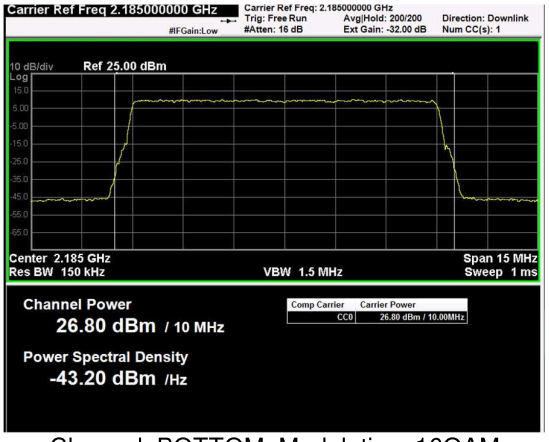
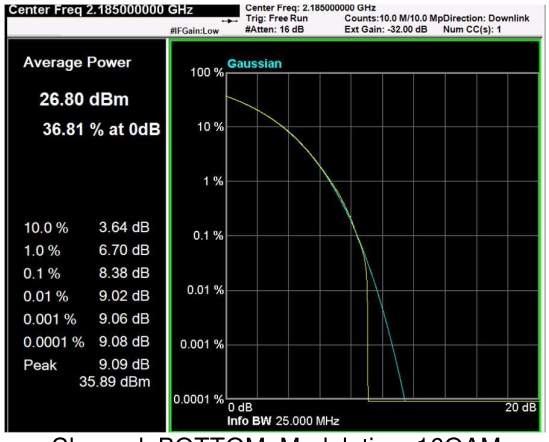
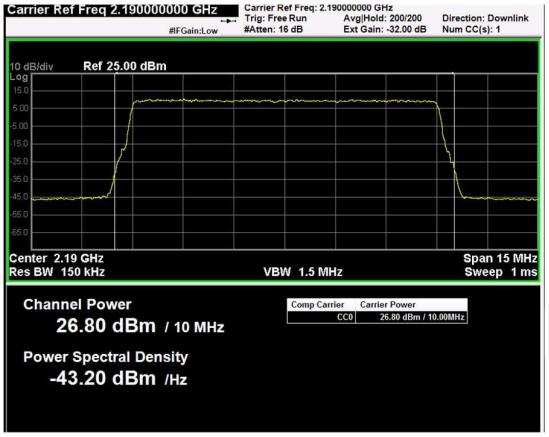


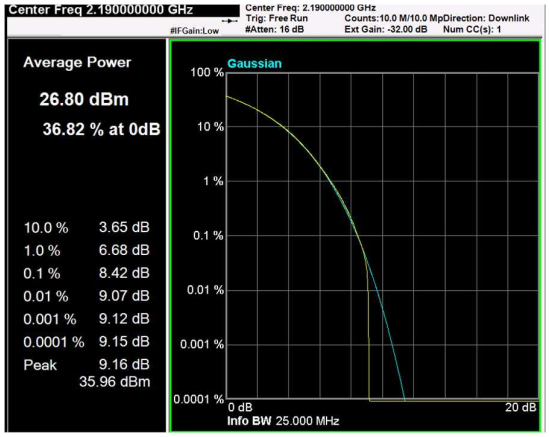
Channel: BOTTOM, Modulation: 16QAM, BW=10MHz, Channel Power



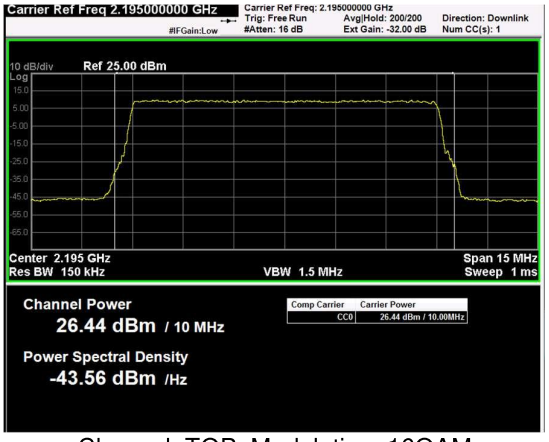
Channel: BOTTOM, Modulation: 16QAM, BW=10MHz, CCDF



Channel: MIDDLE, Modulation: 16QAM, BW=10MHz, Channel Power

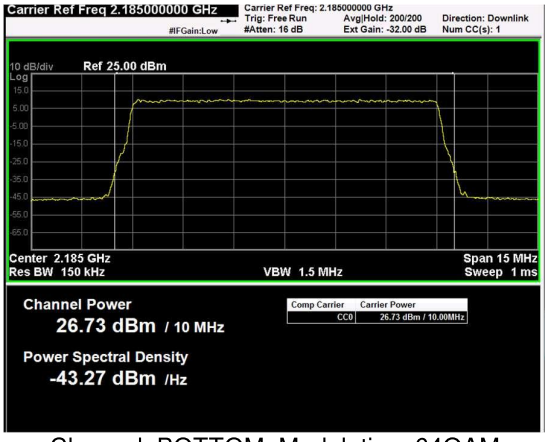


Channel: MIDDLE, Modulation: 16QAM, BW=10MHz, CCDF



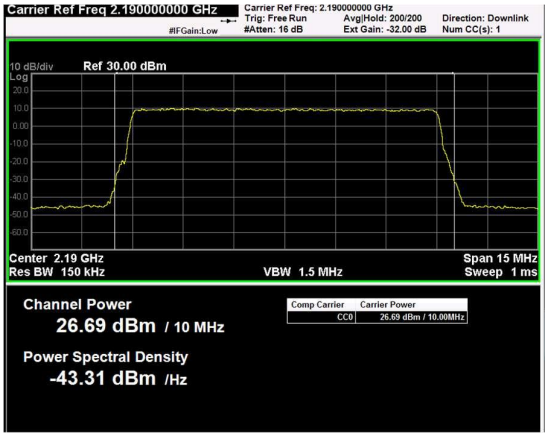
Channel: TOP, Modulation: 16QAM, BW=10MHz, Channel Power

Channel: TOP, Modulation: 16QAM, BW=10MHz, CCDF

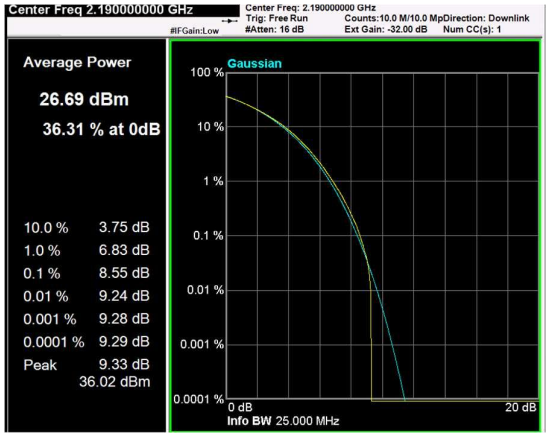


Channel: BOTTOM, Modulation: 64QAM, BW=10MHz, Channel Power

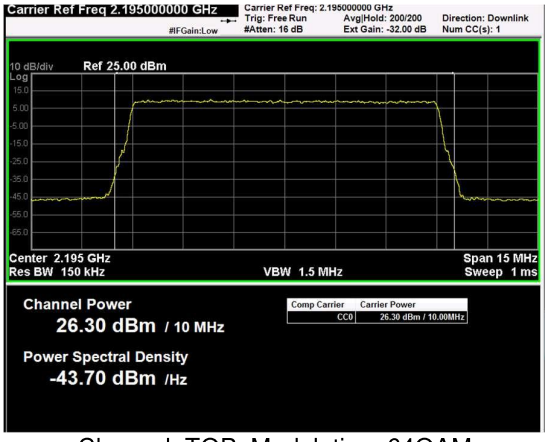
Channel: BOTTOM, Modulation: 64QAM, BW=10MHz, CCDF



