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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	13 September 2018

Document 75939974 Report 01 Issue 2 September 2018

Product Service

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Product Service

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

This report has been up issued to Issue 2 and should be read in place of Issue 1. This report has been up issued to Issue 2 to correct the Maximum rated output power Statement in Section 1.4, The Declaration of Build Status.

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.

Section	Specification Clause		Test Description	Result
	FCC CFR 47 Part 2	FCC CFR 47 Part 22		
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		
Product Number	KRC 161 592/1 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 power(s)	Maximum 46.0dBm (40W) per port for all modes except maximum 43.0dBm (20W) per carrier per port for LTE 1.4MHz Single Carrier		
Duplex Mode	FDD		
Frequency Band	B26D (800MHz)		
Modulation type(s)	LTE: QPSK, 16QAM, 64QAM, 256QAM		
Channel Bandwidth(s)	LTE: 1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz		
Transmit diversity	Each transmitter path is declared to be equivalent		
Receive diversity	Each receiver path is declared to be equivalent		
MIMO	Each transmitter path is declared to be equivalent		
	Each receiver path is declared to be equivalent		
ITU designation or class of emission	LTE: 1M40F9W, 3M00F9W, 5M00F9W, 10M0F9W, 15M0F9W		
Hardware Version	R1E		
Software Version	CXP 901 7316/2 R67GK		
FCC ID	TA8AKRC161592		
ISED Model Name			
Highest Internally Generated Frequency	1030.1 MHz		
Environment temperature range(s)	Minimum		Maximum
	−40 °C		+55 °C
AC Power source	Voltage Range(s)		
	Minimum VAC	Nominal VAC	Maximum VAC
DC Power source	Yes		
	Voltage Range(s)		
	Minimum VDC	Nominal VDC	Maximum VDC
	−36.0	−48 V	−58.5 V
Options	Type		Model

Signature _____

Date _____

D of B S Serial No _____

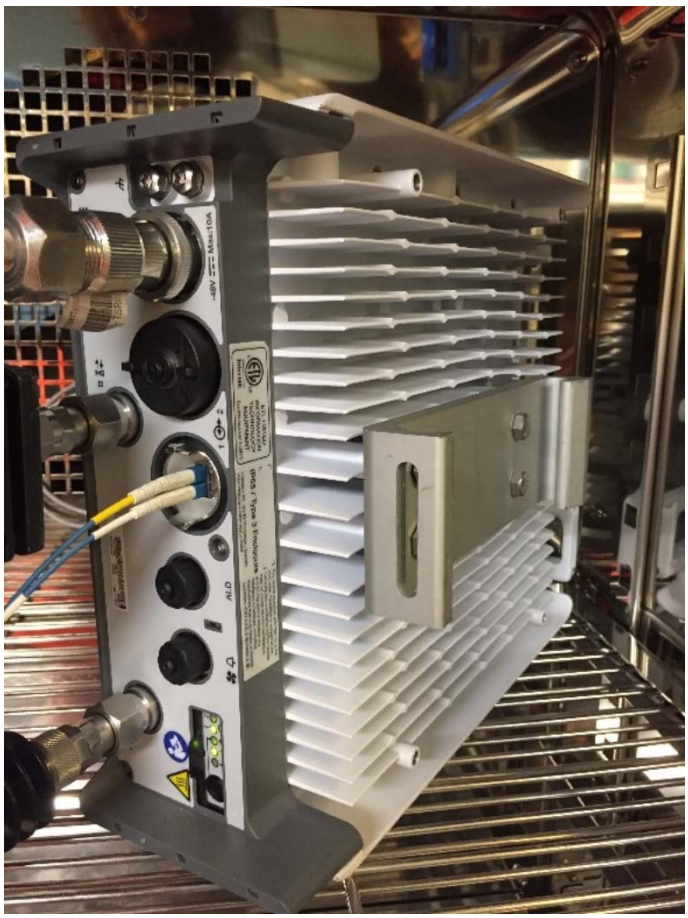
No responsibility will be accepted by TÜV SÜD Product Service UK Limited as to the accuracy of the information declared in this document by the manufacturer.

1.5 PRODUCT INFORMATION

1.5.1 Technical Description

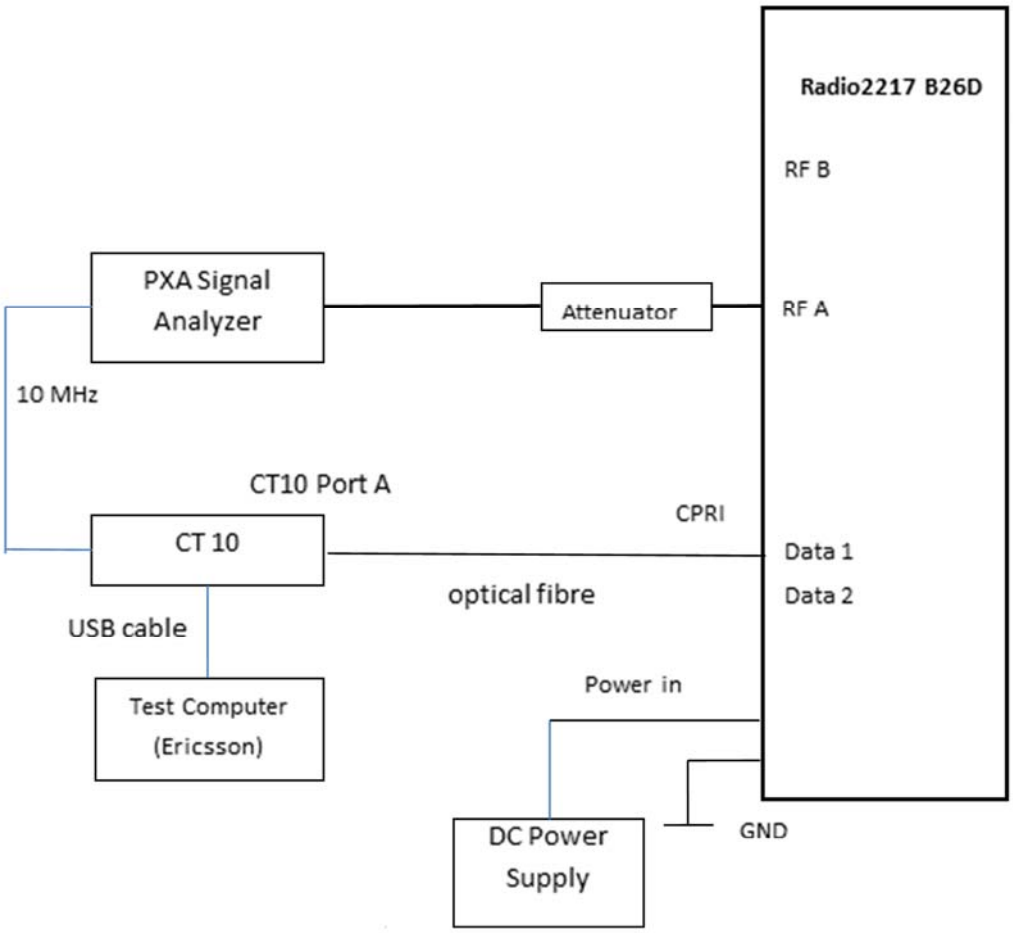
The Equipment Under Test (EUT) Radio 2217 B26D KRC 161 592/1 and KRC 161 592/2 is an Ericsson Remote Radio Unit working in the public mobile service 800MHz band which provides communication connections to 800MHz network. The Radio 2217 B26D KRC 161 592/1 and KRC 161 592/2 operates from a -48V DC supply.

