



# Test report

REP045199-2TRFWL

Date of issue: June 14, 2024

Applicant:

Echodyne Corporation

Product:

Ku Band Radar

Model:

EchoShield 700025-200

Variant(s):

N/A

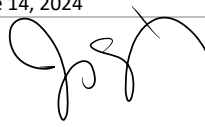
FCC ID:

2ANLB-MESA00054

Specifications:

- ◆ FCC CFR 47 Part 90  
Private land mobile radio services – radiolocation service
- ◆ FCC CFR 47 Part 2  
Frequency Allocations and Radio Treaty Matters, General Rules and Regulations

#### Lab and test locations

|                    |                                                                                   |
|--------------------|-----------------------------------------------------------------------------------|
| Company name       | Nemko USA Inc.                                                                    |
| Address            | 2210 Faraday Ave, Suite 150                                                       |
| City               | Carlsbad                                                                          |
| State              | California                                                                        |
| Postal code        | 92008                                                                             |
| Country            | USA                                                                               |
| Telephone          | +1 760 444 3500                                                                   |
| Website            | www.nemko.com                                                                     |
| FCC Site Number    | Test Firm Registration Number: 392943; Designation Number: US5058                 |
| ISED Test Site     | 2040B-3                                                                           |
| Tested by          | Chenhao Ma Wireless test technician                                               |
| Reviewed by        | James Cunningham, EMC/Wireless Manager                                            |
| Review date        | June 14, 2024                                                                     |
| Reviewer signature |  |

#### Limits of responsibility

Note that the results contained in this report relate only to the items tested and were obtained in the period between the date of initial receipt of samples and the date of issue of the report.

This test report has been completed in accordance with the requirements of ISO/IEC 17025. All results contain in this report are within Nemko USA's ISO/IEC 17025 accreditation.

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## Section 1 Report summary

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### 1.1 Test specifications

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|                    |                                                                              |
|--------------------|------------------------------------------------------------------------------|
| FCC CFR 47 Part 2  | Frequency Allocations and Radio Treaty Matters General Rules and Regulations |
| FCC 47 CFR Part 90 | Private land mobile radio services                                           |

### 1.2 Test methods

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|                  |                                                                                                                 |
|------------------|-----------------------------------------------------------------------------------------------------------------|
| ANSI C63.26-2015 | American National Standard of Procedures for Compliance Testing of Transmitters Used in Licensed Radio Services |
|------------------|-----------------------------------------------------------------------------------------------------------------|

### 1.3 Exclusions

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None.

### 1.4 Statement of compliance

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Testing was performed against all relevant requirements of the test standard(s).

Results obtained indicate that the product under test complies in full with the tested requirements.

The test results relate only to the item(s) tested.

See "Section 2 Summary of test results" for full details.

### 1.5 Test report revision history

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**Table 1.5-1: Test report revision history**

| Revision #        | Issue Date    | Details of changes made to test report |
|-------------------|---------------|----------------------------------------|
| REP045199-2TRFEMC | June 14, 2024 | Original report issued                 |

## Section 2 Summary of test results

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### 2.1 FCC Part 2 and Part 90 test results

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| Part    | Test description                               | Verdict                 |
|---------|------------------------------------------------|-------------------------|
| §90.205 | Power and antenna height limits                | Pass                    |
| §90.207 | Types of emissions                             | Pass                    |
| §90.209 | Bandwidth limitations (99% OBW)                | Pass                    |
| §90.209 | Frequency stability                            | Not tested <sup>1</sup> |
| §90.210 | Emission masks: Emission limitations           | Pass                    |
| §90.210 | Emission masks: Transmitter spurious emissions | Pass                    |

<sup>1</sup> Note: Test not performed. Testing is to support a class I permissive change – frequency stability performance is not impacted by the product changes.

## Section 3 Equipment under test (EUT) details

### 3.1 Disclaimer

This section contains information provided by the applicant and has been utilized to support the test plan. Inaccurate information provided by the applicant can affect the validity of the results within this test report. Nemko accepts no responsibility for the information contained within this section and the impact it may have on the test plan and resulting measurements.

### 3.2 Sample information

|                        |           |
|------------------------|-----------|
| Receipt date           | 29-May-24 |
| Nemko sample ID number | REP045199 |

### 3.3 Testing period

|                 |           |
|-----------------|-----------|
| Test start date | 29-May-24 |
| Test end date   | 04-Jun-24 |

### 3.4 Applicant

|                 |                          |
|-----------------|--------------------------|
| Company name    | Echodyne Corporation     |
| Address         | 12112 115th Ave NE       |
| City            | Kirkland                 |
| State           | WA                       |
| Postal/Zip code | 98034                    |
| Country         | United States of America |

### 3.5 Manufacturer

|                 |                          |
|-----------------|--------------------------|
| Company name    | Echodyne Corporation     |
| Address         | 12112 115th Ave NE       |
| City            | Kirkland                 |
| State           | WA                       |
| Postal/Zip code | 98034                    |
| Country         | United States of America |

### 3.6 EUT information

|                                 |                                                                                                                                                                                                        |
|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Product name                    | Ku Band Radar                                                                                                                                                                                          |
| Model                           | EchoShield 700025-200                                                                                                                                                                                  |
| Variant(s)                      | N/A                                                                                                                                                                                                    |
| Serial number                   | N/A                                                                                                                                                                                                    |
| Part number                     | N/A                                                                                                                                                                                                    |
| Power requirements              | 28 VDC                                                                                                                                                                                                 |
| Description/theory of operation | Ground-based location and navigation radar                                                                                                                                                             |
| Software details                | N/A                                                                                                                                                                                                    |
| Operating band                  | Ku Band: 15.7 GHz - 17.3 GHz                                                                                                                                                                           |
| Operational frequencies         | 15.75 GHz – 16.15 GHz – 16.55 GHz (25 MHz BW);<br>15.80 GHz – 16.15 GHz – 16.50 GHz (50 MHz BW);<br>15.85 GHz – 16.15 GHz – 16.45 GHz (100 MHz BW);<br>15.90 GHz – 16.15 GHz – 16.40 GHz (200 MHz BW). |
| Antenna type                    | AESA (Active Electronically Scanned Array)                                                                                                                                                             |
| Antenna gain (declared)         | 27 dBi                                                                                                                                                                                                 |

### 3.7 EUT exercise and monitoring details

#### EUT description of the methods used to exercise the EUT and all relevant ports:

- EUT was configured with a channel frequency and bandwidth fixed via ethernet port using a computer (via client's software).

#### EUT setup/configuration rationale:

- The EUT was set up in a configuration that was expected to produce the highest amplitude emissions.

### 3.8 EUT setup details

**Table 3.8-1: EUT sub assemblies**

| Description | Brand name | Model/Part number | Serial number | Rev. |
|-------------|------------|-------------------|---------------|------|
| N/A         | N/A        | N/A               | N/A           | N/A  |

**Table 3.8-2: EUT interface ports**

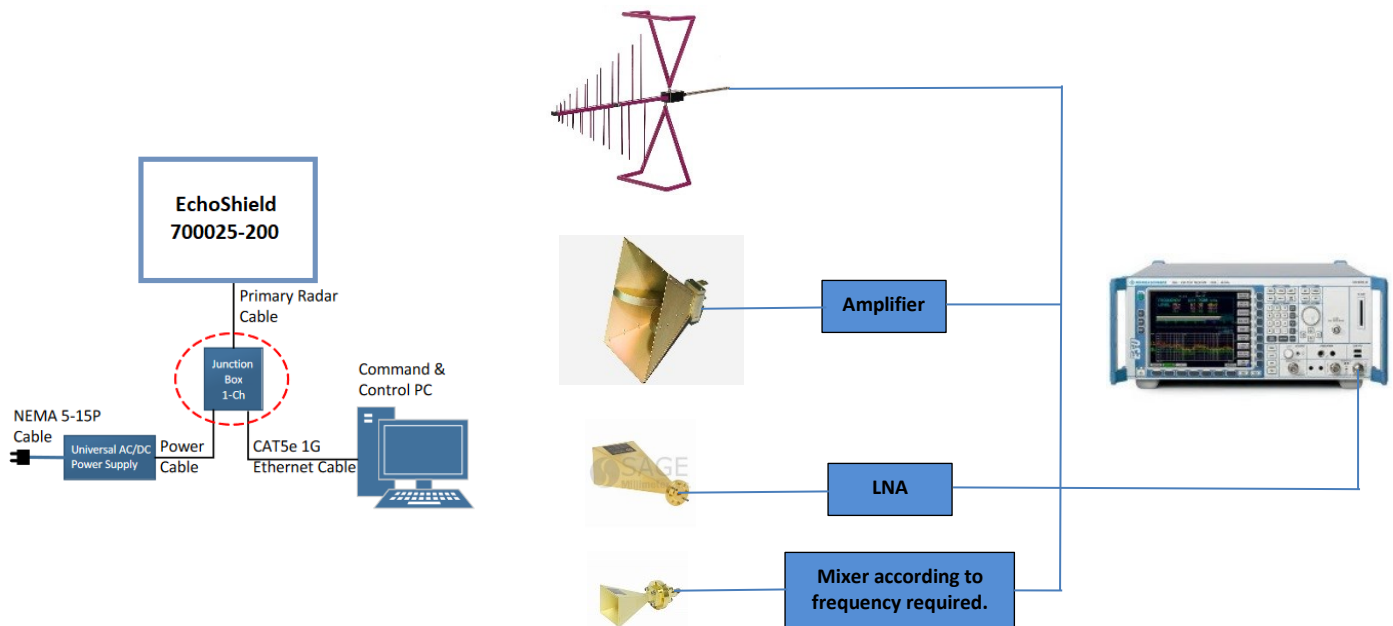
| Description         | Qty. |
|---------------------|------|
| 1G Base-T Ethernet. | 1    |

**Table 3.8-3: Support equipment**

| Description                  | Brand name | Model/Part number | Serial number | Rev. |
|------------------------------|------------|-------------------|---------------|------|
| Control PC                   | ThinkPad   | N/A               | N/A           | N/A  |
| Universal AC/DC Power supply | Echodyne   | N/A               | N/A           | --   |
| Junction Box (1 Channel)     | Echodyne   | N/A               | N/A           | --   |

**Table 3.8-4: Inter-connection cables**

| Cable description       | From                | To                           | Length (m) |
|-------------------------|---------------------|------------------------------|------------|
| Primary radar cable     | EUT                 | Junction Box (1 CH)          | 2          |
| CAT5e 1G Ethernet cable | Junction Box (1 CH) | Control PC                   | 5          |
| DC Power cable          | Junction Box (1 CH) | Universal AC/DC Power supply | 2          |
| NEMA 5-15P Cable        | AC Outlet           | Universal AC/DC Power supply | 1          |



**Figure 3.8-1: Test setup diagram**

## Section 4 Engineering considerations

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### 4.1 Modifications incorporated in the EUT

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None.

### 4.2 Technical judgement

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None.

### 4.3 Deviations from laboratory test procedures

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None.



## Section 5 Test conditions

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### 5.1 Atmospheric conditions

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|                   |            |
|-------------------|------------|
| Temperature       | 15–30 °C   |
| Relative humidity | 20–75 %    |
| Air pressure      | 86–106 kPa |

When it is impracticable to carry out tests under these conditions, a note to this effect stating the ambient temperature and relative humidity during the tests shall be recorded and stated.

### 5.2 Power supply range

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The normal test voltage for equipment to be connected to the mains shall be the nominal mains voltage. For the purpose of the present document, the nominal voltage shall be the declared voltage, or any of the declared voltages  $\pm 5$  %, for which the equipment was designed.

## Section 6 Measurement uncertainty

### 6.1 Uncertainty of measurement

Nemko USA Inc. has calculated measurement uncertainty and is documented in EMC/MUC/001 "Uncertainty in EMC measurements." Measurement uncertainty was calculated using the methods described in CISPR 16-4-2 Specification for radio disturbance and immunity measuring apparatus and methods – Part 4-2: Uncertainties, statistics, and limit modelling – Measurement instrumentation uncertainty. The expression of Uncertainty in EMC testing. Measurement uncertainty calculations assume a coverage factor of K=2 with 95% certainty.

**Table 6.1-1: Measurement uncertainty calculations**

| Measurement                                                          |                   | $U_{\text{cispr}}$ dB | $U_{\text{lab}}$ dB |
|----------------------------------------------------------------------|-------------------|-----------------------|---------------------|
| Conducted disturbance at AC mains and other port power using a V-AMN | 9 kHz to 150 kHz  | 3.8                   | 2.9                 |
|                                                                      | 150 kHz to 30 MHz | 3.4                   | 2.3                 |
| Conducted disturbance at telecommunication port using AAN            | 150 kHz to 30 MHz | 5.0                   | 4.3                 |
| Conducted disturbance at telecommunication port using CVP            | 150 kHz to 30 MHz | 3.9                   | 2.9                 |
| Conducted disturbance at telecommunication port using CP             | 150 kHz to 30 MHz | 2.9                   | 1.4                 |
| Conducted disturbance at telecommunication port using CP and CVP     | 150 kHz to 30 MHz | 4.0                   | 3.1                 |
| Radiated disturbance (electric field strength in a SAC)              | 30 MHz to 1 GHz   | 6.3                   | 5.5                 |
| Radiated disturbance (electric field strength in a FAR)              | 1 GHz to 6 GHz    | 5.2                   | 4.7                 |
| Radiated disturbance (electric field strength in a FAR)              | 6 GHz to 18 GHz   | 5.5                   | 5.0                 |

- Notes:
- Compliance assessment:
    - If  $U_{\text{lab}}$  is less than or equal to  $U_{\text{cispr}}$  then:
      - compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit;
      - non-compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit
    - If  $U_{\text{lab}}$  is greater than  $U_{\text{cispr}}$  then:
      - compliance is deemed to occur if no measured disturbance level, increased by  $(U_{\text{lab}} - U_{\text{cispr}})$ , exceeds the disturbance limit;
      - non-compliance is deemed to occur if any measured disturbance level, increased by  $(U_{\text{lab}} - U_{\text{cispr}})$ , exceeds the disturbance limit

V-AMN: V type artificial mains network  
 AAN: Asymmetric artificial network  
 CP: Current probe  
 CVP: Capacitive voltage probe  
 SAC: Semi-anechoic chamber  
 FAR: Fully anechoic room

## Section 7 Test equipment

### 7.1 Test equipment list

**Table 7.1-1: Test equipment list**

| Equipment                                 | Manufacturer        | Model no.              | Asset no. | Cal cycle | Next cal.    |
|-------------------------------------------|---------------------|------------------------|-----------|-----------|--------------|
| Signal & Spectrum Analyzer 2Hz / 43.5 GHz | Rohde & Schwarz     | FSW43                  | E1302     | 1 year    | Jan-22-2025  |
| Antenna Horn                              | EMCO                | 3115                   | 1033      | 2 years   | Nov-02-2024  |
| EMC Test Receiver                         | Rohde & Schwarz     | ESU 40                 | E1121     | 1 year    | Aug-23-2024  |
| Antenna, Bilog                            | Schaffner-Chase     | CBL6111C               | 1763      | 1 year    | July-01-2024 |
| Antenna, Horn                             | ETS-Lingren         | 3117-PA                | E1160     | 2 years   | Feb-13-2025  |
| Standard Gain Horn Antenna                | Eravant             | SAZ-2410-42-S1         | EW107     | 1 year    | Dec-05-2024  |
| Standard Gain Horn Antenna                | Eravant             | SAZ-2410-2-S1          | EW108     | 1 year    | Dec-05-2024  |
| Low Noise Amplifier                       | Sage Millimeter     | SBL-1834034030-KFKF-SI | E1228     | NCR       | NCR          |
| Antenna, Horn                             | Sage Millimeter     | SAR-2309-19-S2         | E1144     | NCR       | NCR          |
| Mixer                                     | Rohde & Schwarz     | FS-Z60                 | E1138     | VOU       | VOU          |
| Antenna, Horn                             | Sage Millimeter     | SAR-2408-15-S2         | E1152     | NCR       | NCR          |
| Mixer                                     | Rohde & Schwarz     | FS-Z75                 | E1149     | VOU       | VOU          |
| Antenna, Horn                             | Sage Millimeter     | SAR-2507-10-S2         | E1146     | NCR       | NCR          |
| Mixer                                     | Rohde & Schwarz     | FS-Z110                | E1154     | VOU       | VOU          |
| Low pass filter                           | RF-Lambda           | RLPF13G14              | PBC       | VOU       | VOU          |
| High pass filter                          | Anatech Electronics | AE18000SSH6616         | PBC       | VOU       | VOU          |
| High pass filter                          | Anatech Electronics | AE18000SSH6615         | PBC       | VOU       | VOU          |

Notes: N/A – not applicable  
 NCR – no calibration required  
 VOU – verify on use  
 PBC – provided by client

**Table 7.1-2: Test software details**

| Manufacturer of Software | Details          |
|--------------------------|------------------|
| Rohde & Schwarz          | EMC 32 V10.60.15 |

Notes: None

## Section 8 Testing data

### 8.1 Bandwidth of emission (99%)

#### 8.1.1 References and limits

- FCC 47 CFR Part 90: §90.209
- Test method: ANSI C63.26-2014 (5.4.4)

Each authorization issued to a station licensed under this part will show an emission designator representing the class of emission authorized. The designator will be prefixed by a specified necessary bandwidth. This number does not necessarily indicate the bandwidth occupied by the emission at any instant. In those cases where § 2.202 of this chapter does not provide a formula for the computation of necessary bandwidth, the occupied bandwidth, as defined in part 2 of this chapter, may be used in lieu of the necessary bandwidth.

