



**FCC CFR47 PART 22H AND 24E  
CERTIFICATION TEST REPORT  
FOR  
QUAD-BAND RADIO WITH WLAN AND BT RADIO**

**Model: A1530**

**FCC ID: BCG-E2643A**

**REPORT NUMBER: 13U15037-2**

**ISSUE DATE: JULY 22, 2013**

*Prepared for*  
**APPLE INC.  
1 INFINITE LOOP  
CUPERTINO, CA 95014, U.S.A.**

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



**NVLAP LAB CODE 200065-0**

Revision History

<u>Rev.</u>	<u>Issue Date</u>	<u>Revisions</u>	<u>Revised By</u>
---	07/18/13	Initial Issue	T. Chan

## TABLE OF CONTENTS

<b>1. ATTESTATION OF TEST RESULTS .....</b>	<b>5</b>
<b>2. TEST METHODOLOGY .....</b>	<b>6</b>
<b>3. FACILITIES AND ACCREDITATION .....</b>	<b>6</b>
<b>4. CALIBRATION AND UNCERTAINTY .....</b>	<b>6</b>
4.1. MEASURING INSTRUMENT CALIBRATION .....	6
4.2. SAMPLE CALCULATION .....	6
4.3. MEASUREMENT UNCERTAINTY .....	6
<b>5. EQUIPMENT UNDER TEST .....</b>	<b>7</b>
5.1. DESCRIPTION OF EUT .....	7
5.2. MAXIMUM OUTPUT POWER .....	7
5.3. SOFTWARE AND FIRMWARE .....	11
5.4. MAXIMUM ANTENNA GAIN .....	11
5.5. WORST-CASE CONFIGURATION AND MODE .....	11
5.6. DESCRIPTION OF TEST SETUP .....	12
<b>6. TEST AND MEASUREMENT EQUIPMENT .....</b>	<b>14</b>
<b>7. RF POWER OUTPUT VERIFICATION .....</b>	<b>15</b>
7.1. LAT LTE BAND 2 .....	15
7.2. UAT LTE BAND 2 .....	21
7.3. LAT LTE BAND 5 .....	27
7.4. UAT LTE BAND 5 .....	31
<b>8. CONDUCTED TEST RESULTS .....</b>	<b>35</b>
8.1. OCCUPIED BANDWIDTH .....	35
8.1.1. LTE Band 2 .....	39
8.1.2. LTE Band 5 .....	75
8.2. BAND EDGE .....	99
8.2.1. LTE BAND 2 .....	100
8.2.2. LTE BAND 5 .....	148
8.3. OUT OF BAND EMISSIONS .....	180
8.3.1. LTE BAND 2 .....	181
8.3.2. LTE BAND 5 .....	205
8.4. FREQUENCY STABILITY .....	221

---

<b>9. RADIATED TEST RESULTS</b> .....	<b>224</b>
9.1. RADIATED POWER (ERP & EIRP).....	224
9.1.1. LAT / PORT A.....	225
9.1.2. UAT / PORT B .....	227
9.2. PEAK-TO-AVERAGE RATIO.....	270
9.3. FIELD STRENGTH OF SPURIOUS RADIATION .....	276
9.3.1. LAT / PORT A.....	277
9.3.2. UAT / PORT B .....	297
<b>10. SETUP PHOTOS</b> .....	<b>317</b>

# 1. ATTESTATION OF TEST RESULTS

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

**EUT DESCRIPTION:** QUAD-BAND RADIO WITH WLAN AND BT RADIO

**MODEL:** A1530

**SERIAL NUMBER:** C39KD00CFJ0Y

**DATE TESTED:** APRIL 24 – JULY 15, 2013

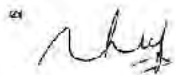
APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
FCC CFR47 PART 22H AND 24E	Pass

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.

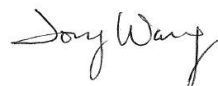
Approved & Released For

UL Verification Services Inc. By:



Thu Chan  
WiSE Operations Manager  
UL Verification Services Inc.

Tested By:



Tony Wang  
WiSE Lab Technician  
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 Benicia Street, Fremont, California, USA.

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

$$\text{Field Strength (dBuV/m)} = \text{Measured Voltage (dBuV)} + \text{Antenna Factor (dB/m)} + \text{Cable Loss (dB)} - \text{Preamp Gain (dB)}$$

$$36.5 \text{ dBuV} + 18.7 \text{ dB/m} + 0.6 \text{ dB} - 26.9 \text{ dB} = 28.9 \text{ dBuV/m}$$

### 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, Model A1530 is a mobile phone with multimedia functions (music, application support, and video), cellular GSM/GPRS/EGPRS/WCDMA/HSPA+/DC-HSDPA/CDMA/EVDO/LTE radio, IEEE 802.11a/b/g/n, Bluetooth and GPS radio. The rechargeable battery is not user accessible

### 5.2. MAXIMUM OUTPUT POWER

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

#### LAT LTE BAND 2

Part 24 LTE Band 2 MODE (1.4 MHz BANDWIDTH)					
Frequency range (MHz)	Modulation	Conducted(Peak)		EIRP(Peak)	
		dBm	mW	dBm	mW
1850.7-1909.3	QPSK RB6-0	28.04	636.8	29.10	812.8
1850.7-1909.3	16QAM, RB6-0	27.68	586.1	28.10	645.7

Part 24 LTE Band 2 MODE (3 MHz BANDWIDTH)					
Frequency range (MHz)	Modulation	Conducted(Peak)		EIRP(Peak)	
		dBm	mW	dBm	mW
1851.5-1908.5	QPSK RB15-0	27.97	626.6	29.18	827.9
1851.5-1908.5	16QAM, RB15-0	27.67	584.8	28.18	657.7

Part 24 LTE Band 2 MODE (5 MHz BANDWIDTH)					
Frequency range (MHz)	Modulation	Conducted(Peak)		EIRP(Peak)	
		dBm	mW	dBm	mW
1852.5-1907.5	QPSK RB25-0	27.95	623.7	30.04	1009.3
1852.5-1907.5	16QAM, RB25-0	27.80	602.6	29.24	839.5

Part 24 LTE Band 2 MODE (10 MHz BANDWIDTH)					
Frequency range (MHz)	Modulation	Conducted(Peak)		EIRP(Peak)	
		dBm	mW	dBm	mW
1855.0-1905.0	QPSK RB50-0	28.02	633.9	30.38	1091.4
1855.0-1905.0	16QAM, RB50-0	28.00	631.0	29.44	879.0

Part 24 LTE Band 2 MODE (15.0 MHz BANDWIDTH)					
Frequency range (MHz)	Modulation	Conducted(Peak)		EIRP(Peak)	
		dBm	mW	dBm	mW
1857.5-1902.5	QPSK RB75-0	28.04	636.8	30.14	1032.8
1857.5-1902.5	16QAM, RB75-0	27.88	613.8	29.24	839.5

Part 24 LTE Band 2 MODE (20.0 MHz BANDWIDTH)					
Frequency range (MHz)	Modulation	Conducted(Peak)		EIRP(PEAK)	
		dBm	mW	dBm	mW
1860.0-1900.0	QPSK RB100-0	28.11	647.1	30.68	1169.5
1860.0-1900.0	16QAM, RB100-0	27.87	612.4	29.58	907.8

**LAT LTE BAND 5**

Part 22 LTE Band 5 MODE (1.4 MHz BANDWIDTH)					
Frequency range (MHz)	Modulation	Conducted(Average)		ERP(Average)	
		dBm	mW	dBm	mW
824.7-848.3	QPSK RB6-0	23.98	250.0	20.10	102.3
824.7-848.3	16QAM, RB6-0	23.26	211.8	19.00	79.4

Part 22 LTE Band 5 MODE (3.0 MHz BANDWIDTH)					
Frequency range (MHz)	Modulation	Conducted(Average)		ERP(Average)	
		dBm	mW	dBm	mW
825.5-847.5	QPSK RB15-0	24.00	251.2	19.70	93.3
825.5-847.5	16QAM, RB15-0	23.40	218.8	18.60	72.4

Part 22 LTE Band 5 MODE (5.0 MHz BANDWIDTH)					
Frequency range (MHz)	Modulation	Conducted(Average)		ERP(Average)	
		dBm	mW	dBm	mW
826.5-846.5	QPSK RB25-0	23.96	248.9	19.70	93.3
826.5-846.5	16QAM, RB25-0	23.34	215.8	18.60	72.4

Part 22 LTE Band 5 MODE (10.0 MHz BANDWIDTH)					
Frequency range (MHz)	Modulation	Conducted(Average)		ERP(Average)	
		dBm	mW	dBm	mW
829.0-844.0	QPSK RB50-0	23.98	250.0	20.60	114.8
829.0-844.0	16QAM, RB50-0	23.31	214.3	19.80	95.5



**UAT LTE BAND 2**

Part 24 LTE Band 2 MODE (1.4 MHz BANDWIDTH)					
Frequency range (MHz)	Modulation	Conducted(Peak)		EIRP(Peak)	
		dBm	mW	dBm	mW
1850.7-1909.3	QPSK RB6-0	26.96	496.6	21.60	144.5
1850.7-1909.3	16QAM, RB6-0	26.73	471.0	20.70	117.5

Part 24 LTE Band 2 MODE (3 MHz BANDWIDTH)					
Frequency range (MHz)	Modulation	Conducted(Peak)		EIRP(Peak)	
		dBm	mW	dBm	mW
1851.5-1908.5	QPSK RB15-0	26.83	481.9	21.60	144.5
1851.5-1908.5	16QAM, RB15-0	26.59	456.0	20.70	117.5

Part 24 LTE Band 2 MODE (5 MHz BANDWIDTH)					
Frequency range (MHz)	Modulation	Conducted(Peak)		EIRP(Peak)	
		dBm	mW	dBm	mW
1852.5-1907.5	QPSK RB25-0	27.00	501.2	22.00	158.5
1852.5-1907.5	16QAM, RB25-0	26.73	471.0	21.00	125.9

Part 24 LTE Band 2 MODE (10 MHz BANDWIDTH)					
Frequency range (MHz)	Modulation	Conducted(Peak)		EIRP(Peak)	
		dBm	mW	dBm	mW
1855.0-1905.0	QPSK RB50-0	26.94	494.3	22.40	173.8
1855.0-1905.0	16QAM, RB50-0	26.81	479.7	21.40	138.0

Part 24 LTE Band 2 MODE (15.0 MHz BANDWIDTH)					
Frequency range (MHz)	Modulation	Conducted(Peak)		EIRP(Peak)	
		dBm	mW	dBm	mW
1857.5-1902.5	QPSK RB75-0	27.01	502.3	22.00	158.5
1857.5-1902.5	16QAM, RB75-0	26.76	474.2	21.10	128.8

Part 24 LTE Band 2 MODE (20.0 MHz BANDWIDTH)					
Frequency range (MHz)	Modulation	Conducted(Peak)		EIRP(PEAK)	
		dBm	mW	dBm	mW
1860.0-1900.0	QPSK RB100-0	27.03	504.7	22.28	169.0
1860.0-1900.0	16QAM, RB100-0	26.82	480.8	21.28	134.3

**UAT LTE BAND 5**

Part 22 LTE Band 5 MODE (1.4 MHz BANDWIDTH)					
Frequency range (MHz)	Modulation	Conducted(Average)		ERP(Average)	
		dBm	mW	dBm	mW
824.7-848.3	QPSK RB6-0	23.70	234.4	19.80	95.5
824.7-848.3	16QAM, RB6-0	23.30	213.8	18.80	75.9

Part 22 LTE Band 5 MODE (3.0 MHz BANDWIDTH)					
Frequency range (MHz)	Modulation	Conducted(Average)		ERP(Average)	
		dBm	mW	dBm	mW
825.5-847.5	QPSK RB15-0	23.70	234.4	19.30	85.1
825.5-847.5	16QAM, RB15-0	23.40	218.8	18.40	69.2

Part 22 LTE Band 5 MODE (5.0 MHz BANDWIDTH)					
Frequency range (MHz)	Modulation	Conducted(Average)		ERP(Average)	
		dBm	mW	dBm	mW
826.5-846.5	QPSK RB25-0	23.70	234.4	18.90	77.6
826.5-846.5	16QAM, RB25-0	23.35	216.3	18.00	63.1

Part 22 LTE Band 5 MODE (10.0 MHz BANDWIDTH)					
Frequency range (MHz)	Modulation	Conducted(Average)		ERP(Average)	
		dBm	mW	dBm	mW
829.0-844.0	QPSK RB50-0	23.68	233.3	18.80	75.9
829.0-844.0	16QAM, RB50-0	23.24	210.9	17.90	61.7

### 5.3. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was version 11A360 baseband 7.02-16  
The EUT is linked with CMW500 Test Set.

### 5.4. MAXIMUM ANTENNA GAIN

Please see table below:

LTE BANDS	A1530 LAT Antenna Gain (dBi)	A1530 UAT Antenna Gain (dBi)
LTE Band 5, 824 – 849MHz	-1.60	-4.50
LTE Band 2, 1850-1910MHz	1.70	-2.80

### 5.5. WORST-CASE CONFIGURATION AND MODE

The worst-case channel for RF radiated emissions below 1GHz tests is channel with highest RF output power.

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

For the device, all tests were performed as below,

\_Port A: Both conducted and radiated emissions measurement with all LTE bands.

\_Port B: All conducted emissions measurement and only ERP/EIRP radiated emissions on all LTE bands.

For the fundamental investigation of radiated emissions, the EUT is investigated for vertical and horizontal antenna orientations and X, Y, and Z orientation and the worst case was determined to be at Z position on Cell band and X position on CS Band.

## 5.6. DESCRIPTION OF TEST SETUP

### SUPPORT EQUIPMENT

Support Equipment List			
Description	Manufacturer	Model	Serial Number
AC Adapter	Apple	A1385	D292066H2T2DHLHAC
DC Power Supply	Sorensen	XT 15-4	1319A02780

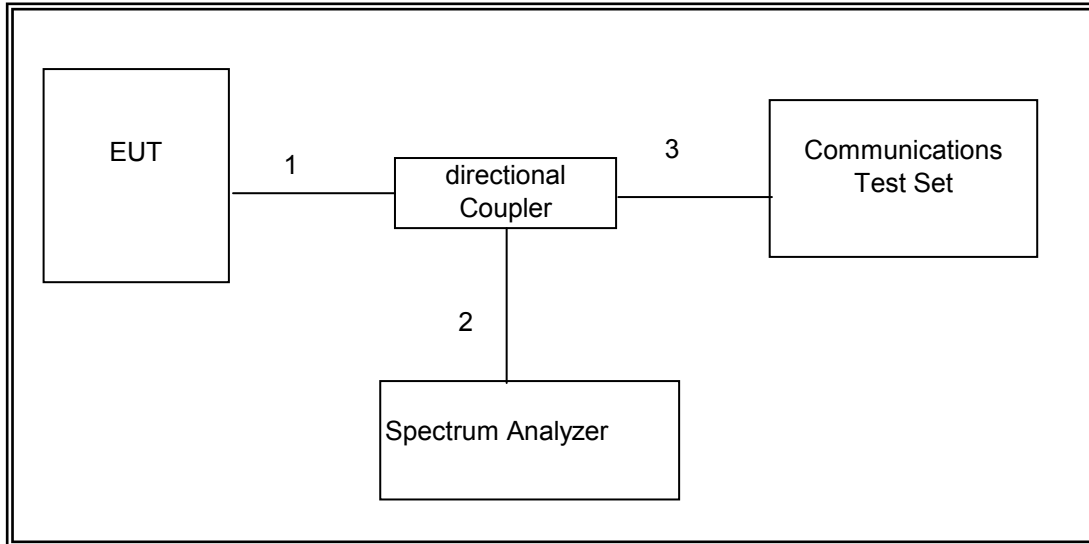
### I/O CABLES ( RF Conducted Test)

I/O CABLE LIST						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length	Remarks
1	RFOut	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

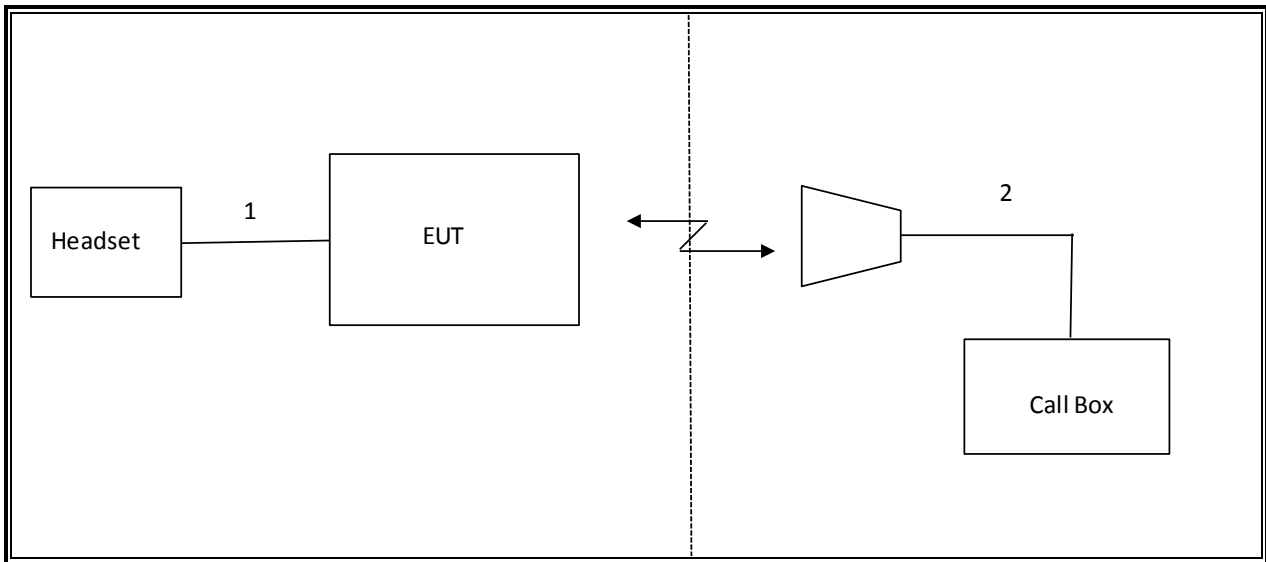
### I/O CABLES (RF Radiated Test)

I/O CABLE LIST						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length	Remarks
1	Jack	1	Earphone	Un-shielded	0.5m	NA
2	RF In/Out	1	Antenna	Un-shielded	5m	NA

**CONDUCTED SETUP:**



**RADIATED TEST SET UP:**



## 6. TEST AND MEASUREMENT EQUIPMENT

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

TEST EQUIPMENT LIST				
Description	Manufacturer	Model	Asset	Cal Due
Spectrum Analyzer, 44GHz	Agilent	N9030A	F00129	02/21/14
Directional Coupler	Krytar	1817	N02656	CNR
Communication Test Set	R & S	CMW500	F00014	02/21/14
Temperature / Humidity Chamber	Thermotron	SE 600-10-10	C00930	01/09/14
Vector signal generator, 6 GHz	Agilent / HP	E4438C	F00037	07/06/14
Highpass Filter, 2.7 GHz	Micro-Tronics	HPM13194	N02686	CNR
Highpass Filter, 1.5 GHz	Micro-Tronics	HPM13193	N02688	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
Horn Antenna	ETS Lindgren	3117	F00131	02/19/14
PreAmp 1-18GHz	Agilent/HP	8449B	C01063	03/18/14
PreAmp 30-1000MHz	Sonama	310	F00027	11/06/13

## 7. RF POWER OUTPUT VERIFICATION

### 7.1. LAT LTE BAND 2

#### Output power for LTE Band 2 (1.4 MHz)

Freq. (MHz)	UL Channel	Modulation	BW (MHz)	RB Size	RB Offset	Peak Power (dBm)	Average (dBm)
1850.7	18607	QPSK	1.4	1	0	27.10	23.00
				1	2	26.99	22.97
				1	5	27.05	22.95
				3	0	27.16	22.97
				3	1	27.13	22.94
				3	2	27.20	21.98
		6		0	28.04	21.69	
		16-QAM		1	0	27.08	22.03
				1	2	26.96	22.02
				1	5	27.06	22.00
				3	0	27.42	22.12
				3	1	27.43	21.09
				3	2	27.24	21.00
				6	0	27.68	21.15
1880.0	18900		QPSK	1	0	26.50	23.00
		1		2	26.49	22.98	
		1		5	26.54	22.99	
		3		0	26.71	23.00	
		3		1	26.51	21.97	
		3		2	26.53	21.98	
		6	0	27.22	22.06		
		16-QAM	1	0	26.12	22.04	
			1	2	26.10	22.00	
			1	5	26.60	22.01	
			3	0	26.56	21.62	
			3	1	26.22	21.52	
			3	2	26.30	21.04	
			6	0	27.06	21.08	
1909.3	19193		QPSK	1	0	26.10	23.00
		1		2	26.12	22.92	
		1		5	26.33	22.93	
		3		0	26.6	22.99	
		3		1	26.26	22.98	
		3		2	26.31	22.97	
		6	0	27.48	22.05		
		16-QAM	1	0	26.05	22.02	
			1	2	26.11	22.03	
			1	5	26.30	22.02	
			3	0	26.49	21.60	
			3	1	26.30	21.23	
			3	2	26.51	21.21	
			6	0	27.36	21.03	

**Output power for LTE Band 2 (3 MHz)**

Freq. (MHz)	UL Channel	Modulation	BW (MHz)	RB Size	RB Offset	Peak Power (dBm)	Average (dBm)
1851.5	18615	QPSK	3.0	1	0	26.62	22.96
				1	7	26.80	22.90
				1	14	26.82	22.99
				8	0	26.80	22.20
				8	4	27.01	22.24
				8	7	27.52	22.28
		15		0	26.46	22.16	
		16-QAM		1	0	26.61	22.00
				1	7	26.30	22.00
				1	14	26.81	21.95
				8	0	26.78	21.15
				8	4	27.01	21.40
				8	7	27.13	21.47
				15	0	26.20	21.23
				1880.0	18900	QPSK	1
1	7		26.40				22.92
1	14	27.07	22.90				
8	0	26.91	22.33				
8	4	27.21	22.35				
8	7	27.97	22.39				
15	0	26.19	22.37				
16-QAM	1	0	26.20			22.05	
	1	7	26.30			22.00	
	1	14	27.30			22.00	
	8	0	27.00			21.30	
	8	4	27.33			21.46	
	8	7	26.62			21.30	
	15	0	26.80			21.48	
	1908.5	19185	QPSK			1	0
				1	7	26.80	22.97
1				14	27.01	22.92	
8				0	27.52	22.39	
8				4	26.46	22.38	
8				7	26.61	22.37	
15			0	26.30	22.40		
16-QAM			1	0	26.81	22.10	
			1	7	26.78	22.10	
			1	14	27.01	22.05	
			8	0	27.13	21.44	
			8	4	26.20	21.36	
			8	7	26.15	21.40	
			15	0	27.67	21.53	



**Output power for LTE Band 2 (5 MHz)**

Freq. (MHz)	UL Channel	Modulation	BW (MHz)	RB Size	RB Offset	Peak Power (dBm)	Average (dBm)
1852.5	18625	QPSK	5.0	1	0	26.51	22.98
				1	12	26.82	22.97
				1	24	27.20	22.90
				12	0	27.34	22.14
				12	6	27.43	22.25
				12	11	27.47	22.23
				25	0	27.85	22.17
		16-QAM		1	0	26.60	21.92
				1	12	26.80	21.95
				1	24	27.22	22.00
				12	0	27.32	21.20
				12	6	27.26	21.27
				12	11	27.42	21.25
				25	0	27.80	21.23
1880.0	18900	QPSK	1	0	26.10	22.98	
			1	12	26.40	22.97	
			1	24	26.70	22.92	
			12	0	26.65	22.47	
			12	6	26.52	22.39	
			12	11	26.69	22.35	
			25	0	27.75	22.32	
		16-QAM	1	0	26.30	22.40	
			1	12	26.24	22.23	
			1	24	26.28	21.88	
			12	0	26.56	21.52	
			12	6	26.61	21.56	
			12	11	26.60	21.44	
			25	0	27.63	21.39	
1907.5	19175	QPSK	1	0	26.00	22.98	
			1	12	26.05	22.95	
			1	24	26.20	22.90	
			12	0	27.02	22.89	
			12	6	26.70	22.62	
			12	11	26.88	22.40	
			25	0	27.95	22.56	
		16-QAM	1	0	26.68	22.35	
			1	12	26.96	22.10	
			1	24	26.50	22.02	
			12	0	26.97	22.01	
			12	6	26.91	21.80	
			12	11	26.86	21.57	
			25	0	27.60	21.60	

**Output power for LTE Band 2 (10 MHz)**

Freq. (MHz)	UL Channel	Modulation	BW (MHz)	RB Size	RB Offset	Peak Power (dBm)	Average (dBm)
1855.0	18650	QPSK	10.0	1	0	27.10	22.98
				1	24	27.31	22.97
				1	49	27.11	22.99
				25	0	27.90	22.21
				25	12	27.71	22.18
				25	24	27.81	22.16
				50	0	28.02	22.17
		16-QAM		1	0	26.90	22.20
				1	24	27.20	22.13
				1	49	27.10	22.08
				25	0	27.36	21.21
				25	12	27.41	21.25
				25	24	27.56	21.22
				50	0	28.00	21.05
1880.0	18900	QPSK	1	0	26.20	22.99	
			1	24	26.62	22.97	
			1	49	27.09	22.94	
			25	0	26.63	22.47	
			25	12	26.49	22.24	
			25	24	27.00	22.15	
			50	0	27.70	22.32	
		16-QAM	1	0	26.10	22.10	
			1	24	26.20	22.12	
			1	49	26.60	22.22	
			25	0	26.65	21.57	
			25	12	26.53	21.41	
			25	24	26.92	21.34	
			50	0	27.58	21.30	
1905.0	19150	QPSK	1	0	26.15	22.98	
			1	24	26.11	22.95	
			1	49	26.17	22.94	
			25	0	27.16	22.85	
			25	12	26.90	22.54	
			25	24	26.94	22.34	
			50	0	27.85	22.10	
		16-QAM	1	0	26.11	22.06	
			1	24	26.10	22.06	
			1	49	26.22	22.00	
			25	0	27.20	21.93	
			25	12	26.81	21.57	
			25	24	26.98	21.44	
			50	0	27.68	21.40	

**Output power for LTE Band 2 (15 MHz)**

Freq. (MHz)	UL Channel	Modulation	BW (MHz)	RB Size	RB Offset	Peak Power (dBm)	Average (dBm)
1857.5	18675	QPSK	15.0	1	0	27.02	22.96
				1	37	27.10	22.98
				1	74	26.78	22.97
				36	0	27.89	22.15
				36	16	27.87	22.20
				36	35	27.86	22.27
				75	0	28.00	22.22
		16-QAM		1	0	26.96	22.13
				1	37	27.08	22.10
				1	74	26.56	22.02
				36	0	27.49	21.55
				36	16	27.61	21.30
				36	35	27.59	21.29
				75	0	27.88	21.26
1880.0	18900	QPSK	1	0	26.45	22.95	
			1	37	26.51	22.92	
			1	74	27.10	22.90	
			36	0	27.15	22.29	
			36	16	26.55	22.28	
			36	35	26.99	22.07	
			75	0	28.04	22.10	
		16-QAM	1	0	26.41	22.16	
			1	37	26.46	22.10	
			1	74	26.78	22.14	
			36	0	26.82	21.55	
			36	16	26.62	21.43	
			36	35	27.03	21.24	
			75	0	27.41	21.36	
1902.5	19125	QPSK	1	0	26.76	22.99	
			1	37	25.97	22.96	
			1	74	26.20	22.95	
			36	0	27.47	22.49	
			36	16	27.08	22.69	
			36	35	27.03	22.42	
			75	0	28.01	22.53	
		16-QAM	1	0	26.71	22.17	
			1	37	25.99	22.16	
			1	74	26.18	22.07	
			36	0	27.61	21.58	
			36	16	27.12	21.80	
			36	35	27.15	21.53	
			75	0	27.82	21.59	

**Output power for LTE Band 2 (20 MHz)**

Freq. (MHz)	UL Channel	Modulation	BW (MHz)	RB Size	RB Offset	Peak Power (dBm)	Average (dBm)
1860.0	18700	QPSK	20.0	1	0	26.92	22.96
				1	49	27.08	22.98
				1	99	26.30	22.97
				50	0	27.98	22.27
				50	24	27.90	22.31
				50	49	27.69	22.34
				100	0	28.08	22.25
		16-QAM		1	0	26.66	22.14
				1	49	27.01	22.09
				1	99	26.31	22.03
				50	0	27.42	21.24
				50	24	27.37	21.30
				50	49	27.23	21.41
				100	0	27.87	21.29
1880.0	18900	QPSK	1	0	26.02	22.96	
			1	49	26.43	22.92	
			1	99	27.21	22.95	
			50	0	26.77	22.35	
			50	24	27.20	22.23	
			50	49	27.30	22.14	
			100	0	28.05	22.09	
		16-QAM	1	0	26.55	22.03	
			1	49	26.47	22.00	
			1	99	26.85	22.00	
			50	0	26.69	21.52	
			50	24	26.67	21.50	
			50	49	27.11	21.32	
			100	0	27.58	21.33	
1900.0	19100	QPSK	1	0	27.10	22.97	
			1	49	26.10	22.99	
			1	99	26.23	22.95	
			50	0	27.68	22.44	
			50	24	27.24	22.92	
			50	49	27.11	22.55	
			100	0	28.11	22.66	
		16-QAM	1	0	27.05	22.15	
			1	49	26.06	22.10	
			1	99	26.21	22.03	
			50	0	27.24	21.48	
			50	24	27.30	21.94	
			50	49	27.13	21.24	
			100	0	27.68	21.57	

## 7.2. UAT LTE BAND 2

### Output power for LTE Band 2 (1.4 MHz)

Freq. (MHz)	UL Channel	Modulation	BW (MHz)	RB Size	RB Offset	Peak Power (dBm)	Average (dBm)
1850.7	18607	QPSK	1.4	1	0	26.44	22.43
				1	2	26.44	22.39
				1	5	26.57	22.46
				3	0	26.75	22.38
				3	1	26.70	22.41
				3	2	26.70	22.38
				6	0	27.45	21.93
		16-QAM		1	0	26.52	21.50
				1	2	26.41	21.45
				1	5	26.72	21.12
				3	0	26.98	20.90
				3	1	26.75	21.11
				3	2	26.81	21.13
				6	0	27.11	20.75
1880.0	18900	QPSK	1	0	26.65	22.46	
			1	2	26.53	22.40	
			1	5	26.69	22.41	
			3	0	26.68	22.36	
			3	1	26.62	22.36	
			3	2	26.62	22.41	
			6	0	27.44	21.64	
		16-QAM	1	0	26.56	21.50	
			1	2	26.53	21.49	
			1	5	26.59	21.46	
			3	0	27.06	21.38	
			3	1	26.94	21.17	
			3	2	26.85	20.88	
			6	0	26.87	20.76	
1909.3	19193	QPSK	1	0	26.10	22.50	
			1	2	26.02	22.49	
			1	5	26.10	22.48	
			3	0	26.38	22.48	
			3	1	26.23	22.45	
			3	2	26.22	22.50	
			6	0	27.30	22.18	
		16-QAM	1	0	26.12	21.50	
			1	2	26.18	21.43	
			1	5	26.13	21.24	
			3	0	26.60	21.26	
			3	1	26.45	21.01	
			3	2	26.47	21.00	
			6	0	26.97	20.42	

**Output power for LTE Band 2 (3 MHz)**

Freq. (MHz)	UL Channel	Modulation	BW (MHz)	RB Size	RB Offset	Peak Power (dBm)	Average (dBm)
1851.5	18615	QPSK	3.0	1	0	26.42	22.41
				1	7	26.55	22.47
				1	14	26.60	22.50
				8	0	27.01	21.92
				8	4	26.95	21.97
				8	7	26.99	22.02
		15		0	27.33	21.90	
		16-QAM		1	0	26.38	21.50
				1	7	26.41	21.50
				1	14	26.62	21.23
				8	0	26.87	20.84
				8	4	26.90	20.97
				8	7	27.05	20.97
				15	0	27.09	21.00
				1880.0	18900	QPSK	1
1	7		26.47				22.44
1	14	26.33	22.22				
8	0	26.80	21.89				
8	4	26.71	21.85				
8	7	26.81	21.85				
15	0	27.28	21.50				
16-QAM	1	0	26.45			21.45	
	1	7	26.42			21.36	
	1	14	26.42			21.30	
	8	0	26.62			20.85	
	8	4	26.44			20.78	
	8	7	26.63			20.81	
	15	0	26.84			20.90	
	1908.5	19185	QPSK			1	0
				1	7	26.00	22.48
1				14	25.93	22.50	
8				0	26.50	21.98	
8				4	26.27	22.00	
8				7	26.60	22.11	
15			0	27.20	21.45		
16-QAM			1	0	26.19	21.50	
			1	7	26.08	21.44	
			1	14	26.10	21.23	
			8	0	26.71	21.34	
			8	4	26.49	21.03	
			8	7	26.72	21.04	
			15	0	27.00	21.20	

**Output power for LTE Band 2 (5 MHz)**

Freq. (MHz)	UL Channel	Modulation	BW (MHz)	RB Size	RB Offset	Peak Power (dBm)	Average (dBm)
1852.5	18625	QPSK	5.0	1	0	26.49	22.39
				1	12	26.58	22.50
				1	24	26.61	22.47
				12	0	26.64	21.95
				12	6	26.71	22.06
				12	11	26.72	21.96
				25	0	27.30	21.91
		16-QAM		1	0	26.59	21.52
				1	12	26.55	21.46
				1	24	26.67	21.34
				12	0	26.73	21.03
				12	6	26.69	21.16
				12	11	26.76	21.09
				25	0	27.23	20.91
1880.0	18900	QPSK	1	0	26.42	22.35	
			1	12	26.51	22.48	
			1	24	26.43	22.17	
			12	0	26.72	21.91	
			12	6	26.61	21.84	
			12	11	26.71	21.85	
			25	0	27.50	21.75	
		16-QAM	1	0	26.58	21.47	
			1	12	26.61	21.43	
			1	24	26.57	21.23	
			12	0	26.25	21.01	
			12	6	26.30	20.89	
			12	11	26.34	20.85	
			25	0	27.14	20.79	
1907.5	19175	QPSK	1	0	26.43	22.50	
			1	12	26.22	22.41	
			1	24	26.21	22.42	
			12	0	26.44	21.82	
			12	6	26.46	21.87	
			12	11	26.45	22.00	
			25	0	27.50	21.73	
		16-QAM	1	0	26.50	21.48	
			1	12	26.26	21.43	
			1	24	26.31	21.34	
			12	0	26.43	20.90	
			12	6	26.30	20.93	
			12	11	26.46	20.92	
			25	0	27.20	20.78	

**Output power for LTE Band 2 (10 MHz)**

Freq. (MHz)	UL Channel	Modulation	BW (MHz)	RB Size	RB Offset	Peak Power (dBm)	Average (dBm)
1855.0	18650	QPSK	10.0	1	0	26.40	22.41
				1	24	26.46	22.50
				1	49	26.43	22.44
				25	0	26.93	21.93
				25	12	26.80	21.87
				25	24	26.80	21.69
		16-QAM		50	0	27.40	21.70
				1	0	26.37	21.47
				1	24	26.47	21.45
				1	49	26.32	21.44
				25	0	26.83	21.20
				25	12	26.77	20.91
				25	24	26.75	20.83
				50	0	27.31	20.89
				1880.0	18900	QPSK	1
1	24	26.62	22.40				
1	49	26.32	22.30				
25	0	26.84	21.72				
25	12	26.80	21.75				
25	24	26.80	21.70				
16-QAM	50	0	27.44			21.65	
	1	0	26.25			21.40	
	1	24	26.46			21.50	
	1	49	26.35			21.31	
	25	0	26.33			20.90	
	25	12	26.36			20.91	
	25	24	26.36			20.81	
	50	0	27.05			20.66	
	1905.0	19150	QPSK			1	0
1				24	26.18	22.45	
1				49	25.92	22.50	
25				0	26.87	21.78	
25				12	26.59	21.81	
25				24	26.61	21.72	
16-QAM			50	0	27.37	21.87	
			1	0	26.35	21.50	
			1	24	26.19	21.50	
			1	49	26.02	21.55	
			25	0	26.70	20.87	
			25	12	26.31	21.02	
			25	24	26.37	20.86	
			50	0	27.14	20.92	



**Output power for LTE Band 2 (15 MHz)**

Freq. (MHz)	UL Channel	Modulation	BW (MHz)	RB Size	RB Offset	Peak Power (dBm)	Average (dBm)
1857.5	18675	QPSK	15.0	1	0	26.37	22.48
				1	37	26.42	22.50
				1	74	26.26	22.27
				36	0	26.87	21.88
				36	16	26.70	21.67
				36	35	26.68	21.68
				75	0	27.45	21.75
		16-QAM		1	0	26.43	21.52
				1	37	26.33	21.55
				1	74	26.16	21.50
				36	0	26.76	21.16
				36	16	26.83	20.90
				36	35	26.72	20.90
				75	0	27.16	20.99
1880.0	18900	QPSK	1	0	26.12	22.22	
			1	37	26.59	22.50	
			1	74	26.22	22.35	
			36	0	26.84	21.55	
			36	16	26.69	21.69	
			36	35	26.77	21.46	
			75	0	27.51	21.46	
		16-QAM	1	0	26.22	21.53	
			1	37	26.48	21.55	
			1	74	26.21	21.50	
			36	0	26.57	20.80	
			36	16	26.34	21.00	
			36	35	26.33	20.64	
			75	0	26.95	20.80	
1902.5	19125	QPSK	1	0	26.31	22.50	
			1	37	26.25	22.43	
			1	74	26.00	22.46	
			36	0	26.92	21.85	
			36	16	26.59	21.78	
			36	35	26.58	21.81	
			75	0	27.30	21.85	
		16-QAM	1	0	26.38	21.50	
			1	37	26.30	21.50	
			1	74	25.86	21.40	
			36	0	27.10	21.00	
			36	16	26.60	20.92	
			36	35	26.53	20.87	
			75	0	27.26	20.54	

**Output power for LTE Band 2 (20 MHz)**

Freq. (MHz)	UL Channel	Modulation	BW (MHz)	RB Size	RB Offset	Peak Power (dBm)	Average (dBm)
1860.0	18700	QPSK	20.0	1	0	26.47	22.50
				1	49	26.40	22.47
				1	99	26.25	22.25
				50	0	26.88	21.88
				50	24	26.64	21.74
				50	49	26.73	21.60
				100	0	27.39	21.84
		16-QAM		1	0	26.42	21.45
				1	49	26.30	21.55
				1	99	26.29	21.51
				50	0	26.43	21.01
				50	24	26.58	20.73
				50	49	26.60	20.83
				100	0	27.31	21.01
1880.0	18900	QPSK	1	0	26.31	22.20	
			1	49	26.52	22.47	
			1	99	26.32	22.45	
			50	0	26.74	21.47	
			50	24	26.70	21.71	
			50	49	26.85	21.57	
			100	0	27.53	21.46	
		16-QAM	1	0	26.19	21.53	
			1	49	26.42	21.52	
			1	99	26.14	21.55	
			50	0	26.33	20.90	
			50	24	26.25	20.70	
			50	49	26.42	20.64	
			100	0	26.97	20.66	
1900.0	19100	QPSK	1	0	26.43	22.49	
			1	49	26.35	22.45	
			1	99	25.94	22.50	
			50	0	26.94	21.77	
			50	24	26.76	21.91	
			50	49	26.80	21.78	
			100	0	27.47	21.73	
		16-QAM	1	0	26.45	21.50	
			1	49	26.31	21.50	
			1	99	25.83	21.45	
			50	0	26.81	21.10	
			50	24	26.49	21.20	
			50	49	26.62	20.81	
			100	0	27.32	20.85	

