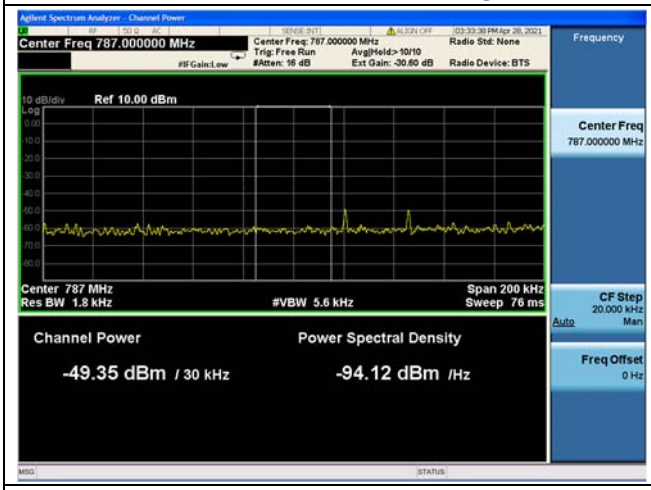
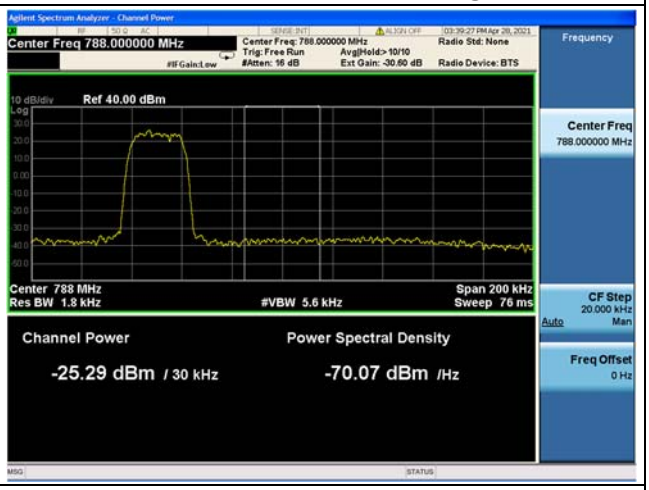
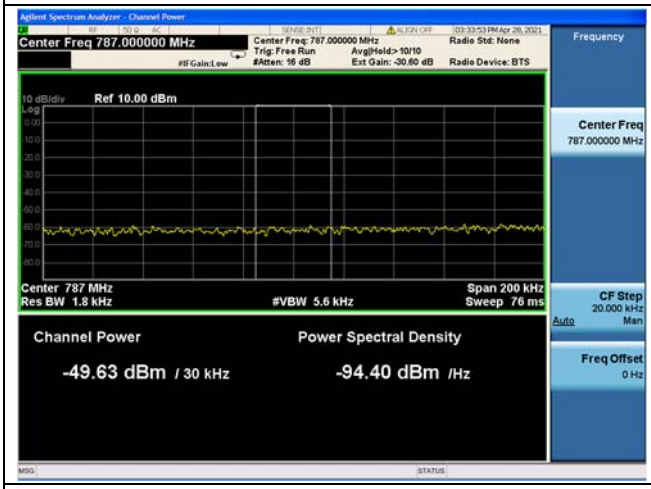
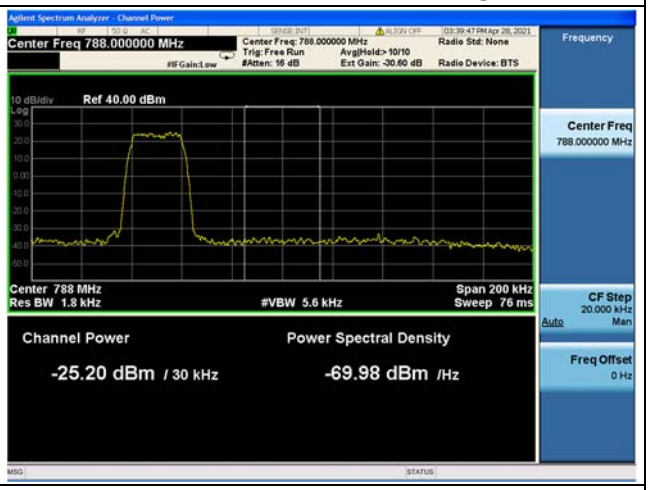
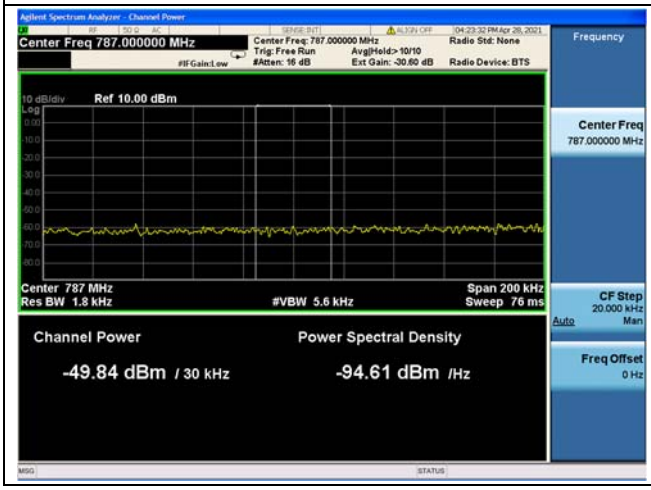
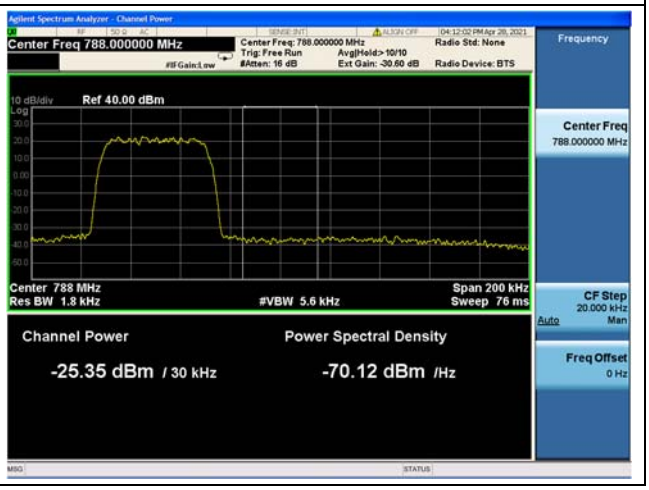
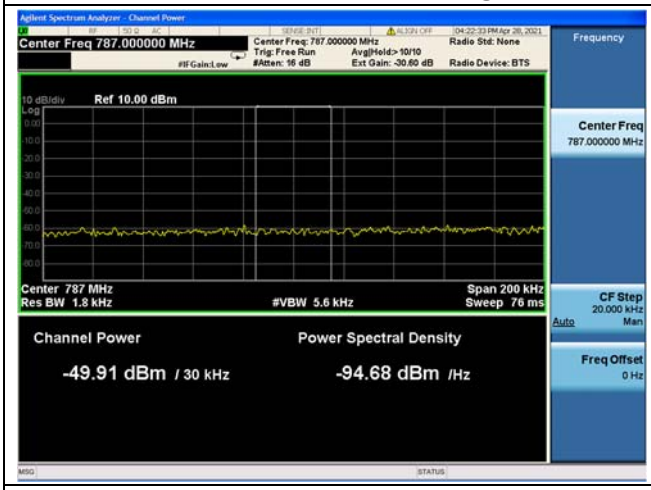
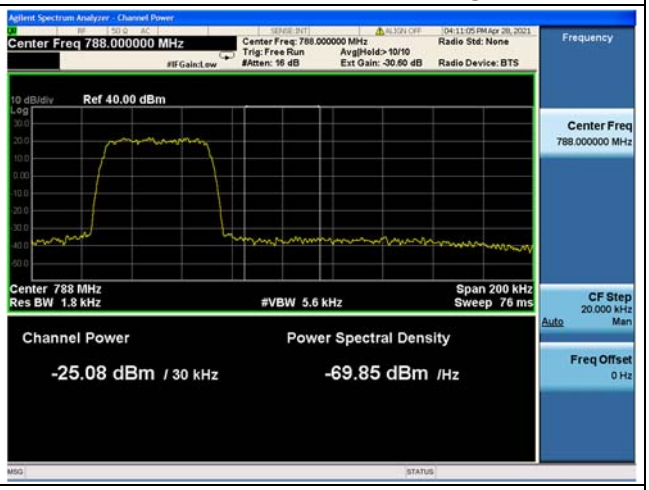
| 25kHz/64QAM/Lower edge | 25kHz/64QAM/Upper edge |
|---|---|
|  |  |
| **25kHz/256QAM/Lower edge** | **25kHz/256QAM/Upper edge** |
|  |  |
| **50kHz/QPSK/Lower edge** | **50kHz/QPSK/Upper edge** |
|  |  |

