



## 6 Peak to Average Power Ratio

### 6.1 Test Specification

FCC Part 27, Subpart C, Section 50

### 6.2 Test Procedure

(Temperature (20°C)/ Humidity (40%RH))

The method used is detailed in FCC KDB 971168 D03 v01

Measurements was using CCDF function for each modulation.

### 6.3 Test Limit

The peak-to-average power ratio (PAPR) of the transmitter output power must not exceed 13 dB.

### 6.4 Test Results

JUDGEMENT: Passed

For additional information see Table 11 to Table 14 and Figure 168 to Figure 263.



| Modulation | Bandwidth | Sub Carrier | Operation Frequency | 0.1% PAPR | Limit |
|------------|-----------|-------------|---------------------|-----------|-------|
|            | (MHz)     | (kHz)       | (MHz)               | (dB)      | (dB)  |
| 16QAM      | 5         | 15          | 619.5               | 8.49      | 13    |
|            |           | 30          |                     | 8.48      |       |
|            |           | 15          | 634.5               | 8.65      |       |
|            |           | 30          |                     | 8.61      |       |
|            |           | 15          | 649.5               | 8.75      |       |
|            |           | 30          |                     | 8.56      |       |
|            | 10        | 15          | 622.0               | 8.57      |       |
|            |           | 30          |                     | 8.60      |       |
|            |           | 15          | 634.5               | 8.59      |       |
|            |           | 30          |                     | 8.64      |       |
|            |           | 15          | 647.0               | 8.63      |       |
|            |           | 30          |                     | 8.56      |       |
|            | 15        | 15          | 624.5               | 8.95      |       |
|            |           | 30          |                     | 8.59      |       |
|            |           | 15          | 634.5               | 8.99      |       |
|            |           | 30          |                     | 8.60      |       |
|            |           | 15          | 644.5               | 8.99      |       |
|            |           | 30          |                     | 8.56      |       |
|            | 20        | 15          | 627.0               | 8.58      |       |
|            |           | 30          |                     | 8.37      |       |
|            |           | 15          | 634.5               | 8.59      |       |
|            |           | 30          |                     | 8.42      |       |
|            |           | 15          | 642.0               | 8.51      |       |
|            |           | 30          |                     | 8.28      |       |

Table 11 Test Results Peak to Average Power Ratio 16 QAM



| Modulation | Bandwidth | Sub Carrier | Operation Frequency | 0.1% PAPR | Limit |
|------------|-----------|-------------|---------------------|-----------|-------|
|            | (MHz)     | (kHz)       | (MHz)               | (dB)      | (dB)  |
| 64QAM      | 5         | 15          | 619.5               | 8.30      | 13    |
|            |           | 30          |                     | 8.09      |       |
|            |           | 15          | 634.5               | 8.47      |       |
|            |           | 30          |                     | 8.19      |       |
|            |           | 15          | 649.5               | 8.47      |       |
|            |           | 30          |                     | 8.08      |       |
|            | 10        | 15          | 622.0               | 8.31      |       |
|            |           | 30          |                     | 8.33      |       |
|            |           | 15          | 634.5               | 8.30      |       |
|            |           | 30          |                     | 8.45      |       |
|            |           | 15          | 647.0               | 8.19      |       |
|            |           | 30          |                     | 8.57      |       |
|            | 15        | 15          | 624.5               | 8.17      |       |
|            |           | 30          |                     | 8.40      |       |
|            |           | 15          | 634.5               | 8.24      |       |
|            |           | 30          |                     | 8.46      |       |
|            |           | 15          | 644.5               | 8.29      |       |
|            |           | 30          |                     | 8.44      |       |
|            | 20        | 15          | 627.0               | 8.37      |       |
|            |           | 30          |                     | 8.37      |       |
|            |           | 15          | 634.5               | 8.39      |       |
|            |           | 30          |                     | 8.40      |       |
|            |           | 15          | 642.0               | 8.45      |       |
|            |           | 30          |                     | 8.28      |       |

Table 12 Test Results Peak to Average Power Ratio 64 QAM



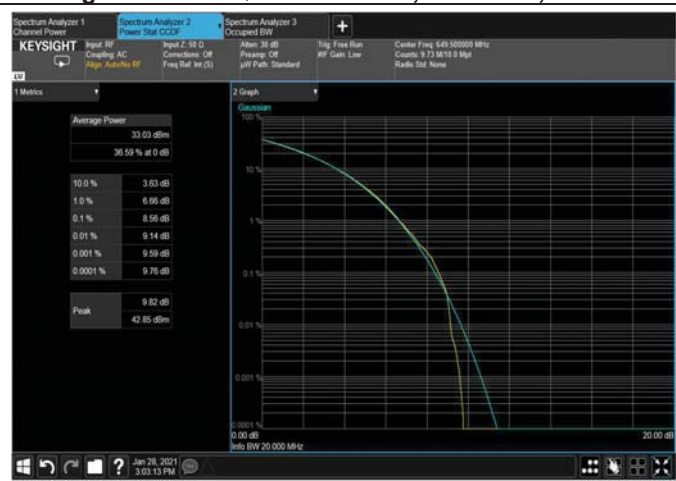
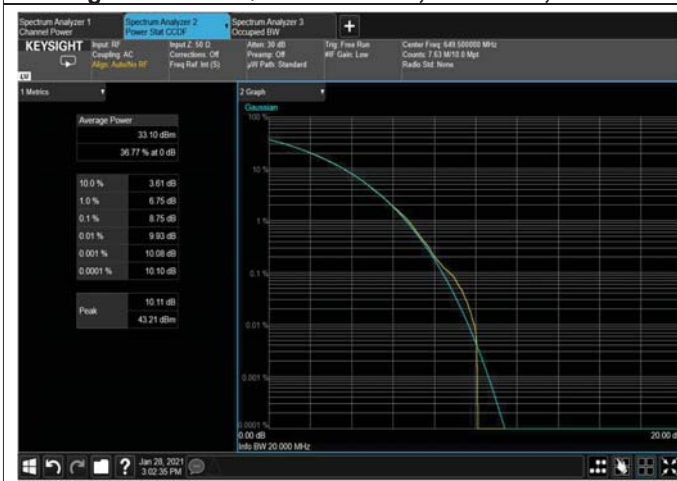
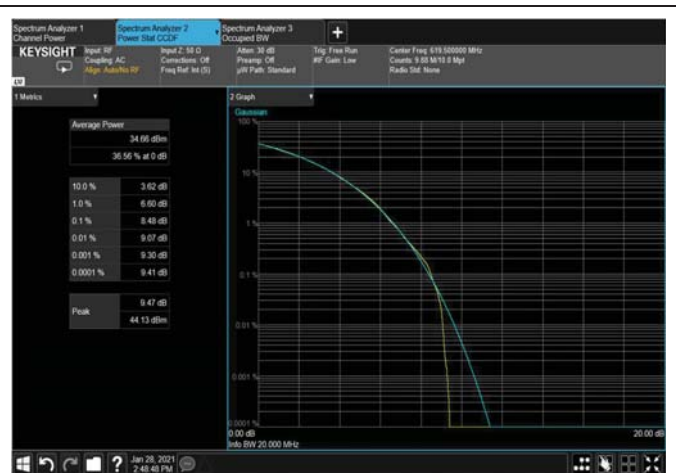
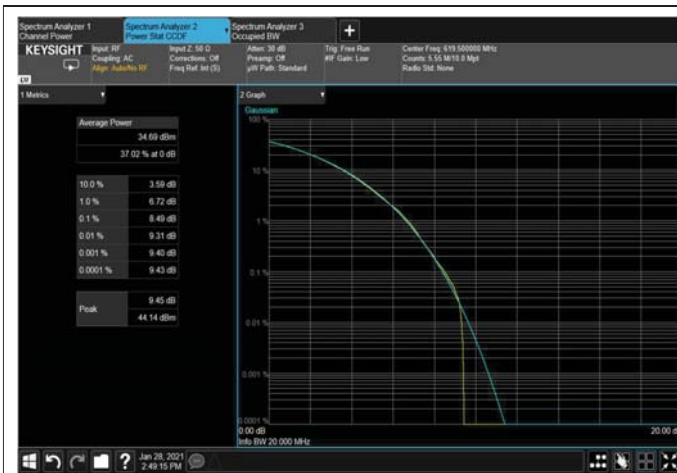
| Modulation | Bandwidth<br>(MHz) | Sub<br>Carrier<br>(kHz) | Operation<br>Frequency<br>(MHz) | 0.1%<br>PAPR<br>(dB) | Limit<br>(dB) |
|------------|--------------------|-------------------------|---------------------------------|----------------------|---------------|
| 256QAM     | 5                  | 15                      | 619.5                           | 8.44                 | 13            |
|            |                    | 30                      |                                 | 8.42                 |               |
|            |                    | 15                      | 634.5                           | 8.58                 |               |
|            |                    | 30                      |                                 | 8.56                 |               |
|            |                    | 15                      | 649.5                           | 8.56                 |               |
|            |                    | 30                      |                                 | 8.64                 |               |
|            | 10                 | 15                      | 622.0                           | 8.53                 |               |
|            |                    | 30                      |                                 | 8.39                 |               |
|            |                    | 15                      | 634.5                           | 8.60                 |               |
|            |                    | 30                      |                                 | 8.47                 |               |
|            |                    | 15                      | 647.0                           | 8.43                 |               |
|            |                    | 30                      |                                 | 8.47                 |               |
|            | 15                 | 15                      | 624.5                           | 8.46                 |               |
|            |                    | 30                      |                                 | 8.36                 |               |
|            |                    | 15                      | 634.5                           | 8.53                 |               |
|            |                    | 30                      |                                 | 8.46                 |               |
|            |                    | 15                      | 644.5                           | 8.55                 |               |
|            |                    | 30                      |                                 | 8.50                 |               |
|            | 20                 | 15                      | 627.0                           | 8.38                 |               |
|            |                    | 30                      |                                 | 8.42                 |               |
|            |                    | 15                      | 634.5                           | 8.32                 |               |
|            |                    | 30                      |                                 | 8.39                 |               |
|            |                    | 15                      | 642.0                           | 8.35                 |               |
|            |                    | 30                      |                                 | 8.36                 |               |

Table 13 Test Results Peak to Average Power Ratio 256 QAM



| Modulation | Bandwidth | Sub Carrier | Operation Frequency | 0.1% PAPR | Limit |
|------------|-----------|-------------|---------------------|-----------|-------|
|            | (MHz)     | (kHz)       | (MHz)               | (dB)      | (dB)  |
| QPSK       | 5         | 15          | 619.5               | 8.18      | 13    |
|            |           | 30          |                     | 8.72      |       |
|            |           | 15          | 634.5               | 8.27      |       |
|            |           | 30          |                     | 8.88      |       |
|            |           | 15          | 649.5               | 8.25      |       |
|            |           | 30          |                     | 8.86      |       |
|            | 10        | 15          | 622.0               | 8.41      |       |
|            |           | 30          |                     | 8.45      |       |
|            |           | 15          | 634.5               | 8.51      |       |
|            |           | 30          |                     | 8.48      |       |
|            |           | 15          | 647.0               | 8.48      |       |
|            |           | 30          |                     | 8.43      |       |
|            | 15        | 15          | 624.5               | 8.47      |       |
|            |           | 30          |                     | 8.47      |       |
|            |           | 15          | 634.5               | 8.40      |       |
|            |           | 30          |                     | 8.49      |       |
|            |           | 15          | 644.5               | 8.46      |       |
|            |           | 30          |                     | 8.69      |       |
|            | 20        | 15          | 627.0               | 8.37      |       |
|            |           | 30          |                     | 8.23      |       |
|            |           | 15          | 634.5               | 8.45      |       |
|            |           | 30          |                     | 8.34      |       |
|            |           | 15          | 642.0               | 8.47      |       |
|            |           | 30          |                     | 8.43      |       |