Channel: MIDDLE, Modulation: 64QAM, BW=10MHz, Channel Power

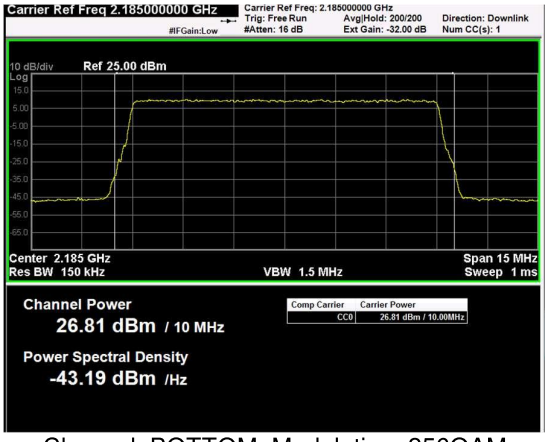


Channel: MIDDLE, Modulation: 64QAM, BW=10MHz, CCDF



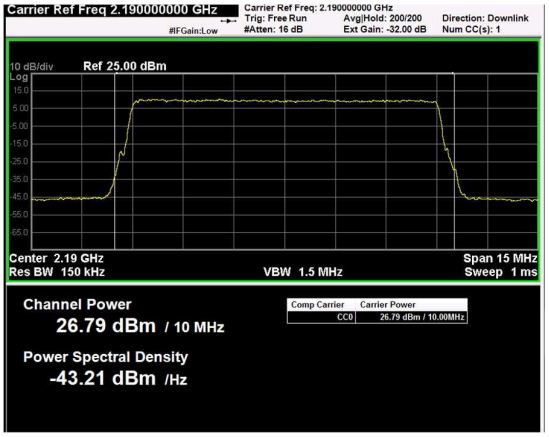
Channel: TOP, Modulation: 64QAM, BW=10MHz, Channel Power

Channel: TOP, Modulation: 64QAM, BW=10MHz, CCDF

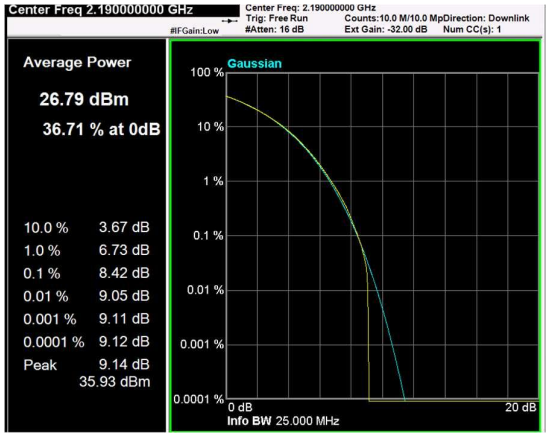


Channel: BOTTOM, Modulation: 256QAM, BW=10MHz, Channel Power

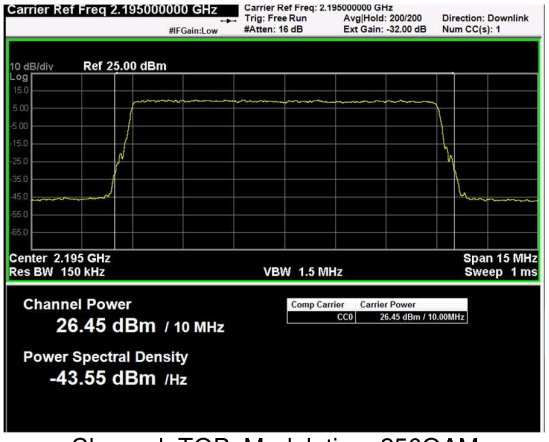
Channel: BOTTOM, Modulation: 256QAM, BW=10MHz, CCDF



Channel: MIDDLE, Modulation: 256QAM, BW=10MHz, Channel Power



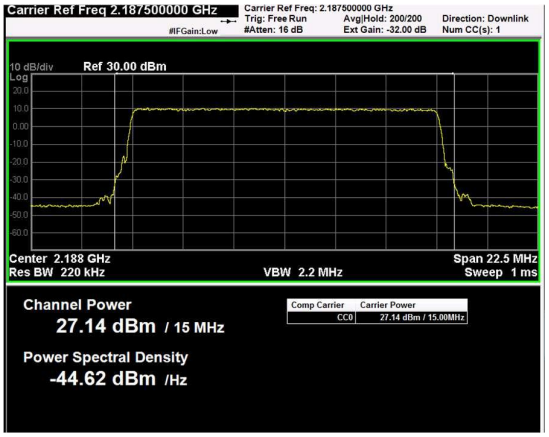
Channel: MIDDLE, Modulation: 256QAM, BW=10MHz, CCDF



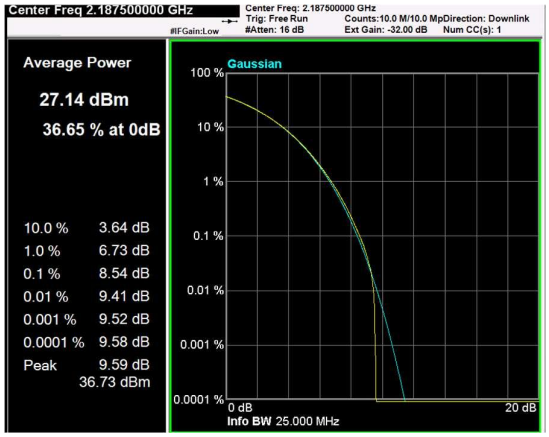
Channel: TOP, Modulation: 256QAM, BW=10MHz, Channel Power

Channel: TOP, Modulation: 256QAM, BW=10MHz, CCDF

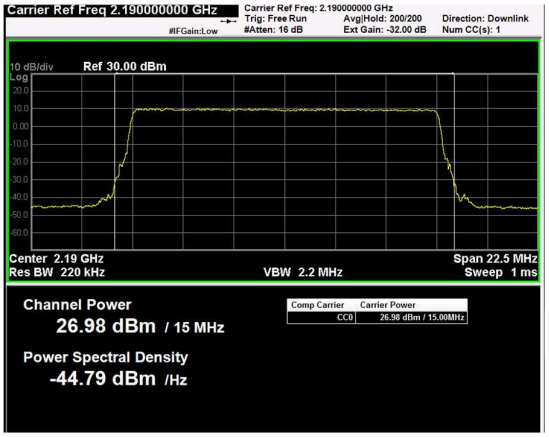
Test data					
Direction	Modulation	Frequency (MHz)	RF output Power (dBm)	RF output channel Power (W)	PAR (dB)
Down-link	LTE 15MHz (QPSK)	2187.5	27.1	0.518	9.6
Down-link	LTE 15MHz (QPSK)	2190	27.0	0.499	9.6
Down-link	LTE 15MHz (QPSK)	2192.5	26.9	0.492	9.7
Down-link	LTE 15MHz (16QAM)	2187.5	27.1	0.513	9.6
Down-link	LTE 15MHz (16QAM)	2190	27.0	0.499	9.7
Down-link	LTE 15MHz (16QAM)	2192.5	26.9	0.489	9.7
Down-link	LTE 15MHz (64QAM)	2187.5	27.0	0.501	9.8
Down-link	LTE 15MHz (64QAM)	2190	26.8	0.483	9.8
Down-link	LTE 15MHz (64QAM)	2192.5	26.8	0.476	9.9
Down-link	LTE 15MHz (256QAM)	2187.5	27.1	0.514	9.6
Down-link	LTE 15MHz (256QAM)	2190	27.0	0.500	9.6
Down-link	LTE 15MHz (256QAM)	2192.5	26.9	0.488	9.7



