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Report On

FCC Testing of the

Ericsson Remote Radio Unit LTE KRC 161 592/1 and KRC 161 592/2, Radio 2217 B26D (869-880 MHz), in a Base Station configuration in accordance with FCC CFR 47 Part 2 and FCC CFR 47 Part 22

COMMERCIAL-IN-CONFIDENCE

FCC ID: TA8AKRC161592

PREPARED BY

APPROVED BY

DATED

Maggie Whiting Key Account Manager Steve Scarfe Authorised Signatory 28 September 2017

Document 75939974 Report 01 Issue 1

September 2017



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SECTION 1

REPORT INFORMATION



1.1 REPORT DETAILS

The information contained in this report is intended to show verification of the Ericsson Radio 2217 B26D KRC 161 592/1 and KRC 161 592/2 to the requirements of FCC CFR 47 Part 22.

Testing was carried out in support of an application for Grant of Radio 2217 B26D KRC 161 592/1 and KRC 161 592/2 in LTE mode.

Manufacturer Ericsson AB

Address Isafjordsgatan 10

SE-164 80

Stockholm 16480

Sweden

Product Name Radio 2217 B26D

Product Number KRC 161 592/1

Serial Number(s) SD825975510

Software Version CXP 901 7316/2 R67GK

Hardware Version R1E

Non-Test Variant KRC 161 592/2

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

FCC CFR 47 Part 22: 2016

Start of Test 06 September 2017

Finish of Test 27 September 2017

Name of Engineer(s) Mohamed Toubella

Jack Tuckwell

Related Document(s) KDB 971168 D01 v02r02

KDB 662911 D01 v02r01



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 22 is shown below.

	Specification Clause			
Section	FCC CFR 47 Part 2	FCC CFR 47 Part 22	Test Description	Result
2.1	2.1046	22.913 (a)	Maximum Peak Output Power and Peak to Average Ratio - Conducted	Pass
-	-	22.913 (a)	Effective Radiated Power (ERP)	N/A ¹
2.2	2.1049	22.917 (b)	Occupied Bandwidth	Pass
2.3	2.1051	22.917	Band Edge	Pass
2.4	2.1053	22.917	Radiated Spurious Emissions	Pass
2.5	2.1051	22.917	Transmitter Spurious Emissions	Pass
2.6	2.1055	22.355	Frequency Stability	Pass
-	-	15.111	Receiver Spurious Emissions	N/A ²

 N/A^1 – Not Applicable, due to no Integral Antenna. N/A^2 – Not Applicable, as this is a transceiver.



1.3 CONFIGURATION DESCRIPTION

Test Configuration	Configuration Code	Carrier(s)	Configuration Description
Config A	L-MIMO-SC	1C	LTE MIMO, Single Carrier
Config B	L-MIMO-MC	2C	LTE MIMO, Multi Carrier x2
Config C	L-MIMO-MC1	3C	LTE MIMO, Multi Carrier x3

The Radio 2217 B26D KRC 161 592/1 and KRC 161 592/2 supports Test Models E-TM1.1, E-TM3.2 and E-TM3.1 at 800MHz defined in 3GPP TS 36.141. Test Model E-TM1.1 is used to represent QPSK modulation only, and Test Model E-TM3.2 is used to represent 16QAM modulation, and Test Model E-TM3.1 is used to represent 64QAM modulation. The product also supports ETM3.1a for 256QAM.

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

LTE:

MIMO mode single carrier: E-TM1.1 MIMO mode multi carrier (x2): E-TM1.1 MIMO mode multi carrier (x3): E-TM1.1

The Maximum Output Power was tested on both TX/RX output connector RF A and RF B, all other TX measurements were performed on the combined TX/RX output connector RF A of the EUT as the representative ports.

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



1.4 DECLARATION OF BUILD STATUS

Manufacturing Description	Remote Radio Unit				
Manufacturer	Ericsson AB				
Product Name	Radio 2217 B26D				
	KRC 161 592/1				
Product Number	KRC 161 592/2				
RU Name	Radio 2217 B26D				
RU Number	KRC 161 592/1				
	KRC 161 592/2				
DU Name	NA				
DU Number	NA				
Band Number	B26D				
RAT	LTE				
Number of carriers	Maximum 3 carriers per port				
Base station class	Wide Area				
Maximum rated output		for all m	nodes e	except maximum 43.0dBm (20W) per	
power(s)	carrier per port for LTE 1.4MHz			орг(, / р	
Duplex Mode	FDD				
Frequency Band	B26D (800MHz)				
Modulation type(s)	LTE: QPSK, 16QAM, 64QAM, 2560	MAQ			
Channel Bandwidth(s)	LTE: 1.4MHz. 3MHz. 5MHz. 10MHz		z		
Transmit diversity	Each transmitter path is declared to	, -			
Receive diversity	Each receiver path is declared to be equivalent				
MIMO	Each transmitter path is declared to				
	Each receiver path is declared to be				
ITU designation or class of	LTE: 1M40F9W, 3M00F9W, 5M00F			V 15M0F9W	
emission		011, 10		v, romor ovv	
Hardware Version	R1E				
Software Version	CXP 901 7316/2 R67GK				
FCC ID	TA8AKRC161592				
ISED Model Name	17 107 11 11 10 10 10 1				
Highest Internally	1030.1 MHz				
Generated Frequency	1000.1 WHILE				
Environment temperature	Minimum Maximum			mum	
range(s)	-40 °C +55 °C				
AC Power source	Voltage Range(s)				
7.0 1 Swel Source	Minimum VAC Nominal Maximum VAC			Maximum VAC	
	William VAO	VAC	iiui	Maximum VAO	
DC Power source	Yes			<u> </u>	
20. 300. 300.00	Voltage Range(s)				
	Minimum VDC	Nomi	nal	Maximum VDC	
		VDC		maximum vb0	
	-36.0	-48 V	/	-58.5 V	
Options	Type		Mode		
Орионо	1 1 3 PC		IVIOUC	1	

Signature	
Date	
D of B S Serial No	

No responsibility will be accepted by $T\ddot{U}V$ $S\ddot{U}D$ Product Service UK Limited as to the accuracy of the information declared in this document by the manufacturer.



1.5 PRODUCT INFORMATION

1.5.1 Technical Description

The Equipment Under Test (EUT) Radio 2217 B26D KRC 161 592/1 and KRC 161 592/2 is an Ericsson Remote Radio Unit working in the public mobile service 800MHz band which provides communication connections to 800MHz network. The Radio 2217 B26D KRC 161 592/1 and KRC 161 592/2 operates from a -48V DC supply.

