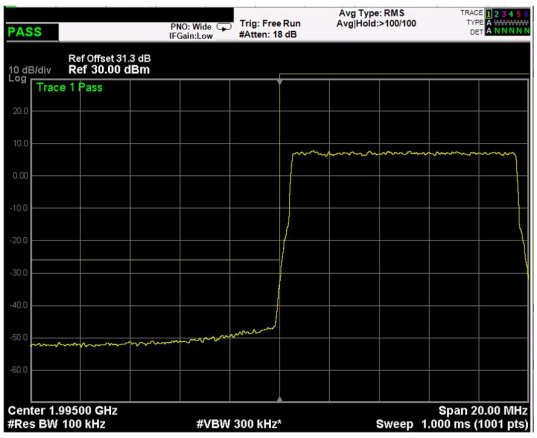
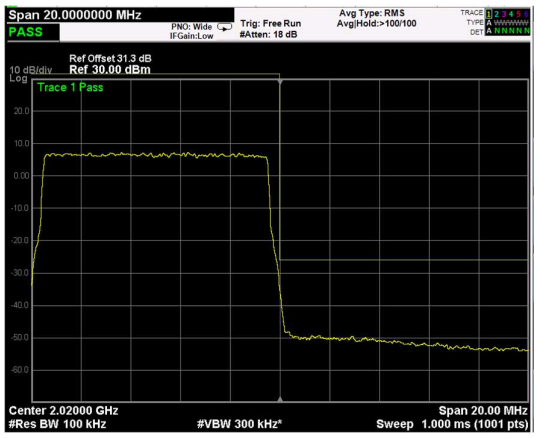
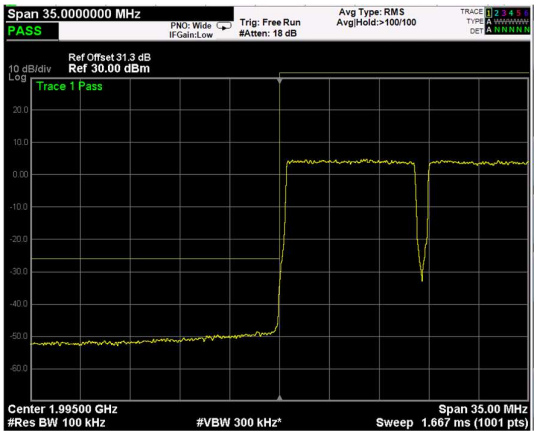


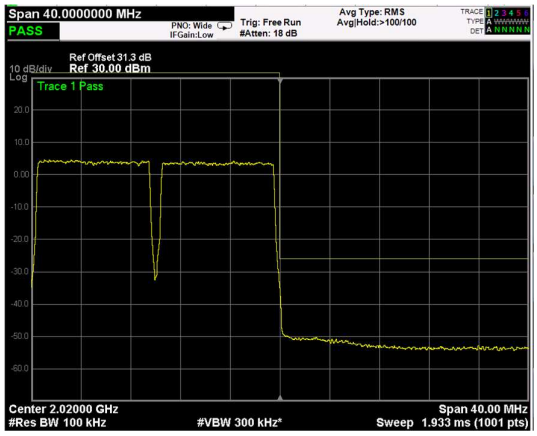
Low Band Edge, 1 Carrier,
Modulation: QPSK, BW=10MHz



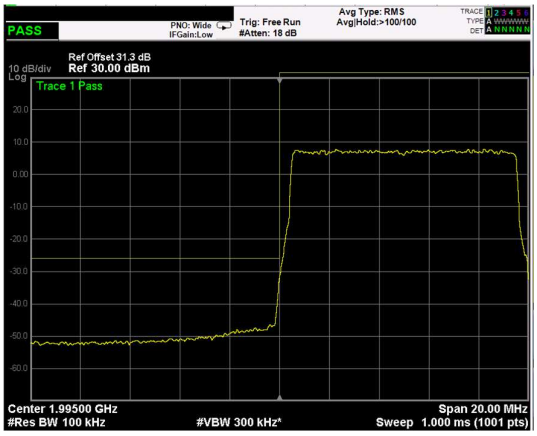
High Band Edge, 1 Carrier,
Modulation: QPSK, BW=10MHz



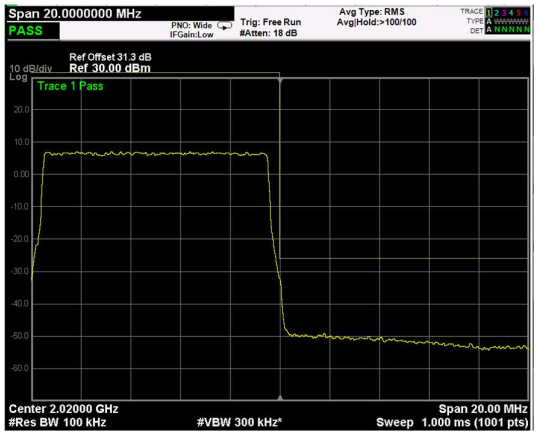
Low Band Edge, 2 Carrier,
Modulation: QPSK, BW=10MHz



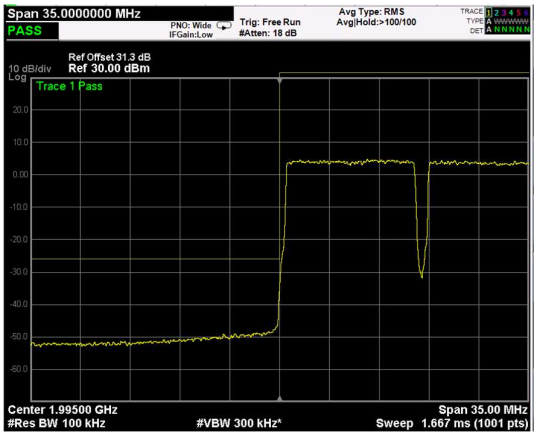
High Band Edge, 2 Carrier,
Modulation: QPSK, BW=10MHz



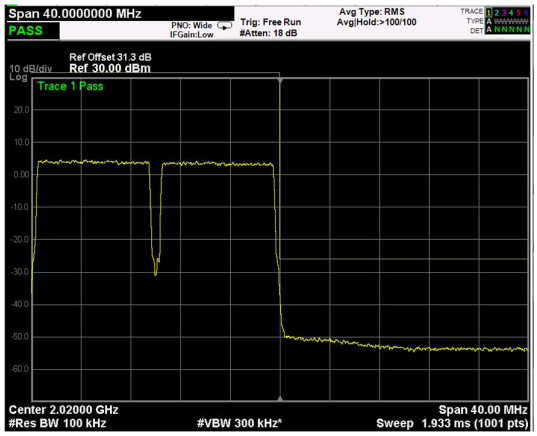
Low Band Edge, 1 Carrier,
Modulation: 16QAM, BW=10MHz



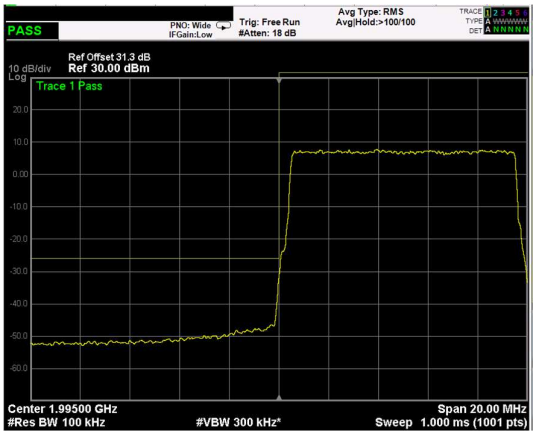
High Band Edge, 1 Carrier,
Modulation: 16QAM, BW=10MHz



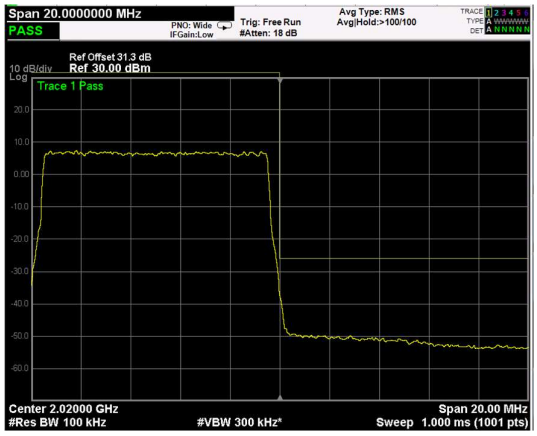
Low Band Edge, 2 Carrier,
Modulation: 16QAM, BW=10MHz



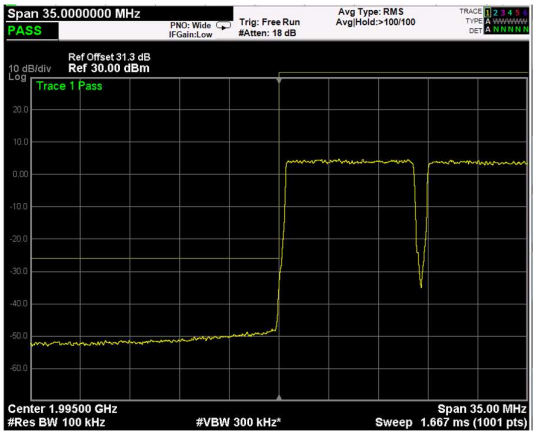
High Band Edge, 2 Carrier,
Modulation: 16QAM, BW=10MHz



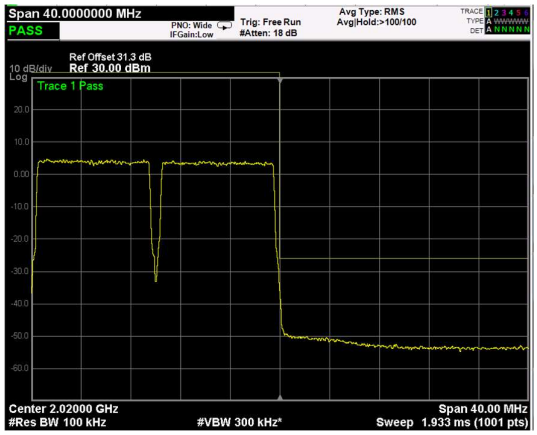
Low Band Edge, 1 Carrier,
Modulation: 64QAM, BW=10MHz



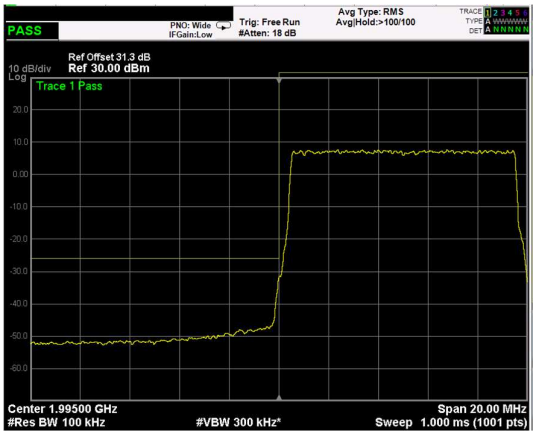
High Band Edge, 1 Carrier,
Modulation: 64QAM, BW=10MHz



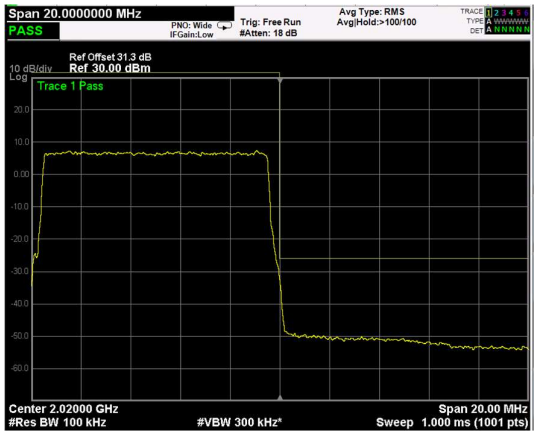
Low Band Edge, 2 Carrier,
Modulation: 64QAM, BW=10MHz



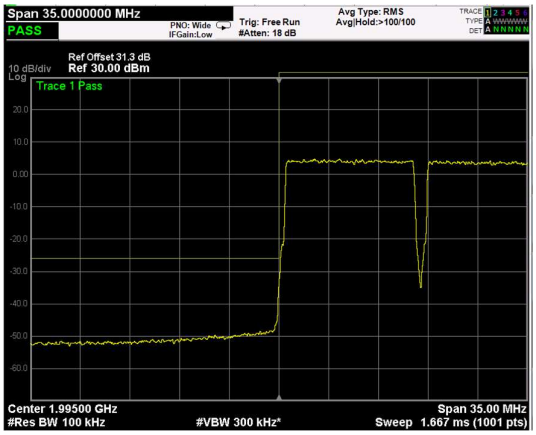
High Band Edge, 2 Carrier,
Modulation: 64QAM, BW=10MHz



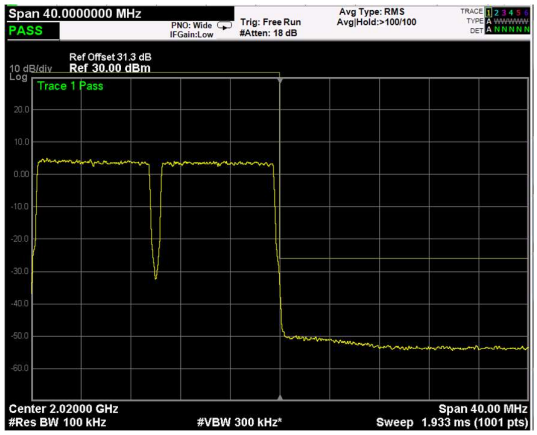
Low Band Edge, 1 Carrier,
Modulation: 256QAM, BW=10MHz



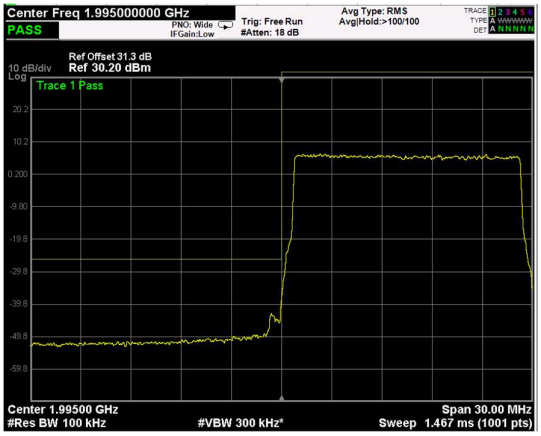
High Band Edge, 1 Carrier,
Modulation: 256QAM, BW=10MHz



