Product Service

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Report On

FCC Testing of the
FW-300i Intelligent LTE Base Station in accordance with FCC CFR 47 Part 2, FCC CFR 47 Part 96
COMMERCIAL-IN-CONFIDENCE

FCC ID: ROR00000005

PREPARED BY	APPROVED BY	DATED
Scott Drysdale Test Personnel	Abderrahmane Ferhat Authorised Signatory	Nov 7, 2018

Product Service

CONTENTS

SECTION 1

REPORT INFORMATION

1.1 REPORT DETAILS

Manufacturer	Blinq Networks
Address	140 Renfrew Drive, Suite 205, Markham ON
Product Name	FW-300i Intelligent LTE Base Station
Serial Number(s)	A180814008
Software Version	1.2.2
Hardware Version	A01
Test Specification/Issue/Date	FCC CFR 47 Part 2: 2017 FCC CFR 47 Part 96: 2017
Product Name	FW-300i B48
Start of Test	Aug 22, 2018
Finish of Test	Sept 15, 2018
Name of Engineer(s)	Scott Drysdale
Report issue / Revisions	Issue 000 – October 29, 2018 Issue 001 – Nov 7, 2018 – Minor revisions as per request kept on file Issue 002 – Nov 8, 2018 – Removed accidently reference to 4 port Mimo when 2 port is employed. Issue 003 – Nov 15, minor revisions as per TCB request
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

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

Note: Compliance to power line conducted emissions and radiated spurious emissions as per 15.107 and 15.109 is documented in a separate test report covering FCC Part 15 Subpart B.

1.3 CONFIGURATION DESCRIPTION

1.3 CONFIGURATION DESCRIPTION

The FW-300i B48 supports Single Carrier operation from a dual port configuration.

TX test cases: Maximum Conducted Output Power, Maximum Power Spectral Density, Spurious Emissions at Antenna Terminals (±1MHz) and Conducted Spurious Emissions, measurements were performed on both RF Ports of the B48 radios using a test limit accounting for MIMO operation with 2 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 by an AC adapter power supply.

LTE B48 (3550 MHz – 3700 MHz) Channel Configurations

RAT	No. of Carrier Bandwidth (MHz) Carriers	Carrier Bandwidth (MHz)	Carrier Frequency Configuration (MHz)		
			Bottom (BRFBW)	Middle (MRFBW)	Top (TRFBW)
LTE	1	10	3555.0	3625	3695.0
LTE	1	20	3565.0	3625	3685.0

1.4 PRODUCT INFORMATION

1.4.1 Summary

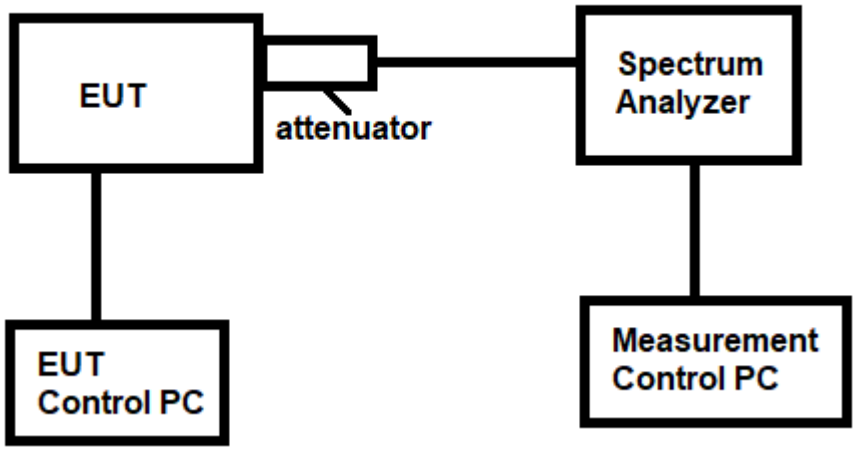
Power rated: EIRP 49.02 dBm at 20 MHz setting, 46.31 dBm at 10 MHz setting
Antenna Sectors: 3 sectors, non-overlapping.
Antenna gain: 17 dBi
MIMO: 2 ports in MIMO
Frequency band of operation: 3550-3700 MHz
Bandwidth(S): 10 MHz and 20 MHz.
CBSD Category: B (EIRP limit of 47 dBm / 10 MHz)

1.4.2 Technical Description

Technical Description
The BLiNQ FW-300i system operates in the sub 6 GHz licensed frequency bands and incorporates advanced Physical Layer (PHY) and Media Access Control (MAC) layer algorithms and techniques. BLiNQ Networks includes enhanced beamforming techniques in its solutions to increase capacity and reliability beyond that of ordinary Small Cell solutions. Mitigating interference and enhancing signal reliability maximizes system performance.
The FW-300i packs up to three (3), 2x2 Multiple Input Multiple Output (MIMO) carrier radios in one compact form factor.
The FW-300i system operates in licensed Long Term Evolution (LTE) bands 42 and 43 plus Citizens Broadband Radio Service (CBRS) band 48 including 3.4 — 3.70 GHz bands in Point-to-Multipoint (PMP) configurations.

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

1.5 TEST SETUP



1.6 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 an external AC supply.

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

1.7 DEVIATION FROM THE STANDARD

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

1.8 MODIFICATION RECORD

No modifications were made to the EUT during testing.

1.9 ALTERNATIVE TEST SITE

Under our Accreditation, TÜV SÜD Canada, Laval conducted the following tests at TUV SUD Canada in Laval and under Laval's scope of accreditation at TUV SUD Canada in Ottawa at 1280 Teron Rd, Ottawa, On.

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

SECTION 2

TEST DETAILS

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

August 22 to September 10,2018

No modifications.

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 antenna gain of 17 dBi and a mimo value of 3 dB for 2 port operaiton

2.1.6 Test Results

Antenna	LTE Modulation	LTE Carrier Bandwidth	Peak to Average Ratio (PAR) / Output Power/PSD					
			Channel Position B					
			PAR (dB)	Conducted Average Power		EIRP (+17 dBi) +3 dB (MIMO)		EIRP
				dBm (Note 1)	dBm/MHz	dBm (Note 2)	dBm/MHz	dBm/10 MHz (See note 3)
A	QPSK	10.0 MHz	8.30	25.54	16.30	45.54	36.3	45.54
B	QPSK	10.0 MHz	8.39	26.31	17.18	46.31	36.8 (Note 4)	46.31
C	QPSK	10.0 MHz	8.24	25.75	16.44	45.75	36.44	45.75
D	QPSK	10.0 MHz	8.33	25.76	16.40	45.76	36.4	45.76
E	QPSK	10.0 MHz	8.14	26.00	16.48	46	36.48	46
F	QPSK	10.0 MHz	8.28	26.15	16.96	46.15	36.96	46.15
A	QPSK	20.0 MHz	7.97	26.01	16.33	49.02	36.33	46.01
B	QPSK	20.0 MHz	8.03	24.7	15.05	47.71	35.05	44.7
C	QPSK	20.0 MHz	8.15	25.61	15.93	48.62	35.93	45.61
D	QPSK	20.0 MHz	8.26	25.66	16.04	48.67	36.04	45.66
E	QPSK	20.0 MHz	8.07	25.91	16.13	48.92	36.13	45.91
F	QPSK	20.0 MHz	8.25	25.15	15.5	48.16	35.5	45.15

Note 1: Measured in 10 MHz span.

Note 2: For 20 MHz value, a worst case value of 3 dB based on 10log(10MHz/20MHz) is added for the EIRP value.

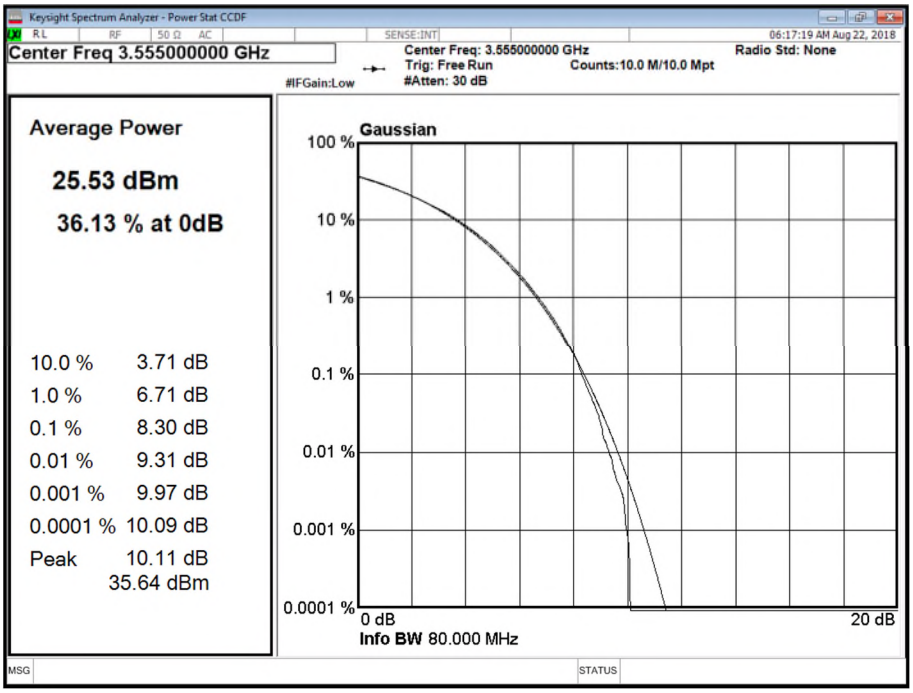
Note 3: 3 dB added for worst case two port mimo. 17 dBi added for antenna gain.

Note 4: The sum of port A (42.7 mW) and Port B (52.2 mW) is added for a total dBm/MHz of 94.9 mW. This is 19.8 dBm/MHz for MIMO operation. A 17 dBi antenna gain is added to obtain the EIRP of 36.8 dBm/MHz.

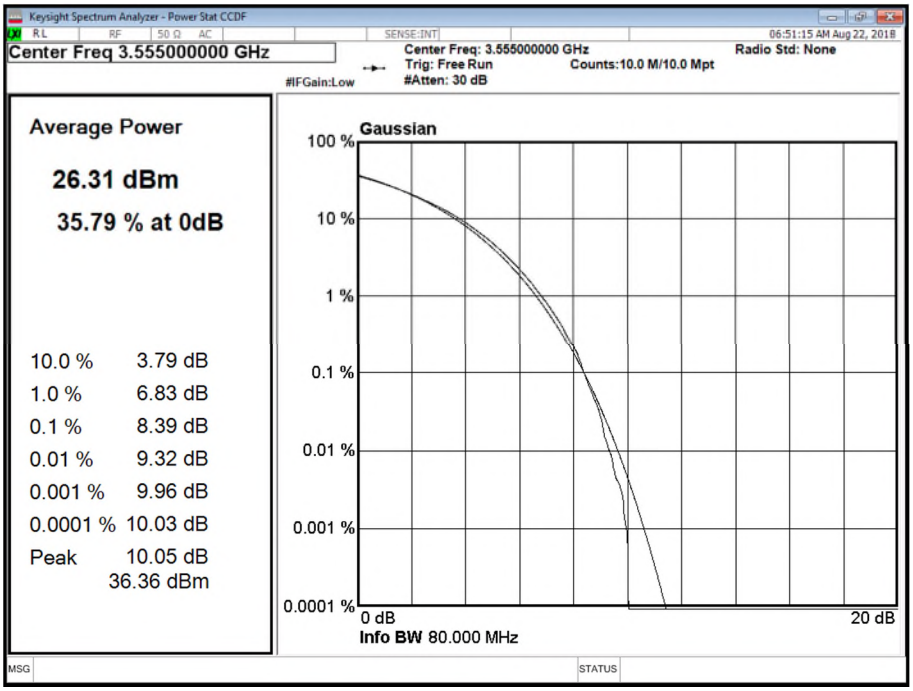
Note 5: Other modulation modes were scanned and the QPSK mode was found to be worst case, i.e. highest bandwidth and highest power and highest out of band emissions. QPSK is documented as representative of all other modulations scanned.

Note 6: Maximum Output power 26.3dBm (10MHz) and 29.0dBm (20MHz)

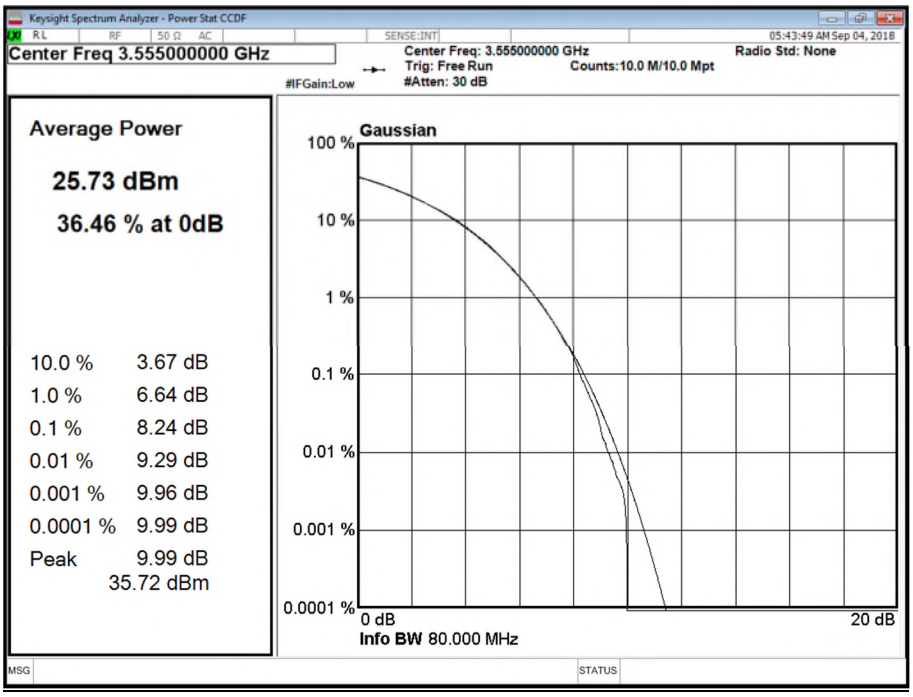
Antenna A - LTE Modulation QPSK - LTE Carrier Bandwidth 10.0 MHz - Channel Position B



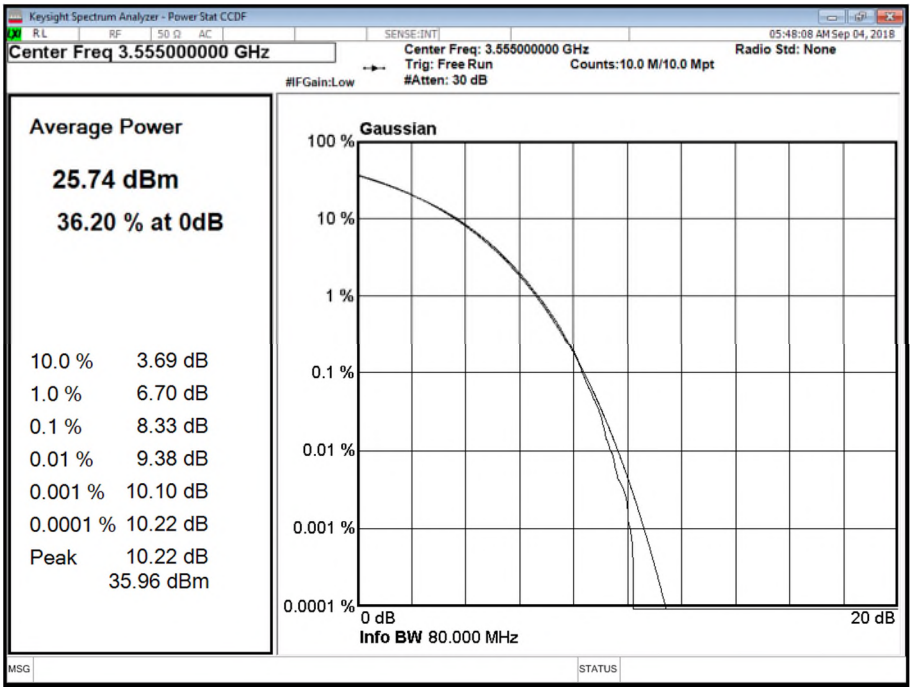
Antenna B - LTE Modulation QPSK - LTE Carrier Bandwidth 10.0 MHz - Channel Position B



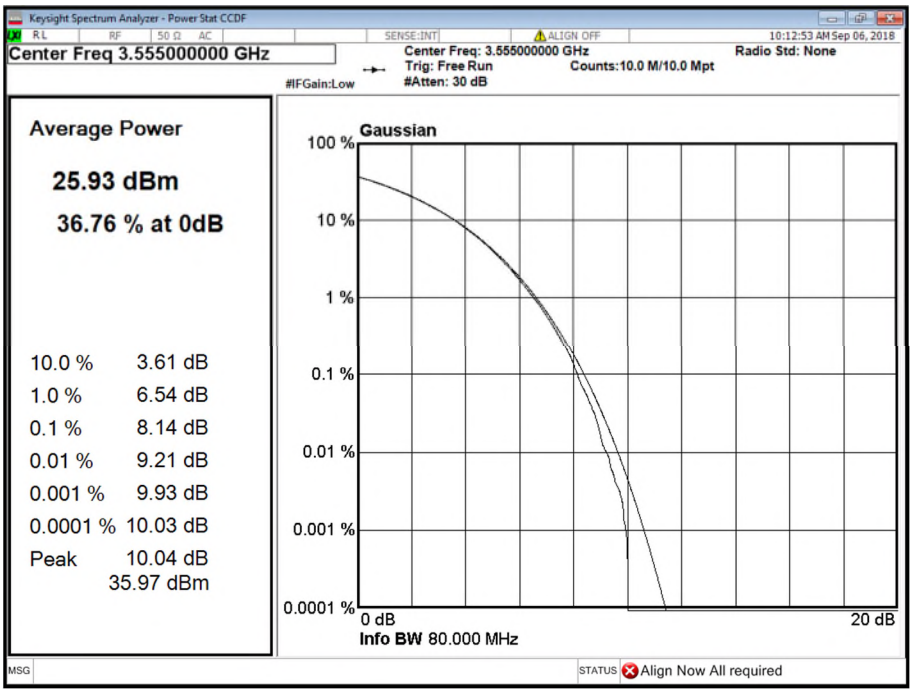
Antenna C - LTE Modulation QPSK - LTE Carrier Bandwidth 10.0 MHz - Channel Position B



