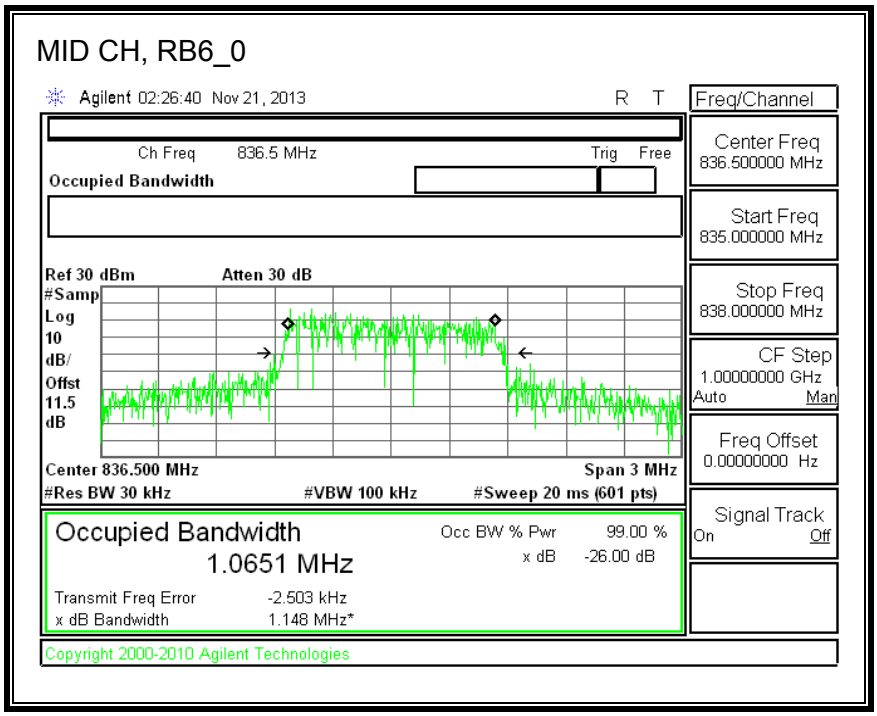
Band 5 (1.4 MHz Bandwidth)

LTE 16QAM

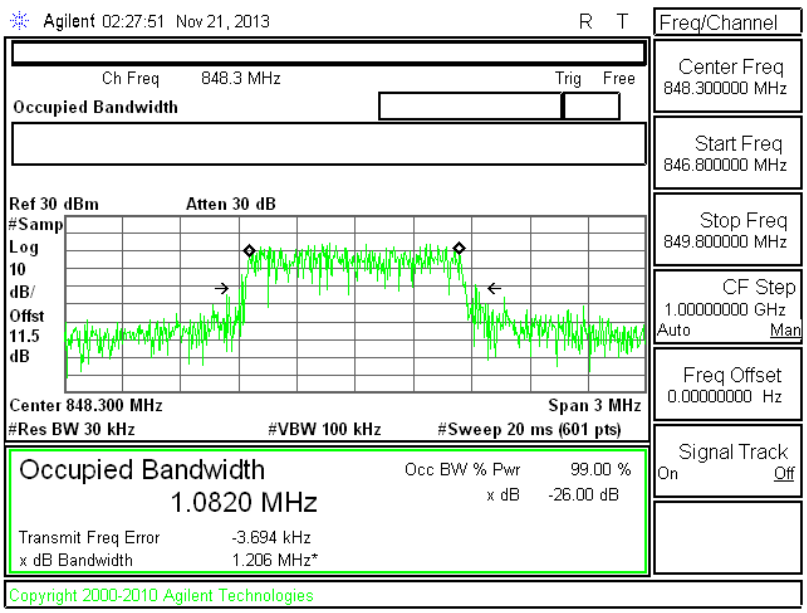
LOW CH, RB6_0



MID CH, RB6_0

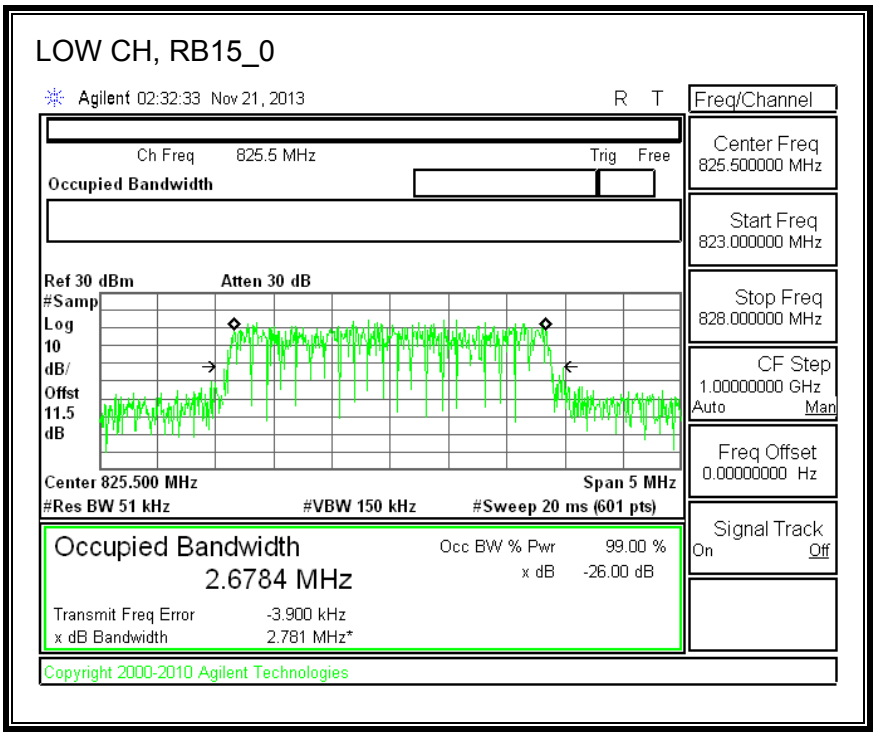


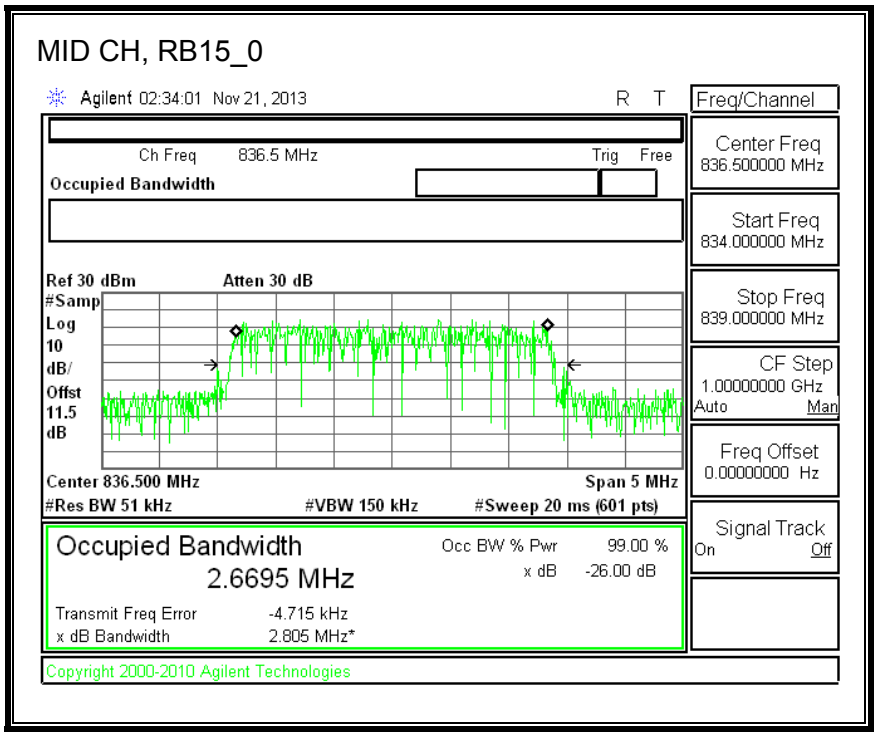
HI CH, RB6_0

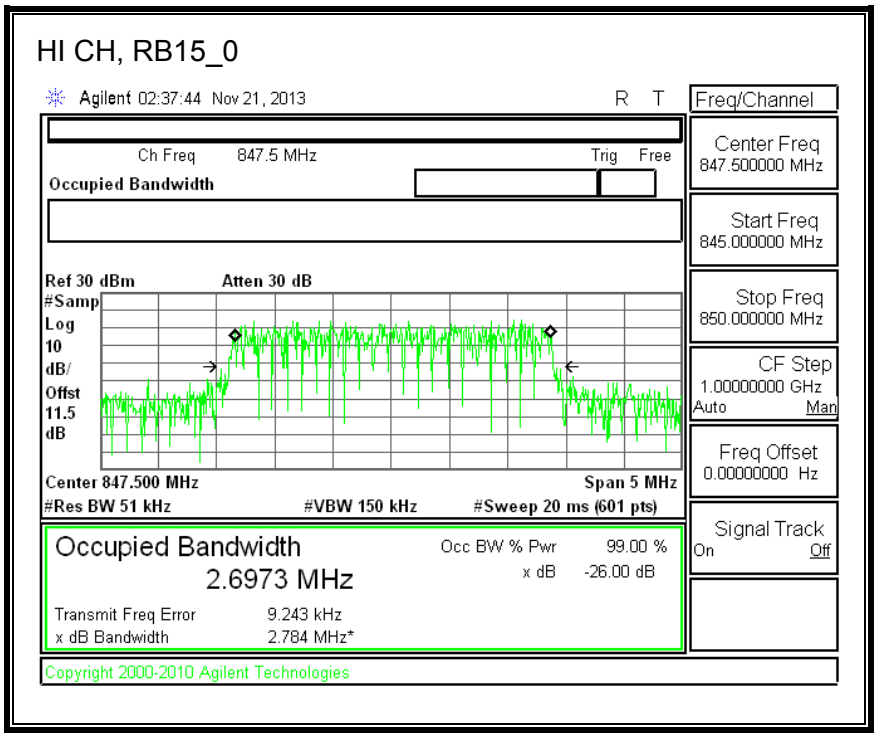


Band 5 (3MHz BANDWIDTH)

LTE QPSK



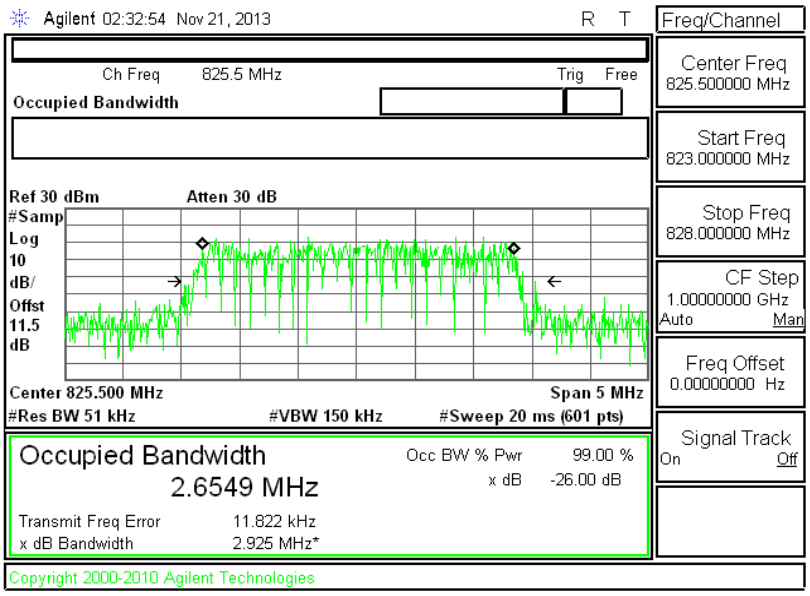




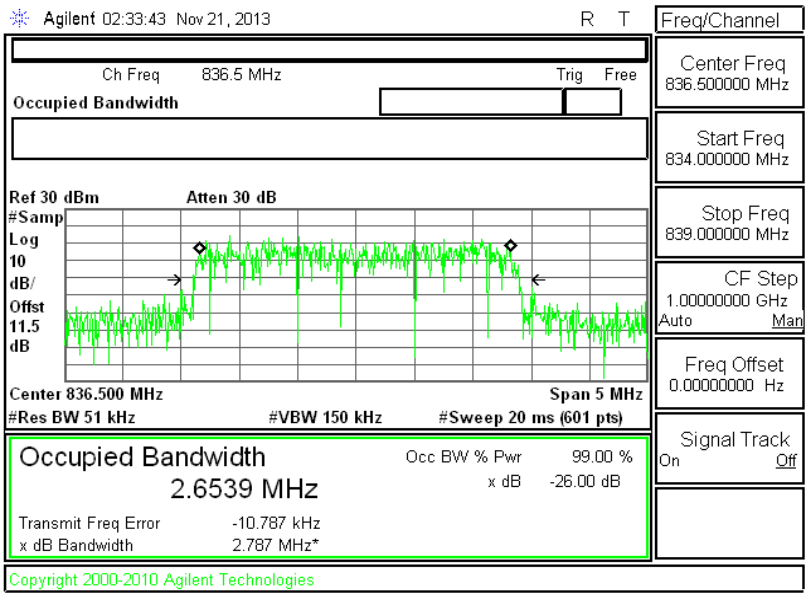
Band 5 (3MHz BANDWIDTH)

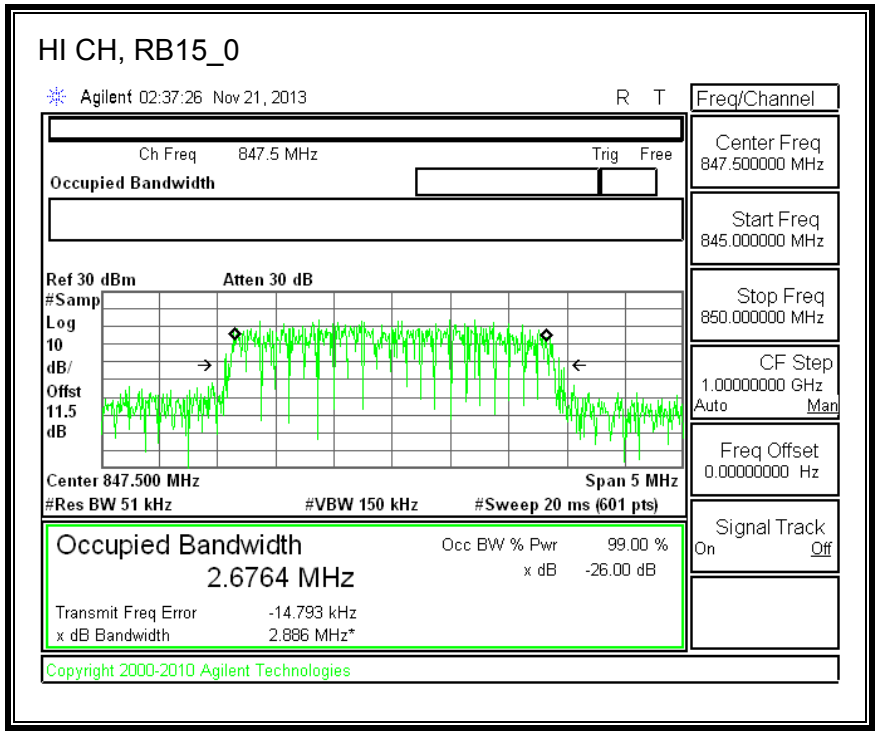
LTE 16QAM

LOW CH, RB15_0



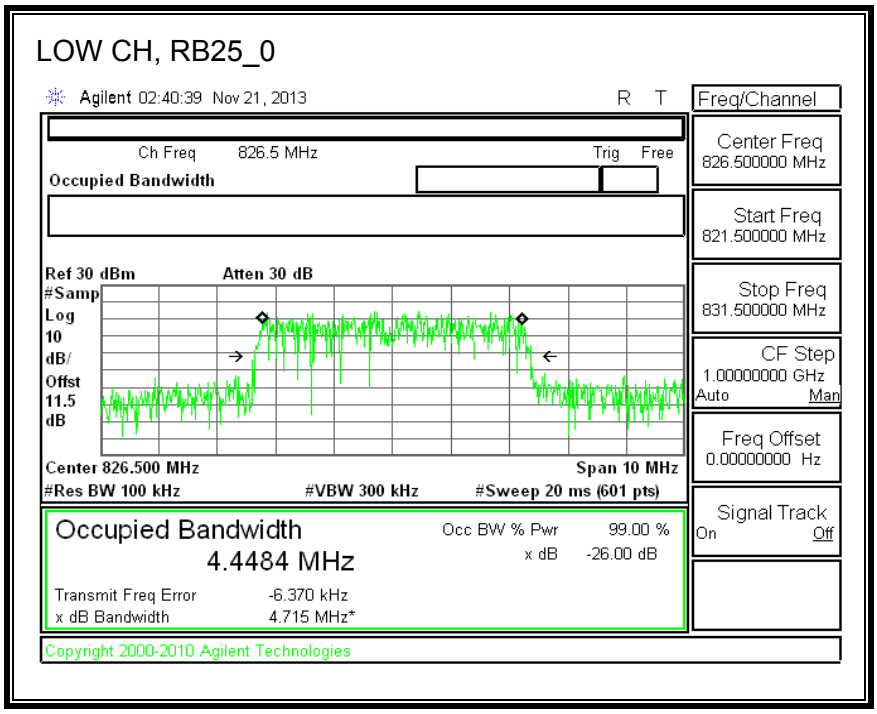
MID CH, RB15_0

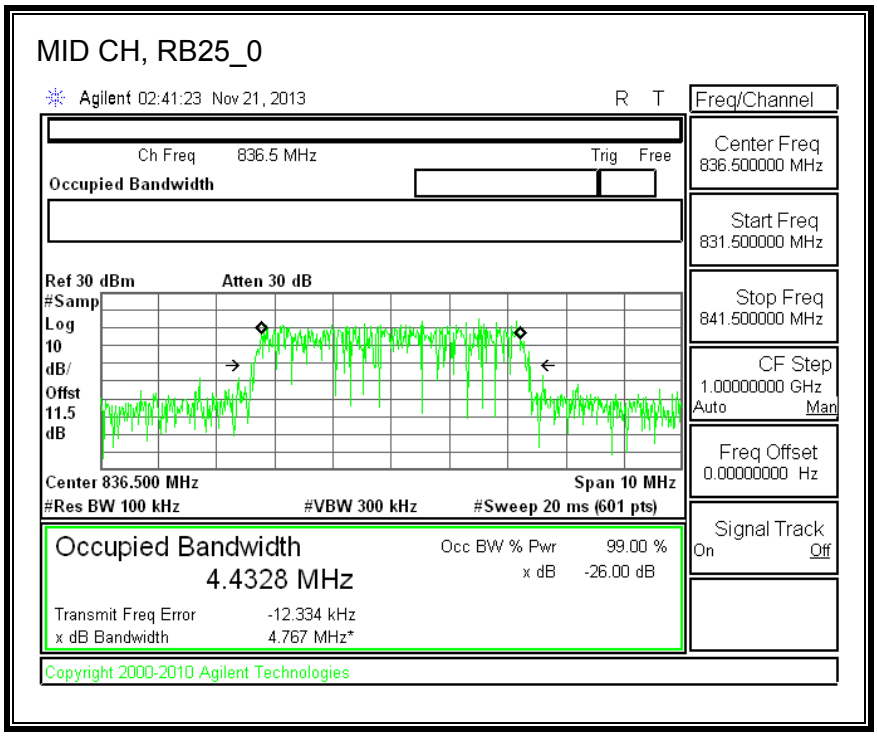


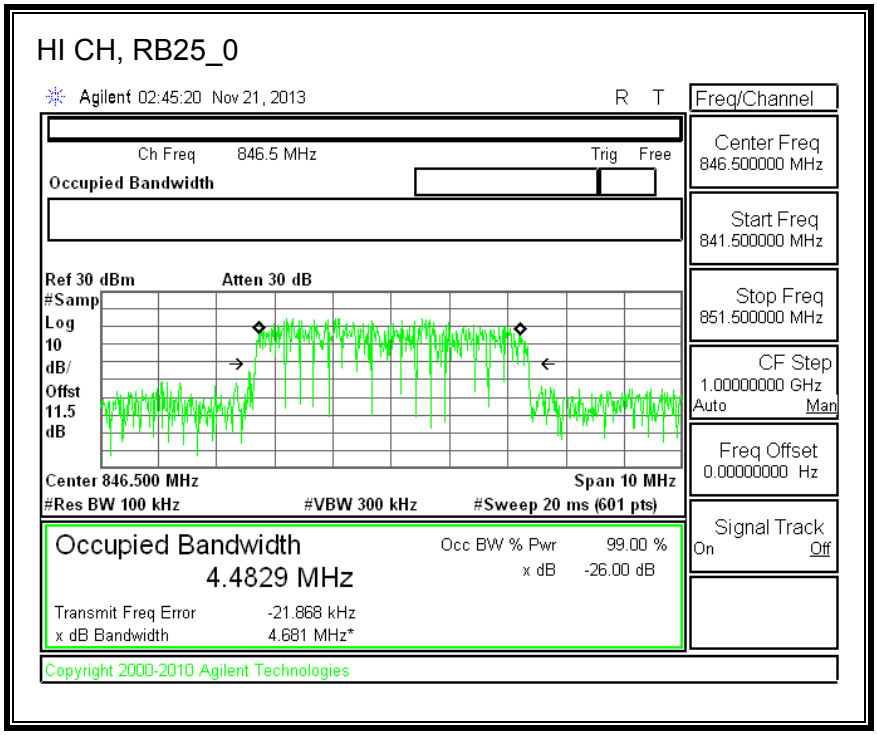


Band 5 (5MHz BANDWIDTH)

LTE QPSK

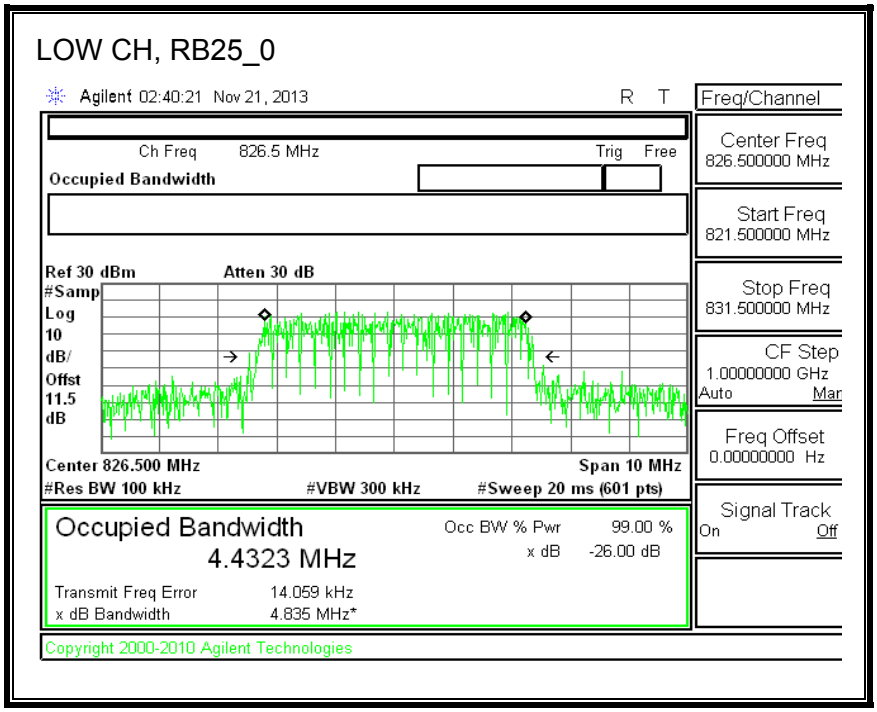


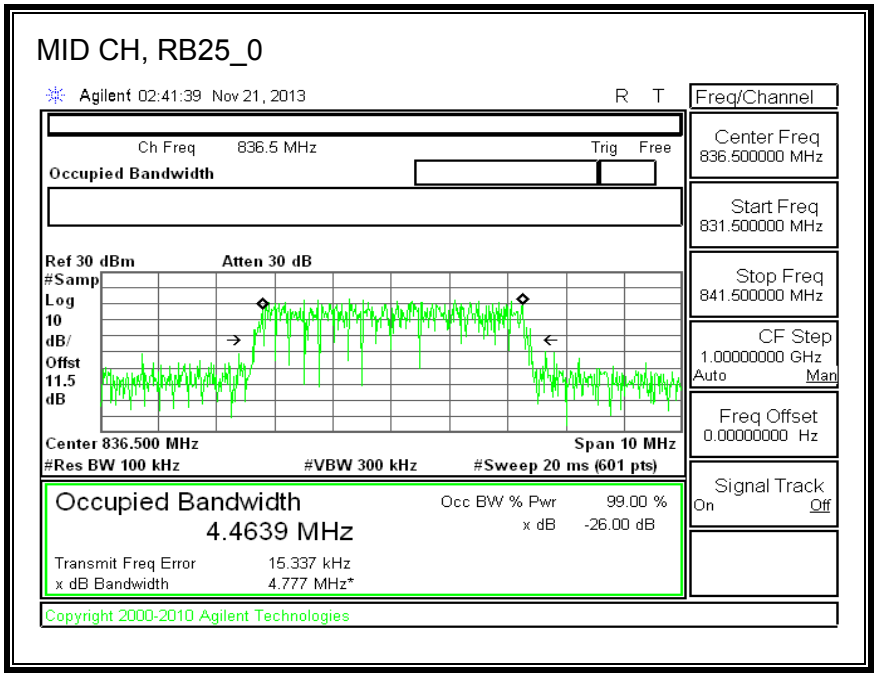


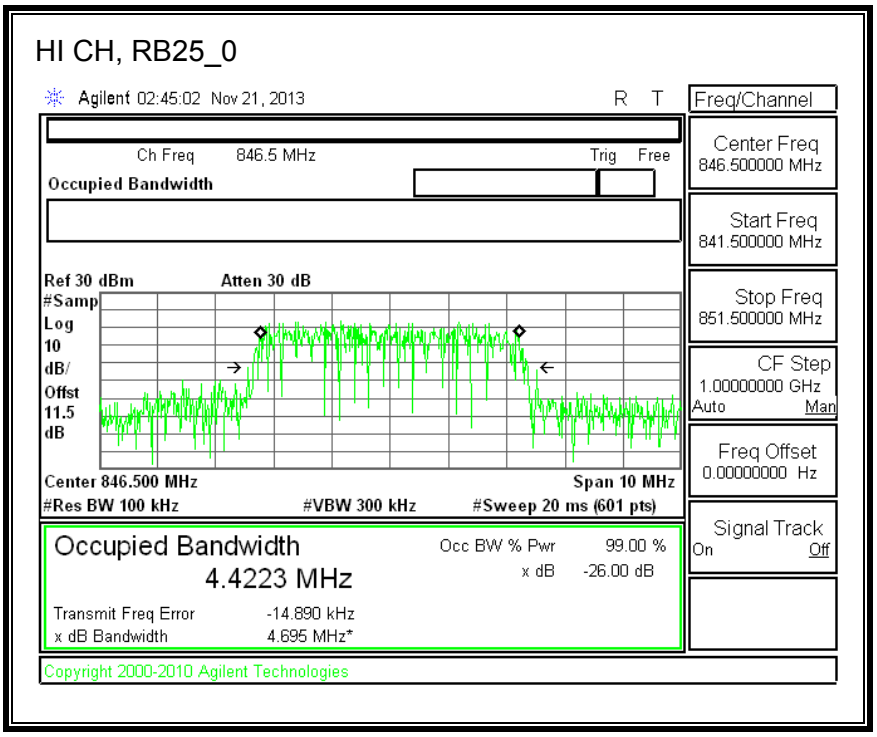


Band 5 (5MHz BANDWIDTH)

LTE 16QAM

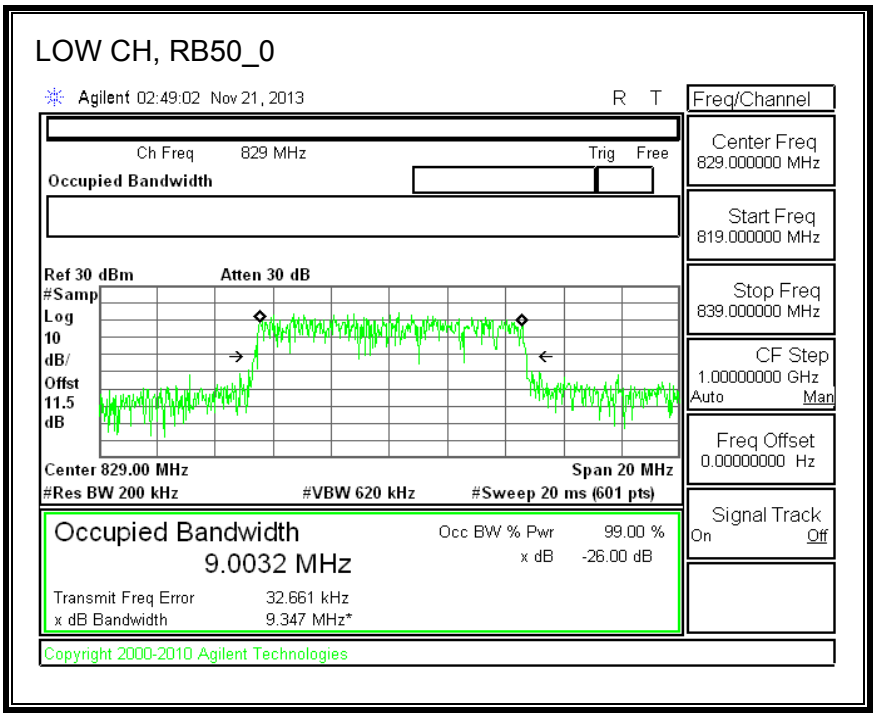


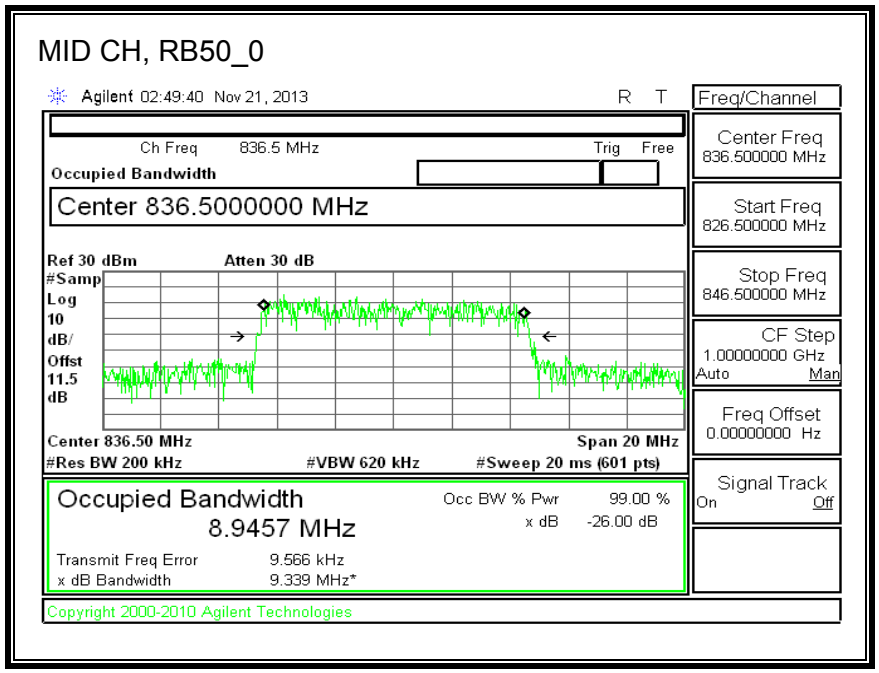




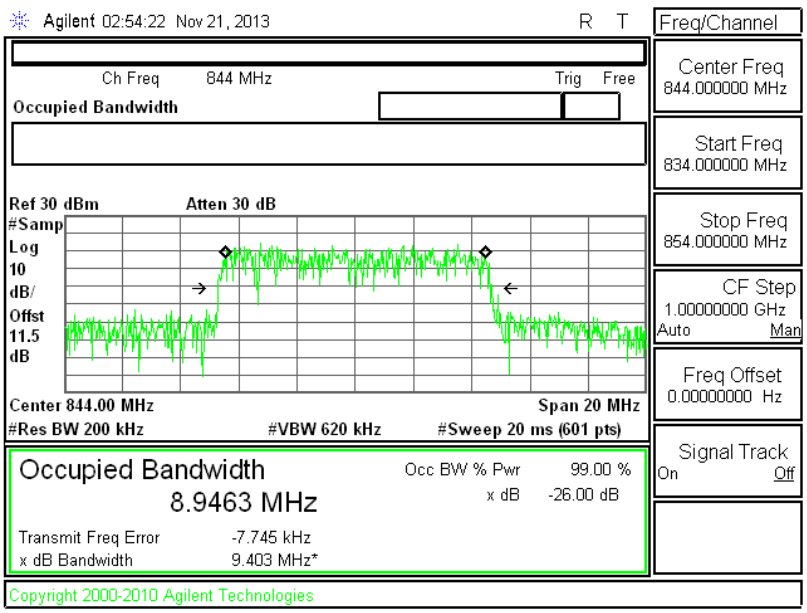
Band 5 (10MHz BANDWIDTH)

LTE QPSK





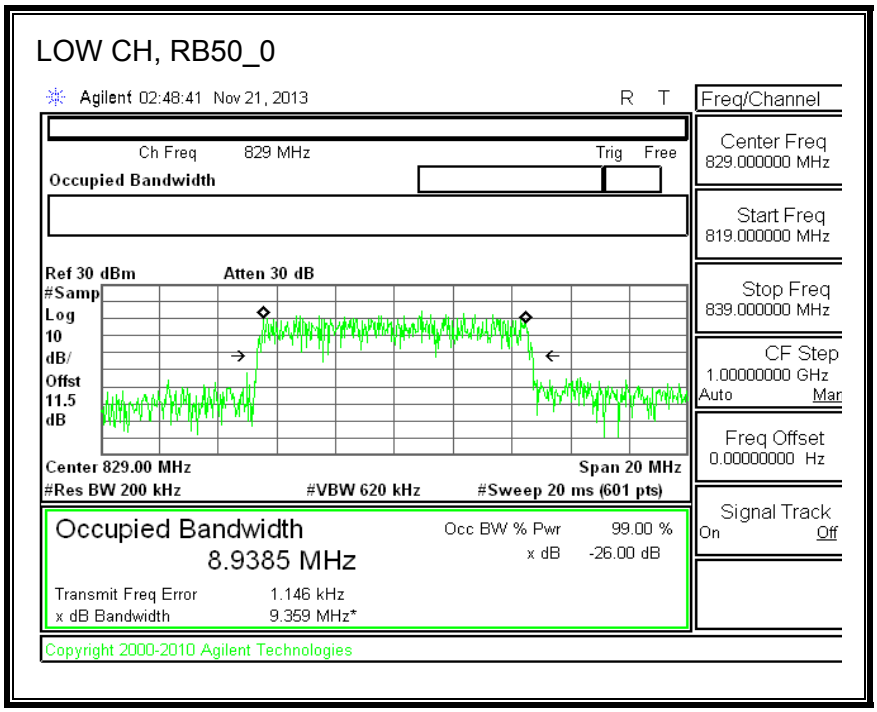
HI CH, RB50_0



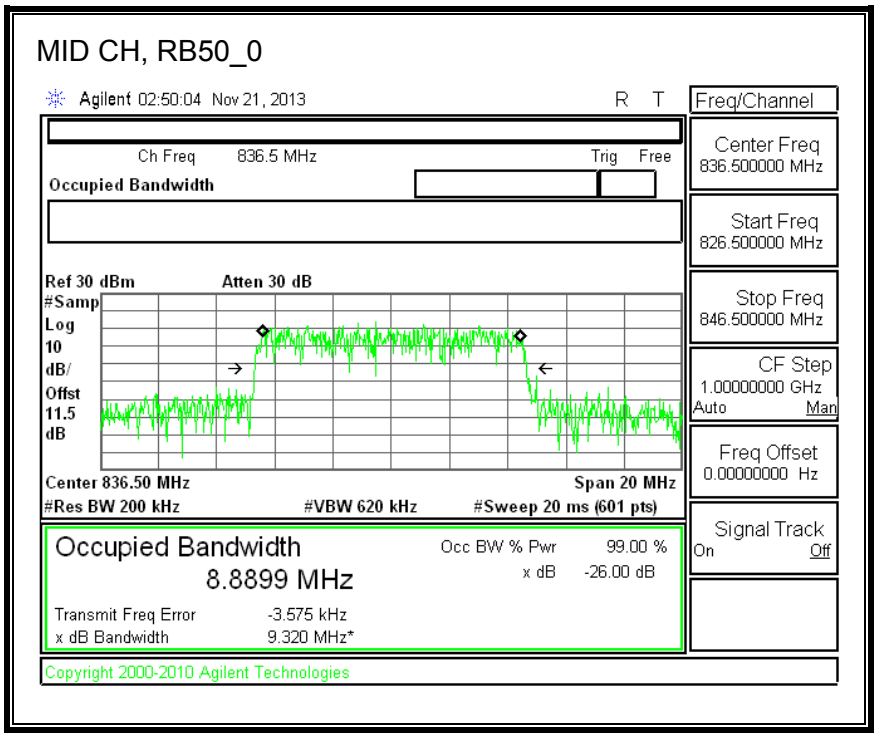
Band 5 (10MHz BANDWIDTH)

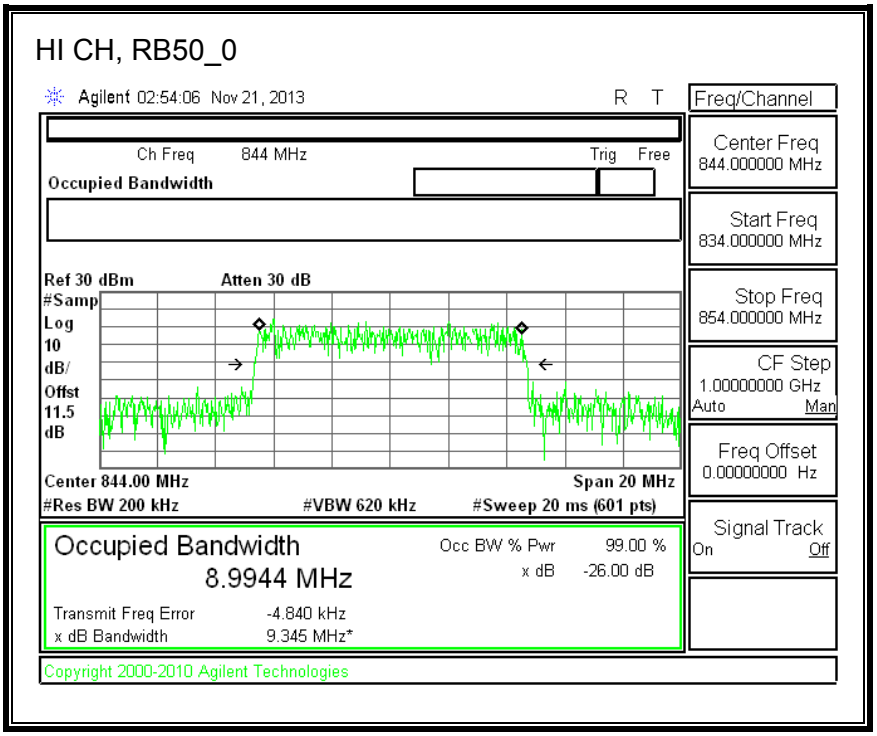
LTE 16QAM

LOW CH, RB50_0



MID CH, RB50_0





8.2. BANDEDGE AND EMISSION MASK

RULE PART(S)

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

LIMITS

FCC: §22.359, §24.238
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 transmitter output was connected to a CMW500Test Set and configured to operate at maximum power. The bandedge emissions were measured at the required operating frequencies in each band on the Spectrum Analyzer.

For each bandedge measurement:
Set the spectrum analyzer span to include the block edge frequency (824, 849, 1850 and 1910MHz)
Set a marker to point the corresponding bandedge frequency in each test case.
Set display line at -13 dBm
Set resolution bandwidth to at least 1% of emission bandwidth.

MODES TESTED

- Band 2
- Band 5

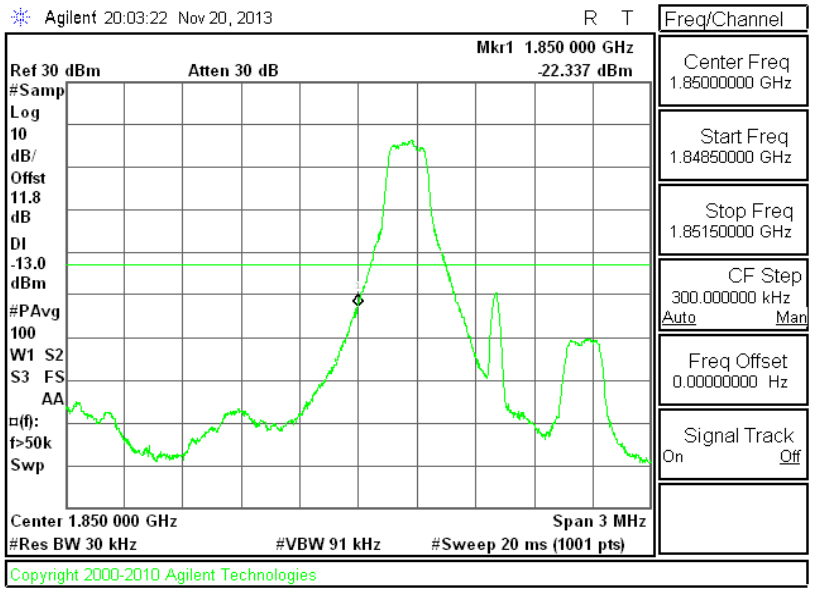
RESULTS

8.2.1. LTE BAND 2

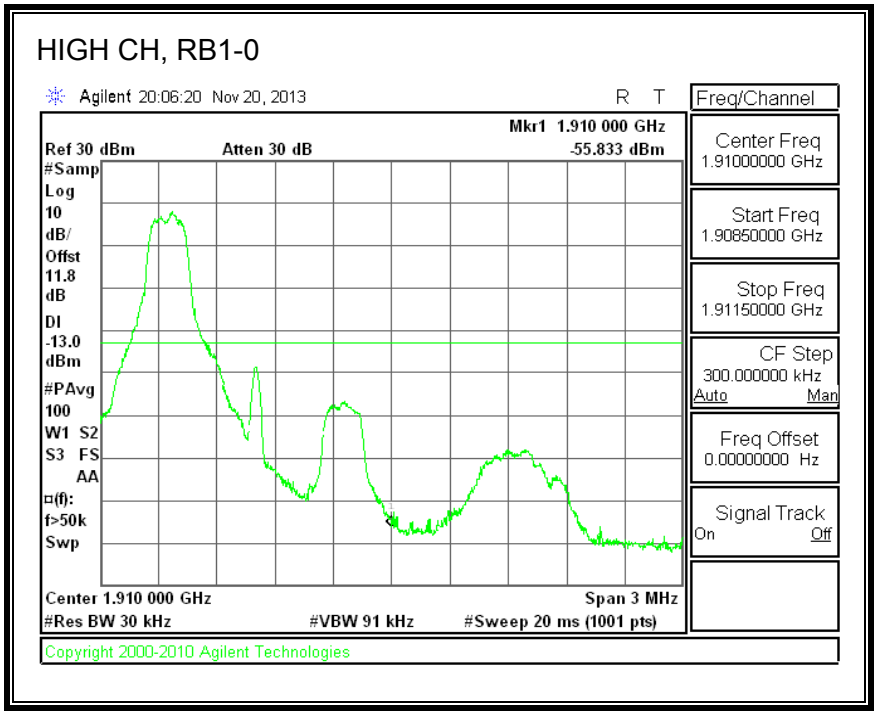
Band 2 (1.4 MHz BANDWIDTH)

LTE QPSK

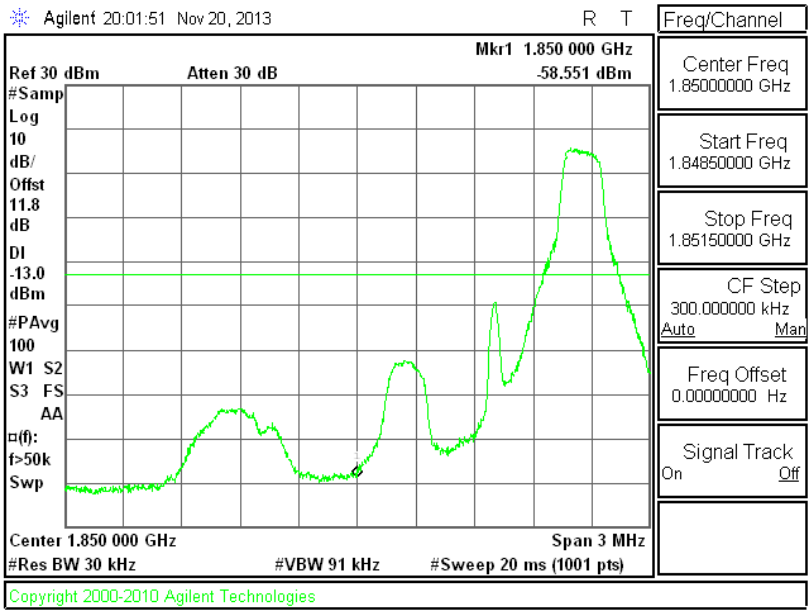
LOW CH, RB1_0



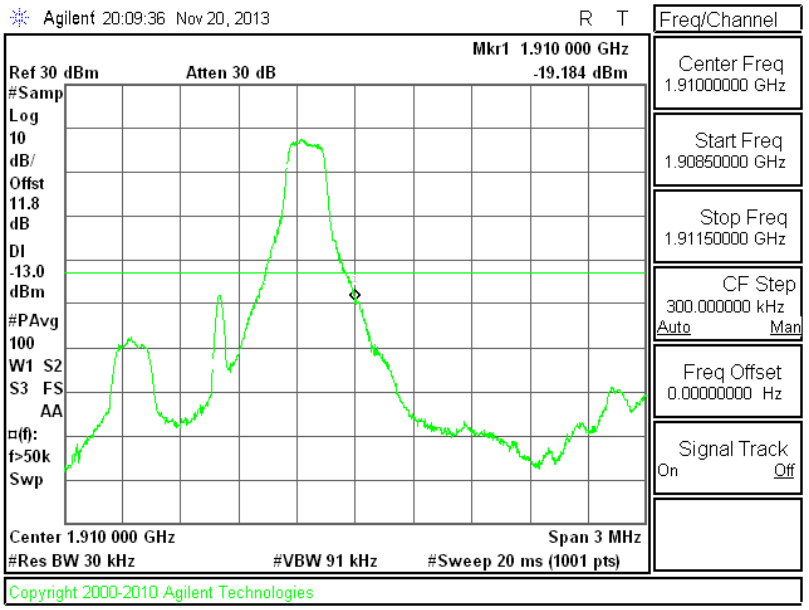
HIGH CH, RB1-0



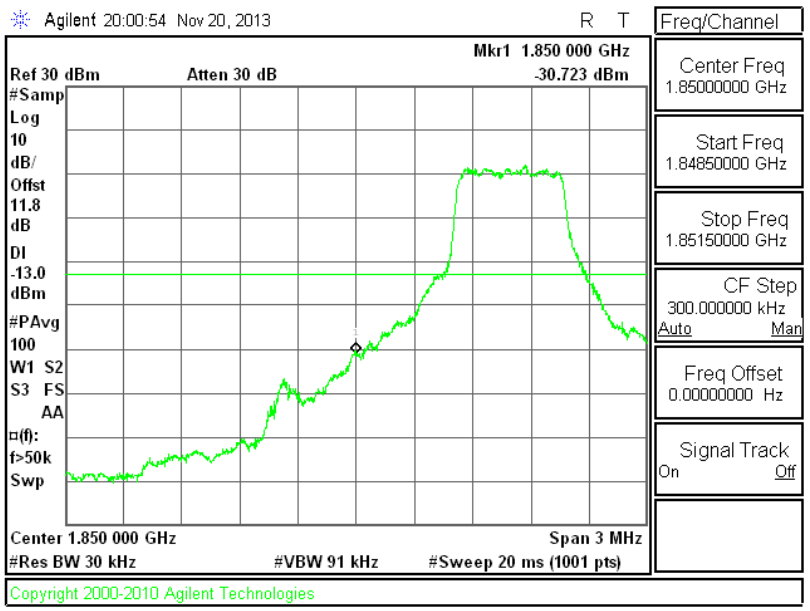
LOW CH, RB1-5



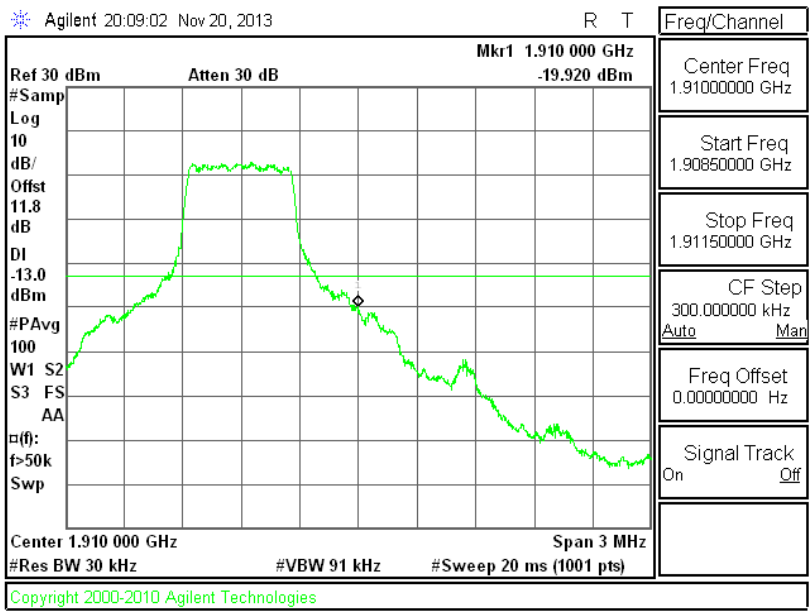
HIGH CH, RB1-5



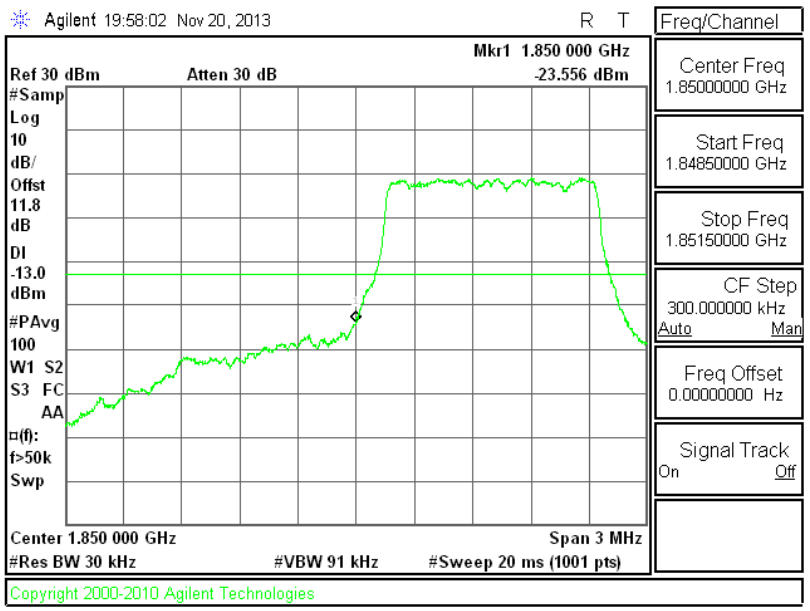
LOW CH, RB3-2



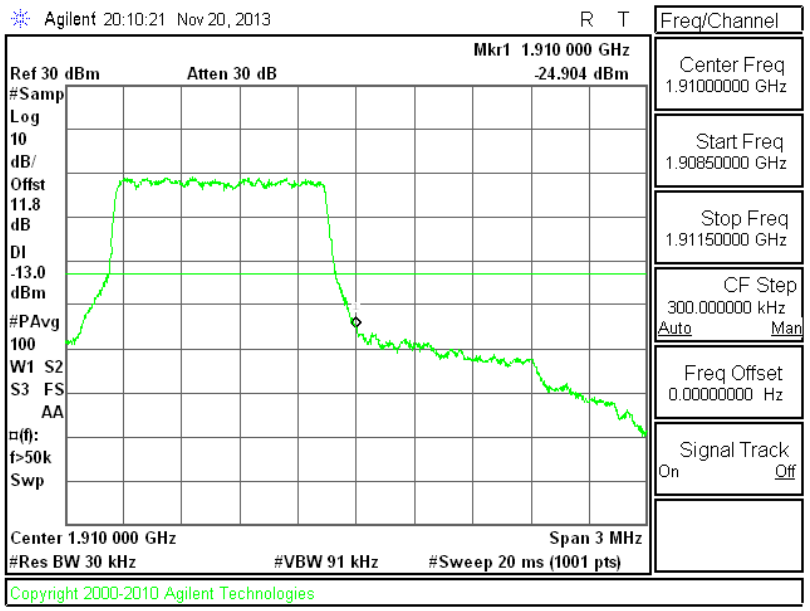
HIGH CH, RB3-2



LOW CH, RB6-0



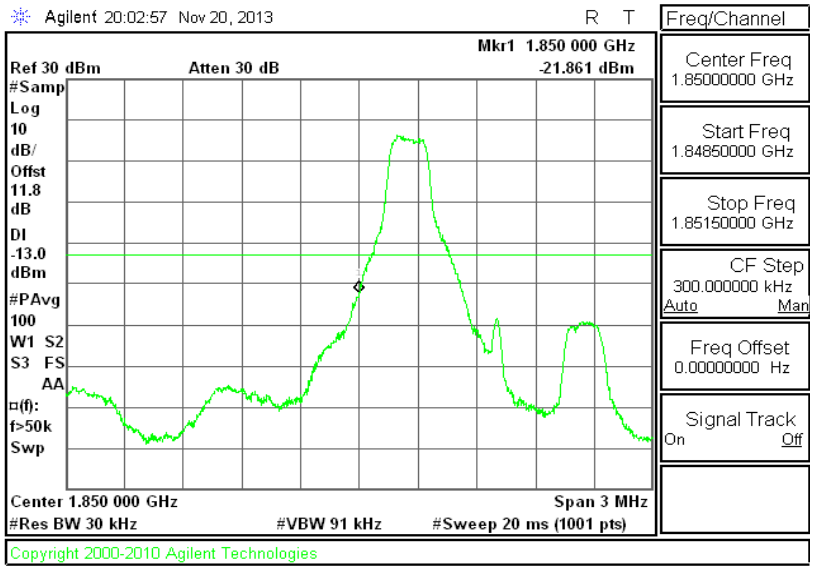
HIGH CH, RB6-0



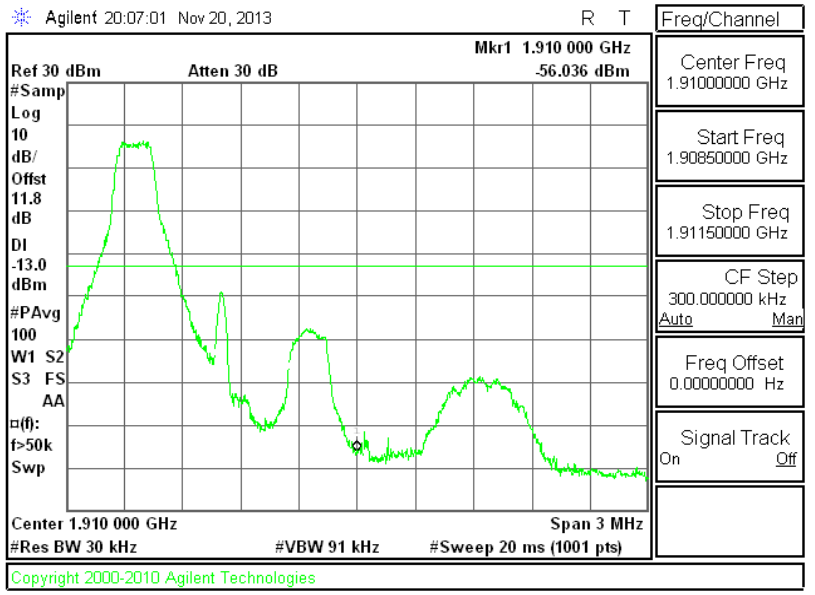
Band 2 (1.4 MHz BANDWIDTH)

