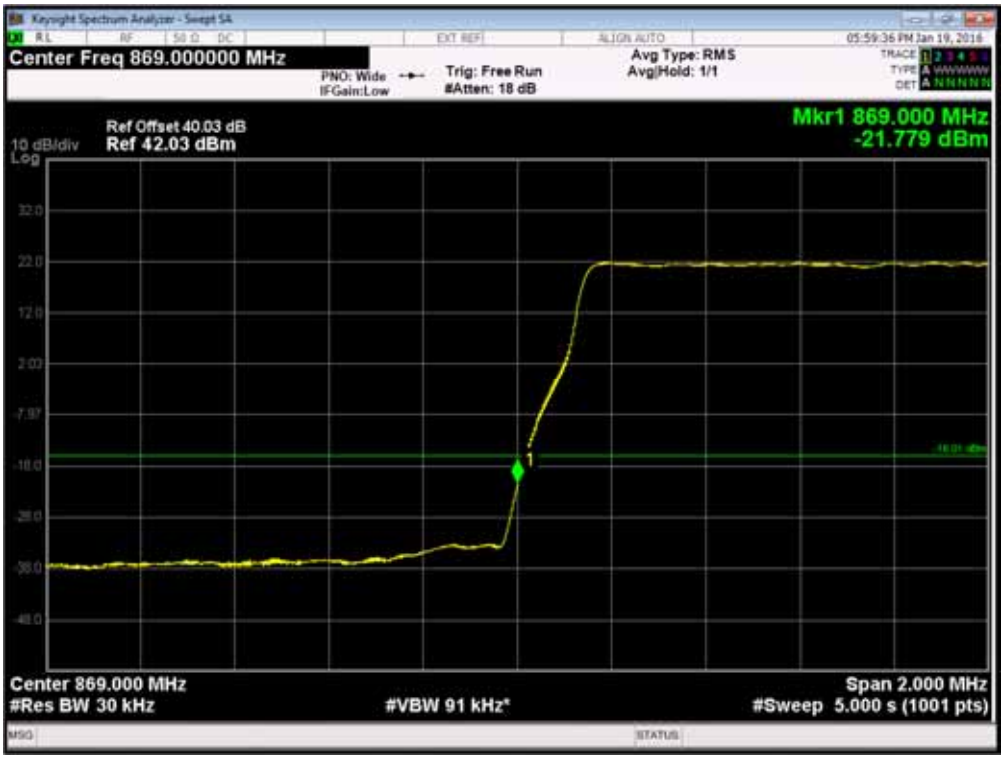
Channel Position T_{RFBW} - WCDMA 16QAM / LTE QPSK: Bandwidth 1.4 MHz

Channel Position B_{RFBW} - WCDMA 16QAM / LTE QPSK: Bandwidth 3.0 MHz



Channel Position T_{RFBW} - WCDMA 16QAM / LTE QPSK: Bandwidth 3.0 MHz

Channel Position B_{RFBW} - WCDMA 16QAM / LTE QPSK: Bandwidth 5.0 MHz

Channel Position T_{RFBW} - WCDMA 16QAM / LTE QPSK: Bandwidth 5.0 MHz

Channel Position B_{RFBW} - WCDMA 16QAM / LTE QPSK: Bandwidth 10.0 MHz

Channel Position T_{RFBW} - WCDMA 16QAM / LTE QPSK: Bandwidth 10.0 MHz

Limit

The power of any emission outside the frequency band shall be attenuated below the transmitter power (P) by at least 43 + 10logP dB.

2.4 RADIATED SPURIOUS EMISSIONS

2.4.1 Specification Reference

FCC CFR 47 Part 2, Clause 2.1053
FCC CFR 47 Part 22, Clause 22.917 (a)
Industry Canada RSS-132, Clause 5.5

2.4.2 Equipment Under Test

Radio 2217 B5, KRC 161 566/2, S/N: D822618359

2.4.3 Date of Test and Modification State

26 and 27 January 2016 - Modification State 0

2.4.4 Test Equipment Used

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

2.4.5 Environmental Conditions

Ambient Temperature	20.5 - 22.0°C
Relative Humidity	33.0 - 35.0%

2.4.6 Test Method

The test was applied in accordance with test method requirements of FCC Part 22 and RSS-132 and ANSI/TIA-603-C-2004.

A preliminary profile of the Spurious Radiated Emissions was obtained by operating the EUT on a remotely controlled turntable within the chamber. Measurements of emissions from the EUT were obtained with the measurement antenna in both horizontal and vertical polarisations.

Emissions identified within the range 30MHz to 10GHz were then formally measured using a peak detector as the worst case.

The limits for outside a licensee's frequency band(s) of operation the power of the spurious emissions have been calculated, as shown below using the following formula:

Field Strength of Carrier - (43 + 10Log (P)) dB

Where:
Field Strength is measured in dBµV/m
P is measured Transmitter Power in Watts

The EUT was measured with the antenna height varied between 1 and 4 m with the turntable rotated between 0 and 360 degrees. The emission of any outside a licensee's frequencies within 20dB of the limit were measured with the substitution method used according to the standard.

The measurements were performed at a 3m distance unless otherwise stated.

Determination of Spurious Emission Limit

The field strength of the carrier has been calculated assuming that the power is to be fed to a half-wave tuned dipoles as per 2.1053 (a).

$E_{(v/m)}=(30 \times G_i \times P_o)^{0.5} / d$

Where G_i is the antenna gain of ideal half-wave dipoles,
P_o is the power out of the transceiver in W,
d is the measurement distance in meter.

Therefore at 3m measurement distance the field strength using the lowest transceiver output power would be:

$E_{(v/m)}=(30 \times 1.64 \times 18.97)^{0.5} / 3 = 10.18$ V/m = 140.16 dBµV/m

As per 22.917 (a) the spurious emission must be attenuated by 43 + 10log (P_o) dB this gives:

43 + 10log(18.97) = 55.78 dB

Therefore the limit at 3m measurement distance is:

140.16 – 55.78 = 84.4 dBµV/m

These limits have been used to determine Pass or Fail for the harmonics measured and detailed in the following results.

The results are shown in the plots below.

2.4.7 Test Results

Note: Only the worst case results plots have been included as all of the emissions are greater than 20dB below the limit. A set of plots have been included to show the measurement system noise floor.

Configuration W-SC

Maximum Output Power 46.0dBm per port, WCDMA Bandwidth 5.0MHz

Channel Position	Channel Frequencies
Channel Position M	881.4MHz

Channel Position M - QPSK

No emissions were detected within 20dB of the limit.

Configuration W-MIMO-SC

Maximum Output Power 46.0dBm per port, WCDMA Bandwidth 5.0MHz

Channel Position	Channel Frequencies
Channel Position M	881.4MHz

Channel Position M - 16QAM/64QAM

No emissions were detected within 20dB of the limit.

Configuration L-MIMO-SC

Maximum Output Power 43.0dBm per port, LTE Bandwidth 1.4MHz

Channel Position	Channel Frequencies
Channel Position B	869.7MHz
Channel Position M	881.5MHz
Channel Position T	893.3MHz

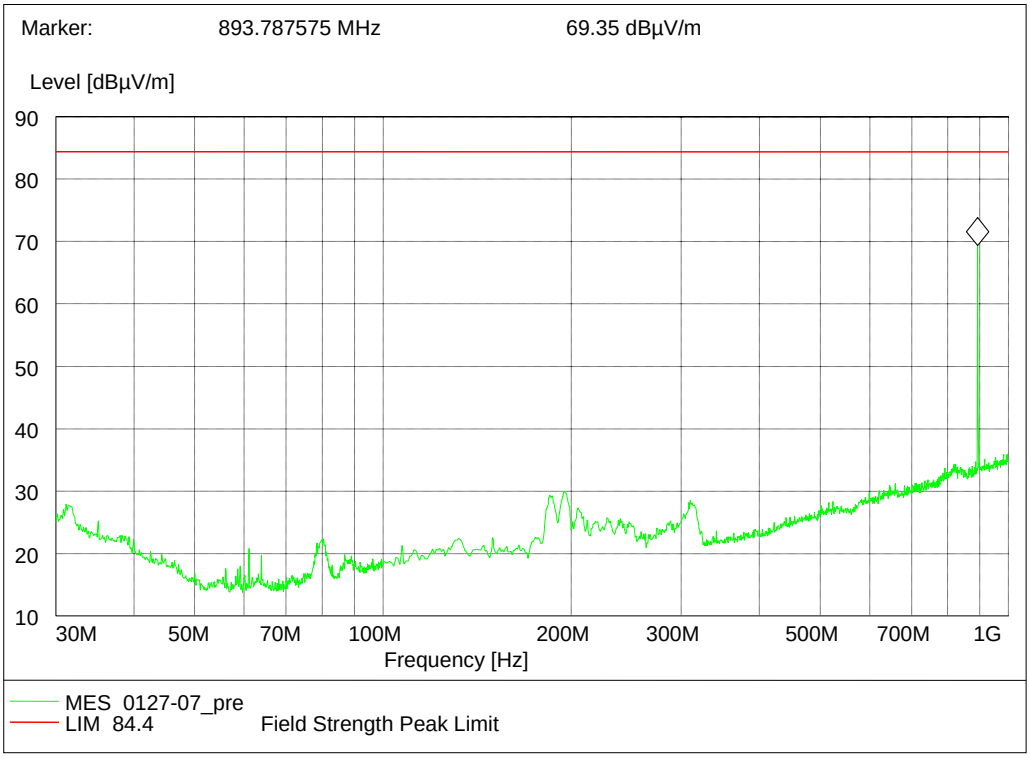
Channel Position B - 16QAM

No emissions were detected within 20dB of the limit.

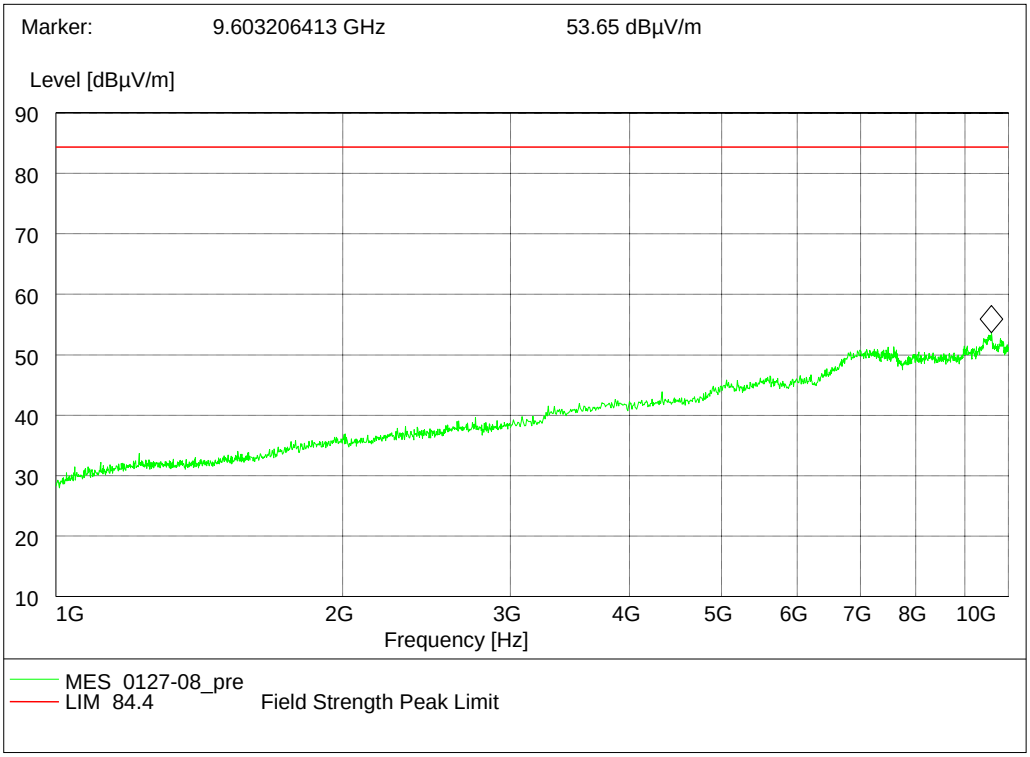
Channel Position M - QPSK/16QAM/64QAM/256QAM

No emissions were detected within 20dB of the limit.

Channel Position T - 16QAM - 30MHz - 1GHz



Channel Position T - 16QAM - 1GHz - 10GHz



Configuration L-MIMO-MC 1 (2C)

Maximum Output Power 43.0dBm per port, LTE Bandwidth 1.4MHz

Channel Position	Channel Frequencies
Channel Position M_{RFBW}	872.2MHz + 890.8MHz

Channel Position M_{RFBW} - 16QAM

No emissions were detected within 20dB of the limit.

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

Maximum Output Power 46.0dBm per port, WCDMA Bandwidth 5.0MHz, LTE Bandwidth 1.4MHz

Channel Position	Channel Frequencies
Channel Position M_{RFBW}	(W) 871.4MHz + (L) 893.3MHz

Channel Position M_{RFBW} - WCDMA 64QAM / LTE 16QAM

No emissions were detected within 20dB of the limit.

Limit	-13dBm / 84.4dBµV/m.

Remarks

The EUT does not exceed -13dBm / 84.4dBµV/m at the measured frequencies.

2.5 CONDUCTED SPURIOUS EMISSIONS

2.5.1 Specification Reference

FCC CFR 47 Part 2, Clause 2.1051
FCC CFR 47 Part 22, Clause 22.917 (a)
Industry Canada RSS-132, Clause 5.5

2.5.2 Equipment Under Test

Radio 2217 B5, KRC 161 566/2, S/N: D822618359

2.5.3 Date of Test and Modification State

14, 15, 18, 19 and 20 January 2016 - Modification State 0

2.5.4 Test Equipment Used

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

2.5.5 Environmental Conditions

Ambient Temperature	23.6 - 24.9°C
Relative Humidity	25.0 - 29.0%

2.5.6 Test Method

The test was applied in accordance with test method requirements of FCC Part 22 and RSS-132.

In accordance with FCC CFR 47 Part 22, Clause 22.917 (a), any emissions outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least 43 + 10 log (P)dB, and the measurement should be performed with a resolution bandwidth of 100kHz.

The spurious emissions from the antenna terminal were measured. The transmitter output power was attenuated using an attenuator and the frequency spectrum investigated from 9kHz to 10GHz. The resolution bandwidth of 100kHz was employed for frequency band 9kHz to 10GHz. The spectrum analyzer detector was set to RMS.

For MIMO mode configurations, the limit was adjusted with a correction of -3.01dB [10Log2] by using the Measure and Add 10Log(N) dB technique according to FCC KDB 662911 D01 Multiple Transmitter Output v02r01 accounting for simultaneous transmission from antenna ports RF A and RF B. Then the limit was adjust to -16.01dBm.

The measurements were performed on the output connector RF A. Limited complementary measurement were done at output conector RF B to verify identical performance for both transmitter chains in MIMO mode.

The maximum path loss across the measurement band was used as the reference level offset to ensure worst case.

The worst results are shown in the plots below.

2.5.7 Test Results

Remark:

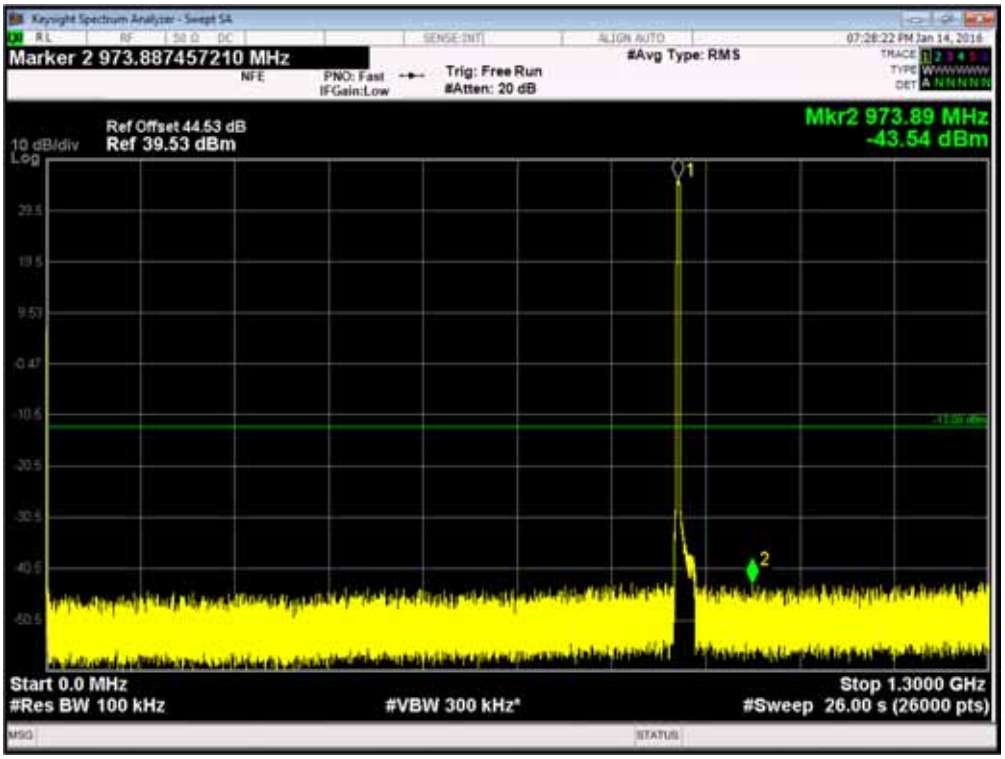
The emissions at 9kHz on the plots was not generated by the test object.

Configuration W-SC

Maximum Output Power 46.0dBm per port

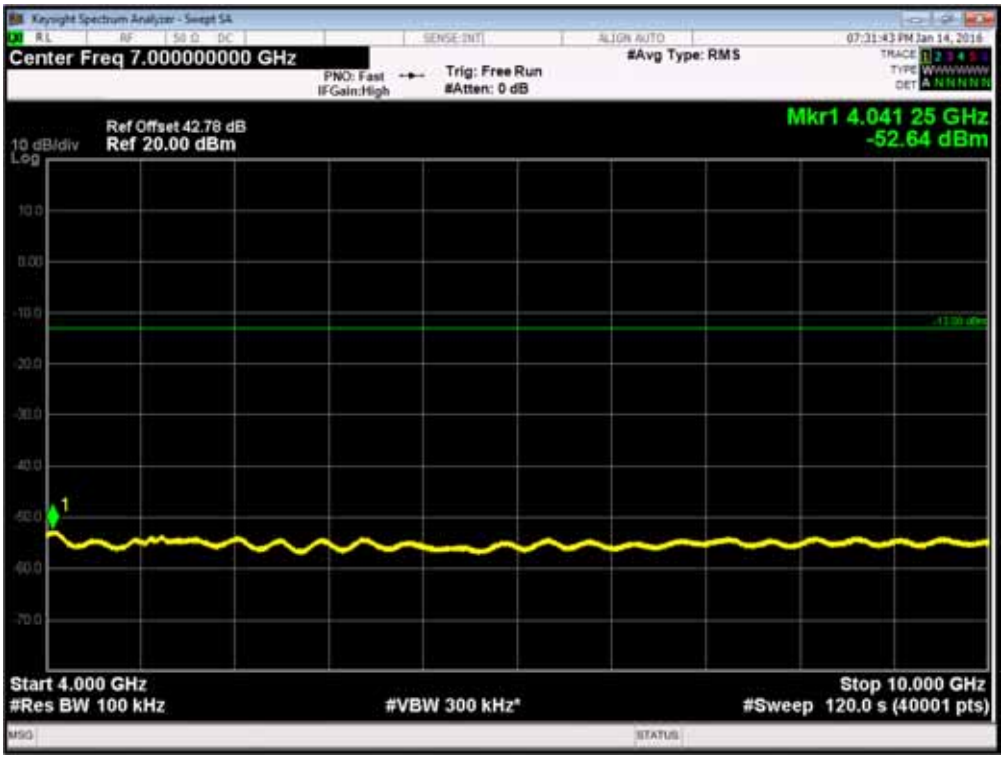
Channel Position	Bandwidth	Channel Frequency
Channel Position B	5.0 MHz	871.4MHz
Channel Position M	5.0 MHz	881.4MHz
Channel Position T	5.0 MHz	891.6MHz

