

# BTI Wireless

TEST REPORT FOR

**700MHz 40W Remote Transmitting Unit  
Model: mBSC0700-040-RUC11**

**Tested To The Following Standard:**

**FCC Part 27C**

**Report No.: 94688-3**

**Date of issue: August 16, 2013**



This test report bears the accreditation symbol indicating that the testing performed herein meets the test and reporting requirements of ISO/IEC 17025 under the applicable scope of EMC testing for CKC Laboratories, Inc.

We strive to create long-term, trust based relationships by providing sound, adaptive, customer first testing services. We embrace each of our customers' unique EMC challenges, not as an interruption to set processes, but rather as the reason we are in business.

**TABLE OF CONTENTS**

Administrative Information ..... 3

    Test Report Information .....3

    Report Authorization .....3

    Test Facility Information .....4

    Software Versions.....4

    Site Registration & Accreditation Information .....4

    Summary of Results .....5

    Equipment Under Test.....6

    Peripheral Devices .....6

FCC Part 27C..... 7

    FCC 2.1033(c)(14)/2.1046/27C - RF Power Output.....7

    FCC 2.1033(c)(14)/2.1049 - Occupied Bandwidth .....24

    FCC 2.1033(c)(14)/2.1051/27.53(g) - Spurious Emissions at Antenna Terminal .....35

    FCC 2.1033(c)(14)/2.1053/27C - Field Strength of Spurious Radiation .....41

    Band Edge .....44

    Intermodulation.....49

    Out of Band Rejection.....53

Supplemental Information..... 56

    Measurement Uncertainty .....56

    Emissions Test Details.....56

## ADMINISTRATIVE INFORMATION

### Test Report Information

**REPORT PREPARED FOR:**

BTI Wireless  
6185 Phyllis Dr. Unit D  
Cypress, CA 90630

Representative: Winston Abrian

**REPORT PREPARED BY:**

Joyce Walker  
CKC Laboratories, Inc.  
5046 Sierra Pines Drive  
Mariposa, CA 95338

Project Number: 94688

**DATE OF EQUIPMENT RECEIPT:**

July 22, 2013

**DATE(S) OF TESTING:**

July 22 - 29, 2013

### Report Authorization

The test data contained in this report documents the observed testing parameters pertaining to and are relevant for only the sample equipment tested in the agreed upon operational mode(s) and configuration(s) as identified herein. Compliance assessment remains the client's responsibility. This report may not be used to claim product endorsement by A2LA or any government agencies. This test report has been authorized for release under quality control from CKC Laboratories, Inc.



**Steve Behm**  
*Director of Quality Assurance & Engineering Services*  
*CKC Laboratories, Inc.*

## Test Facility Information



Our laboratories are configured to effectively test a wide variety of product types. CKC utilizes first class test equipment, anechoic chambers, data acquisition and information services to create accurate, repeatable and affordable test results.

TEST LOCATION(S):  
CKC Laboratories, Inc.  
110 North Olinda Place  
Brea, CA 92823

## Software Versions

CKC Laboratories Proprietary Software	Version
EMITest Emissions	5.00.14
Immunity	5.00.07

## Site Registration & Accreditation Information

Location	CB #	TAIWAN	CANADA	FCC	JAPAN
Brea A	US0060	SL2-IN-E-1146R	3082D-1	90473	A-0147

## SUMMARY OF RESULTS

### Standard / Specification: FCC Part 27C

Description	Test Procedure/Method	Results
RF Power Output	FCC 2.1033(c)(14)/2.1046/27.50(c)(3)	Pass
Occupied Bandwidth	FCC 2.1033(c)(14)/2.1049	Pass
Spurious Emissions at Antenna Terminal	FCC 2.1033(c)(14)/2.1051/27.53(g)	Pass
Field Strength of Spurious Radiation	FCC 2.1033(c)(14)/2.1053/27.53(g)	Pass
Band Edge		Pass
Intermodulation		Pass
Out of Band Rejection	Referencing RSS 131 4.2 Procedure	Pass

## **EQUIPMENT UNDER TEST (EUT)**

### **EQUIPMENT UNDER TEST**

#### **700MHz 40W Remote Transmitting Unit**

Manuf: BTI Wireless

Model: mBSC0700-040-RUC11

Serial: 070013010001

### **PERIPHERAL DEVICES**

The EUT was tested with the following peripheral device(s):

#### **ESG Vector Signal Generator**

Manuf: Agilent

Model: 4438C

Serial: MY45091601

## FCC PART 27C

This report contains EMC emissions test results under United States Federal Communications Commission (FCC) requirements for licensed devices.

### FCC 2.1033(c)(14)/2.1046/27C - RF Power Output

**Test Data**

Test Location: CKC Laboratories, Inc. • 110 N. Olinda Place • Brea, CA 92823 • (714) 993-6112

Customer: **BTI Wireless**

Specification: **RF Output Power**

Work Order #: **94688** Date: 7/26/2013

Test Type: **Conducted Emissions** Time: 15:55:14

Equipment: **700MHz 40W remote transmitting unit** Sequence#: 3

Manufacturer: BTI Wireless Tested By: Don Nguyen

Model: mBSC0700-040-RUC11 110V 60Hz

S/N: 070013010001

***Test Equipment:***

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP06153	Cable	16301	10/27/2011	10/27/2013
T2	AN02869	Spectrum Analyzer	E4440A	2/6/2013	2/6/2015
T3	AN03169	High Pass Filter	HM1155-11SS	9/22/2011	9/22/2013

***Equipment Under Test (\* = EUT):***

Function	Manufacturer	Model #	S/N
700MHz 40W remote transmitting unit*	BTI Wireless	mBSC0700-040-RUC11	070013010001

***Support Devices:***

Function	Manufacturer	Model #	S/N
ESG Vector Signal Generator	Agilent	4438C	MY45091601

**Test Conditions / Notes:**

The EUT is placed on the test bench. Tx In is connected to an ESG Signal generator, ANT is connected to a spectrum analyzer and attenuator. RX out port is terminated to 50 ohm load.

The evaluation is performed at the antenna port using Channel power function of the spectrum analyzer.

Freq: 728-746MHz

Signal protocol: LTE-TM1.1 1.4MHz, 5MHz, 15MHz

The RF output power was measured with automatic level control threshold setting (ALCTH) as listed in the result table for RF Output power of 40 W , 20W, 10W

21°C, 65% RH

The EUT is a RF amplifier operating the 728-746 MHz band under part 27. The manufacture does not provide an antenna for sale with the product; hence EIRP is not measured nor calculated. The Automatic Level Control Threshold of each individual unit is to be programed to produce conducted RF output power as rated at the time of deployment.

The end user of this product is to exercise proper engineering judgment to select the appropriate antenna to comply with the EIRP limitation set forth

**27.50**

*(c) The following power and antenna height requirements apply to stations transmitting in the 698-746 MHz band:  
 (3) Fixed and base stations transmitting a signal with an emission bandwidth greater than 1 MHz must not exceed an ERP of 1000 watts/MHz and an antenna height of 305 m HAAT, except that antenna heights greater than 305 m HAAT are permitted if power levels are reduced below 1000 watts/MHz ERP in accordance with Table 3 of this section*

**40W**

Modulation	ALCTH	Power (dBm)	Power (W)
LTE 1.4MHz			
728.9MHz	1616	45.62	36.48
737.0MHz	1616	45.95	39.36
745.1MHz	1616	45.89	38.82
LTE 5MHz			
730.8MHz	1488	45.84	38.37
737.0MHz	1488	45.96	39.45
743.2MHz	1488	45.92	39.08
LTE 15MHz			
735.8MHz	1440	45.92	39.08
737.0MHz	1440	<b>45.99</b>	<b>39.72</b>
738.2MHz	1440	45.97	39.54

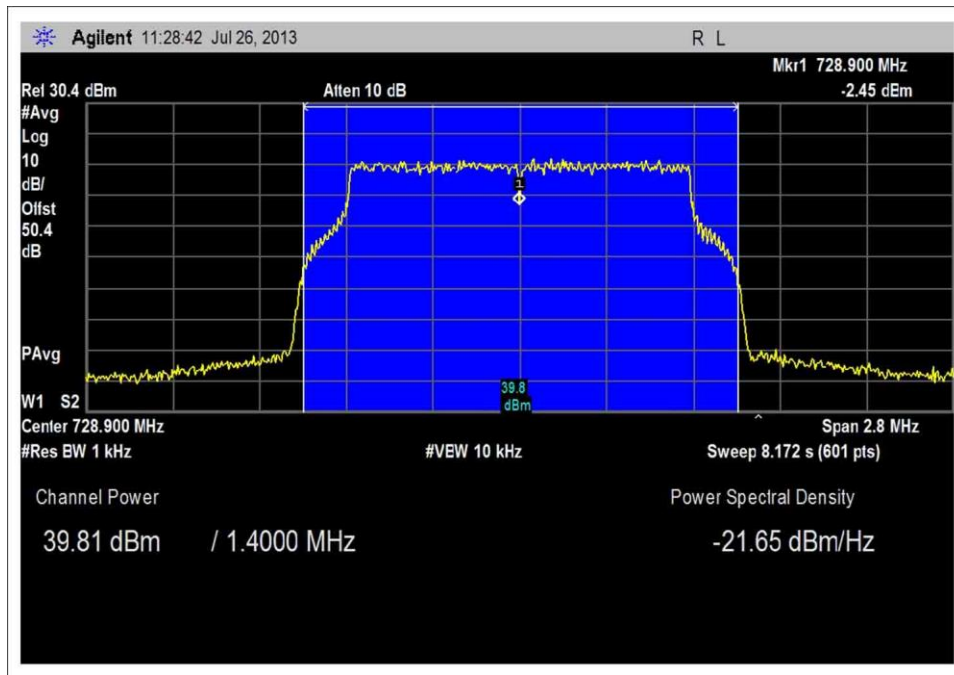


**20W**

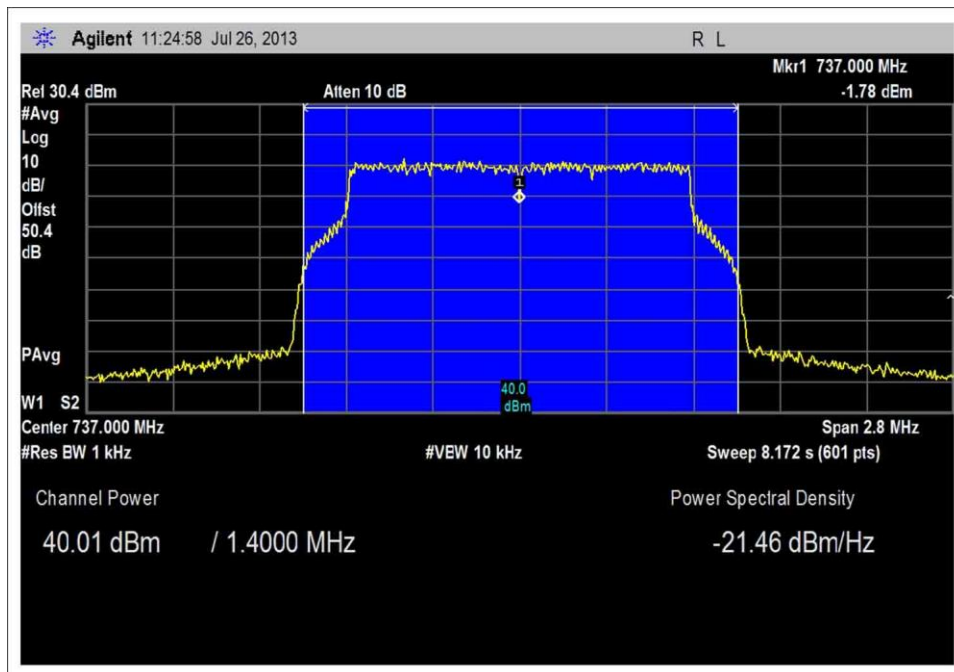
Modulation	ALCTH	Power (dBm)	Power (W)
LTE 1.4MHz			
728.9MHz	1152	42.86	19.32
737.0MHz	1152	<b>43.01</b>	<b>20.00</b>
745.1MHz	1152	42.92	19.59
LTE 5MHz			
730.8MHz	1072	42.85	19.28
737.0MHz	1072	43.00	19.95
743.2MHz	1072	42.92	19.59
LTE 15MHz			
735.8MHz	1024	42.98	19.86
737.0MHz	1024	42.98	19.86
738.2MHz	1024	42.95	19.72

**10W**

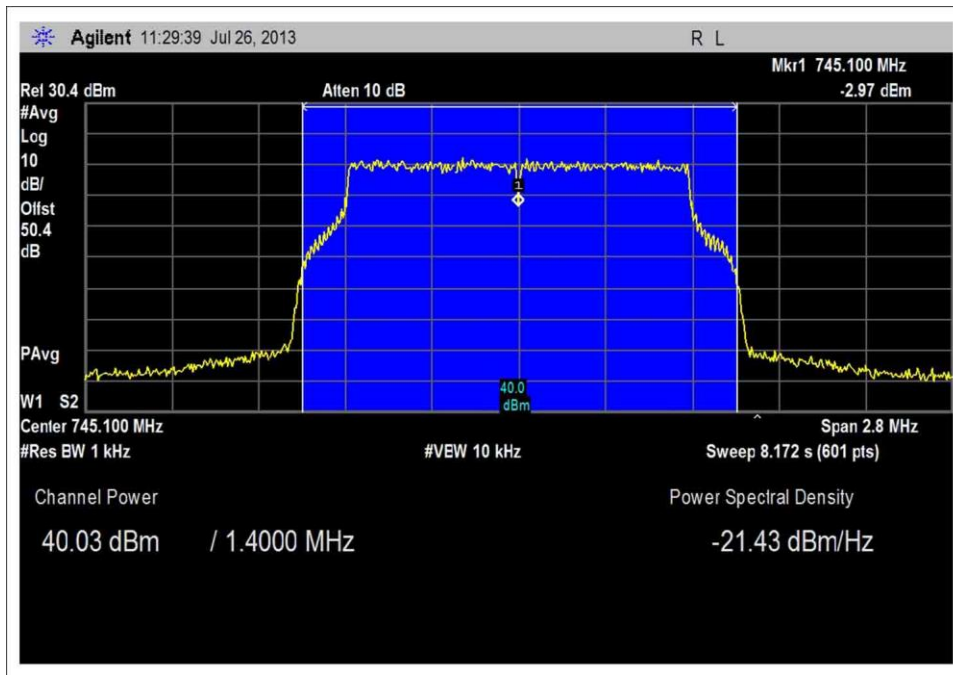
Modulation	ALCTH	Power (dBm)	Power (W)
LTE 1.4MHz			
728.9MHz	784	39.81	9.57
737.0MHz	784	40.01	10.02
745.1MHz	784	40.03	10.07
LTE 5MHz			
730.8MHz	728	39.85	9.66
737.0MHz	728	39.95	9.89
743.2MHz	728	39.82	9.59
LTE 15MHz			
735.8MHz	720	39.98	9.95
737.0MHz	720	<b>40.05</b>	<b>10.12</b>
738.2MHz	720	40.02	10.05



