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Report On

FCC and IC Testing of the
Ericsson AB (2100MHz) RRUS 32 B4 KRC 161 416/1 Remote Radio
Unit In accordance with FCC CFR 47 Part 2 and 27 and Industry
Canada RSS-139

COMMERCIAL-IN-CONFIDENCE

FCC ID: TA8AKRC161416-1

IC: 287AB-AS1614161

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DATED

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Product Service

SECTION 1

REPORT INFORMATION

1.1 REPORT DETAILS

The information contained in this report is intended to show verification of the Ericsson RRUS 32 B4 KRC 161 416/1 Remote Radio Unit to the requirements of FCC CFR 47 Part 2 and 27 and Industry Canada RSS-139.

Testing was carried out in support of an application for Grant of RRUS 32 B4 KRC 161 416/1 in WCDMA / LTE / WCDMA & LTE MSR mode.

Manufacturer	Ericsson AB
Address	Isafjordsgatan 10 SE-164 80 Stockholm 16480 Sweden
Product Name	RRUS 32 B4
Product Number	KRC 161 416/1
HVIN	AS1614161
Serial Number(s)	D16Q644897
Software Version	CXP9017316/5 Rev R60JB
Hardware Version	R1C
Test Specification/Issue/Date	FCC CFR 47 Part 27: 2014 Industry Canada RSS-139 Issue 2: 2009
Start of Test	17 August 2015
Finish of Test	02 September 2015
Name of Engineer(s)	Guiying Zhao
Related Document(s)	ANSI C63.4: 2009 ANSI/TIA-603-C-2004 FCC CFR 47 Part 2: 2014 Industry Canada RSS-GEN Issue 4: 2014 Industry Canada SRSP-513 Issue 3: 2015 KDB 971168 D01 v02 r02 KDB 662911 D01 v02 r01

This report has been upissued from Issue 1 to Issue 2 and should be read in place of Issue 1. This report has been upissued to correct the frequencies stated in the Frequency Stability.

1.2 BRIEF SUMMARY OF RESULTS

A brief summary of results for each configuration, in accordance with FCC CFR 47 Part 2, Part 27 and Industry Canada RSS-139 is shown below.

Section	Spec Clause			Test Description	Result
	Part 2	Part 27	RSS 139		
2.1	2.1046	27.50 (d) (i)	6.4	Maximum Output Power and Peak to Average Ratio – Conducted	Pass
	-	27.50 (d)	6.4	Equivalent Isotropically Radiated Power (EIRP)	N/A
2.2	2.1049(h)	27.53 (h)	RSS-Gen 6.6	Occupied Bandwidth	Pass
2.3	2.1051	27.53 (h)	6.5	Spurious Emissions at Band Edge	Pass
2.4	2.1053	27.53 (h)	6.5	Radiated Spurious Emissions	Pass
2.5	2.1051	27.53 (h)	6.5	Conducted Spurious Emissions	Pass
2.6	2.1055	27.54	6.3	Frequency Stability	Pass

N/A – Not Applicable, due to no integral antenna

1.3 CONFIGURATION DESCRIPTION

Configuration Code	Carrier(s)	Configuration Description
W-SC	1C	WCDMA Single Antenna, Single Carrier
W-MC	2C	WCDMA Single Antenna, Multi Carrier x2
W-MIMO-SC	1C	WCDMA MIMO, Single Carrier
W-MIMO-MC	2C	WCDMA MIMO, Multi Carrier x2
L-MIMO-SC	1C	LTE MIMO, Single Carrier
L-MIMO-MC 1	2C	LTE MIMO, Multi Carrier x2
L-MIMO-MC 2	3C	LTE MIMO, Multi Carrier x3
W+L-MC 1	1W+1L	WCDMA+LTE Single Antenna, One Tx, 1WCDMA+1LTE
W+L-MC 2	2W+3L	WCDMA+LTE Single Antenna, One Tx, 2WCDMA+3LTE
W+L-MIMO-MC 1	1W+1L	WCDMA+LTE MIMO, 1WCDMA+1LTE
W+L-MIMO-MC 2	2W+3L	WCDMA+LTE MIMO, 2WCDMA+3LTE
W+L-MIMO-MC 3	2W+1L	WCDMA+LTE MIMO, 2WCDMA+1LTE

The settings below were deemed representative for all traffic scenarios when settings with different modulations, channel bandwidths, number for carriers and RF configurations have been tested to find the worst case setting. The settings below were used for all measurements unless otherwise noted:

WCDMA:

Non-MIMO:

Single carrier TM1: 64 DPCHs at 30ksps (SF=128)

Multi carrier TM1 (x2): 32 DPCHs at 30ksps (SF=128) in each carrier

MIMO:

Single carrier TM5: 30 DPCHs at 30ksps (SF=128) and 8 HS-PDSCHs at 240 kbps (SF16)

Multi carrier TM5 (x2): 30 DPCHs at 30ksps (SF=128) and 8 HS-PDSCHs at 240 kbps (SF16)

MIMO:

Single carrier TM6: 30 DPCHs at 30ksps (SF=128) and 8 HS-PDSCHs at 240 kbps (SF16)

Multi carrier TM6 (x2): 30 DPCHs at 30ksps (SF=128) and 8 HS-PDSCHs at 240 kbps (SF16)

Channel Bandwidth: 5.0MHz and 4.2MHz

LTE:

MIMO mode single carrier: E-TM1.1

MIMO mode multi carrier (x2): E-TM1.1

MIMO mode multi carrier (x3): E-TM1.1

MIMO mode single carrier: E-TM3.2

MIMO mode multi carrier (x2): E-TM3.2

MIMO mode multi carrier (x3): E-TM3.2

MIMO mode single carrier: E-TM3.1

MIMO mode multi carrier (x2): E-TM3.1

MIMO mode multi carrier (x3): E-TM3.1



Product Service

The EUT includes four TX/RX ports and it can be configured to transmit in MIMO mode, and MIMO mode was used for measurements as the worst configuration.

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

The Maximum Output Power was tested on all TX/RX output connector RF A, B, C and D, and all other TX measurements were performed on the combined TX/RX output connector RF A of the EUT as the representative port.

1.4 DECLARATION OF BUILD STATUS

MAIN EUT	
MANUFACTURING DESCRIPTION	Remote Radio Unit
MANUFACTURER	Ericsson AB
PRODUCT NAME	RRUS 32 B4
PRODUCT NUMBER	KRC 161 416/1
IC MODLE NUMBER	AS1614161
TRANSMITTER OPERATING RANGE	TX: 2110 MHz - 2155 MHz RX: 1710 MHz - 1755 MHz
MODULATIONS	WCDMA: QPSK, 16QAM, 64QAM LTE: QPSK, 16QAM, 64QAM
ITU DESIGNATION OF EMISSION	WCDMA: 5M00F9W LTE: 5M00F9W, 10M0F9W, 15M0F9W, 20M0F9W
NUMBER OF CARRIERS	Maximum 5 carriers
SUPPORTED CHANNEL BANDWIDTH CONFIGURATION	WCDMA: 4.2MHz to 5MHz (configurable in steps of 100/200kHz) LTE: 5MHz, 10MHz, 15MHz and 20MHz
OUTPUT POWER (RMS) (W or dBm)	Maximum 46.0dBm (40W) per port
OUTPUT POWER TOLERANCE	± 2.0dB
INSTANTANEOUS BANDWIDTH	45MHz
NUMBER OF ANTENNA PORTS	4 TX/RX ports
FCC ID	TA8AKRC161416-1
IC ID	287AB-AS1614161
Power source	-48V DC
TECHNICAL DESCRIPTION (a brief description of the intended use and operation)	The equipment is the Remote Radio Part of WCDMA / LTE / WCDMA & LTE MSR Base Station.

Signature



Date

07 September 2015

D of B S Serial No

75930571/01

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

1.5 PRODUCT INFORMATION

1.5.1 Technical Description

The Equipment Under Test (EUT) RRUS 32 B4 KRC 161 416/1 is an Ericsson Remote Radio Unit working in the public mobile service 2100MHz band which provides communication connections to 2100MHz network in WCDMA / LTE modes and WCDMA & LTE MSR modes. The RRUS 32 B4 KRC 161 416/1 operates from a -48V DC supply.

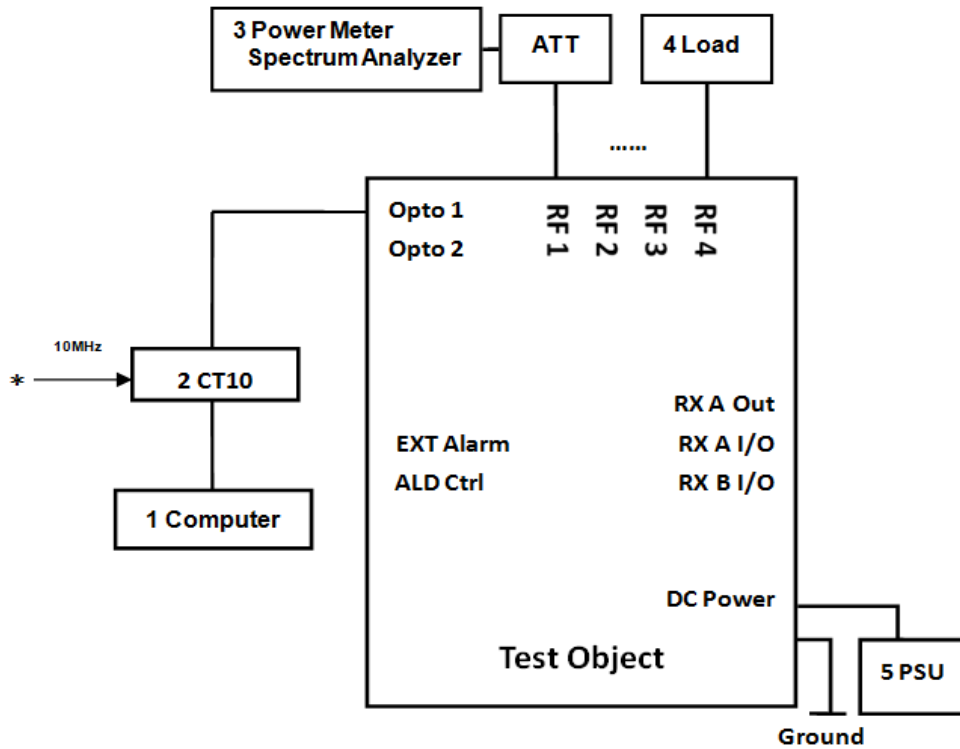
The Equipment Under Test (EUT) is shown in the photograph below. A full technical description can be found in the Manufacturer's documentation.



Equipment Under Test

1.6 TEST SETUP

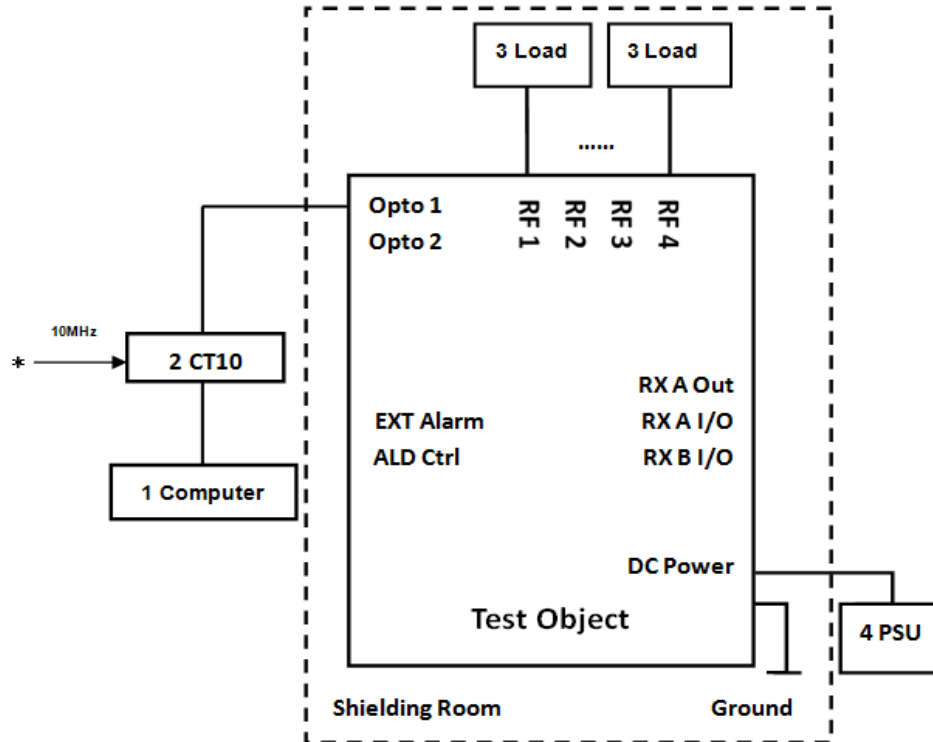
Test Setup, Conducted Measurement:



Product Name	Product Number	Version	Serial Number
RRUS 32 B4	KRC 161 416/1	R1C	D16Q644897

No.	Auxiliary Equipment	Part Number / Model Type	Version	Serial Number
1	Computer	HP EliteBook 8540w	--	CND1234694
2	CT10	LPC 102 487/1	R1C	T01F428608
3	Spectrum Analyzer	N9030A	--	MY54490502
	Power Meter	NRP2	--	104221
	Power Sensor	NRP-Z51	--	121216
4	40dB Attenuator	66-40-33	--	CD4016
	Load	TF150	--	11081905
	Load	TF100	--	09121609
	Load	TF150	--	06081413
5	PSU AC 08	BML 901 341/1	R1B	BR83767592

Test Setup, Radiated Measurement:



Product Name	Product Number	Version	Serial Number
RRUS 32 B4	KRC 161 416/1	R1C	D16Q644897

No.	Auxiliary Equipment	Part Number / Model Type	Version	Serial Number
1	Computer	HP EliteBook 8540w	--	CND1234694
2	CT10	LPC 102 487/1	R1C	T01F428608
3	Load	TF150	--	11081905
	Load	TF100	--	09121609
	Load	TF150	--	06081413
	Load	WA1428-3	--	608
4	PSU AC 08	BML 901 341/1	R1B	BR83767592

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.

All test case were tested with the EUT supplied with -48V DC by an external power 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

Modification State 0 - 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 Beijing, China:

- Maximum Output Power and Peak to Average Ratio – Conducted
- Occupied Bandwidth
- Band Edge
- Conducted Spurious Emissions
- Frequency Stability

Only Radiated Spurious Emissions testing has been performed under the following site registrations:

FCC Accreditation 910917:

The State Radio Monitoring Centre, No.80 Beilishi Road, Xicheng District, Beijing, China

Industry Canada Accreditation 7308A-1:

The State Radio Monitoring Centre, No.80 Beilishi Road, Xicheng District, Beijing, China



Product Service

SECTION 2

TEST DETAILS

2.1 MAXIMUM 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 6.4

2.1.2 Equipment Under Test

RRUS 32 B4, KRC 161 416/1, S/N: D16Q644897

2.1.3 Date of Test and Modification State

17, 18 and 19 August 2015 - Modification State 0

2.1.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.1.5 Environmental Conditions

Ambient Temperature	23.5 - 24.0°C
Relative Humidity	42.0 - 43.0%

2.1.6 Test Method

The test was applied in accordance with the test method requirements of FCC 47 CFR Part 27 and Industry Canada RSS-139.

Using a power meter and attenuator(s), the output power of the EUT was measured at the antenna terminal. The path loss between the EUT and the power sensor was measured and recorded for the test band. The path loss was entered as an offset into the Power Meter and Spectrum Analyzer.

The EUT was configured to transmit on maximum power on the configurations defined in the tables below. Since the EUT transmits on four antennas simultaneously in the same frequency range for MIMO devices, i.e., TX MIMO mode, using the Measure-and-Sum approach, the output power at both antennas were tested, and the total output power were then summed mathematically in linear power units According to FCC KDB 662911 D01.

A peak to average ratio measurement is performed at the conducted ports of the EUT for single carrier for single RAT mode. The spectrum analyzers Complementary Cumulative Distribution Function (CCDF) was used and 0.1% probability value recorded.

The RMS Power and Peak to Average Ratio was measured and recorded with the results being compared with the limits.

2.1.7 Test Results

Configuration W-SC

Maximum Output Power 46.0dBm per carrier

Antenna	Modulation / Carrier Bandwidth (MHz)	RMS Output Power / Peak to Average Ratio (PAR)								
		Channel Position B 2112.4MHz			Channel Position M 2132.6MHz			Channel Position T 2152.6MHz		
		Power (dBm)	Power (dBm/MHz)	PAR (dB)	Power (dBm)	Power (dBm/MHz)	PAR (dB)	Power (dBm)	Power (dBm/MHz)	PAR (dB)
A	QPSK / 5.0 MHz	46.30	40.95	7.20	46.31	40.84	7.20	46.30	40.88	7.20

Configuration W-MC (2C)

Maximum Output Power 43.0dBm per carrier

Antenna	Modulation / Carrier Bandwidth (MHz)	RMS Output Power / Peak to Average Ratio (PAR)								
		Channel Position B _{RFBW} -			Channel Position M _{RFBW} 2112.4MHz + 2152.6MHz			Channel Position T _{RFBW} -		
		Power (dBm)	Power (dBm/MHz)	PAR (dB)	Power (dBm)	Power (dBm/MHz)	PAR (dB)	Power (dBm)	Power (dBm/MHz)	PAR (dB)
A	QPSK / 5.0 MHz	-	-	-	46.18	-	-	-	-	-

Configuration W-MIMO-SC

Maximum Output Power 46.0dBm per carrier

Antenna	Modulation / Carrier Bandwidth (MHz)	RMS Output Power / Peak to Average Ratio (PAR)								
		Channel Position B 2112.4MHz			Channel Position M 2132.6MHz			Channel Position T 2152.6MHz		
		Power (dBm)	Power (dBm/MHz)	PAR (dB)	Power (dBm)	Power (dBm/MHz)	PAR (dB)	Power (dBm)	Power (dBm/MHz)	PAR (dB)
A	16QAM / 5.0 MHz	46.32	40.90	7.16	46.32	40.79	7.18	46.31	40.80	7.17
B		46.33	40.83	7.16	46.36	40.79	7.17	46.28	40.75	7.18
C		46.31	40.71	7.17	46.32	40.60	7.17	46.29	40.67	7.17
D		46.36	40.78	7.17	46.28	40.74	7.16	46.25	40.67	7.17
Total		52.35	-	-	52.34	-	-	52.30	-	-

Antenna	Modulation / Carrier Bandwidth (MHz)	RMS Output Power / Peak to Average Ratio (PAR)								
		Channel Position B 2112.4MHz			Channel Position M 2132.6MHz			Channel Position T 2152.6MHz		
		Power (dBm)	Power (dBm/MHz)	PAR (dB)	Power (dBm)	Power (dBm/MHz)	PAR (dB)	Power (dBm)	Power (dBm/MHz)	PAR (dB)
A	64QAM / 5.0 MHz	46.36	40.91	7.17	46.35	40.77	7.18	46.31	40.85	7.17
B		46.36	40.89	7.17	46.36	40.75	7.18	46.28	40.68	7.18
C		46.32	40.84	7.16	46.34	40.72	7.17	46.31	40.71	7.17
D		46.36	40.92	7.17	46.28	40.71	7.17	46.25	40.69	7.18
Total		52.37	-	-	52.35	-	-	52.31	-	-

Configuration W-MIMO-MC (2C)

Maximum Output Power 43.0dBm per carrier

Antenna	Modulation / Carrier Bandwidth (MHz)	RMS Output Power / Peak to Average Ratio (PAR)								
		Channel Position B _{RFBW}			Channel Position M _{RFBW} 2112.4MHz + 2152.6MHz			Channel Position T _{RFBW}		
		Power (dBm)	Power (dBm/MHz)	PAR (dB)	Power (dBm)	Power (dBm/MHz)	PAR (dB)	Power (dBm)	Power (dBm/MHz)	PAR (dB)
A	16QAM / 5.0 MHz	-	-	-	46.19	-	-	-	-	-
B		-	-	-	46.18	-	-	-	-	-
C		-	-	-	46.17	-	-	-	-	-
D		-	-	-	46.15	-	-	-	-	-
Total		-	-	-	52.19	-	-	-	-	-

Antenna	Modulation / Carrier Bandwidth (MHz)	RMS Output Power / Peak to Average Ratio (PAR)								
		Channel Position B _{RFBW}			Channel Position M _{RFBW} 2112.4MHz + 2152.6MHz			Channel Position T _{RFBW}		
		Power (dBm)	Power (dBm/MHz)	PAR (dB)	Power (dBm)	Power (dBm/MHz)	PAR (dB)	Power (dBm)	Power (dBm/MHz)	PAR (dB)
A	64QAM / 5.0 MHz	-	-	-	46.20	-	-	-	-	-
B		-	-	-	46.19	-	-	-	-	-
C		-	-	-	46.19	-	-	-	-	-
D		-	-	-	46.16	-	-	-	-	-
Total		-	-	-	52.21	-	-	-	-	-

Configuration L-MIMO-SC

Maximum Output Power 46.0dBm per carrier

Antenna	Modulation / Carrier Bandwidth (MHz)	RMS Output Power / Peak to Average Ratio (PAR)								
		Channel Position B 2112.5MHz			Channel Position M 2132.5MHz			Channel Position T 2152.5MHz		
		Power (dBm)	Power (dBm/MHz)	PAR (dB)	Power (dBm)	Power (dBm/MHz)	PAR (dB)	Power (dBm)	Power (dBm/MHz)	PAR (dB)
A	QPSK / 5.0 MHz	46.27	40.10	7.07	46.27	40.01	7.08	46.24	40.00	7.08
B		46.24	40.06	7.10	46.25	39.97	7.11	46.21	39.90	7.11
C		46.23	39.93	7.09	46.23	39.92	7.10	46.22	39.96	7.10
D		46.26	40.10	7.09	46.18	39.93	7.09	46.18	39.97	7.09
Total		52.27	-	-	52.25	-	-	52.23	-	-

Antenna	Modulation / Carrier Bandwidth (MHz)	RMS Output Power / Peak to Average Ratio (PAR)								
		Channel Position B 2112.5MHz			Channel Position M 2132.5MHz			Channel Position T 2152.5MHz		
		Power (dBm)	Power (dBm/MHz)	PAR (dB)	Power (dBm)	Power (dBm/MHz)	PAR (dB)	Power (dBm)	Power (dBm/MHz)	PAR (dB)
A	16QAM / 5.0 MHz	-	-	-	46.27	40.37	7.08	-	-	-
B		-	-	-	46.24	40.31	7.10	-	-	-
C		-	-	-	46.22	40.40	7.09	-	-	-
D		-	-	-	46.18	40.28	7.09	-	-	-
Total		-	-	-	52.25	-	-	-	-	-

Antenna	Modulation / Carrier Bandwidth (MHz)	RMS Output Power / Peak to Average Ratio (PAR)								
		Channel Position B 2112.5MHz			Channel Position M 2132.5MHz			Channel Position T 2152.5MHz		
		Power (dBm)	Power (dBm/MHz)	PAR (dB)	Power (dBm)	Power (dBm/MHz)	PAR (dB)	Power (dBm)	Power (dBm/MHz)	PAR (dB)
A	64QAM / 5.0 MHz	-	-	-	46.28	39.94	7.08	-	-	-
B		-	-	-	46.26	39.90	7.11	-	-	-
C		-	-	-	46.23	39.94	7.09	-	-	-
D		-	-	-	46.20	39.93	7.09	-	-	-
Total		-	-	-	52.26	-	-	-	-	-

Antenna	Modulation / Carrier Bandwidth (MHz)	RMS Output Power / Peak to Average Ratio (PAR)								
		Channel Position B 2115.0MHz			Channel Position M 2132.5MHz			Channel Position T 2150.0MHz		
		Power (dBm)	Power (dBm/MHz)	PAR (dB)	Power (dBm)	Power (dBm/MHz)	PAR (dB)	Power (dBm)	Power (dBm/MHz)	PAR (dB)
A	QPSK / 10.0 MHz	-	-	-	46.27	37.21	7.09	-	-	-
B		-	-	-	46.23	37.18	7.11	-	-	-
C		-	-	-	46.22	37.40	7.10	-	-	-
D		-	-	-	46.21	37.32	7.10	-	-	-
Total		-	-	-	52.25	-	-	-	-	-

Antenna	Modulation / Carrier Bandwidth (MHz)	RMS Output Power / Peak to Average Ratio (PAR)								
		Channel Position B 2115.0MHz			Channel Position M 2132.5MHz			Channel Position T 2150.0MHz		
		Power (dBm)	Power (dBm/MHz)	PAR (dB)	Power (dBm)	Power (dBm/MHz)	PAR (dB)	Power (dBm)	Power (dBm/MHz)	PAR (dB)
A	16QAM / 10.0 MHz	-	-	-	46.27	37.59	7.09	-	-	-
B		-	-	-	46.26	37.39	7.10	-	-	-
C		-	-	-	46.24	37.67	7.09	-	-	-
D		-	-	-	46.21	37.56	7.09	-	-	-
Total		-	-	-	52.27	-	-	-	-	-

Antenna	Modulation / Carrier Bandwidth (MHz)	RMS Output Power / Peak to Average Ratio (PAR)								
		Channel Position B 2115.0MHz			Channel Position M 2132.5MHz			Channel Position T 2150.0MHz		
		Power (dBm)	Power (dBm/MHz)	PAR (dB)	Power (dBm)	Power (dBm/MHz)	PAR (dB)	Power (dBm)	Power (dBm/MHz)	PAR (dB)
A	64QAM / 10.0 MHz	-	-	-	46.28	37.40	7.09	-	-	-
B		-	-	-	46.26	37.23	7.09	-	-	-
C		-	-	-	46.23	37.31	7.13	-	-	-
D		-	-	-	46.21	37.21	7.11	-	-	-
Total		-	-	-	52.27	-	-	-	-	-

Antenna	Modulation / Carrier Bandwidth (MHz)	RMS Output Power / Peak to Average Ratio (PAR)								
		Channel Position B 2117.5MHz			Channel Position M 2132.5MHz			Channel Position T 2147.5MHz		
		Power (dBm)	Power (dBm/MHz)	PAR (dB)	Power (dBm)	Power (dBm/MHz)	PAR (dB)	Power (dBm)	Power (dBm/MHz)	PAR (dB)
A	QPSK / 15.0 MHz	-	-	-	46.25	35.66	7.10	-	-	-
B		-	-	-	46.24	35.58	7.12	-	-	-
C		-	-	-	46.21	35.49	7.12	-	-	-
D		-	-	-	46.22	35.50	7.12	-	-	-
Total		-	-	-	52.25	-	-	-	-	-

Antenna	Modulation / Carrier Bandwidth (MHz)	RMS Output Power / Peak to Average Ratio (PAR)								
		Channel Position B 2117.5MHz			Channel Position M 2132.5MHz			Channel Position T 2147.5MHz		
		Power (dBm)	Power (dBm/MHz)	PAR (dB)	Power (dBm)	Power (dBm/MHz)	PAR (dB)	Power (dBm)	Power (dBm/MHz)	PAR (dB)
A	16QAM / 15.0 MHz	-	-	-	46.29	36.30	7.10	-	-	-
B		-	-	-	46.27	36.20	7.12	-	-	-
C		-	-	-	46.24	35.55	7.12	-	-	-
D		-	-	-	46.20	36.26	7.11	-	-	-
Total		-	-	-	52.27	-	-	-	-	-