Channel Position B - QPSK / Bandwidth 5.0MHz - 9kHz - 1.3GHz

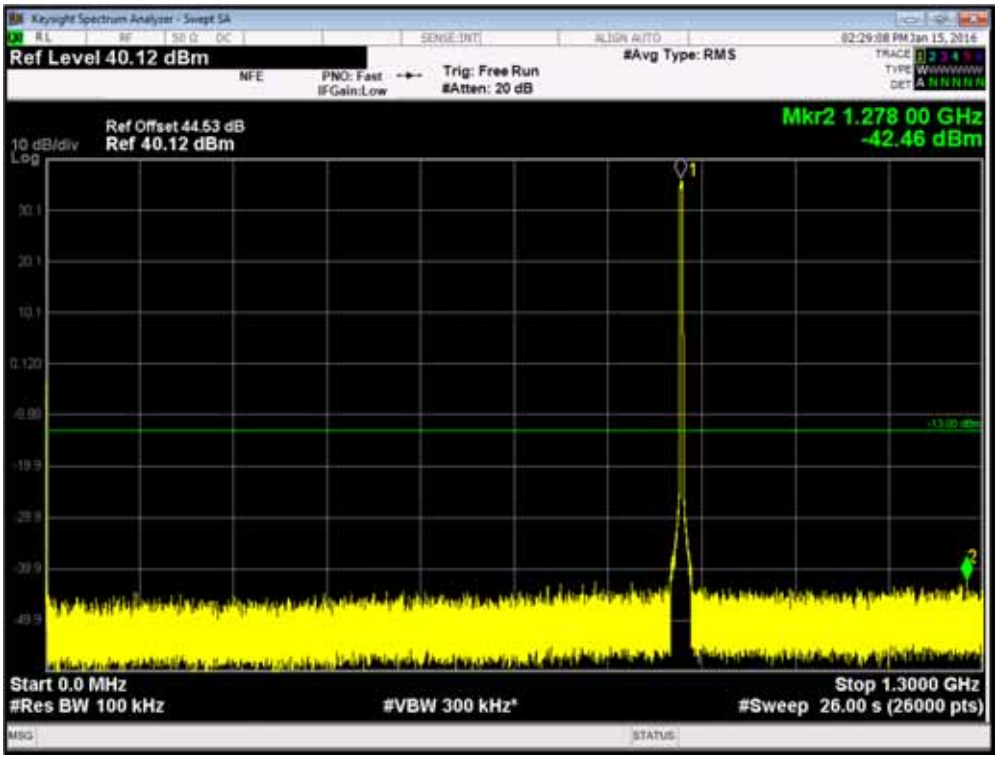


Channel Position B - QPSK / Bandwidth 5.0MHz - 1.3GHz - 4GHz

Channel Position B - QPSK / Bandwidth 5.0MHz - 4GHz - 10GHz

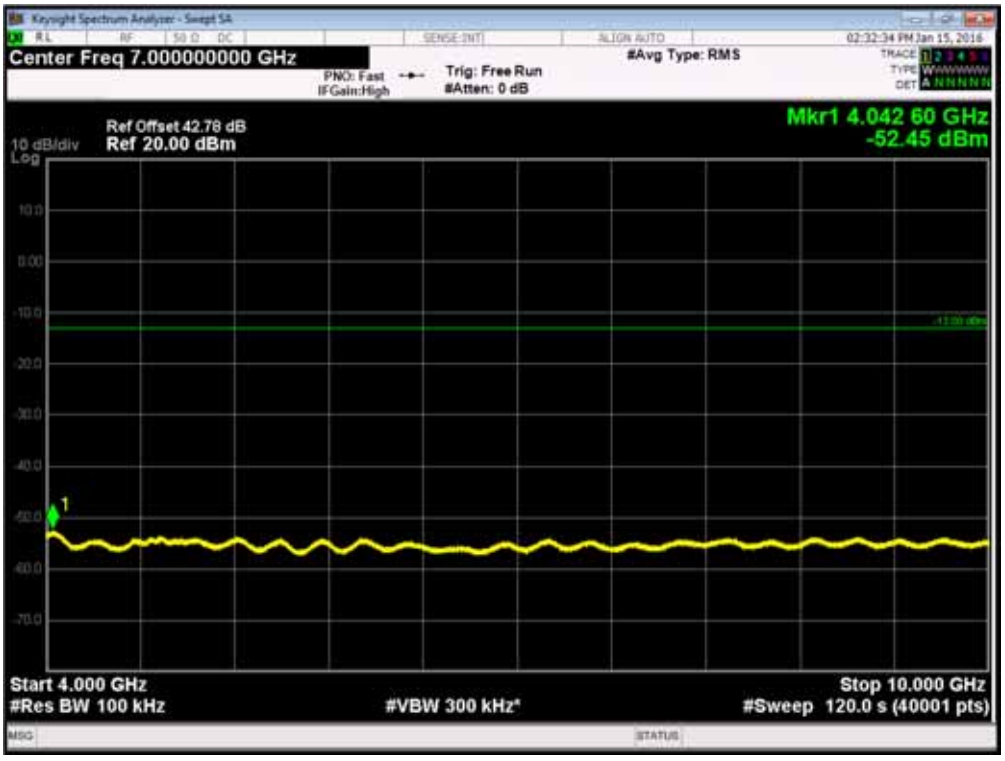


Channel Position M - QPSK / Bandwidth 5.0MHz - 9kHz - 1.3GHz

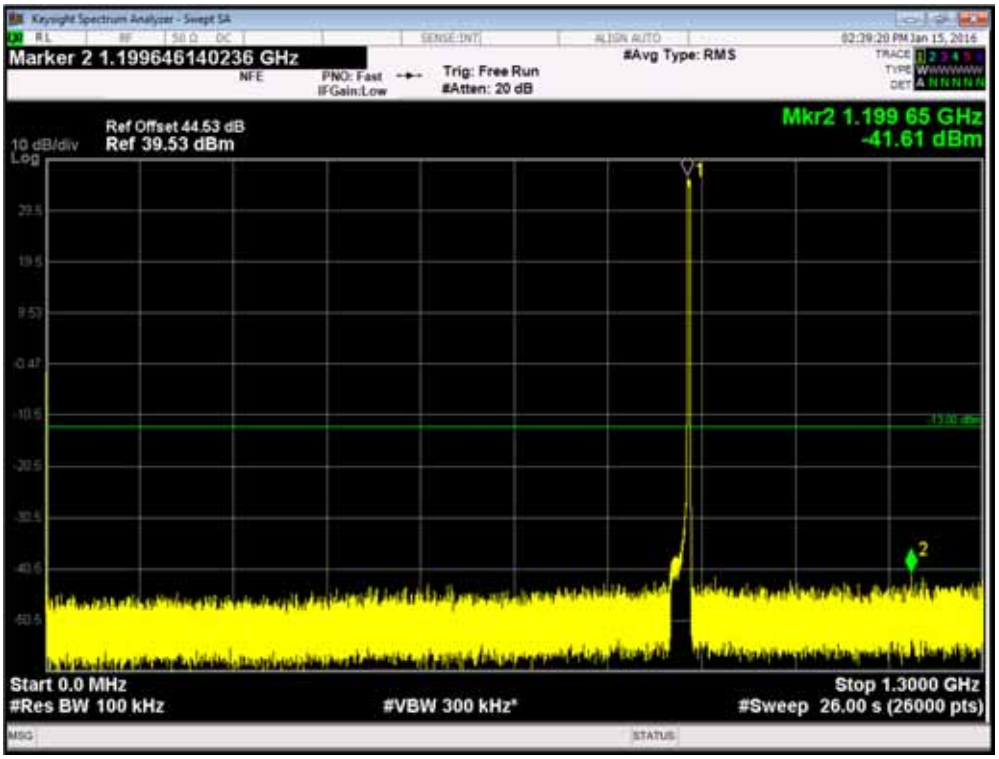


Channel Position M - QPSK / Bandwidth 5.0MHz - 1.3GHz - 4GHz

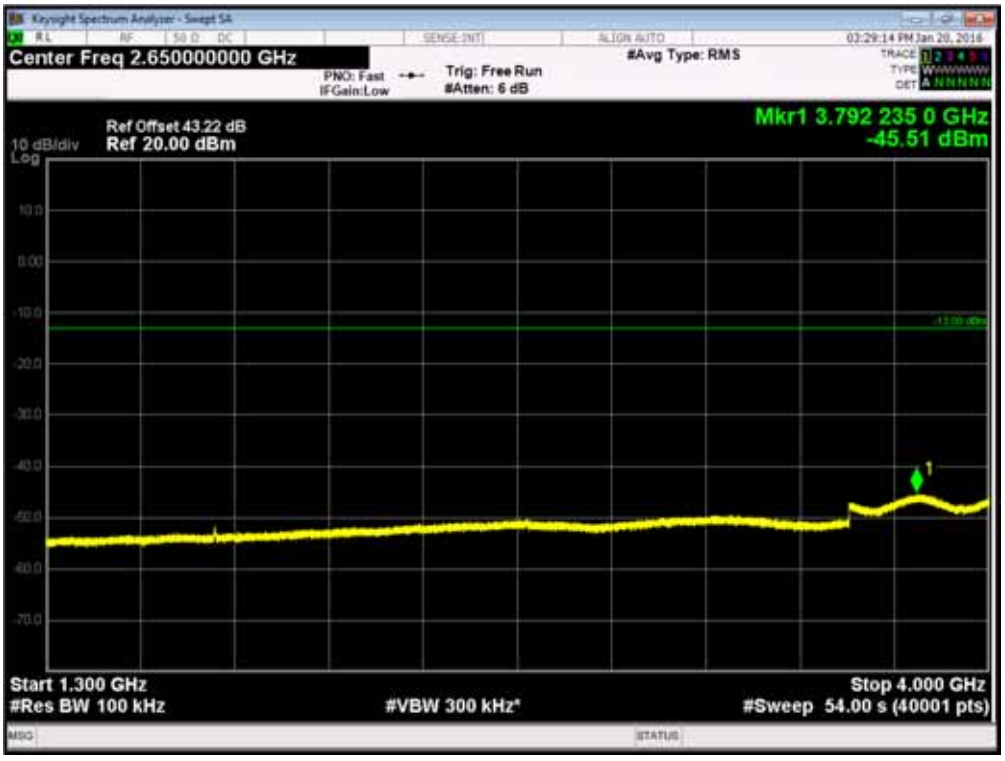
Channel Position M - QPSK / Bandwidth 5.0MHz - 4GHz - 10GHz



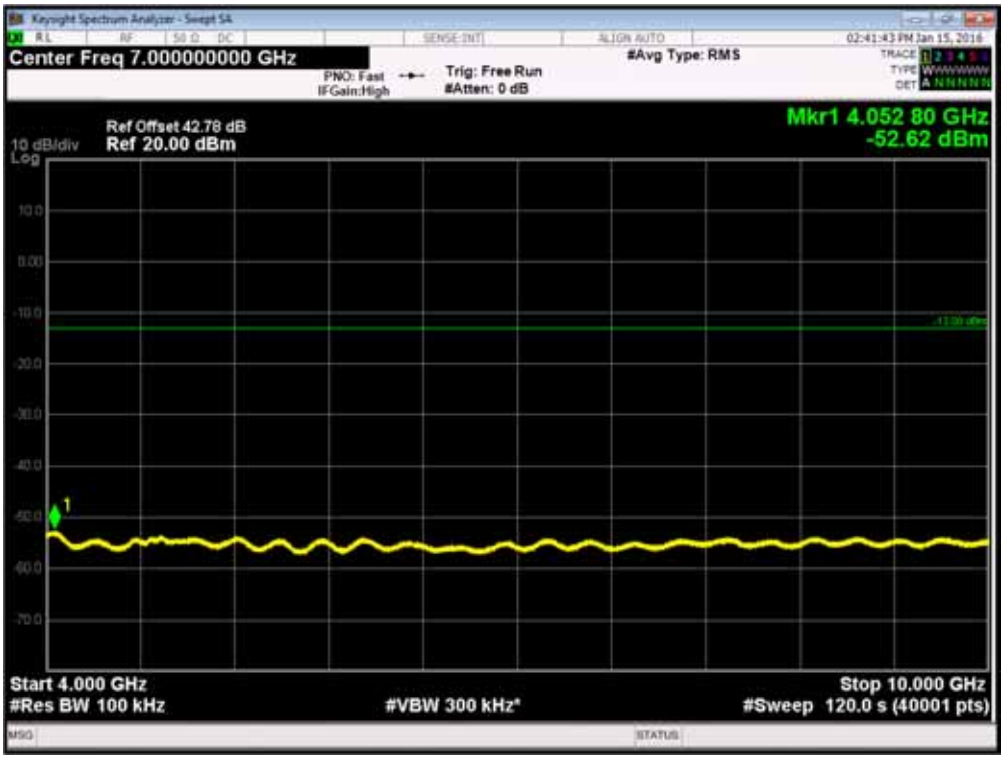
Channel Position T - QPSK / Bandwidth 5.0MHz - 9kHz - 1.3GHz



Channel Position T - QPSK / Bandwidth 5.0MHz - 1.3GHz - 4GHz



Channel Position T - QPSK / Bandwidth 5.0MHz - 4GHz - 10GHz

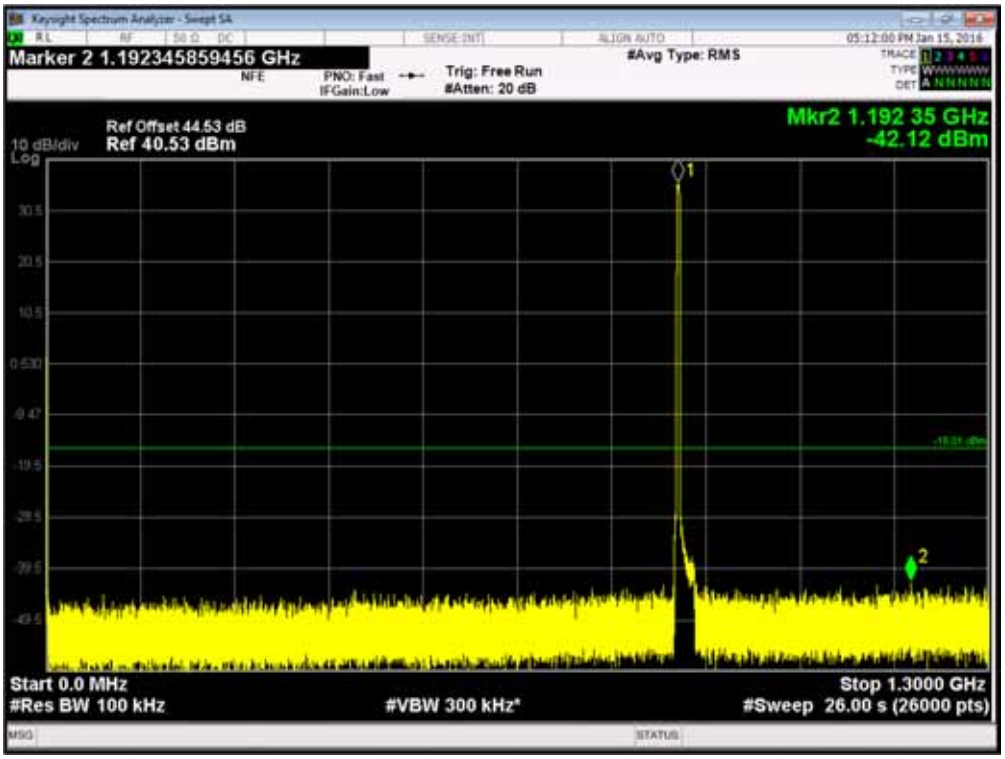


Configuration W-MIMO-SC

Maximum Output Power 46.0dBm per port

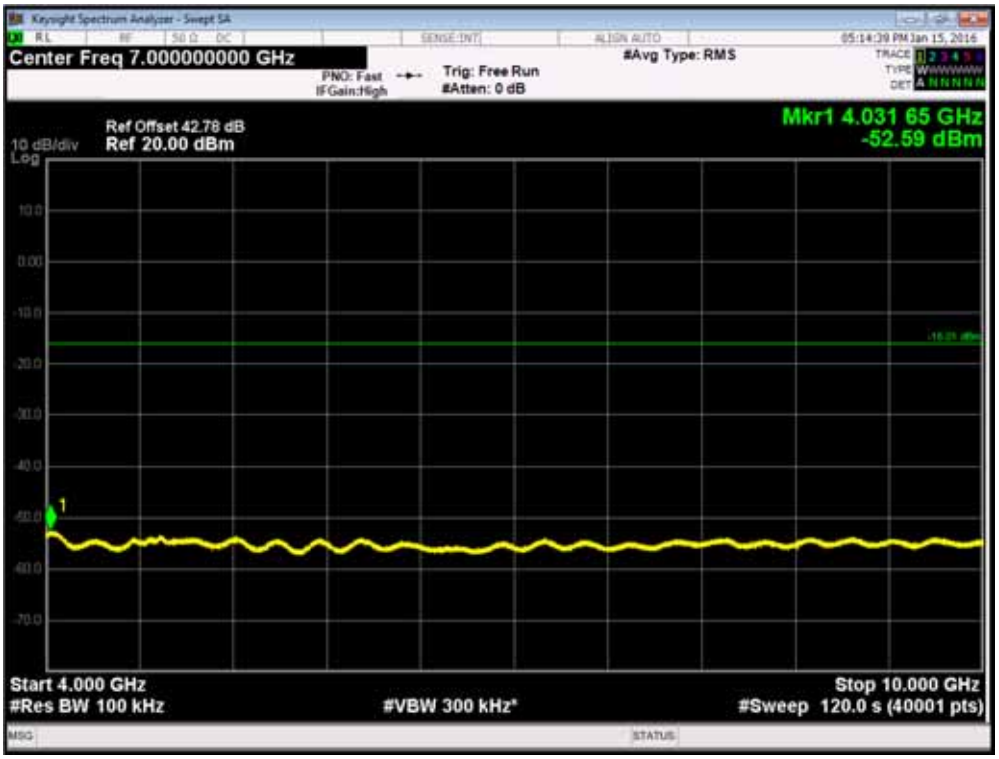
Channel Position	Bandwidth	Channel Frequency
Channel Position B	5.0 MHz	871.4MHz
Channel Position M	5.0 MHz	881.4MHz
Channel Position T	5.0 MHz	891.6MHz