Table 14 Test Results Peak to Average Power Ratio QPSK



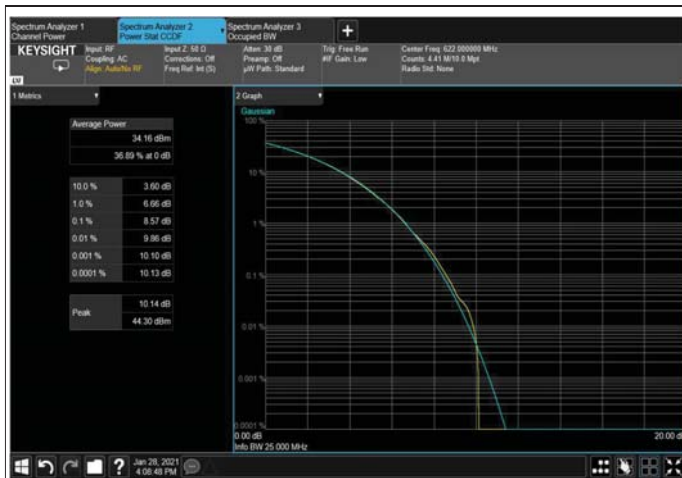


Figure 174: 16QAM 10MHz B.W; 622.0MHz, 15kHz

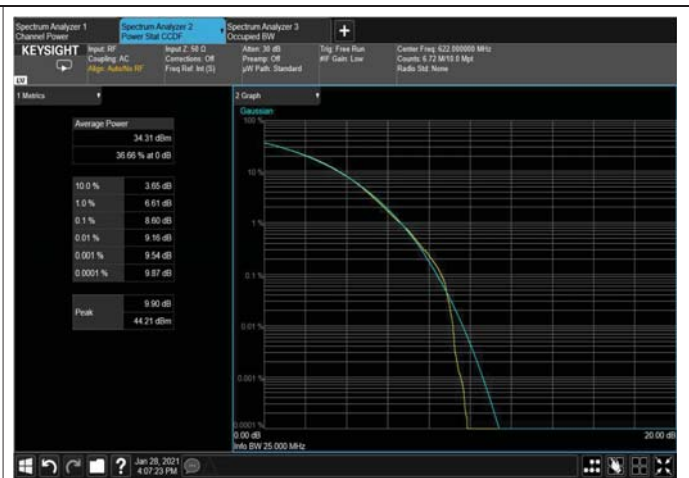


Figure 175: 16QAM 10MHz B.W; 622.0MHz, 30kHz

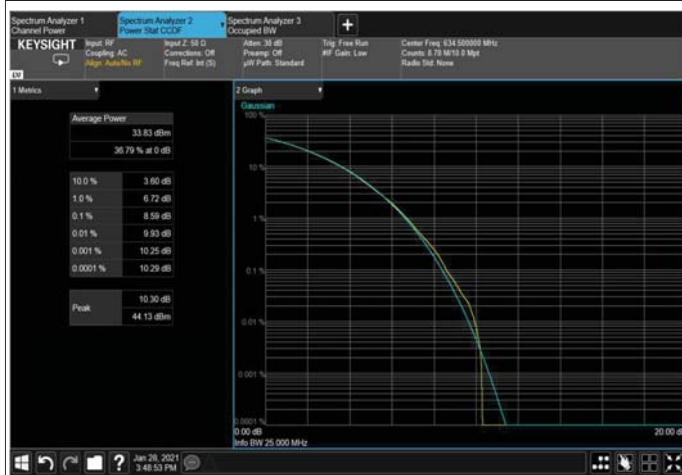


Figure 176: 16QAM 10MHz B.W; 634.5MHz, 15kHz

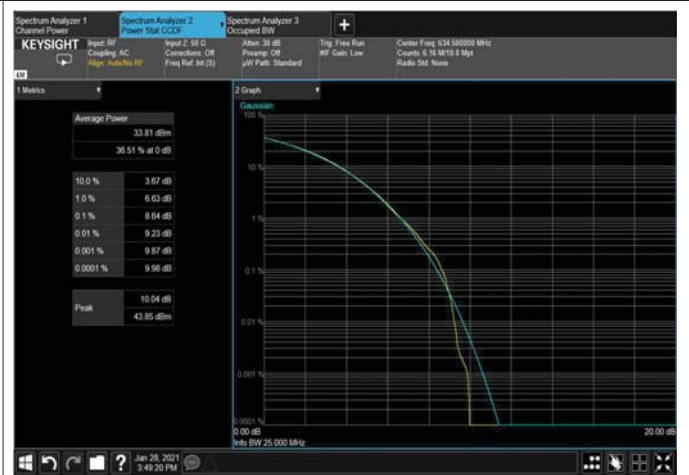


Figure 177: 16QAM 10MHz B.W; 634.5MHz, 30kHz

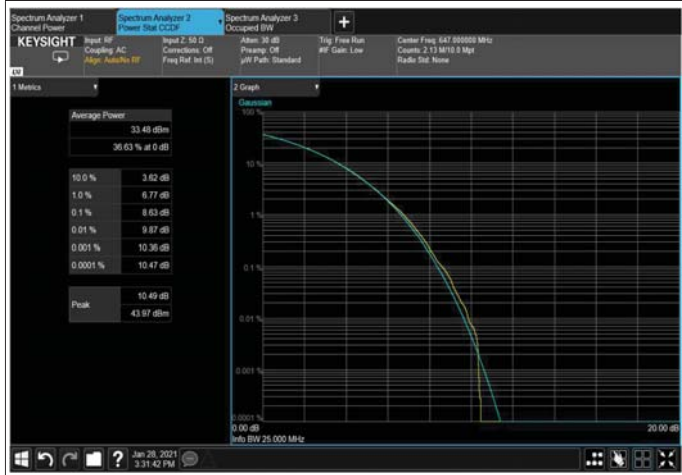


Figure 178: 16QAM 10MHz B.W; 647MHz, 15kHz

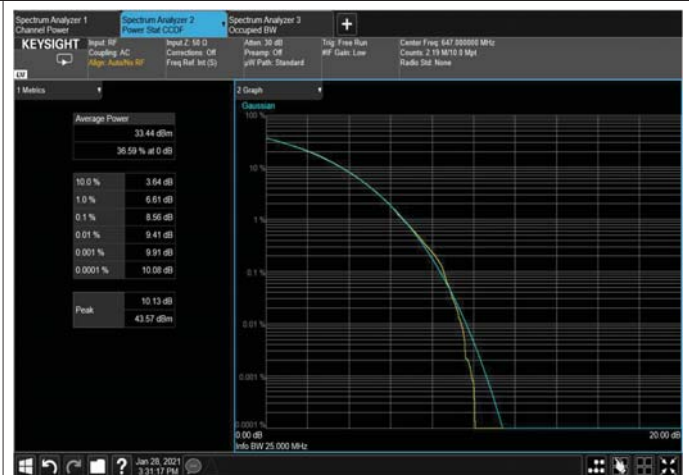
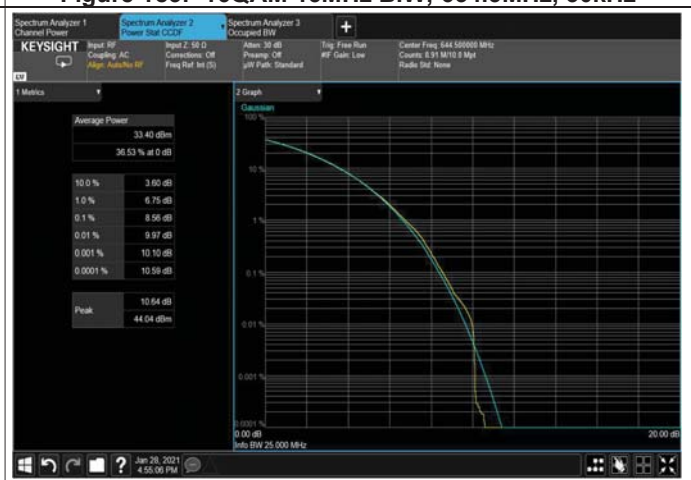
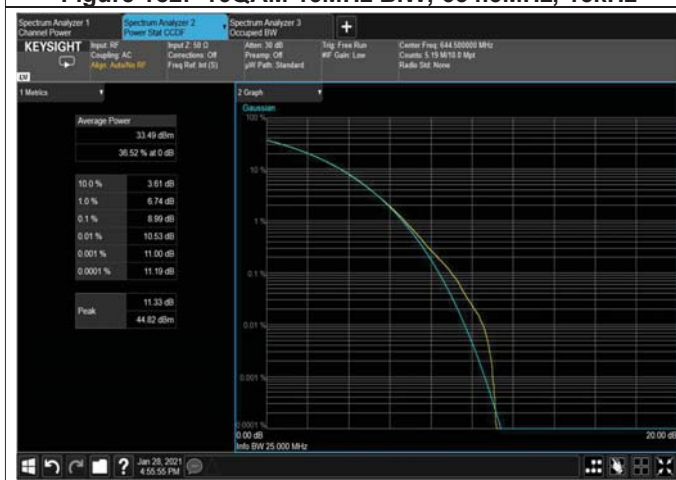
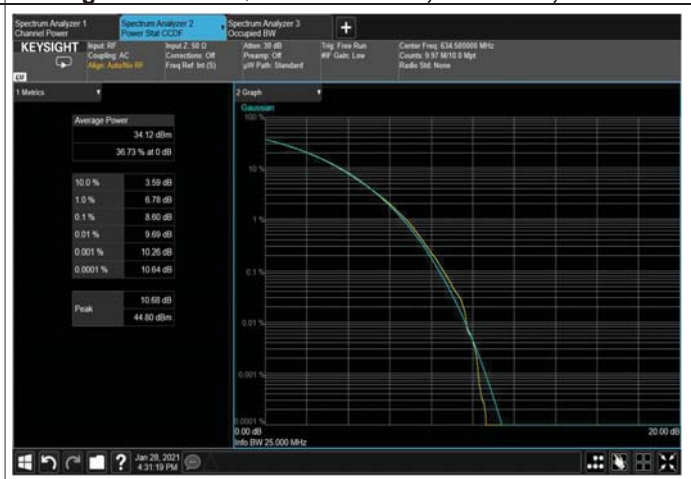
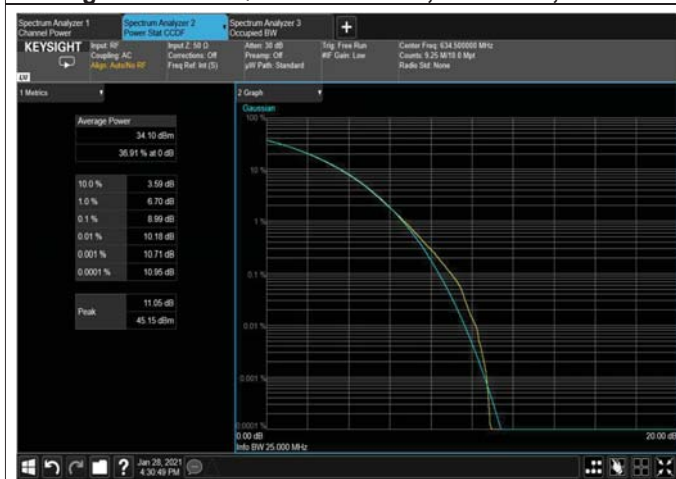
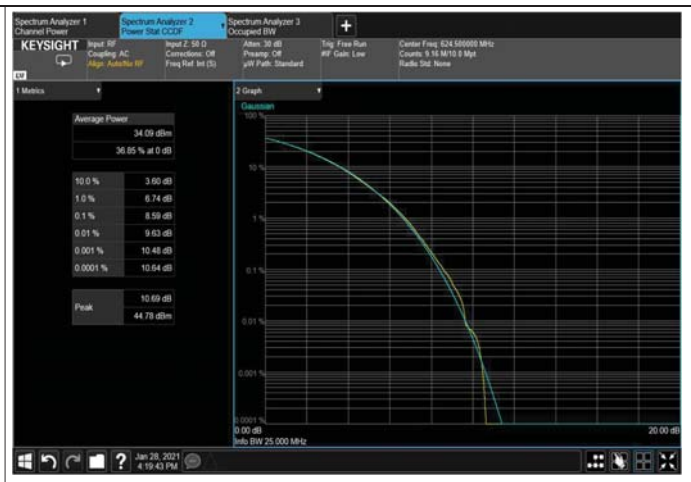
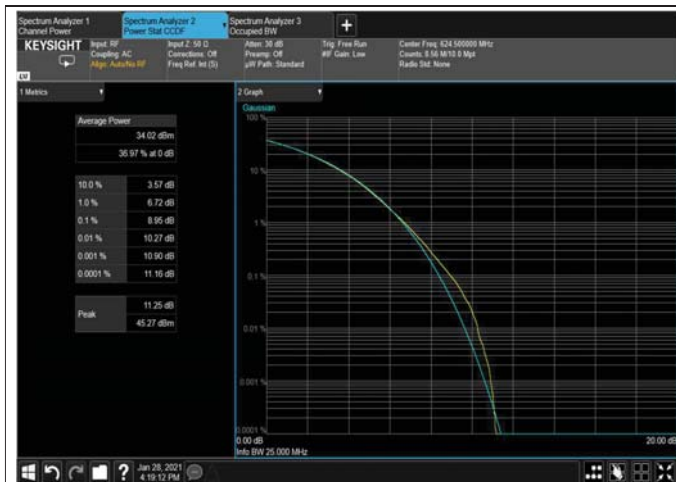