### 7.3. LAT LTE BAND 5

**Output power for LTE Band 5 (1.4 MHz)**

Freq. (MHz)	UL Channel	Modulation	BW (MHz)	RB Size	RB Offset	Peak Power (dBm)	Average (dBm)
824.7	20407	QPSK	1.4	1	0	28.00	23.98
				1	2	27.91	23.97
				1	5	27.84	23.85
				3	0	28.00	23.95
				3	1	27.87	23.96
				3	2	27.83	23.94
				6	0	28.61	23.10
		16-QAM		1	0	27.76	23.05
				1	2	27.75	23.08
				1	5	27.81	23.00
				3	0	28.02	22.95
				3	1	27.99	22.78
				3	2	27.95	22.90
				6	0	28.47	22.13
836.5	20525	QPSK	1	0	27.90	23.98	
			1	2	27.81	23.80	
			1	5	27.79	23.97	
			3	0	27.75	23.79	
			3	1	27.76	23.78	
			3	2	27.89	23.86	
			6	0	28.60	23.13	
		16-QAM	1	0	27.73	23.12	
			1	2	27.69	23.10	
			1	5	27.72	23.08	
			3	0	28.13	22.77	
			3	1	27.85	22.90	
			3	2	27.92	22.98	
			6	0	28.22	22.06	
848.3	20643	QPSK	1	0	27.61	23.98	
			1	2	27.50	23.95	
			1	5	27.42	23.90	
			3	0	27.71	23.89	
			3	1	27.58	23.85	
			3	2	27.42	23.86	
			6	0	28.32	23.40	
		16-QAM	1	0	27.50	23.26	
			1	2	27.49	23.12	
			1	5	27.47	23.14	
			3	0	27.95	23.02	
			3	1	27.72	23.00	
			3	2	27.63	22.94	
			6	0	28.23	22.12	

**Output power for LTE Band 5 (3 MHz)**

Freq. (MHz)	UL Channel	Modulation	BW (MHz)	RB Size	RB Offset	Peak Power (dBm)	Average (dBm)
825.5	20415	QPSK	3.0	1	0	28.00	24.00
				1	7	27.86	23.97
				1	14	28.05	23.99
				8	0	28.32	23.17
				8	4	28.23	23.23
				8	7	28.26	23.26
		15		0	28.70	23.15	
		16-QAM		1	0	27.90	23.10
				1	7	27.79	23.30
				1	14	27.90	23.40
				8	0	28.30	22.21
				8	4	28.20	22.45
				8	7	28.27	22.43
				15	0	28.36	22.28
				836.5	20525	QPSK	1
1	7		27.79				23.98
1	14	27.76	23.97				
8	0	28.21	23.18				
8	4	28.02	23.17				
8	7	28.06	23.19				
15	0	28.46	23.03				
16-QAM	1	0	27.72			23.10	
	1	7	27.75			23.06	
	1	14	27.74			23.08	
	8	0	28.22			22.35	
	8	4	28.27			22.11	
	8	7	28.26			22.02	
	15	0	28.31			22.30	
	847.5	20635	QPSK			1	0
				1	7	27.45	23.85
1				14	27.28	23.80	
8				0	27.85	23.40	
8				4	27.61	23.26	
8				7	27.90	23.11	
15			0	28.66	23.36		
16-QAM			1	0	27.23	23.10	
			1	7	27.40	23.00	
			1	14	27.15	23.01	
			8	0	28.01	22.08	
			8	4	27.80	22.34	
			8	7	27.92	22.31	
			15	0	28.40	22.50	

**Output power for LTE Band 5 (5 MHz)**

Freq. (MHz)	UL Channel	Modulation	BW (MHz)	RB Size	RB Offset	Peak (dBm)	Average (dBm)
826.5	20425	QPSK	5.0	1	0	27.98	23.95
				1	12	27.75	23.96
				1	24	27.74	23.96
				12	0	28.06	23.15
				12	6	28.01	23.29
				12	11	27.95	23.01
				25	0	28.76	23.22
		16-QAM		1	0	28.12	23.30
				1	12	28.00	23.28
				1	24	27.79	23.01
				12	0	28.03	22.31
				12	6	28.05	22.46
				12	11	28.10	22.47
				25	0	28.74	22.27
836.5	20525	QPSK	5.0	1	0	27.68	23.95
				1	12	27.65	23.93
				1	24	27.62	23.90
				12	0	28.04	23.09
				12	6	27.91	23.10
				12	11	27.98	23.06
				25	0	28.67	23.00
		16-QAM		1	0	27.54	23.00
				1	12	27.90	23.21
				1	24	28.00	23.12
				12	0	27.90	22.24
				12	6	27.99	22.26
				12	11	28.02	22.22
				25	0	28.57	22.03
846.5	20625	QPSK	5.0	1	0	27.45	23.96
				1	12	27.32	23.90
				1	24	27.00	23.89
				12	0	27.92	23.16
				12	6	27.72	23.03
				12	11	27.70	23.32
				25	0	28.71	22.97
		16-QAM		1	0	27.85	23.24
				1	12	27.81	23.34
				1	24	27.50	23.40
				12	0	27.92	22.26
				12	6	27.75	22.20
				12	11	27.69	22.46
				25	0	28.30	21.98

**Output power for LTE Band 5 (10 MHz)**

Freq. (MHz)	UL Channel	Modulation	BW (MHz)	RB Size	RB Offset	Peak Power (dBm)	Average (dBm)
829.0	20450	QPSK	10.0	1	0	27.98	23.98
				1	24	27.88	23.95
				1	49	27.70	23.96
				25	0	28.06	22.94
				25	12	28.21	22.99
				25	24	27.97	22.96
		50		0	28.78	22.90	
		16-QAM		1	0	27.86	23.15
				1	24	27.80	23.25
				1	49	27.60	23.16
				25	0	28.05	22.06
				25	12	28.01	22.08
				25	24	28.00	22.04
				50	0	28.61	21.93
				836.5	20525	QPSK	1
1	24		27.90				23.95
1	49	27.88	23.89				
25	0	28.15	22.83				
25	12	27.96	22.87				
25	24	28.00	22.86				
50	0	28.66	22.80				
16-QAM	1	0	27.71			22.99	
	1	24	27.82			23.20	
	1	49	27.76			23.01	
	25	0	27.93			21.89	
	25	12	27.90			21.94	
	25	24	28.00			21.86	
	50	0	28.47			21.70	
	844.0	20600	QPSK			1	0
				1	24	27.85	23.97
1				49	27.28	23.71	
25				0	28.22	22.83	
25				12	28.13	22.85	
25				24	28.21	23.20	
50			0	28.52	22.89		
16-QAM			1	0	27.85	23.31	
			1	24	27.94	23.21	
			1	49	27.21	23.00	
			25	0	28.12	21.94	
			25	12	28.01	21.95	
			25	24	28.04	22.34	
			50	0	28.42	21.92	

### 7.4. UAT LTE BAND 5

**Output power for LTE Band 5 (1.4 MHz)**

Freq. (MHz)	UL Channel	Modulation	BW (MHz)	RB Size	RB Offset	Peak Power (dBm)	Average (dBm)		
824.7	20407	QPSK	1.4	1	0	27.20	<b>23.70</b>		
				1	2	27.11	23.61		
				1	5	27.08	23.68		
				3	0	27.25	23.65		
				3	1	27.01	23.62		
				3	2	27.04	23.61		
		6		0	<b>27.89</b>	22.83			
		1		0	27.10	<b>22.76</b>			
		1		2	27.08	22.69			
		1		5	27.02	22.73			
		3		0	27.46	22.51			
		3		1	27.16	22.57			
		3		2	27.12	21.85			
		6		0	<b>27.58</b>	21.80			
		836.5		20525	QPSK	1	0	27.67	<b>23.64</b>
						1	2	27.65	23.62
1	5		27.67			23.52			
3	0		27.63			23.54			
3	1		27.54			23.53			
3	2		27.52			23.49			
6	0		<b>28.34</b>		22.91				
1	0		27.63		<b>22.70</b>				
1	2		27.66		22.66				
1	5		27.69		22.65				
3	0		27.93		22.58				
3	1		27.77		22.51				
3	2		27.72		22.26				
6	0		<b>27.99</b>		21.91				
848.3	20643		QPSK		1	0	26.84	<b>23.60</b>	
					1	2	26.82	23.47	
		1		5	26.72	23.30			
		3		0	27.07	23.53			
		3		1	26.80	23.47			
		3		2	26.78	23.43			
		6	0	<b>27.58</b>	22.68				
		1	0	26.78	<b>22.75</b>				
		1	2	26.76	22.70				
		1	5	26.69	22.67				
		3	0	27.15	22.59				
		3	1	26.86	22.41				
		3	2	26.85	22.49				
		6	0	<b>27.28</b>	21.64				

**Output power for LTE Band 5 (3 MHz)**

Freq. (MHz)	UL Channel	Modulation	BW (MHz)	RB Size	RB Offset	Peak Power (dBm)	Average (dBm)
825.5	20415	QPSK	3.0	1	0	27.13	23.65
				1	7	26.90	23.29
				1	14	27.05	23.66
				8	0	27.40	22.95
				8	4	27.15	22.86
				8	7	27.33	22.86
				15	0	27.69	22.81
		16-QAM		1	0	27.14	22.64
				1	7	26.90	22.60
				1	14	27.01	22.59
				8	0	27.50	21.91
				8	4	27.11	21.76
				8	7	27.28	21.77
				15	0	27.56	21.70
836.5	20525	QPSK	1	0	27.63	23.68	
			1	7	27.65	23.60	
			1	14	27.75	23.70	
			8	0	27.87	23.09	
			8	4	27.75	22.91	
			8	7	27.79	22.85	
			15	0	28.32	22.94	
		16-QAM	1	0	27.56	22.77	
			1	7	27.66	22.75	
			1	14	27.69	22.70	
			8	0	28.01	22.03	
			8	4	27.88	21.89	
			8	7	27.94	21.81	
			15	0	28.01	22.05	
847.5	20635	QPSK	1	0	26.92	23.61	
			1	7	26.78	23.70	
			1	14	26.72	23.23	
			8	0	27.19	23.05	
			8	4	26.94	22.85	
			8	7	27.07	22.65	
			15	0	28.04	22.80	
		16-QAM	1	0	26.99	22.75	
			1	7	26.84	22.73	
			1	14	26.69	22.70	
			8	0	27.30	22.11	
			8	4	26.94	21.99	
			8	7	27.16	21.75	
			15	0	27.42	21.93	



**Output power for LTE Band 5 (5 MHz)**

Freq. (MHz)	UL Channel	Modulation	BW (MHz)	RB Size	RB Offset	Peak (dBm)	Average (dBm)
826.5	20425	QPSK	5.0	1	0	27.11	23.70
				1	12	26.94	23.68
				1	24	26.98	23.69
				12	0	27.06	22.59
				12	6	26.88	22.68
				12	11	27.00	22.92
				25	0	28.04	22.60
		16-QAM		1	0	27.31	22.80
				1	12	27.10	22.76
				1	24	27.13	22.69
				12	0	27.02	21.70
				12	6	26.90	21.78
				12	11	27.02	22.04
				25	0	27.74	21.68
836.5	20525	QPSK	1	0	27.40	23.64	
			1	12	27.54	23.58	
			1	24	27.64	23.57	
			12	0	27.74	23.10	
			12	6	27.49	23.01	
			12	11	27.50	22.87	
			25	0	28.50	21.81	
		16-QAM	1	0	27.60	22.70	
			1	12	27.84	22.75	
			1	24	27.92	22.72	
			12	0	27.69	22.00	
			12	6	27.54	22.10	
			12	11	27.52	21.96	
			25	0	28.55	21.76	
846.5	20625	QPSK	1	0	27.00	23.57	
			1	12	26.84	23.62	
			1	24	26.72	23.42	
			12	0	27.12	22.88	
			12	6	26.94	23.22	
			12	11	26.93	22.91	
			25	0	28.18	23.10	
		16-QAM	1	0	27.21	22.78	
			1	12	27.03	22.70	
			1	24	26.89	22.71	
			12	0	27.11	21.98	
			12	6	26.89	22.38	
			12	11	26.94	21.38	
			25	0	28.00	21.39	

**Output power for LTE Band 5 (10 MHz)**

Freq. (MHz)	UL Channel	Modulation	BW (MHz)	RB Size	RB Offset	Peak Power (dBm)	Average (dBm)
829.0	20450	QPSK	10.0	1	0	27.14	23.60
				1	24	27.05	23.65
				1	49	27.34	23.53
				25	0	27.33	22.56
				25	12	27.27	22.86
				25	24	27.48	22.66
		50		0	27.99	22.76	
		16-QAM		1	0	27.11	22.70
				1	24	27.03	22.70
				1	49	27.36	22.60
				25	0	27.23	21.62
				25	12	27.17	21.95
				25	24	27.39	21.76
				50	0	27.81	21.62
836.5	20525		QPSK	1	0	27.33	23.52
		1		24	27.67	23.68	
		1		49	27.44	23.58	
		25		0	27.87	22.76	
		25		12	27.89	22.91	
		25		24	27.97	22.76	
		50	0	28.31	22.76		
		16-QAM	1	0	27.31	22.10	
			1	24	27.66	22.80	
			1	49	27.42	22.60	
			25	0	27.74	21.78	
			25	12	27.81	22.01	
			25	24	27.84	21.35	
			50	0	28.20	21.30	
844.0	20600		QPSK	1	0	27.69	23.63
		1		24	27.10	23.61	
		1		49	26.75	23.24	
		25		0	27.82	22.80	
		25		12	27.41	22.72	
		25		24	27.41	23.06	
		50	0	28.03	22.68		
		16-QAM	1	0	27.66	22.75	
			1	24	27.11	22.70	
			1	49	26.79	22.72	
			25	0	27.65	21.61	
			25	12	27.25	21.62	
			25	24	27.25	21.18	
			50	0	28.01	21.08	

## **8. CONDUCTED TEST RESULTS**

### **8.1. OCCUPIED BANDWIDTH**

#### **RULE PART(S)**

FCC: §2.1049

IC: RSS-132, 4.5; RSS-133, 6.5

#### **LIMITS**

For reporting purposes only

#### **TEST PROCEDURE**

The transmitter output was connected to a calibrated coaxial cable and coupler, the other end of which was connected to a spectrum analyzer. The occupied bandwidth was measured with the spectrum analyzer at the low, middle and high channel in each band. The -26dB bandwidth was also measured and recorded.

#### **MODES TESTED**

- LTE BAND 2
- LTE BAND 5

#### **RESULTS**

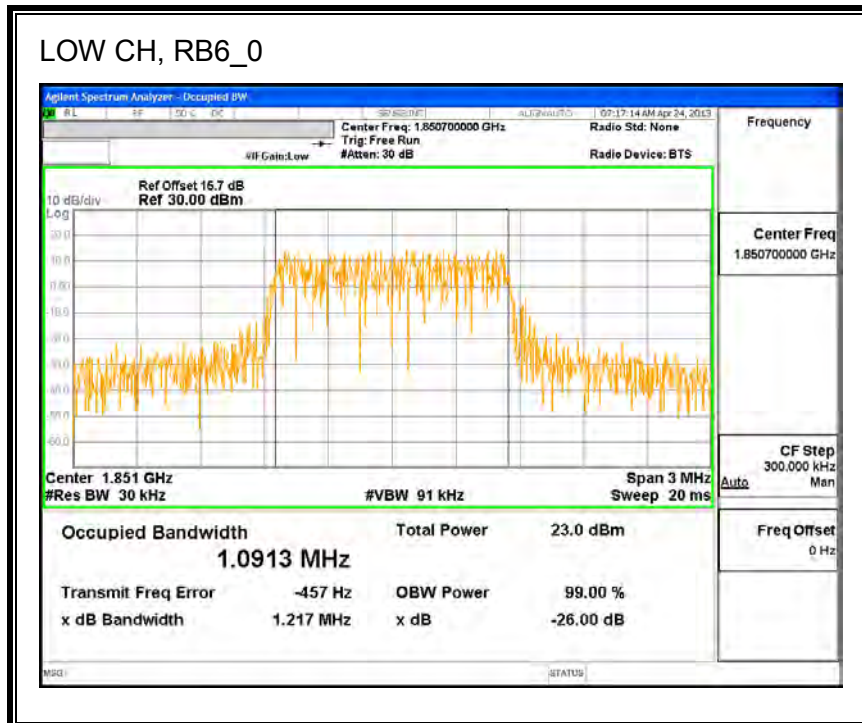
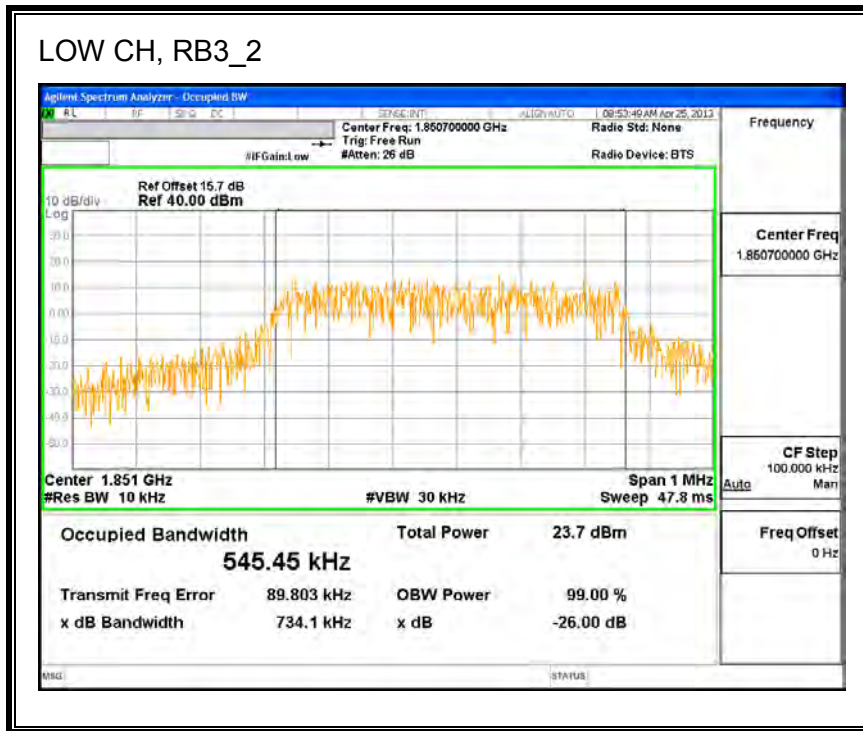
Band	Mode	RB/RB SIZE	f (MHz)	99% BW (MHz)	-26dB BW (MHz)
LTE BAND 2	1.4 MHz BAND QPSK	3/2	1850.7	0.54545	0.7341
		6/0		1.0913	1.2170
	1.4 MHz BAND QPSK	3/2	1880.0	0.54618	0.8102
		6/0		1.0932	1.2790
	1.4 MHz BAND QPSK	3/2	1909.3	0.54645	0.7178
		6/0		<b>1.0984</b>	1.2030
	1.4 MHz BAND 16QAM	3/2	1850.7	0.54113	0.7503
		6/0		1.0760	1.1910
	1.4 MHz BAND 16QAM	3/2	1880.0	0.54686	0.8626
		6/0		1.0805	1.2890
	1.4 MHz BAND 16QAM	3/2	1909.3	0.54578	0.7318
		6/0		<b>1.0851</b>	1.2030
	3.0 MHz BAND QPSK	8/4	1851.5	1.4387	1.7260
		15/0		2.6830	2.8800
	3.0 MHz BAND QPSK	8/4	1880.0	1.4442	2.0170
		15/0		<b>2.6967</b>	2.9370
	3.0 MHz BAND QPSK	8/4	1908.5	1.4488	1.8760
		15/0		2.6712	2.9660
	3.0 MHz BAND 16QAM	8/4	1851.5	1.4336	1.7610
		15/0		<b>2.6790</b>	3.0360
	3.0 MHz BAND 16QAM	8/4	1880.0	1.4314	1.7820
		15/0		2.6649	2.9150
	3.0 MHz BAND 16QAM	8/4	1908.5	1.4331	1.9400
		15/0		2.6602	2.8460
	5.0 MHz BAND QPSK	12/6	1852.5	2.1632	2.5390
		25/0		4.4818	4.8560
	5.0 MHz BAND QPSK	12/6	1880.0	2.1648	2.5950
		25/0		<b>4.5026</b>	4.7590
	5.0 MHz BAND QPSK	12/6	1907.5	2.1697	2.6310
		25/0		4.4813	4.6720
	5.0 MHz BAND 16QAM	12/6	1852.5	2.1594	2.4490
		25/0		<b>4.4855</b>	4.8770
5.0 MHz BAND 16QAM	12/6	1880.0	2.1582	2.5910	
	25/0		4.4684	4.6600	
5.0 MHz BAND 16QAM	12/6	1907.5	2.1595	2.6290	
	25/0		4.4617	5.0050	
10.0 MHz AND QPSK	25/12	1855.0	4.4956	5.2610	
	50/0		8.9689	9.3730	
10.0 MHz AND QPSK	25/12	1880.0	4.4993	5.8280	
	50/0		8.9278	9.5190	
10.0 MHz AND QPSK	25/12	1905.0	4.5001	5.7590	
	50/0		<b>8.9767</b>	9.2650	
10.0 MHz AND 16QAM	25/12	1855.0	4.4793	5.2620	
	50/0		<b>8.9702</b>	9.5940	
10.0 MHz AND 16QAM	25/12	1880.0	4.4851	5.2560	
	50/0		8.8884	9.3850	
10.0 MHz AND 16QAM	25/12	1905.0	4.4814	5.0790	
	50/0		8.8939	9.3560	

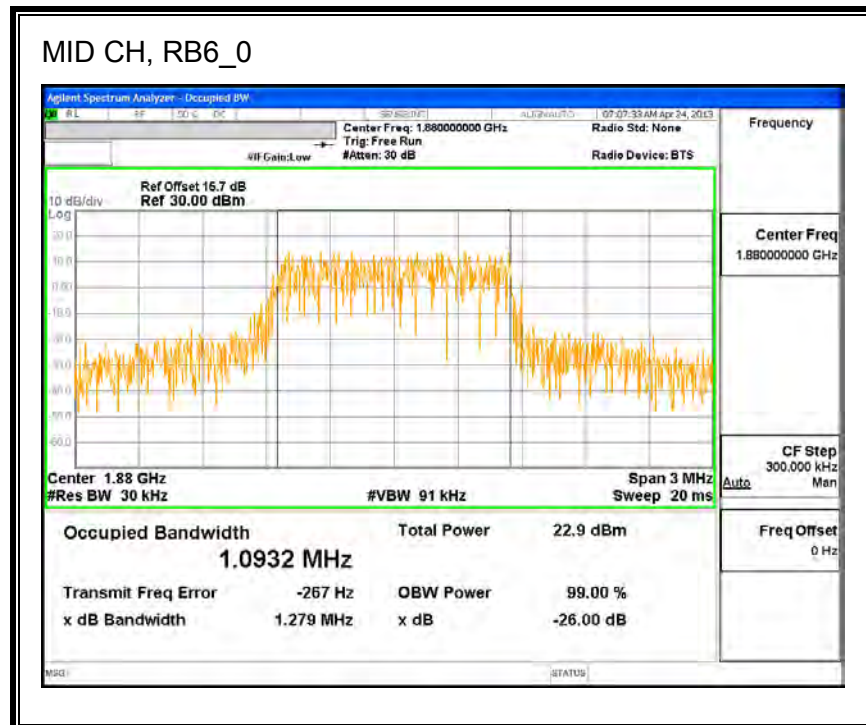
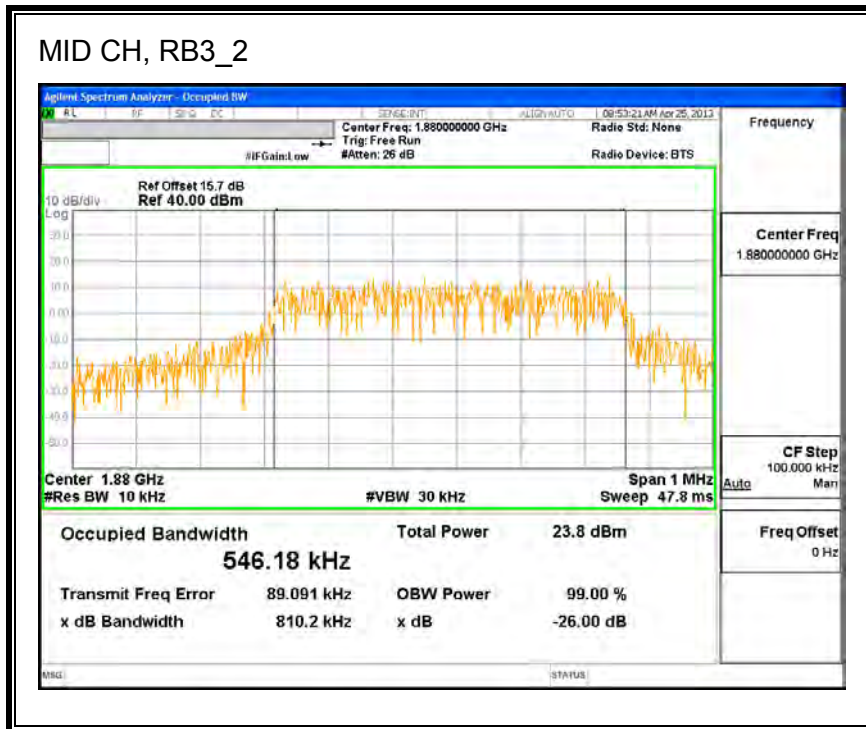
Band	Mode	RB/RB SIZE	f (MHz)	99% BW (MHz)	-26dB BW (MHz)
LTE BAND 2	15 MHz BAND QPSK	36/18	1857.5	6.4873	7.5140
		75/0		<b>13.464</b>	13.840
	15 MHz BAND QPSK	36/18	1880.0	6.4872	7.3150
		75/0		13.384	13.880
	15 MHz BAND QPSK	36/18	1902.5	6.4842	7.5130
		75/0		13.399	13.860
	15 MHz BAND 16QAM	36/18	1857.5	6.4753	7.1480
		75/0		13.464	14.020
	15 MHz BAND 16QAM	36/18	1880.0	6.4570	7.5150
		75/0		13.348	13.960
	15 MHz BAND 16QAM	36/18	1902.5	6.4621	7.4050
		75/0		<b>13.410</b>	13.810
	20 MHz BAND QPSK	50/19	1860.0	8.9958	9.8690
		100/0		17.938	19.290
	20 MHz BAND QPSK	50/19	1880.0	8.9512	10.020
		100/0		<b>17.870</b>	18.540
	20 MHz BAND QPSK	50/19	1900.0	8.9991	9.4170
		100/0		17.810	18.620
20 MHz BAND 16QAM	50/19	1860.0	8.9738	10.030	
	100/0		17.848	18.460	
20 MHz BAND 16QAM	50/19	1880.0	8.9879	9.6810	
	100/0		17.849	18.510	
20 MHz BAND 16QAM	50/19	1900.0	8.9856	9.3530	
	100/0		<b>17.885</b>	18.660	

Band	Mode	RB/RB SIZE	f (MHz)	99% BW (MHz)	-26dB BW (MHz)
LTE BAND 5	1.4 MHz BAND QPSK	3/2	824.7	0.54652	0.7742
		6/0		1.08360	1.2030
	1.4 MHz BAND QPSK	3/2	836.5	0.54668	0.7210
		6/0		1.08020	1.2370
	1.4 MHz BAND QPSK	3/2	848.3	0.54693	0.8254
		6/0		1.09100	1.2330
	1.4 MHz BAND 16QAM	3/2	824.7	0.54562	0.7263
		6/0		1.08010	1.1620
	1.4 MHz BAND 16QAM	3/2	836.5	0.54563	0.7706
		6/0		1.08000	1.1700
	1.4 MHz BAND 16QAM	3/2	848.3	0.54547	0.8442
		6/0		1.08920	1.2030
	3.0 MHz BAND QPSK	8/4	825.5	1.44160	1.6630
		15/0		2.6787	2.8790
	3.0 MHz BAND QPSK	8/4	836.5	1.44120	1.8550
		15/0		2.67710	2.8130
	3.0 MHz BAND QPSK	8/4	847.5	1.44400	1.8340
		15/0		2.69150	2.9150
	3.0 MHz BAND 16QAM	8/4	825.5	1.43640	1.6640
		15/0		2.66280	2.8480
	3.0 MHz BAND 16QAM	8/4	836.5	1.43290	1.6870
		15/0		2.67060	2.9690
	3.0 MHz BAND 16QAM	8/4	847.5	1.43820	1.6310
		15/0		2.66950	2.7980
	5.0 MHz BAND QPSK	12/6	826.5	2.17210	2.9130
		25/0		4.49870	4.7640
	5.0 MHz BAND QPSK	12/6	836.5	2.17200	2.6310
		25/0		4.48330	4.7440
	5.0 MHz BAND QPSK	12/6	846.5	2.17400	2.7530
		25/0		4.49680	4.7400
	5.0 MHz BAND 16QAM	12/6	826.5	2.16350	2.5360
		25/0		4.47210	4.7640
5.0 MHz BAND 16QAM	12/6	836.5	2.16430	2.5080	
	25/0		4.47290	4.7550	
5.0 MHz BAND 16QAM	12/6	846.5	2.16220	2.8790	
	25/0		4.47050	4.6630	
10.0 MHz AND QPSK	25/12	829.0	4.49080	5.5750	
	50/0		8.94920	9.3100	
10.0 MHz AND QPSK	25/12	836.5	4.49740	5.2590	
	50/0		8.98540	9.3520	
10.0 MHz AND QPSK	25/12	844.0	4.49470	5.0810	
	50/0		9.00310	9.5190	
10.0 MHz AND 16QAM	25/12	829.0	4.48280	5.1890	
	50/0		8.85420	9.5290	
10.0 MHz AND 16QAM	25/12	836.5	4.48760	5.0780	
	50/0		8.96200	9.4000	
10.0 MHz AND 16QAM	25/12	844.0	4.48140	5.0060	
	50/0		8.93830	9.5260	

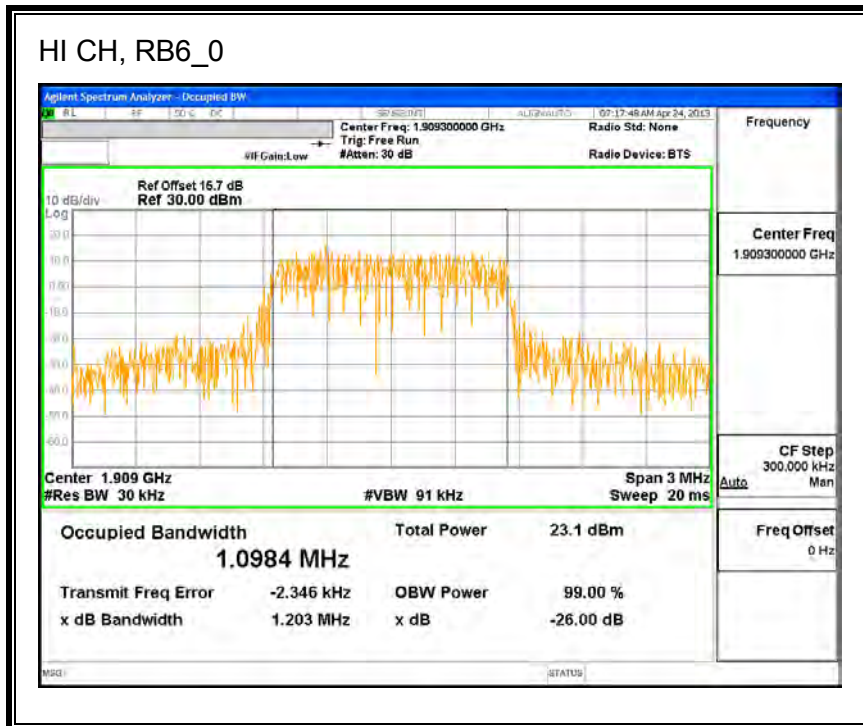
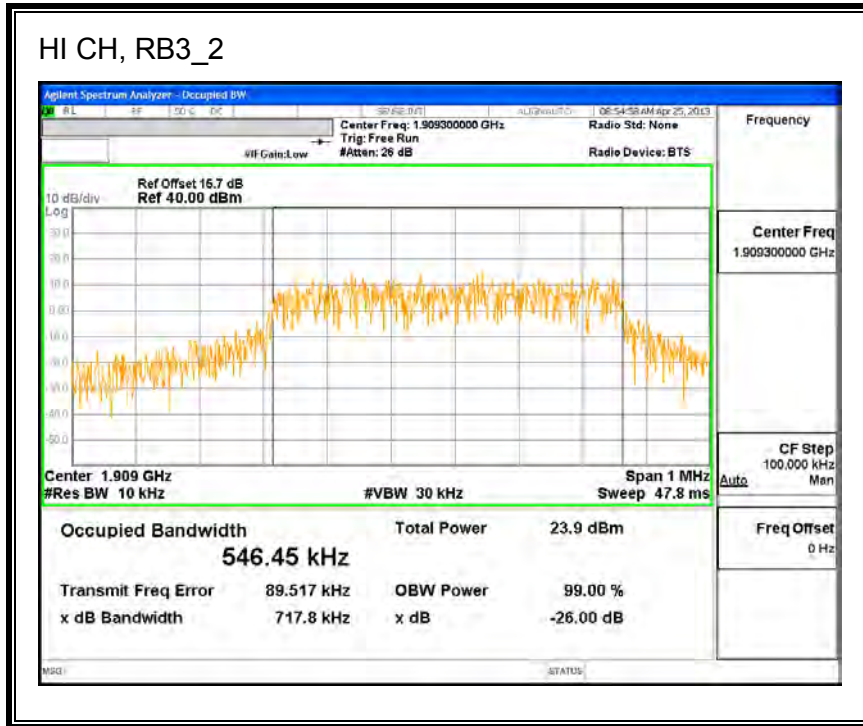
### 8.1.1. LTE Band 2

#### QPSK (1.4 MHz BAND WIDTH)



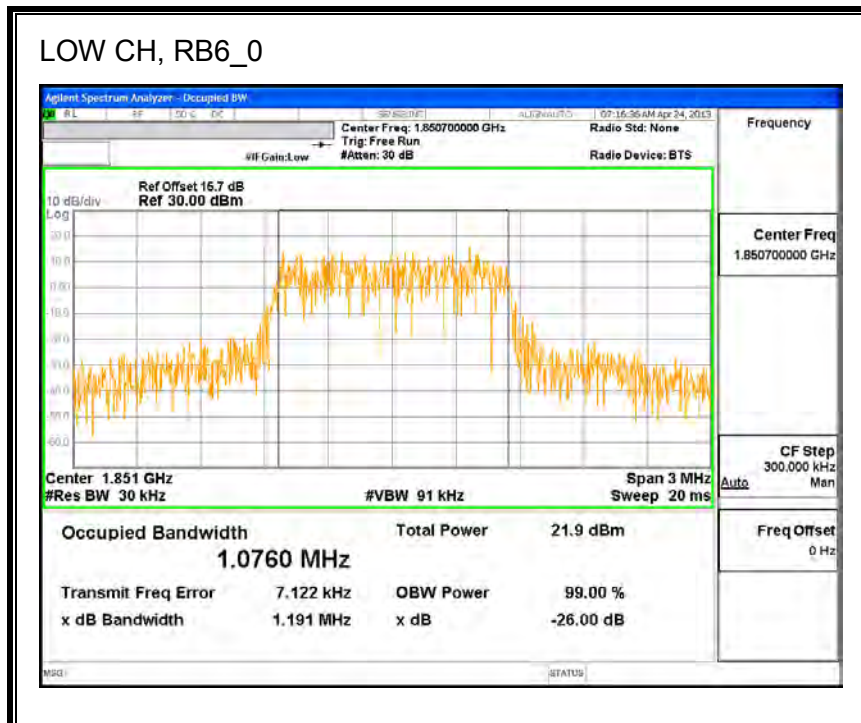
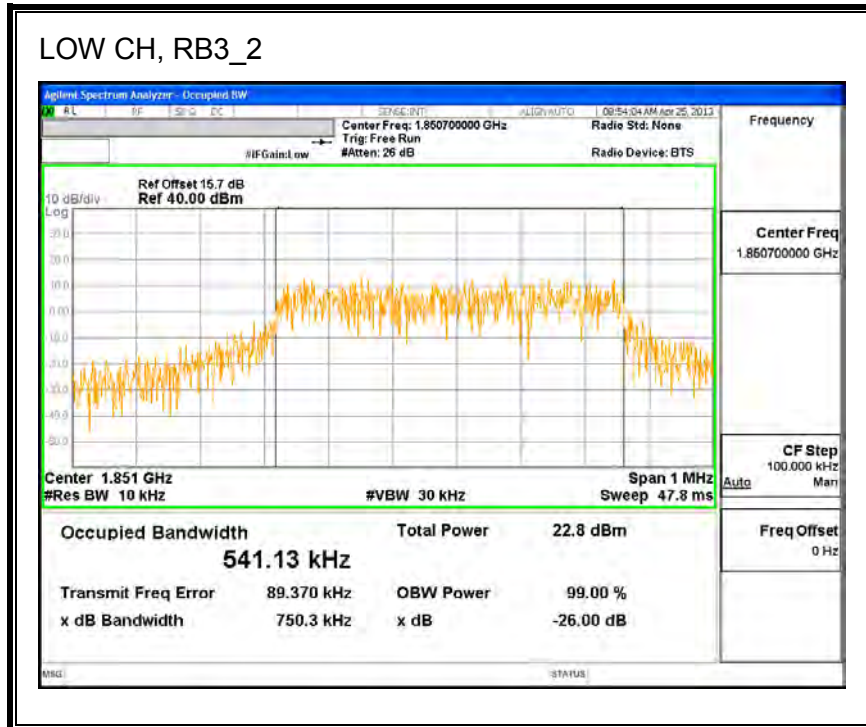


