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Report On

FCC Testing of the ip.access Ltd

S6x Family Access Point Base Station, Model: 435R

Band 2 (1900 MHz) (LTE)

In accordance with FCC CFR 47 Part 2 and FCC CFR 47 Part 24

COMMERCIAL-IN-CONFIDENCE

FCC ID: QGGIPA435R

PREPARED BY

Natalie Bennett
Project Manager – RF
and Telecom

APPROVED BY

Nic Forsyth
Authorised Signatory

DATED

23 October 2017

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SECTION 1

REPORT INFORMATION



Product Service

1.1 REPORT DETAILS

Manufacturer	ip.access Ltd
Address	Building 2020 Cambourne Business Park Cambourne CB23 6DW United Kingdom
Product Name	S6x Family Access Point Base Station
Product Number	435R
Serial Number(s)	000295-0200004122
Software Version	2.0.0 9770 (lte_s60_230.X)
Hardware Version	Rev C
Test Specification/Issue/Date	FCC CFR 47 Part 2: 2016 FCC CFR 47 Part 24: 2016
Start of Test	24 August 2017
Finish of Test	17 October 2017
Name of Engineer(s)	Mohamed Toubella Graeme Lawler Matthew Russell
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 24. The sample tested was found to comply with the requirements defined in the applied rules.

Mohamed Toubella

Graeme Lawler

Matthew Russell



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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 24 is shown below.

Section	Specification Clause		Test Description	Result
	FCC CFR 47 Part 2	FCC CFR 47 Part 24		
2.1	2.1046	24.232 (a)	Maximum Peak Output Power and Peak to Average Ratio - Conducted	Pass
2.2	2.1049	24.238 (b)	Occupied Bandwidth	Pass
2.3	2.1051	24.238 (b)	Radiated Spurious Emissions	Pass
2.4	2.1051	24.238 (b)	Band Edge	Pass
2.5	2.1051	24.238 (a)	Transmitter Spurious Emissions	Pass
2.6	2.1055	24.235	Frequency Stability	Pass



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1.3 CONFIGURATION DESCRIPTION

Configuration Code	Carrier(s)	Configuration Description
1	1C	LTE Single Carrier

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

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

The EUT consists of 2 antenna ports. All measurements were performed on transmit antenna port A and B. Test result limits for Band Edge and Conducted Spurious were based on a 2 port MIMO system. Therefore, a worst case limit accounting for an effective 2 port MIMO configuration was employed and corrected in accordance with FCC KDB 662911, $(10\log 2)$.

The RDS B41– KRY 901 405/1 supports LTE Band 2 – 1930 – 1990 MHz, (downlink), and 1850 – 1910 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 12 V DC Supply.



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1.4 APPLICATION FORM

EQUIPMENT DESCRIPTION	
Model Name/Number	S60 Band 2
Part Number	435R
Hardware Version	Rev C
Software Version	2.0.0 9770 (lte_s60_230.X)
FCC ID (if applicable)	QGGIPA435R
Industry Canada ID (if applicable)	
Technical Description (Please provide a brief description of the intended use of the equipment)	LTE Indoor Small Cell

INTENTIONAL RADIATORS									
Technology	Frequency Band (MHz)	Conducted Declared Output Power (dBm)	Antenna Gain (dBi)	Supported Bandwidth (s) (MHz)	Modulation Scheme(s)	ITU Emission Designator	Test Channels (MHz)		
							Bottom	Middle	Top
LTE	1900	20	0.5	3	QAM	20M00D1 WEC	1931.5	1960.0	1988.5
LTE	1900	20	0.5	5	QAM	20M00D1 WEC	1932.5	1960.0	1987.5
LTE	1900	20	0.5	10	QAM	20M00D1 WEC	1935.0	1960.0	1985.0
LTE	1900	20	0.5	15	QAM	20M00D1 WEC	1937.5	1960.0	1982.5
LTE	1900	20	0.5	20	QAM	20M00D1 WEC	1940.0	1960.0	1980.0

UN-INTENTIONAL RADIATOR	
Highest frequency generated or used in the device or on which the device operates or tunes	1990 MHz

Power Source			
AC	Single Phase	Three Phase	Nominal Voltage
External DC	Nominal Voltage		Maximum Current
	12V		2A
Battery	Nominal Voltage		Battery Operating End Point Voltage
Can EUT transmit whilst being charged?			Yes ☐ No ☐

EXTREME CONDITIONS					
Maximum temperature	45	°C	Minimum temperature	0	°C

Ancillaries	
Please list all ancillaries which will be used with the device.	
AC/DC Adaptor 12V output	Or
PoE+ Splitter with 12V output	



Product Service

ANTENNA CHARACTERISTICS			
☐	Antenna connector	State impedance	Ohm
☐	Temporary antenna connector	State impedance	Ohm
☒	Integral antenna	Type	PCB Mount
☐	External antenna	Type	

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

Name: Costa Panayi

Position held: Product Design and Development Engineer

Date: 09/08/2017

1.5 PRODUCT INFORMATION

1.5.1 Technical Description

The Equipment Under Test (EUT) was an ip.access Ltd, S6x Family Access Point, Model: 435R

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

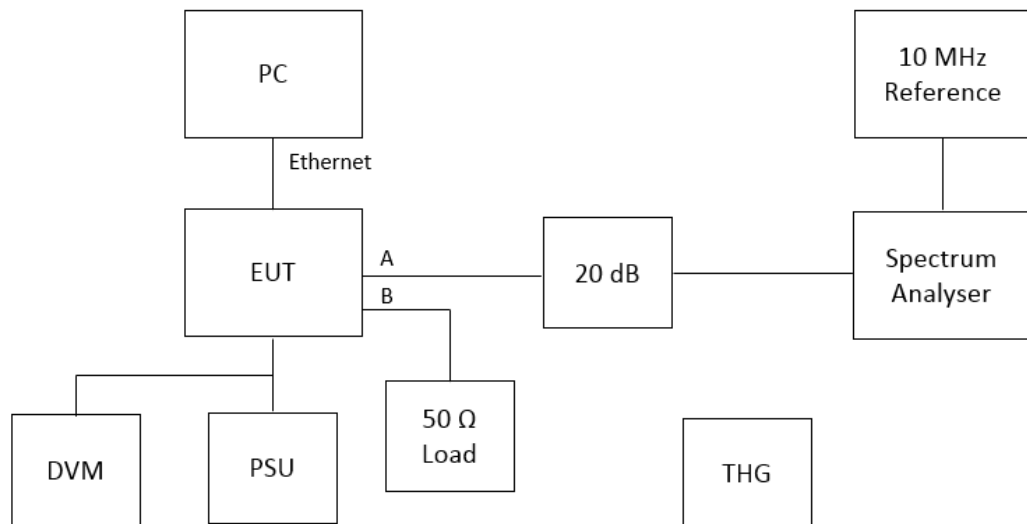


Equipment Under Test



Equipment Under Test

1.6 TEST SETUP





Product Service

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 12 V 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 TEST SITE

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

Test Name	Name of Engineer(s)
Maximum Peak Output Power and Peak to Average Ratio – Conducted	Mohamed Toubella
Occupied Bandwidth	Mohamed Toubella
Radiated Spurious Emissions	Graeme Lawler
Band Edge	Mohamed Toubella
Transmitter Spurious Emissions	Mohamed Toubella
Frequency Stability	Matthew Russell



Product Service

SECTION 2

TEST DETAILS



Product Service

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 24, Clause 24.232 (a)

2.1.2 Date of Test and Modification State

20 September to 12 October 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 - 23.3°C
Relative Humidity	55.2 - 41.9%

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.



Product Service

2.1.6 Test Results

Configuration 1

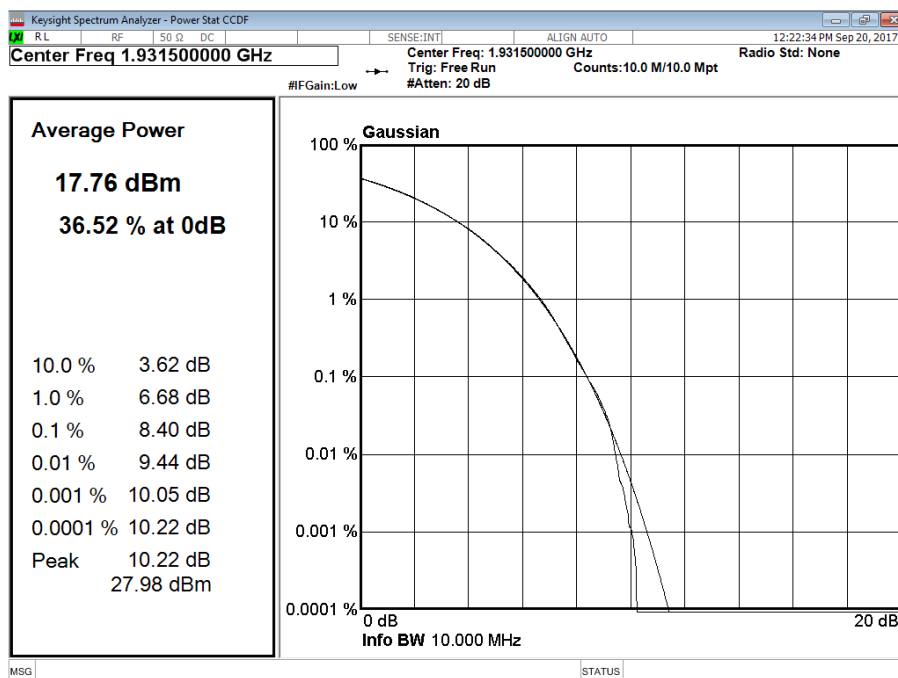
Maximum Output Power 20 dBm

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	3.0 MHz	8.40	17.73	14.04
B	QPSK	3.0 MHz	8.40	18.05	14.41
Total			-	20.90	17.24
A	16QAM	3.0 MHz	8.43	17.70	14.28
B	16QAM	3.0 MHz	8.36	17.92	14.61
Total			-	20.82	17.46
A	64QAM	3.0 MHz	8.41	17.72	14.01
B	64QAM	3.0 MHz	8.38	18.05	14.27
Total			-	20.90	17.15
A	QPSK	5.0 MHz	8.49	16.68	10.89
B	QPSK	5.0 MHz	8.61	16.27	10.44
Total			-	19.49	13.68
A	16QAM	5.0 MHz	8.38	16.62	11.19
B	16QAM	5.0 MHz	8.45	16.15	10.68
Total			-	19.40	13.95
A	64QAM	5.0 MHz	8.43	16.65	11.53
B	64QAM	5.0 MHz	8.54	16.23	10.50
Total			-	19.46	14.06
A	QPSK	10.0 MHz	8.46	17.70	9.32
B	QPSK	10.0 MHz	8.45	17.69	9.14
Total			-	20.71	12.24
A	16QAM	10.0 MHz	8.50	17.69	9.56
B	16QAM	10.0 MHz	8.49	17.86	9.59
Total			-	20.79	12.59
A	64QAM	10.0 MHz	8.49	17.81	9.25
B	64QAM	10.0 MHz	8.50	17.78	9.26
Total			-	20.81	12.27
A	QPSK	15.0 MHz	9.74	16.63	6.51
B	QPSK	15.0 MHz	10.70	16.16	6.01
Total			-	19.41	9.28
A	16QAM	15.0 MHz	10.62	16.73	7.24
B	16QAM	15.0 MHz	11.31	16.64	7.31
Total			-	19.70	10.29
A	64QAM	15.0 MHz	11.03	17.04	6.98
B	64QAM	15.0 MHz	11.25	16.91	7.38
Total			-	19.99	10.19
A	QPSK	20.0 MHz	10.79	18.35	7.32
B	QPSK	20.0 MHz	10.77	18.44	7.08
Total			-	21.41	10.21
A	16QAM	20.0 MHz	10.84	17.77	6.39
B	16QAM	20.0 MHz	10.54	18.81	8.36
Total			-	21.33	10.50
A	64QAM	20.0 MHz	10.66	18.61	8.06
B	64QAM	20.0 MHz	10.45	18.97	8.59
Total			-	21.80	11.34

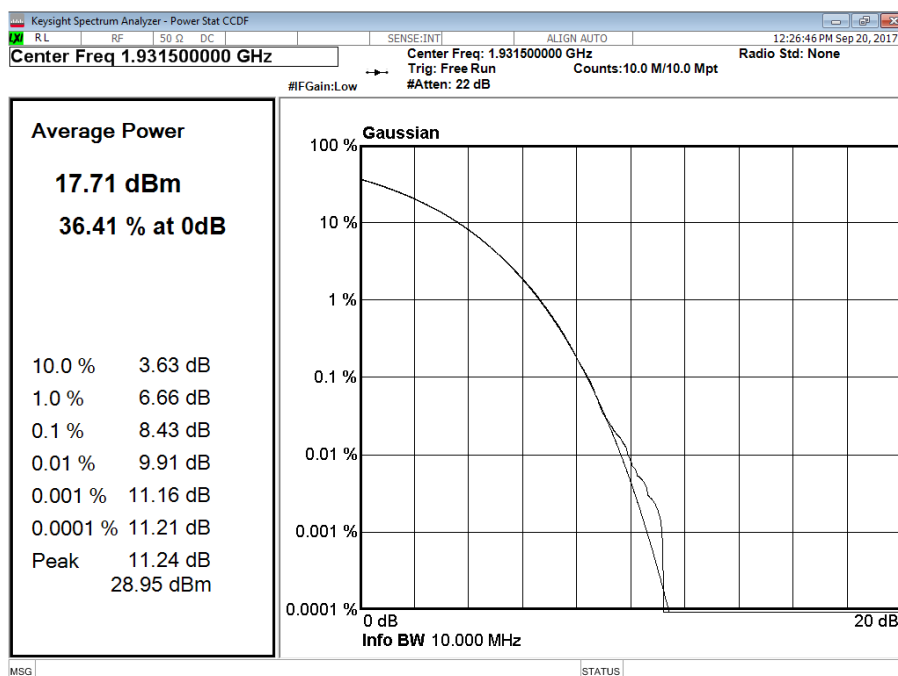


Product Service

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



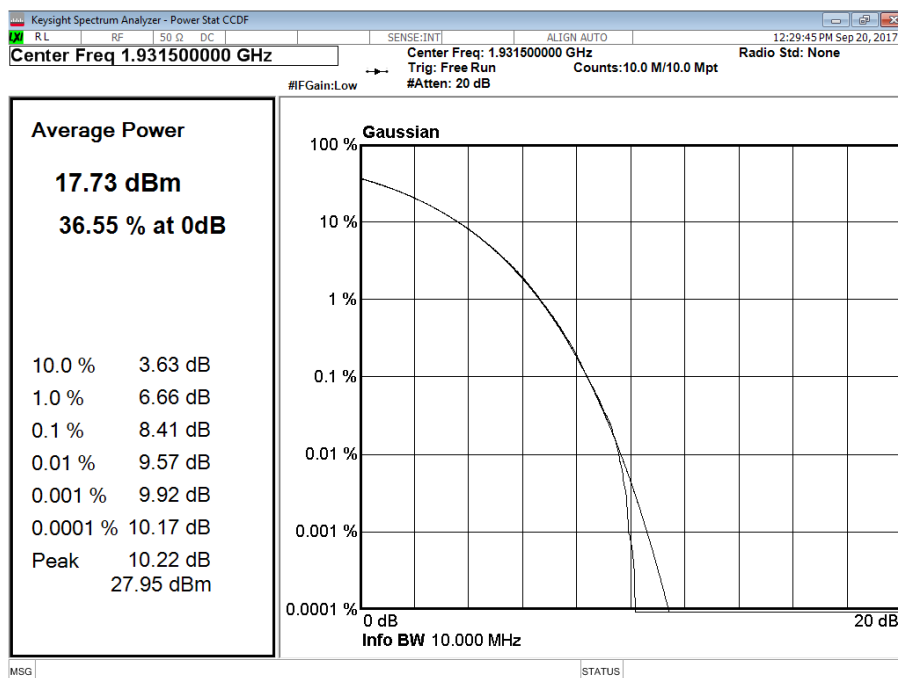
Antenna A - LTE Modulation 16QAM - LTE Carrier Bandwidth 3.0 MHz - Channel Position B



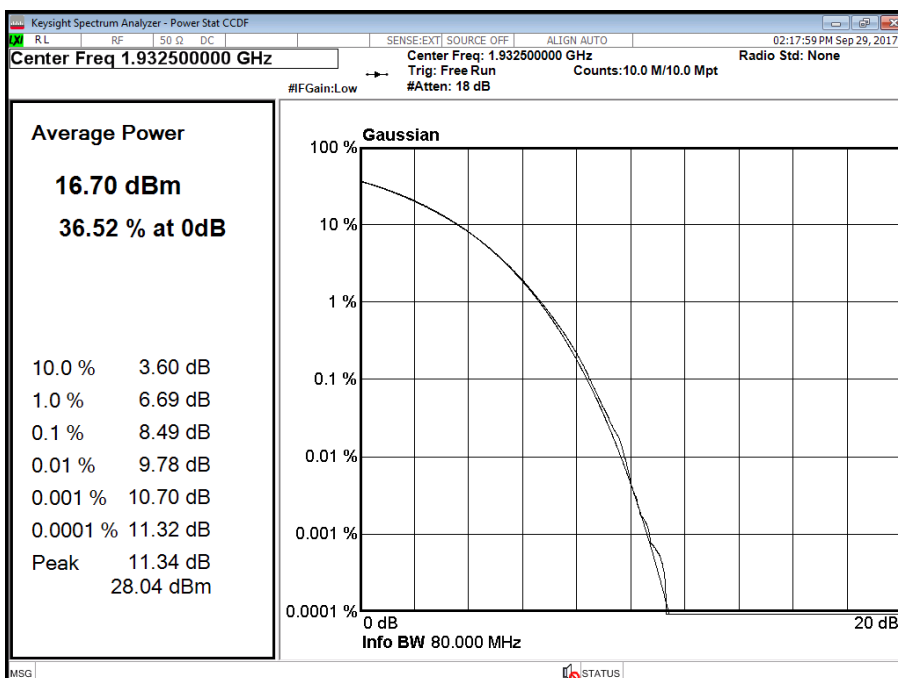


Product Service

Antenna A - LTE Modulation 64QAM - LTE Carrier Bandwidth 3.0 MHz - Channel Position B



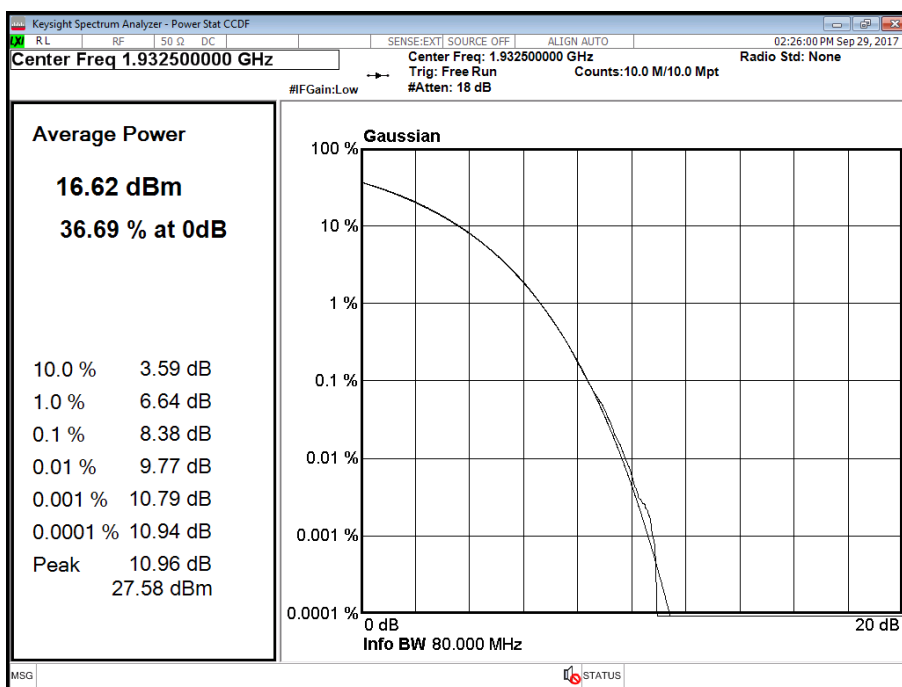
Antenna A - LTE Modulation QPSK - LTE Carrier Bandwidth 5.0 MHz - Channel Position B



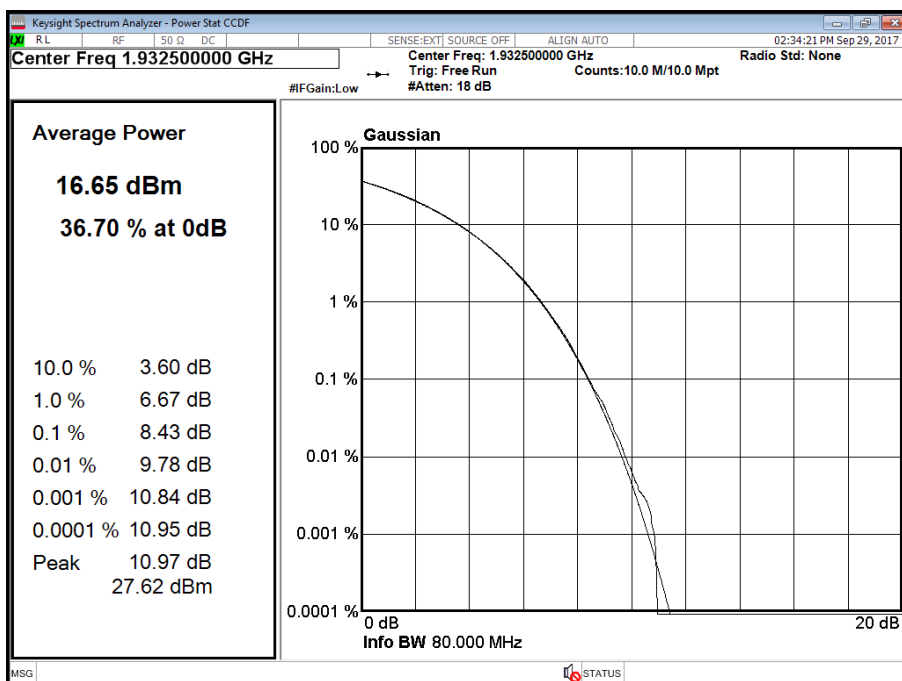


Product Service

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



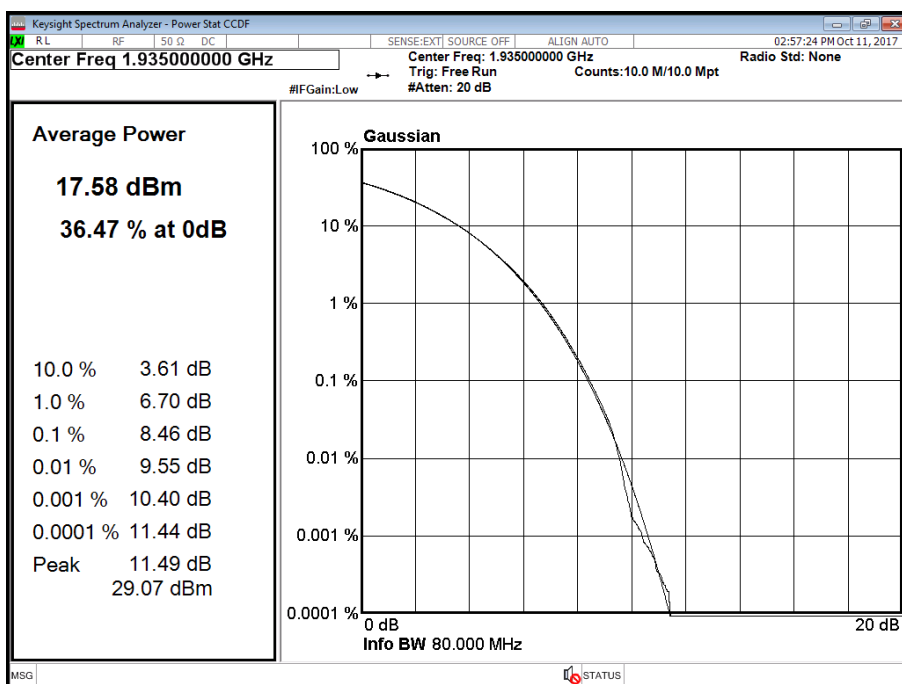
Antenna A - LTE Modulation 64QAM - LTE Carrier Bandwidth 5.0 MHz - Channel Position B



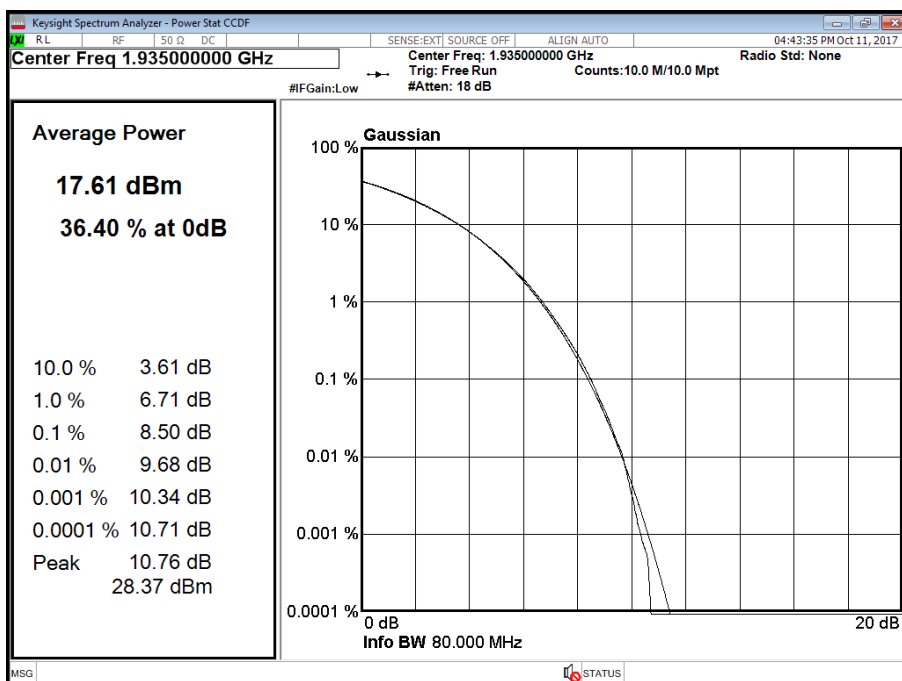


Product Service

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



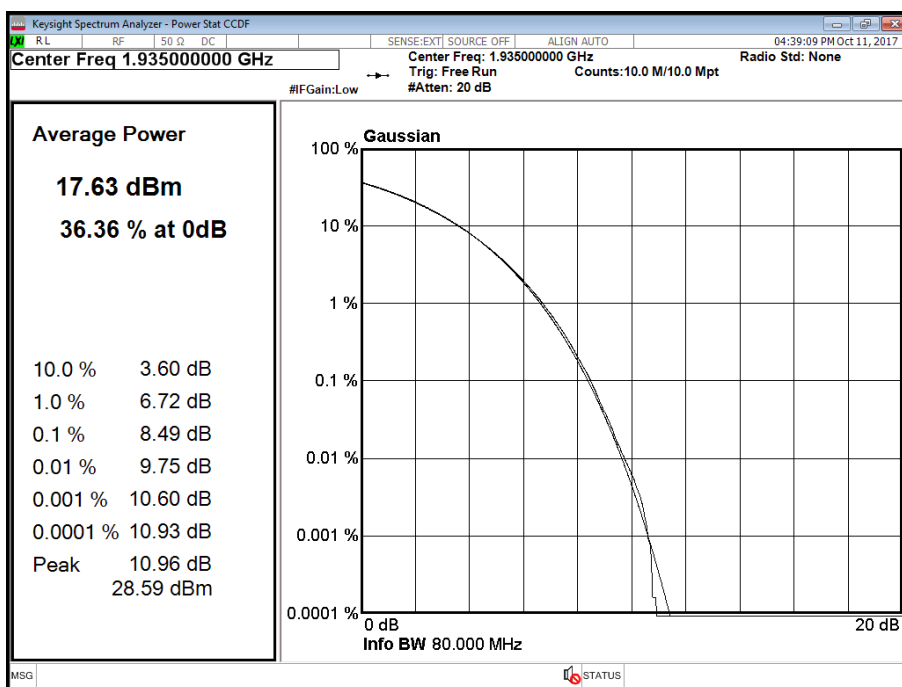
Antenna A - LTE Modulation 16QAM - LTE Carrier Bandwidth 10.0 MHz - Channel Position B



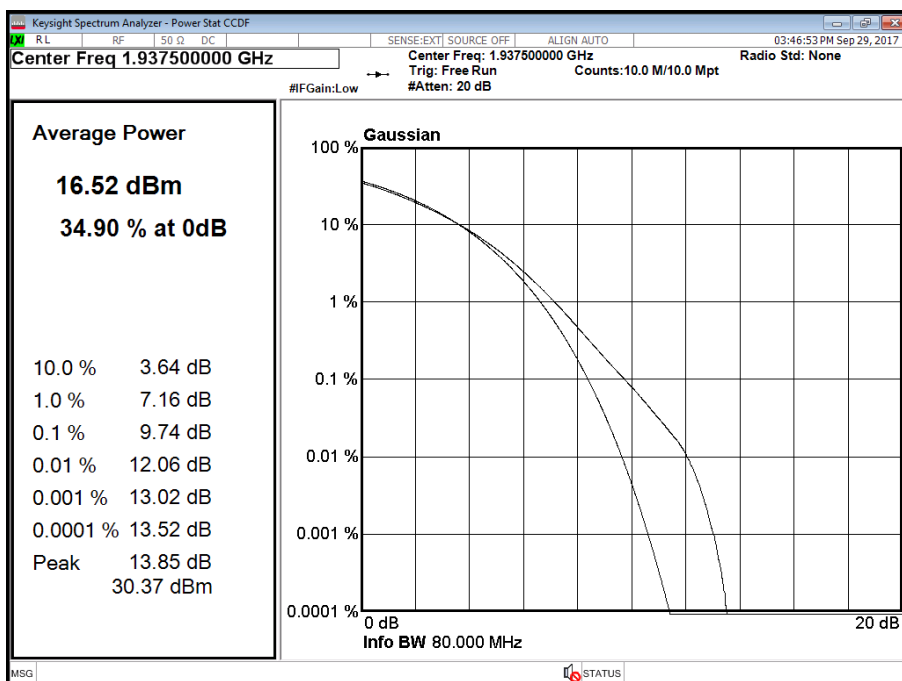


Product Service

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



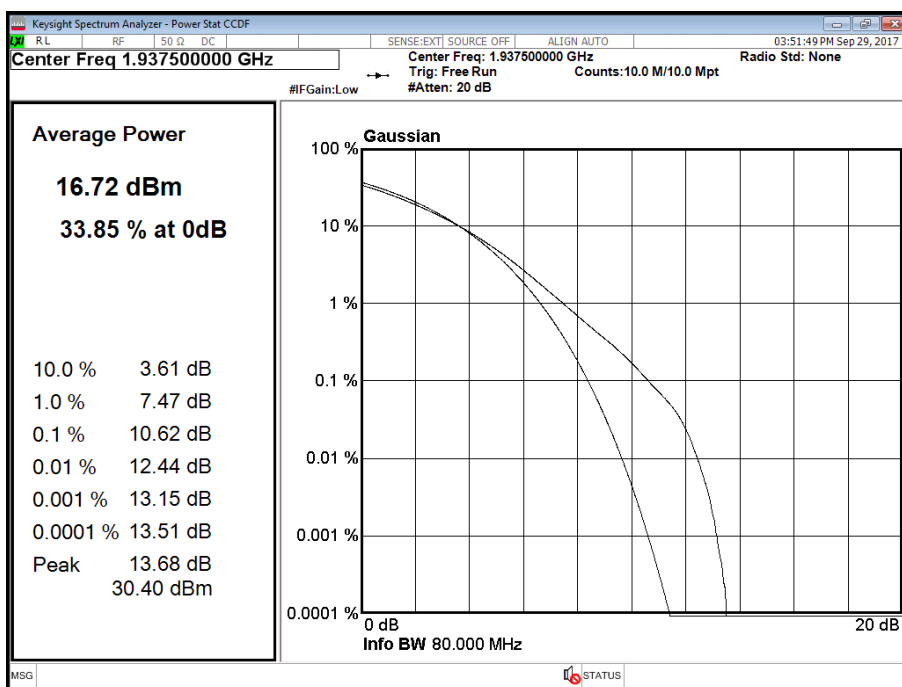
Antenna A - LTE Modulation QPSK - LTE Carrier Bandwidth 15.0 MHz - Channel Position B



