

# RF TEST REPORT

Test item : Multi Band GSM/WCDMA/LTE Phone with Bluetooth, WLAN and NFC  
Model No. : LG-D722p, LGD722p, D722p, LG-D722P, LGD722P, D722P, LG-D722AR, LGD722AR, D722AR, LG-D722ar, LGD722ar, D722ar, LG-D722pa, D722pa, LGD722pa, LG-D722PA, D722PA, LGD722PA  
Order No. : DEMC1408-03374  
Date of receipt : 2014-08-11  
Test duration : 2014-08-11 ~ 2014-09-19  
Date of issue : 2014-09-24  
Use of report : FCC Original Grant

Applicant : LG Electronics MobileComm U.S.A., Inc.  
1000 Sylvan Avenue, Englewood Cliffs NJ 07632

Test laboratory : DT&C Co., Ltd.  
42, Yurim-ro, 154beon-gil, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea 449-935

Test specification : FCC Part 24, 27  
Test environment : See appended test report  
Test result :  Pass  Fail

The test results presented in this test report are limited only to the sample supplied by applicant and the use of this test report is inhibited other than its purpose. This test report shall not be reproduced except in full, without the written approval of DT&C Co., Ltd.

Tested by:



Engineer  
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## Test Report Version

Test Report No.	Date	Description
DRTFCC1409-1216	Sep. 24, 2014	Initial issue

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# 1. GENERAL INFORMATION

**Applicant Name:** LG Electronics Mobile Comm U.S.A., Inc.

**Address:** 1000 Sylvan Avenue, Englewood Cliffs NJ 07632

**FCC ID** : ZNFD722P  
**FCC Classification** : PCS Licensed Transmitter Held to Ear (PCE)  
**EUT Type** : Multi Band GSM/WCDMA/LTE Phone with Bluetooth, WLAN and NFC  
**Model Name** : LG-D722p  
**Add Model Name** : LG-D722p, LGD722p, D722p, LG-D722P, LGD722P, D722P, LG-D722AR, LGD722AR, D722AR, LG-D722ar, LGD722ar, D722ar, LG-D722pa, D722pa, LGD722pa, LG-D722PA, D722PA, LGD722PA  
**Supplying power** : DC 3.8V  
**Antenna Type** : ANT1 (GSM850/900 & WCDMA 5/8 & LTE Band 28/7) : PIFA  
 ANT2 (DCS/PCS & WCDMA 1/2 & LTE 2/3/4) : PIFA

Mode	TX Frequency (MHz)	Emission Designator	Modulation	ERP/EIRP	
				Max power(dBm)	Max power(W)
LTE Band 4	1710.7 ~ 1754.3	1M09G7D	QPSK	21.98	0.158
LTE Band 4	1710.7 ~ 1754.3	1M09W7D	16QAM	20.93	0.124
LTE Band 4	1711.5 ~ 1753.5	2M70G7D	QPSK	22.08	0.161
LTE Band 4	1711.5 ~ 1753.5	2M69W7D	16QAM	21.16	0.131
LTE Band 4	1712.5 ~ 1752.5	4M49G7D	QPSK	22.18	0.165
LTE Band 4	1712.5 ~ 1752.5	4M49W7D	16QAM	20.76	0.119
LTE Band 4	1715 ~ 1750	8M94G7D	QPSK	21.96	0.157
LTE Band 4	1715 ~ 1750	8M92W7D	16QAM	21.22	0.132
LTE Band 4	1717.5 ~ 1747.5	13M4G7D	QPSK	22.00	0.158
LTE Band 4	1717.5 ~ 1747.5	13M4W7D	16QAM	20.73	0.118
LTE Band 4	1720 ~ 1745	17M9G7D	QPSK	22.18	0.165
LTE Band 4	1720 ~ 1745	17M9W7D	16QAM	21.05	0.127
LTE Band 2	1850.7 ~ 1909.3	1M09G7D	QPSK	25.25	0.335
LTE Band 2	1850.7 ~ 1909.3	1M09W7D	16QAM	24.27	0.267
LTE Band 2	1851.5 ~ 1908.5	2M69G7D	QPSK	24.78	0.301
LTE Band 2	1851.5 ~ 1908.5	2M69W7D	16QAM	24.01	0.252
LTE Band 2	1852.5 ~ 1907.5	4M49G7D	QPSK	24.95	0.313
LTE Band 2	1852.5 ~ 1907.5	4M49W7D	16QAM	24.42	0.277
LTE Band 2	1855 ~ 1905	8M94G7D	QPSK	24.64	0.291
LTE Band 2	1855 ~ 1905	8M93W7D	16QAM	23.57	0.228
LTE Band 2	1857.5 ~ 1902.5	13M4G7D	QPSK	24.92	0.310
LTE Band 2	1857.5 ~ 1902.5	13M4W7D	16QAM	24.37	0.274
LTE Band 2	1860 ~ 1900	17M8G7D	QPSK	25.21	0.332
LTE Band 2	1860 ~ 1900	17M8W7D	16QAM	24.30	0.269
LTE Band 7	2502.5 ~ 2567.5	4M49G7D	QPSK	17.86	0.061
LTE Band 7	2502.5 ~ 2567.5	4M49W7D	16QAM	16.90	0.049
LTE Band 7	2505 ~ 2565	8M96G7D	QPSK	17.62	0.058
LTE Band 7	2505 ~ 2565	8M95W7D	16QAM	17.18	0.052
LTE Band 7	2507.5 ~ 2562.5	13M4G7D	QPSK	17.32	0.054
LTE Band 7	2507.5 ~ 2562.5	13M4W7D	16QAM	16.60	0.046
LTE Band 7	2510 ~ 2560	17M9G7D	QPSK	17.68	0.059
LTE Band 7	2510 ~ 2560	17M9W7D	16QAM	16.44	0.044

## **2. INTRODUCTION**

### **2.1 EUT DESCRIPTION**

The Equipment Under Test (EUT) supports 850/1900 GSM/GPRS/EDGE, 850/1900 WCDMA/HSPA, Band 4 (1.4, 3, 5, 10, 15, 20 MHz BW), Band 2 (1.4, 3, 5, 10, 15, 20 MHz BW), Band 7 (5, 10, 15, 20 MHz BW) LTE, 802.11 b/g/n WLAN, Bluetooth (BDR, EDR, LE), NFC

### **2.2 MEASURING INSTRUMENT CALIBRATION**

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards.

### **2.3 TEST FACILITY**

The 3 & 10M test site and conducted measurement facility used to collect the radiated data are located at the 38, Yurim-ro, 154beon-gil, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea 449-935. The site is constructed in conformance with the requirements.

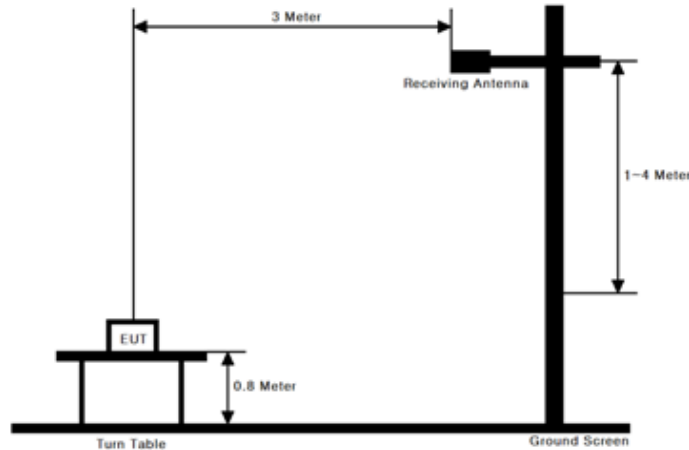
- 3 & 10M test site registration Number: 678747

### 3. DESCRIPTION OF TESTS

#### 3.1 ERP&EIRP

(Effective Radiated Power & Equivalent Isotropic Radiated Power)

##### *Test Set-up*



##### *Test Procedure*

- ANSI/TIA-603-C-2004 - Section 2.2.17
- KDB971168 v02r01 - Section 5.2.1

These measurements were performed at 3 & 10 m test site. The equipment under test is placed on a non-conductive table 0.8-meters above a turntable which is flush with the ground plane and 3 meters from the receive antenna.

##### Test setting

1. Set span to at least 1.5 times the OBW.
2. Set RBW = 1-5 % of the OBW, not to exceed 1 MHz.
3. Set VBW  $\geq 3 \times$  RBW.
4. Set number of points in sweep  $\geq 2 \times$  span / RBW.
5. Sweep time = auto couple.
6. Detector = RMS (power averaging).
7. If the EUT can be configured to transmit continuously (i.e., burst duty cycle  $\geq 98$  %), then set the trigger to free run.
8. If the EUT cannot be configured to transmit continuously (i.e., burst duty cycle  $< 98$  %), then use a sweep trigger with the level set to enable triggering only on full power bursts and configure the EUT to transmit at full power for the entire duration of each sweep.  
Ensure that the sweep time is less than or equal to the transmission burst duration.
9. Trace average at least 100 traces in power averaging (i.e., RMS) mode.
10. Compute the power by integrating the spectrum across the OBW of the signal using the instrument's band power measurement function, with the band limits set equal to the OBW band edges. If the instrument does not have a band power function, then sum the spectrum levels (in linear power units) at intervals equal to the RBW extending across the entire OBW of the spectrum.

The receive antenna height and turntable rotations were adjusted for the highest reading on the receive spectrum analyzer.

A half-wave dipole was substituted in place of the EUT. This dipole antenna was driven by a signal generator and the level of the signal generator was adjusted to obtain the same receive spectrum analyzer reading. The conducted power at the terminal of the substitute antenna is measured.

The ERP/EIRP is calculated using the following formula:

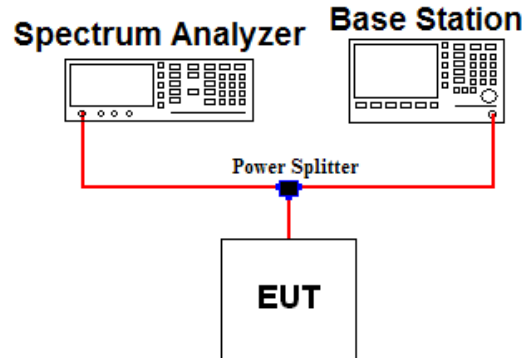
**ERP/EIRP = The conducted power at the substitute antenna's terminal [dBm] + Substitute Antenna gain [dBd for ERP, dBi for EIRP]**

For readings above 1 GHz, the above procedure is repeated using horn antennas and the difference between the gain of the horn antenna and an isotropic antenna are taken into consideration.



## 3.2 PEAK TO AVERAGE RATIO

### Test set-up



### Test Procedure

- KDB971168 v02r01 - Section 5.7.1

A peak to average ratio measurement is performed at the conducted port of the EUT. The spectrum analyzer's Complementary Cumulative Distribution Function (CCDF) measurement profile is used to determine the largest deviation between the average and the peak power of the EUT in a given bandwidth. The CCDF curve shows how much time the peak waveform spends at or above a given average power level. The present of time the signal spends at or above the level defines the probability for that particular power level.

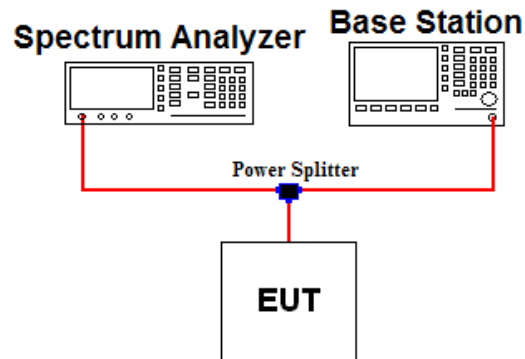
### Test setting

The spectrum Analyzer's CCDF measurement function is enabled.

1. Set resolution/measurement bandwidth  $\geq$  signal's occupied bandwidth.
2. Set the number of counts to a value that stabilizes the measured CCDF curve
3. Set the measurement interval as follows:
  - 1) For continuous transmissions, set to 1 ms.
  - 2) For burst transmissions, employ an external trigger that is synchronized with the EUT burst timing sequence, or use the internal burst trigger with a trigger level that allows the burst to stabilize and set the measurement interval to a time that is less than or equal to the burst duration.
4. Record the maximum PAPR level associated with a probability of 0.1 %

### 3.3 OCCUPIED BANDWIDTH.

#### Test set-up



#### Test Procedure

- KDB971168 v02r01-Section 4.2

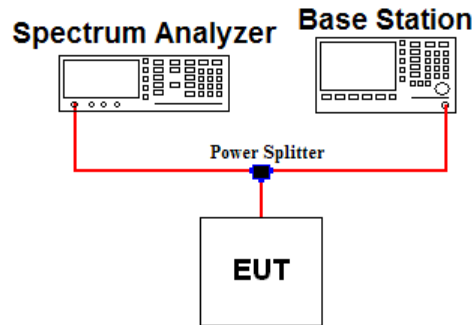
The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power of a given emission.

#### Test setting

1. The signal analyzer's automatic bandwidth measurement capability was used to perform the 99 % occupied bandwidth and the 26 dB bandwidth. The bandwidth measurement was not influenced by any intermediate power nulls in the fundamental emission.
2.  $RBW = 1 \sim 5 \%$  of the expected OBW &  $VBW \geq 3 \times RBW$
3. Detector = Peak
4. Trance mode = Max hold
5. Sweep = Auto couple
6. The trace was allowed to stabilize
7. If necessary, step 2 ~ 6 were repeated after changing the RBW such that it would be within  $1 \sim 5 \%$  of the 99 % occupied bandwidth observed in step 6.

### 3.4 BAND EDGE EMISSIONS (Conducted)

#### Test set-up



#### Test Procedure

##### - KDB971168 v02r01 - Section 6.0

All out of band emissions are measured by means of a calibrated spectrum analyzer. The EUT was setup to maximum output power at its lowest and highest channel with all bandwidths, modulations and RB configurations.

The power of any spurious emission shall be attenuated below the transmitter power (P) by at least  $43 + 10 \log(P)$  dB or requirements on note 2 in case of band 7 and 41

#### Test setting

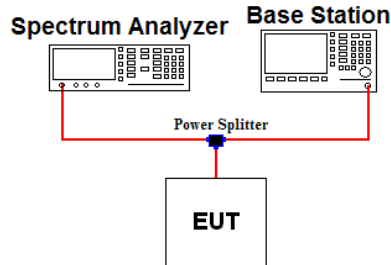
1. Start and stop frequency were set such that the band edge would be placed in the center of the plot
2. Span was set large enough so as to capture all out of band emissions near the band edge
3. RBW  $\geq 1\%$  of the emission bandwidth or  $2\%$  of the emission bandwidth (refer to note 2)
4. VBW  $\geq 3 \times$  RBW
5. Detector = RMS & Trace mode = Max hold
6. Sweep time = Auto couple or 1 s for band edge
7. Number of sweep point  $\geq 2 \times$  span / RBW
8. The trace was allowed to stabilize

Note 1: 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 to demonstrate compliance with the out-of-band emissions limit. 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 emission are attenuated at least 26 dB below the transmitter power.

Note 2: For part 27.53(m) (4) the attenuation factor shall be not less than  $40 + 10 \log(P)$  dB on all frequencies between the channel edge and 5 MHz from the channel edge,  $43 + 10 \log(P)$  dB on all frequencies between 5 MHz and X MHz from the channel edge, and  $55 + 10 \log(P)$  dB on all frequencies more than X MHz from the channel edge, where X is the greater of 6 MHz or the actual emission bandwidth as defined in paragraph (m) (6) of this section. In addition, the attenuation factor shall not be less that  $43 + 10 \log(P)$  dB on all frequencies between 2490.5 MHz and 2496 MHz and  $55 + 10 \log(P)$  dB at or below 2490.5 MHz. For mobile digital stations, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of **at least two percent** may be employed, except when the 1 MHz band is 2495-2496 MHz, in which case a resolution bandwidth of **at least one percent** may be employed

### 3.5 SPURIOUS AND HARMONIC EMISSIONS (Conducted)

#### Test set-up



#### Test Procedure

- KDB971168 v02r01 - Section 6.0

The level of the carrier and the various conducted spurious and harmonic frequencies is measured by means of a calibrated spectrum analyzer. The EUT was setup to maximum output power at its low, middle, high channel with all bandwidths, modulations and RB configurations. The spectrum is scanned from 30 MHz up to a frequency including its 10<sup>th</sup> harmonic.

The power of any spurious emission shall be attenuated below the transmitter power (P) by at least  $43 + 10 \log(P)$  dB or  $55 + 10 \log(P)$  in case of band 7 and 41.

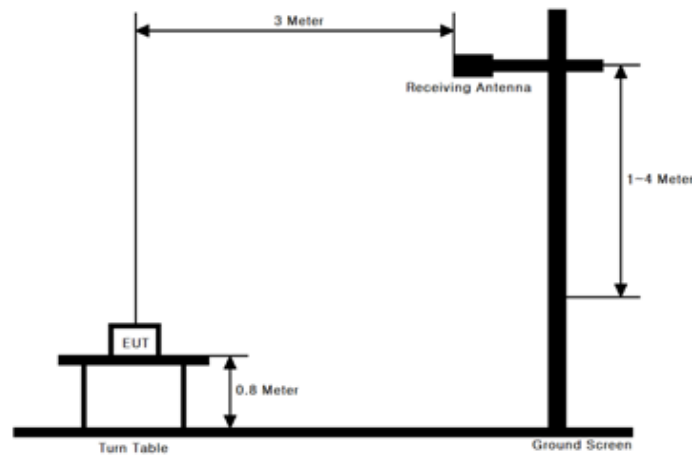
#### Test setting

1. RBW = 100 KHz or 1 MHz & VBW  $\geq 3 \times$  RBW ( Refer to Note 1)
2. Detector = RMS & Trace mode = Max hold
3. Sweep time = Auto couple
4. Number of sweep point  $\geq 2 \times$  span / RBW
5. The trace was allowed to stabilize

Note 1: Compliance with these provisions is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater for Part 22 and 1 MHz or greater for Part 24, 27.

### 3.6 UNDESIRABLE EMISSIONS (Radiated)

#### Test Set-up



#### Test Procedure

- ANSI/TIA-603-C-2004 - Section 2.2.12
- KDB971168 v02r01 - Section 5.8

These measurements were performed at 3 & 10m test site. The equipment under test is placed on a non-conductive table 0.8-meters above a turntable which is flush with the ground plane and 3 meters from the receive antenna.

#### Test setting

1. RBW = 100 kHz for below 1 GHz and 1 MHz for above 1 GHz / VBW  $\geq$  3 X RBW
2. Detector = Peak & Trace mode = Max hold
3. Sweep time = Auto couple
4. Number of sweep point  $\geq$  2 X span / RBW
5. The trace was allowed to stabilize

The receive antenna height and turntable rotations were adjusted for the highest reading on the receive spectrum analyzer.

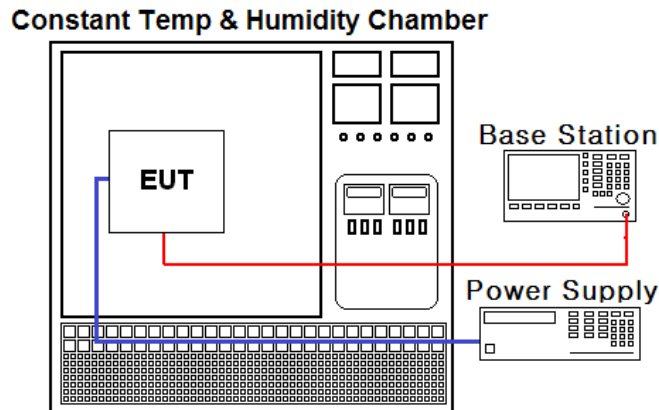
For radiated power measurements below 1 GHz, a half-wave dipole was substituted in place of the EUT. This dipole antenna was driven by a signal generator and the level of the signal generator was adjusted to obtain the same spectrum analyzer reading.

For radiated power measurements above 1 GHz, a Horn antenna was substituted in place of the EUT. This Horn antenna was driven by a signal generator and the level of the signal generator was adjusted to obtain the same spectrum analyzer reading. The difference between the gain of the horn and an isotropic antenna are taken into consideration.

This measurement was performed with the EUT oriented in 3 orthogonal axis.

### 3.6 FREQUENCY STABILITY

#### Test Set-up



#### Test Procedure

- ANSI/TIA-603-C-2004
- KDB971168 v02r01 - Section 9.0

The frequency stability of the transmitter is measured by:

a.) **Temperature:**

The temperature is varied from - 30 °C to + 50 °C using an environmental chamber.

b.) **Primary Supply Voltage:**

The primary supply voltage is varied from 85 % to 115 % of the nominal value for non hand-carried battery and AC powered equipment. For hand-carried, battery-powered equipment, primary supply voltage is reduced to the battery operating end point which shall be specified by the manufacturer.

#### Specification:

The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block for Part 24. The frequency stability of the transmitter shall be maintained within  $\pm 0.00025\%$  ( $\pm 2.5$  ppm) of the center frequency for Part 22.

#### Time Period and Procedure:

1. The carrier frequency of the transmitter is measured at room temperature. (25 °C to provide a reference)
2. The equipment is turned on in a “standby” condition for one minute before applying power to the transmitter. Measurement of the carrier frequency of the transmitter is made within one minute after applying power to the transmitter.
3. Frequency measurements are made at 10 °C intervals ranging from -30 °C to +50 °C. A period of at least one half-hour is provided to allow stabilization of the equipment at each temperature level.

**4. LIST OF TEST EQUIPMENT**

Type	Manufacturer	Model	Cal. Date (yy/mm/dd)	Next. Cal. Date (yy/mm/dd)	S/N
Spectrum Analyzer	Agilent	N9020A	13/09/24	14/09/24	MY50200867
Spectrum Analyzer	Agilent	N9030A	13/10/29	14/10/29	MY53310140
Multimeter	Fluke	17B	14/05/12	15/05/12	26030065WS
DC Power Supply	H.P	66332A	14/02/04	15/02/04	GB37470200
Power Splitter	Anritsu	K241B	14/02/28	15/02/28	1301181
Thermohygrometer	BODYCOM	BJ5478	14/03/03	15/03/03	1209
Temp & Humid Test Chamber	SJ Science	SJ-TH-S50	13/10/22	14/10/22	SJ-TH-S50-130930
Radio Communication Analyzer	Anritsu	MT8820C	14/01/10	15/01/10	6201274519
LOOP Antenna	Schwarzbeck	FMZB1513	14/04/29	16/04/29	1513-128
Bilog Antenna	SCHAFFNER	CBL6112B	12/11/06	14/11/06	2737
Dipole Antenna	Schwarzbeck	VHA9103	13/10/24	15/10/24	2116
Dipole Antenna	Schwarzbeck	VHA9103	14/04/01	16/04/01	2117
Dipole Antenna	Schwarzbeck	UHA9105	13/10/24	15/10/24	2261
Dipole Antenna	Schwarzbeck	UHA9105	14/04/01	16/04/01	2262
HORN ANT	ETS	3115	14/02/26	16/02/26	6419
HORN ANT	ETS	3117	14/05/12	16/05/12	00140394
HORN ANT	A.H.Systems	SAS-574	13/03/20	15/03/20	154
HORN ANT	A.H.Systems	SAS-574	13/05/27	15/05/27	155
Amplifier (22dB)	H.P	8447E	14/01/07	15/01/07	2945A02865
Amplifier (30dB)	Agilent	8449B	14/02/27	15/02/27	3008A00370
High-Pass Filter	Wainwright	WHNX2.1	14/09/11	15/09/11	1
High-pass filter	Wainwright	WHKX3.0	14/09/12	15/09/12	9
Amplifier	EMPOWER	BBS3Q7ELU	14/09/12	15/09/12	1020
Vector Signal Generator	Rohde Schwarz	SMBV100A	14/01/08	15/01/08	255571
Signal Generator	Rohde Schwarz	SMF100A	14/07/01	15/07/01	102341

### 5. SUMMARY OF TEST RESULTS

FCC Part Section(s)	Test Description	Test Limit	Test Condition	Status Note 1
2.1046	Conducted Output Power	N/A	Conducted	<b>C</b>
2.1049	Occupied Bandwidth	N/A		<b>C</b>
24.232(d)	Peak to Average Ratio	< 13 dB		<b>C</b>
2.1051 24.238(a) 27.53(h)	Band Edge / conducted Spurious Emissions	< 43 + 10log <sub>10</sub> (P) dB at Band edge and for all out-of-band emissions		<b>C</b>
27.53(m)	Band Edge / conducted Spurious Emissions	< 40 + 10log <sub>10</sub> (P) dB at channel edge and 5 MHz from the channel edge < 43 + 10log <sub>10</sub> (P) dB at 5 MHz and X MHz from the channel edge < 55 + 10log <sub>10</sub> (P) dB at all frequencies more than X MHz from the channel edge		<b>C</b> Note2
2.1055 24.235 27.54	Frequency Stability	< 2.5 ppm (Part 22) Fundamental emissions must stay within Authorized frequency block (Part 24, 27)		<b>C</b>
24.232(c) 27.50(h.2)	Equivalent Isotropic Radiated Power (Band 2,7)	< 2 Watts max. EIRP	Radiated	<b>C</b>
27.50(d.4)	Equivalent Isotropic Radiated Power (Band 4)	< 1 Watts max. EIRP		<b>C</b>
2.1053 24.238(a) 27.53(h)	Undesirable Emissions	< 43 + 10log <sub>10</sub> (P) dB at Band edge and for all out-of-band emissions		<b>C</b>
27.53(m)	Undesirable Emissions	< 40 + 10log <sub>10</sub> (P) dB at channel edge and 5 MHz from the channel edge < 43 + 10log <sub>10</sub> (P) dB at 5 MHz and X MHz from the channel edge < 55 + 10log <sub>10</sub> (P) dB at all frequencies more than X MHz from the channel edge		<b>C</b>
Note 1: <b>C</b> =Comply <b>NC</b> =Not Comply <b>NT</b> =Not Tested <b>NA</b> =Not Applicable Note 2: where X is the greater of 6 MHz or the actual emission bandwidth as defined in paragraph (m) (6) of this section.				

The sample was tested according to the following specification:  
**ANSI/TIA/EIA-603-C-2004 and KDB 971168 D01 v02r01**



## 6. SAMPLE CALCULATION

### A. Emission Designator

#### LTE Band 4(QPSK)

Emission Designator = **17M87G7D**

LTE OBW = 17.870 MHz

G = Phase Modulation

7 = Quantized/Digital Info

D = Data Transmission

#### LTE Band 4(16QAM)

Emission Designator = **17M89W7D**

LTE OBW = 17.894 MHz

W = Amplitude/Angle Modulated

7 = Quantized/Digital Info

D = Data Transmission

#### LTE Band 2(QPSK)

Emission Designator = **17M85G7D**

LTE OBW = 17.846 MHz

G = Phase Modulation

7 = Quantized/Digital Info

D = Data Transmission

#### LTE Band 2(16QAM)

Emission Designator = **17M84W7D**

LTE OBW = 17.835 MHz

W = Amplitude/Angle Modulated

7 = Quantized/Digital Info

D = Data Transmission

#### LTE Band 7(QPSK)

Emission Designator = **17M88G7D**

LTE OBW = 17.882 MHz

G = Phase Modulation

7 = Quantized/Digital Info

D = Data Transmission

#### LTE Band 7(16QAM)

Emission Designator = **17M91W7D**

LTE OBW = 17.911 MHz

W = Amplitude/Angle Modulated

7 = Quantized/Digital Info

D = Data Transmission

## **7. TEST DATA**

### **7.1 OCCUPIED BANDWIDTH**

- Plots of the EUT's Occupied Bandwidth are shown in Clause 8.1

### **7.2 PEAK TO AVERAGE RATIO**

- Plots of the EUT's Peak- to- Average Ratio are shown in Clause 8.2

### **7.3 BAND EDGE EMISSIONS (Conducted)**

- Plots of the EUT's Band Edge Emissions are shown in Clause 8.3

### **7.4 SPURIOUS AND HARMONICS EMISSIONS (Conducted)**

- Plots of the EUT's Spurious Emissions are shown in Clause 8.4

## 7.5 EQUIVALENT ISOTROPIC RADIATED POWER

### 7.5.1 LTE Band 4

Channel Bandwidth (MHz)	Test Frequency (MHz)	Test Mode	RB Offset/ Size	Battery cover	EUT Axis	Ant Pol (H/V)	Level(dBm) @ Ant Terminal	TX Ant Gain (dBi)	EIRP (dBm)	EIRP (W)	Margin (dB)
20	1720	QPSK	0/1	Standard	X	H	16.98	5.20	22.18	0.165	7.82
		16QAM	0/1	Standard	X	H	15.85	5.20	21.05	0.127	8.95
	1745	QPSK	0/1	Standard	X	H	16.02	5.17	21.19	0.132	8.81
		16QAM	0/1	Standard	X	H	15.09	5.17	20.26	0.106	9.74
15	1717.5	QPSK	74/1	Standard	X	H	16.26	5.20	21.46	0.140	8.54
		16QAM	74/1	Standard	X	H	15.53	5.20	20.73	0.118	9.27
	1732.5	QPSK	0/1	Standard	X	H	16.82	5.18	22.00	0.158	8.00
		16QAM	0/1	Standard	X	H	15.54	5.18	20.72	0.118	9.28
	1747.5	QPSK	38/1	Standard	X	H	16.23	5.17	21.40	0.138	8.60
		16QAM	0/1	Standard	X	H	14.96	5.17	20.13	0.103	9.87
10	1715	QPSK	0/1	Standard	X	H	16.76	5.20	21.96	0.157	8.04
		16QAM	25/1	Standard	X	H	16.02	5.20	21.22	0.132	8.78
	1732.5	QPSK	0/1	Standard	X	H	15.83	5.18	21.01	0.126	8.99
		16QAM	0/1	Standard	X	H	14.80	5.18	19.98	0.100	10.02
	1750	QPSK	0/1	Standard	X	H	15.88	5.17	21.05	0.127	8.95
		16QAM	0/1	Standard	X	H	14.87	5.17	20.04	0.101	9.96
5	1712.5	QPSK	0/1	Standard	X	H	16.98	5.20	22.18	0.165	7.82
		16QAM	13/1	Standard	X	H	15.56	5.20	20.76	0.119	9.24
	1732.5	QPSK	24/1	Standard	X	H	16.22	5.18	21.40	0.138	8.60
		16QAM	24/1	Standard	X	H	15.17	5.18	20.35	0.108	9.65
	1752.5	QPSK	13/1	Standard	X	H	16.03	5.17	21.20	0.132	8.80
		16QAM	0/1	Standard	X	H	15.47	5.17	20.64	0.116	9.36
3	1711.5	QPSK	8/1	Standard	X	H	16.88	5.20	22.08	0.161	7.92
		16QAM	0/1	Standard	X	H	15.96	5.20	21.16	0.131	8.84
	1732.5	QPSK	0/1	Standard	X	H	15.87	5.18	21.05	0.127	8.95
		16QAM	0/1	Standard	X	H	15.00	5.18	20.18	0.104	9.82
	1753.5	QPSK	0/1	Standard	X	H	16.18	5.17	21.35	0.136	8.65
		16QAM	0/1	Standard	X	H	15.01	5.17	20.18	0.104	9.82
1.4	1710.7	QPSK	0/1	Standard	X	H	16.78	5.20	21.98	0.158	8.02
		16QAM	5/1	Standard	X	H	15.73	5.20	20.93	0.124	9.07
	1732.5	QPSK	3/1	Standard	X	H	15.86	5.18	21.04	0.127	8.96
		16QAM	0/1	Standard	X	H	14.75	5.18	19.93	0.098	10.07
	1754.3	QPSK	0/1	Standard	X	H	15.63	5.17	20.80	0.120	9.20
		16QAM	0/1	Standard	X	H	14.50	5.17	19.67	0.093	10.33

Note: This device was tested under all bandwidths, modulations and RB configurations and the worst case data are reported in the table above.