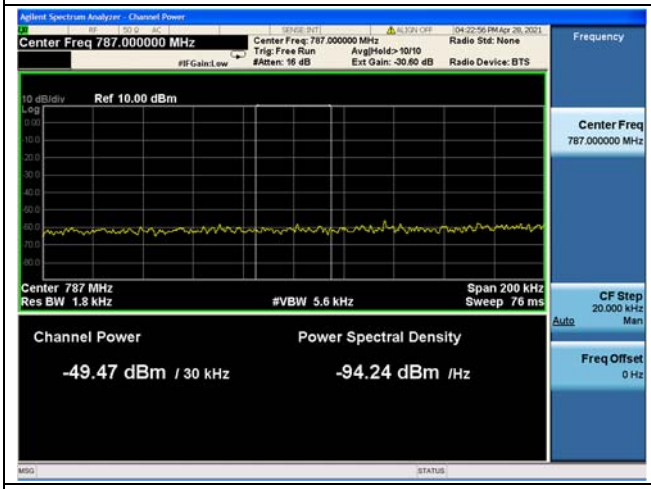
## 50kHz/16QAM/Lower edge



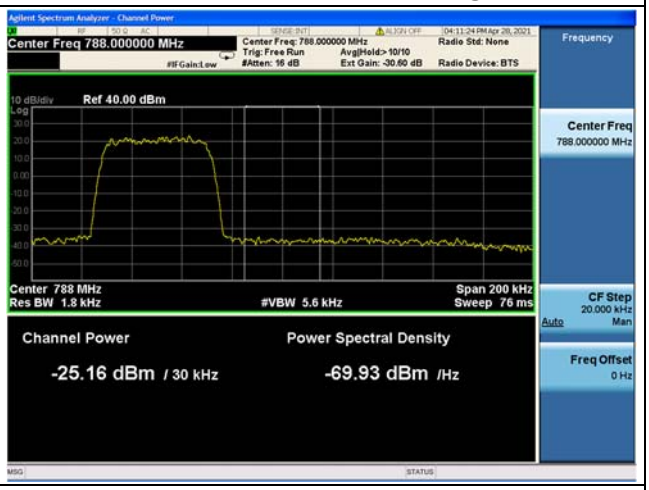

## 50kHz/16QAM/Upper edge



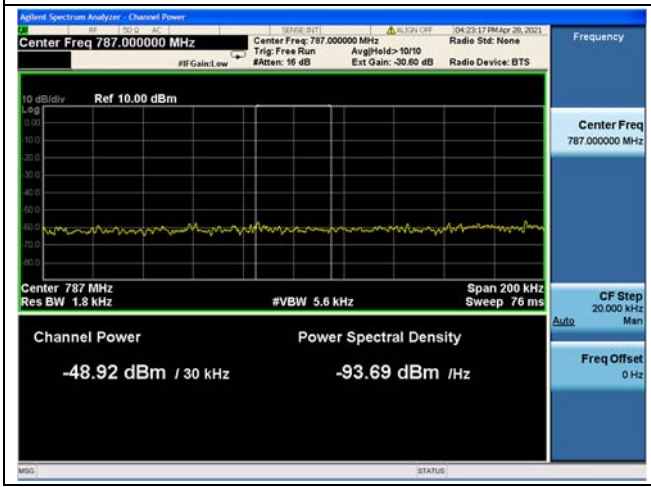

## 50kHz/64QAM/Lower edge




## 50kHz/64QAM/Upper edge



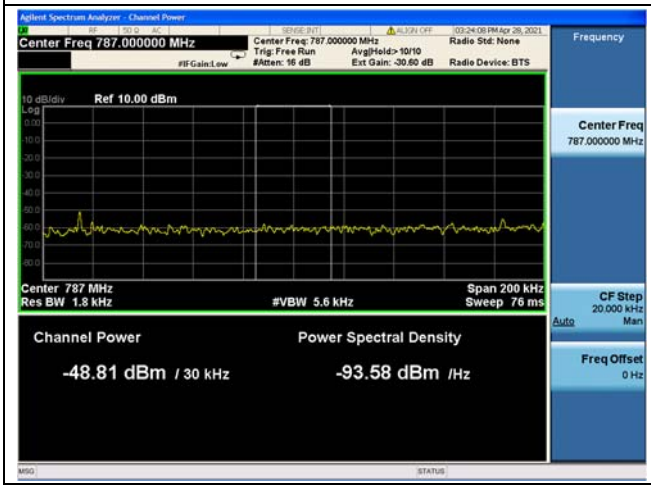

## 50kHz/256QAM/Lower edge



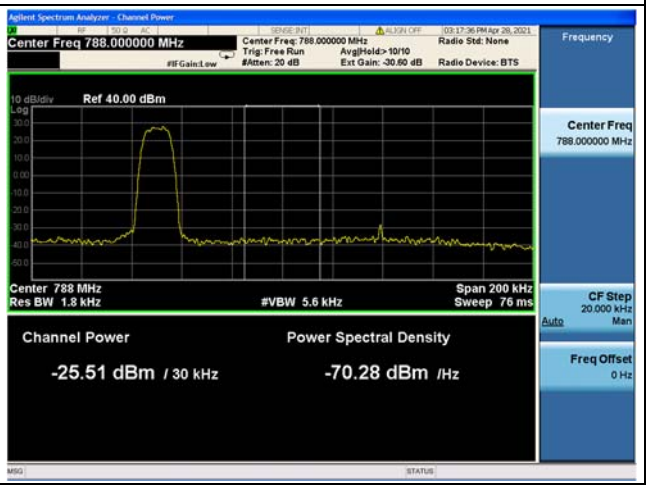

## 50kHz/256QAM/Upper edge

Nominal Frequency: 787.950 MHz Tx Port: Channel V

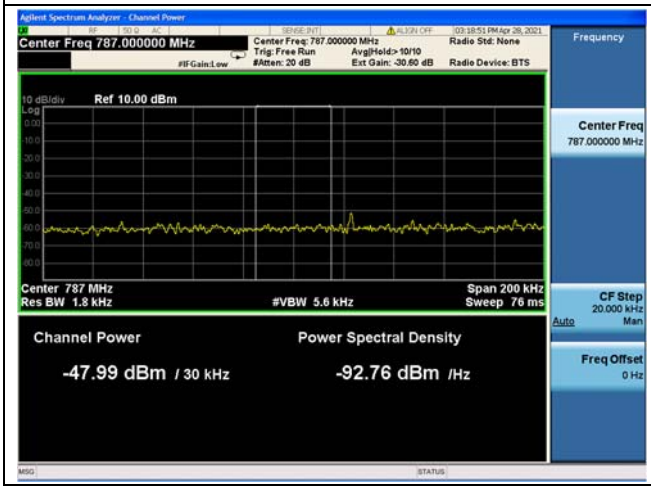
**12.5kHz/QPSK/Lower edge**



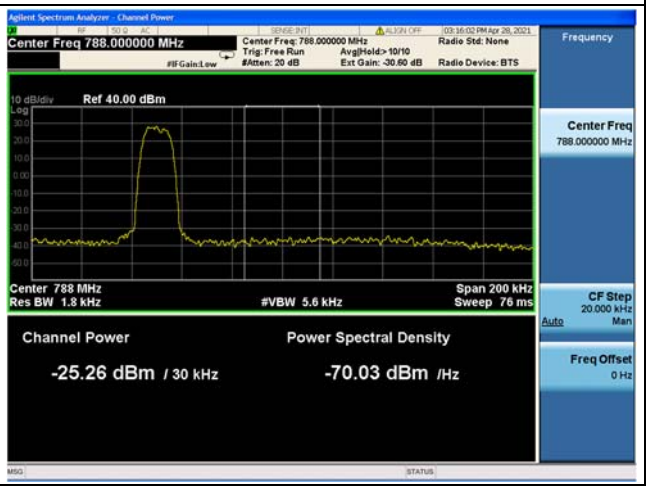

**12.5kHz/QPSK/Upper edge**



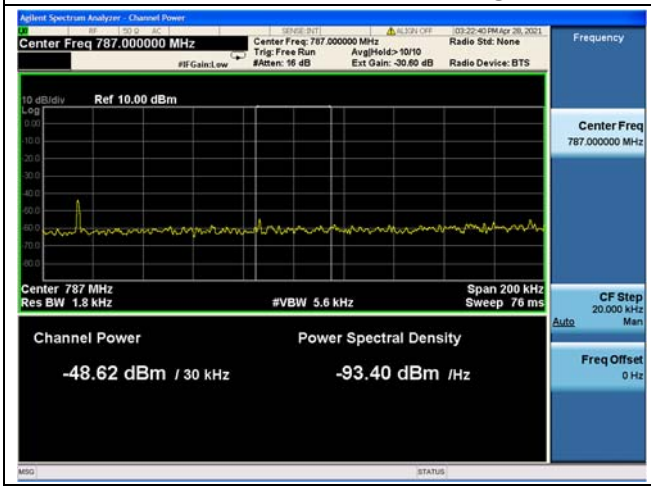

**12.5kHz/16QAM/Lower edge**



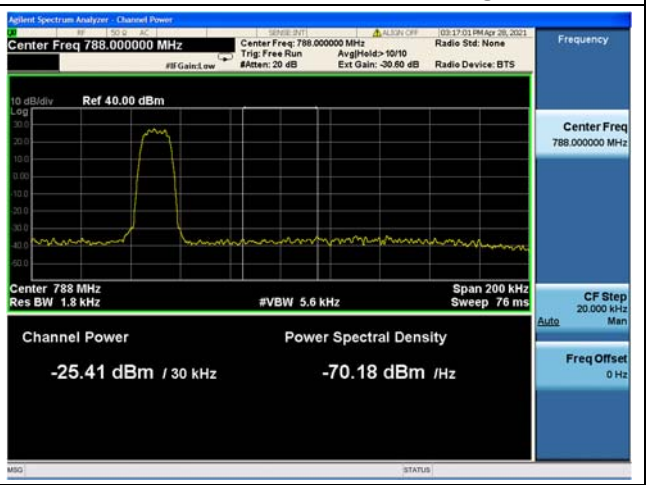