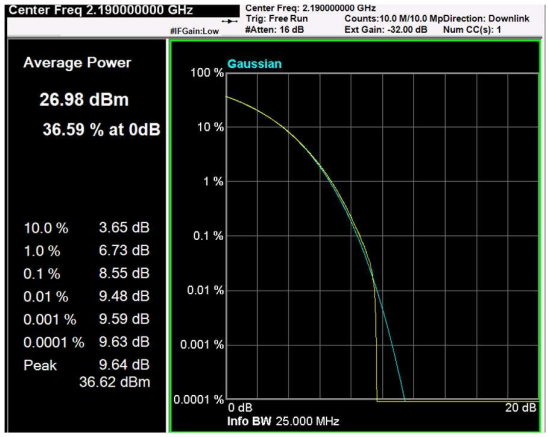
Channel: BOTTOM, Modulation: QPSK, BW=15MHz, Channel Power



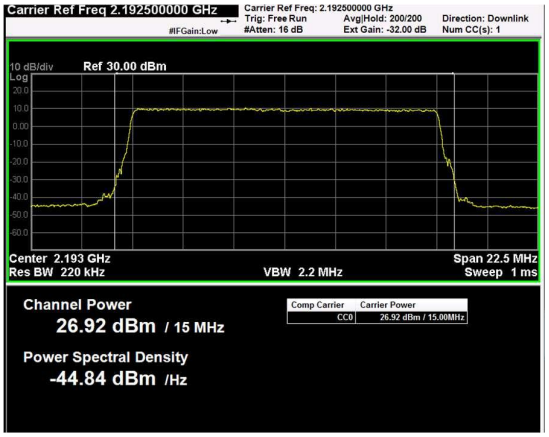
Channel: BOTTOM, Modulation: QPSK, BW=15MHz, CCDF



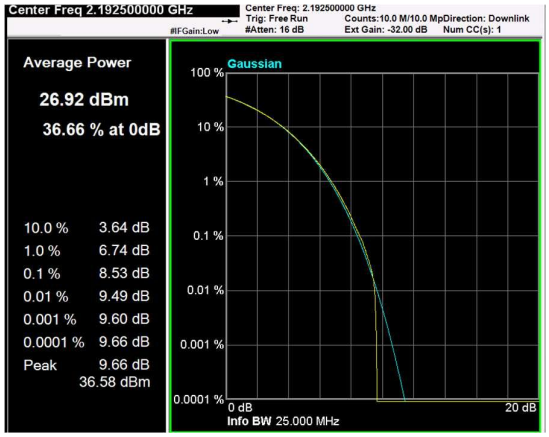
Channel: MIDDLE, Modulation: QPSK, BW=15MHz, Channel Power



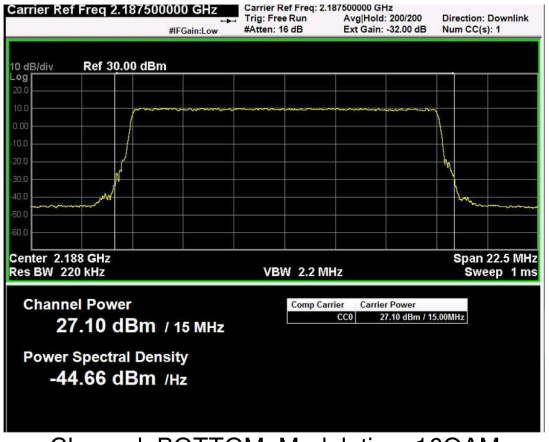
Channel: MIDDLE, Modulation: QPSK, BW=15MHz, CCDF



Channel: TOP, Modulation: QPSK, BW=15MHz, Channel Power

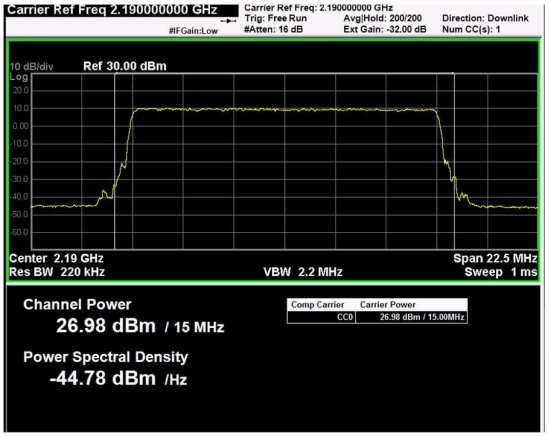


Channel: TOP, Modulation: QPSK, BW=15MHz, CCDF

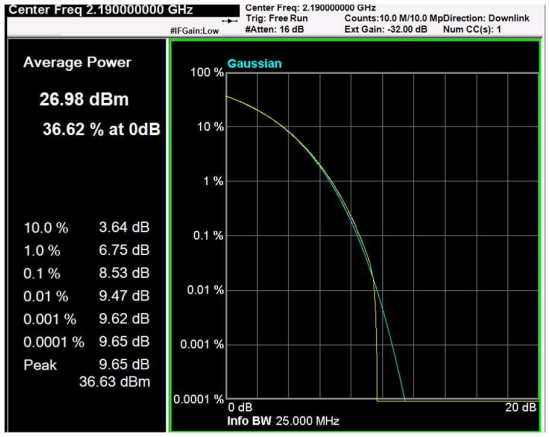


Channel: BOTTOM, Modulation: 16QAM, BW=15MHz, Channel Power

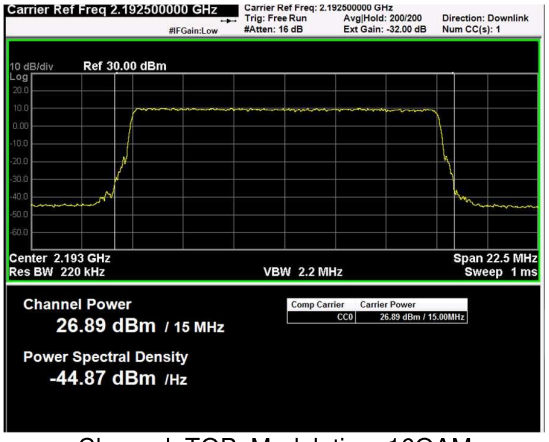
Channel: BOTTOM, Modulation: 16QAM, BW=15MHz, CCDF