7.5.2 LTE Band 2

Channel Bandwidth (MHz)	Test Frequency (MHz)	Test Mode	RB Offset/ Size	Battery cover	EUT Axis	Ant Pol (H/V)	Level(dBm) @ Ant Terminal	TX Ant Gain (dBi)	EIRP (dBm)	EIRP (W)	Margin (dB)
20	1860	QPSK	0/1	Standard	X	H	19.57	5.08	24.65	0.292	8.36
		16QAM	0/1	Standard	X	H	18.63	5.08	23.71	0.235	9.30
	1880	QPSK	0/1	Standard	X	H	19.57	5.06	24.63	0.290	8.38
		16QAM	0/1	Standard	X	H	18.72	5.06	23.78	0.239	9.23
	1900	QPSK	99/1	Standard	X	H	20.17	5.04	25.21	0.332	7.80
		16QAM	99/1	Standard	X	H	19.26	5.04	24.30	0.269	8.71
15	1857.5	QPSK	74/1	Standard	X	H	19.60	5.08	24.68	0.294	8.33
		16QAM	0/1	Standard	X	H	18.06	5.08	23.14	0.206	9.87
	1880	QPSK	0/1	Standard	X	H	19.23	5.06	24.29	0.269	8.72
		16QAM	38/1	Standard	X	H	18.07	5.06	23.13	0.206	9.88
	1902.5	QPSK	0/1	Standard	X	H	19.88	5.04	24.92	0.310	8.09
		16QAM	0/1	Standard	X	H	19.33	5.04	24.37	0.274	8.64
10	1855	QPSK	49/1	Standard	X	H	19.56	5.08	24.64	0.291	8.37
		16QAM	25/1	Standard	X	H	18.29	5.08	23.37	0.217	9.64
	1880	QPSK	0/1	Standard	X	H	18.96	5.06	24.02	0.252	8.99
		16QAM	0/1	Standard	X	H	17.73	5.06	22.79	0.190	10.22
	1905	QPSK	49/1	Standard	X	H	19.46	5.04	24.50	0.282	8.51
		16QAM	25/1	Standard	X	H	18.53	5.04	23.57	0.228	9.44
5	1852.5	QPSK	0/1	Standard	X	H	18.28	5.08	23.36	0.217	9.65
		16QAM	0/1	Standard	X	H	17.56	5.08	22.64	0.184	10.37
	1880	QPSK	0/1	Standard	X	H	19.04	5.06	24.10	0.257	8.91
		16QAM	0/1	Standard	X	H	18.04	5.06	23.10	0.204	9.91
	1907.5	QPSK	0/1	Standard	X	H	19.91	5.04	24.95	0.313	8.06
		16QAM	0/1	Standard	X	H	19.38	5.04	24.42	0.277	8.59
3	1851.5	QPSK	0/1	Standard	X	H	18.23	5.08	23.31	0.214	9.70
		16QAM	0/1	Standard	X	H	17.59	5.08	22.67	0.185	10.34
	1880	QPSK	0/1	Standard	X	H	18.93	5.06	23.99	0.251	9.02
		16QAM	0/1	Standard	X	H	17.97	5.06	23.03	0.201	9.98
	1908.5	QPSK	8/1	Standard	X	H	19.74	5.04	24.78	0.301	8.23
		16QAM	14/1	Standard	X	H	18.97	5.04	24.01	0.252	9.00
1.4	1850.7	QPSK	5/1	Standard	X	H	18.60	5.09	23.69	0.234	9.32
		16QAM	5/1	Standard	X	H	17.94	5.09	23.03	0.201	9.98
	1880	QPSK	5/1	Standard	X	H	19.15	5.06	24.21	0.264	8.80
		16QAM	5/1	Standard	X	H	18.34	5.06	23.40	0.219	9.61
	1909.3	QPSK	0/1	Standard	X	H	20.21	5.04	25.25	0.335	7.76
		16QAM	3/1	Standard	X	H	19.23	5.04	24.27	0.267	8.74

Note: This device was tested under all bandwidths, modulations and RB configurations and the worst case data are reported in the table above.

7.5.3 LTE Band 7

Channel Bandwidth (MHz)	Test Frequency (MHz)	Test Mode	RB Offset/ Size	Battery cover	EUT Axis	Ant Pol (H/V)	Level(dBm) @ Ant Terminal	TX Ant Gain (dBi)	EIRP (dBm)	EIRP (W)	Margin (dB)
20	2510	QPSK	99/1	Standard	X	H	12.19	5.49	17.68	0.059	15.33
		16QAM	99/1	Standard	X	H	10.95	5.49	16.44	0.044	16.57
	2535	QPSK	99/1	Standard	X	H	11.34	5.59	16.93	0.049	16.08
		16QAM	99/1	Standard	X	H	10.49	5.59	16.08	0.041	16.93
	2560	QPSK	50/1	Standard	X	H	10.65	5.68	16.33	0.043	16.68
		16QAM	99/1	Standard	X	H	10.03	5.68	15.71	0.037	17.30
15	2507.5	QPSK	74/1	Standard	X	H	11.84	5.48	17.32	0.054	15.69
		16QAM	74/1	Standard	X	H	11.12	5.48	16.60	0.046	16.41
	2535	QPSK	74/1	Standard	X	H	10.62	5.59	16.21	0.042	16.80
		16QAM	74/1	Standard	X	H	9.12	5.59	14.71	0.030	18.30
	2562.5	QPSK	38/1	Standard	X	H	11.02	5.69	16.71	0.047	16.30
		16QAM	0/1	Standard	X	H	9.73	5.69	15.42	0.035	17.59
10	2505	QPSK	49/1	Standard	X	H	12.15	5.47	17.62	0.058	15.39
		16QAM	49/1	Standard	X	H	11.71	5.47	17.18	0.052	15.83
	2535	QPSK	25/1	Standard	X	H	11.01	5.59	16.60	0.046	16.41
		16QAM	25/1	Standard	X	H	10.48	5.59	16.07	0.040	16.94
	2565	QPSK	0/1	Standard	X	H	10.67	5.70	16.37	0.043	16.64
		16QAM	0/1	Standard	X	H	9.52	5.70	15.22	0.033	17.79
5	2502.5	QPSK	13/1	Standard	X	H	12.40	5.46	17.86	0.061	15.15
		16QAM	0/1	Standard	X	H	11.44	5.46	16.90	0.049	16.11
	2535	QPSK	0/1	Standard	X	H	11.62	5.59	17.21	0.053	15.80
		16QAM	24/1	Standard	X	H	10.90	5.59	16.49	0.045	16.52
	2567.5	QPSK	13/1	Standard	X	H	11.19	5.71	16.90	0.049	16.11
		16QAM	0/1	Standard	X	H	9.86	5.71	15.57	0.036	17.44

Note: This device was tested under all bandwidths, modulations and RB configurations and the worst case data are reported in the table above.

### 7.6 UNDESIRABLE EMISSIONS (Radiated)

#### 7.6.1 LTE Band 4

B.W (MHz)	Test Freq. (MHz)	RB Offset/ Size	Test Mode	Freq.(MHz)	EUT Axis	Ant Pol (H/V)	Level(dBm) @ Ant Terminal	TX Ant Gain(dBi)	Result		Limit (dBc)
									(dBm)	(dBc)	
20	1720 (0.2W)	0/1	QPSK	3422.31	X	H	-49.43	7.93	-41.50	63.68	35.18
				5133.26	Y	H	-47.75	9.57	-38.18	60.36	
				6844.26	Z	V	-44.43	11.31	-33.12	55.30	
	1745 (0.1W)	0/1	QPSK	3472.28	Z	V	-51.20	7.99	-43.21	64.40	34.19
				5208.27	Y	H	-49.35	9.67	-39.68	60.87	
				6944.65	Z	V	-47.08	11.42	-35.66	56.85	
15	1717.5 (0.1W)	74/1	QPSK	3448.14	X	H	-50.75	7.96	-42.79	64.25	34.46
				5172.42	X	V	-48.18	9.62	-38.56	60.02	
				6896.71	X	V	-45.98	11.37	-34.61	56.07	
	1732.5 (0.2W)	0/1	QPSK	3451.83	X	H	-53.15	7.97	-45.18	67.18	35.00
				5177.55	X	V	-47.81	9.63	-38.18	60.18	
				6903.33	X	V	-45.23	11.38	-33.85	55.85	
	1747.5 (0.1W)	38/1	QPSK	3495.39	X	H	-52.61	8.02	-44.59	65.99	34.40
				5243.07	X	V	-49.49	9.72	-39.77	61.17	
				6990.75	X	V	-47.36	11.47	-35.89	57.29	
10	1715 (0.2W)	0/1	QPSK	3421.13	X	H	-50.68	7.93	-42.75	64.71	34.96
				5131.91	X	V	-47.27	9.57	-37.70	59.66	
				6842.41	X	V	-45.50	11.31	-34.19	56.15	
	1732.5 (0.1W)	0/1	QPSK	3456.15	X	H	-51.08	7.97	-43.11	64.12	34.01
				5184.42	X	V	-47.98	9.64	-38.34	59.35	
				6912.39	X	V	-45.84	11.39	-34.45	55.46	
	1750 (0.1W)	0/1	QPSK	3491.27	X	H	-52.00	8.02	-43.98	65.03	34.05
				5236.82	X	V	-48.04	9.71	-38.33	59.38	
				6982.45	X	V	-46.30	11.46	-34.84	55.89	

5	1712.5 (0.2W)	0/1	QPSK	3420.80	X	H	-51.07	7.93	-43.14	65.32	35.18
				5130.86	Y	H	-47.17	9.57	-37.60	59.78	
				6841.53	Y	H	-46.47	11.31	-35.16	57.34	
	1732.5 (0.1W)	24/1	QPSK	3469.30	X	H	-50.80	7.99	-42.81	64.21	34.40
				5203.94	Y	H	-48.29	9.67	-38.62	60.02	
				6938.84	Y	H	-46.53	11.42	-35.11	56.51	
	1752.5 (0.1W)	13/1	QPSK	3505.42	X	H	-51.68	8.04	-43.64	64.84	34.20
				5257.91	Y	H	-45.58	9.74	-35.84	57.04	
				7010.54	Y	H	-45.31	11.49	-33.82	55.02	
3	1711.5 (0.2W)	8/1	QPSK	3423.40	X	H	-51.60	7.93	-43.67	65.75	35.08
				5135.00	Y	H	-47.64	9.57	-38.07	60.15	
				6846.73	Y	H	-43.93	11.32	-32.61	54.69	
	1732.5 (0.1W)	0/1	QPSK	3462.54	X	H	-53.09	7.98	-45.11	66.16	34.05
				5193.58	Y	H	-47.14	9.65	-37.49	58.54	
				6924.90	Y	H	-45.60	11.40	-34.20	55.25	
	1753.5 (0.1W)	0/1	QPSK	3504.52	X	H	-53.09	8.04	-45.05	66.40	34.35
				5256.54	Y	H	-46.03	9.74	-36.29	57.64	
				7008.94	Y	H	-45.38	11.49	-33.89	55.24	
1.4	1710.7 (0.2W)	0/1	QPSK	3420.40	X	H	-52.41	7.93	-44.48	66.46	34.98
				5130.77	Z	H	-47.16	9.57	-37.59	59.57	
				6841.19	Y	H	-45.40	11.31	-34.09	56.07	
	1732.5 (0.1W)	3/1	QPSK	3465.16	X	H	-52.43	7.98	-44.45	65.49	34.04
				5197.75	Z	H	-46.56	9.66	-36.90	57.94	
				6930.27	Y	H	-46.65	11.41	-35.24	56.28	
	1754.3 (0.1W)	0/1	QPSK	3507.82	X	H	-54.87	8.04	-46.83	67.63	33.80
				5261.51	Z	H	-46.38	9.75	-36.63	57.43	
				7015.49	Y	H	-45.08	11.49	-33.59	54.39	

Note 1: Limit Calculation =  $43 + 10\log_{10}(P \text{ [Watts]})$

Note 2: This device was tested under all bandwidths, modulations and RB configurations and the worst case data are reported in the table above.

Note 3: The frequency spectrum is examined from 9 kHz to the 10th harmonic of the fundamental frequency of the transmitter. No other spurious and harmonic emissions were reported greater than listed emissions above table.

7.6.2 LTE Band 2

B.W (MHz)	Test Freq. (MHz)	RB Offset/ Size	Test Mode	Freq.(MHz)	EUT Axis	Ant Pol (H/V)	Level(dBm) @ Ant Terminal	TX Ant Gain(dBi)	Result		Limit (dBc)
									(dBm)	(dBc)	
20	1860 (0.3W)	0/1	QPSK	3702.12	Z	V	-49.34	8.41	-40.93	65.58	37.65
				5553.22	Y	H	-41.13	10.11	-31.02	55.67	
				7404.22	Y	H	-45.37	11.80	-33.57	58.22	
	1880 (0.3W)	0/1	QPSK	3742.07	Z	V	-49.61	8.48	-41.13	65.76	37.63
				5613.24	Y	H	-45.14	10.15	-34.99	59.62	
				7484.48	Y	H	-43.04	11.86	-31.18	55.81	
	1900 (0.3W)	99/1	QPSK	3817.75	Z	V	-46.15	8.62	-37.53	62.74	38.21
				5726.77	Y	H	-44.96	10.23	-34.73	59.94	
				7635.48	Y	H	-43.23	11.98	-31.25	56.46	
15	1857.5 (0.3W)	74/1	QPSK	3728.30	Z	V	-50.98	8.45	-42.53	67.21	37.68
				5592.60	Y	H	-45.17	10.13	-35.04	59.72	
				7456.72	Y	H	-46.23	11.84	-34.39	59.07	
	1880 (0.3W)	0/1	QPSK	3746.63	Z	V	-48.65	8.49	-40.16	64.45	37.29
				5620.20	Y	H	-46.72	10.15	-36.57	60.86	
				7493.41	Y	H	-41.26	11.87	-29.39	53.68	
	1902.5 (0.3W)	0/1	QPSK	3791.70	Z	V	-48.45	8.57	-39.88	64.80	37.92
				5687.47	Y	H	-42.77	10.20	-32.57	57.49	
				7583.31	Y	H	-44.68	11.94	-32.74	57.66	
10	1855 (0.3W)	49/1	QPSK	3718.85	Z	V	-50.90	8.62	-42.28	66.92	37.64
				5578.20	Y	H	-44.17	10.12	-34.05	58.69	
				7437.50	Y	H	-45.53	11.83	-33.70	58.34	
	1880 (0.3W)	0/1	QPSK	3751.30	Z	V	-51.41	8.50	-42.91	66.93	37.02
				5626.67	Y	H	-46.83	10.16	-36.67	60.69	
				7502.35	Y	H	-42.52	11.88	-30.64	54.66	
	1905 (0.3W)	49/1	QPSK	3818.72	Z	V	-46.66	8.62	-38.04	62.54	37.50
				5726.26	Y	H	-46.50	10.23	-36.27	60.77	
				7637.77	Y	H	-45.32	11.98	-33.34	57.84	



5	1852.5 (0.2W)	0/1	QPSK	3700.54	Z	V	-49.70	8.40	-41.30	64.66	36.36
				5551.10	Y	H	-45.86	10.11	-35.75	59.11	
				7401.23	Y	H	-45.94	11.80	-34.14	57.50	
	1880 (0.3W)	0/1	QPSK	3755.76	Z	V	-49.82	8.51	-41.31	65.41	37.10
				5633.52	Y	H	-44.34	10.16	-34.18	58.28	
				7511.29	Y	H	-44.18	11.88	-32.30	56.40	
	1907.5 (0.3W)	0/1	QPSK	3810.60	Z	V	-50.71	8.61	-42.10	67.05	37.95
				5716.12	Y	H	-44.47	10.22	-34.25	59.20	
				7621.34	Y	H	-44.37	11.97	-32.40	57.35	
3	1851.5 (0.2W)	0/1	QPSK	3700.35	Z	V	-49.41	8.40	-41.01	64.32	36.31
				5550.72	Y	H	-41.35	10.11	-31.24	54.55	
				7400.82	Y	H	-44.61	11.80	-32.81	56.12	
	1880 (0.3W)	0/1	QPSK	3757.45	Z	V	-48.50	8.51	-39.99	63.98	36.99
				5636.29	Y	H	-46.17	10.17	-36.00	59.99	
				7515.11	Y	H	-45.34	11.89	-33.45	57.44	
	1908.5 (0.3W)	8/1	QPSK	3817.21	Z	V	-45.93	8.62	-37.31	62.09	37.78
				5725.92	Y	H	-43.03	10.23	-32.80	57.58	
				7634.55	Y	H	-43.55	11.98	-31.57	56.35	
1.4	1850.7 (0.2W)	5/1	QPSK	3702.29	Z	V	-49.92	8.41	-41.51	65.20	36.69
				5553.50	Y	H	-42.32	10.11	-32.21	55.90	
				7404.65	Y	H	-43.31	11.80	-31.51	55.20	
	1880 (0.3W)	5/1	QPSK	3760.87	Z	V	-47.17	8.52	-38.65	62.86	37.21
				5641.36	Y	H	-45.45	10.17	-35.28	59.49	
				7521.35	Y	H	-44.24	11.89	-32.35	56.56	
	1909.3 (0.3W)	0/1	QPSK	3817.81	Z	V	-43.56	8.62	-34.94	60.19	38.25
				5726.36	Y	H	-44.37	10.23	-34.14	59.39	
				7635.51	Y	H	-44.11	11.98	-32.13	57.38	

Note 1: Limit Calculation =  $43 + 10\log_{10}(P \text{ [Watts]})$

Note 2: This device was tested with all bandwidths, modulations and RB configurations and the worst case data are reported in the table above.

Note 3: The frequency spectrum is examined from 9 kHz to the 10th harmonic of the fundamental frequency of the transmitter. No other spurious and harmonic emissions were reported greater than listed emissions above table.

7.6.3 LTE Band 7

B.W (MHz)	Test Freq. (MHz)	RB Offset/ Size	Test Mode	Freq.(MHz)	EUT Axis	Ant Pol (H/V)	Level(dBm) @ Ant Terminal	TX Ant Gain(dBi)	Result		Limit (dBc)
									(dBm)	(dBc)	
20	2510 (0.1W)	99/1	QPSK	5037.82	Z	H	-41.14	9.44	-31.70	49.38	42.68
				7556.67	Y	V	-44.64	11.92	-32.72	50.40	
				10075.67	Z	V	-43.34	13.03	-30.31	47.99	
	2535 (0.04W)	99/1	QPSK	5087.87	Z	H	-44.42	9.51	-34.91	51.84	41.93
				7631.91	Y	V	-43.28	11.98	-31.30	48.23	
				10175.62	Z	V	-42.87	13.02	-29.85	46.78	
	2560 (0.04W)	50/1	QPSK	5120.24	Z	H	-39.97	9.55	-30.42	46.75	41.33
				7680.12	Y	V	-45.03	12.02	-33.01	49.34	
				10240.22	Z	V	-44.04	13.02	-31.02	47.35	
15	2507.5 (0.3W)	74/1	QPSK	5028.23	Z	H	-41.07	9.43	-31.64	48.96	42.32
				7542.36	Y	V	-44.48	11.91	-32.57	49.89	
				10056.59	Z	V	-43.26	13.03	-30.23	47.55	
	2535 (0.3W)	74/1	QPSK	5083.28	Z	H	-46.87	9.50	-37.37	53.58	41.21
				7624.97	Y	V	-42.54	11.97	-30.57	46.78	
				10166.50	Z	V	-42.19	13.03	-29.16	45.37	
	2562.5 (0.3W)	38/1	QPSK	5125.32	Z	H	-38.45	9.56	-28.89	45.60	41.71
				7688.45	Y	V	-43.55	12.02	-31.53	48.24	
				10250.37	Z	V	-44.61	13.02	-31.59	48.30	
10	2505 (0.1W)	49/1	QPSK	5018.74	Z	H	-42.58	9.42	-33.16	50.78	42.62
				7528.15	Y	V	-44.54	11.90	-32.64	50.26	
				10037.63	Z	V	-41.63	13.03	-28.60	46.22	
	2535 (0.04W)	25/1	QPSK	5070.24	Z	H	-43.37	9.49	-33.88	50.48	41.60
				7605.42	Y	V	-44.84	11.96	-32.88	49.48	
				10140.17	Z	V	-44.13	13.03	-31.10	47.70	
	2565 (0.04W)	0/1	QPSK	5121.26	Z	H	-39.30	9.55	-29.75	46.12	41.37
				7681.72	Y	V	-45.05	12.02	-33.03	49.40	
				10242.33	Z	V	-43.77	13.02	-30.75	47.12	

5	2502.5 (0.1W)	13/1	QPSK	5005.42	Z	H	-46.14	9.40	-36.74	54.60	42.86
				7508.10	Y	V	-44.02	11.88	-32.14	50.00	
				10010.92	Z	V	-42.74	13.03	-29.71	47.57	
	2535 (0.1W)	0/1	QPSK	5065.60	Z	H	-44.64	9.48	-35.16	52.37	42.21
				7598.60	Y	V	-44.27	11.95	-32.32	49.53	
				10131.33	Z	V	-44.16	13.03	-31.13	48.34	
	2567.5 (0.04W)	13/1	QPSK	5135.27	Z	H	-40.11	9.57	-30.54	47.44	41.90
				7703.27	Y	V	-43.80	12.04	-31.76	48.66	
				10270.48	Z	V	-43.90	13.02	-30.88	47.78	

Note 1: Limit Calculation =  $55 + 10\log_{10}(P \text{ [Watts]})$  at all frequencies more than X MHz from the channel edge.  
 (Where X is the greater of 6 MHz or the actual emission bandwidth)

Note 2: This device was tested under all bandwidths, modulations and RB configurations and the worst case data are reported in the table above.

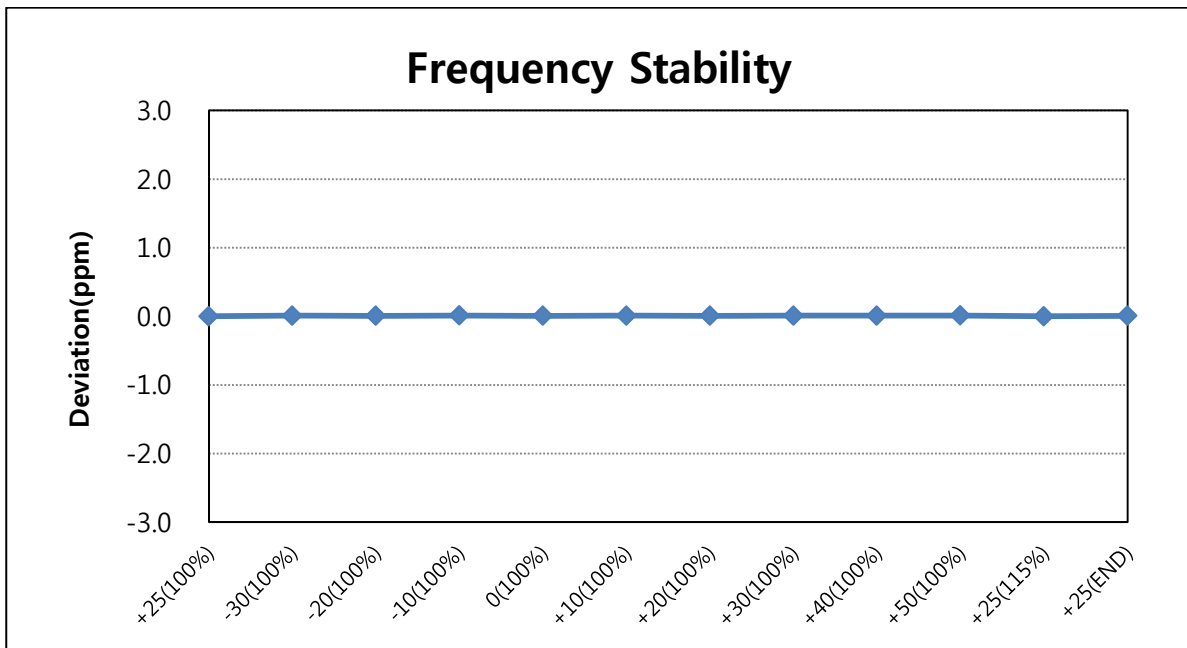
Note 3: The frequency spectrum is examined from 9 kHz to the 10<sup>th</sup> harmonic of the fundamental frequency of the transmitter. No other spurious and harmonic emissions were reported greater than listed emissions above table.

## 7.7 FREQUENCY STABILITY

### 7.7.1 LTE Band 4

OPERATING FREQUENCY : 1,732,499,993 Hz  
 CHANNEL : 20175  
 REFERENCE VOLTAGE : 3.8 VDC  
 :

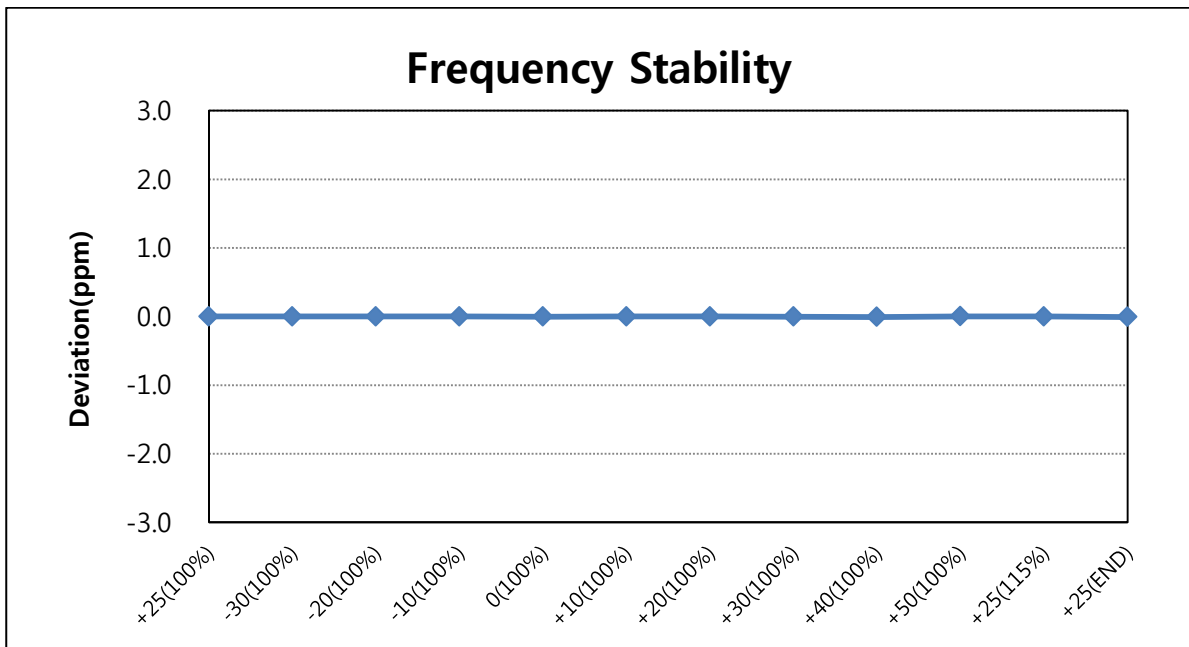
VOLTAGE (%)	POWER (V DC)	TEMP (°C)	FREQUENCY (Hz)	FREQ.Dev (Hz)	Deviation	
					(ppm)	(%)
100%	3.80	+25(Ref)	1,732,499,993	-7	0.0	0
100%		-30	1,732,500,009	9	0.0095	0.00000095
100%		-20	1,732,500,005	5	0.0068	0.00000068
100%		-10	1,732,500,012	12	0.0110	0.00000110
100%		0	1,732,500,007	7	0.0079	0.00000079
100%		10	1,732,500,008	8	0.0087	0.00000087
100%		20	1,732,500,007	7	0.0079	0.00000079
100%		30	1,732,500,010	10	0.0098	0.00000098
100%		40	1,732,500,009	9	0.0090	0.00000090
100%		50	1,732,500,012	12	0.0111	0.00000111
115%		4.37	25	1,732,499,993	-7	0.0003
BATT.END POINT	3.40	25	1,732,500,005	5	0.0072	0.00000072



7.7.2 LTE Band 2

OPERATING FREQUENCY : 1,880,000,007 Hz  
 CHANNEL : 18900  
 REFERENCE VOLTAGE : 3.8\_VDC  
 :

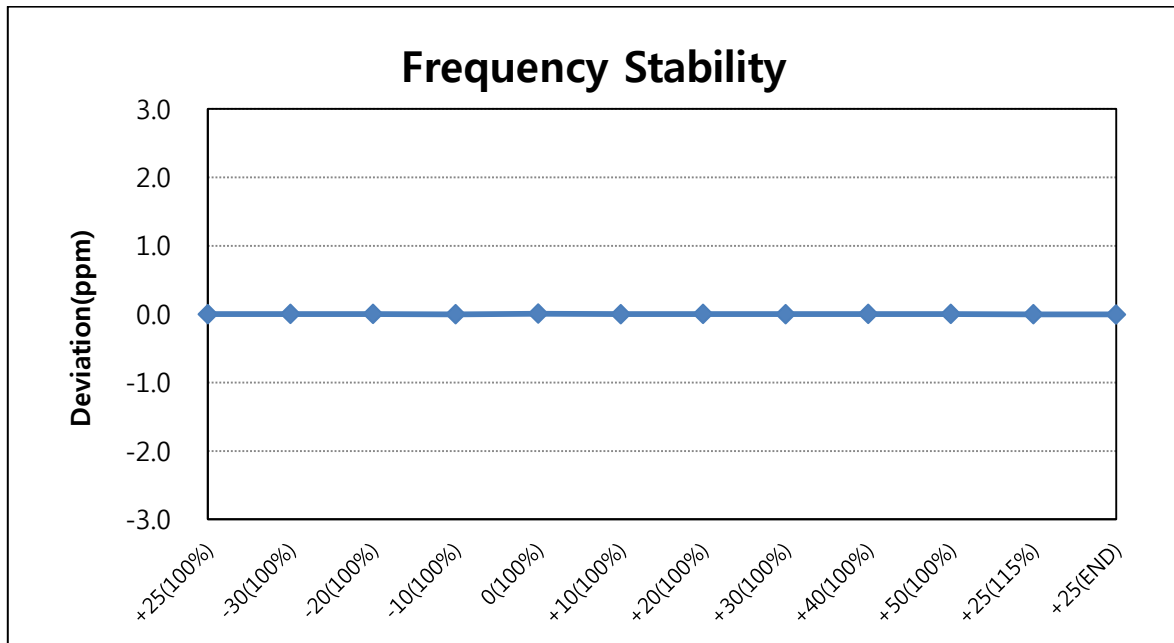
VOLTAGE (%)	POWER (V DC)	TEMP (°C)	FREQUENCY (Hz)	FREQ.Dev (Hz)	Deviation	
					(ppm)	(%)
100%	3.80	+25(Ref)	1,880,000,007	7	0.0	0
100%		-30	1,880,000,006	6	-0.0006	-0.00000006
100%		-20	1,880,000,007	7	-0.0003	-0.00000003
100%		-10	1,880,000,008	8	0.0006	0.00000006
100%		0	1,880,000,005	5	-0.0013	-0.00000013
100%		10	1,880,000,007	7	-0.0001	-0.00000001
100%		20	1,880,000,010	10	0.0015	0.00000015
100%		30	1,880,000,004	4	-0.0019	-0.00000019
100%		40	1,879,999,995	-5	-0.0066	-0.00000066
100%		50	1,880,000,010	10	0.0017	0.00000017
115%		4.37	25	1,880,000,008	8	0.0004
BATT.END POINT	3.40	25	1,879,999,993	-7	-0.0074	-0.00000074



**7.7.3 LTE Band 7**

OPERATING FREQUENCY : 2,524,999,966 Hz  
 CHANNEL : 21000  
 REFERENCE VOLTAGE : 3.8 VDC  
 :

VOLTAGE (%)	POWER (V DC)	TEMP (°C)	Frequency (Hz)	FREQ.Dev (Hz)	Deviation	
					(ppm)	(%)
100%	3.80	+25(Ref)	2,524,999,966	-34	0.0	0
100%		-30	2,524,999,975	-25	0.0036	0.00000036
100%		-20	2,524,999,974	-26	0.0031	0.00000031
100%		-10	2,524,999,961	-39	-0.0019	-0.00000019
100%		0	2,524,999,982	-18	0.0065	0.00000065
100%		10	2,524,999,970	-31	0.0015	0.00000015
100%		20	2,524,999,975	-25	0.0037	0.00000037
100%		30	2,524,999,964	-36	-0.0006	-0.00000006
100%		40	2,524,999,971	-29	0.0019	0.00000019
100%		50	2,524,999,973	-27	0.0028	0.00000028
115%		4.37	25	2,524,999,963	-37	-0.0012
BATT.END POINT	3.40	25	2,524,999,957	-43	-0.0034	-0.00000034

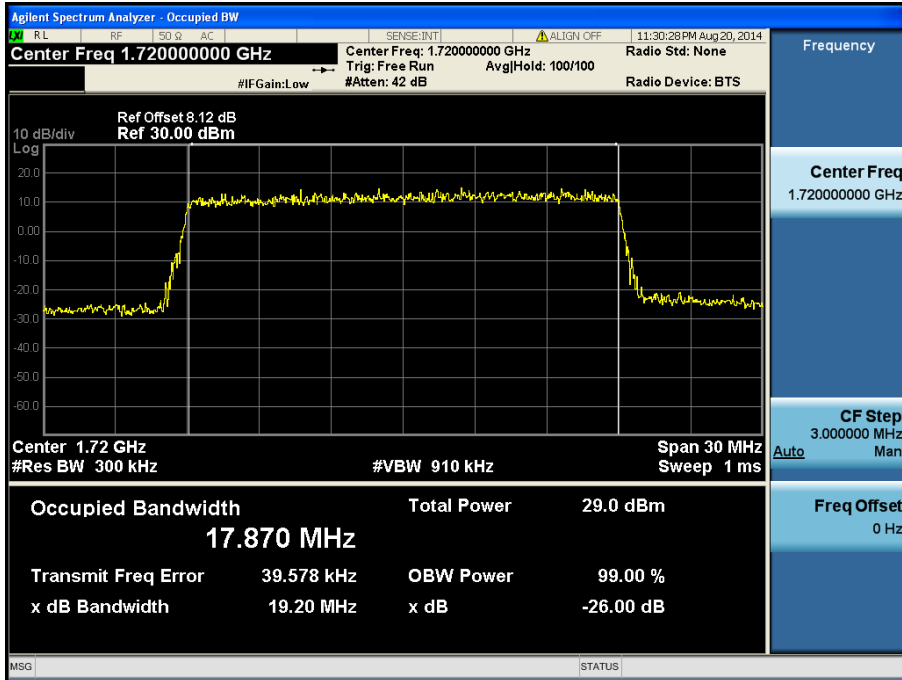


## 8. TEST PLOTS

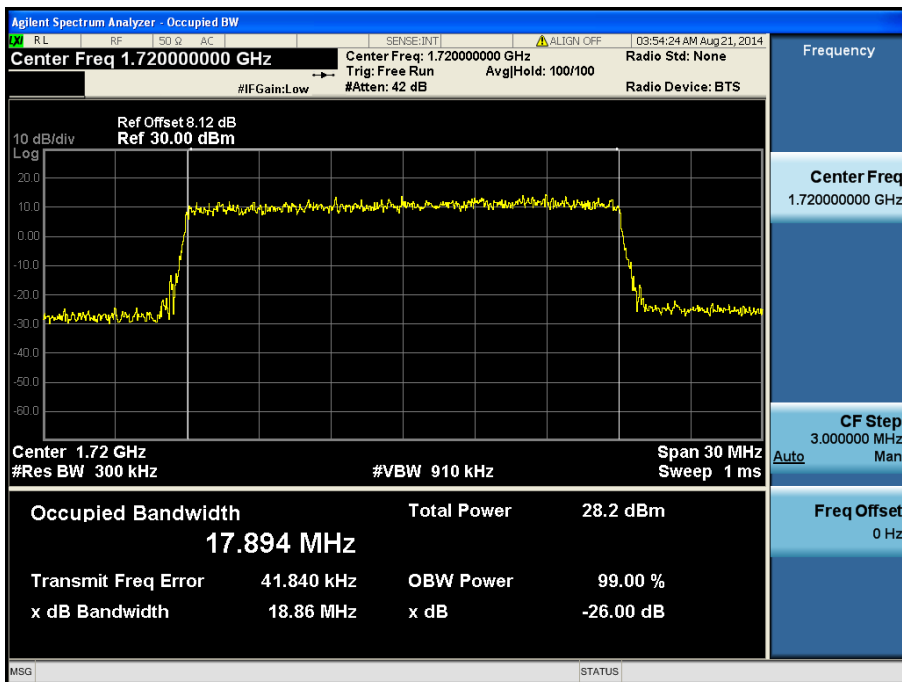
**Note:** All bandwidths, RB configurations, and modulations were investigated. The worst case test results are reported below.