**12.5kHz/16QAM/Upper edge**

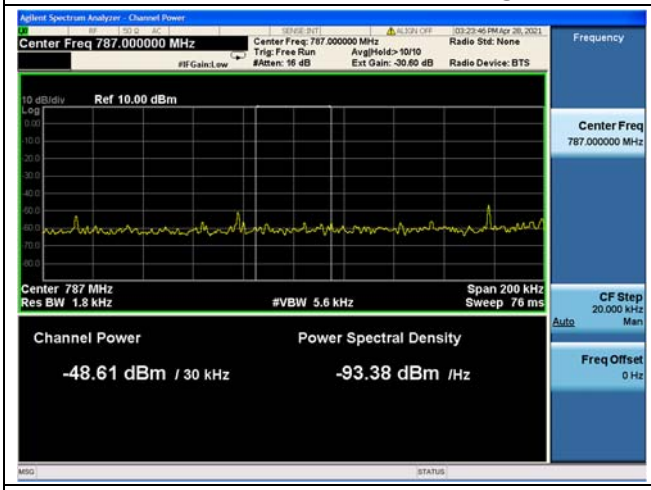
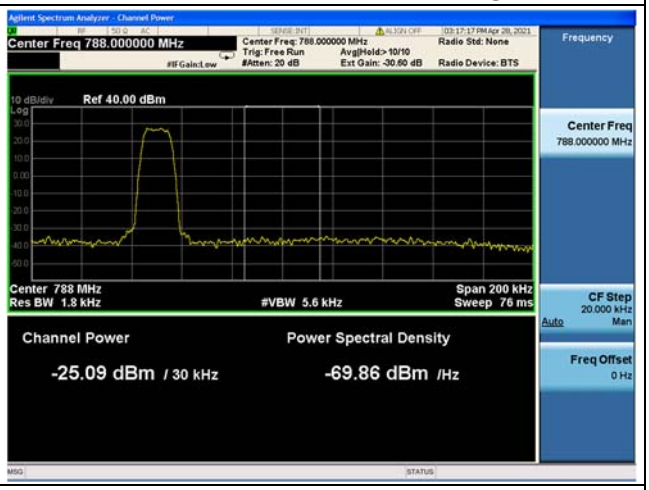
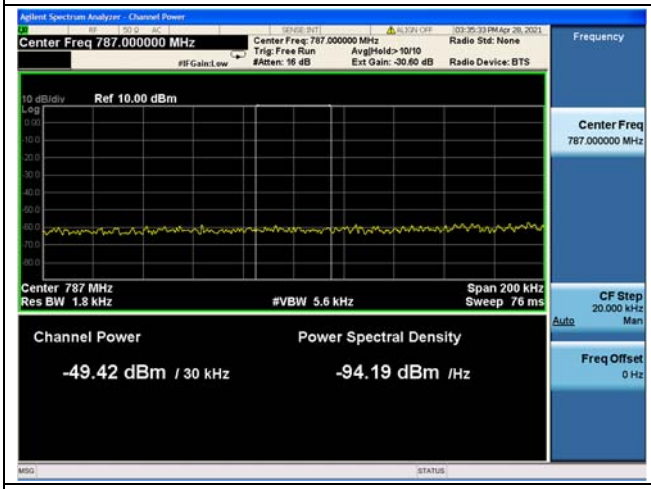
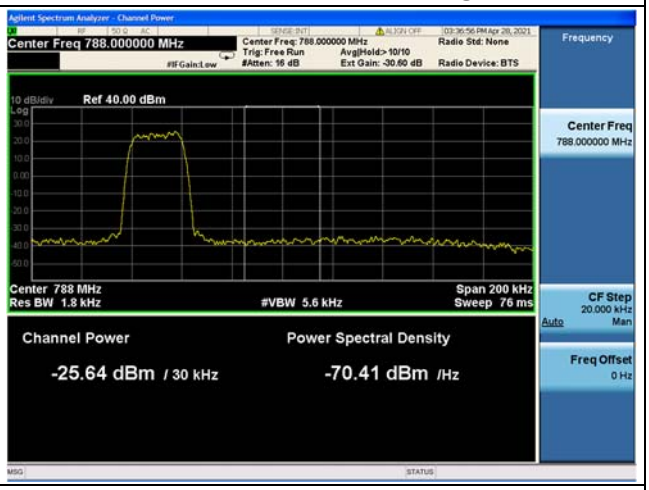
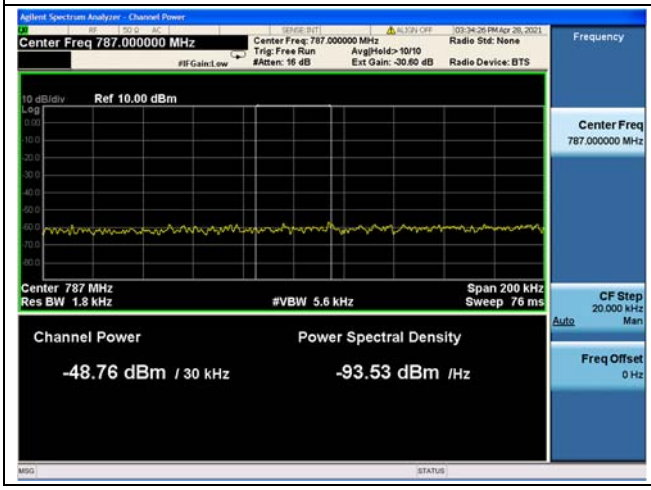
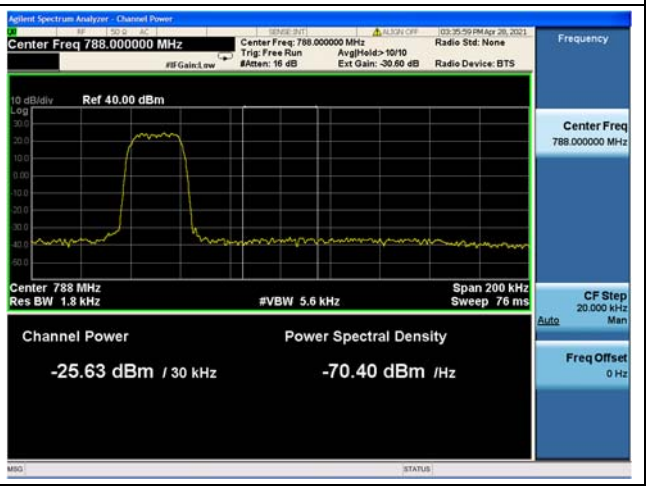



**12.5kHz/64QAM/Lower edge**

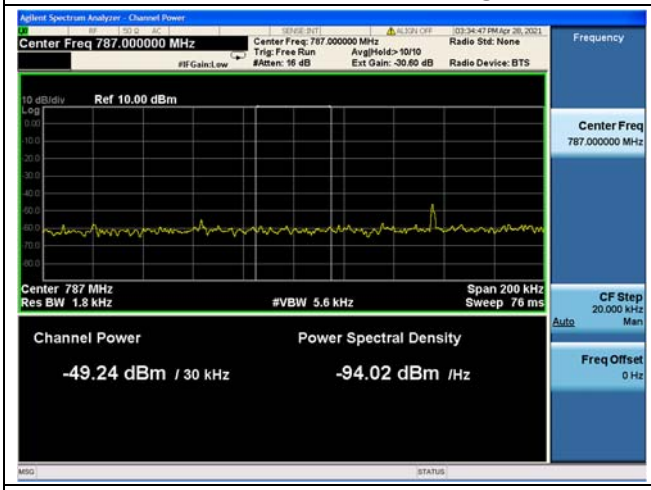



**12.5kHz/64QAM/Upper edge**

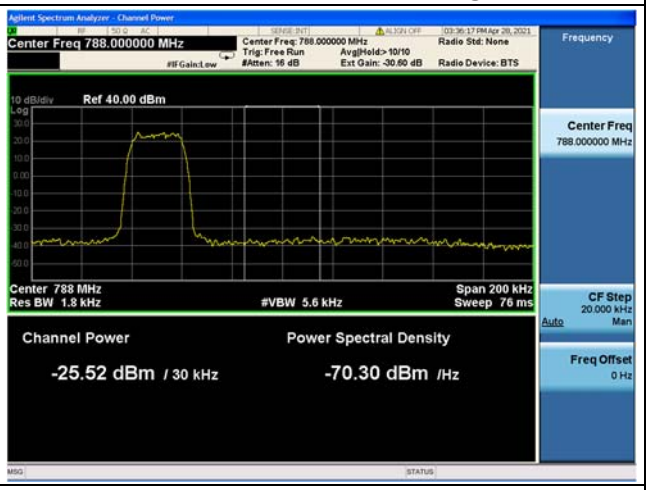


| 12.5kHz/256QAM/Lower edge | 12.5kHz/256QAM/Upper edge |
|---|---|
|  |  |
| **25kHz/QPSK/Lower edge** | **25kHz/QPSK/Upper edge** |
|  |  |
| **25kHz/16QAM/Lower edge** | **25kHz/16QAM/Upper edge** |
|  |  |