Antenna	Modulation / Carrier Bandwidth (MHz)	RMS Output Power / Peak to Average Ratio (PAR)								
		Channel Position B 2117.5MHz			Channel Position M 2132.5MHz			Channel Position T 2147.5MHz		
		Power (dBm)	Power (dBm/MHz)	PAR (dB)	Power (dBm)	Power (dBm/MHz)	PAR (dB)	Power (dBm)	Power (dBm/MHz)	PAR (dB)
A	64QAM / 15.0 MHz	-	-	-	46.28	35.64	7.12	-	-	-
B		-	-	-	46.26	35.61	7.11	-	-	-
C		-	-	-	46.22	36.15	7.11	-	-	-
D		-	-	-	46.20	35.40	7.11	-	-	-
Total		-	-	-	52.26	-	-	-	-	-

Antenna	Modulation / Carrier Bandwidth (MHz)	RMS Output Power / Peak to Average Ratio (PAR)								
		Channel Position B 2120.0MHz			Channel Position M 2132.5MHz			Channel Position T 2145.0MHz		
		Power (dBm)	Power (dBm/MHz)	PAR (dB)	Power (dBm)	Power (dBm/MHz)	PAR (dB)	Power (dBm)	Power (dBm/MHz)	PAR (dB)
A	QPSK / 20.0 MHz	46.26	34.402	7.13	46.25	34.49	7.11	46.23	34.443	7.17
B		46.24	34.305	7.13	46.25	34.20	7.12	46.21	34.389	7.20
C		46.20	34.194	7.14	46.23	34.34	7.12	46.23	34.219	7.18
D		46.23	34.491	7.12	46.20	34.31	7.11	46.19	34.324	7.16
Total		52.25	-	-	52.25	-	-	52.23	-	-

Antenna	Modulation / Carrier Bandwidth (MHz)	RMS Output Power / Peak to Average Ratio (PAR)								
		Channel Position B 2120.0MHz			Channel Position B 2132.5MHz			Channel Position B 2145.0MHz		
		Power (dBm)	Power (dBm/MHz)	PAR (dB)	Power (dBm)	Power (dBm/MHz)	PAR (dB)	Power (dBm)	Power (dBm/MHz)	PAR (dB)
A	16QAM / 20.0 MHz	-	-	-	46.27	34.62	7.10	-	-	-
B		-	-	-	46.24	34.65	7.11	-	-	-
C		-	-	-	46.24	34.75	7.11	-	-	-
D		-	-	-	46.21	34.67	7.10	-	-	-
Total		-	-	-	52.26	-	-	-	-	-

Antenna	Modulation / Carrier Bandwidth (MHz)	RMS Output Power / Peak to Average Ratio (PAR)								
		Channel Position B 2120.0MHz			Channel Position B 2132.5MHz			Channel Position B 2145.0MHz		
		Power (dBm)	Power (dBm/MHz)	PAR (dB)	Power (dBm)	Power (dBm/MHz)	PAR (dB)	Power (dBm)	Power (dBm/MHz)	PAR (dB)
A	64QAM / 20.0 MHz	-	-	-	46.26	34.42	7.11	-	-	-
B		-	-	-	46.24	34.24	7.11	-	-	-
C		-	-	-	46.23	34.17	7.13	-	-	-
D		-	-	-	46.20	34.27	7.11	-	-	-
Total		-	-	-	52.25	-	-	-	-	-

Configuration L-MIMO-MC 1 (2C)

Maximum Output Power 43.0dBm per carrier

Antenna	Carrier Bandwidth (MHz)	RMS Output Power / Peak to Average Ratio (PAR)								
		Channel Position M_{RFBW} 2112.5MHz + 2152.5MHz			Channel Position M_{RFBW} 2112.5MHz + 2152.5MHz			Channel Position M_{RFBW} 2112.5MHz + 2152.5MHz		
		QPSK			16QAM			64QAM		
		Power (dBm)	Power (dBm/MHz)	PAR (dB)	Power (dBm)	Power (dBm/MHz)	PAR (dB)	Power (dBm)	Power (dBm/MHz)	PAR (dB)
A	5.0 MHz	46.10	-	-	46.12	-	-	46.12	-	-
B		46.10	-	-	46.10	-	-	46.10	-	-
C		46.09	-	-	46.11	-	-	46.10	-	-
D		46.08	-	-	46.09	-	-	46.08	-	-
Total		52.11	-	-	52.13	-	-	52.12	-	-

Antenna	Carrier Bandwidth (MHz)	RMS Output Power / Peak to Average Ratio (PAR)								
		Channel Position M_{RFBW} 2115.0MHz + 2150.0MHz			Channel Position M_{RFBW} 2115.0MHz + 2150.0MHz			Channel Position M_{RFBW} 2115.0MHz + 2150.0MHz		
		QPSK			16QAM			64QAM		
		Power (dBm)	Power (dBm/MHz)	PAR (dB)	Power (dBm)	Power (dBm/MHz)	PAR (dB)	Power (dBm)	Power (dBm/MHz)	PAR (dB)
A	10.0 MHz	46.18	-	-	46.19	-	-	46.19	-	-
B		46.17	-	-	46.18	-	-	46.16	-	-
C		46.16	-	-	46.16	-	-	46.16	-	-
D		46.14	-	-	46.14	-	-	46.15	-	-
Total		52.18	-	-	52.19	-	-	52.19	-	-

Antenna	Carrier Bandwidth (MHz)	RMS Output Power / Peak to Average Ratio (PAR)								
		Channel Position M_{RFBW} 2117.5MHz + 2147.5MHz			Channel Position M_{RFBW} 2117.5MHz + 2147.5MHz			Channel Position M_{RFBW} 2117.5MHz + 2147.5MHz		
		QPSK			16QAM			64QAM		
		Power (dBm)	Power (dBm/MHz)	PAR (dB)	Power (dBm)	Power (dBm/MHz)	PAR (dB)	Power (dBm)	Power (dBm/MHz)	PAR (dB)
A	15.0 MHz	46.20	-	-	46.21	-	-	46.20	-	-
B		46.17	-	-	46.19	-	-	46.18	-	-
C		46.17	-	-	46.19	-	-	46.18	-	-
D		46.18	-	-	46.18	-	-	46.19	-	-
Total		52.20	-	-	52.21	-	-	52.21	-	-

Antenna	Carrier Bandwidth (MHz)	RMS Output Power / Peak to Average Ratio (PAR)								
		Channel Position M_{RFBW} 2120.0MHz + 2145.0MHz			Channel Position M_{RFBW} 2120.0MHz + 2145.0MHz			Channel Position M_{RFBW} 2120.0MHz + 2145.0MHz		
		QPSK			16QAM			64QAM		
		Power (dBm)	Power (dBm/MHz)	PAR (dB)	Power (dBm)	Power (dBm/MHz)	PAR (dB)	Power (dBm)	Power (dBm/MHz)	PAR (dB)
A	20.0 MHz	46.22	-	-	46.23	-	-	46.22	-	-
B		46.20	-	-	46.22	-	-	46.21	-	-
C		46.19	-	-	46.22	-	-	46.21	-	-
D		46.17	-	-	46.19	-	-	46.20	-	-
Total		52.22	-	-	52.24	-	-	52.23	-	-

Configuration L-MIMO-MC 2 (3C)

Maximum Output Power 41.2dBm per carrier

Antenna	Carrier Bandwidth (MHz)	RMS Output Power / Peak to Average Ratio (PAR)								
		Channel Position M_{RFBW} 2112.5MHz + 2147.5MHz + 2152.5MHz			Channel Position M_{RFBW} 2112.5MHz + 2147.5MHz + 2152.5MHz			Channel Position M_{RFBW} 2112.5MHz + 2147.5MHz + 2152.5MHz		
		QPSK			16QAM			64QAM		
		Power (dBm)	Power (dBm/MHz)	PAR (dB)	Power (dBm)	Power (dBm/MHz)	PAR (dB)	Power (dBm)	Power (dBm/MHz)	PAR (dB)
A	5.0 MHz	46.14	-	-	46.14	-	-	46.14	-	-
B		46.12	-	-	46.13	-	-	46.12	-	-
C		46.08	-	-	46.12	-	-	46.13	-	-
D		46.07	-	-	46.08	-	-	46.10	-	-
Total		52.12	-	-	52.14	-	-	52.14	-	-

Antenna	Carrier Bandwidth (MHz)	RMS Output Power / Peak to Average Ratio (PAR)								
		Channel Position M_{RFBW} 2115.0MHz + 2140.0MHz + 2150.0MHz			Channel Position M_{RFBW} 2115.0MHz + 2140.0MHz + 2150.0MHz			Channel Position M_{RFBW} 2115.0MHz + 2140.0MHz + 2150.0MHz		
		QPSK			16QAM			64QAM		
		Power (dBm)	Power (dBm/MHz)	PAR (dB)	Power (dBm)	Power (dBm/MHz)	PAR (dB)	Power (dBm)	Power (dBm/MHz)	PAR (dB)
A	10.0 MHz	46.16	-	-	46.19	-	-	46.18	-	-
B		46.15	-	-	46.17	-	-	46.17	-	-
C		46.14	-	-	46.15	-	-	46.18	-	-
D		46.11	-	-	46.13	-	-	46.13	-	-
Total		52.16	-	-	52.18	-	-	52.19	-	-

Antenna	Carrier Bandwidth (MHz)	RMS Output Power / Peak to Average Ratio (PAR)								
		Channel Position M_{RFBW} 2117.5MHz + 2132.5MHz + 2147.5MHz			Channel Position M_{RFBW} 2117.5MHz + 2132.5MHz + 2147.5MHz			Channel Position M_{RFBW} 2117.5MHz + 2132.5MHz + 2147.5MHz		
		QPSK			16QAM			64QAM		
		Power (dBm)	Power (dBm/MHz)	PAR (dB)	Power (dBm)	Power (dBm/MHz)	PAR (dB)	Power (dBm)	Power (dBm/MHz)	PAR (dB)
A	15.0 MHz	46.20	-	-	46.20	-	-	46.19	-	-
B		46.19	-	-	46.19	-	-	46.19	-	-
C		46.20	-	-	46.20	-	-	46.20	-	-
D		46.17	-	-	46.16	-	-	46.17	-	-
Total		52.21	-	-	52.21	-	-	52.21	-	-

Configuration W+L-MC 1 (1W+1L)

Maximum Output Power 43.0dBm per carrier

Antenna	WCDMA Modulation / LTE Modulation Bandwidth	RMS Output Power / Peak to Average Ratio (PAR)		
		Channel Position M_{RFBW} (W) 2112.4MHz + (L) 2152.5MHz		
		Power (dBm)	Power (dBm/MHz)	PAR (dB)
A	QPSK / QPSK 5.0 MHz	46.11	-	-

Antenna	WCDMA Modulation / LTE Modulation Bandwidth	RMS Output Power / Peak to Average Ratio (PAR)		
		Channel Position M_{RFBW} (W) 2112.4MHz + (L) 2150.0MHz		
		Power (dBm)	Power (dBm/MHz)	PAR (dB)
A	QPSK / QPSK 10.0 MHz	46.13	-	-

Antenna	WCDMA Modulation / LTE Modulation Bandwidth	RMS Output Power / Peak to Average Ratio (PAR)		
		Channel Position M_{RFBW} (W) 2112.4MHz + (L) 2147.5MHz		
		Power (dBm)	Power (dBm/MHz)	PAR (dB)
A	QPSK / QPSK 15.0 MHz	46.15	-	-

Antenna	WCDMA Modulation / LTE Modulation Bandwidth	RMS Output Power / Peak to Average Ratio (PAR)		
		Channel Position M_{RFBW} (W) 2112.4MHz + (L) 2145.0MHz		
		Power (dBm)	Power (dBm/MHz)	PAR (dB)
A	QPSK / QPSK 20.0 MHz	46.17	-	-

Configuration W+L-MC 2 (2W+3L)

Maximum Output Power 39.0dBm per carrier

Antenna	WCDMA Modulation / LTE Modulation Bandwidth	RMS Output Power / Peak to Average Ratio (PAR)		
		Channel Position M_{RFBW} (W) 2112.4MHz + (W) 2117.4MHz + (L) 2142.5MHz + (L) 2147.5MHz + (L) 2152.5MHz		
		Power (dBm)	Power (dBm/MHz)	PAR (dB)
A	QPSK / QPSK 5.0 MHz	45.87	-	-

Antenna	WCDMA Modulation / LTE Modulation Bandwidth	RMS Output Power / Peak to Average Ratio (PAR)		
		Channel Position M_{RFBW} (W) 2112.4MHz + (W) 2117.4MHz + (L) 2130.0MHz + (L) 2140.0MHz + (L) 2150.0MHz		
		Power (dBm)	Power (dBm/MHz)	PAR (dB)
A	QPSK / QPSK 10.0 MHz	45.92	-	-

Configuration W+L-MIMO-MC 1 (1W+1L)

Maximum Output Power 43.0dBm per carrier

Antenna	WCDMA Modulation / LTE Modulation Bandwidth	RMS Output Power / Peak to Average Ratio (PAR)		
		Channel Position M_{RFBW} (W) 2112.4MHz + (L) 2152.5MHz		
		Power (dBm)	Power (dBm/MHz)	PAR (dB)
A	16QAM / QPSK 5.0 MHz	46.13	-	-
B		46.12	-	-
C		46.09	-	-
D		46.07	-	-
Total		52.12	-	-

Antenna	WCDMA Modulation / LTE Modulation Bandwidth	RMS Output Power / Peak to Average Ratio (PAR)		
		Channel Position M_{RFBW} (W) 2112.4MHz + (L) 2150.0MHz		
		Power (dBm)	Power (dBm/MHz)	PAR (dB)
A	16QAM / QPSK 10.0 MHz	46.14	-	-
B		46.14	-	-
C		46.15	-	-
D		46.12	-	-
Total		52.16	-	-

Antenna	WCDMA Modulation / LTE Modulation Bandwidth	RMS Output Power / Peak to Average Ratio (PAR)		
		Channel Position M_{RFBW} (W) 2112.4MHz + (L) 2147.5MHz		
		Power (dBm)	Power (dBm/MHz)	PAR (dB)
A	16QAM / QPSK 15.0 MHz	46.15	-	-
B		46.17	-	-
C		46.20	-	-
D		46.17	-	-
Total		52.19	-	-

Antenna	WCDMA Modulation / LTE Modulation Bandwidth	RMS Output Power / Peak to Average Ratio (PAR)		
		Channel Position M_{RFBW} (W) 2112.4MHz +(L) 2145.0MHz		
		Power (dBm)	Power (dBm/MHz)	PAR (dB)
A	16QAM / QPSK 20.0 MHz	46.18	-	-
B		46.17	-	-
C		46.23	-	-
D		46.18	-	-
Total		52.21	-	-

Configuration W+L-MIMO-MC 2 (2W+3L)

Maximum Output Power 39.0dBm per carrier

Antenna	WCDMA Modulation / LTE Modulation Bandwidth	RMS Output Power / Peak to Average Ratio (PAR)		
		Channel Position M_{RFBW} (W) 2112.4MHz + (W) 2117.4MHz + (L) 2142.5MHz + (L) 2147.5MHz + (L) 2152.5MHz		
		Power (dBm)	Power (dBm/MHz)	PAR (dB)
A	16QAM / QPSK 5.0 MHz	45.89	-	-
B		45.88	-	-
C		45.88	-	-
D		45.85	-	-
Total		51.89	-	-

Antenna	WCDMA Modulation / LTE Modulation Bandwidth	RMS Output Power / Peak to Average Ratio (PAR)		
		Channel Position M_{RFBW} (W) 2112.4MHz + (W) 2117.4MHz + (L) 2130.0MHz + (L) 2140.0MHz + (L) 2150.0MHz		
		Power (dBm)	Power (dBm/MHz)	PAR (dB)
A	16QAM / QPSK 10.0 MHz	45.91	-	-
B		45.91	-	-
C		45.92	-	-
D		45.89	-	-
Total		51.93	-	-

Note :

This unit is tested without antenna. ERP/EIRP compliance is addressed at the time of licensing, as required by the responsible IC Bureau(s). Licensees are required to take into account maximum allowed antenna gain used in combination with above power settings to prevent the radiated output power to exceed the limits.

Limit	
Output Power	FCC: (ERP) 1000 W/MHz or 60 dBm/MHz IC: (e.i.r.p) 1640 W/MHz or 62.15 dBm/MHz
Peak to Average Ratio	13 dB

Remarks

The maximum output power of the EUT is sufficient to keep it within the range of the rated transmitter power that the manufacture declared and the requirements of FCC and IC standards. The peak to average ratio is under the limit of 13dB.

2.2 OCCUPIED BANDWIDTH

2.2.1 Specification Reference

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

2.2.2 Equipment Under Test

RRUS 32 B4, KRC 161 416/1, S/N: D16Q644897

2.2.3 Date of Test and Modification State

20 August 2015 - Modification State 0

2.2.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.2.5 Environmental Conditions

Ambient Temperature	22.0°C
Relative Humidity	61.0%

2.2.6 Test Method

The test was applied in accordance with the test method requirements of FCC47 CFR Part 27 and Industry Canada RSS-GEN.

The EUT was set to transmit at maximum power and testing was carried out on Bottom, Middle and Top Channels. Using the Occupied Bandwidth measurement function in the Spectrum Analyser, the 26dB bandwidth was measured in accordance with FCC KDB 971168 D01 Power Meas License Digital Systems v02r02 Clause 4.2. In addition, measurements of 99% occupied bandwidths were made in accordance with Industry Canada RSS-GEN Clause 6.6. The RBW was configured to 1% of the theoretical channel bandwidth, meeting the requirement of being between 1 to 5% of the Occupied Bandwidth described in the KDB aforementioned.

The results are shown in the plots below.

2.2.7 Test Results

Configuration W-SC

Maximum Output Power 46.0dBm per carrier

-26dBc Occupied Bandwidth for FCC requirement

Modulation / Bandwidth	Occupied Bandwidth (MHz)		
	Channel Position B 2112.4MHz	Channel Position M 2132.6MHz	Channel Position T 2152.6MHz
QPSK / 5.0 MHz	4.657	4.657	4.657

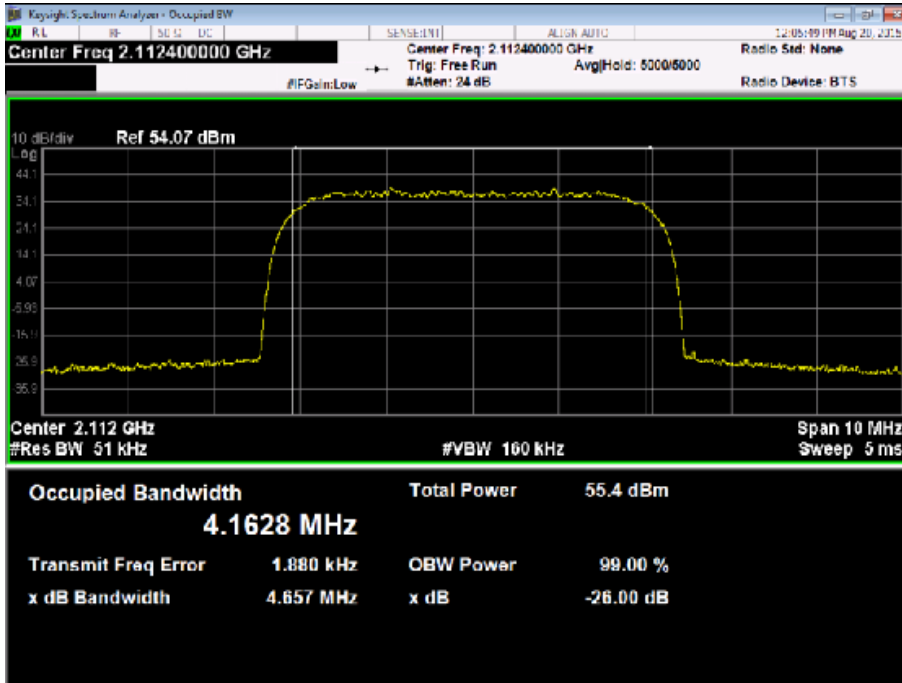
Modulation / Bandwidth	Occupied Bandwidth (MHz)		
	Channel Position B 2112.4MHz	Channel Position M 2132.6MHz	Channel Position T 2152.6MHz
QPSK / 4.2 MHz	4.121	4.121	4.121

99% Occupied Bandwidth for IC requirement

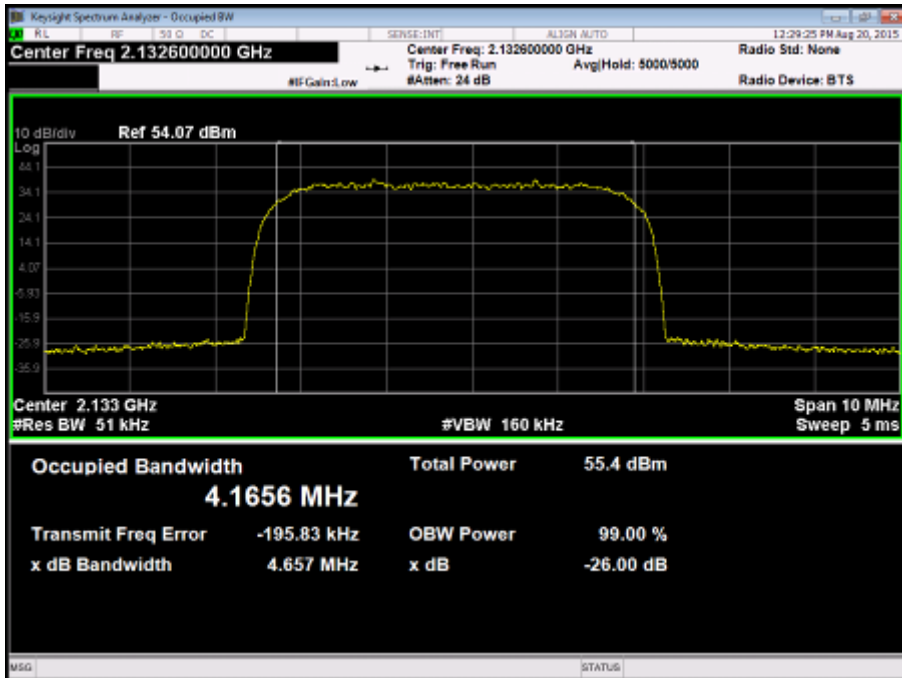
Modulation / Bandwidth	Occupied Bandwidth (MHz)		
	Channel Position B 2112.4MHz	Channel Position M 2132.6MHz	Channel Position T 2152.6MHz
QPSK / 5.0 MHz	4.163	4.166	4.164

Modulation / Bandwidth	Occupied Bandwidth (MHz)		
	Channel Position B 2112.4MHz	Channel Position M 2132.6MHz	Channel Position T 2152.6MHz
QPSK / 4.2 MHz	3.850	3.850	3.848

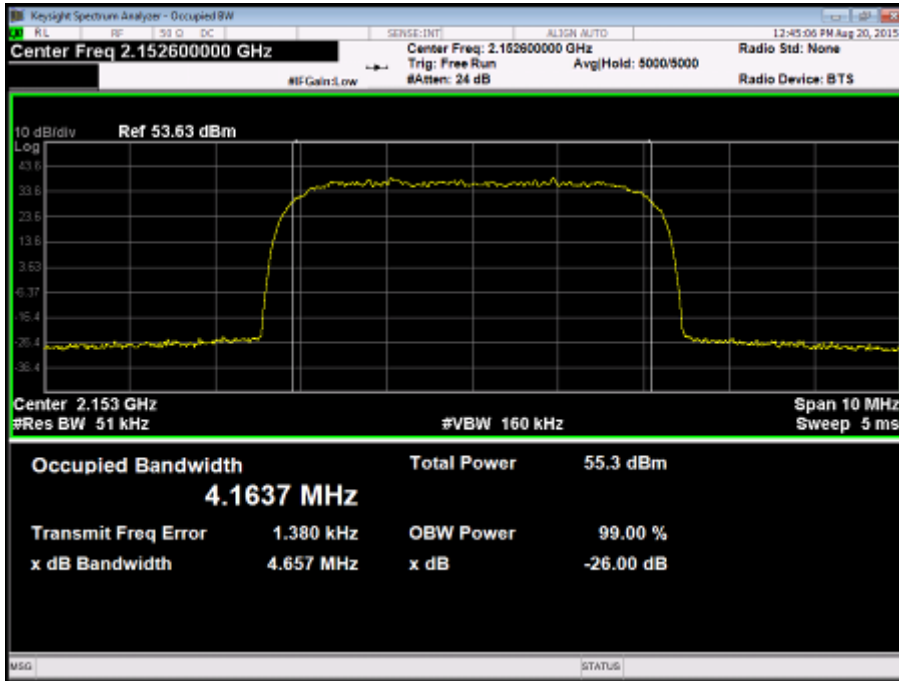
Channel Position B - QPSK / Bandwidth 5.0 MHz



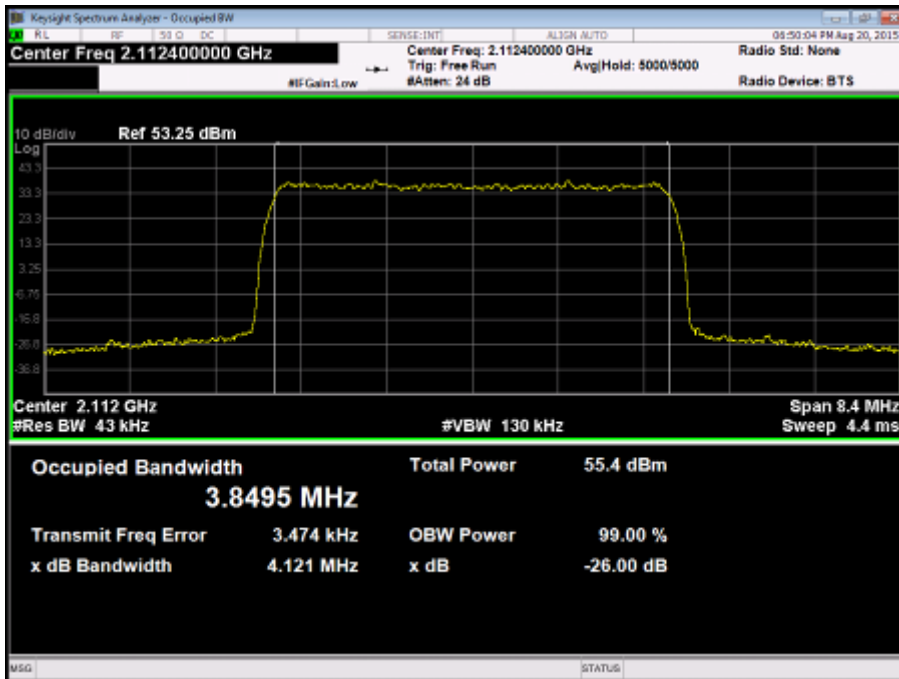
Channel Position M - QPSK / Bandwidth 5.0 MHz