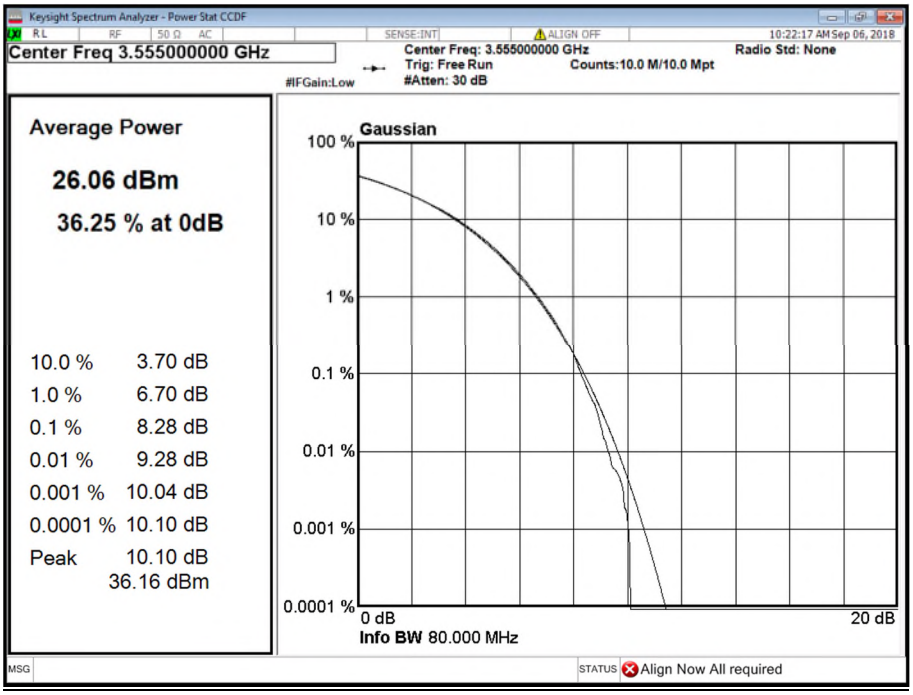
Antenna D - LTE Modulation QPSK - LTE Carrier Bandwidth 10.0 MHz - Channel Position B



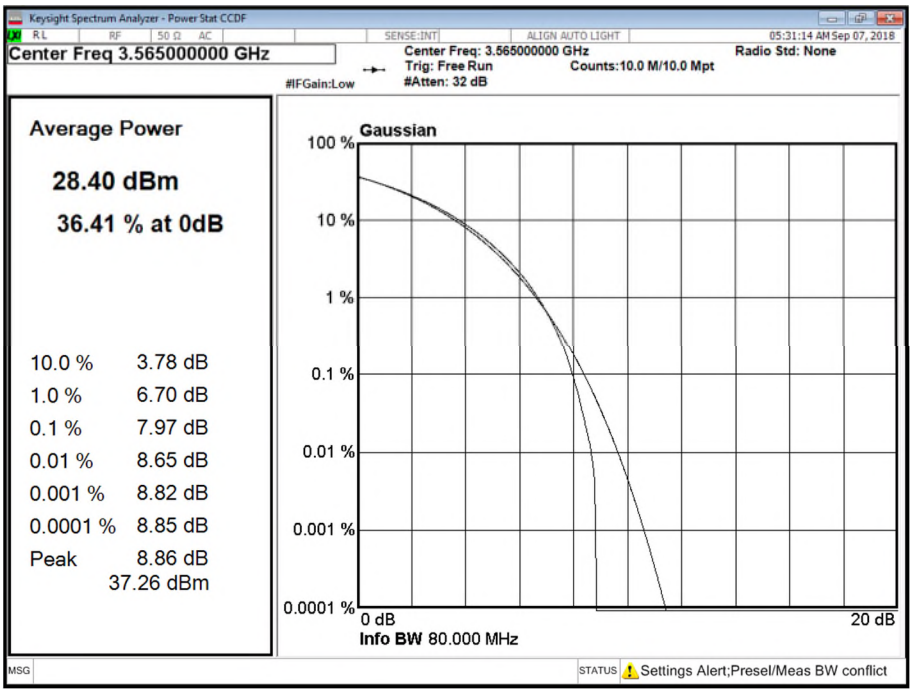
Antenna E - LTE Modulation QPSK - LTE Carrier Bandwidth 10.0 MHz - Channel Position B



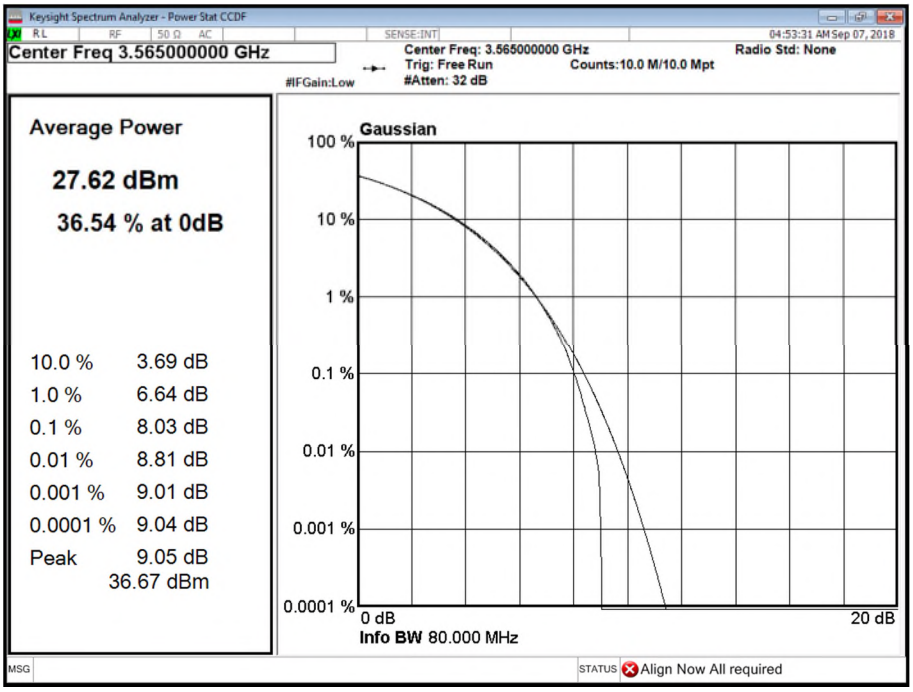
Antenna F - LTE Modulation QPSK - LTE Carrier Bandwidth 10.0 MHz - Channel Position B



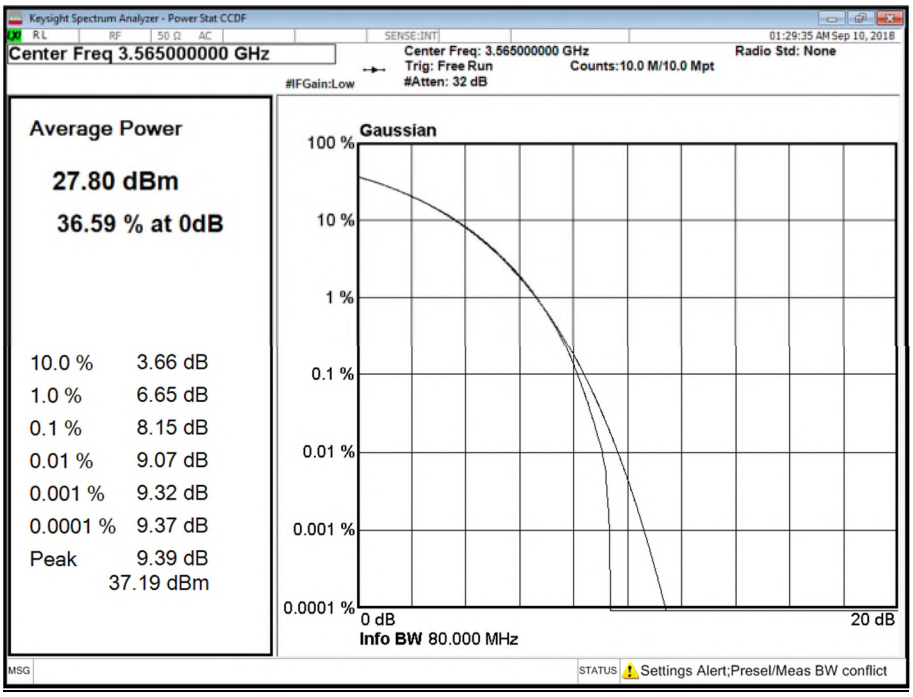
Antenna A - LTE Modulation QPSK - LTE Carrier Bandwidth 20.0 MHz - Channel Position B



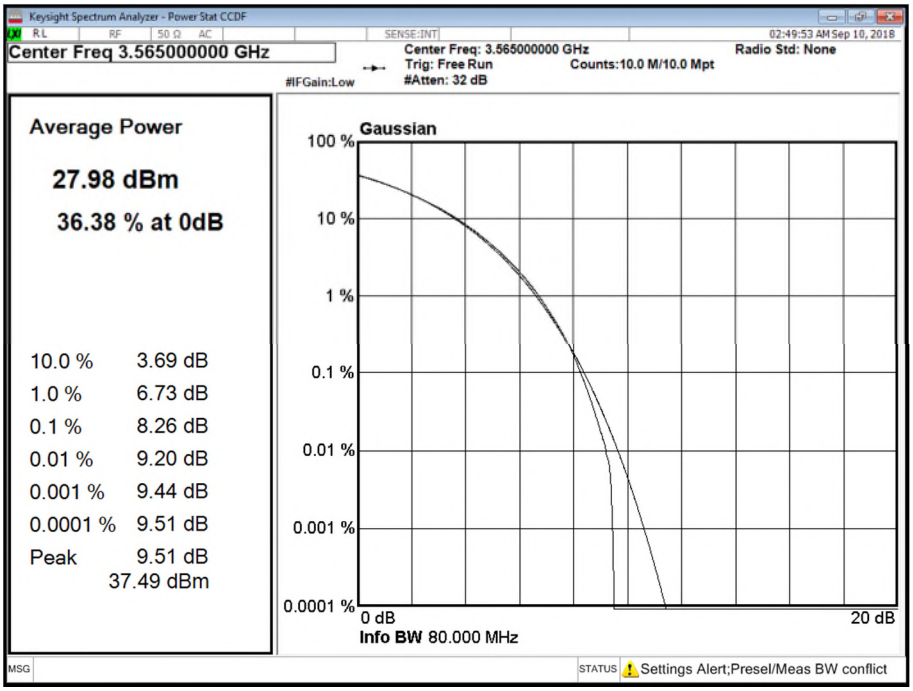
Antenna B - LTE Modulation QPSK - LTE Carrier Bandwidth 20.0 MHz - Channel Position B



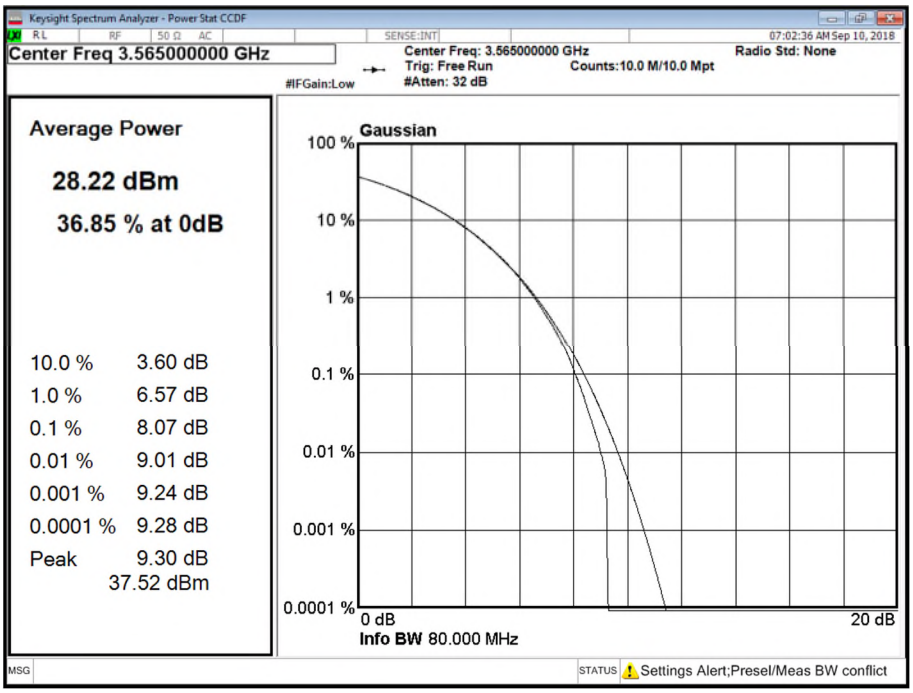
Antenna C - LTE Modulation QPSK - LTE Carrier Bandwidth 20.0 MHz - Channel Position B



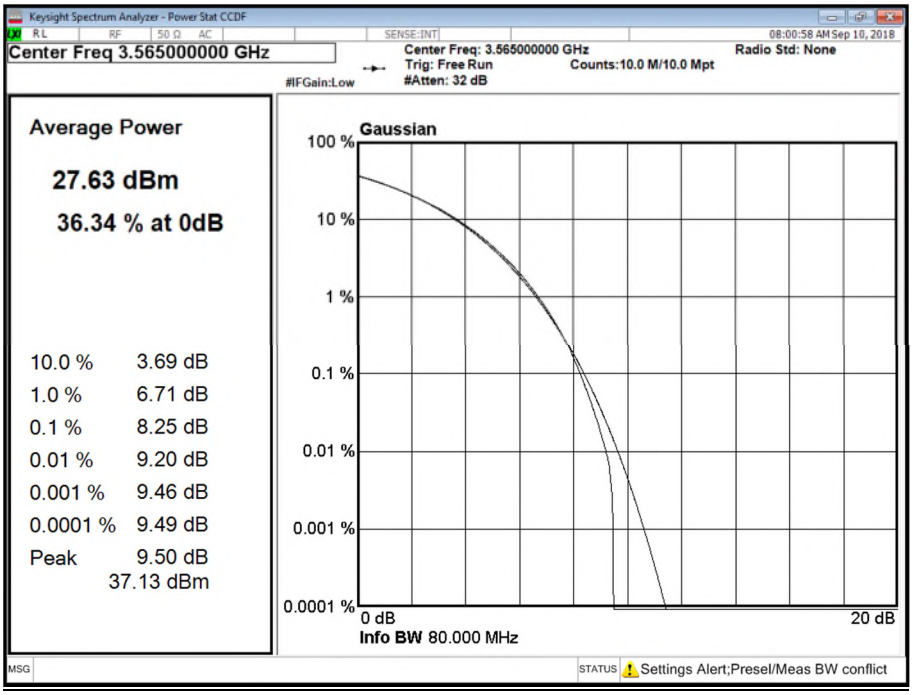
Antenna D - LTE Modulation QPSK - LTE Carrier Bandwidth 20.0 MHz - Channel Position B



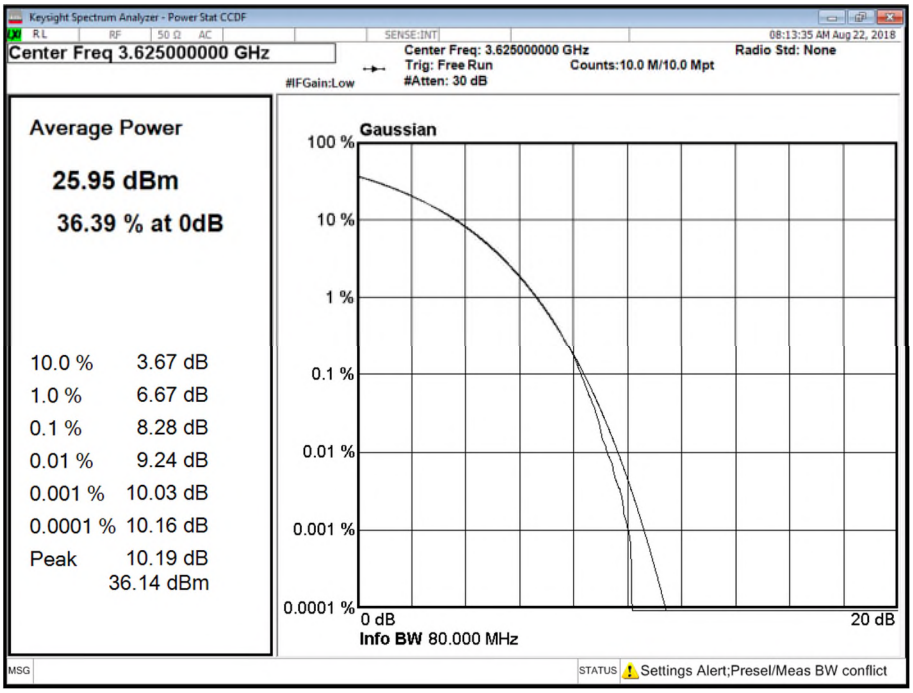
Antenna E - LTE Modulation QPSK - LTE Carrier Bandwidth 20.0 MHz - Channel Position B