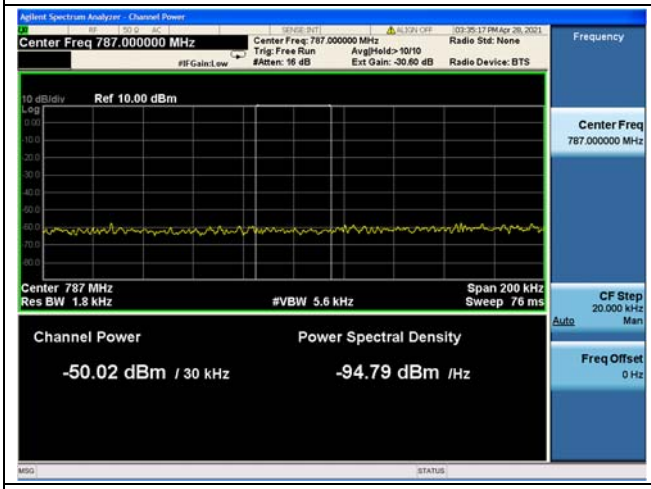
## 25kHz/64QAM/Lower edge



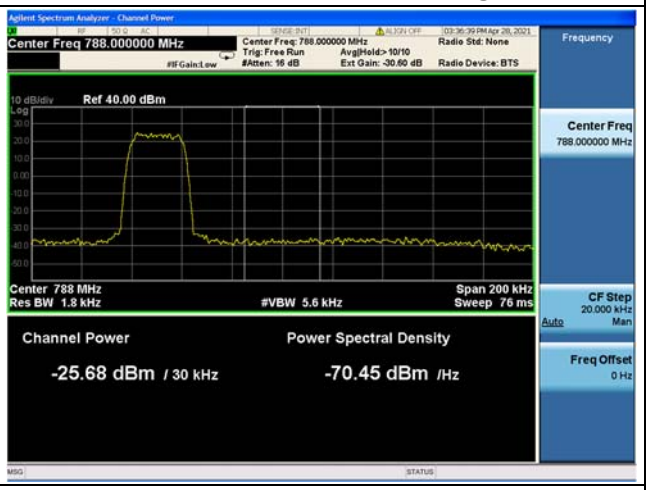

## 25kHz/64QAM/Upper edge



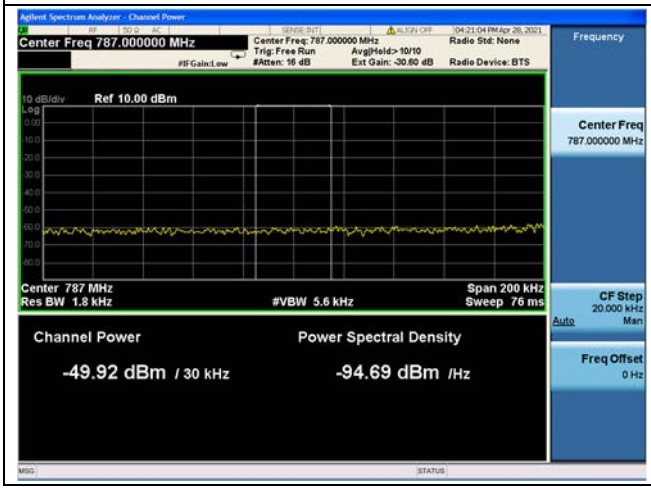

## 25kHz/256QAM/Lower edge



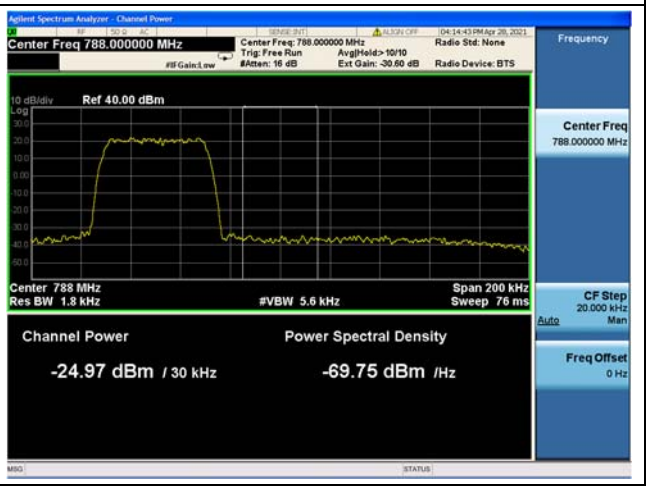

## 25kHz/256QAM/Upper edge



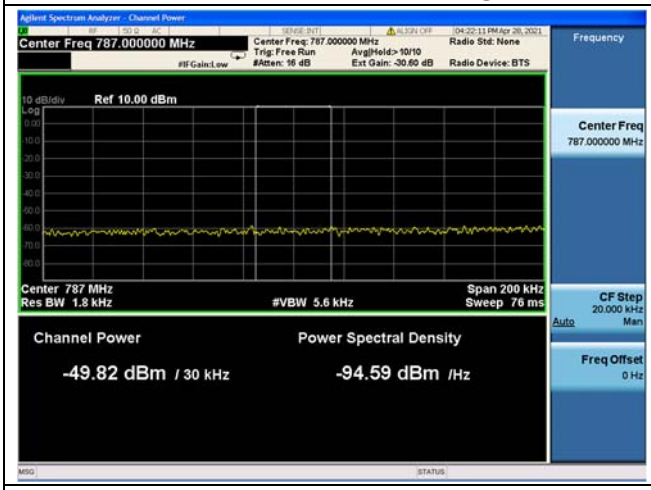

## 50kHz/QPSK/Lower edge



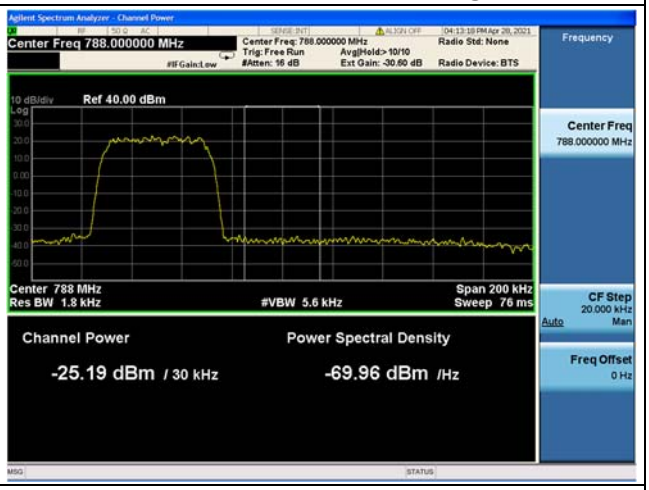

## 50kHz/QPSK/Upper edge



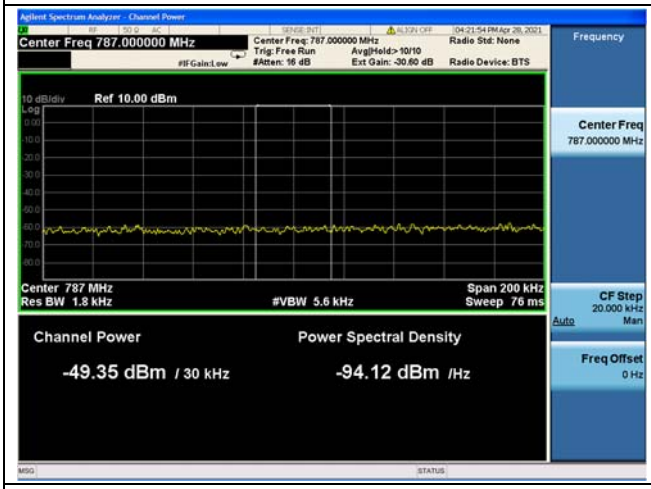
## 50kHz/16QAM/Lower edge



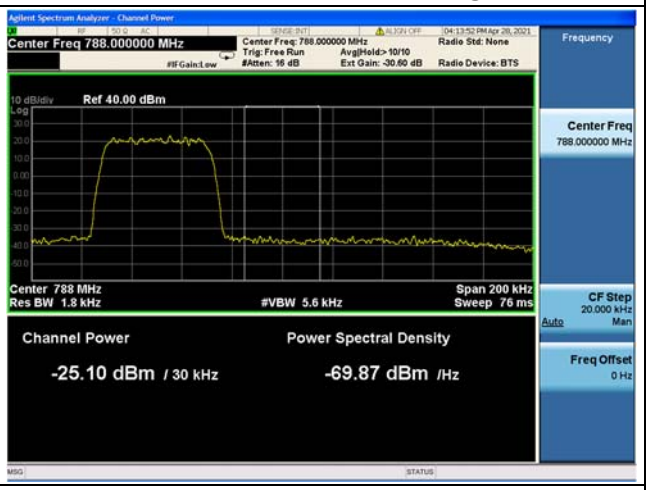

## 50kHz/16QAM/Upper edge



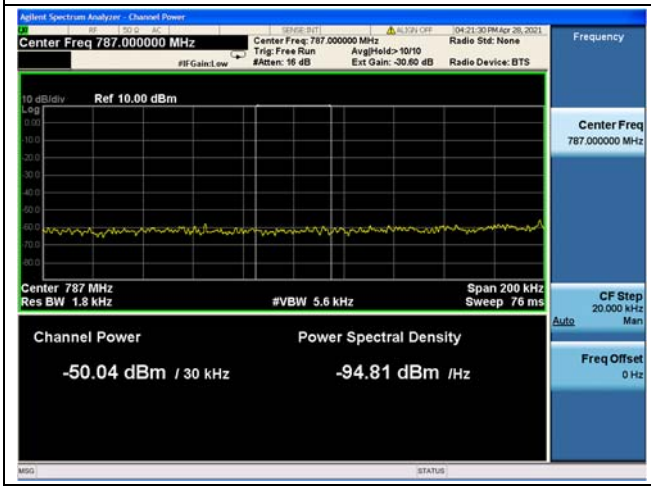

## 50kHz/64QAM/Lower edge



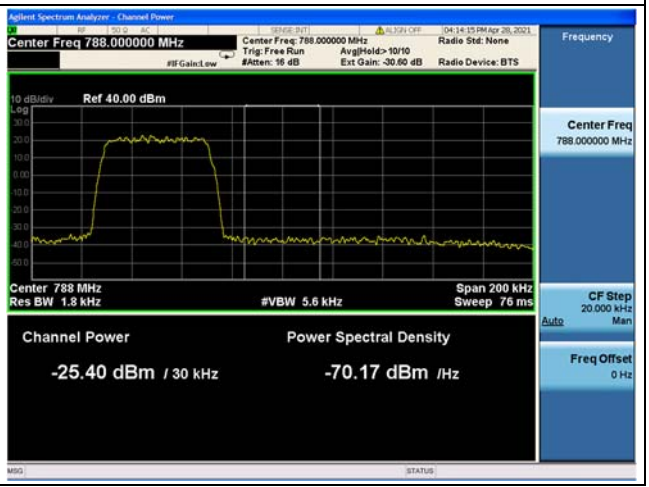

## 50kHz/64QAM/Upper edge




## 50kHz/256QAM/Lower edge




## 50kHz/256QAM/Upper edge



## 2.4. Radiated Spurious Emissions

### 2.4.1. Requirement

According to FCC section 2.1053 and section 27.53(c). For operations in the 746-758 MHz band and the 776-788 MHz band, the power of any emission outside the licensee's frequency band(s) of operation shall be attenuated below the transmitter power within the licensed band(s) of operation, measured in watts, in accordance with the following:

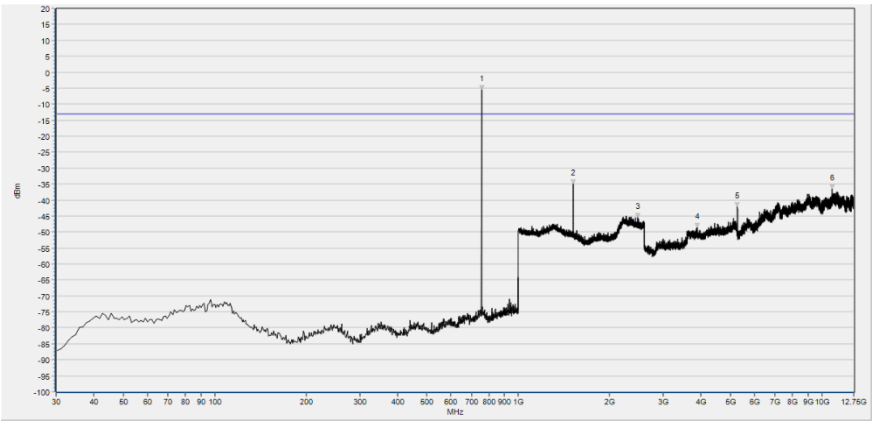
(1) On any frequency outside the 746-758 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least 43 + 10 log (P) dB;
(2) On any frequency outside the 776-788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least 43 + 10 log (P) dB;
(3) On all frequencies between 763-775 MHz and 793-805 MHz, by a factor not less than 76 + 10 log (P) dB in a 6.25 kHz band segment, for base and fixed stations;
(5) Compliance with the provisions of paragraphs (c)(1) and (c)(2) of this section is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. However, in the 100 kHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least 30 kHz may be employed;