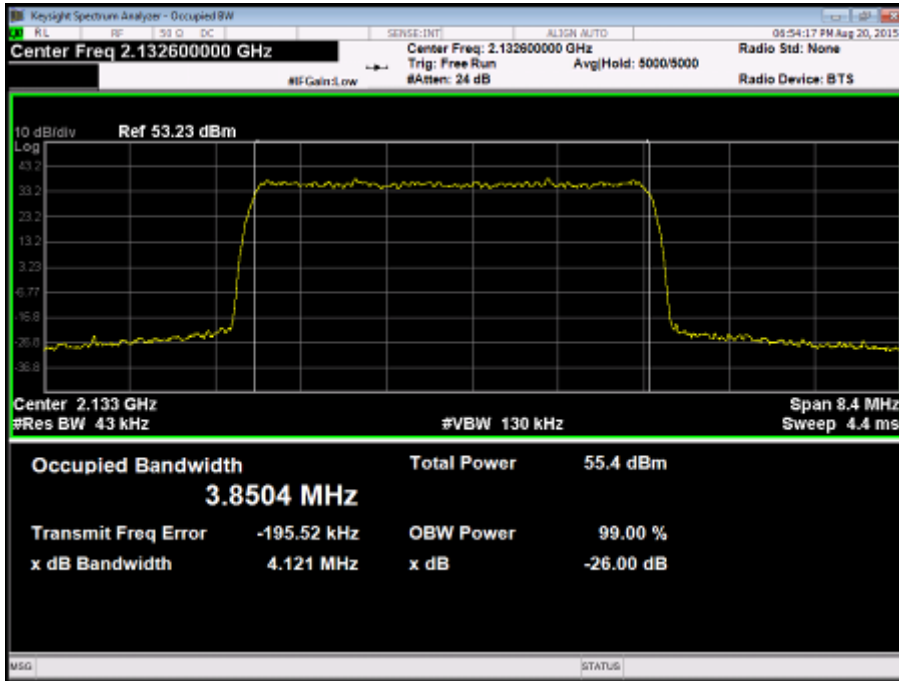
Channel Position T - QPSK / Bandwidth 5.0 MHz



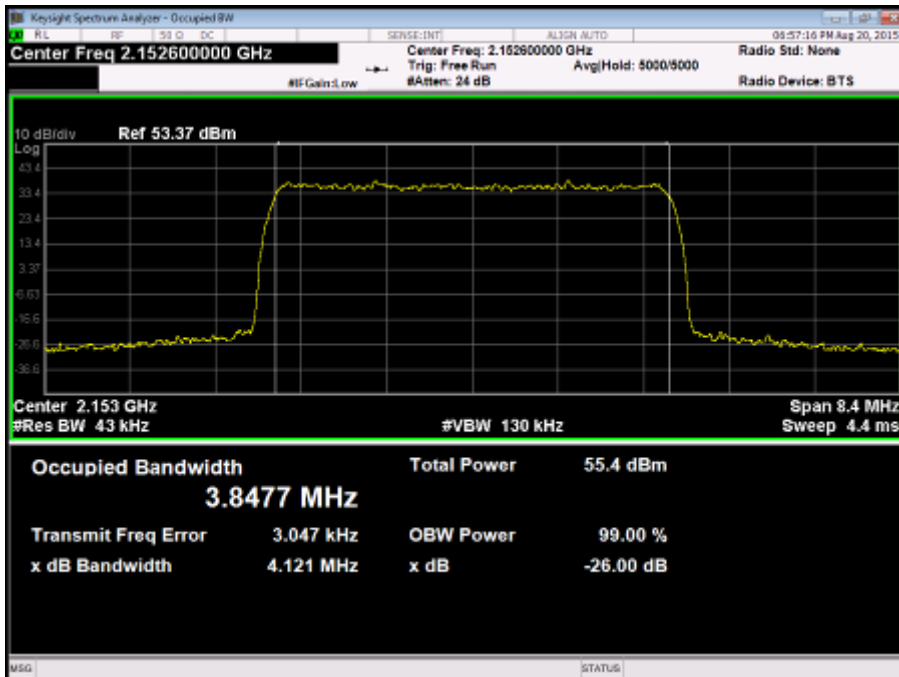
Channel Position B - QPSK / Bandwidth 4.2 MHz



Channel Position M - QPSK / Bandwidth 4.2 MHz



Channel Position T - QPSK / Bandwidth 4.2 MHz



Configuration W-MIMO-SC

Maximum Output Power 46.0dBm per carrier

-26dBc Occupied Bandwidth for FCC requirement

Modulation / Bandwidth	Occupied Bandwidth (MHz)		
	Channel Position B 2112.4MHz	Channel Position M 2132.6MHz	Channel Position T 2152.6MHz
16QAM / 5.0 MHz	4.645	4.645	4.644
64QAM / 5.0 MHz	4.659	4.661	4.660

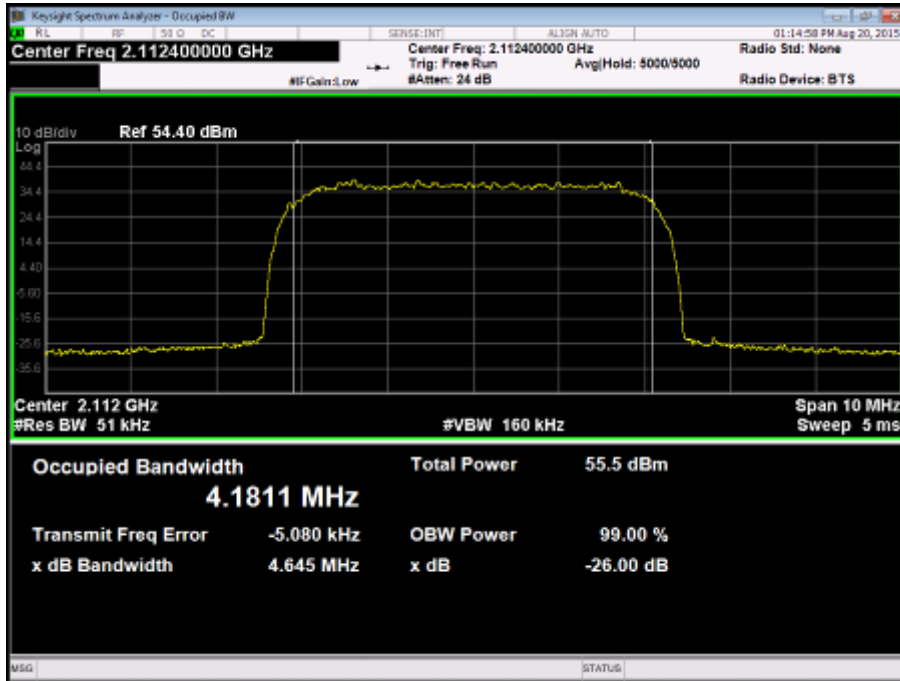
Modulation / Bandwidth	Occupied Bandwidth (MHz)		
	Channel Position B 2112.4MHz	Channel Position M 2132.6MHz	Channel Position T 2152.6MHz
16QAM / 4.2 MHz	-	4.117	-
64QAM / 4.2 MHz	-	4.128	-

99% Occupied Bandwidth for IC requirement

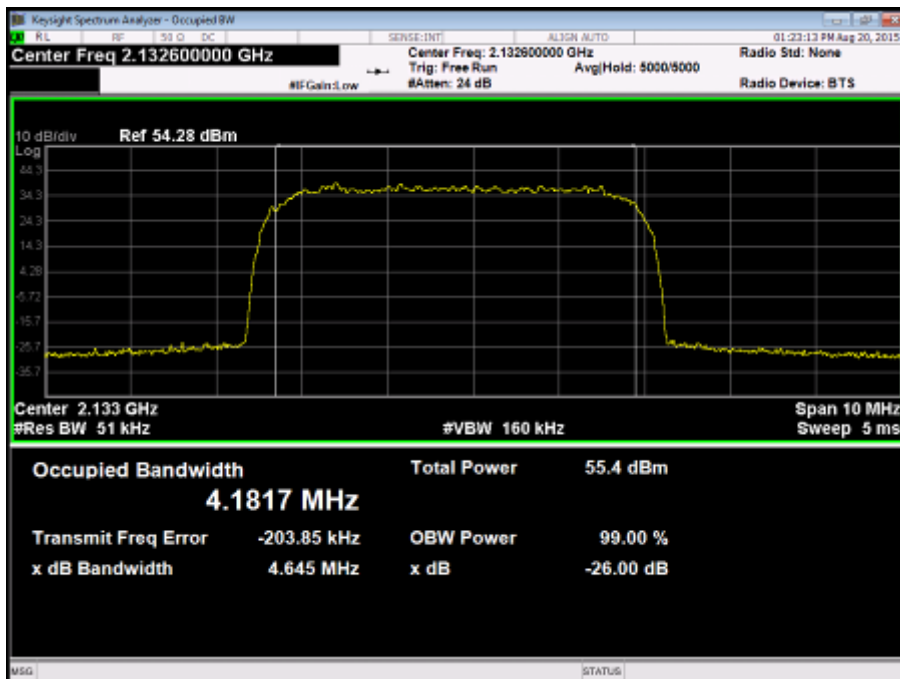
Modulation / Bandwidth	Occupied Bandwidth (MHz)		
	Channel Position B 2112.4MHz	Channel Position M 2132.6MHz	Channel Position T 2152.6MHz
16QAM / 5.0 MHz	4.181	4.182	4.177
64QAM / 5.0 MHz	4.151	4.152	4.151

Modulation / Bandwidth	Occupied Bandwidth (MHz)		
	Channel Position B 2112.4MHz	Channel Position M 2132.6MHz	Channel Position T 2152.6MHz
16QAM / 4.2 MHz	-	3.846	-
64QAM / 4.2 MHz	-	3.854	-

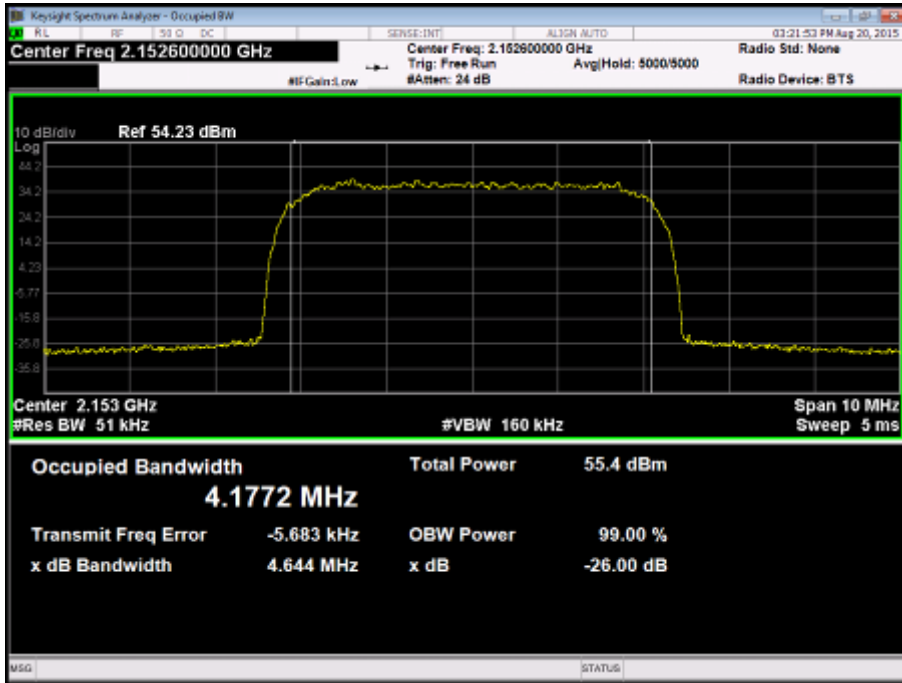
Channel Position B - 16QAM / Bandwidth 5.0 MHz



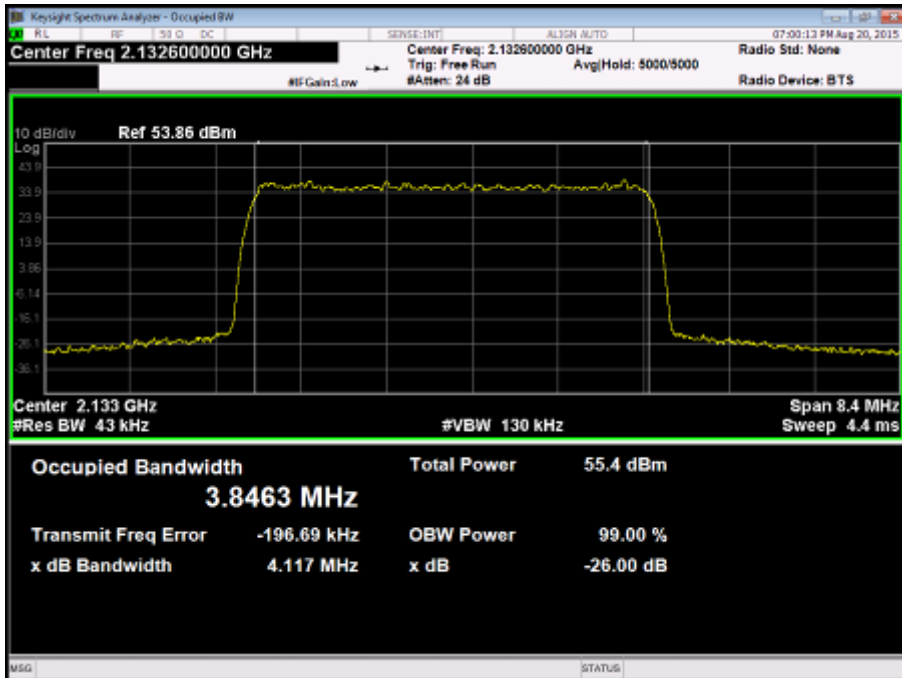
Channel Position M - 16QAM / Bandwidth 5.0 MHz



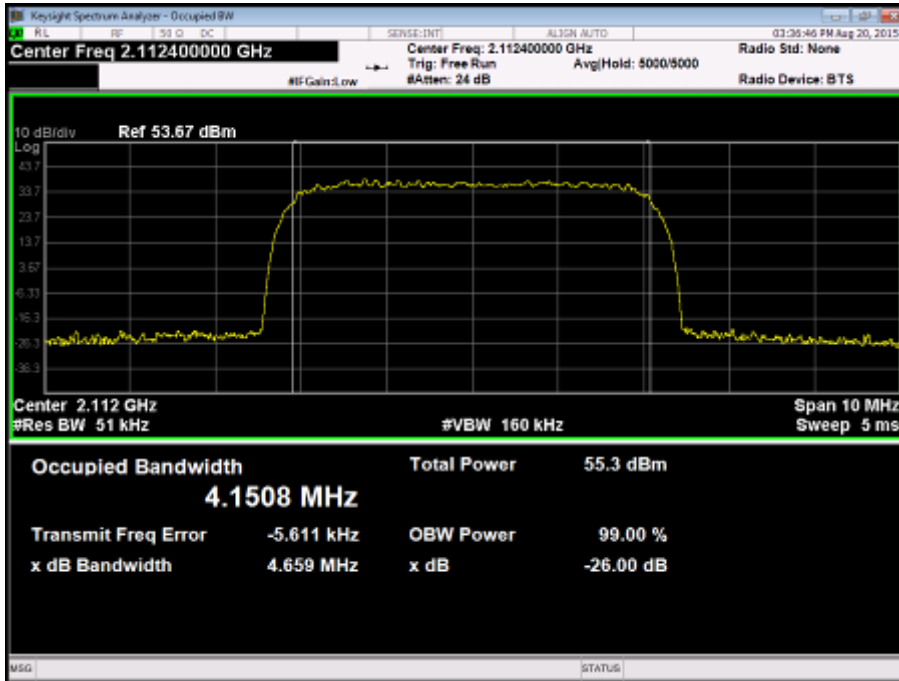
Channel Position T - 16QAM / Bandwidth 5.0 MHz



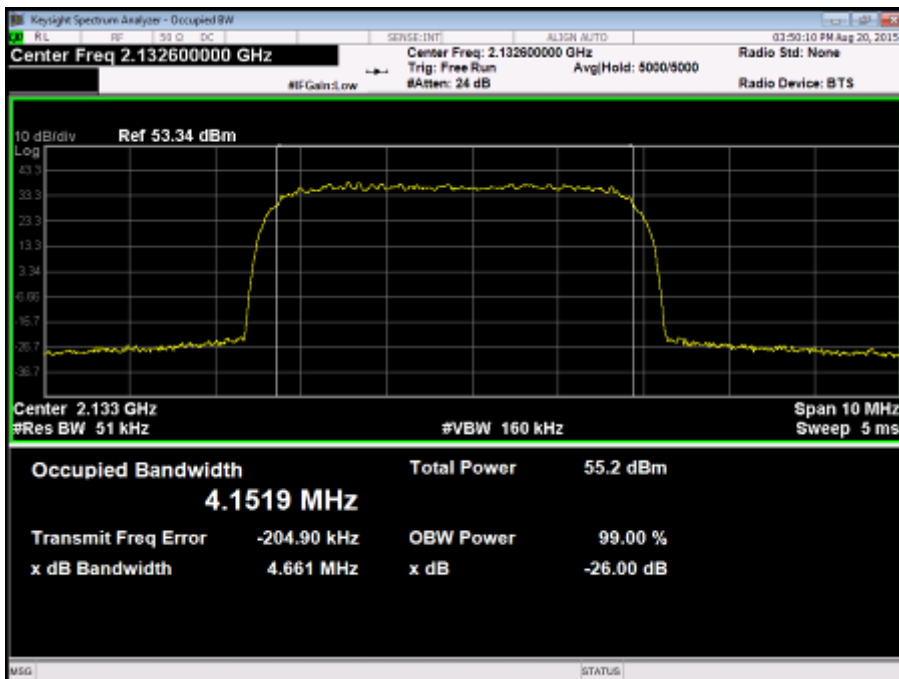
Channel Position M - 16QAM / Bandwidth 4.2 MHz



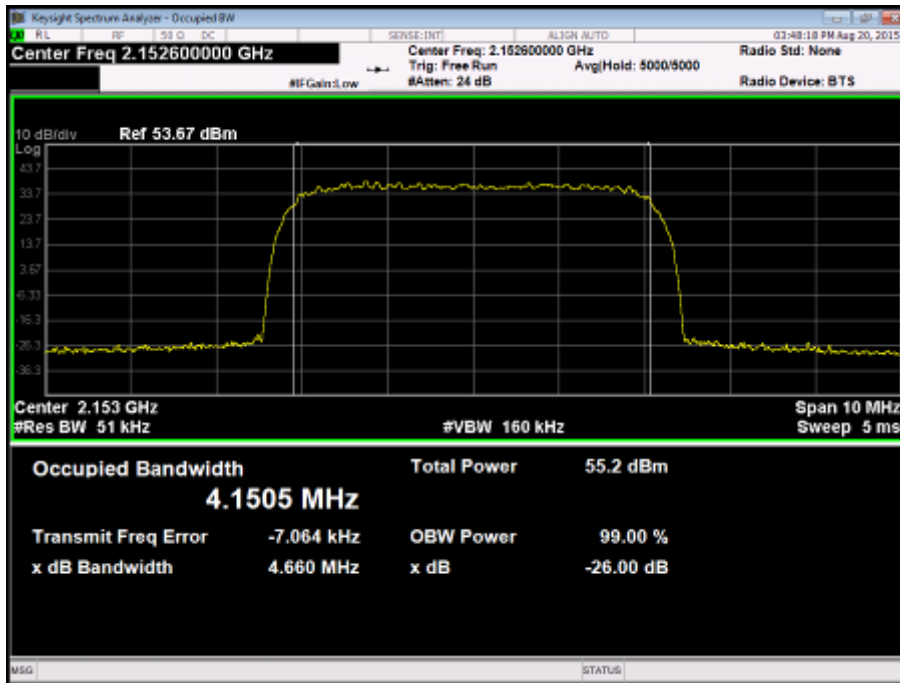
Channel Position B - 64QAM / Bandwidth 5.0 MHz



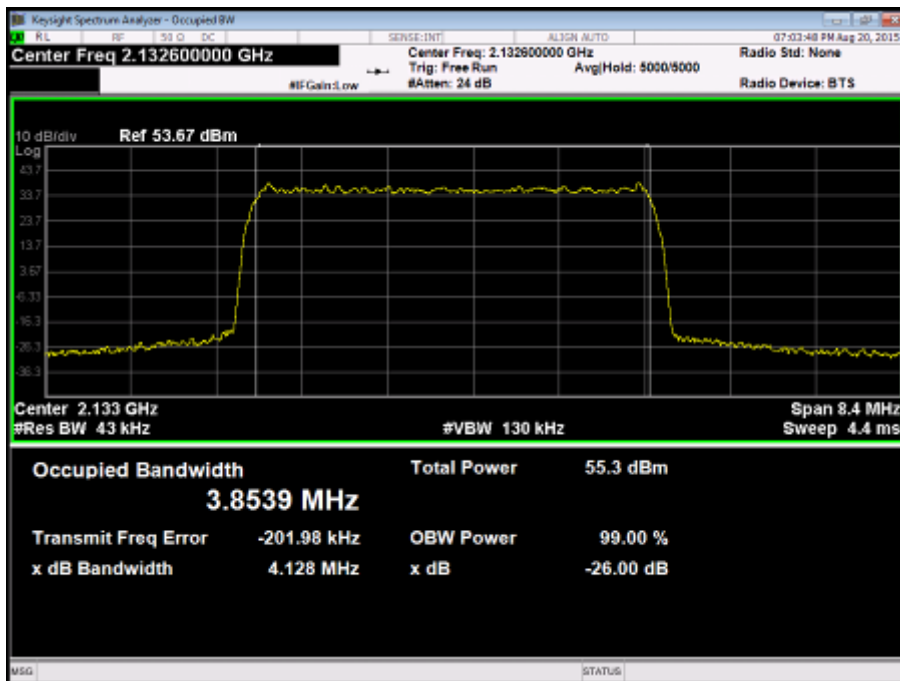
Channel Position M - 64QAM / Bandwidth 5.0 MHz



Channel Position T - 64QAM / Bandwidth 5.0 MHz



Channel Position M - 64QAM / Bandwidth 4.2 MHz



Configuration L-MIMO-SC

Maximum Output Power 46.0dBm per carrier

-26dBc Occupied Bandwidth for FCC requirement

Modulation / Bandwidth	Occupied Bandwidth (MHz)		
	Channel Position B 2112.5MHz	Channel Position M 2132.5MHz	Channel Position T 2152.5MHz
QPSK / 5.0 MHz	4.813	4.813	4.816
16QAM / 5.0 MHz	-	4.810	-
64QAM / 5.0 MHz	-	4.831	-

Modulation / Bandwidth	Occupied Bandwidth (MHz)		
	Channel Position B 2115.0MHz	Channel Position M 2132.5MHz	Channel Position T 2150.0MHz
QPSK / 10.0 MHz	-	9.644	-
16QAM / 10.0 MHz	-	9.645	-
64QAM / 10.0 MHz	-	9.669	-

Modulation / Bandwidth	Occupied Bandwidth (MHz)		
	Channel Position B 2117.5MHz	Channel Position M 2132.5MHz	Channel Position T 2147.5MHz
QPSK / 15.0 MHz	-	14.440	-
16QAM / 15.0 MHz	-	14.380	-
64QAM / 15.0 MHz	-	14.460	-

Modulation / Bandwidth	Occupied Bandwidth (MHz)		
	Channel Position B 2120.0MHz	Channel Position M 2132.5MHz	Channel Position T 2145.0MHz
QPSK / 20.0 MHz	19.270	19.240	19.230
16QAM / 20.0 MHz	-	19.180	-
64QAM / 20.0 MHz	-	19.200	-

99% Occupied Bandwidth for IC requirement

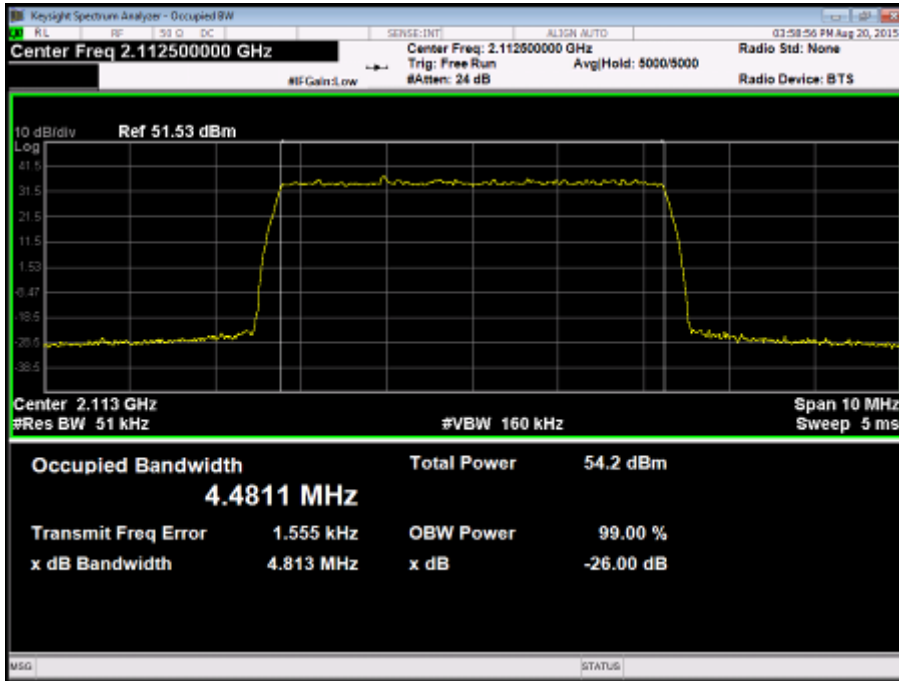
Modulation / Bandwidth	Occupied Bandwidth (MHz)		
	Channel Position B 2112.5MHz	Channel Position M 2132.5MHz	Channel Position T 2152.5MHz
QPSK / 5.0 MHz	4.481	4.481	4.481
16QAM / 5.0 MHz	-	4.482	-
64QAM / 5.0 MHz	-	4.497	-

Modulation / Bandwidth	Occupied Bandwidth (MHz)		
	Channel Position B 2115.0MHz	Channel Position M 2132.5MHz	Channel Position T 2150.0MHz
QPSK / 10.0 MHz	-	8.967	-
16QAM / 10.0 MHz	-	8.976	-
64QAM / 10.0 MHz	-	8.974	-

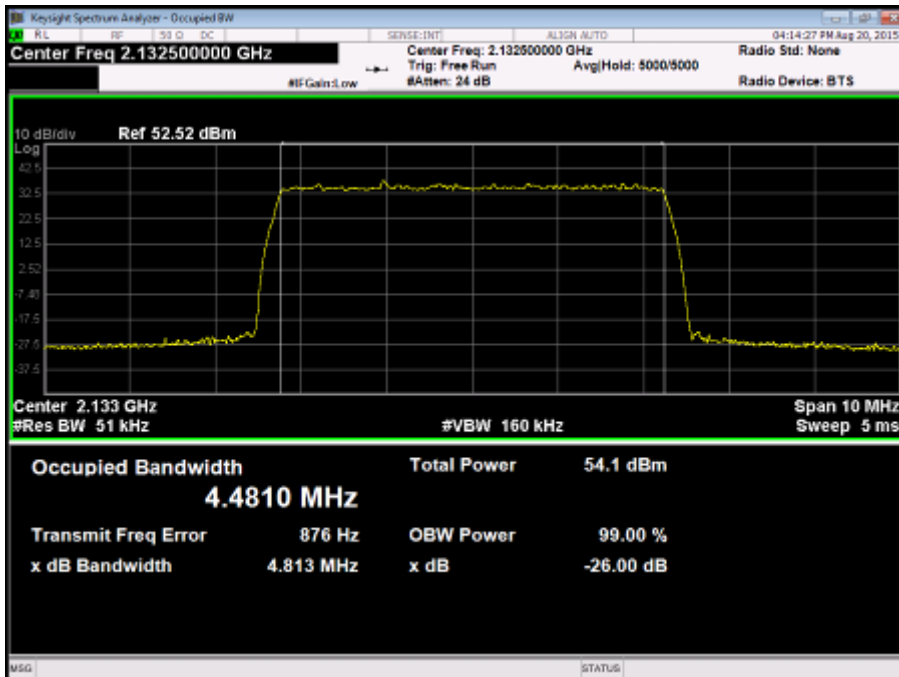
Modulation / Bandwidth	Occupied Bandwidth (MHz)		
	Channel Position B 2117.5MHz	Channel Position M 2132.5MHz	Channel Position T 2147.5MHz
QPSK / 15.0 MHz	-	13.436	-
16QAM / 15.0 MHz	-	13.453	-
64QAM / 15.0 MHz	-	13.447	-