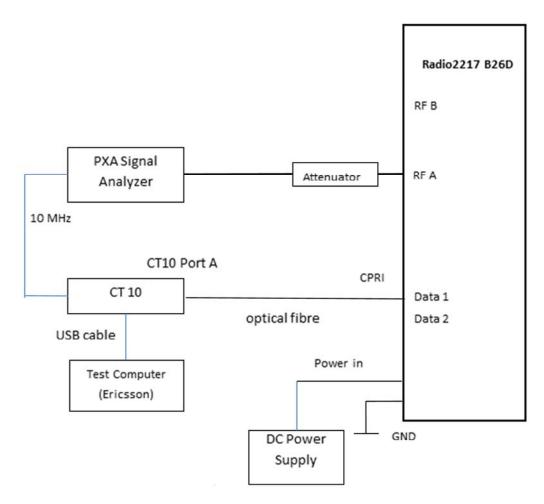
The Equipment Under Test (EUT) is shown in the photograph below. A full technical description can be found in the Manufacturer's documentation.



Equipment Under Test

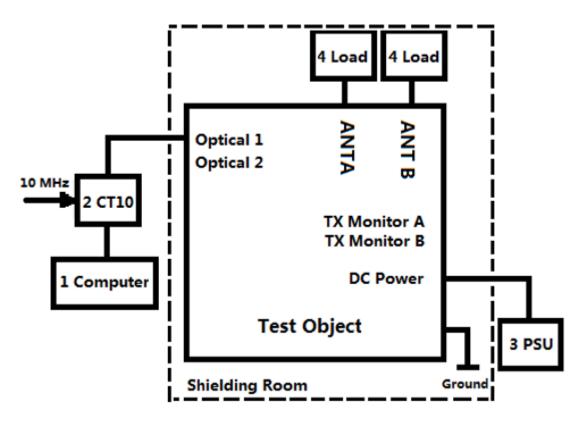


1.6 TEST SETUP



Block diagram of Radio 2217 B26D with cables and auxiliary equipment for Conducted measurements.





Block diagram of Radio 2217 B26D with cables and auxiliary equipment for Radiated measurements.



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 -48V DC supply.

FCC Measurement Facility Registration Number 90987 Octagon House, Fareham Test Laboratory

1.8 DEVIATION FROM THE STANDARD

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

1.9 MODIFICATION RECORD

No modifications were made to the EUT during testing.

1.10 ALTERNATIVE TEST SITE

Under our group UKAS Accreditation, TÜV SÜD Product Service conducted the following tests at Ericsson in Fareham, UK.

Test Name	Name of Engineer(s)
Maximum Peak Output Power and Peak to Average Ratio - Conducted	Mohamed Toubella
Occupied Bandwidth	Mohamed Toubella
Band Edge	Mohamed Toubella
Radiated Spurious Emissions	Jack Tuckwell
Transmitter Spurious Emissions	Mohamed Toubella
Frequency Stability	Mohamed Toubella
Receiver Spurious Emissions	Mohamed Toubella



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 22, Clause 22.913 (a)

2.1.2 Date of Test and Modification State

22 September 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 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 at least 1 % of the carrier bandwidth and a VBW of at least 3 times the RBW. The integration bandwidth was configured to be wider than the total bandwidth of the carrier or combinations of carriers, (multi-carrier). Using a sweep time of auto, measurements were performed over 200 samples, with the average measurement recorded.

Due to Average measurements being recorded, an additional Peak to Average measurement was made in all single carrier configurations. This was achieved using the CCDF function of the Spectrum Analyser with the RBW being set to a value wider than the largest signal being measured – in this case – 10 MHz.



2.1.6 Test Results

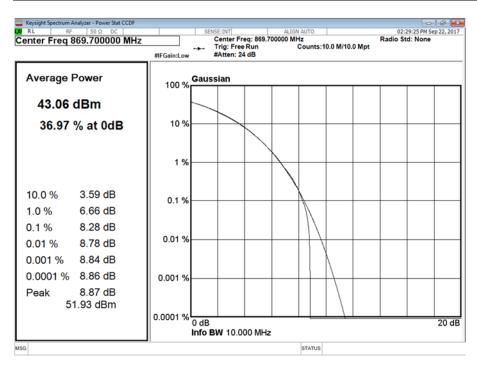
Configuration A

Maximum Output Power 46 dBm

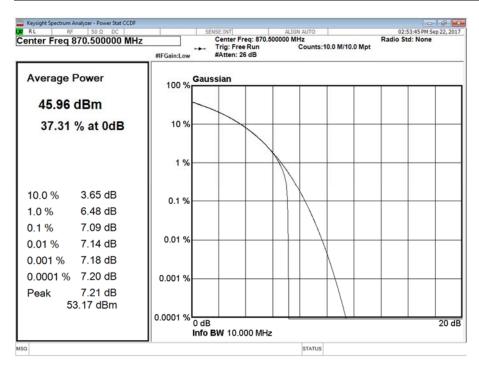
		LTE Carrier Bandwidth	Peak to Average Ratio (PAR) / Output Power			
			Channel Position B			
Antenna	LTE Modulation		PAR (dB)	Average Power		
				dBm	dBm/MHz	
Α	QPSK	1.4 MHz	8.28	43.07	42.63	
Α	QPSK	3.0 MHz	7.09	45.97	42.21	
Α	QPSK	5.0 MHz	7.08	45.97	40.00	
В	QPSK	5.0 MHz	7.10	46.00	39.99	
	Total		-	49.00	43.01	
Α	QPSK	10.0 MHz	7.14	45.99	37.38	



Antenna A - LTE Modulation QPSK - LTE Carrier Bandwidth 1.4 MHz - Channel Position B

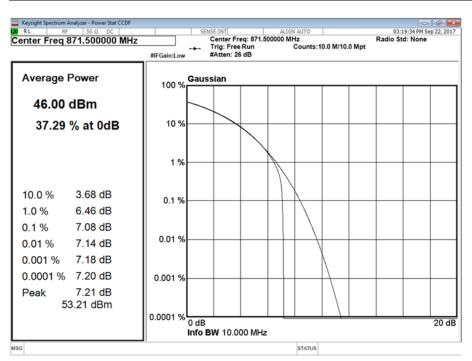


Antenna A - LTE Modulation QPSK - LTE Carrier Bandwidth 3.0 MHz - Channel Position B