#### 8.1.2 Test summary

|               |                                                                                                               |                   |          |
|---------------|---------------------------------------------------------------------------------------------------------------|-------------------|----------|
| Verdict       | Pass                                                                                                          |                   |          |
| Test date     | May 29, 2024;                                                                                                 | Temperature       | 19°C     |
| Test engineer | Chenhao Ma, Wireless Test Technician                                                                          | Air pressure      | 1003mbar |
| Test location | <input type="checkbox"/> Wireless bench<br><input checked="" type="checkbox"/> Other: 3M Chamber, 10m Chamber | Relative humidity | 58%      |

#### 8.1.3 Notes

Testing was performed with the transmitter operating on a fixed channel at full power.

Two modes related to the width of the radar pulse were tested and the summary of the time duration of each pulse is described in the following table:

| Frequency | Bandwidth declared   | Type of pulse  | Time duration |
|-----------|----------------------|----------------|---------------|
| 15.75 GHz | 25 MHz               | Longest pulse  | 30 µs         |
| 16.15 GHz | 25 MHz               | Longest pulse  | 30 µs         |
| 16.55 GHz | 25 MHz               | Longest pulse  | 30 µs         |
| 15.80 GHz | 50 MHz               | Longest pulse  | 30 µs         |
| 16.15 GHz | 50 MHz               | Longest pulse  | 30 µs         |
| 16.50 GHz | 50 MHz               | Longest pulse  | 30 µs         |
| 15.85 GHz | 100 MHz              | Longest pulse  | 30 µs         |
| 16.15 GHz | 100 MHz              | Longest pulse  | 30 µs         |
| 16.45 GHz | 100 MHz              | Longest pulse  | 30 µs         |
| 15.90 GHz | 200 MHz              | Longest pulse  | 28.494 µs     |
| 16.15 GHz | 200 MHz              | Longest pulse  | 28.494 µs     |
| 16.40 GHz | 200 MHz              | Longest pulse  | 28.494 µs     |
| 15.75 GHz | 25 MHz <sup>1</sup>  | Shortest pulse | 2 µs          |
| 16.15 GHz | 25 MHz <sup>1</sup>  | Shortest pulse | 1 µs          |
| 16.55 GHz | 25 MHz <sup>1</sup>  | Shortest pulse | 2 µs          |
| 15.80 GHz | 50 MHz <sup>1</sup>  | Shortest pulse | 5 µs          |
| 16.15 GHz | 50 MHz <sup>1</sup>  | Shortest pulse | 500 ns        |
| 16.50 GHz | 50 MHz <sup>1</sup>  | Shortest pulse | 5 µs          |
| 15.85 GHz | 100 MHz <sup>1</sup> | Shortest pulse | 5 µs          |
| 16.15 GHz | 100 MHz <sup>1</sup> | Shortest pulse | 500 ns        |
| 16.45 GHz | 100 MHz <sup>1</sup> | Shortest pulse | 5 µs          |
| 15.90 GHz | 200 MHz <sup>1</sup> | Shortest pulse | 15 µs         |
| 16.15 GHz | 200 MHz <sup>1</sup> | Shortest pulse | 500 ns        |
| 16.40 GHz | 200 MHz <sup>1</sup> | Shortest pulse | 15 µs         |

Note 1: These bandwidths are declared only as reference, the real number is shown in table 8.1-2 of this section.

**Table 8.1-1: Pulse description table.**

Testing was done at 3 meters with the antenna and turntable fixed. A maximization of the signal was done to define the position of the max power:

#### 8.1.4 Setup details

|                             |                                                                                                                                                    |
|-----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|
| EUT power input during test | 28 V DC                                                                                                                                            |
| EUT setup configuration     | <input type="checkbox"/> Table-top<br><input type="checkbox"/> Floor standing<br><input checked="" type="checkbox"/> Other: Tripod mounted (1.5 m) |

#### Receiver settings:

|                      |                                    |
|----------------------|------------------------------------|
| Resolution bandwidth | 1 MHz                              |
| Video bandwidth      | 3 MHz                              |
| Detector mode        | Peak                               |
| Trace mode           | Max Hold                           |
| Measurement time     | Long enough for trace to stabilize |

#### 8.1.5 Test data

| Frequency | Bandwidth  | Type of pulse  | Time duration |
|-----------|------------|----------------|---------------|
| 15.75 GHz | 25.213MHz  | Longest pulse  | 30 µs         |
| 16.15 GHz | 25.210MHz  | Longest pulse  | 30 µs         |
| 16.55 GHz | 25.025MHz  | Longest pulse  | 30 µs         |
| 15.80 GHz | 49.077MHz  | Longest pulse  | 30 µs         |
| 16.15 GHz | 49.038MHz  | Longest pulse  | 30 µs         |
| 16.50 GHz | 48.816MHz  | Longest pulse  | 30 µs         |
| 15.85 GHz | 97.320MHz  | Longest pulse  | 30 µs         |
| 16.15 GHz | 97.118MHz  | Longest pulse  | 30 µs         |
| 16.45 GHz | 96.819MHz  | Longest pulse  | 30 µs         |
| 15.90 GHz | 194.37MHz  | Longest pulse  | 28.494 µs     |
| 16.15 GHz | 193.82MHz  | Longest pulse  | 28.494 µs     |
| 16.40 GHz | 193.47MHz  | Longest pulse  | 28.494 µs     |
| 15.75 GHz | 26.185MHz  | Shortest pulse | 2 µs          |
| 16.15 GHz | 27.607MHz  | Shortest pulse | 1 µs          |
| 16.55 GHz | 26.284MHz  | Shortest pulse | 2 µs          |
| 15.80 GHz | 48.929MHz  | Shortest pulse | 5 µs          |
| 16.15 GHz | 54.289MHz  | Shortest pulse | 500 ns        |
| 16.50 GHz | 48.655MHz  | Shortest pulse | 5 µs          |
| 15.85 GHz | 97.075MHz  | Shortest pulse | 5 µs          |
| 16.15 GHz | 99.360MHz  | Shortest pulse | 500 ns        |
| 16.45 GHz | 96.437MHz  | Shortest pulse | 5 µs          |
| 15.90 GHz | 194.232MHz | Shortest pulse | 15 µs         |
| 16.15 GHz | 195.591MHz | Shortest pulse | 500 ns        |
| 16.40 GHz | 193.194MHz | Shortest pulse | 15 µs         |

Table 8.1-2: 99% OBW results.

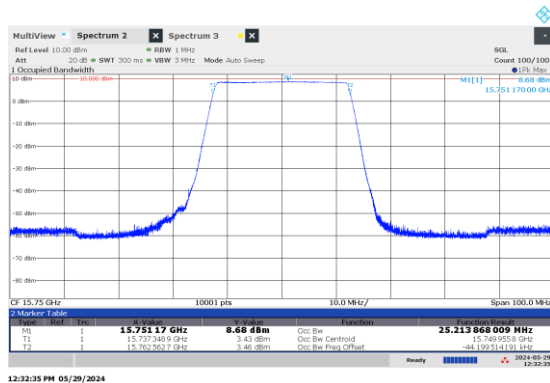


Figure 8.1-1: 99% OBW Low channel: 15.75 GHz, longest pulse (25 MHz BW)

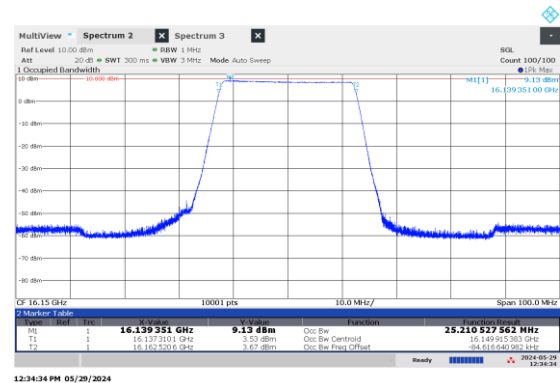


Figure 8.1-2: 99% OBW Middle channel: 16.15 GHz, longest pulse (25 MHz BW)

Section 8  
Test name

Testing data  
Bandwidth of emission (99%)

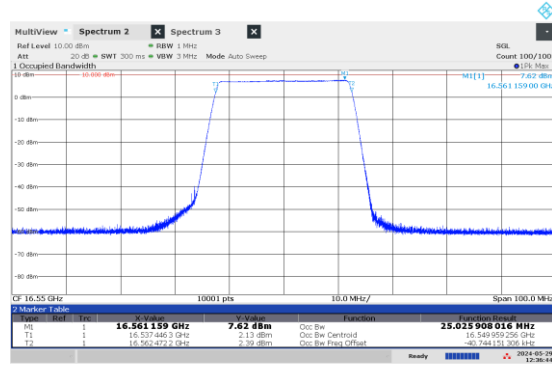


Figure 8.1-3: 99% OBW High channel: 16.55 GHz, longest pulse (25 MHz BW)

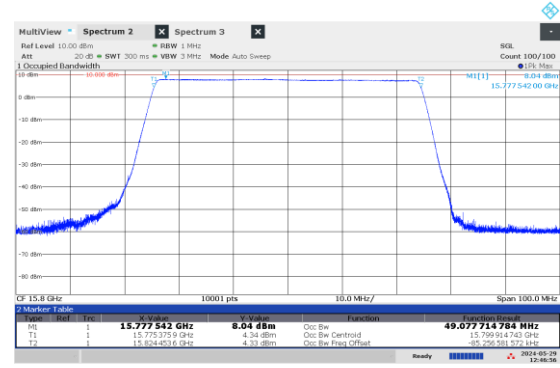


Figure 8.1-4: 99% OBW Low channel: 15.80 GHz, longest pulse (50 MHz BW)

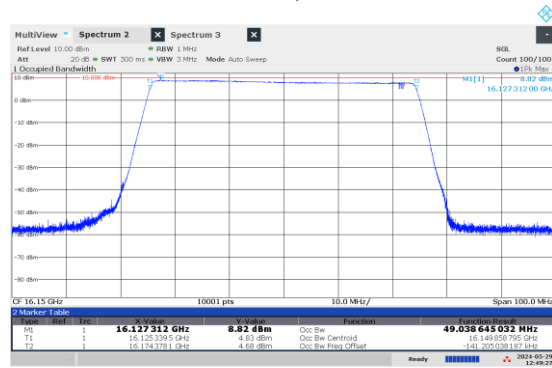


Figure 8.1-5: 99% OBW Middle channel: 16.15 GHz, longest pulse (50 MHz BW)

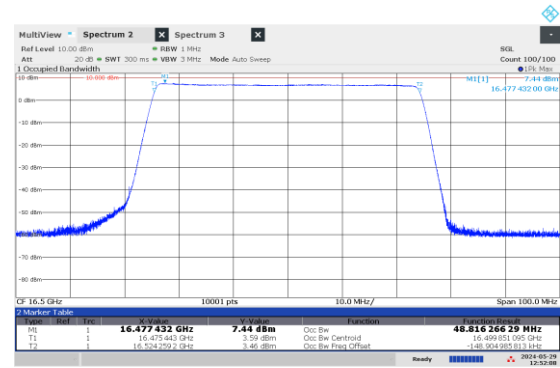


Figure 8.1-6: 99% OBW High channel: 16.50 GHz, longest pulse (50 MHz BW)

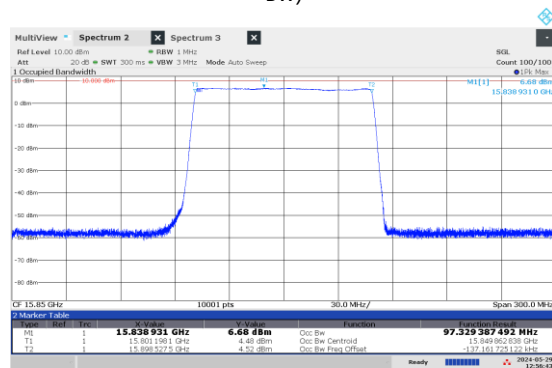


Figure 8.1-7: 99% OBW Low channel: 15.85 GHz, longest pulse (100 MHz BW)

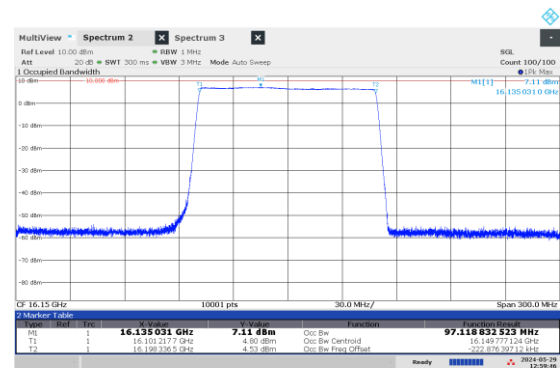


Figure 8.1-8: 99% OBW Middle channel: 16.15 GHz, longest pulse (100 MHz BW)

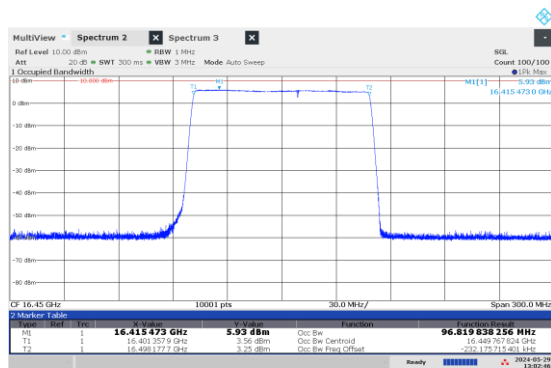


Figure 8.1-9: 99% OBW High channel: 16.45 GHz, longest pulse (100 MHz BW)

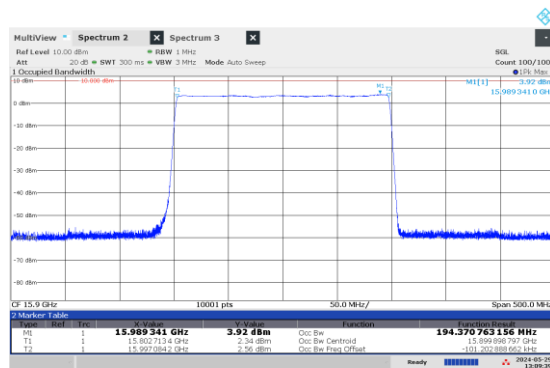


Figure 8.1-10: 99% OBW Low channel: 15.90 GHz, longest pulse (200 MHz BW)

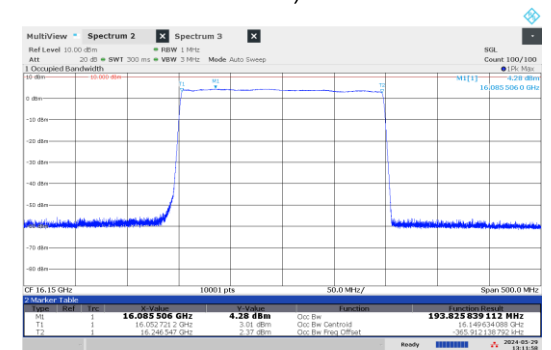


Figure 8.1-11: 99% OBW Middle channel: 16.15 GHz, longest pulse (200 MHz BW)