### 8.1 OCCUPIED BANDWIDTH

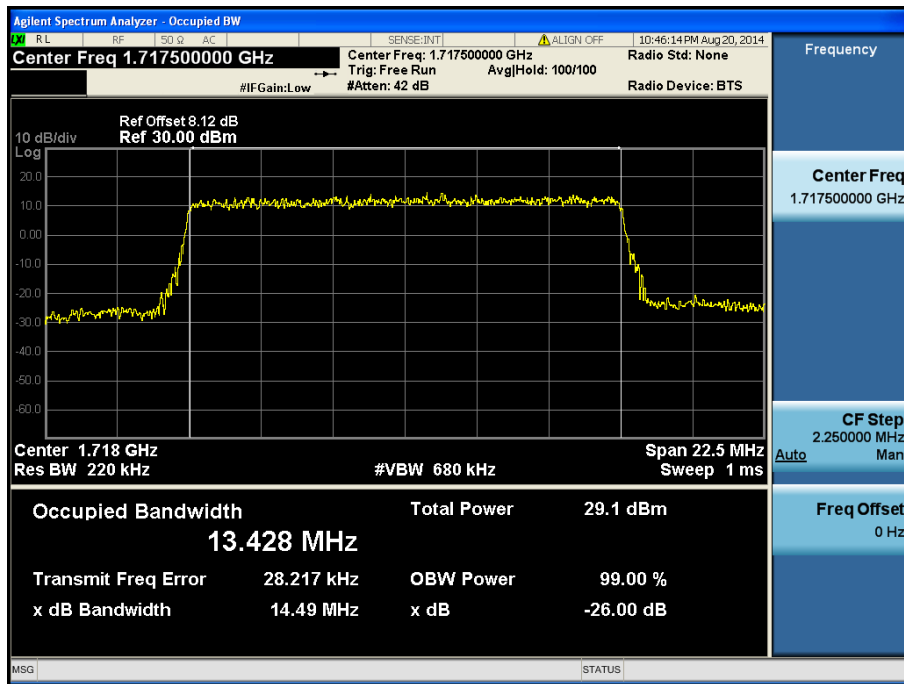
#### 8.1.1 LTE Band 4



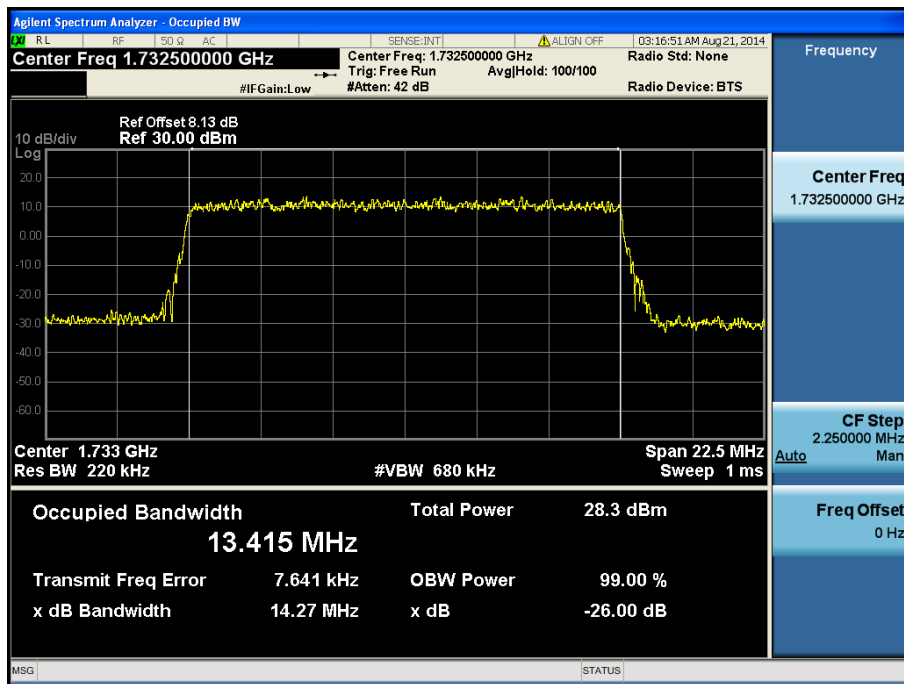
LTE Band 4 / 20 MHz / QPSK - RB Size 100



LTE Band 4 / 20 MHz / 16QAM - RB Size 100

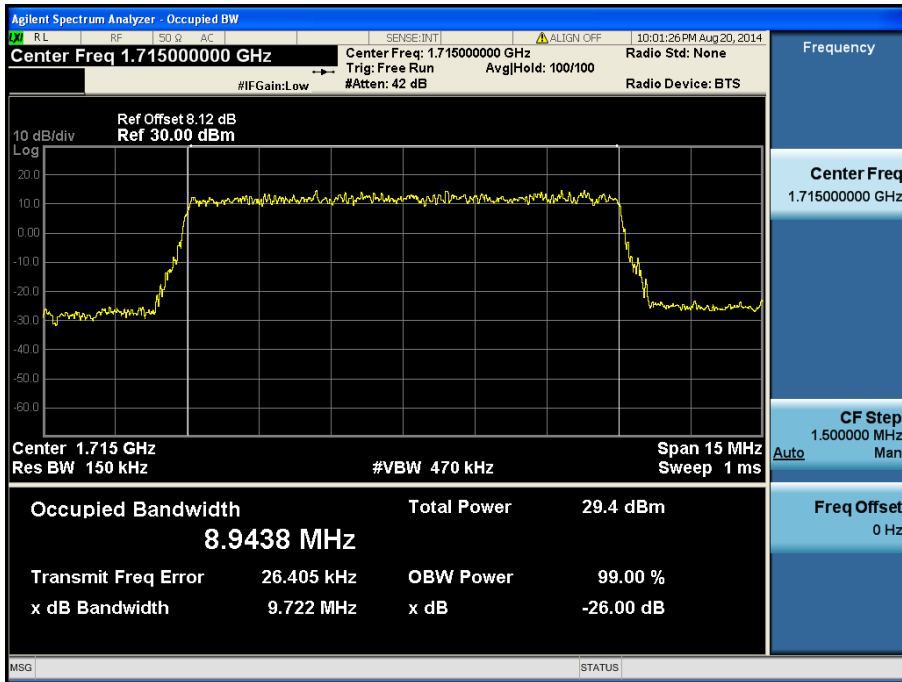


LTE Band 4 / 15 MHz / QPSK - RB Size 75

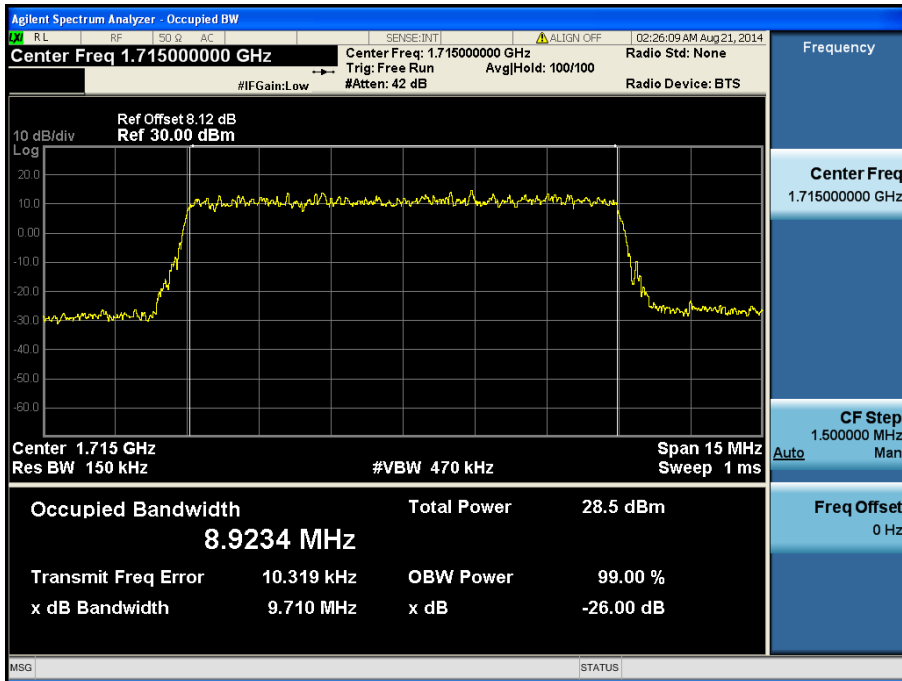


LTE Band 4 / 15 MHz / 16QAM - RB Size 75

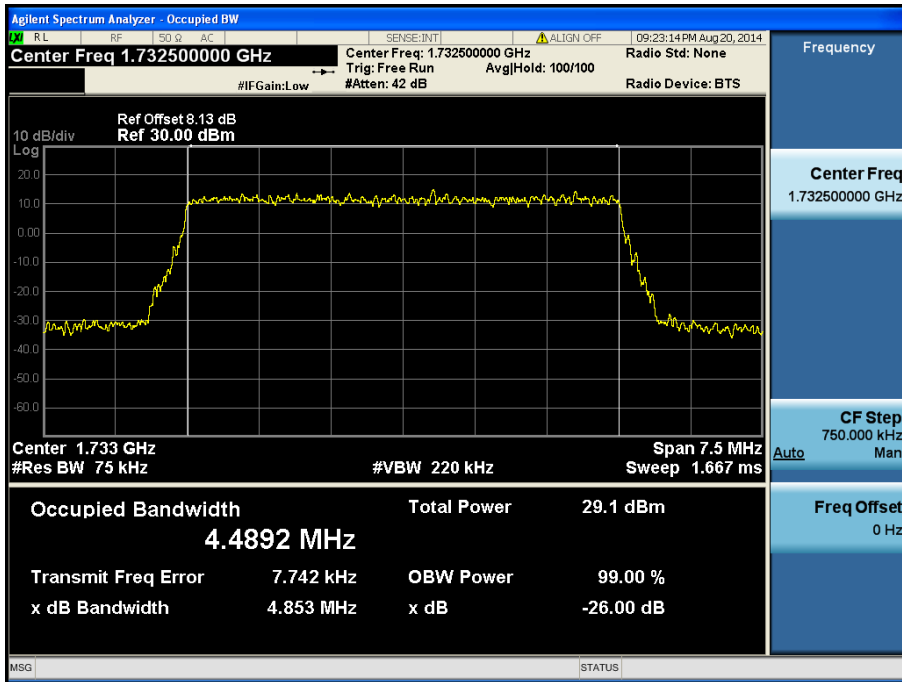




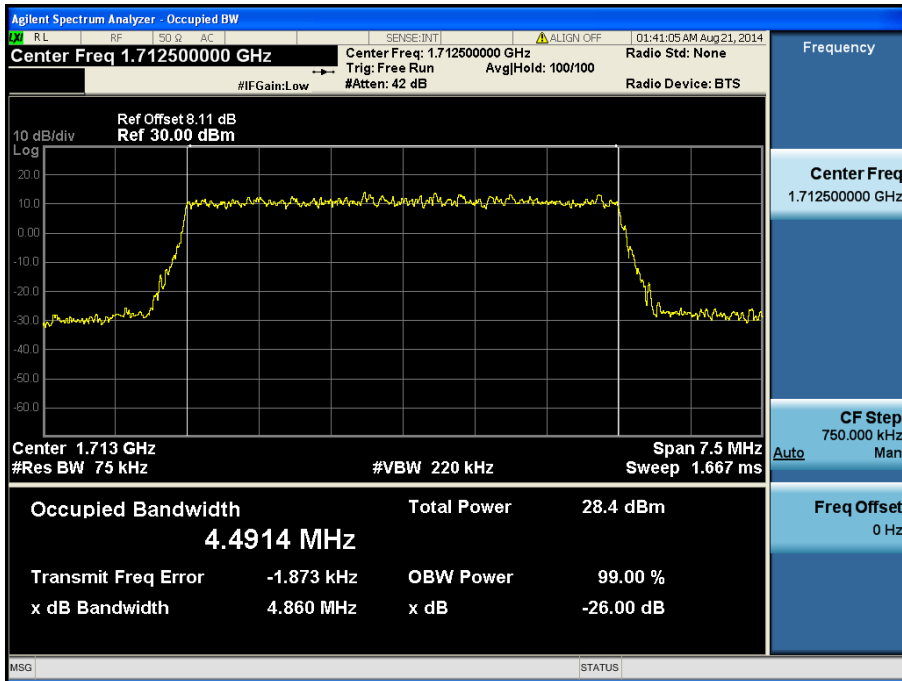
LTE Band 4 / 10 MHz / QPSK - RB Size 50



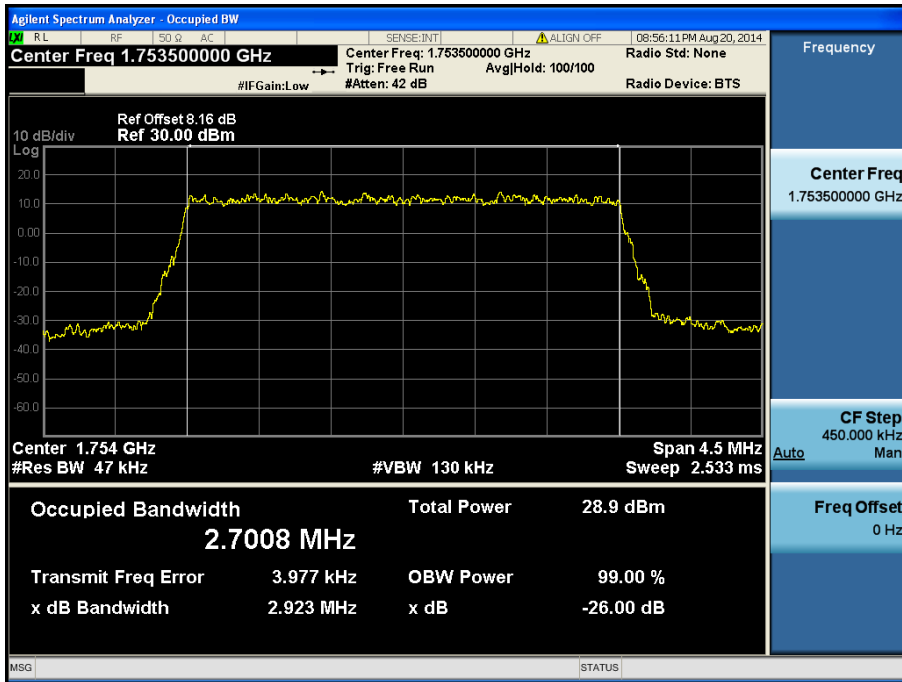
LTE Band 4 / 10 MHz / 16QAM - RB Size 50



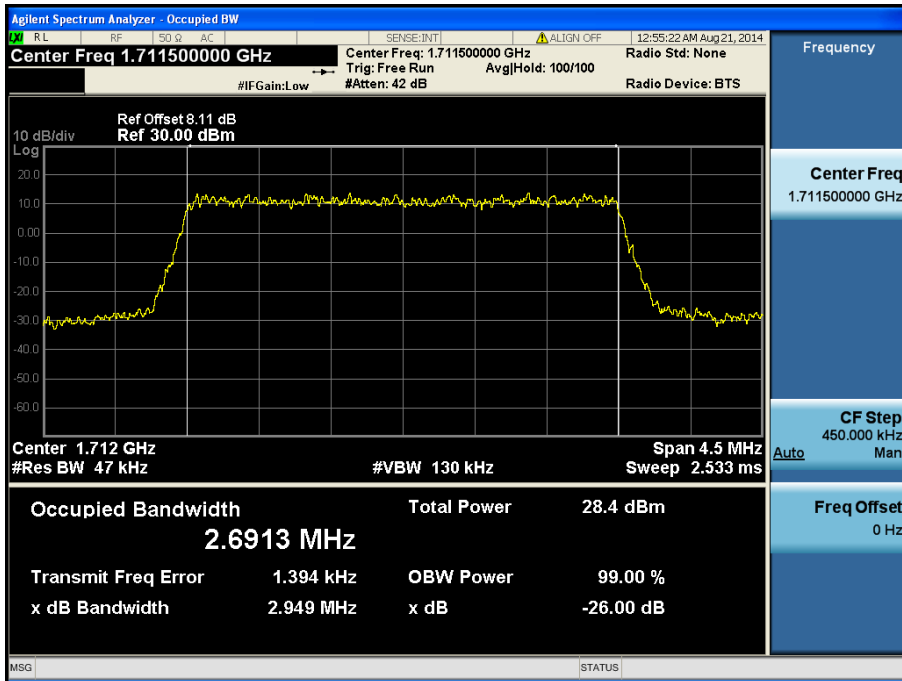
LTE Band 4 / 5 MHz / QPSK - RB Size 25



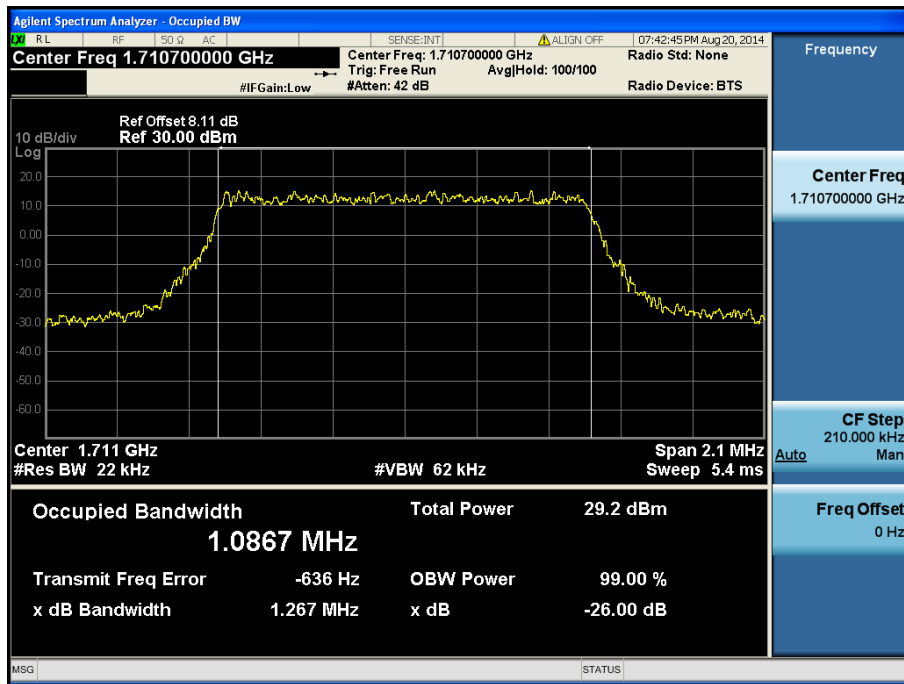
LTE Band 4 / 5 MHz / 16QAM - RB Size 25



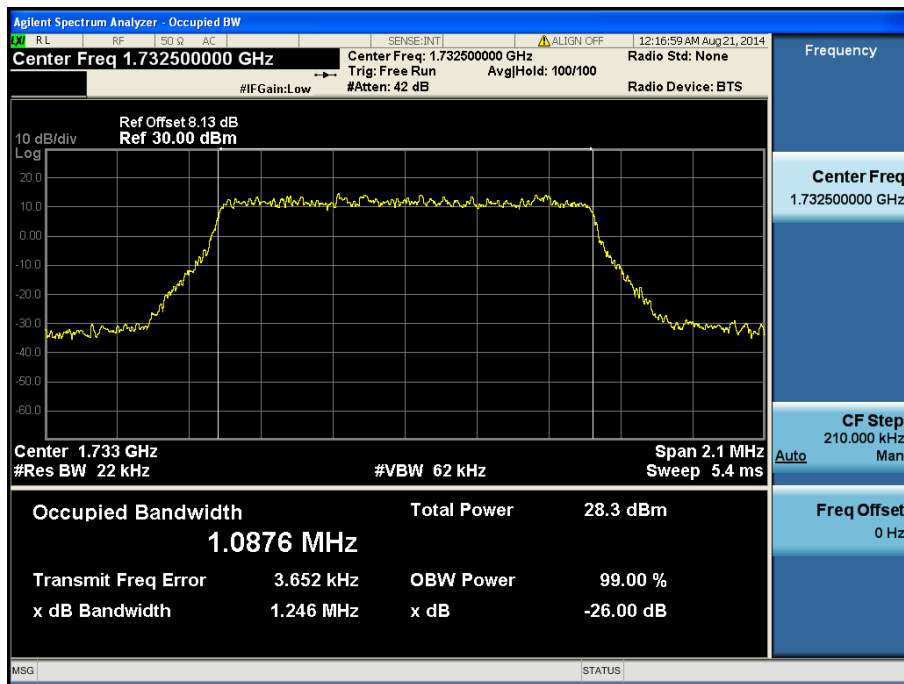
LTE Band 4 / 3 MHz / QPSK - RB Size 15



LTE Band 4 / 3 MHz / 16QAM - RB Size 15

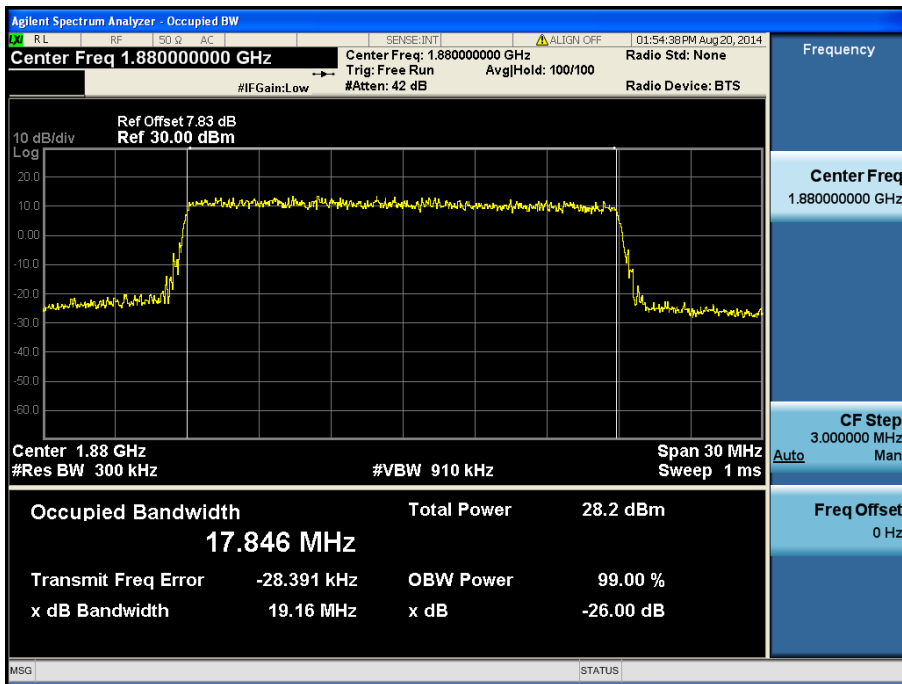


LTE Band 4 / 1.4 MHz / QPSK - RB Size 6

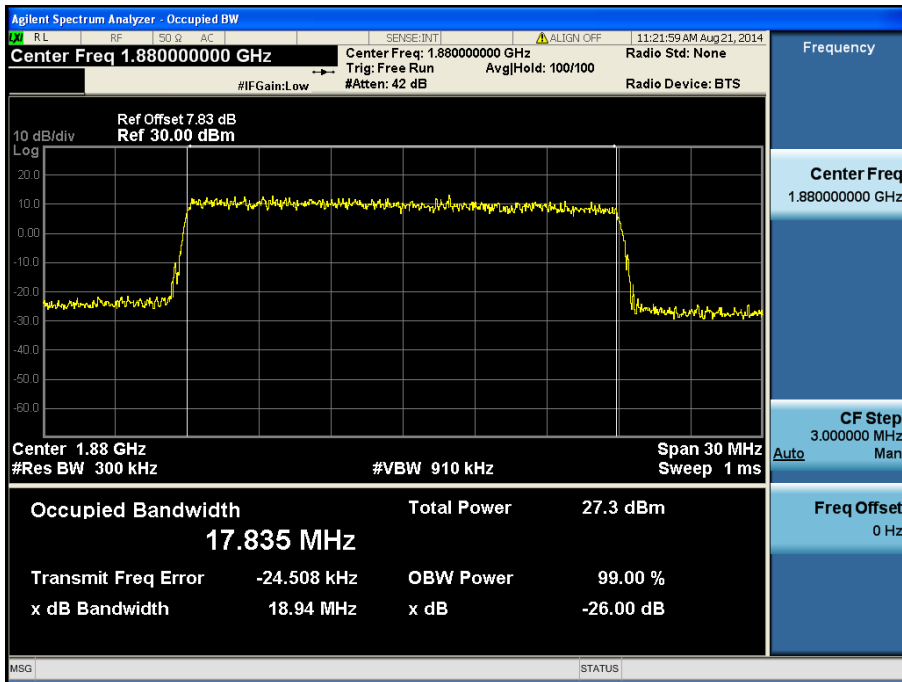


LTE Band 4 / 1.4 MHz / 16QAM - RB Size 6

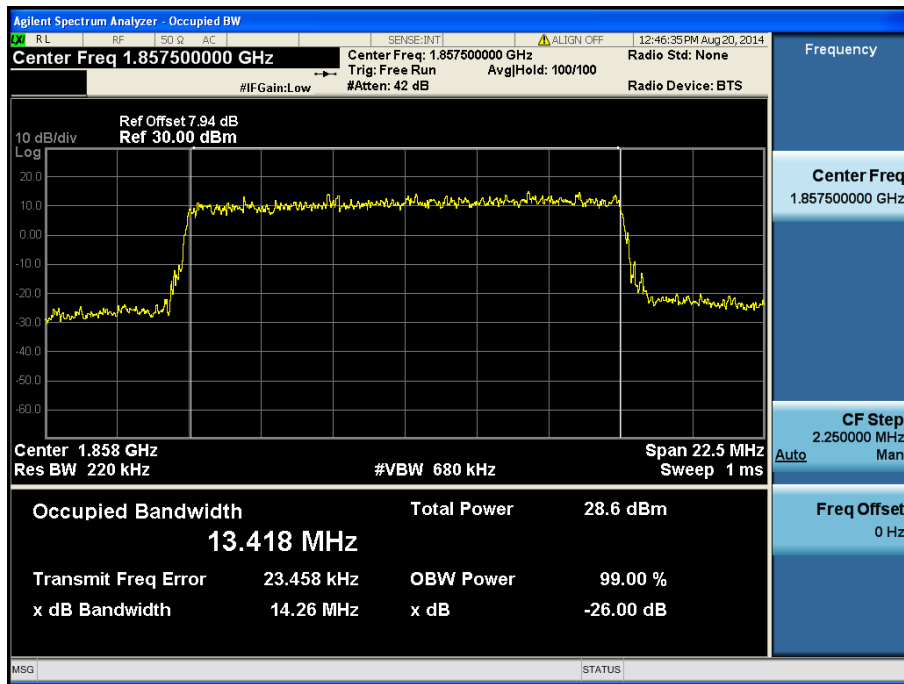
8.1.2 LTE Band 2



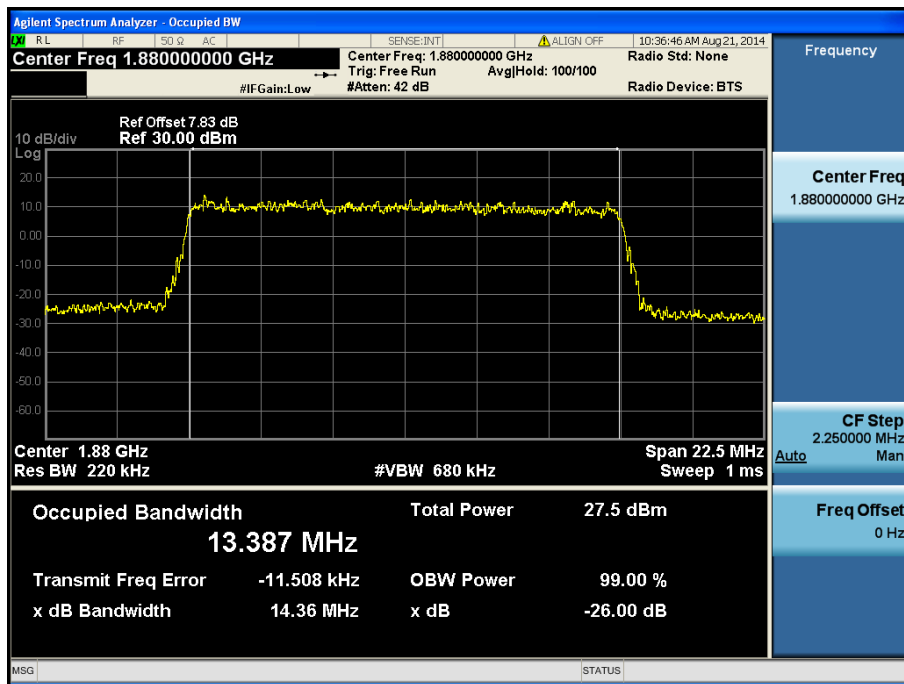
LTE Band 2 / 20 MHz / QPSK - RB Size 100



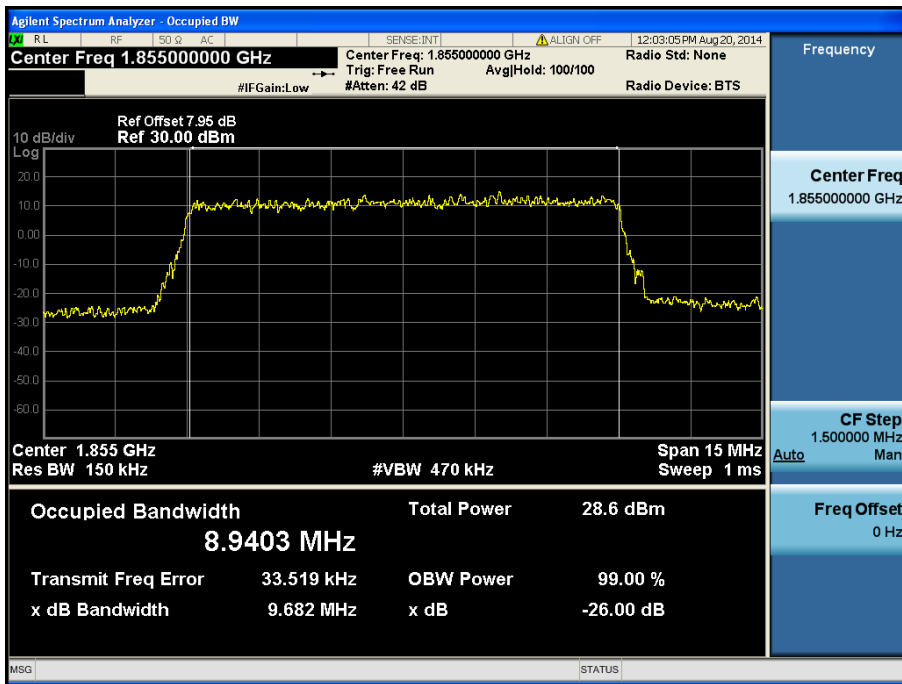
LTE Band 2 / 20 MHz / 16QAM - RB Size 100