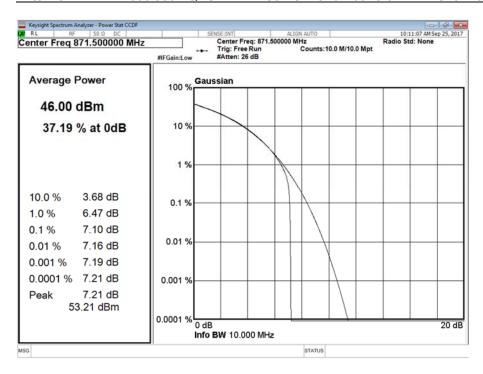




Antenna A - LTE Modulation QPSK - LTE Carrier Bandwidth 5.0 MHz - Channel Position B



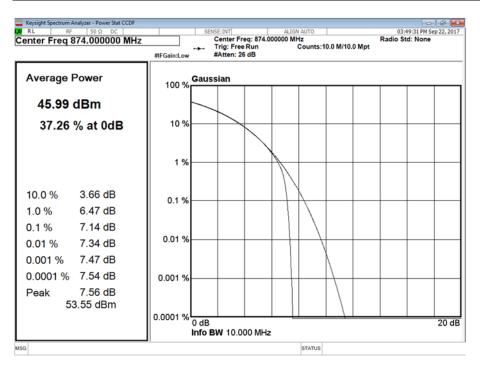
Antenna B - LTE Modulation QPSK - LTE Carrier Bandwidth 5.0 MHz - Channel Position B





Product Service

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

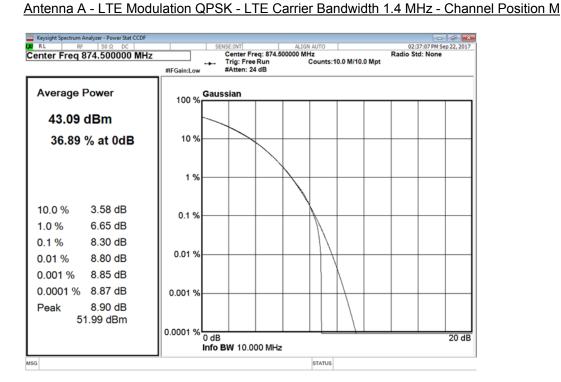


Configuration A

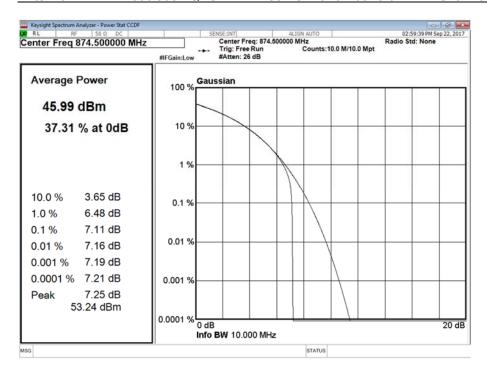
Maximum Output Power 46 dBm

			Peak to Ave	erage Ratio (PAR) /	Output Power
	1.TE M 1.1.0	LTE Carrier Bandwidth	Channel Position M		
Antenna	LTE Modulation		DVD (4D)	Averag	ge Power
			PAR (dB)	dBm	dBm/MHz
Α	QPSK	1.4 MHz	8.30	43.05	42.50
Α	QPSK	3.0 MHz	7.11	46.00	42.17
Α	QPSK	5.0 MHz	7.10	46.01	40.13
В	QPSK	5.0 MHz	7.13	45.99	40.00
	Total		-	49.01	43.08
Α	QPSK	10.0 MHz	7.17	46.04	37.25



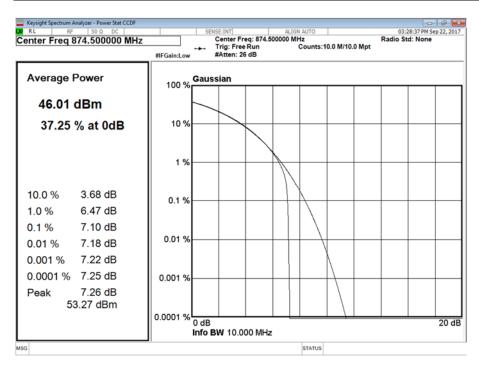


Antenna A - LTE Modulation QPSK - LTE Carrier Bandwidth 3.0 MHz - Channel Position M

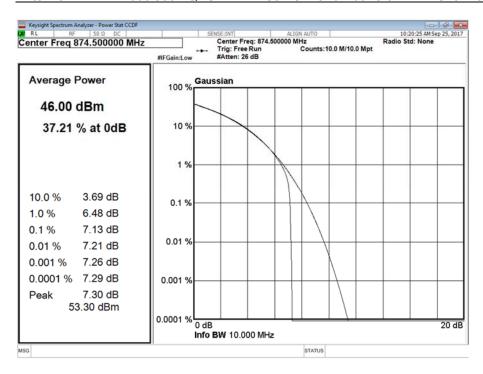




Antenna A - LTE Modulation QPSK - LTE Carrier Bandwidth 5.0 MHz - Channel Position M



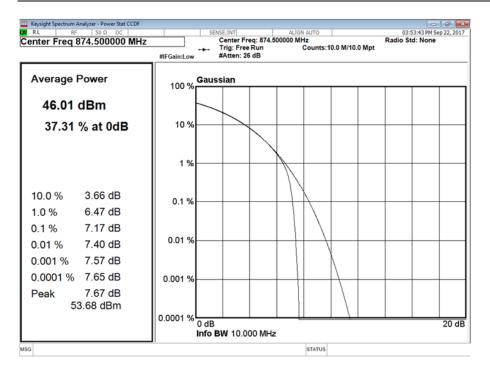
Antenna B - LTE Modulation QPSK - LTE Carrier Bandwidth 5.0 MHz - Channel Position M





Product Service

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



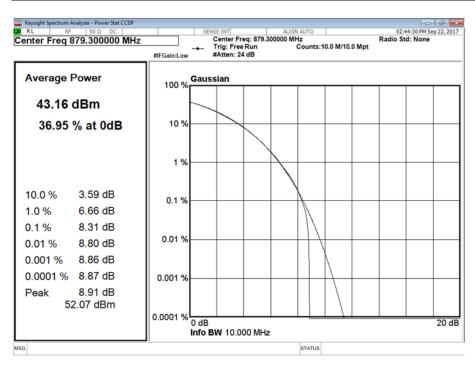
Configuration A

Maximum Output Power 46 dBm

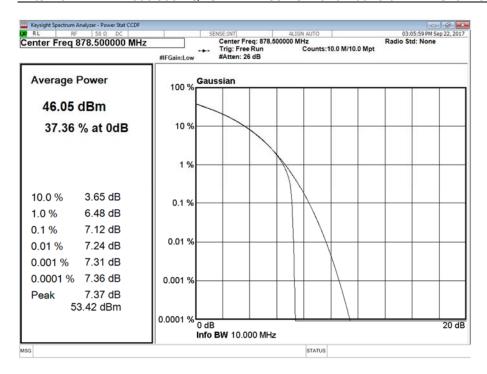
			Peak to Average Ratio (PAR) / Output Power		
		Bandwidth	Channel Position T		
Antenna	LTE Modulation		Averag	ge Power	
			PAR (dB)	dBm	dBm/MHz
Α	QPSK	1.4 MHz	8.31	43.15	42.59
Α	QPSK	3.0 MHz	7.12	46.06	42.20
Α	QPSK	5.0 MHz	7.15	46.03	40.01
В	QPSK	5.0 MHz	7.17	45.99	40.02
	Total		-	49.02	43.03
Α	QPSK	10.0 MHz	7.20	46.04	37.57



