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Report On

FCC and IC Testing of the
Ericsson WCDMA and LTE RRUS 32A B66A (2100 MHz) Base Station
In accordance with FCC CFR 47 Part 2, FCC CFR 47 Part 27, Industry
Canada RSS-GEN and Industry Canada RSS-139

COMMERCIAL-IN-CONFIDENCE

FCC ID: TA8AKRC161601-1
IC: 287AB-AS1616011

PREPARED BY

Neil Rousell
Senior Engineer (RF)

APPROVED BY

Nic Forsyth
Authorised Signatory

DATED

23 March 2016

Document 75933223 Report 01 Issue 1

March 2016

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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	RRUS 32A B66A
Product Number	KRC 161 601/1
IC Model Name	AS1616011
Serial Number(s)	D16R596241
Software Version	CXP9017316/5_R62DE
Hardware Version	R1A
Test Specification/Issue/Date	FCC CFR 47 Part 2: 2015 FCC CFR 47 Part 27: 2015 Industry Canada RSS-GEN: Issue 4: 2014 Industry Canada RSS-139: Issue 3: 2015
Start of Test	11 February 2016
Finish of Test	18 February 2016
Name of Engineer(s)	Neil Rousell
Related Document(s)	KDB 971168 D01

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 27, Industry Canada RSS-GEN and Industry Canada RSS-139 is shown below.

Section	Specification Clause				Test Description	Result
	FCC CFR 47 Part 2	FCC CFR 47 Part 27	RSS-GEN	RSS-139		
2.1	2.1046	27.50 (d)	-	6.5	Output Power and Peak to Average Ratio - Conducted	Pass
2.2	2.1049	27.53	6.6	-	Occupied Bandwidth	Pass
2.3	2.1051	27.53 (h)	-	6.6	Band Edge	Pass
2.4	2.1051	27.53 (h)	-	6.6	Transmitter Spurious Emissions	Pass
2.5	2.1055	27.54	-	6.4	Frequency Stability	Pass
-	2.1051	27.53 (h)	-	6.6	Transmitter Radiated Emissions	Pass*
-	-	-	7.1	-	Receiver Spurious Emissions	Pass*

*- Reference Nemko Canada Inc. EMC Test Report: Reference Number 305067-1TRFWL-R1

Nemko Canada Inc.
303 River Road
Ottawa, Ontario, K1V 1H2
Canada

Accreditations

Nemko Canada Inc., a testing laboratory, is accredited by the Standards Council of Canada. The tests included in this report are within the scope of this accreditation .

1.3 CONFIGURATION DESCRIPTION

The RRUS 32A B66A / KRC 161 601/1 supports single, dual, three and four carrier operation from either a single, dual or four port configuration. Pre-test results were used to establish the worst case configuration of the EUT in the above mentioned operating modes. The reported results represent testing in the worst case modes of operation. Testing was also carried out on all antenna ports to confirm that each output was electrically identical. Results of these tests are available on request.

The RRUS 32A B66A / KRC 161 601/1 supports WCDMA carriers in the 2110 to 2155 MHz frequency band and LTE carriers in the 2110 to 2180 MHz frequency band. Test Models as defined in 3GPP TS 25.141 and TS 36.141 were used to represent the required modulation for test.

TX test cases: Conducted Output Power, Spurious Emissions at Antenna Terminals (± 1 MHz) and Conducted Spurious Emissions measurements were performed on all RF Ports 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 output power unless otherwise stated.

The EUT was powered by a -48V DC Power supply.

Channel Configurations

WCDMA B4 or WCDMA (2110 MHz – 2155 MHz)

Configuration	RAT	No. of Carriers	Carrier Bandwidth (MHz)	Carrier Frequency Configuration (MHz)		
				Bottom (BRFBW)	Middle (MRFBW)	Top (TRFBW)
1	W	1	5 / 4.2	2112.4	2132.6	2152.6
2	W	2	5	-	2112.4 + 2152.6	-

LTE B66A (2110 MHz – 2180 MHz)

Configuration	RAT	No. of Carriers	Carrier Bandwidth (MHz)	Carrier Frequency Configuration (MHz)		
				Bottom (BRFBW)	Middle (MRFBW)	Top (TRFBW)
3	L	1	5	2112.5	2145	2177.5
3	L	1	10	2115	2145	2175
3	L	1	15	2117.5	2145	2172.5
3	L	1	20	2120	2145	2170
4	L	2	5	-	2112.5 + 2177.5	-
4	L	2	10	-	2115 + 2175	-
4	L	2	15	-	2117.5 + 2172.5	-
4	L	2	20	-	2120 + 2170	-
5	L	3	20	-	2120 + 2140 + 2170	-
5	L	4	5	-	2112.5 + 2117.5 + 2172.5 + 2177.5	-
5	L	4	10	-	2115 + 2125 + 2165 + 2175	-
5	L	4	15	-	2117.5 + 2132.5 + 2157.5 + 2172.5	-

WCDMA/LTE (MM) B66A (2110 MHz – 2180 MHz)

Configuration	RAT	No. of Carriers	Carrier Bandwidth (MHz)	Carrier Frequency Configuration (MHz)		
				BRFBW	MRFBW	TRFBW
6	W + L	2	5 + 20	-	2112.4 + 2170	-
7	W + W + L	3	5 + 5 + 20	-	2112.4 + 2117.4 + 2170	-
7	W + W + L + L	4	5 + 5 + 20 + 20	-	2112.4 + 2117.4 + 2150 + 2170	-

1.4 DECLARATION OF BUILD STATUS

MAIN EUT	
MANUFACTURING DESCRIPTION	Antenna Radio Unit (Multi-standard)
MANUFACTURER	Ericsson
TYPE	Remote Radio Base Station
PART NUMBER	KRC 161 601/1
SERIAL NUMBER	D16R596241
HARDWARE VERSION	R1A
SOFTWARE VERSION	CXP9017316/5 R62DE
TRANSMITTER OPERATING RANGE	LTE: 2110MHz – 2180MHz WCDMA: 2110MHz – 2155MHz
RECEIVER OPERATING RANGE	LTE: 1710MHz – 1780MHz WCDMA: 1710MHz – 1755MHz
COUNTRY OF ORIGIN	Sweden
INTERMEDIATE FREQUENCIES	Tx: Direct Conversion, Rx: IF1=358.4MHz, IF2=80.64MHz
EMISSION DESIGNATOR(S): (i.e. G1D, GXW)	LTE 5M00 W7D 10M0 W7D 15M0 W7D 20M0 W7D WCDMA 5M00 F9W
MODULATION TYPES: (i.e. GMSK, QPSK)	LTE: QPSK, 16QAM, 64QAM WCDMA: QPSK, 16QAM, 64QAM
HIGHEST INTERNALLY GENERATED FREQUENCY	2180MHz
OUTPUT POWER (W or dBm)	4 x 30W (44.77dBm)
FCC ID	TA8AKRC161601-1
INDUSTRY CANADA ID	287AB-AS1616011
TECHNICAL DESCRIPTION (a brief description of the intended use and operation)	The RRUS 32AB66A (KRC 161 601/1) is a multi-standard Antenna Radio Unit forming part of the Ericsson Radio Base Station (RBS) equipment. The RRUS provides radio access for mobile and fixed devices and is intended for the outdoor environment, designed to be co-located and directly mated with a compatible antenna. The radio operates over 4 Transmit ports in Single, Multi-Carrier, Mixed Mode and MIMO transmission with a maximum rated RF Output of 30W per port over an operational temperature of -40°C to +55°C. The unit is designed to be mast, pole or building mounted. Altitude during operation: Below 3000.

Signature:



.....
Denis Lalonde

Date: 14 March 2016

Declaration of Build Status Serial Number: D16R596241

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

1.5 PRODUCT INFORMATION

1.5.1 Technical Description

The RRUS 32A B66A (KRC 161 601/1) is a multi-standard radio forming part of Ericsson's RBS 6000 series Radio Base Station (RBS) equipment. The Antenna Radio Unit product provides radio access for mobile and fixed devices and is intended for the outdoor environment. Classed under ITE (Information Technology Equipment), the RRUS is designed to be co-located and directly mated with a compatible antenna, specified for path loss optimization. A fibre optic interface provides the ARUS RRUS / RBS control and digital communications between the Radio and RBS. The location of the RRUS with respect to the RBS is limited to a distance dictated by the limitations of the fibre link.

The RRUS 32A B66A supports four (4) Transmit / Receive ports operating in the LTE Band 66A at a Downlink (transmit) frequency from 2110 MHz to 2180 MHz and an Uplink (receive) frequency from 1710 MHz to 1780 MHz (WCDMA operation is restricted to Downlink (transmit) frequency from 2110 MHz to 2155 MHz and an Uplink (receive) frequency from 1710 MHz to 1755 MHz). The radio operates in FDD (Frequency Division Duplex) with a duplex spacing of 400 MHz and supports operation on multi Radio Access Transmission Standards (RATS) at transmit bandwidths up to 20 MHz.

The radio operates over 4 transmit ports in Single, Multi-Carrier, Mixed Mode, and MIMO transmission with a maximum rated RF output power of 30W per port over an operational temperature of -40° C to +55° C.

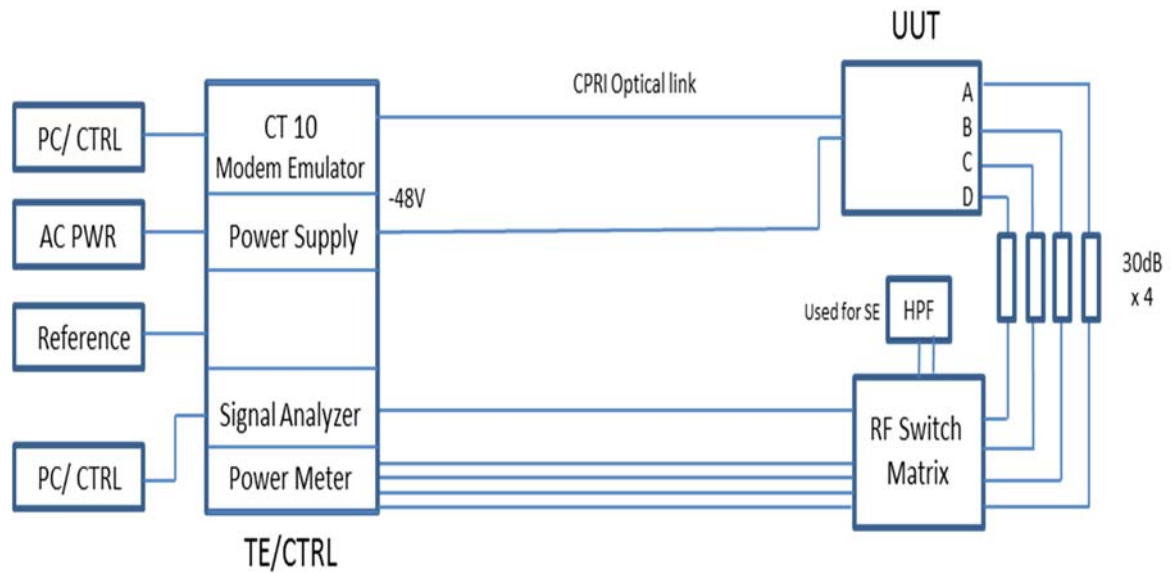
The RRUS is mounted directly behind a specified antenna along with a Fan Tray, which provides Forced Air Cooling for radio operation. The Fan Tray is powered and controlled from the RRUS via closed loop telemetry to maintain thermals through redundant variable speed fans to optimize air flow.

For directional optimization, the ARUS product has an active RET (Remote Electronic Tilt) function. Power for this option is provided via the RRUS RET interface (30V @ < 2A).

A full technical description can be found in the Manufacturer's documentation.

1.6 TEST SETUP

Test Setup, Conducted Measurement:



See Section 3 for a list of the test equipment used in the test.

Test Setup, Radiated Measurement:

*- Reference Nemko Canada Inc. EMC Test Report: Reference Number 305067-1TRFWL-R1

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.

1.8 DEVIATION FROM THE STANDARD

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

1.9 MODIFICATION RECORD

No modifications were made to the EUT during testing.

1.10 ALTERNATIVE TEST SITE

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

1.11 ADDITIONAL INFORMATION

Testing performed in the presence of Mr Denis Lalonde and Mr Mark McMullin.

Prior to commencement of the test, measurements were made in different carrier configurations to determine the worst case operating mode. The results reported indicate the identified worst case operating modes of the BTS. In addition, tests were performed on all ports to confirm that each radio was electrically identical.



Product Service

SECTION 2

TEST DETAILS

2.1 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 27, Clause 27.50 (d)
Industry Canada RSS-139, Clause 6.5

2.1.2 Date of Test and Modification State

02 and 16 February 2016 - 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	25.1 - 25.9°C
Relative Humidity	20.4 - 21.8%

2.1.5 Test Method

The EUT was connected to a Signal Analyser via attenuators and an RF switch. The path loss between the EUT and the Analyser was measured using a Network Analyser and entered as a Reference Level Offset.

The EUT was set to transmit at its maximum rated output power in the configurations described below.

Measurements were performed with the Analyser Band Power measurement function in accordance with FCC KDB 971168 D01 v02r02. The detector was set to RMS with a RBW of at least 1% of the theoretical signal bandwidth and a VBW of 3 times the RBW. The detection bandwidth was configured to be wider than the total bandwidth of the carrier or combinations of carriers, (multi-carrier). The sweep time was set to Auto and 200 averages were performed before the result was recorded.

Due to Average measurements being recorded, an additional Peak to Average measurement was made in all single carrier configurations. This was achieved using the CCDF function of the Analyser with the RBW being set to 80MHz (In this case 60MHz was the maximum total RF Bandwidth in single and multi-carrier mode).

In order to confirm the Average Equivalent Isotropically Radiated Power (EIRP) a Power Spectral Density (PSD) measurement was made in a 1MHz bandwidth.

Testing was performed on all ports.

An antenna gain of 18.1 dBi was applied to all results.

All measurements were summed in accordance with FCC KDB 662911 D01.

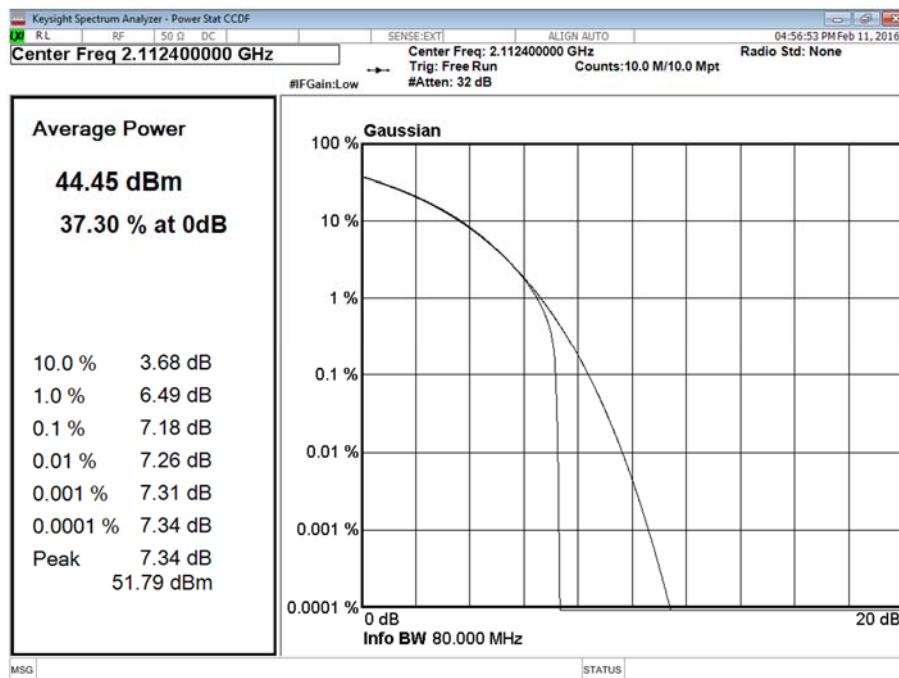
2.1.6 Test Results

Configuration 1

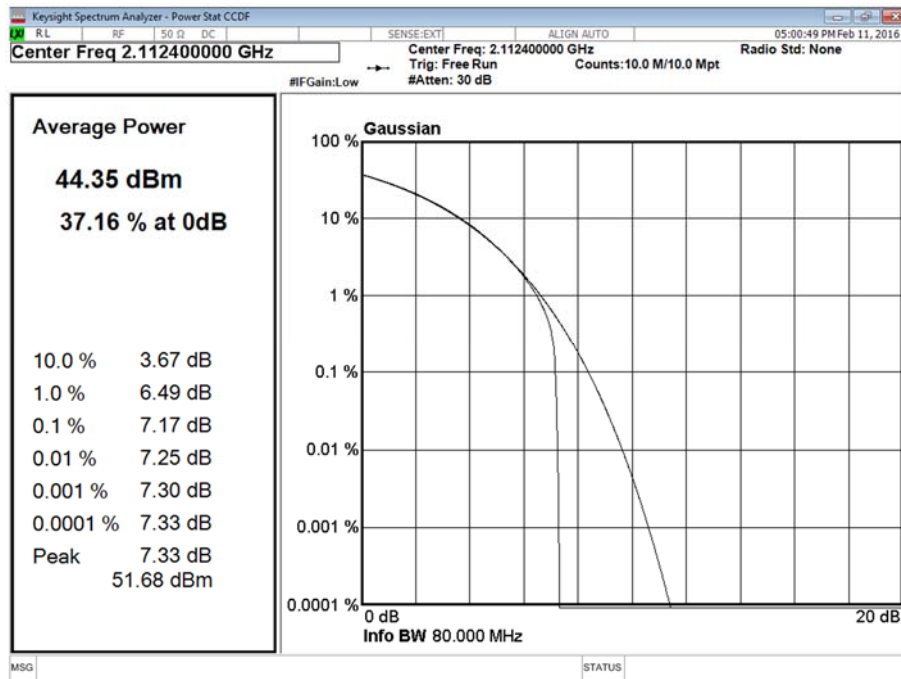
Maximum Output Power 44.77 dBm

Modulation	Carrier Bandwidth (MHz)	Antenna	Peak to Average Ratio (PAR) / Output Power						
			Channel Position B						
			PAR (dB)	Average Power		Average EIRP			
				dBm	dBm/MHz	dBm	dBm/MHz	W	W/MHz
16QAM	5.0	A	7.18	44.31	39.09	62.41	57.19	1,741.8069	523.6004
		B	7.17	44.15	38.97	62.25	57.07	1,678.8040	509.3309
		C	7.18	44.30	38.98	62.40	57.08	1,737.8008	510.5050
		D	7.17	44.27	39.15	62.37	57.25	1,725.8379	530.8844
Total			-	47.30	42.13	65.40	60.23	3,467.6448	1,054.4849

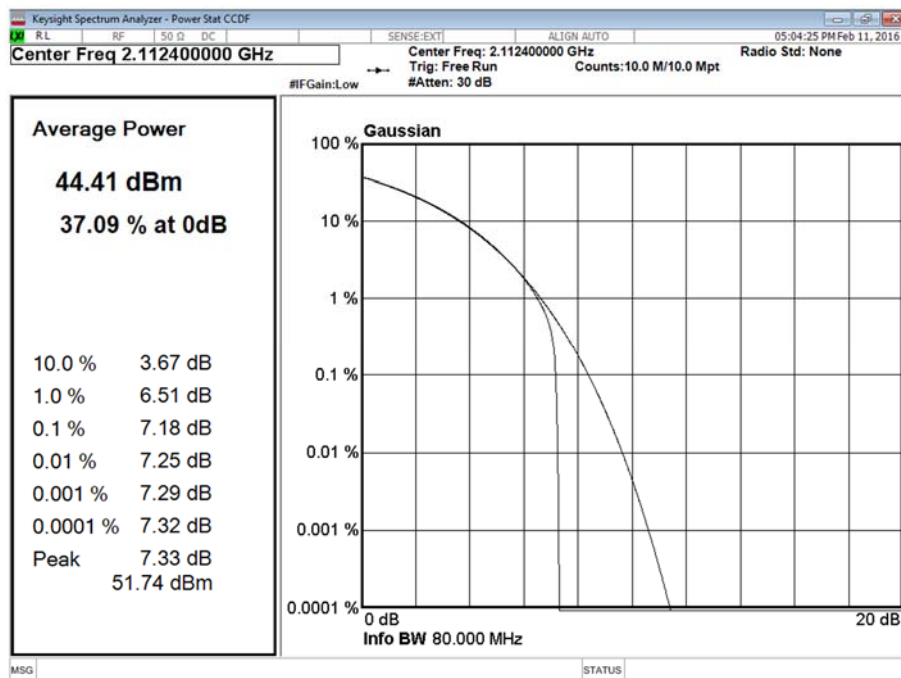
Channel Position B - Bandwidth 5.0 MHz - Antenna A



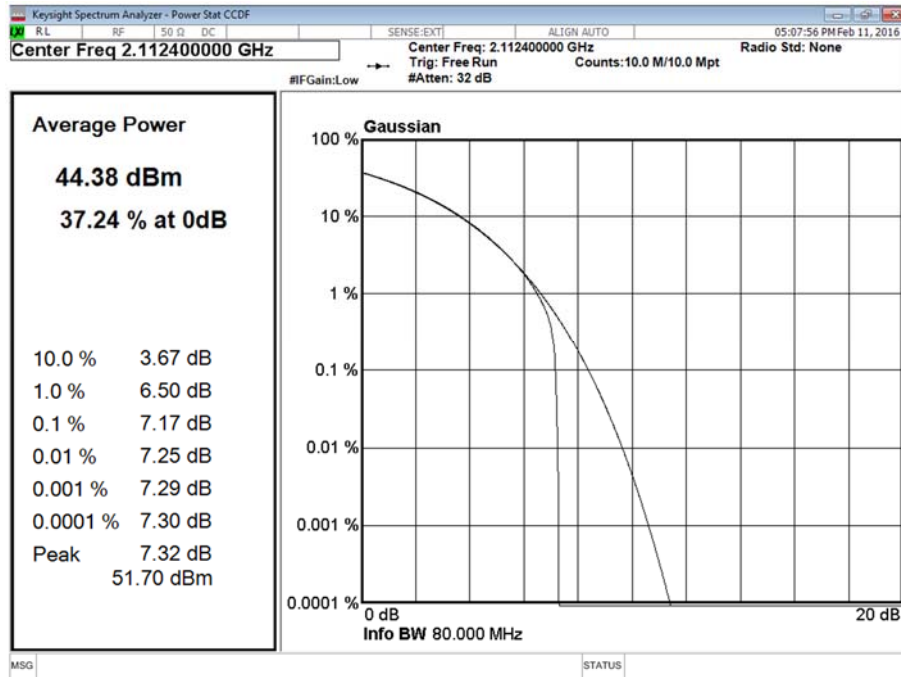
Channel Position B - Bandwidth 5.0 MHz - Antenna B



