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# Report On

FCC Testing of the Motorola Solutions LXN 500 LTE Band 14 Base Station In accordance with FCC CFR 47 Part 2 and FCC CFR 47 Part 90

COMMERCIAL-IN-CONFIDENCE

FCC ID: AZ492FT7102

PREPARED BY

**APPROVED BY** 

**DATED** 

Simon Bennett Senior Engineer Matthew Russell Authorised Signatory 29 November 2017

Document 75939219 Report 01 Issue 6

November 2017



# **CONTENTS**

Section		Page No
1	REPORT INFORMATION	2
1.1	Report Details	3
1.2	Brief Summary of Results	
1.3	Configuration Description	5
1.4	Application Form	
1.5	Product Information	
1.6	Test Setup	
1.7	Test Conditions	
1.8	Deviation From The Standard	
1.9	Modification Record	
1.10 1.11	Test Location	
1.11		
2	TEST DETAILS	13
2.1	Maximum Peak Output Power and Peak to Average Ratio - Conducted	14
2.2	Occupied Bandwidth	31
2.3	Band Edge	
2.4	Transmitter Conducted Spurious Emissions	
2.5	Frequency Stability	151
2.6	Modulation Characteristics	
2.7	Transmitter Radiated Spurious Emissions	155
3	TEST EQUIPMENT USED	171
3.1	Test Equipment Used	172
3.2	Measurement Uncertainty	
4	ACCREDITATION, DISCLAIMERS AND COPYRIGHT	175
4.1	Accreditation, Disclaimers and Copyright	176



# **SECTION 1**

# REPORT INFORMATION



#### 1.1 REPORT DETAILS

Manufacturer Motorola Solutions Israel Ltd.

Address 2 Hanegev St.

Airport City

Israel 70199

Product Name LXN 500

Product Number SQM01SUM0309A

FCC ID AZ492FT7102

Serial Number(s) 569REG0001

Software Version 1.0.0

Hardware Version 1.0.0

Test Specification/Issue/Date FCC CFR 47 Part 2: 2016

FCC CFR 47 Part 90: 2016

Start of Test 28 June 2017

Finish of Test 11 July 2017

Name of Engineer(s) Mohamed Toubella

Simon Bennett Graeme Lawler

Related Document(s) KDB 971168 D01 v02r02

KDB 662911 D01 v02r01

#### **ENGINEERING STATEMENT**

The measurements shown in this report were made in accordance with the procedures described on test pages. All reported testing was carried out on a sample equipment to demonstrate limited compliance with FCC 47 CFR Part 2 and FCC 47 CFR Part 90. The sample tested was found to comply with the requirements defined in the applied rules.

Mohamed Toubella Simon Bennett Graeme Lawler

This report has been up-issued, to Issue 6 to remove references to Backpack operation.



# 1.2 BRIEF SUMMARY OF RESULTS

A brief summary of results for each configuration, in accordance with FCC CFR 47 Part 2 and FCC CFR 47 Part 90 is shown below.

	Specificat	tion Clause	Test Description	Result
Section	FCC CFR 47 Part 2	FCC CFR 47 Part 90		
2.1	2.1046	90.542	Maximum Peak Output Power and Peak to Average Ratio - Conducted	Pass
2.2	2.1049	1	Occupied Bandwidth	Pass
2.3	2.1051	90.543(e)	Band Edge	Pass
2.4	2.1051	90.543(e)(f)	Transmitter Conducted Spurious Emissions	Pass
2.5	2.1055	90.539(d)	Frequency Stability	Pass
2.6	2.1047	-	Modulation Characteristics	Pass
2.7	2.1051	90.543(e)(f)	Transmitter Radiated Spurious Emissions	Pass



#### 1.3 CONFIGURATION DESCRIPTION

The settings below were deemed representative for all traffic scenarios when settings with different modulations, channel bandwidths, number of carriers and RF configurations has been tested to find the worst case setting. The settings below were used for all measurements if not otherwise noted:

LTE:

MIMO mode single carrier: E-TM1.1, E-TM3.2, E-TM3.1

MIMO mode multi carrier (x2): E-TM1.1

The complete testing was performed with the EUT transmiting at maximum RF power unless otherwise stated.

The EUT consists of 2 antenna ports. All measurements were performed on both Antenna ports, (A & B).

Pre-test results were used to establish the worst-case configuration of the EUT for Frequency Stability. It was established that QPSK – 10 MHz was the worst case for Frequency Stability measurements. As the EUT can be powered by a DC supply, measurements were also conducted at voltage extremes at 20 °C.

The LXN 500 supports LTE Band 14 - 758 - 768 MHz, (downlink) and 788 - 798 MHz, (uplink), frequency bands.

Test Models as defined in 3GPP TS 25.141 and TS 36.141 were used to represent the required modulation for test.

The EUT was powered by an external 120 V AC 60 Hz Supply which provided power to the EUT.

# **Channel Configurations**

# LTE B14 (758 MHz - 768 MHz)

Configuration	RAT	No. of	Carrier Bandwidth	Carrier	Frequency Configuration	ı (MHz)
Configuration	KAI	Carriers	(MHz)	Bottom (BRFBW)	Middle (MRFBW)	Top (TRFBW)
1	LTE	1	5	760.5	763	765.5
1	LTE	1	10	-	763	-



# 1.4 APPLICATION FORM

	E	QUIPMENT DESCRIPTION
Model Name/Number	LXN 500 B	314
Part Number	SQM01SU	JM0309A
Hardware Version	1.0.0	
Software Version	1.0.0	
FCC ID (if applicable)		AZ492FT7102
Industry Canada ID (if applicable)		
Technical Description (Please provide description of the intended use of the equ		The LXN 500 is an Ultra Deployable LTE System designed for on-demand coverage and public safety applications.
		The solution consists of a single portable unit that can be operated from a vehicle.

			INTE	ENTIONAL RADIA	TORS				
Technology	Frequency Band	Conducted Declared Output	Antenna Gain	Supported Bandwidth (s)	Modulation	ITU Emission	Test	Channels (	MHz)
rearmology	(MHz)	Power (dBm)	(dBi)	(MHz)	Scheme(s)	Designator	Bottom	Middle	Тор
LTE	758-768	30	6	5,10	64QAM	10M0G7D	760.5	763	765.5
Wi-Fi	2400-2500	tbc	10	5,20	OFDM	17M9GXW	2412	2442	2484

UN-INTENTION	AL RADIATOR
Highest frequency generated or used in the device or on which the device operates or tunes	2484 MHz

		Power Sourc	е	
4.0	Single Phase	Three F	Phase	Nominal Voltage
AC	Yes			110/240
External DC	Nominal Voltage			Maximum Current
External DC	9-33VDC			5A
Dattami	Nominal Voltage		Batte	ery Operating End Point Voltage
Battery	12-16.8v			
Can EUT transmi	t whilst being charged?		Yes ⊠ No □	

			EXTREME CONDITIONS			
Maximum temperature	60	°C	Minimum temperature	-20	°C	



Product Service

			Ancilla	aries		
Plea	se list all ancillaries which will be	e used wi	th the device.			
NP1	2/NP24 NAV PAC (UPS)					
2 x l	JSB flash drives and associated o	ables				
			ANTENNA CHAF	RACTERISTICS		
$\boxtimes$	Antenna connector			State impedance	50	Ohm
	Temporary antenna connector			State impedance		Ohm
	Integral antenna	Type				
M	External antenna	Tyne	VI 069273			

I hereby declare that the information supplied is correct and complete.

