



# REPORT

For

## **Avari Wireless Inc.**

1400 112th Ave SE, Ste 100  
Bellevue, WA 98004

|               |                                    |
|---------------|------------------------------------|
| Date:         | June 11, 2024                      |
| Report No.:   | 20.01.22192-1                      |
| Revision No.: | Rev 1                              |
| Project No.:  | 22192                              |
| Equipment:    | Dual-Band Medium Power Remote Unit |
| Model No.:    | RU37-2-PS-FG-21-4N-A0-1            |
| FCC ID:       | 2BA6ERU372PSFG21A                  |

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Prepared by: LabTest Certification Inc.  
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## TEST REPORT

### FCC Part 15, Subpart B - Unintentional Radiators FCC Part 90 - Private Land Mobile Radio Services

|                                                                                        |                                                                                                 |                  |
|----------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|------------------|
| <b>Report Reference No.</b> .....                                                      | 20.01.22192-1                                                                                   |                  |
| <b>Report Revision History</b> .....                                                   | ✓ Rev. 0<br>✓ Rev.1                                                                             |                  |
| <b>Compiled by (+ signature)</b> .....                                                 | Zara Vali                                                                                       | <i>Zara Vali</i> |
| <b>Approved by (+ signature)</b> .....                                                 | Jack Qin                                                                                        | <i>Jack Qin</i>  |
| <b>Date of issue</b> .....                                                             | June 11, 2024                                                                                   |                  |
| <b>Total number of pages</b> .....                                                     | 85                                                                                              |                  |
| <b>FCC Site Registration No.:</b> CA5970                                               |                                                                                                 |                  |
| <b>IC Site Registration No.:</b> 5970A-2                                               |                                                                                                 |                  |
| <b>Testing Laboratory</b> ..... LabTest Certification Inc.                             |                                                                                                 |                  |
| <b>Address</b> ..... Unit 3128-20800 Westminster HWY, Richmond, B.C.<br>V6V 2W3 Canada |                                                                                                 |                  |
| <b>Applicant's name</b> ..... Avari Wireless Inc.                                      |                                                                                                 |                  |
| <b>Address</b> ..... 1400 112th Ave SE, Ste 100 Bellevue, WA 98004                     |                                                                                                 |                  |
| <b>Manufacture's Name</b> ..... Avari Wireless Inc.                                    |                                                                                                 |                  |
| <b>Address</b> ..... 1400 112th Ave SE, Ste 100 Bellevue, WA 98004                     |                                                                                                 |                  |
| <b>Test specification:</b>                                                             |                                                                                                 |                  |
| <b>Standards</b> .....                                                                 | ➤ FCC Part 90 Private Land Mobile Radio Services                                                |                  |
| <b>Test procedure</b> .....                                                            | ➤ KDB 935210 D05 Indus Booster Basic Meas v01r04<br>➤ ANSI/TIA-603- E-2016<br>➤ ANSI C63.4:2014 |                  |
| <b>Test item description :</b>                                                         |                                                                                                 |                  |
| <b>Trade Mark</b> .....                                                                | RU37™                                                                                           |                  |
| <b>Model/Type reference</b> .....                                                      | RU37-2-PS-FG-21-4N-A0-1                                                                         |                  |
| <b>Serial Number</b> .....                                                             | 10911139E01BD2001                                                                               |                  |
| <b>FCC ID</b> .....                                                                    | 2BA6ERU372PSFG21A                                                                               |                  |
| <b>Possible test case verdicts:</b>                                                    |                                                                                                 |                  |

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|                                                     |                   |
|-----------------------------------------------------|-------------------|
| - test case does not apply to the test object ..... | N/A               |
| - test object does meet the requirement.....        | P (Pass)          |
| - test object does not meet the requirement.....    | F (Fail)          |
| Date of receipt of test item .....                  | February 12, 2024 |
| Date of performance of tests .....                  | February 12, 2024 |

## Revision History

| Revision | Date          | Reason For Change                        | Author    |
|----------|---------------|------------------------------------------|-----------|
| 0        | May 3rd, 2024 | Initial Data                             | Zara Vali |
| 1        | June 11, 2024 | Updating standards for radiated emission | Zara Vali |

## Result Summary

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                           |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|
| <b>Tests performed:</b><br><b>Conducted Measurement</b><br><b>Radiated Emissions on Enclosure</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | <b>Testing location:</b><br><b>Bench top, Richmond Lab</b><br><b>In SAC, Richmond Lab</b> |
| <p>The tests indicated in Test Summary were performed on the product constructed as described below.</p> <p>The test sections are the verbatim text from the actual data sheets used during the investigation. These test sections include the test name, the specified test Method, a list of the actual Test Equipment Used, documentation Photos, Results and raw Data. No additions, deviations, or exclusions have been made from the standard(s) unless specifically noted.</p> <p>Based on the results of our investigation, we have concluded the product tested <b>complies</b> with the requirements of the standard(s) indicated. The results obtained in this test report pertain only to the item tested. LabTest does not make any claims of compliance for samples or variants which were not tested.</p> <p>The Compliance Status is a judgment based on the direct measurements and calculated highest emissions to appropriate standard limits. Measurement uncertainty values, provided on calibration certificates, were not be used in the judgment of the final status of compliance.</p> |                                                                                           |

| Test Item                                                                                       | Regulation                                     | Measurement Method                                                            | Result |
|-------------------------------------------------------------------------------------------------|------------------------------------------------|-------------------------------------------------------------------------------|--------|
| AGC Threshold                                                                                   | FCC Part 2 2.1046(a)<br>FCC Part 90.219(d)     | ANSI TIA-603- E-2016<br>KDB 935210 D05,<br>v01r03, Section 4.2                | PASS   |
| Occupied Bandwidth                                                                              | FCC Part 2 2.1049                              | ANSI/TIA-603- E-2016;<br>KDB 935210 D05, v01r03                               | PASS   |
| Out of Band Rejection                                                                           | FCC Part 2 2.1046(a)<br>FCC Part 90.219(d)     | ANSI TIA-603- E-2016<br>KDB 935210 D05,<br>v01r03, Section 4.3                | PASS   |
| Input-versus-output Signal<br>Comparison                                                        | FCC Part 90.210 (j) (h) (g)<br>(c) (d) and (e) | ANSI TIA-603- E-2016<br>KDB 935210 D05,<br>v01r03, Section 4.4                | PASS   |
| Input/output Power and<br>Amplifier/Booster Gain                                                | FCC Part 90.219                                | ANSI TIA-603- E-2016<br>KDB 935210 D05,<br>v01r03, Section 4.5                | PASS   |
| Noise Figure                                                                                    | FCC Part 90.219                                | ANSI TIA-603- E-2016<br>KDB 935210 D05,<br>v01r03, Section 4.6                | PASS   |
| Measuring out-of-band/out-of-<br>block (including<br>intermodulation) and spurious<br>emissions | FCC Part 90.219                                | ANSI TIA-603- E-2016<br>KDB 935210 D05,<br>v01r03, Section 4.7                | PASS   |
| Frequency stability                                                                             | NA                                             | ANSI TIA-603- E-2016<br>KDB 935210 D05,<br>v01r03, Section 4.8                | PASS   |
| Spurious emissions<br>radiated measurements                                                     | FCC Part 90<br>(§ 90.219 and § 90.210)         | ANSI C63.4:2014<br>KDB 935210 D05,<br>v01r03, Section 4.9<br>ANSI C63.26-2015 | PASS   |
| Radiated Emissions                                                                              | FCC Part 90<br>(§ 90.219 and § 90.210)         | ANSI C63.4:2014, CISPR 16-2-1<br>ANSI C63.26-2015<br>KDB 935210 D05 v01r04    | PASS   |
| Conducted Emissions at AC<br>Main                                                               | FCC Part 15 Subpart B<br>(§ 15.107)            | ANSI C63.4:2014, CISPR 16-2-1                                                 | PASS   |

## 1. EUT Information

### EUT Description and Variant Models

#### Description:

The RU37 800PS/415PS/150 PS is a tri-band remote unit that provides at least 5 W of output power on each band. The tri-band unit supports up to 3 bands in a sealed type 2 chassis for Class A operation. On the downlink path the RU37 PS remote receives an aggregated stream of digitized RF signals from an DMU PS, which it then converts into analog RF signals. Depending on the frequency band, the signal is amplified in the RF module and then sent out through simplex RF ports to an external filter. On the UL path the RU37 PS remote receives analog RF signals for the RF band, from an external filter. The RF signals are converted into a digital data stream and then delivered over optical fiber to an DMU

PS. The RU37 PS remote also accommodates a 1 Gbps Ethernet backhaul for transporting the data from nearby IP devices such as security cameras and Wi-Fi access points. The intentional transmitter only exists in the downlink path and hence the EMC tests in this report dedicated to the downlink emission.

In order to build up a complete signal booster system, the DMU PS was connected as the Auxiliary device. The DMU PS does not have an antenna port, where the signal was injected and ejected via coaxial cables.

EUT Picture



#### Variant Models:

The following variant models were not tested as part of this evaluation but have been identified by the manufacturer as being electrically identical models, depopulated models, or with reasonable similarity to the model(s) tested. Intertek does not make any claims of compliance for samples or variants which were not tested.

RU37-2-PS-FG-21-4N-A0-1 Dual Band UHF VHF model as tested

Dual Band

1. RU37-2-PS-FG-21-4N-D0-1
2. RU33-2- PS-FG-21-4N-D0-1

Single Band  
3. RU37-1-PS-F-21-2N-D0-1  
4. RU33-1- PS-F-21-2N-D0-1  
5. RU37-1-PS-G-21-2N-D0-1  
6. RU33-1- PS-G-21-2N-D0-1

|                                           |                                                                                                                                         |
|-------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|
| Application for .....                     | PS 415/150 Remote Unit, Dual Band Medium Power DAS                                                                                      |
| Passing Transmit Frequency .....          | 400 MHz – 425 MHz<br>152 MHz – 174 MHz                                                                                                  |
| Operating Transmit Frequency<br>FCC ..... | 406.1 MHz – 425 MHz<br>150.8 MHz – 156.2475 MHz<br>157.1875 MHz – 161.575 MHz<br>161.775 MHz – 161.9625 MHz<br>162.0375 MHz – 173.4 MHz |
| Passing Receive Frequency .....           | 405 MHz – 430 MHz<br>152 MHz – 174 MHz                                                                                                  |
| Operating Receive Frequency<br>FCC .....  | 406.1 MHz – 430 MHz<br>150.8 MHz – 156.2475 MHz<br>157.1875 MHz – 161.575 MHz<br>161.775 MHz – 161.9625 MHz<br>162.0375 MHz – 173.4 MHz |
| Number of Channels .....                  | Up to 64 channels                                                                                                                       |
| Rated RF Output (e.i.r.p.) .....          | 37 dBm                                                                                                                                  |
| Modulation Type .....                     | P25 Phase I C4FM, CQPSK; P25 Phase II HDQPSK on full band of Band 415 and Band 150                                                      |
| Equipment mobility .....                  | Fixed                                                                                                                                   |
| Operating condition.....                  | -40 to +50 °C                                                                                                                           |
| Mass of equipment (g) .....               | < 27,700g                                                                                                                               |
| Dimensions (W X D X H)                    | 410 mm X 230 mm X 696 mm                                                                                                                |
| Nominal Voltages for:                     | <u>48 V</u> stand-alone equipment<br><u>48 V</u> combined (or host) equipment                                                           |
| Supply Voltage:                           | _____ AC _____ Amps<br><u>48V</u> DC <u>7.1</u> Amps                                                                                    |

|              |                                                           |
|--------------|-----------------------------------------------------------|
| If DC Power: | <input type="checkbox"/> Internal Power Supply            |
|              | <input checked="" type="checkbox"/> External Power Supply |
|              | <input type="checkbox"/> Battery                          |
|              | <input type="checkbox"/> Nickel Cadmium                   |
|              | <input type="checkbox"/> Alkaline                         |
|              | <input type="checkbox"/> Nickel-Metal Hydride             |
|              | <input type="checkbox"/> Lithium-Ion                      |
|              | <input type="checkbox"/> Other                            |