Channel Position B - Bandwidth 5.0 MHz - Antenna C



Channel Position B - Bandwidth 5.0 MHz - Antenna D

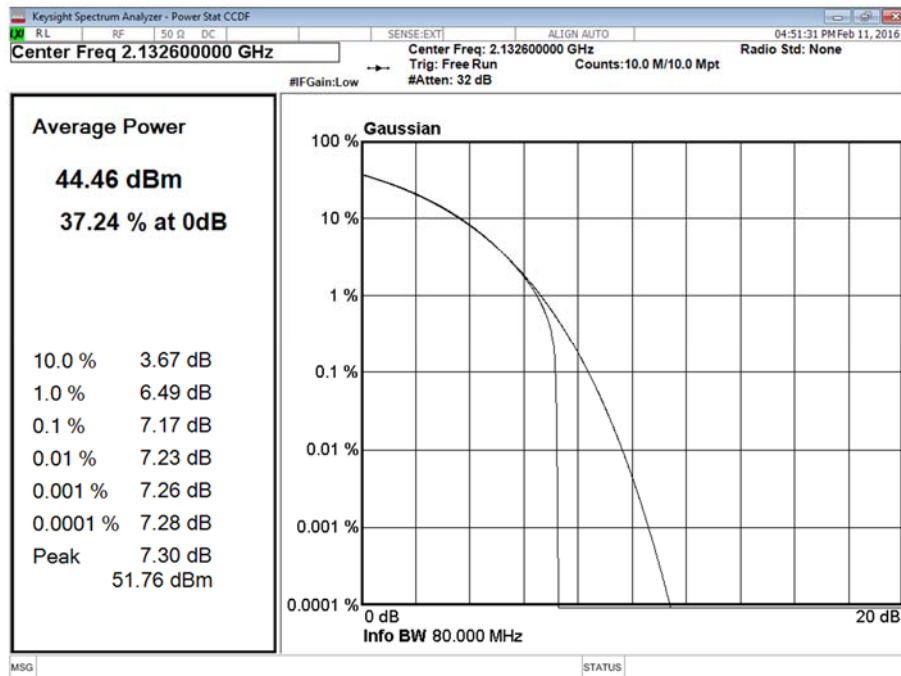


Configuration 1

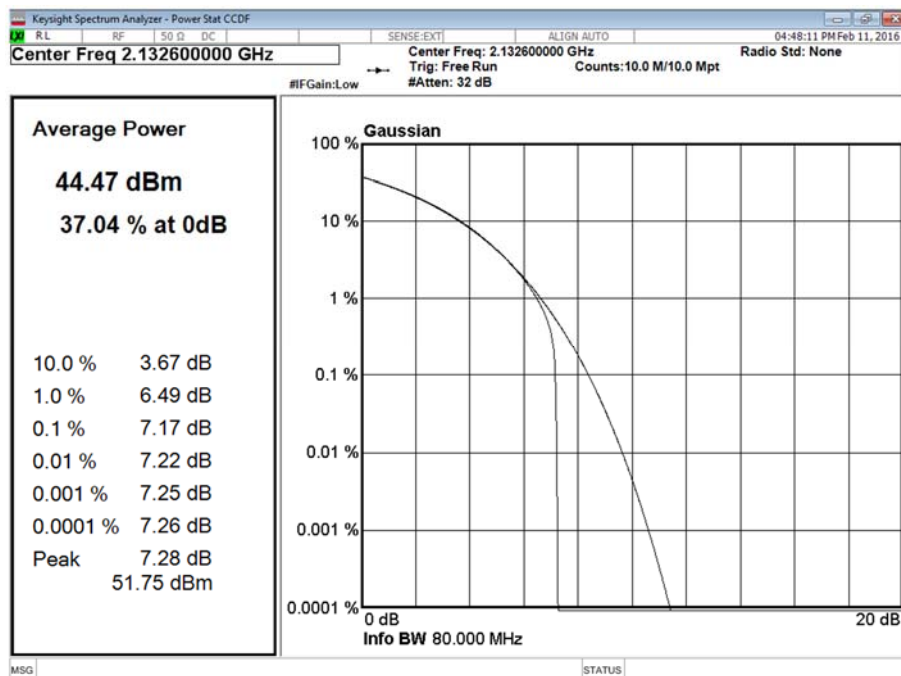
Maximum Output Power 44.77 dBm

Modulation	Carrier Bandwidth (MHz)	Antenna	Peak to Average Ratio (PAR) / Output Power						
			Channel Position M						
			PAR (dB)	Average Power		Average EIRP			
				dBm	dBm/MHz	dBm	dBm/MHz	W	W/MHz
16QAM	5.0	A	7.17	44.34	39.24	62.44	57.34	1,753.8805	542.0009
		B	7.17	44.34	39.23	62.44	57.33	1,753.8805	540.7543
		C	7.17	44.23	38.99	62.33	57.09	1,710.0153	511.6818
		D	7.17	44.52	39.16	62.62	57.26	1,828.1002	532.1083
Total			-	47.44	42.21	65.54	60.31	3,581.9807	1,074.1091

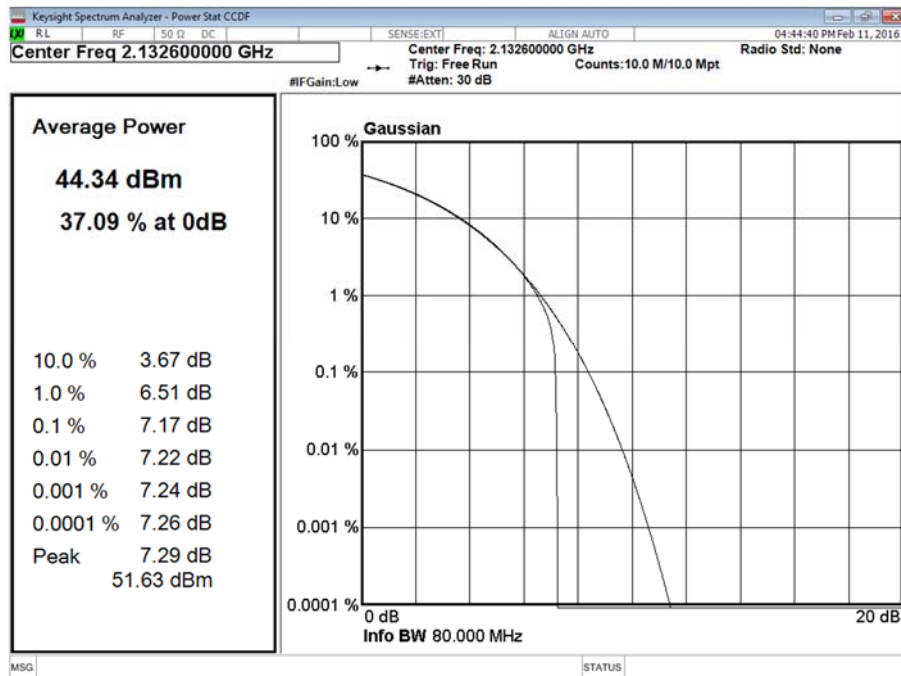
Channel Position M - Bandwidth 5.0 MHz - Antenna A



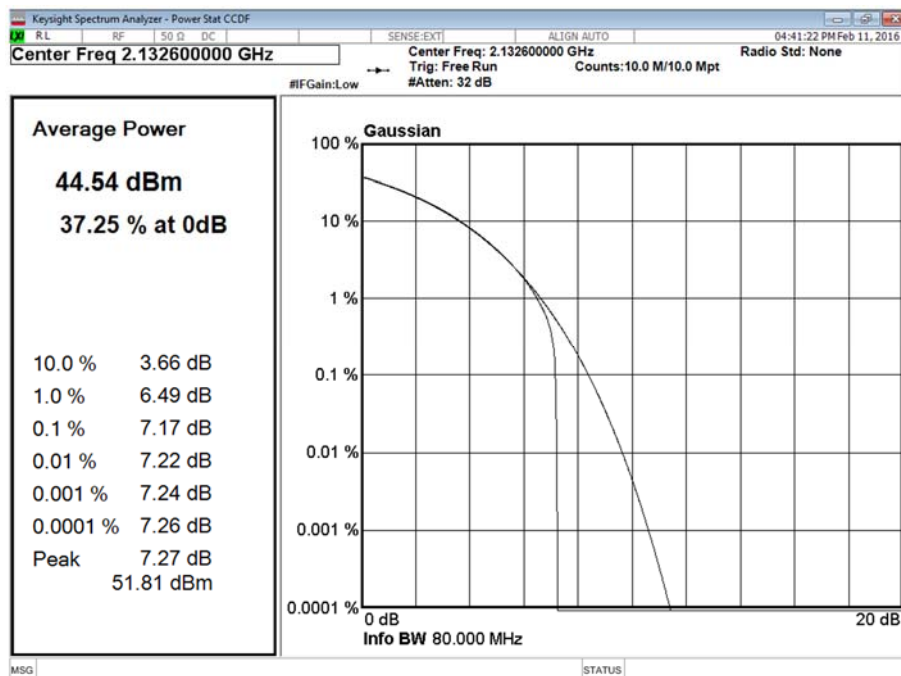
Channel Position M - Bandwidth 5.0 MHz - Antenna B



Channel Position M - Bandwidth 5.0 MHz - Antenna C



Channel Position M - Bandwidth 5.0 MHz - Antenna D

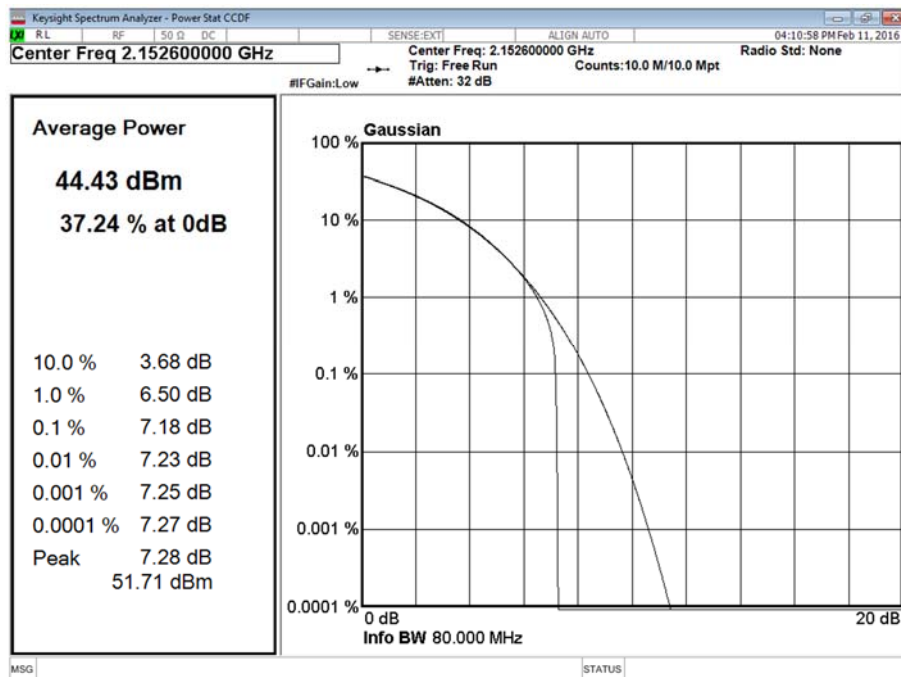


Configuration 1

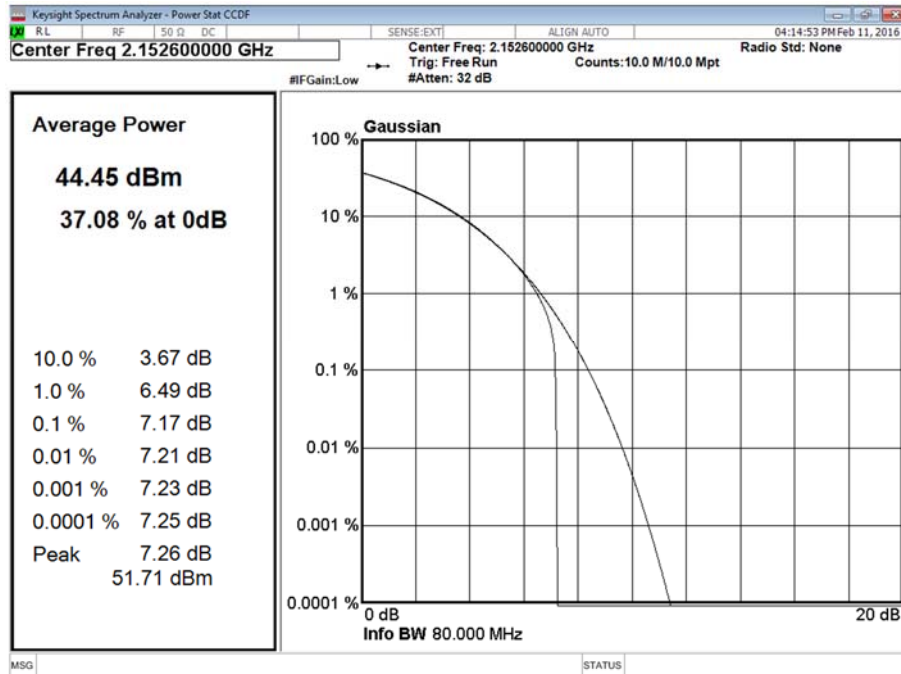
Maximum Output Power 44.77 dBm

Modulation	Carrier Bandwidth (MHz)	Antenna	Peak to Average Ratio (PAR) / Output Power						
			Channel Position T						
			PAR (dB)	Average Power		Average EIRP			
				dBm	dBm/MHz	dBm	dBm/MHz	W	W/MHz
16QAM	5.0	A	7.18	44.39	39.24	62.49	57.34	1,774.1895	542.0009
		B	7.17	44.36	39.18	62.46	57.28	1,761.9760	534.5644
		C	7.17	44.30	39.08	62.40	57.18	1,737.8008	522.3962
		D	7.18	44.38	39.13	62.48	57.23	1,770.1090	528.4453
Total			-	47.40	42.20	65.50	60.30	3,544.2984	1,070.4461

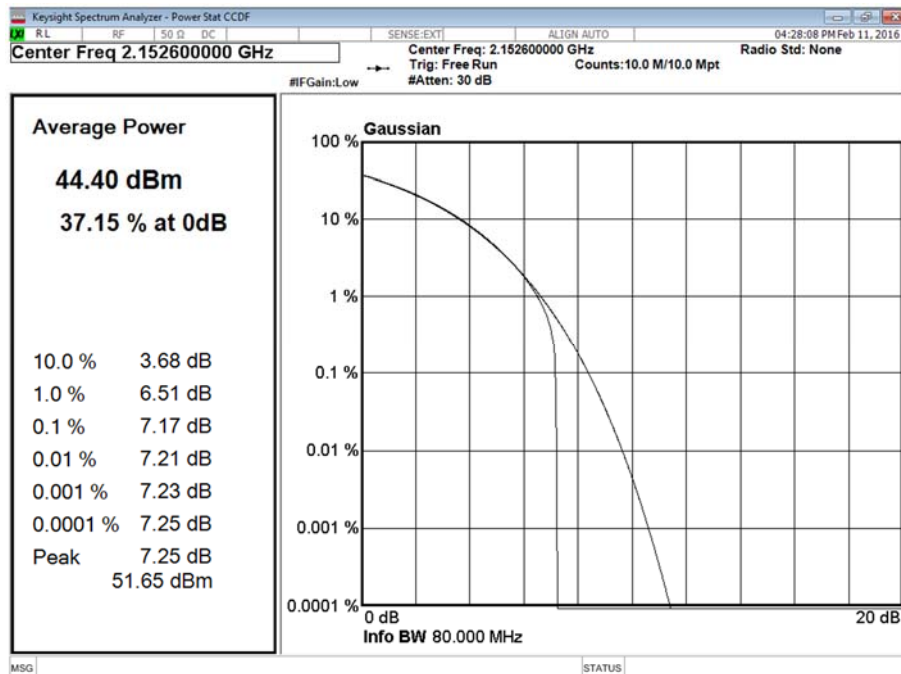
Channel Position T - Bandwidth 5.0 MHz - Antenna A



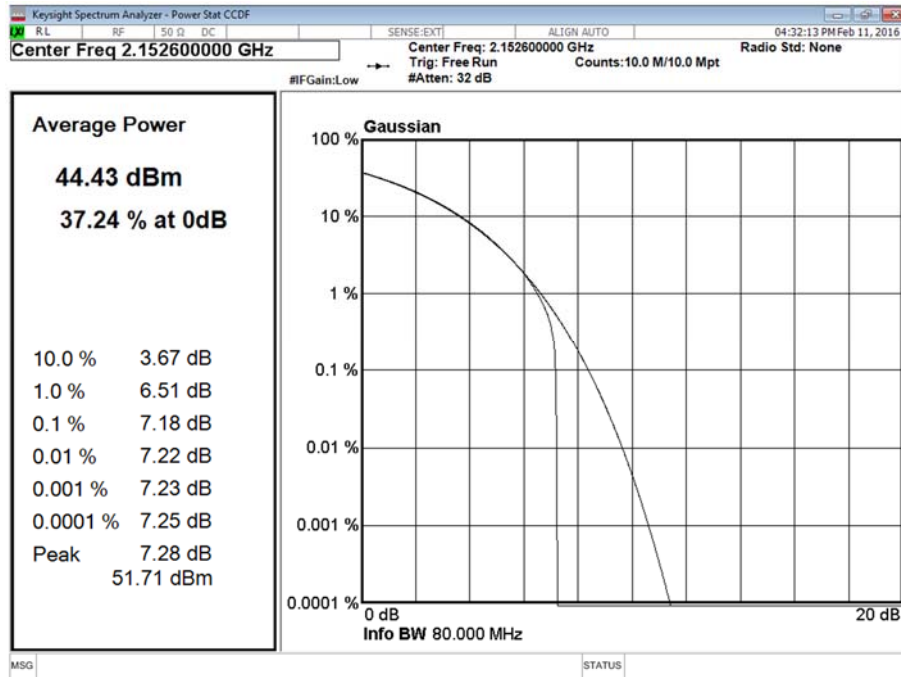
Channel Position T - Bandwidth 5.0 MHz - Antenna B



Channel Position T - Bandwidth 5.0 MHz - Antenna C



Channel Position T - Bandwidth 5.0 MHz - Antenna D



Configuration 2

Maximum Output Power 44.77 dBm

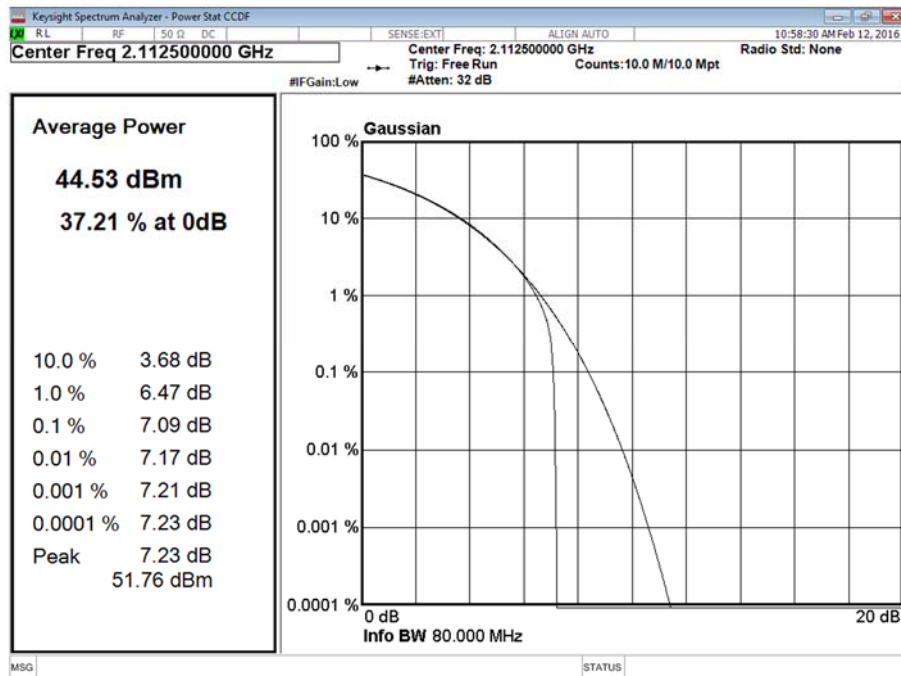
Modulation	Carrier Bandwidth (MHz)	Antenna	Peak to Average Ratio (PAR) / Output Power						
			Channel Position M						
			PAR (dB)	Average Power		Average EIRP			
				dBm	dBm/MHz	dBm	dBm/MHz	W	W/MHz
16QAM	5.0 MHz	A	-	44.30	36.39	62.40	54.49	1,737.8008	281.1901
		B	-	44.30	36.16	62.40	54.26	1,737.8008	266.6859
		C	-	44.11	36.21	62.21	54.31	1,663.4127	269.7739
		D	-	44.22	36.24	62.32	54.34	1,706.0824	271.6439
Total			-	47.27	39.33	65.37	57.43	3,443.8832	552.8340

Configuration 3

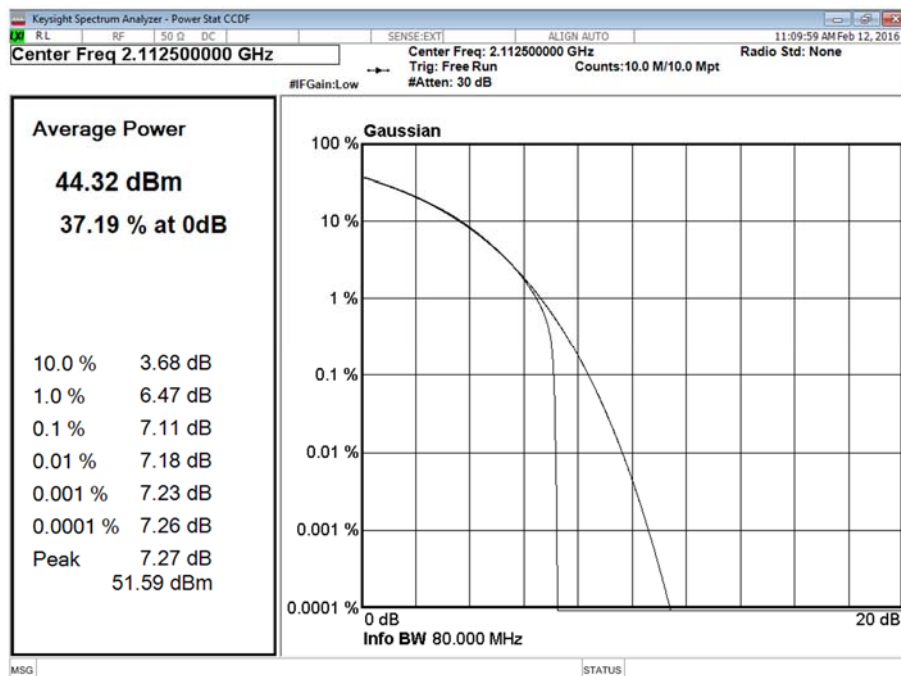
Maximum Output Power 44.77 dBm

Modulation	Carrier Bandwidth (MHz)	Antenna	Peak to Average Ratio (PAR) / Output Power						
			Channel Position B						
			PAR (dB)	Average Power		Average EIRP			
				dBm	dBm/MHz	dBm	dBm/MHz	W	W/MHz
QPSK	5.0	A	7.09	44.43	38.51	62.53	56.61	1,790.6059	458.1419
		B	7.11	44.19	38.28	62.29	56.38	1,694.3378	434.5102
		C	7.10	44.07	38.15	62.17	56.25	1,648.1624	421.6965
		D	7.09	44.09	38.17	62.19	56.27	1,655.7700	423.6430
Total			-	47.27	41.35	65.37	59.45	3,446.3758	881.7849
QPSK	10.0	A	7.12	44.49	35.65	62.59	53.75	1,815.5157	237.1374
		B	7.12	44.37	35.70	62.47	53.80	1,766.0378	239.8833
		C	7.12	44.46	35.86	62.56	53.96	1,803.0177	248.8857
		D	7.12	44.43	35.82	62.53	53.92	1,790.6059	246.6039
Total			-	47.47	38.75	65.57	56.85	3,606.1215	483.7413
QPSK	15.0	A	7.16	44.30	33.75	62.40	51.85	1,737.8008	153.1087
		B	7.17	44.35	33.90	62.45	52.00	1,757.9236	158.4893
		C	7.15	44.24	33.97	62.34	52.07	1,713.9573	161.0646
		D	7.16	44.07	33.64	62.17	51.74	1,648.1624	149.2794
Total			-	47.20	36.71	65.30	54.81	3,385.9632	302.3882
QPSK	20.0	A	7.19	44.23	32.50	62.33	50.60	1,710.0153	114.8154
		B	7.19	44.19	32.60	62.29	50.70	1,694.3378	117.4898
		C	7.20	44.16	32.44	62.26	50.54	1,682.6741	113.2400
		D	7.19	44.02	32.34	62.12	50.44	1,629.2960	110.6624
Total			-	47.14	35.43	65.24	53.53	3,339.3113	225.4777

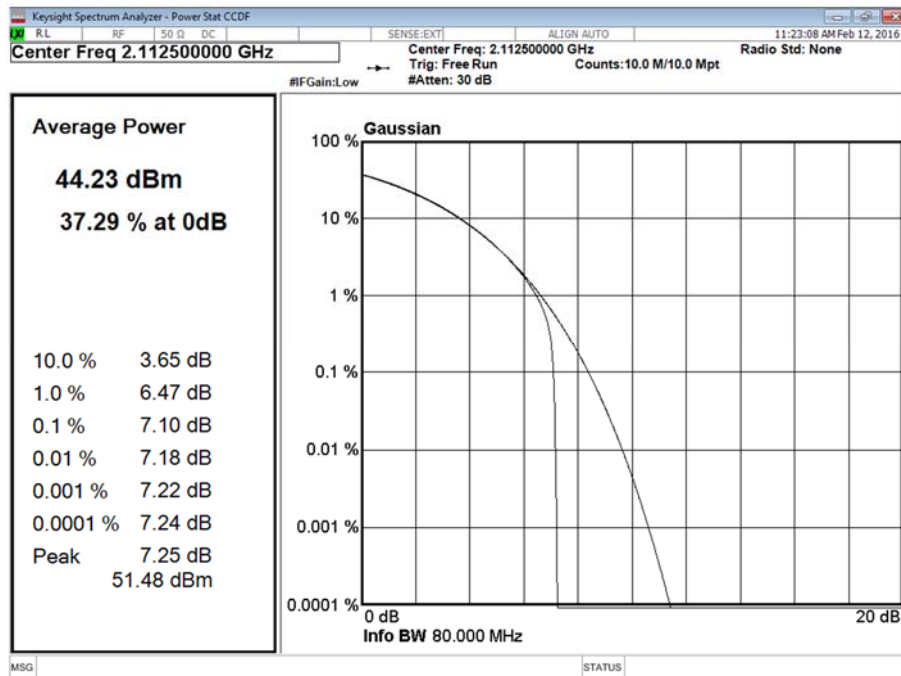
Channel Position B - Bandwidth 5.0 MHz - Antenna A