Channel: MIDDLE, Modulation: 16QAM, BW=15MHz, Channel Power

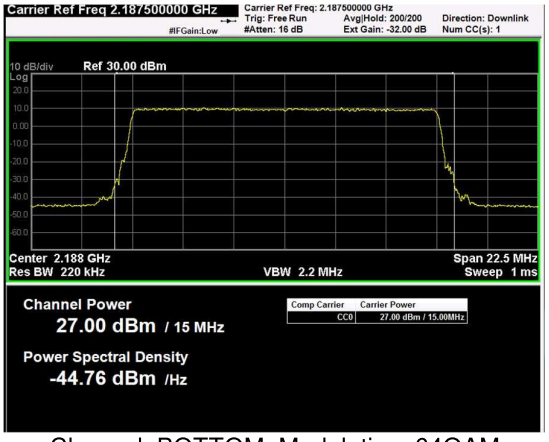


Channel: MIDDLE, Modulation: 16QAM, BW=15MHz, CCDF



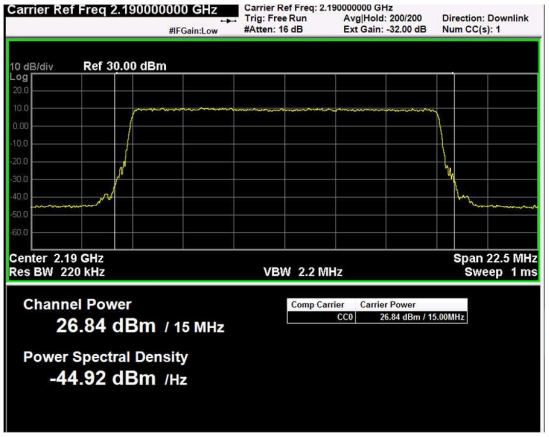
Channel: TOP, Modulation: 16QAM, BW=15MHz, Channel Power

Channel: TOP, Modulation: 16QAM, BW=15MHz, CCDF

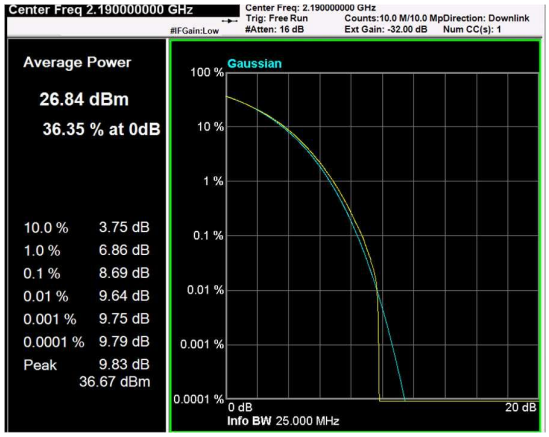


Channel: BOTTOM, Modulation: 64QAM, BW=15MHz, Channel Power

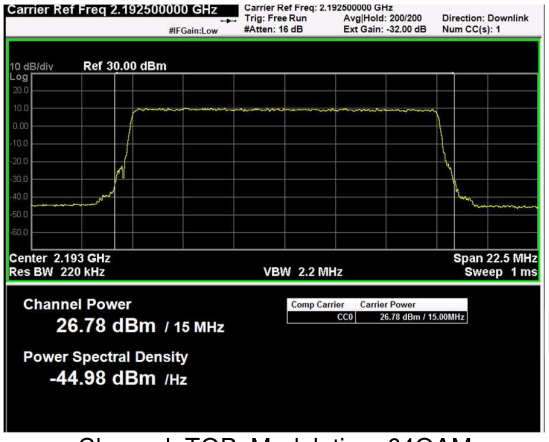
Channel: BOTTOM, Modulation: 64QAM, BW=15MHz, CCDF



Channel: MIDDLE, Modulation: 64QAM, BW=15MHz, Channel Power

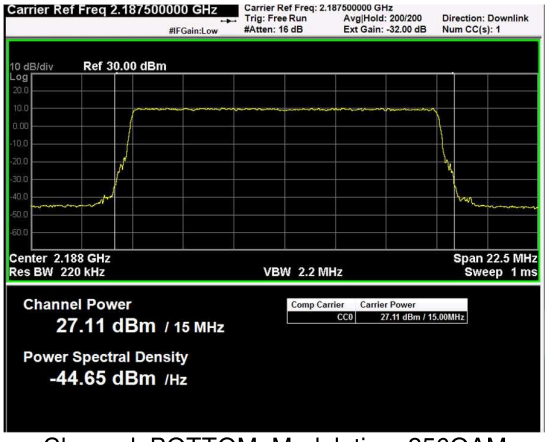


Channel: MIDDLE, Modulation: 64QAM, BW=15MHz, CCDF



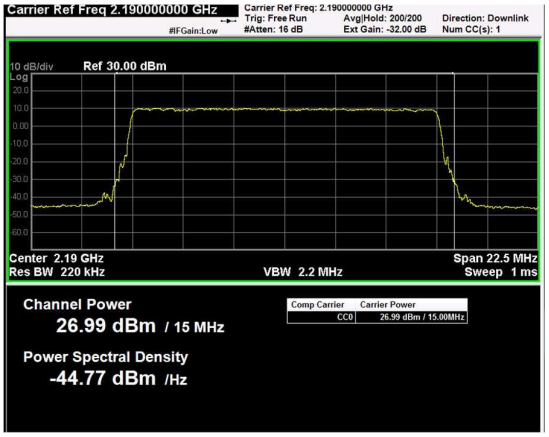
Channel: TOP, Modulation: 64QAM, BW=15MHz, Channel Power

Channel: TOP, Modulation: 64QAM, BW=15MHz, CCDF

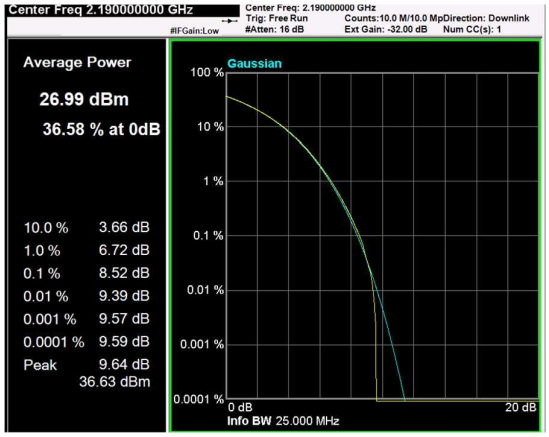


Channel: BOTTOM, Modulation: 256QAM, BW=15MHz, Channel Power

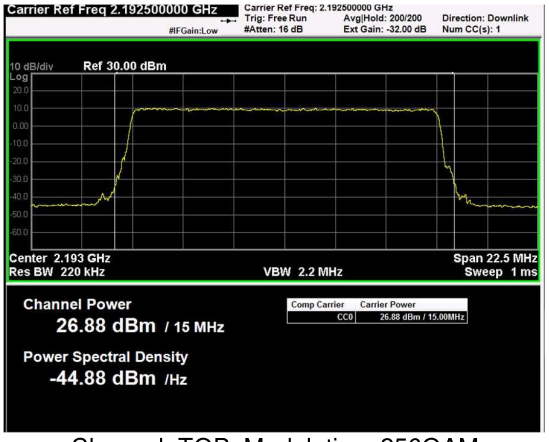
Channel: BOTTOM, Modulation: 256QAM, BW=15MHz, CCDF