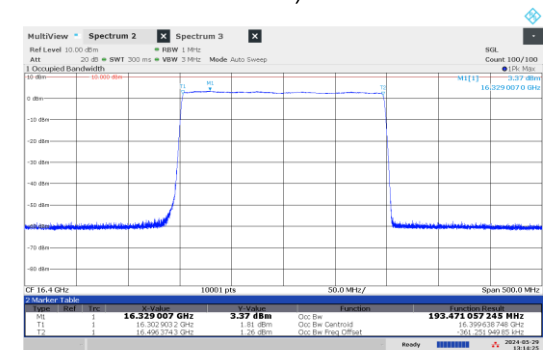


Figure 8.1-12: 99% OBW High channel: 16.40 GHz, longest pulse (200 MHz BW)



Figure 8.1-13: 99% OBW Low channel: 15.75 GHz, shortest pulse (25 MHz BW)

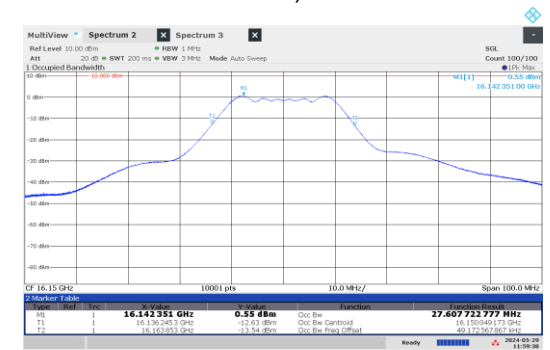


Figure 8.1-14: 99% OBW Middle channel: 16.15 GHz, shortest pulse (25 MHz BW)

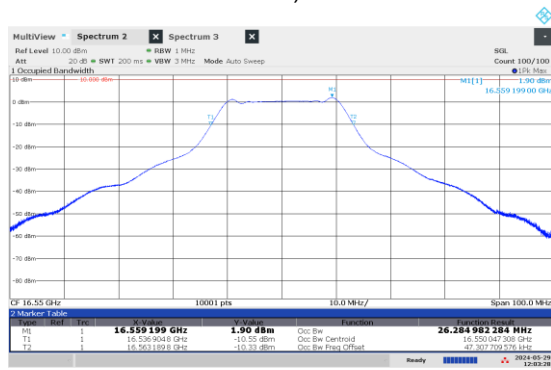


Figure 8.1-15: 99% OBW High channel: 16.55 GHz, shortest pulse (25 MHz BW)

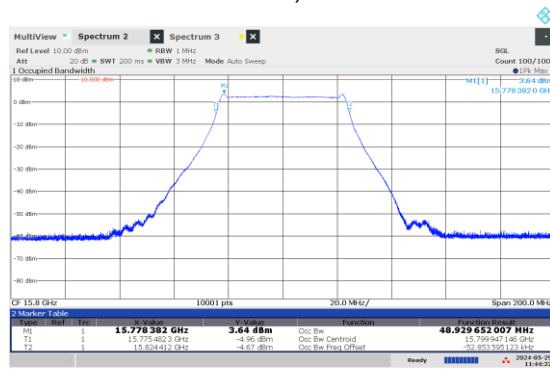


Figure 8.1-16: 99% OBW Low channel: 15.80 GHz, shortest pulse (50 MHz BW)



Figure 8.1-17: 99% OBW Middle channel: 16.15 GHz, shortest pulse (50 MHz BW)

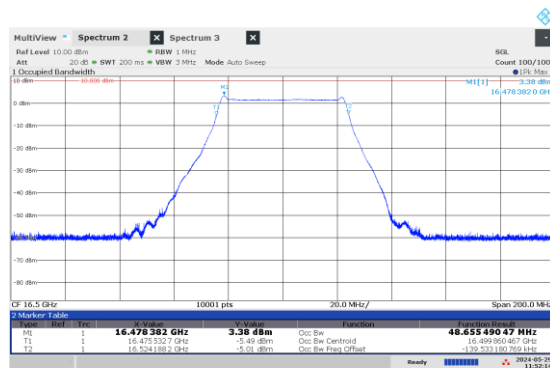


Figure 8.1-18: 99% OBW High channel: 16.50 GHz, shortest pulse (50 MHz BW)

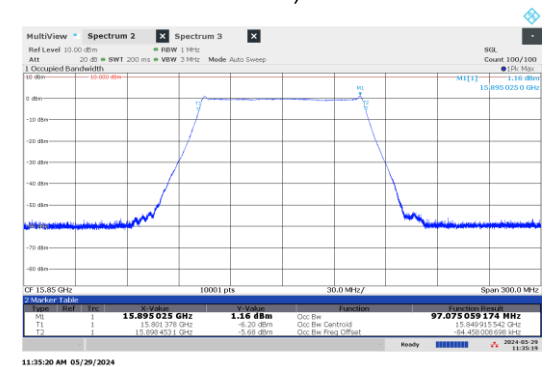


Figure 8.1-19: 99% OBW Low channel: 15.85 GHz, shortest pulse (100 MHz BW)

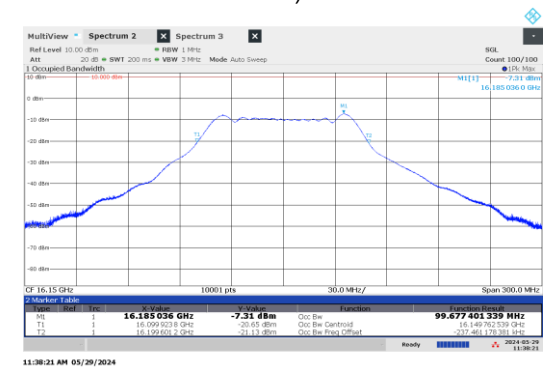


Figure 8.1-20: 99% OBW Middle channel: 16.15 GHz, shortest pulse (100 MHz BW)

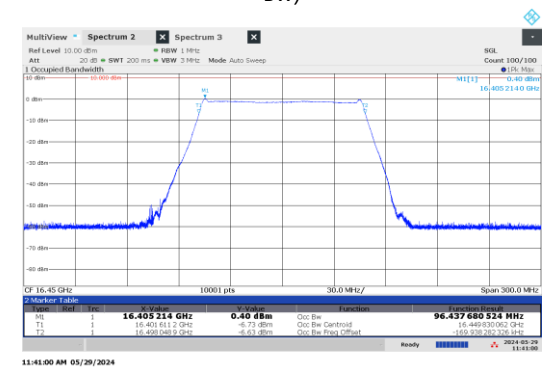


Figure 8.1-21: 99% OBW High channel: 16.45 GHz, shortest pulse (100 MHz BW)

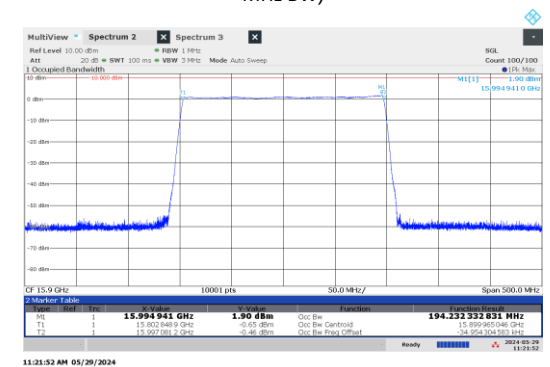


Figure 8.1-22: 99% OBW Low channel: 15.90 GHz, shortest pulse (200 MHz BW)

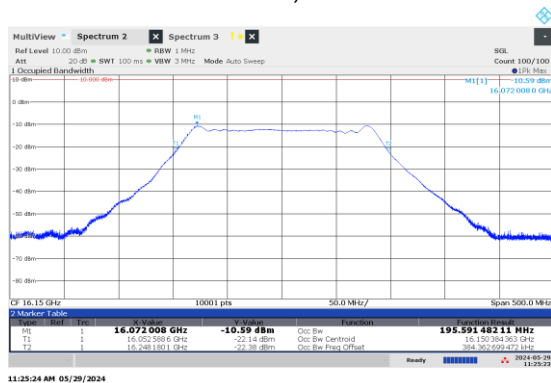


Figure 8.1-23: 99% OBW Middle channel: 16.15 GHz, shortest pulse (200 MHz BW)

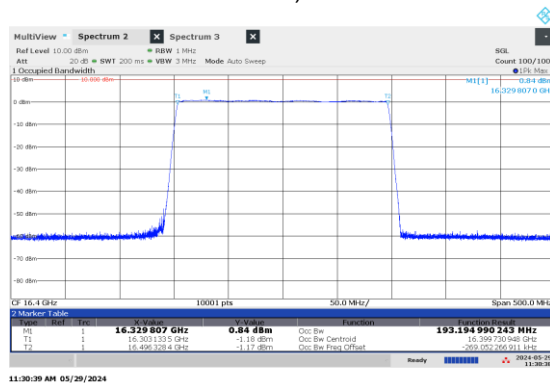


Figure 8.1-24: 99% OBW High channel: 16.40 GHz, shortest pulse (200 MHz BW)



## 8.2 Bandwidth of emission (26 dB)

### 8.2.1 References and limits

- Test method: ANSI C63.26-2014 (5.4.3)

### 8.2.2 Test summary

|               |                                                                                                               |                   |          |
|---------------|---------------------------------------------------------------------------------------------------------------|-------------------|----------|
| Verdict       | Pass                                                                                                          |                   |          |
| Test date     | May 29, 2024                                                                                                  | Temperature       | 19°C     |
| Test engineer | Chenhao Ma, Wireless Test Technician                                                                          | Air pressure      | 1003mbar |
| Test location | <input type="checkbox"/> Wireless bench<br><input checked="" type="checkbox"/> Other: 3M Chamber, 10m chamber | Relative humidity | 58%      |

### 8.2.3 Notes

Testing was performed with the transmitter operating on a fixed channel at full power following the cases shown on table 8.1-1 from section 8.1.3 of this document. This measurement is not a requirement, but it is used for the mask calculation shown on section 8.4 of this document.

Testing was done at 3 meters with the antenna and turntable fixed. A maximization of the signal was done to define the position of the max power:

### 8.2.4 Setup details

|                             |                                                                                                                                                    |
|-----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|
| EUT power input during test | 28 V DC                                                                                                                                            |
| EUT setup configuration     | <input type="checkbox"/> Table-top<br><input type="checkbox"/> Floor standing<br><input checked="" type="checkbox"/> Other: Tripod mounted (1.5 m) |

Receiver settings:

|                      |                                    |
|----------------------|------------------------------------|
| Resolution bandwidth | 1 MHz                              |
| Video bandwidth      | 3 MHz                              |
| Detector mode        | Peak                               |
| Trace mode           | Max Hold                           |
| Measurement time     | Long enough for trace to stabilize |

### 8.2.5 Test data

| Frequency | Bandwidth | Type of pulse  | Time duration |
|-----------|-----------|----------------|---------------|
| 15.75 GHz | 28.77MHz  | Longest pulse  | 30 µs         |
| 16.15 GHz | 28.77MHz  | Longest pulse  | 30 µs         |
| 16.55 GHz | 28.27MHz  | Longest pulse  | 30 µs         |
| 15.80 GHz | 53.85MHz  | Longest pulse  | 30 µs         |
| 16.15 GHz | 53.85MHz  | Longest pulse  | 30 µs         |
| 16.50 GHz | 53.25MHz  | Longest pulse  | 30 µs         |
| 15.85 GHz | 103.4MHz  | Longest pulse  | 30 µs         |
| 16.15 GHz | 103.7MHz  | Longest pulse  | 30 µs         |
| 16.45 GHz | 103.1MHz  | Longest pulse  | 30 µs         |
| 15.90 GHz | 203.3MHz  | Longest pulse  | 28.494 µs     |
| 16.15 GHz | 203.3MHz  | Longest pulse  | 28.494 µs     |
| 16.40 GHz | 202.8MHz  | Longest pulse  | 28.494 µs     |
| 15.75 GHz | 38.76MHz  | Shortest pulse | 2 µs          |
| 16.15 GHz | 38.16MHz  | Shortest pulse | 1 µs          |
| 16.55 GHz | 37.36MHz  | Shortest pulse | 2 µs          |
| 15.80 GHz | 61.74MHz  | Shortest pulse | 5 µs          |
| 16.15 GHz | 83.12MHz  | Shortest pulse | 500 ns        |
| 16.50 GHz | 59.94MHz  | Shortest pulse | 5 µs          |
| 15.85 GHz | 114.19MHz | Shortest pulse | 5 µs          |
| 16.15 GHz | 142.36MHz | Shortest pulse | 500 ns        |
| 16.45 GHz | 112.69MHz | Shortest pulse | 5 µs          |
| 15.90 GHz | 206.29MHz | Shortest pulse | 15 µs         |
| 16.15 GHz | 264.74MHz | Shortest pulse | 500 ns        |
| 16.40 GHz | 205.29MHz | Shortest pulse | 15 µs         |

Table 8.2-1: 26 dB OBW results

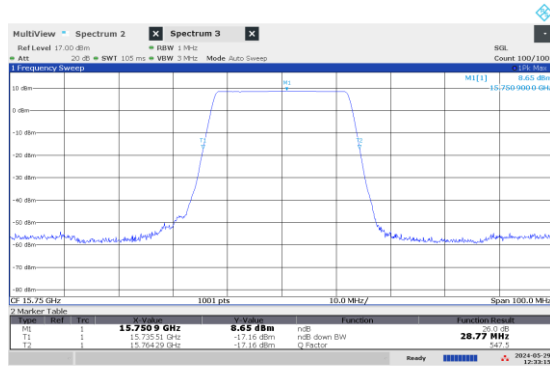


Figure 8.2-1: 26 dB OBW Low channel: 15.75 GHz, longest pulse (25 MHz BW)

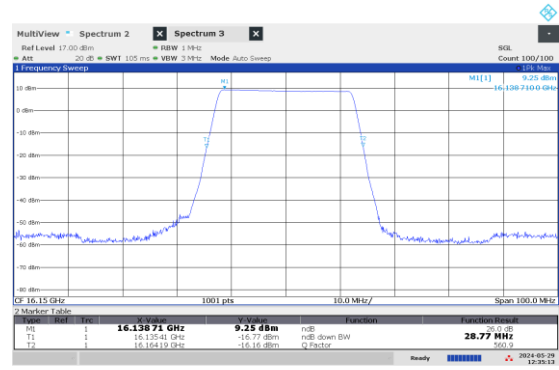


Figure 8.2-2: 26 dB OBW Middle channel: 16.15 GHz, longest pulse (25 MHz BW)

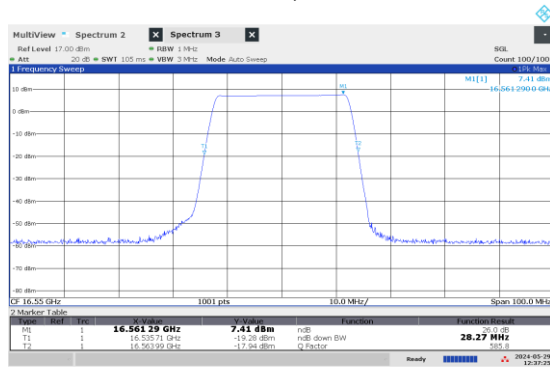


Figure 8.2-3: 26 dB OBW High channel: 16.55 GHz, longest pulse (25 MHz BW)



Figure 8.2-4: 26 dB OBW Low channel: 15.80 GHz, longest pulse (50 MHz BW)



Figure 8.2-5: 26 dB OBW Middle channel: 16.15 GHz, longest pulse (50 MHz BW)

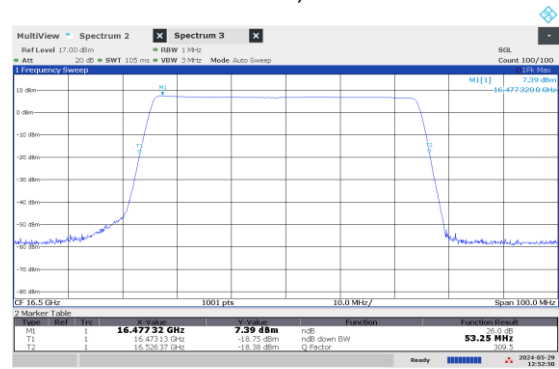


Figure 8.2-6: 26 dB OBW High channel: 16.50 GHz, longest pulse (50 MHz BW)

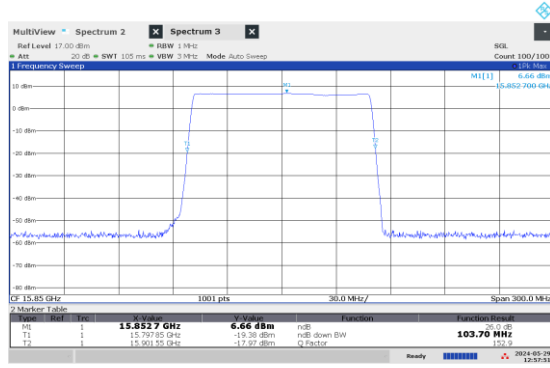


Figure 8.2-7: 26 dB OBW Low channel: 15.85 GHz, longest pulse (100 MHz BW)