Figure 179: 16QAM 10MHz B.W; 647.0MHz, 30kHz



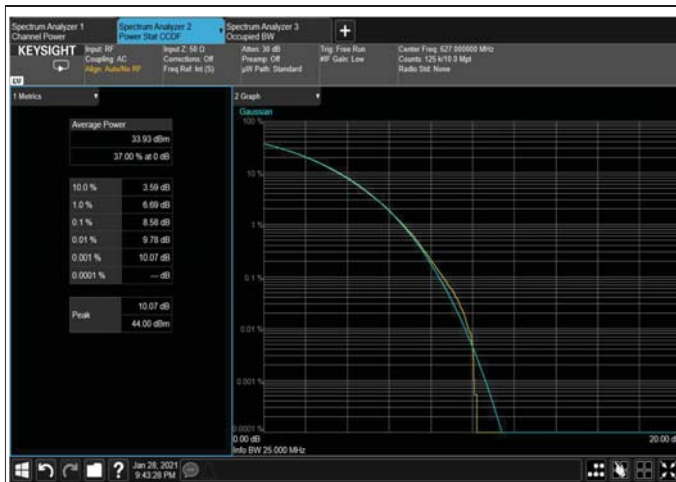


Figure 186: 16QAM 20MHz B.W; 627.0MHz, 15kHz

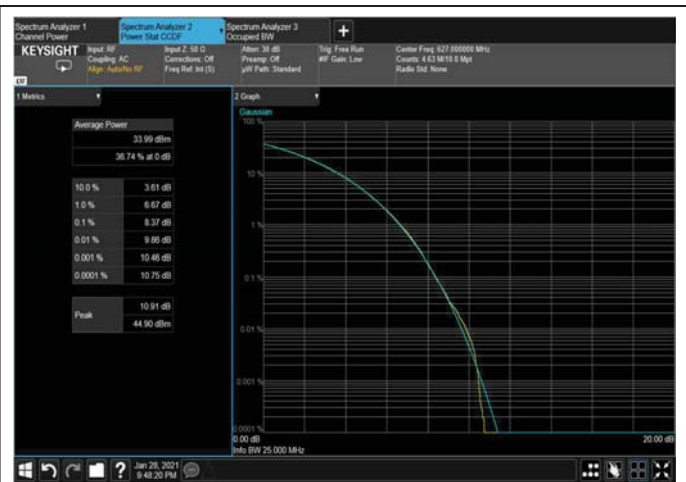


Figure 187: 16QAM 20MHz B.W; 627.0MHz, 30kHz

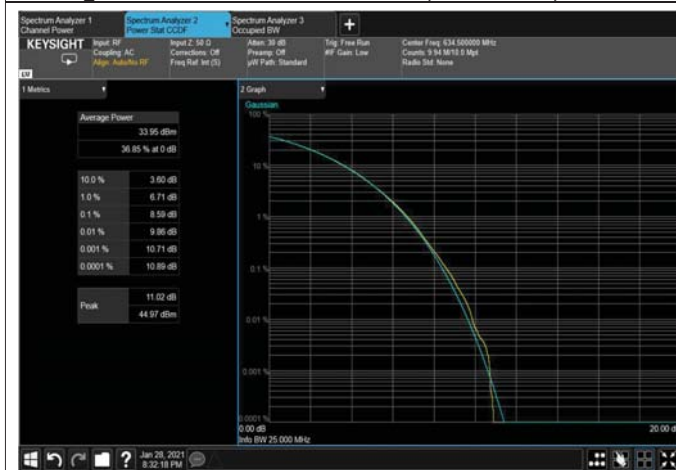


Figure 188: 16QAM 20MHz B.W; 634.5MHz, 15kHz

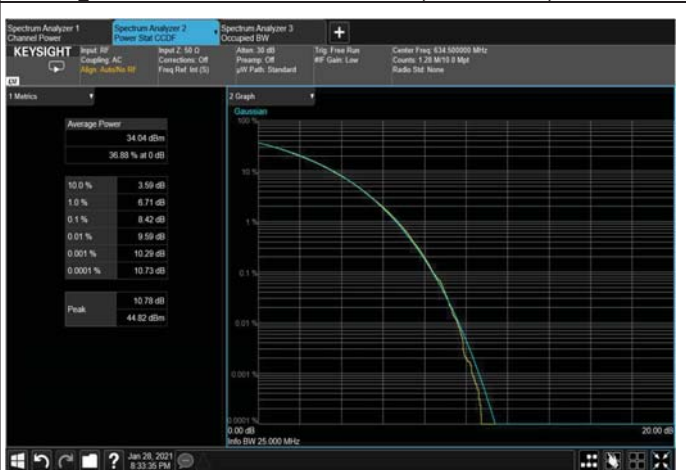


Figure 189: 16QAM 20MHz B.W; 634.5MHz, 30kHz

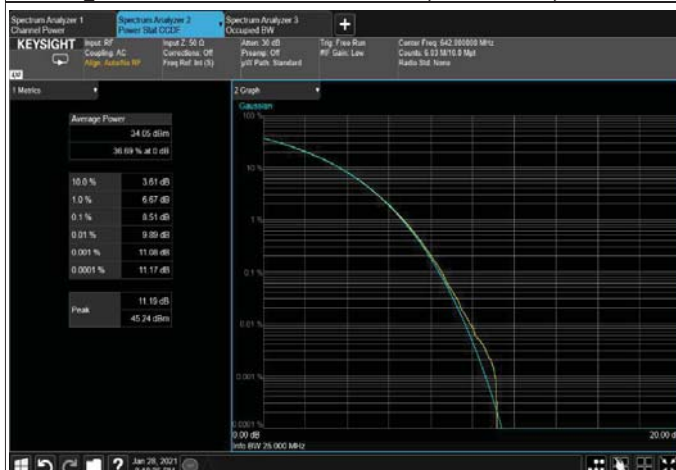


Figure 190: 16QAM 20MHz B.W; 642.0MHz, 15kHz

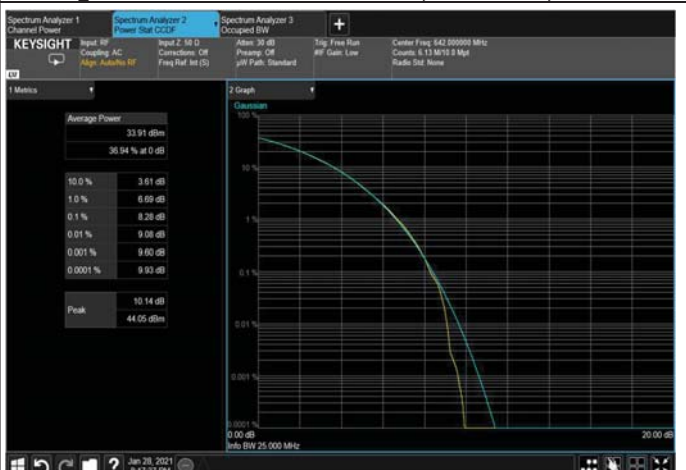
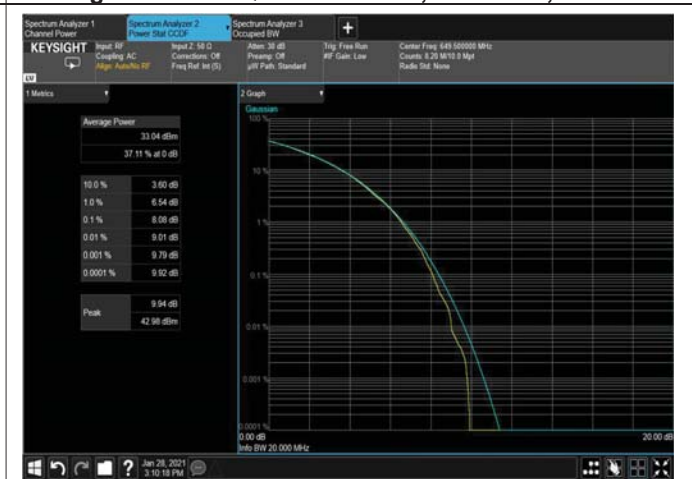
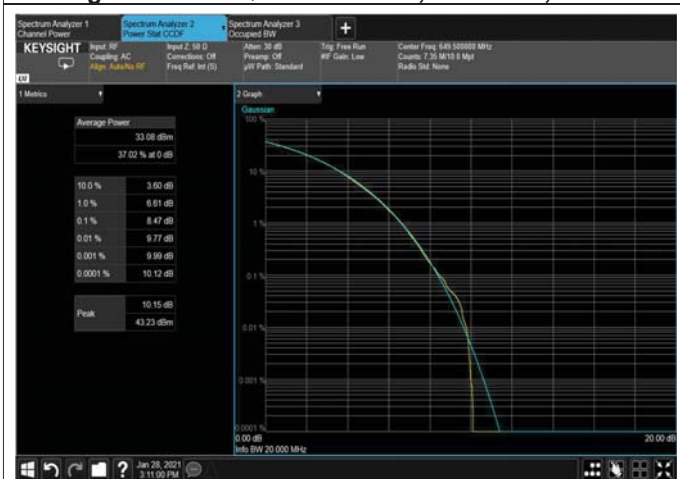
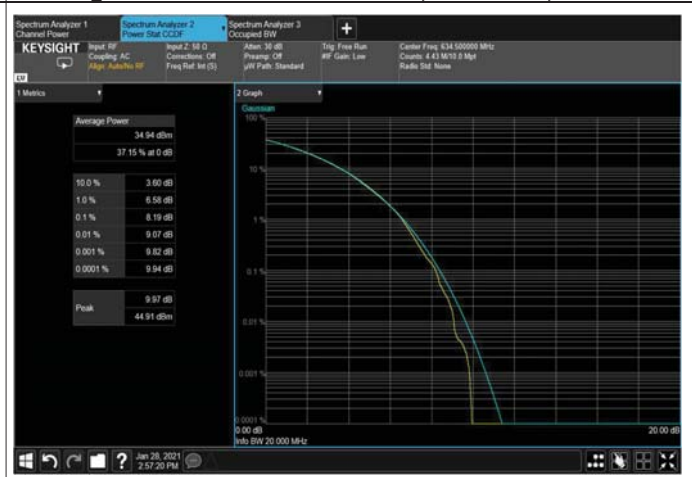
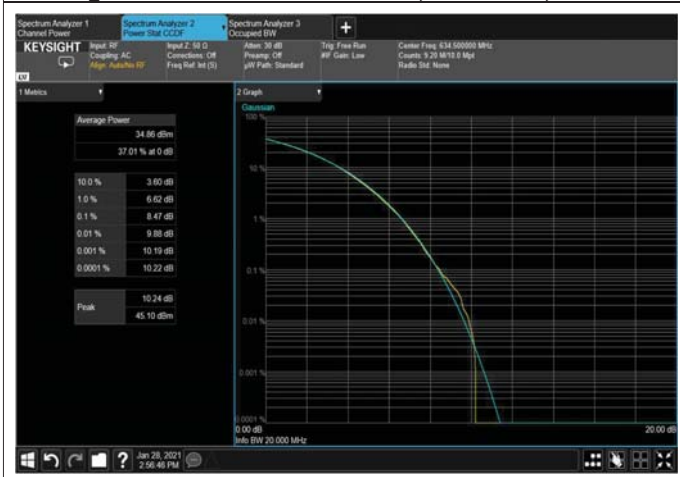
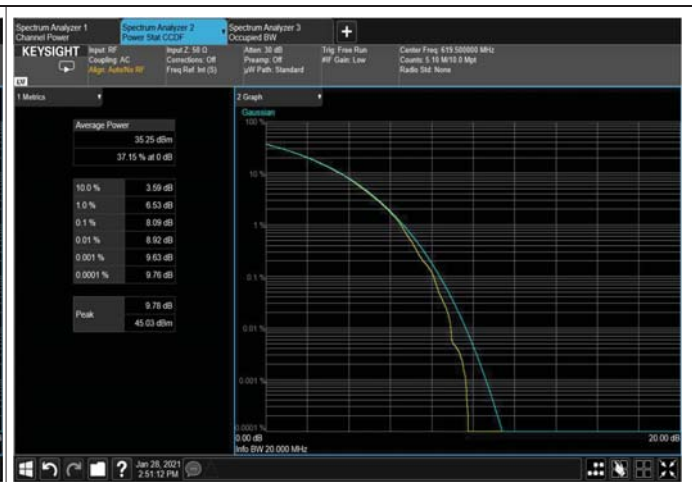
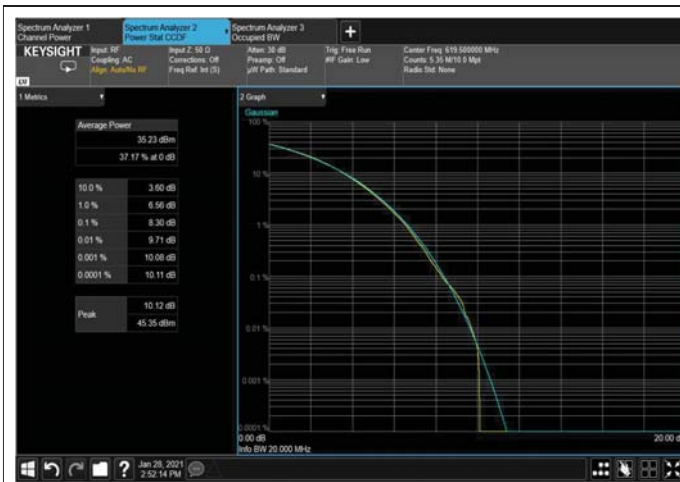


Figure 191: 16QAM 20MHz B.W; 642.0MHz, 30kHz



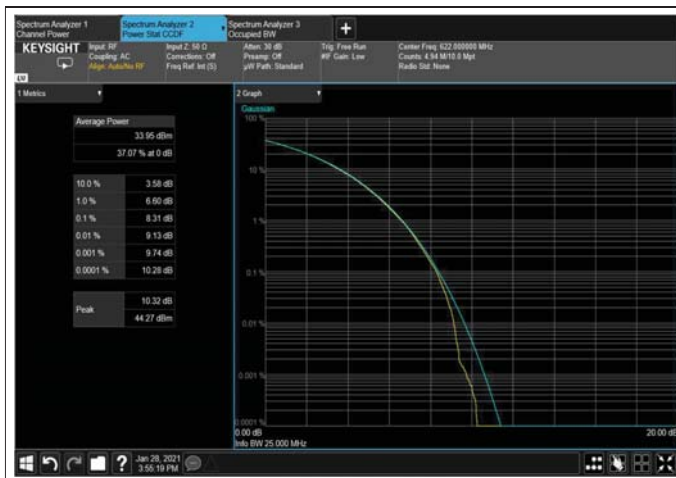


Figure 198: 64QAM 10MHz B.W; 622.0MHz, 15kHz

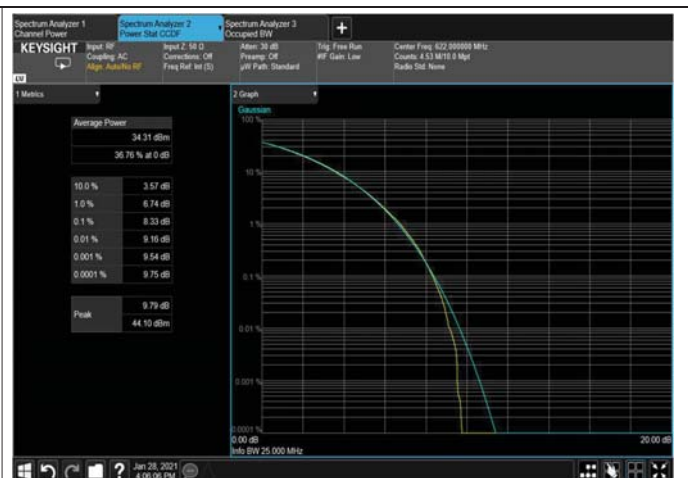


Figure 199: 64QAM 10MHz B.W; 622.0.5MHz, 30kHz

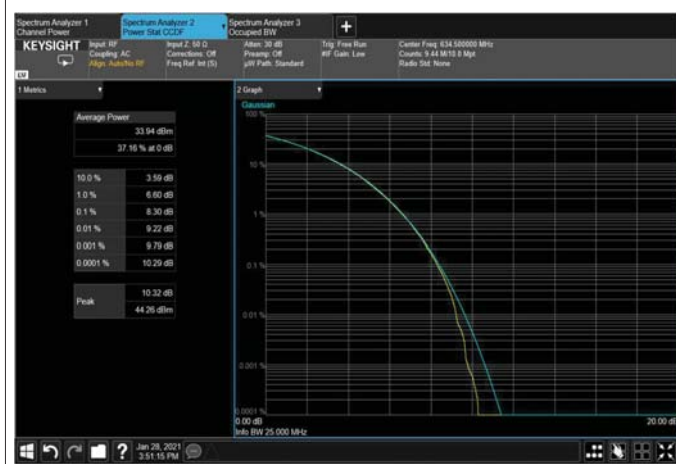


Figure 200: 64QAM 10MHz B.W; 634.5MHz, 15kHz

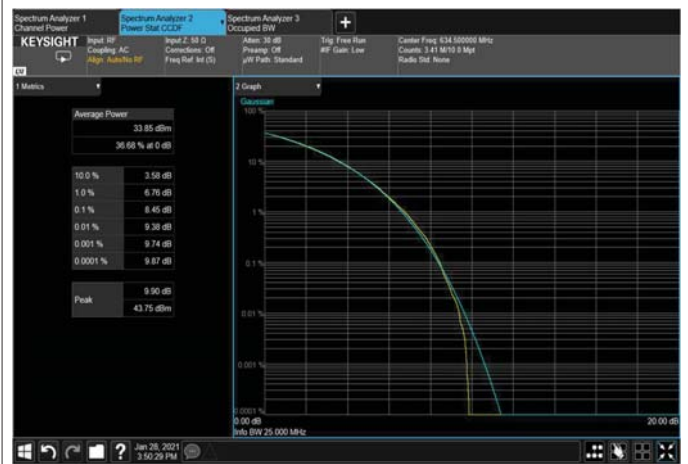


Figure 201: 64QAM 10MHz B.W; 634.5MHz, 30kHz

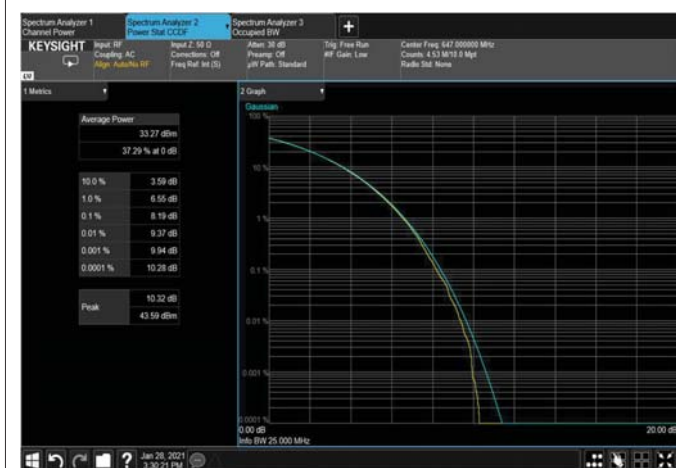


Figure 202: 64QAM 10MHz B.W; 647.0MHz, 15kHz

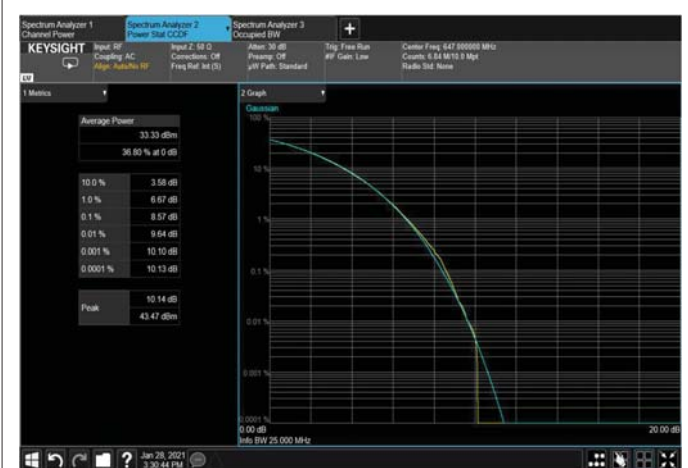
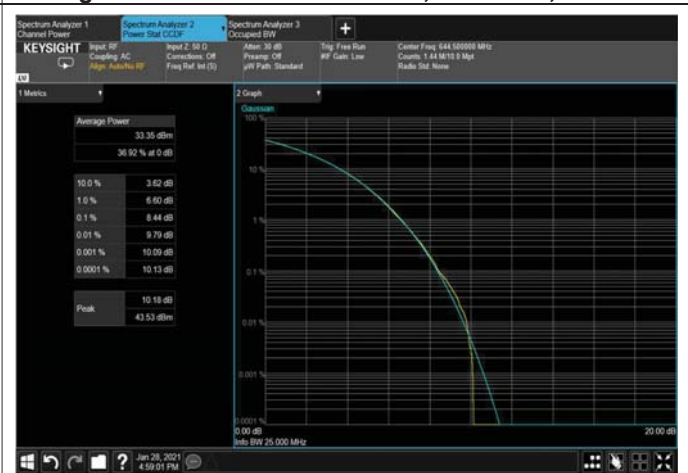
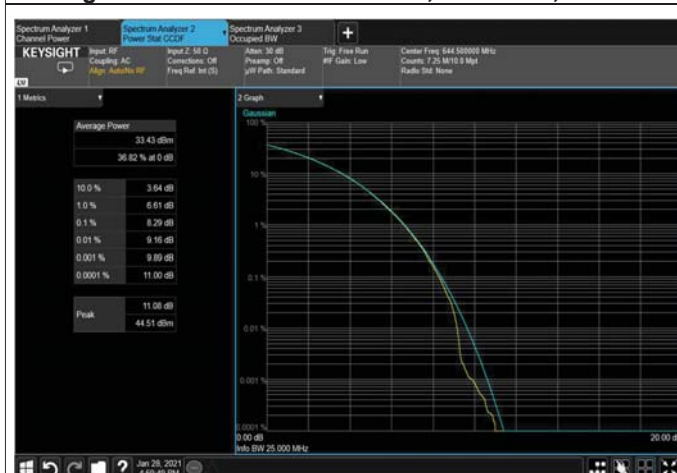
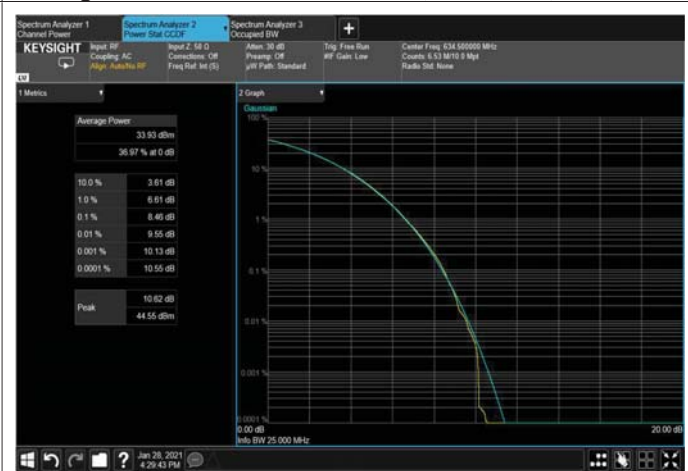
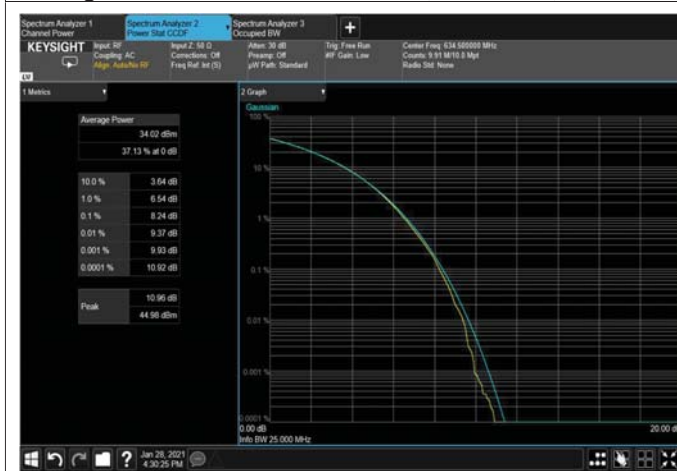
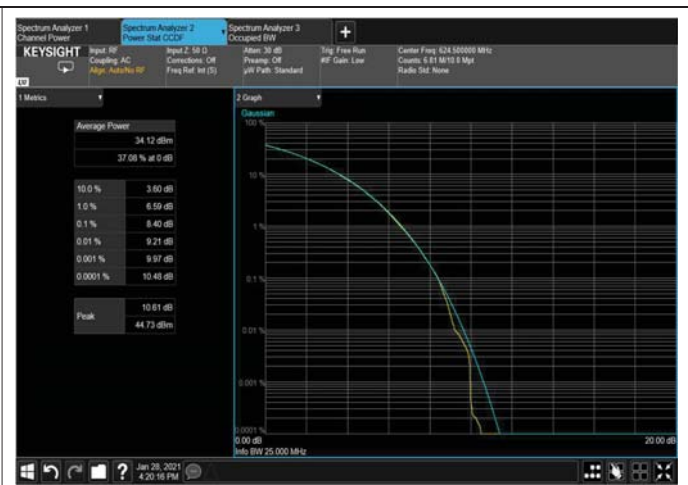
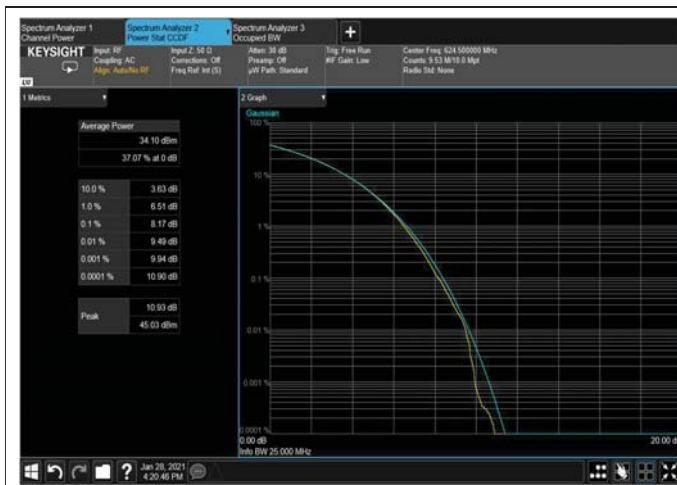