Darragh McShane Project Manager Position held: 07/06/2017 Date:



#### 1.5 PRODUCT INFORMATION

# 1.5.1 Technical Description

The Equipment Under Test (EUT) –is a Motorola LTE Portable Infrastructure working in the public mobile service Band 14 which provides communication connections to Band 14 network. The EUT can operate from a 120 V 60 Hz AC, 12 or 24 V DC supply.

The Equipment Under Test (EUT) is shown in the photograph below. A full technical description can be found in the Manufacturer's documentation.



**Front View** 



Rear View



# 1.5.2 Antenna and ancillaries for use with the LXN 500

Vehicle 4 port antenna and cables:

AN000226A01	Laird Combo antenna VLQ69273 (4 ports)
CB000613A01	Laird Combo LTE antenna VLQ69273 (4 ports) cable
CB000548A01	Laird Combo WiFi antenna VLQ69273 (4 ports) cable
CB000133A01	Laird Combo GPS antenna VLQ69273 (4 ports) cable

# Vehicle 3 port antenna and cables:

AN000036A01	Laird combo antenna (3 ports) - Base
85013016001	Laird combo antenna (3 ports) - Whip
CB000613A01	Laird combo antenna (3 ports) LTE cable
CB000133A01	Laird combo antenna (3 ports) GPS cable
CB000548A01	Laird combo antenna (3 ports) WiFi cable

# Vehicle power cable

CB000540A01 Vehicle power cable
---------------------------------

#### 1.5.3 Details of antennas for use with LXN 500

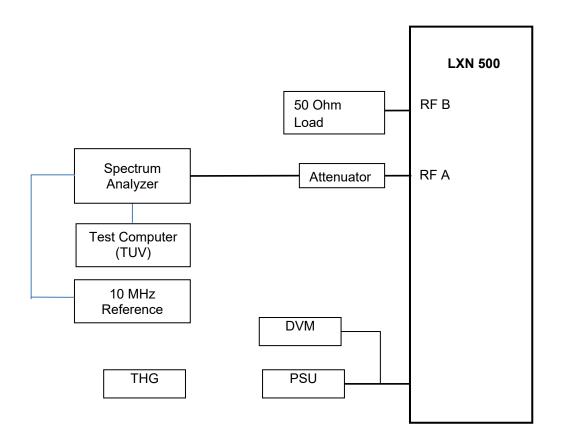
APP	Туре	LTE Freq (MHz)	Elec. length	Max Gain	ст	MOTOTOROLA p.n
Vehicle	3 port	LTE: 746 MHz -894MHz WiFi: 2400 MHz-2483 MHz	1/2 wave 1/4 wave	LTE:5 dBi Wifi:7 dBi	LTE mechanical length: 33cm WiFi radiated element : 60x50mm	AN000036A01+ 85013016001(Whip)
Vehicle/ In Building	4 port	LTE: 698-960 MHz , WiFi:2300-2700 MHz	1/4 wave 1/4 wave		LTE radiated element : 60x50mm WiFi radiated element : 25x45mm	AN000226A01*

<sup>\*</sup>Antenna used during testing



# 1.6 TEST SETUP

# **Conducted Testing Setup**





#### 1.7 TEST CONDITIONS

For all tests the EUT was set up in accordance with the relevant test standard and to represent typical operating conditions. Tests were applied with the EUT situated in a shielded enclosure, test laboratories or a chamber as appropriate.

The EUT was powered from a 120 V 60 Hz AC supply.

FCC Accreditation 90987 Octagon House, Fareham Test Laboratory

Designation Number: UK0010

#### 1.8 DEVIATION FROM THE STANDARD

No deviations from the applicable test standards or test plan were made during testing.

#### 1.9 MODIFICATION RECORD

All tests were performed in Modification State 0 – as supplied except for tests at -20 °C.

Modification State 1 – modifications to PA matching circuit to improve device linearity

## 1.10 TEST LOCATION

TÜV SÜD Product Service conducted the following tests at our Fareham Test Laboratory.

Test Name	Name of Engineer(s)
Maximum Peak Output Power and Peak to Average Ratio - Conducted	M Toubella
Occupied Bandwidth	M Toubella
Band Edge	M Toubella S Bennett
Transmitter Spurious Emissions	M Toubella S Bennett
Frequency Stability	M Toubella S Bennett
Modulation Characteristics	S Bennett

Office Address:

Octagon House Concorde Way Segensworth North Fareham Hampshire PO15 5RL United Kingdom



# 1.11 ADDITIONAL INFORMATION

Testing performed in the presence of Pat O'Halloran



**SECTION 2** 

**TEST DETAILS** 



#### 2.1 MAXIMUM PEAK OUTPUT POWER AND PEAK TO AVERAGE RATIO - CONDUCTED

#### 2.1.1 Specification Reference

FCC CFR 47 Part 2, Clause 2.1046 FCC CFR 47 Part 90, Clause 90.542(a)(3)(6)

#### 2.1.2 Date of Test and Modification State

29 June 2017 - Modification State 0

#### 2.1.3 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

#### 2.1.4 Environmental Conditions

Ambient Temperature 22.5°C Relative Humidity 55.2%

#### 2.1.5 Test Method

All measurements were made in accordance with FCC KDB 971168 D01 Clause 5.2.1 and 5.7.1 and summed in accordance with FCC KDB 662911 D01.

Measurements were performed with a Spectrum Analyser using the Band Power measurement function. The detector was set to RMS with an RBW of 300 kHz and VBW of 1 MHz. The detection bandwidth was configured to be wider than the total bandwidth of the carrier or combinations of carriers, (multi-carrier). Using a sweep time of 5 seconds, the average measurement was recorded.