Modulation / Bandwidth	Occupied Bandwidth (MHz)		
	Channel Position B 2120.0MHz	Channel Position M 2132.5MHz	Channel Position T 2145.0MHz
QPSK / 20.0 MHz	17.908	17.906	17.897
16QAM / 20.0 MHz	-	17.934	-
64QAM / 20.0 MHz	-	17.908	-

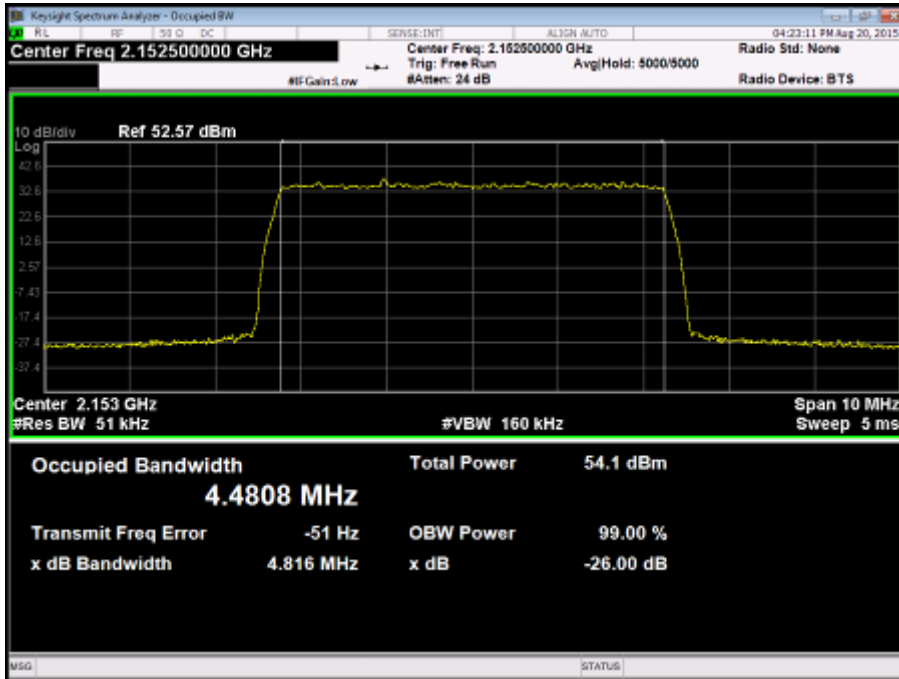
Channel Position B - QPSK / Bandwidth 5.0 MHz



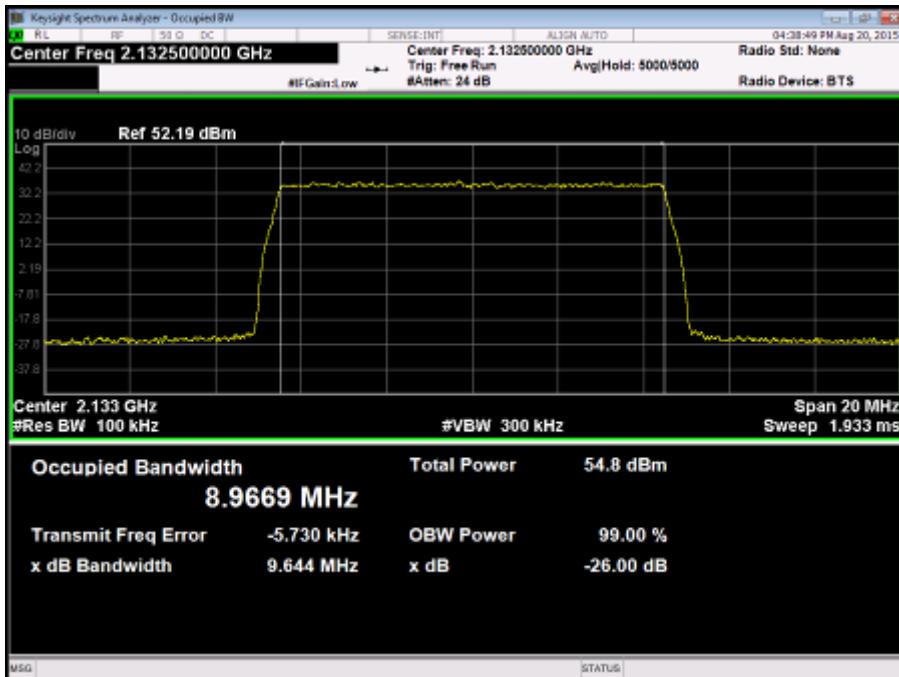
Channel Position M - QPSK / Bandwidth 5.0 MHz



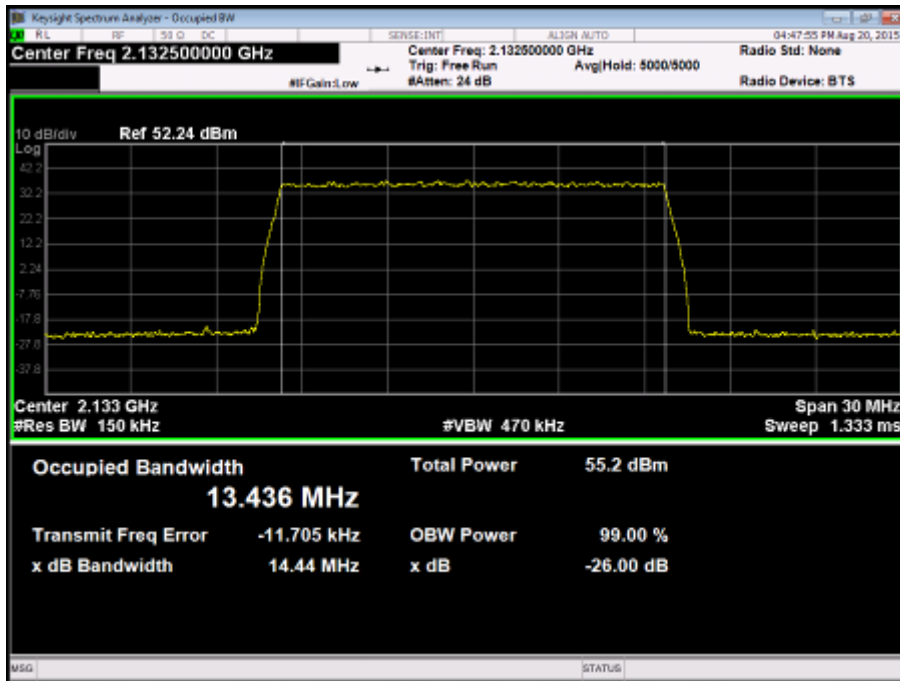
Channel Position T - QPSK / Bandwidth 5.0 MHz



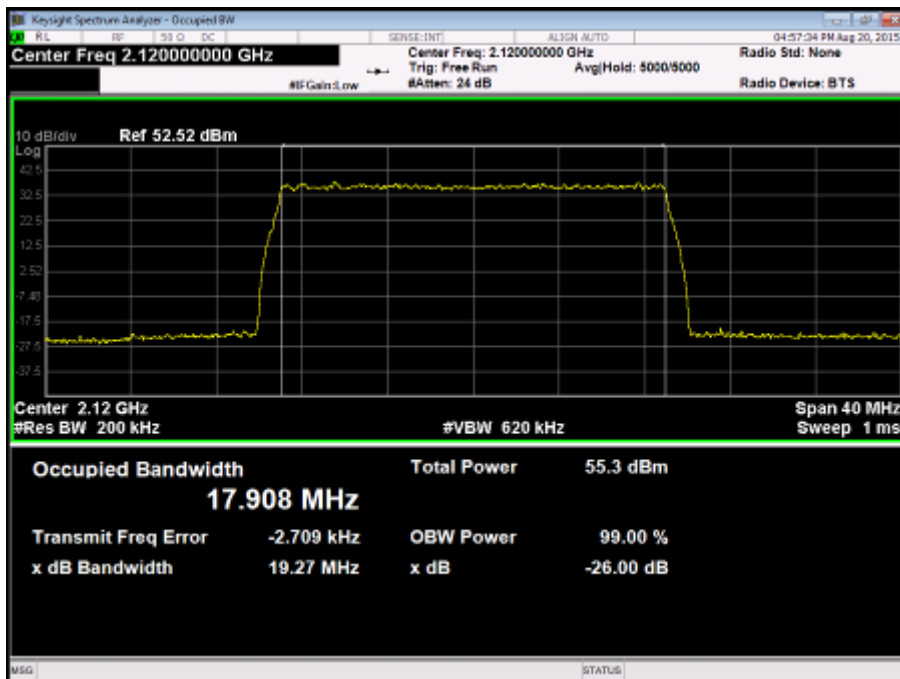
Channel Position M - QPSK / Bandwidth 10.0 MHz



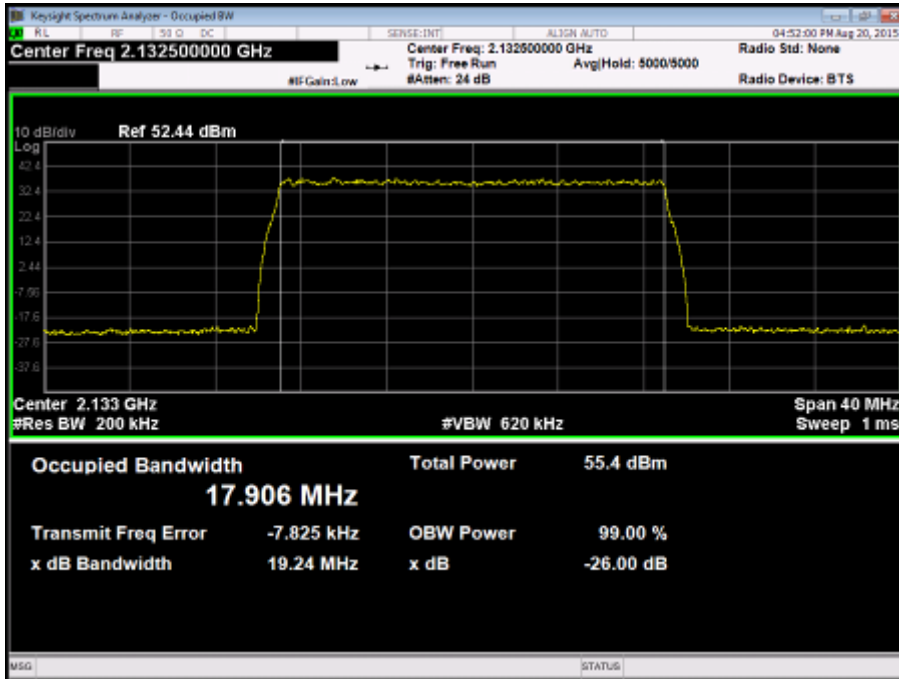
Channel Position M - QPSK / Bandwidth 15.0 MHz



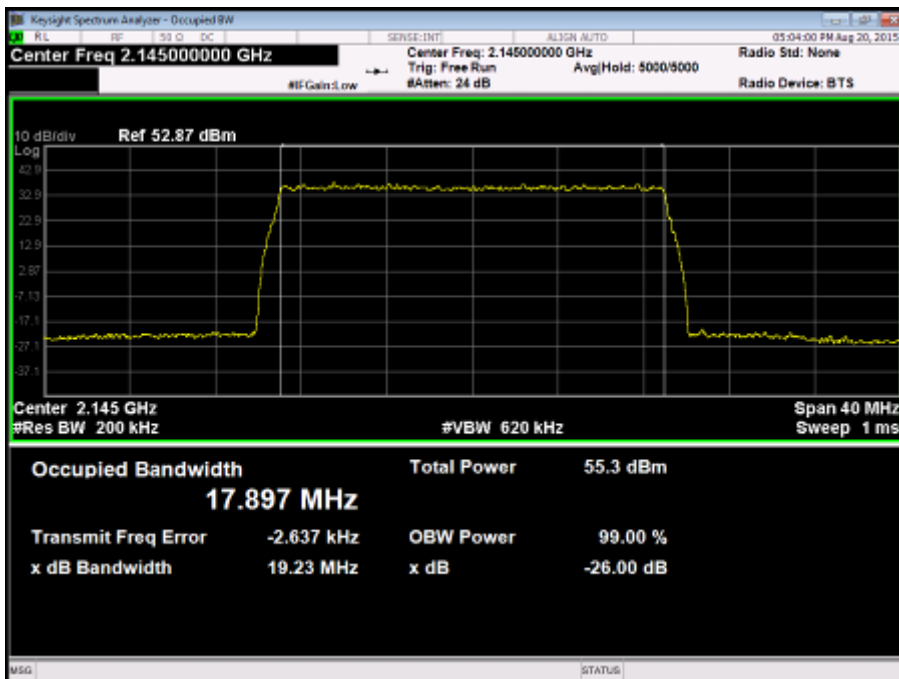
Channel Position B - QPSK / Bandwidth 20.0 MHz



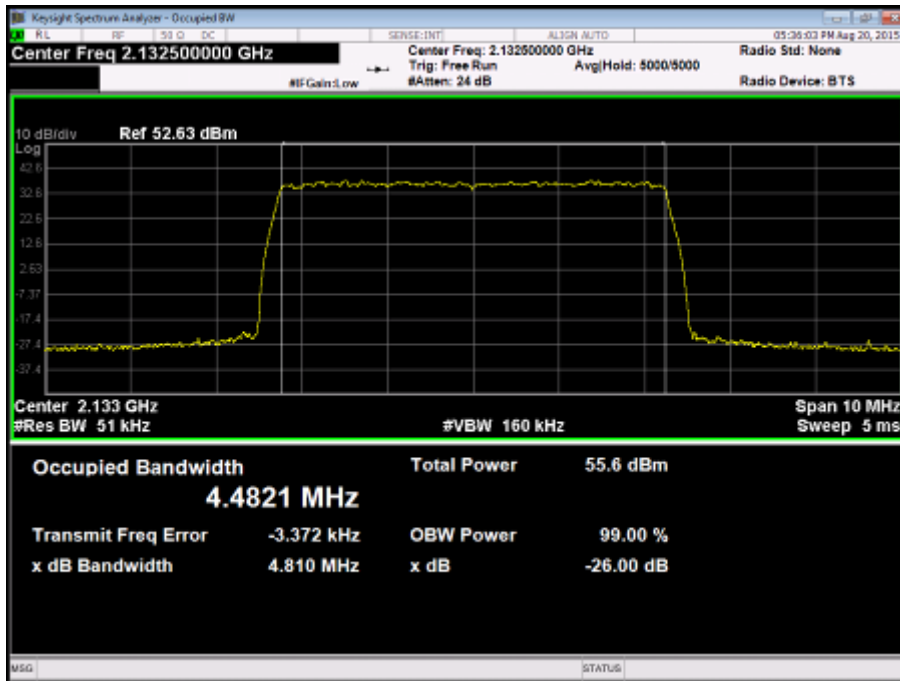
Channel Position M - QPSK / Bandwidth 20.0 MHz



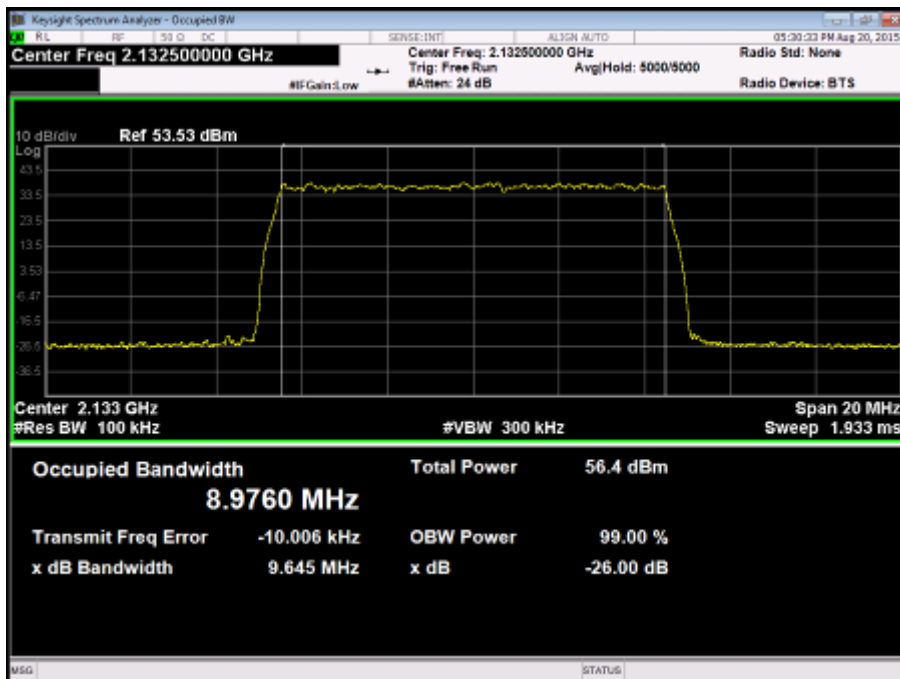
Channel Position T - QPSK / Bandwidth 20.0 MHz



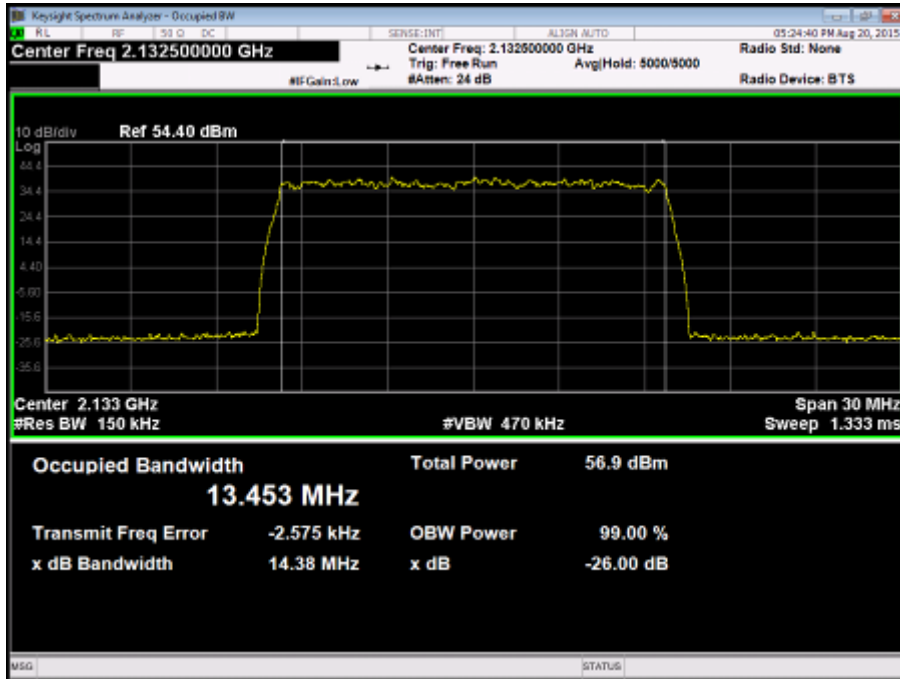
Channel Position M - 16QAM / Bandwidth 5.0 MHz



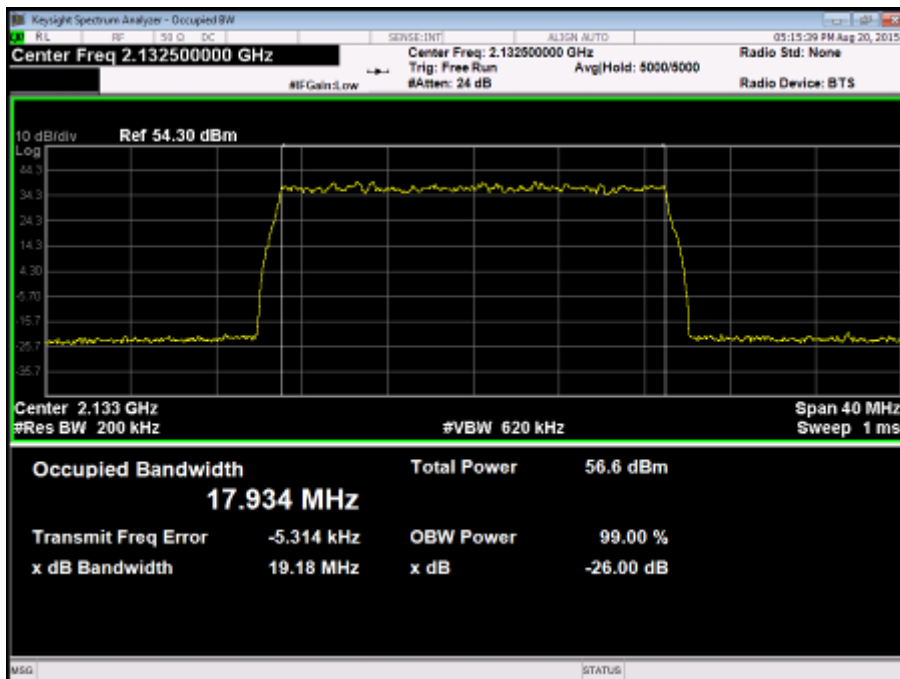
Channel Position M - 16QAM / Bandwidth 10.0 MHz



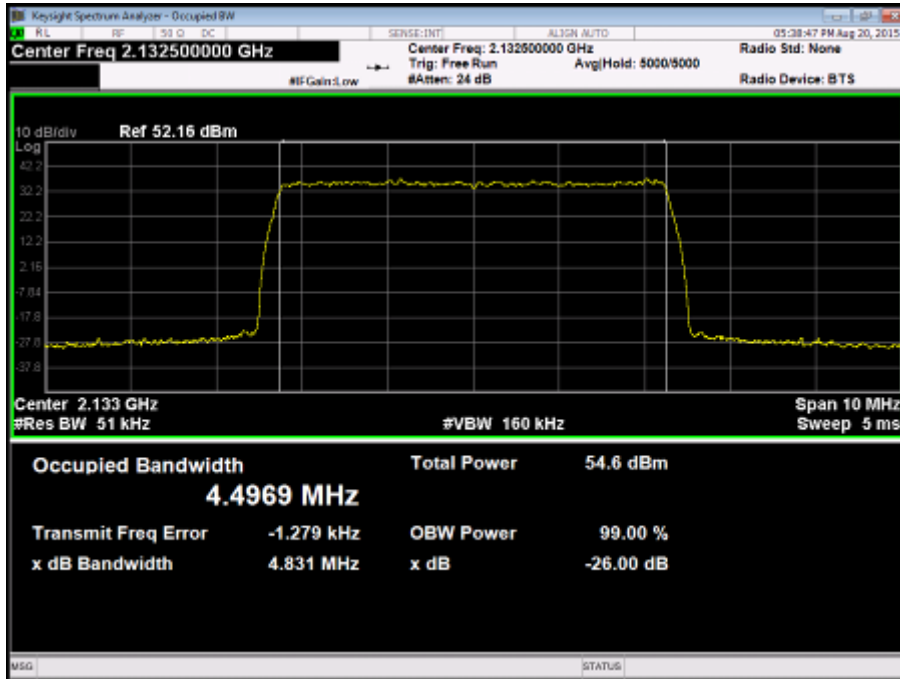
Channel Position M - 16QAM / Bandwidth 15.0 MHz



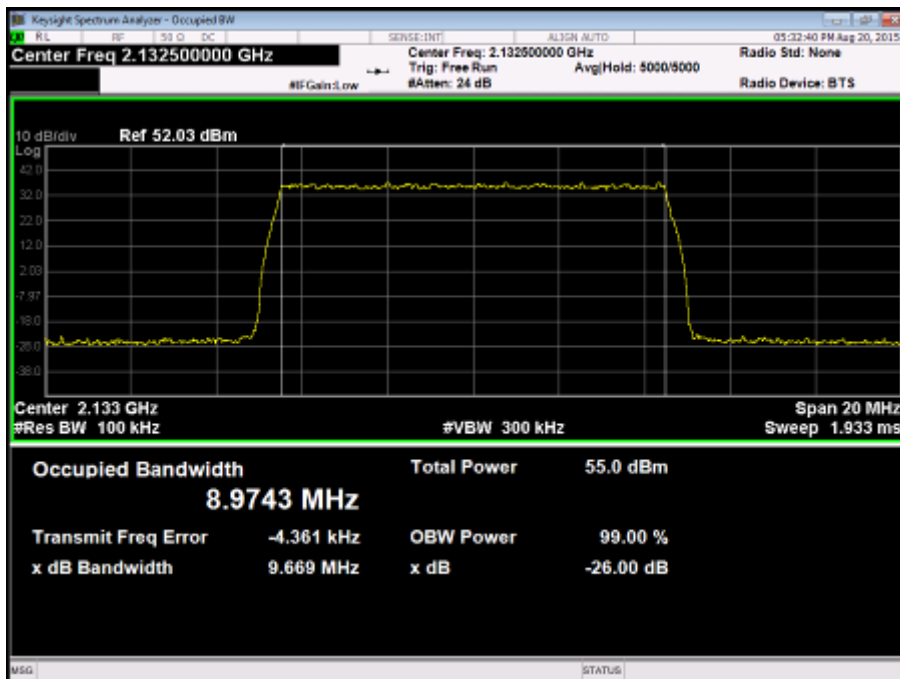
Channel Position M - 16QAM / Bandwidth 20.0 MHz



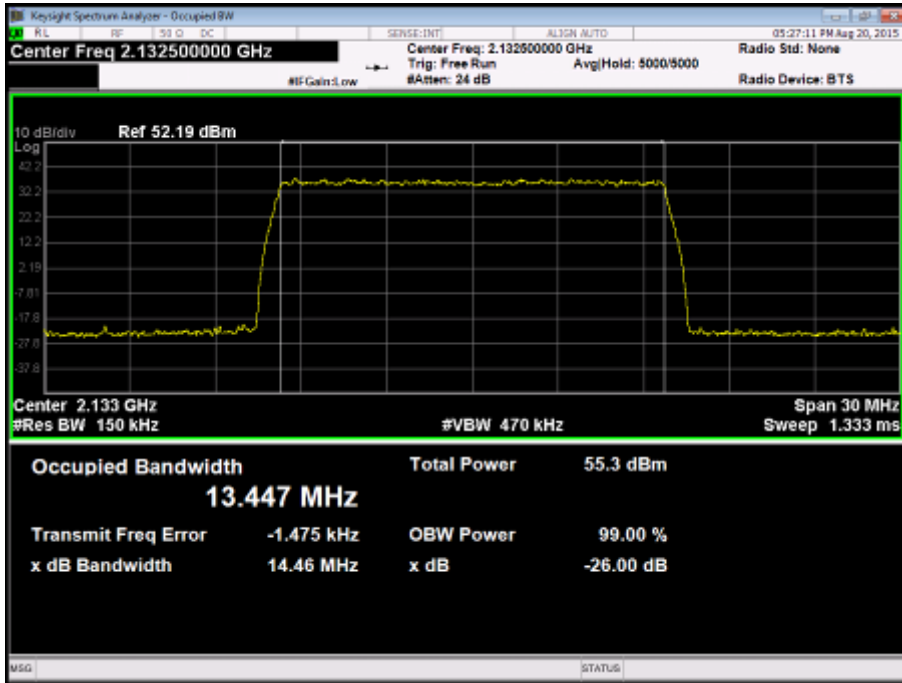
Channel Position M - 64QAM / Bandwidth 5.0 MHz



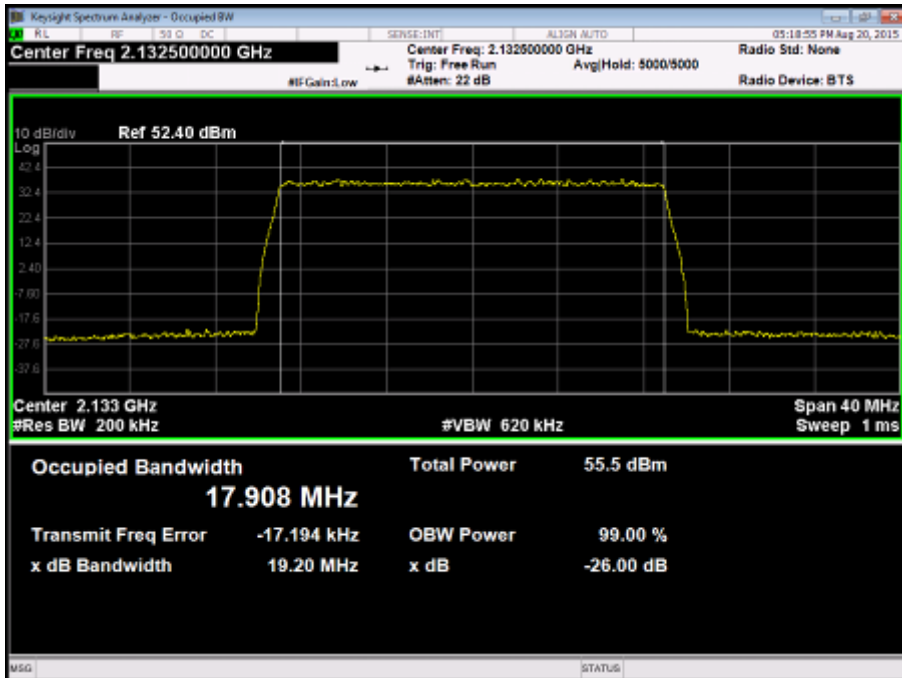
Channel Position M - 64QAM / Bandwidth 10.0 MHz



Channel Position M - 64QAM / Bandwidth 15.0 MHz



Channel Position M - 64QAM / Bandwidth 20.0 MHz



2.3 SPURIOUS EMISSION AT BAND EDGE

2.3.1 Specification Reference

FCC CFR 47 Part 2, Clause 2.1051
FCC CFR 47 Part 27, Clause 27.53 (h)
Industry Canada RSS-139, Clause 6.5

2.3.2 Equipment Under Test

RRUS 32 B4, KRC 161 416/1, S/N: D16Q644897

2.3.3 Date of Test and Modification State

20, 21 and 24 August 2015 - Modification State 0

2.3.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.3.5 Environmental Conditions

Ambient Temperature	22.0 - 24.5°C
Relative Humidity	44.8 - 61.0%

2.3.6 Test Method

The test was applied in accordance with the test method requirements of FCC 47 CFR Part 27 and Industry Canada RSS-139.