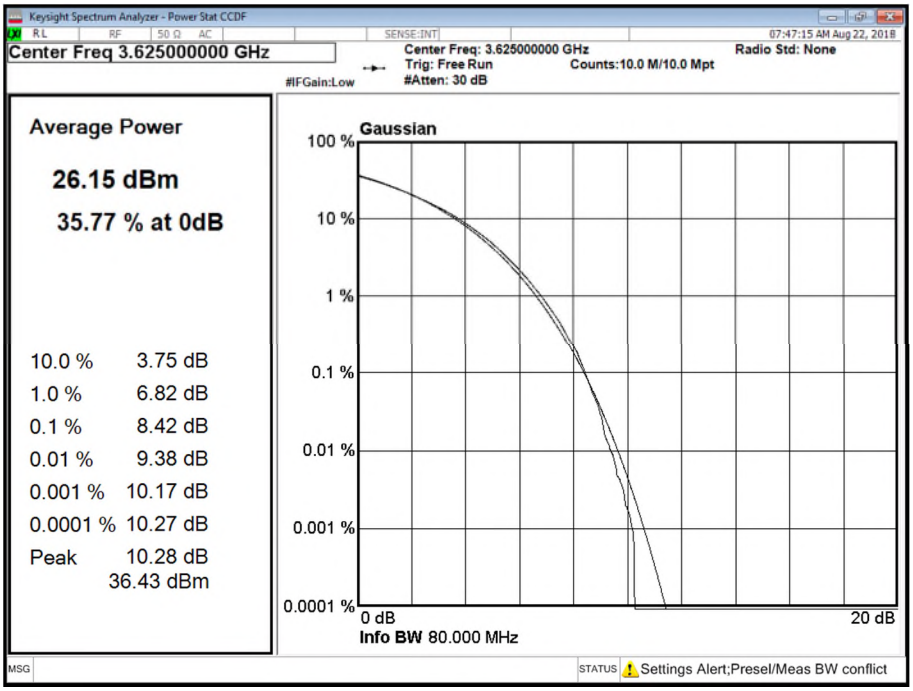
Antenna F - LTE Modulation QPSK - LTE Carrier Bandwidth 20.0 MHz - Channel Position B



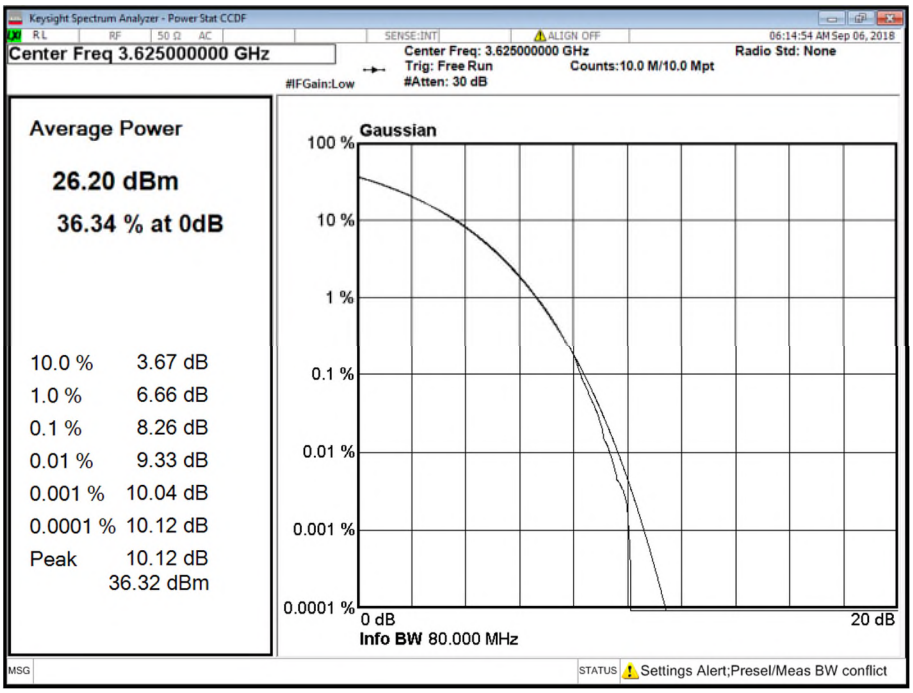
Antenna A - LTE Modulation QPSK - LTE Carrier Bandwidth 10.0 MHz - Channel Position M



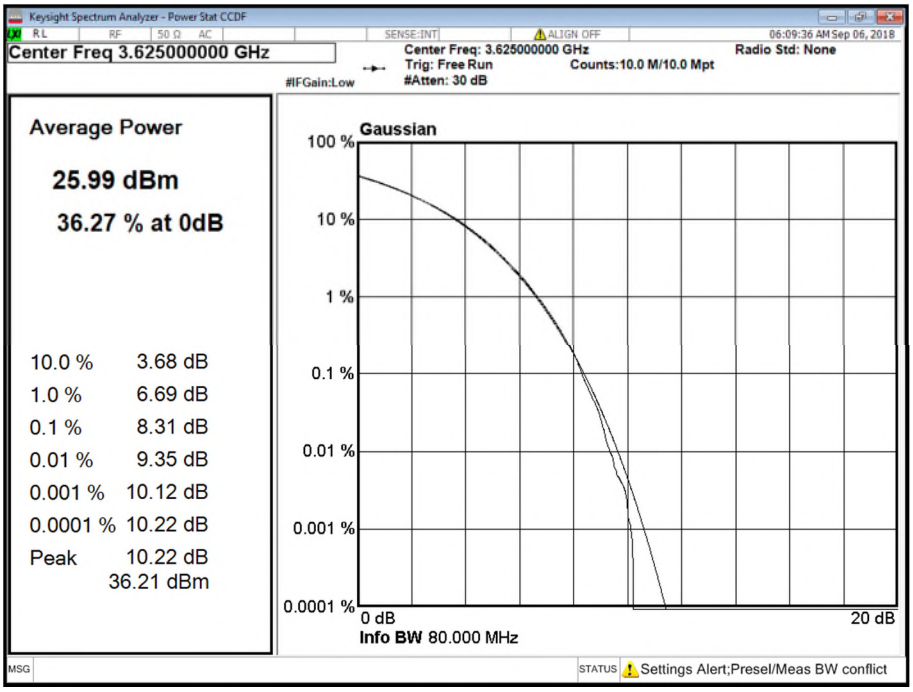
Antenna B - LTE Modulation QPSK - LTE Carrier Bandwidth 10.0 MHz - Channel Position M



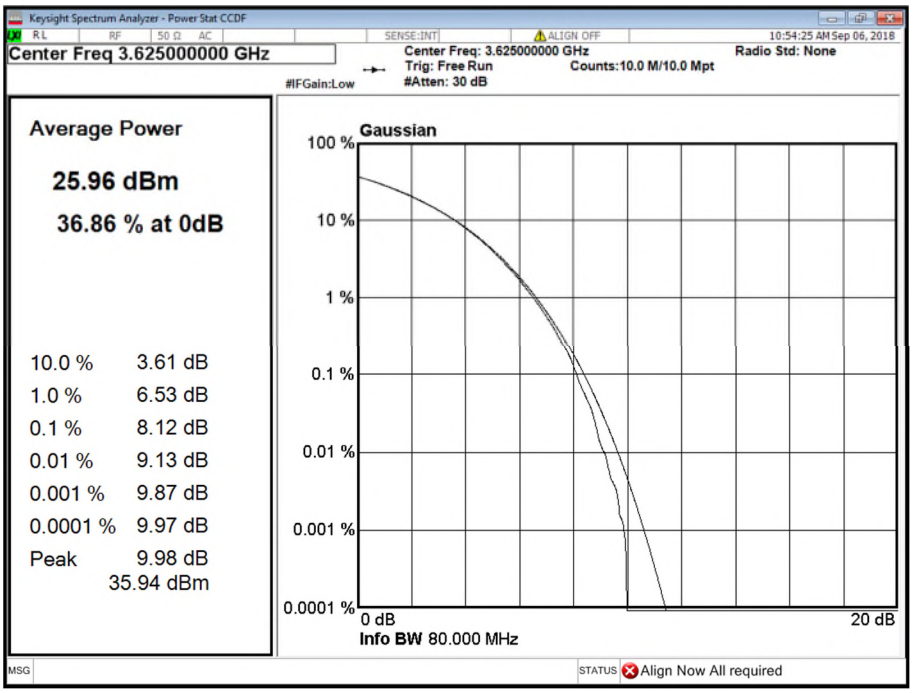
Antenna C - LTE Modulation QPSK - LTE Carrier Bandwidth 10.0 MHz - Channel Position M



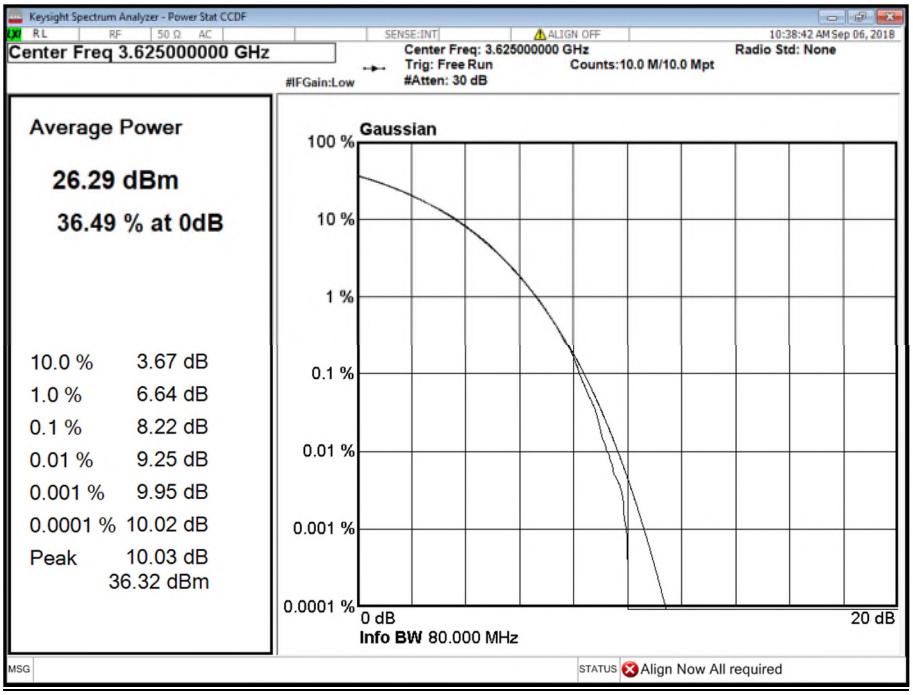
Antenna D - LTE Modulation QPSK - LTE Carrier Bandwidth 10.0 MHz - Channel Position M



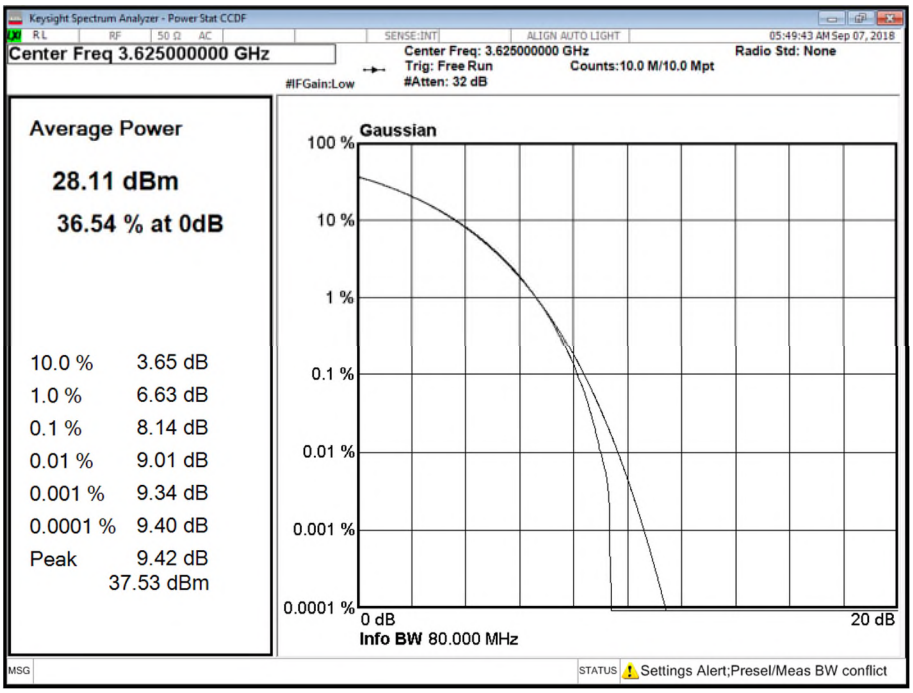
Antenna E - LTE Modulation QPSK - LTE Carrier Bandwidth 10.0 MHz - Channel Position M



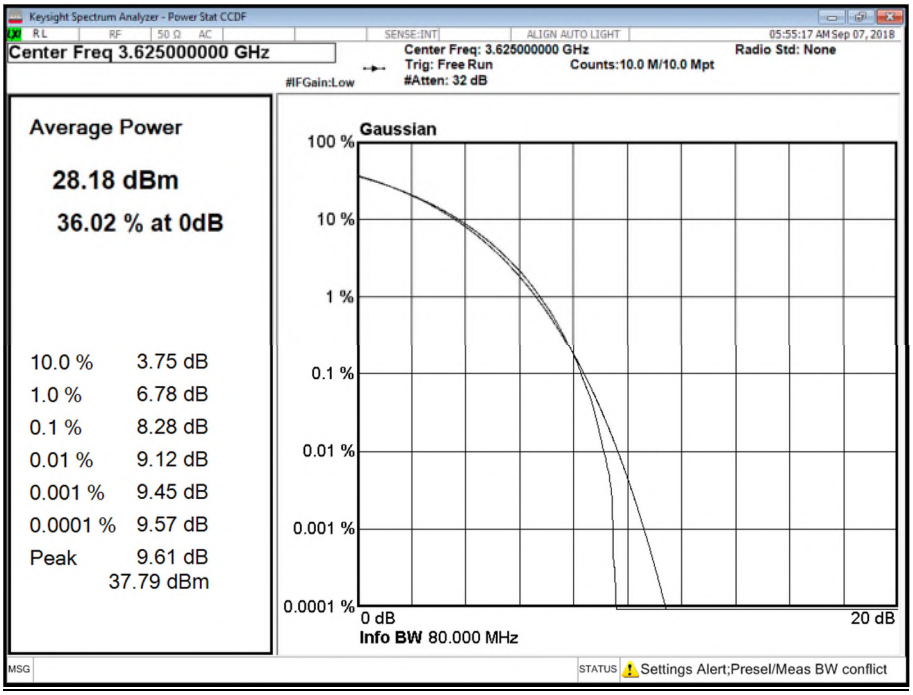
Antenna F - LTE Modulation QPSK - LTE Carrier Bandwidth 10.0 MHz - Channel Position M



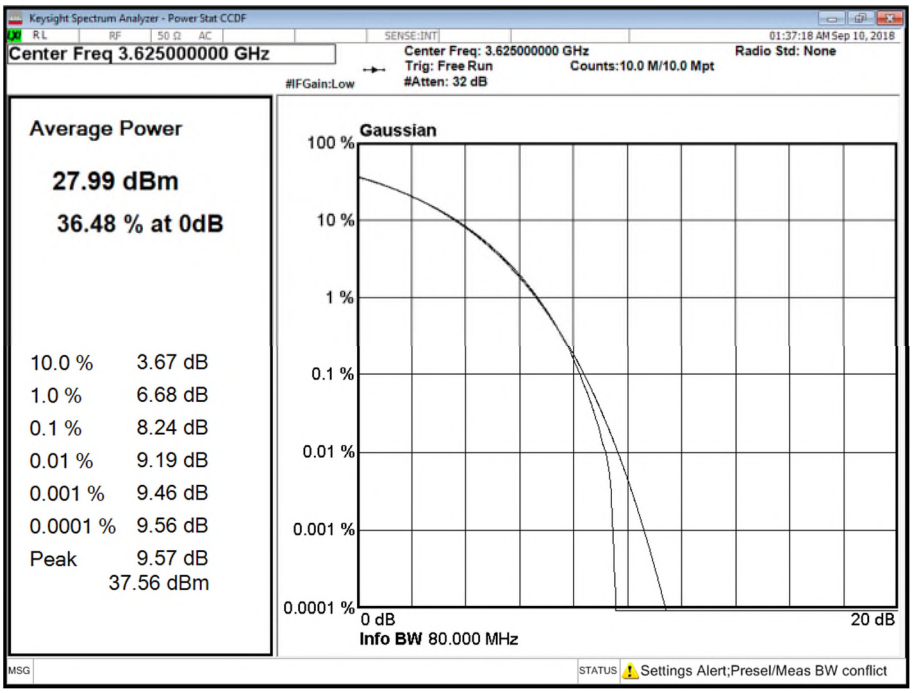
Antenna A - LTE Modulation QPSK - LTE Carrier Bandwidth 20.0 MHz - Channel Position M



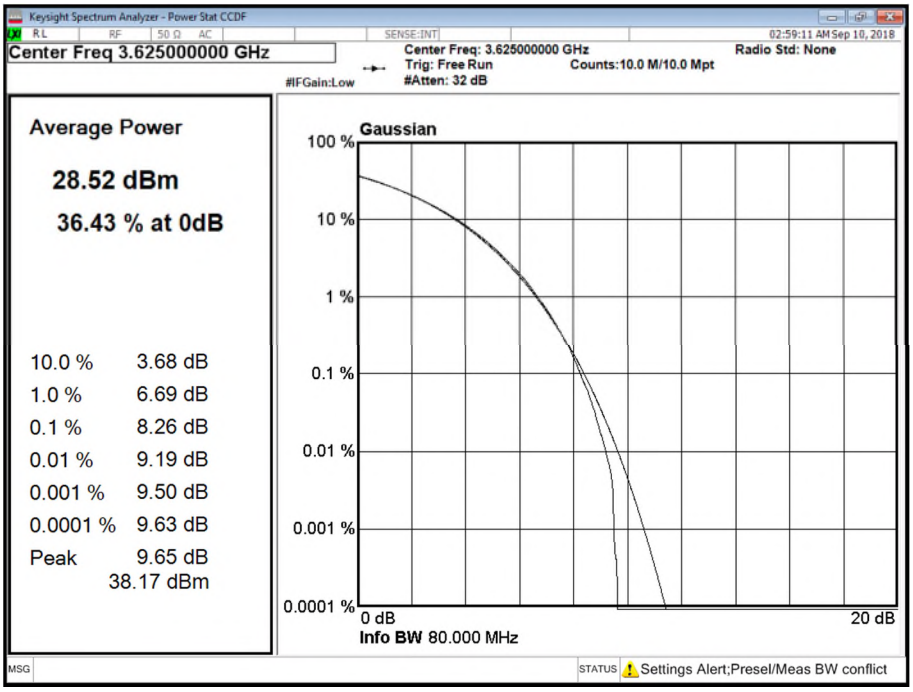
Antenna B - LTE Modulation QPSK - LTE Carrier Bandwidth 20.0 MHz - Channel Position M