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

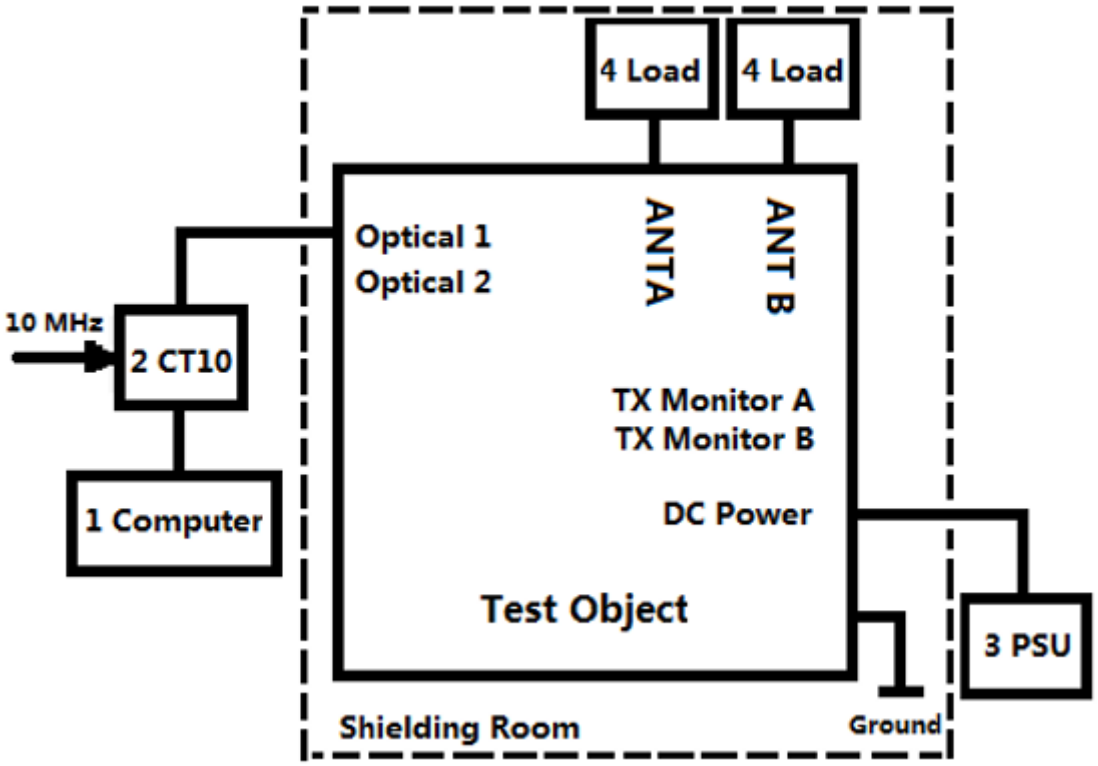


Equipment Under Test

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.

