

## 7. BANDWIDTH TEST

### 7.1 LIMIT

| FCC Part 15.247, Subpart C |           |                                         |                       |        |
|----------------------------|-----------|-----------------------------------------|-----------------------|--------|
| Section                    | Test Item | Limit                                   | Frequency Range (MHz) | Result |
| 15.247(a)(2)               | Bandwidth | $\geq 500\text{KHz}$<br>(6dB bandwidth) | 902-928               | PASS   |

### 7.2 TEST PROCEDURE

The automatic bandwidth measurement capability of an instrument may be employed using the X dB bandwidth mode with X set to 6 dB, if the functionality described above (i.e., RBW = 100 kHz, VBW  $\geq$  3RBW, peak detector with maximum hold) is implemented by the instrumentation function. When using this capability, care shall be taken so that the bandwidth measurement is not influenced by any intermediate power nulls in the fundamental emission that might be  $\geq 6$  dB.

### 7.3 TEST SETUP



### 7.4 EUT OPERATION CONDITIONS

Please refer to section 3.4 of this report.

### 7.5 TEST RESULTS

Note: The test data please refer to APPENDIX 1.



## 8. PEAK OUTPUT POWER TEST

### 8.1 LIMIT

| FCC Part 15.247, Subpart C |              |                 |                       |        |
|----------------------------|--------------|-----------------|-----------------------|--------|
| Section                    | Test Item    | Limit           | Frequency Range (MHz) | Result |
| 15.247(b)(3)               | Output Power | 1 watt or 30dBm | 902-928               | PASS   |

### 8.2 TEST PROCEDURE

One of the following procedures may be used to determine the averaging conducted output power of a DTS EUT.

Method AVGSA-2 uses trace averaging across ON and OFF times of the EUT transmissions, followed by duty cycle correction. The procedure for this method is as follows:

- Measure the duty cycle D of the transmitter output signal as described in 11.6.
- Set span to at least 1.5 times the OBW.
- Set RBW = 1% to 5% of the OBW, not to exceed 1 MHz.
- Set VBW  $\geq [3 \times \text{RBW}]$ .
- Number of points in sweep  $\geq [2 \times \text{span} / \text{RBW}]$ . (This gives bin-to-bin spacing  $\leq \text{RBW} / 2$ , so that narrowband signals are not lost between frequency bins.)
- Sweep time = auto.
- Detector = RMS (i.e., power averaging), if available. Otherwise, use the sample detector mode.
- Do not use sweep triggering. Allow the sweep to "free run."
- Trace average at least 100 traces in power averaging (rms) mode; however, the number of traces to be averaged shall be increased above 100 as needed such that the average accurately represents the true average over the ON and OFF periods of the transmitter.
- Compute power by integrating the spectrum across the OBW of the signal using the instrument's band power measurement function with band limits set equal to the OBW band edges. If the instrument does not have a band power function, then sum the spectrum levels (in power units) at intervals equal to the RBW extending across the entire OBW of the spectrum.
- Add  $[10 \log (1 / D)]$ , where D is the duty cycle, to the measured power to compute the average power during the actual transmission times (because the measurement represents an average over both the ON and OFF times of the transmission). For example, add  $[10 \log (1/0.25)] = 6 \text{ dB}$  if the duty cycle is 25%.

One of the following procedures may be used to determine the maximum peak conducted output power of a DTS EUT.

$\text{RBW} \geq \text{DTS bandwidth}$

The following procedure shall be used when an instrument with a resolution bandwidth that is greater than the DTS bandwidth is available to perform the measurement:

- Set the RBW  $\geq$  DTS bandwidth.
- Set VBW  $\geq [3 \times \text{RBW}]$ .
- Set span  $\geq [3 \times \text{RBW}]$ .
- Sweep time = auto couple.
- Detector = peak.
- Trace mode = max hold.
- Allow trace to fully stabilize.
- Use peak marker function to determine the peak amplitude level.



### 8.3 TEST SETUP



### 8.4 EUT OPERATION CONDITIONS

Please refer to section 3.4 of this report.

### 8.5 TEST RESULTS

Note: The test data please refer to APPENDIX 1.



## 9. ANTENNA REQUIREMENT

### 9.1 STANDARD REQUIREMENT

15.203 requirement: For intentional device, according to 15.203: 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.

### 9.2 EUT ANTENNA

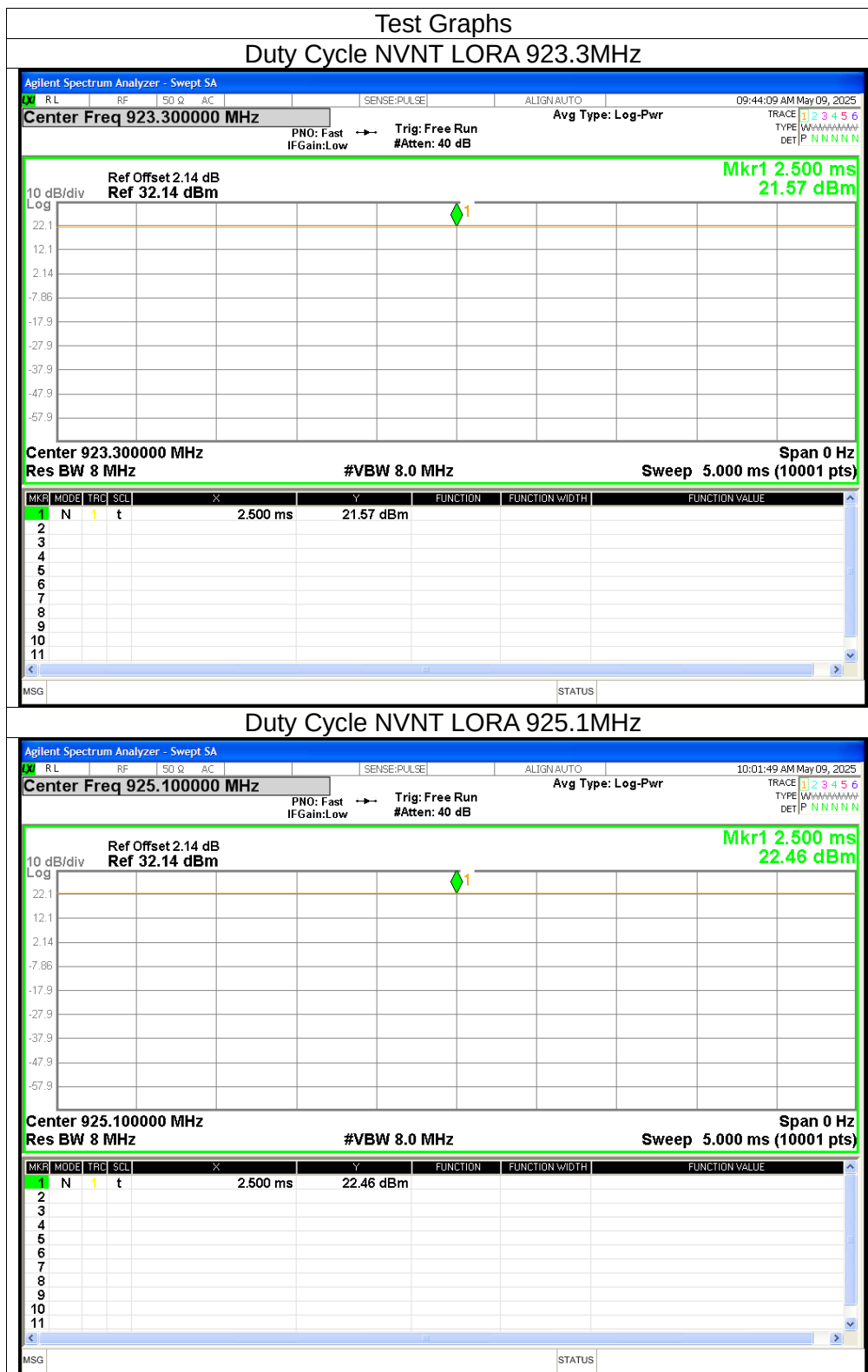
The EUT antenna is FPC Antenna. It comply with the standard requirement.