LTE 16QAM

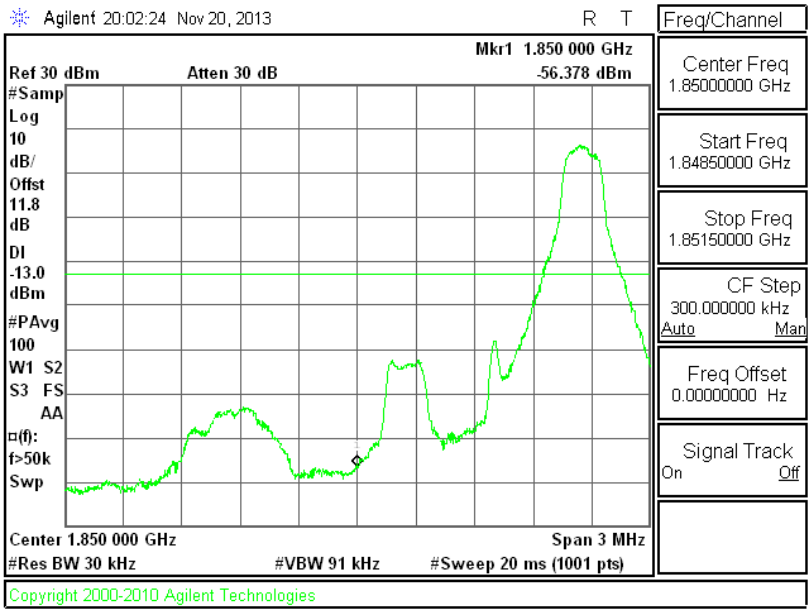
LOW CH, RB1_0



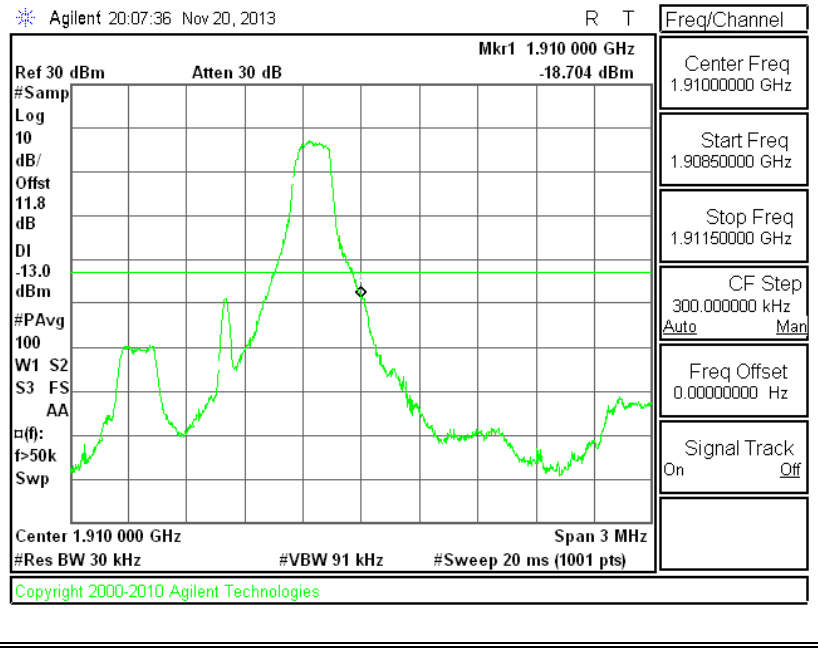
HIGH CH, RB1-0



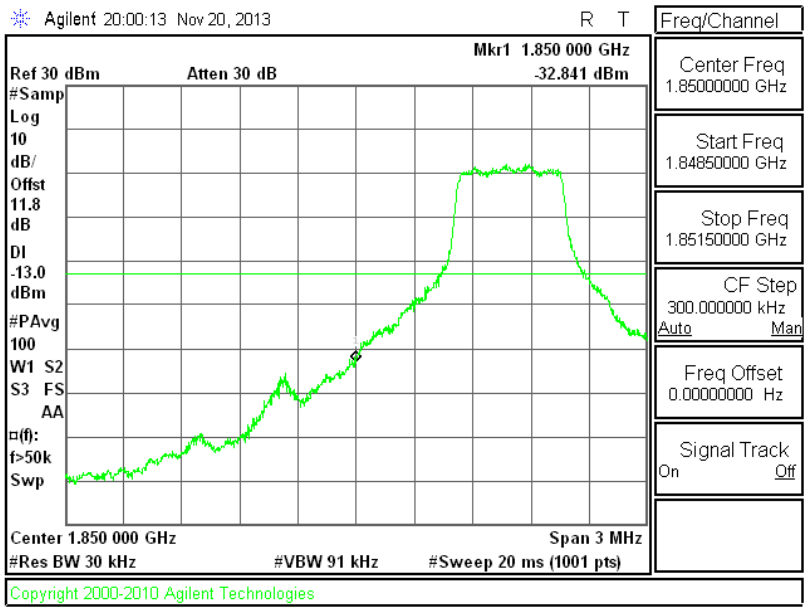
LOW CH, RB1-5



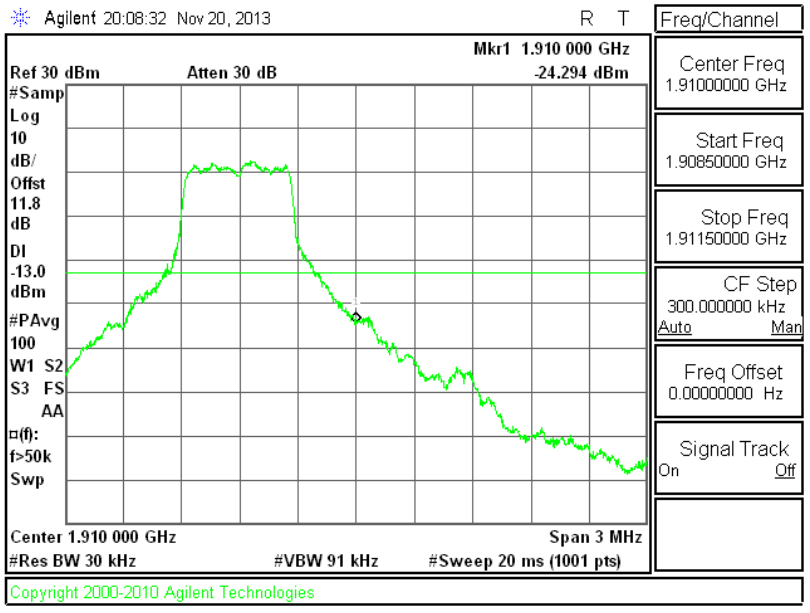
HIGH CH, RB1-5



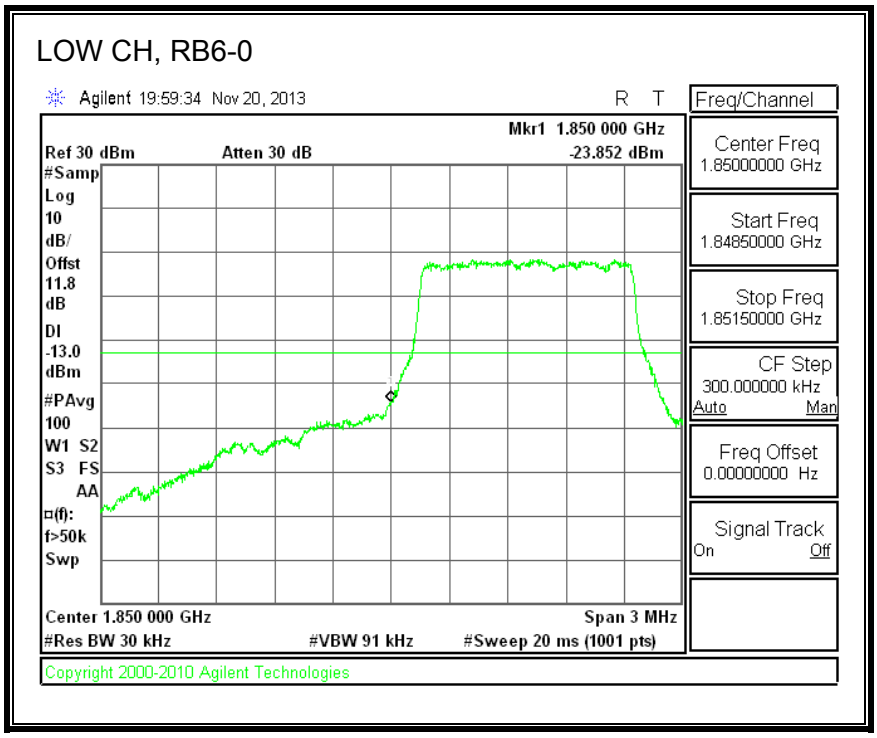
LOW CH, RB3-2



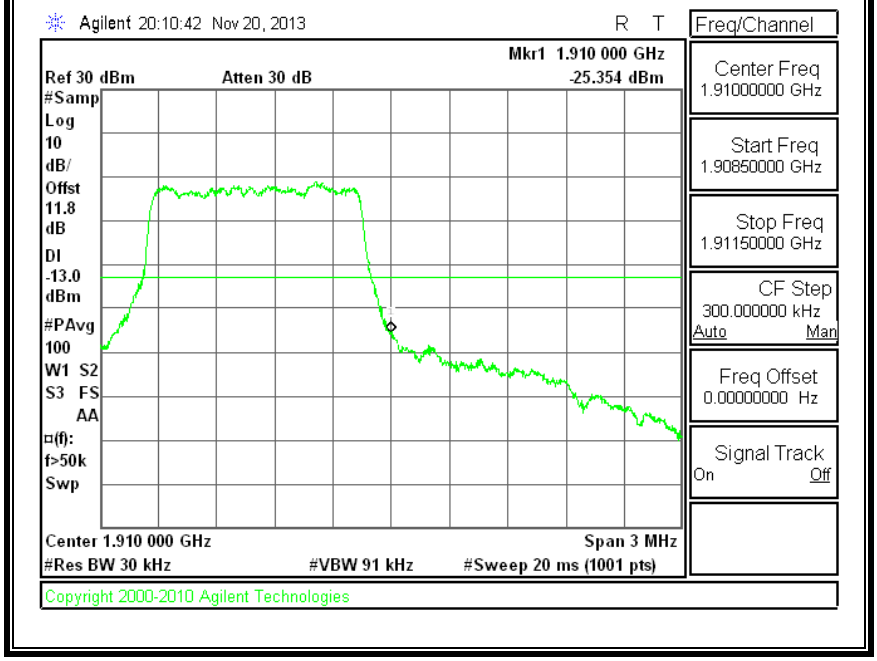
HIGH CH, RB3-2



LOW CH, RB6-0



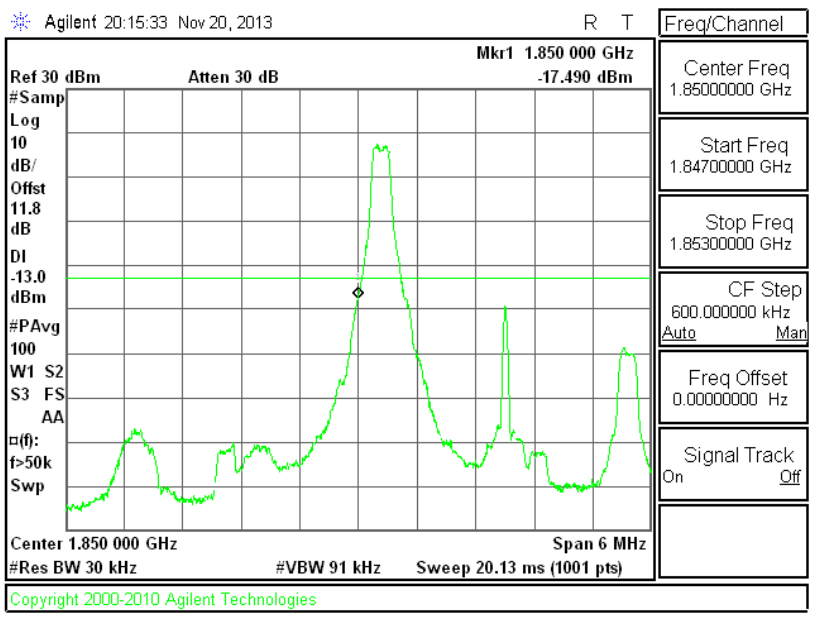
HIGH CH, RB6-0



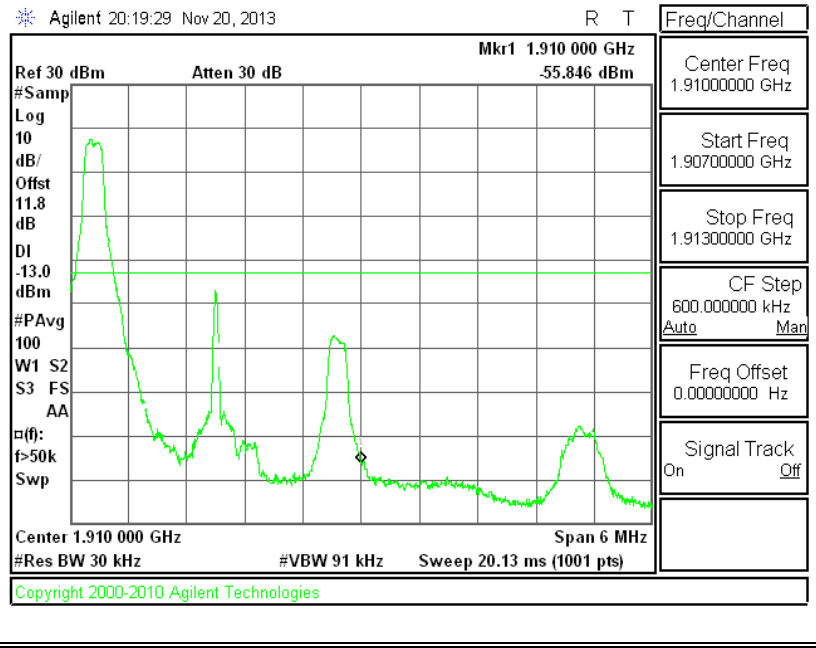
Band 2 (3MHz BANDWIDTH)

LTE QPSK

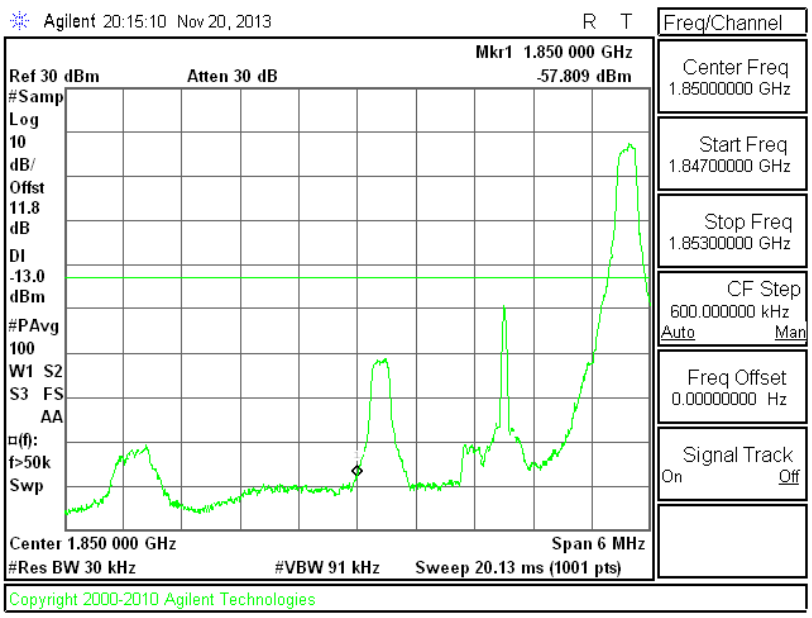
LOW CH, RB1_0



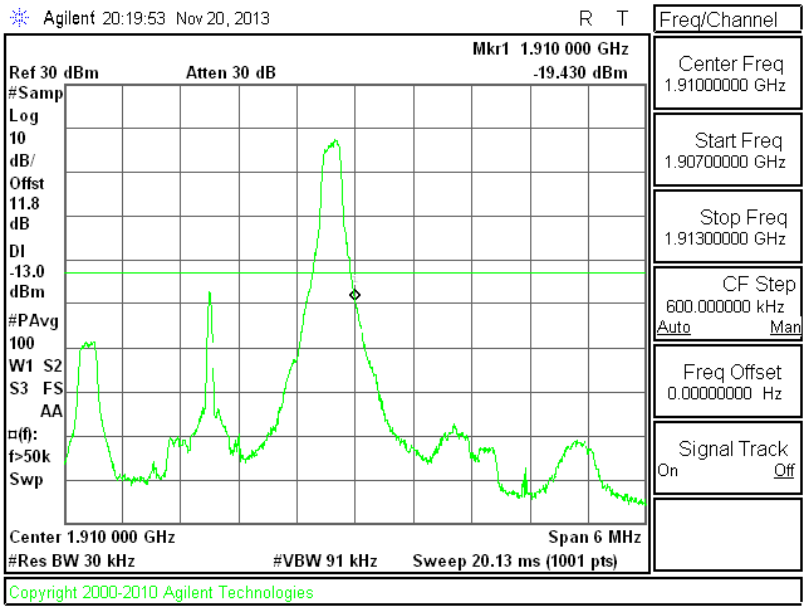
HIGH CH, RB1-0



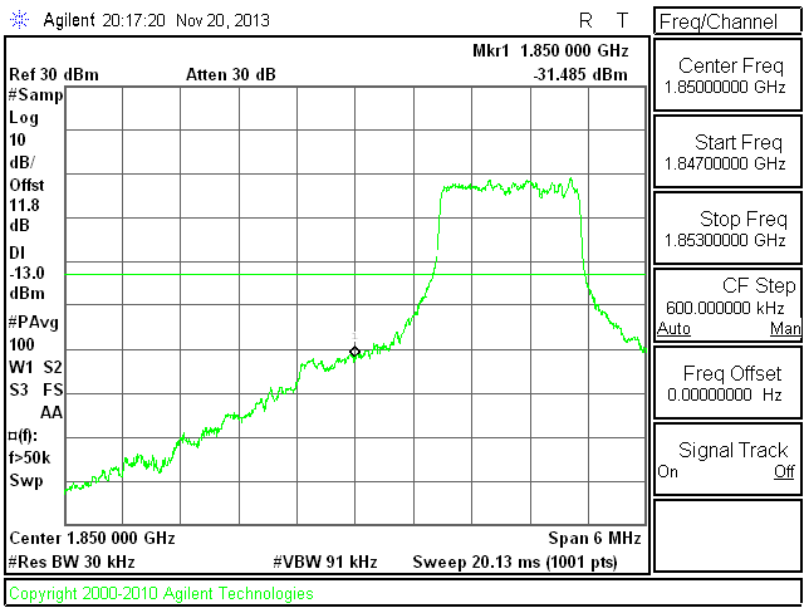
LOW CH, RB1-14



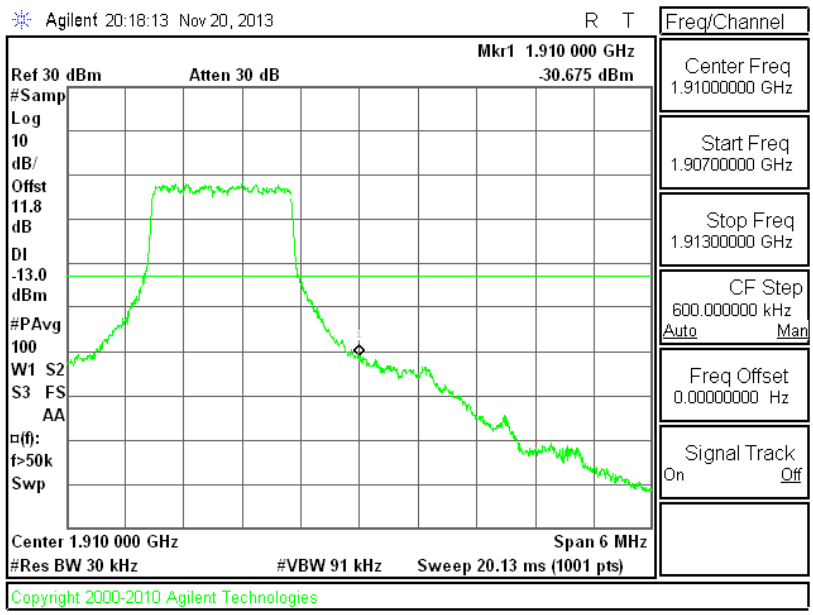
HIGH CH, RB1-14



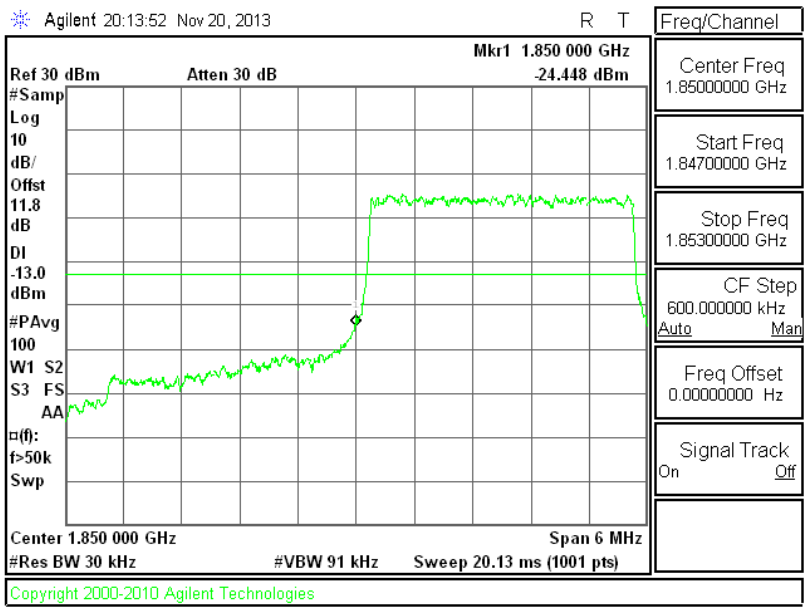
LOW CH, RB8-4



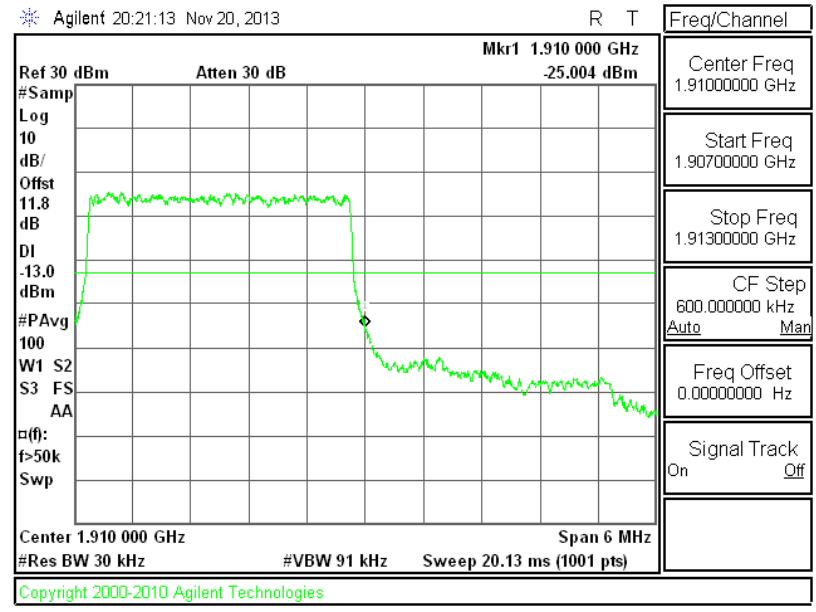
HIGH CH, RB8-4



LOW CH, RB15-0



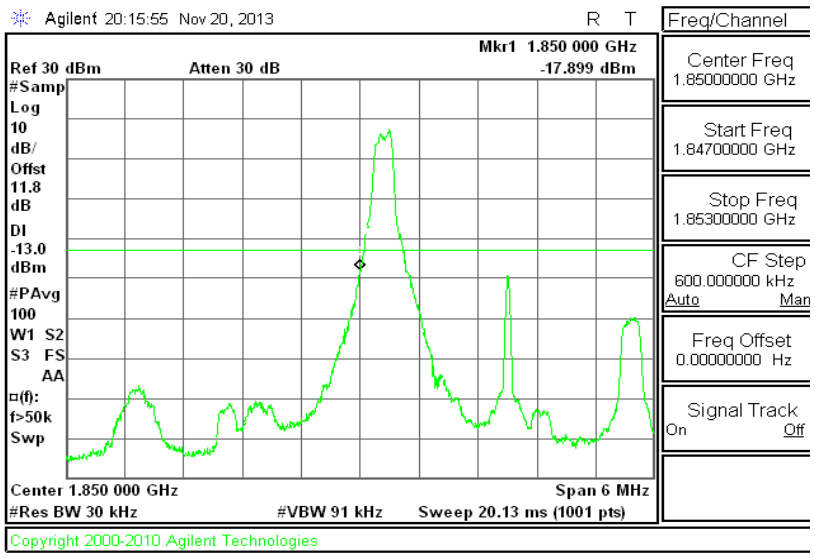
HIGH CH, RB15-0



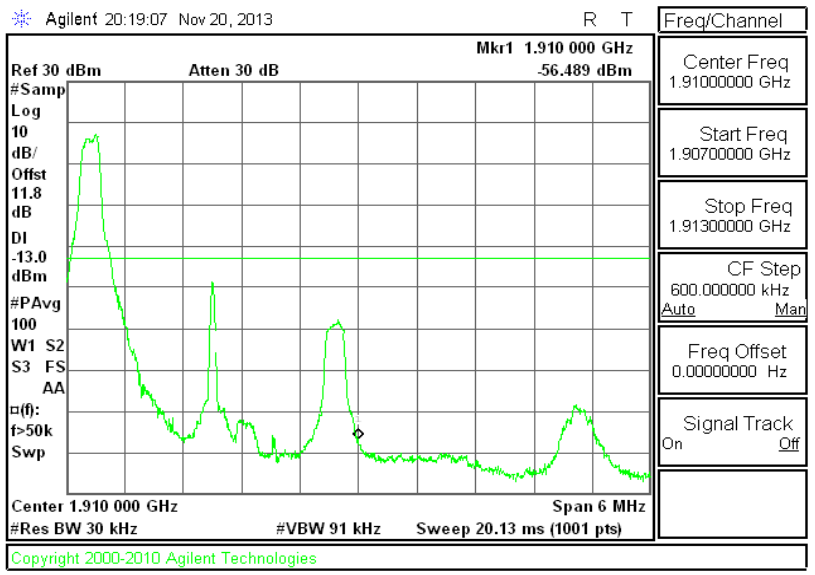
Band 2 (3MHz BANDWIDTH)

LTE 16QAM

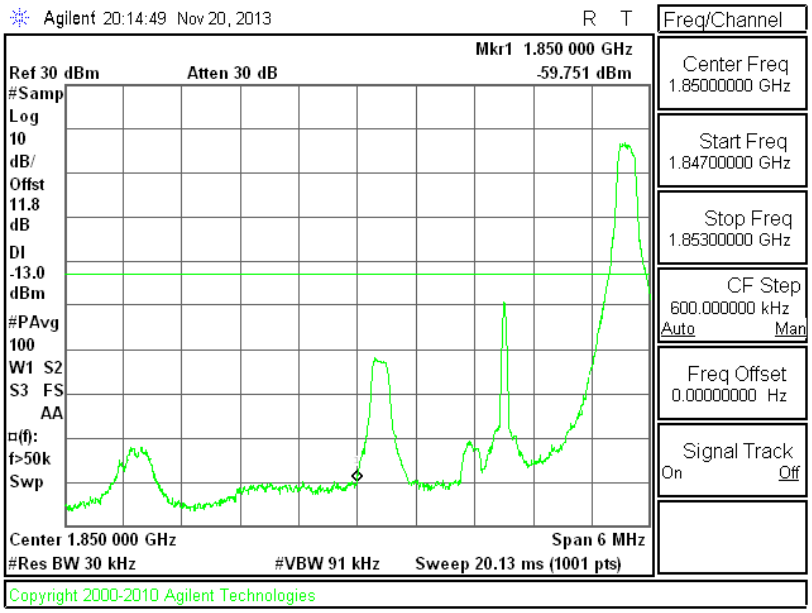
LOW CH, RB1_0



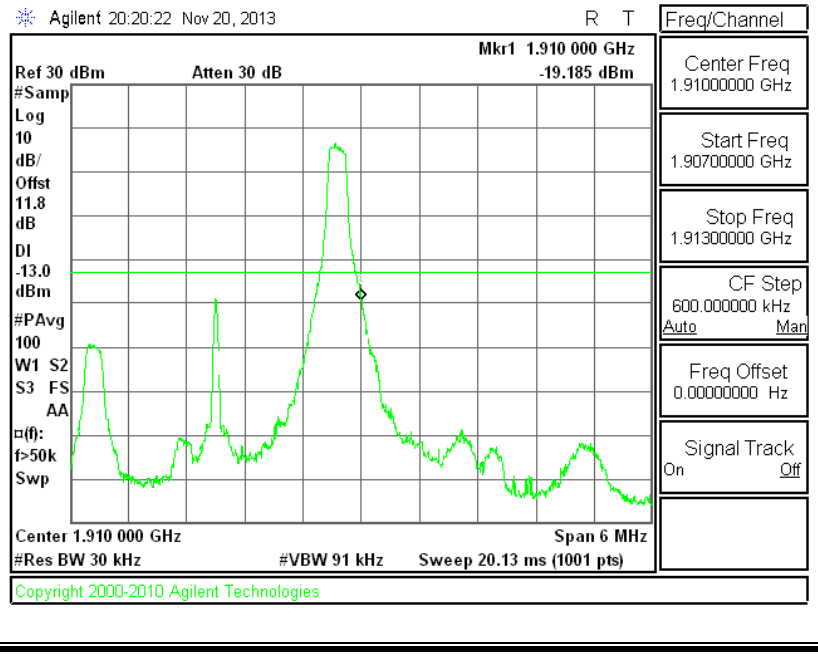
HIGH CH, RB1-0



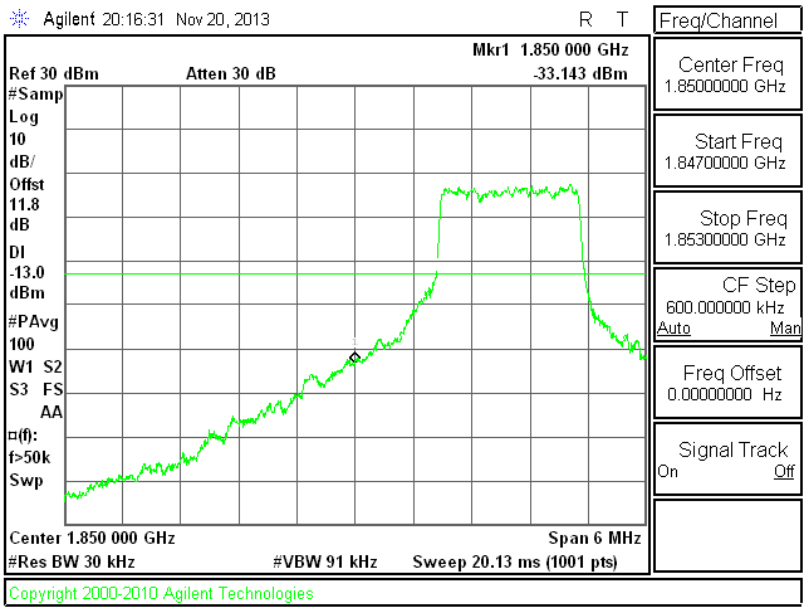
LOW CH, RB1-14



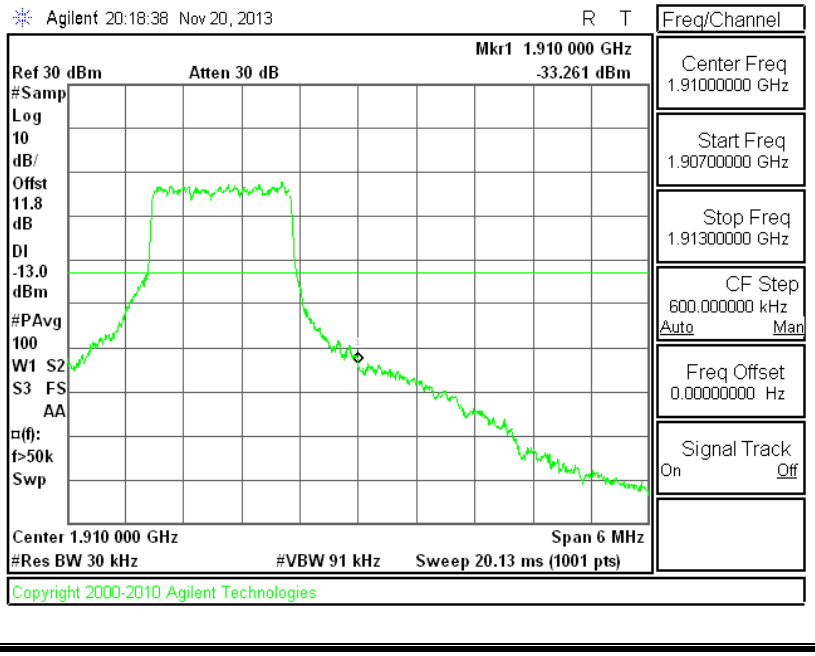
HIGH CH, RB1-14



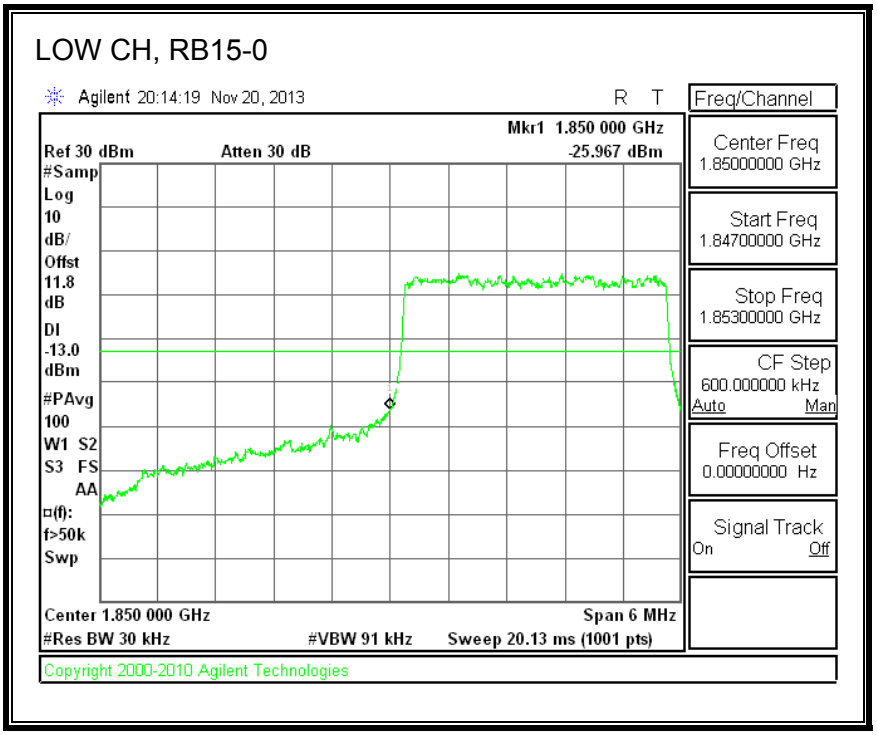
LOW CH, RB8-4



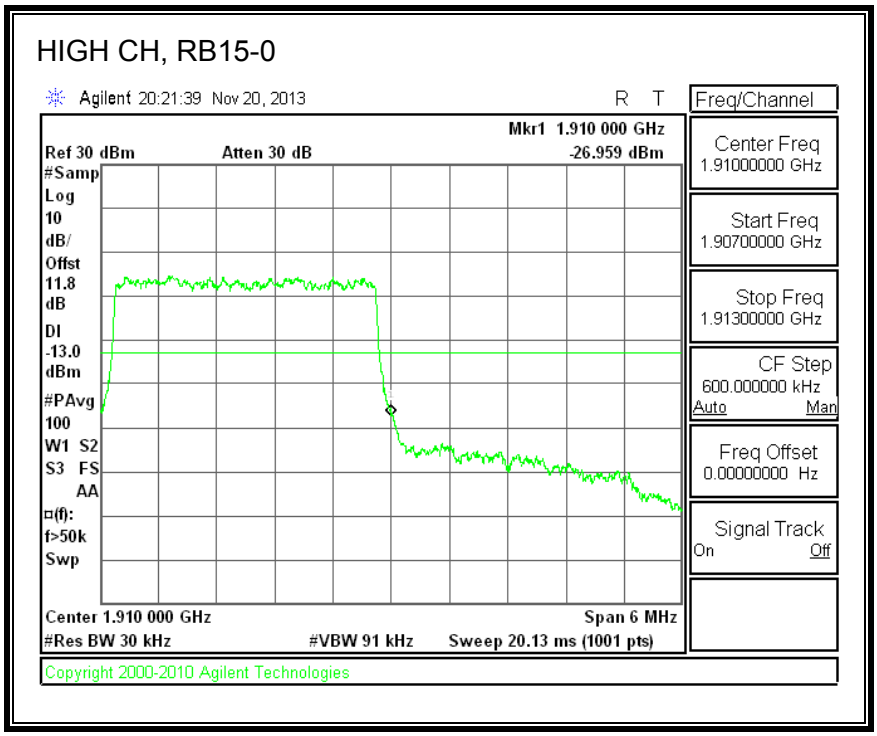
HIGH CH, RB8-4



LOW CH, RB15-0



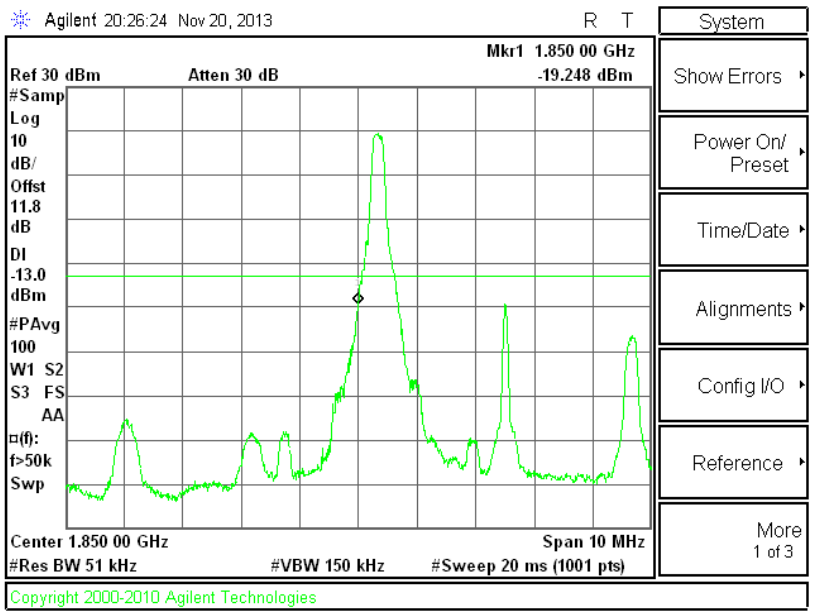
HIGH CH, RB15-0



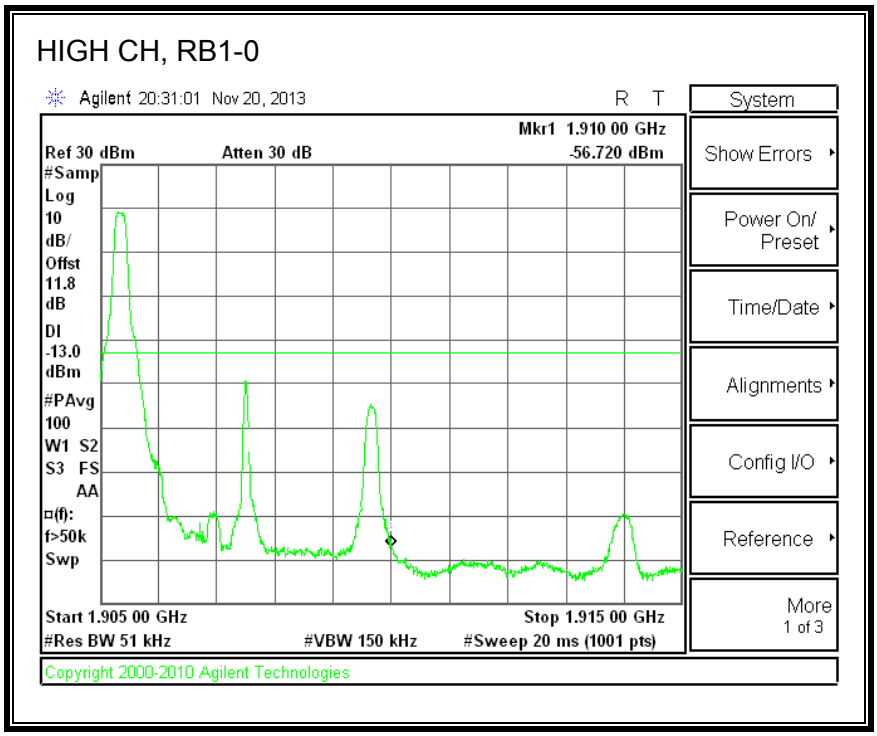
Band 2 (5MHz BANDWIDTH)

LTE QPSK

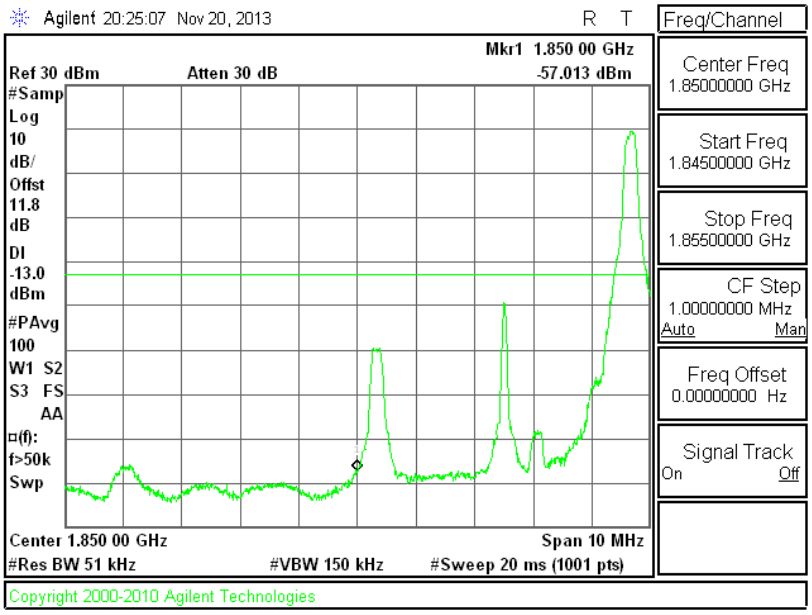
LOW CH, RB1_0



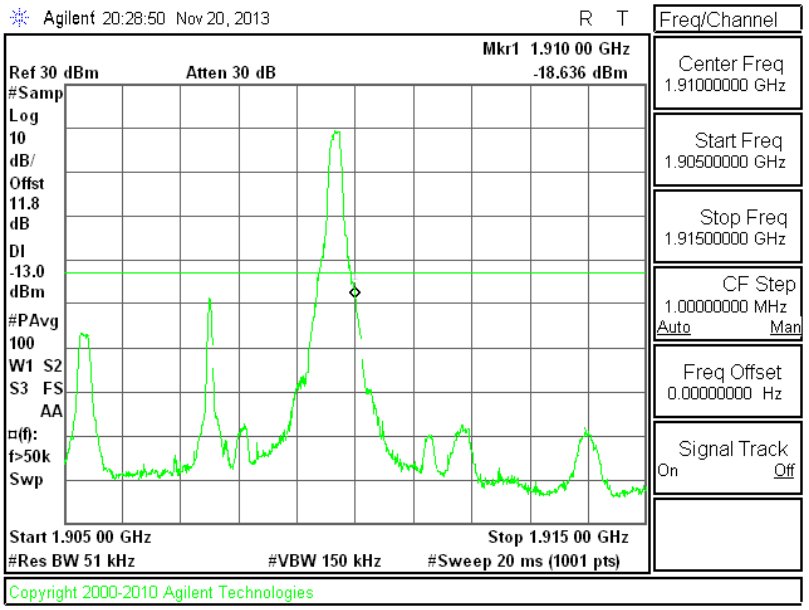
HIGH CH, RB1-0



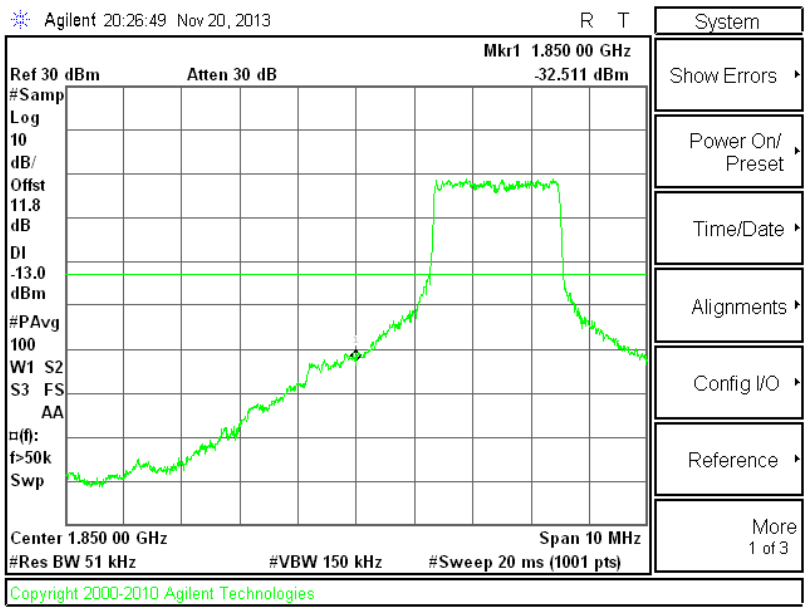
LOW CH, RB1-24



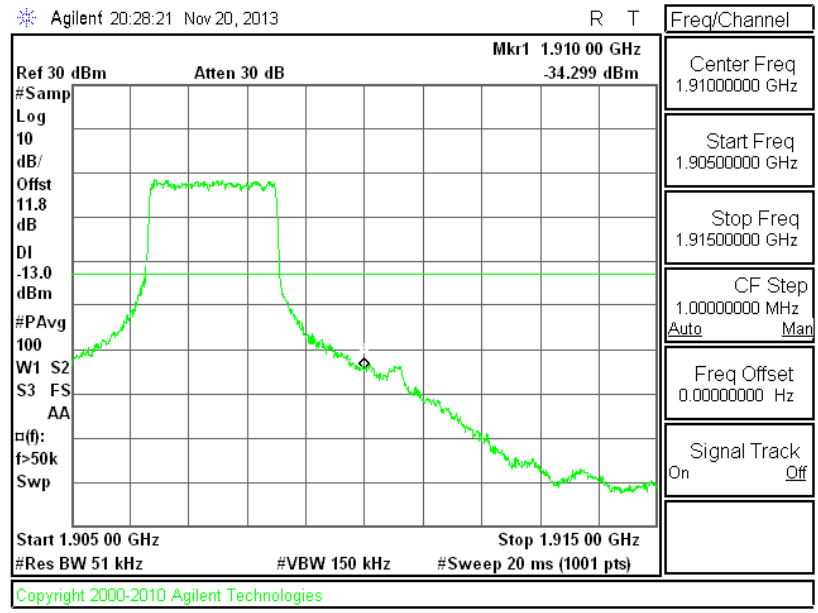
HIGH CH, RB1-24



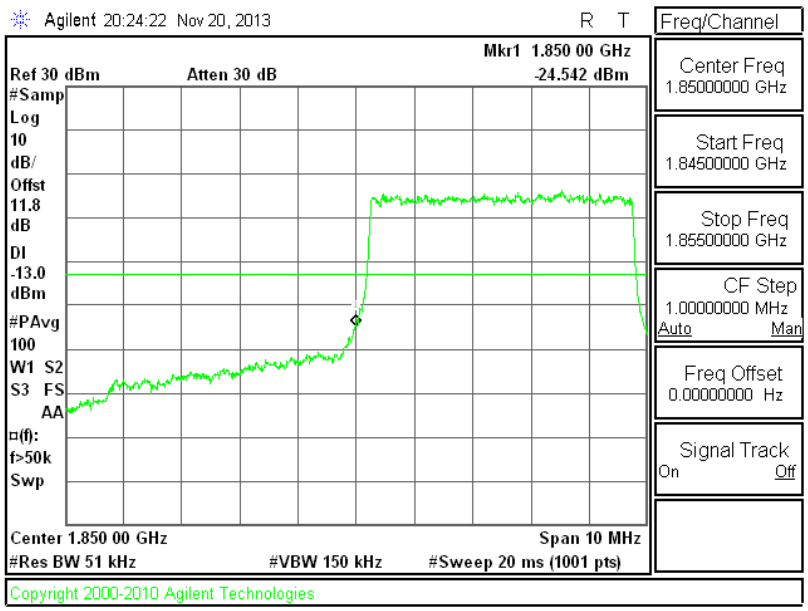
LOW CH, RB12-6



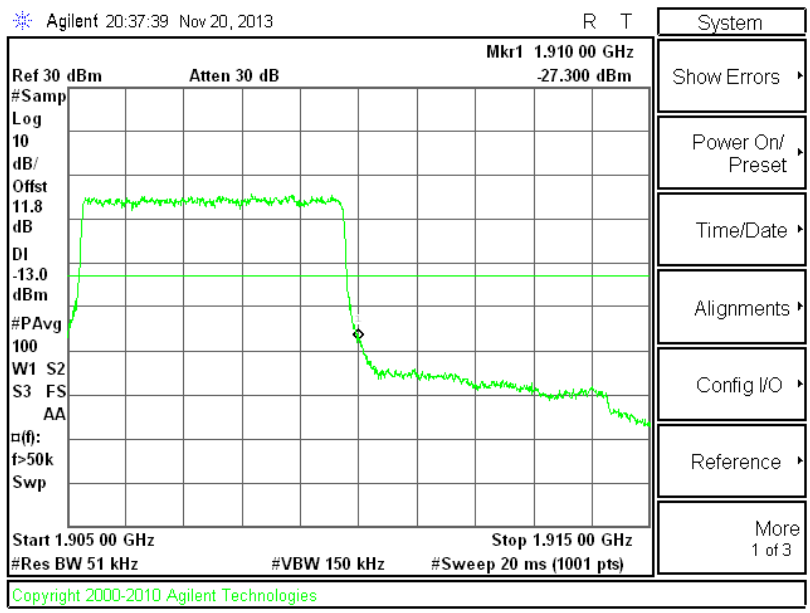
HIGH CH, RB12-6



LOW CH, RB25-0



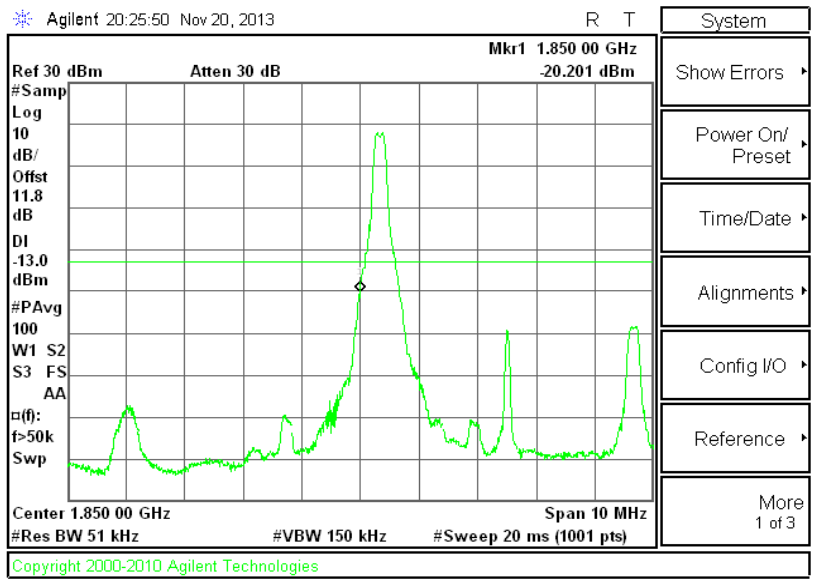
HIGH CH, RB25-0



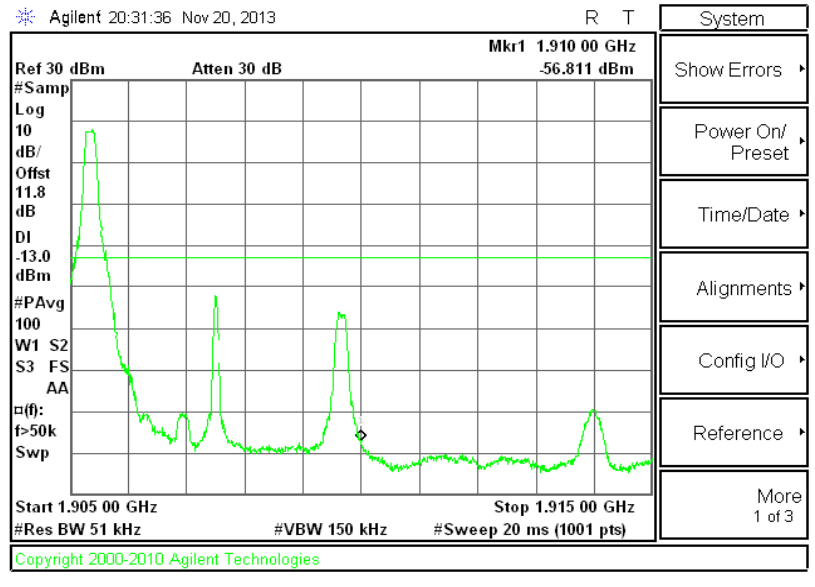
Band 2 (5MHz BANDWIDTH)

LTE 16QAM

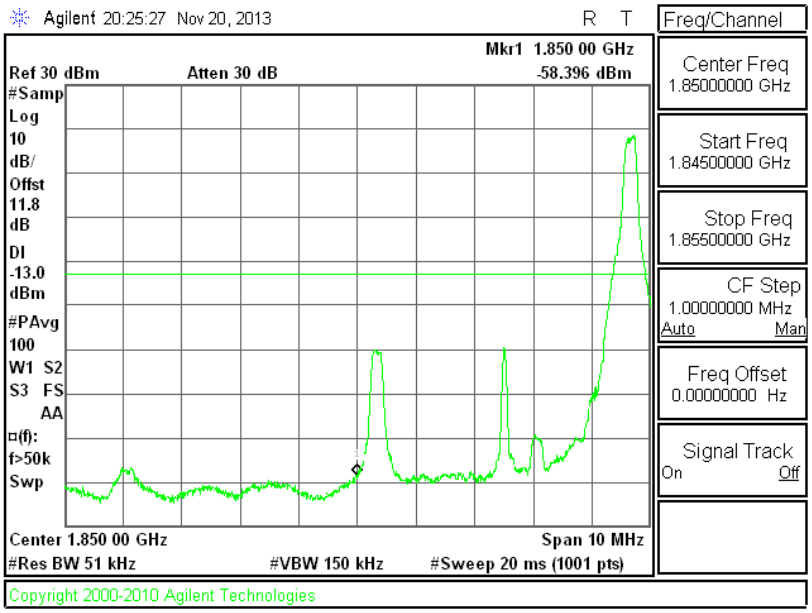
LOW CH, RB1_0



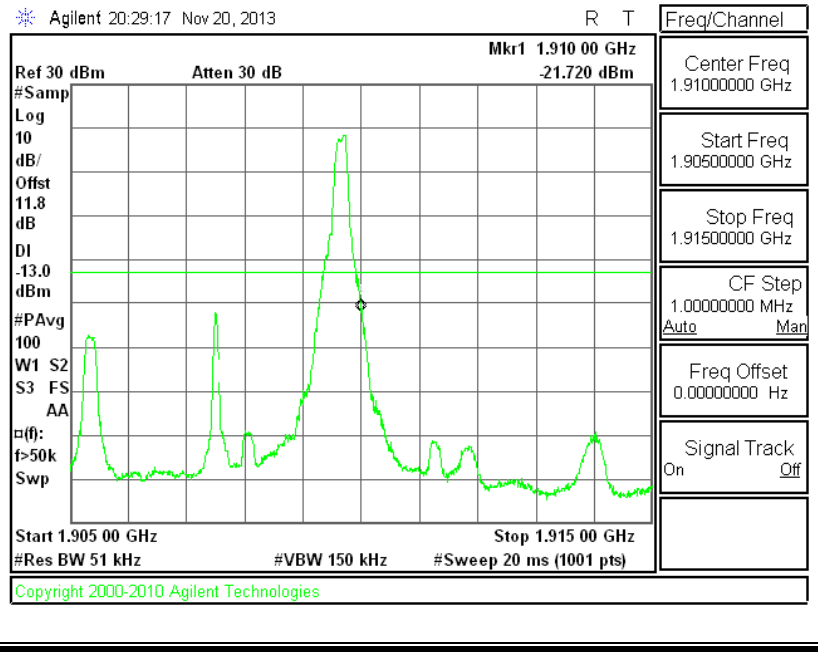
HIGH CH, RB1-0



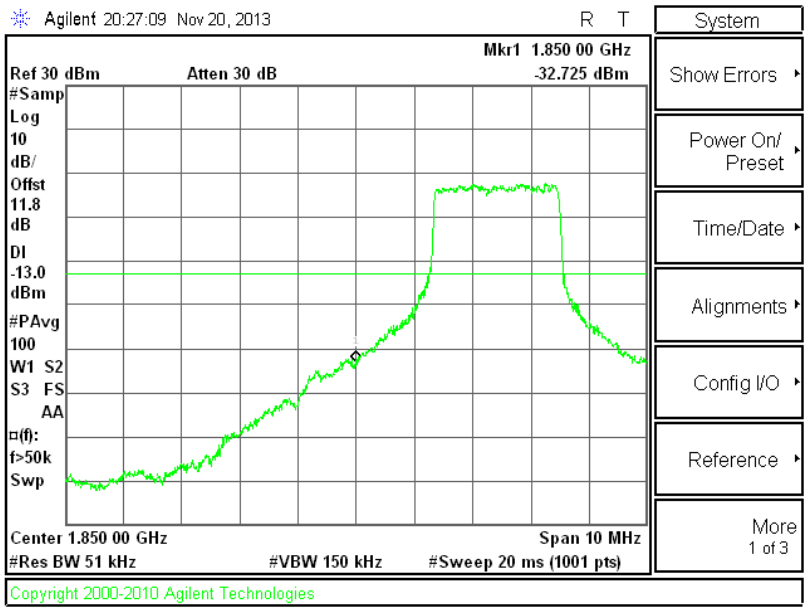
LOW CH, RB1-24



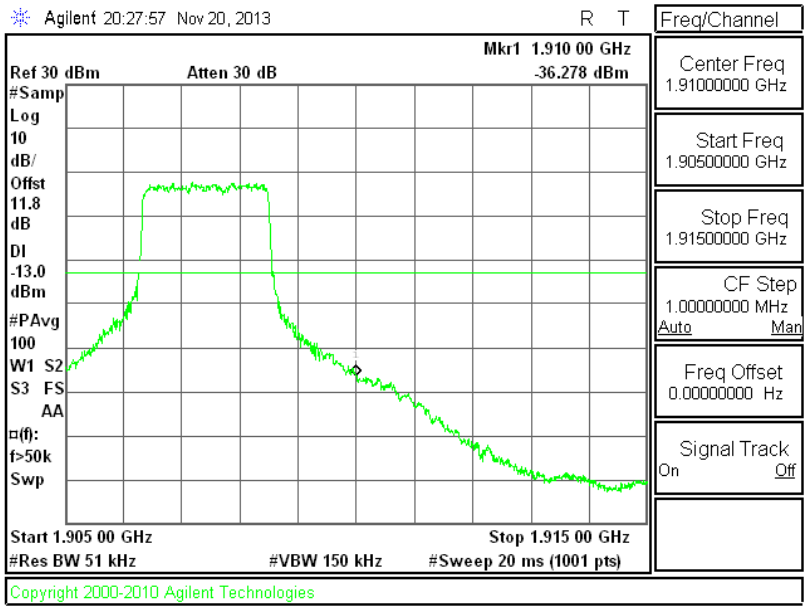
HIGH CH, RB1-24



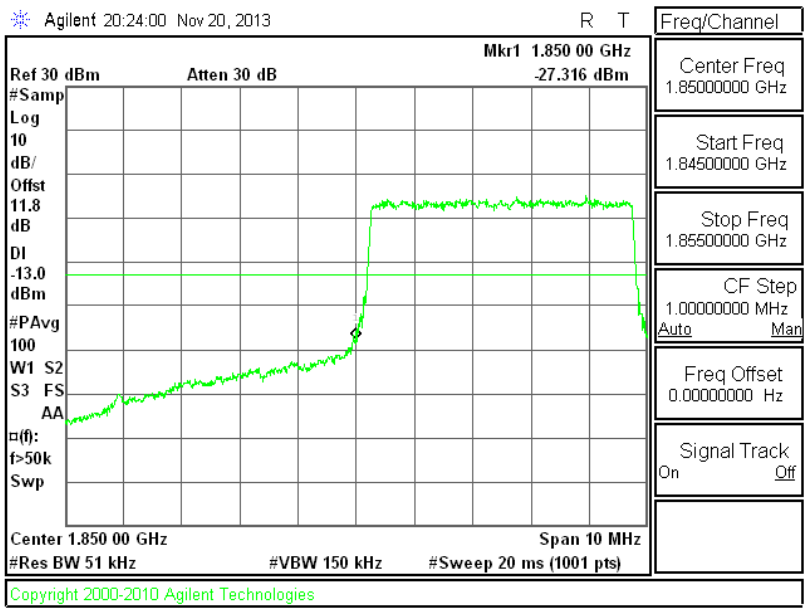
LOW CH, RB12-6



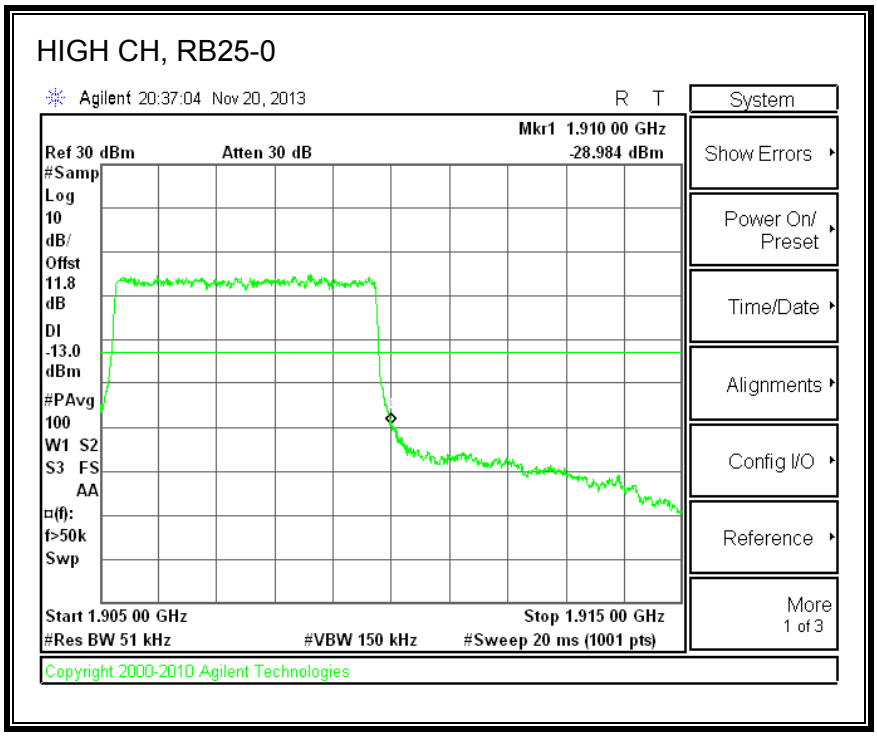
HIGH CH, RB12-6



LOW CH, RB25-0



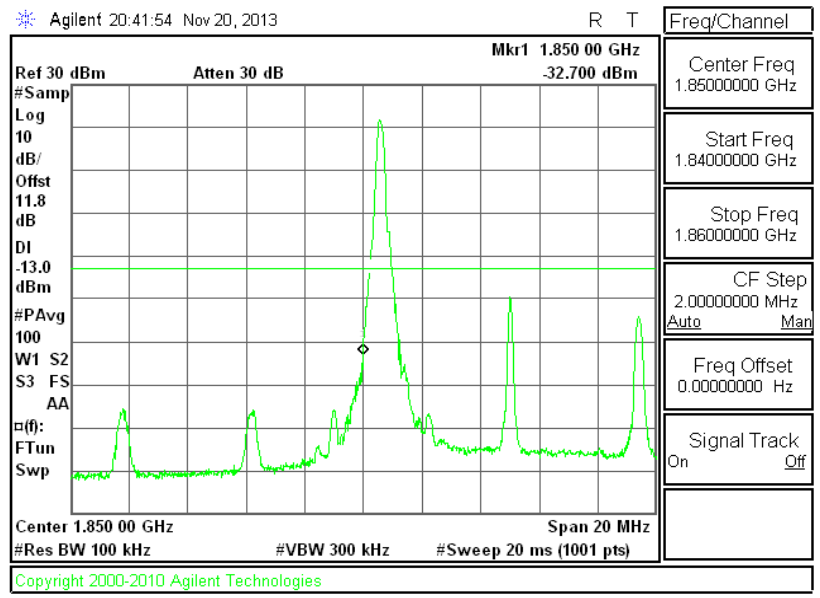
HIGH CH, RB25-0



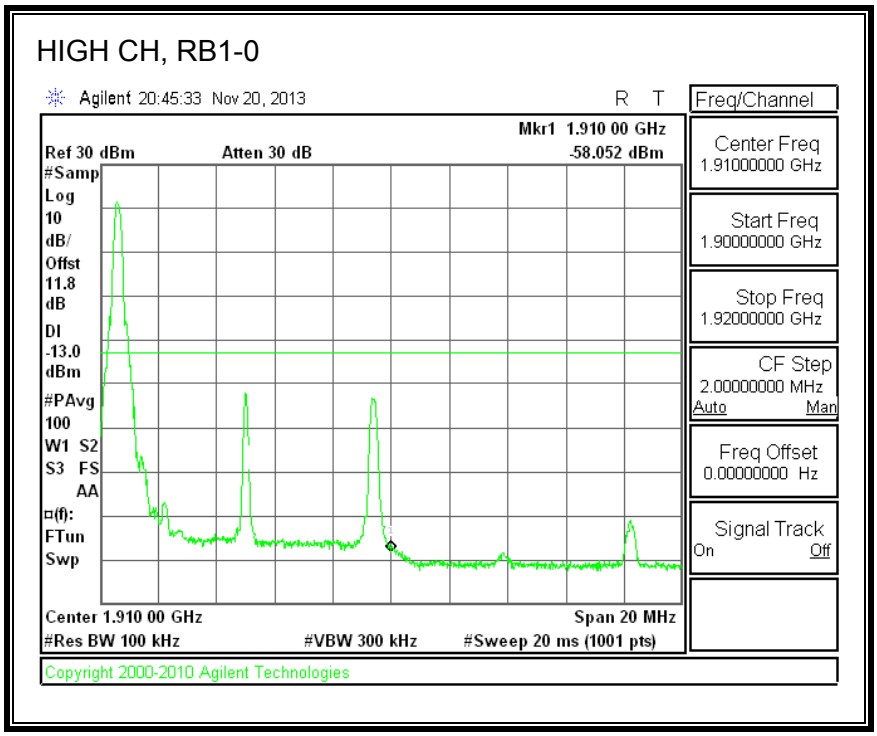
Band 2 (10MHz BANDWIDTH)