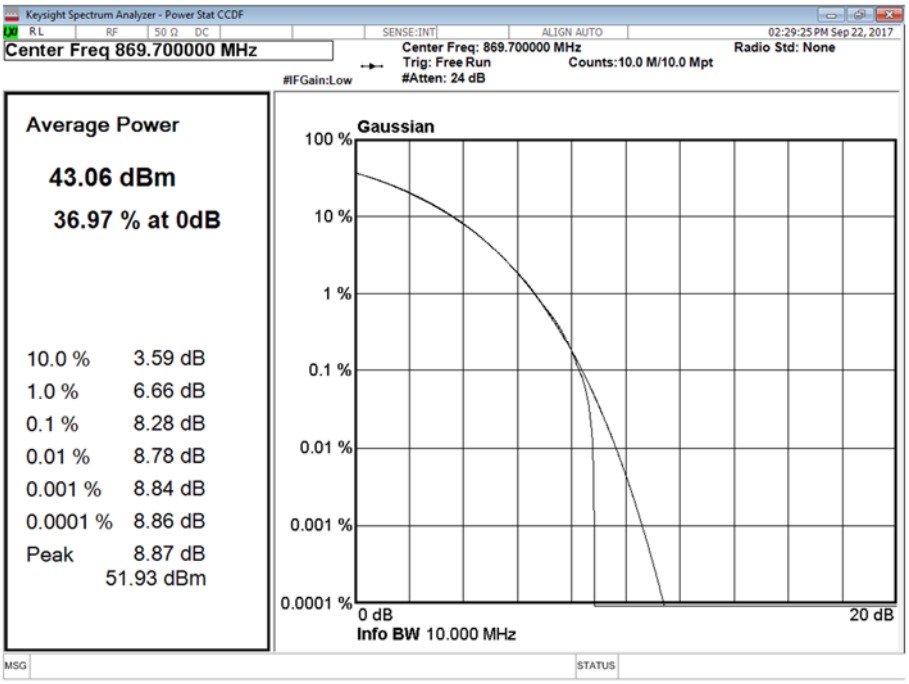
2.1.6 Test Results

Configuration A

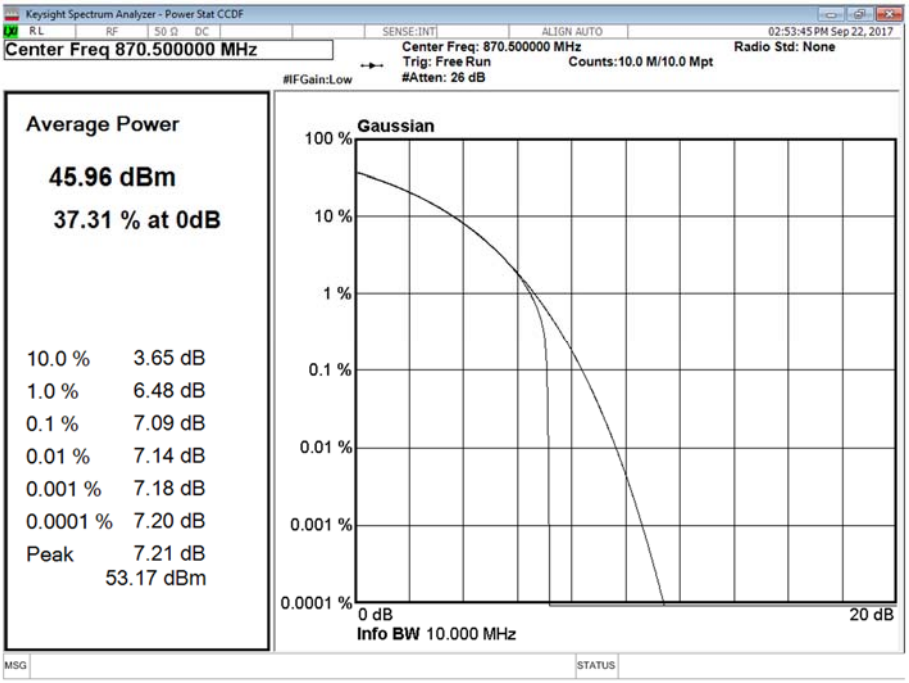
Maximum Output Power 46 dBm

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

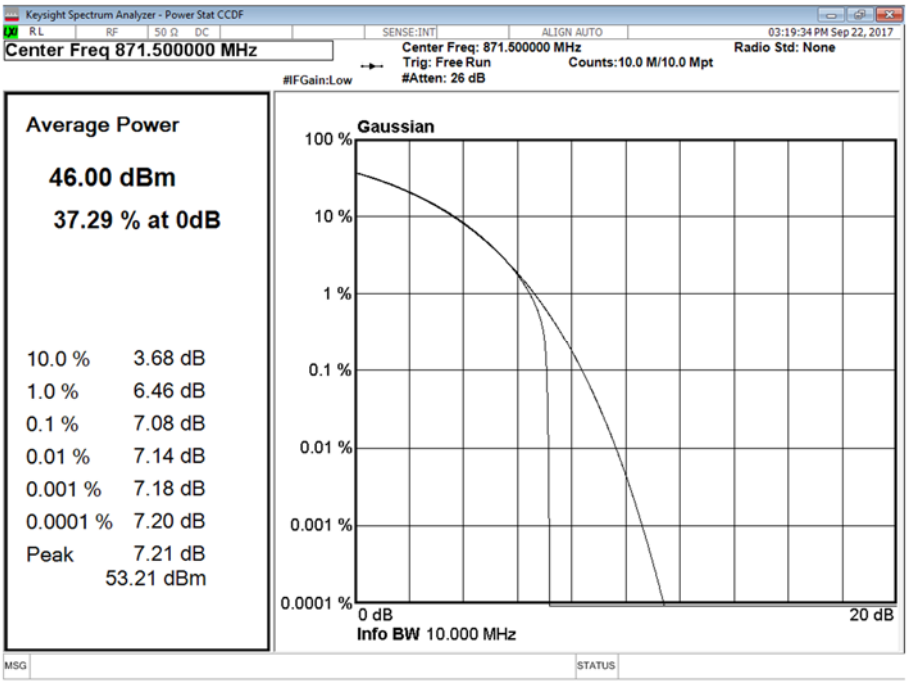
Antenna A - LTE Modulation QPSK - LTE Carrier Bandwidth 1.4 MHz - Channel Position B



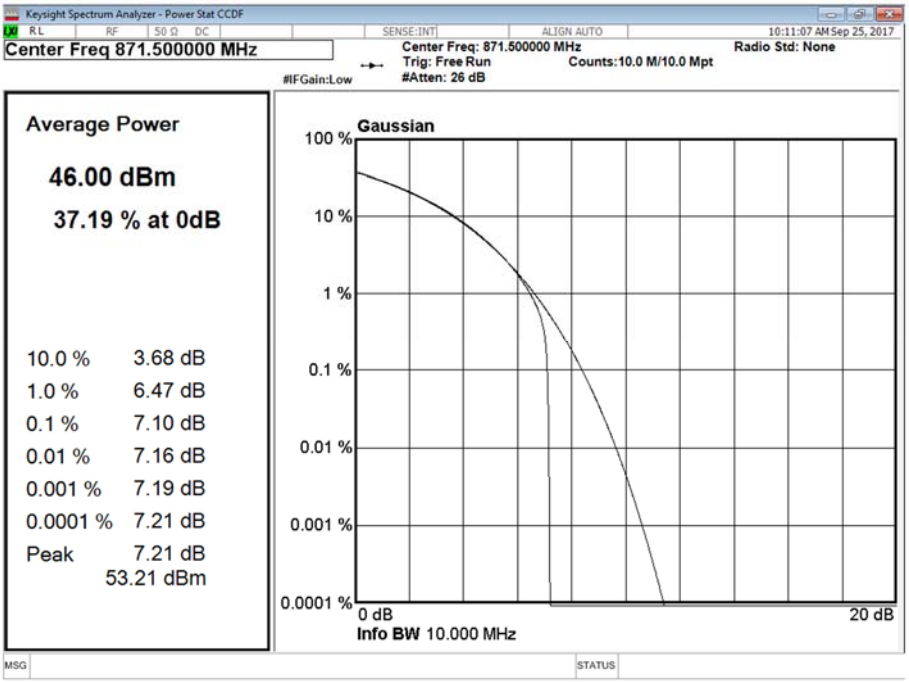
Antenna A - LTE Modulation QPSK - LTE Carrier Bandwidth 3.0 MHz - Channel Position B



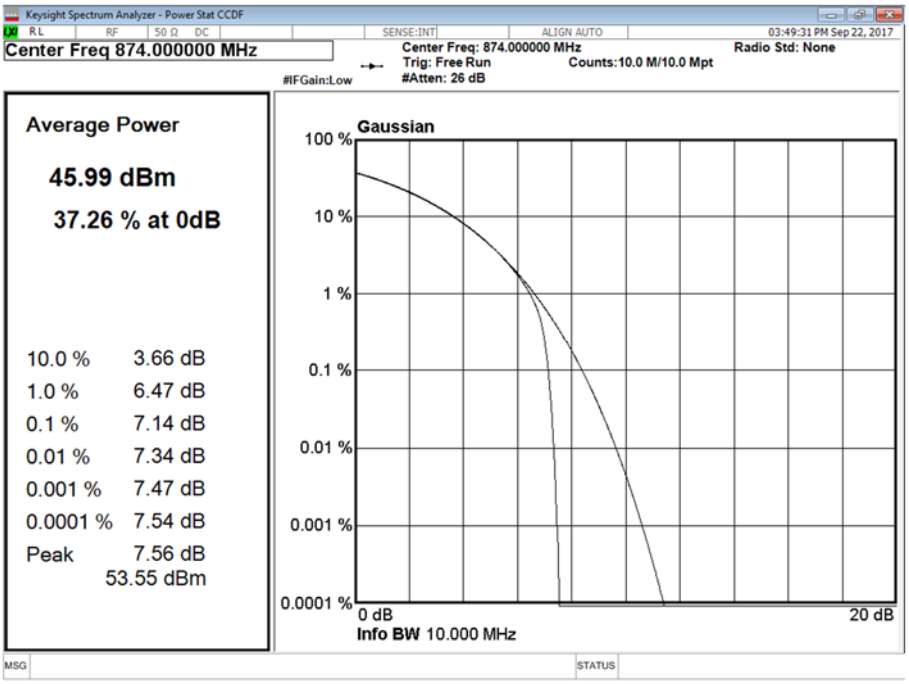
Antenna A - LTE Modulation QPSK - LTE Carrier Bandwidth 5.0 MHz - Channel Position B