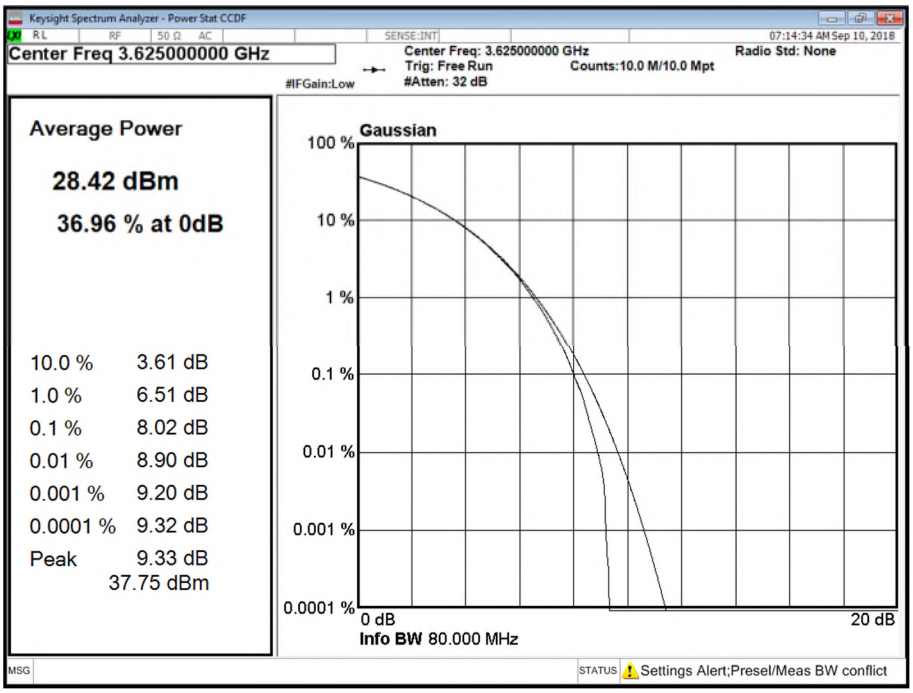
Antenna C - LTE Modulation QPSK - LTE Carrier Bandwidth 20.0 MHz - Channel Position M



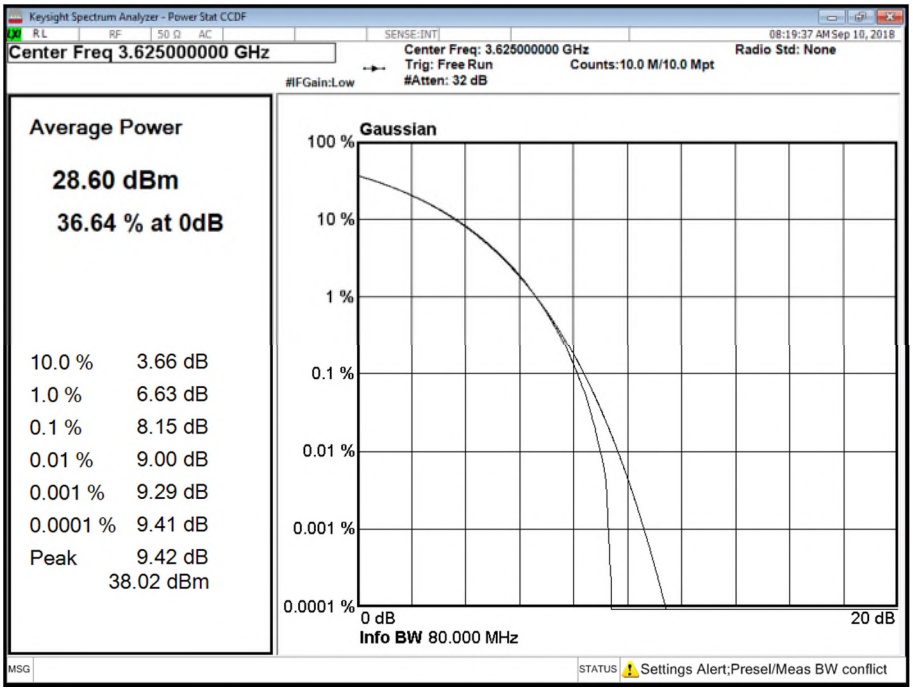
Antenna D - LTE Modulation QPSK - LTE Carrier Bandwidth 20.0 MHz - Channel Position M



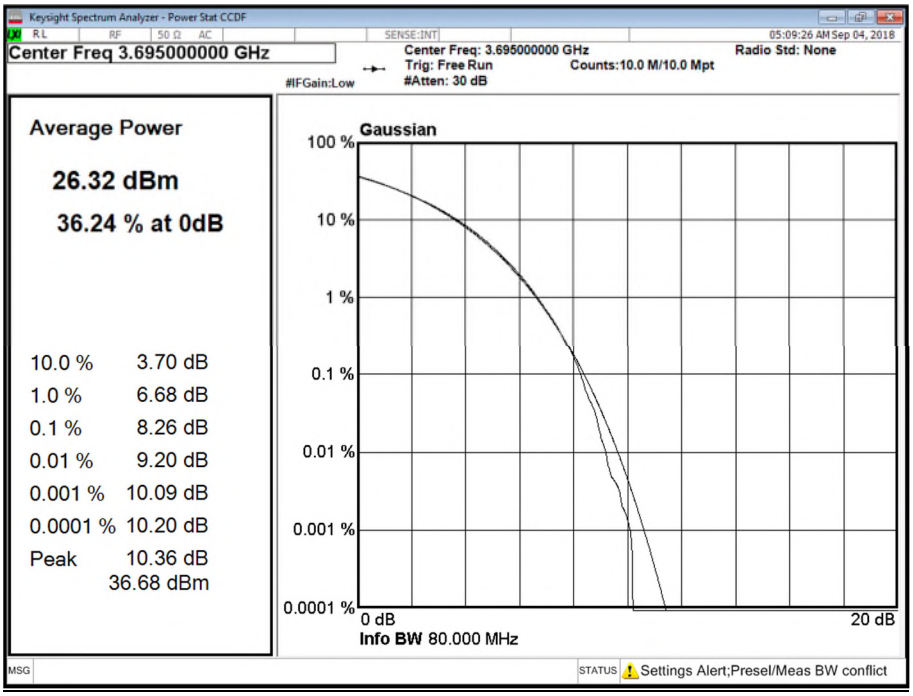
Antenna E - LTE Modulation QPSK - LTE Carrier Bandwidth 20.0 MHz - Channel Position M



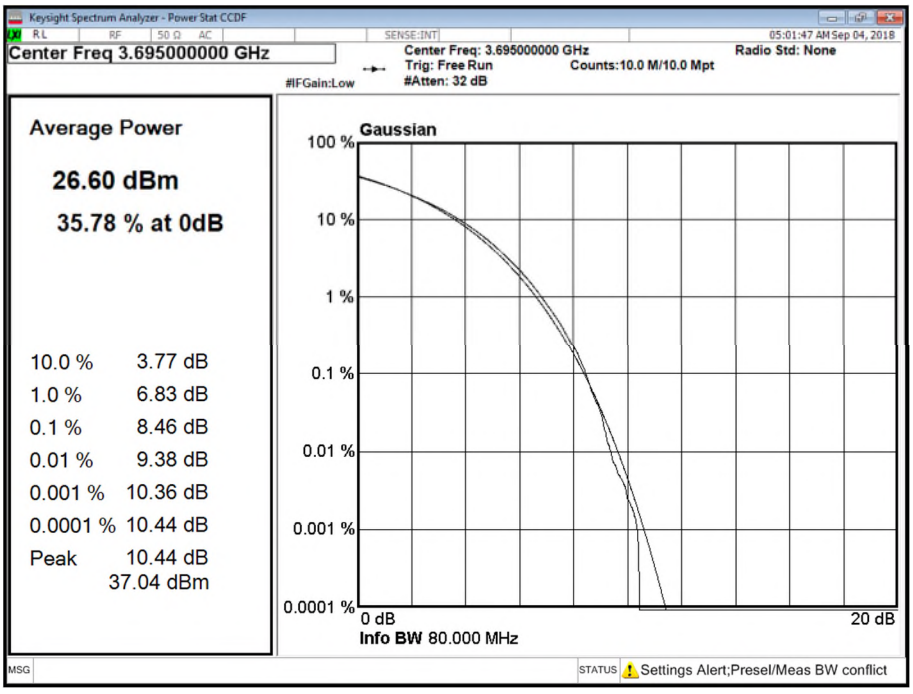
Antenna F - LTE Modulation QPSK - LTE Carrier Bandwidth 20.0 MHz - Channel Position M



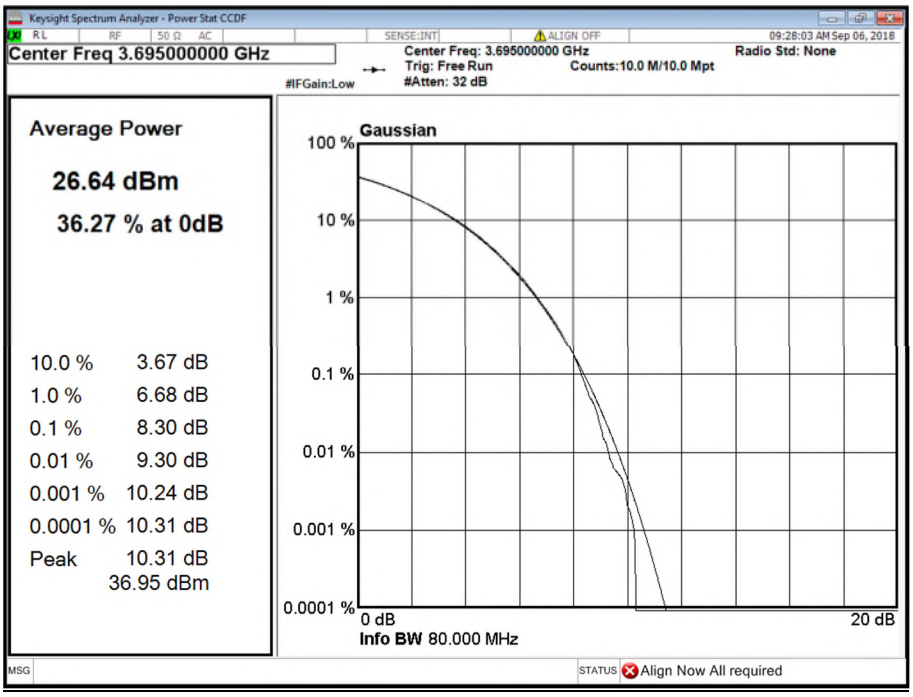
Antenna A - LTE Modulation QPSK - LTE Carrier Bandwidth 10.0 MHz - Channel Position T



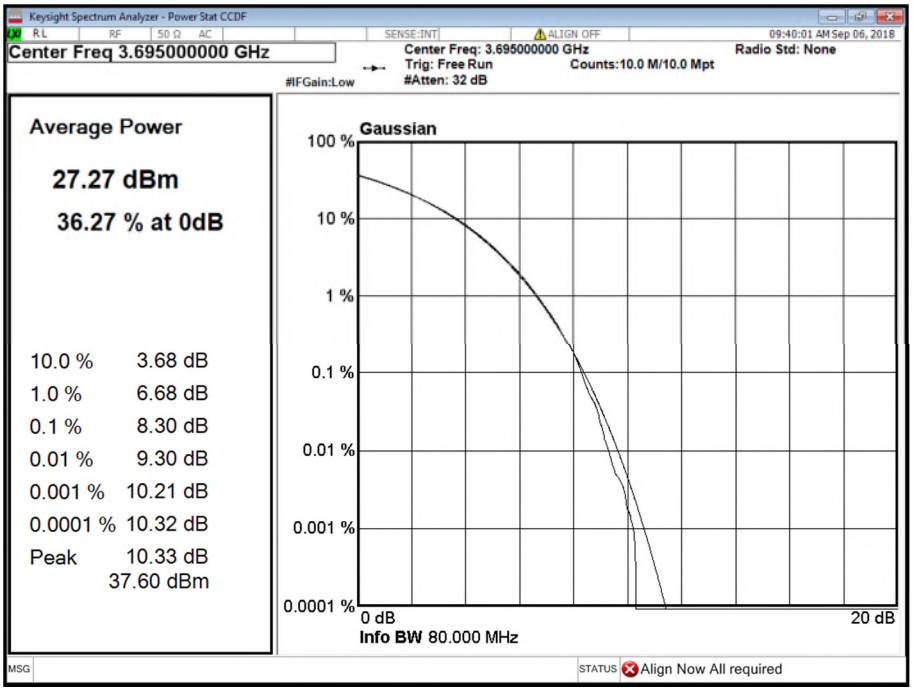
Antenna B - LTE Modulation QPSK - LTE Carrier Bandwidth 10.0 MHz - Channel Position T



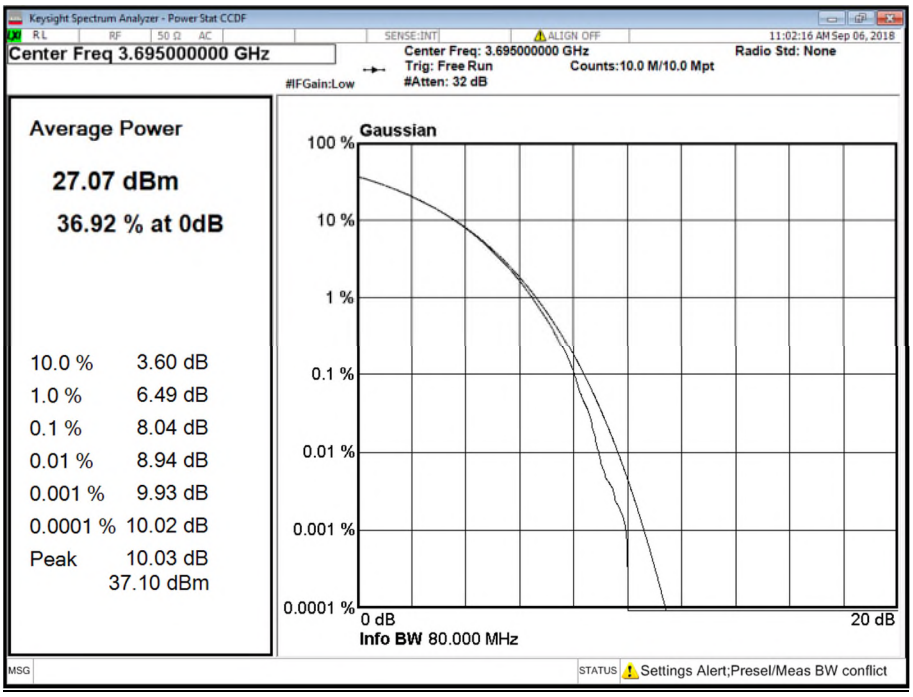
Antenna C - LTE Modulation QPSK - LTE Carrier Bandwidth 10.0 MHz - Channel Position T



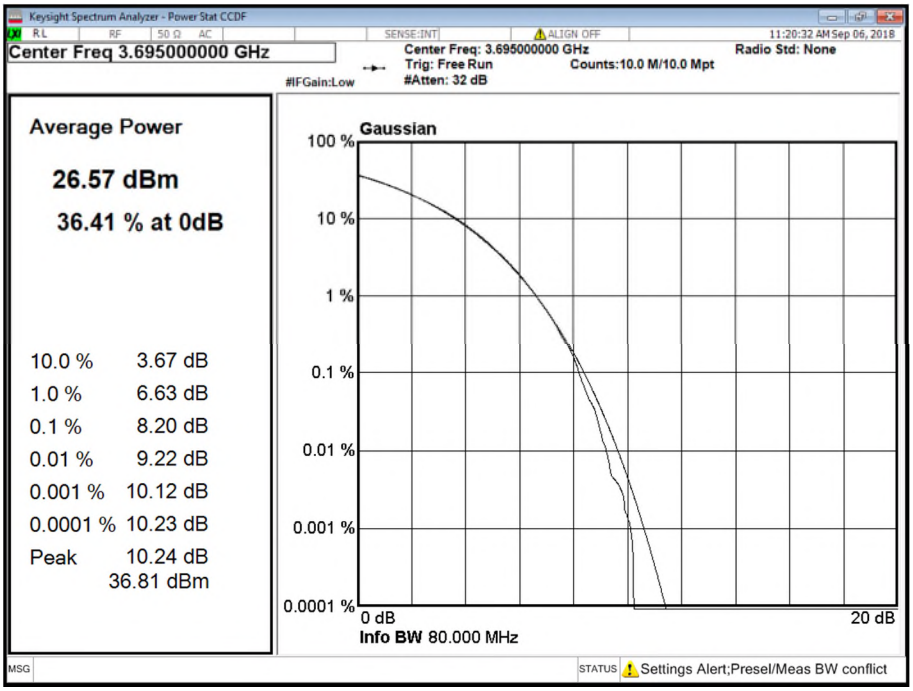
Antenna D - LTE Modulation QPSK - LTE Carrier Bandwidth 10.0 MHz - Channel Position T