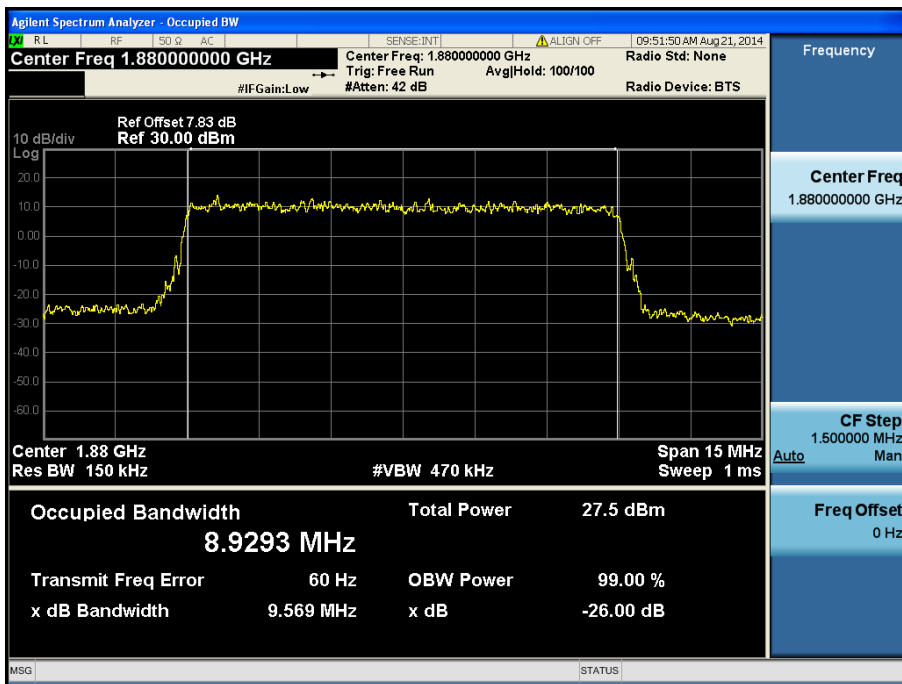
LTE Band 2 / 15 MHz / QPSK - RB Size 75



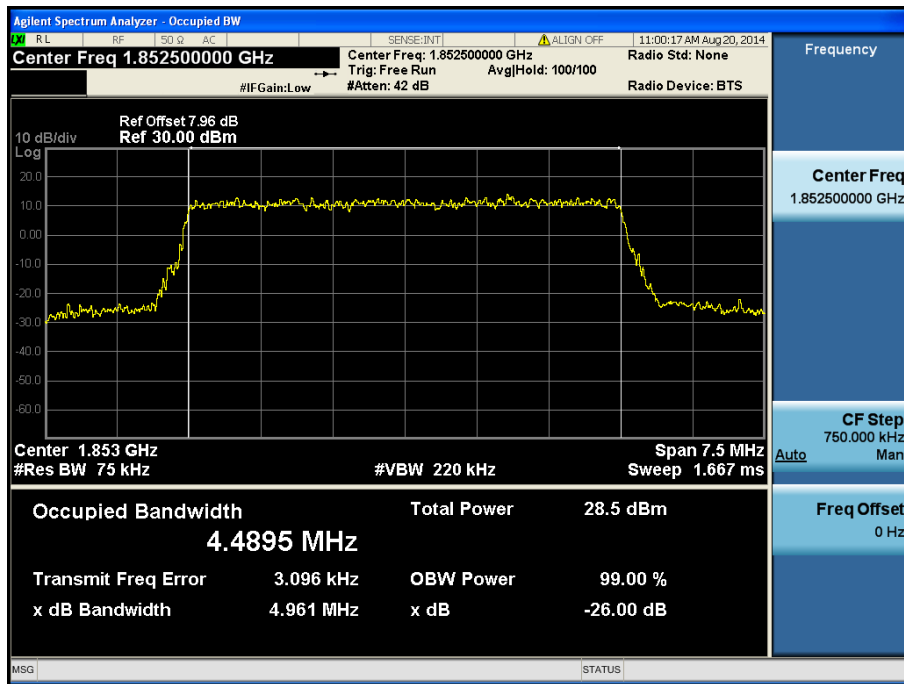
LTE Band 2 / 15 MHz / 16QAM - RB Size 75



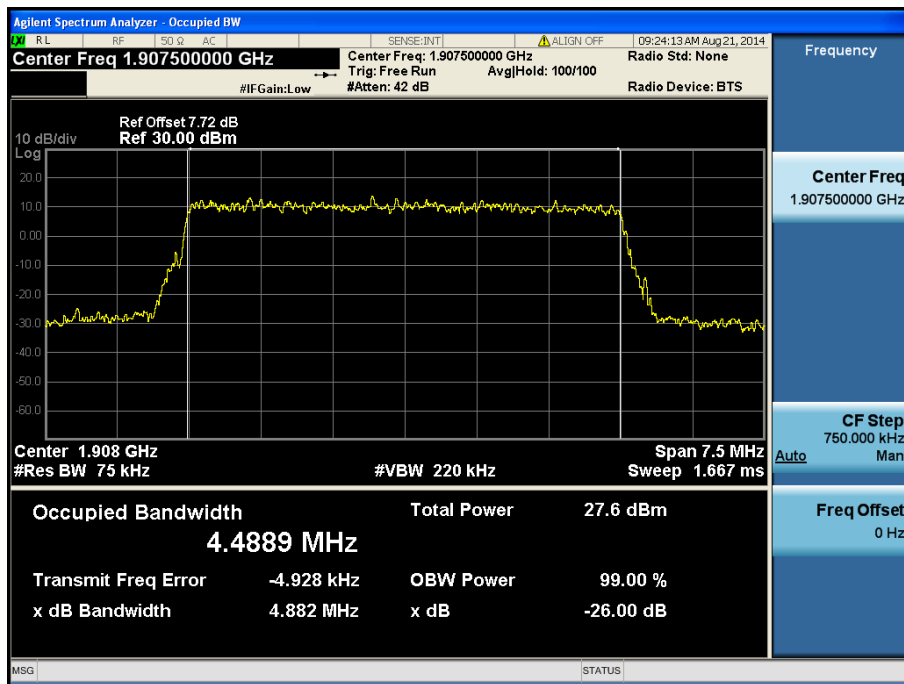
LTE Band 2 / 10 MHz / QPSK - RB Size 50



LTE Band 2 / 10 MHz / 16QAM - RB Size 50

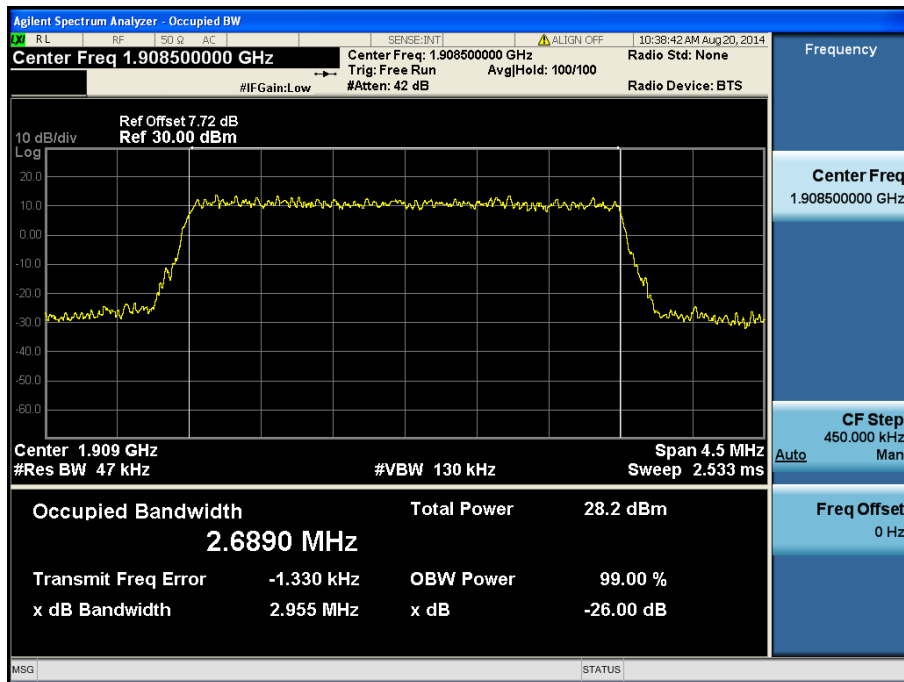


LTE Band 2 / 5 MHz / QPSK - RB Size 25

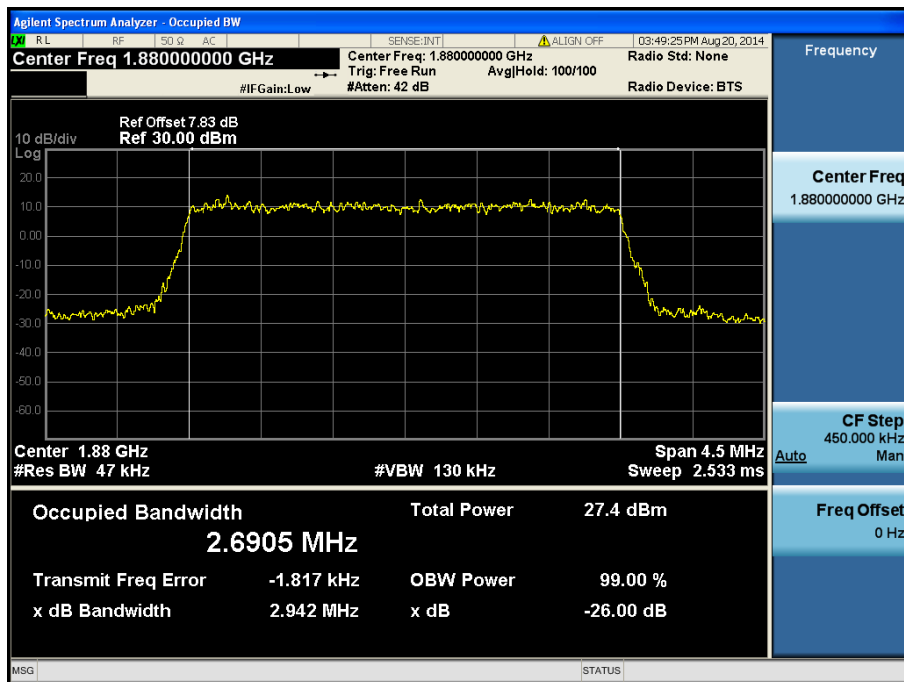


LTE Band 2 / 5 MHz / 16QAM - RB Size 25

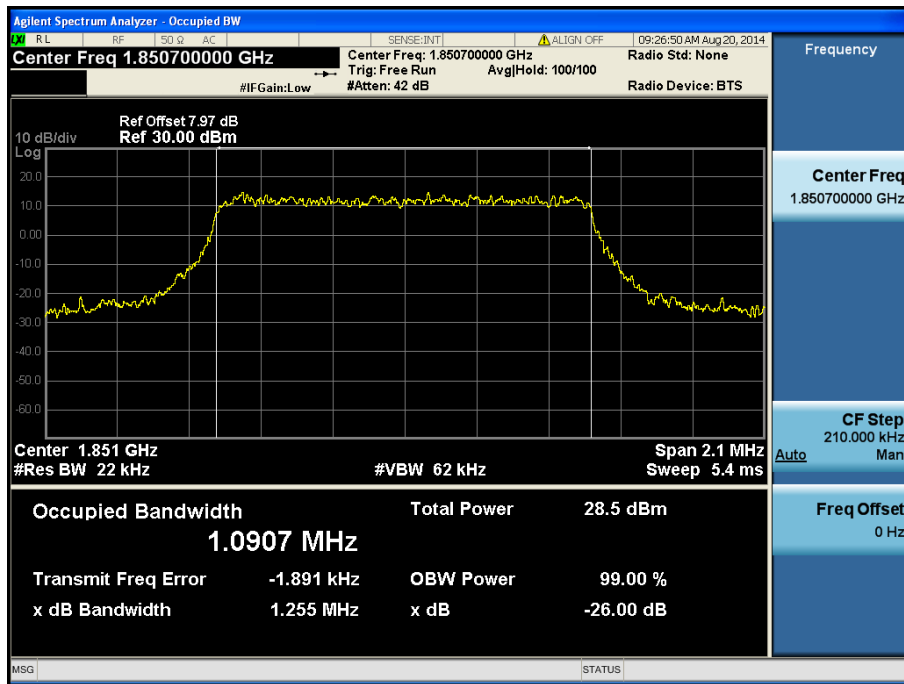




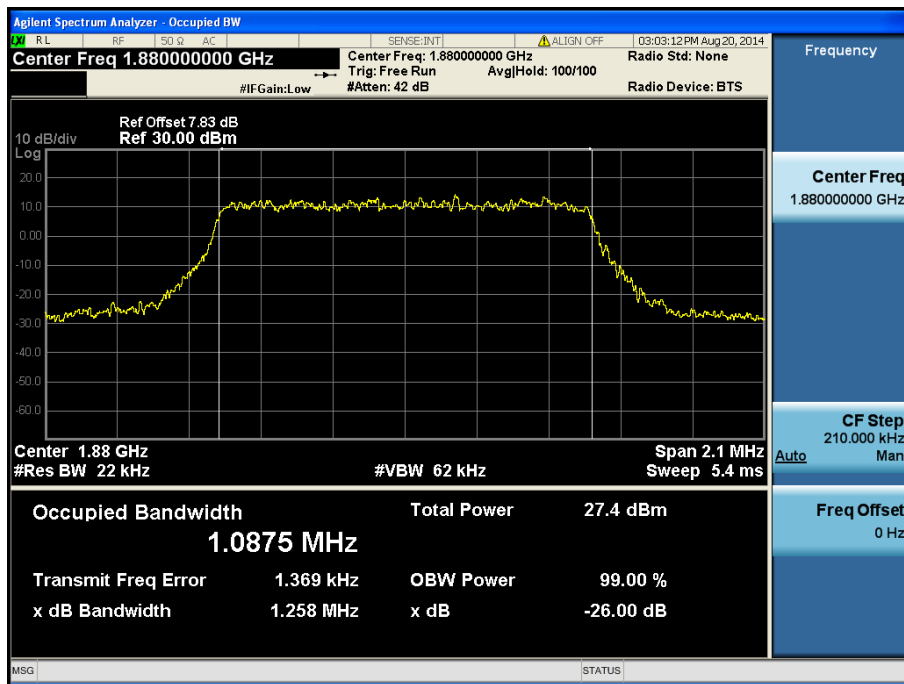
LTE Band 2 / 3 MHz / QPSK - RB Size 15



LTE Band 2 / 3 MHz / 16QAM - RB Size 15

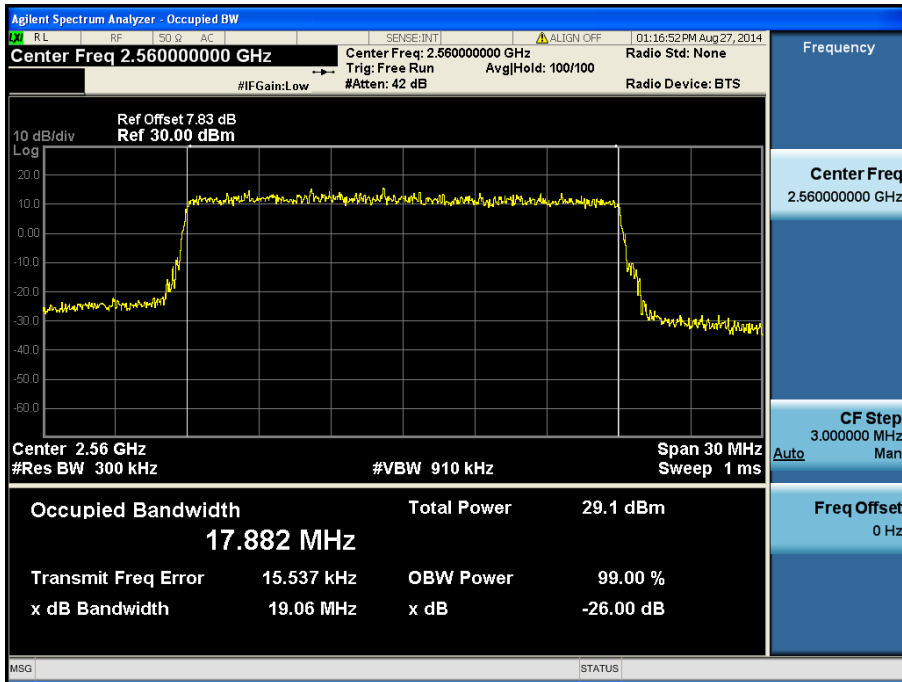


LTE Band 2 / 1.4 MHz / QPSK - RB Size 6

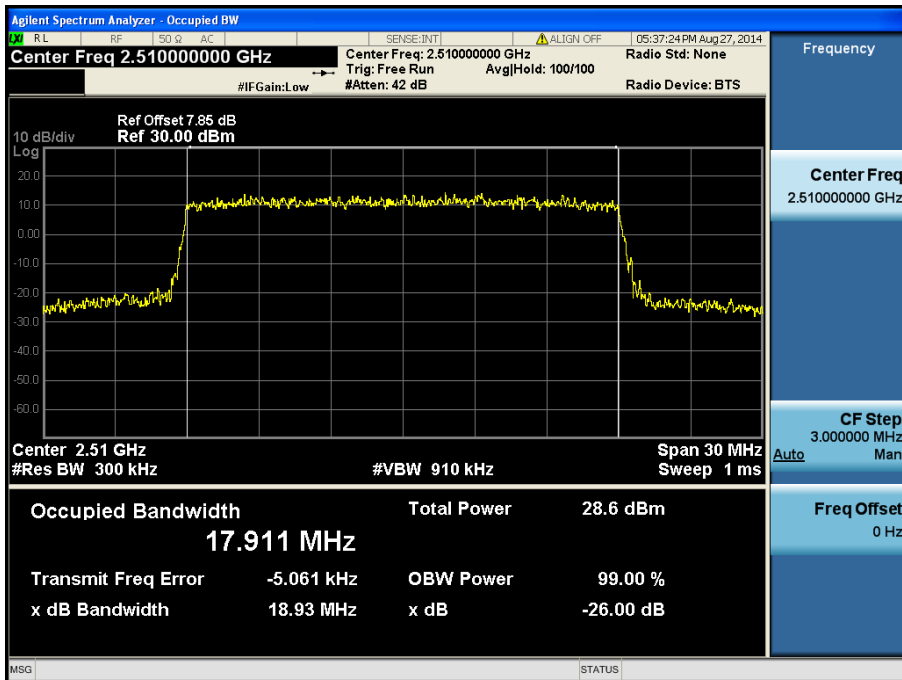


LTE Band 2 / 1.4 MHz / 16QAM - RB Size 6

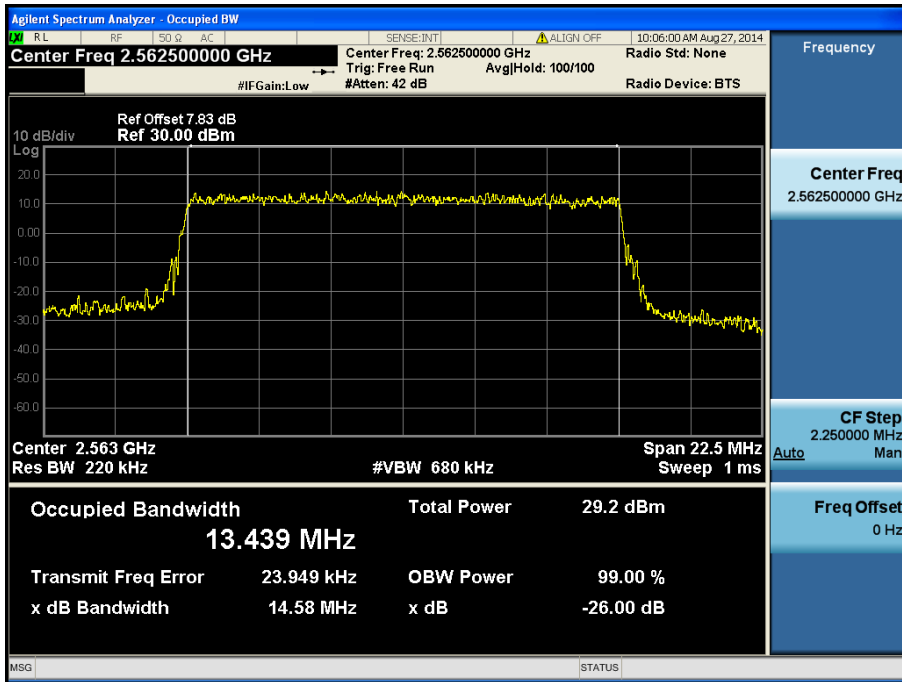
8.1.3 LTE Band 7



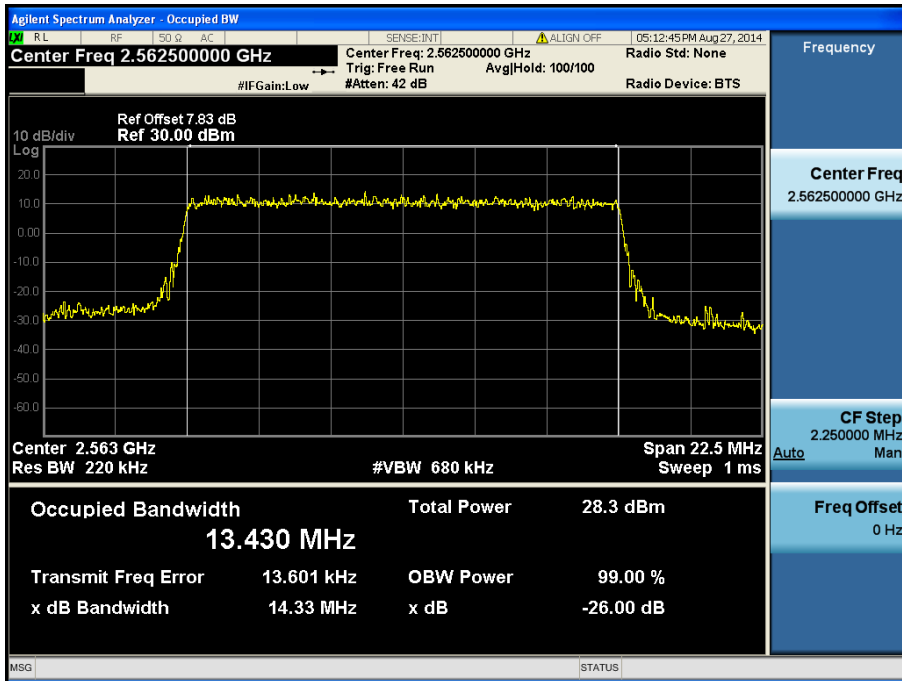
LTE Band 7 / 20 MHz / QPSK - RB Size 100



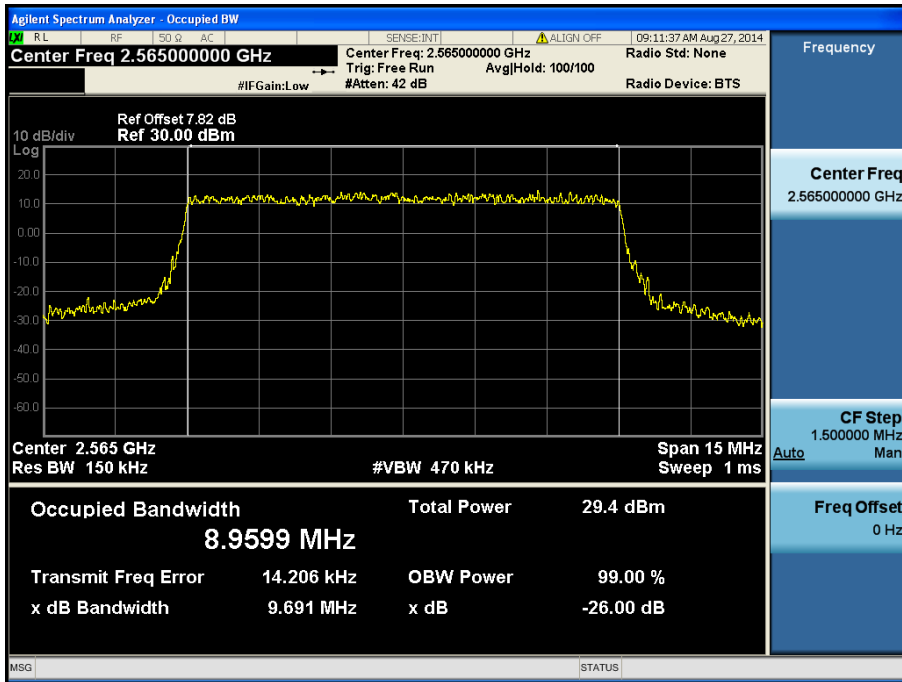
LTE Band 7 / 20 MHz / 16QAM - RB Size 100



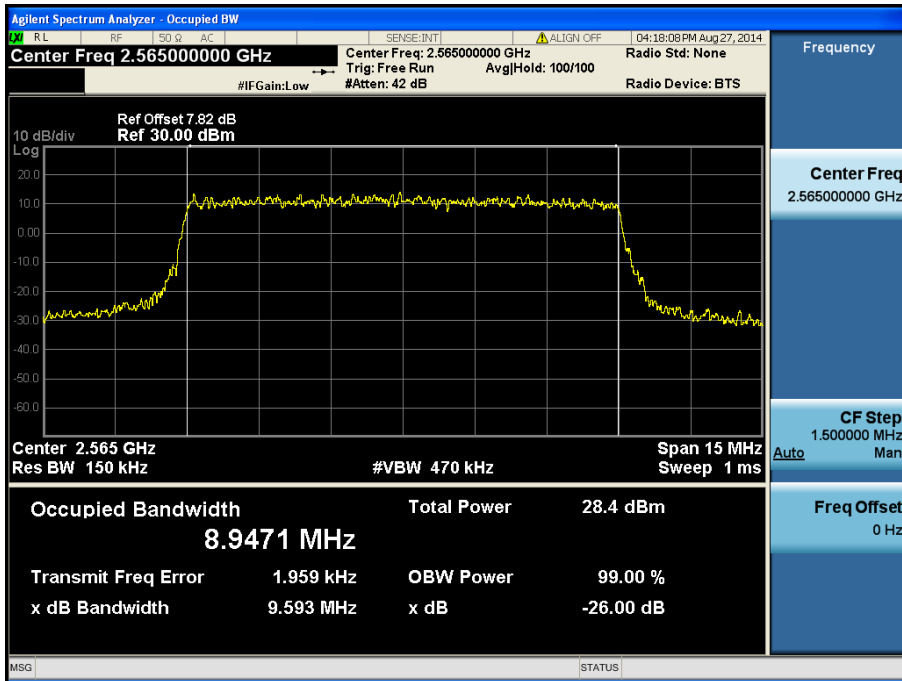
LTE Band 7 / 15 MHz / QPSK - RB Size 75



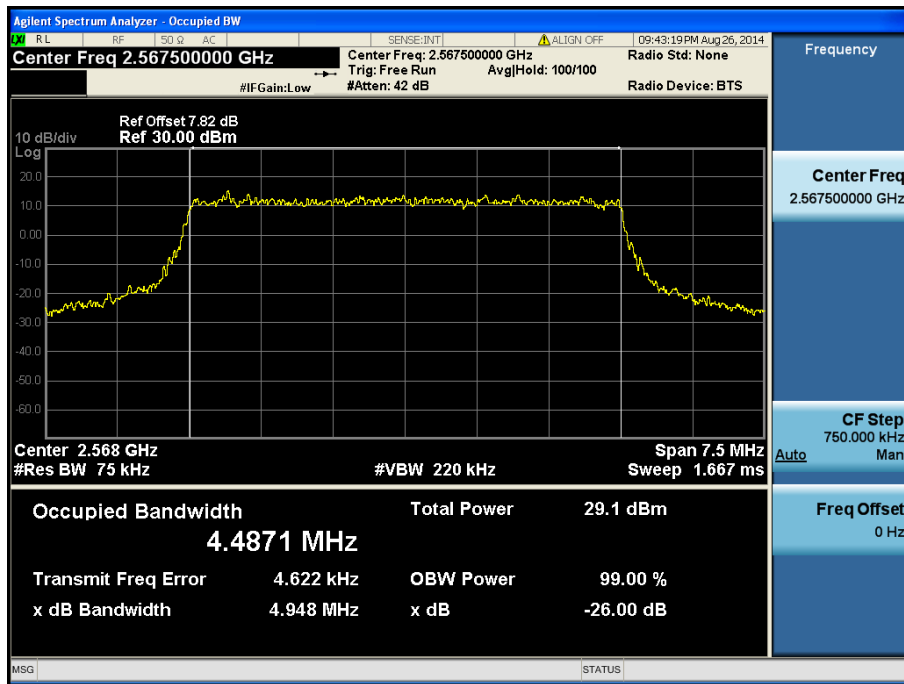
LTE Band 7 / 15 MHz / 16QAM - RB Size 75



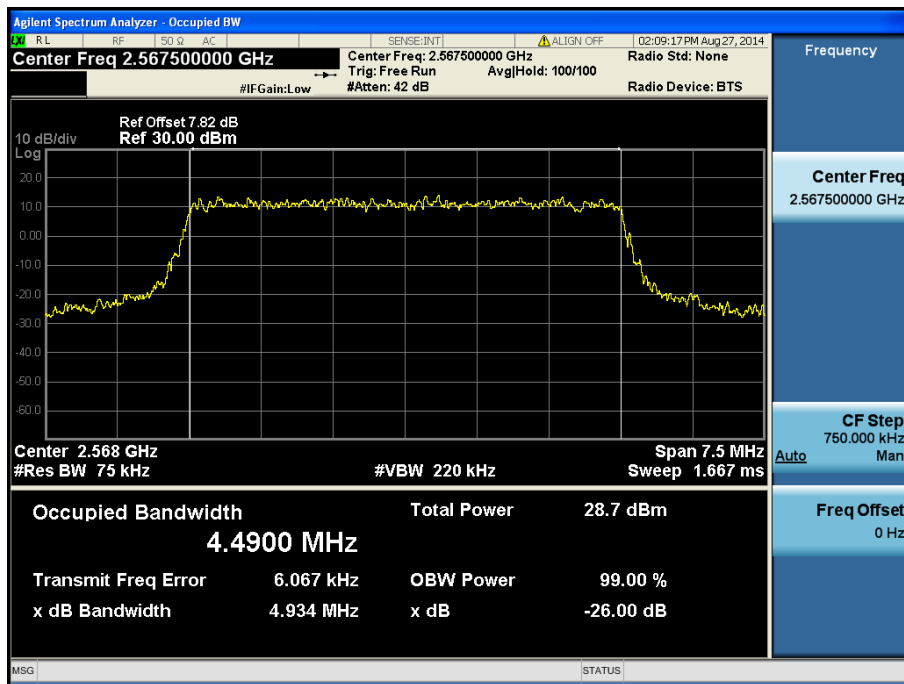
LTE Band 7 / 10 MHz / QPSK - RB Size 50



LTE Band 7 / 10 MHz / 16QAM - RB Size 50



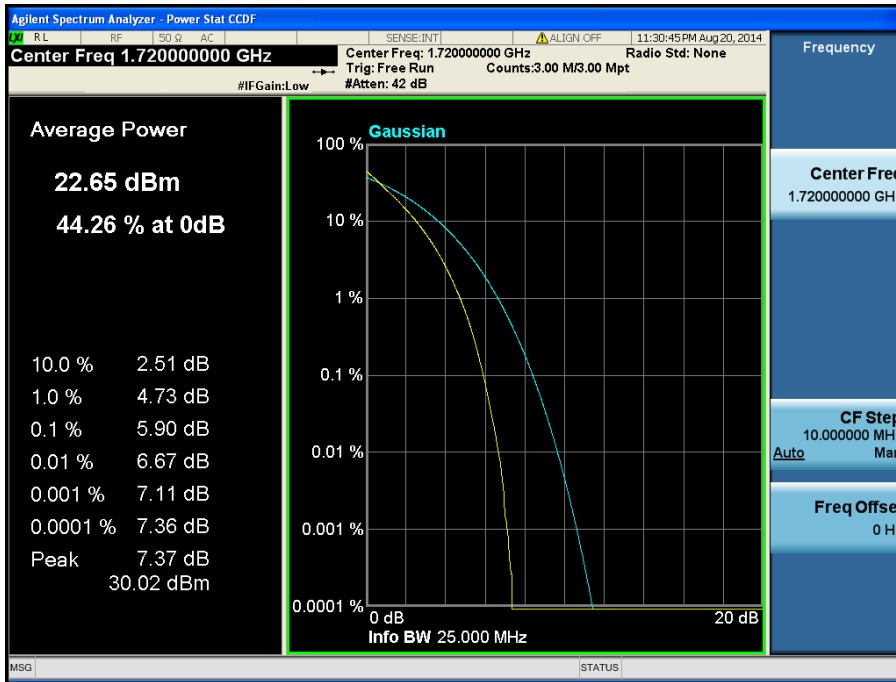
LTE Band 7 / 5 MHz / QPSK - RB Size 25



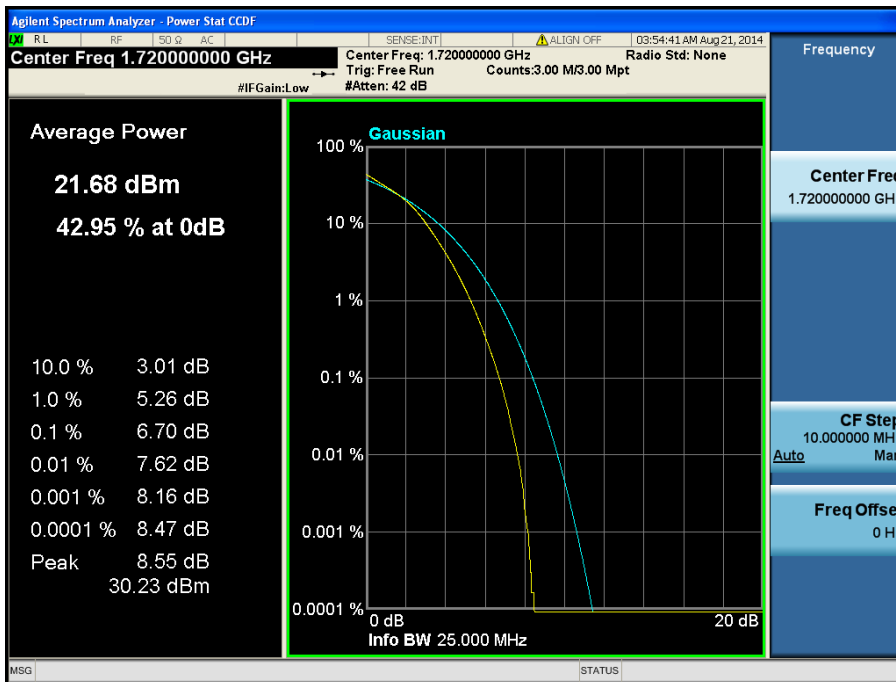
LTE Band 7 / 5 MHz / 16QAM - RB Size 25

## 8.2 PEAK TO AVERAGE RATIO

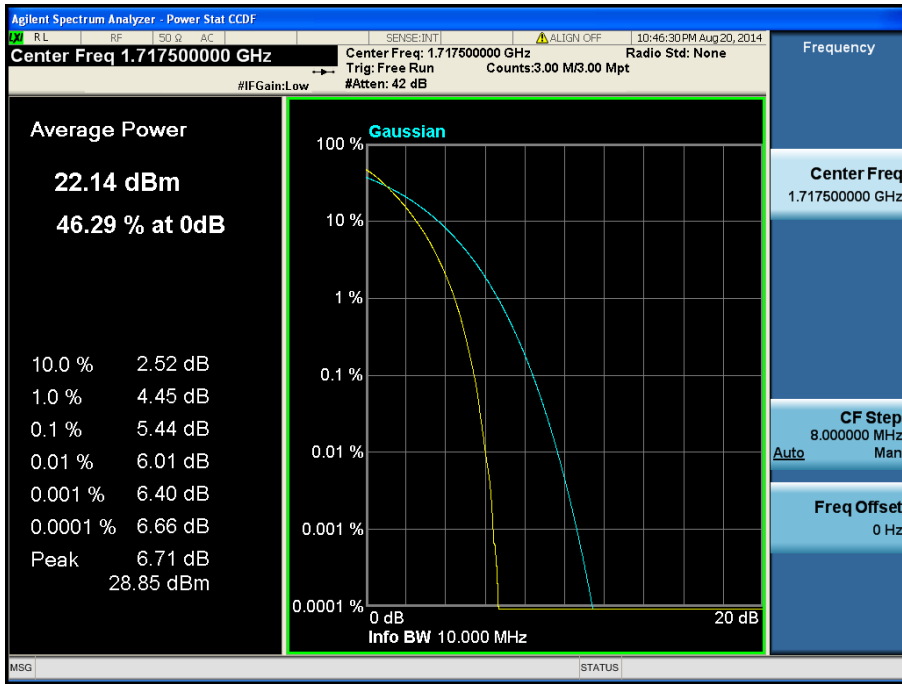
### 8.2.1 LTE Band 4



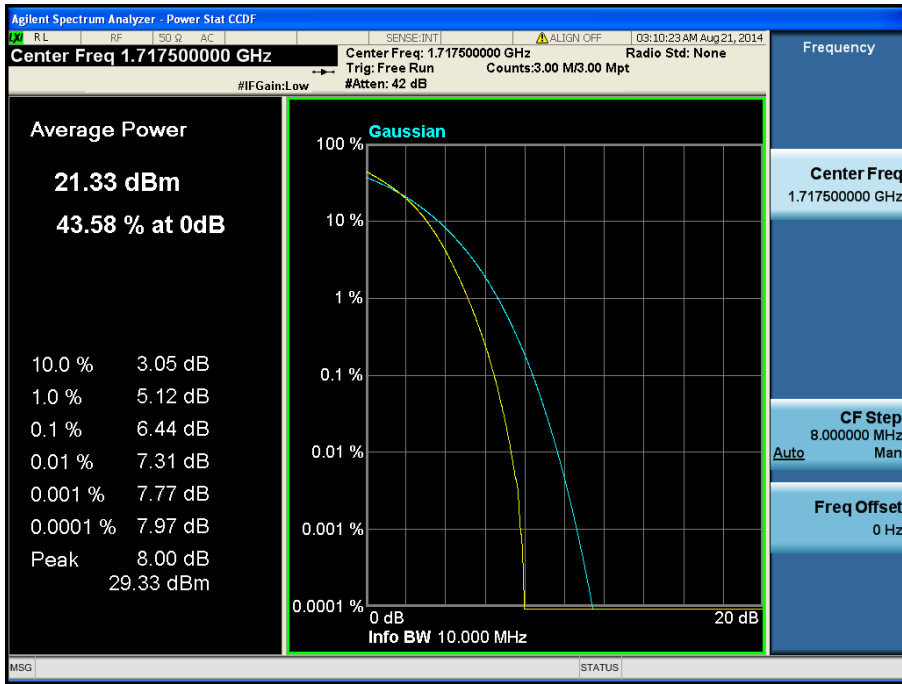
LTE Band 4 / 20 MHz / QPSK - RB Size 100