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



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

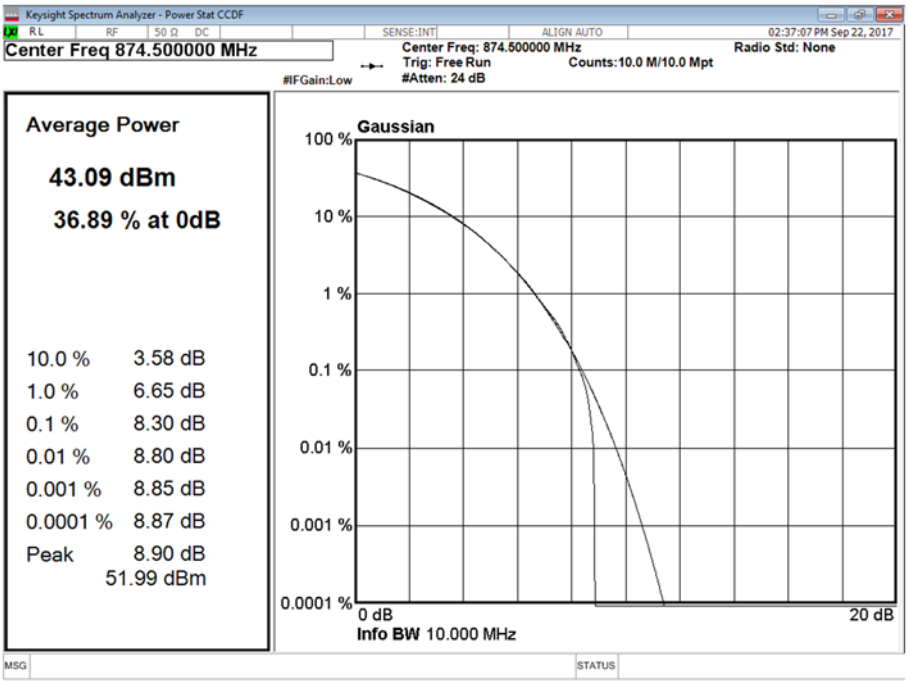


Configuration A

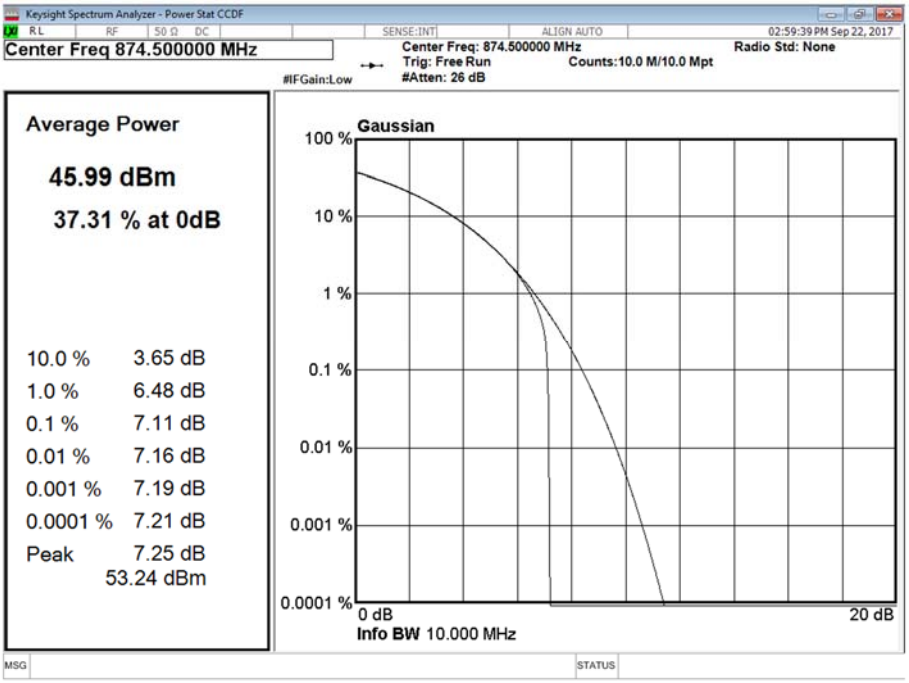
Maximum Output Power 46 dBm

Antenna	LTE Modulation	LTE Carrier Bandwidth	Peak to Average Ratio (PAR) / Output Power		
			Channel Position M		
			PAR (dB)	Average Power	
				dBm	dBm/MHz
A	QPSK	1.4 MHz	8.30	43.05	42.50
A	QPSK	3.0 MHz	7.11	46.00	42.17
A	QPSK	5.0 MHz	7.10	46.01	40.13
B	QPSK	5.0 MHz	7.13	45.99	40.00
Total			-	49.01	43.08
A	QPSK	10.0 MHz	7.17	46.04	37.25

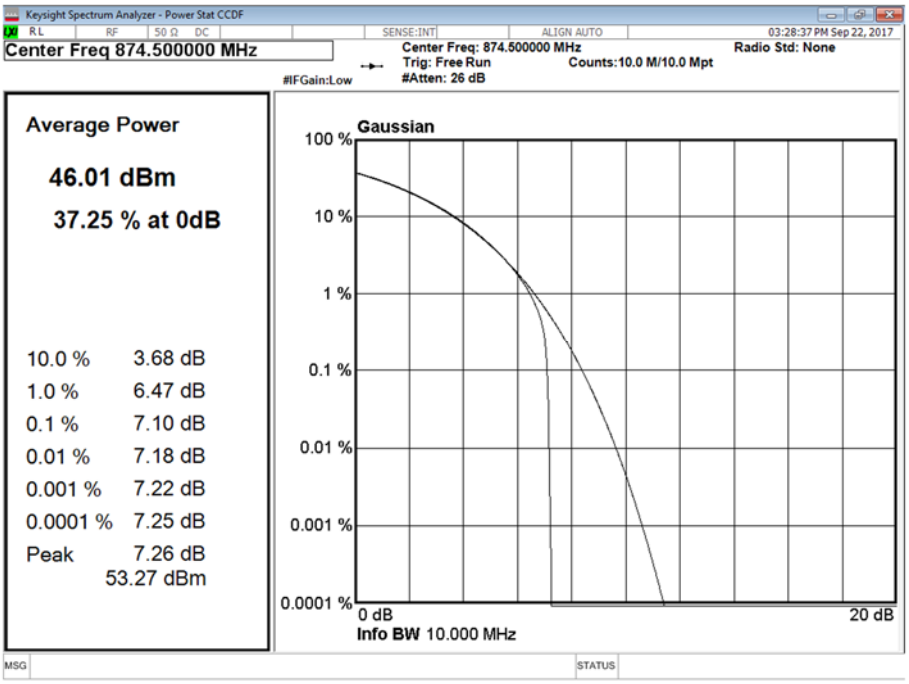
Antenna A - LTE Modulation QPSK - LTE Carrier Bandwidth 1.4 MHz - Channel Position M



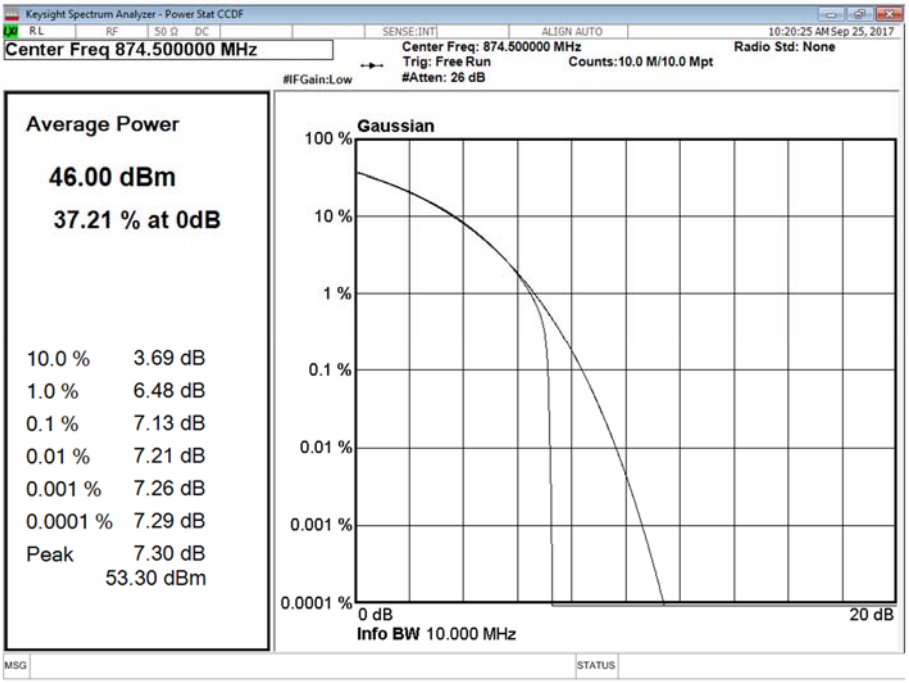
Antenna A - LTE Modulation QPSK - LTE Carrier Bandwidth 3.0 MHz - Channel Position M



