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Report On

FCC Testing of the
Ericsson LTE KRY 901 385/1 RD 4442 B48 (3550-3700 MHz) Base
Station in accordance with FCC CFR 47 Part 2, FCC CFR 47 Part 96
COMMERCIAL-IN-CONFIDENCE

FCC ID: TA8AKRY901385-1

PREPARED BY

A handwritten signature in black ink, appearing to read "Scott Drysdale".

Scott Drysdale
Test Personnel

APPROVED BY

A handwritten signature in black ink, appearing to read "Abderrahmane Ferhat".

Abderrahmane Ferhat
Authorised Signatory

DATED

Sept 17, 2018



Product Service

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Product Service

SECTION 1

REPORT INFORMATION



Product Service

1.1 REPORT DETAILS

Manufacturer	Ericsson
Address	349 Terry Fox Drive Ottawa Ontario K2K 2V6 Canada
Product Name	RD 4442 B48
Product Number	KRY 901 385/1
Serial Number(s)	TD3T428788
Software Version	CXP 901 3268/14: R70AK
Hardware Version	R1C
Test Specification/Issue/Date	FCC CFR 47 Part 2: 2017 FCC CFR 47 Part 96: 2017
Product Name	RD 4442 B48
Start of Test	16 April 2018
Finish of Test	13 June 2018
Name of Engineer(s)	Scott Drysdale
Report issue / Revisions	Issue 1 –July 2018 Issue 2 – Sept 2018 – Added dBm/10 MHz Issue 3 – Sept 2018 – corrected dBm/10 MHz
Related Document(s)	KDB 971168 D01 v03r01 KDB 662911 D01 v02r01 KDB 940660 D01 Part 96 CBRS Eqpt v01 ANSI C63.26:2015

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 compliance with FCC CFR 47 Part 96. The sample tested was found to comply with the requirements defined in the applied rules.

Test Engineer(s);

S Drysdale



Product Service

1.2 BRIEF SUMMARY OF RESULTS

A brief summary of results for each configuration, in accordance with FCC CFR 47 Part 2, FCC CFR 47 Part 96 is shown below.

Section	Specification Clause		Test Description	Result
	FCC CFR 47 Part 2	FCC CFR 47 Part 96		
2.1	2.1046	96.41 (b)(c)(g)	Peak Output Power and Peak to Average Ratio – Conducted, PSD	Pass
2.2	2.1049	96.41 (e)(3)	Occupied Bandwidth	Pass
2.3	2.1051	96.41 (e)(3)	Band Edge	Pass
2.4	2.1051	96.41 (e)(1)	Transmitter Spurious Emissions	Pass
2.5	2.1055		Frequency Stability	Pass

1.3 CONFIGURATION DESCRIPTION

1.3 CONFIGURATION DESCRIPTION

The RD 4442 B48 / KRY 901 385/1 supports Single and Multi-Carrier operation from either a single or dual port configuration.

The RD 4442 B48 supports LTE Test Models E-TM1.1, E-TM3.1, E-TM3.1a E-TM3.2 in Band 48 (3550 MHz – 3700 MHz).

The LTE Test Models (as defined in 3GPP TS 36.141) E-TM1.1, E-TM3.1, E-TM3.1a and E-TM3.2 were used to represent QPSK, 64QAM, 256QAM and 16QAM modulation respectively.

TX test cases: Maximum Conducted Output Power, Maximum Power Spectral Density, Spurious Emissions at Antenna Terminals (± 1 MHz) and Conducted Spurious Emissions, measurements were performed on both RF Ports of the 2 B48 radios using a test limit accounting for MIMO operation with 4 ports. All RF ports were tested for RF Carrier Power and results recorded using the Measure and Sum approach to account for MIMO operation. The test limits shown are representative of the worst case. All testing was performed with the EUT transmitting at maximum RF power unless otherwise stated.

The EUT was powered via POE (Power Over Ethernet) from the IRU 2242 using a -48V DC Power supply.

LTE B48 (3550 MHz – 3700 MHz) Channel Configurations

All tests except MC Band Edge Emissions

Configuration	RAT	No. of Carrier Bandwidth (MHz) Carriers	Carrier Bandwidth (MHz)	Carrier Frequency Configuration (MHz)		
				Bottom (BRFBW)	Middle (MRFBW)	Top (TRFBW)
A	LTE	1	5	3552.5	3625	3697.5
A	LTE	1	10	3555.0	3625	3695.0
A	LTE	1	15	3557.5	3625	3692.5
A	LTE	1	20	3560.0	3625	3690.0
B	LTE	2	5	3552.5 + 3557.5	3622.5 + 3627.5	3692.5 + 3697.5
B	LTE	2	10	3555.0 + 3565.0	3620.0 + 3630.0	3685.0 + 3695.0
B	LTE	2	15	3557.5 + 3572.5	3617.5 + 3632.5	3677.5 + 3692.5
B	LTE	2	20	3560.0 + 3580.0	3615.0 + 3635.0	3670.0 + 3690.0
C	LTE	4	5	3552.5 + 3557.5 + 3562.5 + 3567.5	3617.5 + 3622.5 + 3627.5 + 3632.5	3682.5 + 3687.5 3692.5 + 3697.5
C	LTE	4	10	3555.0 + 3565.0 + 3575.0 + 3585.0	3610.0 + 3620.0+ 3630.0 + 3640.0	3665.0 + 3675.0+ 3685.0 + 3695.0



Product Service

MC Band Edge Emissions

Configuration	RAT	No. of Carrier Bandwidth (MHz) Carriers	Carrier Bandwidth (MHz)	Carrier Frequency Configuration (MHz)	
				Bottom (BRFBW)	Top (TRFBW)
B	LTE	2	5	3552.5 + 3557.5	3692.5 + 3697.5
B	LTE	2	10	3555.0 + 3565.0	3685.0 + 3695.0
B	LTE	2	15	3557.5 + 3572.5	3677.5 + 3692.5
B	LTE	2	20	3560.0 + 3580.0	3670.0 + 3690.0



Product Service

1.4 DECLARATION OF BUILD STATUS

MAIN EUT	
MANUFACTURING DESCRIPTION	Radio Dot
MANUFACTURER	Ericsson
TYPE	Remote Radio Base Station
PART NUMBER	RD 4442 B25B66A: KRY 901 385/1
SERIAL NUMBER	TD3T428788
HARDWARE VERSION	R1C
SOFTWARE VERSION	R70AK
TRANSMITTER OPERATING RANGE	B48 3550 – 3700 MHz (TDD)
RECEIVER OPERATING RANGE	B48 3550 – 3700 MHz (TDD)
COUNTRY OF ORIGIN	China
INTERMEDIATE FREQUENCIES	DL: 110 – 150MHz, UL: 40 – 80MHz
EMISSION DESIGNATOR(S): (i.e. G1D, GXW)	LTE 5M00 W7D 10M0 W7D 15M0 W7D 20M0 W7D
MODULATION TYPES: (i.e. GMSK, QPSK)	LTE: QPSK, 16QAM, 64QAM, 256QAM
HIGHEST INTERNALLY GENERATED FREQUENCY	3.7 GHz
OUTPUT POWER (W or dBm)	4x 0.05 W (17dBm)
FCC ID	Tested EUT: TA8AKRY901385-1
INDUSTRY CANADA ID	NA
TECHNICAL DESCRIPTION (a brief description of the intended use and operation)	The RD 4442 B48 (KRY 901 385/1) is a dual band Remote Radio Unit forming part of the Ericsson Radio Base Station (RBS) equipment. The RD provides radio access for mobile and fixed devices and is intended for the indoor environment. The radio operates over 4 Transmit ports in MRO; Single, Multi-Carrier, and MIMO transmission with a maximum rated RF Output of 0.050W per port over an operational temperature of 5°C to +40°C. The unit is designed to be ceiling mounted.

Signature:

.....
Denis Lalonde

Date: 20 July 2018

Declaration of Build Status Serial Number: TD3T428788

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

1.5 PRODUCT INFORMATION

1.5.1 Technical Description

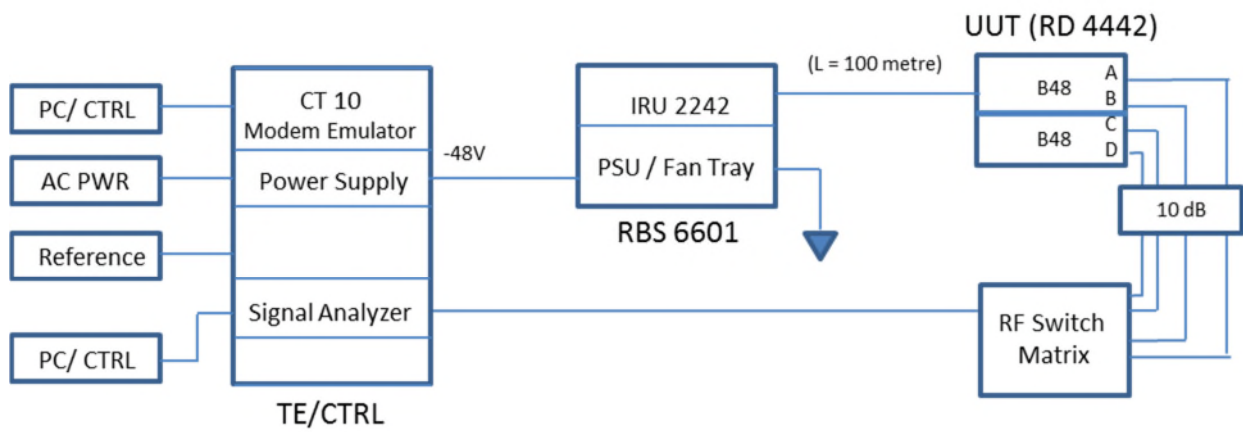
The Equipment Under Test (EUT) RD 4442 B48 KRY 901 385/1 is an Ericsson AB Radio Unit working in the public mobile service (3550-3700 MHz) band which provides communication connections to (Band) network. The RD 4442 B48 KRY 901 385/1 operates from a -48V DC supply.

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



Note: the RF Switch Matrix wasn't used for spurious emissions between 18 and 37 GHz



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 -48V DC supply.

FCC Measurement Facility Accreditation Designation Number: CA6845
TUV SUD Canada (Laval)

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 Accreditation, TÜV SÜD Canada, Laval conducted the following tests at Ericsson in Ottawa.

Test Name	Name of Engineer(s)
Peak Output Power and Peak to Average Ratio – Conducted, PSD	Scott Drysdale Gavin Gan Denis Lalonde
Occupied Bandwidth	Scott Drysdale Gavin Gan Denis Lalonde
Band Edge	Scott Drysdale Gavin Gan Denis Lalonde
Transmitter Spurious Emissions	Scott Drysdale Gavin Gan Denis Lalonde
Frequency Stability	Scott Drysdale Gavin Gan Denis Lalonde



Product Service

SECTION 2

TEST DETAILS



Product Service

2.1 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 96, Clause 96.41 (b)(c)(g)

2.1.2 Date of Test and Modification State

19, 23 and 27 April 2018 - 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	23°C
Relative Humidity	35%

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. EIRP values were calculated by adding the Port A and Port B antenna gain of 2.6 dBi and the Port C and Port D antenna gain of 3.1 dBi

2.1.6 Test Results

Configuration A

Maximum Output Power 17 dBm

Antenna	LTE Modulation	LTE Carrier Bandwidth	Peak to Average Ratio (PAR) / Output Power/PSD						
			Channel Position B						
			PAR (dB)	Conducted Average Power		EIRP		EIRP	
				dBm	dBm/MHz	dBm	dBm/MHz	dBm/10 MHz (See note)	
A	QPSK	5.0 MHz	7.09	16.48	10.78	19.08	13.38	19.08	
B	QPSK	5.0 MHz	7.05	16.66	11	19.26	13.6	19.26	
C	QPSK	5.0 MHz	7.06	16.52	10.98	19.62	14.08	19.62	
D	QPSK	5.0 MHz	7.02	16.8	11.08	19.9	14.18	19.9	
Total			-	22.64	16.98	25.50	19.84	25.50	
A	QPSK	10.0 MHz	7.11	16.59	8.38	19.19	10.98	19.19	
B	QPSK	10.0 MHz	7.05	16.7	8.21	19.3	10.81	19.3	
C	QPSK	10.0 MHz	7.12	16.5	8.47	19.6	11.57	19.6	
D	QPSK	10.0 MHz	7.04	16.77	8.29	19.87	11.39	19.87	
Total			-	22.66	14.36	25.52	17.22	25.52	
A	QPSK	15.0 MHz	7.16	16.63	6.7	19.23	9.3		
B	QPSK	15.0 MHz	7.08	16.78	6.91	19.38	9.51		
C	QPSK	15.0 MHz	7.13	16.65	6.87	19.75	9.97		
D	QPSK	15.0 MHz	7.05	16.72	6.72	19.82	9.82		
Total			-	22.72	12.82	25.57	15.68	24.34	
A	QPSK	20.0 MHz	7.13	16.68	5.51	19.28	8.11		
B	QPSK	20.0 MHz	7.09	16.86	5.8	19.46	8.4		
C	QPSK	20.0 MHz	7.14	16.59	5.72	19.69	8.82		
D	QPSK	20.0 MHz	7.02	16.85	5.71	19.95	8.81		
Total			-	22.77	11.71	25.62	14.57	23.12	

Note: For the 15 MHz and the 20 MHz, determination of pass or fail against the 30 dBm/ 10 MHz limit was made using the full bandwidth as worst case. For the purpose of presenting a value, the estimated total dBm/10 MHz value is calculated by adjusting the full value by $10 \log (\text{occbw} / 10 \text{ MHz})$, where by the lowest occupied bandwidth for 15 MHz and 20 MHz.

15 MHz occupied bandwidth is 13,3 MHz

15 MHz adjustment = $10 \log (13.3 / 10) = 1.23 \text{ dB}$

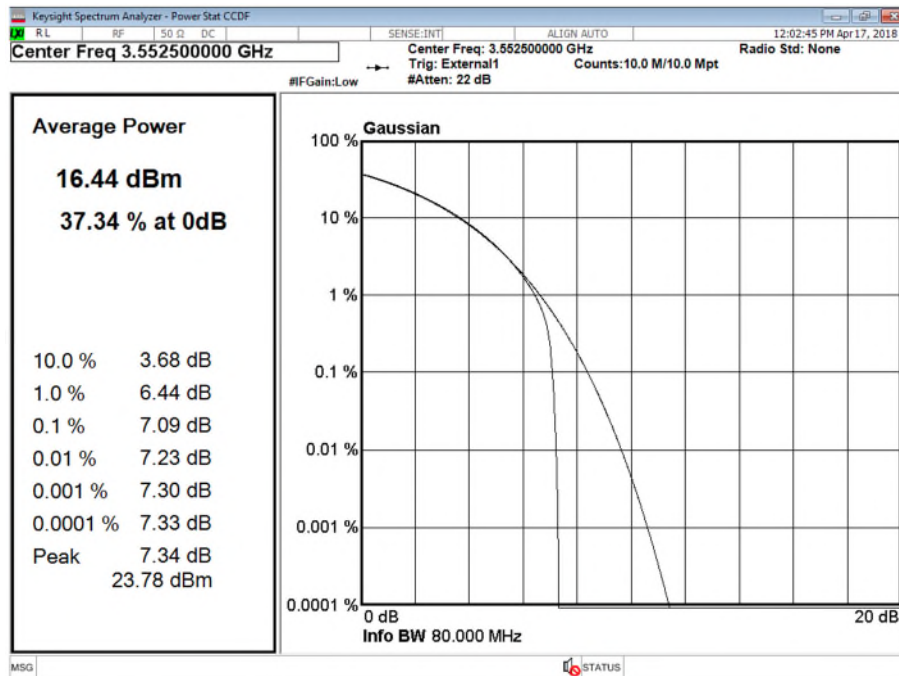
20 MHz occupied bandwidth is 17.8 MHz

20 MHz adjustment = $10 \log (17.8 / 10) = 2.50 \text{ dB}$

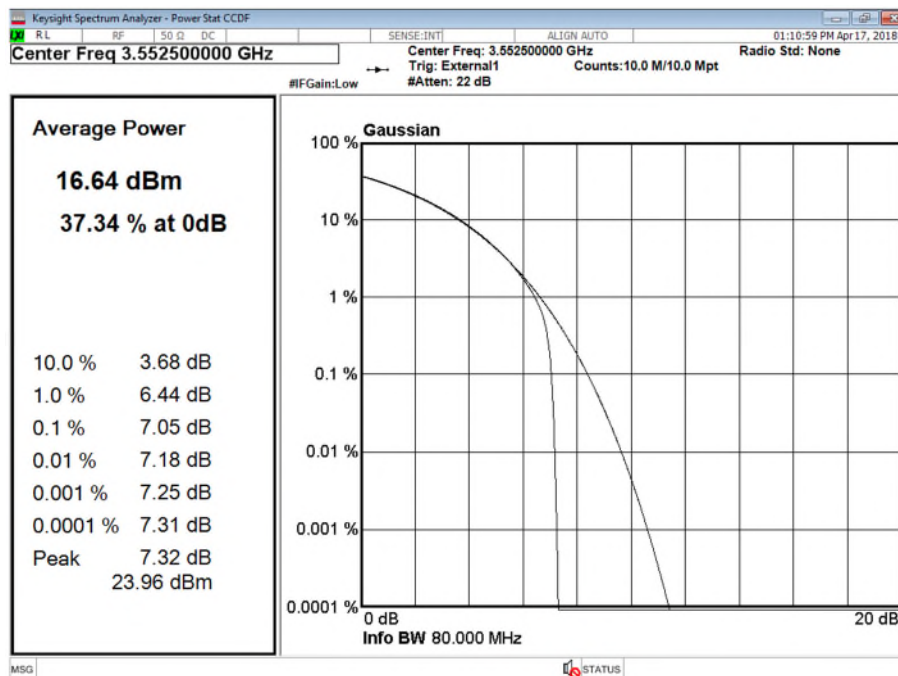


Product Service

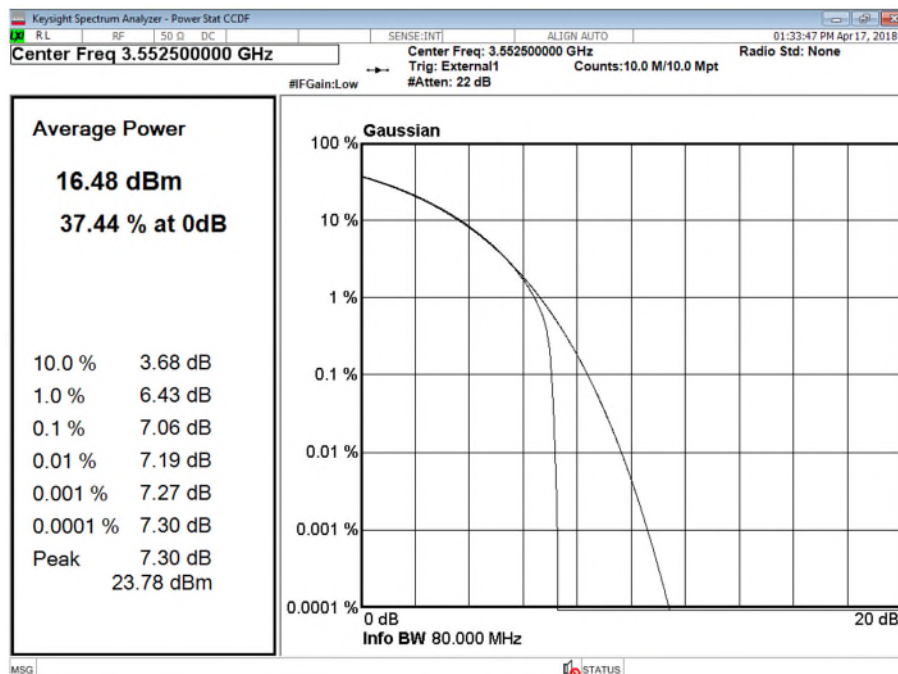
Antenna A - LTE Modulation QPSK - LTE Carrier Bandwidth 5.0 MHz - Channel Position B