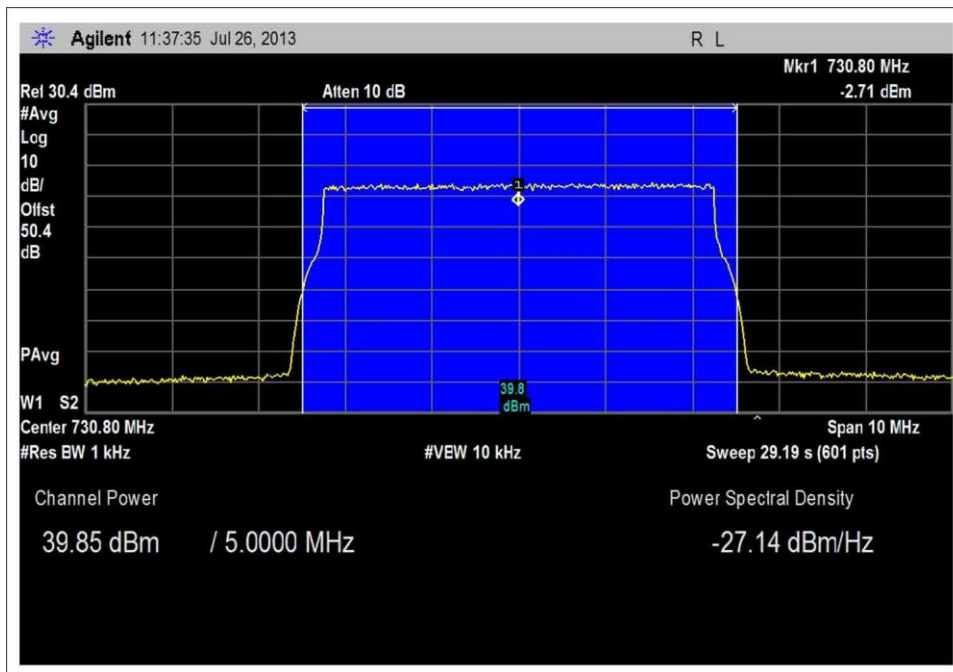
10W, LTE 1.4MHz - Low



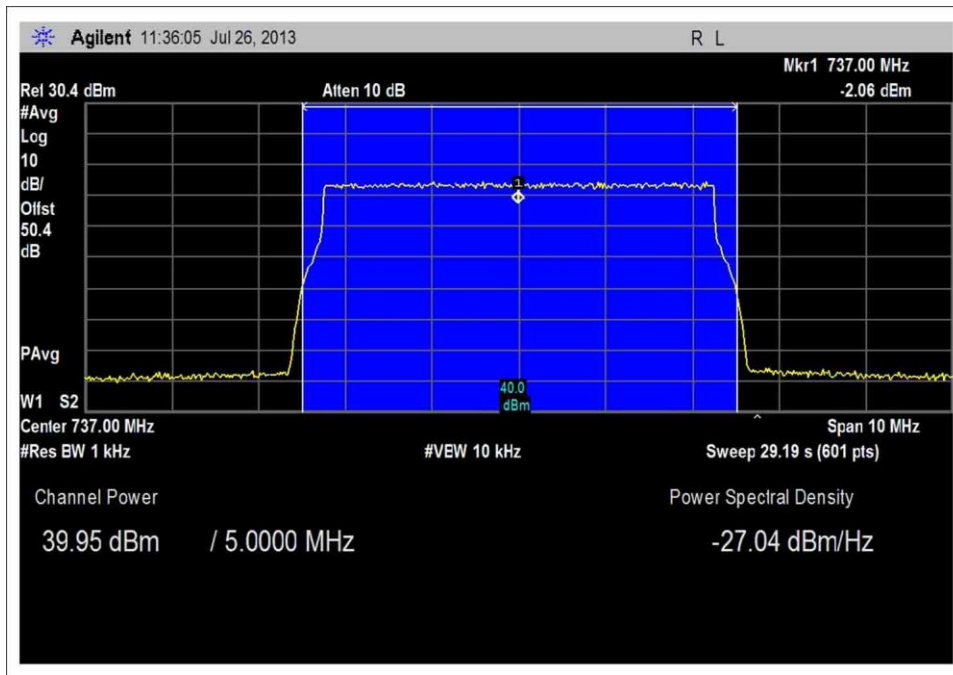
10W, LTE 1.4MHz - Middle



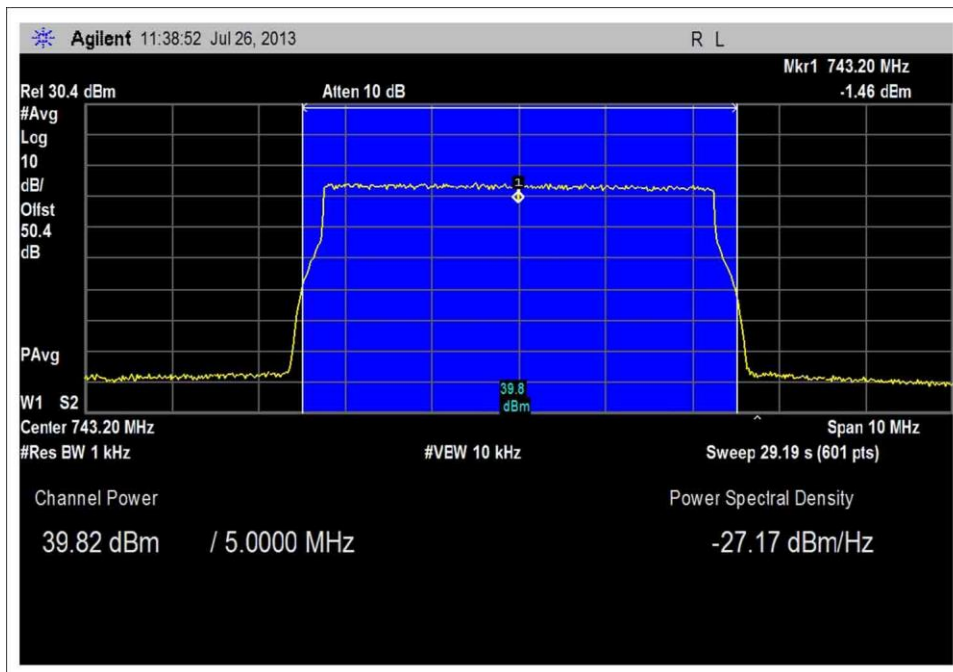
10W, LTE 1.4MHz – High



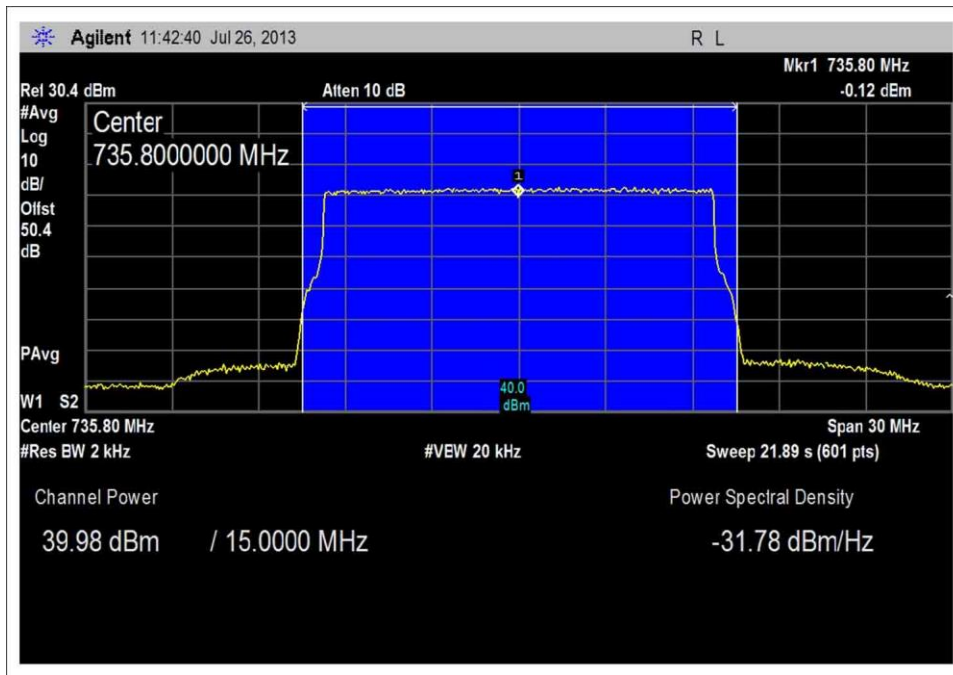
10W, LTE 5MHz – Low



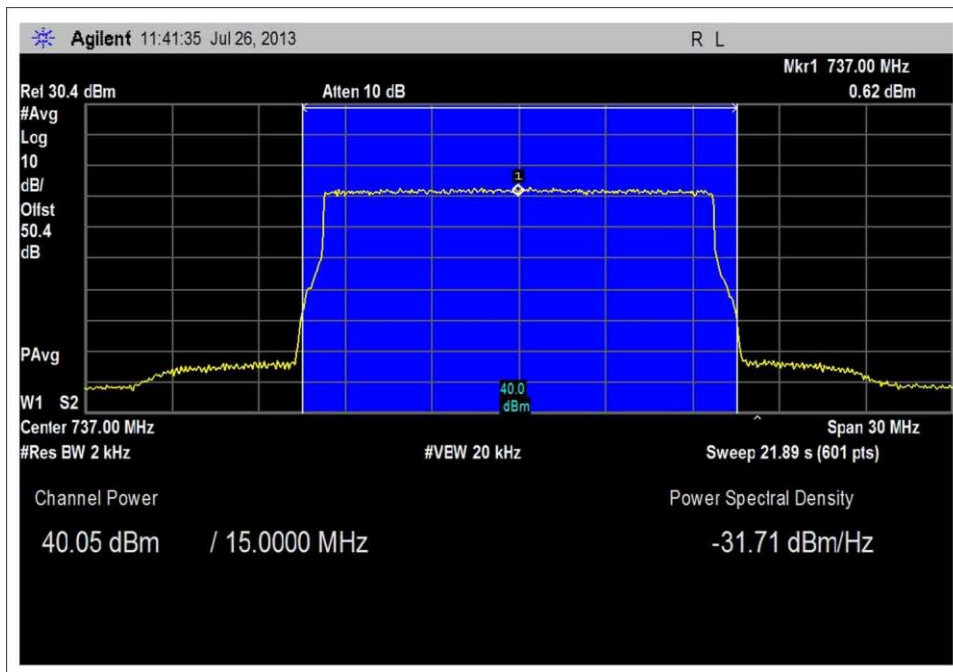
10W, LTE 5MHz - Middle



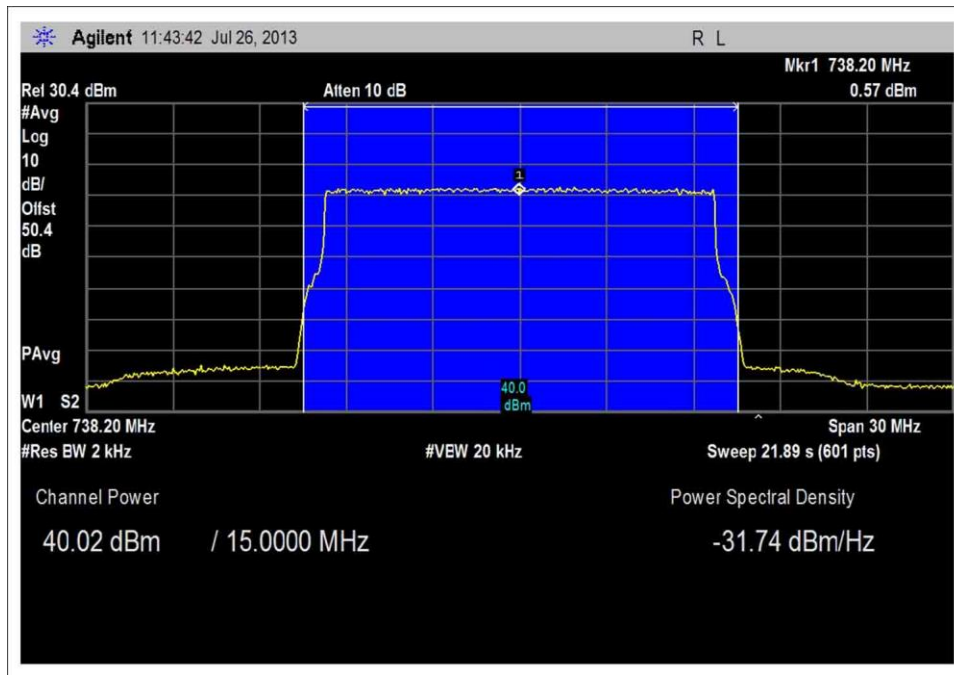
10W, LTE 5MHz - High



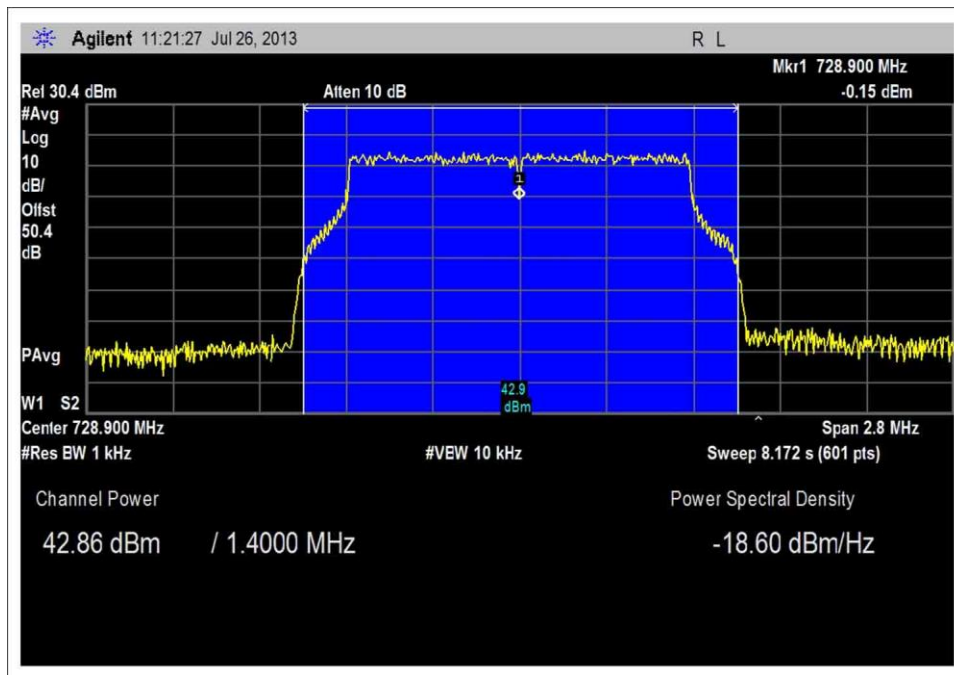
10W, LTE 15MHz – Low



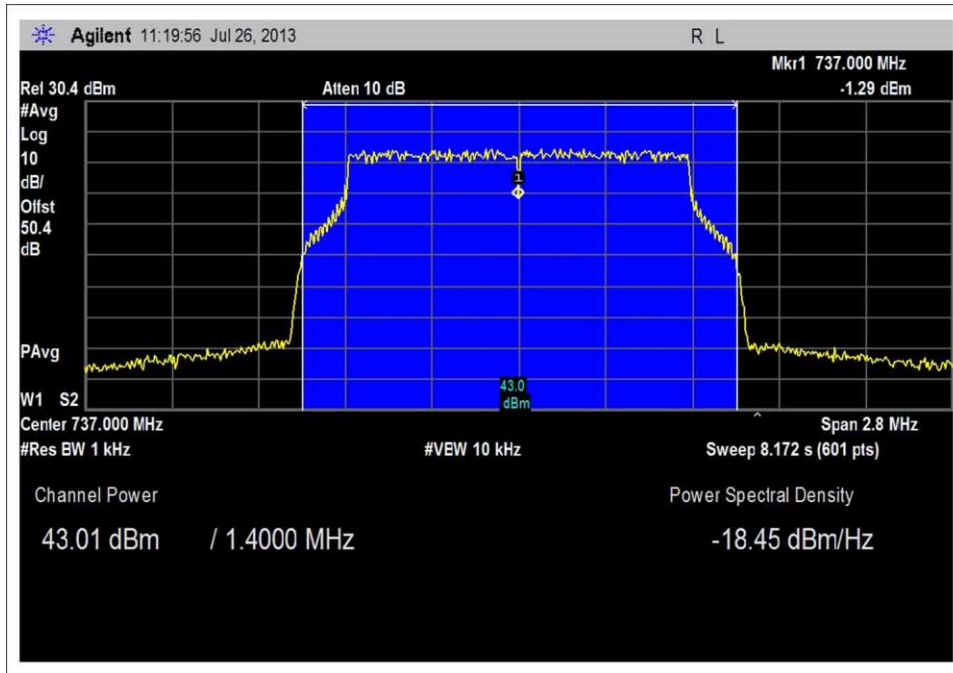
10W, LTE 15MHz – Middle



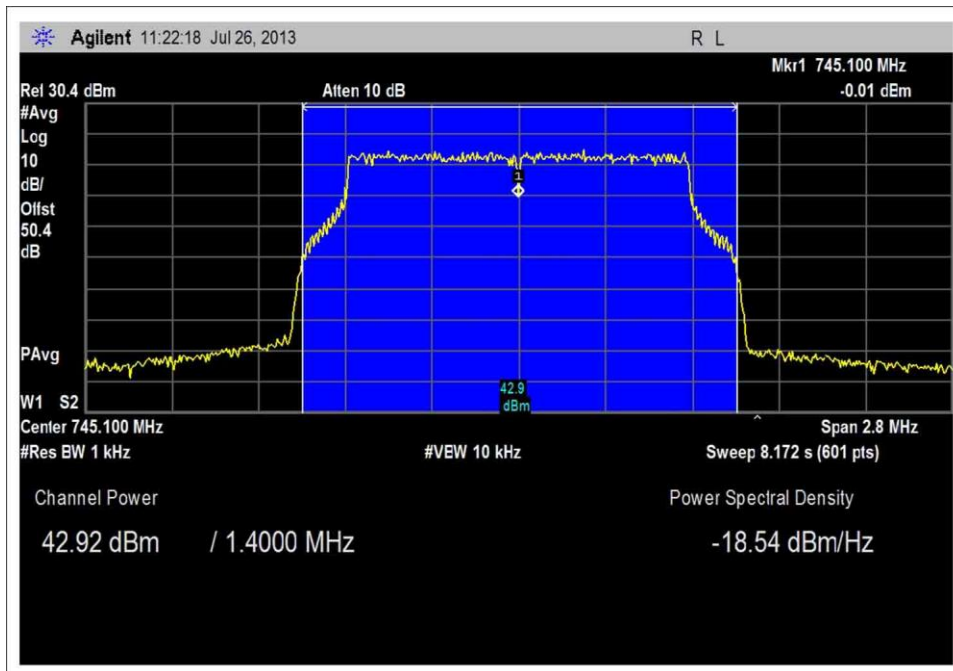
10W, LTE 15MHz – High



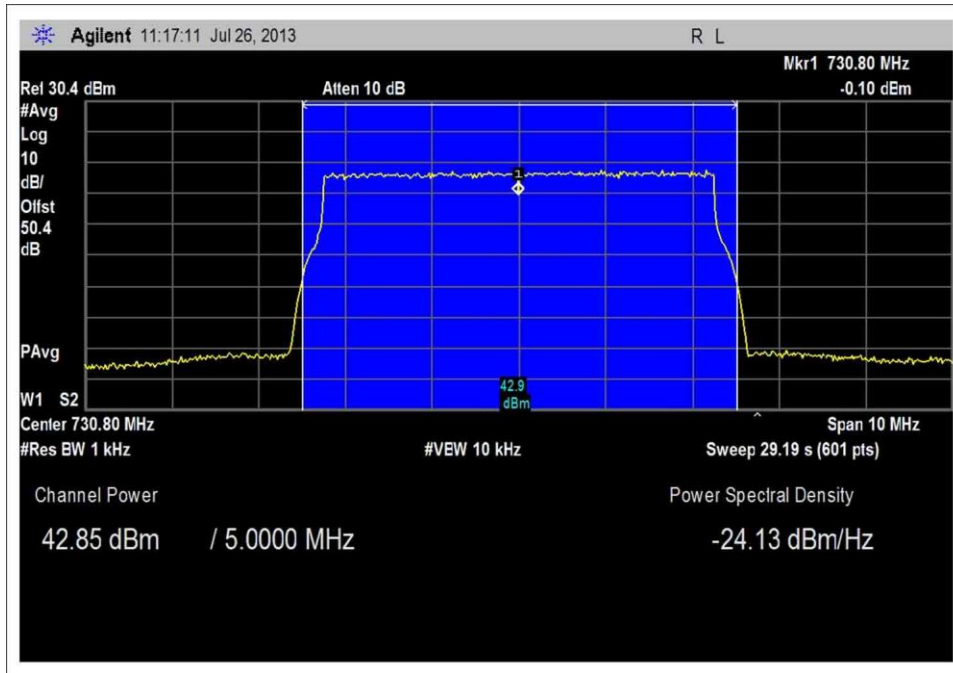
20W, LTE 1.4MHz – Low



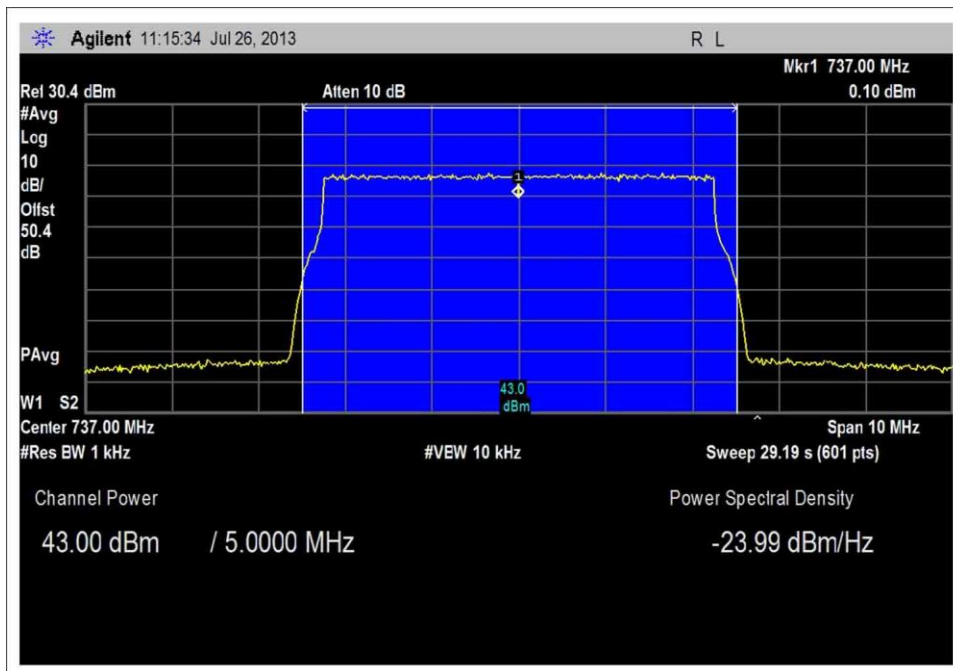
20W, LTE 1.4MHz – Middle



20W, LTE 1.4MHz – High

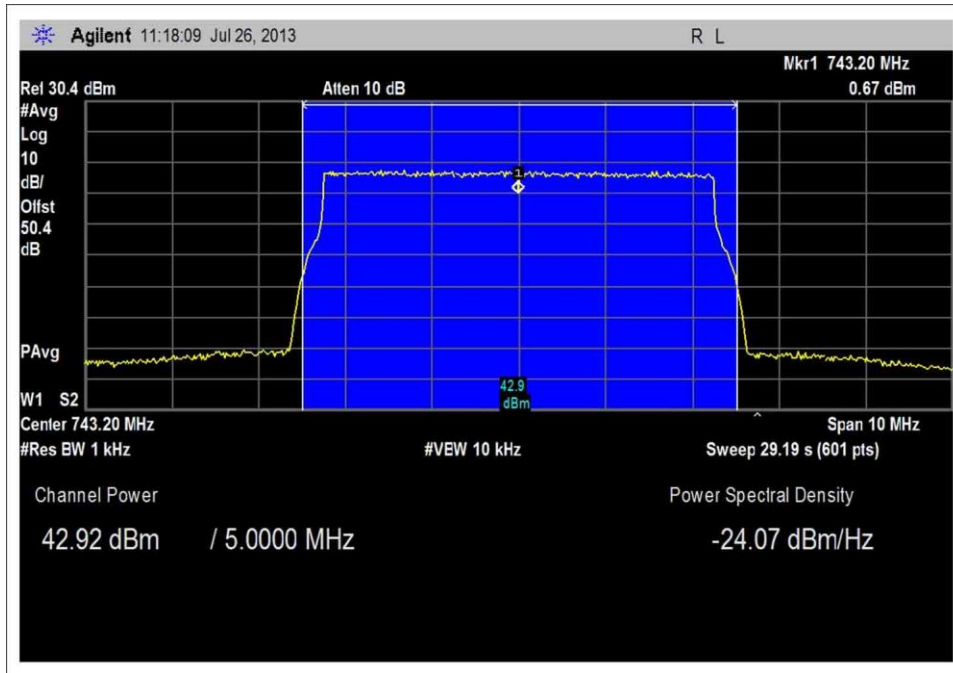


20W, LTE 5MHz – Low

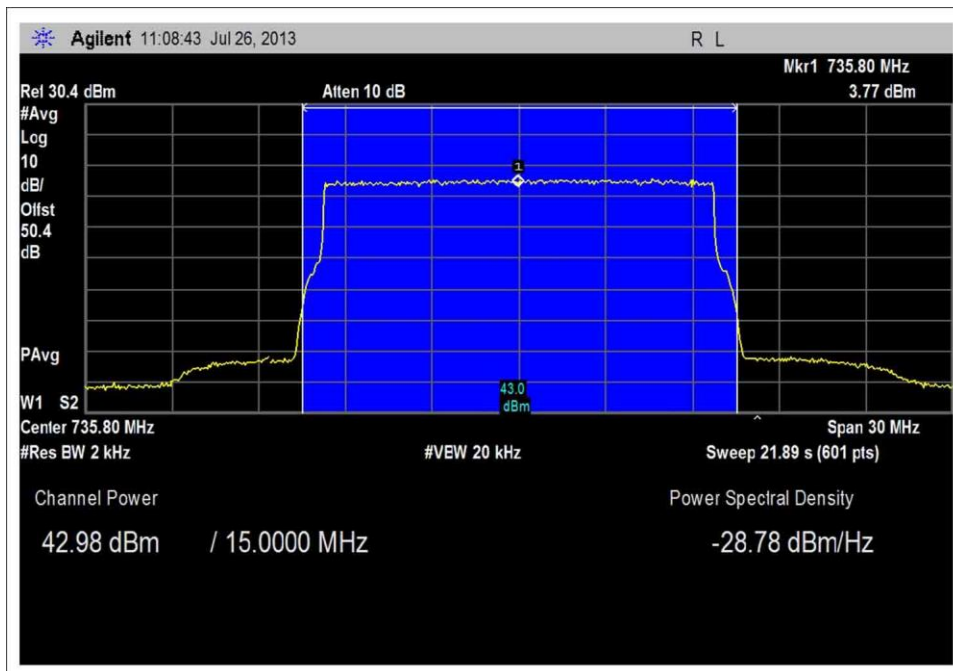


20W, LTE 5MHz – Middle

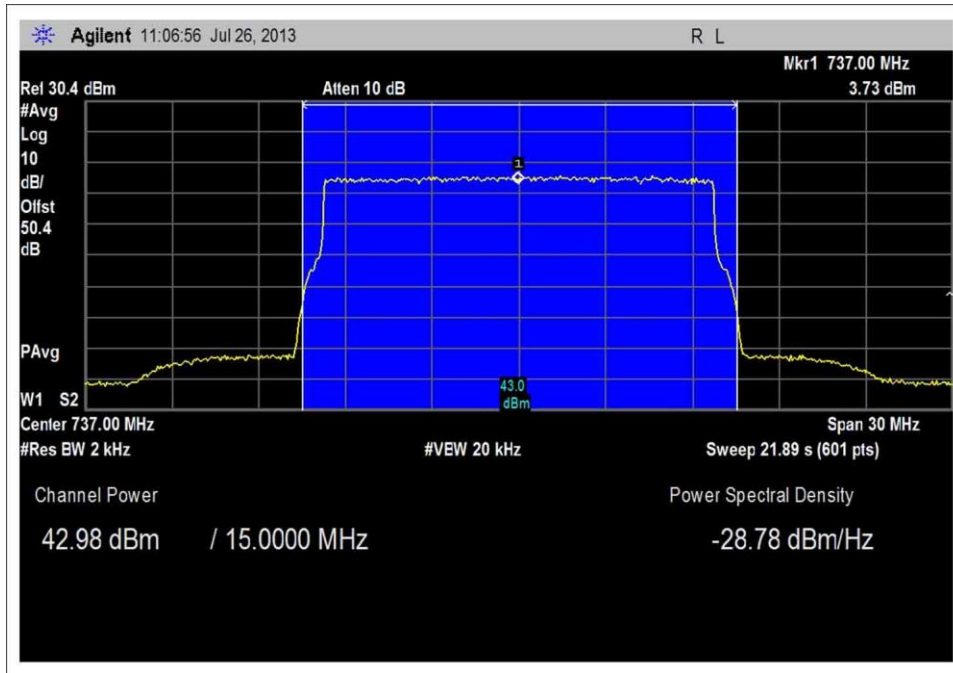




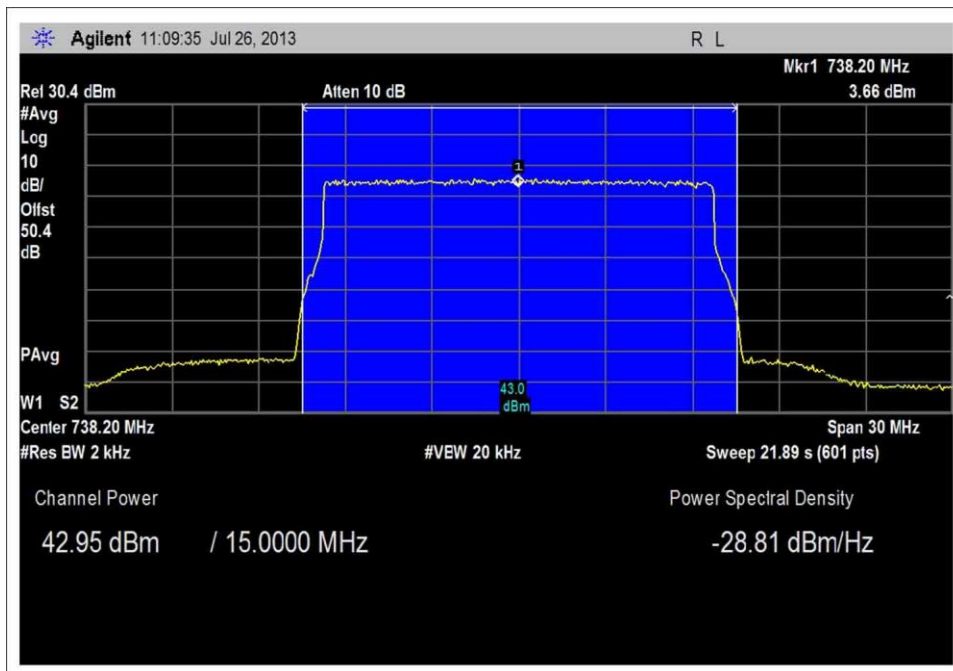
20W, LTE 5MHz – High



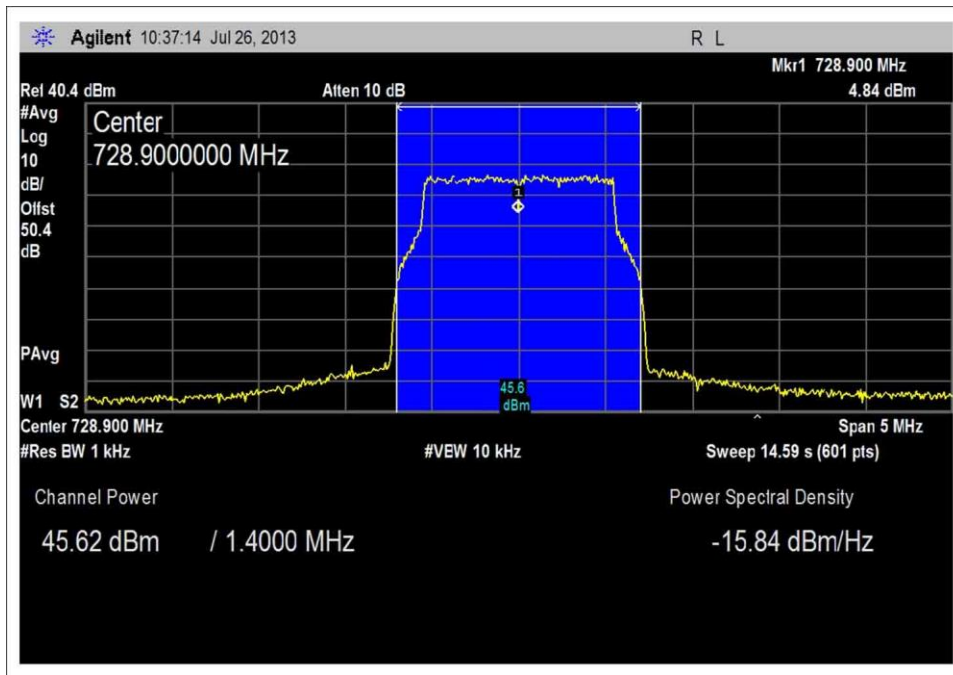
20W, LTE 15MHz – Low



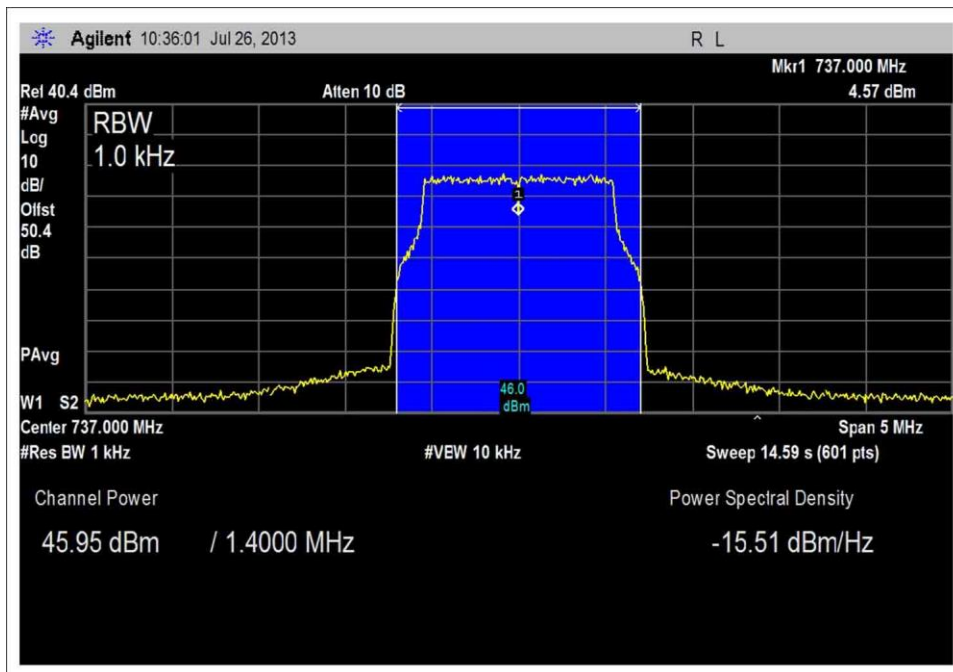