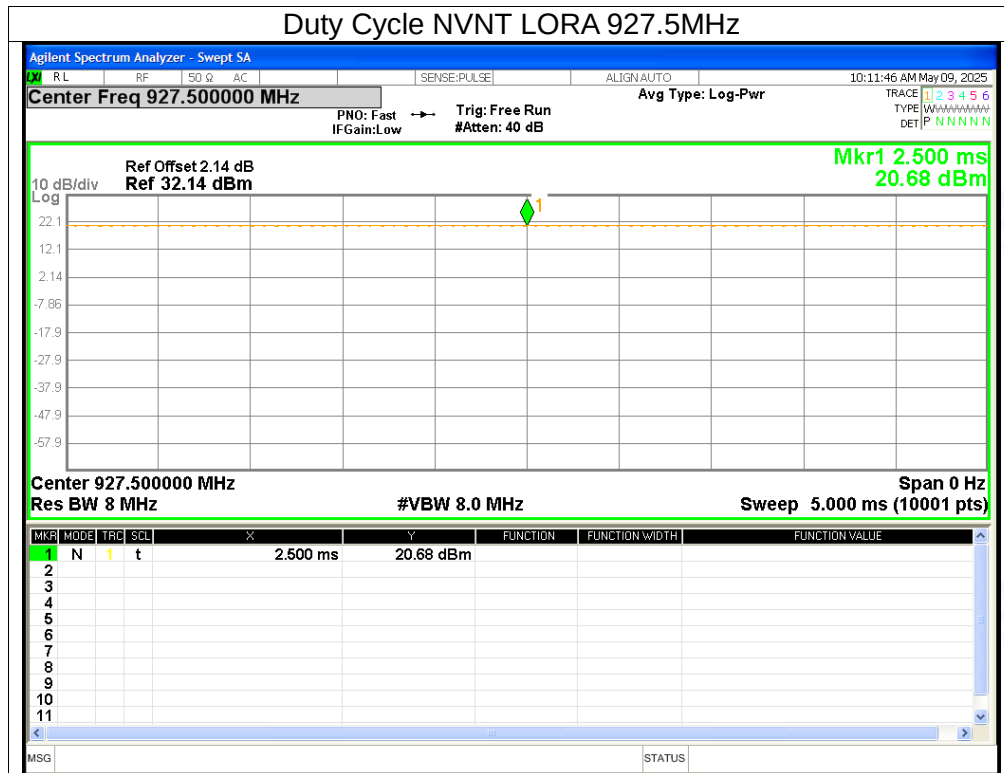


## APPENDIX 1-TEST DATA

## Duty Cycle

| Condition | Mode | Frequency<br>(MHz) | Duty Cycle<br>(%) | Correction Factor<br>(dB) | 1/T<br>(kHz) |
|-----------|------|--------------------|-------------------|---------------------------|--------------|
| NVNT      | LORA | 923.3              | 100               | 0                         | 0            |
| NVNT      | LORA | 925.1              | 100               | 0                         | 0            |
| NVNT      | LORA | 927.5              | 100               | 0                         | 0            |