### Client Equipment Used During Test

| Use*                                                                                                                           | Product Type               | Manufacturer        | Model                    | Comments                                                                                             |
|--------------------------------------------------------------------------------------------------------------------------------|----------------------------|---------------------|--------------------------|------------------------------------------------------------------------------------------------------|
| EUT                                                                                                                            | <i>RU37, 415PS, 150 PS</i> | Avari Wireless Inc. | RU37-2-PS-FG-21-4N-A0-1  | EUT where the RF (I/O) antenna is attached via duplexers/multiplexer when necessary.                 |
| AE1                                                                                                                            | <i>DMU, 415PS, 150PS</i>   | Avari Wireless Inc. | VL-DMU-2-PS-FG-1-4N-D-1F | Auxiliary equipment, which is the front end of system interfaced to Base Station.                    |
| AE2                                                                                                                            | Element Manager (DMC)      | Avari Wireless Inc. | EM-1A                    | Auxiliary equipment provides the configuration and control interface to <i>DMU</i> and <i>RU37</i> . |
| AE3                                                                                                                            | Power Supply               | MeanWell            | HGL-480H-48              | AC to DC Converter,<br>I/P: 120VAC, 60Hz, 5.5A<br>O/P: +48VDC, 480W                                  |
| Abbreviations:<br>EUT - Equipment Under Test<br>AE - Auxiliary/Associated Equipment<br>SIM - Simulator (Not Subjected to Test) |                            |                     |                          |                                                                                                      |

### Software and Firmware

| Use*                                                                                                                                | Description        | Version      |
|-------------------------------------------------------------------------------------------------------------------------------------|--------------------|--------------|
| EUT                                                                                                                                 | Software installed | 5.6.0-0.5750 |
| AE1                                                                                                                                 | Software installed | 5.6.0-0.5750 |
| AE2                                                                                                                                 | Software installed | 5.7.1-1385   |
| Abbreviations:<br>EUT - Equipment Under Test,<br>AE - Auxiliary/Associated Equipment, or<br>SIM - Simulator (Not Subjected to Test) |                    |              |

## Input/Output Ports

| Port #                                                                                                                                                                   | Name                        | Type* | Cable Max. >3m | Cable Shielded | Comments                  |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|-------|----------------|----------------|---------------------------|
| 1                                                                                                                                                                        | DC Power Port               | DC    | No             | No             | Dual feed 48 VDC Assembly |
| 2                                                                                                                                                                        | 4 * RF Input/Output Ports   | I/O   | No             | No             | N-Type Coaxial            |
| 3                                                                                                                                                                        | 2 * Optical Fibre I/O Ports | I/O   | No             | No             | LC/UPC Duplex             |
| 4                                                                                                                                                                        | 2 * TP                      | TP    | No             | No             | RJ-45                     |
| *Note: AC = AC Power Port DC = DC Power Port N/E = Non-Electrical<br>I/O = Signal Input or Output Port (Not Involved in Process Control)<br>TP = Telecommunication Ports |                             |       |                |                |                           |

## Power Interface

| Mode # | Voltage (V) | Current (A) | Power (W) | Frequency (DC/AC-Hz) | Phases (#) | Comments                                       |
|--------|-------------|-------------|-----------|----------------------|------------|------------------------------------------------|
| 1      | 48          | 7.1         | 340       | DC                   | -          | DC power port is connected to AC/DC convertor. |

## EUT Operation Modes

| Mode # | Description                             |
|--------|-----------------------------------------|
| 1      | UL and DL transmission and receiving ON |

## EUT Configuration Modes

| Mode # | Description                                                                                                                    |
|--------|--------------------------------------------------------------------------------------------------------------------------------|
| 1      | DMU maximum input threshold set to -10 dBm, uplink attenuation set to 0dB;<br>RU37 uplink and downlink attenuation set to 0dB. |

## 2. Description of Test Setup

### Test Equipment Verified for function

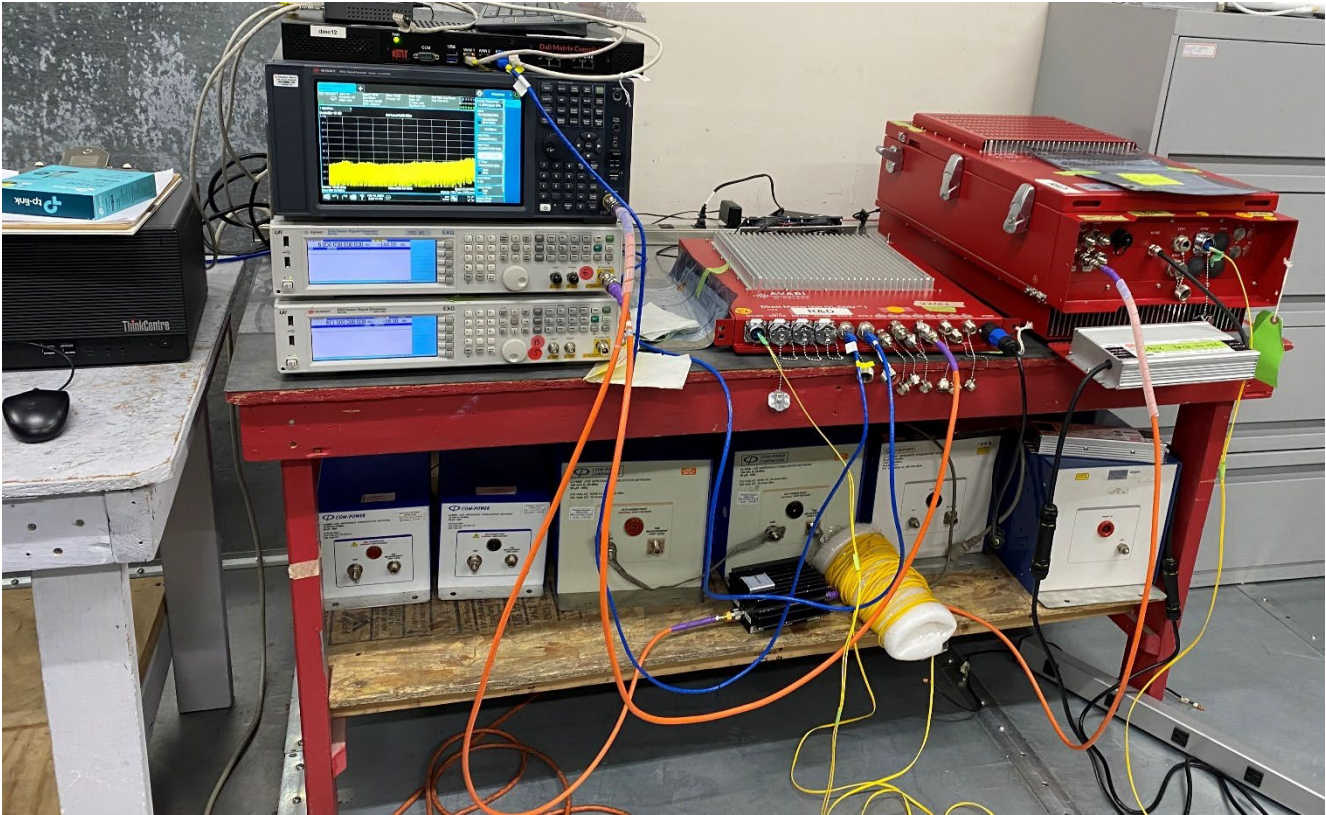
| Model #   | Description               | Checked Function                       | Results                                                  |
|-----------|---------------------------|----------------------------------------|----------------------------------------------------------|
| KT-N9038A | Spectrum Analyzer         | Frequency and Amplitude                | Connected 50MHz and -20 dBm<br>Ref_signal and checked OK |
| JB1       | Antenna,<br>30 to 2000MHz | Checked structure                      | Normal – no damage                                       |
| SAS-571   | Antenna,<br>1 to 18GHz    | Checked structure                      | Normal – no damage                                       |
| KT-N5172B | Signal Generator          | Frequency, Amplitude and<br>Modulation | Within MFR Specs                                         |
| KT-N9020B | Spectrum Analyzer         | Frquency and Amplitude                 | Within MFR Specs                                         |

### Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests:

| Parameter                          | Uncertainty |
|------------------------------------|-------------|
| Radio Frequency                    | ±1 ppm      |
| Total RF Power: Conducted          | ±1 dB       |
| RF Power Density: Conducted        | ±2.75 dB    |
| Spurious Emissions: Conducted      | ±3 dB       |
| Temperature                        | ±1 °C       |
| Humidity                           | ±5 %        |
| DC and Low Frequency Voltages      | ±3 %        |
| Radiated Emission, 30 to 18,000MHz | ± 4.95 dB   |

## Test Station Photo



## Test Station Cables and Loads

| Model #         | Manufacture | Description                                   |
|-----------------|-------------|-----------------------------------------------|
| 3 x TM8-N1S1-60 | MegaPhase   | N male to SMA male coaxial cable in 60 inches |
| 1 x 49-30-34    | Aeroflex    | 30dB 25W attenuator                           |

## Test Station Insertion Loss

|                | Band 415 | Band 150 |
|----------------|----------|----------|
| DL Transmitter | 31.1 dB  | 30.7 dB  |
| UL Receiver    | 0.8 dB   | 0.8 dB   |

### 3. Test Result

#### 3.1 AGC Threshold

|                                                                                                                              |                                                                                                                                       |                           |                      |                  |                 |
|------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|---------------------------|----------------------|------------------|-----------------|
| Governing Doc                                                                                                                | FCC Part 2 2.1046(a)<br>FCC Part 90.219(d)                                                                                            | Room Temperature (°C)     | 21                   |                  |                 |
| Test Procedure                                                                                                               | ANSI TIA-603- E-2016<br>KDB 935210 D05,<br>v01r03, Section 4.2                                                                        | Relative Humidity (%)     | 45                   |                  |                 |
| Test Location                                                                                                                | Richmond                                                                                                                              | Barometric Pressure (hPa) | 1012                 |                  |                 |
| Test Engineer                                                                                                                | Zara Vali                                                                                                                             | Date                      | February 12,<br>2024 |                  |                 |
| EUT Voltage                                                                                                                  | <input checked="" type="checkbox"/> +48VDC <input type="checkbox"/> 120VAC @ 60Hz                                                     |                           |                      |                  |                 |
| Test Equipment Used                                                                                                          | Manufacturer                                                                                                                          | Model                     | Serial Number        | Calibration date | Calibration due |
| Signal Generator                                                                                                             | Keysight                                                                                                                              | N5172B                    | MY53050270           | Dec 12, 2023     | Dec 12, 2026    |
| Spectrum Analyzer                                                                                                            | Keysight                                                                                                                              | N9020B                    | MY62153079           | Oct 25, 2023     | Aug 1, 2025     |
| Frequency Range:                                                                                                             | <input checked="" type="checkbox"/> 400 MHz – 425 MHz; <input checked="" type="checkbox"/> 152 MHz – 174 MHz                          |                           |                      |                  |                 |
| Detector:                                                                                                                    | <input checked="" type="checkbox"/> Peak                                                                                              |                           |                      |                  |                 |
| Type of Facility:                                                                                                            | <input checked="" type="checkbox"/> Test bench                                                                                        |                           |                      |                  |                 |
| Distance:                                                                                                                    | <input checked="" type="checkbox"/> Direct                                                                                            |                           |                      |                  |                 |
| Arrangement of EUT:                                                                                                          | <input checked="" type="checkbox"/> Table-top only <input type="checkbox"/> Floor-standing only <input type="checkbox"/> Rack Mounted |                           |                      |                  |                 |
| Output Power is less than or equal 37.08 dBm in band 415, and less than or equal 37.09 dBm in band 150.                      |                                                                                                                                       |                           |                      |                  |                 |
| Compliant <input checked="" type="checkbox"/> Non-Compliant <input type="checkbox"/> Not Applicable <input type="checkbox"/> |                                                                                                                                       |                           |                      |                  |                 |

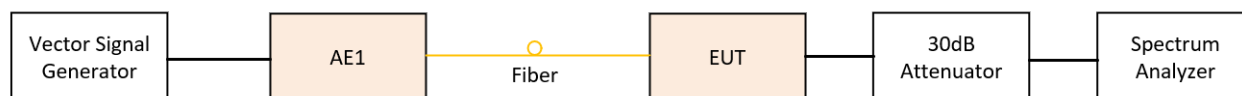
## Test setup

### Description of test set-up:

Output power is measured by connecting a spectrum analyzer to RF output connector of EUT via 30dB attenuator. With a nominal input power and the amplifier properly adjusted the RF output is measured.