In accordance with FCC CFR 47 Part 27, Clause 27.53 (h), the power of any emissions outside of the block edges shall be attenuated below the transmitter power (P) with the licensed band(s) of operation, measured in watts, by at least $43 + 10 \log(P)$ dB. At least 1% of the emission bandwidth was used for the resolution bandwidths up to 1MHz away from the block edge.

For MIMO mode configurations, the limit was adjusted with a correction of $-6.02\text{dB} [10\text{Log}(4)]$ by using the Measure and Add $10\text{Log}(4)$ dB technique according to FCC KDB 662911 D01 Multiple Transmitter Output v02r01 accounting for simultaneous transmission from antennas port RF A to RF D.

As the FCC rules specify a RBW of 1MHz for measurements of emissions > 1MHz away from the band edges, the limit was adjusted with $-13.01\text{dB} [10\text{Log}(50/1000)]$ to compensate for the reduce measurement bandwidth. For MIMO mode, the limit of -32.03dBm was used for emission > 1MHz away from the band edges. For Non-MIMO mode, the limit of -26.01dBm was used for emission > 1MHz away from the band edges. Spectrum analyser detector was set as RMS.

The limits and RBW applied to the measurement of emissions in the 1MHz immediately outside and adjacent to the frequency block were shown in the test results for each test configuration.

The path loss measured and entered as a reference level offset. The EUT was set to transmit at its maximum rated output power in the configurations described in the tables below. The measurements were made at the bottom and top of the band with all channel bandwidth.

2.3.7 Test Results

Configuration W-SC

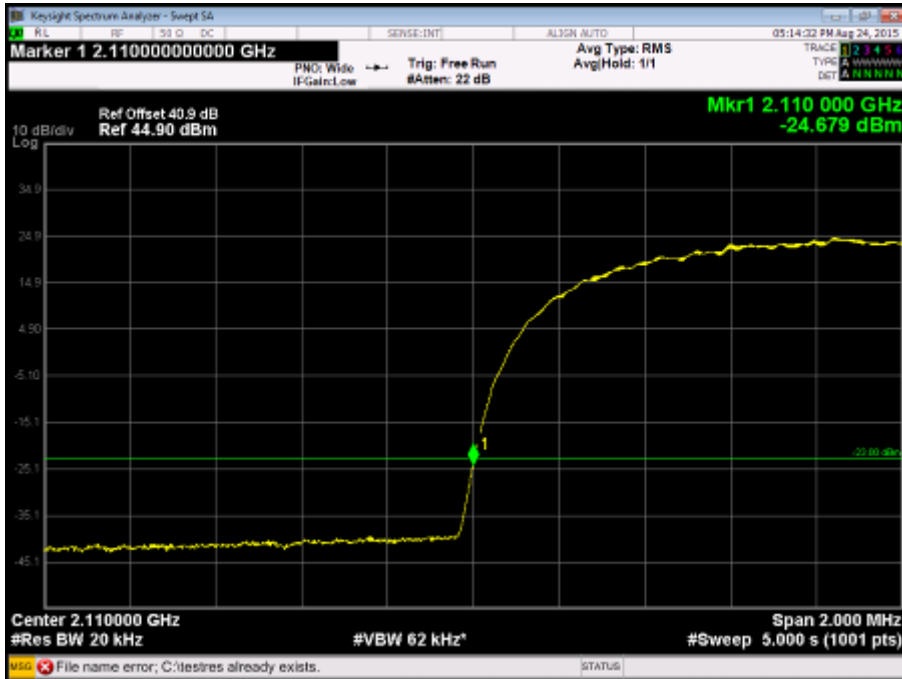
Maximum Output Power 46.0dBm per carrier

Band Edge Frequency	Channel Bandwidth	Edge Test with modulation QPSK Channel Frequencies	RBW (kHz)	Limit (dBm)
Channel Position B 2110.0 MHz	5.0 MHz	2112.4 MHz	20	-16.98
Channel Position T 2155.0 MHz	5.0 MHz	2152.6 MHz	20	-16.98

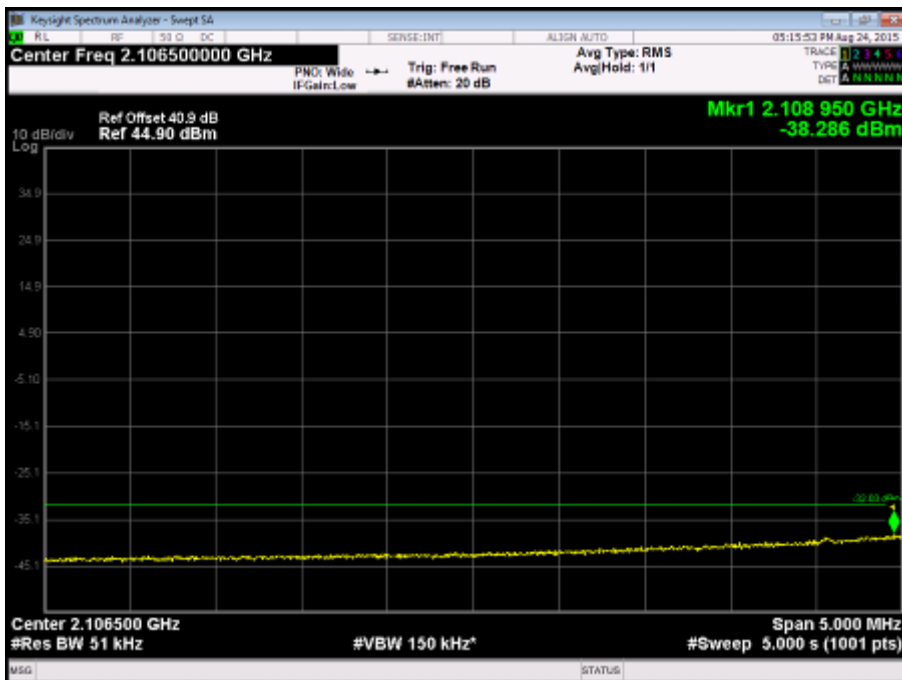
Note 1: For the measurement of 1MHz immediately outside and adjacent to the frequency band edge, a resolution bandwidth of 20kHz was used, and 20kHz is < 50kHz (1% of nominal bandwidth). To compensate for the reduced measurement bandwidth, the limit was adjusted with a correction of -3.98dB [10Log(20/50)] to -13dBm. The test results should be compared to a limit of -16.98dBm.

Note 2: The channels shown in the table above are the minimum and maximum channels that can be used in the authorised frequency ranges to maintain compliance. Channels outside of the ranges shown in the above tables shall not be available to the end user.

Channel Position B - QPSK / Bandwidth 5.0 MHz



Note: The limit was changed to -23.00dBm which is more stringent than -16.98dBm.

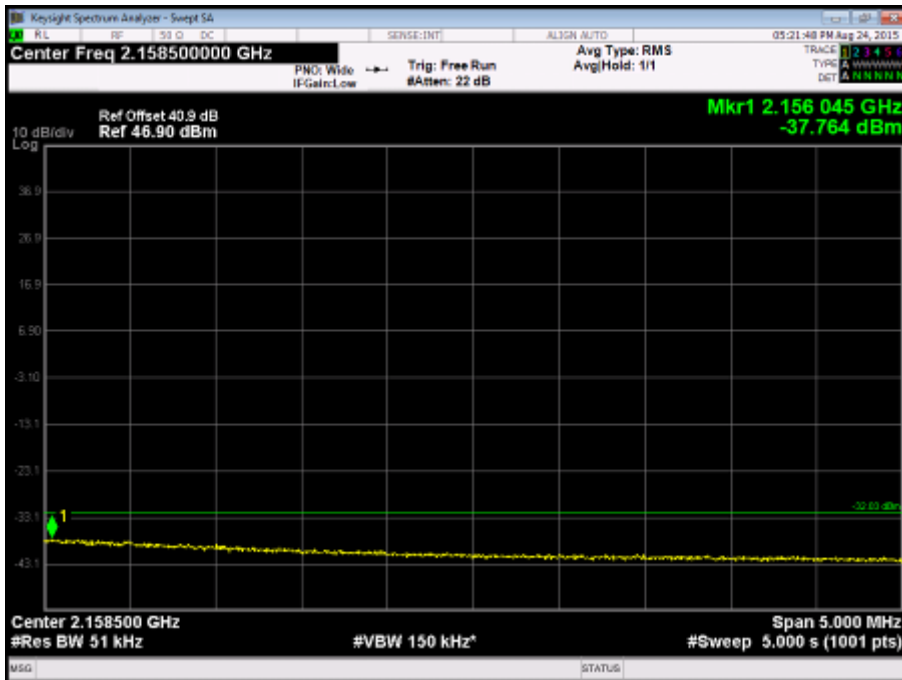


Note: The limit was changed to -32.03dBm which is more stringent than -26.01dBm.

Channel Position T - QPSK / Bandwidth 5.0 MHz



Note: The limit was changed to -23.00dBm which is more stringent than -16.98dBm.



Note: The limit was changed to -32.03dBm which is more stringent than -26.01dBm.

Configuration W-MIMO-SC

Maximum Output Power 46.0dBm per carrier

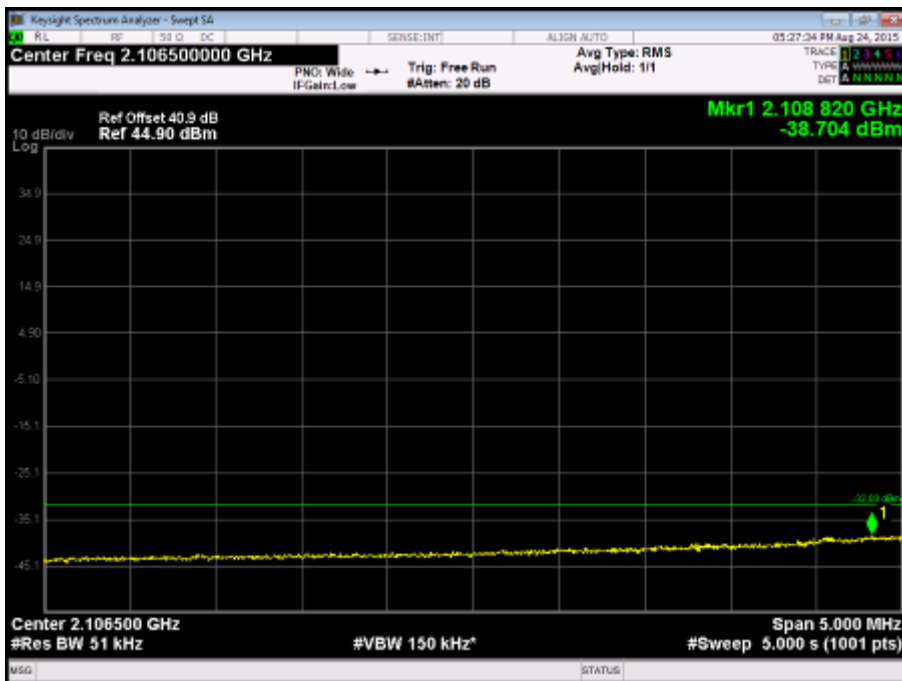
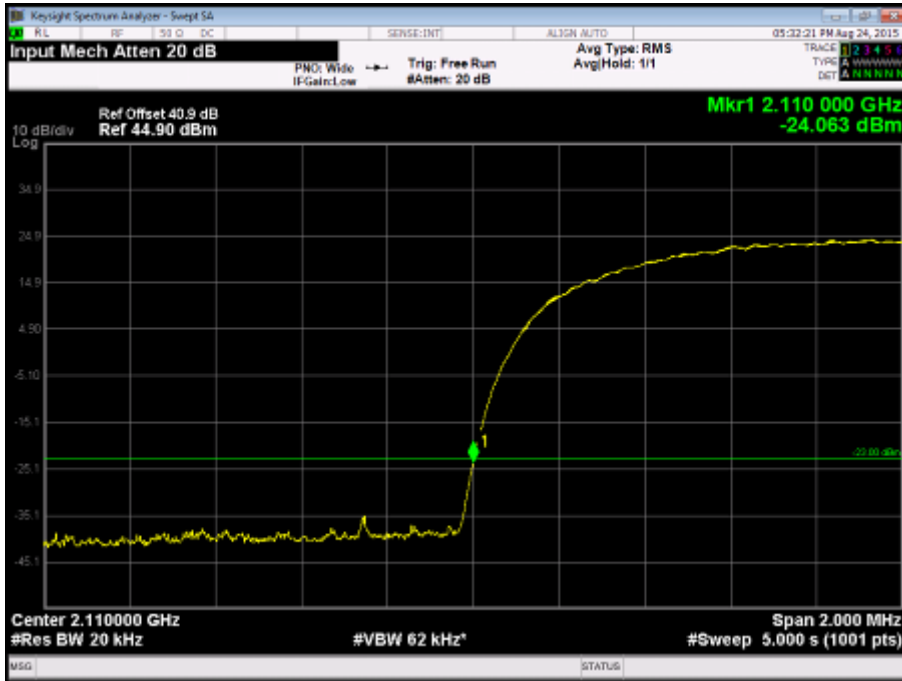
Band Edge Frequency	Channel Bandwidth	Edge Test with modulation 16QAM Channel Frequencies	RBW (kHz)	Limit (dBm)
Channel Position B 2110.0 MHz	5.0 MHz	2112.4 MHz	20	-23.00
Channel Position T 2155.0 MHz	5.0 MHz	2152.6 MHz	20	-23.00

Band Edge Frequency	Channel Bandwidth	Edge Test with modulation 64QAM Channel Frequencies	RBW (kHz)	Limit (dBm)
Channel Position B 2110.0 MHz	5.0 MHz	2112.4 MHz	20	-23.00
Channel Position T 2155.0 MHz	5.0 MHz	2152.6 MHz	20	-23.00

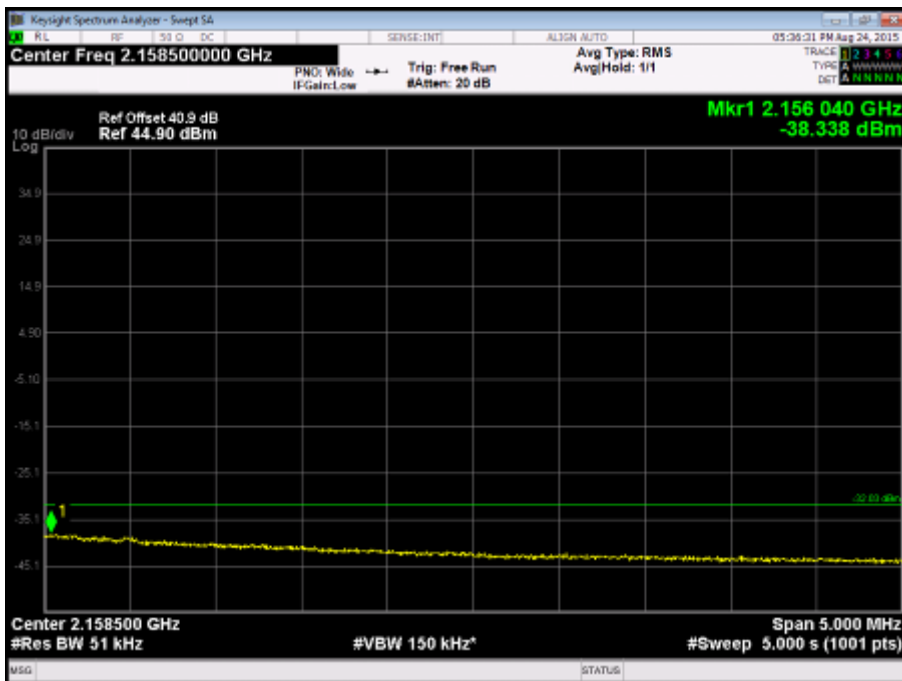
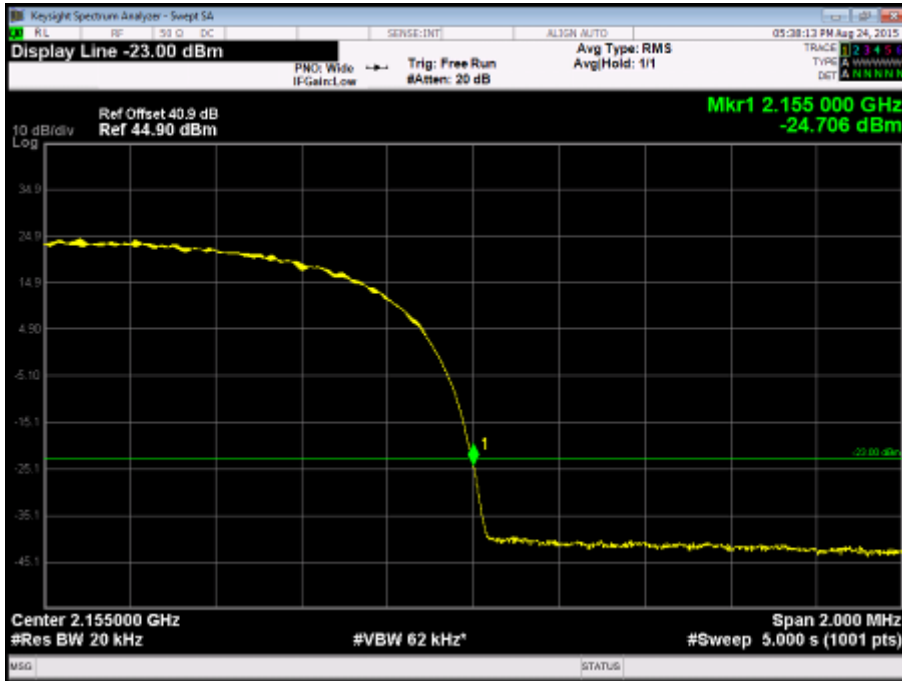
Note 1: For MIMO mode configurations, the limit was adjusted with a correction of -6.02dB [10Log(4)] to -13dBm. For the measurement of 1MHz immediately outside and adjacent to the frequency band edge, a resolution bandwidth of 20kHz was used, and 20kHz is < 50kHz (1% of nominal bandwidth). To compensate for the reduced measurement bandwidth, the limit was adjusted with a correction of -3.98dB [10Log(20/50)] to -19.02dBm.

Note 2: The channels shown in the table above are the minimum and maximum channels that can be used in the authorised frequency ranges to maintain compliance. Channels outside of the ranges shown in the above tables shall not be available to the end user.

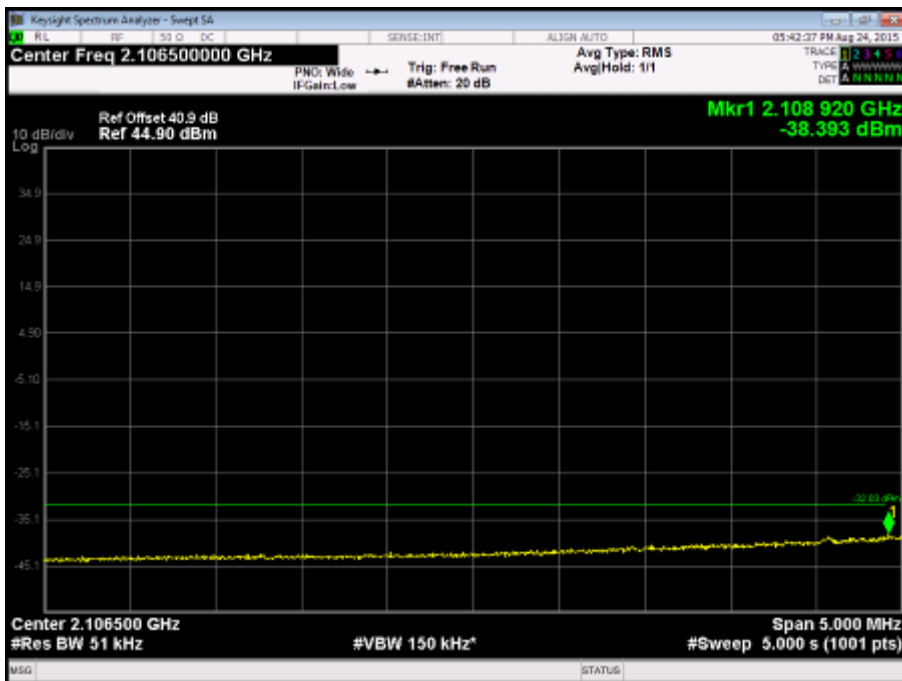
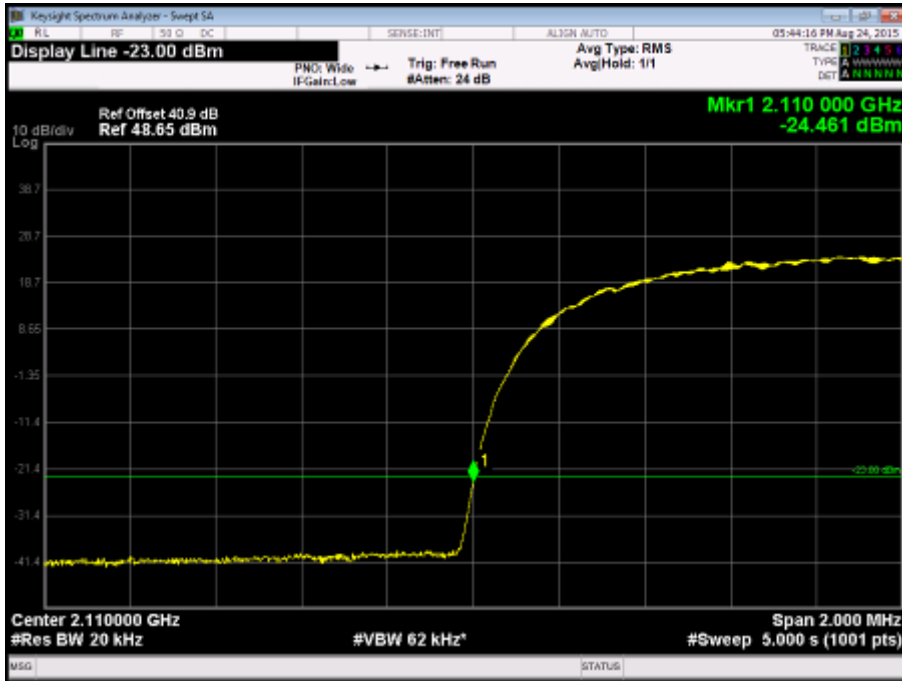
Channel Position B - 16QAM / Bandwidth 5.0 MHz