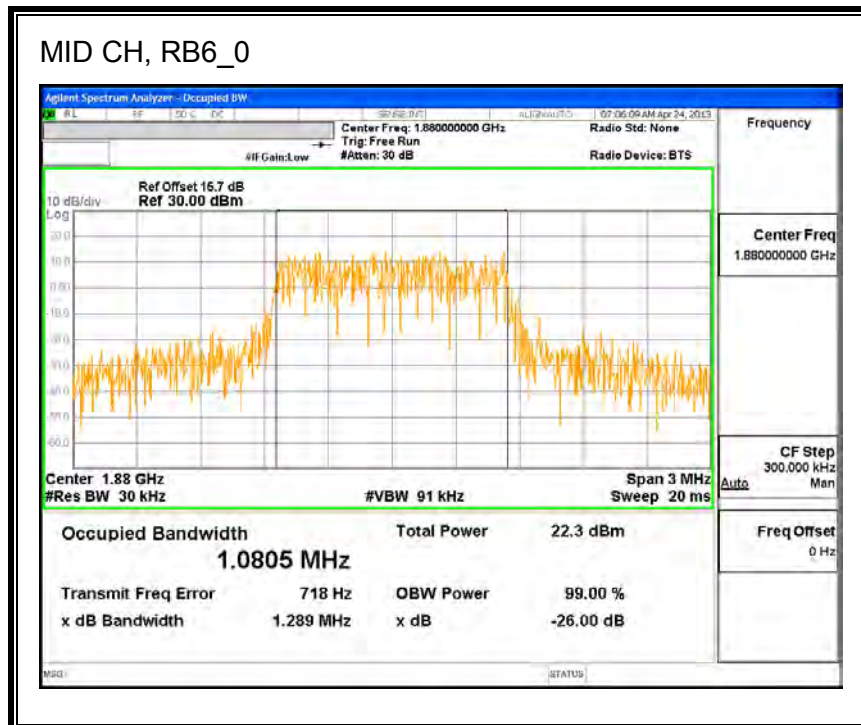
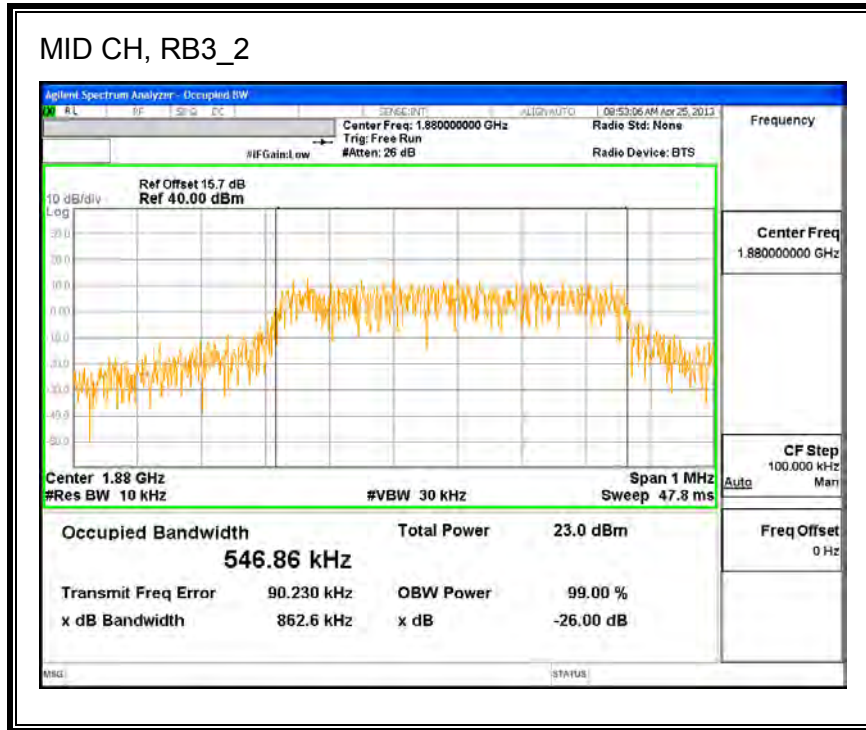


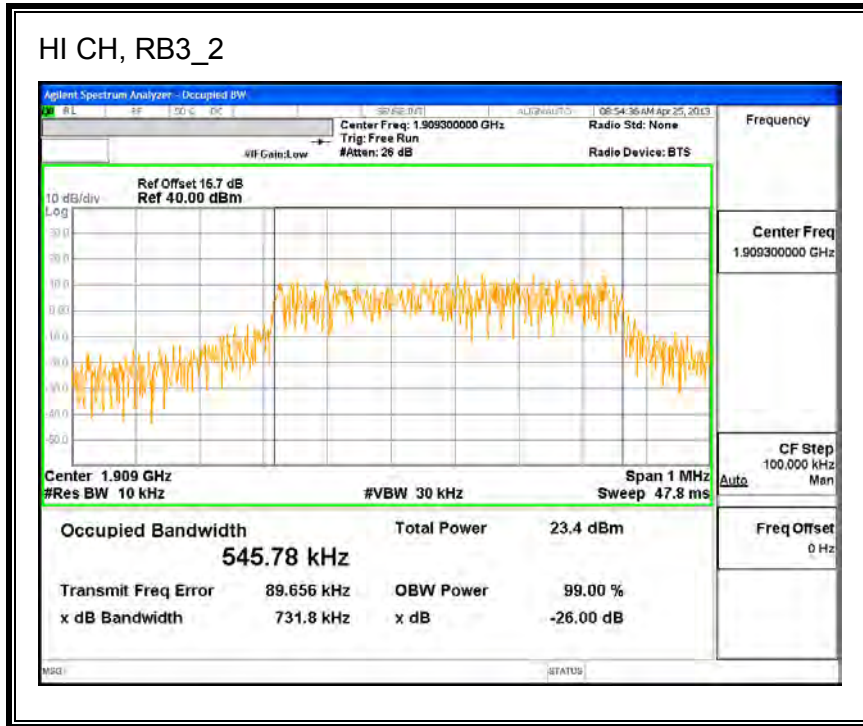


**Band 2 (1.4 MHz BAND WIDTH)**

**LTE 16QAM**

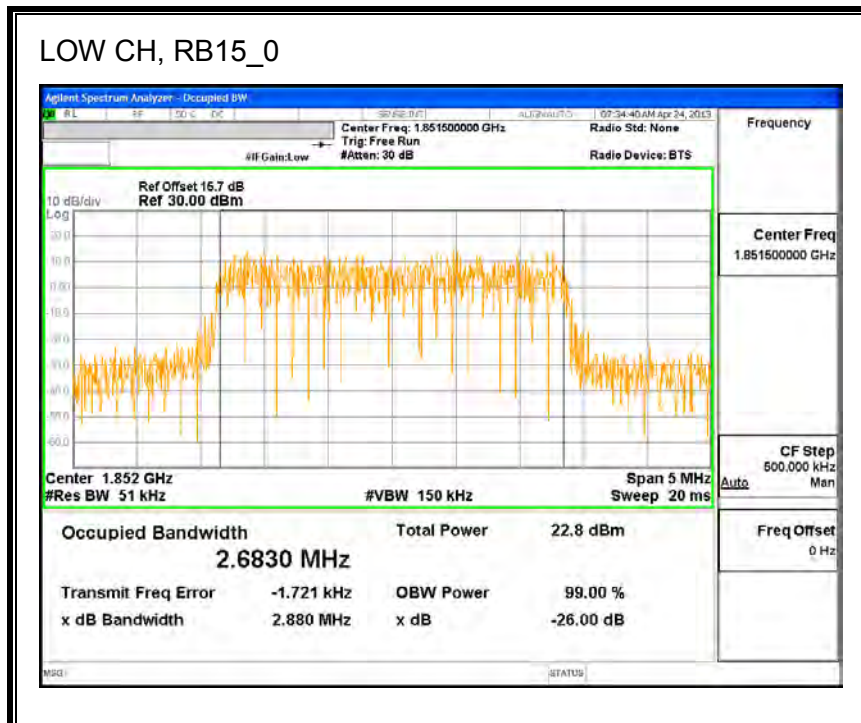
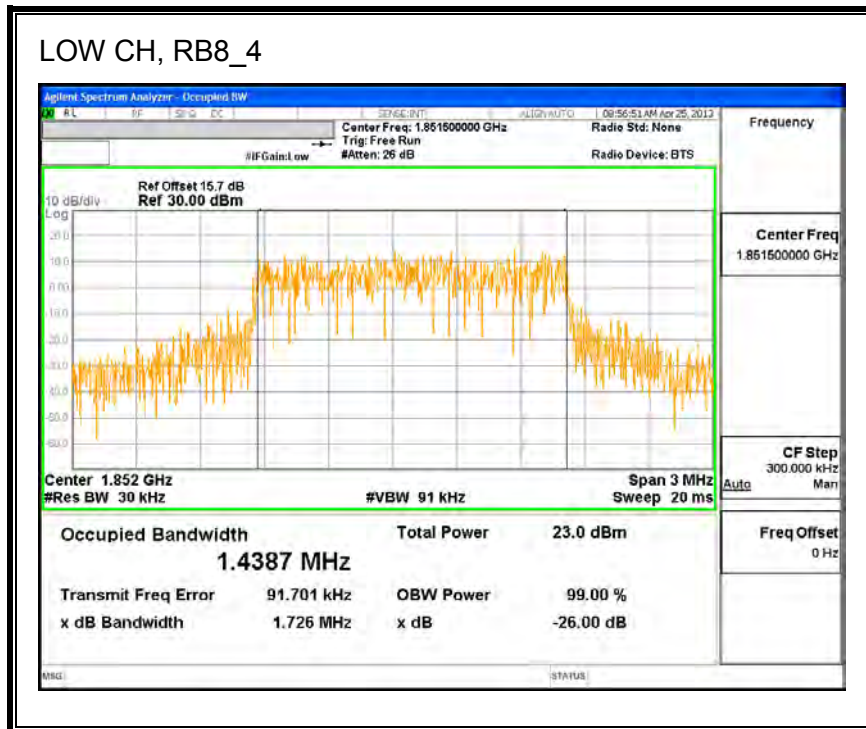


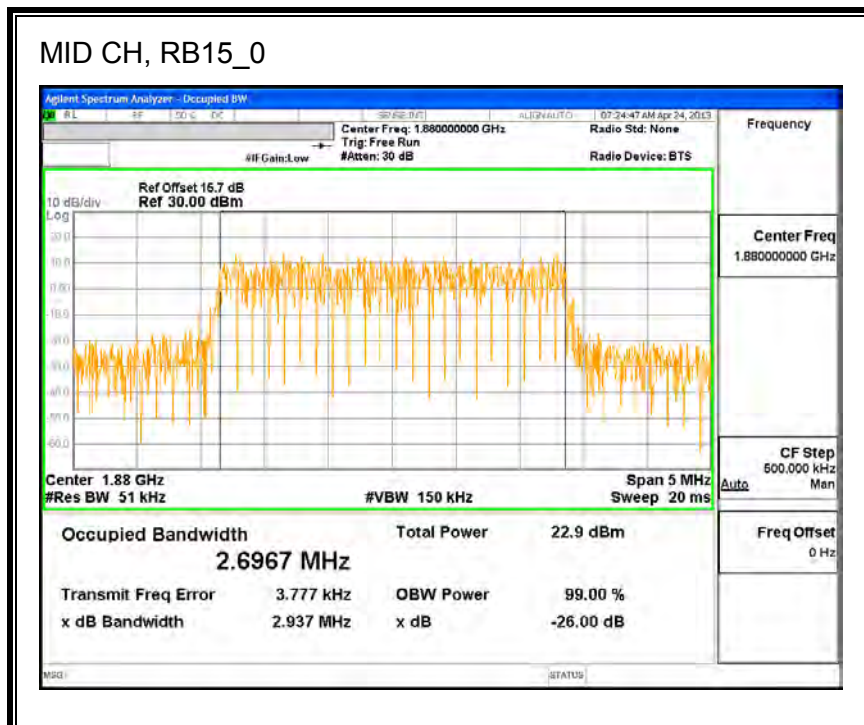
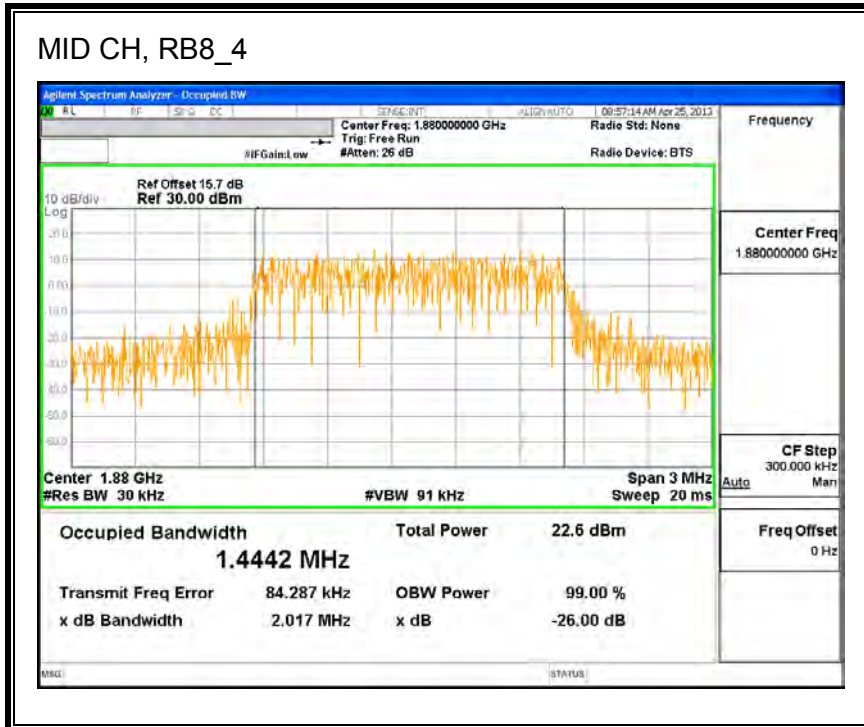


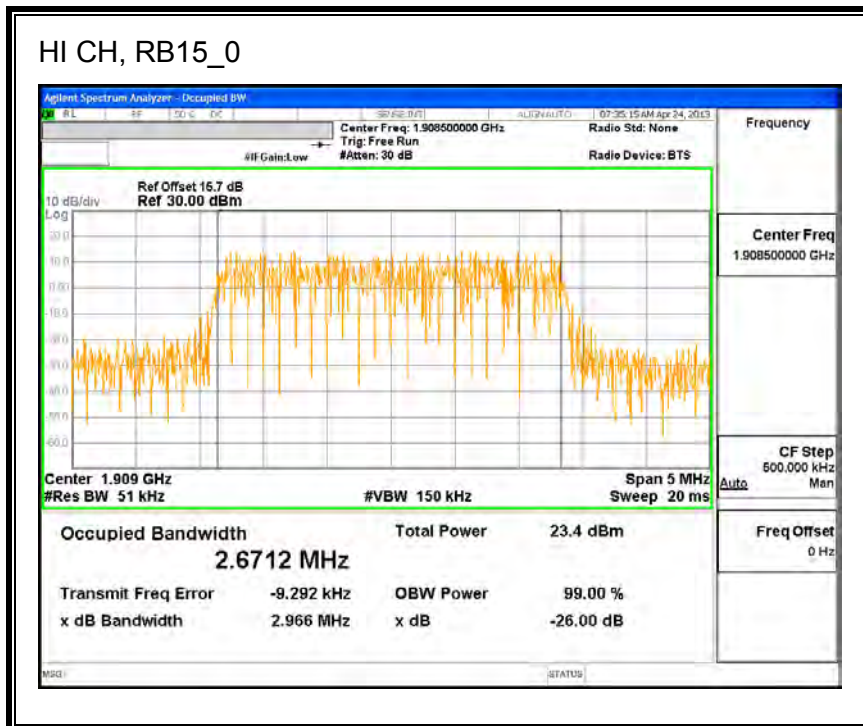
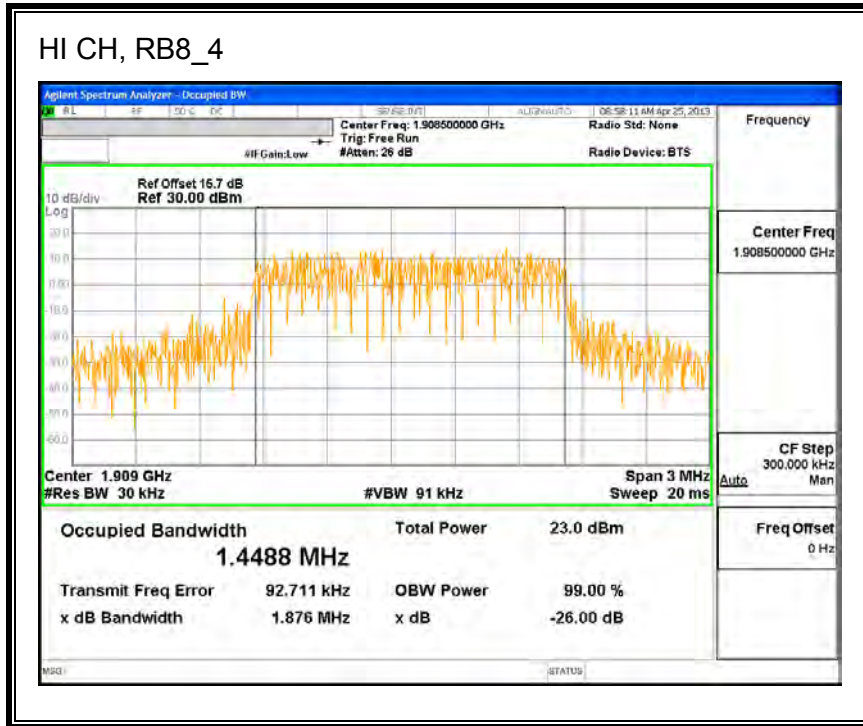


**Band 2 (3.0 MHz BAND WIDTH)**

**LTE QPSK**

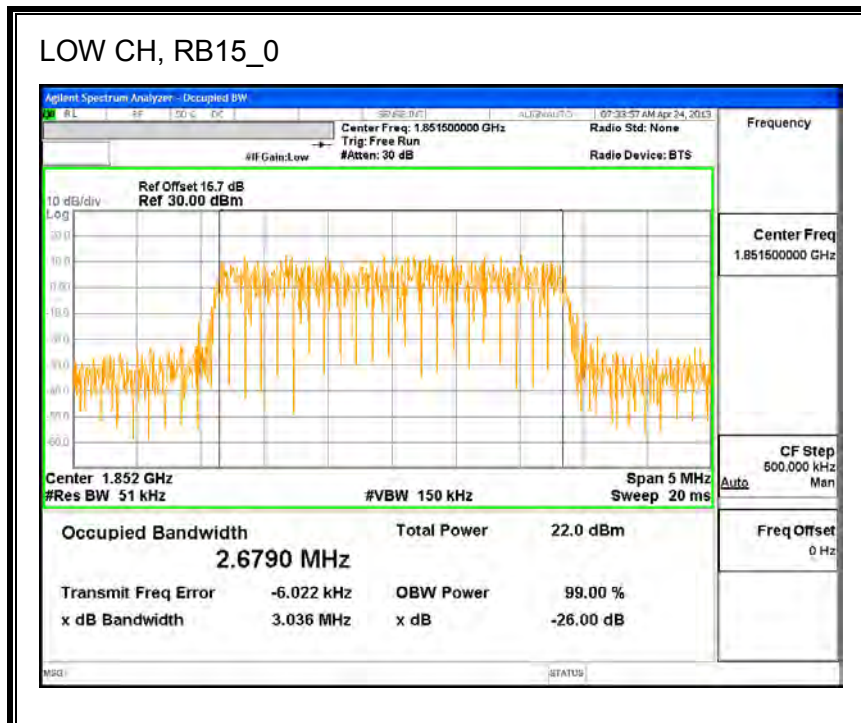
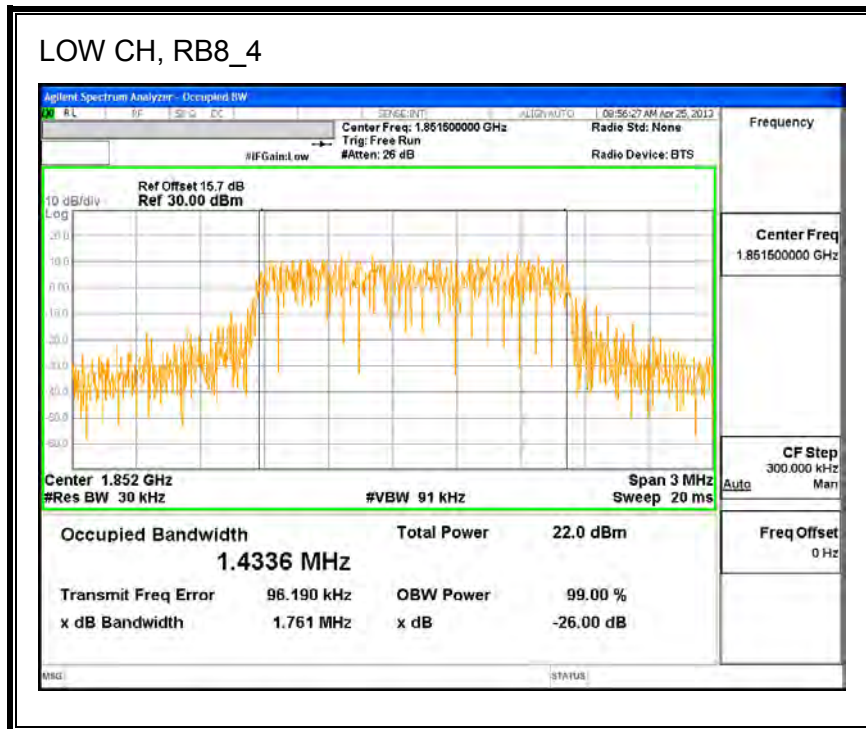




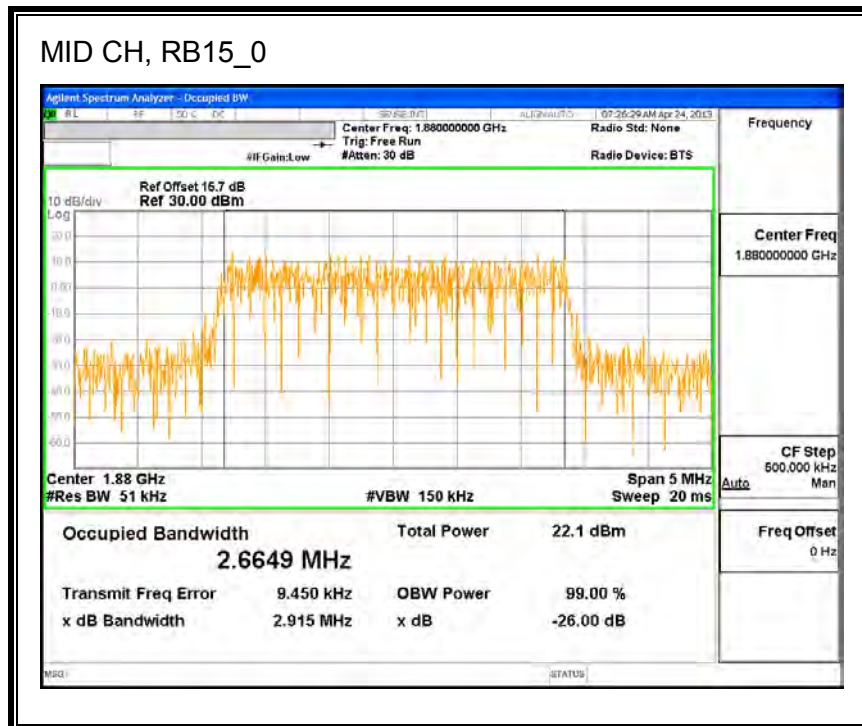
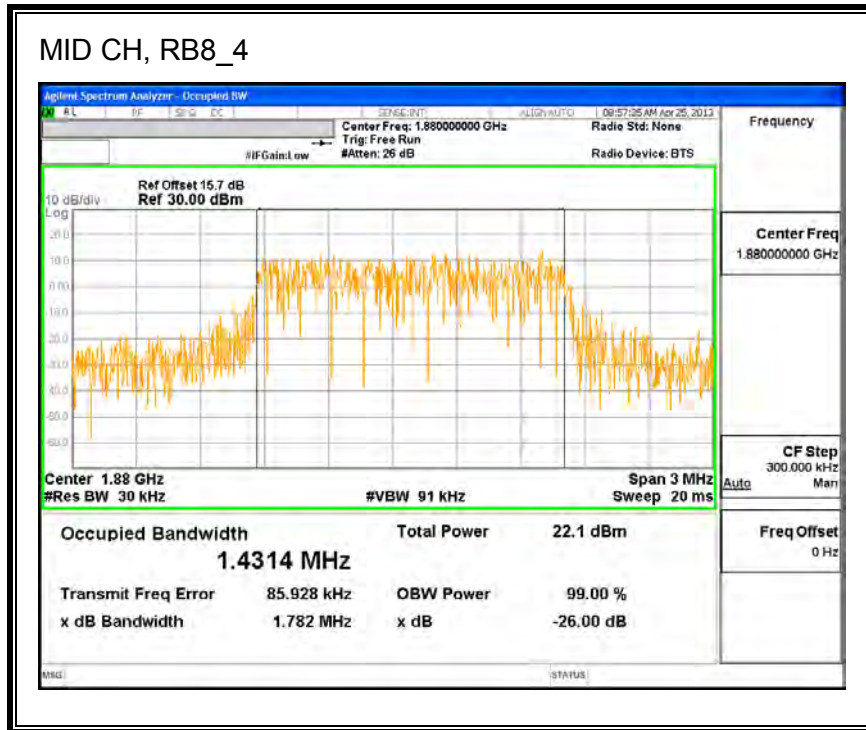


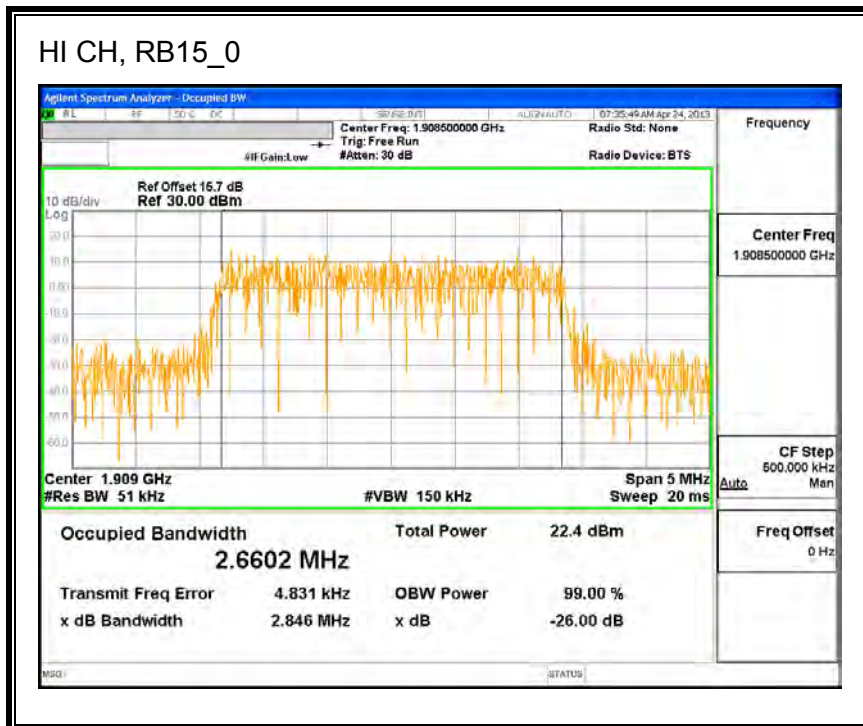
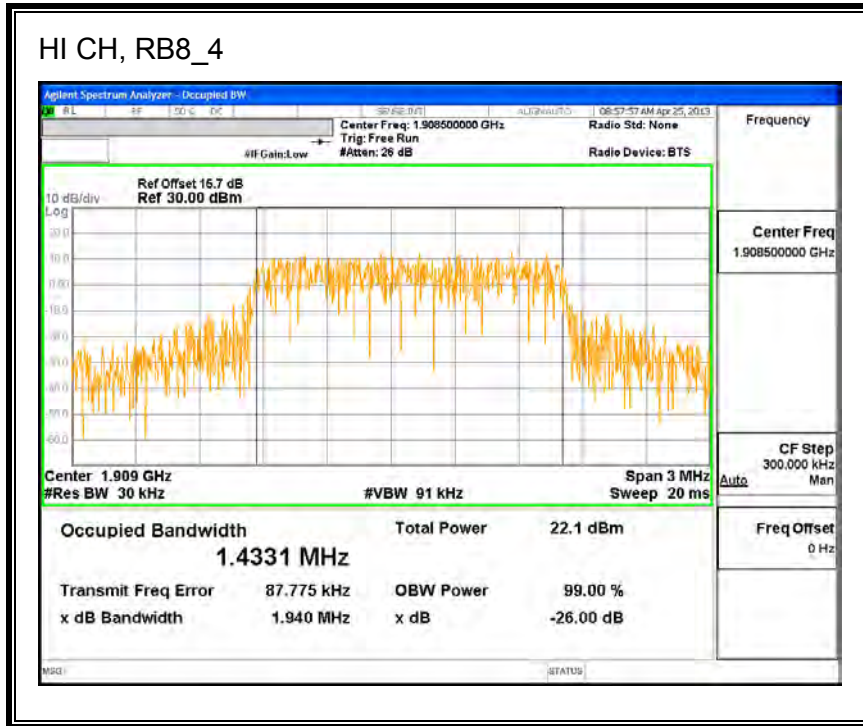
**Band 2 (3.0 MHz BAND WIDTH)**

**LTE 16QAM**



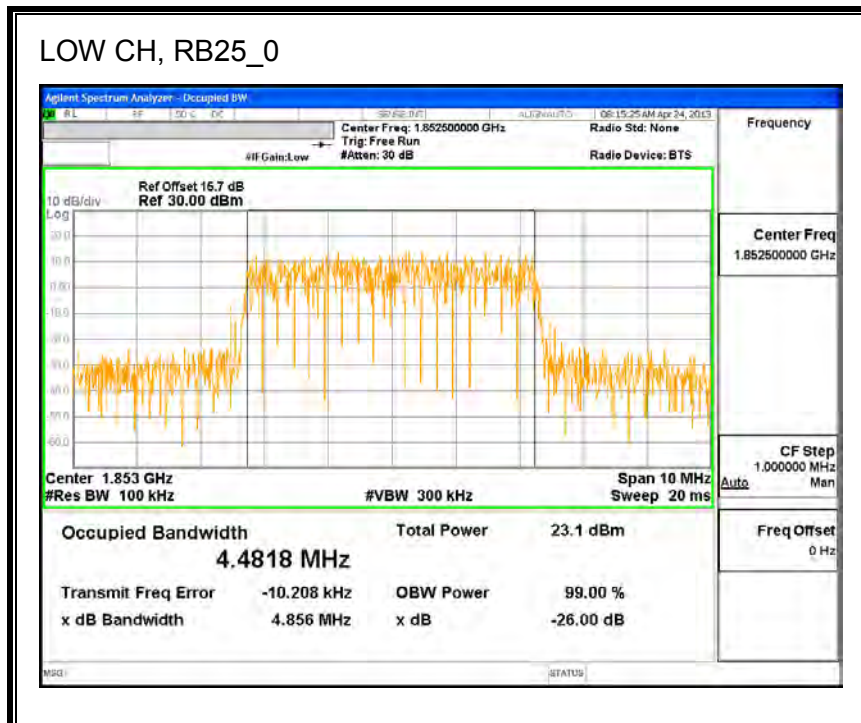
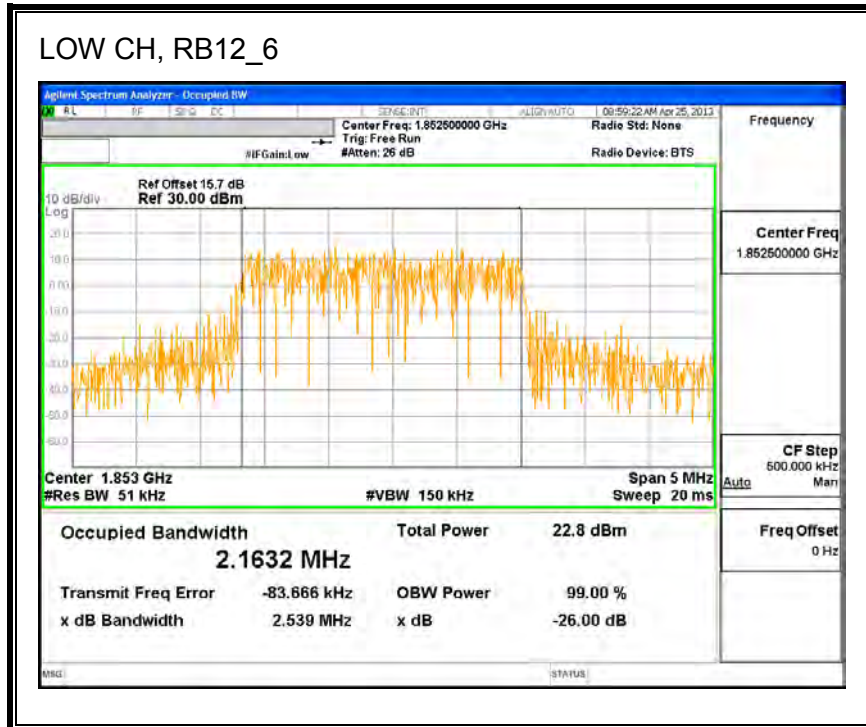


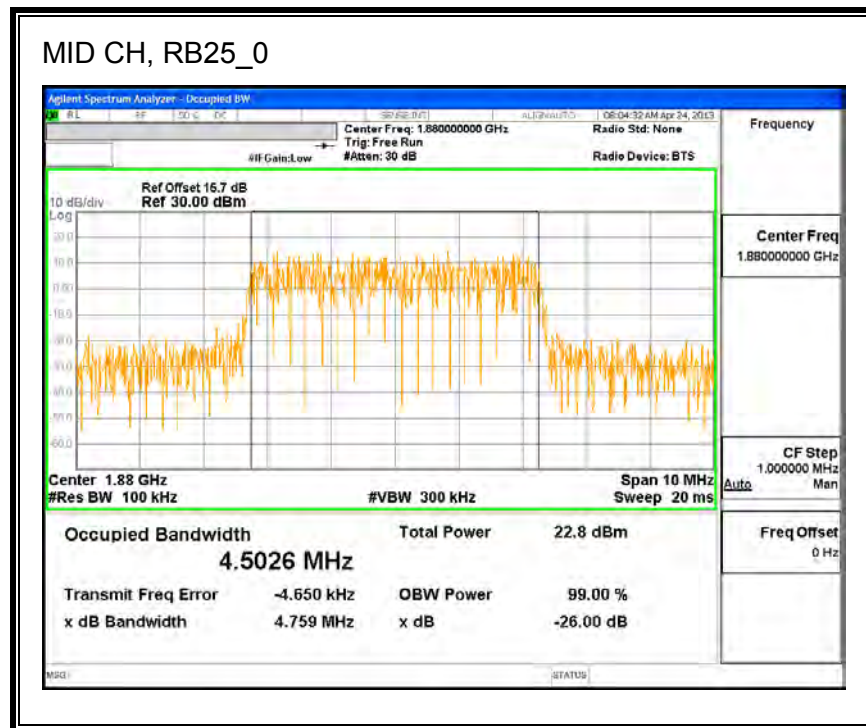
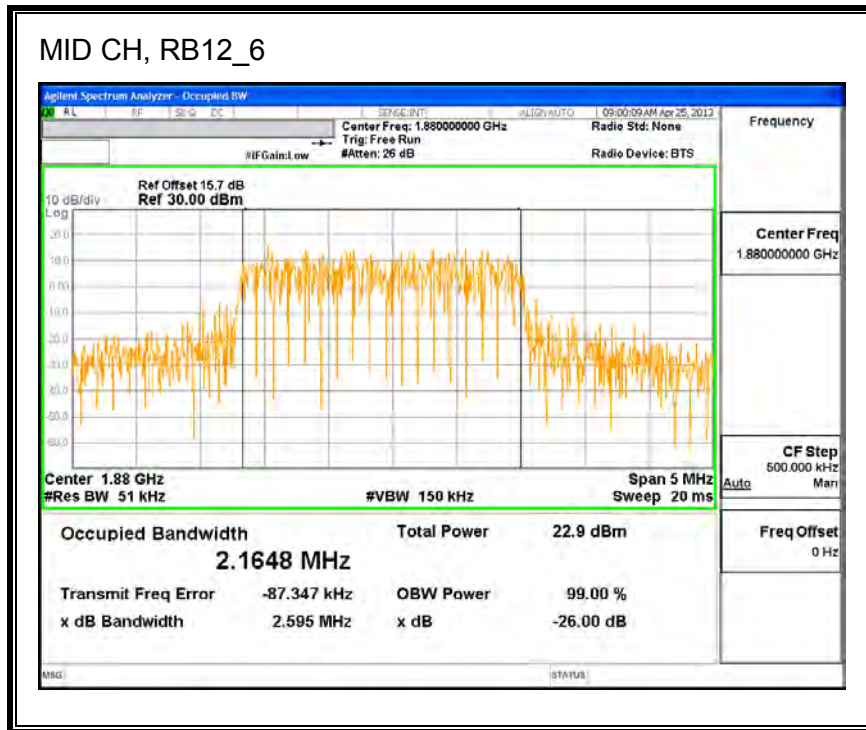


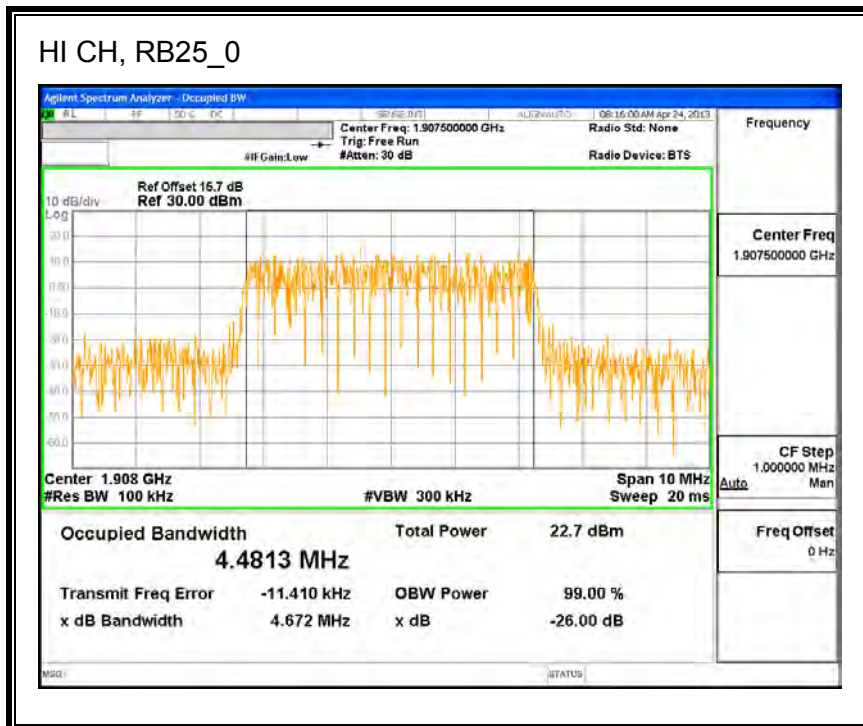
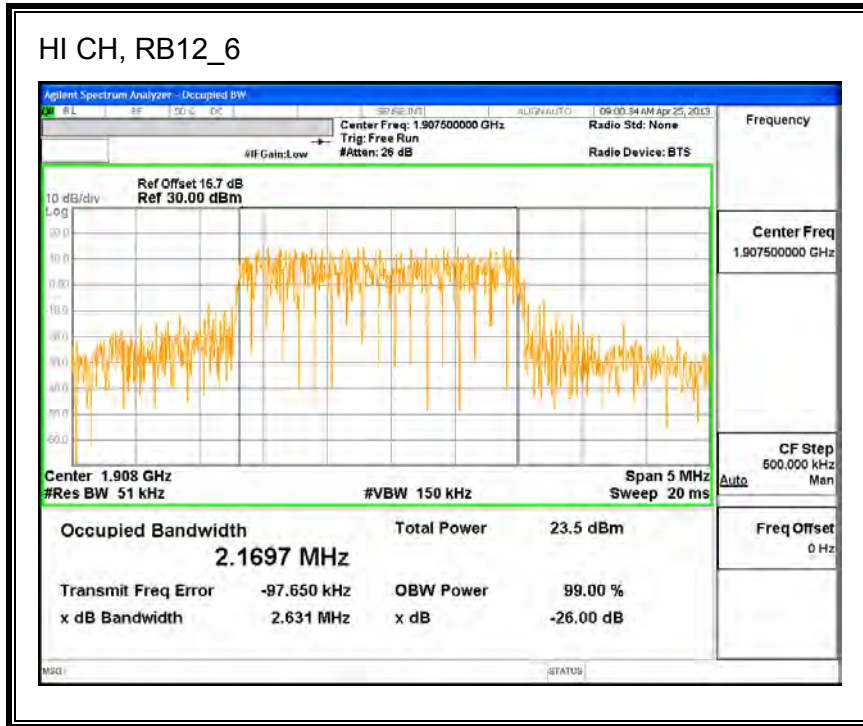