20W, LTE 15MHz – Middle



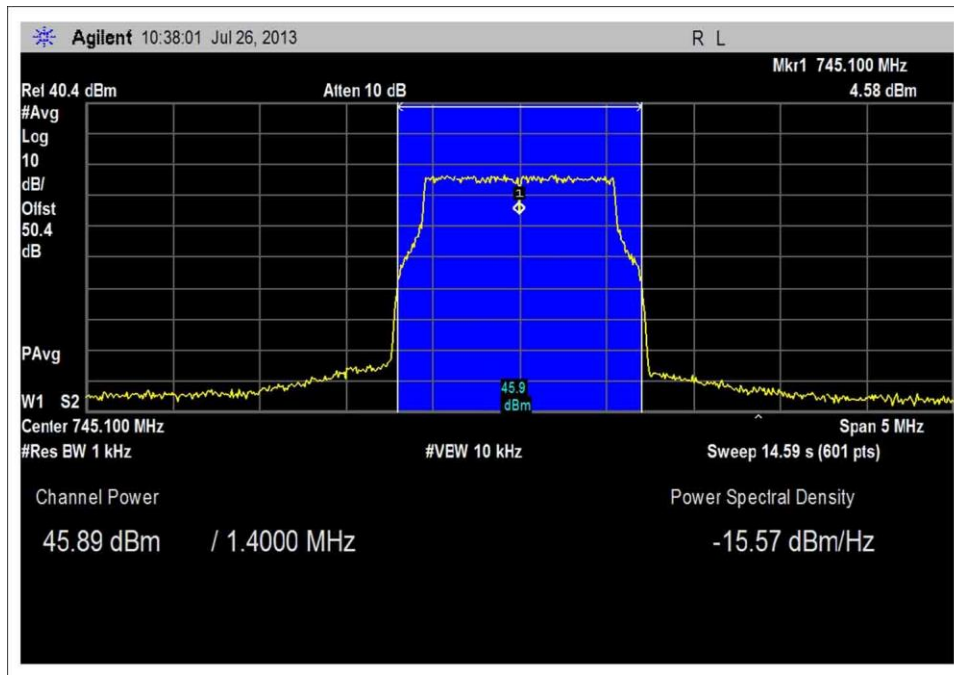
20W, LTE 15MHz – High



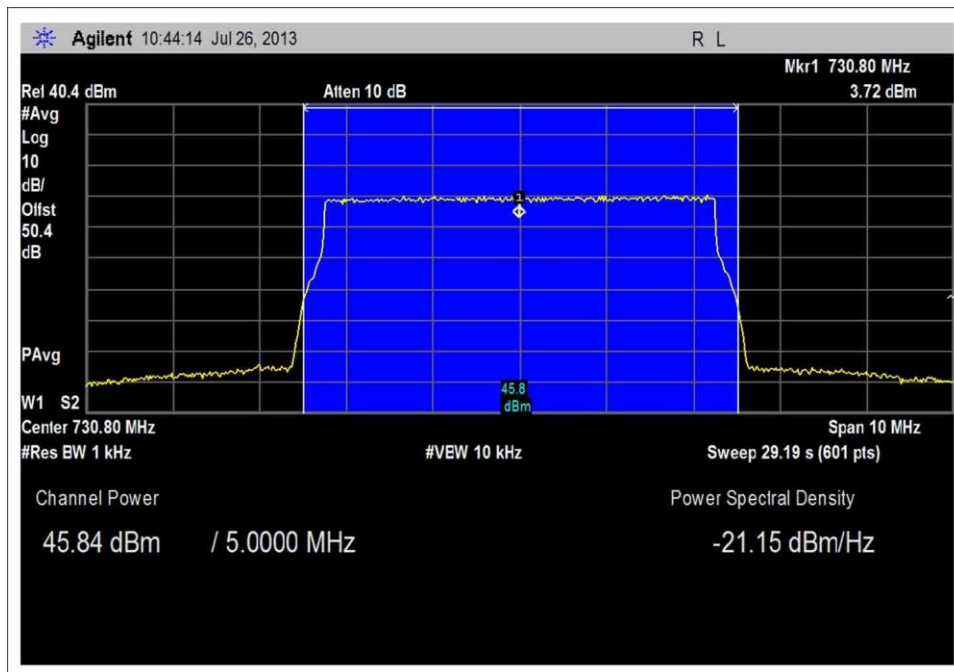
40W, LTE 1.4MHz – Low



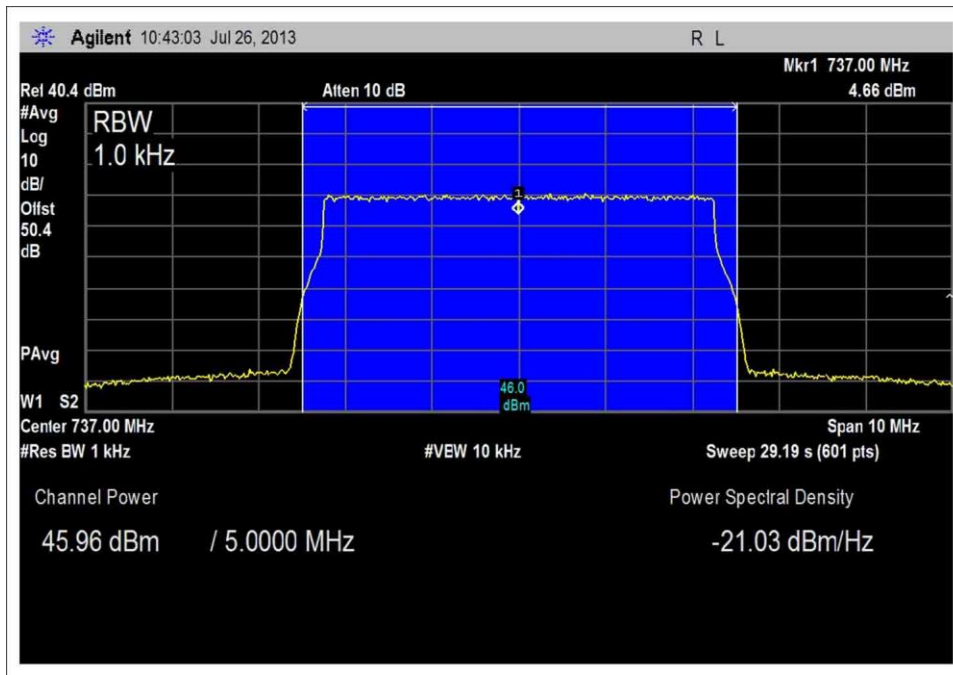
40W, LTE 1.4MHz – Middle



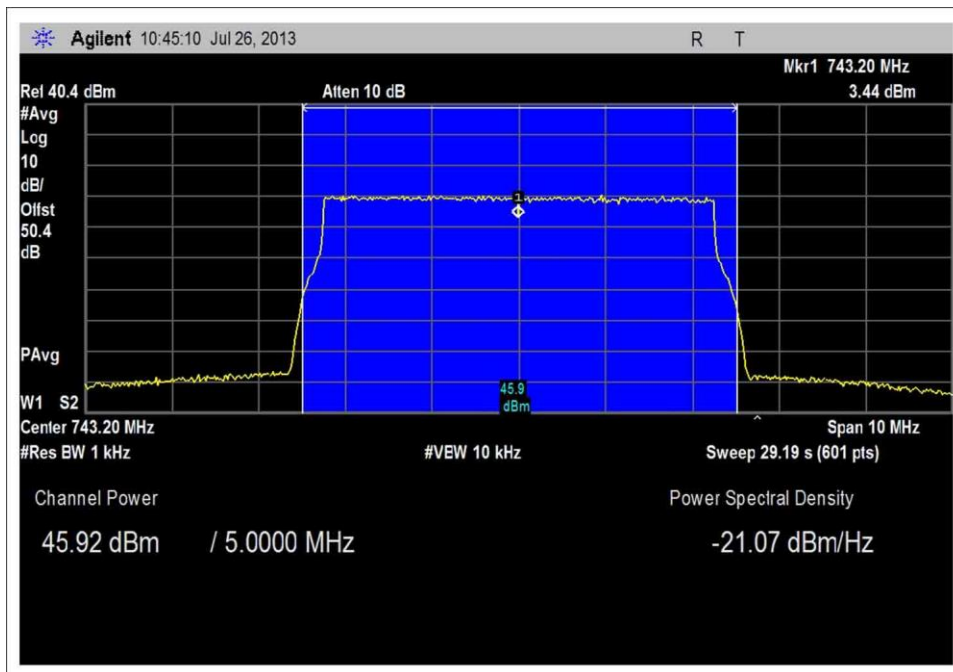
40W, LTE 1.4MHz – High



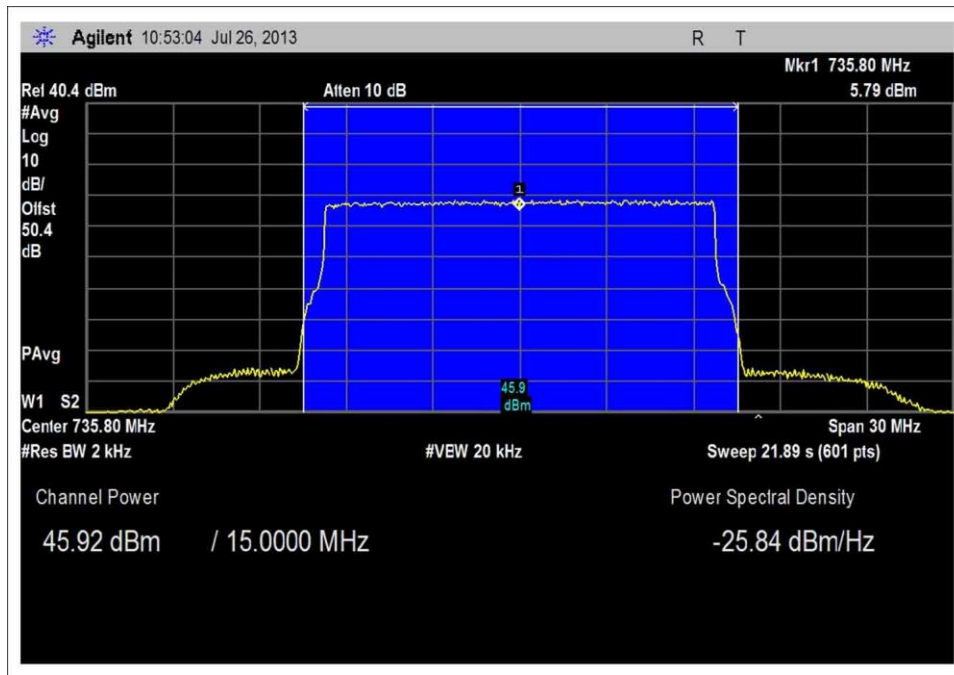
40W, LTE 5MHz – Low



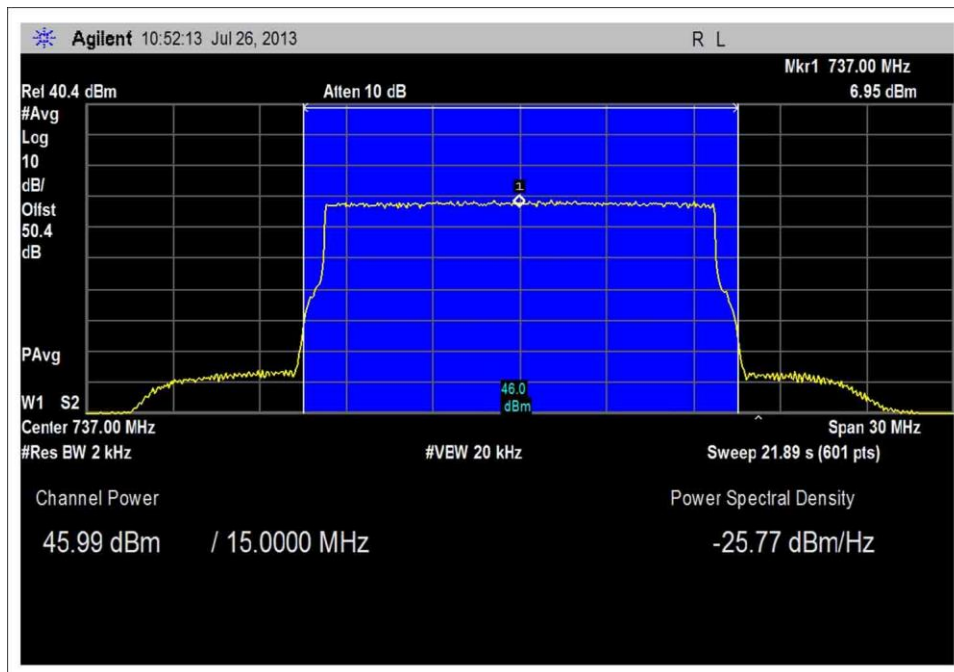
40W, LTE 5MHz – Middle



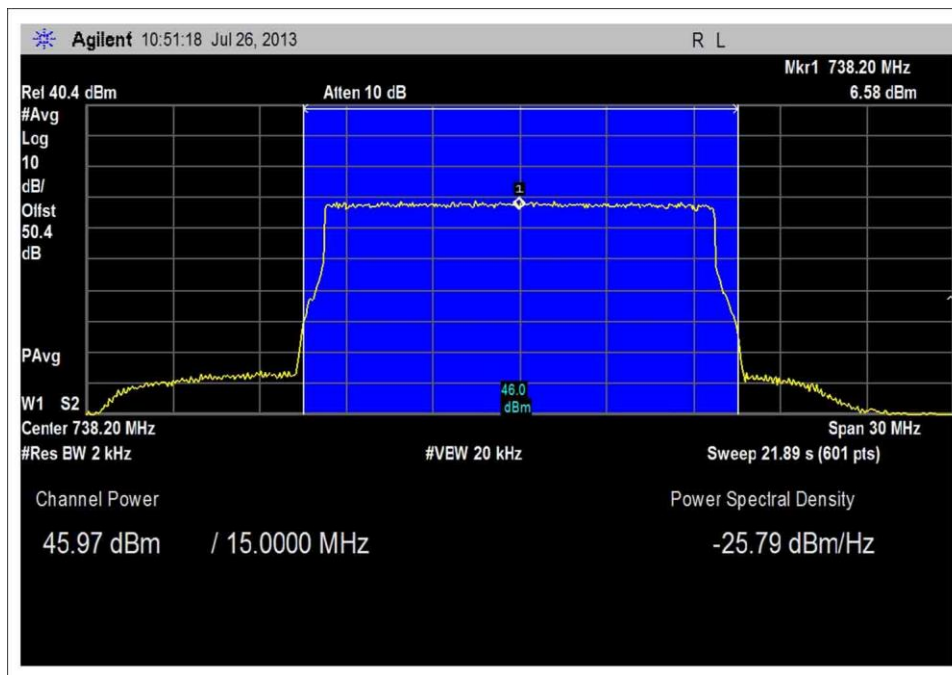
40W, LTE 5MHz – High



40W, LTE 15MHz – Low

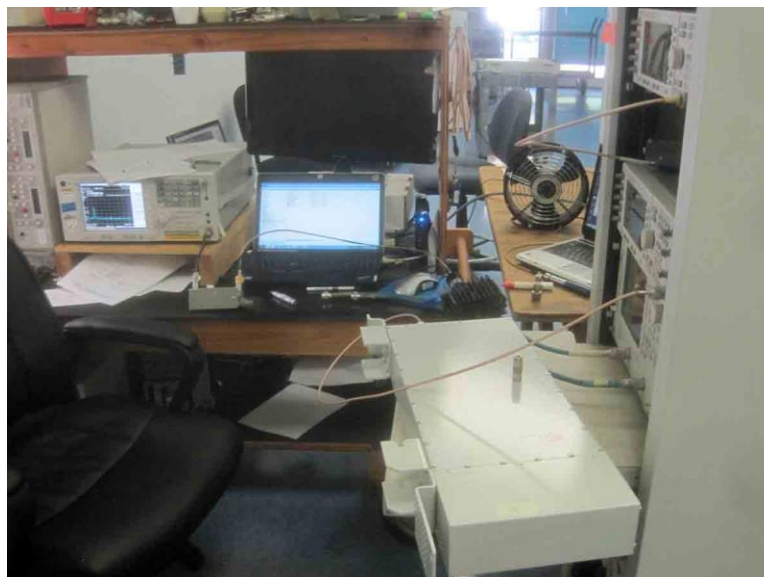


40W, LTE 15MHz – Middle



40W, LTE 15MHz – High

**Test Setup Photos**



**FCC 2.1033(c)(14)/2.1049 - Occupied Bandwidth**

Test Location: CKC Laboratories, Inc. • 110 N. Olinda Place • Brea, CA 92823 • (714) 993-6112

Customer: **BTI Wireless**  
 Specification: **Occupied Bandwidth Input vs Output plot**  
 Work Order #: **94688** Date: 7/26/2013  
 Test Type: **Conducted Emissions** Time: 14:18:15  
 Equipment: **700MHz 40W remote transmitting unit** Sequence#: 1  
 Manufacturer: BTI Wireless Tested By: Don Nguyen  
 Model: mBSC0700-040-RUC11 110V 60Hz  
