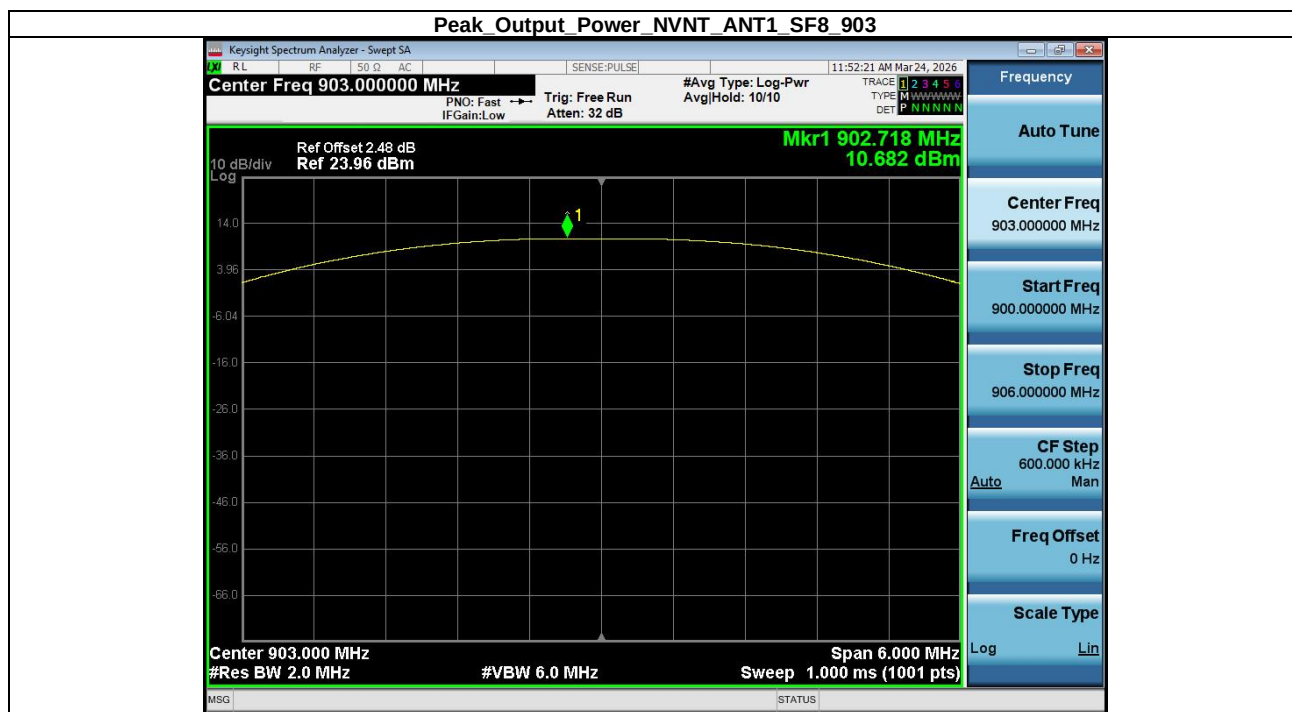
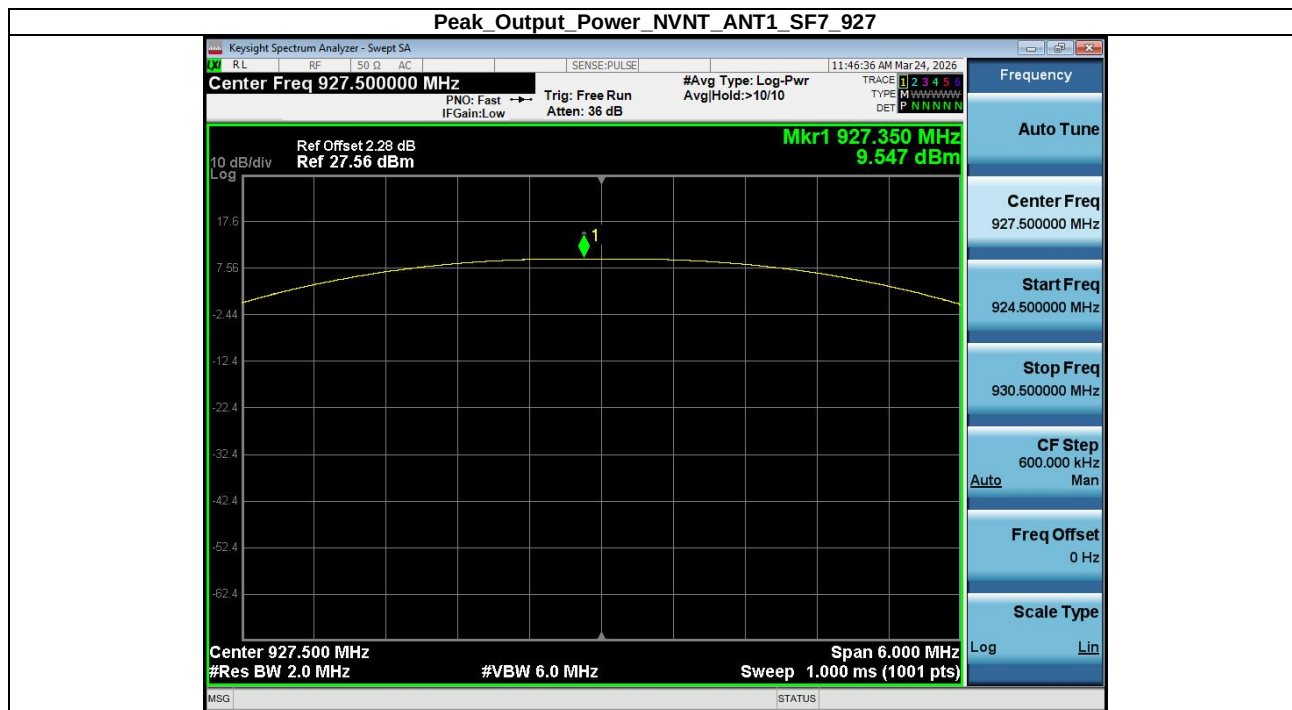
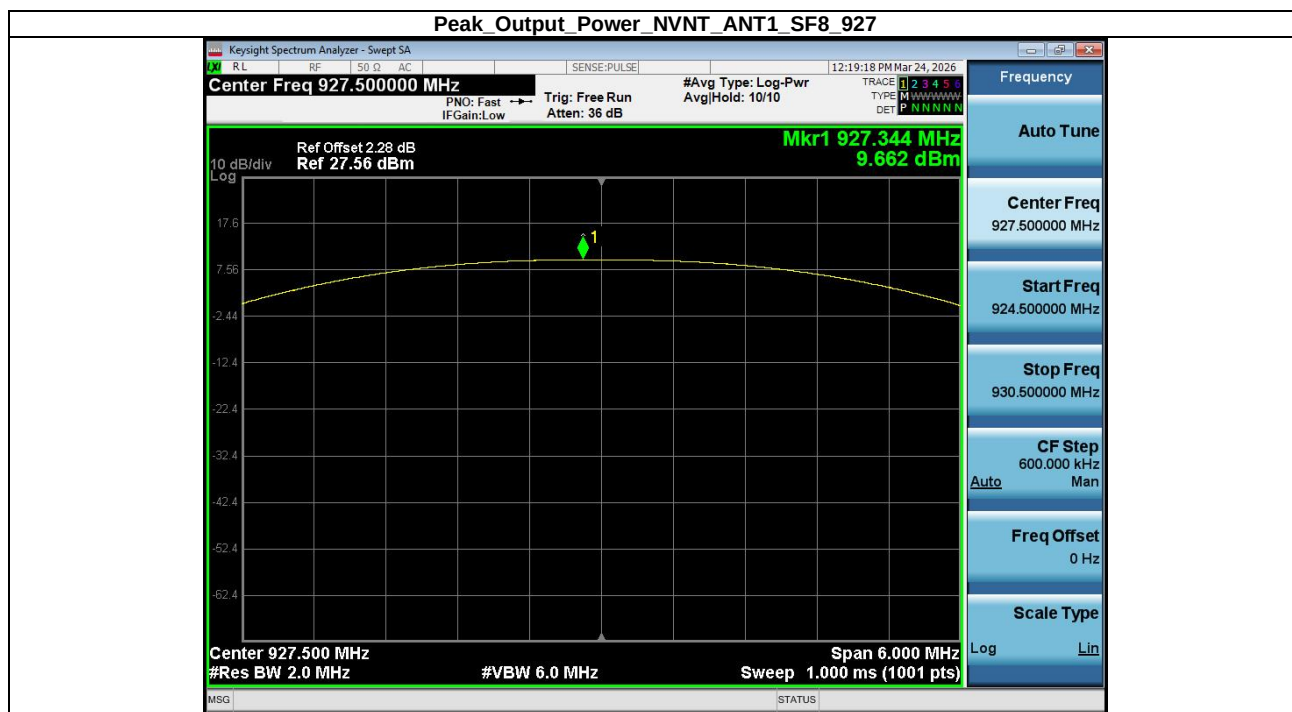
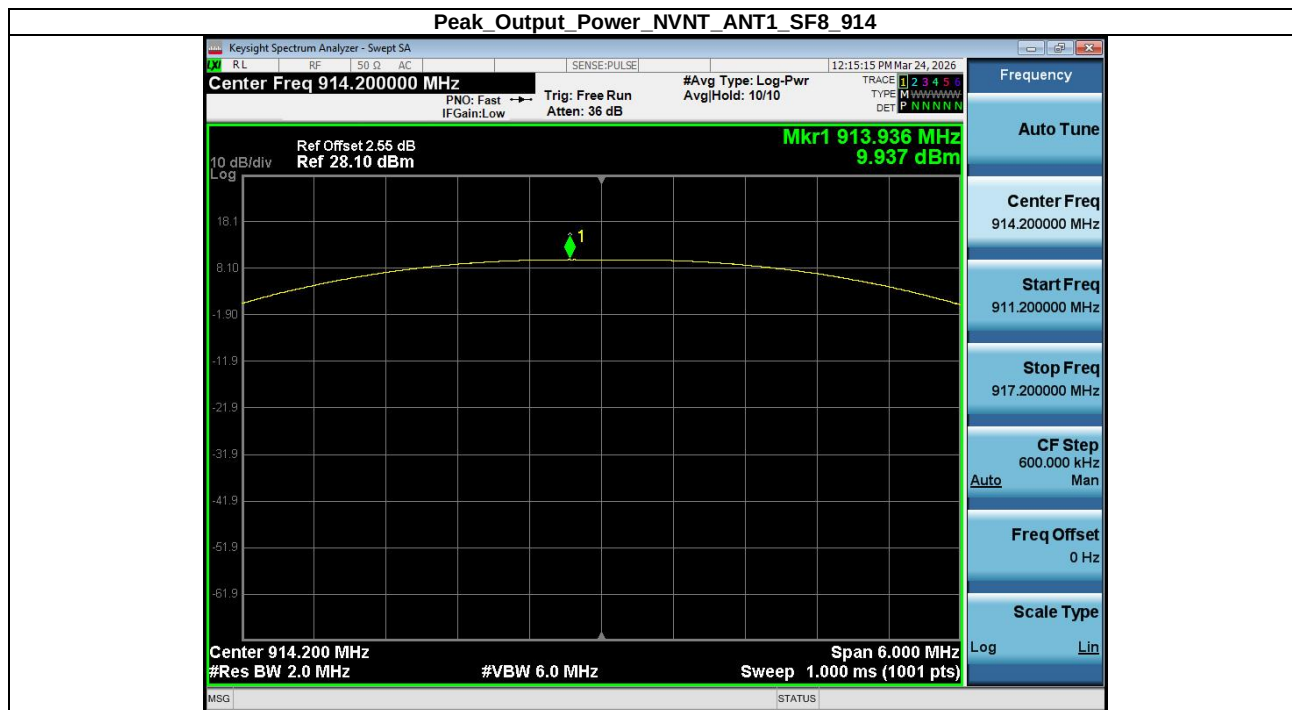
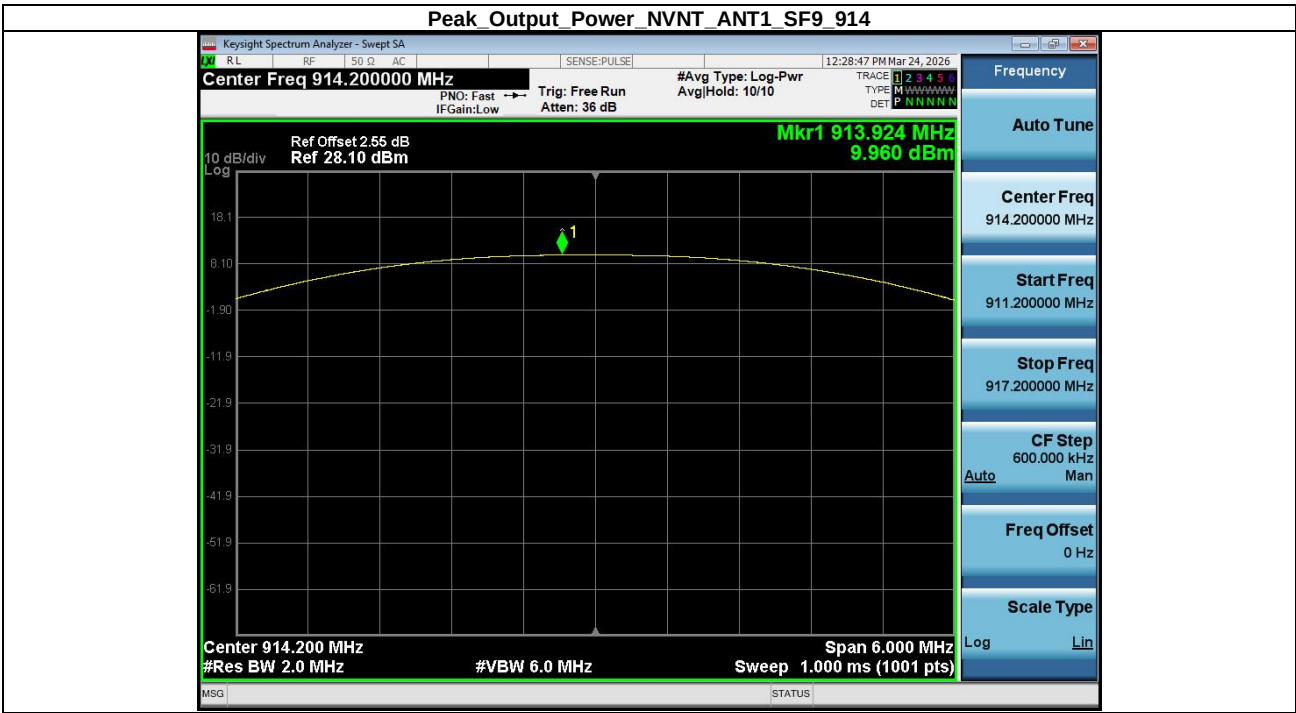
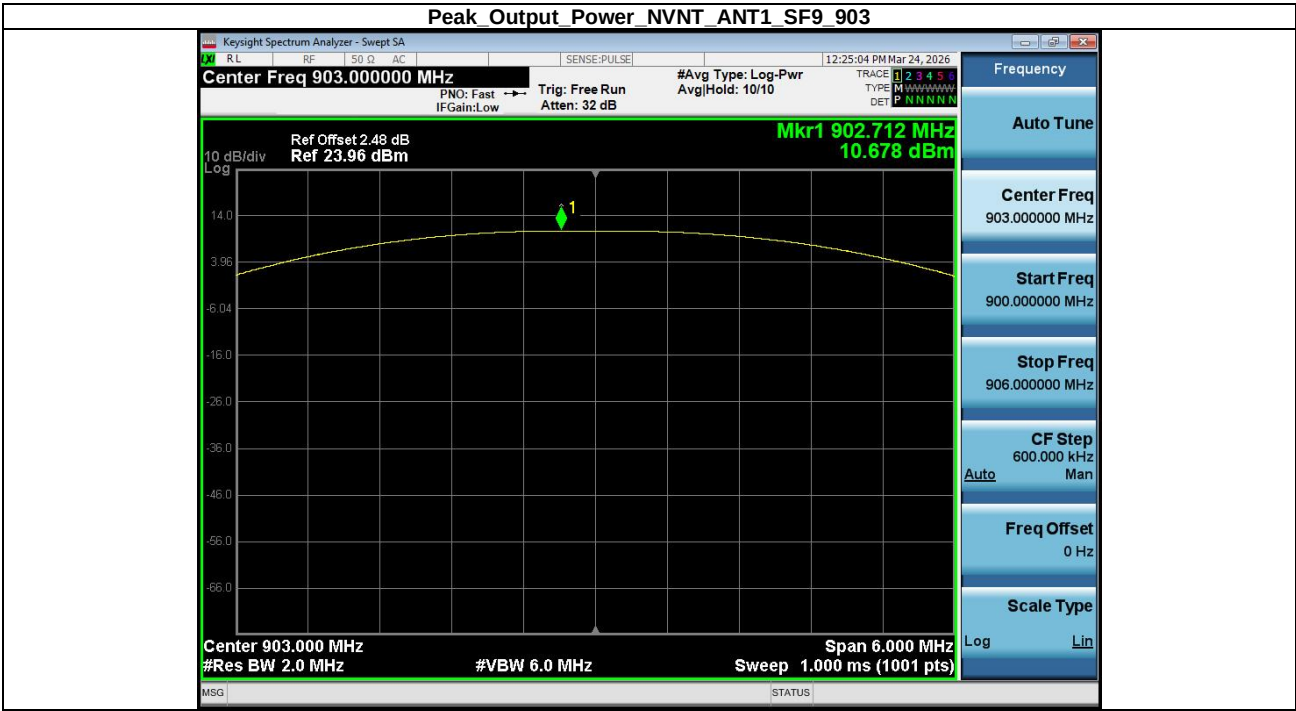
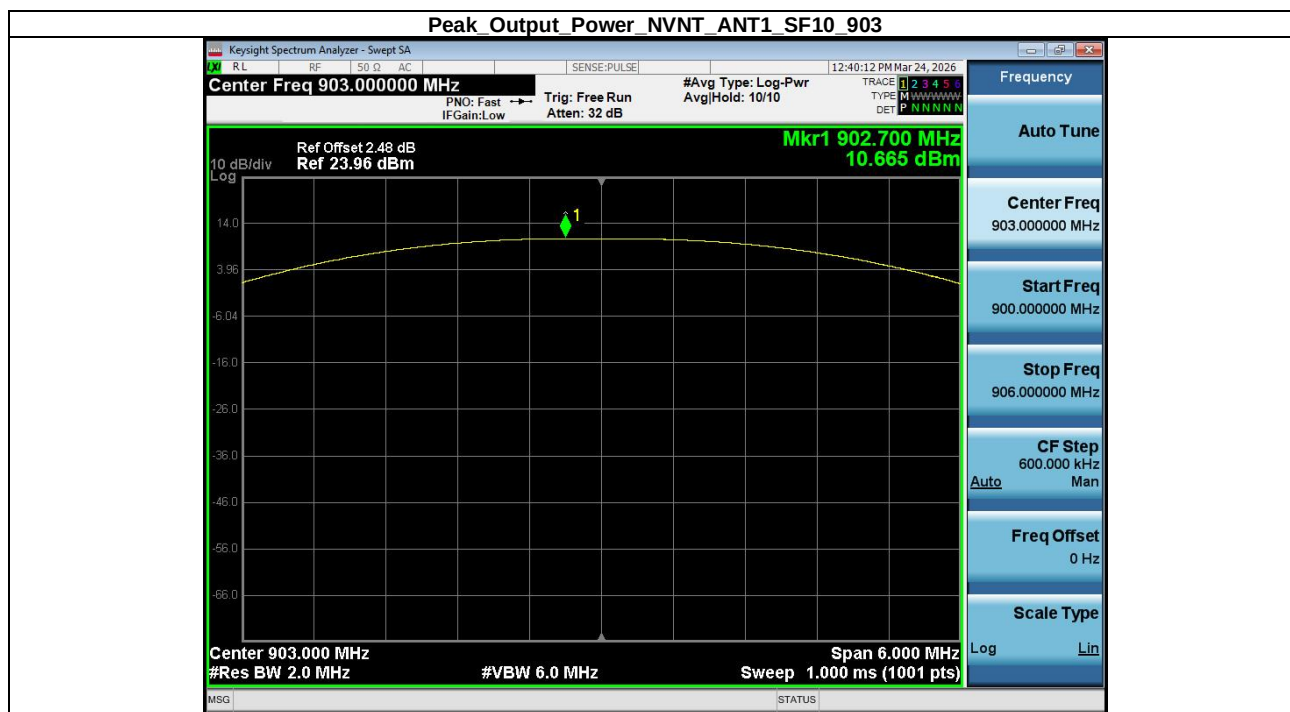
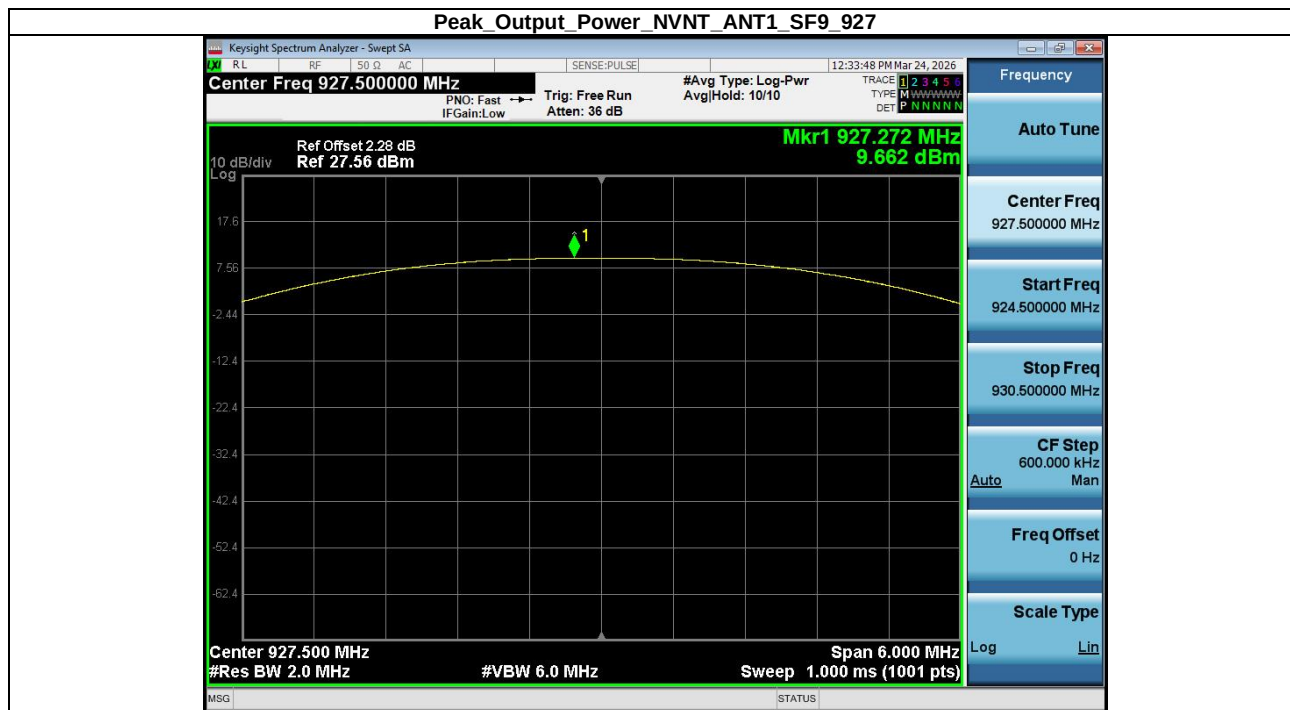


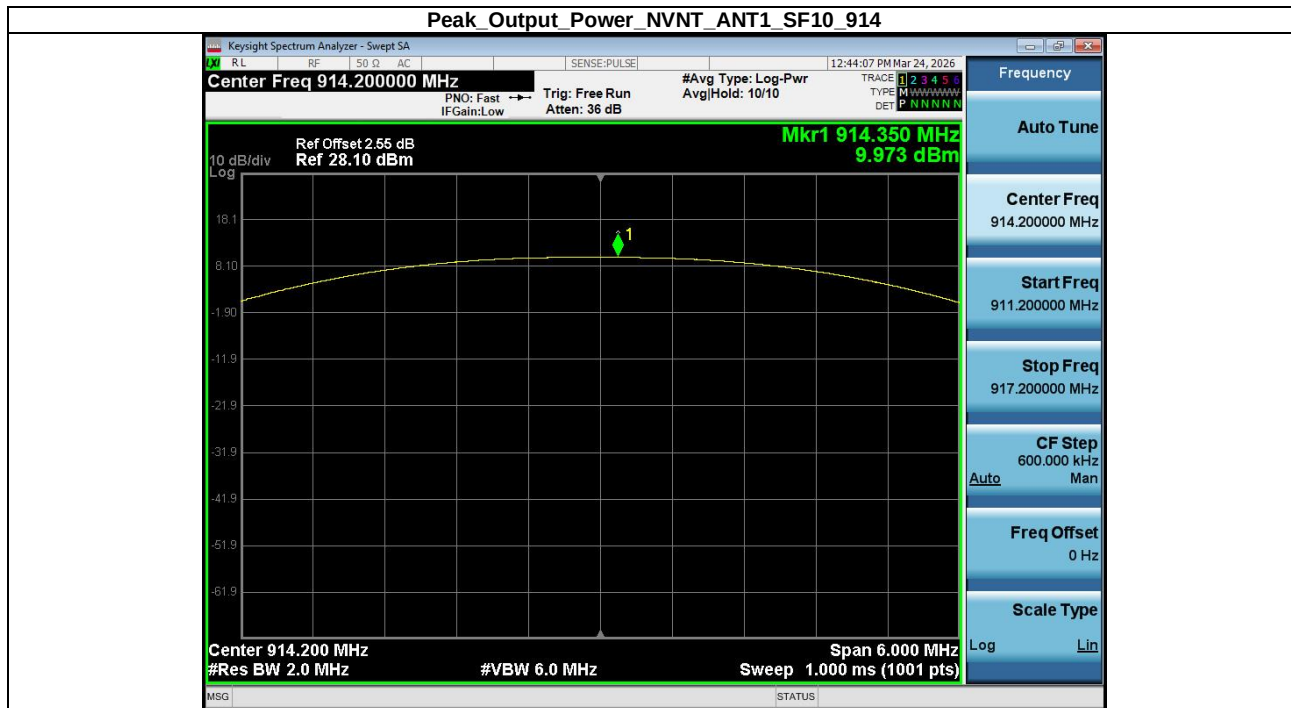




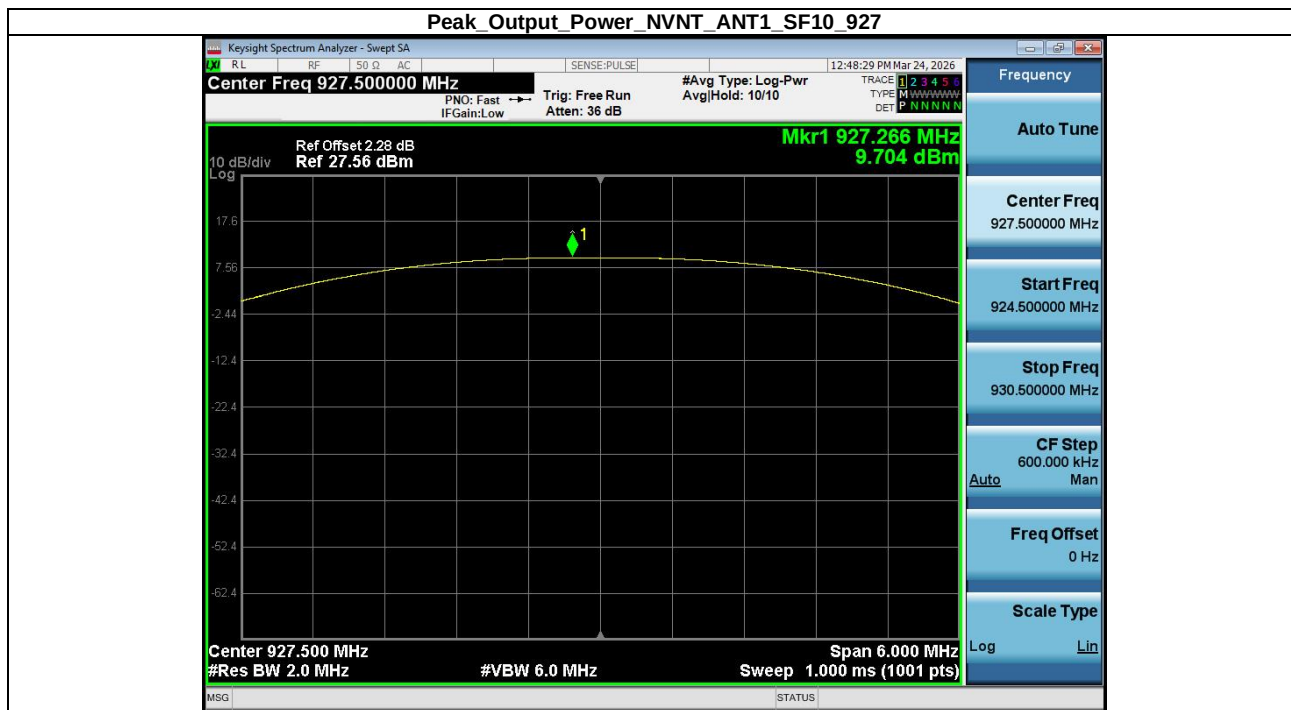


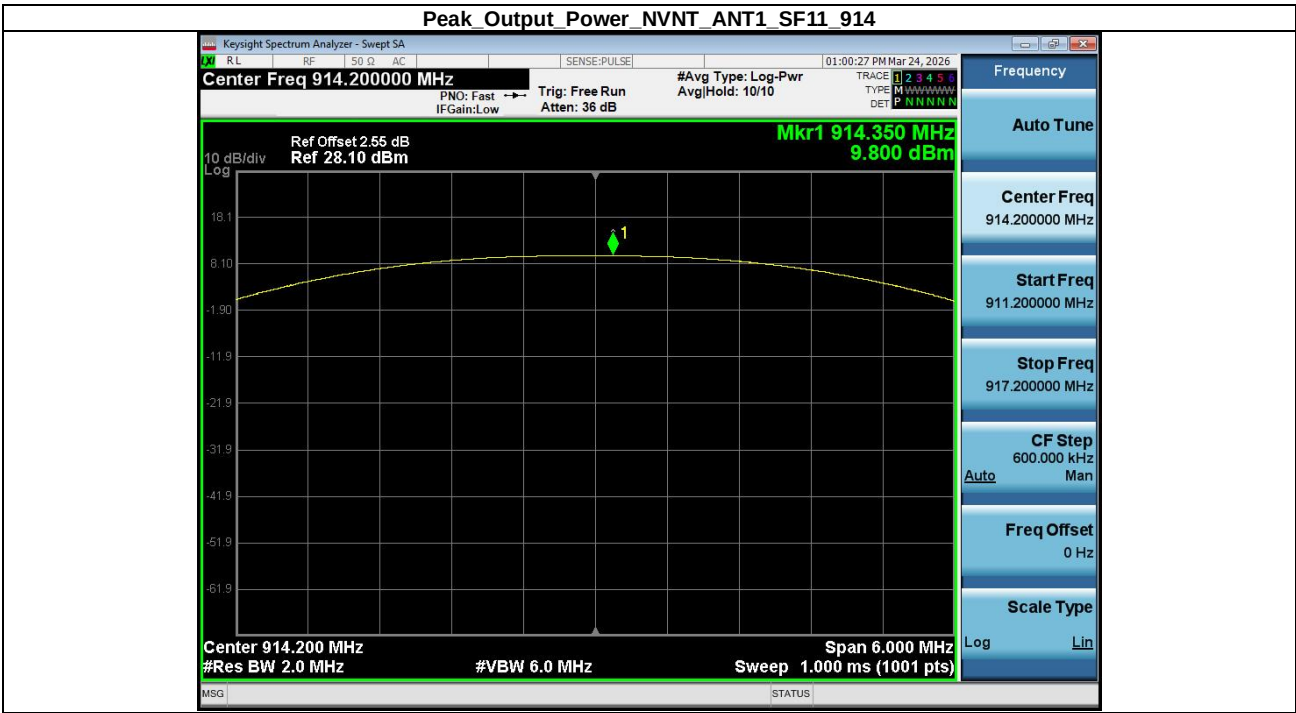
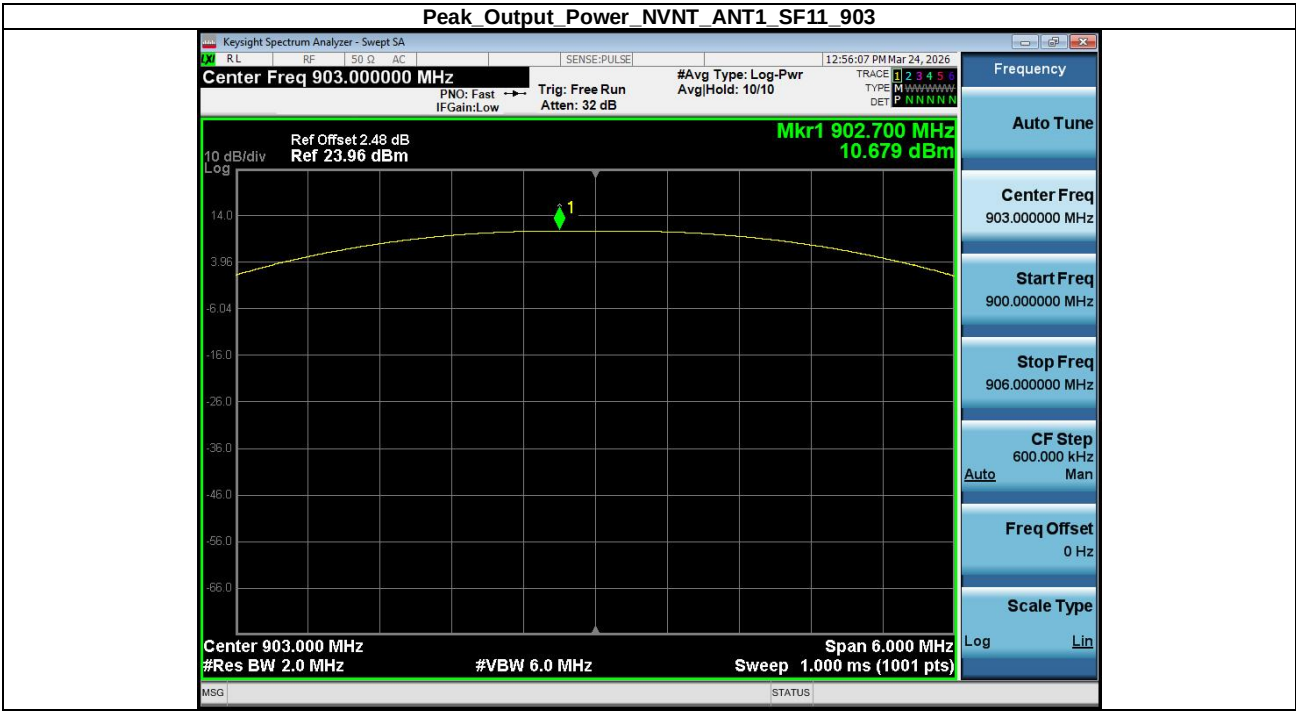