Channel Position B - 16QAM / Bandwidth 5.0MHz - 9kHz - 1.3GHz

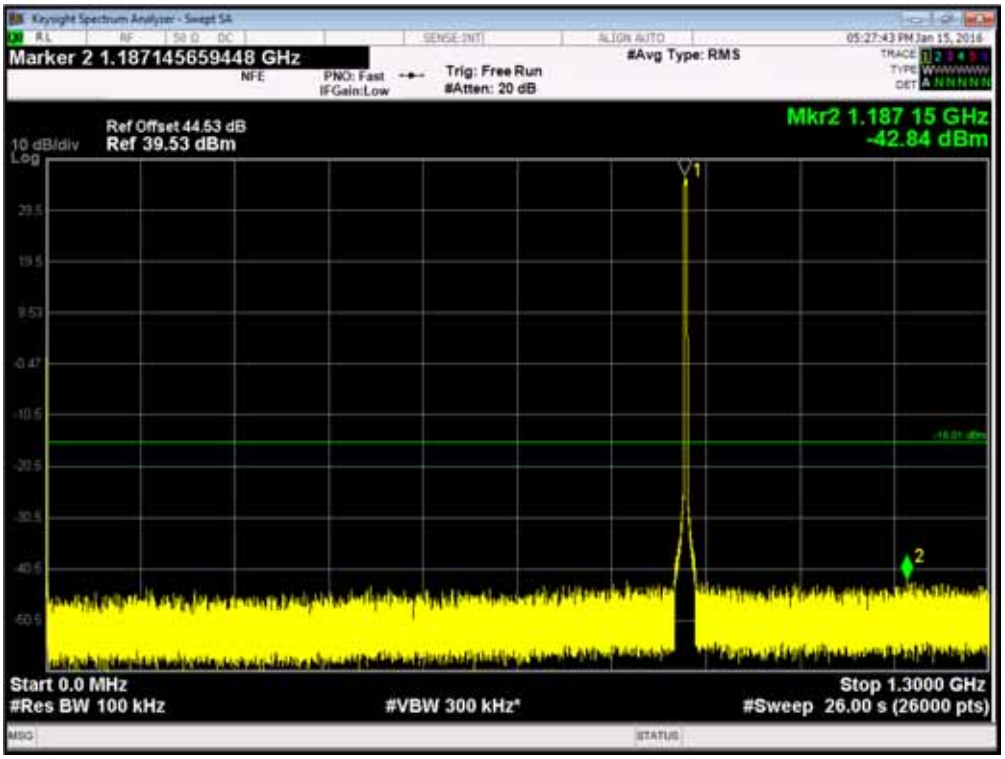


Channel Position B - 16QAM / Bandwidth 5.0MHz - 1.3GHz - 4GHz

Channel Position B - 16QAM / Bandwidth 5.0MHz - 4GHz - 10GHz

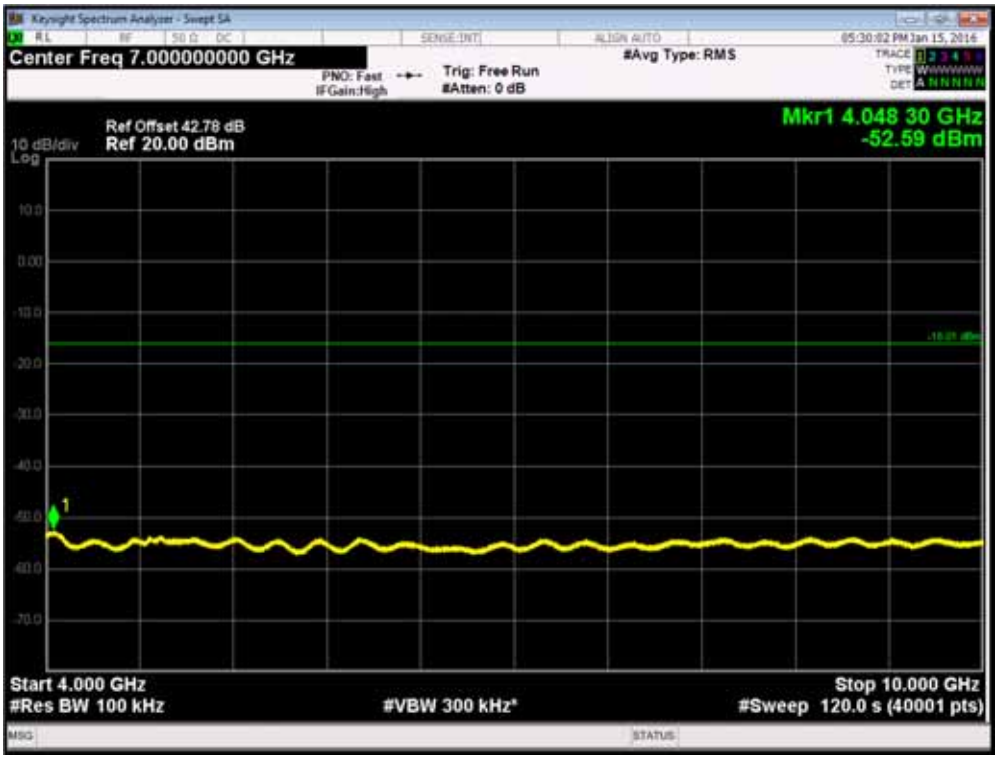


Channel Position M - 16QAM / Bandwidth 5.0MHz - 9kHz - 1.3GHz

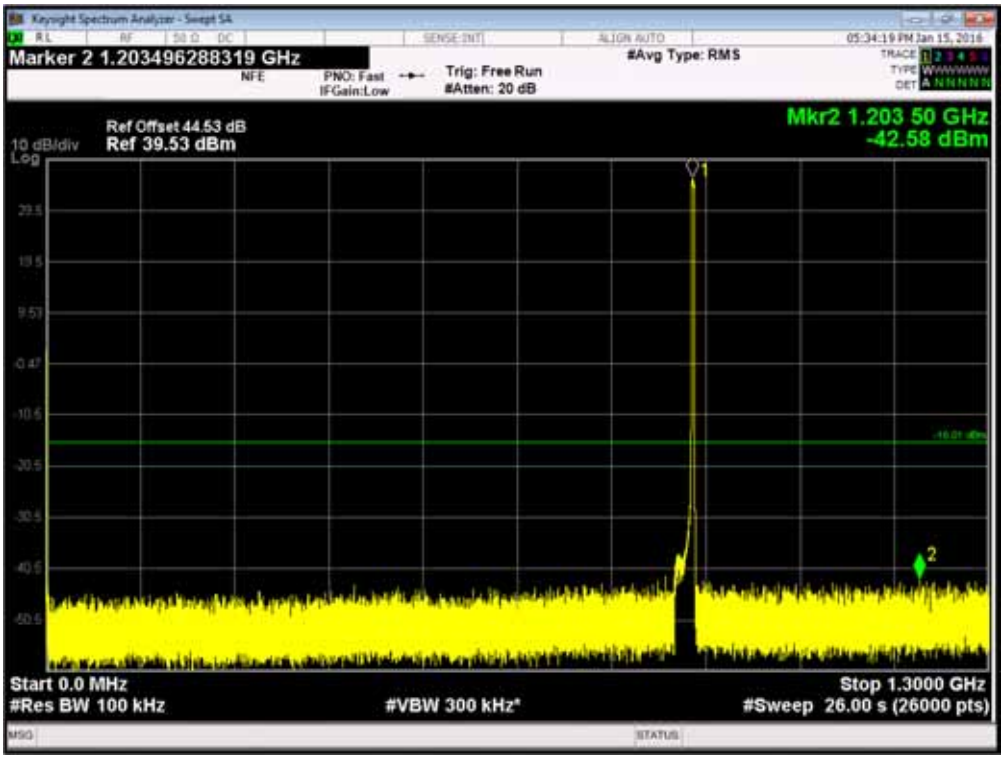


Channel Position M - 16QAM / Bandwidth 5.0MHz - 1.3GHz - 4GHz

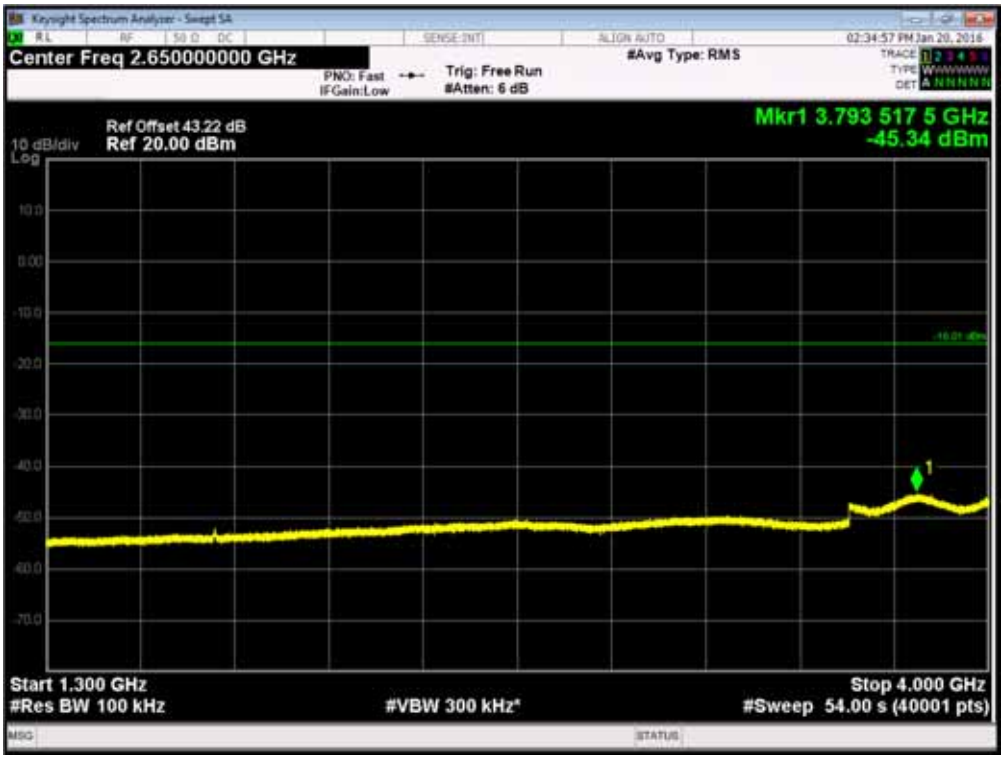
Channel Position M - 16QAM / Bandwidth 5.0MHz - 4GHz - 10GHz



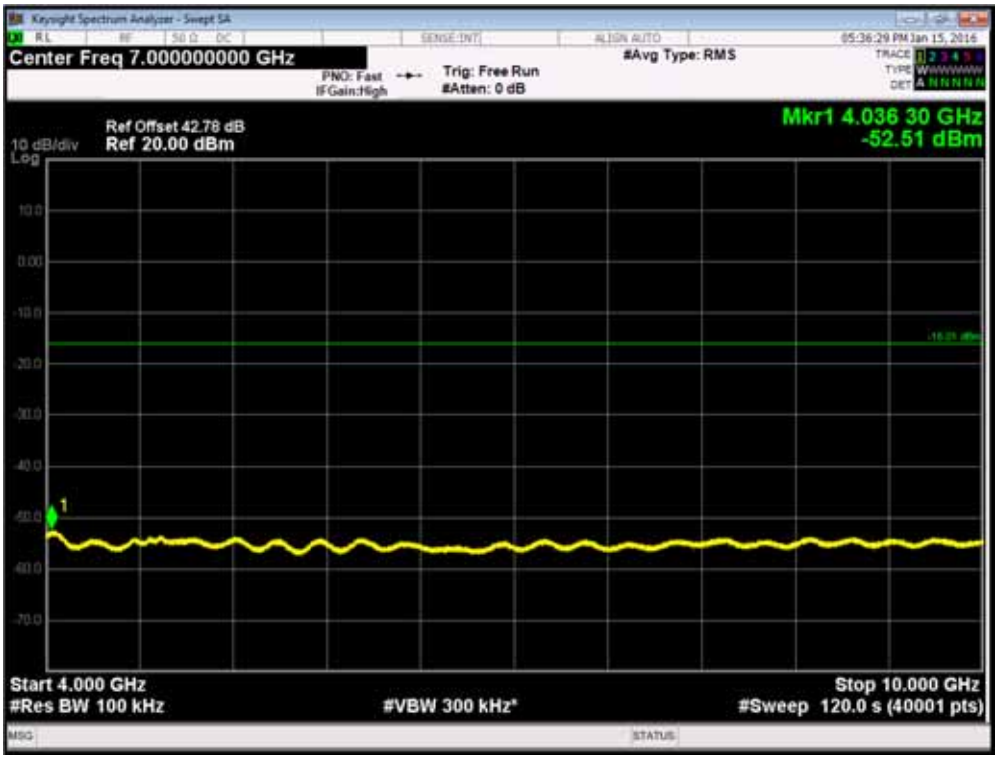
Channel Position T - 16QAM / Bandwidth 5.0MHz - 9kHz - 1.3GHz



Channel Position T - 16QAM / Bandwidth 5.0MHz - 1.3GHz - 4GHz



Channel Position T - 16QAM / Bandwidth 5.0MHz - 4GHz - 10GHz

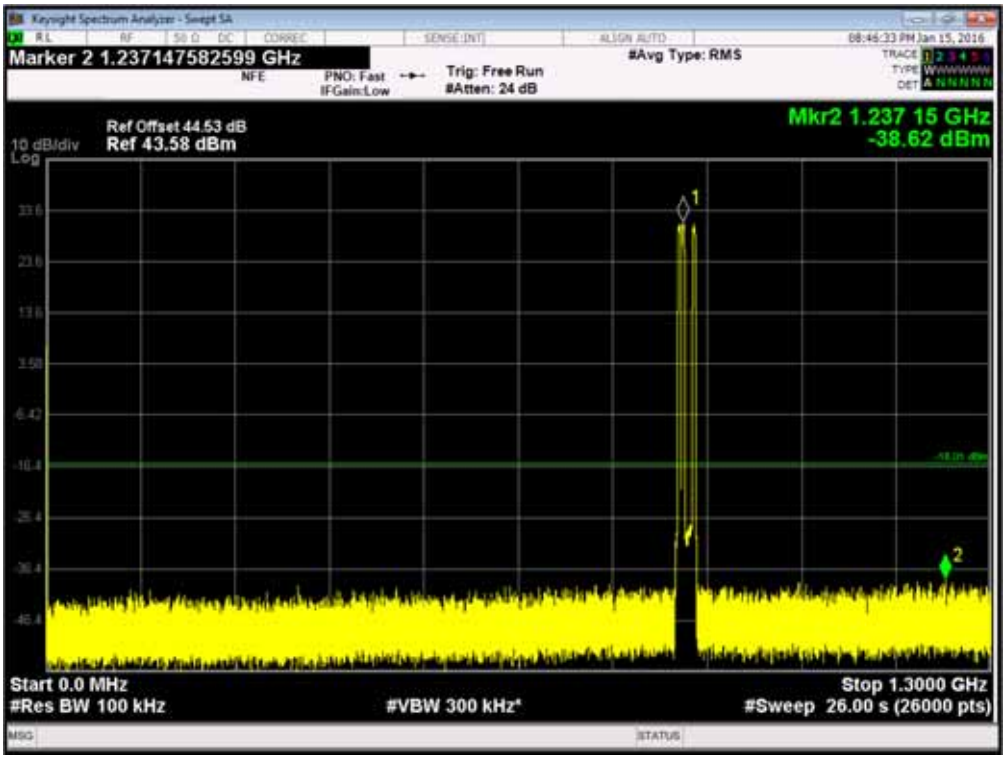


Configuration W-MIMO-MC 3 (3C)

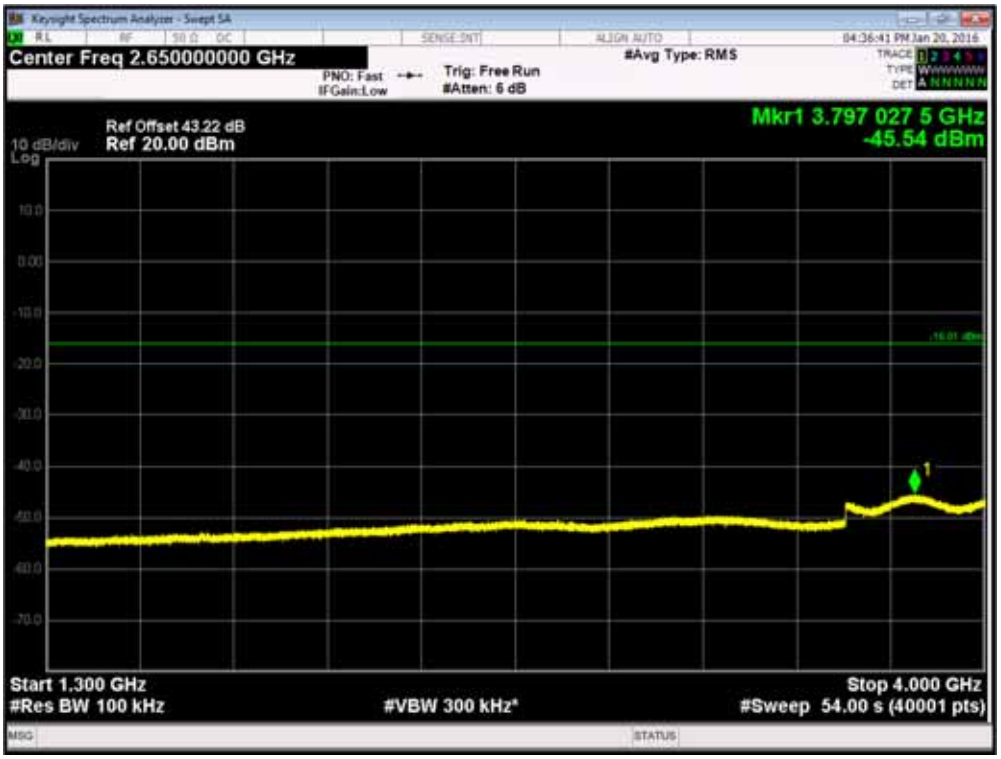
Maximum Output Power 46.0dBm per port

Channel Position	Bandwidth	Channel Frequency
Channel Position B_{RFBW}	5.0 MHz	871.4MHz + 876.4MHz + 891.4MHz
Channel Position T_{RFBW}	5.0 MHz	871.6MHz + 876.6MHz + 891.6MHz

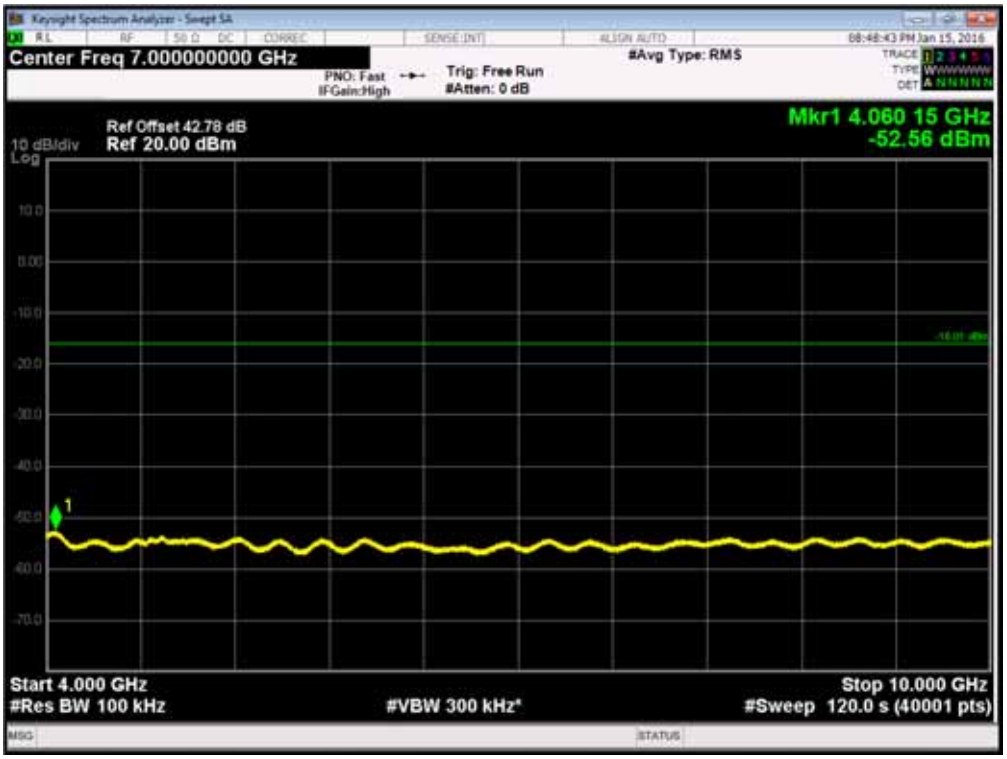
Channel Position B_{RFBW} - 16QAM / Bandwidth 5.0MHz - 9kHz - 1.3GHz



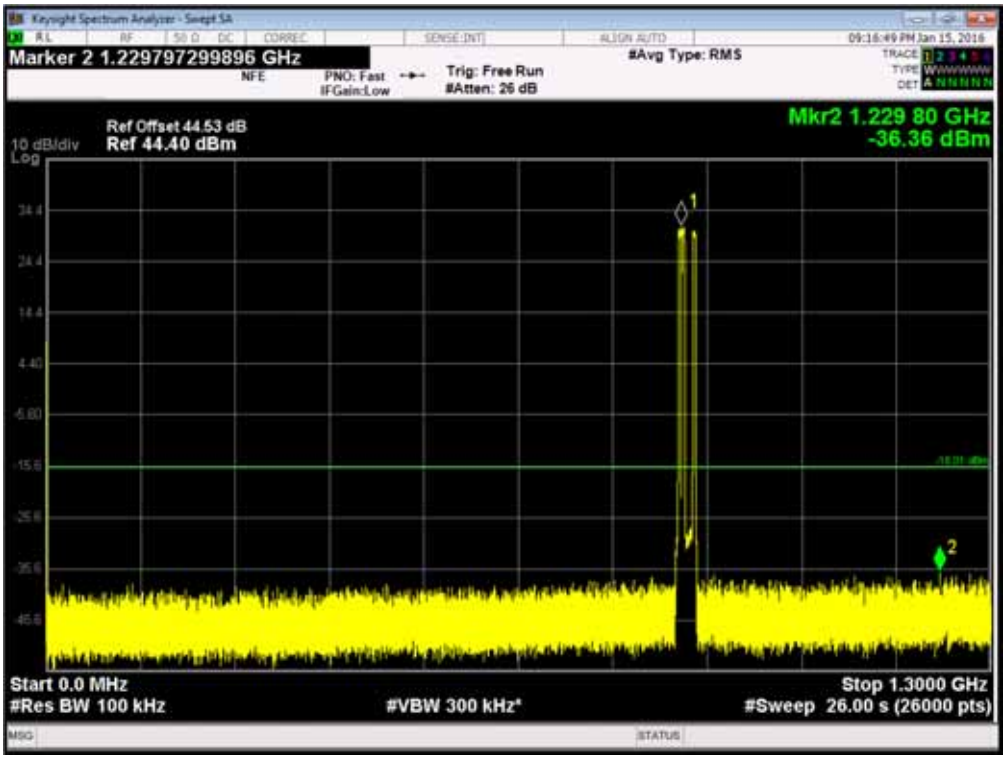
Channel Position B_{RFBW} - 16QAM / Bandwidth 5.0MHz - 1.3GHz - 4GHz



Channel Position B_{RFBW} - 16QAM / Bandwidth 5.0MHz - 4GHz - 10GHz

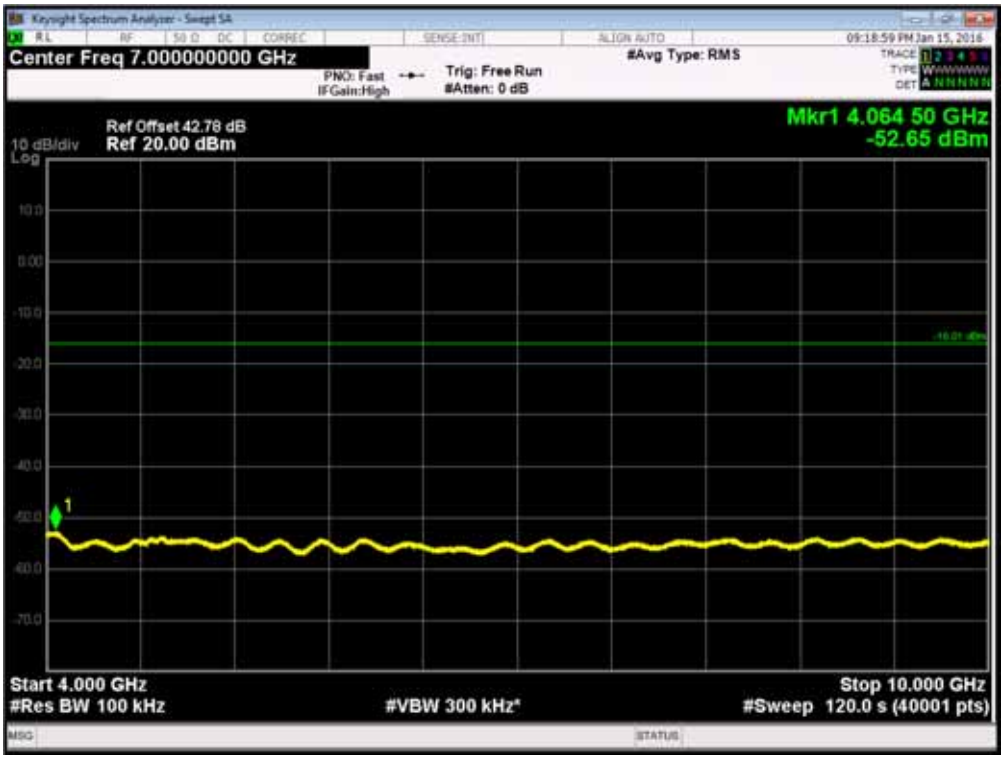


Channel Position T_{RFBW} - 16QAM / Bandwidth 5.0MHz - 9kHz - 1.3GHz



Channel Position T_{RFBW} - 16QAM / Bandwidth 5.0MHz - 1.3GHz - 4GHz

Channel Position T_{RFBW} - 16QAM / Bandwidth 5.0MHz - 4GHz - 10GHz

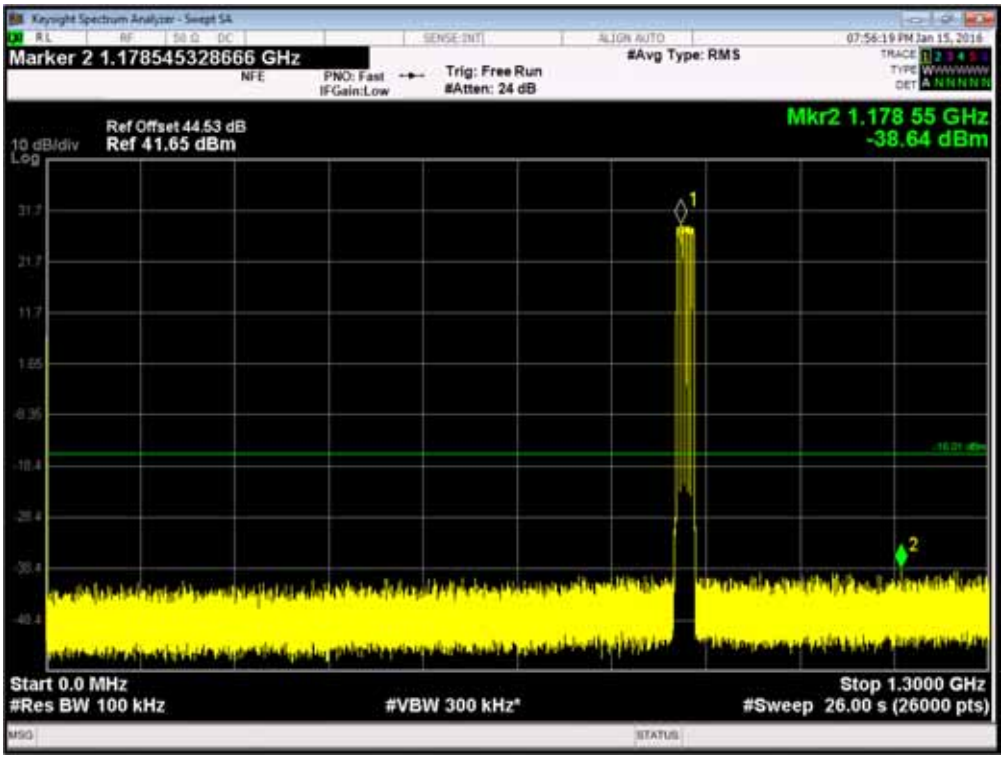


Configuration W-MIMO-MC 2 (5C)