LTE QPSK

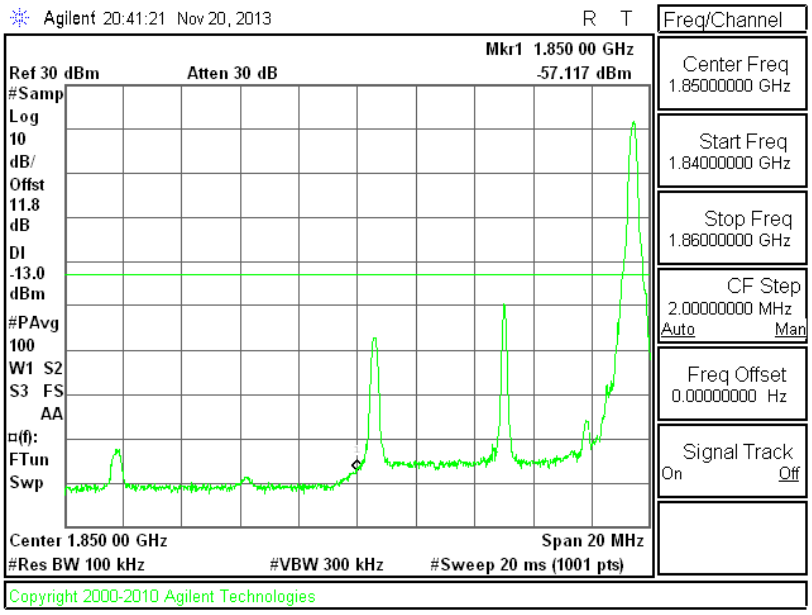
LOW CH, RB1_0



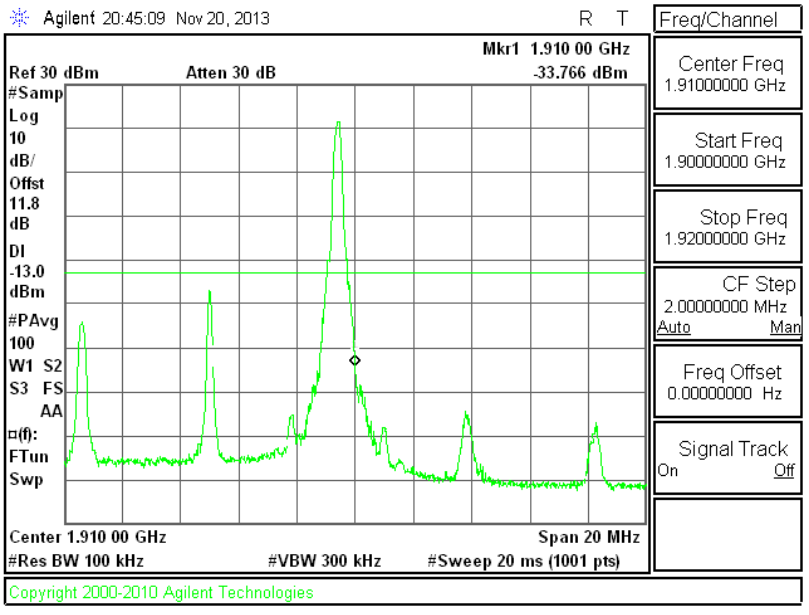
HIGH CH, RB1-0



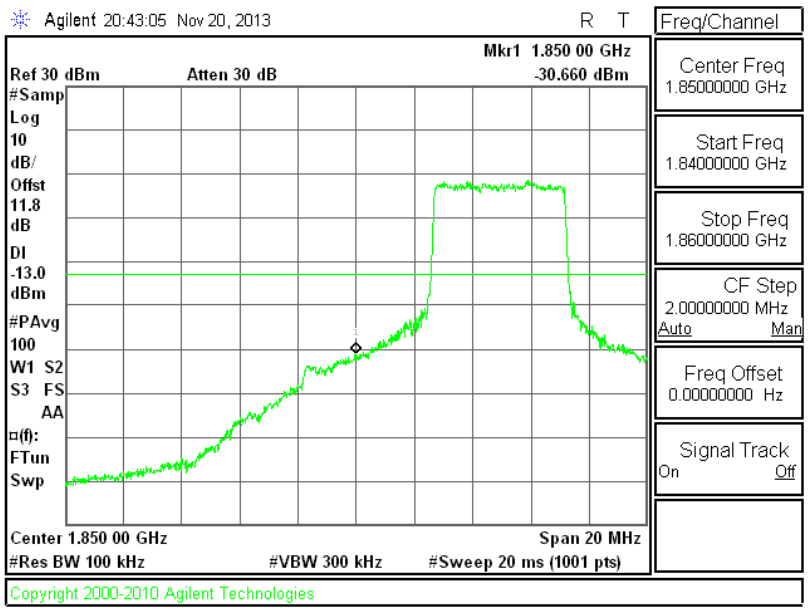
LOW CH, RB1-49



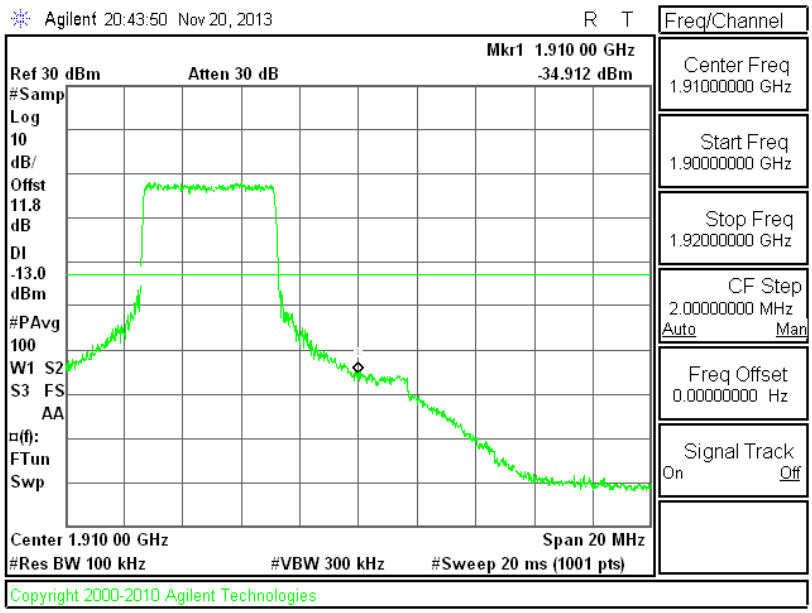
HIGH CH, RB1-49



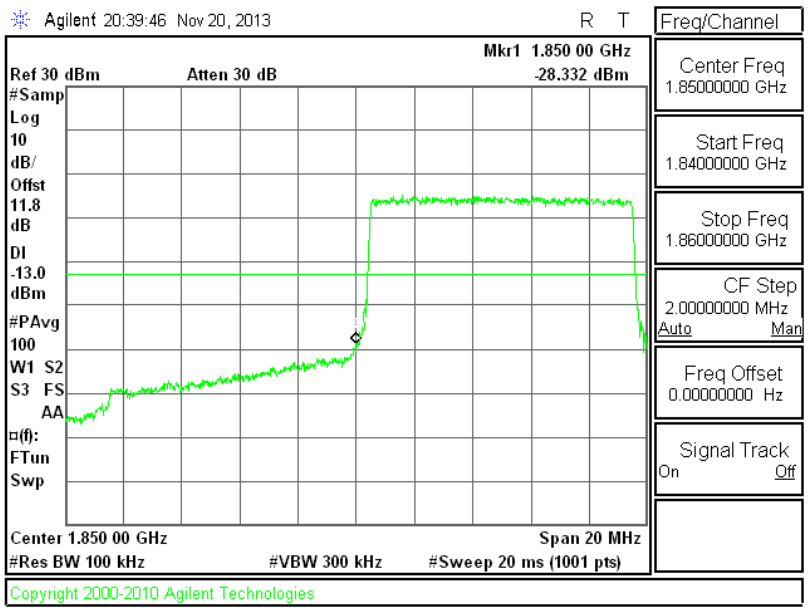
LOW CH, RB25-12



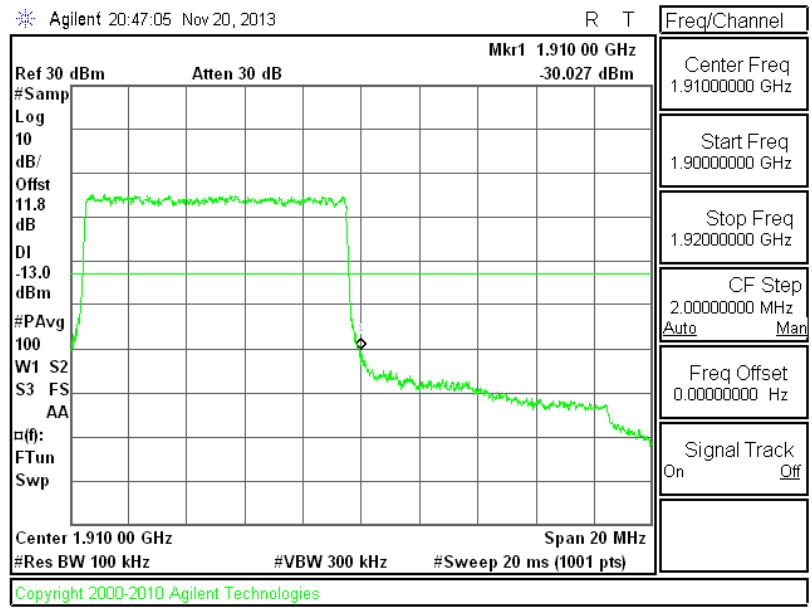
HIGH CH, RB25-12



LOW CH, RB50-0



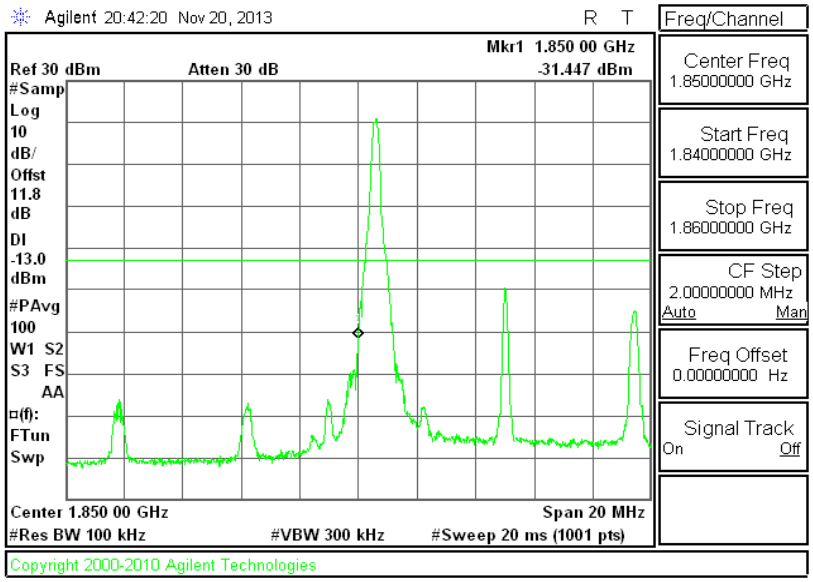
HIGH CH, RB50-0



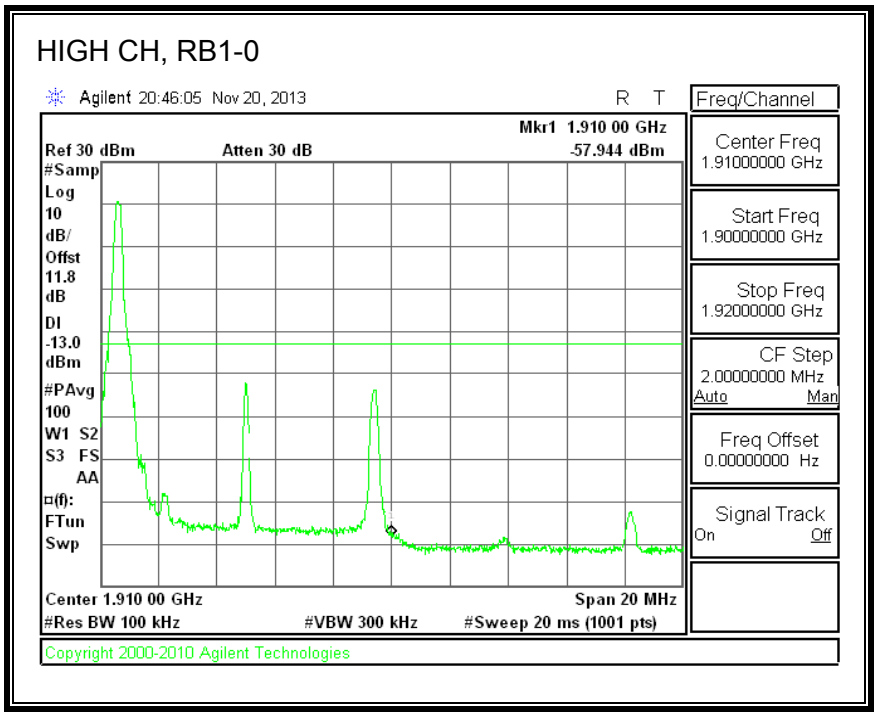
Band 2 (10 MHz BANDWIDTH)

LTE 16QAM

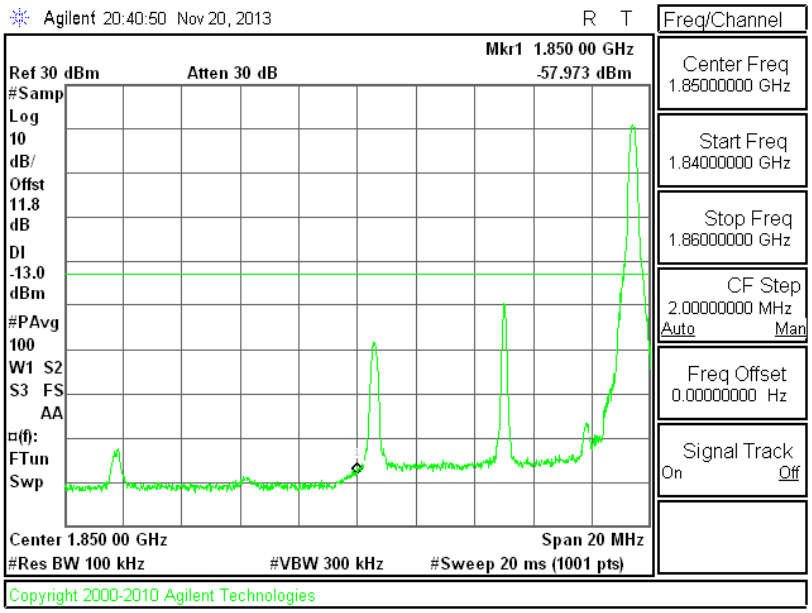
LOW CH, RB1_0



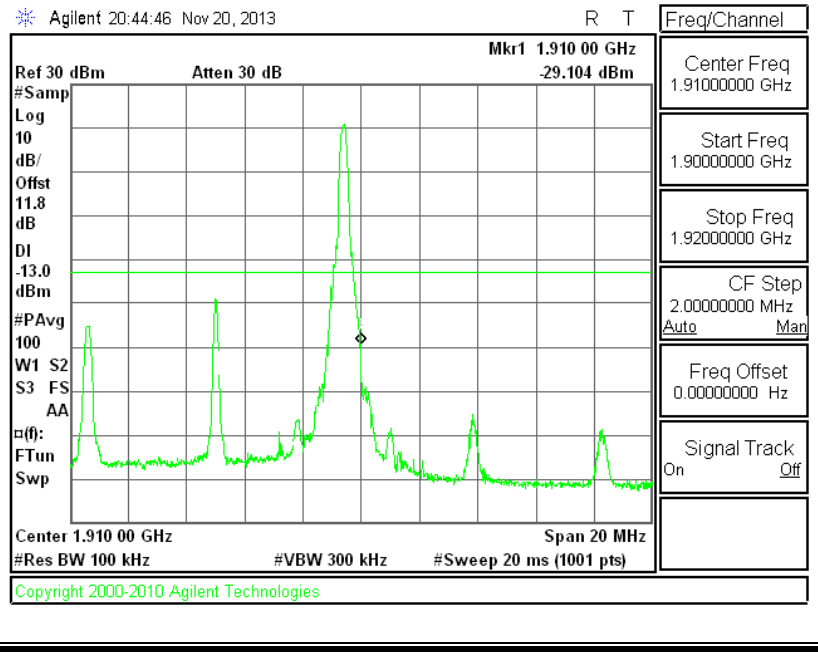
HIGH CH, RB1-0



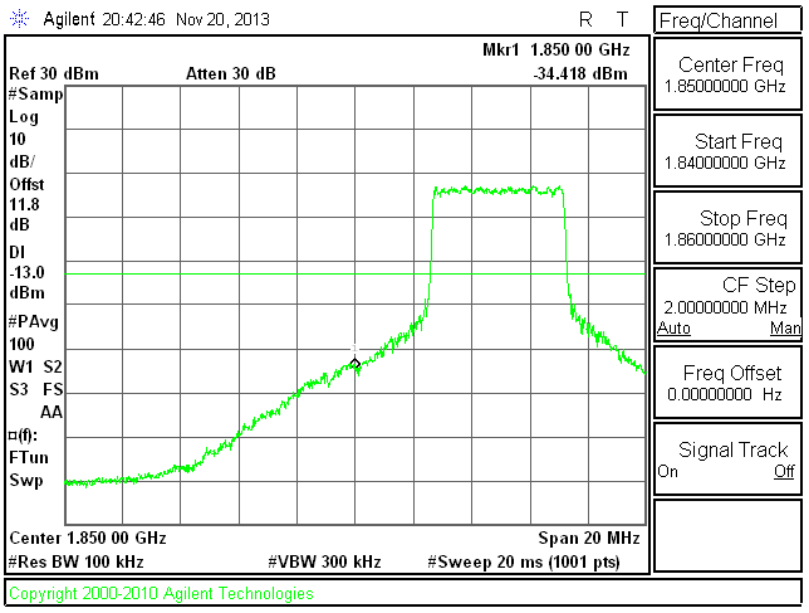
LOW CH, RB1-49



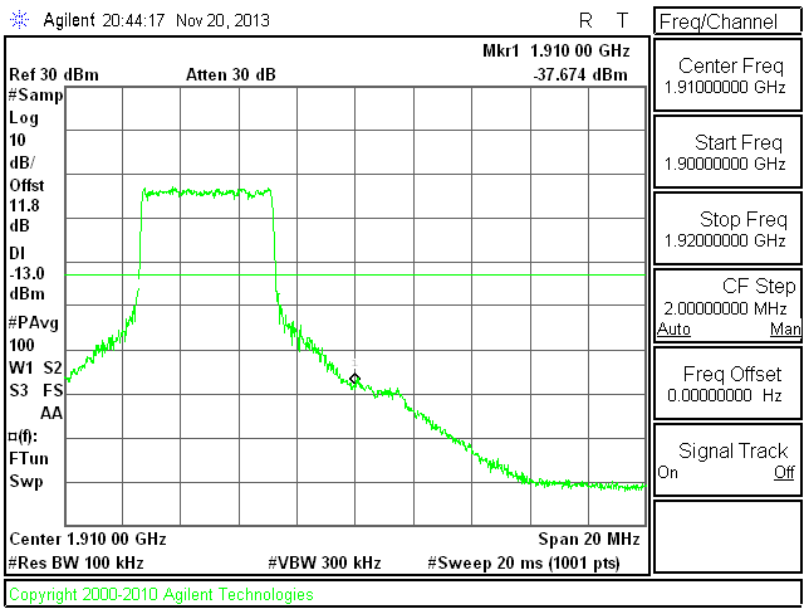
HIGH CH, RB1-49



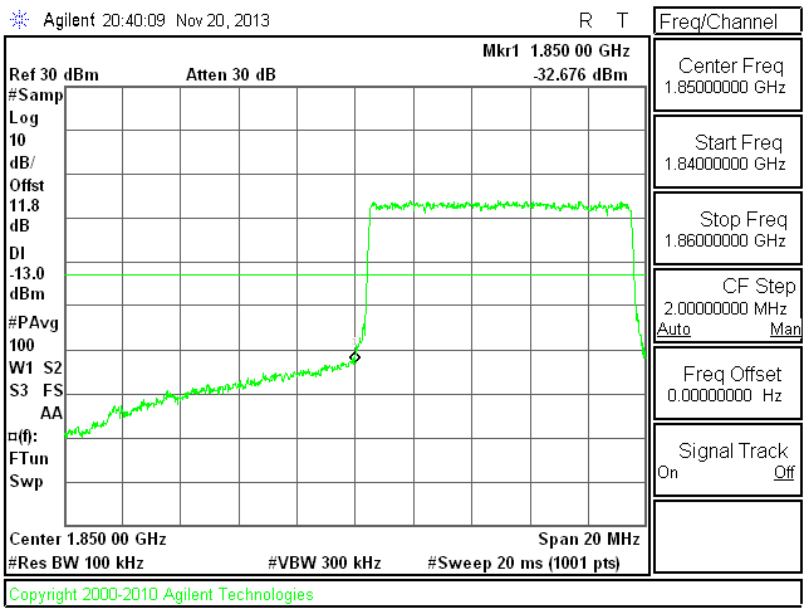
LOW CH, RB25-12



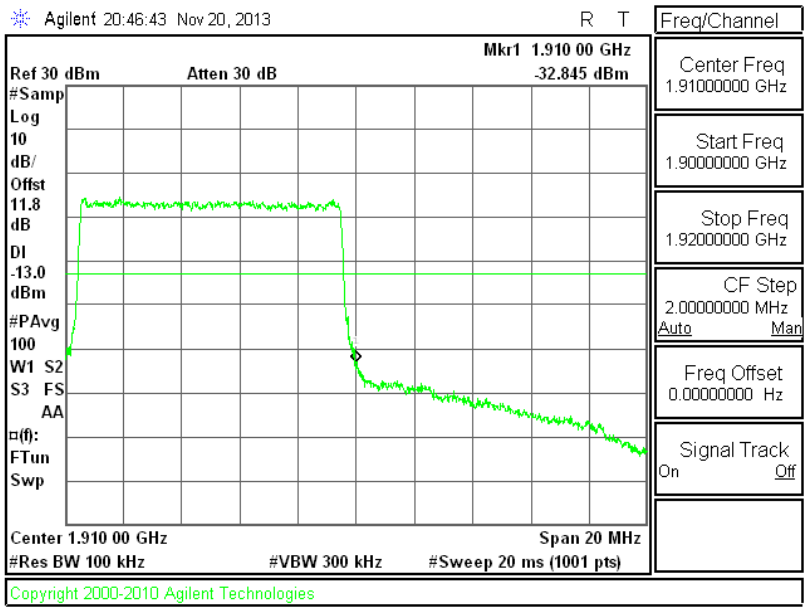
HIGH CH, RB25-12



LOW CH, RB50-0



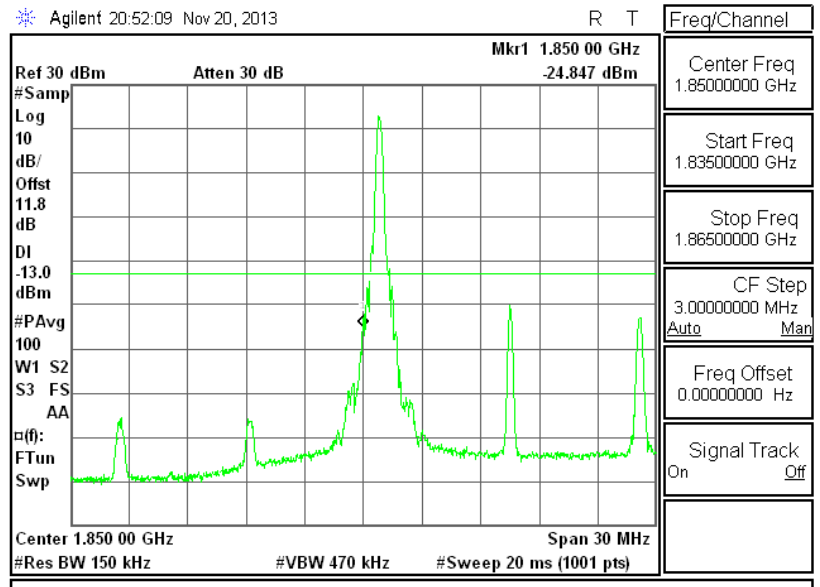
HIGH CH, RB50-0



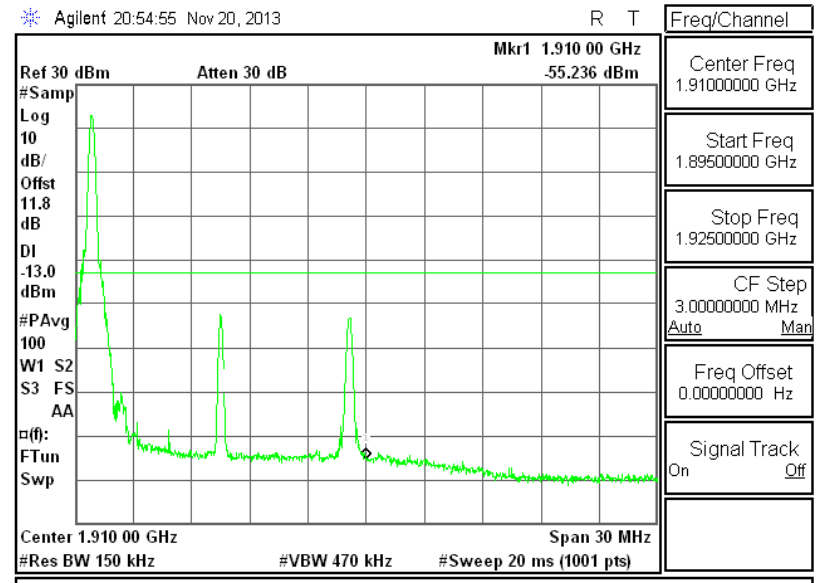
Band 2 (15MHz BANDWIDTH)

LTE QPSK

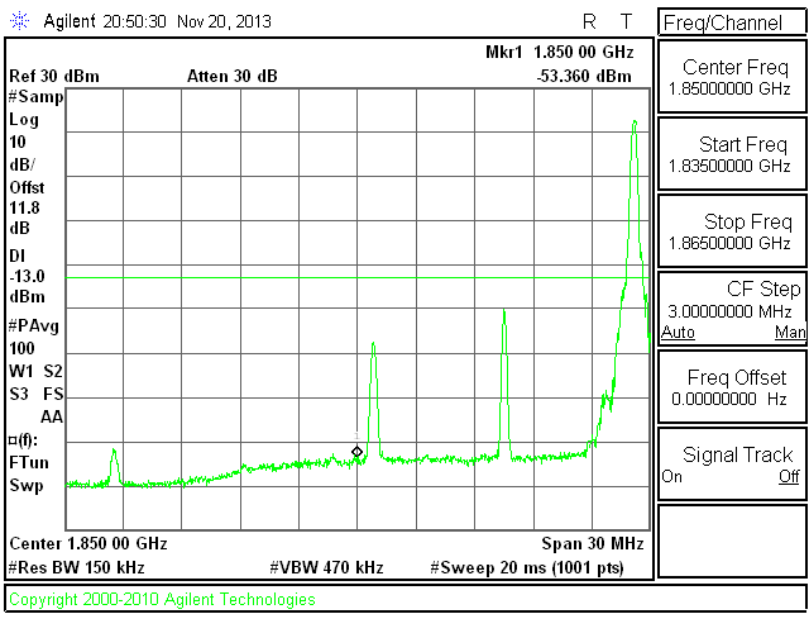
LOW CH, RB1_0



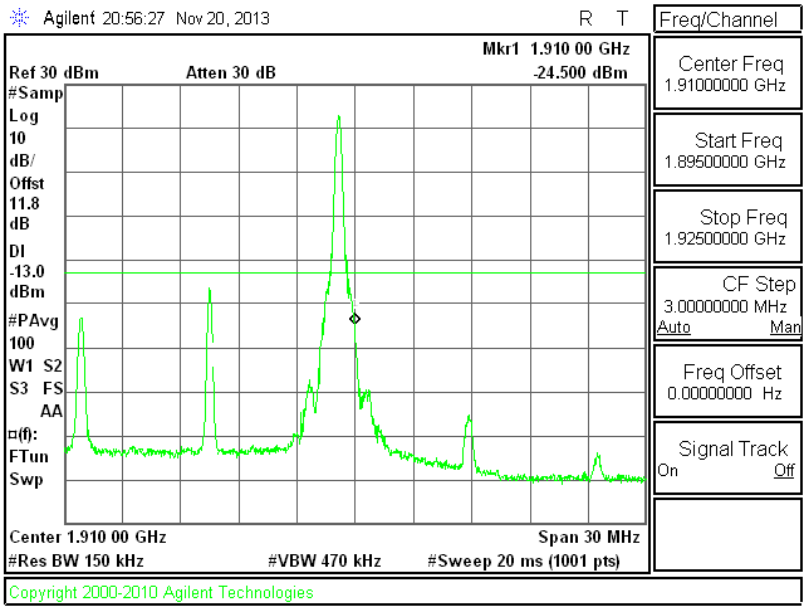
HIGH CH, RB1-0



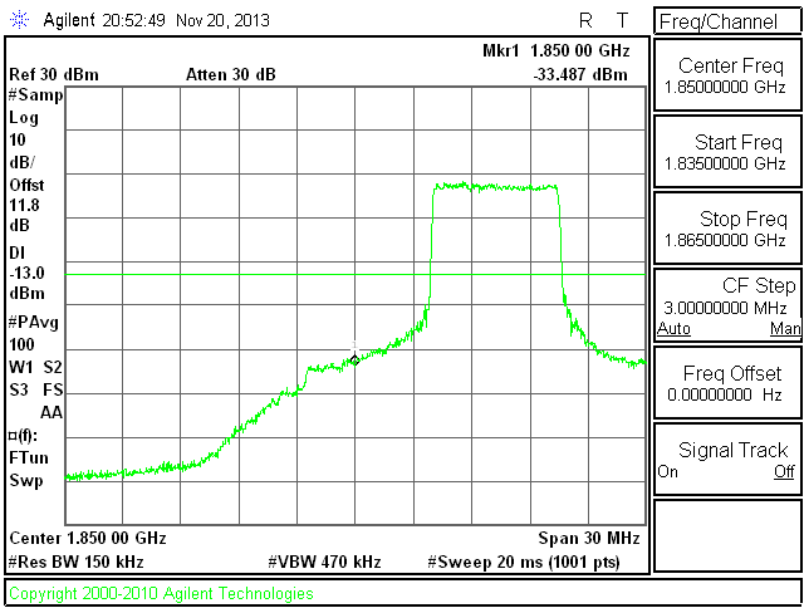
LOW CH, RB1-74



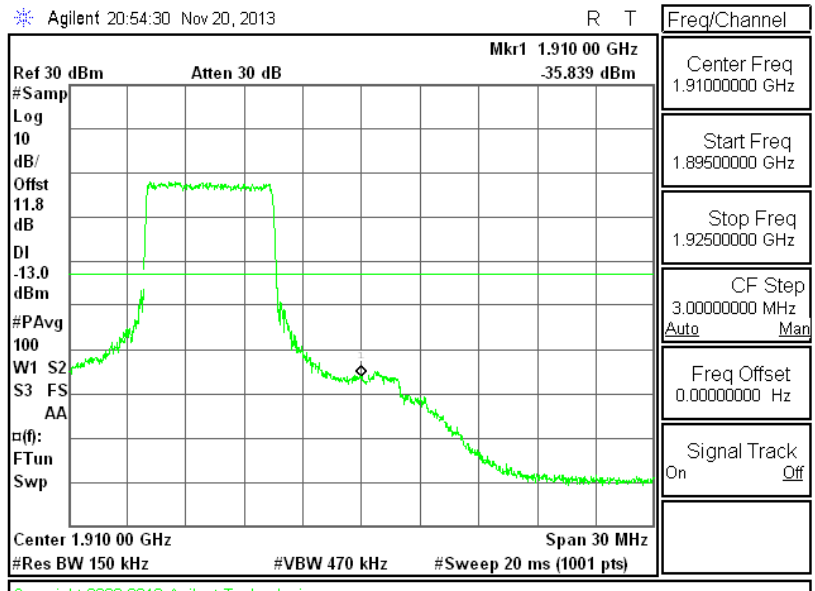
HIGH CH, RB1-74



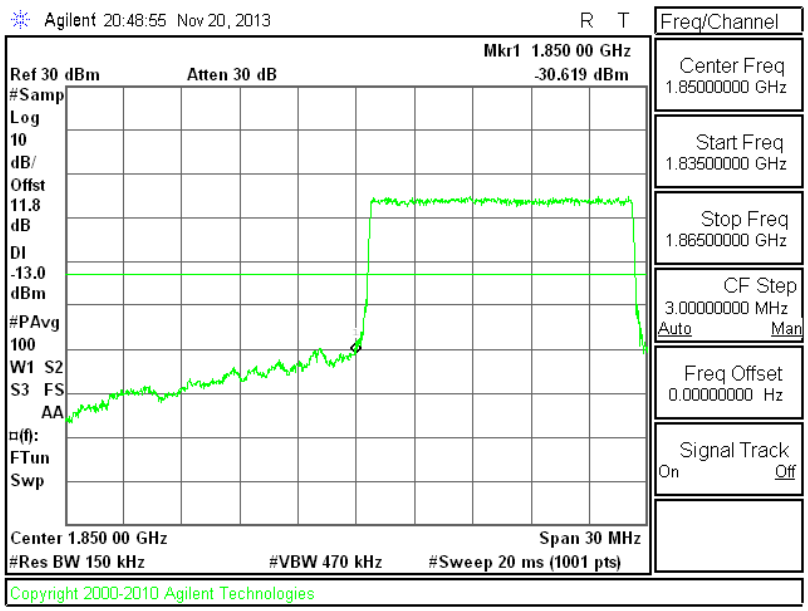
LOW CH, RB36-18



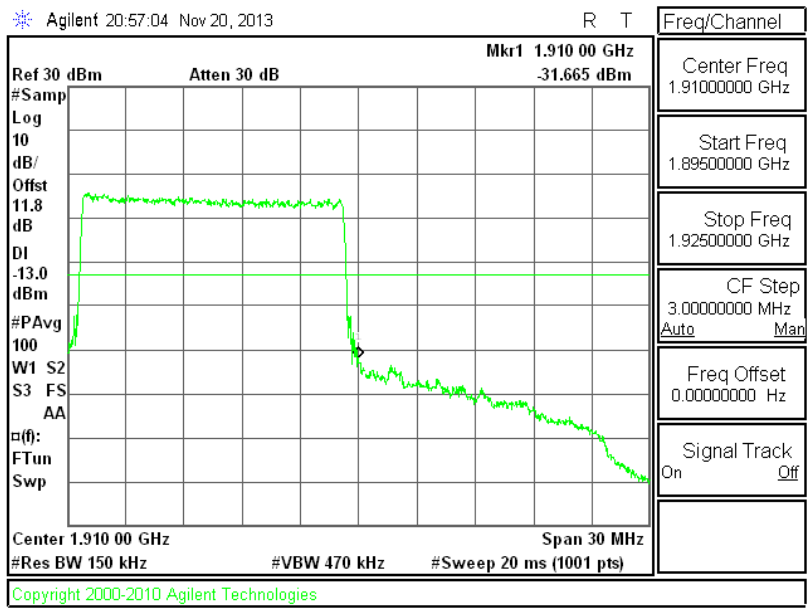
HIGH CH, RB36-18



LOW CH, RB75-0



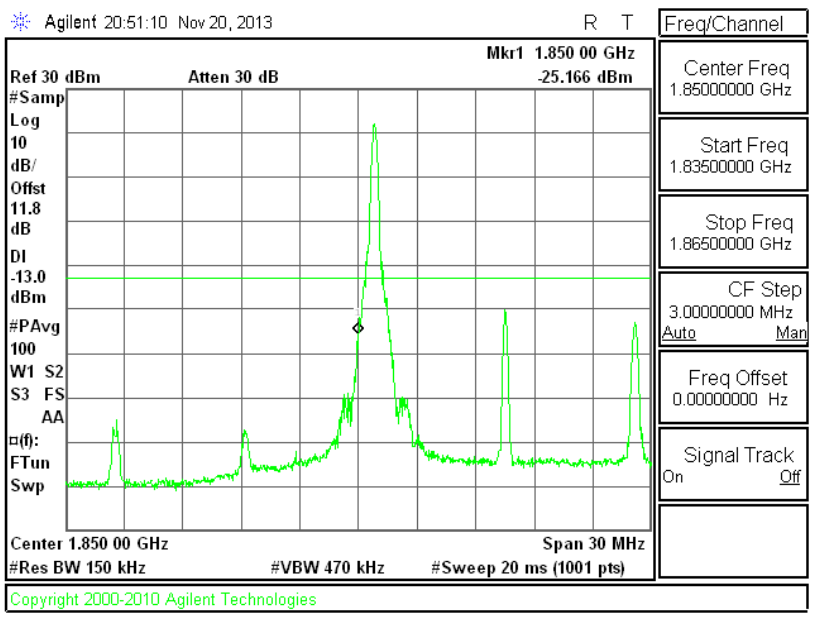
HIGH CH, RB75-0



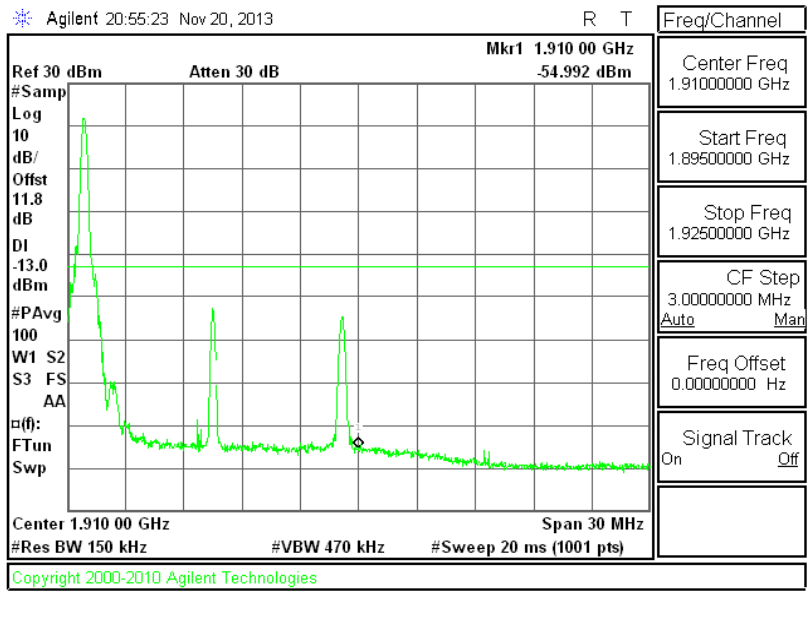
Band 2 (15MHz BANDWIDTH)

LTE 16QAM

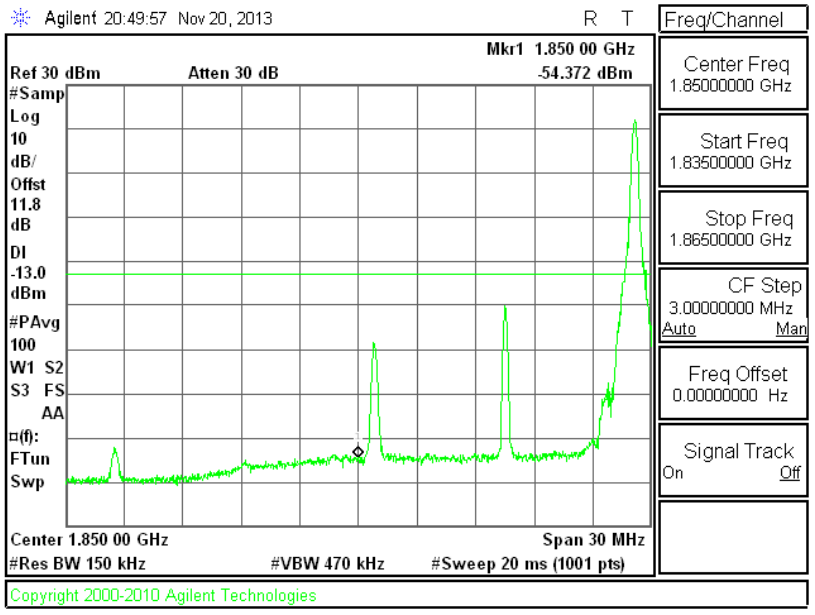
LOW CH, RB1_0



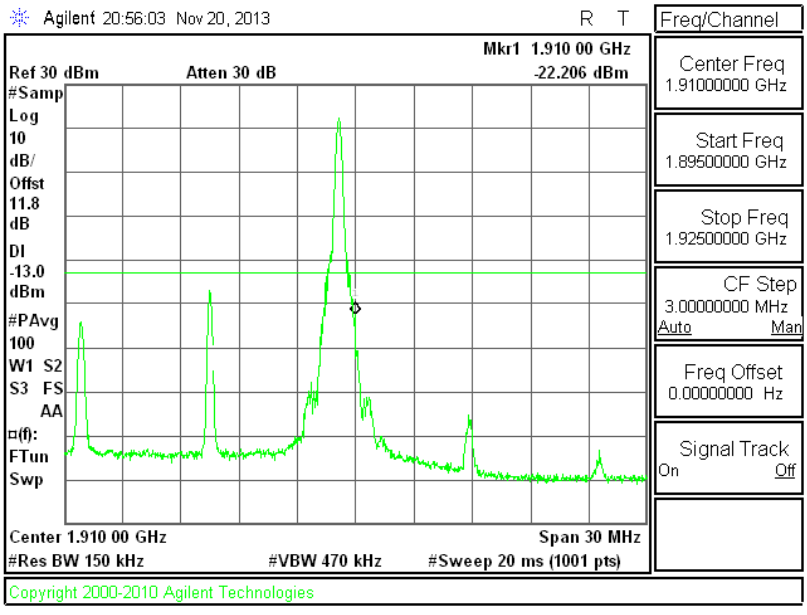
HIGH CH, RB1-0



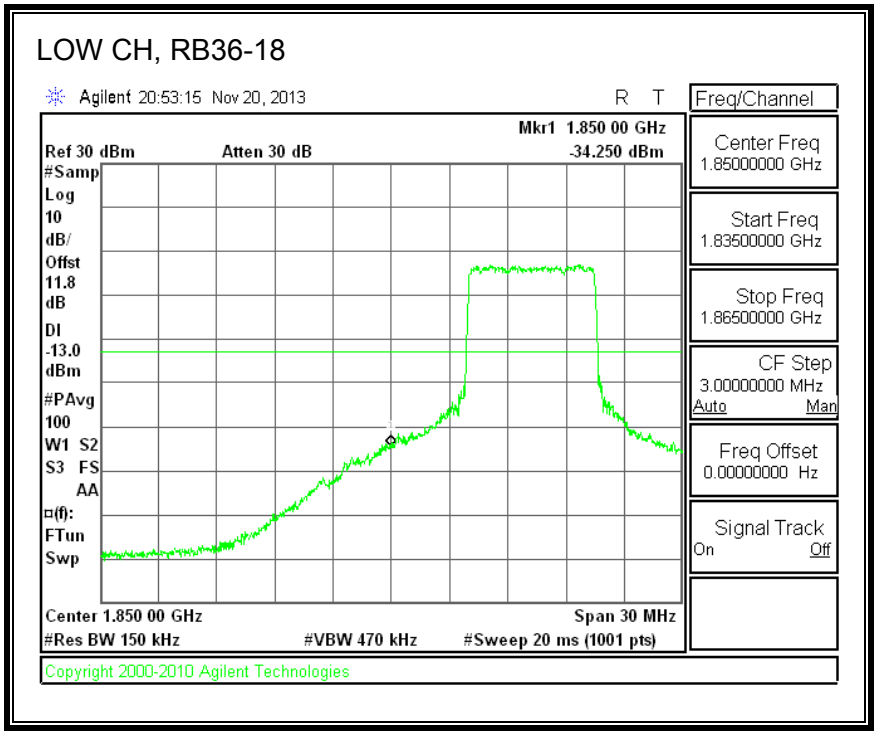
LOW CH, RB1-74



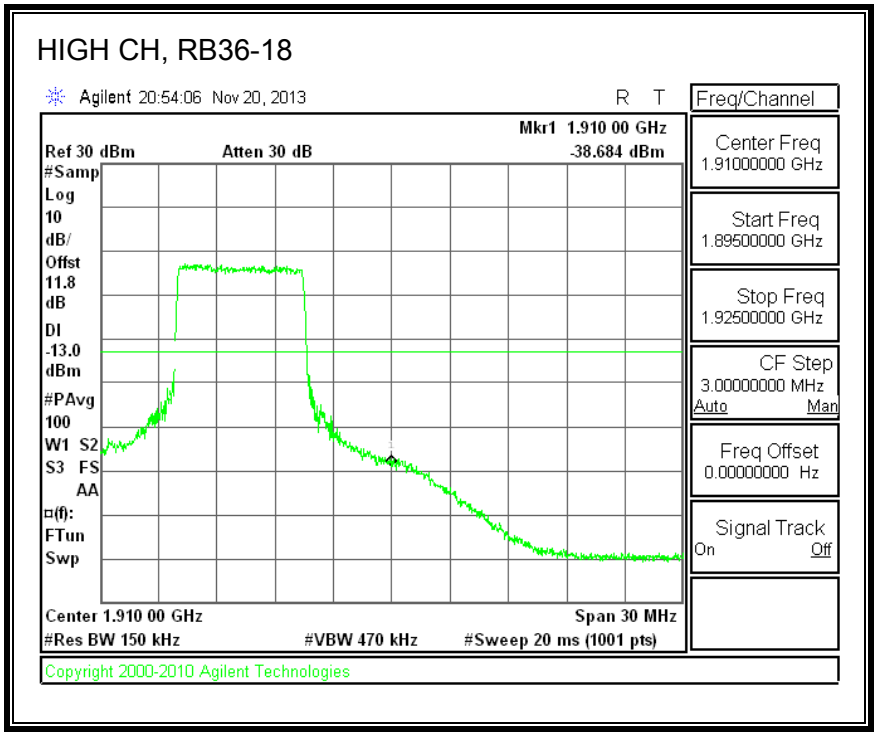
HIGH CH, RB1-74



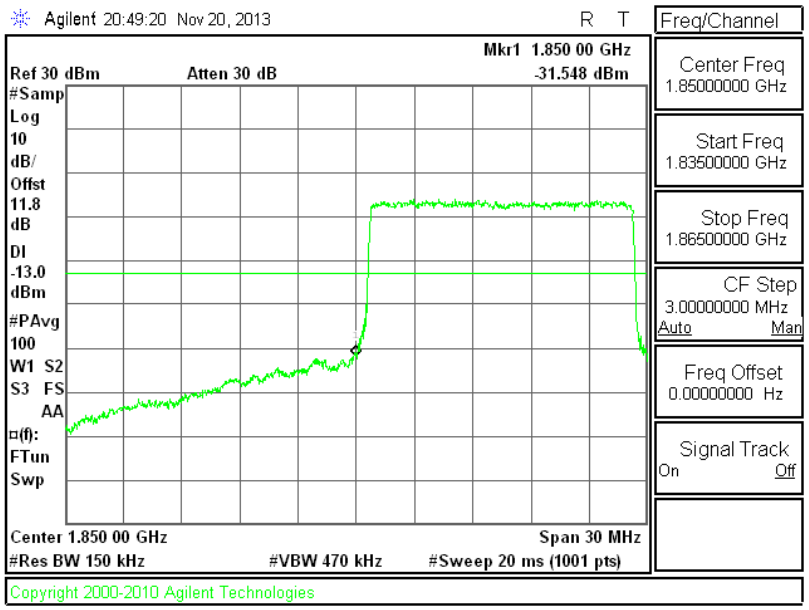
LOW CH, RB36-18



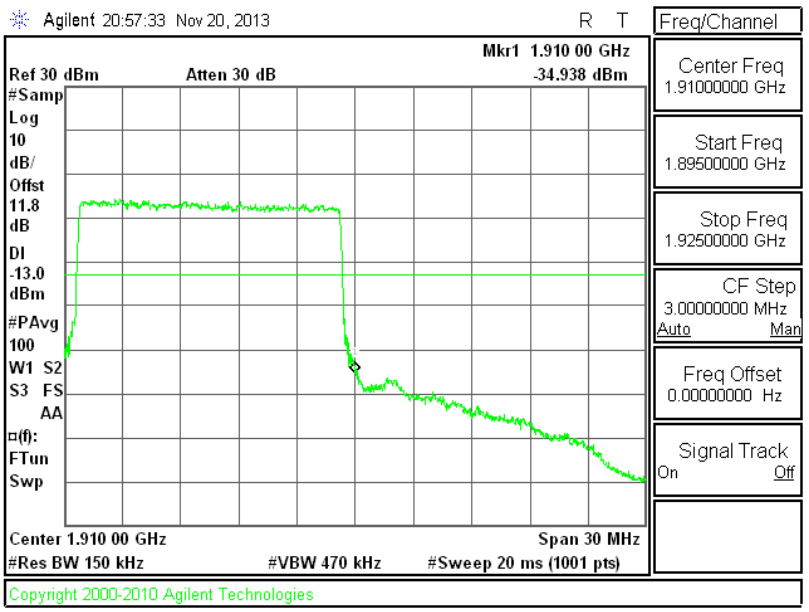
HIGH CH, RB36-18



LOW CH, RB75-0



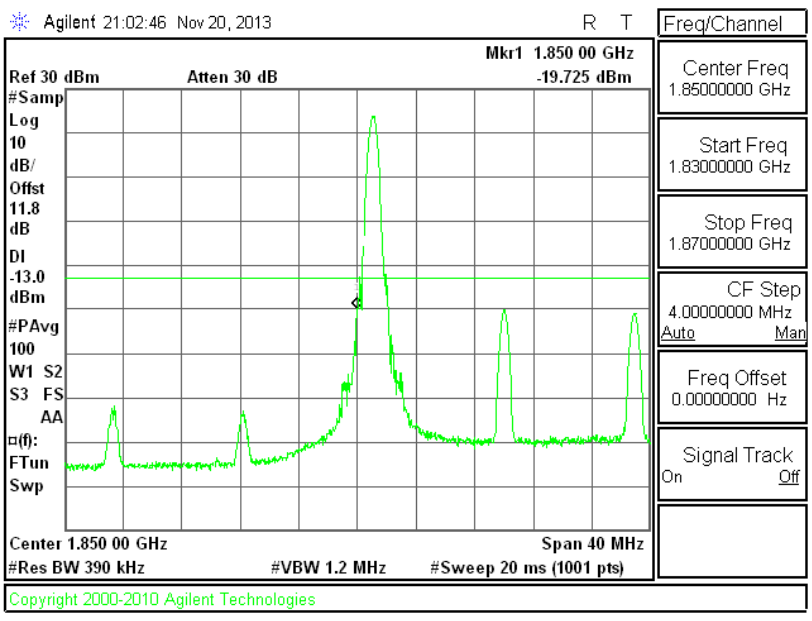
HIGH CH, RB75-0



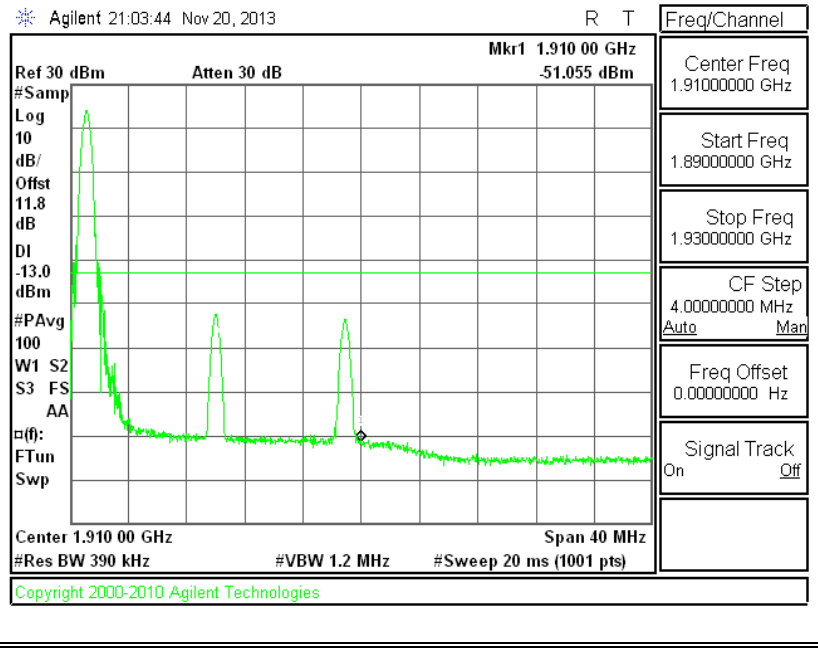
Band 2 (20MHz BANDWIDTH)