The EUT was set to **Operation Mode #1 with configuration Mode #1**.

The maximum output power is measured when the Automatic Level Control (ALC) starting to compress the power and hold to a constant level.



## Results – Output Power FCC Requirement

| Frequency Range (MHz) | Frequency (MHz) | Input Power Trip ALC (dBm) | Output Power (dBm) | Output Power (Watt) |
|-----------------------|-----------------|----------------------------|--------------------|---------------------|
| 415PS<br>406 - 415    | 406.1           | -10.6                      | 36.99              | 5.0                 |
|                       | 415.5           | -10.8                      | 37.03              | 5.04                |
|                       | 424.9           | -11.0                      | 37.08              | 5.11                |
| 150PS<br>152 - 174    | 153             | -10.8                      | 36.94              | 4.94                |
|                       | 161.5           | -11.4                      | 37.03              | 5.04                |
|                       | 170             | -11.2                      | 37.09              | 5.12                |

### 3.2 Occupied Bandwidth

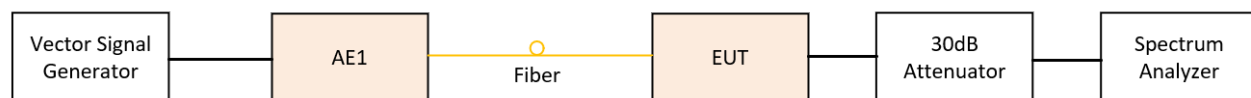
|                                                                                                                                                                                                                                                                                                                               |                                                                                                                                       |                           |                   |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|---------------------------|-------------------|
| Governing Doc                                                                                                                                                                                                                                                                                                                 | FCC Part 2 2.1049                                                                                                                     | Room Temperature (°C)     | 21                |
| Test Procedure                                                                                                                                                                                                                                                                                                                | ANSI/TIA-603- E-2016;<br>KDB 935210 D05, v01r03                                                                                       | Relative Humidity (%)     | 45                |
| Test Location                                                                                                                                                                                                                                                                                                                 | Richmond                                                                                                                              | Barometric Pressure (hPa) | 1012              |
| Test Engineer                                                                                                                                                                                                                                                                                                                 | Zara Vali                                                                                                                             | Date                      | February 12, 2024 |
| EUT Voltage                                                                                                                                                                                                                                                                                                                   | <input checked="" type="checkbox"/> +48VDC <input type="checkbox"/> 120VAC @ 60Hz                                                     |                           |                   |
| Test Equipment Used                                                                                                                                                                                                                                                                                                           | Manufacturer                                                                                                                          | Model                     | Serial Number     |
| Signal Generator                                                                                                                                                                                                                                                                                                              | Keysight                                                                                                                              | N5172B                    | MY53050270        |
| Spectrum Analyzer                                                                                                                                                                                                                                                                                                             | Keysight                                                                                                                              | N9020B                    | MY62153079        |
| Frequency Range:                                                                                                                                                                                                                                                                                                              | <input checked="" type="checkbox"/> 400 MHz – 425 MHz; <input checked="" type="checkbox"/> 152 MHz – 174 MHz                          |                           |                   |
| Detector:                                                                                                                                                                                                                                                                                                                     | <input checked="" type="checkbox"/> Peak                                                                                              |                           |                   |
| Type of Facility:                                                                                                                                                                                                                                                                                                             | <input checked="" type="checkbox"/> Test bench                                                                                        |                           |                   |
| Distance:                                                                                                                                                                                                                                                                                                                     | <input checked="" type="checkbox"/> Direct                                                                                            |                           |                   |
| Arrangement of EUT:                                                                                                                                                                                                                                                                                                           | <input checked="" type="checkbox"/> Table-top only <input type="checkbox"/> Floor-standing only <input type="checkbox"/> Rack Mounted |                           |                   |
| Output signal has an occupied channel bandwidth less than the designated channel bandwidth on any location on the operating band. <ul style="list-style-type: none"> <li>- C4FM &lt; 12.5 kHz</li> <li>- CQPSK &lt; 6.25 kHz</li> <li>- HDQPSK &lt; 12.5 kHz</li> <li>- 4 kHz FM with 1kHz deviation &lt; 12.5 kHz</li> </ul> |                                                                                                                                       |                           |                   |
| Compliant <input checked="" type="checkbox"/> Non-Compliant <input type="checkbox"/> Not Applicable <input type="checkbox"/>                                                                                                                                                                                                  |                                                                                                                                       |                           |                   |

## Test setup

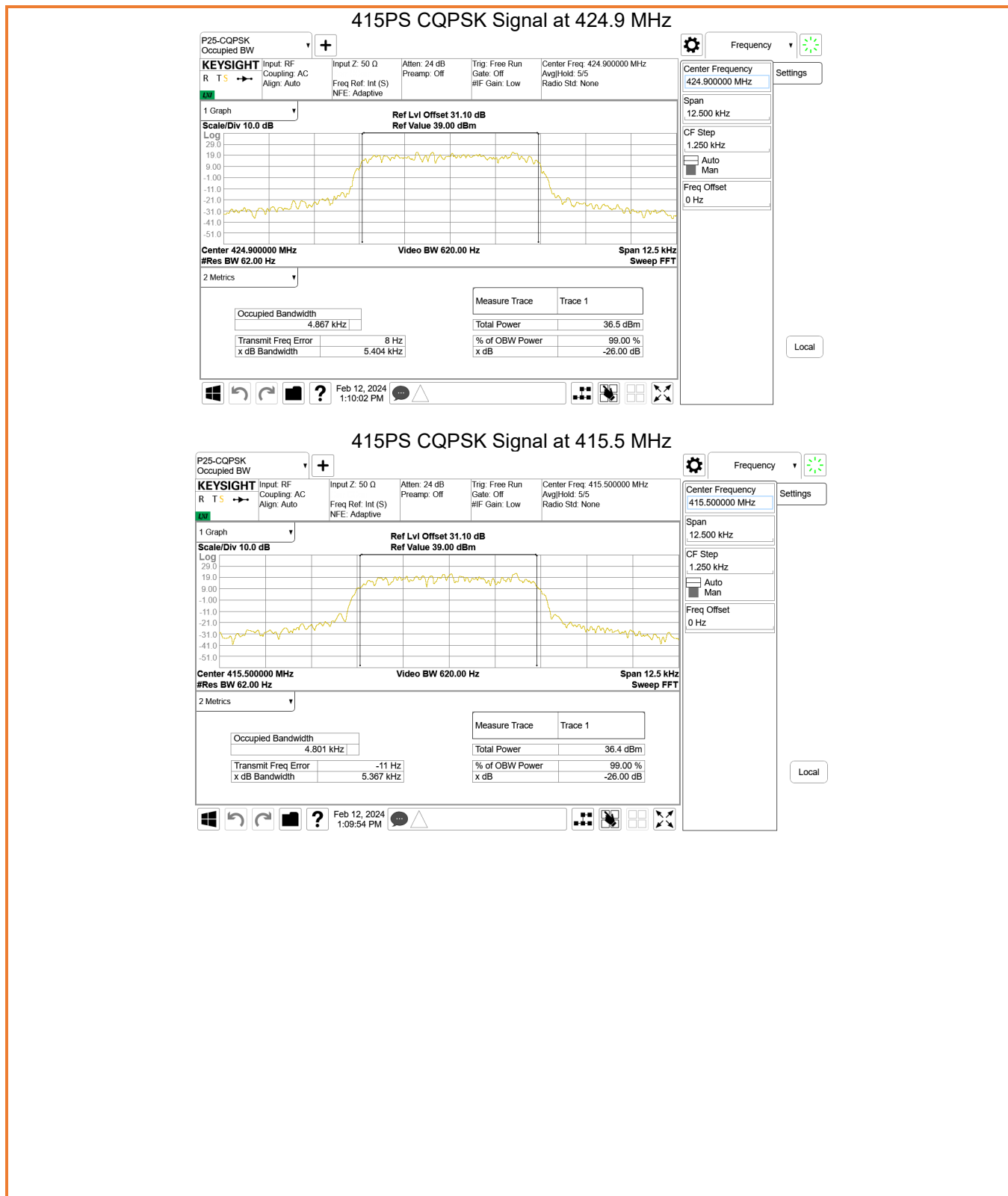
Occupied Bandwidth is measured by connecting a Spectrum Analyzer to the RF output connector via 30dB attenuator. The required measurement resolution bandwidth (RBW) is 1% of the emission bandwidth. 99% energy rule was applied to measure the occupied channel bandwidth. The emission bandwidth is measured as the width of the signal between two frequency points on the channel edge, outside of which the transmission power is attenuated at least 26dB below the transmitter output power

The EUT was set to **Operation Mode #1 with configuration Mode #1**.

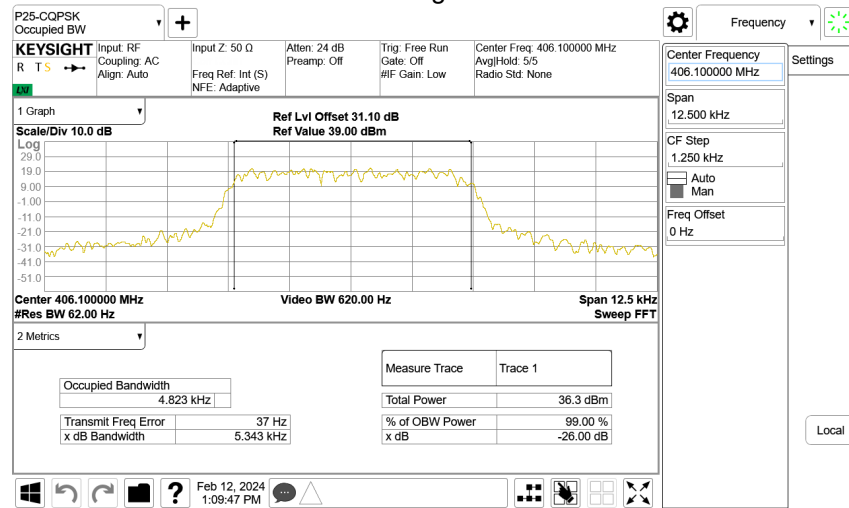
The occupied bandwidth of UL output is measured under one input conditions: Nominal: with input 0.5dB below AGC threshold