Maximum Output Power 46.0dBm per port

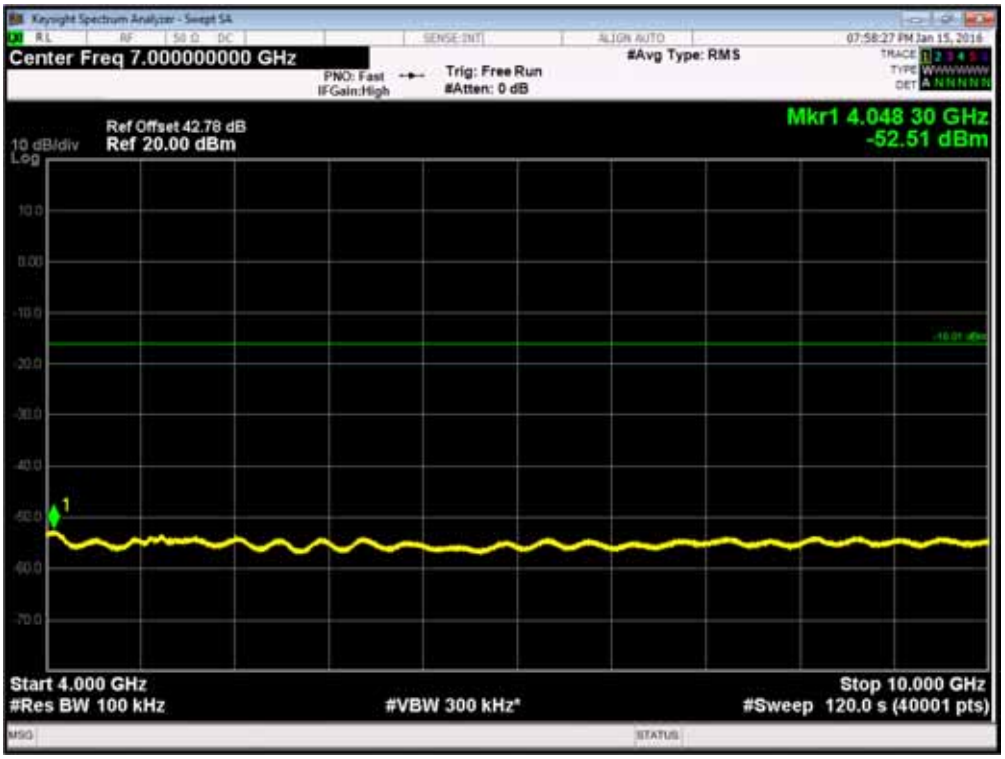
Channel Position	Bandwidth	Channel Frequency
Channel Position B_{RFBW}	5.0 MHz	871.4MHz + 876.4MHz + 881.4MHz + 886.4MHz + 891.4MHz
Channel Position T_{RFBW}	5.0 MHz	871.6MHz + 876.6MHz + 881.6MHz + 886.6MHz + 891.6MHz

Channel Position B_{RFBW} - 16QAM / Bandwidth 5.0MHz - 9kHz - 1.3GHz

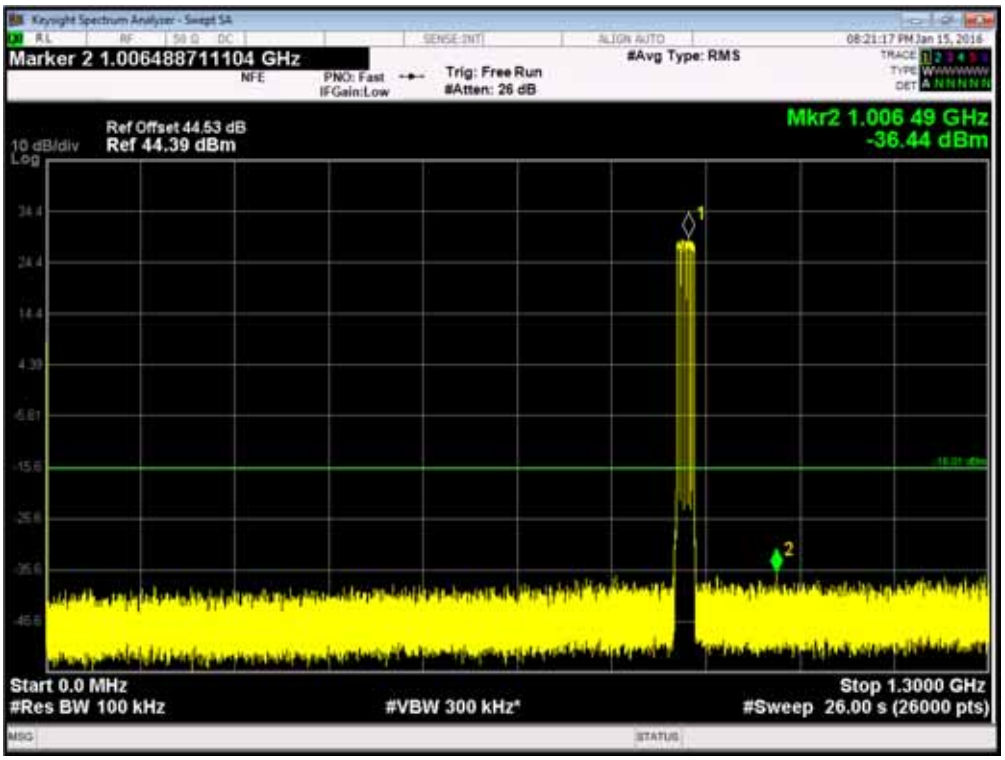


Channel Position B_{RFBW} - 16QAM / Bandwidth 5.0MHz - 1.3GHz - 4GHz

Channel Position B_{RFBW} - 16QAM / Bandwidth 5.0MHz - 4GHz - 10GHz

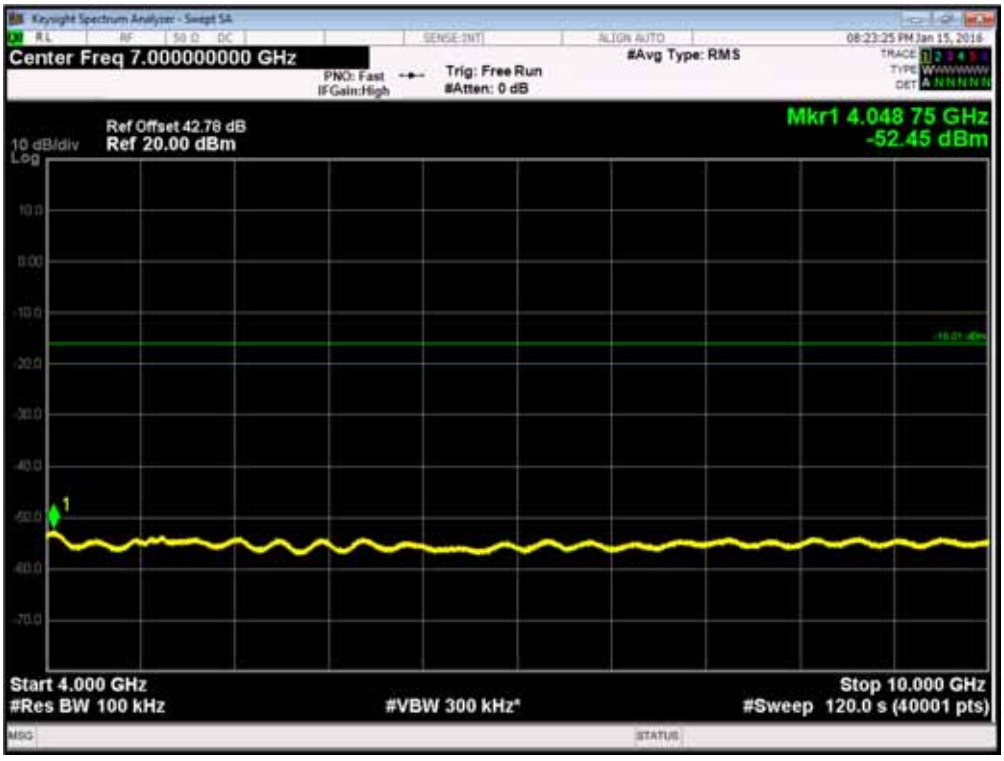


Channel Position T_{RFBW} - 16QAM / Bandwidth 5.0MHz - 9kHz - 1.3GHz



Channel Position T_{RFBW} - 16QAM / Bandwidth 5.0MHz - 1.3GHz - 4GHz

Channel Position T_{RFBW} - 16QAM / Bandwidth 5.0MHz - 4GHz - 10GHz



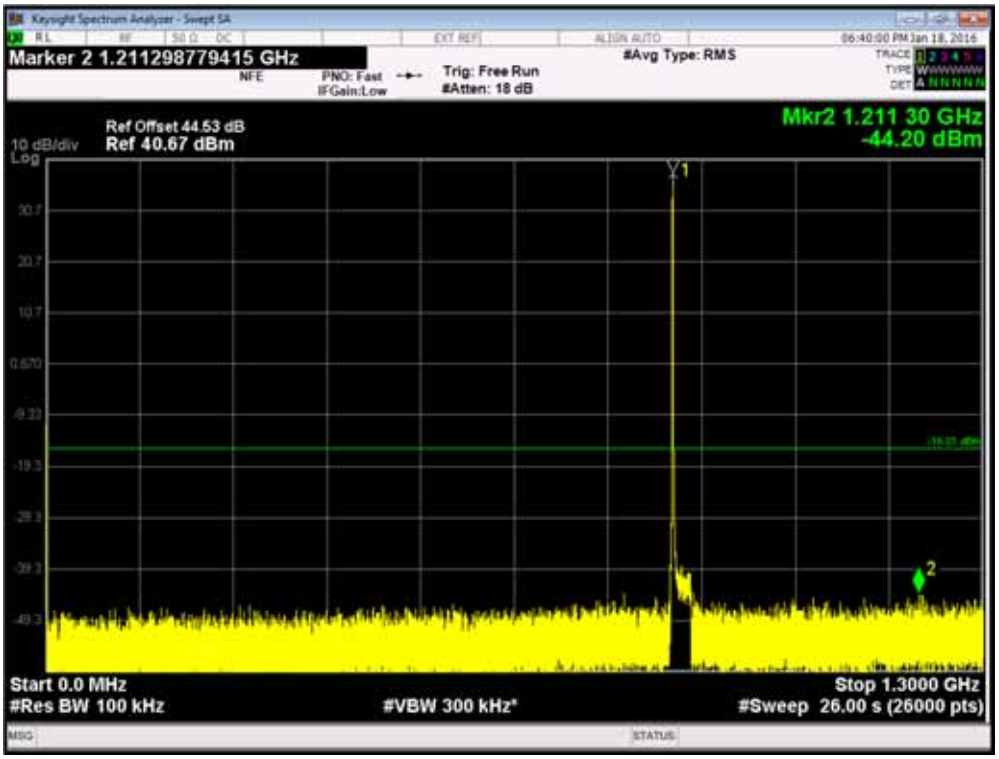
Configuration L-MIMO-SC

Maximum Output Power 46.0dBm per port

Channel Position	Bandwidth	Channel Frequency
Channel Position B	1.4 MHz	869.7MHz
Channel Position M	1.4 MHz	881.5MHz
Channel Position T	1.4 MHz	893.30MHz

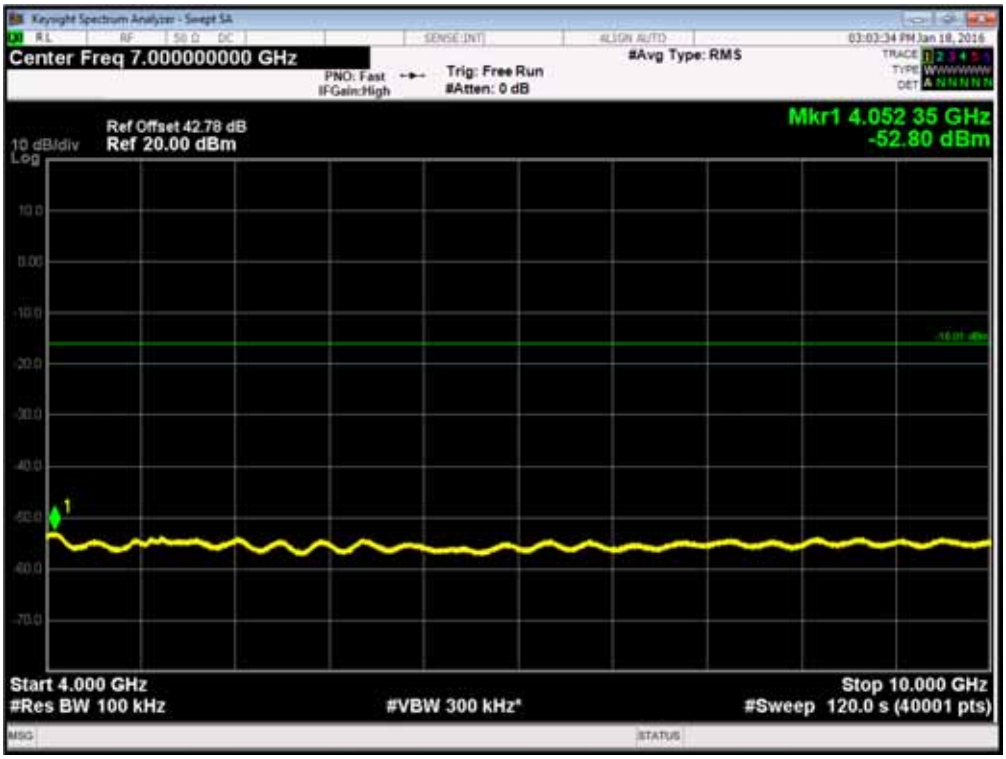
Channel Position	Bandwidth	Channel Frequency
Channel Position B	10.0 MHz	874.0MHz
Channel Position M	10.0 MHz	881.5MHz
Channel Position T	10.0 MHz	889.0MHz

Channel Position B - QPSK / Bandwidth 1.4MHz - 9kHz - 1.3GHz

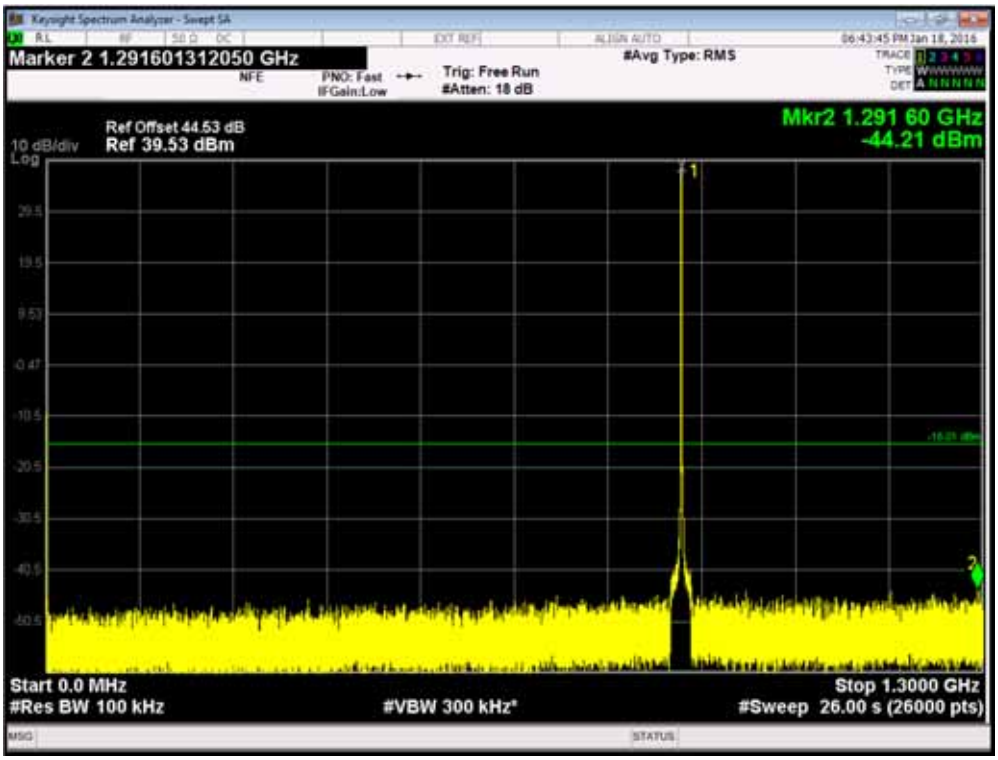


Channel Position B - QPSK / Bandwidth 1.4MHz - 1.3GHz - 4GHz

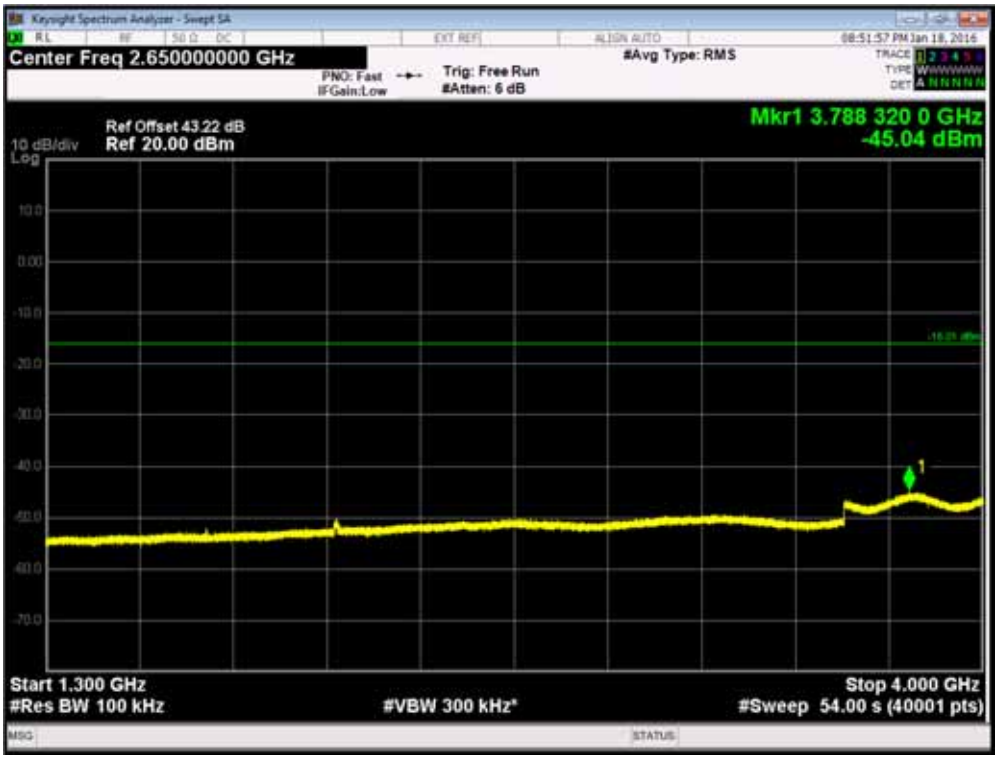
Channel Position B - QPSK / Bandwidth 1.4MHz - 4GHz - 10GHz



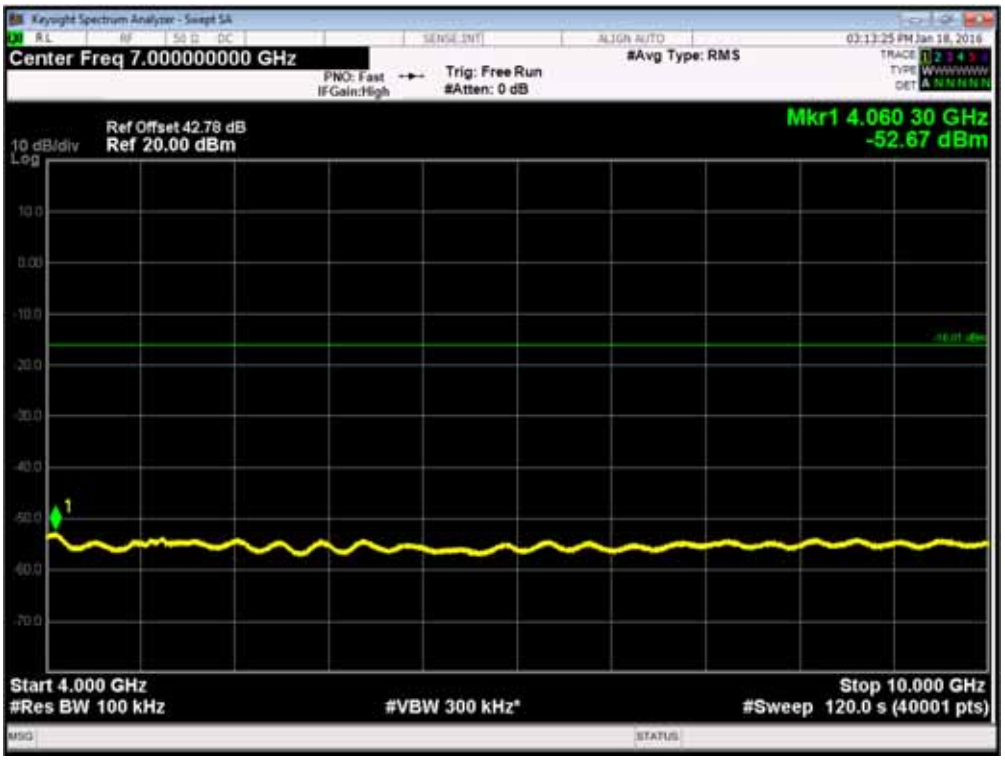
Channel Position M - QPSK / Bandwidth 1.4MHz - 9kHz - 1.3GHz