## Peak\_Output\_Power\_NVNT\_ANT1\_SF10\_914



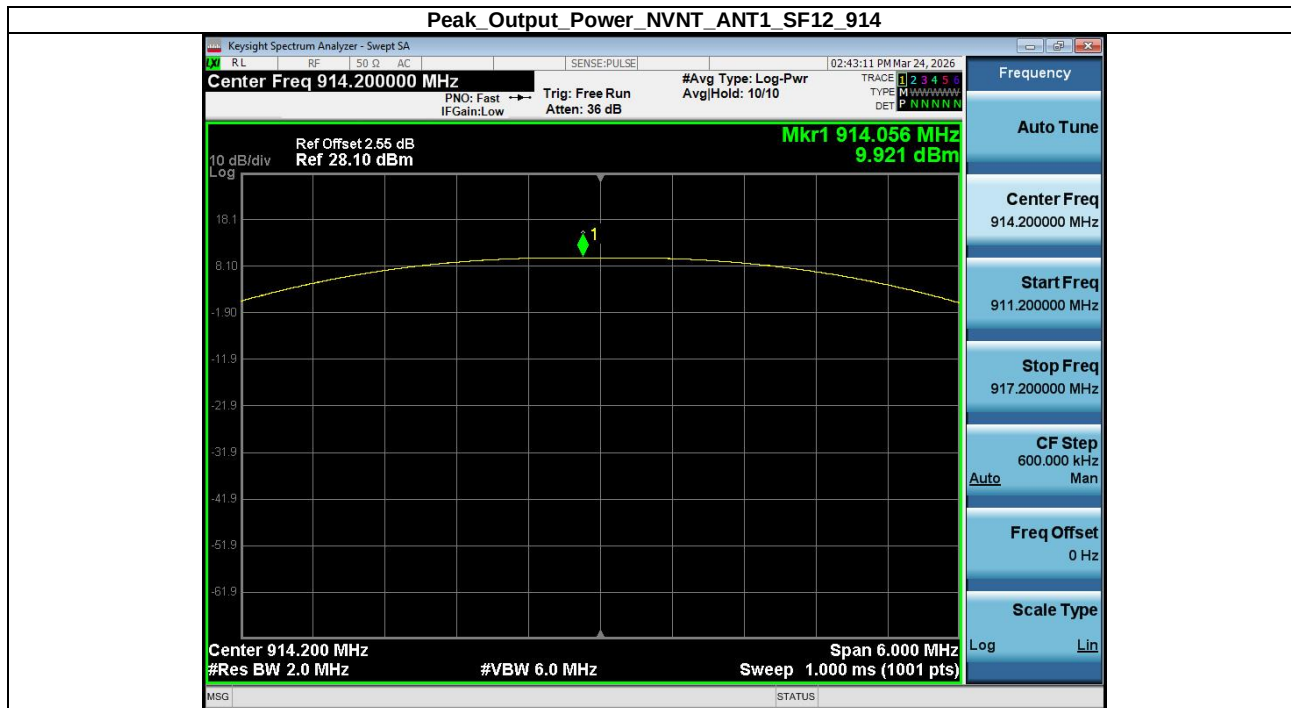
## Peak\_Output\_Power\_NVNT\_ANT1\_SF10\_927



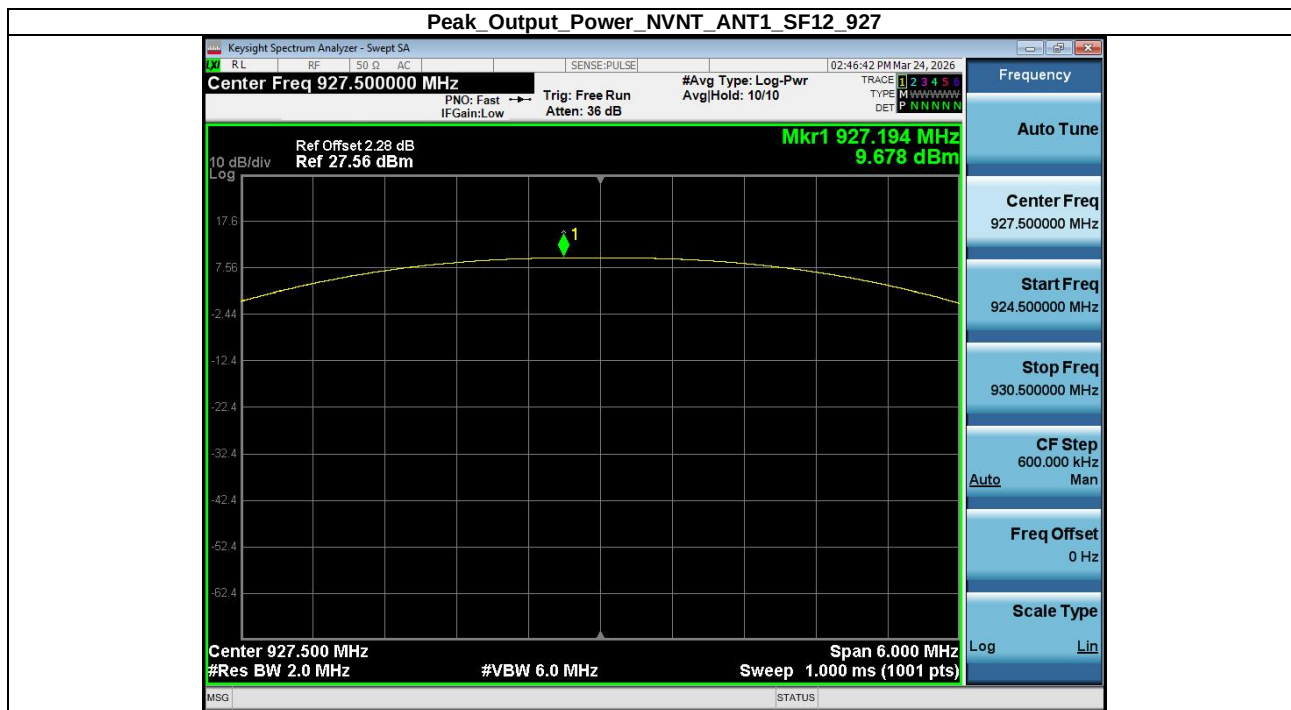




## Peak\_Output\_Power\_NVNT\_ANT1\_SF12\_914



## Peak\_Output\_Power\_NVNT\_ANT1\_SF12\_927



## 7. Peak Power Spectral Density

### 7.1. Test limits

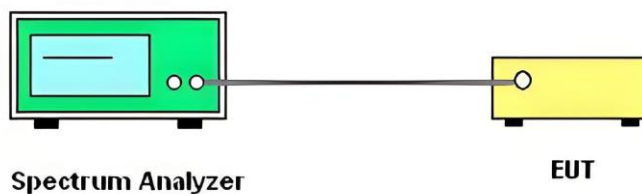
For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

### 7.2. Test Procedure

Details see the KDB558074 D01 Meas Guidance v05r02

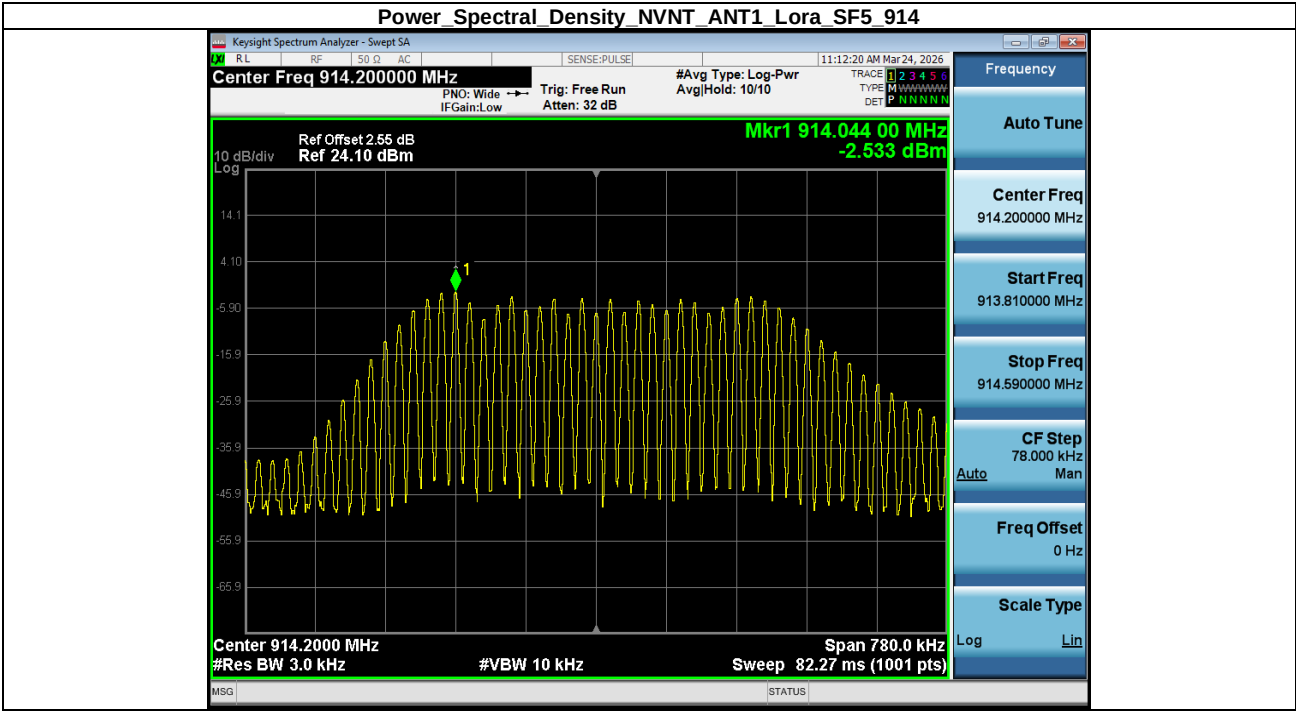
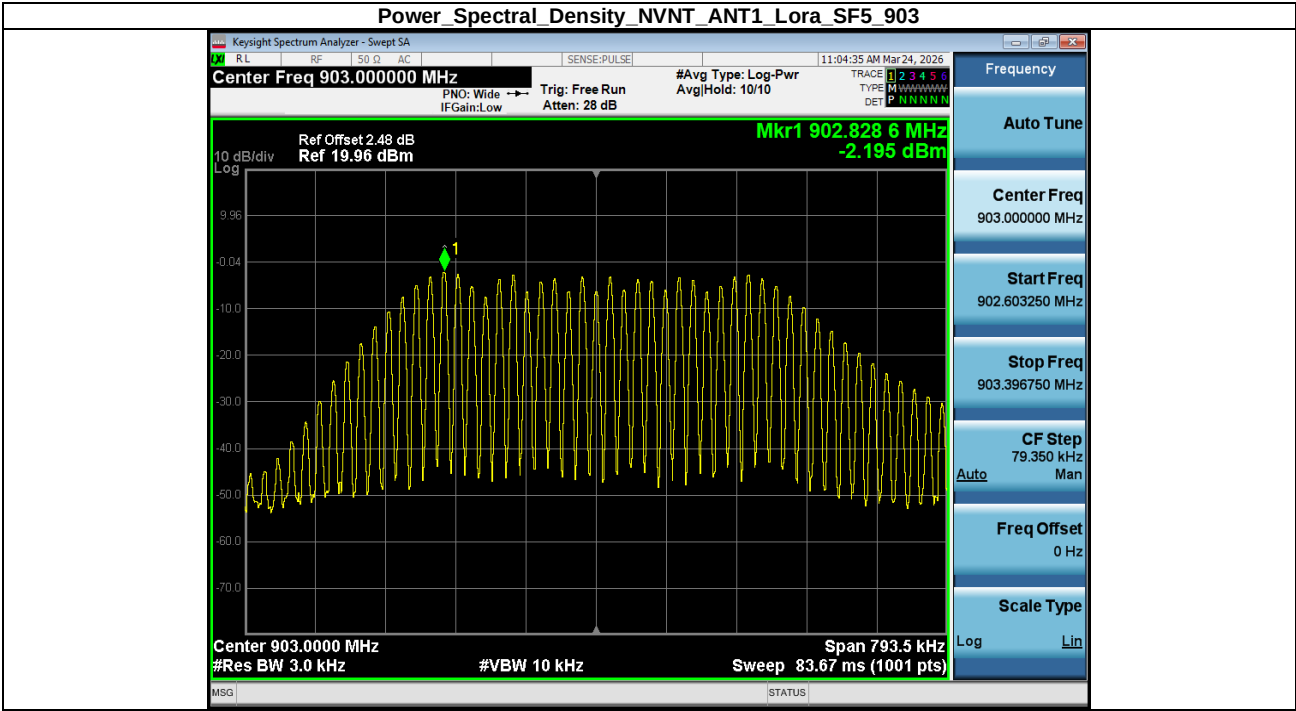
1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set the spectrum analyzer as RBW = 3kHz(Set the RBW to:  $3\text{ kHz} \leq \text{RBW} \leq 100\text{ kHz}$ .), VBW = 10kHz(Set the  $\text{VBW} \geq 3 \times \text{RBW}$ ), span  $\geq 1.5 \times \text{DTS bandwidth}$ ., detail see the test plot.
4. Record the max reading.
5. Repeat the above procedure until the measurements for all frequencies are completed.

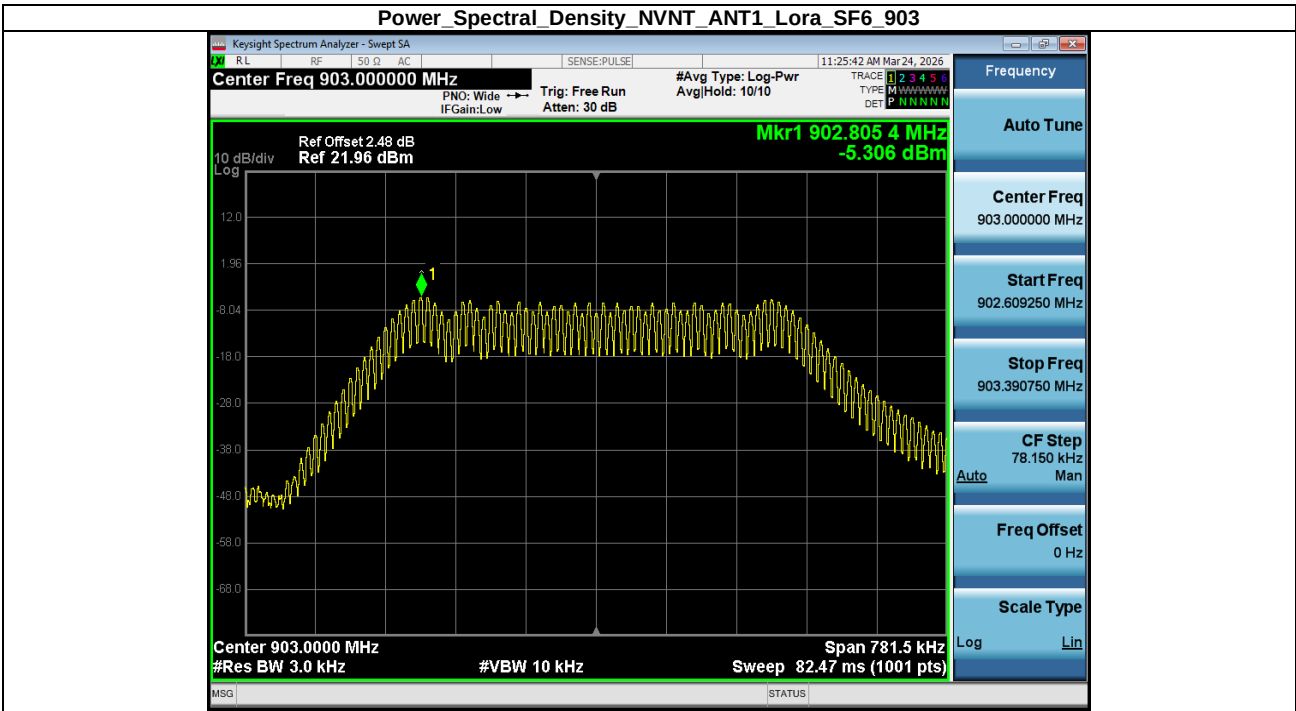
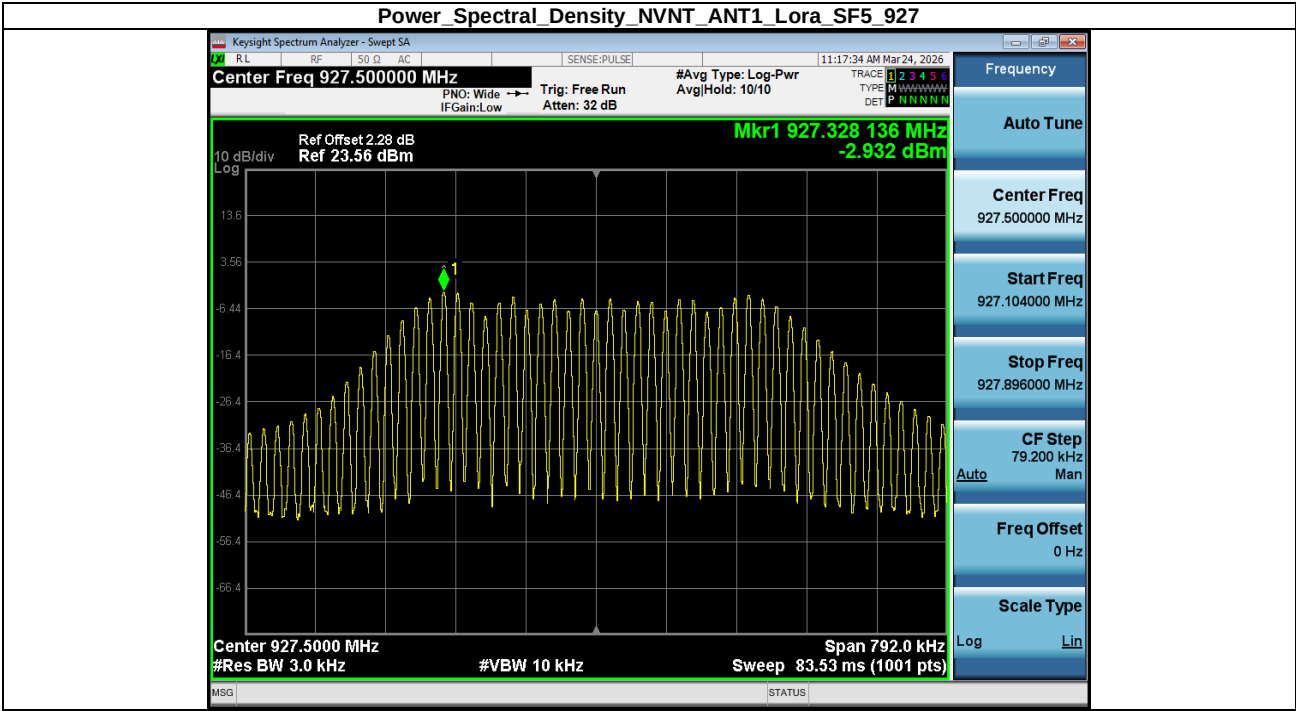
### 7.3. Test Setup

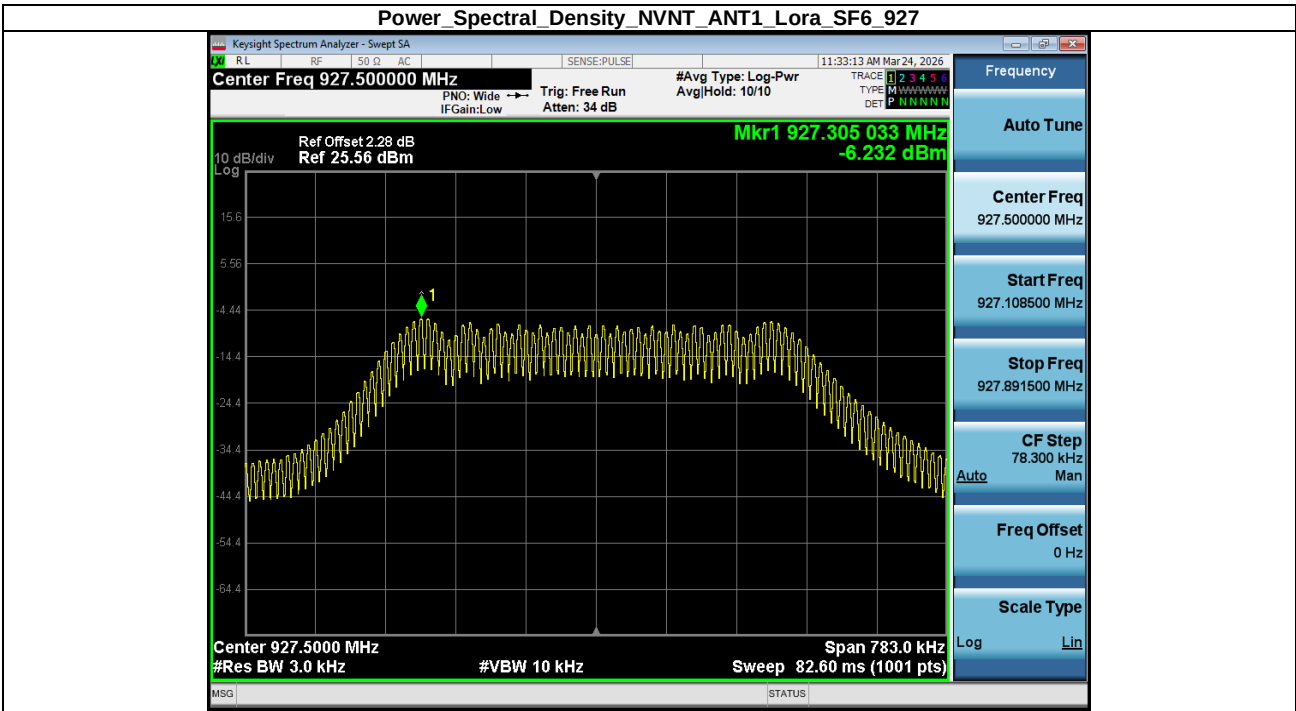
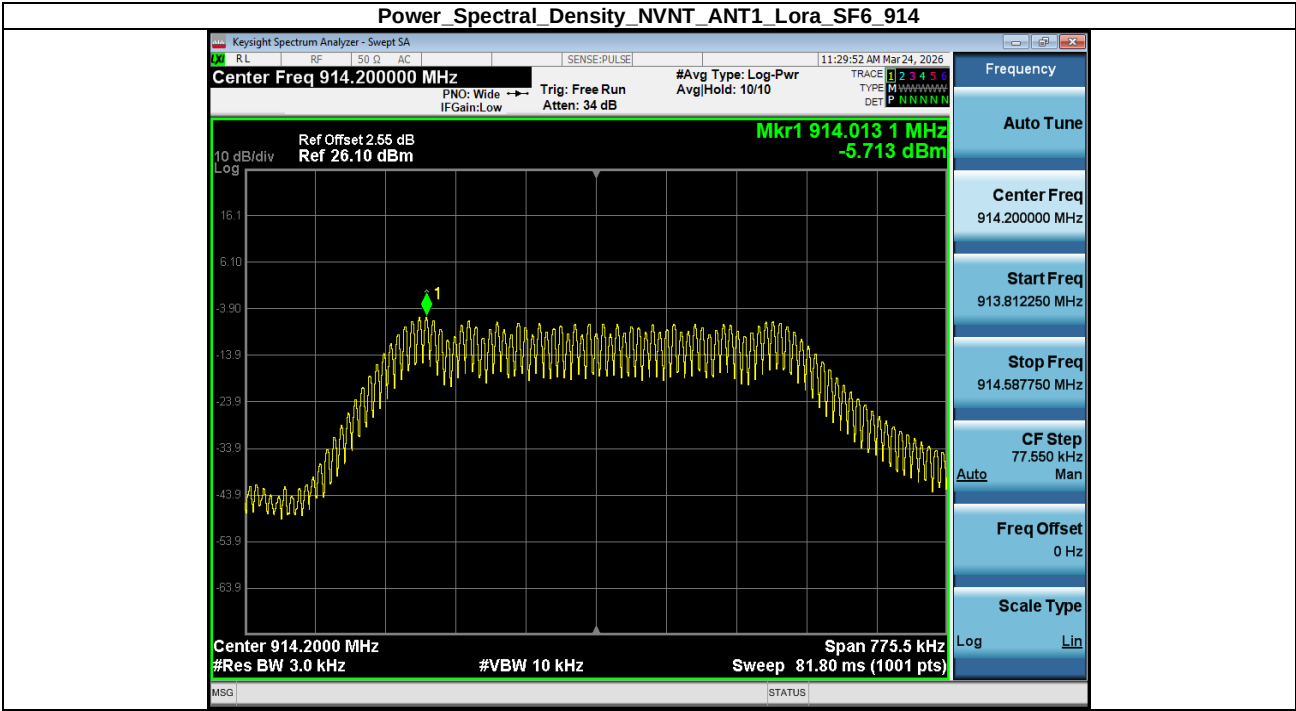


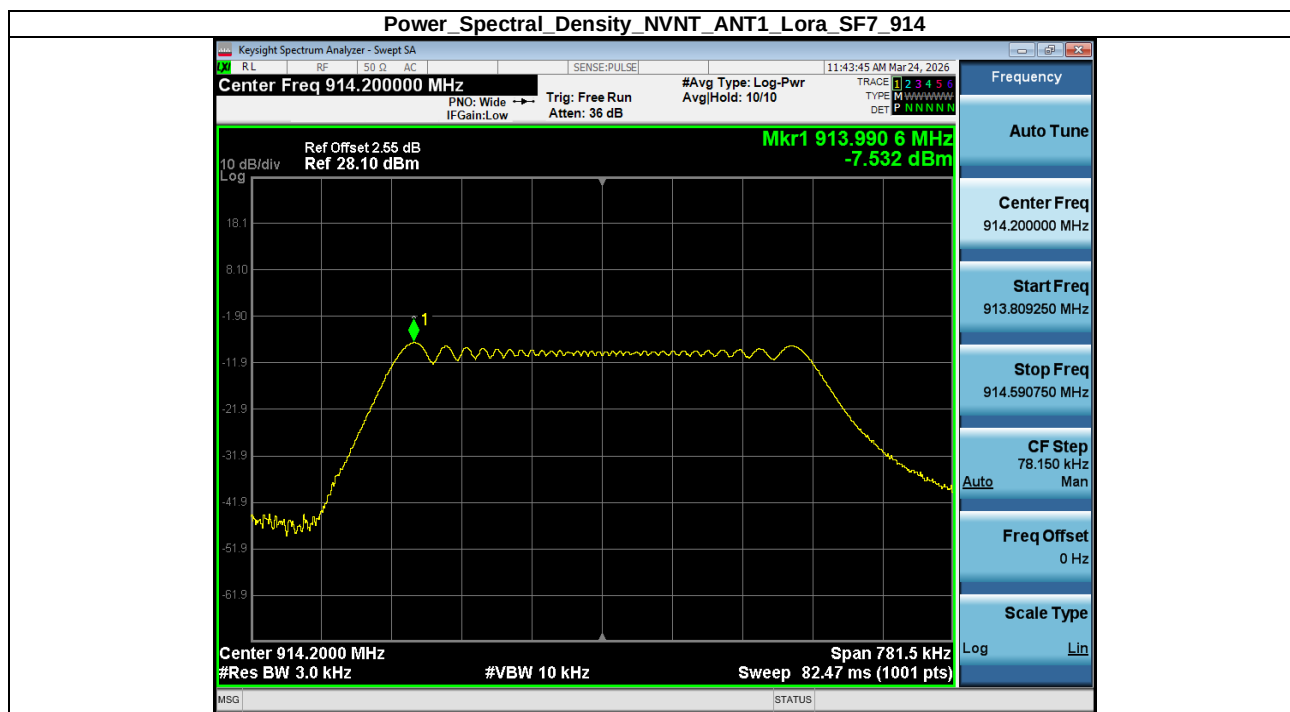
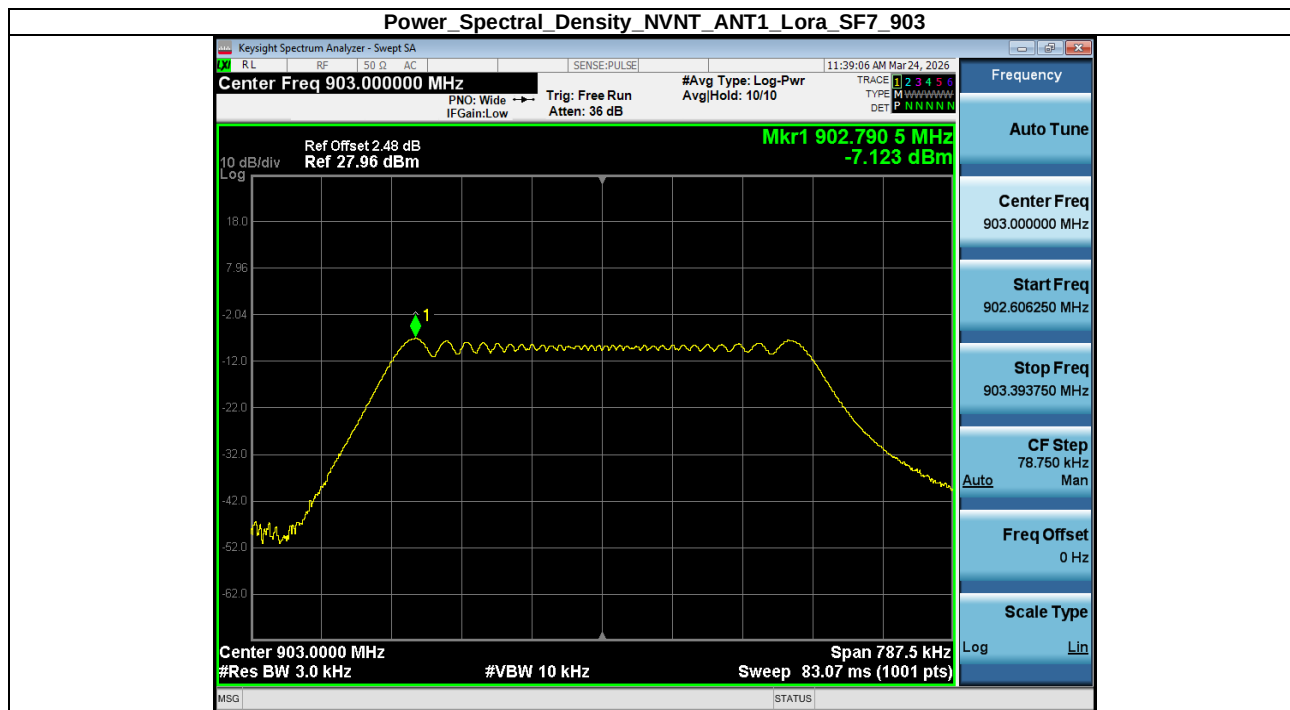
## 7.4. Test Results