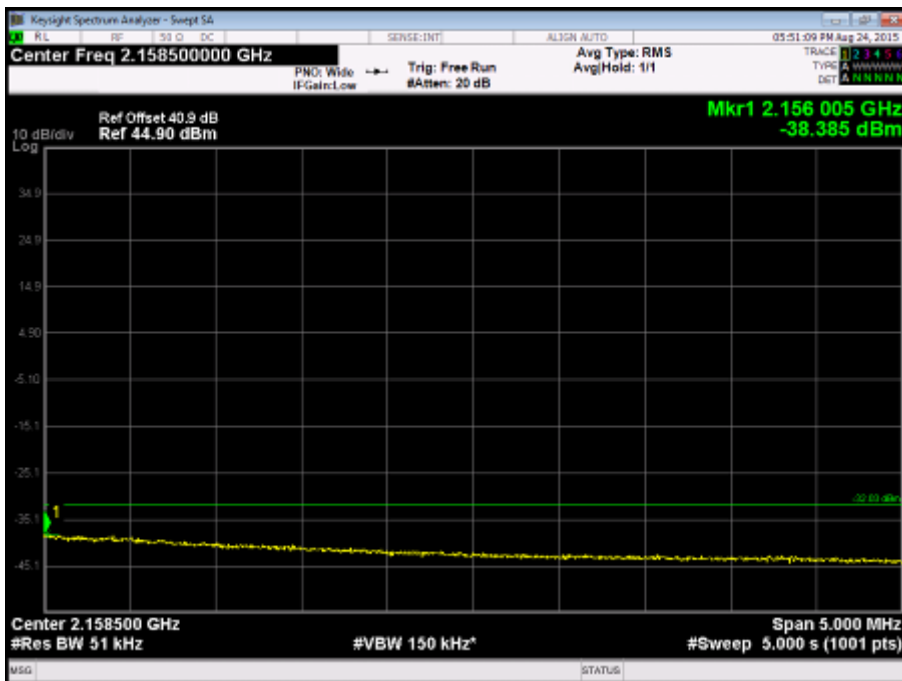
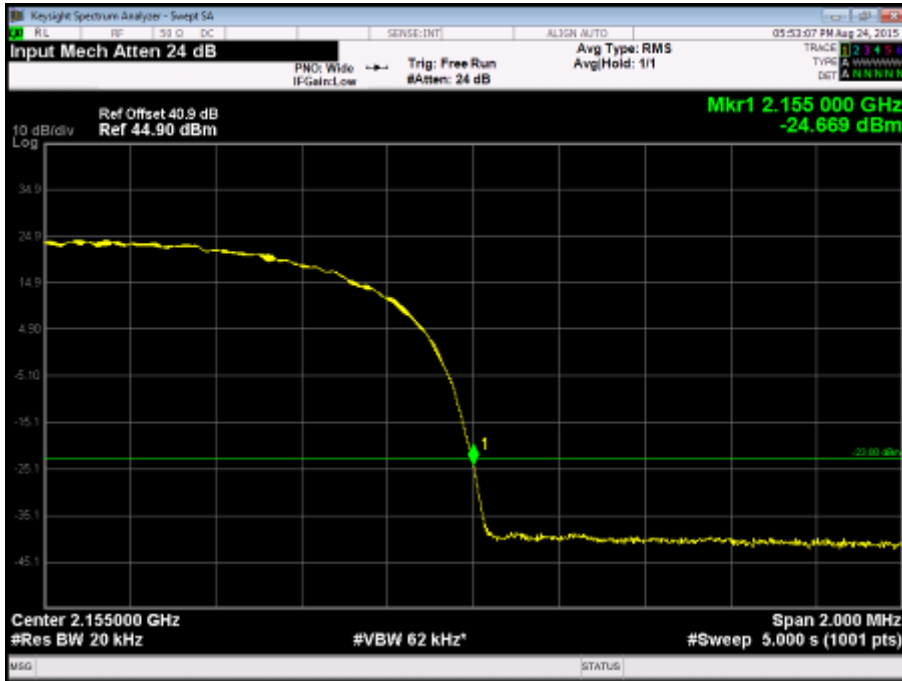
Channel Position T - 16QAM / Bandwidth 5.0 MHz



Channel Position B - 64QAM / Bandwidth 5.0 MHz



Channel Position T - 64QAM / Bandwidth 5.0 MHz



Configuration L-MIMO-SC

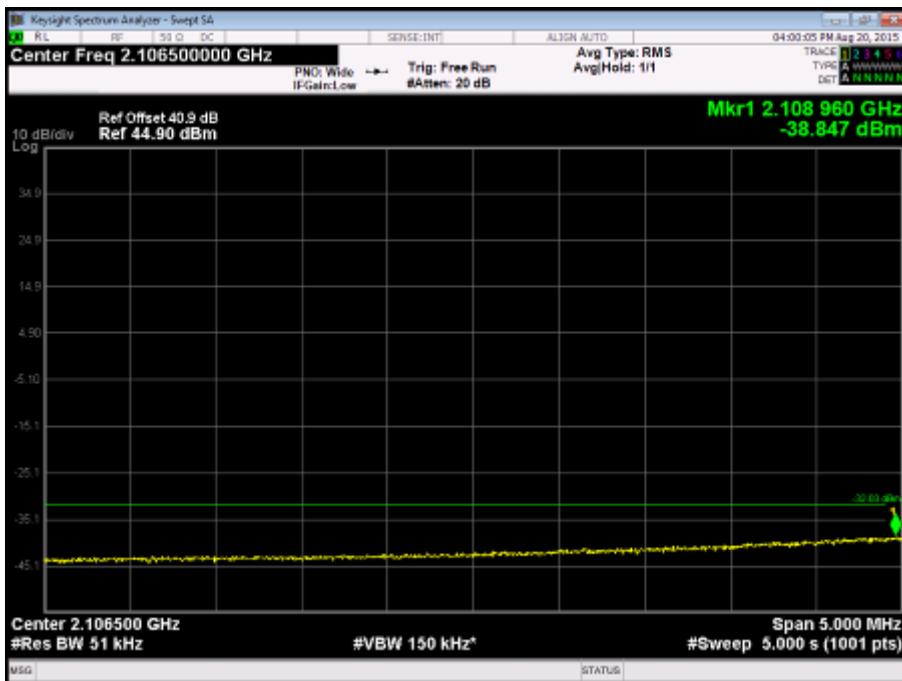
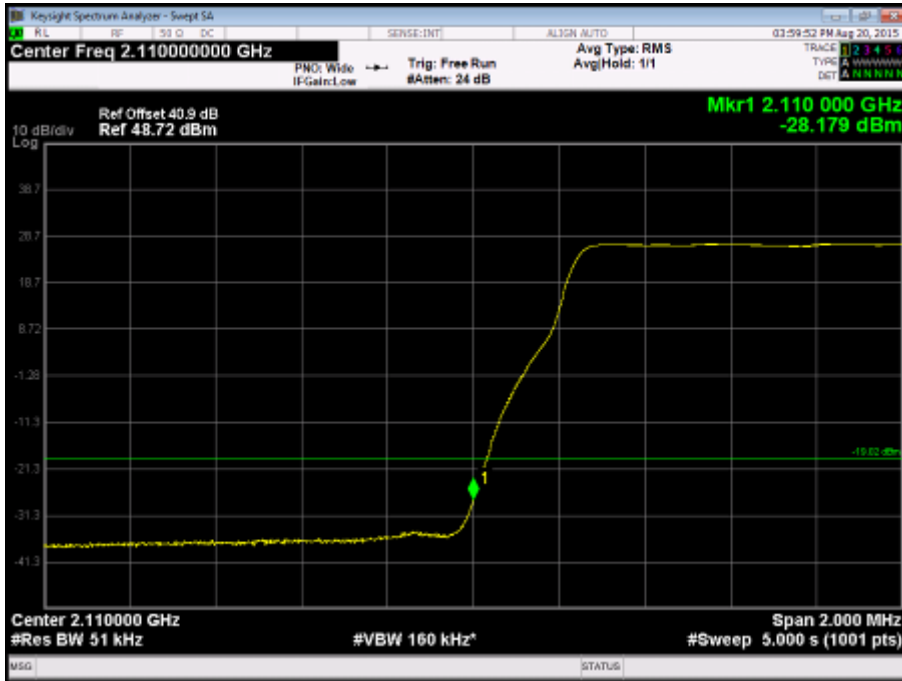
Maximum Output Power 46.0dBm per carrier

Band Edge Frequency	Channel Bandwidth	Edge Test with modulation QPSK Channel Frequencies	RBW (kHz)	Limit (dBm)
Channel Position B 2110.0 MHz	5.0 MHz	2112.5MHz	51	-19.02
	10.0 MHz	2110.0MHz	100	-19.02
	15.0 MHz	2117.5MHz	200	-19.02
	20.0 MHz	2120.0MHz	200	-19.02
Channel Position T 2155.0 MHz	5.0 MHz	2152.5MHz	51	-19.02
	10.0 MHz	2150.0MHz	100	-19.02
	15.0 MHz	2147.5MHz	200	-19.02
	20.0 MHz	2145.0MHz	200	-19.02

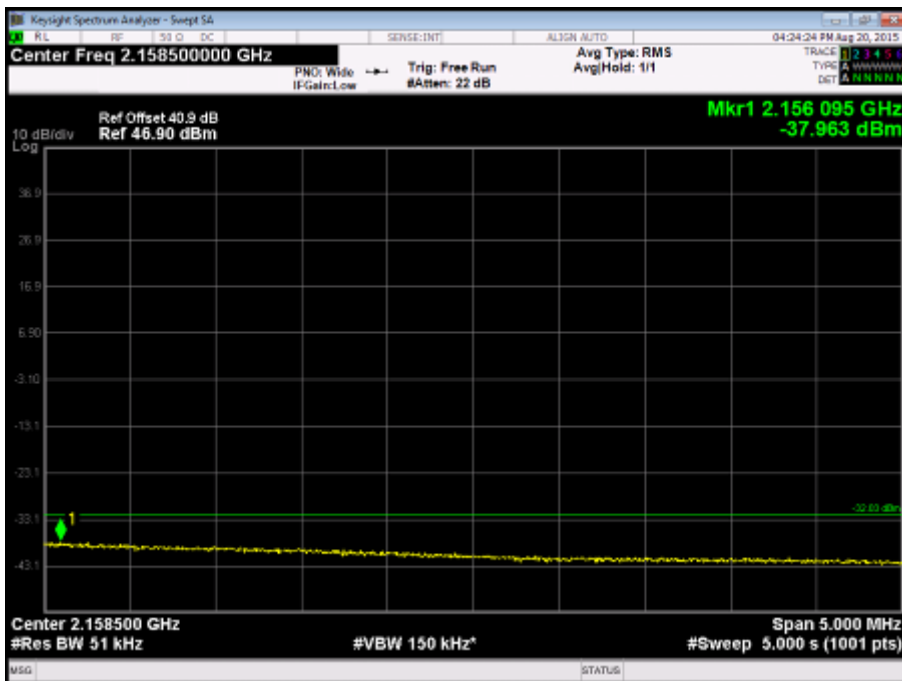
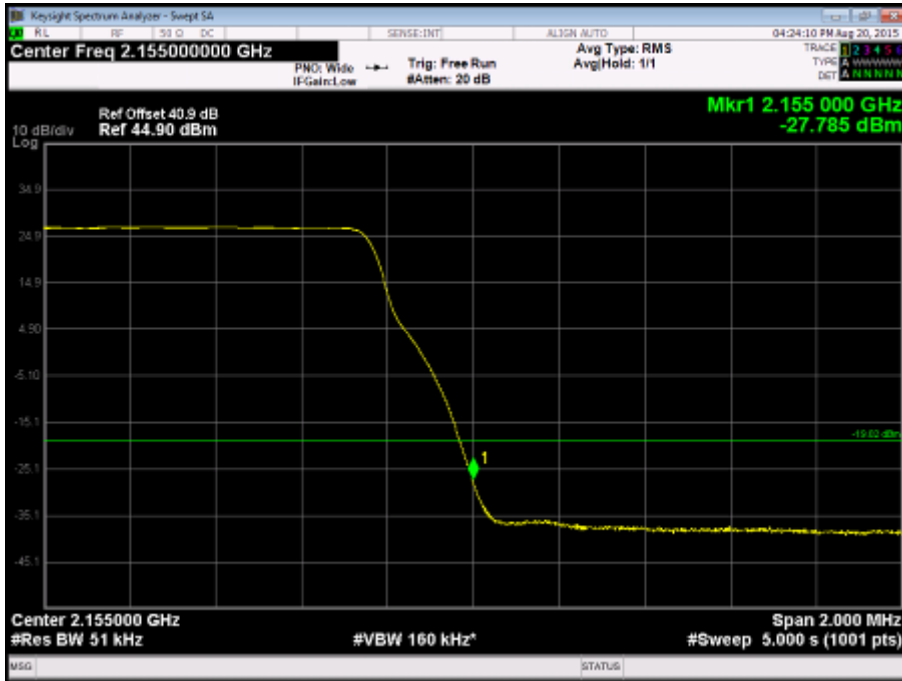
Note 1: For MIMO mode configurations, the limit was adjusted with a correction of -6.02dB [10Log(4)] to -13dBm.

Note 2: The channels shown in the table above are the minimum and maximum channels that can be used in the authorised frequency ranges to maintain compliance. Channels outside of the ranges shown in the above tables shall not be made available to the end user.

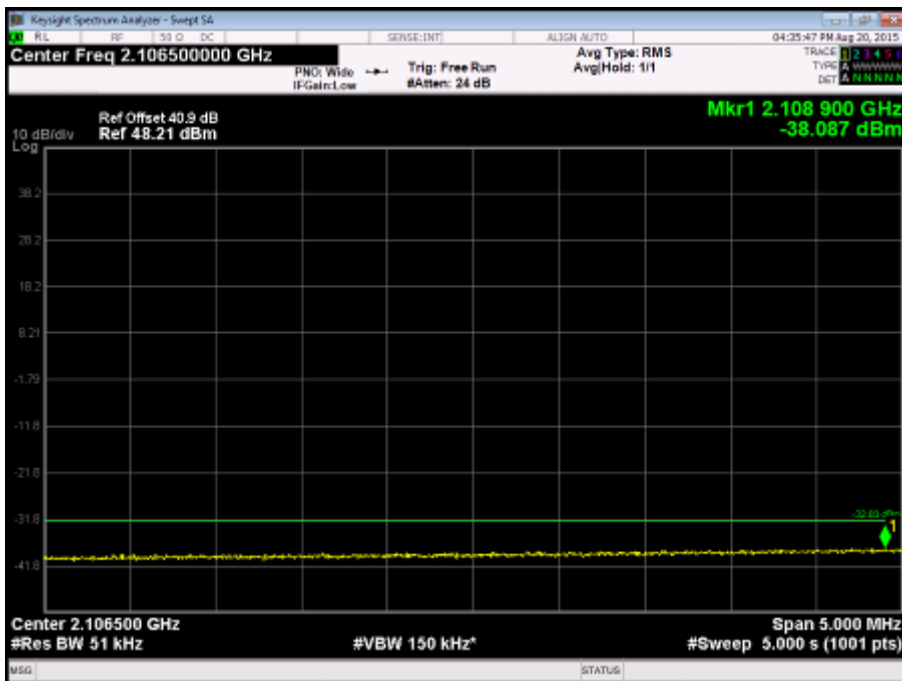
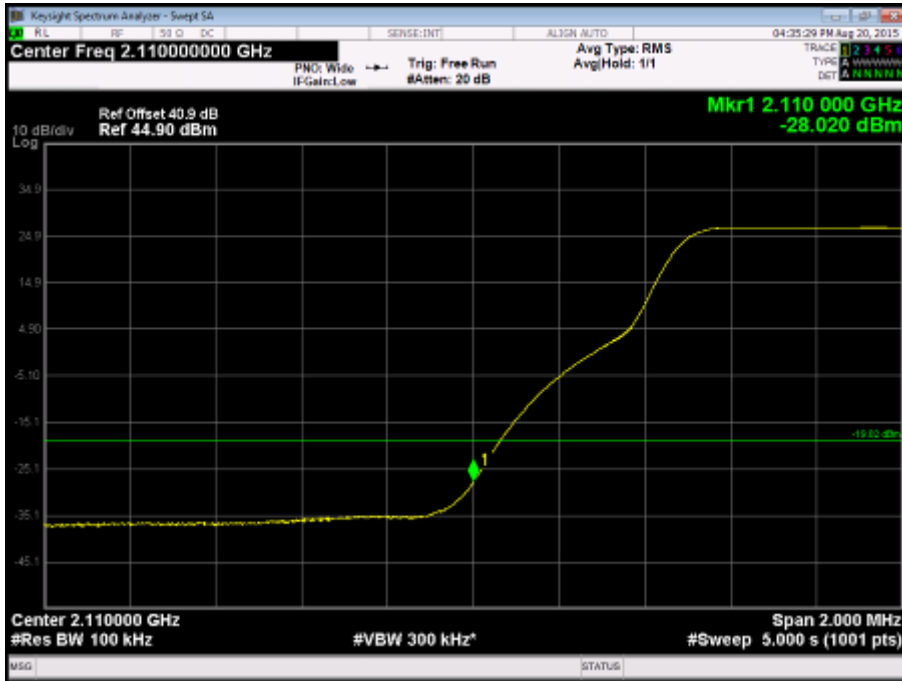
Channel Position B - QPSK / Bandwidth 5.0 MHz



Channel Position T - QPSK / Bandwidth 5.0 MHz

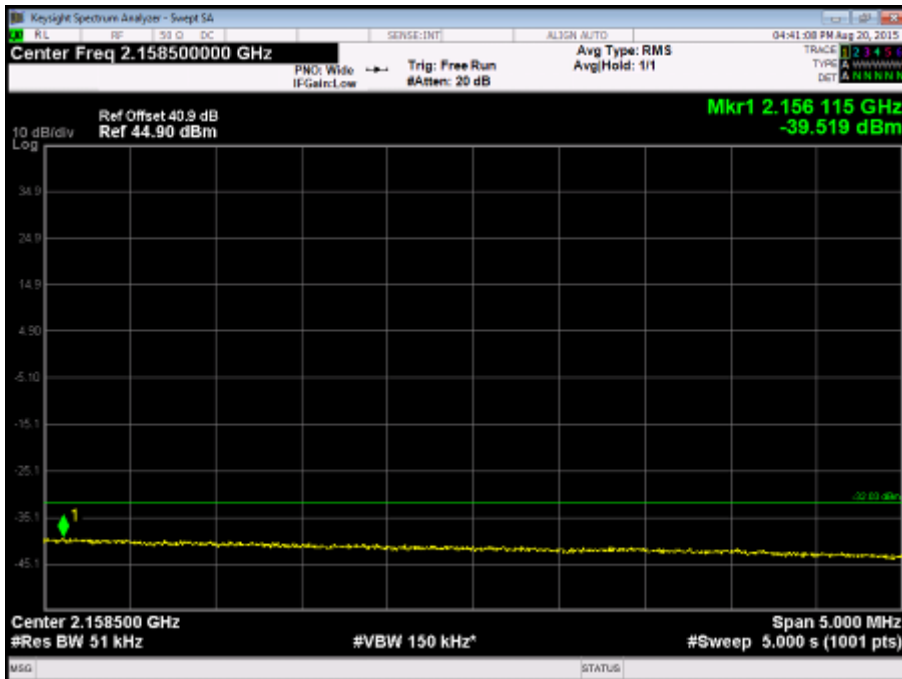
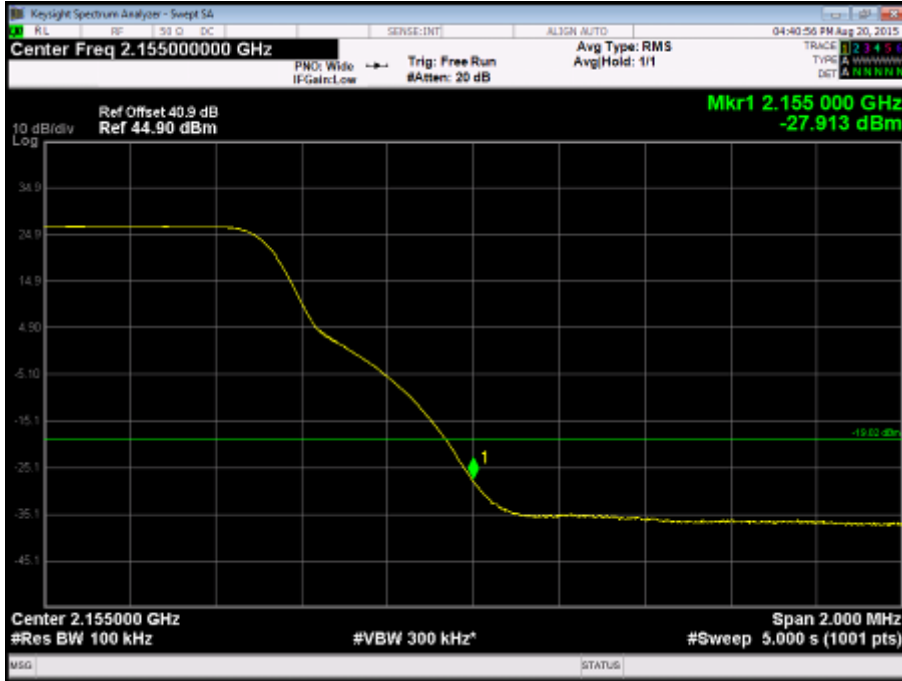


Channel Position B - QPSK / Bandwidth 10.0 MHz

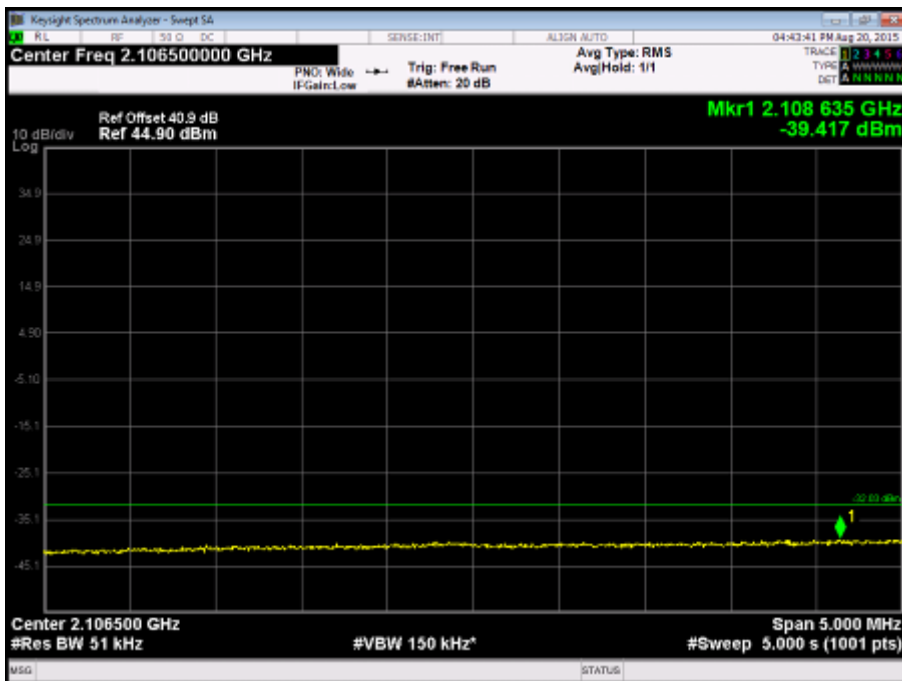
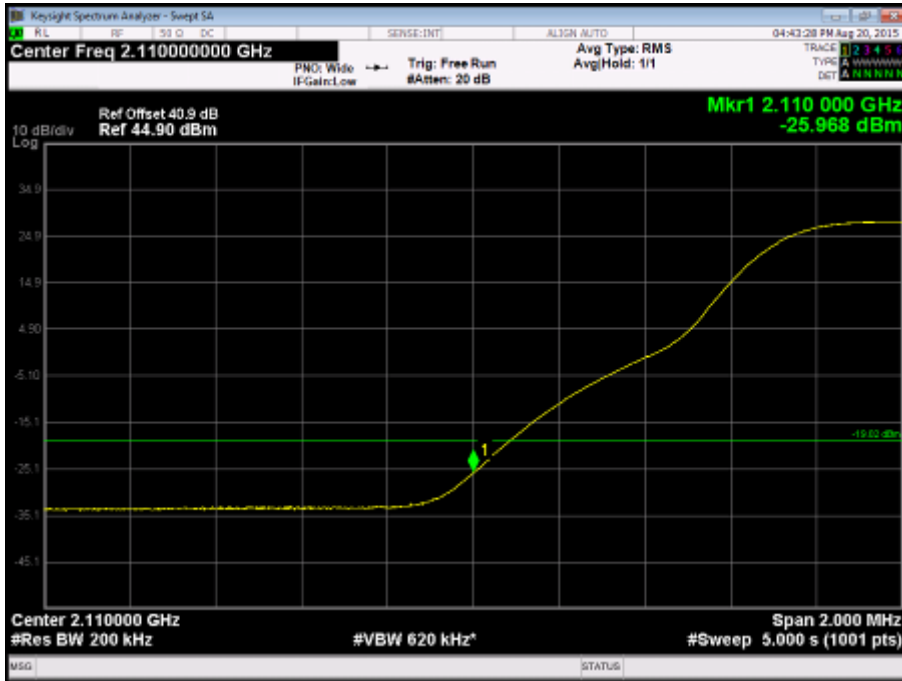


Channel

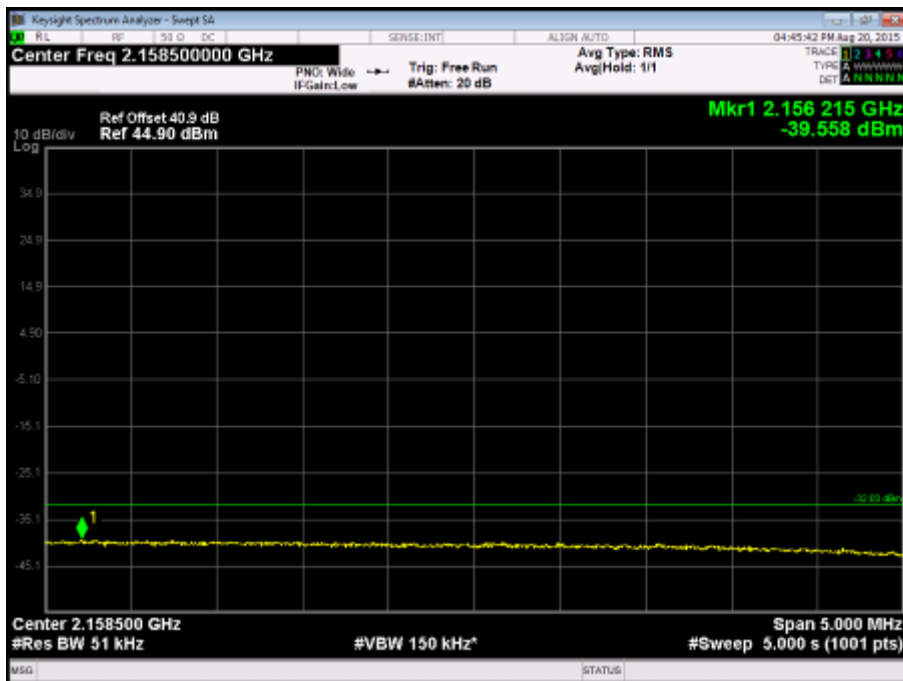
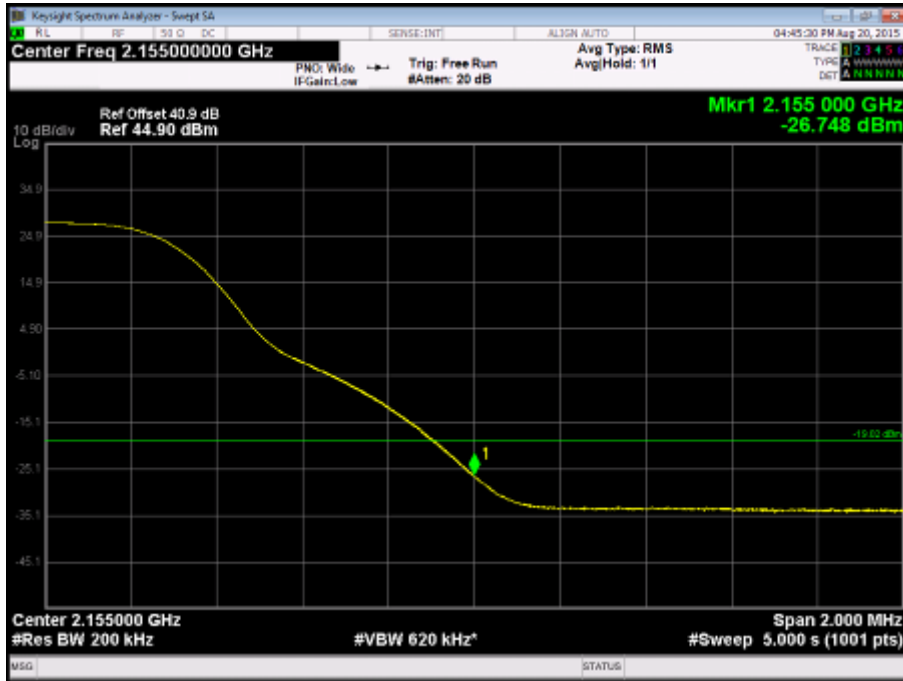
Position T - QPSK / Bandwidth 10.0 MHz