**Band 2 (5.0 MHz BAND WIDTH)**

**LTE QPSK**

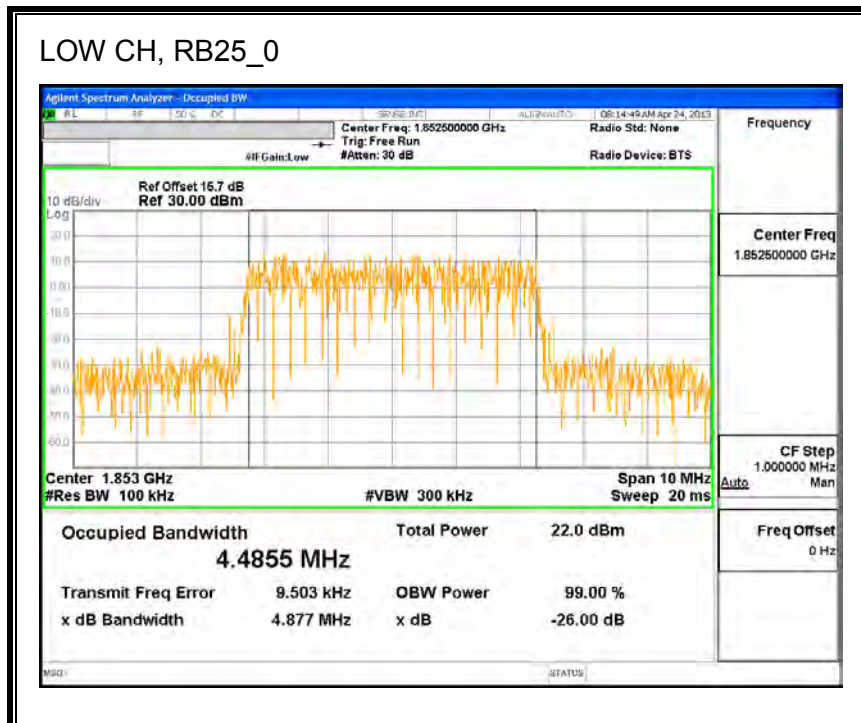
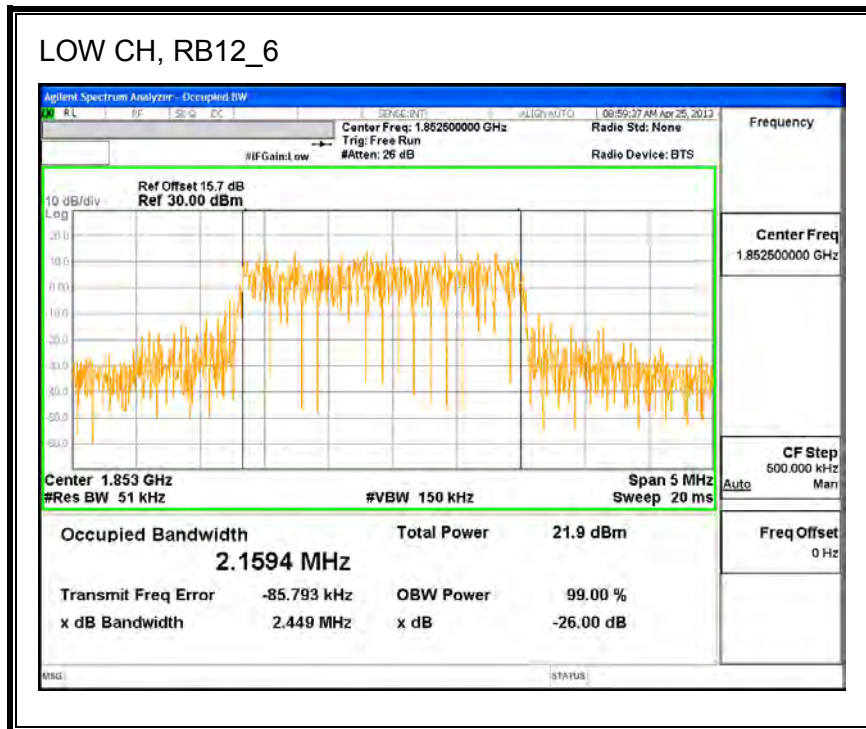


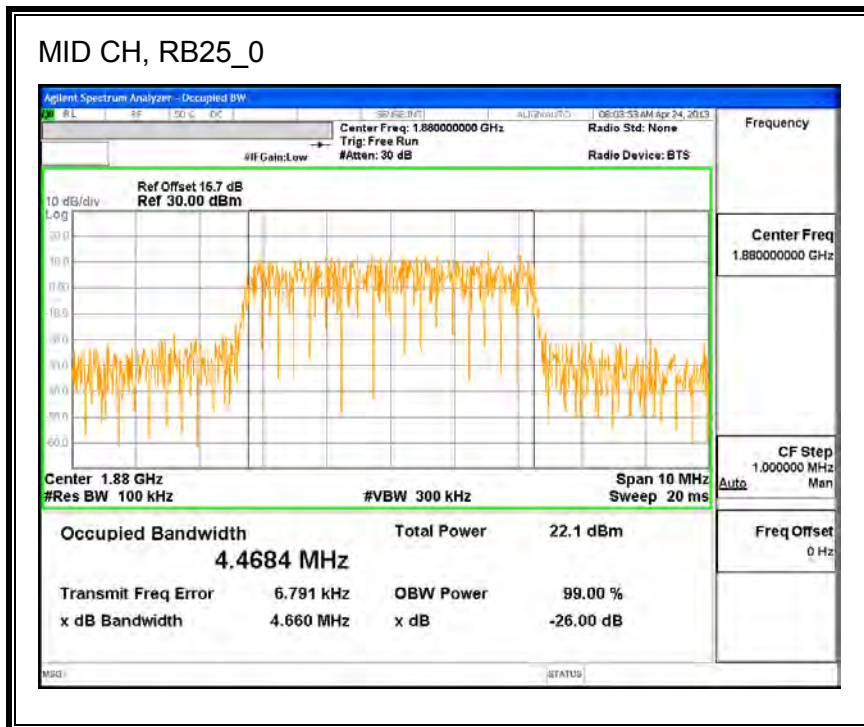
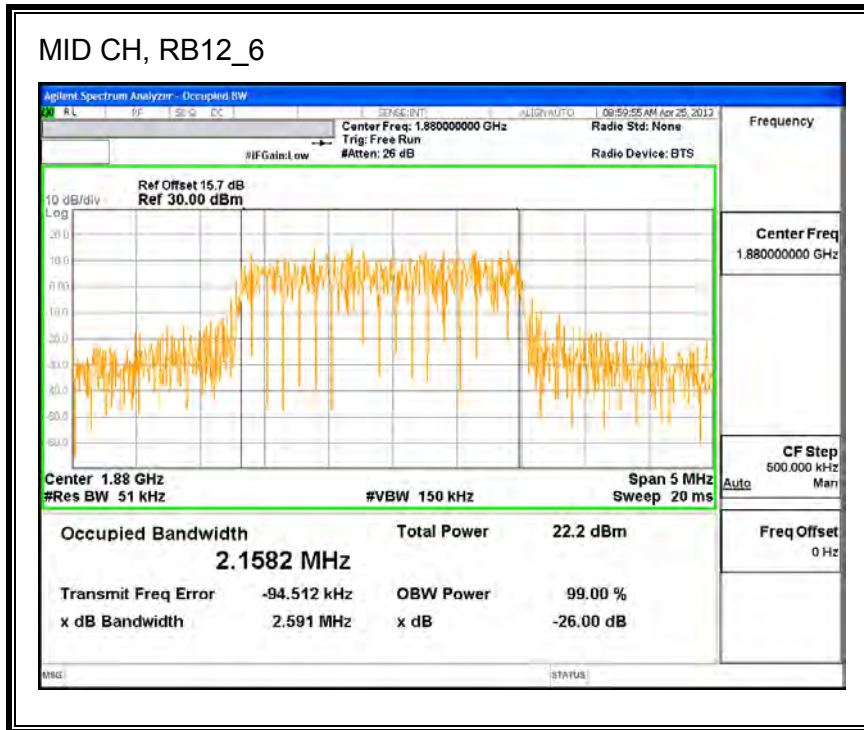


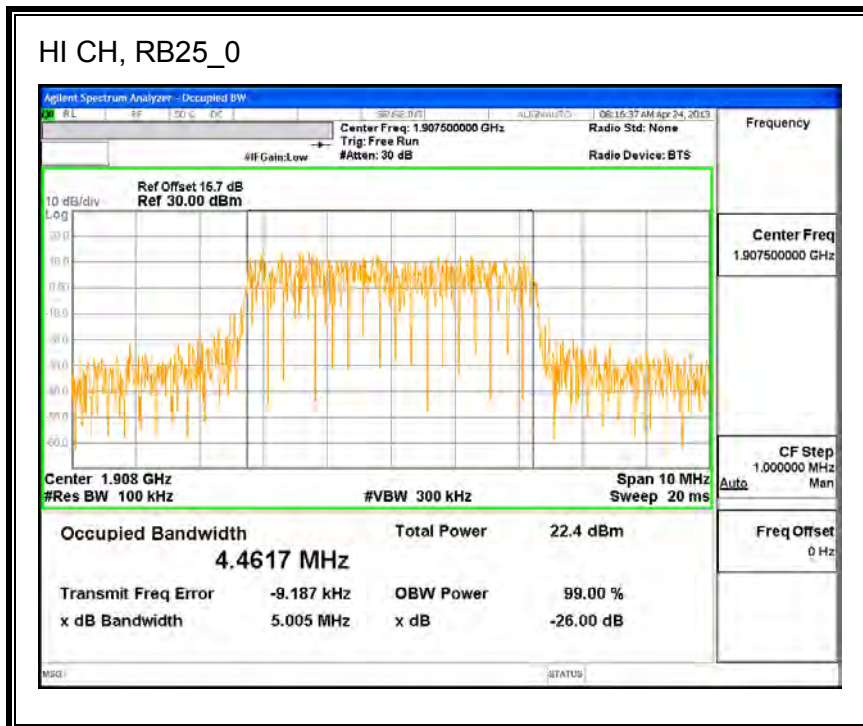
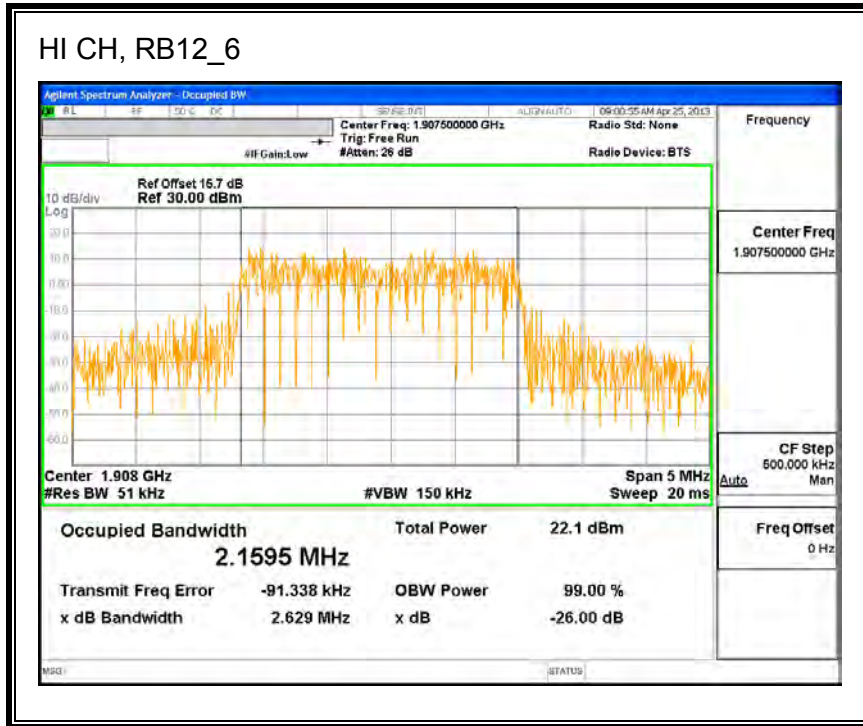


**Band 2 (5 MHz BAND WIDTH)**

**LTE 16QAM**



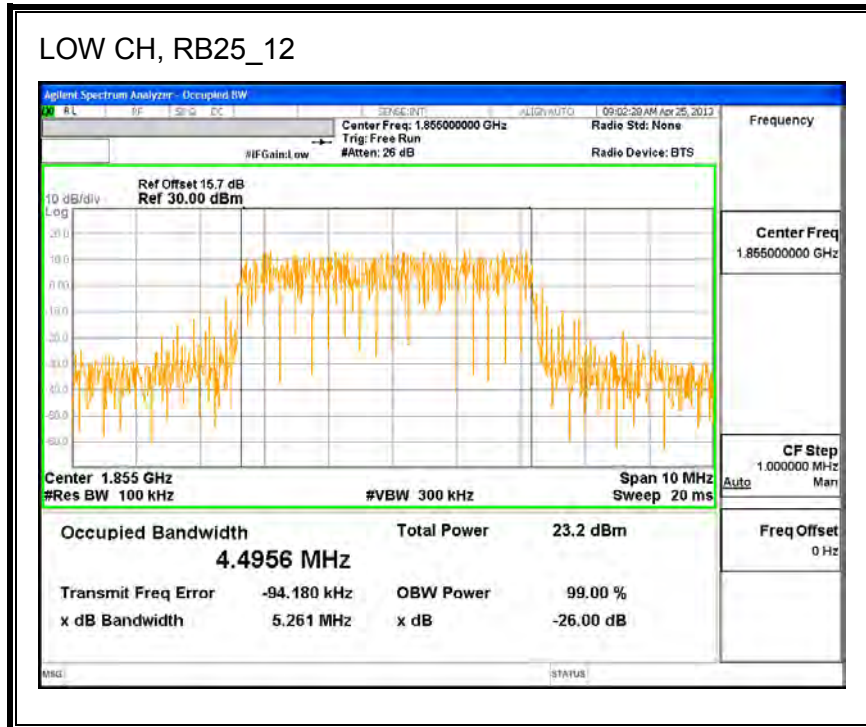


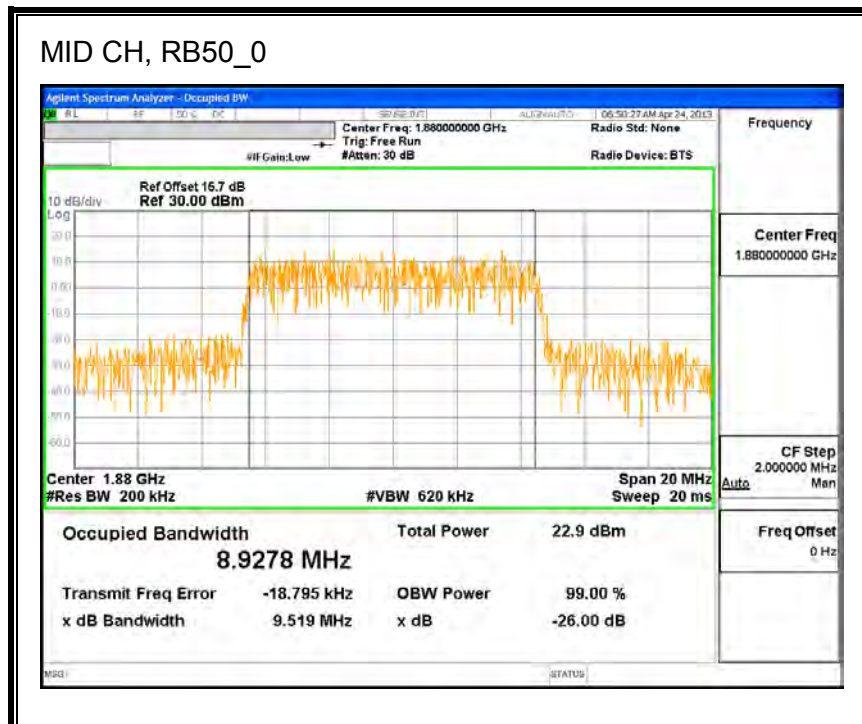
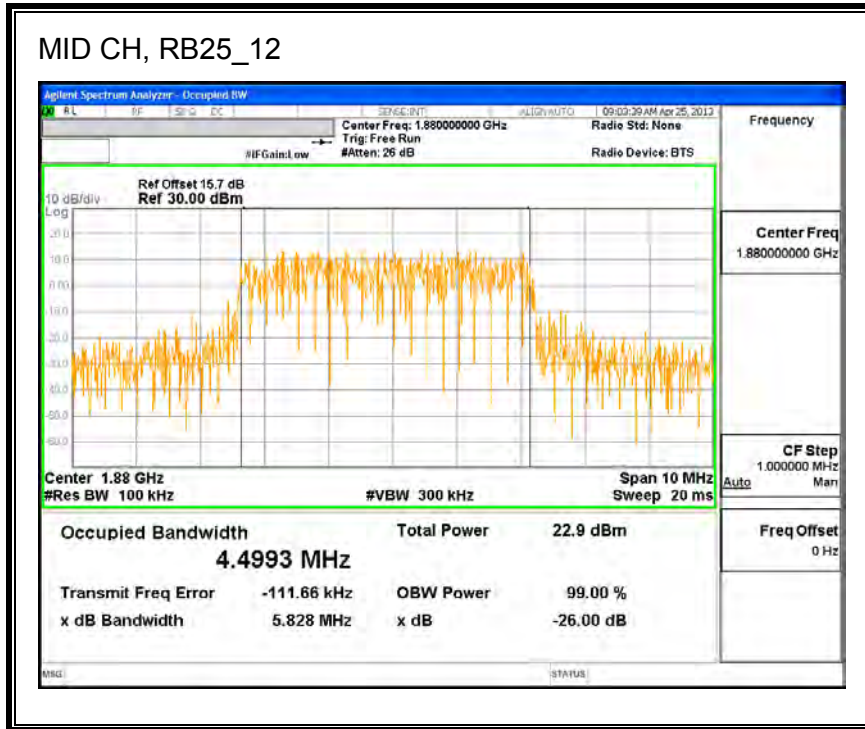


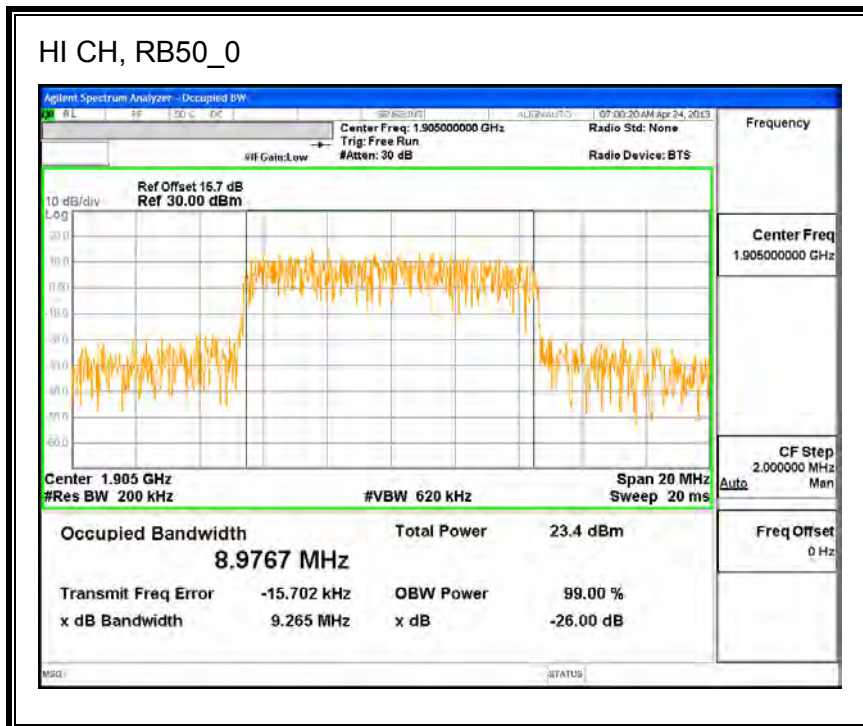
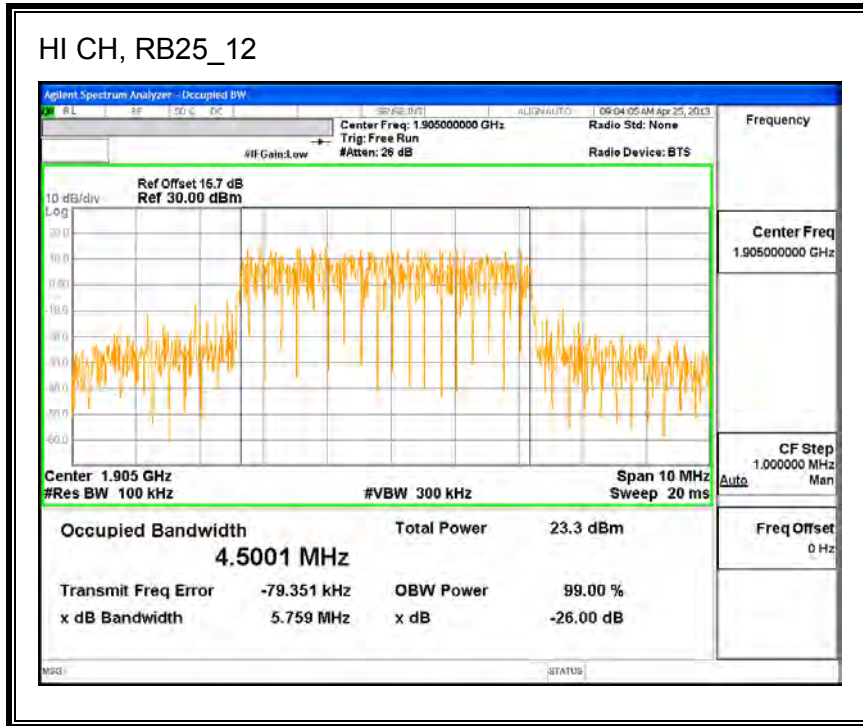


**Band 2 (10.0 MHz BAND WIDTH)**

**LTE QPSK**

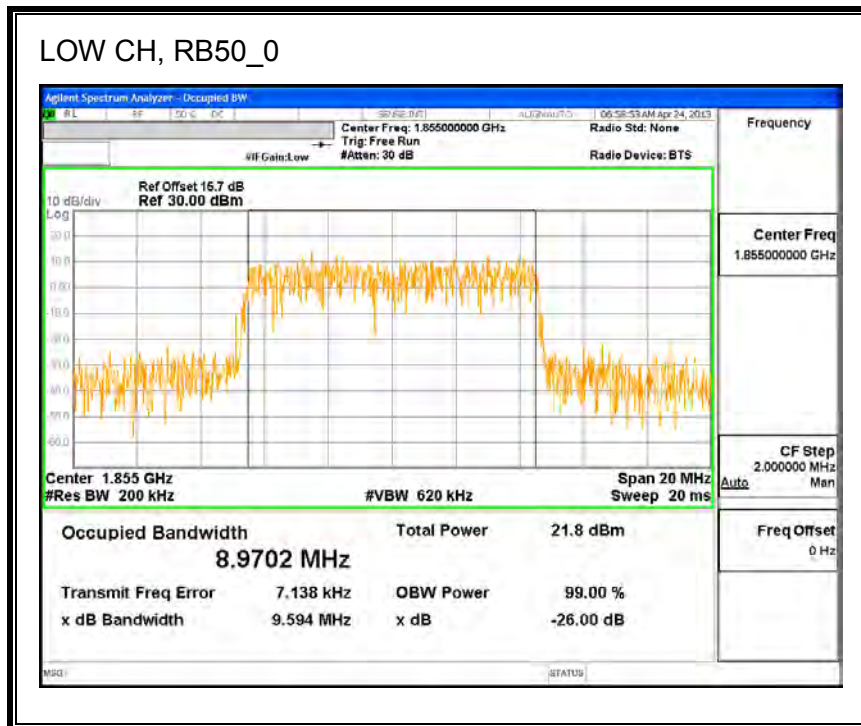
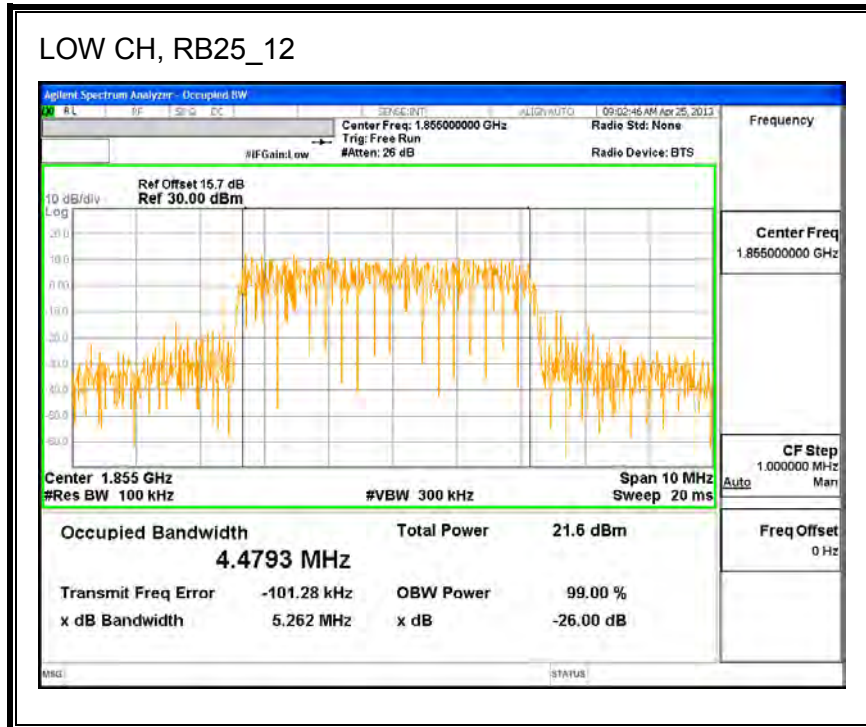


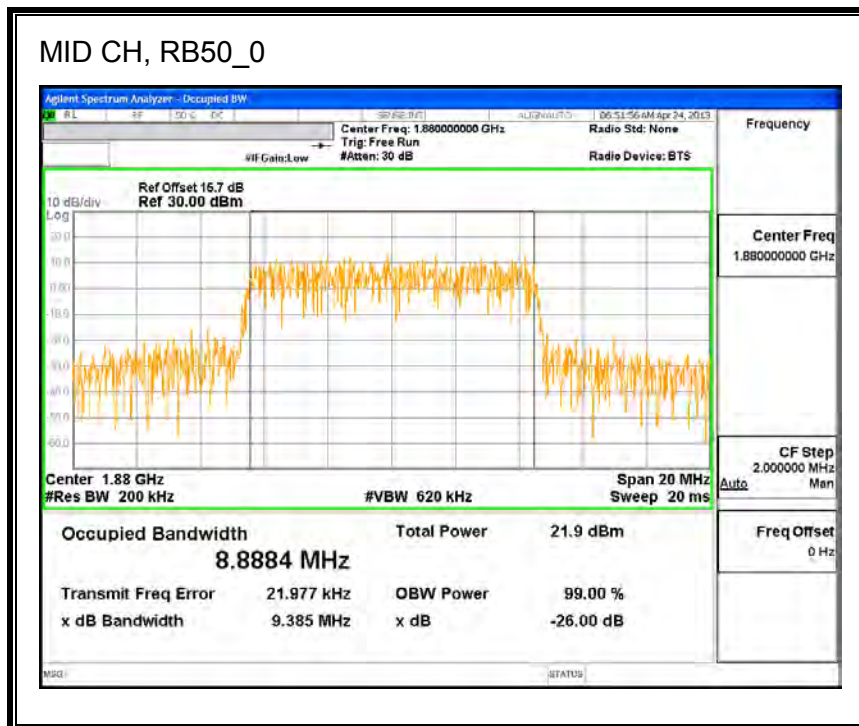
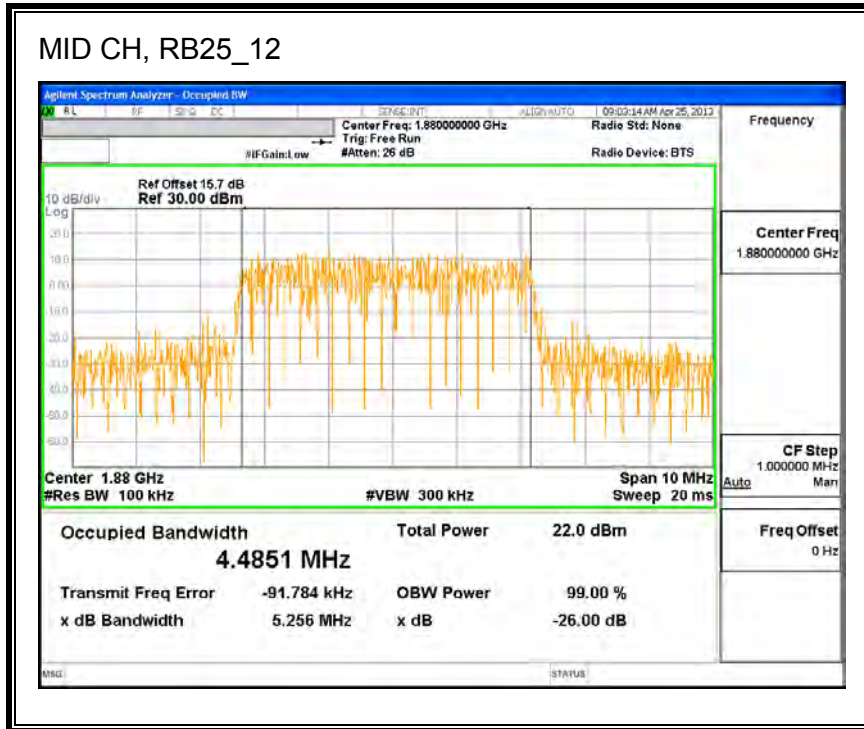


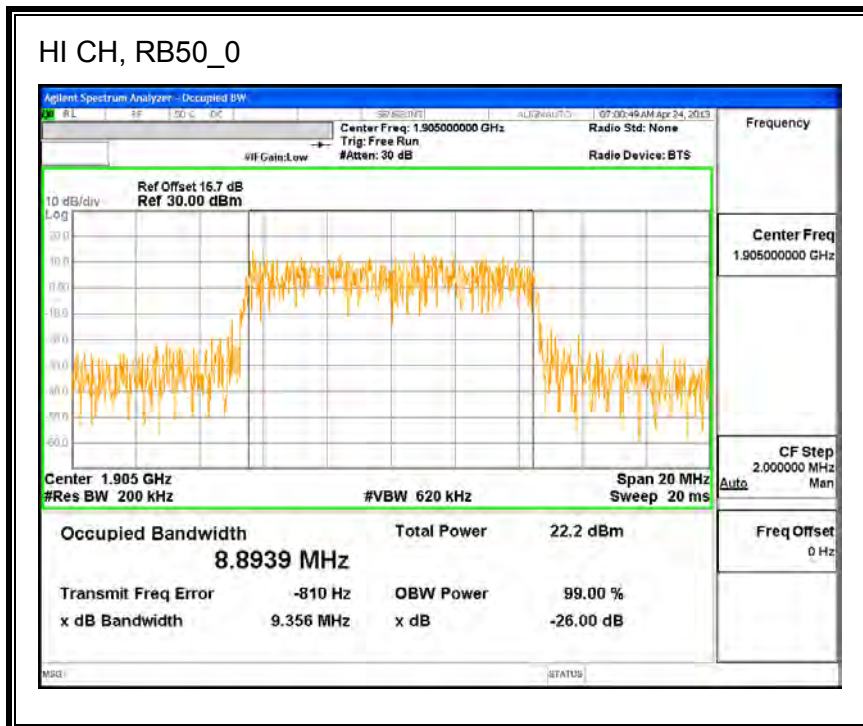
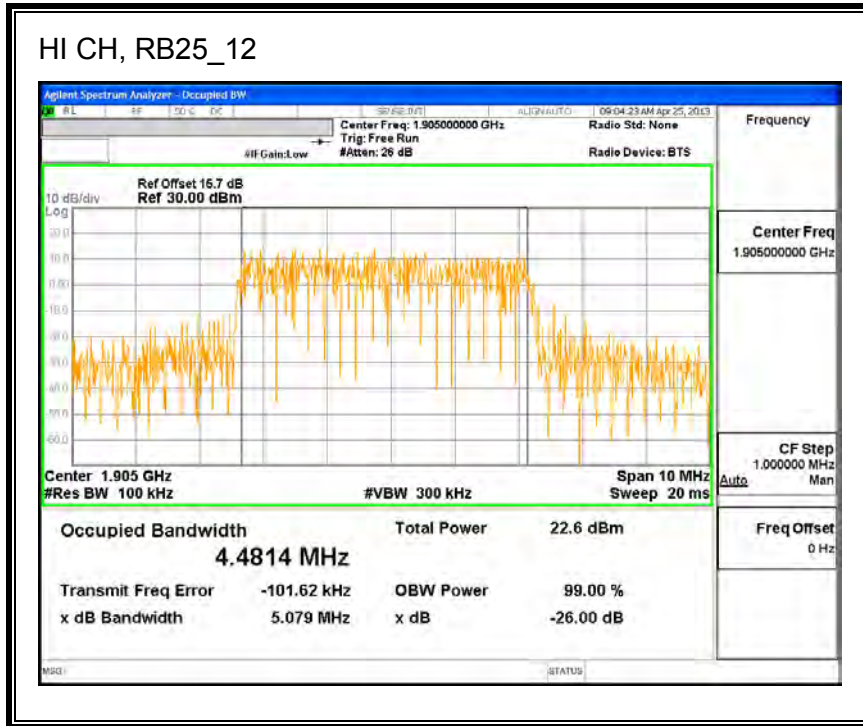


**Band 2 (10 MHz BAND WIDTH)**

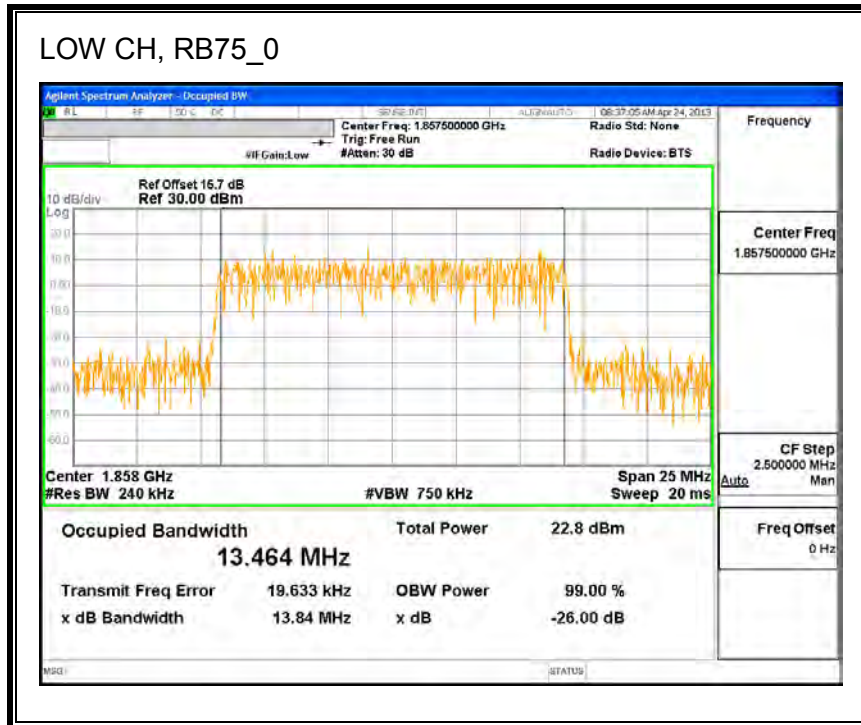
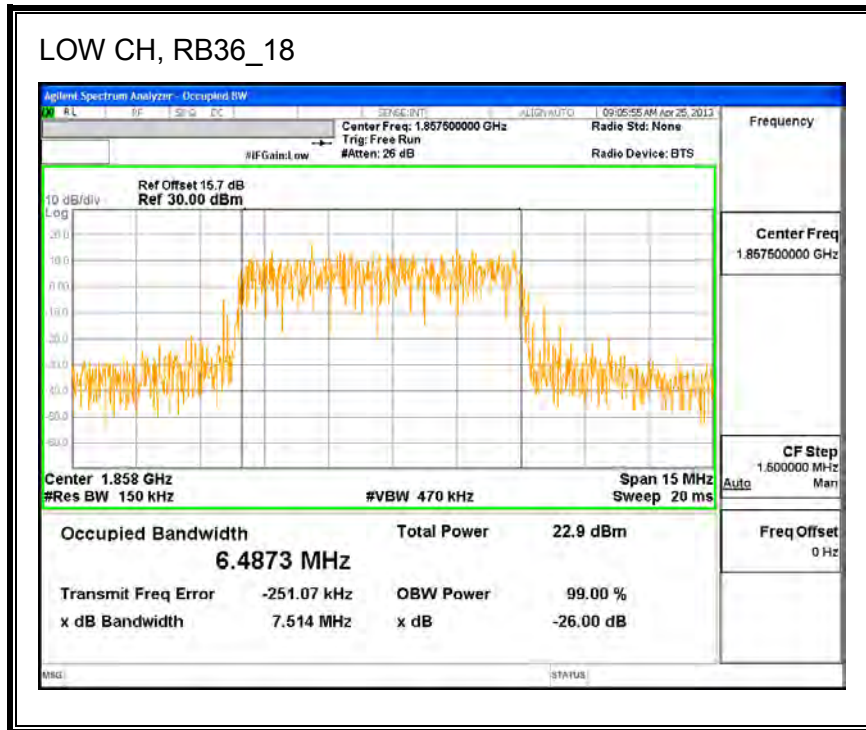
**LTE 16QAM**