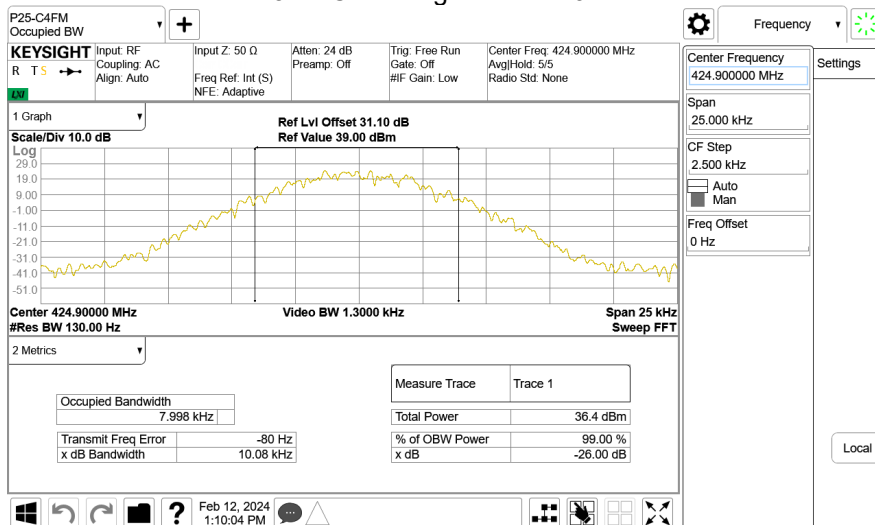
## Results – Occupied Bandwidth



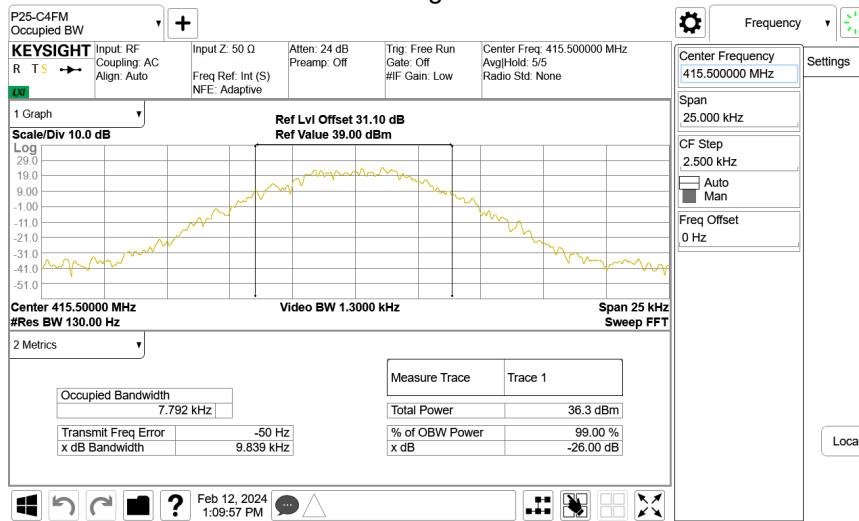
### 415PS CQPSK Signal at 406.1 MHz



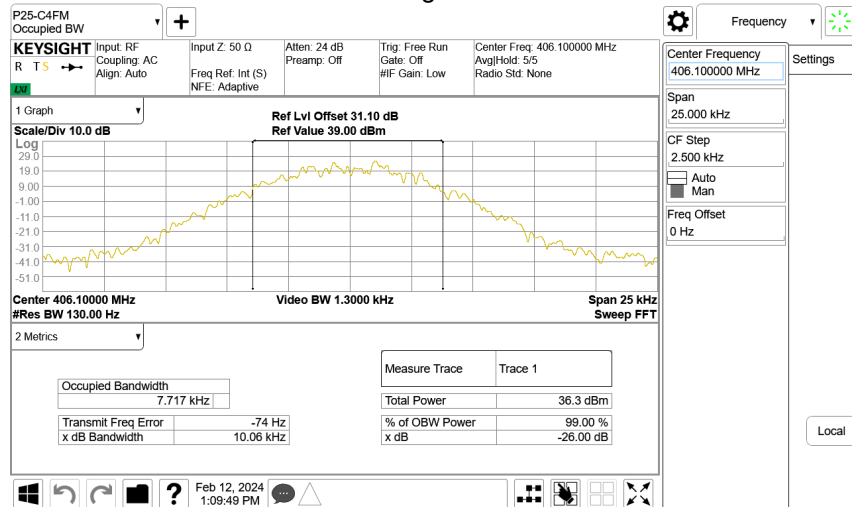
### 415PS C4FM Signal at 424.9 MHz



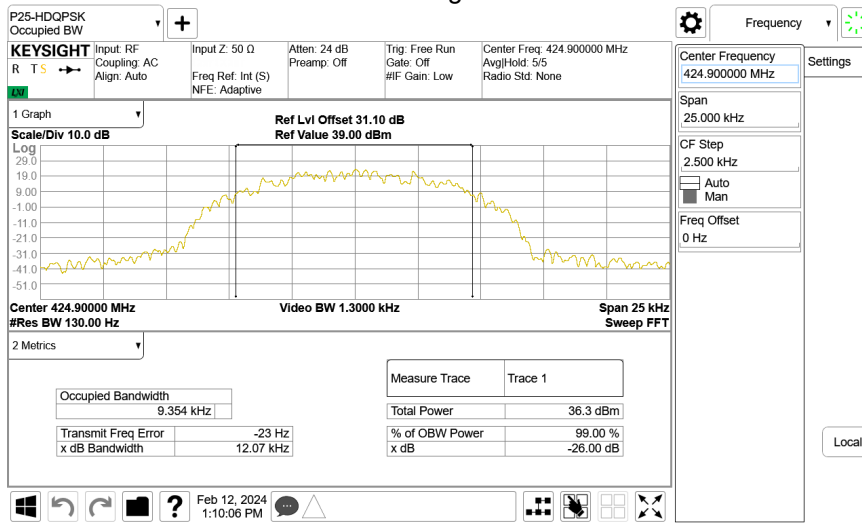
### 415PS C4FM Signal at 415.5 MHz



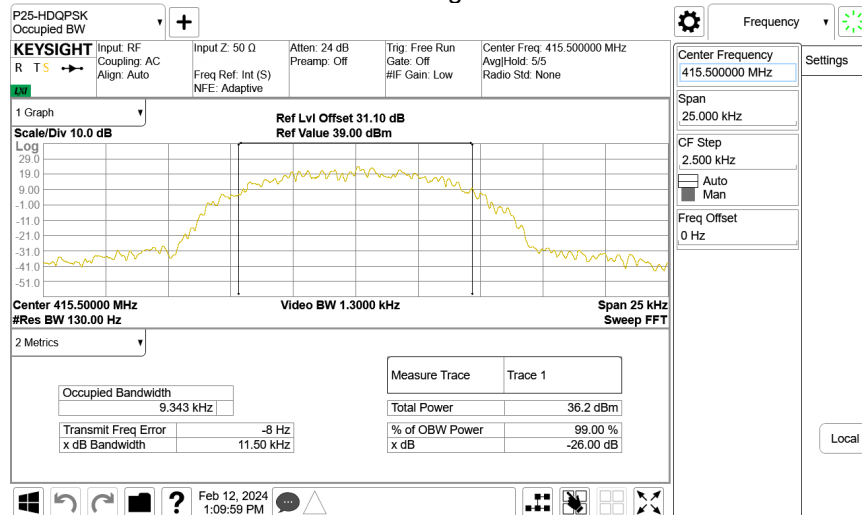
### 415PS C4FM Signal at 406.1 MHz



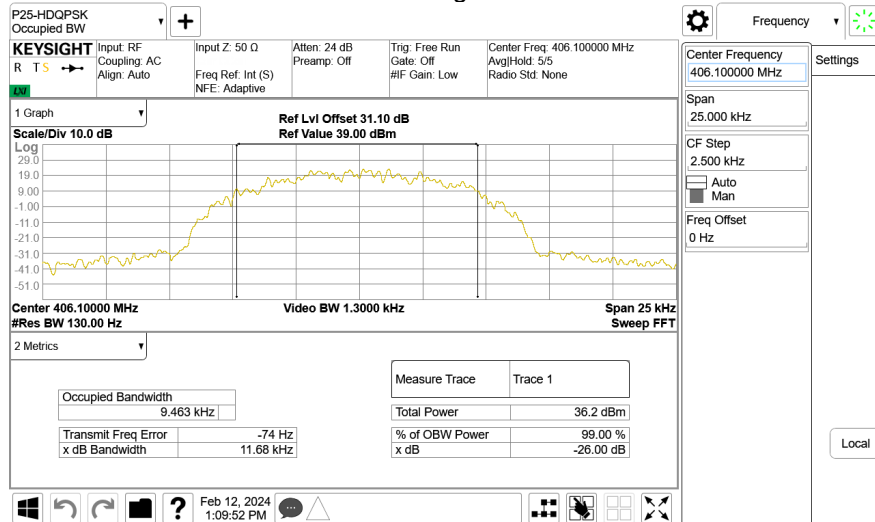
### 415PS HDQPSK Signal at 424.9 MHz



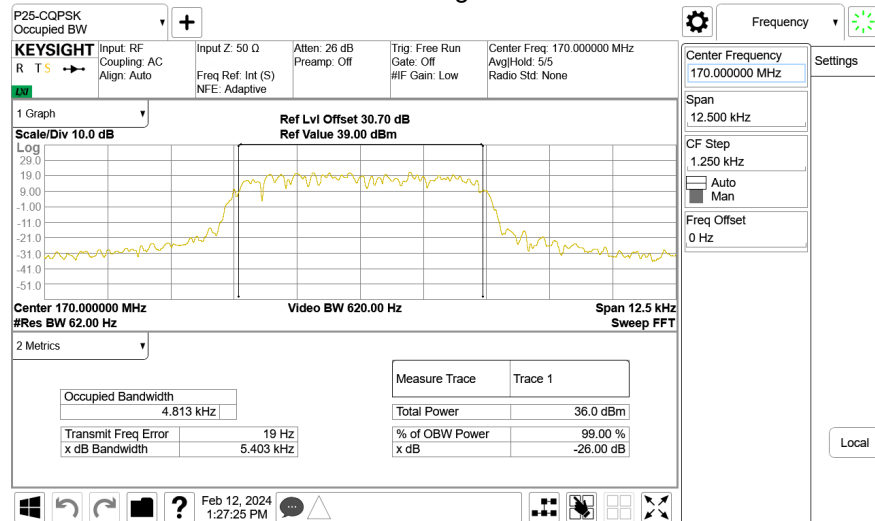
### 415PS HDQPSK Signal at 415.5 MHz



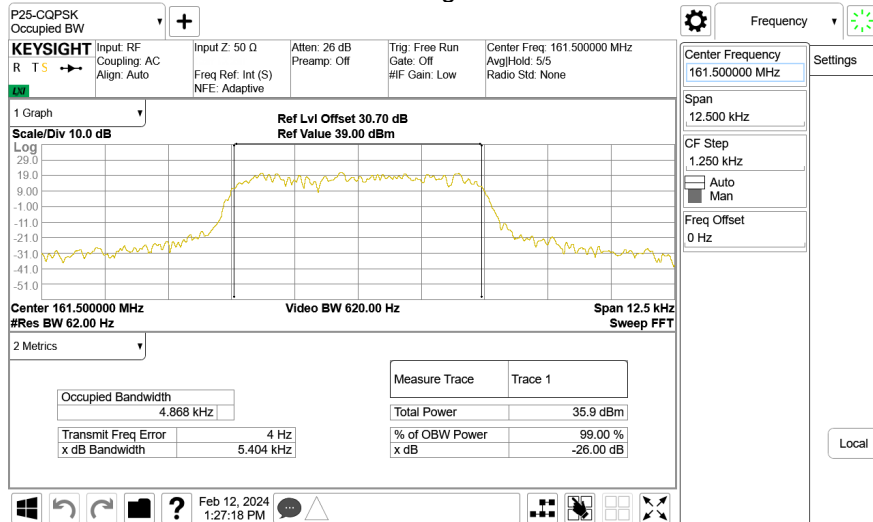
### 415PS HDQPSK Signal at 406.1 MHz



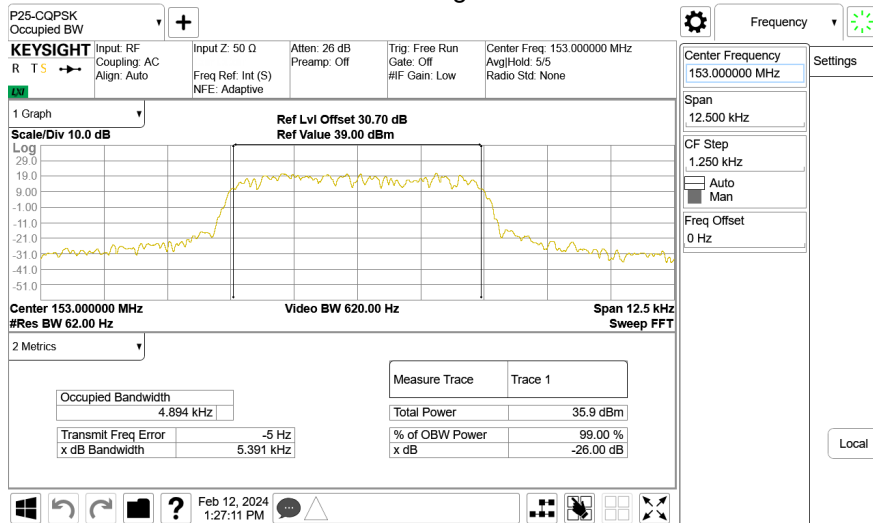
### 150PS CQPSK Signal at 170 MHz



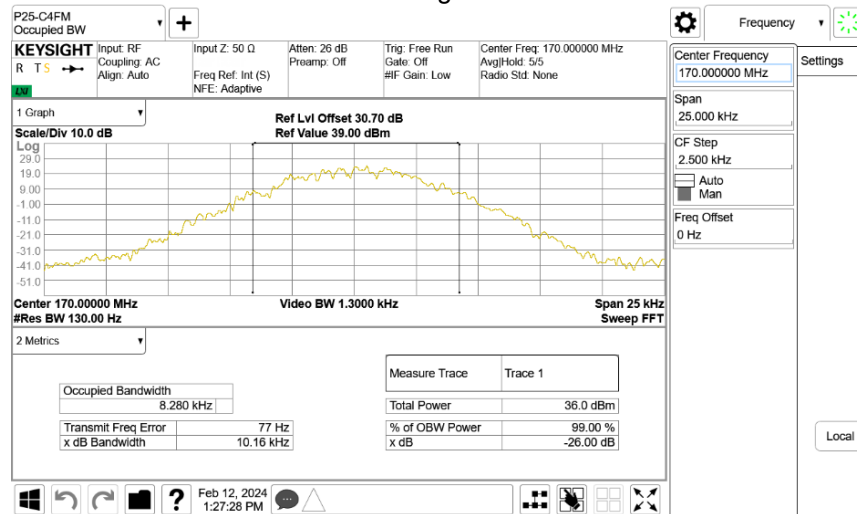
### 150PS CQPSK Signal at 161.5 MHz



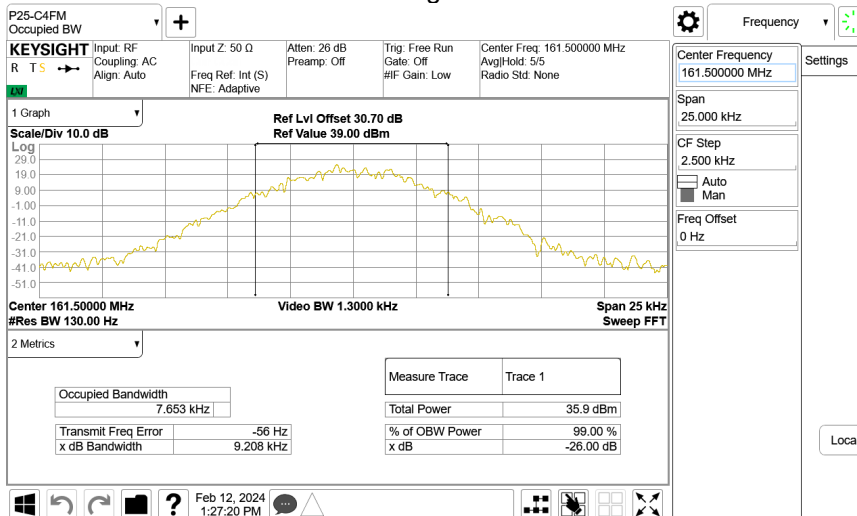
### 150PS CQPSK Signal at 153 MHz



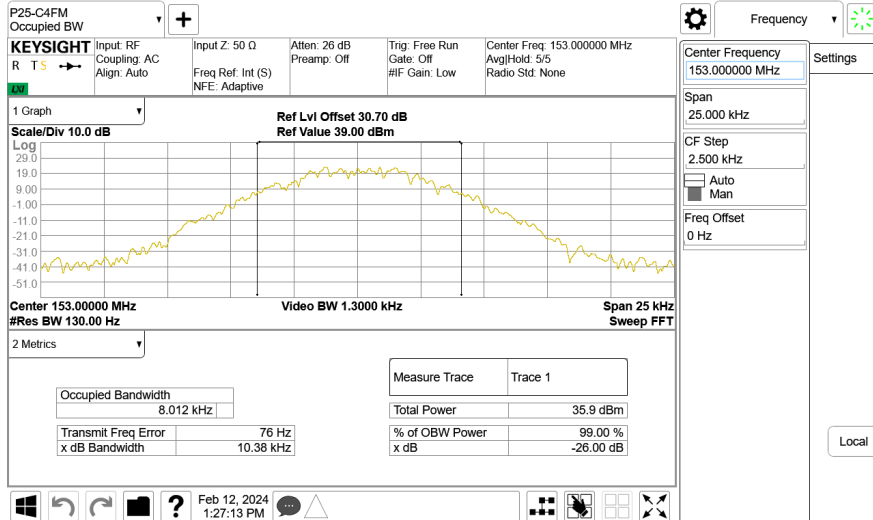
### 150PS C4FM Signal at 170 MHz



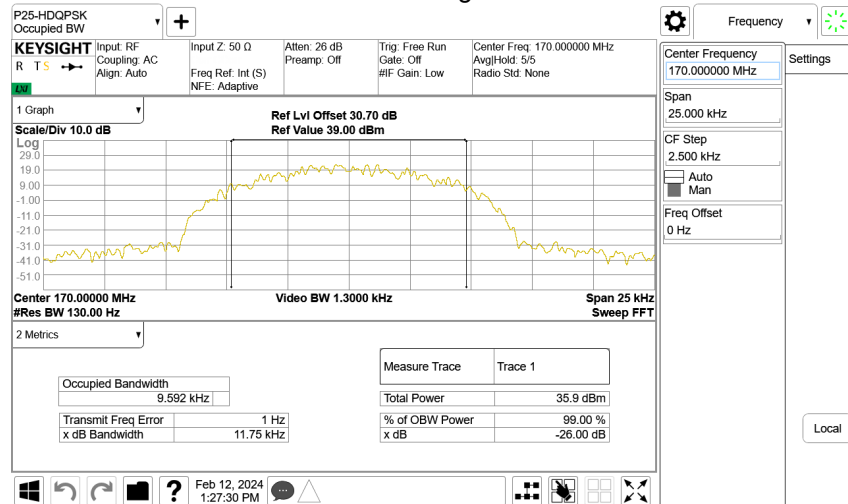
### 150PS C4FM Signal at 161.5 MHz

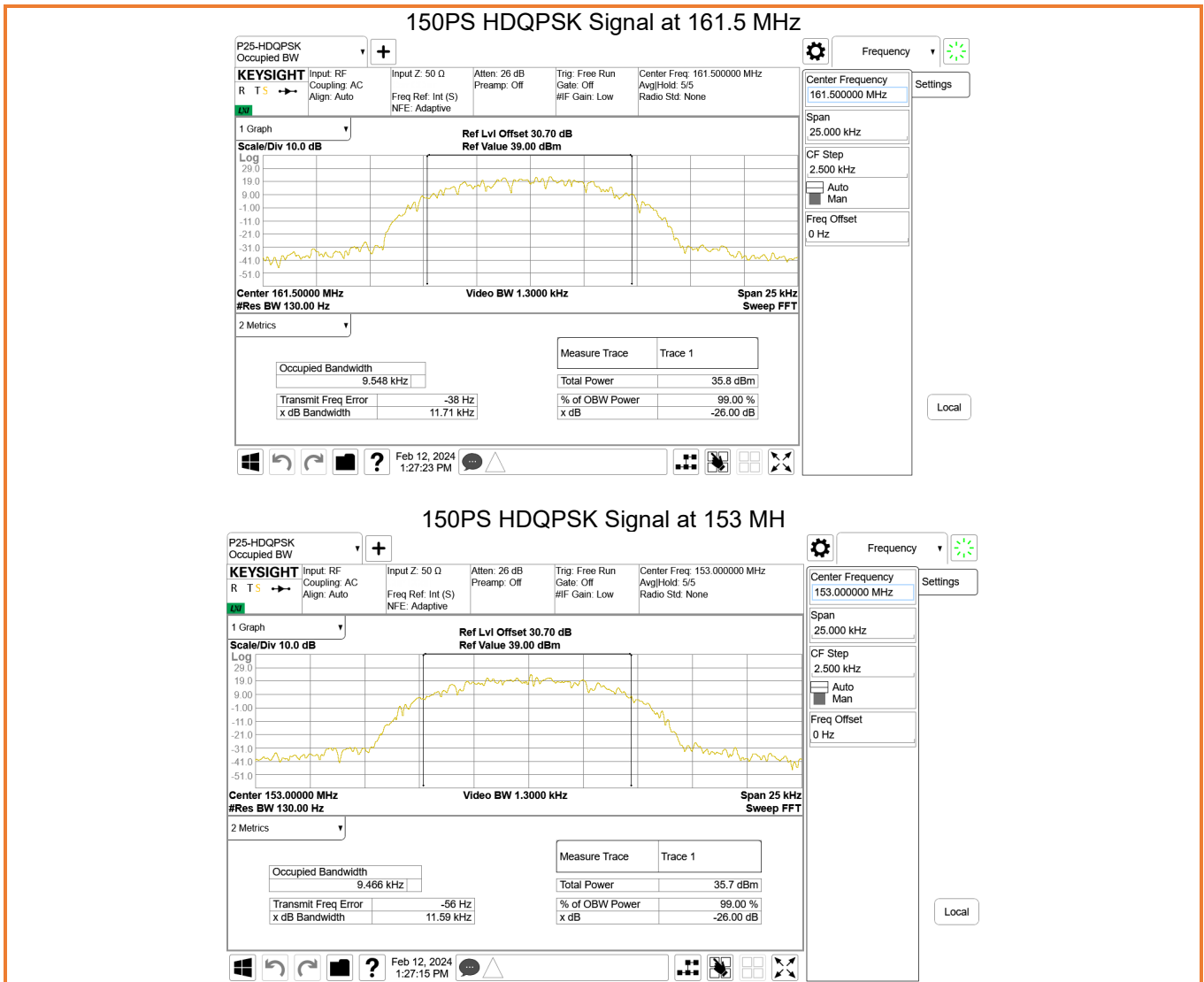


### 150PS C4FM Signal at 153 MHz



### 150PS HDQPSK Signal at 170 MHz





### 3.3 Out of Band Rejection

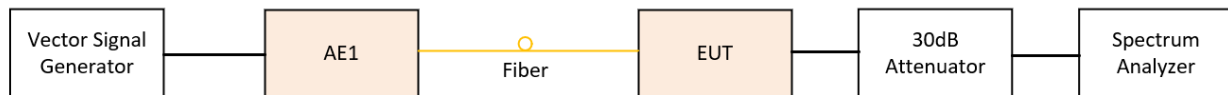
|                                                                                                                              |                                                                                              |                       |                   |                  |                 |
|------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------|-----------------------|-------------------|------------------|-----------------|
| Governing Doc                                                                                                                | FCC Part 2 2.1046(a)<br>FCC Part 90.219(d)                                                   | Room Temperature (°C) | 20.5              |                  |                 |
| Test Procedure                                                                                                               | ANSI/TIA-603- E;<br>FCC KDB 935210 D05, v01r03                                               | Relative Humidity (%) | 38.6              |                  |                 |
| Test Location                                                                                                                | Richmond                                                                                     | Barometric Pressure   | 101.8             |                  |                 |
| Test Engineer                                                                                                                | Zara Vali                                                                                    | Date                  | February 12, 2024 |                  |                 |
| EUT Voltage                                                                                                                  | <input checked="" type="checkbox"/> +48VDC <input type="checkbox"/> 120VAC @ 60Hz            |                       |                   |                  |                 |
| Test Equipment Used                                                                                                          | Manufacturer                                                                                 | Model                 | Serial Number     | Calibration date | Calibration due |
| Signal Generator                                                                                                             | Keysight                                                                                     | N5172B                | MY53050270        | Dec 12, 2023     | Dec 12, 2026    |
| Spectrum Analyzer                                                                                                            | Keysight                                                                                     | N9020B                | MY62153079        | Oct 25, 2023     | Aug 1, 2025     |
| Frequency Range:                                                                                                             | <input checked="" type="checkbox"/> Product Passband $\pm 250\%$                             |                       |                   |                  |                 |