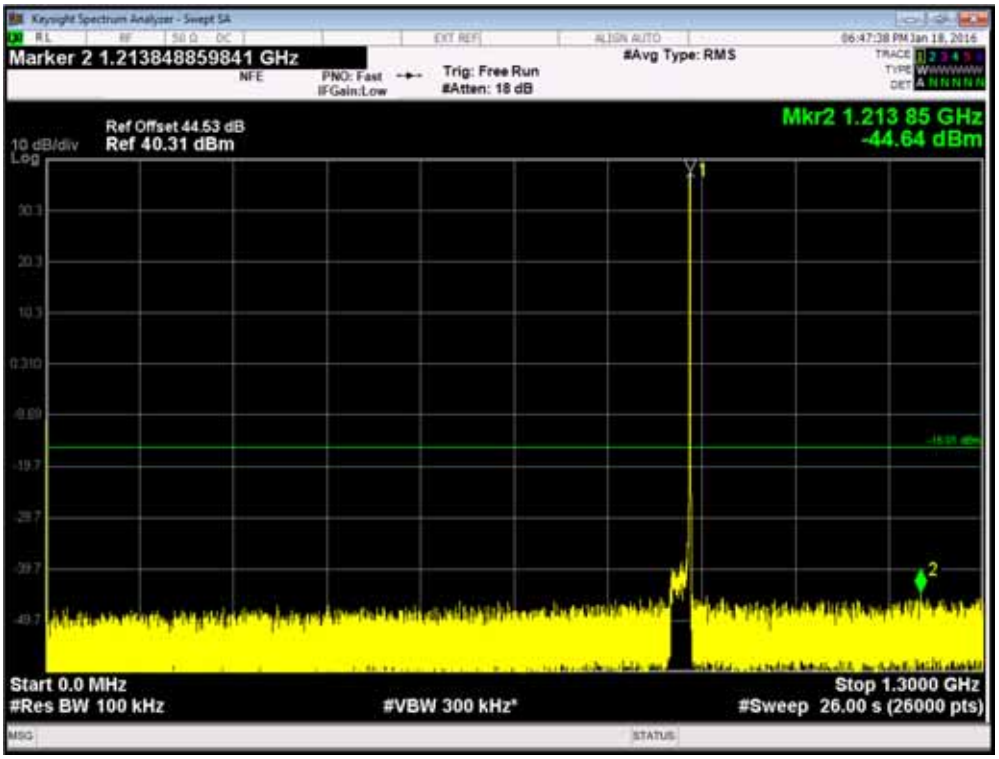
Channel Position M - QPSK / Bandwidth 1.4MHz - 1.3GHz - 4GHz



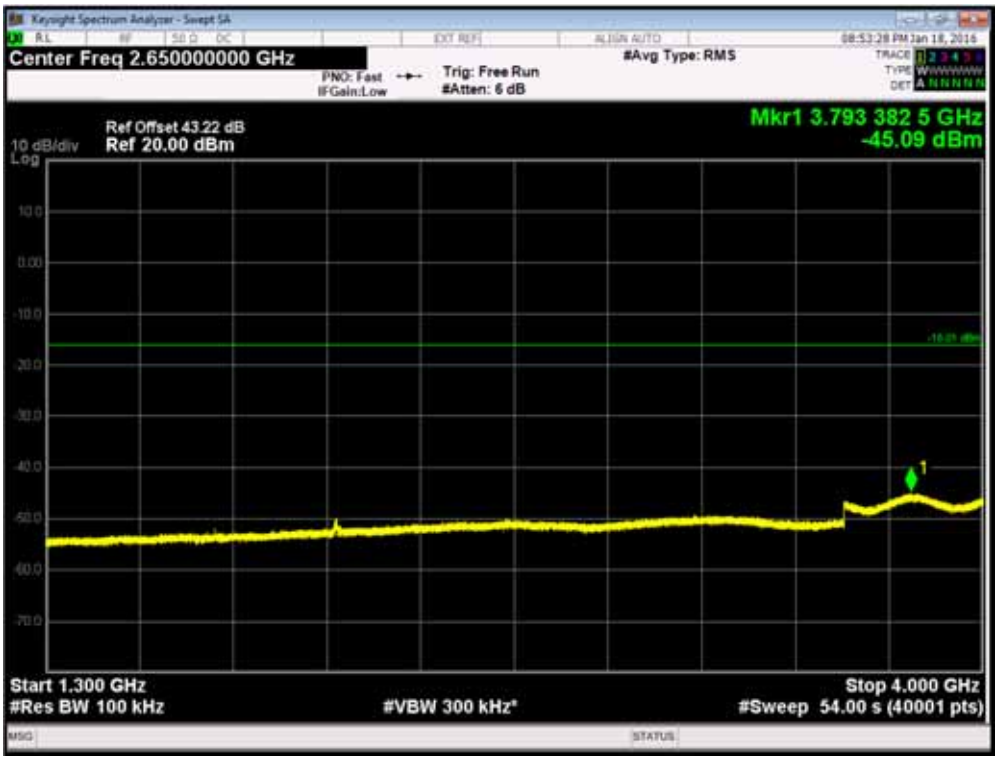
Channel Position M - QPSK / Bandwidth 1.4MHz - 4GHz - 10GHz



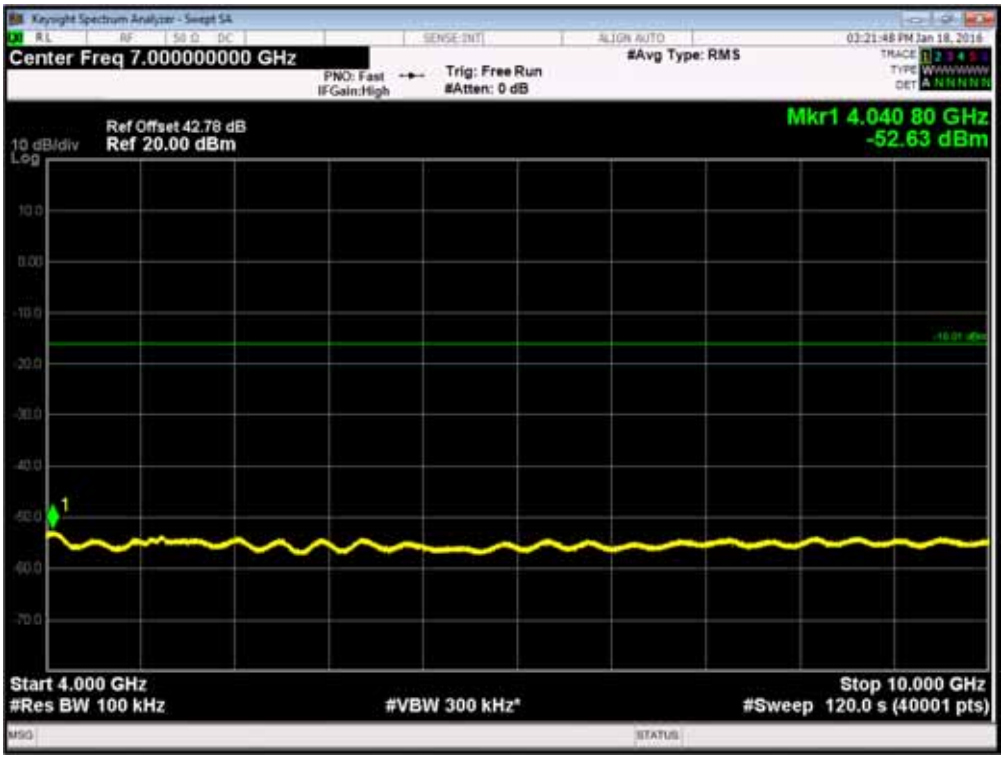
Channel Position T - QPSK / Bandwidth 1.4MHz - 9kHz - 1.3GHz



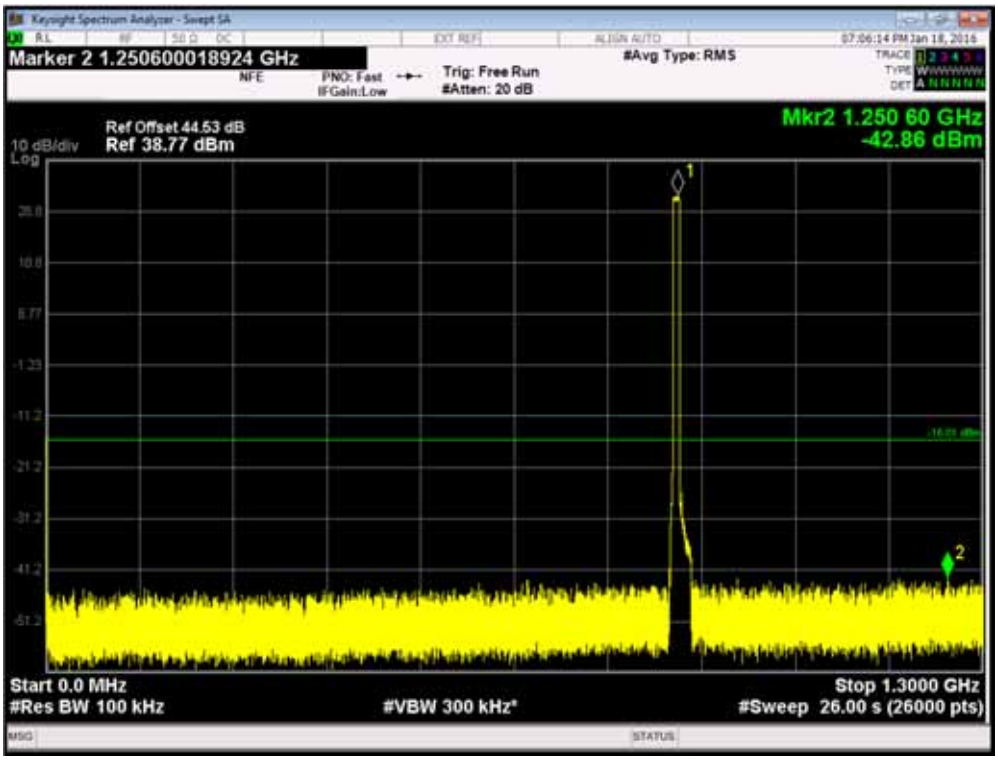
Channel Position T - QPSK / Bandwidth 1.4MHz - 1.3GHz - 4GHz



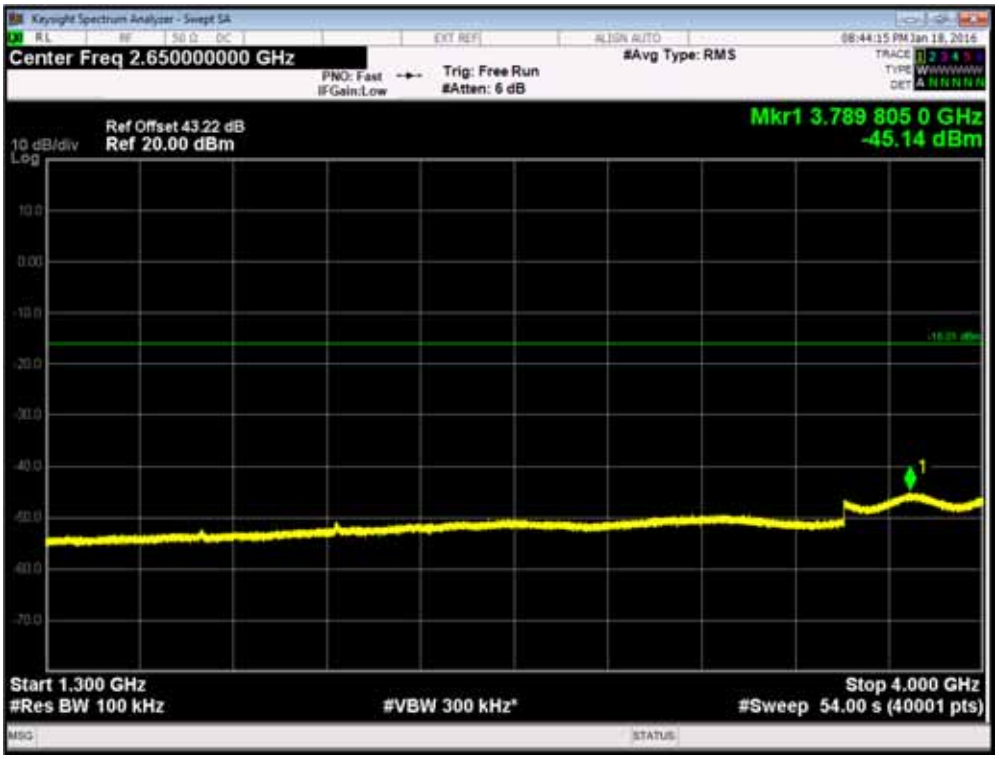
Channel Position T - QPSK / Bandwidth 1.4MHz - 4GHz - 10GHz



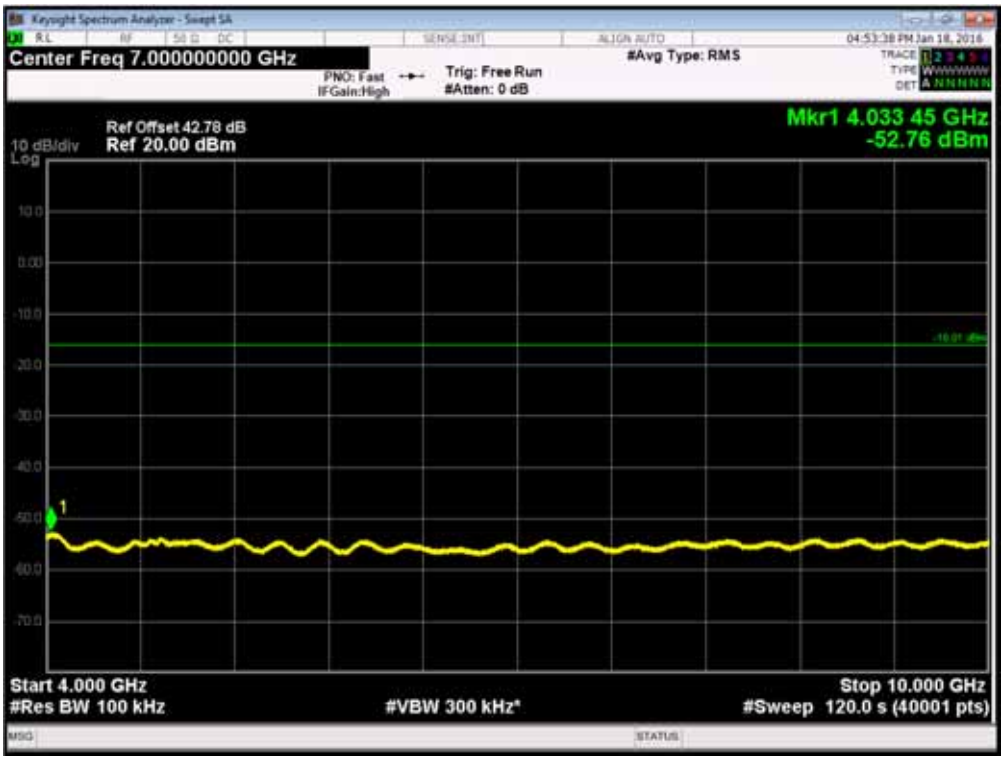
Channel Position B - QPSK / Bandwidth 10.0MHz - 9kHz - 1.3GHz



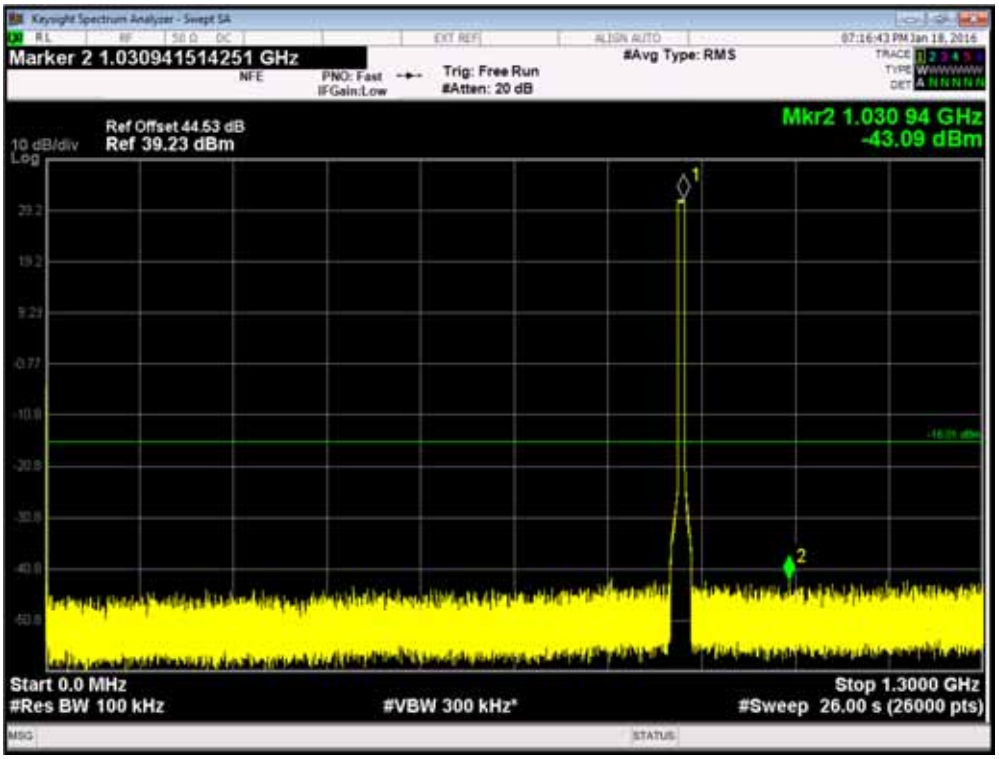
Channel Position B - QPSK / Bandwidth 10.0MHz - 1.3GHz - 4GHz