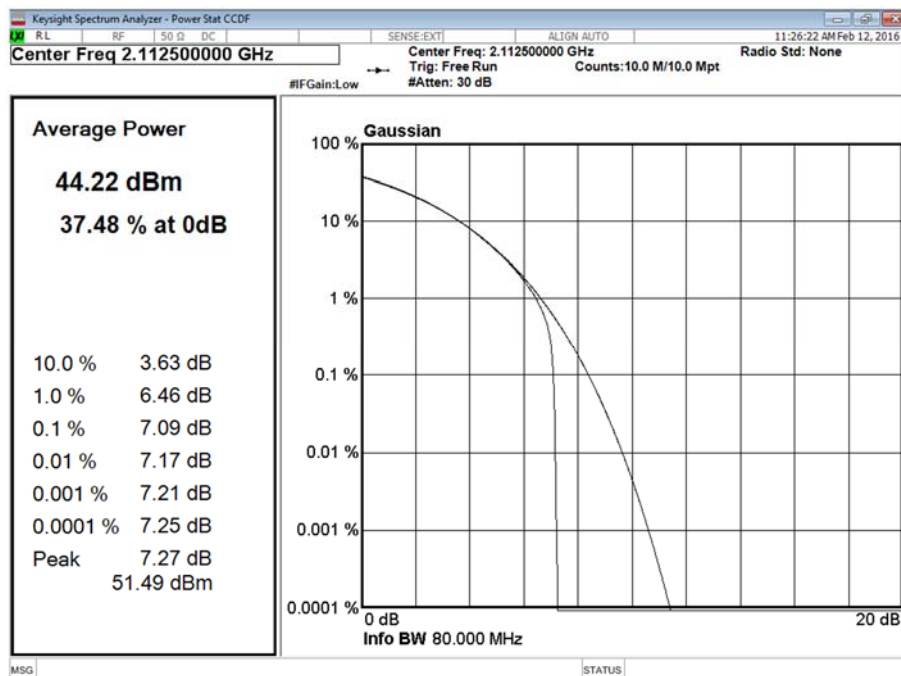
Channel Position B - Bandwidth 5.0 MHz - Antenna B



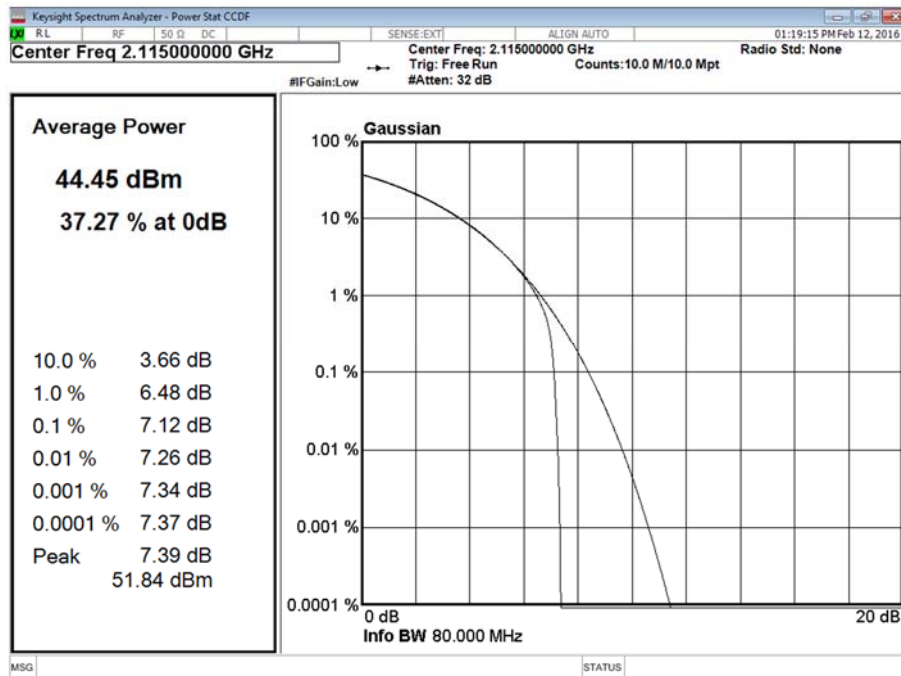
Channel Position B - Bandwidth 5.0 MHz - Antenna C



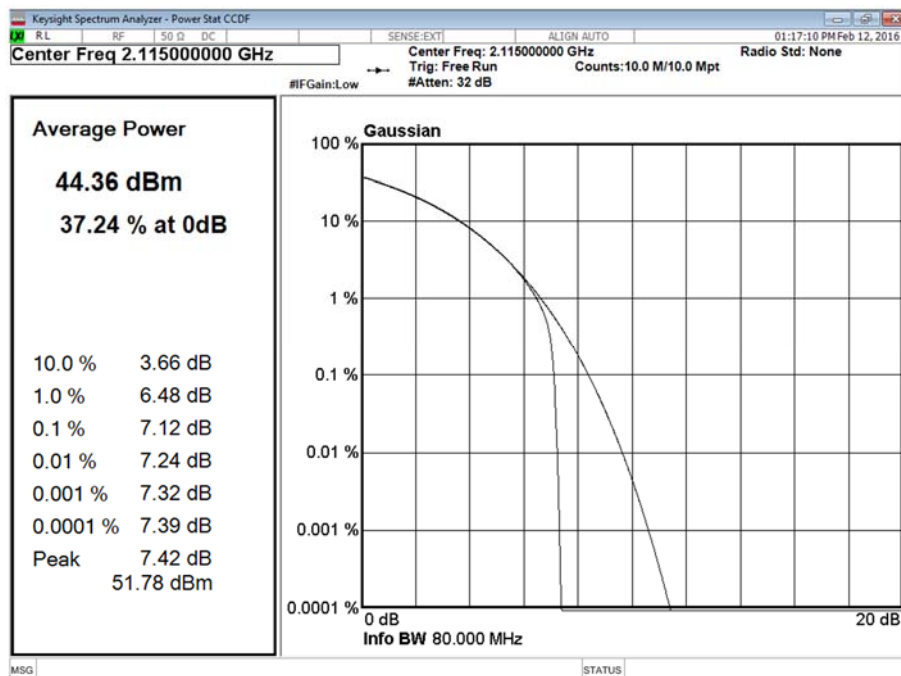
Channel Position B - Bandwidth 5.0 MHz - Antenna D



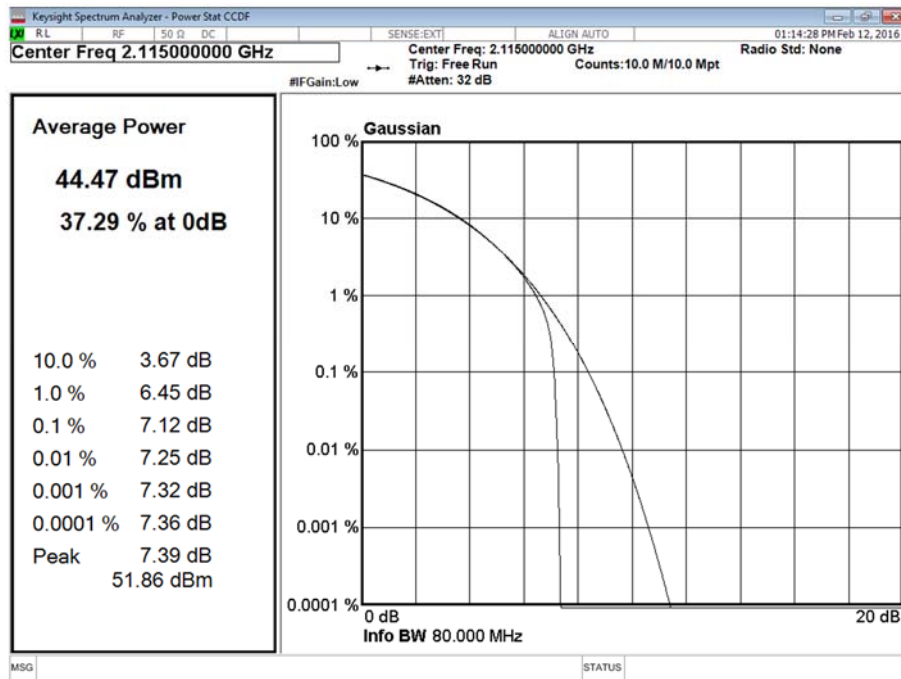
Channel Position B - Bandwidth 10.0 MHz - Antenna A



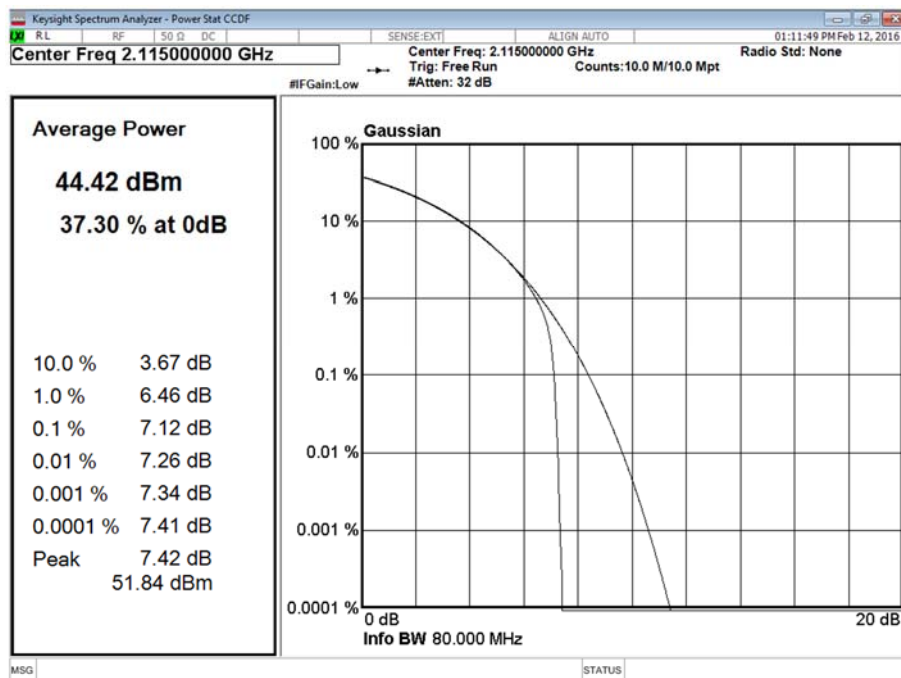
Channel Position B - Bandwidth 10.0 MHz - Antenna B



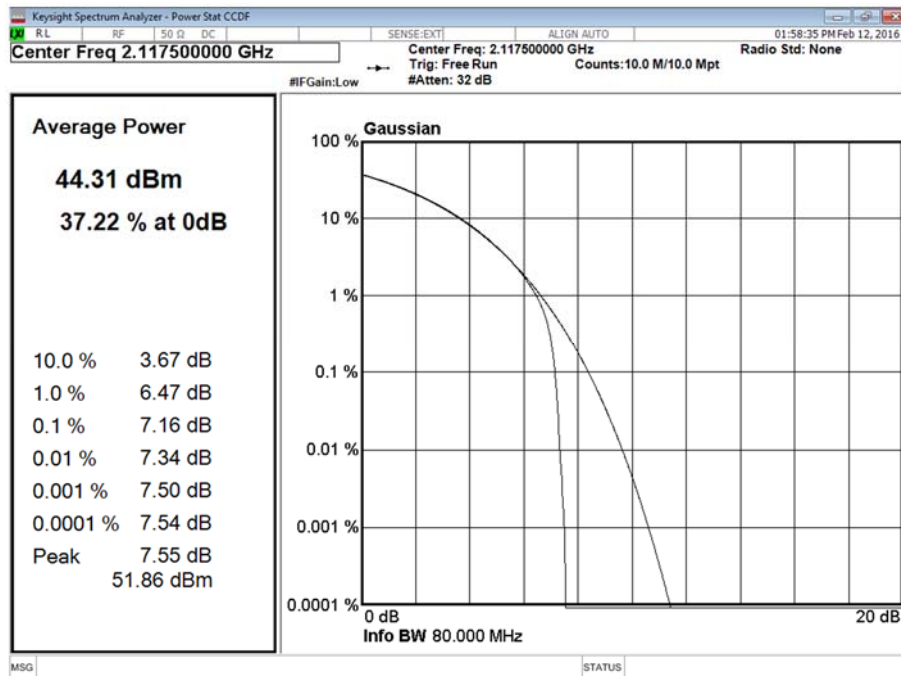
Channel Position B - Bandwidth 10.0 MHz - Antenna C



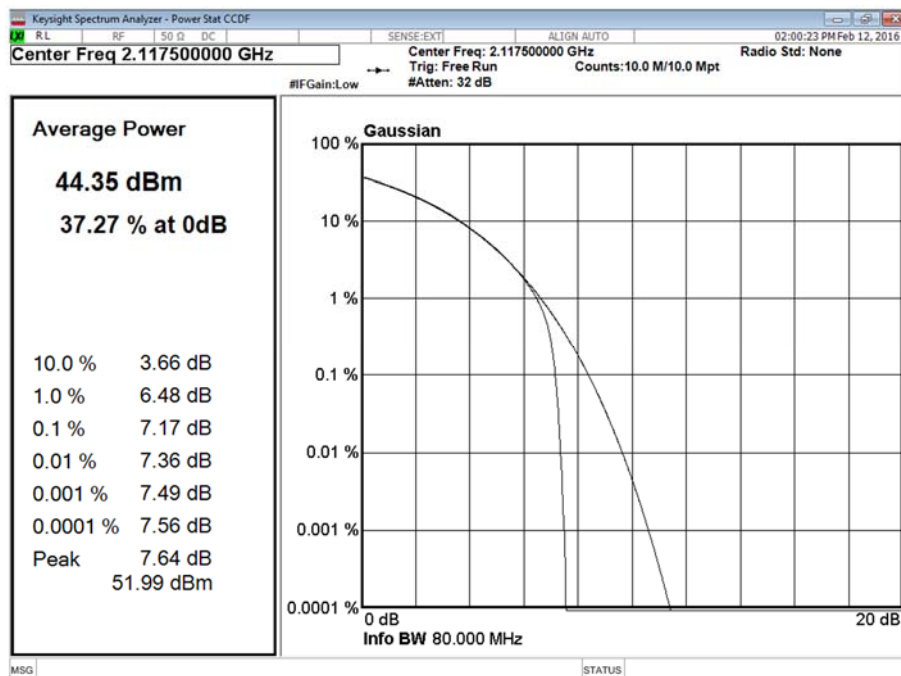
Channel Position B - Bandwidth 10.0 MHz - Antenna D



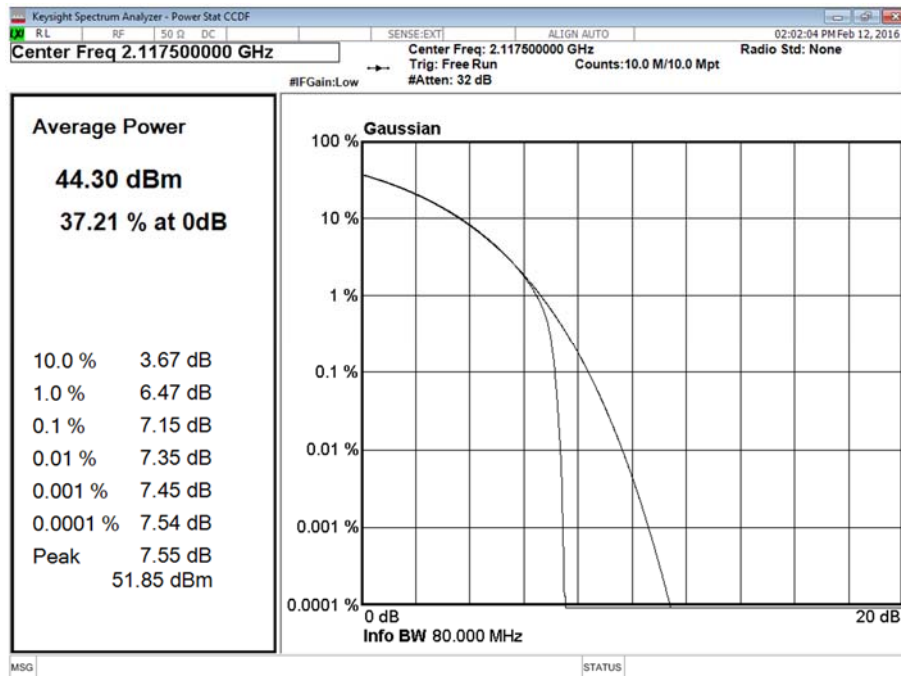
Channel Position B - Bandwidth 15.0 MHz - Antenna A



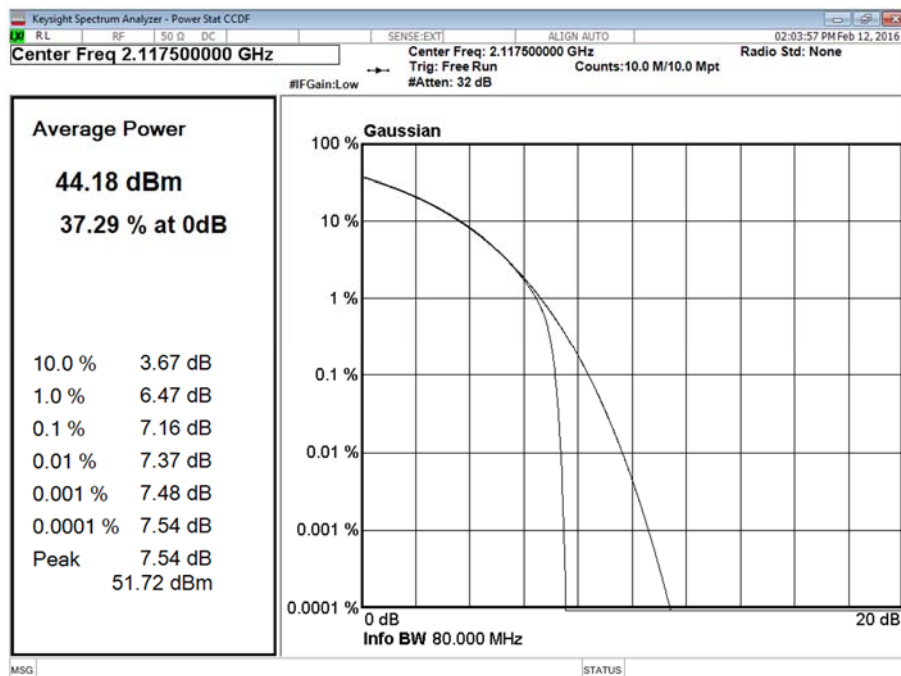
Channel Position B - Bandwidth 15.0 MHz - Antenna B



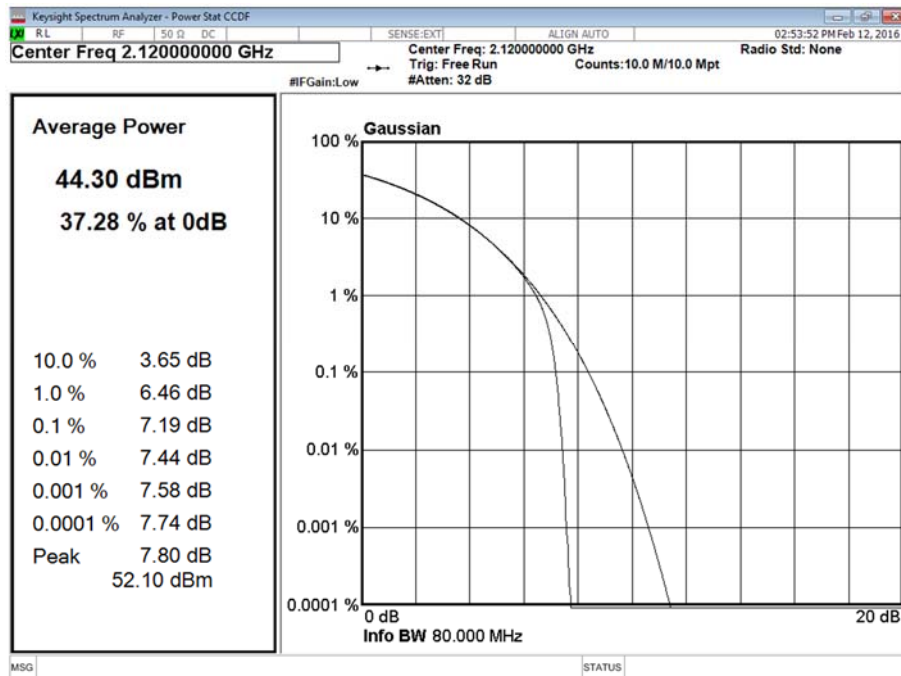
Channel Position B - Bandwidth 15.0 MHz - Antenna C



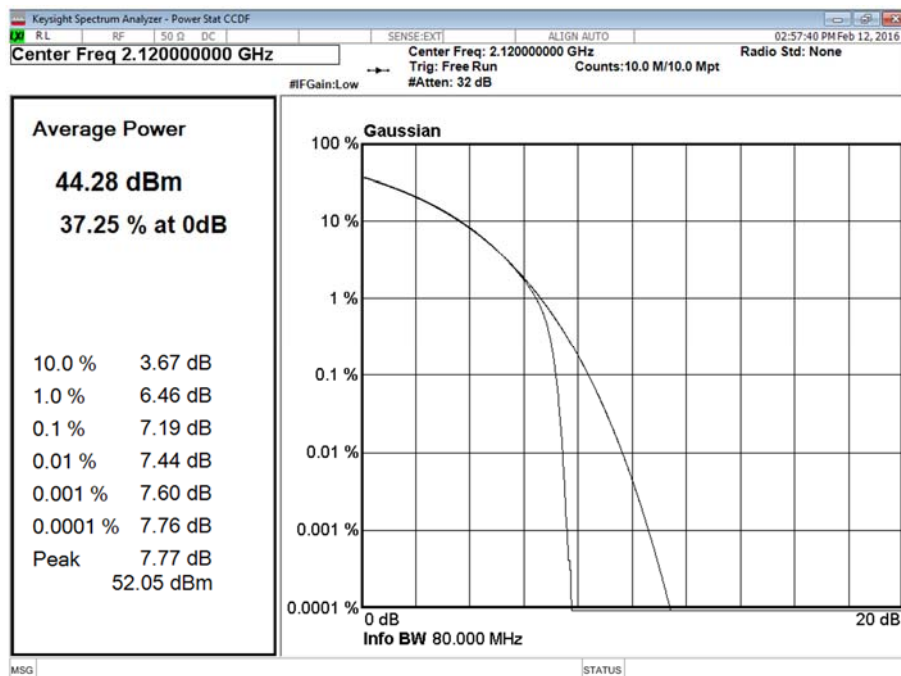
Channel Position B - Bandwidth 15.0 MHz - Antenna D



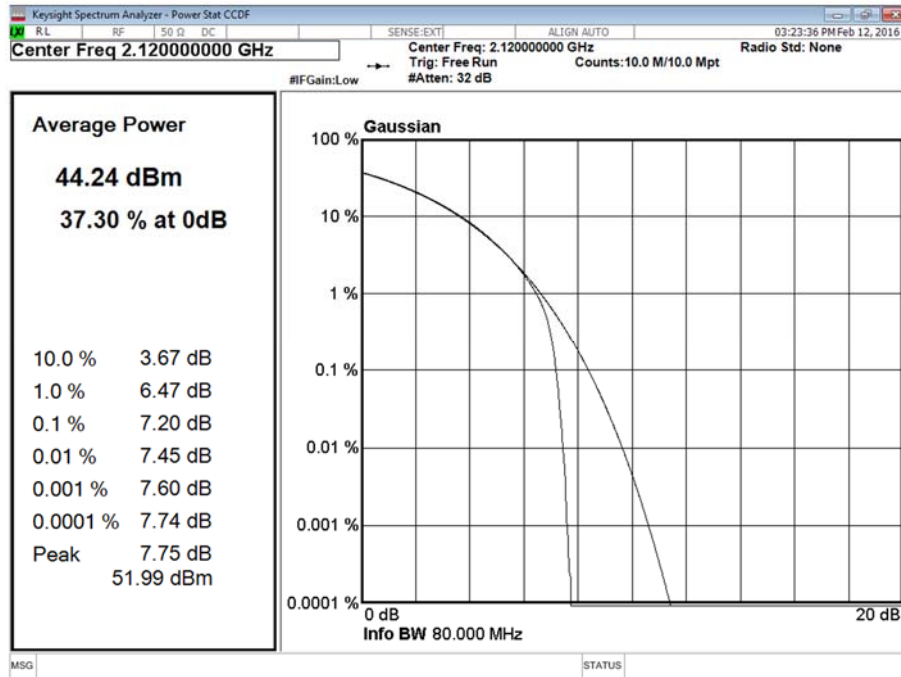
Channel Position B - Bandwidth 20.0 MHz - Antenna A