LTE QPSK

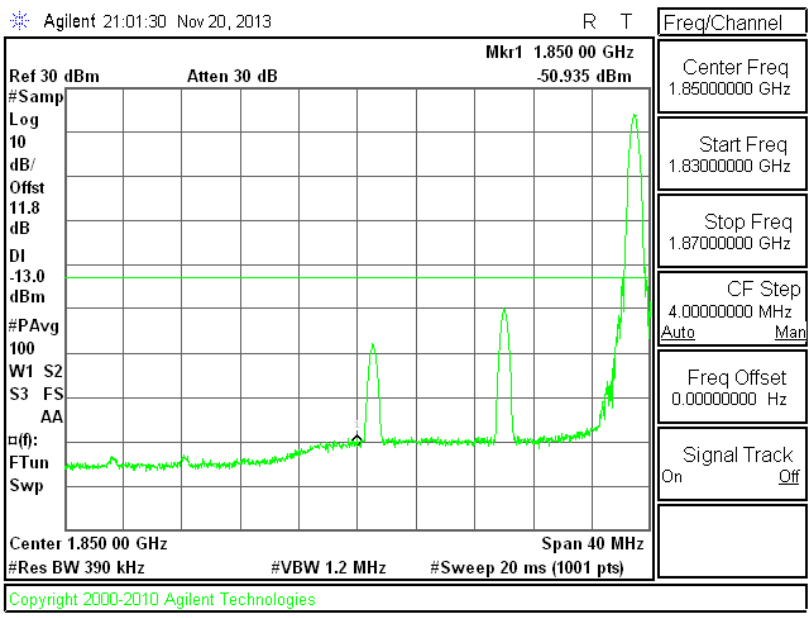
LOW CH, RB1_0



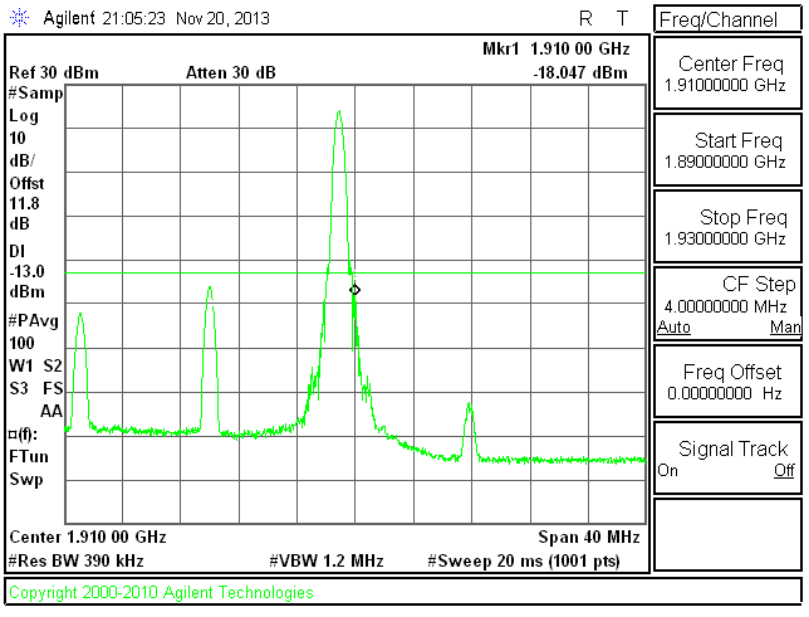
HIGH CH, RB1-0



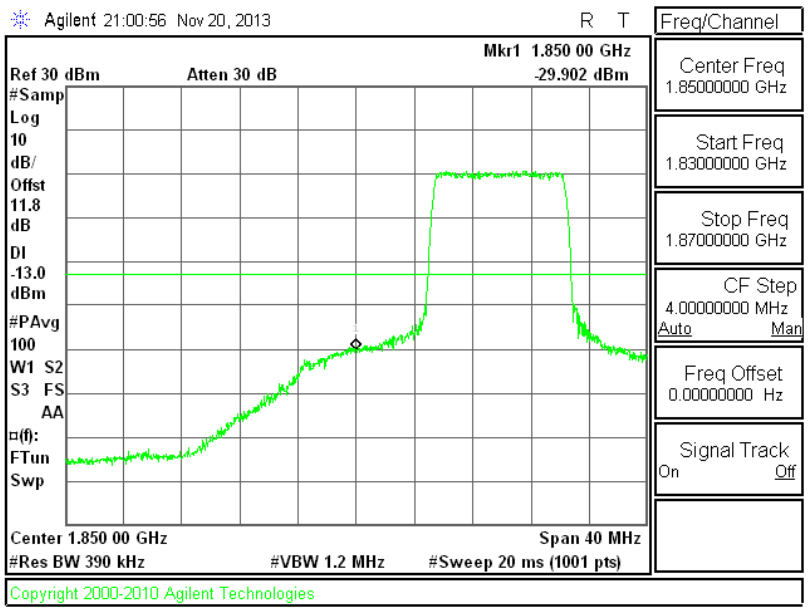
LOW CH, RB1-99



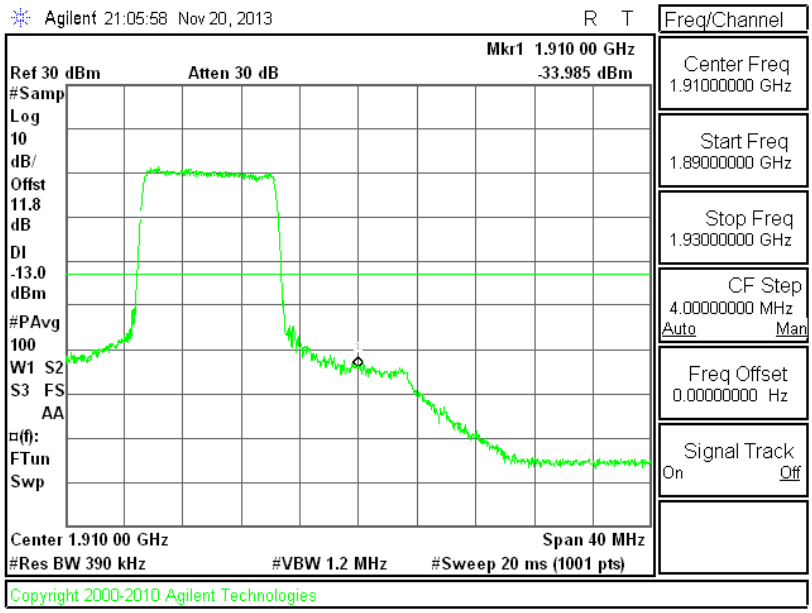
HIGH CH, RB1-99



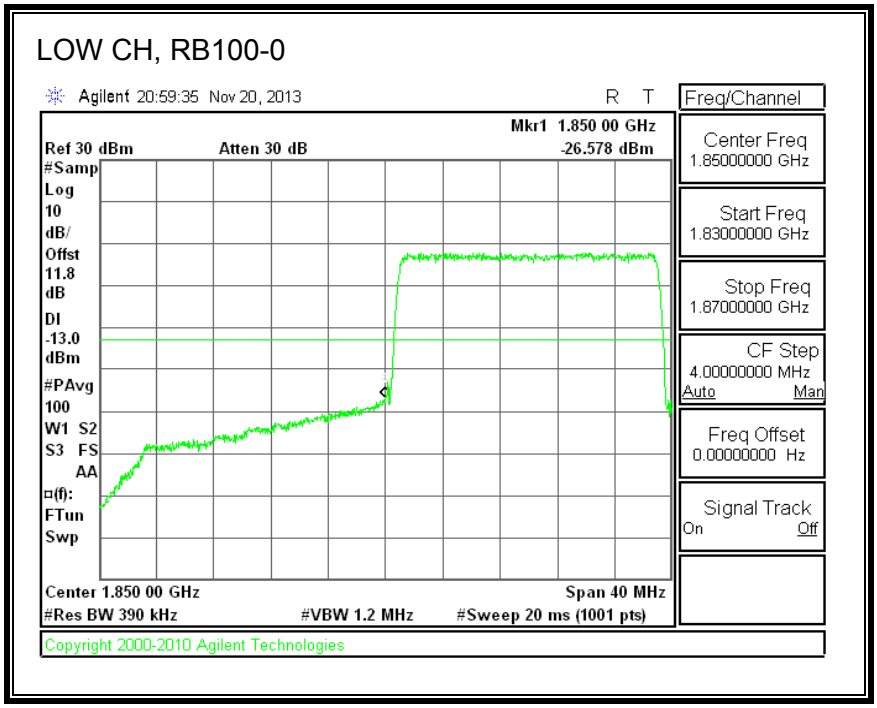
LOW CH, RB50-19



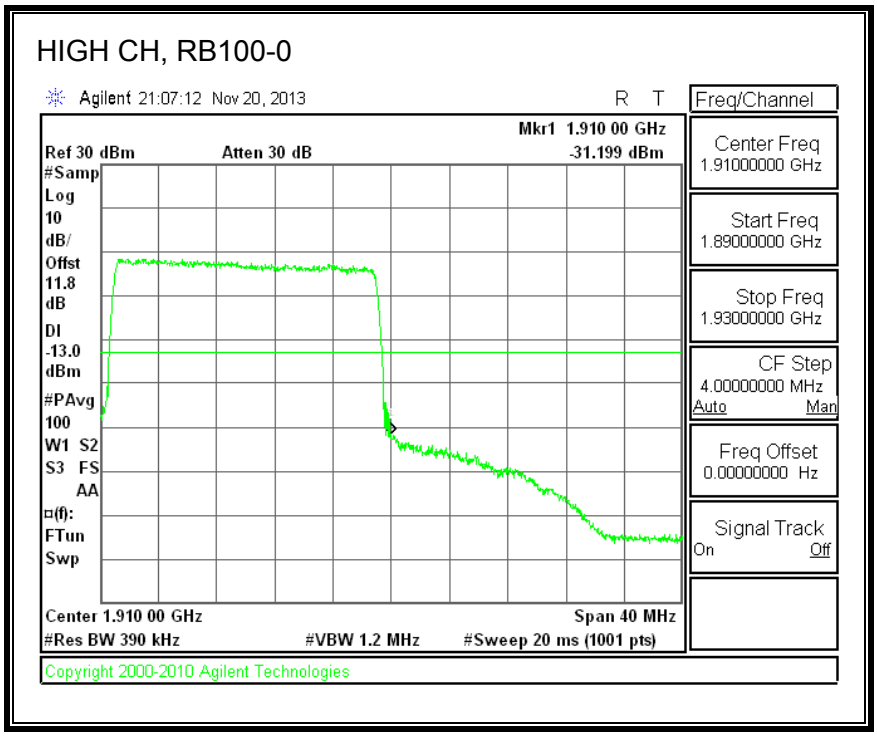
HIGH CH, RB50-19



LOW CH, RB100-0



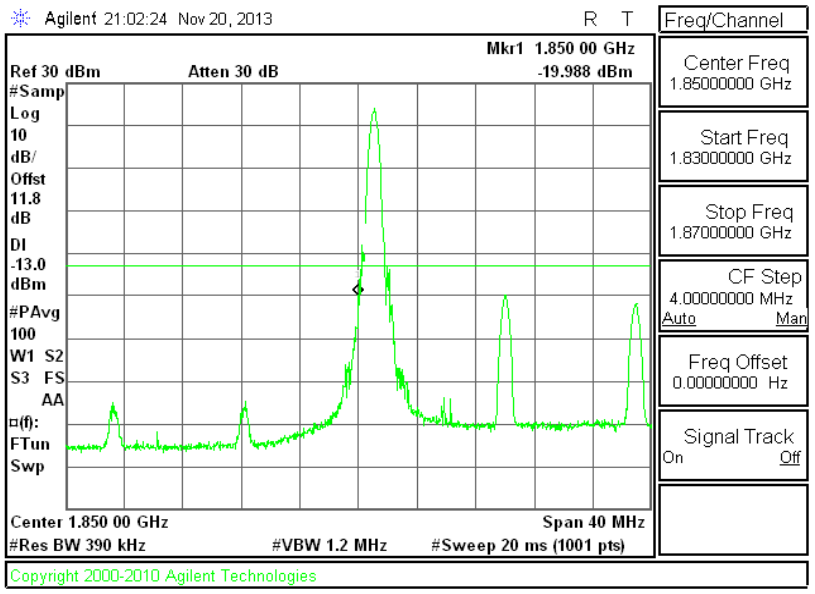
HIGH CH, RB100-0



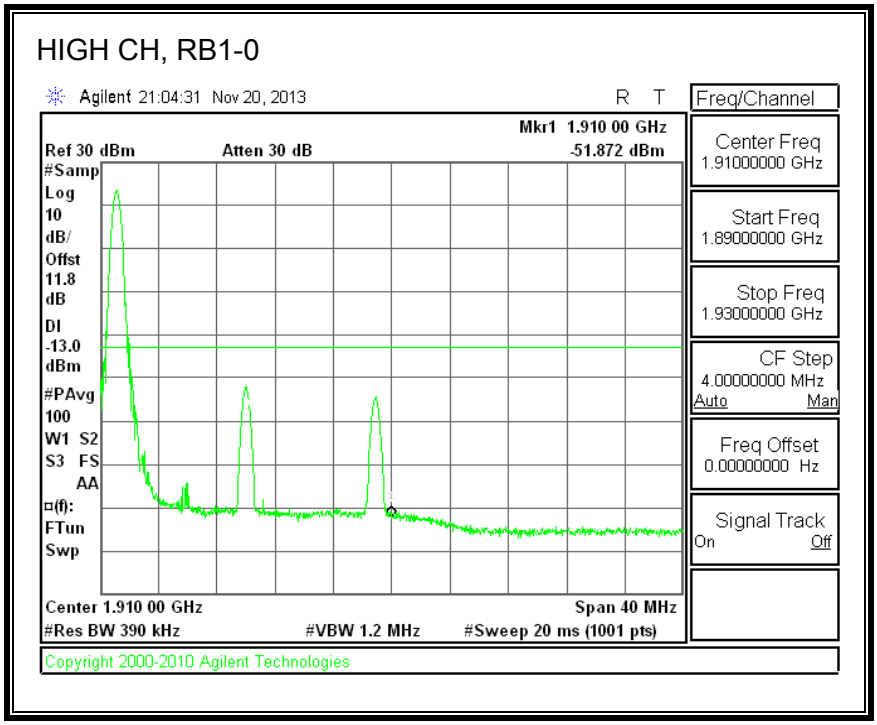
Band 2 (20MHz BANDWIDTH)

LTE 16QAM

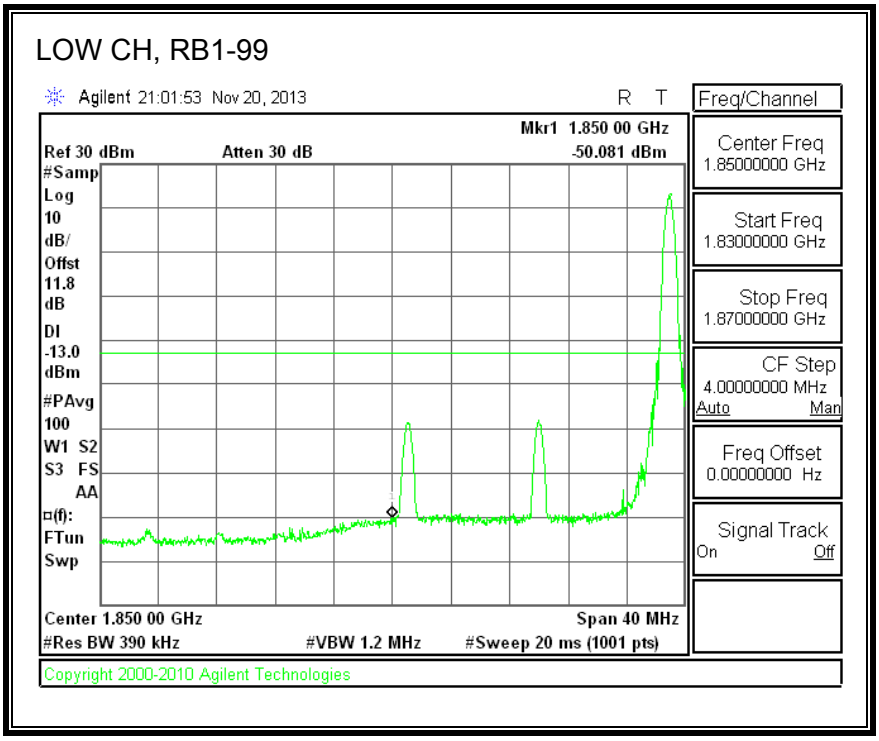
LOW CH, RB1_0



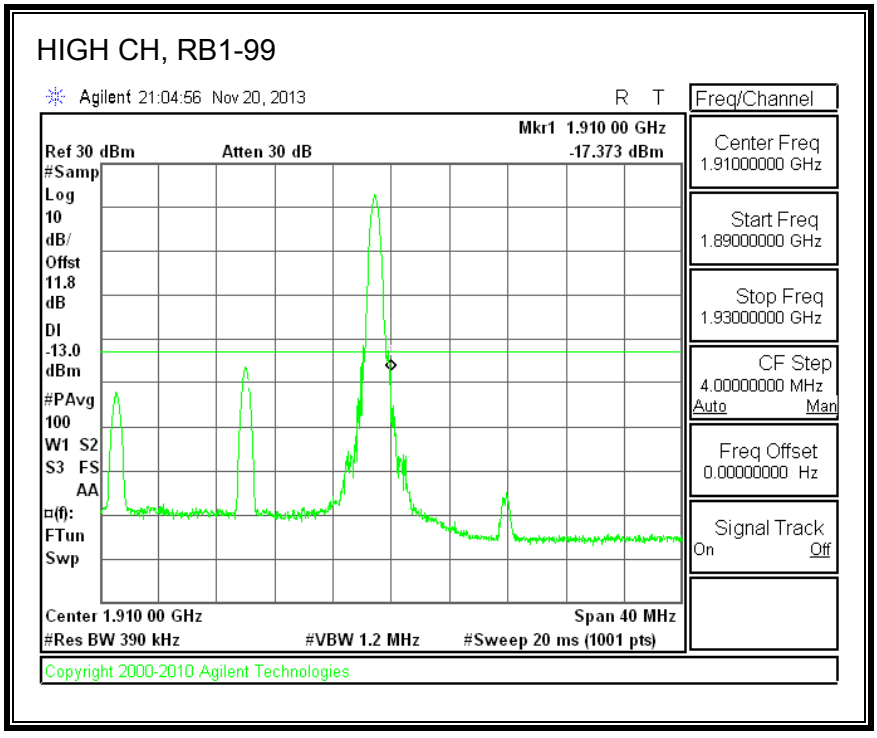
HIGH CH, RB1-0



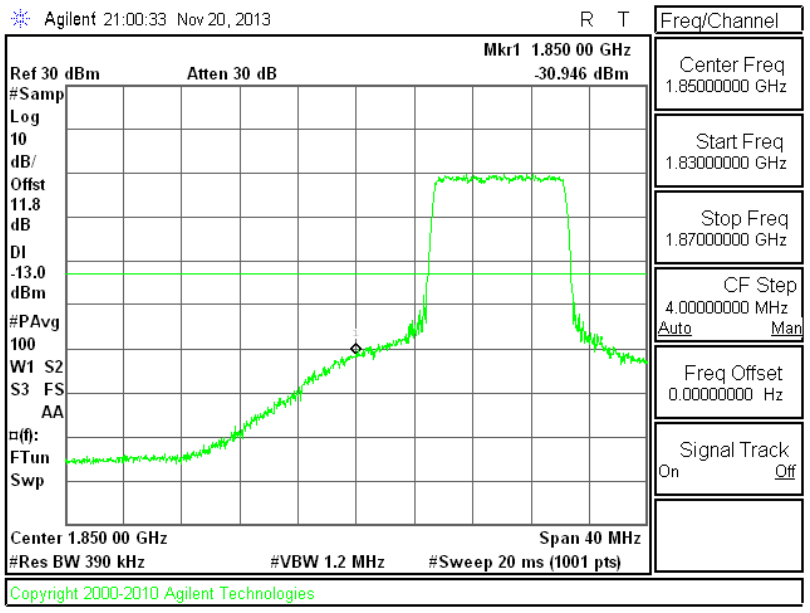
LOW CH, RB1-99



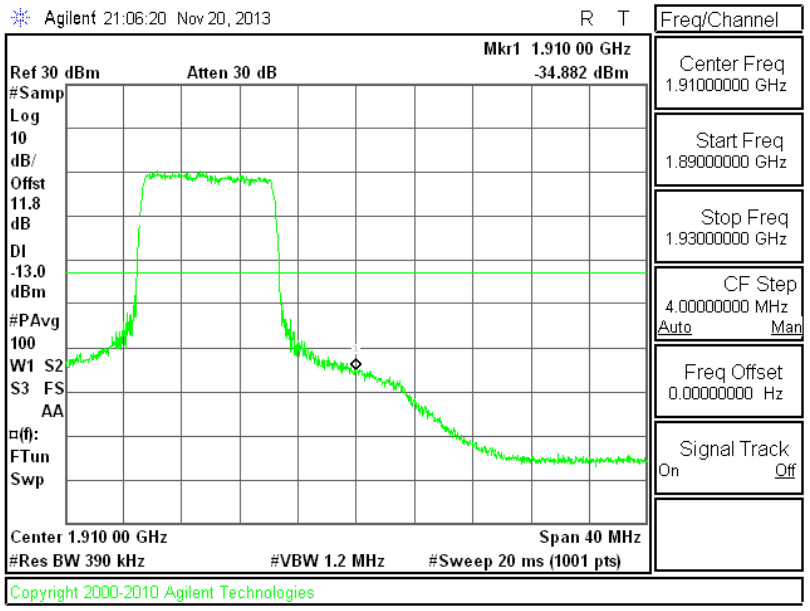
HIGH CH, RB1-99



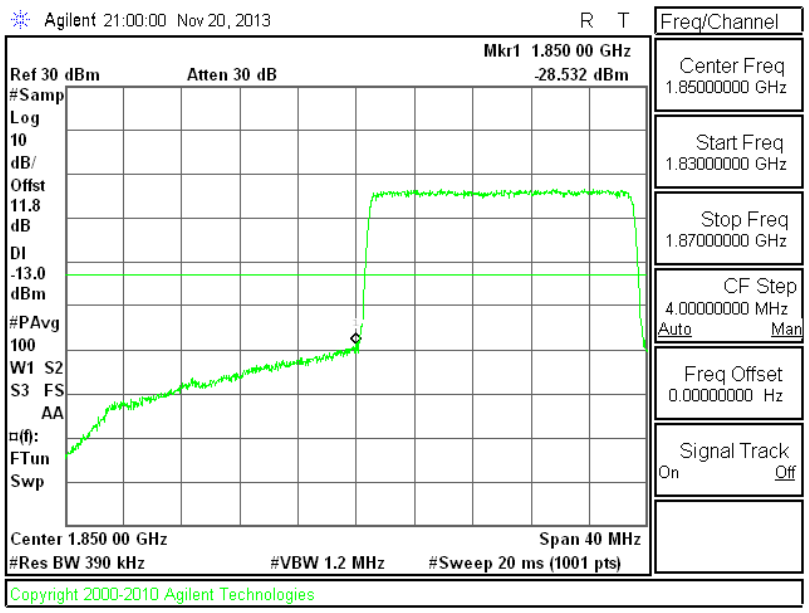
LOW CH, RB50-19



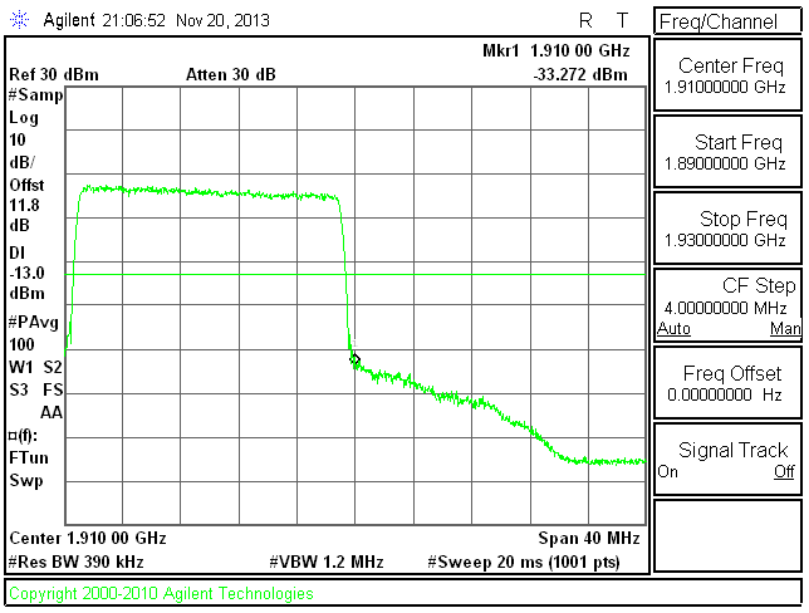
HIGH CH, RB50-19



LOW CH, RB100-0



HIGH CH, RB100-0

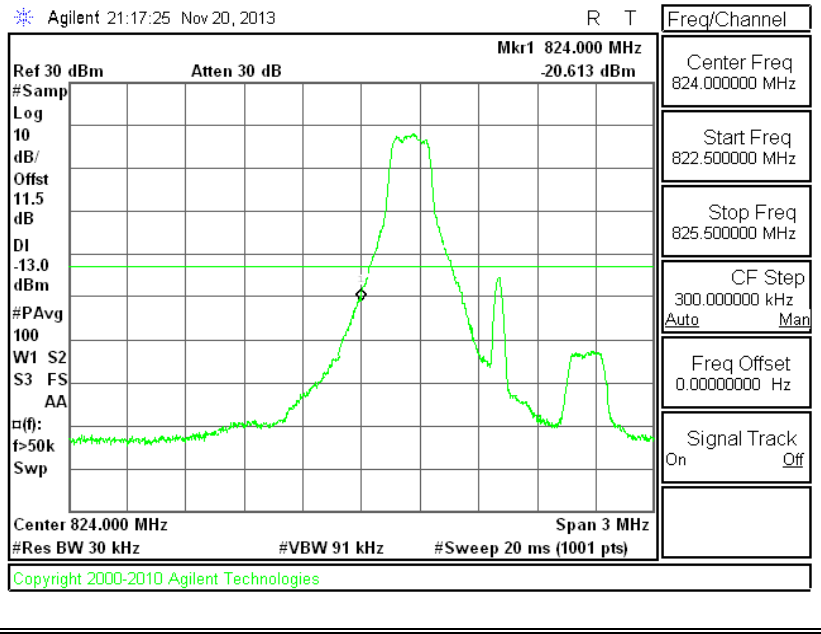


8.2.2. LTE BAND 5

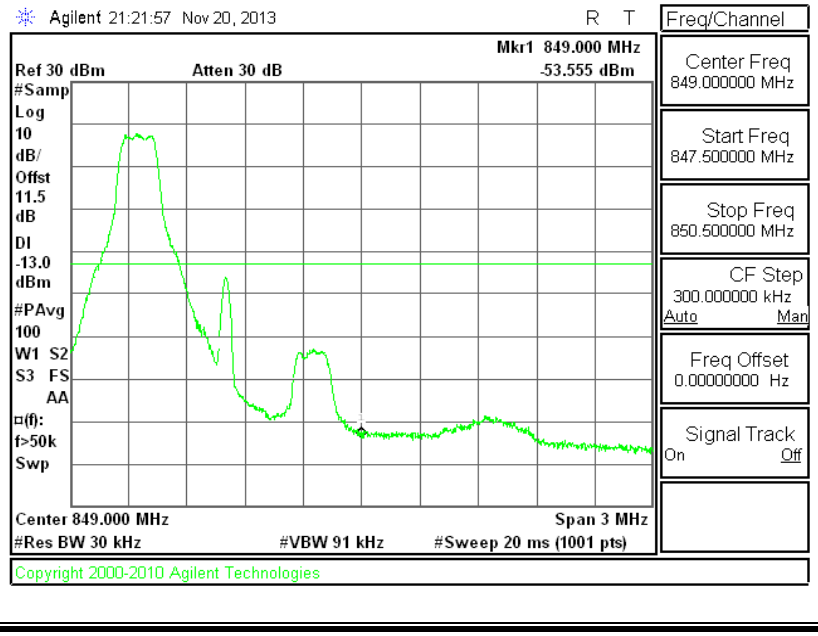
Band 5 (1.4 MHz BANDWIDTH)

LTE QPSK

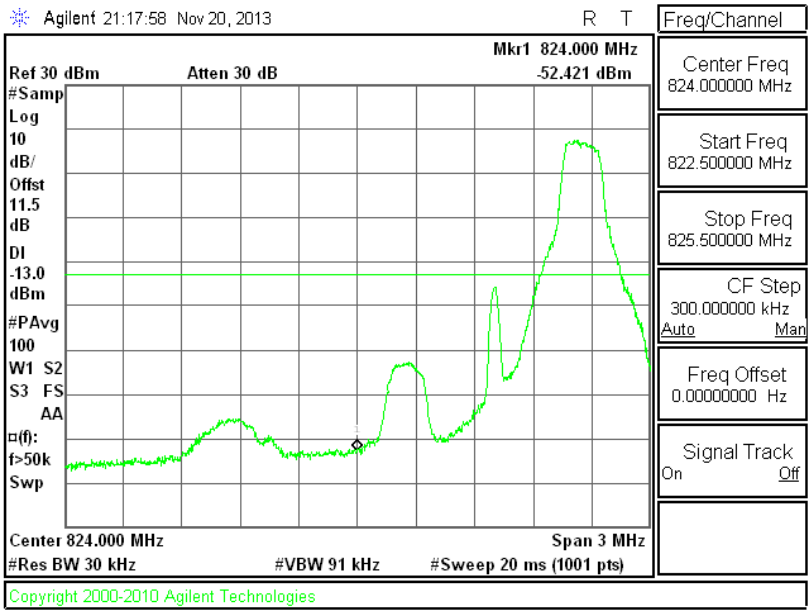
LOW CH, RB1_0



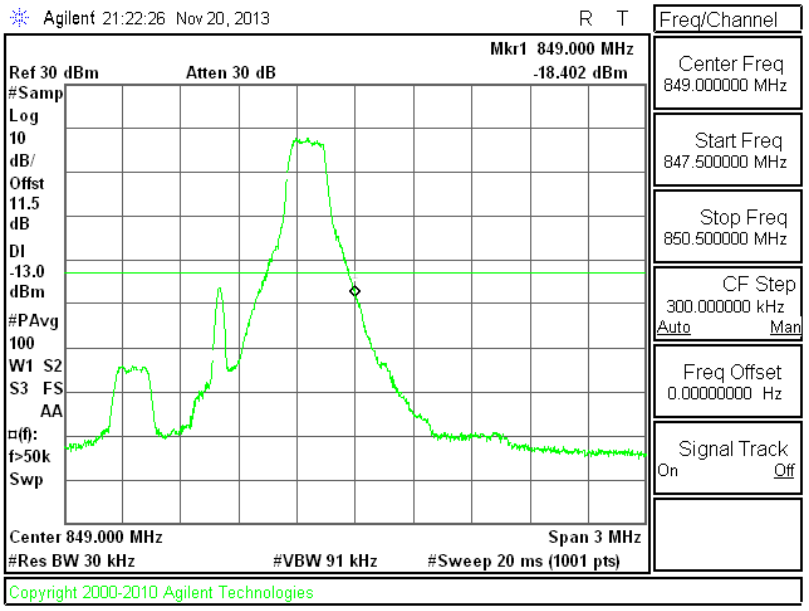
HIGH CH, RB1-0



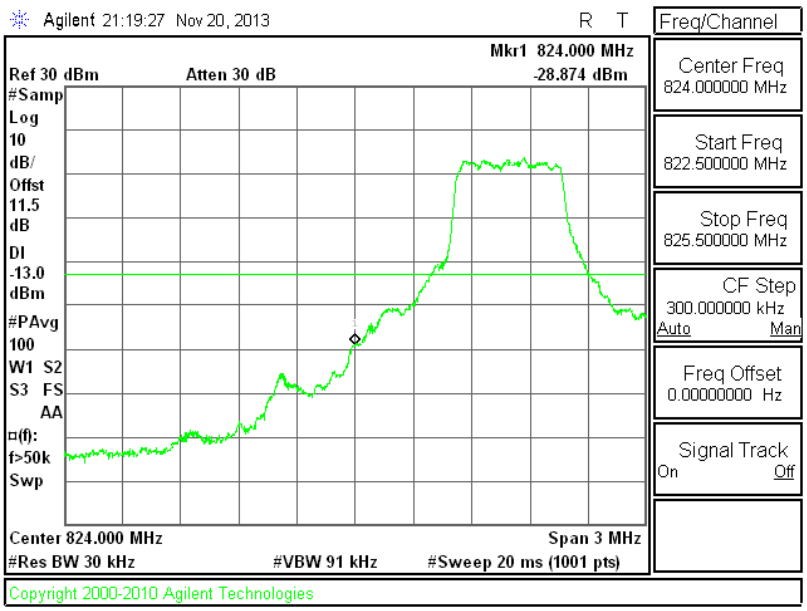
LOW CH, RB1-5



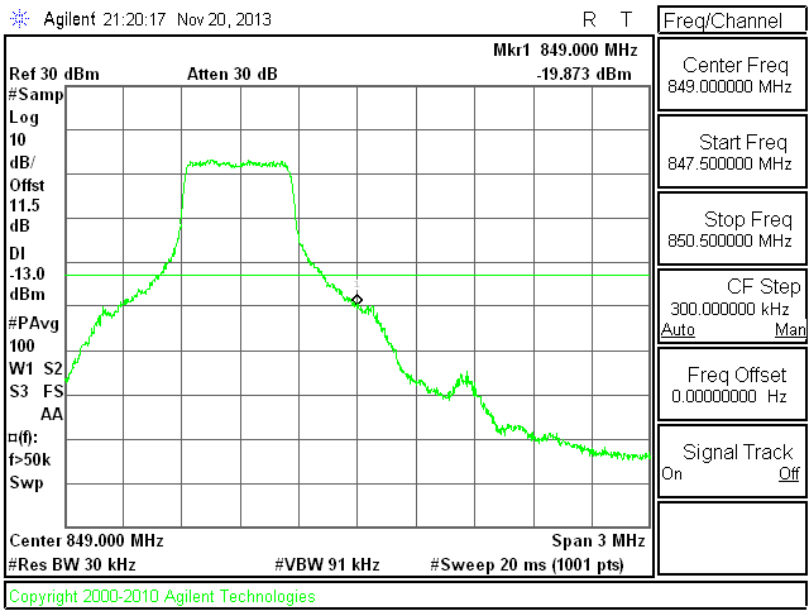
HIGH CH, RB1-5



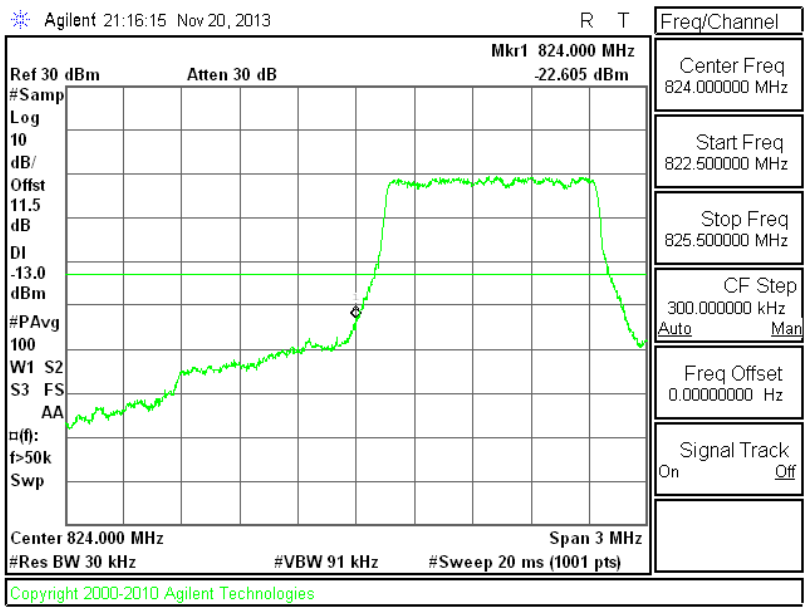
LOW CH, RB3-2



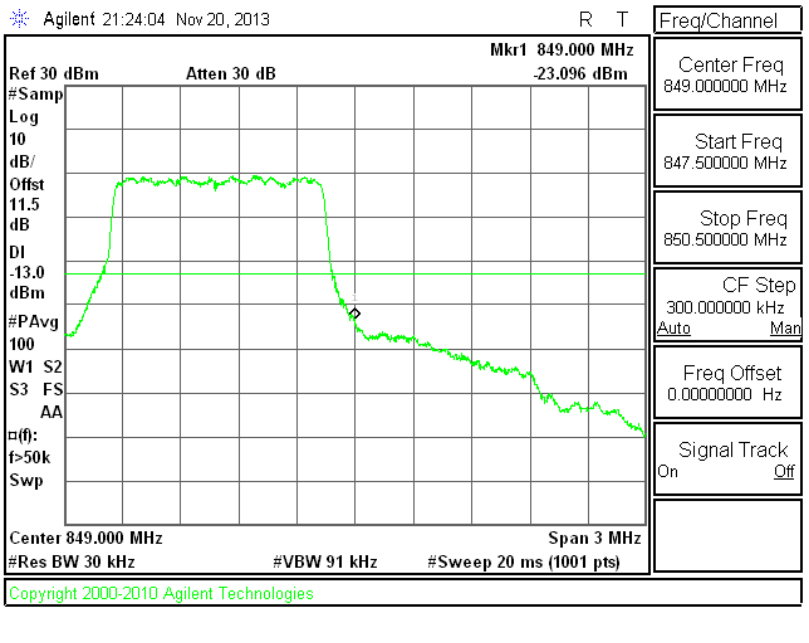
HIGH CH, RB3-2



LOW CH, RB6-0



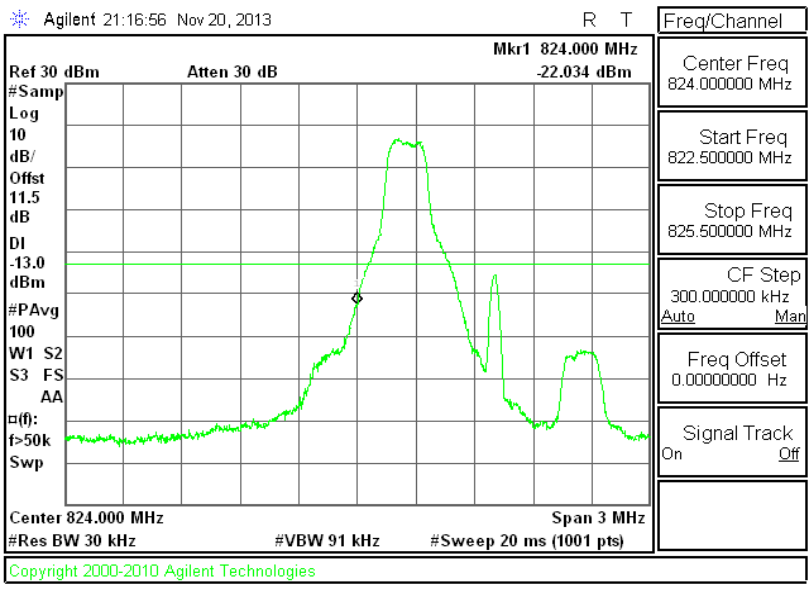
HIGH CH, RB6-0



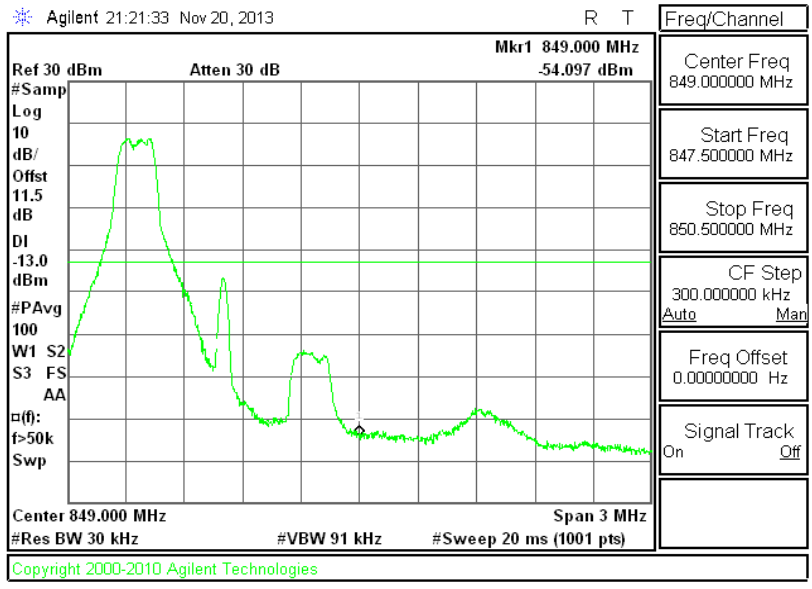
Band 5 (1.4 MHz BANDWIDTH)

LTE 16QAM

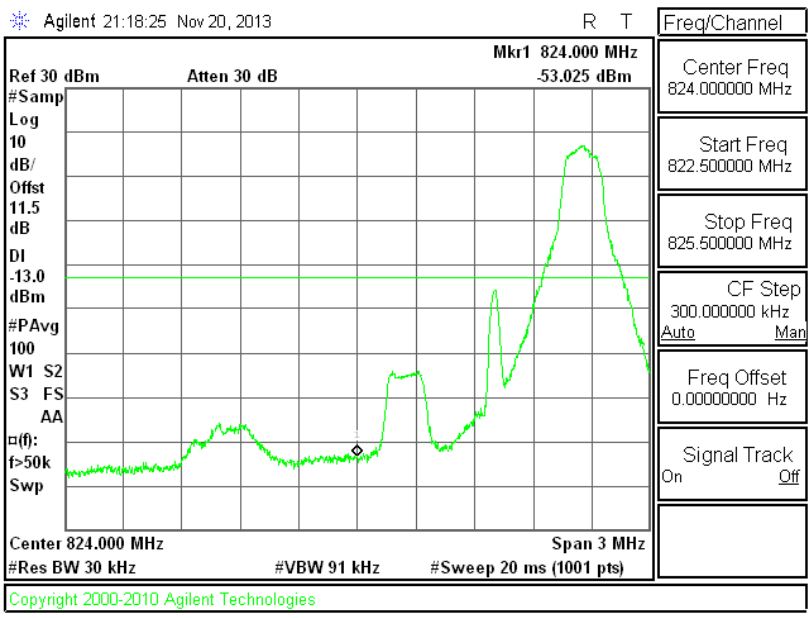
LOW CH, RB1_0



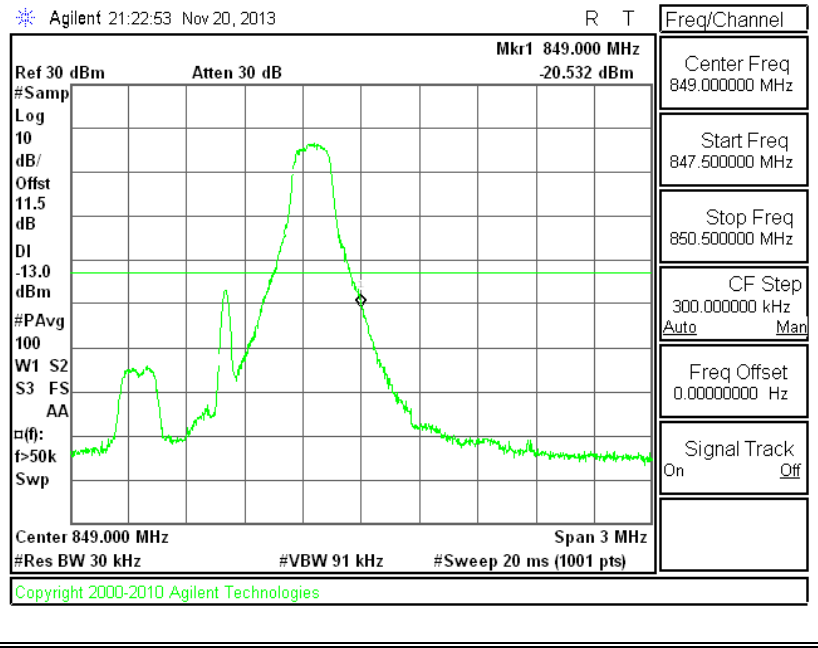
HIGH CH, RB1-0



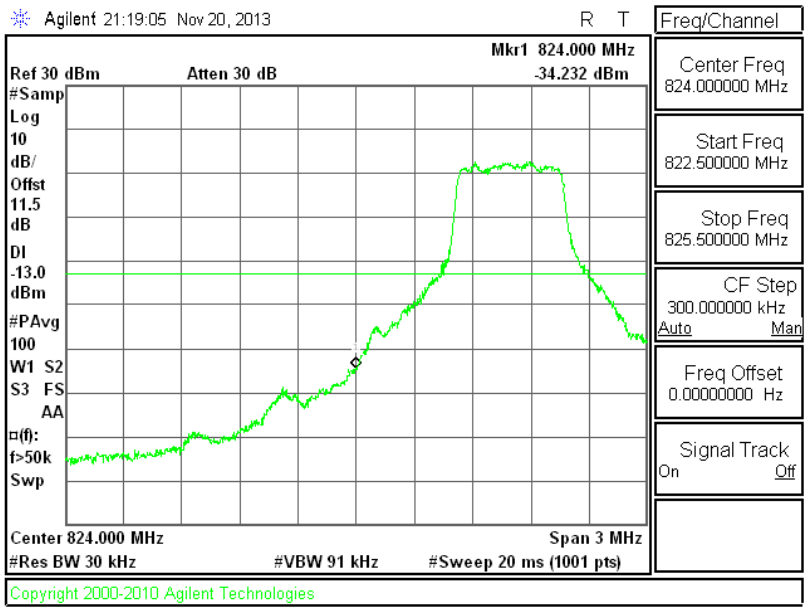
LOW CH, RB1-5



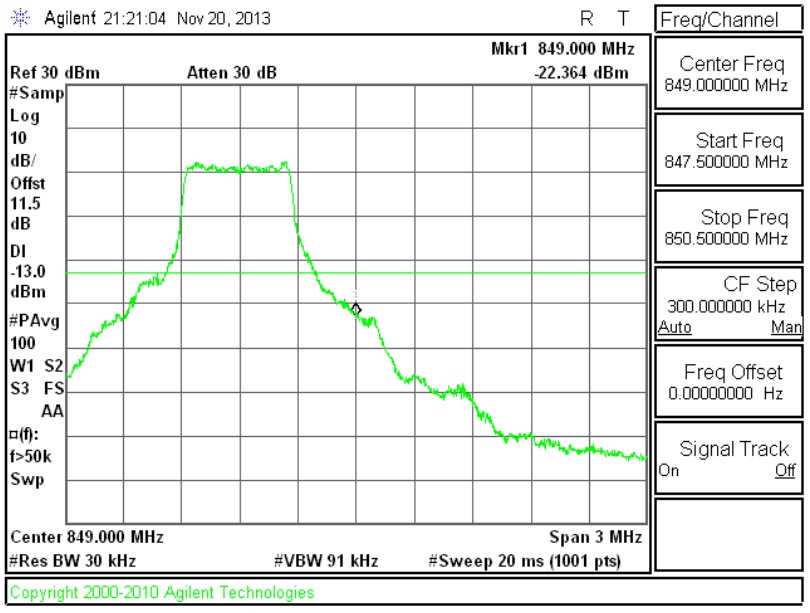
HIGH CH, RB1-5



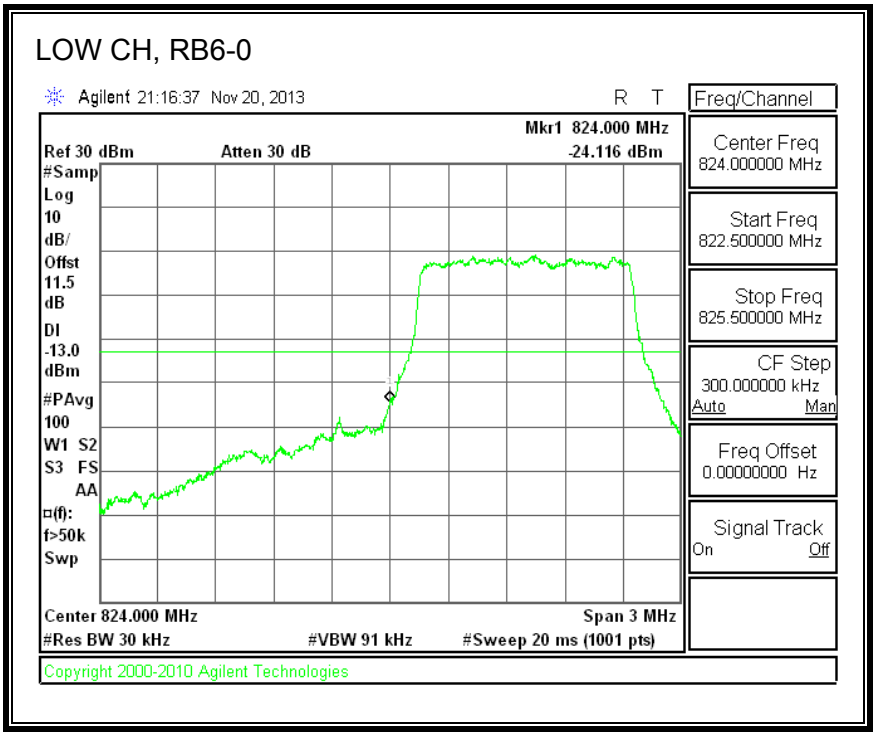
LOW CH, RB3-2



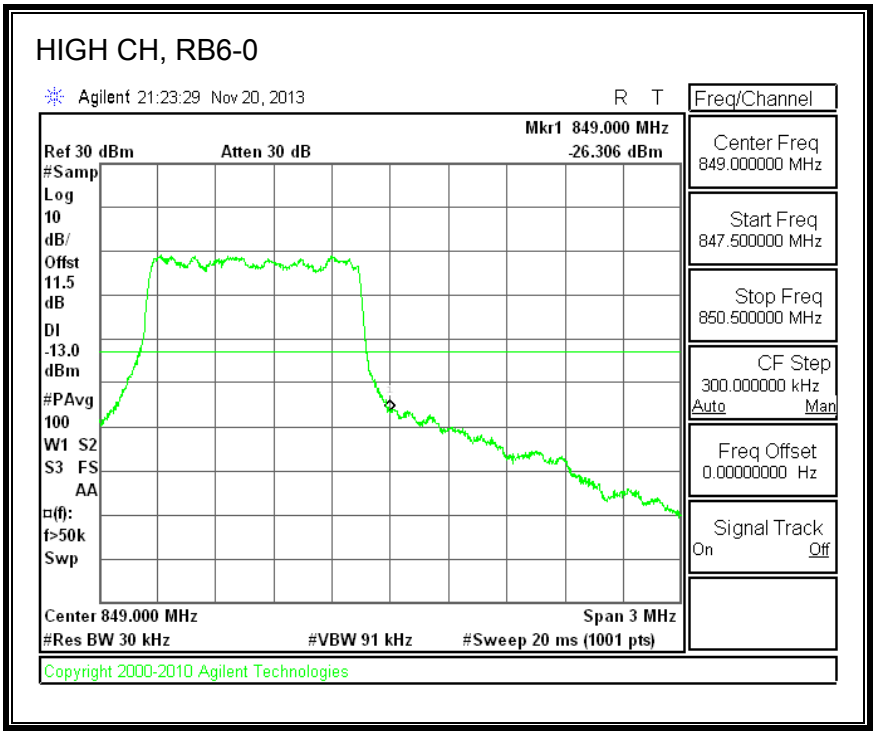
HIGH CH, RB3-2



LOW CH, RB6-0



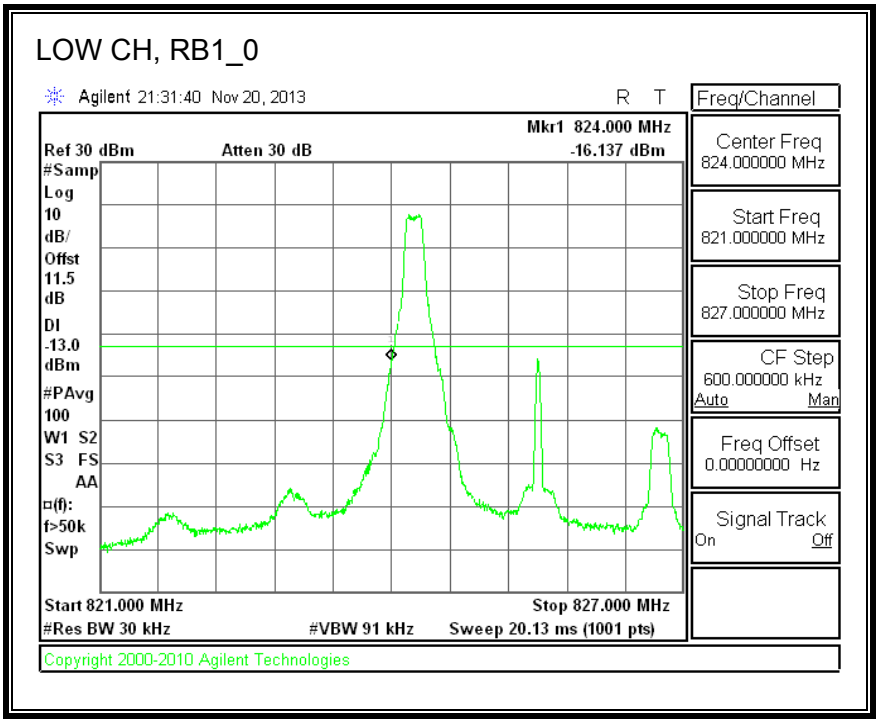
HIGH CH, RB6-0



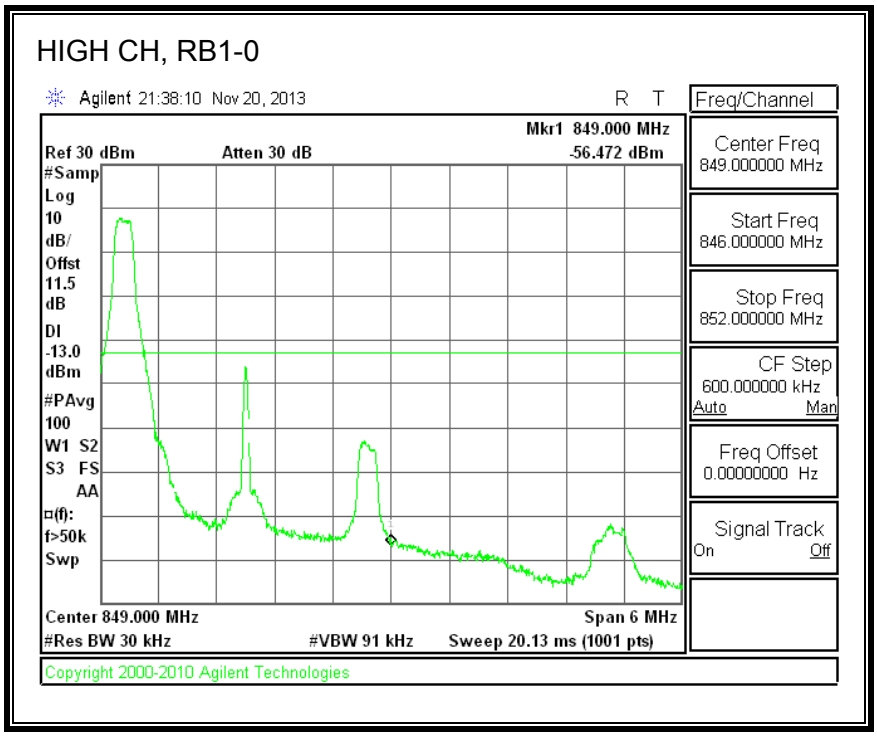
Band 5 (3MHz BANDWIDTH)

LTE QPSK

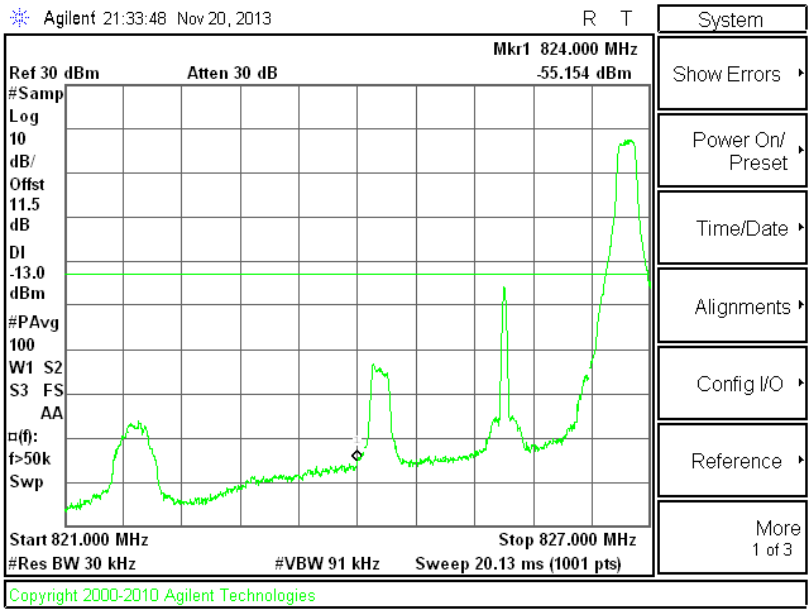
LOW CH, RB1_0



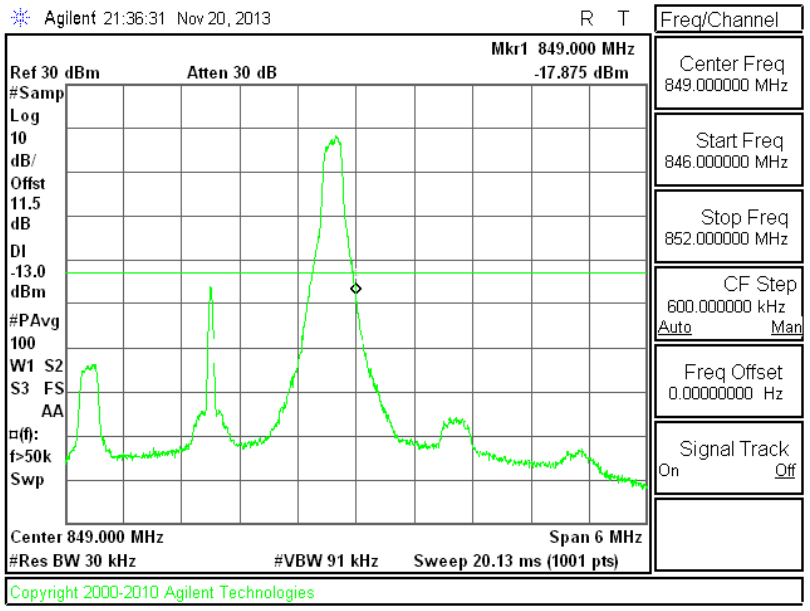
HIGH CH, RB1-0



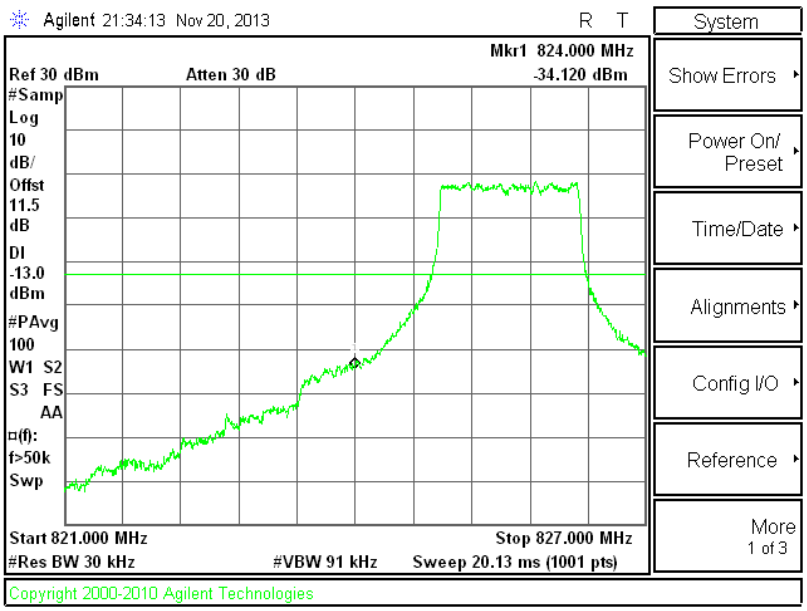
LOW CH, RB1-14



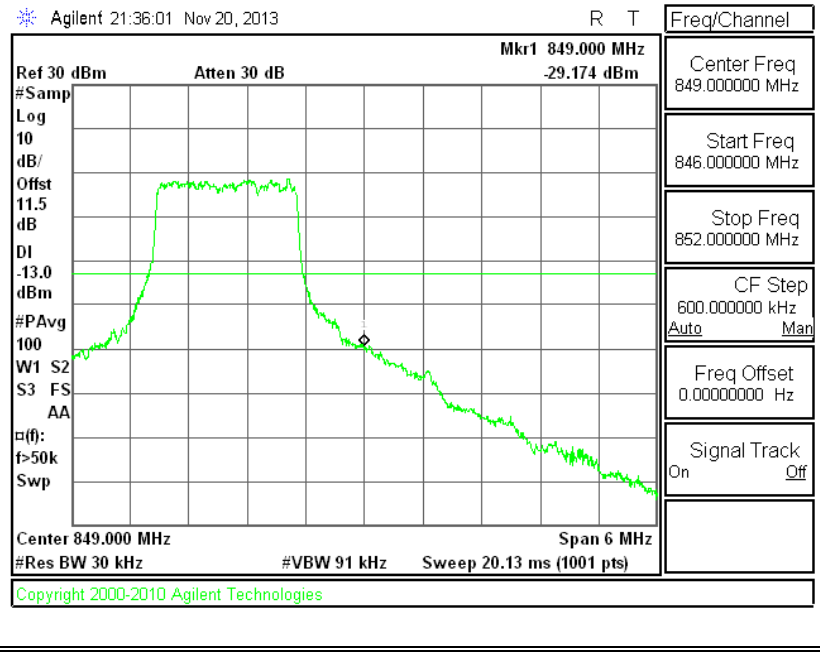
HIGH CH, RB1-14



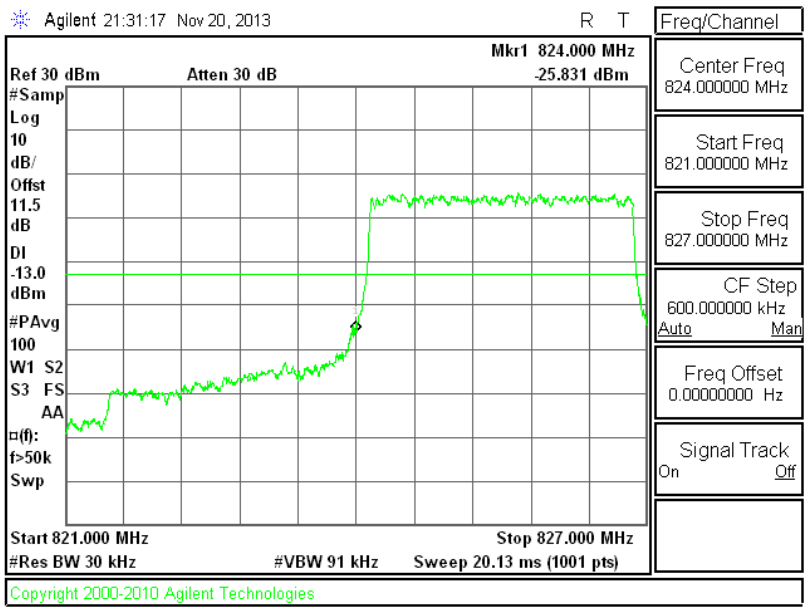
LOW CH, RB8-4



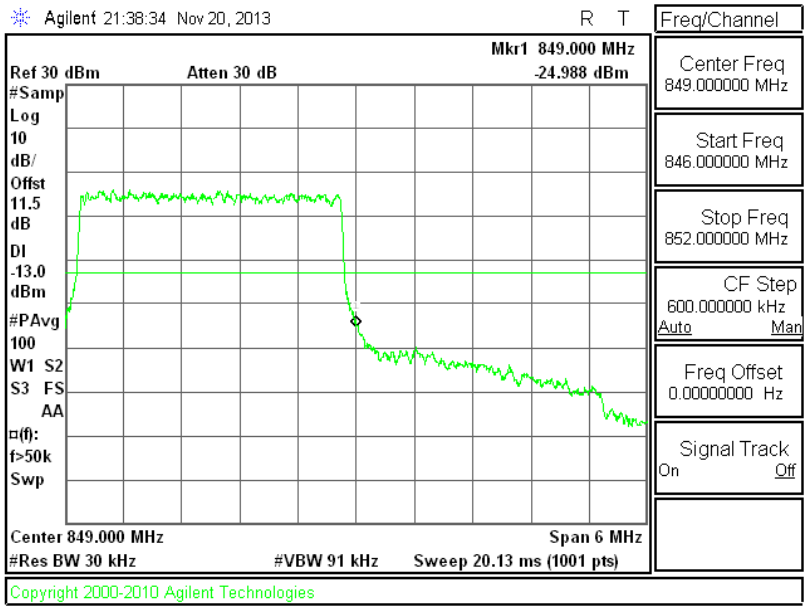
HIGH CH, RB8-4



LOW CH, RB15-0



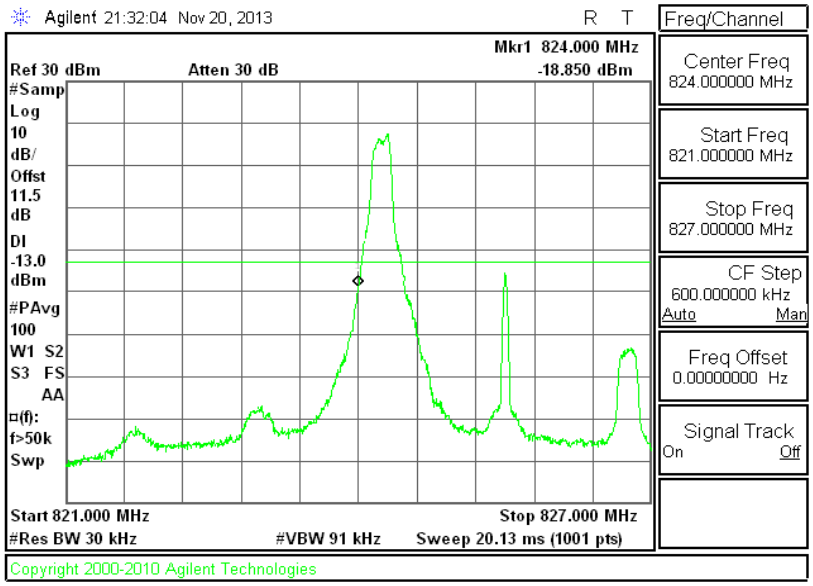
HIGH CH, RB15-0



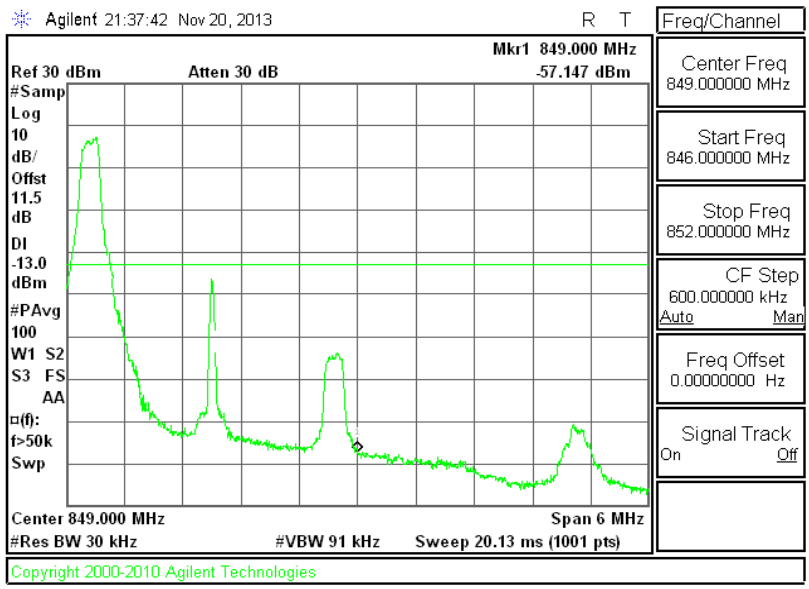
Band 5 (3MHz BANDWIDTH)