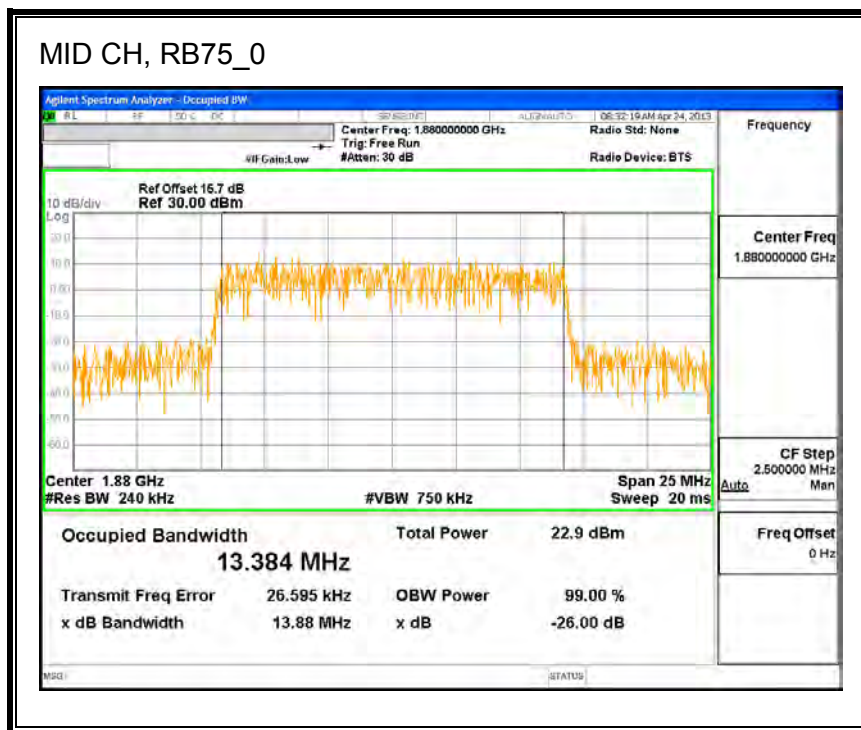
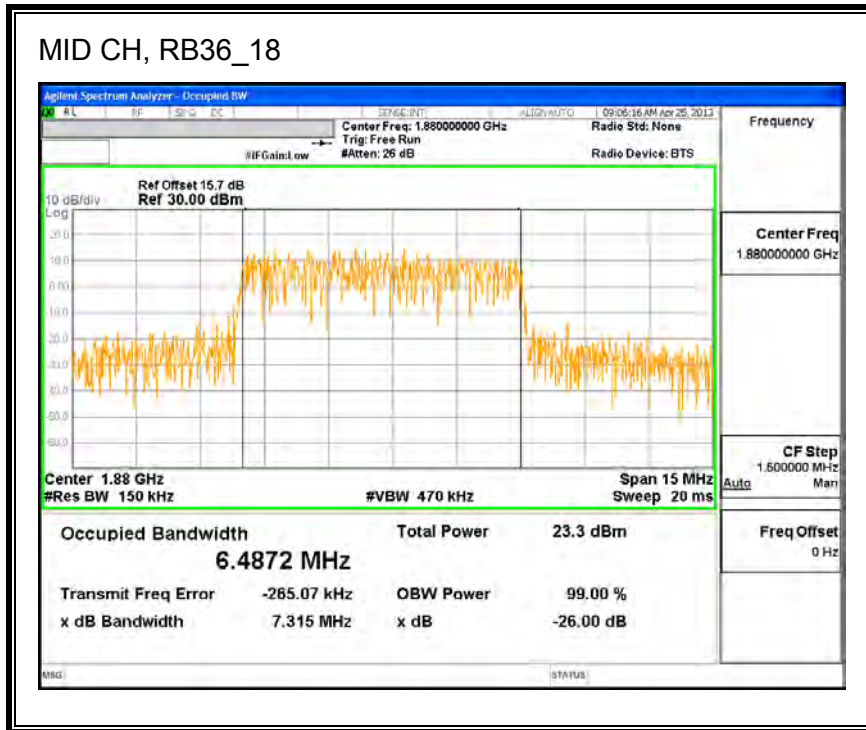




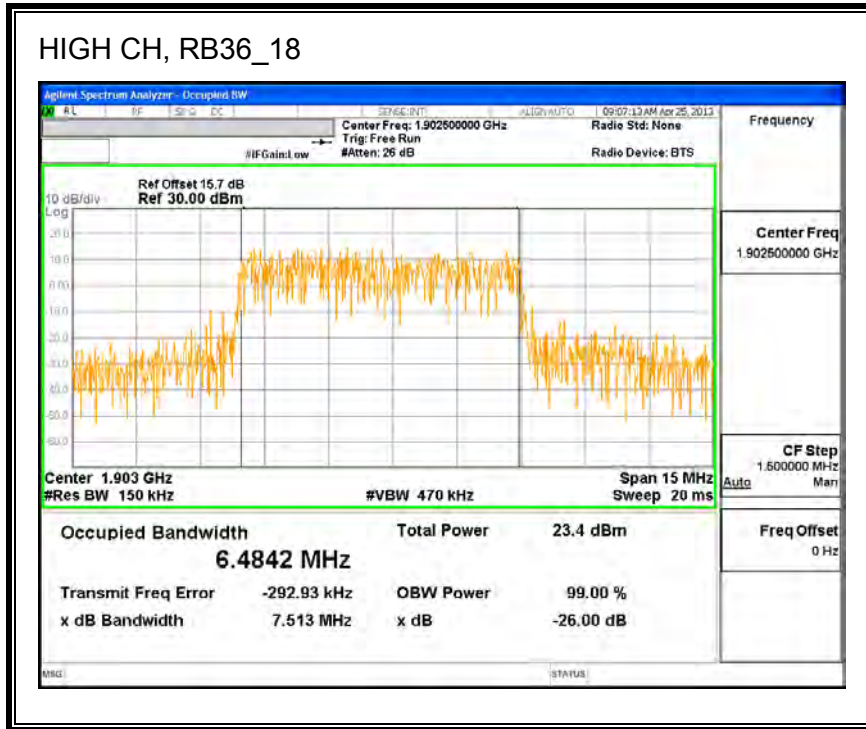
**Band 2 (15.0 MHz BAND WIDTH)**



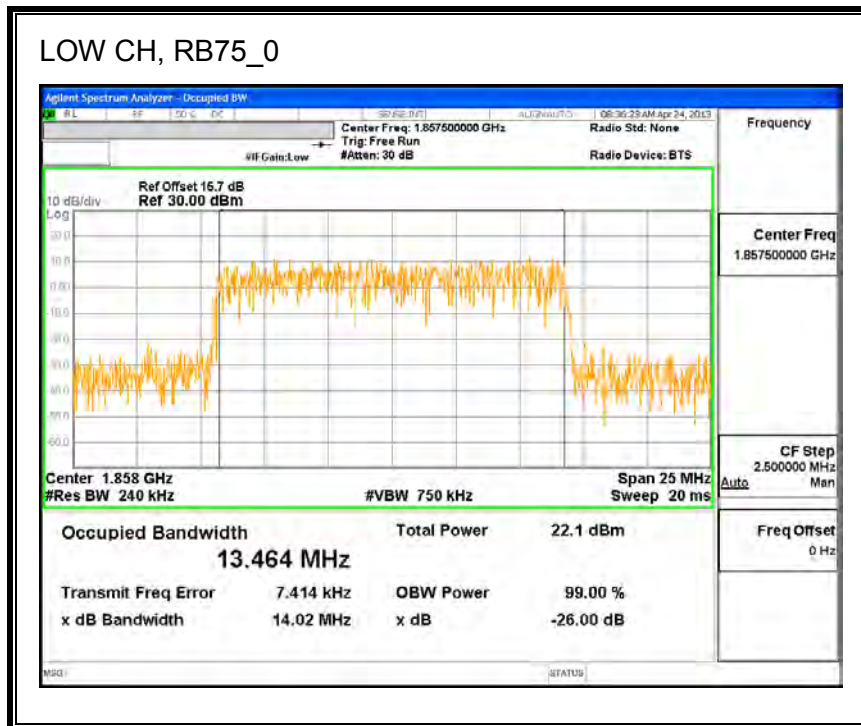
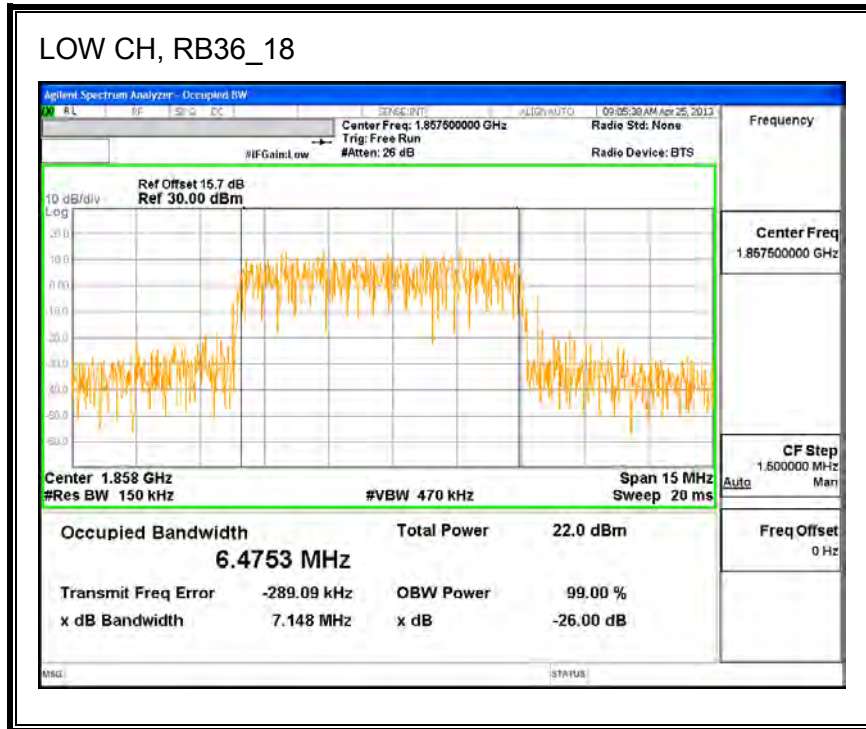
**LTE QPSK**



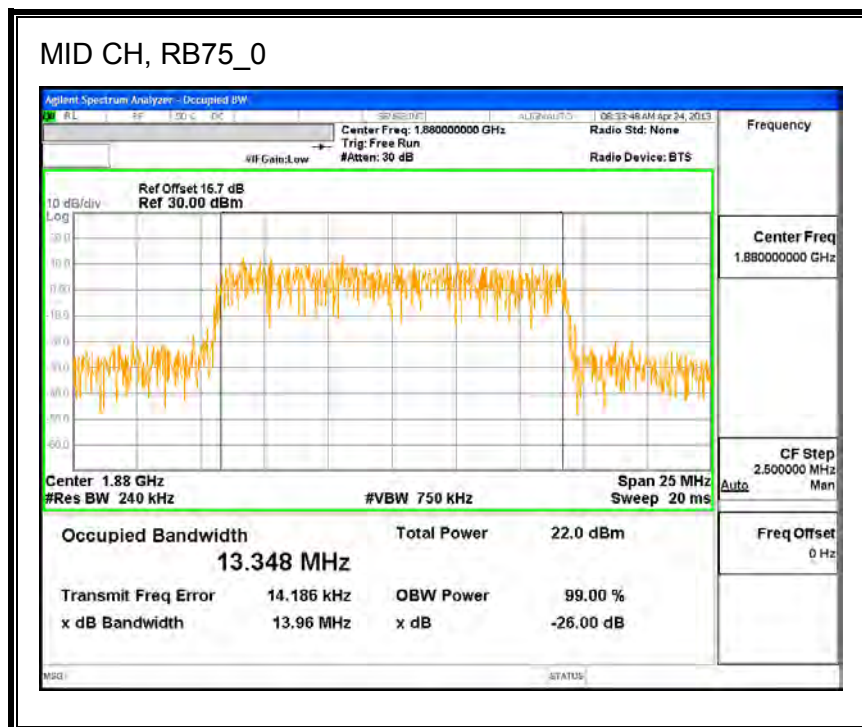
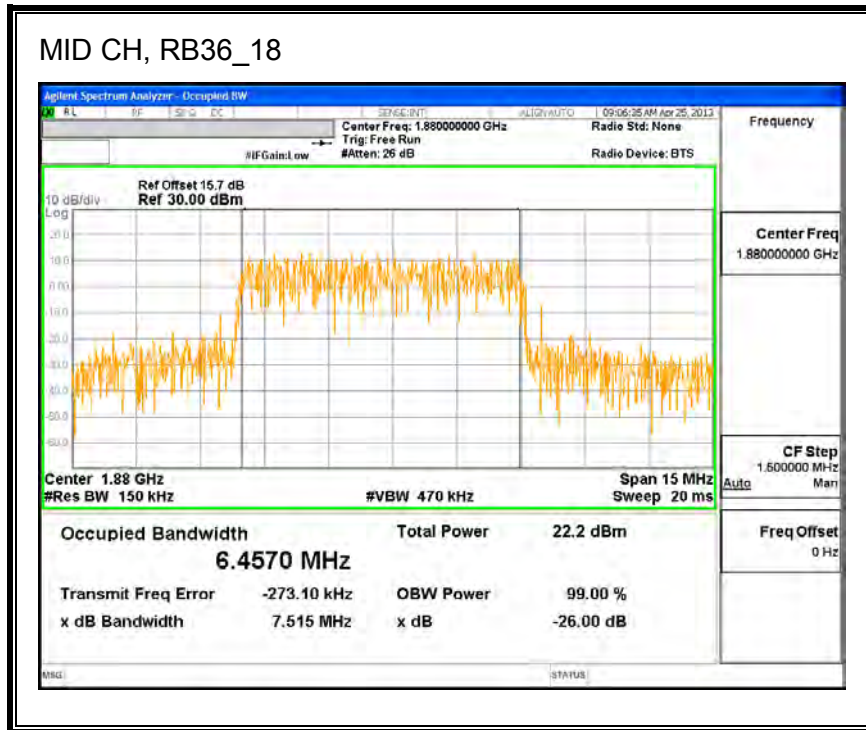


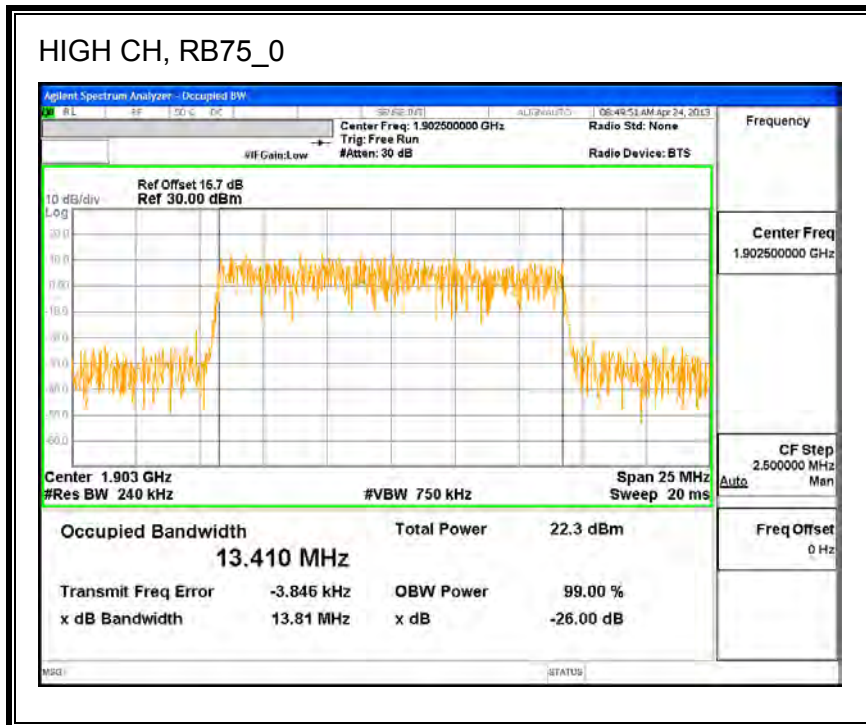
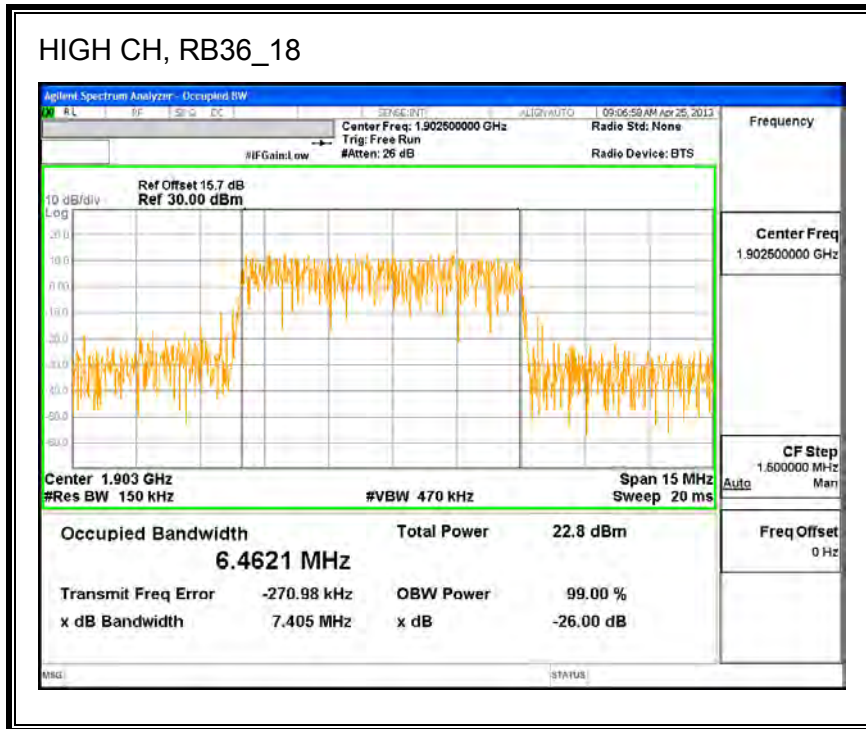


**Band 2 (15.0 MHz BAND WIDTH)**



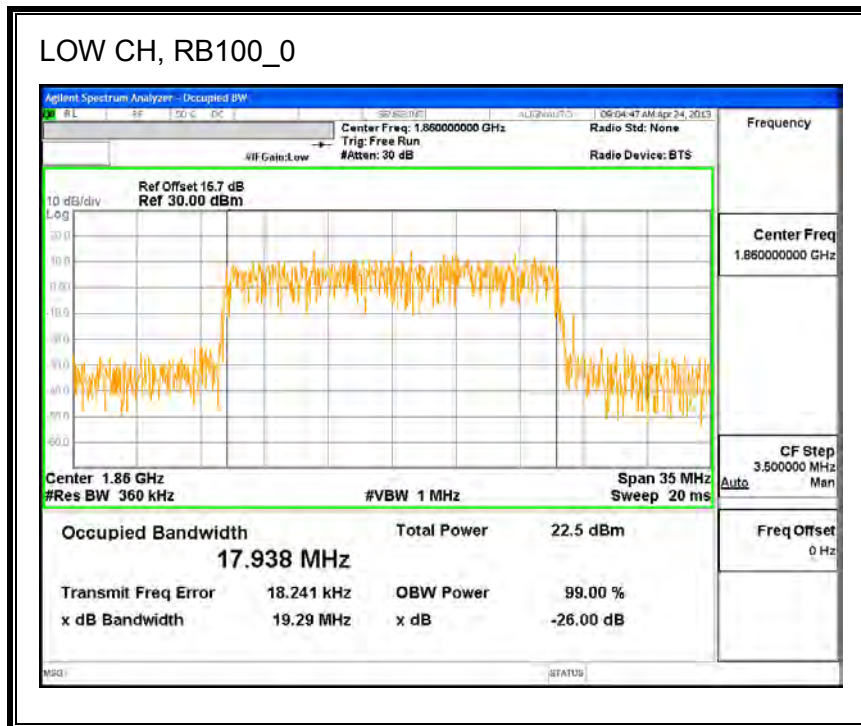
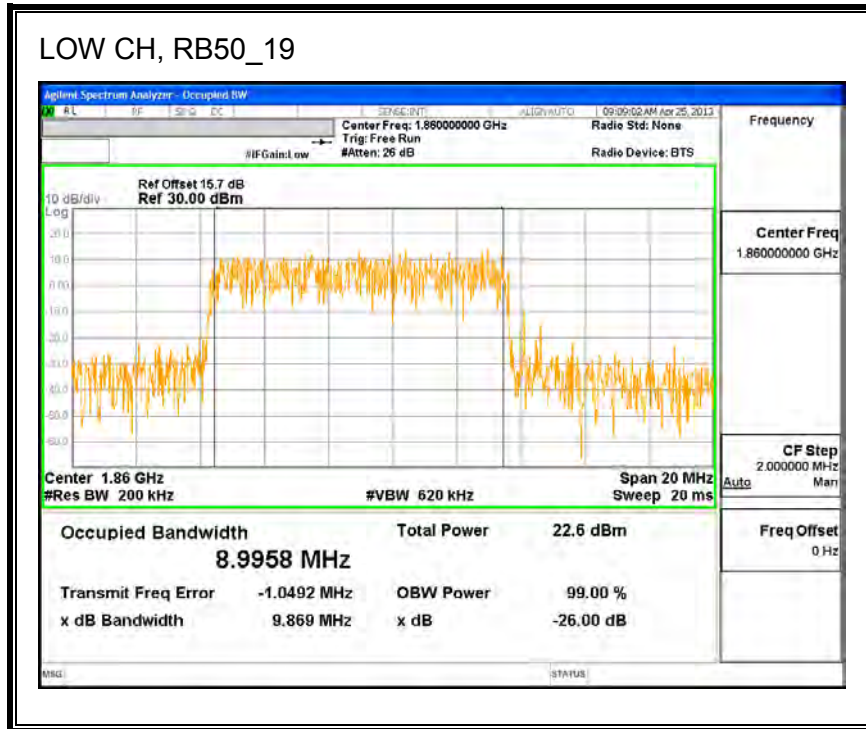
**LTE 16QAM**

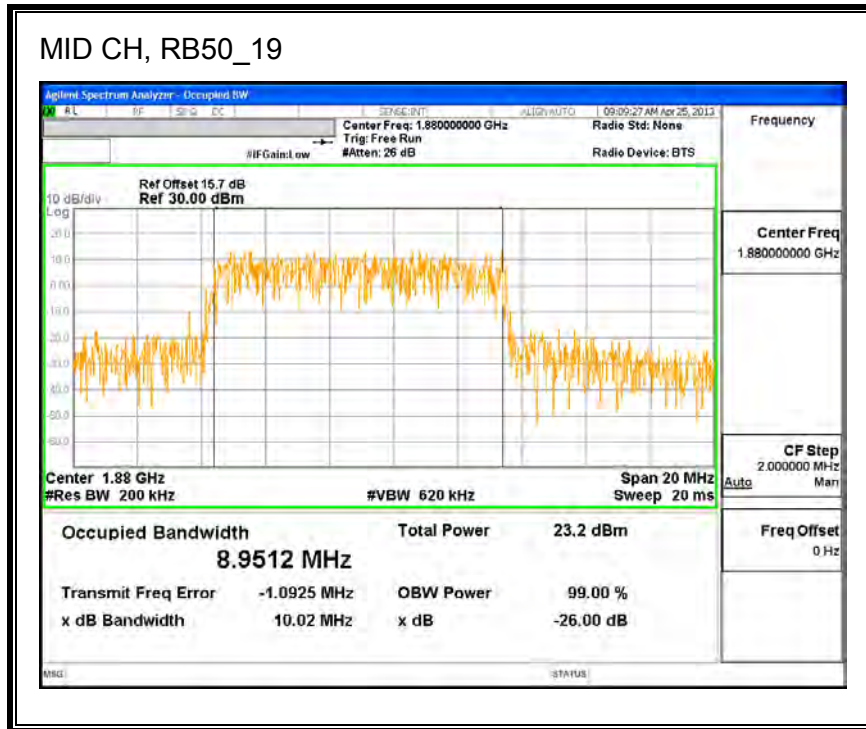


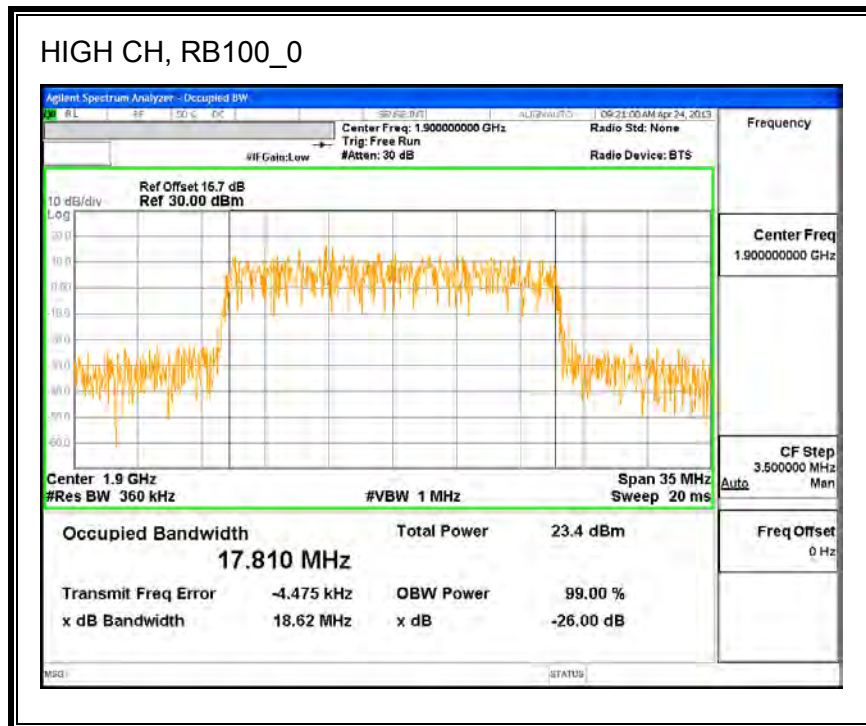
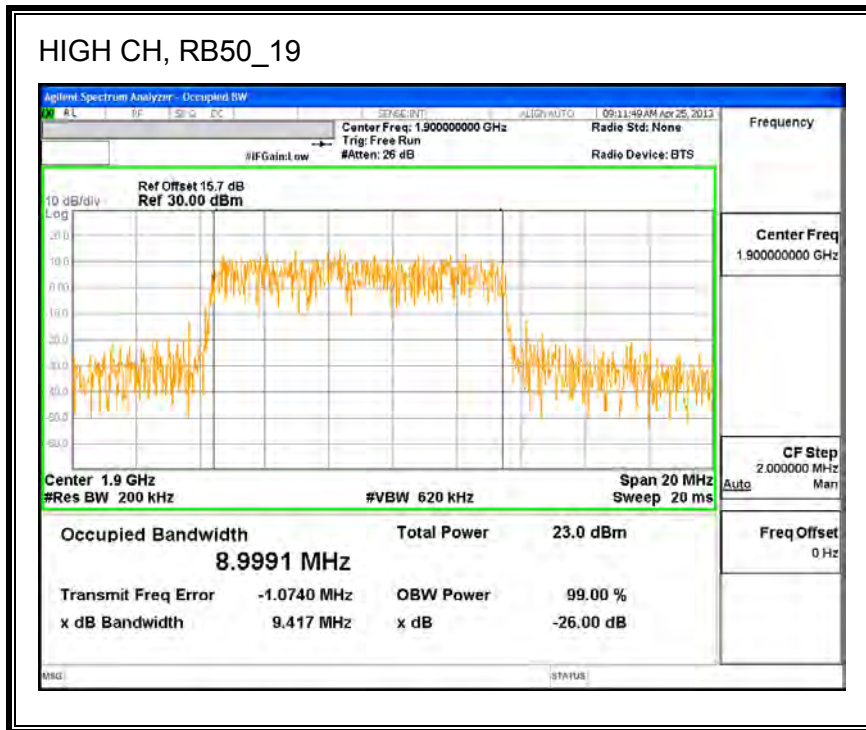


**Band 2 (20.0 MHz BAND WIDTH)**

**LTE QPSK**

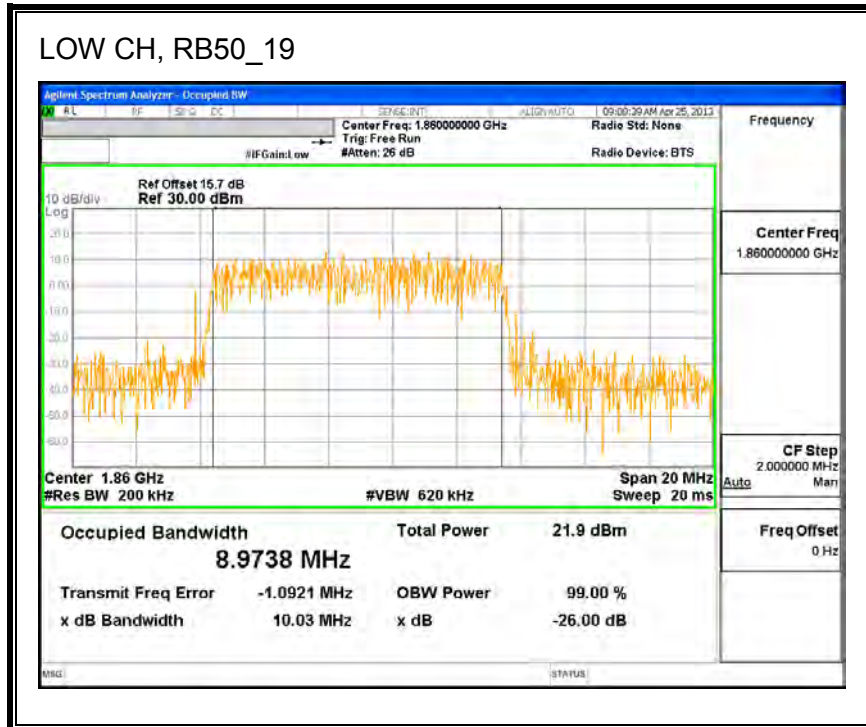




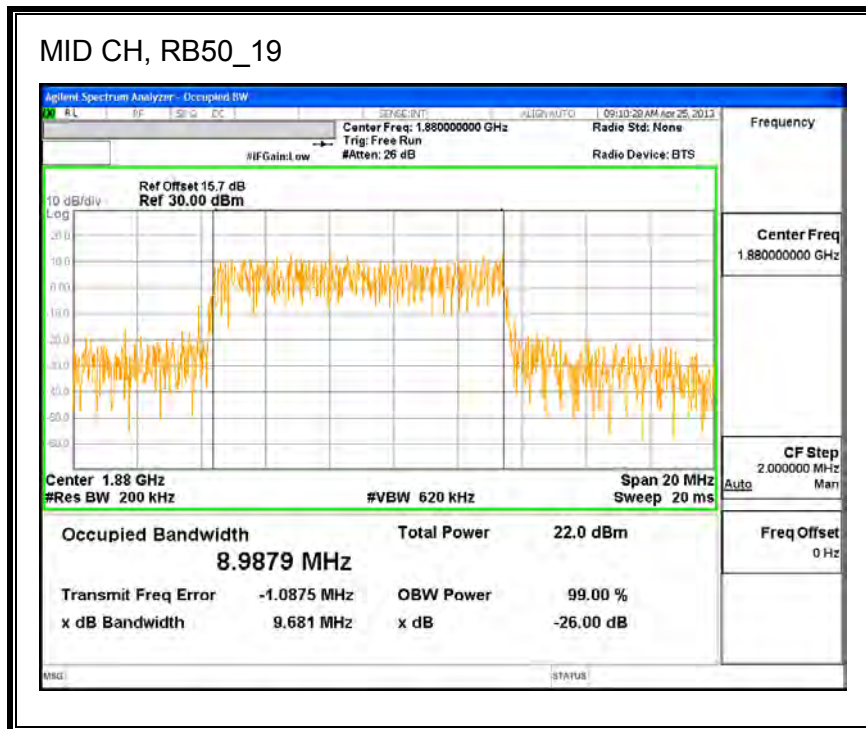


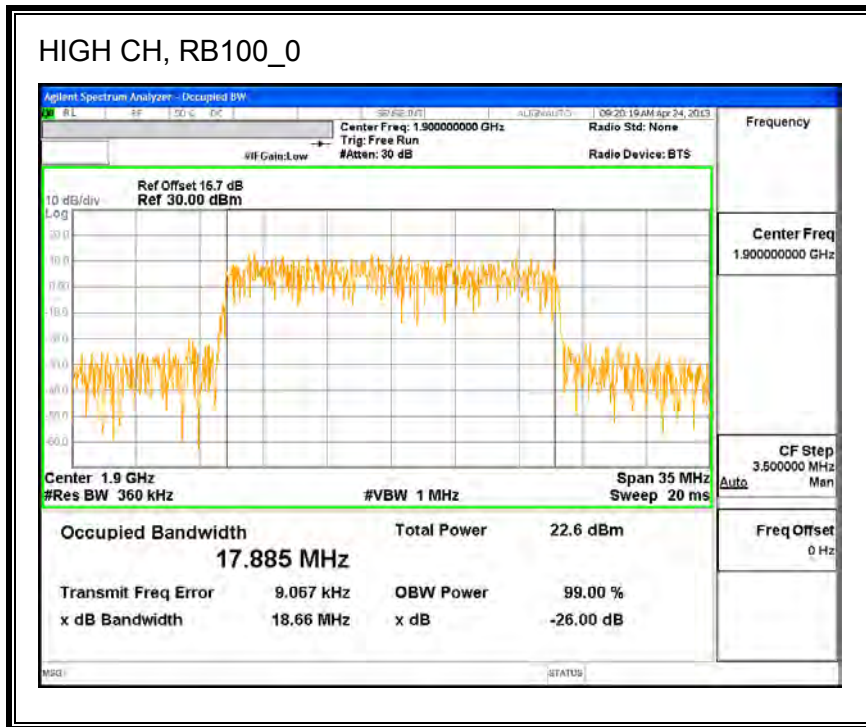
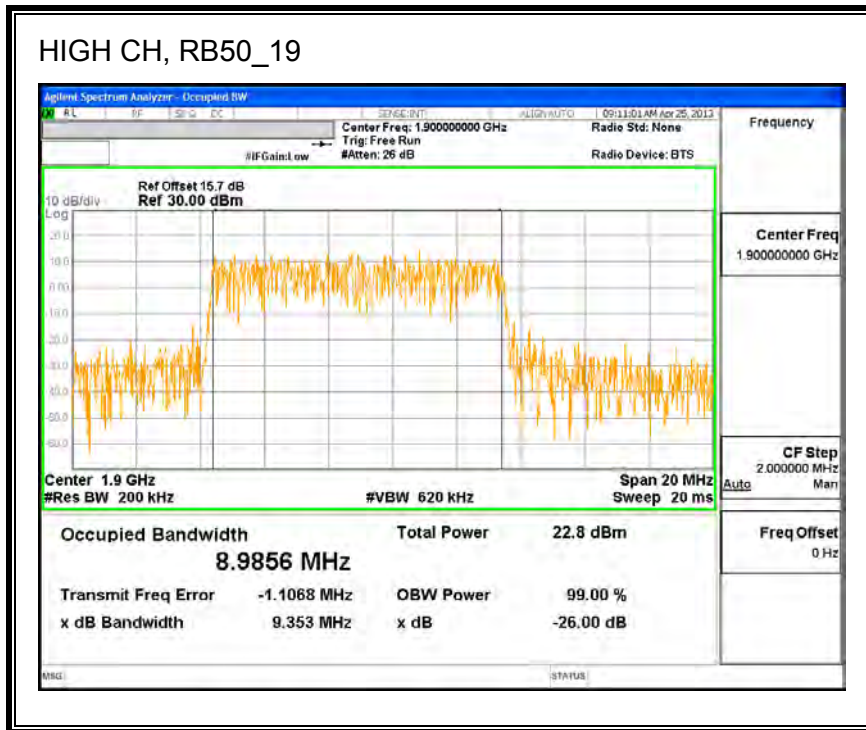
**Band 2 (20.0 MHz BAND WIDTH)**

**LTE 16QAM**



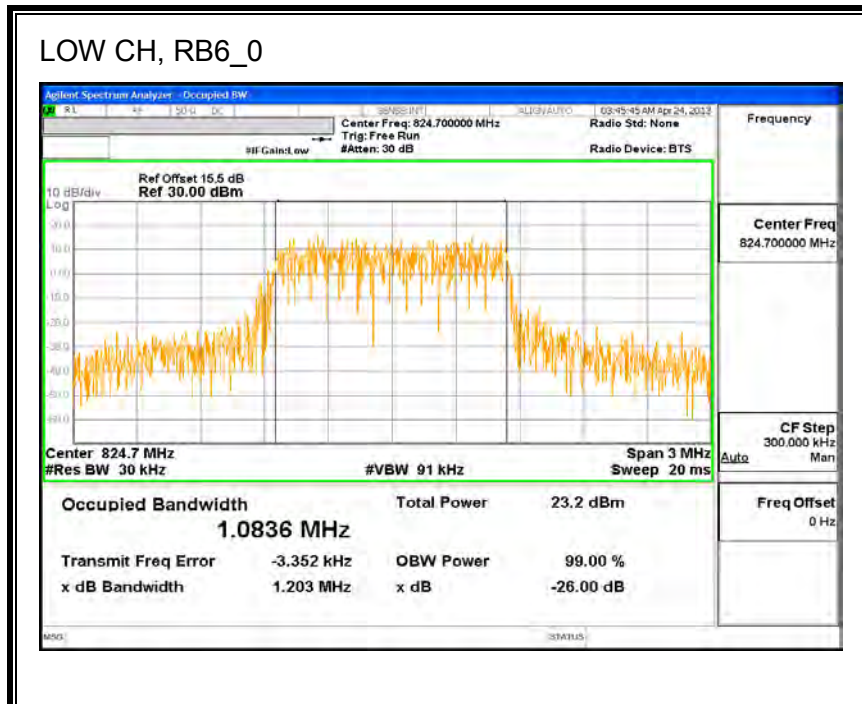
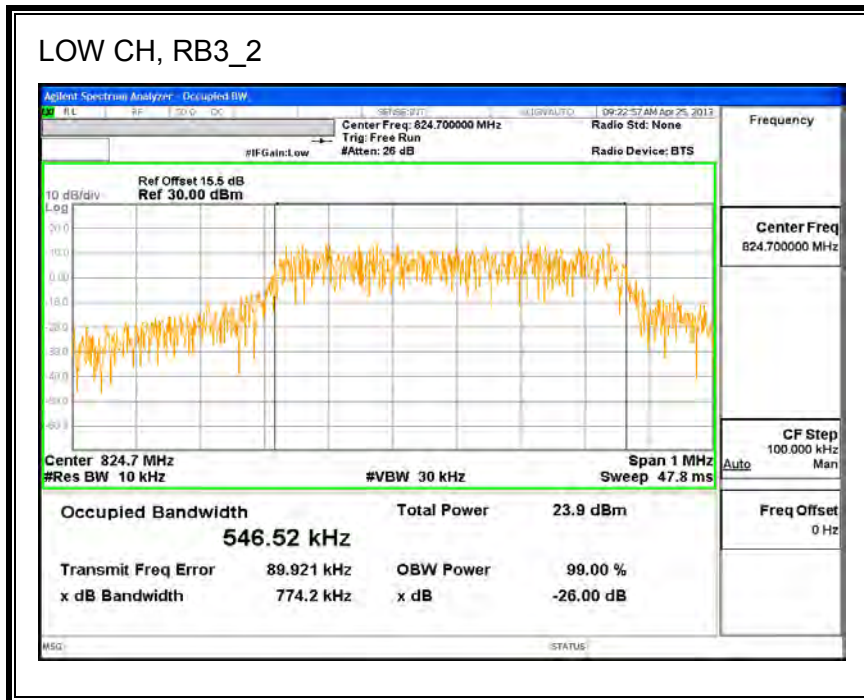