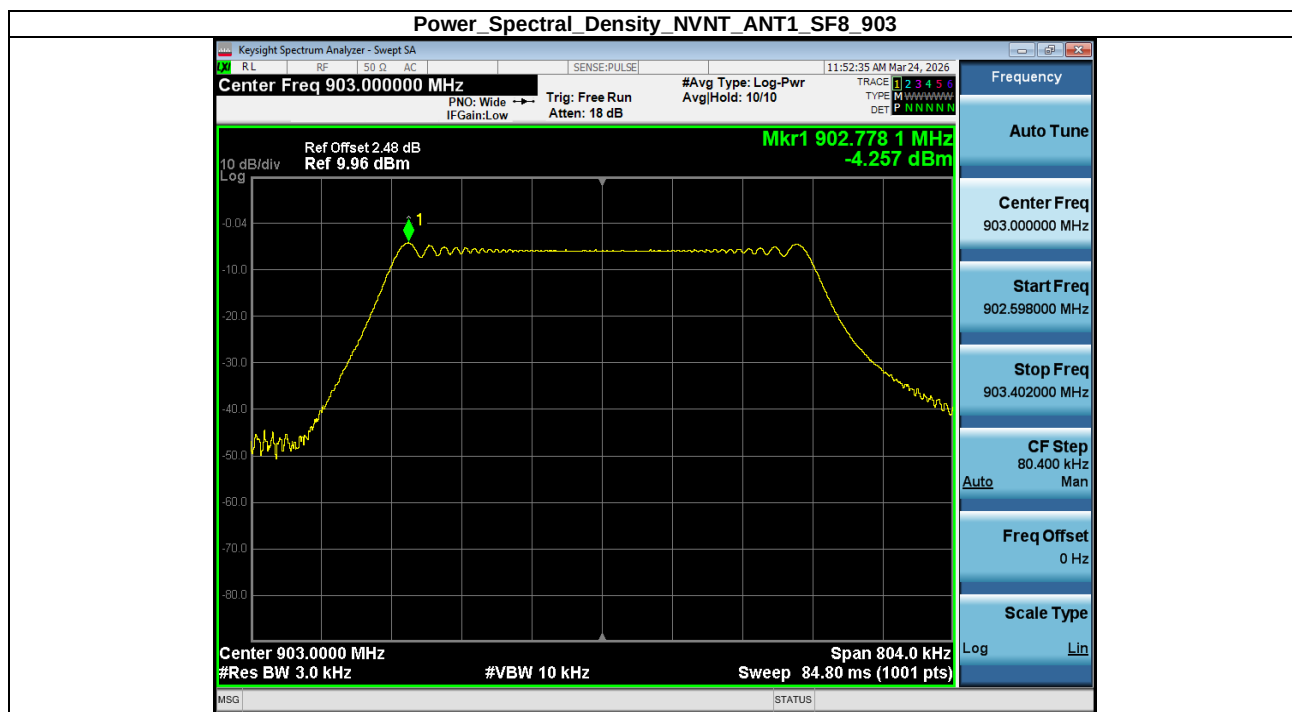
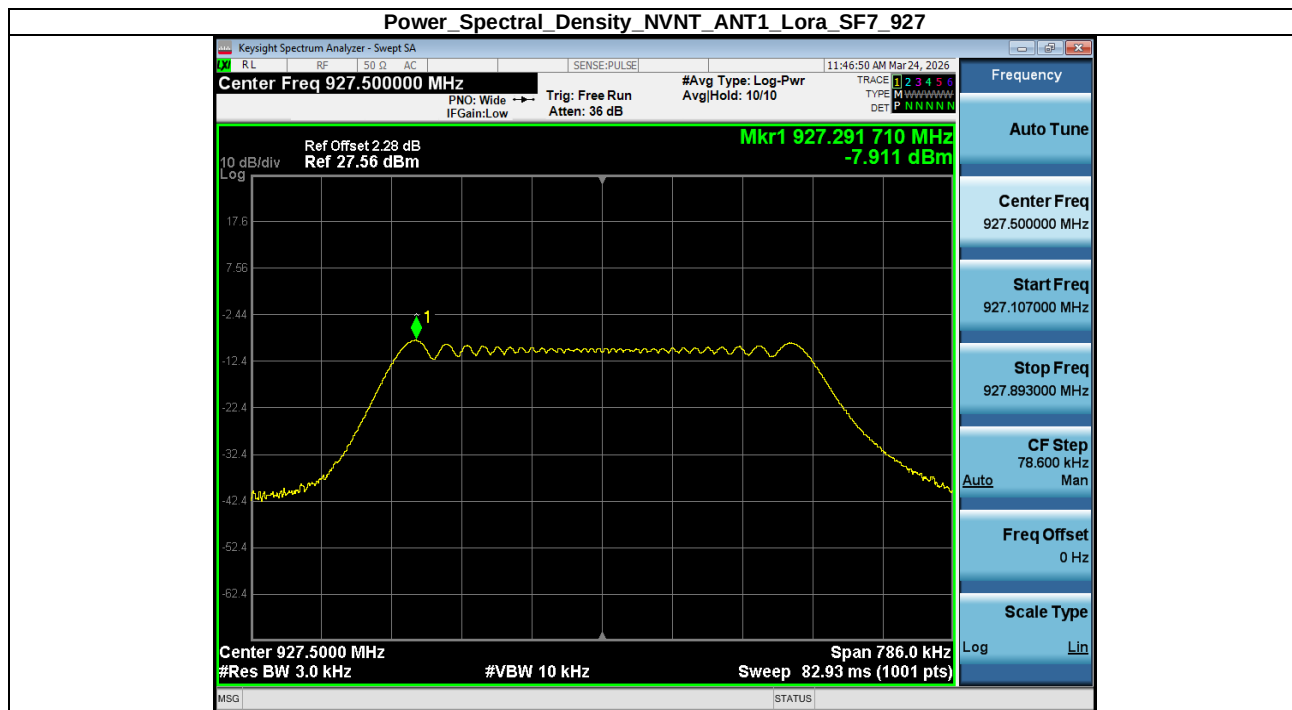
| Condition | Antenna | Test Mode | Frequency (MHz) | Power Spectral Density(dBm/3kHz) | Limit(dBm/3kHz) | Result |
|-----------|---------|-----------|-----------------|----------------------------------|-----------------|--------|
| NVNT      | ANT1    | Lora_SF5  | 903.00          | -2.19                            | 8               | Pass   |
| NVNT      | ANT1    | Lora_SF5  | 914.20          | -2.53                            | 8               | Pass   |
| NVNT      | ANT1    | Lora_SF5  | 927.50          | -2.93                            | 8               | Pass   |
| NVNT      | ANT1    | Lora_SF6  | 903.00          | -5.31                            | 8               | Pass   |
| NVNT      | ANT1    | Lora_SF6  | 914.20          | -5.71                            | 8               | Pass   |
| NVNT      | ANT1    | Lora_SF6  | 927.50          | -6.23                            | 8               | Pass   |
| NVNT      | ANT1    | Lora_SF7  | 903.00          | -7.12                            | 8               | Pass   |
| NVNT      | ANT1    | Lora_SF7  | 914.20          | -7.53                            | 8               | Pass   |
| NVNT      | ANT1    | Lora_SF7  | 927.50          | -7.91                            | 8               | Pass   |
| NVNT      | ANT1    | Lora_SF8  | 903.00          | -4.26                            | 8               | Pass   |
| NVNT      | ANT1    | Lora_SF8  | 914.20          | -4.71                            | 8               | Pass   |
| NVNT      | ANT1    | Lora_SF8  | 927.50          | -5.13                            | 8               | Pass   |
| NVNT      | ANT1    | Lora_SF9  | 903.00          | -1.33                            | 8               | Pass   |
| NVNT      | ANT1    | Lora_SF9  | 914.20          | -1.97                            | 8               | Pass   |
| NVNT      | ANT1    | Lora_SF9  | 927.50          | -2.32                            | 8               | Pass   |
| NVNT      | ANT1    | Lora_SF10 | 903.00          | 1.48                             | 8               | Pass   |
| NVNT      | ANT1    | Lora_SF10 | 914.20          | 0.89                             | 8               | Pass   |
| NVNT      | ANT1    | Lora_SF10 | 927.50          | 0.62                             | 8               | Pass   |
| NVNT      | ANT1    | Lora_SF11 | 903.00          | 1.46                             | 8               | Pass   |
| NVNT      | ANT1    | Lora_SF11 | 914.20          | 0.68                             | 8               | Pass   |
| NVNT      | ANT1    | Lora_SF11 | 927.50          | 0.36                             | 8               | Pass   |
| NVNT      | ANT1    | Lora_SF12 | 903.00          | 1.47                             | 8               | Pass   |
| NVNT      | ANT1    | Lora_SF12 | 914.20          | 0.85                             | 8               | Pass   |
| NVNT      | ANT1    | Lora_SF12 | 927.50          | 0.50                             | 8               | Pass   |

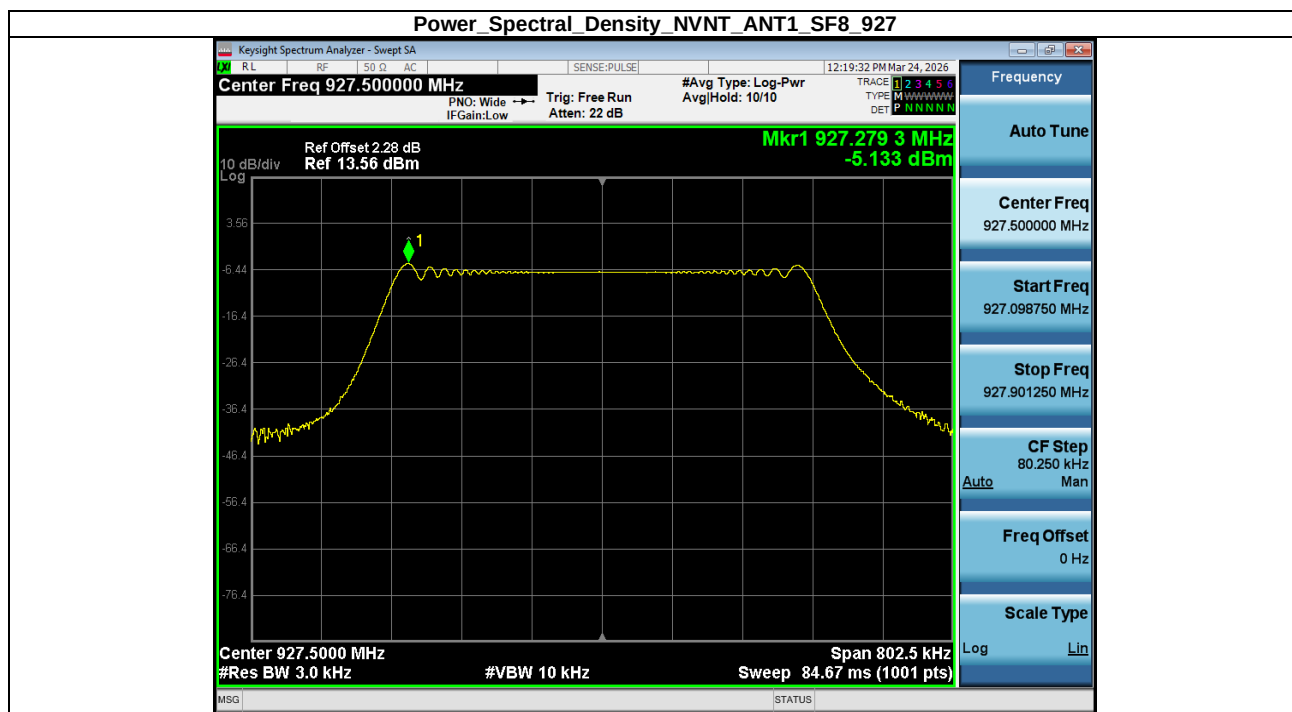
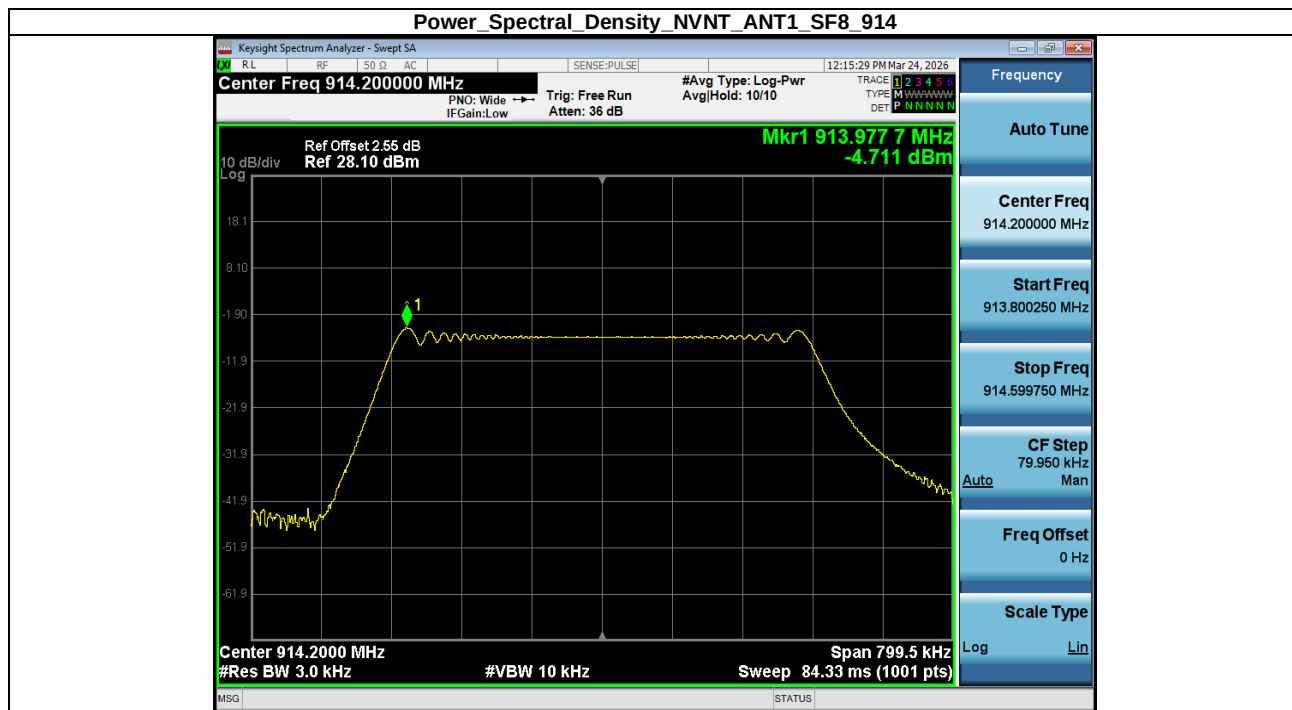


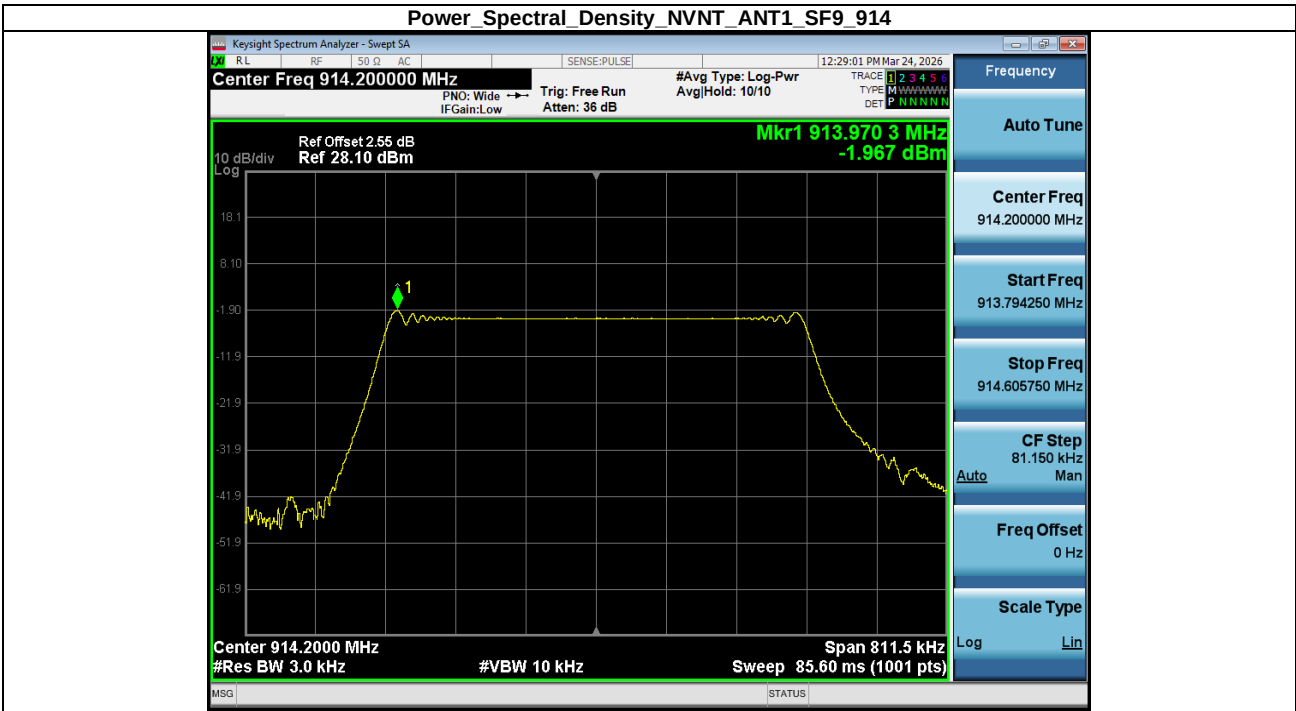


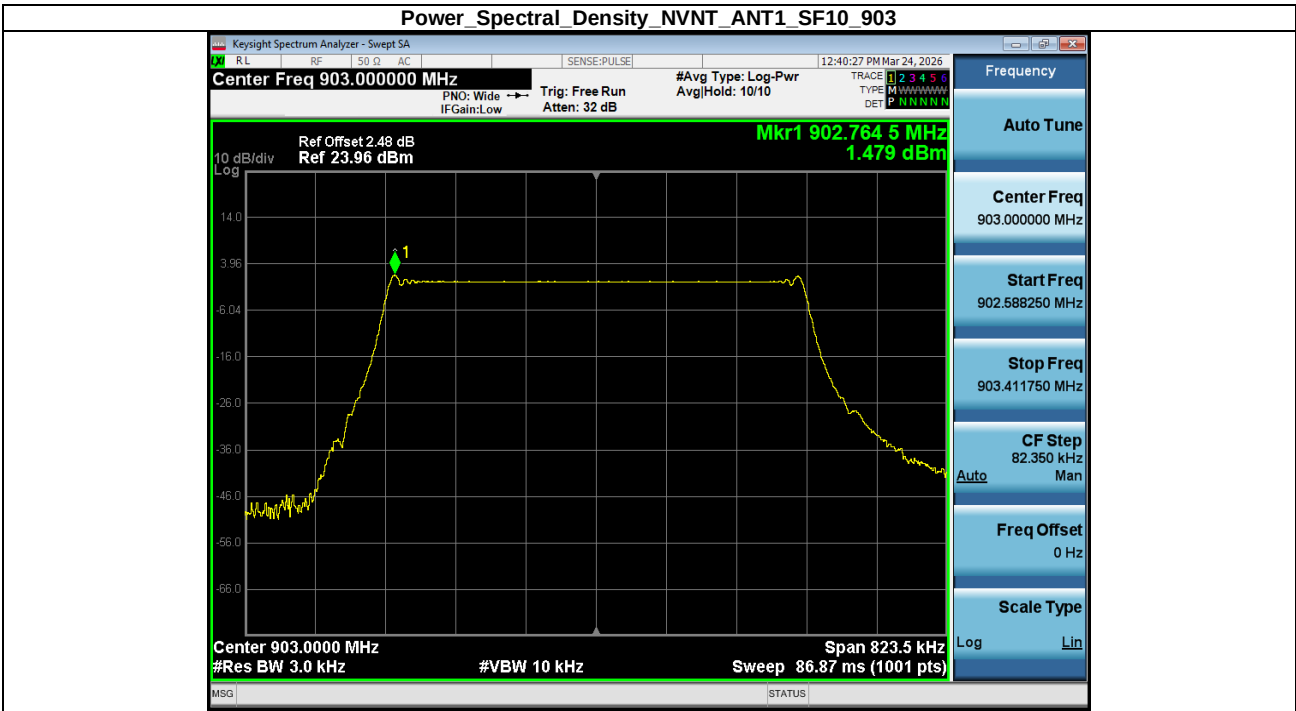
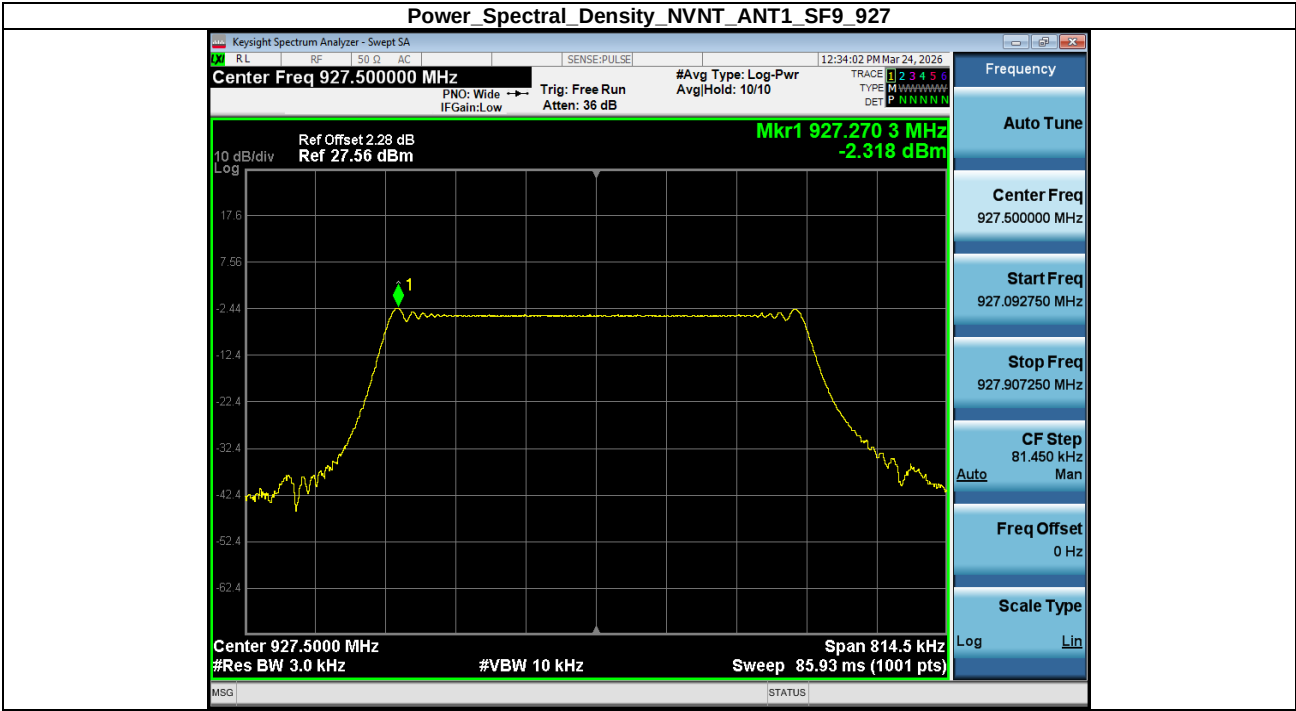


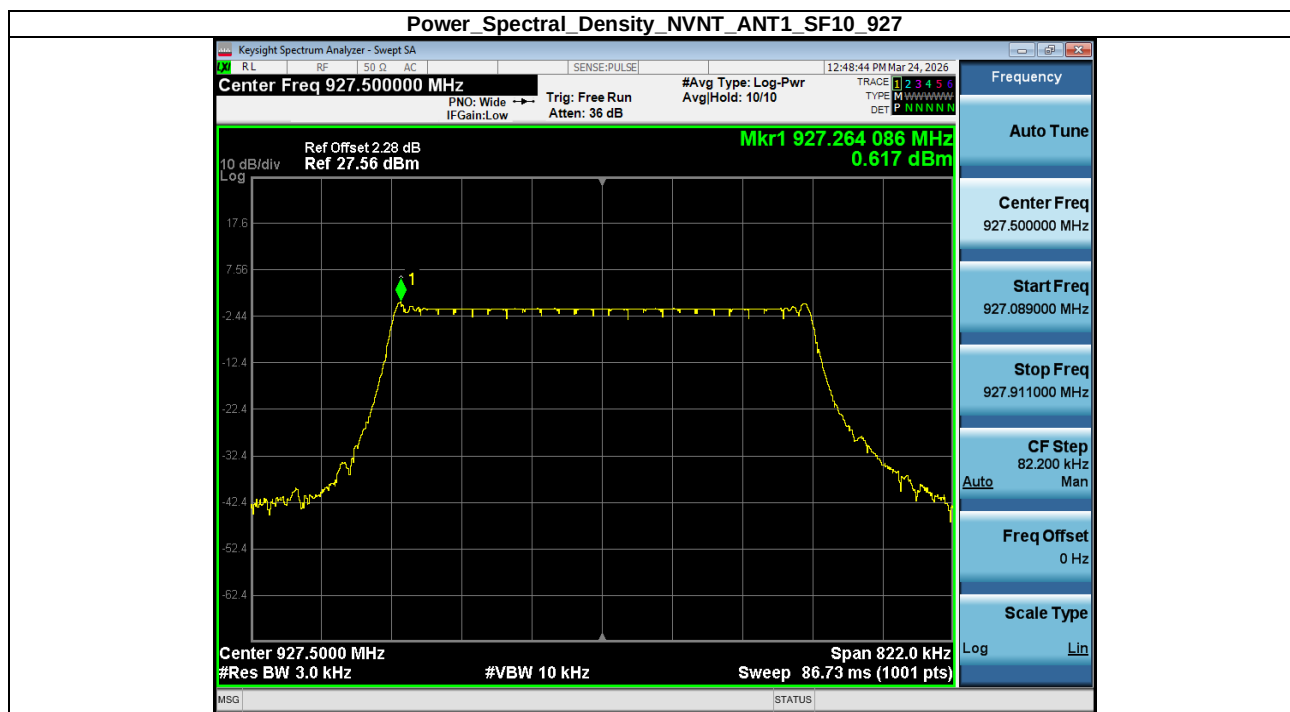
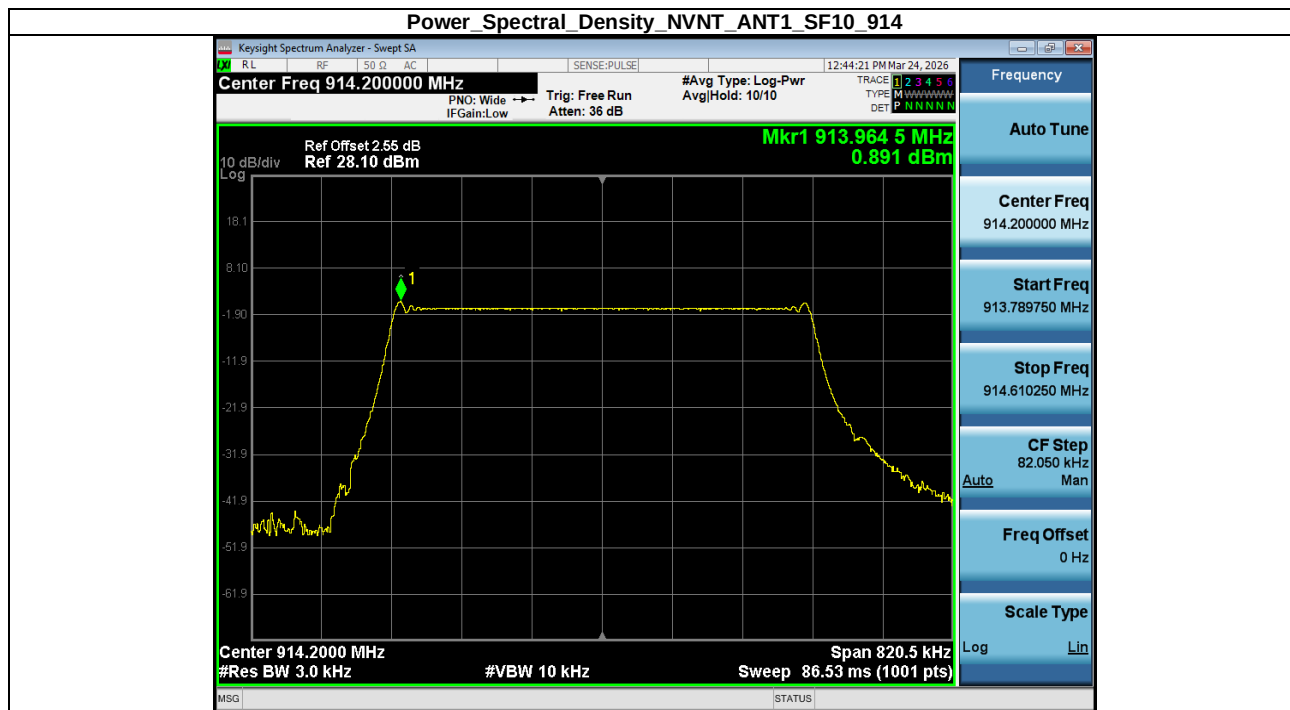