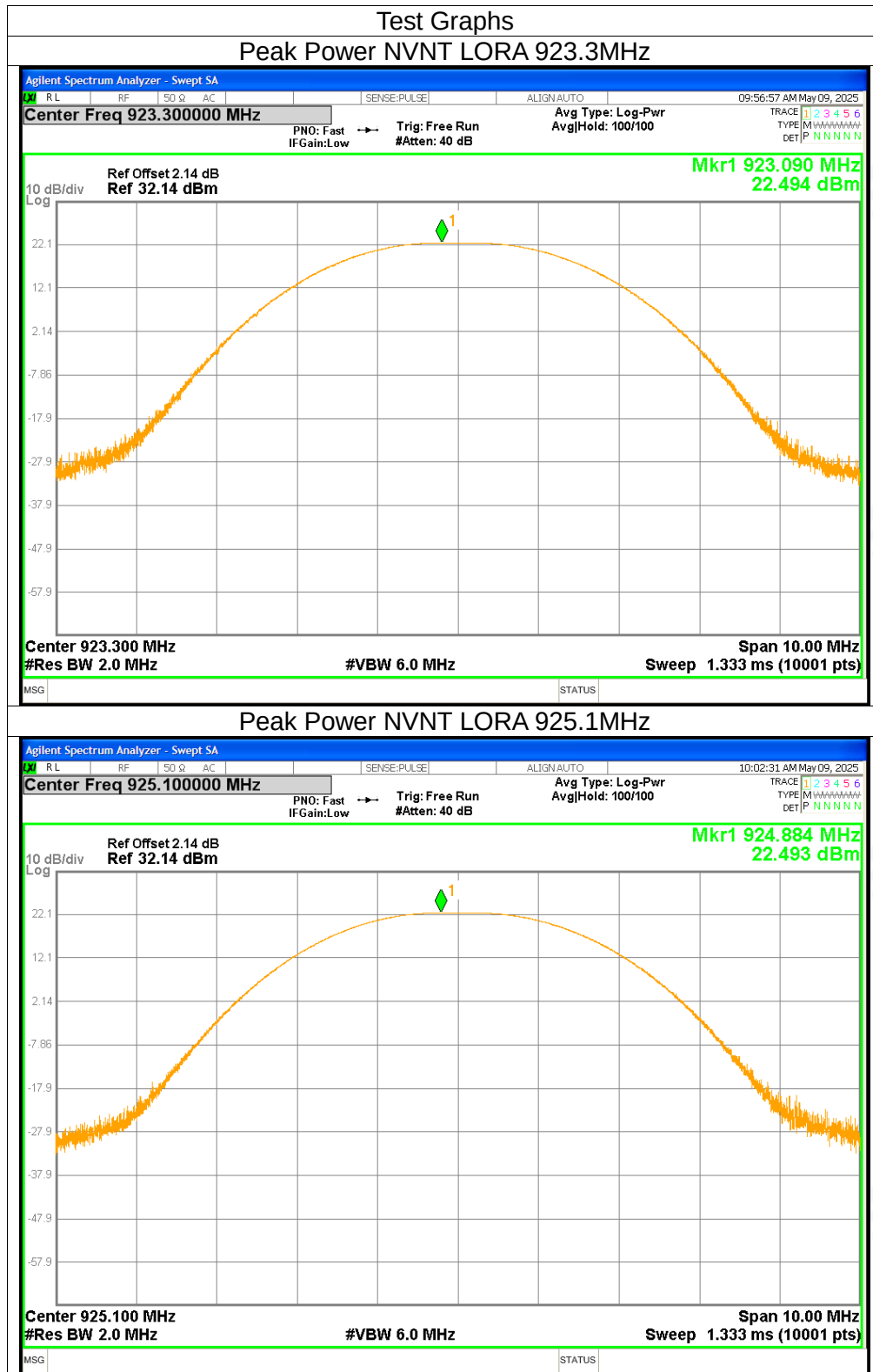


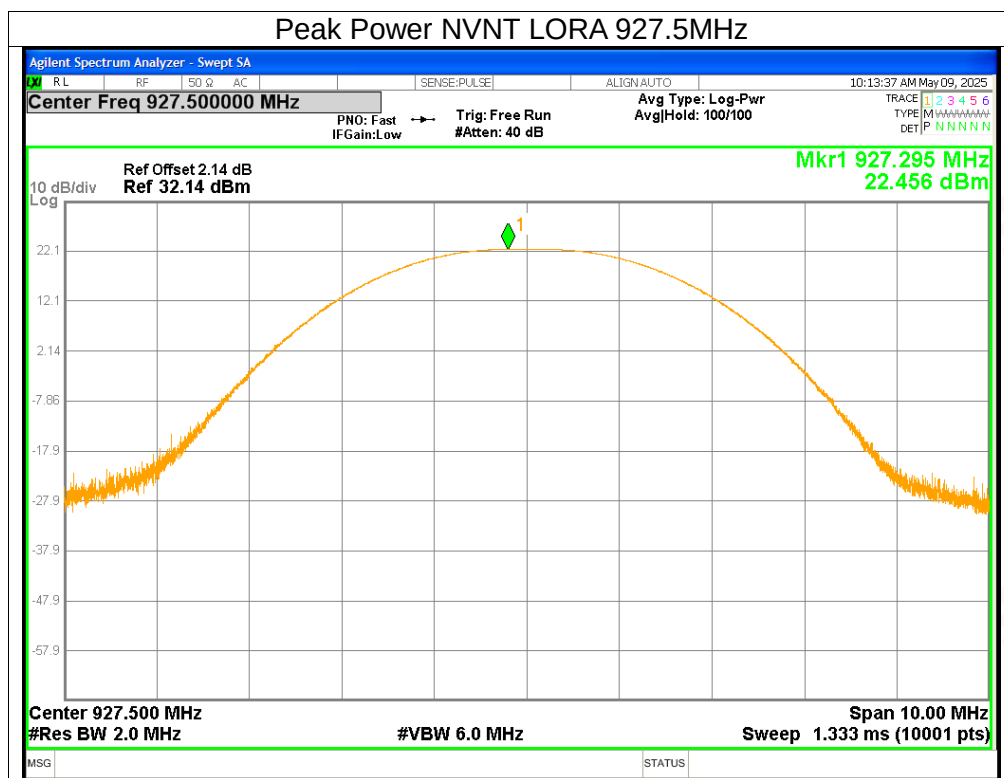




## Maximum Peak Conducted Output Power

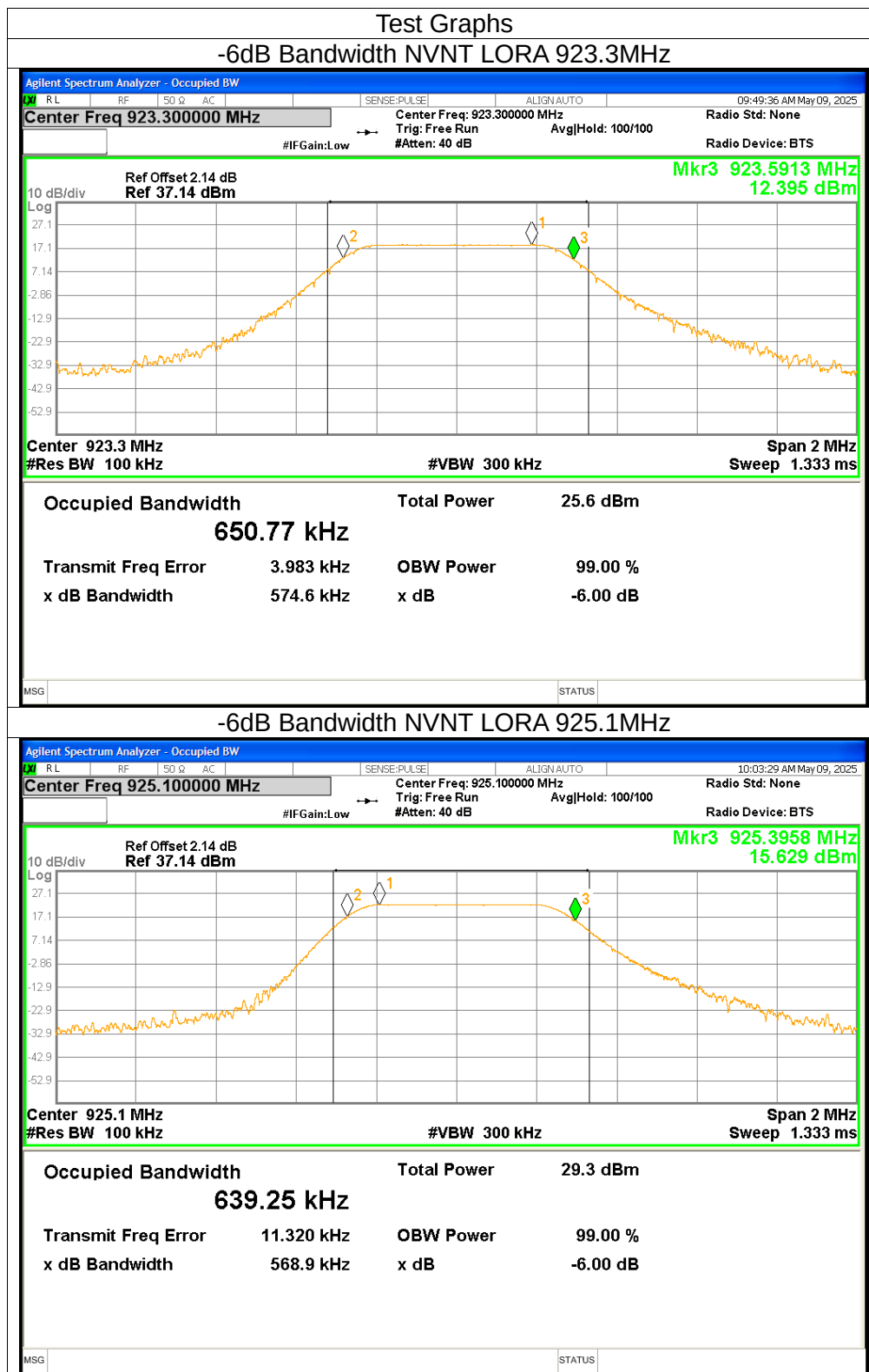
| Condition | Mode | Frequency (MHz) | Conducted Power (dBm) | Limit (dBm) | Verdict |
|-----------|------|-----------------|-----------------------|-------------|---------|
| NVNT      | LORA | 923.3           | 22.49                 | $\leq 30$   | Pass    |
| NVNT      | LORA | 925.1           | 22.49                 | $\leq 30$   | Pass    |
| NVNT      | LORA | 927.5           | 22.46                 | $\leq 30$   | Pass    |