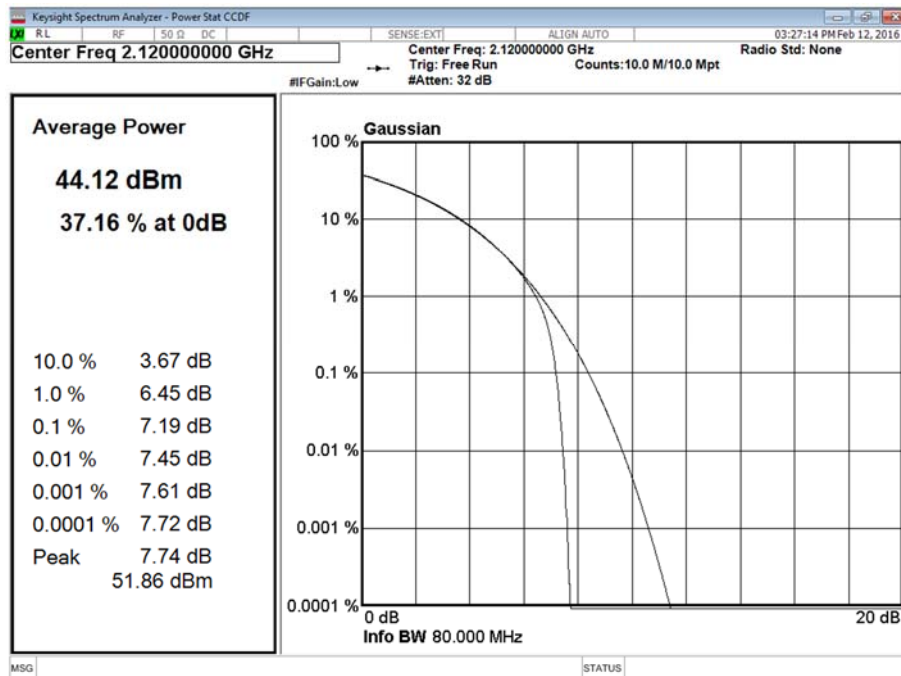
Channel Position B - Bandwidth 20.0 MHz - Antenna B



Channel Position B - Bandwidth 20.0 MHz - Antenna C



Channel Position B - Bandwidth 20.0 MHz - Antenna D

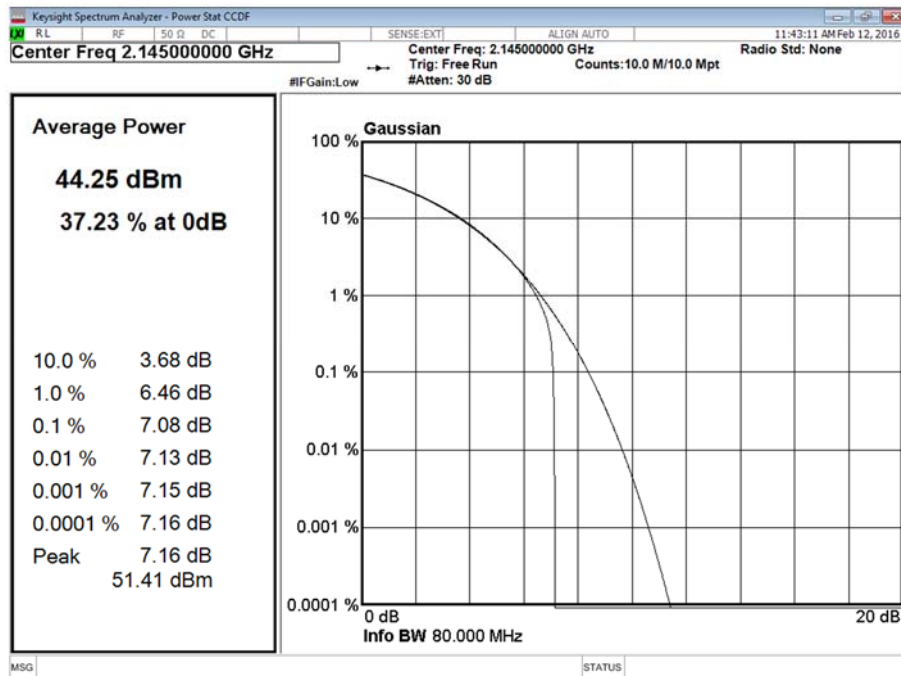


Configuration 3

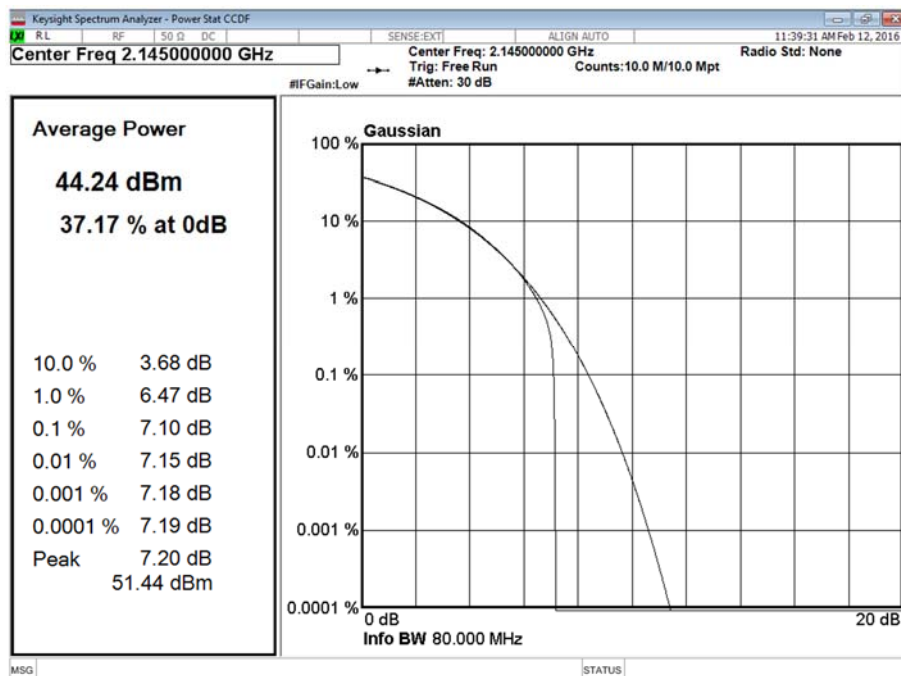
Maximum Output Power 44.77 dBm

Modulation	Carrier Bandwidth (MHz)	Antenna	Peak to Average Ratio (PAR) / Output Power						
			Channel Position M						
			PAR (dB)	Average Power		Average EIRP			
				dBm	dBm/MHz	dBm	dBm/MHz	W	W/MHz
QPSK	5.0	A	7.08	44.11	38.18	62.21	56.28	1,663.4127	424.6196
		B	7.10	44.10	38.29	62.20	56.39	1,659.5869	435.5119
		C	7.09	44.06	38.10	62.16	56.20	1,644.3717	416.8694
		D	7.09	44.16	38.17	62.26	56.27	1,682.6741	423.6430
Total			-	47.15	41.19	65.25	59.29	3,346.0867	848.2625
QPSK	10.0	A	7.09	44.33	35.77	62.43	53.87	1,749.8467	243.7811
		B	7.11	44.29	35.68	62.39	53.78	1,733.8040	238.7811
		C	7.10	44.19	35.47	62.29	53.57	1,694.3378	227.5097
		D	7.10	44.20	35.49	62.30	53.59	1,698.2437	228.5599
Total			-	47.28	38.64	65.38	56.74	3,448.0903	472.3410
QPSK	15.0	A	7.11	44.25	33.82	62.35	51.92	1,717.9084	155.5966
		B	7.12	44.19	33.79	62.29	51.89	1,694.3378	154.5254
		C	7.12	44.14	33.82	62.24	51.92	1,674.9429	155.5966
		D	7.12	44.20	33.84	62.30	51.94	1,698.2437	156.3148
Total			-	47.24	36.84	65.34	54.94	3,416.1520	311.9113
QPSK	20.0	A	7.11	44.21	32.44	62.31	50.54	1,702.1585	113.2400
		B	7.12	44.18	32.40	62.28	50.50	1,690.4409	112.2018
		C	7.11	44.09	32.47	62.19	50.57	1,655.7700	114.0250
		D	7.11	44.10	32.33	62.20	50.43	1,659.5869	110.4079
Total			-	47.17	35.40	65.27	53.50	3,361.7454	223.6479

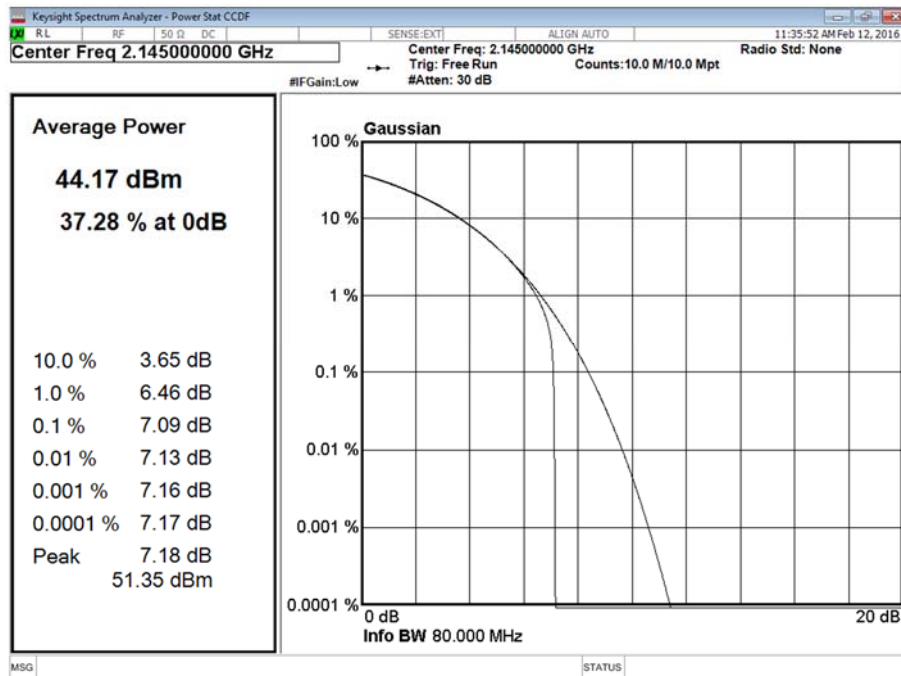
Channel Position M - Bandwidth 5.0 MHz - Antenna A



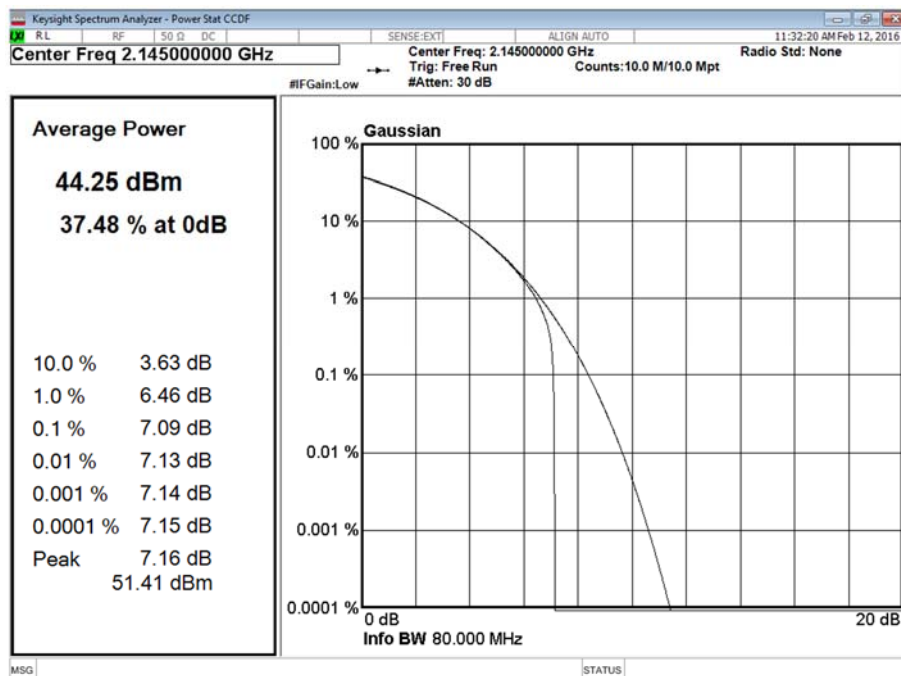
Channel Position M - Bandwidth 5.0 MHz - Antenna B



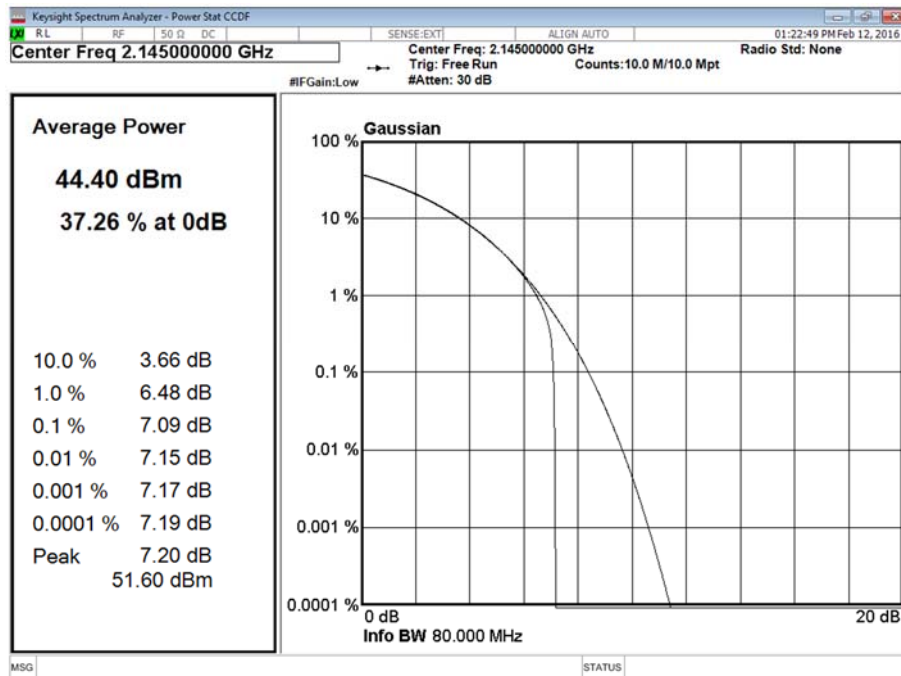
Channel Position M - Bandwidth 5.0 MHz - Antenna C



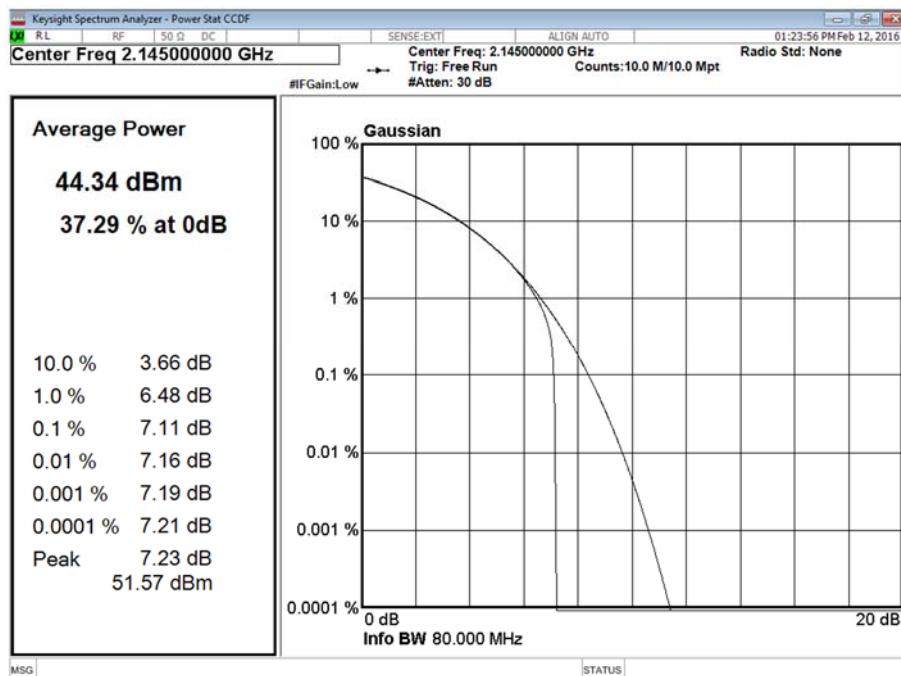
Channel Position M - Bandwidth 5.0 MHz - Antenna D



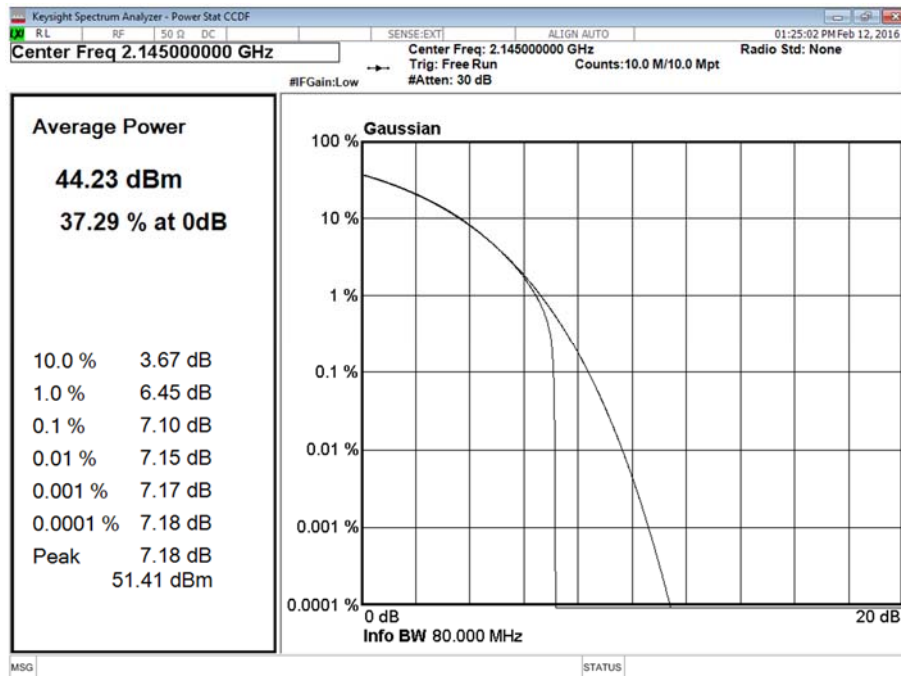
Channel Position M - Bandwidth 10.0 MHz - Antenna A



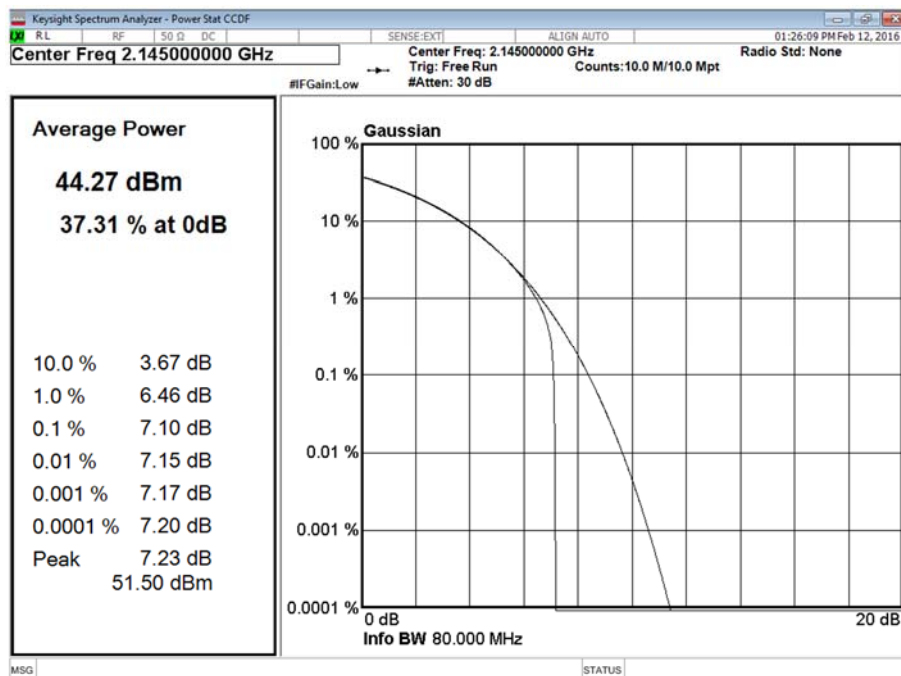
Channel Position M - Bandwidth 10.0 MHz - Antenna B



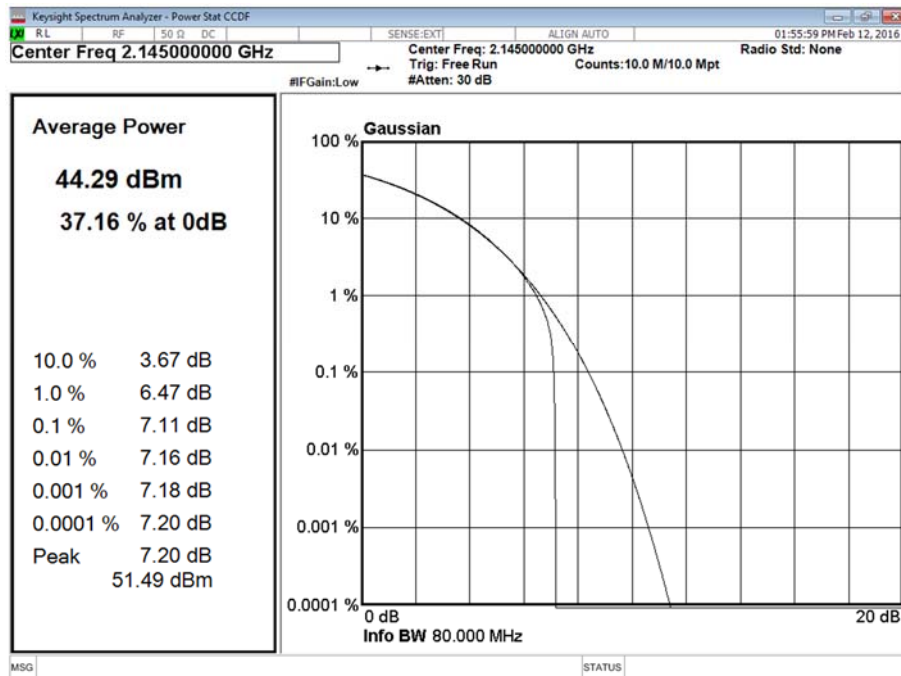
Channel Position M - Bandwidth 10.0 MHz - Antenna C



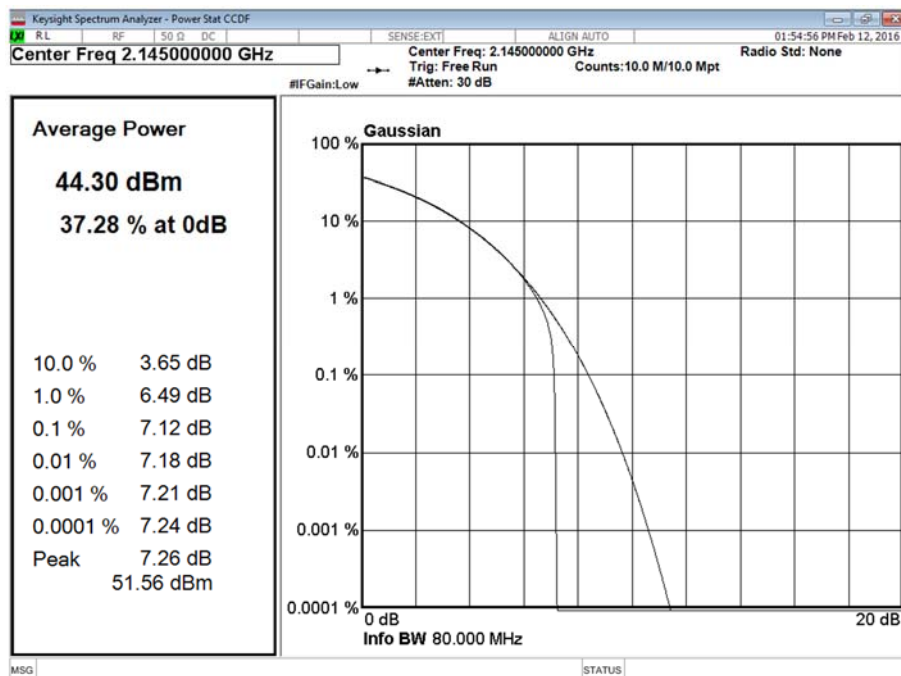
Channel Position M - Bandwidth 10.0 MHz - Antenna D