Antenna A - LTE Modulation QPSK - LTE Carrier Bandwidth 1.4 MHz - Channel Position T

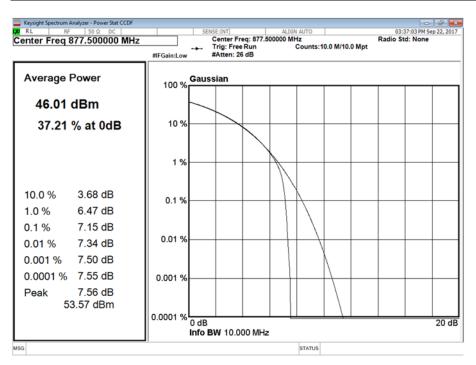


Antenna A - LTE Modulation QPSK - LTE Carrier Bandwidth 3.0 MHz - Channel Position T

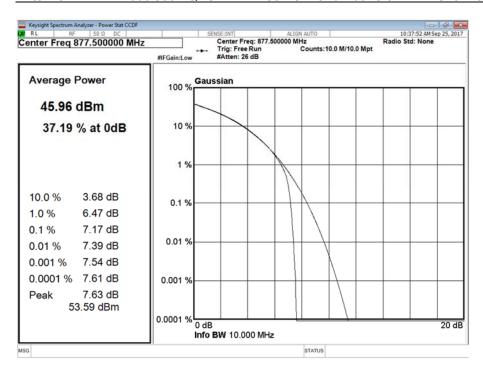




Antenna A - LTE Modulation QPSK - LTE Carrier Bandwidth 5.0 MHz - Channel Position T

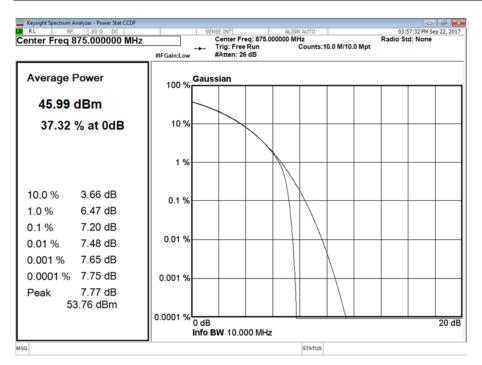


Antenna B - LTE Modulation QPSK - LTE Carrier Bandwidth 5.0 MHz - Channel Position T





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



Configuration B

Maximum Output Power 46 dBm

Antono	LTE Modulation	LTE Carrier	Peak to Average Ratio (PAR) / Output Power			
			Channel Position M			
Antenna		Bandwidth	DAD (4D)	Average Power		
			PAR (dB)	dBm	dBm/MHz	
Α	QPSK	1.4 MHz	-	45.96	42.18	
Α	QPSK	3.0 MHz	-	45.99	39.34	
Α	QPSK	5.0 MHz	-	46.00	37.20	

Configuration C

Maximum Output Power 46 dBm

Antenna		LTE Carrier Bandwidth	Peak to Average Ratio (PAR) / Output Power		
	LTE Modulation		Channel Position M		
	Bandwidth			Average Power	
				PAR (dB)	dBm
А	QPSK	1.4 MHz	-	45.96	40.61
А	QPSK	3.0 MHz	-	45.99	37.57

Limit	
Peak Power	≤500 W or ≤+57 dBm
Peak to Average Ratio	13 dB



2.2 OCCUPIED BANDWIDTH

2.2.1 Specification Reference

FCC CFR 47 Part 2, Clause 2.1049 FCC CFR 47 Part 22, Clause 22.917 (b)

2.2.2 Date of Test and Modification State

22 September 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 4.1.

The Spectrum Analyser RBW was configured to be at least 1% of the channel bandwidth of the carrier to be measured.

For 26dB Bandwidth, in accordance with KDB 971168 D01, a peak detector and a trace setting of Max Hold were used. The trace was allowed to stabilise. Using the Spectrum Analyser function, the 26 dB measurement result was obtained.

2.2.6 Test Results

Configuration A

Maximum Output Power 46 dBm

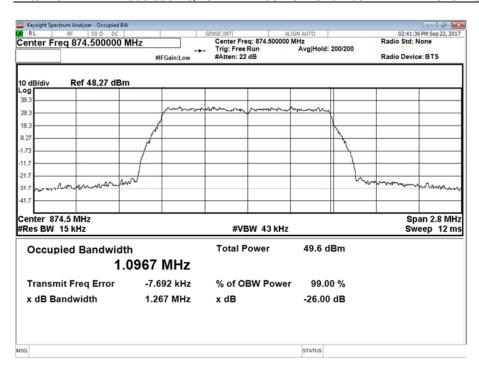
Antenna	LTE Modulation	LTE Carrier Bandwidth	Result (kHz)					
			Channel Position B		Channel Position M		Channel Position T	
			Occupied Bandwidth	-26 dB Bandwidth	Occupied Bandwidth	-26 dB Bandwidth	Occupied Bandwidth	-26 dB Bandwidth
Α	QPSK	1.4 MHz	1,097.61	1,269.85	1,096.72	1,266.66	1,096.17	1,266.89
Α	QPSK	3.0 MHz	2,694.23	2,894.58	2,699.31	2,895.16	2,694.25	2,900.19
Α	QPSK	5.0 MHz	4,485.23	4,817.72	4,480.38	4,781.25	4,478.45	4,776.42
В	QPSK	5.0 MHz	4,482.21	4,798.16	4,481.27	4,806.77	4,479.35	4,794.28
Α	QPSK	10.0 MHz	8,941.10	9,599.04	8,957.77	9,572.16	8,935.83	9,646.72