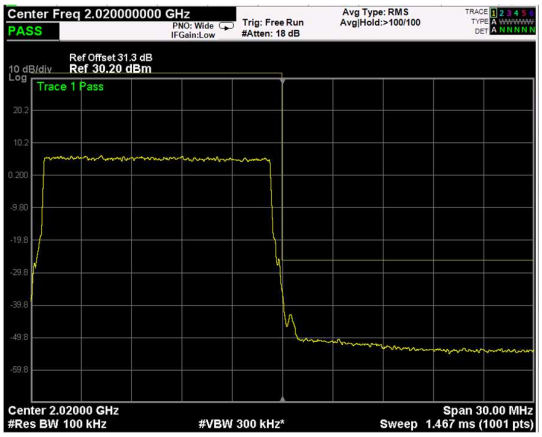
Low Band Edge, 2 Carrier,
Modulation: 256QAM, BW=10MHz



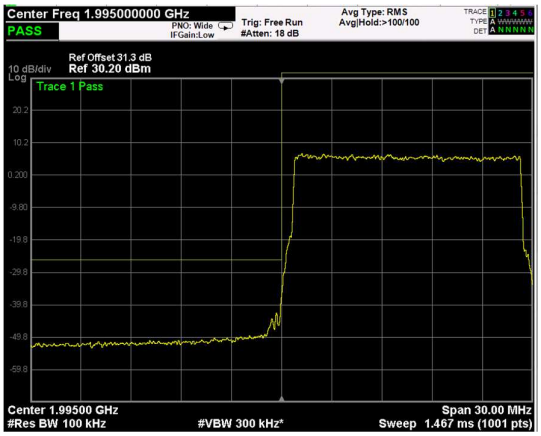
High Band Edge, 2 Carrier,
Modulation: 256QAM, BW=10MHz



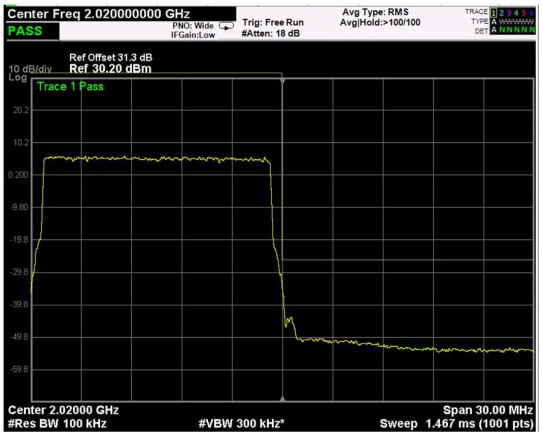
Low Band Edge, 1 Carrier,
Modulation: QPSK, BW=15MHz



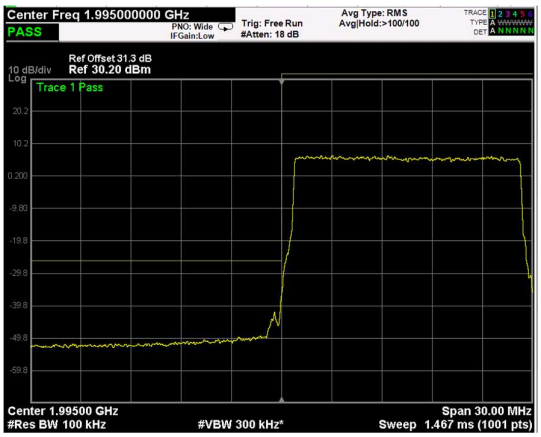
High Band Edge, 1 Carrier,
Modulation: QPSK, BW=15MHz



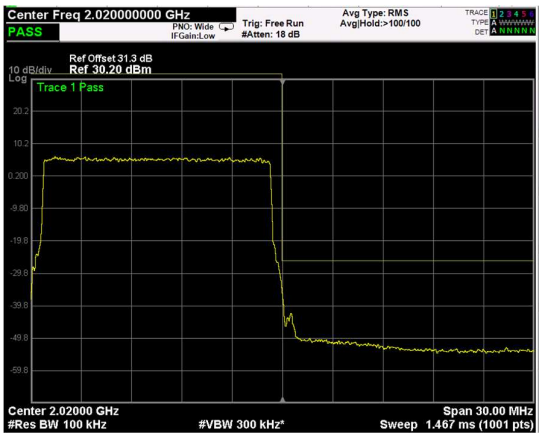
Low Band Edge, 1 Carrier,
Modulation: 16QAM, BW=15MHz



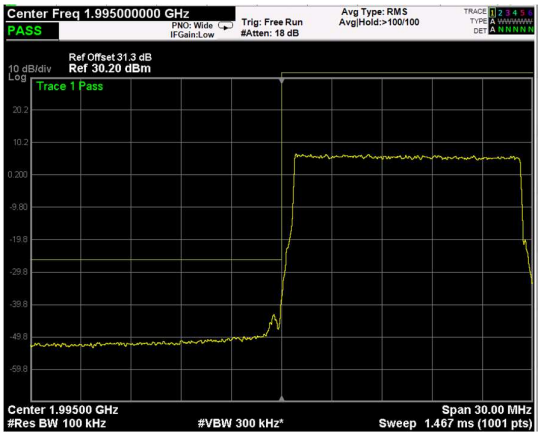
High Band Edge, 1 Carrier,
Modulation: 16QAM, BW=15MHz



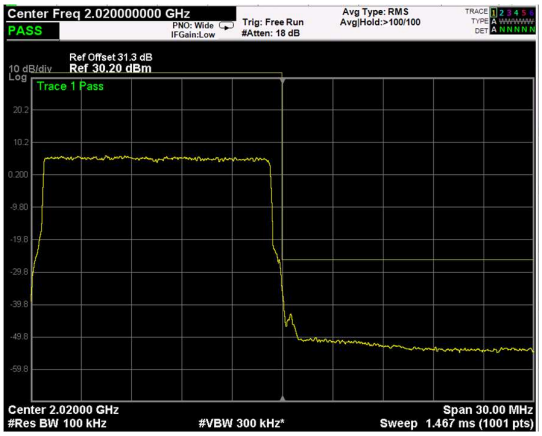
Low Band Edge, 1 Carrier,
Modulation: 64QAM, BW=15MHz



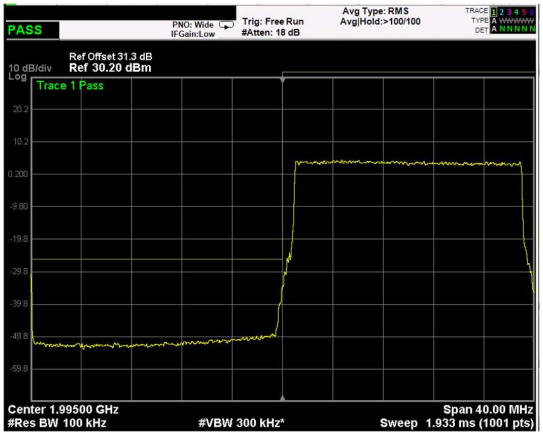
High Band Edge, 1 Carrier,
Modulation: 64QAM, BW=15MHz



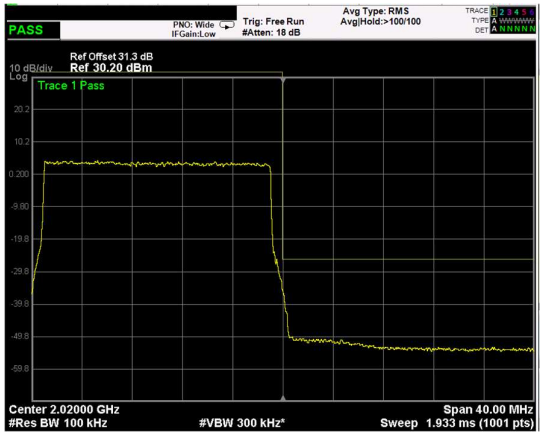
Low Band Edge, 1 Carrier,
Modulation: 256QAM, BW=15MHz



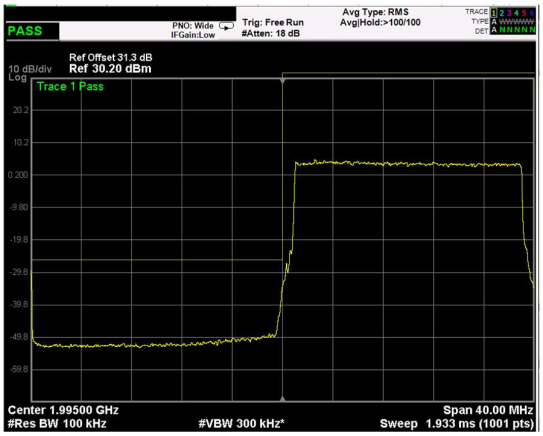
High Band Edge, 1 Carrier,
Modulation: 256QAM, BW=15MHz



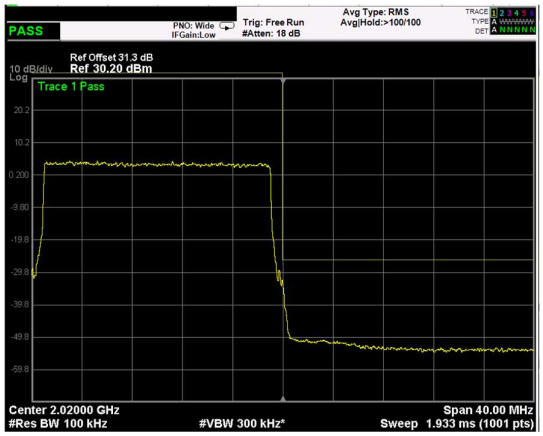
Low Band Edge, 1 Carrier,
Modulation: QPSK, BW=20MHz



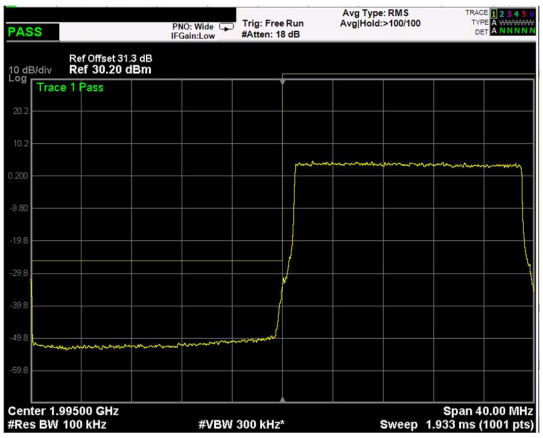
High Band Edge, 1 Carrier,
Modulation: QPSK, BW=20MHz



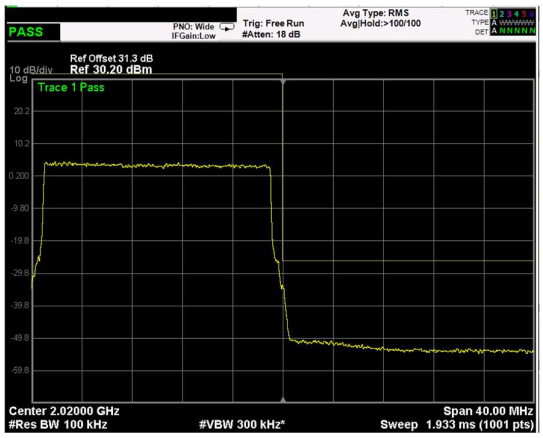
Low Band Edge, 1 Carrier,
Modulation: 16QAM, BW=20MHz



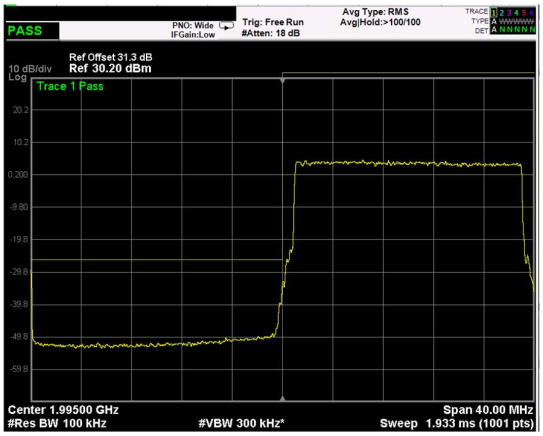
High Band Edge, 1 Carrier,
Modulation: 16QAM, BW=20MHz



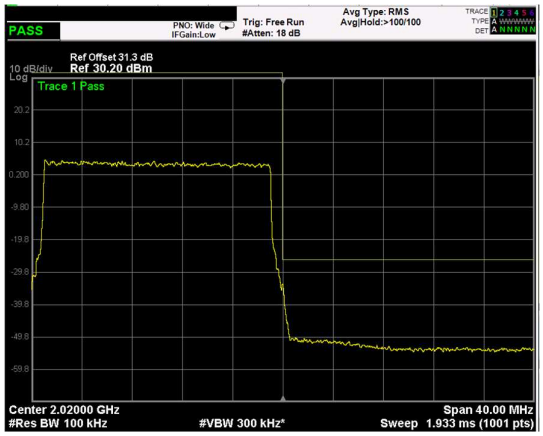
Low Band Edge, 1 Carrier,
Modulation: 64QAM, BW=20MHz