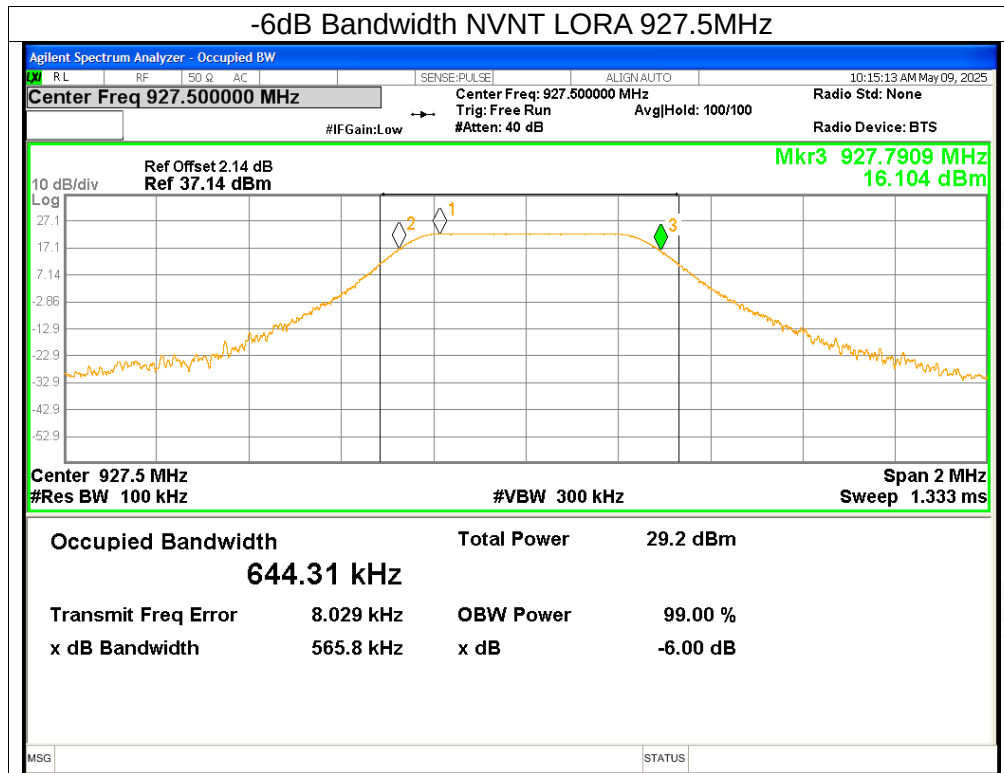




**-6dB Bandwidth**

| Condition | Mode | Frequency (MHz) | -6 dB Bandwidth (MHz) | Limit -6 dB Bandwidth (MHz) | Verdict |
|-----------|------|-----------------|-----------------------|-----------------------------|---------|
| NVNT      | LORA | 923.3           | 0.5746                | $\geq 0.5$                  | Pass    |
| NVNT      | LORA | 925.1           | 0.5689                | $\geq 0.5$                  | Pass    |
| NVNT      | LORA | 927.5           | 0.5658                | $\geq 0.5$                  | Pass    |