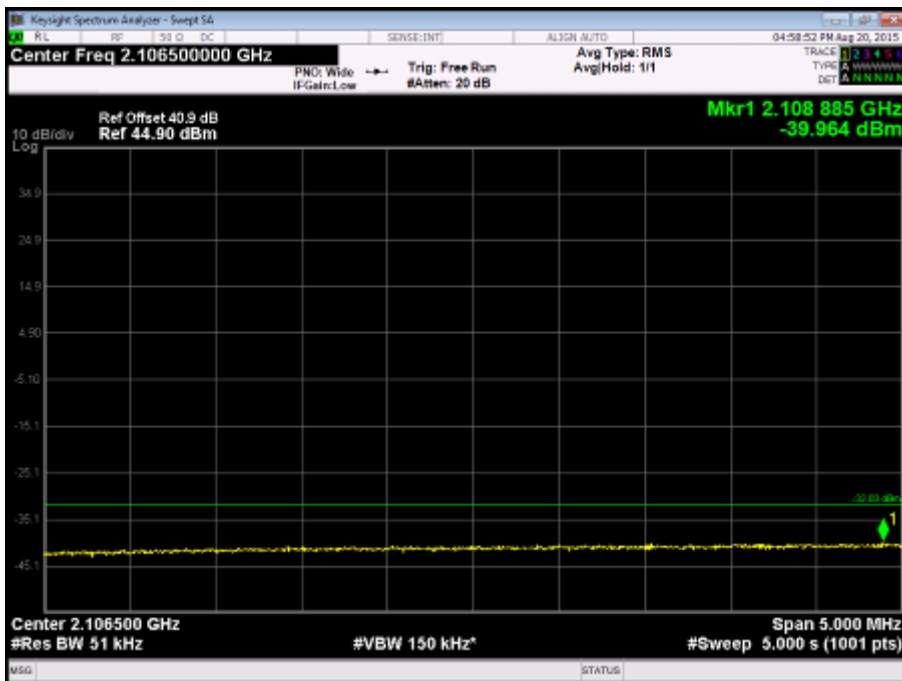
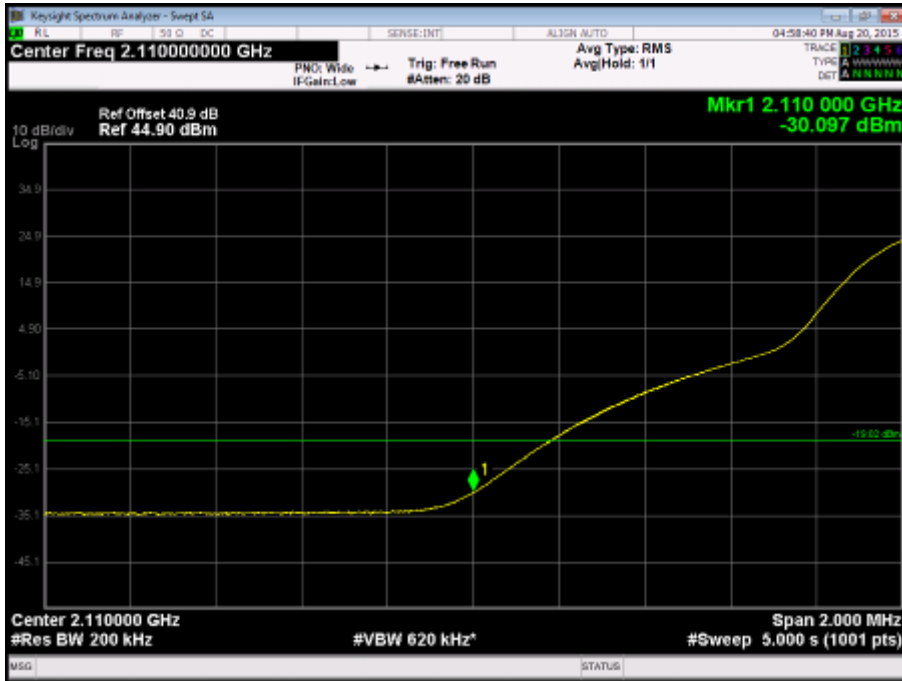
Channel Position B - QPSK / Bandwidth 15.0 MHz



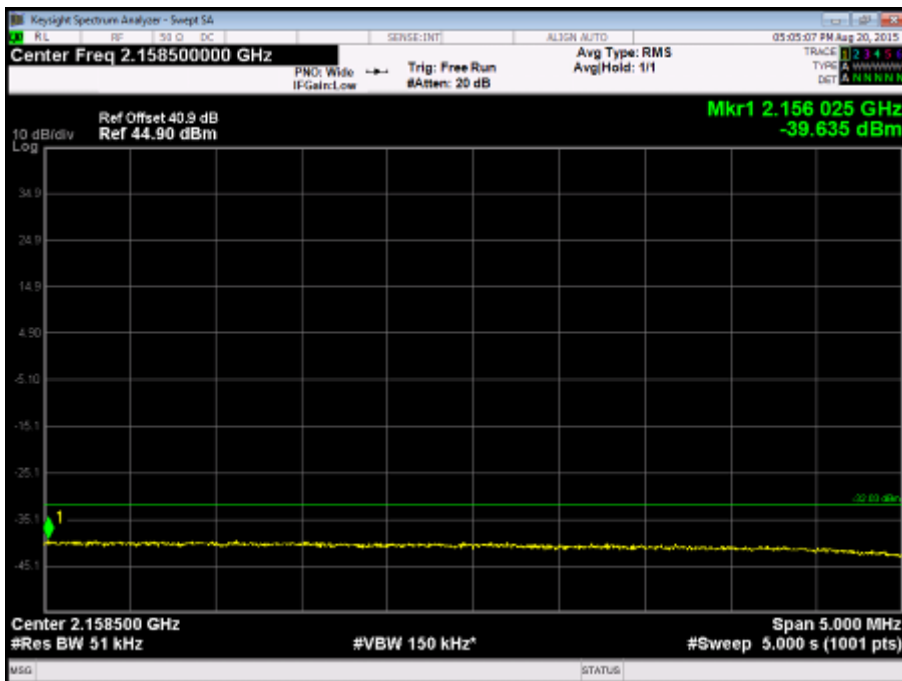
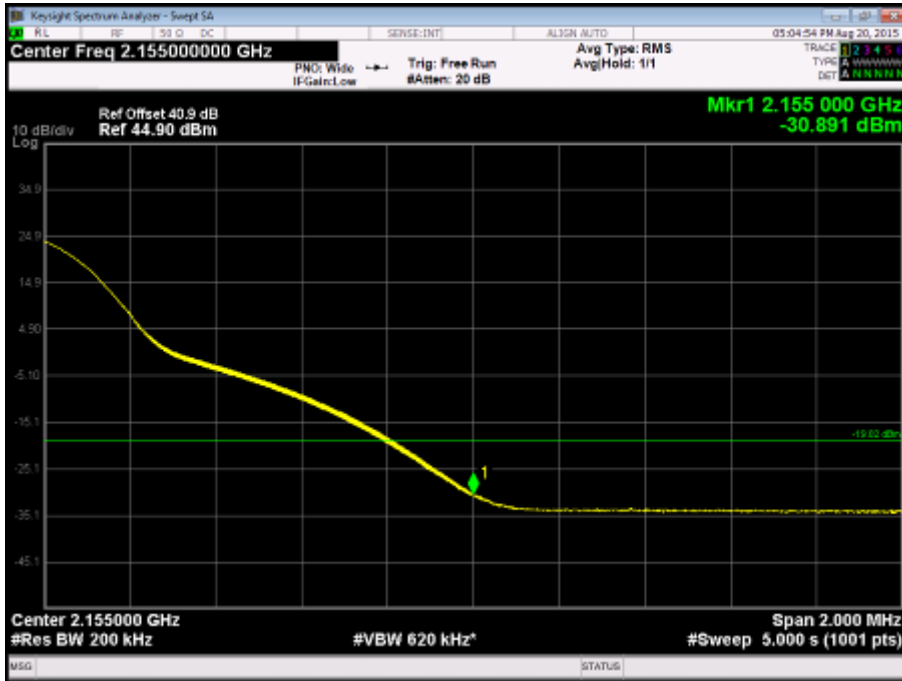
Channel Position T - QPSK / Bandwidth 15.0 MHz



Channel Position B - QPSK / Bandwidth 20.0 MHz



Channel Position T - QPSK / Bandwidth 20.0 MHz



Configuration W-MC (2C)

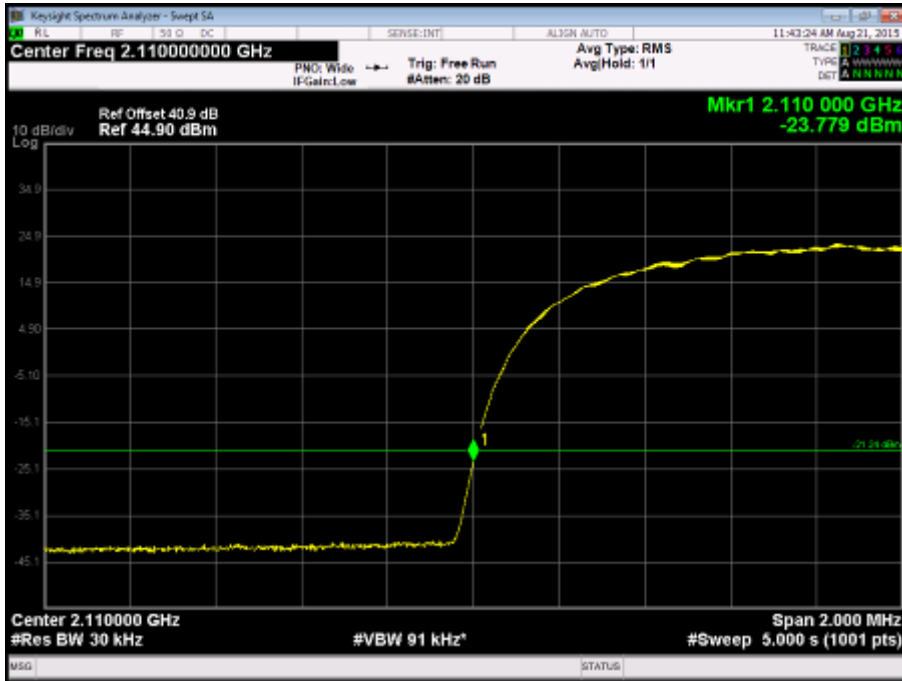
Maximum Output Power 43.0dBm per carrier

Band Edge Frequency	Channel Bandwidth	Edge Test with modulation QPSK Channel Frequencies	RBW (kHz)	Limit (dBm)
Channel Position B _{RFBW} 2110.0 MHz	5.0 MHz	2112.4MHz+2117.4MHz	30	-15.22
Channel Position T _{RFBW} 2155.0 MHz	5.0 MHz	2152.6MHz+2147.6MHz	30	-15.22

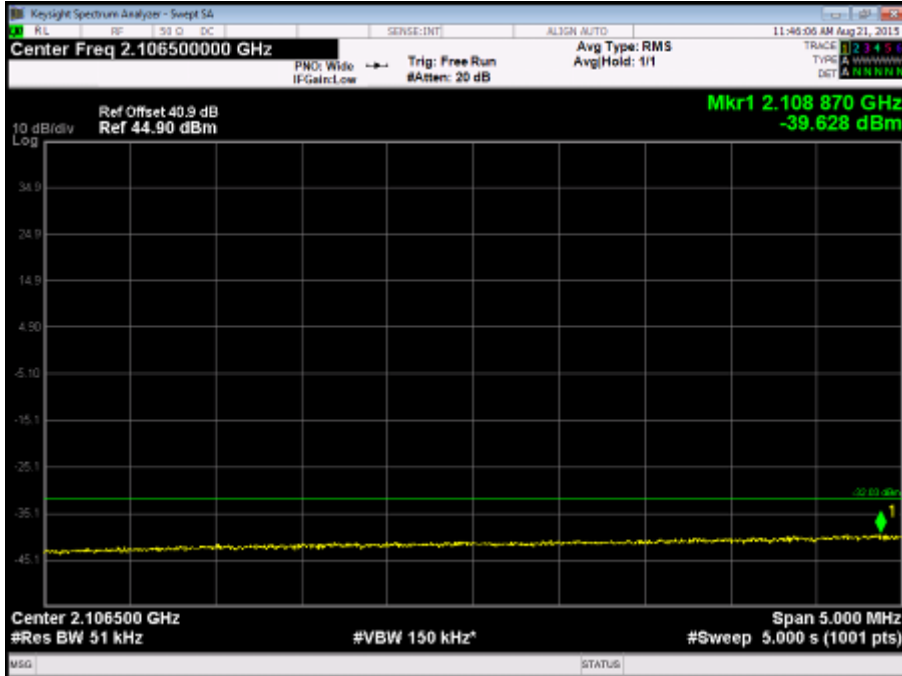
Note 1: For the measurement of 1MHz immediately outside and adjacent to the frequency band edge, a resolution bandwidth of 30kHz was used, and 30kHz is < 50kHz (1% of nominal bandwidth). To compensate for the reduced measurement bandwidth, the limit was adjusted with a correction of -2.22dB [10Log(30/50)] to -13dBm. The test results should be compared to a limit of -15.22dBm.

Note 2: The channels shown in the table above are the minimum and maximum channels that can be used in the authorised frequency ranges to maintain compliance. Channels outside of the ranges shown in the above tables shall not be made available to the end user.

Channel Position B_{RFBW} - QPSK / Bandwidth 5.0 MHz

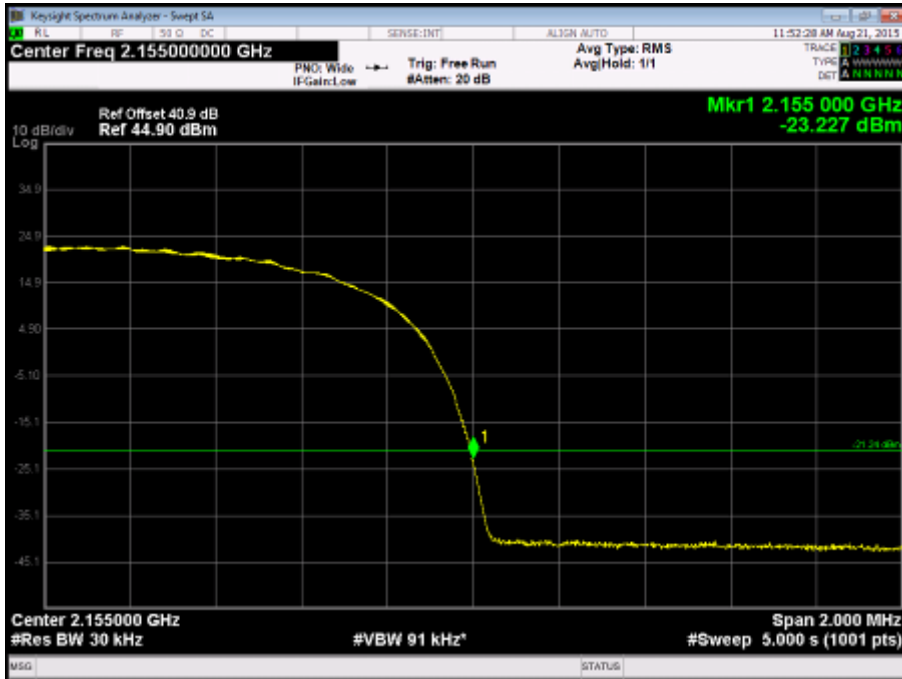


Note: The limit was changed to -21.24dBm which is more stringent than -15.22dBm.

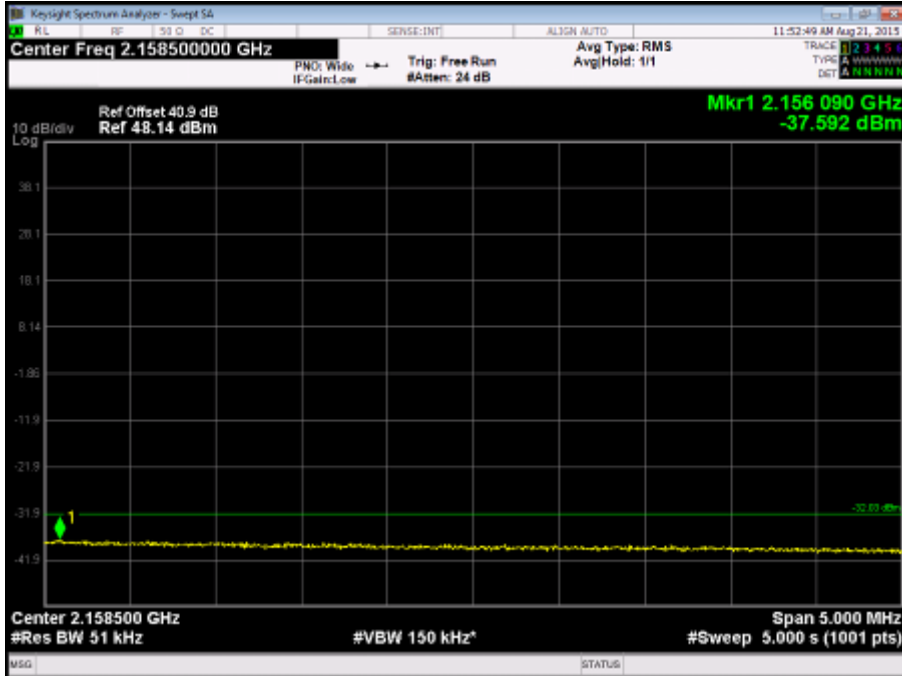


Note: The limit was changed to -32.03dBm which is more stringent than -26.01dBm.

Channel Position T_{RFBW} – QPSK / Bandwidth 5.0 MHz



Note: The limit was changed to -21.24dBm which is more stringent than -15.22dBm.



Note: The limit was changed to -32.03dBm which is more stringent than -26.01dBm.

Configuration W-MIMO- MC (2C)

Maximum Output Power 43.0dBm per carrier

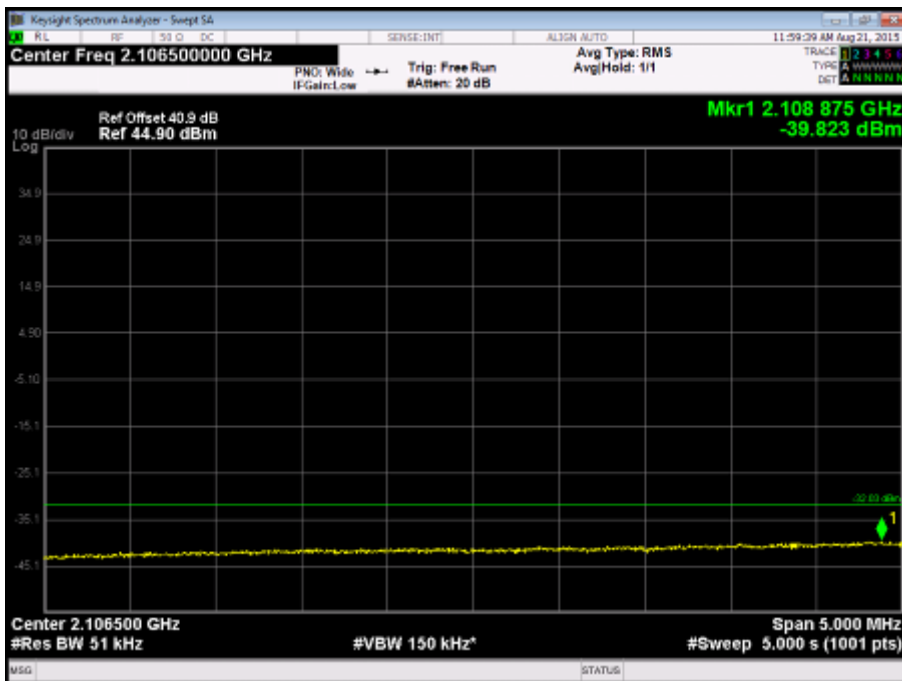
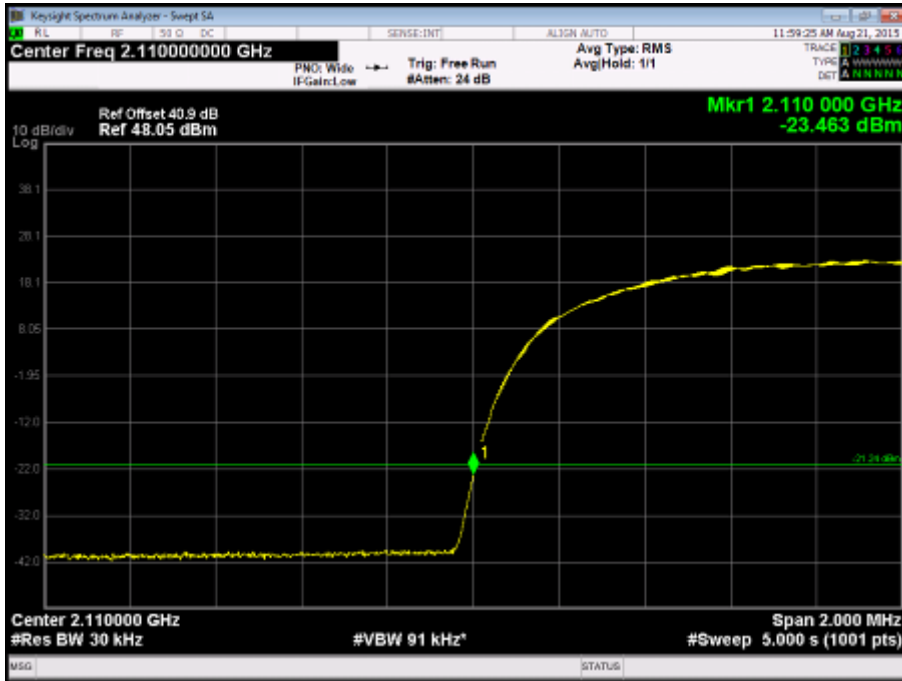
Band Edge Frequency	Channel Bandwidth	Edge Test with modulation 16QAM Channel Frequencies	RBW (kHz)	Limit (dBm)
Channel Position B_{RFBW} 2110.0 MHz	5.0 MHz	2112.4MHz + 2117.4MHz	30	-21.24
Channel Position T_{RFBW} 2155.0 MHz	5.0 MHz	2152.6MHz + 2147.6MHz	30	-21.24

Band Edge Frequency	Channel Bandwidth	Edge Test with modulation 64QAM Channel Frequencies	RBW (kHz)	Limit (dBm)
Channel Position B_{RFBW} 2110.0 MHz	5.0 MHz	2112.4MHz + 2117.4MHz	30	-21.24
Channel Position T_{RFBW} 2155.0 MHz	5.0 MHz	2152.6MHz + 2147.6MHz	30	-21.24

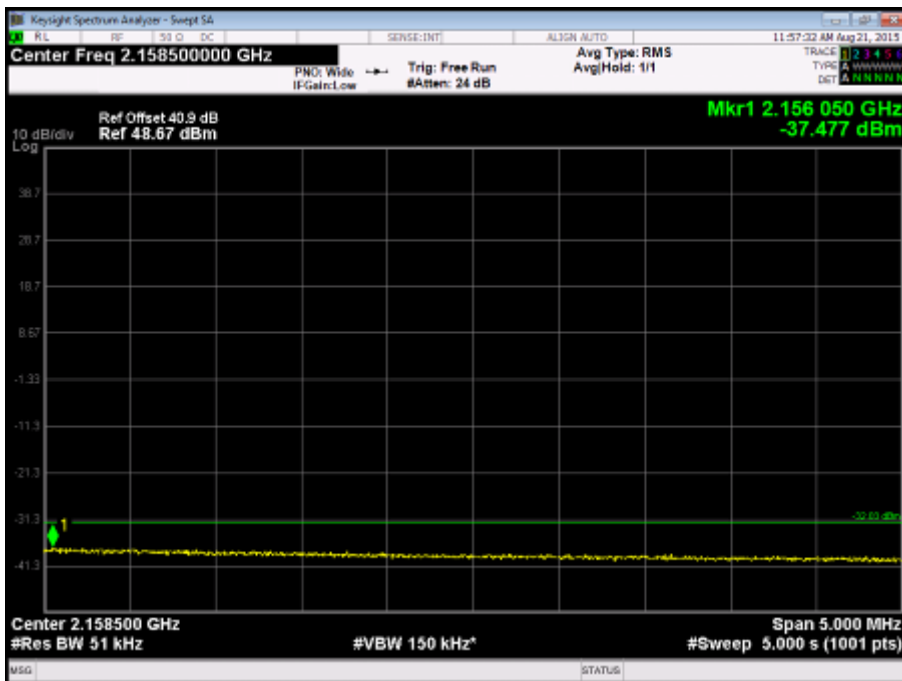
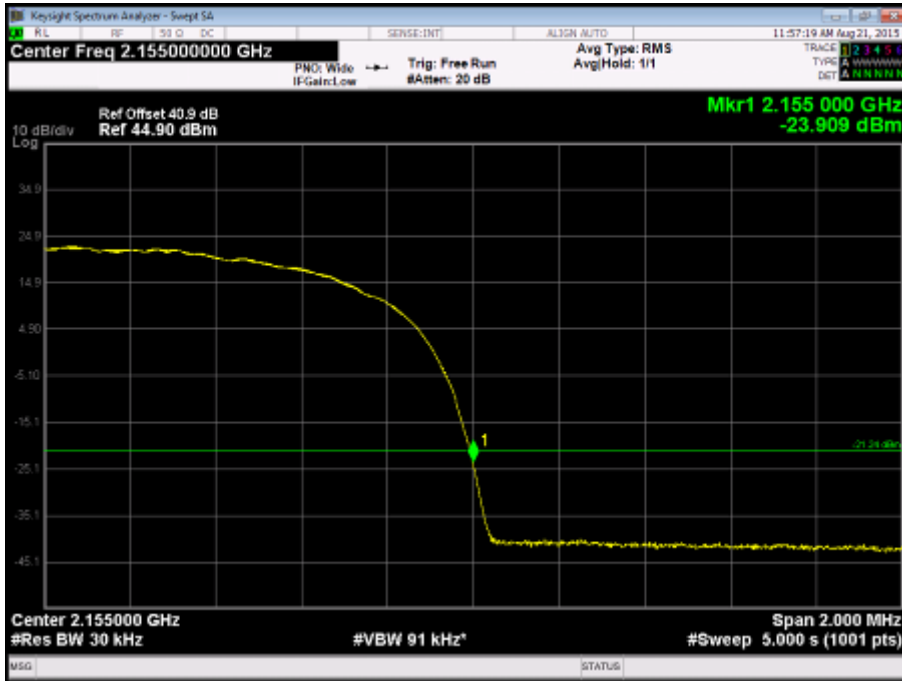
Note 1: For MIMO mode configurations, the limit was adjusted with a correction of -6.02dB $[10\text{Log}(4)]$ to -13dBm. For the measurement of 1MHz immediately outside and adjacent to the frequency band edge, a resolution bandwidth of 30kHz was used, and 30kHz is < 50kHz (1% of nominal bandwidth). To compensate for the reduced measurement bandwidth, the limit was adjusted with a correction of -2.22dB $[10\text{Log}(30/50)]$ to -19.02dBm.