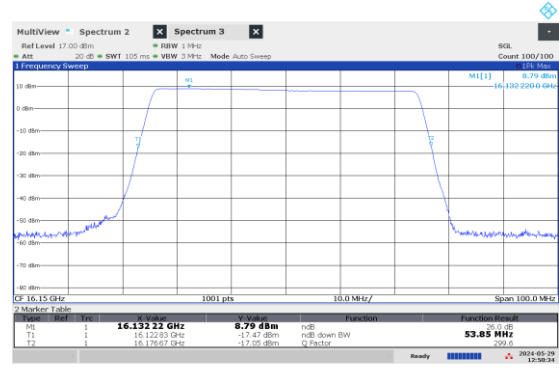


Figure 8.2-8: 26 dB OBW Middle channel: 16.15 GHz, longest pulse (100 MHz BW)

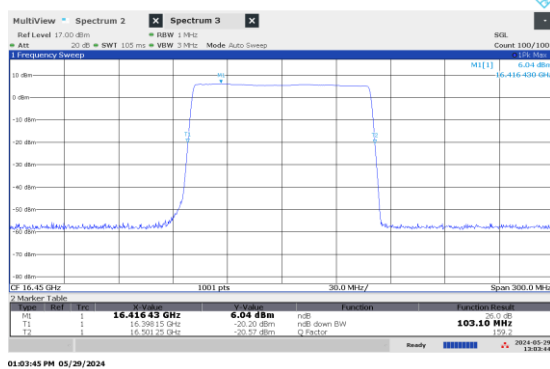


Figure 8.2-9: 26 dB OBW High channel: 16.45 GHz, longest pulse (100 MHz BW)

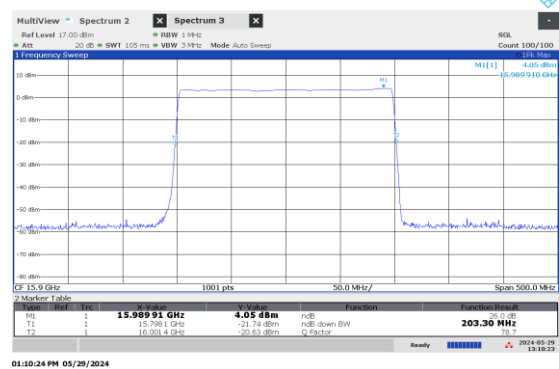


Figure 8.2-10: 26 dB OBW Low channel: 15.90 GHz, longest pulse (200 MHz BW)

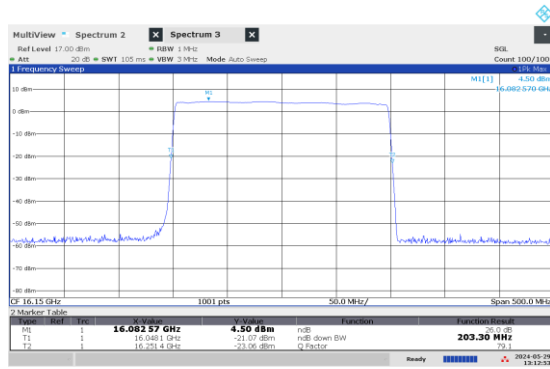


Figure 8.2-11: 26 dB OBW Middle channel: 16.15 GHz, longest pulse (200 MHz BW)

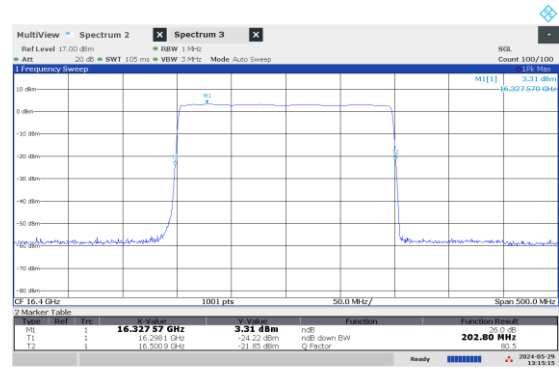


Figure 8.2-12: 26 dB OBW High channel: 16.40 GHz, longest pulse (200 MHz BW)



Figure 8.2-13: 26 dB OBW Low channel: 15.75 GHz, shortest pulse (25 MHz BW)



Figure 8.2-14: 26 dB OBW Middle channel: 16.15 GHz, shortest pulse (25 MHz BW)

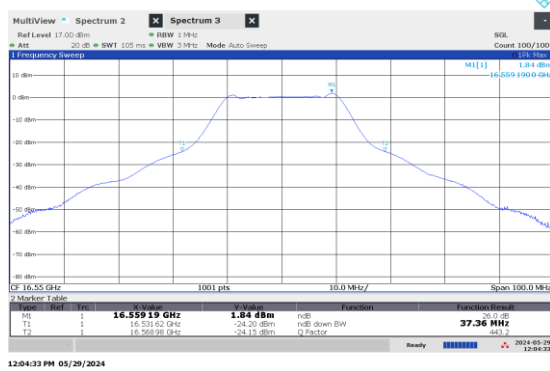


Figure 8.2-15: 26 dB OBW High channel: 16.55 GHz, shortest pulse (25 MHz BW)

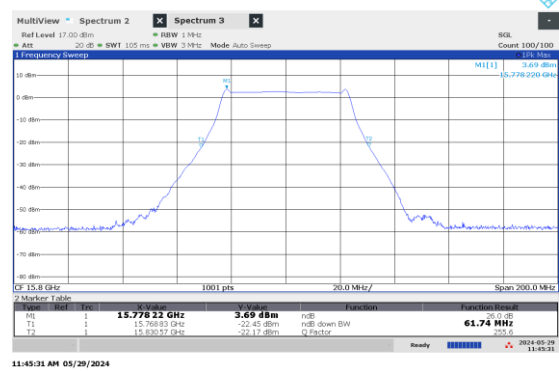


Figure 8.2-16: 26 dB OBW Low channel: 15.80 GHz, shortest pulse (50 MHz BW)



Figure 8.2-17: 26 dB OBW Middle channel: 16.15 GHz, shortest pulse (50 MHz BW)

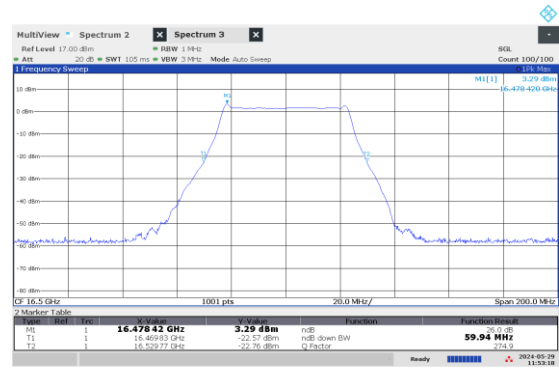


Figure 8.2-18: 26 dB OBW High channel: 16.50 GHz, shortest pulse (50 MHz BW)

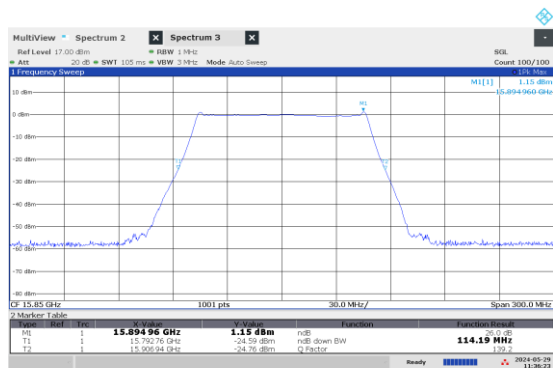


Figure 8.2-19: 26 dB OBW Low channel: 15.85 GHz, shortest pulse (100 MHz BW)

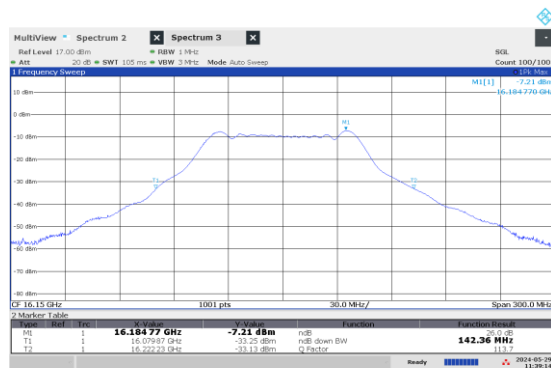


Figure 8.2-20: 26 dB OBW Middle channel: 16.15 GHz, shortest pulse (100 MHz BW)

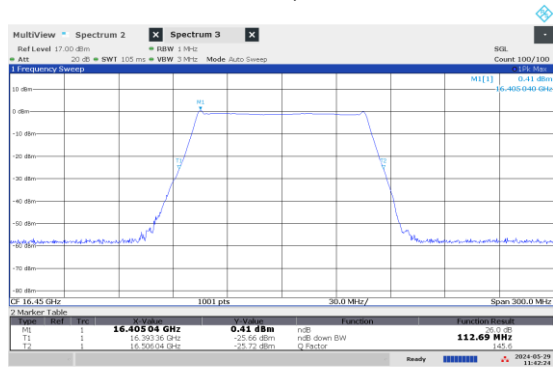


Figure 8.2-21: 26 dB OBW High channel: 16.45 GHz, shortest pulse (100 MHz BW)

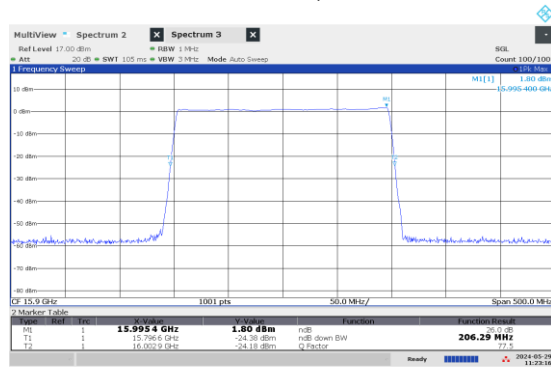


Figure 8.2-22: 26 dB OBW Low channel: 15.90 GHz, shortest pulse (200 MHz BW)

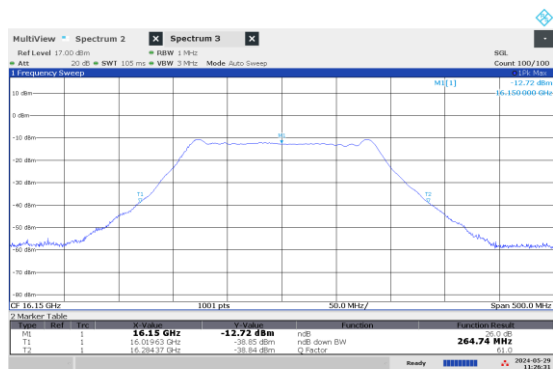


Figure 8.2-23: 26 dB OBW Middle channel: 16.15 GHz, shortest pulse (200 MHz BW)

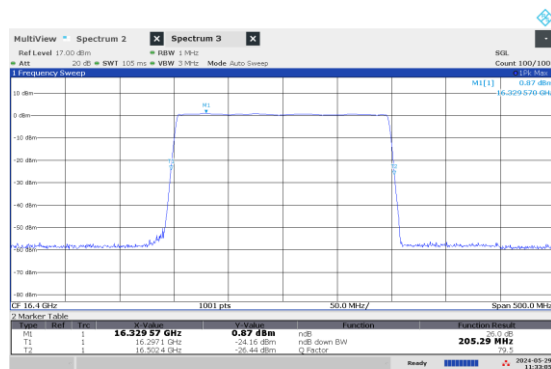


Figure 8.2-24: 26 dB OBW High channel: 16.40 GHz, shortest pulse (200 MHz BW)

## 8.3 Power and antenna height limits

### 8.3.1 References and limits

- FCC 47 CFR Part 90: §90.205
- Test method: ANSI C63.26-2014 (5.2.4.4.2)

Applicants for licenses must request and use no more power than the actual power necessary for satisfactory operation. Except where otherwise specifically provided for, the maximum power that will be authorized to applicants whose license applications for new stations are filed after August 18, 1995, is as follows:

(r) All other frequency bands. Requested transmitter power will be considered and authorized on a case by case basis.

### 8.3.2 Test summary

|               |                                                                                                  |                   |          |
|---------------|--------------------------------------------------------------------------------------------------|-------------------|----------|
| Verdict       | Pass                                                                                             |                   |          |
| Test date     | May 31, 2024                                                                                     | Temperature       | 20°C     |
| Test engineer | Chenhao Ma, Wireless Test Technician                                                             | Air pressure      | 1001mbar |
| Test location | <input type="checkbox"/> Wireless bench<br><input checked="" type="checkbox"/> Other: 3M Chamber | Relative humidity | 57%      |

### 8.3.3 Notes

Testing was performed with the transmitter operating on a fixed channel at full power following the cases shown on table 8.1-1 from section 8.1.3 of this document. All correction factors corresponding cables losses, receiving antenna gain, and air path losses were compensated to get the real EIRP value of the product. Both polarizations were evaluated, horizontal and vertical (linear polarization per client declaration) and only the worst case (max power) was taken for the testing purposes: horizontal polarization. The duty cycle correction factor was added according to each frequency channel tested. Table 8.3-1 shows the constant duty cycle corresponding to each case.

The equation to calculate the total correction factor corresponding to each frequency tested is given by the following expression as well as the table with the corresponding duty cycle to each case:

$$E.I.R.P = P_r - G_r - 20 \log_{10} \left( \frac{\lambda}{4\pi d} \right)$$

Adding cable losses and duty cycle correction factors (absolute values):

$$E.I.R.P = P_r - G_r - 20 \log_{10} \left( \frac{\lambda}{4\pi d} \right) + L_{cable} + 10 \log_{10} \left( \frac{1}{Duty\ cycle} \right)$$

Where:

$P_r$  = Power received in the spectrum analyzer  
 $\lambda$  = Wavelength of the signal  
 $L_{cable}$  = Losses corresponding to interconnexion cables  
 $d$  = Measuring distance (3 meters)  
 $G_r$  = Receiving antenna gain  
 $DC$  = Duty cycle declared

Example:

$$E.I.R.P = P_r - 16.389 - 20 \log_{10} \left( \frac{299792458}{15750000000 \cdot 4\pi(3)} \right) + 19.96 + 10 \log_{10} \left( \frac{1}{0.15} \right)$$

$$E.I.R.P = P_r - 16.389 - (-65.935) + 19.96 + 8.239 = P_r + 77.745 \text{ (offset)}$$

$DC$  = Duty cycle declared

Testing was done at 3 meters with the antenna and turntable fixed. A maximization of the signal was done to define the position of the max power:

| Frequency | Type of pulse  | Time duration  | Duty cycle |
|-----------|----------------|----------------|------------|
| 15.75 GHz | Longest pulse  | 30 $\mu$ s     | 15%        |
| 16.15 GHz | Longest pulse  | 30 $\mu$ s     | 15%        |
| 16.55 GHz | Longest pulse  | 30 $\mu$ s     | 15%        |
| 15.80 GHz | Longest pulse  | 30 $\mu$ s     | 15%        |
| 16.15 GHz | Longest pulse  | 30 $\mu$ s     | 15%        |
| 16.50 GHz | Longest pulse  | 30 $\mu$ s     | 15%        |
| 15.85 GHz | Longest pulse  | 30 $\mu$ s     | 15%        |
| 16.15 GHz | Longest pulse  | 30 $\mu$ s     | 15%        |
| 16.45 GHz | Longest pulse  | 30 $\mu$ s     | 15%        |
| 15.90 GHz | Longest pulse  | 28.494 $\mu$ s | 15%        |
| 16.15 GHz | Longest pulse  | 28.494 $\mu$ s | 15%        |
| 16.40 GHz | Longest pulse  | 28.494 $\mu$ s | 15%        |
| 15.75 GHz | Shortest pulse | 2 $\mu$ s      | 10%        |
| 16.15 GHz | Shortest pulse | 1 $\mu$ s      | 10%        |
| 16.55 GHz | Shortest pulse | 2 $\mu$ s      | 10%        |
| 15.80 GHz | Shortest pulse | 5 $\mu$ s      | 10%        |
| 16.15 GHz | Shortest pulse | 500 ns         | 10%        |
| 16.50 GHz | Shortest pulse | 5 $\mu$ s      | 10%        |
| 15.85 GHz | Shortest pulse | 5 $\mu$ s      | 10%        |
| 16.15 GHz | Shortest pulse | 500 ns         | 10%        |
| 16.45 GHz | Shortest pulse | 5 $\mu$ s      | 10%        |
| 15.90 GHz | Shortest pulse | 15 $\mu$ s     | 10%        |
| 16.15 GHz | Shortest pulse | 500 ns         | 10%        |
| 16.40 GHz | Shortest pulse | 15 $\mu$ s     | 10%        |

Table 8.3-1: Duty cycle table.