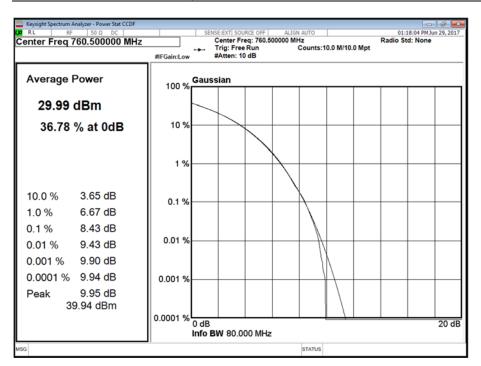
#### 2.1.6 Test Results

Configuration 1

Maximum Output Power 30 dBm

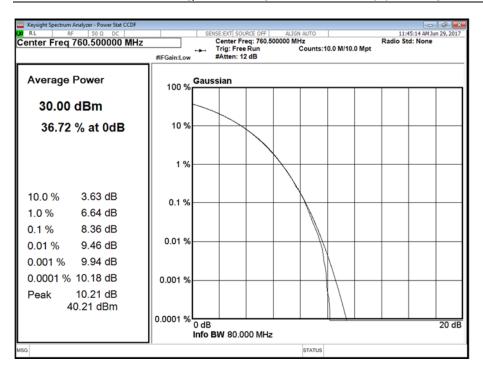
	LTE Modulation	LTE Carrier Bandwidth	Peak to Average Ratio (PAR) / Output Power			
A			Channel Position B			
Antenna			PAR (dB)	Average Power		
				dBm	dBm/MHz	
Α	QPSK	5.0 MHz	8.43	29.96	24.16	
В	B QPSK 5		8.36	29.97	24.05	
	Total		-	32.98	27.12	
Α	16QAM	5.0 MHz	8.38	29.86	24.22	
В	B 16QAM		8.37	29.86	24.14	
	Total		-	32.87	27.19	
А	64QAM	5.0 MHz	8.32 29.85		23.93	
В	B 64QAM 5.0 MHz		8.38	29.85	23.93	
	Total		-	32.86	26.94	

Antenna A - LTE Modulation QPSK - LTE Carrier Bandwidth 5.0 MHz - Channel Position B

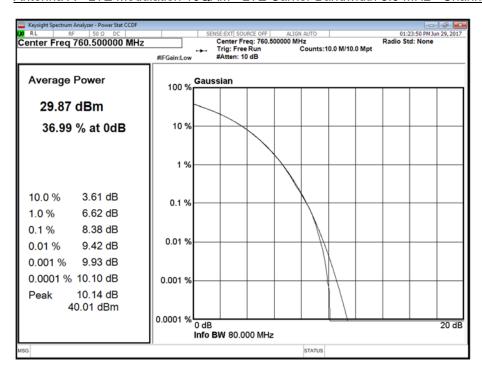




Antenna B - LTE Modulation QPSK - LTE Carrier Bandwidth 5.0 MHz - Channel Position B



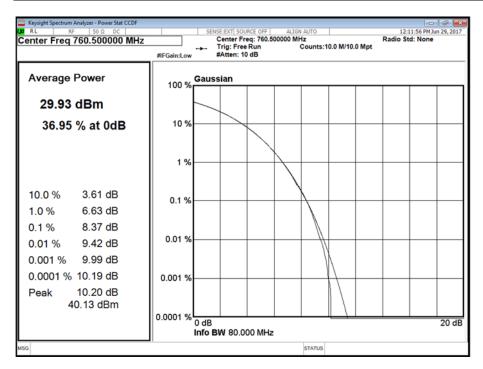
Antenna A - LTE Modulation 16QAM - LTE Carrier Bandwidth 5.0 MHz - Channel Position B



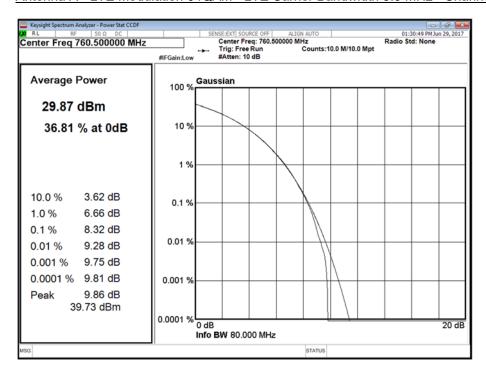


**Product Service** 

Antenna B - LTE Modulation 16QAM - LTE Carrier Bandwidth 5.0 MHz - Channel Position B



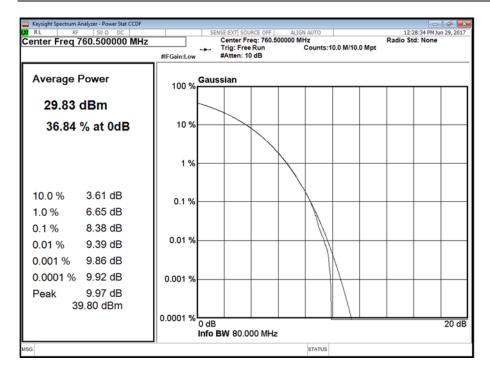
Antenna A - LTE Modulation 64QAM - LTE Carrier Bandwidth 5.0 MHz - Channel Position B





#### Product Service

# Antenna B - LTE Modulation 64QAM - LTE Carrier Bandwidth 5.0 MHz - Channel Position B



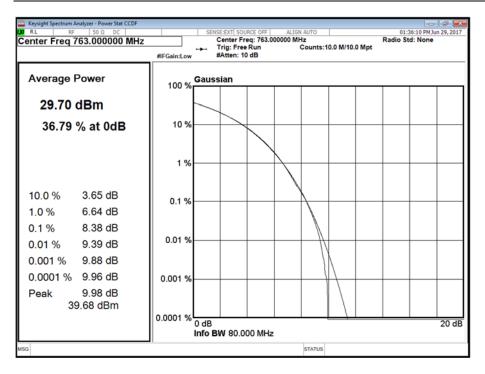


# Configuration 1

#### Maximum Output Power 30 dBm

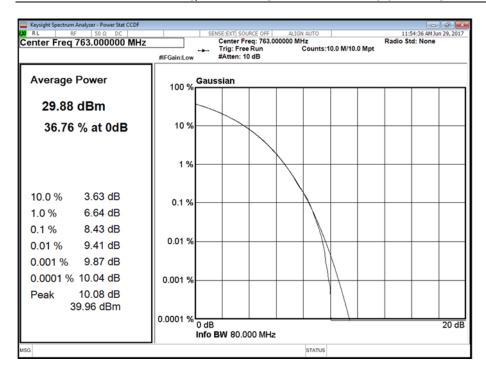
		LTE Carrier Bandwidth	Peak to Average Ratio (PAR) / Output Power				
A t	LTC Madulation		Channel Position M				
Antenna	LTE Modulation		PAR (dB)	Average Power			
				dBm	dBm/MHz		
Α	QPSK	5.0 MHz	8.38	29.71	23.76		
В	QPSK	5.0 MHz	8.43	29.82	23.96		
	Total			32.78	26.87		
Α	16QAM	5.0 MHz	8.36	29.74	23.93		
В	16QAM	5.0 MHz	8.44	8.44 29.65			
	Total			32.71	27.06		
Α	64QAM	5.0 MHz	8.27	8.27 29.64			
В	64QAM	5.0 MHz	8.34	29.64	23.82		
Total			-	32.65	26.79		
А	A QPSK		8.35	29.44	20.86		
В	B QPSK		8.40	30.16	21.66		
Total			-	32.83	24.29		
Α	A 16QAM		8.29	29.37	20.85		
В	B 16QAM		8.32 30.01		21.59		
Total			-	32.71	24.25		
А	64QAM 10.0 MHz		8.40	29.38	20.72		
В	64QAM	10.0 MHz	8.36	30.01	21.34		
	Total		-	32.72	24.05		