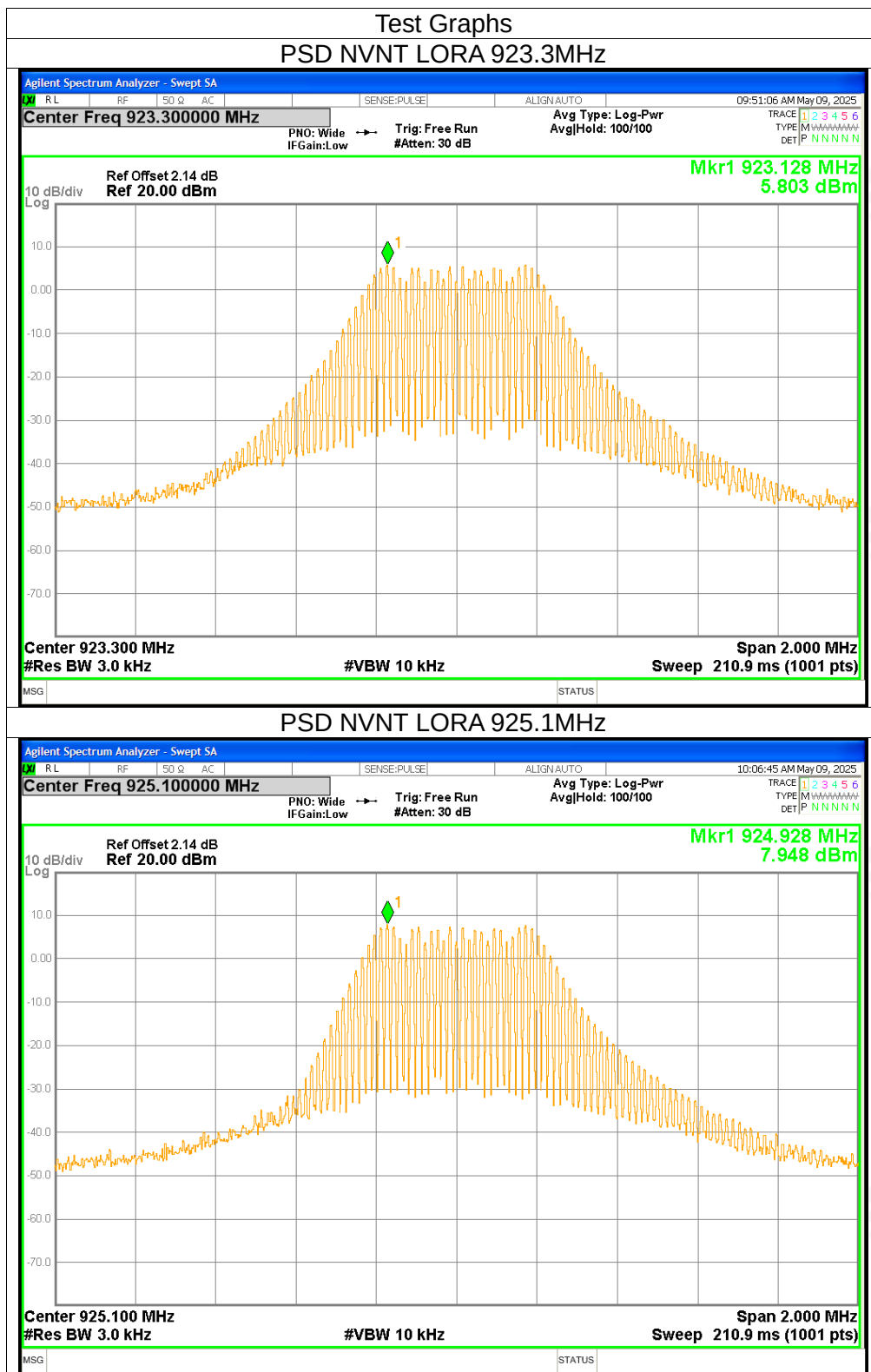


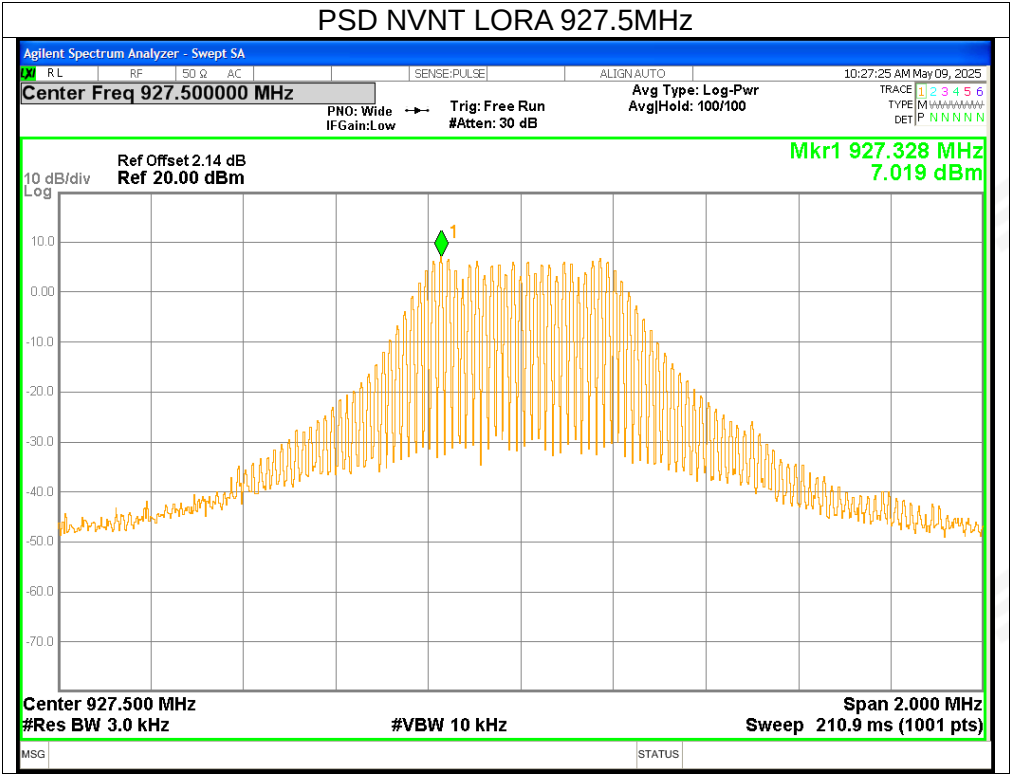




## Maximum Power Spectral Density Level

| Condition | Mode | Frequency (MHz) | PSD (dBm/3kHz) | Limit (dBm/3kHz) | Verdict |
|-----------|------|-----------------|----------------|------------------|---------|
| NVNT      | LORA | 923.3           | 5.8            | $\leq 8$         | Pass    |
| NVNT      | LORA | 925.1           | 7.95           | $\leq 8$         | Pass    |
| NVNT      | LORA | 927.5           | 7.02           | $\leq 8$         | Pass    |







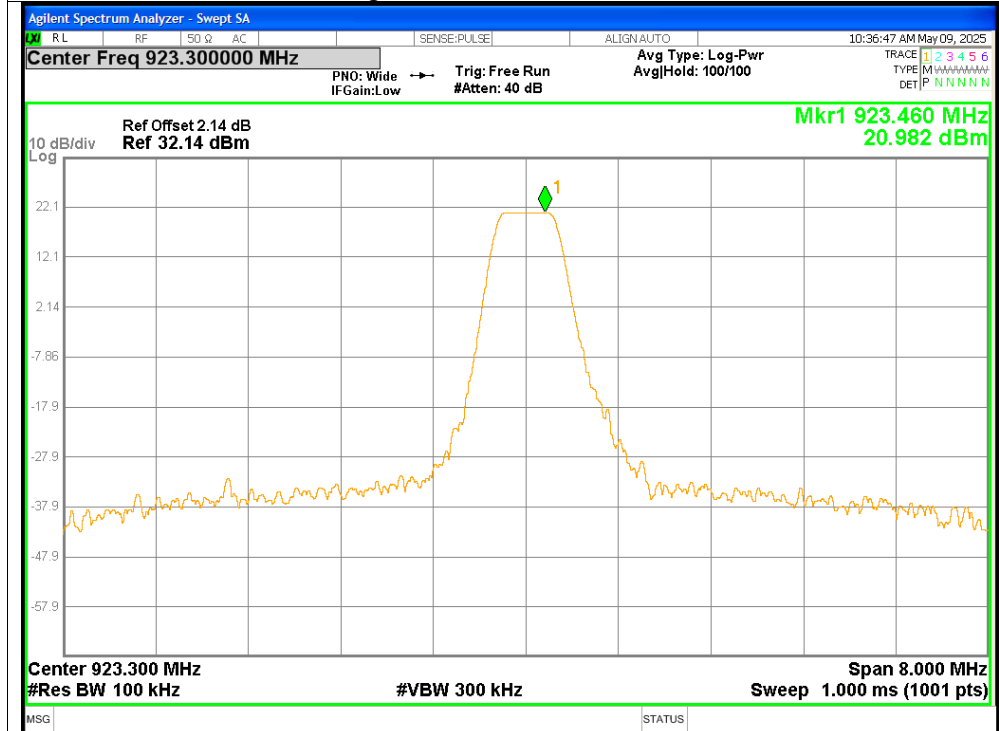
## Band Edge

| Condition | Mode | Frequency (MHz) | Max Value (dBc) | Limit (dBc) | Verdict |
|-----------|------|-----------------|-----------------|-------------|---------|
| NVNT      | LORA | 923.3           | -68.44          | $\leq -20$  | Pass    |
| NVNT      | LORA | 927.5           | -23.27          | $\leq -20$  | Pass    |

