# REPORT

For

## Dali Wireless, Inc.

535 Middlefield Road, Suite 280
Menlo Park, CA 94025

| | |
|---|---|
| Date: | 06 August 2020 |
| Report No.: | 18280-5E |
| Revision No.: | 0 |
| Project No.: | 18280 |
| Equipment: | Advanced Digital Distributed Antenna System |
| Model No.: | AH37-3-PS-ABC-21-3N-D0 |
| FCC ID: | HCOAH373PSABC21A |

**ONE STOP GLOBAL CERTIFICATION SOLUTIONS**

Unit 205 – 8291 92 ST., Delta, BC
V4G 0A4, Canada
Phone: 604-247-0444
Fax: 604-247-0442
www.labtestcert.com

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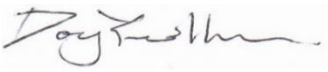
|---|---|---|
| **Private Land Mobile Services** | | |
| **Report Reference No**.....: | 18280-5E | |
| **Report Revision History**. .....: | ✓ Rev. 0 06 August 2020 | |
| Compiled by (+ signature) ..... | Daniel Lee |  |
| Approved by (+ signature)..... | Jeremy Lee |  |
| Date of issue .....: | 06 August 2020 | |
| Total number of pages ..... | 81 | |
| | | |
| **FCC Site Registration No.:** | CA5970 | |
| **IC Site Registration No.:** | 5970A-2 | |
| **Testing Laboratory**.....: | LabTest Certification Inc. | |
| Address .....: | Unit 3128-20800 Westminster HWY, Richmond, B.C. V6V 2W3 Canada | |
| **Applicant's name**.....: | Dali Wireless, Inc. | |
| Address .....: | 535 Middlefield Road, Suite 280, Menlo Park, CA 94025 | |
| **Manufacture's Name .....:** | Dali Wireless (Canada) Inc. | |
| Address .....: | 8618 Commerce Court, Burnaby, B.C. V5A 4N6, Canada | |
| **Test specification:** | | |
| Standards .....: | ➢ FCC Part 2; 2020<br>➢ FCC Part 90; 2020 | |
| Test procedure .....: | ➢ FCC KDB 935210 D05 Indus Booster Basic Meas v01r04: April 03, 2020<br>➢ ANSI/TIA-603- E-2016<br>➢ ANSI C63.4:2014 | |
| Non-standard test method……..: | N/A | |
| Test Report Form(s) Originator .....: | Jeremy Lee | |
| Master TRF .....: | 1036_Rev2 – RF Report Template | |
| **Test item description :** | | |
| Trade Mark .....: | AH37™ | |
| Model/Type reference .....: | AH37-3-PS-ABC-21-3N-D0 | |

| | |
|---|---|
| Serial Number ..... : | 10911208RA1B980001 |
| FCC ID ..... : | HCOHD373PSABC21A |
| **Possible test case verdicts:** | |
| - 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) |
| **Testing:** | |
| Date of receipt of test item ..... : | 01 June 2020 |
| Date (s) of performance of tests..... : | 08 June and 15 July 2020 |

## Revision History

| Revision | Date | Reason For Change | Author(s) |
|---|---|---|---|
| 0 | 06 August 2020 | Initial Data | Daniel Lee |