High Band Edge, 1 Carrier,
Modulation: 64QAM, BW=20MHz

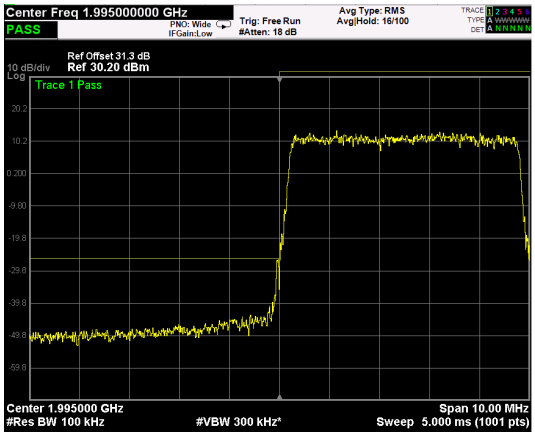


Low Band Edge, 1 Carrier,
Modulation: 256QAM, BW=20MHz

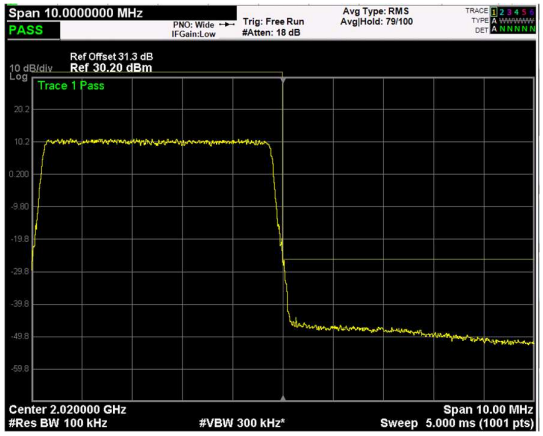


High Band Edge, 1 Carrier,
Modulation: 256QAM, BW=20MHz

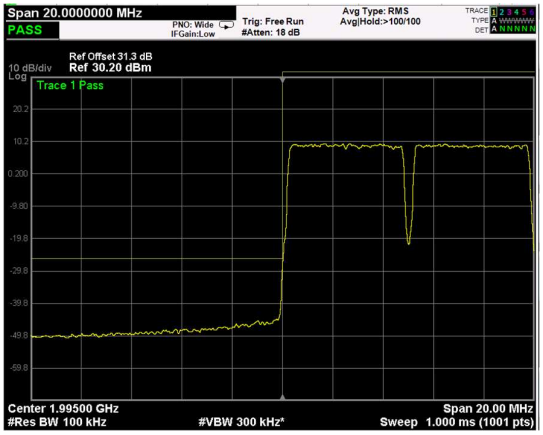
RF PORT 2



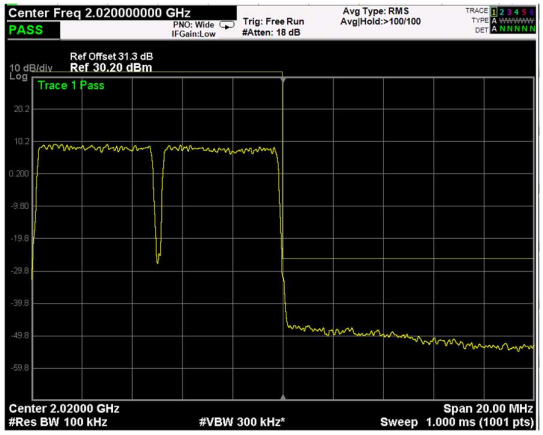
Low Band Edge, 1 Carrier,
Modulation: QPSK, BW=5MHz



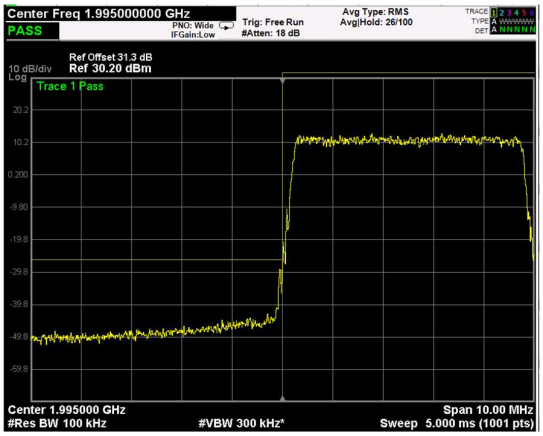
High Band Edge, 1 Carrier,
Modulation: QPSK, BW=5MHz



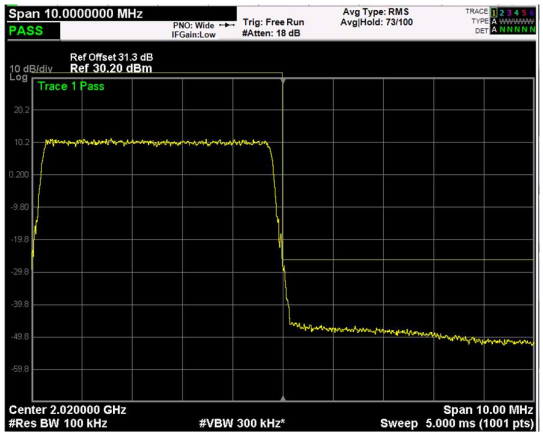
Low Band Edge, 2 Carrier,
Modulation: QPSK, BW=5MHz



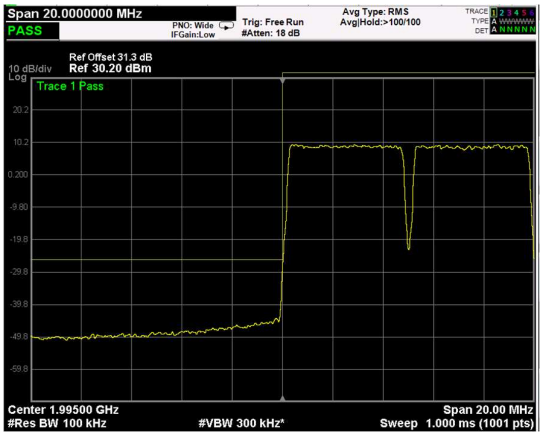
High Band Edge, 2 Carrier,
Modulation: QPSK, BW=5MHz



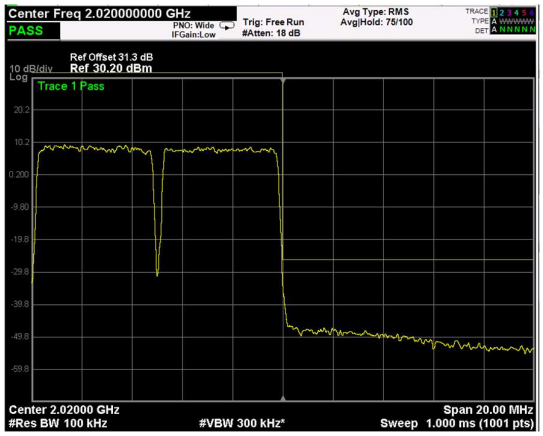
Low Band Edge, 1 Carrier,
Modulation: 16QAM, BW=5MHz



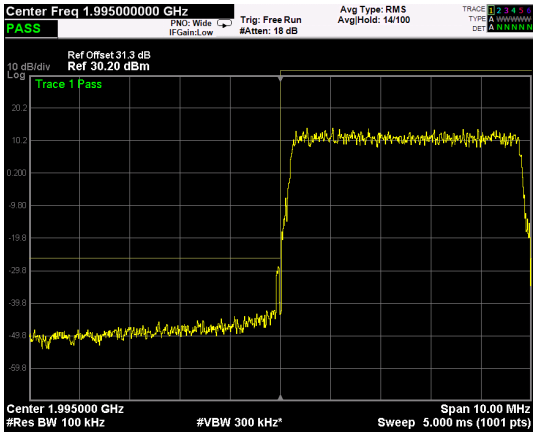
High Band Edge, 1 Carrier,
Modulation: 16QAM, BW=5MHz



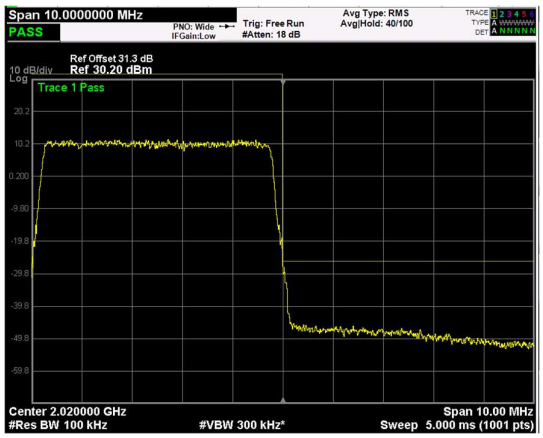
Low Band Edge, 2 Carrier,
Modulation: 16QAM, BW=5MHz



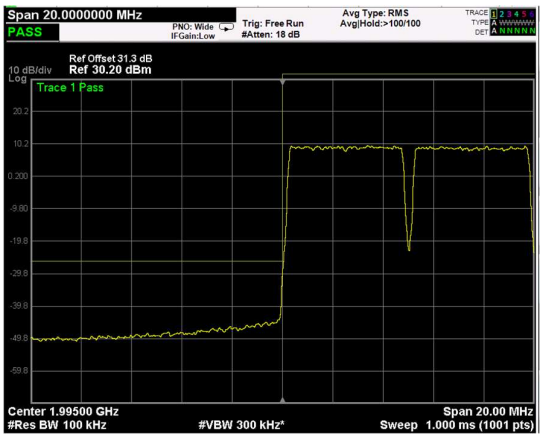
High Band Edge, 2 Carrier,
Modulation: 16QAM, BW=5MHz



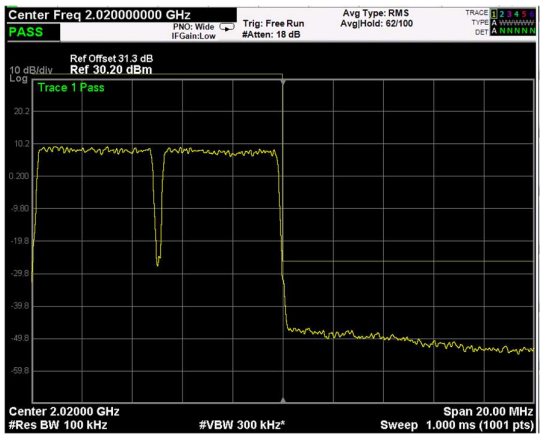
Low Band Edge, 1 Carrier,
Modulation: 64QAM, BW=5MHz



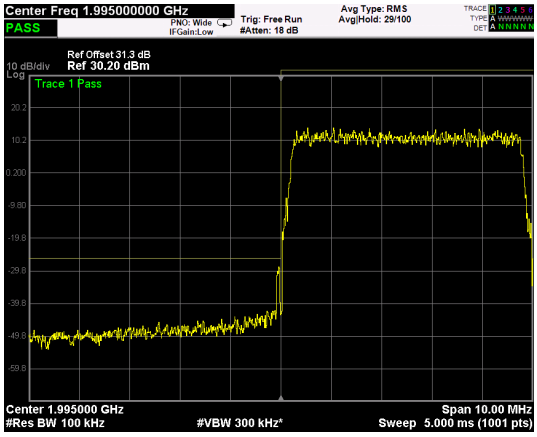
High Band Edge, 1 Carrier,
Modulation: 64QAM, BW=5MHz



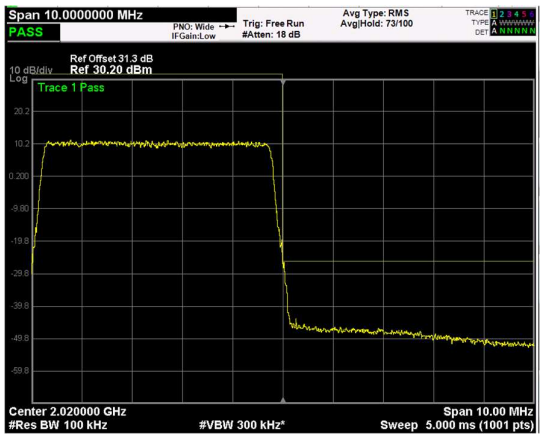
Low Band Edge, 2 Carrier,
Modulation: 64QAM, BW=5MHz



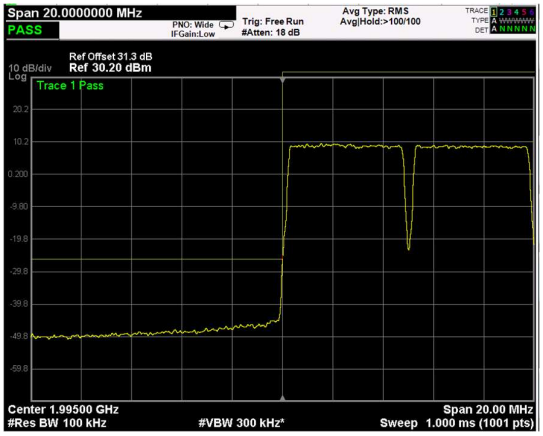
High Band Edge, 2 Carrier,
Modulation: 64QAM, BW=5MHz



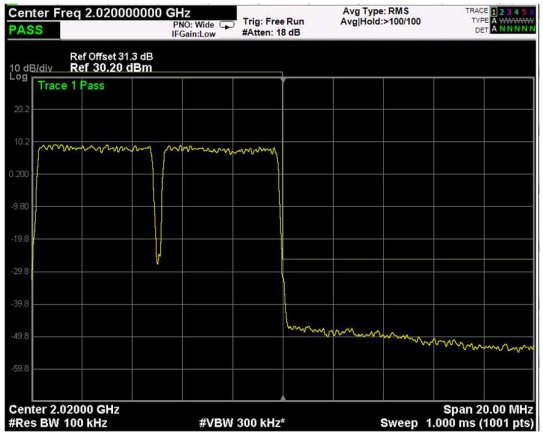
Low Band Edge, 1 Carrier,
Modulation: 256QAM, BW=5MHz



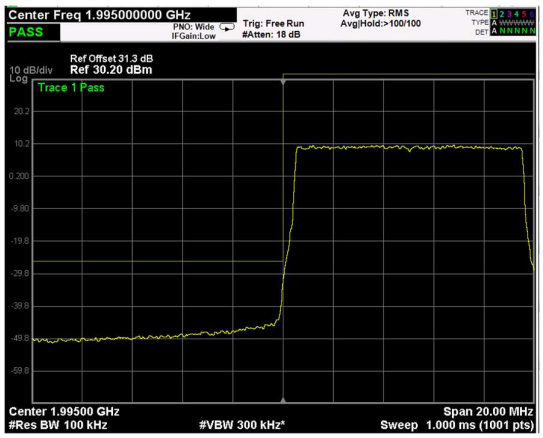
High Band Edge, 1 Carrier,
Modulation: 256QAM, BW=5MHz



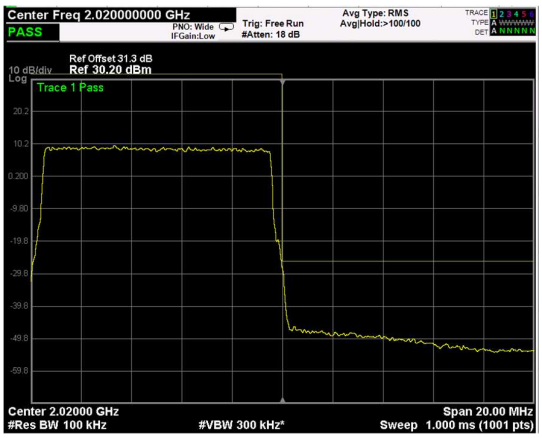
Low Band Edge, 2 Carrier,
Modulation: 256QAM, BW=5MHz