 S/N: 070013010001

**Test Equipment:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02869	Spectrum Analyzer	E4440A	2/6/2013	2/6/2015
T2	ANP06153	Cable	16301	10/27/2011	10/27/2013

**Equipment Under Test (\* = EUT):**

Function	Manufacturer	Model #	S/N
700MHz 40W remote transmitting unit*	BTI Wireless	mBSC0700-040-RUC11	070013010001

**Support Devices:**

Function	Manufacturer	Model #	S/N
ESG Vector Signal Generator	Agilent	4438C	MY45091601

**Test Conditions / Notes:**

The EUT is placed on the test bench. Tx In is connected to an ESG Signal generator, ANT is connected to a spectrum analyzer and attenuator. RX out port is terminated to 50 ohm load.

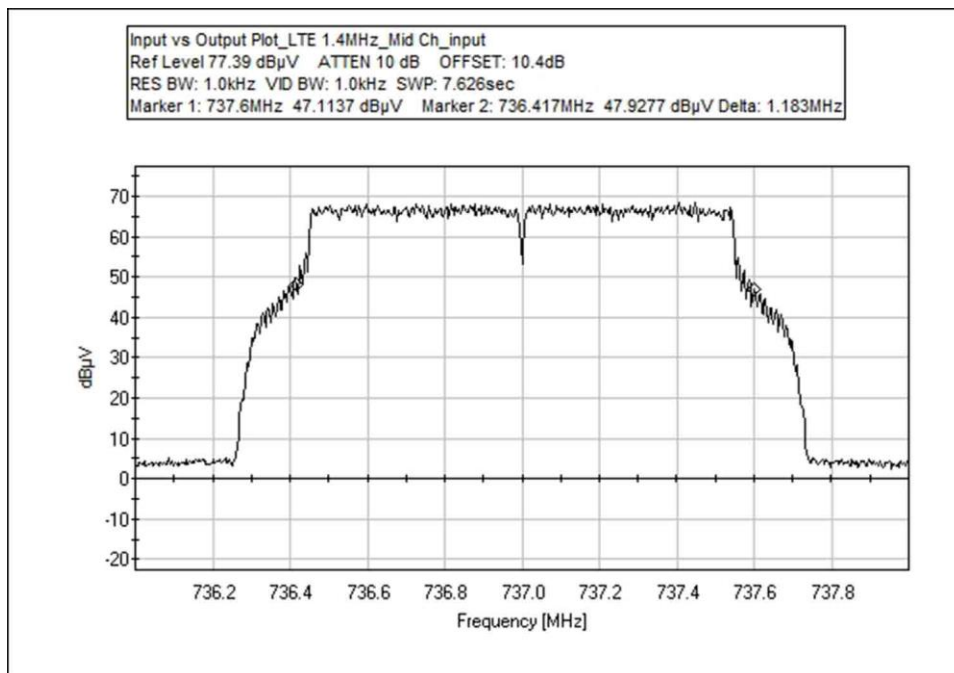
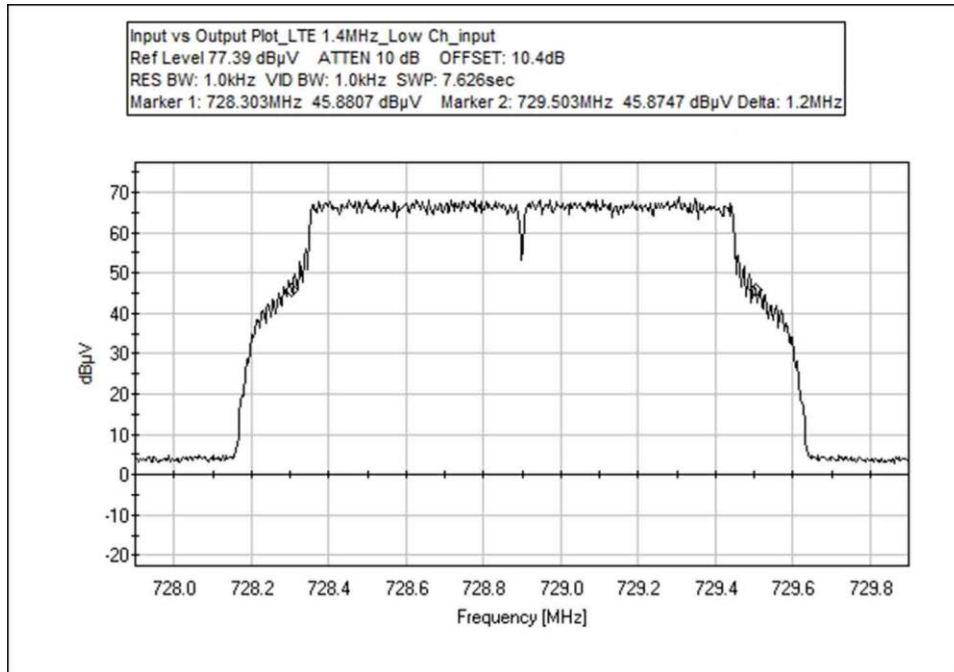
Output waveform is recorded with a spectrum analyzer at the Antenna port of the device.  
 Input waveform is recorded with a spectrum analyzer at the RF out of the support ESG.

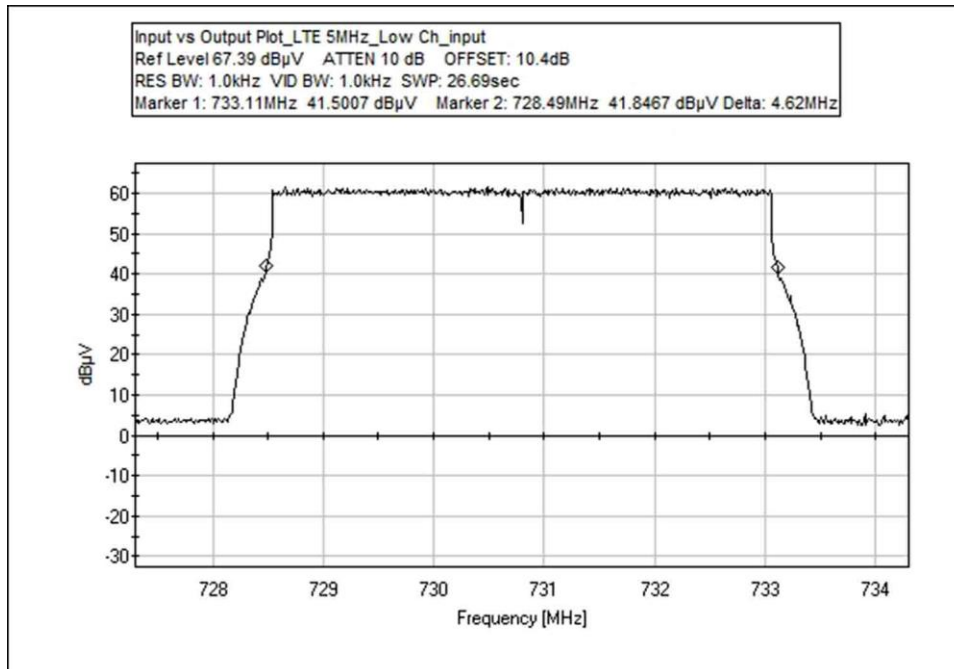
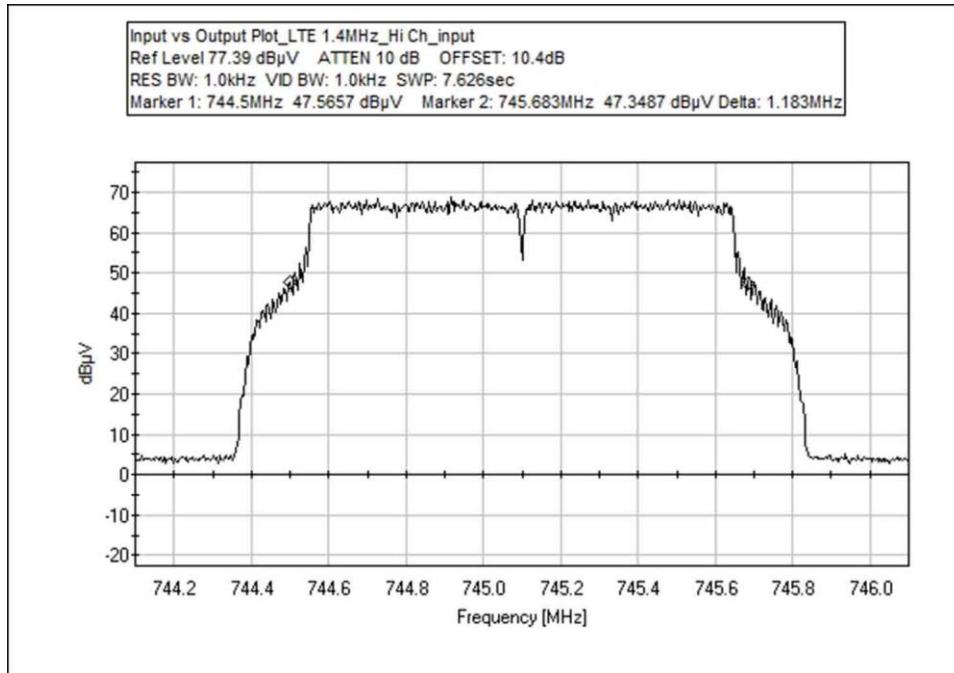
Freq: 728-746MHz  
 Signal protocol: LTE-TM1.1 1.4MHz, 5MHz. 15MHz  
 Power: 40 W