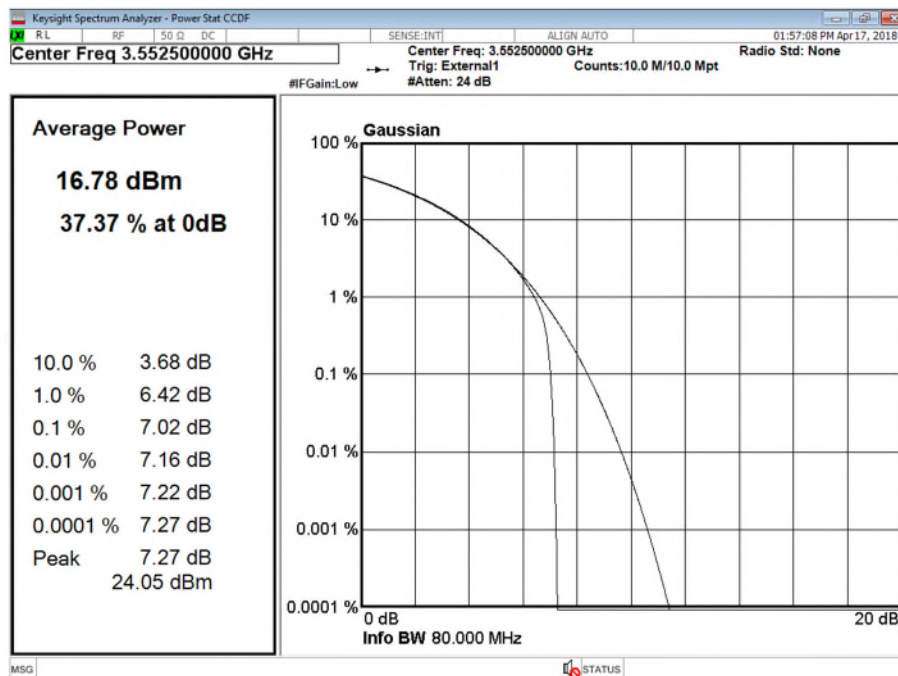
Antenna B - LTE Modulation QPSK - LTE Carrier Bandwidth 5.0 MHz - Channel Position B



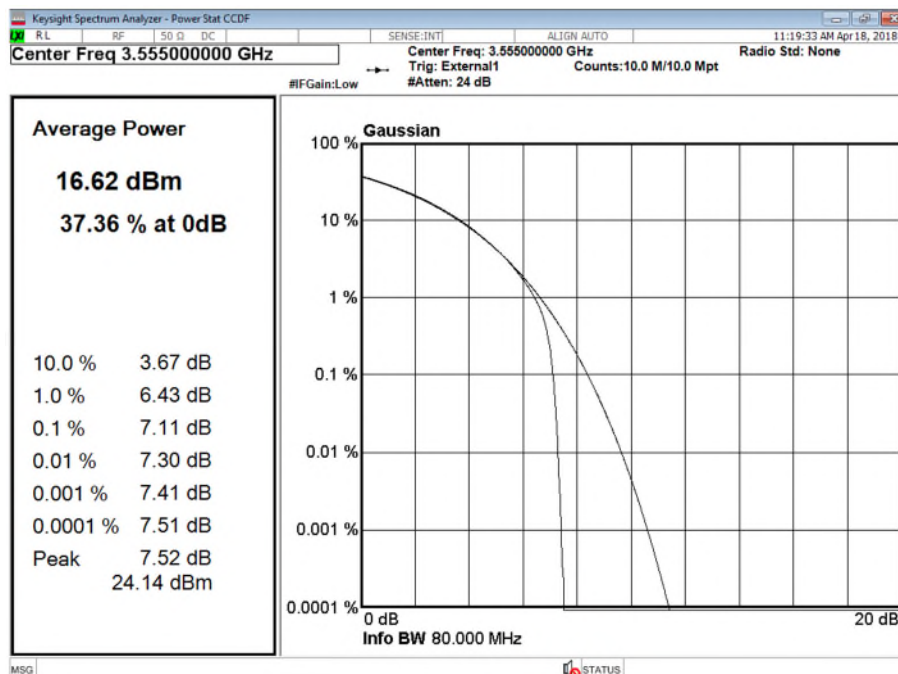
Antenna C - LTE Modulation QPSK - LTE Carrier Bandwidth 5.0 MHz - Channel Position B



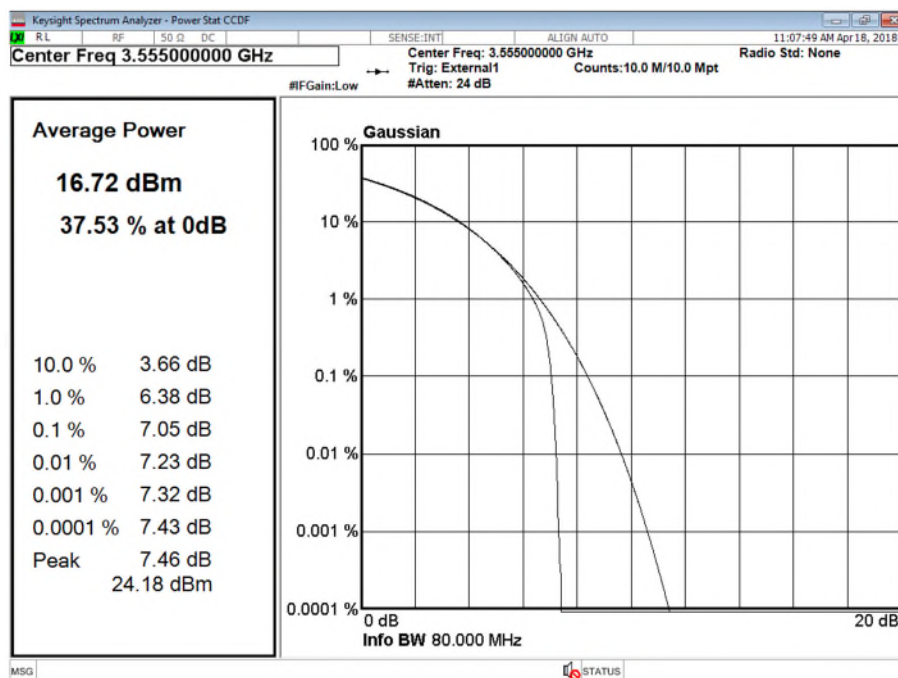
Antenna D - LTE Modulation QPSK - LTE Carrier Bandwidth 5.0 MHz - Channel Position B



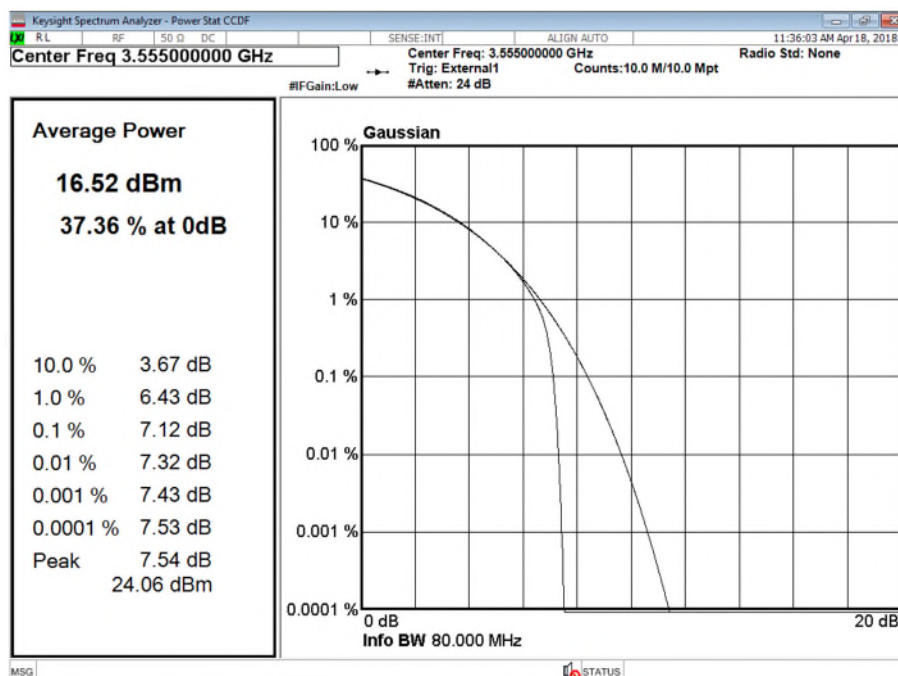
Antenna A - LTE Modulation QPSK - LTE Carrier Bandwidth 10.0 MHz - Channel Position B



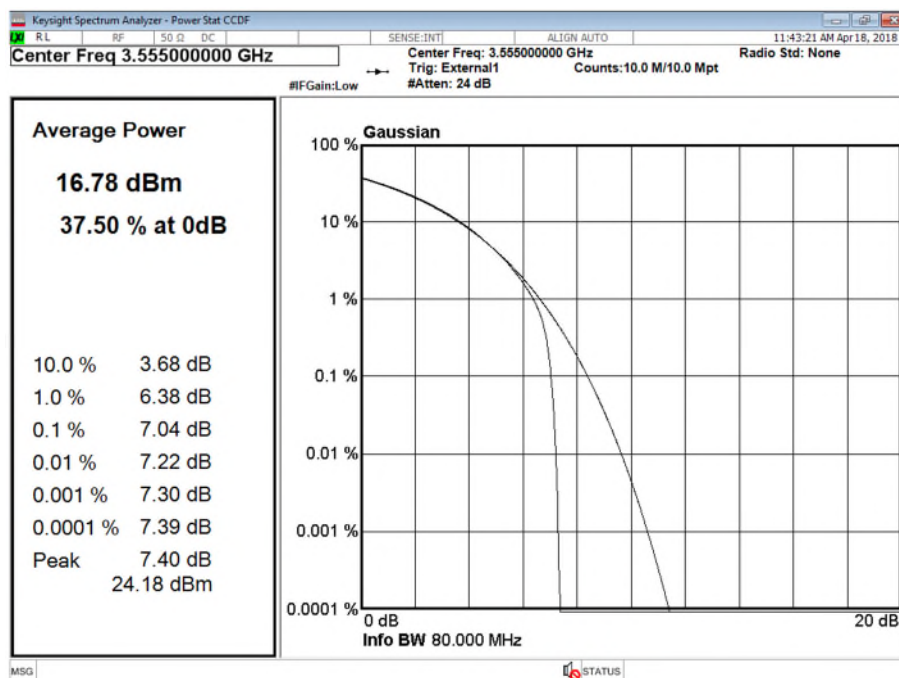
Antenna B - LTE Modulation QPSK - LTE Carrier Bandwidth 10.0 MHz - Channel Position B



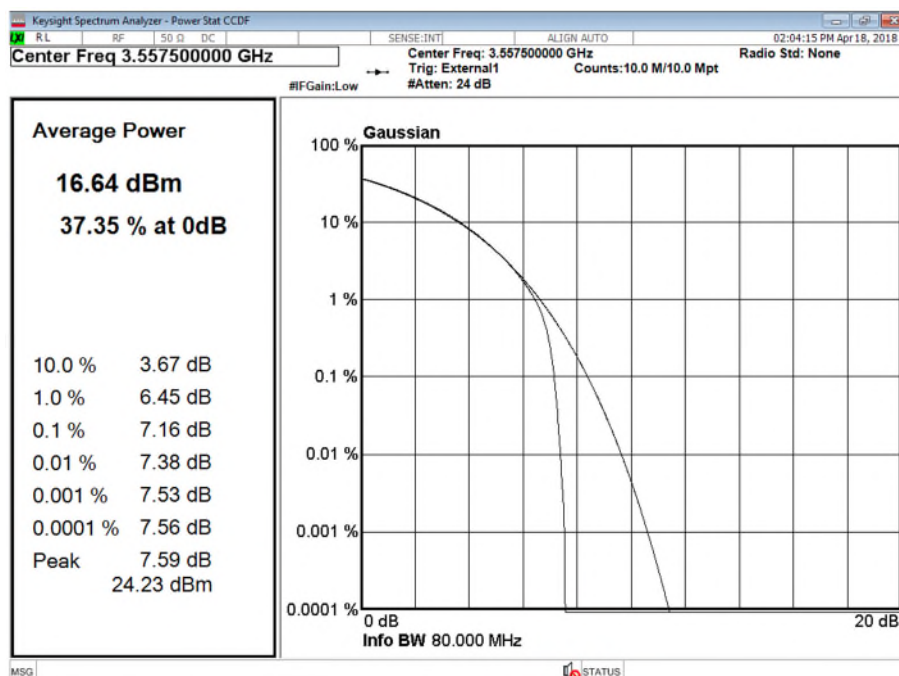
Antenna C - LTE Modulation QPSK - LTE Carrier Bandwidth 10.0 MHz - Channel Position B



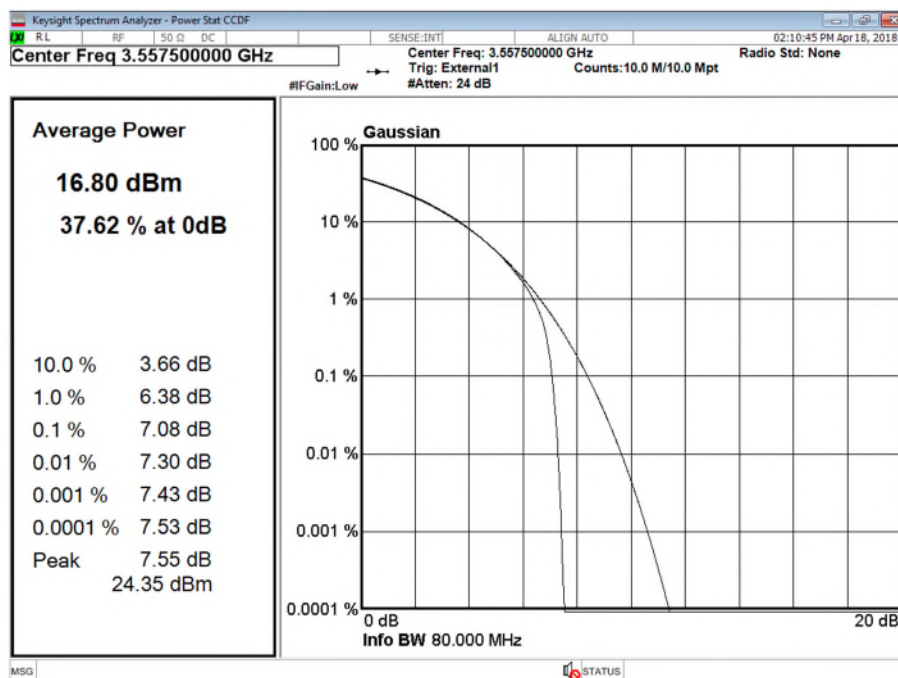
Antenna D - LTE Modulation QPSK - LTE Carrier Bandwidth 10.0 MHz - Channel Position B



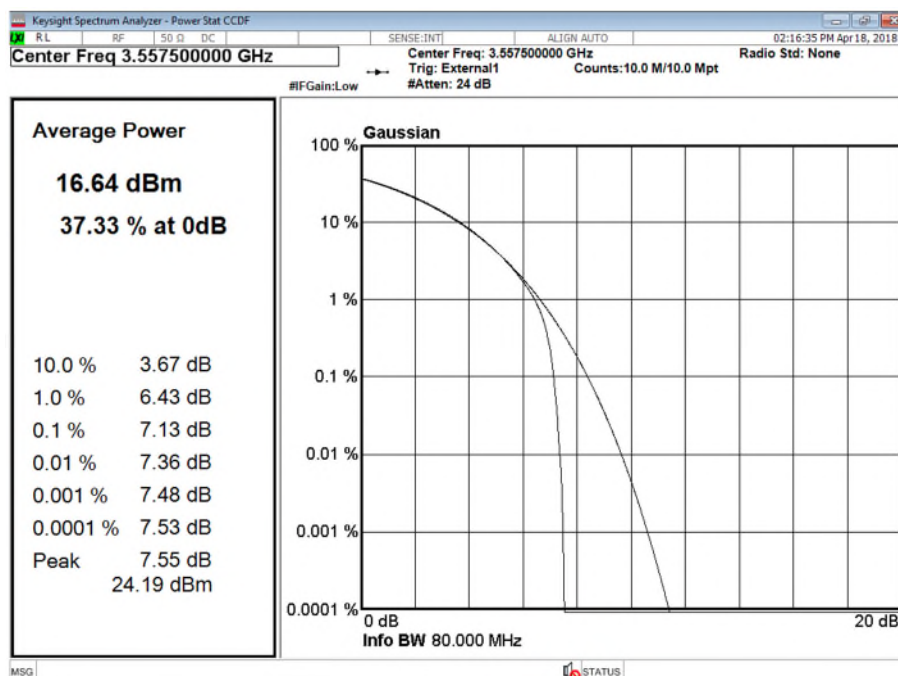
Antenna A - LTE Modulation QPSK - LTE Carrier Bandwidth 15.0 MHz - Channel Position B



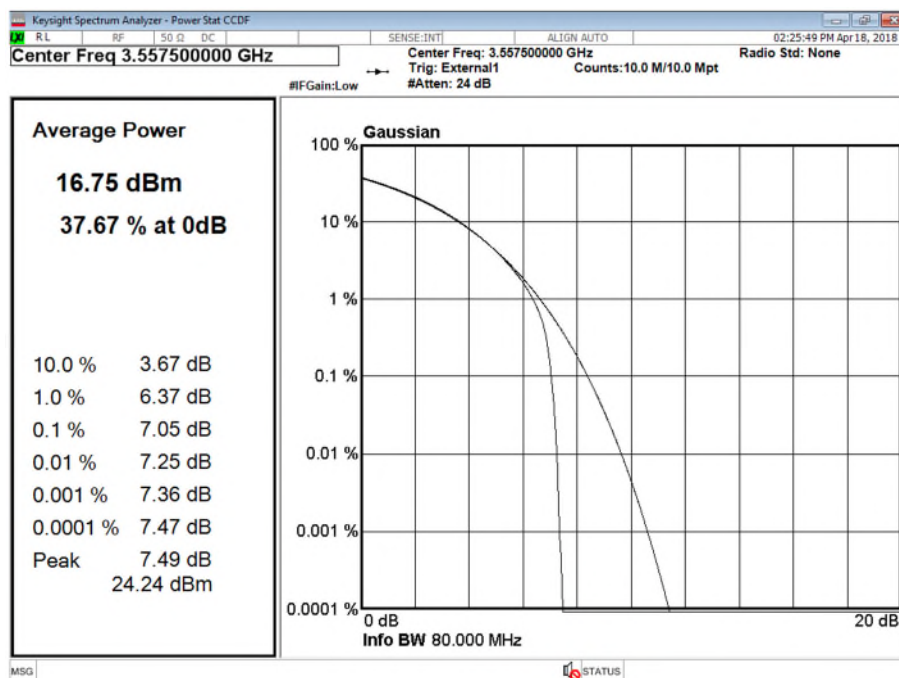
Antenna B - LTE Modulation QPSK - LTE Carrier Bandwidth 15.0 MHz - Channel Position B



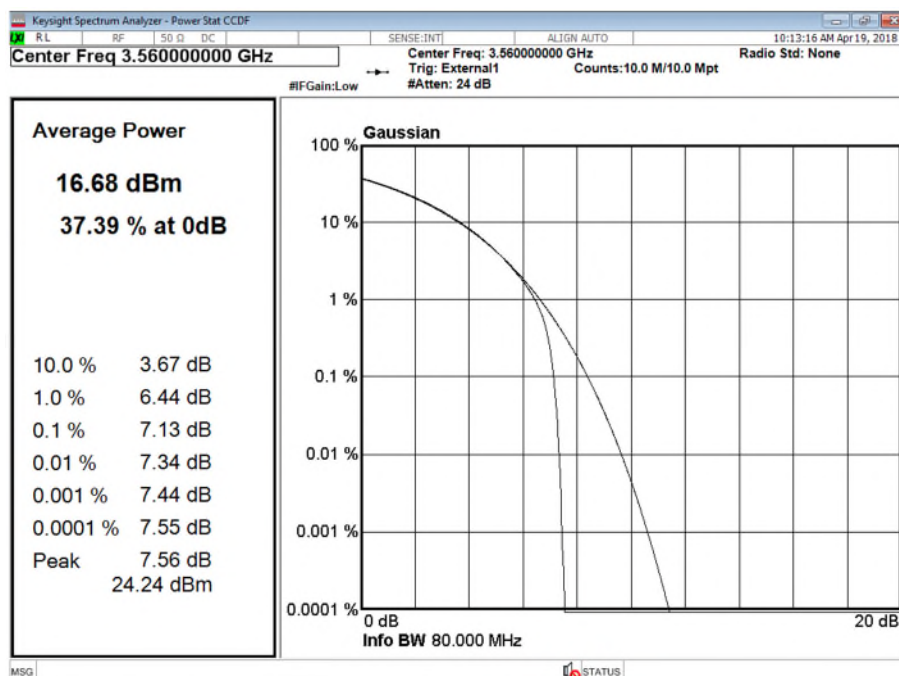
Antenna C - LTE Modulation QPSK - LTE Carrier Bandwidth 15.0 MHz - Channel Position B