Figure 203: 64QAM 10MHz B.W; 647.0MHz, 30kHz



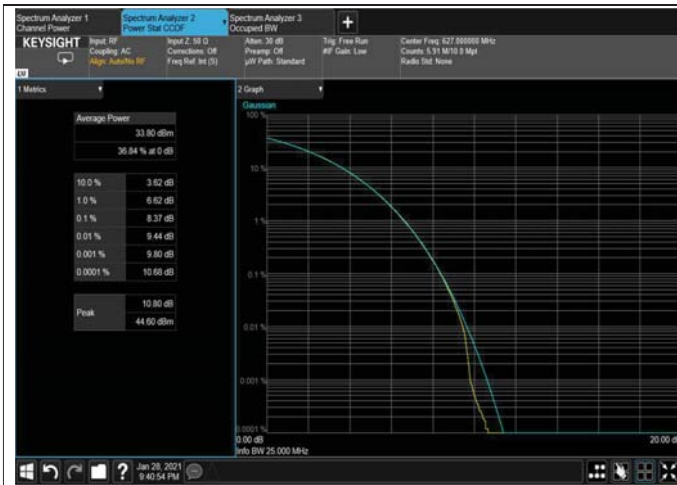


Figure 210: 64QAM 20MHz B.W; 627.0MHz, 15kHz

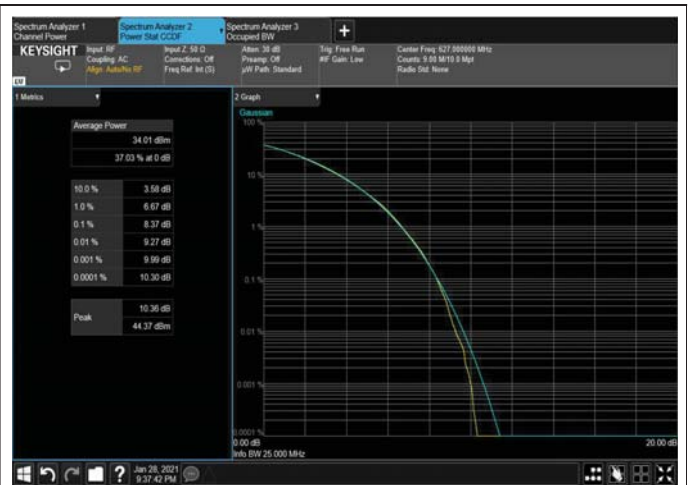


Figure 211: 64QAM 20MHz B.W; 627.0MHz, 30kHz

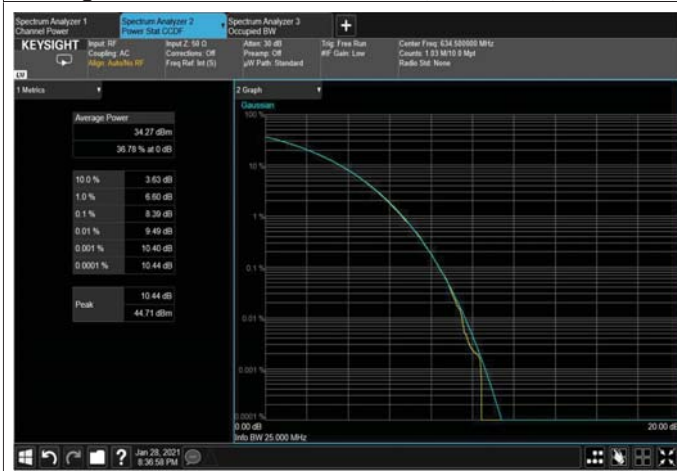


Figure 212: 64QAM 20MHz B.W; 634.5MHz, 15kHz

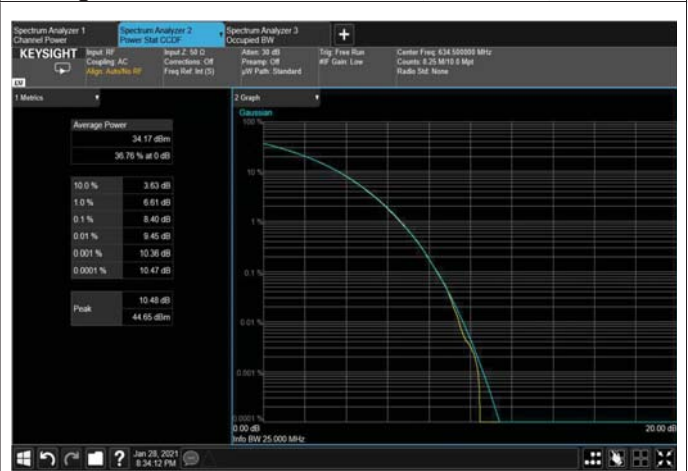


Figure 213: 64QAM 20MHz B.W; 634.5MHz, 30kHz

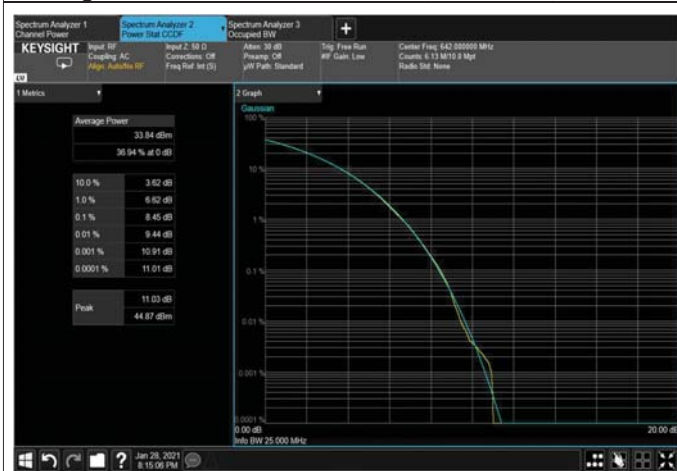


Figure 214: 64QAM 20MHz B.W; 642.0MHz, 15kHz

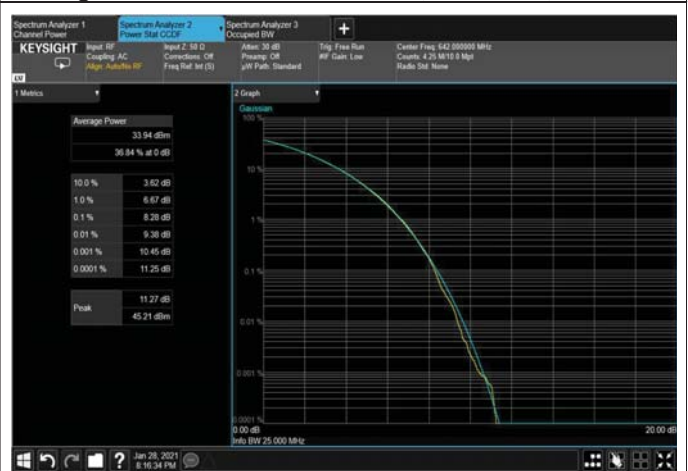
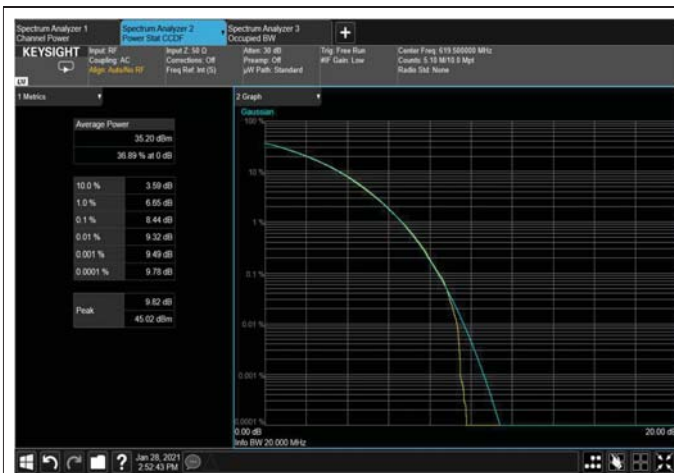


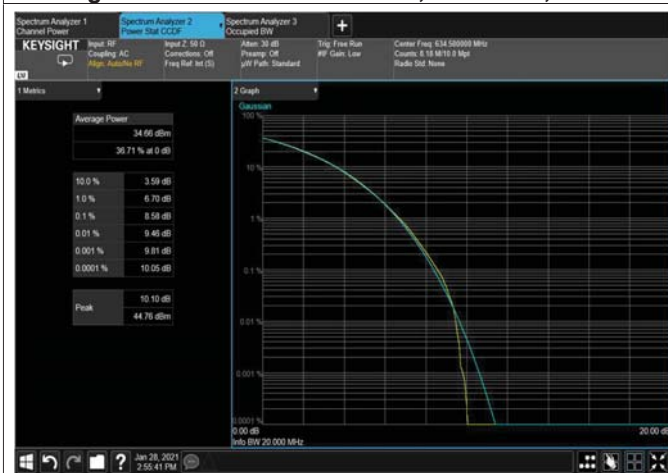
Figure 215: 64QAM 20MHz B.W; 642.0MHz, 30kHz



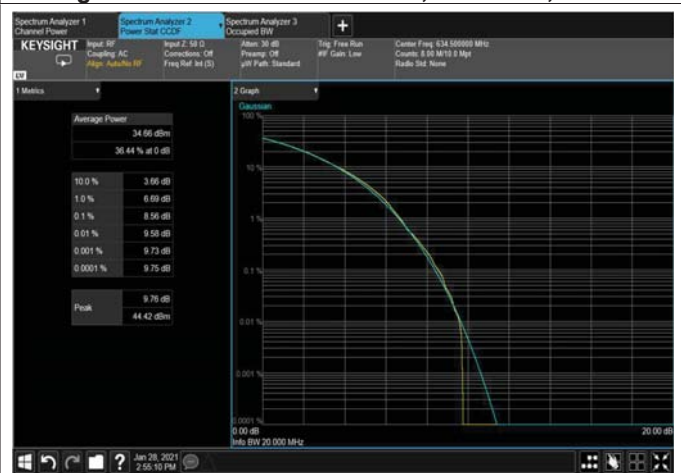
**Figure 216: 64QAM 5MHz B.W; 619.5MHz, 15kHz**



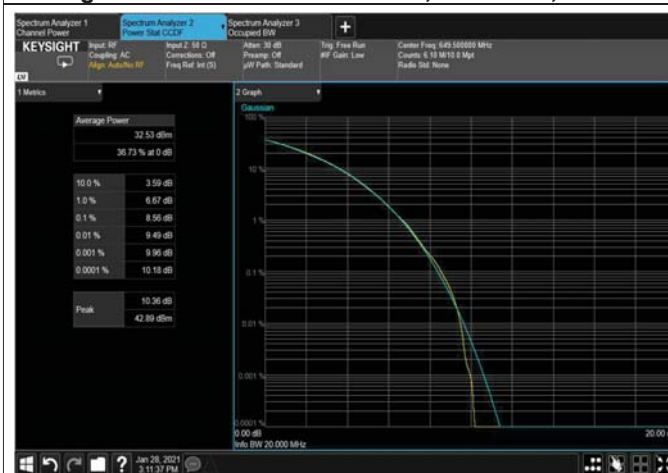
**Figure 217: 256QAM 5MHz B.W; 619.5MHz, 30kHz**



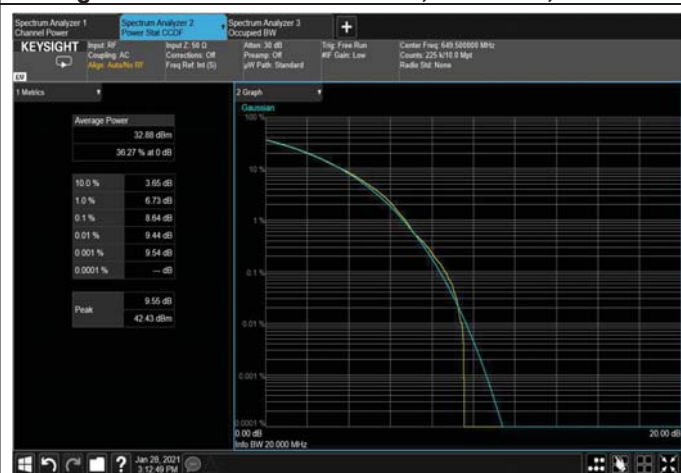
**Figure 218: 256QAM 5MHz B.W; 634.5MHz, 15kHz**



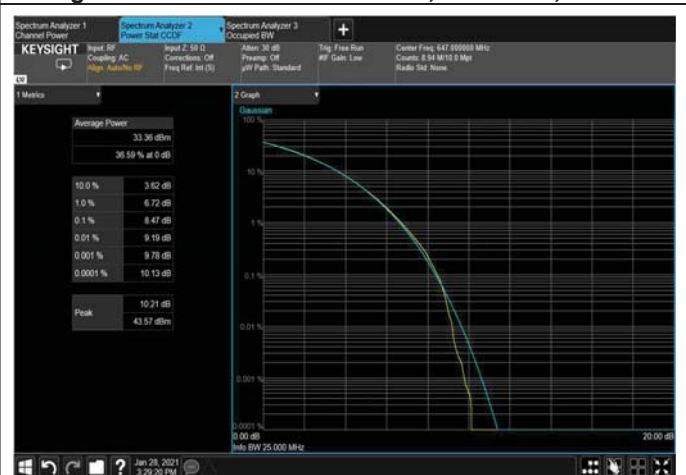
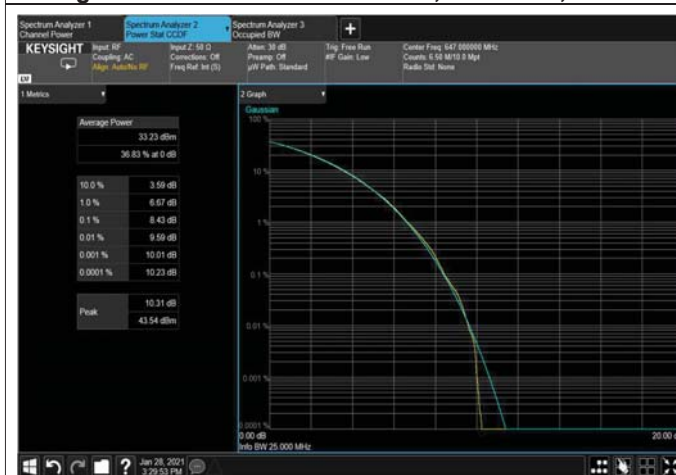
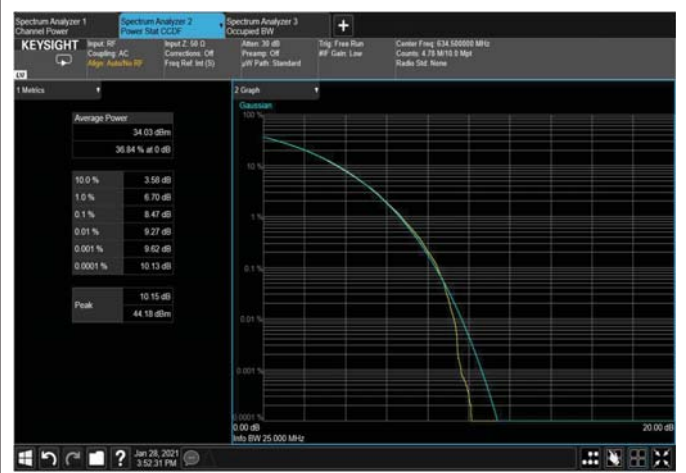
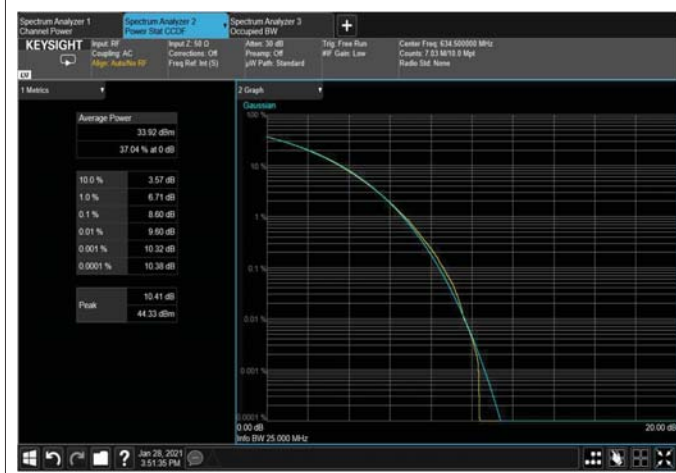
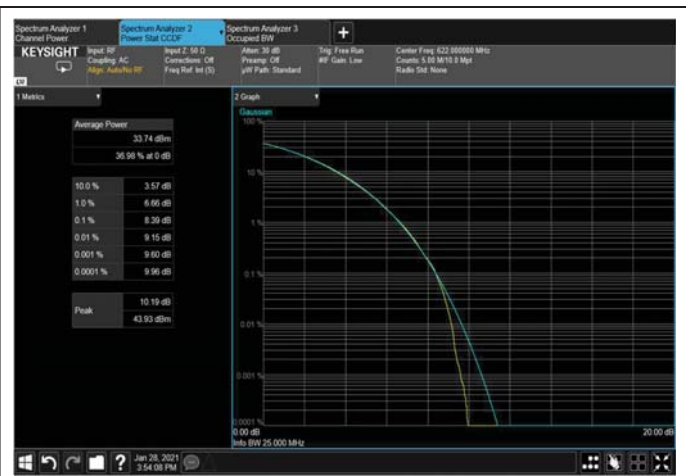
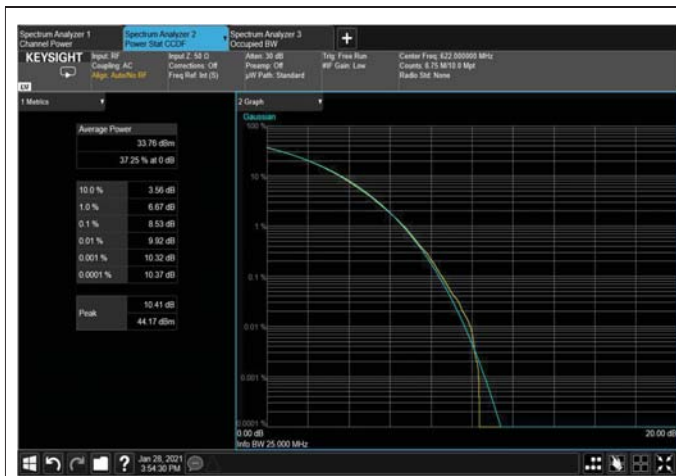
**Figure 219: 256QAM 5MHz B.W; 634.5MHz, 30kHz**