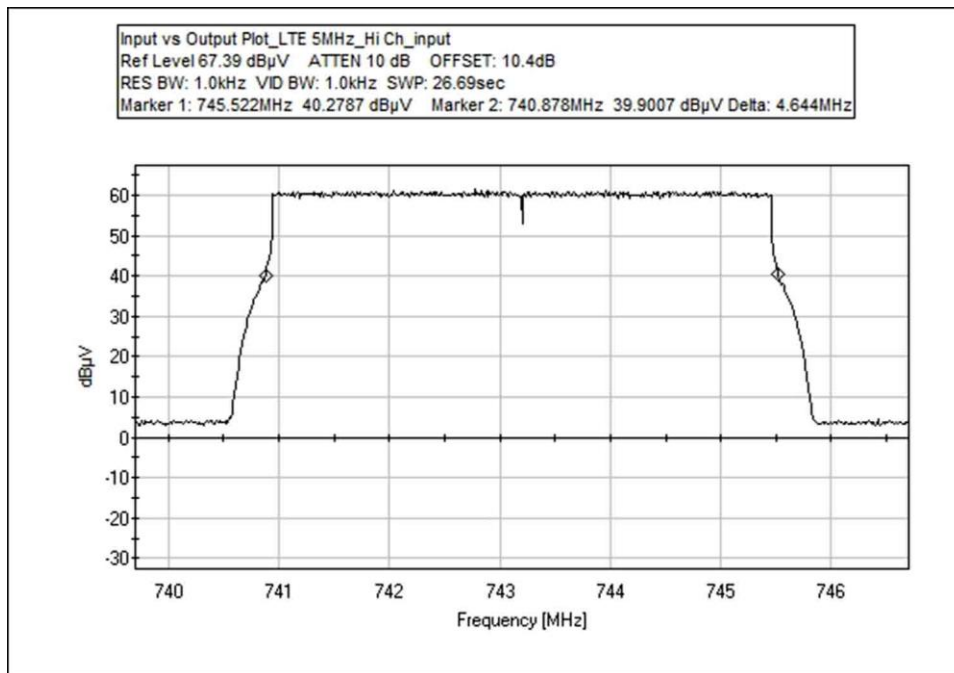
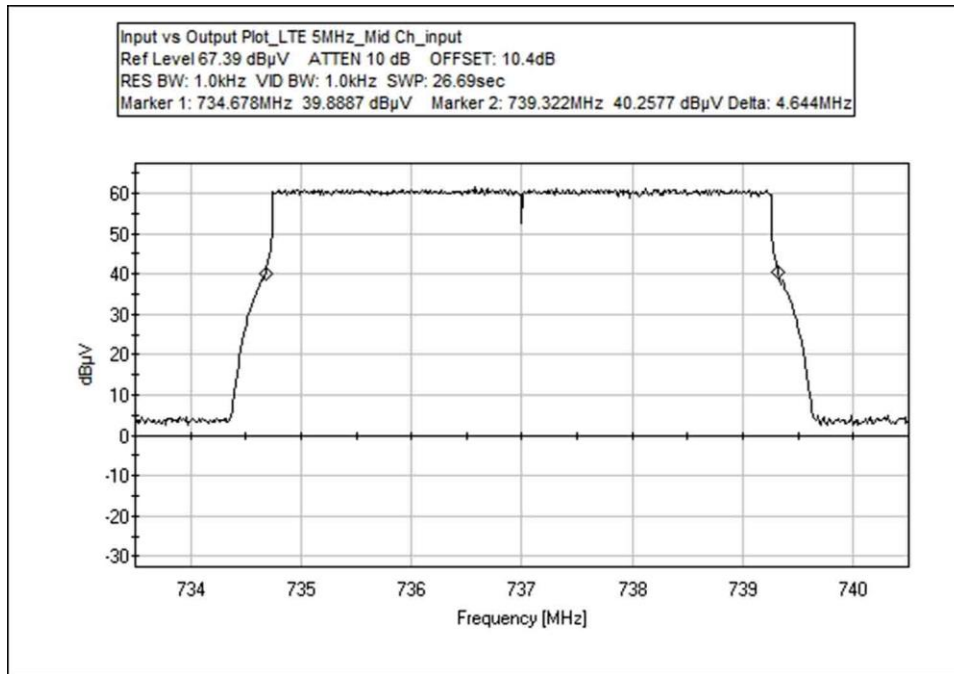
21°C, 47% RH.

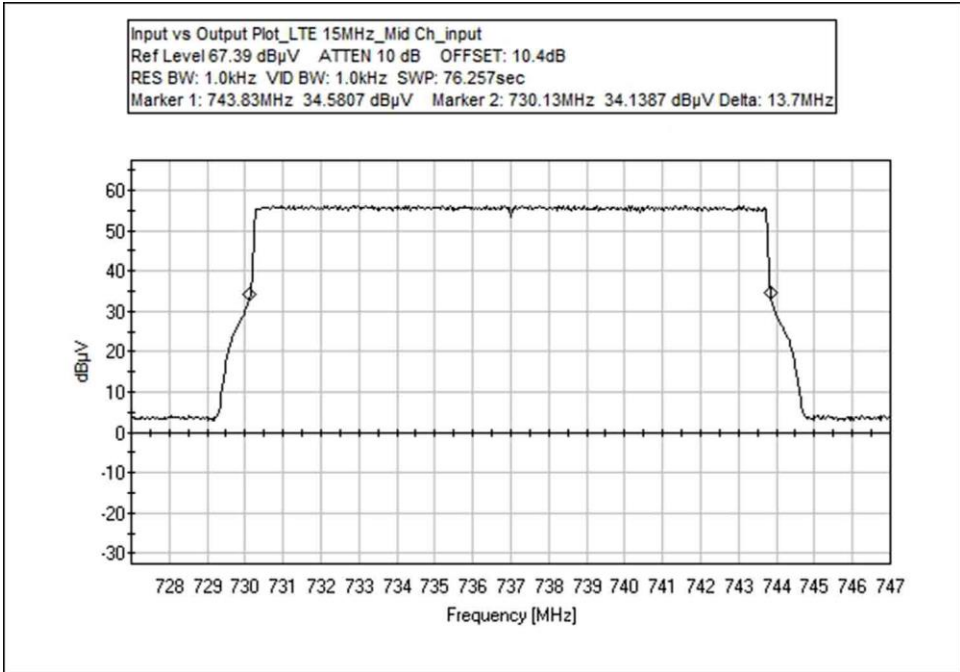
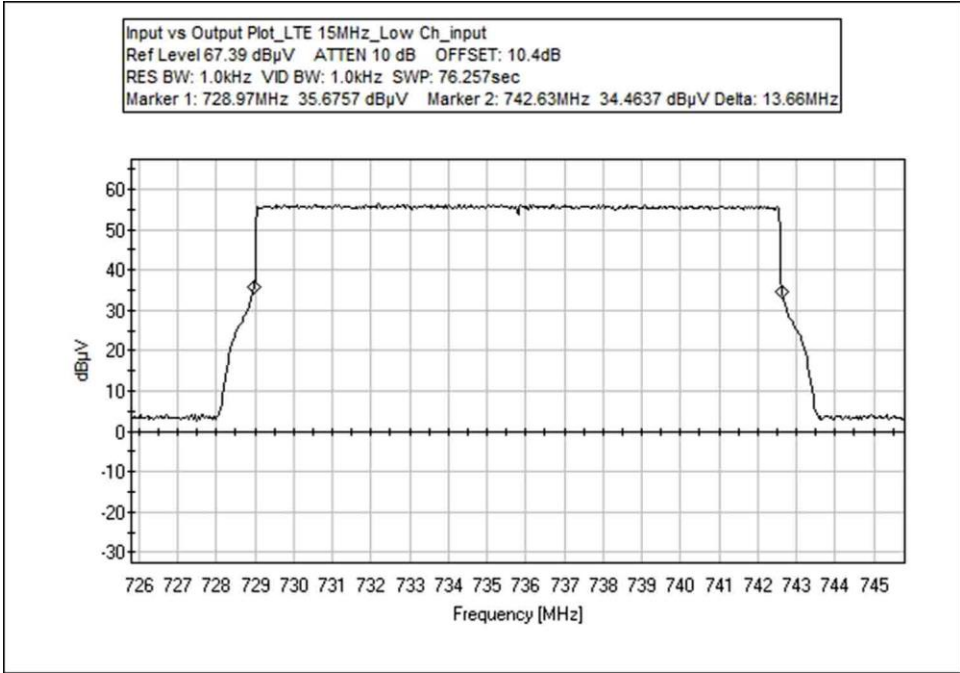


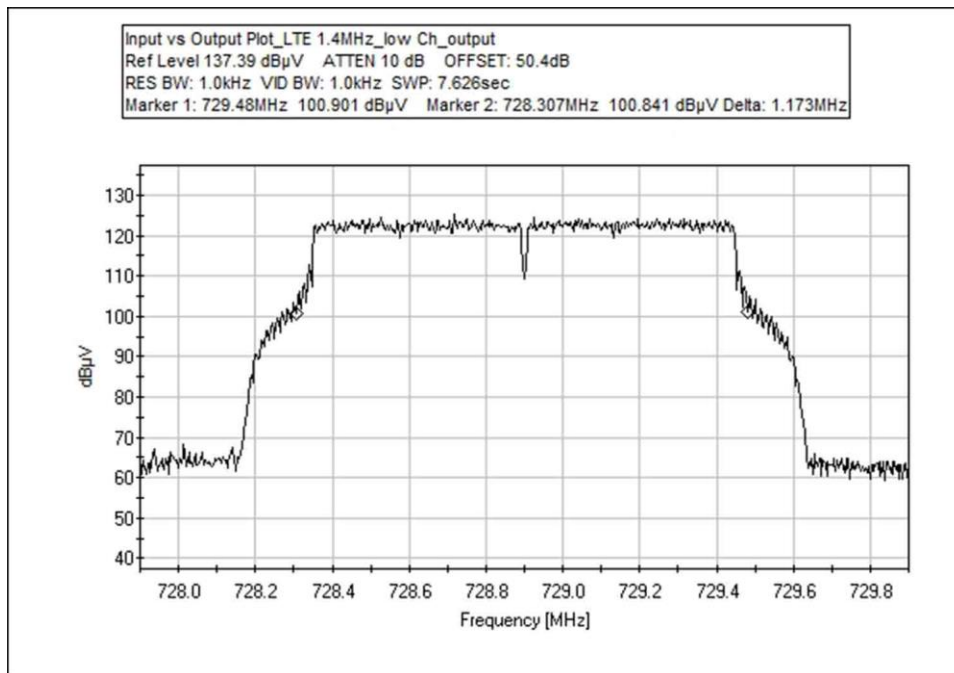
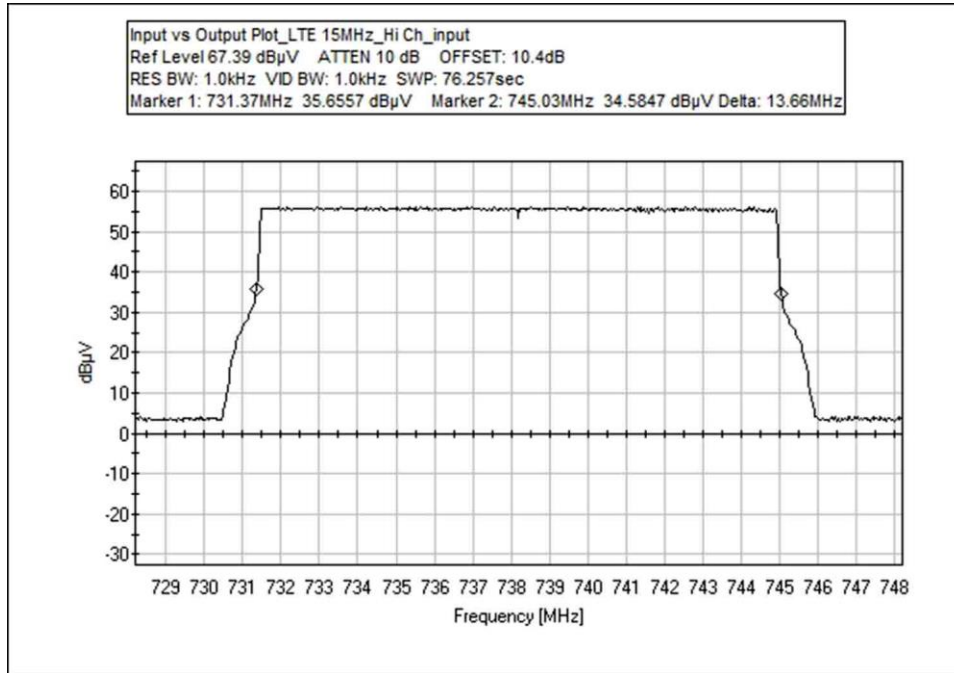
**Test Data**

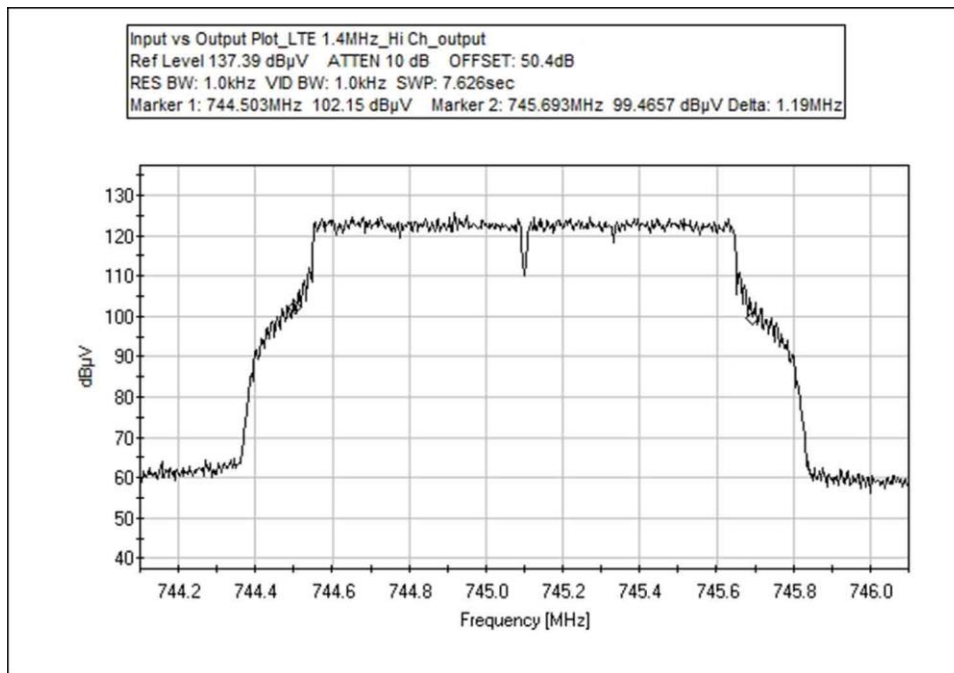
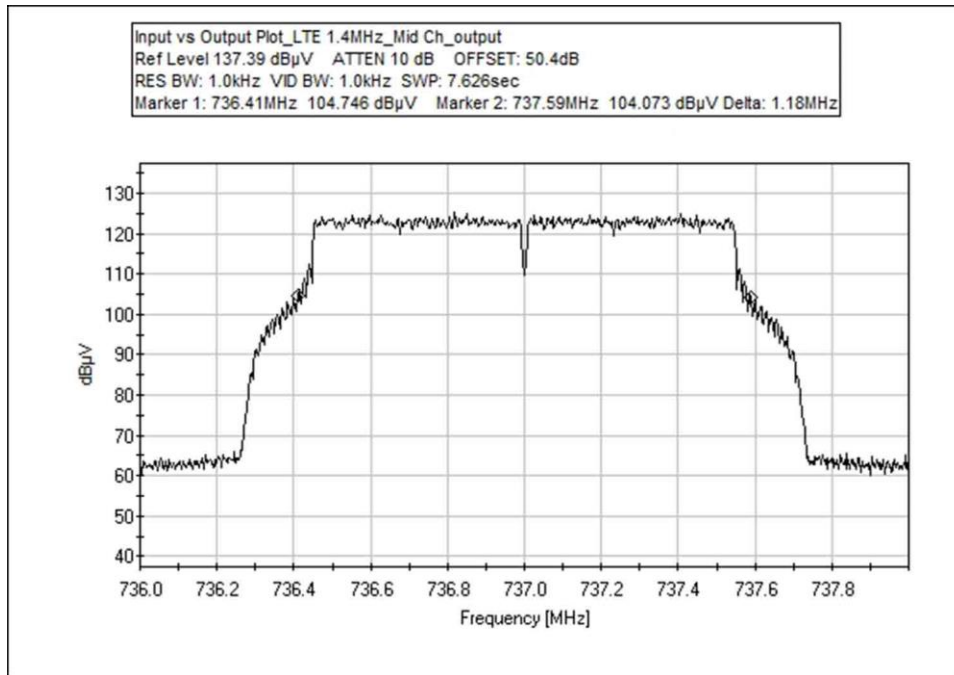


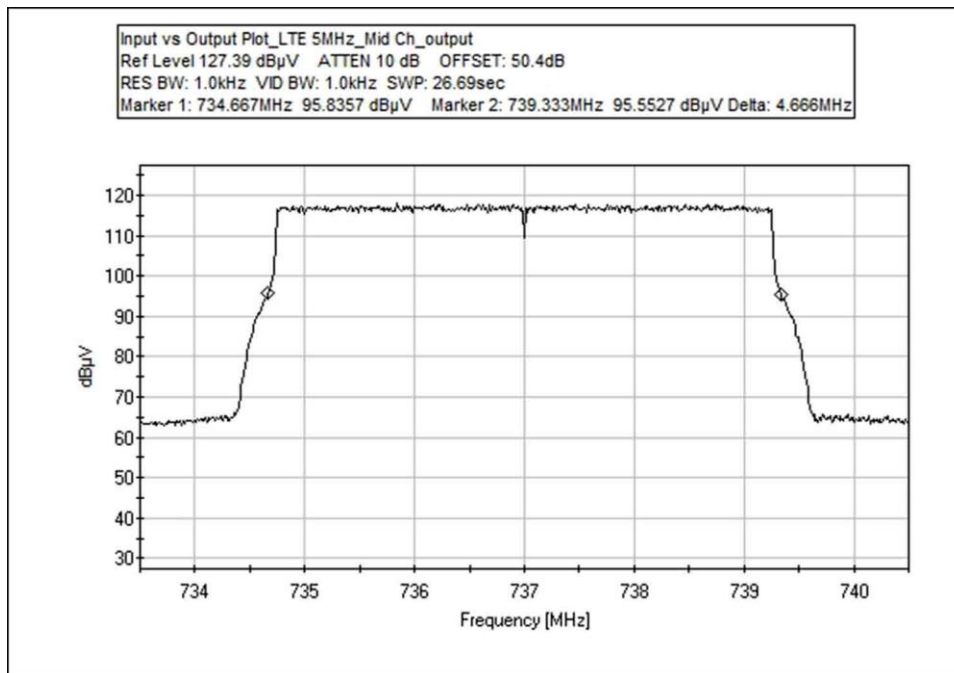
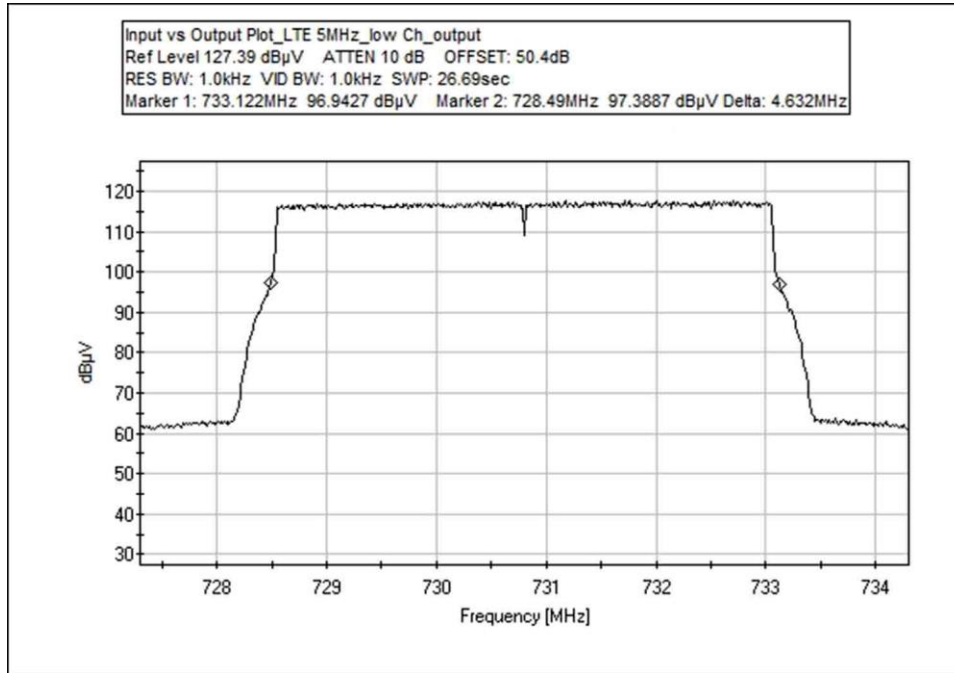