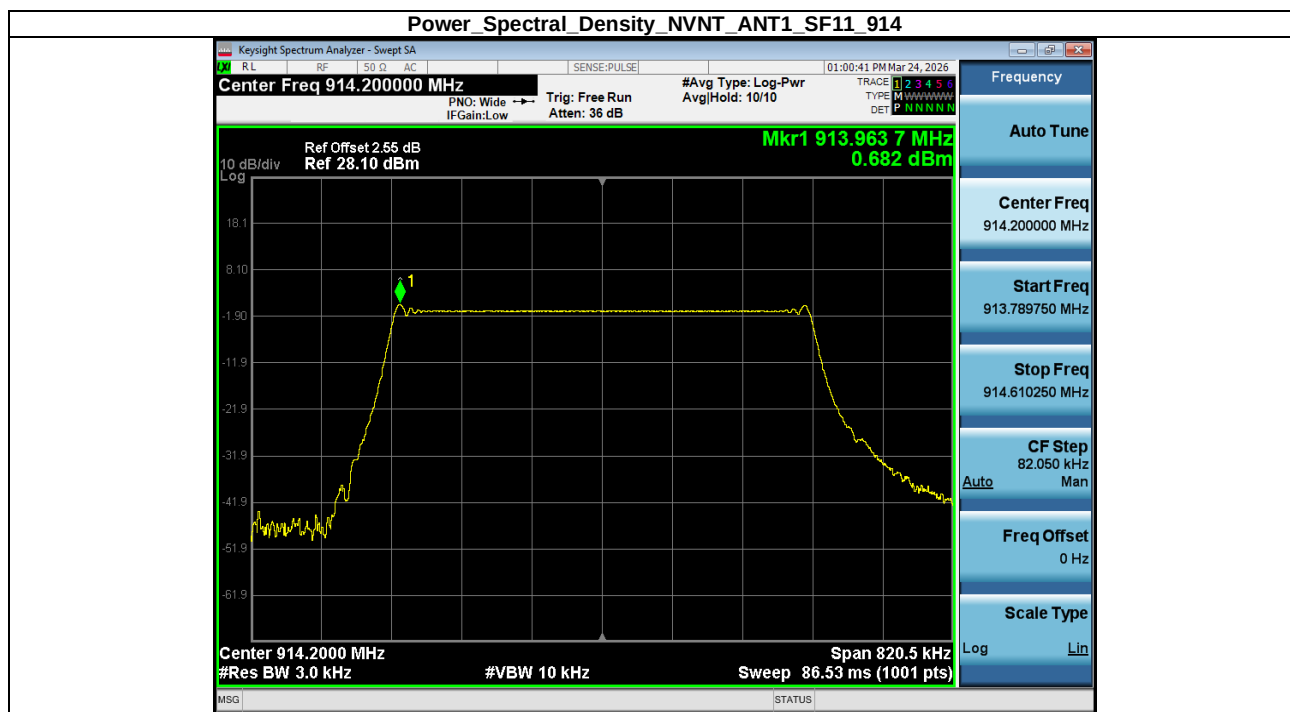
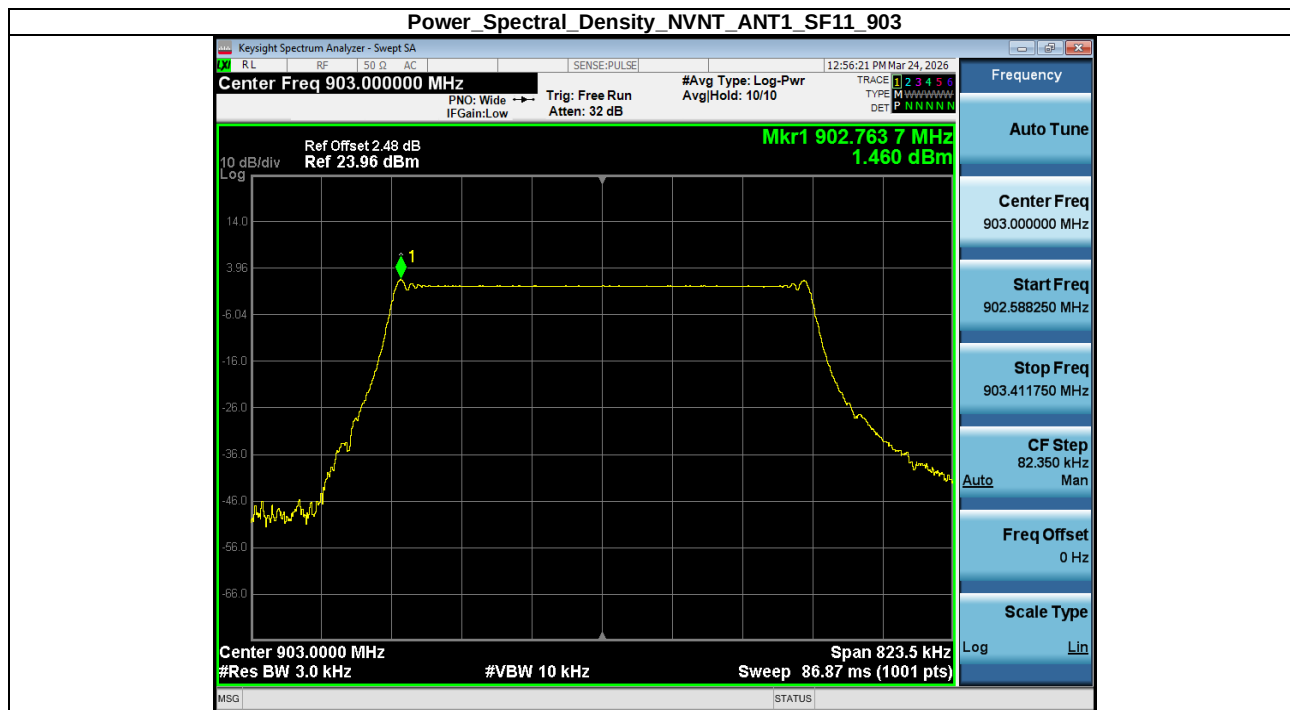


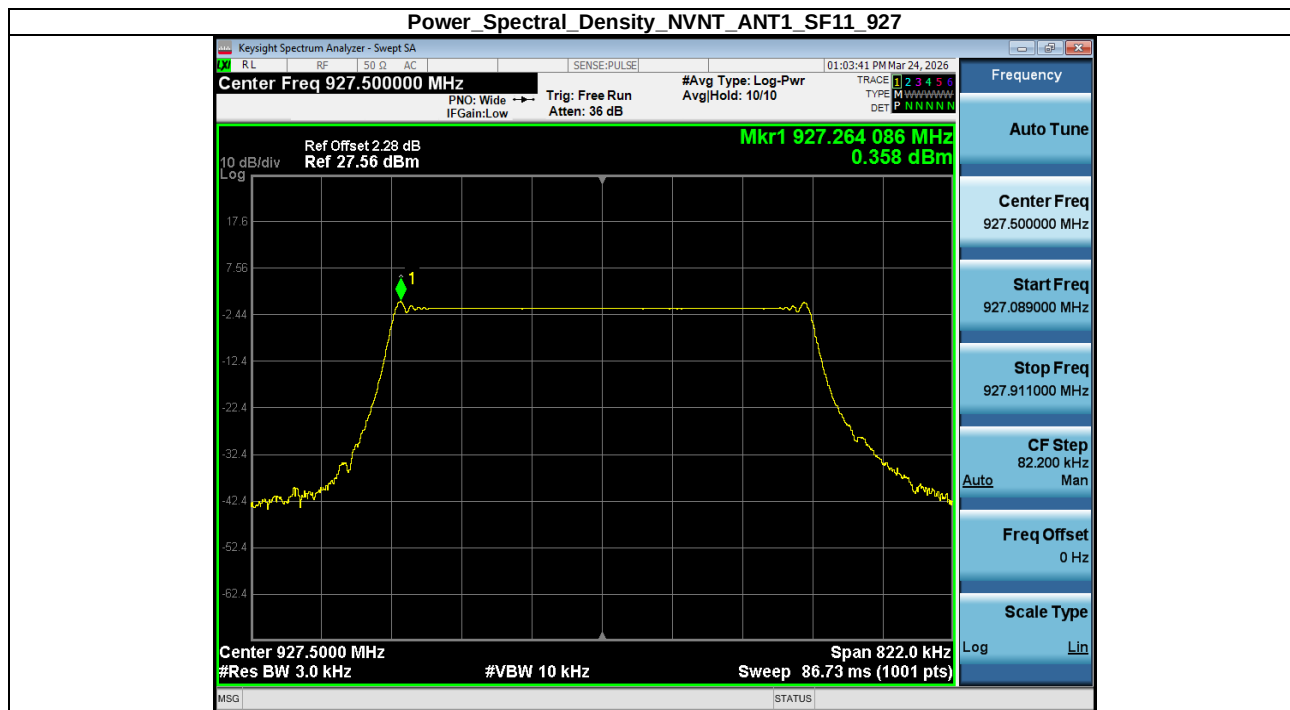


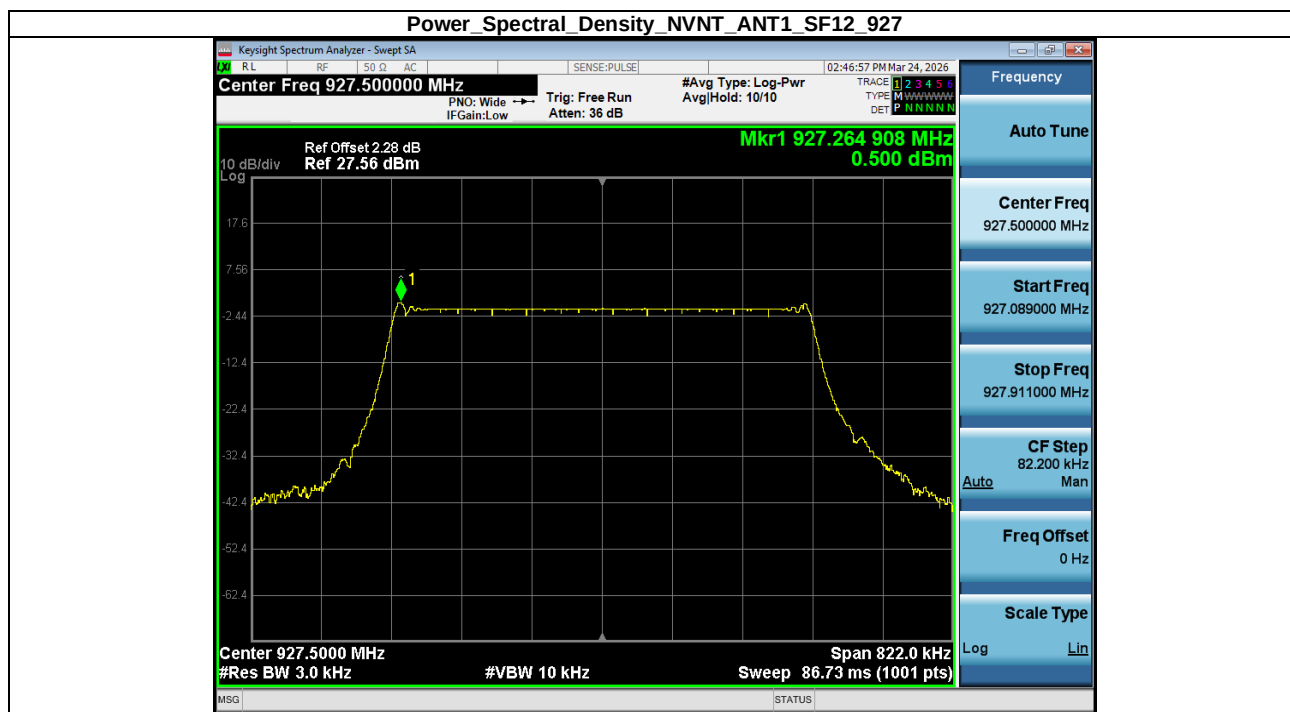
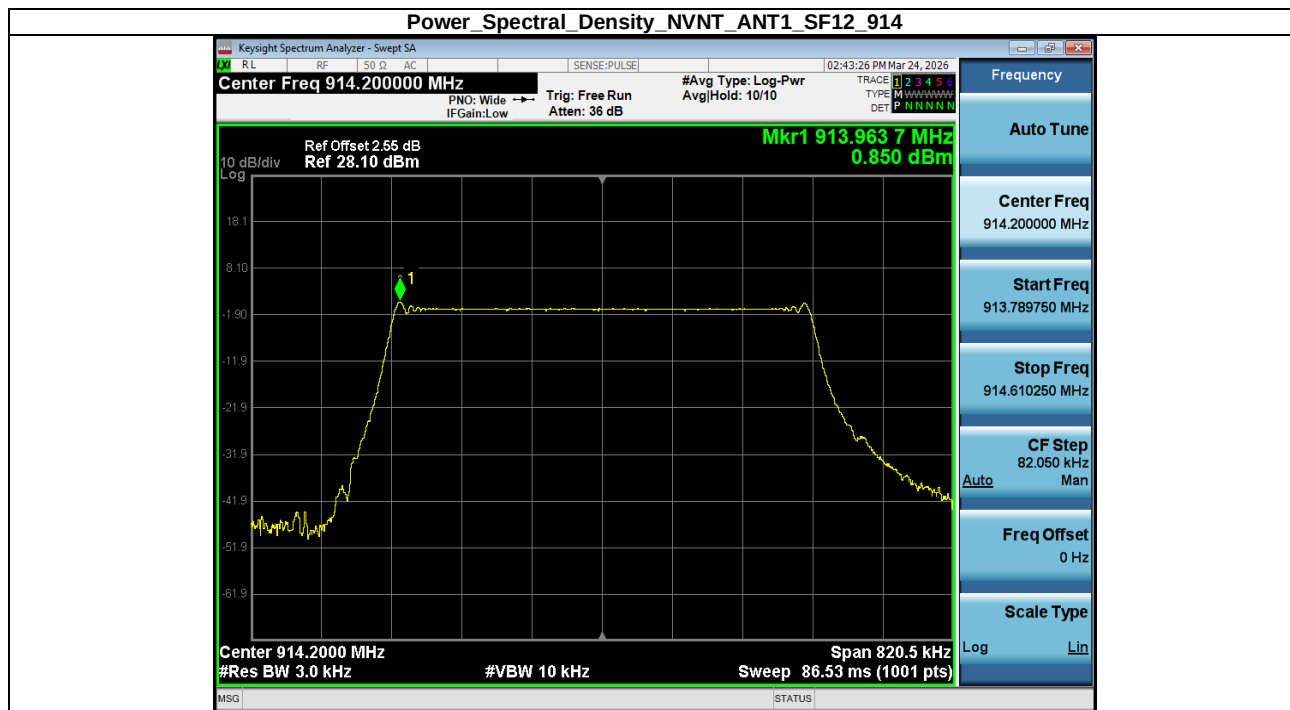












## 8. Occupied Bandwidth

### 8.1. Test limits

Systems using digital modulation techniques may operate in the 902-928 MHz, and 2400-2483.5 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz

### 8.2. Test Procedure

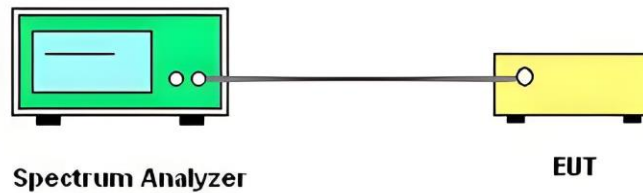
Details see the KDB558074 D01 Meas Guidance v05r02 and C63.10 section 6.9.3

a) The bandwidth is measured at an amplitude level reduced 6dB from the reference level. The reference level is the level of the highest amplitude signal observed from the transmitter at the fundamental frequency. Once the reference level is established, the equipment is conditioned with typical modulating signal to produce the worst-case (i.e. the widest) bandwidth.

b) The test receiver set RBW = 100kHz, VBW $\geq$ 3\*RBW =300kHz, Peak Detector, Sweep time set auto, detail see the test plot.

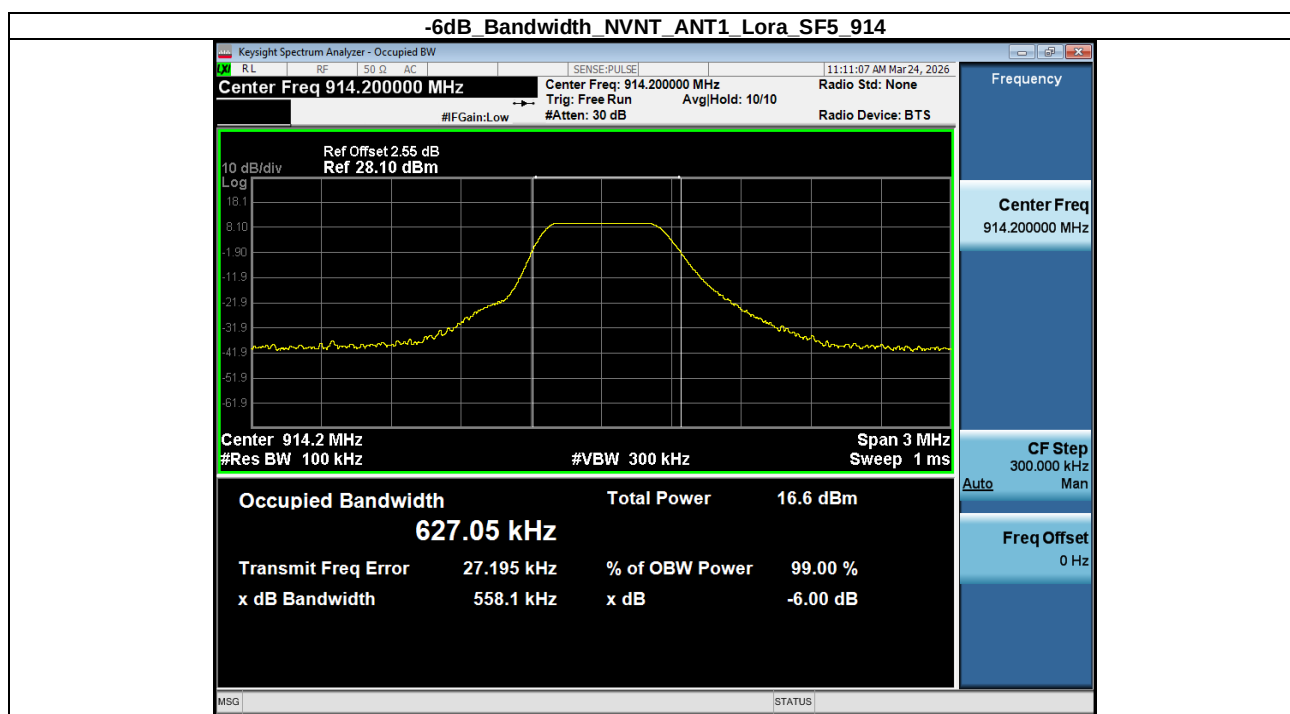
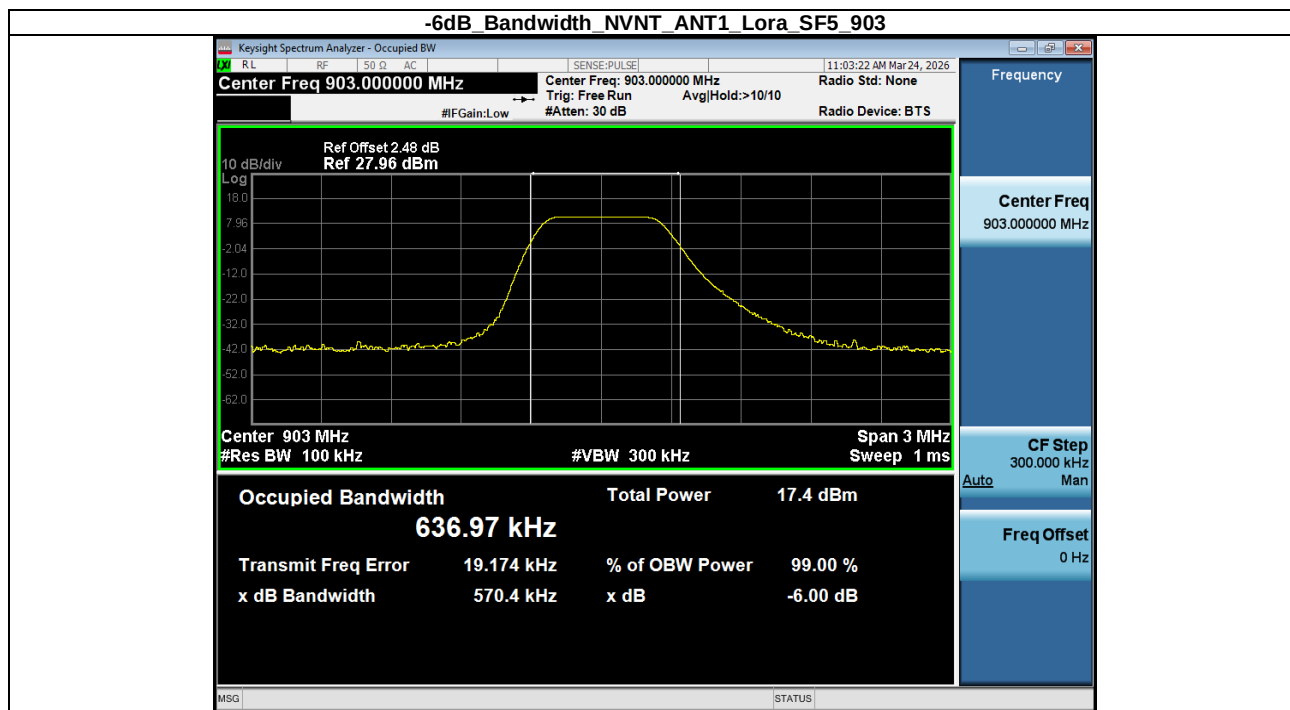
c) The test receiver set RBW =1-5%BW, VBW>3\*RBW, Sweep time set auto, detail see the test plot for 99%Bandwidth.

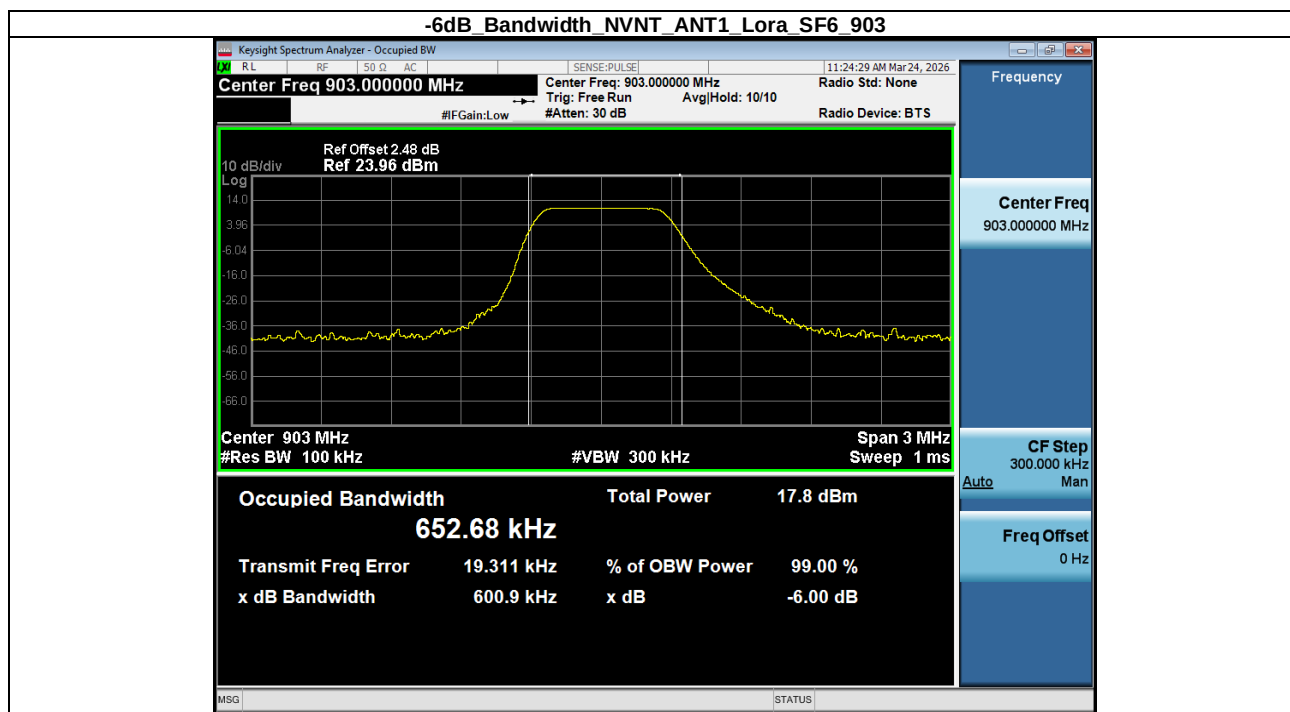
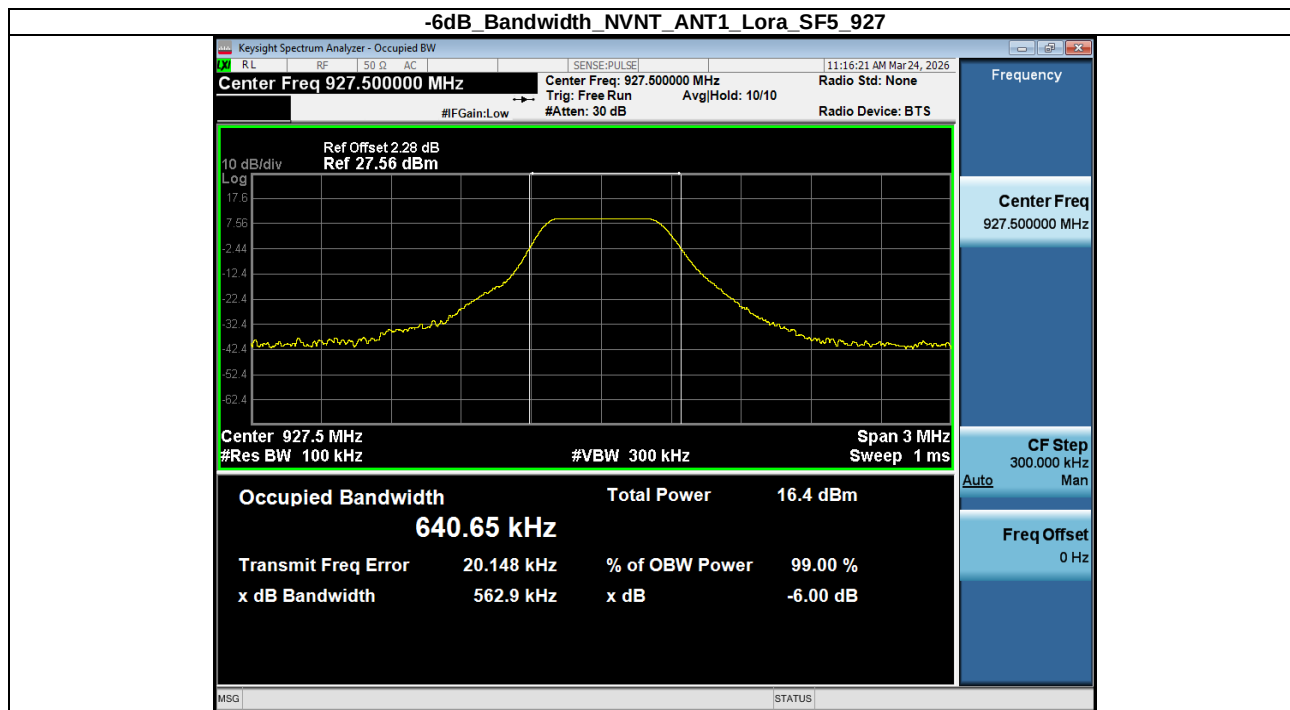
### 8.3. Test Setup

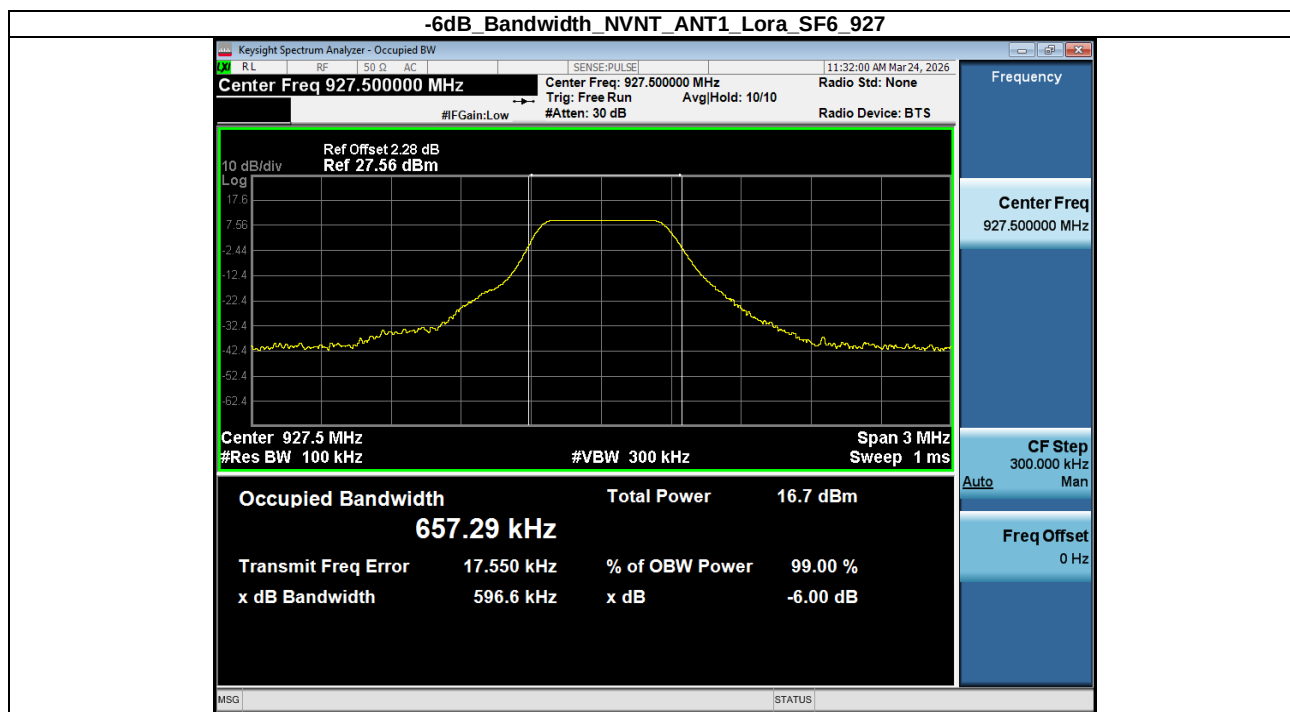
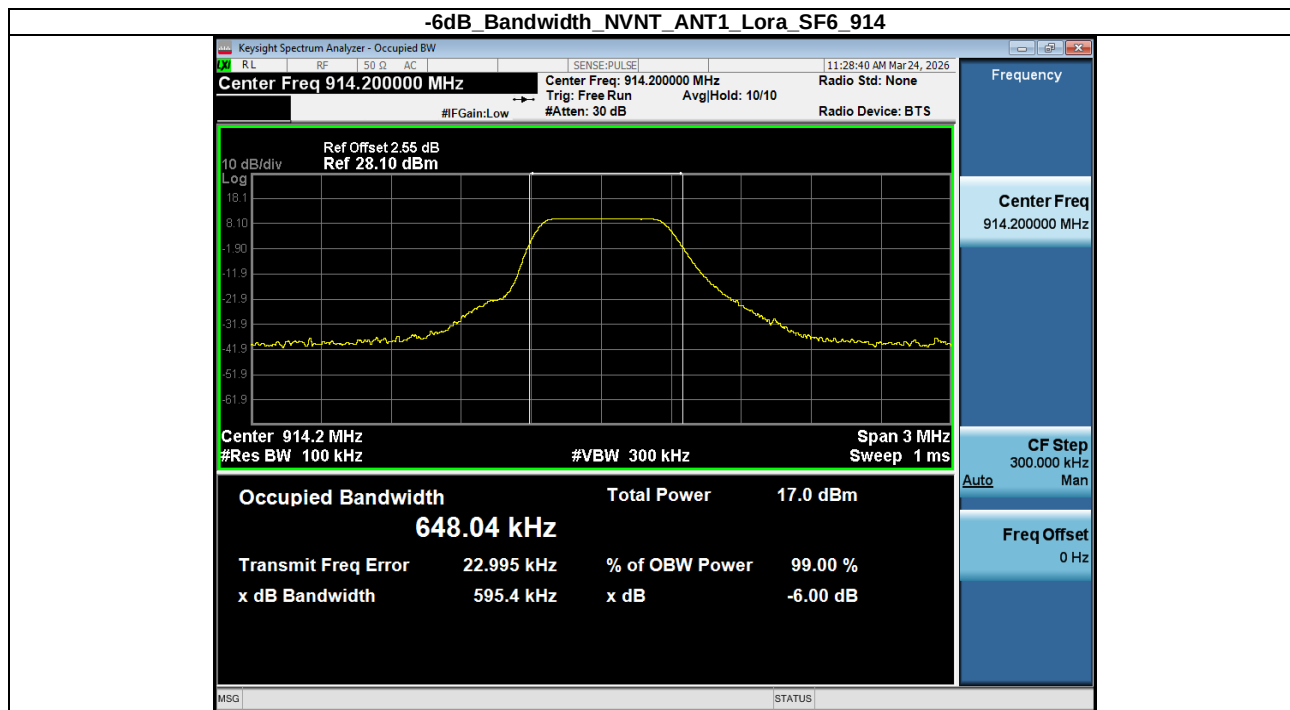