LTE Band 4 / 20 MHz / 16QAM - RB Size 100

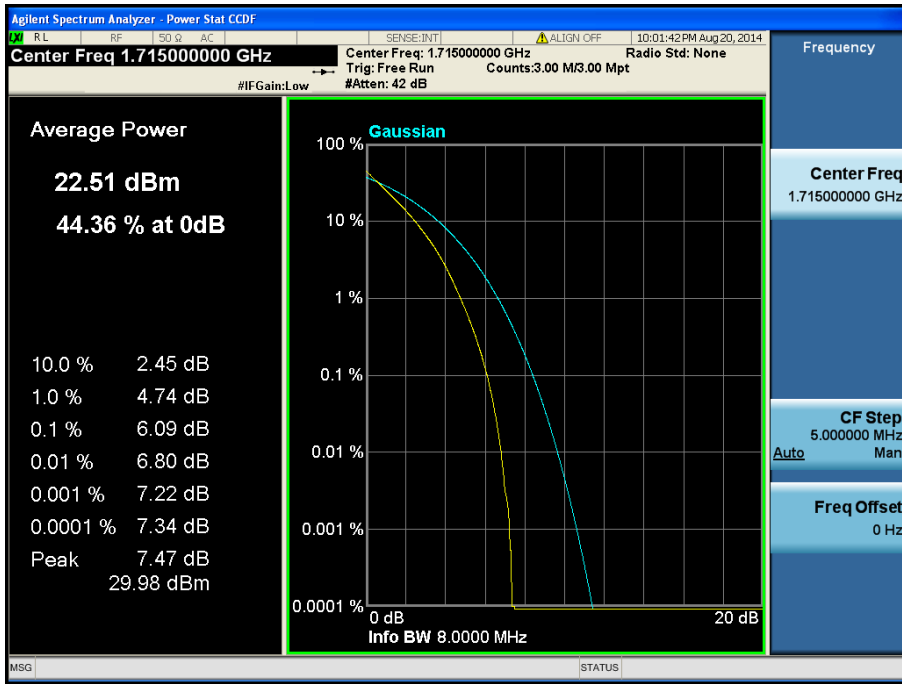


LTE Band 4 / 15 MHz / QPSK - RB Size 75

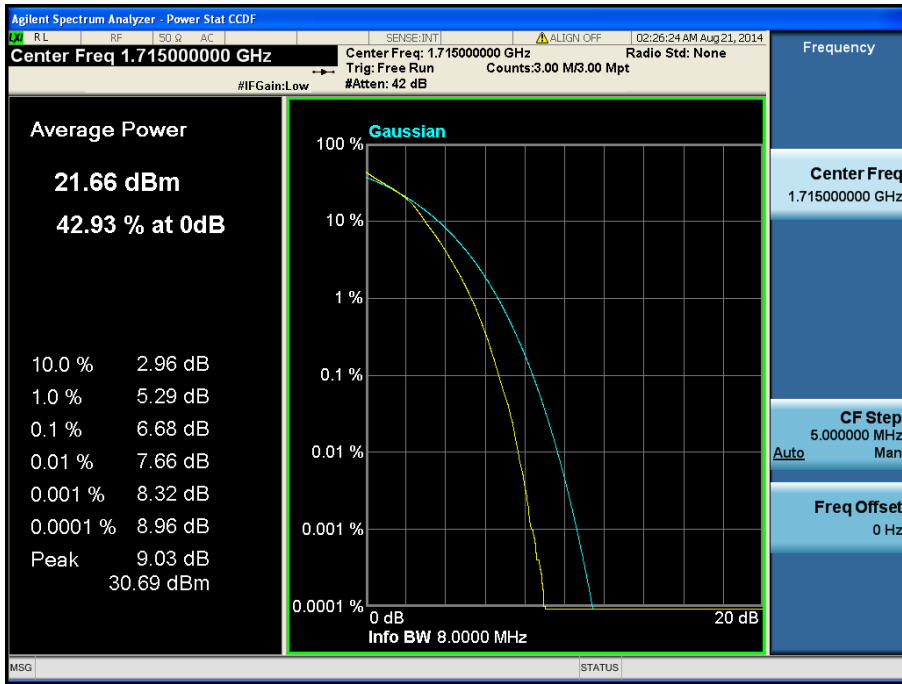


LTE Band 4 / 15 MHz / 16QAM - RB Size 75

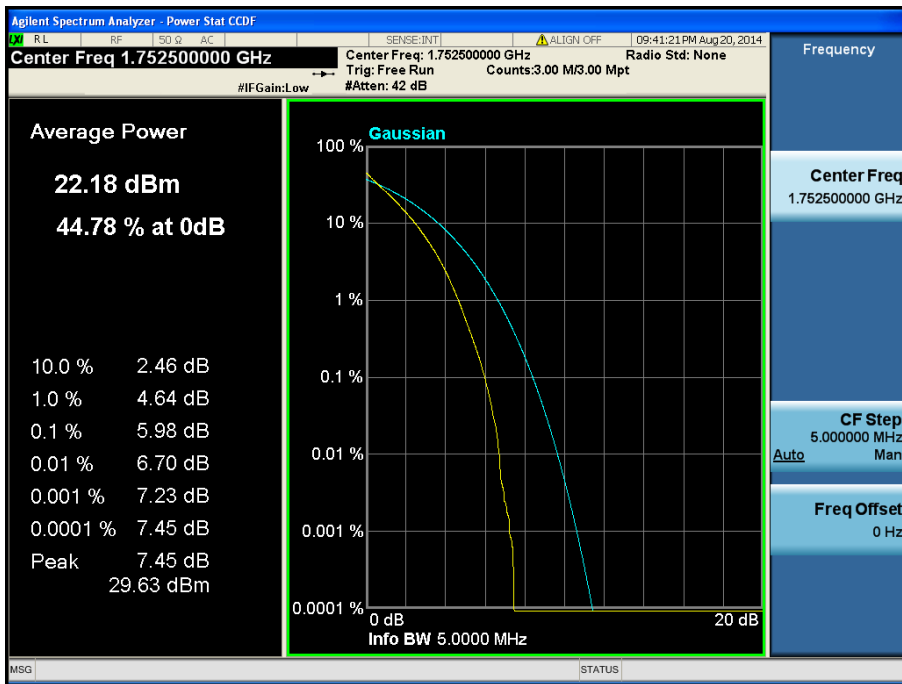




LTE Band 4 / 10 MHz / QPSK - RB Size 50



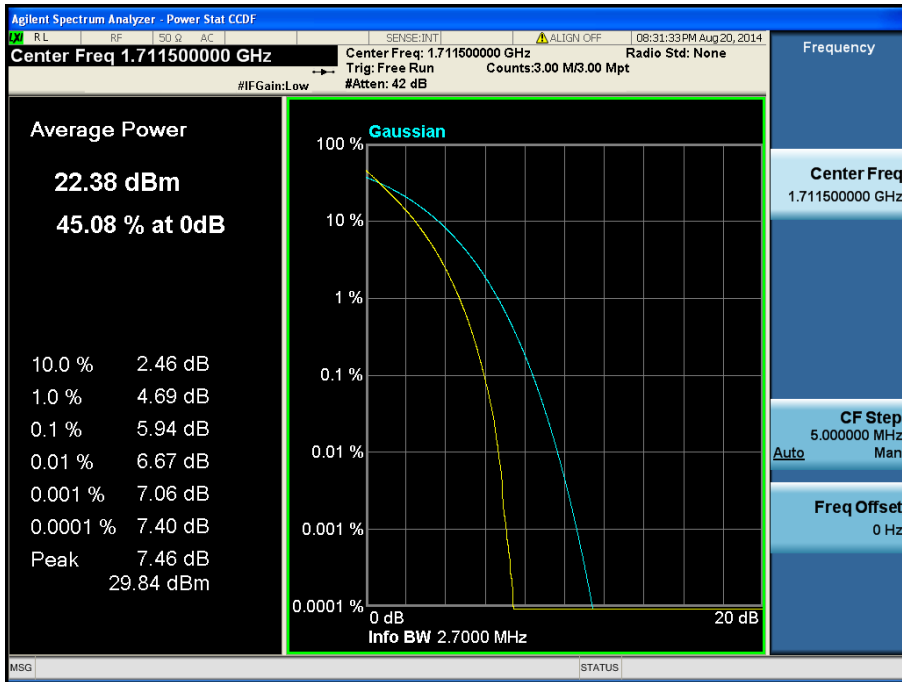
LTE Band 4 / 10 MHz / 16QAM - RB Size 50



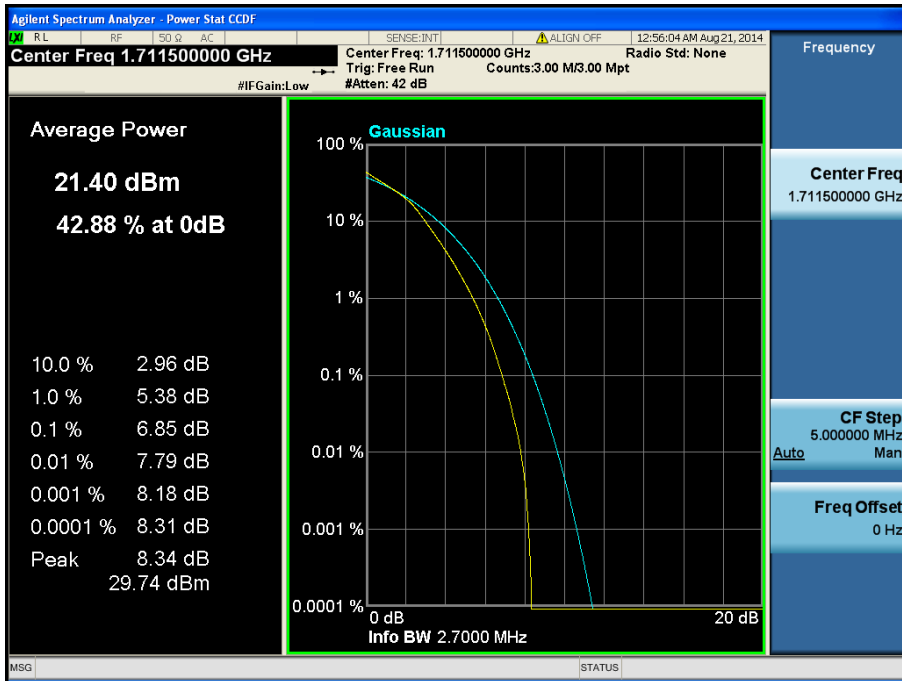
LTE Band 4 / 5 MHz / QPSK - RB Size 25



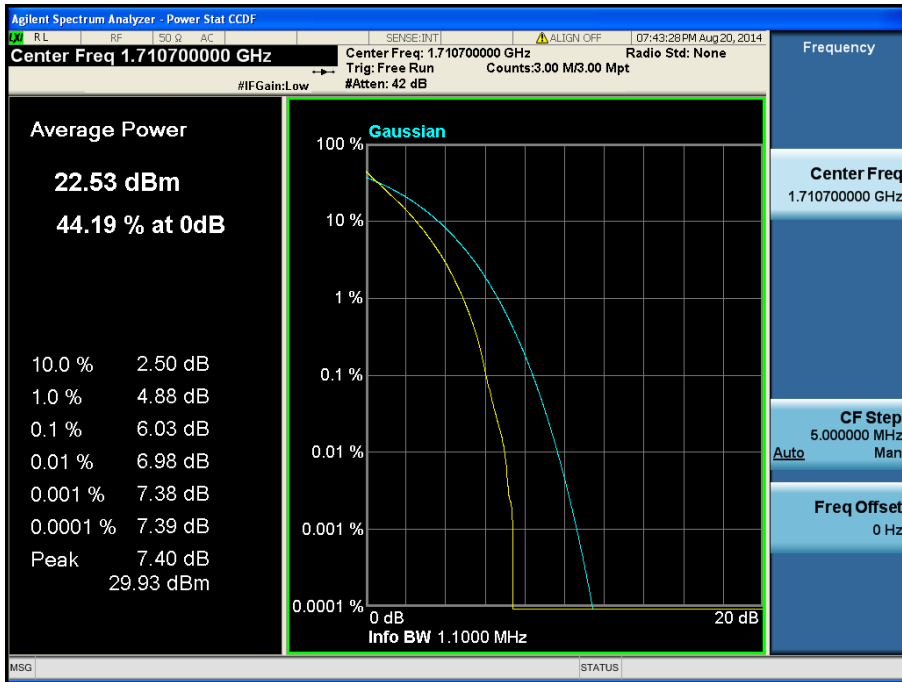
LTE Band 4 / 5 MHz / 16QAM - RB Size 25



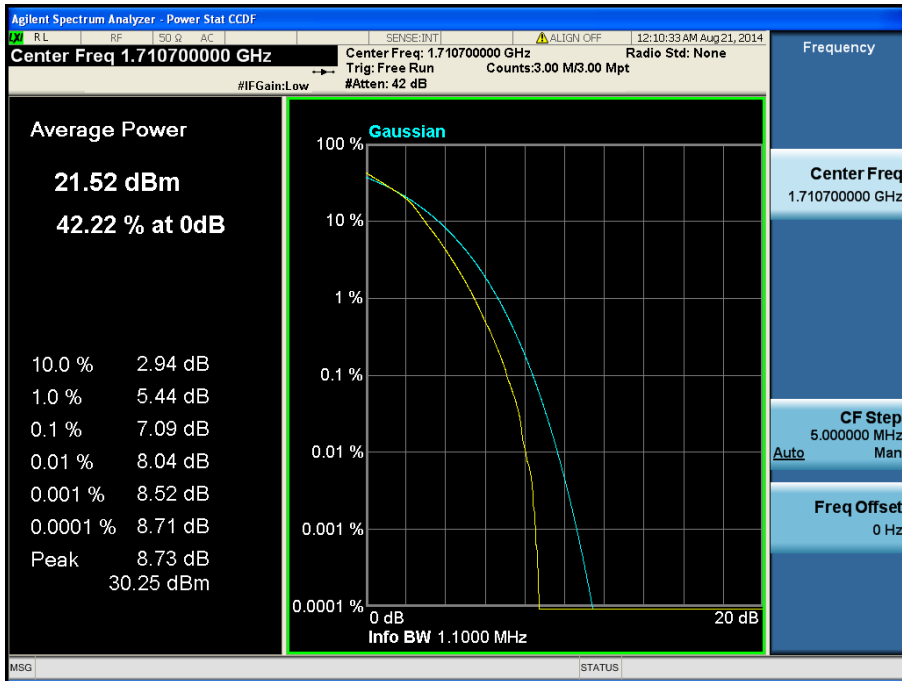
LTE Band 4 / 3 MHz / QPSK - RB Size 15



LTE Band 4 / 3 MHz / 16QAM - RB Size 15

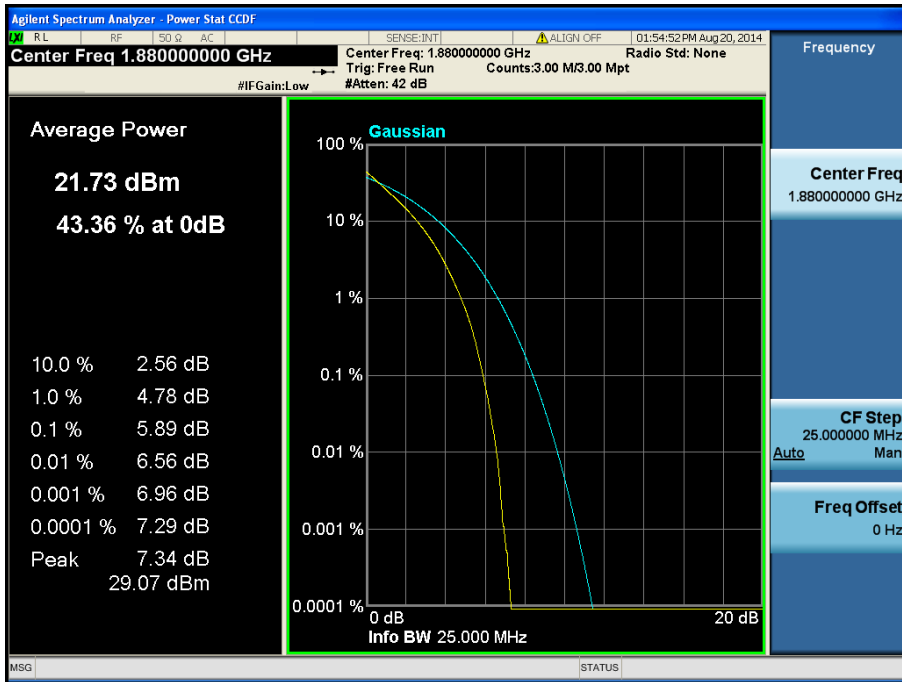


LTE Band 4 / 1.4 MHz / QPSK - RB Size 6

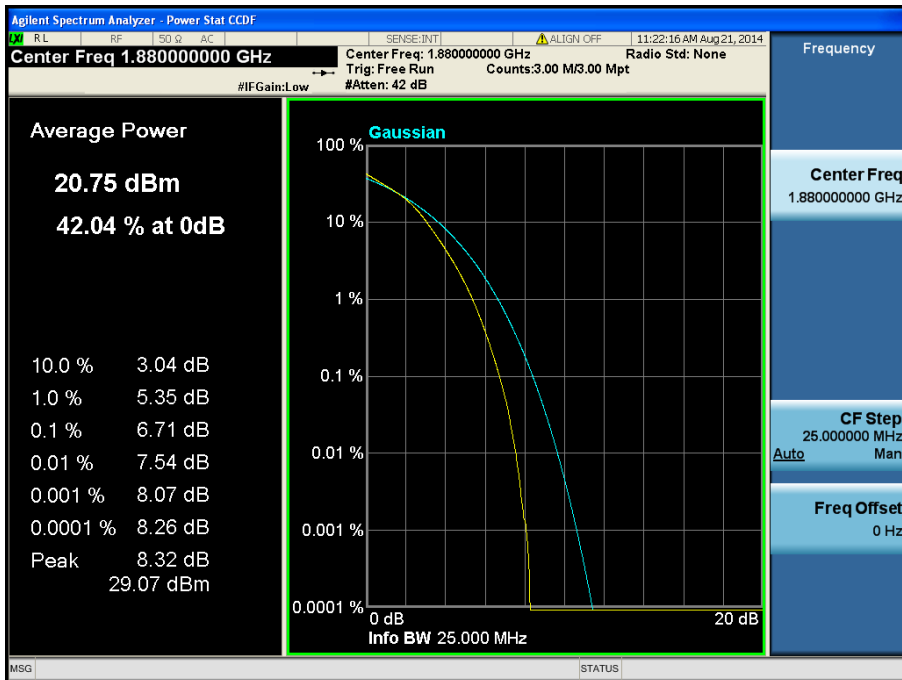


LTE Band 4 / 1.4 MHz / 16QAM - RB Size 6

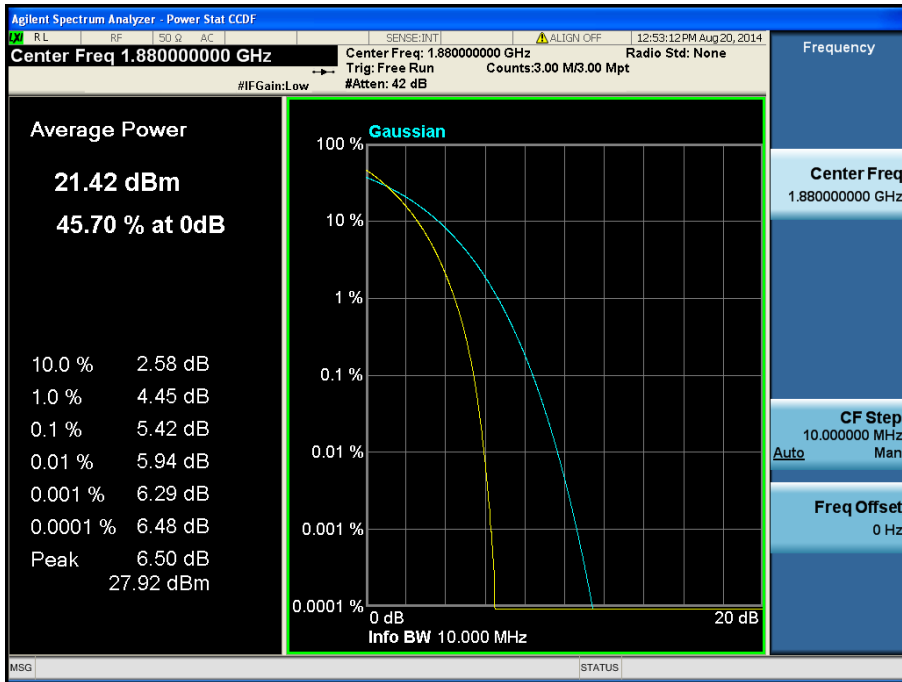
### 8.2.2 LTE Band 2



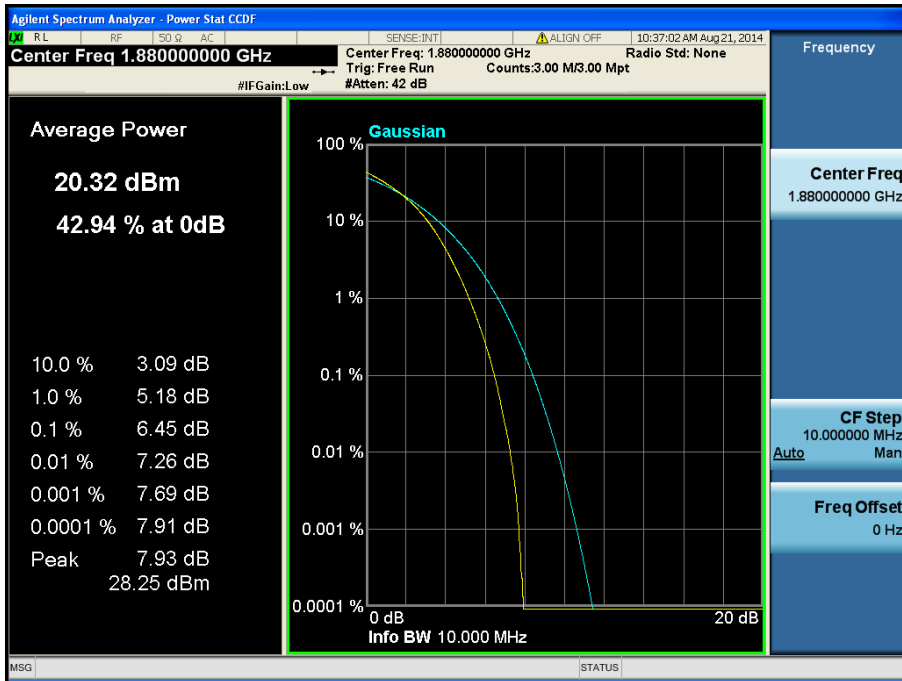
LTE Band 2 / 20 MHz / QPSK - RB Size 100



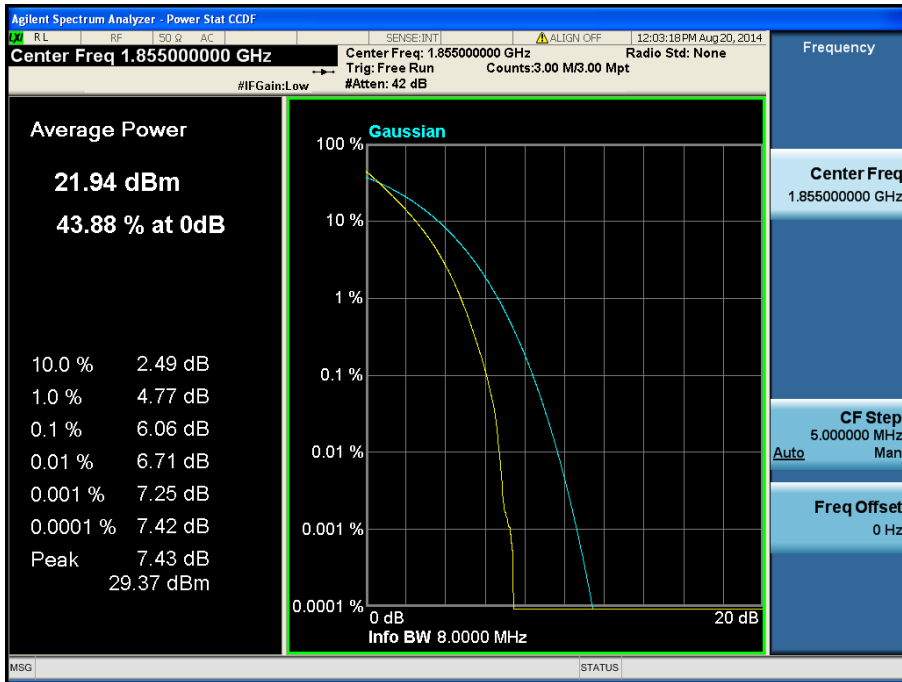
LTE Band 2 / 20 MHz / 16QAM - RB Size 100



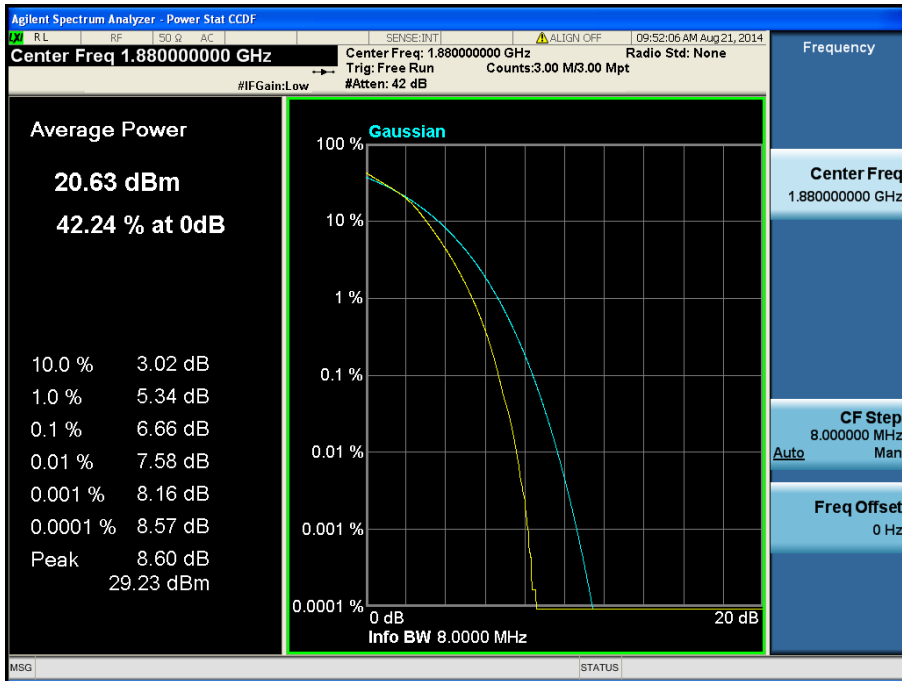
LTE Band 2 / 15 MHz / QPSK - RB Size 75



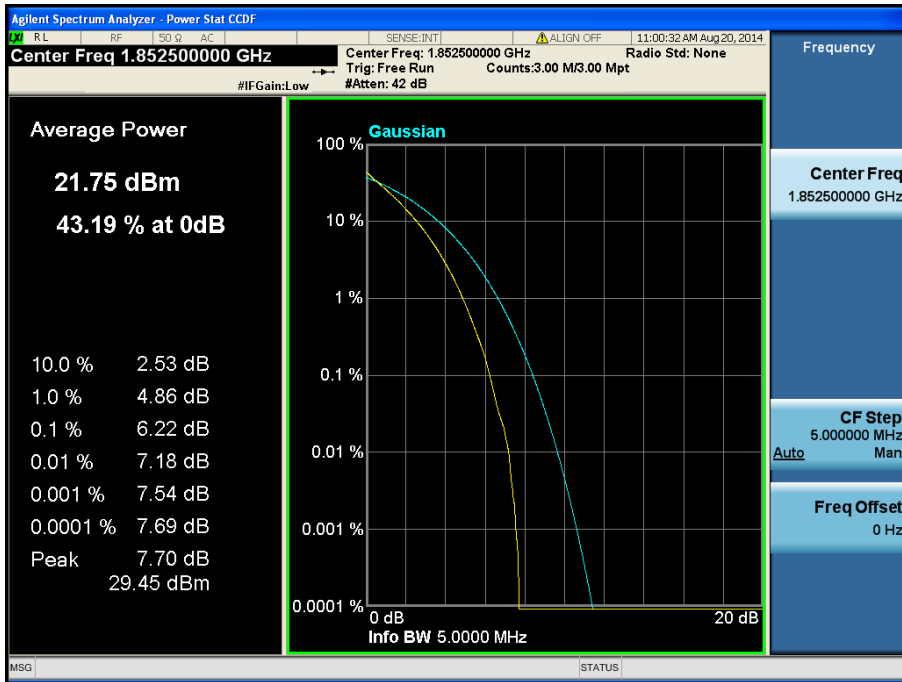
LTE Band 2 / 15 MHz / 16QAM - RB Size 75