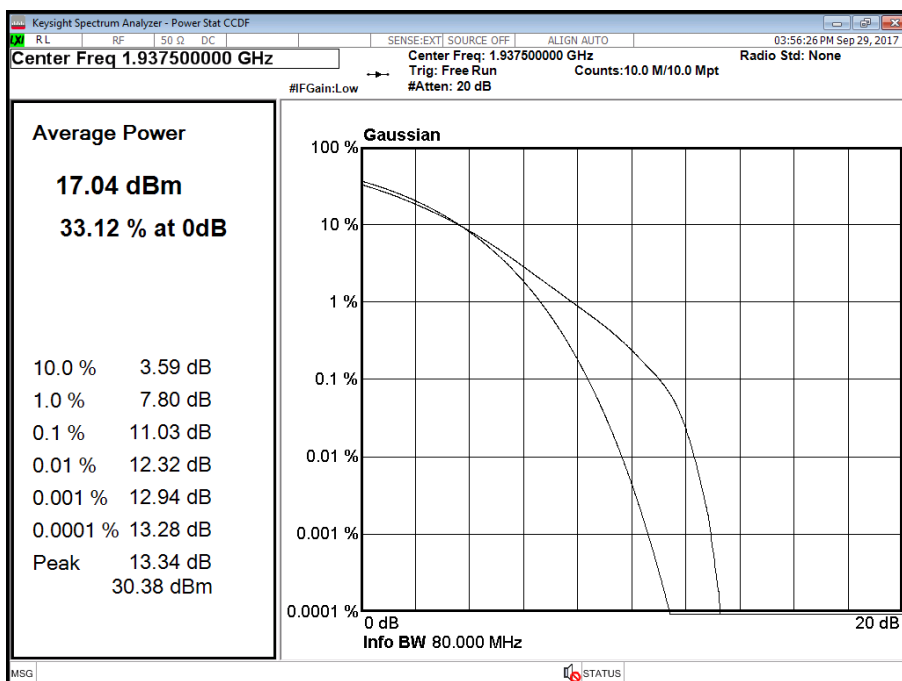


Product Service

Antenna A - LTE Modulation 16QAM - LTE Carrier Bandwidth 15.0 MHz - Channel Position B



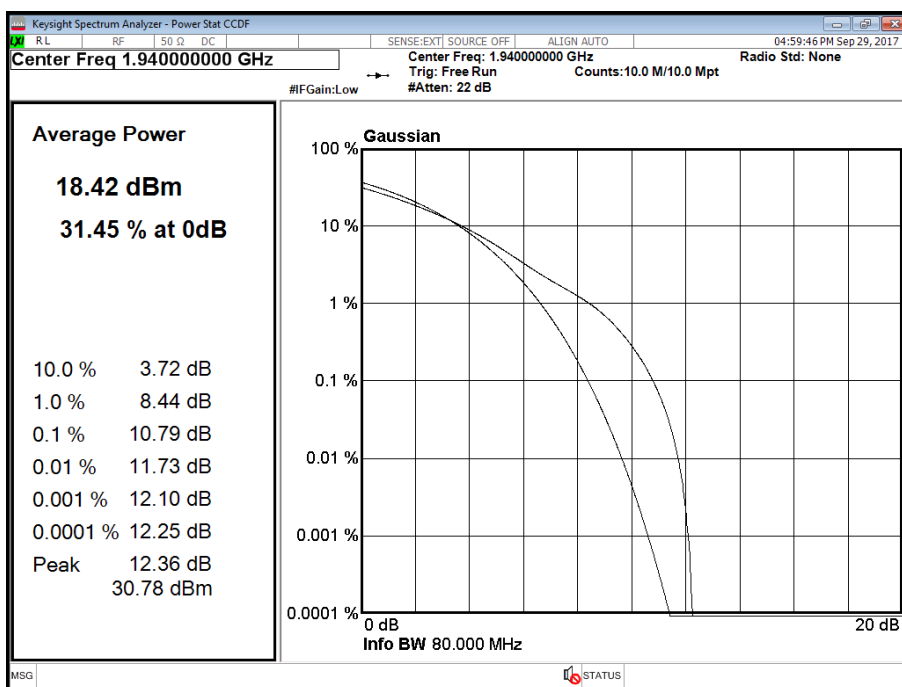
Antenna A - LTE Modulation 64QAM - LTE Carrier Bandwidth 15.0 MHz - Channel Position B



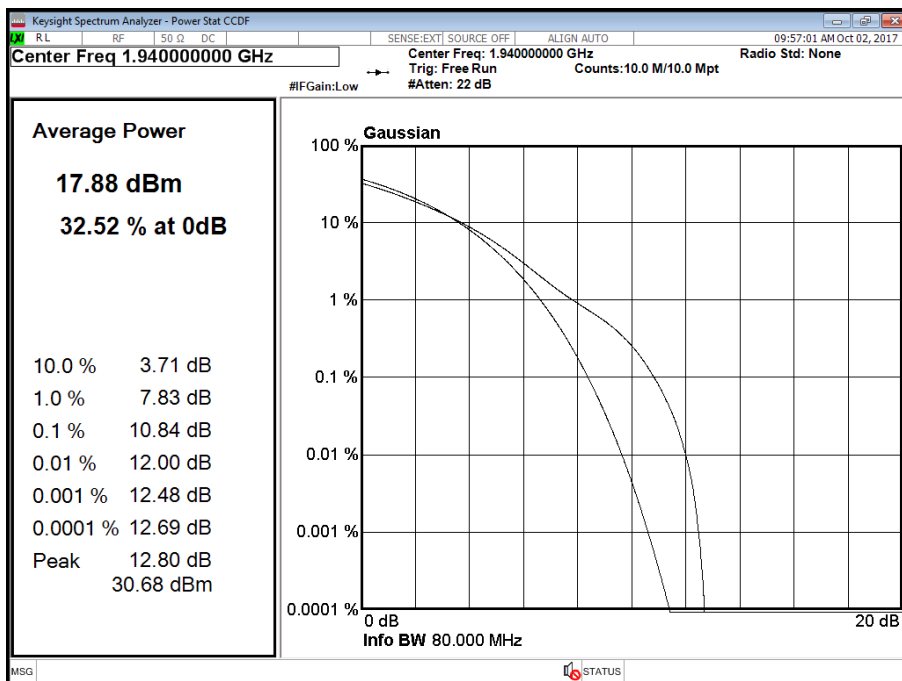


Product Service

Antenna A - LTE Modulation QPSK - LTE Carrier Bandwidth 20.0 MHz - Channel Position B



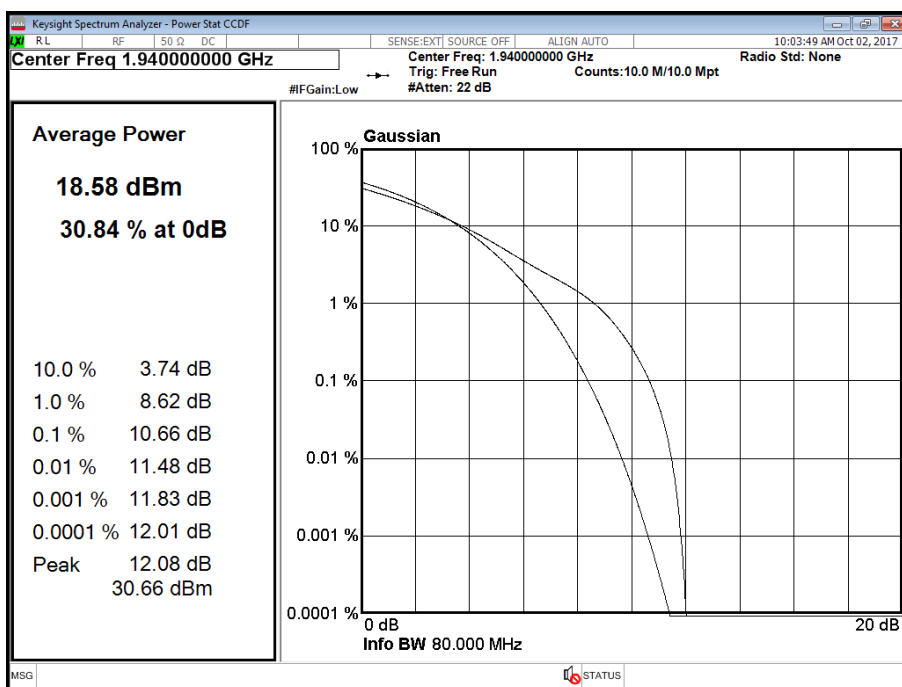
Antenna A - LTE Modulation 16QAM - LTE Carrier Bandwidth 20.0 MHz - Channel Position B



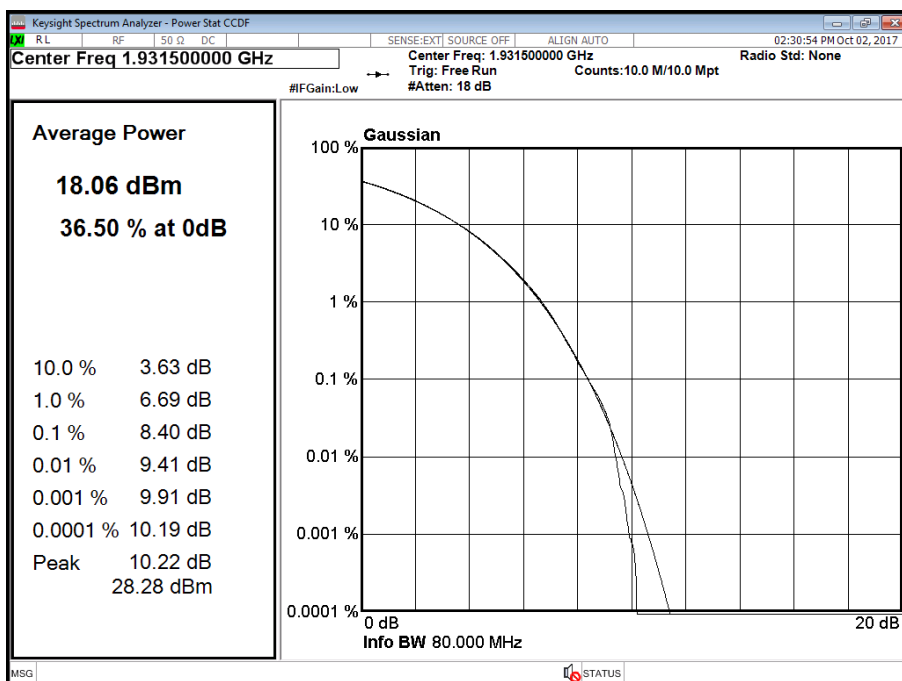


Product Service

Antenna A - LTE Modulation 64QAM - LTE Carrier Bandwidth 20.0 MHz - Channel Position B



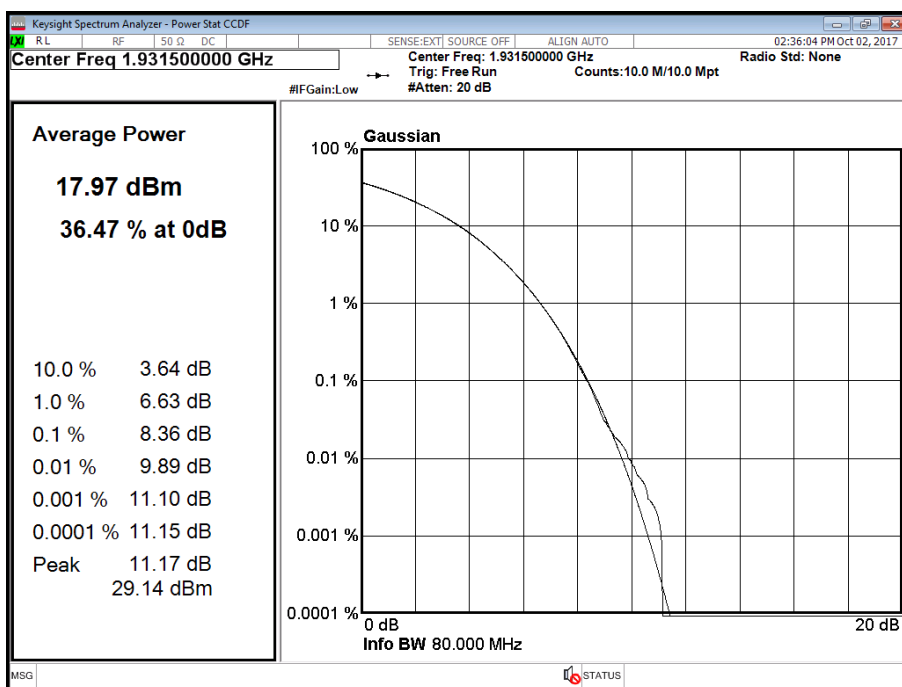
Antenna B - LTE Modulation QPSK - LTE Carrier Bandwidth 3.0 MHz - Channel Position B



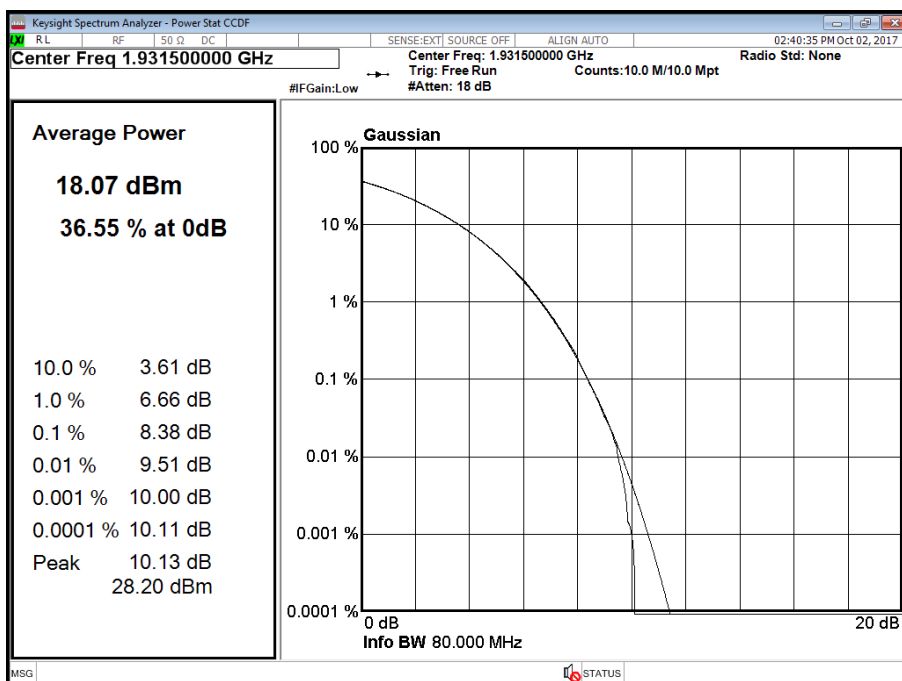


Product Service

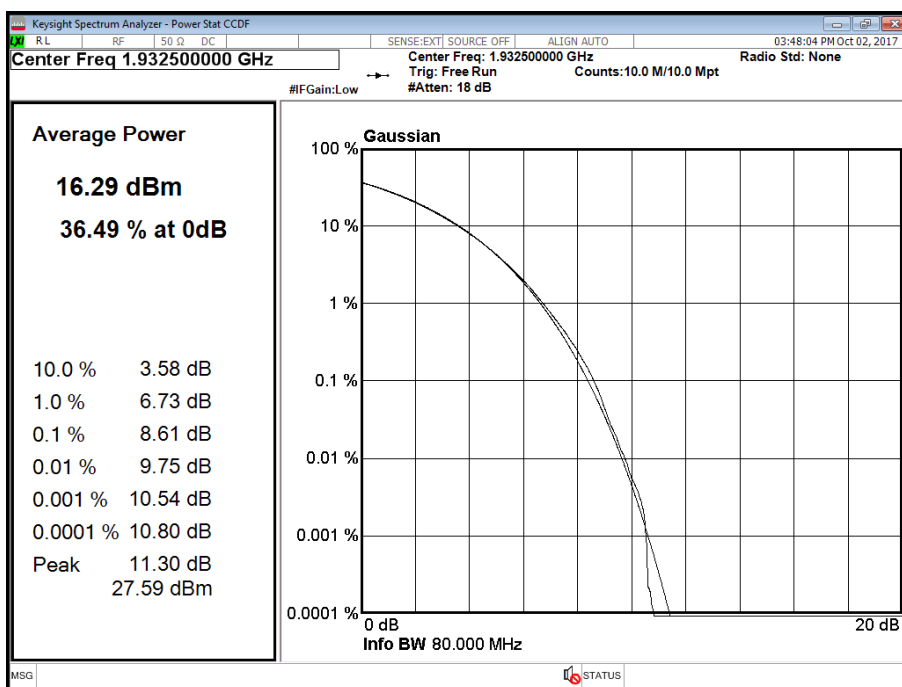
Antenna B - LTE Modulation 16QAM - LTE Carrier Bandwidth 3.0 MHz - Channel Position B



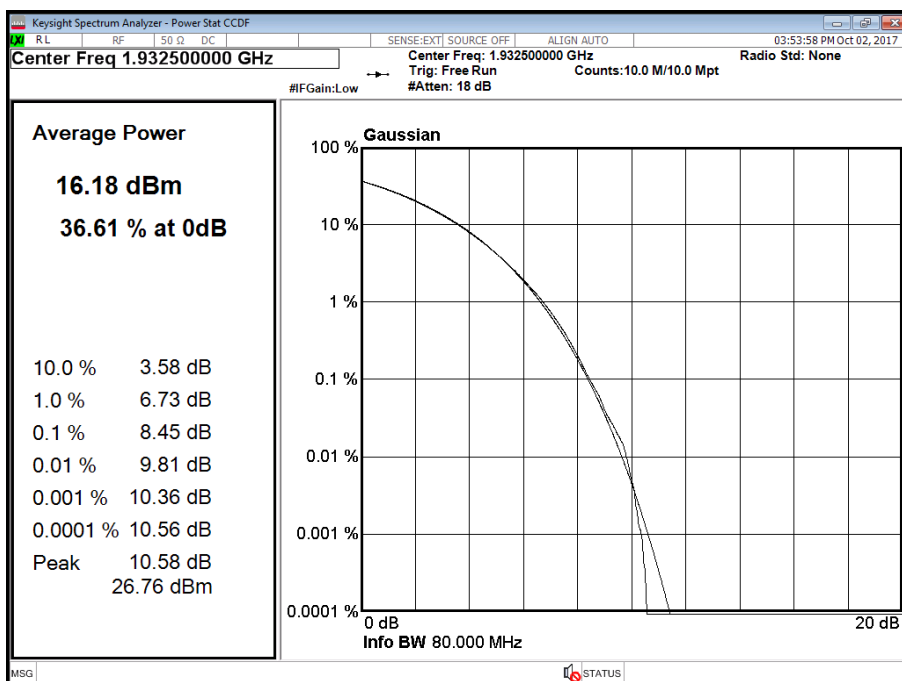
Antenna B - LTE Modulation 64QAM - LTE Carrier Bandwidth 3.0 MHz - Channel Position B



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



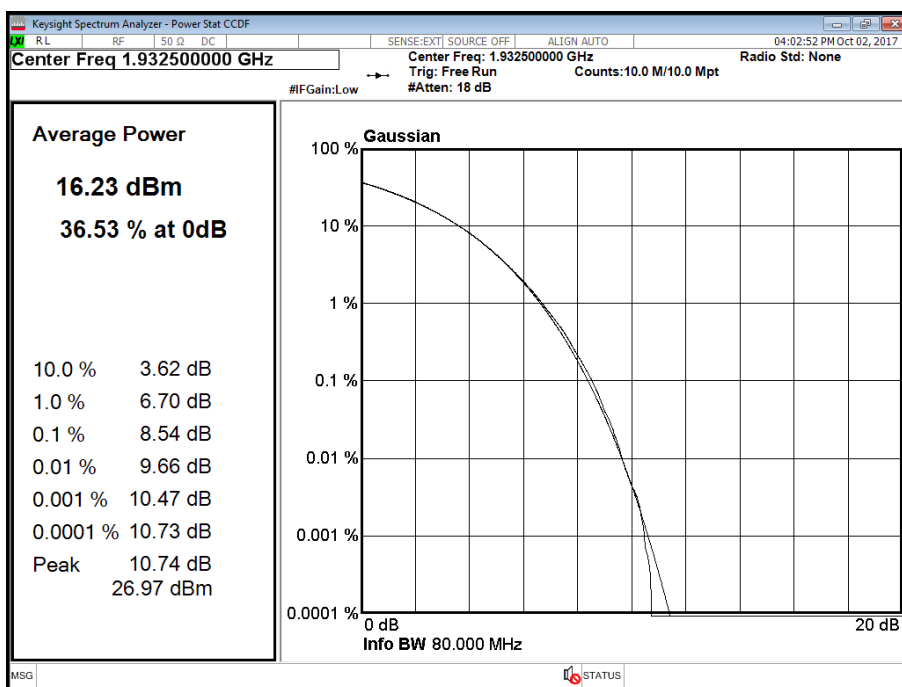
Antenna B - LTE Modulation 16QAM - LTE Carrier Bandwidth 5.0 MHz - Channel Position B



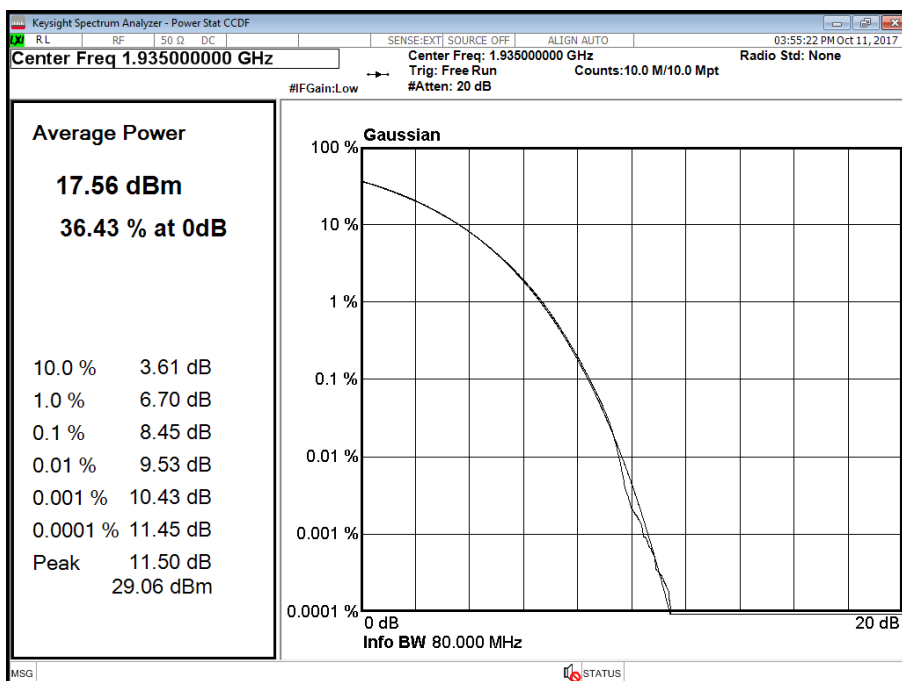


Product Service

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



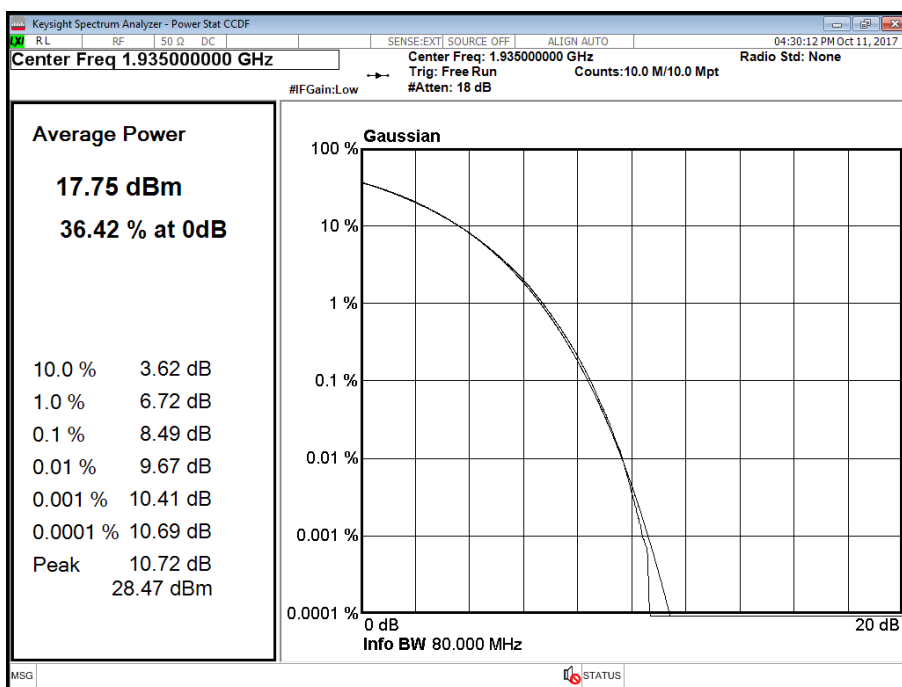
Antenna B - LTE Modulation QPSK - LTE Carrier Bandwidth 10.0 MHz - Channel Position B



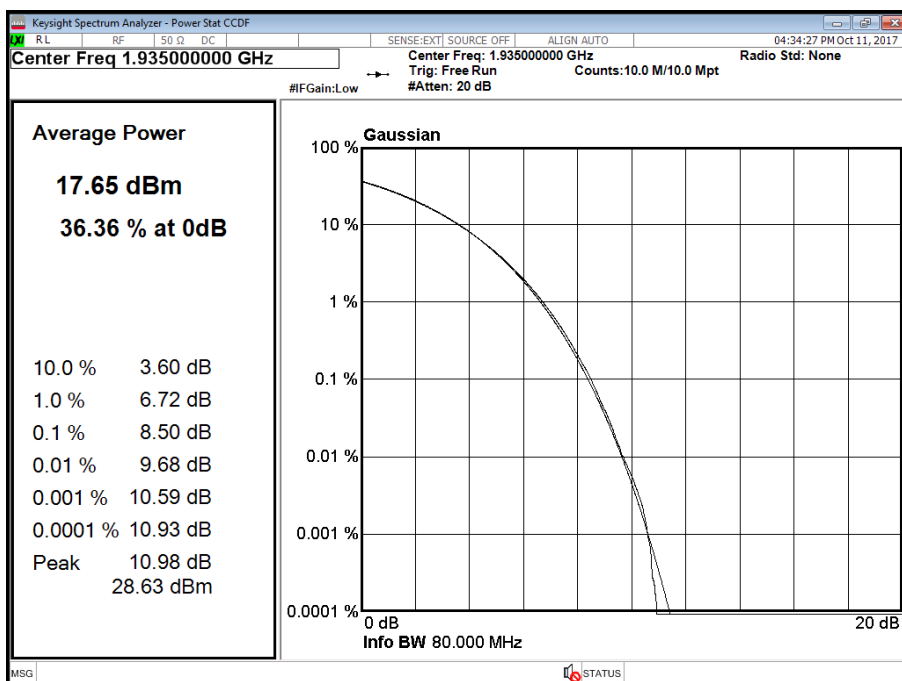


Product Service

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



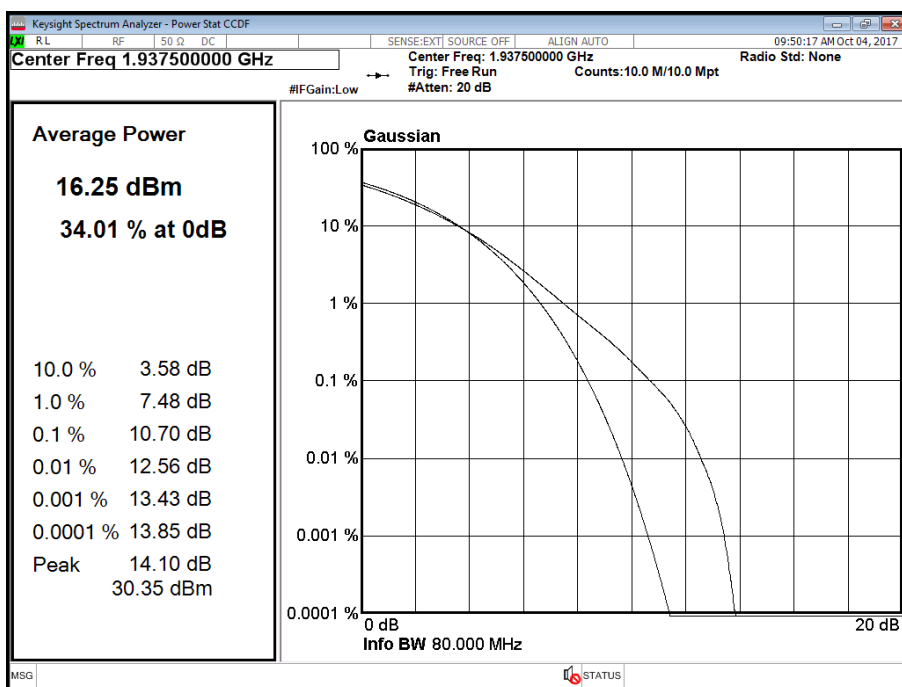
Antenna B - LTE Modulation 64QAM - LTE Carrier Bandwidth 10.0 MHz - Channel Position B



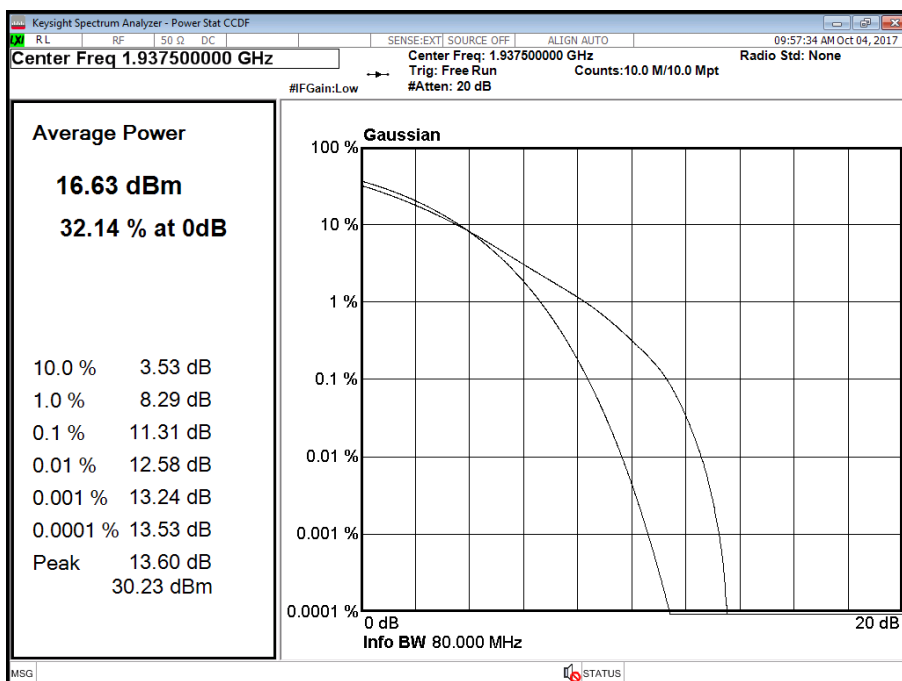


Product Service

Antenna B - LTE Modulation QPSK - LTE Carrier Bandwidth 15.0 MHz - Channel Position B