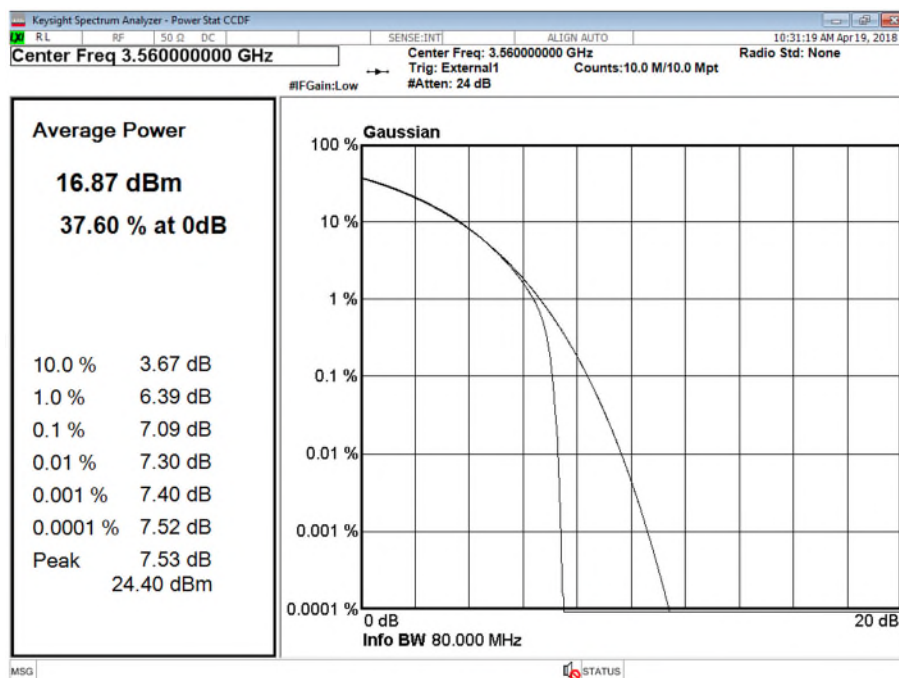
Antenna D - LTE Modulation QPSK - LTE Carrier Bandwidth 15.0 MHz - Channel Position B



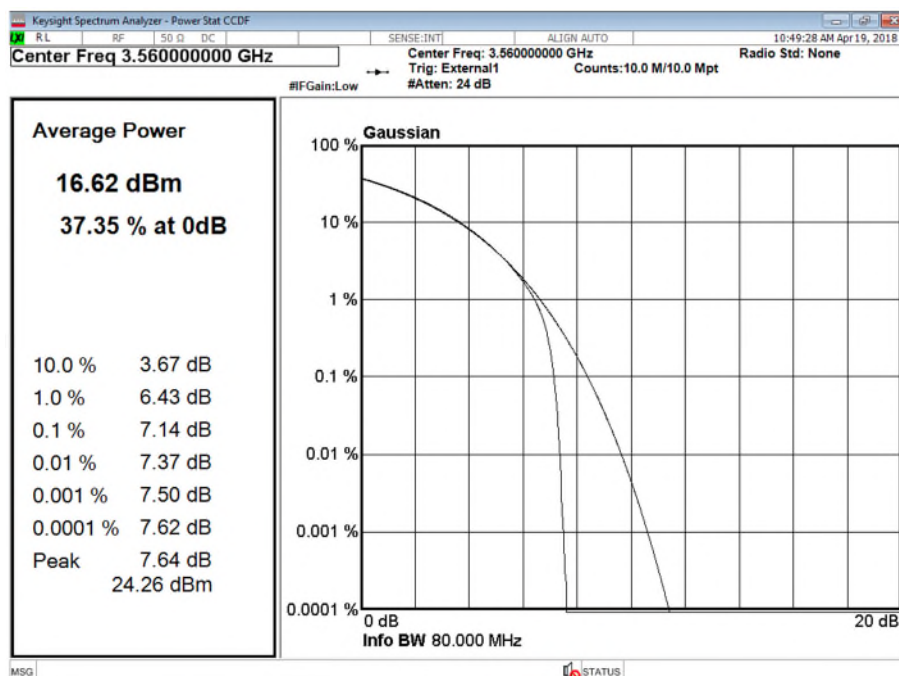
Antenna A - LTE Modulation QPSK - LTE Carrier Bandwidth 20.0 MHz - Channel Position B



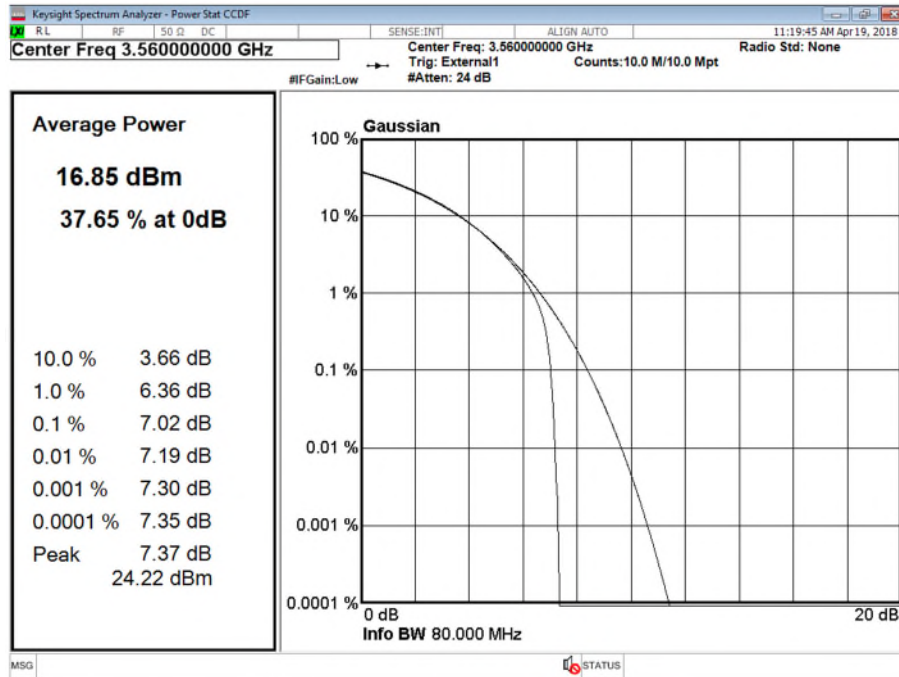
Antenna B - LTE Modulation QPSK - LTE Carrier Bandwidth 20.0 MHz - Channel Position B



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



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



Configuration A

Maximum Output Power 17 dBm

Antenna	LTE Modulation	LTE Carrier Bandwidth	Peak to Average Ratio (PAR) / Output Power/PSD						
			Channel Position M						
			PAR (dB)	Conducted Average Power		EIRP		EIRP	
				dBm	dBm/MHz	dBm	dBm/MHz	dBm / 10 MHz	
A	QPSK	5.0 MHz	7.12	15.66	10.42	18.26	13.02	18.26	
B	QPSK	5.0 MHz	7.08	16.09	10.57	18.69	13.17	18.69	
C	QPSK	5.0 MHz	7.08	16.05	10.56	19.15	13.66	19.15	
D	QPSK	5.0 MHz	7.07	16.53	10.84	19.63	13.94	19.63	
Total			-	22.11	16.62	24.98	19.48	24.98	
A	QPSK	10.0 MHz	7.21	15.77	7.36	18.37	9.96	18.37	
B	QPSK	10.0 MHz	7.16	16.16	7.49	18.76	10.09	18.76	
C	QPSK	10.0 MHz	7.17	16.18	7.84	19.28	10.94	19.28	
D	QPSK	10.0 MHz	7.13	16.59	7.96	19.69	11.06	19.69	
Total			-	22.21	13.69	25.07	16.56	25.07	
A	QPSK	15.0 MHz	7.23	15.98	5.66	18.58	8.26		
B	QPSK	15.0 MHz	7.2	16.15	5.89	18.75	8.49		
C	QPSK	15.0 MHz	7.22	16.17	5.98	19.27	9.08		
D	QPSK	15.0 MHz	7.16	16.68	6.62	19.78	9.72		
Total			-	22.27	12.07	25.14	14.95	23.91	
A	QPSK	20.0 MHz	7.24	15.74	4.35	18.34	6.95		
B	QPSK	20.0 MHz	7.21	16.21	4.77	18.81	7.37		
C	QPSK	20.0 MHz	7.2	16.26	4.77	19.36	7.87		
D	QPSK	20.0 MHz	7.19	16.49	4.97	19.59	8.07		
Total			-	22.2	10.74	25.07	13.61	22.57	

Note: For the 15 MHz and the 20 MHz, determination of pass or fail against the 30 dBm/ 10 MHz limit was made using the full bandwidth as worst case. For the purpose of presenting a value, the estimated total dBm/10 MHz value is calculated by adjusting the full value by $10 \log (\text{occ bw} / 10 \text{ MHz})$, where by the lowest occupied bandwidth for 15 MHz and 20 MHz.

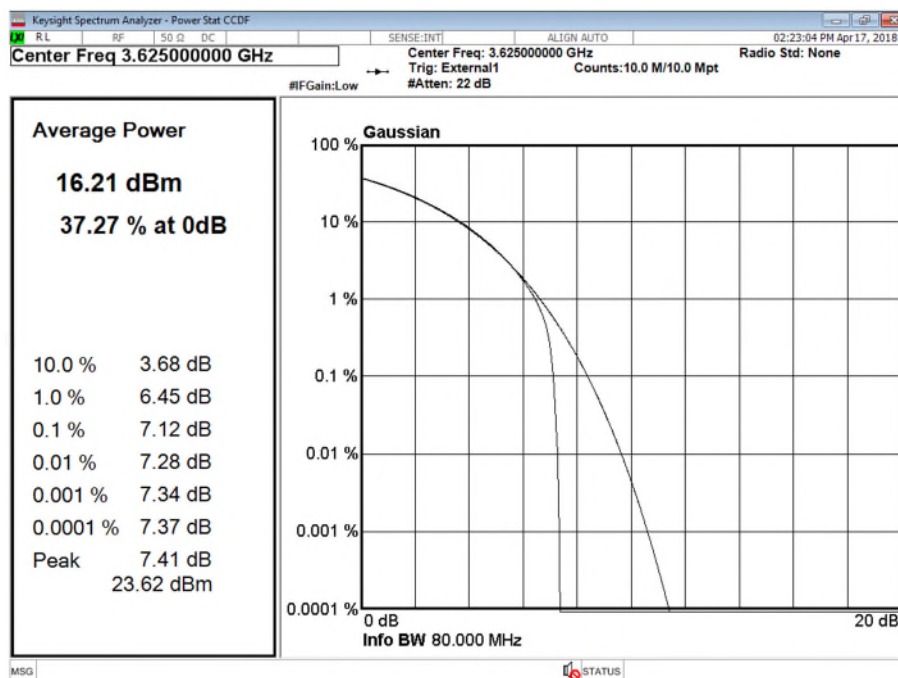
15 MHz occupied bandwidth is 13,3 MHz

15 MHz adjustment = $10 \log (13.3 / 10) = 1.23 \text{ dB}$

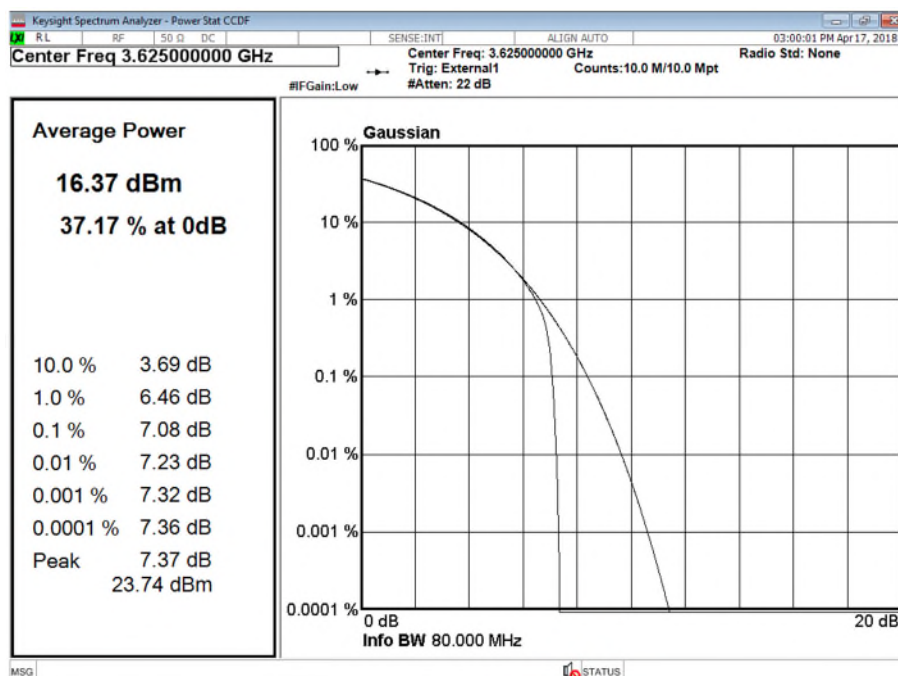
20 MHz occupied bandwidth is 17.8 MHz

20 MHz adjustment = $10 \log (17.8 / 10) = 2.50 \text{ dB}$

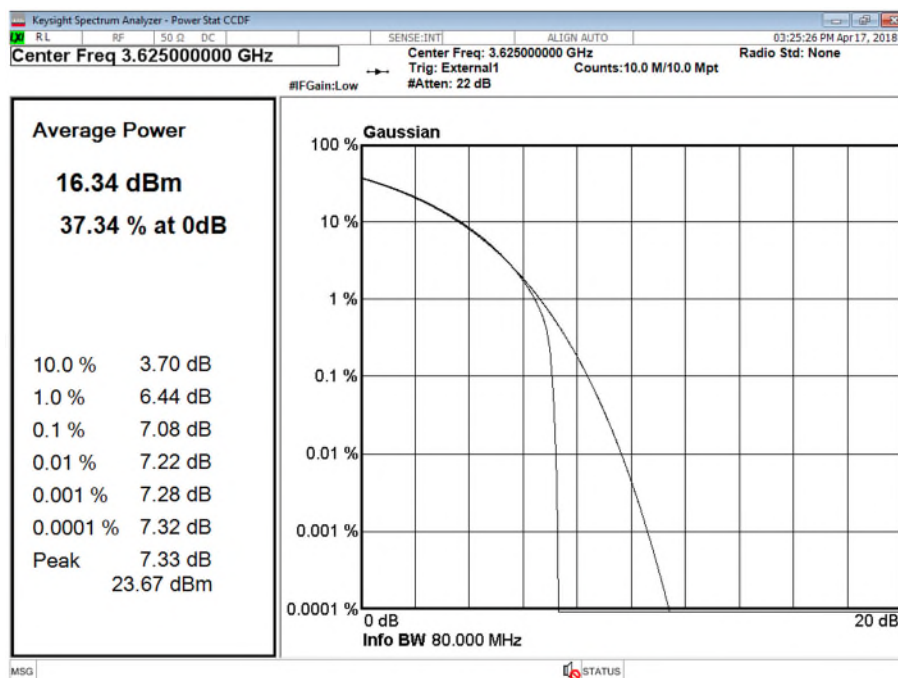
Antenna A - LTE Modulation QPSK - LTE Carrier Bandwidth 5.0 MHz - Channel Position M



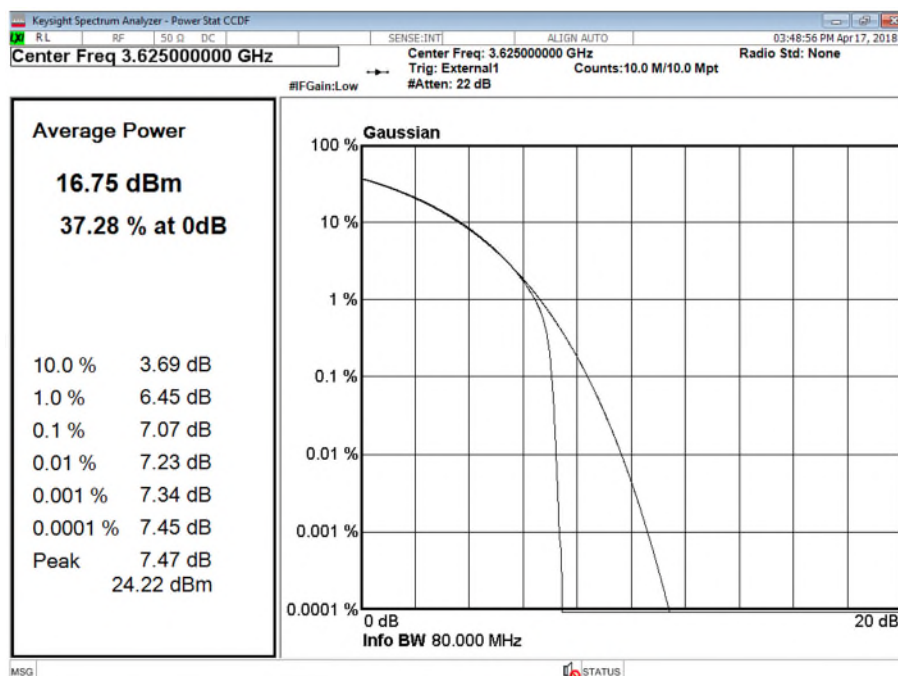
Antenna B - LTE Modulation QPSK - LTE Carrier Bandwidth 5.0 MHz - Channel Position M



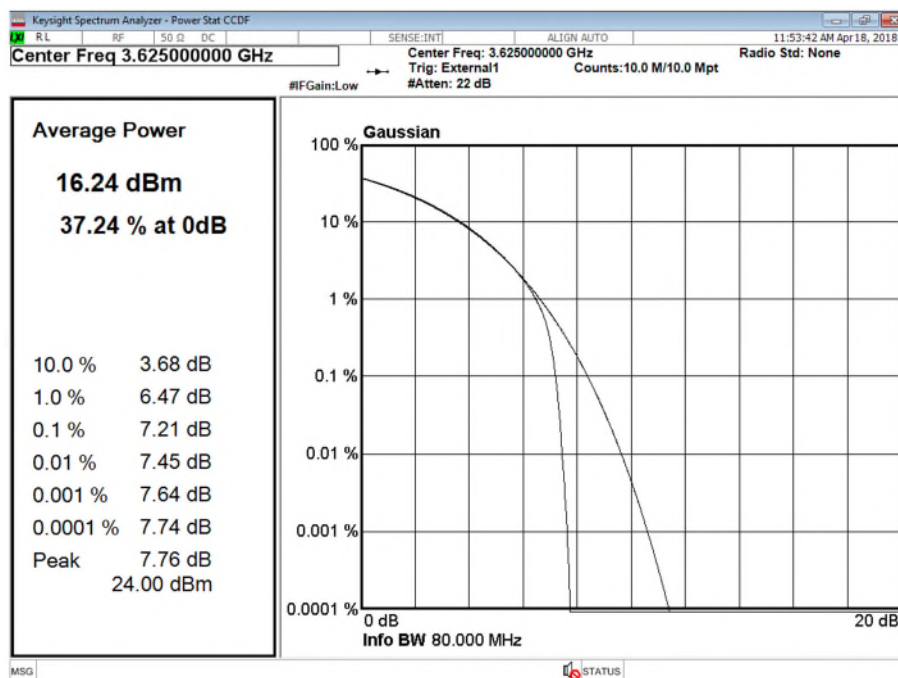
Antenna C - LTE Modulation QPSK - LTE Carrier Bandwidth 5.0 MHz - Channel Position M