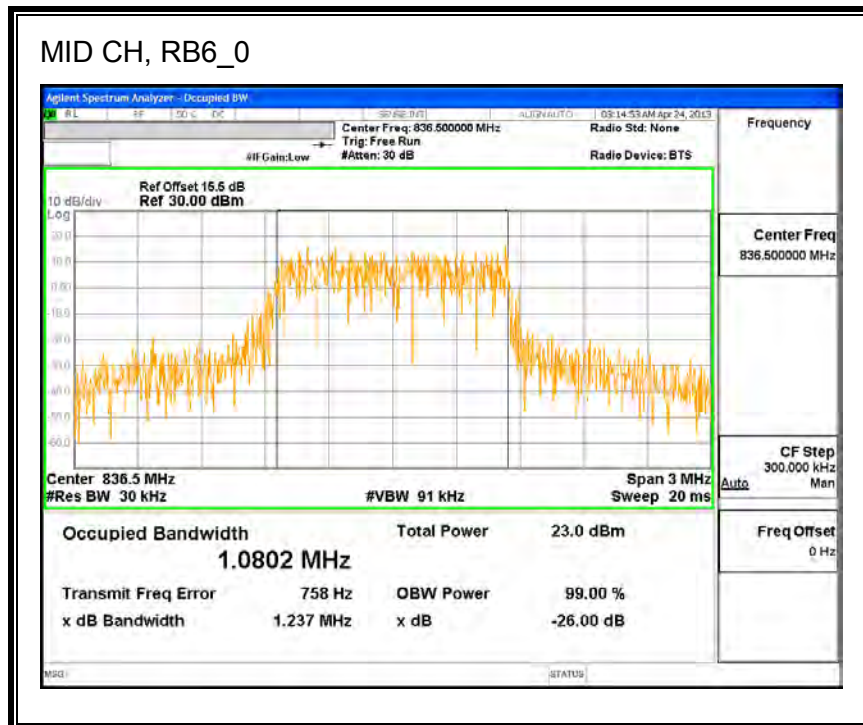
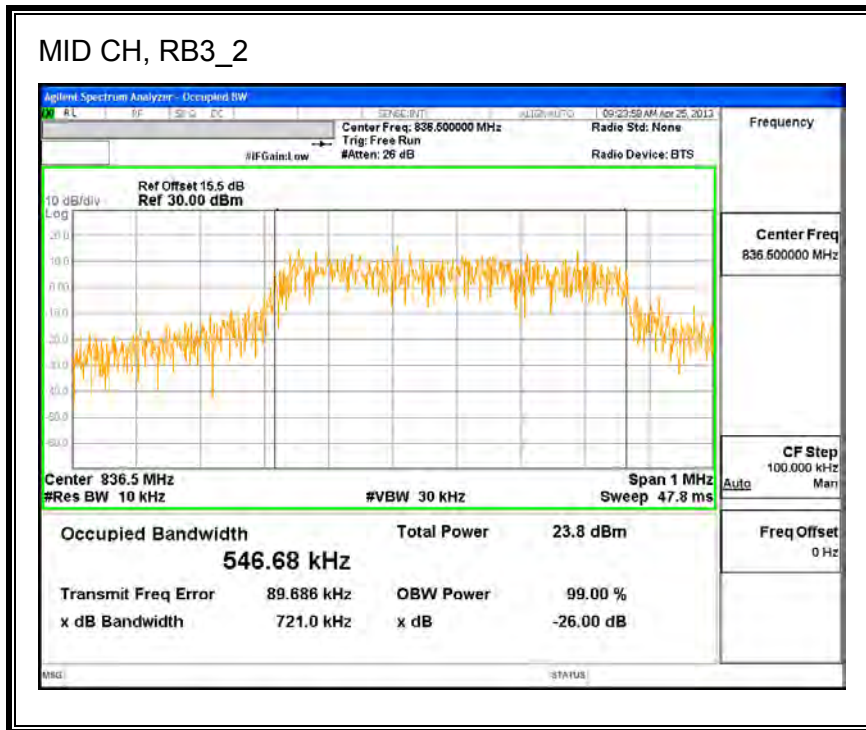


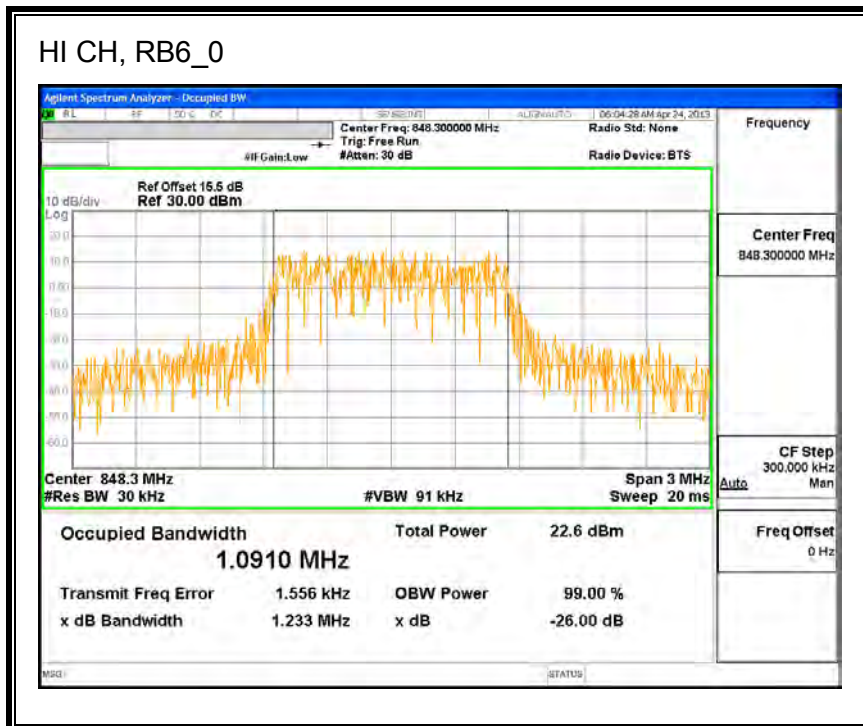
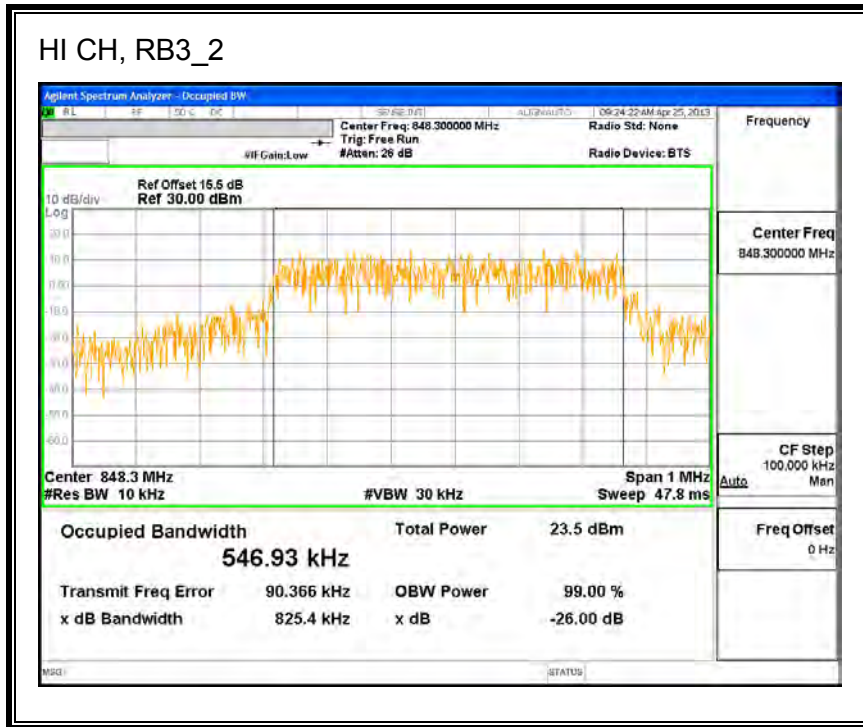


### 8.1.2. LTE Band 5

#### QPSK (1.4 MHz BAND WIDTH)

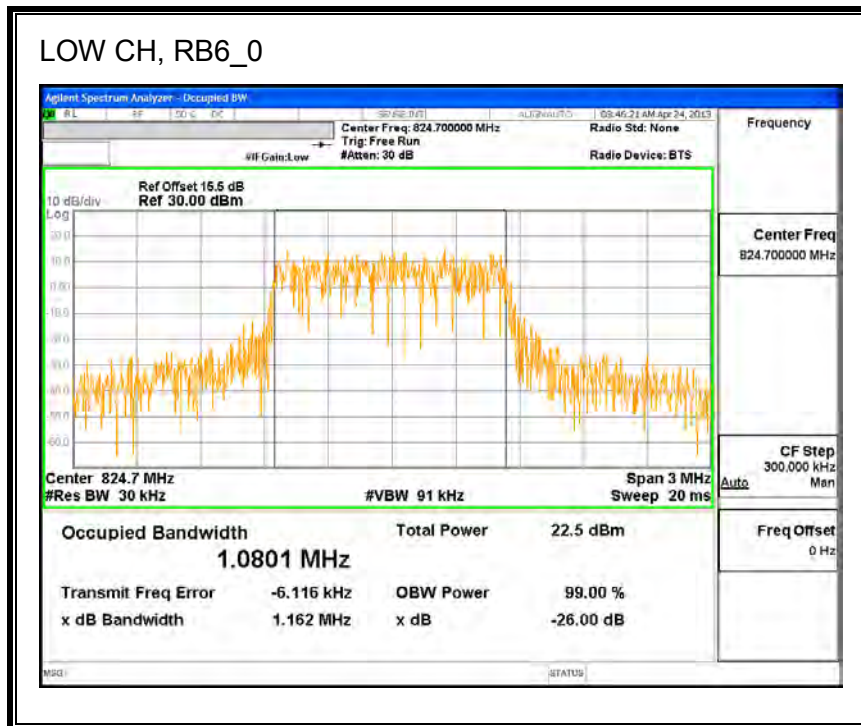
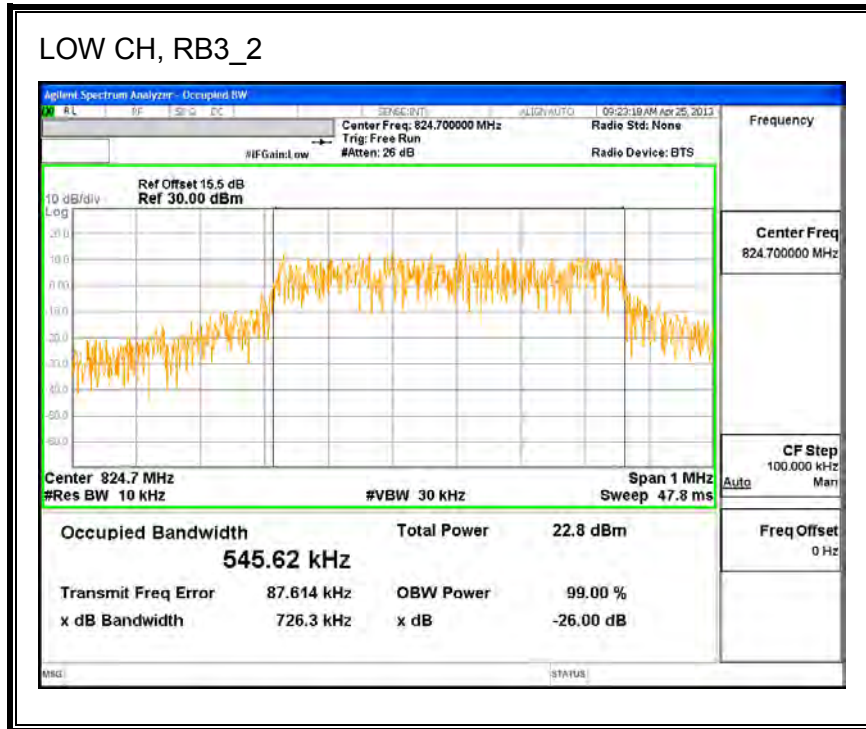


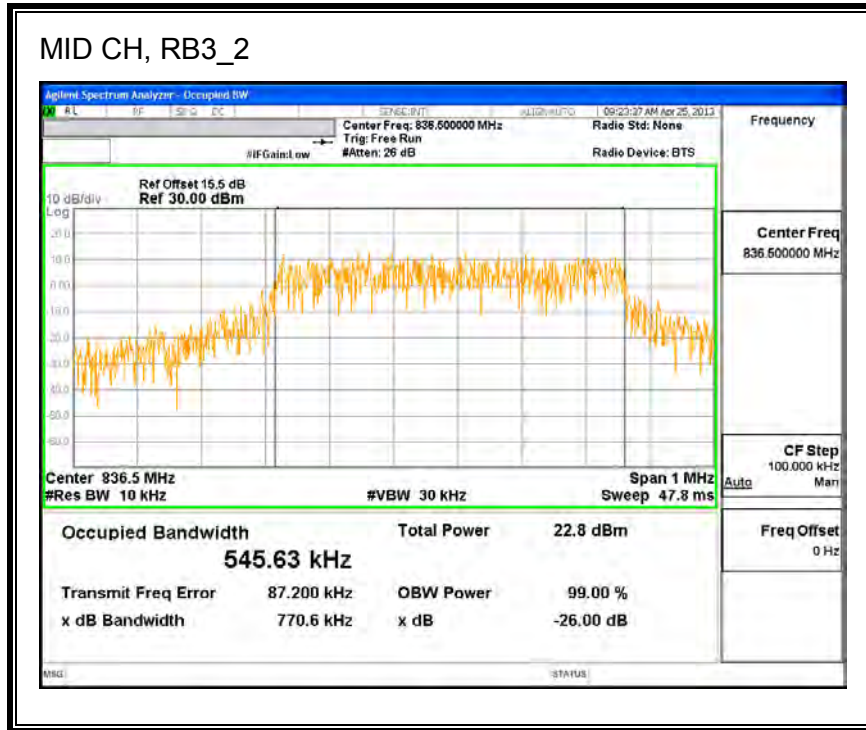


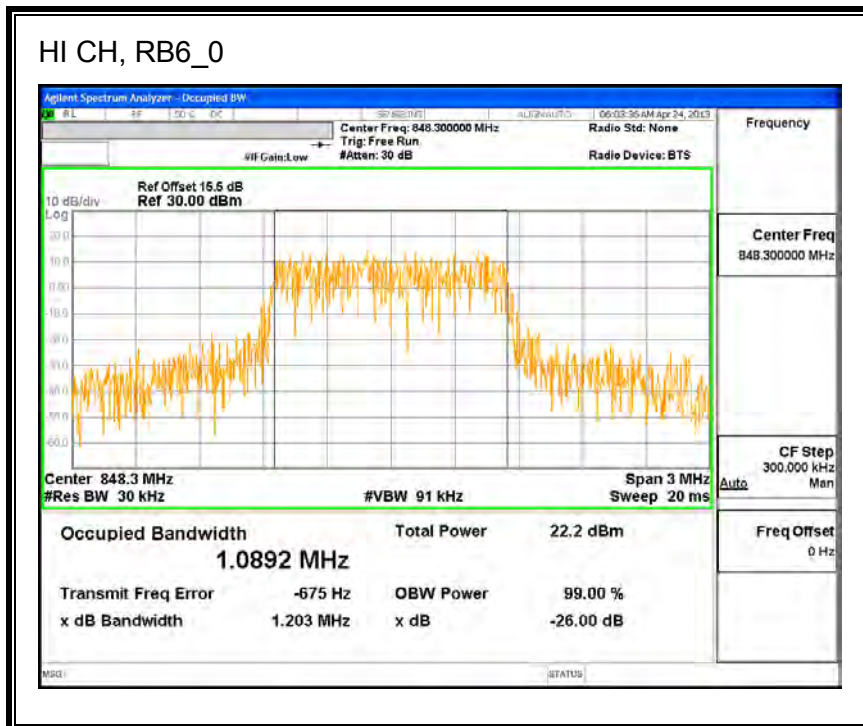
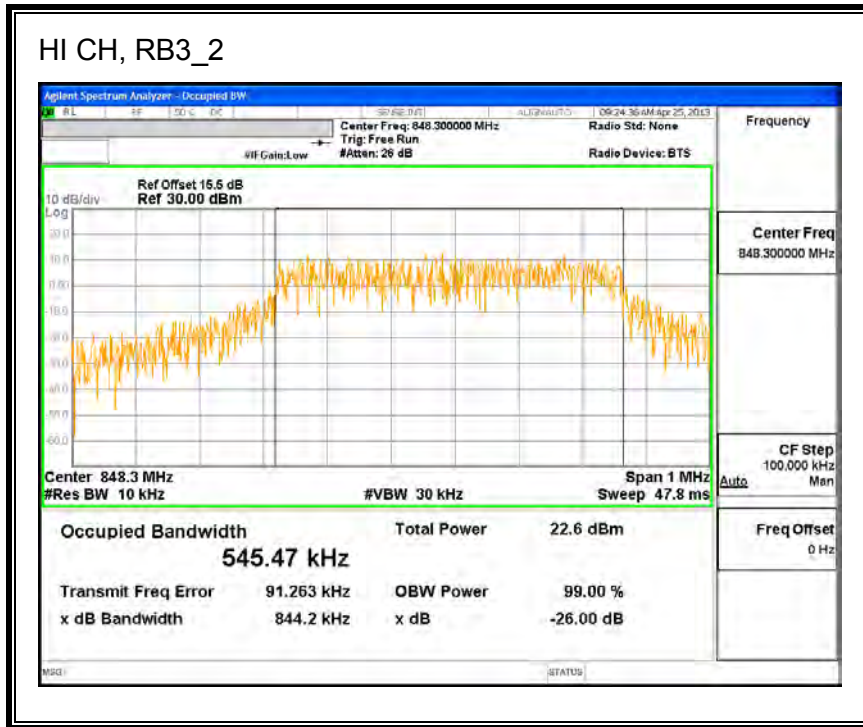


**Band 5 (1.4 MHz BAND WIDTH)**

**LTE 16QAM**



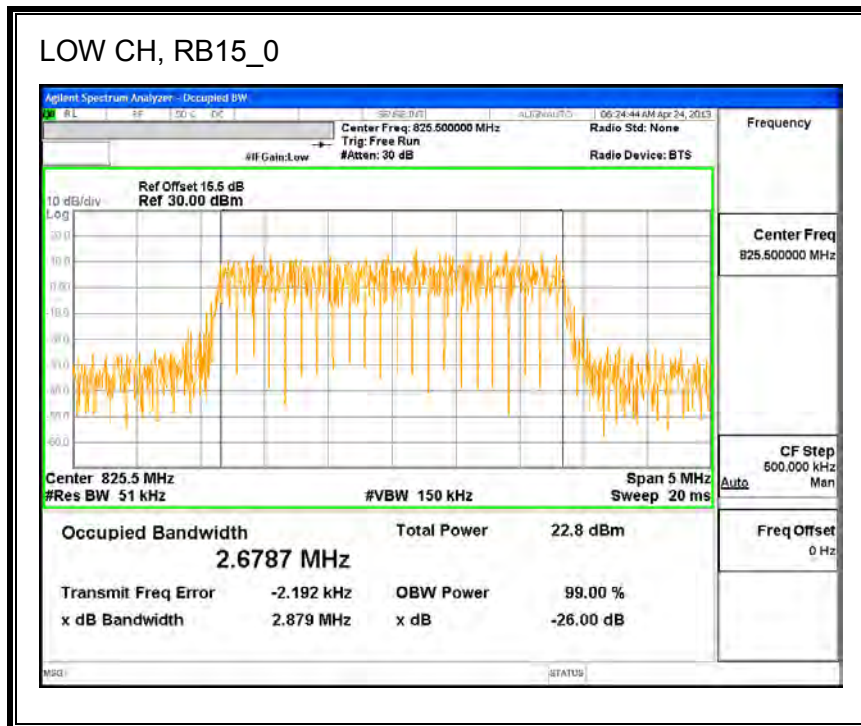
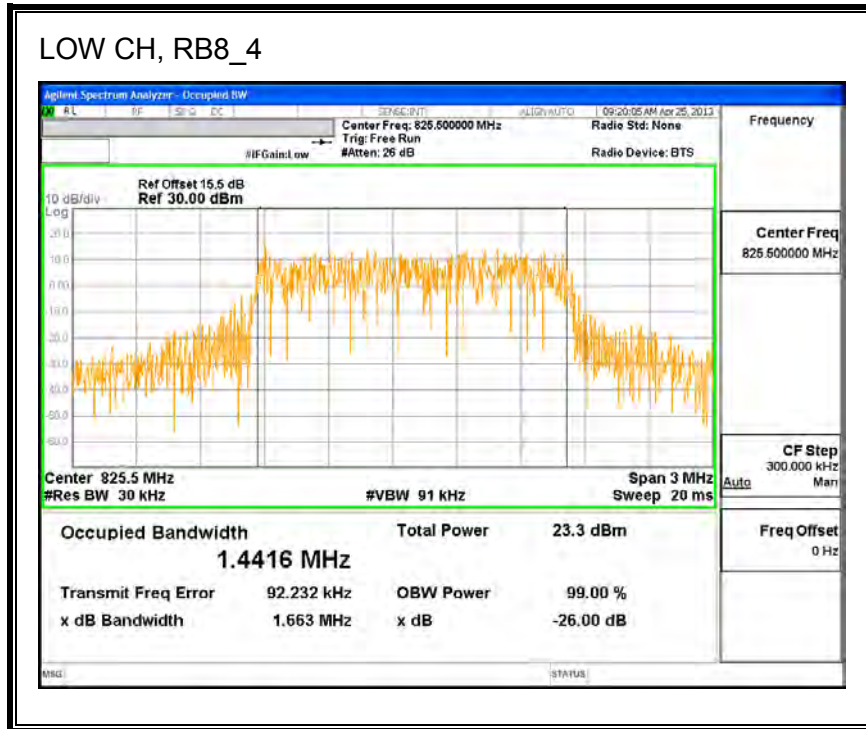


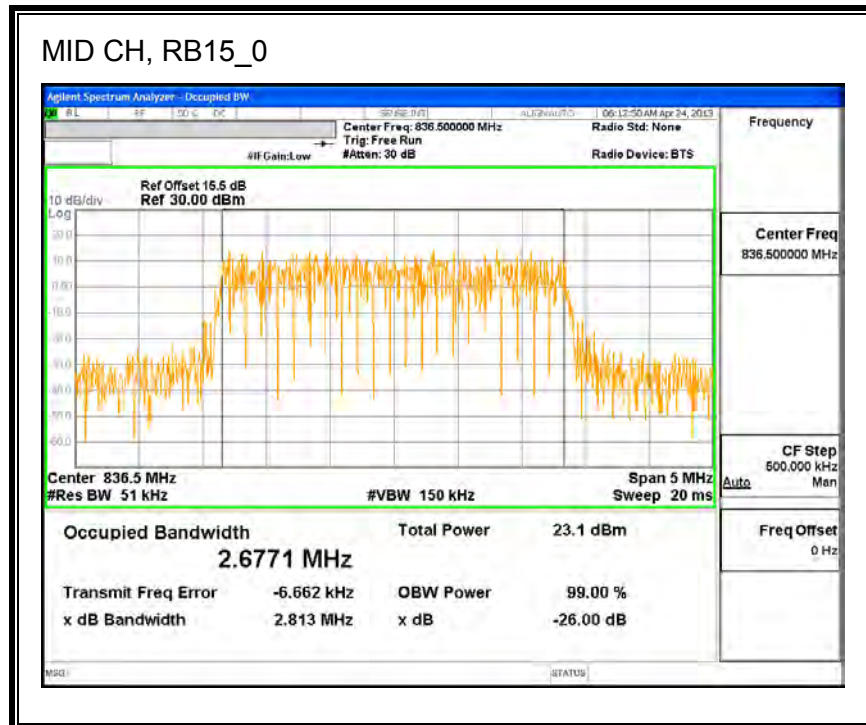
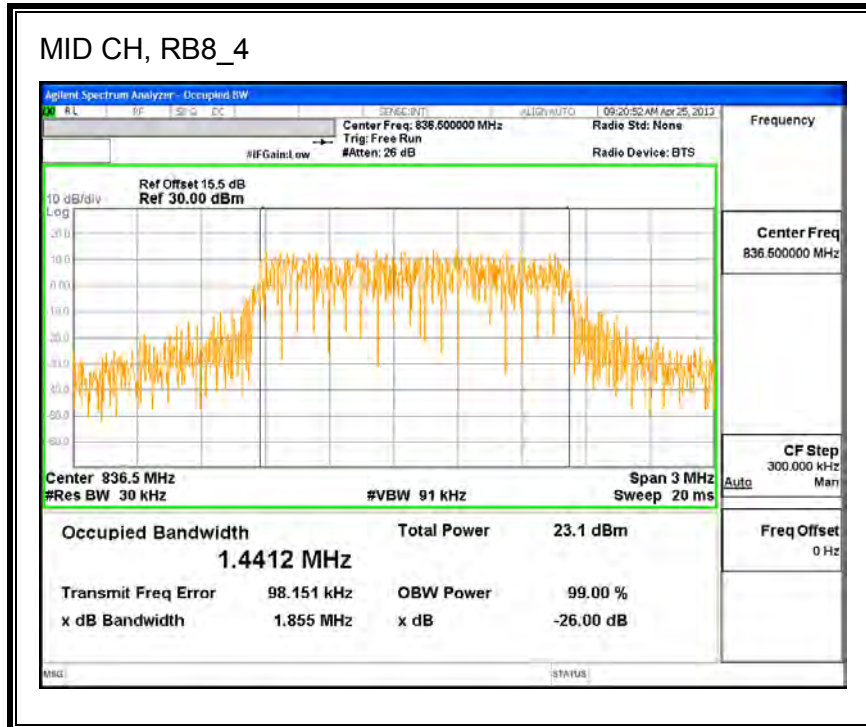


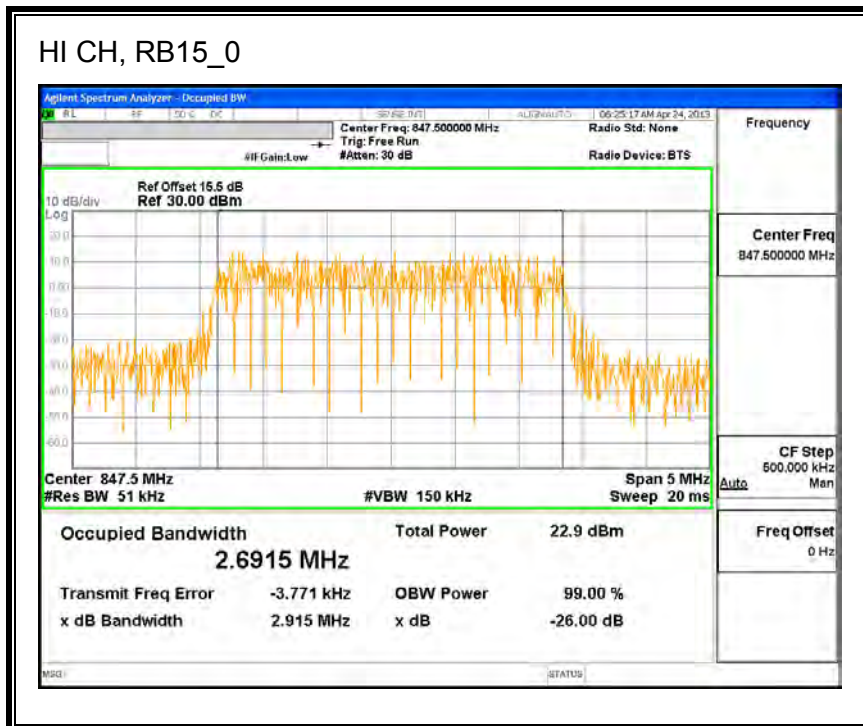
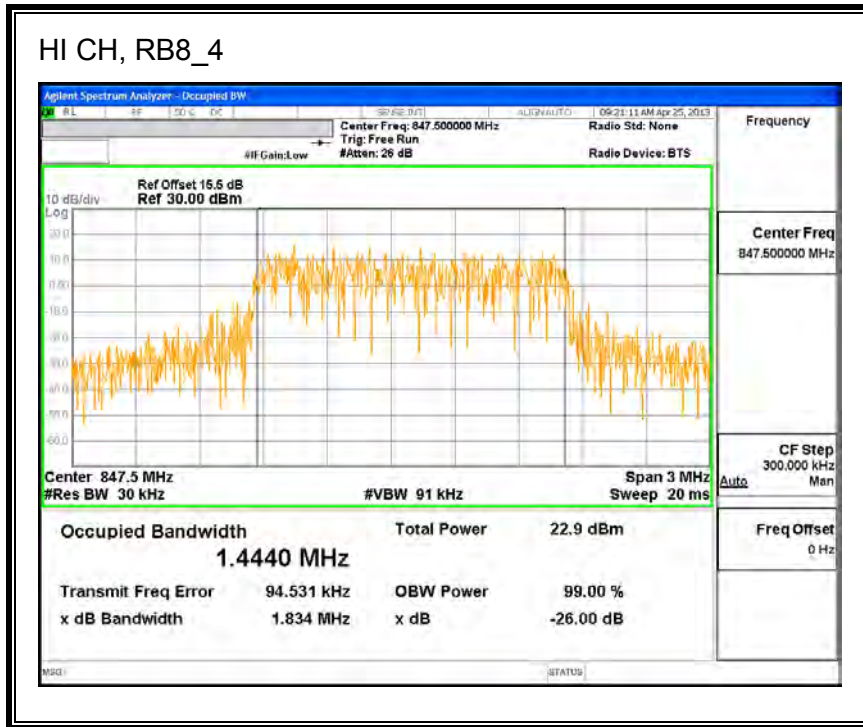


**Band 5 (3.0 MHz BAND WIDTH)**

**LTE QPSK**

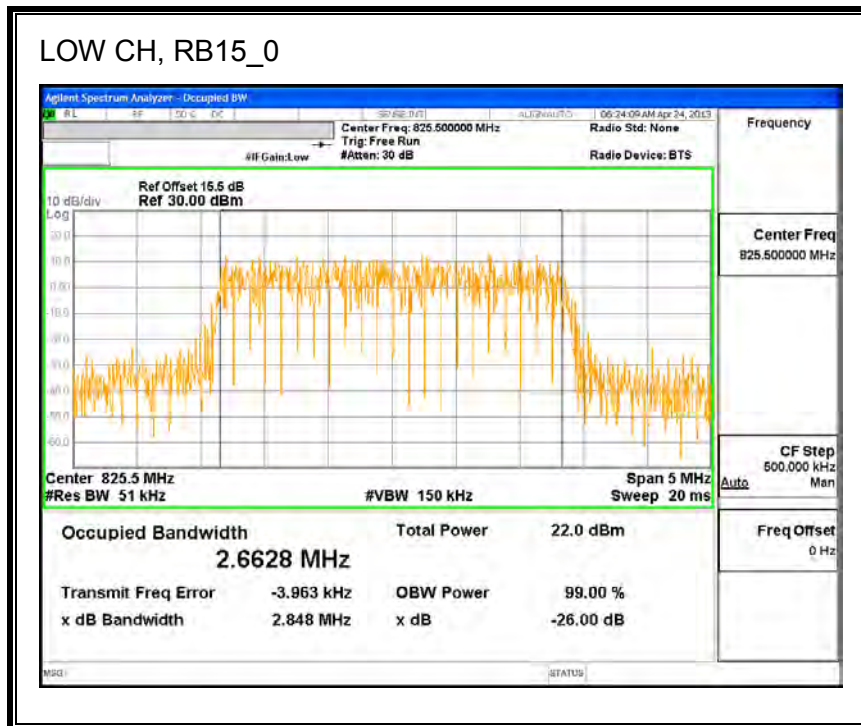
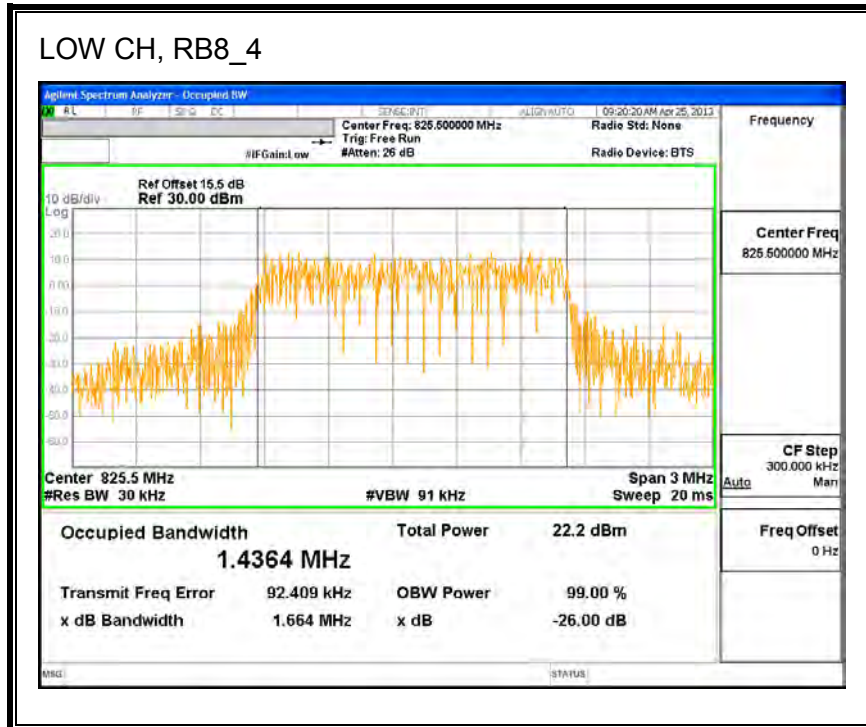


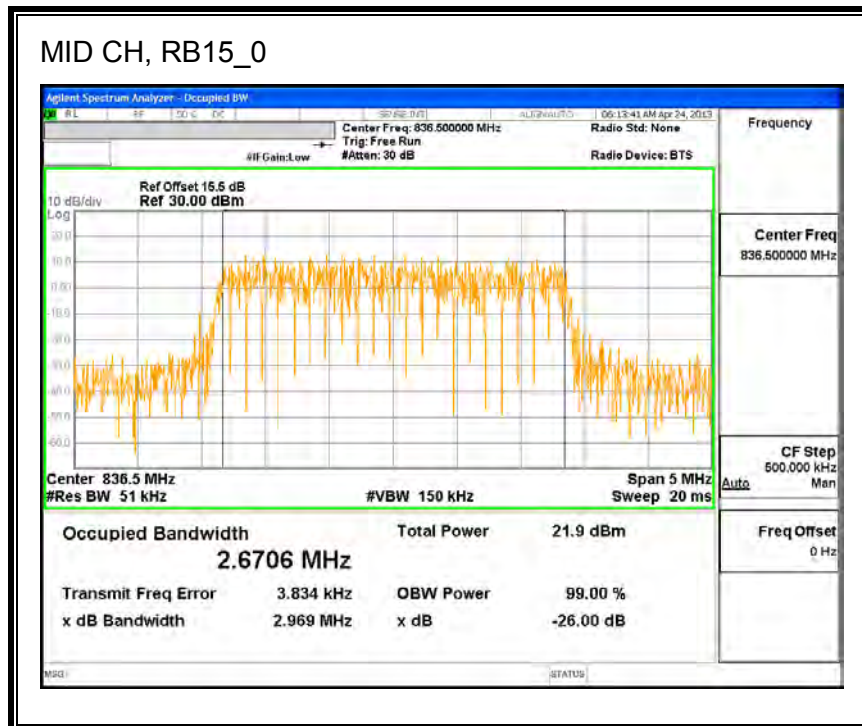
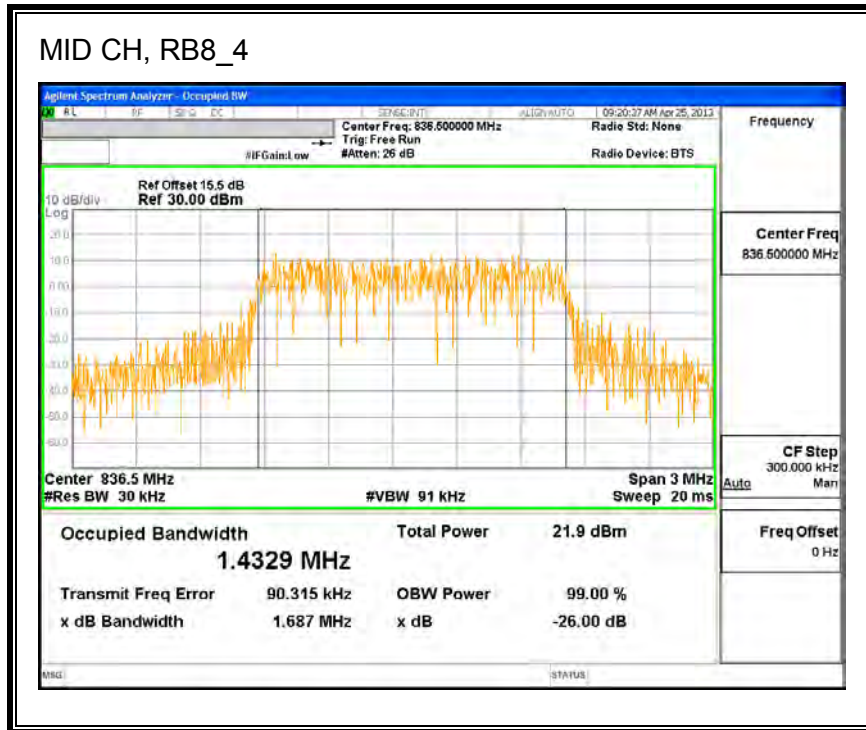


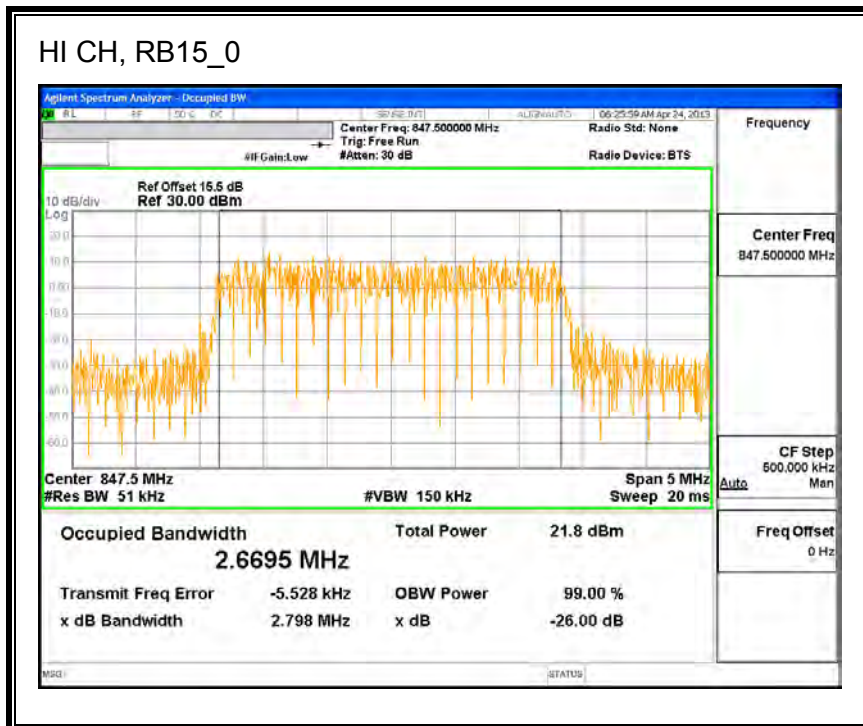
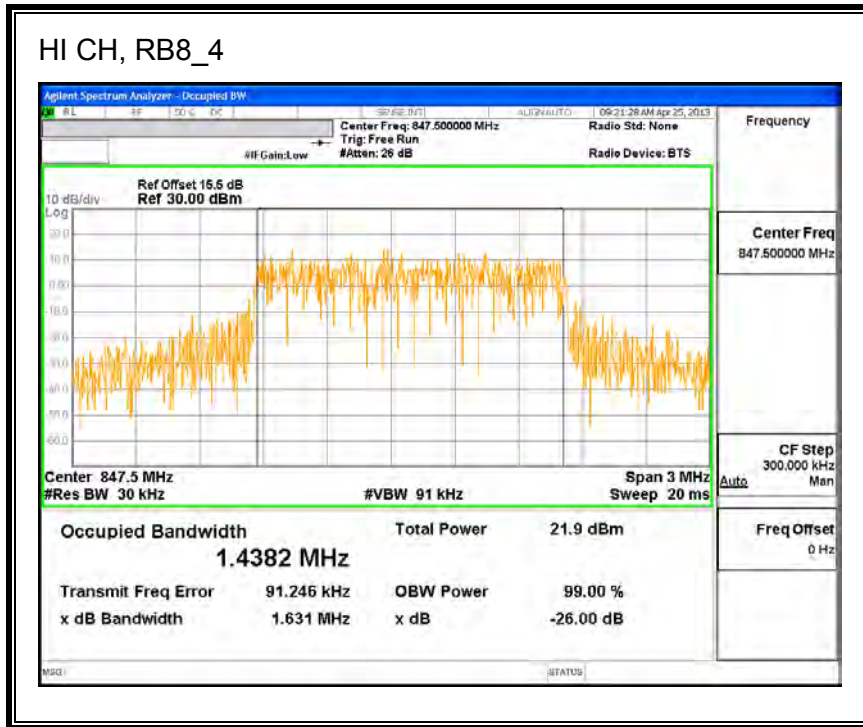