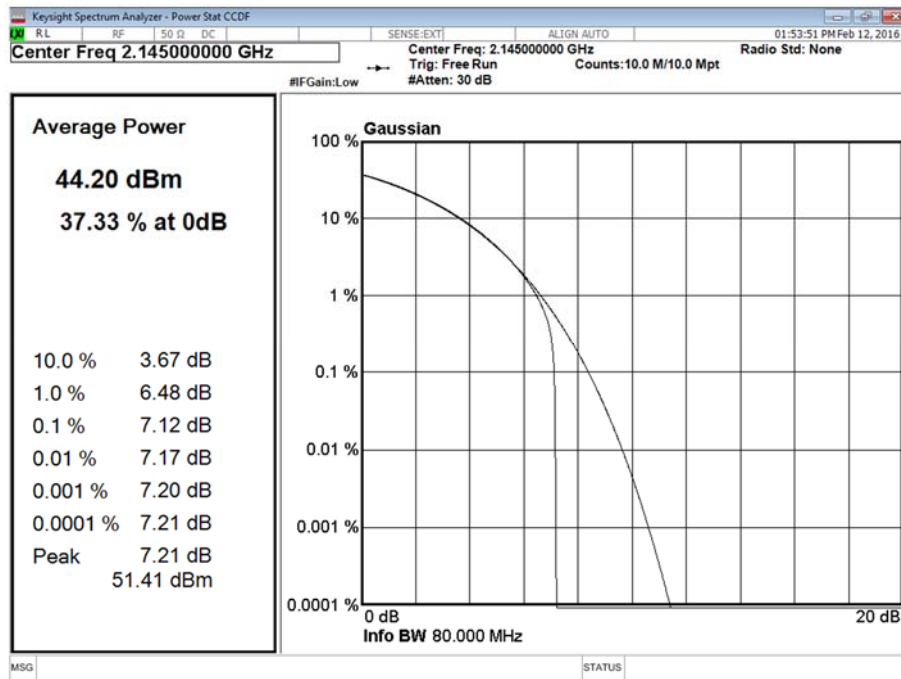
Channel Position M - Bandwidth 15.0 MHz - Antenna A



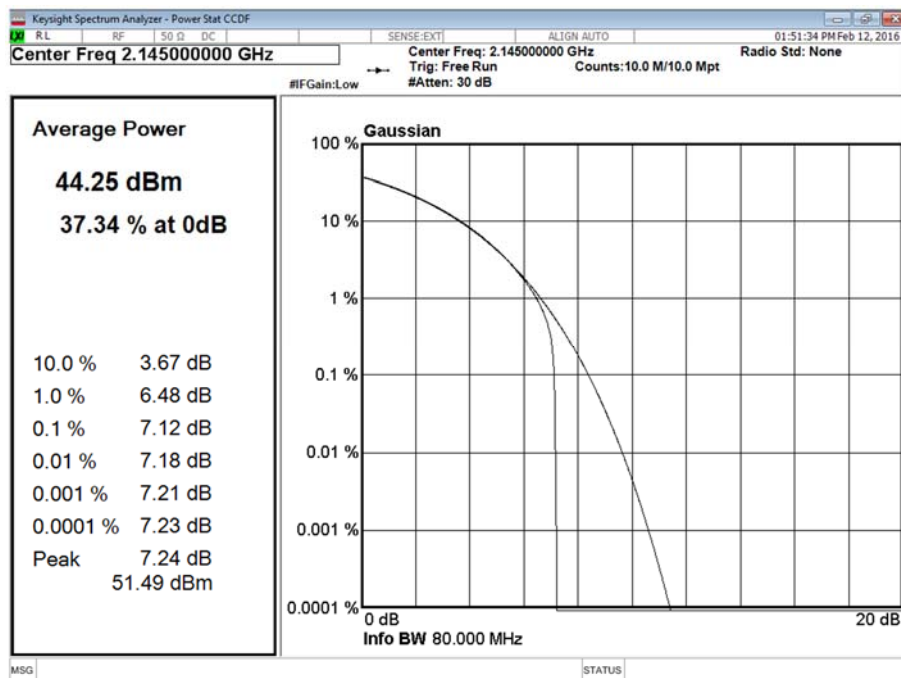
Channel Position M - Bandwidth 15.0 MHz - Antenna B



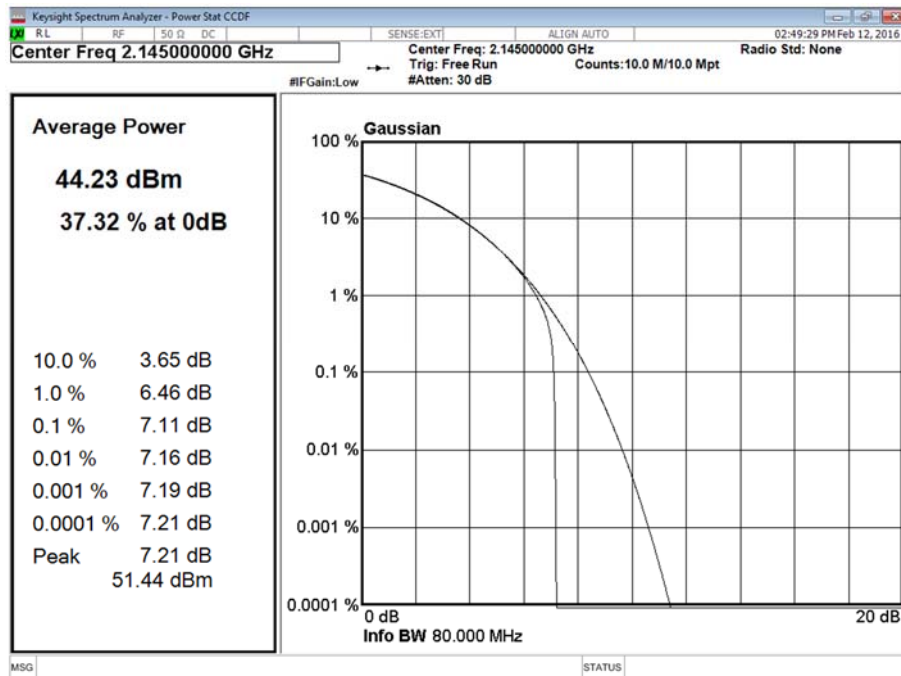
Channel Position M - Bandwidth 15.0 MHz - Antenna C



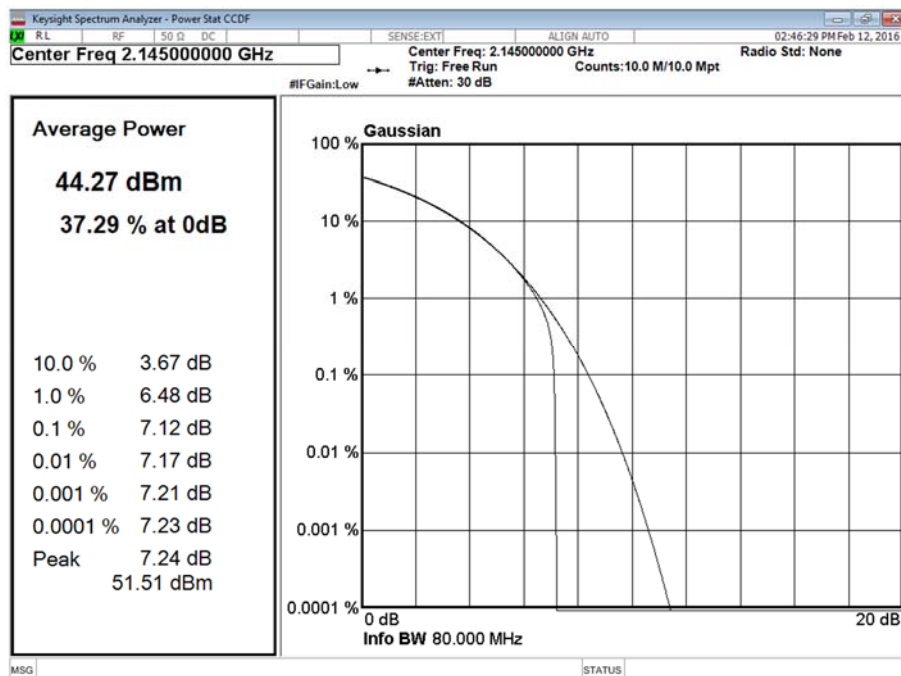
Channel Position M - Bandwidth 15.0 MHz - Antenna D



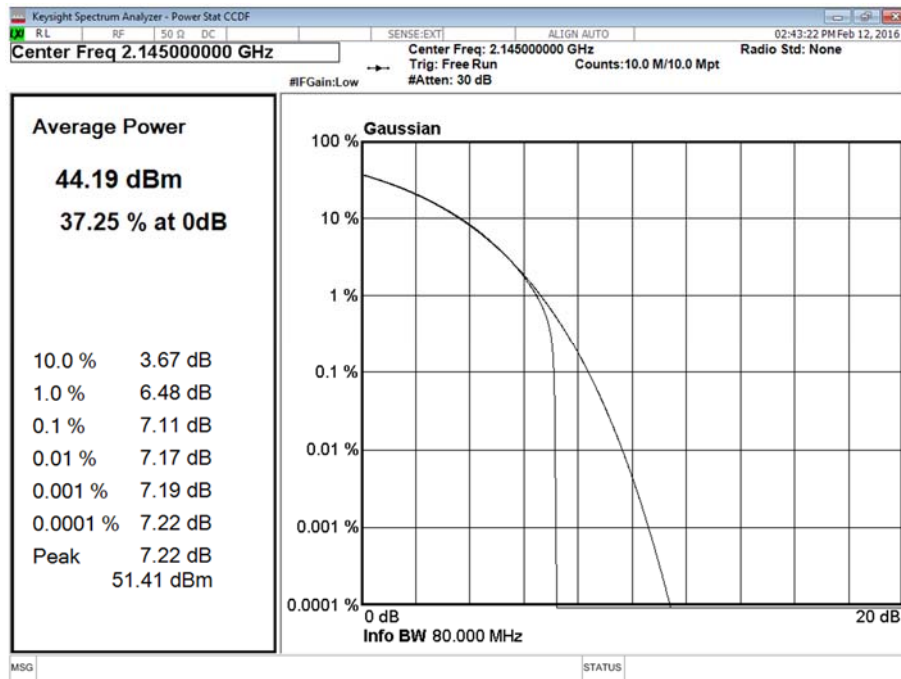
Channel Position M - Bandwidth 20.0 MHz - Antenna A



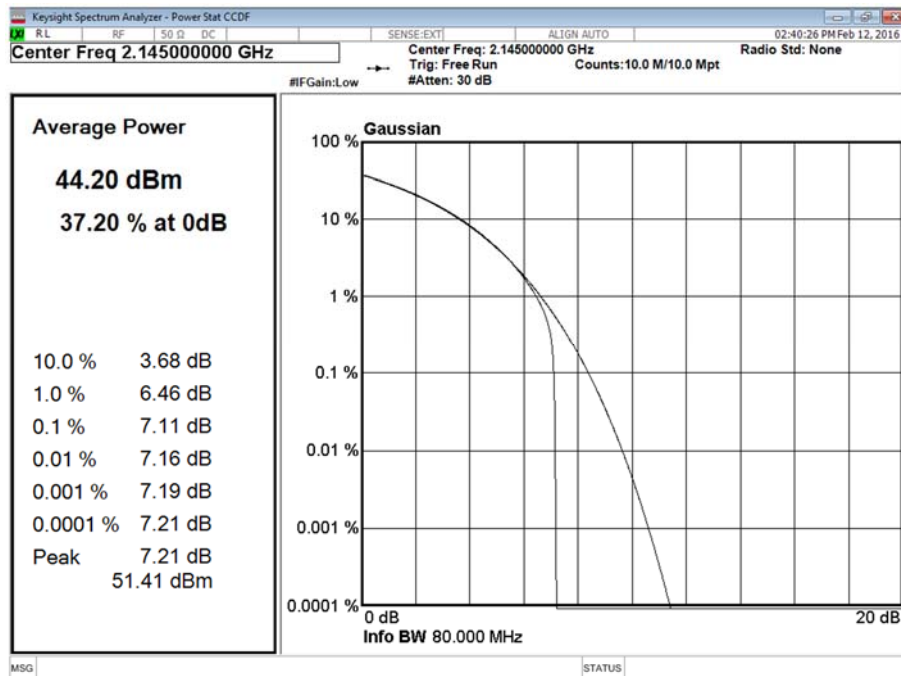
Channel Position M - Bandwidth 20.0 MHz - Antenna B



Channel Position M - Bandwidth 20.0 MHz - Antenna C



Channel Position M - Bandwidth 20.0 MHz - Antenna D

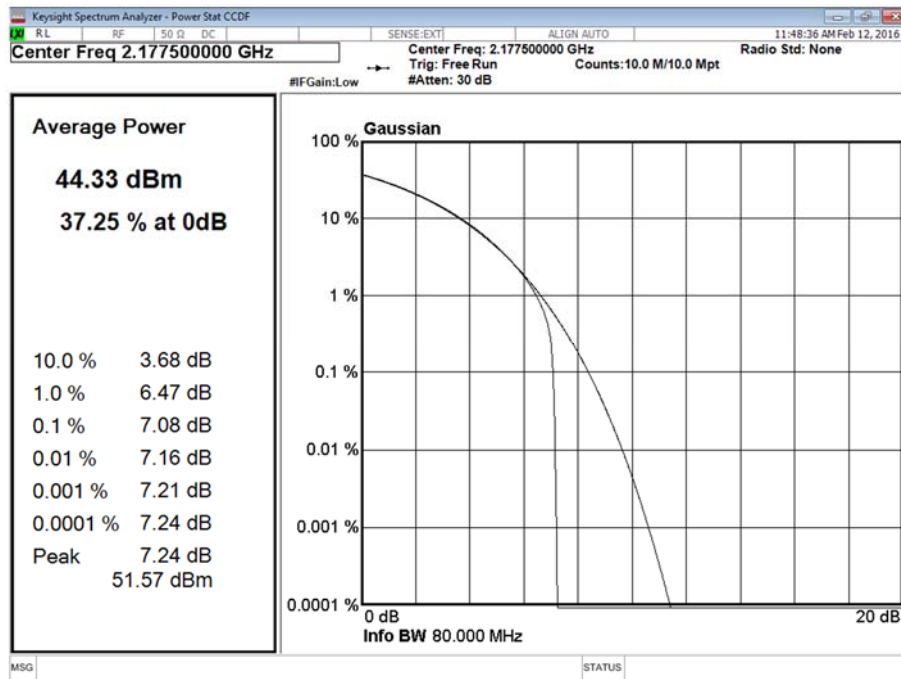


Configuration 3

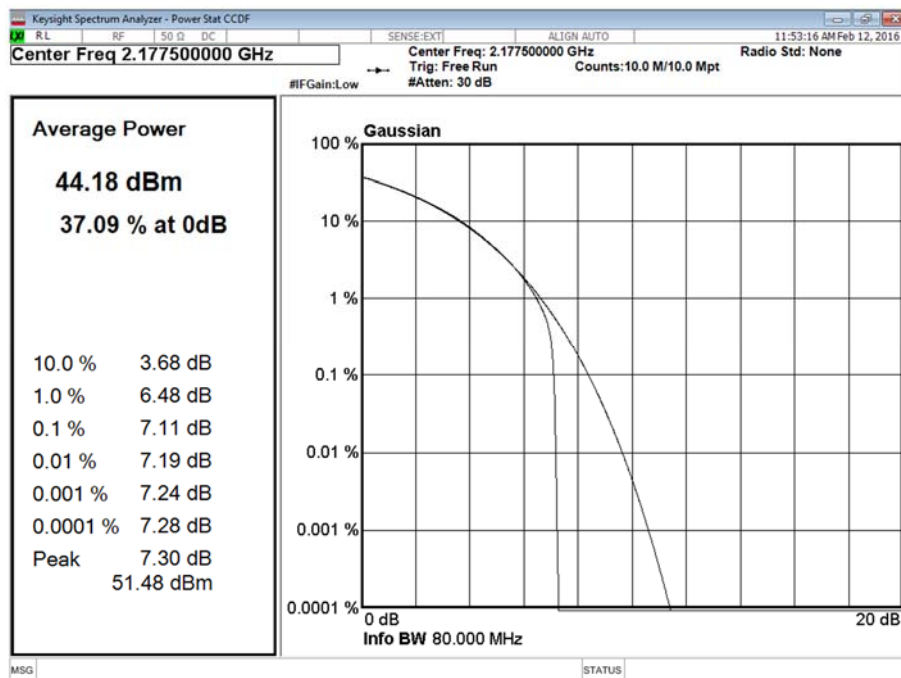
Maximum Output Power 44.77 dBm

Modulation	Carrier Bandwidth (MHz)	Antenna	Peak to Average Ratio (PAR) / Output Power						
			Channel Position T						
			PAR (dB)	Average Power		Average EIRP			
				dBm	dBm/MHz	dBm	dBm/MHz	W	W/MHz
QPSK	5.0	A	7.08	44.26	38.24	62.36	56.34	1,721.8686	430.5266
		B	7.11	44.09	38.04	62.19	56.14	1,655.7700	411.1497
		C	7.10	44.09	38.11	62.19	56.21	1,655.7700	417.8304
		D	7.09	44.18	38.16	62.28	56.26	1,690.4409	422.6686
Total			-	47.23	41.21	65.33	59.31	3,412.3095	853.1952
QPSK	10.0	A	7.12	44.35	35.63	62.45	53.73	1,757.9236	236.0478
		B	7.13	44.22	35.58	62.32	53.68	1,706.0824	233.3458
		C	7.11	44.14	35.39	62.24	53.49	1,674.9429	223.3572
		D	7.12	44.32	35.53	62.42	53.63	1,745.8222	230.6747
Total			-	47.35	38.59	65.45	56.69	3,503.7458	466.7225
QPSK	15.0	A	7.16	44.25	33.71	62.35	51.81	1,717.9084	151.7050
		B	7.17	44.18	33.59	62.28	51.69	1,690.4409	147.5707
		C	7.18	44.03	33.68	62.13	51.78	1,633.0519	150.6607
		D	7.16	44.19	33.68	62.29	51.78	1,694.3378	150.6607
Total			-	47.23	36.71	65.33	54.81	3,412.2462	302.3657
QPSK	20.0	A	7.20	44.20	32.48	62.30	50.58	1,698.2437	114.2878
		B	7.21	44.26	32.61	62.36	50.71	1,721.8686	117.7606
		C	7.21	44.16	32.44	62.26	50.54	1,682.6741	113.2400
		D	7.19	44.11	32.49	62.21	50.59	1,663.4127	114.5513
Total			-	47.17	35.50	65.27	53.60	3,361.6563	228.8391

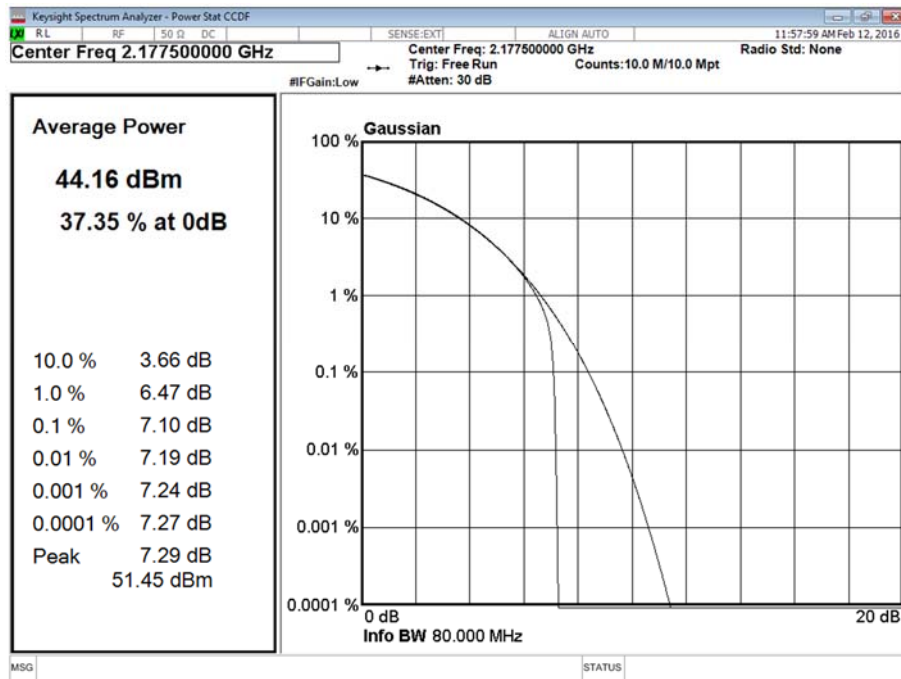
Channel Position T - Bandwidth 5.0 MHz - Antenna A



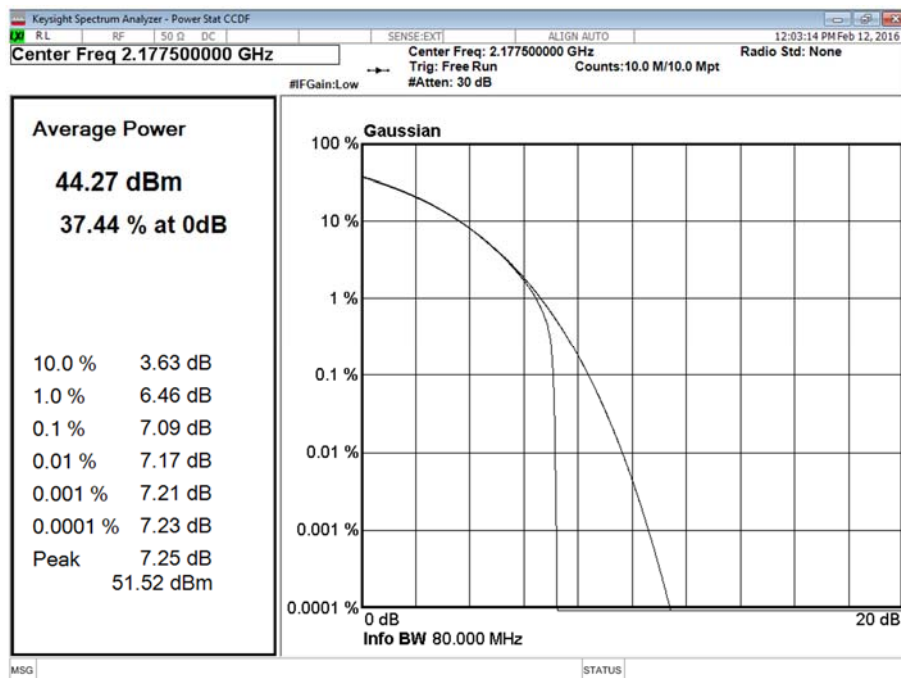
Channel Position T - Bandwidth 5.0 MHz - Antenna B



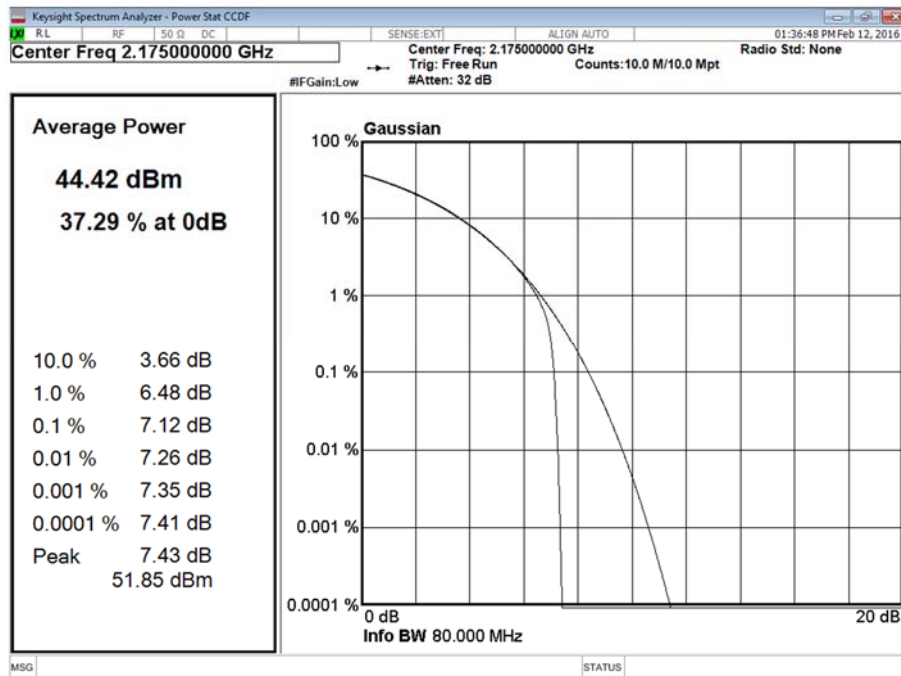
Channel Position T - Bandwidth 5.0 MHz - Antenna C



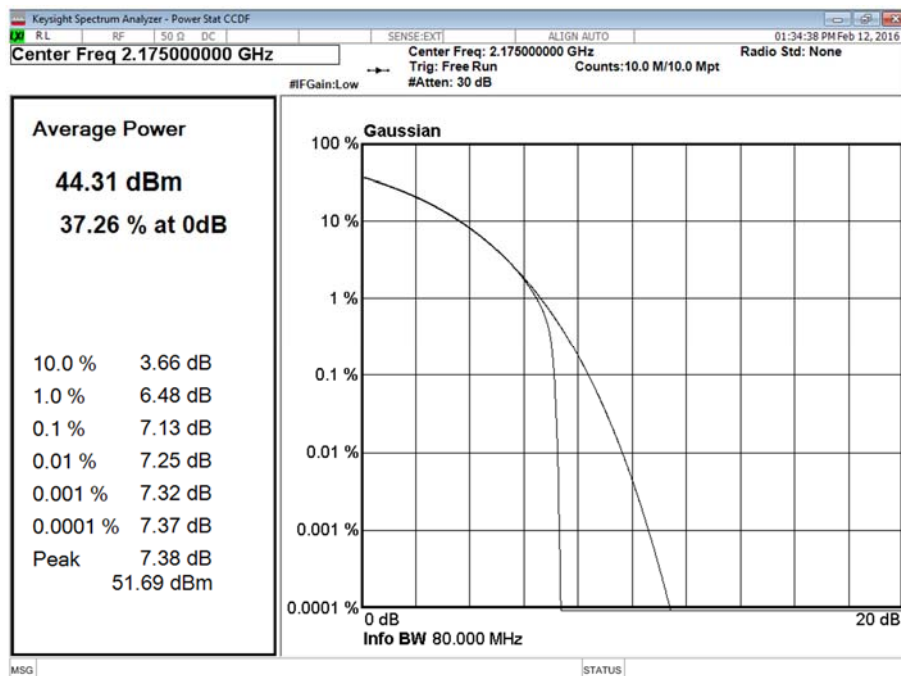
Channel Position T - Bandwidth 5.0 MHz - Antenna D