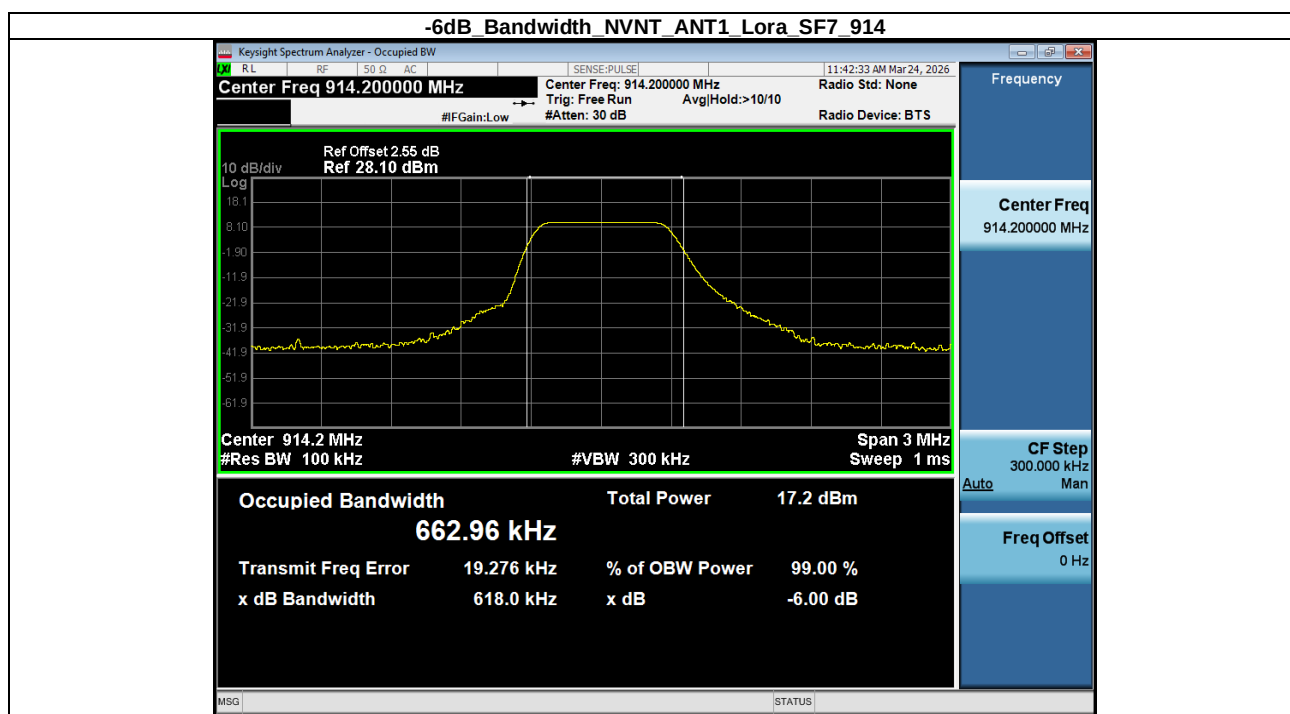
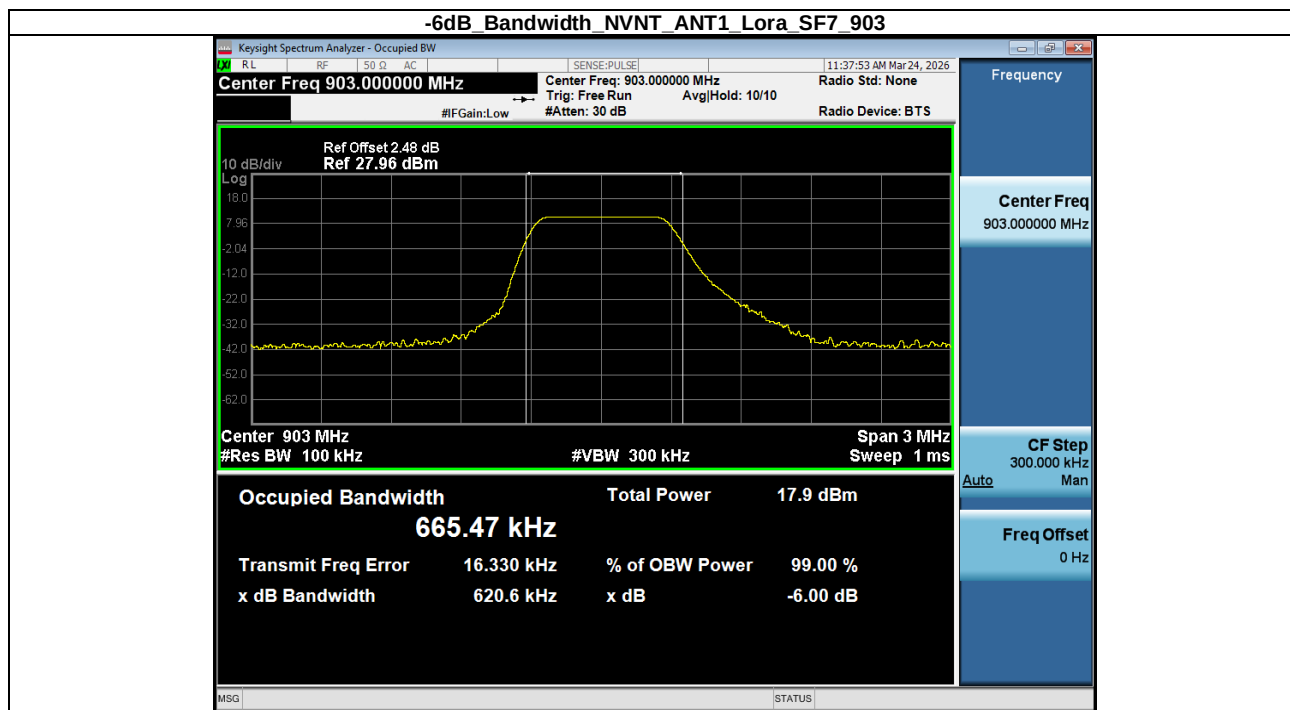
### 8.4. Test Results

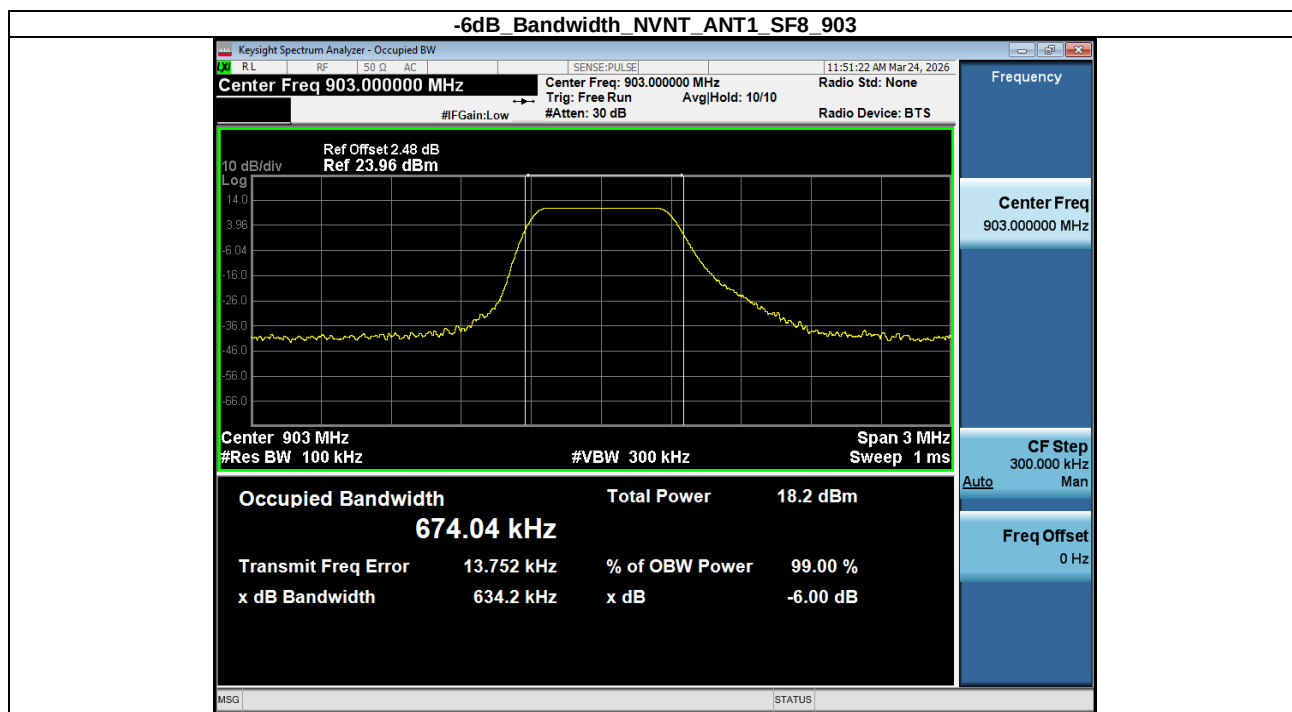
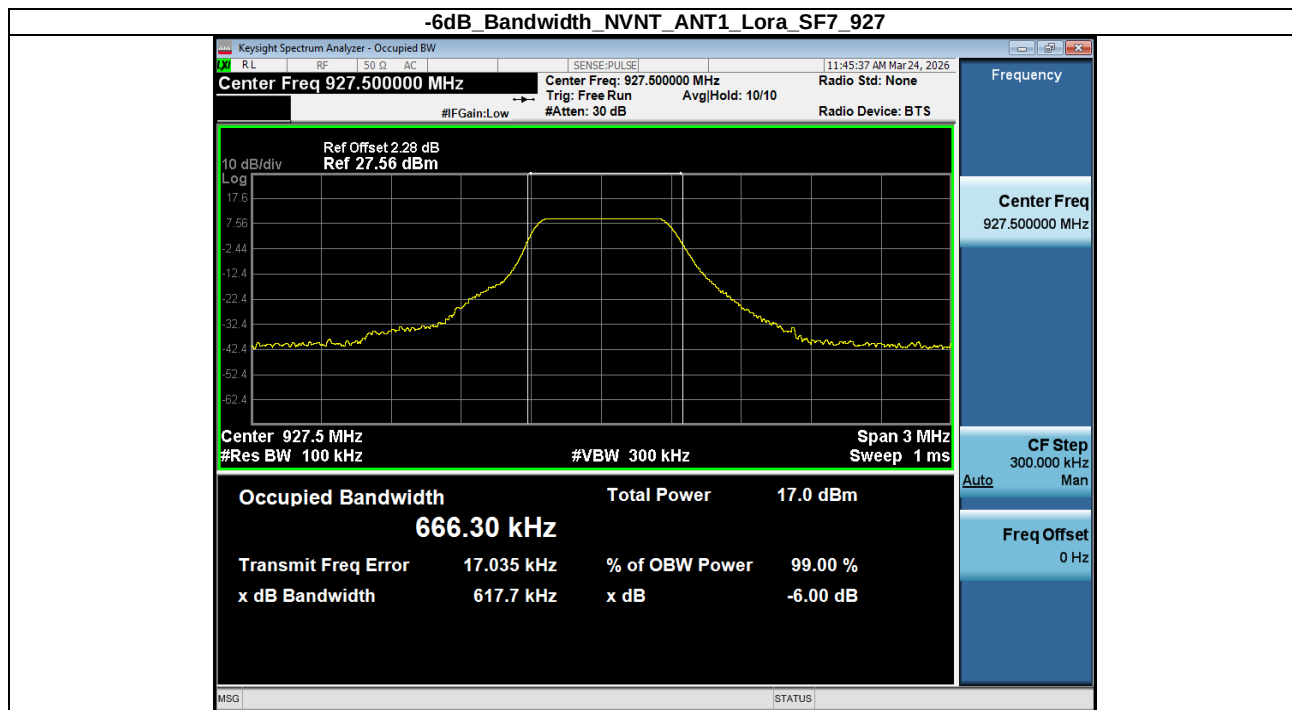
| Condition | Antenna | Test Mode | Frequency (MHz) | -6dB BW(kHz) | limit(kHz) | Result |
|-----------|---------|-----------|-----------------|--------------|------------|--------|
| NVNT      | ANT1    | Lora_SF5  | 903.00          | 570.36       | 500        | Pass   |
| NVNT      | ANT1    | Lora_SF5  | 914.20          | 558.07       | 500        | Pass   |
| NVNT      | ANT1    | Lora_SF5  | 927.50          | 562.93       | 500        | Pass   |
| NVNT      | ANT1    | Lora_SF6  | 903.00          | 600.91       | 500        | Pass   |
| NVNT      | ANT1    | Lora_SF6  | 914.20          | 595.38       | 500        | Pass   |
| NVNT      | ANT1    | Lora_SF6  | 927.50          | 596.58       | 500        | Pass   |
| NVNT      | ANT1    | Lora_SF7  | 903.00          | 620.59       | 500        | Pass   |
| NVNT      | ANT1    | Lora_SF7  | 914.20          | 618.02       | 500        | Pass   |
| NVNT      | ANT1    | Lora_SF7  | 927.50          | 617.65       | 500        | Pass   |
| NVNT      | ANT1    | Lora_SF8  | 903.00          | 634.18       | 500        | Pass   |
| NVNT      | ANT1    | Lora_SF8  | 914.20          | 630.37       | 500        | Pass   |
| NVNT      | ANT1    | Lora_SF8  | 927.50          | 630.28       | 500        | Pass   |
| NVNT      | ANT1    | Lora_SF9  | 903.00          | 639.81       | 500        | Pass   |
| NVNT      | ANT1    | Lora_SF9  | 914.20          | 637.08       | 500        | Pass   |
| NVNT      | ANT1    | Lora_SF9  | 927.50          | 636.75       | 500        | Pass   |
| NVNT      | ANT1    | Lora_SF10 | 903.00          | 644.46       | 500        | Pass   |
| NVNT      | ANT1    | Lora_SF10 | 914.20          | 642.20       | 500        | Pass   |
| NVNT      | ANT1    | Lora_SF10 | 927.50          | 639.92       | 500        | Pass   |
| NVNT      | ANT1    | Lora_SF11 | 903.00          | 641.56       | 500        | Pass   |
| NVNT      | ANT1    | Lora_SF11 | 914.20          | 641.25       | 500        | Pass   |
| NVNT      | ANT1    | Lora_SF11 | 927.50          | 641.86       | 500        | Pass   |
| NVNT      | ANT1    | Lora_SF12 | 903.00          | 642.09       | 500        | Pass   |
| NVNT      | ANT1    | Lora_SF12 | 914.20          | 641.96       | 500        | Pass   |
| NVNT      | ANT1    | Lora_SF12 | 927.50          | 639.17       | 500        | Pass   |

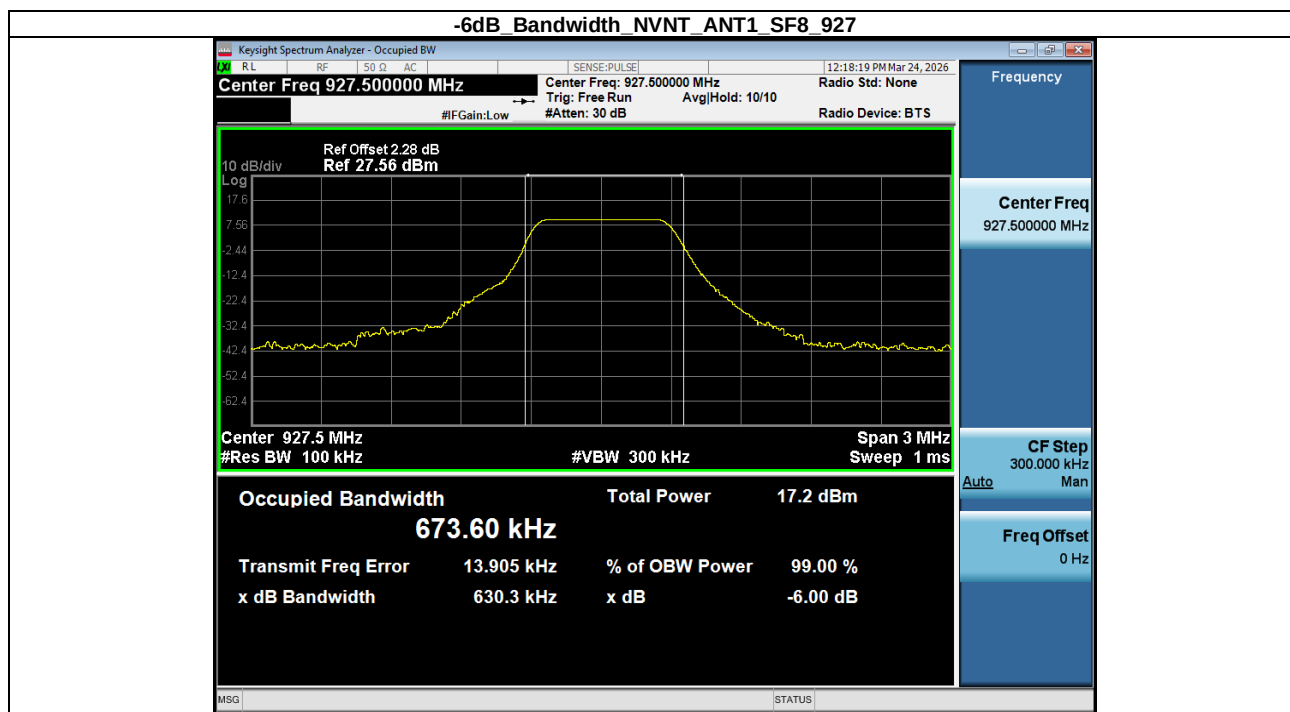
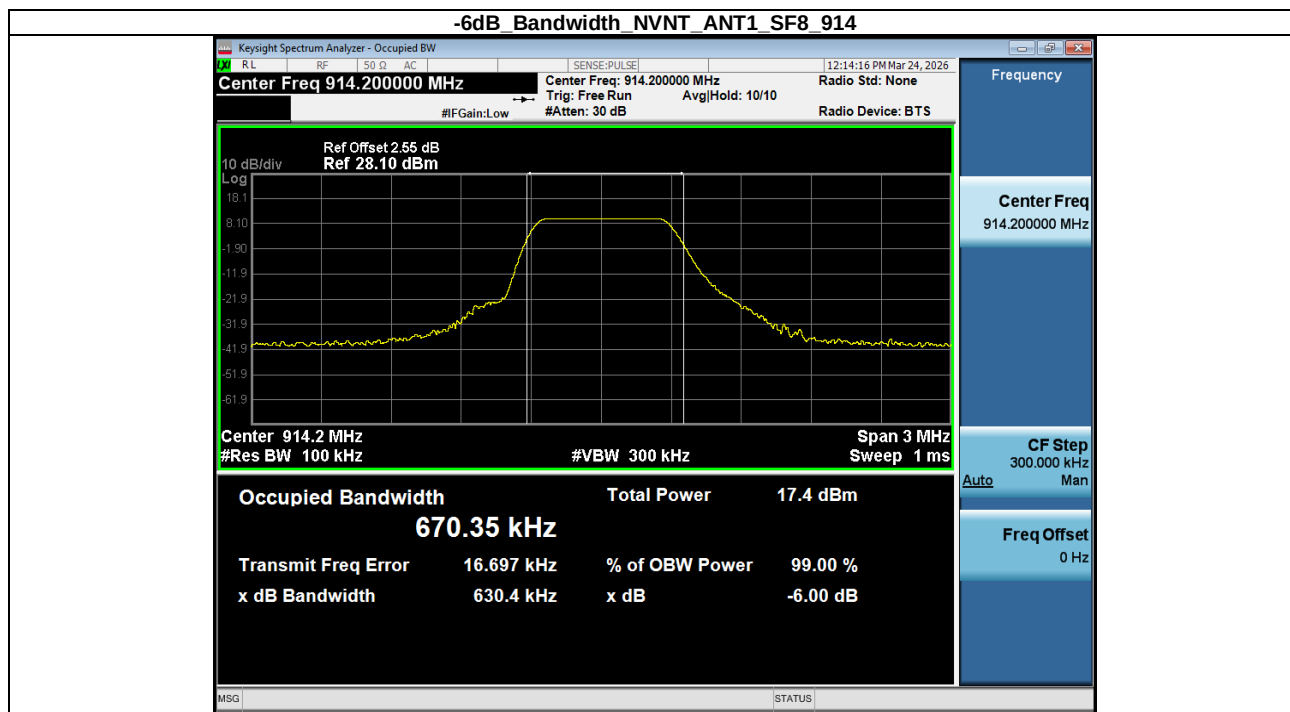


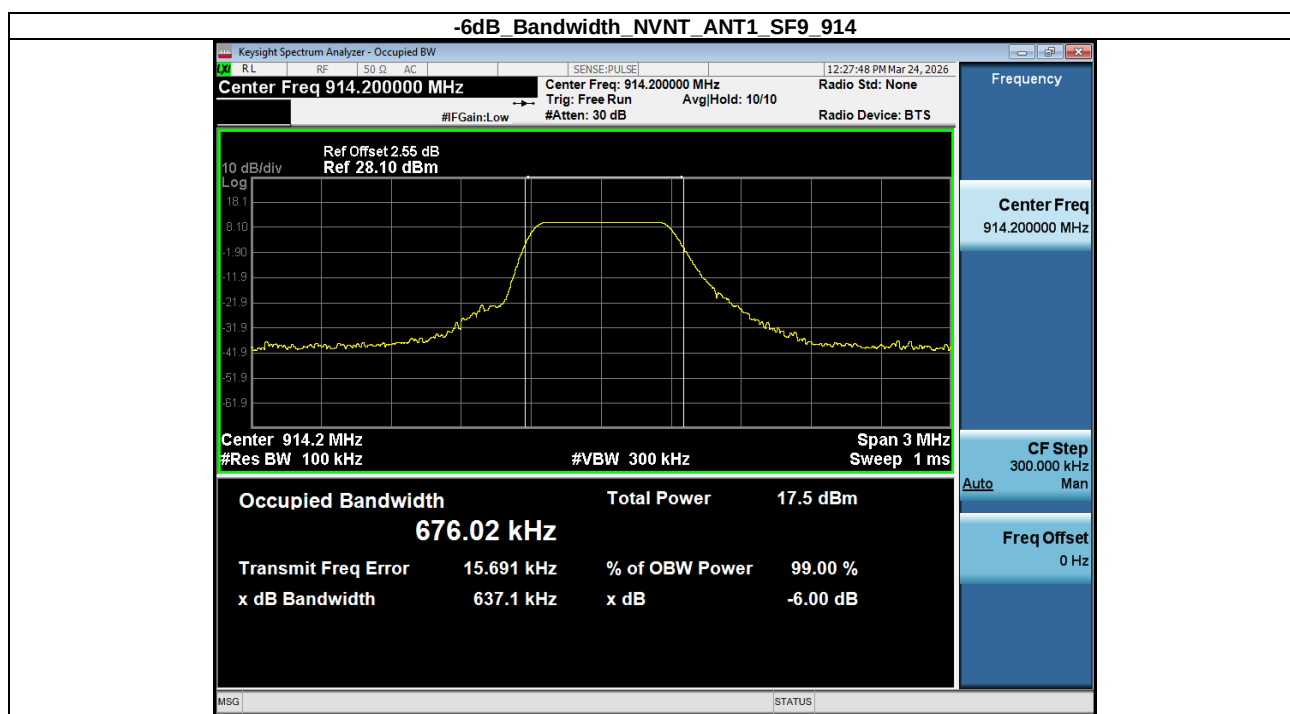
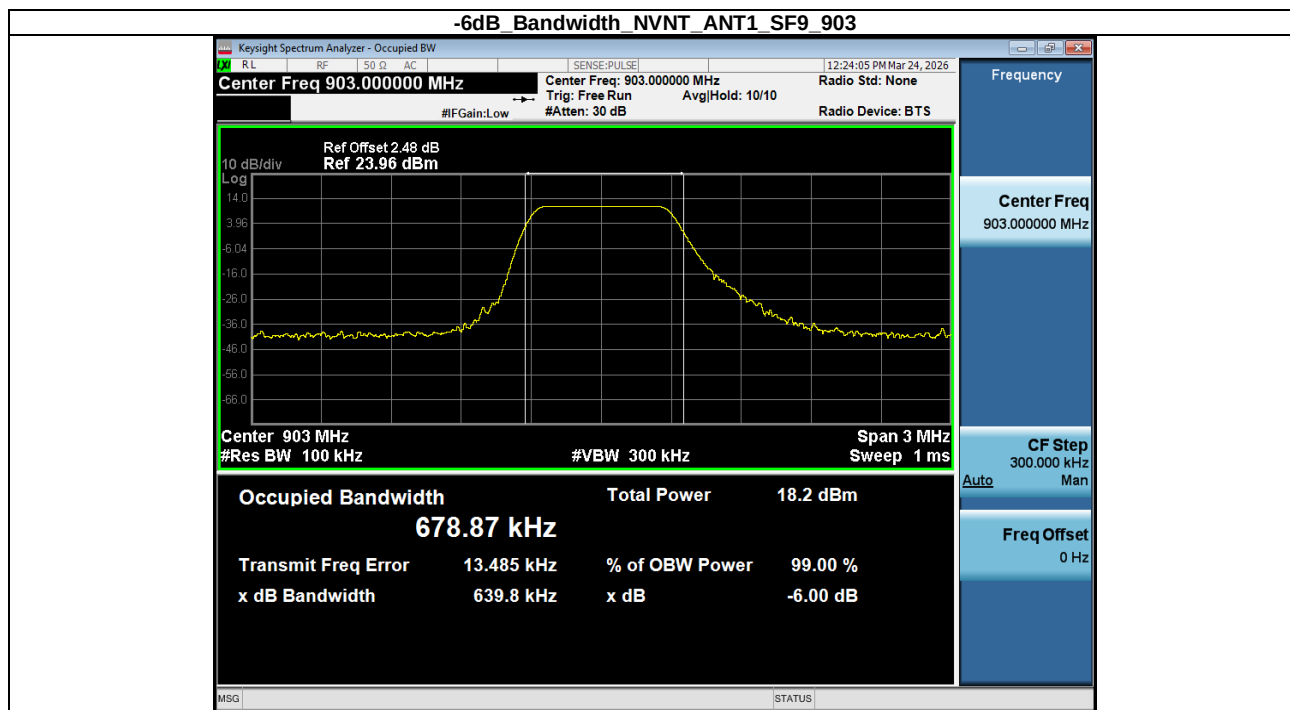


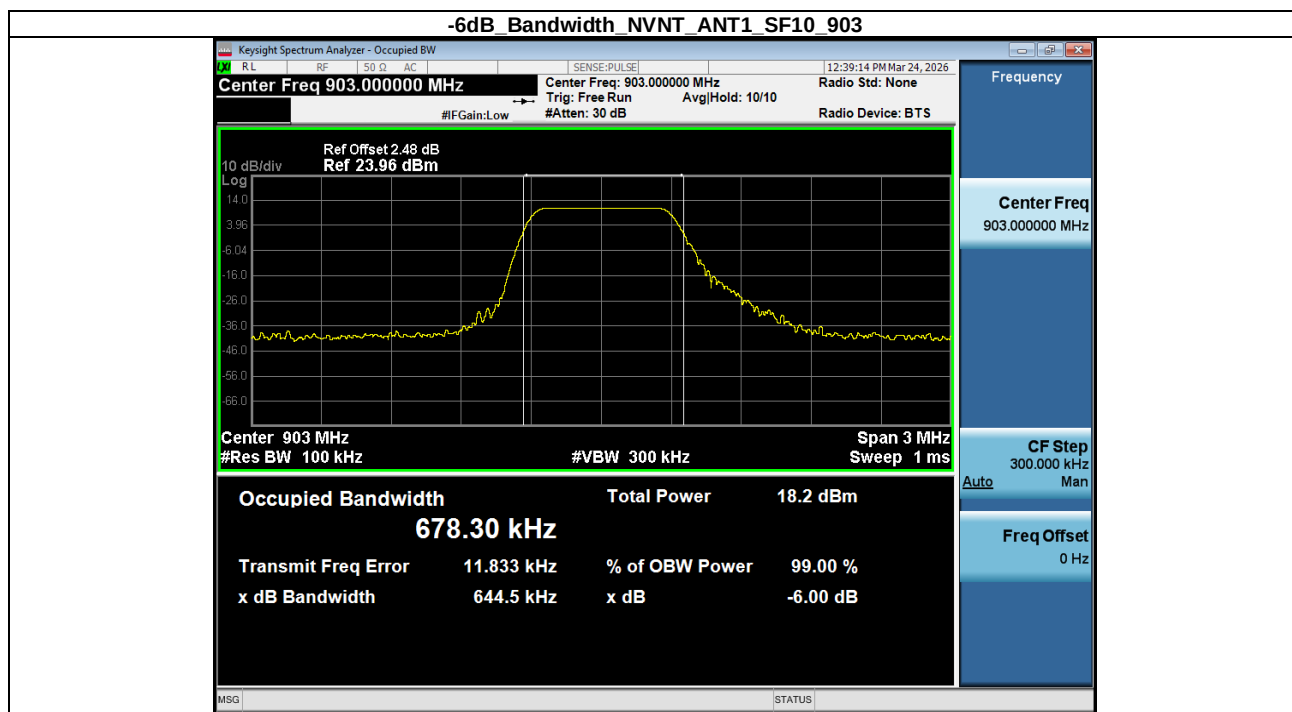
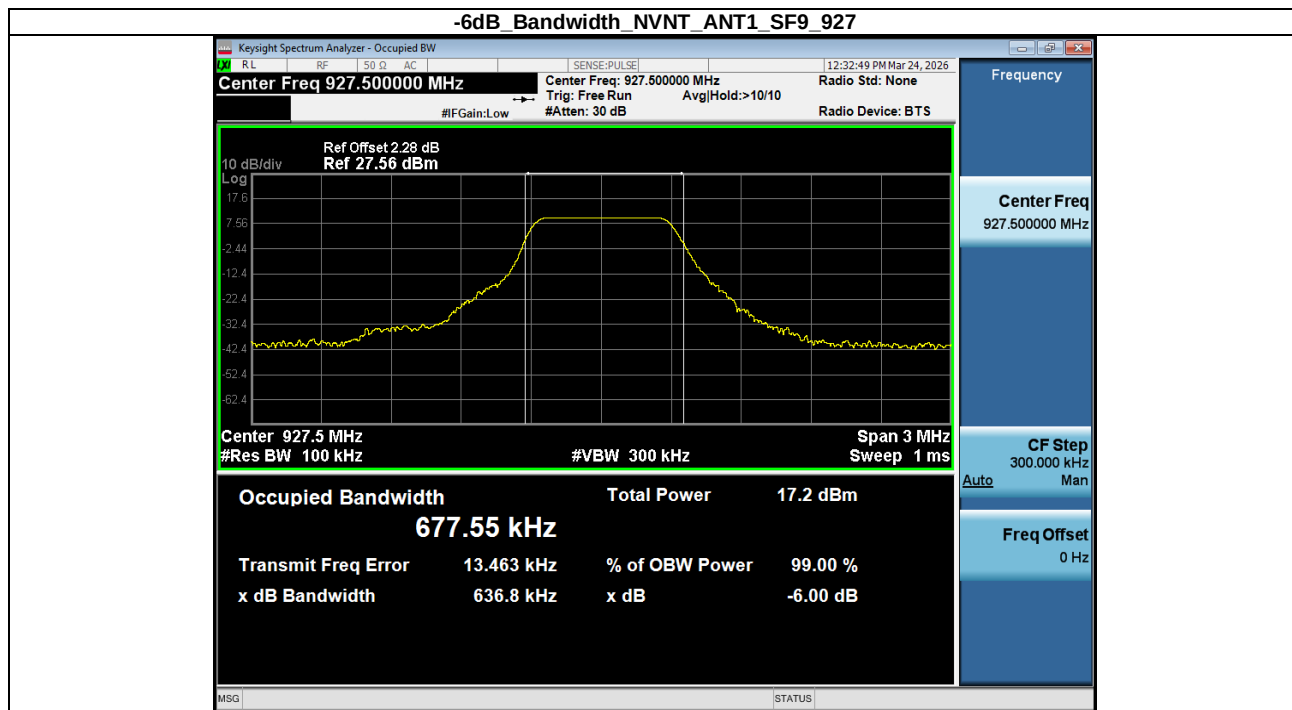