Channel: MIDDLE, Modulation: 256QAM, BW=15MHz, Channel Power



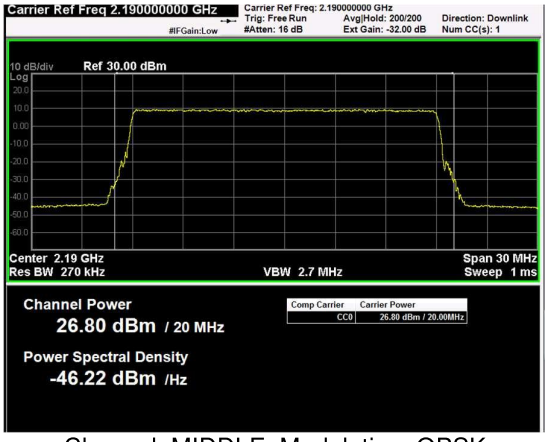
Channel: MIDDLE, Modulation: 256QAM, BW=15MHz, CCDF



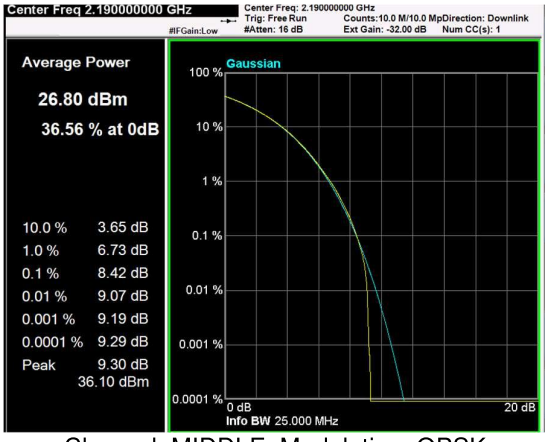
Channel: TOP, Modulation: 256QAM, BW=15MHz, Channel Power

Channel: TOP, Modulation: 256QAM, BW=15MHz, CCDF

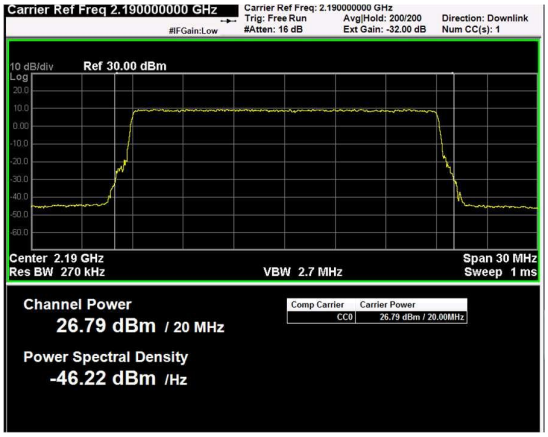
Test data					
Direction	Modulation	Frequency (MHz)	RF output Power (dBm)	RF output channel Power (W)	PAR (dB)
Down-link	LTE 20MHz (QPSK)	2190	26.8	0.479	9.3
Down-link	LTE 20MHz (16QAM)	2190	26.8	0.478	9.3
Down-link	LTE 20MHz (64QAM)	2190	26.7	0.468	9.4
Down-link	LTE 20MHz (256QAM)	2190	26.9	0.485	9.3



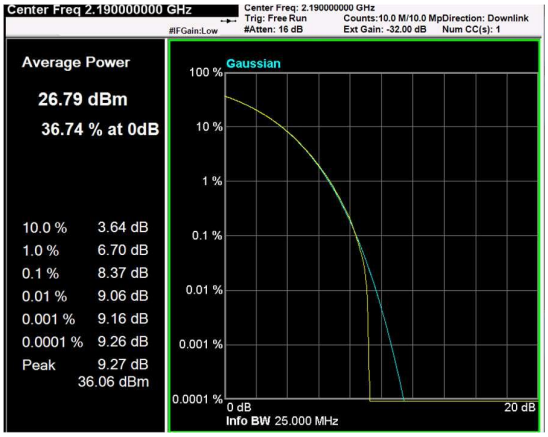
Channel: MIDDLE, Modulation: QPSK, BW=20MHz, Channel Power



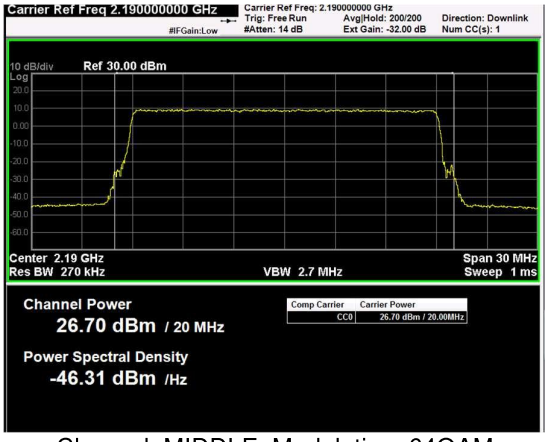
Channel: MIDDLE, Modulation: QPSK, BW=20MHz, CCDF



Channel: MIDDLE, Modulation: 16QAM, BW=20MHz, Channel Power

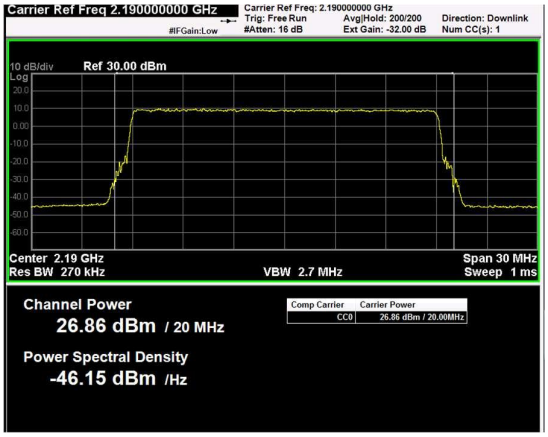


Channel: MIDDLE, Modulation: 16QAM, BW=20MHz, CCDF

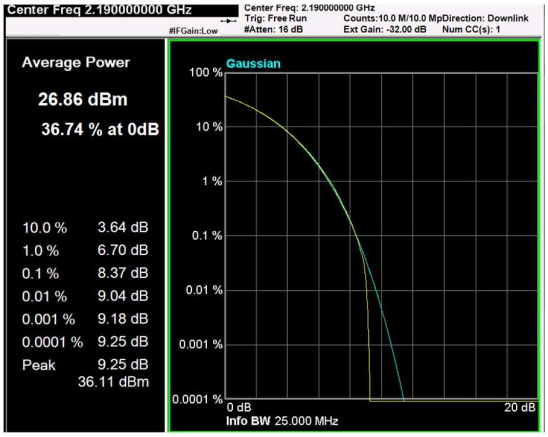


Channel: MIDDLE, Modulation: 64QAM, BW=20MHz, Channel Power

Channel: MIDDLE, Modulation: 64QAM, BW=20MHz, CCDF



Channel: MIDDLE, Modulation: 256QAM, BW=20MHz, Channel Power



Channel: MIDDLE, Modulation: 256QAM, BW=20MHz, CCDF

Clause 27.53(h) Spurious emissions at RF antenna connector

(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.