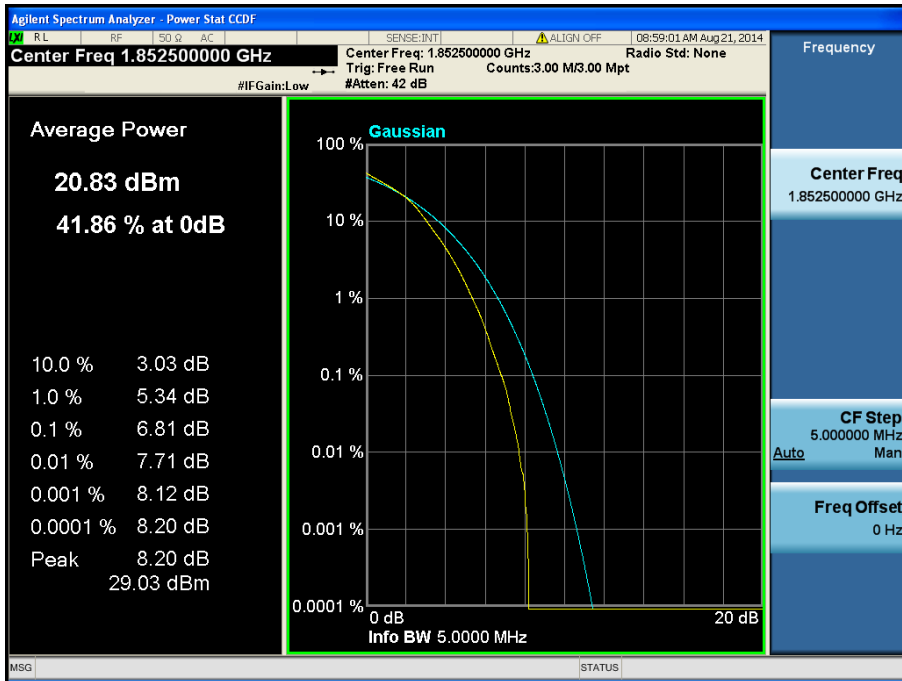
LTE Band 2 / 10 MHz / QPSK - RB Size 50



LTE Band 2 / 10 MHz / 16QAM - RB Size 50

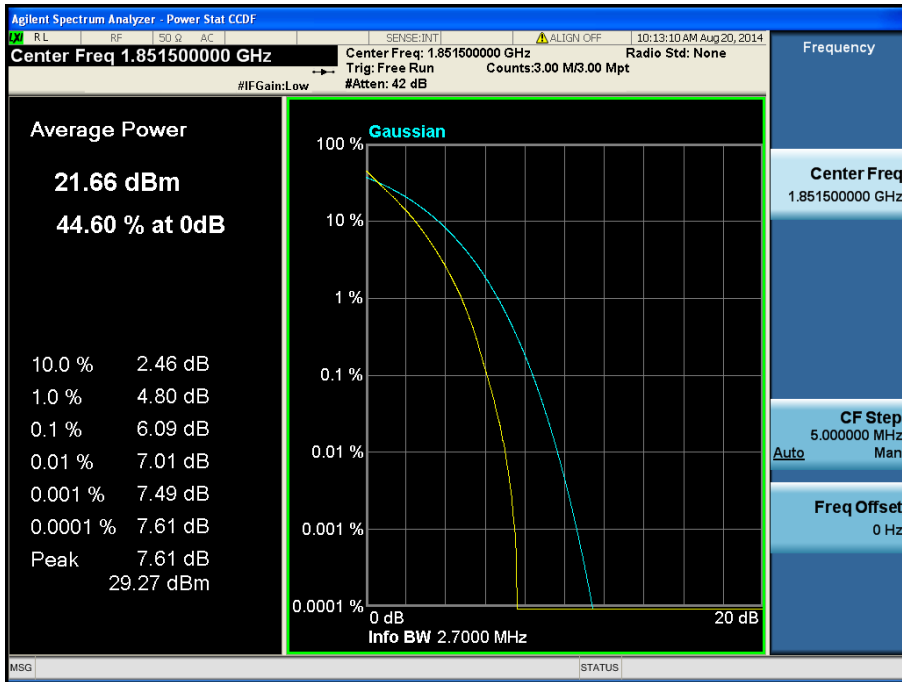


LTE Band 2 / 5 MHz / QPSK - RB Size 25

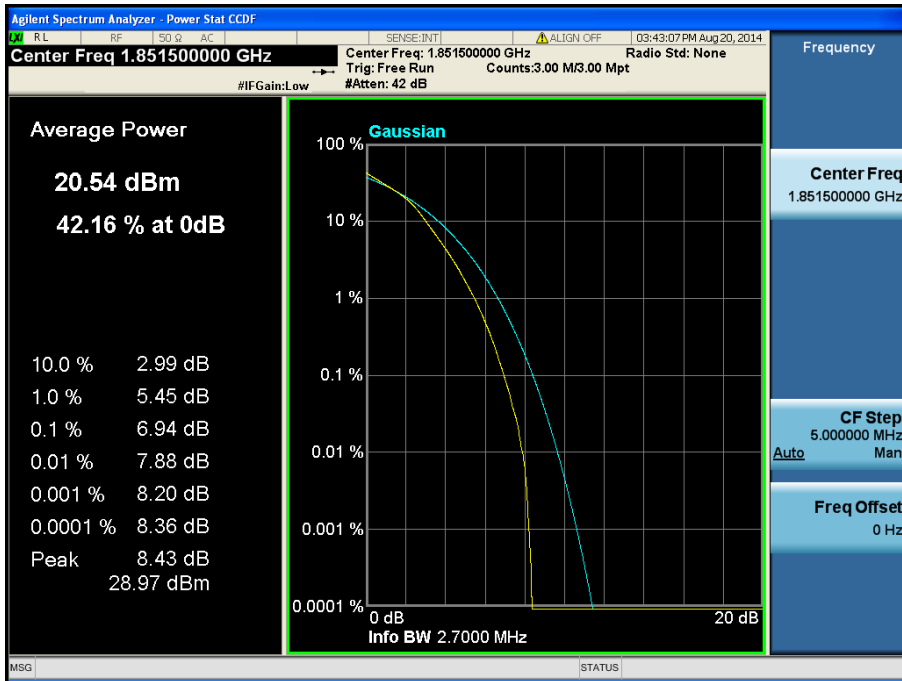


LTE Band 2 / 5 MHz / 16QAM - RB Size 25

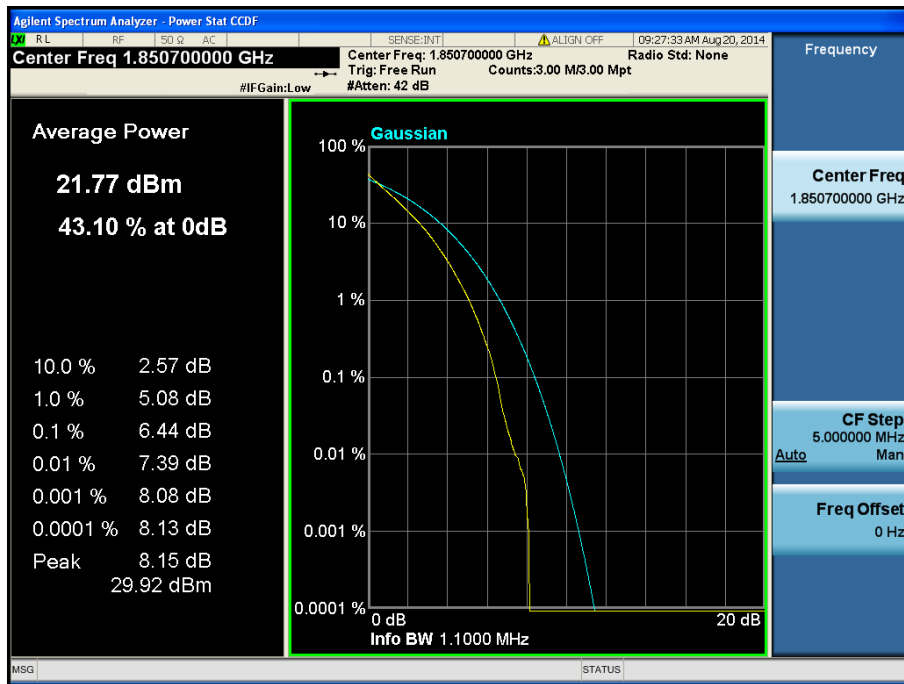




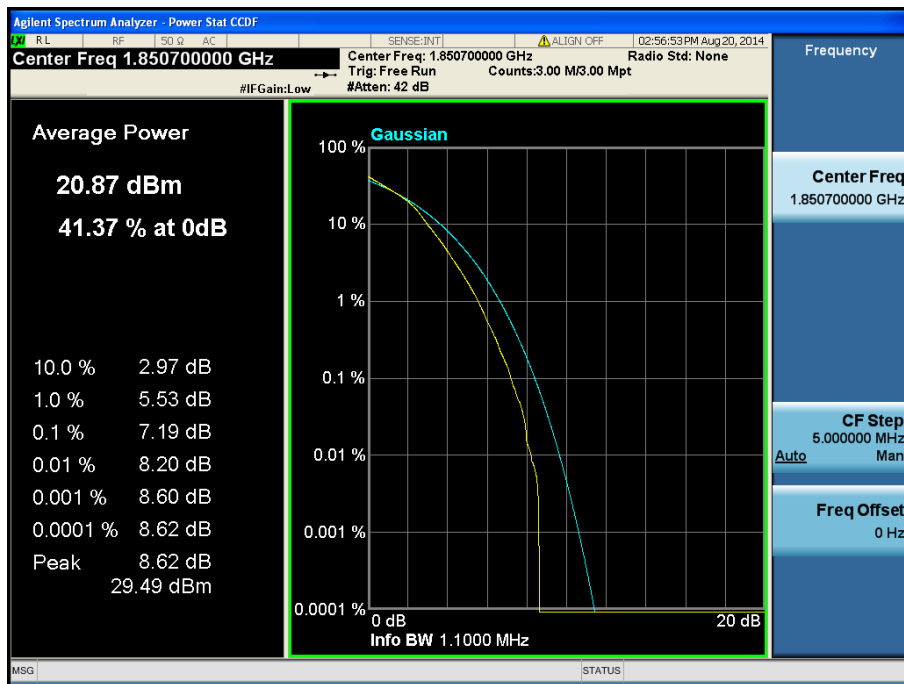
LTE Band 2 / 3 MHz / QPSK - RB Size 15



LTE Band 2 / 3 MHz / 16QAM - RB Size 15

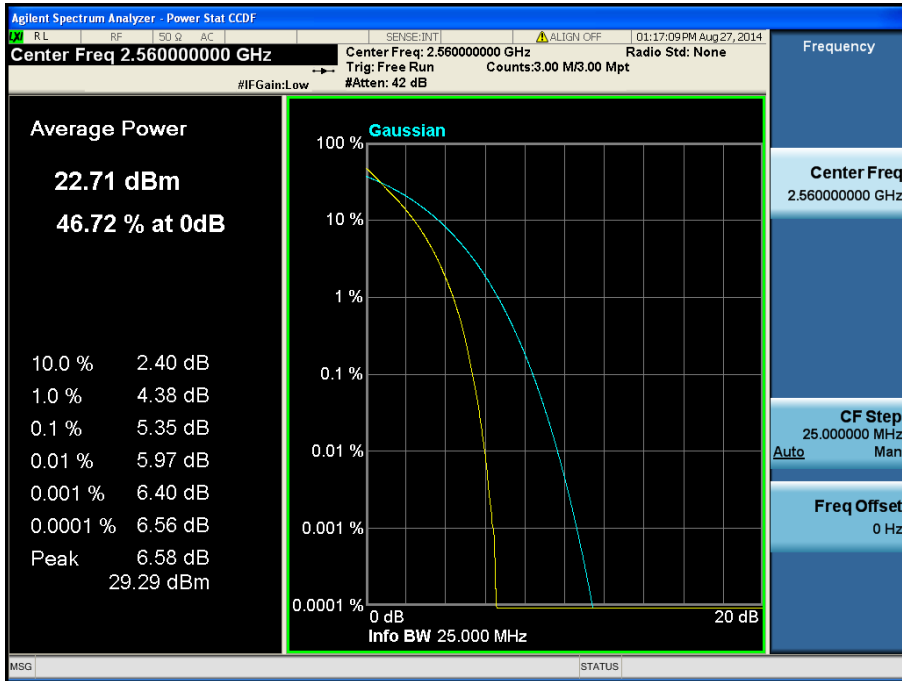


LTE Band 2 / 1.4 MHz / QPSK - RB Size 6

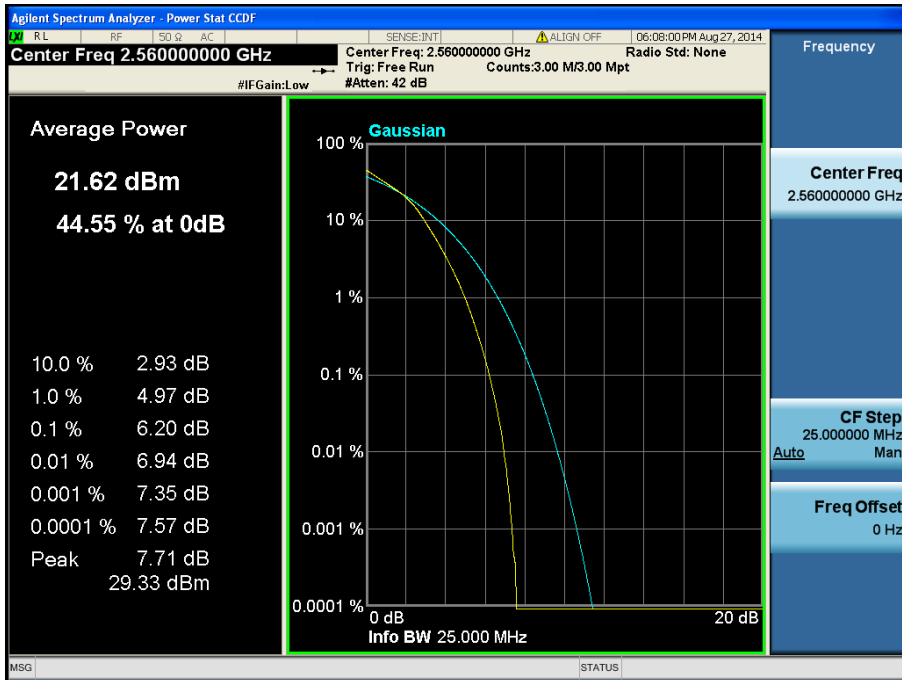


LTE Band 2 / 1.4 MHz / 16QAM - RB Size 6

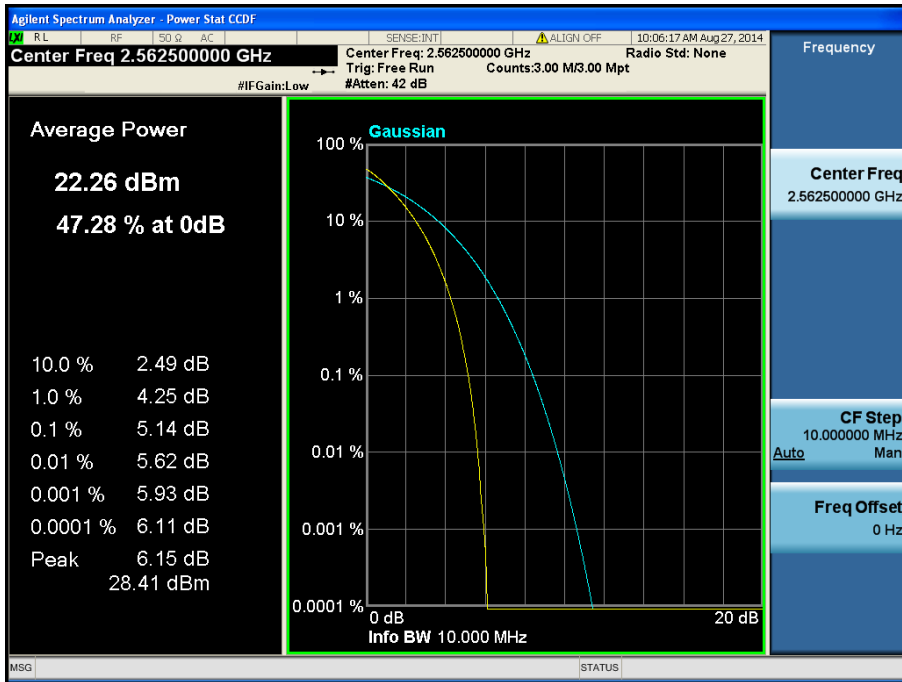
### 8.2.3 LTE Band 7



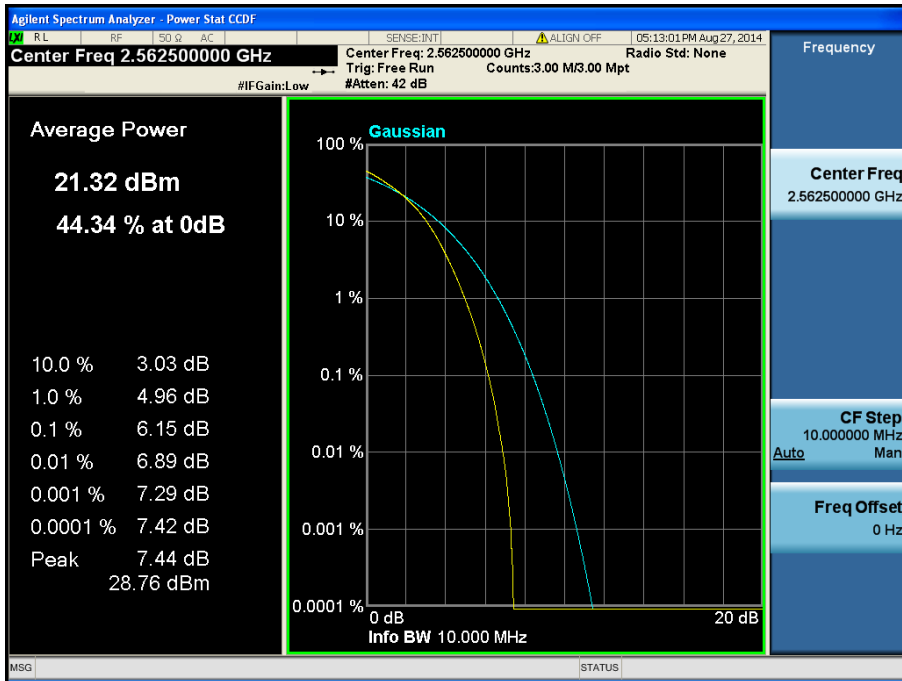
LTE Band 7 / 20 MHz / QPSK - RB Size 100



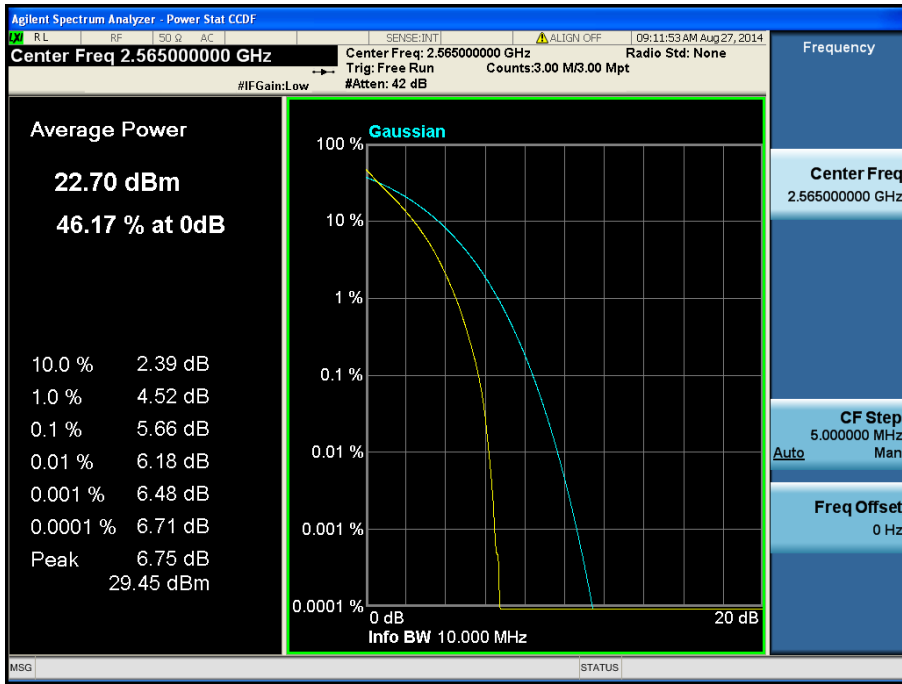
LTE Band 7 / 20 MHz / 16QAM - RB Size 100



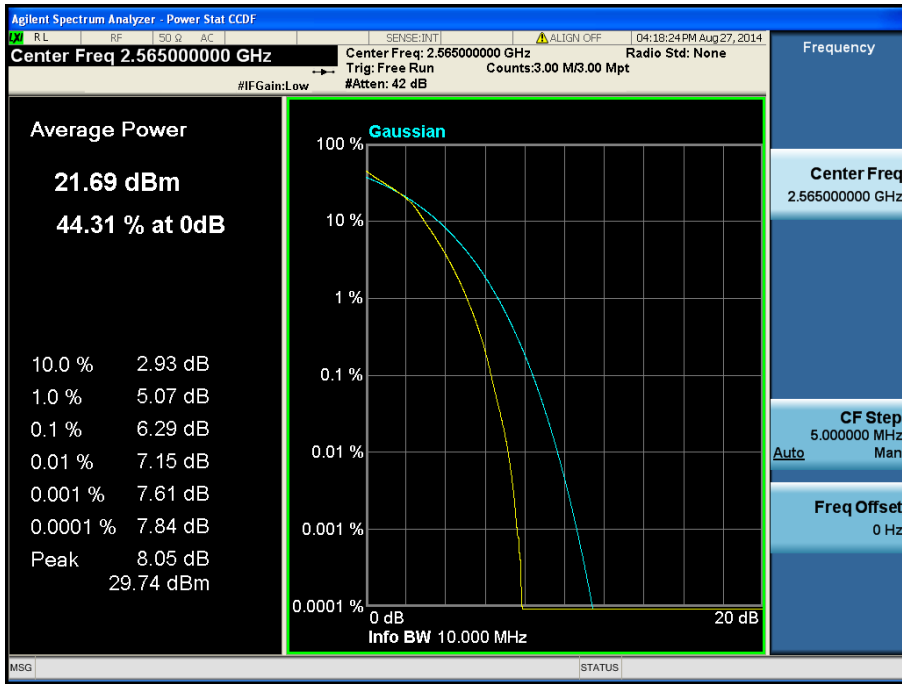
LTE Band 7 / 15 MHz / QPSK - RB Size 75



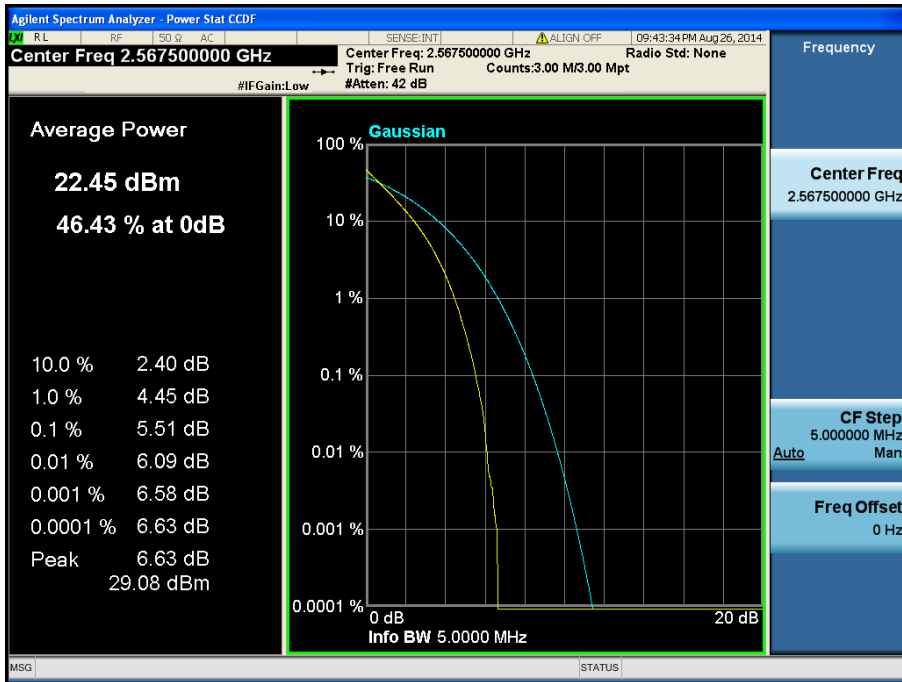
LTE Band 7 / 15 MHz / 16QAM - RB Size 75



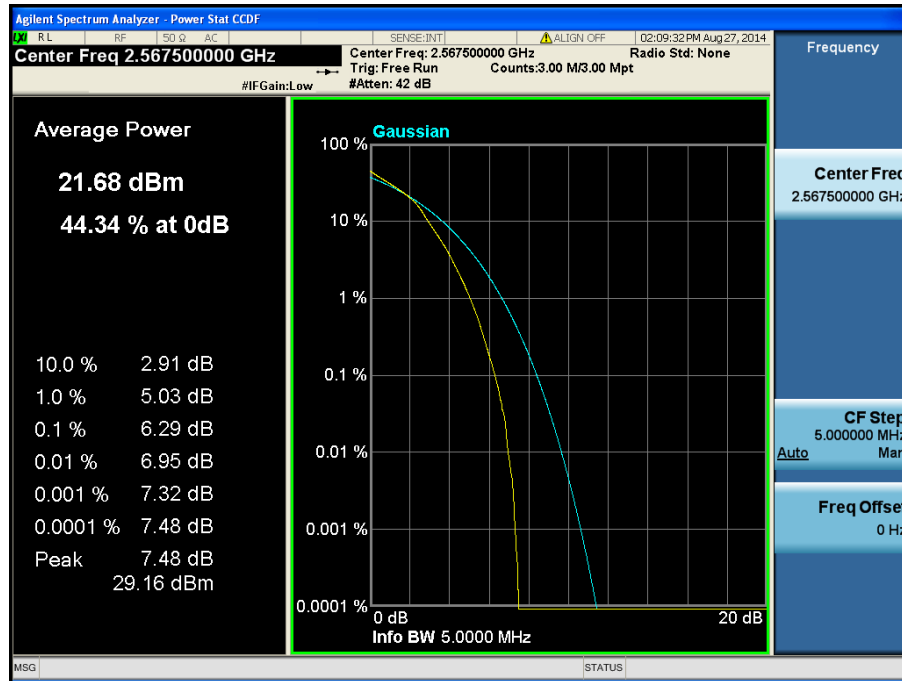
LTE Band 7 / 10 MHz / QPSK - RB Size 50



LTE Band 7 / 10 MHz / 16QAM - RB Size 50



LTE Band 7 / 5 MHz / QPSK - RB Size 25

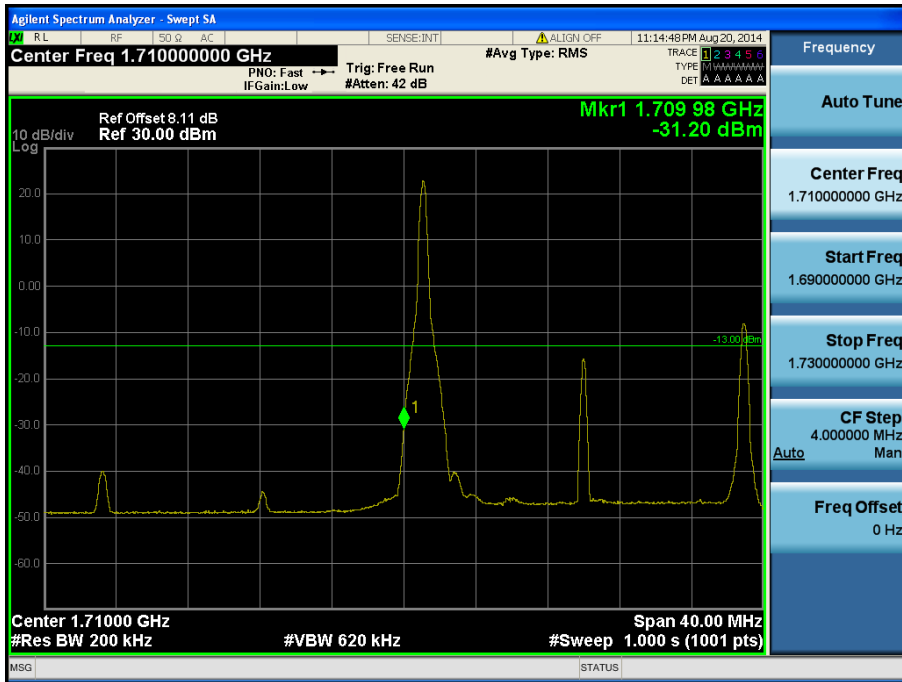


LTE Band 7 / 5 MHz / 16QAM - RB Size 25

### 8.3 BAND EDEG EMISSIONS (Conducted)

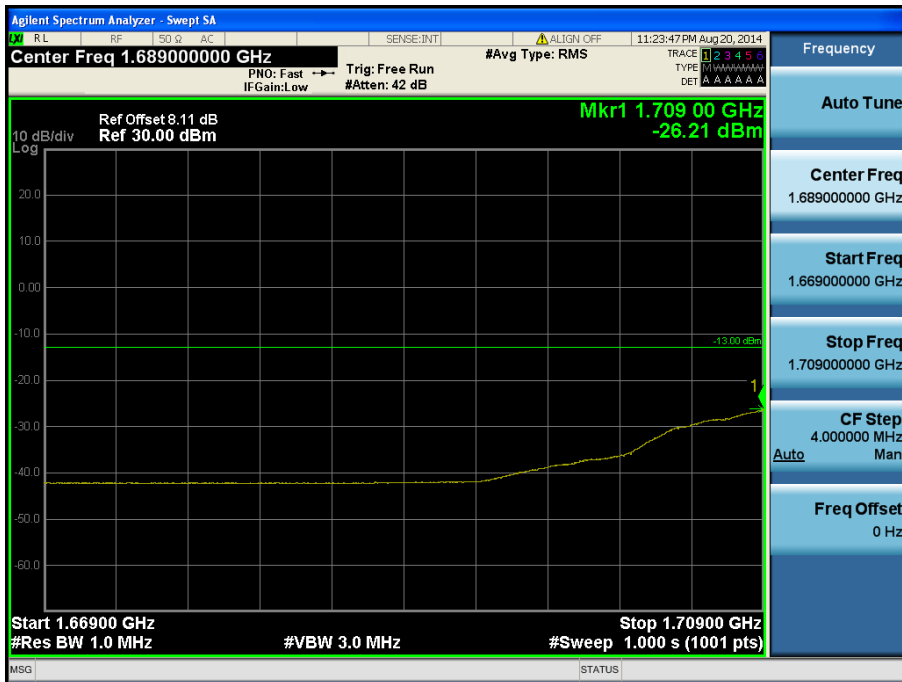
#### 8.3.1 LTE Band 4

- Lower Band Edge



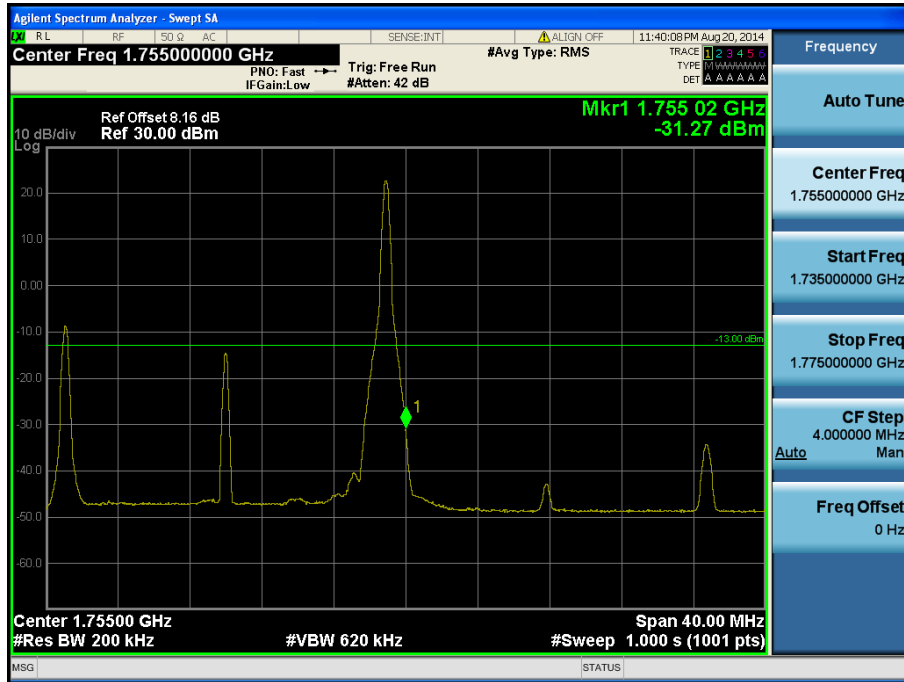
LTE Band 4 / 20 MHz / QPSK - RB Offset/Size (0/1)

- Lower Extended Band Edge



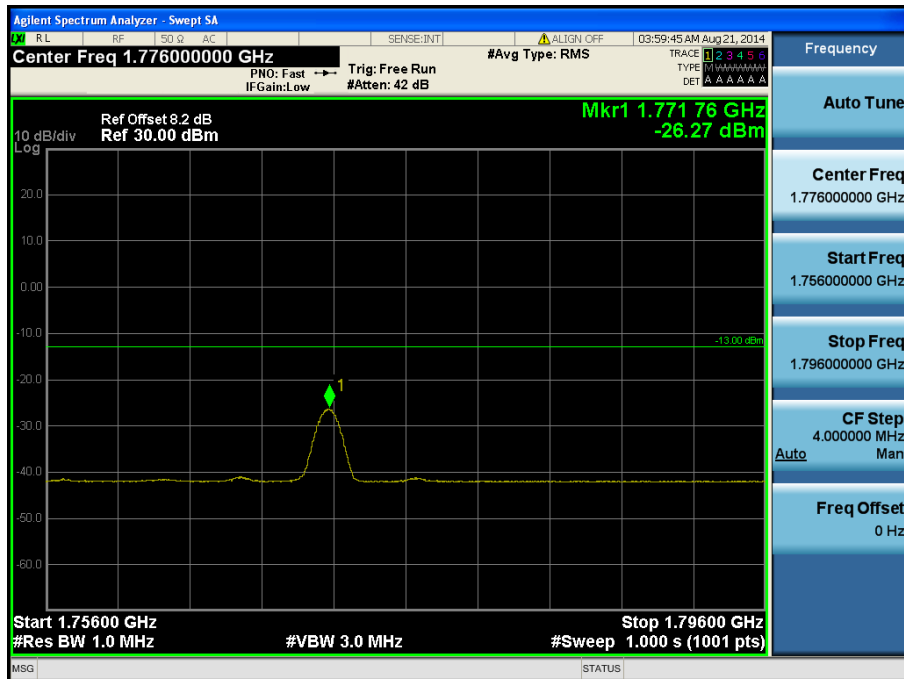
LTE Band 4 / 20 MHz / QPSK - RB Offset/Size (0/50)