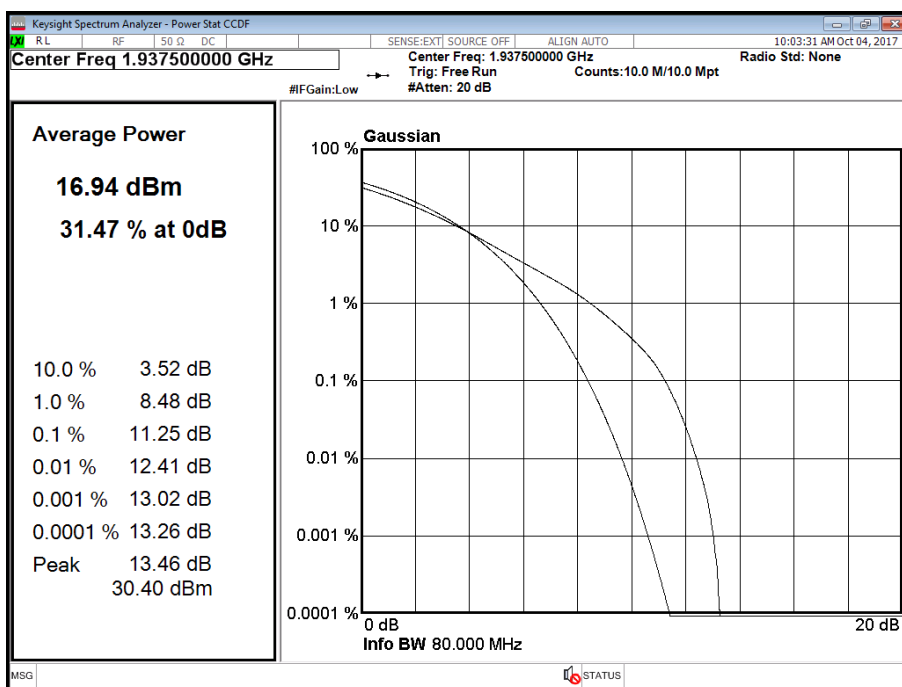
Antenna B - LTE Modulation 16QAM - LTE Carrier Bandwidth 15.0 MHz - Channel Position B



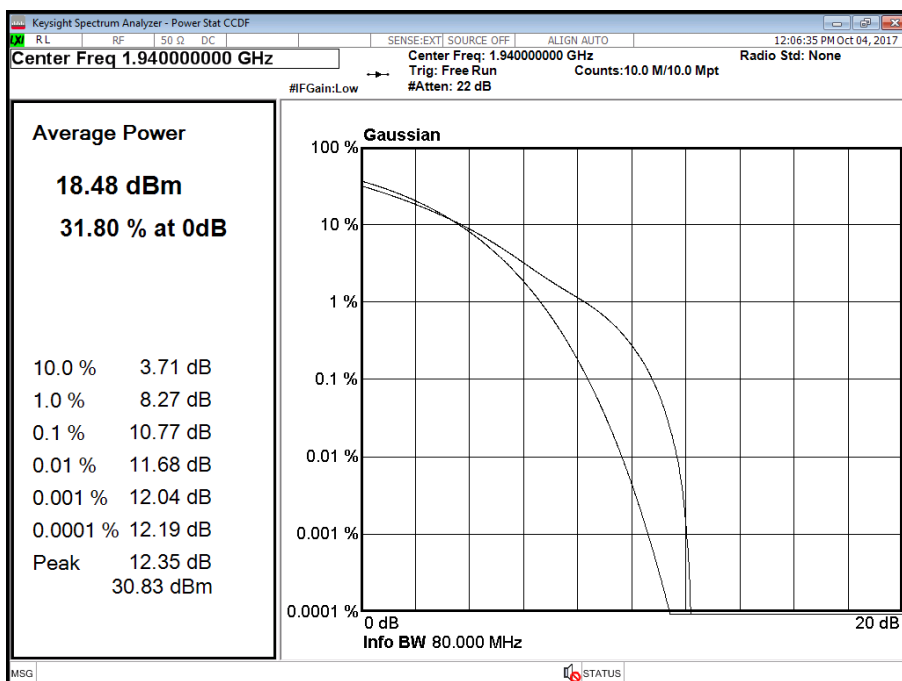


Product Service

Antenna B - LTE Modulation 64QAM - LTE Carrier Bandwidth 15.0 MHz - Channel Position B



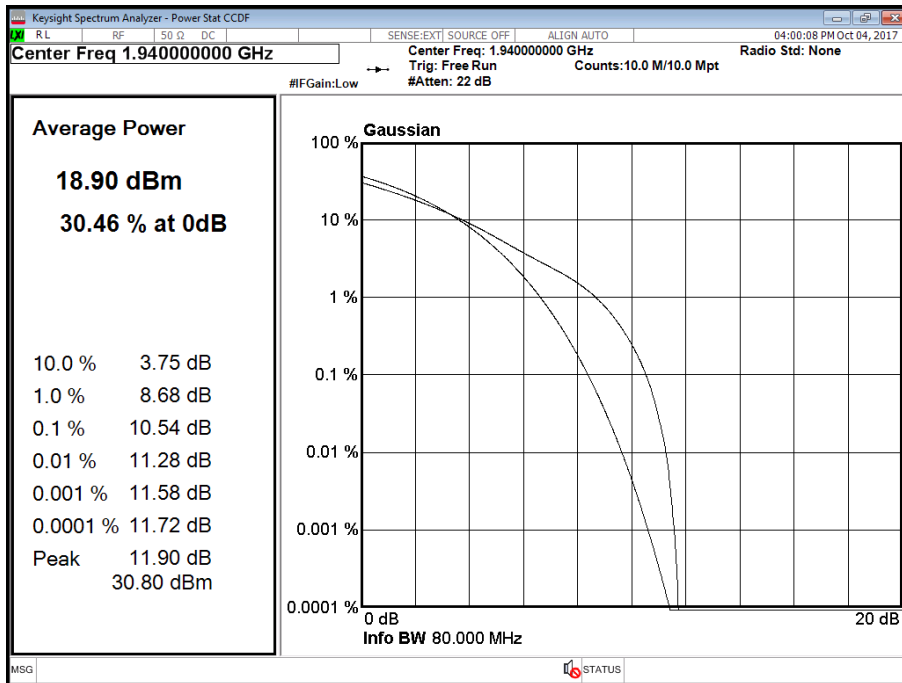
Antenna B - LTE Modulation QPSK - LTE Carrier Bandwidth 20.0 MHz - Channel Position B



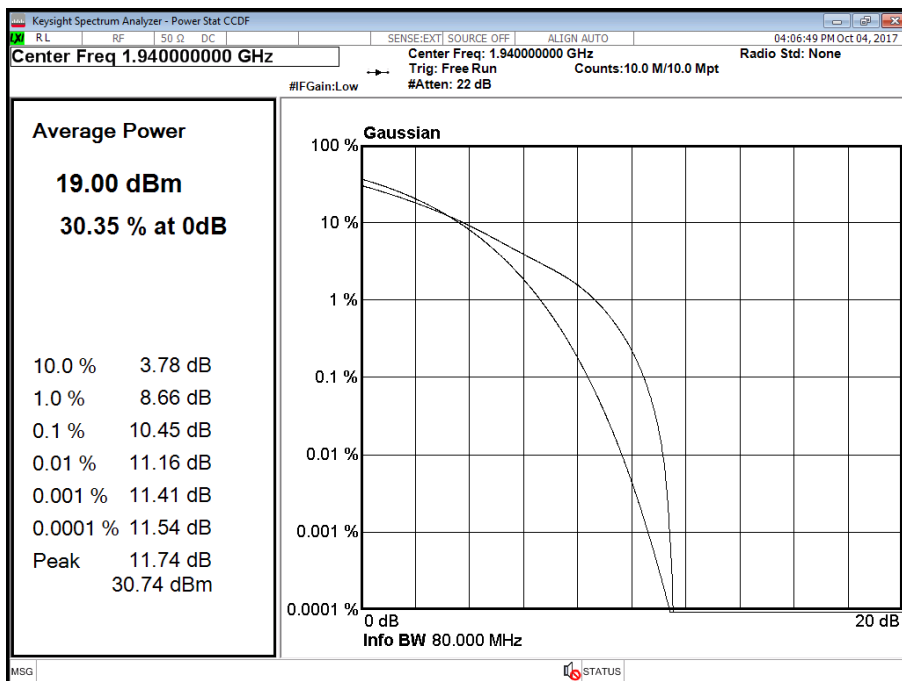


Product Service

Antenna B - LTE Modulation 16QAM - LTE Carrier Bandwidth 20.0 MHz - Channel Position B



Antenna B - LTE Modulation 64QAM - LTE Carrier Bandwidth 20.0 MHz - Channel Position B





Product Service

Configuration 1

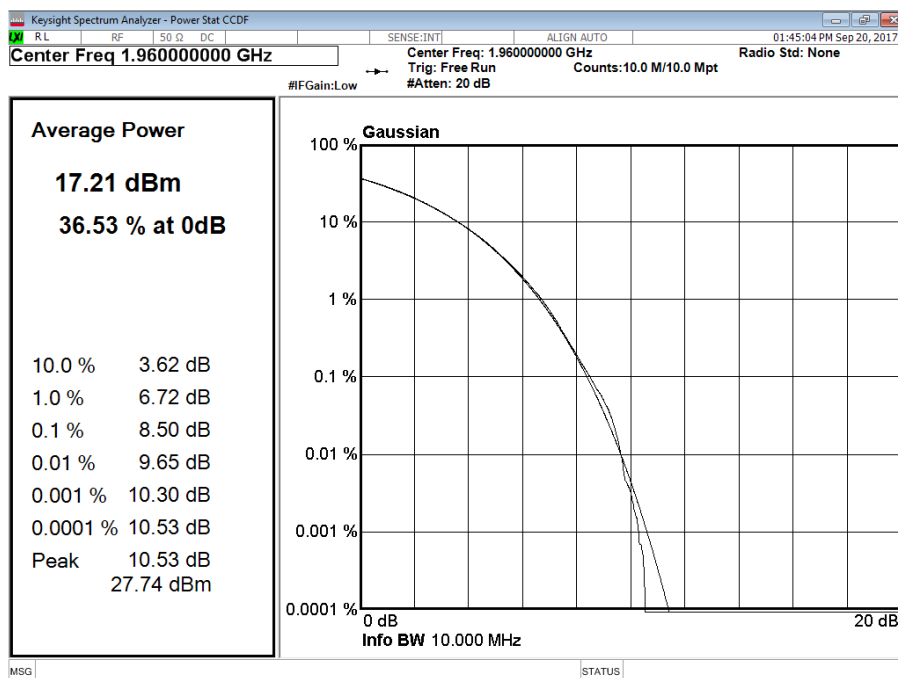
Maximum Output Power 20 dBm

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	3.0 MHz	8.50	17.22	13.49
B	QPSK	3.0 MHz	8.53	17.77	14.03
Total			-	20.51	16.78
A	16QAM	3.0 MHz	8.52	17.22	13.77
B	16QAM	3.0 MHz	8.54	17.81	14.34
Total			-	20.54	17.07
A	64QAM	3.0 MHz	8.49	17.26	13.41
B	64QAM	3.0 MHz	8.48	17.62	13.83
Total			-	20.45	16.64
A	QPSK	5.0 MHz	8.53	17.68	11.77
B	QPSK	5.0 MHz	8.59	17.29	11.30
Total			-	20.50	14.55
A	16QAM	5.0 MHz	8.44	17.52	12.00
B	16QAM	5.0 MHz	8.48	17.12	11.48
Total			-	20.33	14.76
A	64QAM	5.0 MHz	8.43	17.69	11.63
B	64QAM	5.0 MHz	8.55	17.22	11.25
Total			-	20.47	14.45
A	QPSK	10.0 MHz	8.55	16.44	7.72
B	QPSK	10.0 MHz	8.56	16.15	7.64
Total			-	19.31	10.69
A	16QAM	10.0 MHz	8.55	16.04	7.61
B	16QAM	10.0 MHz	8.56	16.08	7.65
Total			-	19.07	10.64
A	64QAM	10.0 MHz	8.58	16.17	7.52
B	64QAM	10.0 MHz	8.57	16.06	7.45
Total			-	19.13	10.50
A	QPSK	15.0 MHz	8.61	16.17	5.80
B	QPSK	15.0 MHz	11.20	17.71	8.02
Total			-	20.02	10.06
A	16QAM	15.0 MHz	11.04	16.74	7.24
B	16QAM	15.0 MHz	11.22	17.76	8.98
Total			-	20.29	11.21
A	64QAM	15.0 MHz	11.25	17.13	6.99
B	64QAM	15.0 MHz	11.18	17.75	8.31
Total			-	20.46	10.71
A	QPSK	20.0 MHz	10.75	18.37	7.09
B	QPSK	20.0 MHz	8.67	16.85	5.26
Total			-	20.69	9.28
A	16QAM	20.0 MHz	10.57	18.73	7.97
B	16QAM	20.0 MHz	10.96	17.99	6.60
Total			-	21.39	10.35
A	64QAM	20.0 MHz	10.46	18.90	8.21
B	64QAM	20.0 MHz	10.64	18.47	8.27
Total			-	21.70	11.25

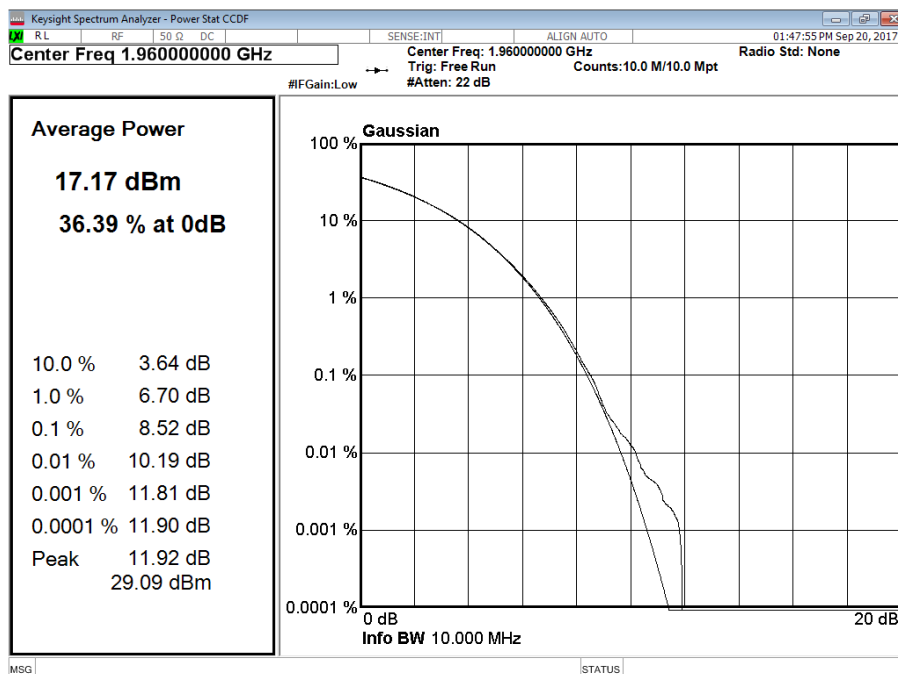


Product Service

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



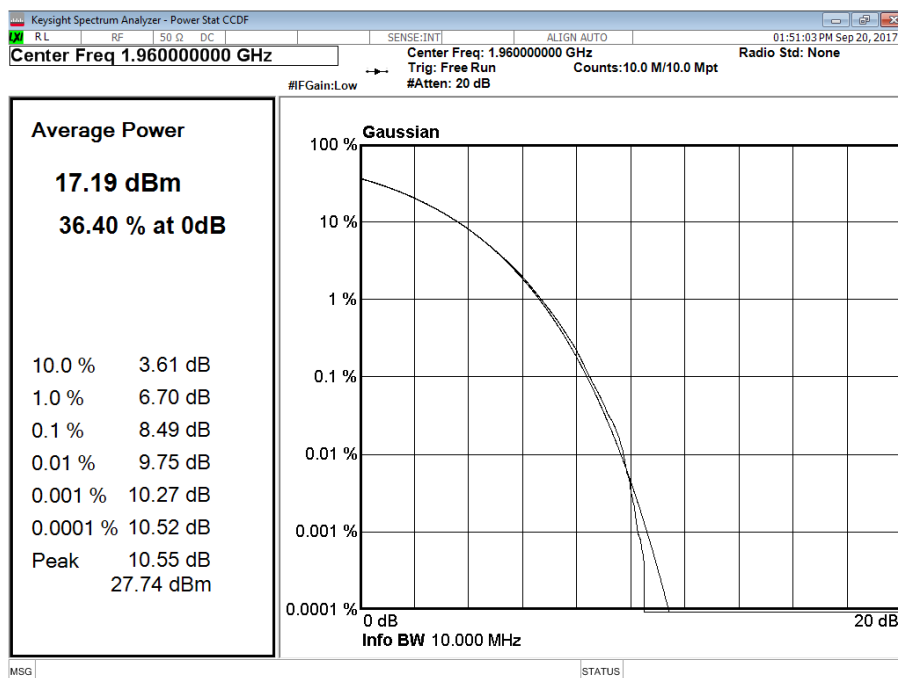
Antenna A - LTE Modulation 16QAM - LTE Carrier Bandwidth 3.0 MHz - Channel Position M



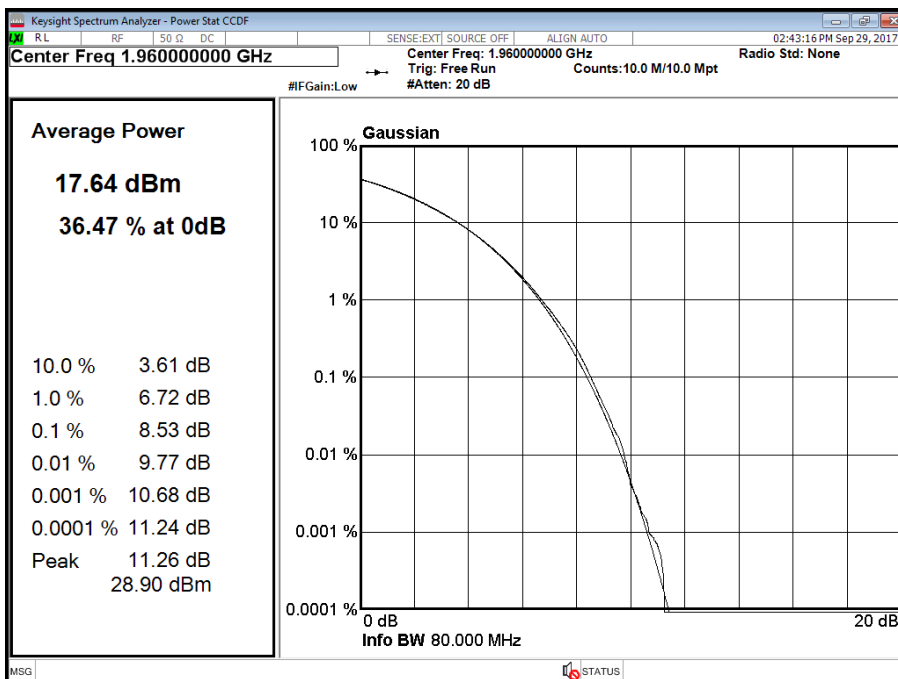


Product Service

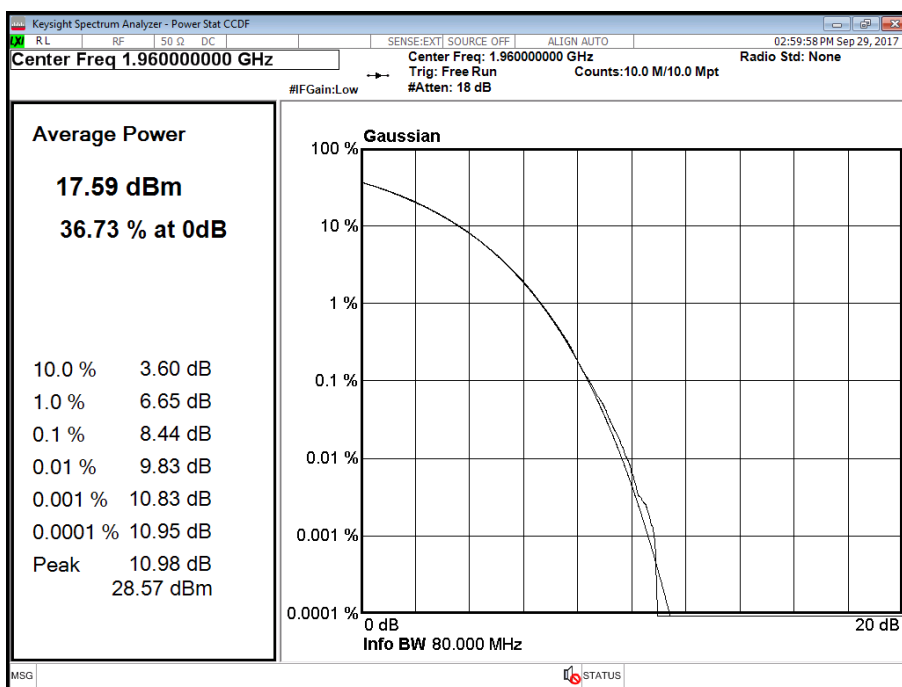
Antenna A - LTE Modulation 64QAM - LTE Carrier Bandwidth 3.0 MHz - Channel Position M



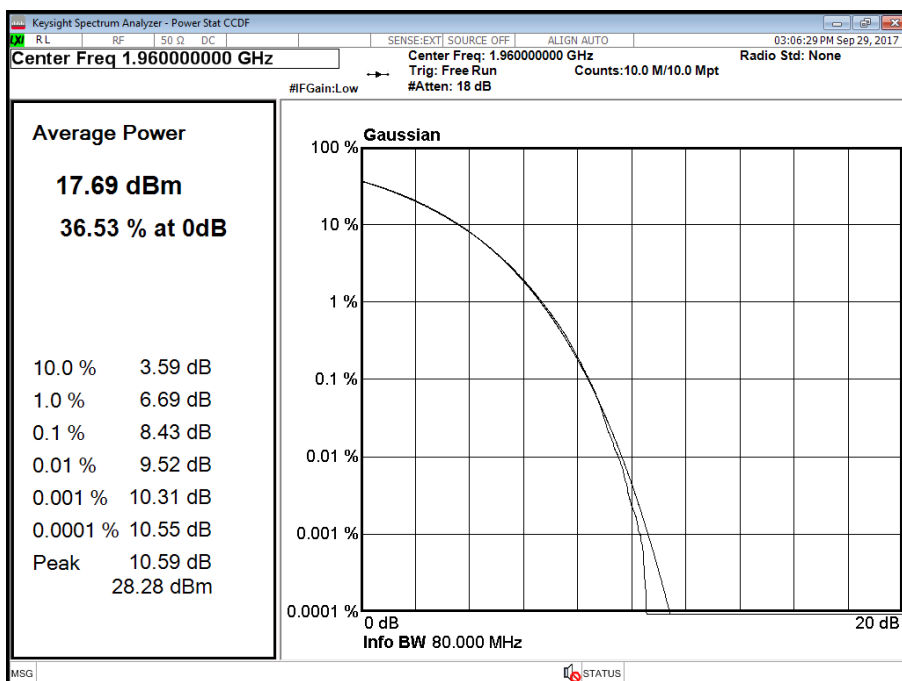
Antenna A - LTE Modulation QPSK - LTE Carrier Bandwidth 5.0 MHz - Channel Position M



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



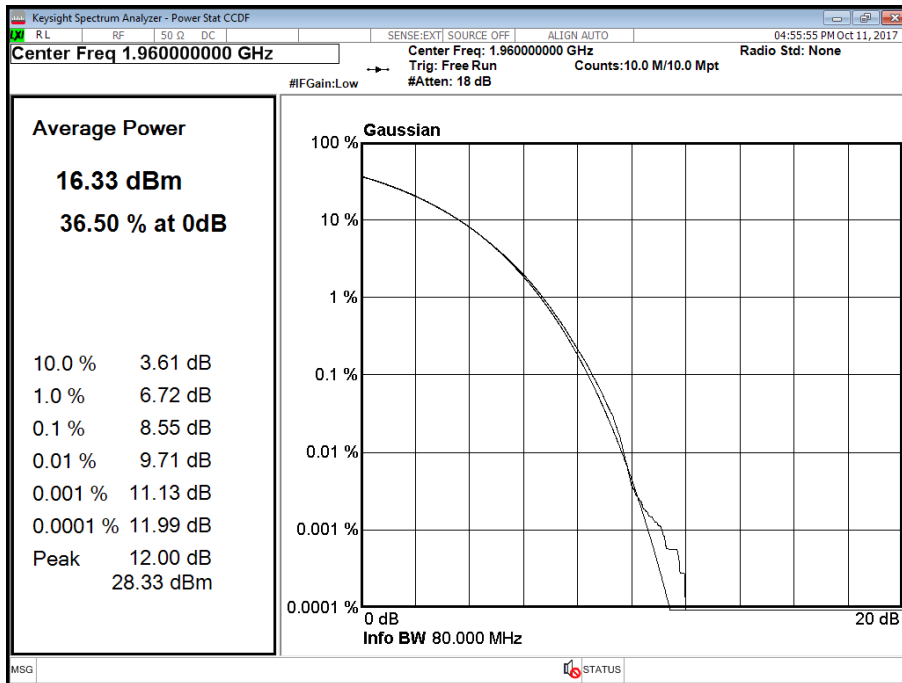
Antenna A - LTE Modulation 64QAM - LTE Carrier Bandwidth 5.0 MHz - Channel Position M



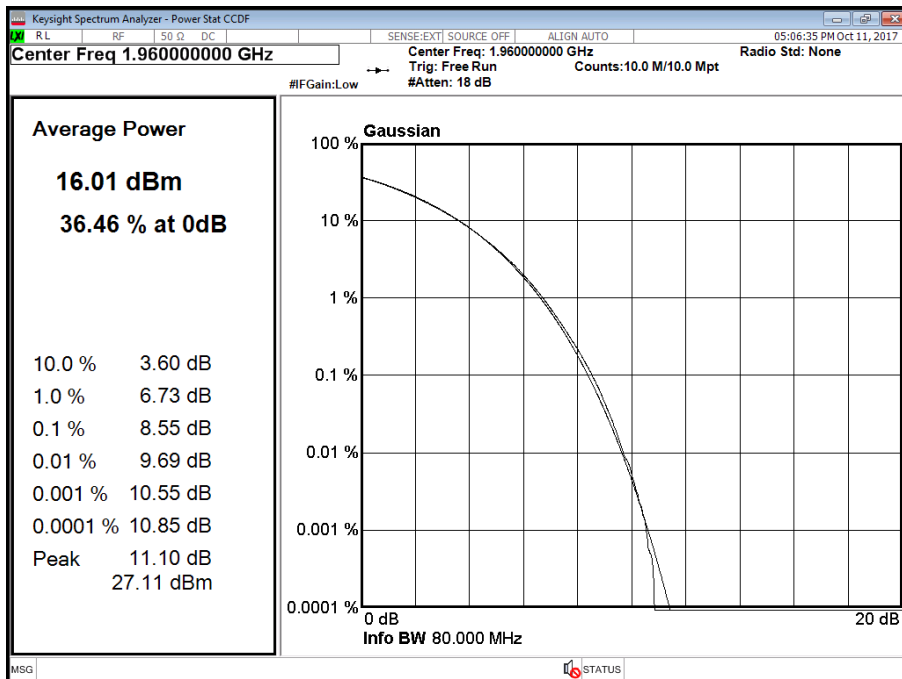


Product Service

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



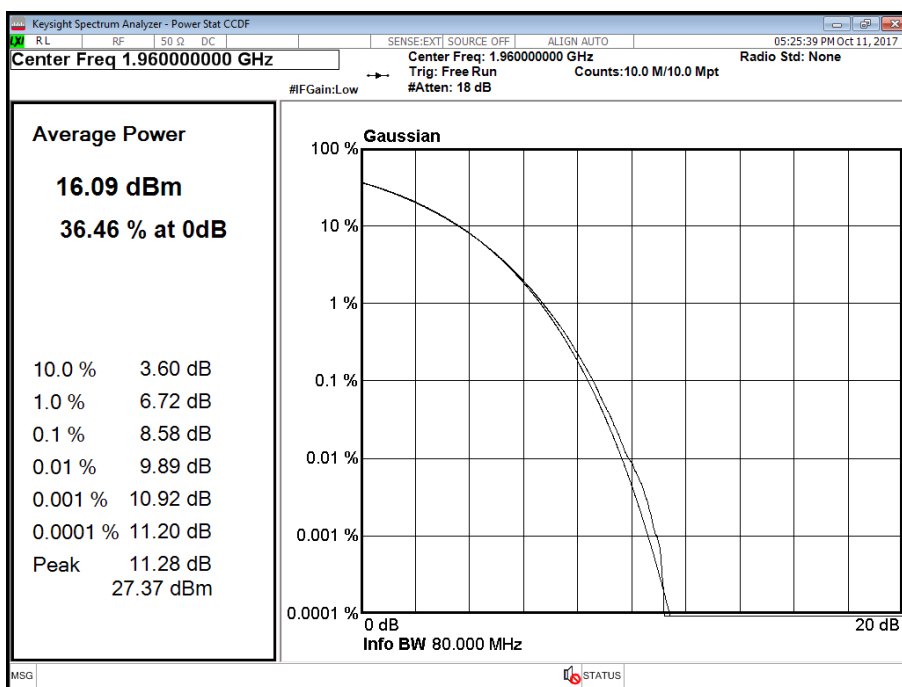
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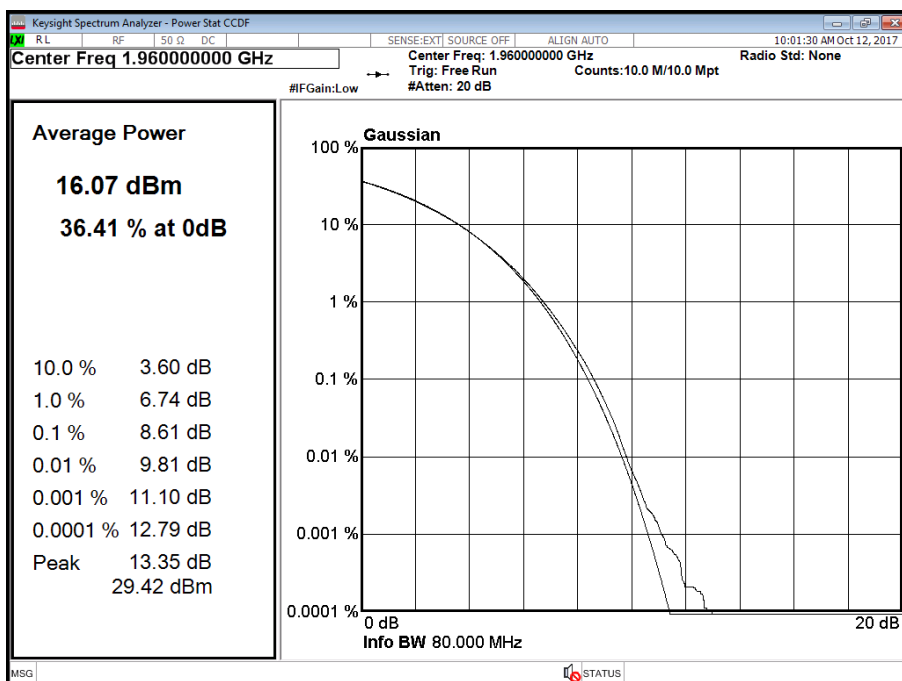