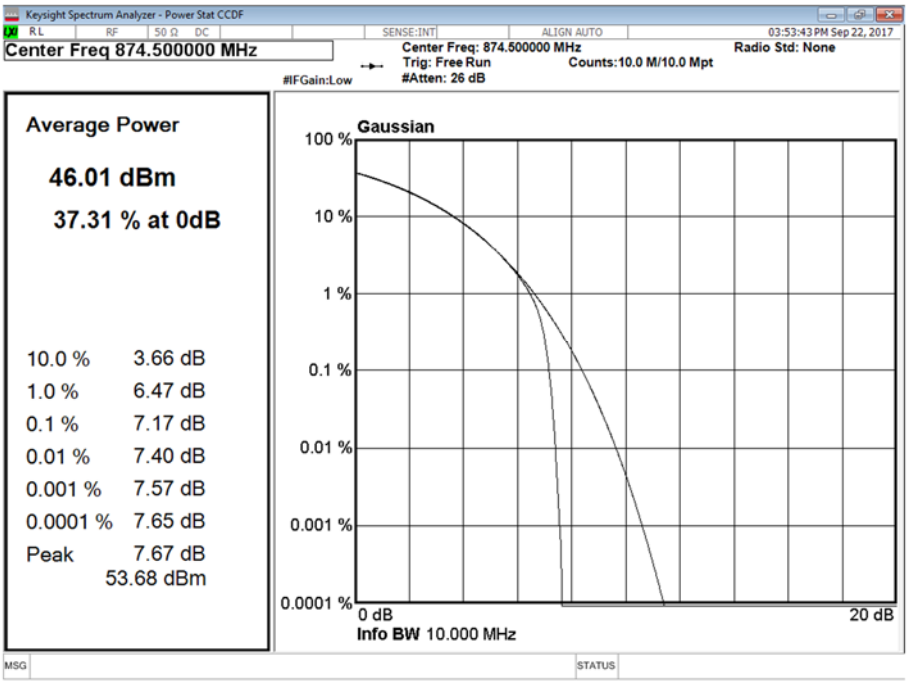
Antenna A - LTE Modulation QPSK - LTE Carrier Bandwidth 5.0 MHz - Channel Position M