**Band 5 (3.0 MHz BAND WIDTH)**

**LTE 16QAM**

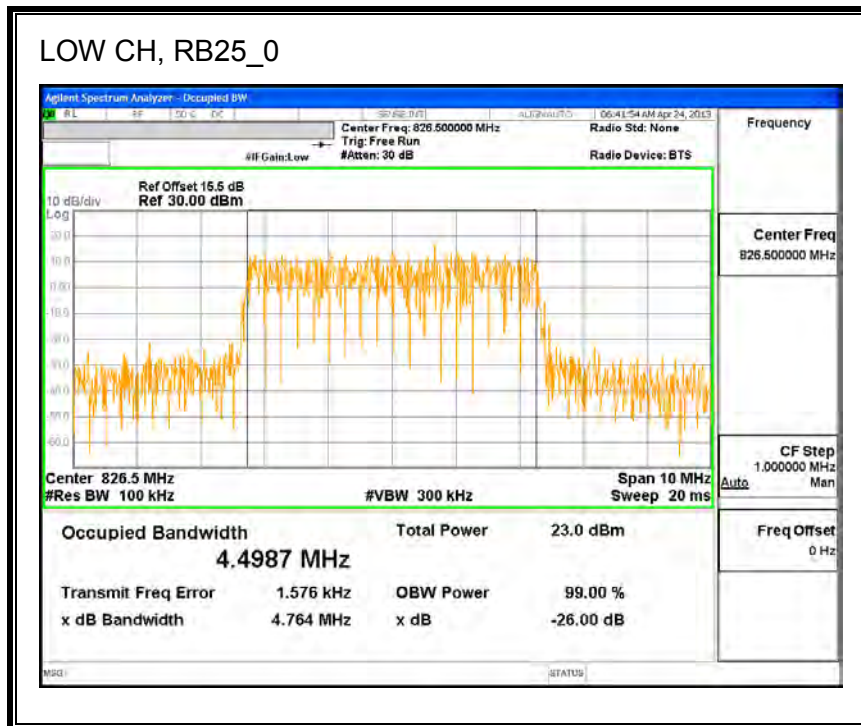
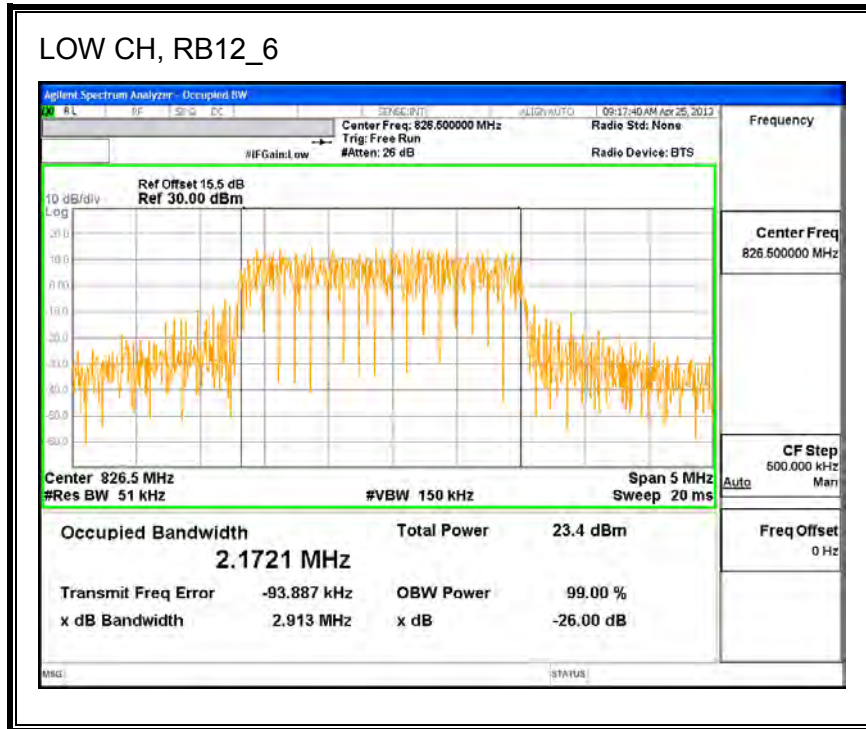


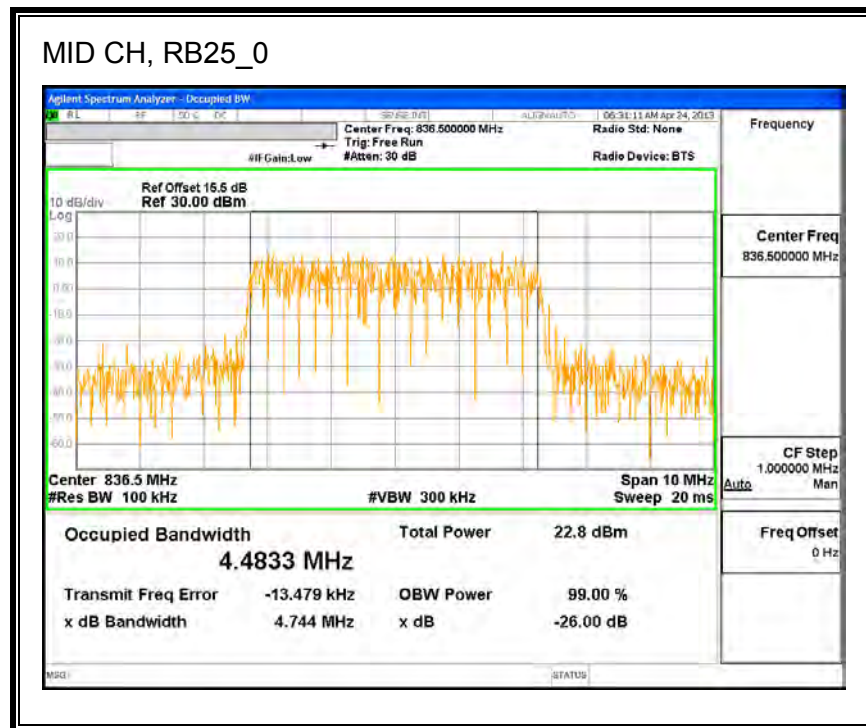
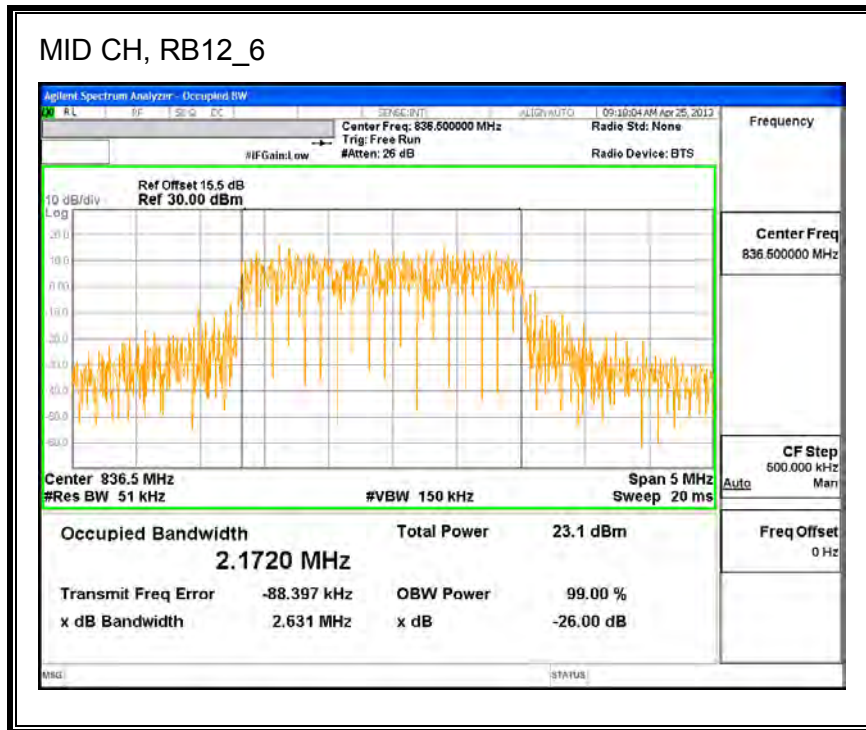




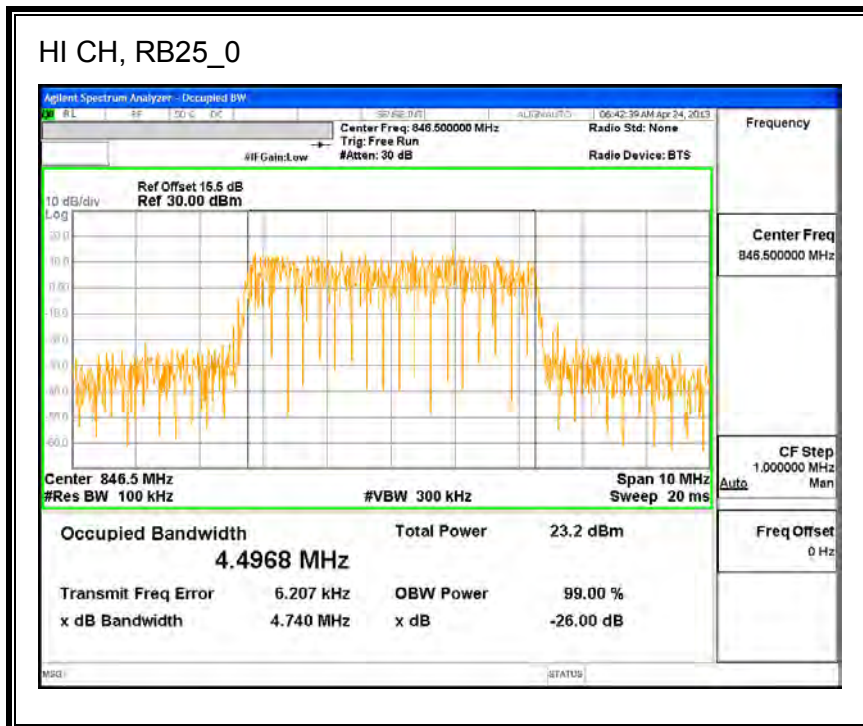
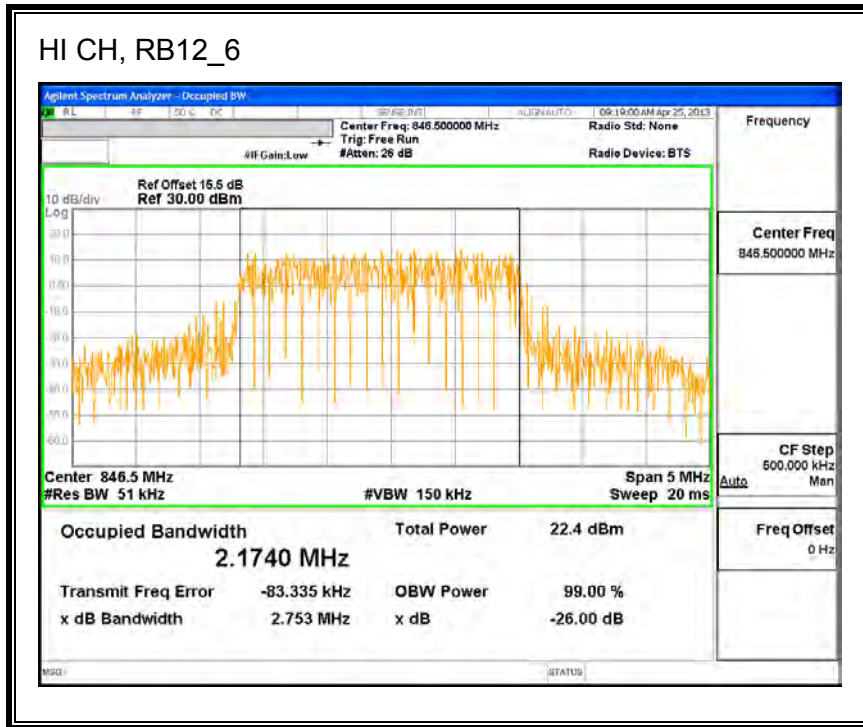
**Band 5 (5.0 MHz BAND WIDTH)**

**LTE QPSK**



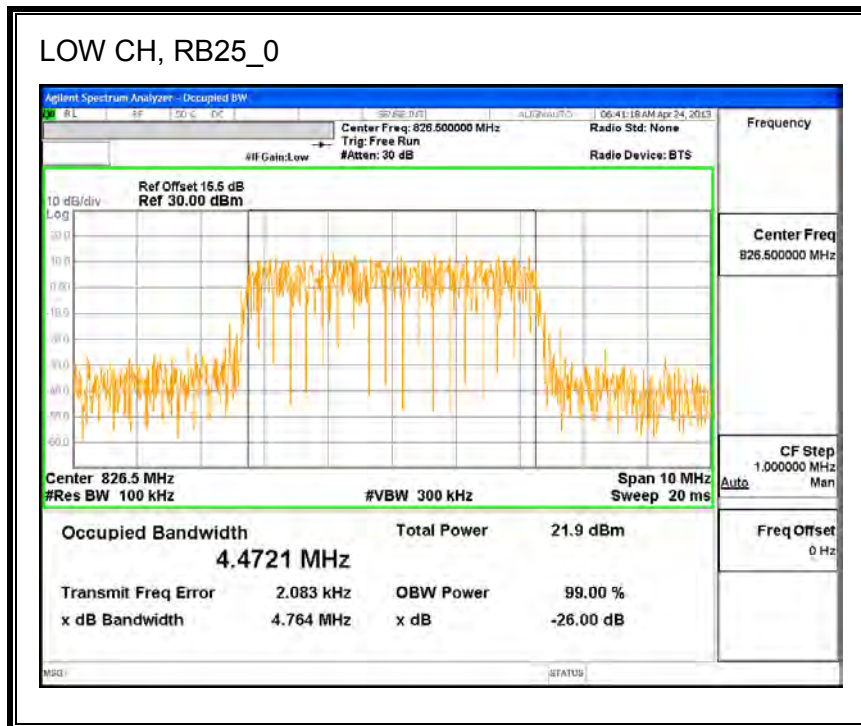
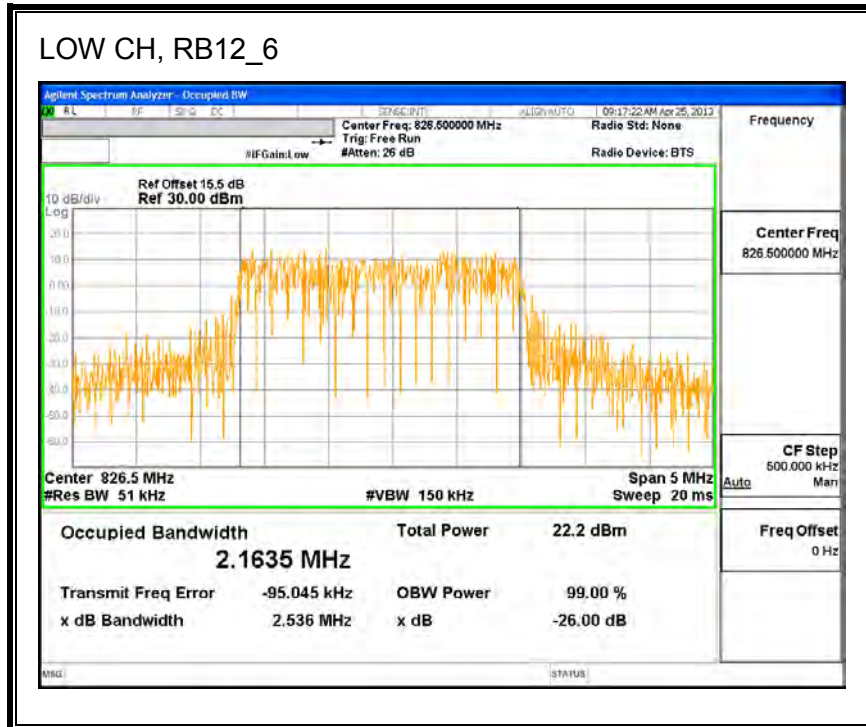


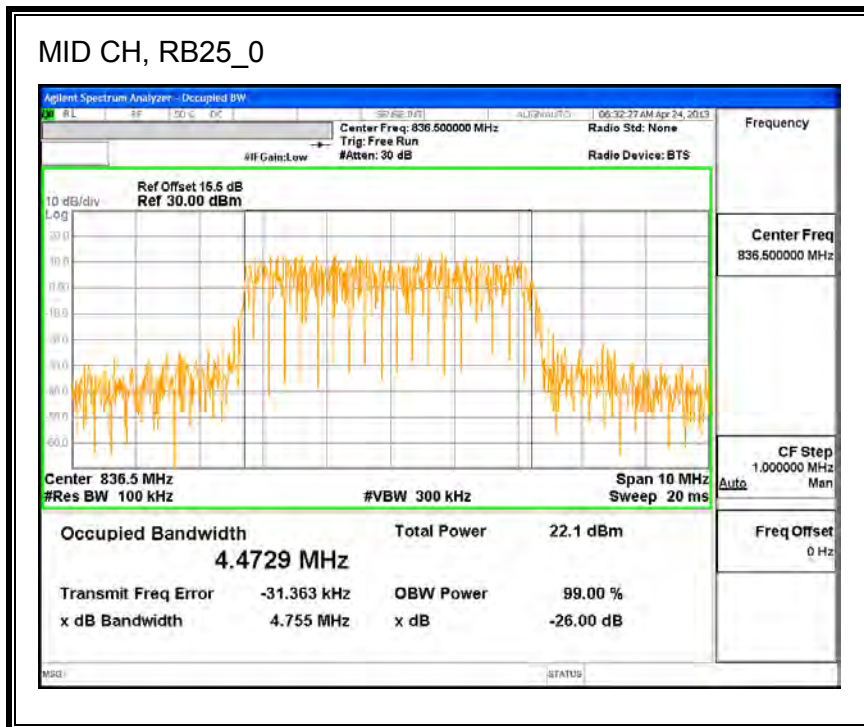
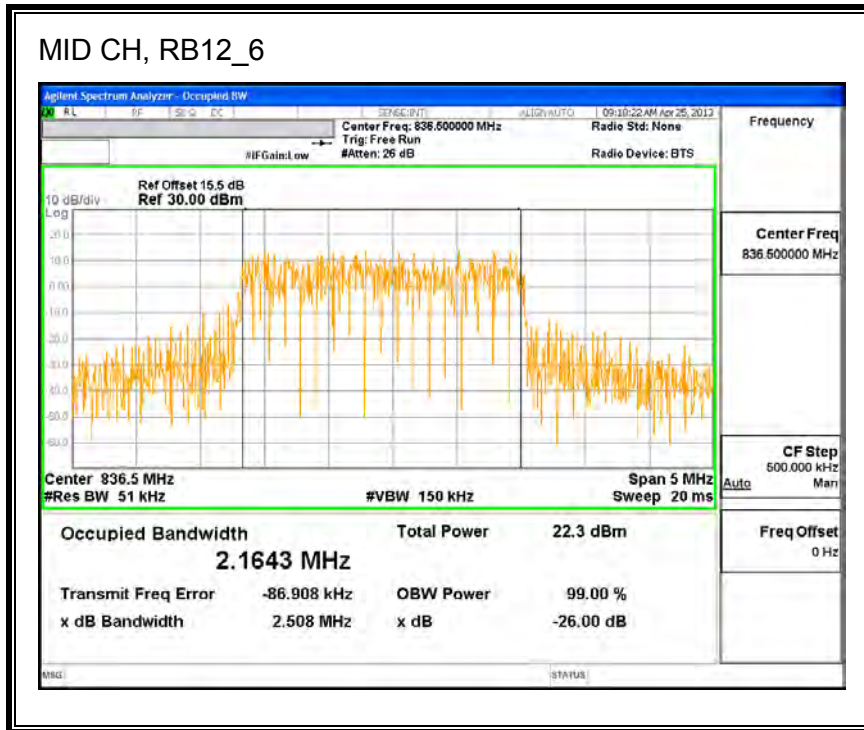


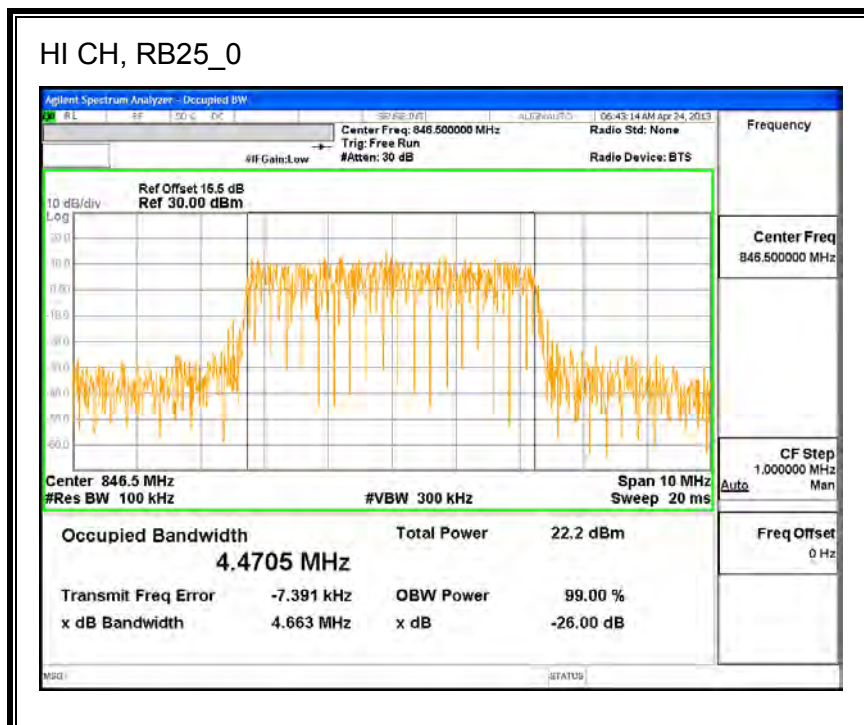
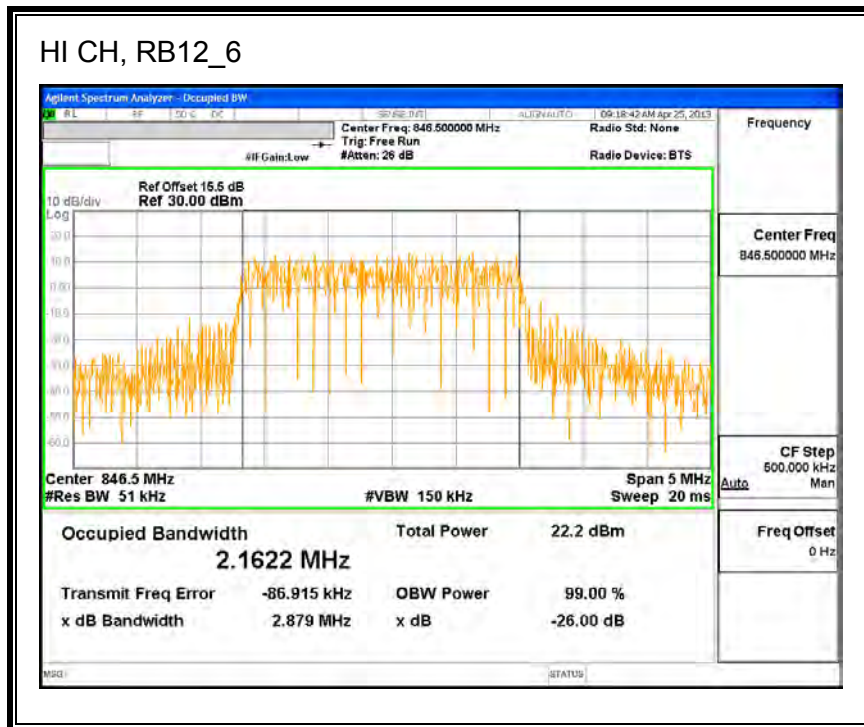


**Band 5 (5 MHz BAND WIDTH)**

**LTE 16QAM**

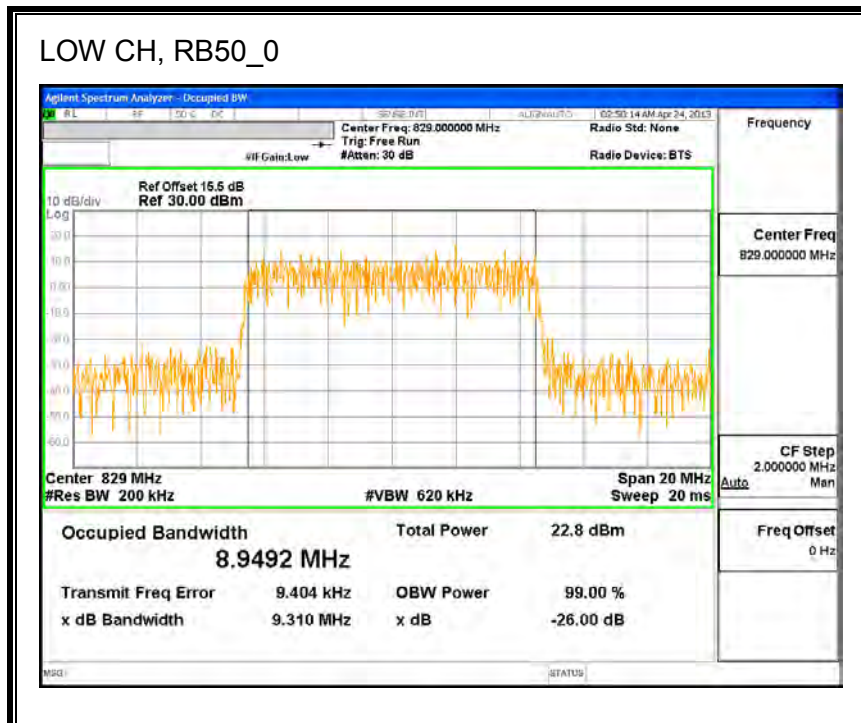
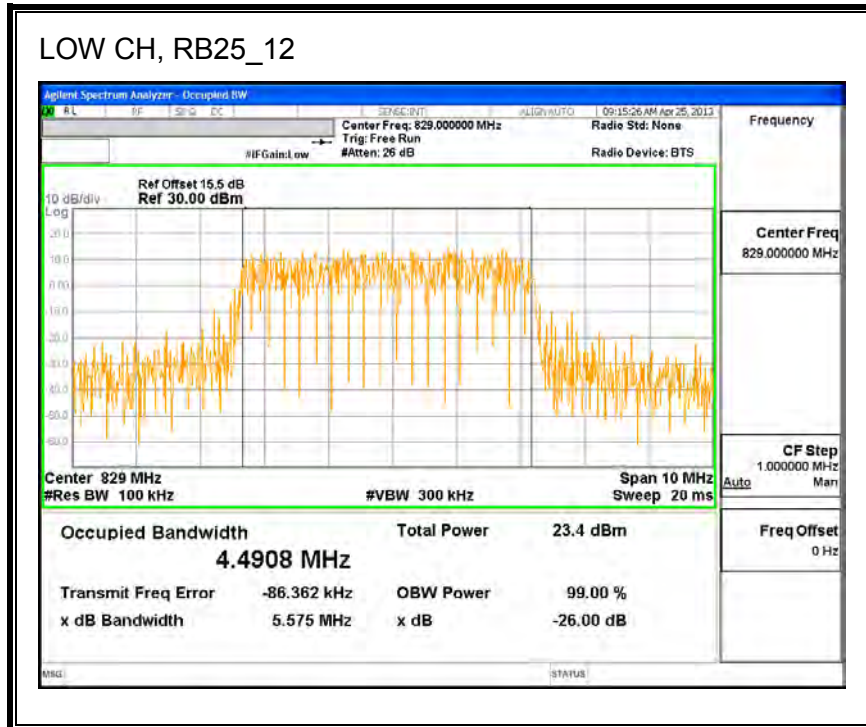


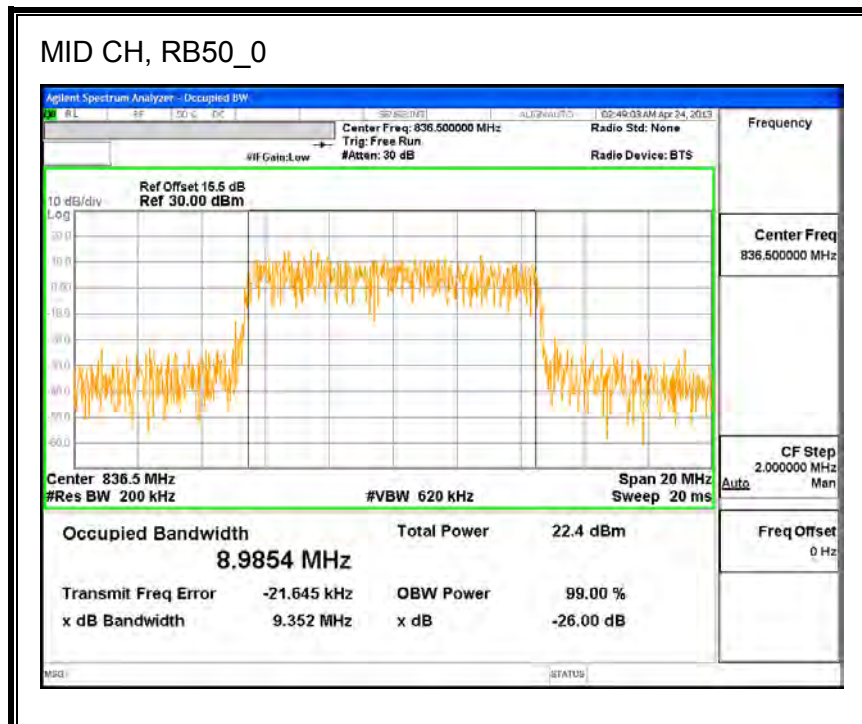
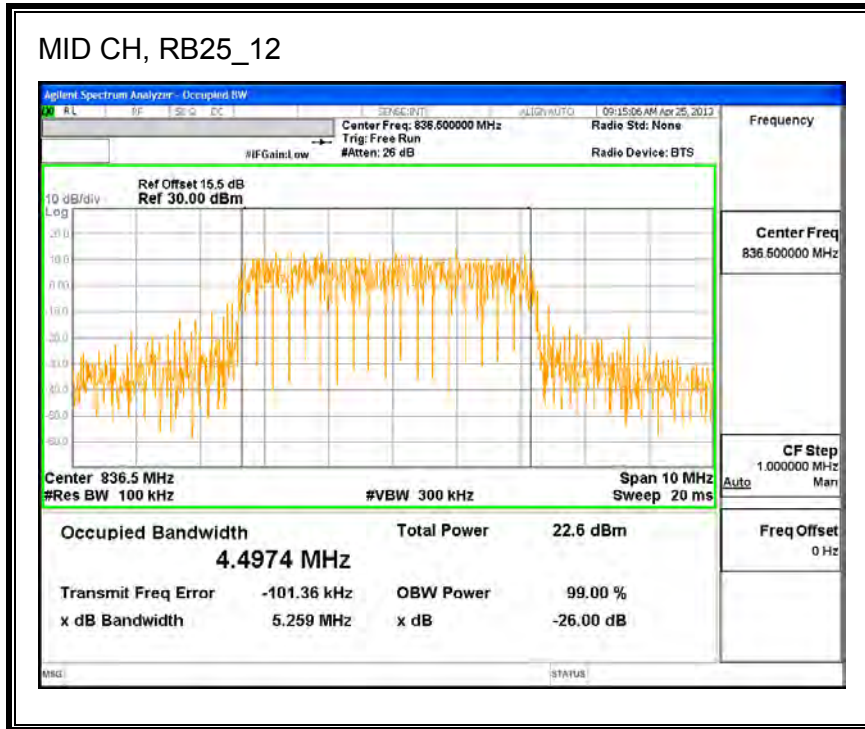


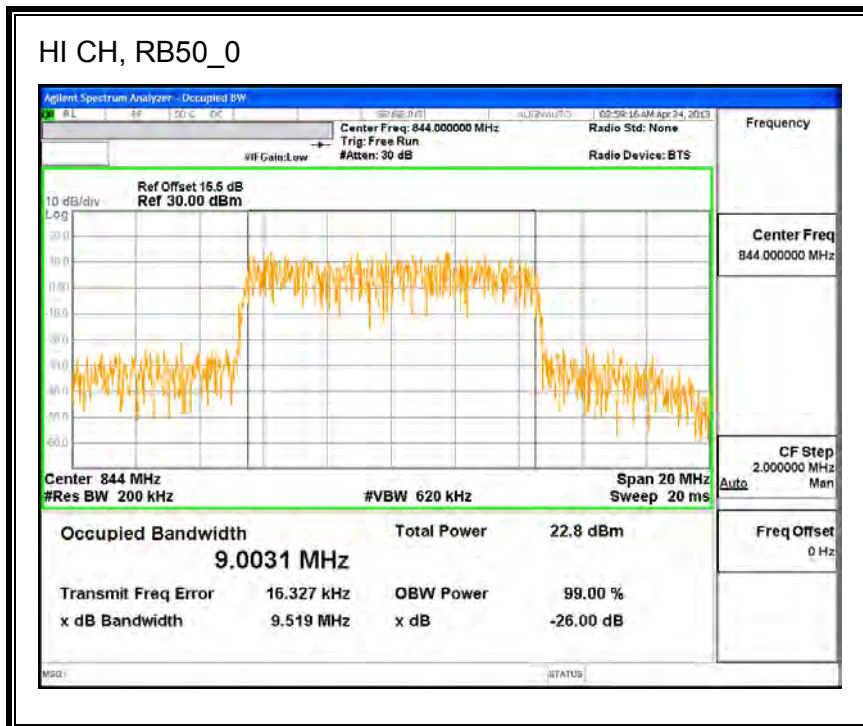
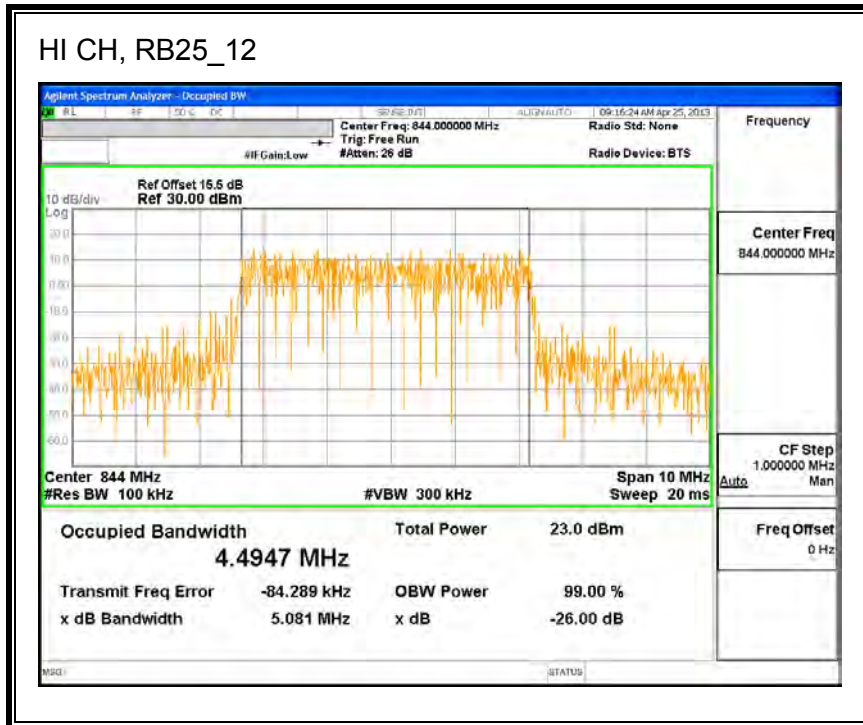


**Band 5 (10.0 MHz BAND WIDTH)**

**LTE QPSK**

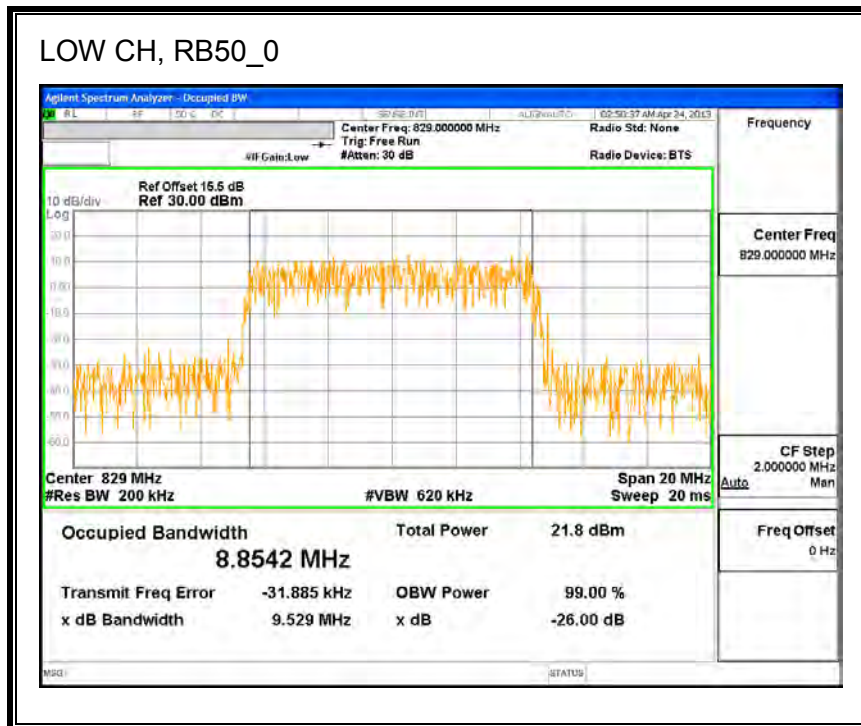
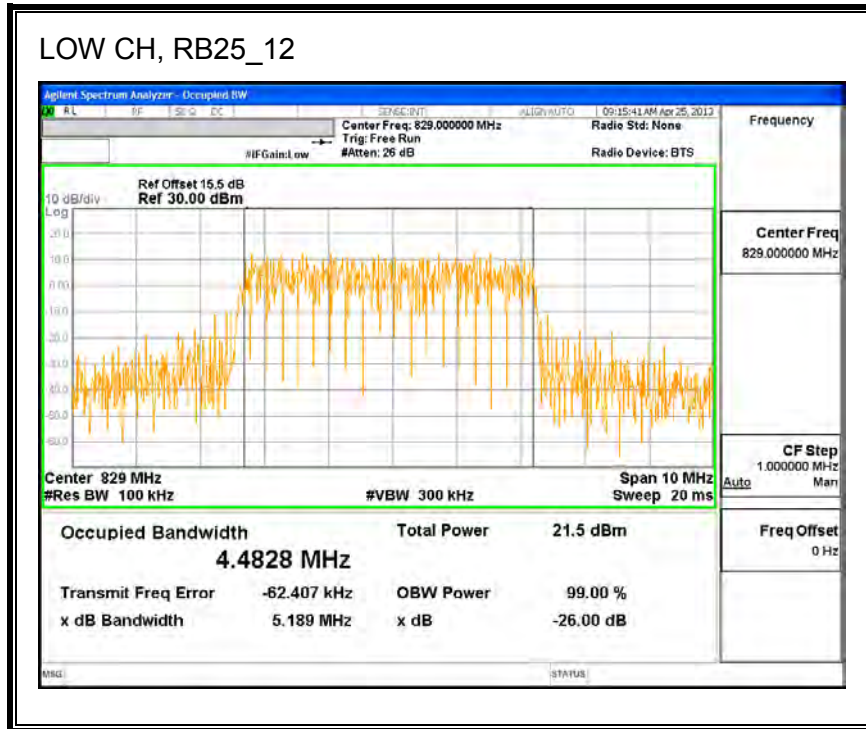