Product Service

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



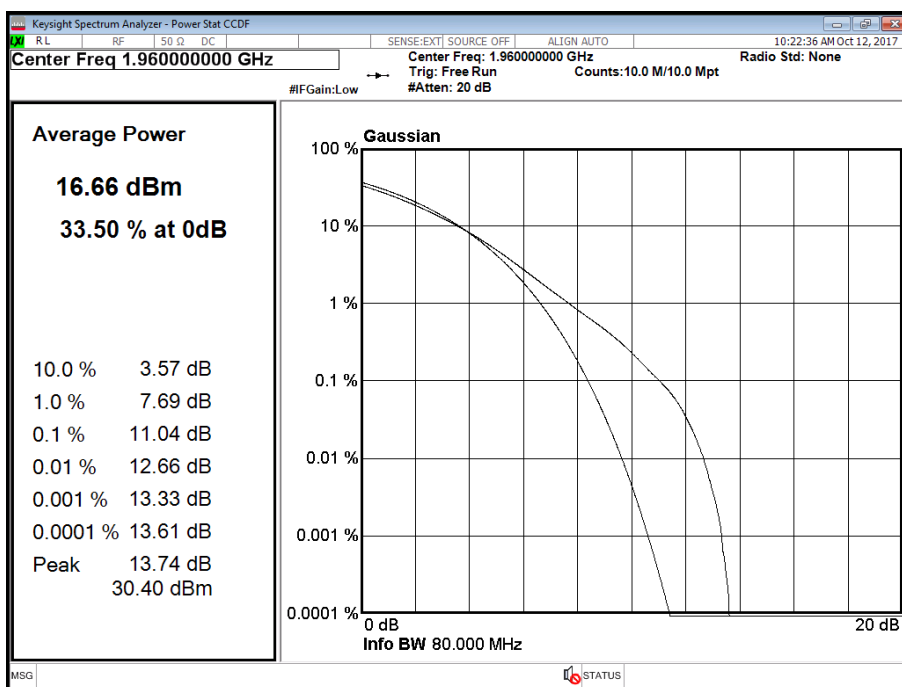
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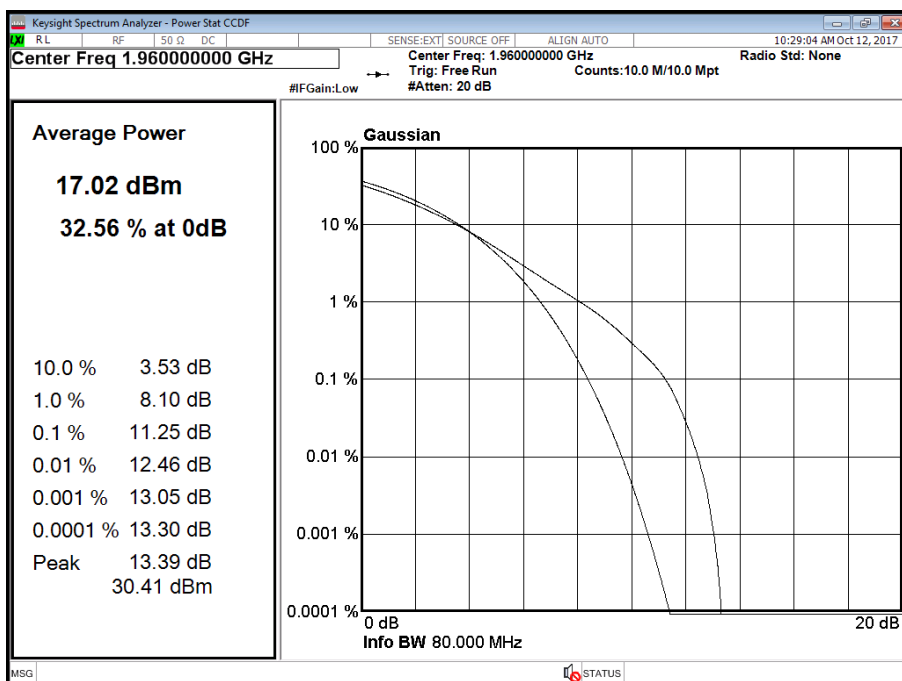


Product Service

Antenna A - LTE Modulation 16QAM - LTE Carrier Bandwidth 15.0 MHz - Channel Position M



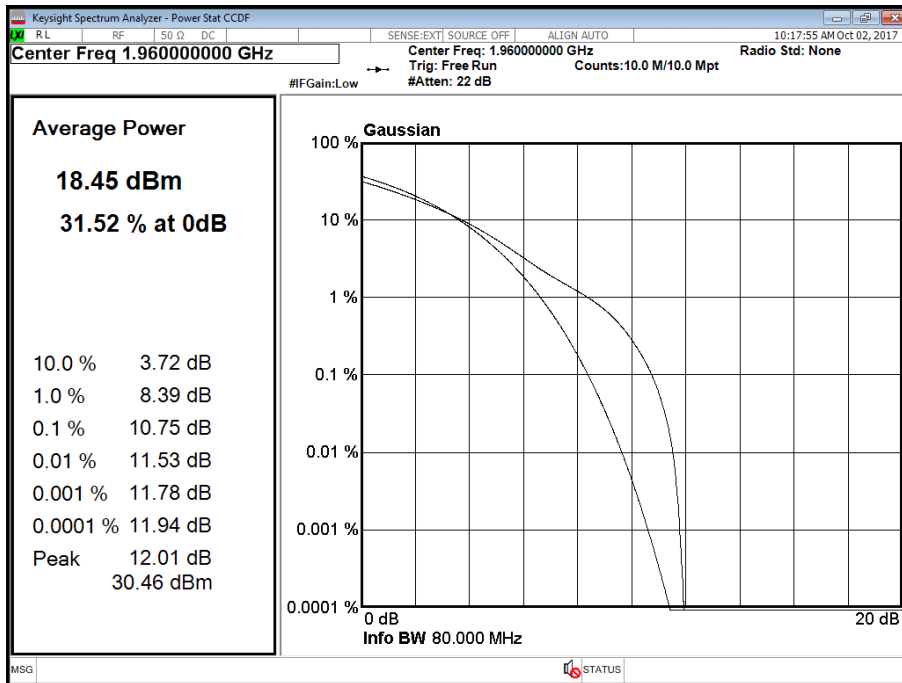
Antenna A - LTE Modulation 64QAM - LTE Carrier Bandwidth 15.0 MHz - Channel Position M



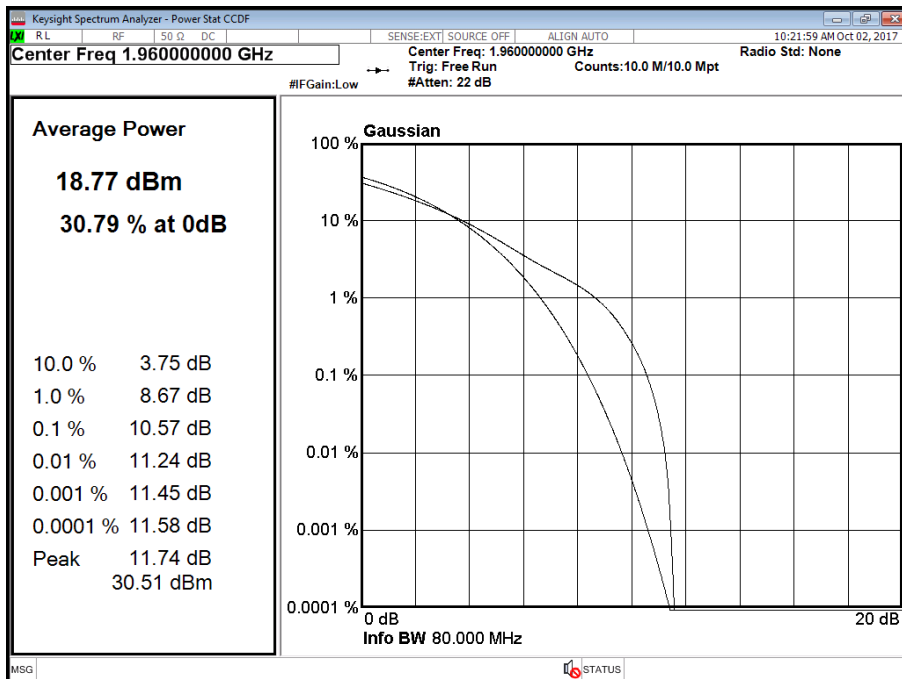


Product Service

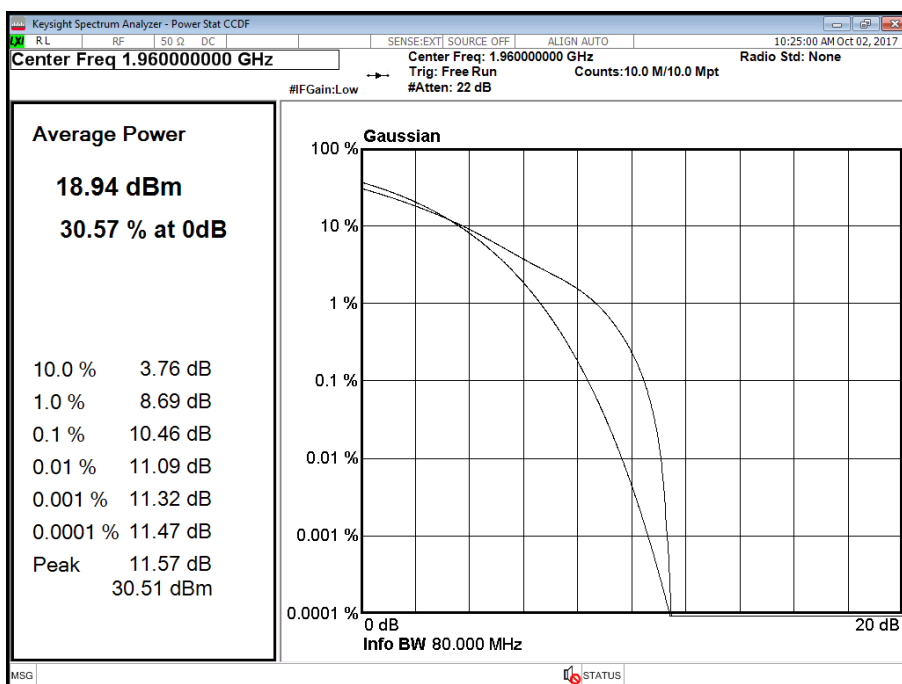
Antenna A - LTE Modulation QPSK - LTE Carrier Bandwidth 20.0 MHz - Channel Position M



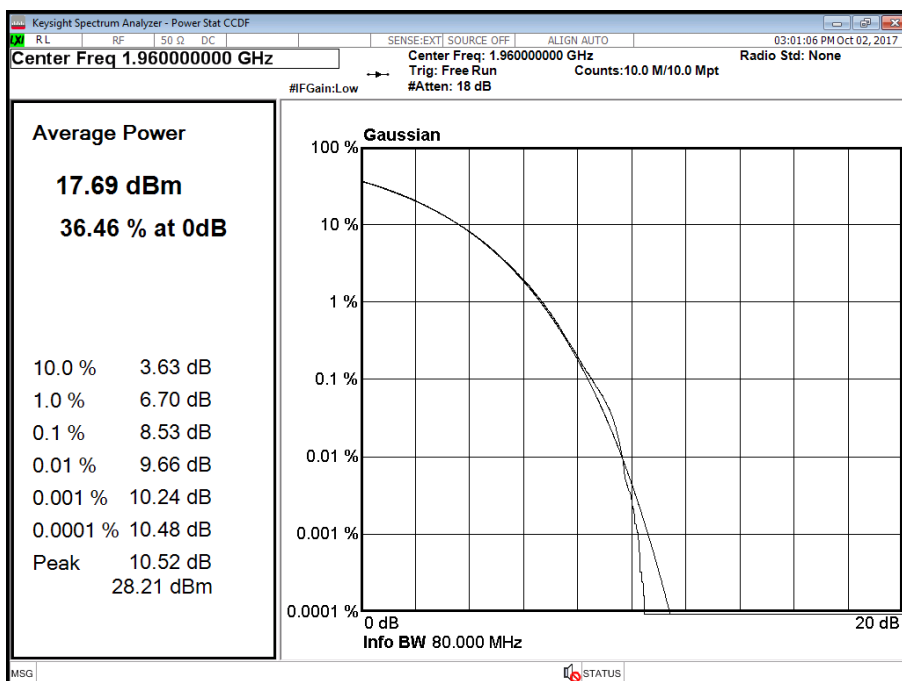
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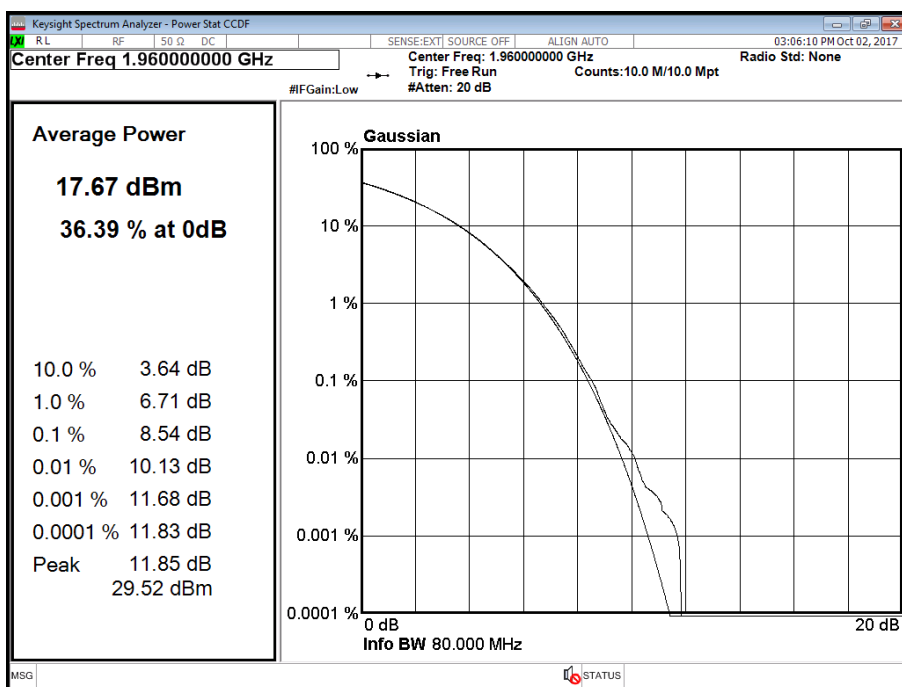
Antenna A - LTE Modulation 64QAM - LTE Carrier Bandwidth 20.0 MHz - Channel Position M



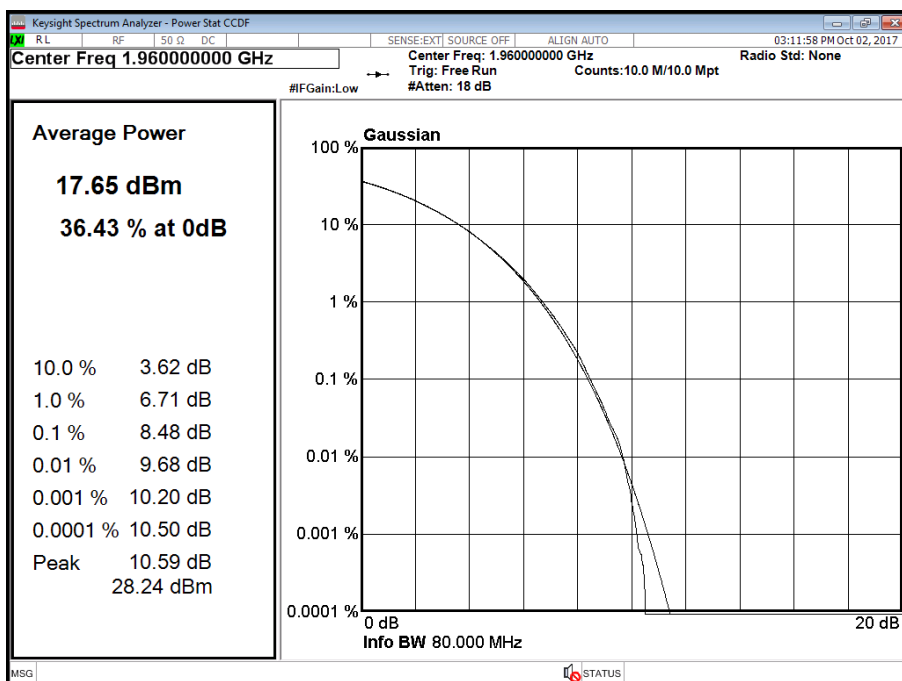
Antenna B - LTE Modulation QPSK - LTE Carrier Bandwidth 3.0 MHz - Channel Position M



Antenna B - LTE Modulation 16QAM - LTE Carrier Bandwidth 3.0 MHz - Channel Position M



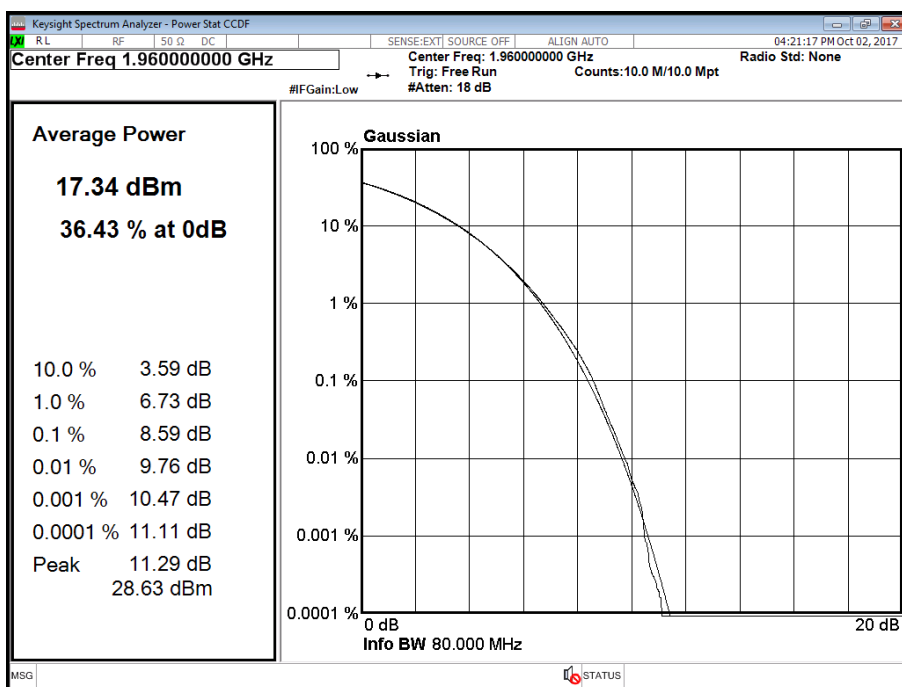
Antenna B - LTE Modulation 64QAM - LTE Carrier Bandwidth 3.0 MHz - Channel Position M



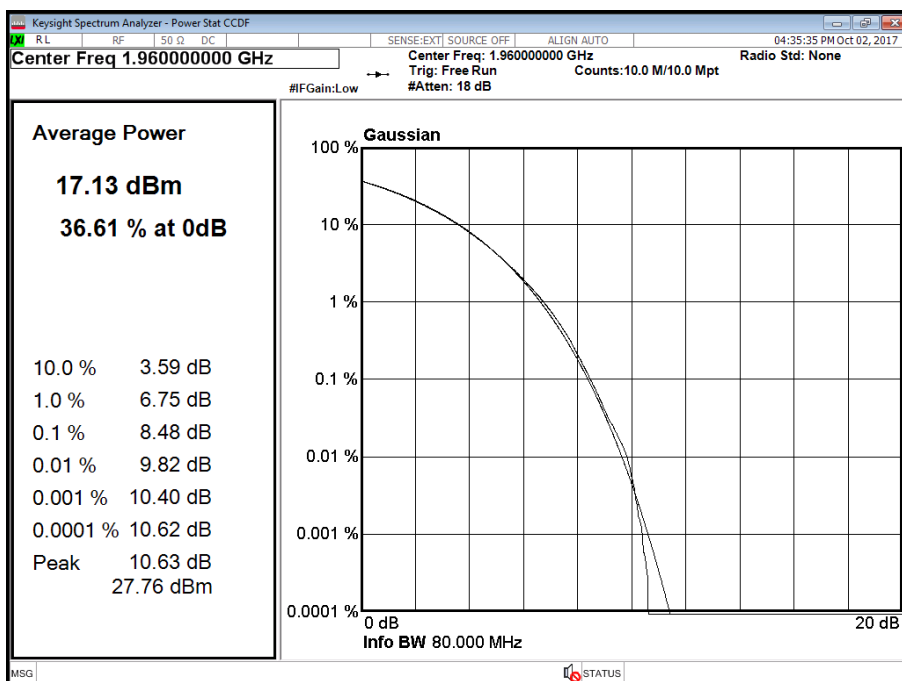


Product Service

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



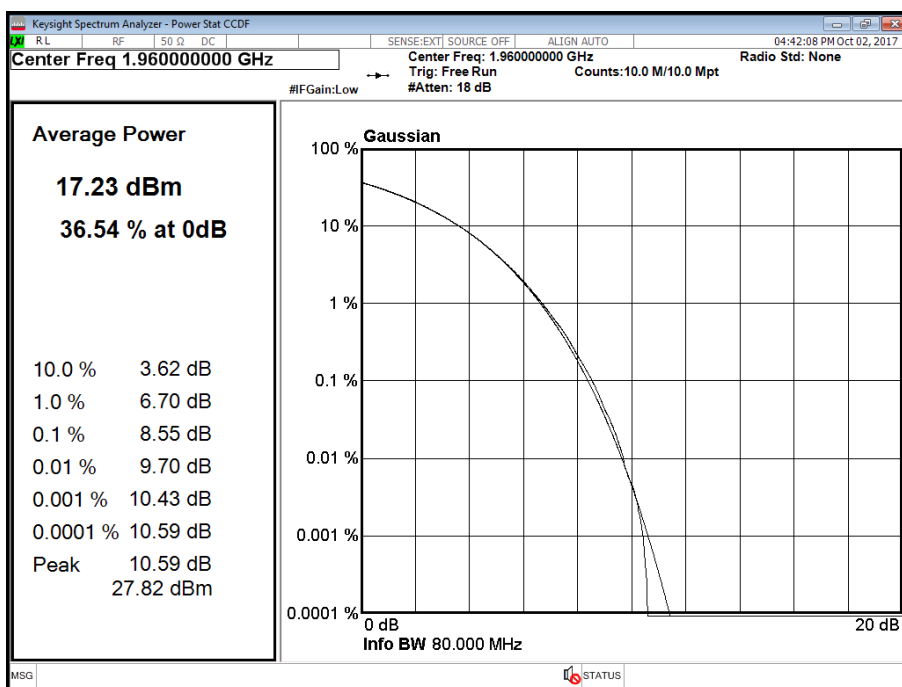
Antenna B - LTE Modulation 16QAM - LTE Carrier Bandwidth 5.0 MHz - Channel Position M



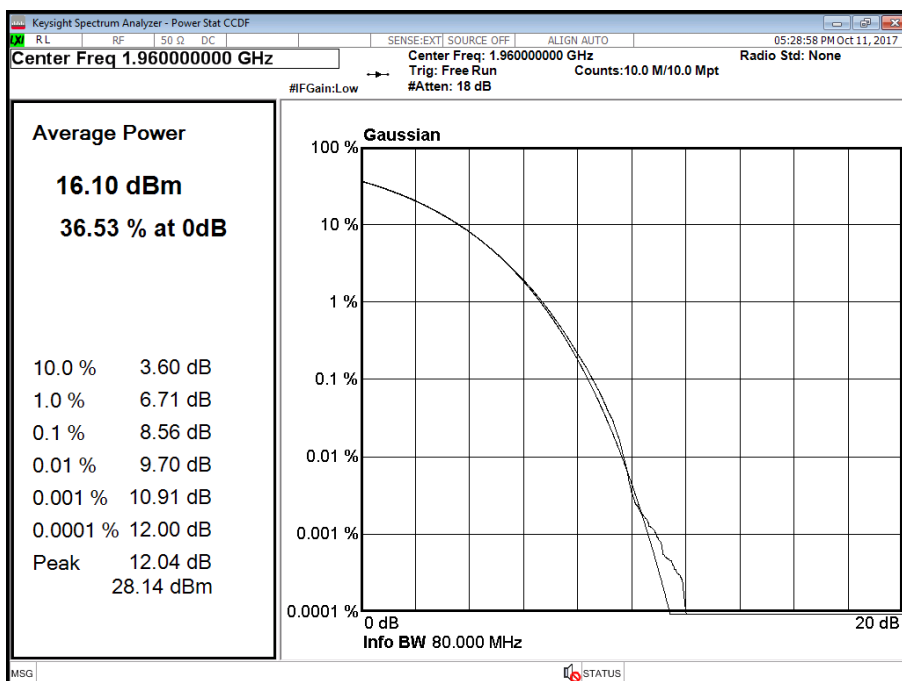


Product Service

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



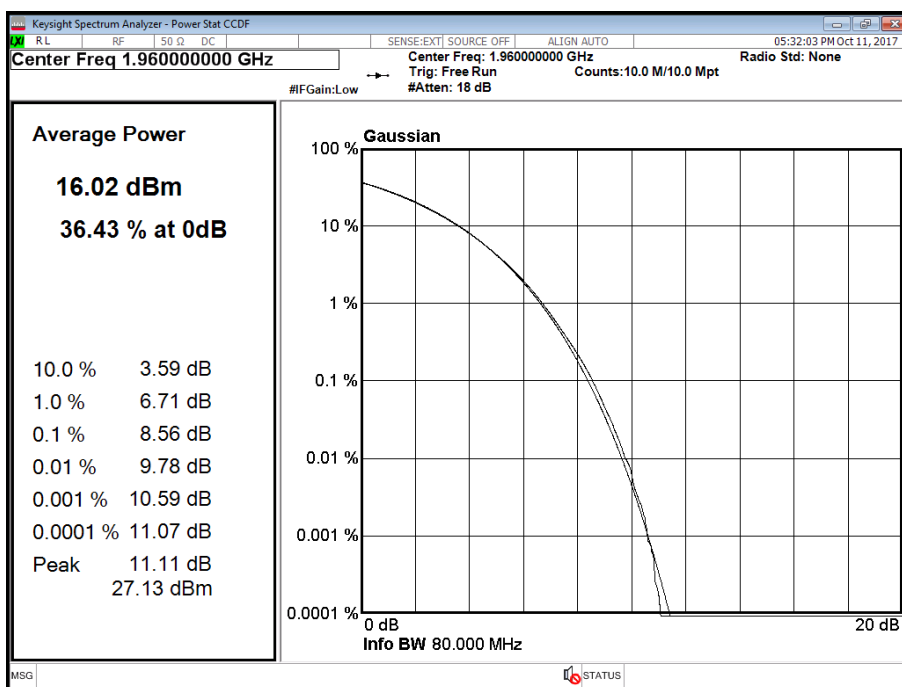
Antenna B - LTE Modulation QPSK - LTE Carrier Bandwidth 10.0 MHz - Channel Position M



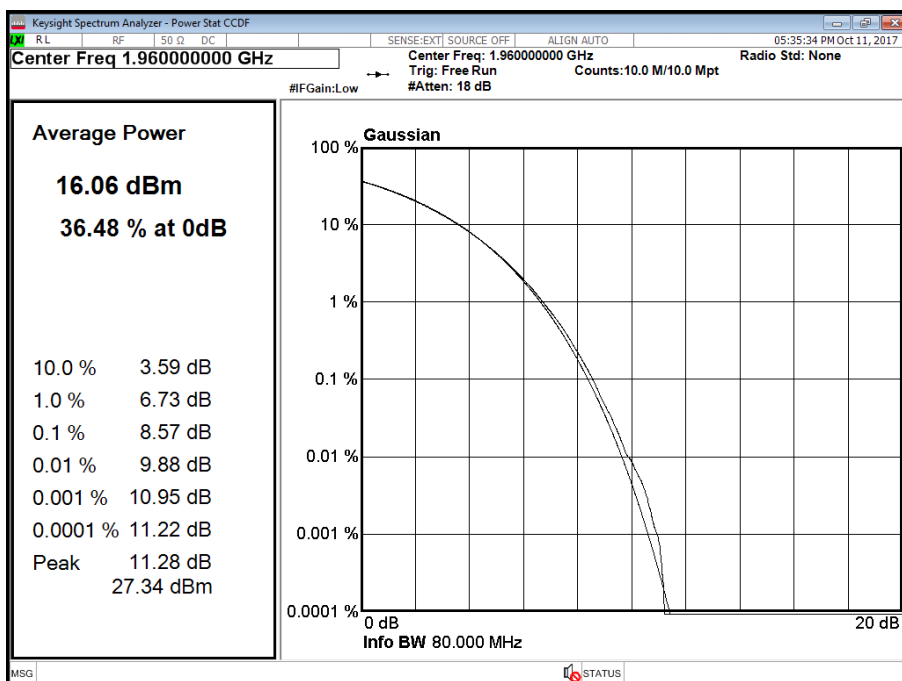


Product Service

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



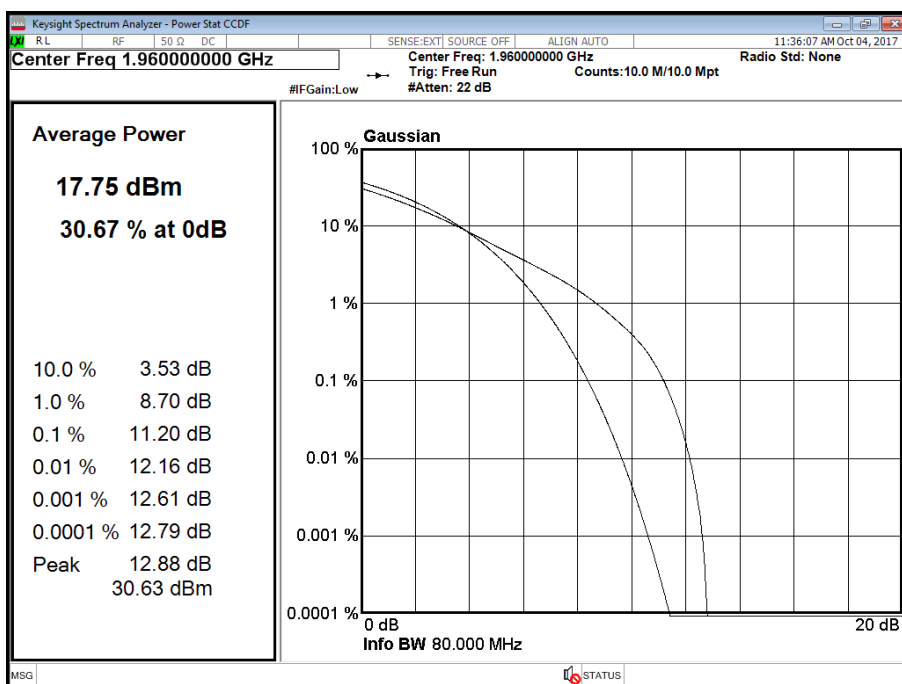
Antenna B - LTE Modulation 64QAM - LTE Carrier Bandwidth 10.0 MHz - Channel Position M



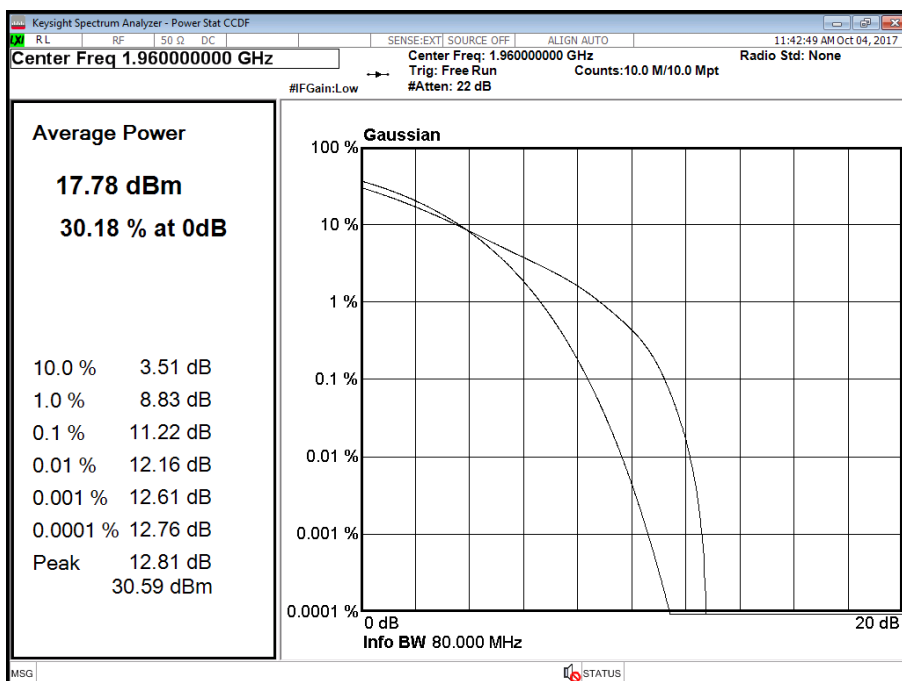


Product Service

Antenna B - LTE Modulation QPSK - LTE Carrier Bandwidth 15.0 MHz - Channel Position M