**Figure 220: 256QAM 5MHz B.W; 649.5MHz, 15kHz**



**Figure 221: 256QAM 5MHz B.W; 649.5MHz, 30kHz**



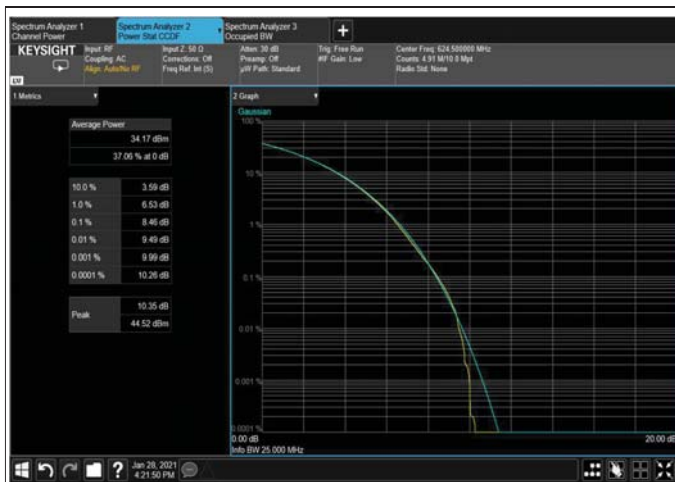


Figure 228: 256QAM 15MHz B.W; 624.5MHz, 15kHz

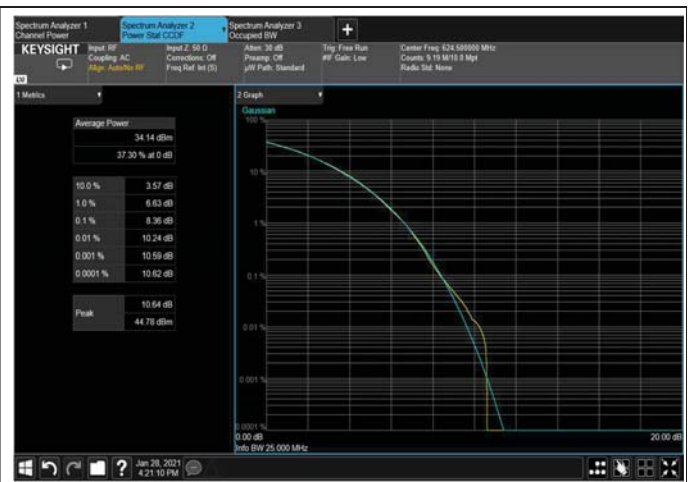


Figure 229: 256QAM 15MHz B.W; 624.5MHz, 30kHz

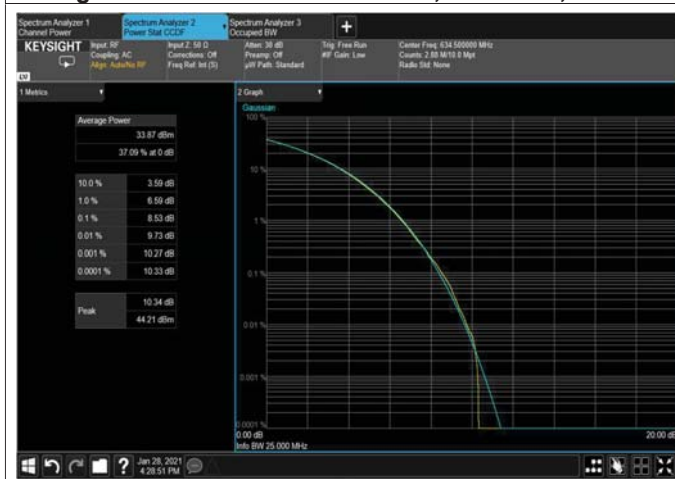


Figure 230: 256QAM 15MHz B.W; 634.5MHz, 15kHz

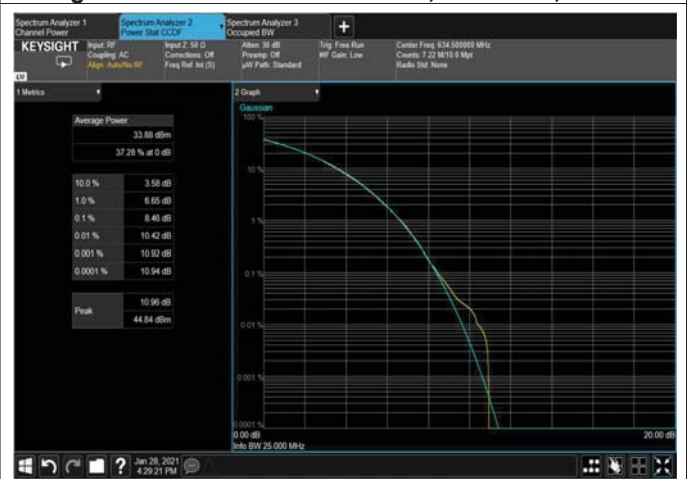


Figure 231: 256QAM 15MHz B.W; 634.5MHz, 30kHz

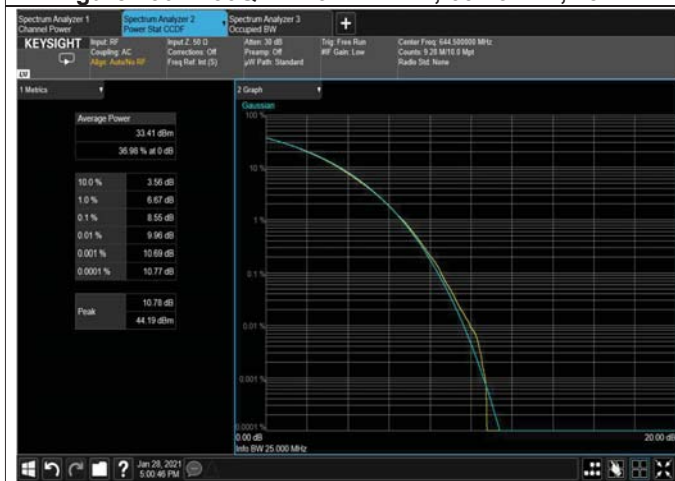


Figure 232: 256QAM 15MHz B.W; 644.5MHz, 15kHz

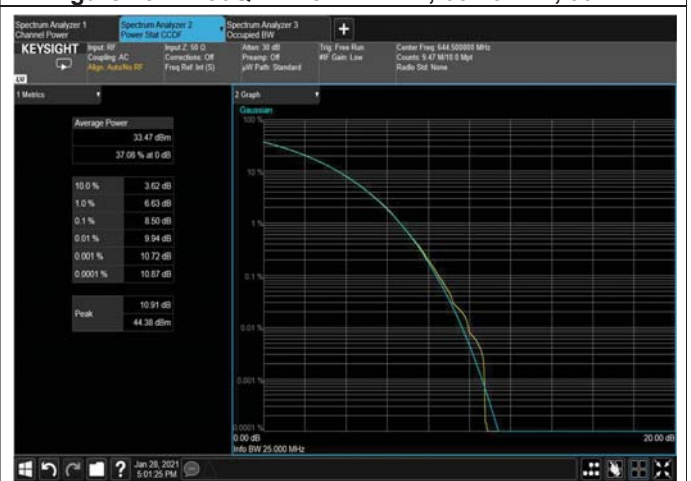


Figure 233: 256QAM 15MHz B.W; 644.5MHz, 30kHz

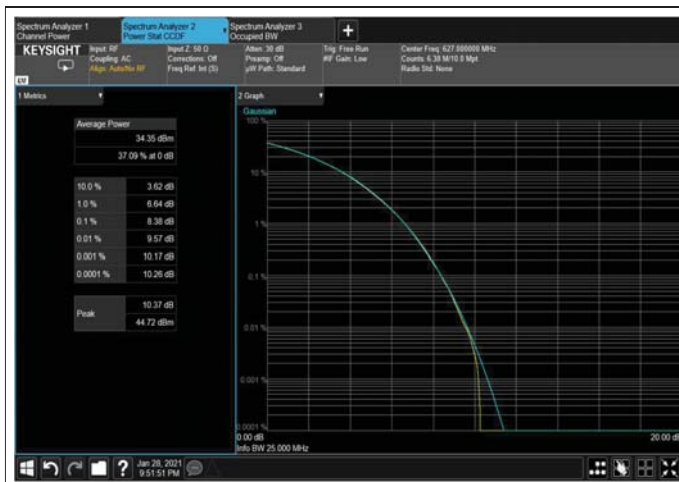


Figure 234: 256QAM 20MHz B.W; 627MHz, 15kHz

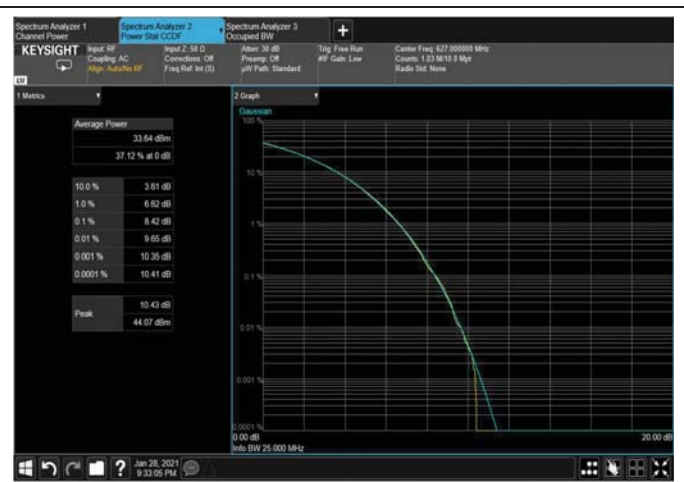


Figure 235: 256QAM 20MHz B.W; 627.0MHz, 30kHz

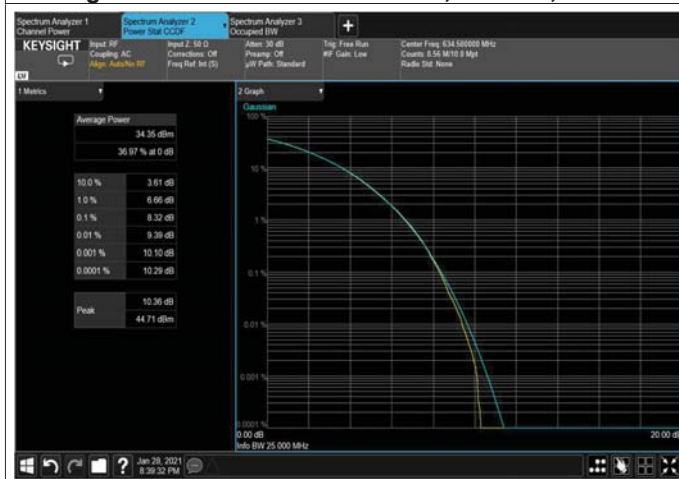


Figure 236: 256QAM 20MHz B.W; 634.5MHz, 15kHz

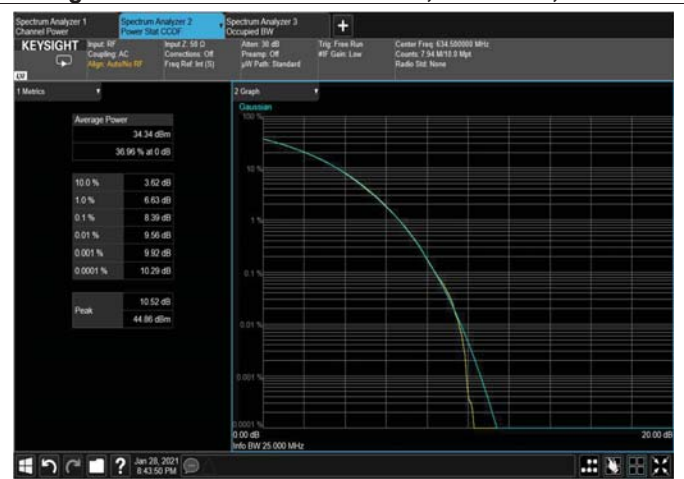


Figure 237: 256QAM 20MHz B.W; 642.0MHz, 30kHz

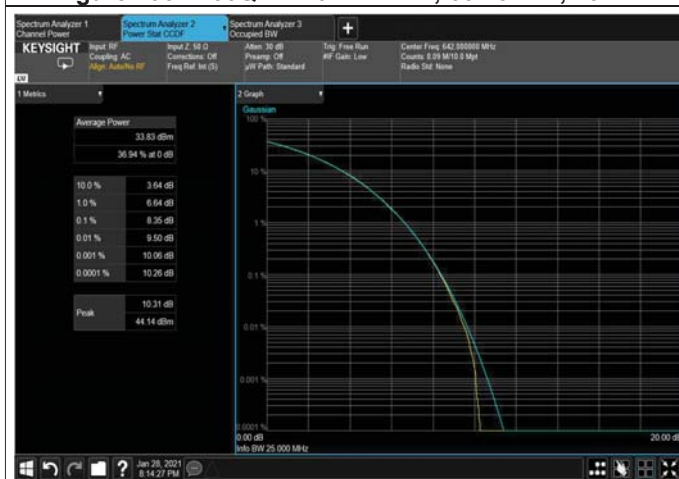


Figure 238: 256QAM 20MHz B.W; 642.0MHz, 15kHz

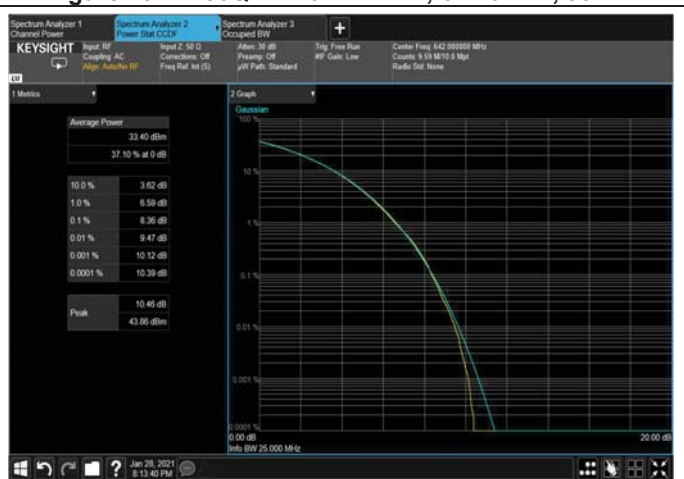
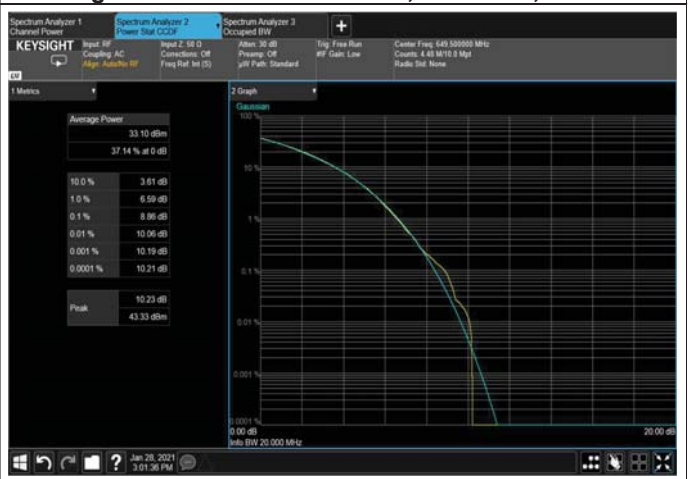
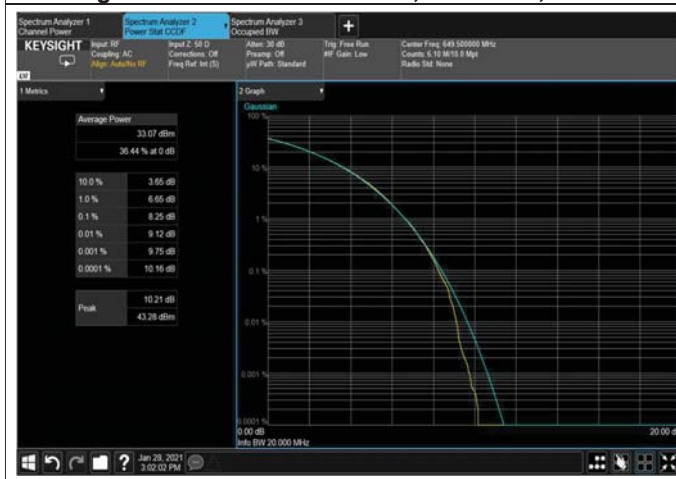
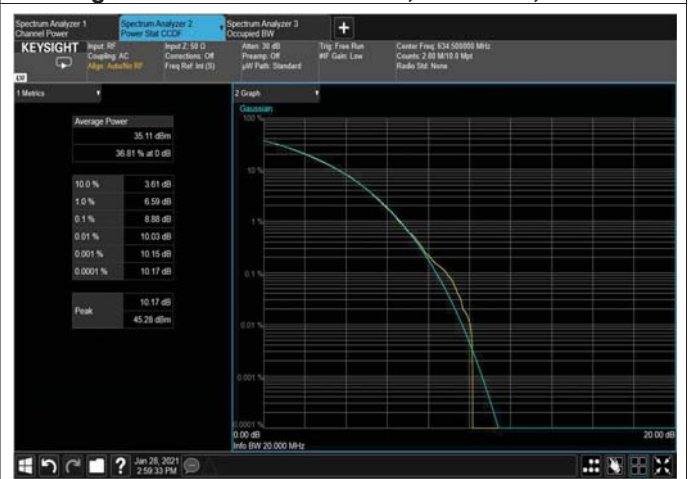
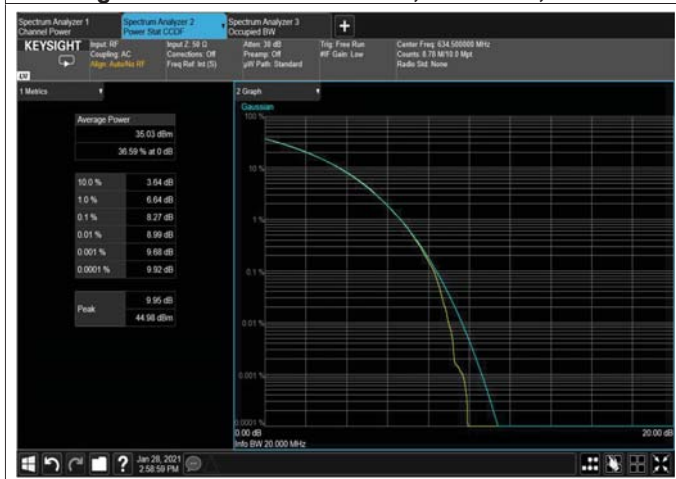
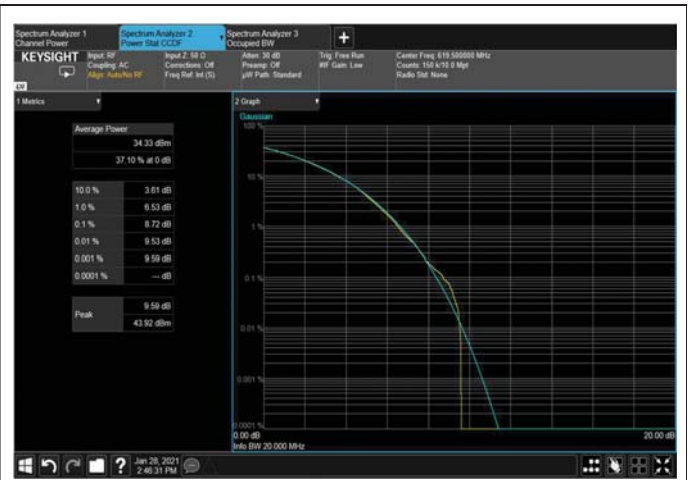
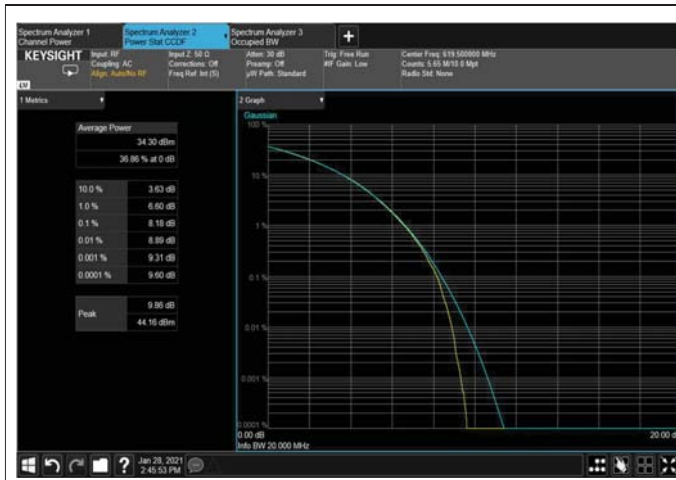