#### 8.3.4 Setup details

|                             |                                                                                                                                                    |
|-----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|
| EUT power input during test | 28 V DC                                                                                                                                            |
| EUT setup configuration     | <input type="checkbox"/> Table-top<br><input type="checkbox"/> Floor standing<br><input checked="" type="checkbox"/> Other: Tripod mounted (1.5 m) |

#### Receiver settings:

|                      |                                            |
|----------------------|--------------------------------------------|
| Resolution bandwidth | 1 MHz                                      |
| Video bandwidth      | 3 MHz                                      |
| Detector mode        | RMS                                        |
| Trace mode           | Average (at least 100 traces)              |
| Measurement points   | $\geq (2 \times \text{span}) / \text{RBW}$ |
| Span                 | 2 times or 3 times the 99% OBW             |

### 8.3.5 Test data

| Frequency | Type of pulse  | Time duration  | Power (EIRP)    |
|-----------|----------------|----------------|-----------------|
| 15.75 GHz | Longest pulse  | 30 $\mu$ s     | 75.04dBm        |
| 16.15 GHz | Longest pulse  | 30 $\mu$ s     | 75.58dBm        |
| 16.55 GHz | Longest pulse  | 30 $\mu$ s     | 75.4dBm         |
| 15.80 GHz | Longest pulse  | 30 $\mu$ s     | 75.54dBm        |
| 16.15 GHz | Longest pulse  | 30 $\mu$ s     | 75.84dBm        |
| 16.50 GHz | Longest pulse  | 30 $\mu$ s     | 75.33dBm        |
| 15.85 GHz | Longest pulse  | 30 $\mu$ s     | 75.43dBm        |
| 16.15 GHz | Longest pulse  | 30 $\mu$ s     | <b>76.15dBm</b> |
| 16.45 GHz | Longest pulse  | 30 $\mu$ s     | 75.99dBm        |
| 15.90 GHz | Longest pulse  | 28.494 $\mu$ s | 75.71dBm        |
| 16.15 GHz | Longest pulse  | 28.494 $\mu$ s | 75.85dBm        |
| 16.40 GHz | Longest pulse  | 28.494 $\mu$ s | 75.90dBm        |
| 15.75 GHz | Shortest pulse | 2 $\mu$ s      | 74.67dBm        |
| 16.15 GHz | Shortest pulse | 1 $\mu$ s      | 74.79dBm        |
| 16.55 GHz | Shortest pulse | 2 $\mu$ s      | 75.00dBm        |
| 15.80 GHz | Shortest pulse | 5 $\mu$ s      | 75.54dBm        |
| 16.15 GHz | Shortest pulse | 500 ns         | 75.84dBm        |
| 16.50 GHz | Shortest pulse | 5 $\mu$ s      | 75.33dBm        |
| 15.85 GHz | Shortest pulse | 5 $\mu$ s      | 75.34dBm        |
| 16.15 GHz | Shortest pulse | 500 ns         | 75.12dBm        |
| 16.45 GHz | Shortest pulse | 5 $\mu$ s      | 75.79dBm        |
| 15.90 GHz | Shortest pulse | 15 $\mu$ s     | 74.35dBm        |
| 16.15 GHz | Shortest pulse | 500 ns         | 74.86dBm        |
| 16.40 GHz | Shortest pulse | 15 $\mu$ s     | 75.95dBm        |

Table 8.3-2: Power results (EIRP.).

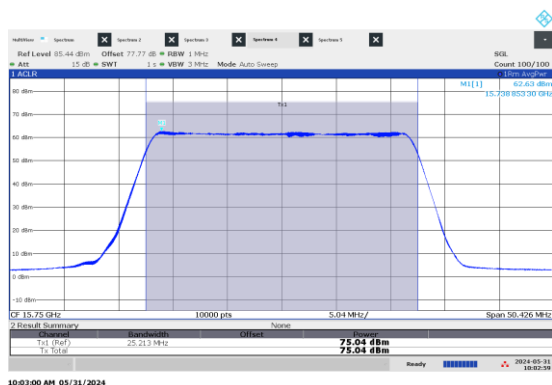


Figure 8.3-1: EIRP Power, Low channel: 15.75 GHz, longest pulse (25 MHz BW)

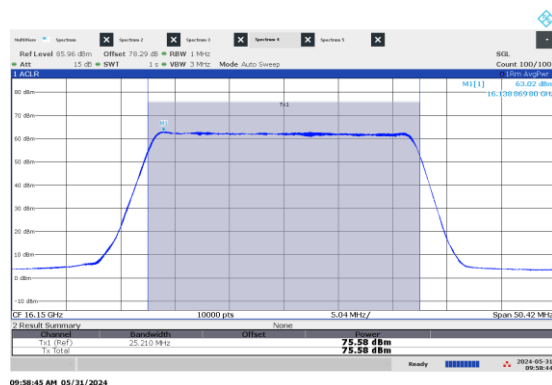


Figure 8.3-2: EIRP Power, Middle channel: 16.15 GHz, longest pulse (25 MHz BW)

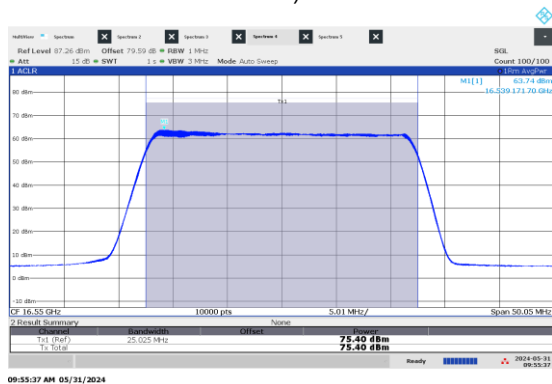


Figure 8.3-3: EIRP Power, High channel: 16.55 GHz, longest pulse (25 MHz BW)

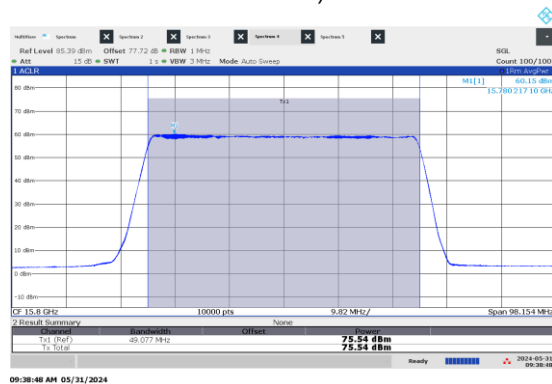


Figure 8.3-4: EIRP Power, Low channel: 15.80 GHz, longest pulse (50 MHz BW)



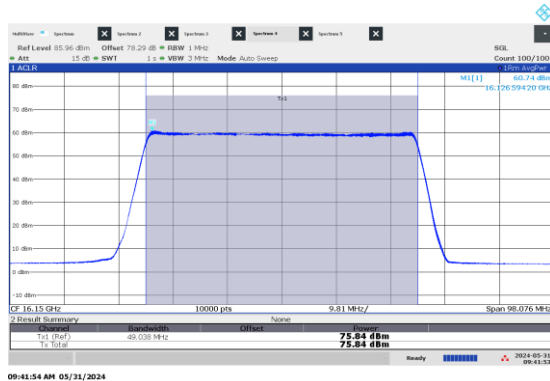


Figure 8.3-5: EIRP Power, Middle channel: 16.15 GHz, longest pulse (50 MHz BW)

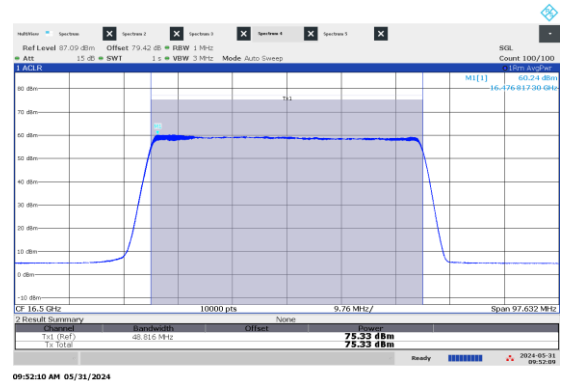


Figure 8.3-6: EIRP Power, High channel: 16.50 GHz, longest pulse (50 MHz BW)

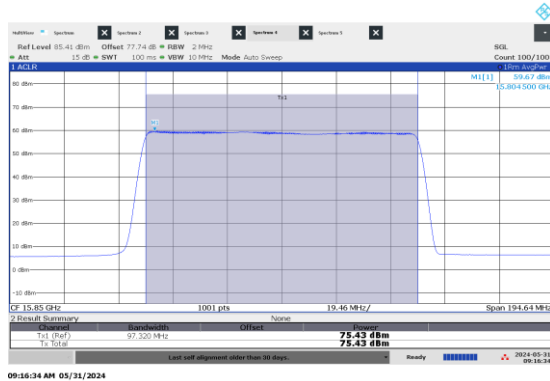


Figure 8.3-7: EIRP Power, Low channel: 15.85 GHz, longest pulse (100 MHz BW)

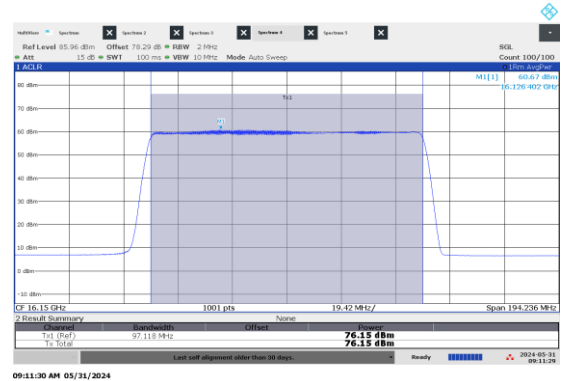


Figure 8.3-8: EIRP Power, Middle channel: 16.15 GHz, longest pulse (100 MHz BW)



Figure 8.3-9: EIRP Power, High channel: 16.45 GHz, longest pulse (100 MHz BW)

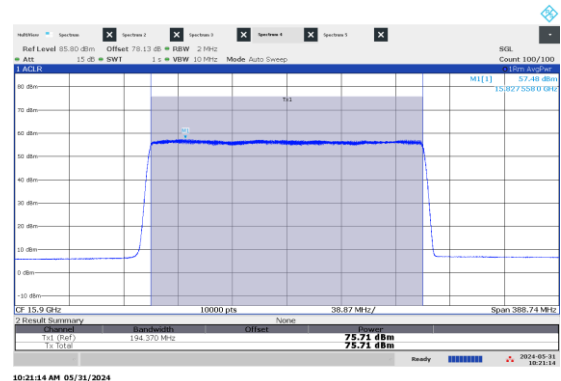


Figure 8.3-10: EIRP Power, Low channel: 15.90 GHz, longest pulse (200 MHz BW)

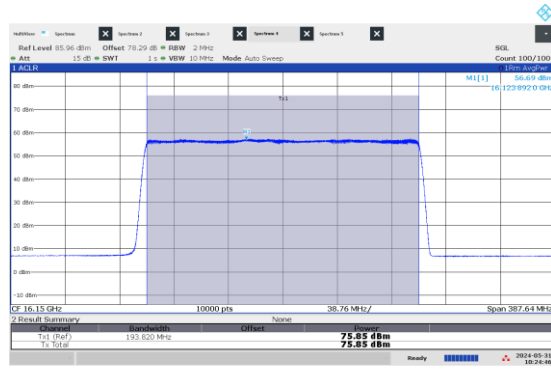


Figure 8.3-11: EIRP Power, Middle channel: 16.15 GHz, longest pulse (200 MHz BW)

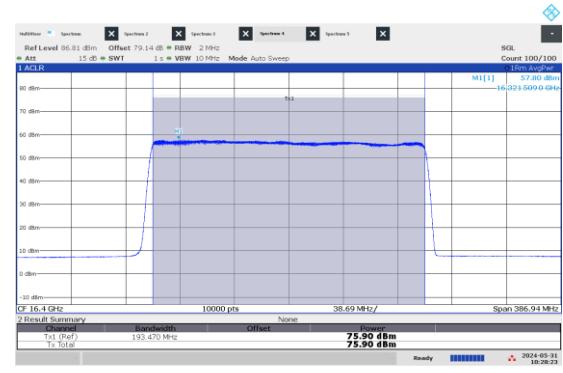


Figure 8.3-12: EIRP Power, High channel: 16.40 GHz, longest pulse (200 MHz BW)

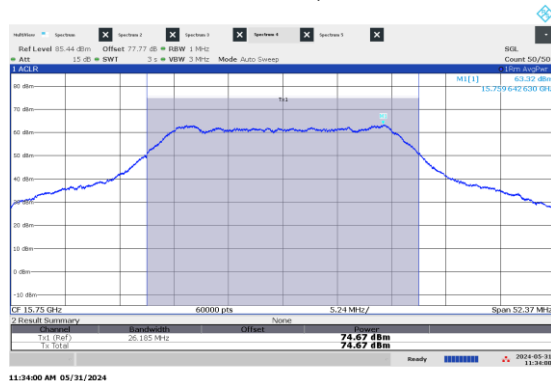


Figure 8.3-13: EIRP Power, Low channel: 15.75 GHz, shortest pulse (25 MHz BW)

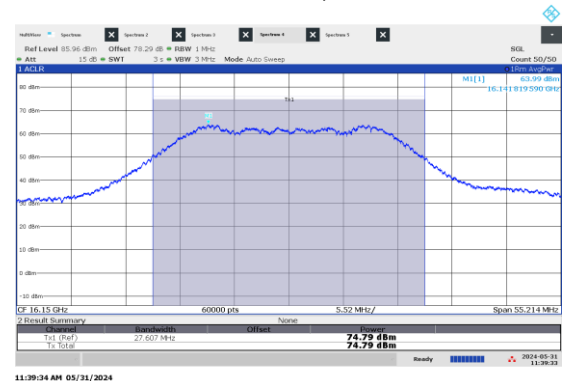


Figure 8.3-14: EIRP Power, Middle channel: 16.15 GHz, shortest pulse (25 MHz BW)

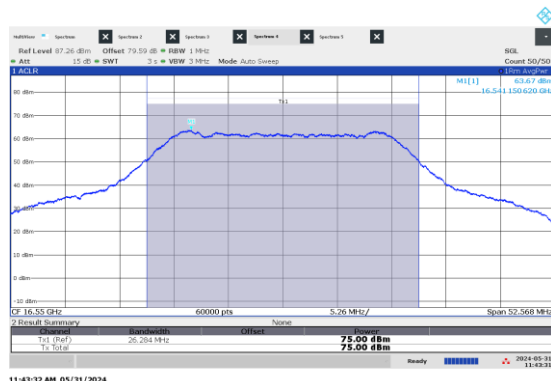


Figure 8.3-15: EIRP Power, High channel: 16.55 GHz, shortest pulse (25 MHz BW)



Figure 8.3-16: EIRP Power, Low channel: 15.80 GHz, shortest pulse (50 MHz BW)

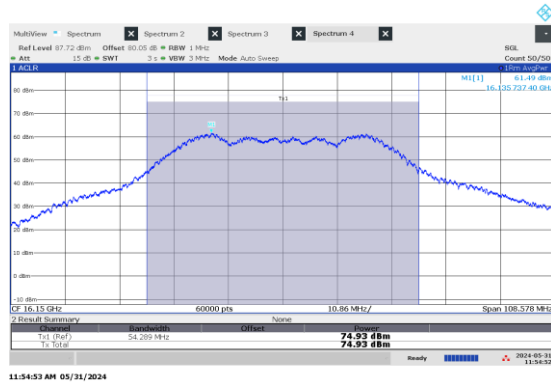


Figure 8.3-17: EIRP Power, Middle channel: 16.15 GHz, shortest pulse (50 MHz BW)