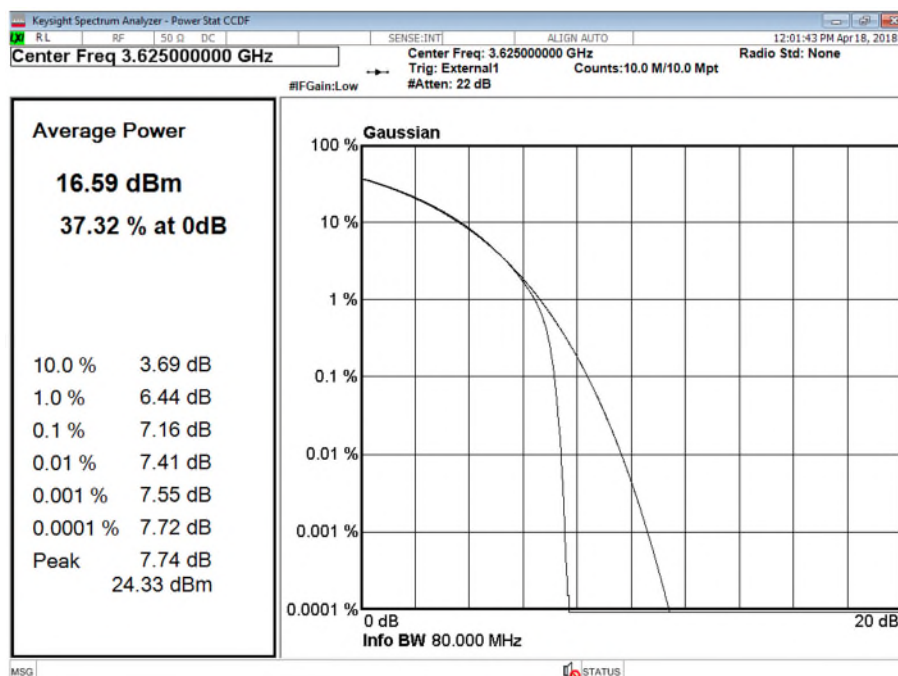
Antenna D - LTE Modulation QPSK - LTE Carrier Bandwidth 5.0 MHz - Channel Position M



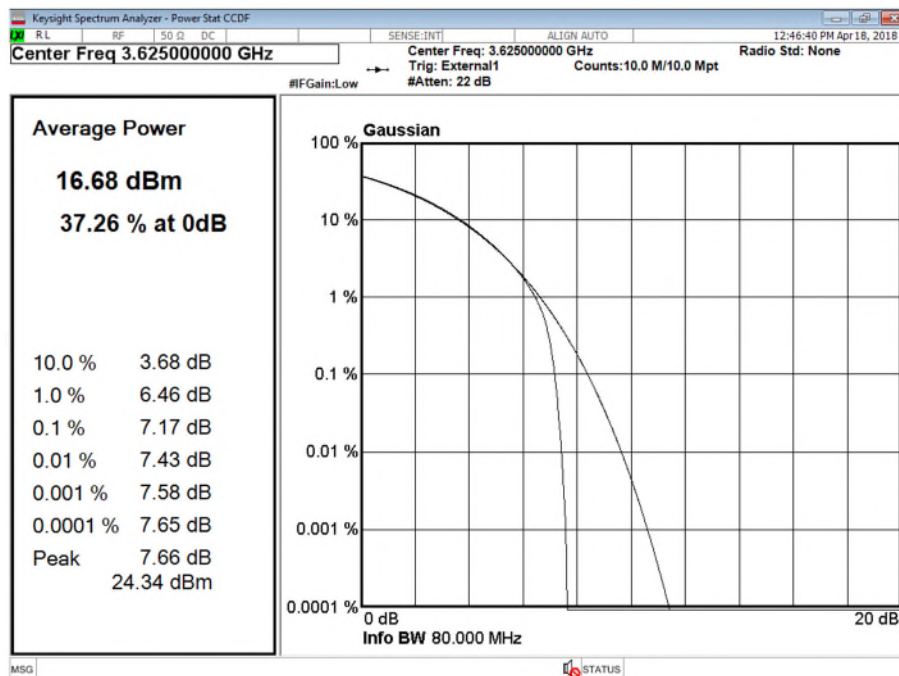
Antenna A - LTE Modulation QPSK - LTE Carrier Bandwidth 10.0 MHz - Channel Position M



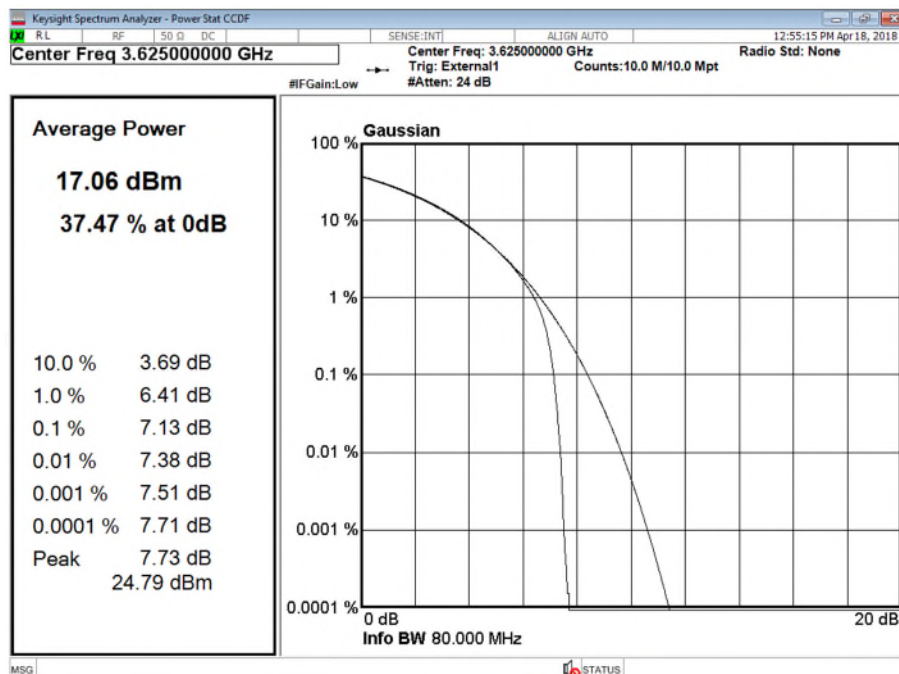
Antenna B - LTE Modulation QPSK - LTE Carrier Bandwidth 10.0 MHz - Channel Position M



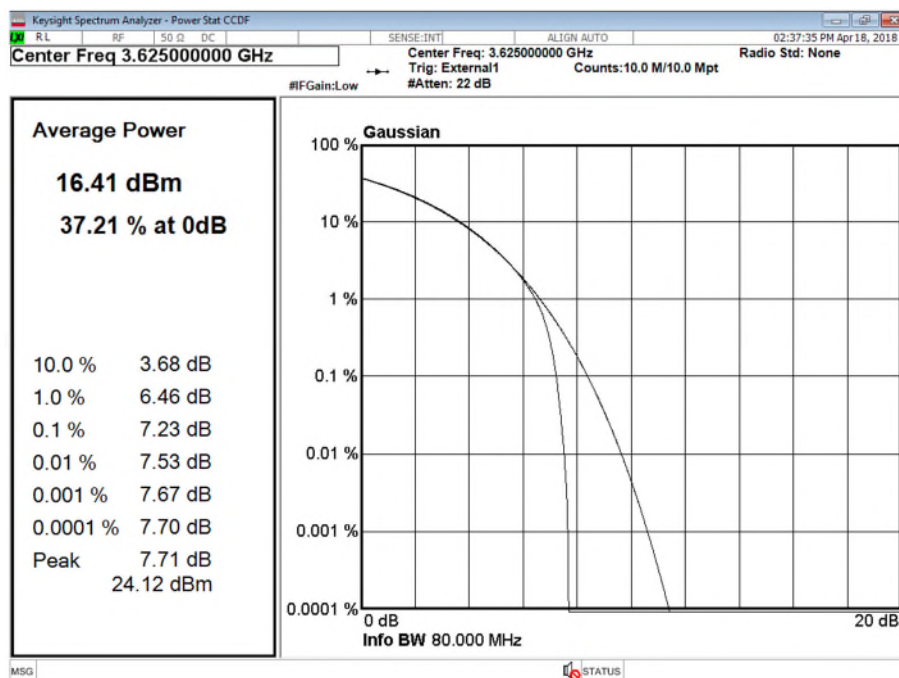
Antenna C - LTE Modulation QPSK - LTE Carrier Bandwidth 10.0 MHz - Channel Position M



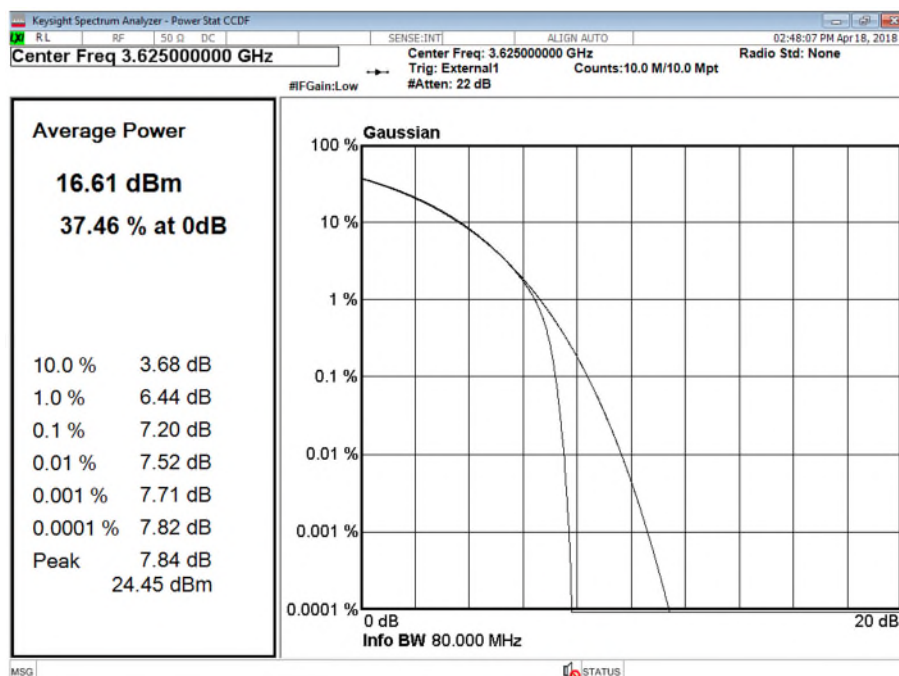
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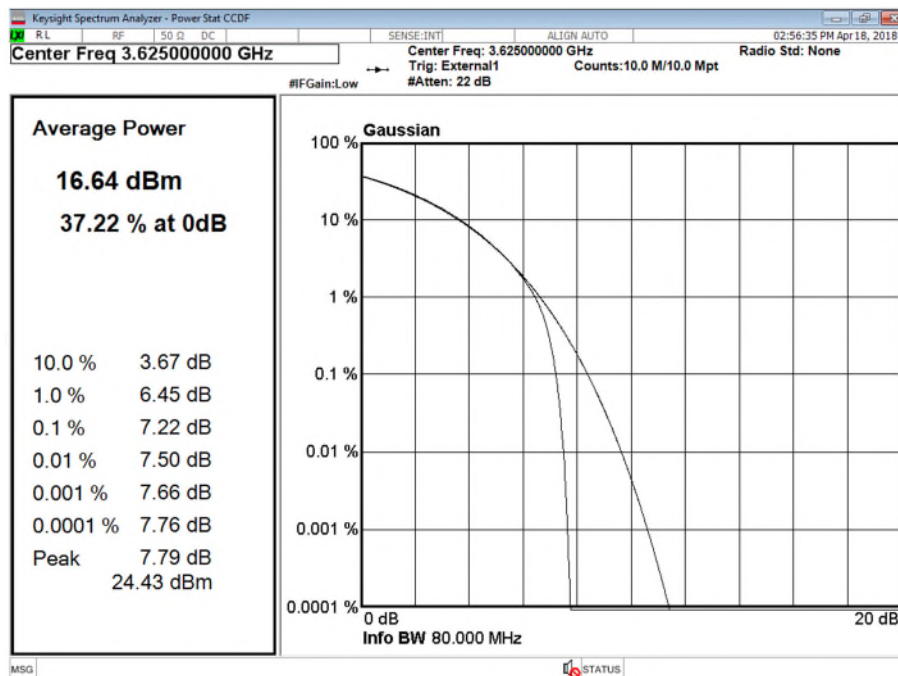
Antenna A - LTE Modulation QPSK - LTE Carrier Bandwidth 15.0 MHz - Channel Position M



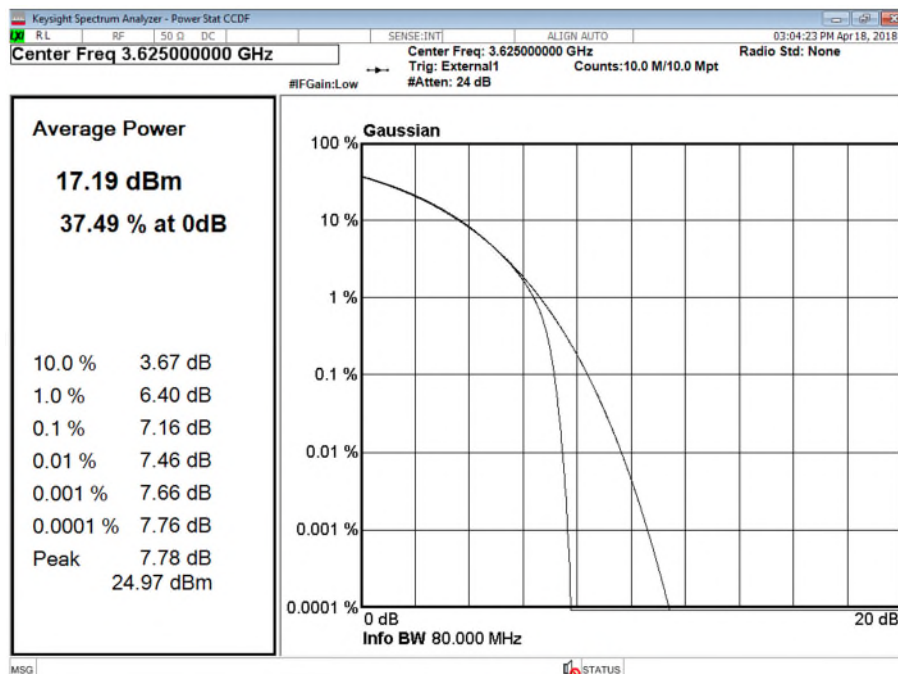
Antenna B - LTE Modulation QPSK - LTE Carrier Bandwidth 15.0 MHz - Channel Position M



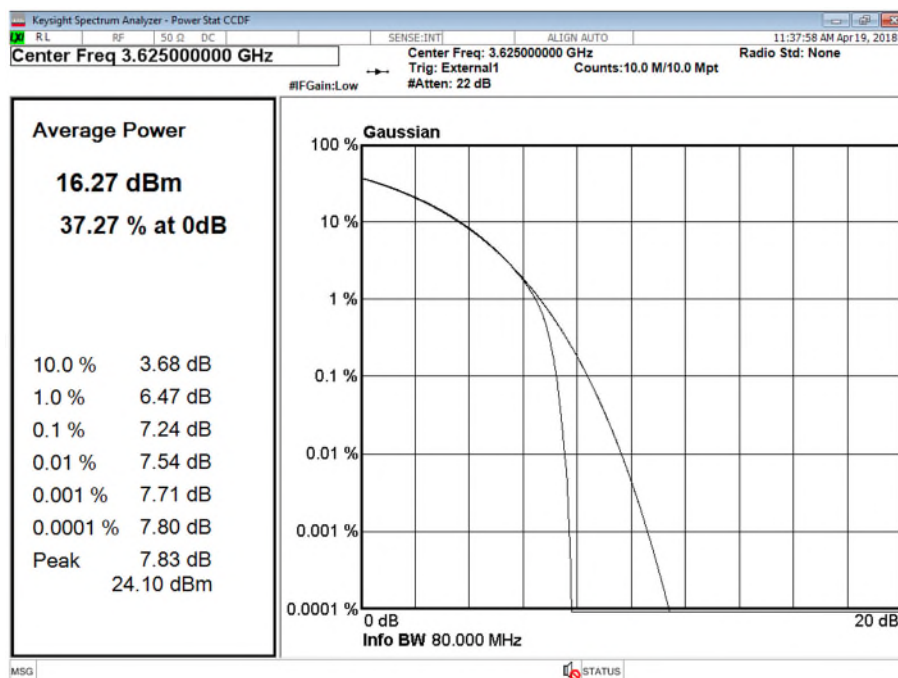
Antenna C - LTE Modulation QPSK - LTE Carrier Bandwidth 15.0 MHz - Channel Position M



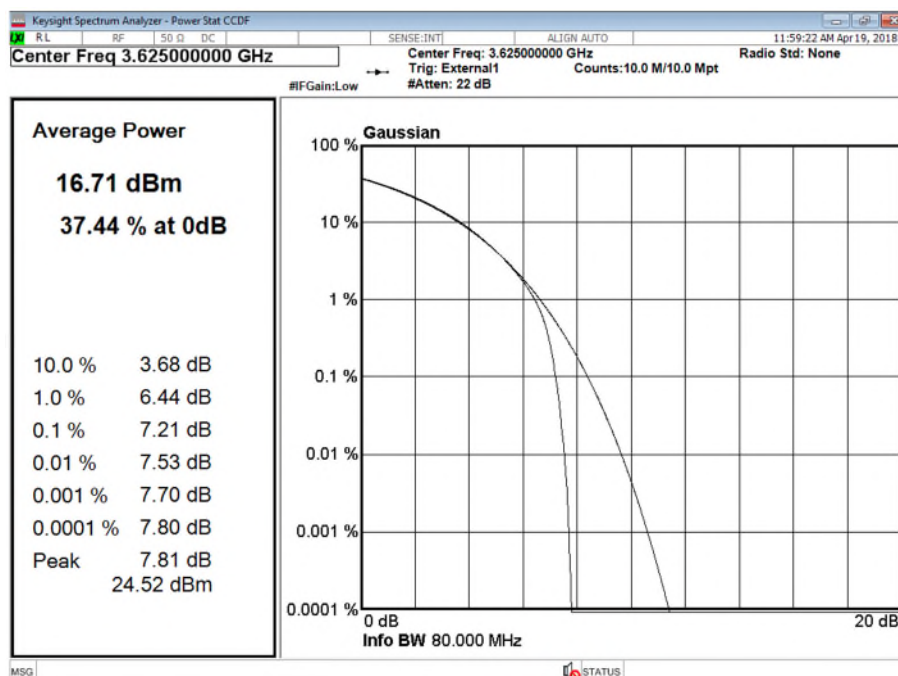
Antenna D - LTE Modulation QPSK - LTE Carrier Bandwidth 15.0 MHz - Channel Position M



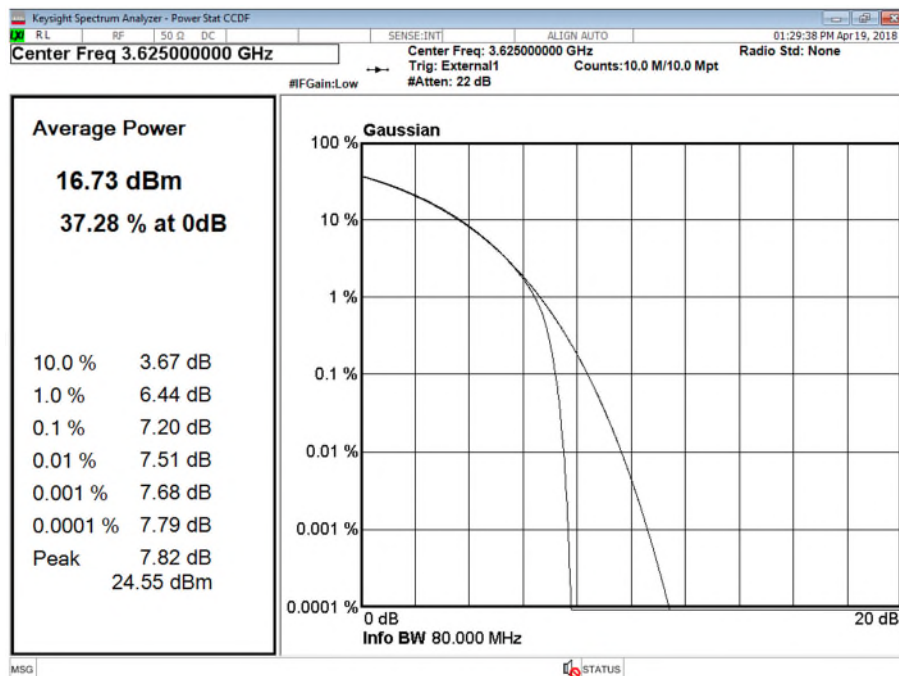
Antenna A - LTE Modulation QPSK - LTE Carrier Bandwidth 20.0 MHz - Channel Position M