Antenna A - LTE Modulation QPSK - LTE Carrier Bandwidth 1.4 MHz - Channel Position B

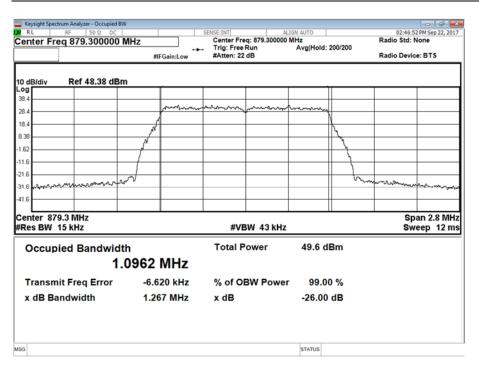


Antenna A - LTE Modulation QPSK - LTE Carrier Bandwidth 1.4 MHz - Channel Position M

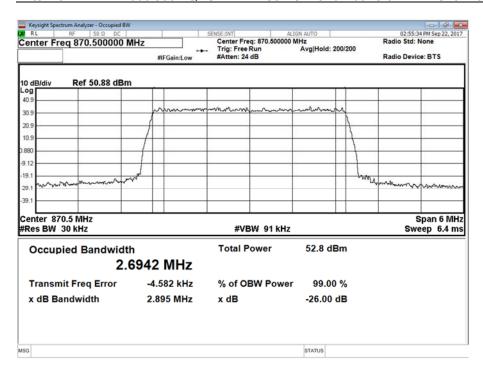




Antenna A - LTE Modulation QPSK - LTE Carrier Bandwidth 1.4 MHz - Channel Position T

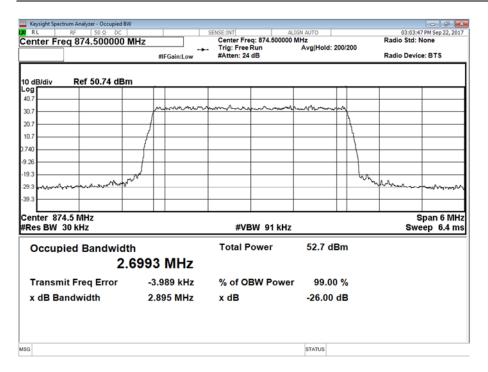


Antenna A - LTE Modulation QPSK - LTE Carrier Bandwidth 3.0 MHz - Channel Position B

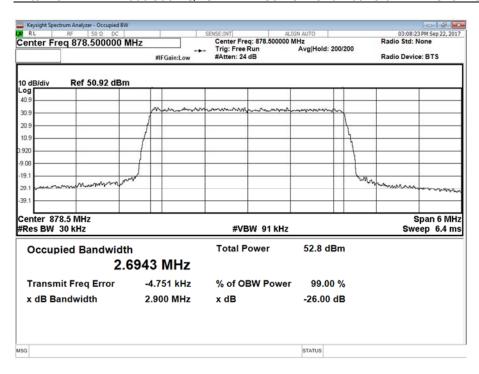




Antenna A - LTE Modulation QPSK - LTE Carrier Bandwidth 3.0 MHz - Channel Position M

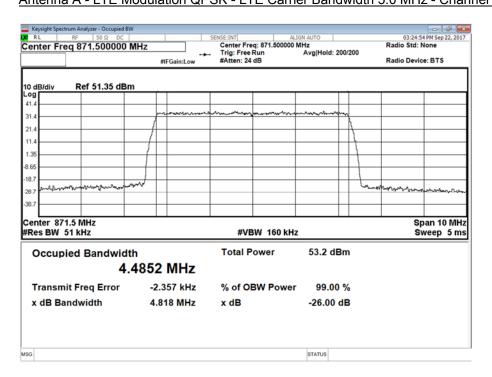


Antenna A - LTE Modulation QPSK - LTE Carrier Bandwidth 3.0 MHz - Channel Position T

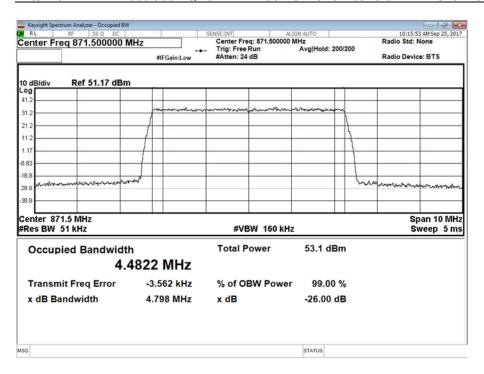




Antenna A - LTE Modulation QPSK - LTE Carrier Bandwidth 5.0 MHz - Channel Position B

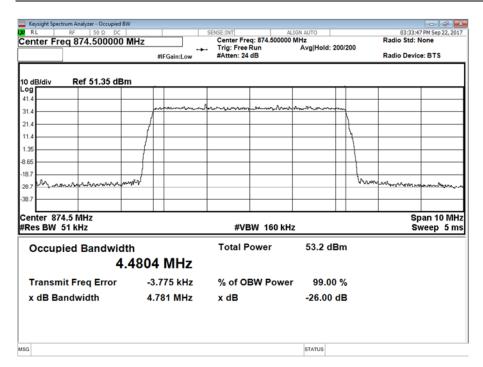


Antenna B - LTE Modulation QPSK - LTE Carrier Bandwidth 5.0 MHz - Channel Position B

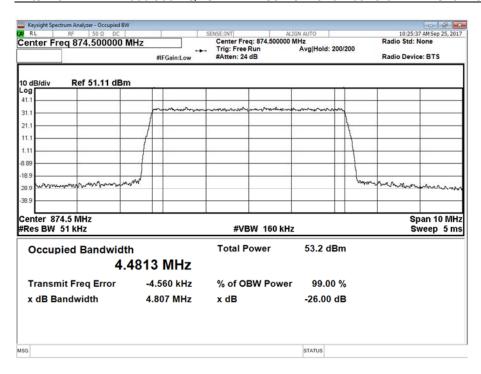




Antenna A - LTE Modulation QPSK - LTE Carrier Bandwidth 5.0 MHz - Channel Position M

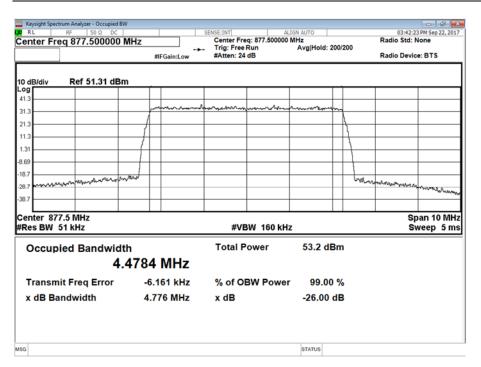


Antenna B - LTE Modulation QPSK - LTE Carrier Bandwidth 5.0 MHz - Channel Position M