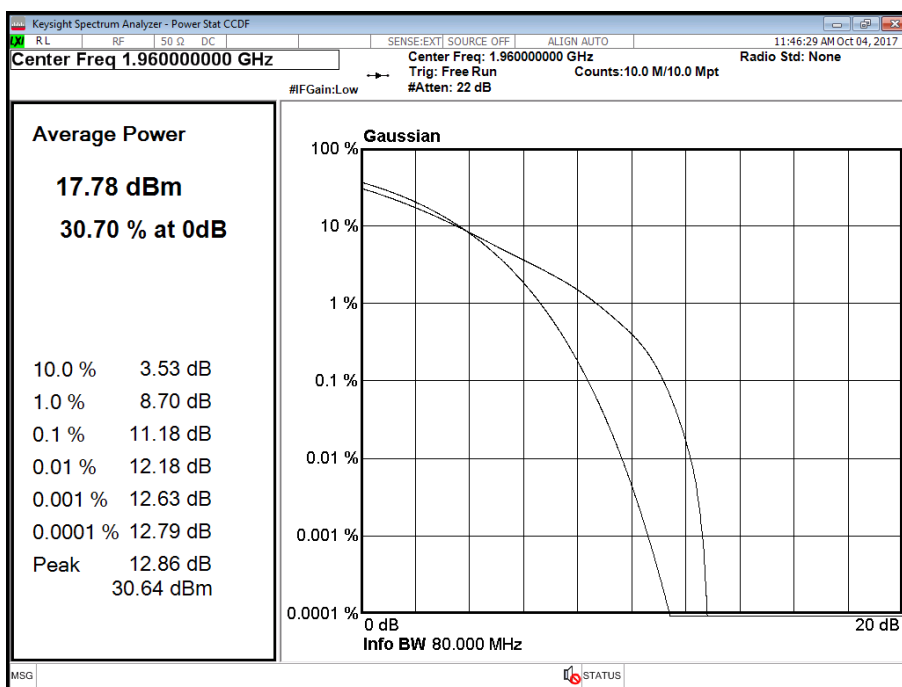
Antenna B - LTE Modulation 16QAM - LTE Carrier Bandwidth 15.0 MHz - Channel Position M



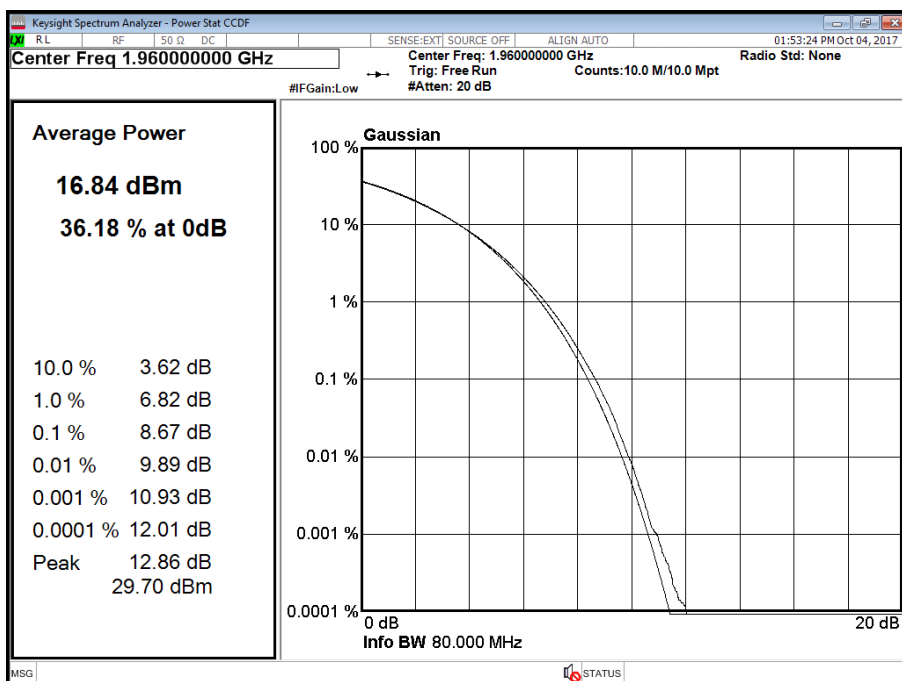


Product Service

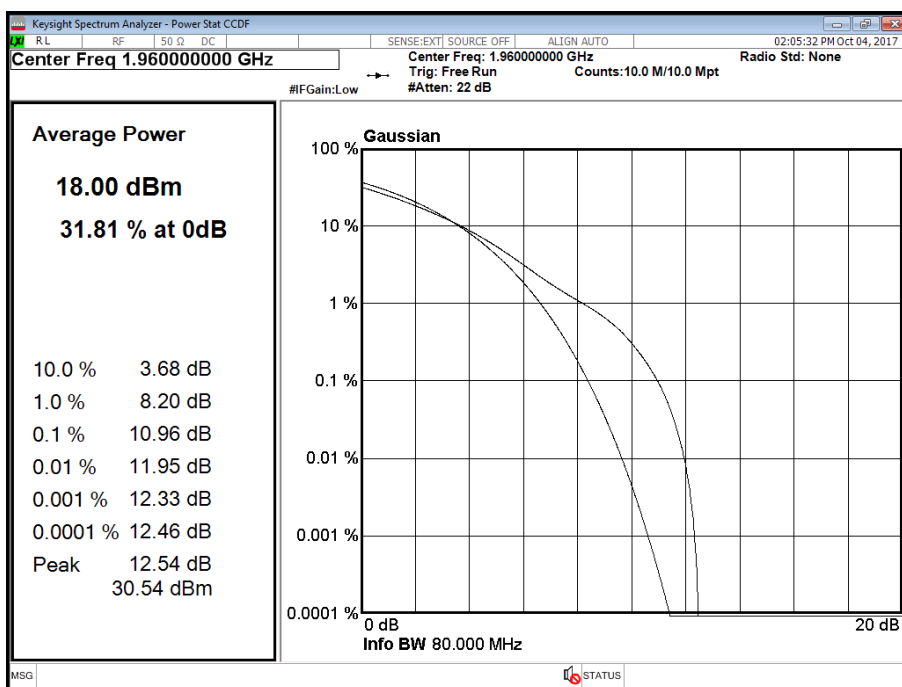
Antenna B - LTE Modulation 64QAM - LTE Carrier Bandwidth 15.0 MHz - Channel Position M



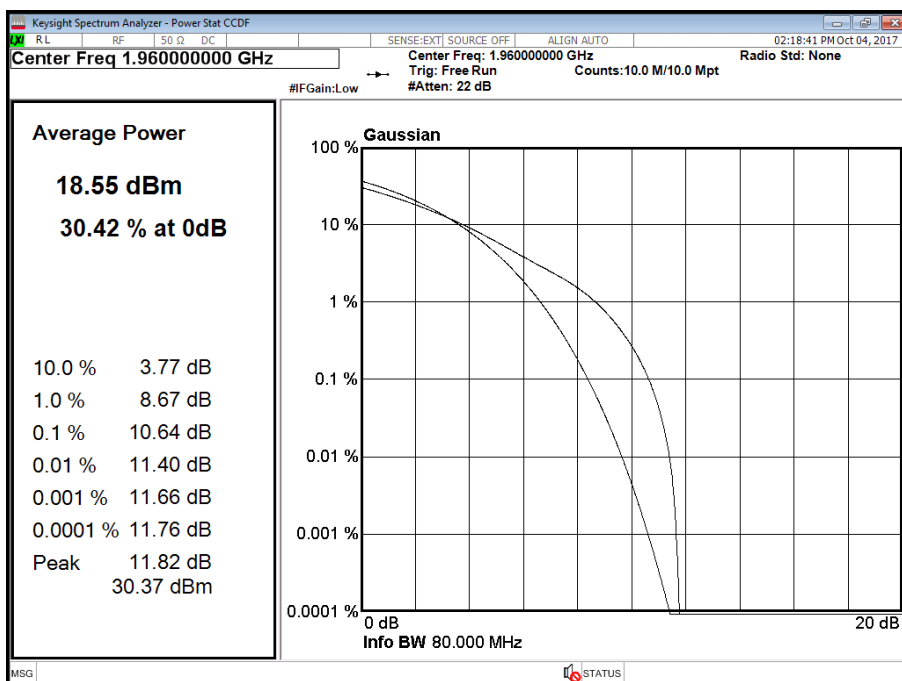
Antenna B - LTE Modulation QPSK - LTE Carrier Bandwidth 20.0 MHz - Channel Position M



Antenna B - LTE Modulation 16QAM - LTE Carrier Bandwidth 20.0 MHz - Channel Position M



Antenna B - LTE Modulation 64QAM - LTE Carrier Bandwidth 20.0 MHz - Channel Position M





Product Service

Configuration 1

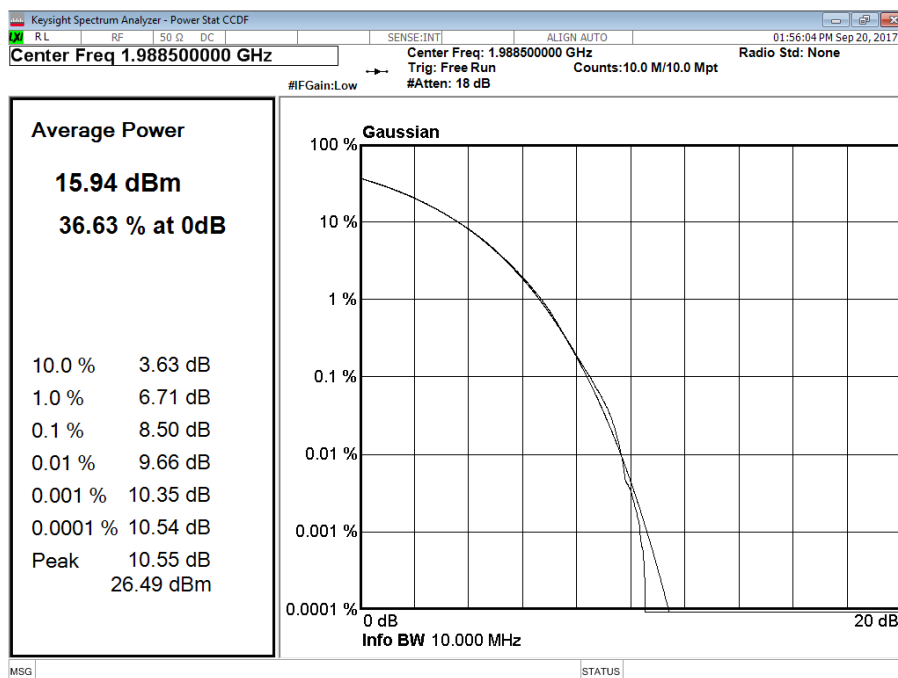
Maximum Output Power 20 dBm

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	3.0 MHz	8.50	15.93	12.12
B	QPSK	3.0 MHz	8.53	16.75	13.06
Total			-	19.37	15.63
A	16QAM	3.0 MHz	8.52	15.89	12.55
B	16QAM	3.0 MHz	8.54	16.78	13.43
Total			-	19.37	16.02
A	64QAM	3.0 MHz	8.47	15.91	12.19
B	64QAM	3.0 MHz	8.50	16.89	13.01
Total			-	19.44	15.63
A	QPSK	5.0 MHz	8.52	17.25	11.32
B	QPSK	5.0 MHz	8.52	16.55	10.79
Total			-	19.92	14.07
A	16QAM	5.0 MHz	8.46	16.96	11.35
B	16QAM	5.0 MHz	8.46	16.32	10.70
Total			-	19.66	14.05
A	64QAM	5.0 MHz	8.42	17.04	11.12
B	64QAM	5.0 MHz	8.49	16.50	10.70
Total			-	19.79	13.93
A	QPSK	10.0 MHz	8.48	17.87	9.38
B	QPSK	10.0 MHz	8.49	17.98	9.45
Total			-	20.94	12.43
A	16QAM	10.0 MHz	8.50	17.78	9.51
B	16QAM	10.0 MHz	8.50	17.82	9.47
Total			-	20.81	12.50
A	64QAM	10.0 MHz	8.50	17.91	9.45
B	64QAM	10.0 MHz	8.49	17.88	9.42
Total			-	20.91	12.45
A	QPSK	15.0 MHz	11.05	16.54	6.74
B	QPSK	15.0 MHz	11.25	17.37	8.08
Total			-	19.99	10.47
A	16QAM	15.0 MHz	11.42	17.01	7.87
B	16QAM	15.0 MHz	11.24	17.52	8.79
Total			-	20.28	11.36
A	64QAM	15.0 MHz	11.23	17.27	7.86
B	64QAM	15.0 MHz	11.12	17.60	8.61
Total			-	20.45	11.26
A	QPSK	20.0 MHz	10.57	19.20	8.87
B	QPSK	20.0 MHz	10.85	18.49	7.87
Total			-	21.87	11.41
A	16QAM	20.0 MHz	10.26	19.50	10.08
B	16QAM	20.0 MHz	10.57	18.78	8.82
Total			-	22.17	12.51
A	64QAM	20.0 MHz	10.24	19.51	10.41
B	64QAM	20.0 MHz	10.56	18.85	8.82
Total			-	22.20	12.70

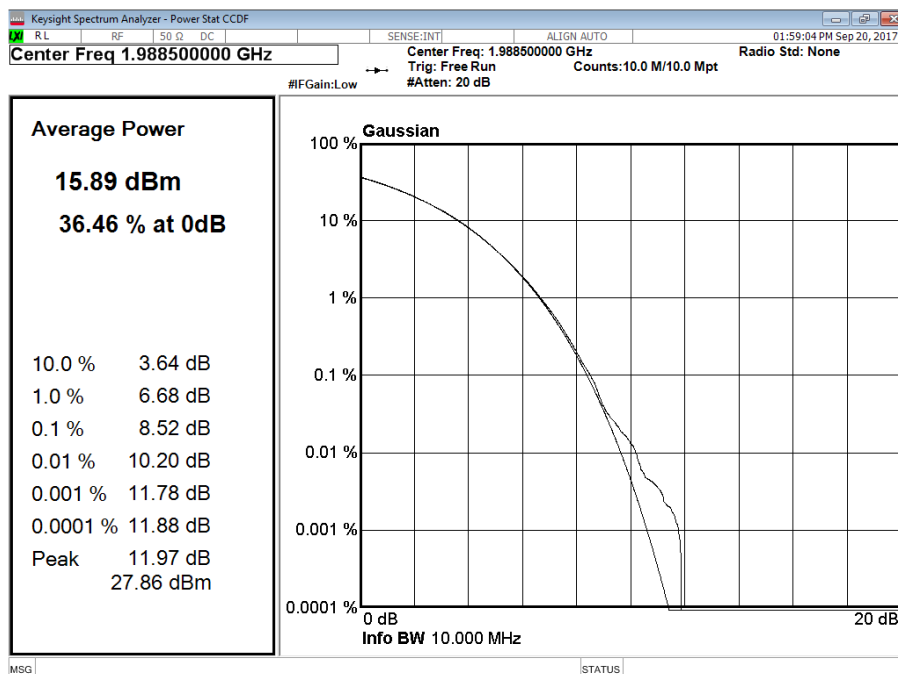


Product Service

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



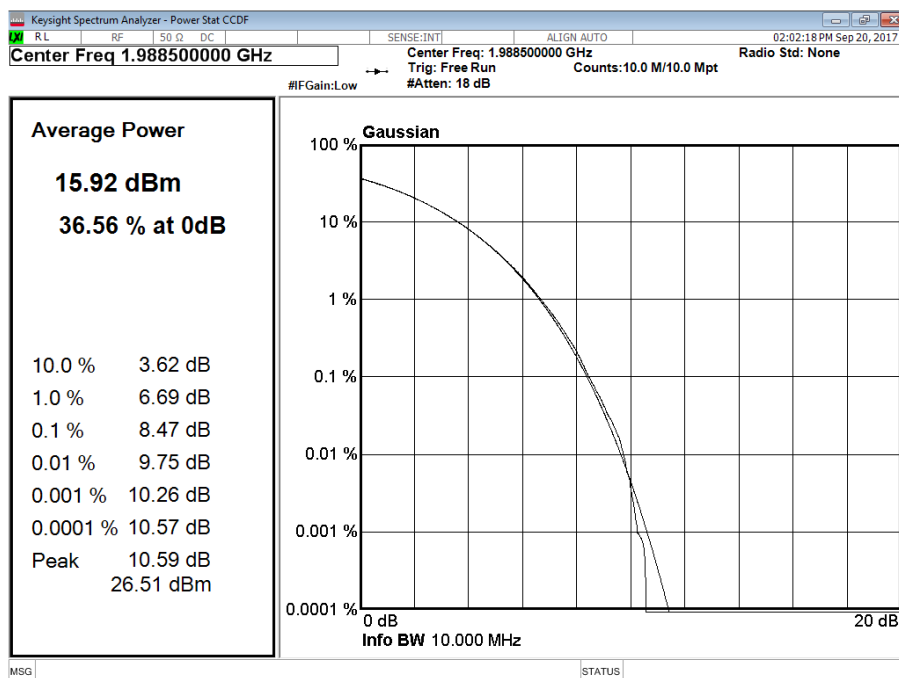
Antenna A - LTE Modulation 16QAM - LTE Carrier Bandwidth 3.0 MHz - Channel Position T



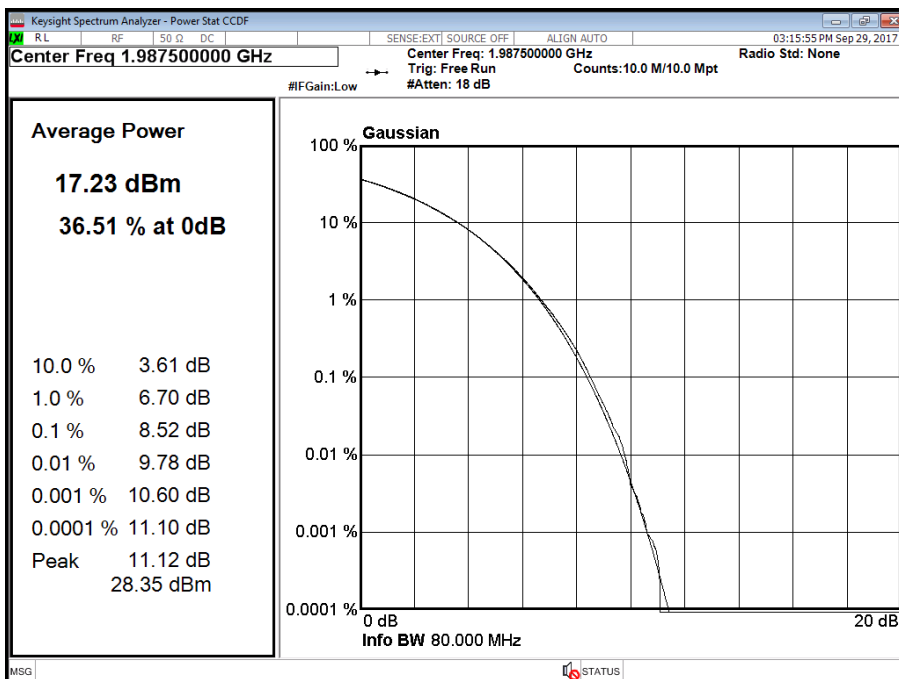


Product Service

Antenna A - LTE Modulation 64QAM - LTE Carrier Bandwidth 3.0 MHz - Channel Position T



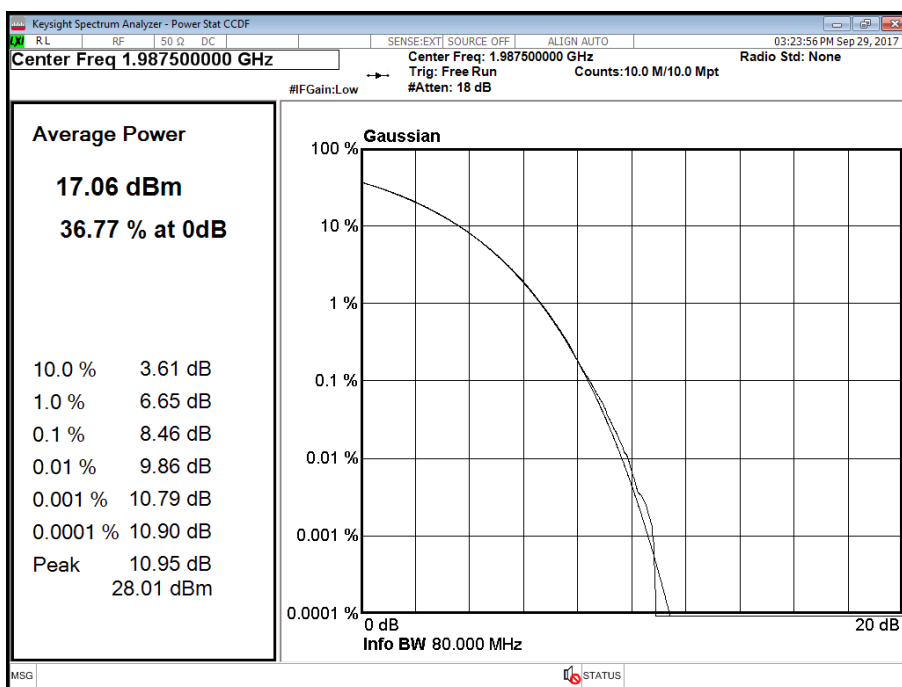
Antenna A - LTE Modulation QPSK - LTE Carrier Bandwidth 5.0 MHz - Channel Position T



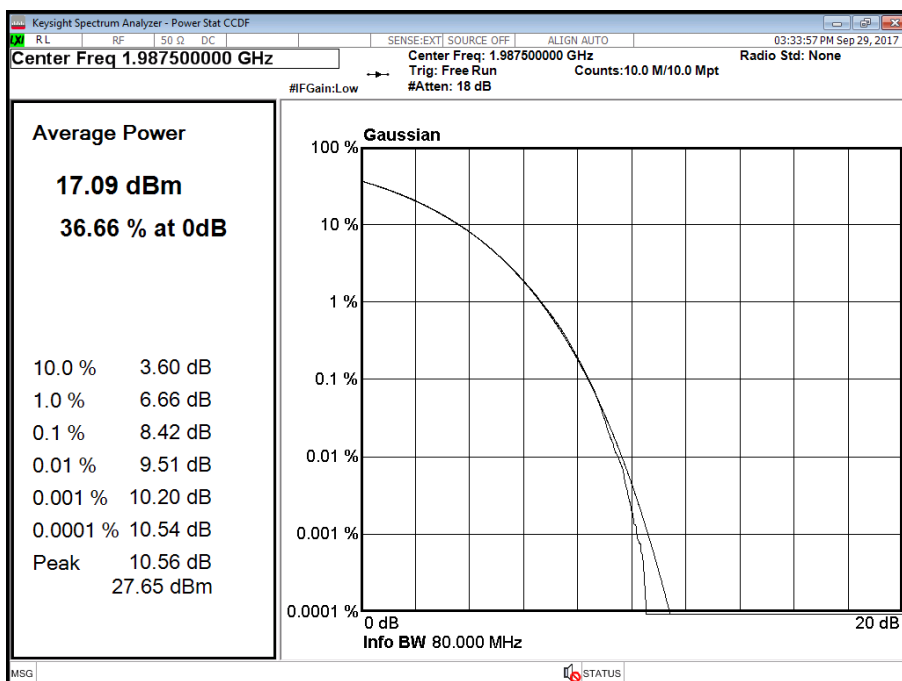


Product Service

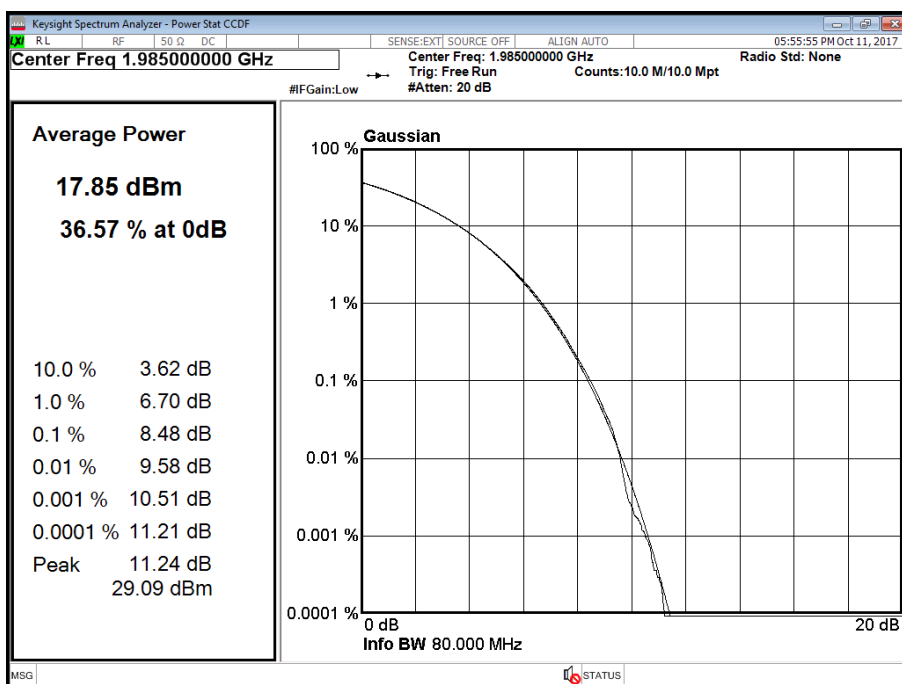
Antenna A - LTE Modulation 16QAM - LTE Carrier Bandwidth 5.0 MHz - Channel Position T



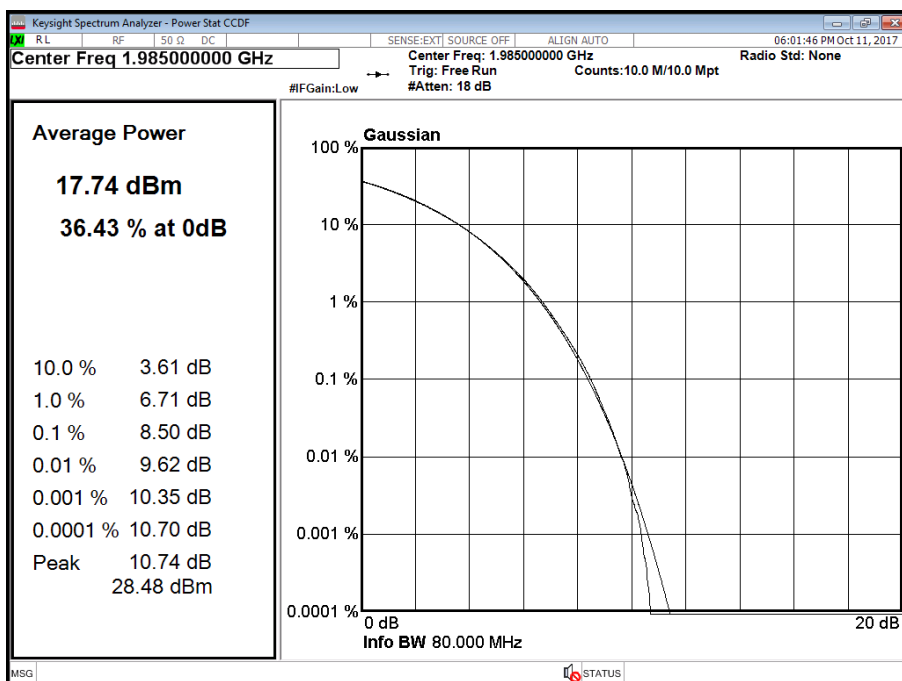
Antenna A - LTE Modulation 64QAM - LTE Carrier Bandwidth 5.0 MHz - Channel Position T



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



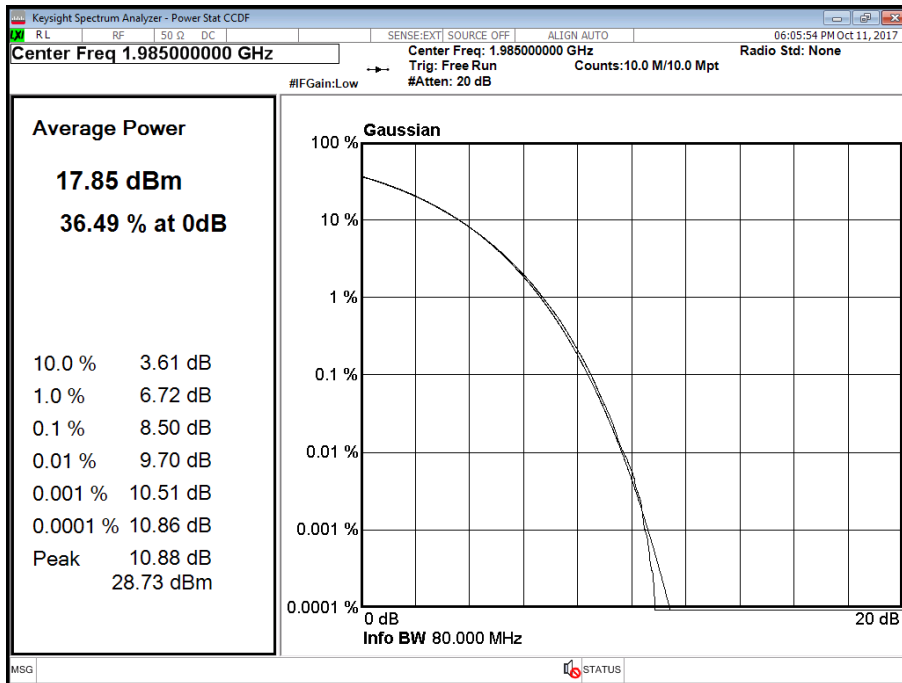
Antenna A - LTE Modulation 16QAM - LTE Carrier Bandwidth 10.0 MHz - Channel Position T