Channel Position B - QPSK / Bandwidth 10.0MHz - 4GHz - 10GHz

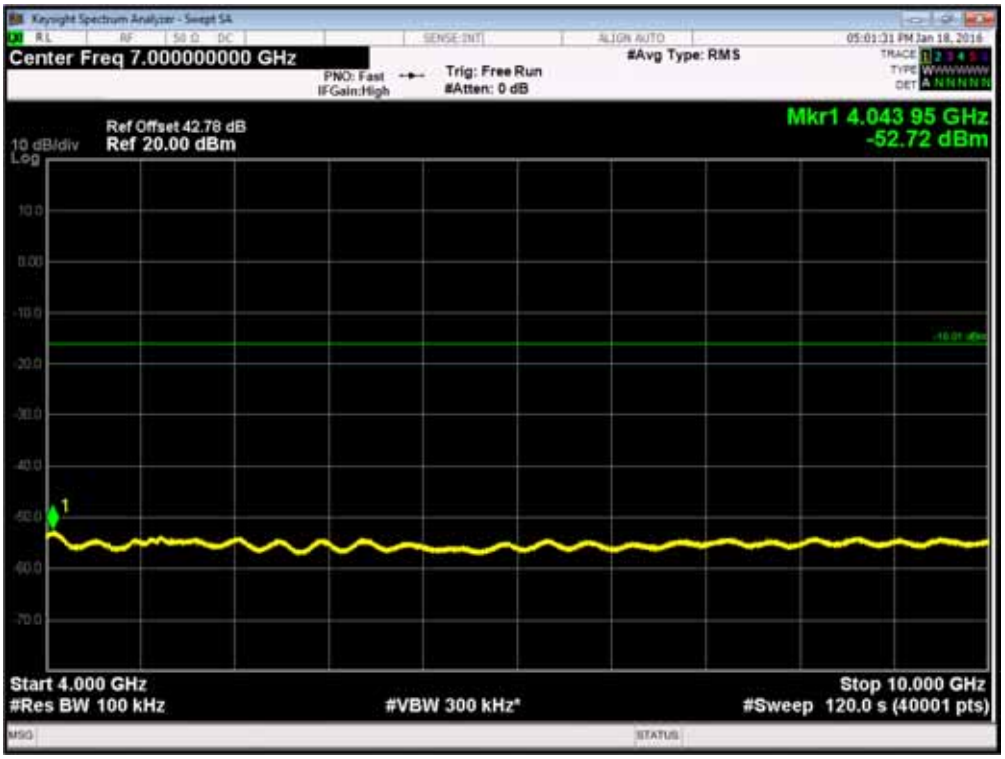


Channel Position M - QPSK / Bandwidth 10.0MHz - 9kHz - 1.3GHz

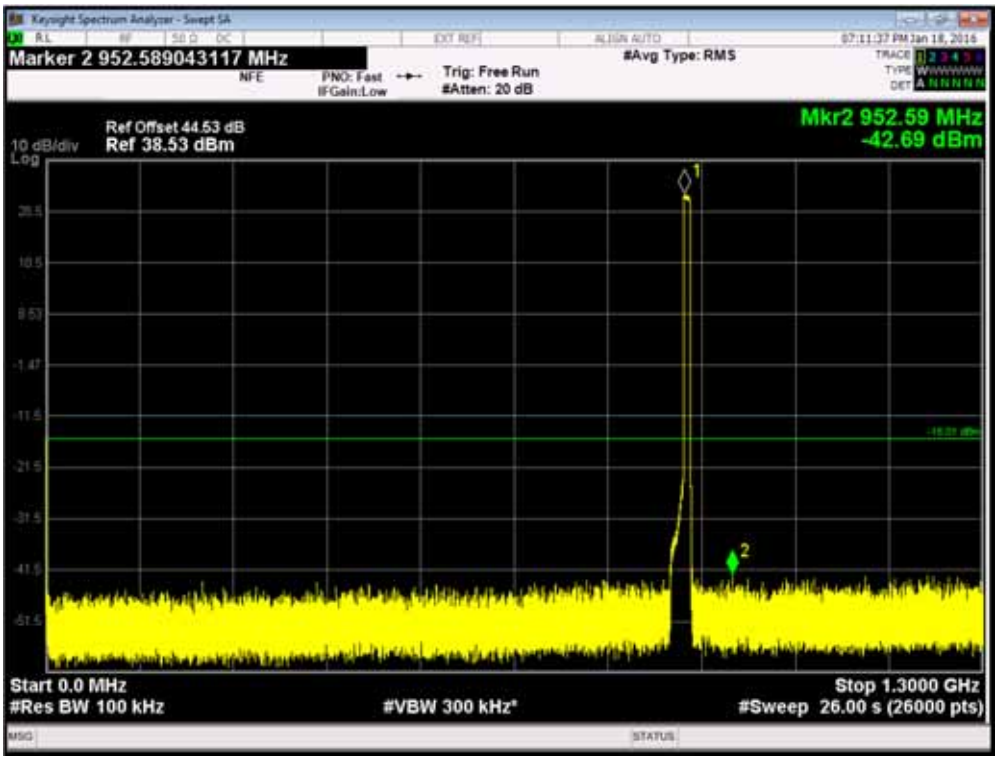


Channel Position M - QPSK / Bandwidth 10.0MHz - 1.3GHz - 4GHz

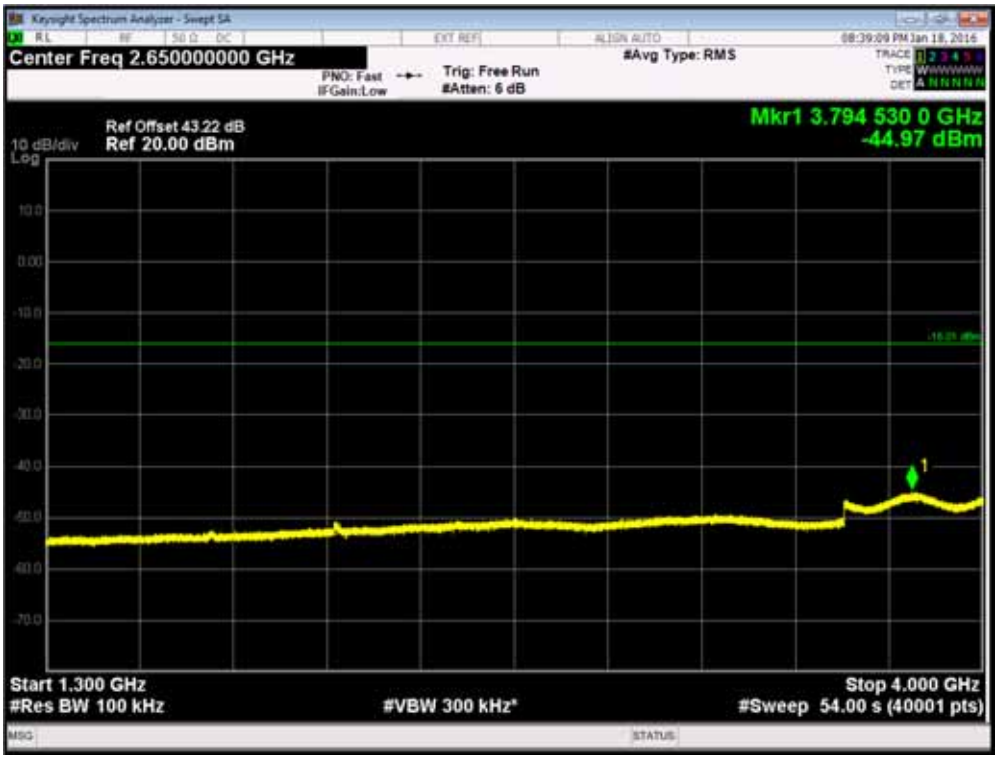
Channel Position M - QPSK / Bandwidth 10.0MHz - 4GHz - 10GHz



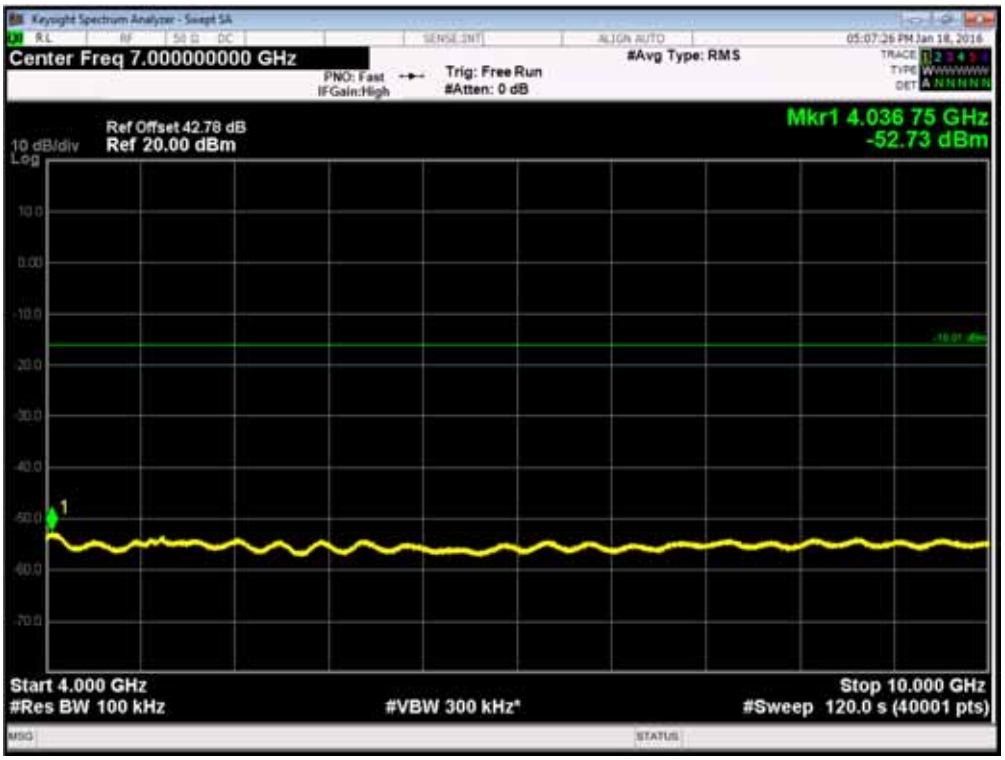
Channel Position T - QPSK / Bandwidth 10.0MHz - 9kHz - 1.3GHz



Channel Position T - QPSK / Bandwidth 10.0MHz - 1.3GHz - 4GHz



Channel Position T - QPSK / Bandwidth 10.0MHz - 4GHz - 10GHz



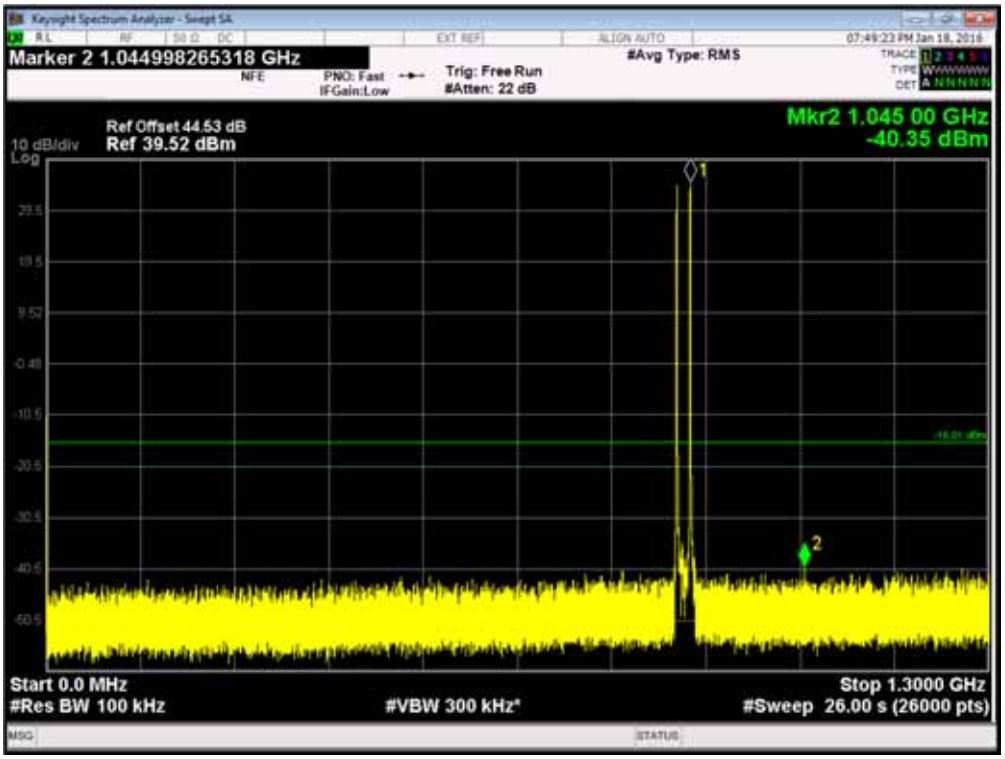
Configuration L-MIMO-MC 1 (2C)

Maximum Output Power 46.0dBm per port

Channel Position	Bandwidth	Channel Frequency
Channel Position B_{RFBW}	1.4 MHz	869.7MHz + 888.3MHz
Channel Position M_{RFBW}	1.4 MHz	872.2MHz + 890.8MHz
Channel Position T_{RFBW}	1.4 MHz	874.7MHz + 893.3MHz

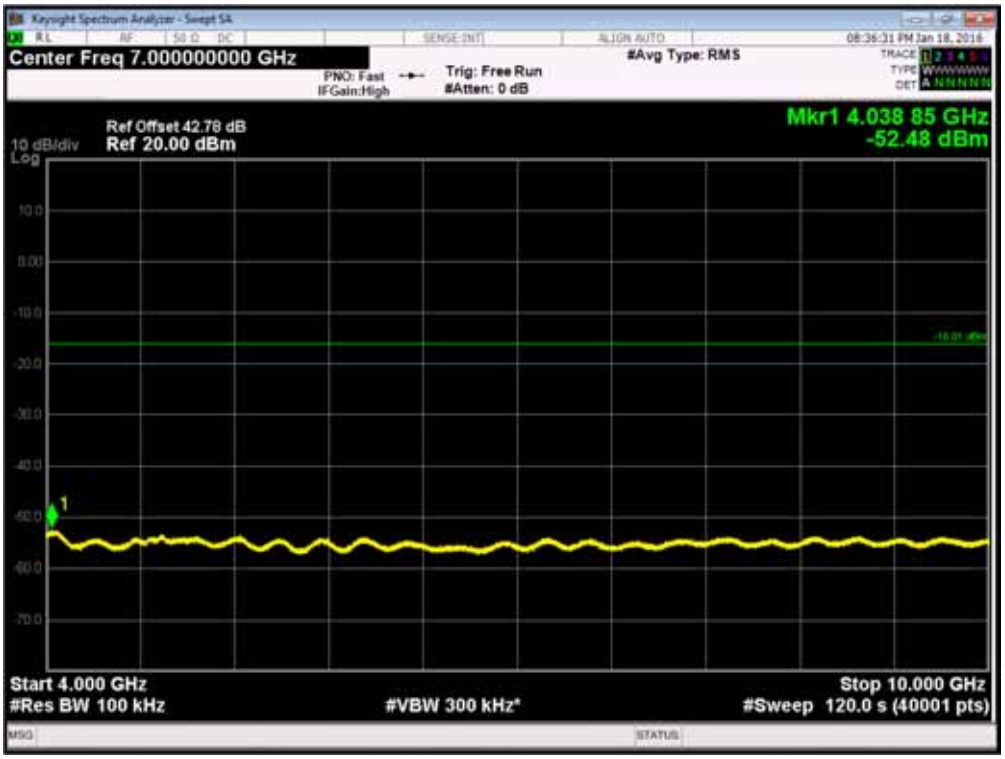
Channel Position	Bandwidth	Channel Frequency
Channel Position M_{RFBW}	10.0 MHz	874.0MHz + 889.0MHz