(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.

Test date: 10/21/2019 to 12/13/2019

Test results: Pass

Special notes

1) Limit of spurious emission at RF connector has been calculated following the indication in the "662911 D01 Multiple Transmitter Output v02r01" Clause 3) a) iii) with $N_{Ant} = 2$.

10Log(N_{Ant})= 10Log(2) = 3 dB
Limit= -13dBm - 3dBm=-16dBm

2) Limit of band edges Inter modulation has been calculated following the indication in the "662911 D01 Multiple Transmitter Output v02r01" Clause 3) a) iii) with $N_{Ant} = 2$ considering RBW=100kHz.

Limit(RBW=1MHz) = -13dBm ➔ Limit(RBW=100kHz) = -23dBm
10Log(N_{Ant})= 10Log(2) = 3 dB
Limit= -23dBm - 3dBm=-26dBm

Clause 27.53 (h) Spurious emissions at RF antenna connector, continued

Test data

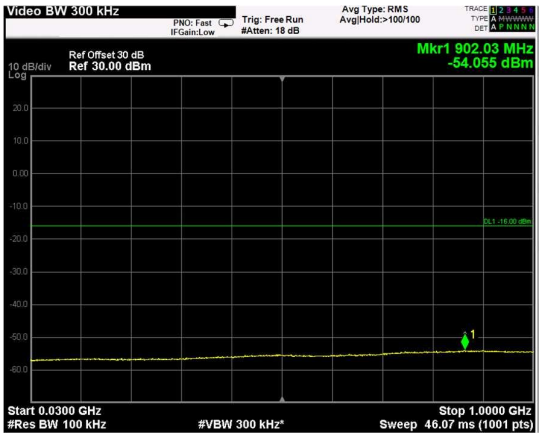
See Plots below

Spurious emissions measurement results:

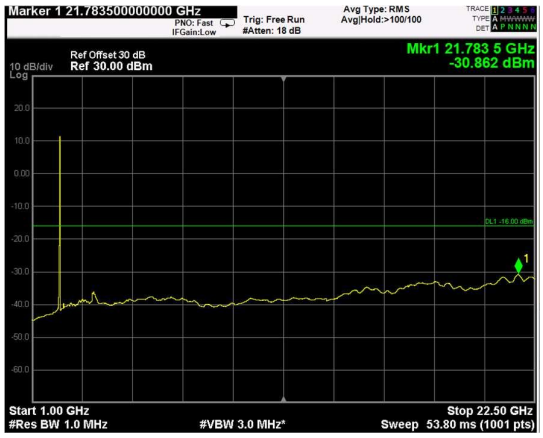
Frequency (MHz)	Spurious emission (dBm)	Limit (dBm)	Margin (dB)
Low channel			
First channel	Negligible	-13	
Mid channel			
2190 MHz	Negligible	-13	
High channel			
Last channel	Negligible	-13	

Test data: Spurious Emissions at antenna terminal

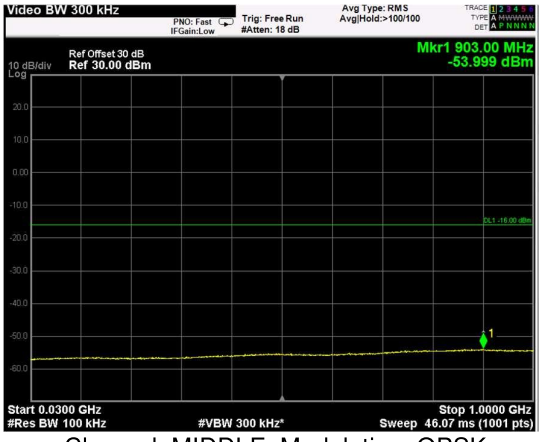
RF PORT 1



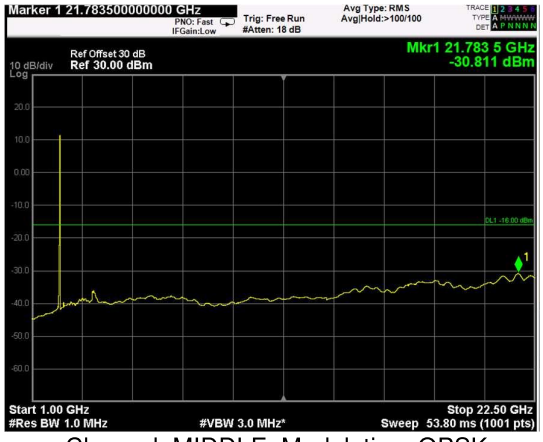
Channel: BOTTOM, Modulation: QPSK, BW=5MHz, Range: Lower



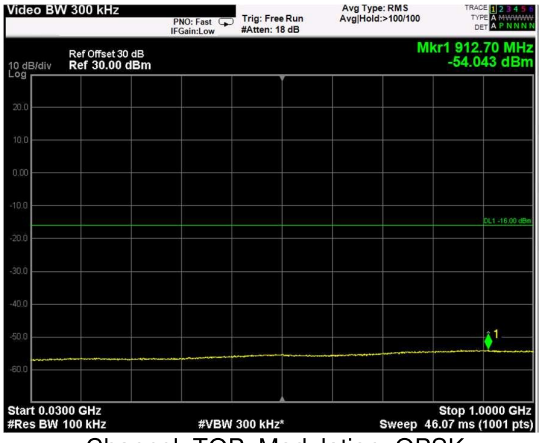
Channel: BOTTOM, Modulation: QPSK, BW=5MHz, Range: Upper



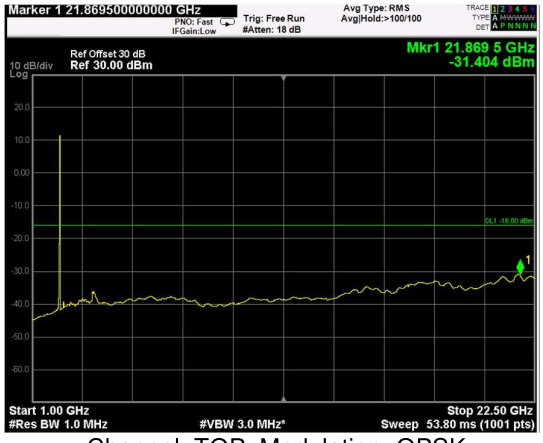
Channel: MIDDLE, Modulation: QPSK, BW=5MHz, Range: Lower



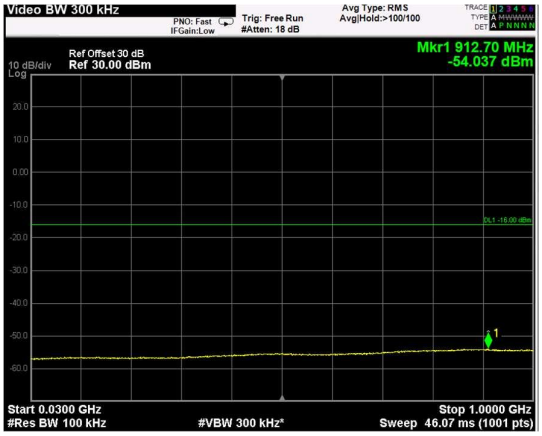
Channel: MIDDLE, Modulation: QPSK, BW=5MHz, Range: Upper