LTE 16QAM

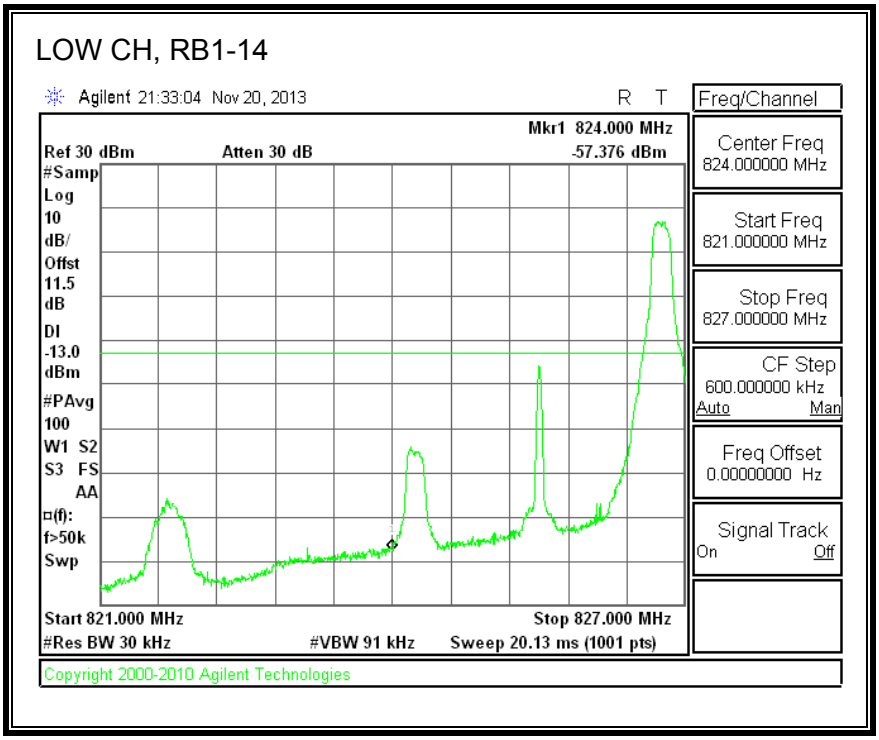
LOW CH, RB1_0



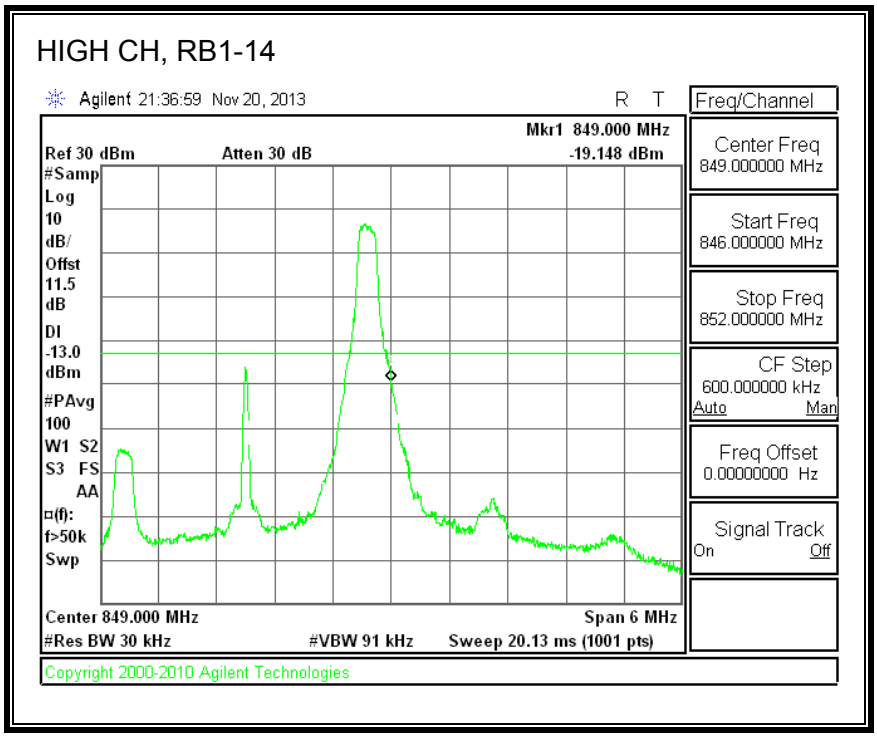
HIGH CH, RB1-0



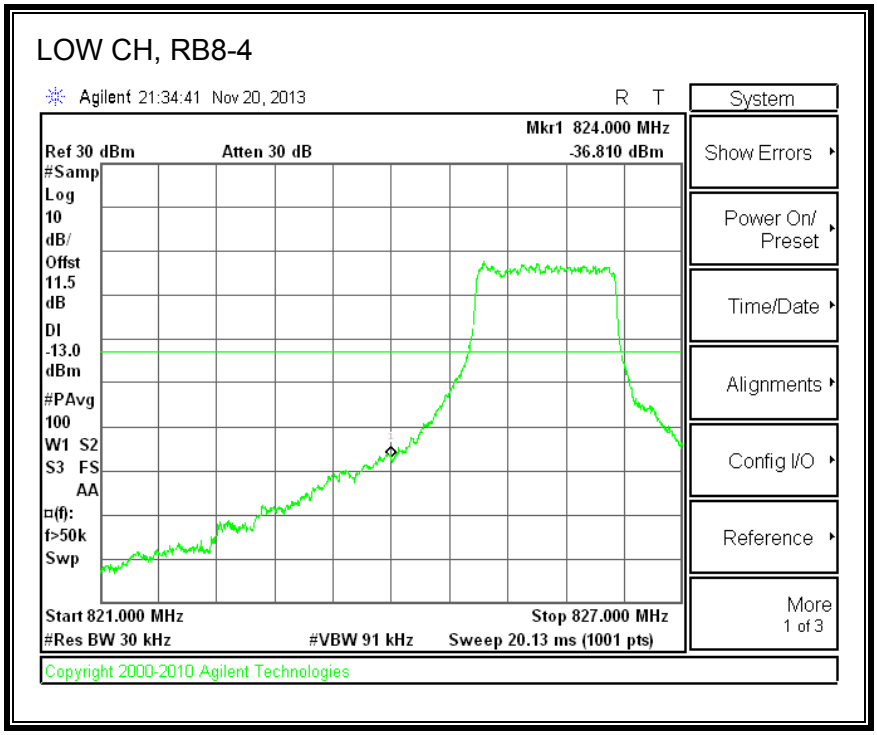
LOW CH, RB1-14



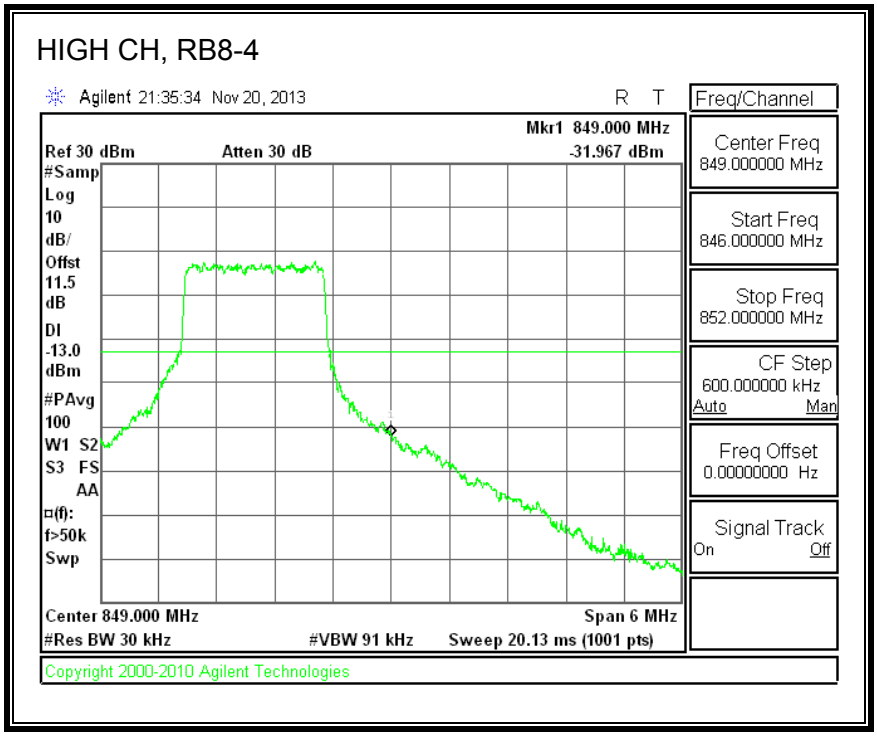
HIGH CH, RB1-14



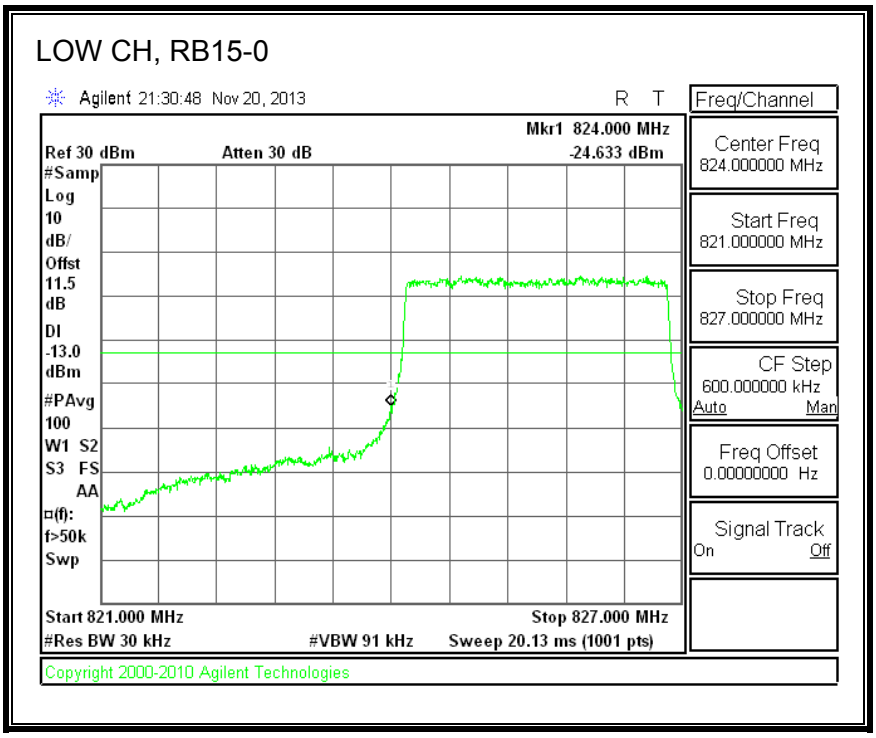
LOW CH, RB8-4



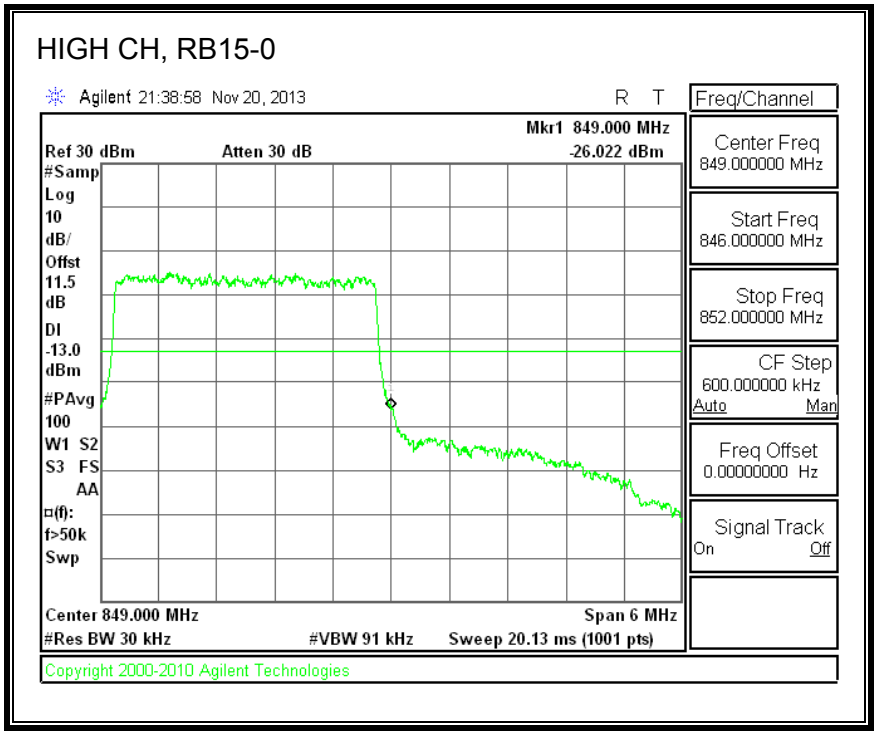
HIGH CH, RB8-4



LOW CH, RB15-0



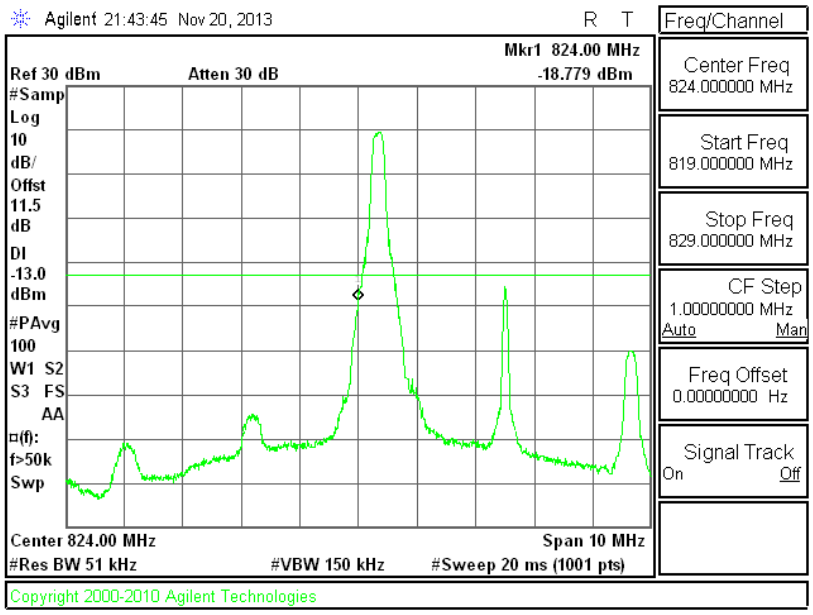
HIGH CH, RB15-0



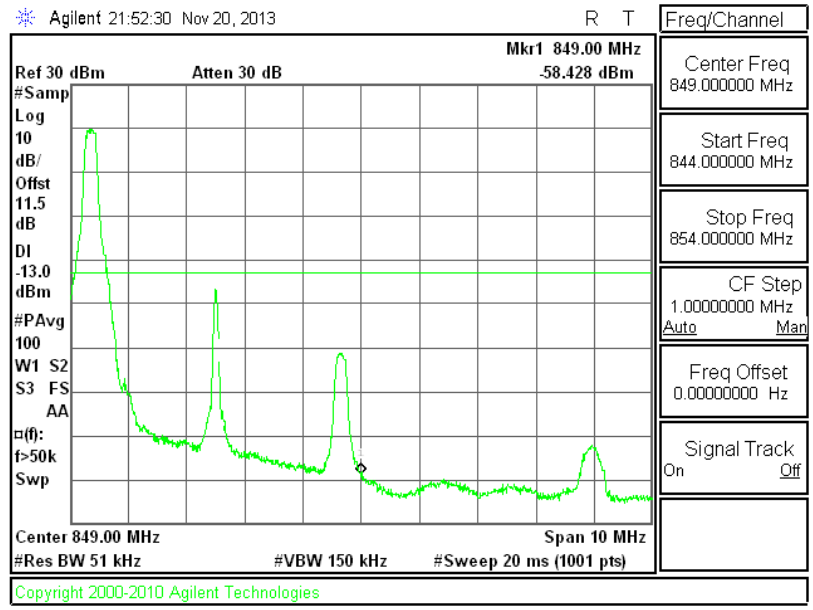
Band 5 (5MHz BANDWIDTH)

LTE QPSK

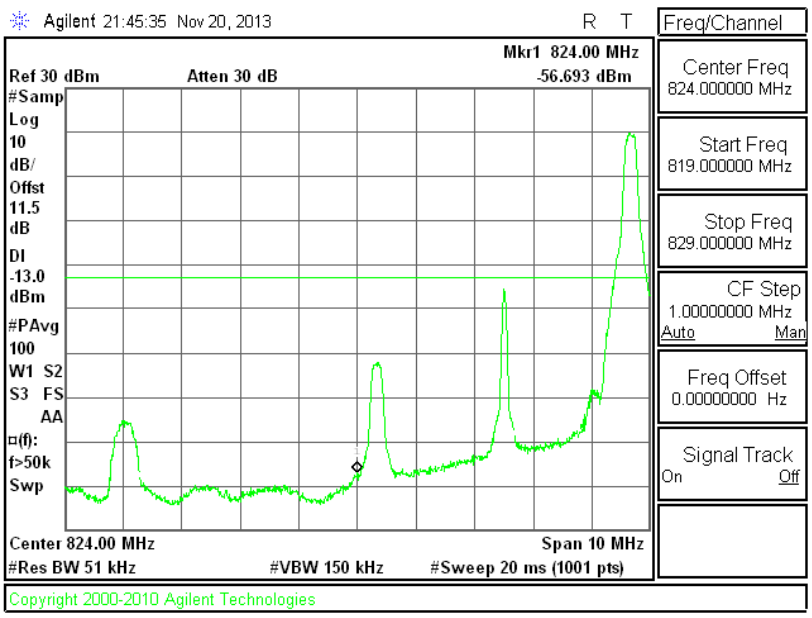
LOW CH, RB1_0



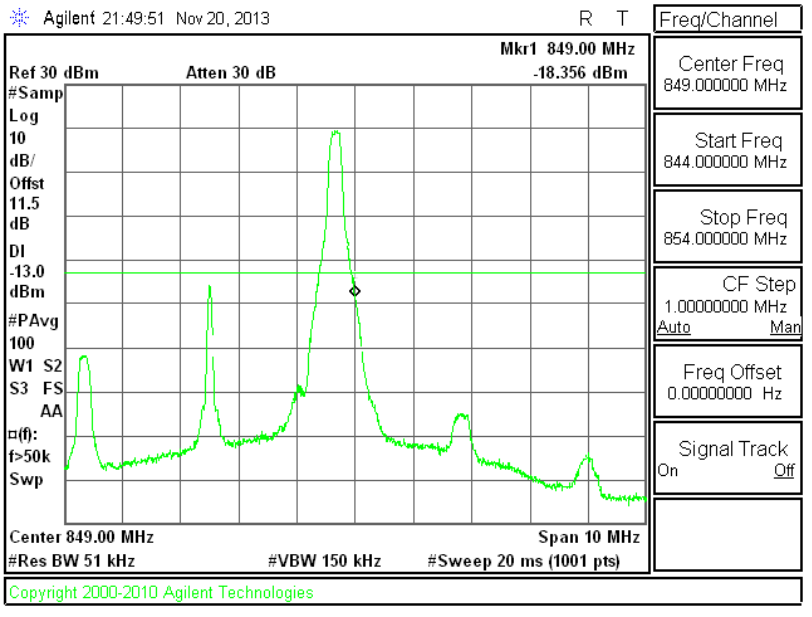
HIGH CH, RB1-0



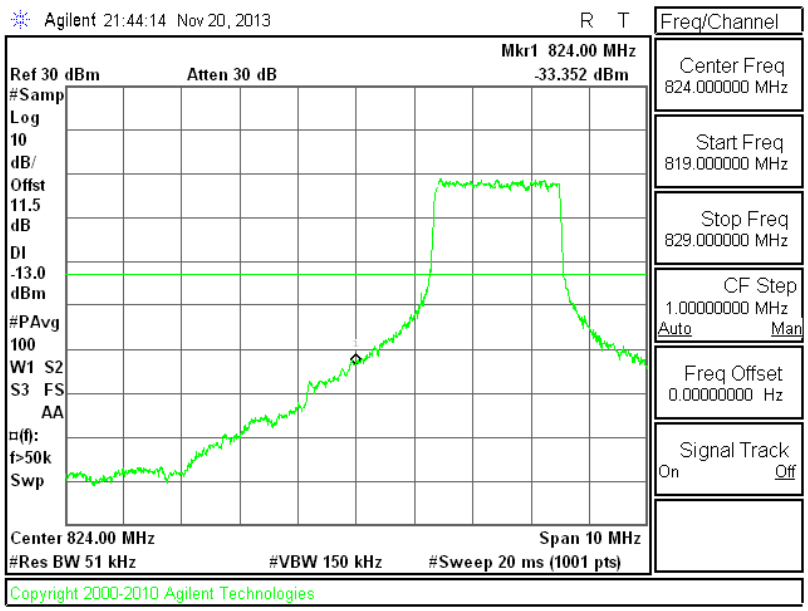
LOW CH, RB1-24



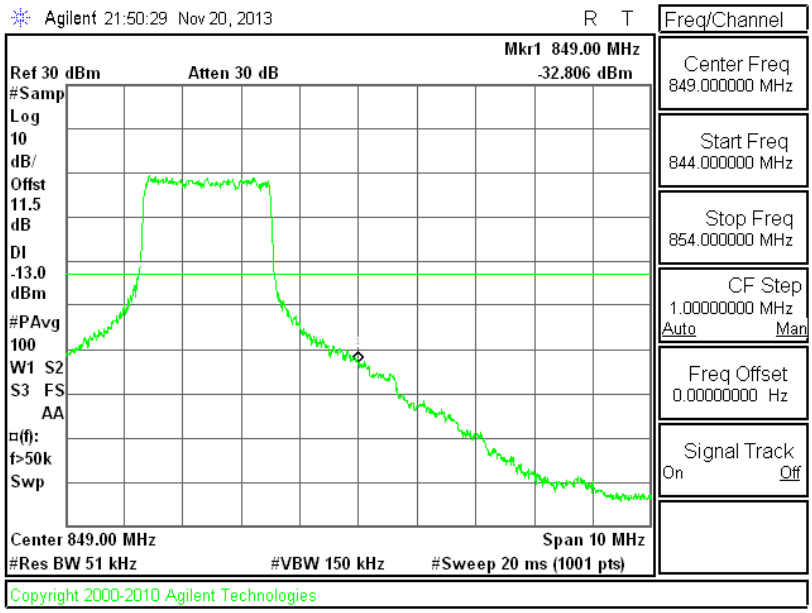
HIGH CH, RB1-24



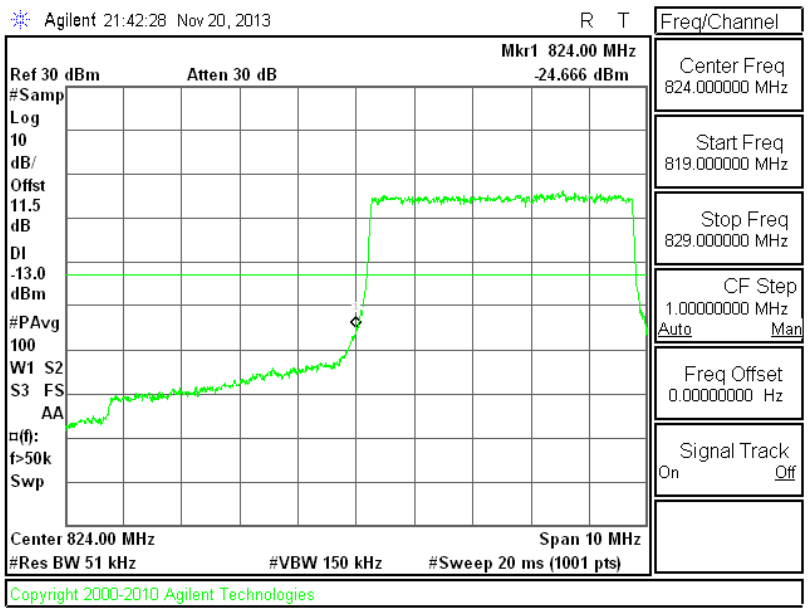
LOW CH, RB12-6



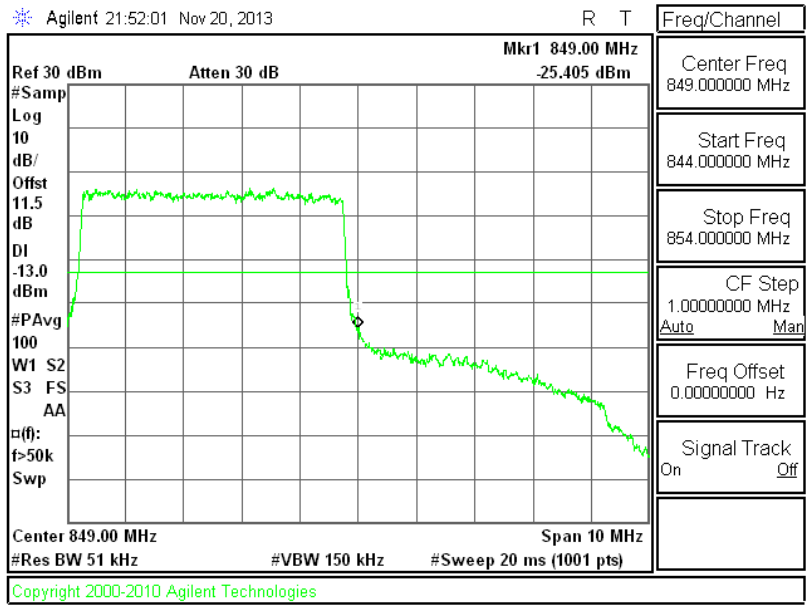
HIGH CH, RB12-6



LOW CH, RB25-0



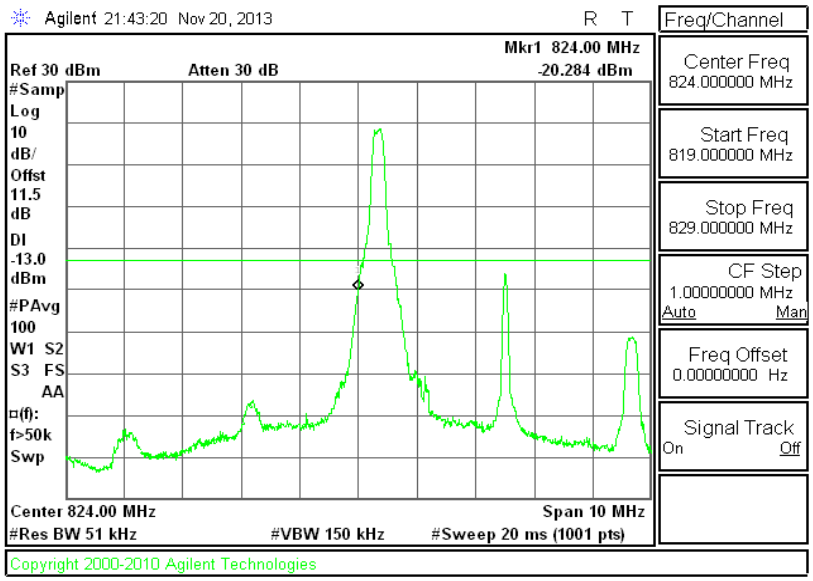
HIGH CH, RB25-0



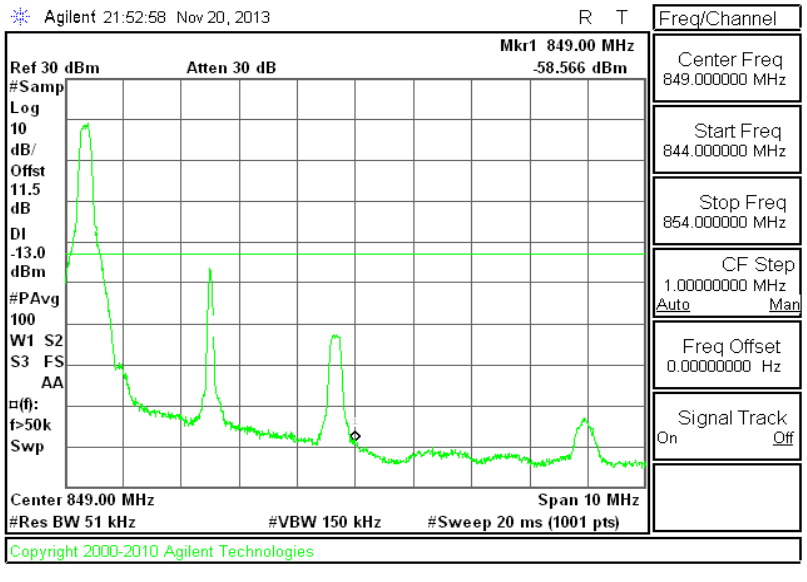
Band 5 (5MHz BANDWIDTH)

LTE 16QAM

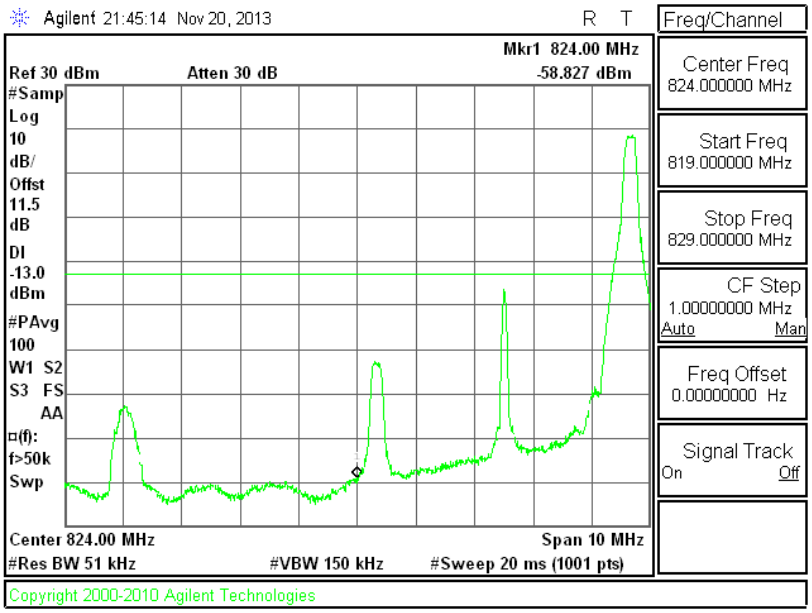
LOW CH, RB1_0



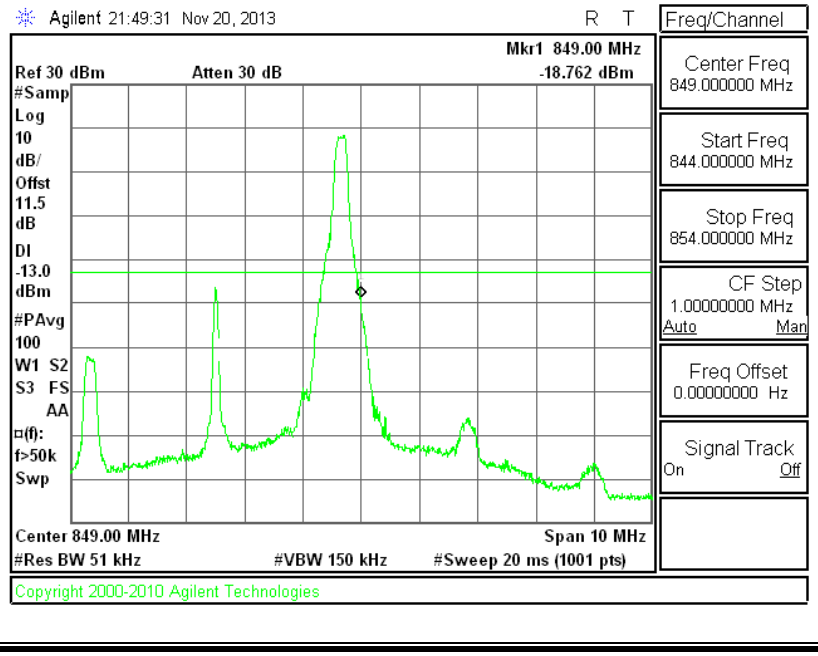
HIGH CH, RB1-0



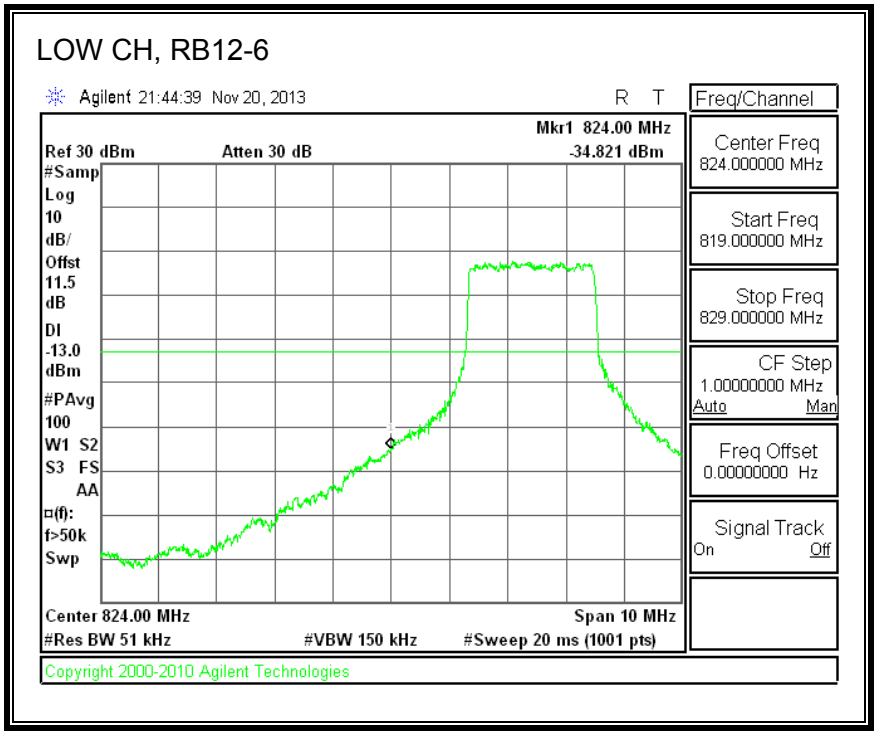
LOW CH, RB1-24



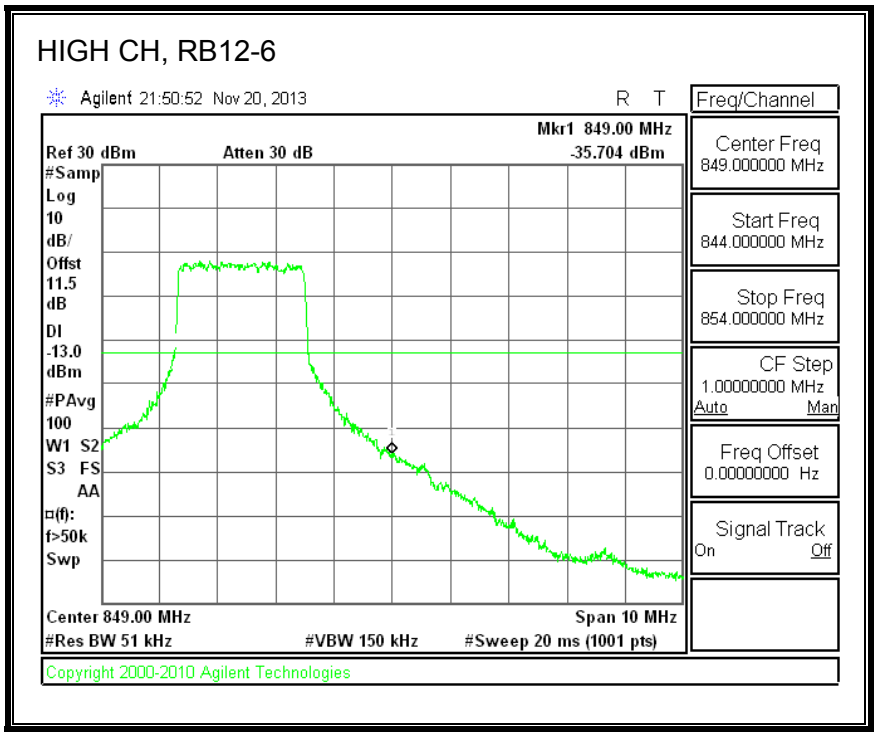
HIGH CH, RB1-24



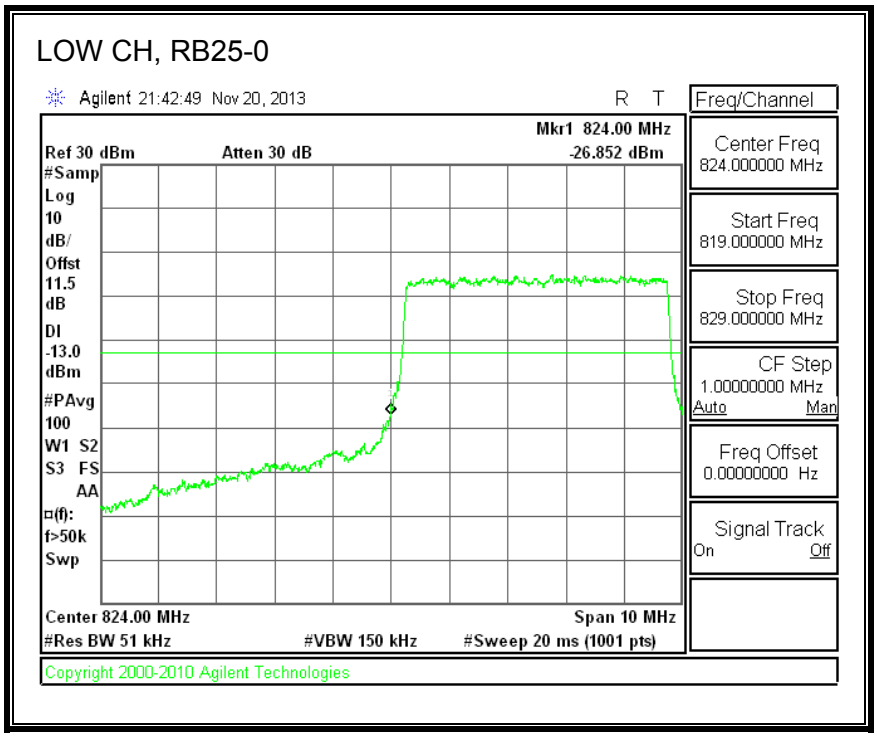
LOW CH, RB12-6



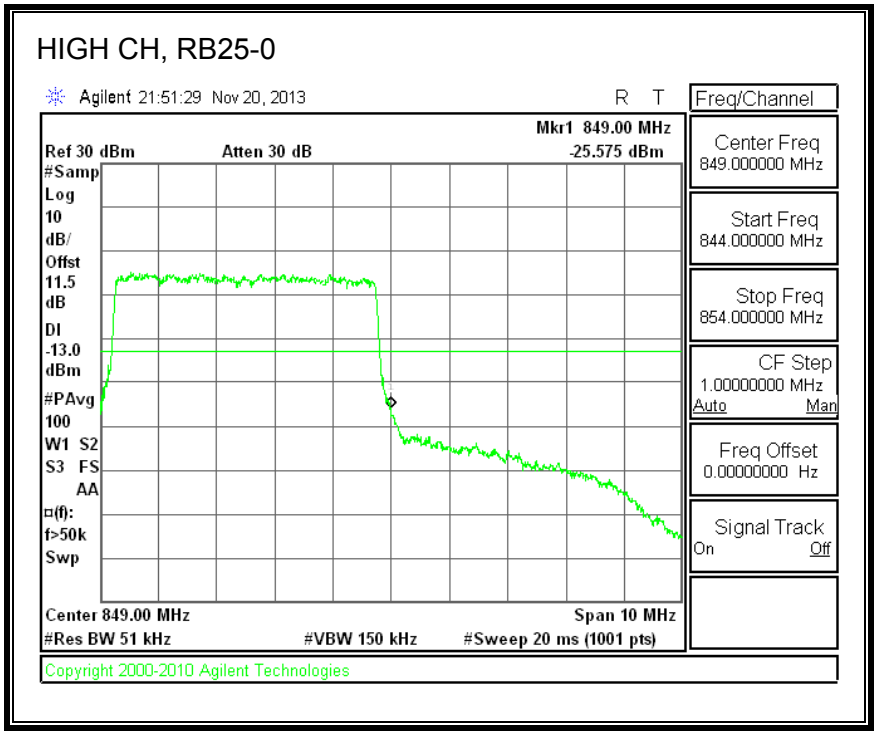
HIGH CH, RB12-6



LOW CH, RB25-0



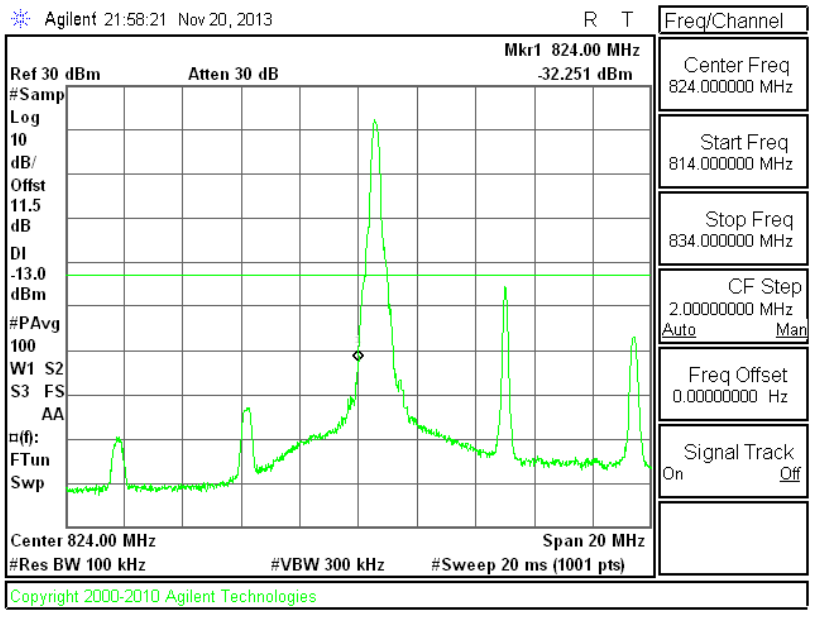
HIGH CH, RB25-0



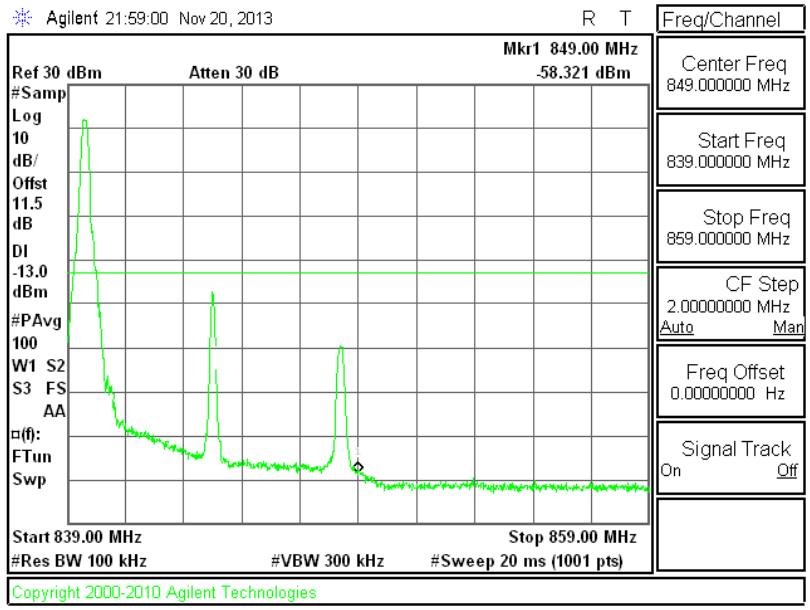
Band 5 (10MHz BANDWIDTH)

LTE QPSK

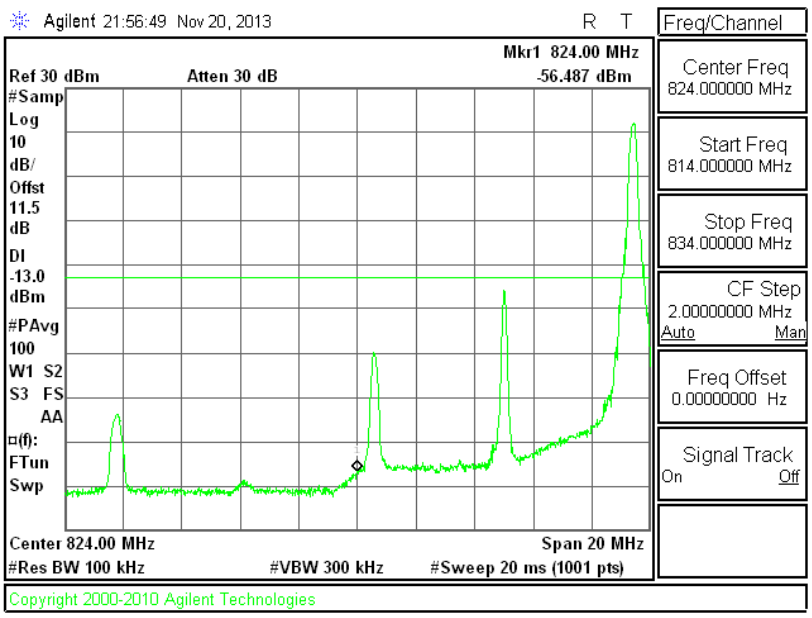
LOW CH, RB1_0



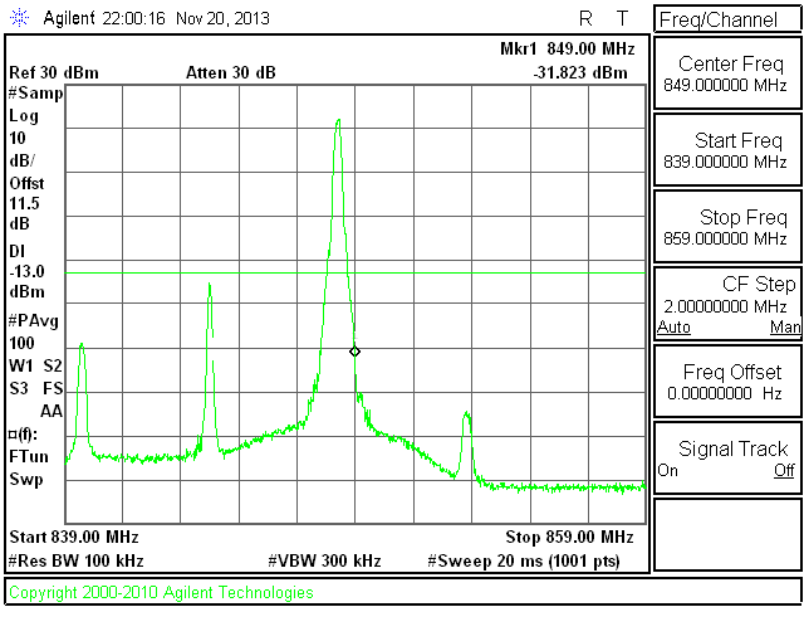
HIGH CH, RB1-0



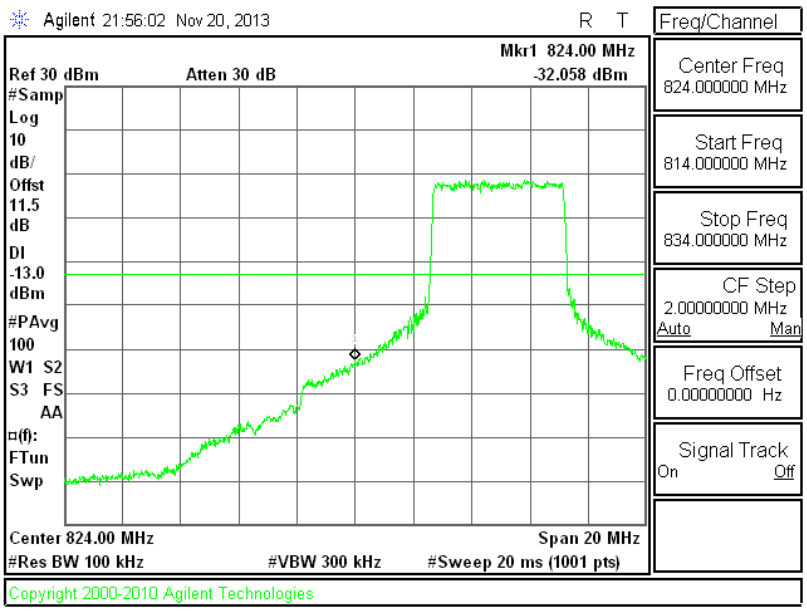
LOW CH, RB1-49



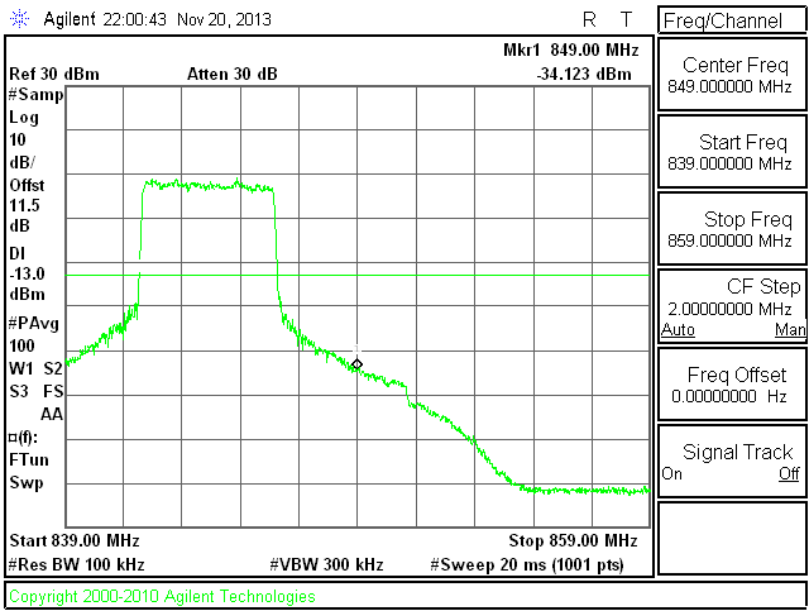
HIGH CH, RB1-49



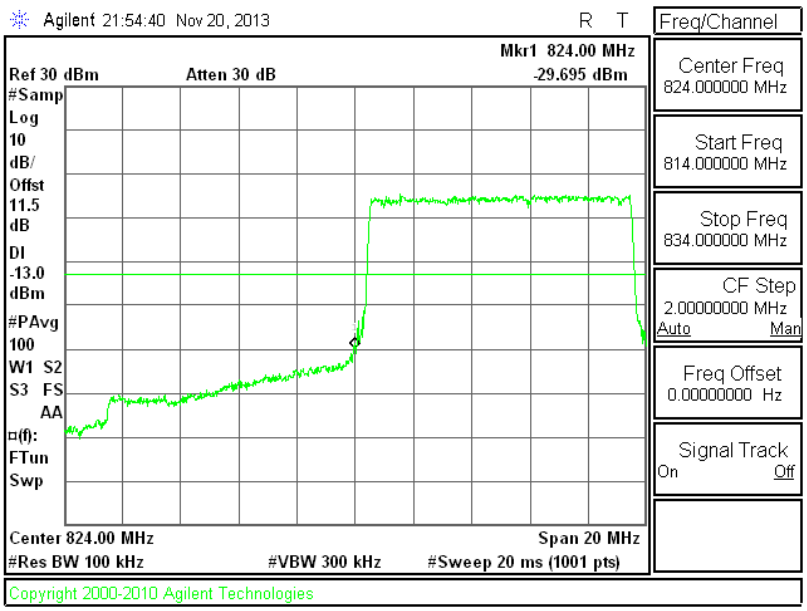
LOW CH, RB25-12



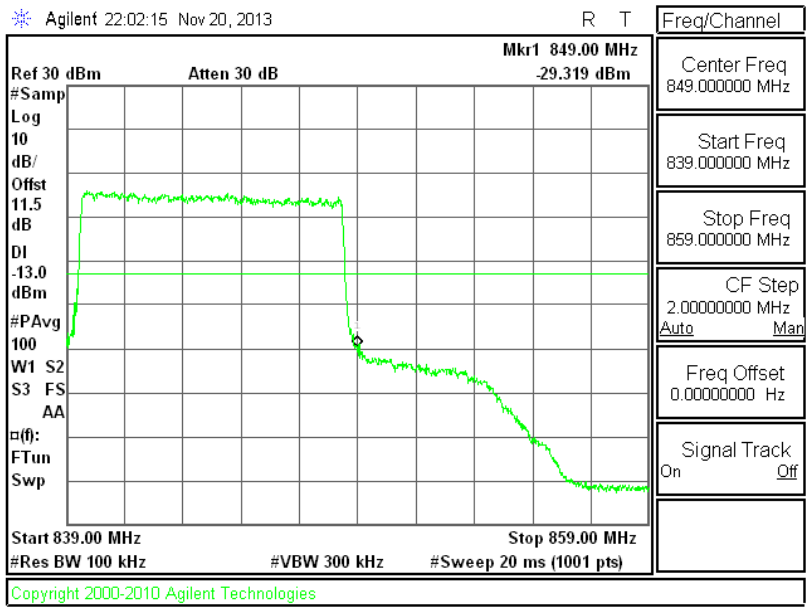
HIGH CH, RB25-12



LOW CH, RB50-0



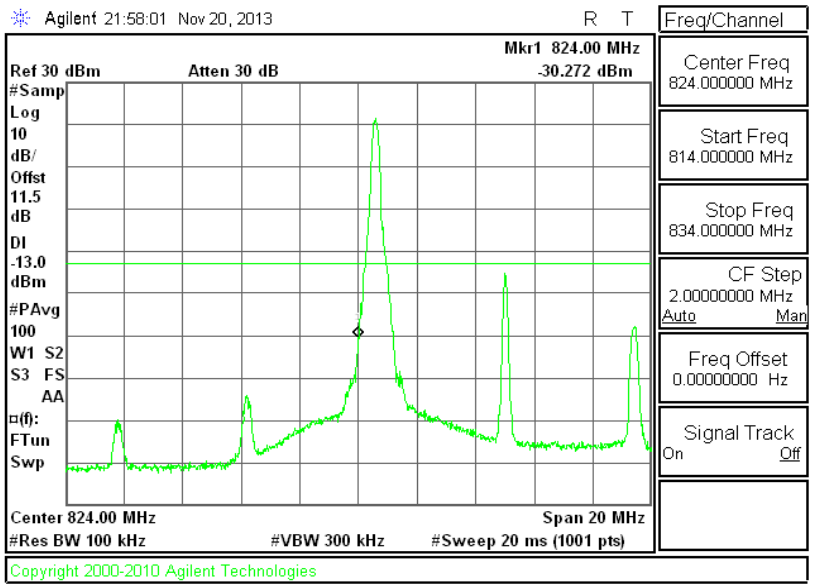
HIGH CH, RB50-0



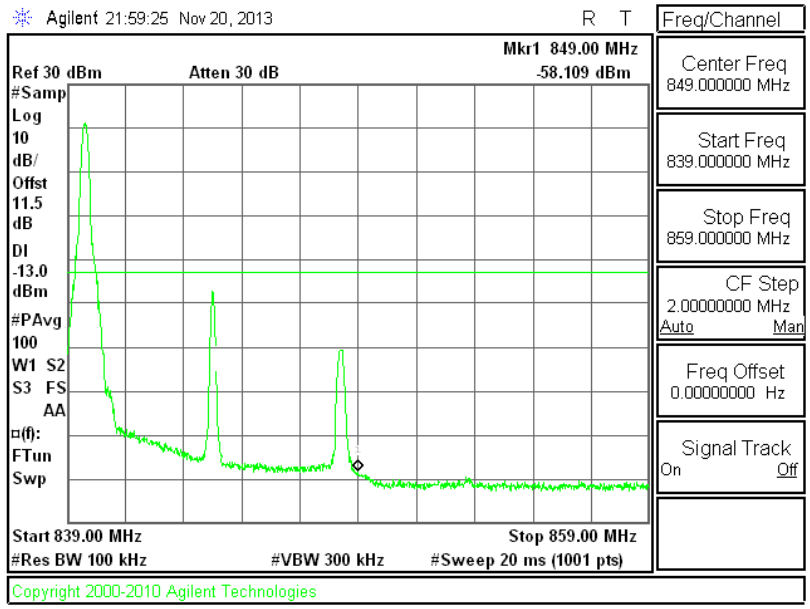
Band 5 (10MHz BANDWIDTH)

LTE 16QAM

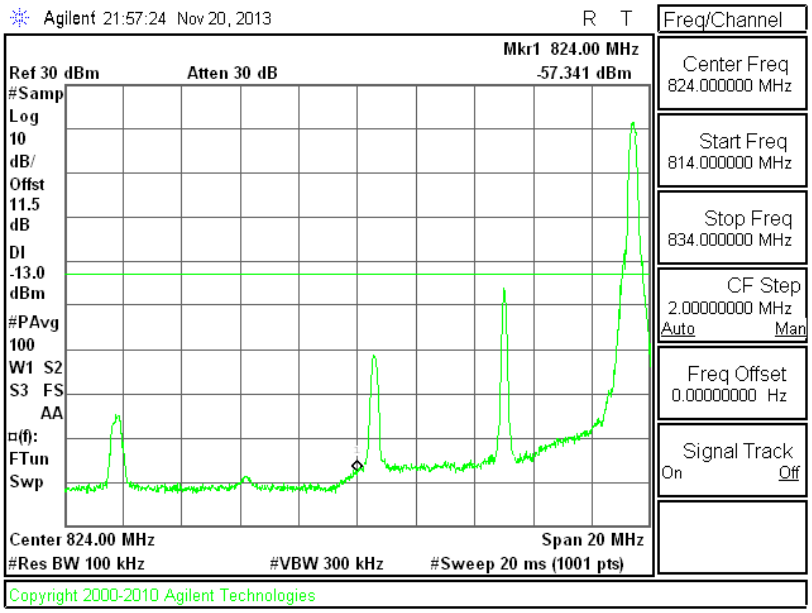
LOW CH, RB1_0



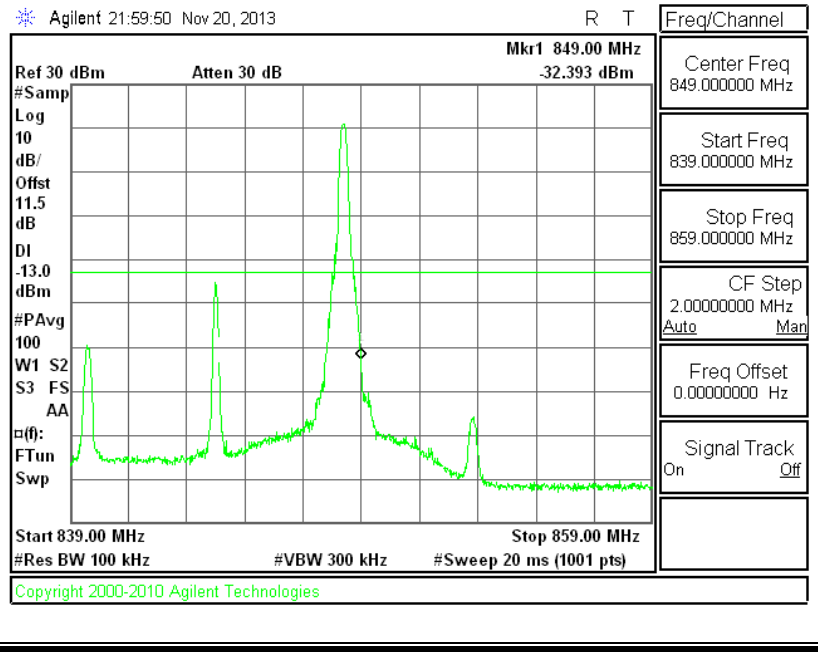
HIGH CH, RB1-0



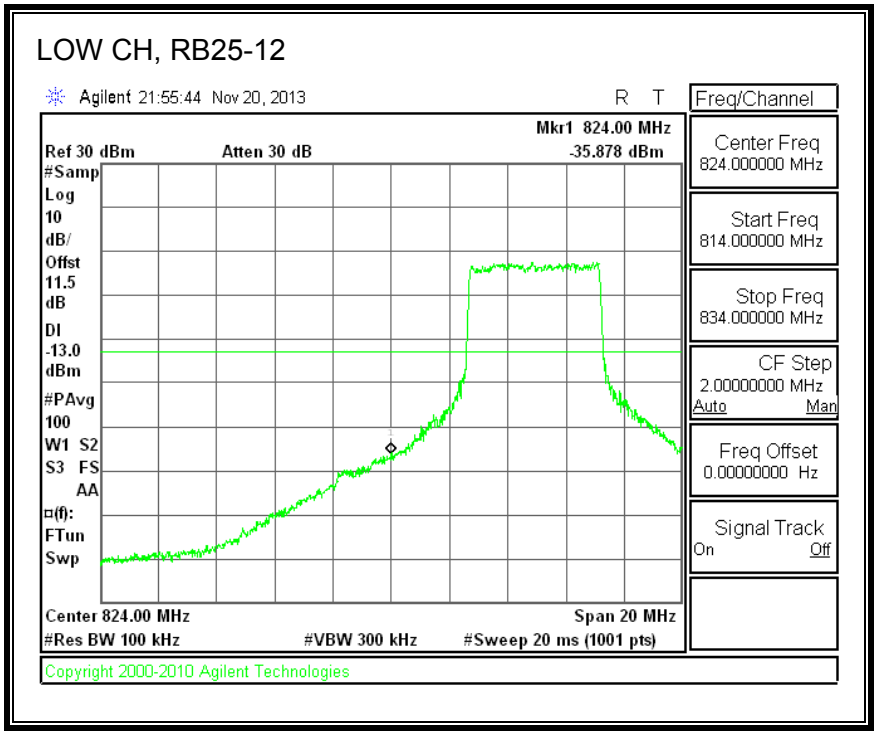
LOW CH, RB1-49



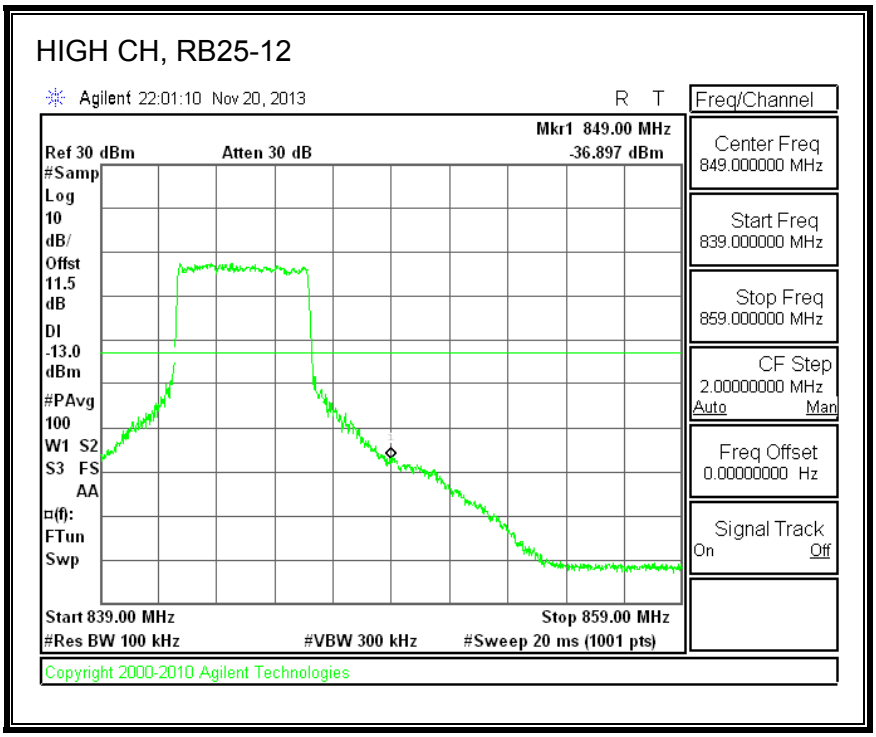
HIGH CH, RB1-49



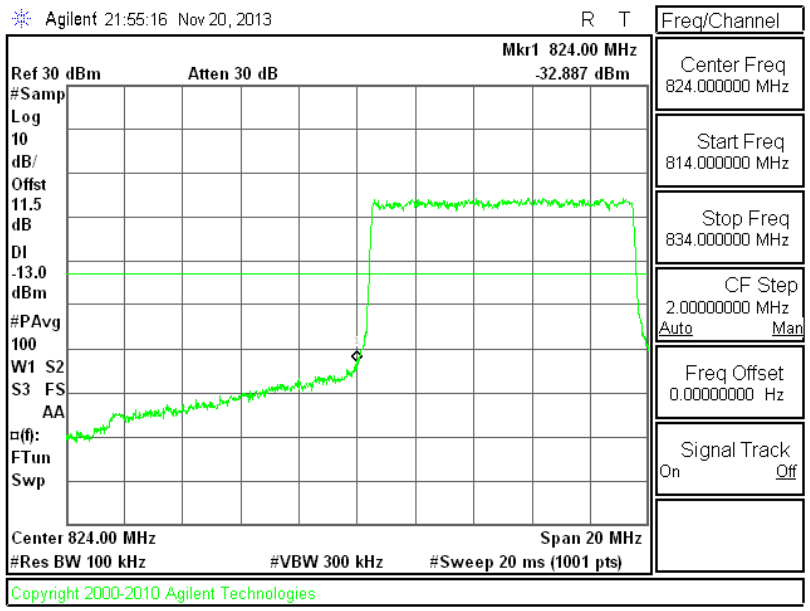
LOW CH, RB25-12



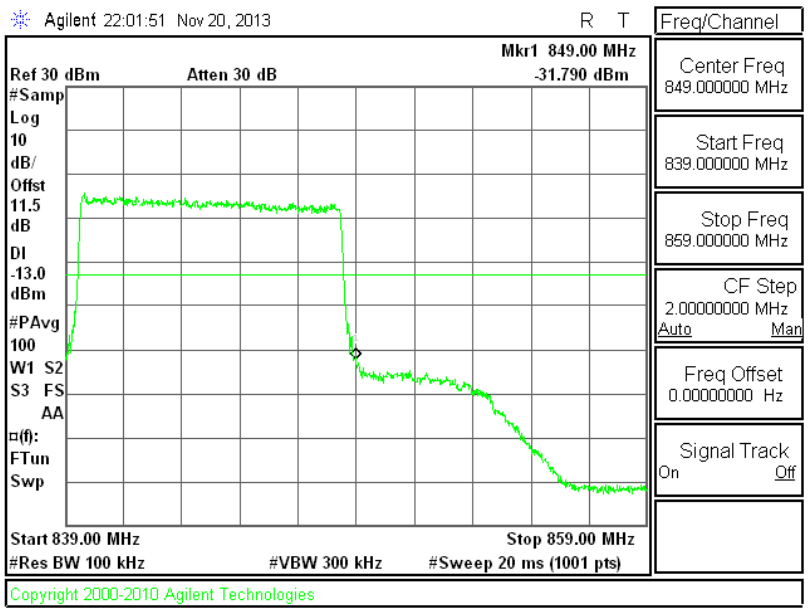
HIGH CH, RB25-12



LOW CH, RB50-0



HIGH CH, RB50-0



8.3. OUT OF BAND EMISSIONS

RULE PART(S)

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

LIMITS

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

TEST PROCEDURE

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 -13 dBm
- Set RBW & VBW to 100 kHz for the measurement below 1 GHz, and 1 MHz for the measurement above 1 GHz.