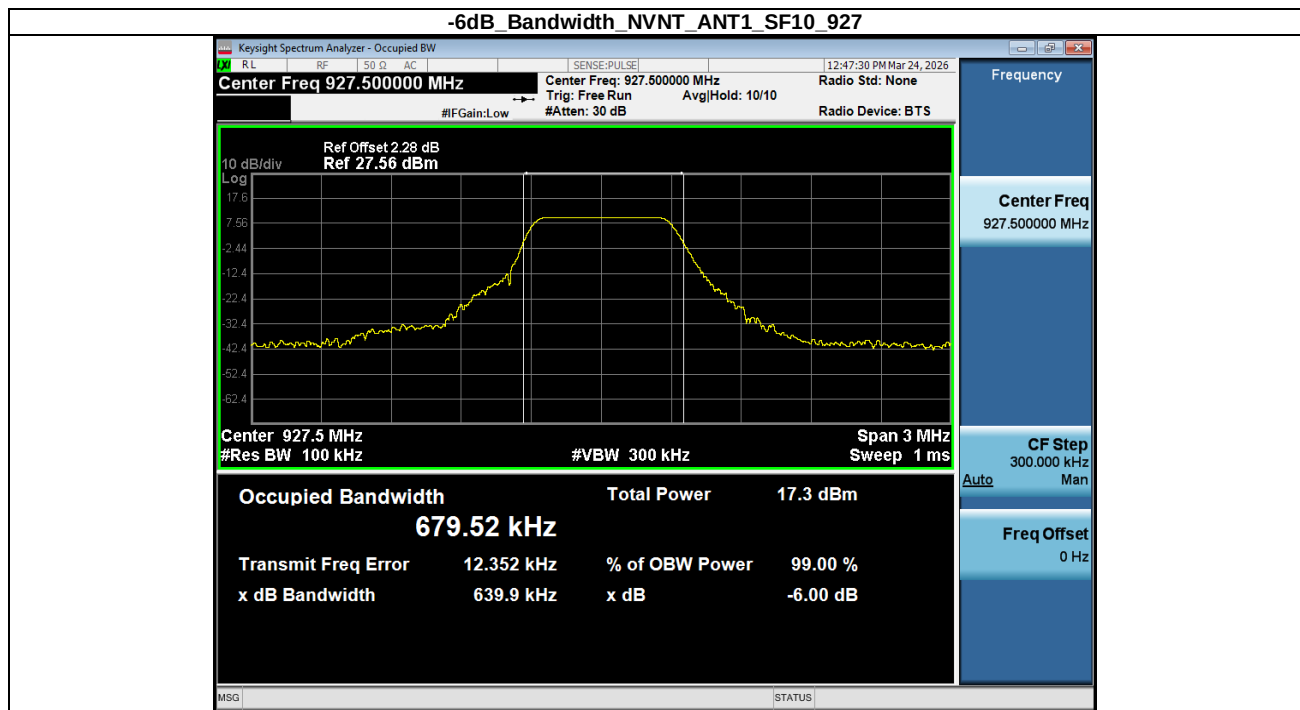
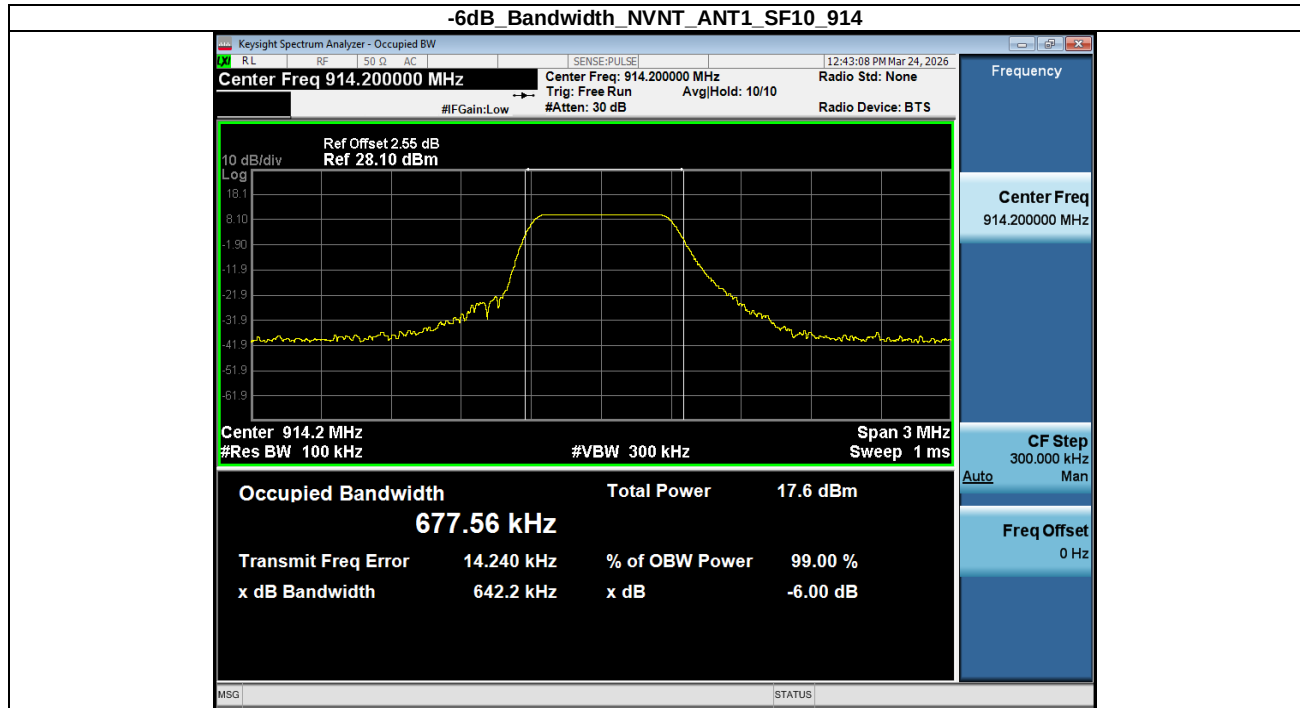


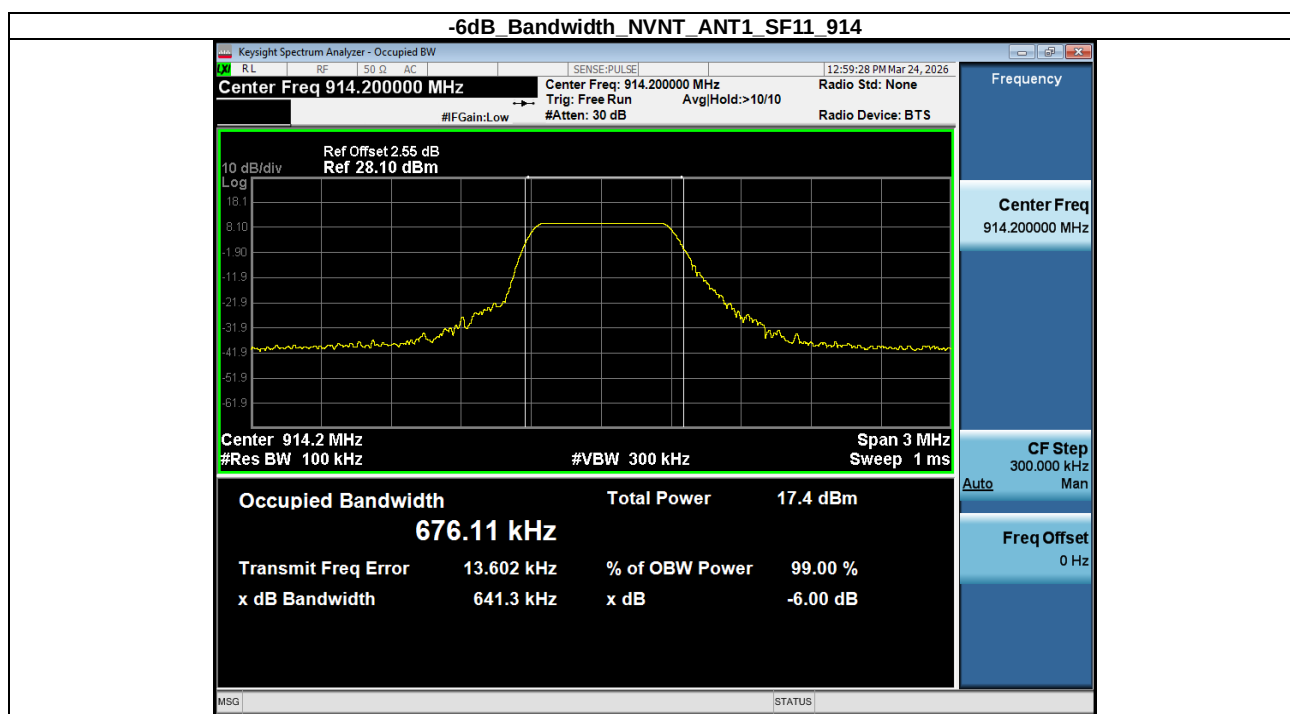
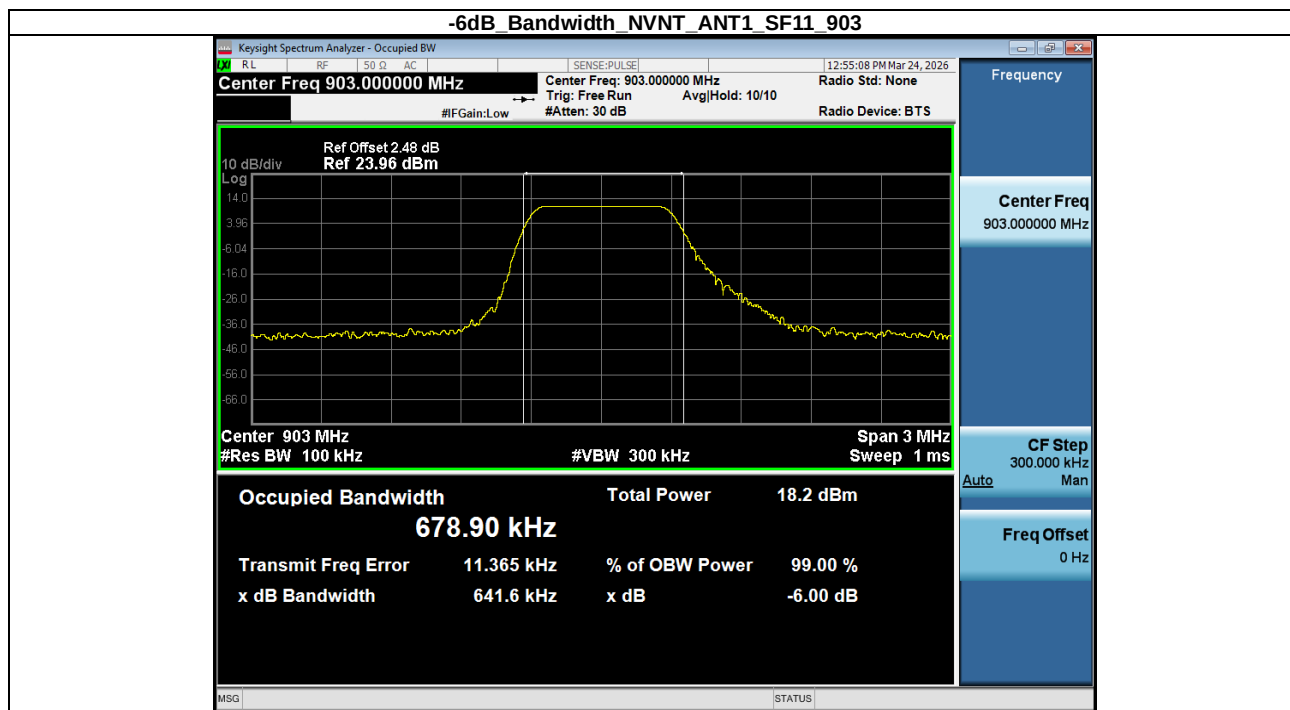


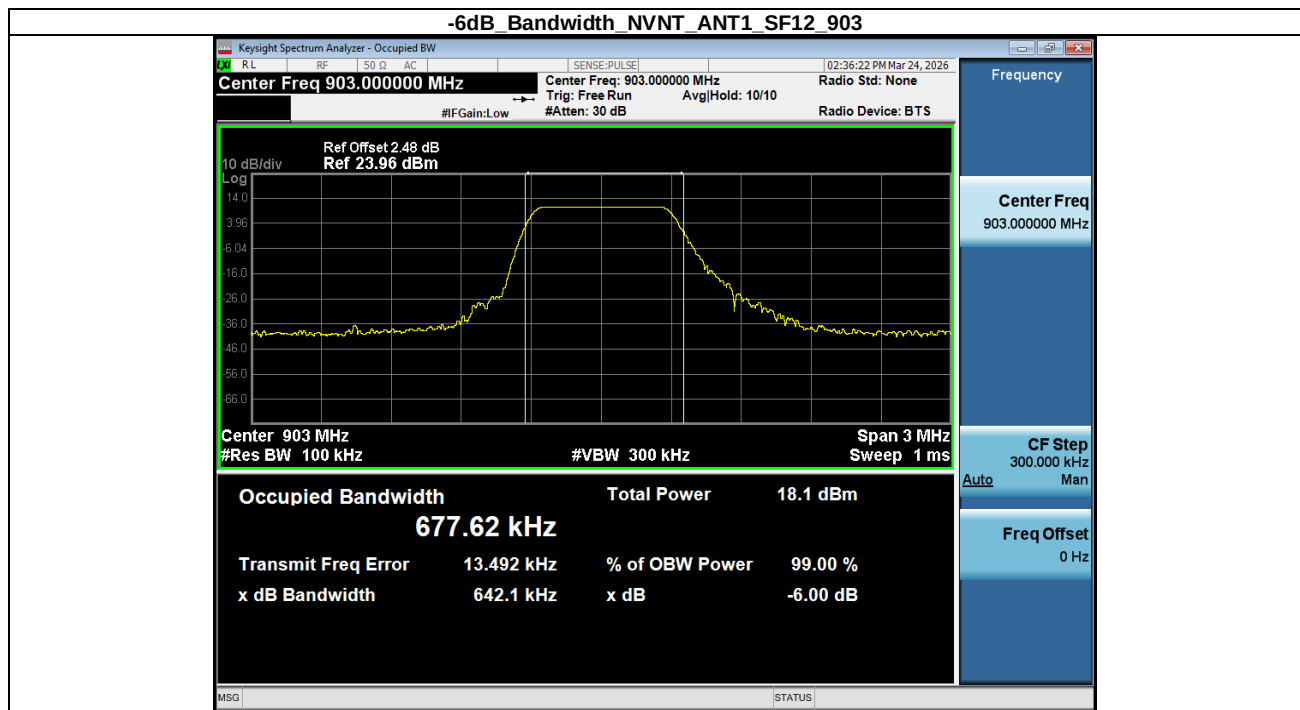
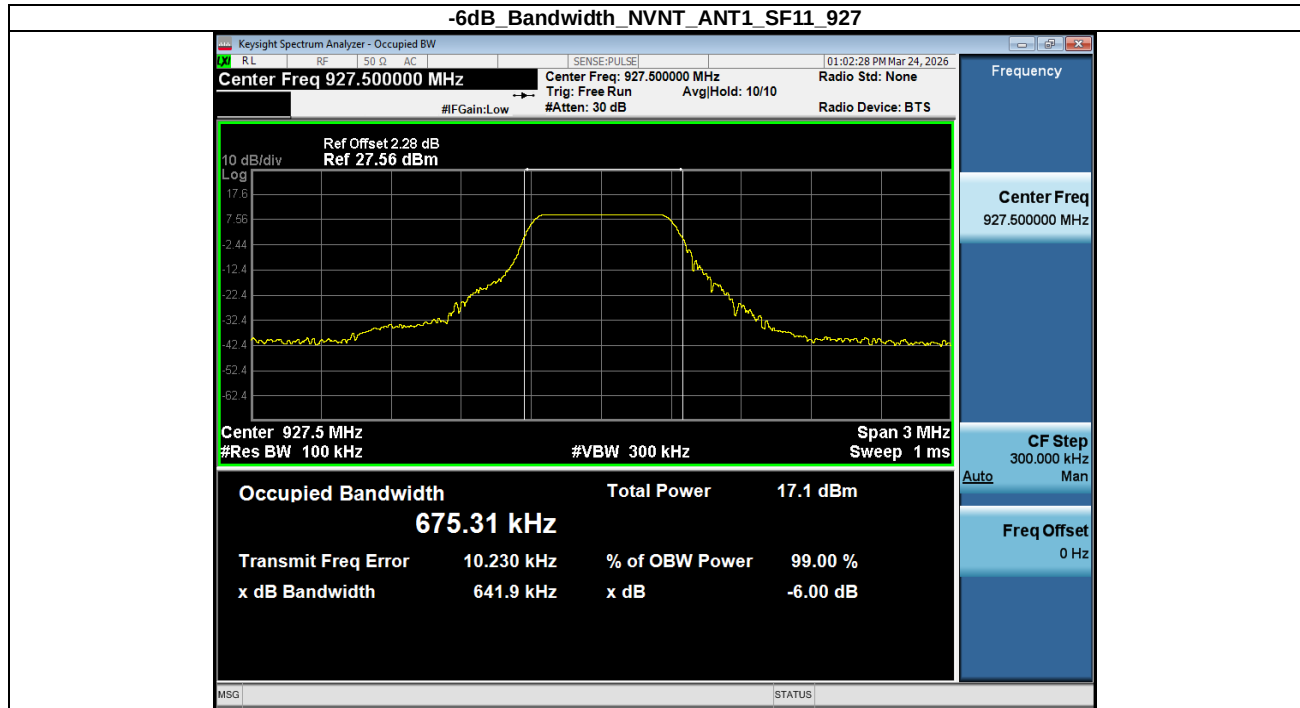


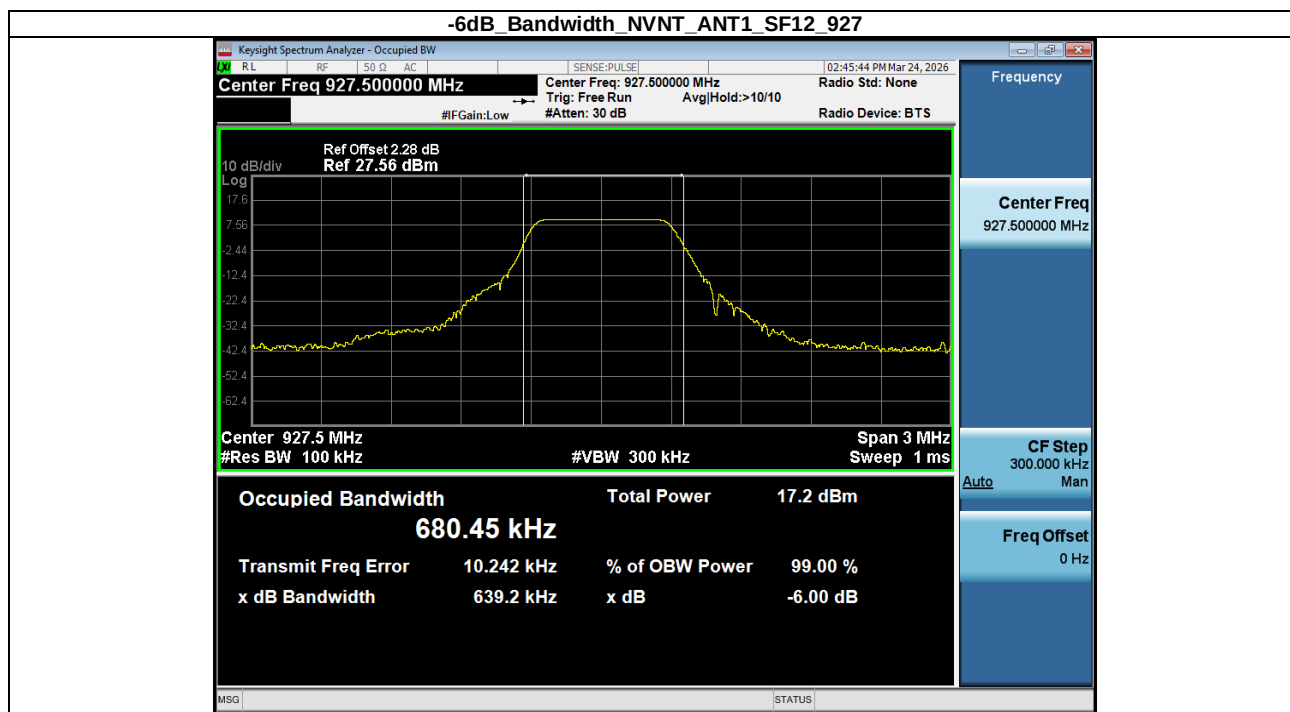
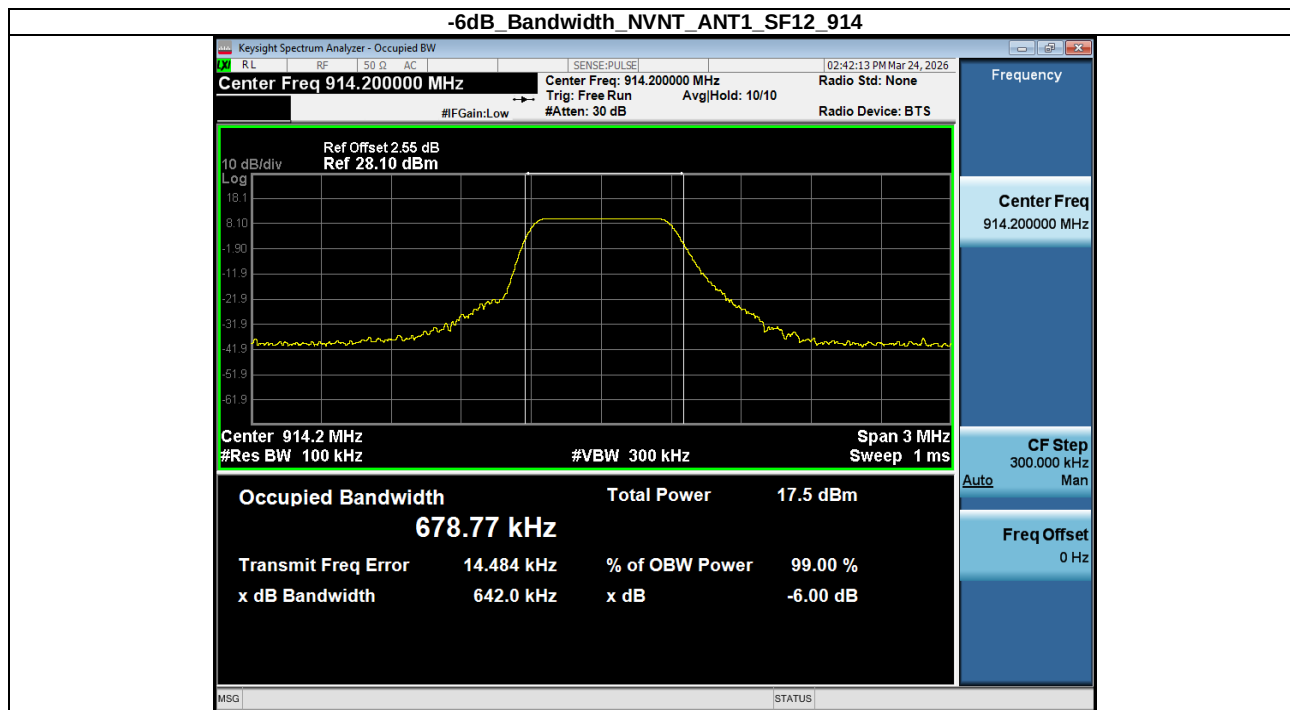




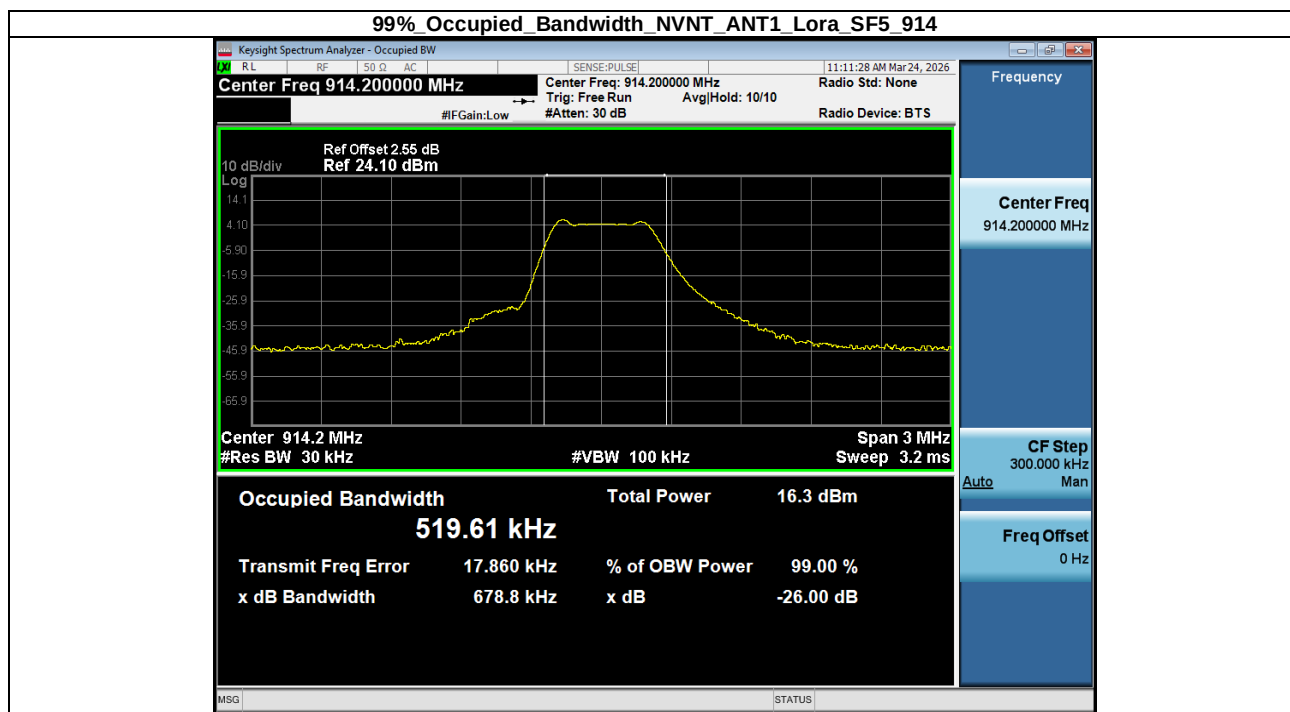
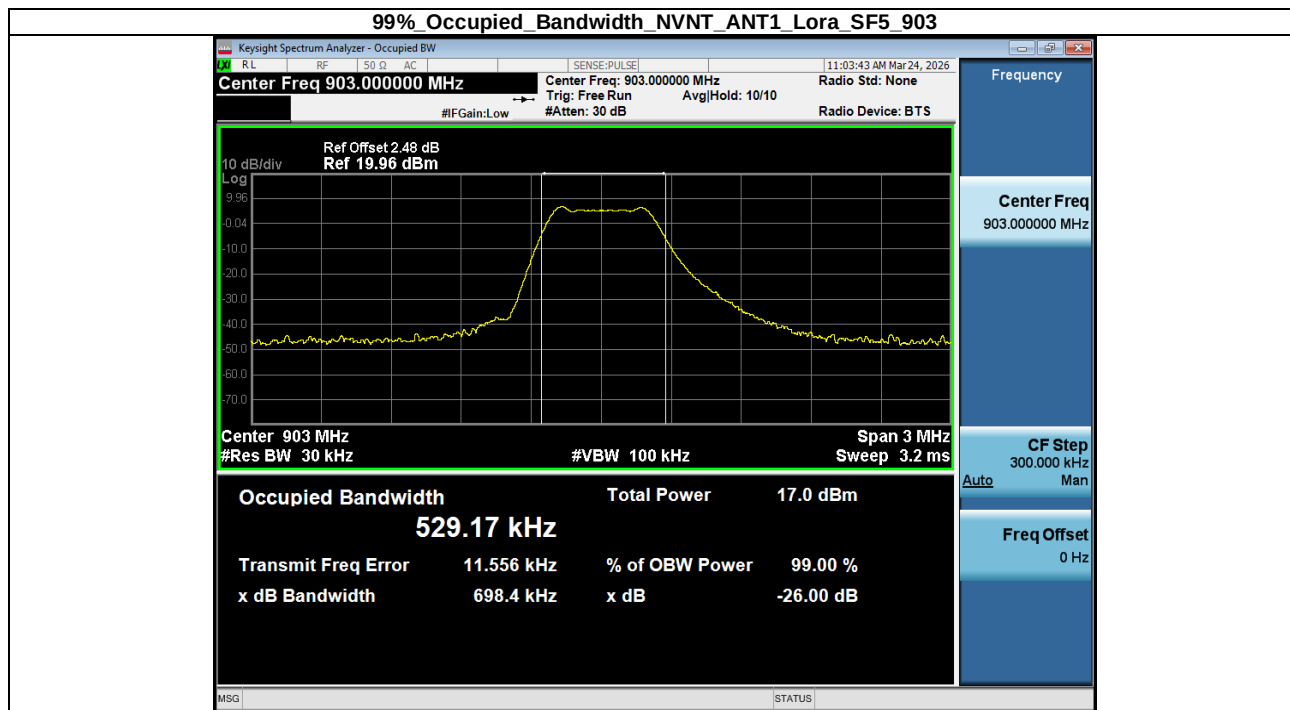


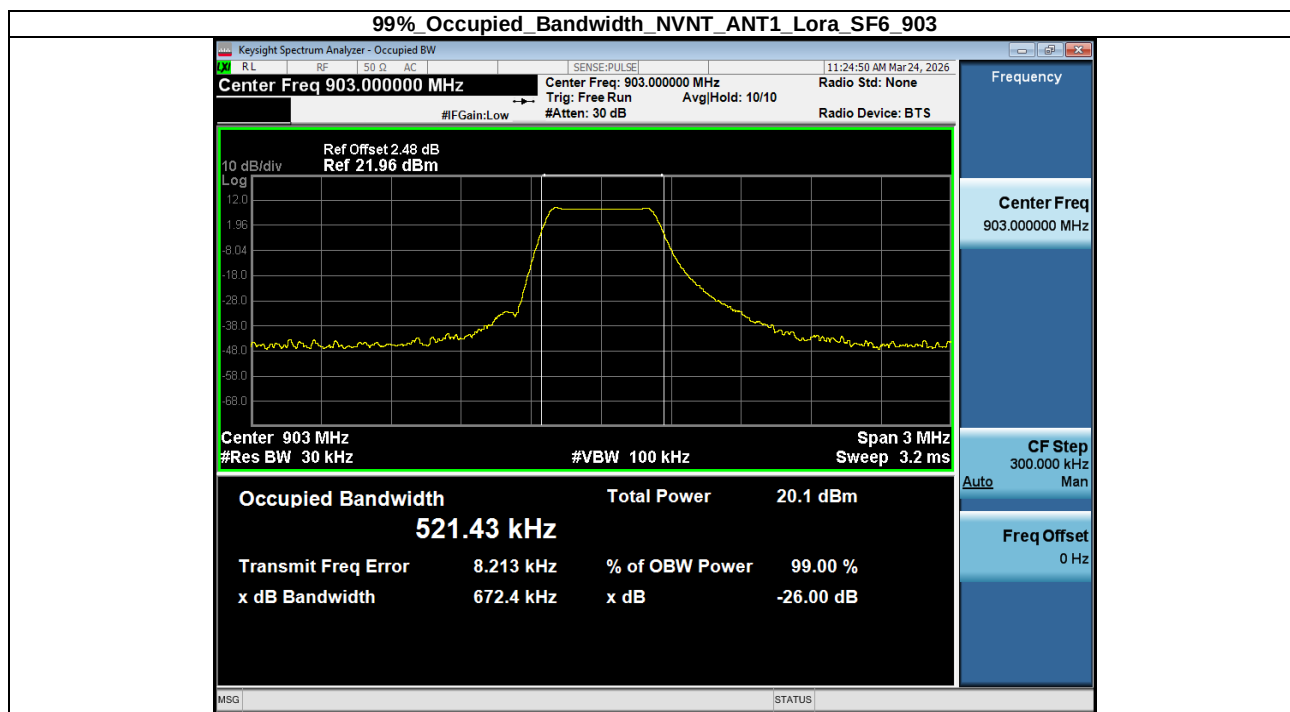
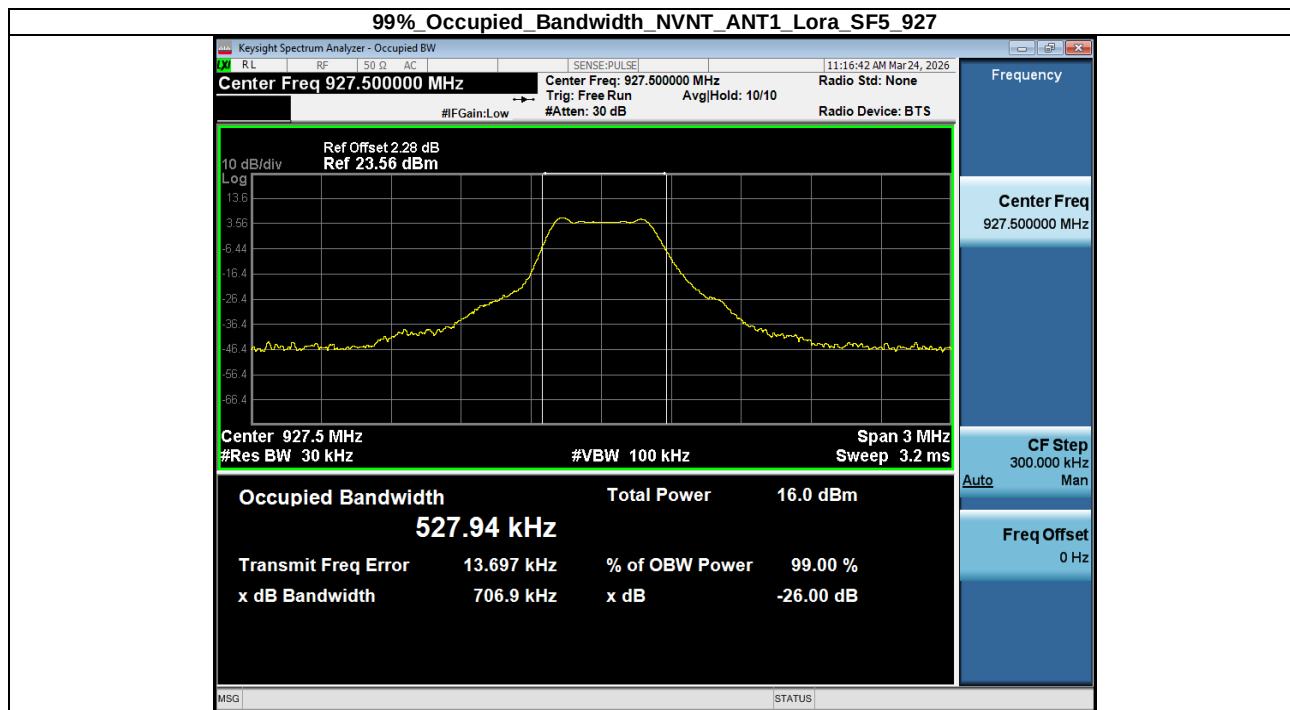