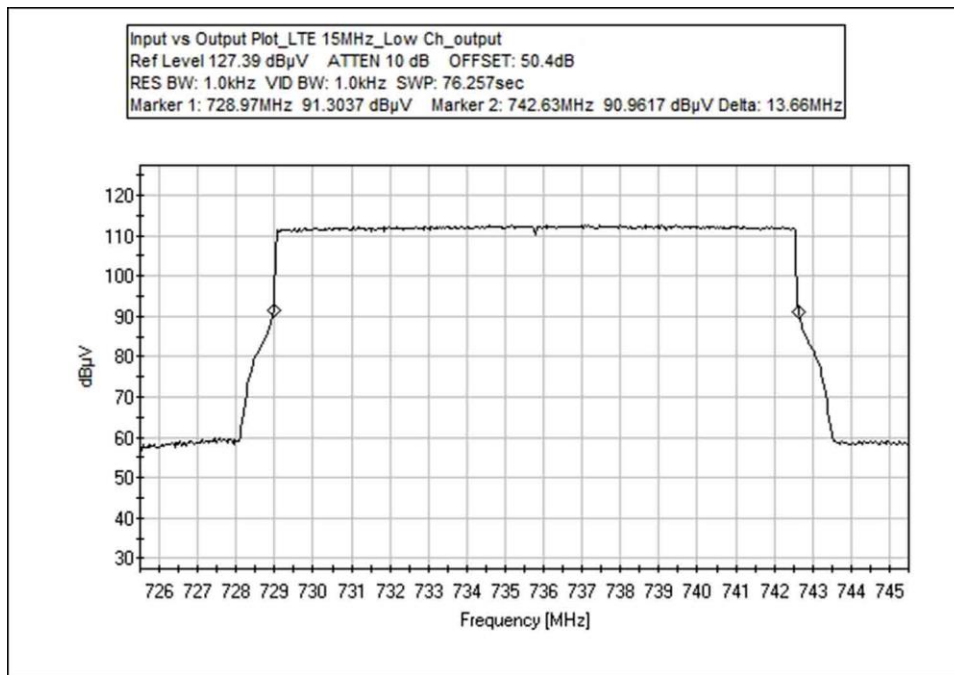
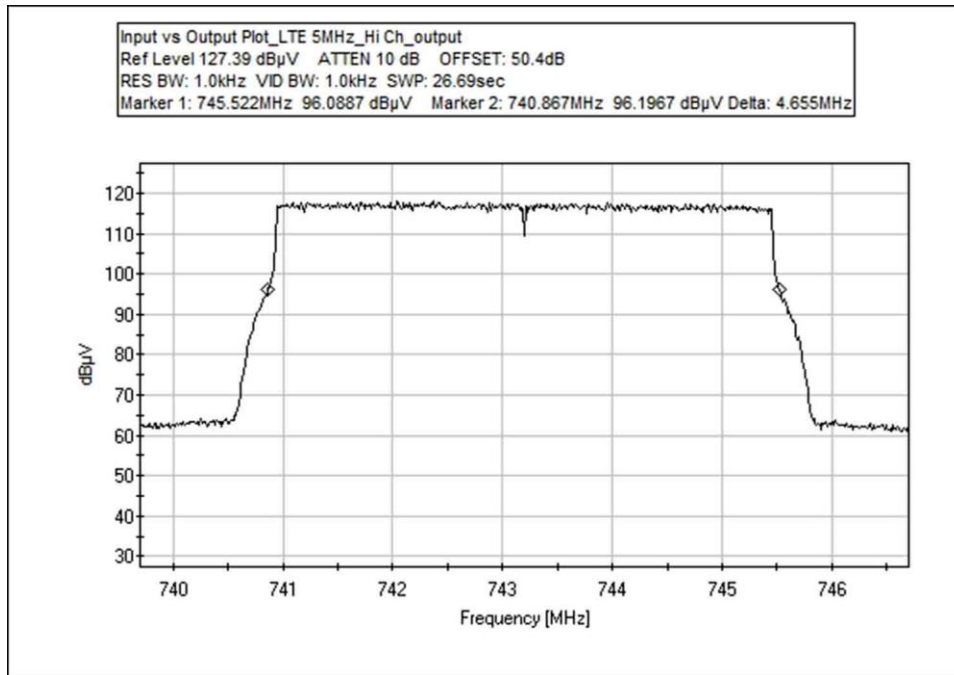




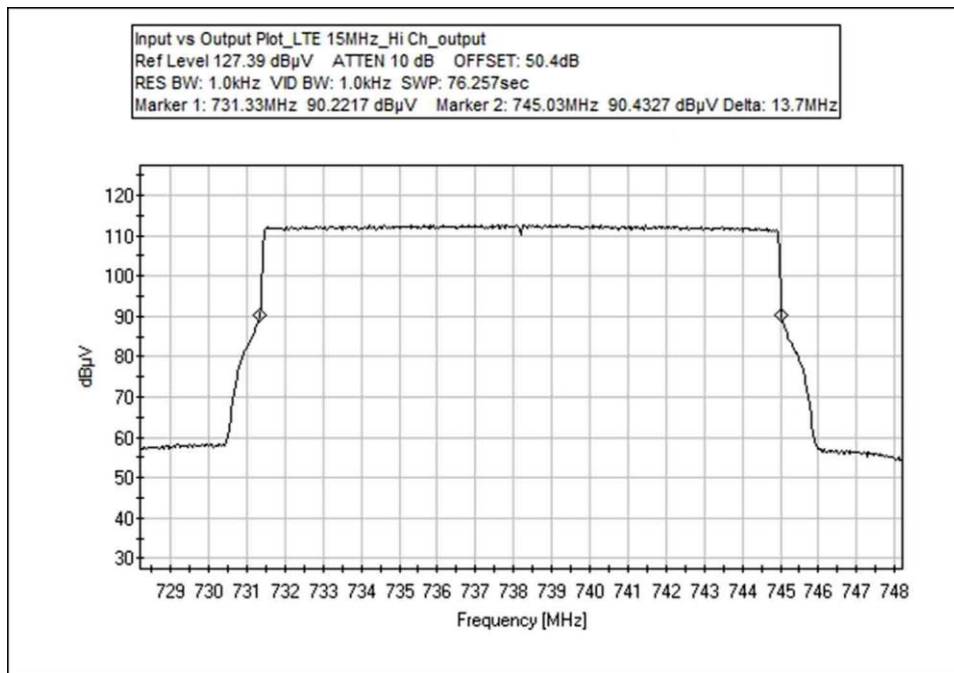
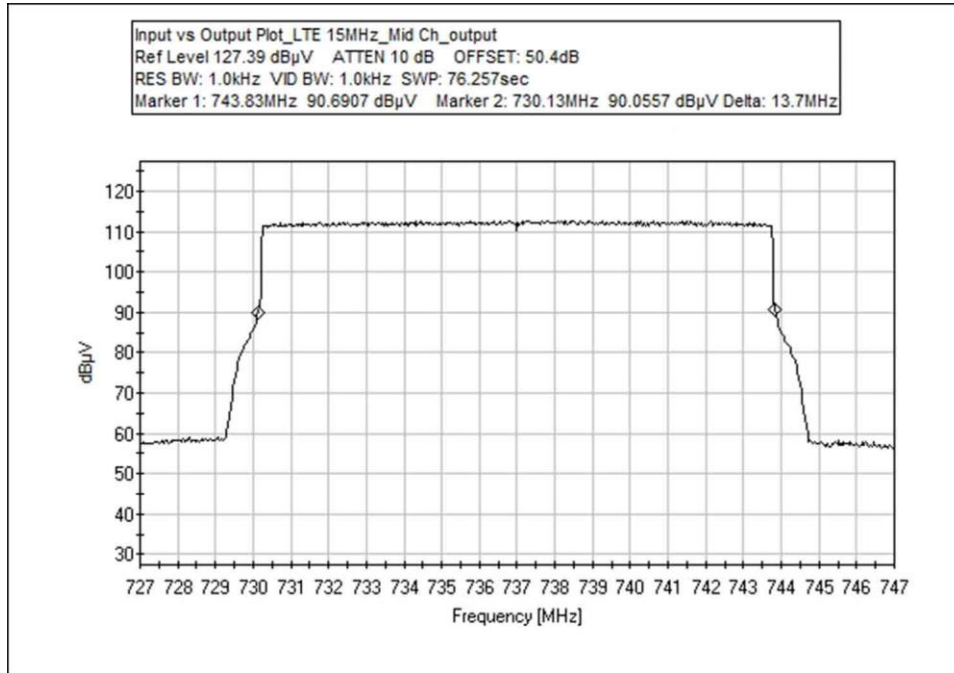












**Test Setup Photos**



**FCC 2.1033(c)(14)/2.1051/27.53(g) - Spurious Emissions at Antenna Terminal**

**Test Data**

Test Location: CKC Laboratories, Inc. • 110 N. Olinda Place • Brea, CA 92823 • (714) 993-6112

Customer: **BTI Wireless**  
 Specification: **FCC Part 27.53(g) Conducted Spurious Emission**  
 Work Order #: **94688** Date: 7/26/2013  
 Test Type: **Conducted Emissions** Time: 15:55:14  
 Equipment: **700MHz 40W remote transmitting unit** Sequence#: 3  
 Manufacturer: BTI Wireless Tested By: Don Nguyen  
 Model: mBSC0700-040-RUC11 110V 60Hz  
 S/N: 070013010001

**Test Equipment:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP06153	Cable	16301	10/27/2011	10/27/2013
T2	AN02869	Spectrum Analyzer	E4440A	2/6/2013	2/6/2015
T3	AN03169	High Pass Filter	HM1155-11SS	9/22/2011	9/22/2013

**Equipment Under Test (\* = EUT):**

Function	Manufacturer	Model #	S/N
700MHz 40W remote transmitting unit*	BTI Wireless	mBSC0700-040-RUC11	070013010001

**Support Devices:**

Function	Manufacturer	Model #	S/N
ESG Vector Signal Generator	Agilent	4438C	MY45091601

**Test Conditions / Notes:**

The EUT is placed on the test bench. Tx In is connected to an ESG Signal generator, ANT is connected to a spectrum analyzer and attenuator. RX out port is terminated to 50 ohm load.

The evaluation is performed at the antenna port.

Freq: 728-746MHz  
 Signal protocol: LTE-TM1.1 1.4MHz, 5MHz. 15MHz

The RF output power was measured with the following Automatic level control threshold setting.  
 Automatic Level Control Threshold: 1616, 1152, 0784  
 Power: 40W, 20W, 10W

Frequency range of measurement = 9 kHz-8 GHz.  
 9 kH -150 kHz;RBW=200 Hz,VBW=200 Hz;150 kHz-30 MHz;RBW=9 kHz,VBW=9 kHz;30 MHz-1000 MHz;RBW=120 kHz,VBW=120 kHz,1000 MHz-9000 MHz;RBW=1 MHz,VBW=1 MHz.

21°C, 65% RH

**LIMIT LINE FOR SPURIOUS CONDUCTED EMISSION**

$$\text{REQUIRED ATTENUATION} = 43 + 10 \text{ LOG P DB}$$

$$\text{Limit line (dBuV)} = V_{\text{dBuV}} - \text{Attenuation}$$

$$\begin{aligned} V_{\text{dBuV}} &= 20 \text{ Log } \frac{V}{1 \times 10^{-6}} \\ &= 20 (\text{Log } V - \text{Log } 1 \times 10^{-6}) \\ &= 20 \text{ Log } V - 20 \text{ Log } 1 \times 10^{-6} \\ &= 20 \text{ Log } V - 20 (-6) \\ &= 20 \text{ Log } V + 120 \end{aligned}$$

$$\begin{aligned} \text{Attenuation} &= 43 + 10 \text{ Log } P \\ &= 43 + 10 \text{ Log } \frac{V^2}{R} \\ &= 43 + 10 (\text{Log } V^2 - \text{Log } R) \\ &= 43 + 10 (2 \text{ Log } V - \text{Log } R) \\ &= 43 + 20 \text{ Log } V - 10 \text{ Log } R \end{aligned}$$

$$\begin{aligned} \text{Limit line} &= V_{\text{dBuV}} - \text{Attenuation} \\ &= 20 \text{ Log } V + 120 - (43 + 20 \text{ Log } V - 10 \text{ Log } R) \\ &= 20 \text{ Log } V + 120 - 43 - 20 \text{ Log } V + 10 \text{ Log } R \\ &= 20 \text{ Log } V + 120 - 43 - 20 \text{ Log } V + 10 \text{ Log } R \\ &= 120 - 43 + 10 \text{ Log } 50 \quad \text{Note: } R = 50 \Omega \\ &= 120 - 43 + 16.897 \\ &= 94 \text{ dBuV at any power level} \end{aligned}$$

Ext Attn: 0 dB

**Measurement Data:**

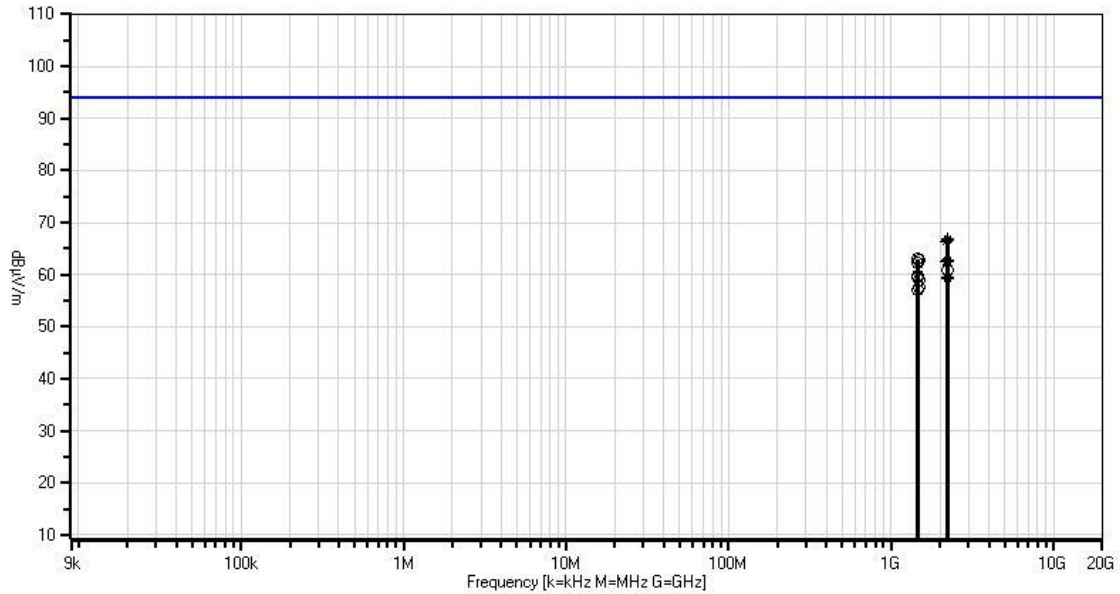
Reading listed by margin.

Test Lead: Ant Port

#	Freq MHz	Rdng dBμV	T1 dB	T2 dB	T3 dB	dB	Dist Table	Corr dBμV/m	Spec dBμV/m	Margin dB	Polar Ant
1	2211.100M Ave	66.0	+0.5	+0.0	+0.3		+0.0	66.8	94.0 LTE 1.4MHz, mid Ch, 40W	-27.2	Ant P
^	2211.100M	70.4	+0.5	+0.0	+0.3		+0.0	71.2	94.0 LTE 1.4MHz, mid Ch, 40W	-22.8	Ant P
3	2235.347M Ave	65.9	+0.5	+0.0	+0.3		+0.0	66.7	94.0 LTE 1.4MHz, hi Ch, 40W	-27.3	Ant P
^	2235.310M	70.0	+0.5	+0.0	+0.3		+0.0	70.8	94.0 LTE 1.4MHz, hi Ch, 40W	-23.2	Ant P
5	2186.750M Ave	65.5	+0.5	+0.0	+0.3		+0.0	66.3	94.0 LTE 1.4MHz, Low Ch, 40W	-27.7	Ant P
^	2186.720M	68.4	+0.5	+0.0	+0.3		+0.0	69.2	94.0 LTE 1.4MHz, Low Ch, 40W	-24.8	Ant P
7	1457.820M	61.9	+0.5	+0.0	+0.6		+0.0	63.0	94.0 LTE 1.4MHz, Low Ch, 40W	-31.0	Ant P
8	2211.300M Ave	62.1	+0.5	+0.0	+0.3		+0.0	62.9	94.0 LTE 5MHz, Mid Ch, 40W	-31.1	Ant P
^	2211.230M	63.5	+0.5	+0.0	+0.3		+0.0	64.3	94.0 LTE 5MHz, Mid Ch, 40W	-29.7	Ant P
10	1490.230M	61.7	+0.5	+0.0	+0.6		+0.0	62.8	94.0 LTE 1.4MHz, hi Ch, 40W	-31.2	Ant P
11	2229.800M Ave	61.8	+0.5	+0.0	+0.3		+0.0	62.6	94.0 LTE 5MHz, Hi Ch, 40W	-31.4	Ant P
^	2229.800M	63.3	+0.5	+0.0	+0.3		+0.0	64.1	94.0 LTE 5MHz, Hi Ch, 40W	-29.9	Ant P
13	2193.100M Ave	61.7	+0.5	+0.0	+0.3		+0.0	62.5	94.0 LTE 5MHz, Low Ch, 40W	-31.5	Ant P
^	2193.100M	63.2	+0.5	+0.0	+0.3		+0.0	64.0	94.0 LTE 5MHz, Low Ch, 40W	-30.0	Ant P
15	1474.100M	61.1	+0.5	+0.0	+0.6		+0.0	62.2	94.0 LTE 1.4MHz, mid Ch, 40W	-31.8	Ant P
16	2215.400M	60.1	+0.5	+0.0	+0.3		+0.0	60.9	94.0 LTE 15MHz, Hi Ch, 40W	-33.1	Ant P