(6) Compliance with the provisions of paragraphs (c)(3) and (c)(4) of this section is based on the use of measurement instrumentation such that the reading taken with any resolution bandwidth setting should be adjusted to indicate spectral energy in a 6.25 kHz segment.

Additional requirement for operations in the 746-758 MHz, 775-788 MHz:
According to FCC section 27.53(f), for operations in the 746-758 MHz, 775-788 MHz, and 805-806 MHz bands, emissions in the band 1559-1610 MHz shall be limited to −70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and −80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth.
This calculated to be -40dBm.

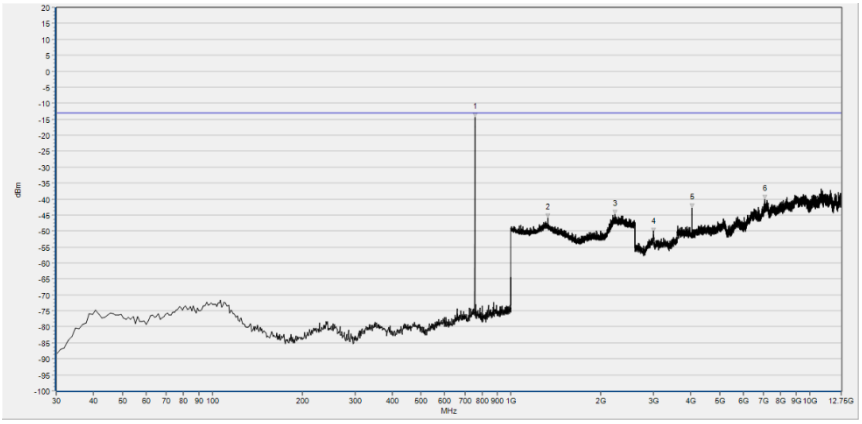
### 2.4.2. Test Result

**Note 1:** An Omni 4dBi antenna was attached to the transmitter which was considered to be typical. Testing was carried out at the test site between 1559-1610 MHz using a peak detector with 1 MHz resolution bandwidth using both vertical and horizontal polarizations.
**Note 2:** No discrete emissions were detected.
**Note 3:** The power of the EUT transmitting frequency should be ignored.
**Note 4:** N/A means the frequency is the basic frequency, they are no need to verdict.
**Note 5:** For measurements below 1GHz the resolution bandwidth is set to 100kHz for peak detection measurements. For measurements above 1GHz (exclude 1559-1610 MHz) the resolution bandwidth is set to 1MHz for peak measurements.
**Note 6:** All bandwidth and modulation were considered and evaluated respectively by performing full test, only the worst cases were recorded in this test report.
**Note 7:** The graph is tested with the antenna gain of 4dBi, the data table of 757.050MHz is calculated from the antenna gain of 16dBi, and the data table of 787.950MHz is calculated from the antenna gain of 12dBi. The calculation formula: PK (dBm) = DATA(reading value of the graph) + 12dB(Difference of the antenna gain).
**Note 8:** The tested RSE at 1559 – 1610MHz is limited by test instruments.