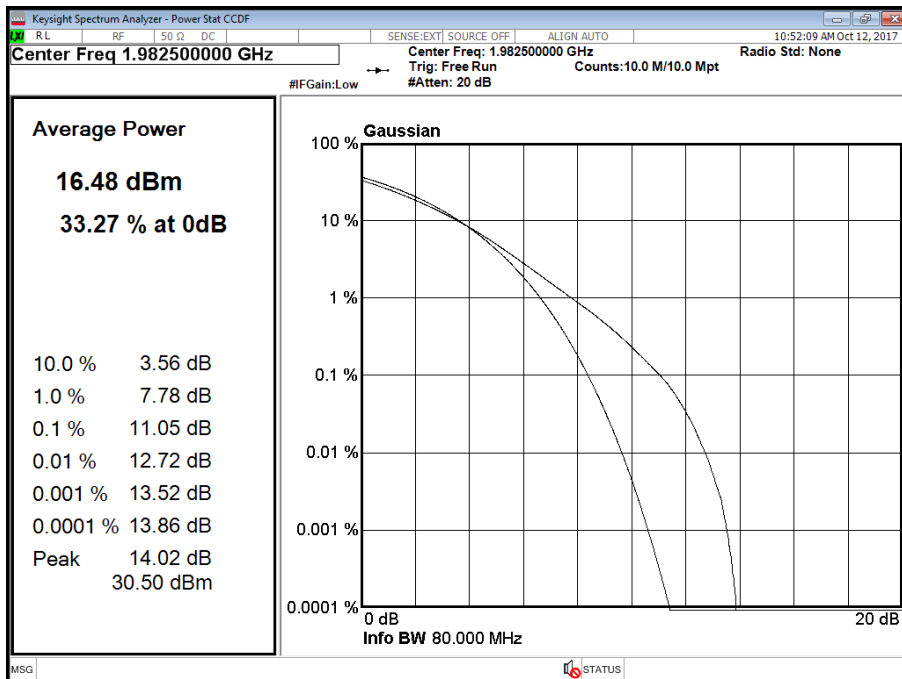


Product Service

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



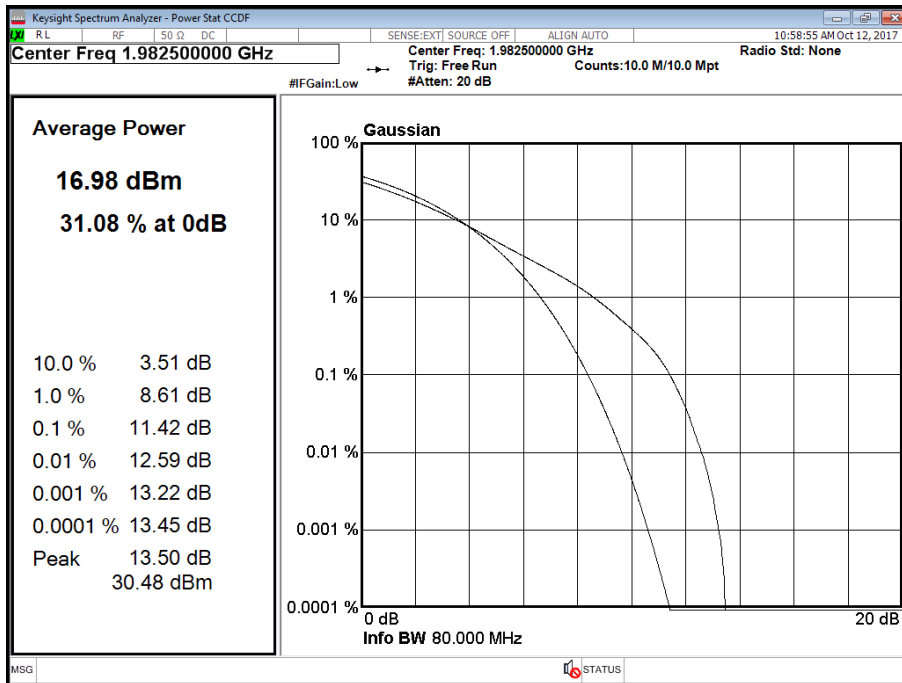
Antenna A - LTE Modulation QPSK - LTE Carrier Bandwidth 15.0 MHz - Channel Position T



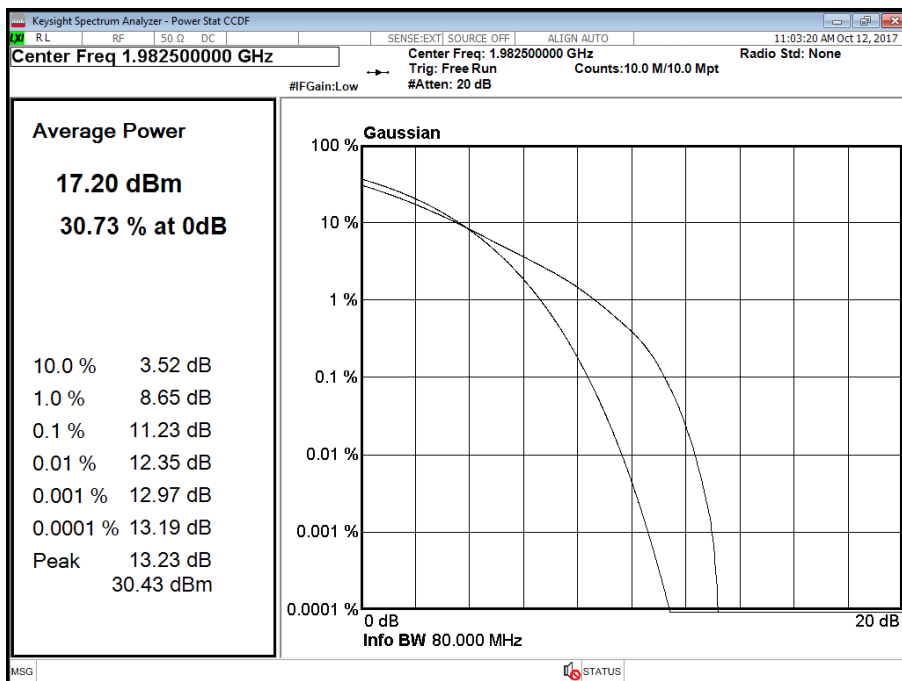


Product Service

Antenna A - LTE Modulation 16QAM - LTE Carrier Bandwidth 15.0 MHz - Channel Position T



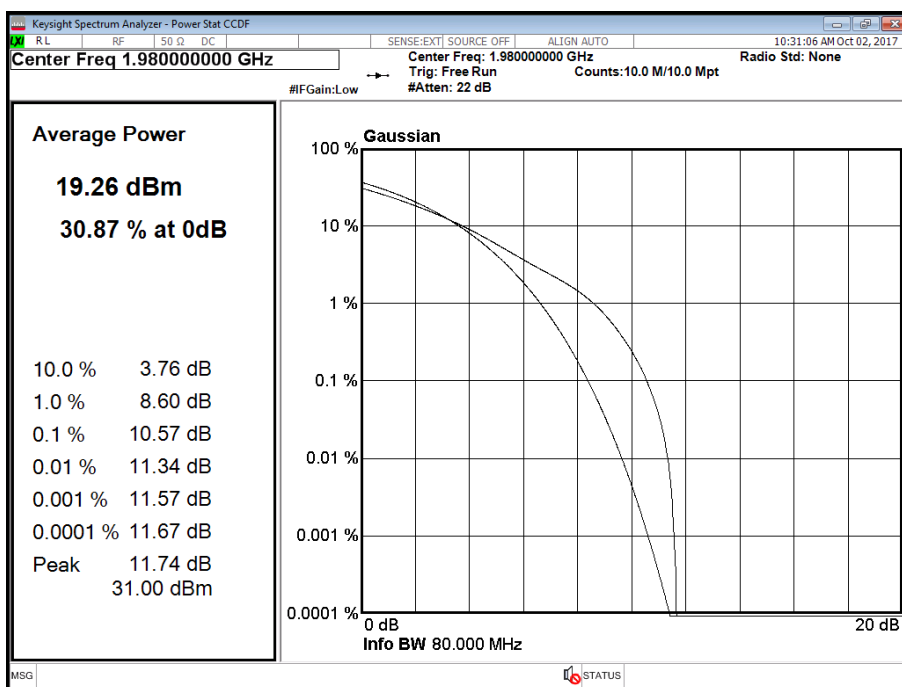
Antenna A - LTE Modulation 64QAM - LTE Carrier Bandwidth 15.0 MHz - Channel Position T



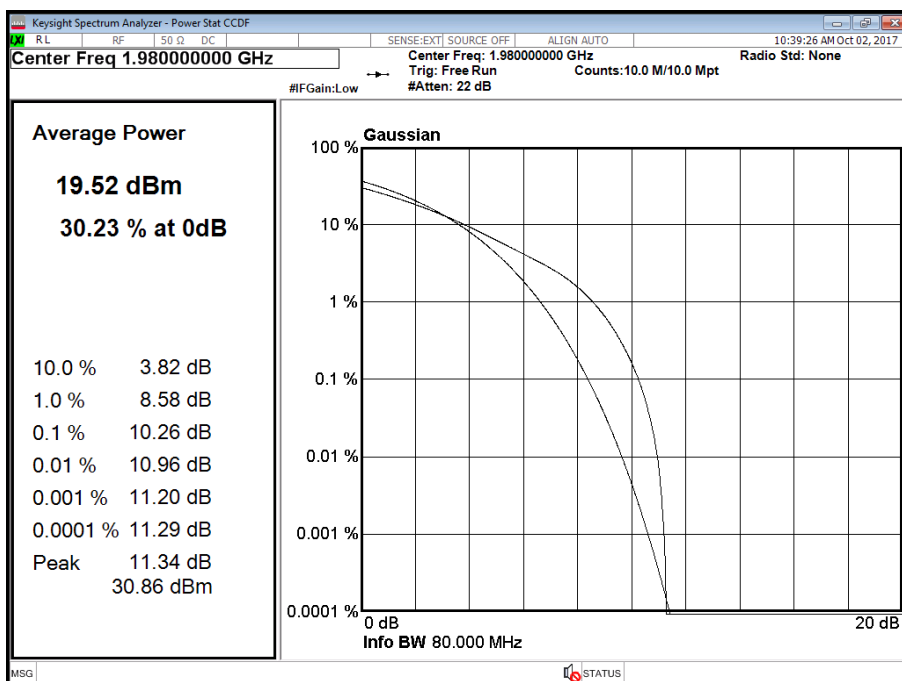


Product Service

Antenna A - LTE Modulation QPSK - LTE Carrier Bandwidth 20.0 MHz - Channel Position T



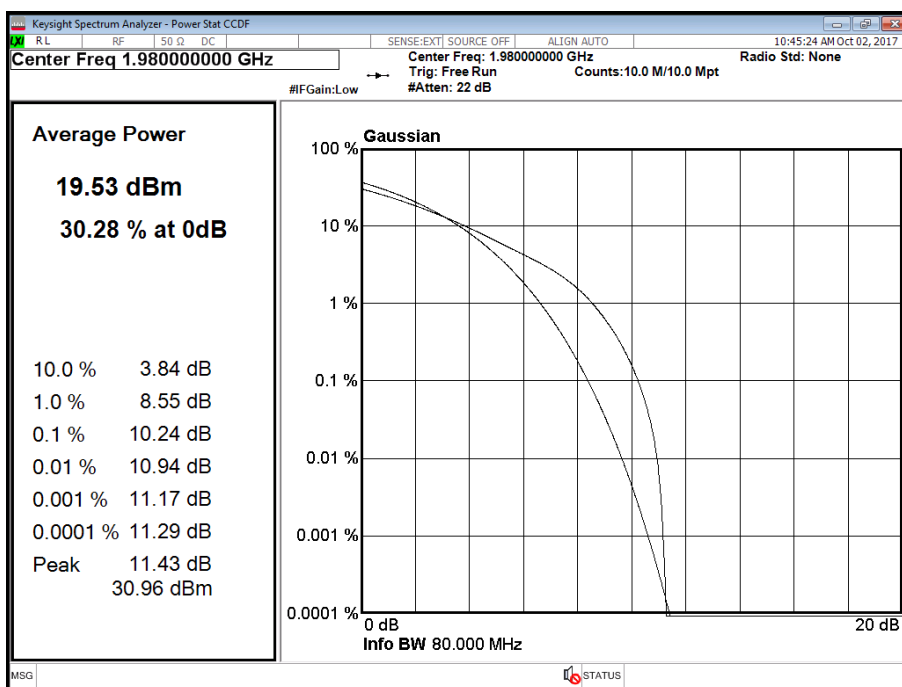
Antenna A - LTE Modulation 16QAM - LTE Carrier Bandwidth 20.0 MHz - Channel Position T



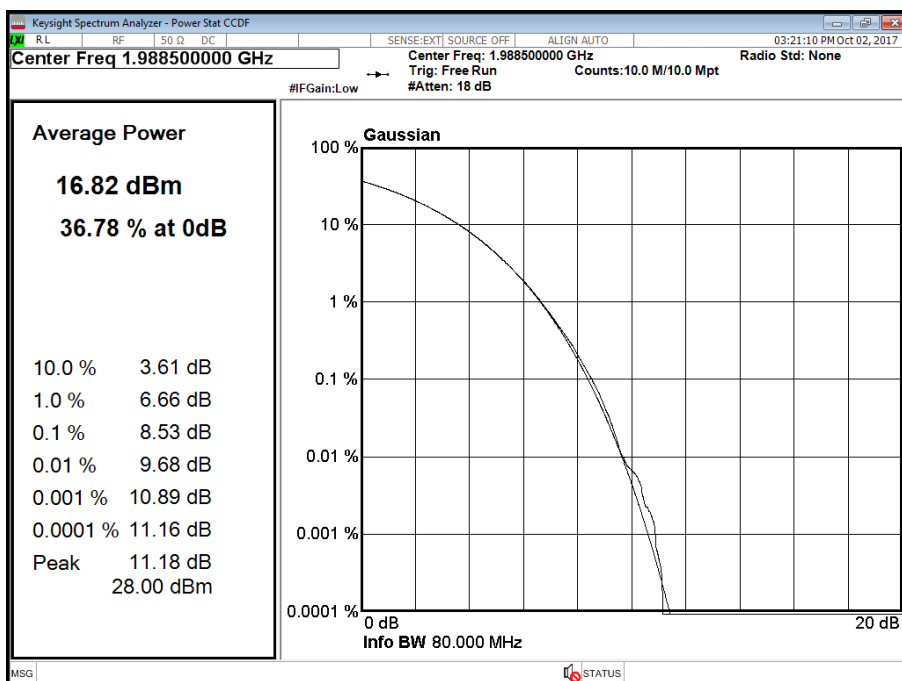


Product Service

Antenna A - LTE Modulation 64QAM - LTE Carrier Bandwidth 20.0 MHz - Channel Position T



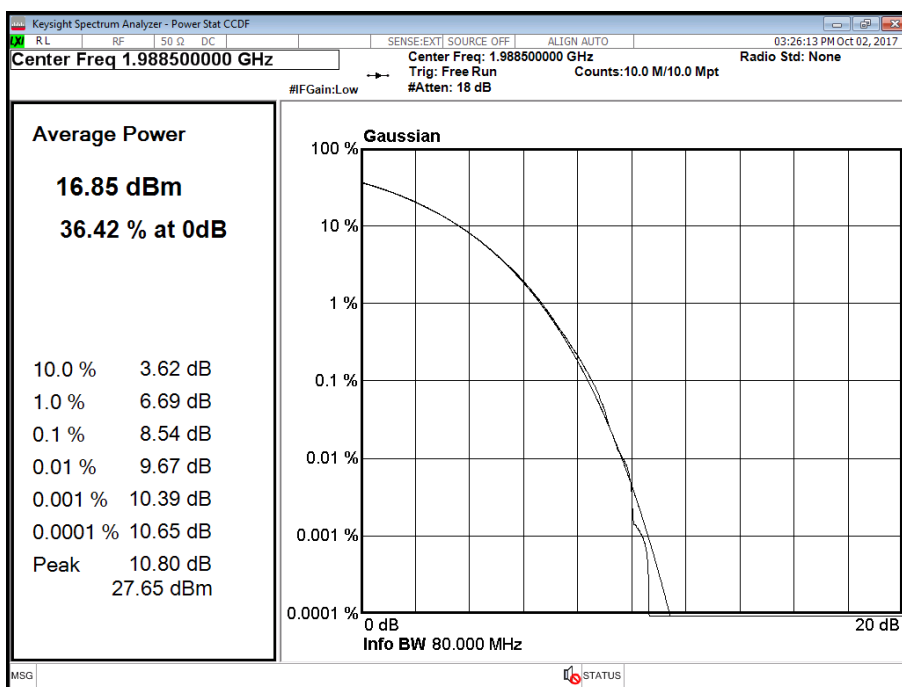
Antenna B - LTE Modulation QPSK - LTE Carrier Bandwidth 3.0 MHz - Channel Position T



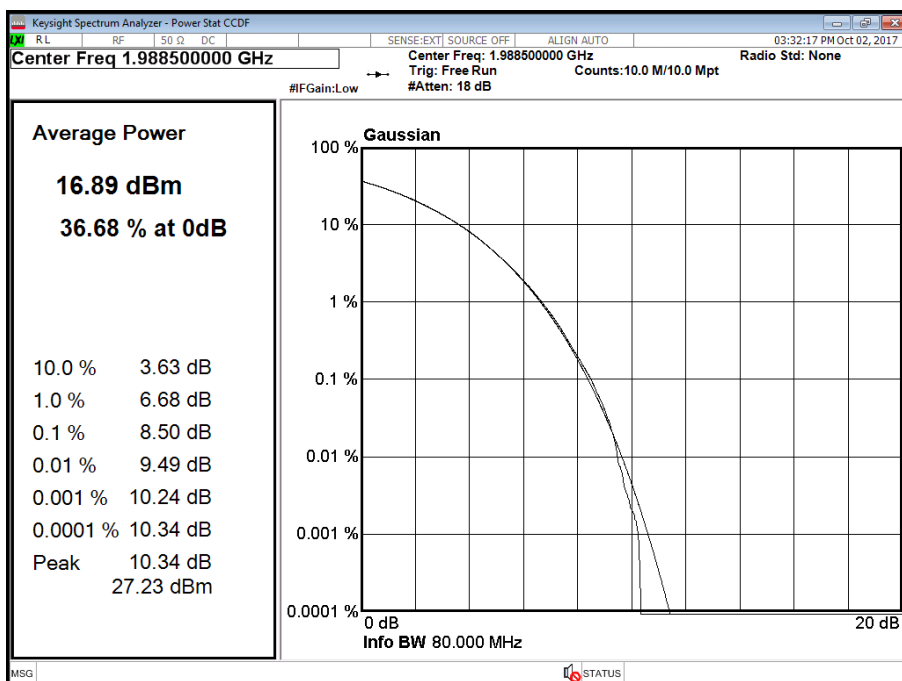


Product Service

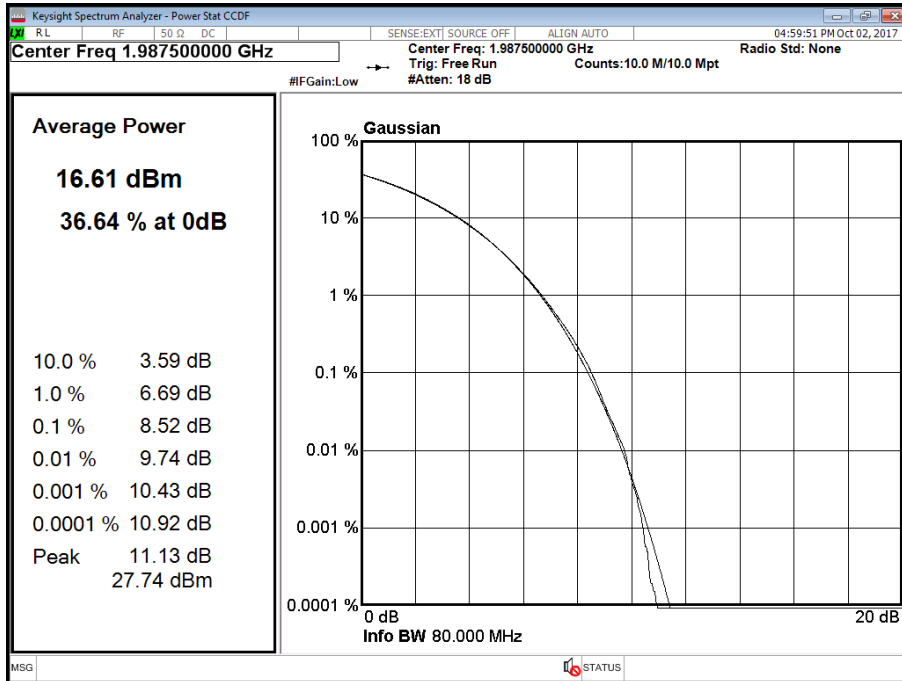
Antenna B - LTE Modulation 16QAM - LTE Carrier Bandwidth 3.0 MHz - Channel Position T



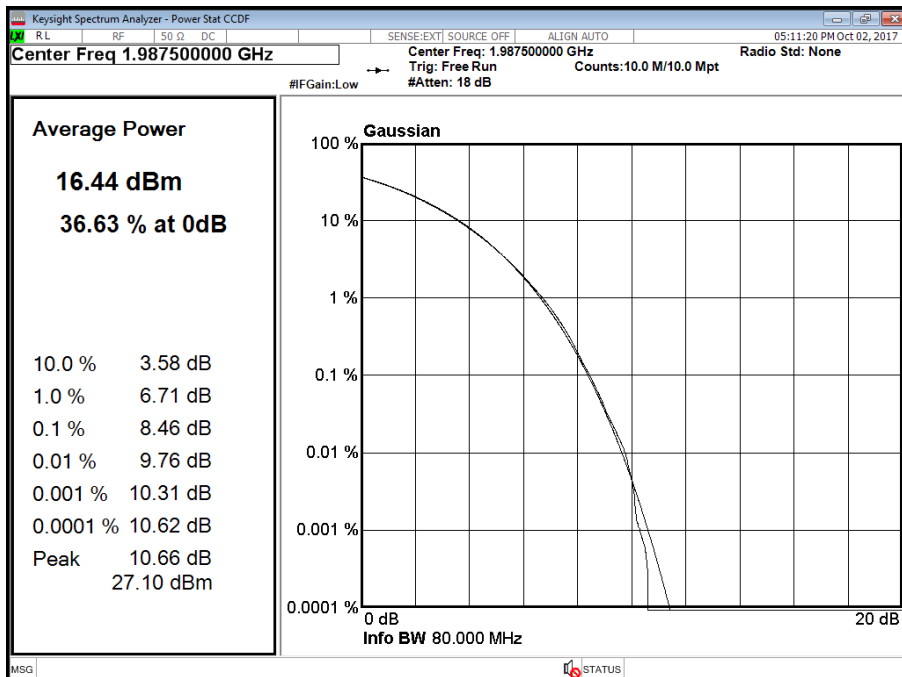
Antenna B - LTE Modulation 64QAM - LTE Carrier Bandwidth 3.0 MHz - Channel Position T



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



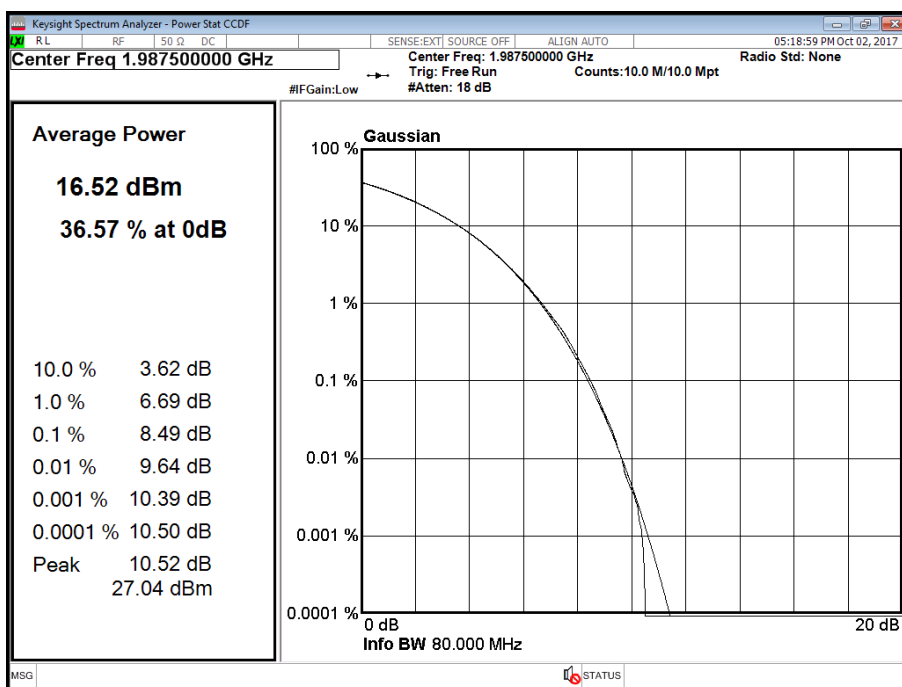
Antenna B - LTE Modulation 16QAM - LTE Carrier Bandwidth 5.0 MHz - Channel Position T



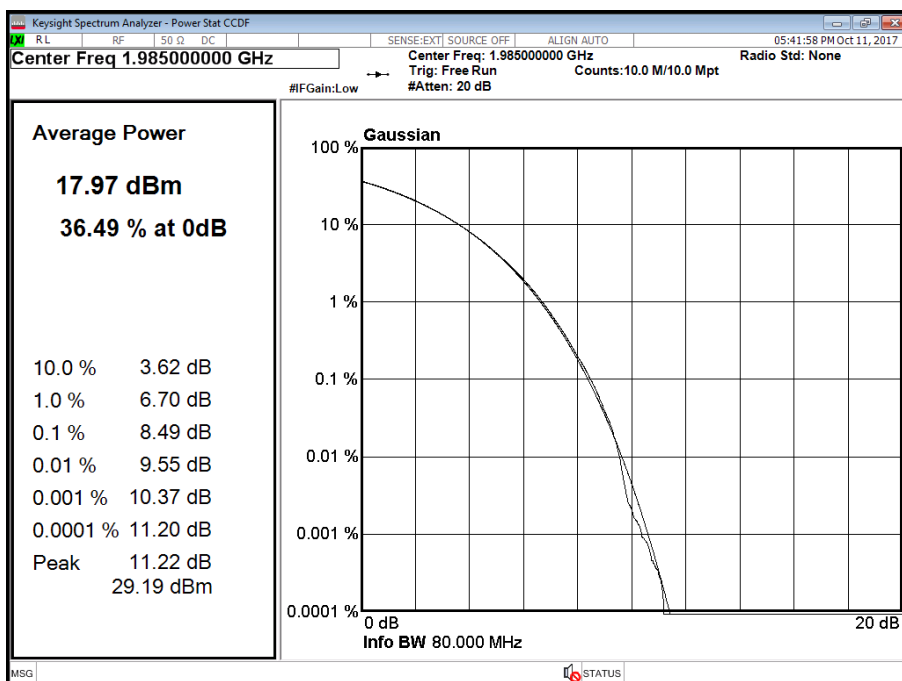


Product Service

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



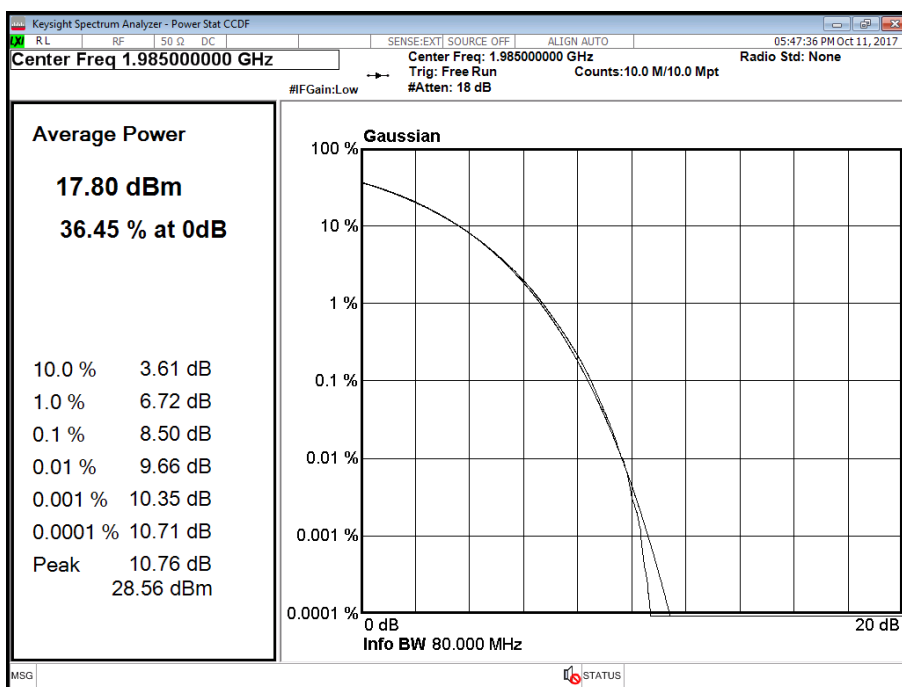
Antenna B - LTE Modulation QPSK - LTE Carrier Bandwidth 10.0 MHz - Channel Position T



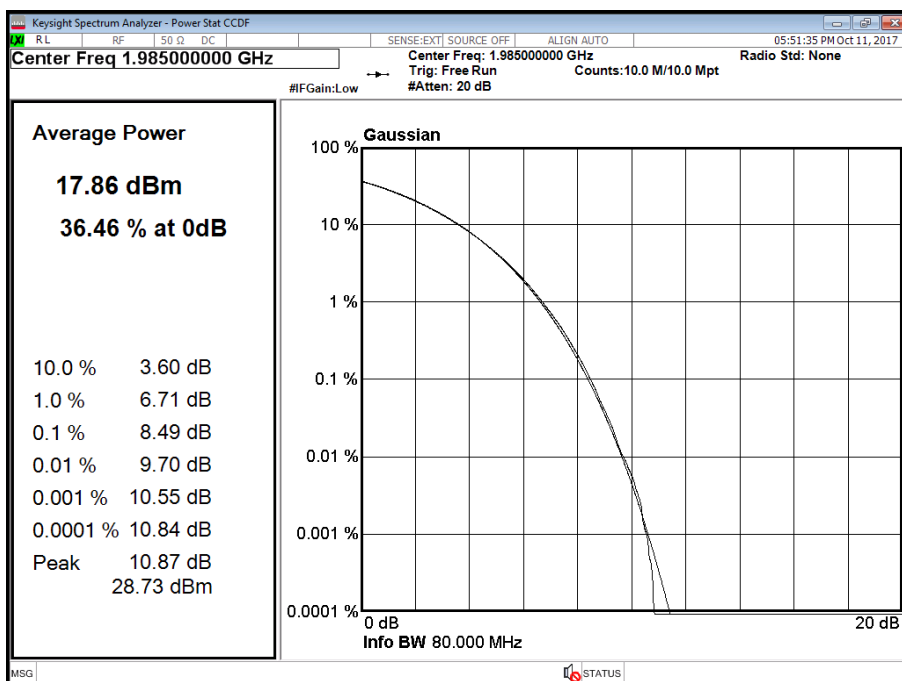


Product Service

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



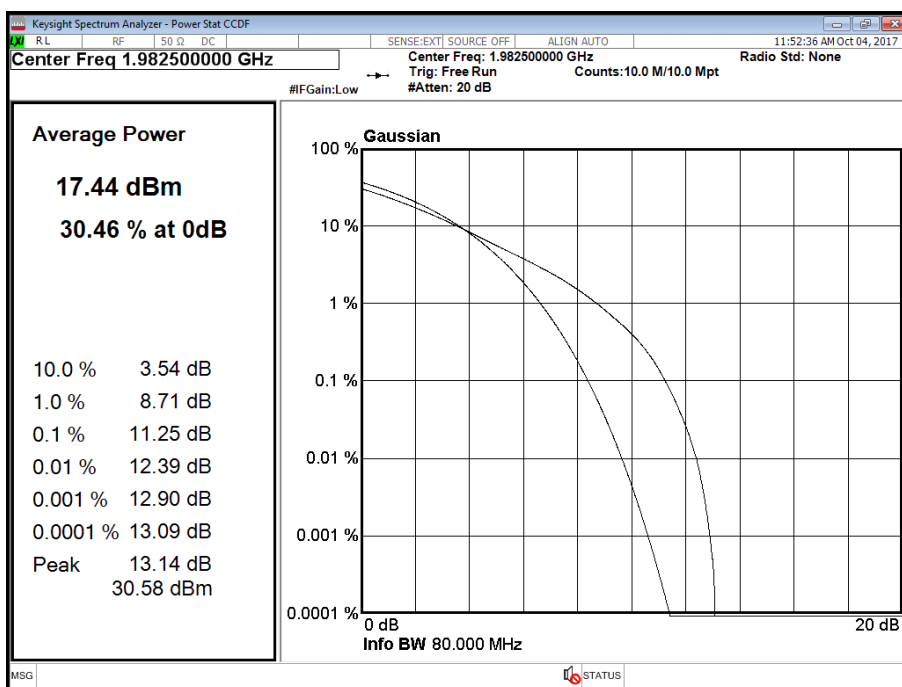
Antenna B - LTE Modulation 64QAM - LTE Carrier Bandwidth 10.0 MHz - Channel Position T