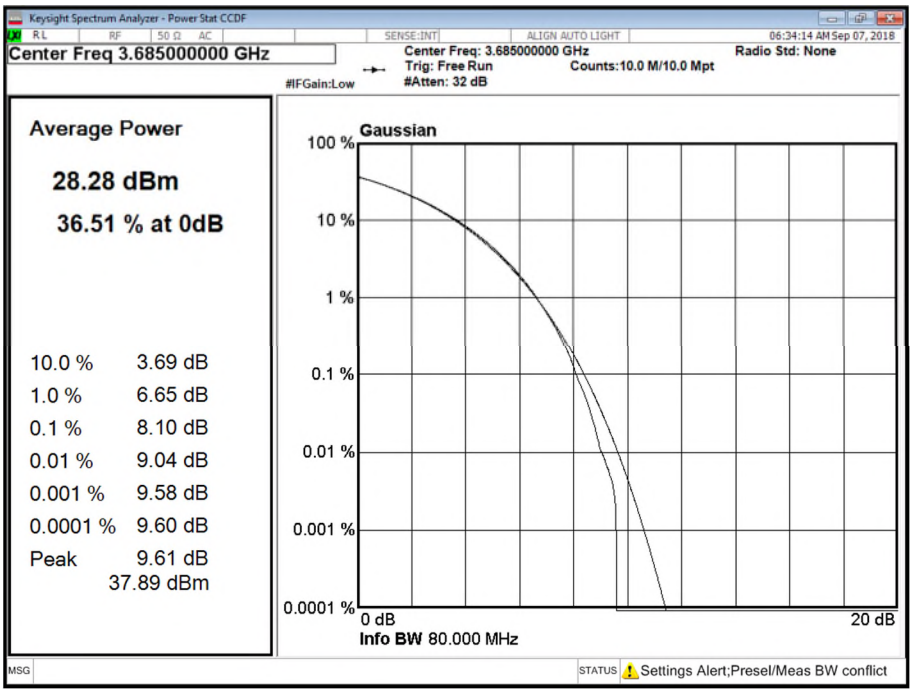
Antenna E - LTE Modulation QPSK - LTE Carrier Bandwidth 10.0 MHz - Channel Position T



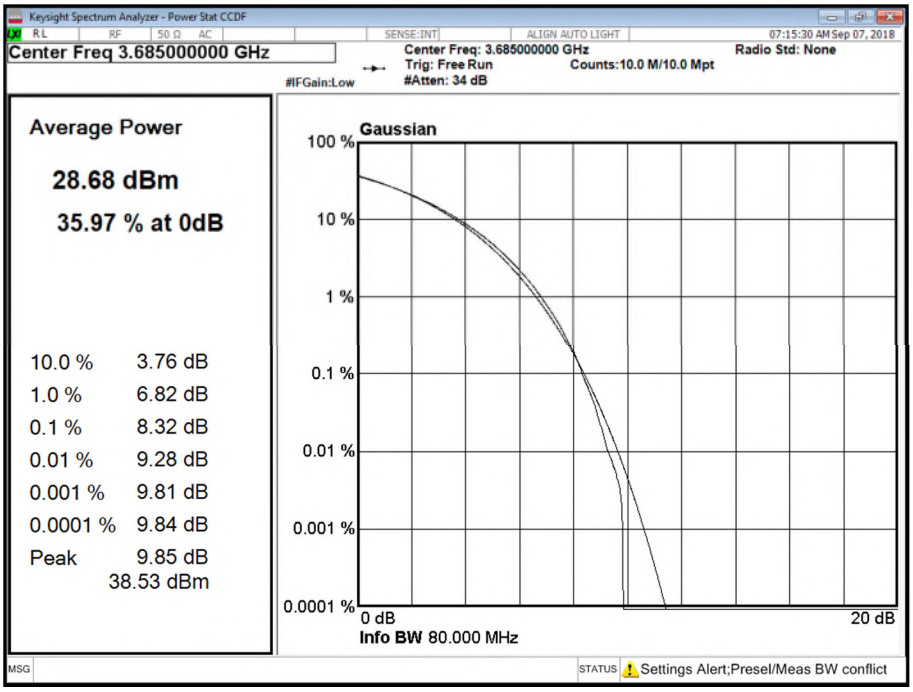
Antenna F - LTE Modulation QPSK - LTE Carrier Bandwidth 10.0 MHz - Channel Position T



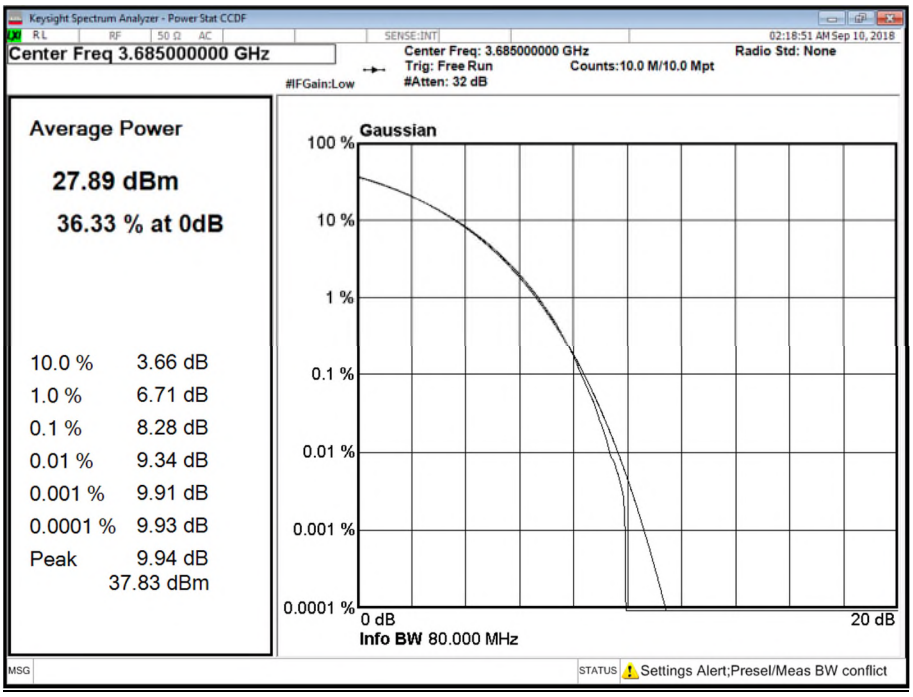
Antenna A - LTE Modulation QPSK - LTE Carrier Bandwidth 20.0 MHz - Channel Position T



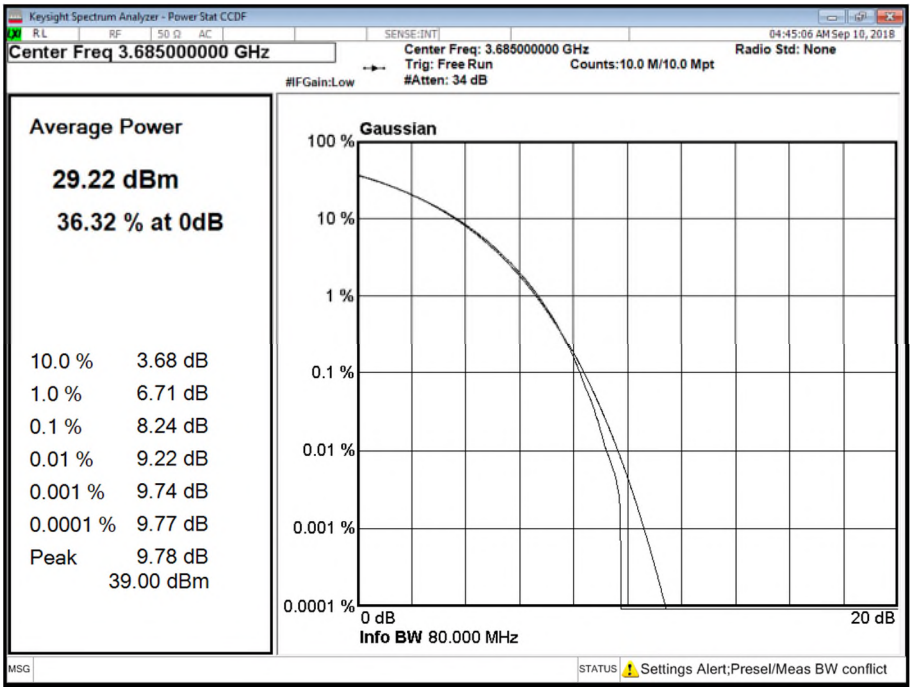
Antenna B - LTE Modulation QPSK - LTE Carrier Bandwidth 20.0 MHz - Channel Position T



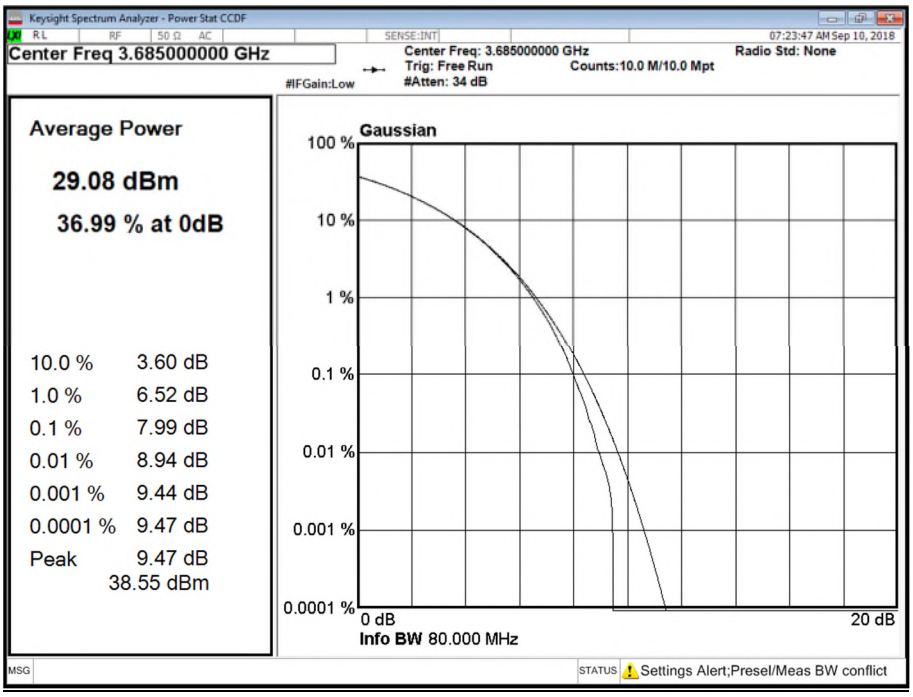
Antenna C - LTE Modulation QPSK - LTE Carrier Bandwidth 20.0 MHz - Channel Position T



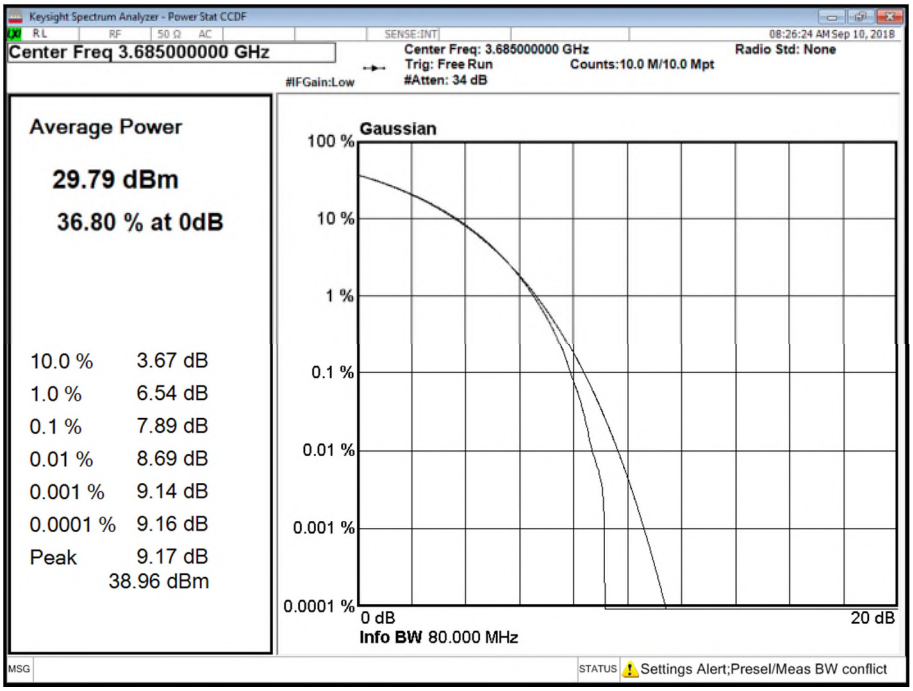
Antenna D - LTE Modulation QPSK - LTE Carrier Bandwidth 20.0 MHz - Channel Position T



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



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



Limit	
Maximum EIRP	Category B CBSD Maximum EIRP: 47 dBm/10 MHz Maximum PSD: 37 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.

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

September 6 to 10, 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

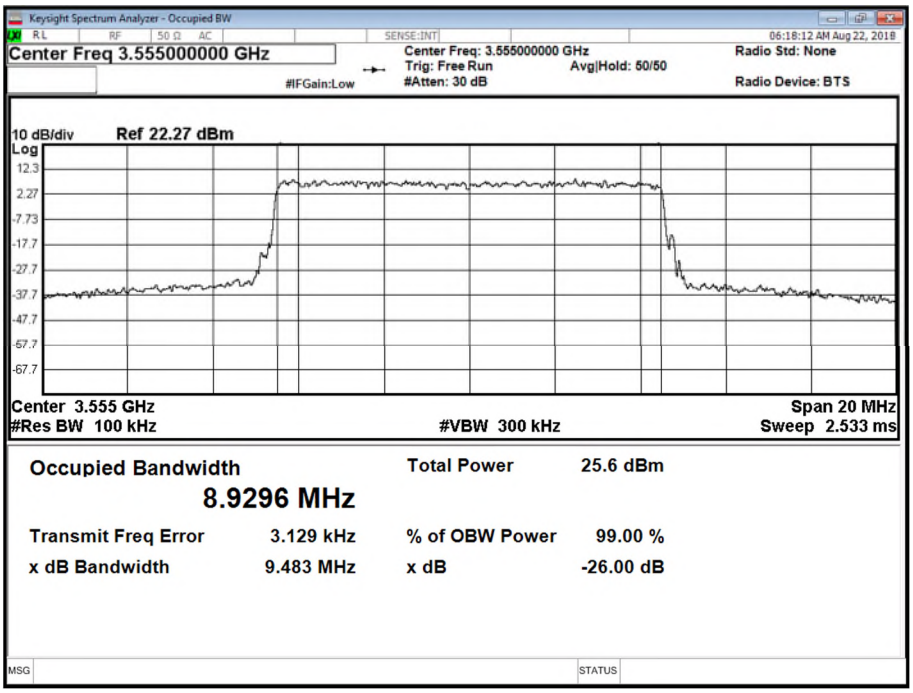
All measurements were made in accordance with FCC KDB 971168 D01.

2.2.6 Test Results

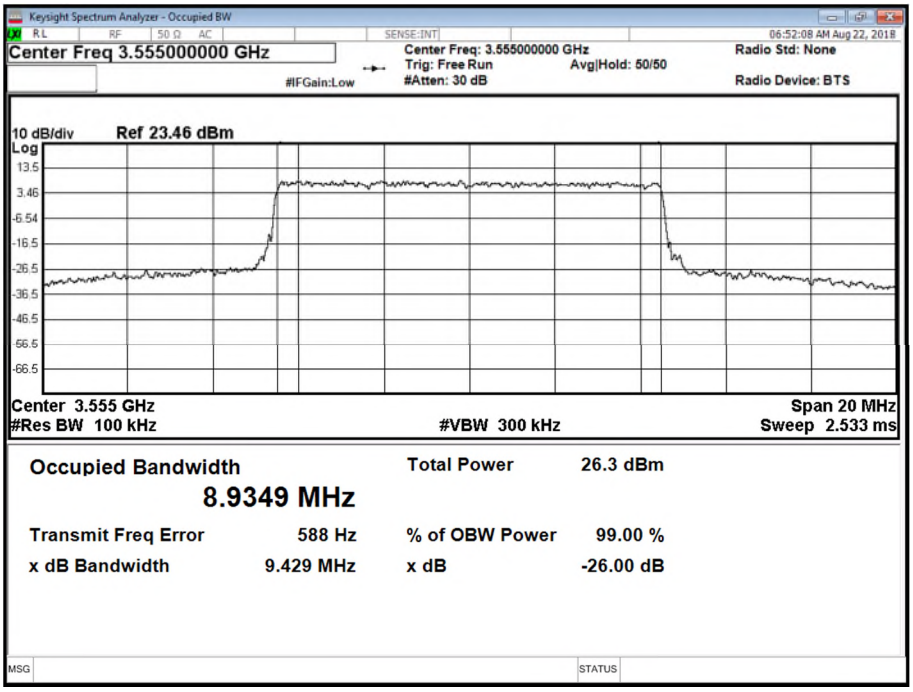
Maximum Output Power 17 dBm

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	10.0 MHz	8929.64	9482.57	8936.83	9359.74	8921.94	9314.00
B	QPSK	10.0 MHz	8934.86	9429.22	8943.06	9292.36	8930.65	9342.26
C	QPSK	10.0 MHz	8930.41	9420.54	8926.26	9360.97	8925.69	9310.00
D	QPSK	10.0 MHz	8932.52	9386.67	8943.15	9353.91	8922.82	9385.26
E	QPSK	10.0 MHz	8940.61	9491.10	8934.84	9356.14	8934.18	9418.61
F	QPSK	10.0 MHz	8941.33	9303.88	8932.78	9412.04	8935.20	9274.65
A	QPSK	20.0 MHz	17875.08	18589.99	17863.96	18669.70	17808.27	18557.34
B	QPSK	20.0 MHz	17863.57	18544.59	17826.05	18684.88	17842.58	18798.26
C	QPSK	20.0 MHz	17873.05	18655.71	17862.17	18531.97	17843.85	18623.72
D	QPSK	20.0 MHz	17859.28	18535.75	17837.24	18795.18	17872.83	18505.75
E	QPSK	20.0 MHz	17846.74	18665.50	17853.08	18721.77	17859.04	18557.09
F	QPSK	20.0 MHz	17848.16	18730.32	17838.73	18508.03	17845.16	18624.15