Note 2: The channels shown in the table above are the minimum and maximum channels that can be used in the authorised frequency ranges to maintain compliance. Channels outside of the ranges shown in the above tables shall not be available to the end user.

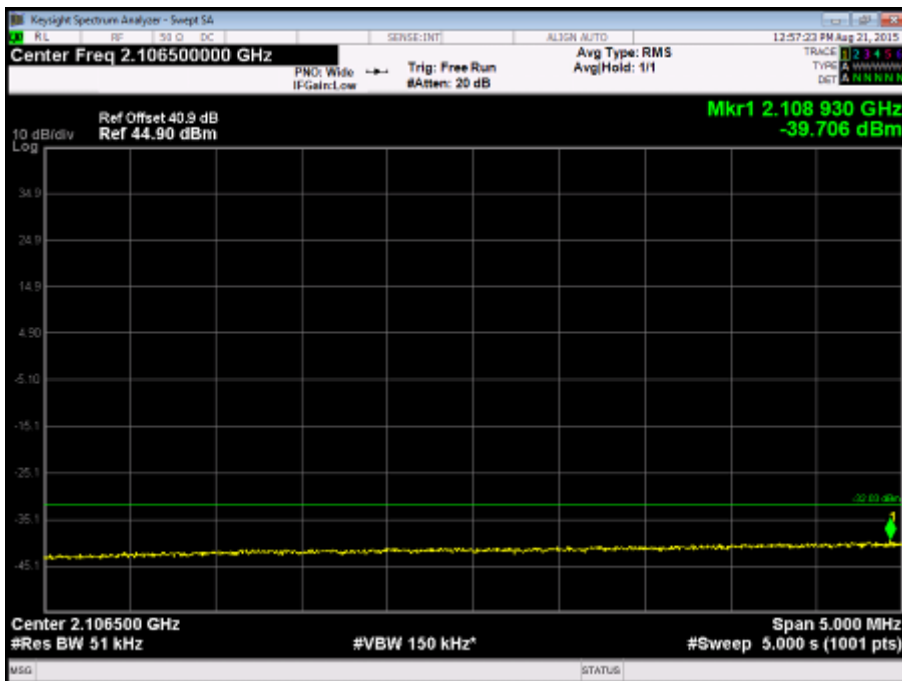
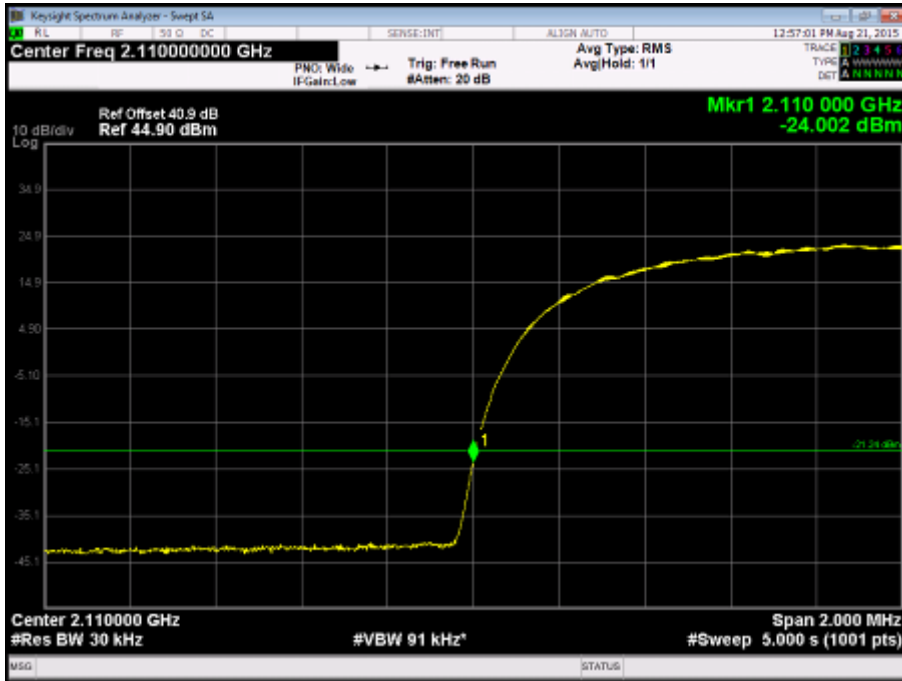
Channel Position B_{RFBW} - 16QAM / Bandwidth 5.0 MHz



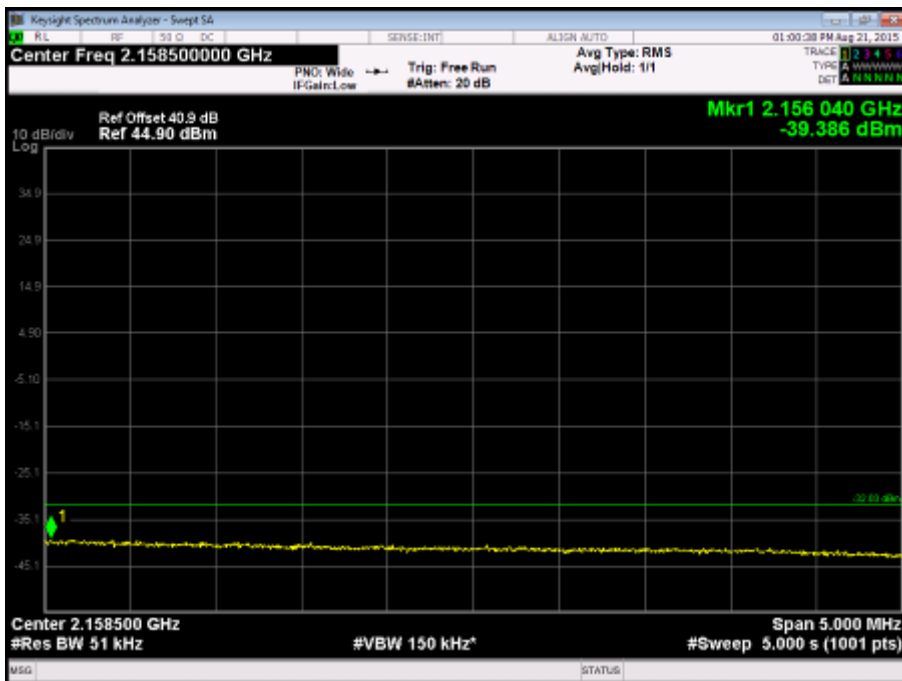
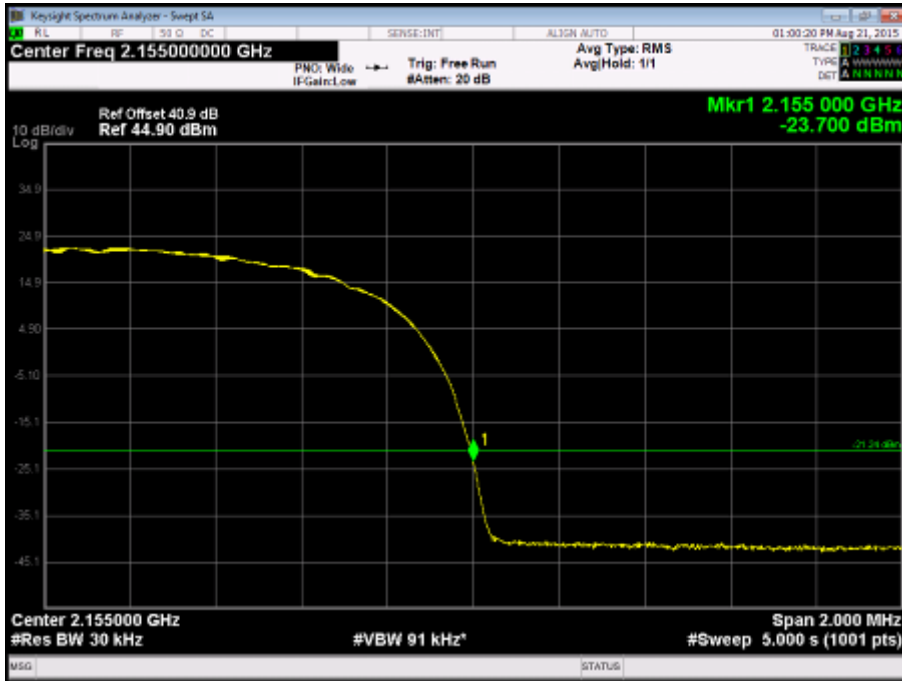
Channel Position T_{RFBW} - 16QAM / Bandwidth 5.0 MHz



Channel Position B_{RFBW} - 64QAM / Bandwidth 5.0 MHz



Channel Position T_{RFBW} - 64QAM / Bandwidth 5.0 MHz



Configuration L-MIMO-MC 1 (2C)

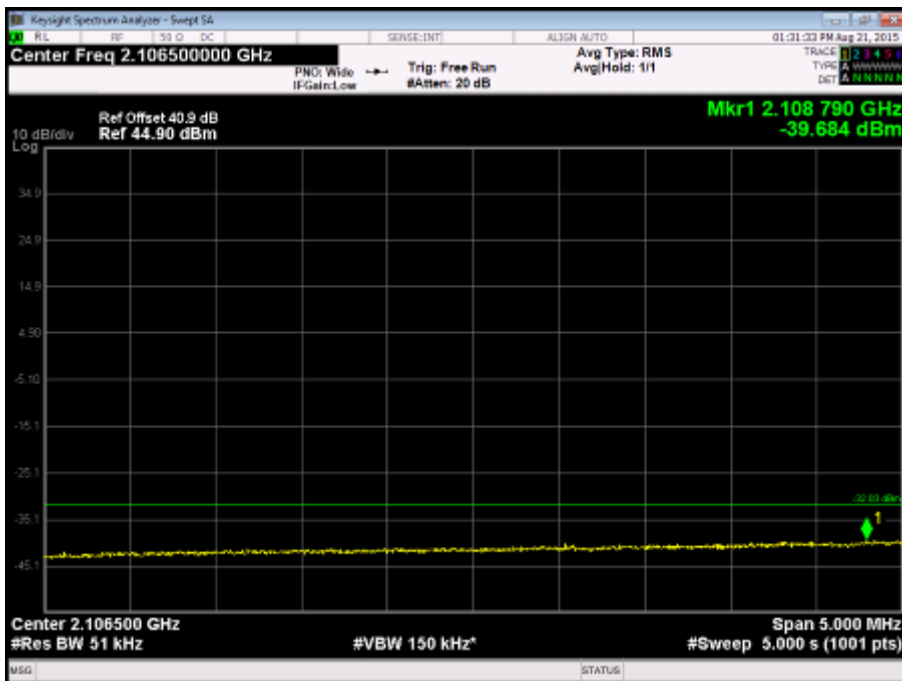
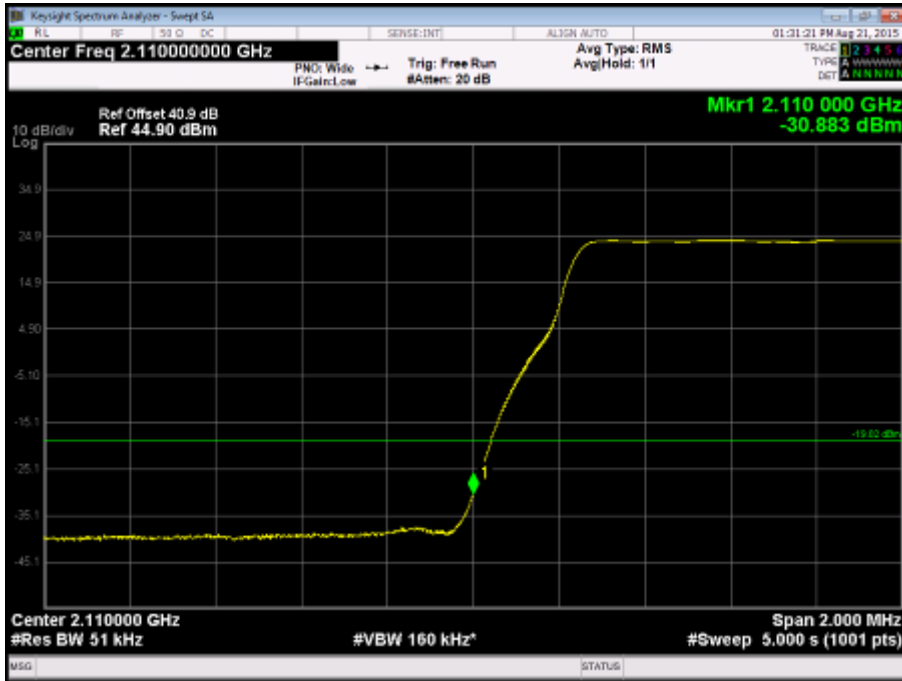
Maximum Output Power 43.0dBm per carrier

Band Edge Frequency	Channel Bandwidth	Edge Test with modulation QPSK Channel Frequencies	RBW (kHz)	Limit (dBm)
Channel Position B _{RFBW} 2110.0 MHz	5.0 MHz	2112.5MHz + 2117.5MHz	51	-19.02
	10.0 MHz	2115.0MHz + 2125.0MHz	100	-19.02
	15.0 MHz	2117.5MHz + 2132.5MHz	200	-19.02
	20.0 MHz	2120.0MHz + 2140.0MHz	200	-19.02
Channel Position T _{RFBW} 2155.0 MHz	5.0 MHz	2152.5MHz + 2147.5MHz	51	-19.02
	10.0 MHz	2150.0MHz + 2140.0MHz	100	-19.02
	15.0 MHz	2147.5MHz + 2132.5MHz	200	-19.02
	20.0 MHz	2145.0MHz + 2125.0MHz	200	-19.02

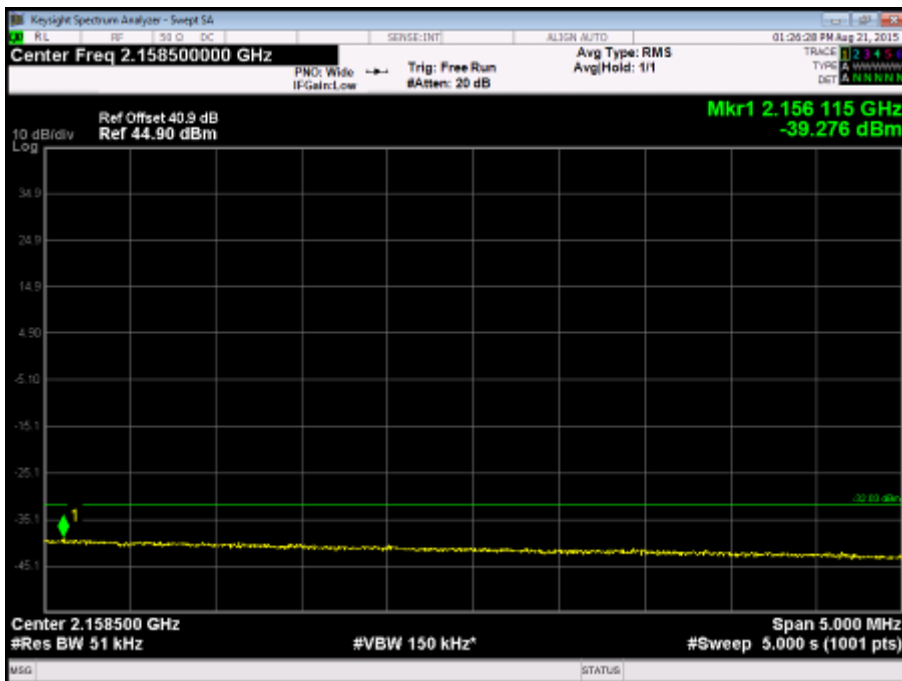
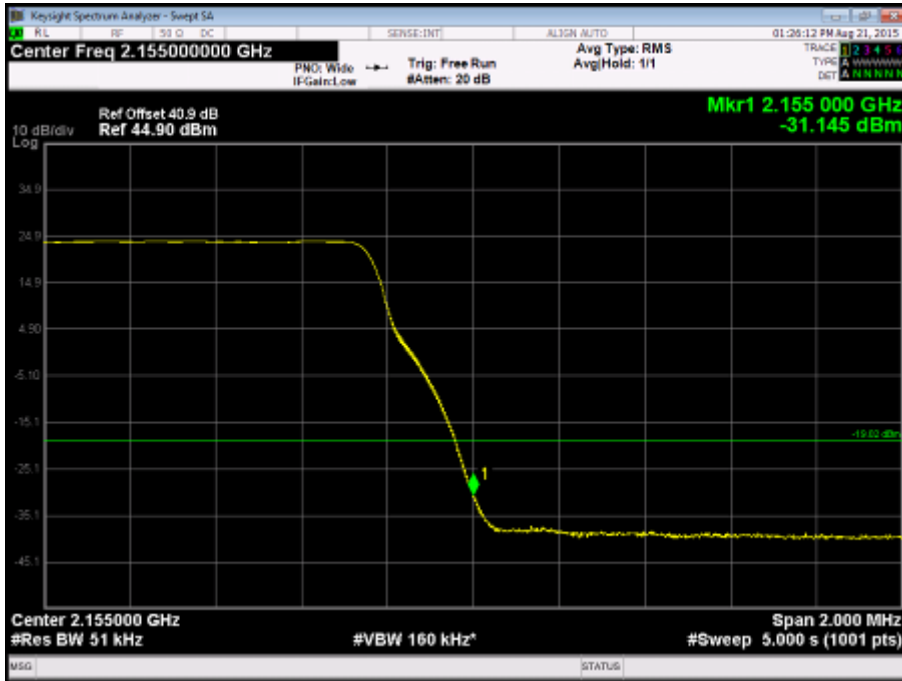
Note 1: For MIMO mode configurations, the limit was adjusted with a correction of -6.02dB [10Log(4)] to -13dBm.

Note 2: The channels shown in the table above are the minimum and maximum channels that can be used in the authorised frequency ranges to maintain compliance. Channels outside of the ranges shown in the above tables shall not be available to the end user.

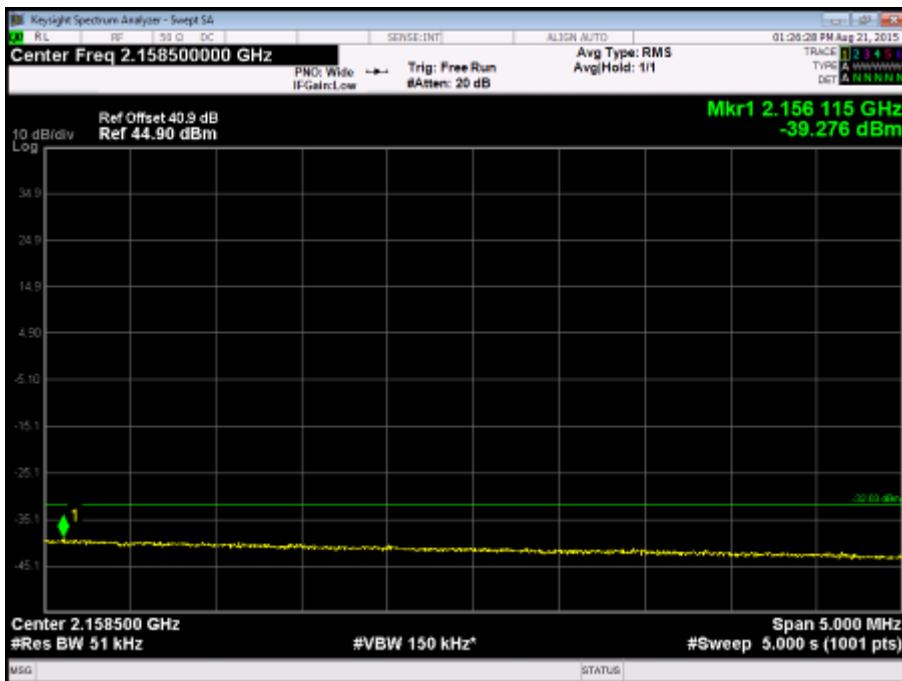
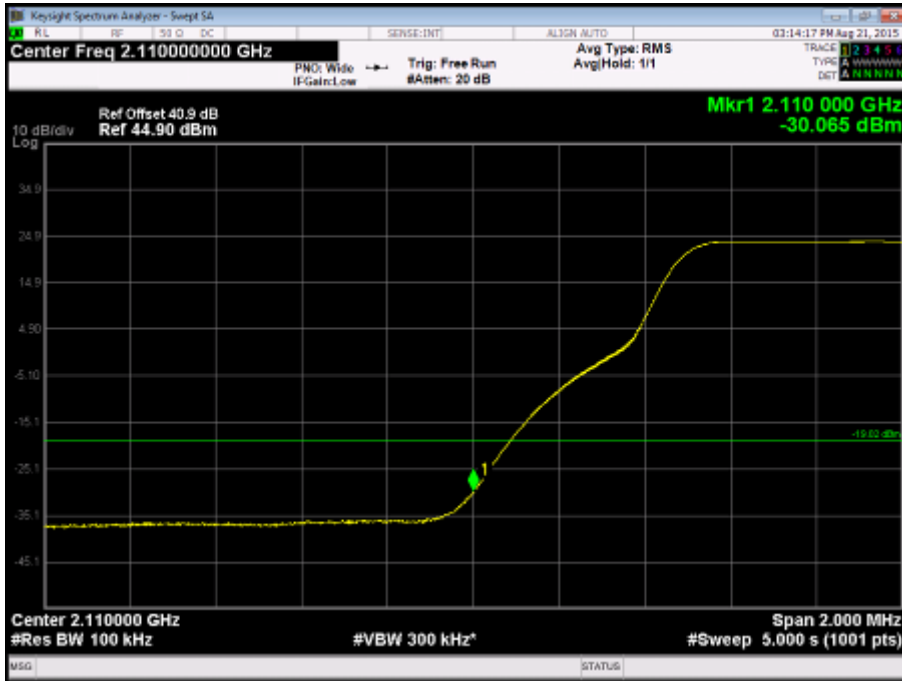
Channel Position B_{RFBW} - QPSK / Bandwidth 5.0 MHz



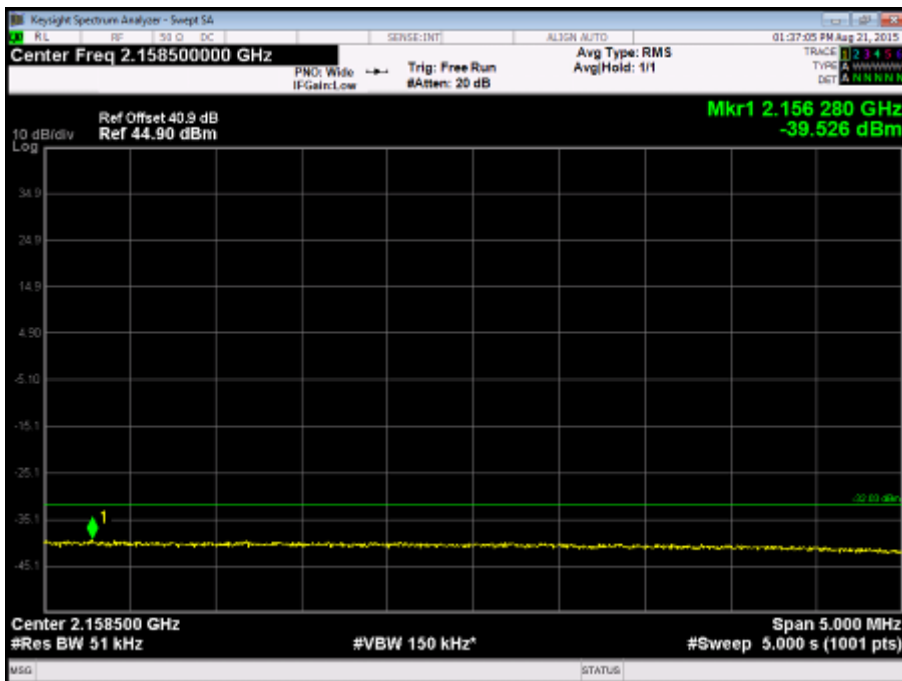
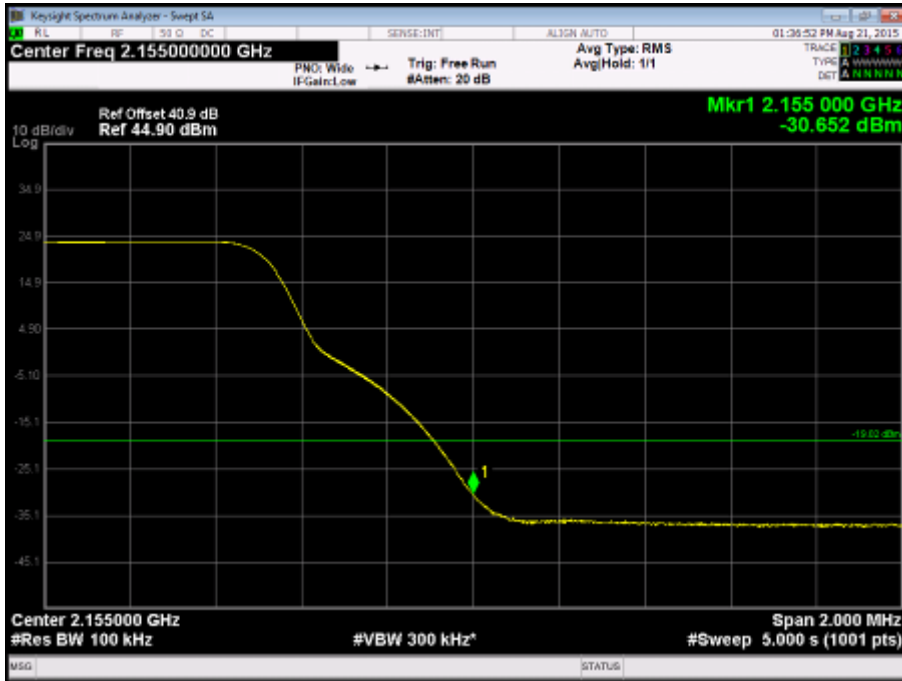
Channel Position T_{RFBW} - QPSK / Bandwidth 5.0 MHz



Channel Position B_{RFBW} - QPSK / Bandwidth 10.0 MHz



Channel Position T_{RFBW} - QPSK / Bandwidth 10.0 MHz



Channel Position B_{RFBW} - QPSK / Bandwidth 15.0 MHz