MODES TESTED

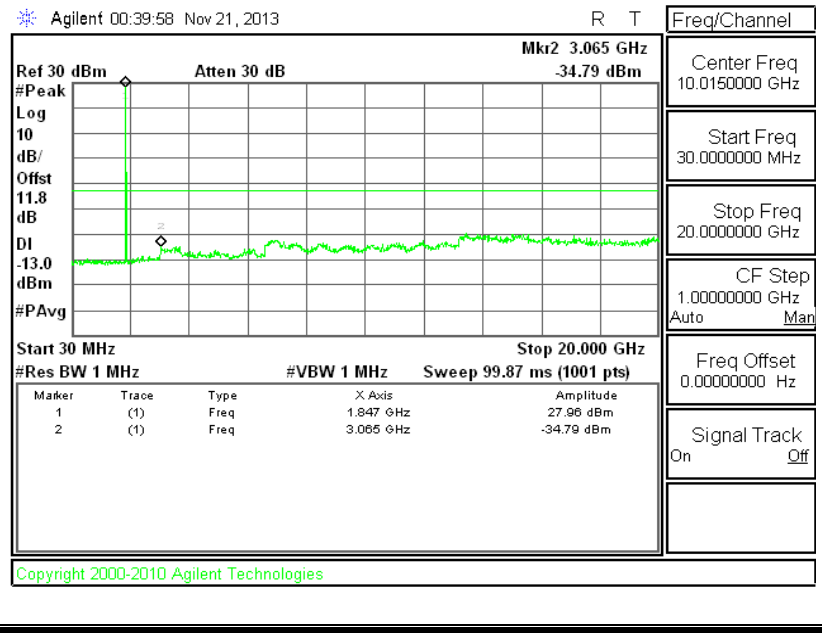
- Band 2
- Band 5

8.3.1. LTE BAND 2

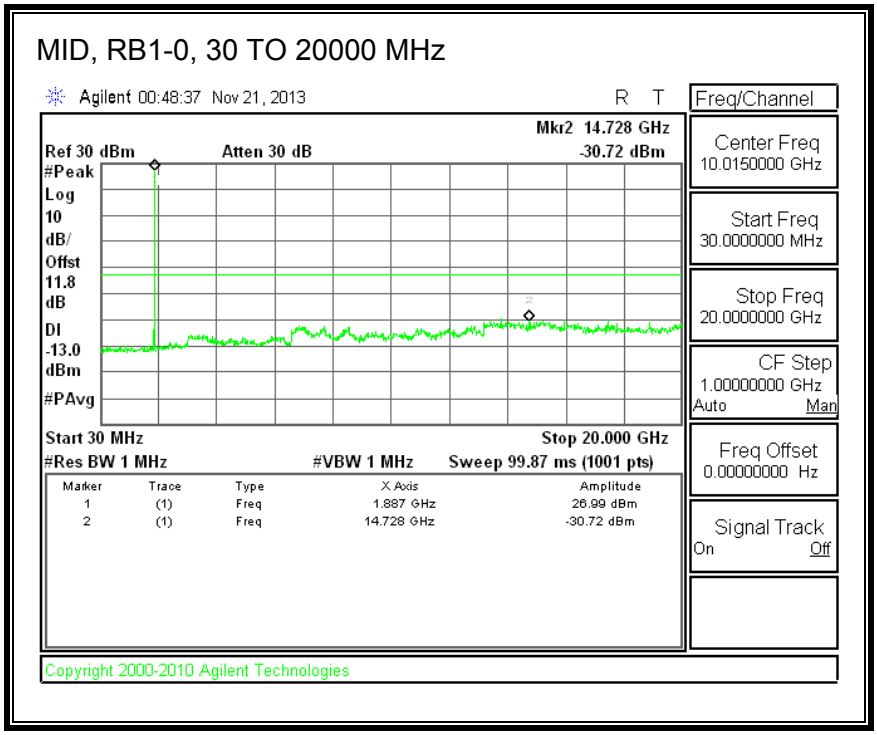
Band 2 (1.4 MHz BANDWIDTH)

LTE QPSK

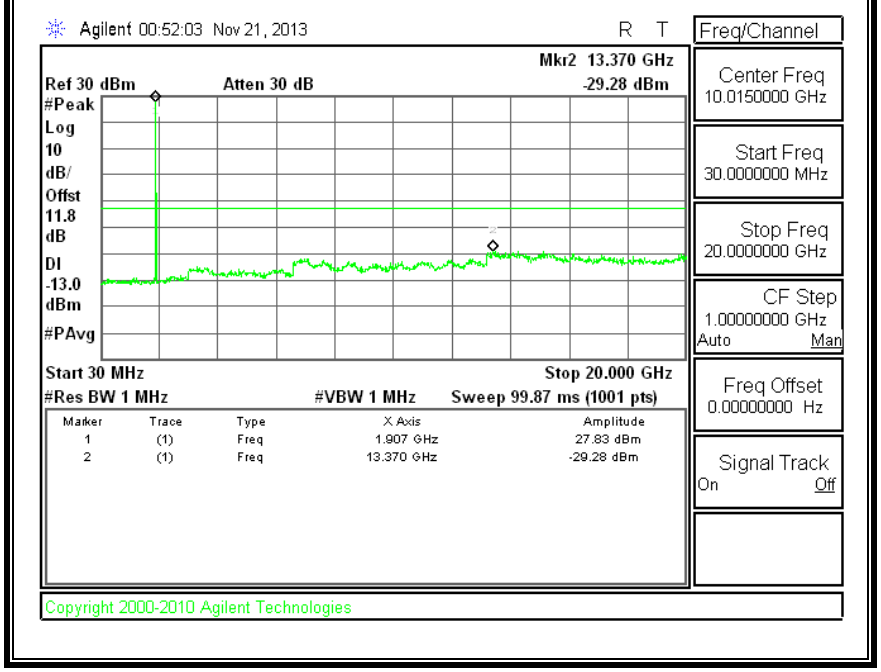
LOW, RB1-0, 30 TO 20000 MHz



MID, RB1-0, 30 TO 20000 MHz



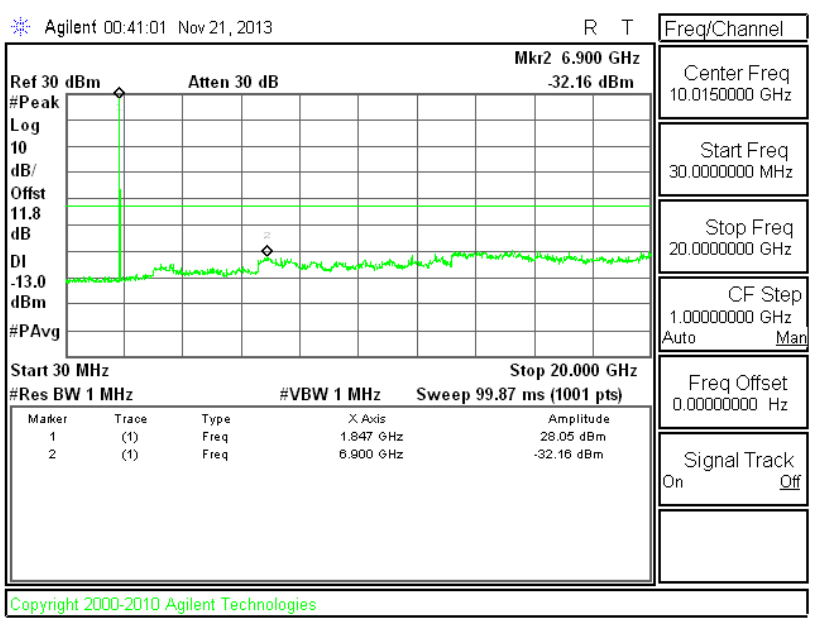
HIGH, RB1-0, 30 TO 20000 MHz



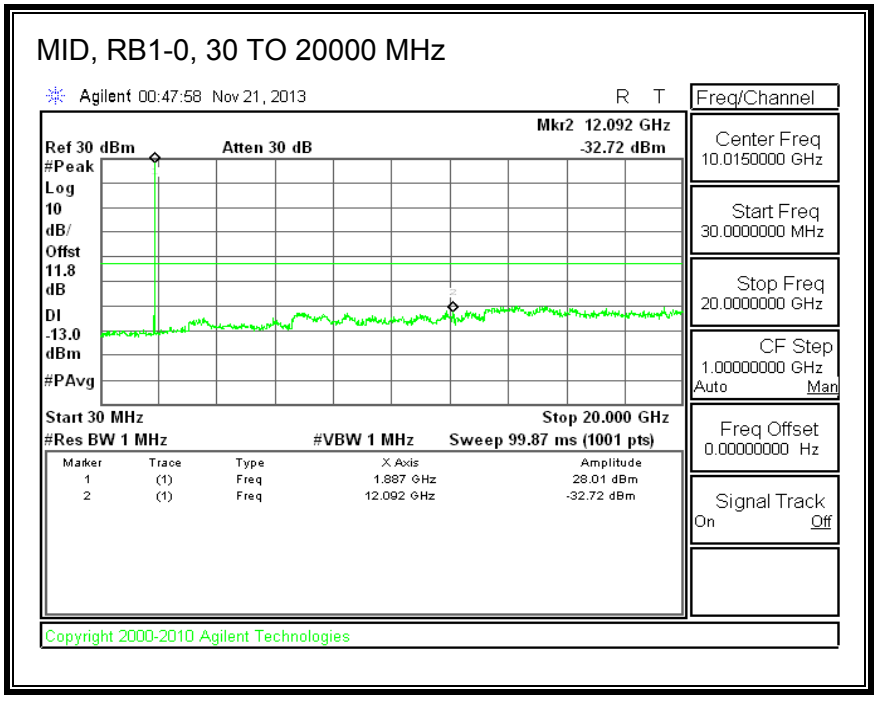
Band 2 (1.4 MHz BANDWIDTH)

LTE 16QAM

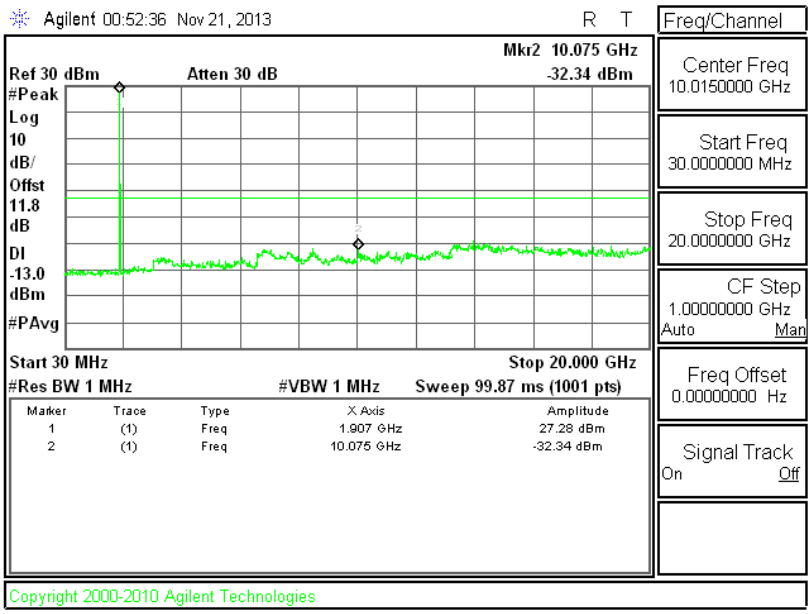
LOW, RB1-0, 30 TO 20000 MHz



MID, RB1-0, 30 TO 20000 MHz



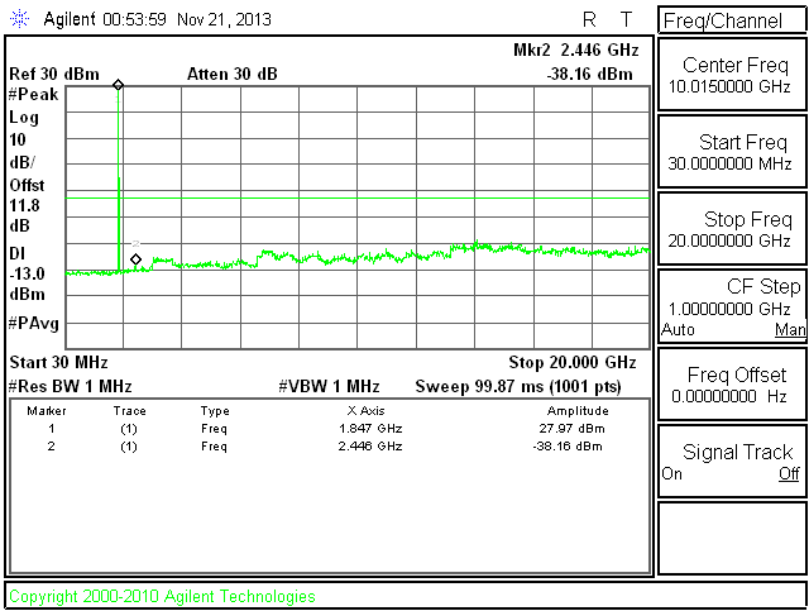
HIGH, RB1-0, 30 TO 20000 MHz



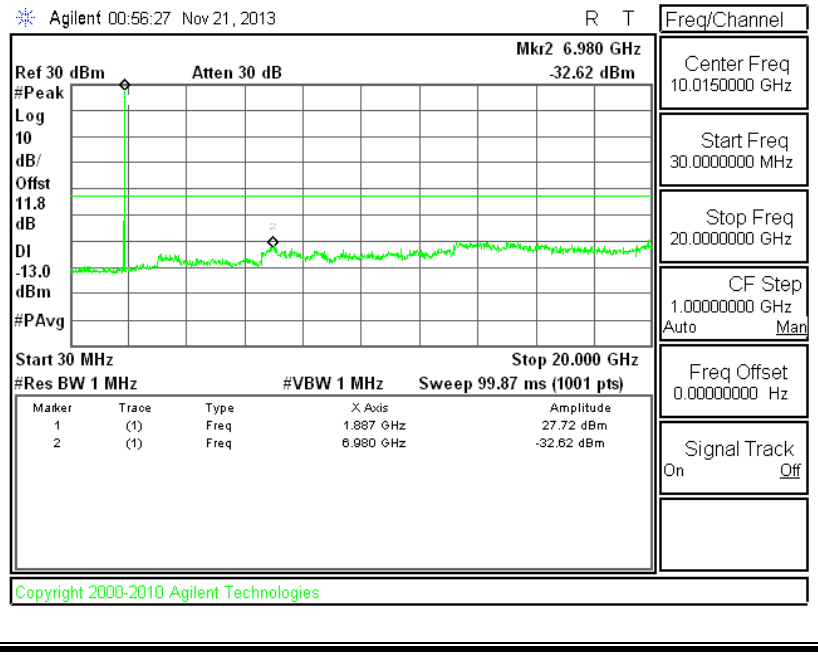
Band 2 (3MHz BANDWIDTH)

LTE QPSK

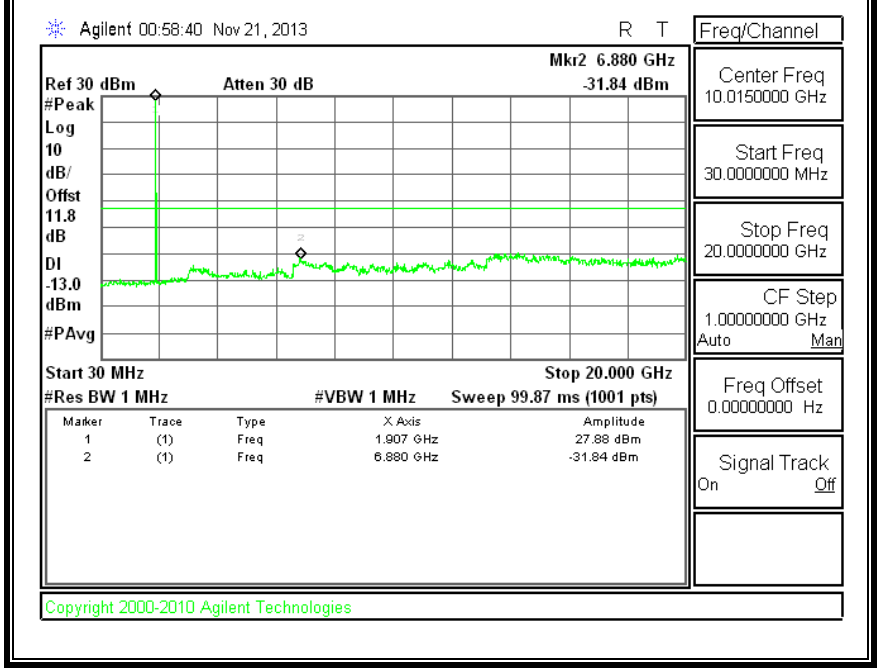
LOW, RB1-0, 30 TO 20000 MHz



MID, RB1-0, 30 TO 20000 MHz



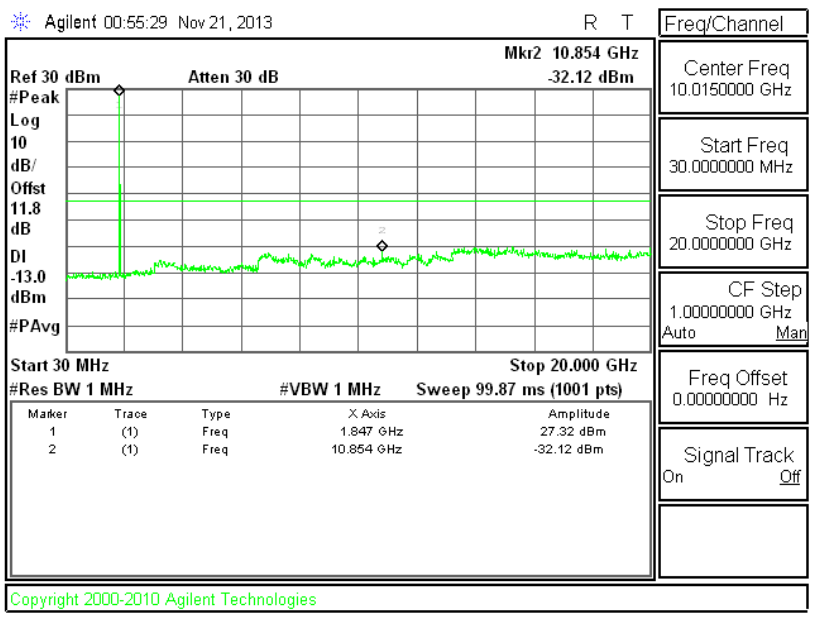
HIGH, RB1-0, 30 TO 20000 MHz



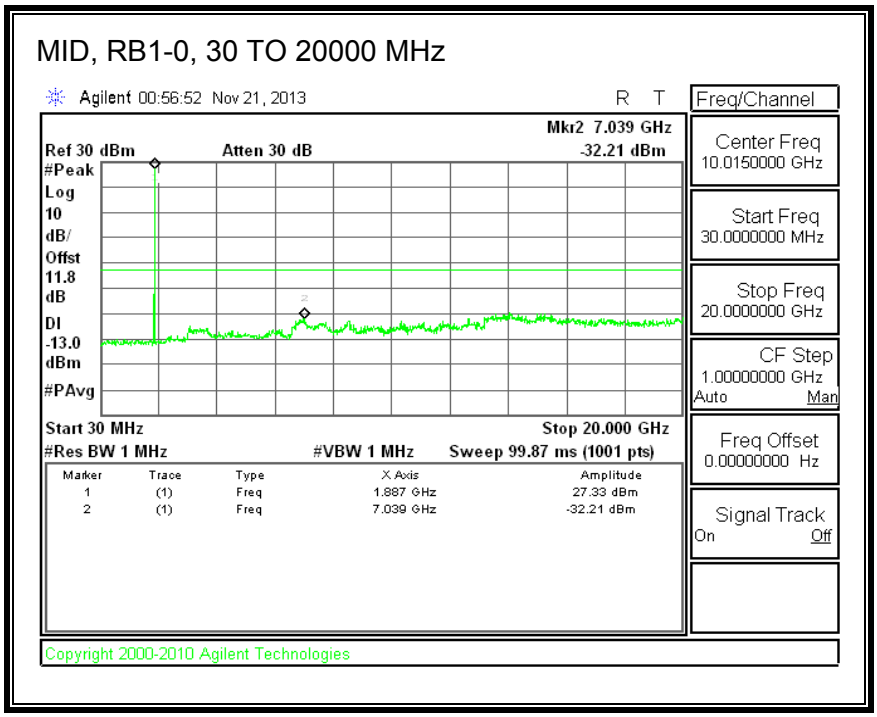
Band 2 (3MHz BANDWIDTH)

LTE 16QAM

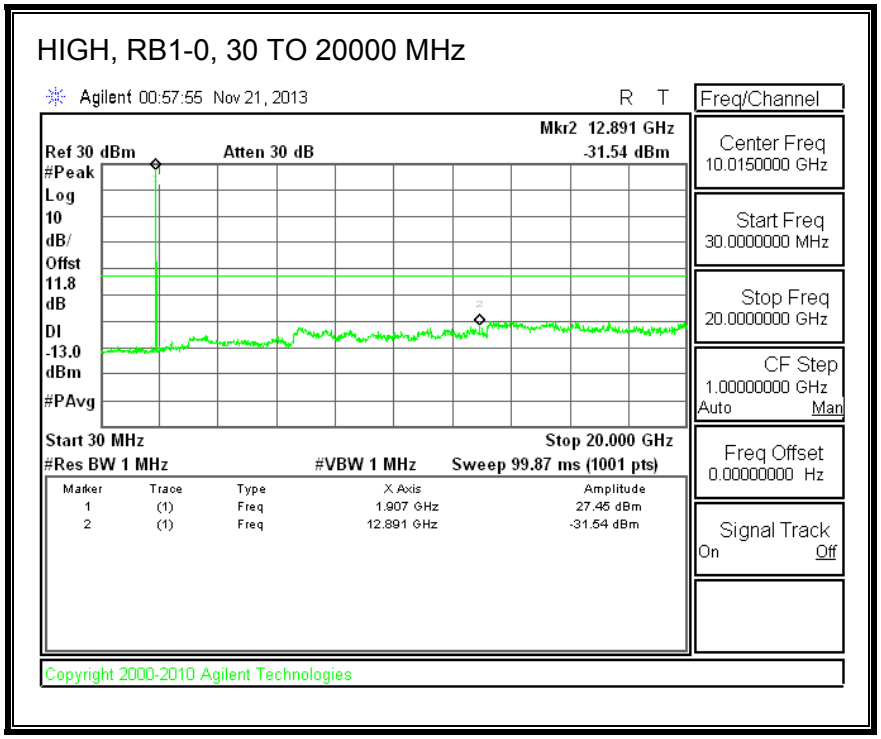
LOW, RB1-0, 30 TO 20000 MHz



MID, RB1-0, 30 TO 20000 MHz



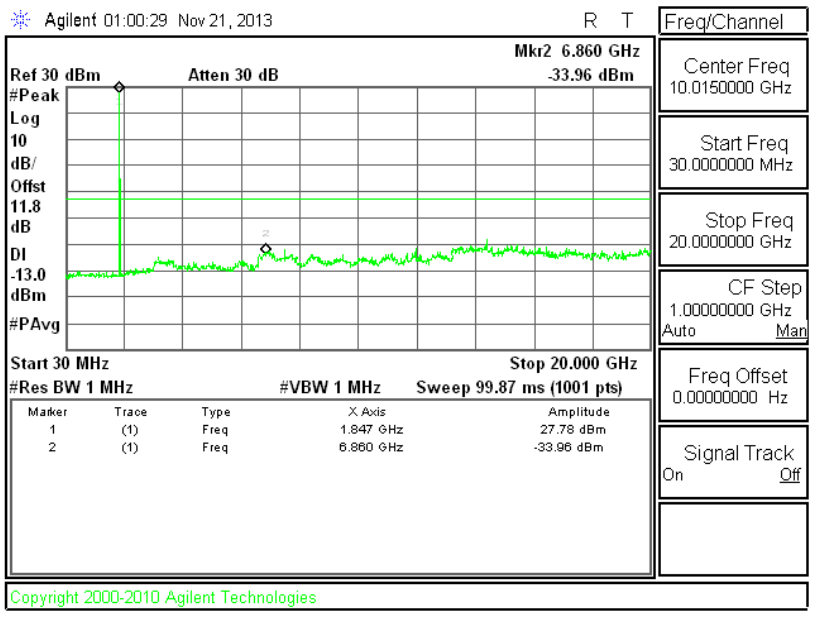
HIGH, RB1-0, 30 TO 20000 MHz



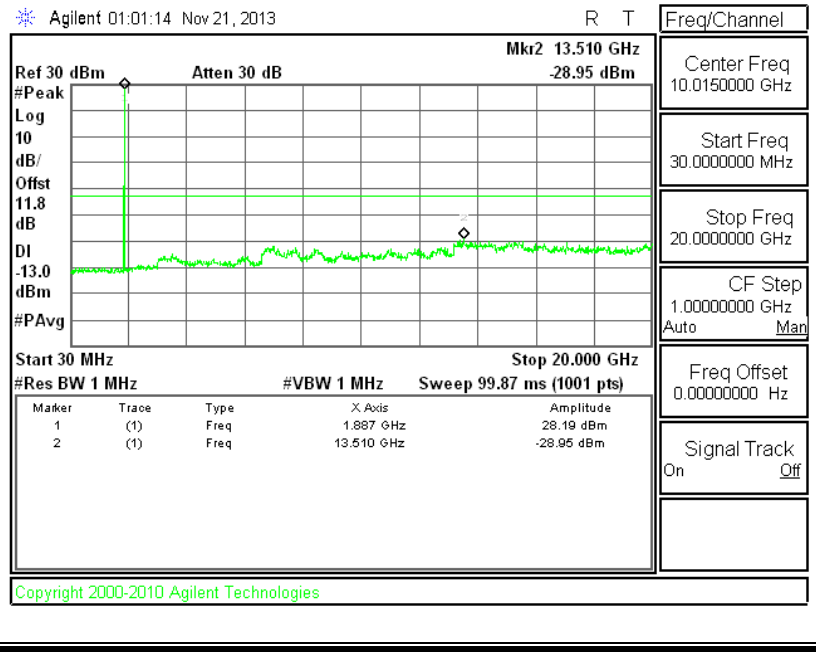
Band 2 (5MHz BANDWIDTH)

LTE QPSK

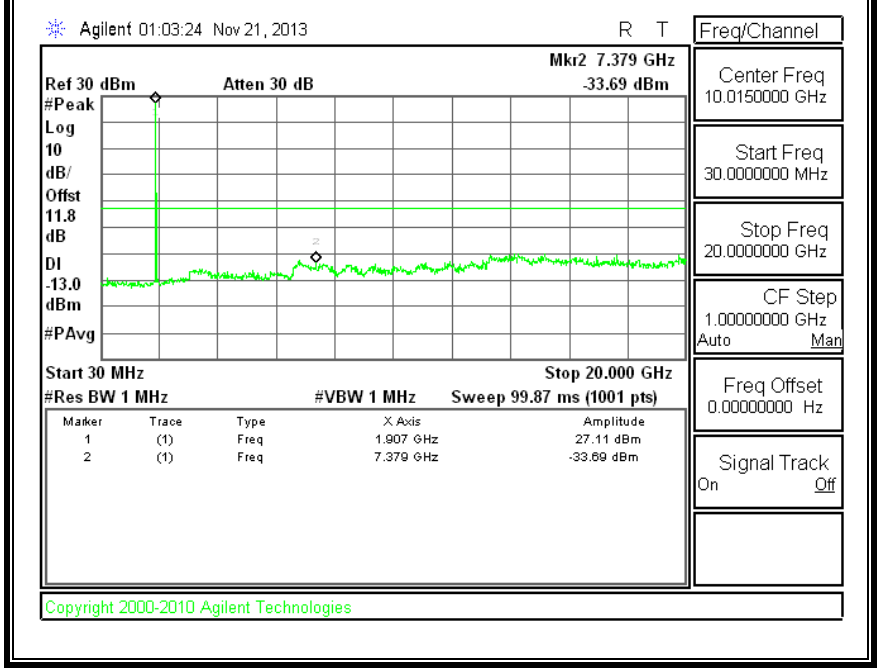
LOW, RB1-0, 30 TO 20000 MHz



MID, RB1-0, 30 TO 20000 MHz



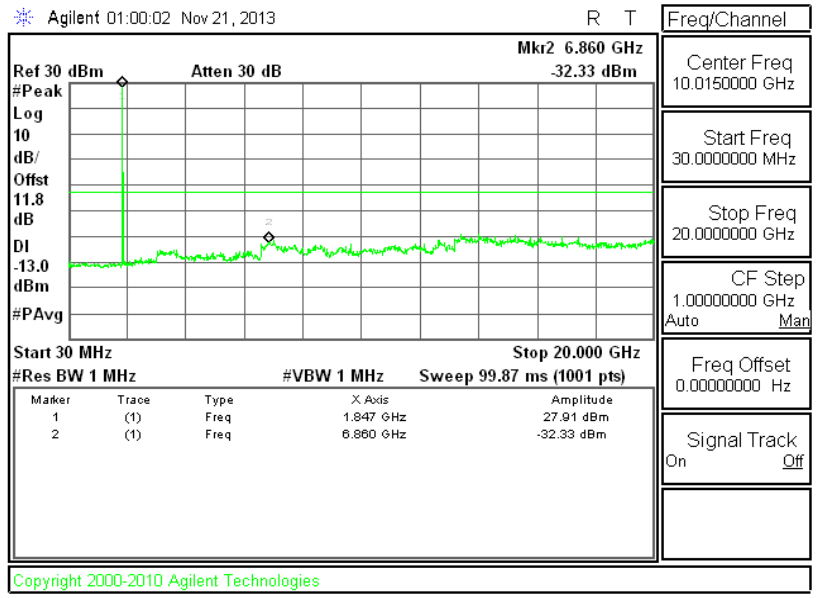
HIGH, RB1-0, 30 TO 20000 MHz



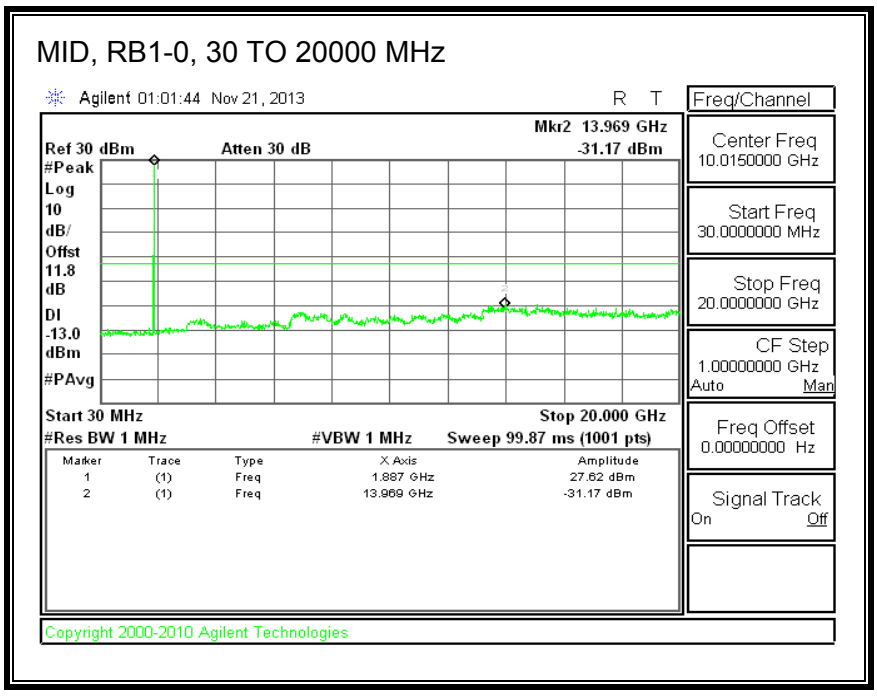
Band 2 (5MHz BANDWIDTH)

LTE 16QAM

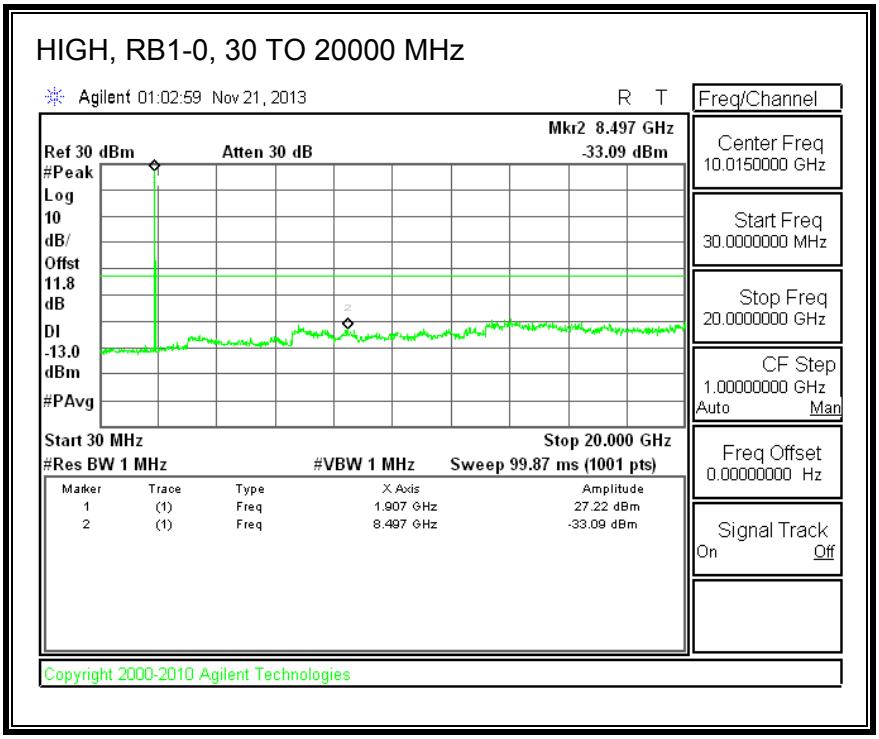
LOW, RB1-0, 30 TO 20000 MHz



MID, RB1-0, 30 TO 20000 MHz



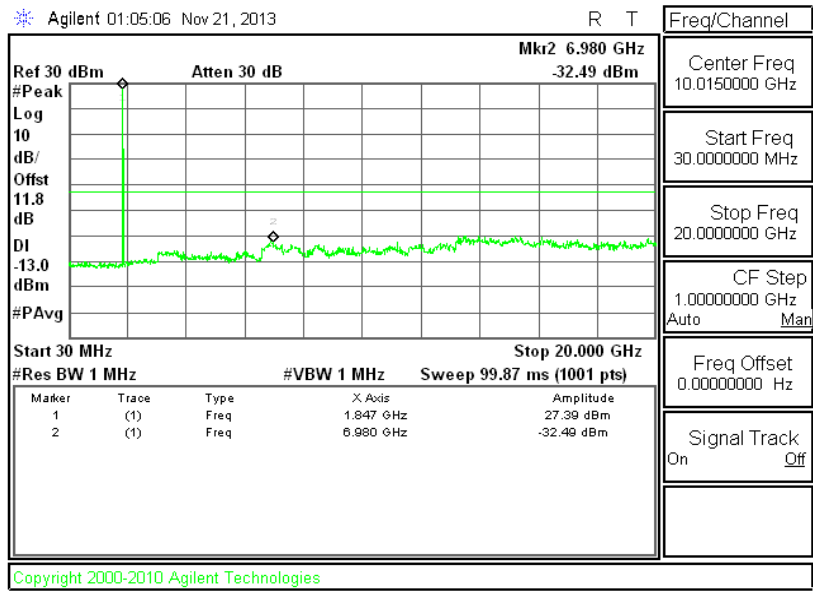
HIGH, RB1-0, 30 TO 20000 MHz



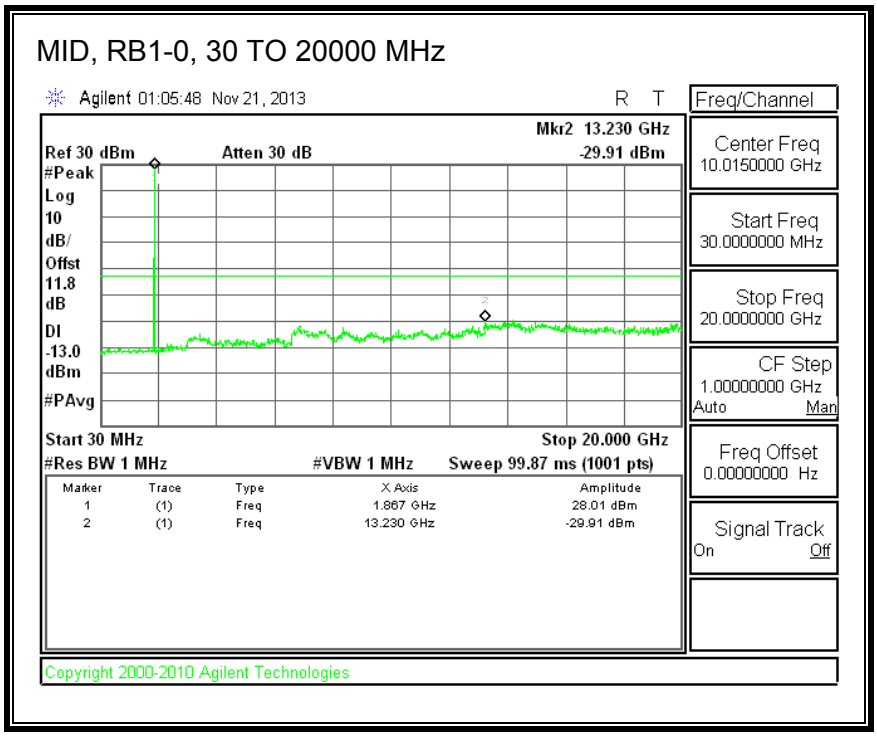
Band 2 (10MHz BANDWIDTH)

LTE QPSK

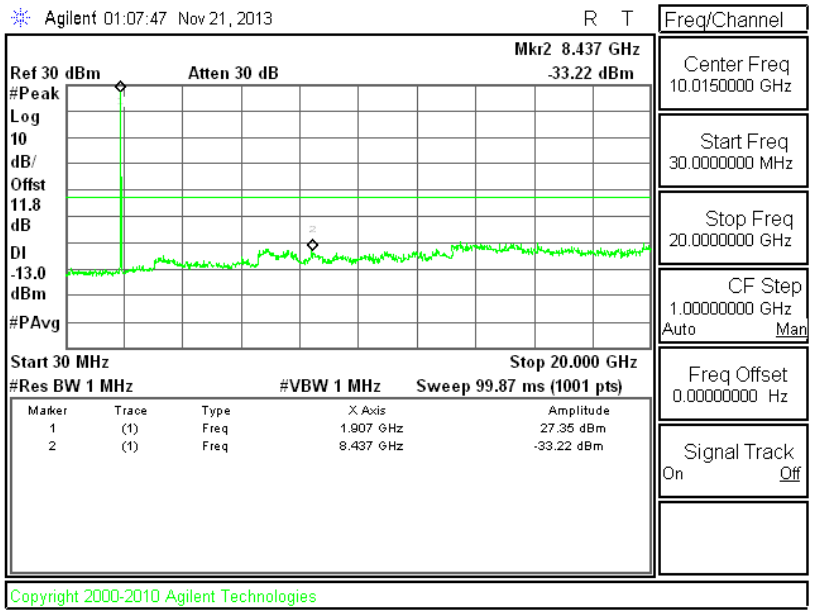
LOW, RB1-0, 30 TO 20000 MHz



MID, RB1-0, 30 TO 20000 MHz



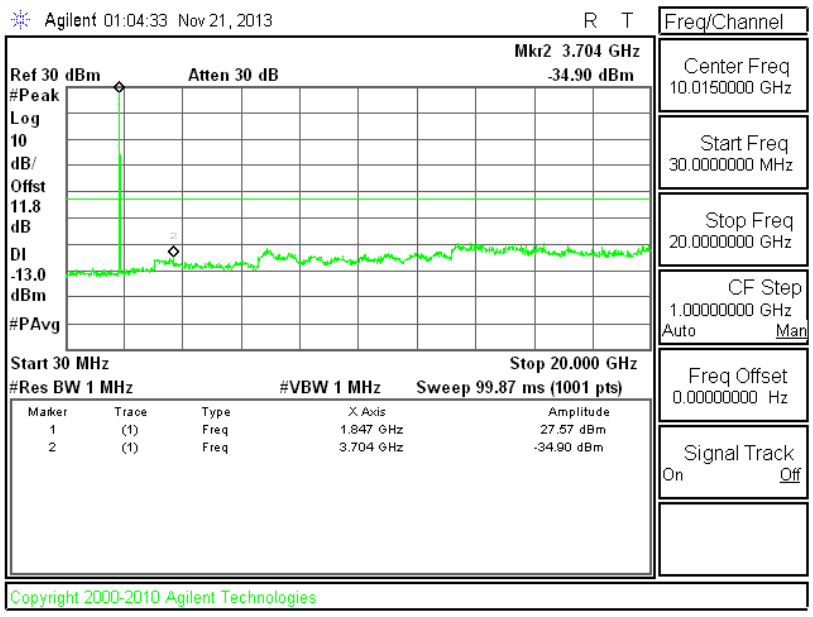
HIGH, RB1-0, 30 TO 20000 MHz



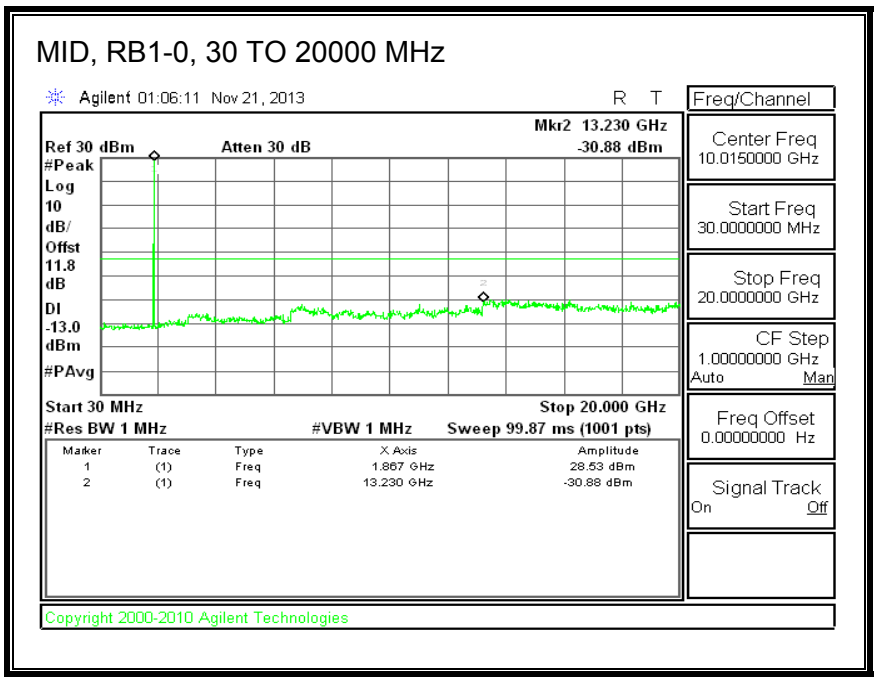
Band 2 (10MHz BANDWIDTH)

LTE 16QAM

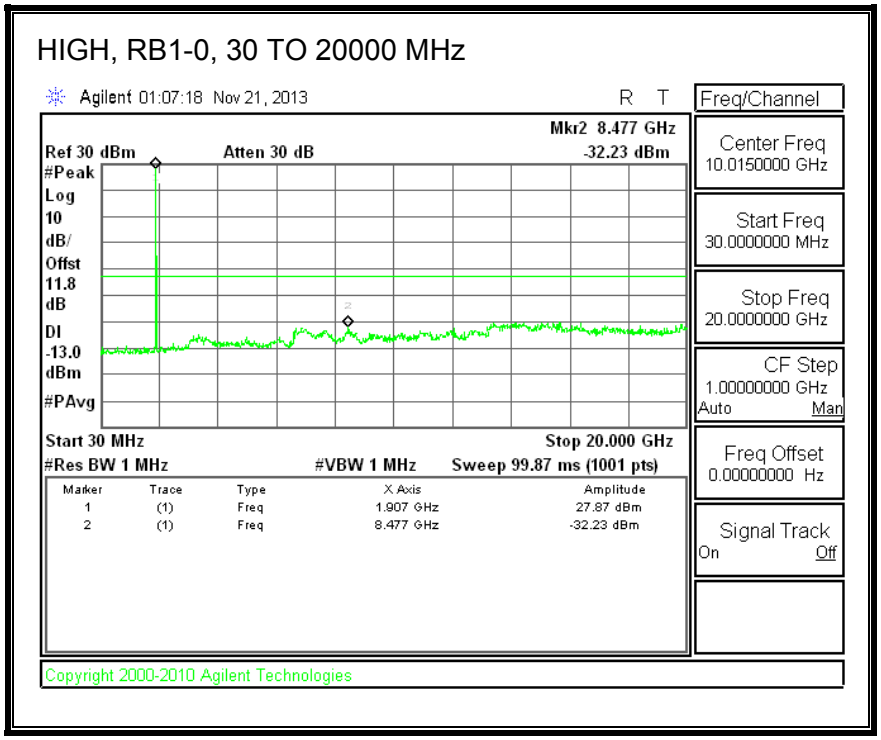
LOW, RB1-0, 30 TO 20000 MHz



MID, RB1-0, 30 TO 20000 MHz



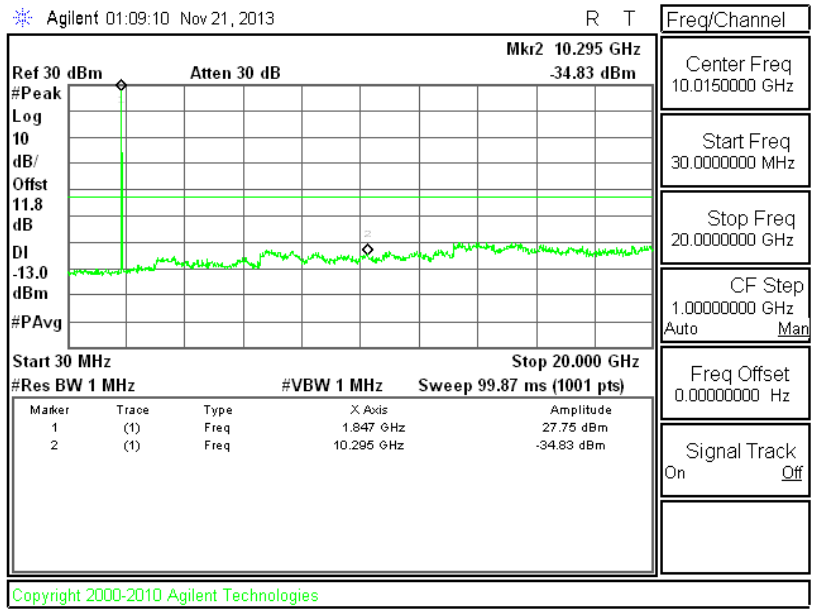
HIGH, RB1-0, 30 TO 20000 MHz



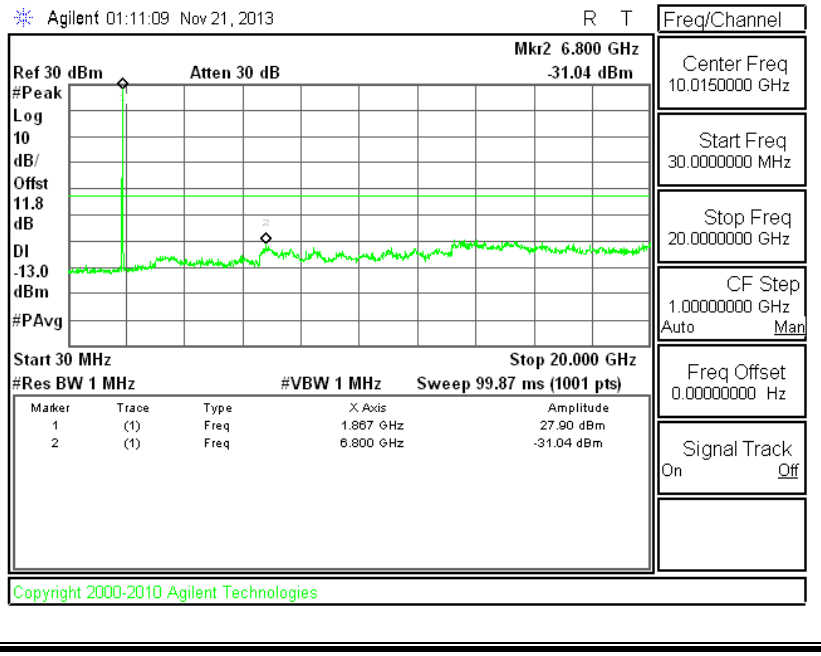
Band 2 (15MHz BANDWIDTH)

LTE QPSK

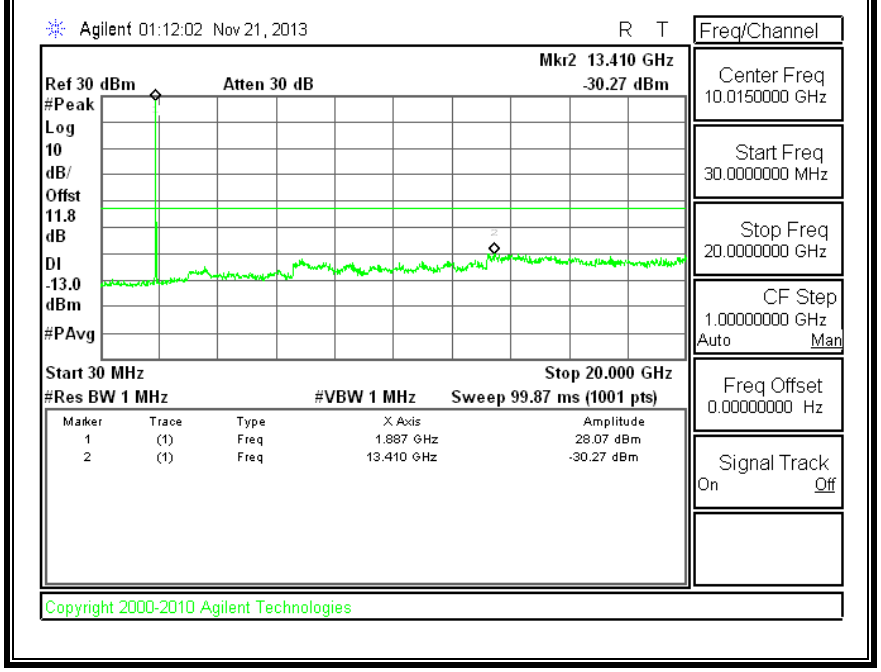
LOW, RB1-0, 30 TO 20000 MHz



MID, RB1-0, 30 TO 20000 MHz



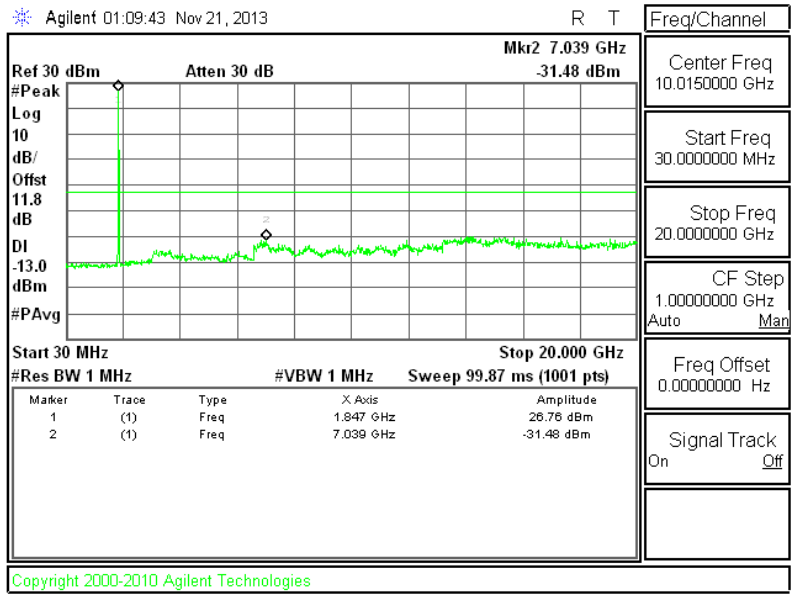
HIGH, RB1-0, 30 TO 20000 MHz



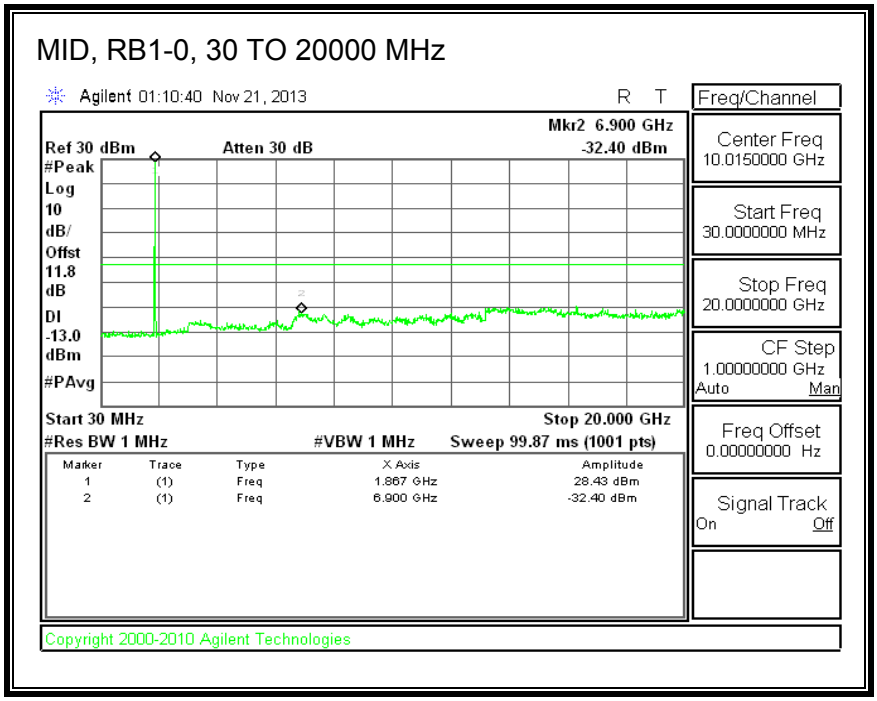
Band 2 (15MHz BANDWIDTH)