17	1474.030M	58.7	+0.5	+0.0	+0.6	+0.0	59.8	94.0	-34.2	Ant P
								LTE 5MHz, Mid Ch, 40W		
18	2212.300M Ave	58.7	+0.5	+0.0	+0.3	+0.0	59.5	94.0	-34.5	Ant P
								LTE 15MHz, Mid Ch, 40W		
^	2212.300M	60.2	+0.5	+0.0	+0.3	+0.0	61.0	94.0	-33.0	Ant P
								LTE 15MHz, Mid Ch, 40W		
20	2215.700M Ave	58.7	+0.5	+0.0	+0.3	+0.0	59.5	94.0	-34.5	Ant P
								LTE 15MHz, Hi Ch, 40W		
21	1461.700M	58.3	+0.5	+0.0	+0.6	+0.0	59.4	94.0	-34.6	Ant P
								LTE 5MHz, Low Ch, 40W		
22	2208.800M Ave	58.4	+0.5	+0.0	+0.3	+0.0	59.2	94.0	-34.8	Ant P
								LTE 15MHz, Low Ch, 40W		
^	2208.800M	59.9	+0.5	+0.0	+0.3	+0.0	60.7	94.0	-33.3	Ant P
								LTE 15MHz, Low Ch, 40W		
24	1486.630M	57.8	+0.5	+0.0	+0.6	+0.0	58.9	94.0	-35.1	Ant P
								LTE 5MHz, Hi Ch, 40W		
25	1476.400M	56.5	+0.5	+0.0	+0.6	+0.0	57.6	94.0	-36.4	Ant P
								LTE 15MHz, Hi Ch, 40W		
26	1475.500M	56.4	+0.5	+0.0	+0.6	+0.0	57.5	94.0	-36.5	Ant P
								LTE 15MHz, Mid Ch, 40W		
27	1472.100M	55.9	+0.5	+0.0	+0.6	+0.0	57.0	94.0	-37.0	Ant P
								LTE 15MHz, Low Ch, 40W		

Date: 7/26/2013 Time: 15:55:14 BTI Wireless WO#: 94688  
 FCC Part 27.53(g) Conducted Spurious Emission Test Lead: Ant Port 110V 60Hz Sequence#: 3 Ext ATTN: 0 dB



**Test Setup Photos**





**FCC 2.1033(c)(14)/2.1053/27C - Field Strength of Spurious Radiation**

Test Location: CKC Laboratories, Inc. • 110 N. Olinda Place • Brea, CA 92823 • (714) 993-6112

Customer: **BTI Wireless**  
 Specification: **FCC 27.53 (g) Radiated Spurious Emission**  
 Work Order #: **94688** Date: 7/29/2013  
 Test Type: **Maximized Emissions** Time: 09:39:27  
 Equipment: **700MHz 40W remote transmitting unit** Sequence#: 4  
 Manufacturer: BTI Wireless Tested By: Don Nguyen  
 Model: mBSC0700-040-RUC11  
 S/N: 070013010001

**Test Equipment:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN00309	Preamp	8447D	3/29/2012	3/29/2014
	AN01995	Biconilog Antenna	CBL6111C	5/16/2012	5/16/2014
	ANP05050	Cable	RG223/U	1/21/2013	1/21/2015
	ANP05198	Cable-Amplitude 15 to 45degC (dB)	8268	12/11/2012	12/11/2014
	AN00314	Loop Antenna	6502	6/29/2012	6/29/2014
T1	AN02869	Spectrum Analyzer	E4440A	2/6/2013	2/6/2015
T2	AN00787	Preamp	83017A	5/31/2013	5/31/2015
T3	AN00849	Horn Antenna	3115	4/13/2012	4/13/2014
T4	ANP05421	Cable	Sucoflex 104A	2/8/2012	2/8/2014
T5	ANP05988	Cable	LDF1-50	3/12/2012	3/12/2014
T6	ANP06153	Cable	16301	10/27/2011	10/27/2013

**Equipment Under Test (\* = EUT):**

Function	Manufacturer	Model #	S/N
700MHz 40W remote transmitting unit*	BTI Wireless	mBSC0700-040-RUC11	070013010001

**Support Devices:**

Function	Manufacturer	Model #	S/N
ESG Vector Signal Generator	Agilent	4438C	MY45091601
Power Meter	HP	EPM-441A	GB37170458
Power Sensor	Agilent	E4412A	MY41502826

***Test Conditions / Notes:***

The EUT is installed on an open rack to simulating final installation, and placed on the wooden table. Tx In is connected to a remotely located ESG. ANT is connected to a power meter for verification of output power level. RX out port is terminated to 50 ohm load.

Freq: 728-746MHz  
 Signal protocol: LTE-TM1.1\_1.4MHz  
 Power: 40W ( Max rated power)

LTE-TM1.1\_1.4MHz 728.9MHz, 737.0MHz, 745.1MHz

Frequency range of measurement = 9 kHz-8 GHz.  
 9 kH -150 kHz;RBW=200 Hz,VBW=200 Hz;150 kHz-30 MHz;RBW=9 kHz,VBW=9 kHz;30 MHz-1000 MHz;RBW=120 kHz,VBW=120 kHz,1000 MHz-9000 MHz;RBW=1 MHz,VBW=1 MHz.

21°C, 47% RH

RMS detector.

**Test Data**

Operating Frequency: 728-746MHz  
 Channels: LTE-TM1.1\_1.4MHz  
 Highest Measured Output Power: 46.00 (dBm)= 40 (Watts)  
 Distance: 3 meters  
 Limit: 43+10Log(P)= 59.02 dBc

Freq. (MHz)	Reference Level (dBm)	Antenna Polarity (H/V)	dBc
1,457.80	-55.12059991	Vert	101.12
1,474.00	-56.32059991	Vert	102.32
2,211.00	-55.02059991	Vert	101.02
2,186.70	-56.12059991	Vert	102.12
1,490.20	-56.82059991	Vert	102.82
2,235.30	-57.22059991	Vert	103.22
1,490.20	-55.42059991	Horiz	101.42
2,235.30	-55.92059991	Horiz	101.92
1,474.00	-57.22059991	Horiz	103.22
2,211.00	-57.92059991	Horiz	103.92
1,457.80	-55.82059991	Horiz	101.82
2,186.70	-56.22059991	Horiz	102.22

**Test Setup Photos**



## Band Edge

Test Location: CKC Laboratories, Inc. • 110 N. Olinda Place • Brea, CA 92823 • (714) 993-6112

Customer: **BTI Wireless**  
 Specification: **Band edge plot**  
 Work Order #: **94688** Date: 7/26/2013  
 Test Type: **Conducted Emissions** Time: 14:18:15  
 Equipment: **700MHz 40W remote transmitting unit** Sequence#: 1  
 Manufacturer: BTI Wireless Tested By: Don Nguyen  
 Model: mBSC0700-040-RUC11 110V 60Hz  
 S/N: 070013010001

**Test Equipment:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02869	Spectrum Analyzer	E4440A	2/6/2013	2/6/2015
T2	ANP06153	Cable	16301	10/27/2011	10/27/2013

**Equipment Under Test (\* = EUT):**

Function	Manufacturer	Model #	S/N
700MHz 40W remote transmitting unit*	BTI Wireless	mBSC0700-040-RUC11	070013010001

**Support Devices:**

Function	Manufacturer	Model #	S/N
ESG Vector Signal Generator	Agilent	4438C	MY45091601

**Test Conditions / Notes:**

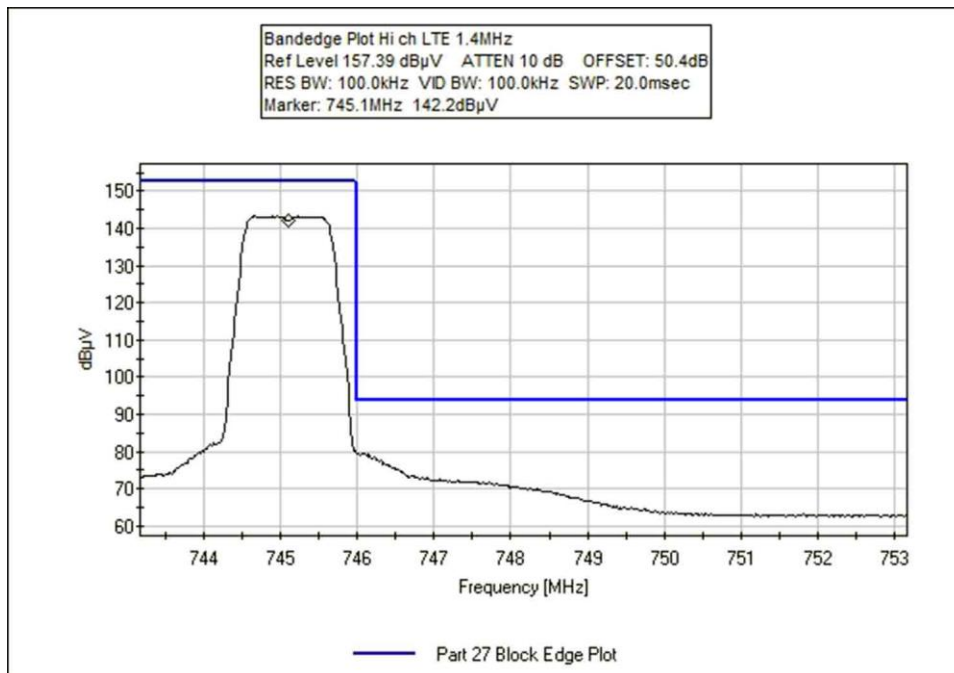
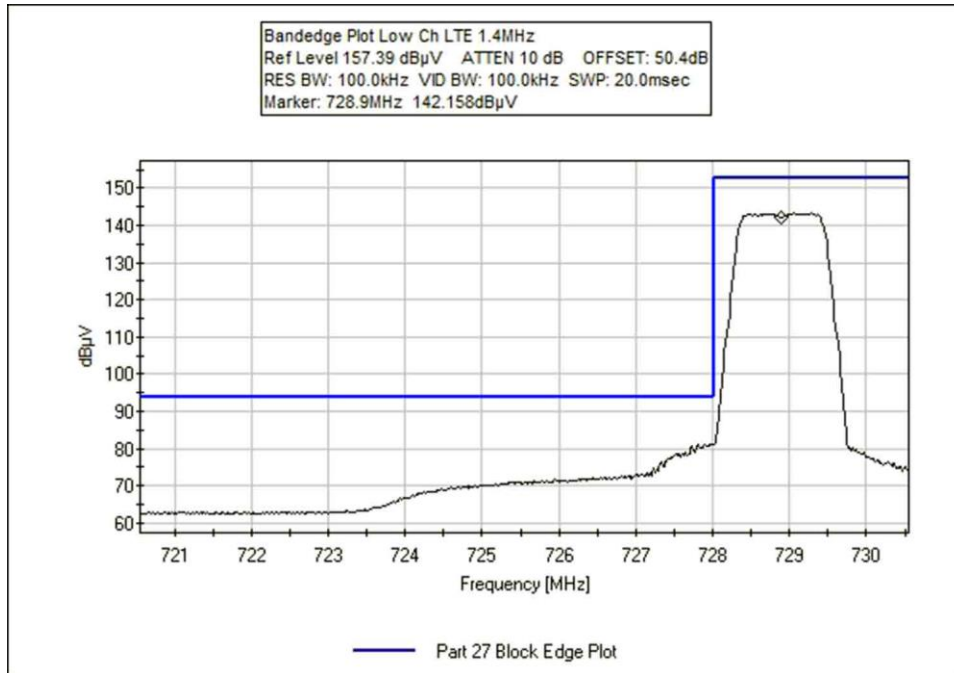
The EUT is placed on the test bench. Tx In is connected to an ESG Signal generator, ANT is connected to a spectrum analyzer and attenuator. RX out port is terminated to 50 ohm load.

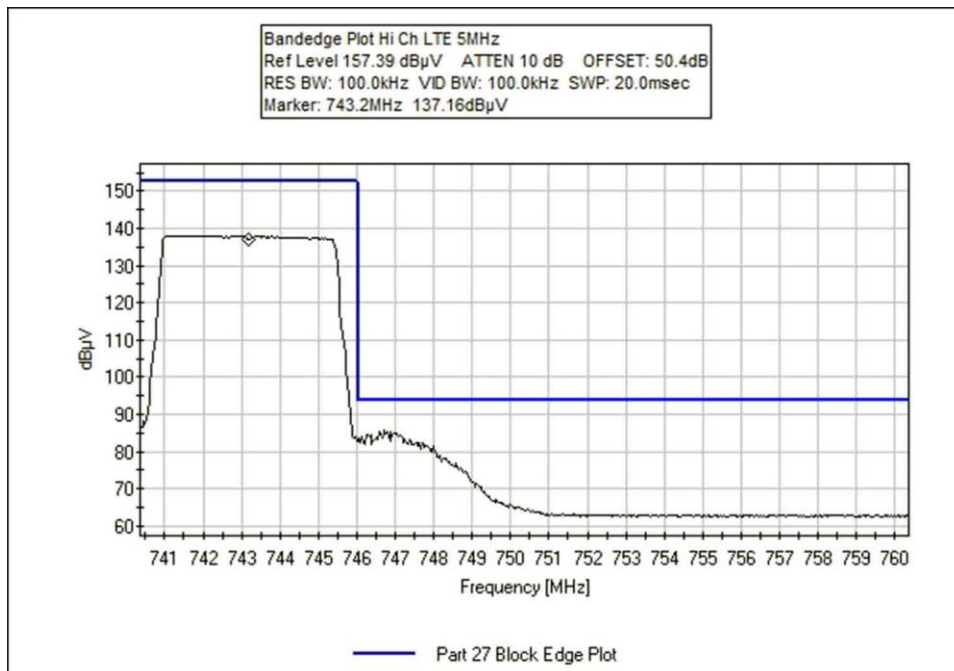
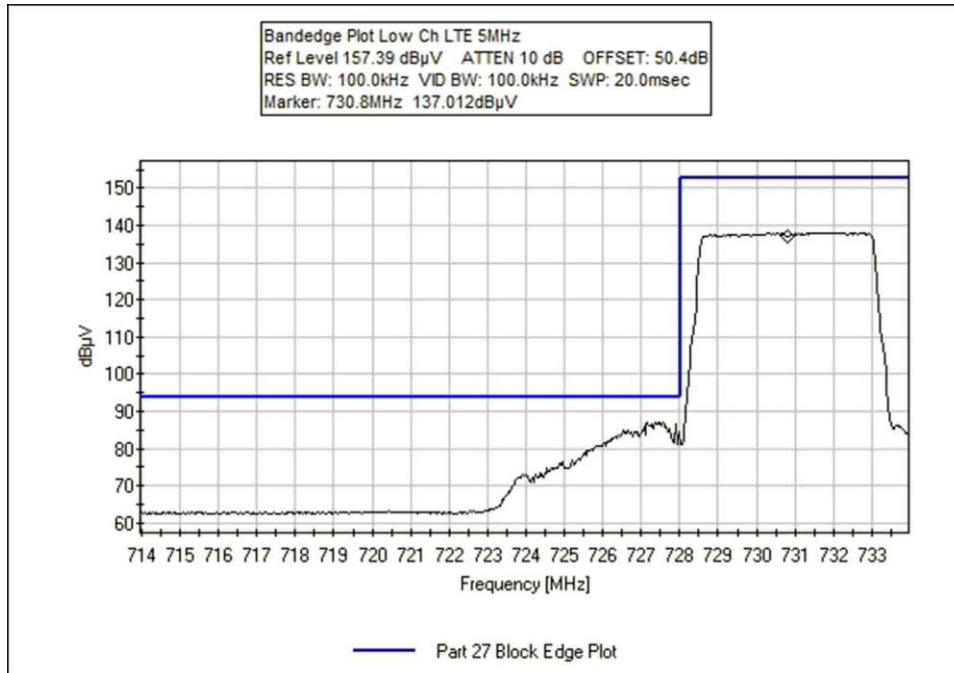
The evaluation is performed at the antenna port.

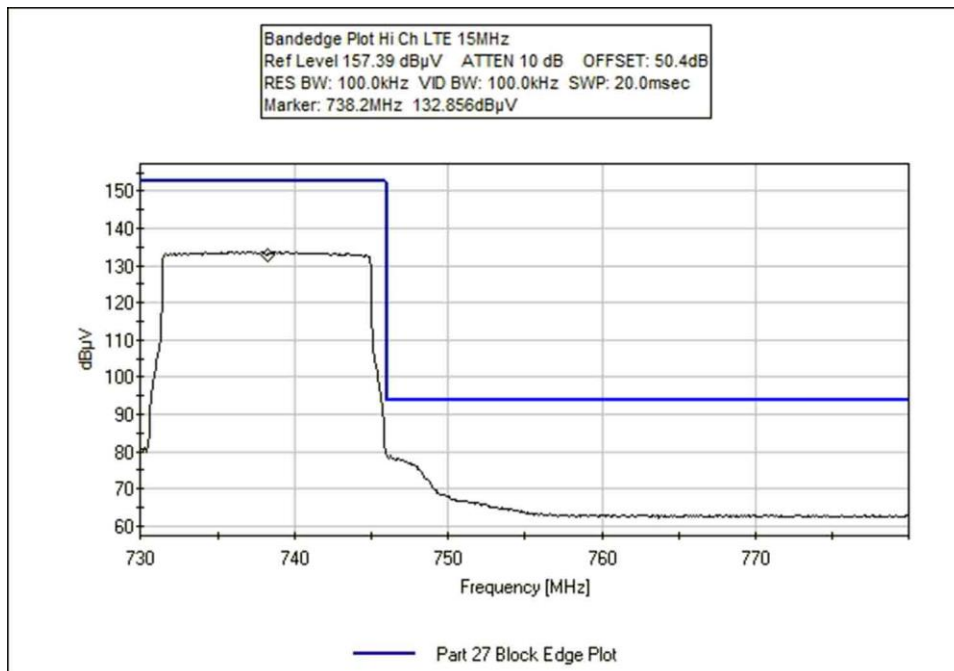
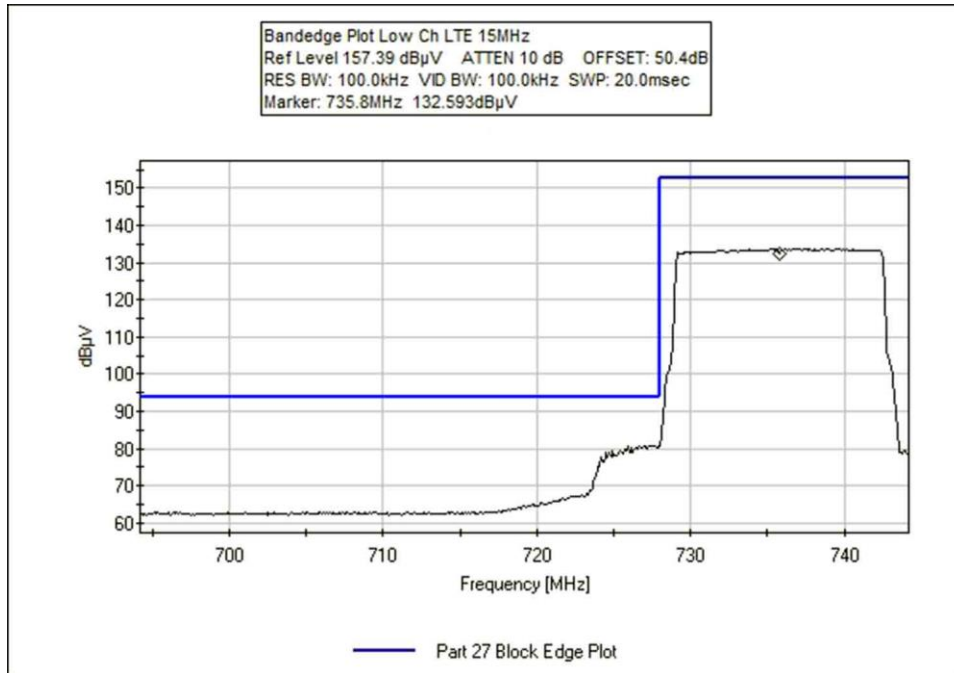
Freq: 728-746MHz  
 Signal protocol: LTE-TM1.1 1.4MHz, 5MHz, 15MHz  
 Power : 40W

21°C, 47% RH.