Figure 239: 256QAM 20MHz B.W; 642.0MHz, 30kHz



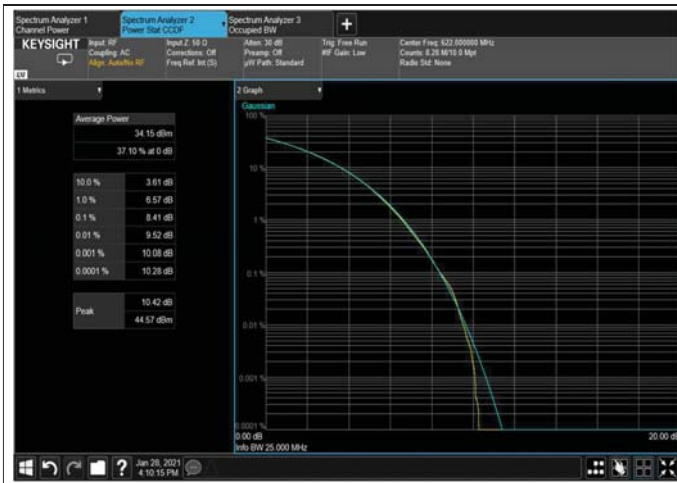


Figure 246: QPSK 10MHz B.W; 622.0MHz, 15kHz

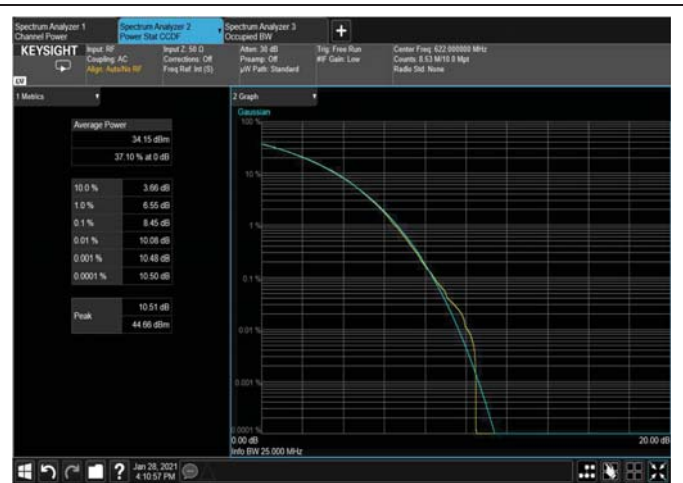


Figure 247: QPSK 10MHz B.W; 622MHz, 30kHz

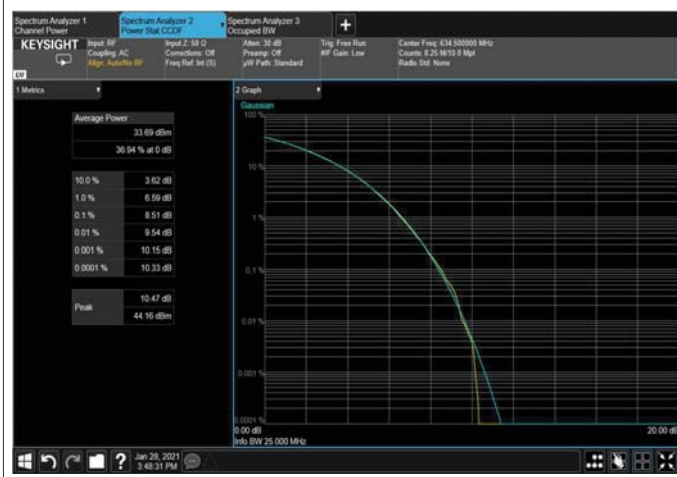


Figure 248: QPSK 10MHz B.W; 634.5MHz, 15kHz

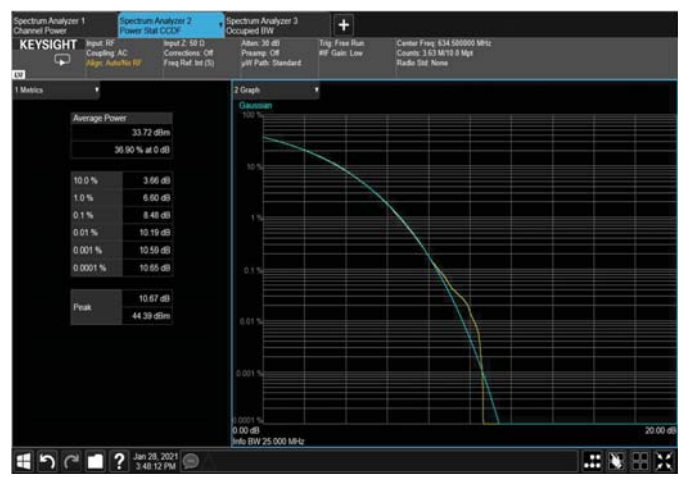


Figure 249: QPSK 10MHz B.W; 634.5MHz, 30kHz

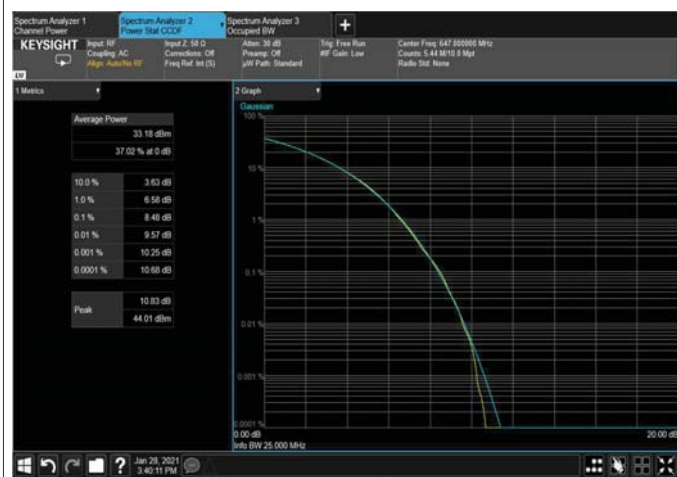


Figure 250: QPSK 10MHz B.W; 647.0MHz, 15kHz

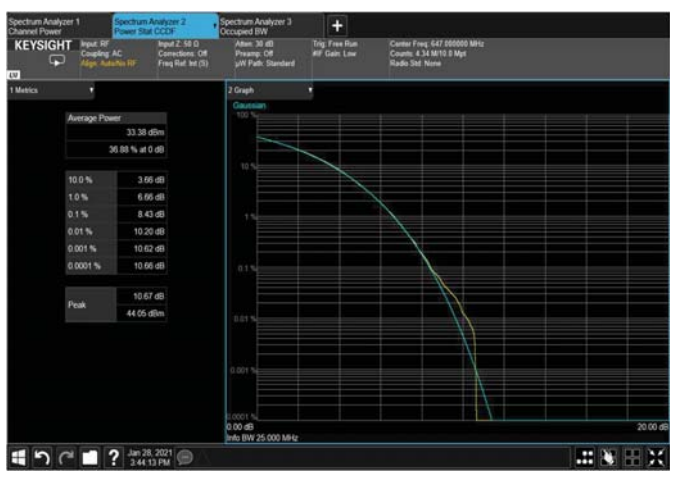


Figure 251: QPSK 10MHz B.W; 647.0MHz, 30kHz

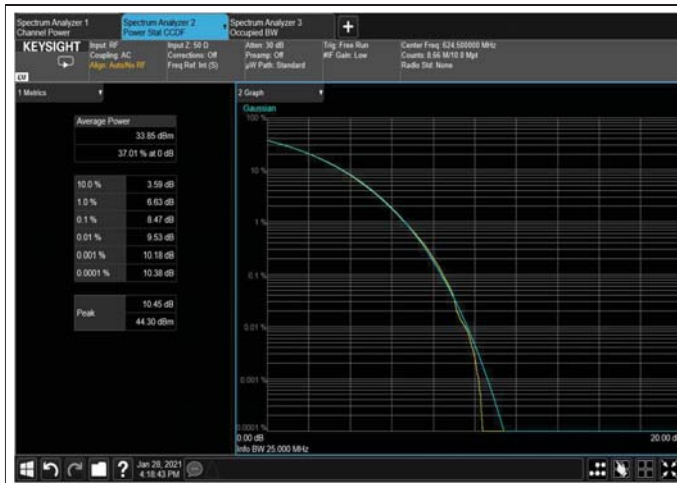


Figure 252: QPSK 15MHz B.W; 624.5MHz, 15kHz

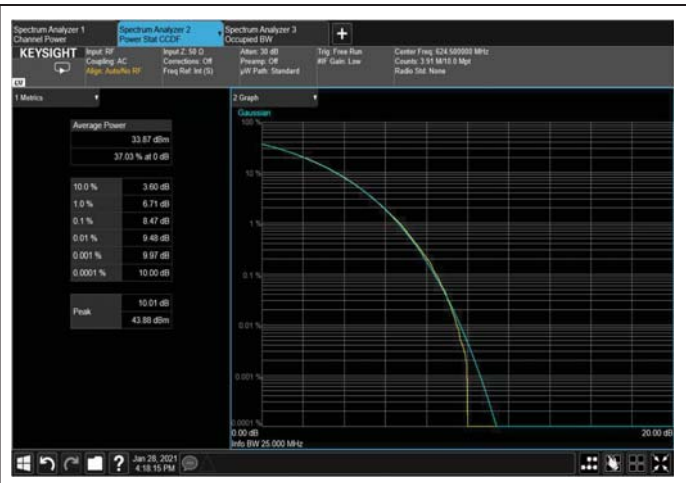


Figure 253: QPSK 15MHz B.W; 624.5MHz, 30kHz

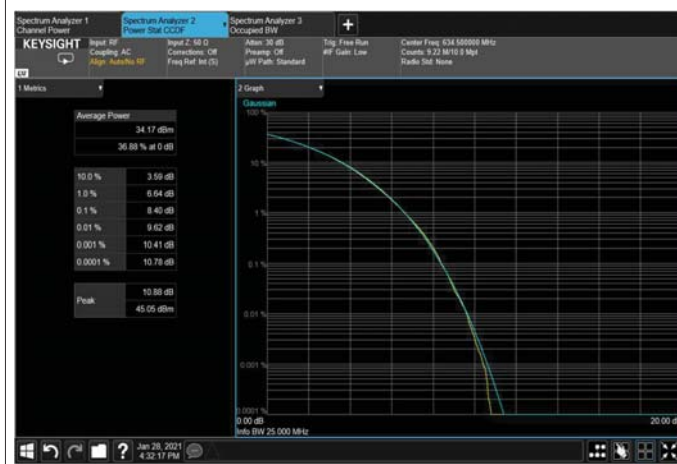


Figure 254: QPSK 15MHz B.W; 634.5MHz, 15kHz

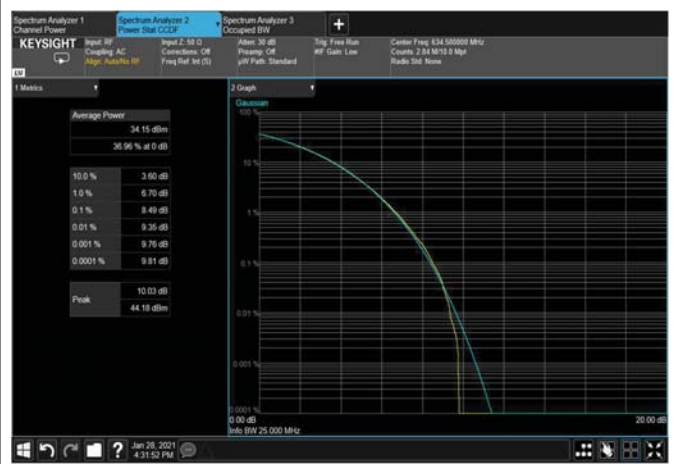


Figure 255: QPSK 15MHz B.W; 634.5MHz, 30kHz

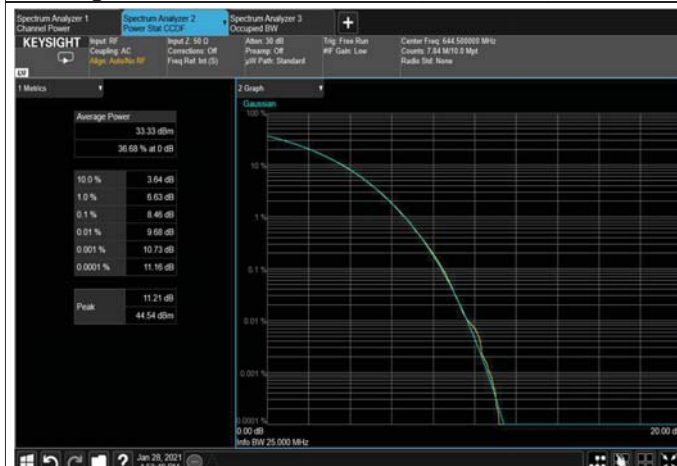


Figure 256: QPSK 15MHz B.W; 644.5MHz, 15kHz

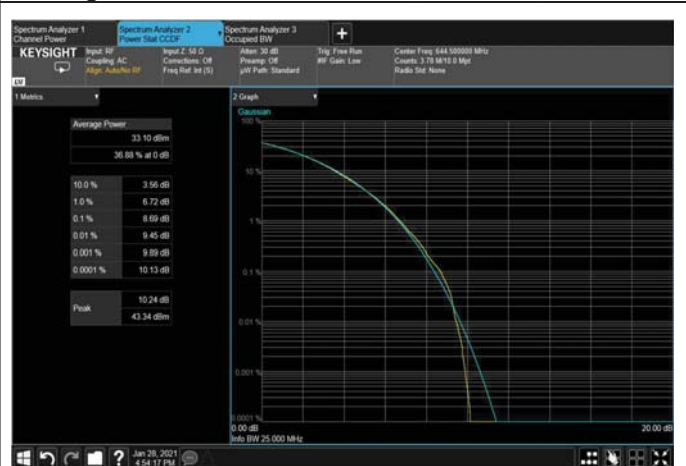
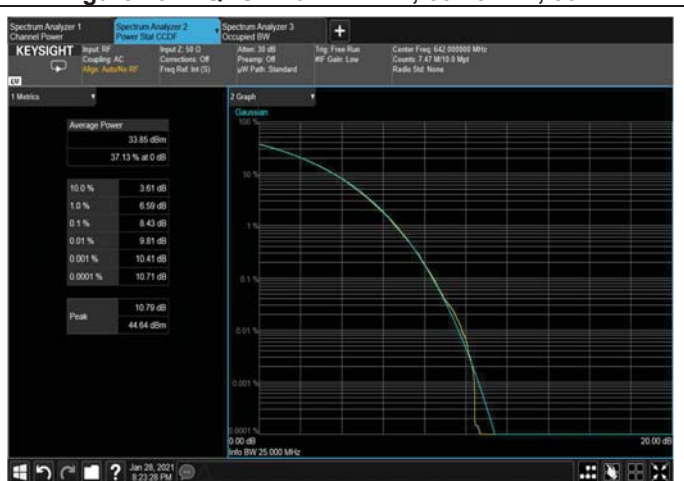
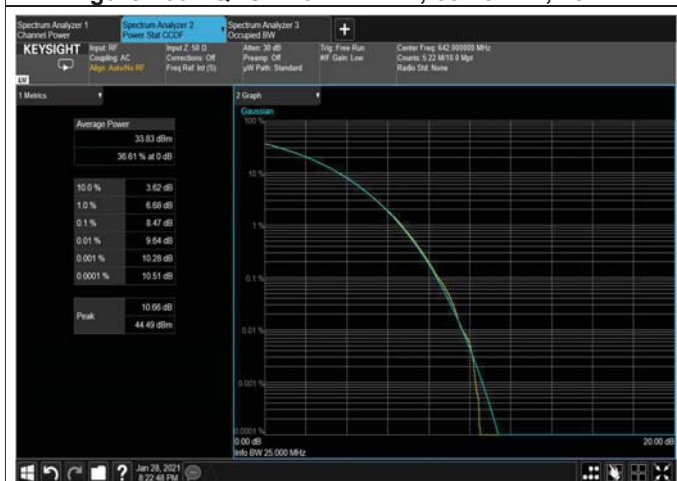
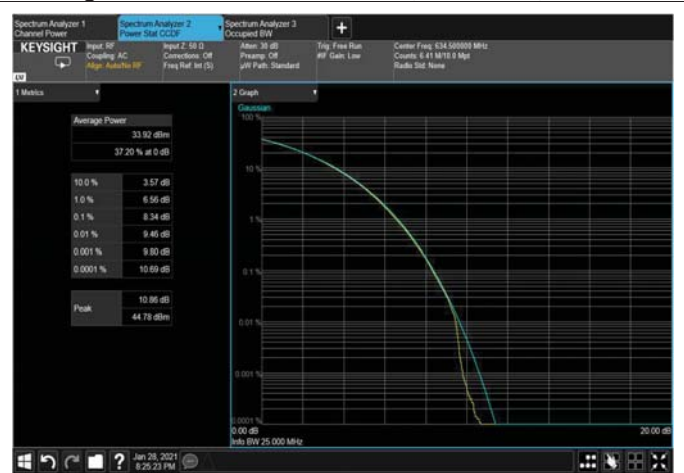
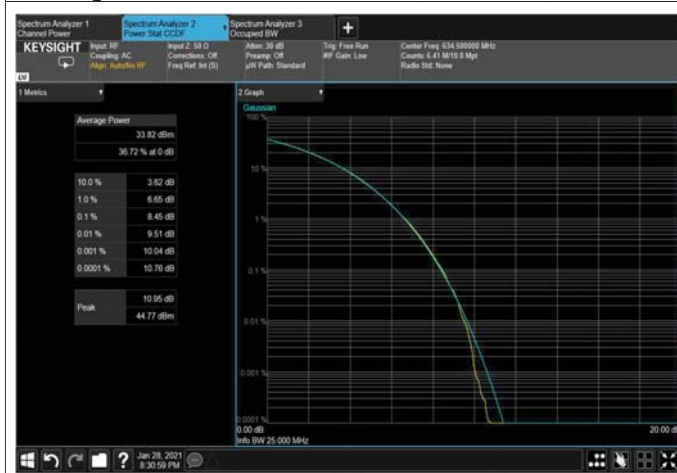
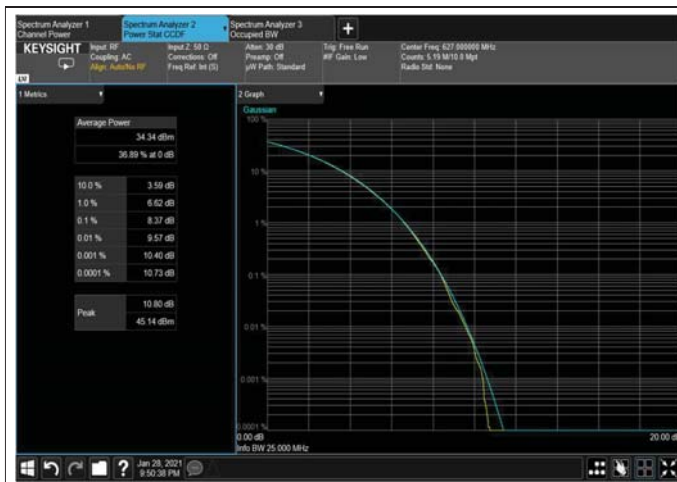


Figure 257: QPSK 15MHz B.W; 644.5MHz, 30kHz





### 6.5 Test Equipment Used; 0.1% PAPR

| Instrument                  | Manufacturer         | Model       | Serial Number | Calibration           |                      |
|-----------------------------|----------------------|-------------|---------------|-----------------------|----------------------|
|                             |                      |             |               | Last Calibration Date | Next Calibration Due |
| EXA signal Analyzer         | Keysight             | UXA N9040B  | MY56080119    | January 31, 2020      | January 31, 2022     |
| EXG Vector Signal Generator | Agilent Technologies | N5172B      | MY53051952    | January 17, 2019      | January 17, 2022     |
| 40 dB Attenuator            | Weinschel Associates | WA 39-40-33 | -             | November 1, 2020      | November 1, 2021     |
| RF Coaxial Cable            | Huber-Suner          | SLLS210B    | -             | November 1, 2020      | November 1, 2021     |

**Table 15 Test Equipment Used**



## 7 Occupied Bandwidth

### 7.1 Test Specification

FCC Part 2, Section 1049

### 7.2 Test Procedure

(Temperature (20°C)/ Humidity (46%RH))

The E.U.T. antenna terminal was connected to the spectrum analyzer through an external attenuator and an appropriate coaxial cable (loss=40.7 dB). The spectrum analyzer was set to proper RBW

OBW function (99%) was employed for this evaluation.

Occupied bandwidth measured was repeated in the input terminal of the E.U.T.

### 7.3 Test Limit

N/A

### 7.4 Test Results

JUDGEMENT: Passed

See additional information in Table 16 to Table 23 and Figure 264 to Figure 455.



| Modulation | Bandwidth | Sub Carrier | Operation Frequency | Reading |
|------------|-----------|-------------|---------------------|---------|
|            | (MHz)     | (kHz)       | (MHz)               | (MHz)   |
| 16QAM      | 5         | 15          | 619.5               | 4.5363  |
|            |           | 30          |                     | 4.0607  |
|            |           | 15          | 634.5               | 4.5333  |
|            |           | 30          |                     | 4.0601  |
|            |           | 15          | 649.5               | 4.5356  |
|            |           | 30          |                     | 4.0595  |
|            | 10        | 15          | 622.0               | 9.2479  |
|            |           | 30          |                     | 8.6051  |
|            |           | 15          | 634.5               | 9.2498  |
|            |           | 30          |                     | 8.5912  |
|            |           | 15          | 647.0               | 9.2427  |
|            |           | 30          |                     | 8.5964  |
|            | 15        | 15          | 624.5               | 14.180  |
|            |           | 30          |                     | 13.540  |
|            |           | 15          | 634.5               | 14.175  |
|            |           | 30          |                     | 13.551  |
|            |           | 15          | 644.5               | 14.175  |
|            |           | 30          |                     | 13.551  |
|            | 20        | 15          | 627.0               | 19.038  |
|            |           | 30          |                     | 18.348  |
|            |           | 15          | 634.5               | 19.037  |
|            |           | 30          |                     | 18.359  |
|            |           | 15          | 642.0               | 19.050  |
|            |           | 30          |                     | 18.355  |

Table 16 Occupied Bandwidth 16 QAM Input



| Modulation | Bandwidth | Sub Carrier | Operation Frequency | Reading |
|------------|-----------|-------------|---------------------|---------|
|            | (MHz)     | (kHz)       | (MHz)               | (MHz)   |
| 64QAM      | 5         | 15          | 619.5               | 4.4929  |
|            |           | 30          |                     | 3.9965  |
|            |           | 15          | 634.5               | 4.4923  |
|            |           | 30          |                     | 3.9990  |
|            |           | 15          | 649.5               | 4.4925  |
|            |           | 30          |                     | 4.0002  |
|            | 10        | 15          | 622.0               | 9.3355  |
|            |           | 30          |                     | 8.6337  |
|            |           | 15          | 634.5               | 9.3343  |
|            |           | 30          |                     | 8.6380  |
|            |           | 15          | 647.0               | 9.3342  |