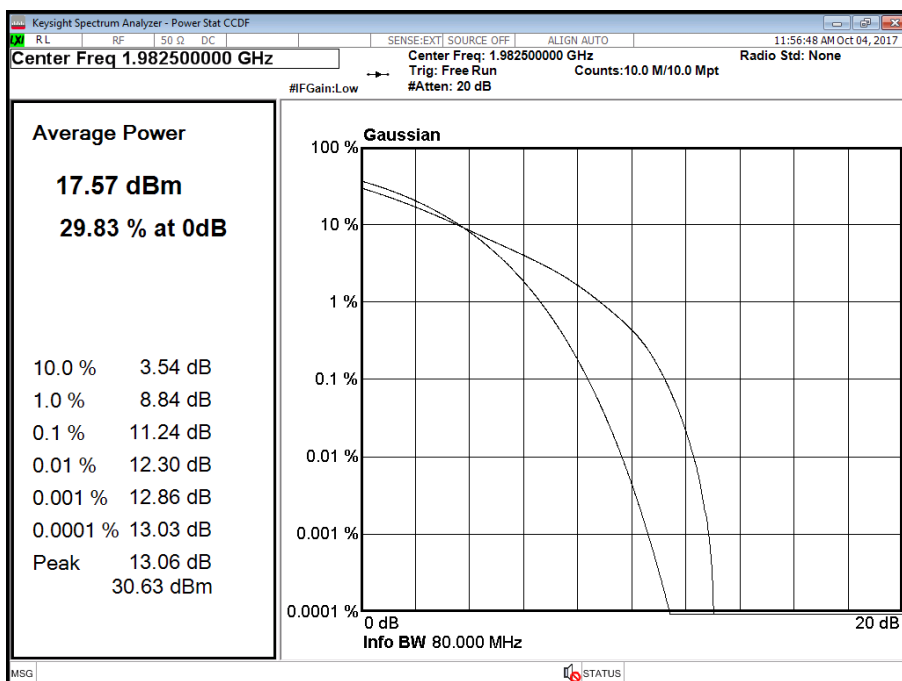


Product Service

Antenna B - LTE Modulation QPSK - LTE Carrier Bandwidth 15.0 MHz - Channel Position T



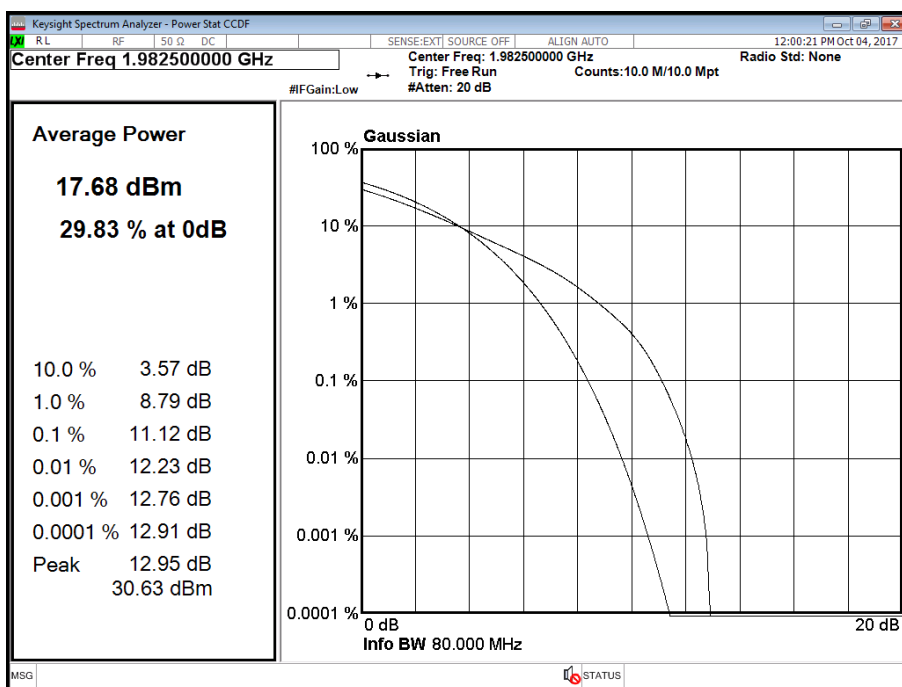
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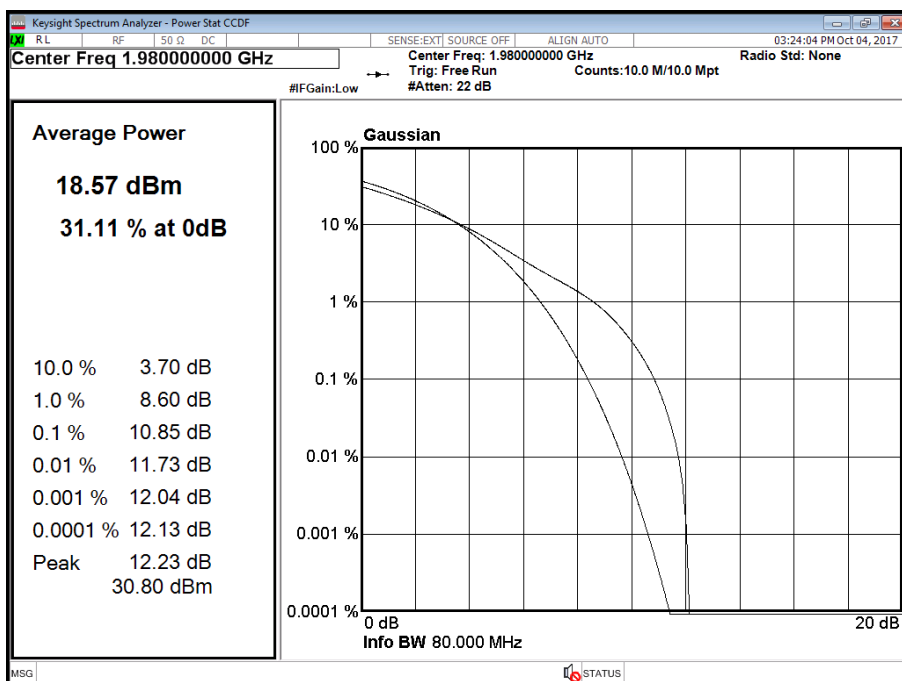


Product Service

Antenna B - LTE Modulation 64QAM - LTE Carrier Bandwidth 15.0 MHz - Channel Position T



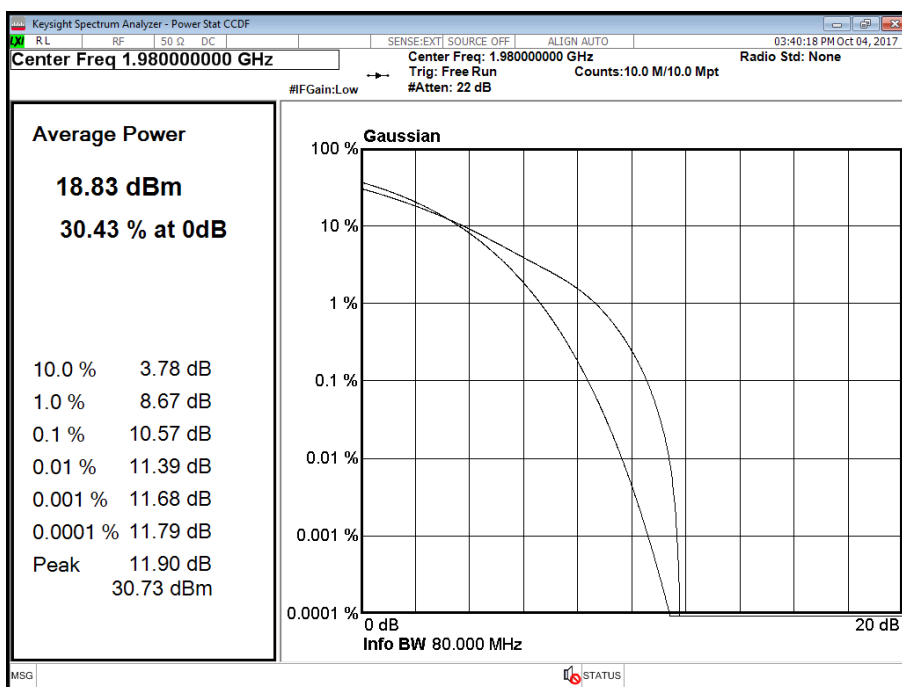
Antenna B - LTE Modulation QPSK - LTE Carrier Bandwidth 20.0 MHz - Channel Position T



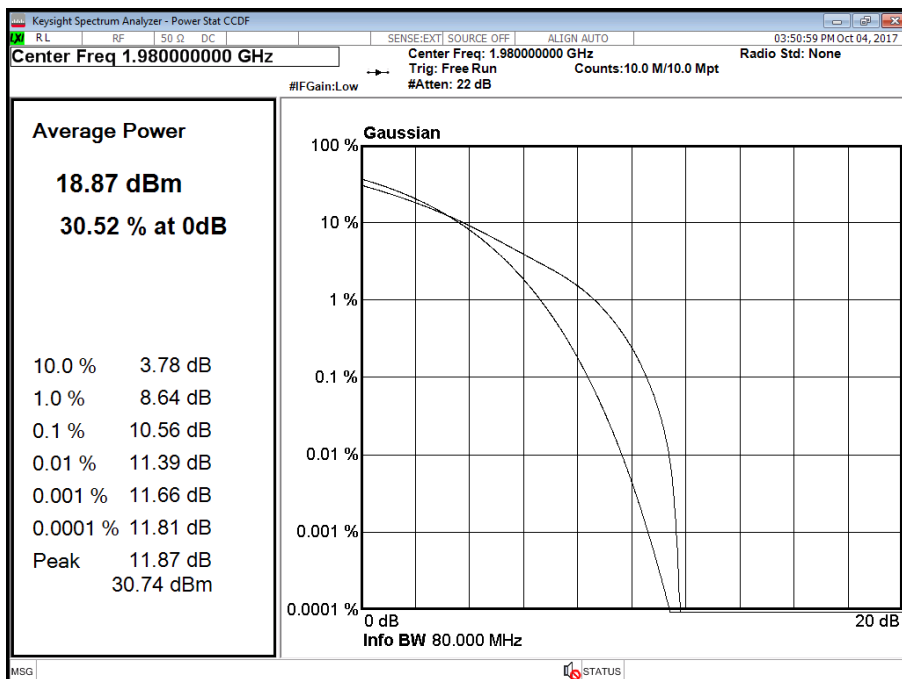


Product Service

Antenna B - LTE Modulation 16QAM - LTE Carrier Bandwidth 20.0 MHz - Channel Position T



Antenna B - LTE Modulation 64QAM - LTE Carrier Bandwidth 20.0 MHz - Channel Position T



Limit	
Peak Power	≤160 W or ≤+52 dBm (worst case limit from 24.232(a) >1 MHz bandwidth
Peak to Average Ratio	13 dB



Product Service

2.2 OCCUPIED BANDWIDTH

2.2.1 Specification Reference

FCC CFR 47 Part 2, Clause 2.1049
FCC CFR 47 Part 24, Clause 24.238 (b)

2.2.2 Date of Test and Modification State

20 September to 12 October 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 - 23.3°C
Relative Humidity 55.2 - 41.9%

2.2.5 Test Method

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

2.2.6 Test Results

Configuration 1

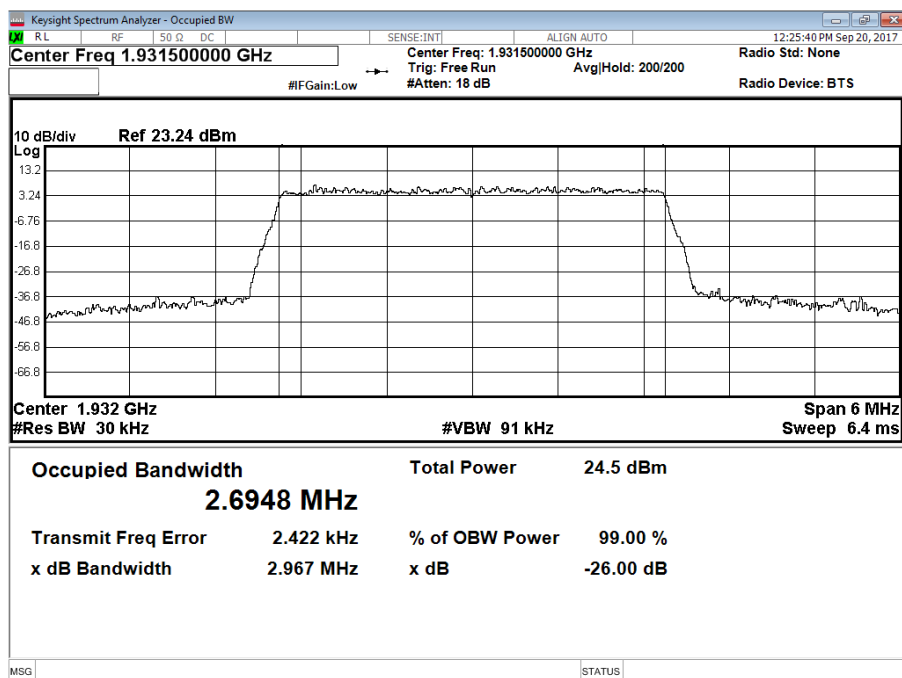
Maximum Output Power 20 dBm

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	3.0 MHz	2,694.79	2,966.73	2,693.44	2,958.41	2,694.19	2,958.08
A	16QAM	3.0 MHz	2,692.46	2,939.77	2,699.01	2,957.32	2,695.06	2,956.48
A	64QAM	3.0 MHz	2,702.57	2,960.05	2,702.13	2,954.04	2,700.89	2,958.62
A	QPSK	5.0 MHz	4,479.35	4,905.77	4,481.77	4,887.98	4,483.03	4,944.51
A	16QAM	5.0 MHz	4,466.63	4,821.11	4,474.57	4,859.39	4,464.27	4,845.30
A	64QAM	5.0 MHz	4,469.91	4,834.07	4,496.41	4,876.64	4,486.90	4,875.93
A	QPSK	10.0 MHz	8,932.45	9,728.71	8,964.19	9,684.43	8,961.79	9,779.06
A	16QAM	10.0 MHz	8,936.49	9,651.40	8,953.18	9,563.14	8,945.84	9,699.17
A	64QAM	10.0 MHz	8,945.77	9,712.02	8,932.74	9,735.97	8,940.88	9,646.36
A	QPSK	15.0 MHz	13,730.19	15,231.59	13,415.02	14,544.20	13,790.93	15,229.94
A	16QAM	15.0 MHz	13,625.58	15,072.57	13,735.17	15,271.29	13,776.03	15,183.15
A	64QAM	15.0 MHz	13,844.98	15,253.41	13,846.49	15,285.32	13,800.56	15,172.28
A	QPSK	20.0 MHz	18,831.09	20,394.84	18,839.24	20,478.70	18,892.71	20,437.76
A	16QAM	20.0 MHz	18,767.76	20,604.19	18,782.45	20,474.36	18,874.16	20,546.03
A	64QAM	20.0 MHz	18,838.80	20,464.20	18,825.07	20,437.18	18,972.91	20,357.67

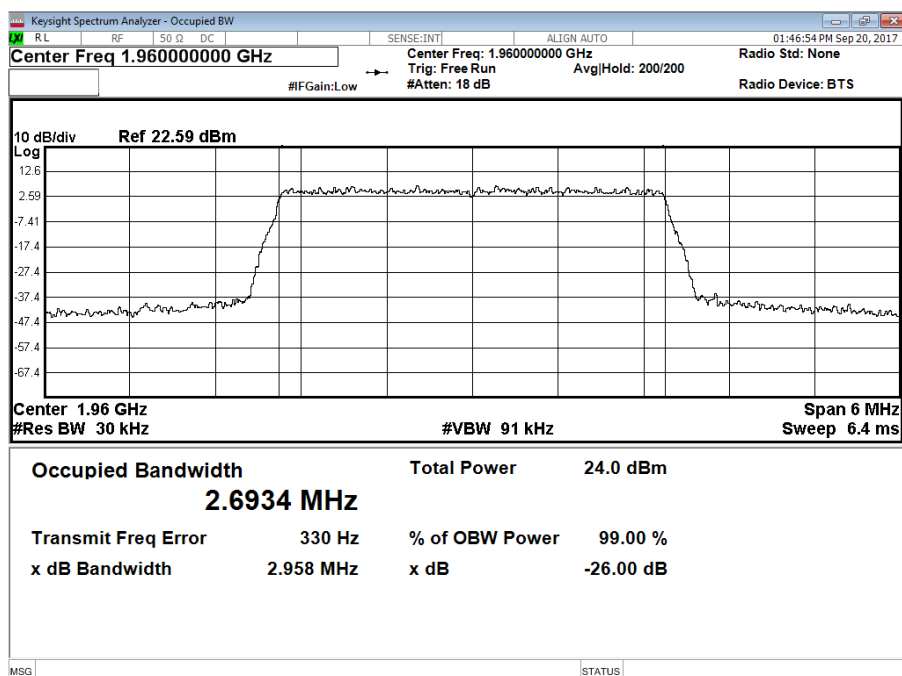


Product Service

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



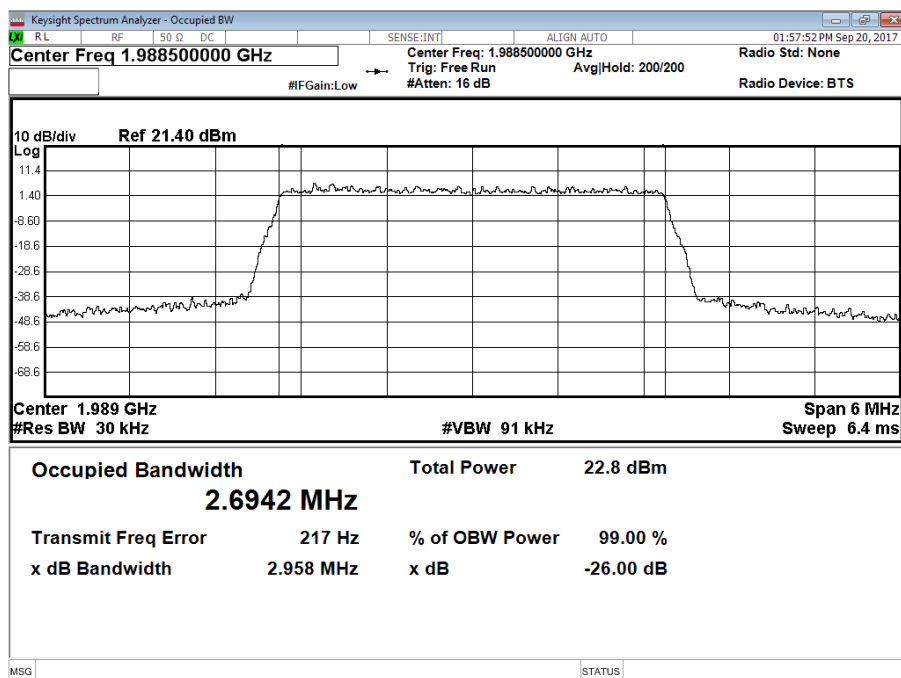
Antenna A - LTE Modulation QPSK - LTE Carrier Bandwidth 3.0 MHz - Channel Position M



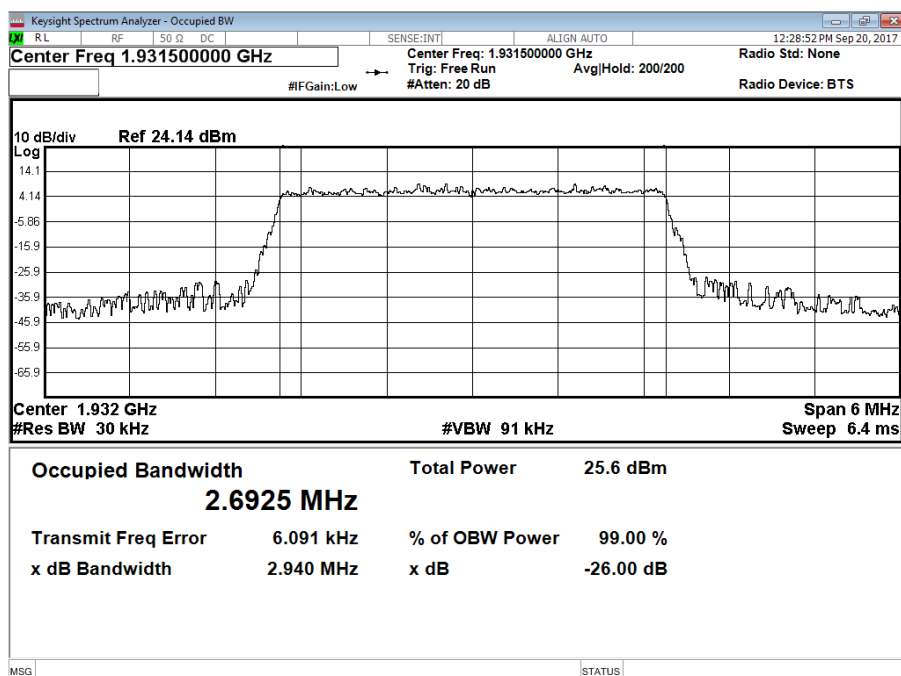


Product Service

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



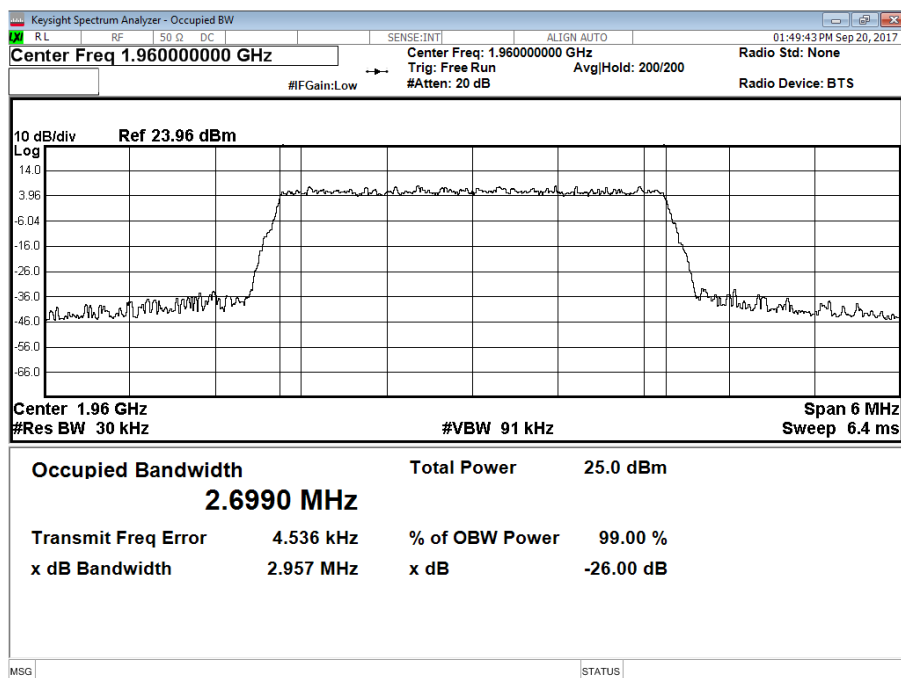
Antenna A - LTE Modulation 16QAM - LTE Carrier Bandwidth 3.0 MHz - Channel Position B



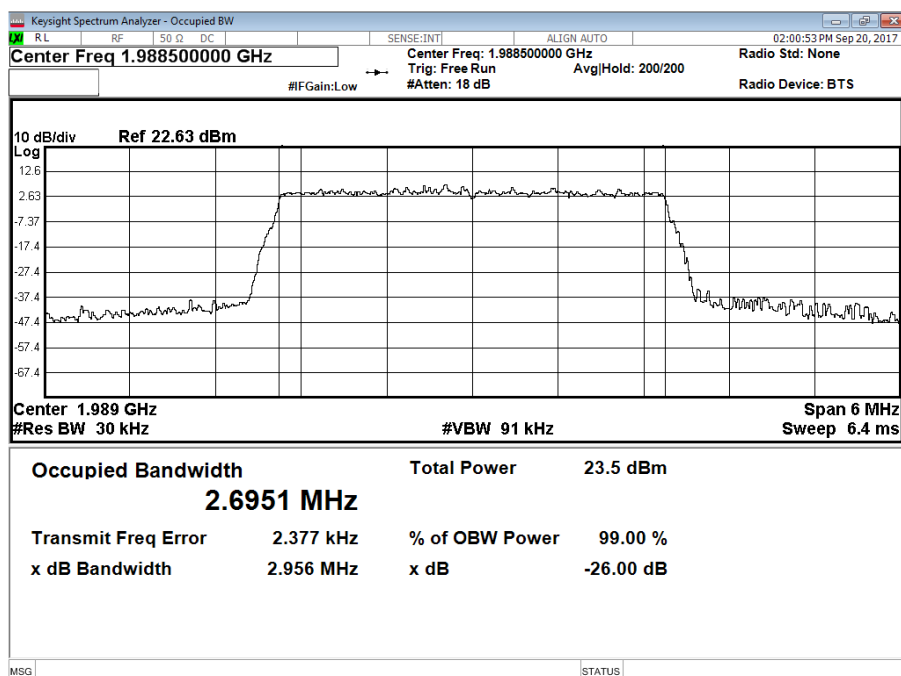


Product Service

Antenna A - LTE Modulation 16QAM - LTE Carrier Bandwidth 3.0 MHz - Channel Position M



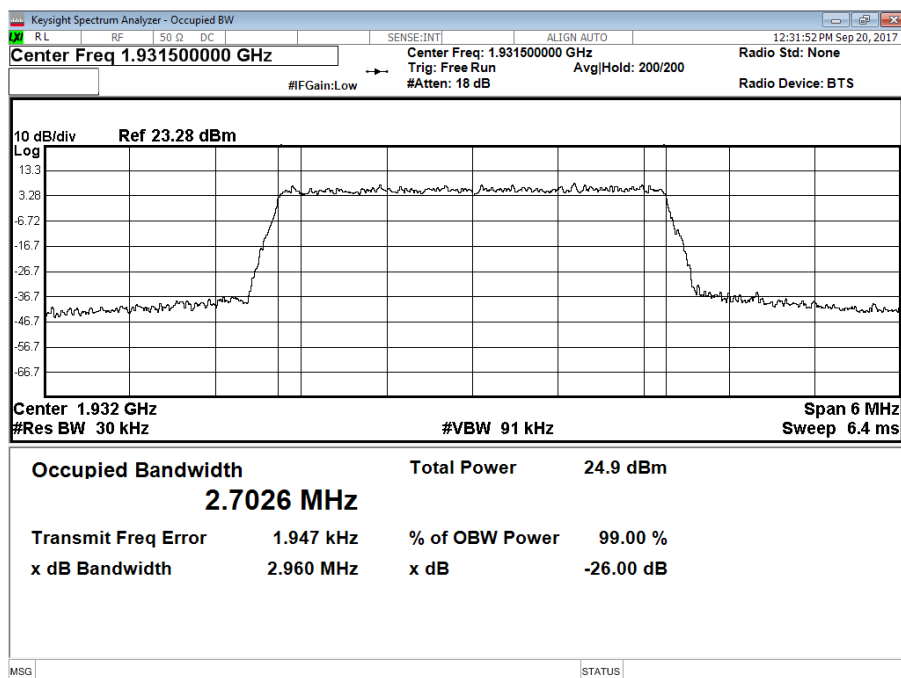
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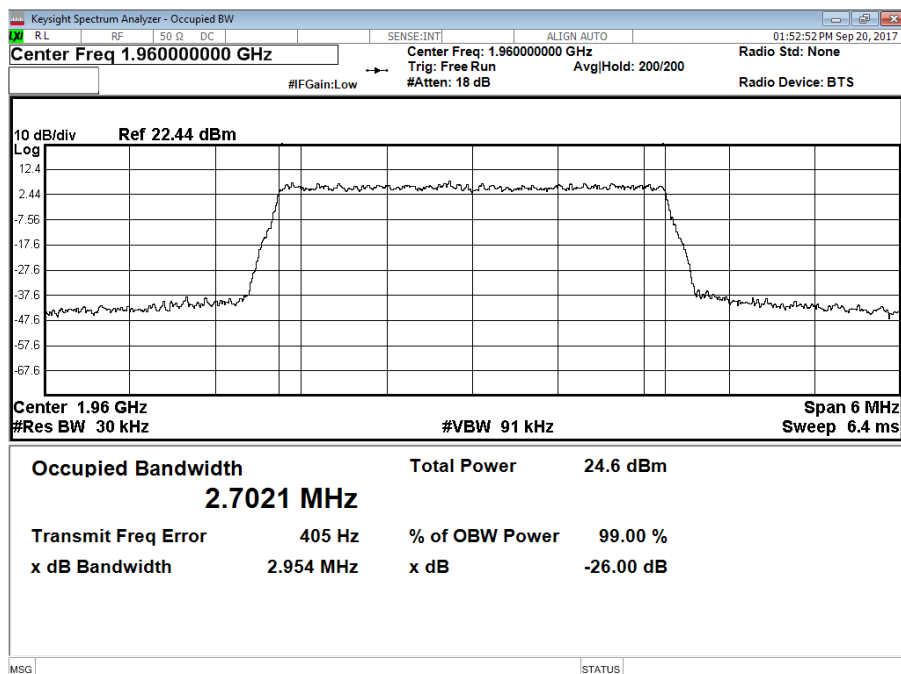


Product Service

Antenna A - LTE Modulation 64QAM - LTE Carrier Bandwidth 3.0 MHz - Channel Position B



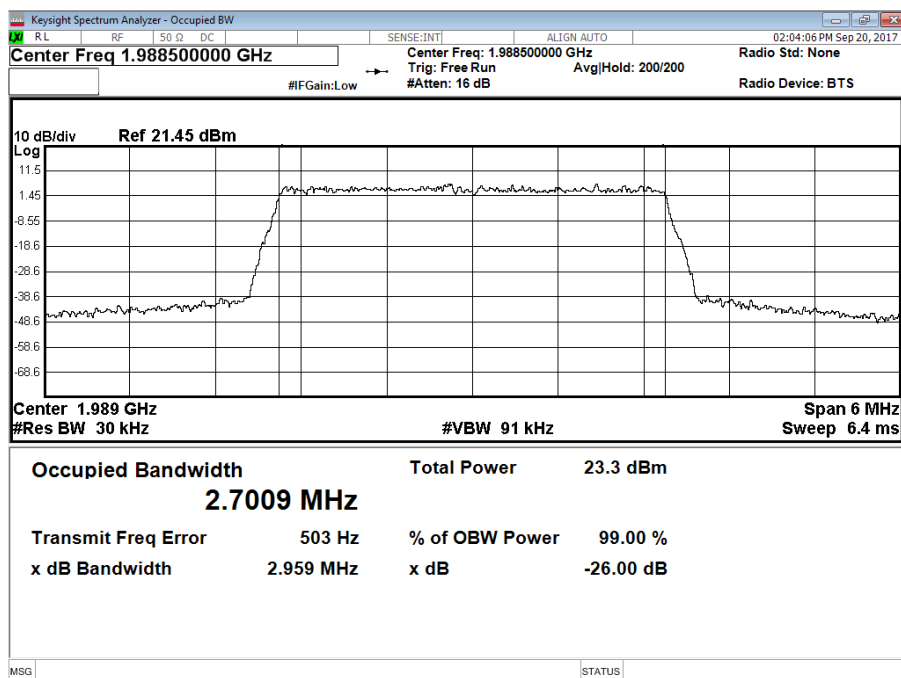
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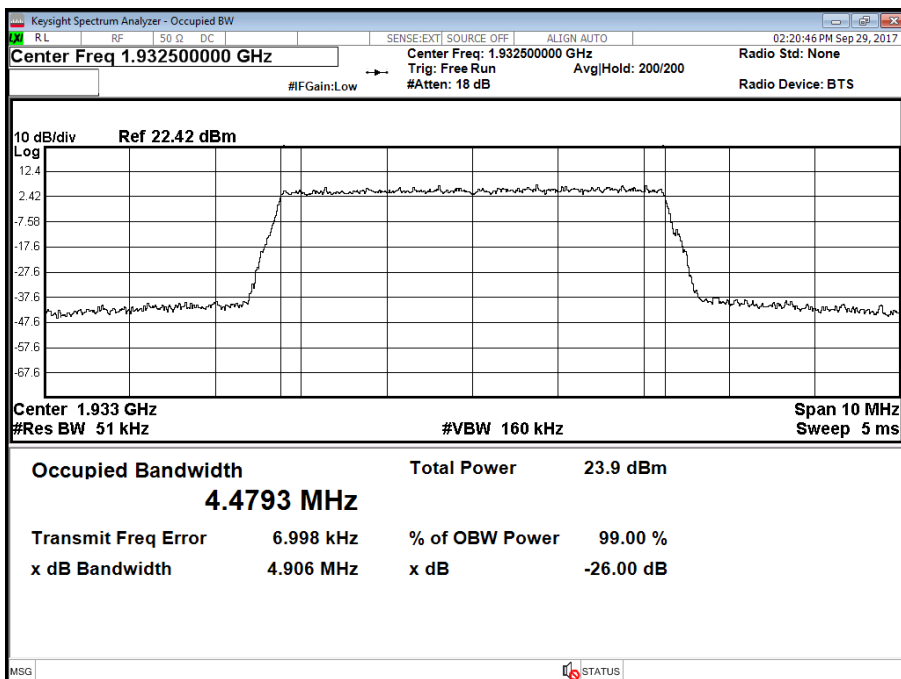