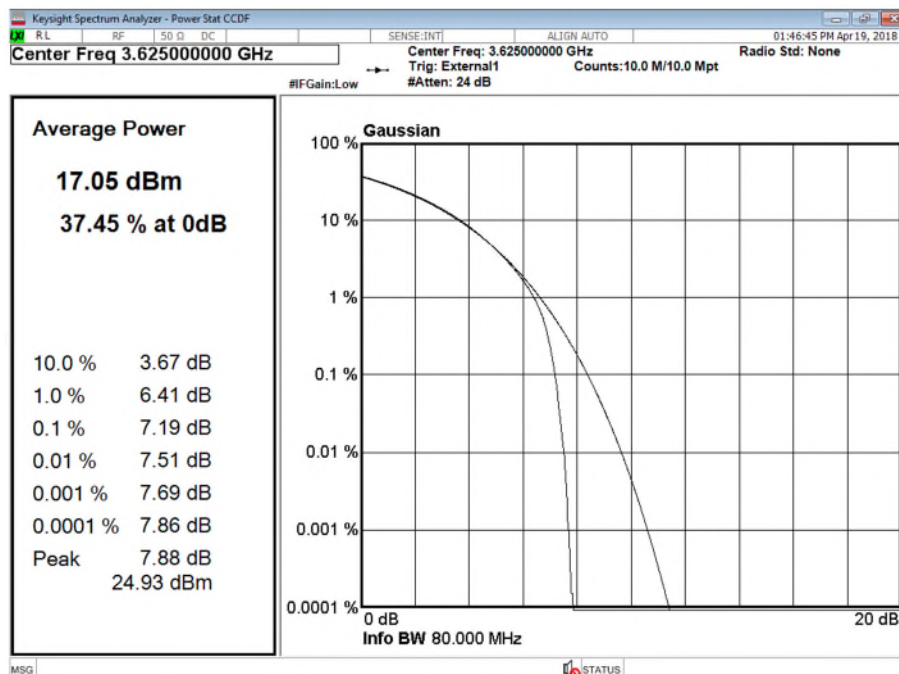
Antenna B - LTE Modulation QPSK - LTE Carrier Bandwidth 20.0 MHz - Channel Position M



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



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



Configuration A

Maximum Output Power 17 dBm

Antenna	LTE Modulation	LTE Carrier Bandwidth	Peak to Average Ratio (PAR) / Output Power/PSD						
			Channel Position T						
			PAR (dB)	Conducted Average Power		EIRP		EIRP	
				dBm	dBm/MHz	dBm	dBm/MHz	dBm/ 10 MHz	
A	QPSK	5.0 MHz	7.05	16.1	10.38	18.7	12.98	18.7	
B	QPSK	5.0 MHz	7.01	16.33	10.76	18.93	13.36	18.93	
C	QPSK	5.0 MHz	7.04	16.27	10.74	19.37	13.84	19.37	
D	QPSK	5.0 MHz	7.01	16.39	10.71	19.49	13.81	19.49	
Total			-	22.29	16.67	25.15	19.53	25.15	
A	QPSK	10.0 MHz	7.1	16.2	7.82	18.8	10.42	18.8	
B	QPSK	10.0 MHz	7.05	16.3	7.62	18.9	10.22	18.9	
C	QPSK	10.0 MHz	7.09	16.14	7.8	19.24	10.9	19.24	
D	QPSK	10.0 MHz	7.05	16.28	7.64	19.38	10.74	19.38	
Total			-	22.25	13.74	25.11	16.60	25.11	
A	QPSK	15.0 MHz	7.16	16.17	5.97	18.77	8.57		
B	QPSK	15.0 MHz	7.09	16.27	6.11	18.87	8.71		
C	QPSK	15.0 MHz	7.14	16.12	5.77	19.22	8.87		
D	QPSK	15.0 MHz	7.11	16.2	6.1	19.3	9.2		
Total			-	22.21	12.01	25.07	14.86	23.84	
A	QPSK	20.0 MHz	7.15	16.05	4.59	18.65	7.19		
B	QPSK	20.0 MHz	7.11	16.14	4.44	18.74	7.04		
C	QPSK	20.0 MHz	7.14	16.05	4.52	19.15	7.62		
D	QPSK	20.0 MHz	7.08	16.23	4.66	19.33	7.76		
Total			-	22.14	10.57	25.00	13.43	22.5	

Note: For the 15 MHz and the 20 MHz, determination of pass or fail against the 30 dBm/ 10 MHz limit was made using the full bandwidth as worst case. For the purpose of presenting a value, the estimated total dBm/10 MHz value is calculated by adjusting the full value by 10 log (occbw / 10 MHz), where by the lowest occupied bandwidth for 15 MHz and 20 MHz.

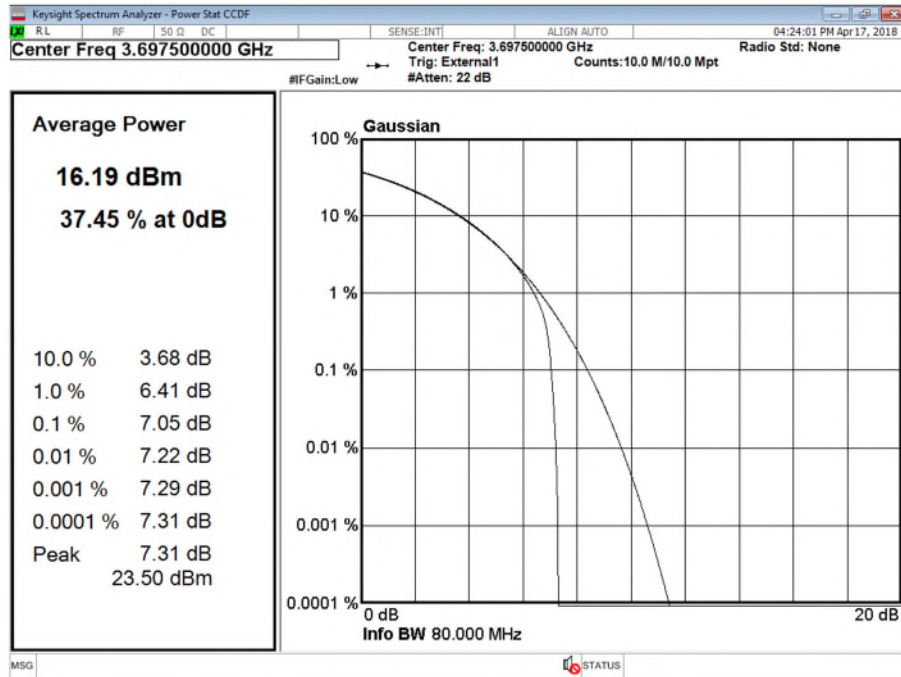
15 MHz occupied bandwidth is 13,3 MHz

15 MHz adjustment = $10 \log (13.3 / 10) = 1.23 \text{ dB}$

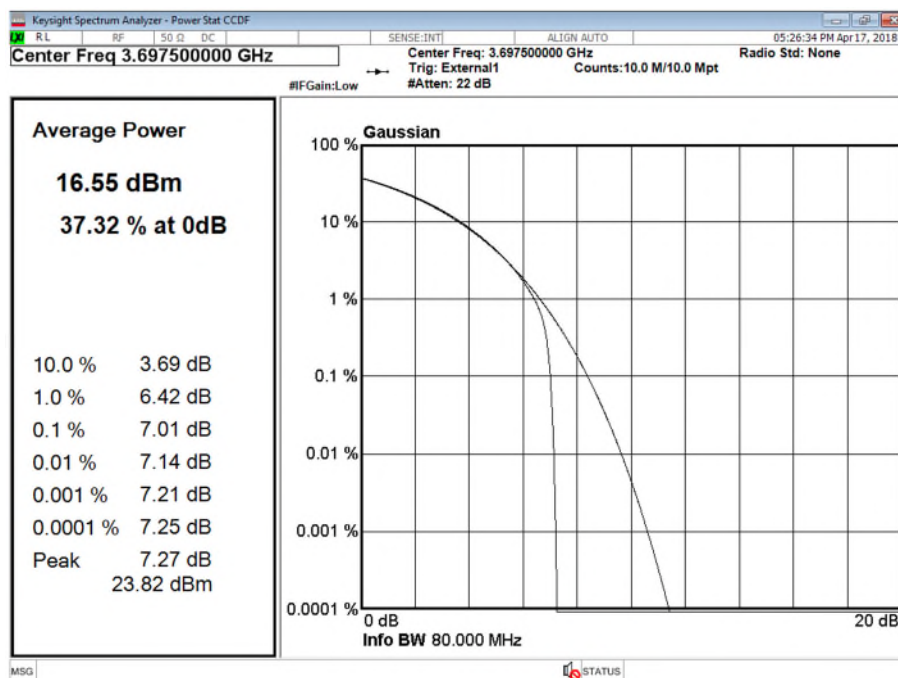
20 MHz occupied bandwidth is 17.8 MHz

20 MHz adjustment = $10 \log (17.8 / 10) = 2.50 \text{ dB}$

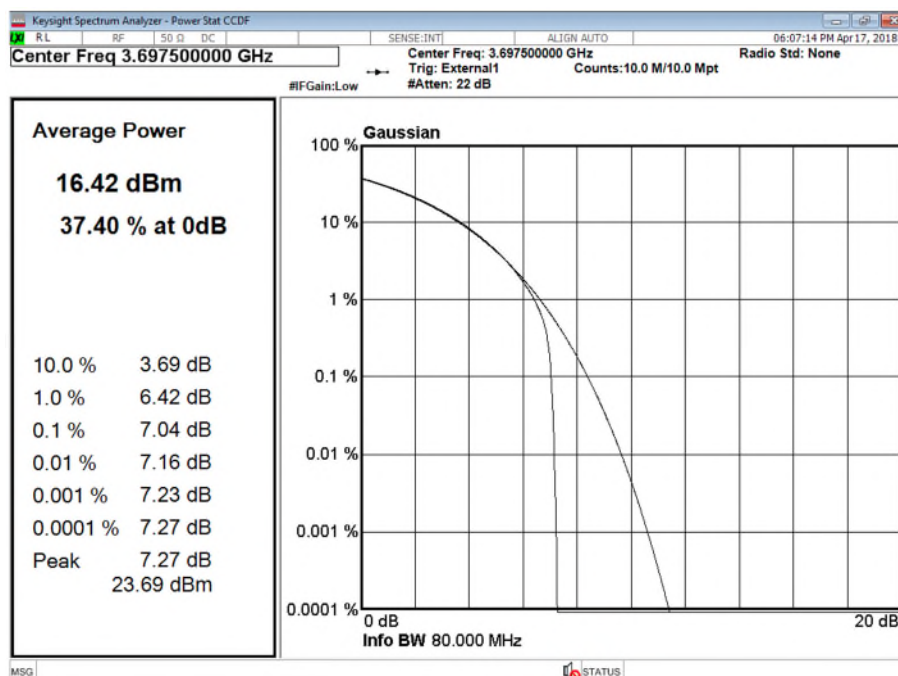
Antenna A - LTE Modulation QPSK - LTE Carrier Bandwidth 5.0 MHz - Channel Position T



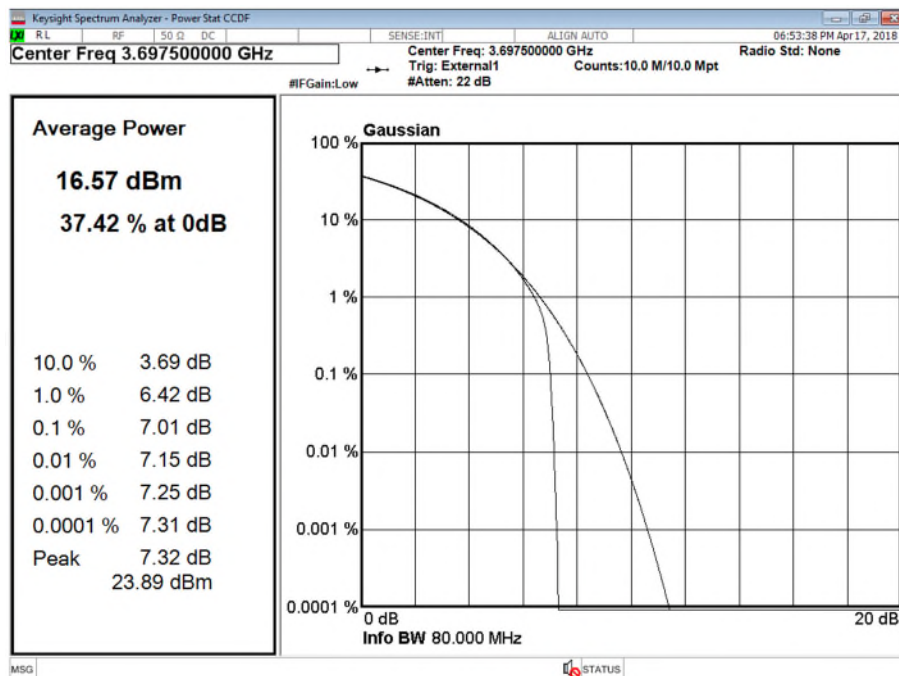
Antenna B - LTE Modulation QPSK - LTE Carrier Bandwidth 5.0 MHz - Channel Position T



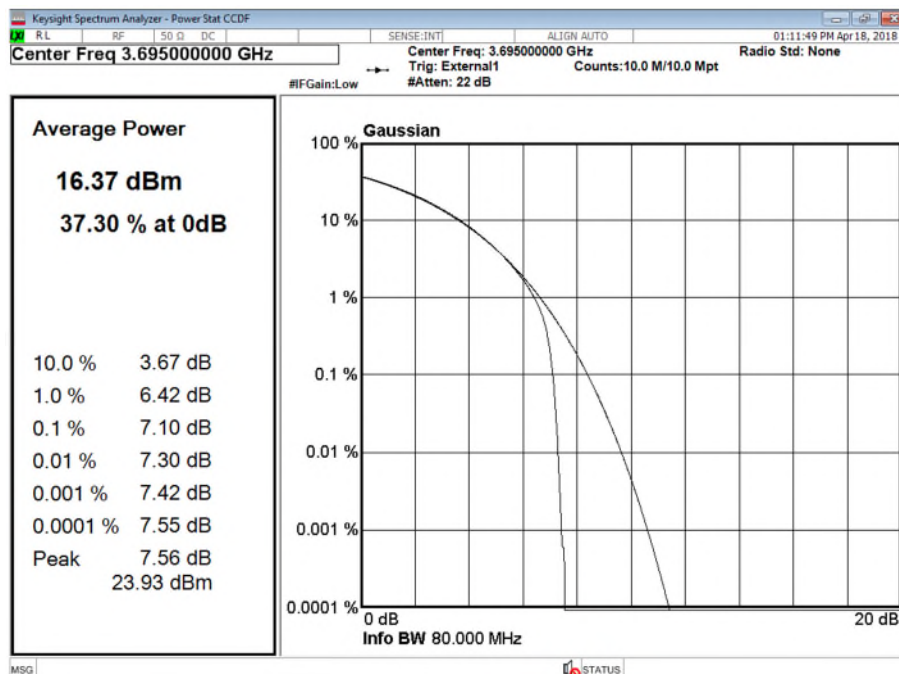
Antenna C - LTE Modulation QPSK - LTE Carrier Bandwidth 5.0 MHz - Channel Position T



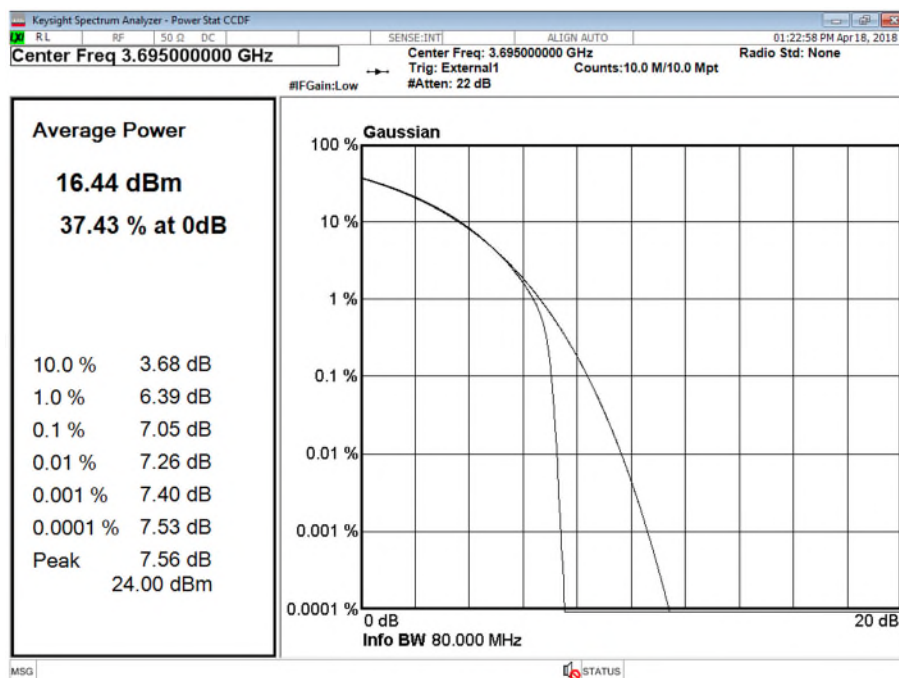
Antenna D - LTE Modulation QPSK - LTE Carrier Bandwidth 5.0 MHz - Channel Position T



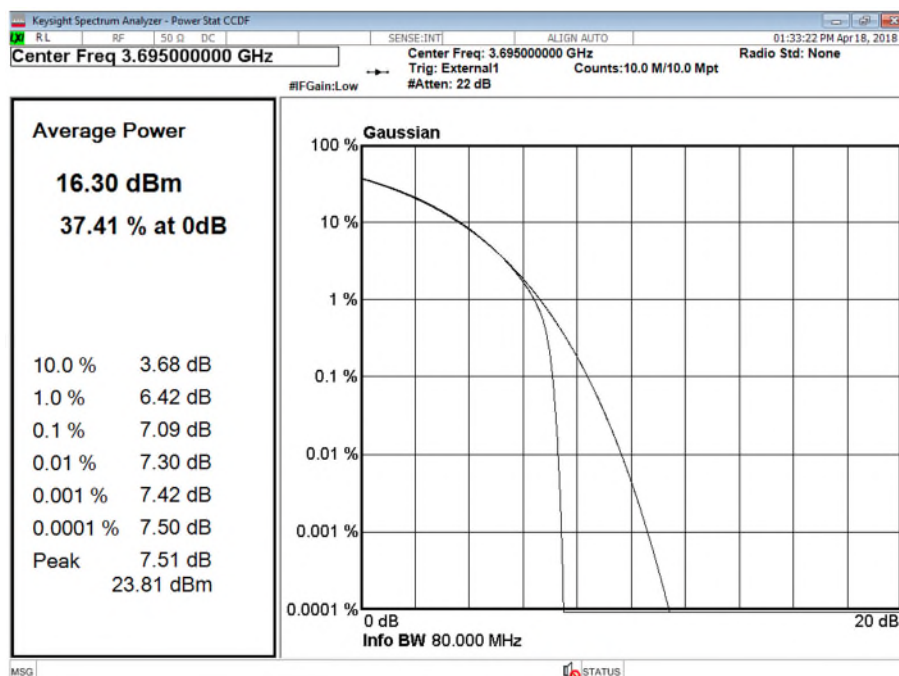
Antenna A - LTE Modulation QPSK - LTE Carrier Bandwidth 10.0 MHz - Channel Position T



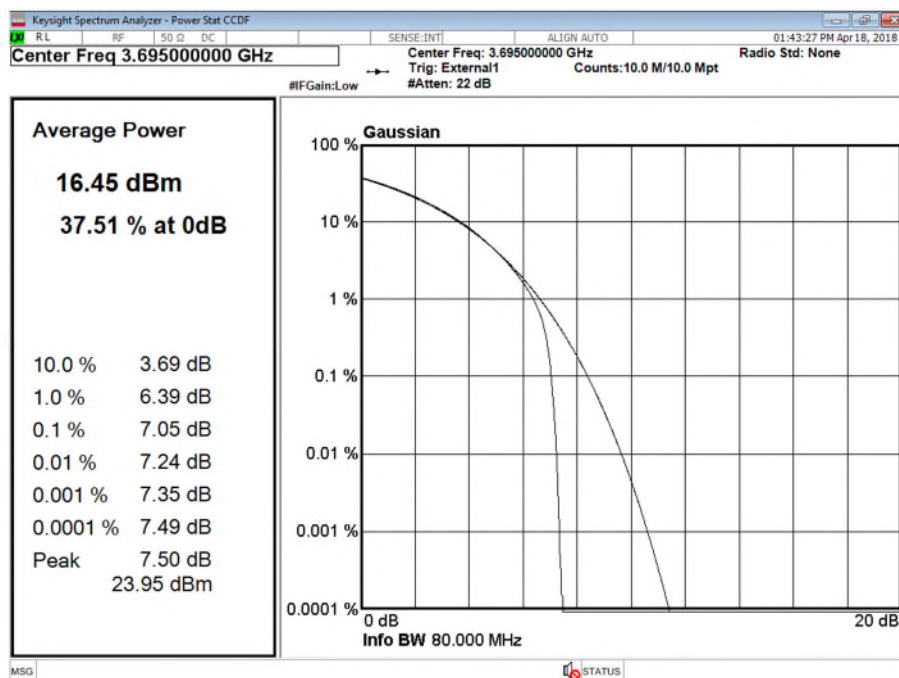
Antenna B - LTE Modulation QPSK - LTE Carrier Bandwidth 10.0 MHz - Channel Position T