Antenna A - LTE Modulation QPSK - LTE Carrier Bandwidth 5.0 MHz - Channel Position M

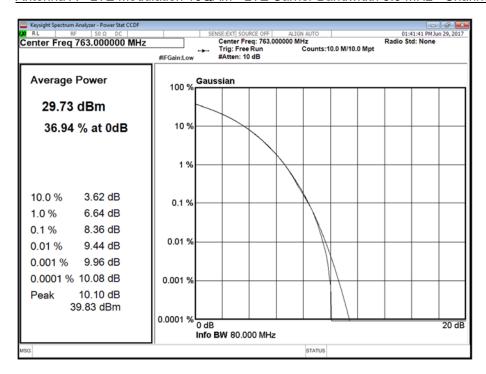




Antenna B - LTE Modulation QPSK - LTE Carrier Bandwidth 5.0 MHz - Channel Position M

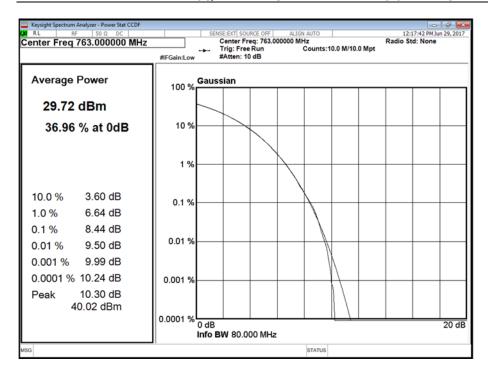


Antenna A - LTE Modulation 16QAM - LTE Carrier Bandwidth 5.0 MHz - Channel Position M

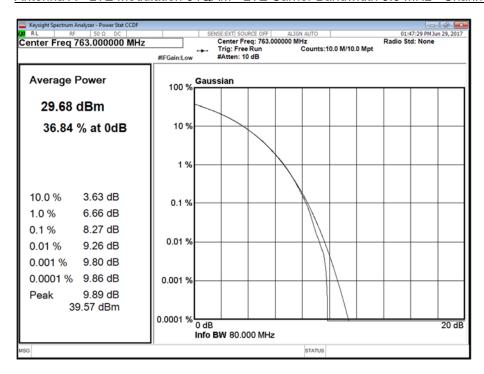




Antenna B - LTE Modulation 16QAM - LTE Carrier Bandwidth 5.0 MHz - Channel Position M

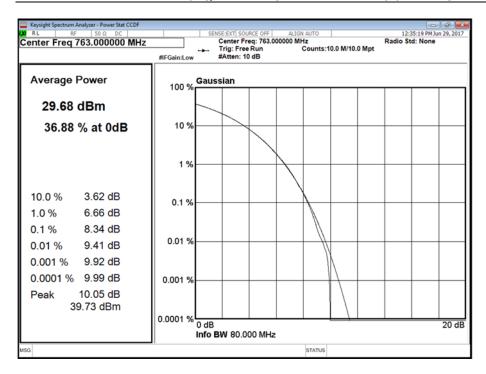


Antenna A - LTE Modulation 64QAM - LTE Carrier Bandwidth 5.0 MHz - Channel Position M

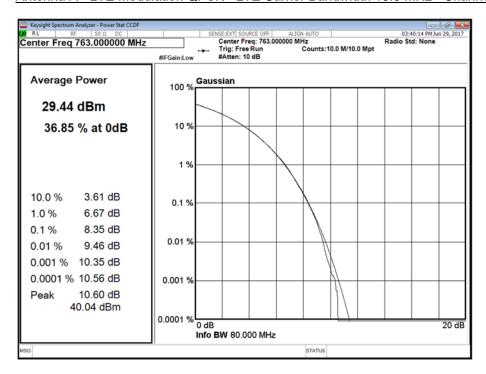




Antenna B - LTE Modulation 64QAM - LTE Carrier Bandwidth 5.0 MHz - Channel Position M



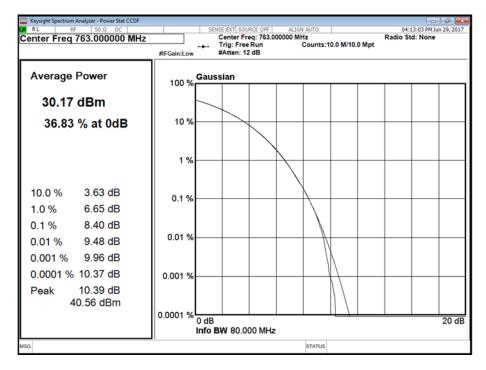
Antenna A - LTE Modulation QPSK - LTE Carrier Bandwidth 10.0 MHz - Channel Position M



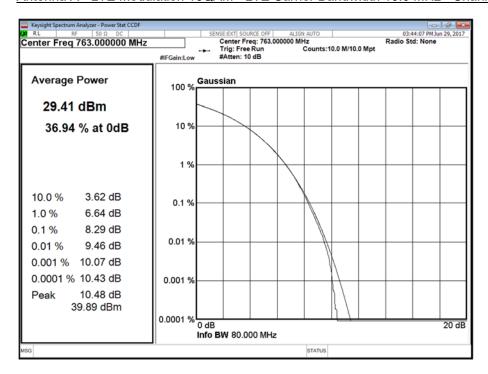


Product Service

Antenna B - LTE Modulation QPSK - LTE Carrier Bandwidth 10.0 MHz - Channel Position M

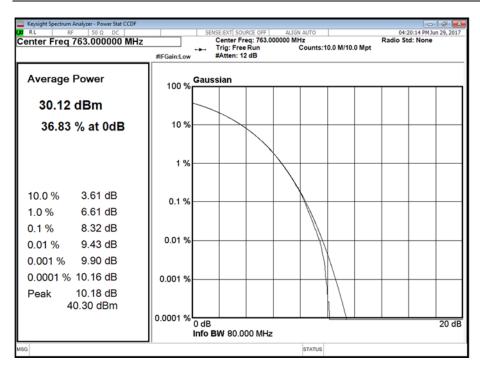


Antenna A - LTE Modulation 16QAM - LTE Carrier Bandwidth 10.0 MHz - Channel Position M