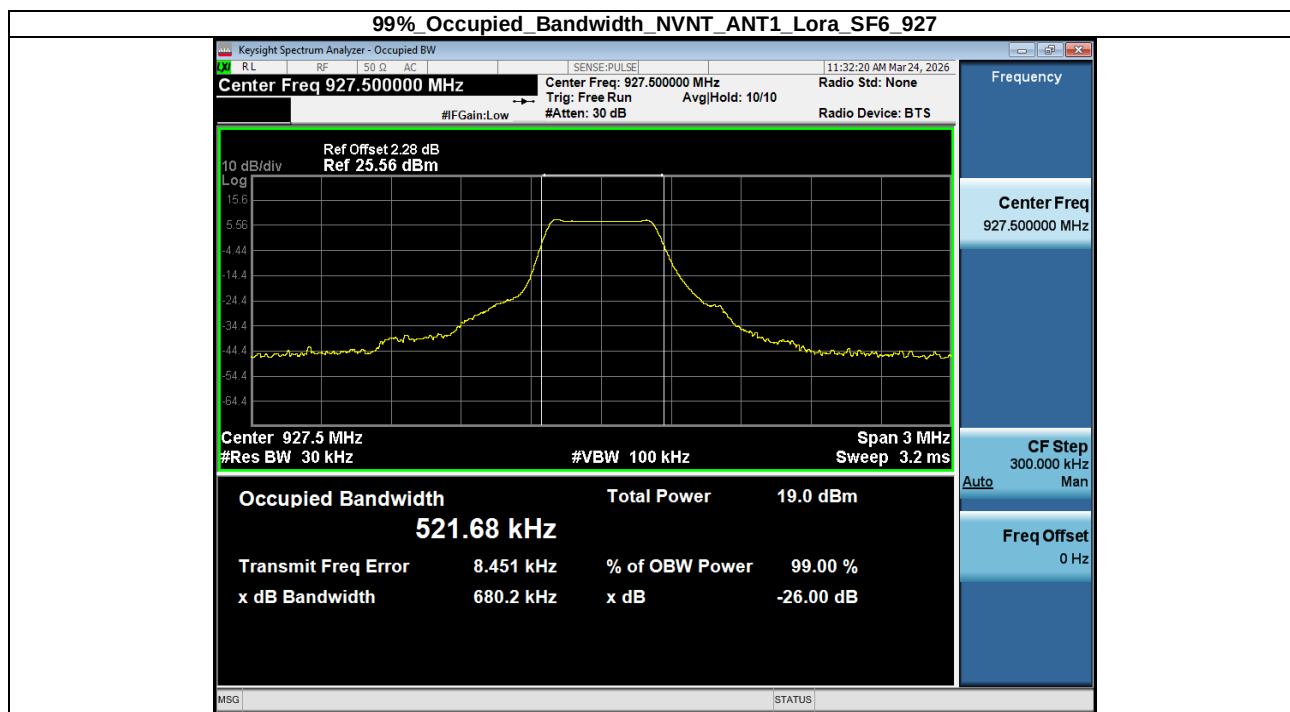
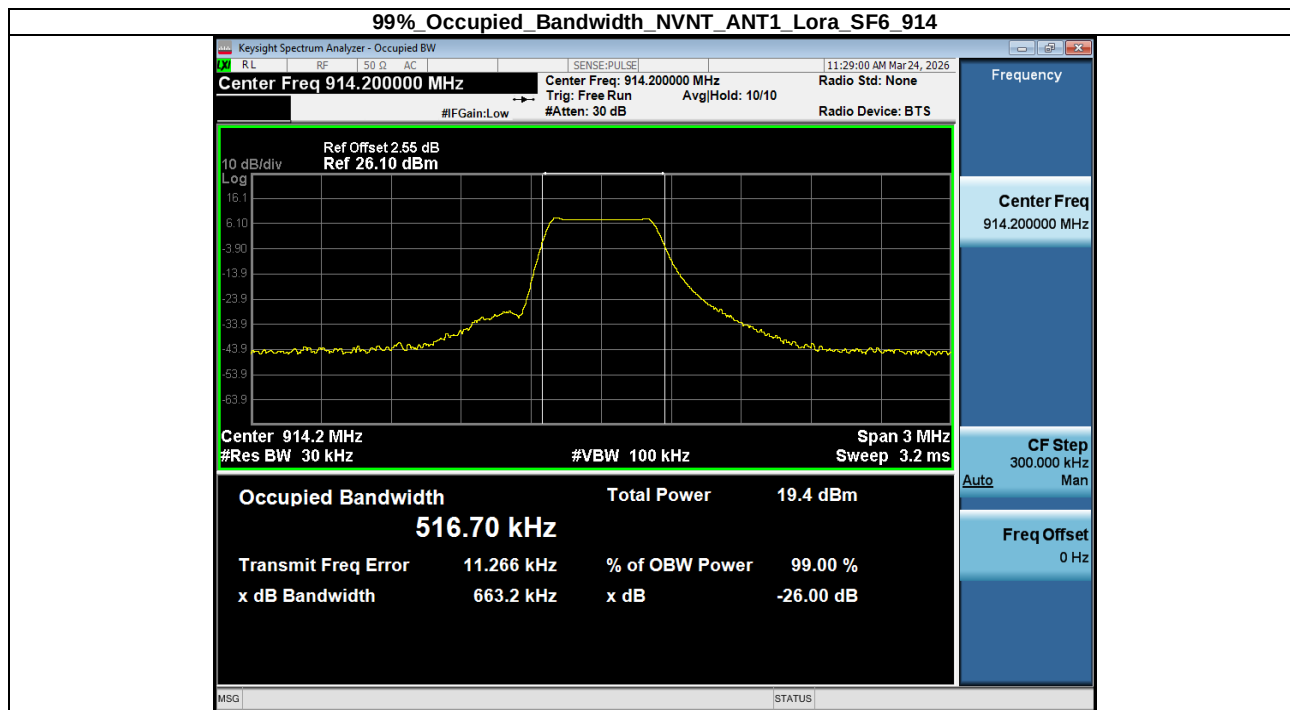


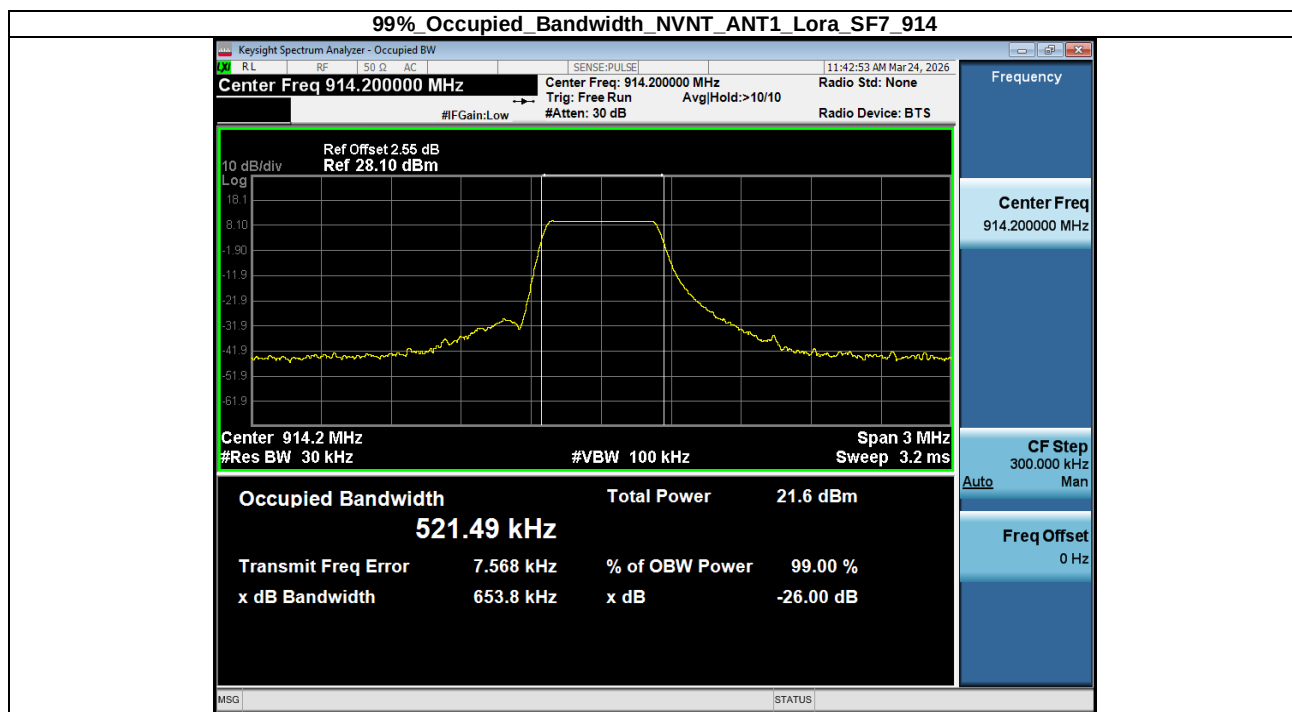
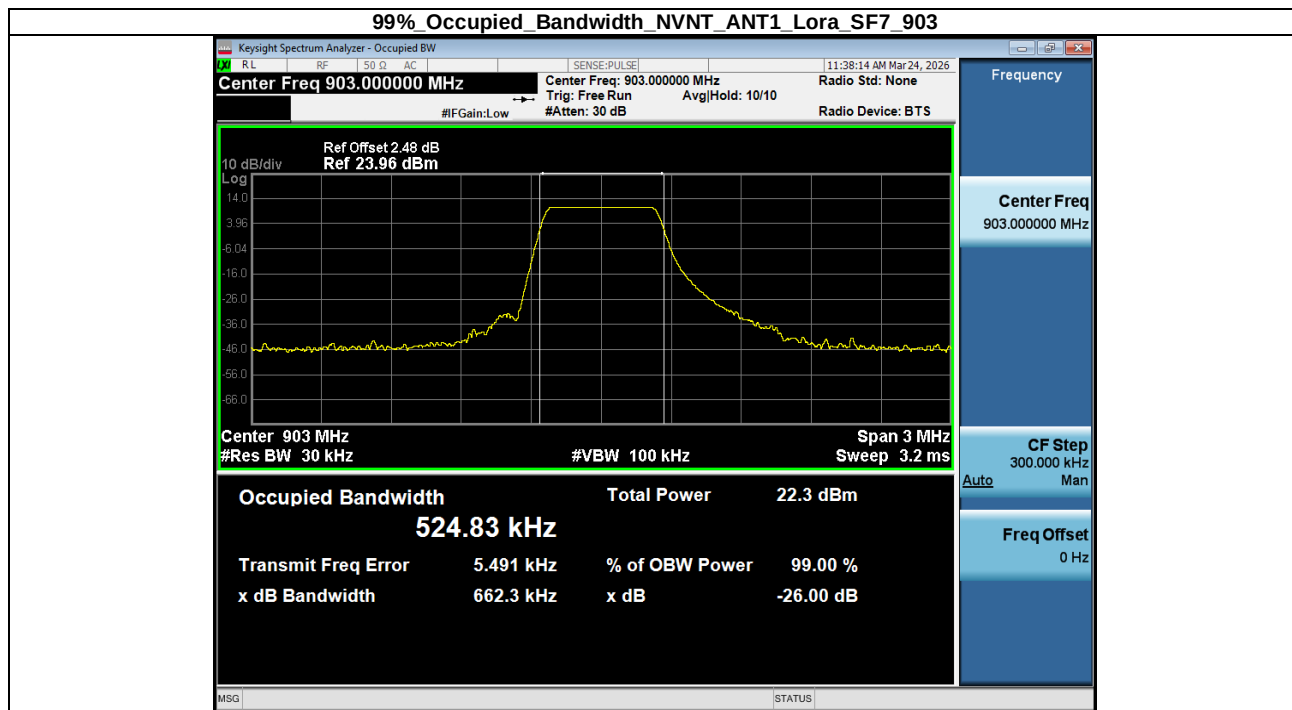


| Condition | Antenna | Test Mode | Frequency (MHz) | 99%BW(MHz) |
|-----------|---------|-----------|-----------------|------------|
| NVNT      | ANT1    | Lora_SF5  | 903.00          | 0.529      |
| NVNT      | ANT1    | Lora_SF5  | 914.20          | 0.520      |
| NVNT      | ANT1    | Lora_SF5  | 927.50          | 0.528      |
| NVNT      | ANT1    | Lora_SF6  | 903.00          | 0.521      |
| NVNT      | ANT1    | Lora_SF6  | 914.20          | 0.517      |
| NVNT      | ANT1    | Lora_SF6  | 927.50          | 0.522      |
| NVNT      | ANT1    | Lora_SF7  | 903.00          | 0.525      |
| NVNT      | ANT1    | Lora_SF7  | 914.20          | 0.521      |
| NVNT      | ANT1    | Lora_SF7  | 927.50          | 0.524      |
| NVNT      | ANT1    | Lora_SF8  | 903.00          | 0.536      |
| NVNT      | ANT1    | Lora_SF8  | 914.20          | 0.533      |
| NVNT      | ANT1    | Lora_SF8  | 927.50          | 0.535      |
| NVNT      | ANT1    | Lora_SF9  | 903.00          | 0.544      |
| NVNT      | ANT1    | Lora_SF9  | 914.20          | 0.541      |
| NVNT      | ANT1    | Lora_SF9  | 927.50          | 0.543      |
| NVNT      | ANT1    | Lora_SF10 | 903.00          | 0.549      |
| NVNT      | ANT1    | Lora_SF10 | 914.20          | 0.547      |
| NVNT      | ANT1    | Lora_SF10 | 927.50          | 0.548      |
| NVNT      | ANT1    | Lora_SF11 | 903.00          | 0.549      |
| NVNT      | ANT1    | Lora_SF11 | 914.20          | 0.547      |
| NVNT      | ANT1    | Lora_SF11 | 927.50          | 0.548      |
| NVNT      | ANT1    | Lora_SF12 | 903.00          | 0.547      |
| NVNT      | ANT1    | Lora_SF12 | 914.20          | 0.547      |
| NVNT      | ANT1    | Lora_SF12 | 927.50          | 0.548      |

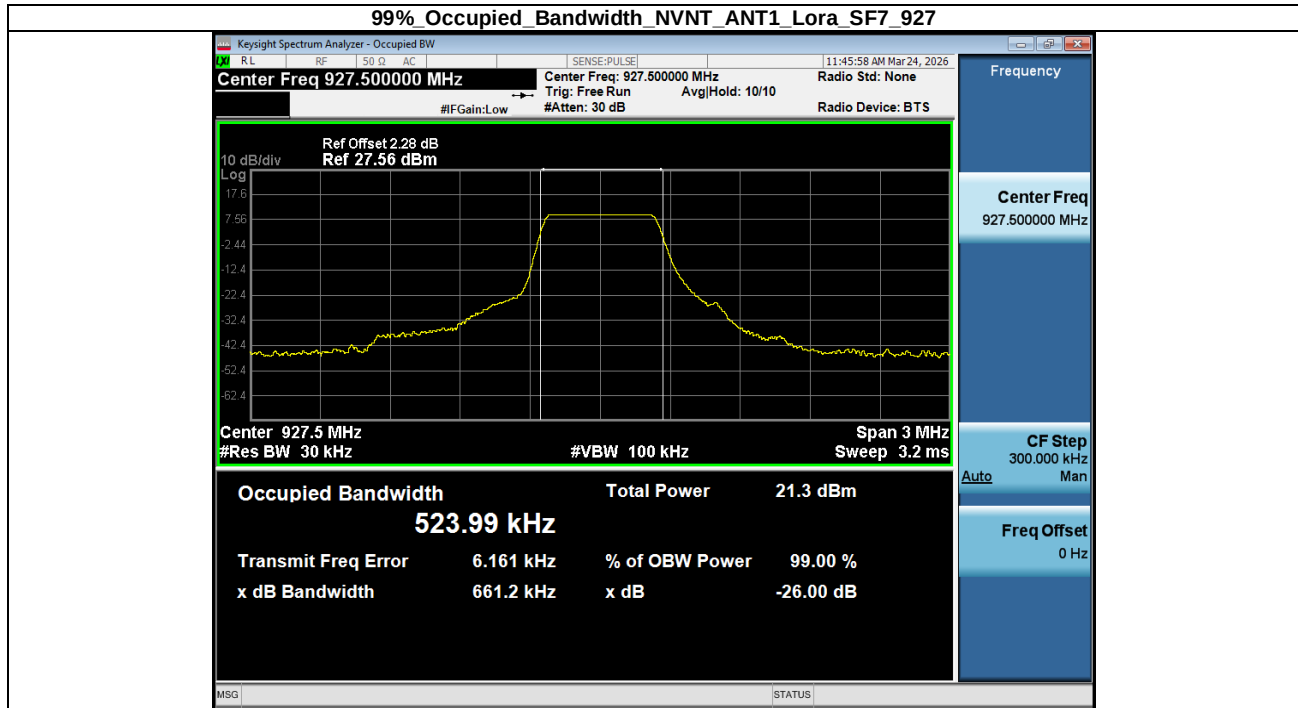




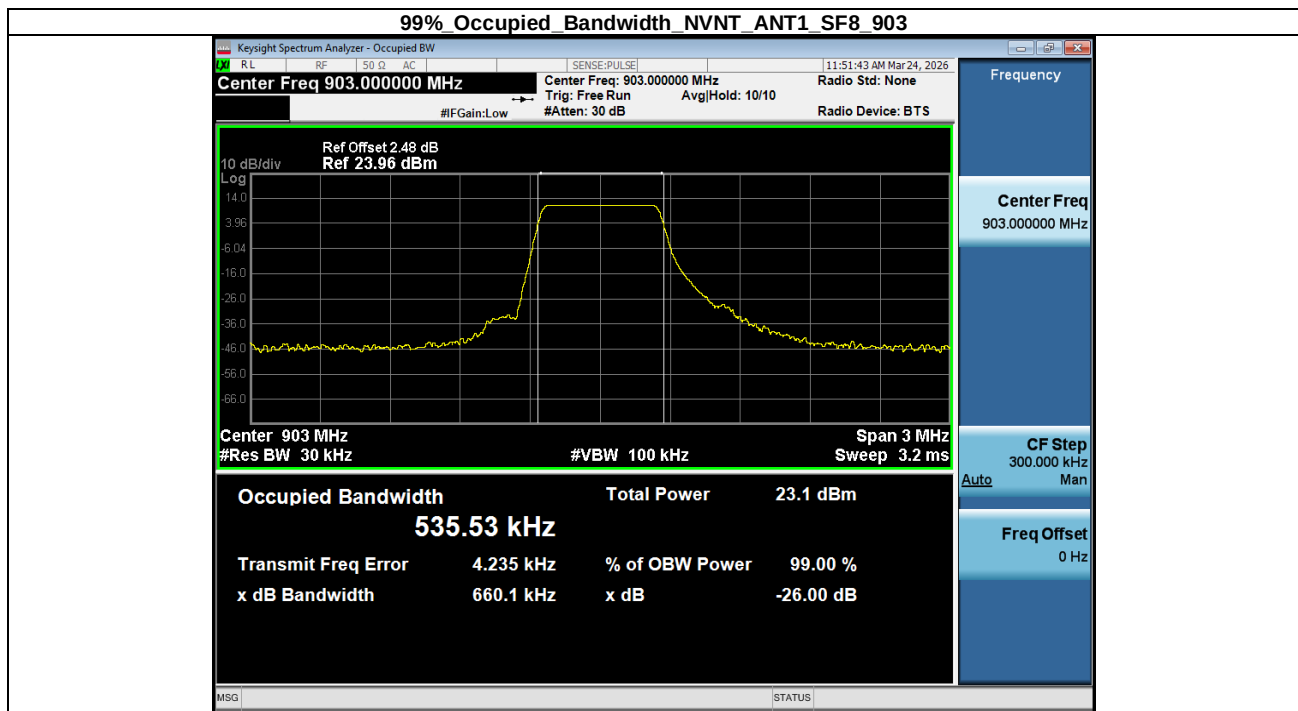




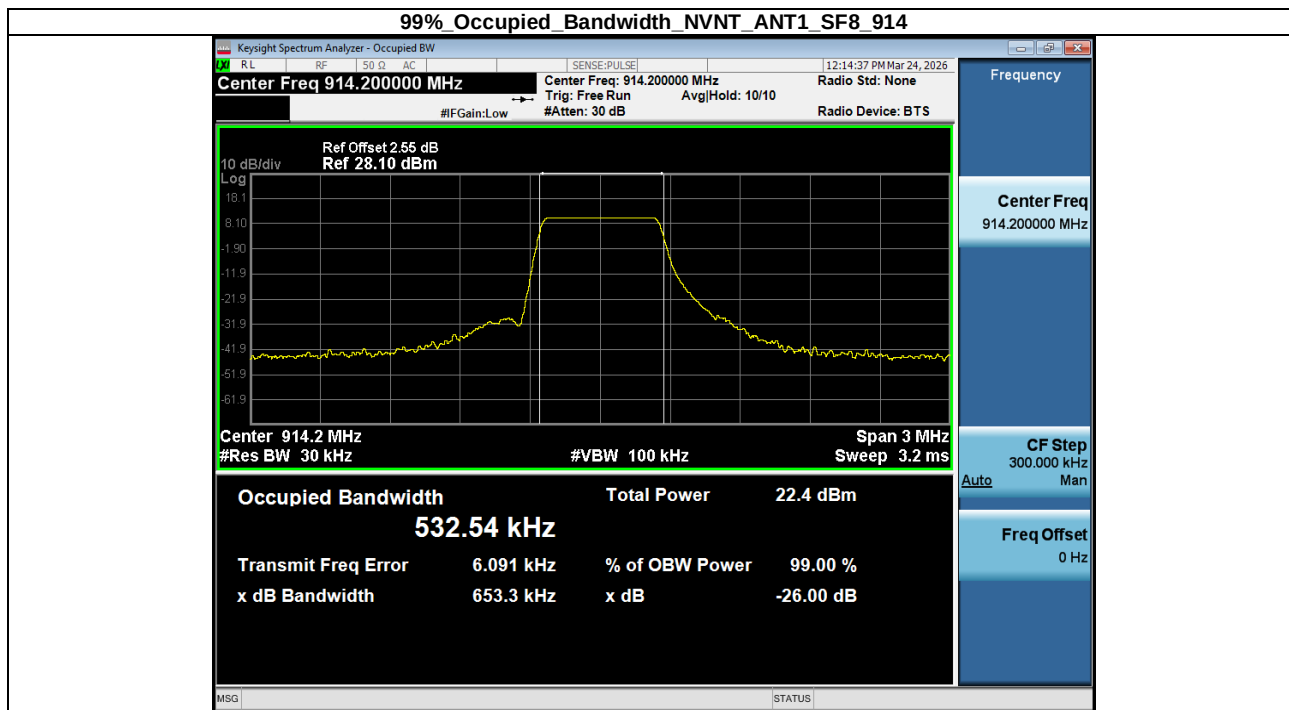
## 99% Occupied Bandwidth NVNT ANT1 Lora SF7\_927



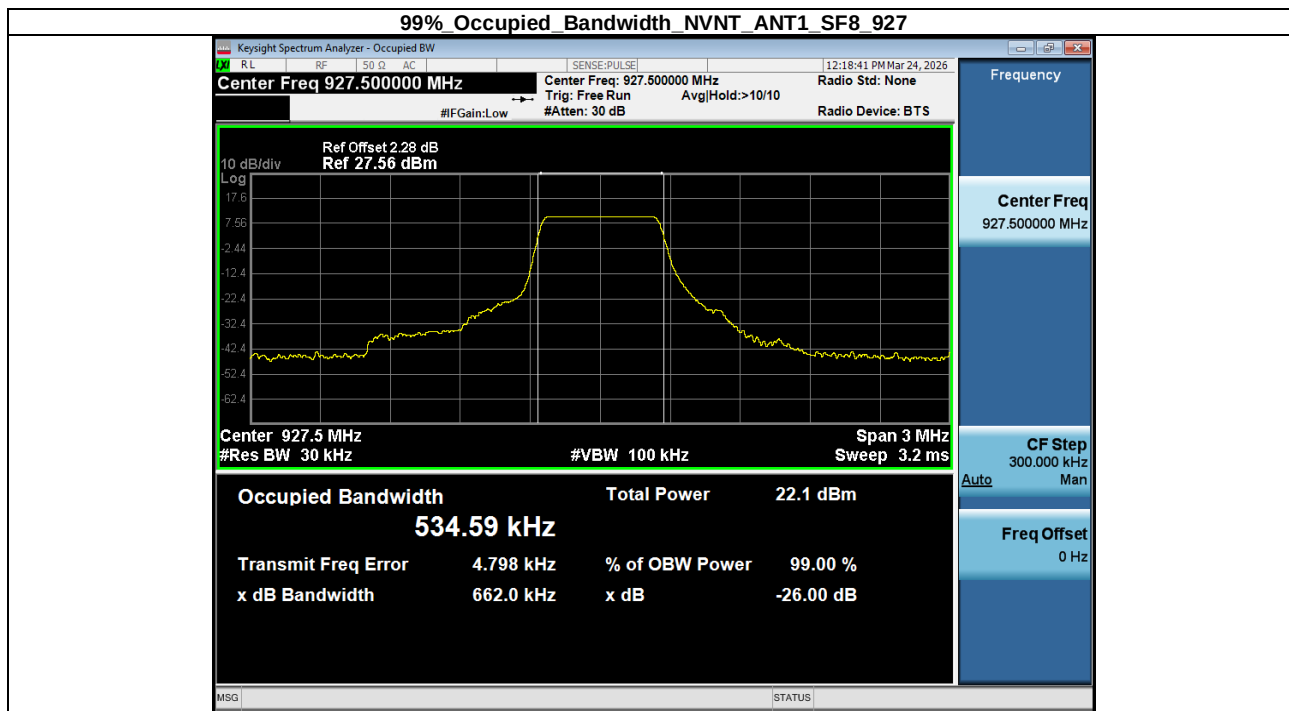
## 99% Occupied Bandwidth NVNT ANT1 SF8\_903

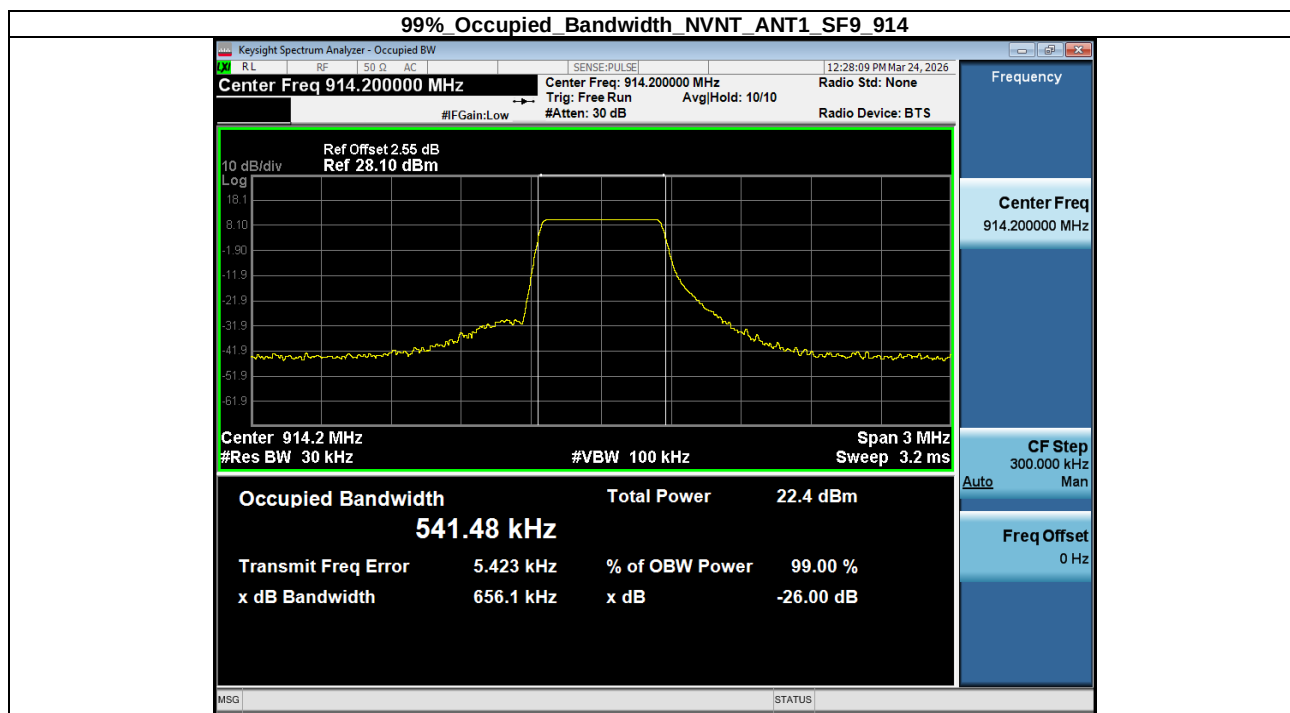
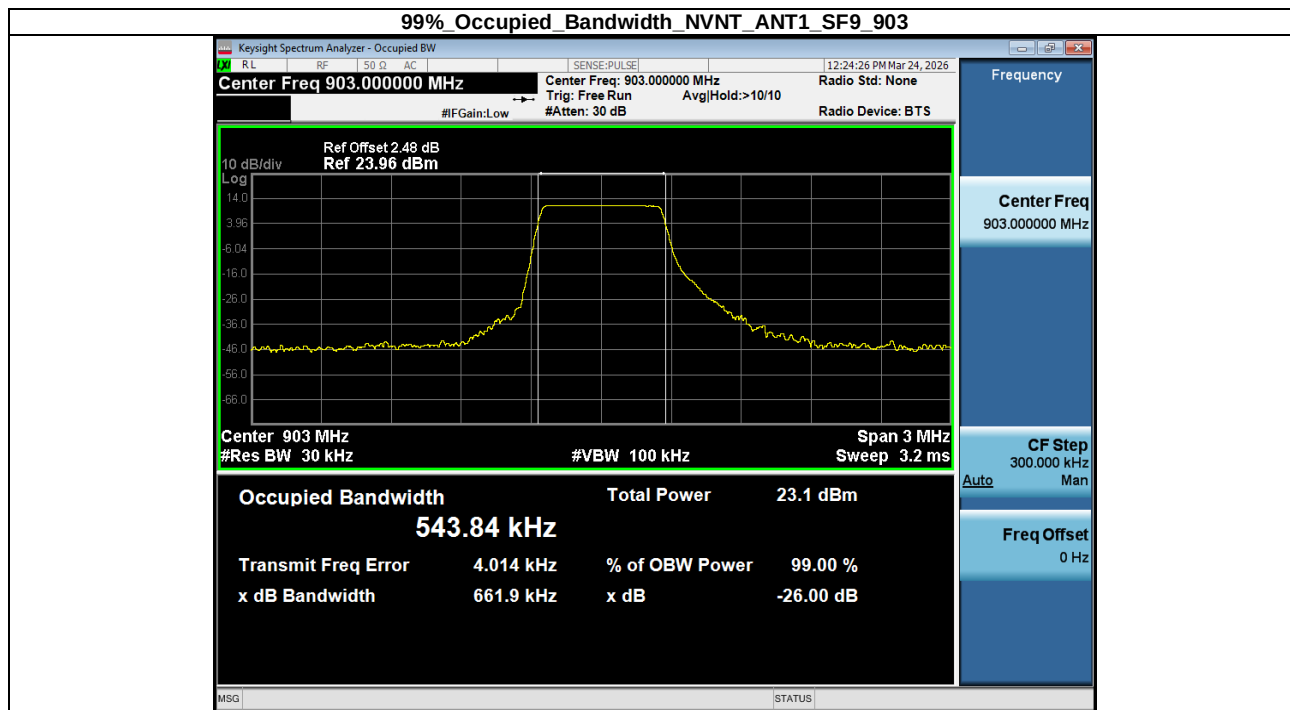