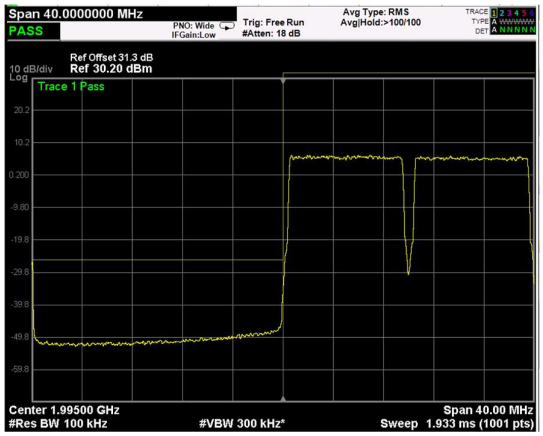
High Band Edge, 2 Carrier,
Modulation: 256QAM, BW=5MHz



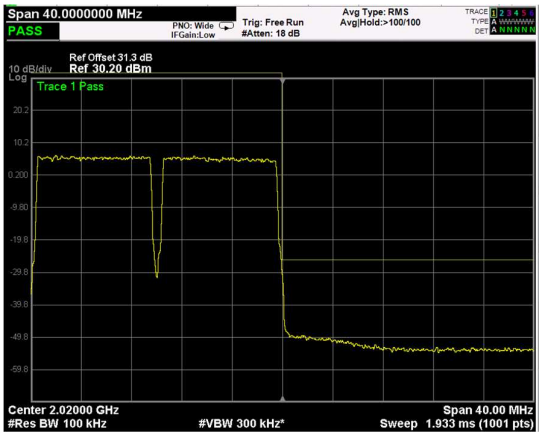
Low Band Edge, 1 Carrier,
Modulation: QPSK, BW=10MHz



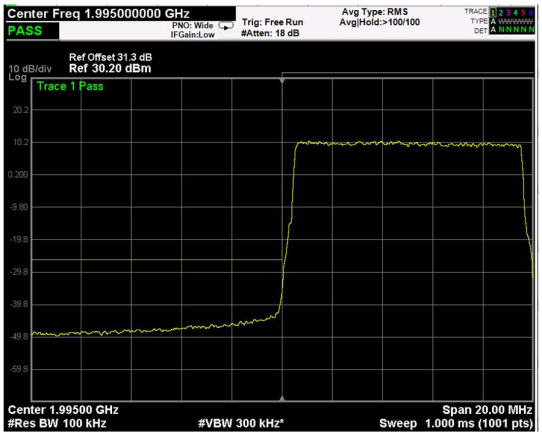
High Band Edge, 1 Carrier,
Modulation: QPSK, BW=10MHz



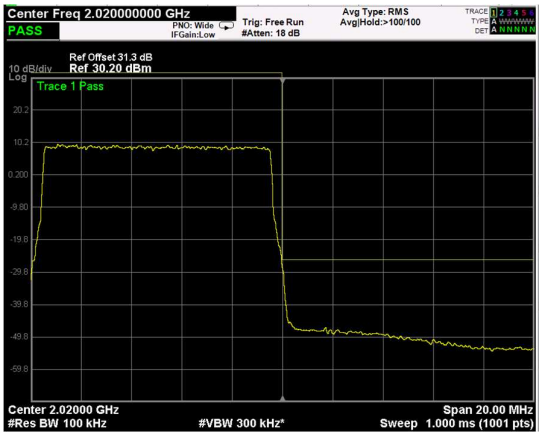
Low Band Edge, 2 Carrier,
Modulation: QPSK, BW=10MHz



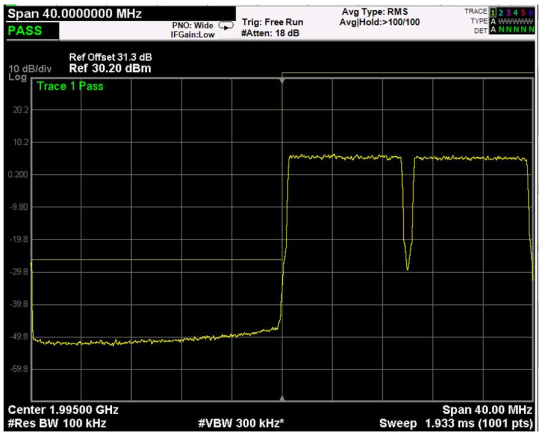
High Band Edge, 2 Carrier,
Modulation: QPSK, BW=10MHz



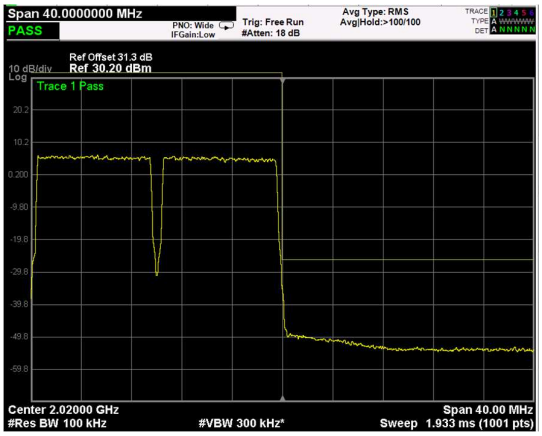
Low Band Edge, 1 Carrier,
Modulation: 16QAM, BW=10MHz



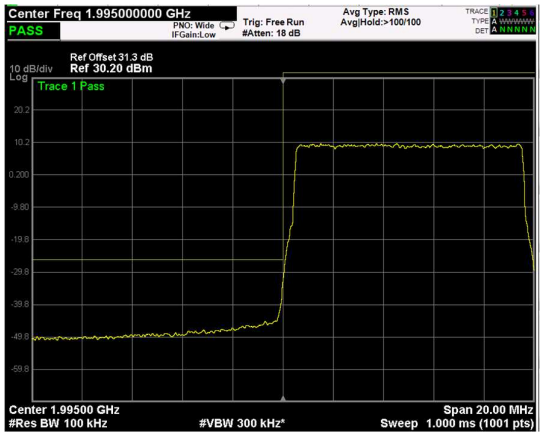
High Band Edge, 1 Carrier,
Modulation: 16QAM, BW=10MHz



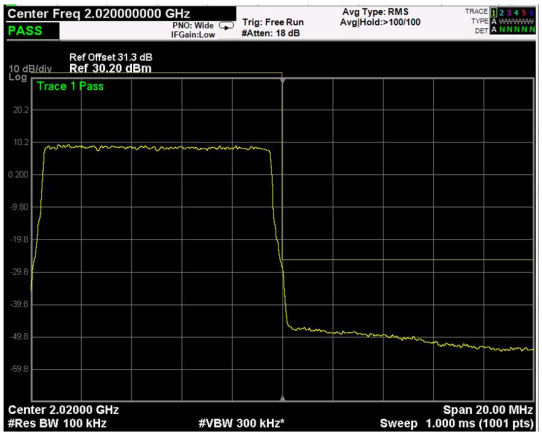
Low Band Edge, 2 Carrier,
Modulation: 16QAM, BW=10MHz



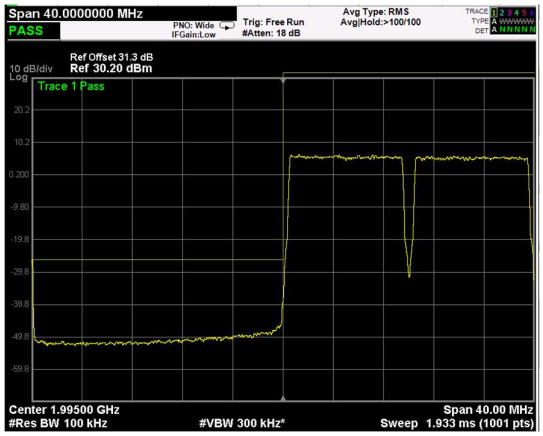
High Band Edge, 2 Carrier,
Modulation: 16QAM, BW=10MHz



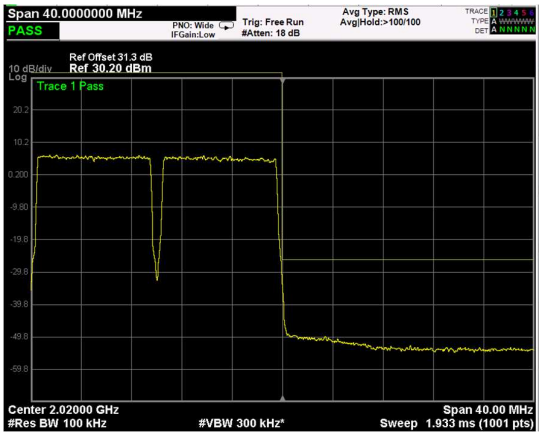
Low Band Edge, 1 Carrier,
Modulation: 64QAM, BW=10MHz



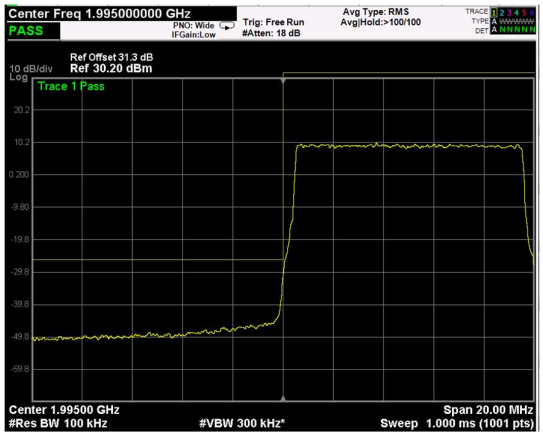
High Band Edge, 1 Carrier,
Modulation: 64QAM, BW=10MHz



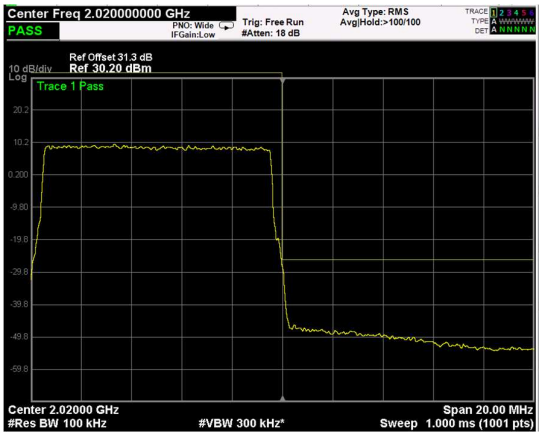
Low Band Edge, 2 Carrier,
Modulation: 64QAM, BW=10MHz



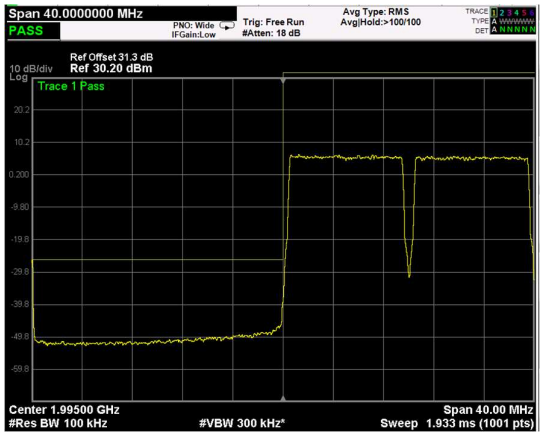
High Band Edge, 2 Carrier,
Modulation: 64QAM, BW=10MHz



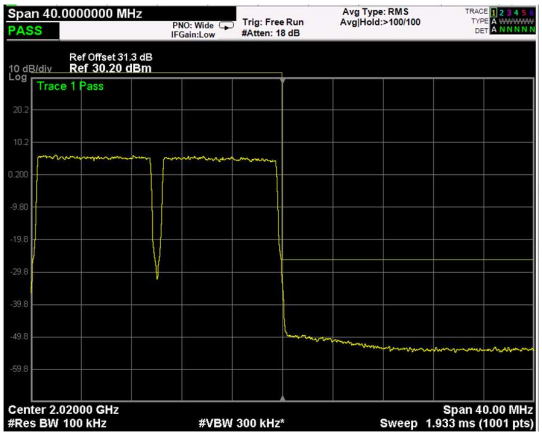
Low Band Edge, 1 Carrier,
Modulation: 256QAM, BW=10MHz



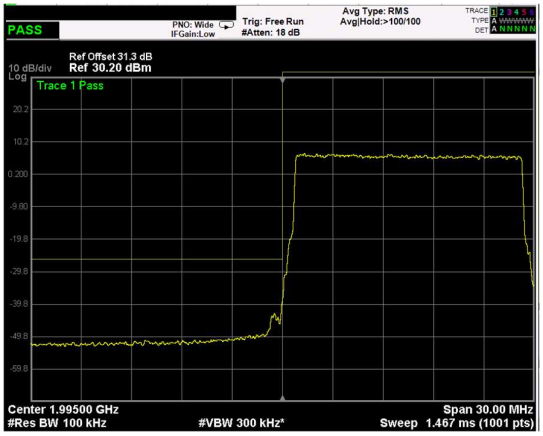
High Band Edge, 1 Carrier,
Modulation: 256QAM, BW=10MHz



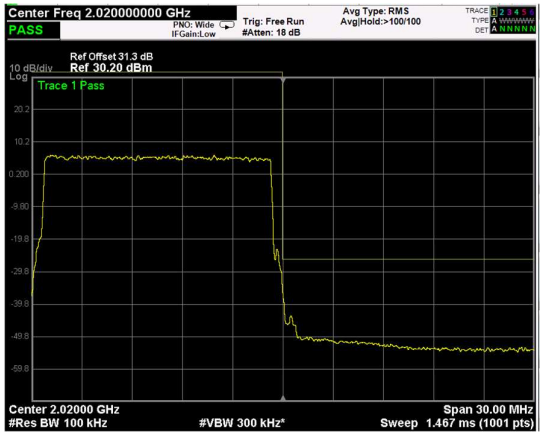
Low Band Edge, 2 Carrier,
Modulation: 256QAM, BW=10MHz