Channel Position B_{RFBW} - QPSK / Bandwidth 1.4MHz - 9kHz - 1.3GHz

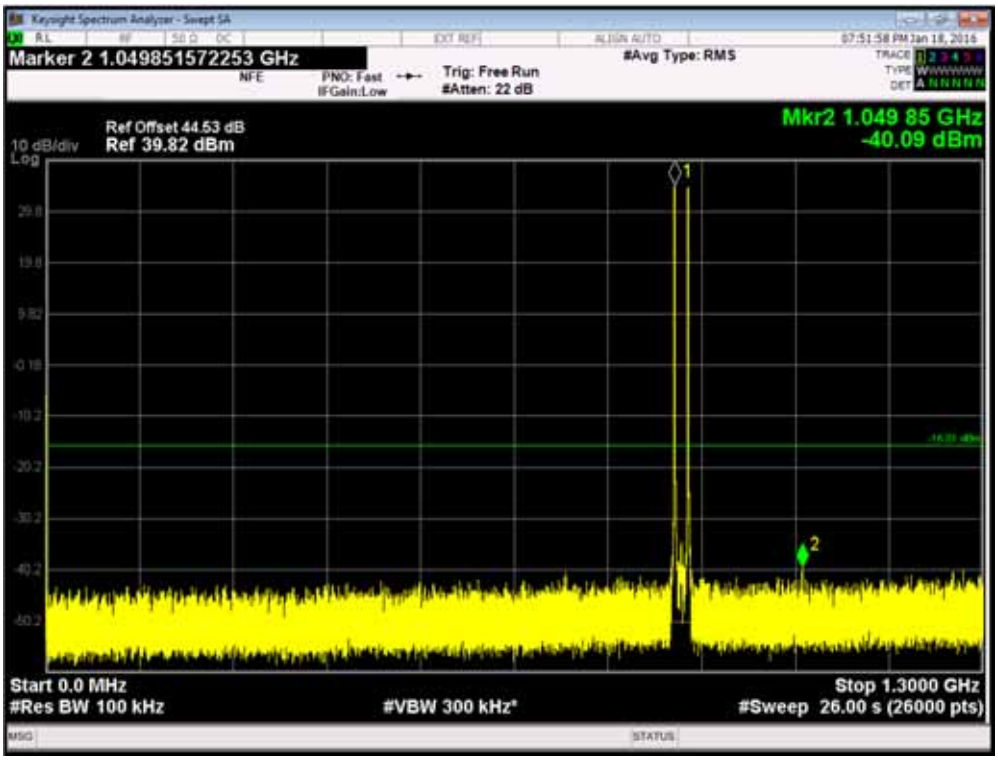


Channel Position B_{RFBW} - QPSK / Bandwidth 1.4MHz - 1.3GHz - 4GHz

Channel Position B_{RFBW} - QPSK / Bandwidth 1.4MHz - 4GHz - 10GHz

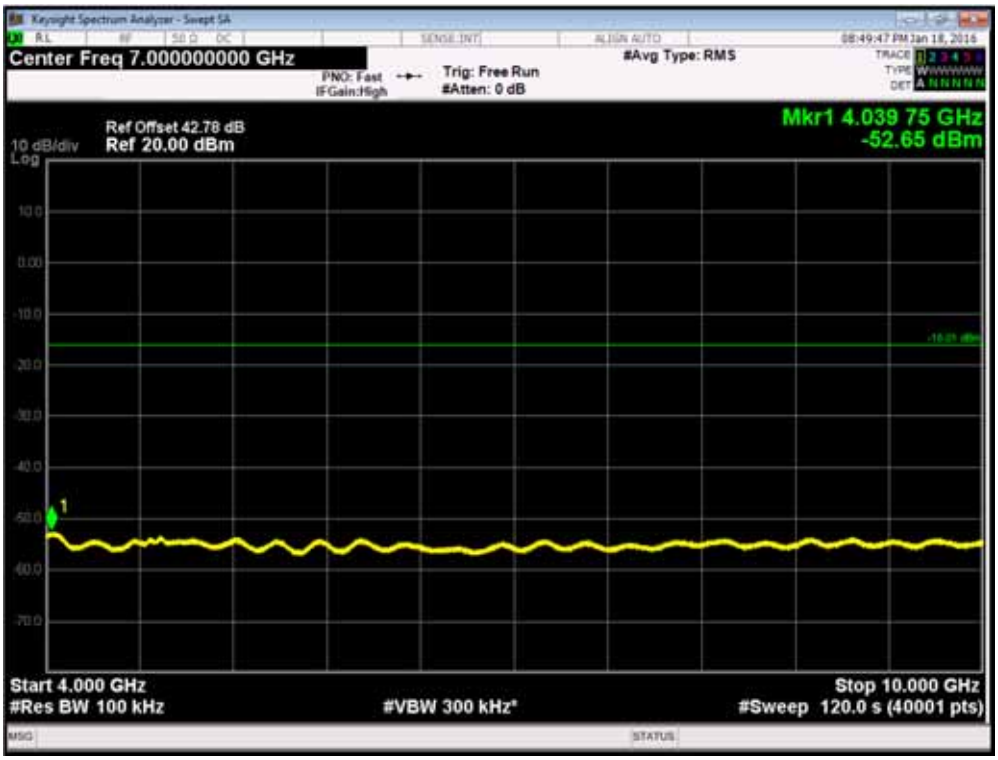


Channel Position M_{RFBW} - QPSK / Bandwidth 1.4MHz - 9kHz - 1.3GHz

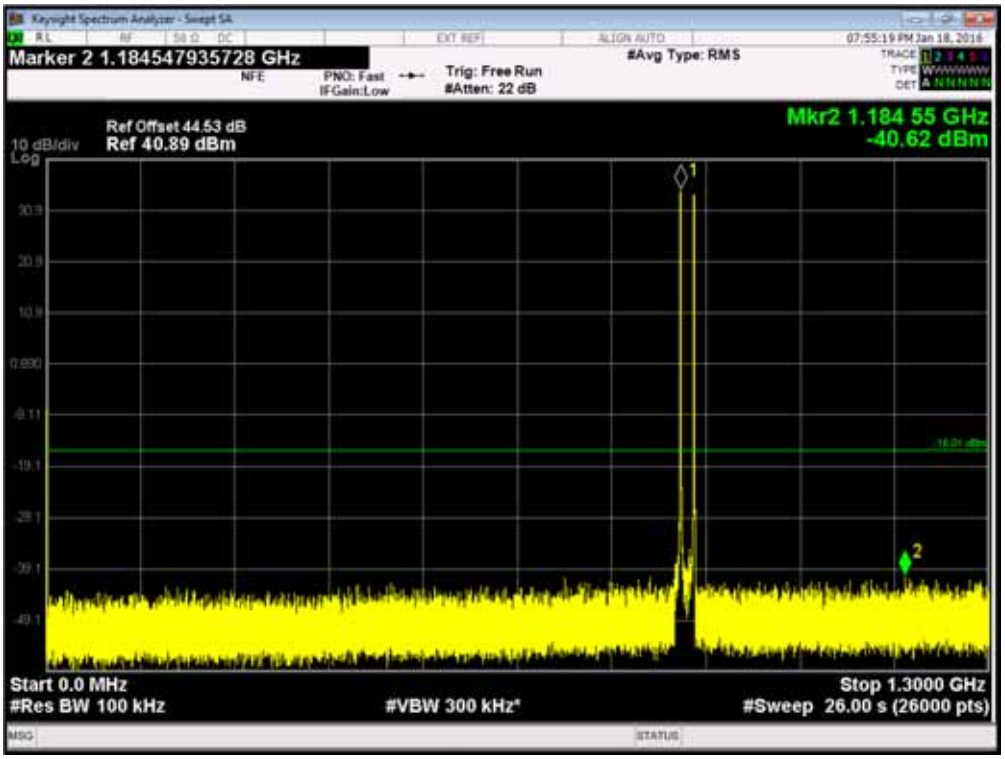


Channel Position M_{RFBW} - QPSK / Bandwidth 1.4MHz - 1.3GHz - 4GHz

Channel Position M_{RFBW} - QPSK / Bandwidth 1.4MHz - 4GHz - 10GHz

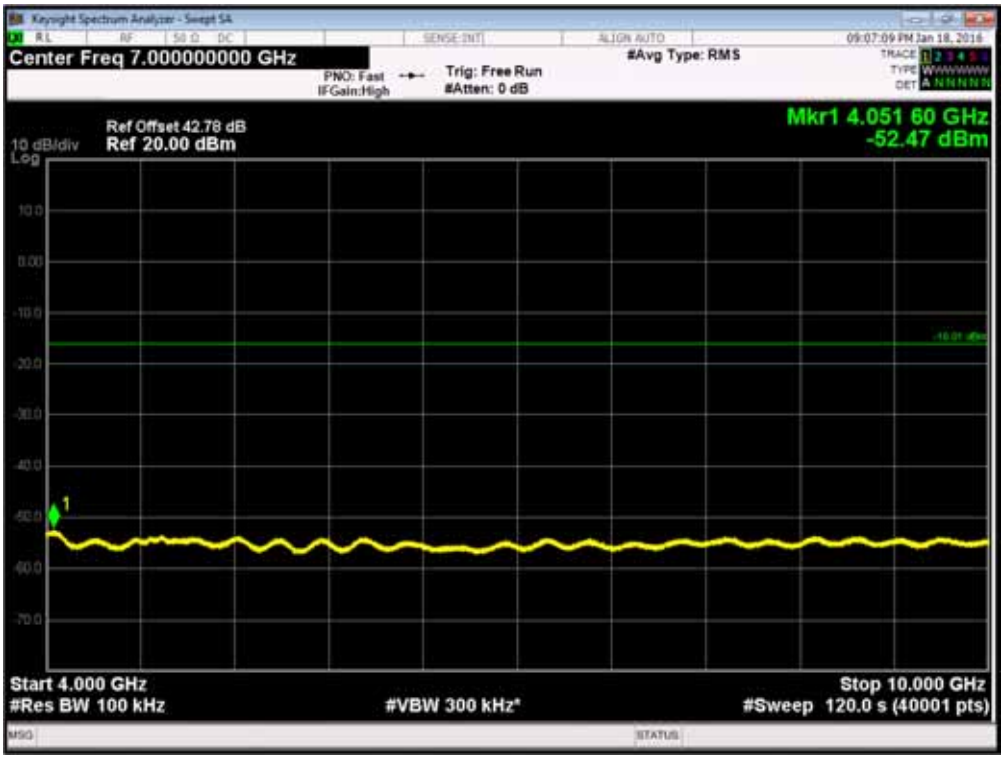


Channel Position T_{RFBW} - QPSK / Bandwidth 1.4MHz - 9kHz - 1.3GHz

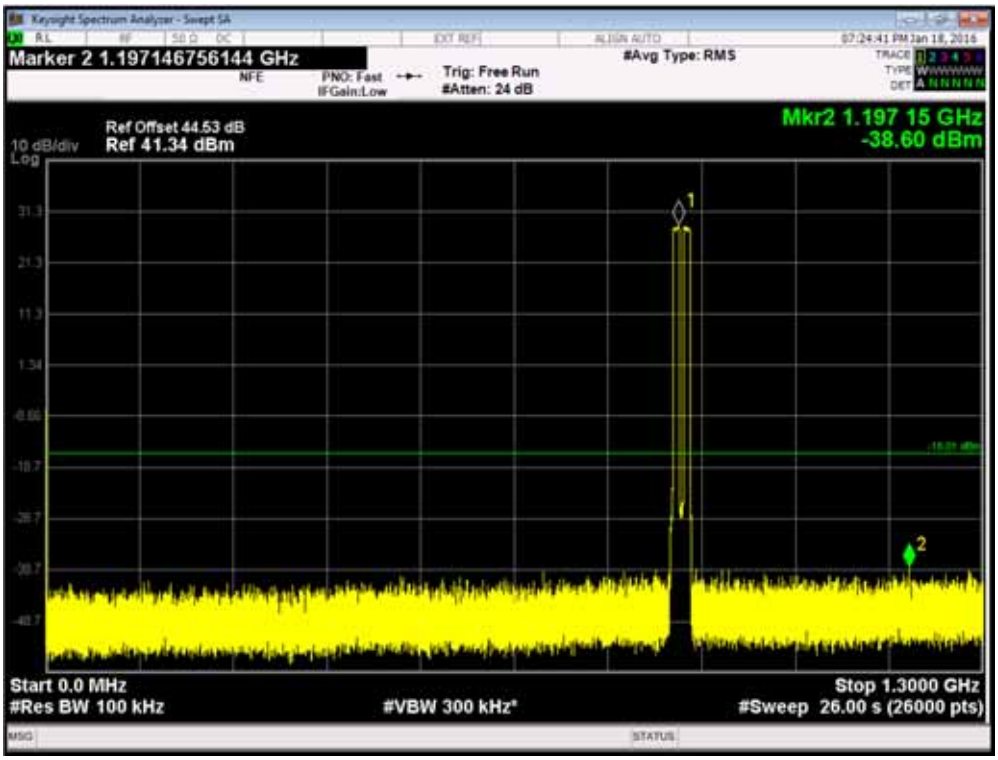


Channel Position T_{RFBW} - QPSK / Bandwidth 1.4MHz - 1.3GHz - 4GHz

Channel Position T_{RFBW} - QPSK / Bandwidth 1.4MHz - 4GHz - 10GHz

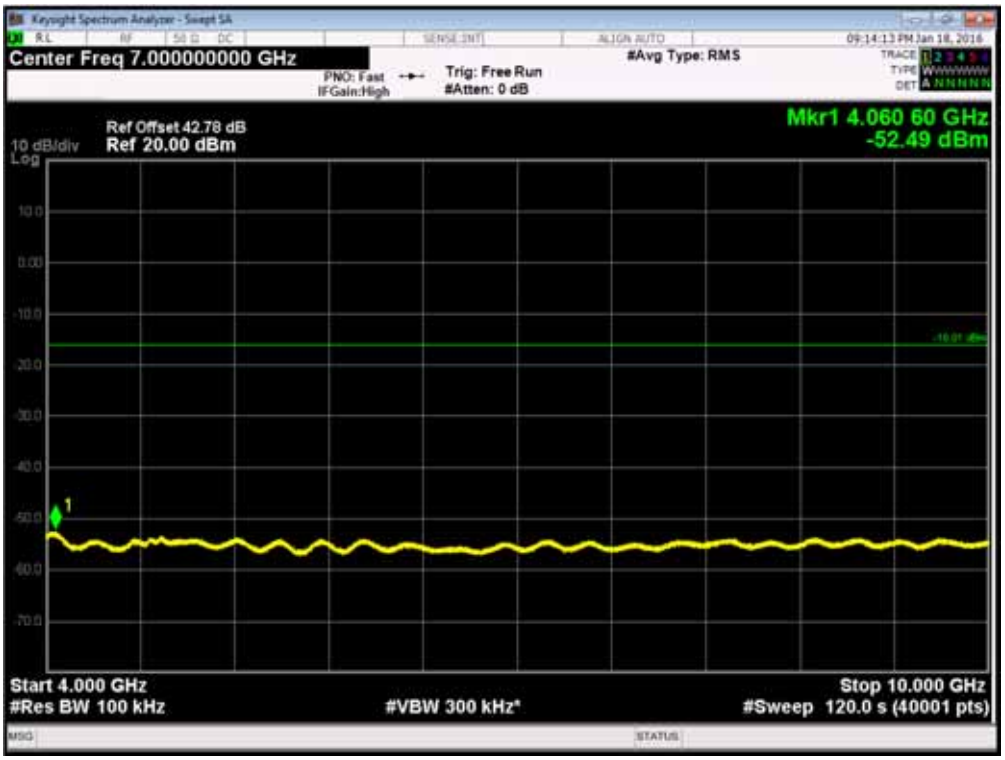


Channel Position M_{RFBW} - QPSK / Bandwidth 10.0MHz - 9kHz - 1.3GHz



Channel Position M_{RFBW} - QPSK / Bandwidth 10.0MHz - 1.3GHz - 4GHz

Channel Position M_{RFBW} - QPSK / Bandwidth 10.0MHz - 4GHz - 10GHz



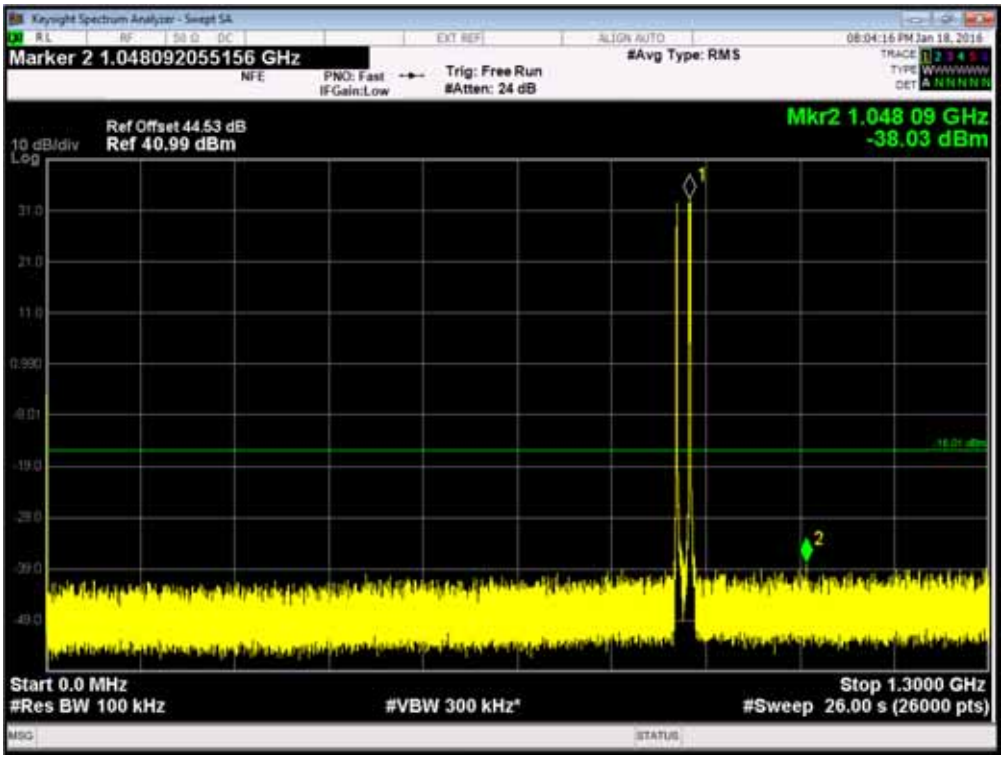
Configuration L-MIMO-MC 2 (3C)

Maximum Output Power 46.0dBm per port

Channel Position	Bandwidth	Channel Frequency
Channel Position B_{RFBW}	1.4 MHz	869.7MHz + 886.9MHz + 888.3MHz
Channel Position M_{RFBW}	1.4 MHz	872.2MHz + 889.4MHz + 890.8MHz
Channel Position T_{RFBW}	1.4 MHz	874.7MHz + 891.9MHz + 893.3MHz

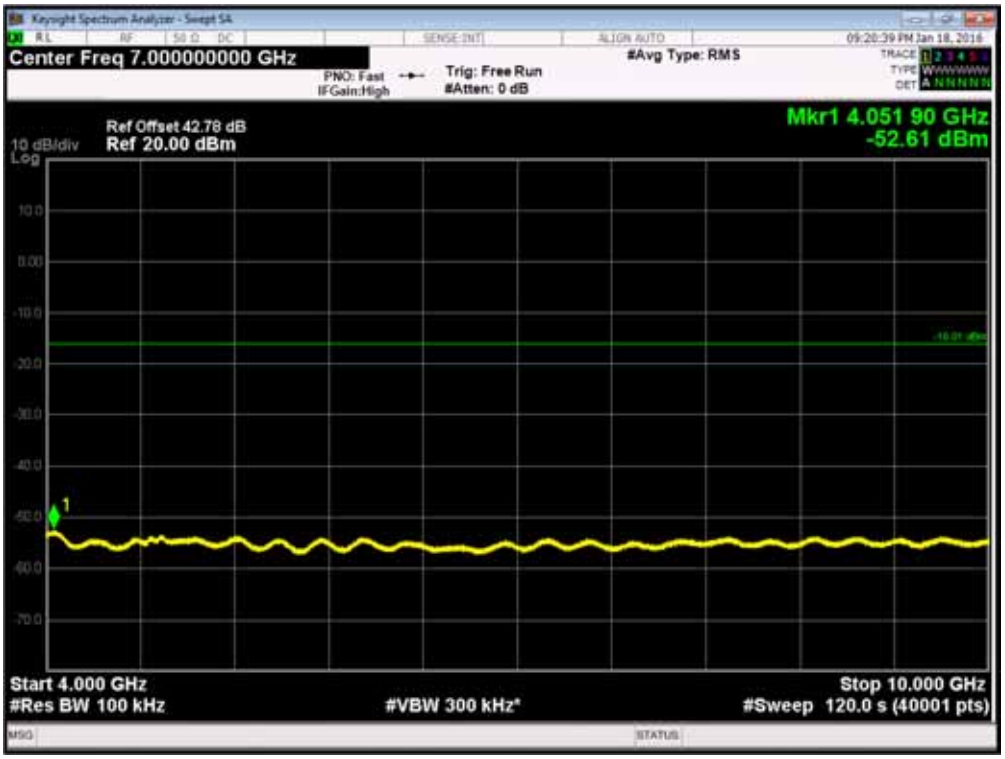
Channel Position	Bandwidth	Channel Frequency
Channel Position M_{RFBW}	5.0 MHz	971.5MHz + 886.5MHz + 891.5MHz