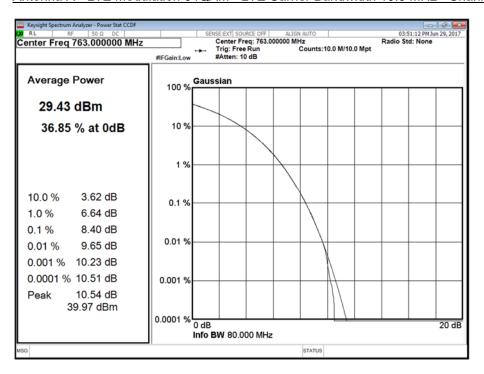




Antenna B - LTE Modulation 16QAM - LTE Carrier Bandwidth 10.0 MHz - Channel Position M



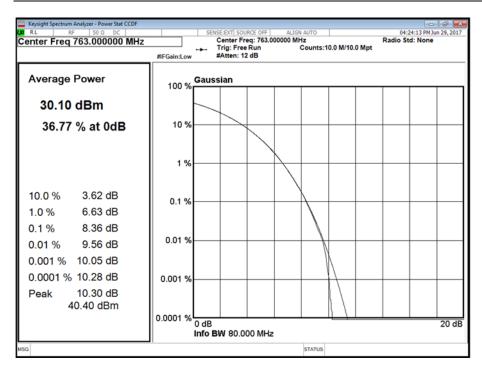
Antenna A - LTE Modulation 64QAM - LTE Carrier Bandwidth 10.0 MHz - Channel Position M





#### Product Service

# Antenna B - LTE Modulation 64QAM - LTE Carrier Bandwidth 10.0 MHz - Channel Position M



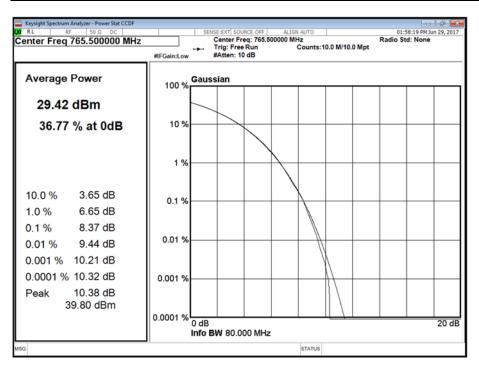


# Configuration 1

#### Maximum Output Power 30 dBm

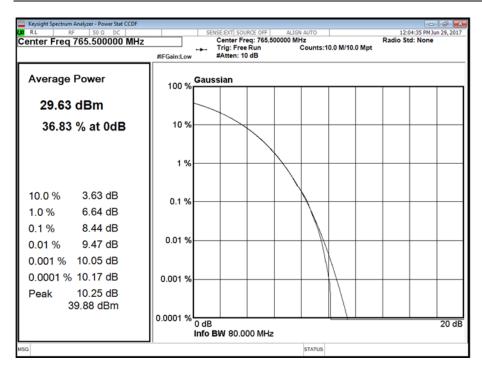
	LTE Modulation	LTE Carrier Bandwidth	Peak to Average Ratio (PAR) / Output Power				
Antonna			Channel Position T				
Antenna			PAR (dB)	Average Power			
				dBm	dBm/MHz		
Α	QPSK	5.0 MHz	8.37	29.49	23.53		
В	B QPSK 5.0 MHz		8.44	29.54	23.65		
	Total		-	32.53	26.60		
Α	16QAM	5.0 MHz	8.33	29.57	23.79		
В	B 16QAM		8.39	29.53	23.67		
	Total		-	32.56	26.74		
Α	64QAM	5.0 MHz	8.28 29.37		23.52		
В	B 64QAM 5.0 MHz		8.35	29.53	23.60		
	Total		-	32.46	26.57		

#### Antenna A - LTE Modulation QPSK - LTE Carrier Bandwidth 5.0 MHz - Channel Position T

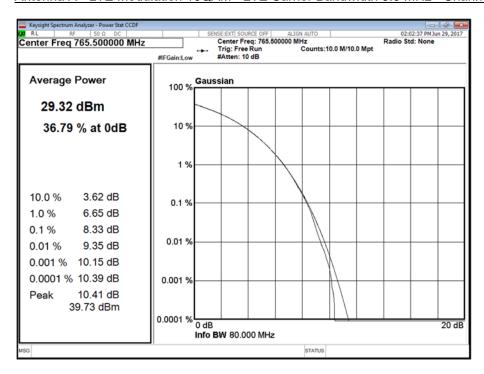




Antenna B - LTE Modulation QPSK - LTE Carrier Bandwidth 5.0 MHz - Channel Position T



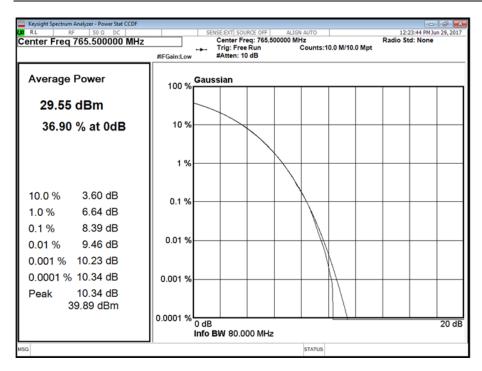
Antenna A - LTE Modulation 16QAM - LTE Carrier Bandwidth 5.0 MHz - Channel Position T





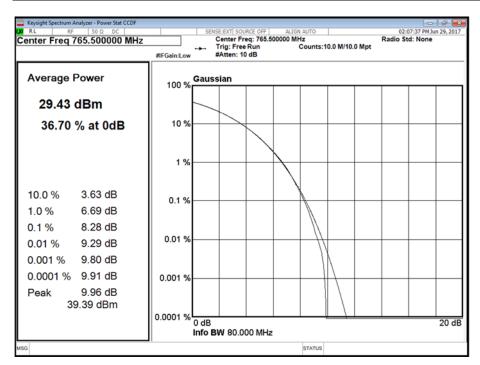
#### Product Service

# Antenna B - LTE Modulation 16QAM - LTE Carrier Bandwidth 5.0 MHz - Channel Position T

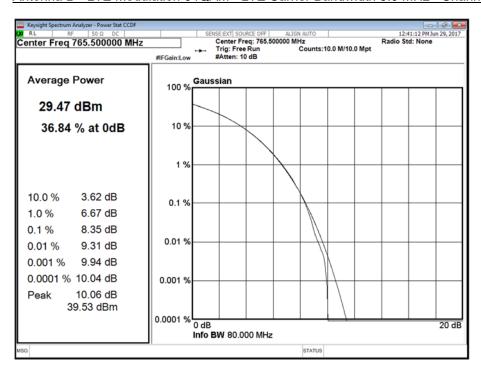




#### Antenna A - LTE Modulation 64QAM - LTE Carrier Bandwidth 5.0 MHz - Channel Position T



Antenna B - LTE Modulation 64QAM - LTE Carrier Bandwidth 5.0 MHz - Channel Position T





Limit					
Peak Power	≤65 W/MHz or ≤+48.13 dBm/MHz (FCC Part 90.542(3))* ≤30 W or ≤+44.77 dBm (FCC Part 90.542(6))				
Peak to Average Ratio	Not specified				
*Note: Limit is based on worst case Antenna height from Table 3.					