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



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

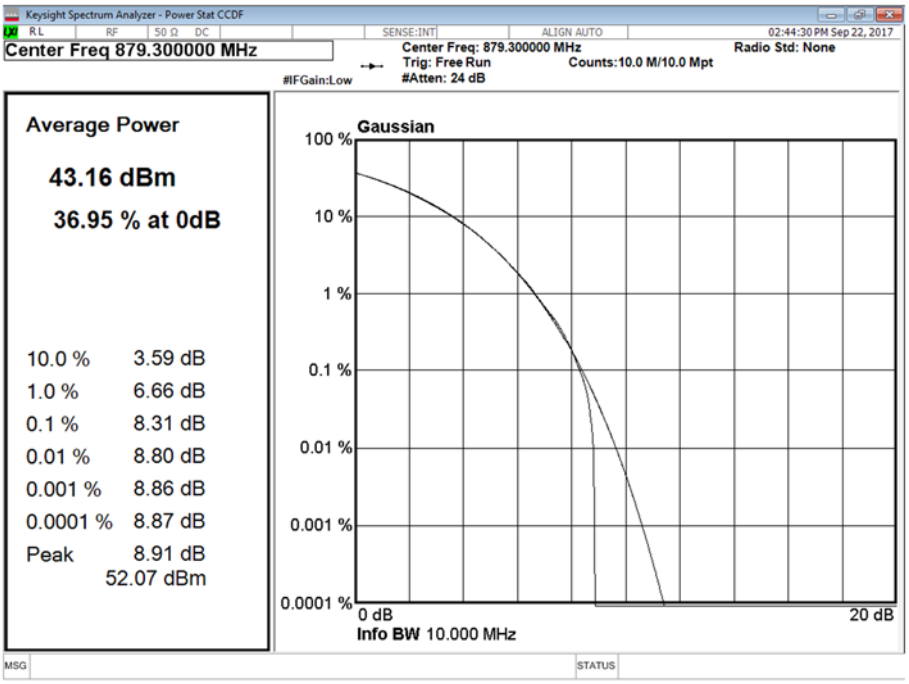


Configuration A

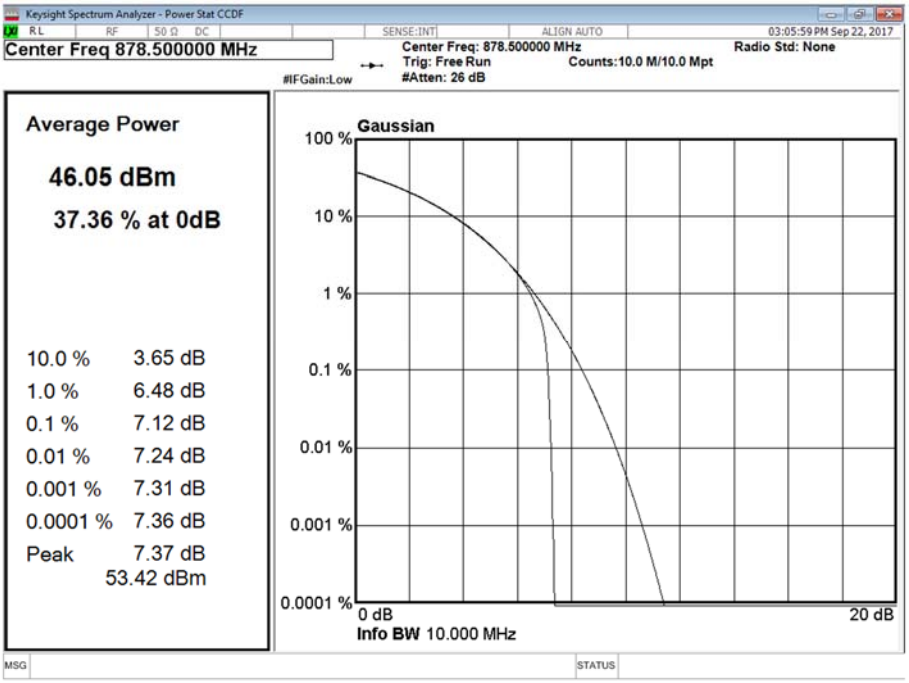
Maximum Output Power 46 dBm

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

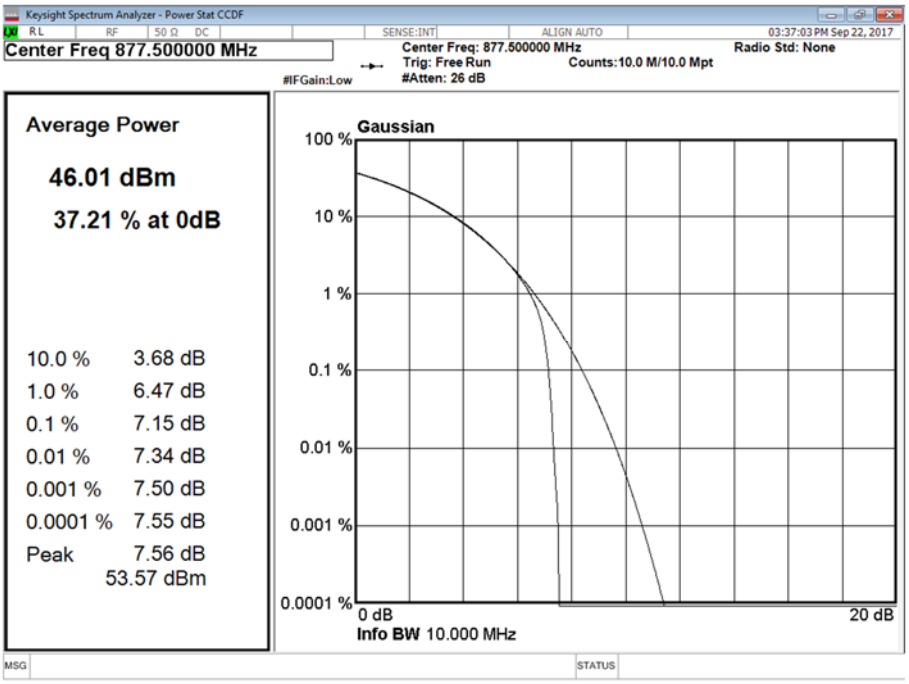
Antenna A - LTE Modulation QPSK - LTE Carrier Bandwidth 1.4 MHz - Channel Position T



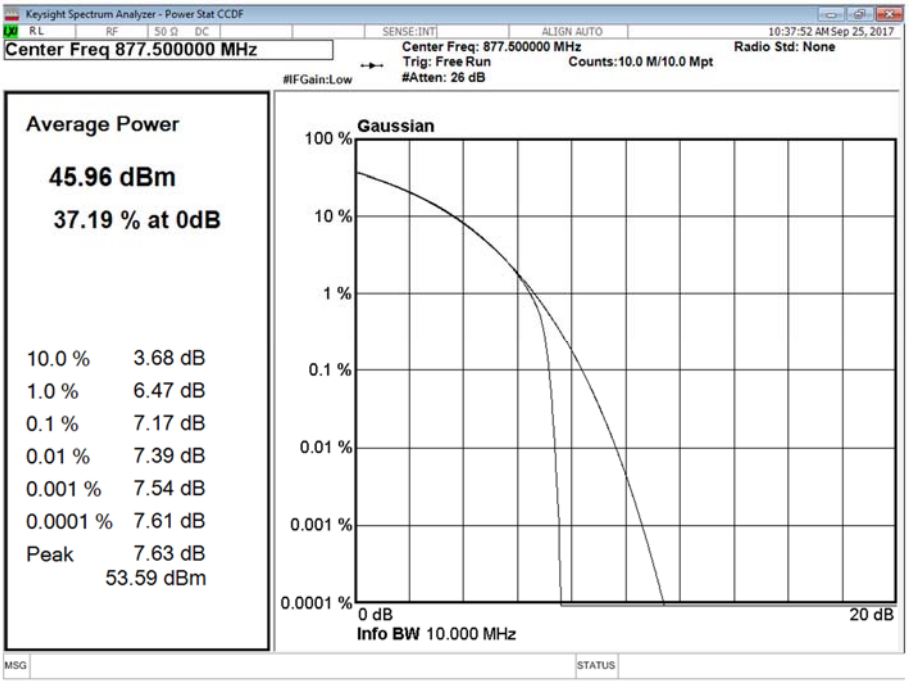
Antenna A - LTE Modulation QPSK - LTE Carrier Bandwidth 3.0 MHz - Channel Position T



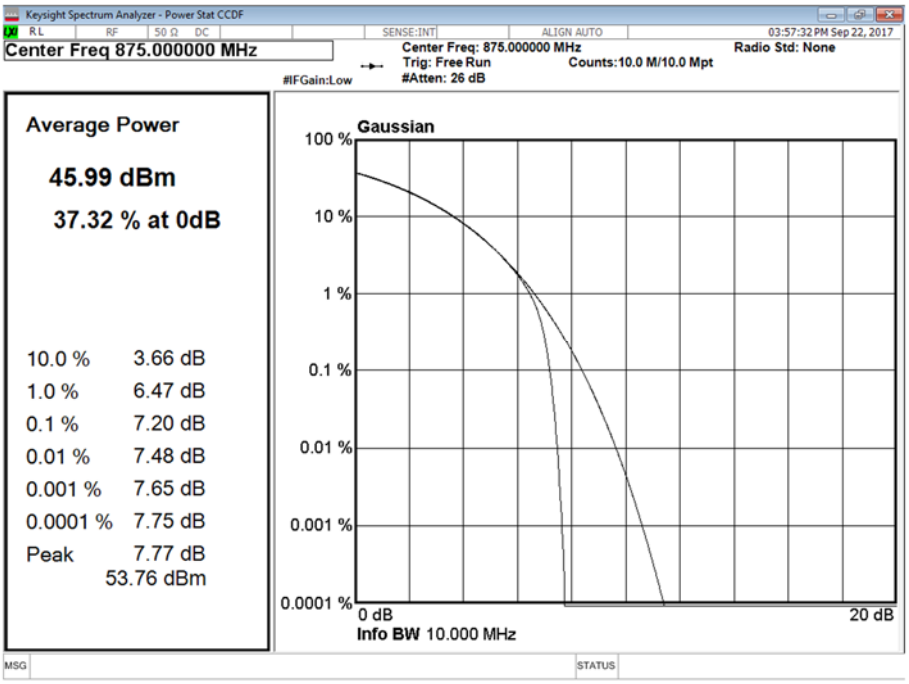
Antenna A - LTE Modulation QPSK - LTE Carrier Bandwidth 5.0 MHz - Channel Position T