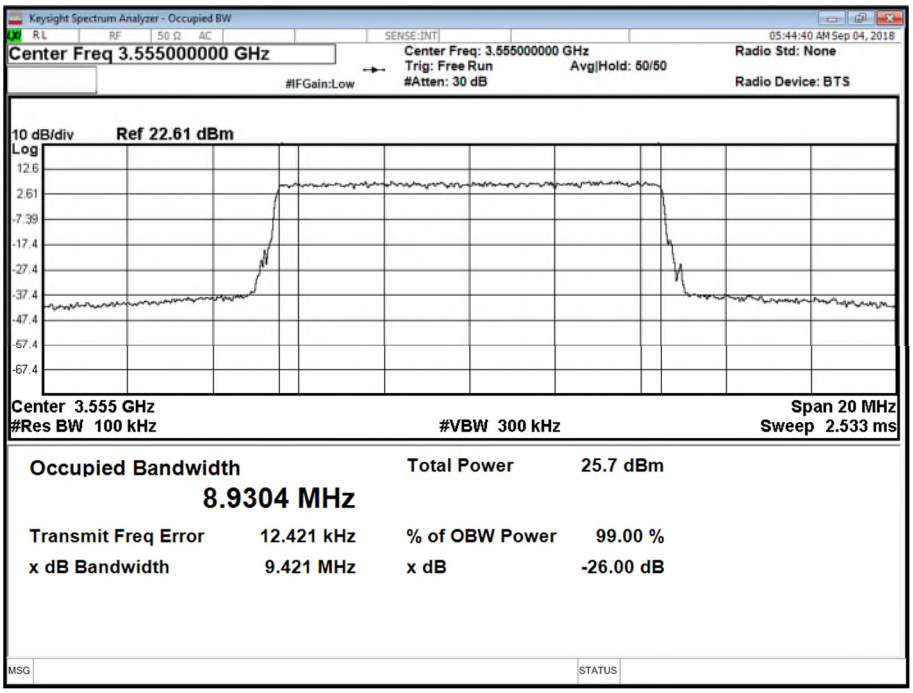
Antenna A - LTE Modulation QPSK - LTE Carrier Bandwidth 10.0 MHz - Channel Position B



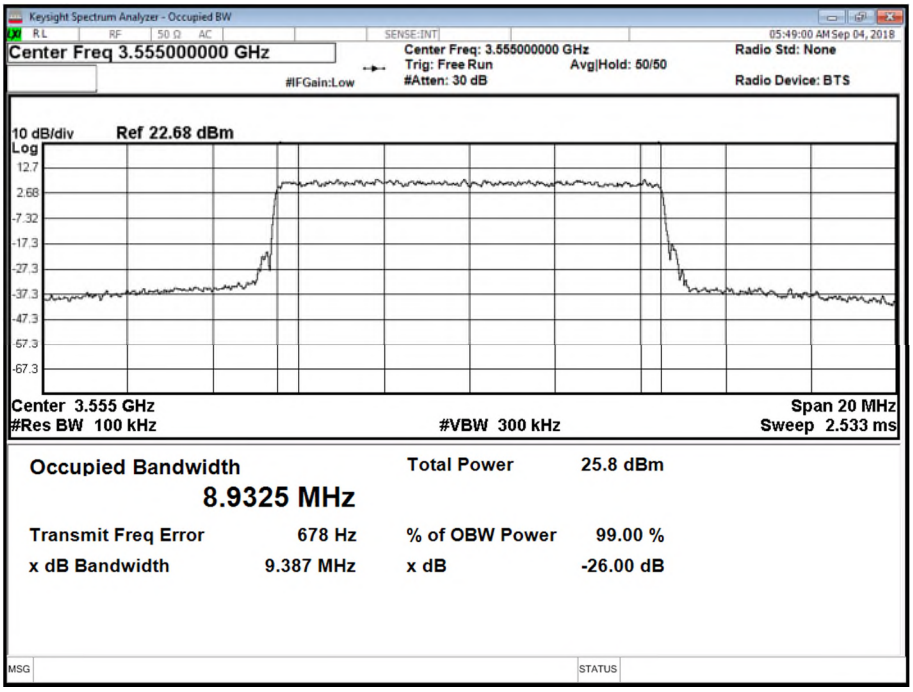
Antenna B - LTE Modulation QPSK - LTE Carrier Bandwidth 10.0 MHz - Channel Position B



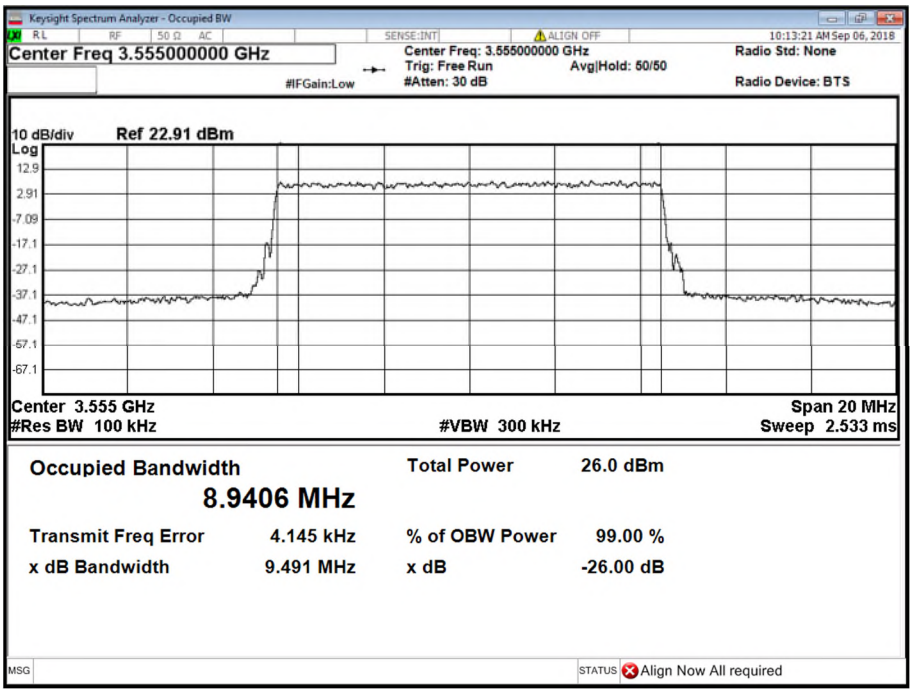
Antenna C - LTE Modulation QPSK - LTE Carrier Bandwidth 10.0 MHz - Channel Position B



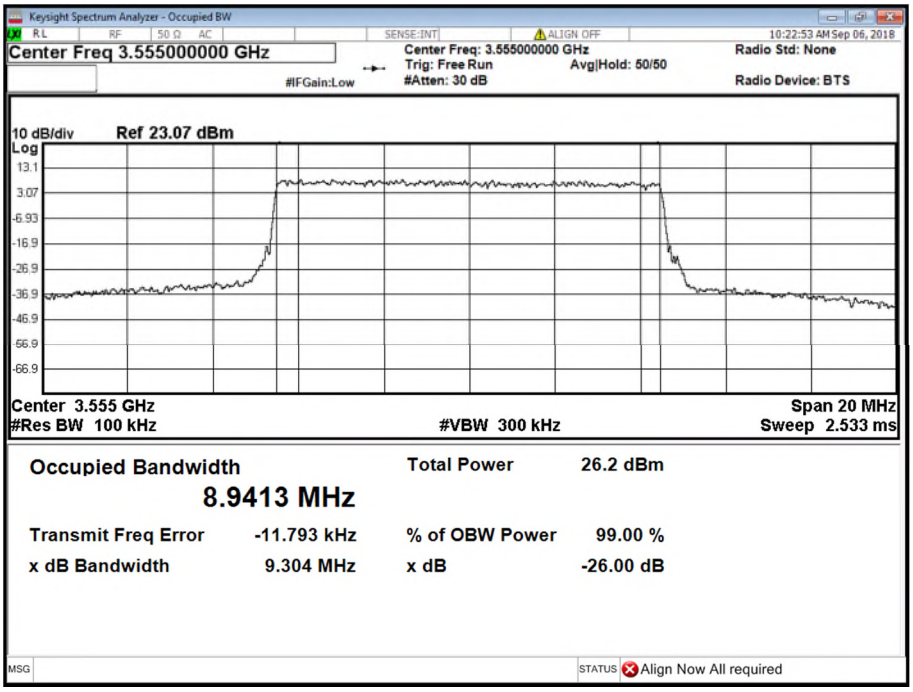
Antenna D - LTE Modulation QPSK - LTE Carrier Bandwidth 10.0 MHz - Channel Position B



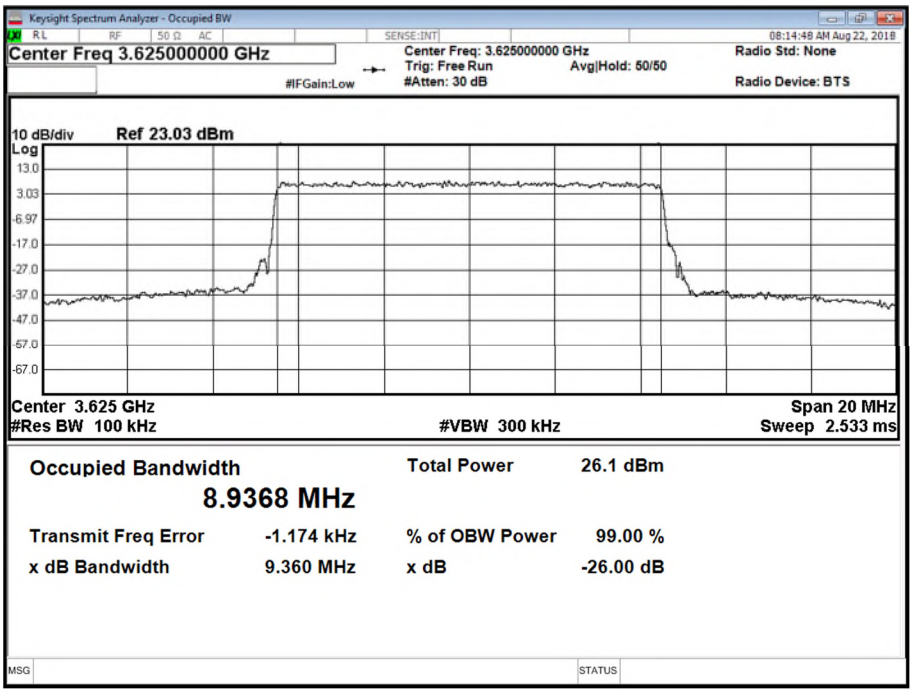
Antenna E - LTE Modulation QPSK - LTE Carrier Bandwidth 10.0 MHz - Channel Position B



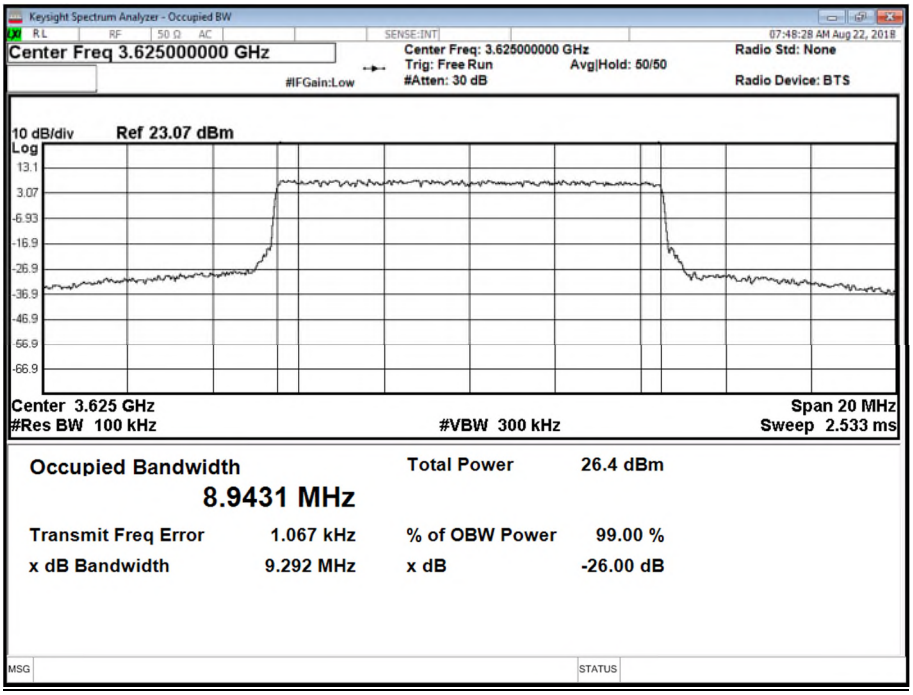
Antenna F - LTE Modulation QPSK - LTE Carrier Bandwidth 10.0 MHz - Channel Position B



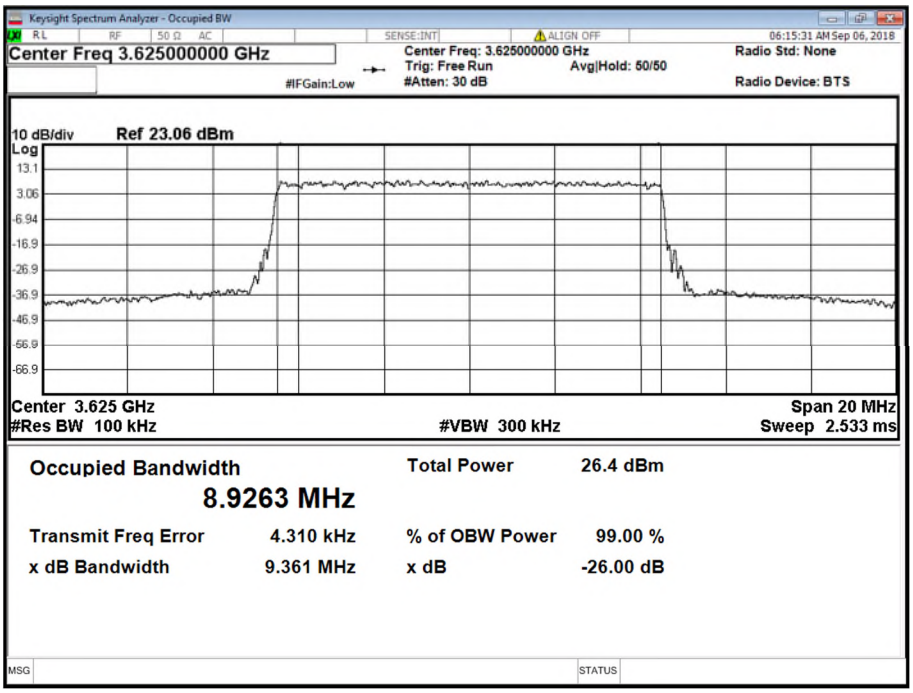
Antenna A - LTE Modulation QPSK - LTE Carrier Bandwidth 10.0 MHz - Channel Position M



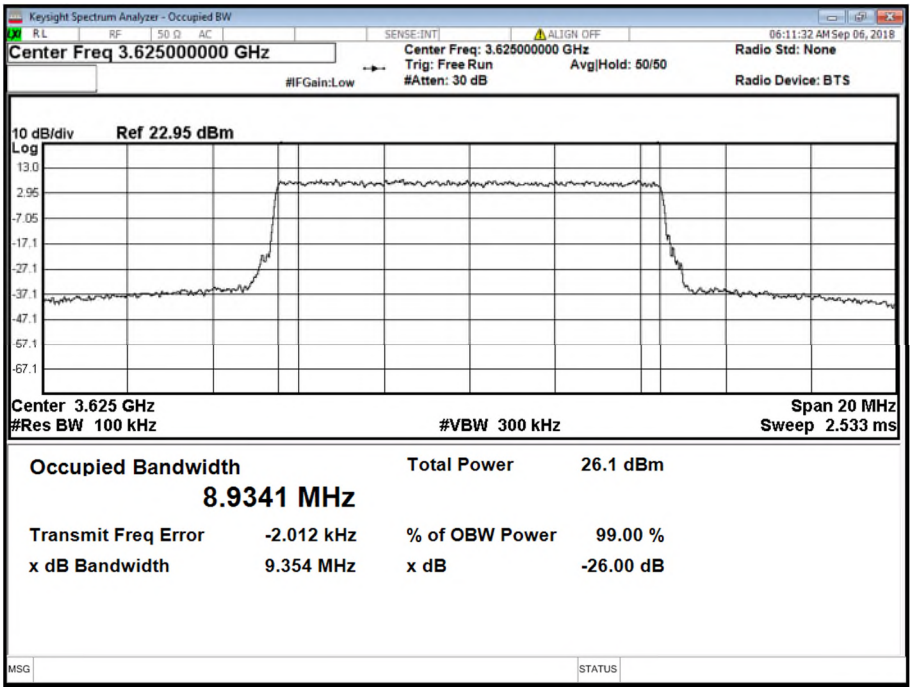
Antenna B - LTE Modulation QPSK - LTE Carrier Bandwidth 10.0 MHz - Channel Position M