- Upper Band Edge



LTE Band 4 / 20 MHz / QPSK - RB Offset/Size (99/1)

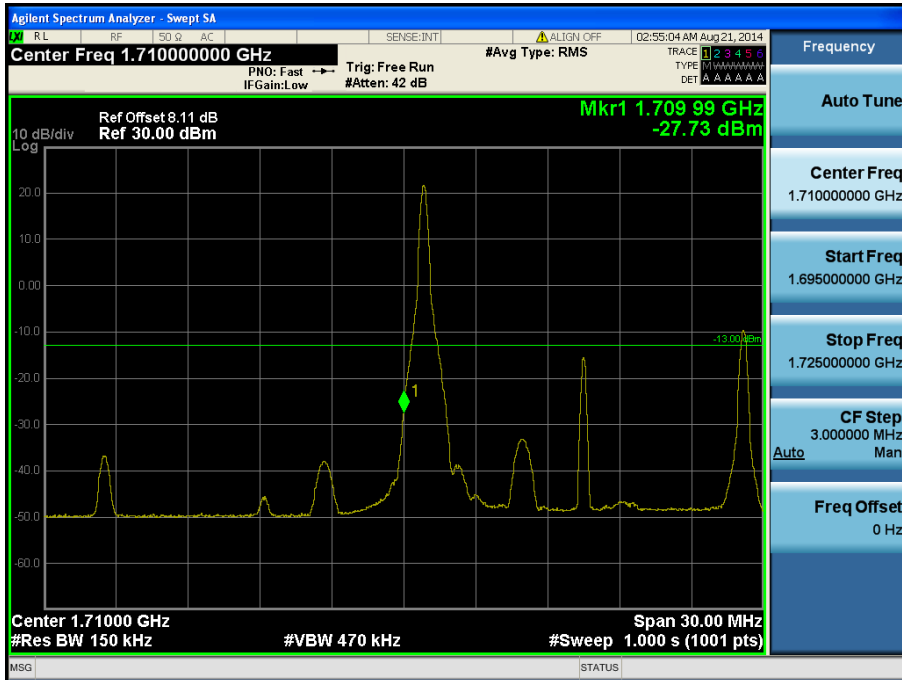
- Upper Extended Band Edge



LTE Band 4 / 20 MHz / 16QAM - RB Offset/Size (0/1)

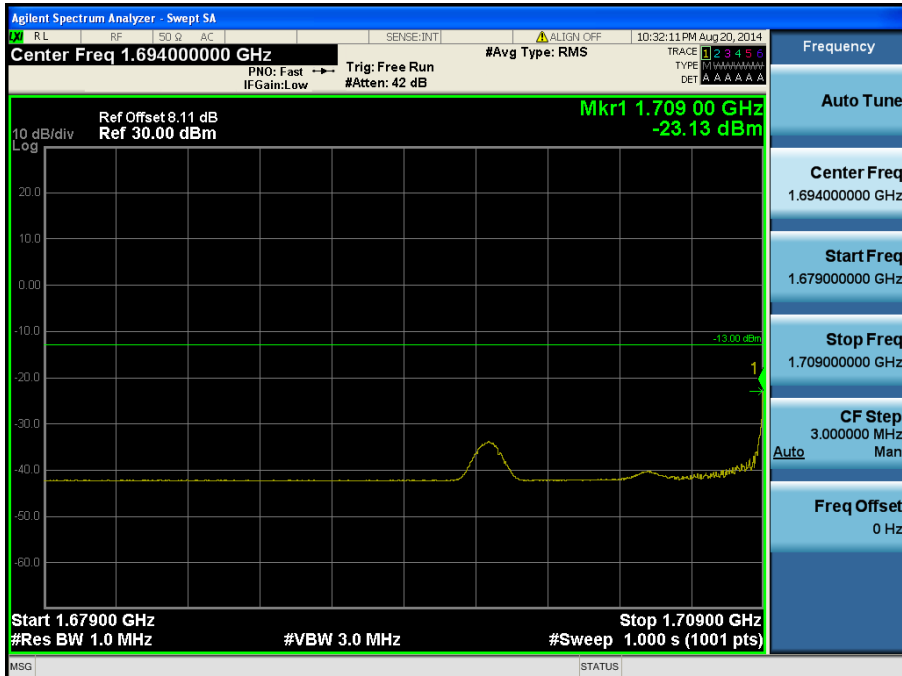


- Lower Band Edge



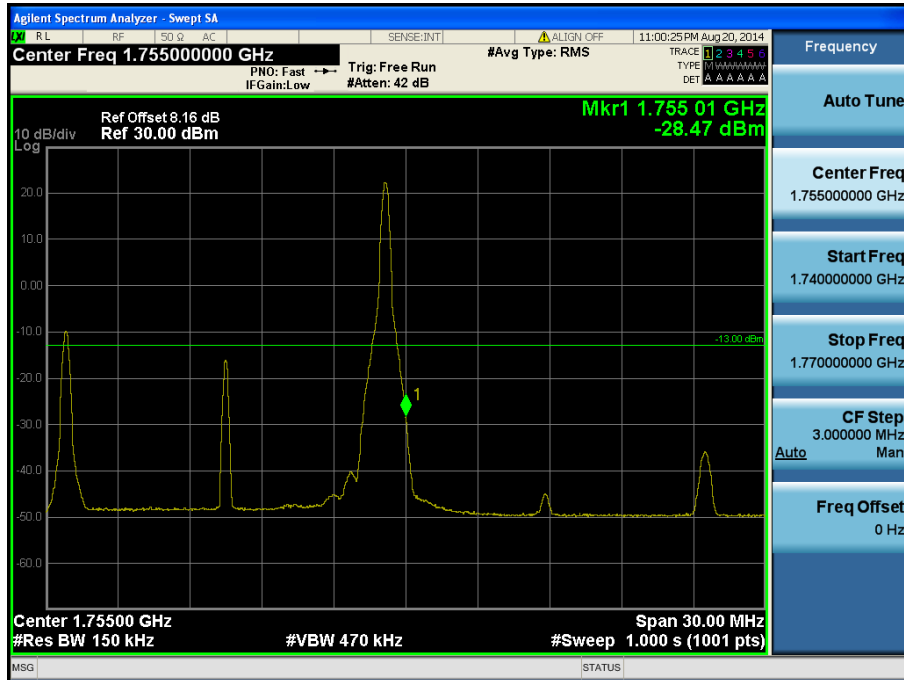
LTE Band 4 / 15 MHz / 16QAM - RB Offset/Size (0/1)

- Lower Extended Band Edge



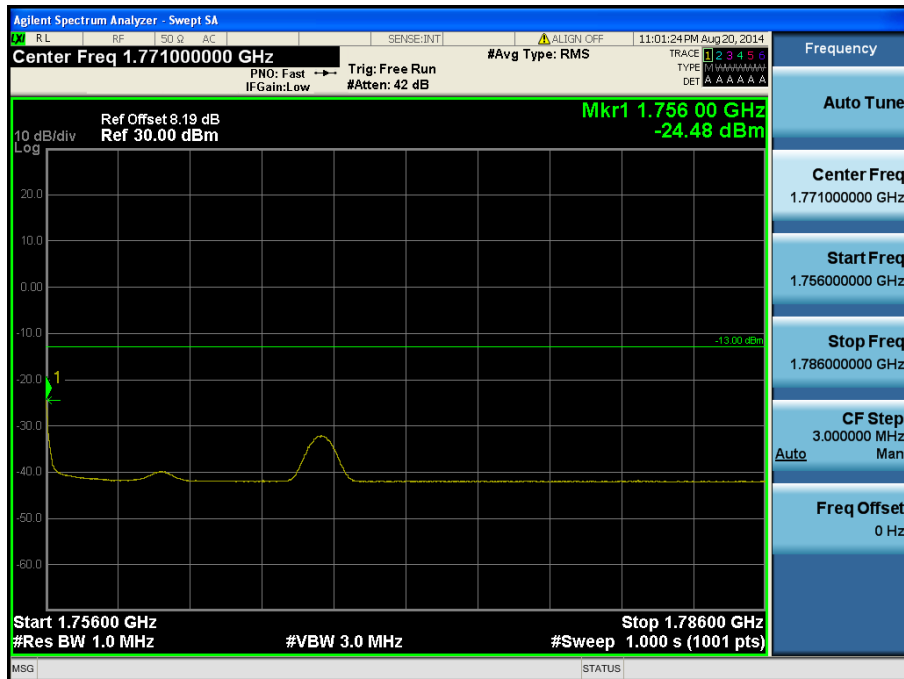
LTE Band 4 / 15 MHz / QPSK - RB Offset/Size (0/1)

- Upper Band Edge



LTE Band 4 / 15 MHz / QPSK - RB Offset/Size (74/1)

- Upper Extended Band Edge



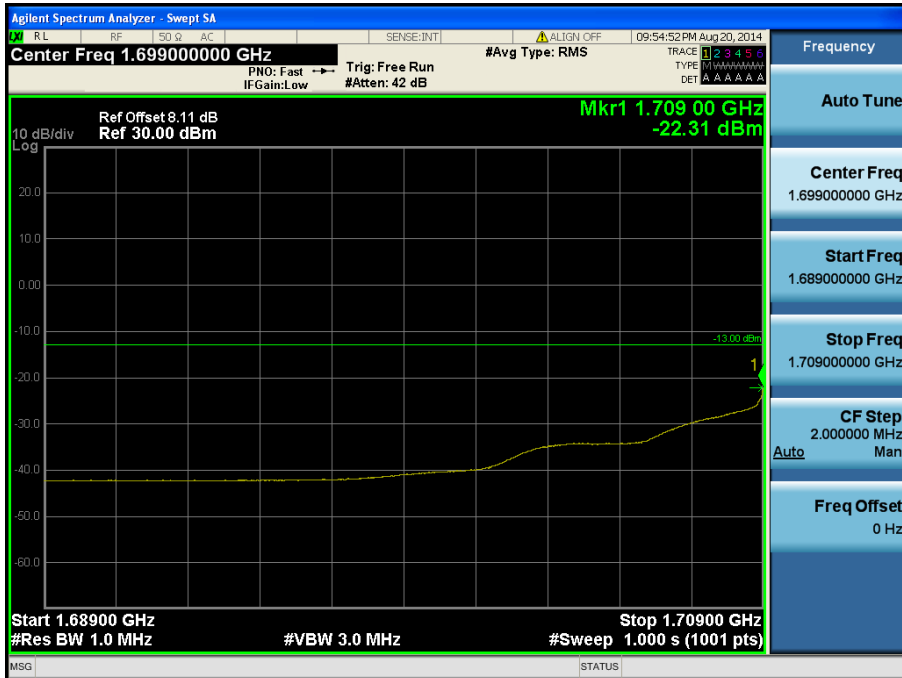
LTE Band 4 / 15 MHz / QPSK - RB Offset/Size (74/1)

- Lower Band Edge



LTE Band 4 / 10 MHz / QPSK - RB Offset/Size (0/25)

- Lower Extended Band Edge



LTE Band 4 / 10 MHz / QPSK - RB Offset/Size (0/25)

- Upper Band Edge



LTE Band 4 / 10 MHz / QPSK - RB Offset/Size (25/25)

- Upper Extended Band Edge



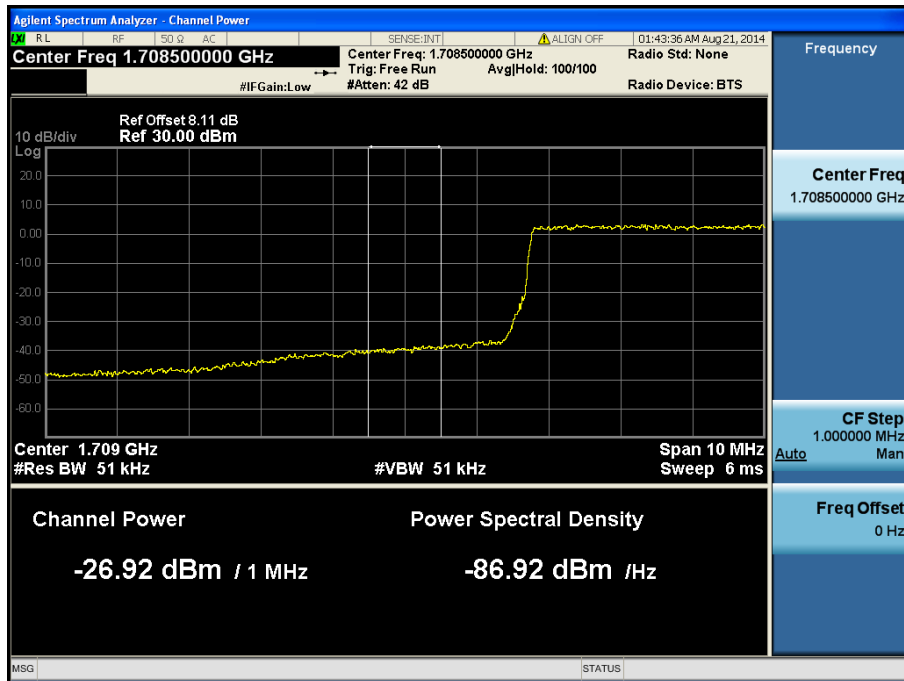
LTE Band 4 / 10 MHz / QPSK - RB Offset/Size (25/25)

- Lower Band Edge



LTE Band 4 / 5 MHz / 16QAM Offset/Size (0/1)

- Lower Extended Band Edge



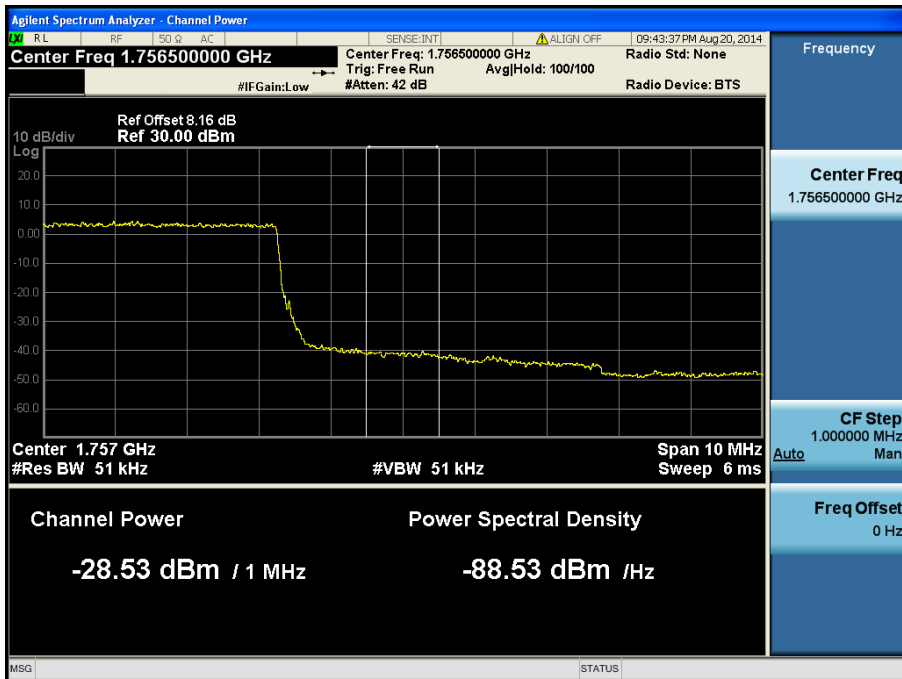
LTE Band 4 / 5 MHz / 16QAM Offset/Size (0/25)

- Upper Band Edge



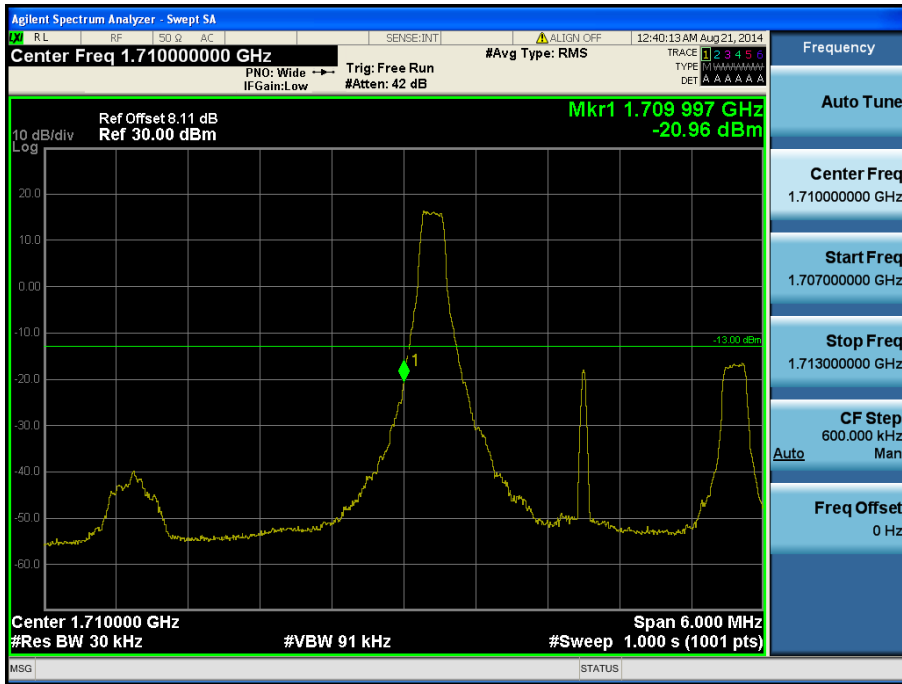
LTE Band 4 / 5 MHz / 16QAM - RB Offset/Size (24/1)

- Upper Extended Band Edge



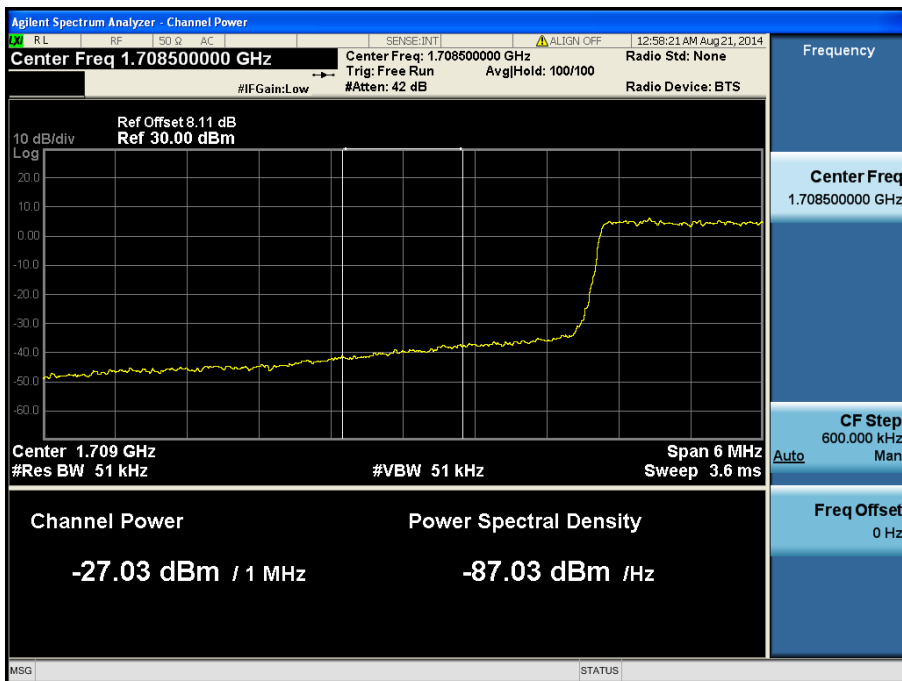
LTE Band 4 / 5 MHz / QPSK - RB Offset/Size (0/25)

- Lower Band Edge



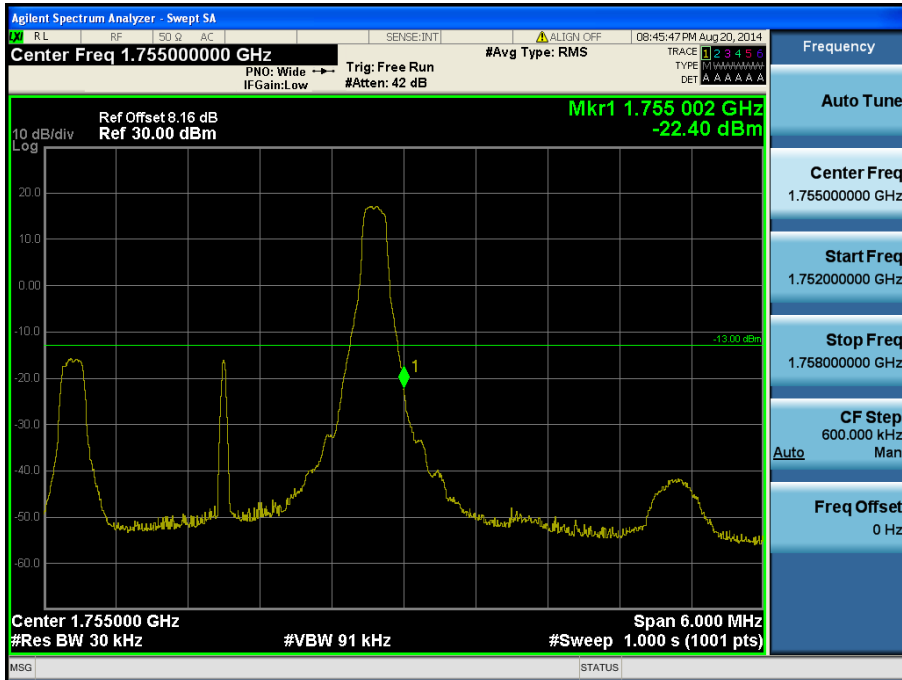
LTE Band 4 / 3 MHz / 16QAM - RB Offset/Size (0/1)

- Lower Extended Band Edge



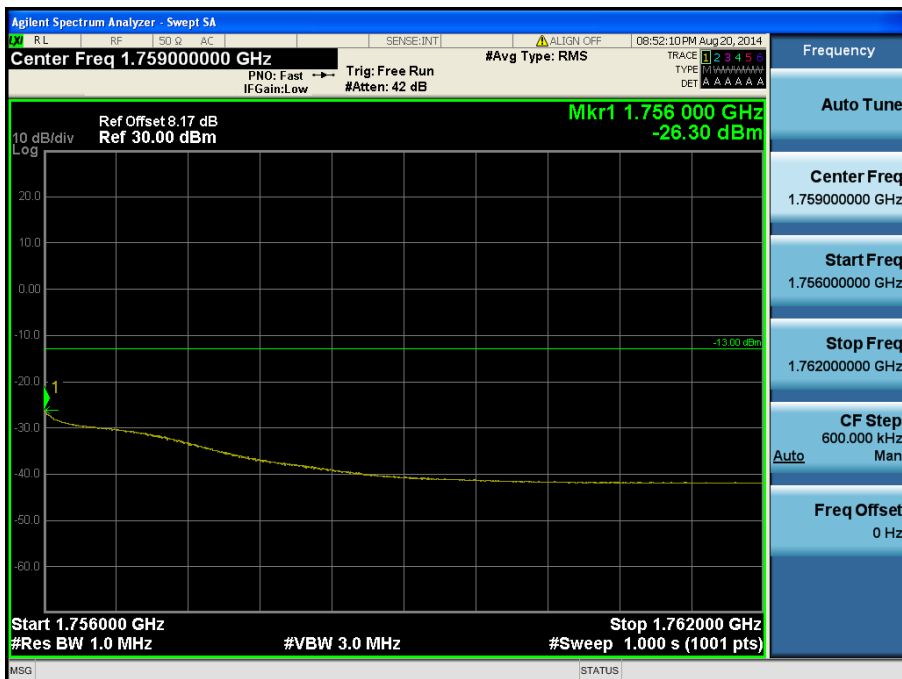
LTE Band 4 / 3 MHz / 16QAM - RB Offset/Size (0/15)

- Upper Band Edge



LTE Band 4 / 3 MHz / QPSK - RB Offset/Size (14/1)

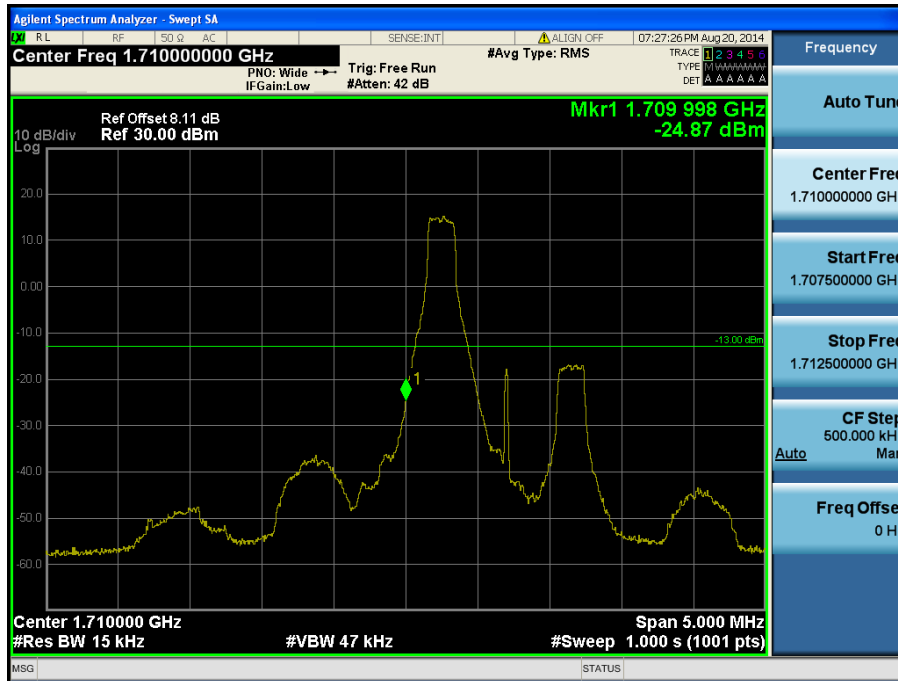
- Upper Extended Band Edge



LTE Band 4 / 3 MHz / QPSK - RB Offset/Size (3/8)

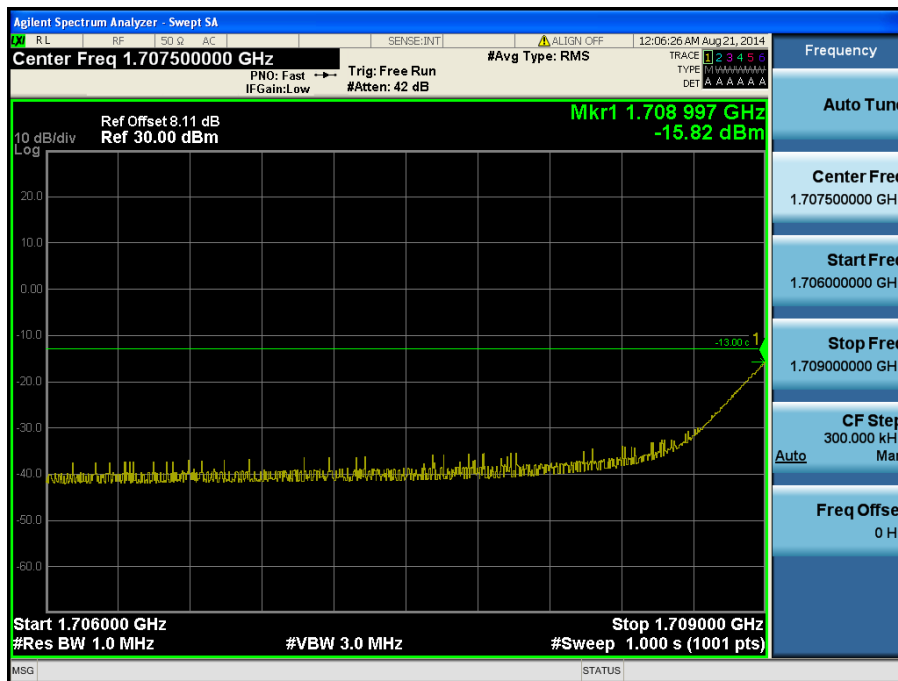


- Lower Band Edge



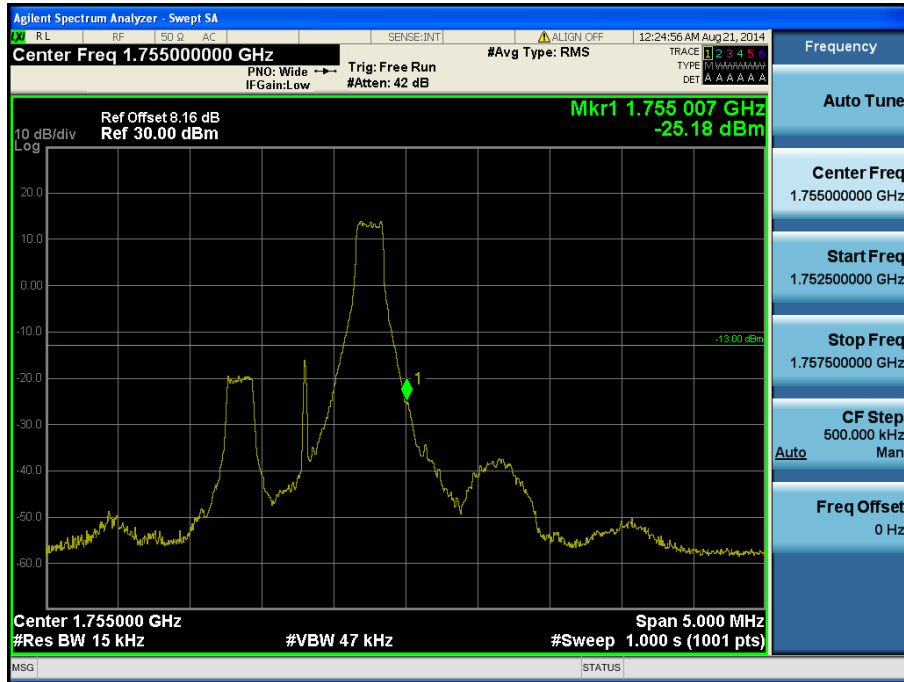
LTE Band 4 / 1.4 MHz / QPSK - RB Offset/Size (0/1)

- Lower Extended Band Edge



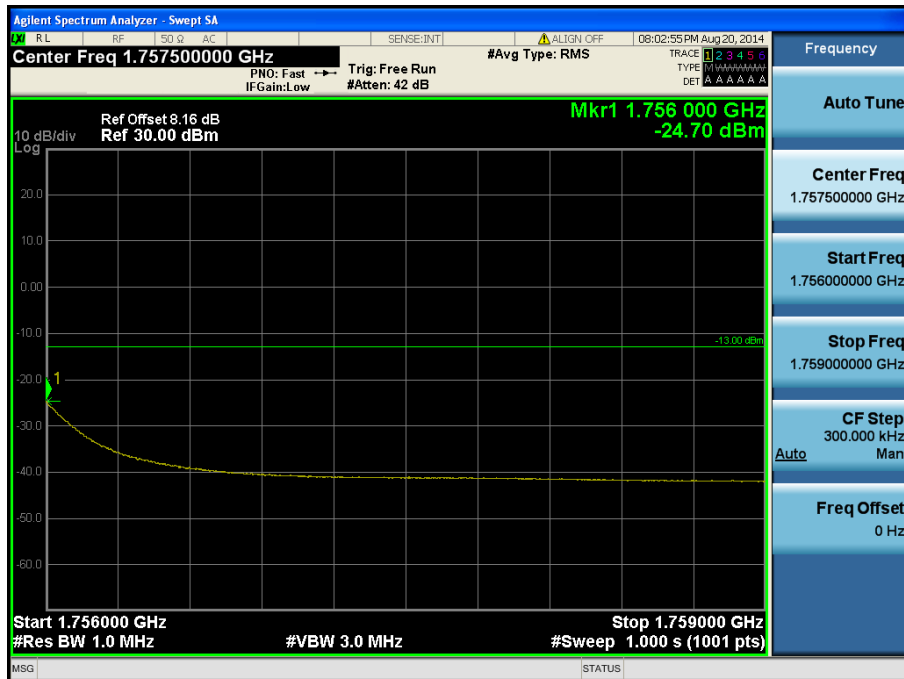
LTE Band 4 / 1.4 MHz / 16QAM - RB Offset/Size (1/3)

- Upper Band Edge



LTE Band 4 / 1.4 MHz / 16QAM - RB Offset/Size (5/1)

- Upper Extended Band Edge



LTE Band 4 / 1.4 MHz / QPSK - RB Offset/Size (0/3)