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

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

Configuration C

Maximum Output Power 46 dBm

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

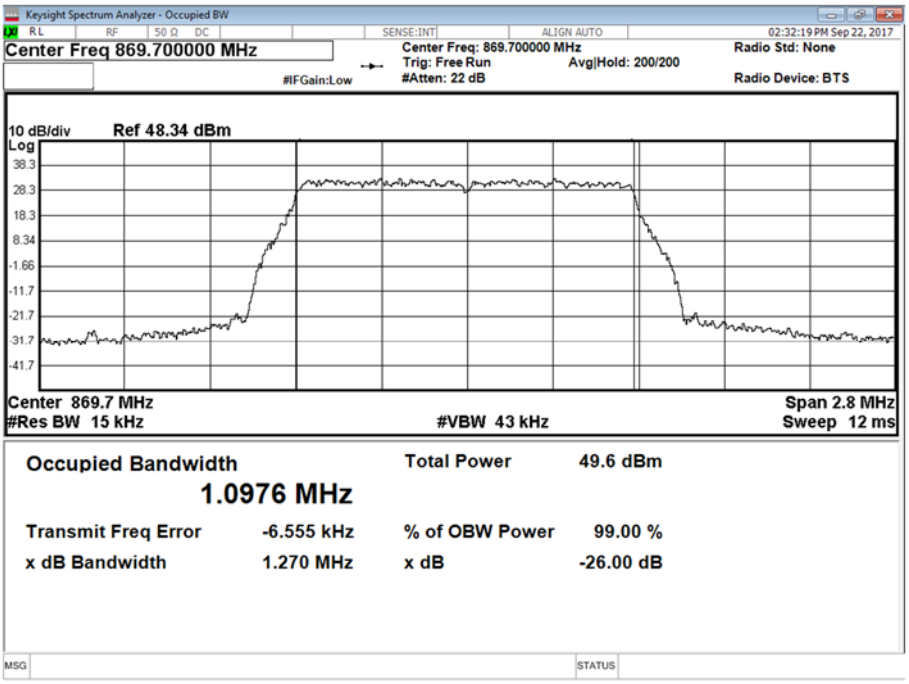
2.2.6 Test Results

Configuration A

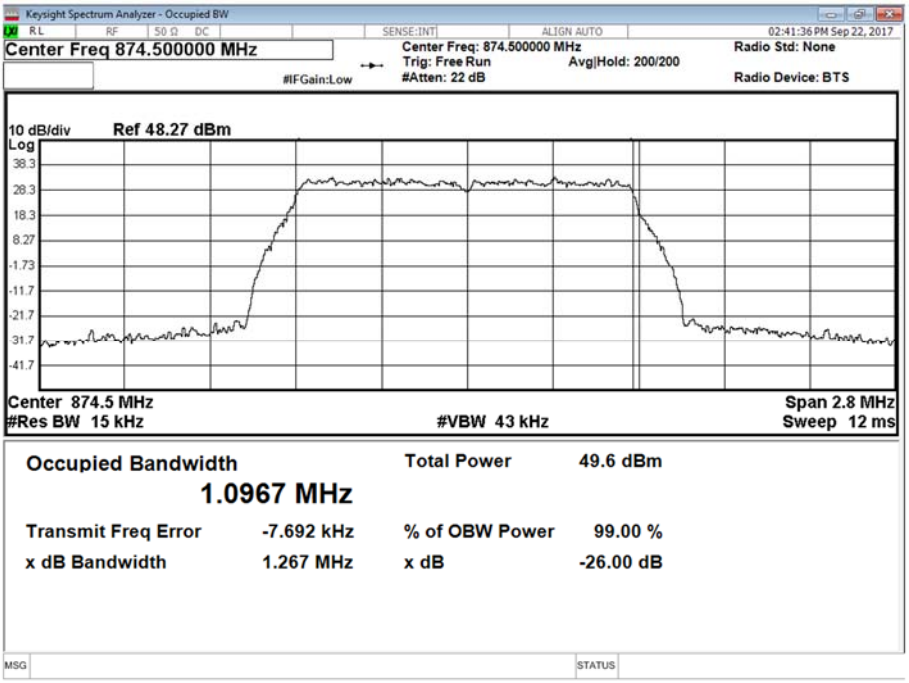
Maximum Output Power 46 dBm

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
A	QPSK	1.4 MHz	1,097.61	1,269.85	1,096.72	1,266.66	1,096.17	1,266.89
A	QPSK	3.0 MHz	2,694.23	2,894.58	2,699.31	2,895.16	2,694.25	2,900.19
A	QPSK	5.0 MHz	4,485.23	4,817.72	4,480.38	4,781.25	4,478.45	4,776.42
B	QPSK	5.0 MHz	4,482.21	4,798.16	4,481.27	4,806.77	4,479.35	4,794.28
A	QPSK	10.0 MHz	8,941.10	9,599.04	8,957.77	9,572.16	8,935.83	9,646.72

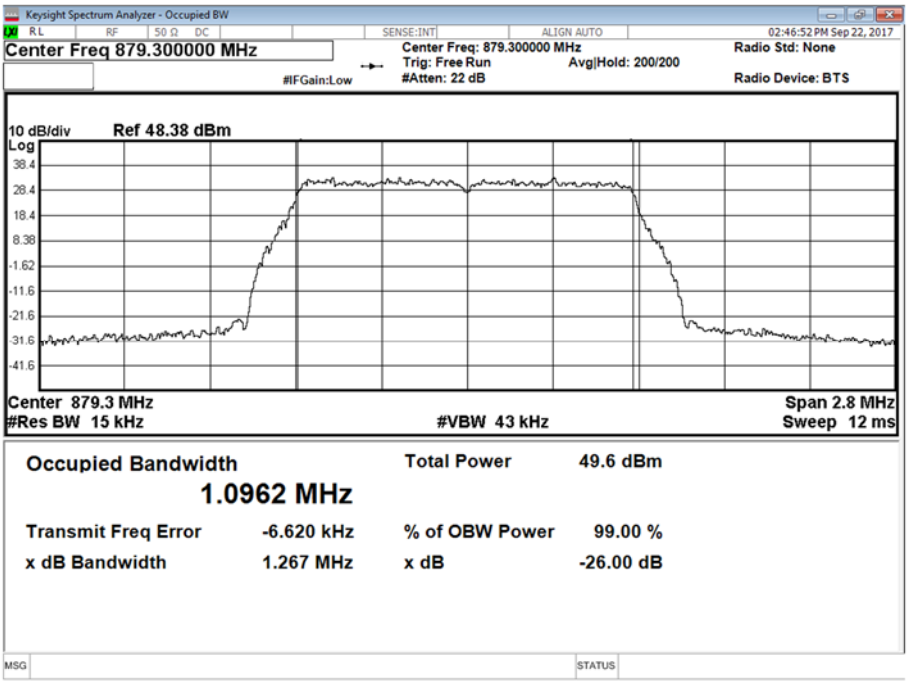
Antenna A - LTE Modulation QPSK - LTE Carrier Bandwidth 1.4 MHz - Channel Position B



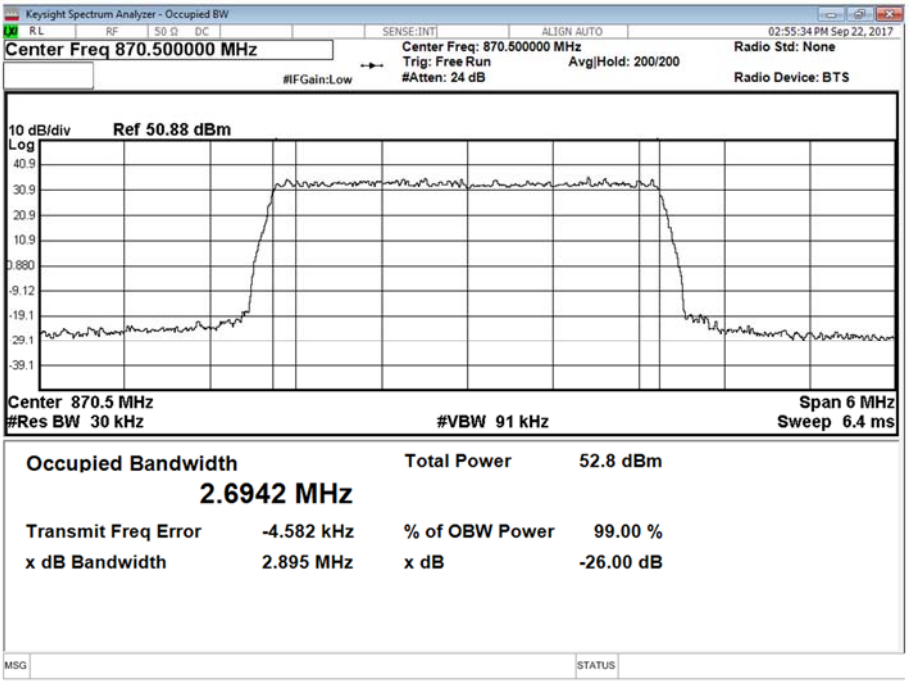
Antenna A - LTE Modulation QPSK - LTE Carrier Bandwidth 1.4 MHz - Channel Position M