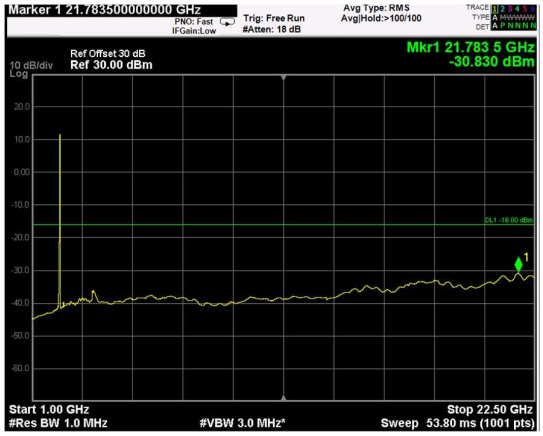
Channel: TOP, Modulation: QPSK, BW=5MHz, Range: Lower



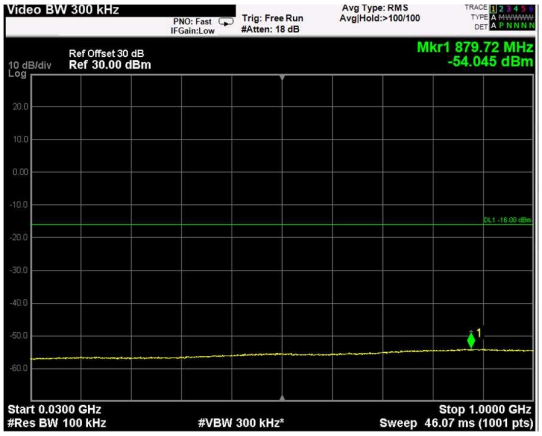
Channel: TOP, Modulation: QPSK, BW=5MHz, Range: Upper



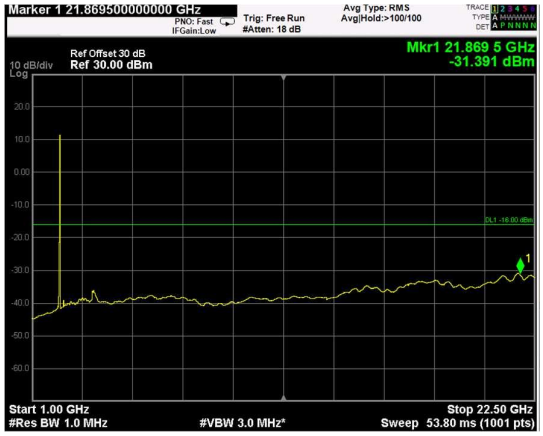
Channel: BOTTOM, Modulation: 16QAM, BW=5MHz, Range: Lower



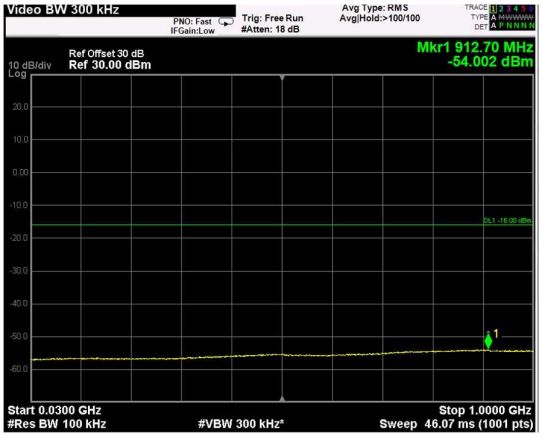
Channel: BOTTOM, Modulation: 16QAM, BW=5MHz, Range: Upper



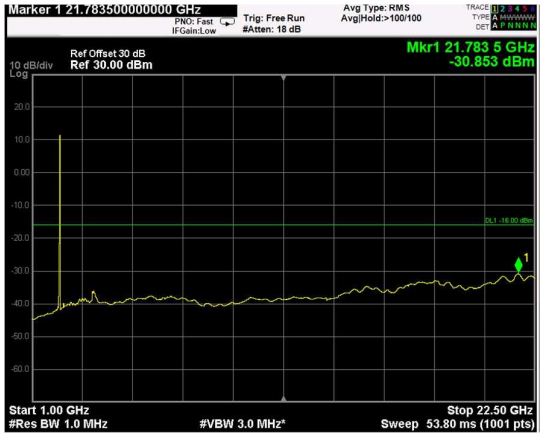
Channel: MIDDLE, Modulation: 16QAM, BW=5MHz, Range: Lower



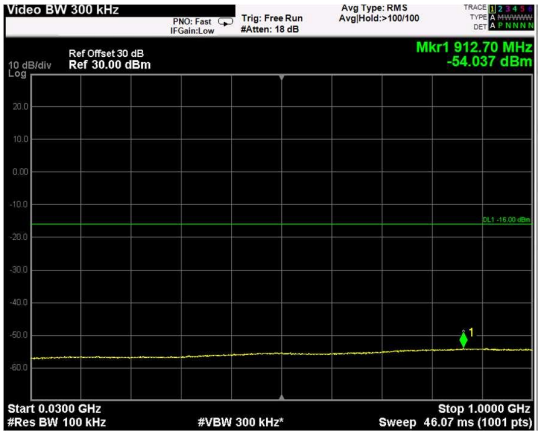
Channel: MIDDLE, Modulation: 16QAM, BW=5MHz, Range: Upper



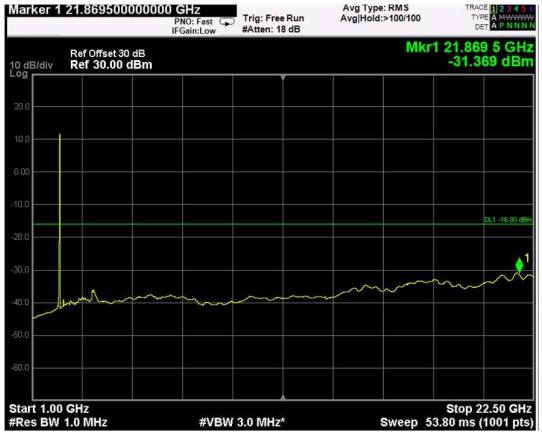
Channel: TOP, Modulation: 16QAM, BW=5MHz, Range: Lower



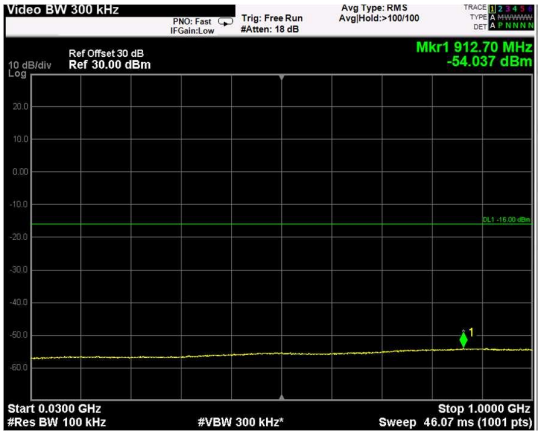
Channel: TOP, Modulation: 16QAM, BW=5MHz, Range: Upper