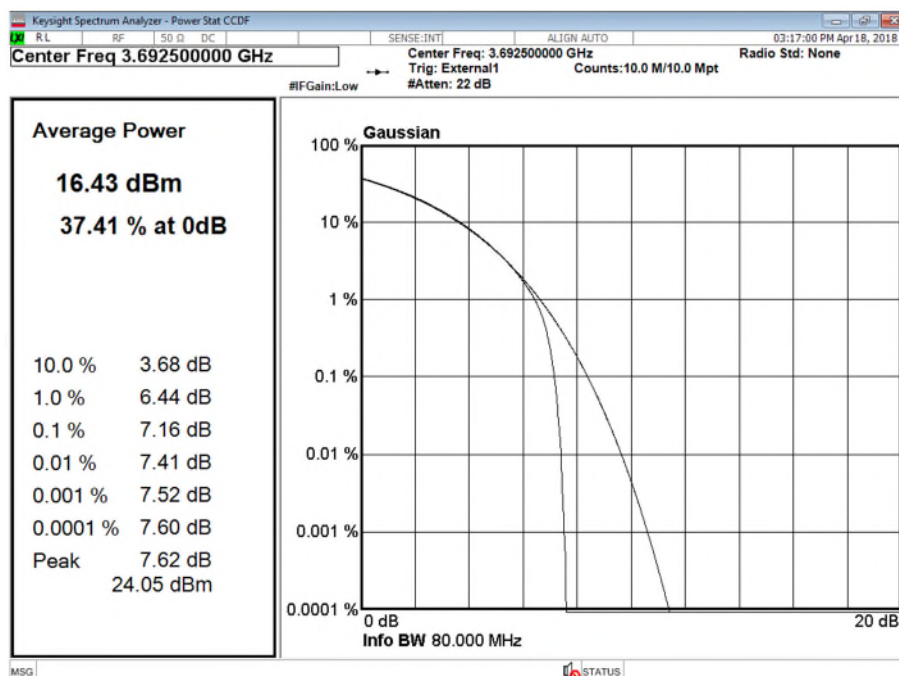
Antenna C - LTE Modulation QPSK - LTE Carrier Bandwidth 10.0 MHz - Channel Position T



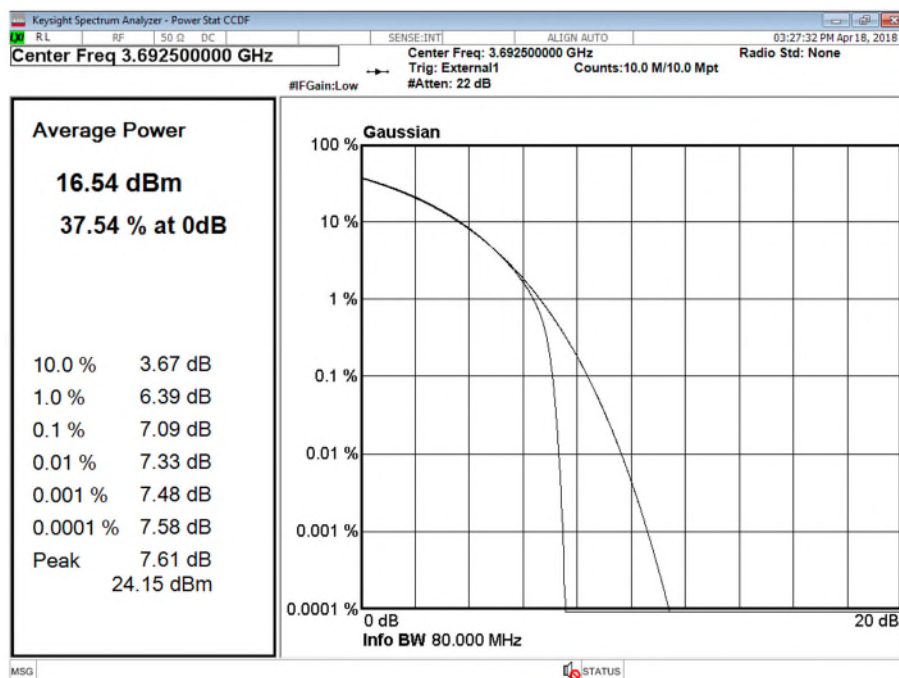
Antenna D - LTE Modulation QPSK - LTE Carrier Bandwidth 10.0 MHz - Channel Position T



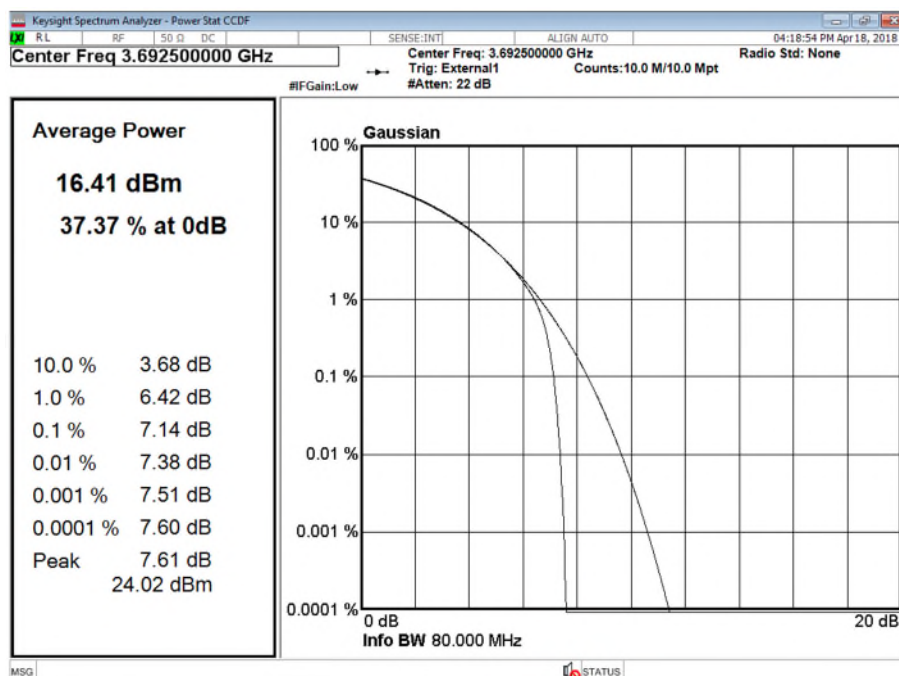
Antenna A - LTE Modulation QPSK - LTE Carrier Bandwidth 15.0 MHz - Channel Position T



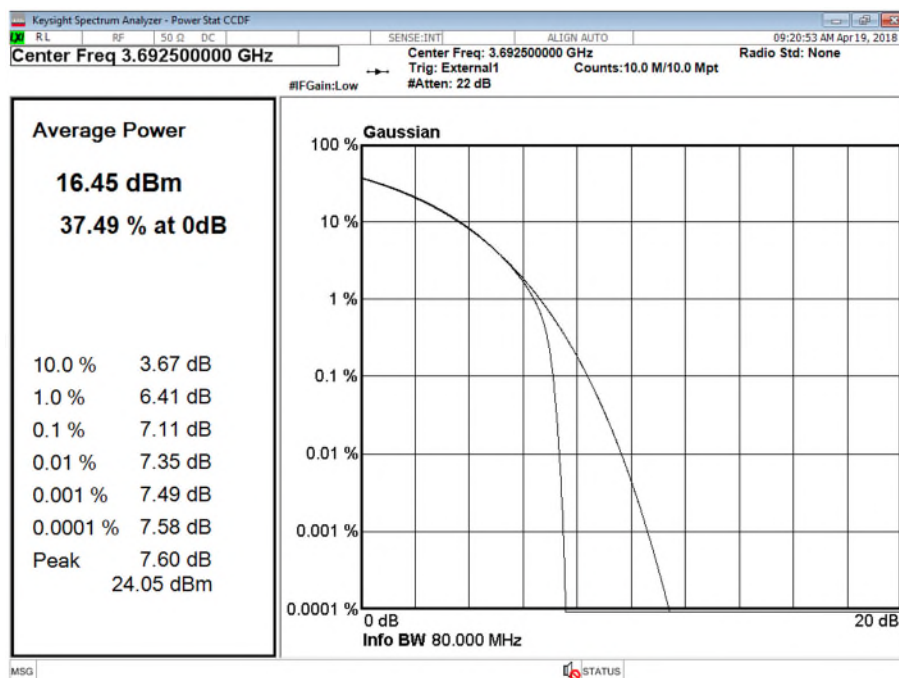
Antenna B - LTE Modulation QPSK - LTE Carrier Bandwidth 15.0 MHz - Channel Position T



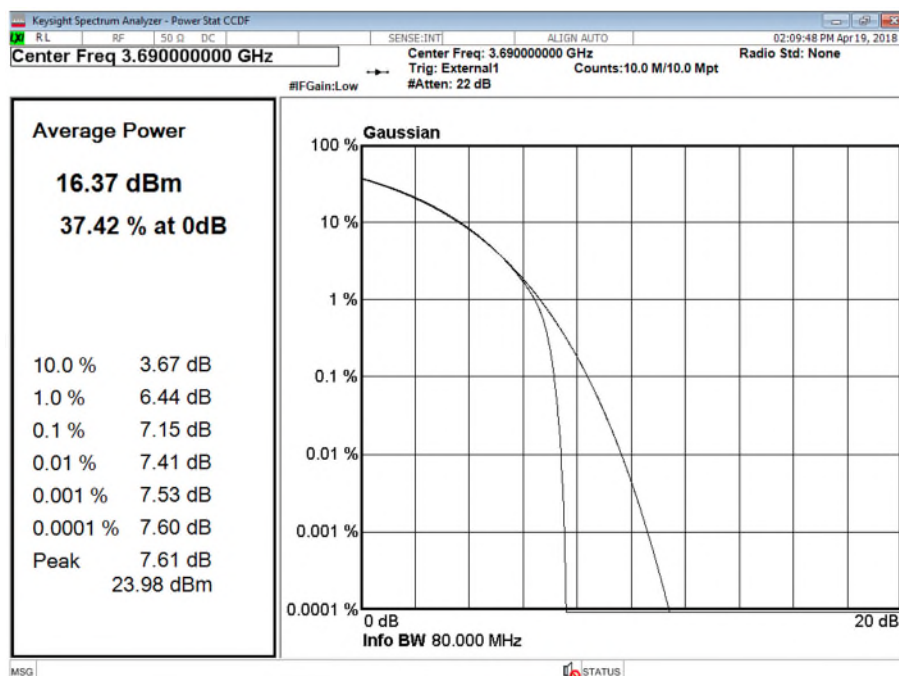
Antenna C - LTE Modulation QPSK - LTE Carrier Bandwidth 15.0 MHz - Channel Position T



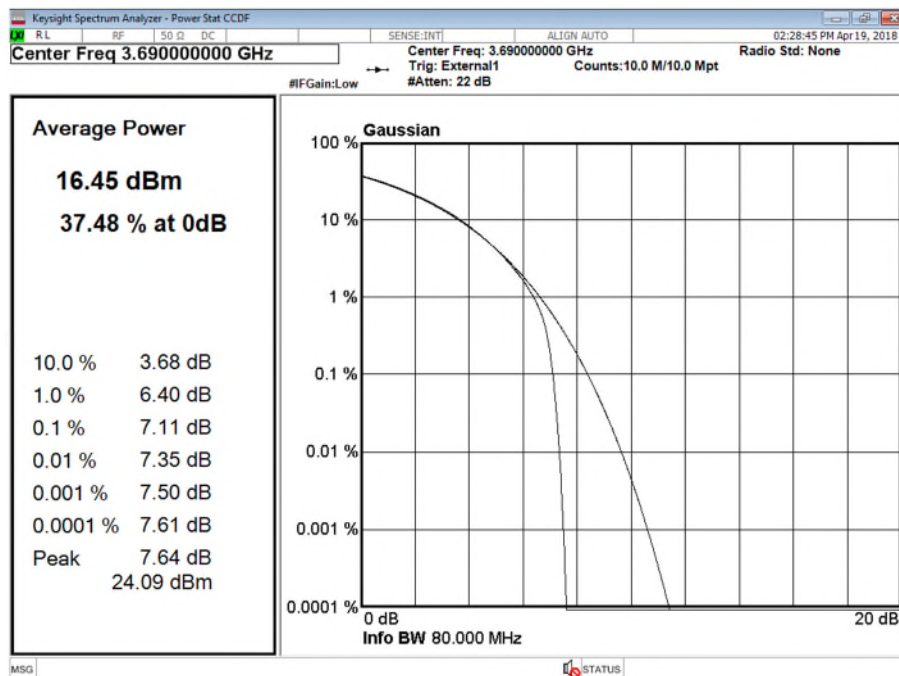
Antenna D - LTE Modulation QPSK - LTE Carrier Bandwidth 15.0 MHz - Channel Position T



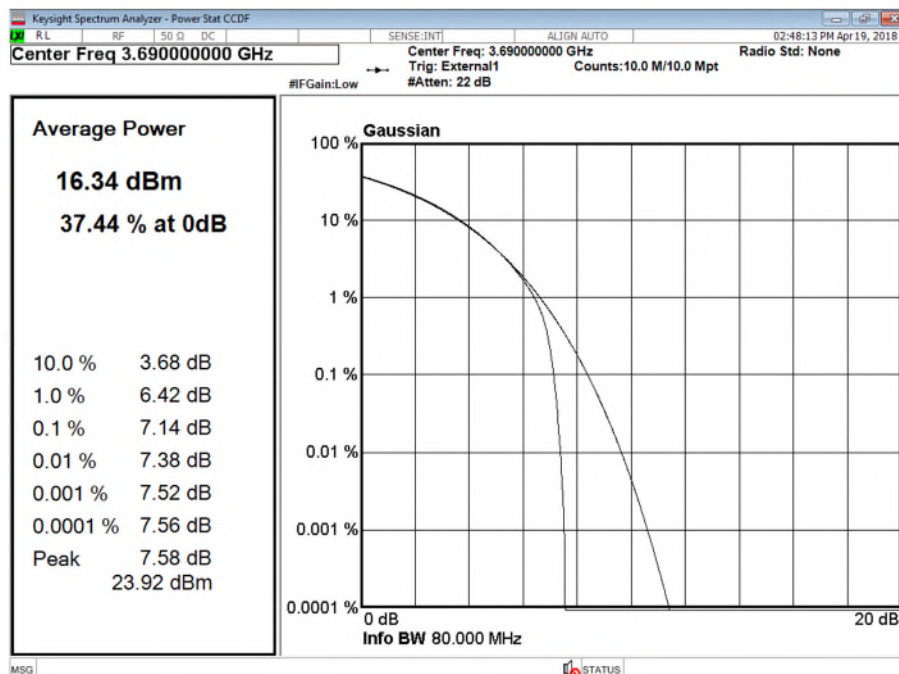
Antenna A - LTE Modulation QPSK - LTE Carrier Bandwidth 20.0 MHz - Channel Position T



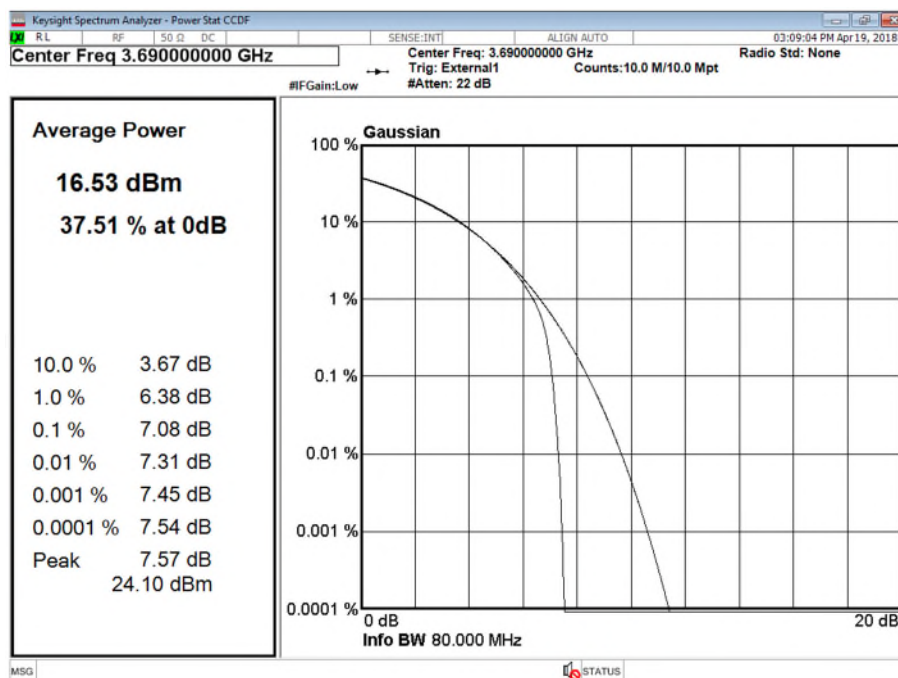
Antenna B - LTE Modulation QPSK - LTE Carrier Bandwidth 20.0 MHz - Channel Position T



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



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



Configuration B

Maximum Output Power 17 dBm

Antenna	LTE Modulation	LTE Carrier Bandwidth	Peak to Average Ratio (PAR) / Output Power				
			Channel Position B				
			PAR (dB)	Conducted Average Power		EIRP	
				dBm	dBm/MHz	dBm	dBm/MHz
A	QPSK	5.0 MHz	See note	16.56	8.09	19.16	10.69
B	QPSK	5.0 MHz	See note	16.67	8.16	19.27	10.76
C	QPSK	5.0 MHz	See note	16.51	8.11	19.61	11.21
D	QPSK	5.0 MHz	See note	17	8.45	20.1	11.55
Total			-	22.71	14.23	25.57	17.09
A	QPSK	10.0 MHz	See note	16.61	5.56	19.21	8.16
B	QPSK	10.0 MHz	See note	16.77	5.72	19.37	8.32
C	QPSK	10.0 MHz	See note	16.72	5.59	19.82	8.69
D	QPSK	10.0 MHz	See note	16.97	5.53	20.07	8.63
Total			-	22.79	11.62	25.65	14.48
A	QPSK	15.0 MHz	See note	16.41	3.89	19.01	6.49
B	QPSK	15.0 MHz	See note	16.49	3.66	19.09	6.26
C	QPSK	15.0 MHz	See note	16.2	3.38	19.3	6.48
D	QPSK	15.0 MHz	See note	16.08	3.4	19.18	6.5



Product Service

Total			-	22.32	9.61	25.17	12.45
A	QPSK	20.0 MHz	See note	16.1	2.7	18.7	5.3
B	QPSK	20.0 MHz	See note	16.4	2.99	19	5.59
C	QPSK	20.0 MHz	See note	16.34	2.76	19.44	5.86
D	QPSK	20.0 MHz	See note	16.4	2.66	19.5	5.76
Total			-	22.33	8.8	25.19	11.65

Note: Worst case/representative PAR is as shown in configuration A with maximum power.



Product Service

Configuration B

Maximum Output Power 17 dBm

Antenna	LTE Modulation	LTE Carrier Bandwidth	Peak to Average Ratio (PAR) / Output Power				
			Channel Position M				
			PAR (dB)	Conducted Average Power		EIRP	
				dBm	dBm/MHz	dBm	dBm/MHz
A	QPSK	5.0 MHz	See note	15.64	7.28	18.24	9.88
B	QPSK	5.0 MHz	See note	16.14	7.71	18.74	10.31
C	QPSK	5.0 MHz	See note	16.16	7.69	19.26	10.79
D	QPSK	5.0 MHz	See note	16.45	8.26	19.55	11.36
Total			-	22.13	13.77	25.00	16.64
A	QPSK	10.0 MHz	See note	15.99	4.52	18.59	7.12
B	QPSK	10.0 MHz	See note	16.32	5.07	18.92	7.67
C	QPSK	10.0 MHz	See note	16.33	4.74	19.43	7.84
D	QPSK	10.0 MHz	See note	16.61	5.09	19.71	8.19
Total			-	22.34	10.88	25.20	13.74
A	QPSK	15.0 MHz	See note	15.68	2.27	18.28	4.87
B	QPSK	15.0 MHz	See note	15.9	2.8	18.5	5.4
C	QPSK	15.0 MHz	See note	15.77	2.6	18.87	5.7
D	QPSK	15.0 MHz	See note	16.15	3.13	19.25	6.23
Total			-	21.9	8.73	24.76	11.60
A	QPSK	20.0 MHz	See note	16.06	2.13	18.66	4.73
B	QPSK	20.0 MHz	See note	16.27	2.73	18.87	5.33
C	QPSK	20.0 MHz	See note	16.48	2.25	19.58	5.35
D	QPSK	20.0 MHz	See note	16.42	2.31	19.52	5.41
Total			-	22.33	8.38	25.20	11.23

Note: Worst case/representative PAR is as shown in configuration A with maximum power.