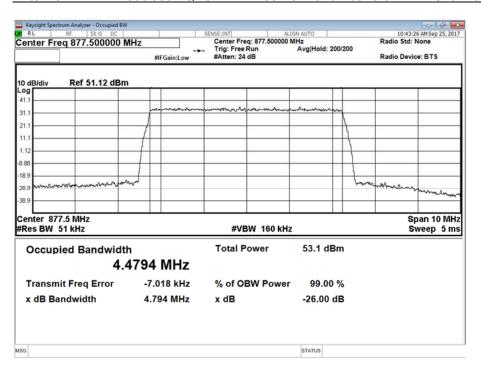




Antenna A - LTE Modulation QPSK - LTE Carrier Bandwidth 5.0 MHz - Channel Position T



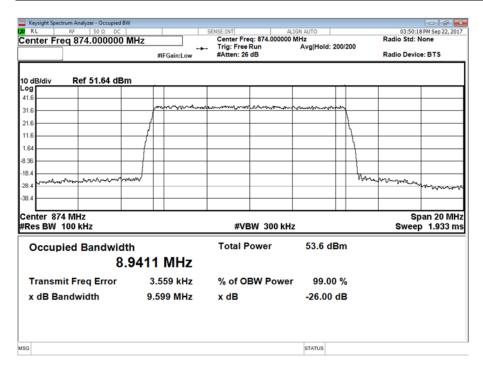
Antenna B - LTE Modulation QPSK - LTE Carrier Bandwidth 5.0 MHz - Channel Position T



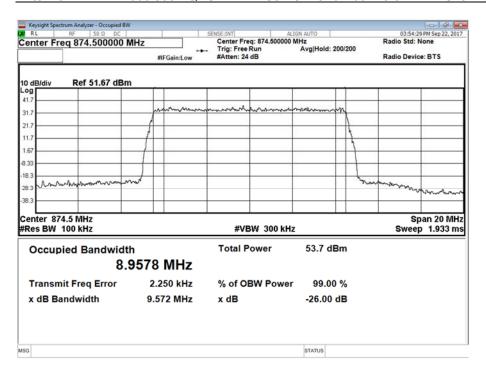


Product Service

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



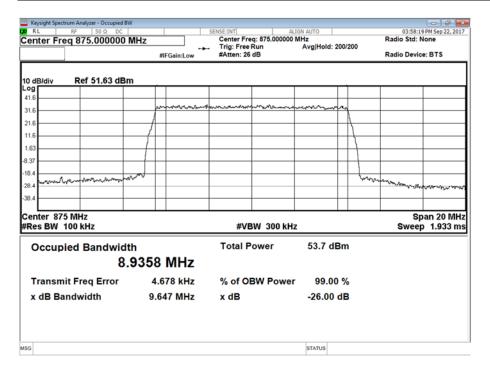
Antenna A - LTE Modulation QPSK - LTE Carrier Bandwidth 10.0 MHz - Channel Position M





Product Service

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



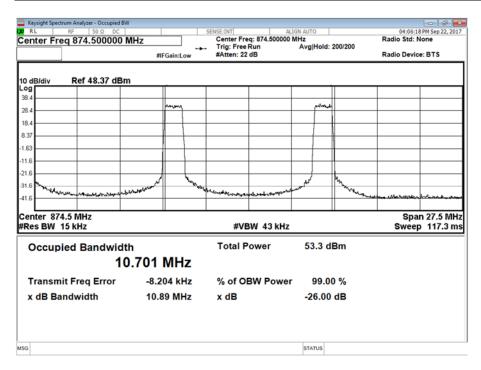
Configuration B

Maximum Output Power 46 dBm

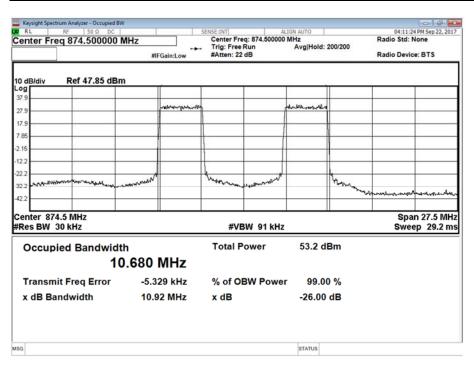
Antenna	LTE Modulation	LTE Carrier Bandwidth	Result (KHz)		
			Channel Position M		
			Occupied Bandwidth	-26 dB Bandwidth	
Α	QPSK	1.4 MHz	10,701.32	10,887.08	
Α	QPSK	3.0 MHz	10,680.28	10,924.34	
Α	QPSK	5.0 MHz	10,431.79	10,822.59	



Antenna A - LTE Modulation QPSK - LTE Carrier Bandwidth 1.4 MHz - Channel Position M



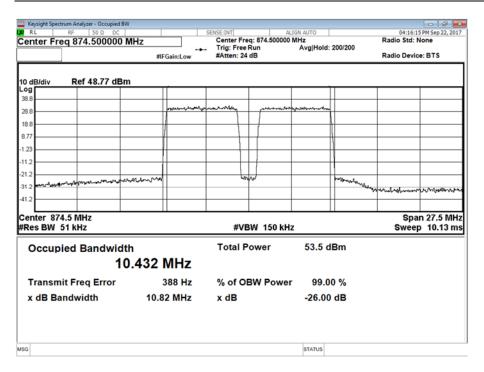
Antenna A - LTE Modulation QPSK - LTE Carrier Bandwidth 3.0 MHz - Channel Position M