|            |           | 30          |                     | 8.6326  |
|            | 15        | 15          | 624.5               | 14.141  |
|            |           | 30          |                     | 13.653  |
|            |           | 15          | 634.5               | 14.139  |
|            |           | 30          |                     | 13.655  |
|            |           | 15          | 644.5               | 14.147  |
|            |           | 30          |                     | 13.658  |
|            | 20        | 15          | 627.0               | 18.975  |
|            |           | 30          |                     | 18.318  |
|            |           | 15          | 634.5               | 18.963  |
|            |           | 30          |                     | 18.315  |
|            |           | 15          | 642.0               | 18.947  |
|            |           | 30          |                     | 18.308  |

Table 17 Occupied Bandwidth 16QAM Output



| Modulation | Bandwidth | Sub Carrier | Operation Frequency | Reading |
|------------|-----------|-------------|---------------------|---------|
|            | (MHz)     | (kHz)       | (MHz)               | (MHz)   |
| 256QAM     | 5         | 15          | 619.5               | 4.4907  |
|            |           | 30          |                     | 4.0229  |
|            |           | 15          | 634.5               | 4.4902  |
|            |           | 30          |                     | 4.0208  |
|            |           | 15          | 649.5               | 4.4883  |
|            |           | 30          |                     | 4.0222  |
|            | 10        | 15          | 622.0               | 9.3158  |
|            |           | 30          |                     | 8.6500  |
|            |           | 15          | 634.5               | 9.3048  |
|            |           | 30          |                     | 8.6307  |
|            |           | 15          | 647.0               | 9.3265  |
|            |           | 30          |                     | 8.6346  |
|            | 15        | 15          | 624.5               | 14.148  |
|            |           | 30          |                     | 13.612  |
|            |           | 15          | 634.5               | 14.122  |
|            |           | 30          |                     | 13.607  |
|            |           | 15          | 644.5               | 14.121  |
|            |           | 30          |                     | 13.605  |
|            | 20        | 15          | 627.0               | 18.958  |
|            |           | 30          |                     | 18.269  |
|            |           | 15          | 634.5               | 18.977  |
|            |           | 30          |                     | 18.270  |
|            |           | 15          | 642.0               | 18.947  |
|            |           | 30          |                     | 18.259  |

Table 18 Occupied Bandwidth 64QAM Input



| Modulation | Bandwidth<br>(MHz) | Sub<br>Carrier<br>(kHz) | Operation<br>Frequency<br>(MHz) | Reading<br>(MHz) |
|------------|--------------------|-------------------------|---------------------------------|------------------|
| QPSK       | 5                  | 15                      | 619.5                           | 4.5206           |
|            |                    | 30                      |                                 | 4.1141           |
|            |                    | 15                      | 634.5                           | 4.5217           |
|            |                    | 30                      |                                 | 4.1150           |
|            |                    | 15                      | 649.5                           | 4.5213           |
|            |                    | 30                      |                                 | 4.1164           |
|            | 10                 | 15                      | 622.0                           | 9.1576           |
|            |                    | 30                      |                                 | 8.5157           |
|            |                    | 15                      | 634.5                           | 9.1621           |
|            |                    | 30                      |                                 | 8.5245           |
|            |                    | 15                      | 647.0                           | 9.1669           |
|            |                    | 30                      |                                 | 8.5213           |
|            | 15                 | 15                      | 624.5                           | 14.182           |
|            |                    | 30                      |                                 | 13.389           |
|            |                    | 15                      | 634.5                           | 14.183           |
|            |                    | 30                      |                                 | 13.378           |
|            |                    | 15                      | 644.5                           | 14.186           |
|            |                    | 30                      |                                 | 13.372           |
|            | 20                 | 15                      | 627.0                           | 19.039           |
|            |                    | 30                      |                                 | 18.489           |
|            |                    | 15                      | 634.5                           | 19.036           |
|            |                    | 30                      |                                 | 18.496           |
|            |                    | 15                      | 642.0                           | 19.033           |
|            |                    | 30                      |                                 | 18.495           |