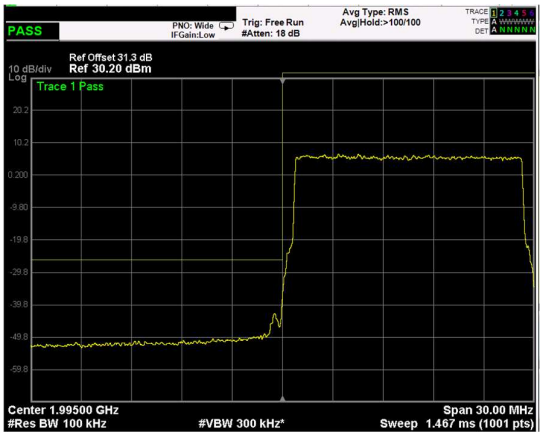
High Band Edge, 2 Carrier,
Modulation: 256QAM, BW=10MHz



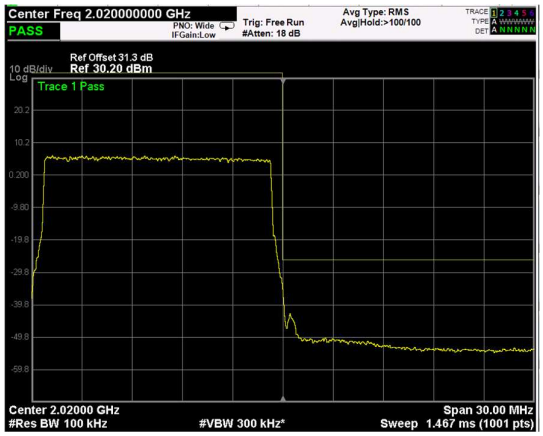
Low Band Edge, 1 Carrier,
Modulation: QPSK, BW=15MHz



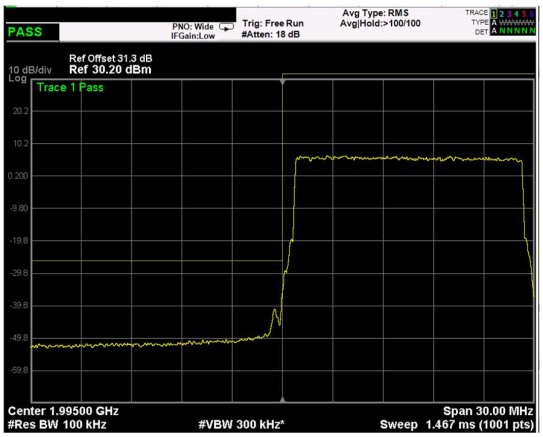
High Band Edge, 1 Carrier,
Modulation: QPSK, BW=15MHz



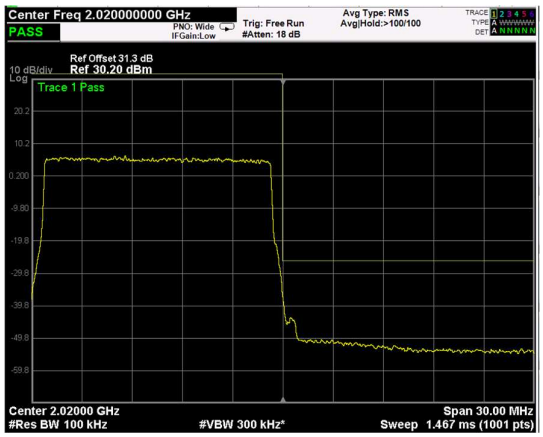
Low Band Edge, 1 Carrier,
Modulation: 16QAM, BW=15MHz



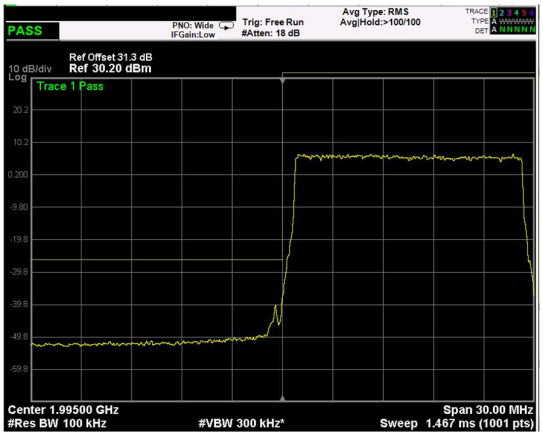
High Band Edge, 1 Carrier,
Modulation: 16QAM, BW=15MHz



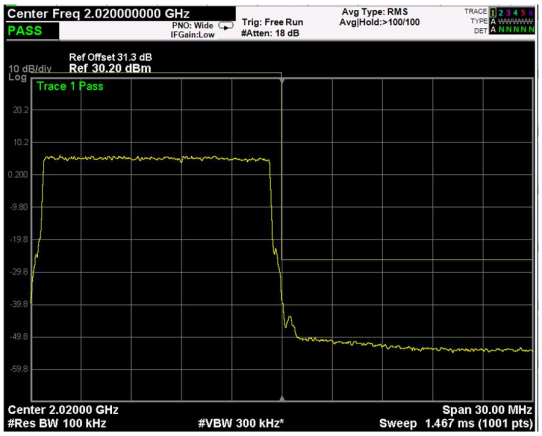
Low Band Edge, 1 Carrier,
Modulation: 64QAM, BW=15MHz



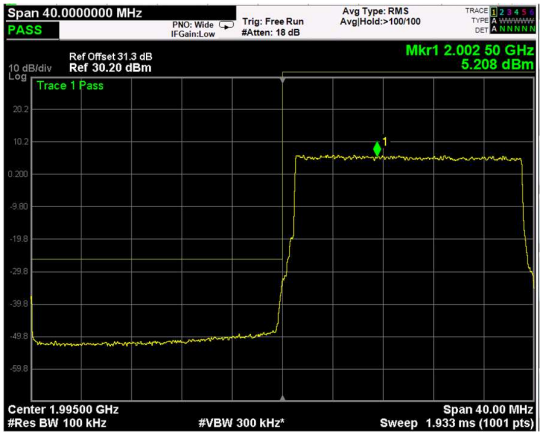
High Band Edge, 1 Carrier,
Modulation: 64QAM, BW=15MHz



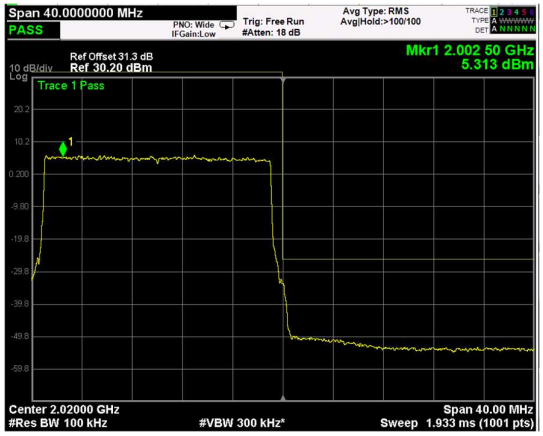
Low Band Edge, 1 Carrier,
Modulation: 256QAM, BW=15MHz



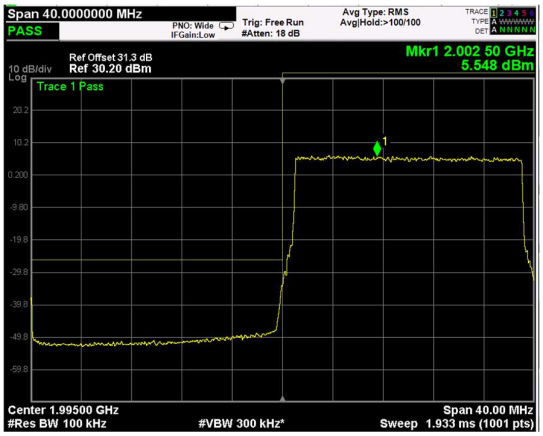
High Band Edge, 1 Carrier,
Modulation: 256QAM, BW=15MHz



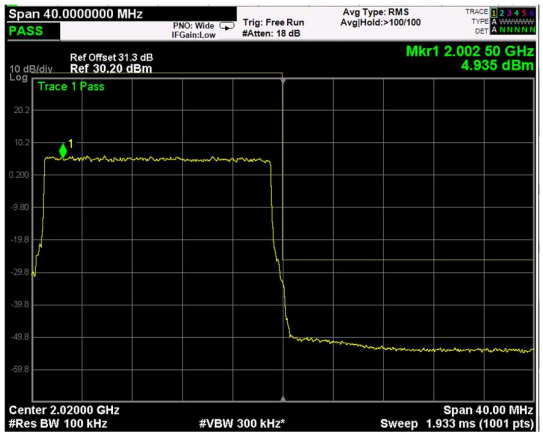
Low Band Edge, 1 Carrier,
Modulation: QPSK, BW=20MHz



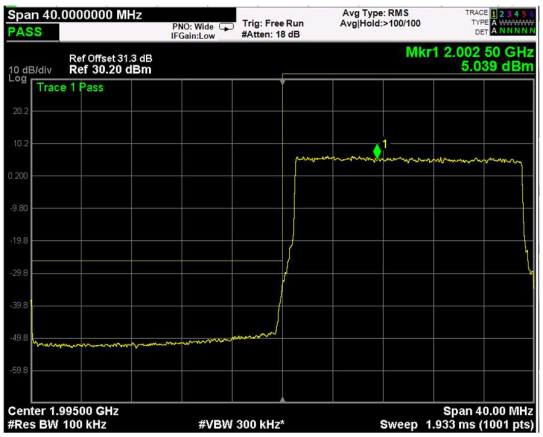
High Band Edge, 1 Carrier,
Modulation: QPSK, BW=20MHz



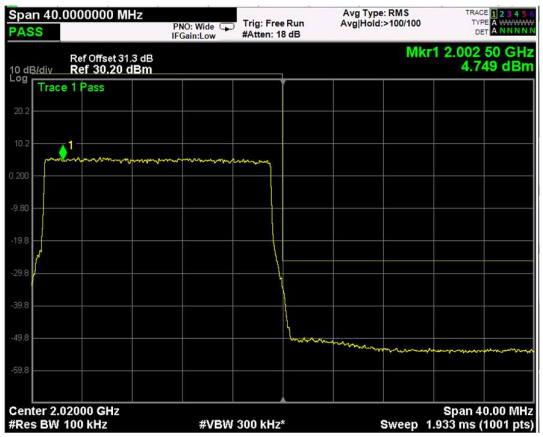
Low Band Edge, 1 Carrier,
Modulation: 16QAM, BW=20MHz



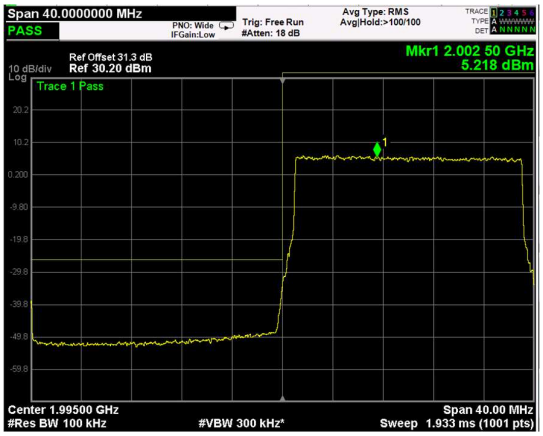
High Band Edge, 1 Carrier,
Modulation: 16QAM, BW=20MHz



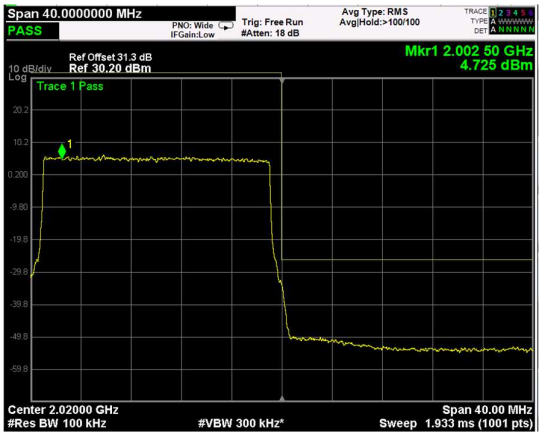
Low Band Edge, 1 Carrier,
Modulation: 64QAM, BW=20MHz



High Band Edge, 1 Carrier,
Modulation: 64QAM, BW=20MHz



Low Band Edge, 1 Carrier,
Modulation: 256QAM, BW=20MHz



High Band Edge, 1 Carrier,
Modulation: 256QAM, BW=20MHz

Clause 27.53(h) Radiated Spurious emissions

(h) AWS emission limits:

(1) General protection levels. Except as otherwise specified below, for operations in the 1695-1710 MHz, 1710-1755 MHz, 1755-1780 MHz, 1915-1920 MHz, 1995-2000 MHz, 2000-2020 MHz, 2110-2155 MHz, 2155-2180 MHz, and 2180-2200 bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least 43 + 10 log10 (P) dB.

(2) Additional protection levels. Notwithstanding the foregoing paragraph (h)(1) of this section:
(ii) For operations in the 2000-2020 MHz band, the power of any emissions below 2000 MHz shall be attenuated below the transmitter power (P) in watts by at least 70 + 10 log10(P) dB.

(3) Measurement procedure.
(i) Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater. However, in the 1 megahertz bands immediately outside and adjacent to the licensee's frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.
(ii) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the licensee's frequency block edges, both upper and lower, as the design permits.
(iii) The measurements of emission power can be expressed in peak or average values, provided they are expressed in the same parameters as the transmitter power.

(4) Private agreements. (i) For AWS operations in the 2000-2020 MHz and 2180-2200 MHz bands, to the extent a licensee establishes unified operations across the AWS blocks, that licensee may choose not to observe the emission limit specified in paragraph (h)(1), above, strictly between its adjacent block licenses in a geographic area, so long as it complies with other Commission rules and is not adversely affecting the operations of other parties by virtue of exceeding the emission limit.

Test date: 04/03/2019 to 05/10/2019

Test results: Pass

Special notes

Based on discussion in docket no. DA 13-2409 (para. 25 and 47) for operations in 2000-2020MHz in downlink, only 27.53 (h)(1) and 27.53 (h)(3) apply.

Clause 27.53(h) Radiated spurious emissions, continued

Test data

The D.U.T. was positioned according to the radiated emissions set-up

The D.U.T. antenna connector was terminated by a 50 Ω shielded dummy load.