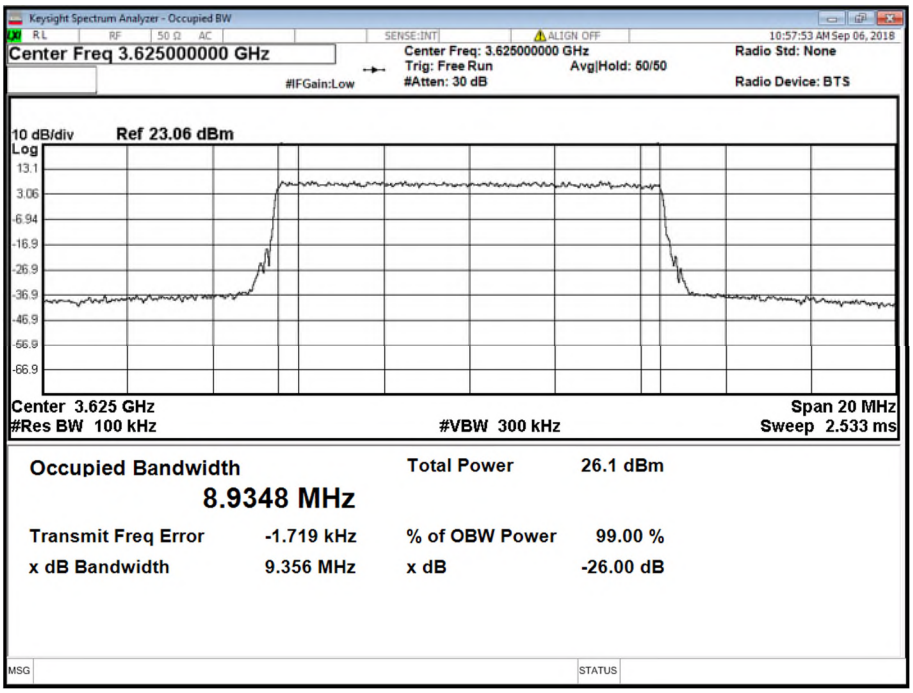
Antenna C - LTE Modulation QPSK - LTE Carrier Bandwidth 10.0 MHz - Channel Position M



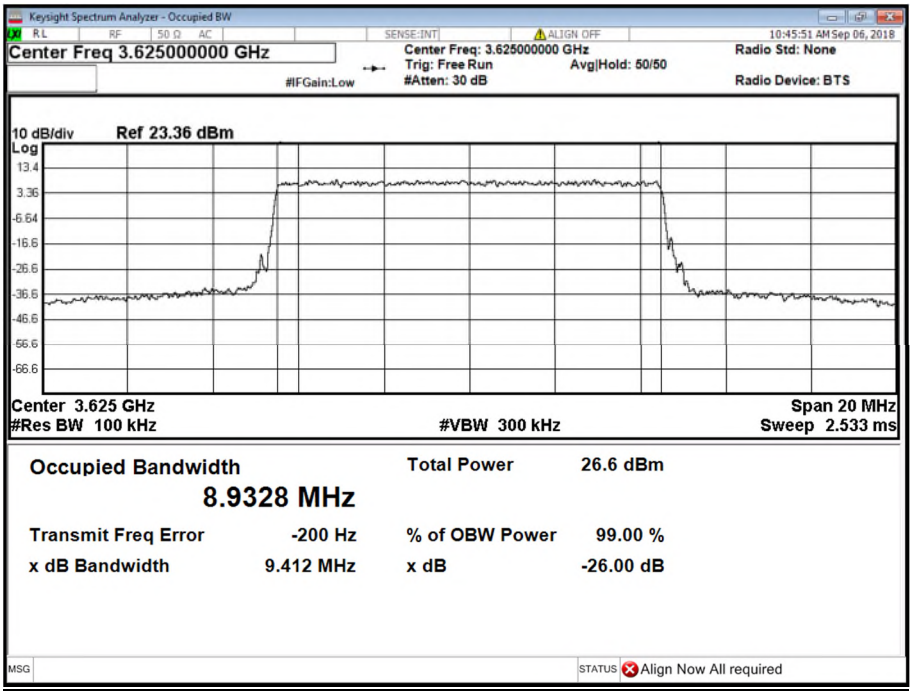
Antenna D - LTE Modulation QPSK - LTE Carrier Bandwidth 10.0 MHz - Channel Position M



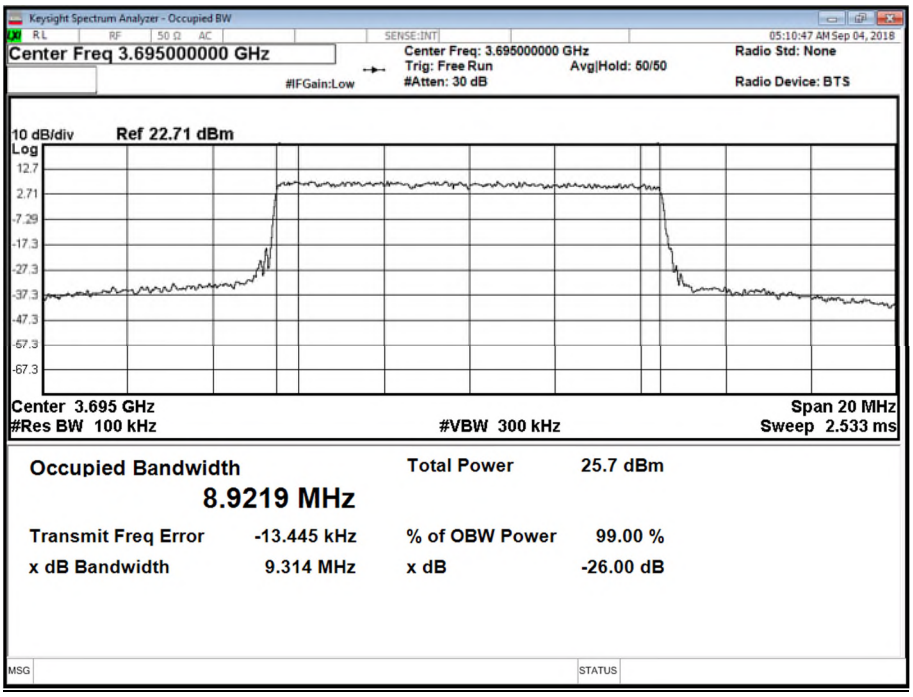
Antenna E - LTE Modulation QPSK - LTE Carrier Bandwidth 10.0 MHz - Channel Position M



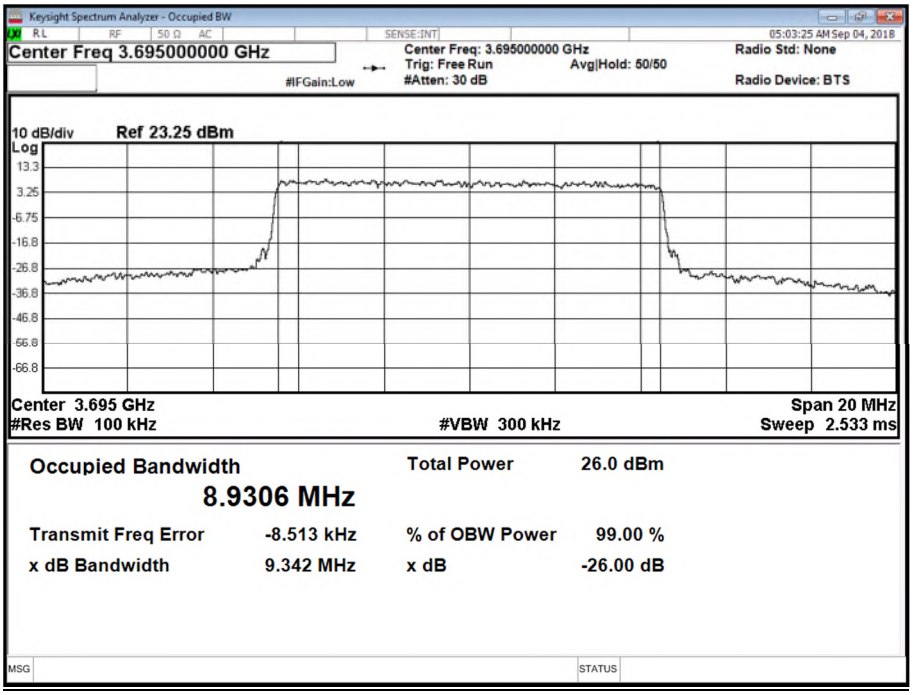
Antenna F - LTE Modulation QPSK - LTE Carrier Bandwidth 10.0 MHz - Channel Position M



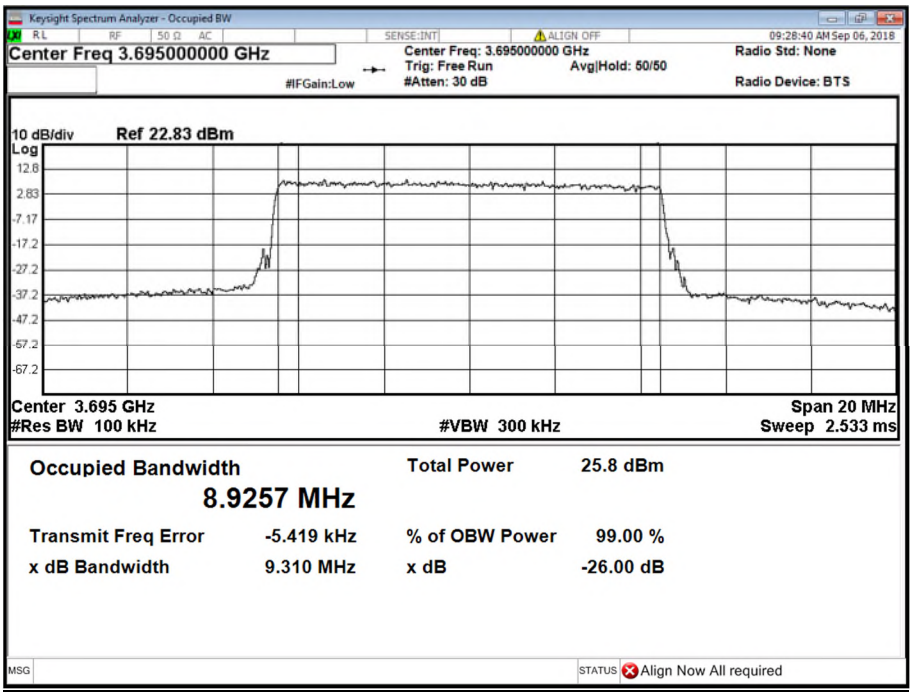
Antenna A - LTE Modulation QPSK - LTE Carrier Bandwidth 10.0 MHz - Channel Position T



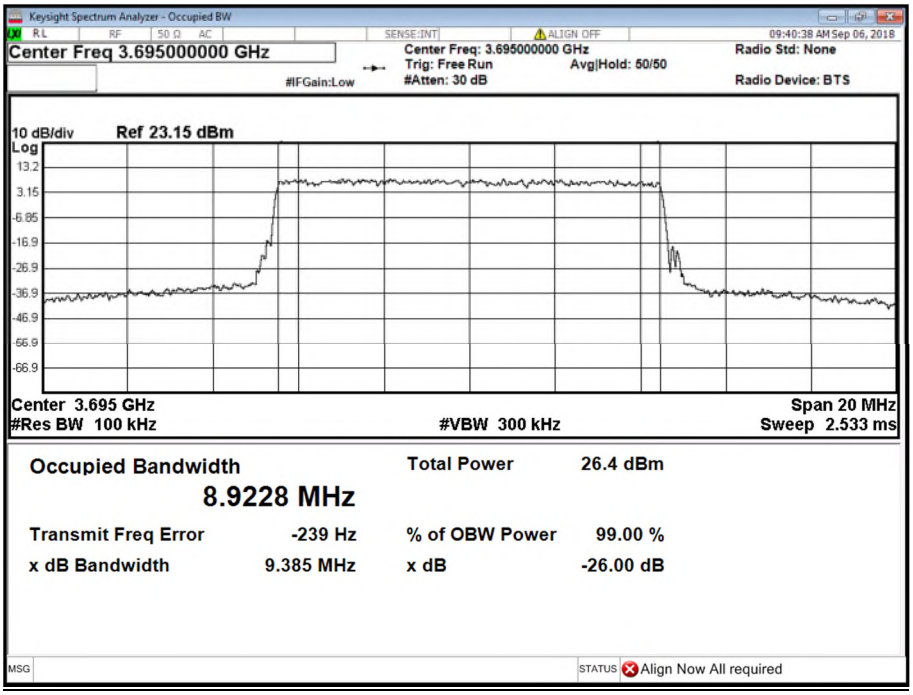
Antenna B - LTE Modulation QPSK - LTE Carrier Bandwidth 10.0 MHz - Channel Position T



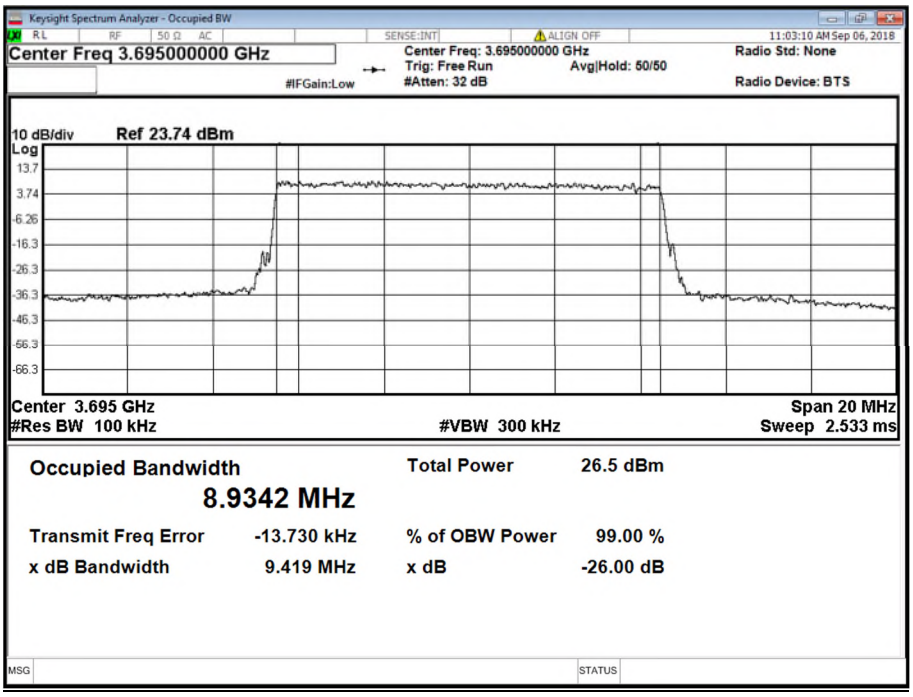
Antenna C - LTE Modulation QPSK - LTE Carrier Bandwidth 10.0 MHz - Channel Position T



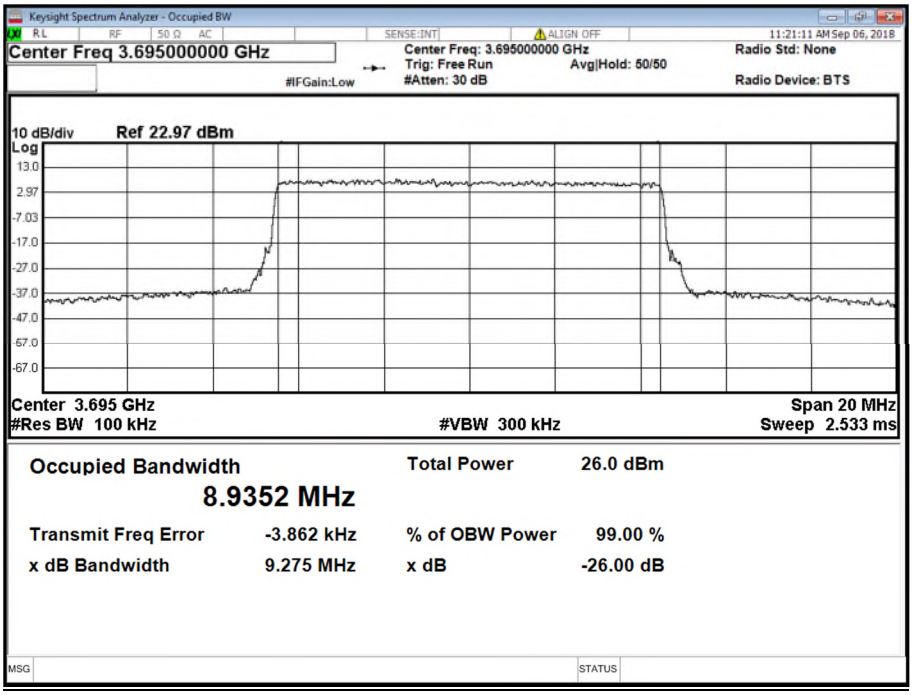
Antenna D - LTE Modulation QPSK - LTE Carrier Bandwidth 10.0 MHz - Channel Position T



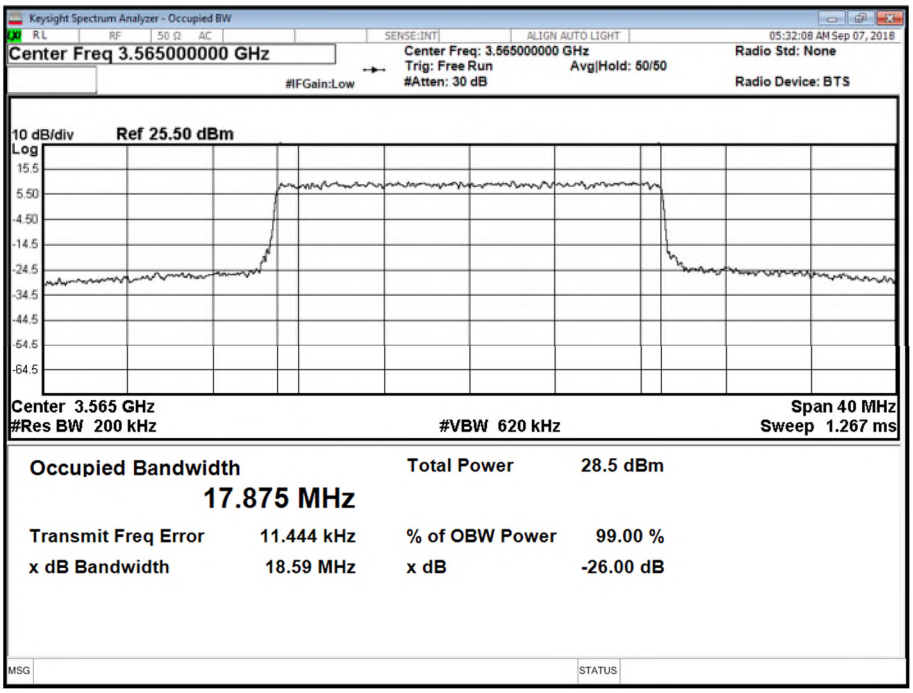
Antenna E - LTE Modulation QPSK - LTE Carrier Bandwidth 10.0 MHz - Channel Position T