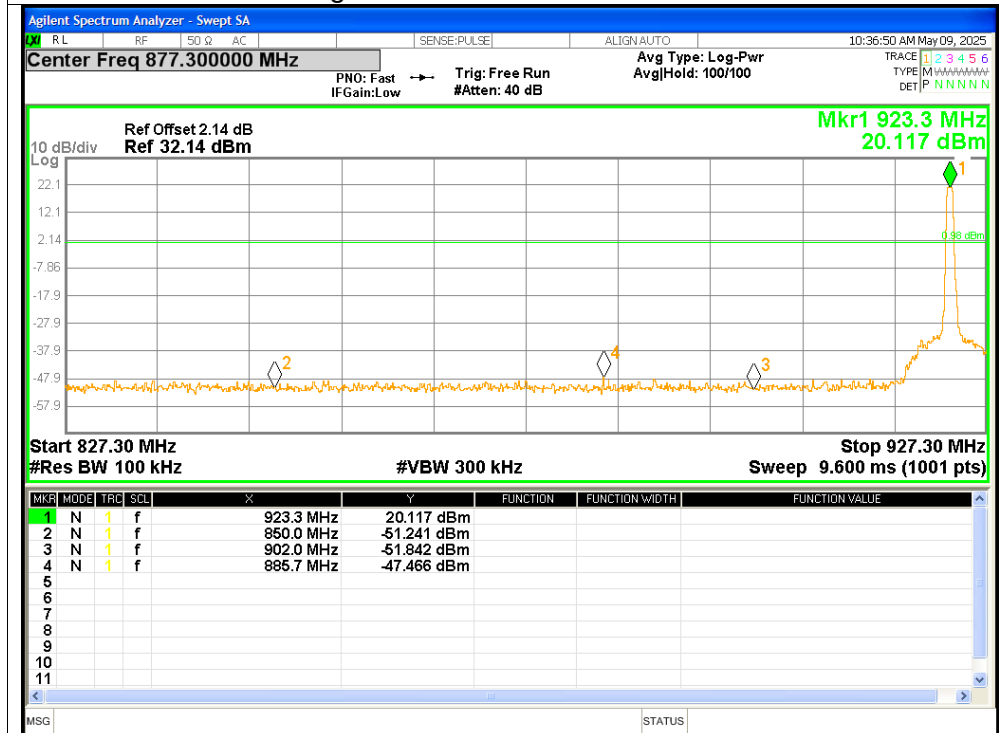


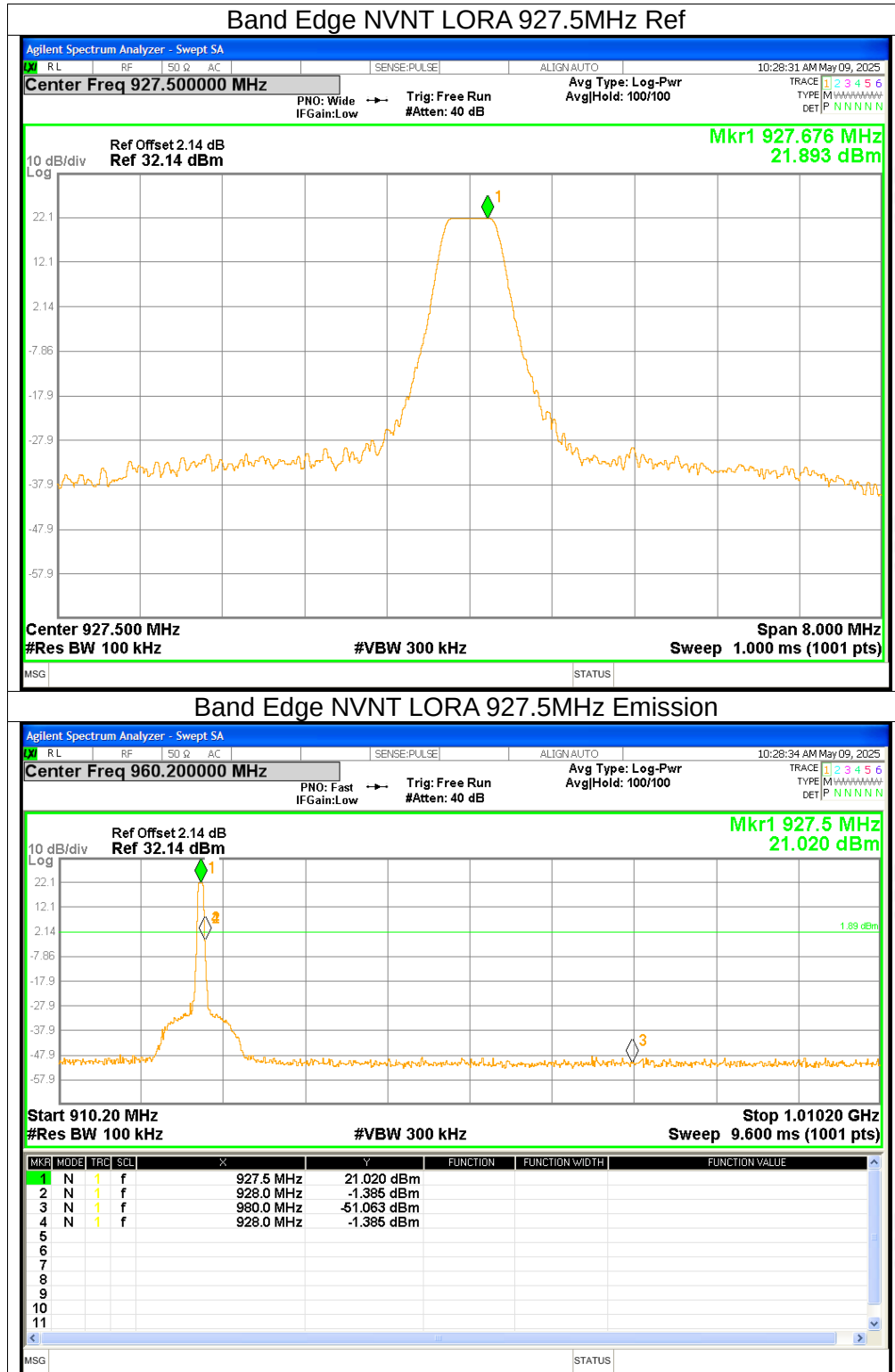
## Test Graphs

## Band Edge NVNT LORA 923.3MHz Ref



## Band Edge NVNT LORA 923.3MHz Emission

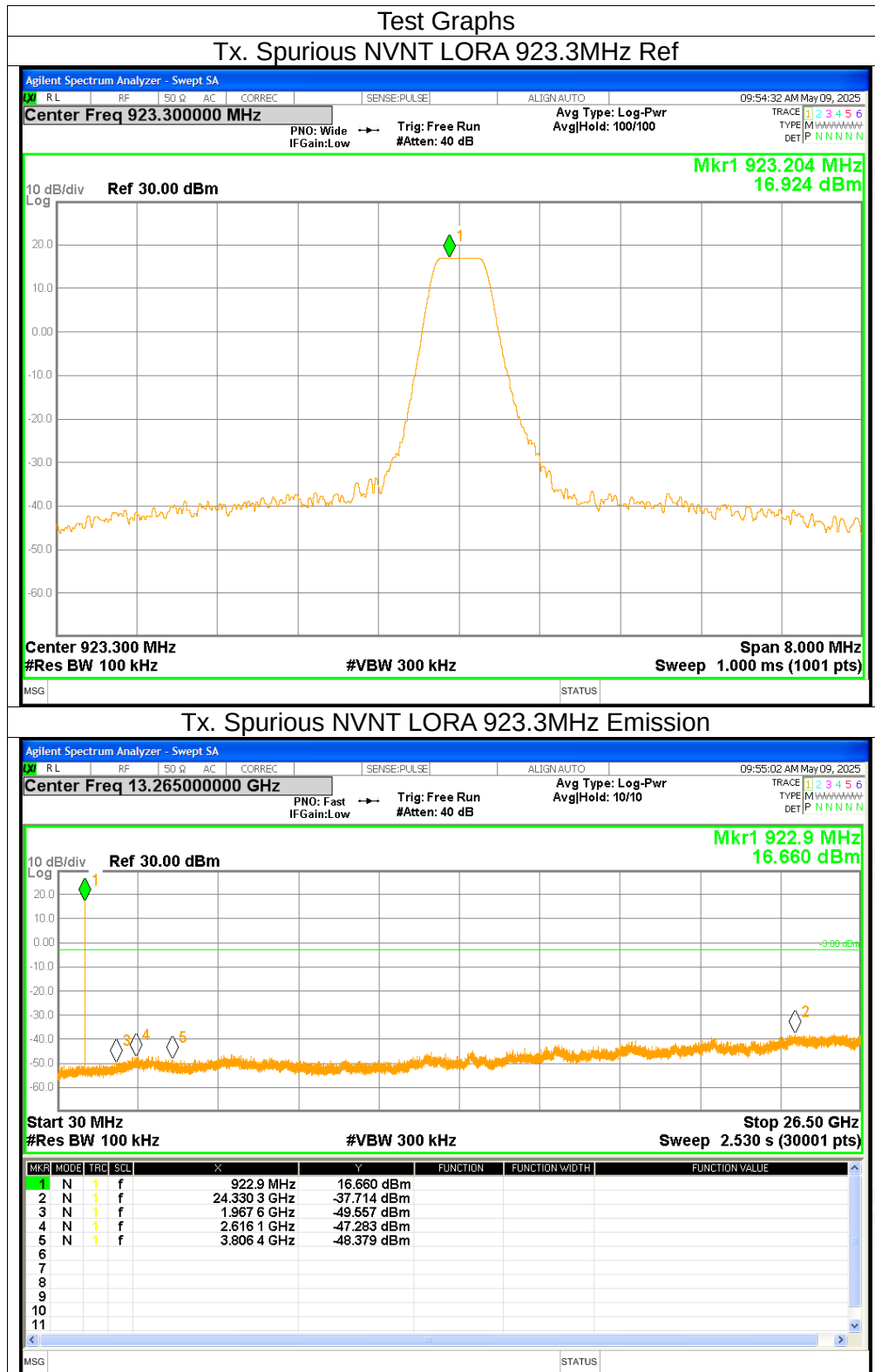






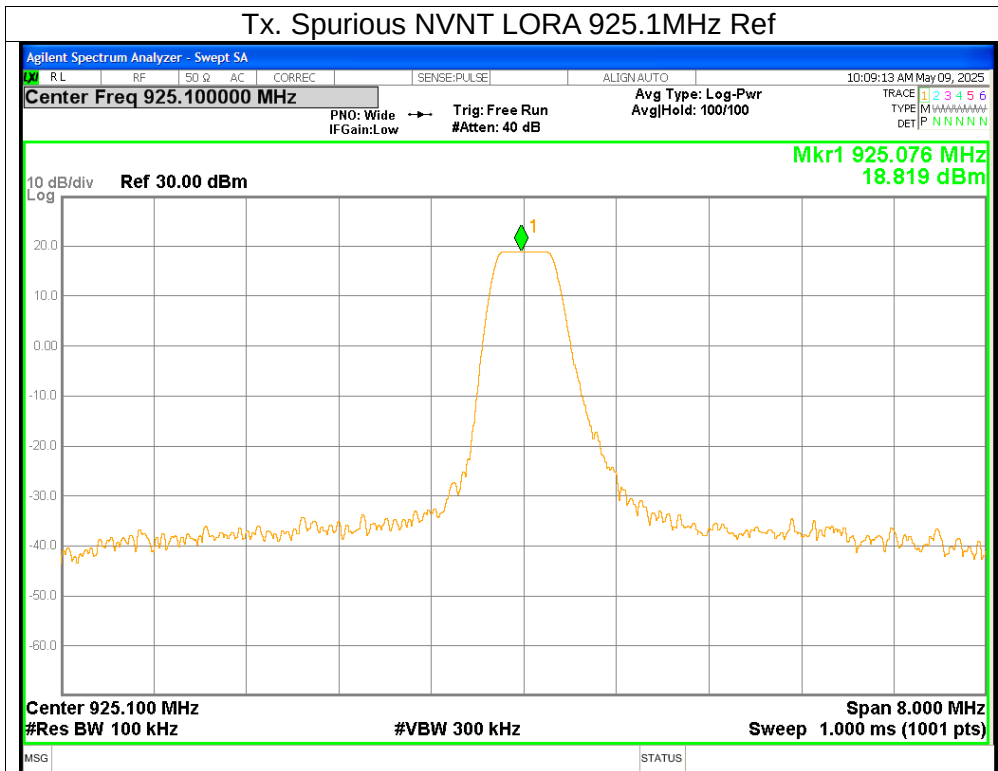
## Conducted RF Spurious Emission

| Condition | Mode | Frequency (MHz) | Max Value (dBc) | Limit (dBc) | Verdict |
|-----------|------|-----------------|-----------------|-------------|---------|
| NVNT      | LORA | 923.3           | -54.63          | $\leq -20$  | Pass    |
| NVNT      | LORA | 925.1           | -56.04          | $\leq -20$  | Pass    |
| NVNT      | LORA | 927.5           | -55.38          | $\leq -20$  | Pass    |