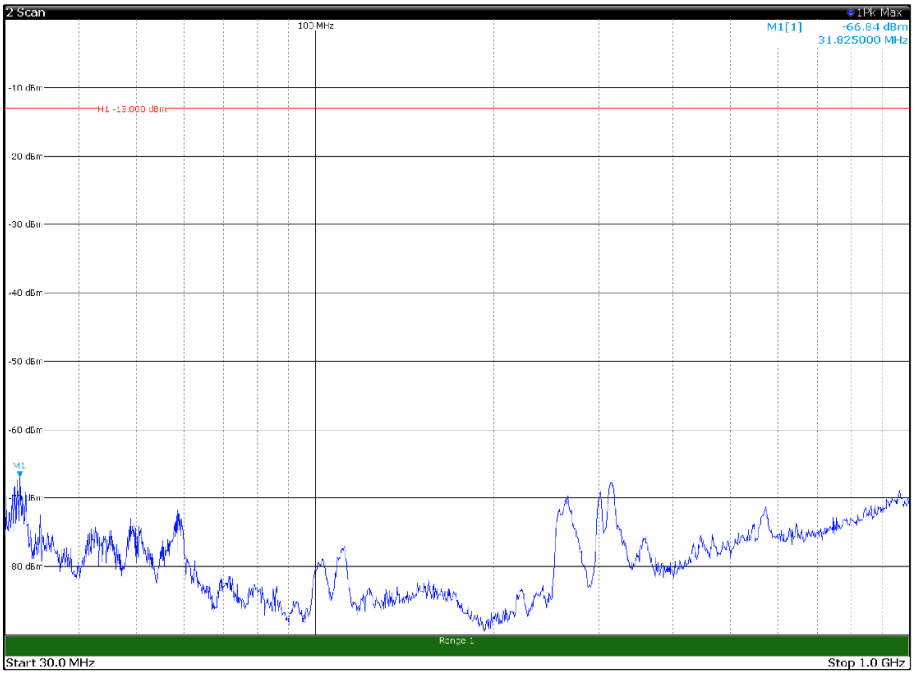
The spectrum was searched from 30 MHz to 1 GHz (RBW 100 kHz) & 1 GHz (RBW 1 MHz) to the tenth harmonic of the carrier.

There were no emissions detected above the noise floor which was at least 20 dB below the specification limit.

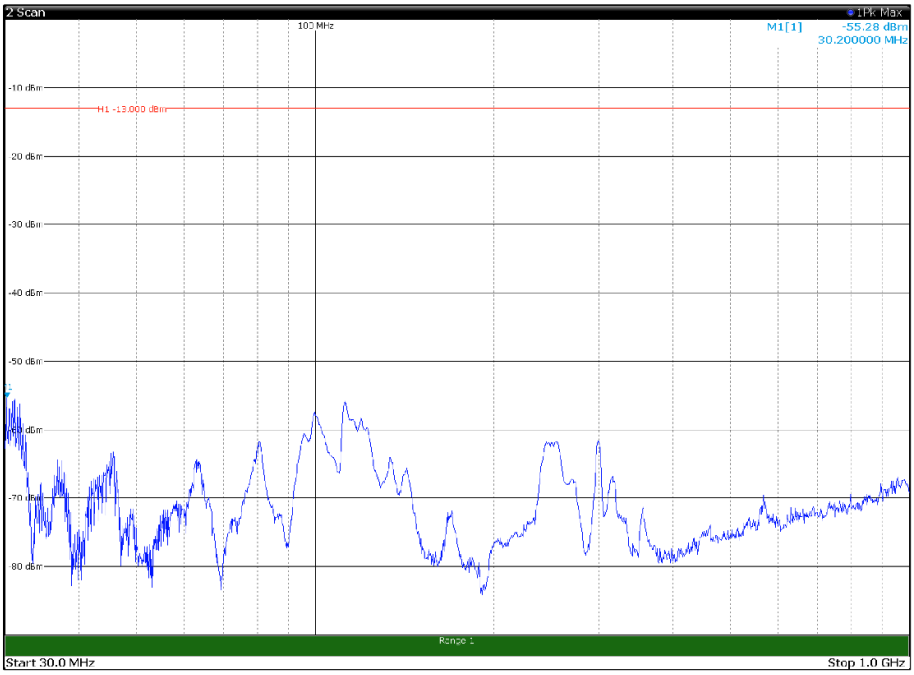
Spurious emissions measurement results:

Frequency (MHz)	Polarization. V/H	Field strength (dBm)	Limit (dBm)	Margin (dB)
Low channel				
First Channel	V/H	Negligible	-13	
Mid channel				
2007,5	V/H	Negligible	-13	
High channel				
Last Channel	V/H	Negligible	-13	

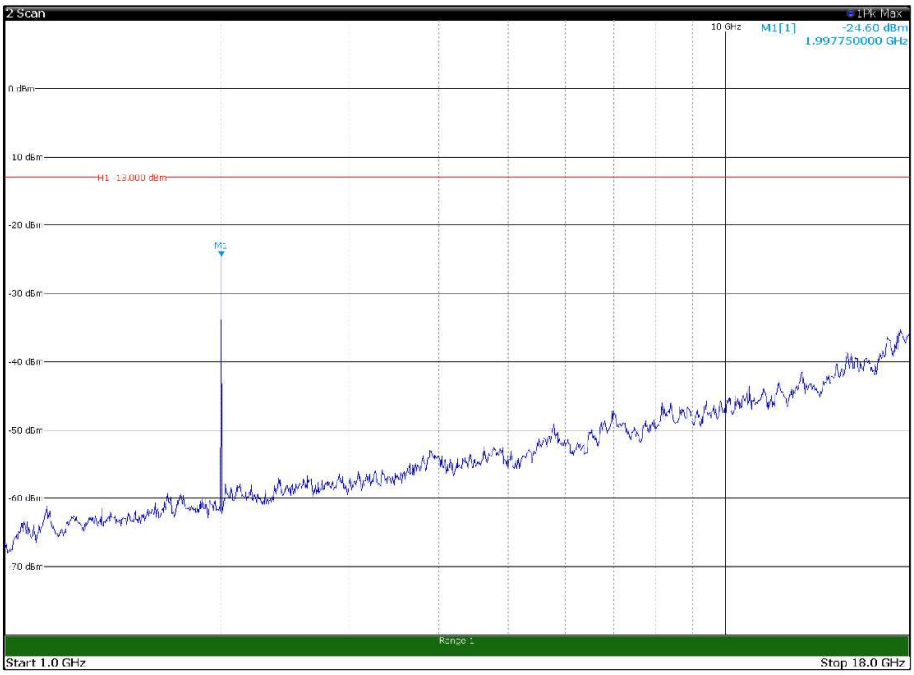
Note: Field strength includes correction factor of antenna, cable loss, amplifier, and attenuators where applicable.



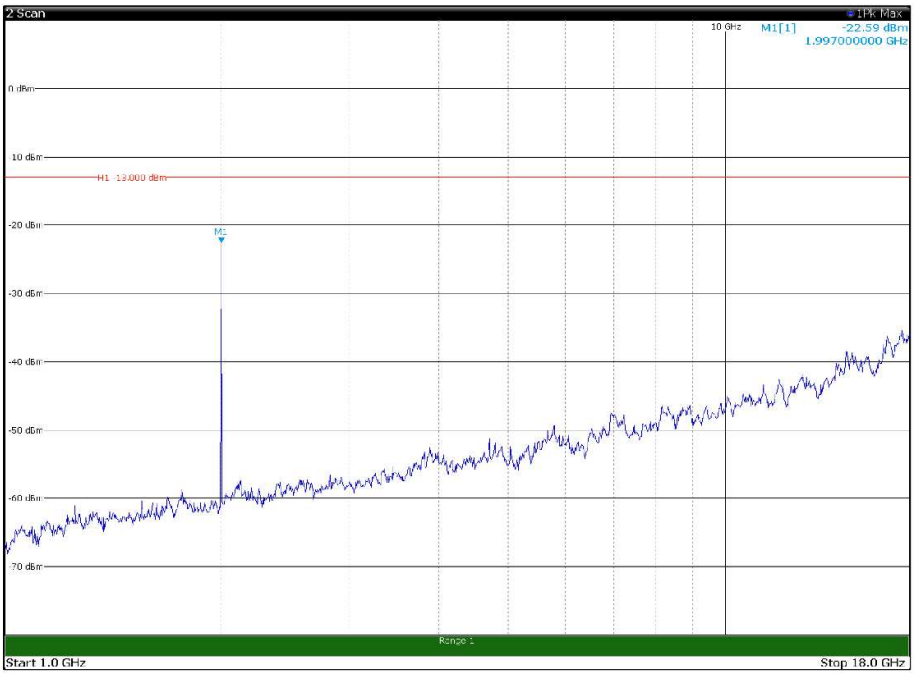
Channel: BOTTOM, Modulation: QPSK,
BW=5MHz, Range: 30MHz - 1GHz, Polarization: Horizontal



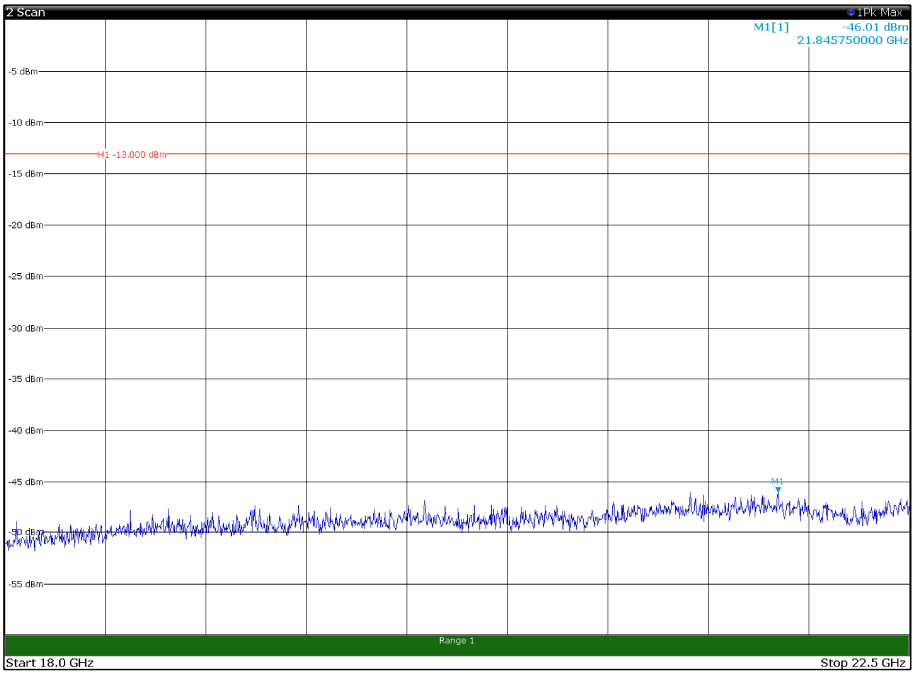
Channel: BOTTOM, Modulation: QPSK,
BW=5MHz, Range: 30MHz - 1GHz, Polarization: Vertical



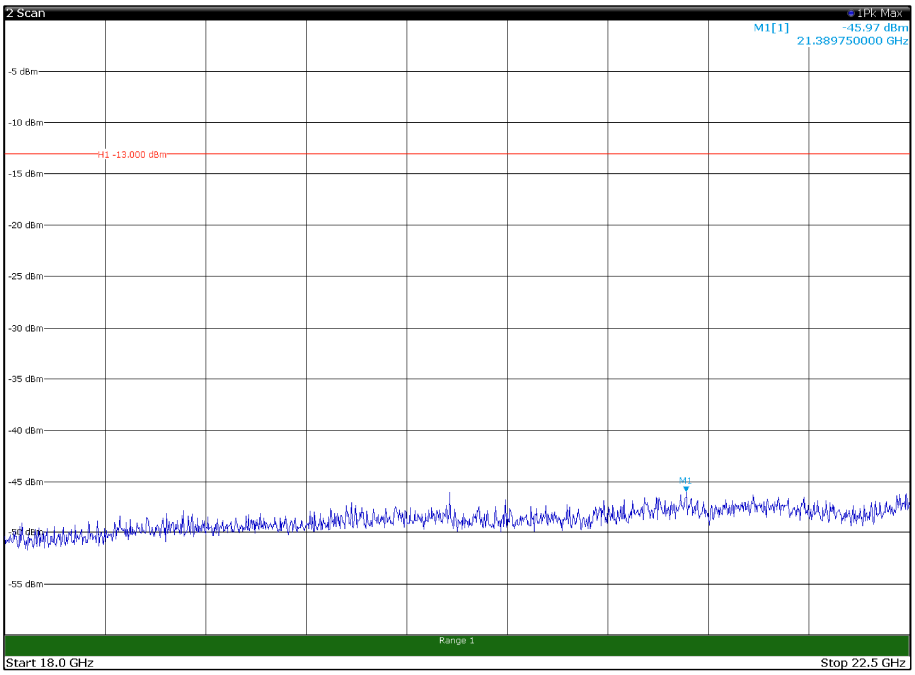
Channel: BOTTOM, Modulation: QPSK,
BW=5MHz, Range: 1GHz - 18GHz, Polarization: Horizontal



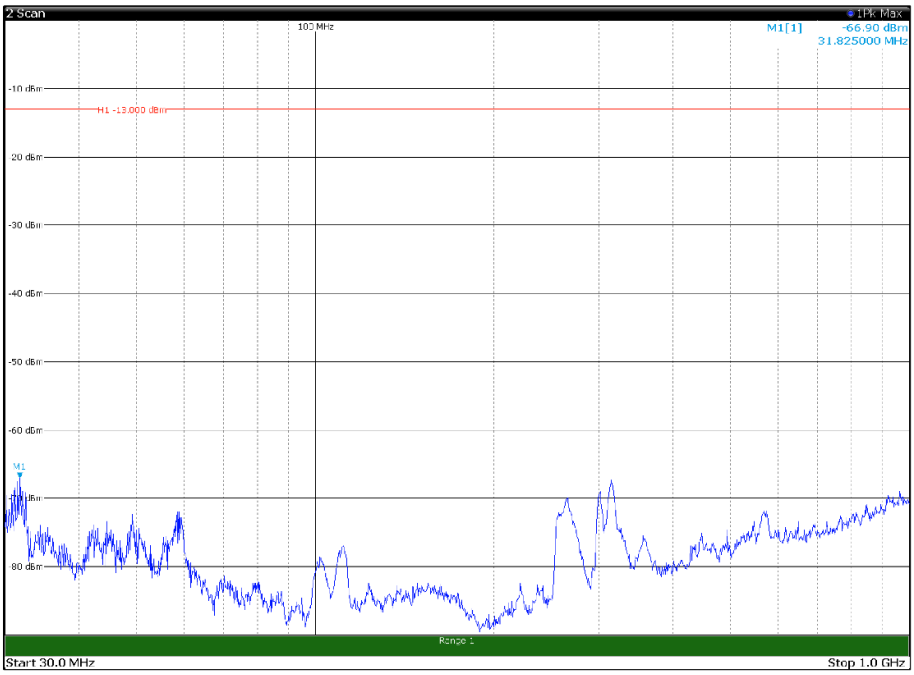
Channel: BOTTOM, Modulation: QPSK,
BW=5MHz, Range: 1GHz - 18GHz, Polarization: Vertical