## 99% Occupied Bandwidth NVNT\_ANT1\_SF8\_914

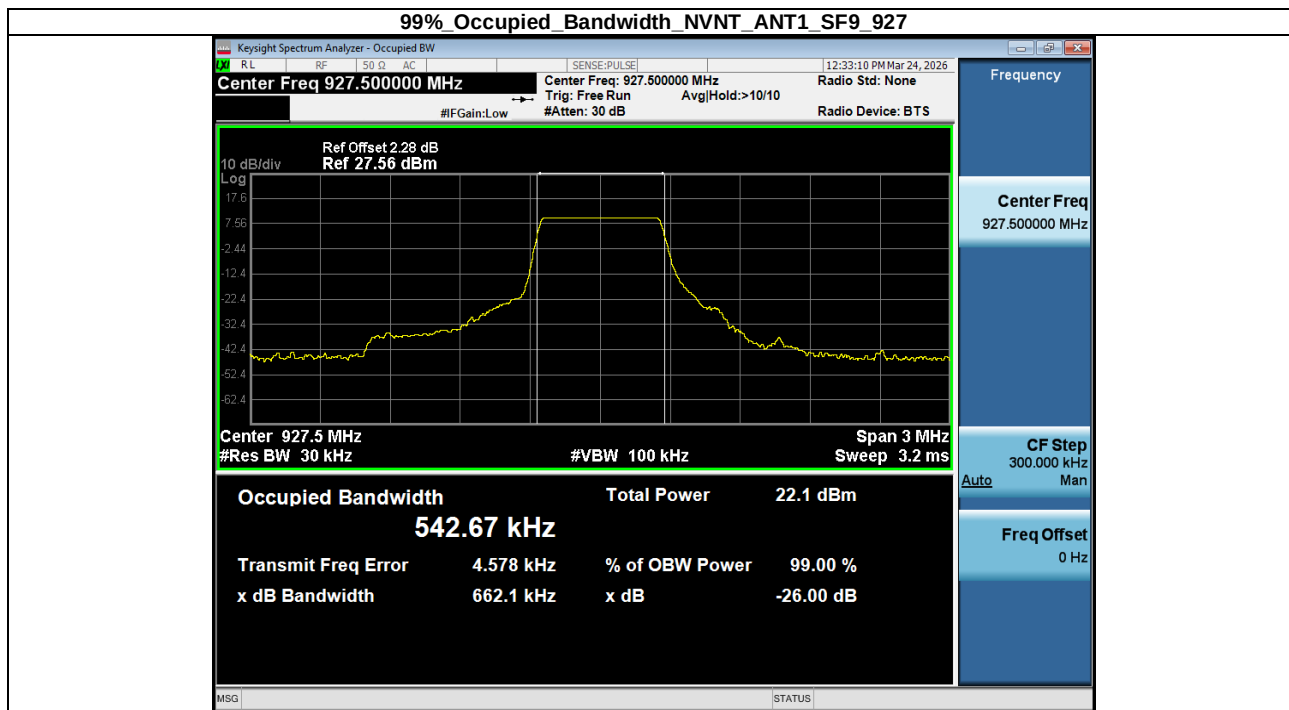


## 99% Occupied Bandwidth NVNT\_ANT1\_SF8\_927

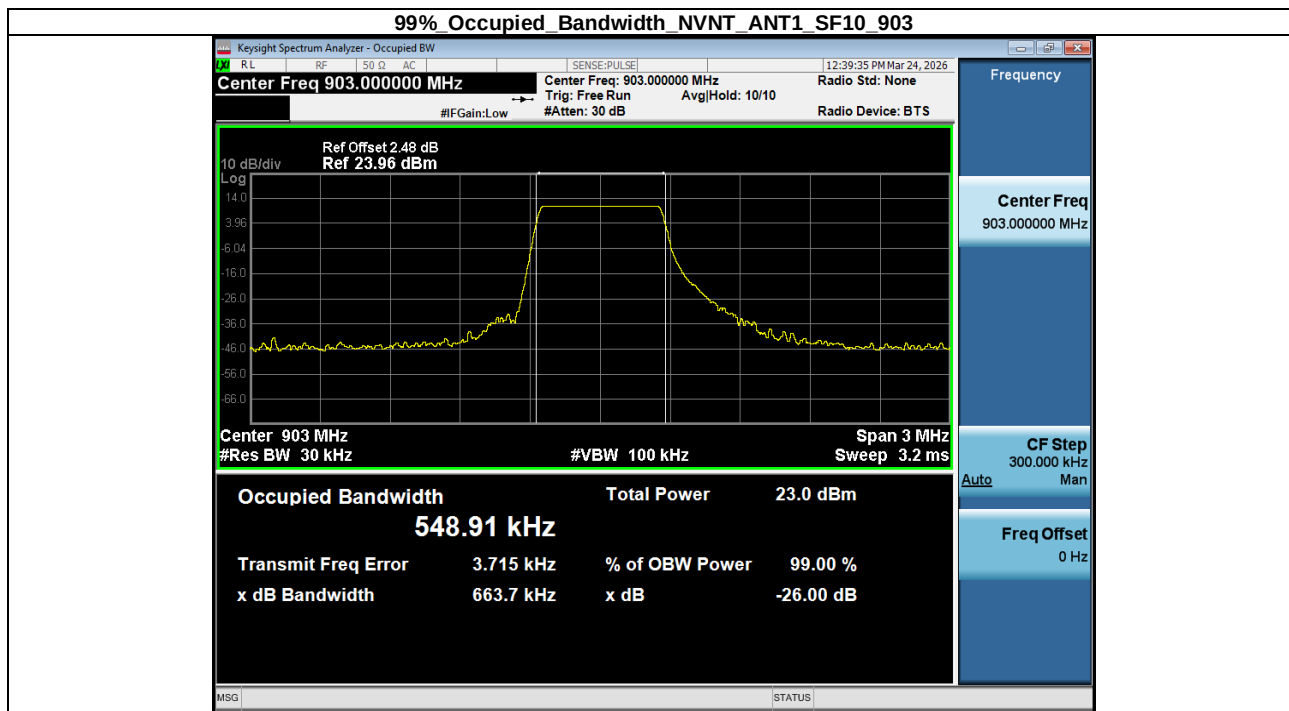




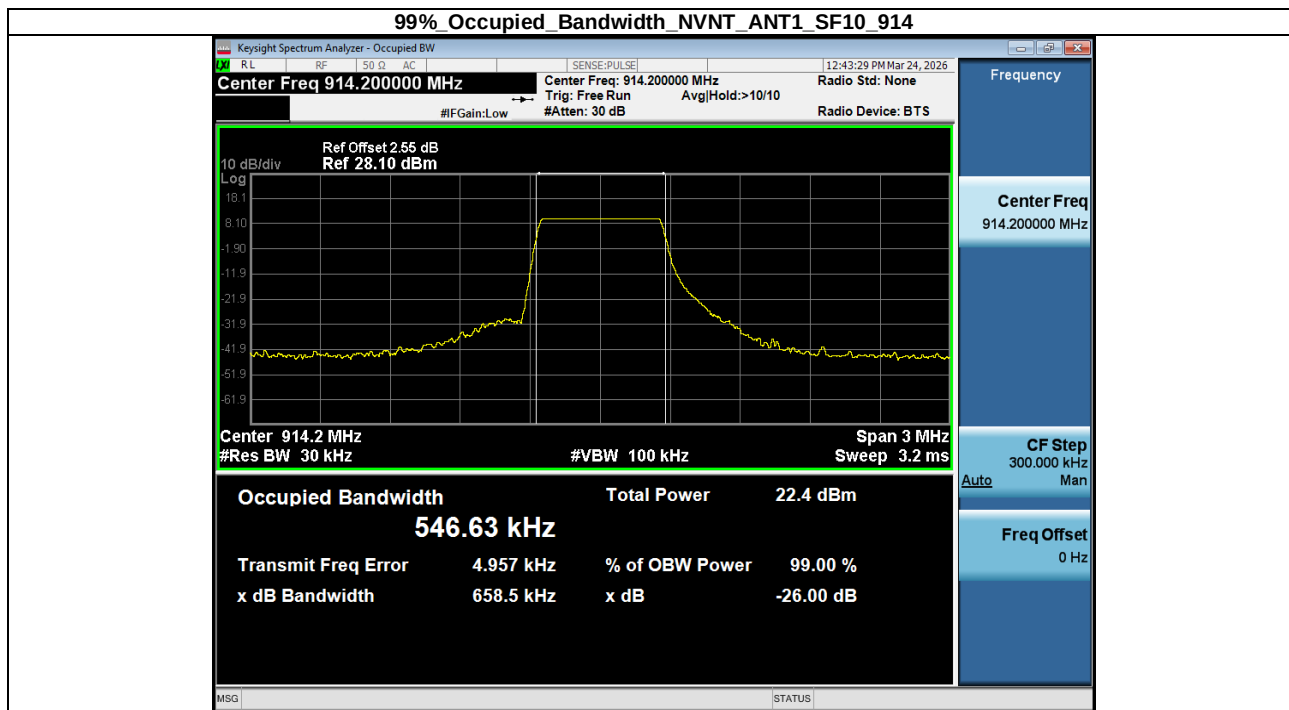
## 99% Occupied Bandwidth NVNT\_ANT1\_SF9\_927



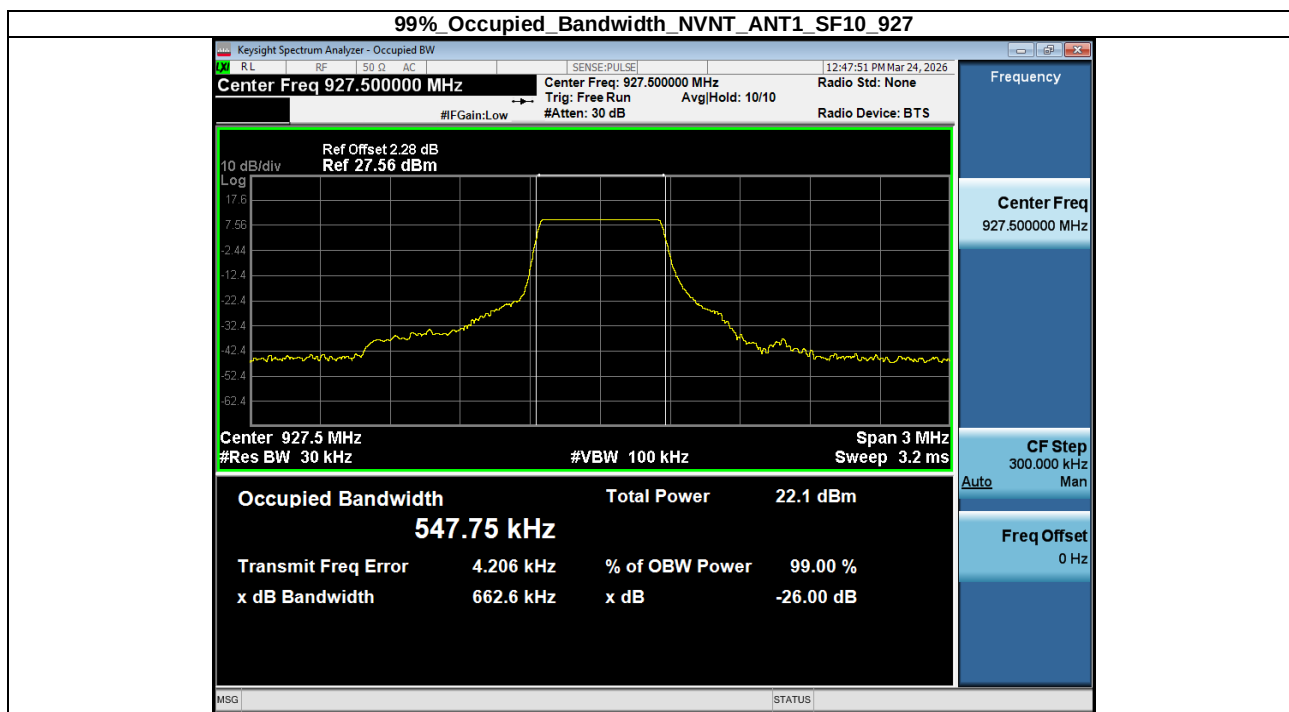
## 99% Occupied Bandwidth NVNT\_ANT1\_SF10\_903



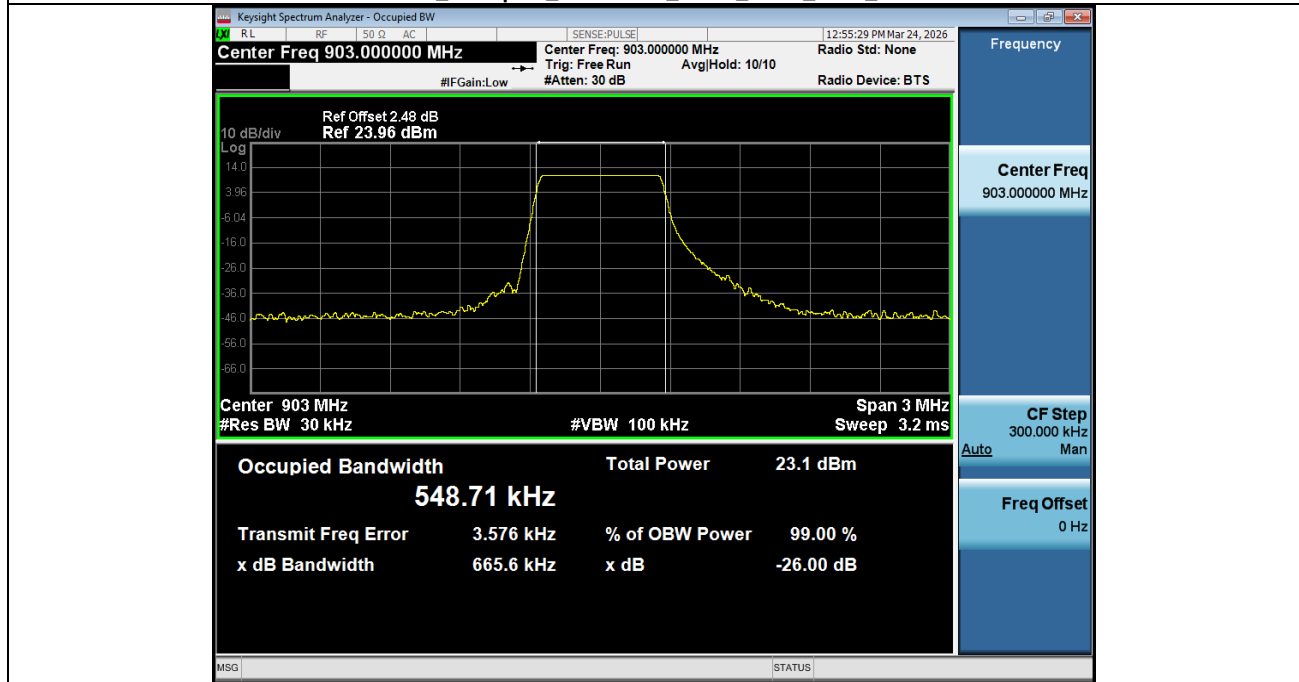
## 99% Occupied Bandwidth NVNT\_ANT1\_SF10\_914



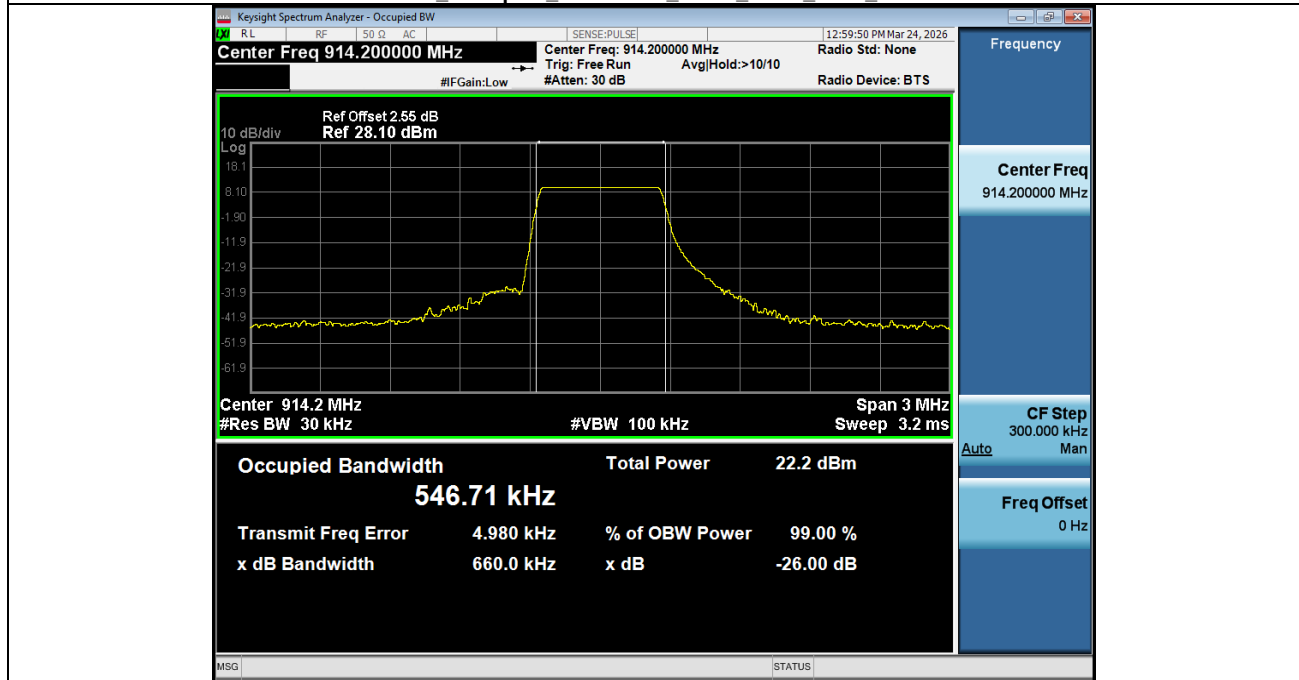
## 99% Occupied Bandwidth NVNT\_ANT1\_SF10\_927



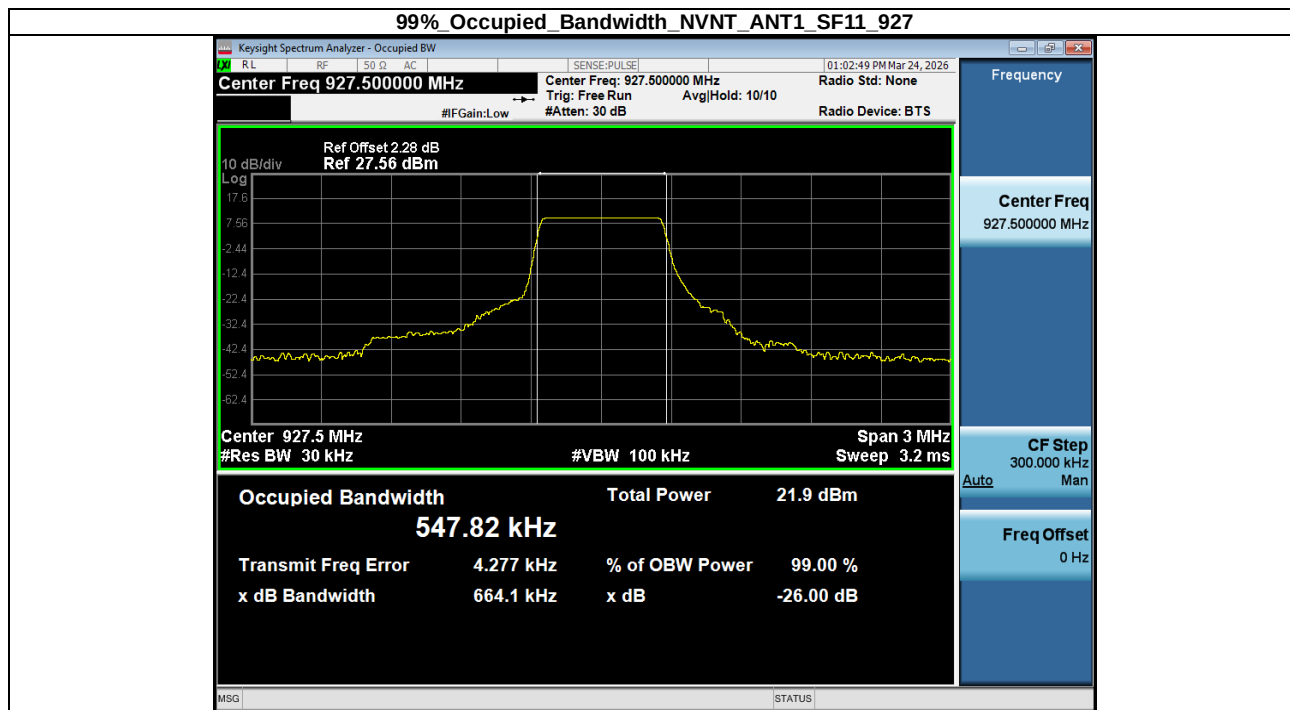
## 99% Occupied Bandwidth NVNT\_ANT1\_SF11\_903



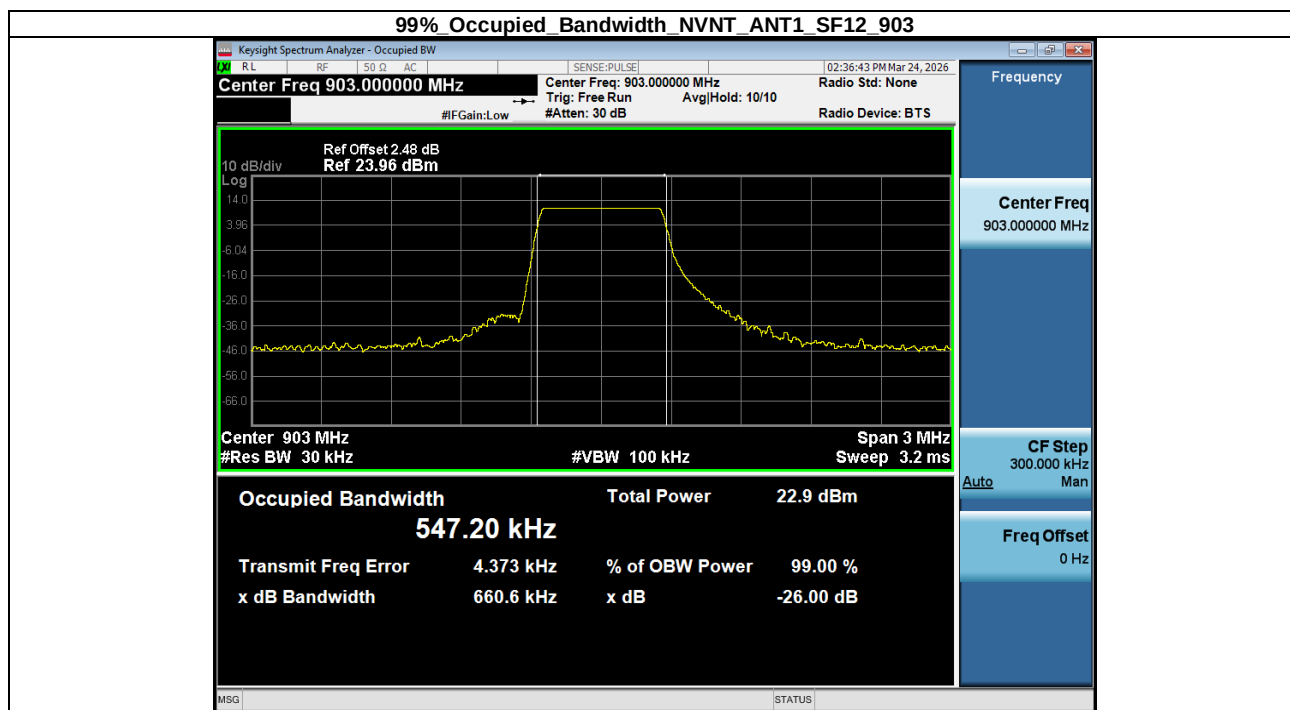
## 99% Occupied Bandwidth NVNT\_ANT1\_SF11\_914



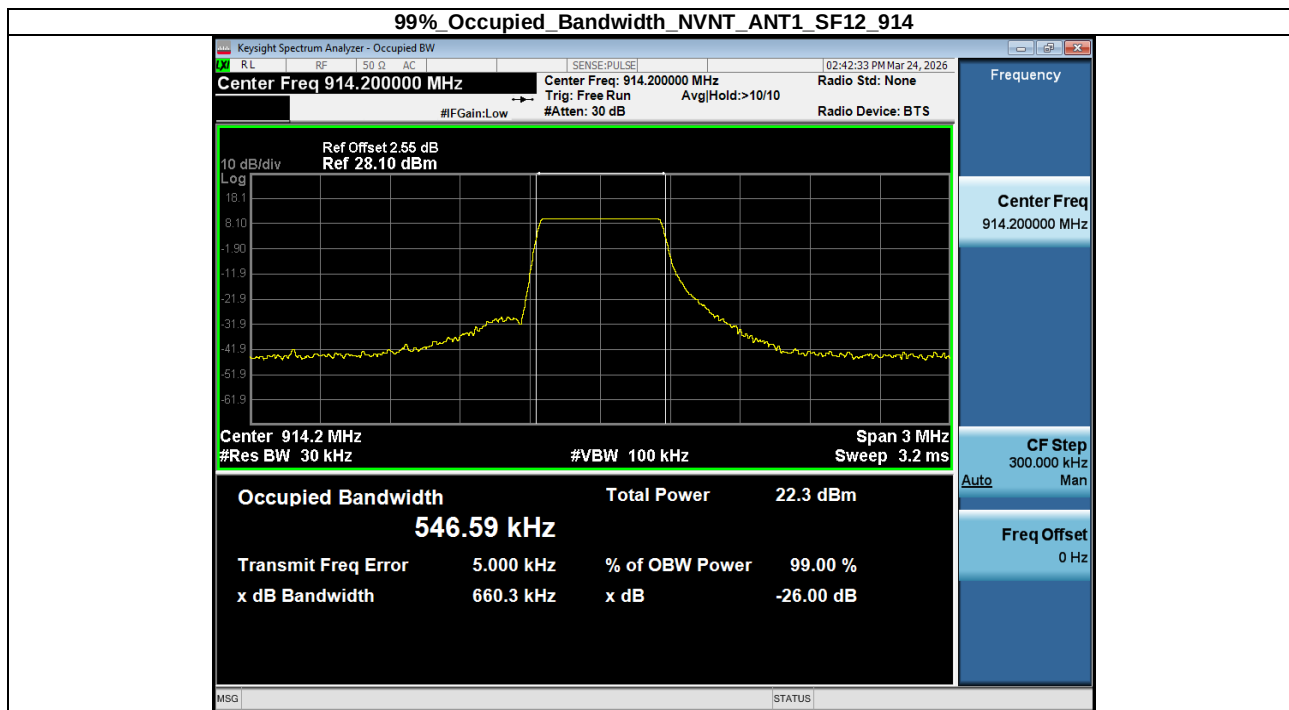
## 99% Occupied Bandwidth NVNT\_ANT1\_SF11\_927



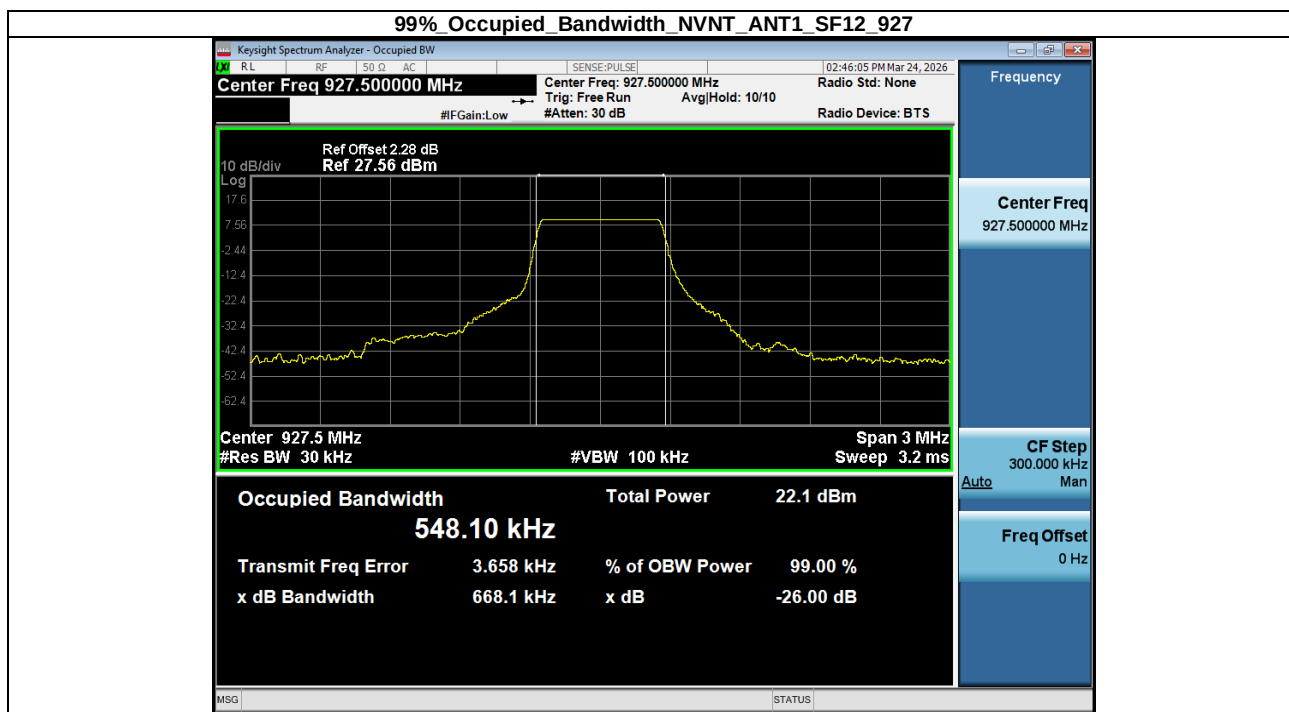
## 99% Occupied Bandwidth NVNT\_ANT1\_SF12\_903



## 99% Occupied Bandwidth NVNT\_ANT1\_SF12\_914



## 99% Occupied Bandwidth NVNT\_ANT1\_SF12\_927



## 9. Antenna Requirement

### 9.1. Standard Requirement

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be replaced by the Lora\_SF5, but the use of a standard antenna jack or electrical connector is prohibited.

### 9.2. Test Results

The EUT antenna is Internal antenna. It complies with the standard requirement.

## 10. Photos of test setup

Reference to the **appendix I Test Setup Photo** for details.

## 11. Photos of EUT

Reference to the **appendix II external photos** and **appendix III internal photos** for details.

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