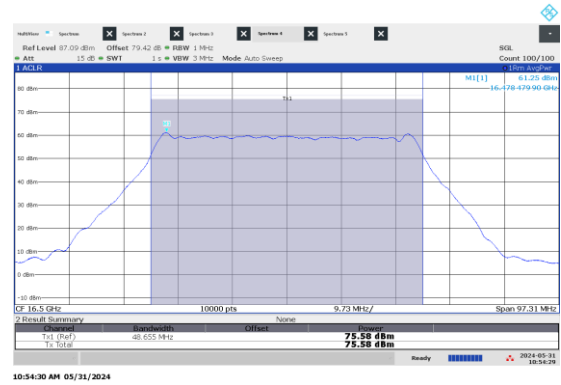


Figure 8.3-18: EIRP Power, High channel: 16.50 GHz, shortest pulse (50 MHz BW)



Figure 8.3-19: EIRP Power, Low channel: 15.85 GHz, shortest pulse (100 MHz BW)

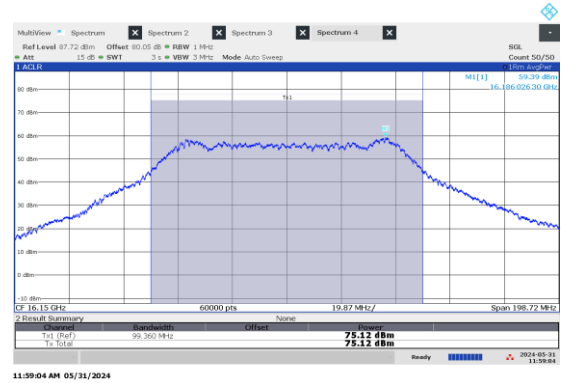


Figure 8.3-20: EIRP Power, Middle channel: 16.15 GHz, shortest pulse (100 MHz BW)

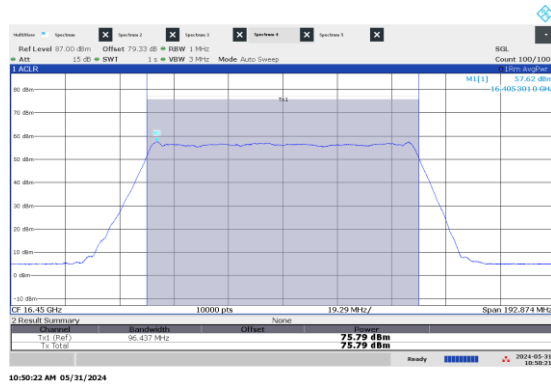


Figure 8.3-21: EIRP Power, High channel: 16.45 GHz, shortest pulse (100 MHz BW)



Figure 8.3-22: EIRP Power, Low channel: 15.90 GHz, shortest pulse (200 MHz BW)

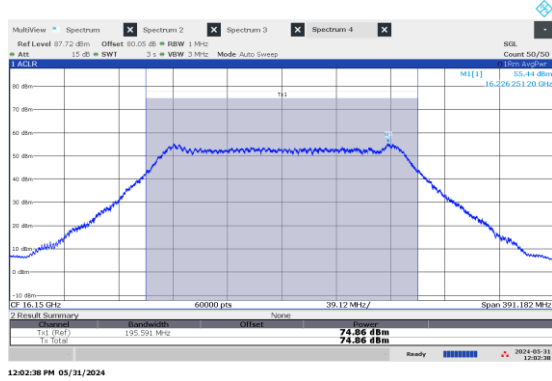


Figure 8.3-23: EIRP Power, Middle channel: 16.15 GHz, shortest pulse (200 MHz BW)

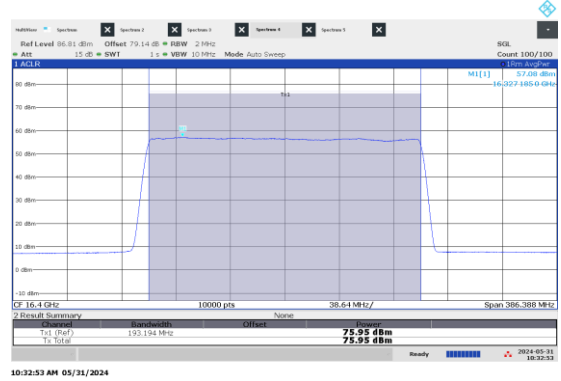


Figure 8.3-24: EIRP Power, High channel: 16.40 GHz, shortest pulse (200 MHz BW)

## 8.4 Emission mask

### 8.4.1 References and limits

- FCC 47 CFR Part 90: §90.210
- Test method: ANSI C63.26-2014 (5.5)

(b) Emission Mask B. For transmitters that are equipped with an audio low-pass filter, the power of any emission must be attenuated below the unmodulated carrier power (P) as follows:

- (1) On any frequency removed from the assigned frequency by more than 50 percent, but not more than 100 percent of the authorized bandwidth: At least 25 dB.
- (2) On any frequency removed from the assigned frequency by more than 100 percent, but not more than 250 percent of the authorized bandwidth: At least 35 dB.
- (3) On any frequency removed from the assigned frequency by more than 250 percent of the authorized bandwidth: At least  $43 + 10 \log (P)$  dB.

### 8.4.2 Test summary

|               |                                                                                                  |                   |                    |
|---------------|--------------------------------------------------------------------------------------------------|-------------------|--------------------|
| Verdict       | Pass                                                                                             |                   |                    |
| Test date     | May 30, 2024; May 31, 2024                                                                       | Temperature       | 19°C; 20°C         |
| Test engineer | Chenhao Ma, Wireless Test Technician                                                             | Air pressure      | 1003mbar; 1001mbar |
| Test location | <input type="checkbox"/> Wireless bench<br><input checked="" type="checkbox"/> Other: 3M Chamber | Relative humidity | 58%; 57%           |

### 8.4.3 Notes

Testing was performed with the transmitter operating on a fixed channel at full power following the cases shown on table 8.1-1 from section 8.1.3 of this document. The width of the mask was defined according to the 26 dB bandwidth widest results (one measured bandwidth selected for each declared bandwidth and each pulse width) shown in table 8.2-1 from section 8.2.5 of this document.

The emission mask was separated into two sections of this document: section 8.4, range from 14 GHz to 18 GHz (including the frequency of operation within  $\pm 250\%$  from occupied bandwidth) and section 8.5 which considered the emissions before 14 GHz and after 18 GHz.

The range between the  $\pm 250\%$  is a relative limit, therefore, no correction factors were added. For the frequency range beyond  $\pm 250\%$  the limit is an absolute value (-13 dBm), which means the corrections factors corresponding to air path losses and interconnexion cables were added as an offset in the spectrum analyzer.

In this section, for the 15.85 GHz long pulse 100MHz BW; 15.90 GHz long pulse 200MHz BW; 16.15 GHz long pulse 100MHz BW offset; 16.15 GHz long pulse 200MHz BW; 16.15 GHz short pulse 50MHz BW DC10% and 16.45 GHz short pulse 100MHz BW a frequency offset equivalent to RBW/2 in the edges of these channels was applied, according to the basic guidelines described on C63.26 (5.7.2). In the other cases, the mask was applied without frequency offset.

### 8.4.4 Setup details

|                             |                                                                                                                                                    |
|-----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|
| EUT power input during test | 28 V DC                                                                                                                                            |
| EUT setup configuration     | <input type="checkbox"/> Table-top<br><input type="checkbox"/> Floor standing<br><input checked="" type="checkbox"/> Other: Tripod mounted (1.5 m) |

Receiver settings:

|                      |                                                |
|----------------------|------------------------------------------------|
| Resolution bandwidth | 1 MHz                                          |
| Video bandwidth      | 3 MHz                                          |
| Detector mode        | RMS                                            |
| Trace mode           | Average (at least 100 traces)                  |
| Span                 | Enough to see the spectrum under investigation |

## 8.4.5 Test data

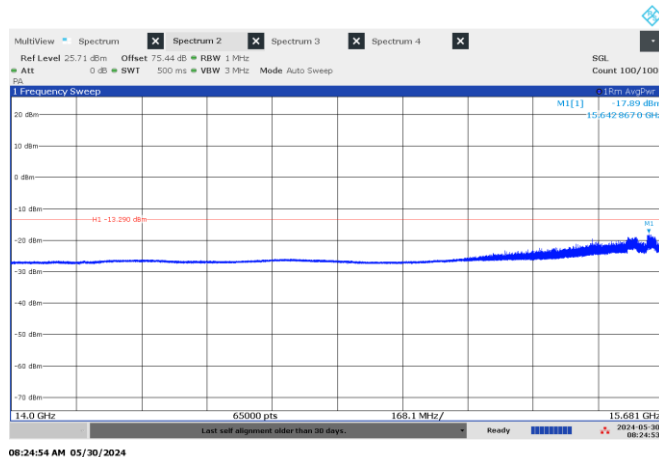


Figure 8.4-1: Emission mask, beyond  $\pm 250\%$  of BW (low frequency range), Low channel: 15.75 GHz, longest pulse. (25 MHz BW)



Figure 8.4-2: Emission mask, Low channel: 15.75 GHz, longest pulse. (25 MHz BW)

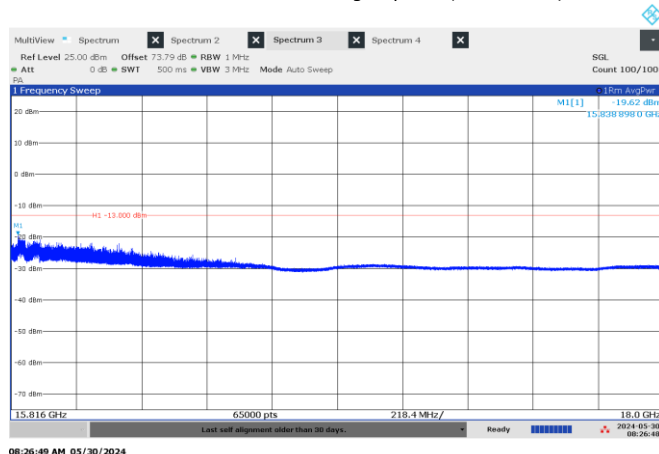


Figure 8.4-3: Emission mask, beyond  $\pm 250\%$  of BW (high frequency range), Low channel: 15.75 GHz, longest pulse. (25 MHz BW)

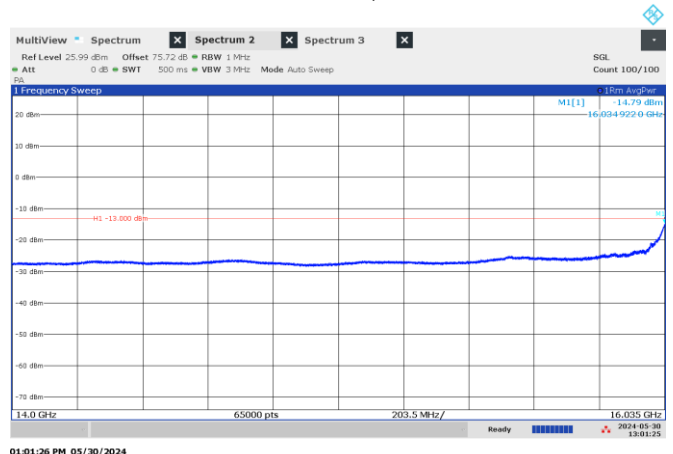


Figure 8.4-4: Emission mask, beyond  $\pm 250\%$  of BW (low frequency range), Middle channel: 16.15 GHz, longest pulse. (25 MHz BW)

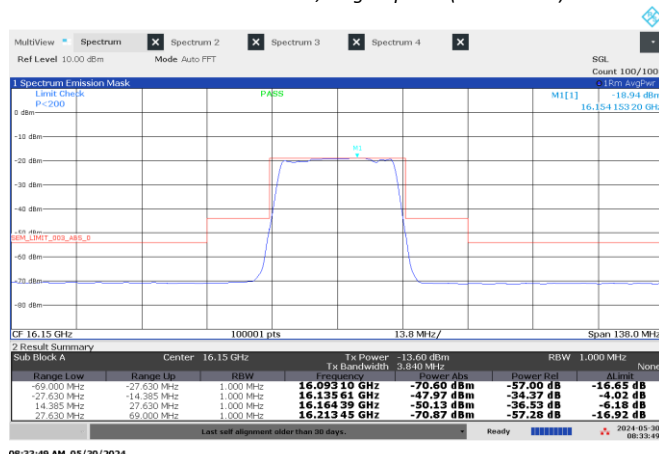


Figure 8.4-5: Emission mask, Middle channel: 16.15 GHz, longest pulse. (25 MHz BW)

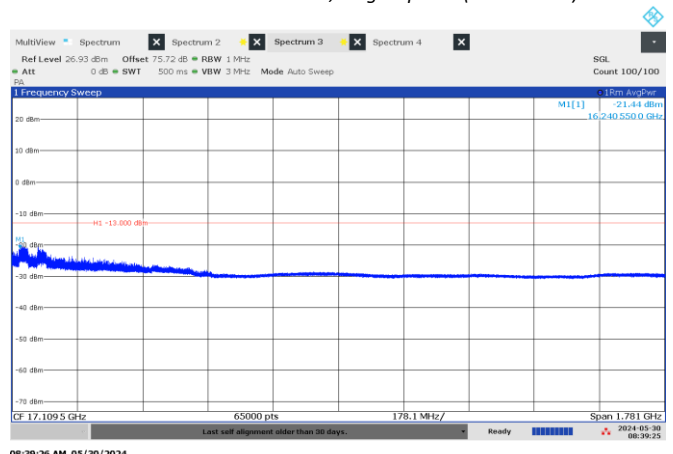


Figure 8.4-6: Emission mask, beyond  $\pm 250\%$  of BW (high frequency range), Middle channel: 16.15 GHz, longest pulse. (25 MHz BW)

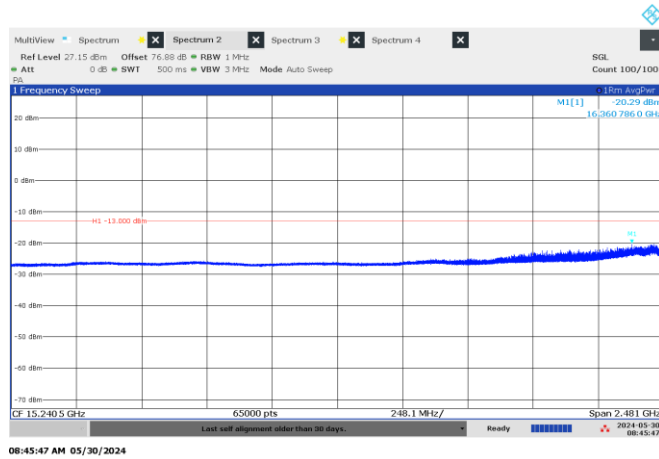


Figure 8.4-7: Emission mask, beyond  $\pm 250\%$  of BW (low frequency range), High channel: 16.55 GHz, longest pulse. (25 MHz BW)

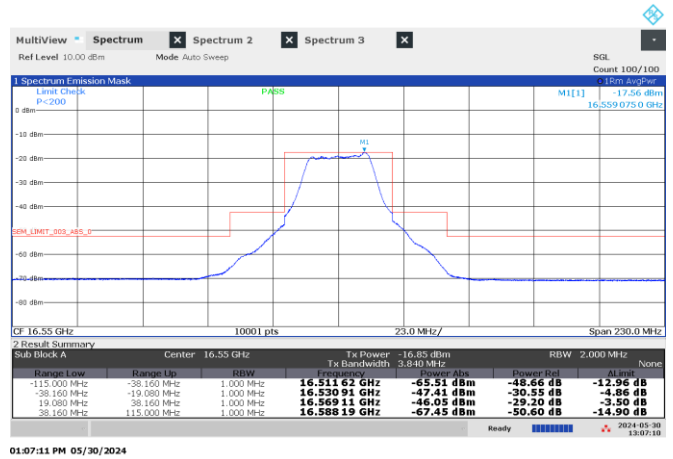


Figure 8.4-8: Emission mask, High channel: 16.55 GHz, longest pulse. (25 MHz BW)

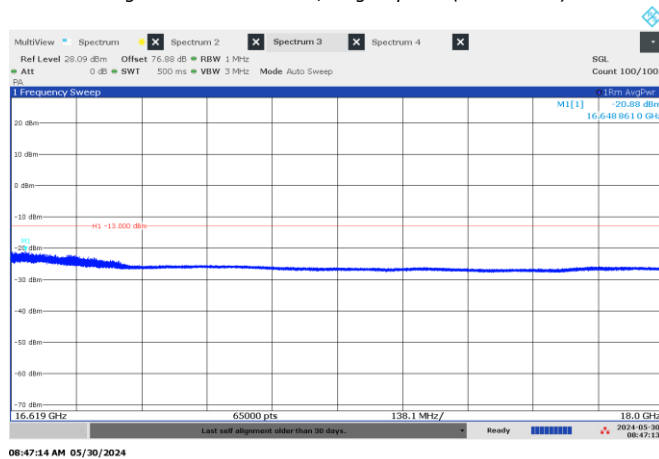


Figure 8.4-9: Emission mask, beyond  $\pm 250\%$  of BW (high frequency range), High channel: 16.55 GHz, longest pulse. (25 MHz BW)