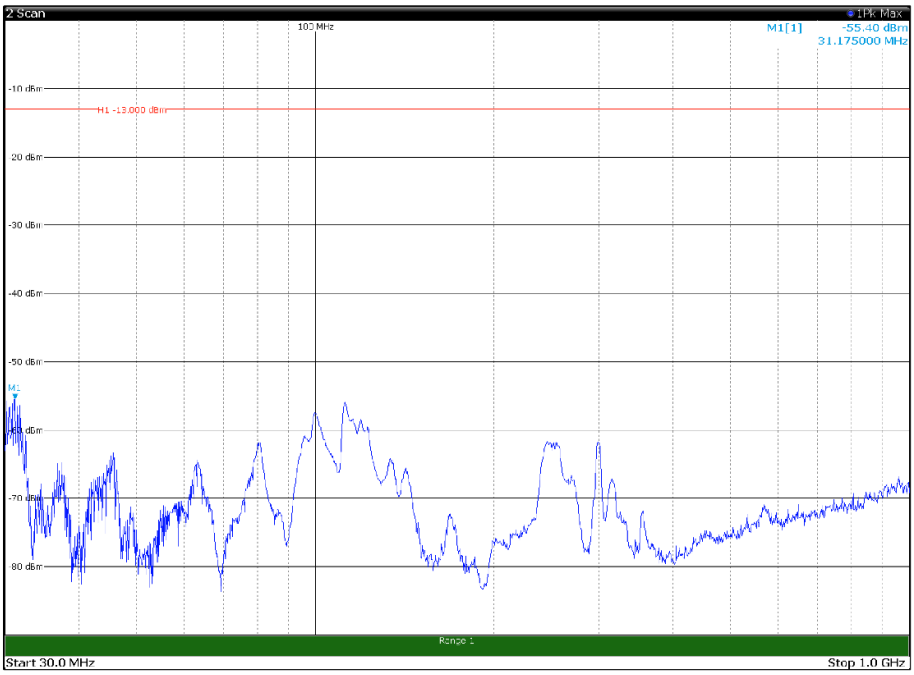
Channel: BOTTOM, Modulation: QPSK,
BW=5MHz, Range: 18GHz - 22.5GHz, Polarization: Horizontal



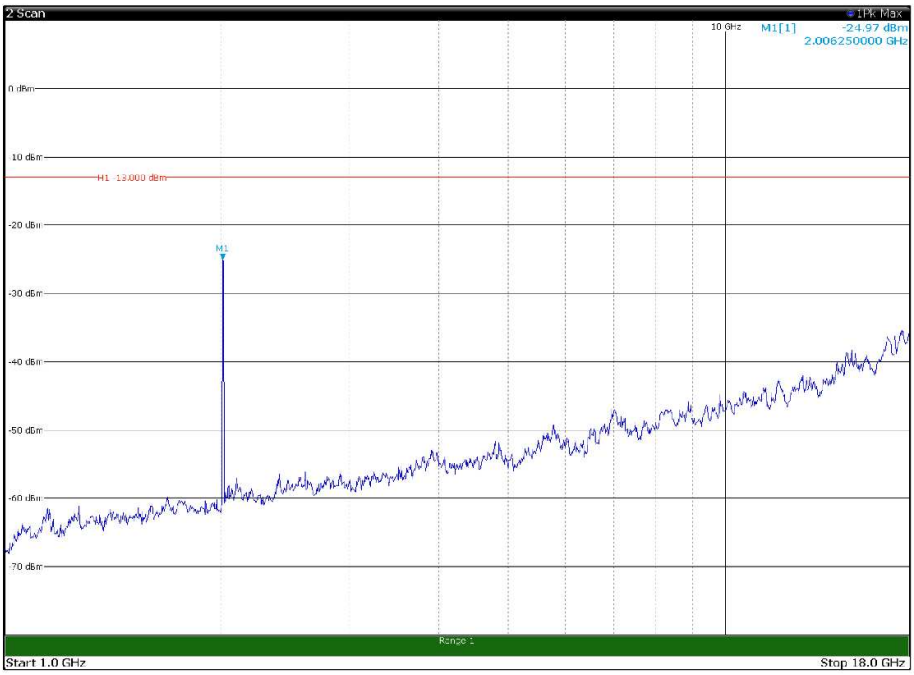
Channel: BOTTOM, Modulation: QPSK,
BW=5MHz, Range: 18GHz - 22.5GHz, Polarization: Vertical



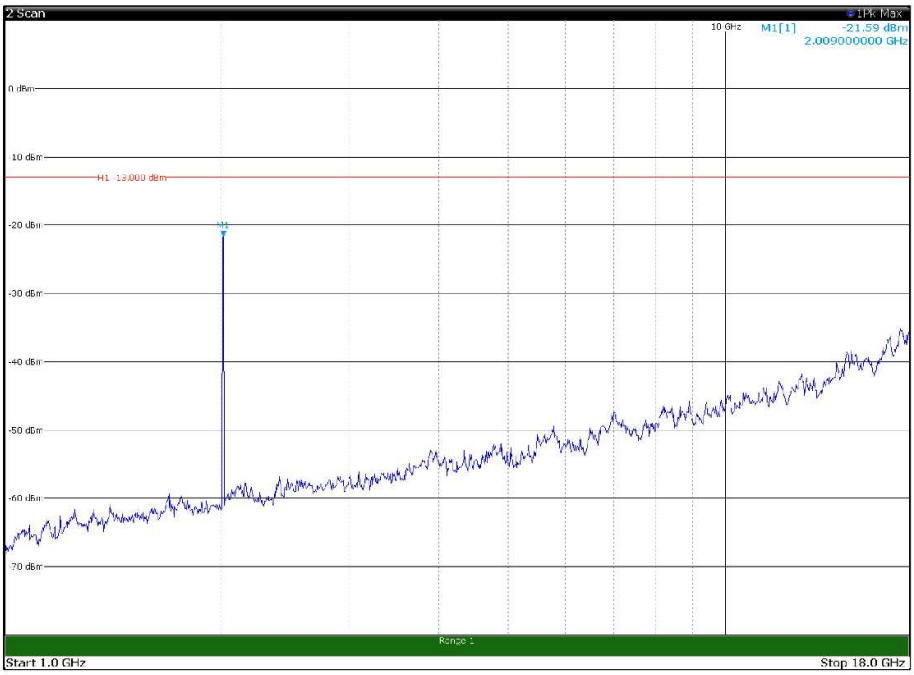
Channel: MIDDLE, Modulation: QPSK,
BW=5MHz, Range: 30MHz - 1GHz, Polarization: Horizontal



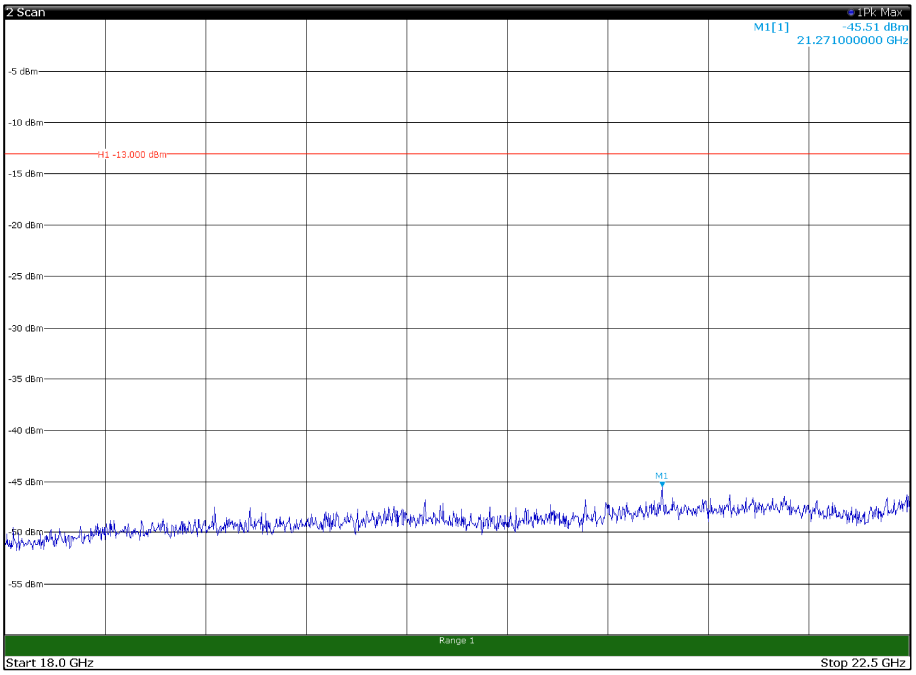
Channel: MIDDLE, Modulation: QPSK,
BW=5MHz, Range: 30MHz - 1GHz, Polarization: Vertical



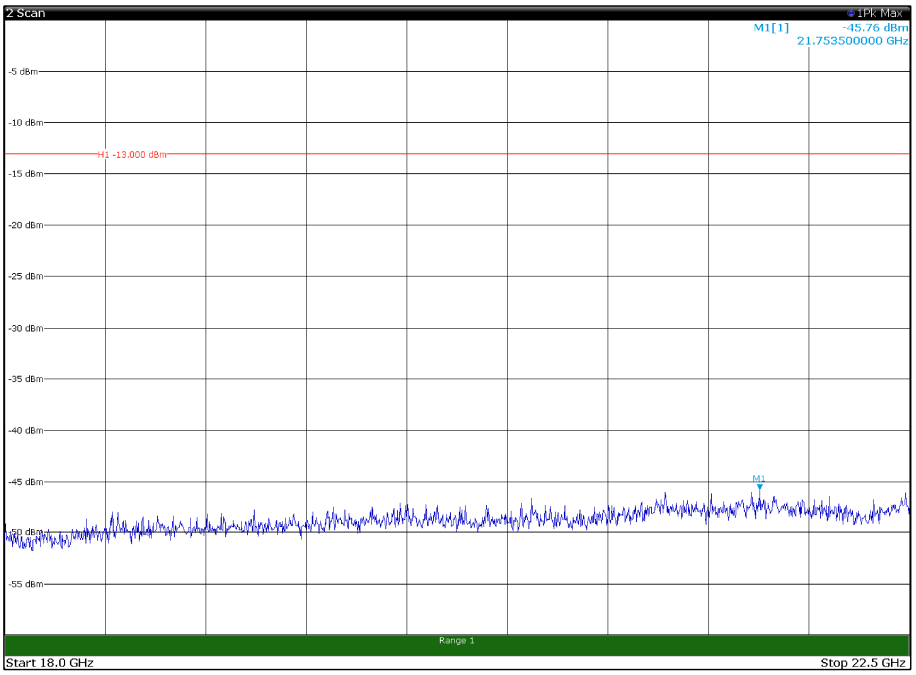
Channel: MIDDLE, Modulation: QPSK,
BW=5MHz, Range: 1GHz - 18GHz, Polarization: Horizontal



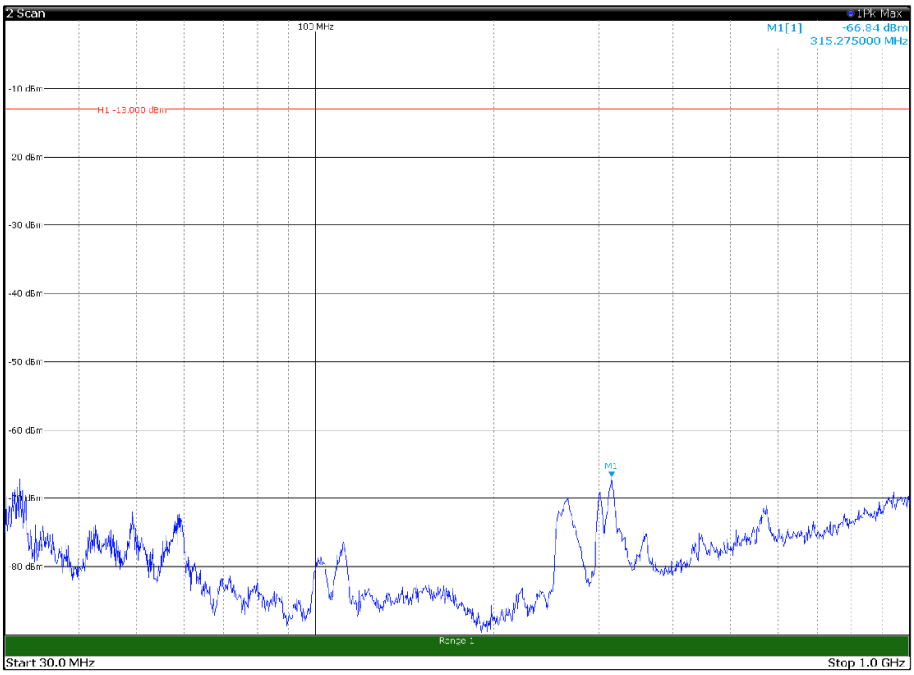
Channel: MIDDLE, Modulation: QPSK,
BW=5MHz, Range: 1GHz - 18GHz, Polarization: Vertical