Product Service

Antenna A - LTE Modulation 64QAM - LTE Carrier Bandwidth 3.0 MHz - Channel Position T



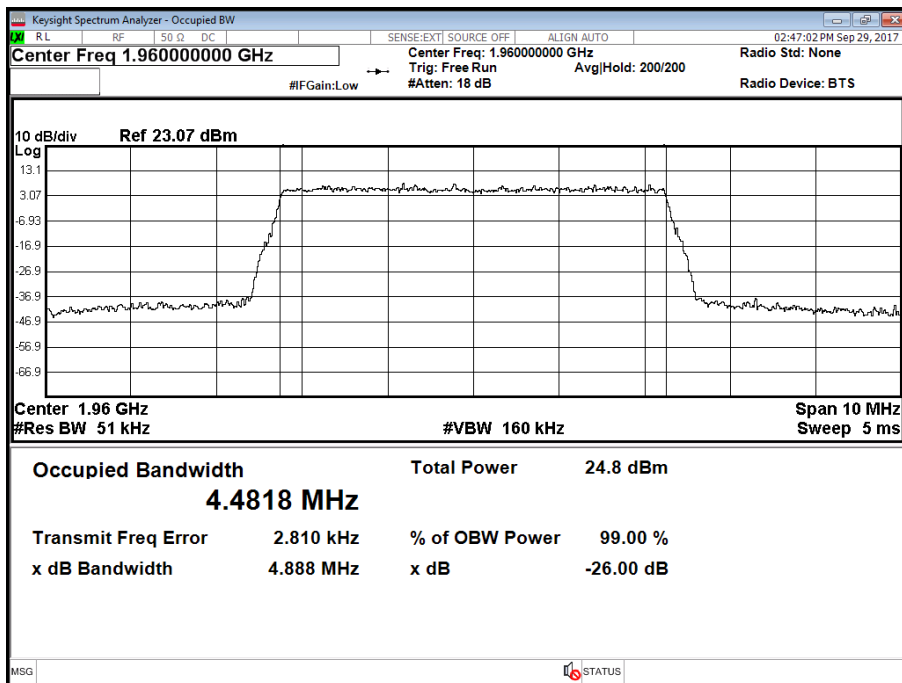
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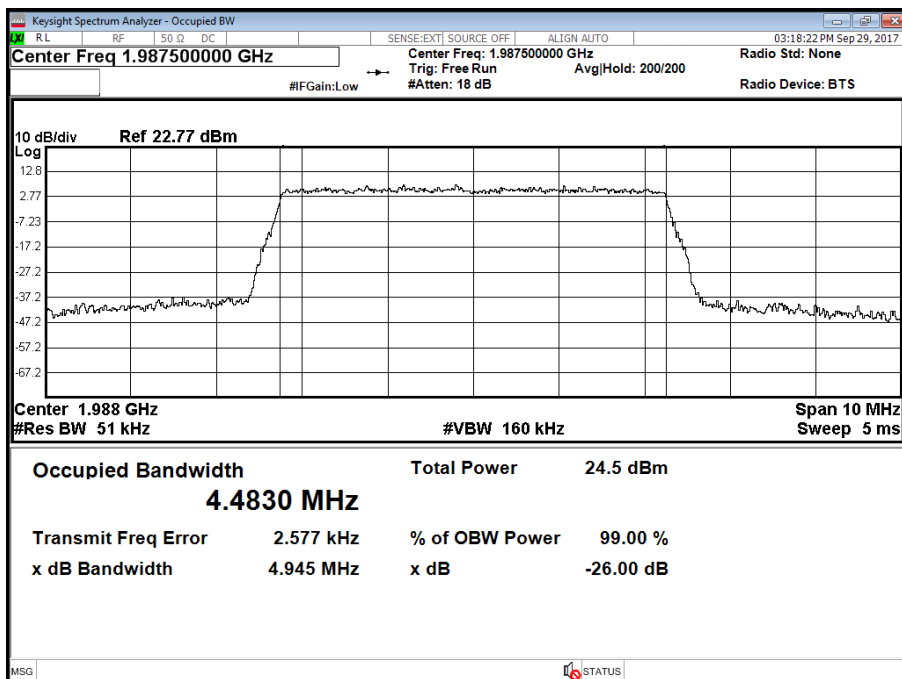


Product Service

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



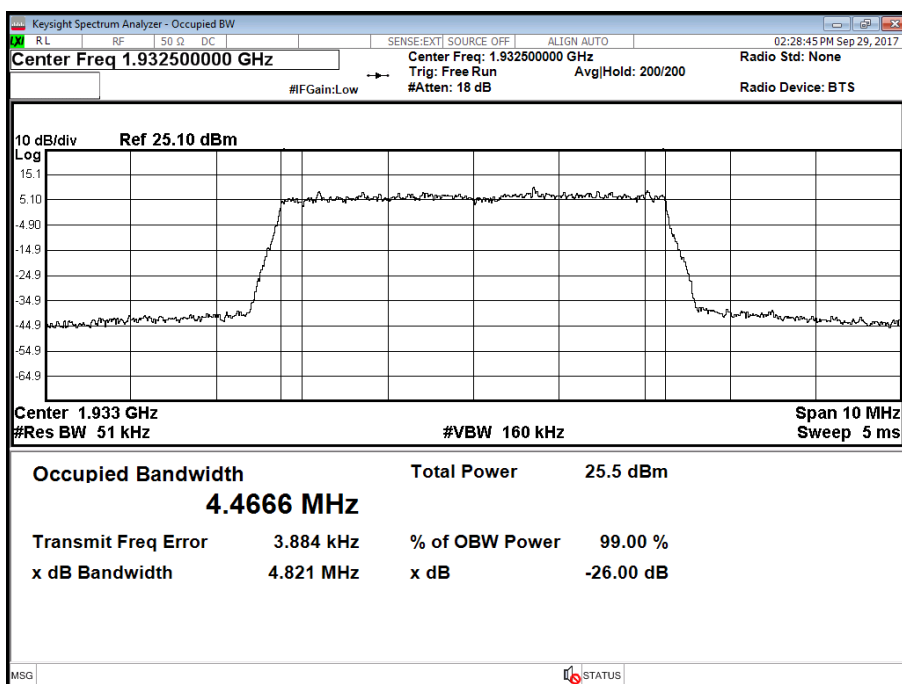
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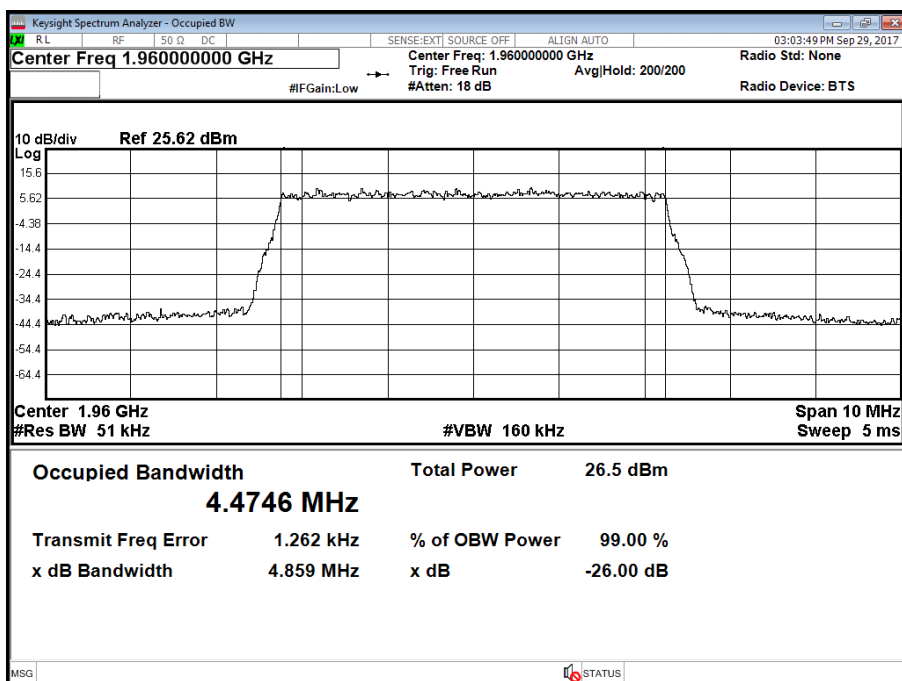


Product Service

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



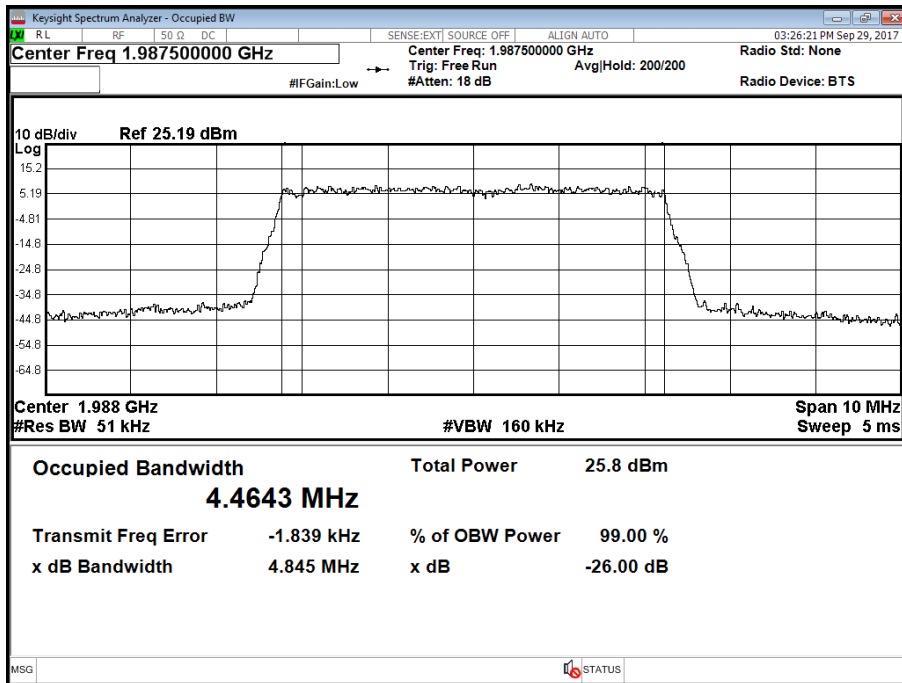
Antenna A - LTE Modulation 16QAM - LTE Carrier Bandwidth 5.0 MHz - Channel Position M



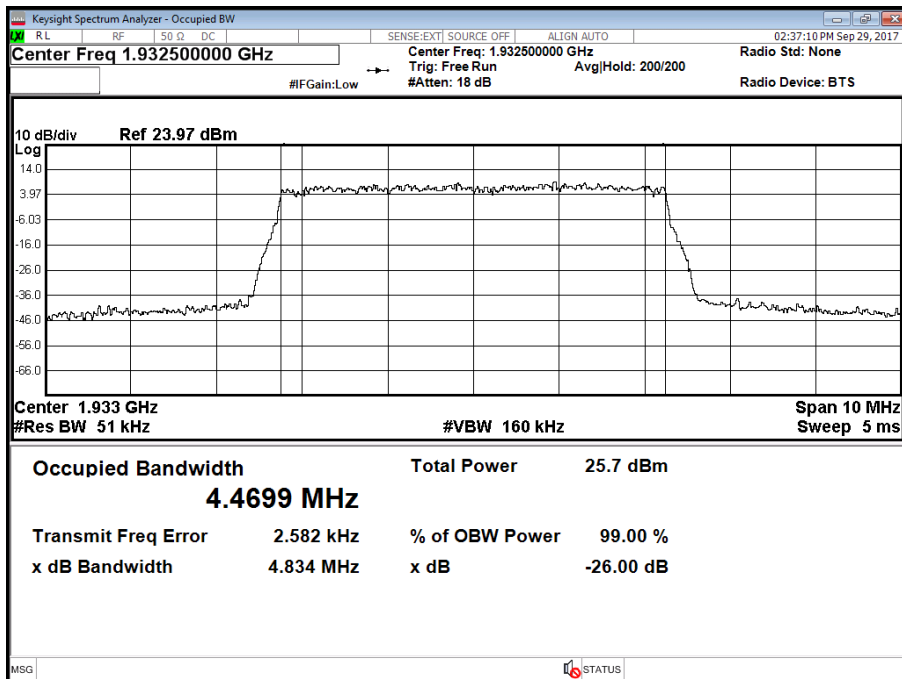


Product Service

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



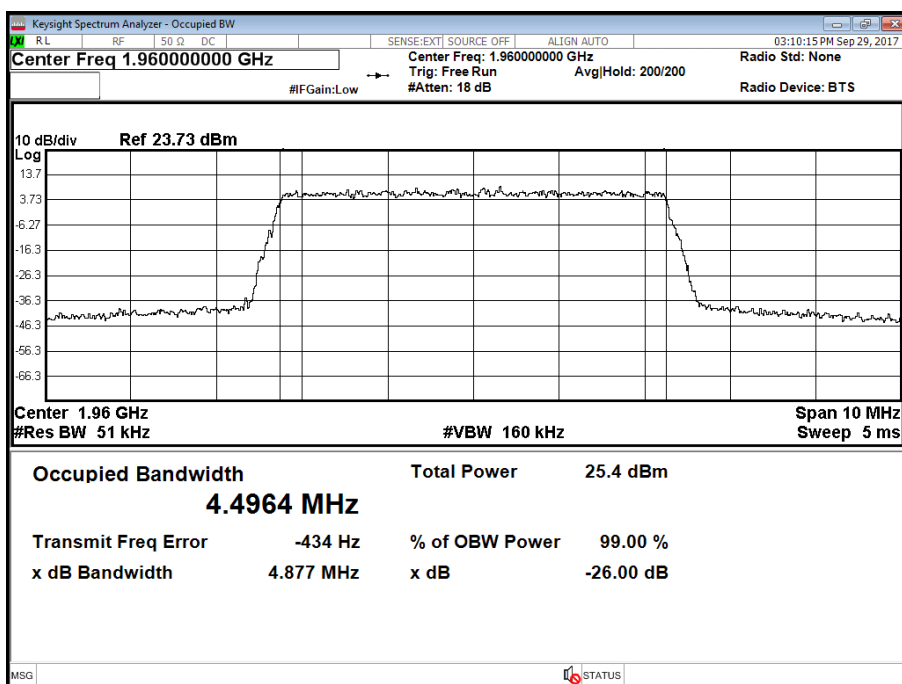
Antenna A - LTE Modulation 64QAM - LTE Carrier Bandwidth 5.0 MHz - Channel Position B



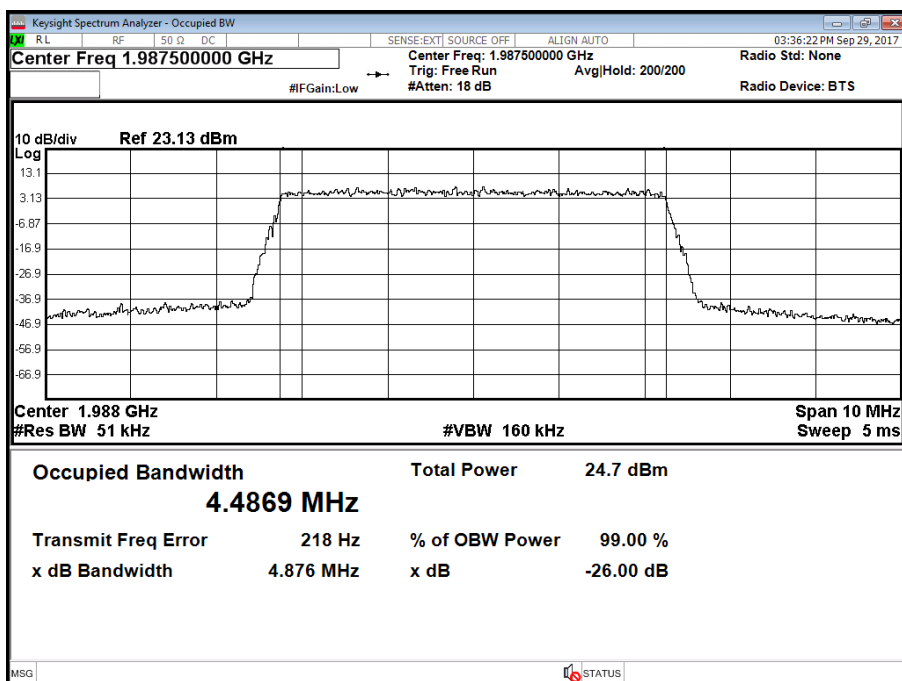


Product Service

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



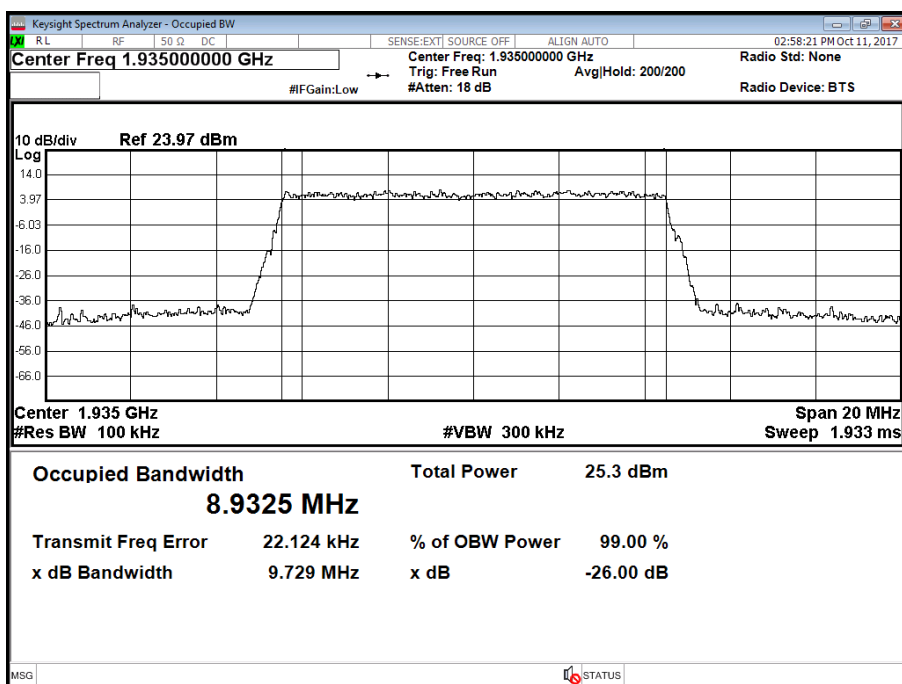
Antenna A - LTE Modulation 64QAM - LTE Carrier Bandwidth 5.0 MHz - Channel Position T



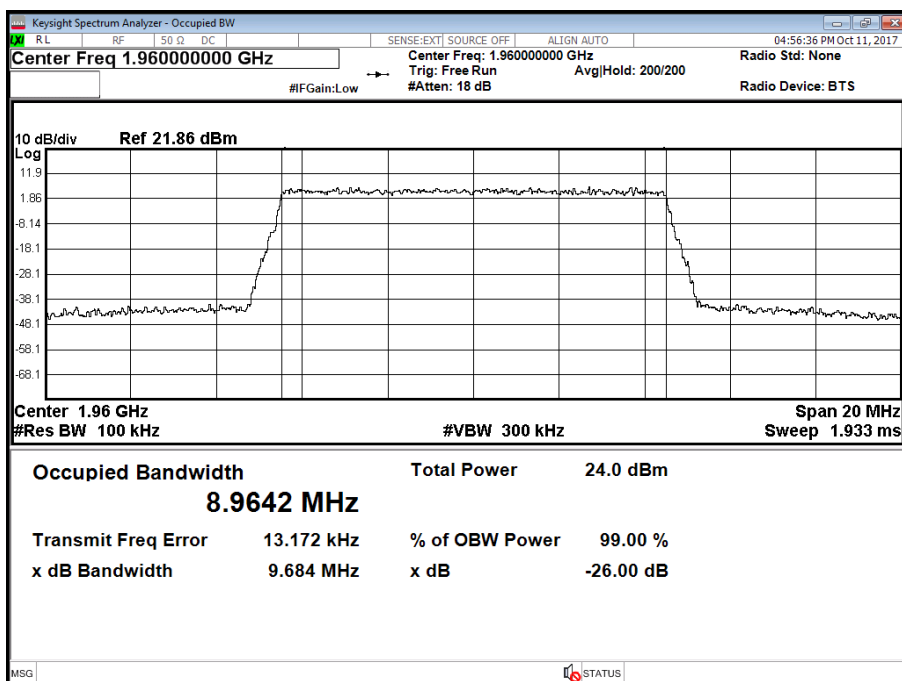


Product Service

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



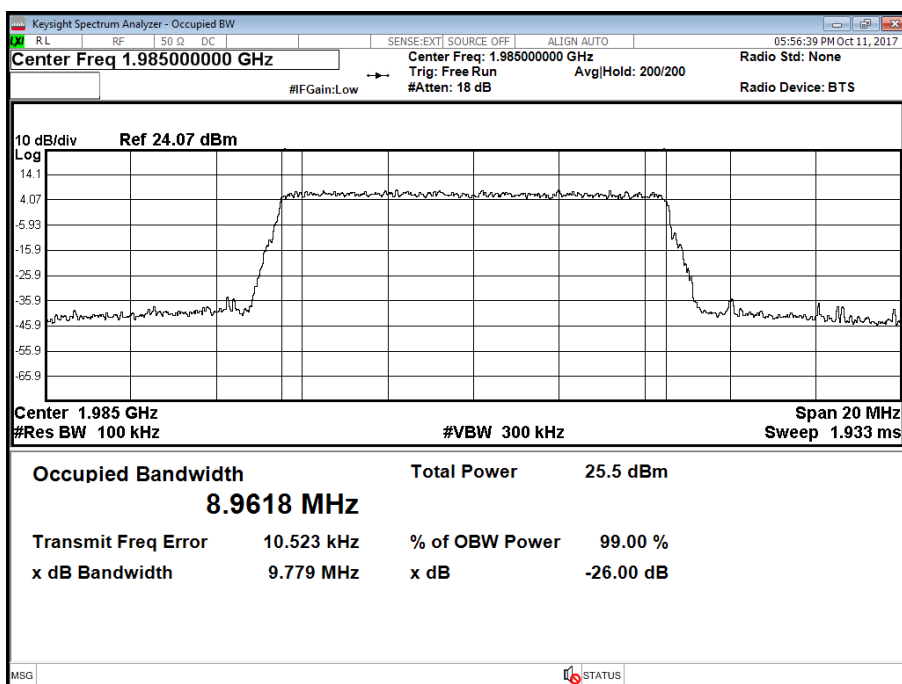
Antenna A - LTE Modulation QPSK - LTE Carrier Bandwidth 10.0 MHz - Channel Position M



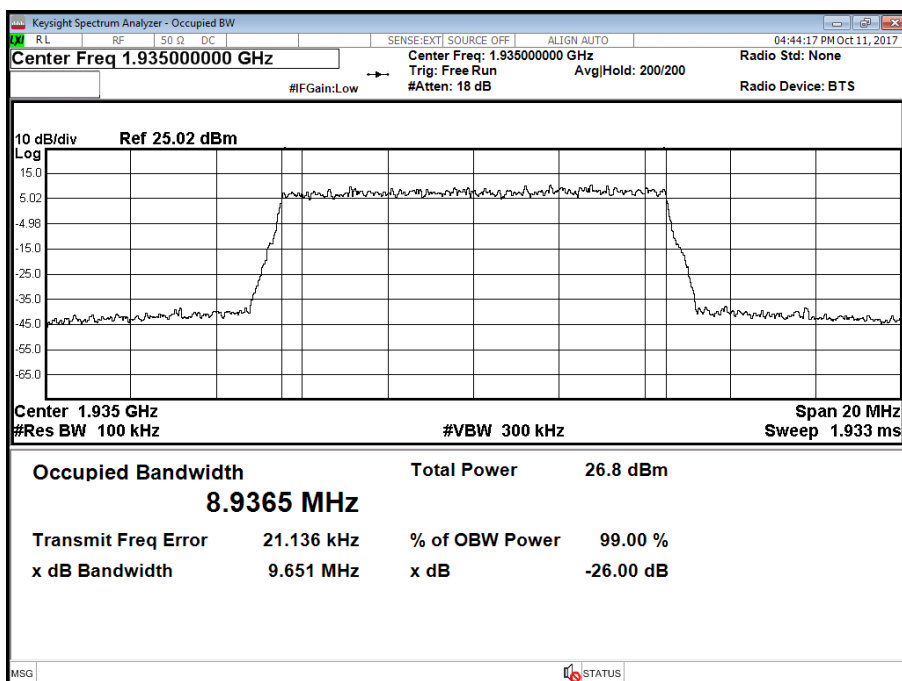


Product Service

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



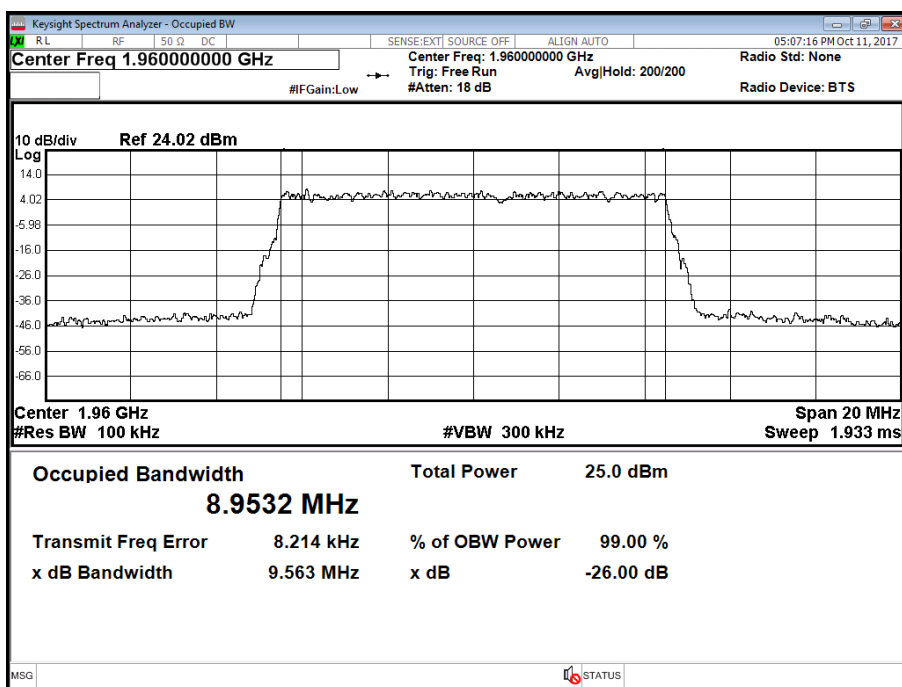
Antenna A - LTE Modulation 16QAM - LTE Carrier Bandwidth 10.0 MHz - Channel Position B



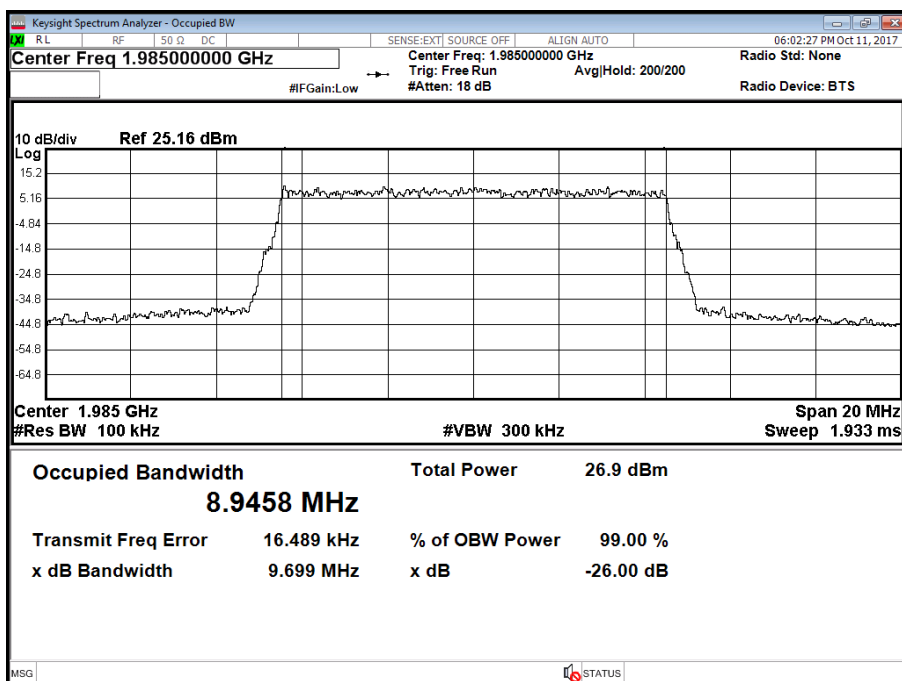


Product Service

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



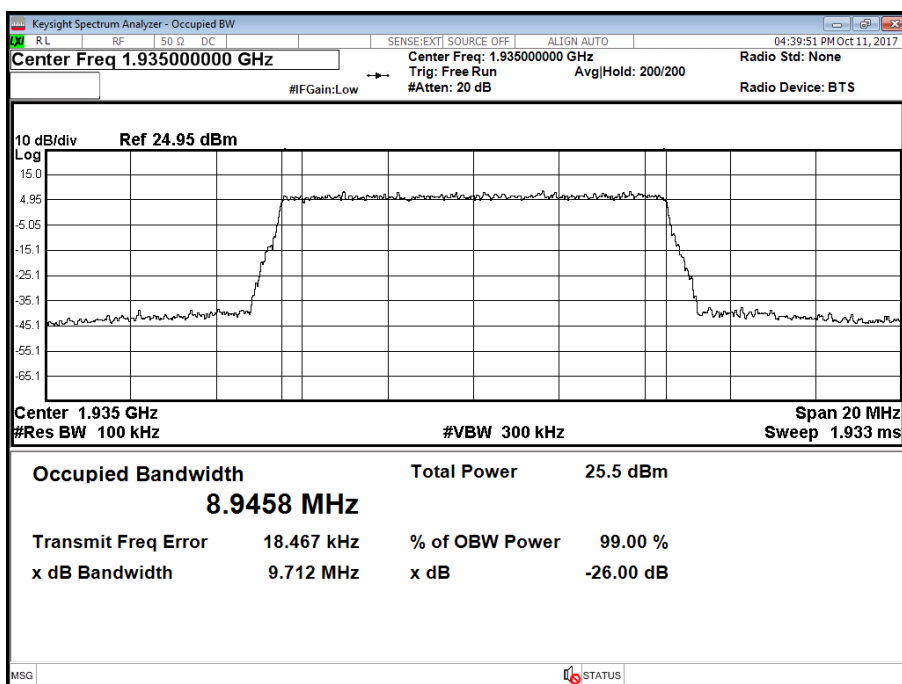
Antenna A - LTE Modulation 16QAM - LTE Carrier Bandwidth 10.0 MHz - Channel Position T





Product Service

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



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