LTE 16QAM

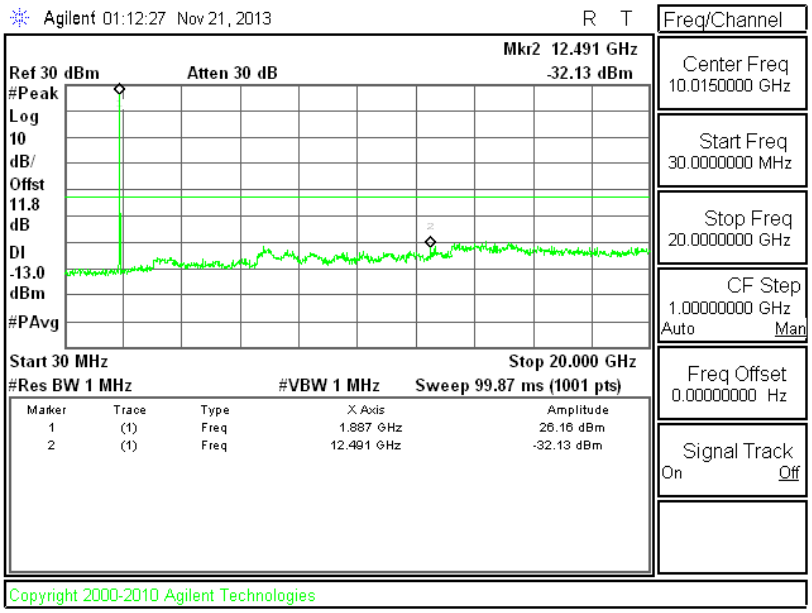
LOW, RB1-0, 30 TO 20000 MHz



MID, RB1-0, 30 TO 20000 MHz



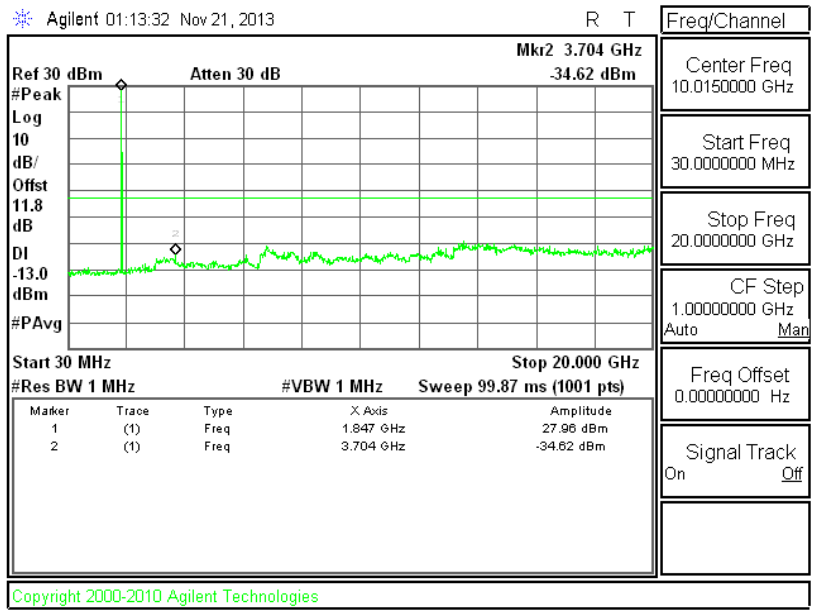
HIGH, RB1-0, 30 TO 20000 MHz



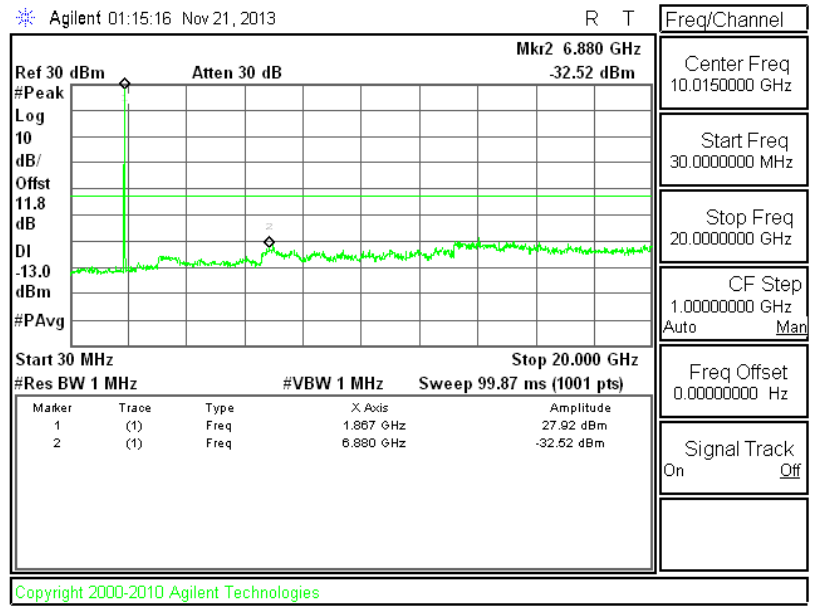
Band 2 (20MHz BANDWIDTH)

LTE QPSK

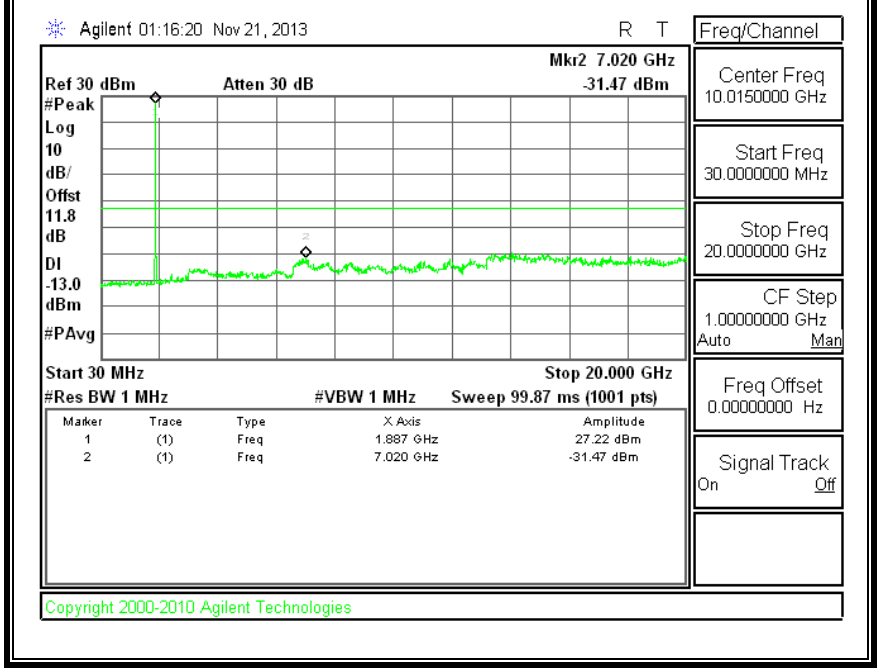
LOW, RB1-0, 30 TO 20000 MHz



MID, RB1-0, 30 TO 20000 MHz



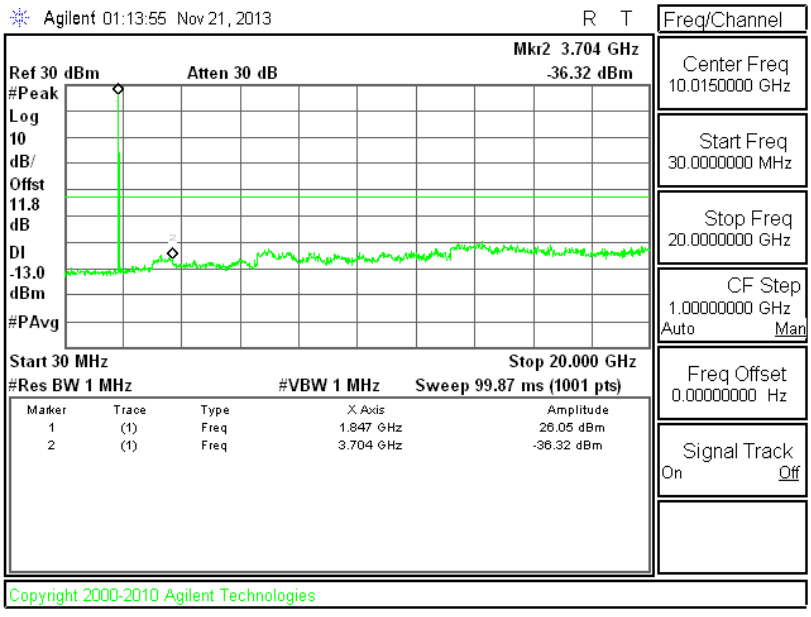
HIGH, RB1-0, 30 TO 20000 MHz



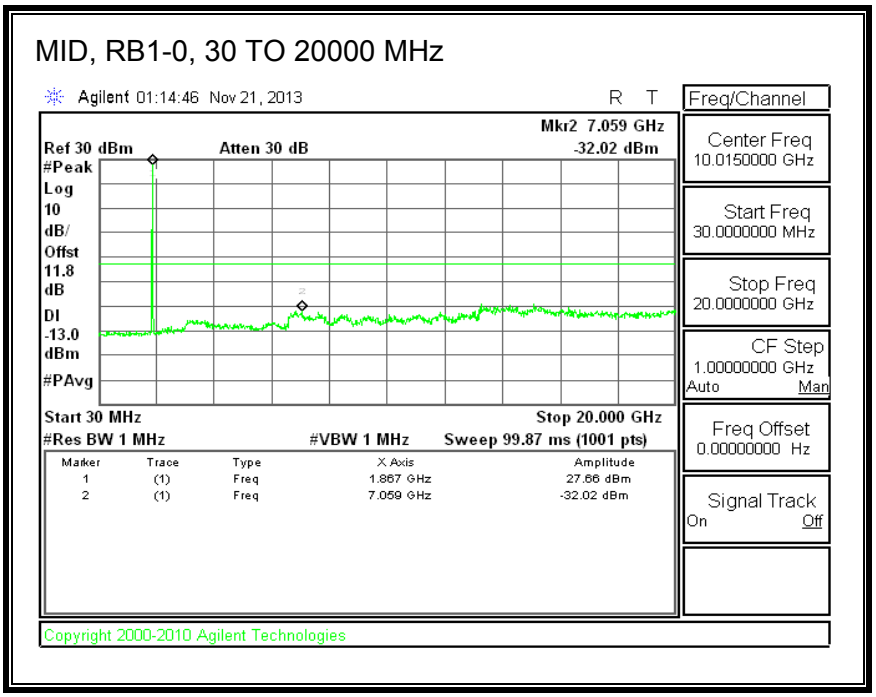
Band 2 (20MHz BANDWIDTH)

LTE 16QAM

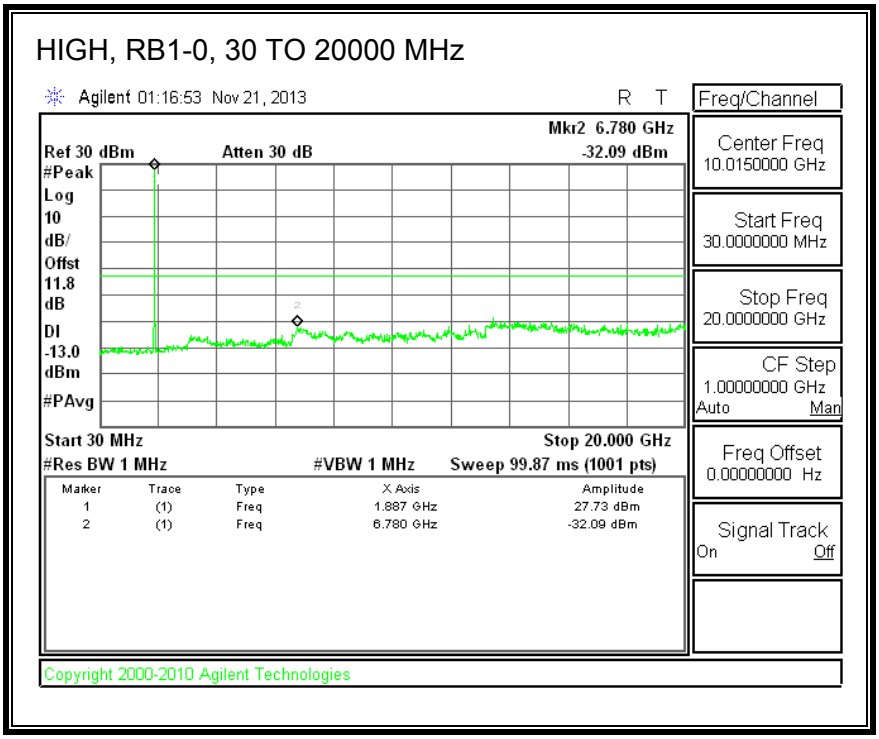
LOW, RB1-0, 30 TO 20000 MHz



MID, RB1-0, 30 TO 20000 MHz



HIGH, RB1-0, 30 TO 20000 MHz

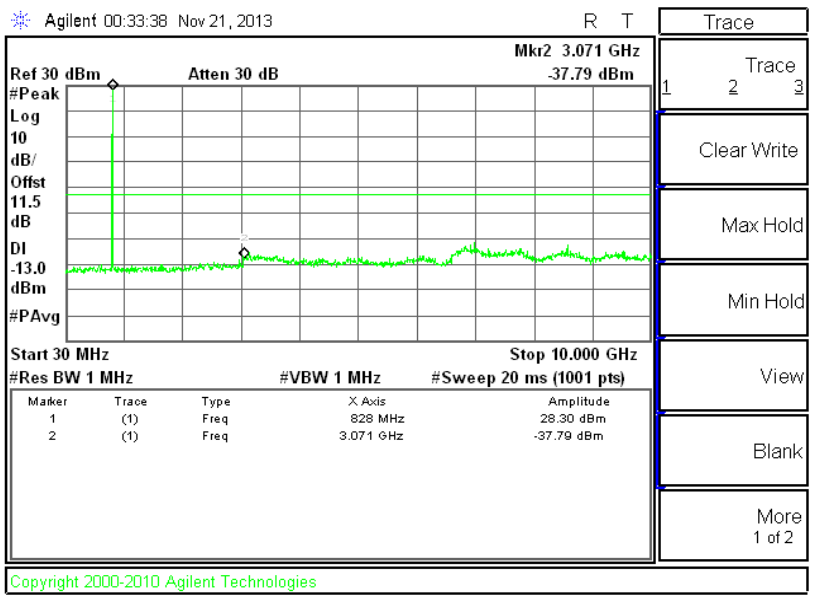


8.3.2. LTE BAND 5

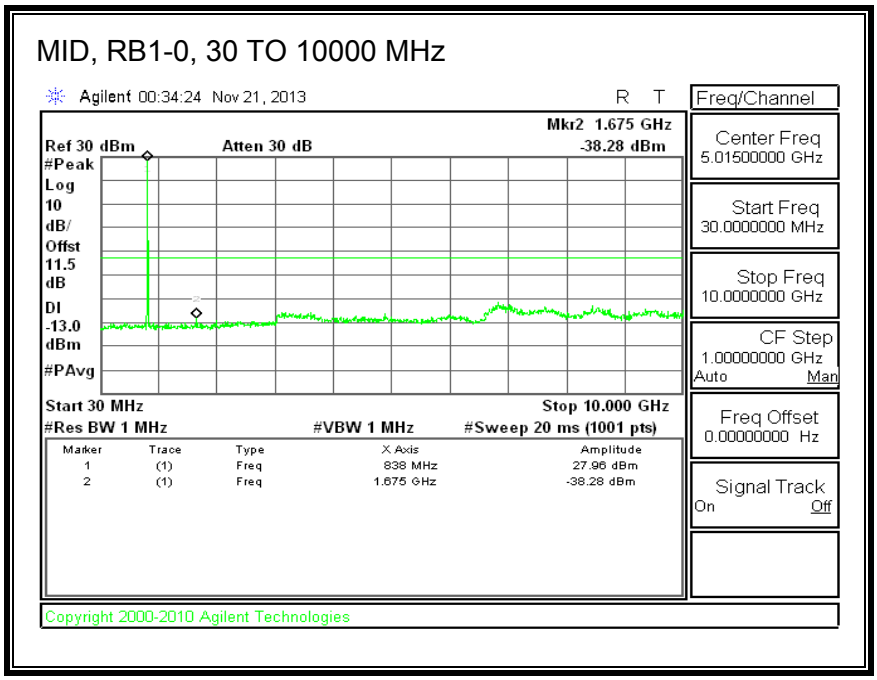
Band 5 (1.4 MHz BANDWIDTH)

LTE QPSK

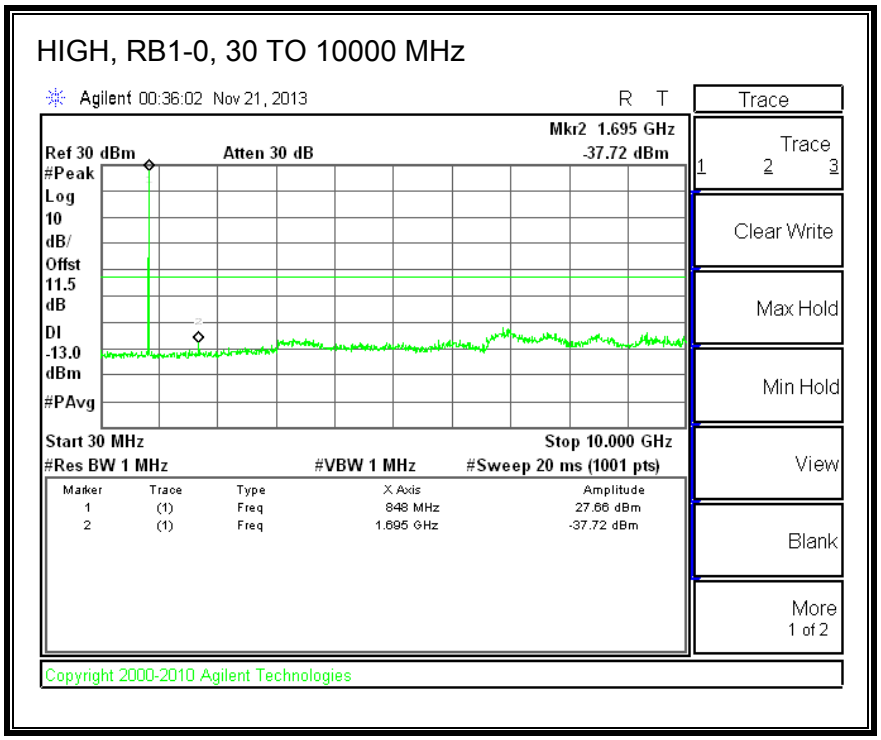
LOW, RB1-0, 30 TO 10000 MHz



MID, RB1-0, 30 TO 10000 MHz



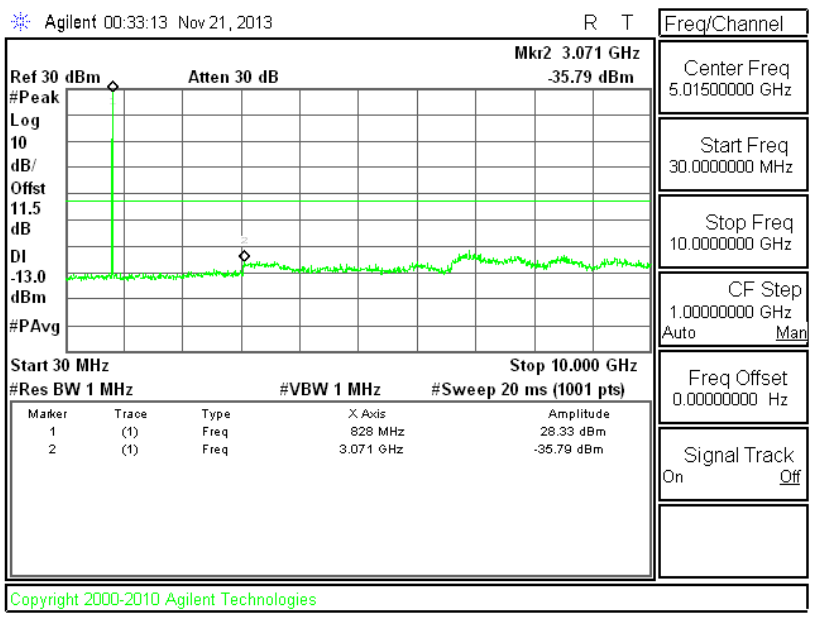
HIGH, RB1-0, 30 TO 10000 MHz



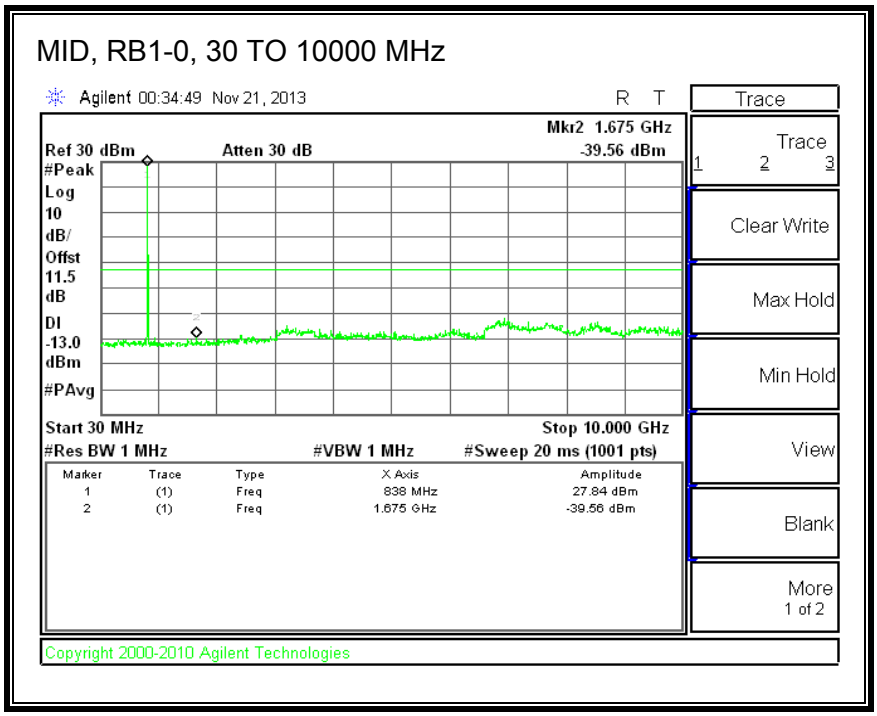
Band 5 (1.4 MHz BANDWIDTH)

LTE 16QAM

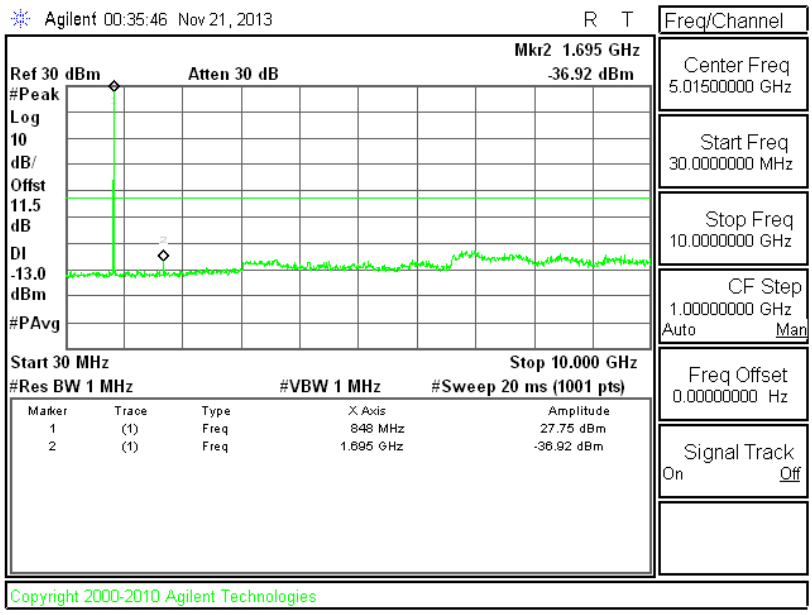
LOW, RB1-0, 30 TO 10000 MHz



MID, RB1-0, 30 TO 10000 MHz



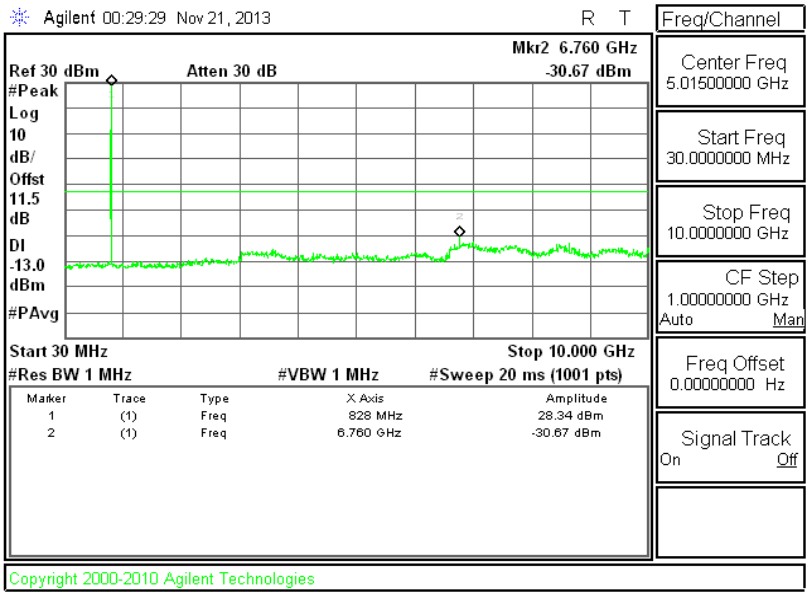
HIGH, RB1-0, 30 TO 10000 MHz



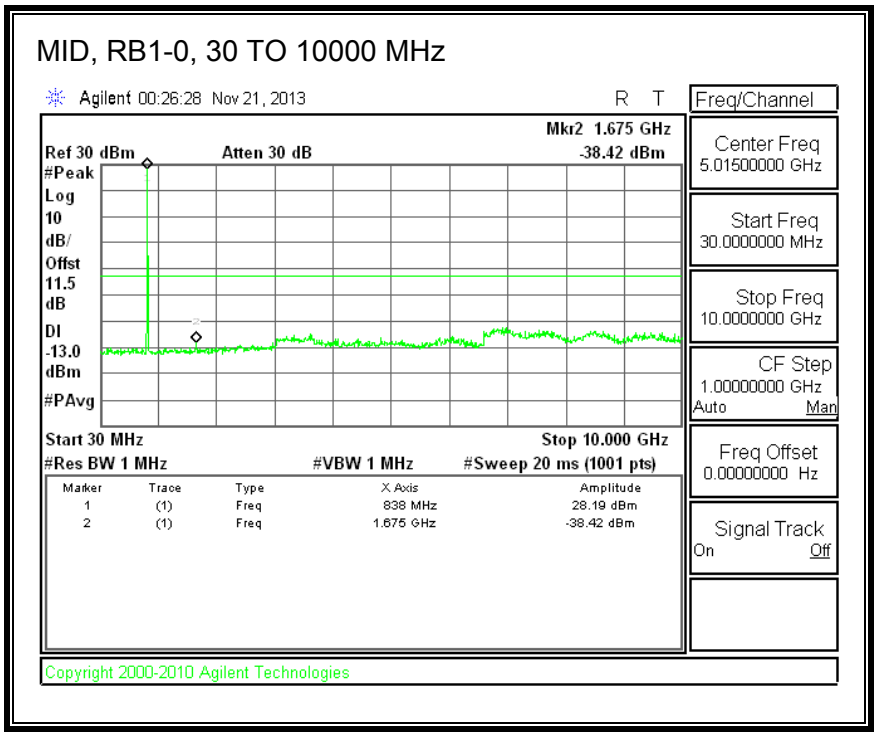
Band 5 (3MHz BANDWIDTH)

LTE QPSK

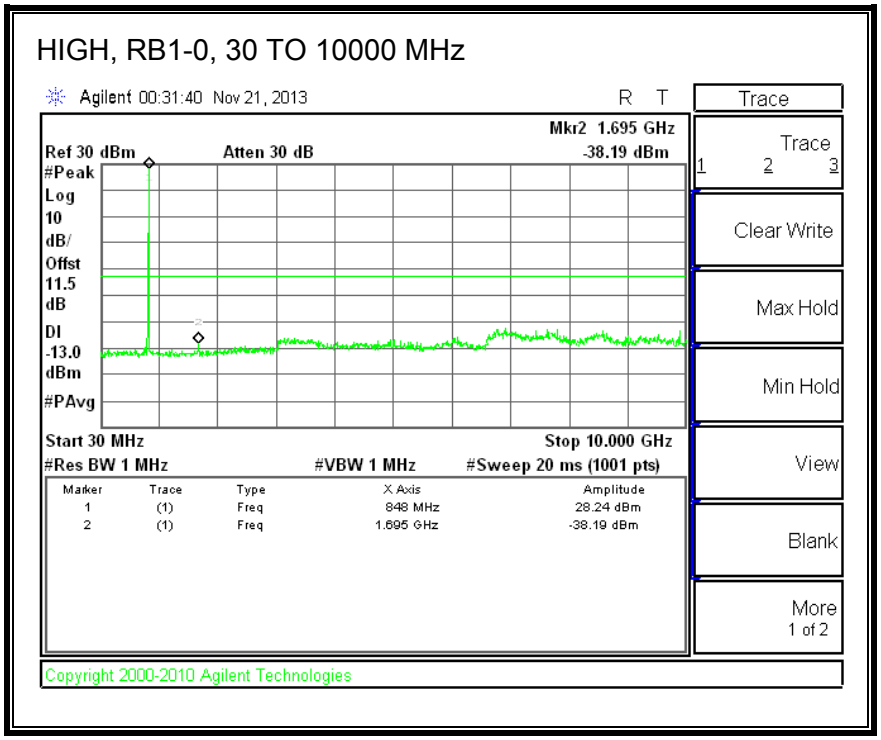
LOW, RB1-0, 30 TO 10000 MHz



MID, RB1-0, 30 TO 10000 MHz



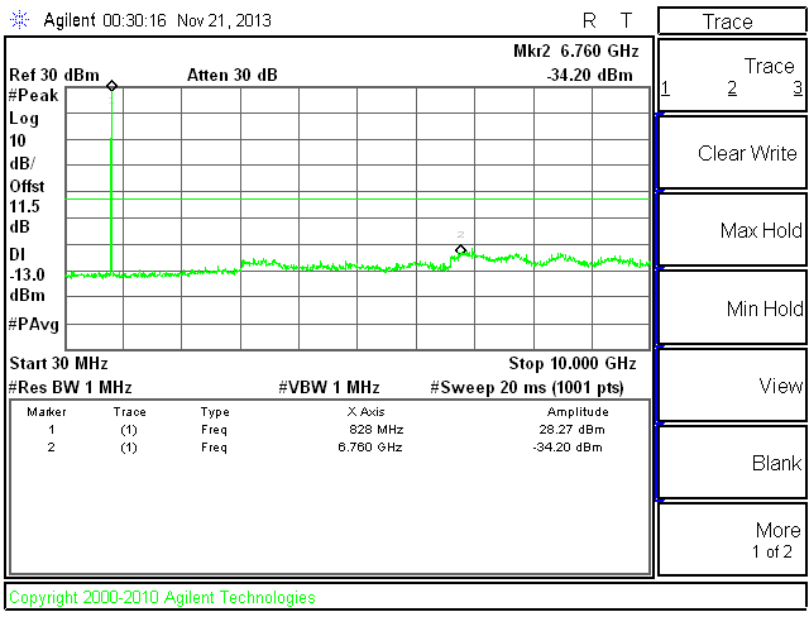
HIGH, RB1-0, 30 TO 10000 MHz



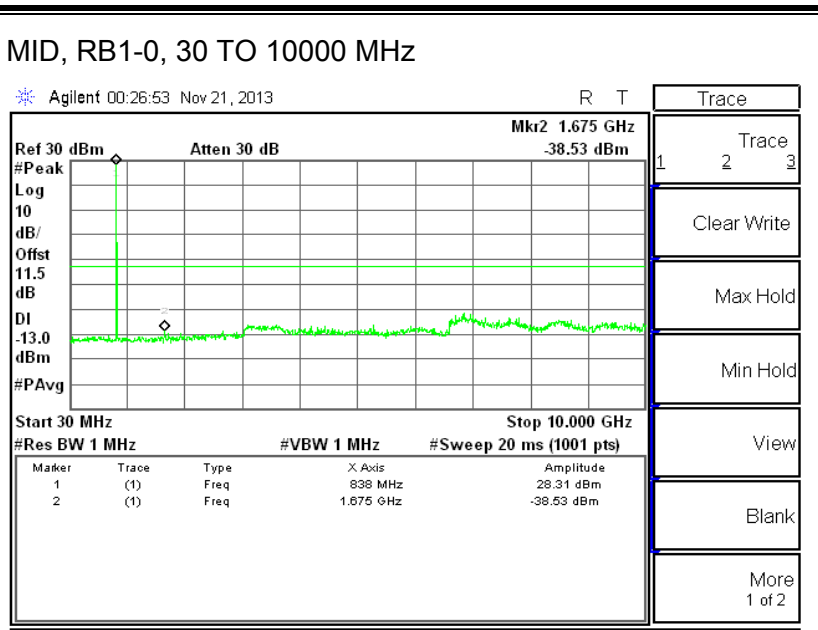
Band 5 (3MHz BANDWIDTH)

LTE 16QAM

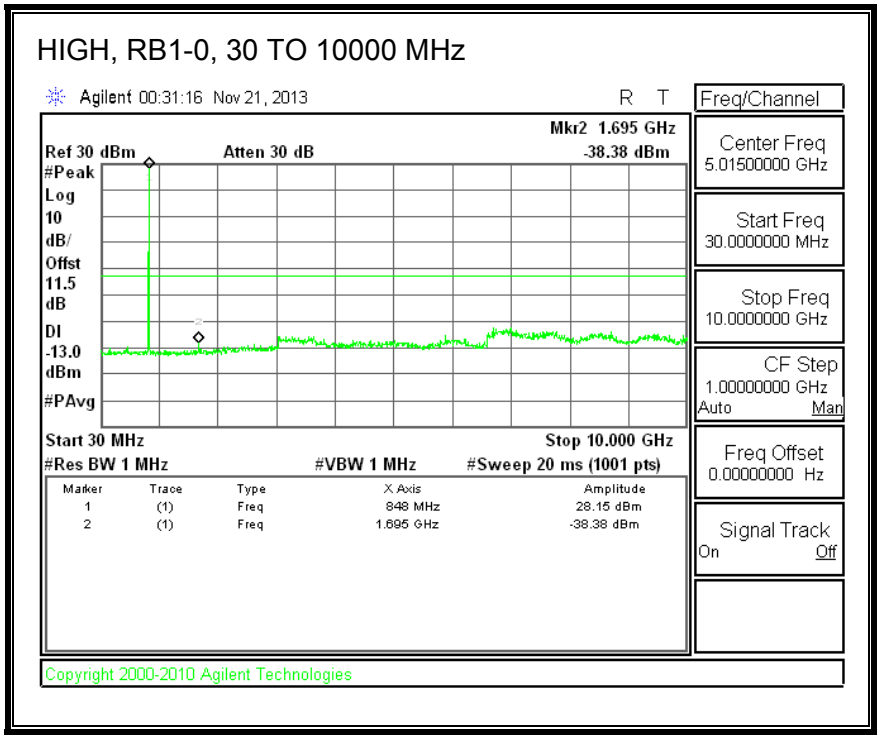
LOW, RB1-0, 30 TO 10000 MHz



MID, RB1-0, 30 TO 10000 MHz



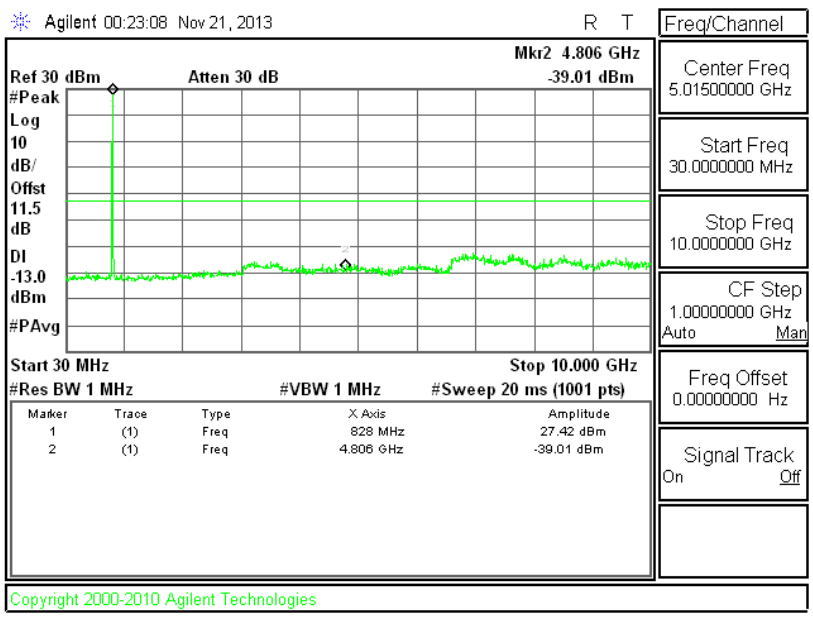
HIGH, RB1-0, 30 TO 10000 MHz



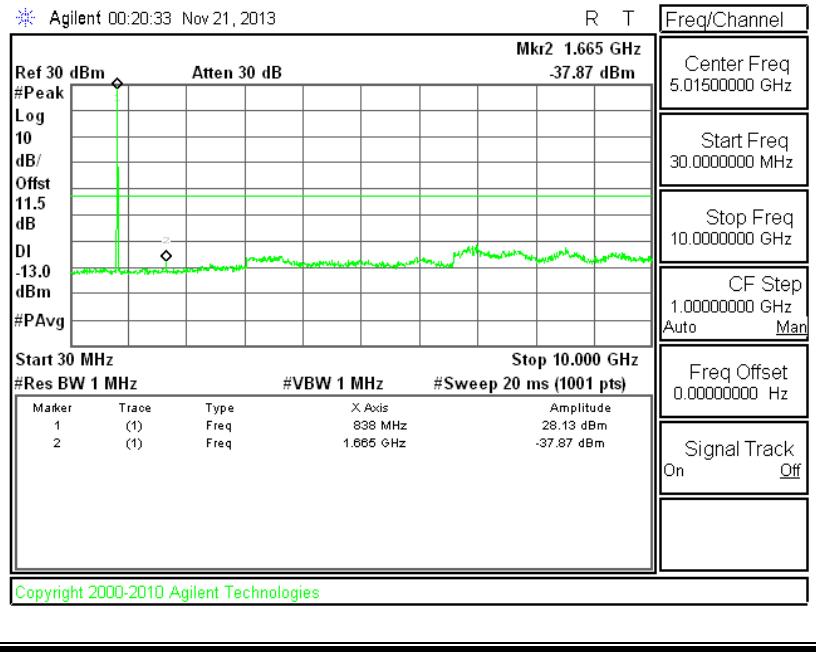
Band 5 (5MHz BANDWIDTH)

LTE QPSK

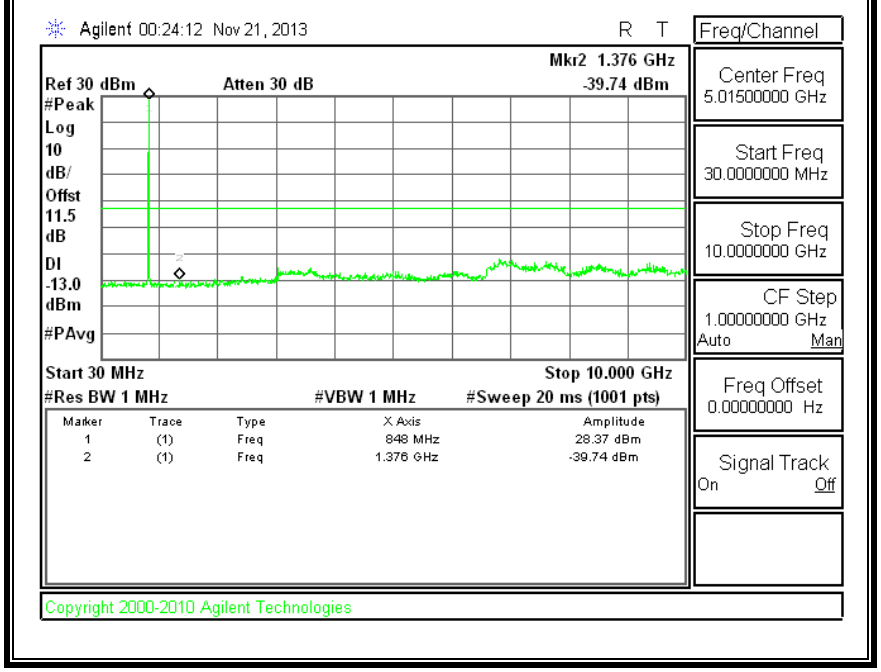
LOW, RB1-0, 30 TO 10000 MHz



MID, RB1-0, 30 TO 10000 MHz



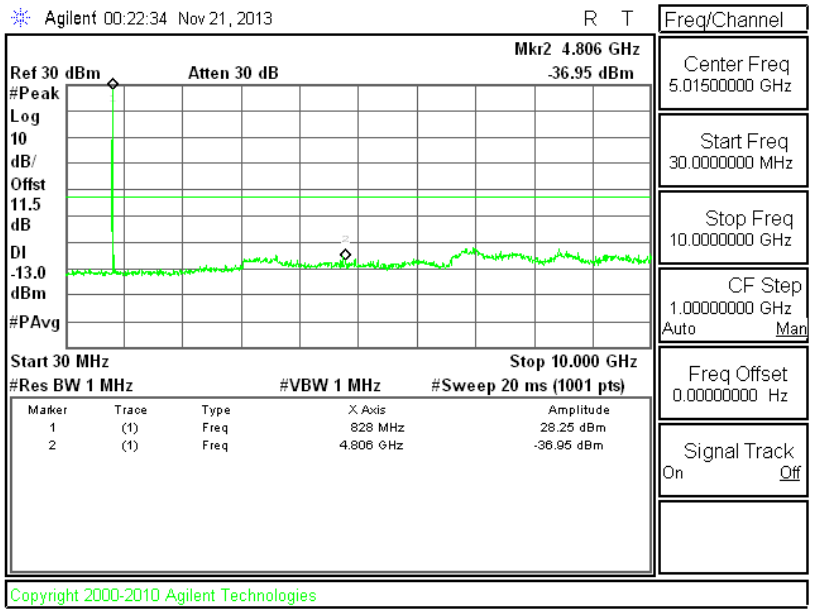
HIGH, RB1-0, 30 TO 10000 MHz



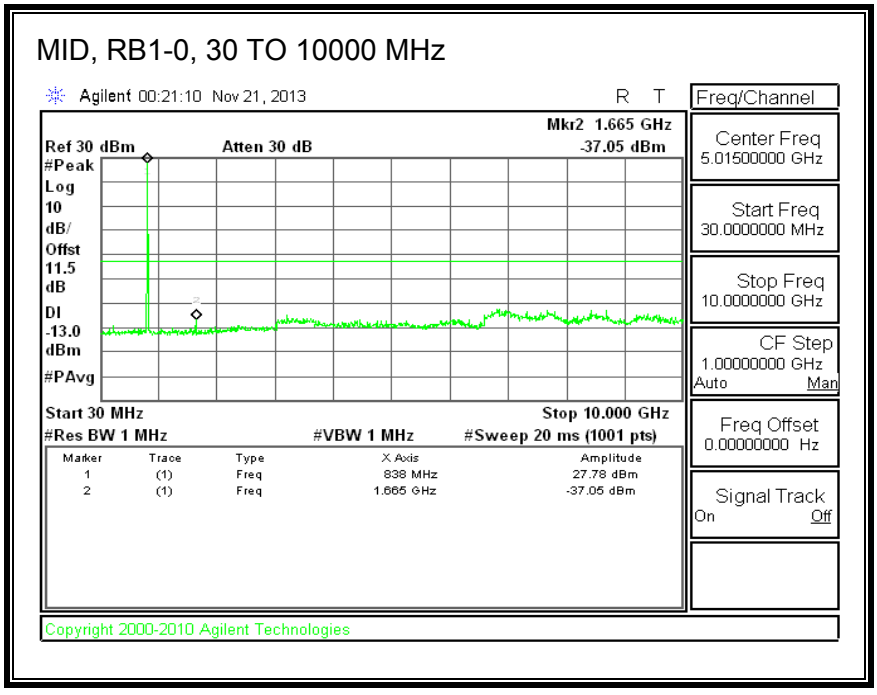
Band 5 (5MHz BANDWIDTH)

LTE 16QAM

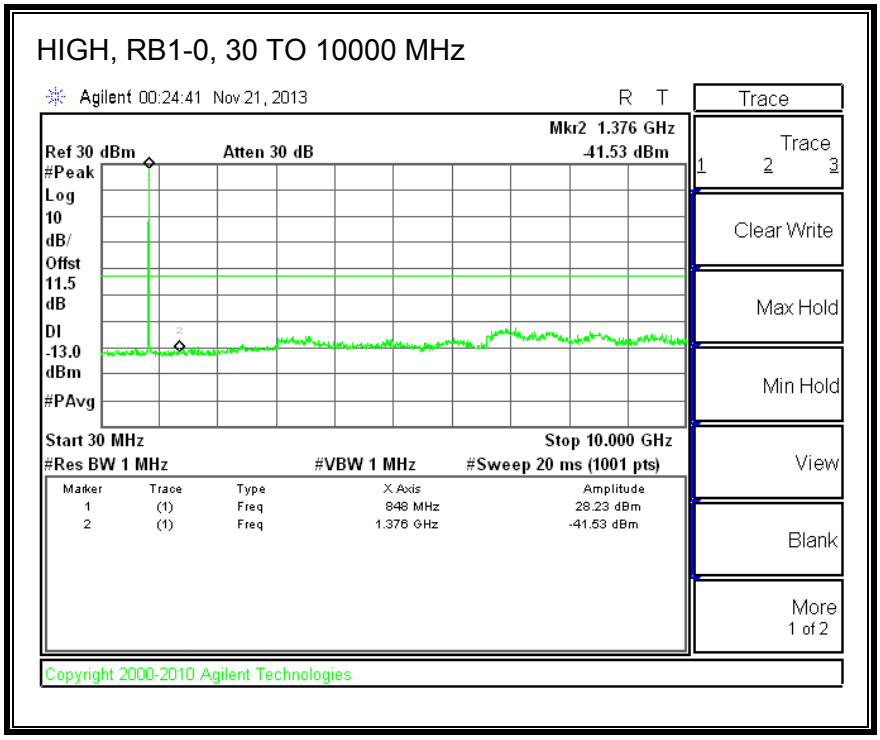
LOW, RB1-0, 30 TO 10000 MHz



MID, RB1-0, 30 TO 10000 MHz



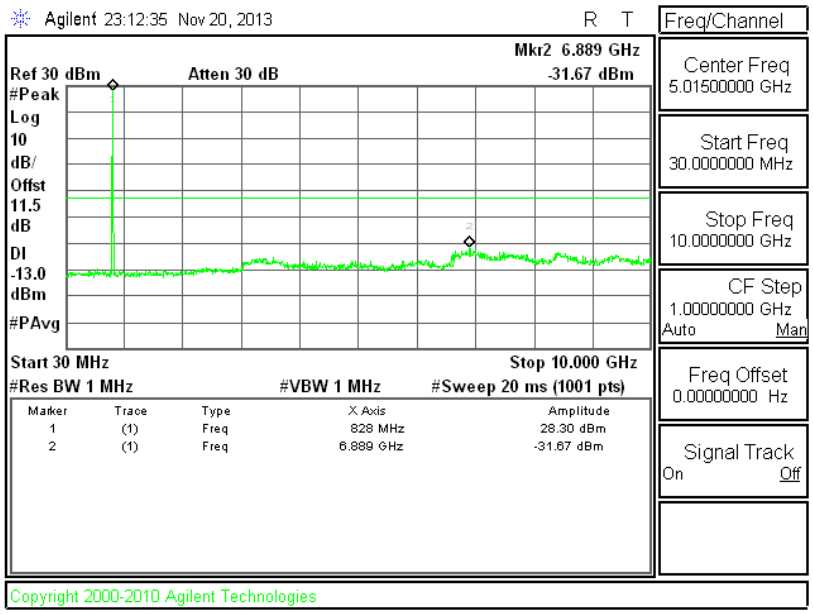
HIGH, RB1-0, 30 TO 10000 MHz



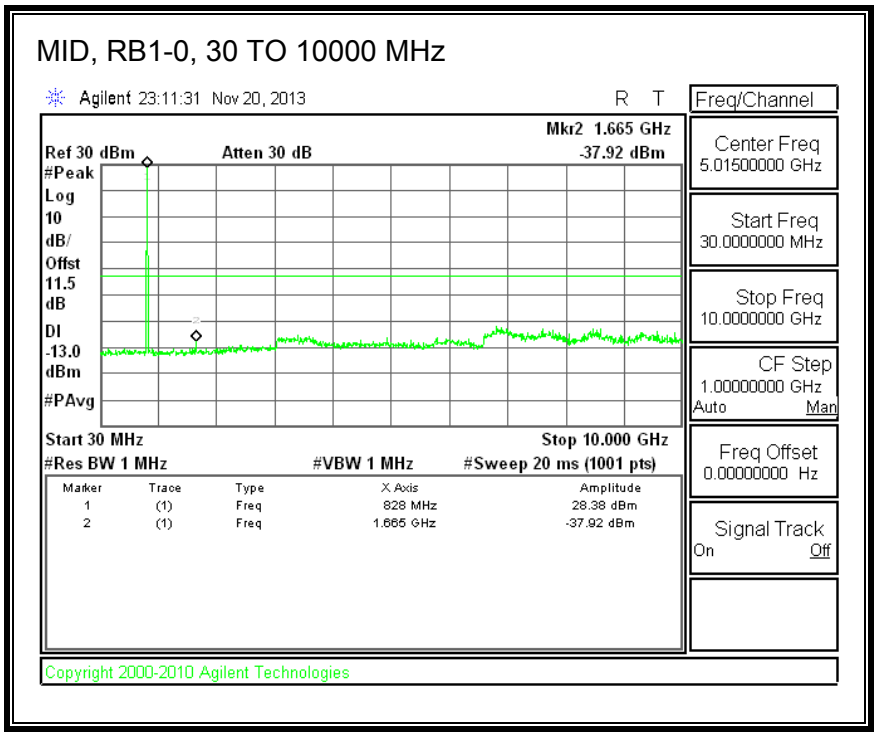
Band 5 (10MHz BANDWIDTH)

LTE QPSK

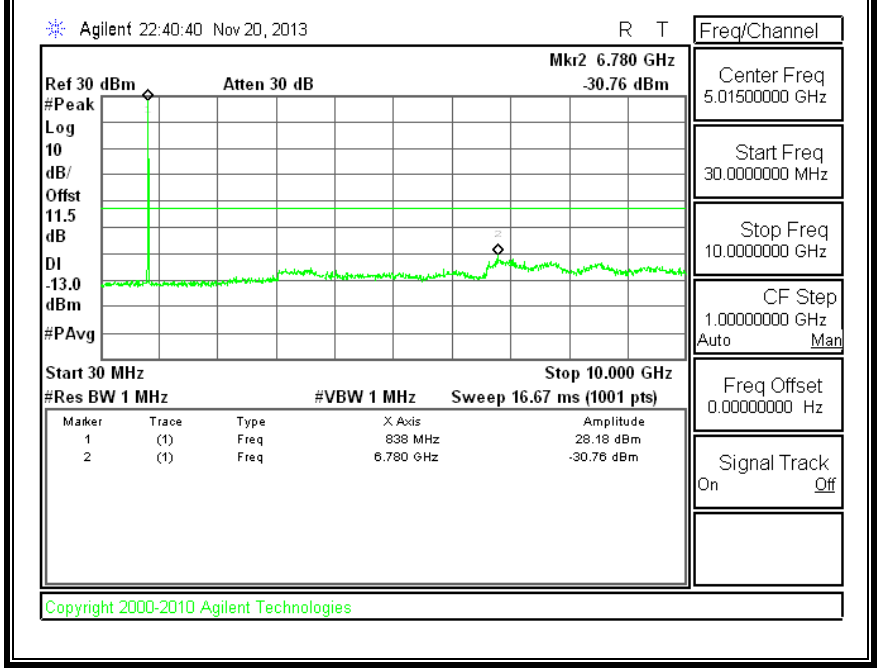
LOW, RB1-0, 30 TO 10000 MHz



MID, RB1-0, 30 TO 10000 MHz



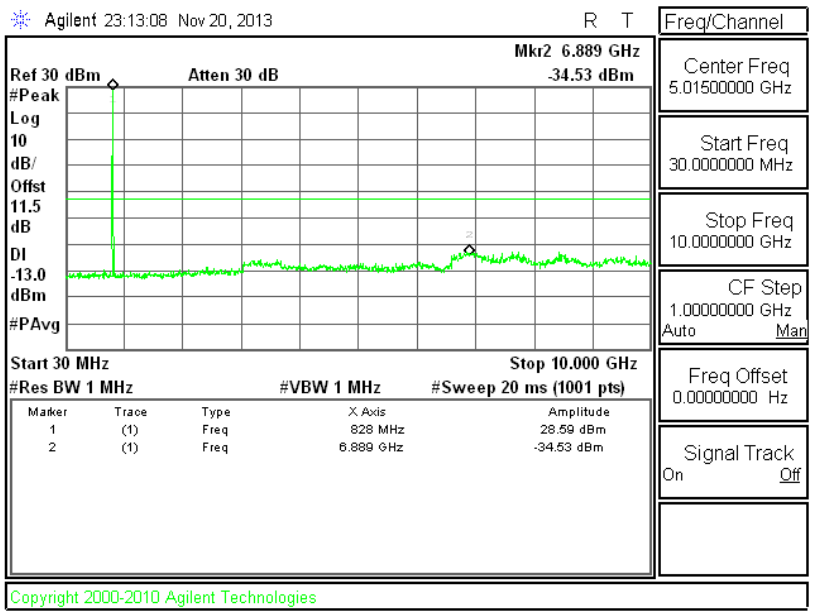
HIGH, RB1-0, 30 TO 10000 MHz



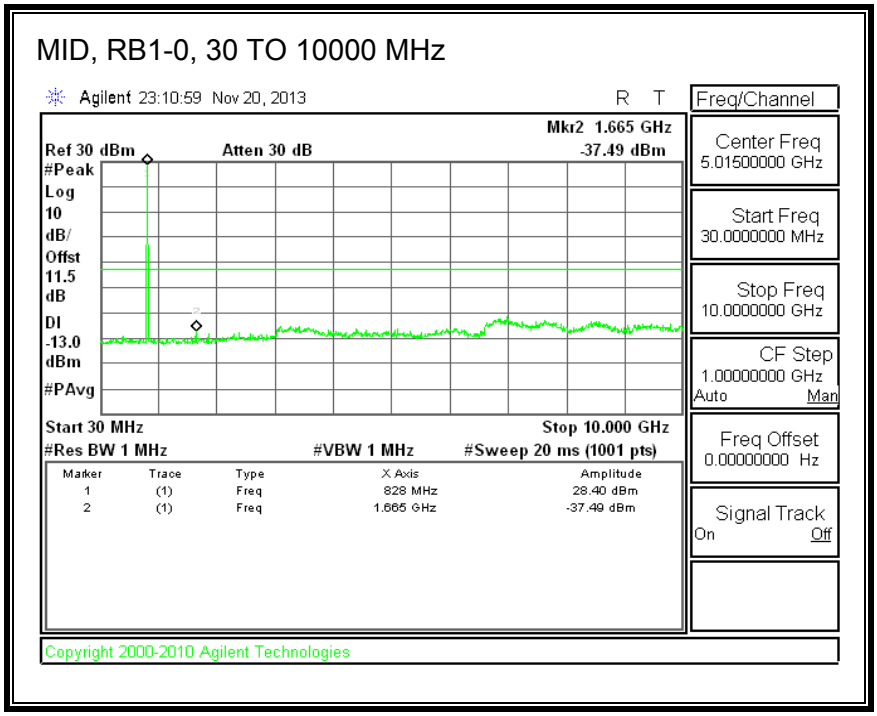
Band 5 (10MHz BANDWIDTH)

LTE 16QAM

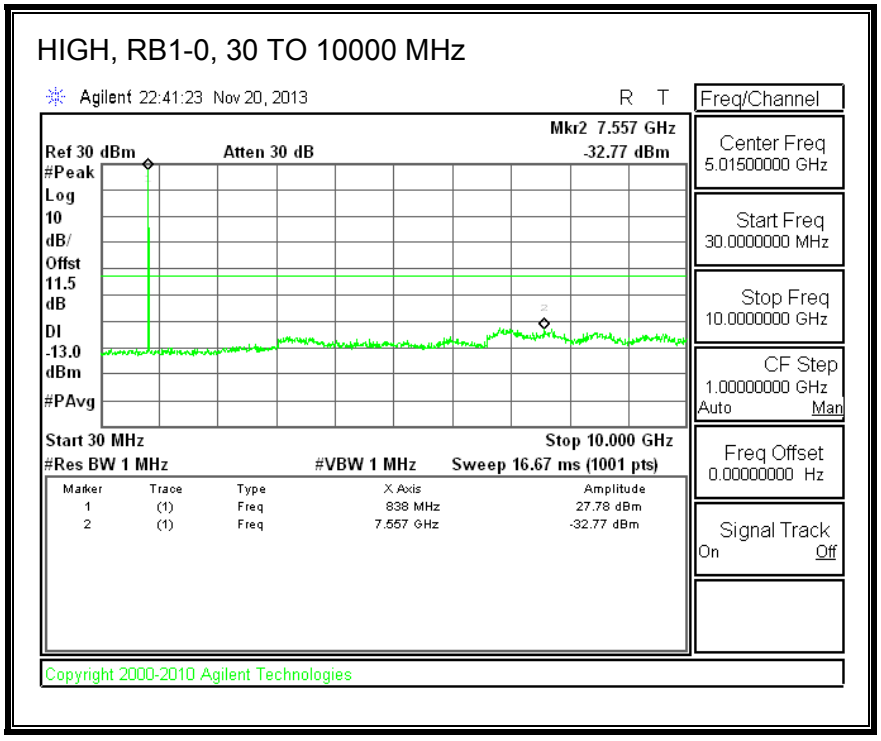
LOW, RB1-0, 30 TO 10000 MHz



MID, RB1-0, 30 TO 10000 MHz



HIGH, RB1-0, 30 TO 10000 MHz



8.4. FREQUENCY STABILITY

RULE PART(S)

FCC: §2.1055, §22.355 and §24.235

LIMITS

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

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

TEST PROCEDURE

Use CMW 500 with Frequency Error measurement capability.

- Temp. = −30° to +50°C
- Voltage = Normal and ± 15%.

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 2
- LTE Band 5

RESULTS

See the following pages.