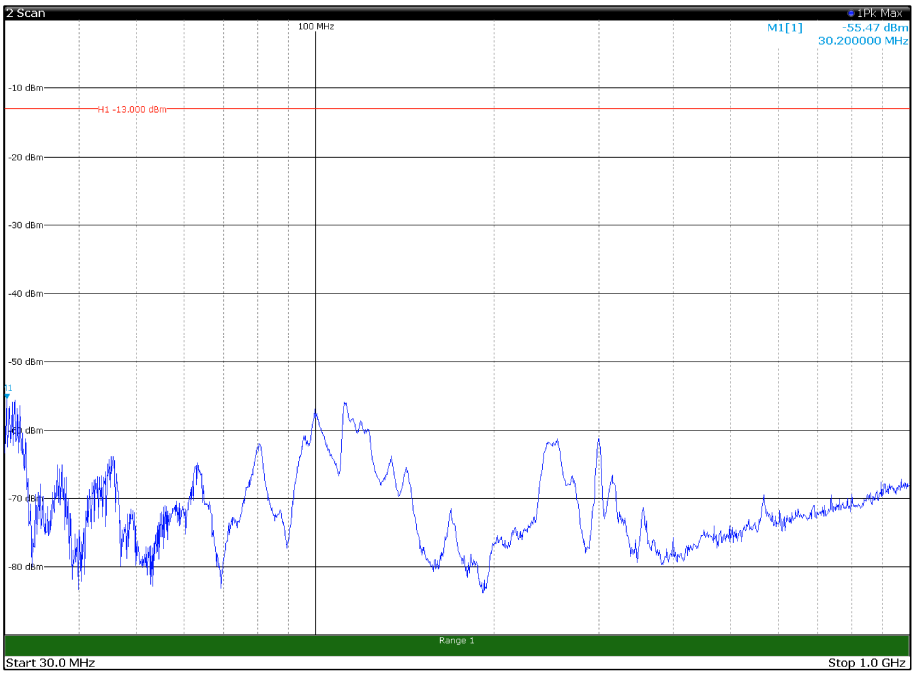
Channel: MIDDLE, Modulation: QPSK,
BW=5MHz, Range: 18GHz - 22.5GHz, Polarization: Horizontal



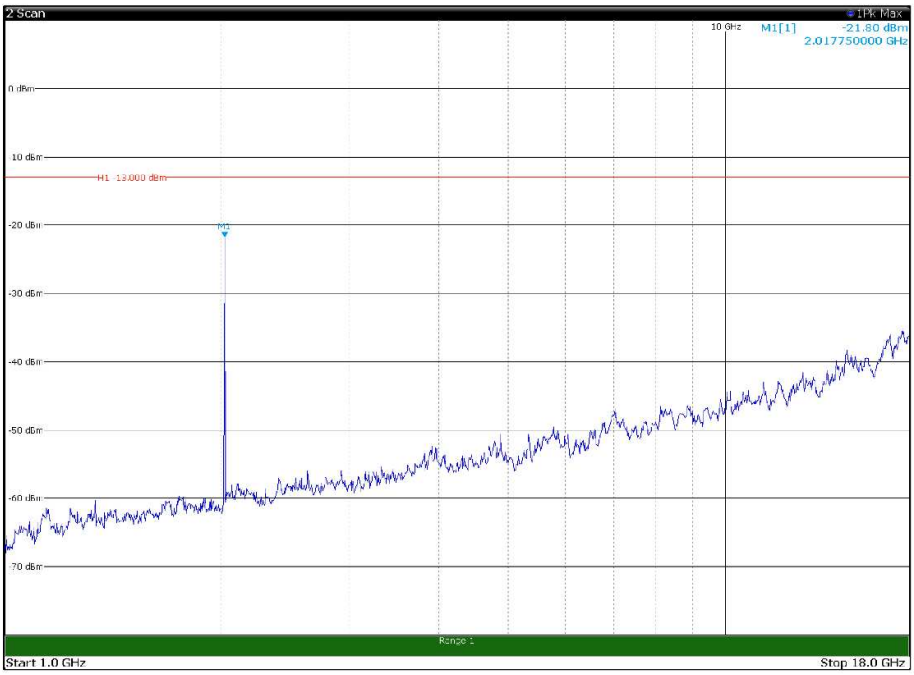
Channel: MIDDLE, Modulation: QPSK,
BW=5MHz, Range: 18GHz - 22.5GHz, Polarization: Vertical



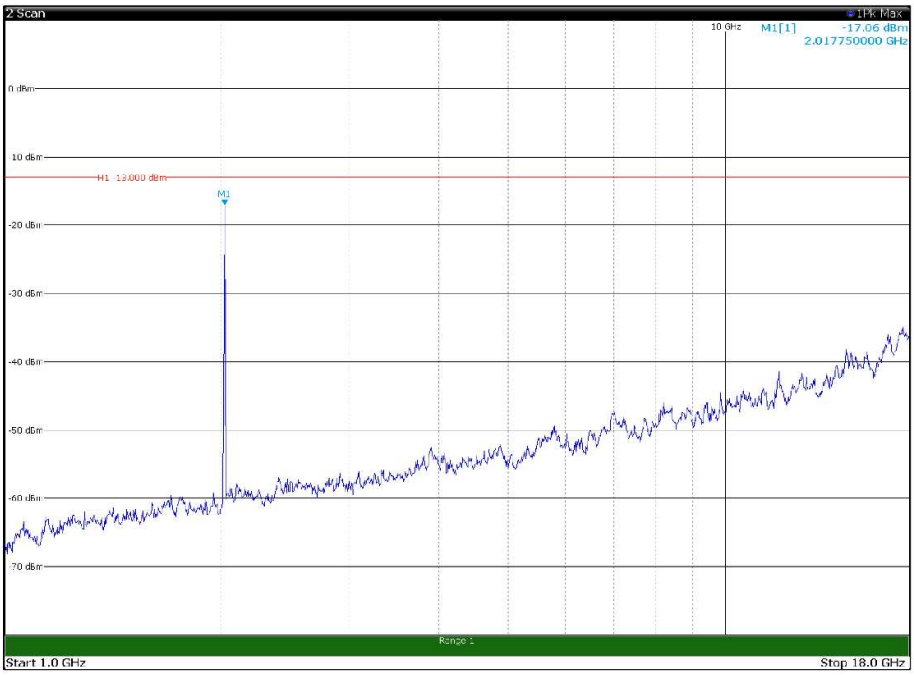
Channel: TOP, Modulation: QPSK,
BW=5MHz, Range: 30MHz - 1GHz, Polarization: Horizontal



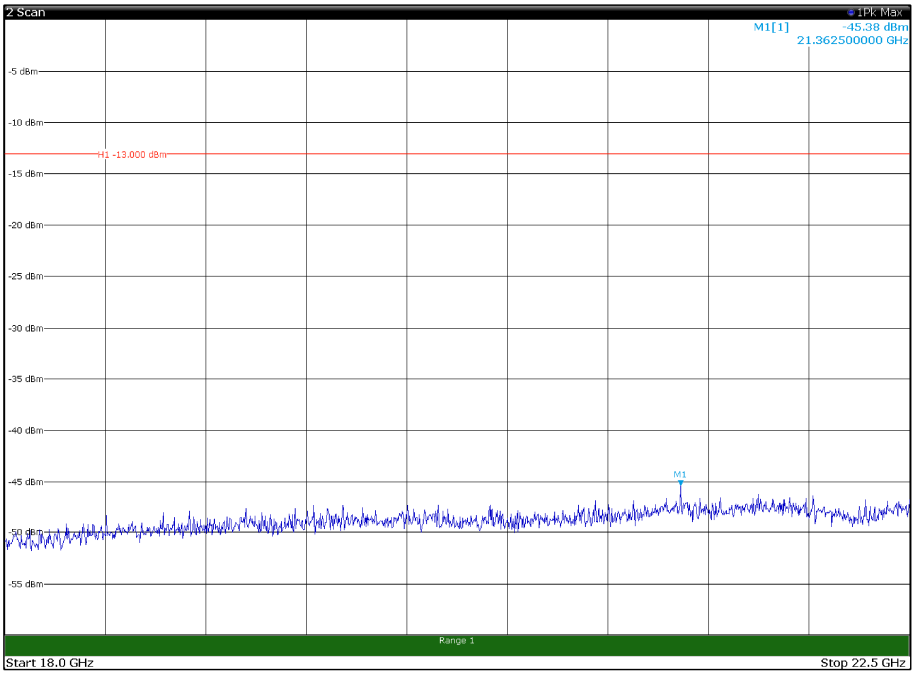
Channel: TOP, Modulation: QPSK,
BW=5MHz, Range: 30MHz - 1GHz, Polarization: Vertical



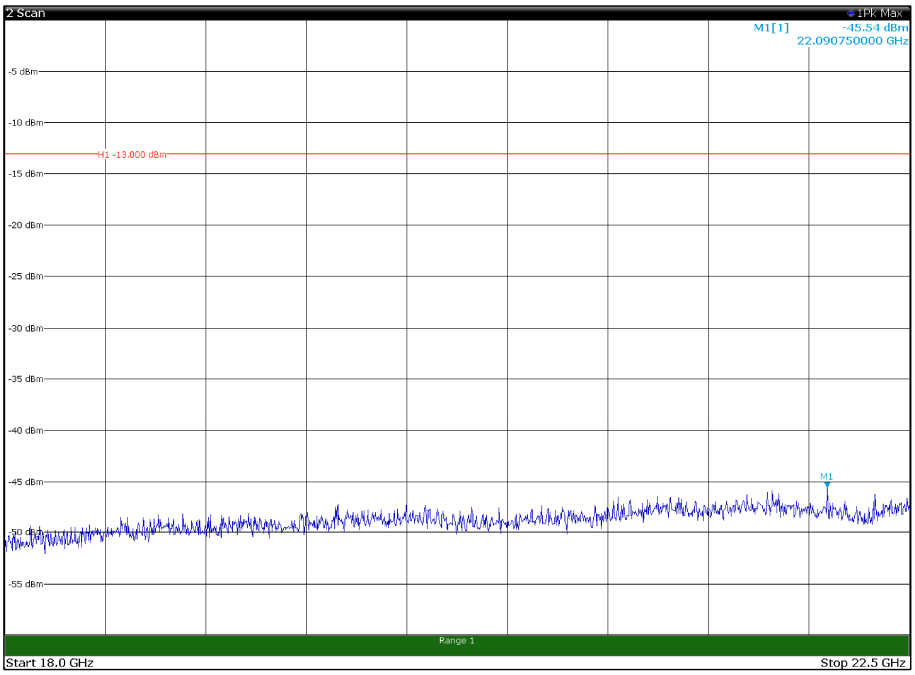
Channel: TOP, Modulation: QPSK,
BW=5MHz, Range: 1GHz - 18GHz, Polarization: Horizontal



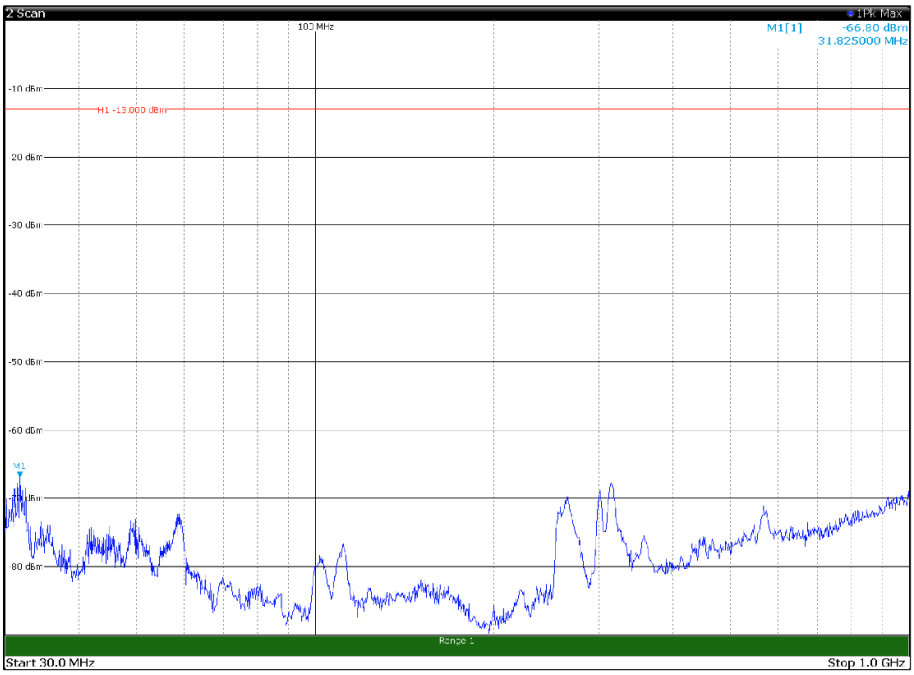
Channel: TOP, Modulation: QPSK,
BW=5MHz, Range: 1GHz - 18GHz, Polarization: Vertical



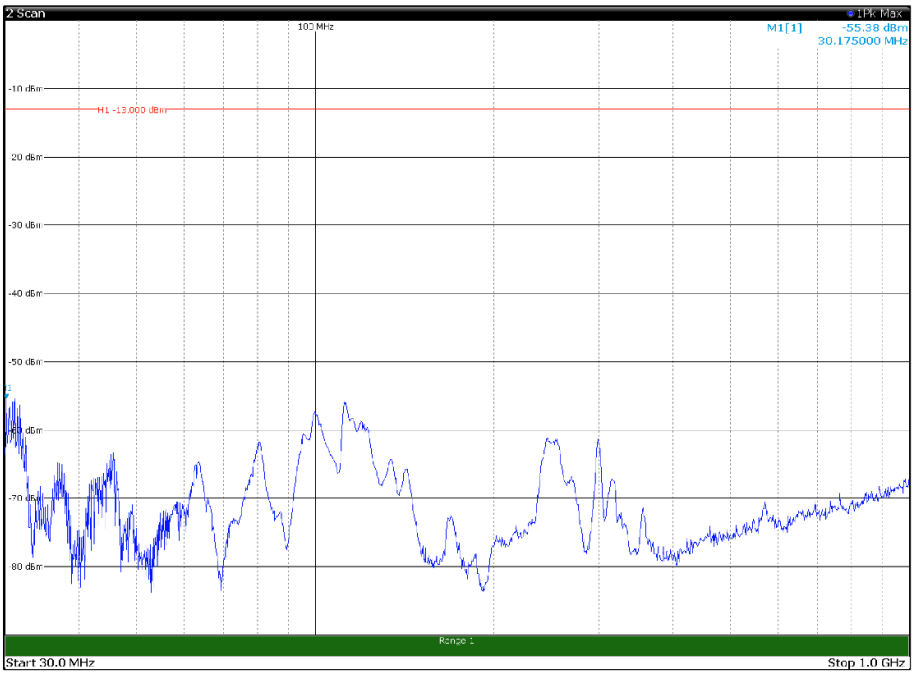
Channel: TOP, Modulation: QPSK,
BW=5MHz, Range: 18GHz - 22.5GHz, Polarization: Horizontal



Channel: TOP, Modulation: QPSK,
BW=5MHz, Range: 18GHz - 22.5GHz, Polarization: Vertical



Channel: BOTTOM, Modulation: 16QAM,
BW=5MHz, Range: 30MHz - 1GHz, Polarization: Horizontal



Channel: BOTTOM, Modulation: 16QAM,
BW=5MHz, Range: 30MHz - 1GHz, Polarization: Vertical