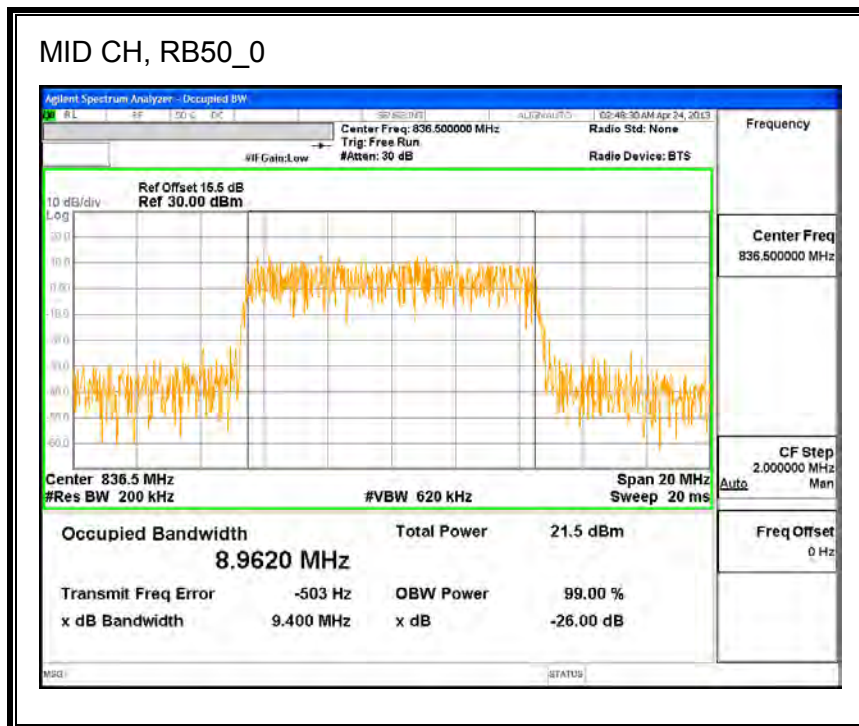
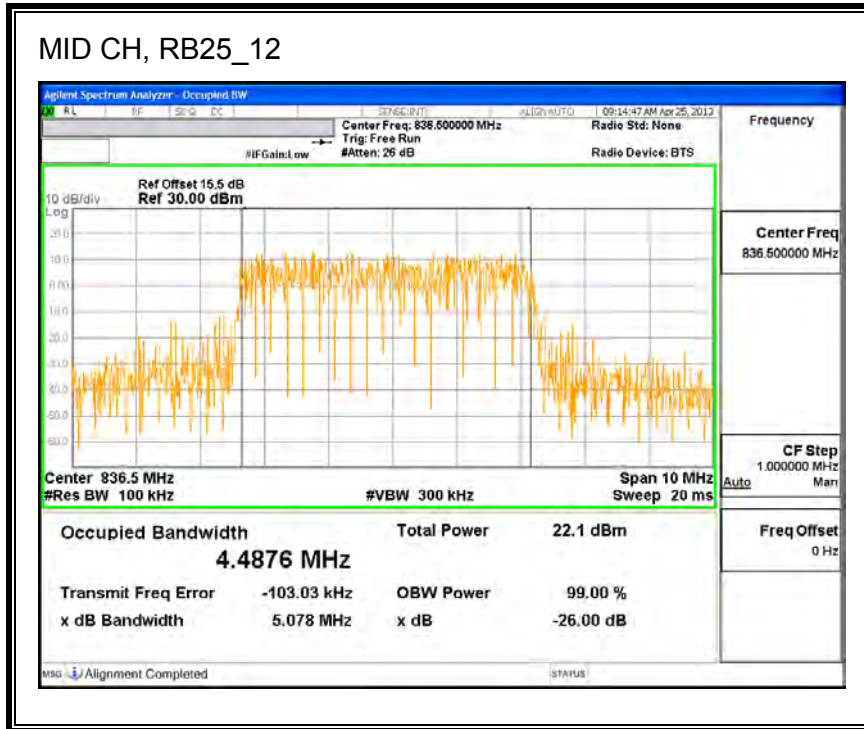


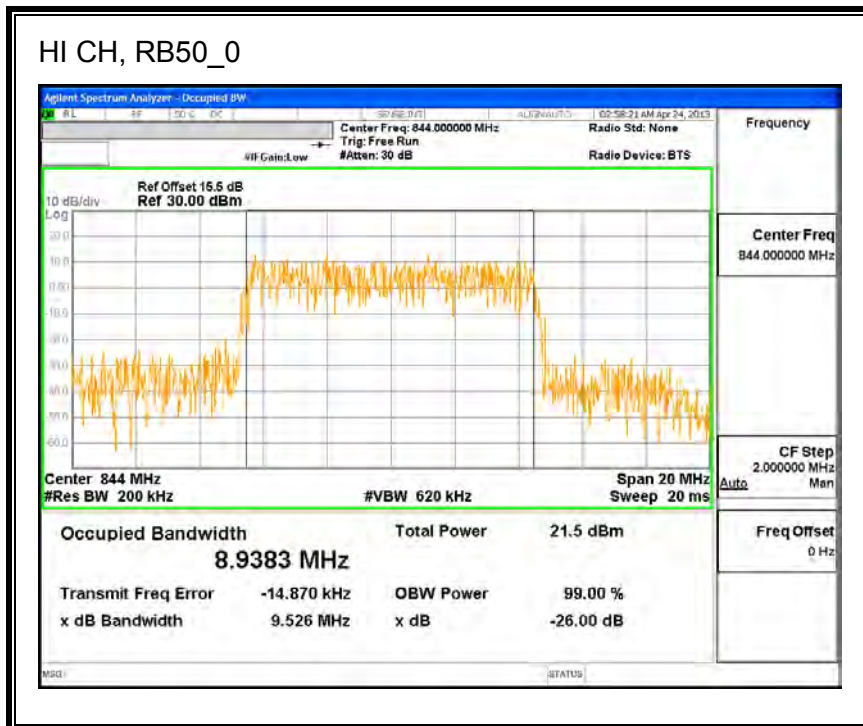
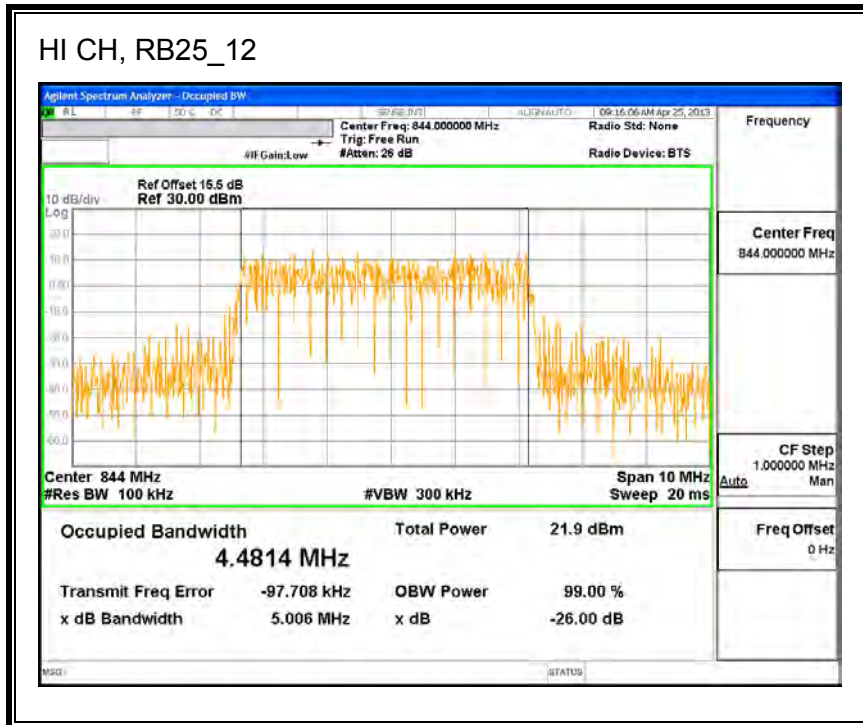
**Band 5 (10 MHz BAND WIDTH)**

**LTE 16QAM**









## **8.2. BAND EDGE**

### **RULE PART(S)**

FCC: §22.359, 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 transmitter output was connected to a Agilent 8960 Test Set and configured to operate at maximum power. The band edge emissions were measured at the required operating frequencies in each band on the Spectrum Analyzer.

For each band edge measurement:

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

### **TEST PROCEDURE**

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

For each band edge measurement:

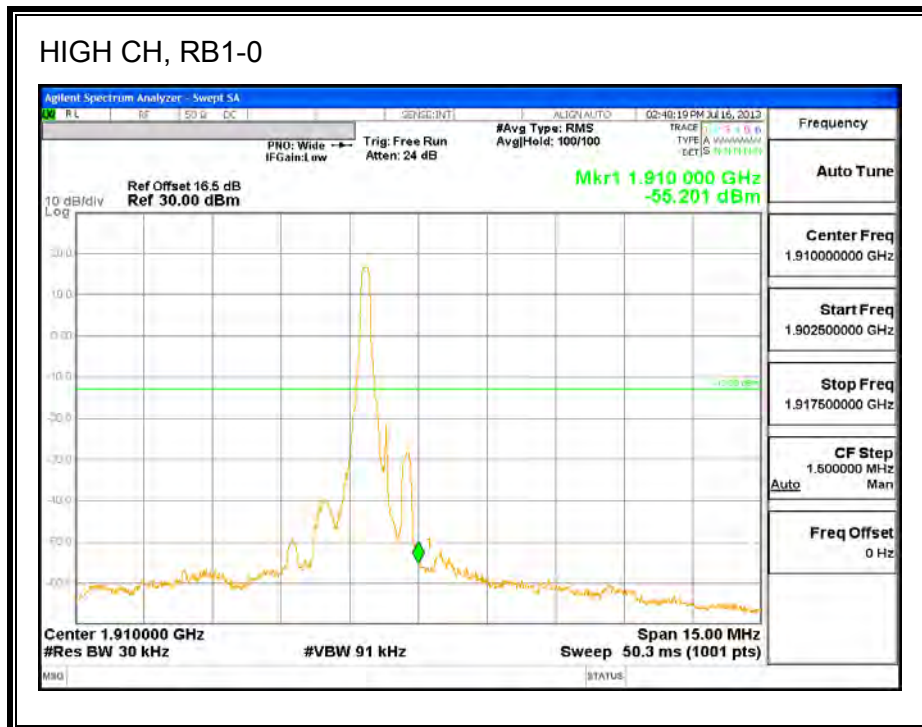
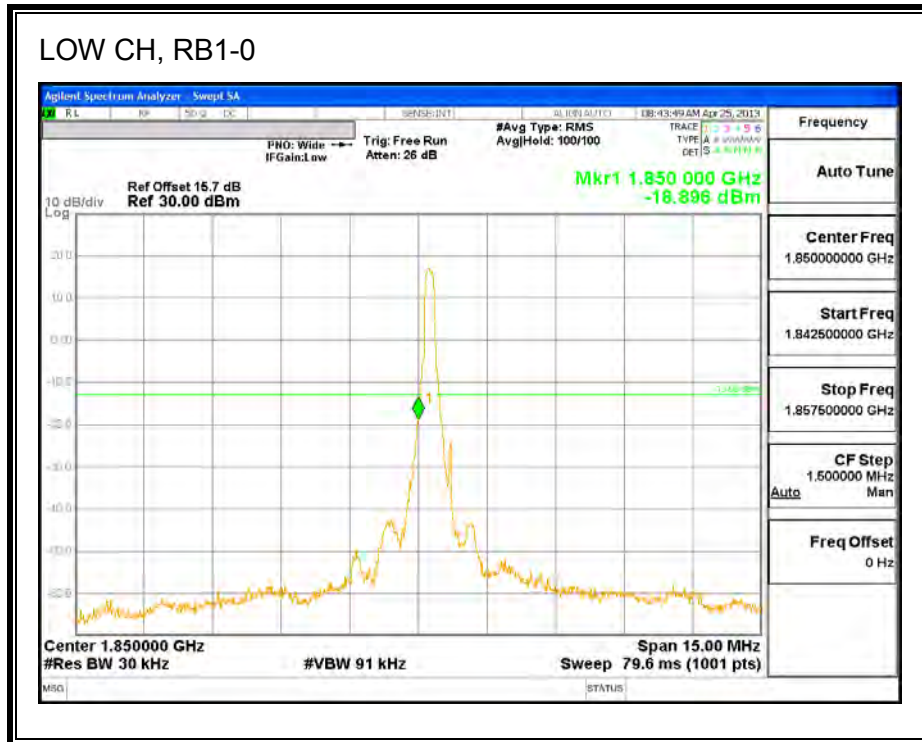
- Set the spectrum analyzer span to include the block edge frequency.
- Set a marker to point the corresponding band edge frequency in each test case.
- Set display line at -13dBm
- Set resolution bandwidth to at least 1% of emission bandwidth.

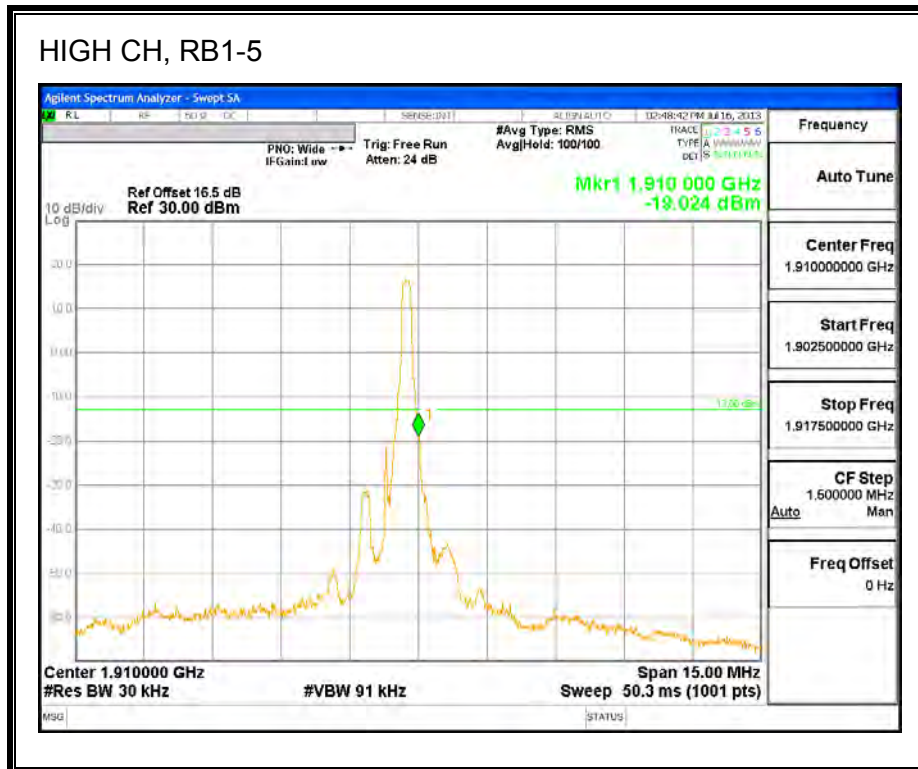
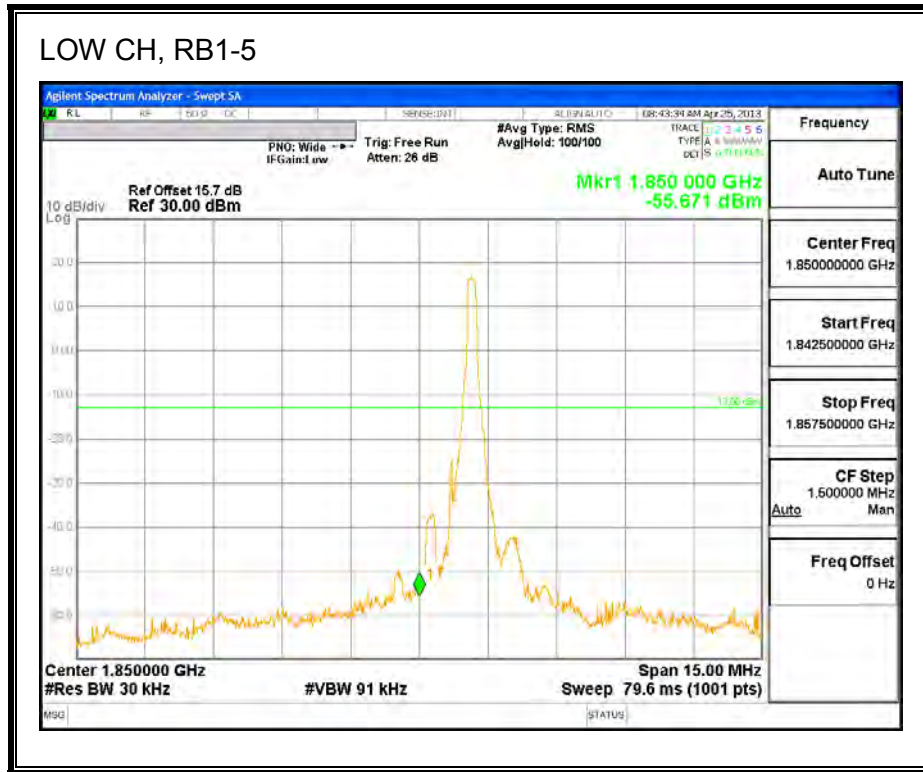
### **MODES TESTED**

- LTE BAND 2
- LTE BAND 5

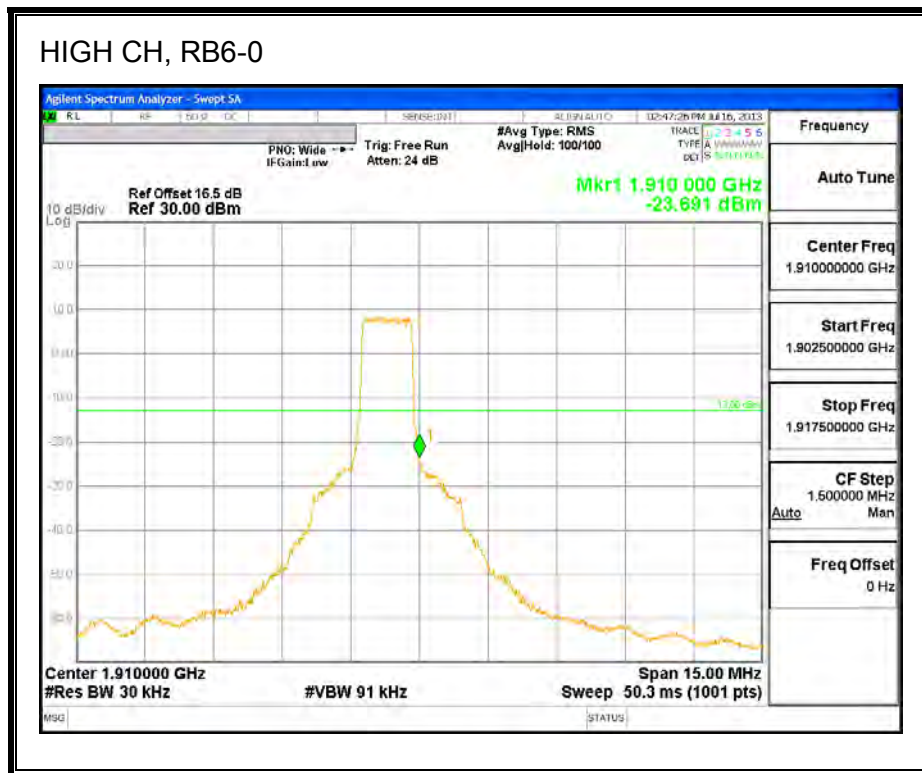
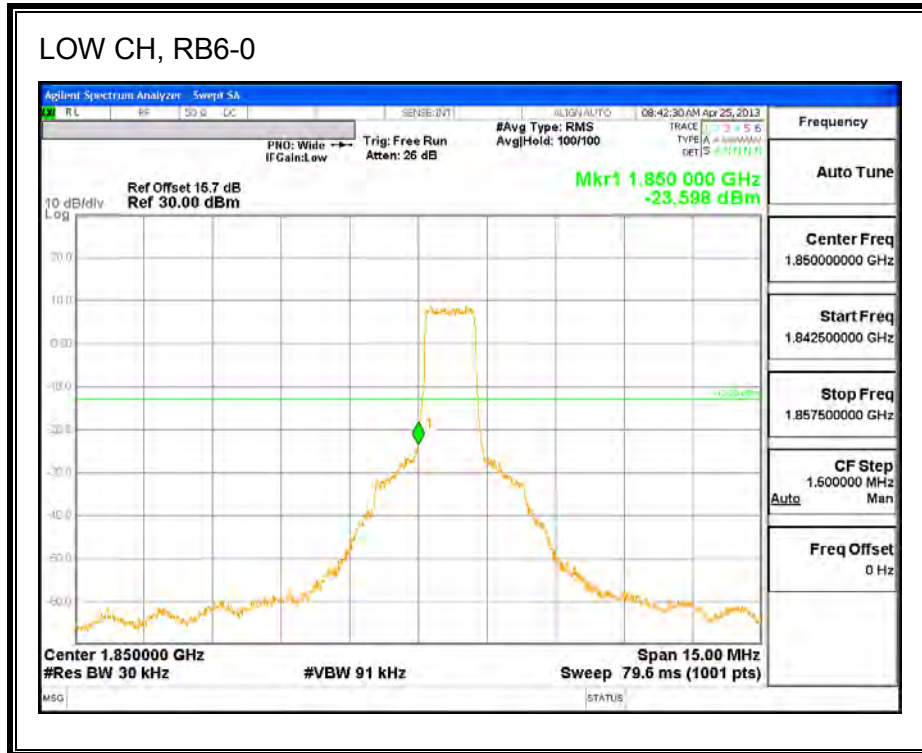
### 8.2.1. LTE BAND 2

#### QPSK Band 2 (1.4 MHz BANDWIDTH)

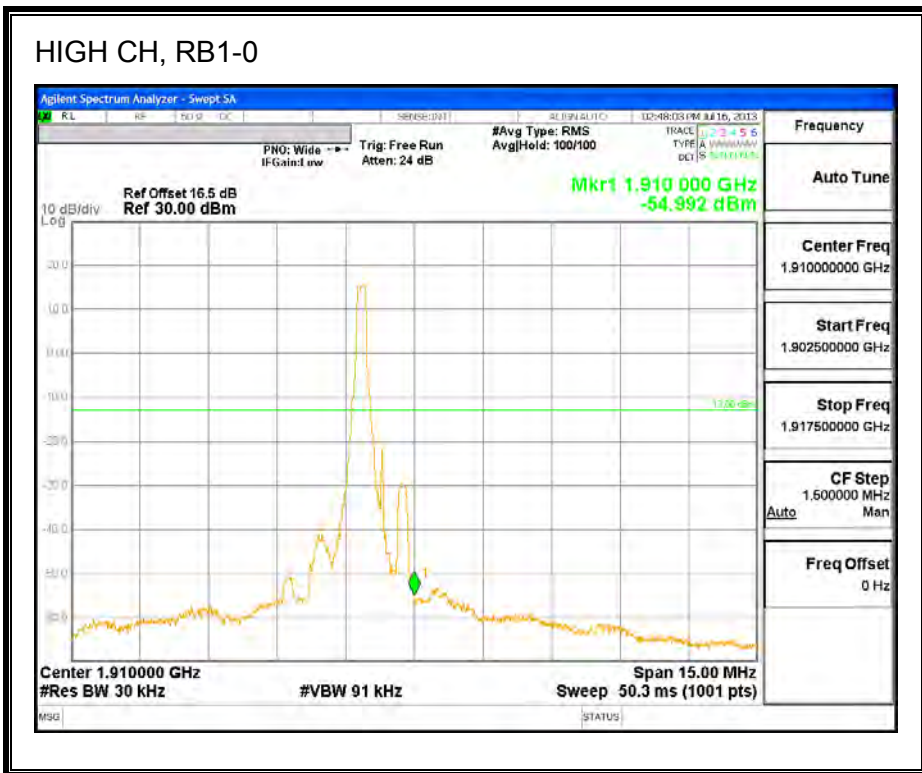
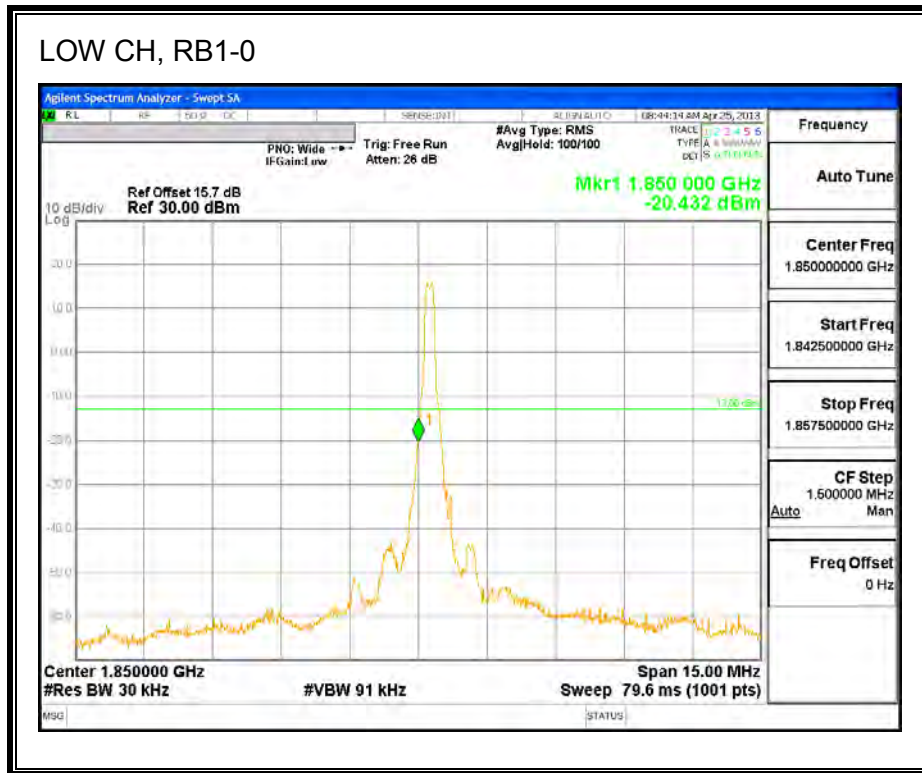




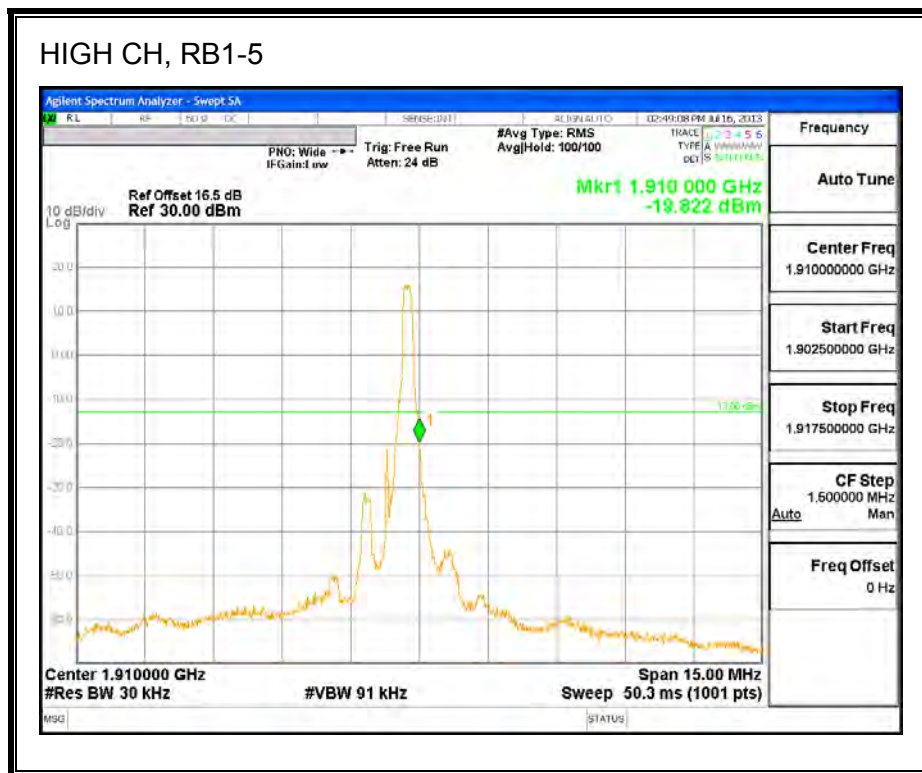
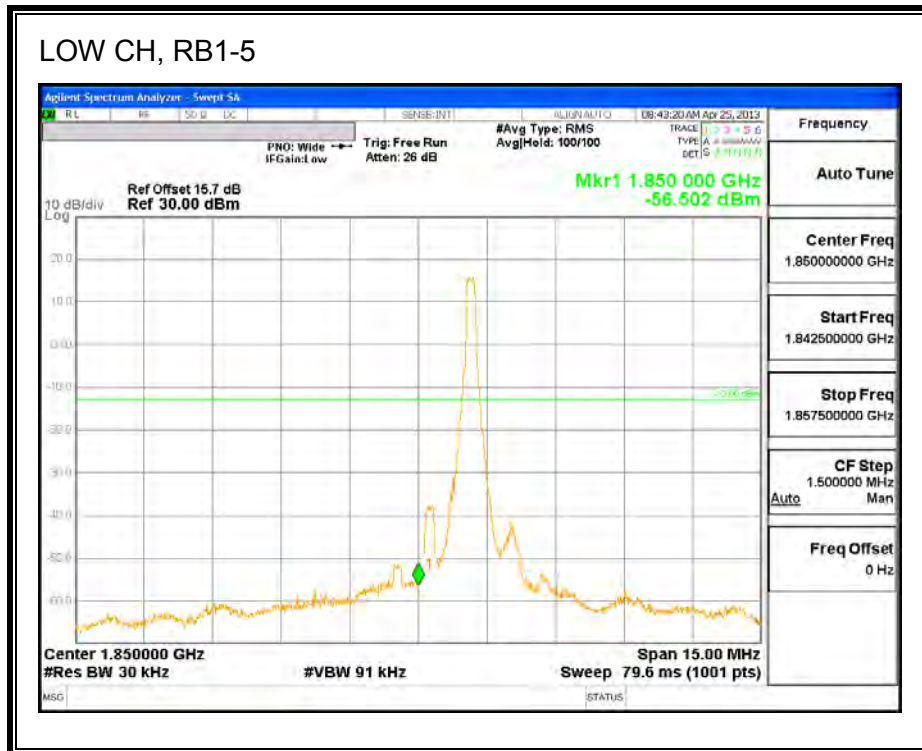


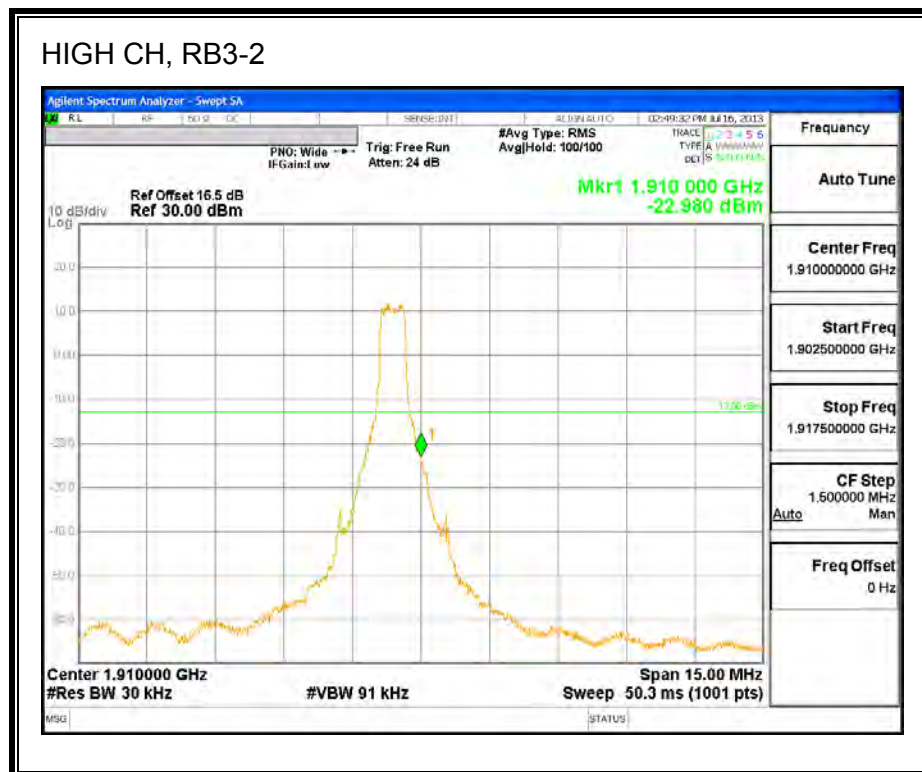
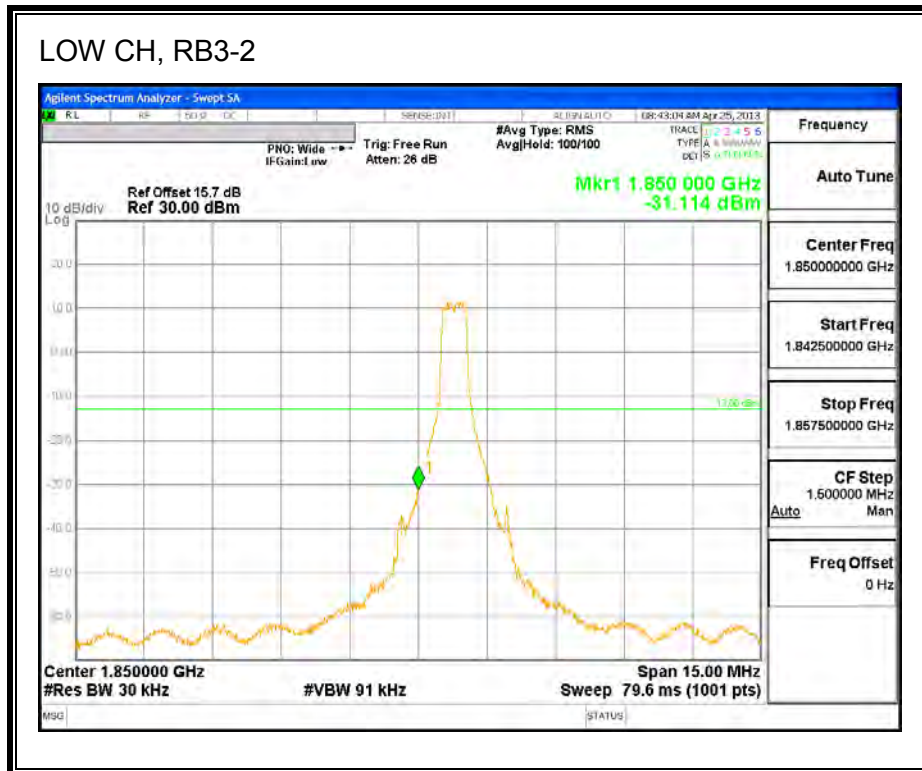


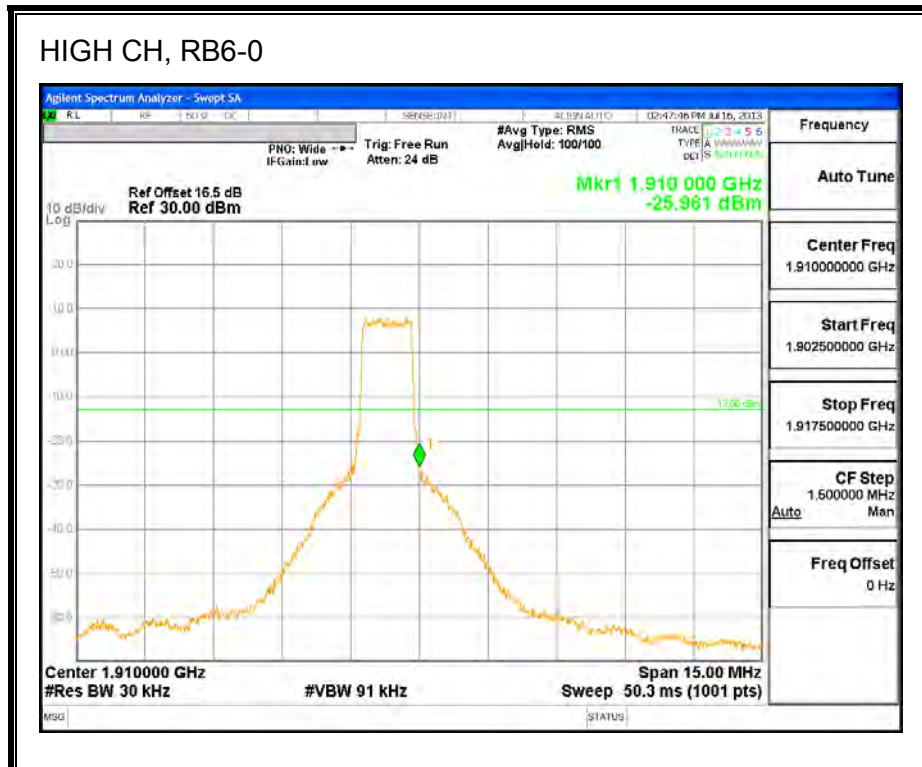
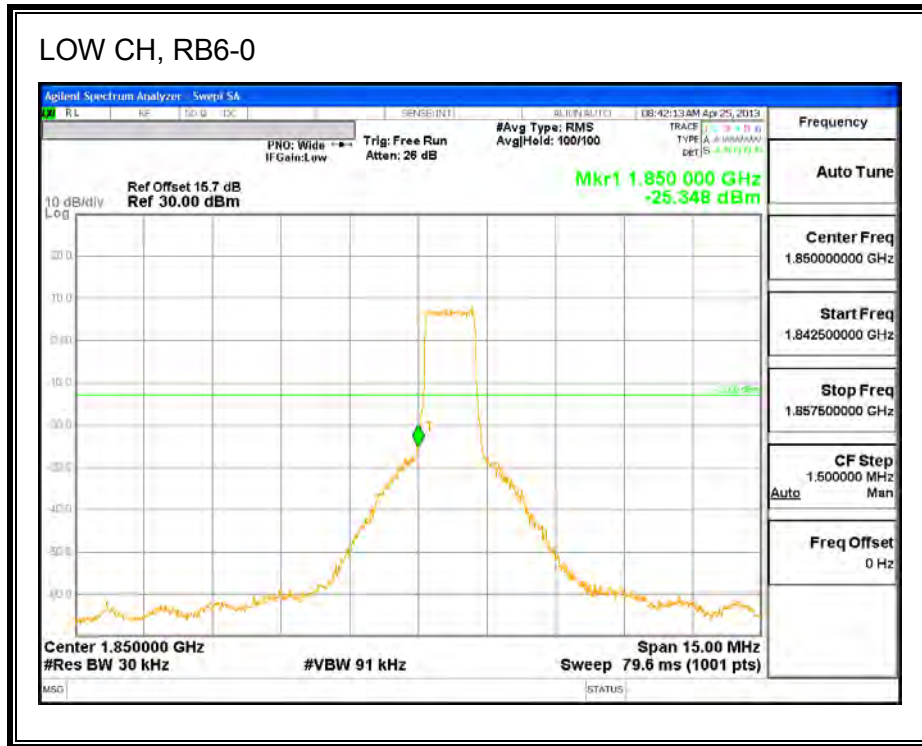
**16QAM Band 2 (1.4 MHz BANDWIDTH)**











**QPSK Band 2 (3 MHz BANDWIDTH)**