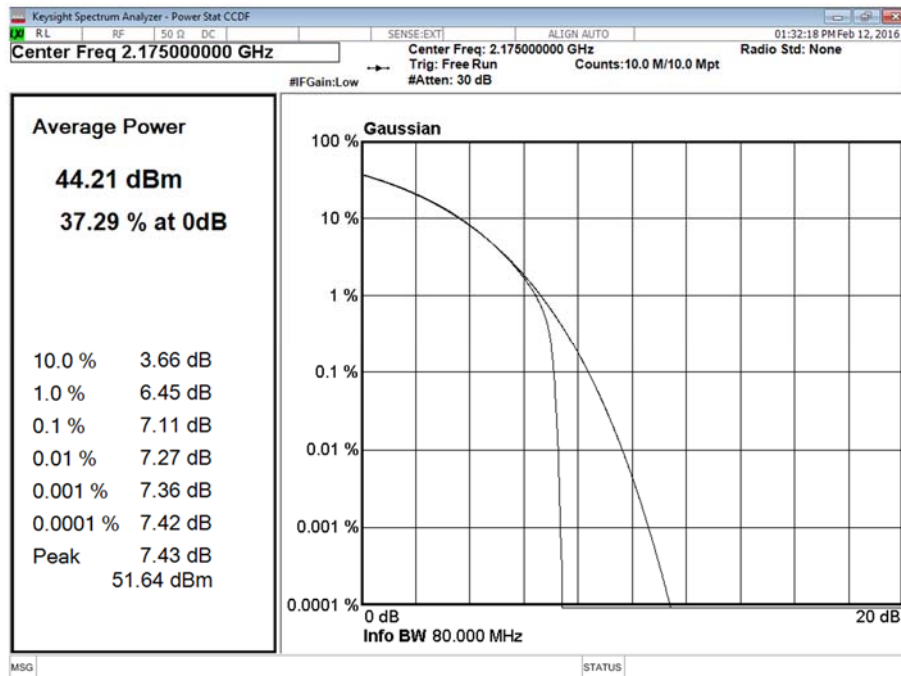
Channel Position T - Bandwidth 10.0 MHz - Antenna A



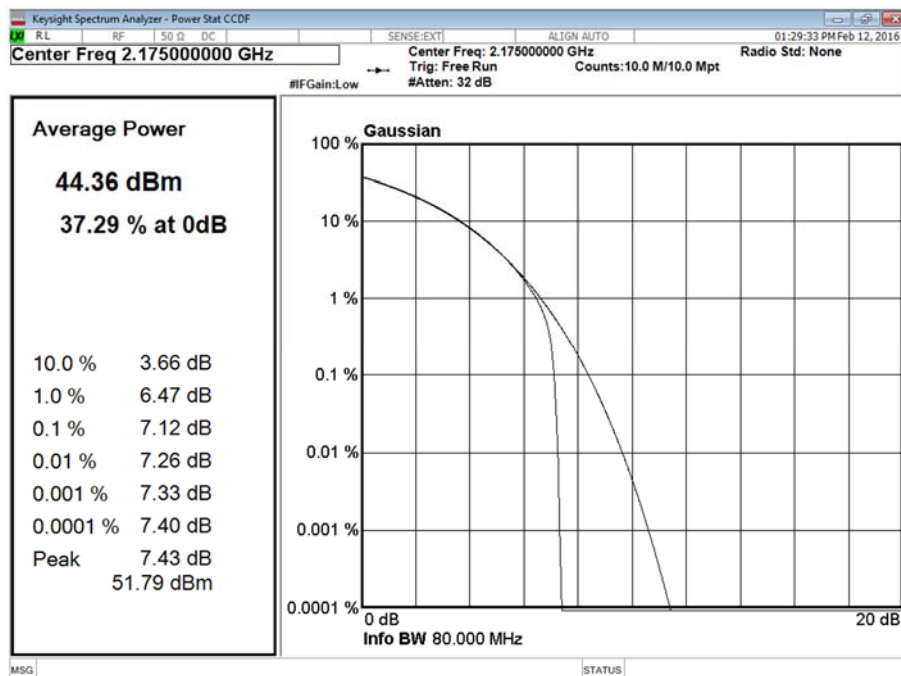
Channel Position T - Bandwidth 10.0 MHz - Antenna B



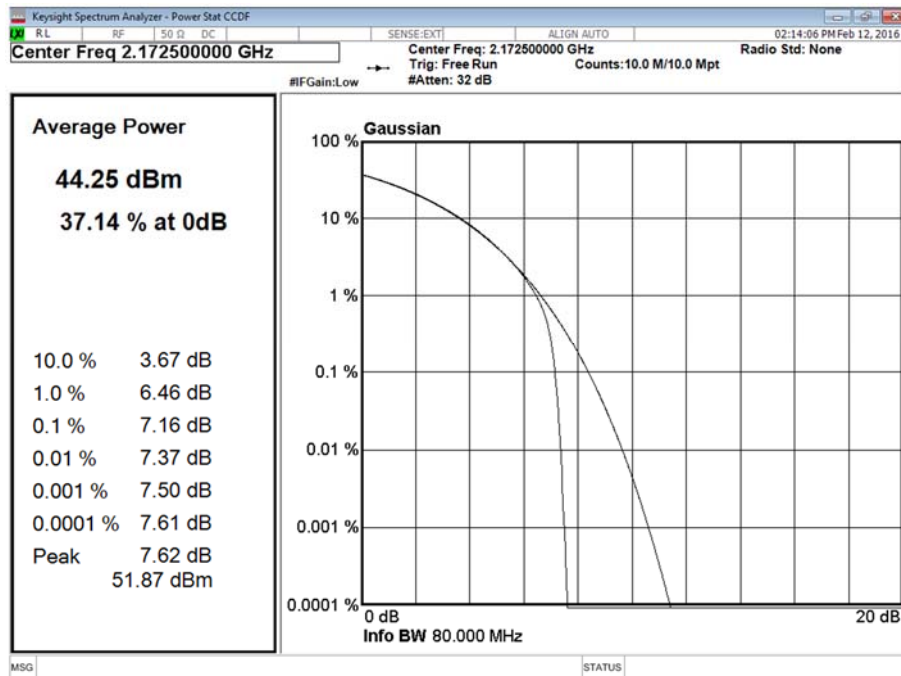
Channel Position T - Bandwidth 10.0 MHz - Antenna C



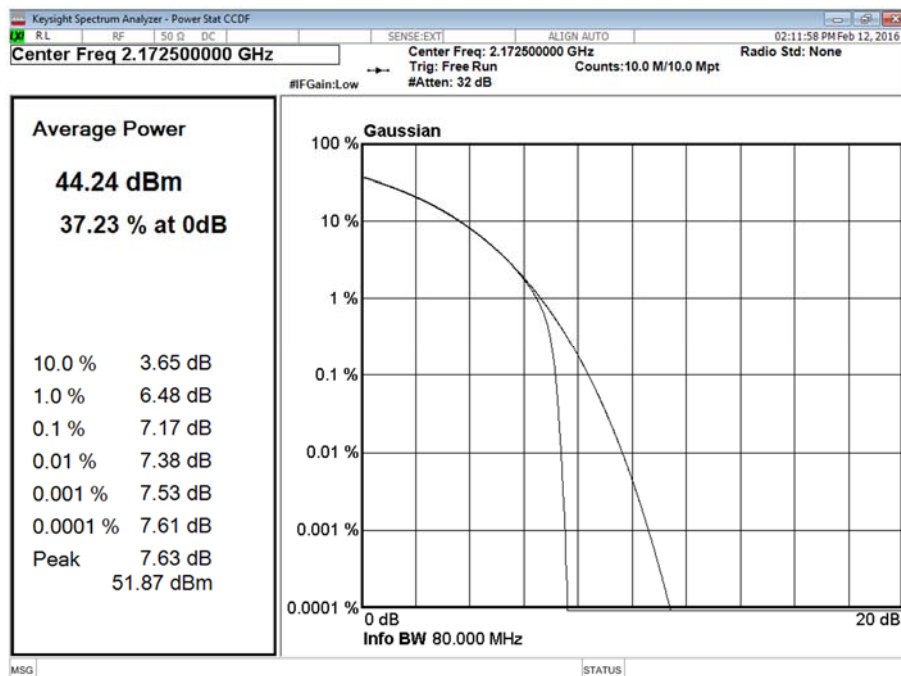
Channel Position T - Bandwidth 10.0 MHz - Antenna D



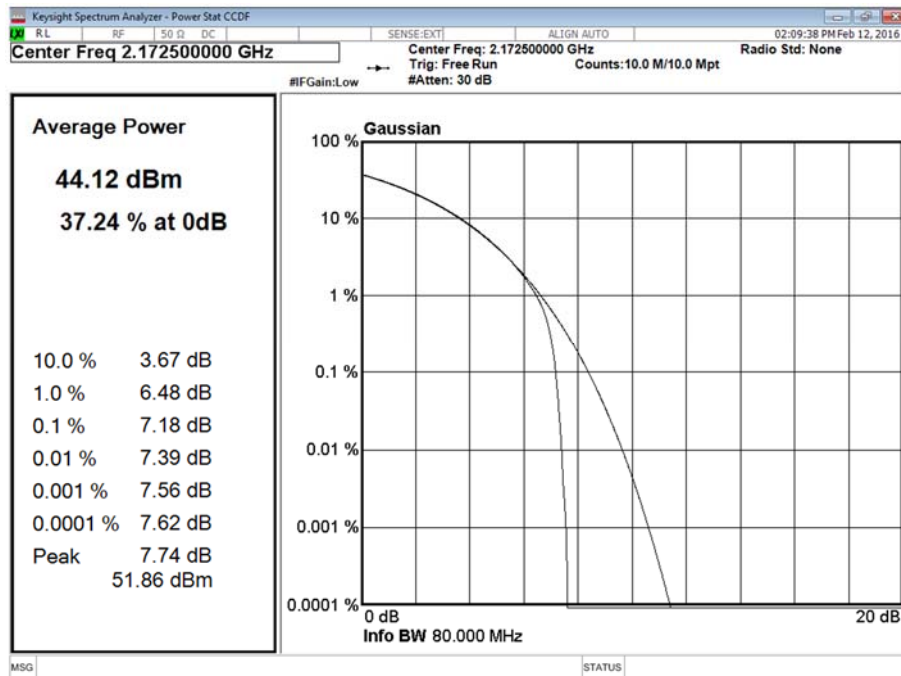
Channel Position T - Bandwidth 15.0 MHz - Antenna A



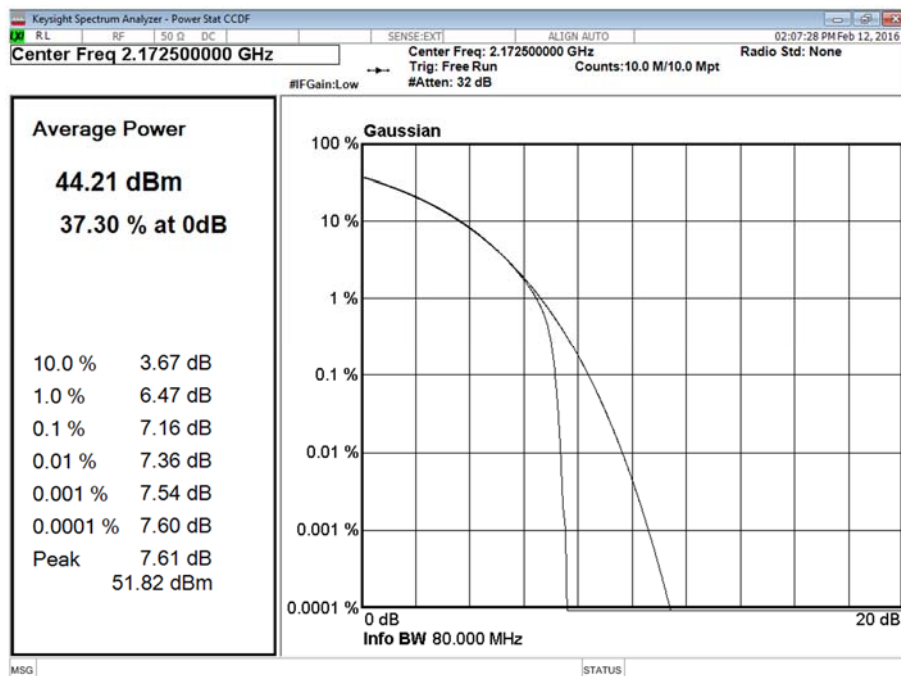
Channel Position T - Bandwidth 15.0 MHz - Antenna B



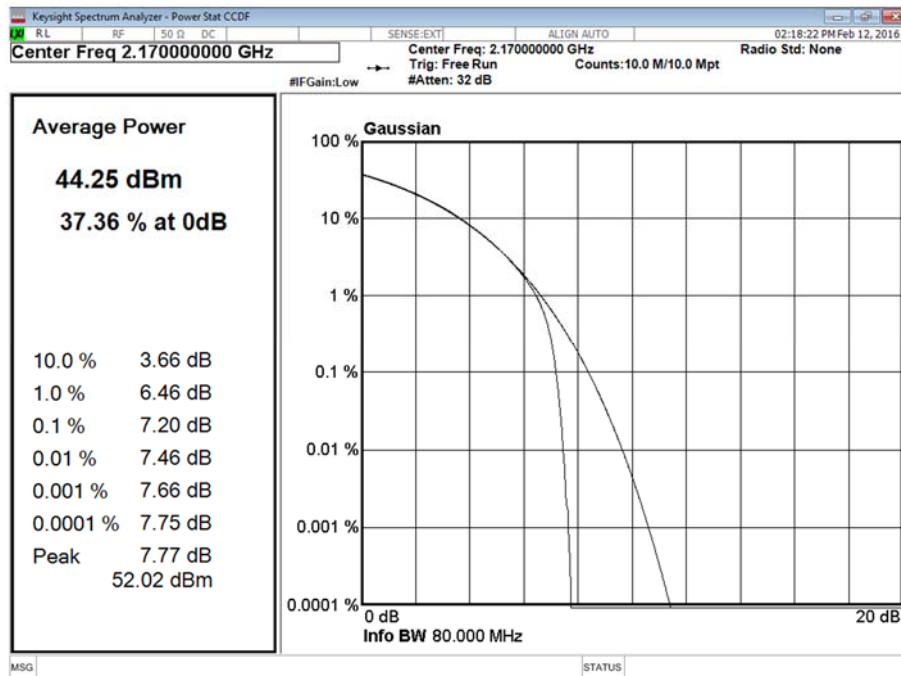
Channel Position T - Bandwidth 15.0 MHz - Antenna C



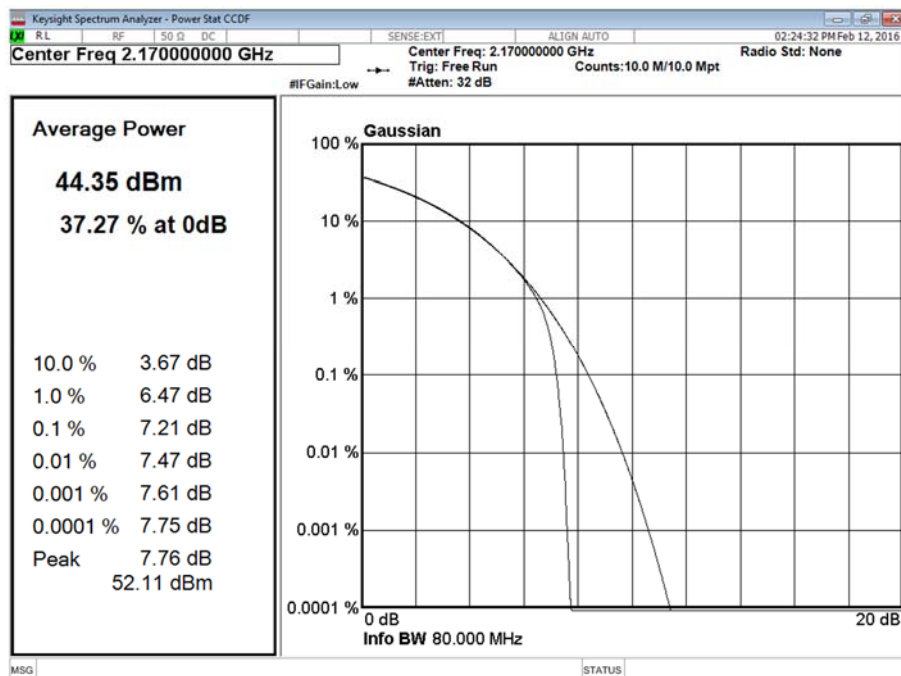
Channel Position T - Bandwidth 15.0 MHz - Antenna D



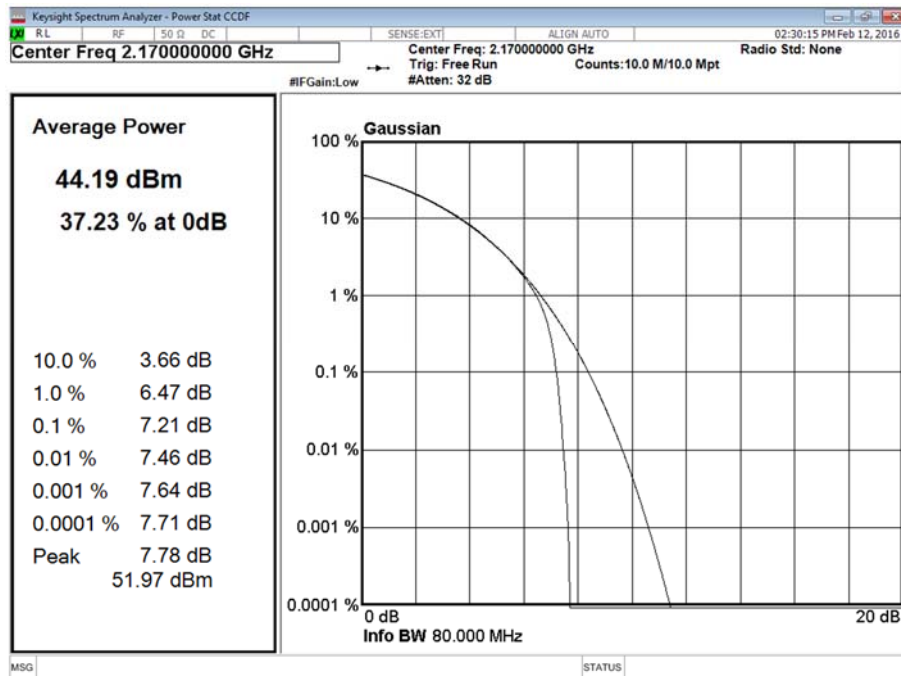
Channel Position T - Bandwidth 20.0 MHz - Antenna A



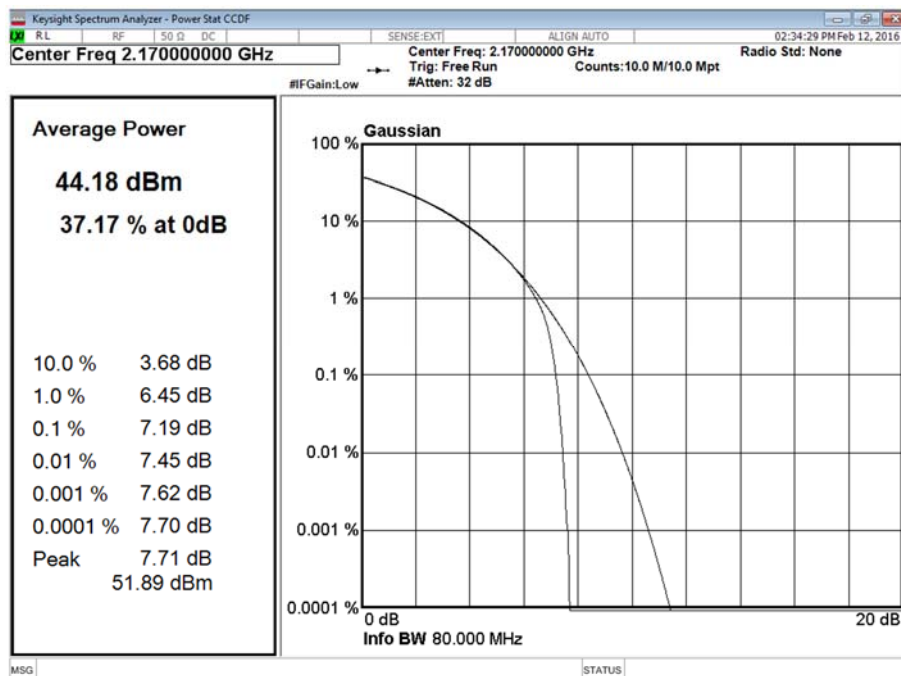
Channel Position T - Bandwidth 20.0 MHz - Antenna B



Channel Position T - Bandwidth 20.0 MHz - Antenna C



Channel Position T - Bandwidth 20.0 MHz - Antenna D



Configuration 4

Maximum Output Power 44.77 dBm

Modulation	Carrier Bandwidth (MHz)	Antenna	Peak to Average Ratio (PAR) / Output Power						
			Channel Position M						
			PAR (dB)	Average Power		Average EIRP			
	dBm	dBm/MHz		dBm	dBm/MHz	W	W/MHz		
QPSK	5.0	A	-	44.08	35.27	62.18	53.37	1,651.9618	217.2701
		B	-	43.91	34.88	62.01	52.98	1,588.5467	198.6095
		C	-	43.87	34.89	61.97	52.99	1,573.9829	199.0673
		D	-	43.84	34.98	61.94	53.08	1,563.1476	203.2357
Total			-	46.97	38.14	65.07	56.24	3,215.1094	420.5058
QPSK	10.0	A	-	44.21	32.53	62.31	50.63	1,702.1585	115.6112
		B	-	44.18	32.39	62.28	50.49	1,690.4409	111.9438
		C	-	44.08	32.13	62.18	50.23	1,651.9618	105.4387
		D	-	44.04	32.14	62.14	50.24	1,636.8165	105.6818
Total			-	47.14	35.35	65.24	53.45	3,338.9750	221.2930
QPSK	15.0	A	-	44.08	30.54	62.18	48.64	1,651.9618	73.1139
		B	-	44.04	30.86	62.14	48.96	1,636.8165	78.7046
		C	-	43.99	30.63	62.09	48.73	1,618.0800	74.6449
		D	-	44.09	30.73	62.19	48.83	1,655.7700	76.3836
Total			-	47.10	33.65	65.20	51.75	3,307.7318	149.4975
QPSK	20.0	A	-	44.14	29.72	62.24	47.82	1,674.9429	60.5341
		B	-	44.09	29.39	62.19	47.49	1,655.7700	56.1048
		C	-	43.96	29.39	62.06	47.49	1,606.9413	56.1048
		D	-	43.92	29.24	62.02	47.34	1,592.2087	54.2001
Total			-	47.04	32.50	65.14	50.60	3,267.1516	114.7342

Configuration 5 (Max 4 carrier)

Maximum Output Power 44.77 dBm

Modulation	Carrier Bandwidth (MHz)	Antenna	Peak to Average Ratio (PAR) / Output Power						
			Channel Position M						
			PAR (dB)	Average Power		Average EIRP			
dBm	dBm/MHz	dBm		dBm/MHz	W	W/MHz			
QPSK	5.0	A	-	43.89	32.27	61.99	50.37	1,581.2480	108.8930
		B	-	43.96	32.28	62.06	50.38	1,606.9413	109.1440
		C	-	43.87	32.29	61.97	50.39	1,573.9829	109.3956
		D	-	43.91	32.13	62.01	50.23	1,588.5467	105.4387
Total			-	46.91	35.21	65.01	53.31	3,169.7948	214.3317
QPSK	10.0	A	-	44.12	29.84	62.22	47.94	1,667.2472	62.2300
		B	-	44.09	29.35	62.19	47.45	1,655.7700	55.5904
		C	-	44.01	29.38	62.11	47.48	1,625.5488	55.9758
		D	-	44.01	29.26	62.11	47.36	1,625.5488	54.4503
Total			-	47.08	32.57	65.18	50.67	3,292.7960	116.6803
QPSK	15.0	A	-	44.23	27.84	62.33	45.94	1,710.0153	39.2645
		B	-	44.23	27.90	62.33	46.00	1,710.0153	39.8107
		C	-	44.10	27.71	62.20	45.81	1,659.5869	38.1066
		D	-	44.09	27.72	62.19	45.82	1,655.7700	38.1944
Total			-	47.17	30.79	65.27	48.89	3,365.7853	77.4589

Configuration 5 (Max 3 carrier)

Maximum Output Power 44.77 dBm

Modulation	Carrier Bandwidth (MHz)	Antenna	Peak to Average Ratio (PAR) / Output Power						
			Channel Position M						
			PAR (dB)	Average Power		Average EIRP			
				dBm	dBm/MHz	dBm	dBm/MHz	W	W/MHz
QPSK	20.0	A	-	44.22	27.77	62.32	45.87	1,706.0824	38.6367
		B	-	44.11	27.93	62.21	46.03	1,663.4127	40.0867
		C	-	43.99	27.80	62.09	45.90	1,618.0800	38.9045
		D	-	44.01	27.54	62.11	45.64	1,625.5488	36.6438
Total			-	47.13	30.67	65.23	48.77	3,331.6311	75.2805

Configuration 6

Maximum Output Power 44.77 dBm

WCDMA Modulation	LTE Bandwidth (MHz)	Antenna	Output Power					
			Channel Position M_{RFBW}					
			Average Power		Average EIRP			
			dBm	dBm/MHz	dBm	dBm/MHz	W	W/MHz
16QAM	20.0	A	44.20	36.00	62.30	54.10	1,697.3089	257.2764
		B	44.09	35.78	62.19	53.88	1,655.0474	244.1181
		C	44.03	35.50	62.13	53.60	1,631.3153	228.8759
		D	44.00	35.75	62.10	53.85	1,623.4092	242.4934
Total			47.11	38.89	65.21	56.99	3,320.7181	499.7699

Remarks

LTE Modulation = QPSK

Configuration 7

Maximum Output Power 44.77 dBm

WCDMA Modulation	LTE Bandwidth (MHz)	Antenna	Output Power					
			Channel Position M_{RFBW}					
			Average Power		Average EIRP			
			dBm	dBm/MHz	dBm	dBm/MHz	W	W/MHz
16QAM	20.0	A	44.28	33.00	62.38	51.10	1,728.9637	128.7064
		B	44.15	32.77	62.25	50.87	1,680.6725	122.1237
		C	44.11	32.91	62.21	51.01	1,661.7276	126.1537
		D	44.25	32.93	62.35	51.03	1,718.9046	126.8236
Total			47.28	35.97	65.38	54.07	3,447.8683	255.5299

Remarks

LTE Modulation = QPSK

Limit	
Peak Power	≤ 3280 W or $\leq +65$ dBm
Peak to Average Ratio	13 dB

2.2 OCCUPIED BANDWIDTH

2.2.1 Specification Reference

FCC CFR 47 Part 2, Clause 2.1049
FCC CFR 47 Part 27, Clause 27.53
Industry Canada RSS-GEN, Clause 6.6

2.2.2 Date of Test and Modification State

02 February 2016 - 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 25.4°C
Relative Humidity 20.4%

2.2.5 Test Method

The EUT was connected to a Signal Analyser via an attenuator and an RF switch. The path loss between the EUT and the Analyser was measured using a Network Analyser and entered as a Reference Level Offset.