#### 2.2 OCCUPIED BANDWIDTH

#### 2.2.1 Specification Reference

FCC CFR 47 Part 2, Clause 2.1049

#### 2.2.2 Date of Test and Modification State

29 June 2017 - Modification State 0

#### 2.2.3 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

#### 2.2.4 Environmental Conditions

Ambient Temperature 22.5°C Relative Humidity 55.2%

#### 2.2.5 Test Method

All measurements were made in accordance with FCC KDB 971168 D01 Clause 4.2.

The Spectrum Analyser RBW was configured to be at least 1% of the channel bandwidth of the carrier to be measured. For 26 dB Bandwidth and 99% Occupied Bandwidth, in accordance with KDB 971168 D01, a peak detector and a trace setting of Max Hold were used with the Spectrum Analyser measurement function.

# 2.2.6 Test Results

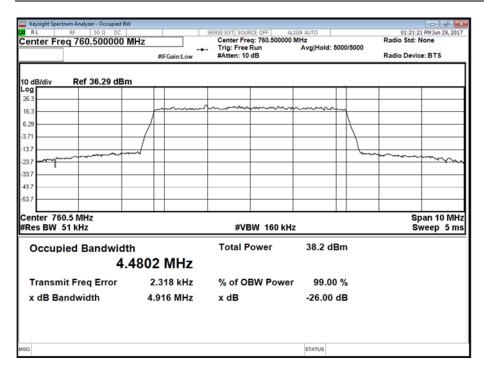
Configuration 1

Maximum Output Power 30 dBm

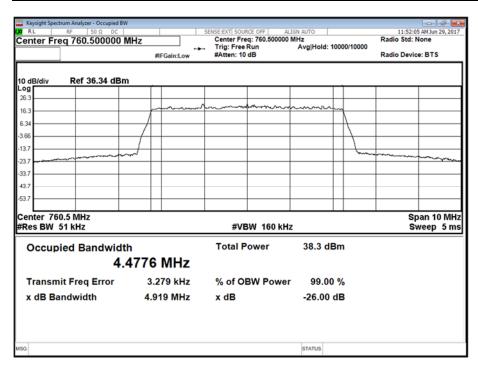
Antenna	LTE Modulation	LTE Carrier Bandwidth	Result (kHz)					
			Channel Position B		Channel Position M		Channel Position T	
			Occupied Bandwidth	-26 dB Bandwidth	Occupied Bandwidth	-26 dB Bandwidth	Occupied Bandwidth	-26 dB Bandwidth
Α	QPSK	5.0 MHz	4,480.22	4,916.32	4,481.69	4,920.42	4,480.11	4,922.22
В	QPSK	5.0 MHz	4,477.63	4,919.47	4,480.59	4,916.26	4,480.38	4,901.27
Α	16QAM	5.0 MHz	4,481.33	4,908.75	4,482.75	4,910.18	4,481.15	4,888.99
В	16QAM	5.0 MHz	4,480.19	4,899.29	4,482.31	4,909.08	4,482.19	4,912.07
Α	64QAM	5.0 MHz	4,501.23	4,953.54	4,502.48	4,946.50	4,498.96	4,953.12
В	64QAM	5.0 MHz	4,499.72	4,954.05	4,502.11	4,952.14	4,502.12	4,951.20
Α	QPSK	10.0 MHz	8,969.52	9,832.44	8,971.30	9,819.62	8,970.33	9,820.38
В	QPSK	10.0 MHz	8,963.13	9,790.92	8,968.23	9,847.66	8,968.63	9,832.79
Α	16QAM	10.0 MHz	8,970.85	9,801.32	8,974.19	9,799.30	8,972.78	9,802.65
В	16QAM	10.0 MHz	8,973.61	9,783.23	8,969.90	9,805.80	8,979.44	9,794.66
Α	64QAM	10.0 MHz	8,977.30	9,831.94	8,981.94	9,814.93	8,980.65	9,823.14
В	64QAM	10.0 MHz	8,980.83	9,842.72	8,978.73	9,847.83	8,979.64	9,836.73



# Antenna A - LTE Modulation QPSK - LTE Carrier Bandwidth 5.0 MHz - Channel Position B

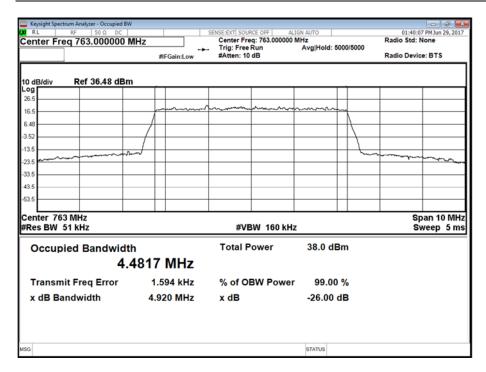


Antenna B - LTE Modulation QPSK - LTE Carrier Bandwidth 5.0 MHz - Channel Position B

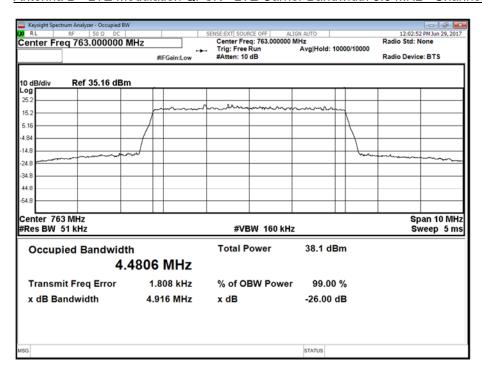




# Antenna A - LTE Modulation QPSK - LTE Carrier Bandwidth 5.0 MHz - Channel Position M

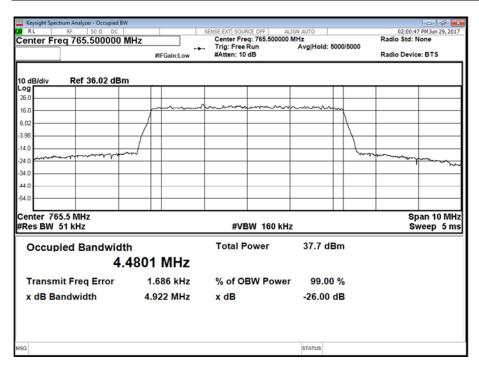


Antenna B - LTE Modulation QPSK - LTE Carrier Bandwidth 5.0 MHz - Channel Position M