Nominal Frequency 757.050MHz, 50kHz BW, 256QAM

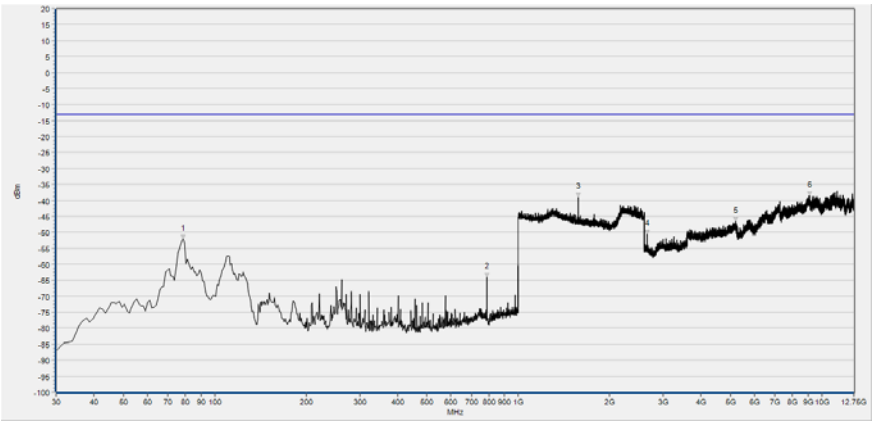


| No. | Fre.(MHz) | PK (dBm) | Limit (dBm) | Antenna | Verdict |
|---|---|---|---|---|---|
| 1 | 757.500 | 7.51 | -13.00 | Horizontal | N/A |
| 2 | 1514.766 | -22.91 | -13.00 | Horizontal | PASS |
| 3 | 2480.272 | -33.48 | -13.00 | Horizontal | PASS |
| 4 | 3879.133 | -36.57 | -13.00 | Horizontal | PASS |
| 5 | 5270.858 | -30.05 | -13.00 | Horizontal | PASS |
| 6 | 10822.995 | -24.60 | -13.00 | Horizontal | PASS |

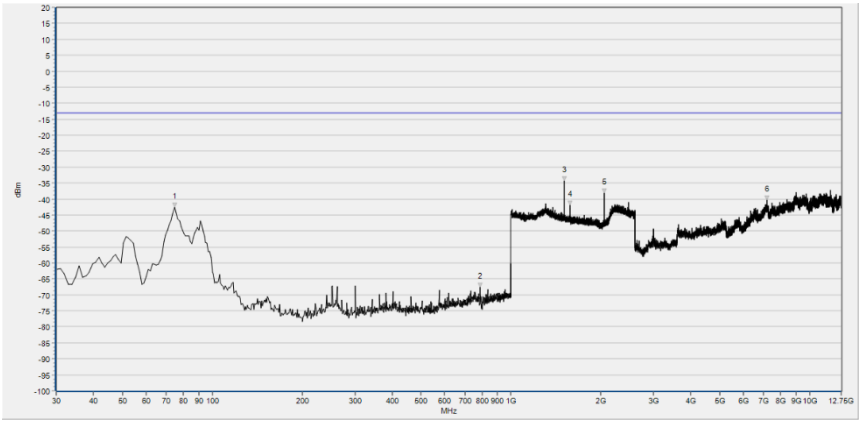


| No. | Fre.(MHz) | PK (dBm) | Limit (dBm) | Antenna | Verdict |
|---|---|---|---|---|---|
| 1 | 757.500 | -2.45 | -13.00 | Vertical | N/A |
| 2 | 1328.451 | -33.94 | -13.00 | Vertical | PASS |
| 3 | 2224.810 | -31.90 | -13.00 | Vertical | PASS |
| 4 | 2993.153 | -38.33 | -13.00 | Vertical | PASS |
| 5 | 4037.871 | -30.69 | -13.00 | Vertical | PASS |
| 6 | 7085.270 | -28.08 | -13.00 | Vertical | PASS |

Nominal Frequency 787.950MHz, 50kHz BW, 256QAM

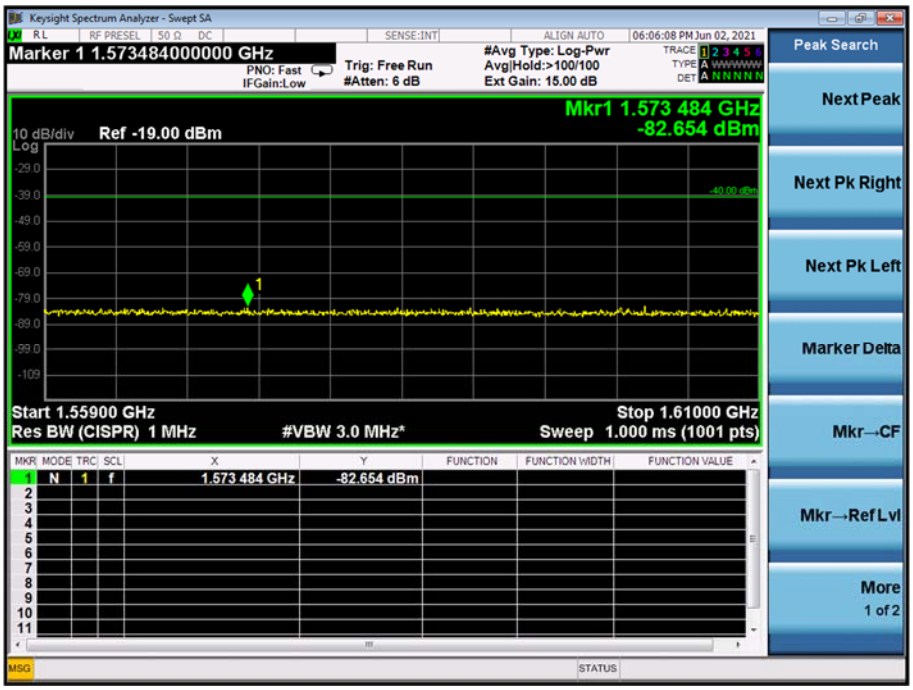


| No. | Fre.(MHz) | PK (dBm) | Limit (dBm) | Antenna | Verdict |
|---|---|---|---|---|---|
| 1 | 78.500 | -44.12 | -13.00 | Horizontal | PASS |
| 2 | 787.570 | -56.00 | -13.00 | Horizontal | NA |
| 3 | 1576.230 | -31.10 | -13.00 | Horizontal | PASS |
| 4 | 2662.757 | -42.57 | -13.00 | Horizontal | PASS |
| 5 | 5208.101 | -36.66 | -13.00 | Horizontal | PASS |
| 6 | 9099.027 | -30.60 | -13.00 | Horizontal | PASS |

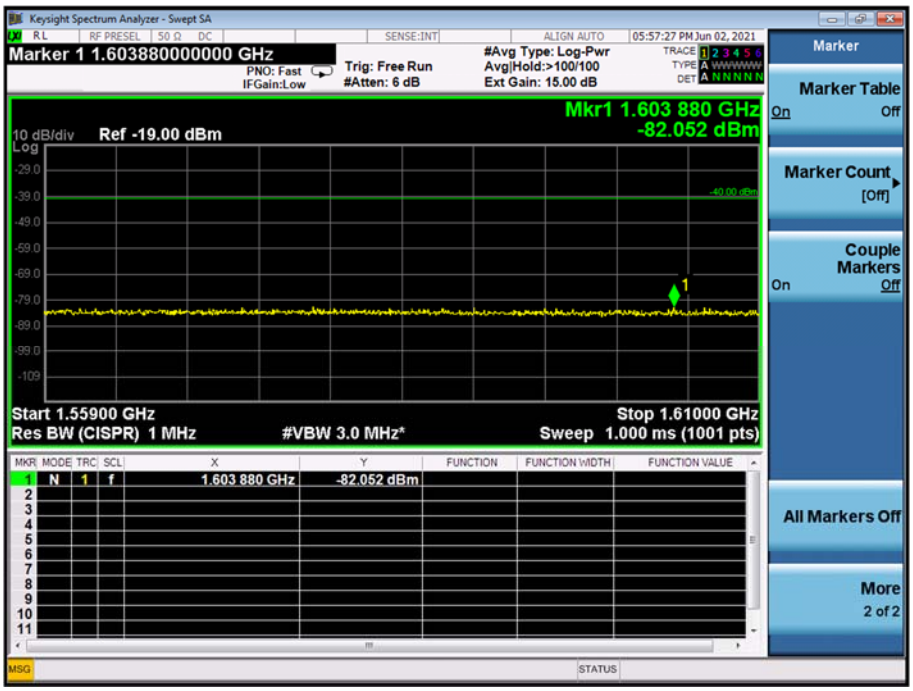


| No. | Fre.(MHz) | PK (dBm) | Limit (dBm) | Antenna | Verdict |
|---|---|---|---|---|---|
| 1 | 74.620 | -34.47 | -13.00 | Vertical | PASS |
| 2 | 787.570 | -59.58 | -13.00 | Vertical | NA |
| 3 | 1506.443 | -26.34 | -13.00 | Vertical | PASS |
| 4 | 1576.230 | -33.99 | -13.00 | Vertical | PASS |
| 5 | 2056.423 | -30.02 | -13.00 | Vertical | PASS |
| 6 | 7181.251 | -32.37 | -13.00 | Vertical | PASS |