Product Service

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



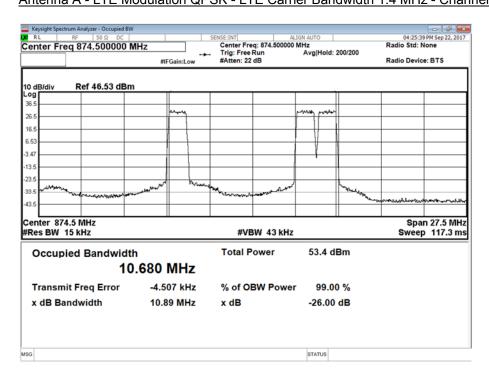
Configuration C

Maximum Output Power 46 dBm

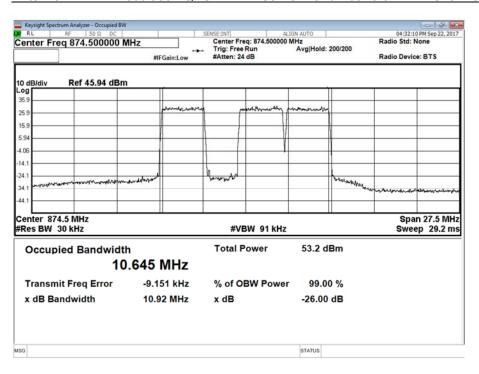
Antenna	LTE Modulation	LTE Carrier Bandwidth	Result (KHz)			
			Channel Position M			
			Occupied Bandwidth	-26 dB Bandwidth		
Α	QPSK	1.4 MHz	10,680.47	10,887.68		
Α	QPSK	3.0 MHz	10,645.48	10,924.75		



Antenna A - LTE Modulation QPSK - LTE Carrier Bandwidth 1.4 MHz - Channel Position M



Antenna A - LTE Modulation QPSK - LTE Carrier Bandwidth 3.0 MHz - Channel Position M





2.3 BAND EDGE

2.3.1 Specification Reference

FCC CFR 47 Part 2, Clause 2.1051 FCC CFR 47 Part 22, Clause 22.917

2.3.2 Date of Test and Modification State

22, 26 and 27 September 2017 - Modification State 0

2.3.3 Test Equipment Used

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

2.3.4 Environmental Conditions

Ambient Temperature 21.2 - 22.5°C Relative Humidity 53.8 - 55.2%

2.3.5 Test Method

All measurements were made in accordance with FCC KDB 971168 D01 Clause 6.

The EUT was connected to a Spectrum Analyser via 40 dB of attenuation. The path loss between the EUT and the Spectrum Analyser was measured using a Network Analyser. The measured path loss was entered as a Reference Level Offset in the Spectrum Analyser. All measurements were made using a RBW of <1 % of the 26 dB Bandwidth in conjunction with the Band Power function of the Spectrum Analyser. The Band Power span was configured to be at least 1 % of the 26 dB Bandwidth and was positioned in the 1MHz region above/below the band edge which gave the worst-case result. The result was an integration of the power giving the result as a value which was at least 1 % of the 26 dB Bandwidth. The display line was set to the worst case accounting for 2 Port MIMO operation in accordance with KDB 662911 D01. This equated to $43 + 10\log(P) - 10\log(2) = -16dBm$.

Additional plots were shown for measurements from 1-5 MHz away from the Band Edge. A RBW of 51 kHz was used with the limit line corrected by $10\log(100 \text{ kHz} / 51 \text{ kHz}) = 3 \text{ db}$. Therefore, the limit line accounting for MIMO and the reduced RBW was set at -19 dBm.

2.3.6 Test Results

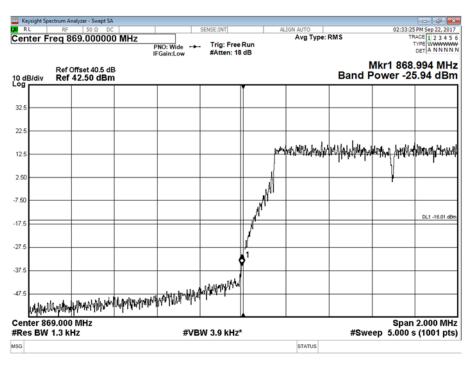
Configuration A

Maximum Output Power 46 dBm

Antonno	LTE Modulation	LTE Comion Donadicidath	Band Edge (MHz)		
Antenna	LTE Modulation	LTE Carrier Bandwidth	Channel Position B	Channel Position T	
Α	QPSK	1.4 MHz	869.7	879.3	
Α	QPSK	3.0 MHz	870.5	878.5	
Α	QPSK	5.0 MHz	871.5	877.5	
В	QPSK	5.0 MHz	871.5	877.5	
Α	QPSK	10.0 MHz	874.0	875.0	



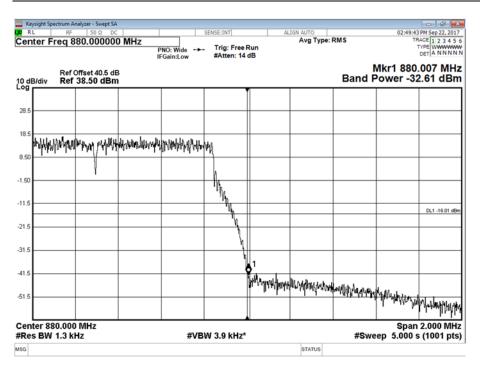
Antenna A - LTE Modulation QPSK - LTE Carrier Bandwidth 1.4 MHz - Channel Position B

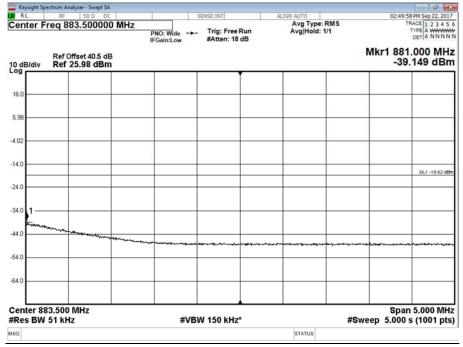






Antenna A - LTE Modulation QPSK - LTE Carrier Bandwidth 1.4 MHz - Channel Position T

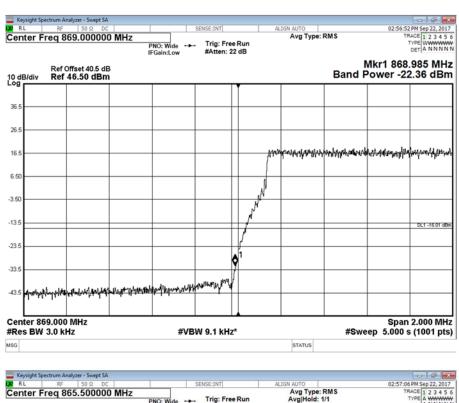


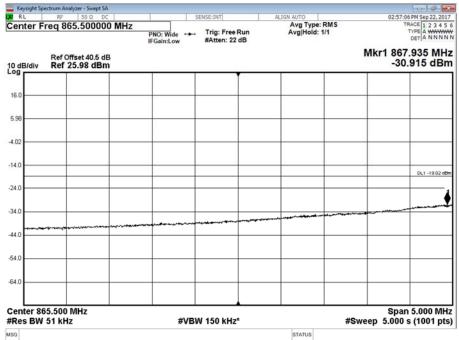




Product Service

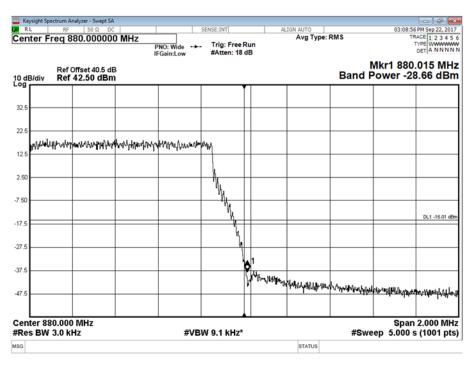
Antenna A - LTE Modulation QPSK - LTE Carrier Bandwidth 3.0 MHz - Channel Position B