The EUT was set to transmit at its maximum rated output power in the configurations described below.

The measurements were performed using the Analyser Occupied Bandwidth measurement mode function in accordance with FCC KDB 971168 D01 v02r02.
The Analyser RBW was configured to be at least 1% of the channel bandwidth of the carrier to be measured. A peak detector with the trace set to max hold was configured.

Testing was performed on all ports.

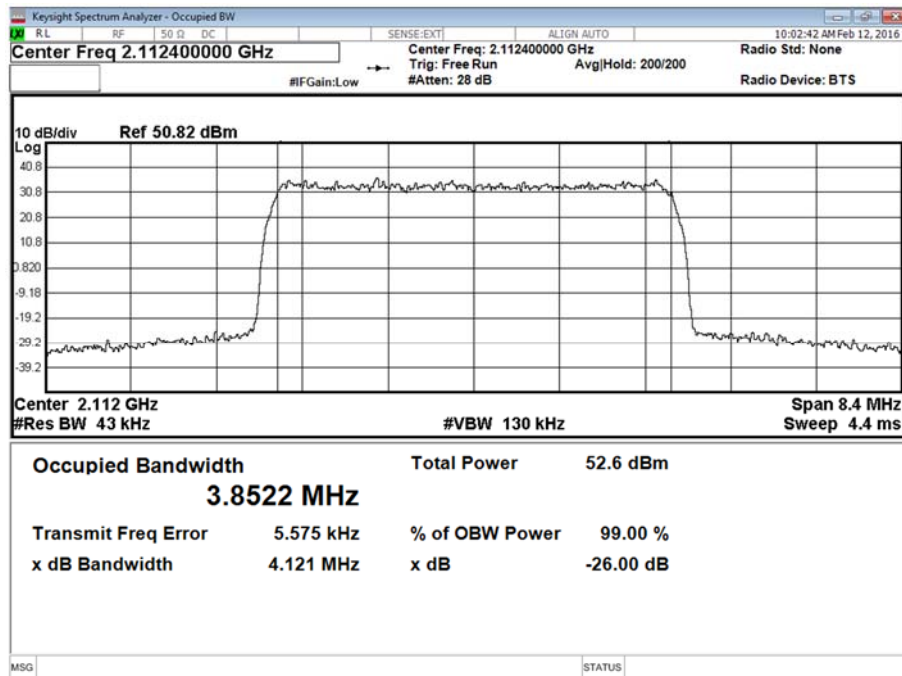
2.2.6 Test Results

Configuration 1 Antenna A

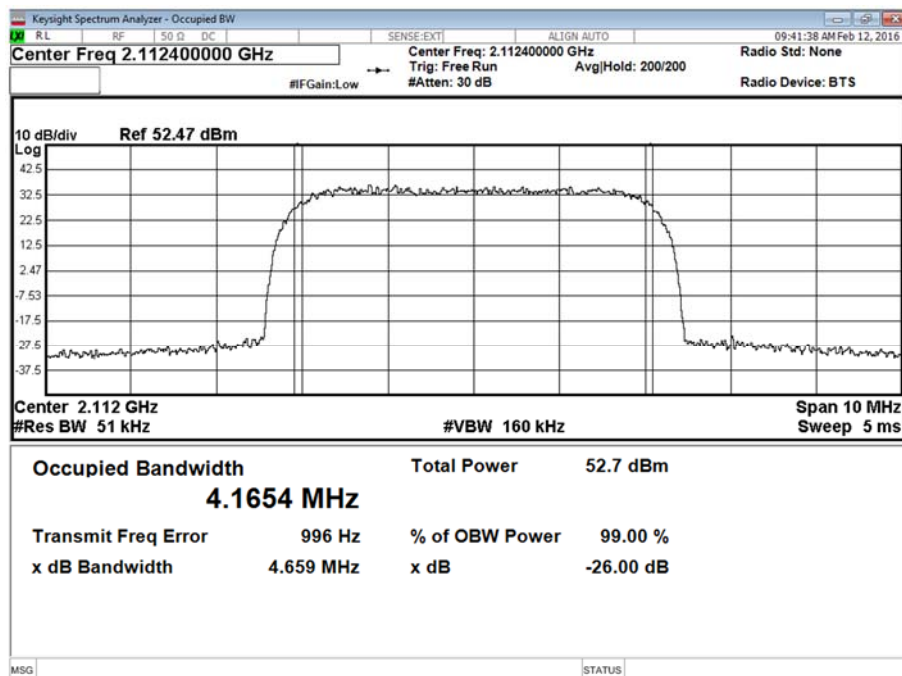
Maximum Output Power 44.77 dBm

Carrier Bandwidth / Modulation	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
4.2 MHz / QPSK	3,852.23	4,121.29	3,844.06	4,115.73	3,852.47	4,102.93
5.0 MHz / QPSK	4,165.37	4,658.92	4,172.18	4,668.03	4,174.33	4,664.80

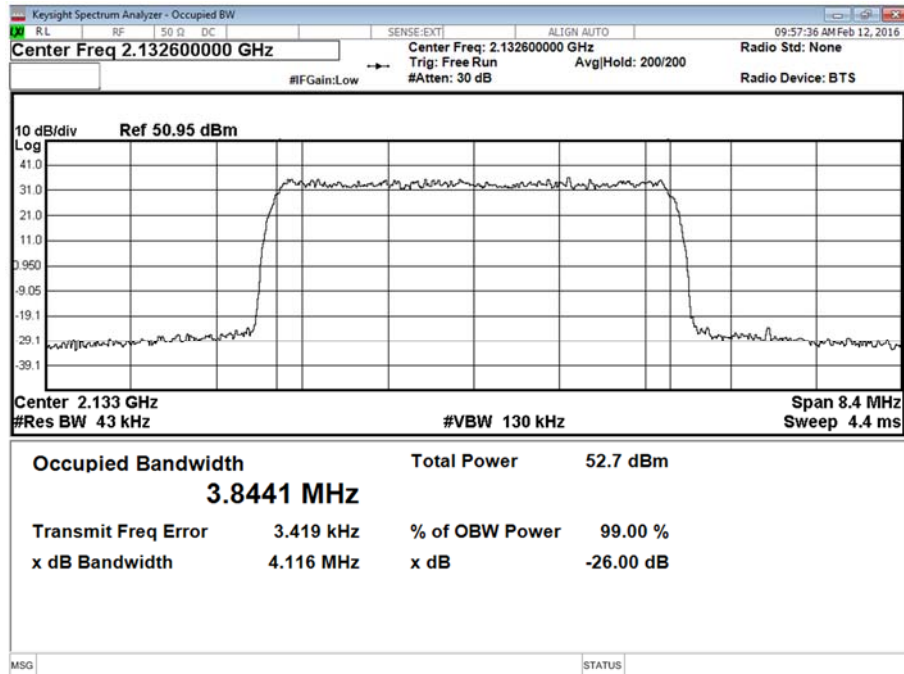
Channel Position B - Bandwidth 4.2 MHz - Antenna A



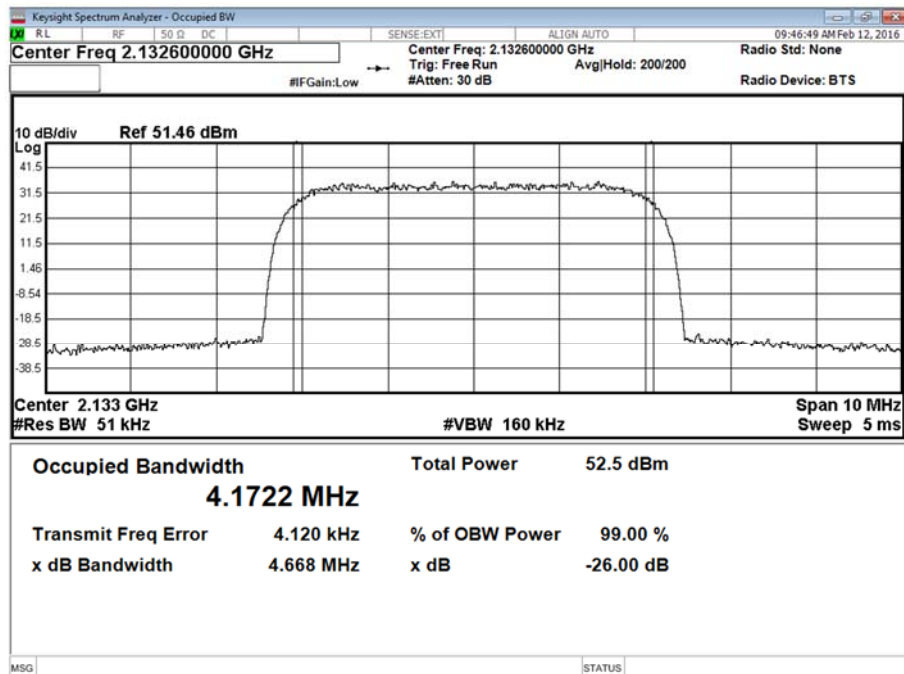
Channel Position B - Bandwidth 5.0 MHz - Antenna A



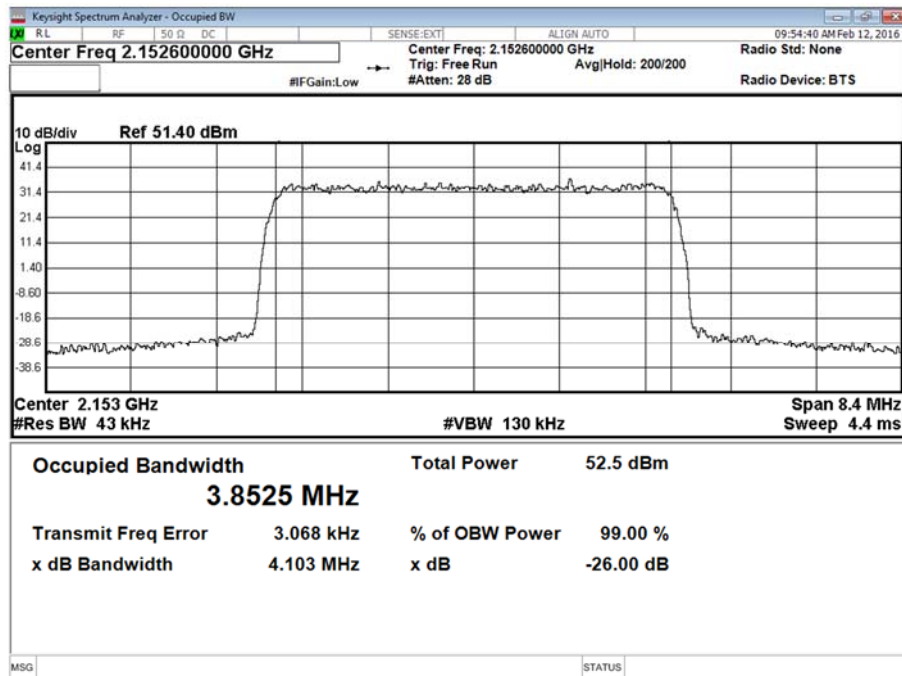
Channel Position M - Bandwidth 4.2 MHz - Antenna A



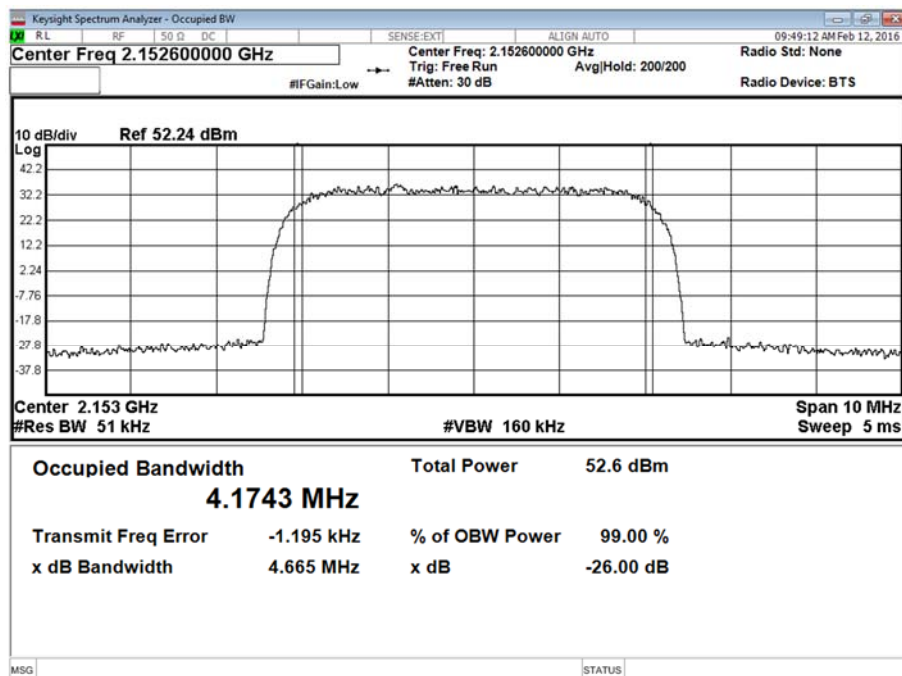
Channel Position M - Bandwidth 5.0 MHz - Antenna A



Channel Position T - Bandwidth 4.2 MHz - Antenna A



Channel Position T - Bandwidth 5.0 MHz - Antenna A

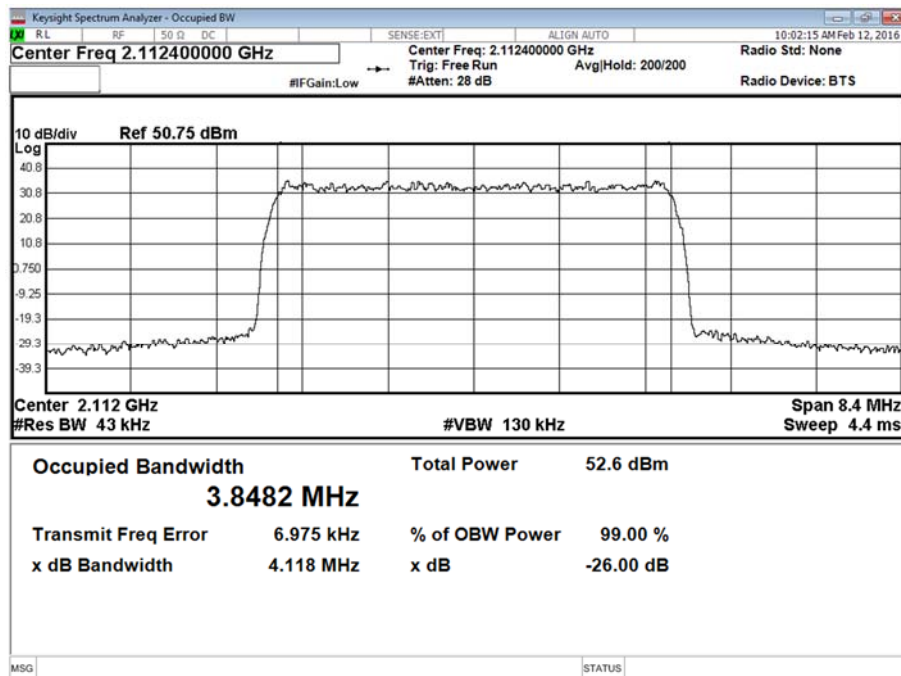


Configuration 1 Antenna B

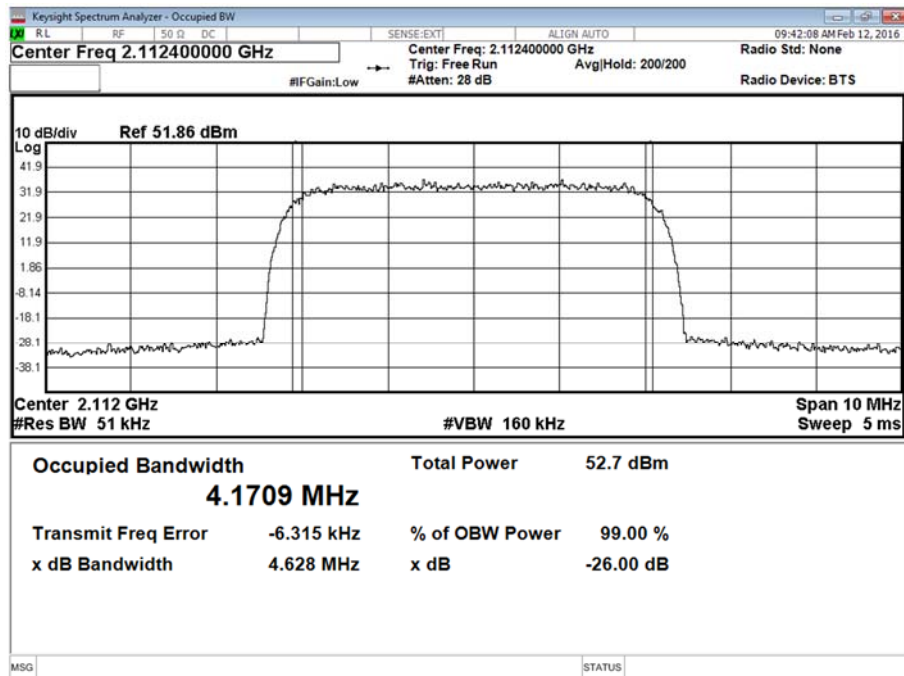
Maximum Output Power 44.77 dBm

Carrier Bandwidth / Modulation	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
4.2 MHz / QPSK	3,848.24	4,118.48	3,848.20	4,118.47	3,848.18	4,115.91
5.0 MHz / QPSK	4,170.88	4,627.58	4,174.79	4,643.05	4,152.85	4,648.73

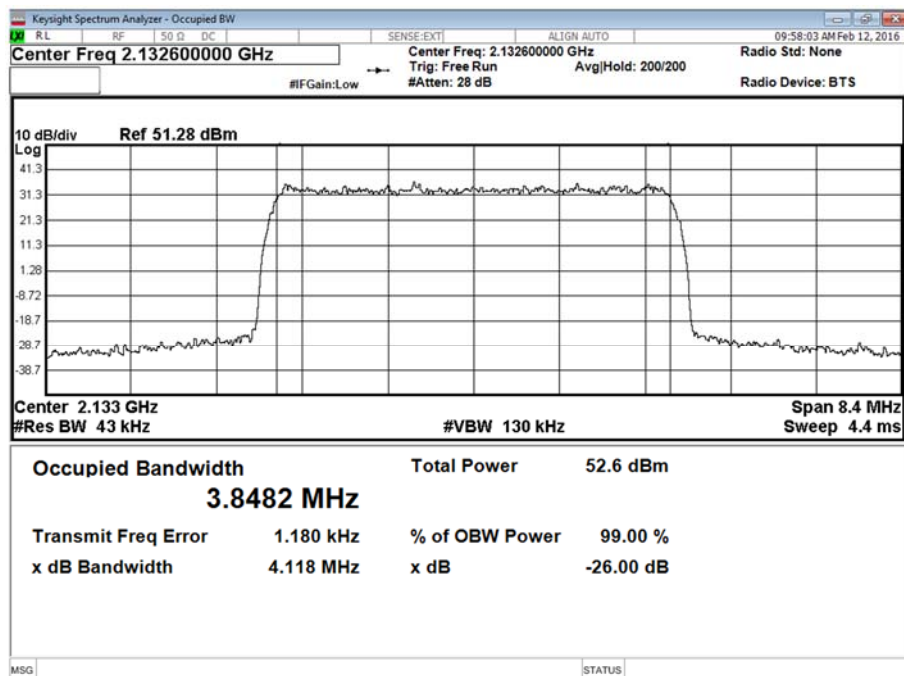
Channel Position B - Bandwidth 4.2 MHz - Antenna B



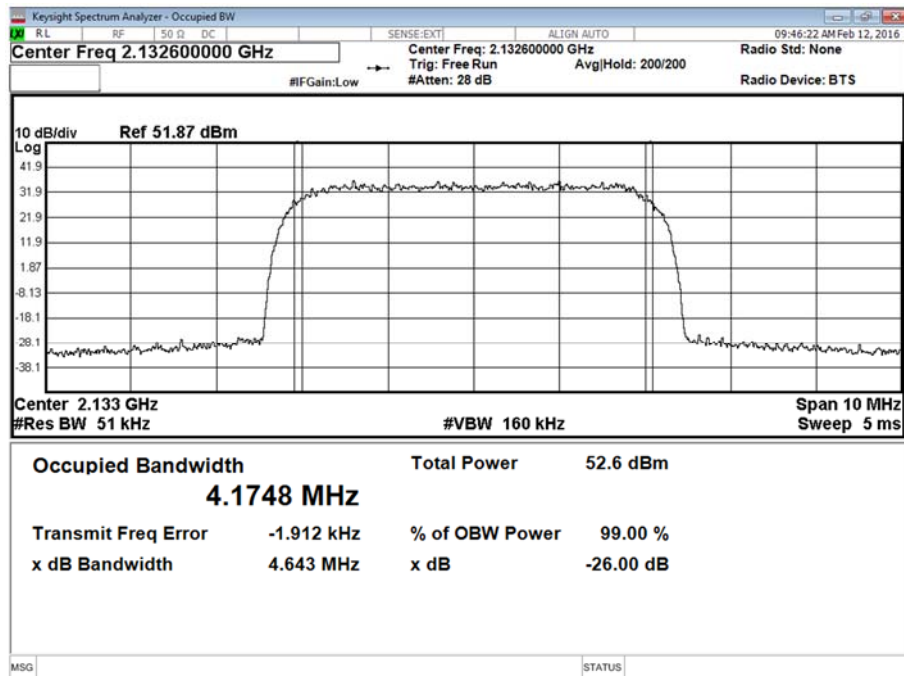
Channel Position B - Bandwidth 5.0 MHz - Antenna B