Table 19 Occupied Bandwidth 64QAM Output



| Modulation | Bandwidth<br>(MHz) | Sub<br>Carrier<br>(kHz) | Operation<br>Frequency<br>(MHz) | Reading<br>(MHz) |
|------------|--------------------|-------------------------|---------------------------------|------------------|
| 16QAM      | 5                  | 15                      | 619.5                           | 4.5281           |
|            |                    | 30                      |                                 | 4.0569           |
|            |                    | 15                      | 634.5                           | 4.5319           |
|            |                    | 30                      |                                 | 4.0586           |
|            |                    | 15                      | 649.5                           | 4.5206           |
|            |                    | 30                      |                                 | 4.0483           |
|            | 10                 | 15                      | 622.0                           | 9.2249           |
|            |                    | 30                      |                                 | 8.5837           |
|            |                    | 15                      | 634.5                           | 9.2324           |
|            |                    | 30                      |                                 | 8.5830           |
|            |                    | 15                      | 647.0                           | 9.2032           |
|            |                    | 30                      |                                 | 8.5519           |
|            | 15                 | 15                      | 624.5                           | 14.158           |
|            |                    | 30                      |                                 | 13.510           |
|            |                    | 15                      | 634.5                           | 14.159           |
|            |                    | 30                      |                                 | 13.517           |
|            |                    | 15                      | 644.5                           | 14.146           |
|            |                    | 30                      |                                 | 13.478           |
|            | 20                 | 15                      | 627.0                           | 19.004           |
|            |                    | 30                      |                                 | 18.331           |
|            |                    | 15                      | 634.5                           | 19.017           |
|            |                    | 30                      |                                 | 18.340           |
|            |                    | 15                      | 642.0                           | 18.977           |
|            |                    | 30                      |                                 | 18.307           |

Table 20 Occupied Bandwidth 256QAM Input



| Modulation | Bandwidth<br>(MHz) | Sub<br>Carrier<br>(kHz) | Operation<br>Frequency<br>(MHz) | Reading<br>(MHz) |
|------------|--------------------|-------------------------|---------------------------------|------------------|
| 64QAM      | 5                  | 15                      | 619.5                           | 4.4870           |
|            |                    | 30                      |                                 | 3.9956           |
|            |                    | 15                      | 634.5                           | 4.5307           |
|            |                    | 30                      |                                 | 3.9958           |
|            |                    | 15                      | 649.5                           | 4.4784           |
|            |                    | 30                      |                                 | 3.9898           |
|            | 10                 | 15                      | 622.0                           | 9.3140           |
|            |                    | 30                      |                                 | 8.6236           |
|            |                    | 15                      | 634.5                           | 9.3159           |
|            |                    | 30                      |                                 | 8.6274           |
|            |                    | 15                      | 647.0                           | 9.3028           |
|            |                    | 30                      |                                 | 8.6178           |
|            | 15                 | 15                      | 624.5                           | 14.117           |
|            |                    | 30                      |                                 | 13.622           |
|            |                    | 15                      | 634.5                           | 14.126           |
|            |                    | 30                      |                                 | 13.634           |
|            |                    | 15                      | 644.5                           | 14.101           |
|            |                    | 30                      |                                 | 13.620           |
|            | 20                 | 15                      | 627.0                           | 18.956           |
|            |                    | 30                      |                                 | 18.282           |
|            |                    | 15                      | 634.5                           | 18.939           |
|            |                    | 30                      |                                 | 18.306           |
|            |                    | 15                      | 642.0                           | 18.894           |
|            |                    | 30                      |                                 | 18.274           |

Table 21 Occupied Bandwidth 256QAM Output



| Modulation | Bandwidth | Sub Carrier | Operation Frequency | Reading |
|------------|-----------|-------------|---------------------|---------|
|            | (MHz)     | (kHz)       | (MHz)               | (MHz)   |
| 256QAM     | 5         | 15          | 619.5               | 4.4864  |
|            |           | 30          |                     | 4.0184  |
|            |           | 15          | 634.5               | 4.4894  |
|            |           | 30          |                     | 4.0224  |
|            |           | 15          | 649.5               | 4.4778  |
|            |           | 30          |                     | 4.0158  |
|            | 10        | 15          | 622.0               | 9.3012  |
|            |           | 30          |                     | 8.6305  |
|            |           | 15          | 634.5               | 9.3040  |
|            |           | 30          |                     | 8.6290  |
|            |           | 15          | 647.0               | 9.2905  |
|            |           | 30          |                     | 8.6227  |
|            | 15        | 15          | 624.5               | 14.112  |
|            |           | 30          |                     | 13.562  |
|            |           | 15          | 634.5               | 14.131  |
|            |           | 30          |                     | 13.587  |
|            |           | 15          | 644.5               | 14.117  |
|            |           | 30          |                     | 13.575  |
|            | 20        | 15          | 627.0               | 18.914  |
|            |           | 30          |                     | 18.232  |
|            |           | 15          | 634.5               | 18.930  |
|            |           | 30          |                     | 18.241  |
|            |           | 15          | 642.0               | 18.893  |
|            |           | 30          |                     | 18.223  |

Table 22 Occupied Bandwidth QPSK Input



| Modulation | Bandwidth | Sub Carrier | Operation Frequency | Reading |
|------------|-----------|-------------|---------------------|---------|
|            | (MHz)     | (kHz)       | (MHz)               | (MHz)   |
| QPSK       | 5         | 15          | 619.5               | 4.5153  |
|            |           | 30          |                     | 4.1068  |
|            |           | 15          | 634.5               | 4.5209  |
|            |           | 30          |                     | 4.1083  |
|            |           | 15          | 649.5               | 4.5038  |
|            |           | 30          |                     | 4.0976  |
|            | 10        | 15          | 622.0               | 9.1310  |
|            |           | 30          |                     | 8.4996  |
|            |           | 15          | 634.5               | 9.1406  |
|            |           | 30          |                     | 8.4966  |
|            |           | 15          | 647.0               | 9.0951  |
|            |           | 30          |                     | 8.4653  |
|            | 15        | 15          | 624.5               | 14.165  |
|            |           | 30          |                     | 13.348  |
|            |           | 15          | 634.5               | 14.173  |
|            |           | 30          |                     | 13.370  |
|            |           | 15          | 644.5               | 14.156  |
|            |           | 30          |                     | 13.271  |
|            | 20        | 15          | 627.0               | 19.015  |
|            |           | 30          |                     | 18.466  |
|            |           | 15          | 634.5               | 19.033  |
|            |           | 30          |                     | 18.474  |
|            |           | 15          | 642.0               | 18.995  |
|            |           | 30          |                     | 18.436  |

**Table 23 Occupied Bandwidth QPSK Output**



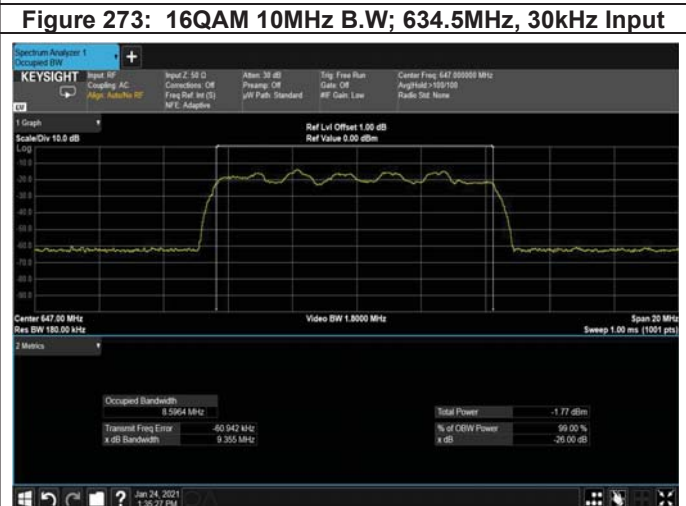
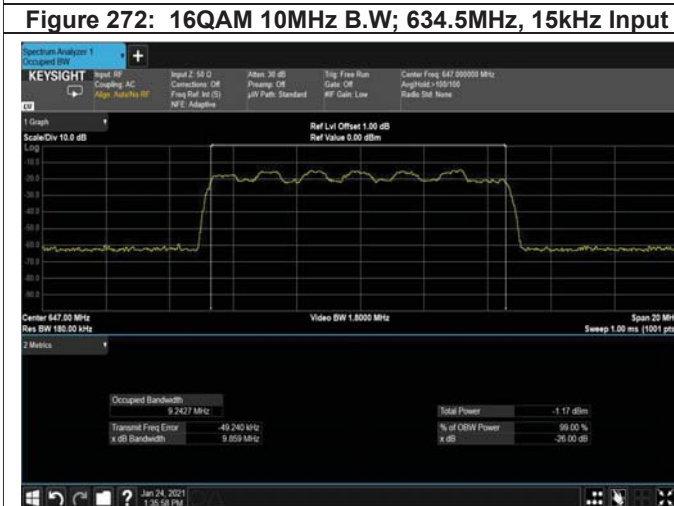




Figure 276: 16QAM 15MHz B.W; 624.5MHz, 15kHz Input



Figure 277: 16QAM 15MHz B.W; 624.5MHz, 30kHz Input



Figure 278: 16QAM 15MHz B.W; 634.5MHz, 15kHz Input



Figure 279: 16QAM 15MHz B.W; 634.5MHz, 30kHz Input



Figure 280: 16QAM 15MHz B.W; 644.5MHz, 15kHz Input



Figure 281: 16QAM 15MHz B.W; 644.5MHz, 30kHz Input

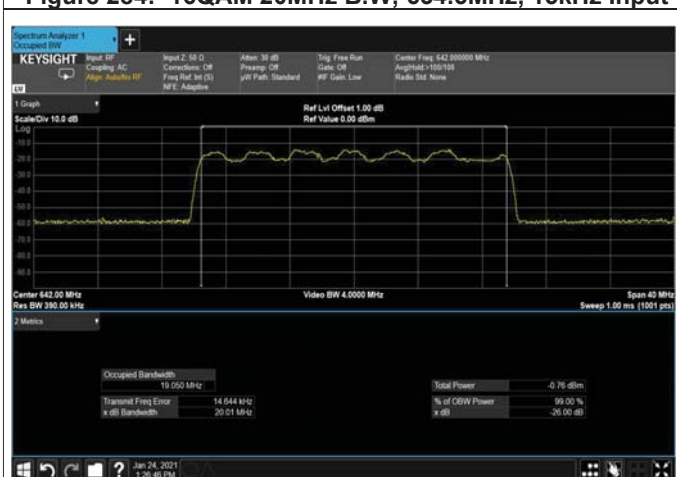






Figure 294: 64QAM 5MHz B.W; 622.0MHz, 15kHz Input



Figure 295: 64QAM 10MHz B.W; 622.0MHz, 30kHz Input



Figure 296: 64QAM 10MHz B.W; 634.5MHz, 15kHz Input



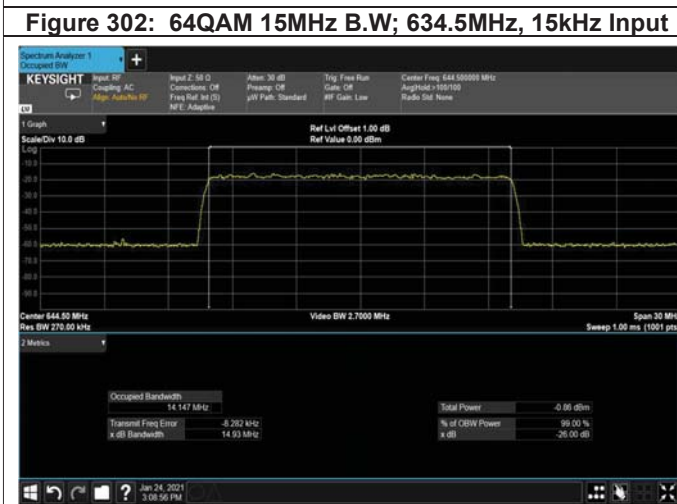
Figure 297: 64QAM 10MHz B.W; 634.5MHz, 30kHz Input



Figure 298: 64QAM 10MHz B.W; 647.0MHz, 15kHz Input



Figure 299: 64QAM 10MHz B.W; 647.0MHz, 30kHz Input





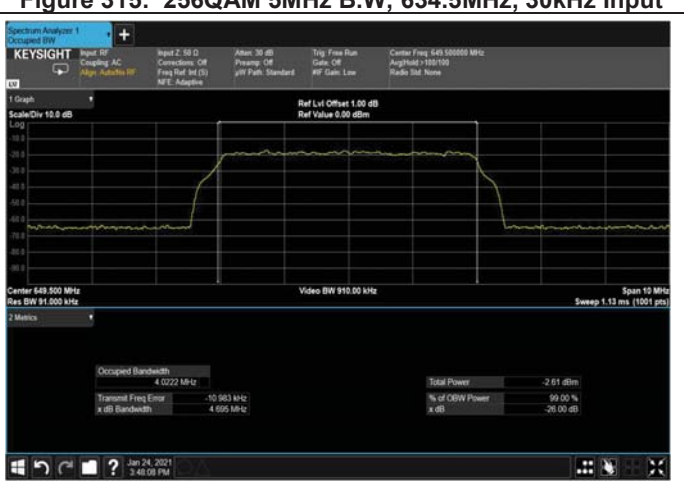






Figure 324: 256QAM 10MHz B.W; 624.5MHz, 15kHz Input



Figure 325: 256QAM 15MHz B.W; 624.5MHz, 30kHz Input



Figure 326: 256QAM 15MHz B.W; 634.5MHz, 15kHz Input



Figure 327: 256QAM 15MHz B.W; 634.5MHz, 30kHz Input



Figure 328: 256QAM 15MHz B.W; 644.5MHz, 15kHz Input



Figure 329: 256QAM 15MHz B.W; 644.5MHz, 30kHz Input

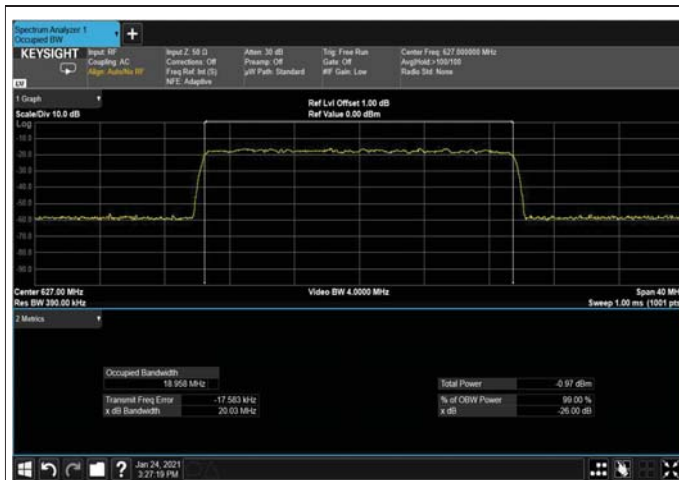


Figure 330: 256QAM 20MHz B.W; 627.0MHz, 15kHz Input



Figure 331: 256QAM 20MHz B.W; 627.0MHz, 30kHz Input



Figure 332: 256QAM 20MHz B.W; 634.5MHz, 15kHz Input



Figure 333: 256QAM 20MHz B.W; 634.5MHz, 30kHz Input



Figure 334: 256QAM 20MHz B.W; 642.0MHz, 15kHz Input

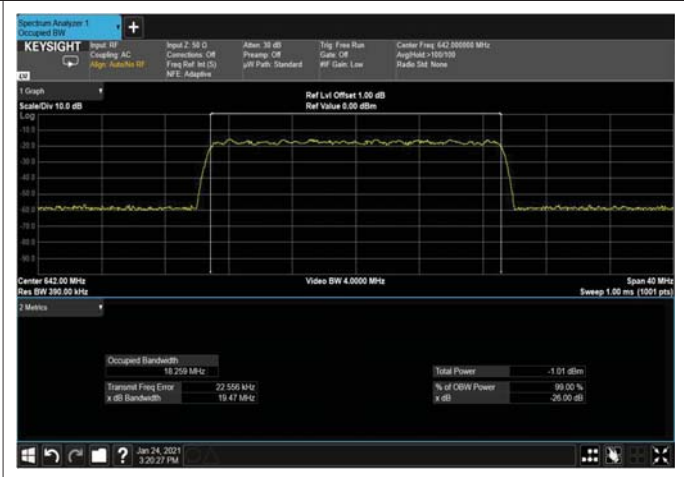


Figure 335: 256QAM 20MHz B.W; 642.0MHz, 30kHz Input