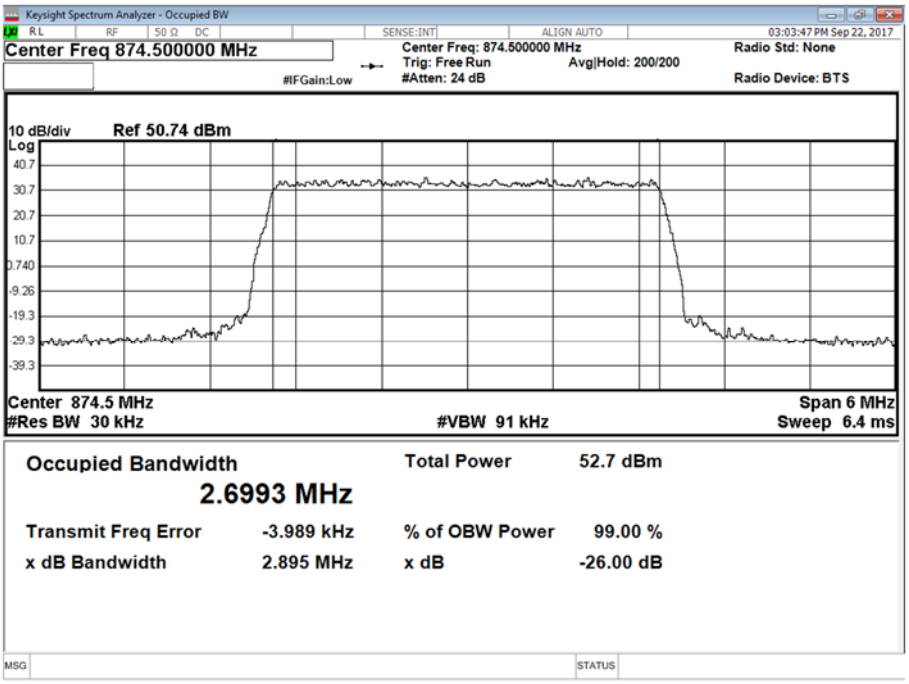
Antenna A - LTE Modulation QPSK - LTE Carrier Bandwidth 1.4 MHz - Channel Position T



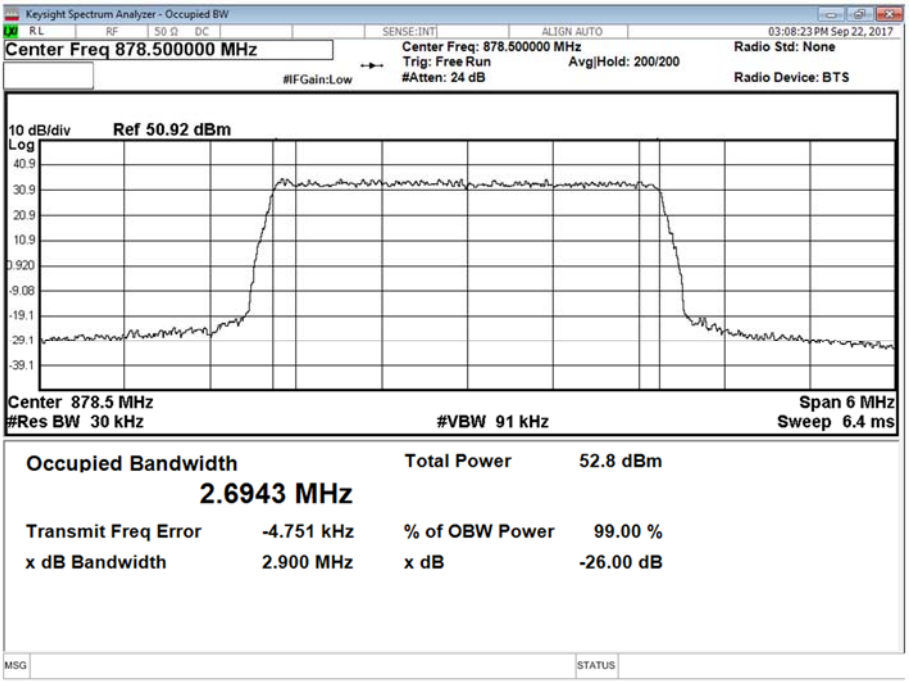
Antenna A - LTE Modulation QPSK - LTE Carrier Bandwidth 3.0 MHz - Channel Position B



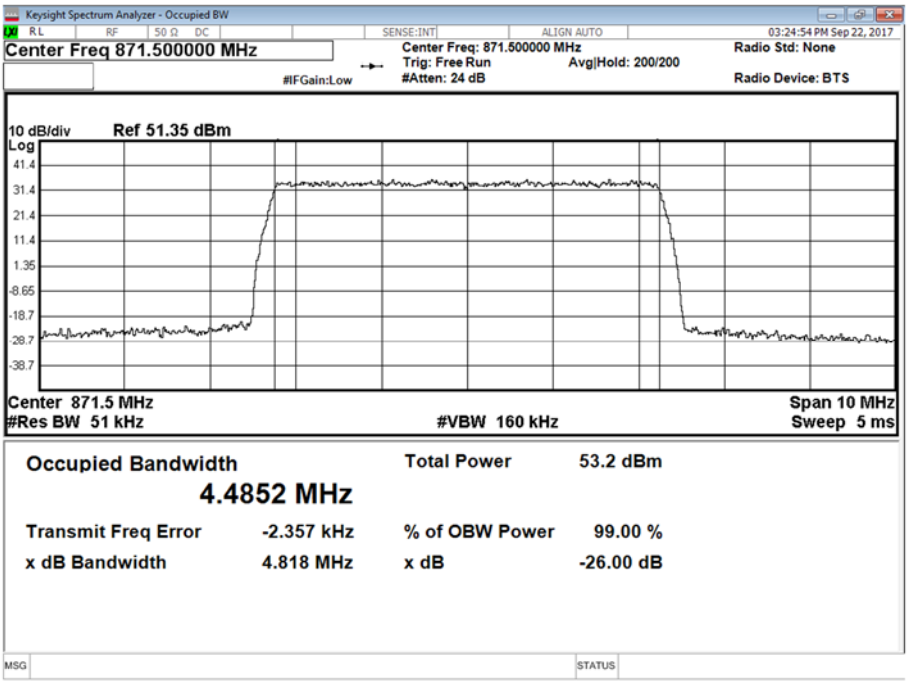
Antenna A - LTE Modulation QPSK - LTE Carrier Bandwidth 3.0 MHz - Channel Position M



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