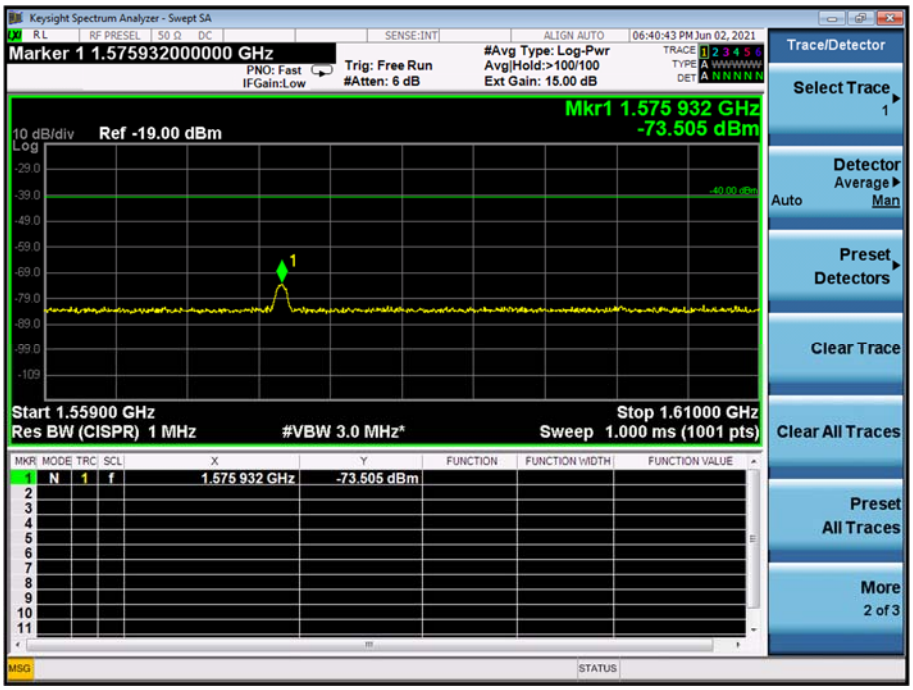
Nominal Frequency 757.050MHz, 1559MHz-1610MHz, 50kHz, 256QAM, Horizontal, Peak value = -82.654dBm, Limit = -40dBm



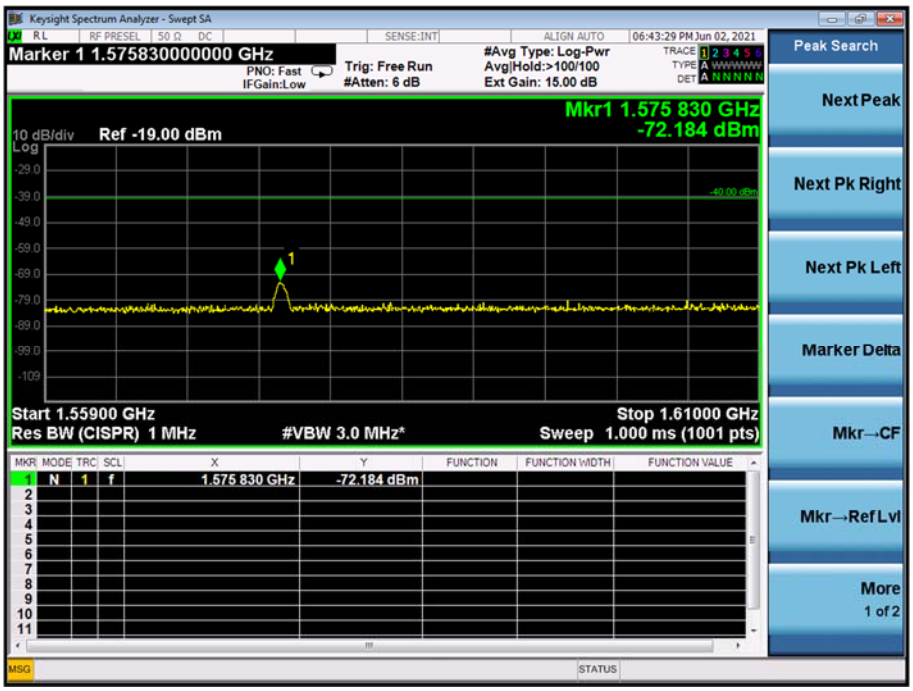

Nominal Frequency 757.050MHz, 1559MHz-1610MHz, 50kHz, 256QAM, Vertical, Peak value = -82.052dBm, Limit = -40dBm



Nominal Frequency 787.950MHz, 1559MHz-1610MHz, 50kHz, 256QAM, Horizontal, Peak value = -73.505dBm, Limit = -40dBm




Nominal Frequency 787.950MHz, 1559MHz-1610MHz, 50kHz, 256QAM, Vertical, Peak value = -72.184dBm, Limit = -40dBm



| Frequency (MHz) | Antenna | CH BW (kHz) | Modulation | Spurious Span (MHz) | Measured Value (4dBi ANT) | Calculation Value | Limit (dBm ) | Verdict |
|---|---|---|---|---|---|---|---|---|
| 757.050 | Horizontal | 50 | 256QAM | 1559-1610 | -82.654dBm | -70.654dBm | -40 | Pass |
| | Vertical | 50 | 256QAM | 1559-1610 | -82.052dBm | -70.052dBm | -40 | Pass |
| 787.950 | Horizontal | 50 | 256QAM | 1559-1610 | -73.505dBm | -65.505dBm | -40 | Pass |
| | Vertical | 50 | 256QAM | 1559-1610 | -72.184dBm | -64.184dBm | -40 | Pass |

## 2.5. Frequency Stability

### 2.5.1. Requirement

According to FCC section 2.1055 and FCC section 27.54, the frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. According to FCC section 2.1055, the test conditions are:

(a) The temperature is varied from -30°C to +50°C at intervals of not more than 10°C.

(b) frequency stability also measured at extreme temperature -40°C and +70°C, which the applicant specified.

### 2.5.2. Test Results

The nominal, highest and lowest extreme voltages are separately 24VDC, 60VDC and 10.5VDC which are specified by the applicant. The normal temperature here used is 20°C.

The tested results show a maximum frequency deviation of 94Hz which equates to an error of 94Hz / 757.05MHz = 0.124 ppm.

| 757.050MHz QPSK 12.5kHz Limit =±1ppm | | | | | |
|---|---|---|---|---|---|
| **Voltage** | **Power (VDC)** | **Temp (°C)** | **Fre. Dev. (Hz)** | **Deviation (ppm)** | **Result** |
| NV | 24.0 | -40 | 81 | 0.107 | PASS |
| NV | | -30 | 18 | 0.024 | |
| NV | | -20 | 94 | 0.124 | |
| NV | | -10 | 20 | 0.026 | |
| NV | | 0 | 51 | 0.067 | |
| NV | | +10 | 17 | 0.022 | |
| NV | | +20 | 77 | 0.102 | |
| NV | | +30 | -19 | -0.025 | |
| NV | | +40 | -22 | -0.029 | |
| NV | | +50 | 34 | 0.045 | |
| NV | | +60 | 47 | 0.062 | |
| NV | | +70 | 57 | 0.075 | |
| LV | 10.5 | +20 | -20 | -0.026 | |
| HV | 60.0 | +20 | 36 | 0.048 | |

| 757.050MHz QPSK 25.0kHz Limit =±1ppm | | | | | |
|---|---|---|---|---|---|
| **Voltage** | **Power** | **Temp (°C)** | **Fre. Dev.** | **Deviation** | **Result** |

| | (VDC) | | (Hz) | (ppm) | |
|---|---|---|---|---|---|
| NV | 24.0 | -40 | 77 | 0.102 | PASS |
| NV | | -30 | -59 | -0.078 | |
| NV | | -20 | 67 | 0.089 | |
| NV | | -10 | 54 | 0.071 | |
| NV | | 0 | 34 | 0.045 | |
| NV | | +10 | -25 | -0.033 | |
| NV | | +20 | -68 | -0.090 | |
| NV | | +30 | -13 | -0.017 | |
| NV | | +40 | 63 | 0.083 | |
| NV | | +50 | -61 | -0.081 | |
| NV | | +60 | -83 | -0.110 | |
| NV | | +70 | -33 | -0.044 | |
| LV | 10.5 | +20 | -67 | -0.089 | |
| HV | 60.0 | +20 | 61 | 0.081 | |