Channel: BOTTOM, Modulation: 64QAM, BW=5MHz, Range: Lower

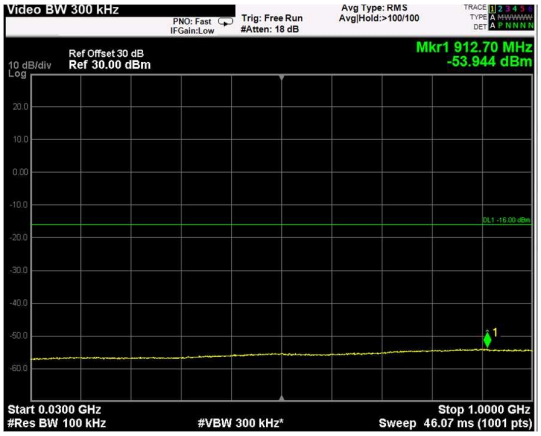


Channel: BOTTOM, Modulation: 64QAM, BW=5MHz, Range: Upper

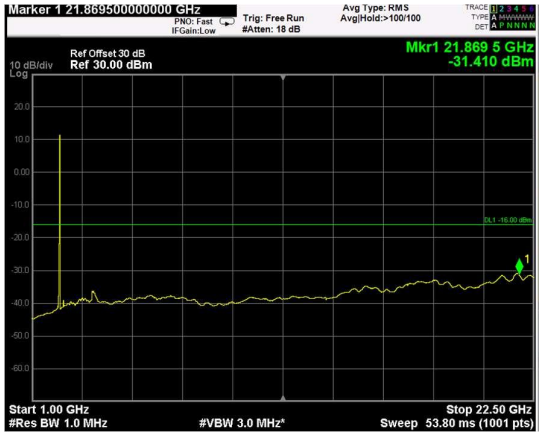


Channel: MIDDLE, Modulation: 64QAM, BW=5MHz, Range: Lower

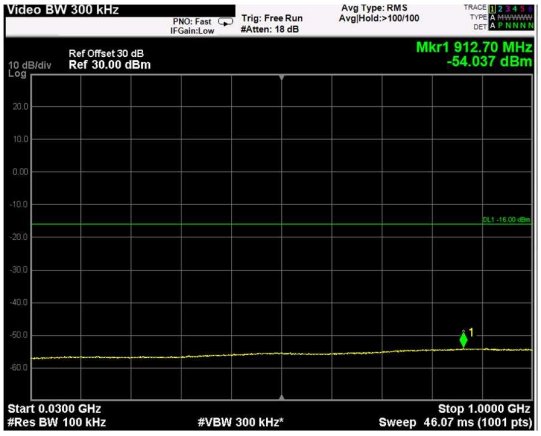
Channel: MIDDLE, Modulation: 64QAM, BW=5MHz, Range: Upper



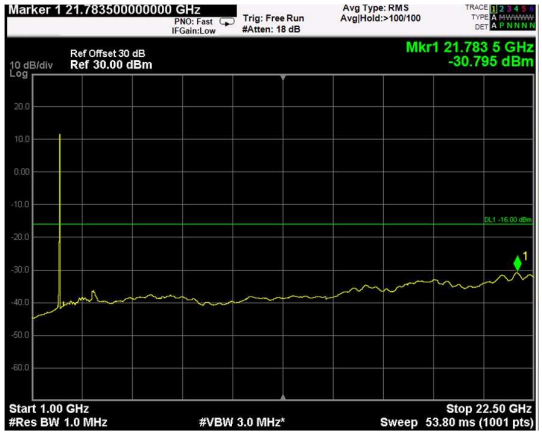
Channel: TOP, Modulation: 64QAM, BW=5MHz, Range: Lower



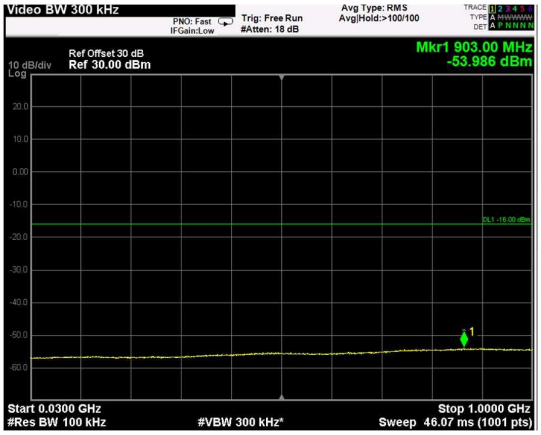
Channel: TOP, Modulation: 64QAM, BW=5MHz, Range: Upper



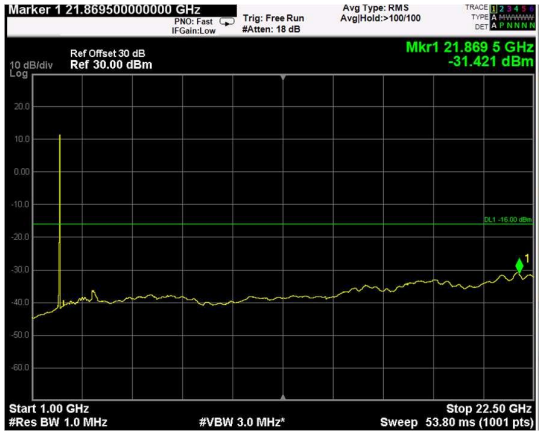
Channel: BOTTOM, Modulation: 256QAM, BW=5MHz, Range: Lower



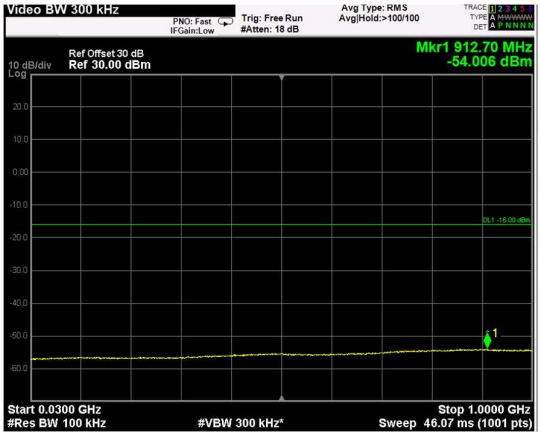
Channel: BOTTOM, Modulation: 256QAM, BW=5MHz, Range: Upper



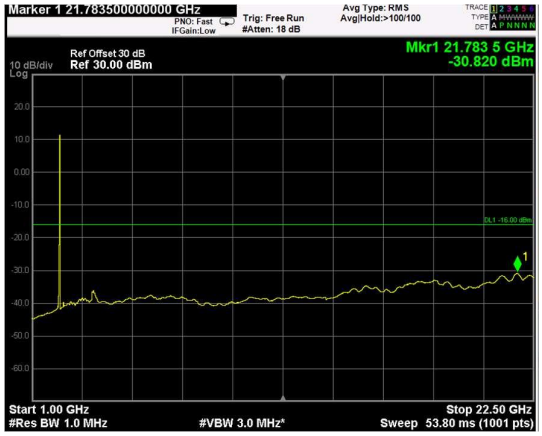
Channel: MIDDLE, Modulation: 256QAM, BW=5MHz, Range: Lower



Channel: MIDDLE, Modulation: 256QAM, BW=5MHz, Range: Upper



Channel: TOP, Modulation: 256QAM, BW=5MHz, Range: Lower



Channel: TOP, Modulation: 256QAM, BW=5MHz, Range: Upper