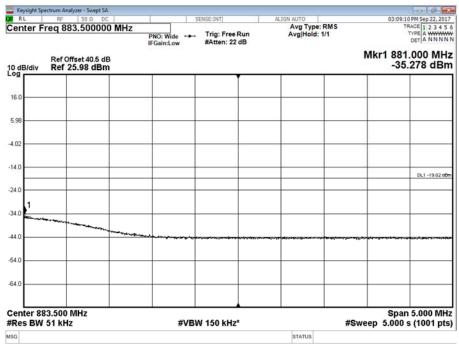






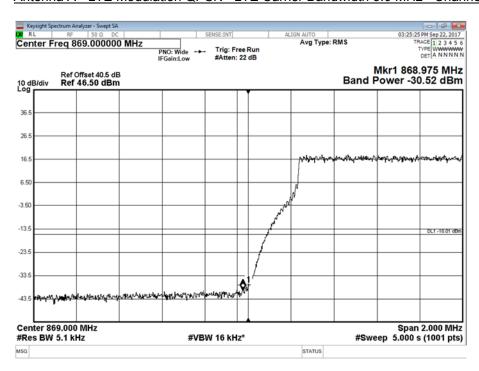
Antenna A - LTE Modulation QPSK - LTE Carrier Bandwidth 3.0 MHz - Channel Position T

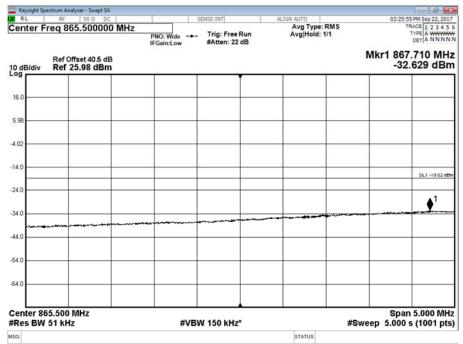






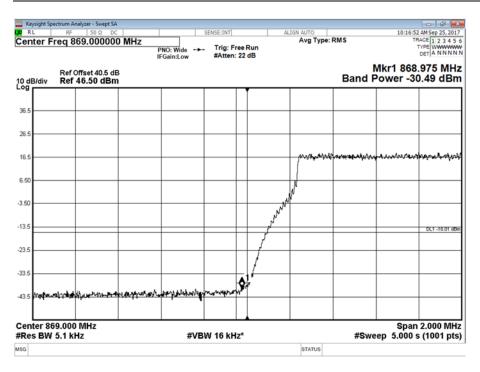
Antenna A - LTE Modulation QPSK - LTE Carrier Bandwidth 5.0 MHz - Channel Position B

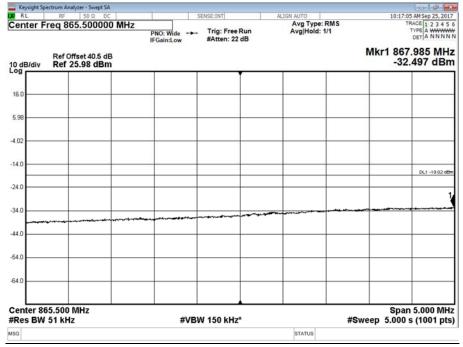






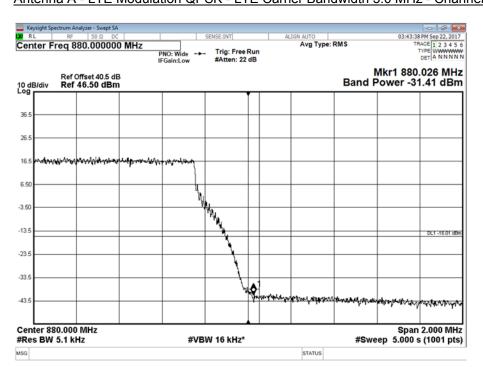
Antenna B - LTE Modulation QPSK - LTE Carrier Bandwidth 5.0 MHz - Channel Position B

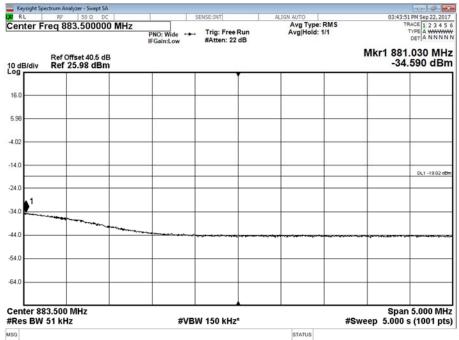






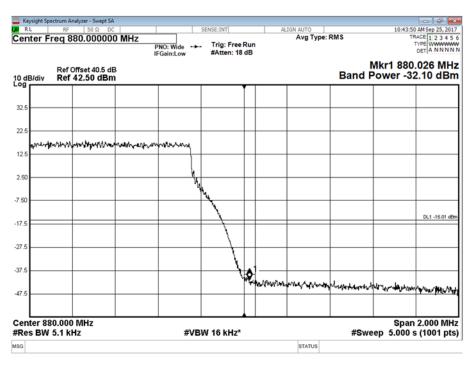
Antenna A - LTE Modulation QPSK - LTE Carrier Bandwidth 5.0 MHz - Channel Position T

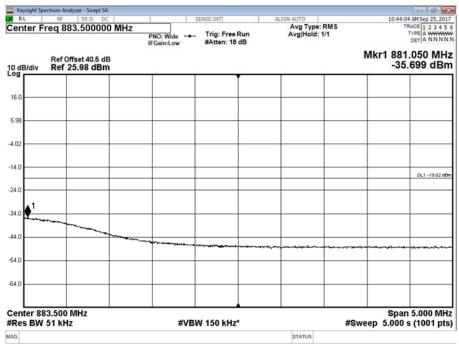






Antenna B - LTE Modulation QPSK - LTE Carrier Bandwidth 5.0 MHz - Channel Position T







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