| 757.050MHz QPSK 50.0kHz Limit =±1ppm | | | | | |
|---|---|---|---|---|---|
| **Voltage** | **Power (VDC)** | **Temp (°C)** | **Fre. Dev. (Hz)** | **Deviation (ppm)** | **Result** |
| NV | 24.0 | -40 | -47 | -0.062 | PASS |
| NV | | -30 | 81 | 0.107 | |
| NV | | -20 | 19 | 0.025 | |
| NV | | -10 | -56 | -0.074 | |
| NV | | 0 | 59 | 0.078 | |
| NV | | +10 | -27 | -0.036 | |
| NV | | +20 | 23 | 0.030 | |
| NV | | +30 | 94 | 0.124 | |
| NV | | +40 | 46 | 0.061 | |
| NV | | +50 | 14 | 0.018 | |
| NV | | +60 | 59 | 0.078 | |
| NV | | +70 | 56 | 0.074 | |
| LV | 10.5 | +20 | 45 | 0.059 | |
| HV | 60.0 | +20 | 34 | 0.045 | |

| 787.950MHz QPSK 12.5kHz Limit =±1ppm | | | | | |
|---|---|---|---|---|---|
| **Voltage** | **Power (VDC)** | **Temp (°C)** | **Fre. Dev. (Hz)** | **Deviation (ppm)** | **Result** |
| NV | 24.0 | -40 | 56 | 0.071 | PASS |

| | | | | | |
|---|---|---|---|---|---|
| NV | | -30 | -55 | -0.070 | |
| NV | | -20 | -10 | -0.013 | |
| NV | | -10 | -80 | -0.102 | |
| NV | | 0 | -18 | -0.023 | |
| NV | | +10 | 26 | 0.033 | |
| NV | | +20 | -46 | -0.058 | |
| NV | | +30 | 37 | 0.047 | |
| NV | | +40 | -74 | -0.094 | |
| NV | | +50 | 63 | 0.080 | |
| NV | | +60 | 61 | 0.077 | |
| NV | | +70 | 70 | 0.089 | |
| LV | 10.5 | +20 | 37 | 0.047 | |
| HV | 60.0 | +20 | 72 | 0.091 | |

| 787.950MHz QPSK 25.0kHz Limit =±1ppm | | | | | |
|---|---|---|---|---|---|
| **Voltage** | **Power (VDC)** | **Temp (°C)** | **Fre. Dev. (Hz)** | **Deviation (ppm)** | **Result** |
| NV | 24.0 | -40 | -95 | -0.121 | PASS |
| NV | | -30 | -69 | -0.088 | |
| NV | | -20 | 53 | 0.067 | |
| NV | | -10 | 23 | 0.029 | |
| NV | | 0 | -37 | -0.047 | |
| NV | | +10 | 31 | 0.039 | |
| NV | | +20 | 70 | 0.089 | |
| NV | | +30 | -49 | -0.062 | |
| NV | | +40 | 51 | 0.065 | |
| NV | | +50 | 70 | 0.089 | |
| NV | | +60 | 78 | 0.099 | |
| NV | | +70 | 58 | 0.074 | |
| LV | 10.5 | +20 | 24 | 0.030 | |
| HV | 60.0 | +20 | 47 | 0.060 | |

| 787.950MHz QPSK 50.0kHz Limit =±1ppm | | | | | |
|---|---|---|---|---|---|
| **Voltage** | **Power (VDC)** | **Temp (°C)** | **Fre. Dev. (Hz)** | **Deviation (ppm)** | **Result** |
| NV | 24.0 | -40 | 62 | 0.079 | PASS |
| NV | | -30 | 67 | 0.085 | |
| NV | | -20 | 11 | 0.014 | |

| | | | | | |
|---|---|---|---|---|---|
| NV | | -10 | -15 | -0.019 | |
| NV | | 0 | 61 | 0.077 | |
| NV | | +10 | -20 | -0.025 | |
| NV | | +20 | 60 | 0.076 | |
| NV | | +30 | 86 | 0.109 | |
| NV | | +40 | -48 | -0.061 | |
| NV | | +50 | 32 | 0.041 | |
| NV | | +60 | -19 | -0.024 | |
| NV | | +70 | -57 | -0.072 | |
| LV | 10.5 | +20 | -45 | -0.057 | |
| HV | 60.0 | +20 | 95 | 0.121 | |

# Annex A Test Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for test performed on the EUT as specified in CISPR 16-1-2:

| Test items | Uncertainty |
|---|---|
| Peak Output Power | ±2.22dB |
| Bandwidth | ±5% |
| Conducted Spurious Emission | ±2.77 dB |
| Radiated Spurious Emissions | ±6 dB |
| Occupied Channel Bandwidth | ±5% |

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

# Annex B Testing Laboratory Information

## 1. Identification of the Responsible Testing Laboratory

| | |
|---|---|
| **Company Name:** | Shenzhen Morlab Communications Technology Co., Ltd. |
| **Laboratory Address:** | FL.3, Building A, FeiYang Science Park, No.8 LongChang Road, Block 67, BaoAn District, ShenZhen, GuangDong Province, P. R. China |
| **Telephone:** | +86 755 36698555 |
| **Facsimile:** | +86 755 36698525 |

## 2. Identification of the Responsible Testing Location

| | |
|---|---|
| **Name:** | Shenzhen Morlab Communications Technology Co., Ltd. |
| **Address:** | FL.3, Building A, FeiYang Science Park, No.8 LongChang Road, Block 67, BaoAn District, ShenZhen, GuangDong Province, P. R. China |

## 3. Facilities and Accreditations

All measurement facilities used to collect the measurement data are located at FL.3, Building A, FeiYang Science Park, Block 67, BaoAn District, Shenzhen, 518101 P. R. China. The test site is constructed in conformance with the requirements of ANSI C63.10-2013and CISPR Publication 22; the FCC designation number is CN1192, the test firm registration number is 226174.

## 4. Test Equipment Utilized

### 4.1 Conducted Test Equipment

| Equipment Name | Serial No. | Type | Manufacturer | Cal. Date | Cal. Due |
|---|---|---|---|---|---|
| Power Splitter | NW521 | 1506A | Weinschel | N/A | N/A |
| Attenuator 1 | (N/A.) | 30.0dB | Resnet | N/A | N/A |
| Attenuator 2 | (N/A.) | 30.0dB | Resnet | N/A | N/A |
| EXA Signal Analyzer | MY51511149 | N9020A | Agilent | 2020.07.27 | 2021.07.26 |
| USB Power Sensor | MY54210011 | U2021XA | Agilent | 2020.10.23 | 2021.10.22 |
| RF Cable (30MHz-26GHz) | CB01 | RF01 | Morlab | N/A | N/A |
| Coaxial Cable | CB02 | RF02 | Morlab | N/A | N/A |
| SMA Connector | CN01 | RF03 | HUBER-SUHNER | N/A | N/A |
| Temperature Chamber | (N/A) | HUT705P | CHONGQING HANBA EXPERIMENTAL EQUIPMENT CO.,LTD | 2021.03.17 | 2022.03.16 |
| Computer | T430i | Think Pad | Lenovo | N/A | N/A |

### 4.2 Radiated Test Equipment

| Equipment Name | Serial No. | Type | Manufacturer | Cal. Date | Cal.Due |
|---|---|---|---|---|---|
| System Simulator | 152038 | CMW500 | R&S | 2020.11.19 | 2021.11.18 |
| System Simulator | 6200995016 | MT8820C | Anritsu | 2020.10.28 | 2021.10.27 |
| Receiver | MY54130016 | N9038A | Agilent | 2020.07.21 | 2021.07.20 |
| Test Antenna - Bi-Log | 9163-519 | VULB 9163 | Schwarzbeck | 2019.05.24 | 2022.05.23 |
| Test Antenna - Horn | 9170C-531 | BBHA9170 | Schwarzbeck | 2019.07.26 | 2022.07.25 |
| Test Antenna - Horn | 01774 | BBHA 9120D | Schwarzbeck | 2019.07.26 | 2022.07.25 |
| Coaxial Cable (N male) (9kHz-30MHz) | CB04 | EMC04 | Morlab | N/A | N/A |

| | | | | | |
|---|---|---|---|---|---|
| Coaxial Cable (N male) (30MHz-26GHz) | CB02 | EMC02 | Morlab | N/A | N/A |
| Coaxial Cable (N male) (30MHz-26GHz) | CB03 | EMC03 | Morlab | N/A | N/A |
| Coaxial Cable (N male) (30MHz-40GHz) | CB05 | EMC05 | Morlab | N/A | N/A |
| 1-18GHz pre-Amplifier | 61171/61172 | S020180L3203 | Tonscend | 2020.07.21 | 2021.07.20 |
| 18-26.5GHz pre-Amplifier | 46732 | S10M100L3802 | Tonscend | 2020.07.21 | 2021.07.20 |
| 26-40GHz pre-Amplifier | 56774 | S40M400L4002 | Tonscend | 2020.07.21 | 2021.07.20 |
| Notch Filter | N/A | WRCGV -LTE B2 | Wainwright | 2020.07.21 | 2021.07.20 |
| Notch Filter | N/A | WRCGV -LTE B4 | Wainwright | 2020.07.21 | 2021.07.20 |
| Notch Filter | N/A | WRCGV -LTE B5 | Wainwright | 2020.07.21 | 2021.07.20 |

END OF REPORT