| Detector:                                                                                                                    | <input checked="" type="checkbox"/> Peak                                                     |                       |                   |                  |                 |
| RBW/VBW:                                                                                                                     | <input checked="" type="checkbox"/> 1 to 5% of the EUT passband / $\geq 3 \times \text{RBW}$ |                       |                   |                  |                 |
| Type of Facility:                                                                                                            | <input checked="" type="checkbox"/> Tabletop                                                 |                       |                   |                  |                 |
| Distance:                                                                                                                    | <input checked="" type="checkbox"/> Direct                                                   |                       |                   |                  |                 |
| Compliant <input checked="" type="checkbox"/> Non-Compliant <input type="checkbox"/> Not Applicable <input type="checkbox"/> |                                                                                              |                       |                   |                  |                 |

### Test setup

The procedure used was ANSI/TIA-603-E-2016 and FCC KDB 935210 D05 Indus Booster Basic Meas v01r03. The signal booster was set to maximum gain. A swept CW signal was set to the range of  $\pm 250\%$  of the product pass band. The CW amplitude was set to 3 dB below the AGC threshold so that the ALC should not activate throughout the test.

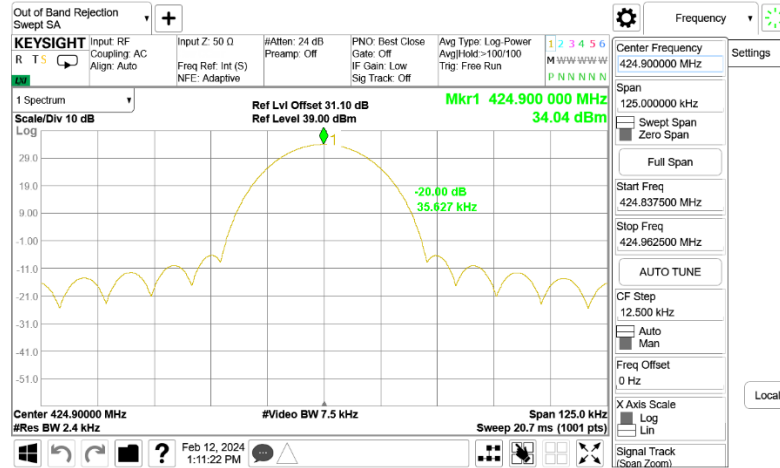
After the max-hold sweep trace was completed, a marker was set to the peak amplitude, and a 20dB bandwidth was measured between two additional markers fall 20 dB from the peak.

The EUT was set to **Operation Mode #1 with configuration Mode #1.**

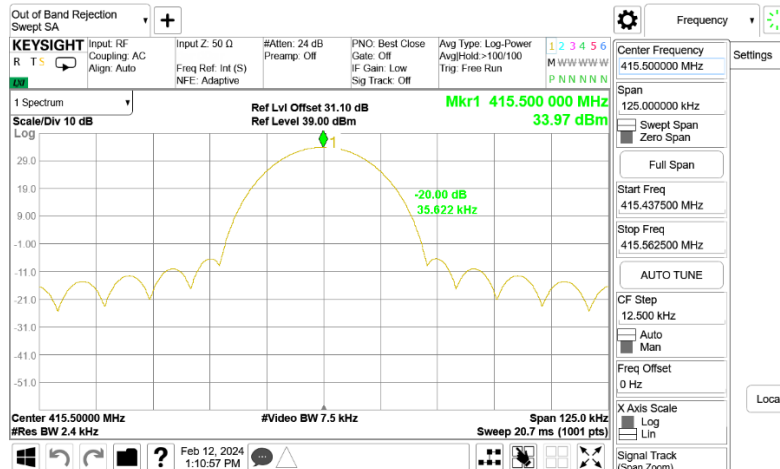


## Results

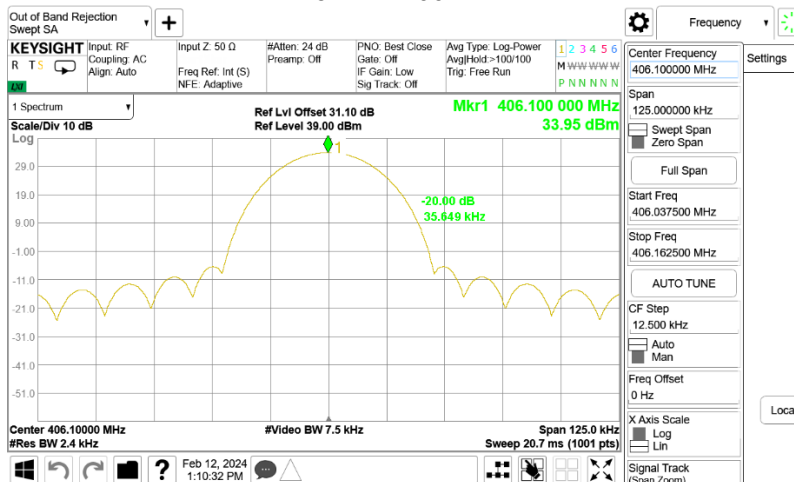
415PS at 424.9 MHz



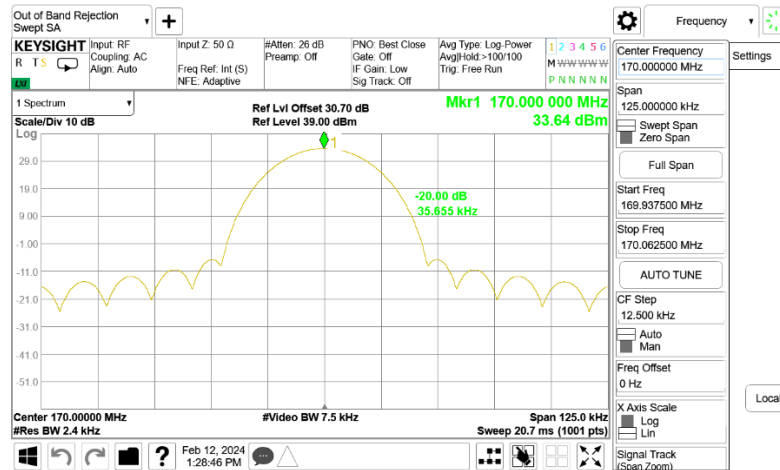
415PS at 415.5 MHz



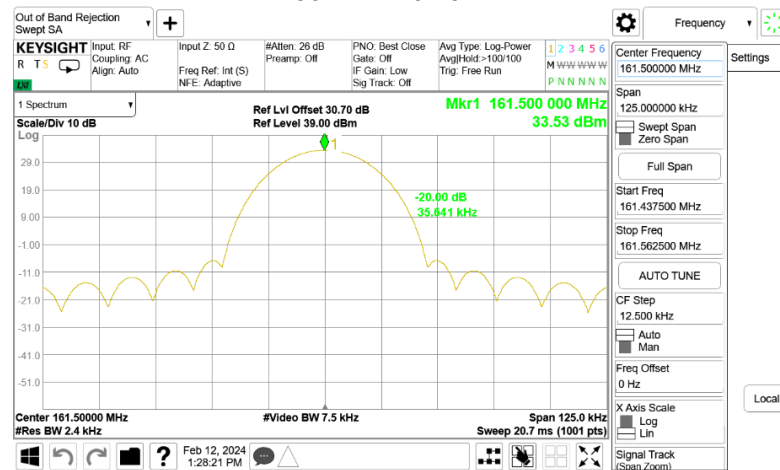
415PS at 406.1 MHz



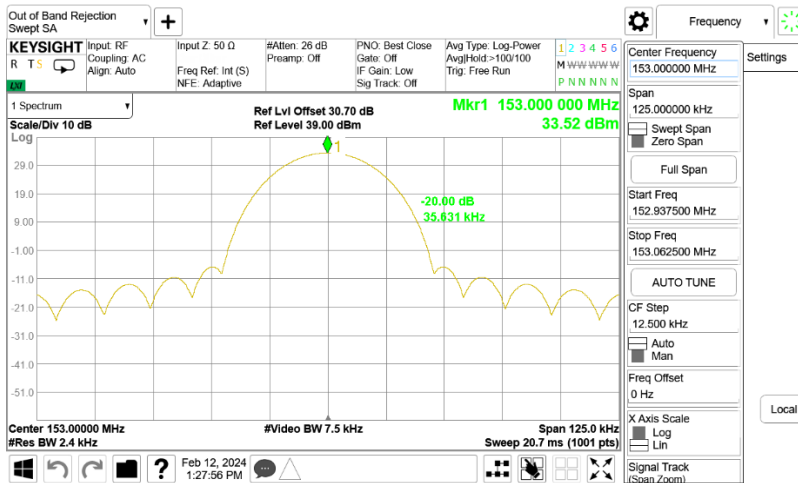
### 150PS at 170 MHz



### 150PS at 161.5 MHz



### 150PS at 153 MHz



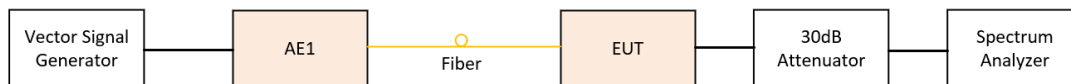
### 3.4 Input-Versus-Output Signal Comparison

|                                                                                                                              |                                                                                                                                       |                           |                   |                  |                 |
|------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|---------------------------|-------------------|------------------|-----------------|
| Governing Doc                                                                                                                | FCC Part 90.210 (j) (h) (g) (c) (d) and (e)                                                                                           | Room Temperature (°C)     | 20.5              |                  |                 |
| Test Procedure                                                                                                               | ANSI/TIA-603- E;<br>FCC KDB 935210 D05, v01r03                                                                                        | Relative Humidity (%)     | 38.6              |                  |                 |
| Test Location                                                                                                                | Richmond                                                                                                                              | Barometric Pressure (kPa) | 101.8             |                  |                 |