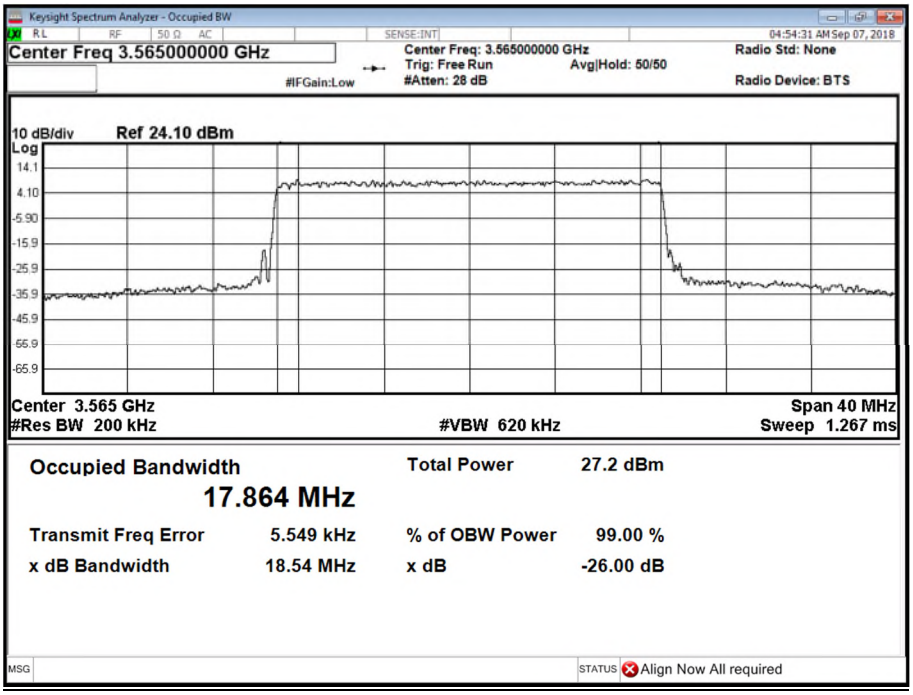
Antenna F - LTE Modulation QPSK - LTE Carrier Bandwidth 10.0 MHz - Channel Position T



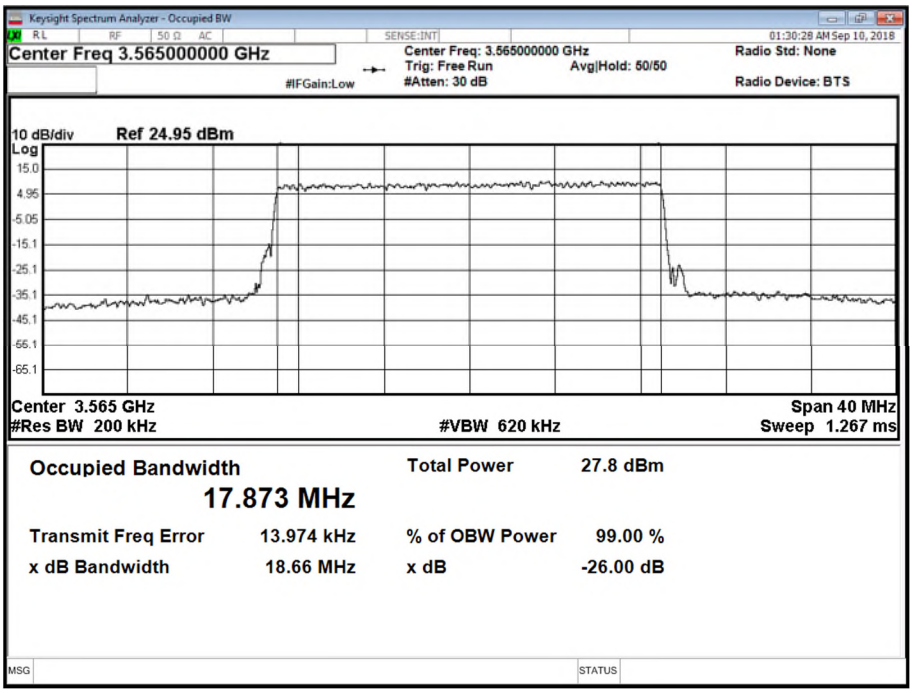
Antenna A - LTE Modulation QPSK - LTE Carrier Bandwidth 20.0 MHz - Channel Position B



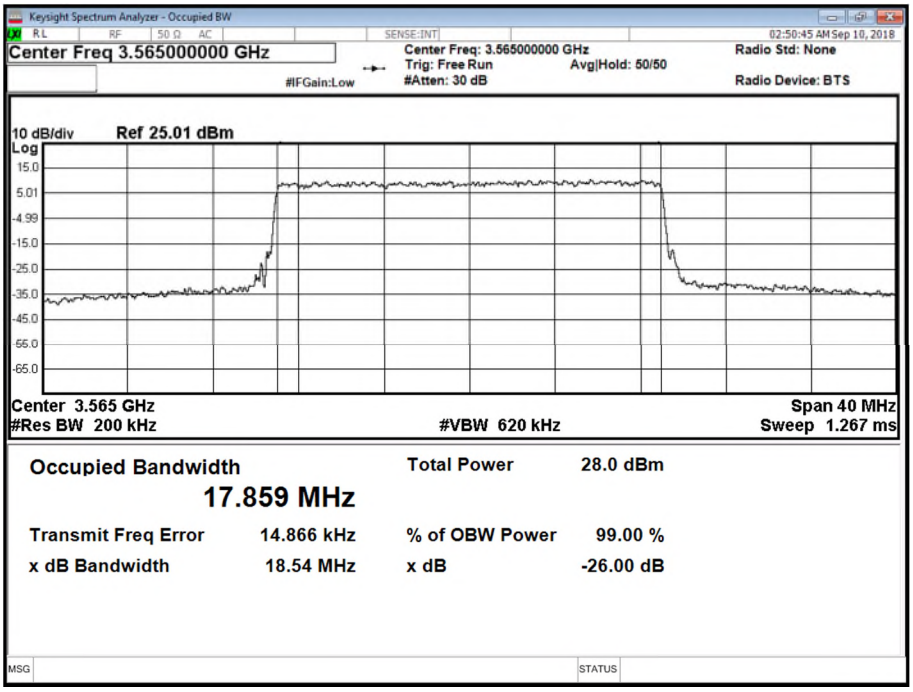
Antenna B - LTE Modulation QPSK - LTE Carrier Bandwidth 20.0 MHz - Channel Position B



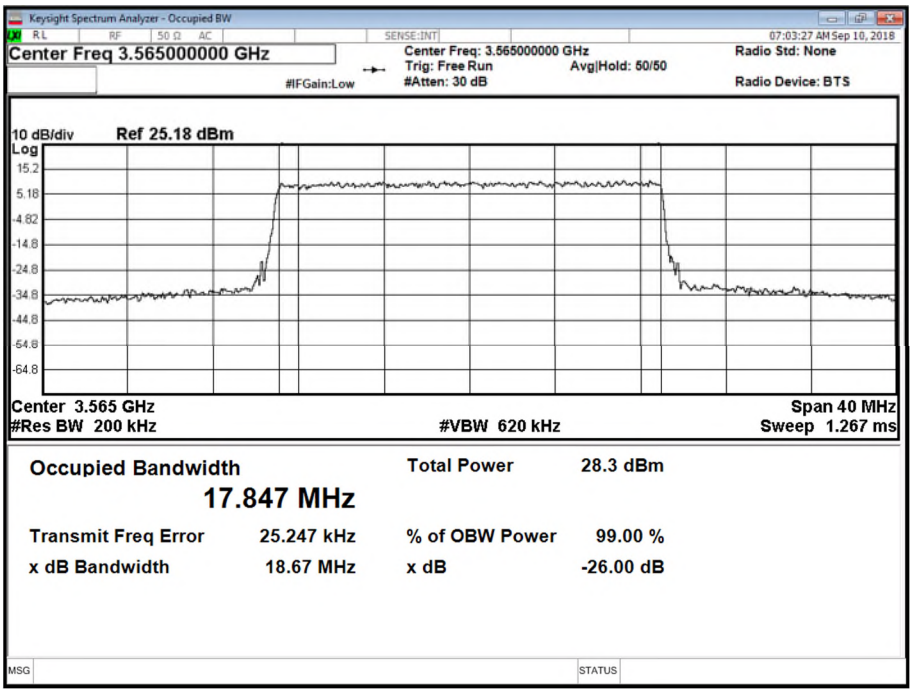
Antenna C - LTE Modulation QPSK - LTE Carrier Bandwidth 20.0 MHz - Channel Position B



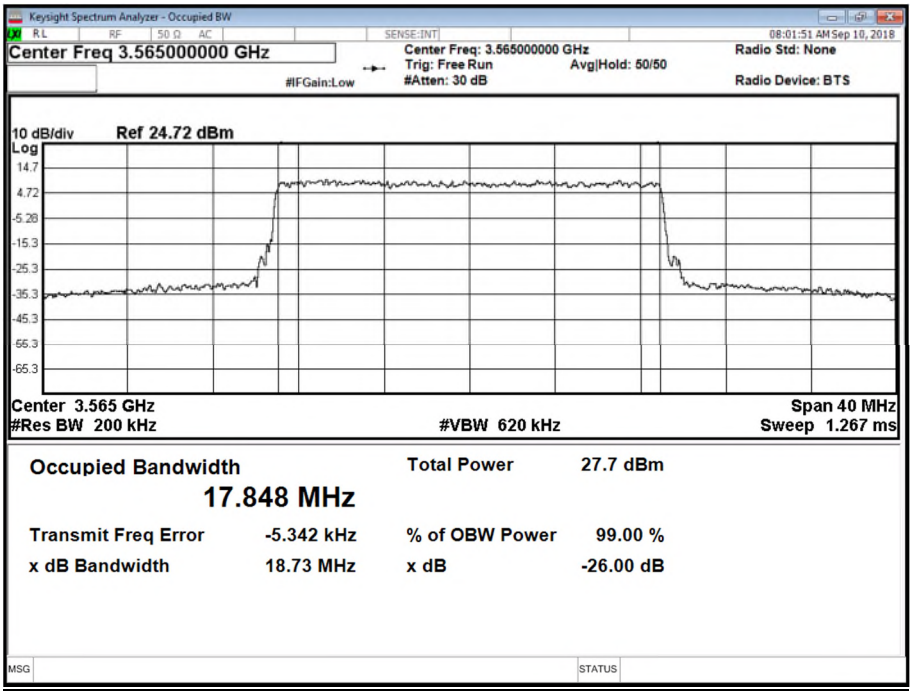
Antenna D - LTE Modulation QPSK - LTE Carrier Bandwidth 20.0 MHz - Channel Position B



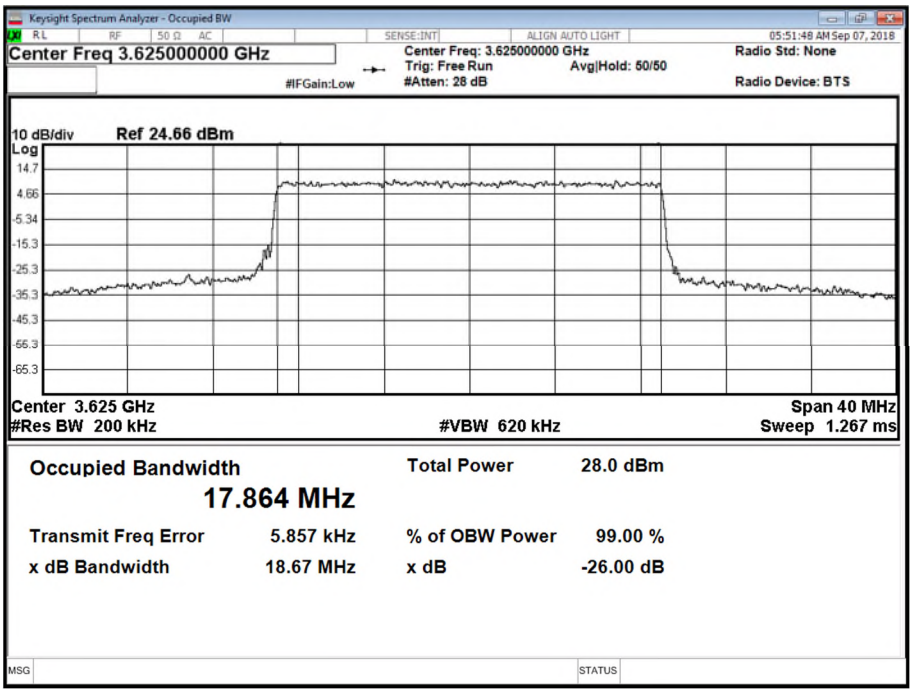
Antenna E - LTE Modulation QPSK - LTE Carrier Bandwidth 20.0 MHz - Channel Position B



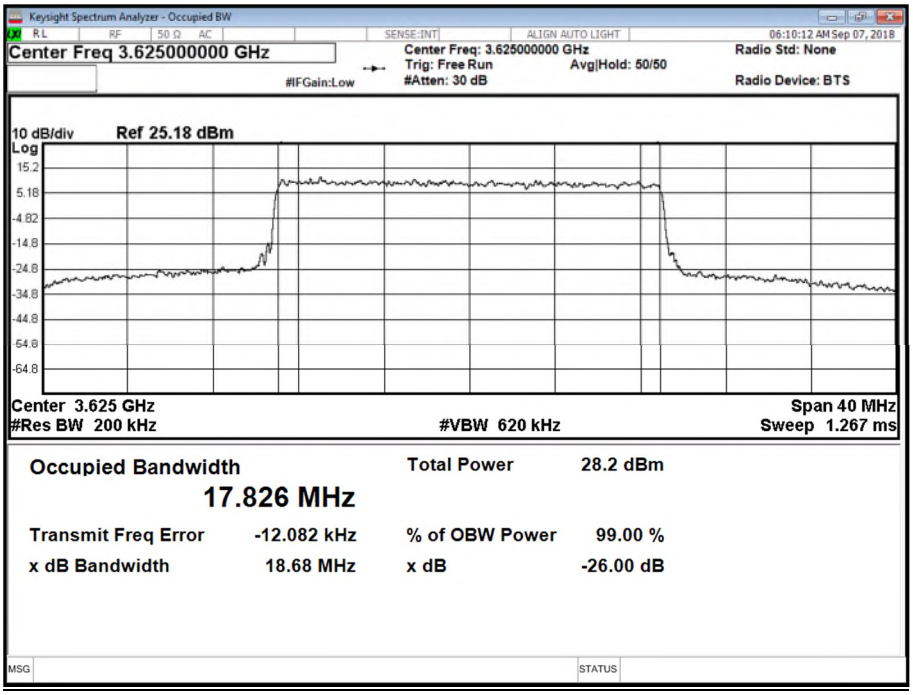
Antenna F - LTE Modulation QPSK - LTE Carrier Bandwidth 20.0 MHz - Channel Position B



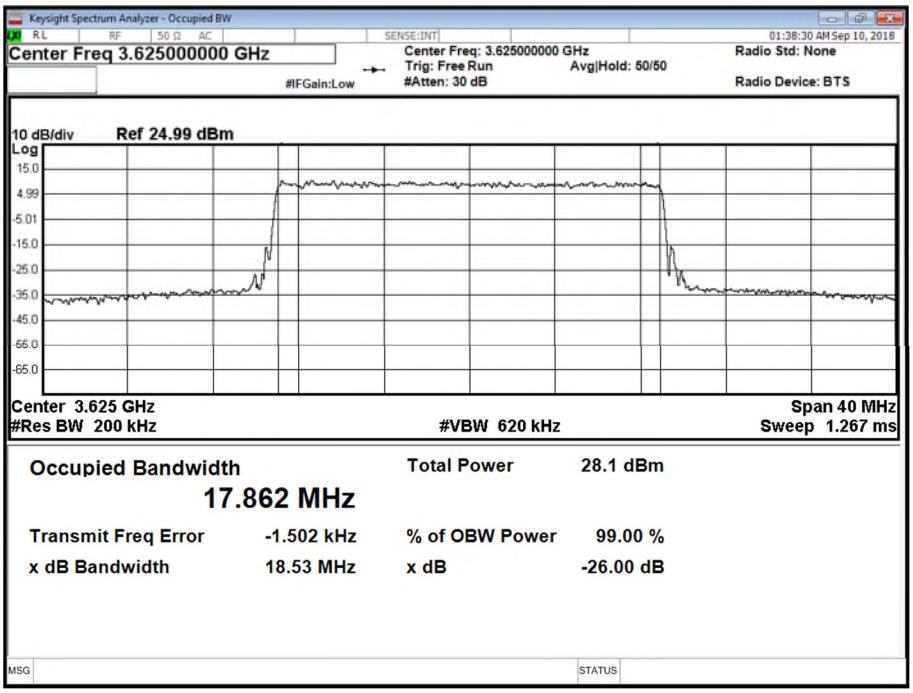
Antenna A - LTE Modulation QPSK - LTE Carrier Bandwidth 20.0 MHz - Channel Position M



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