Configuration B

Maximum Output Power 17 dBm

Antenna	LTE Modulation	LTE Carrier Bandwidth	Peak to Average Ratio (PAR) / Output Power				
			Channel Position T				
			PAR (dB)	Conducted Average Power		EIRP	
				dBm	dBm/MHz	dBm	dBm/MHz
A	QPSK	5.0 MHz	See note	16.26	7.65	18.86	10.25
B	QPSK	5.0 MHz	See note	16.22	7.53	18.82	10.13
C	QPSK	5.0 MHz	See note	16.09	7.43	19.19	10.53
D	QPSK	5.0 MHz	See note	16.31	7.52	19.41	10.62
Total			-	22.24	13.55	25.10	16.41
A	QPSK	10.0 MHz	See note	16.27	4.72	18.87	7.32
B	QPSK	10.0 MHz	See note	16.41	4.92	19.01	7.52
C	QPSK	10.0 MHz	See note	16.26	4.67	19.36	7.77
D	QPSK	10.0 MHz	See note	16.24	4.7	19.34	7.8
Total			-	22.32	10.77	25.17	13.63
A	QPSK	15.0 MHz	See note	15.71	2.48	18.31	5.08
B	QPSK	15.0 MHz	See note	15.69	2.41	18.29	5.01
C	QPSK	15.0 MHz	See note	15.72	2.49	18.82	5.59
D	QPSK	15.0 MHz	See note	15.79	2.53	18.89	5.63
Total			-	21.75	8.5	24.61	11.36
A	QPSK	20.0 MHz	See note	16.2	2.18	18.8	4.78
B	QPSK	20.0 MHz	See note	16.43	2.36	19.03	4.96
C	QPSK	20.0 MHz	See note	16.13	1.82	19.23	4.92
D	QPSK	20.0 MHz	See note	16.3	1.82	19.4	4.92
Total			-	22.29	8.07	25.14	10.92

Note: Worst case/representative PAR is as shown in configuration A with maximum power.



Product Service

Configuration C

Maximum Output Power 17 dBm

Note: Worst case/representative PAR is as shown in configuration A with maximum power.

Configuration C

Maximum Output Power 17 dBm

Antenna	LTE Modulation	LTE Carrier Bandwidth	Peak to Average Ratio (PAR) / Output Power				
			Channel Position B				
			PAR (dB)	Conducted Average Power		EIRP	
				dBm	dBm/MHz	dBm	dBm/MHz
A	QPSK	5.0 MHz	See note	16.21	5.09	18.81	7.69
B	QPSK	5.0 MHz	See note	16.33	5.13	18.93	7.73
C	QPSK	5.0 MHz	See note	16.27	5.2	19.37	8.3
D	QPSK	5.0 MHz	See note	16.47	5.17	19.57	8.27
Total			-	22.34	11.17	25.20	14.03
A	QPSK	10.0 MHz	See note	15.29	1.86	17.89	4.46
B	QPSK	10.0 MHz	See note	15.35	1.36	17.95	3.96
C	QPSK	10.0 MHz	See note	15.35	1.89	18.45	4.99
D	QPSK	10.0 MHz	See note	15.57	2.38	18.67	5.48
Total			-	21.41	7.91	24.27	10.78

Note: Worst case/representative PAR is as shown in configuration A with maximum power.

Configuration C

Maximum Output Power 17 dBm

Antenna	LTE Modulation	LTE Carrier Bandwidth	Peak to Average Ratio (PAR) / Output Power				
			Channel Position M				
			PAR (dB)	Average Power		Average Power	
				dBm	dBm/MHz	dBm	dBm/MHz
A	QPSK	5.0 MHz	See note	15.08	3.8	17.68	6.4
B	QPSK	5.0 MHz	See note	15.06	3.68	17.66	6.28
C	QPSK	5.0 MHz	See note	14.89	3.49	17.99	6.59
D	QPSK	5.0 MHz	See note	15.5	4.3	18.6	7.4
Total			-	21.16	9.85	24.02	12.71
A	QPSK	10.0 MHz	See note	15.04	1.07	17.64	3.67
B	QPSK	10.0 MHz	See note	15.28	1.19	17.88	3.79
C	QPSK	10.0 MHz	See note	15.25	1.62	18.35	4.72
D	QPSK	10.0 MHz	See note	15.5	1.84	18.6	4.94
Total			-	21.29	7.46	24.15	10.34

Note: Worst case/representative PAR is as shown in configuration A with maximum power.

Configuration C

Maximum Output Power 17 dBm

Antenna	LTE Modulation	LTE Carrier Bandwidth	Peak to Average Ratio (PAR) / Output Power				
			Channel Position T				
			PAR (dB)	Average Power		Average Power	
				dBm	dBm/MHz	dBm	dBm/MHz
A	QPSK	5.0 MHz	See note	15.05	3.39	17.65	5.99
B	QPSK	5.0 MHz	See note	14.97	3.54	17.57	6.14
C	QPSK	5.0 MHz	See note	14.81	3.21	17.91	6.31
D	QPSK	5.0 MHz	See note	15.1	3.74	18.2	6.84
Total			-	21	9.49	23.86	12.35
A	QPSK	10.0 MHz	See note	15.25	1.11	17.85	3.71
B	QPSK	10.0 MHz	See note	15.22	0.68	17.82	3.28
C	QPSK	10.0 MHz	See note	15.14	0.97	18.24	4.07
D	QPSK	10.0 MHz	See note	15.31	1.29	18.41	4.39
Total			-	21.25	7.04	24.11	9.90

Note: Worst case/representative PAR is as shown in configuration A with maximum power.

Configuration A

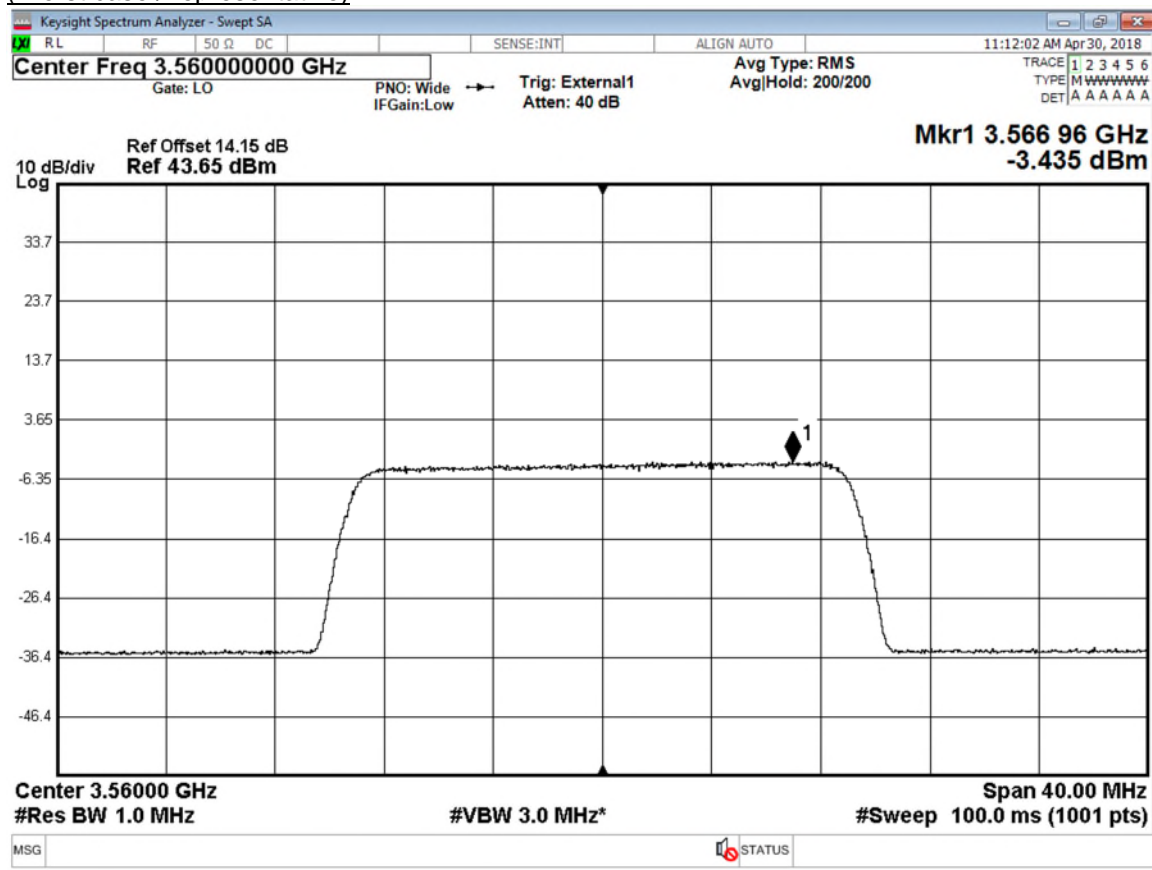
Minimum Output Power 8 dBm

Antenna	LTE Modulation	LTE Carrier Bandwidth	Peak to Average Ratio (PAR) / Output Power				
			Channel Position B				
			PAR (dB)	Average Power		Average Power	
				dBm	dBm/MHz	dBm	dBm/MHz
B	QPSK	20.0 MHz	8.43	9.2	-3.435	11.8	-0.835
Note Antenna B at 20 MHz shown as worst case / Representative							



Product Service

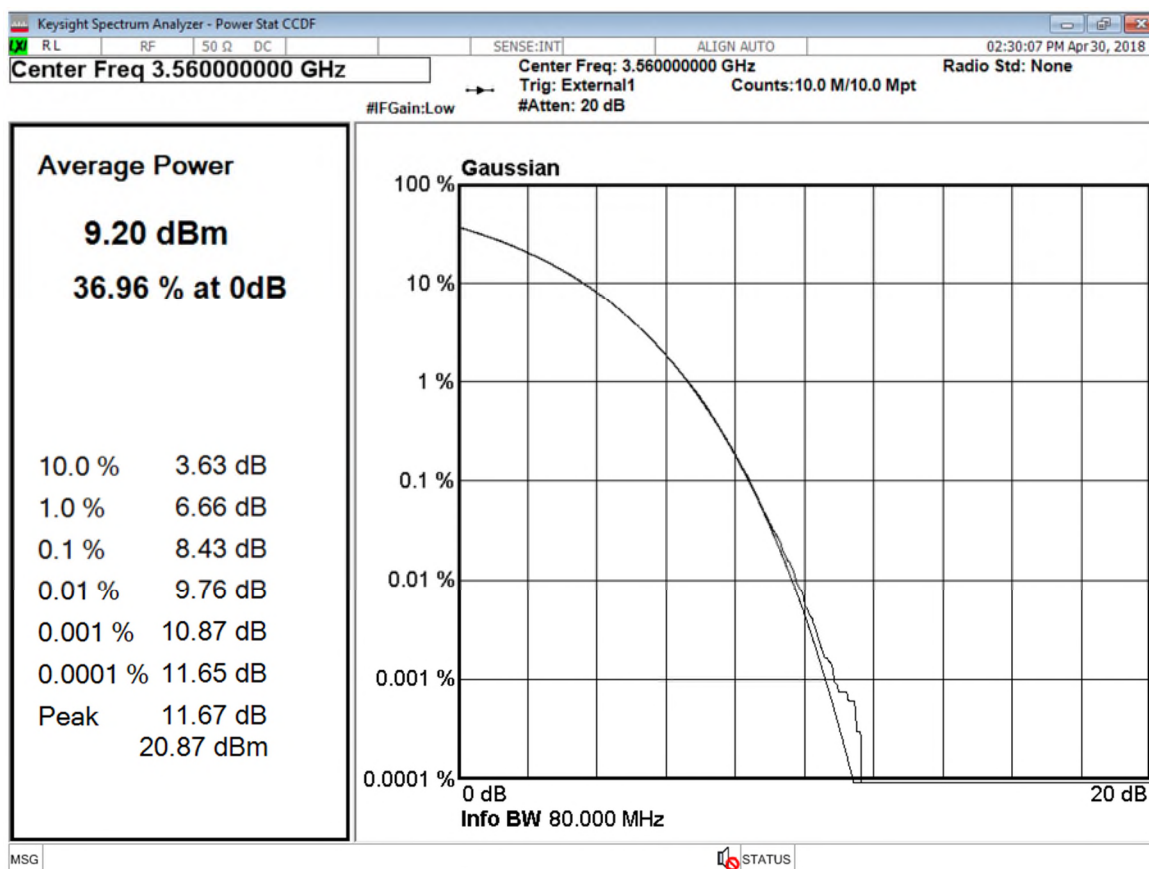
Antenna B - LTE Modulation QPSK - LTE Carrier Bandwidth 20.0 MHz - Channel Position B
(Worst case / representative)



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



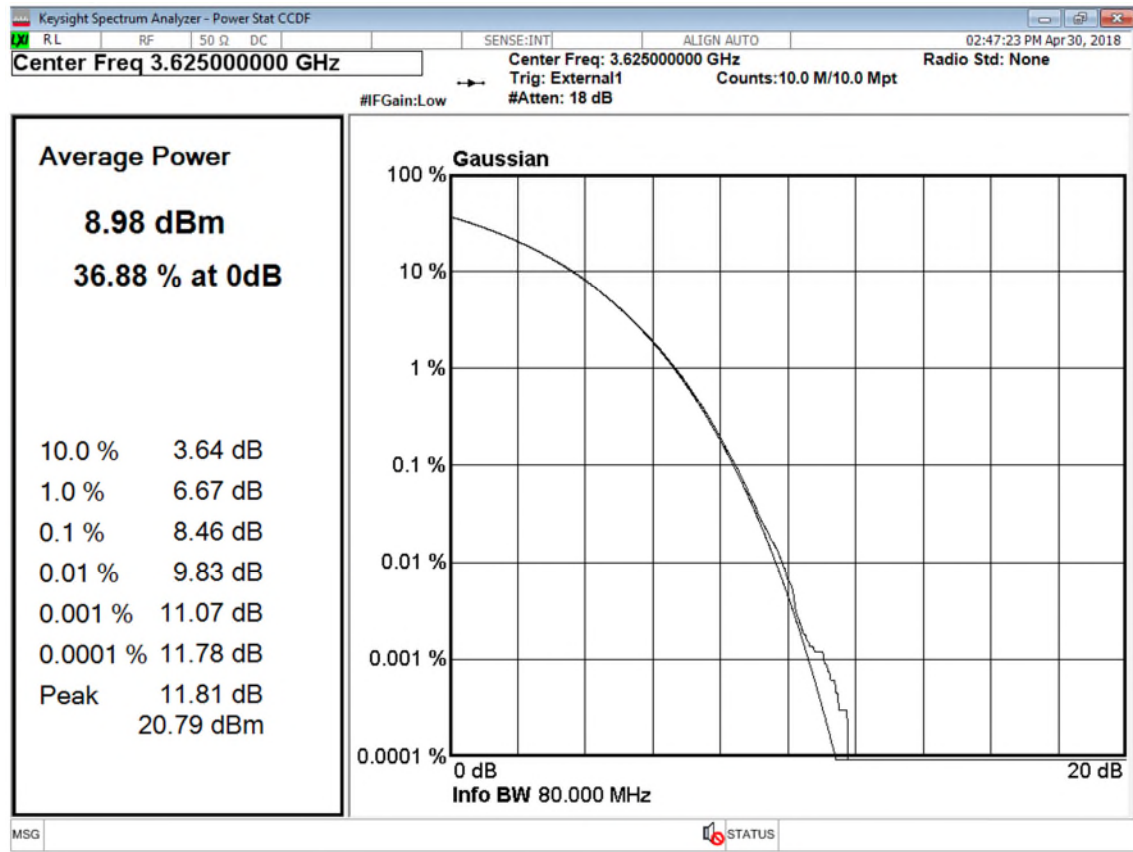
Product Service





Product Service

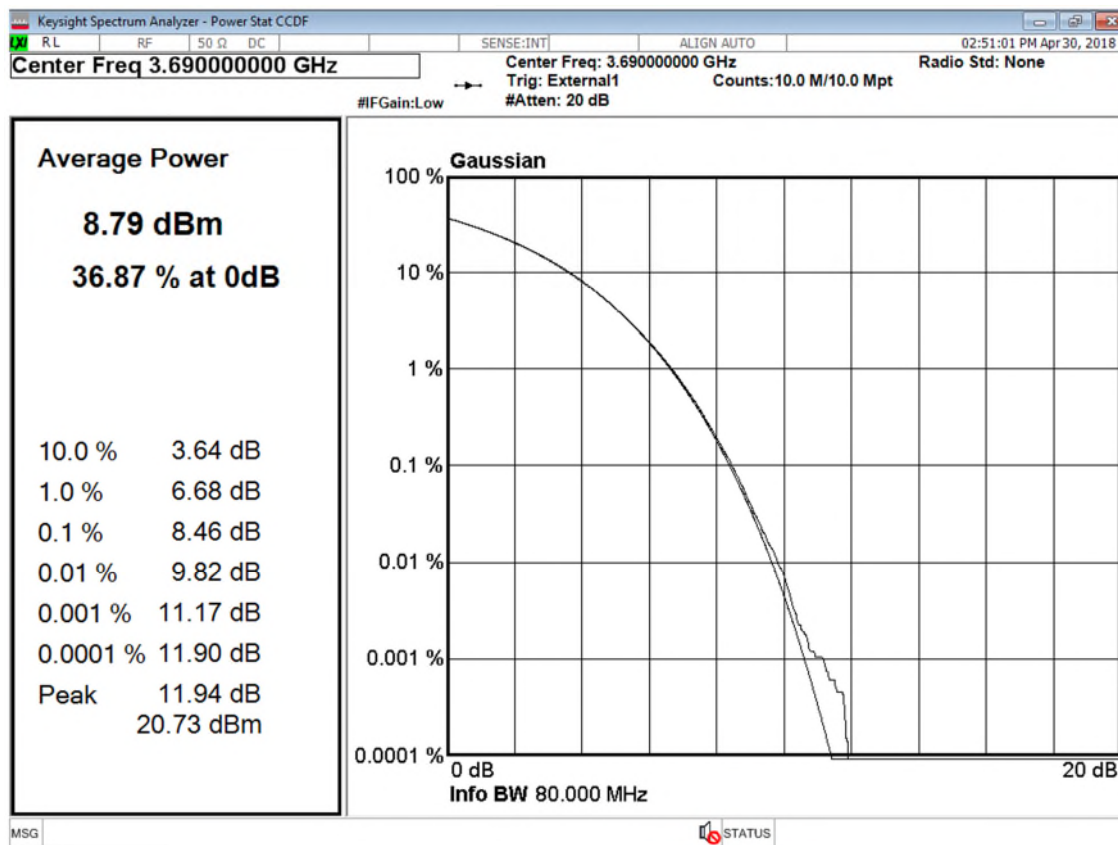
Antenna B - LTE Modulation QPSK - LTE Carrier Bandwidth 20.0 MHz - Channel Position M





Product Service

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



Limit	
Maximum EIRP	Category A CBSD Maximum EIRP: 30 dBm/10 MHz Maximum PSD: 20 dBm/MHz
Peak to Average Ratio	13 dB
Minimum EIRP	CBSDs and End User Devices shall limit their operating power to the minimum necessary for successful operations.