**Test Data**







**Test Setup Photos**





## Intermodulation

Test Location: CKC Laboratories, Inc. • 110 N. Olinda Place • Brea, CA 92823 • (714) 993-6112

Customer: **BTI Wireless**  
 Specification: **Intermodulation**  
 Work Order #: **94688** Date: 7/26/2013  
 Test Type: **Conducted Emissions** Time: 15:55:14  
 Equipment: **800MHz 40W remote transmitting unit** Sequence#: 3  
 Manufacturer: BTI Wireless Tested By: Don Nguyen  
 Model: mBSC0700-040-RUC11 110V 60Hz  
 S/N: 070013010001

**Test Equipment:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02869	Spectrum Analyzer	E4440A	2/6/2013	2/6/2015
T2	ANP06153	Cable	16301	10/27/2011	10/27/2013

**Equipment Under Test (\* = EUT):**

Function	Manufacturer	Model #	S/N
700MHz 40W remote transmitting unit*	BTI Wireless	mBSC0700-040-RUC11	070013010001

**Support Devices:**

Function	Manufacturer	Model #	S/N
ESG Vector Signal Generator	Agilent	4438C	MY45091601
ESG Vector Signal Generator	Agilent	4438C	MY45092055

**Test Conditions / Notes:**

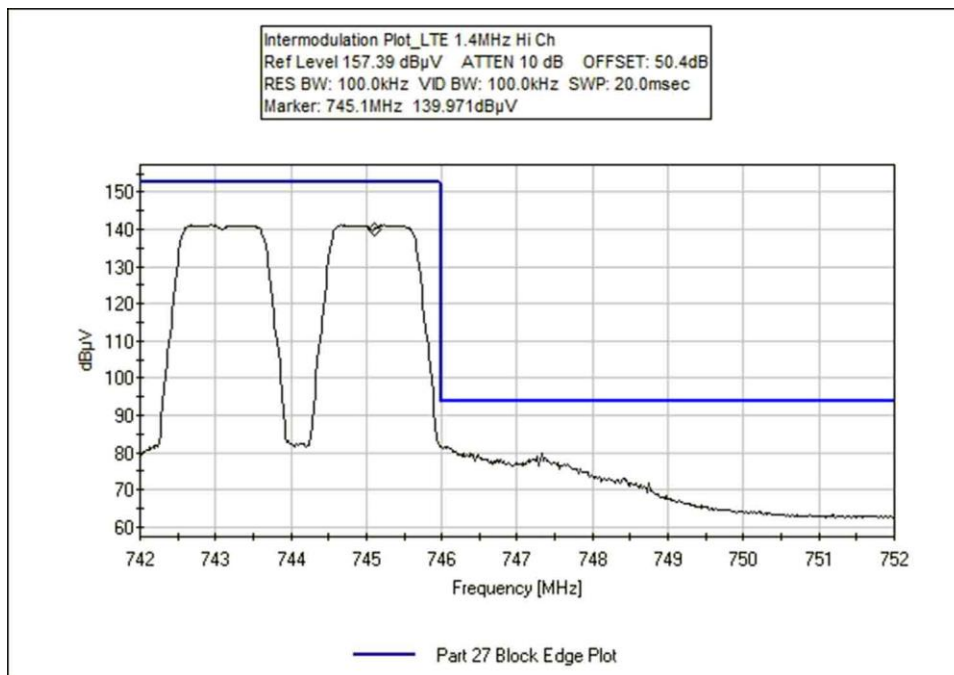
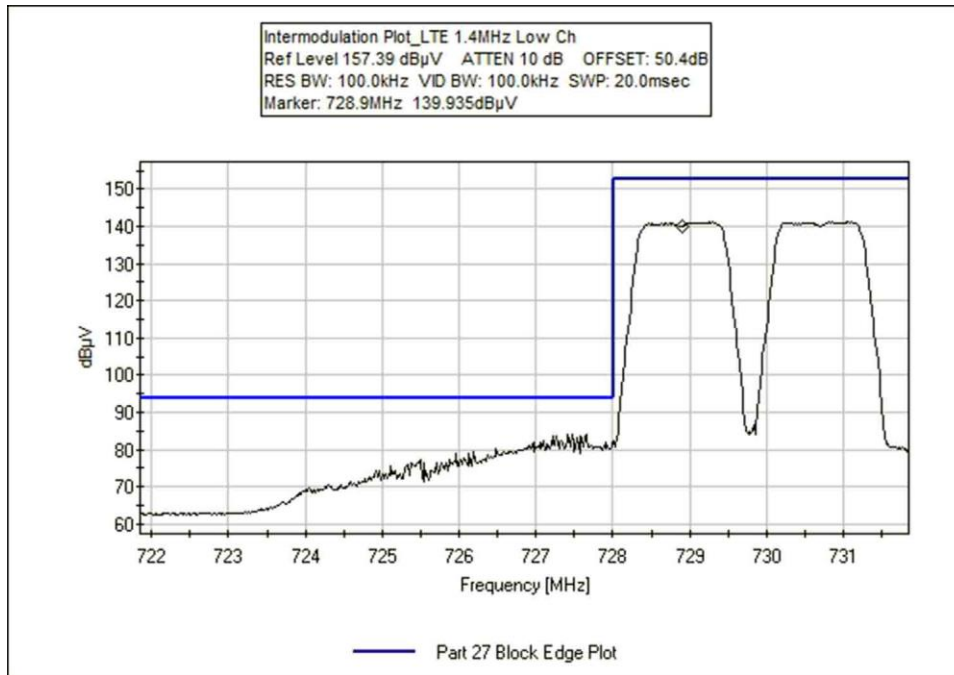
The EUT is placed on the test bench. Tx In is connected to two ESGs via a power combiner. ANT is connected to a spectrum analyzer and attenuator. RX out port is terminated to 50 ohm load.

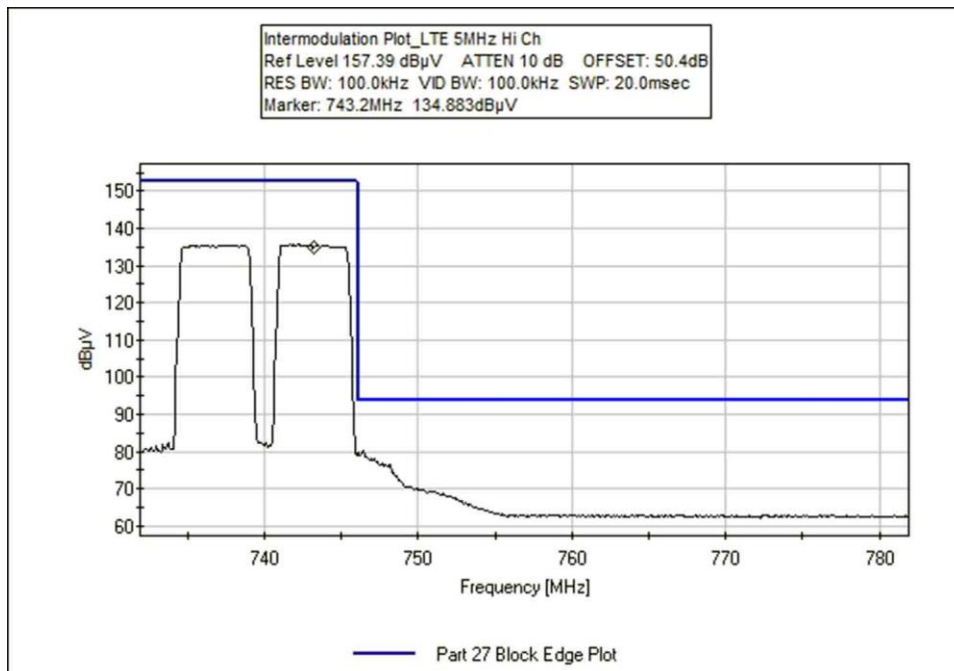
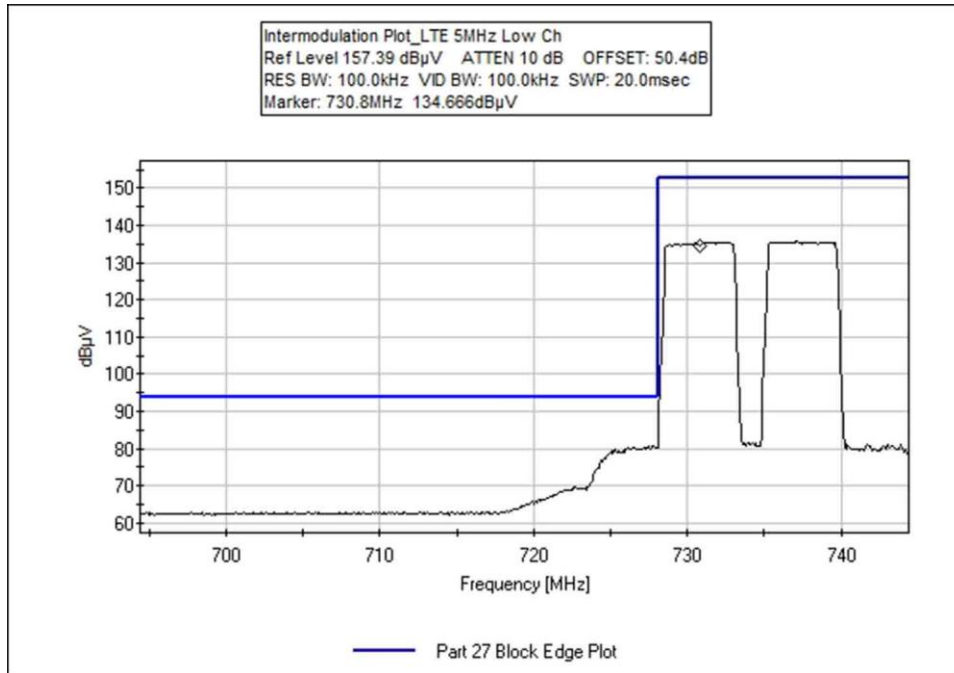
The evaluation is performed at the antenna port.

Freq: 728-746MHz  
 Signal protocol: LTE-TM1.1 1.4MHz, 5MHz, 15MHz  
 Input signal levels were set to produce maximum rated RF output power.  
 Power: 40 W

21°C, 47% RH

**Test Data**





**Test Setup Photos**



## Out of Band Rejection

Test Location: Brea

Customer: **BTI Wireless**

Specification: **Out of band rejection plot**

Work Order #: **94688**

Date: 7/25/2013

Test Type: **Conducted Emissions**

Time: 16:47:52

Equipment: **700MHz 40W remote transmitting unit**

Sequence#: 4

Manufacturer: BTI Wireless

Tested By: E. Wong

Model: mBSC0700-040-RUC11

110V 60Hz

S/N: 070013010001

***Test Equipment:***

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	C00054	Network Analyzer	8753E	9/12/08	9/12/10

***Equipment Under Test (\* = EUT):***

Function	Manufacturer	Model #	S/N
700MHz 40W remote transmitting unit*	BTI Wireless	mBSC0700-040-RUC11	070013010001

***Test Conditions / Notes:***

The EUT is placed on the test bench. Tx In is connected to Port 1 of the Network Analyzer. ANT is connected Port 2 of the Network Analyzer via an attenuator. RX out port is terminated to 50 ohm load.

The evaluation is performed at the antenna port.

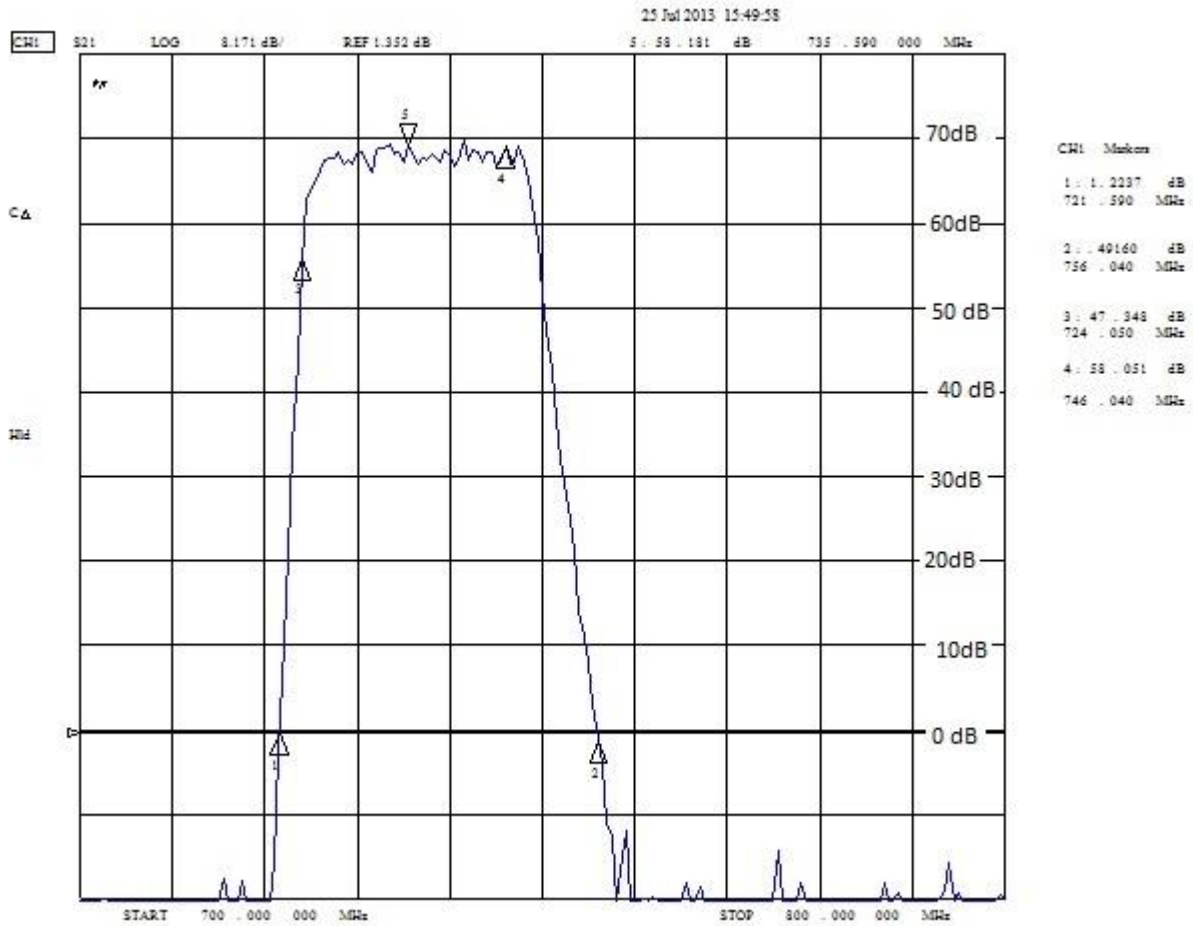
Freq: 728-746MHz

Power : 40W

Frequency range of measurement = 700 – 800 MHz

21°C, 47% RH

**Test Data**



**Test Setup Photos**



## SUPPLEMENTAL INFORMATION

### Measurement Uncertainty

Uncertainty Value	Parameter
4.73 dB	Radiated Emissions
3.34 dB	Mains Conducted Emissions
3.30 dB	Disturbance Power

The reported measurement uncertainties are calculated based on the worst case of all laboratory environments from CKC Laboratories, Inc. test sites. Only those parameters which require estimation of measurement uncertainty are reported. The reported worst case measurement uncertainty is less than the maximum values derived in CISPR 16-4-2. Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k=2. Compliance is deemed to occur provided measurements are below the specified limits.

### Emissions Test Details

**TESTING PARAMETERS**

Unless otherwise indicated, the following configuration parameters are used for equipment setup: The cables were routed consistent with the typical application by varying the configuration of the test sample. Interface cables were connected to the available ports of the test unit. The effect of varying the position of the cables was investigated to find the configuration that produced maximum emissions. Cables were of the type and length specified in the individual requirements. The length of cable that produced maximum emissions was selected.

The equipment under test (EUT) was set up in a manner that represented its normal use, as shown in the setup photographs. Any special conditions required for the EUT to operate normally are identified in the comments that accompany the emissions tables.

The emissions data was taken with a spectrum analyzer or receiver. Incorporating the applicable correction factors for distance, antenna, cable loss and amplifier gain, the data was reduced as shown in the table below. The corrected data was then compared to the applicable emission limits. Preliminary and final measurements were taken in order to ensure that all emissions from the EUT were found and maximized.

**CORRECTION FACTORS**

The basic spectrum analyzer reading was converted using correction factors as shown in the highest emissions readings in the tables. For radiated emissions in dBμV/m, the spectrum analyzer reading in dBμV was corrected by using the following formula. This reading was then compared to the applicable specification limit.



SAMPLE CALCULATIONS		
	Meter reading	(dB $\mu$ V)
+	Antenna Factor	(dB)
+	Cable Loss	(dB)
-	Distance Correction	(dB)
-	Preamplifier Gain	(dB)
=	Corrected Reading	(dB $\mu$ V/m)

### TEST INSTRUMENTATION AND ANALYZER SETTINGS

The test instrumentation and equipment listed were used to collect the emissions data. A spectrum analyzer or receiver was used for all measurements. Unless otherwise specified, the following table shows the measuring equipment bandwidth settings that were used in designated frequency bands. For testing emissions, an appropriate reference level and a vertical scale size of 10 dB per division were used.

MEASURING EQUIPMENT BANDWIDTH SETTINGS PER FREQUENCY RANGE			
TEST	BEGINNING FREQUENCY	ENDING FREQUENCY	BANDWIDTH SETTING
CONDUCTED EMISSIONS	150 kHz	30 MHz	9 kHz
RADIATED EMISSIONS	9 kHz	150 kHz	200 Hz
RADIATED EMISSIONS	150 kHz	30 MHz	9 kHz
RADIATED EMISSIONS	30 MHz	1000 MHz	120 kHz
RADIATED EMISSIONS	1000 MHz	>1 GHz	1 MHz

### SPECTRUM ANALYZER/RECEIVER DETECTOR FUNCTIONS

The notes that accompany the measurements contained in the emissions tables indicate the type of detector function used to obtain the given readings. Unless otherwise noted, all readings were made in the "positive peak" detector mode. Whenever a "quasi-peak" or "average" reading was recorded, the measurement was annotated with a "QP" or an "Ave" on the appropriate rows of the data sheets. In cases where quasi-peak or average limits were employed and data exists for multiple measurement types for the same frequency then the peak measurement was retained in the report for reference, however the numbering for the affected row was removed and an arrow or carrot ("^") was placed in the far left-hand column indicating that the row above takes precedence for comparison to the limit. The following paragraphs describe in more detail the detector functions and when they were used to obtain the emissions data.

#### **Peak**

In this mode, the spectrum analyzer or receiver recorded all emissions at their peak value as the frequency band selected was scanned. By combining this function with another feature called "peak hold," the measurement device had the ability to measure intermittent or low duty cycle transient emission peak levels. In this mode the measuring device made a slow scan across the frequency band selected and measured the peak emission value found at each frequency across the band.

#### **Quasi-Peak**

Quasi-peak measurements were taken using the quasi-peak detector when the true peak values exceeded or were within 2 dB of a quasi-peak specification limit. Additional QP measurements may have been taken at the discretion of the operator.

#### **Average**

Average measurements were taken using the average detector when the true peak values exceeded or were within 2 dB of an average specification limit. Additional average measurements may have been taken at the discretion of the operator. If the specification or test procedure requires trace averaging, then the averaging was performed using 100 samples or as required by the specification. All other average measurements are performed using video bandwidth averaging. To make these measurements, the test engineer reduces the video bandwidth on the measuring device until the modulation of the signal is filtered out. At this point the measuring device is set into the linear mode and the scan time is reduced.