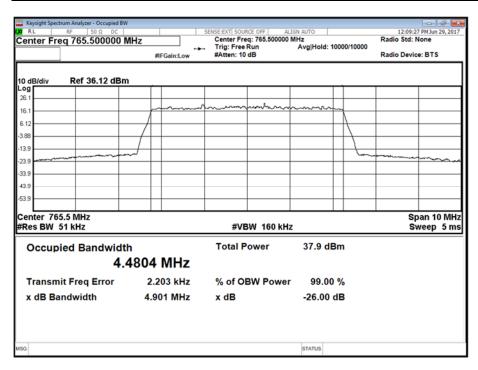




#### Antenna A - LTE Modulation QPSK - LTE Carrier Bandwidth 5.0 MHz - Channel Position T

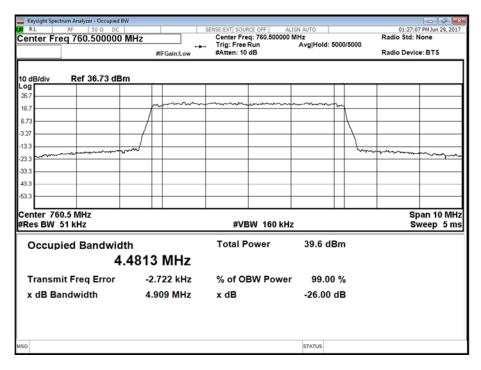


Antenna B - LTE Modulation QPSK - LTE Carrier Bandwidth 5.0 MHz - Channel Position T

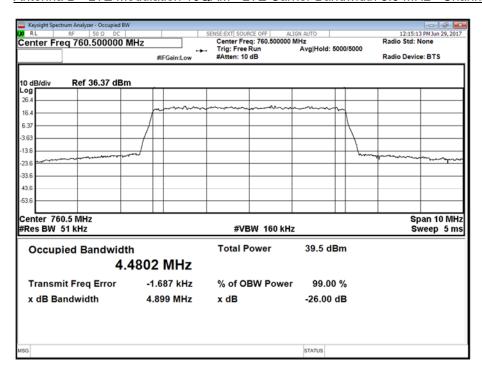




# Antenna A - LTE Modulation 16QAM - LTE Carrier Bandwidth 5.0 MHz - Channel Position B

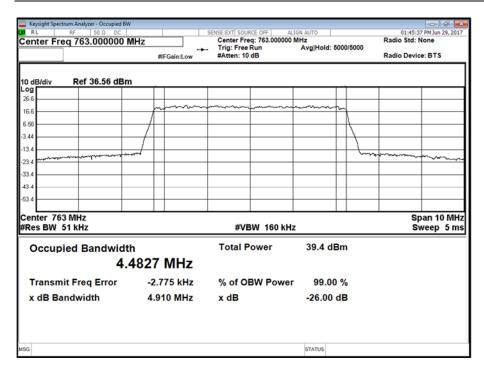


Antenna B - LTE Modulation 16QAM - LTE Carrier Bandwidth 5.0 MHz - Channel Position B

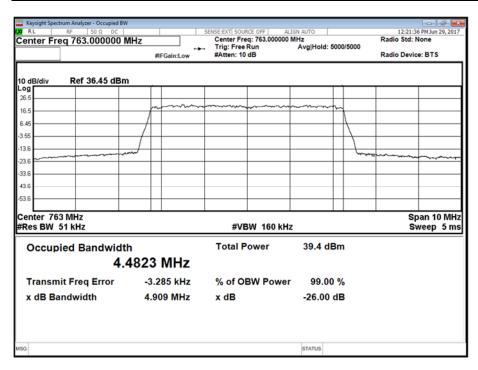




# Antenna A - LTE Modulation 16QAM - LTE Carrier Bandwidth 5.0 MHz - Channel Position M

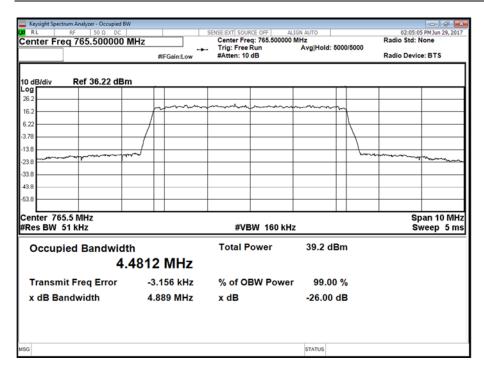


Antenna B - LTE Modulation 16QAM - LTE Carrier Bandwidth 5.0 MHz - Channel Position M

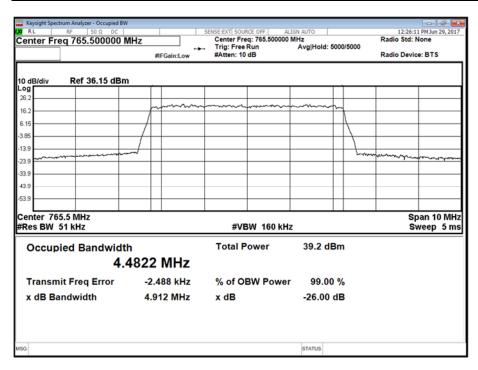




# Antenna A - LTE Modulation 16QAM - LTE Carrier Bandwidth 5.0 MHz - Channel Position T

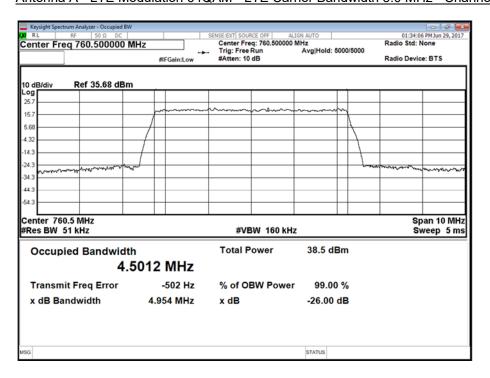


Antenna B - LTE Modulation 16QAM - LTE Carrier Bandwidth 5.0 MHz - Channel Position T

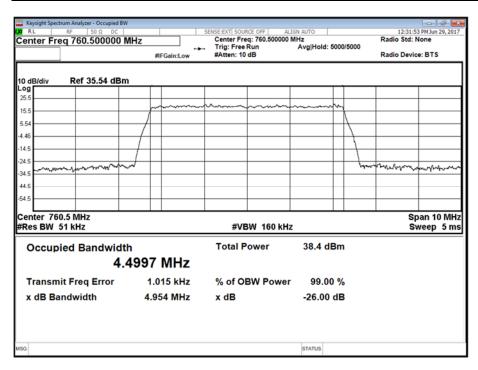




# Antenna A - LTE Modulation 64QAM - LTE Carrier Bandwidth 5.0 MHz - Channel Position B

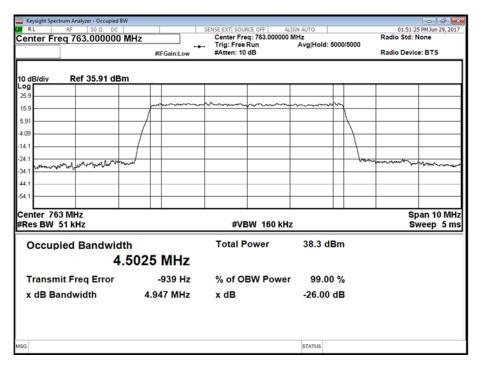


Antenna B - LTE Modulation 64QAM - LTE Carrier Bandwidth 5.0 MHz - Channel Position B