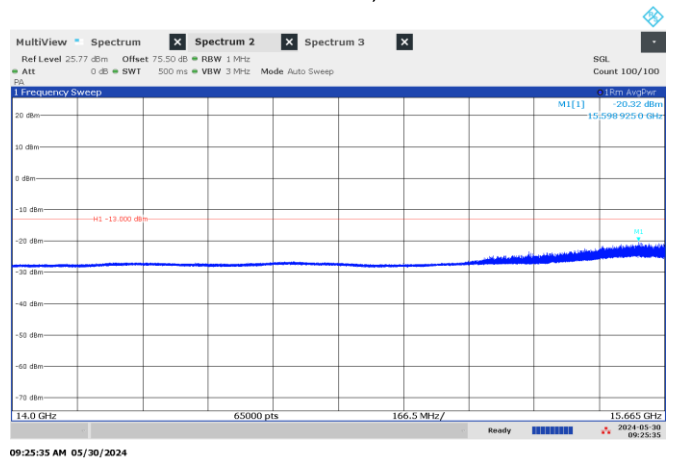


Figure 8.4-10: Emission mask, beyond  $\pm 250\%$  of BW (low frequency range), Low channel: 15.80 GHz, longest pulse. (50 MHz BW)



Figure 8.4-11: Emission mask, Low channel: 15.80 GHz, longest pulse. (50 MHz BW)

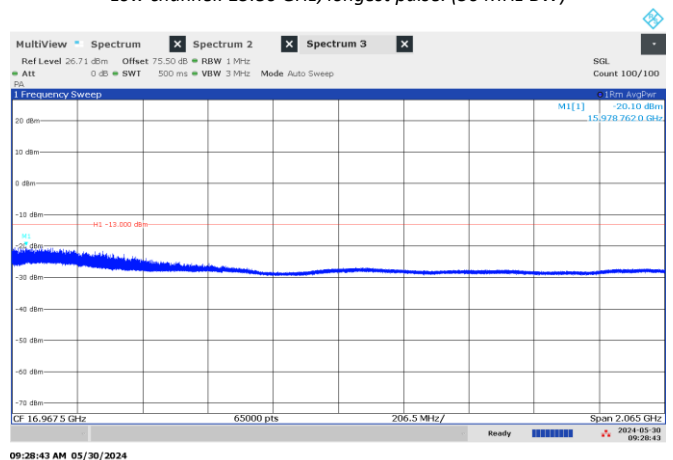


Figure 8.4-12: Emission mask, beyond  $\pm 250\%$  of BW (high frequency range), Low channel: 15.80 GHz, longest pulse. (50 MHz BW)

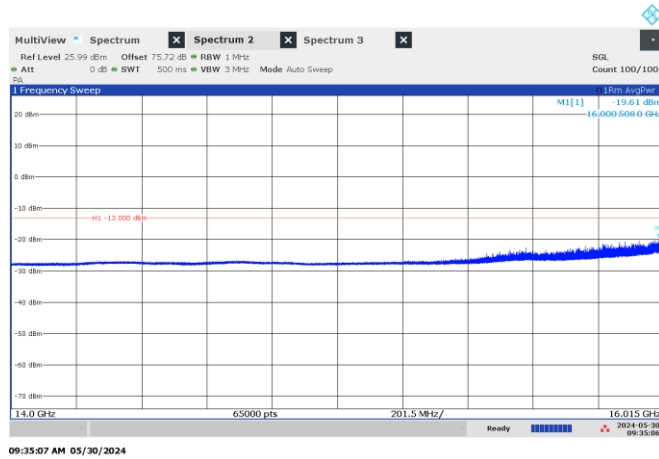


Figure 8.4-13: Emission mask, beyond  $\pm 250\%$  of BW (low frequency range), Middle channel: 16.15 GHz, longest pulse. (50 MHz BW)

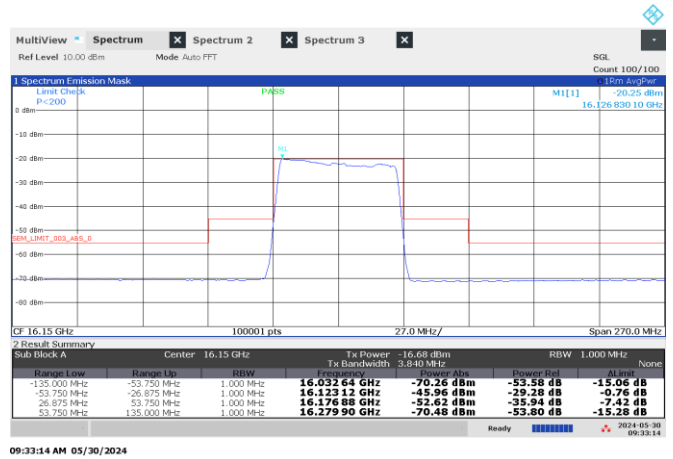


Figure 8.4-14: Emission mask, Middle channel: 16.15 GHz, longest pulse. (50 MHz BW)

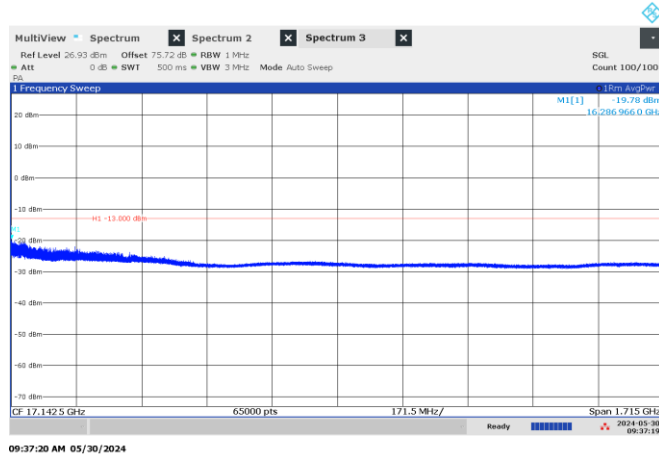


Figure 8.4-15: Emission mask, beyond  $\pm 250\%$  of BW (high frequency range), Middle channel: 16.15 GHz, longest pulse. (50 MHz BW)

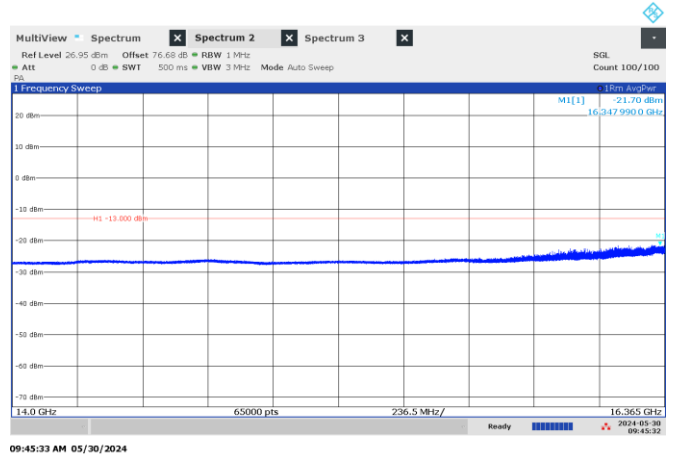


Figure 8.4-16: Emission mask, beyond  $\pm 250\%$  of BW (low frequency range), High channel: 16.50 GHz, longest pulse. (50 MHz BW)

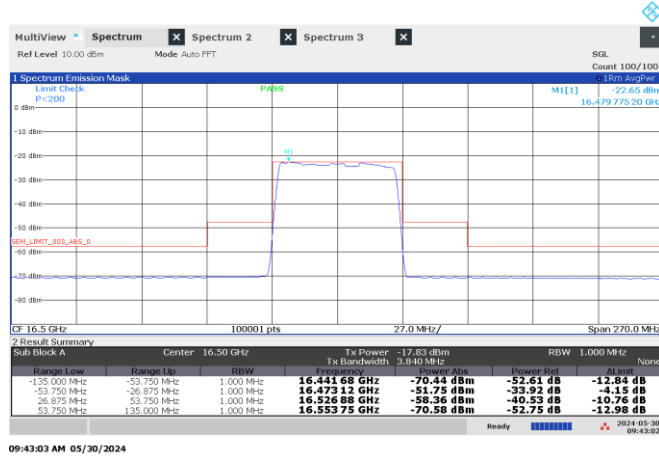


Figure 8.4-17: Emission mask, High channel: 16.50 GHz, longest pulse. (50 MHz BW)



Figure 8.4-18: Emission mask, beyond  $\pm 250\%$  of BW (high frequency range), High channel: 16.50 GHz, longest pulse. (50 MHz BW)



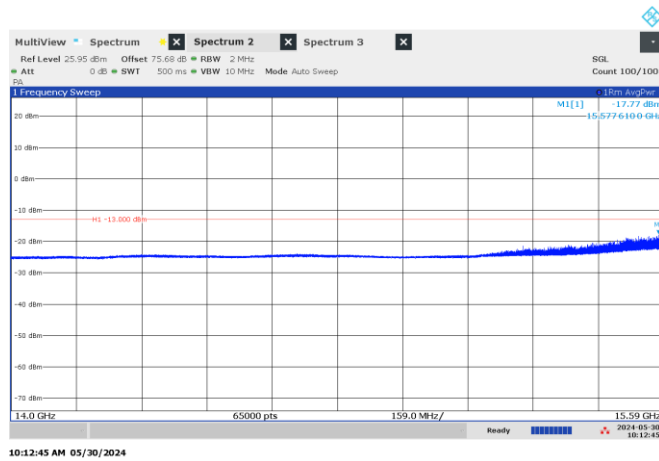


Figure 8.4-19: Emission mask, beyond  $\pm 250\%$  of BW (low frequency range), Low channel: 15.85 GHz, longest pulse. (100 MHz BW)

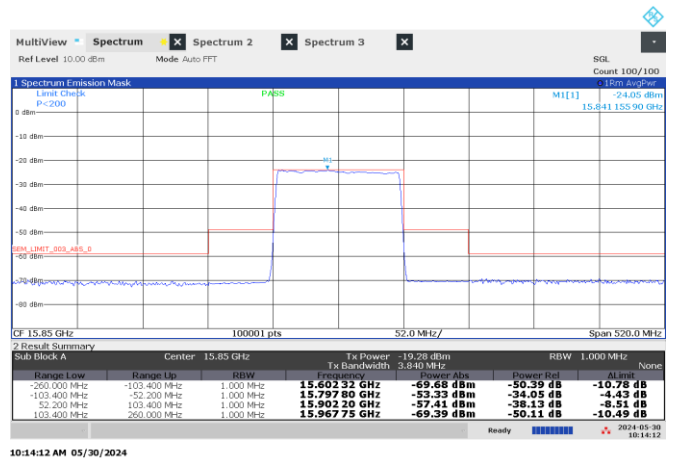


Figure 8.4-20: Emission mask, Low channel: 15.85 GHz, longest pulse. (100 MHz BW)



Figure 8.4-21: Emission mask, beyond  $\pm 250\%$  of BW (high frequency range), Low channel: 15.85 GHz, longest pulse. (100 MHz BW)

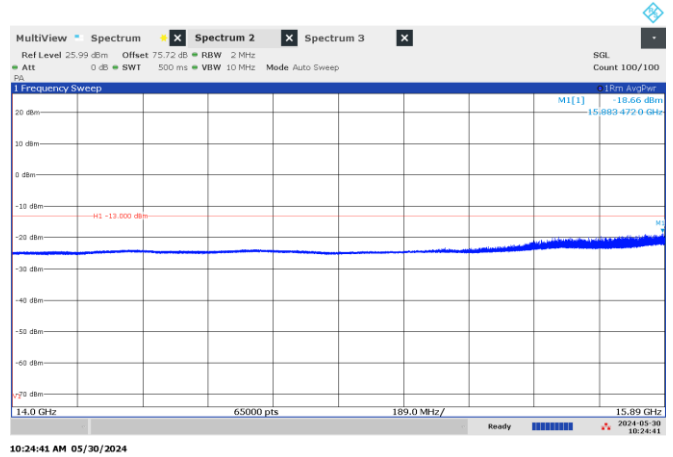


Figure 8.4-22: Emission mask, beyond  $\pm 250\%$  of BW (low frequency range), Middle channel: 16.15 GHz, longest pulse. (100 MHz BW)

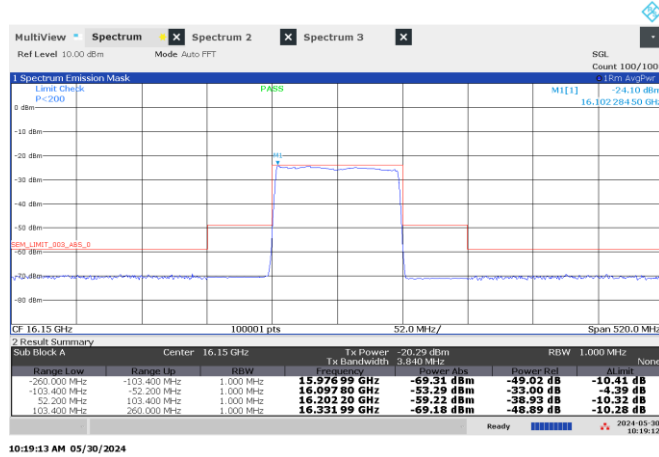


Figure 8.4-23: Emission mask, Middle channel: 16.15 GHz, longest pulse. (100 MHz BW)



Figure 8.4-24: Emission mask, beyond  $\pm 250\%$  of BW (high frequency range), Middle channel: 16.15 GHz, longest pulse. (100 MHz BW)

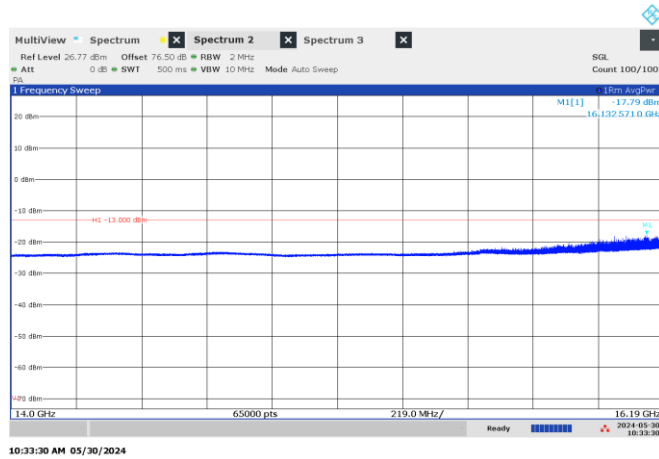


Figure 8.4-25: Emission mask, beyond  $\pm 250\%$  of BW (low frequency range), High channel: 16.45 GHz, longest pulse. (100 MHz BW)

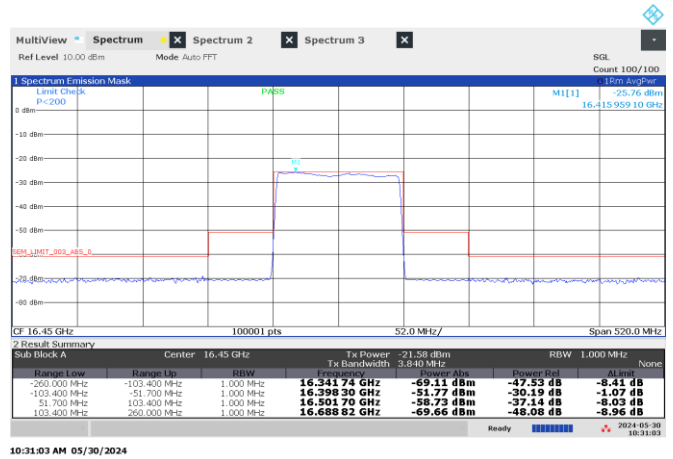


Figure 8.4-26: Emission mask, High channel: 16.45 GHz, longest pulse. (100 MHz BW)