### 8.3.2 LTE Band 2

- Lower Band Edge



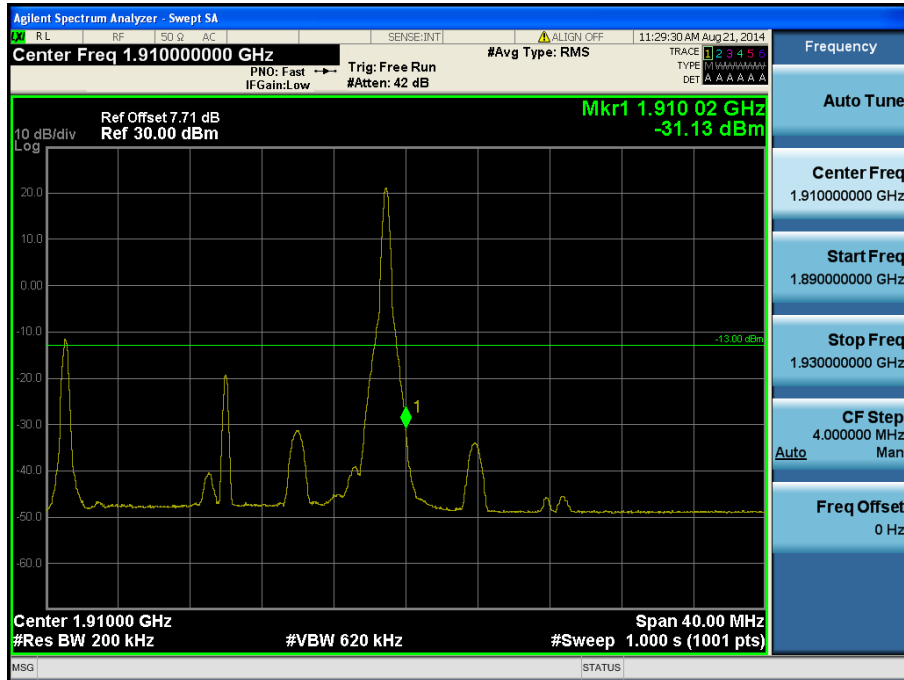
LTE Band 2 / 20 MHz / QPSK - RB Offset/Size (0/50)

- Lower Extended Band Edge



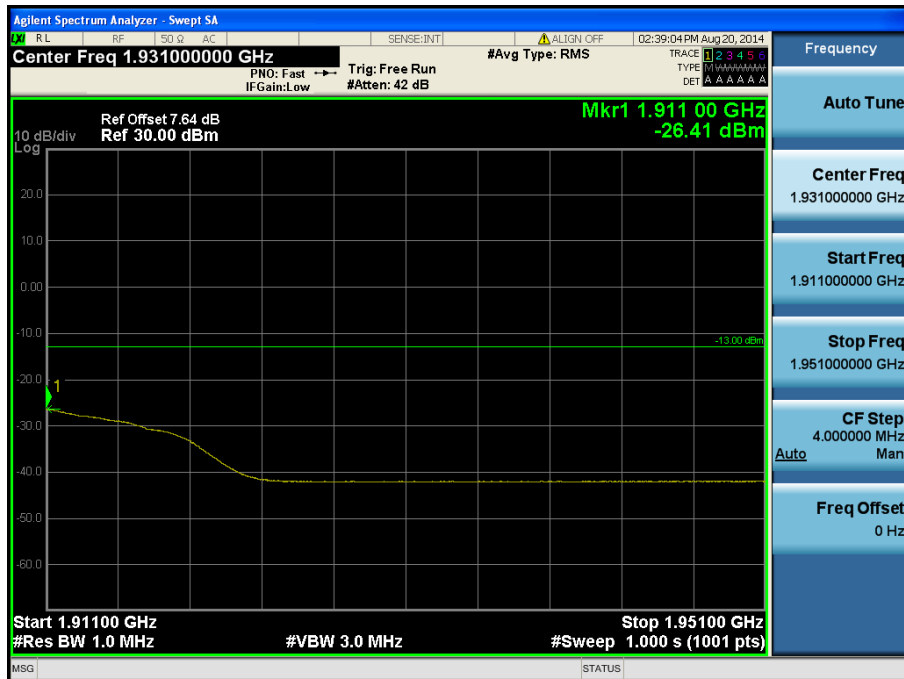
LTE Band 2 / 20 MHz / QPSK - RB Offset/Size (0/50)

- Upper Band Edge



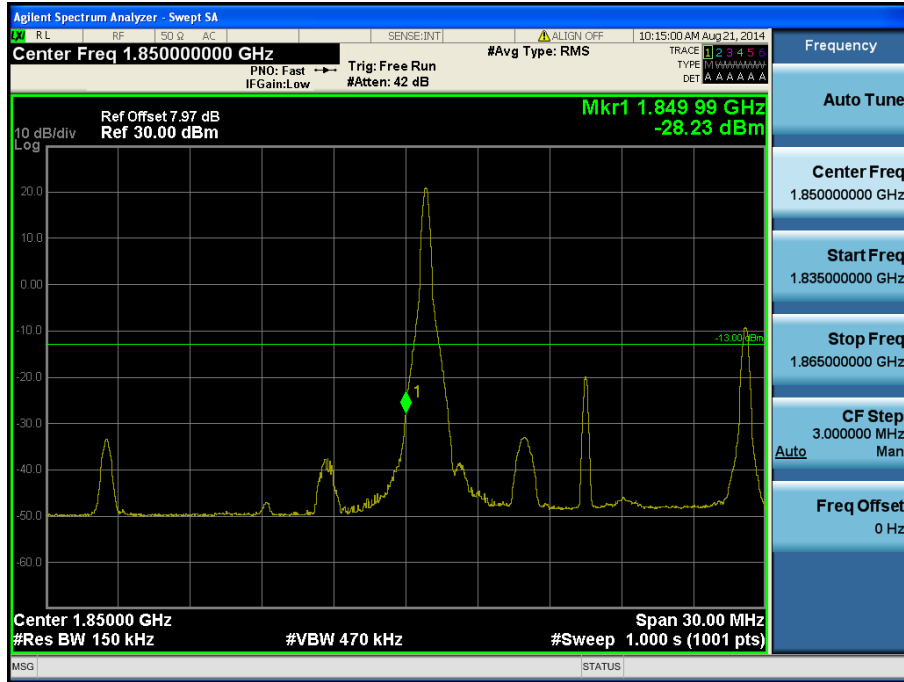
LTE Band 2 / 20 MHz / 16QAM - RB Offset/Size (99/1)

- Upper Extended Band Edge



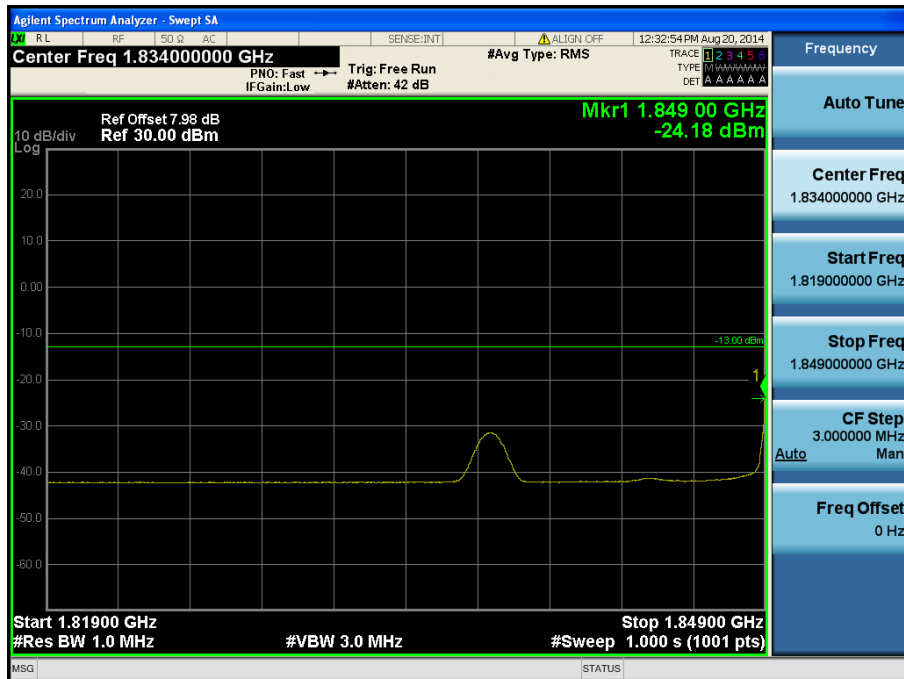
LTE Band 2 / 20 MHz / QPSK - RB Offset/Size (0/99)

- Lower Band Edge



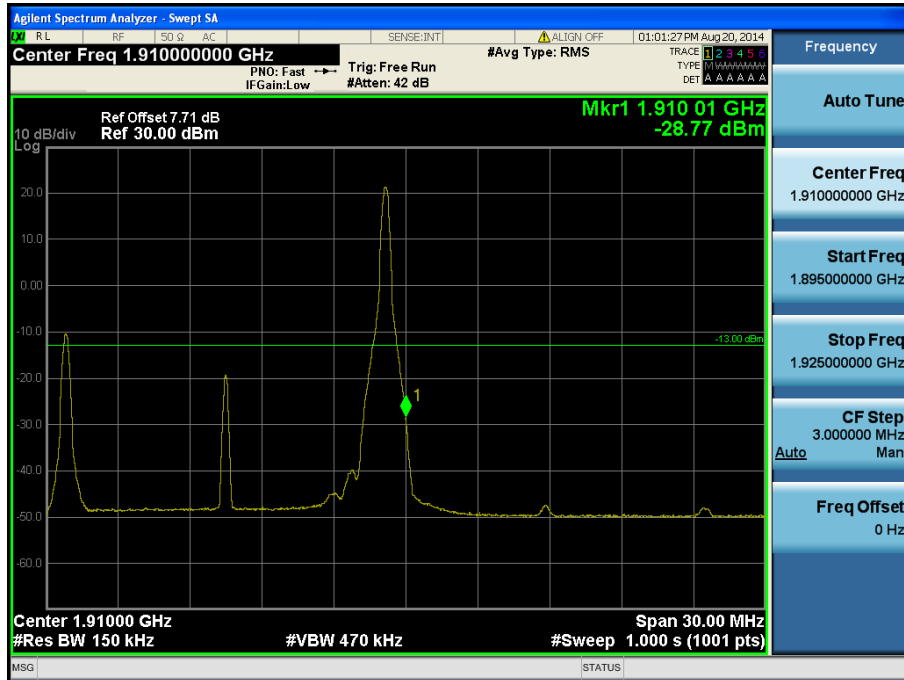
LTE Band 2 / 15 MHz / 16QAM - RB Offset/Size (0/1)

- Lower Extended Band Edge



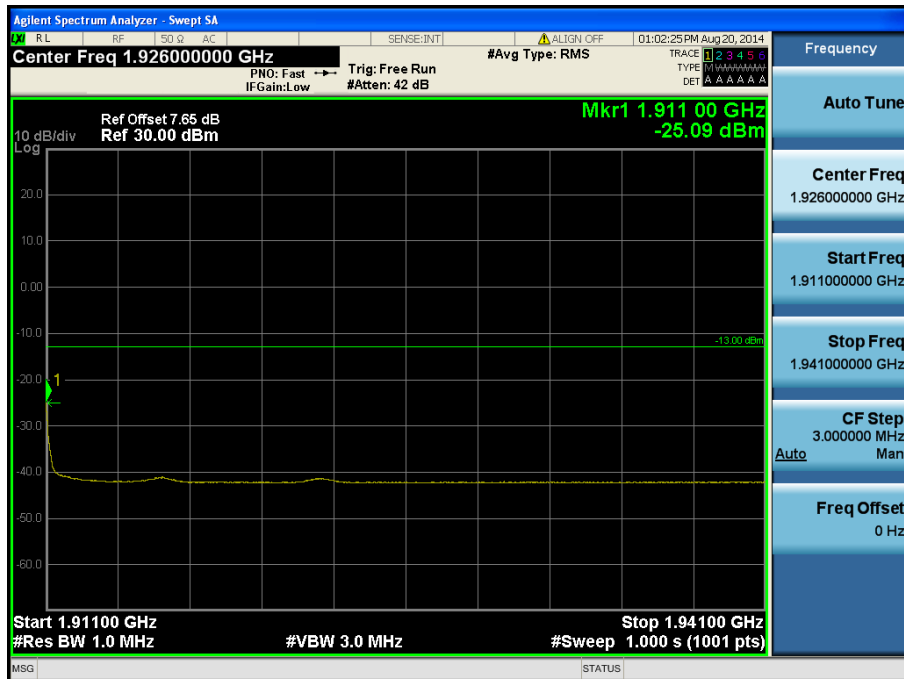
LTE Band 2 / 15 MHz / QPSK - RB Offset/Size (0/1)

- Upper Band Edge



LTE Band 2 / 15 MHz / QPSK - RB Offset/Size (74/1)

- Upper Extended Band Edge



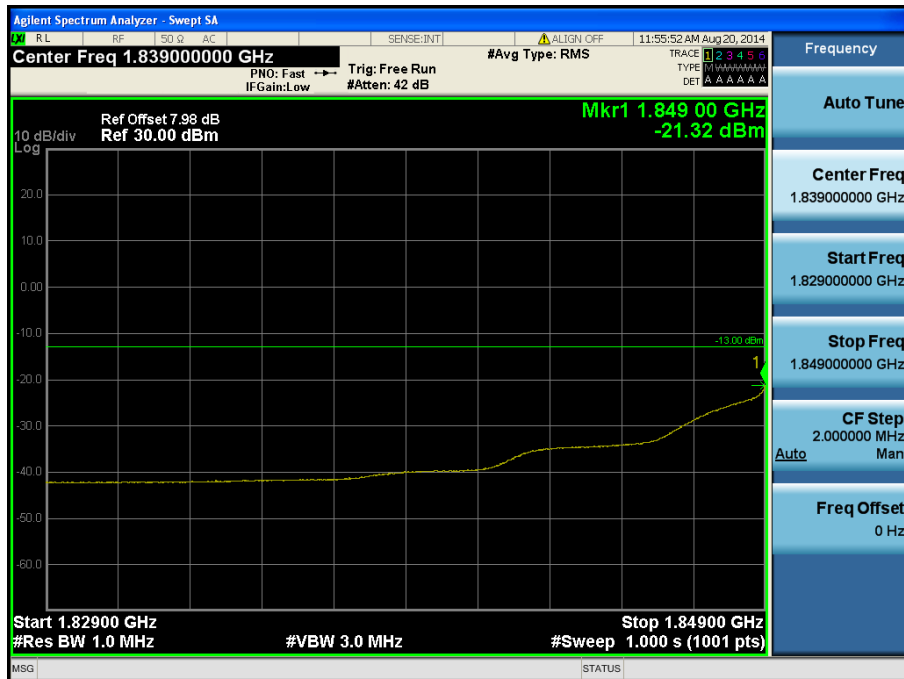
LTE Band 2 / 15 MHz / QPSK - RB Offset/Size (74/1)

- Lower Band Edge



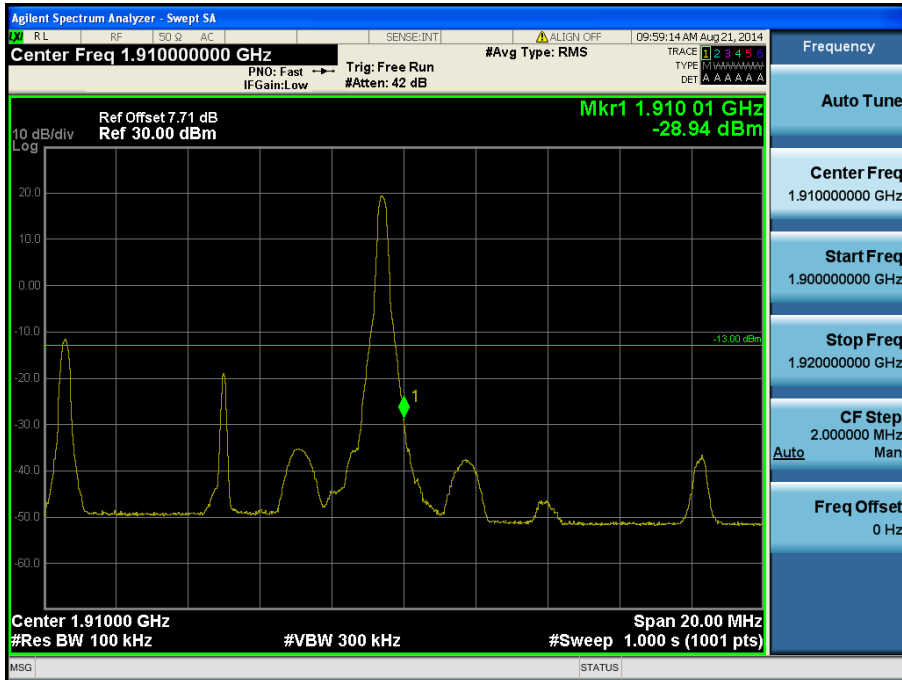
LTE Band 2 / 10 MHz / QPSK - RB Offset/Size (0/25)

- Lower Extended Band Edge



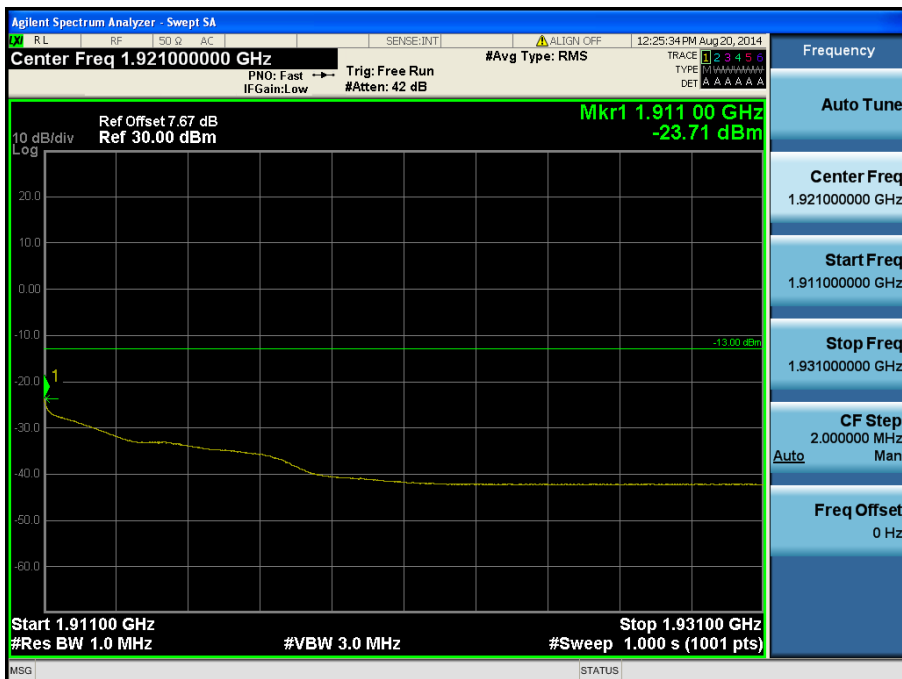
LTE Band 2 / 10 MHz / QPSK - RB Offset/Size (0/25)

- Upper Band Edge



LTE Band 2 / 10 MHz / 16QAM - RB Offset/Size (49/1)

- Upper Extended Band Edge



LTE Band 2 / 10 MHz / QPSK - RB Offset/Size (25/25)

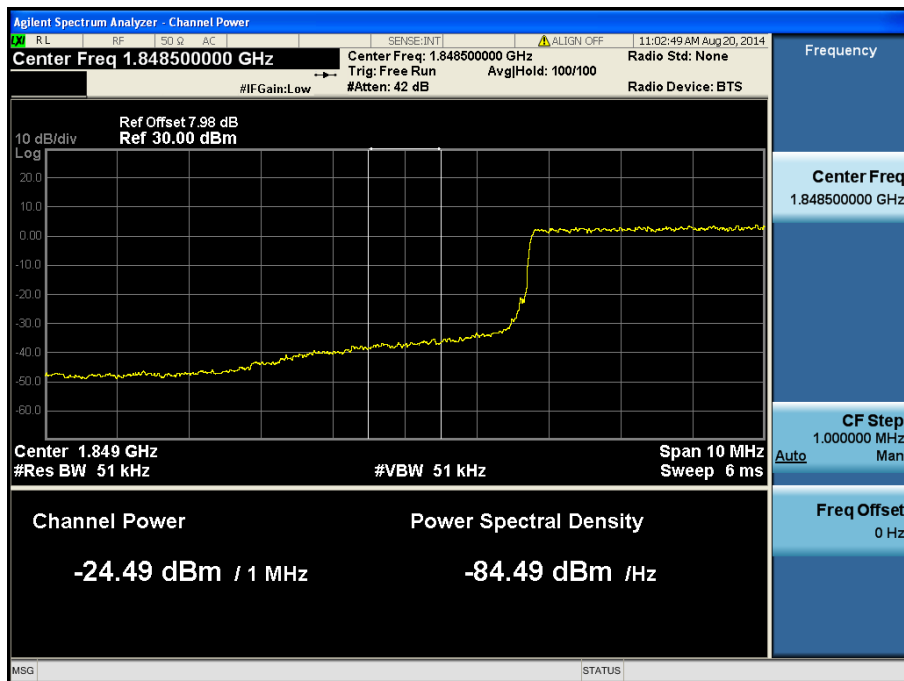


- Lower Band Edge



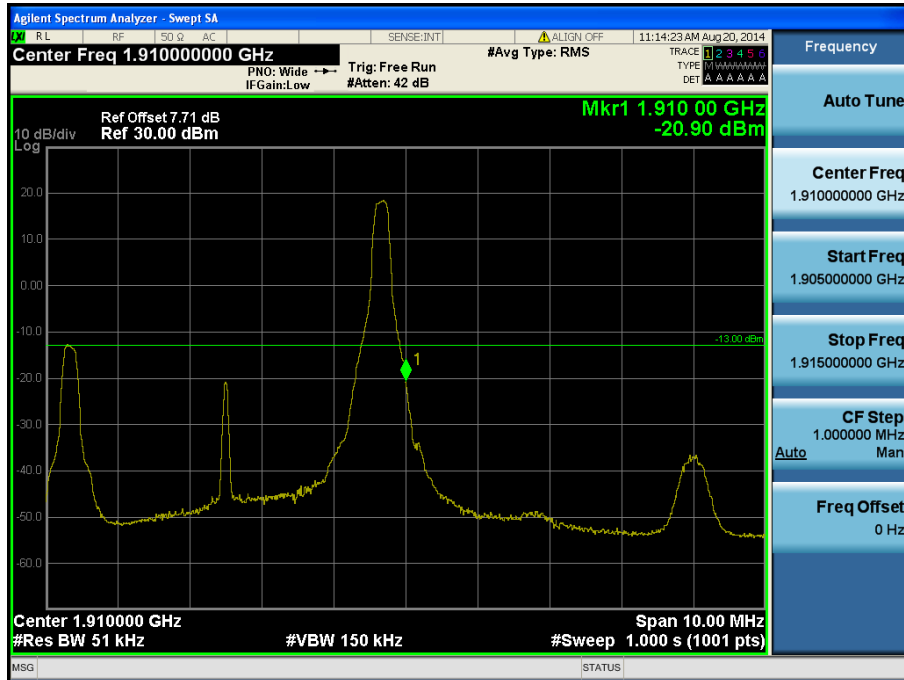
LTE Band 2 / 5 MHz / 16QAM - RB Offset/Size (0/1)

- Lower Extended Band Edge



LTE Band 2 / 5 MHz / QPSK - RB Offset/Size (0/25)

- Upper Band Edge



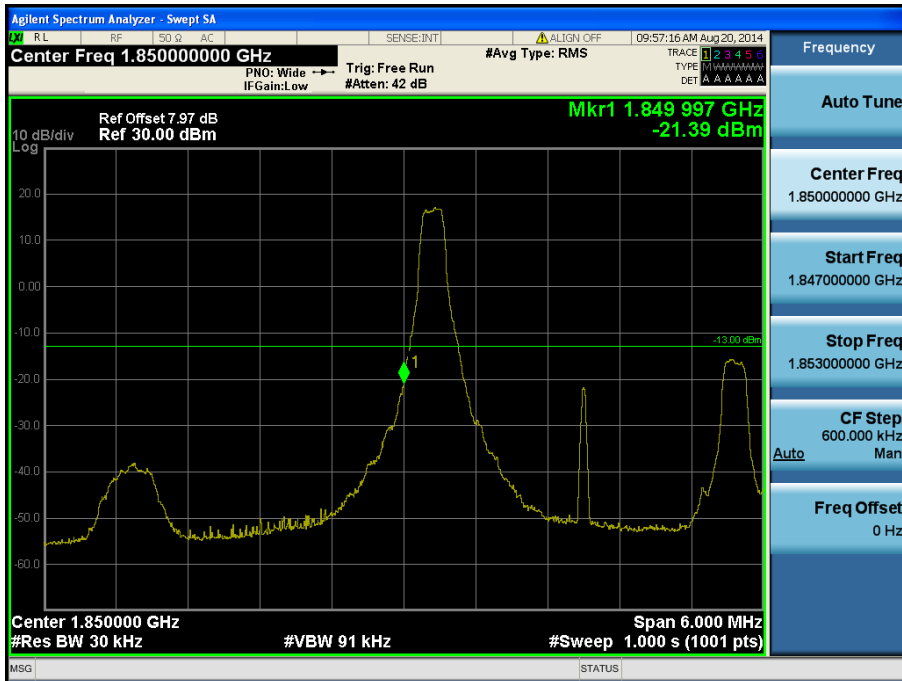
LTE Band 2 / 5 MHz / QPSK - RB Offset/Size (24/1)

- Upper Extended Band Edge



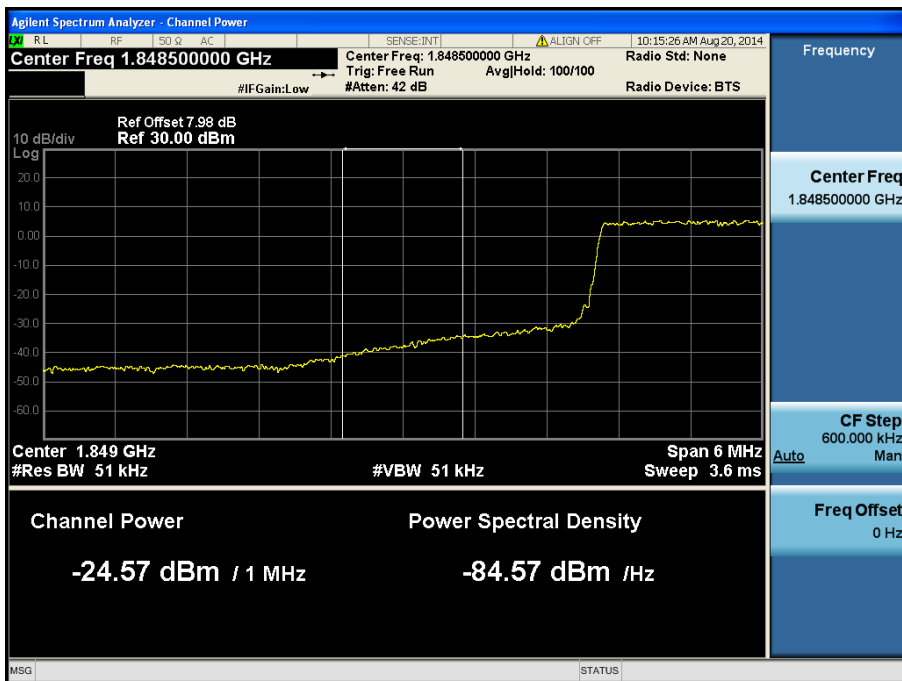
LTE Band 2 / 5 MHz / 16QAM - RB Offset/Size (0/25)

- Lower Band Edge



LTE Band 2 / 3 MHz / QPSK - RB Offset/Size (0/1)

- Lower Extended Band Edge



LTE Band 2 / 3 MHz / QPSK - RB Offset/Size (0/15)

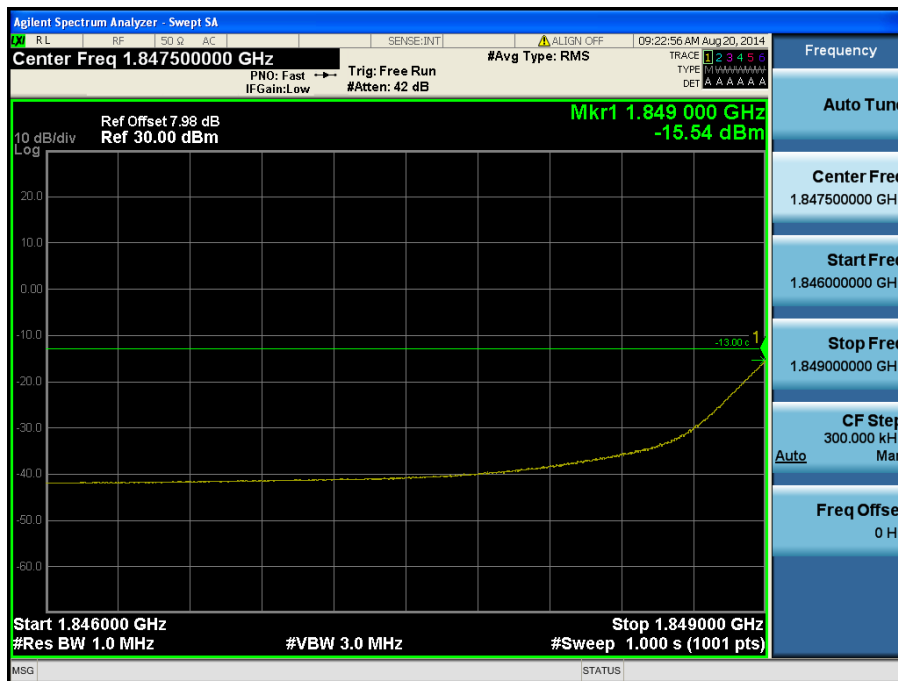


- Lower Band Edge



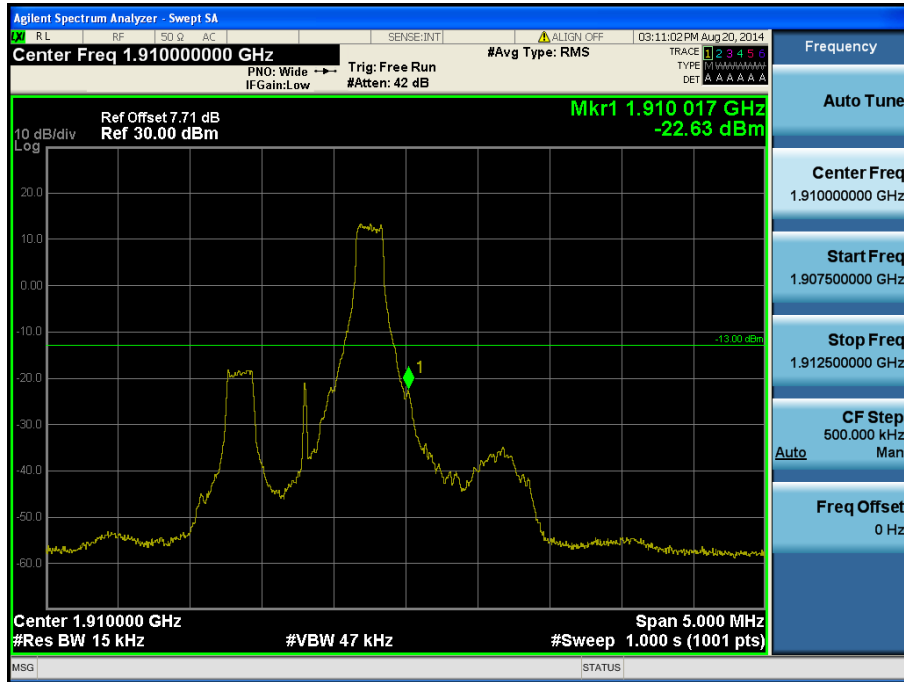
LTE Band 2 / 1.4 MHz / QPSK - RB Offset/Size (0/3)

- Lower Extended Band Edge



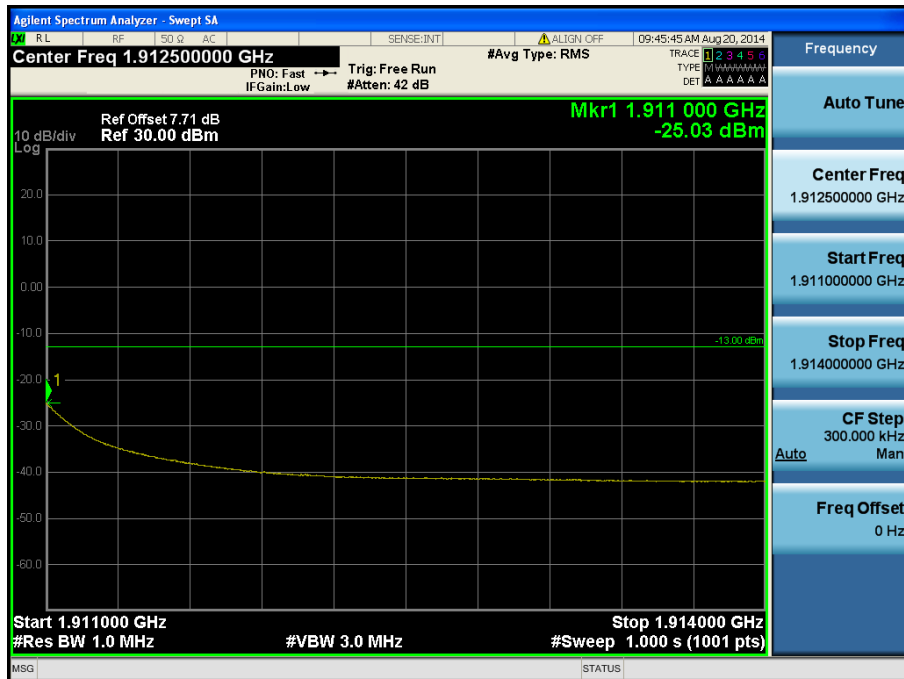
LTE Band 2 / 1.4 MHz / QPSK - RB Offset/Size (1/3)

- Upper Band Edge



LTE Band 2 / 1.4 MHz / 16QAM - RB Offset/Size (5/1)

- Upper Extended Band Edge



LTE Band 2 / 1.4 MHz / QPSK - RB Offset/Size (0/3)