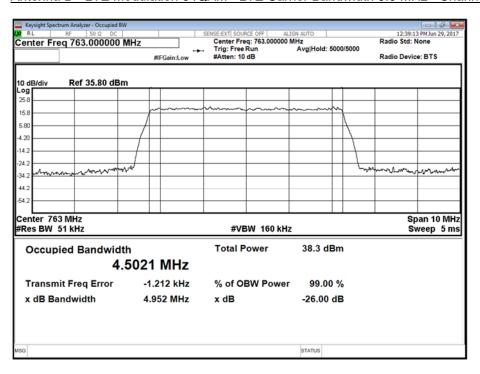




#### Antenna A - LTE Modulation 64QAM - LTE Carrier Bandwidth 5.0 MHz - Channel Position M

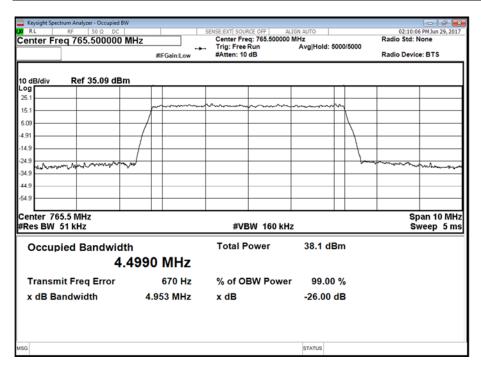


Antenna B - LTE Modulation 64QAM - LTE Carrier Bandwidth 5.0 MHz - Channel Position M

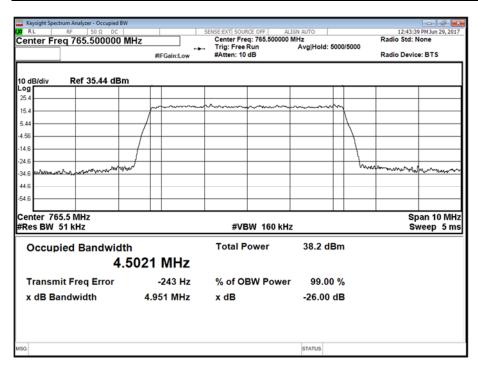




#### Antenna A - LTE Modulation 64QAM - LTE Carrier Bandwidth 5.0 MHz - Channel Position T

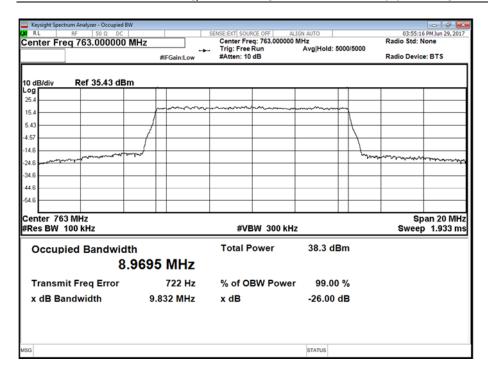


Antenna B - LTE Modulation 64QAM - LTE Carrier Bandwidth 5.0 MHz - Channel Position T

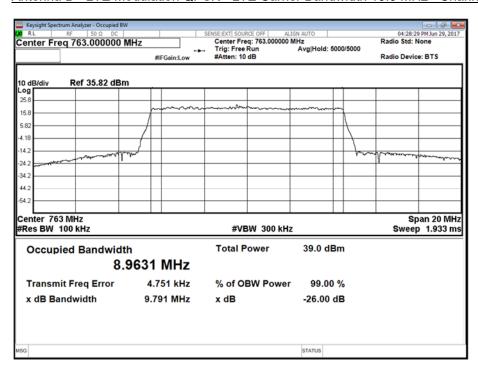




# Antenna A - LTE Modulation QPSK - LTE Carrier Bandwidth 10.0 MHz - Channel Position B

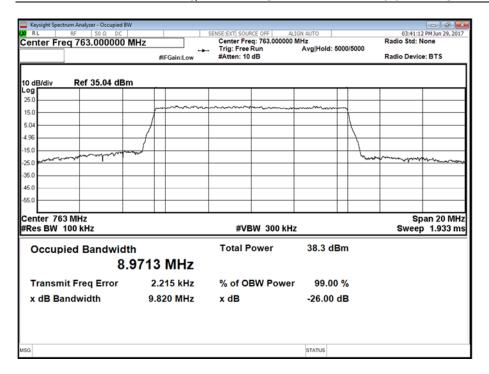


Antenna B - LTE Modulation QPSK - LTE Carrier Bandwidth 10.0 MHz - Channel Position B

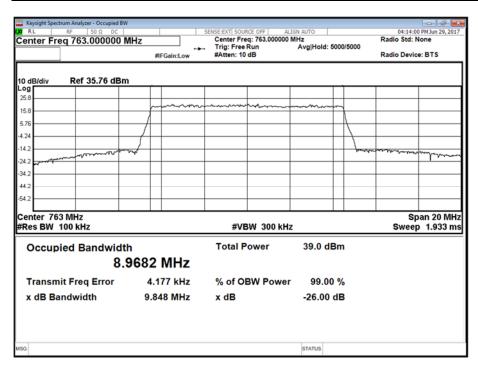




# Antenna A - LTE Modulation QPSK - LTE Carrier Bandwidth 10.0 MHz - Channel Position M

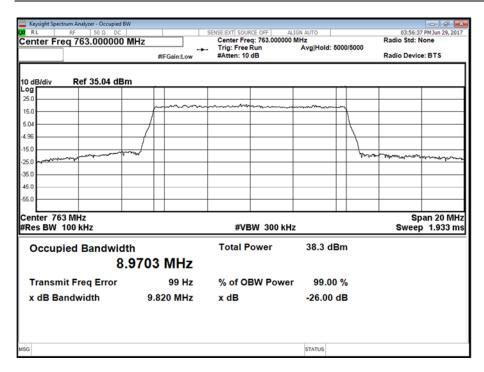


Antenna B - LTE Modulation QPSK - LTE Carrier Bandwidth 10.0 MHz - Channel Position M





# Antenna A - LTE Modulation QPSK - LTE Carrier Bandwidth 10.0 MHz - Channel Position T



Antenna B - LTE Modulation QPSK - LTE Carrier Bandwidth 10.0 MHz - Channel Position T