| Test Engineer                                                                                                                | Zara Vali                                                                                                                             | Date                      | February 12, 2024 |                  |                 |
| EUT Voltage                                                                                                                  | <input checked="" type="checkbox"/> +48VDC <input type="checkbox"/> 120VAC @ 60Hz                                                     |                           |                   |                  |                 |
| Test Equipment Used                                                                                                          | Manufacturer                                                                                                                          | Model                     | Serial Number     | Calibration date | Calibration due |
| Signal Generator                                                                                                             | Keysight                                                                                                                              | N5172B                    | MY53050270        | Dec 12, 2023     | Dec 12, 2026    |
| Spectrum Analyzer                                                                                                            | Keysight                                                                                                                              | N9020B                    | MY62153079        | Oct 25, 2023     | Aug 1, 2025     |
| Frequency Range:                                                                                                             | <input checked="" type="checkbox"/> 400 MHz – 425 MHz; <input checked="" type="checkbox"/> 152 MHz – 174 MHz                          |                           |                   |                  |                 |
| Detector:                                                                                                                    | <input checked="" type="checkbox"/> Peak                                                                                              |                           |                   |                  |                 |
| RBW/VBW:                                                                                                                     | <input checked="" type="checkbox"/> 100 Hz                                                                                            |                           |                   |                  |                 |
| Type of Facility:                                                                                                            | <input checked="" type="checkbox"/> Testbench                                                                                         |                           |                   |                  |                 |
| Distance:                                                                                                                    | <input checked="" type="checkbox"/> direct connect                                                                                    |                           |                   |                  |                 |
| Arrangement of EUT:                                                                                                          | <input checked="" type="checkbox"/> Table-top only <input type="checkbox"/> Floor-standing only <input type="checkbox"/> Rack Mounted |                           |                   |                  |                 |
| Signal of all types of modulation is contained within the emission mask.                                                     |                                                                                                                                       |                           |                   |                  |                 |
| Compliant <input checked="" type="checkbox"/> Non-Compliant <input type="checkbox"/> Not Applicable <input type="checkbox"/> |                                                                                                                                       |                           |                   |                  |                 |