Product Service

2.2 OCCUPIED BANDWIDTH

2.2.1 Specification Reference

FCC CFR 47 Part 2, Clause 2.1049
FCC CFR 47 Part 96, Clause 96.41 (e)(3)

2.2.2 Date of Test and Modification State

19 April 2018 - 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 23°C
Relative Humidity 35%

2.2.5 Test Method

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

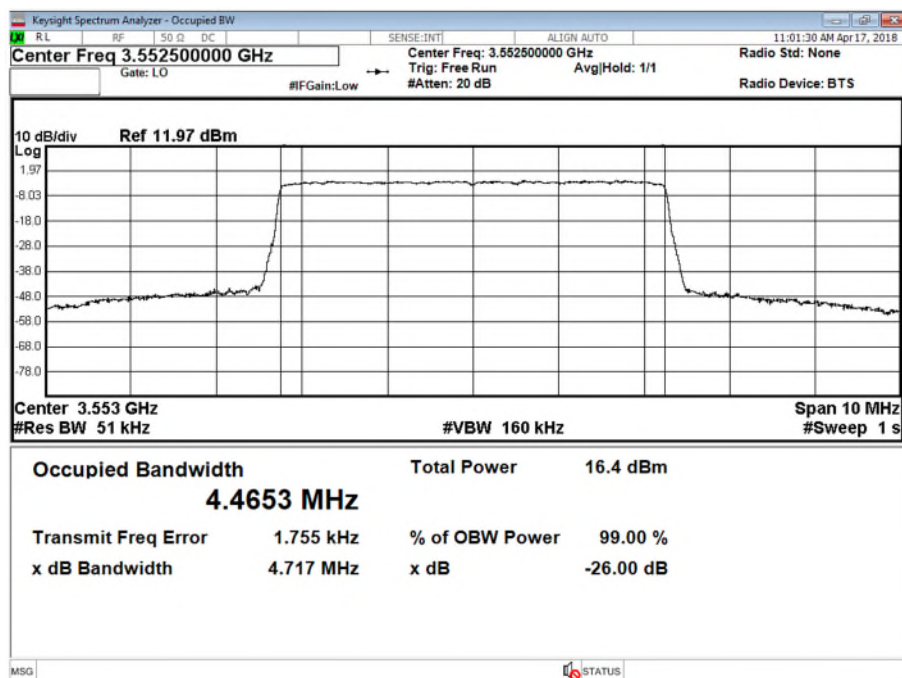
2.2.6 Test Results

Configuration A

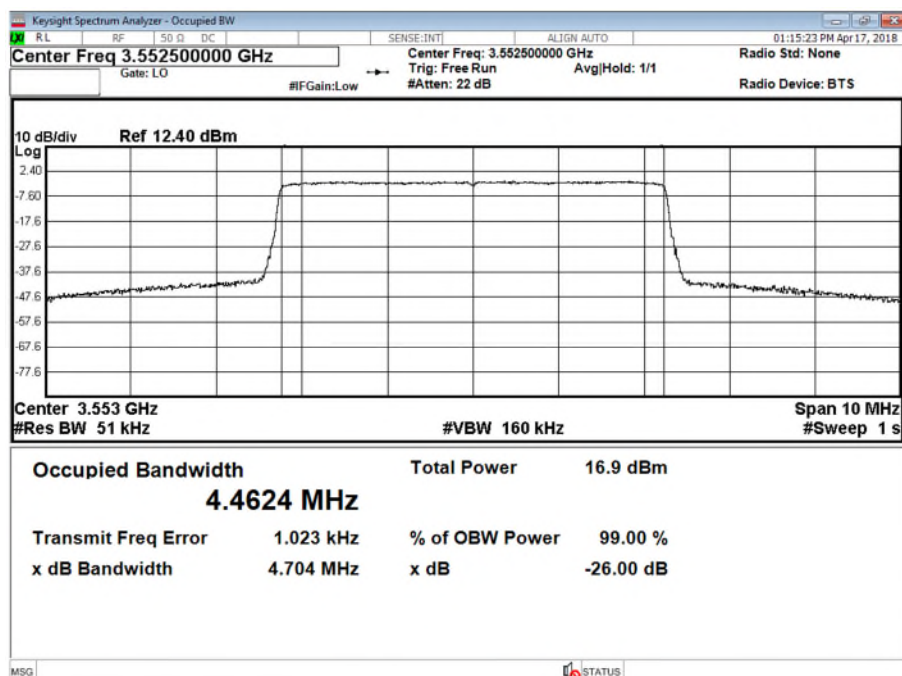
Maximum Output Power 17 dBm

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	5.0 MHz	4,465.33	4,716.85	4,463.25	4,704.85	4,463.22	4,706.80
B	QPSK	5.0 MHz	4,462.39	4,704.21	4,462.17	4,701.97	4,462.03	4,703.53
C	QPSK	5.0 MHz	4,463.22	4,702.15	4,463.07	4,701.74	4,462.88	4,701.84
D	QPSK	5.0 MHz	4,461.73	4,701.89	4,461.74	4,702.71	4,461.81	4,705.60
A	QPSK	10.0 MHz	8,930.26	9,348.07	8,928.60	9,351.79	8,927.62	9,351.14
B	QPSK	10.0 MHz	8,931.70	9,370.62	8,929.81	9,362.90	8,928.98	9,363.46
C	QPSK	10.0 MHz	8,926.76	9,340.93	8,926.76	9,349.04	8,923.99	9,343.23
D	QPSK	10.0 MHz	8,925.71	9,337.63	8,925.87	9,335.91	8,922.97	9,337.61
A	QPSK	15.0 MHz	13,387.76	13,955.56	13,392.41	13,960.77	13,387.51	13,958.23
B	QPSK	15.0 MHz	13,393.82	13,942.39	13,396.78	13,943.29	13,393.52	13,943.31
C	QPSK	15.0 MHz	13,384.87	13,952.17	13,389.98	13,959.72	13,386.62	13,957.06
D	QPSK	15.0 MHz	13,387.21	13,942.07	13,387.88	13,940.41	13,385.92	13,941.27
A	QPSK	20.0 MHz	17,842.63	18,548.59	17,850.59	18,555.36	17,845.26	18,553.30
B	QPSK	20.0 MHz	17,846.81	18,542.76	17,852.62	18,545.41	17,849.83	18,549.23
C	QPSK	20.0 MHz	17,841.41	18,542.20	17,852.29	18,552.56	17,847.75	18,552.69
D	QPSK	20.0 MHz	17,845.90	18,547.77	17,847.31	18,545.98	17,847.54	18,549.57

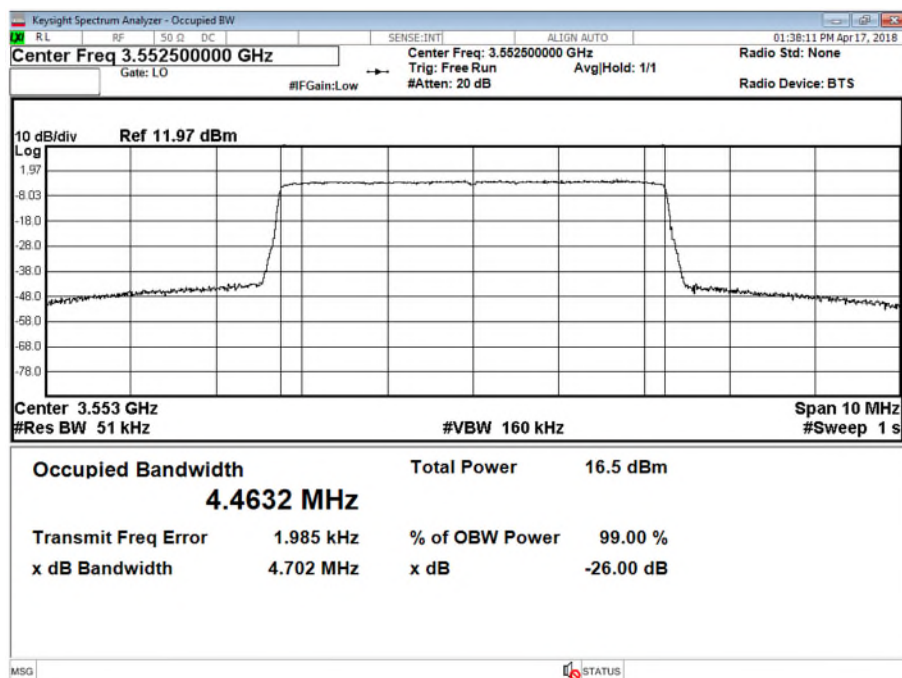
Antenna A - LTE Modulation QPSK - LTE Carrier Bandwidth 5.0 MHz - Channel Position B



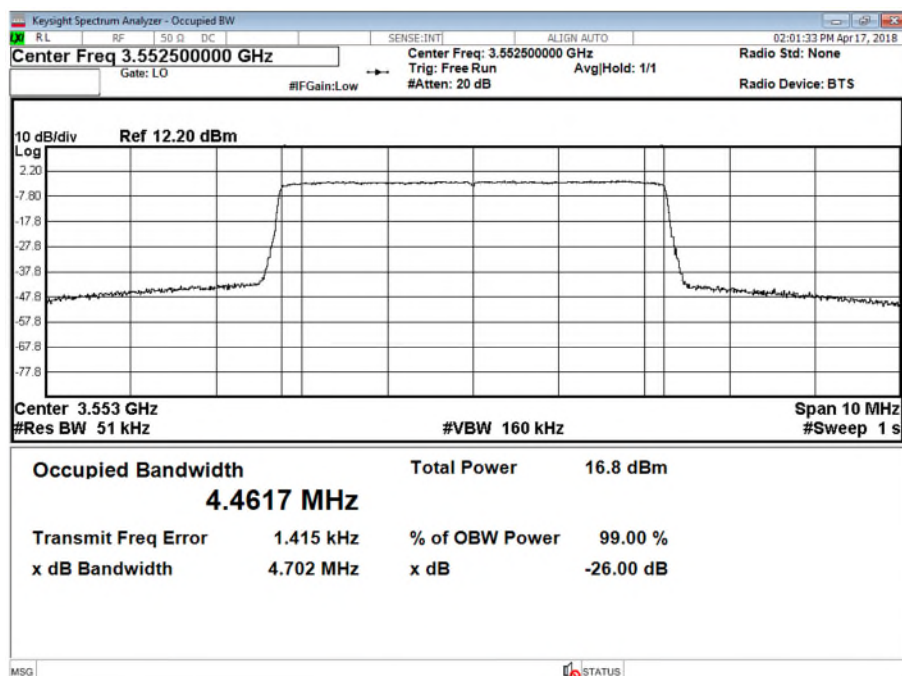
Antenna B - LTE Modulation QPSK - LTE Carrier Bandwidth 5.0 MHz - Channel Position B



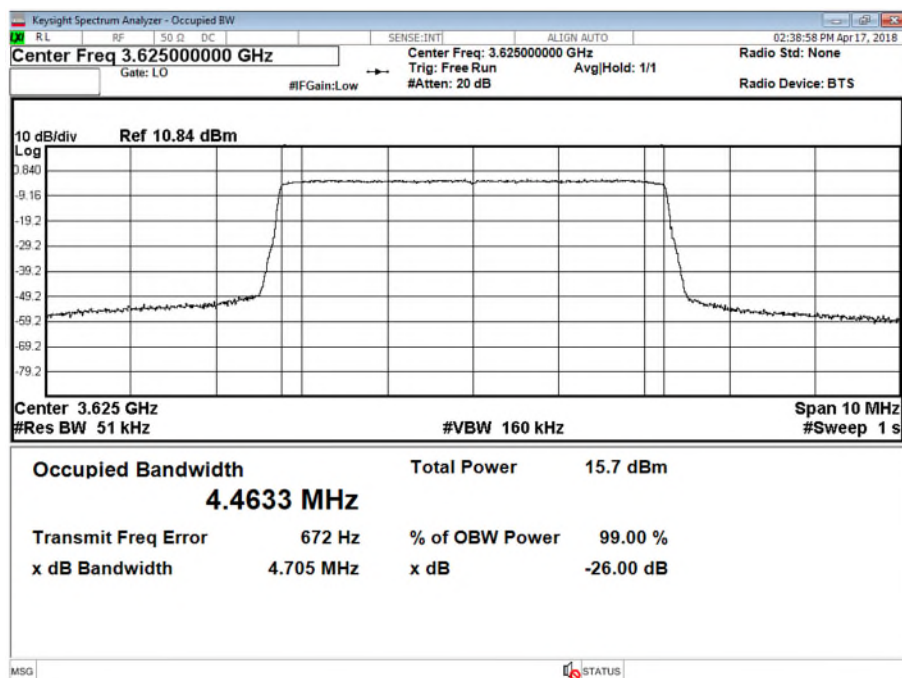
Antenna C - LTE Modulation QPSK - LTE Carrier Bandwidth 5.0 MHz - Channel Position B



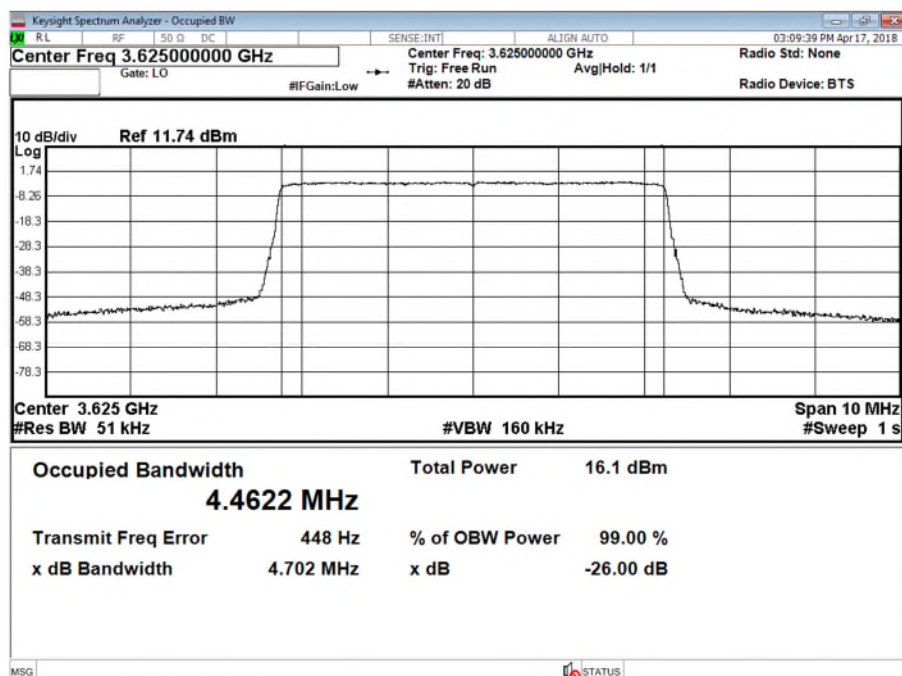
Antenna D - LTE Modulation QPSK - LTE Carrier Bandwidth 5.0 MHz - Channel Position B



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



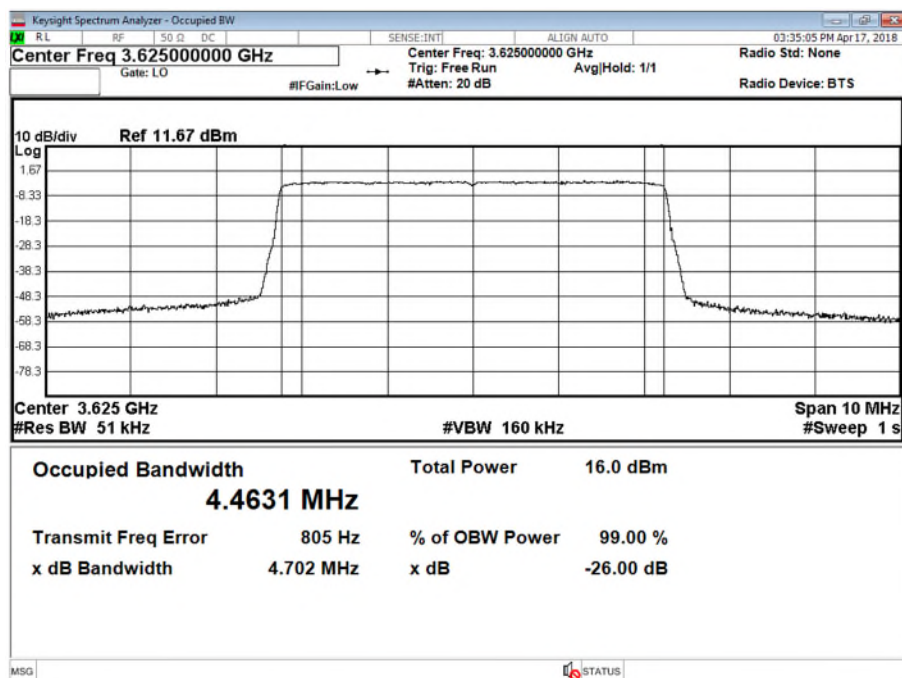
Antenna B - LTE Modulation QPSK - LTE Carrier Bandwidth 5.0 MHz - Channel Position M



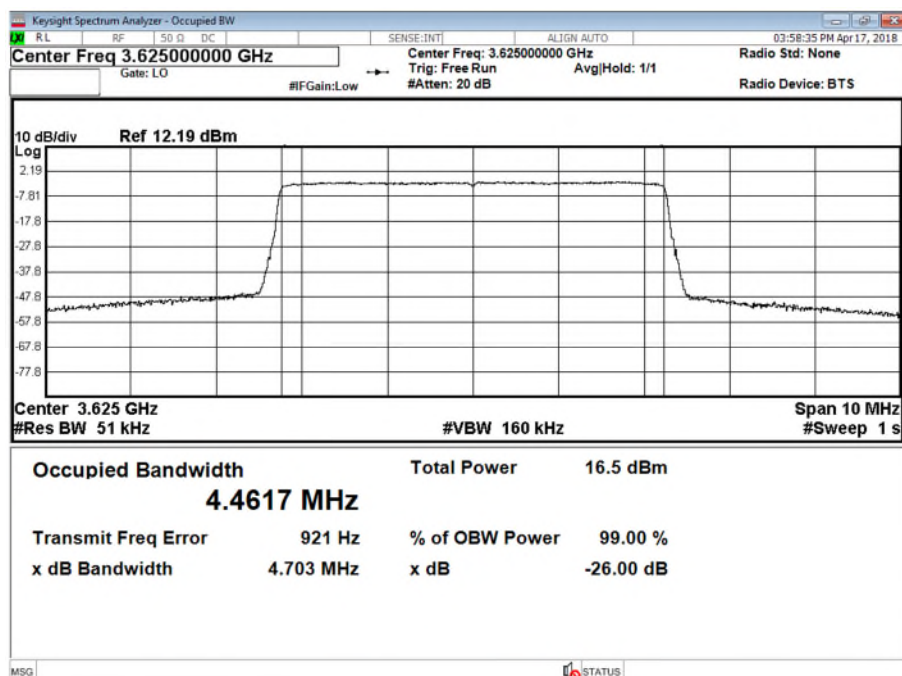


Product Service

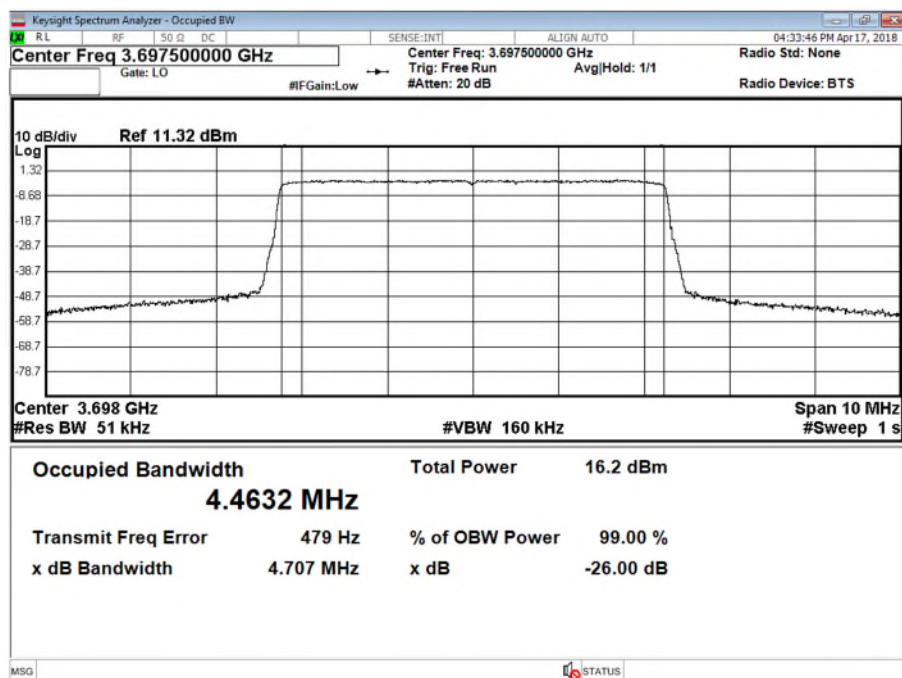
Antenna C - LTE Modulation QPSK - LTE Carrier Bandwidth 5.0 MHz - Channel Position M



Antenna D - 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