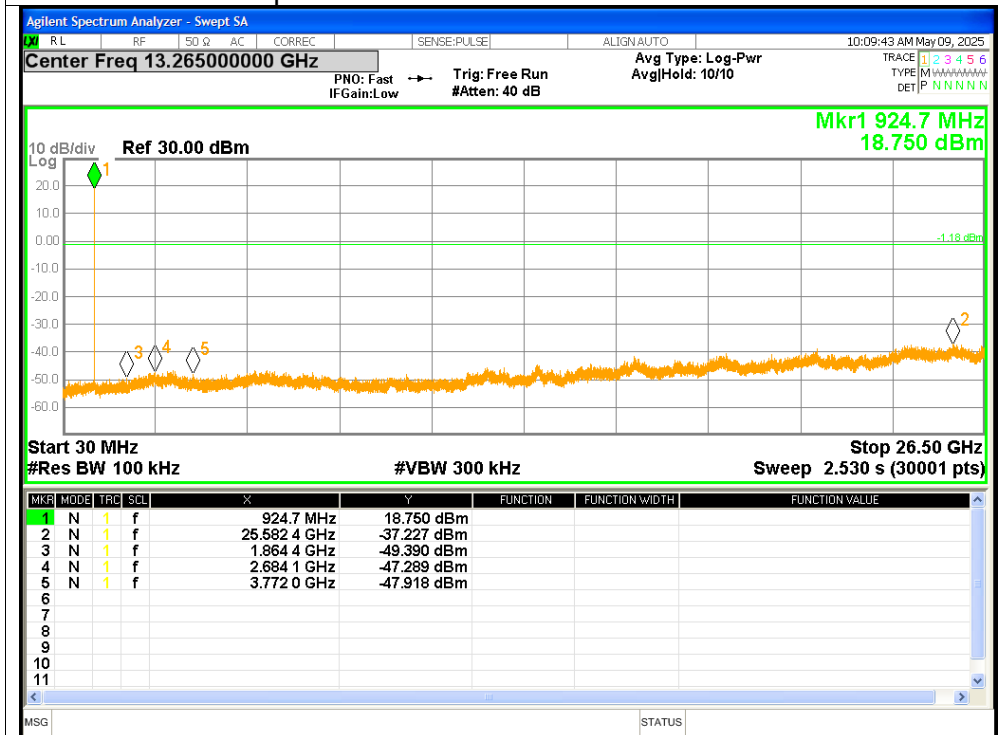




## Tx. Spurious NVNT LORA 925.1MHz Ref

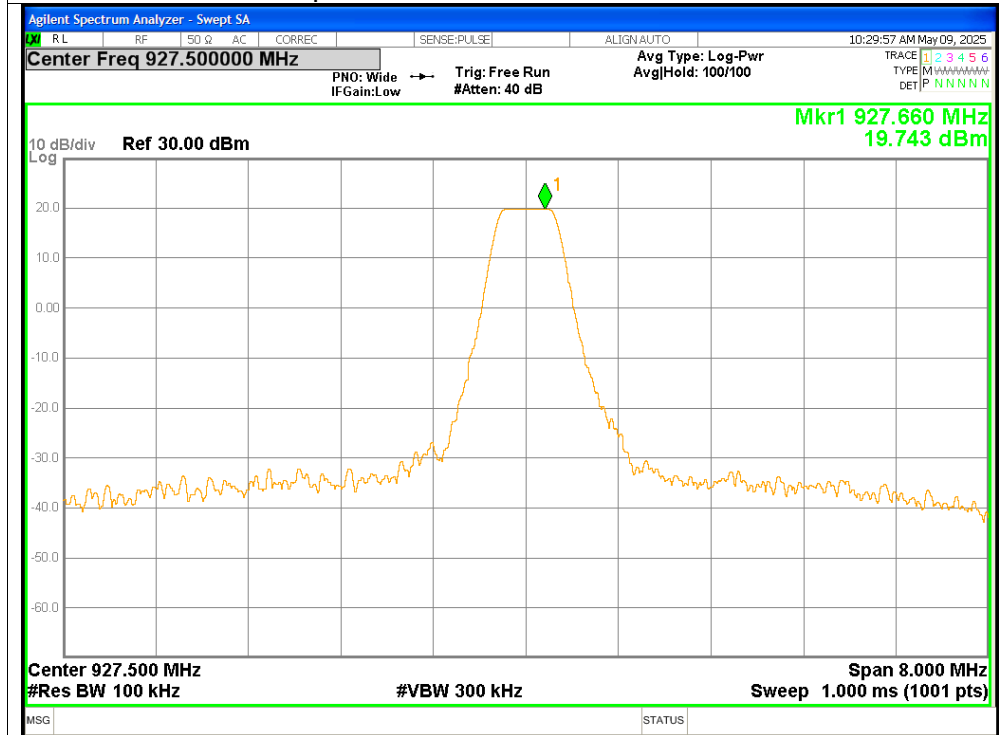


## Tx. Spurious NVNT LORA 925.1MHz Emission

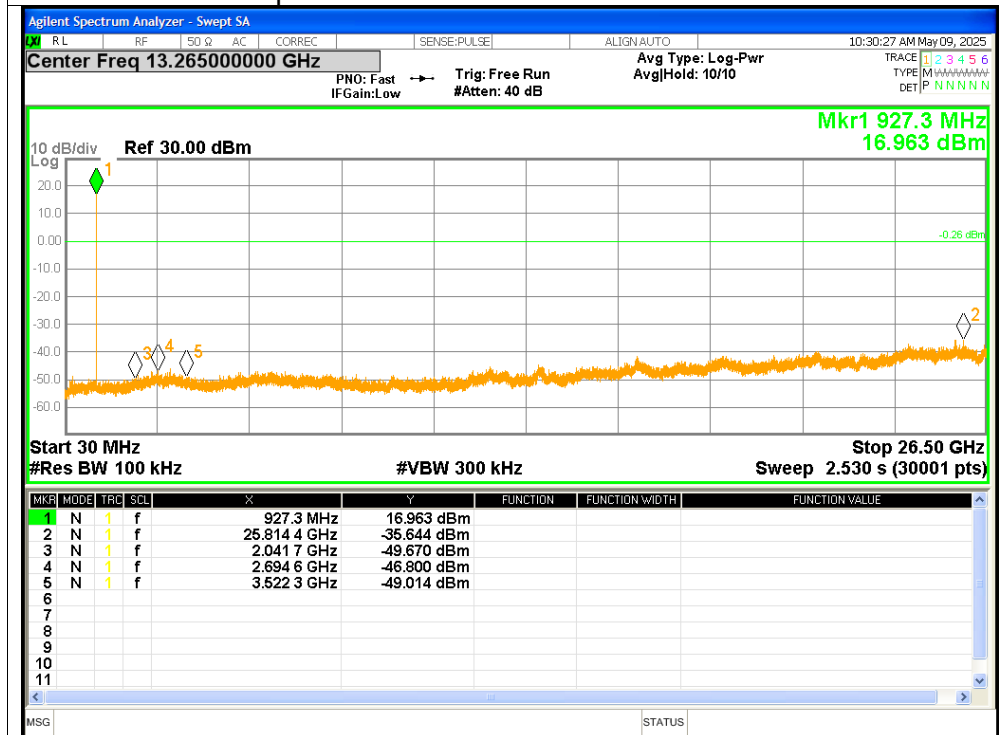




## Tx. Spurious NVNT LORA 927.5MHz Ref



## Tx. Spurious NVNT LORA 927.5MHz Emission





## APPENDIX 2- EUT TEST PHOTO

Note: See test photos in setup photo document for the actual connections between Product and support equipment.

\*\*\*\*\*END OF THE REPORT\*\*\*\*\*