## Device Under Test Description

| | |
|---|---|
| Application for ..... : | PS 700/800/900 Remote Unit, Tri Band Medium Power DAS |
| Passing Transmit Frequency ..... : | 896 MHz – 901 MHz<br>806 MHz – 816 MHz<br>799 MHz – 805 MHz |
| Operating Transmit Frequency<br>FCC ..... : | 896 MHz – 901 MHz<br>806 MHz – 816 MHz<br>788 MHz – 798 MHz<br>799 MHz – 805 MHz |
| Passing Receive Frequency ..... | 935 MHz – 940 MHz<br>851 MHz – 861 MHz<br>769 MHz – 775 MHz |
| Operating Receive Frequency<br>FCC ..... | 935 MHz – 940 MHz<br>851 MHz – 861 MHz<br>758 MHz – 768 MHz<br>769 MHz – 775 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 900 and Band 800;<br>FM on Band 800 between 806 MHz – 809 MHz only;<br>P25 Phase I C4FM, CQPSK; P25 Phase II HDQPSK on Band 700 between 799 MHz – 805 MHz |
| Equipment mobility ..... : | Fixed |
| Operating condition ..... : | -40 to +50 °C |
| Mass of equipment (g) ..... : | < 27,700g |
| Dimension(W X D X H) | 410 mm X 230 mm X 696 mm |
| **Nominal Voltages for:** | 48 V stand-alone equipment<br>48 V combined (or host) equipment |
| Supply Voltage: | _____ AC _____ Amps<br>48V DC 7.083 Amps |
| If DC Power: | ___ Internal Power Supply<br>√ External Power Supply<br>___ Battery<br>☐ Nickel Cadmium<br>☐ Alkaline<br>☐ Nickel-Metal Hydride<br>☐ Lithium-Ion<br>☐ Other |

## Program details

| **Testing Facility by procedure:** | | |
|---|---|---|
| ☒ | **Radiated Measurement** | LabTest Certification Inc. |
| Testing location/ address.....: | | Unit 3128-20800 Westminster HWY, Richmond, B.C. V6V 2W3 Canada |
| ☒ | **Conducted Measurement**: | LabTest Certification Inc. |
| Testing location/ address.....: | | Unit 3128-20800 Westminster HWY, Richmond, B.C. V6V 2W3 Canada |

| **Summary of testing:** | |
|---|---|
| **Tests performed (name of test and test clause):**<br>**Conducted Measurement**<br>**Radiated Emissions on Enclosure** | **Testing location:**<br>**Bench top, Richmond**<br>**In SAC, Richmond** |

The tests indicated in Test Summary were performed on the product constructed as described below. 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.
Based on the results of our investigation, we have concluded the product tested **complies** with the requirements of the standard(s) indicated. The results obtained in this test report pertain only to the item(s) tested. LabTest does not make any claims of compliance for samples or variants which were not tested.

## Description of Equipment Under Test and Variant Models

**Description:**
The AH37 /700PS/800PS/900 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 hd37 PS remote receives an aggregated stream of digitized RF signals from an *air*Host 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 hd37 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 *air*Host PS. The hd37 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 uplink path and hence the EMC tests in this report dedicated to the uplink emission.

In order to build up a complete signal booster system, the *hd37* was connected as the Auxiliary device. The signal was injected and ejected via coaxial cables from the hd37 to the Equipment Under Test (EUT).

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

AH37-3-PS-ABC-21-3N-D0 – tri band 700PS 800PS 900PS model as tested

Tri Band
1. AH37-3-PS-ABC-21-3N-D0 (airHost37 with 700,800,900PS)
2. AH33-3-PS-ABC-21-3N-D0 (airHost33 with 700,800,900PS)

Dual Band:
1. AH37-2-PS-AB-21-2N-D0 (airHost37 with 700,800PS)
2. AH33-2-PS-AB-21-2N-D0 (airHost 33 with 700,800PS)
3. AH37-2-PS-AC-21-2N-D0 (airHost 37 with 700,900PS)
4. AH33-2-PS-AC-21-2N-D0 (airHost 33 with 700,900PS)
5. AH37-2-PS-BC-21-2N-D0 (airHost 37 with 800,900PS)
6. AH33-2-PS-BC-21-2N-D0 (airHost 33 with 800,900PS)

Single Band:
1. AH37-1-PS-A-21-1N-D0 (airHost 37 with 700PS)
2. AH33-1-PS-A-21-1N-D0 (airHost 33 with 700PS)
3. AH37-1-PS-B-21-1N-D0 (airHost 37 with 800PS)
4. AH33-1-PS-B-21-1N-D0 (airHost 33 with 800PS)
5. AH37-1-PS-C-21-1N-D0 (airHost 37 with 900PS)
6. AH33-1-PS-C-21-1N-D0 (airHost 33 with 900PS)