Channel Position B_{RFBW} - QPSK / Bandwidth 1.4MHz - 9kHz - 1.3GHz

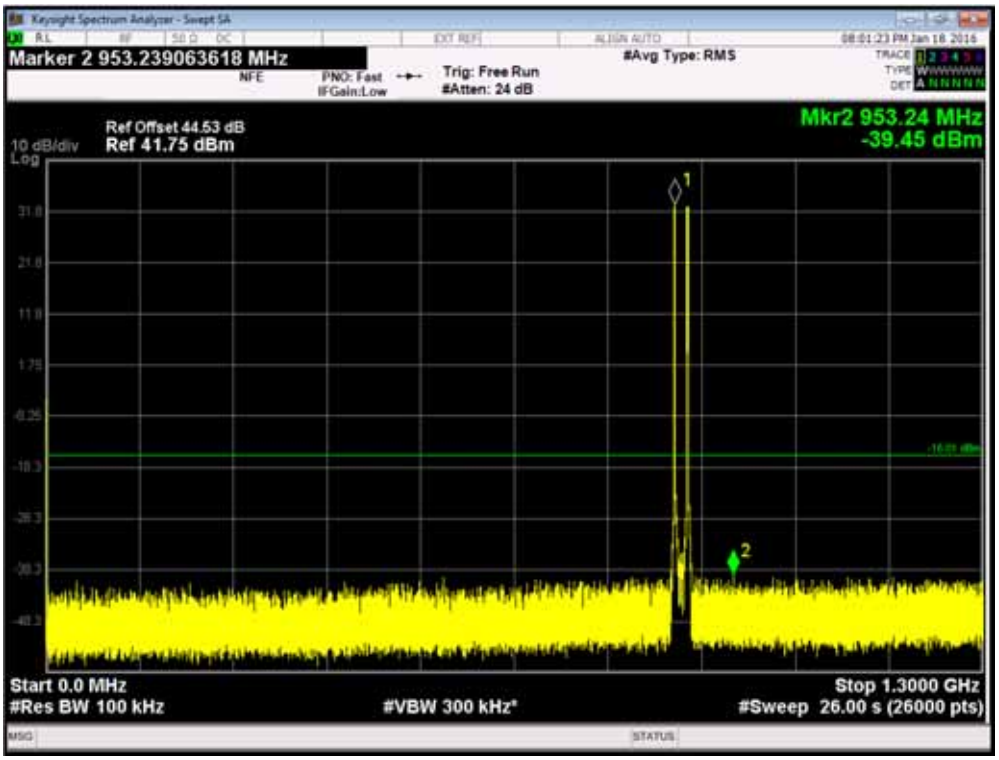


Channel Position B_{RFBW} - QPSK / Bandwidth 1.4MHz - 1.3GHz - 4GHz

Channel Position B_{RFBW} - QPSK / Bandwidth 1.4MHz - 4GHz - 10GHz

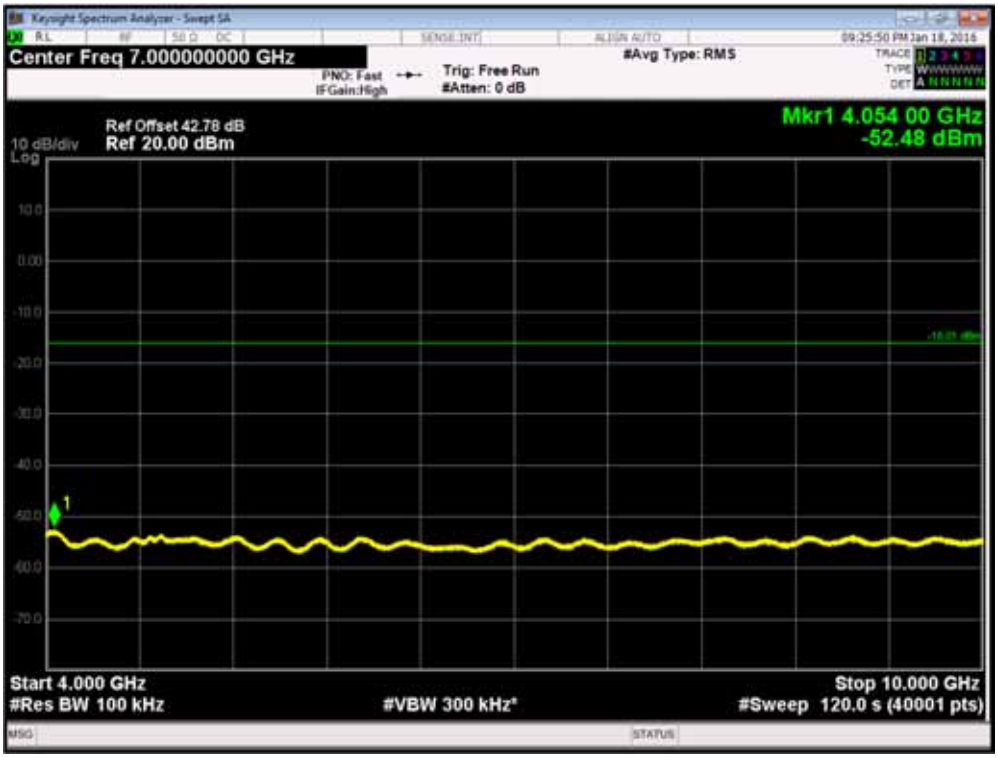


Channel Position M_{RFBW} - QPSK / Bandwidth 1.4MHz - 9kHz - 1.3GHz

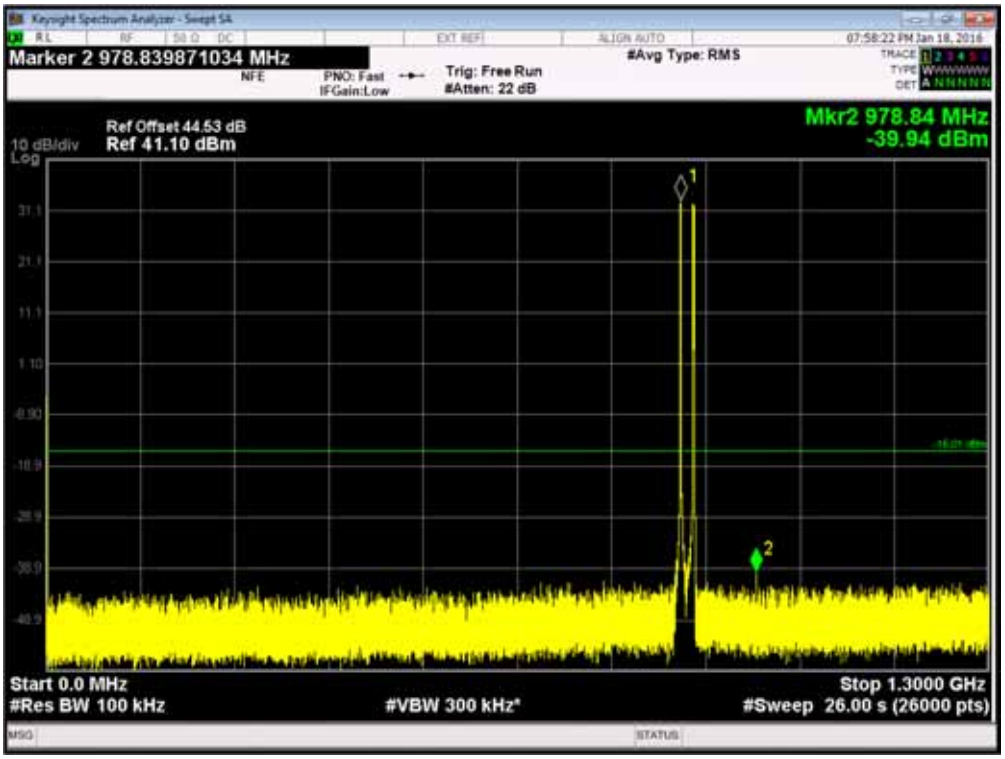


Channel Position M_{RFBW} - QPSK / Bandwidth 1.4MHz - 1.3GHz - 4GHz

Channel Position M_{RFBW} - QPSK / Bandwidth 1.4MHz - 4GHz - 10GHz

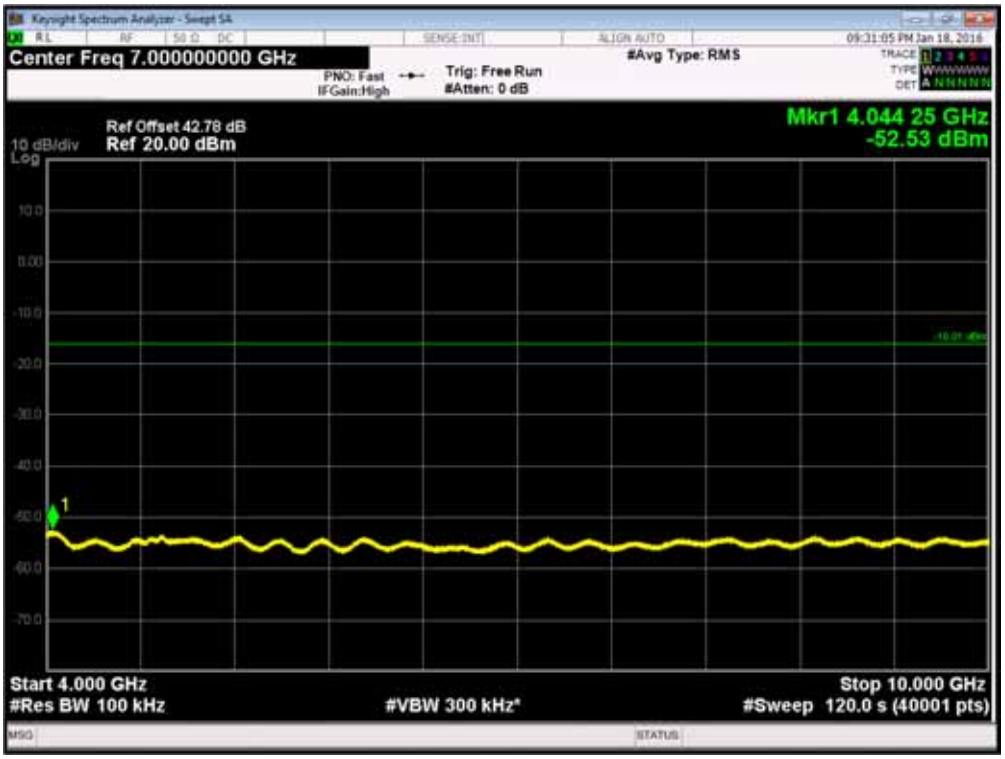


Channel Position T_{RFBW} - QPSK / Bandwidth 1.4MHz - 9kHz - 1.3GHz

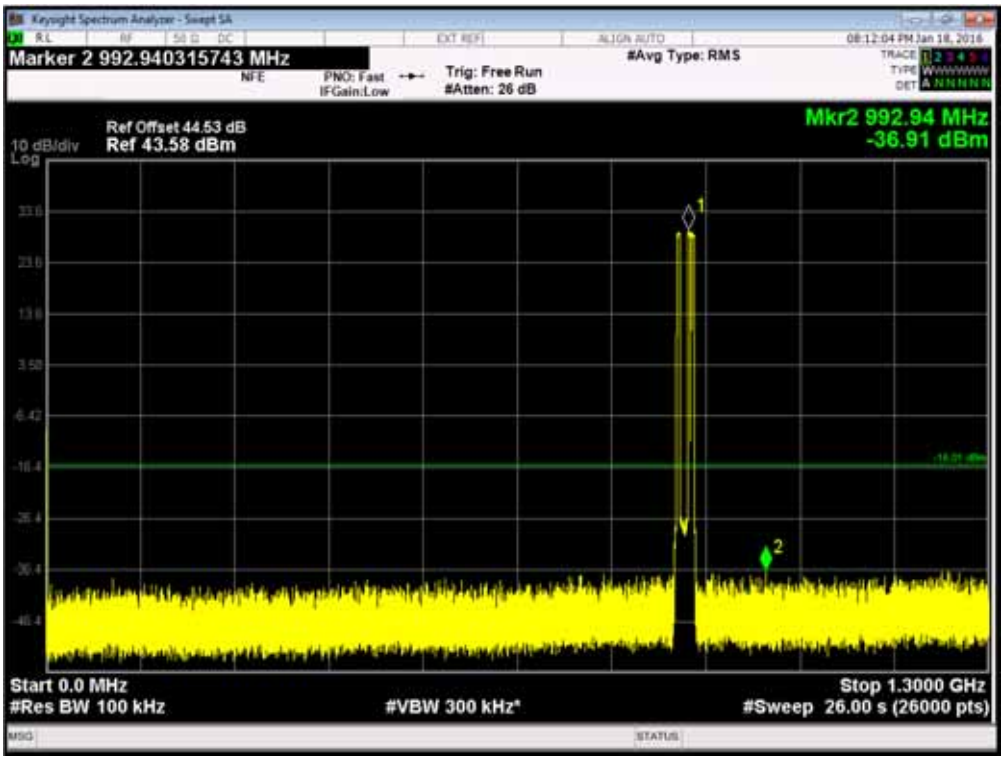


Channel Position T_{RFBW} - QPSK / Bandwidth 1.4MHz - 1.3GHz - 4GHz

Channel Position T_{RFBW} - QPSK / Bandwidth 1.4MHz - 4GHz - 10GHz

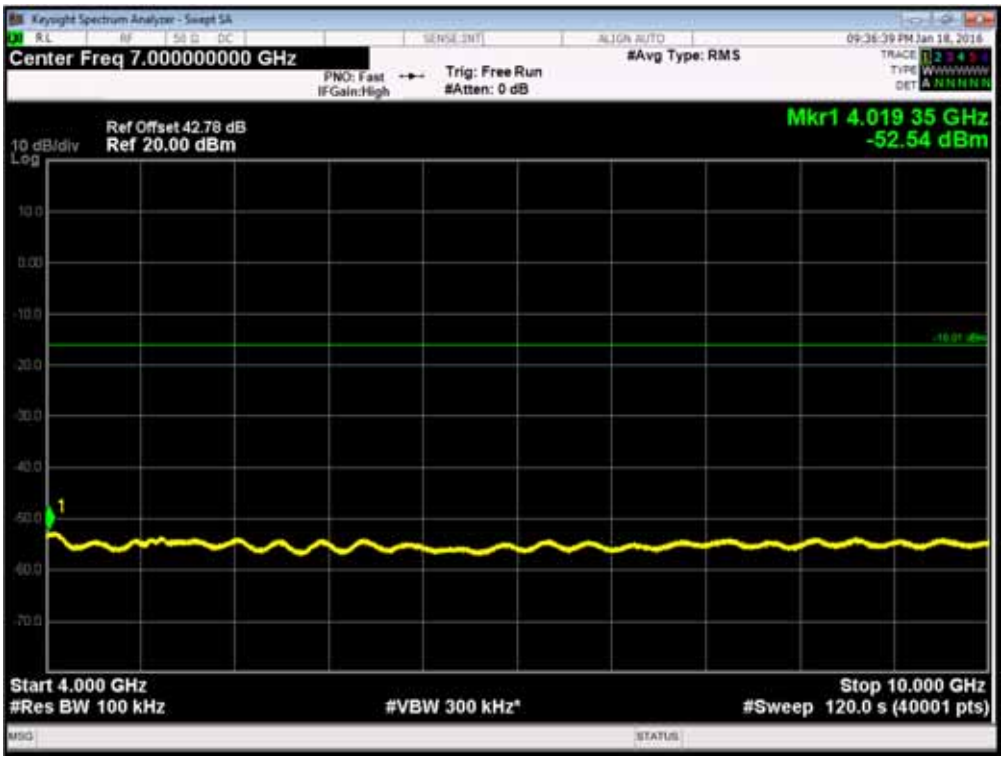


Channel Position M_{RFBW} - QPSK / Bandwidth 5.0MHz - 9kHz - 1.3GHz



Channel Position M_{RFBW} - QPSK / Bandwidth 5.0MHz - 1.3GHz - 4GHz

Channel Position M_{RFBW} - QPSK / Bandwidth 5.0MHz - 4GHz - 10GHz



Configuration W+L-MIMO-MC 6 (2W+1L)

Maximum Output Power 46.0dBm per port

Channel Position	Bandwidth	Channel Frequency
Channel Position M_{RFBW}	W: 5.0 MHz L: 1.4 MHz	(W) 871.4MHz + (W) 876.4MHz + (L) 893.3MHz

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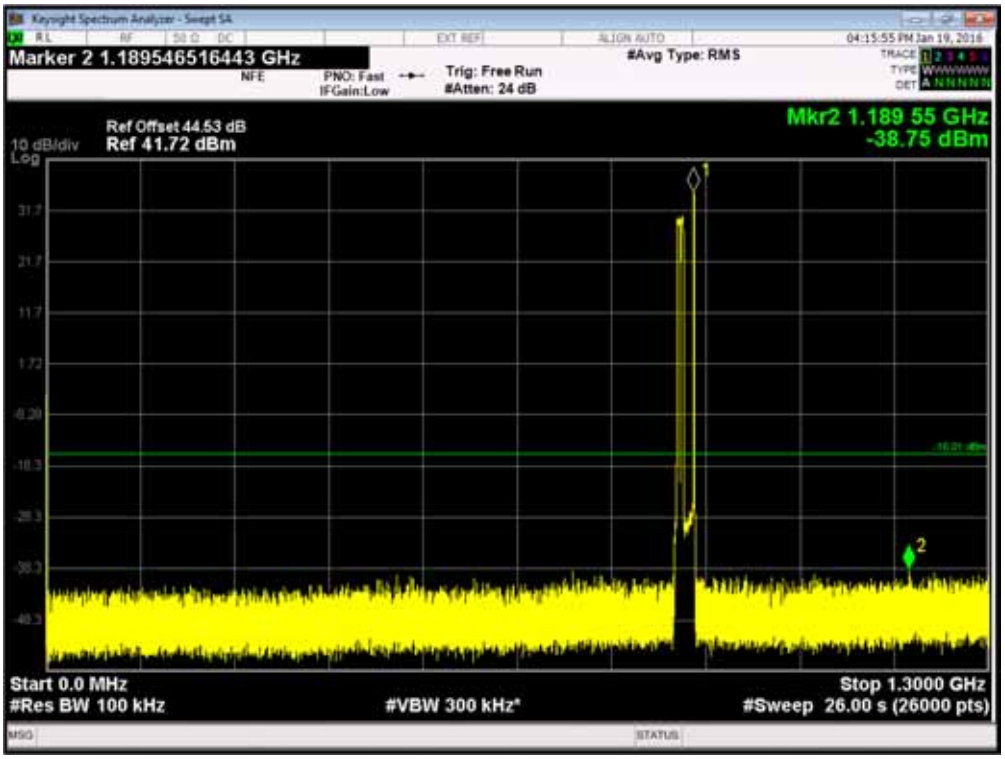
Channel Position	Bandwidth	Channel Frequency
Channel Position M_{RFBW}	W: 5.0 MHz L: 3.0 MHz	(W) 871.4MHz + (W) 876.4MHz + (L) 892.5MHz

Channel Position	Bandwidth	Channel Frequency
Channel Position M_{RFBW}	W: 5.0 MHz L: 5.0 MHz	(W) 871.4MHz + (W) 876.4MHz + (L) 891.5MHz

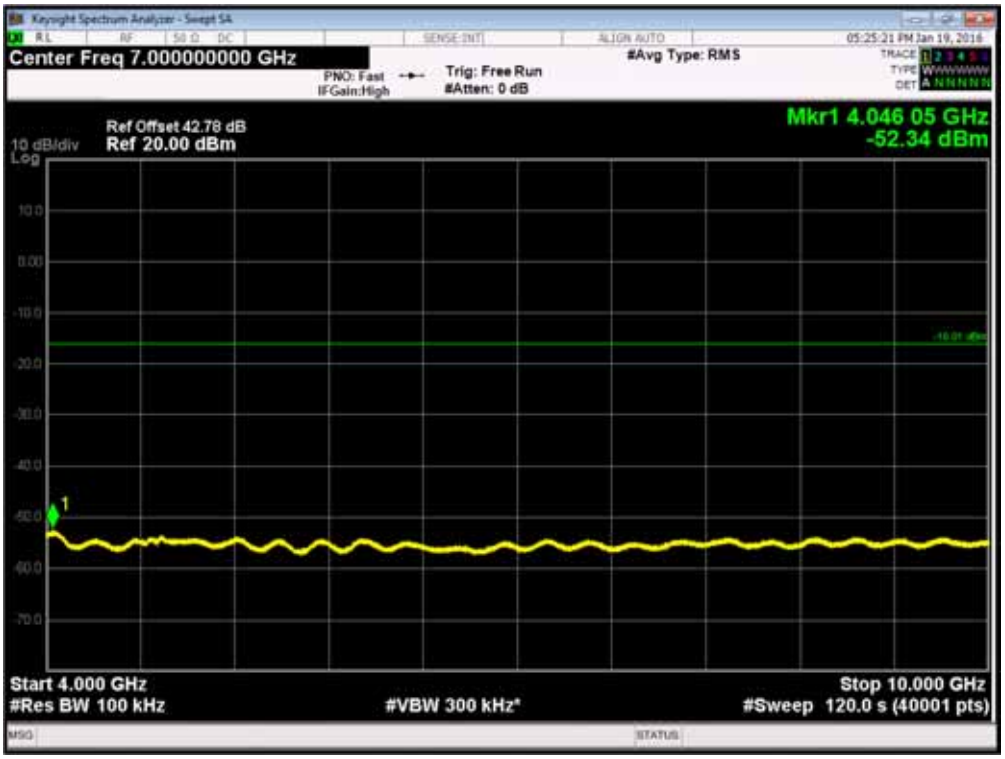
Channel Position	Bandwidth	Channel Frequency
Channel Position M_{RFBW}	W: 5.0 MHz L: 10.0 MHz	(W) 871.4MHz + (W) 876.4MHz + (L) 889.0MHz

Channel Position M_{RFBW} - WCDMA 16QAM / LTE QPSK: Bandwidth 1.4MHz - 9kHz - 1.3GHz

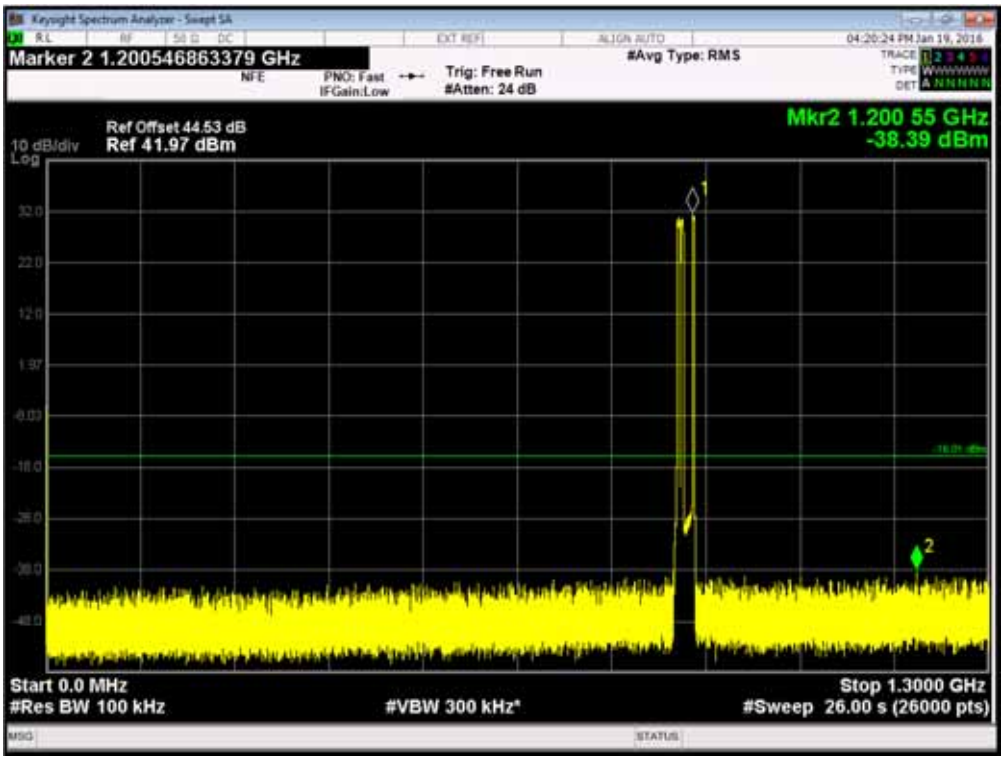


Channel Position M_{RFBW} - WCDMA 16QAM / LTE QPSK: Bandwidth 1.4MHz - 1.3GHz - 4GHz

Channel Position M_{RFBW} - WCDMA 16QAM / LTE QPSK: Bandwidth 1.4MHz - 4GHz - 10GHz

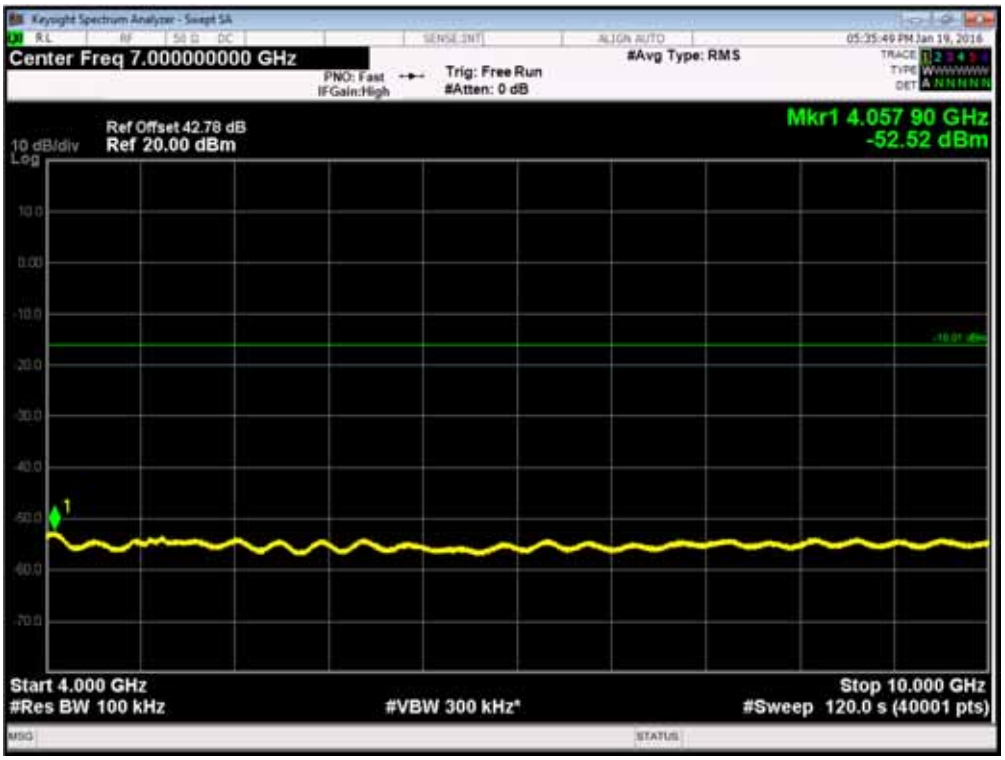


Channel Position M_{RFBW} - WCDMA 16QAM / LTE QPSK: Bandwidth 3.0MHz - 9kHz - 1.3GHz

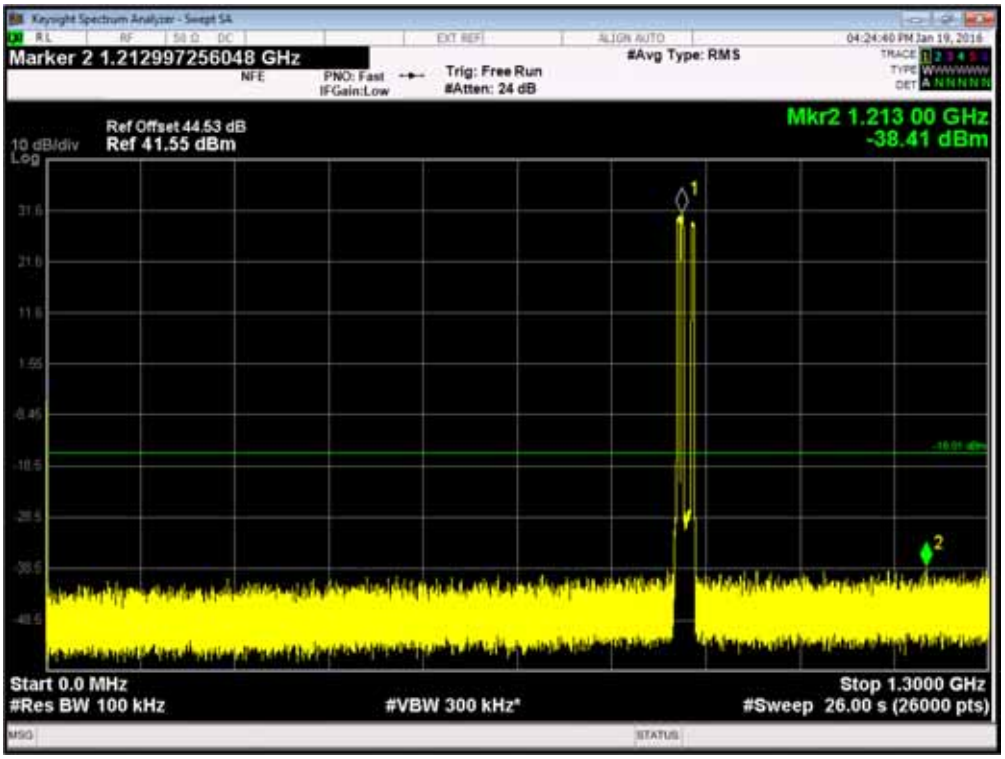


Channel Position M_{RFBW} - WCDMA 16QAM / LTE QPSK: Bandwidth 3.0MHz - 1.3GHz - 4GHz

Channel Position M_{RFBW} - WCDMA 16QAM / LTE QPSK: Bandwidth 3.0MHz - 4GHz - 10GHz

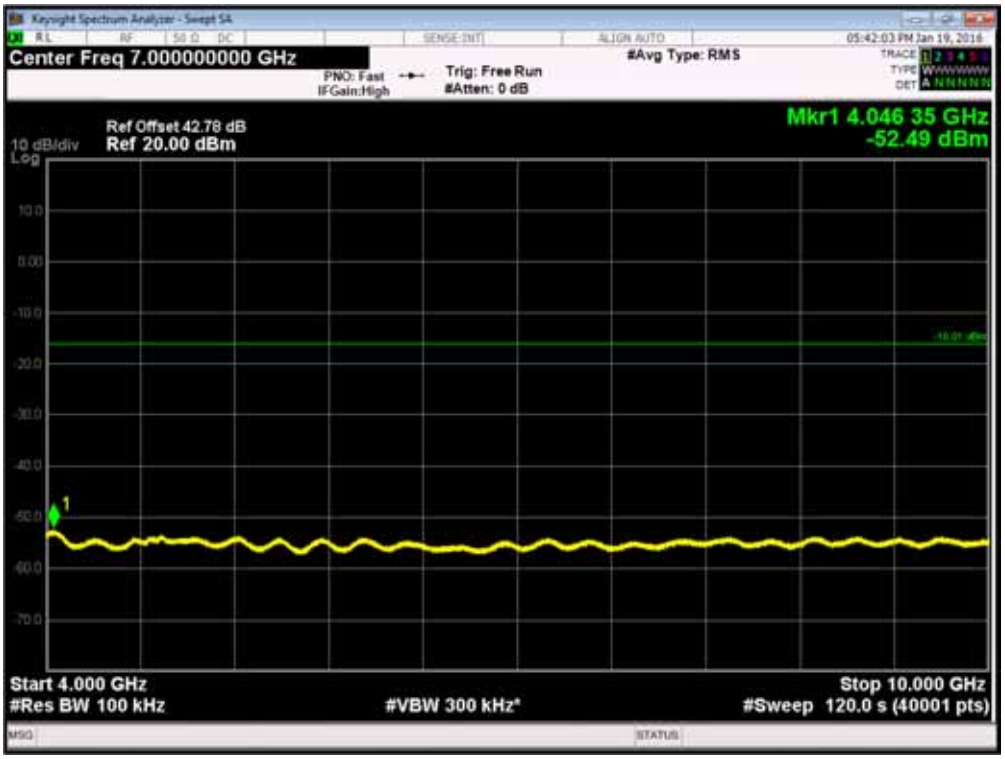


Channel Position M_{RFBW} - WCDMA 16QAM / LTE QPSK: Bandwidth 5.0MHz - 9kHz - 1.3GHz



Channel Position M_{RFBW} - WCDMA 16QAM / LTE QPSK: Bandwidth 5.0MHz - 1.3GHz - 4GHz

Channel Position M_{RFBW} - WCDMA 16QAM / LTE QPSK: Bandwidth 5.0MHz - 4GHz - 10GHz



Channel Position M_{RFBW} - WCDMA 16QAM / LTE QPSK: Bandwidth 10.0MHz - 9kHz - 1.3GHz