### Test setup

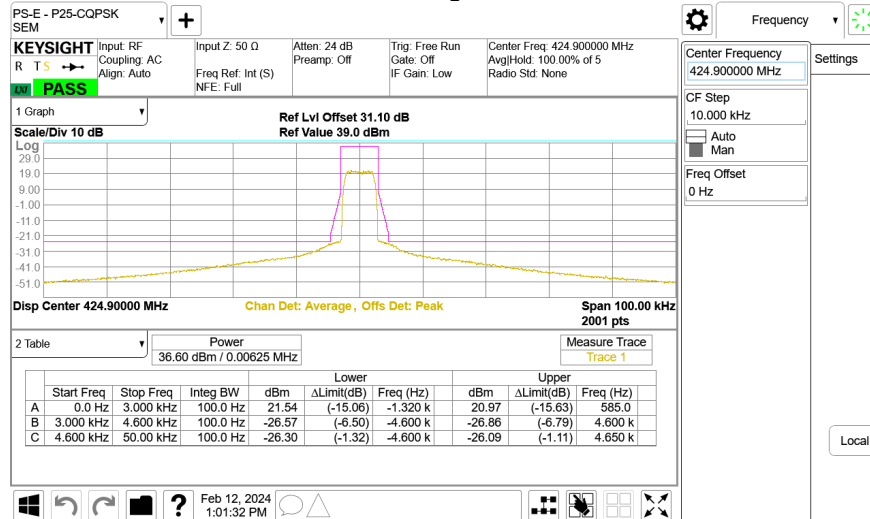
Spectrum Emission Mask is measured by connecting a Spectrum Analyzer to the RF output connector. The input power was adjusted to produce maximum output power on the antenna port. The reference level was measured with integrated BW of the designated channel BW. The emission was measured with RBW 100 Hz.

The EUT was set to **Operation Mode #1 with configuration Mode #1**.