LTE BAND 2, QPSK – 1880.0 MHz

Reference Frequency: Mid Channel 1879.999977 MHz @ 20ºC Limit: within the authorized block or +- 2.5 ppm = 4700.000 Hz				
Power Supply (Vdc)	Environment Temperature (*C)	Frequency Deviation Measureed with Time Elapse (MHz)	Delta (ppm)	Limit (ppm)
3.80	50	1879.999975	0.001	2.5
3.80	40	1879.999976	0.000	2.5
3.80	30	1879.999982	-0.002	2.5
3.80	***20***	***1879.999977***	***0***	***2.5***
3.80	10	1879.999977	0.000	2.5
3.80	0	1879.999978	0.000	2.5
3.80	-10	1879.999978	-0.001	2.5
3.80	-20	1879.999980	-0.001	2.5
3.80	-30	1879.999979	-0.001	2.5

Reference Frequency: Mid Channel 1879.999977 MHz @ 20ºC Limit: within the authorized block or +- 2.5 ppm = 4700.000 Hz				
Power Supply (Vdc)	Environment Temperature (*C)	Frequency Deviation Measureed with Time Elapse (MHz)	Delta (ppm)	Limit (ppm)
3.80	***20***	**1879.999977**	***0***	***2.5***
4.37	20	1879.999976	*0.001*	2.5
3.23	20	1879.999979	*-0.001*	2.5
End Voltage(3.05V)	20	1879.999979	*-0.001*	2.5

LTE BAND 2, 16QAM – 1880.0 MHz

Reference Frequency: Mid Channel 1879.999971 MHz @ 20ºC Limit: within the authorized block or +- 2.5 ppm = 4700.000 Hz				
Power Supply (Vdc)	Environment Temperature (*C)	Frequency Deviation Measureed with Time Elapse (MHz)	Delta (ppm)	Limit (ppm)
3.80	50	1879.999972	0.000	2.5
3.80	40	1879.999972	-0.001	2.5
3.80	30	1879.999973	-0.001	2.5
3.80	***20***	***1879.999971***	***0***	***2.5***
3.80	10	1879.999974	-0.002	2.5
3.80	0	1879.999976	-0.003	2.5
3.80	-10	1879.999973	-0.001	2.5
3.80	-20	1879.999980	-0.005	2.5
3.80	-30	1879.999974	-0.002	2.5

Reference Frequency: Mid Channel 1879.999971 MHz @ 20ºC Limit: within the authorized block or +- 2.5 ppm = 4700.000 Hz				
Power Supply (Vdc)	Environment Temperature (*C)	Frequency Deviation Measureed with Time Elapse (MHz)	Delta (ppm)	Limit (ppm)
3.80	***20***	***1879.999971***	***0***	***2.5***
4.37	20	1879.999974	*-0.001*	2.5
3.23	20	1879.999973	*-0.001*	2.5
End Voltage(3.05V)	20	1879.999973	*-0.001*	2.5

LTE BAND 5 – 836.5 MHz QPSK

Reference Frequency: Mid Channel 836.500006 MHz @ 20ºC Limit: within the authorized block or +- 2.5 ppm = 2091.250 Hz				
Power Supply	Environment	Frequency Deviation Measureed with Time Elapse		
(Vdc)	Temperature (*C)	(MHz)	Delta (ppm)	Limit (ppm)
3.80	50	836.500006	0.000	2.5
3.80	40	836.500005	0.000	2.5
3.80	30	836.500006	0.000	2.5
3.80	***20***	**836.500006**	***0***	***2.5***
3.80	10	836.500005	0.000	2.5
3.80	0	836.500005	0.000	2.5
3.80	-10	836.500005	0.000	2.5
3.80	-20	836.500005	0.000	2.5
3.80	-30	836.500006	0.000	2.5

Reference Frequency: Mid Channel 836.500006 MHz @ 20ºC Limit: within the authorized block or +- 2.5 ppm = 2091.250 Hz				
Power Supply	Environment	Frequency Deviation Measureed with Time Elapse		
(Vdc)	Temperature (*C)	(MHz)	Delta (ppm)	Limit (ppm)
3.80	***20***	***836.500006***	***0***	***2.5***
4.37	20	836.500006	*-0.001*	2.5
3.23	20	836.500005	*0.000*	2.5
End Voltage(3.05V)	20	836.500005	*0.000*	2.5

LTE BAND 5 – 836.5 MHZ, 16QAM

Reference Frequency: Mid Channel 836.5000105 MHz @ 20ºC Limit: within the authorized block or +- 2.5 ppm = 2091.250 Hz				
Power Supply	Environment	Frequency Deviation Measureed with Time Elapse		
(Vdc)	Temperature (*C)	(MHz)	Delta (ppm)	Limit (ppm)
3.80	50	836.5000109	0.000	2.5
3.80	40	836.5000109	0.000	2.5
3.80	30	836.5000108	0.000	2.5
3.80	***20***	***836.5000105***	***0***	***2.5***
3.80	10	836.5000124	-0.002	2.5
3.80	0	836.5000118	-0.002	2.5
3.80	-10	836.5000128	-0.003	2.5
3.80	-20	836.5000098	0.001	2.5
3.80	-30	836.5000062	0.005	2.5

Reference Frequency: Mid Channel 836.5000105 MHz @ 20ºC Limit: within the authorized block or +- 2.5 ppm = 2091.250 Hz				
Power Supply	Environment	Frequency Deviation Measureed with Time Elapse		
(Vdc)	Temperature (*C)	(MHz)	Delta (ppm)	Limit (ppm)
3.80	***20***	***836.5000105***	***0***	***2.5***
4.37	20	836.5000109	*0.000*	2.5
3.23	20	836.5000105	*0.000*	2.5
End Voltage(3.05V)	20	836.5000105	*0.000*	2.5

9. RADIATED TEST RESULTS

9.1. RADIATED POWER (ERP & EIRP)

RULE PART(S)

FCC: §2.1046, §22.913 and §24.232

LIMITS:

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

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

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

ANSI / TIA / EIA 603C Clause 2.2.17
KDB 971168 v02r01 RF power output using broadband peak and average power meter method.

MODES TESTED

- LTE Band 2
- LTE Band 5

RESULTS

BAND 2

EIRP LTE Band 2 (1.4 MHz BANDWIDTH)

Mode	RB Offset/ RB Size	f (MHz)	EIRP (Peak)	
			dBm	mW
1.4MHz Band QPSK	6/0	1850.7	28.59	722.77
		1880.0	**29.22**	835.60
		1909.3	28.02	633.87
1.4MHz Band 16QAM	6/0	1850.7	27.53	566.24
		1880.0	**28.24**	666.81
		1909.3	26.98	498.88

EIRP LTE Band 2 (3MHz BANDWIDTH)

Mode	RB Offset/ RB Size	f (MHz)	EIRP (Peak)	
			dBm	mW
3.0MHz Band QPSK	15/0	1851.5	28.63	729.46
		1880.0	**29.35**	860.99
		1908.5	28.14	651.63
3.0MHz Band 16QAM	15/0	1851.5	27.60	575.44
		1880.0	**28.34**	682.34
		1908.5	27.30	537.03

EIRP LTE Band 2 (5MHz BANDWIDTH)

Mode	RB Offset/ RB Size	f (MHz)	EIRP (Peak)	
			dBm	mW
5.0MHz Band QPSK	25/0	1852.5	29.43	877.00
		1880.0	**29.48**	887.16
		1907.5	29.13	818.46
5.0MHz Band 16QAM	25/0	1852.5	28.47	703.07
		1880.0	**28.58**	721.11
		1907.5	28.14	651.63

EIRP LTE Band 2 (10MHz BANDWIDTH)

Mode	RB Offset/ RB Size	f (MHz)	EIRP (Peak)	
			dBm	mW
10.0MHz Band QPSK	50/0	1855.0	**29.53**	897.43
		1880.0	29.48	887.16
		1905.0	29.42	874.98
10.0MHz Band 16QAM	50/0	1855.0	28.63	729.46
		1880.0	**28.78**	755.09
		1905.0	28.72	744.73

EIRP LTE Band 2 (15MHz BANDWIDTH)

Mode	RB Offset/ RB Size	f (MHz)	EIRP (Peak)	
			dBm	mW
15MHz Band QPSK	75/0	1857.5	29.43	877.00
		1880.0	**29.48**	887.16
		1902.5	29.22	835.60
15MHz Band 16QAM	75/0	1857.5	28.63	729.46
		1880.0	**28.68**	737.90
		1902.5	28.42	695.02

EIRP LTE Band 2 (20MHz BANDWIDTH)

Mode	RB Offset/ RB Size	f (MHz)	EIRP (Peak)	
			dBm	mW
20MHz Band QPSK	100/0	1860.0	29.03	799.83
		1880.0	**29.38**	866.96
		1900.0	29.22	835.60
20MHz Band 16QAM	100/0	1860.0	28.43	696.63
		1880.0	**28.68**	737.90
		1900.0	28.42	695.02

BAND 5

ERP LTE Band 5 (1.4 MHz BANDWIDTH)

Mode	RB Offset/ RB Size	f (MHz)	ERP (Average)	
			dBm	mW
1.4MHz Band QPSK	1/0	824.7	22.98	198.61
		836.5	**23.03**	200.91
		848.3	22.83	191.87
1.4MHz Band 16QAM	1/0	824.7	22.08	161.44
		836.5	**22.13**	163.31
		848.3	21.98	157.76

ERP LTE Band 5 (3MHz BANDWIDTH)

Mode	RB Offset/ RB Size	f (MHz)	ERP (Average)	
			dBm	mW
3.0 MHZ BAND QPSK	1/0	825.5	**23.08**	203.24
		836.5	22.98	198.61
		847.5	22.94	196.79
3.0 MHZ BAND 16QAM	1/0	825.5	**22.18**	165.20
		836.5	22.08	161.44
		847.5	22.03	159.59

ERP LTE Band 5 (5MHz BANDWIDTH)

Mode	RB Offset/ RB Size	f (MHz)	ERP (Average)	
			dBm	mW
5MHz Band QPSK	1/0	826.5	23.08	203.24
		836.5	**23.12**	205.12
		846.5	23.03	200.91
5MHz Band 16QAM	1/0	826.5	22.18	165.20
		836.5	**22.20**	165.96
		846.5	22.11	162.55

ERP LTE Band 5 (10MHz BANDWIDTH)

Mode	RB Offset/ RB Size	f (MHz)	ERP (Average)	
			dBm	mW
10.0 MHZ BAND QPSK	1/0	829.0	**23.05**	201.84
		836.5	22.92	195.88
		844.0	23.00	199.53
10.0 MHZ BAND 16QAM	1/0	829.0	22.13	163.31
		836.5	22.04	159.96
		844.0	**22.18**	165.20

9.1.1. LTE BAND 2

PEAK

EIRP LTE QPSK Band 2 (1.4 MHz BANDWIDTH)

High Frequency Substitution Measurement
UL Fremont Radiated Chamber D

Company: Apple
Project #: 13U16584
Date: 1/8/2014
Test Engineer: M. Hua
Configuration: EUT Only
Mode: LTE Band 2 QPSK 1.4MHz BW

Test Equipment:
Receiving: Horn T344 and Chamber D SMA Cables
Substitution: Horn T59 Substitution, and 12ft SMA Cable

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1.851	21.8	V	1.53	7.88	28.10	33.0	-4.9	
1.851	22.2	H	1.53	7.88	28.59	33.0	-4.4	
Mid Ch								
1.880	21.9	V	1.53	7.86	28.20	33.0	-4.8	
1.880	22.9	H	1.53	7.86	29.22	33.0	-3.8	
High Ch								
1.909	20.9	V	1.53	7.84	27.20	33.0	-5.8	
1.909	21.7	H	1.53	7.84	28.02	33.0	-5.0	

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EIRP LTE 16QAM Band 2 (1.4 MHz BANDWIDTH)

High Frequency Substitution Measurement
UL Fremont Radiated Chamber D

Company: Apple
Project #: 13U16584
Date: 1/8/2014
Test Engineer: M. Hua
Configuration: EUT Only
Mode: LTE Band 2 16QAM 1.4MHz BW

Test Equipment:
Receiving: Horn T344 and Chamber D SMA Cables
Substitution: Horn T59 Substitution, and 12ft SMA Cable

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1.851	20.8	V	1.53	7.88	27.15	33.0	-5.9	
1.851	21.2	H	1.53	7.88	27.53	33.0	-5.5	
Mid Ch								
1.880	20.8	V	1.53	7.86	27.12	33.0	-5.9	
1.880	21.9	H	1.53	7.86	28.24	33.0	-4.8	
High Ch								
1.909	19.9	V	1.53	7.84	26.21	33.0	-6.8	
1.909	20.7	H	1.53	7.84	26.98	33.0	-6.0	

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EIRP LTE QPSK Band 2 (3MHz BANDWIDTH)

High Frequency Substitution Measurement
UL Fremont Radiated Chamber D

Company:	Apple
Project #:	13U16584
Date:	1/8/2014
Test Engineer:	M. Hua
Configuration:	EUT Only
Mode:	LTE Band 2 QPSK 3MHz BW

Test Equipment:
Receiving: Horn T344 and Chamber D SMA Cables
Substitution: Horn T59 Substitution, and 12ft SMA Cable

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1.852	22.0	V	1.53	7.88	28.33	33.0	-4.7	
1.852	22.3	H	1.53	7.88	28.63	33.0	-4.4	
Mid Ch								
1.880	21.9	V	1.53	7.86	28.19	33.0	-4.8	
1.880	23.0	H	1.53	7.86	29.35	33.0	-3.7	
High Ch								
1.909	21.0	V	1.53	7.84	27.34	33.0	-5.7	
1.909	21.8	H	1.53	7.84	28.14	33.0	-4.9	

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EIRP LTE 16QAM Band 2 (3MHz BANDWIDTH)

High Frequency Substitution Measurement
UL Fremont Radiated Chamber D

Company: Apple
Project #: 13U16584
Date: 1/8/2014
Test Engineer: M. Hua
Configuration: EUT Only
Mode: LTE Band 2 16QAM 3MHz BW

Test Equipment:
Receiving: Horn T344 and Chamber D SMA Cables
Substitution: Horn T59 Substitution, and 12ft SMA Cable

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1.852	21.0	V	1.53	7.88	27.36	33.0	-5.6	
1.852	21.3	H	1.53	7.88	27.60	33.0	-5.4	
Mid Ch								
1.880	20.8	V	1.53	7.86	27.16	33.0	-5.8	
1.880	22.0	H	1.53	7.86	28.34	33.0	-4.7	
High Ch								
1.909	20.1	V	1.53	7.84	26.36	33.0	-6.6	
1.909	21.0	H	1.53	7.84	27.30	33.0	-5.7	

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EIRP LTE QPSK Band 2 (5MHz BANDWIDTH)

High Frequency Substitution Measurement
UL Fremont Radiated Chamber D

Company: Apple
Project #: 13U16584
Date: 1/8/2014
Test Engineer: M. Hua
Configuration: EUT Only
Mode: LTE Band 2 QPSK 5MHz BW

Test Equipment:
Receiving: Horn T344 and Chamber D SMA Cables
Substitution: Horn T59 Substitution, and 12ft SMA Cable

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1.853	23.1	V	1.53	7.88	29.40	33.0	-3.6	
1.853	23.1	H	1.53	7.88	29.43	33.0	-3.6	
Mid Ch								
1.880	22.6	V	1.53	7.86	28.91	33.0	-4.1	
1.880	23.2	H	1.53	7.86	29.48	33.0	-3.5	
High Ch								
1.908	22.0	V	1.53	7.84	28.33	33.0	-4.7	
1.908	22.8	H	1.53	7.84	29.13	33.0	-3.9	

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EIRP LTE 16QAM Band 2 (5MHz BANDWIDTH)

High Frequency Substitution Measurement
UL Fremont Radiated Chamber D

Company: Apple
Project #: 13U16584
Date: 1/8/2014
Test Engineer: M. Hua
Configuration: EUT Only
Mode: LTE Band 2 16QAM 5MHz BW

Test Equipment:
Receiving: Horn T344 and Chamber D SMA Cables
Substitution: Horn T59 Substitution, and 12ft SMA Cable

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1.853	22.1	V	1.53	7.88	28.47	33.0	-4.5	
1.853	22.2	H	1.53	7.88	28.53	33.0	-4.5	
Mid Ch								
1.880	21.6	V	1.53	7.86	27.94	33.0	-5.1	
1.880	22.3	H	1.53	7.86	28.58	33.0	-4.4	
High Ch								
1.908	21.0	V	1.53	7.84	27.34	33.0	-5.7	
1.908	21.8	H	1.53	7.84	28.14	33.0	-4.9	

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EIRP LTE QPSK Band 2 (10MHz BANDWIDTH)

High Frequency Substitution Measurement
UL Fremont Radiated Chamber D

Company: Apple
Project #: 13U16584
Date: 1/7/2014
Test Engineer: M. Hua
Configuration: EUT Only
Mode: LTE Band 2 QPSK 10MHz BW

Test Equipment:
Receiving: Horn T344 and Chamber D SMA Cables
Substitution: Horn T59 Substitution, and 12ft SMA Cable

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1.855	21.5	V	1.53	7.88	27.87	33.0	-5.1	
1.855	23.2	H	1.53	7.88	29.53	33.0	-3.5	
Mid Ch								
1.880	21.5	V	1.53	7.86	27.82	33.0	-5.2	
1.880	23.2	H	1.53	7.86	29.48	33.0	-3.5	
High Ch								
1.905	21.6	V	1.53	7.84	27.91	33.0	-5.1	
1.905	23.1	H	1.53	7.84	29.42	33.0	-3.6	

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EIRP LTE 16QAM Band 2 (10MHz BANDWIDTH)

High Frequency Substitution Measurement
UL Fremont Radiated Chamber D

Company: Apple
Project #: 13U16584
Date: 1/7/2014
Test Engineer: M. Hua
Configuration: EUT Only
Mode: LTE Band 2 16QAM 10MHz BW

Test Equipment:
Receiving: Horn T344 and Chamber D SMA Cables
Substitution: Horn T59 Substitution, and 12ft SMA Cable

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1.855	20.7	V	1.53	7.88	27.07	33.0	-5.9	
1.855	22.3	H	1.53	7.88	28.63	33.0	-4.4	
Mid Ch								
1.880	20.8	V	1.53	7.86	27.12	33.0	-5.9	
1.880	22.5	H	1.53	7.86	28.78	33.0	-4.2	
High Ch								
1.905	21.0	V	1.53	7.84	27.31	33.0	-5.7	
1.905	22.4	H	1.53	7.84	28.72	33.0	-4.3	

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EIRP LTE QPSK Band 2 (15MHz BANDWIDTH)

High Frequency Substitution Measurement
UL Fremont Radiated Chamber D

Company: Apple
Project #: 13U16584
Date: 1/8/2014
Test Engineer: M. Hua
Configuration: EUT Only
Mode: LTE Band 2 QPSK 15MHz BW

Test Equipment:
Receiving: Horn T344 and Chamber D SMA Cables
Substitution: Horn T59 Substitution, and 12ft SMA Cable

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1.858	22.7	V	1.53	7.88	29.07	33.0	-3.9	
1.858	23.1	H	1.53	7.88	29.43	33.0	-3.6	
Mid Ch								
1.880	22.6	V	1.53	7.86	28.92	33.0	-4.1	
1.880	23.2	H	1.53	7.86	29.48	33.0	-3.5	
High Ch								
1.903	22.0	V	1.53	7.84	28.31	33.0	-4.7	
1.903	22.9	H	1.53	7.84	29.22	33.0	-3.8	

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EIRP LTE 16QAM Band 2 (15MHz BANDWIDTH)

High Frequency Substitution Measurement
UL Fremont Radiated Chamber D

Company: Apple
Project #: 13U16584
Date: 1/8/2014
Test Engineer: M. Hua
Configuration: EUT Only
Mode: LTE Band 2 16QAM 15MHz BW

Test Equipment:
Receiving: Horn T344 and Chamber D SMA Cables
Substitution: Horn T59 Substitution, and 12ft SMA Cable

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1.858	21.7	V	1.53	7.88	28.07	33.0	-4.9	
1.858	22.3	H	1.53	7.88	28.63	33.0	-4.4	
Mid Ch								
1.880	21.4	V	1.53	7.86	27.72	33.0	-5.3	
1.880	22.4	H	1.53	7.86	28.68	33.0	-4.3	
High Ch								
1.903	21.3	V	1.53	7.84	27.61	33.0	-5.4	
1.903	22.1	H	1.53	7.84	28.42	33.0	-4.6	

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EIRP LTE QPSK Band 2 (20MHz BANDWIDTH)

High Frequency Substitution Measurement
UL Fremont Radiated Chamber D

Company: Apple
Project #: 13U16584
Date: 1/8/2014
Test Engineer: M. Hua
Configuration: EUT Only
Mode: LTE Band 2 QPSK 20MHz BW

Test Equipment:
Receiving: Horn T344 and Chamber D SMA Cables
Substitution: Horn T59 Substitution, and 12ft SMA Cable

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1.860	21.7	V	1.53	7.88	28.07	33.0	-4.9	
1.860	22.7	H	1.53	7.88	29.03	33.0	-4.0	
Mid Ch								
1.880	21.8	V	1.53	7.86	28.12	33.0	-4.9	
1.880	23.1	H	1.53	7.86	29.38	33.0	-3.6	
High Ch								
1.900	22.0	V	1.53	7.84	28.31	33.0	-4.7	
1.900	22.9	H	1.53	7.84	29.22	33.0	-3.8	

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EIRP LTE 16QAM Band 2 (20MHz BANDWIDTH)

High Frequency Substitution Measurement
UL Fremont Radiated Chamber D

Company: Apple
Project #: 13U16584
Date: 1/8/2014
Test Engineer: M. Hua
Configuration: EUT Only
Mode: LTE Band 2 16QAM 20MHz BW

Test Equipment:
Receiving: Horn T344 and Chamber D SMA Cables
Substitution: Horn T59 Substitution, and 12ft SMA Cable

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1.860	21.0	V	1.53	7.88	27.37	33.0	-5.6	
1.860	22.1	H	1.53	7.88	28.43	33.0	-4.6	
Mid Ch								
1.880	21.1	V	1.53	7.86	27.42	33.0	-5.6	
1.880	22.4	H	1.53	7.86	28.68	33.0	-4.3	
High Ch								
1.900	21.3	V	1.53	7.84	27.61	33.0	-5.4	
1.900	22.1	H	1.53	7.84	28.42	33.0	-4.6	

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9.1.2. LTE BAND 5

AVERAGE

ERP LTE QPSK Band 5 (1.4 MHz BANDWIDTH)

High Frequency Substitution Measurement
UL Fremont Radiated Chamber D

Company: Apple
Project #: 13U16584
Date: 12/19/13
Test Engineer: M. Hua
Configuration: EUT Only
Mode: LTE Band 5 QPSK 1.4MHz BW

Test Equipment:
Receiving: Sunol T407, and Chamber D Cable
Substitution: Dipole S/N: 00022117, and 8ft SMA Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
824.70	20.20	V	0.6	0.0	19.58	38.5	-18.9	
824.70	23.60	H	0.6	0.0	22.98	38.5	-15.5	
Mid Ch								
836.50	19.11	V	0.6	0.0	18.49	38.5	-20.0	
836.50	23.65	H	0.6	0.0	23.03	38.5	-15.4	
High Ch								
848.30	18.93	V	0.6	0.0	18.31	38.5	-20.1	
848.30	23.45	H	0.6	0.0	22.83	38.5	-15.6	

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ERP LTE 16QAM Band 5 (1.4 MHz BANDWIDTH)

High Frequency Substitution Measurement
UL Fremont Radiated Chamber D

Company:	Apple
Project #:	13U16584
Date:	12/19/13
Test Engineer:	M. Hua
Configuration:	EUT Only
Mode:	LTE Band 5 16QAM 1.4MHz BW

Test Equipment:
Receiving: Sunol T407, and Chamber D Cable
Substitution: Dipole S/N: 00022117, and 8ft SMA Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
824.70	18.90	V	0.6	0.0	18.28	38.5	-20.2	
824.70	22.70	H	0.6	0.0	22.08	38.5	-16.4	
Mid Ch								
836.50	17.92	V	0.6	0.0	17.30	38.5	-21.1	
836.50	22.75	H	0.6	0.0	22.13	38.5	-16.3	
High Ch								
848.30	18.02	V	0.6	0.0	17.40	38.5	-21.0	
848.30	22.60	H	0.6	0.0	21.98	38.5	-16.5	

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ERP LTE QPSK Band 5 (3MHz BANDWIDTH)

High Frequency Substitution Measurement
UL Fremont Radiated Chamber D

Company: Apple
Project #: 13U16584
Date: 12/19/13
Test Engineer: M. Hua
Configuration: EUT Only
Mode: LTE Band 5 QPSK 3MHz BW

Test Equipment:
Receiving: Sunol T407, and Chamber D Cable
Substitution: Dipole S/N: 00022117, and 8ft SMA Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
825.50	19.99	V	0.6	0.0	19.37	38.5	-19.1	
825.50	23.70	H	0.6	0.0	23.08	38.5	-15.4	
Mid Ch								
836.50	19.06	V	0.6	0.0	18.44	38.5	-20.0	
836.50	23.55	H	0.6	0.0	22.93	38.5	-15.5	
High Ch								
847.50	19.22	V	0.6	0.0	18.60	38.5	-19.8	
847.50	23.56	H	0.6	0.0	22.94	38.5	-15.5	

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ERP LTE 16QAM Band 5 (3MHz BANDWIDTH)

High Frequency Substitution Measurement
UL Fremont Radiated Chamber D

Company:	Apple
Project #:	13U16584
Date:	12/19/13
Test Engineer:	M. Hua
Configuration:	EUT Only
Mode:	LTE Band 5 16QAM 3MHz BW

Test Equipment:
Receiving: Sunol T407, and Chamber D Cable
Substitution: Dipole S/N: 00022117, and 8ft SMA Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
825.50	18.88	V	0.6	0.0	18.26	38.5	-20.2	
825.50	22.80	H	0.6	0.0	22.18	38.5	-16.3	
Mid Ch								
836.50	17.86	V	0.6	0.0	17.24	38.5	-21.2	
836.50	22.70	H	0.6	0.0	22.08	38.5	-16.4	
High Ch								
847.50	18.17	V	0.6	0.0	17.55	38.5	-20.9	
847.50	22.65	H	0.6	0.0	22.03	38.5	-16.4	

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ERP LTE QPSK Band 5 (5MHz BANDWIDTH)

High Frequency Substitution Measurement
UL Fremont Radiated Chamber D

Company: Apple
Project #: 13U16584
Date: 12/19/13
Test Engineer: M. Hua
Configuration: EUT Only
Mode: LTE Band 5 QPSK 5MHz BW

Test Equipment:
Receiving: Sunol T407, and Chamber D Cable
Substitution: Dipole S/N: 00022117, and 8ft SMA Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
826.50	20.25	V	0.6	0.0	19.63	38.5	-18.8	
826.50	23.70	H	0.6	0.0	23.08	38.5	-15.4	
Mid Ch								
836.50	18.92	V	0.6	0.0	18.30	38.5	-20.1	
836.50	23.74	H	0.6	0.0	23.12	38.5	-15.3	
High Ch								
846.50	19.88	V	0.6	0.0	19.26	38.5	-19.2	
846.50	23.65	H	0.6	0.0	23.03	38.5	-15.4	

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ERP LTE 16QAM Band 5 (5MHz BANDWIDTH)

High Frequency Substitution Measurement
UL Fremont Radiated Chamber D

Company:	Apple
Project #:	13U16584
Date:	12/19/13
Test Engineer:	M. Hua
Configuration:	EUT Only
Mode:	LTE Band 5 16QAM 5MHz BW

Test Equipment:
Receiving: Sunol T407, and Chamber D Cable
Substitution: Dipole S/N: 00022117, and 8ft SMA Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
826.50	19.10	V	0.6	0.0	18.48	38.5	-20.0	
826.50	22.80	H	0.6	0.0	22.18	38.5	-16.3	
Mid Ch								
836.50	17.66	V	0.6	0.0	17.04	38.5	-21.4	
836.50	22.82	H	0.6	0.0	22.20	38.5	-16.2	
High Ch								
846.50	18.69	V	0.6	0.0	18.07	38.5	-20.4	
846.50	22.73	H	0.6	0.0	22.11	38.5	-16.3	

Rev. 10.24.13

ERP LTE QPSK Band 5 (10MHz BANDWIDTH)

High Frequency Substitution Measurement
UL Fremont Radiated Chamber D

Company: Apple
Project #: 13U16584
Date: 12/19/13
Test Engineer: M. Hua
Configuration: EUT Only
Mode: LTE Band 5 QPSK 10MHz BW

Test Equipment:
Receiving: Sunol T407, and Chamber D Cable
Substitution: Dipole S/N: 00022117, and 8ft SMA Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
829.00	20.41	V	0.6	0.0	19.79	38.5	-18.7	
829.00	23.67	H	0.6	0.0	23.05	38.5	-15.4	
Mid Ch								
836.50	19.03	V	0.6	0.0	18.41	38.5	-20.0	
836.50	23.54	H	0.6	0.0	22.92	38.5	-15.5	
High Ch								
844.00	20.10	V	0.6	0.0	19.48	38.5	-19.0	
844.00	23.62	H	0.6	0.0	23.00	38.5	-15.4	

Rev. 10.24.13

ERP LTE 16QAM Band 5 (10MHz BANDWIDTH)

High Frequency Substitution Measurement
UL Fremont Radiated Chamber D

Company:	Apple
Project #:	13U16584
Date:	12/19/13
Test Engineer:	M. Hua
Configuration:	EUT Only
Mode:	LTE Band 5 16QAM 10MHz BW

Test Equipment:
Receiving: Sunol T407, and Chamber D Cable
Substitution: Dipole S/N: 00022117, and 8ft SMA Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
829.00	19.30	V	0.6	0.0	18.68	38.5	-19.8	
829.00	22.75	H	0.6	0.0	22.13	38.5	-16.3	
Mid Ch								
836.50	17.84	V	0.6	0.0	17.22	38.5	-21.2	
836.50	22.66	H	0.6	0.0	22.04	38.5	-16.4	
High Ch								
844.00	19.01	V	0.6	0.0	18.39	38.5	-20.1	
844.00	22.80	H	0.6	0.0	22.18	38.5	-16.3	

Rev. 10.24.13

9.2. FIELD STRENGTH OF SPURIOUS RADIATION

RULE PART(S)

FCC: §2.1053, §22.917 and §24.238.

LIMIT

§22.917 (e) and §24.238 (a): Out of band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log (P) dB.

TEST PROCEDURE

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

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

MODES TESTED

- LTE Band 2
- LTE Band 5

RESULTS

9.2.1. LTE BAND 2

QPSK Band 2 (1.4 MHz BANDWIDTH)

Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company:
Project #: 13U16584
Date: 12/11/13
Test Engineer: R Zheng
Configuration: EUT only
Mode: TX, LTE band 2, 1.4MHz, QPSK

Chamber	Pre-amplifer	Filter	Limit
3m Chamber D	T145 8449B	Filter 1	Part 24

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, (1851 MHz)									
3.702	-19.0	V	3.0	30.2	1.0	-48.2	-13.0	-35.2	
5.553	-22.6	V	3.0	28.4	1.0	-50.0	-13.0	-37.0	
3.702	-19.2	H	3.0	30.2	1.0	-48.4	-13.0	-35.4	
5.553	-21.2	H	3.0	28.4	1.0	-48.6	-13.0	-35.6	
Mid Ch, (1880 MHz)									
3.760	-18.7	V	3.0	30.1	1.0	-47.9	-13.0	-34.9	
5.640	-22.8	V	3.0	28.3	1.0	-50.1	-13.0	-37.1	
3.760	-19.2	H	3.0	30.1	1.0	-48.3	-13.0	-35.3	
5.640	-21.6	H	3.0	28.3	1.0	-48.9	-13.0	-35.9	
High Ch, (1909.3 MHz)									
3.819	-19.1	V	3.0	30.1	1.0	-48.2	-13.0	-35.2	
5.728	-22.6	V	3.0	28.2	1.0	-49.8	-13.0	-36.8	
3.819	-19.4	H	3.0	30.1	1.0	-48.5	-13.0	-35.5	
5.728	-21.3	H	3.0	28.2	1.0	-48.5	-13.0	-35.5	

Rev. 03.03.09
Note: No other emissions were detected above the system noise floor.

16QAM Band 2 (1.4 MHz BANDWIDTH)

Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company:
Project#: 13U16584
Date: 12/11/13
Test Engineer: R Zheng
Configuration: EUT only
Mode: TX, LTE band 2, 1.4MHz, 16QAM

Chamber	Pre-amplifer	Filter	Limit
3m Chamber D	T145 8449B	Filter 1	Part 24

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, (1851 MHz)									
3.702	-19.9	V	3.0	30.2	1.0	-49.1	-13.0	-36.1	
5.553	-23.6	V	3.0	28.4	1.0	-51.0	-13.0	-38.0	
3.702	-20.2	H	3.0	30.2	1.0	-49.4	-13.0	-36.4	
5.553	-22.2	H	3.0	28.4	1.0	-49.6	-13.0	-36.6	
Mid Ch, (1880 MHz)									
3.760	-19.7	V	3.0	30.1	1.0	-48.9	-13.0	-35.9	
5.640	-23.8	V	3.0	28.3	1.0	-51.1	-13.0	-38.1	
3.760	-20.2	H	3.0	30.1	1.0	-49.3	-13.0	-36.3	
5.640	-22.6	H	3.0	28.3	1.0	-49.9	-13.0	-36.9	
High Ch, (1909.3 MHz)									
3.819	-20.1	V	3.0	30.1	1.0	-49.2	-13.0	-36.2	
5.728	-23.6	V	3.0	28.2	1.0	-50.8	-13.0	-37.8	
3.819	-20.4	H	3.0	30.1	1.0	-49.5	-13.0	-36.5	
5.728	-22.3	H	3.0	28.2	1.0	-49.5	-13.0	-36.5	

Rev. 03.03.09
Note: No other emissions were detected above the system noise floor.

QPSK Band 2 (3MHz BANDWIDTH)

Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company:
Project#: 13U16584
Date: 12/11/13
Test Engineer: R Zheng
Configuration: EUT only
Mode: TX, LTE band 2, 3MHz, QPSK

Chamber	Pre-amplifer	Filter	Limit
3m Chamber D	T145 8449B	Filter 1	Part 24

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, (1852 MHz)									
3.704	-19.1	V	3.0	30.2	1.0	-48.3	-13.0	-35.3	
5.556	-22.9	V	3.0	28.4	1.0	-50.2	-13.0	-37.2	
3.704	-19.7	H	3.0	30.2	1.0	-48.9	-13.0	-35.9	
5.556	-21.3	H	3.0	28.4	1.0	-48.7	-13.0	-35.7	
Mid Ch, (1880 MHz)									
3.760	-18.8	V	3.0	30.1	1.0	-48.0	-13.0	-35.0	
5.640	-22.8	V	3.0	28.3	1.0	-50.1	-13.0	-37.1	
3.760	-19.3	H	3.0	30.1	1.0	-48.4	-13.0	-35.4	
5.640	-21.7	H	3.0	28.3	1.0	-49.0	-13.0	-36.0	
High Ch, (1909 MHz)									
3.818	-19.0	V	3.0	30.1	1.0	-48.1	-13.0	-35.1	
5.727	-22.8	V	3.0	28.2	1.0	-50.0	-13.0	-37.0	
3.818	-19.6	H	3.0	30.1	1.0	-48.7	-13.0	-35.7	
5.727	-21.5	H	3.0	28.2	1.0	-48.7	-13.0	-35.7	

Rev. 03.03.09
Note: No other emissions were detected above the system noise floor.

16QAM Band 2 (3MHz BANDWIDTH)

Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company:
Project#: 13U16584
Date: 12/11/13
Test Engineer: R Zheng
Configuration: EUT only
Mode: TX, LTE band 2, 3MHz, 16QAM

Chamber	Pre-amplifer	Filter	Limit
3m Chamber D	T145 8449B	Filter 1	Part 24

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, (1852 MHz)									
3.704	-20.1	V	3.0	30.2	1.0	-49.3	-13.0	-36.3	
5.556	-23.9	V	3.0	28.4	1.0	-51.2	-13.0	-38.2	
3.704	-20.7	H	3.0	30.2	1.0	-49.9	-13.0	-36.9	
5.556	-22.4	H	3.0	28.4	1.0	-49.8	-13.0	-36.8	
Mid Ch, (1880 MHz)									
3.760	-19.8	V	3.0	30.1	1.0	-49.0	-13.0	-36.0	
5.640	-23.7	V	3.0	28.3	1.0	-51.0	-13.0	-38.0	
3.760	-20.1	H	3.0	30.1	1.0	-49.2	-13.0	-36.2	
5.640	-22.7	H	3.0	28.3	1.0	-50.0	-13.0	-37.0	
High Ch, (1909 MHz)									
3.818	-19.9	V	3.0	30.1	1.0	-49.0	-13.0	-36.0	
5.727	-23.8	V	3.0	28.2	1.0	-51.0	-13.0	-38.0	
3.818	-20.6	H	3.0	30.1	1.0	-49.7	-13.0	-36.7	
5.727	-22.5	H	3.0	28.2	1.0	-49.7	-13.0	-36.7	

Rev. 03.03.09
Note: No other emissions were detected above the system noise floor.

QPSK Band 2 (5MHz BANDWIDTH)

Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company:
Project#: 13U16584
Date: 12/11/13
Test Engineer: R Zheng
Configuration: EUT only
Mode: TX, LTE band 2, 5MHz, QPSK

Chamber	Pre-amplifer	Filter	Limit
3m Chamber D	T145 8449B	Filter 1	Part 24

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, (1853 MHz)									
3.706	-19.0	V	3.0	30.2	1.0	-48.2	-13.0	-35.2	
5.559	-23.7	V	3.0	28.4	1.0	-51.0	-13.0	-38.0	
3.706	-19.5	H	3.0	30.2	1.0	-48.7	-13.0	-35.7	
5.559	-21.4	H	3.0	28.4	1.0	-48.8	-13.0	-35.8	
Mid Ch, (1880 MHz)									
3.760	-19.4	V	3.0	30.1	1.0	-48.6	-13.0	-35.6	
5.640	-23.2	V	3.0	28.3	1.0	-50.5	-13.0	-37.5	
3.760	-19.6	H	3.0	30.1	1.0	-48.7	-13.0	-35.7	
5.640	-21.7	H	3.0	28.3	1.0	-49.0	-13.0	-36.0	
High Ch, (1908 MHz)									
3.816	-18.8	V	3.0	30.1	1.0	-47.9	-13.0	-34.9	
5.724	-23.4	V	3.0	28.2	1.0	-50.6	-13.0	-37.6	
3.816	-19.3	H	3.0	30.1	1.0	-48.4	-13.0	-35.4	
5.724	-21.5	H	3.0	28.2	1.0	-48.7	-13.0	-35.7	

Rev. 03.03.09
Note: No other emissions were detected above the system noise floor.

16QAM Band 2 (5MHz BANDWIDTH)

Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company:
Project#: 13U16584
Date: 12/11/13
Test Engineer: R Zheng
Configuration: EUT only
Mode: TX, LTE band 2, 5MHz, 16QAM

Chamber	Pre-amplifer	Filter	Limit
3m Chamber D	T145 8449B	Filter 1	Part 24

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, (1853 MHz)									
3.706	-19.9	V	3.0	30.2	1.0	-49.1	-13.0	-36.1	
5.559	-24.7	V	3.0	28.4	1.0	-52.0	-13.0	-39.0	
3.706	-20.5	H	3.0	30.2	1.0	-49.7	-13.0	-36.7	
5.559	-22.4	H	3.0	28.4	1.0	-49.8	-13.0	-36.8	
Mid Ch, (1880 MHz)									
3.760	-20.4	V	3.0	30.1	1.0	-49.6	-13.0	-36.6	
5.640	-24.2	V	3.0	28.3	1.0	-51.5	-13.0	-38.5	
3.760	-20.6	H	3.0	30.1	1.0	-49.7	-13.0	-36.7	
5.640	-22.7	H	3.0	28.3	1.0	-50.0	-13.0	-37.0	
High Ch, (1908 MHz)									
3.816	-19.8	V	3.0	30.1	1.0	-48.9	-13.0	-35.9	
5.724	-24.4	V	3.0	28.2	1.0	-51.6	-13.0	-38.6	
3.816	-20.2	H	3.0	30.1	1.0	-49.3	-13.0	-36.3	
5.724	-22.5	H	3.0	28.2	1.0	-49.7	-13.0	-36.7	

Rev. 03.03.09
Note: No other emissions were detected above the system noise floor.

QPSK Band 2 (10MHz BANDWIDTH)

Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company:
Project#: 13U16584
Date: 12/11/13
Test Engineer: R Zheng
Configuration: EUT only
Mode: TX, LTE band 2, 10MHz, QPSK

Chamber	Pre-amplifer	Filter	Limit
3m Chamber D	T145 8449B	Filter 1	Part 24

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, (1855 MHz)									
3.701	-18.8	V	3.0	30.2	1.0	-48.0	-13.0	-35.0	
5.551	-22.9	V	3.0	28.4	1.0	-50.3	-13.0	-37.3	
3.701	-19.7	H	3.0	30.2	1.0	-48.9	-13.0	-35.9	
5.551	-21.6	H	3.0	28.4	1.0	-49.0	-13.0	-36.0	
Mid Ch, (1880 MHz)									
3.750	-18.7	V	3.0	30.2	1.0	-47.9	-13.0	-34.9	
5.625	-23.4	V	3.0	28.3	1.0	-50.7	-13.0	-37.7	
3.750	-19.5	H	3.0	30.2	1.0	-48.6	-13.0	-35.6	
5.625	-20.7	H	3.0	28.3	1.0	-48.0	-13.0	-35.0	
High Ch, (1905 MHz)									
3.801	-18.1	V	3.0	30.1	1.0	-47.2	-13.0	-34.2	
5.702	-22.2	V	3.0	28.2	1.0	-49.5	-13.0	-36.5	
3.801	-19.9	H	3.0	30.1	1.0	-49.0	-13.0	-36.0	
5.702	-21.2	H	3.0	28.2	1.0	-48.5	-13.0	-35.5	

Rev. 03.03.09
Note: No other emissions were detected above the system noise floor.

16QAM Band 2 (10MHz BANDWIDTH)

Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company:
Project#: 13U16584
Date: 12/11/13
Test Engineer: R Zheng
Configuration: EUT only
Mode: TX, LTE band 2, 10MHz, 16QAM

Chamber	Pre-amplifer	Filter	Limit
3m Chamber D	T145 8449B	Filter 1	Part 24

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, (1855 MHz)									
3.701	-19.8	V	3.0	30.2	1.0	-49.0	-13.0	-36.0	
5.551	-23.9	V	3.0	28.4	1.0	-51.3	-13.0	-38.3	
3.701	-20.7	H	3.0	30.2	1.0	-49.9	-13.0	-36.9	
5.551	-22.5	H	3.0	28.4	1.0	-49.9	-13.0	-36.9	
Mid Ch, (1880 MHz)									
3.750	-19.7	V	3.0	30.2	1.0	-48.9	-13.0	-35.9	
5.625	-24.4	V	3.0	28.3	1.0	-51.7	-13.0	-38.7	
3.750	-20.5	H	3.0	30.2	1.0	-49.6	-13.0	-36.6	
5.625	-21.7	H	3.0	28.3	1.0	-49.0	-13.0	-36.0	
High Ch, (1905 MHz)									
3.801	-19.1	V	3.0	30.1	1.0	-48.2	-13.0	-35.2	
5.702	-23.2	V	3.0	28.2	1.0	-50.5	-13.0	-37.5	
3.801	-20.9	H	3.0	30.1	1.0	-50.0	-13.0	-37.0	
5.702	-22.2	H	3.0	28.2	1.0	-49.5	-13.0	-36.5	

Rev. 03.03.09
Note: No other emissions were detected above the system noise floor.

QPSK Band 2 (15MHz BANDWIDTH)

Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company:
Project#: 13U16584
Date: 12/10/13
Test Engineer: R Zheng
Configuration: EUT only
Mode: TX, LTE band 2, 15MHz, QPSK

Chamber	Pre-amplifer	Filter	Limit
3m Chamber D	T145 8449B	Filter 1	Part 24

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, (1858 MHz)									
3.703	-18.5	V	3.0	30.2	1.0	-47.7	-13.0	-34.7	
5.554	-23.6	V	3.0	28.4	1.0	-51.0	-13.0	-38.0	
3.703	-20.2	H	3.0	30.2	1.0	-49.4	-13.0	-36.4	
5.554	-21.2	H	3.0	28.4	1.0	-48.6	-13.0	-35.6	
Mid Ch, (1880 MHz)									
3.760	-19.4	V	3.0	30.1	1.0	-48.6	-13.0	-35.6	
5.621	-23.4	V	3.0	28.3	1.0	-50.7	-13.0	-37.7	
3.760	-20.1	H	3.0	30.1	1.0	-49.2	-13.0	-36.2	
5.621	-20.9	H	3.0	28.3	1.0	-48.2	-13.0	-35.2	
High Ch, (1903 MHz)									
3.806	-19.7	V	3.0	30.1	1.0	-48.8	-13.0	-35.8	
5.709	-23.2	V	3.0	28.2	1.0	-50.4	-13.0	-37.4	
3.806	-19.5	H	3.0	30.1	1.0	-48.6	-13.0	-35.6	
5.709	-21.5	H	3.0	28.2	1.0	-48.7	-13.0	-35.7	

Rev. 03.03.09
Note: No other emissions were detected above the system noise floor.

16QAM Band 2 (15MHz BANDWIDTH)

Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company:
Project#: 13U16584
Date: 12/10/13
Test Engineer: R Zheng
Configuration: EUT only
Mode: TX, LTE band 2, 15MHz, 16QAM

Chamber	Pre-amplifer	Filter	Limit
3m Chamber D	T145 8449B	Filter 1	Part 24

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, (1858 MHz)									
3.703	-19.5	V	3.0	30.2	1.0	-48.7	-13.0	-35.7	
5.554	-24.6	V	3.0	28.4	1.0	-52.0	-13.0	-39.0	
3.703	-21.2	H	3.0	30.2	1.0	-50.4	-13.0	-37.4	
5.554	-22.2	H	3.0	28.4	1.0	-49.6	-13.0	-36.6	
Mid Ch, (1880 MHz)									
3.760	-20.4	V	3.0	30.1	1.0	-49.6	-13.0	-36.6	
5.621	-24.4	V	3.0	28.3	1.0	-51.7	-13.0	-38.7	
3.760	-21.1	H	3.0	30.1	1.0	-50.2	-13.0	-37.2	
5.621	-21.9	H	3.0	28.3	1.0	-49.2	-13.0	-36.2	
High Ch, (1903 MHz)									
3.806	-20.7	V	3.0	30.1	1.0	-49.8	-13.0	-36.8	
5.709	-24.2	V	3.0	28.2	1.0	-51.4	-13.0	-38.4	
3.806	-19.5	H	3.0	30.1	1.0	-48.6	-13.0	-35.6	
5.709	-22.5	H	3.0	28.2	1.0	-49.7	-13.0	-36.7	

Rev. 03.03.09
Note: No other emissions were detected above the system noise floor.

QPSK Band 2 (20MHz BANDWIDTH)

Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company:
Project#: 13U16584
Date: 12/10/13
Test Engineer: R Zheng
Configuration: EUT only
Mode: TX, LTE band 2, 20MHz, QPSK

Chamber	Pre-amplifer	Filter	Limit
3m Chamber D	T145 8449B	Filter 1	Part 24

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, (1860 MHz)									
3.720	-19.9	V	3.0	30.2	1.0	-49.1	-13.0	-36.1	
5.580	-23.3	V	3.0	28.3	1.0	-50.7	-13.0	-37.7	
3.720	-19.9	H	3.0	30.2	1.0	-49.1	-13.0	-36.1	
5.580	-21.6	H	3.0	28.3	1.0	-48.9	-13.0	-35.9	
Mid Ch, (1880 MHz)									
3.760	-18.8	V	3.0	30.1	1.0	-48.0	-13.0	-35.0	
5.640	-23.6	V	3.0	28.3	1.0	-50.9	-13.0	-37.9	
3.760	-19.3	H	3.0	30.1	1.0	-48.4	-13.0	-35.4	
5.640	-22.1	H	3.0	28.3	1.0	-49.4	-13.0	-36.4	
High Ch, (1900 MHz)									
3.800	-18.8	V	3.0	30.1	1.0	-47.9	-13.0	-34.9	
5.700	-24.1	V	3.0	28.2	1.0	-51.4	-13.0	-38.4	
3.800	-18.7	H	3.0	30.1	1.0	-47.8	-13.0	-34.8	
5.700	-22.6	H	3.0	28.2	1.0	-49.9	-13.0	-36.9	

Rev. 03.03.09
Note: No other emissions were detected above the system noise floor.

16QAM Band 2 (20MHz BANDWIDTH)

Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company:
Project#: 13U16584
Date: 12/10/13
Test Engineer: R Zheng
Configuration: EUT only
Mode: TX, LTE band 2, 20MHz, 16QAM

Chamber	Pre-amplifer	Filter	Limit
3m Chamber D	T145 8449B	Filter 1	Part 24

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, (1860 MHz)									
3.720	-20.8	V	3.0	30.2	1.0	-50.0	-13.0	-37.0	
5.580	-24.3	V	3.0	28.3	1.0	-51.7	-13.0	-38.7	
3.720	-20.9	H	3.0	30.2	1.0	-50.1	-13.0	-37.1	
5.580	-22.6	H	3.0	28.3	1.0	-49.9	-13.0	-36.9	
Mid Ch, (1880 MHz)									
3.760	-19.8	V	3.0	30.1	1.0	-49.0	-13.0	-36.0	
5.640	-24.6	V	3.0	28.3	1.0	-51.9	-13.0	-38.9	
3.760	-20.3	H	3.0	30.1	1.0	-49.4	-13.0	-36.4	
5.640	-23.1	H	3.0	28.3	1.0	-50.4	-13.0	-37.4	
High Ch, (1900 MHz)									
3.800	-19.8	V	3.0	30.1	1.0	-48.9	-13.0	-35.9	
5.700	-25.1	V	3.0	28.2	1.0	-52.4	-13.0	-39.4	
3.800	-19.7	H	3.0	30.1	1.0	-48.8	-13.0	-35.8	
5.700	-22.6	H	3.0	28.2	1.0	-49.9	-13.0	-36.9	

Rev. 03.03.09
Note: No other emissions were detected above the system noise floor.

9.2.2. LTE BAND 5

QPSK Band 5 (1.4 MHz BANDWIDTH)

Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company:
Project #: 13U16584
Date: 12/11/13
Test Engineer: R Zheng
Configuration: EUT only
Mode: TX, Band 5, 1.4MHz, QPSK

Chamber	Pre-amplifer	Filter	Limit
3m Chamber D	T145 8449B	Filter 1	Part 22

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, (824.7MHz)									
1.649	-19.6	V	3.0	32.7	1.0	-51.3	-13.0	-38.3	
2.474	-20.7	V	3.0	31.4	1.0	-51.1	-13.0	-38.1	
1.649	-23.2	H	3.0	32.7	1.0	-54.9	-13.0	-41.9	
2.474	-22.8	H	3.0	31.4	1.0	-53.2	-13.0	-40.2	
Mid Ch, (836.5MHz)									
1.673	-13.7	V	3.0	32.6	1.0	-45.3	-13.0	-32.3	
2.510	-20.2	V	3.0	31.5	1.0	-50.7	-13.0	-37.7	
1.673	-23.3	H	3.0	32.6	1.0	-54.9	-13.0	-41.9	
2.510	-22.5	H	3.0	31.5	1.0	-53.0	-13.0	-40.0	
High Ch, (848.3MHz)									
1.697	-11.4	V	3.0	32.6	1.0	-42.9	-13.0	-29.9	
2.545	-21.1	V	3.0	31.4	1.0	-51.6	-13.0	-38.6	
1.697	-22.9	H	3.0	32.6	1.0	-54.4	-13.0	-41.4	
2.545	-22.6	H	3.0	31.4	1.0	-53.0	-13.0	-40.0	

Rev. 03.03.09
Note: No other emissions were detected above the system noise floor.

16QAM Band 5 (1.4 MHz BANDWIDTH)

Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company:
Project #: 13U16584
Date: 12/11/13
Test Engineer: R Zheng
Configuration: EUT only
Mode: TX, Band 5, 1.4MHz, 16QAM

Chamber	Pre-amplifer	Filter	Limit
3m Chamber D	T145 8449B	Filter 1	Part 22

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, (824.7MHz)									
1.649	-20.6	V	3.0	32.7	1.0	-52.3	-13.0	-39.3	
2.474	-21.7	V	3.0	31.4	1.0	-52.1	-13.0	-39.1	
1.649	-24.2	H	3.0	32.7	1.0	-55.9	-13.0	-42.9	
2.474	-23.8	H	3.0	31.4	1.0	-54.2	-13.0	-41.2	
Mid Ch, (836.5MHz)									
1.673	-14.7	V	3.0	32.6	1.0	-46.3	-13.0	-33.3	
2.510	-21.2	V	3.0	31.5	1.0	-51.7	-13.0	-38.7	
1.673	-24.3	H	3.0	32.6	1.0	-55.9	-13.0	-42.9	
2.510	-23.5	H	3.0	31.5	1.0	-54.0	-13.0	-41.0	
High Ch, (848.3MHz)									
1.697	-12.4	V	3.0	32.6	1.0	-43.9	-13.0	-30.9	
2.545	-22.1	V	3.0	31.4	1.0	-52.6	-13.0	-39.6	
1.697	-23.9	H	3.0	32.6	1.0	-55.4	-13.0	-42.4	
2.545	-23.6	H	3.0	31.4	1.0	-54.0	-13.0	-41.0	

Rev. 03.03.09
Note: No other emissions were detected above the system noise floor.

QPSK Band 5 (3MHz BANDWIDTH)

Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company:
Project #: 13U16584
Date: 12/11/13
Test Engineer: R Zheng
Configuration: EUT only
Mode: TX, Band 5, 3MHz, QPSK

Chamber	Pre-amplifer	Filter	Limit
3m Chamber D	T145 8449B	Filter 1	Part 22

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, (825.5MHz)									
1.651	-15.6	V	3.0	32.7	1.0	-47.3	-13.0	-34.3	
2.477	-20.6	V	3.0	31.4	1.0	-51.0	-13.0	-38.0	
1.651	-23.8	H	3.0	32.7	1.0	-55.5	-13.0	-42.5	
2.477	-22.0	H	3.0	31.4	1.0	-52.4	-13.0	-39.4	
Mid Ch, (836.5MHz)									
1.673	-11.7	V	3.0	32.6	1.0	-43.3	-13.0	-30.3	
2.510	-20.4	V	3.0	31.5	1.0	-50.9	-13.0	-37.9	
1.673	-20.2	H	3.0	32.6	1.0	-51.8	-13.0	-38.8	
2.510	-22.1	H	3.0	31.5	1.0	-52.6	-13.0	-39.6	
High Ch, (847.5MHz)									
1.694	-13.1	V	3.0	32.6	1.0	-44.6	-13.0	-31.6	
2.541	-20.4	V	3.0	31.4	1.0	-50.8	-13.0	-37.8	
1.694	-20.5	H	3.0	32.6	1.0	-52.0	-13.0	-39.0	
2.541	-21.9	H	3.0	31.4	1.0	-52.4	-13.0	-39.4	

Rev. 03.03.09
Note: No other emissions were detected above the system noise floor.

16QAM Band 5 (3MHz BANDWIDTH)

Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company:
Project #: 13U16584
Date: 12/11/13
Test Engineer: R Zheng
Configuration: EUT only
Mode: TX, Band 5, 3MHz, 16QAM

Chamber	Pre-amplifer	Filter	Limit
3m Chamber D	T145 8449B	Filter 1	Part 22

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, (825.5MHz)									
1.651	-16.6	V	3.0	32.7	1.0	-48.3	-13.0	-35.3	
2.477	-21.6	V	3.0	31.4	1.0	-52.0	-13.0	-39.0	
1.651	-24.8	H	3.0	32.7	1.0	-56.5	-13.0	-43.5	
2.477	-23.0	H	3.0	31.4	1.0	-53.4	-13.0	-40.4	
Mid Ch, (836.5MHz)									
1.673	-12.7	V	3.0	32.6	1.0	-44.3	-13.0	-31.3	
2.510	-21.4	V	3.0	31.5	1.0	-51.9	-13.0	-38.9	
1.673	-21.2	H	3.0	32.6	1.0	-52.8	-13.0	-39.8	
2.510	-23.1	H	3.0	31.5	1.0	-53.6	-13.0	-40.6	
High Ch, (847.5MHz)									
1.695	-14.1	V	3.0	32.6	1.0	-45.6	-13.0	-32.6	
2.543	-21.4	V	3.0	31.4	1.0	-51.8	-13.0	-38.8	
1.695	-21.5	H	3.0	32.6	1.0	-53.0	-13.0	-40.0	
2.543	-23.0	H	3.0	31.4	1.0	-53.4	-13.0	-40.4	

Rev. 03.03.09
Note: No other emissions were detected above the system noise floor.

QPSK Band 5 (5MHz BANDWIDTH)

Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company:
Project #: 13U16584
Date: 12/11/13
Test Engineer: R.Zheng
Configuration: EUT only
Mode: TX, Band 5, 5MHz, QPSK

Chamber	Pre-amplifer	Filter	Limit
3m Chamber D	T145 8449B	Filter 1	Part 22

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, (826.5MHz)									
1.649	-16.4	V	3.0	32.7	1.0	-48.1	-13.0	-35.1	
2.473	-20.1	V	3.0	31.4	1.0	-50.5	-13.0	-37.5	
1.649	-23.3	H	3.0	32.7	1.0	-55.0	-13.0	-42.0	
2.473	-22.1	H	3.0	31.4	1.0	-52.5	-13.0	-39.5	
Mid Ch, (836.5MHz)									
1.668	-14.6	V	3.0	32.6	1.0	-46.2	-13.0	-33.2	
2.503	-20.5	V	3.0	31.5	1.0	-51.0	-13.0	-38.0	
1.668	-18.9	H	3.0	32.6	1.0	-50.5	-13.0	-37.5	
2.503	-22.0	H	3.0	31.5	1.0	-52.5	-13.0	-39.5	
High Ch, (846.5MHz)									
1.689	-11.8	V	3.0	32.6	1.0	-43.3	-13.0	-30.3	
2.533	-19.9	V	3.0	31.5	1.0	-50.4	-13.0	-37.4	
1.689	-18.4	H	3.0	32.6	1.0	-50.0	-13.0	-37.0	
2.533	-22.2	H	3.0	31.5	1.0	-52.7	-13.0	-39.7	

Rev. 03.03.09
Note: No other emissions were detected above the system noise floor.

16QAM Band 5 (5MHz BANDWIDTH)

Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company:
Project #: 13U16584
Date: 12/11/13
Test Engineer: R.Zheng
Configuration: EUT only
Mode: TX, Band 5, 5MHz, 16QAM

Chamber	Pre-amplifer	Filter	Limit
3m Chamber D	T145 8449B	Filter 1	Part 22

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, (826.5MHz)									
1.649	-17.4	V	3.0	32.7	1.0	-49.1	-13.0	-36.1	
2.473	-21.1	V	3.0	31.4	1.0	-51.5	-13.0	-38.5	
1.649	-24.3	H	3.0	32.7	1.0	-56.0	-13.0	-43.0	
2.473	-23.1	H	3.0	31.4	1.0	-53.5	-13.0	-40.5	
Mid Ch, (836.5MHz)									
1.668	-15.6	V	3.0	32.6	1.0	-47.2	-13.0	-34.2	
2.503	-21.5	V	3.0	31.5	1.0	-52.0	-13.0	-39.0	
1.668	-19.9	H	3.0	32.6	1.0	-51.5	-13.0	-38.5	
2.503	-23.0	H	3.0	31.5	1.0	-53.5	-13.0	-40.5	
High Ch, (846.5MHz)									
1.689	-12.8	V	3.0	32.6	1.0	-44.3	-13.0	-31.3	
2.533	-20.9	V	3.0	31.5	1.0	-51.4	-13.0	-38.4	
1.689	-19.4	H	3.0	32.6	1.0	-51.0	-13.0	-38.0	
2.533	-23.2	H	3.0	31.5	1.0	-53.7	-13.0	-40.7	

Rev. 03.03.09
Note: No other emissions were detected above the system noise floor.

QPSK Band 5 (10MHz BANDWIDTH)

Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company:
Project #: 13U16584
Date: 12/11/13
Test Engineer: R.Zheng
Configuration: EUT only
Mode: TX, Band 5, 10MHz, QPSK

Chamber	Pre-amplifer	Filter	Limit
3m Chamber D	T145 8449B	Filter 1	Part 22

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, (829MHz)									
1.649	-14.1	V	3.0	32.7	1.0	-45.8	-13.0	-32.8	
2.474	-20.5	V	3.0	31.4	1.0	-50.9	-13.0	-37.9	
1.649	-20.7	H	3.0	32.7	1.0	-52.4	-13.0	-39.4	
2.474	-22.4	H	3.0	31.4	1.0	-52.8	-13.0	-39.8	
Mid Ch, (836.5MHz)									
1.664	-10.4	V	3.0	32.6	1.0	-42.0	-13.0	-29.0	
2.496	-19.3	V	3.0	31.5	1.0	-49.8	-13.0	-36.8	
1.664	-20.9	H	3.0	32.6	1.0	-52.5	-13.0	-39.5	
2.496	-21.1	H	3.0	31.5	1.0	-51.6	-13.0	-38.6	
High Ch, (844MHz)									
1.680	-20.1	V	3.0	32.6	1.0	-51.7	-13.0	-38.7	
2.519	-19.9	V	3.0	31.5	1.0	-50.4	-13.0	-37.4	
1.680	-24.5	H	3.0	32.6	1.0	-56.1	-13.0	-43.1	
2.519	-21.8	H	3.0	31.5	1.0	-52.3	-13.0	-39.3	

Rev. 03.03.09
Note: No other emissions were detected above the system noise floor.

16QAM Band 5 (10MHz BANDWIDTH)

Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company:
Project #: 13U16584
Date: 12/11/13
Test Engineer: R.Zheng
Configuration: EUT only
Mode: TX, Band 5, 10MHz, 16QAM

Chamber	Pre-amplifer	Filter	Limit
3m Chamber D	T145 8449B	Filter 1	Part 22

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, (829MHz)									
1.649	-15.1	V	3.0	32.7	1.0	-46.8	-13.0	-33.8	
2.474	-21.5	V	3.0	31.4	1.0	-51.9	-13.0	-38.9	
1.649	-21.7	H	3.0	32.7	1.0	-53.4	-13.0	-40.4	
2.474	-23.4	H	3.0	31.4	1.0	-53.8	-13.0	-40.8	
Mid Ch, (836.5MHz)									
1.664	-11.4	V	3.0	32.6	1.0	-43.0	-13.0	-30.0	
2.496	-20.3	V	3.0	31.5	1.0	-50.8	-13.0	-37.8	
1.664	-21.9	H	3.0	32.6	1.0	-53.5	-13.0	-40.5	
2.496	-22.1	H	3.0	31.5	1.0	-52.6	-13.0	-39.6	
High Ch, (844MHz)									
1.680	-21.1	V	3.0	32.6	1.0	-52.7	-13.0	-39.7	
2.519	-20.9	V	3.0	31.5	1.0	-51.4	-13.0	-38.4	
1.680	-25.5	H	3.0	32.6	1.0	-57.1	-13.0	-44.1	
2.519	-22.8	H	3.0	31.5	1.0	-53.3	-13.0	-40.3	

Rev. 03.03.09
Note: No other emissions were detected above the system noise floor.