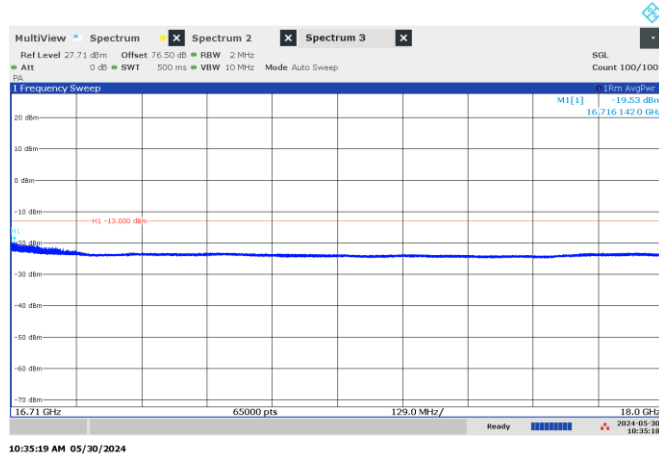


Figure 8.4-27: Emission mask, beyond  $\pm 250\%$  of BW (high frequency range), High channel: 16.45 GHz, longest pulse. (100 MHz BW)



Figure 8.4-28: Emission mask, beyond  $\pm 250\%$  of BW (low frequency range), Low channel: 15.90 GHz, longest pulse. (200 MHz BW)

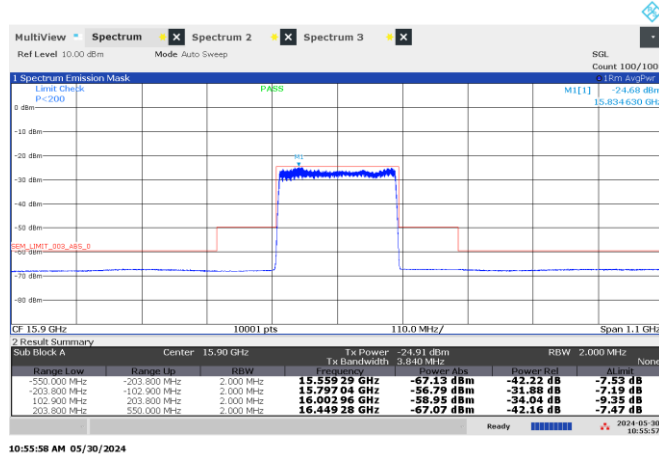


Figure 8.4-29: Emission mask, Low channel: 15.90 GHz, longest pulse. (200 MHz BW)

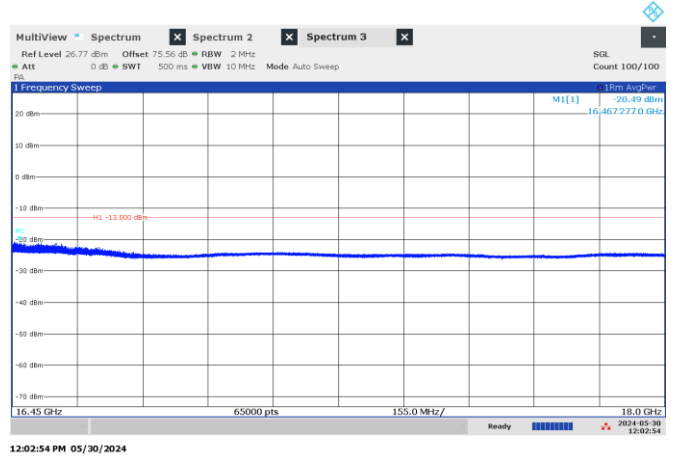


Figure 8.4-30: Emission mask, beyond  $\pm 250\%$  of BW (high frequency range), Low channel: 15.90 GHz, longest pulse. (200 MHz BW)

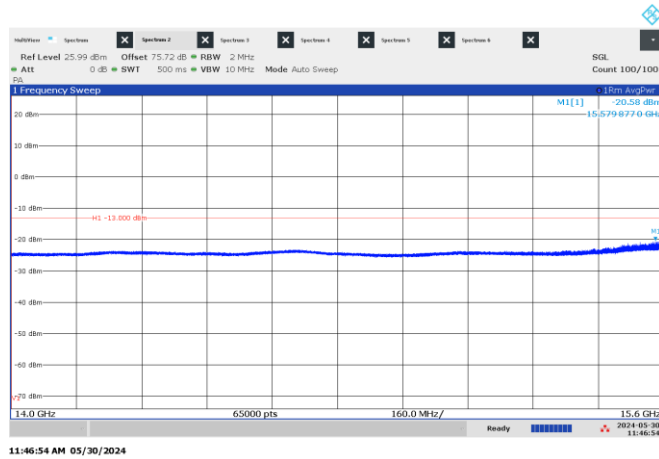


Figure 8.4-31: Emission mask, beyond  $\pm 250\%$  of BW (low frequency range), Middle channel: 16.15 GHz, longest pulse. (200 MHz BW)

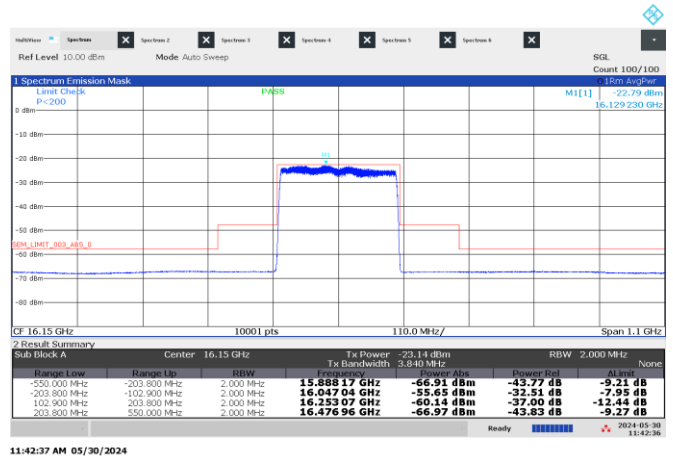


Figure 8.4-32: Emission mask, Middle channel: 16.15 GHz, longest pulse. (200 MHz BW)

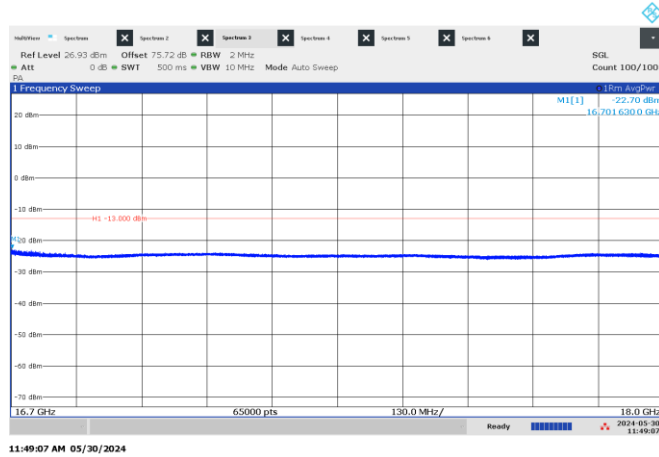


Figure 8.4-33: Emission mask, beyond  $\pm 250\%$  of BW (high frequency range), Middle channel: 16.15 GHz, longest pulse. (200 MHz BW)



Figure 8.4-34: Emission mask, beyond  $\pm 250\%$  of BW (low frequency range), High channel: 16.40 GHz, longest pulse. (200 MHz BW)

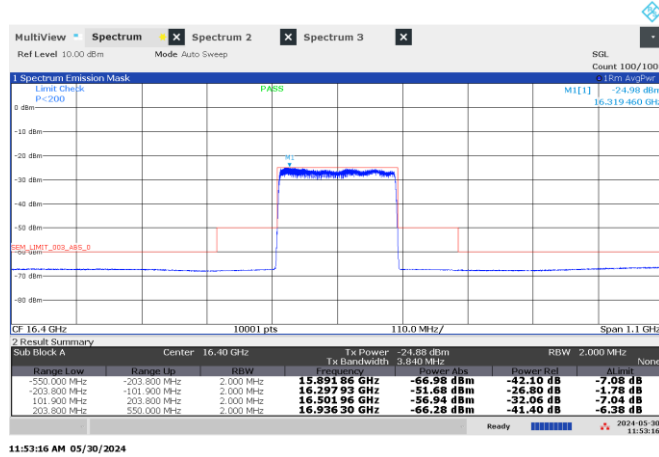


Figure 8.4-35: Emission mask, High channel: 16.40 GHz, longest pulse. (200 MHz BW)



Figure 8.4-36: Emission mask, beyond  $\pm 250\%$  of BW (high frequency range), High channel: 16.40 GHz, longest pulse. (200 MHz BW)

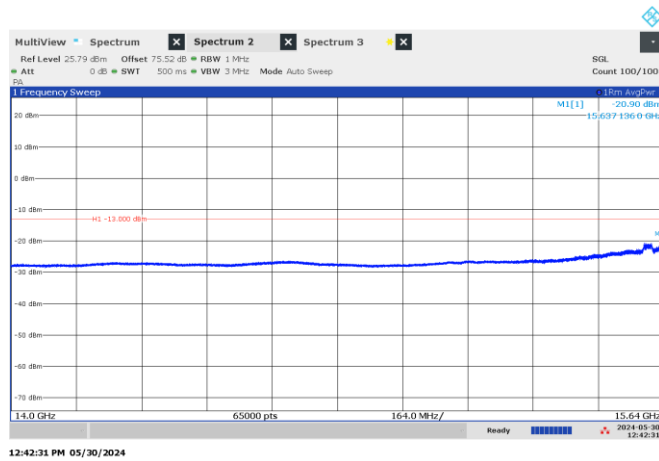


Figure 8.4-37: Emission mask, beyond  $\pm 250\%$  of BW (low frequency range), Low channel: 15.75 GHz, shortest pulse. (25 MHz BW)



Figure 8.4-38: Emission mask, Low channel: 15.75 GHz, shortest pulse. (25 MHz BW)

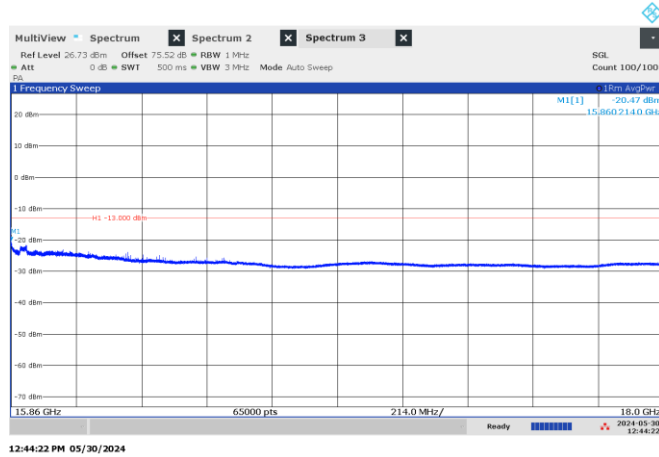


Figure 8.4-39: Emission mask, beyond  $\pm 250\%$  of BW (high frequency range), Low channel: 15.75 GHz, shortest pulse. (25 MHz BW)



Figure 8.4-40: Emission mask, beyond  $\pm 250\%$  of BW (low frequency range), Middle channel: 16.15 GHz, shortest pulse. (25 MHz BW)



Figure 8.4-41: Emission mask, Middle channel: 16.15 GHz, shortest pulse. (25 MHz BW)

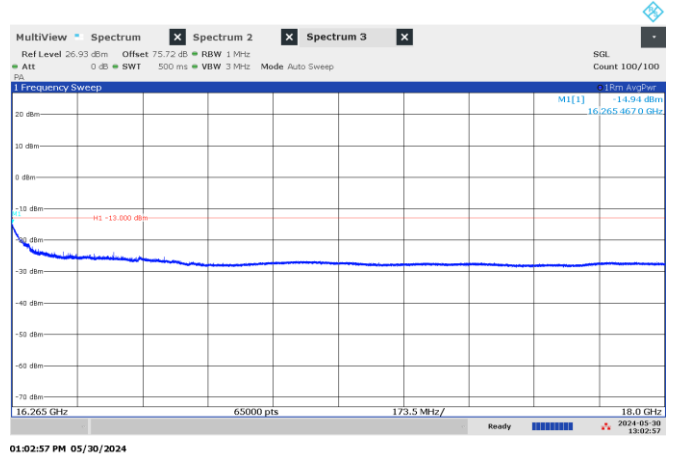
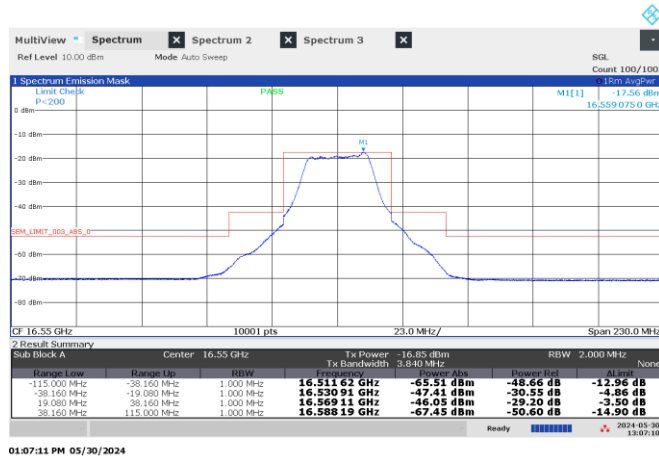


Figure 8.4-42: Emission mask, beyond  $\pm 250\%$  of BW (high frequency range), Middle channel: 16.15 GHz, shortest pulse. (25 MHz BW)



01:07:11 PM 05/30/2024

Figure 8.4-43: Emission mask, beyond  $\pm 250\%$  of BW (low frequency range), High channel: 16.55 GHz, shortest pulse. (25 MHz BW)



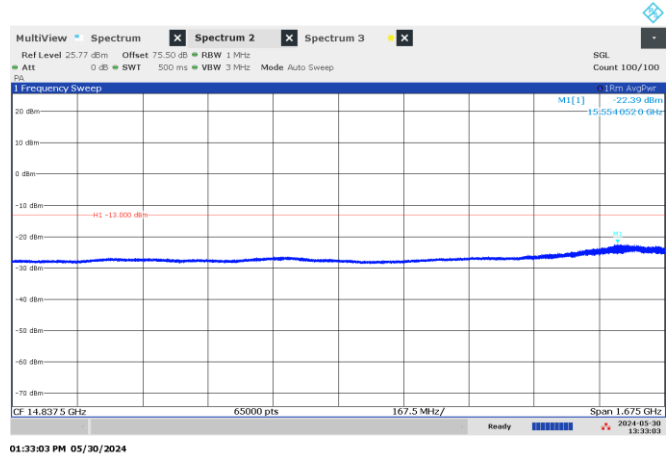
01:09:06 PM 05/30/2024

Figure 8.4-44: Emission mask, beyond  $\pm 250\%$  of BW (low frequency range), High channel: 16.55 GHz, shortest pulse. (25 MHz BW)



01:11:17 PM 05/30/2024

Figure 8.4-45: Emission mask, beyond  $\pm 250\%$  of BW (high frequency range), High channel: 16.55 GHz, shortest pulse. (25 MHz BW)



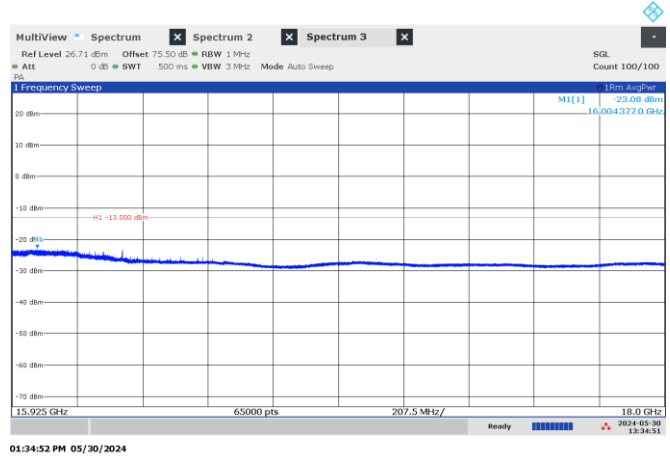
01:13:03 PM 05/30/2024

Figure 8.4-46: Emission mask, beyond  $\pm 250\%$  of BW (low frequency range), Low channel: 15.80 GHz, shortest pulse. (50 MHz BW)



01:30:47 PM 05/30/2024

Figure 8.4-47: Emission mask, Low channel: 15.80 GHz, shortest pulse. (50 MHz BW)



01:34:52 PM 05/30/2024

Figure 8.4-48: Emission mask, beyond  $\pm 250\%$  of BW (high frequency range), Low channel: 15.80 GHz, shortest pulse. (50 MHz BW)