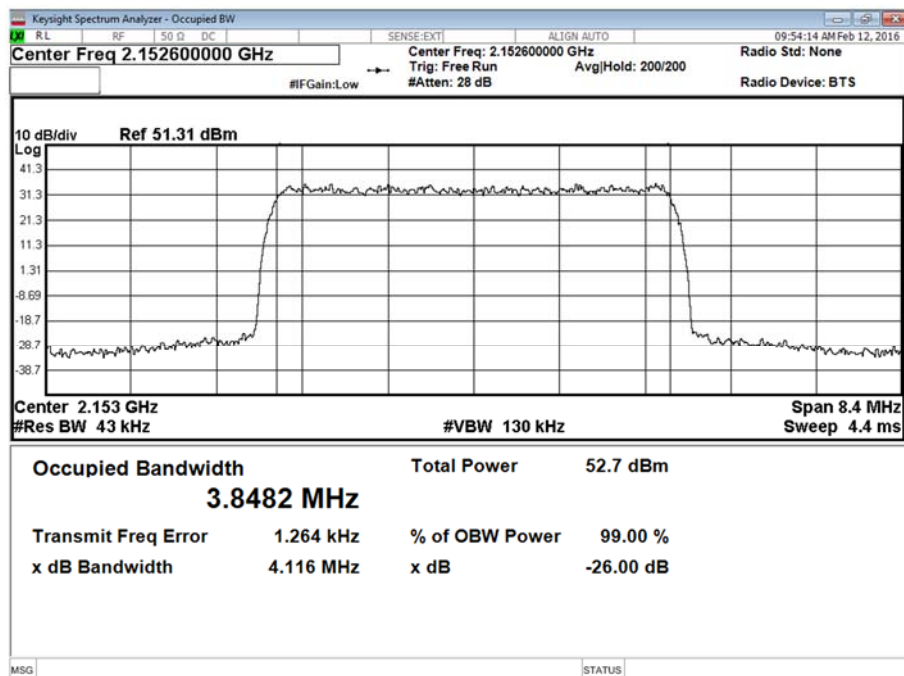
Channel Position M - Bandwidth 4.2 MHz - Antenna B



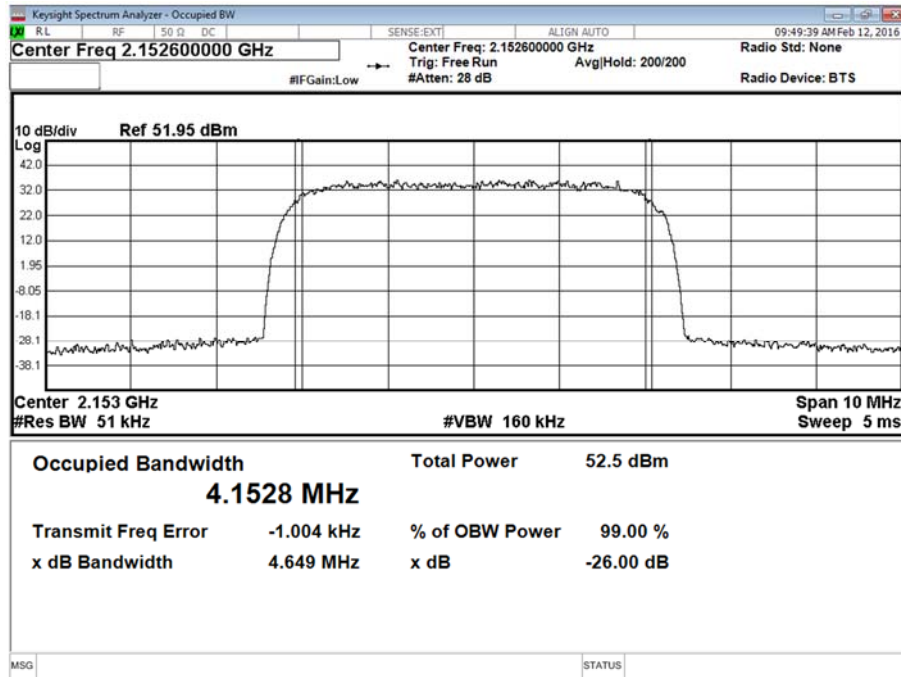
Channel Position M - Bandwidth 5.0 MHz - Antenna B



Channel Position T - Bandwidth 4.2 MHz - Antenna B



Channel Position T - Bandwidth 5.0 MHz - Antenna B

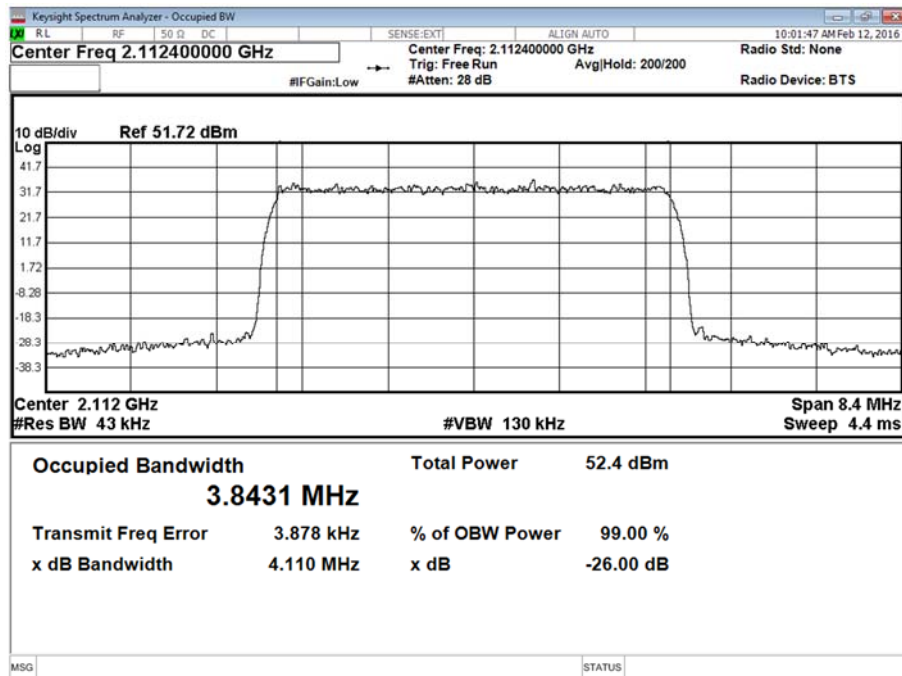


Configuration 1 Antenna C

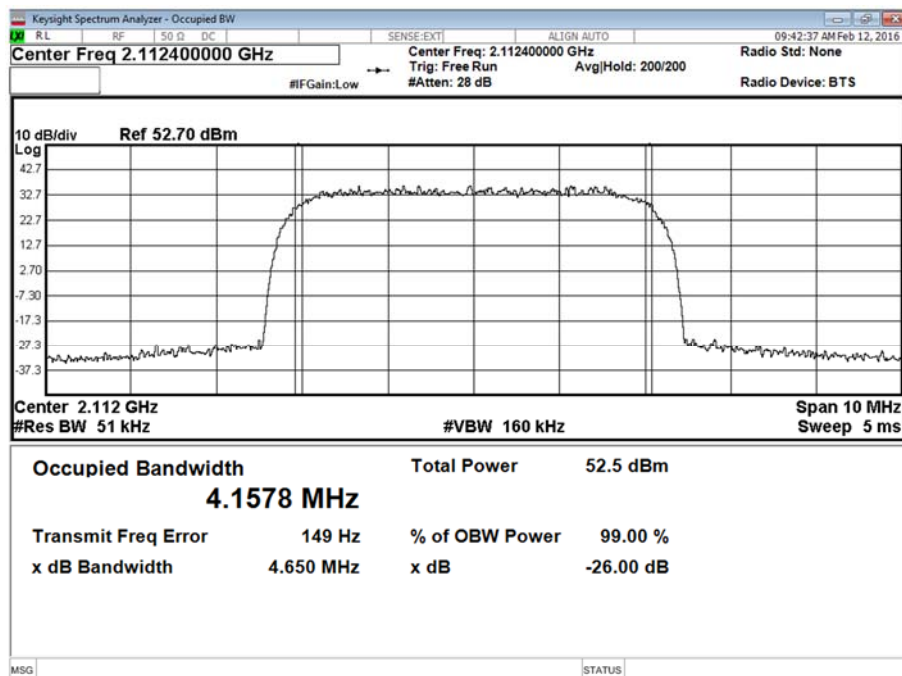
Maximum Output Power 44.77 dBm

Carrier Bandwidth / Modulation	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
4.2 MHz / QPSK	3,843.11	4,110.37	3,832.26	4,117.21	3,859.81	4,118.90
5.0 MHz / QPSK	4,157.79	4,649.76	4,160.01	4,626.31	4,158.29	4,629.60

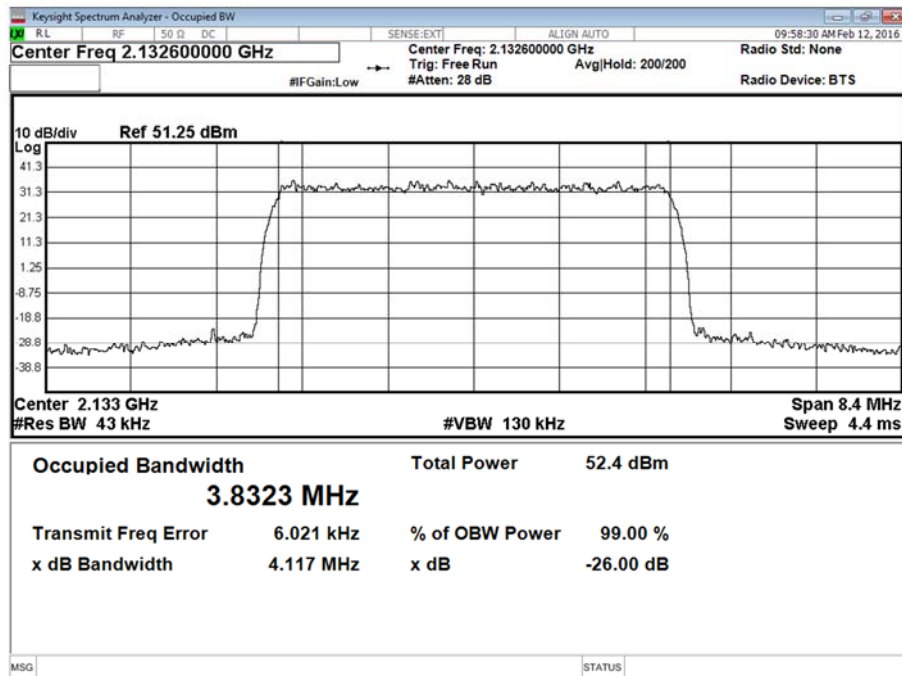
Channel Position B - Bandwidth 4.2 MHz - Antenna C



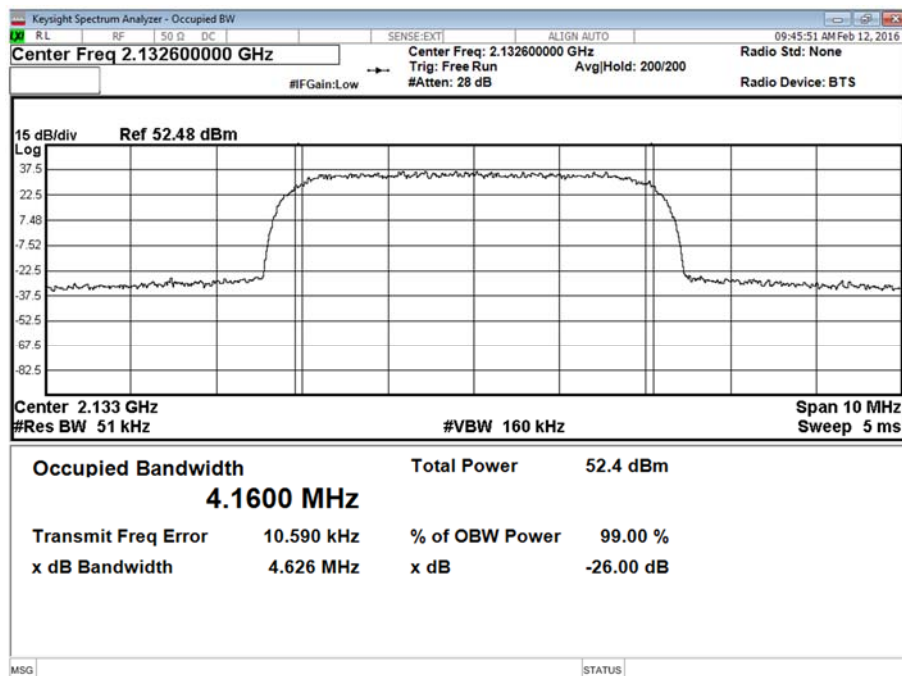
Channel Position B - Bandwidth 5.0 MHz - Antenna C



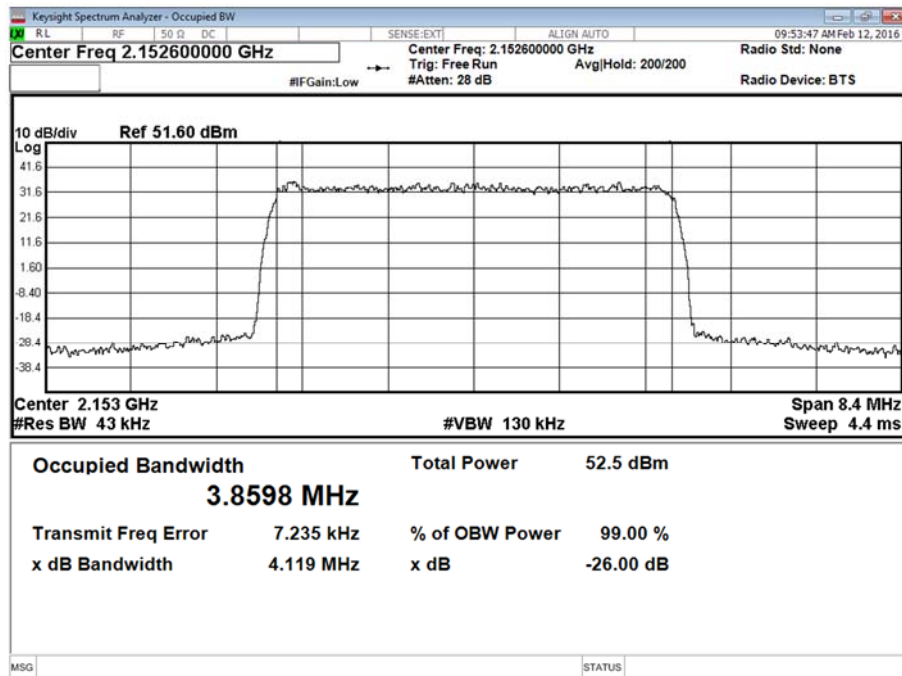
Channel Position M - Bandwidth 4.2 MHz - Antenna C



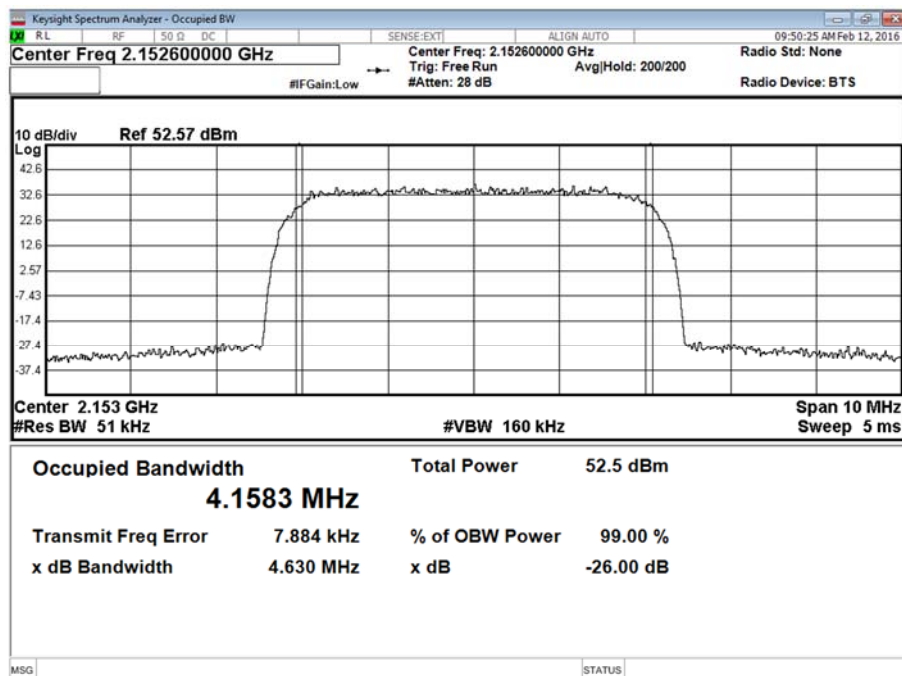
Channel Position M - Bandwidth 5.0 MHz - Antenna C



Channel Position T - Bandwidth 4.2 MHz - Antenna C



Channel Position T - Bandwidth 5.0 MHz - Antenna C

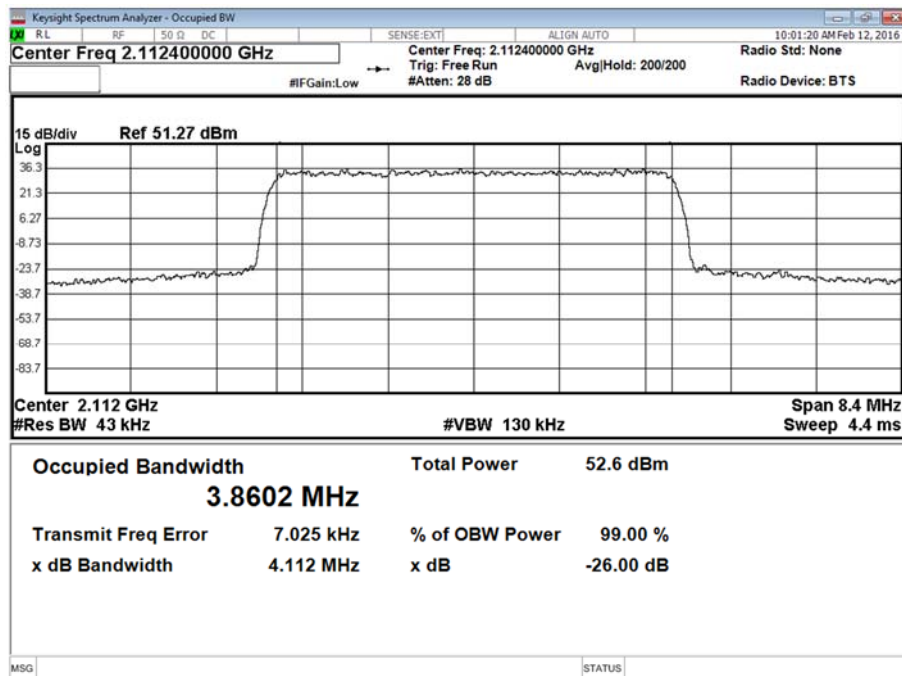


Configuration 1 Antenna D

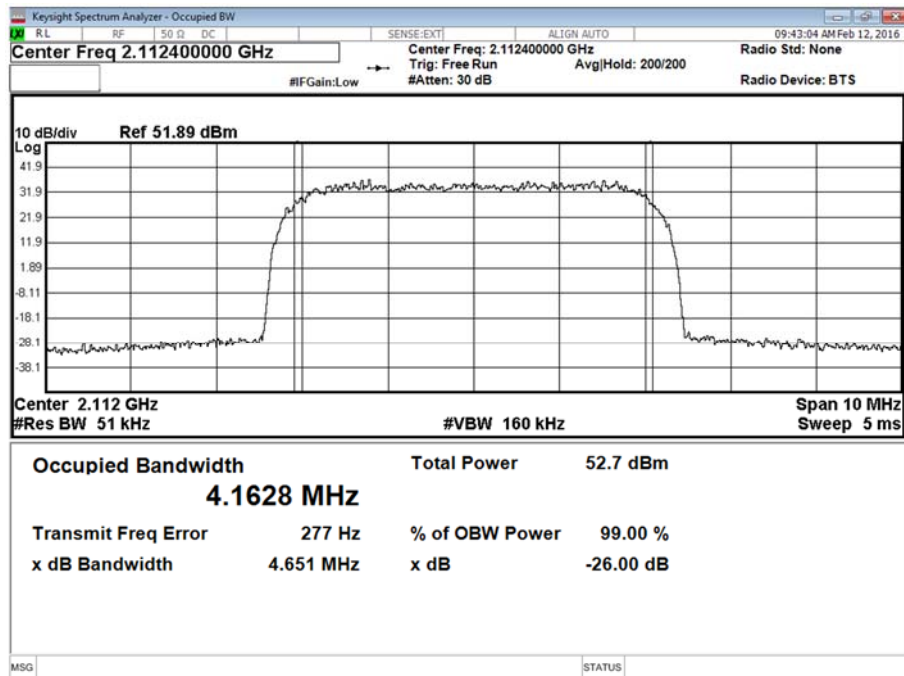
Maximum Output Power 44.77 dBm

Carrier Bandwidth / Modulation	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
4.2 MHz / QPSK	3,860.17	4,112.34	3,846.27	4,101.98	3,859.73	4,118.25
5.0 MHz / QPSK	4,162.83	4,650.54	4,166.96	4,636.33	4,180.87	4,652.26

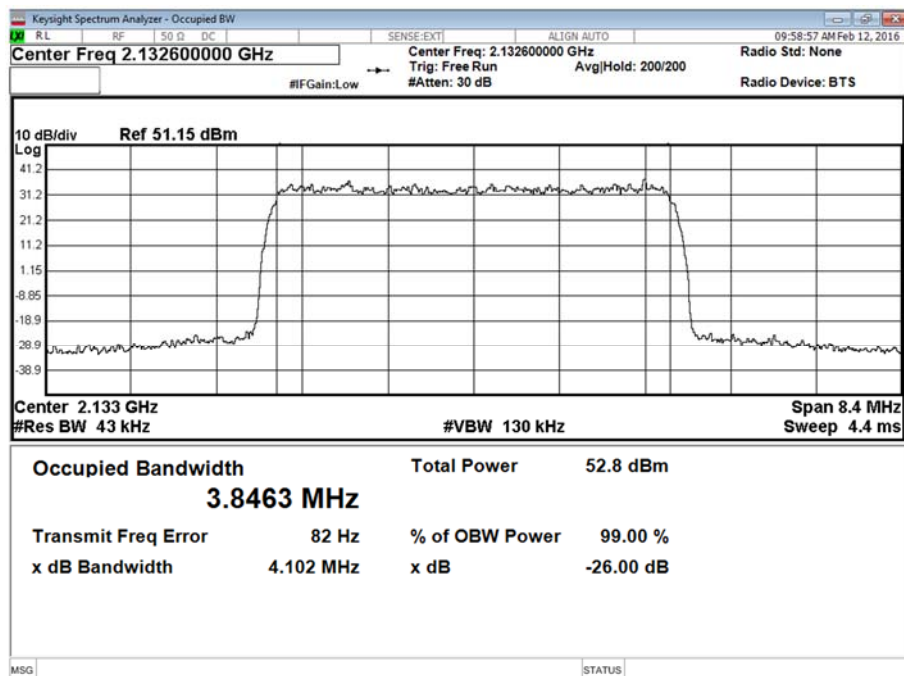
Channel Position B - Bandwidth 4.2 MHz - Antenna D



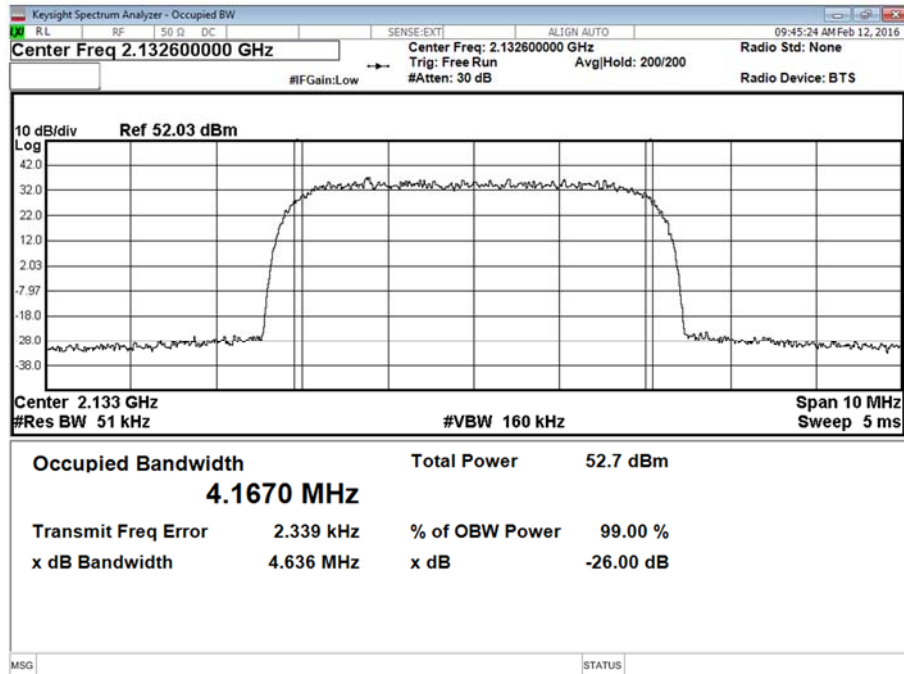
Channel Position B - Bandwidth 5.0 MHz - Antenna D



Channel Position M - Bandwidth 4.2 MHz - Antenna D



Channel Position M - Bandwidth 5.0 MHz - Antenna D



Channel Position T - Bandwidth 4.2 MHz - Antenna D