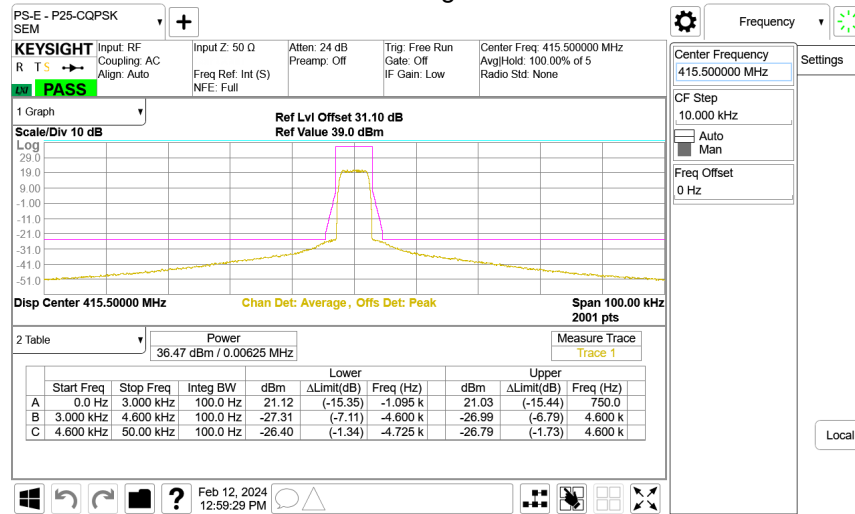


## Results

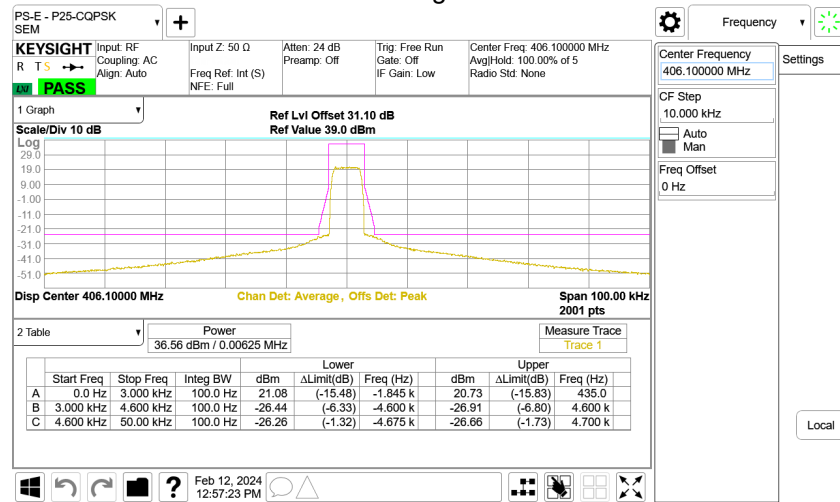
### 415PS CQPSK Signal at 424.9MHz



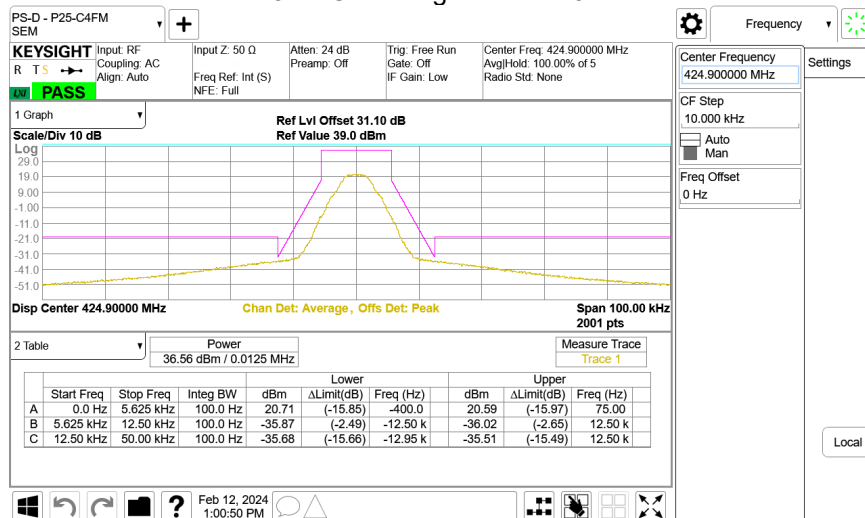
### 415PS CQPSK Signal at 415.5MHz



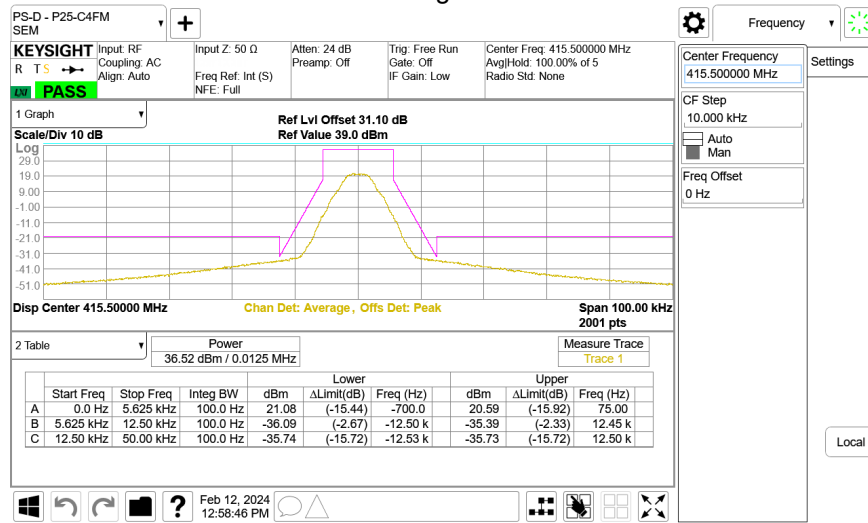
### 415PS CQPSK Signal at 406.1MHz



### 415PS C4FM Signal at 424.9MHz



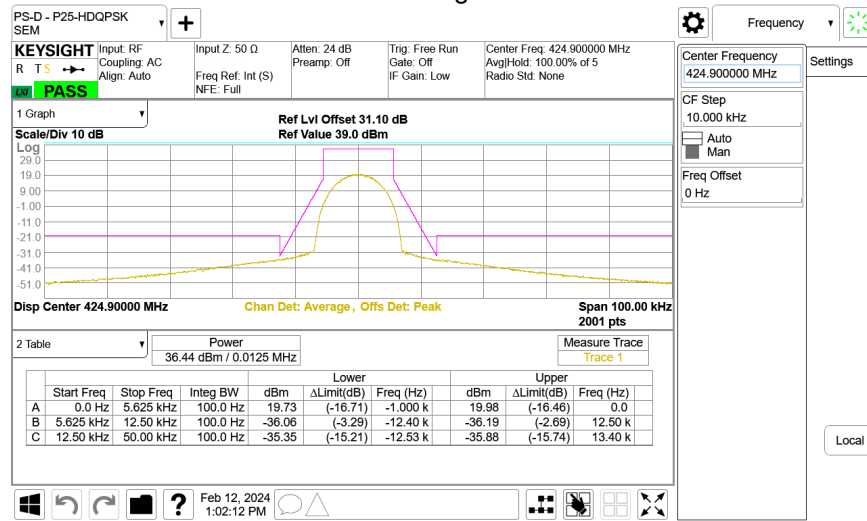
### 415PS C4FM Signal at 415.5MHz



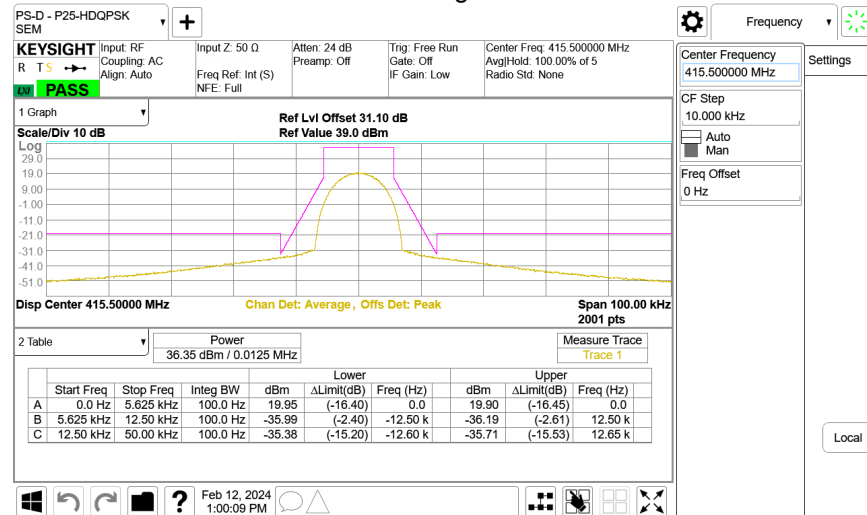
### 415PS C4FM Signal at 406.1MHz



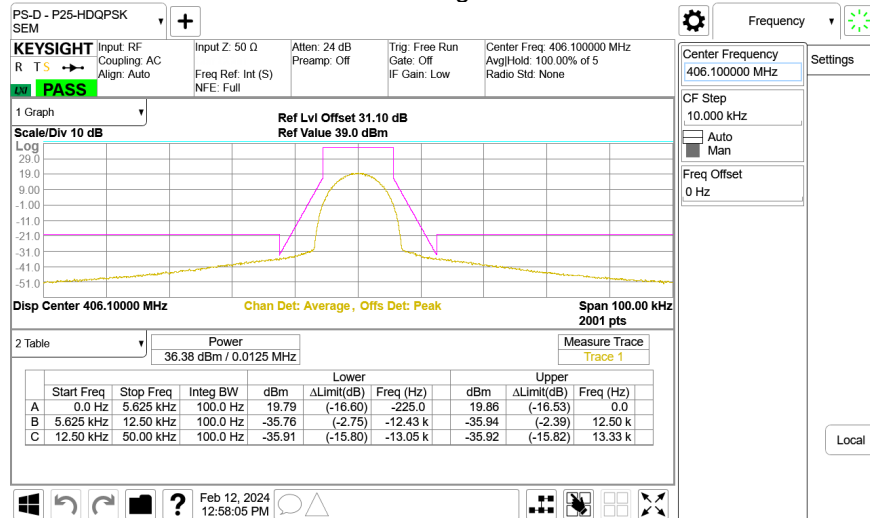
### 415PS HDQPSK Signal at 424.9MHz



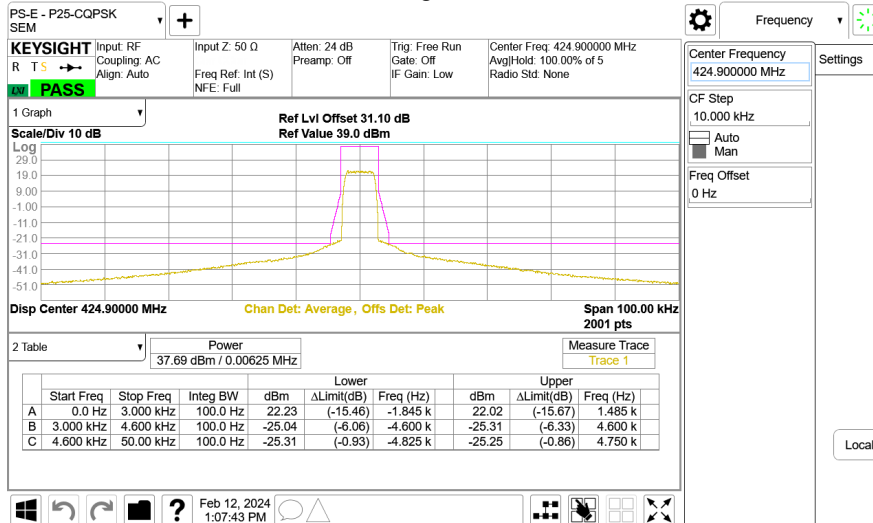
### 415PS HDQPSK Signal at 415.5MHz



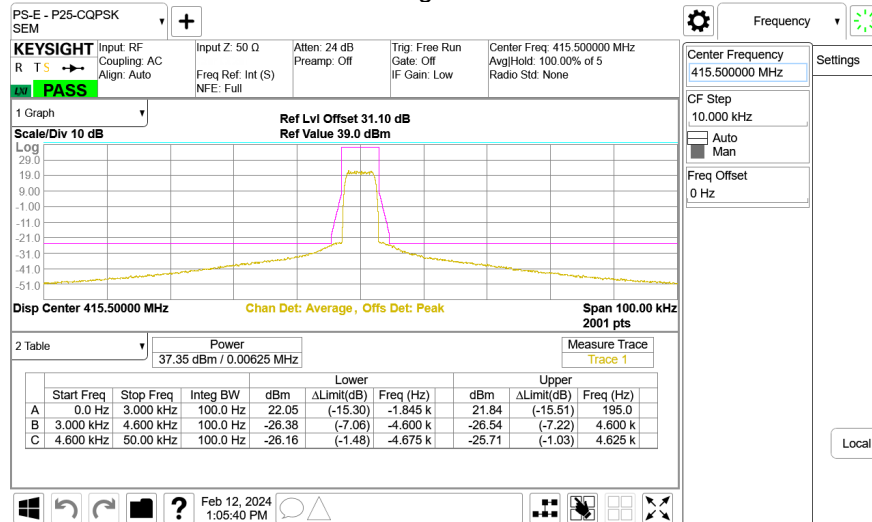
### 415PS HDQPSK Signal at 406.1MHz



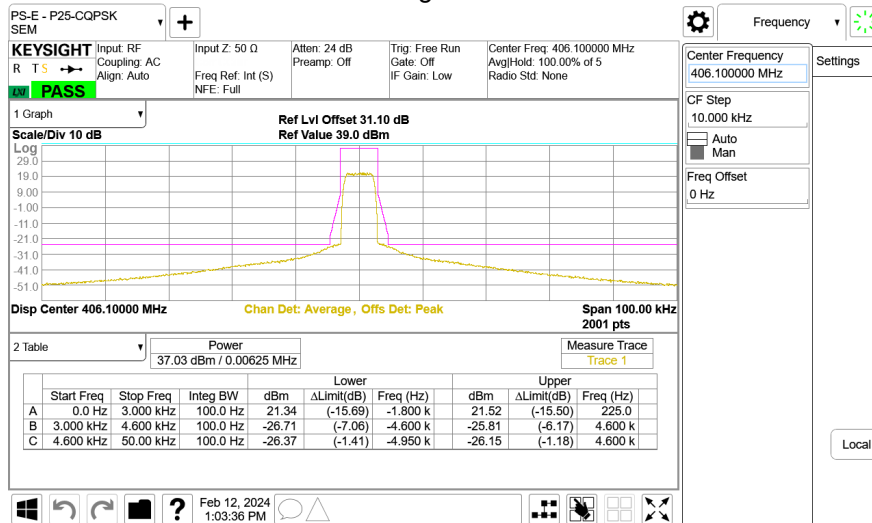
### 415PS CQPSK Signal at 424.9MHz ALC



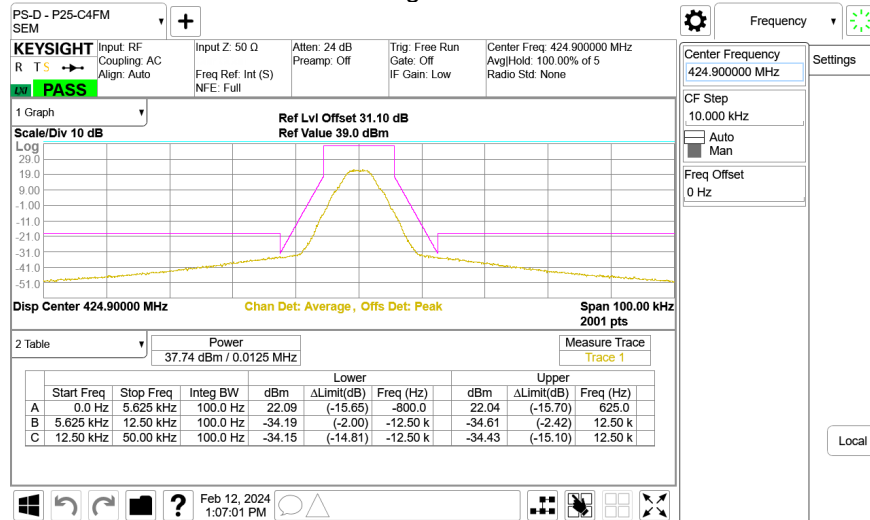
### 415PS CQPSK Signal at 415.5MHz ALC



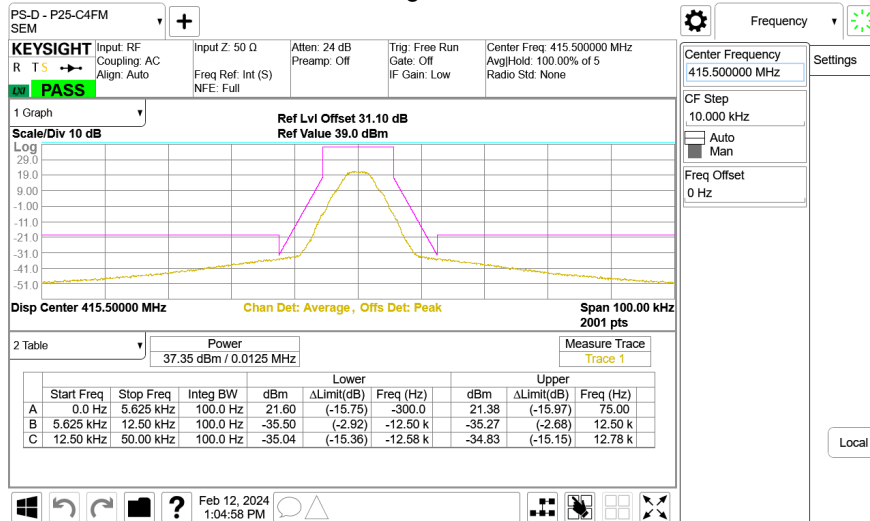
### 415PS CQPSK Signal at 406.1MHz ALC



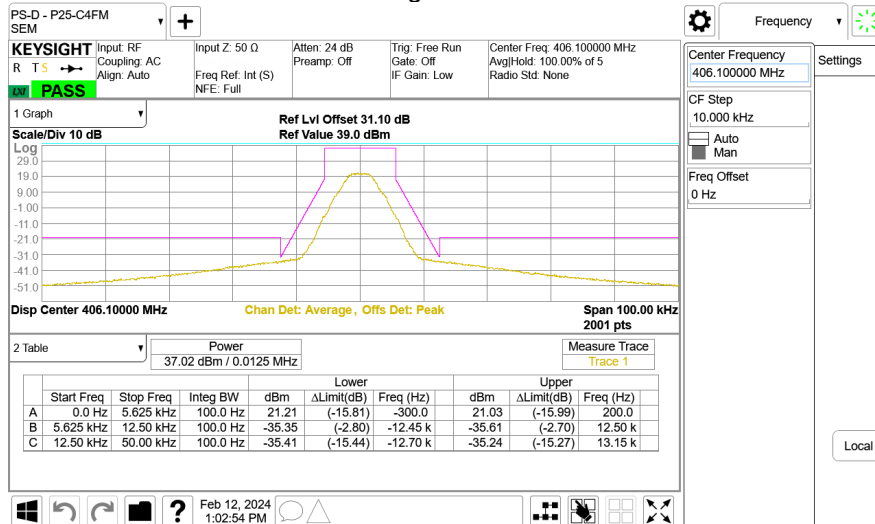
### 415PS C4FM Signal at 424.9MHz ALC



### 415PS C4FM Signal at 415.5MHz ALC



### 415PS C4FM Signal at 406.1MHz ALC



### 415PS HDQPSK Signal at 424.9MHz ALC