## Client Equipment Used During Test

| Use* | Product Type | Manufacturer | Model | Comments |
|---|---|---|---|---|
| AE1 | *hd37, 900PS, 800PS, 700PS* | Dali Wireless Inc. | hd37-3-PS-ABC-21-3N-D0 | Auxiliary equipment, which is the back end of signal booster system air interfaced to donor Base Station. |
| EUT | *airHost, 900PS, 800PS, 700PS* | Dali Wireless Inc. | AH37-3-PS-ABC-21-3N-D0 | EUT where the RF (I/O) antenna attached via duplexers/multiplexer when necessary. |
| AE2 | Dali Matrix Console | Dali Wireless Inc. | hdCNSL-1-8-4-120G-AC | Auxiliary equipment provides the configuration and control interface to *air*Host and *hd*37. |
| AE3 | Power Supply | MeanWell | HGL-480H-48 | AC to DC Converter,<br>I/P: 120VAC, 60Hz, 5.5A<br>O/P: +48VDC, 480W |

Abbreviations:
EUT - Equipment Under Test,
AE - Auxiliary/Associated Equipment, or
SIM - Simulator (Not Subjected to Test)

## Software and Firmware

| Use* | Description | Version |
|---|---|---|
| EUT | Software installed | 5.0.0-0.5413 |
| AE1 | Software installed | 5.0.0-0.5415 |
| AE2 | Software installed | 5.0.0.-704 |

Abbreviations:
EUT - Equipment Under Test,
AE - Auxiliary/Associated Equipment, or
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 | 3 * 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
I/O = Signal Input or Output Port (Not Involved in Process Control)
TP = Telecommunication Ports

## Power Interface

| Mode # | Voltage (V) | Current (A) | Power (W) | Frequency (DC/AC-Hz) | Phases (#) | Comments |
|---|---|---|---|---|---|---|
| 1 | 48 | - | - | DC | - | |

## EUT Operation Modes

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

## EUT Configuration Modes

| Mode # | Description |
|---|---|
| 1 | hd37 maximum input threshold set to -55 dBm, uplink attenuation set to 0dB;<br>*AH37* uplink and downlink attenuation set to 0dB. |

## Test Equipment Verified for function

| Model # | Description | Checked Function | Results |
|---|---|---|---|
| N9038A | Spectrum Analyzer | Frequency and Amplitude | Connected 50MHz and -20 dBm Ref_siganl and checked OK. |
| SAS-540 | Antenna, 30 to 300MHz | Checked structure | Normal – no damage. |
| VUSLP9 111B | Antenna, 300 to 1,000MHz | Checked structure | Normal – no damage. |
| SAS-571 | Antenna, 1 to 18GHz | Checked structure | Normal – no damage. |
| JB1 | Antenna, 30 to 2000MHz | Checked structure | Normal – no damage. |
| AL-130 | Antenna, 9kHz to 30MHz | Checked structure | Normal – no damage. |
| 8449B | Pre-Amplifier | Gain | In Tolerance |
| KT-N5172B | Signal Generator, up to 6GHz | Frequency, Amplitude and Modulation | Within MFR Specs |
| KT-N9010A | Spectrum Analyzer | Frquency and Amplitude | Within MFR Specs |

## Test Station Cables and Loads

| Model # | Manufacture | Description |
|---|---|---|
| 4 * TM8-N1S1-59 | MegaPhase | N male to SMA male coaxial cable in 60 inches |
| 2 * 49-30-34 | Aeroflex | 30dB 150W attenuators |

## Test Station Insertion Loss

| | Band 700 | Band 800 | Band 900 |
|---|---|---|---|
| UL Receiver | 31.18 dB | 31.18 dB | 31.23 dB |
| UL Transmitter | 31.10 dB | 31.13 dB | 31.23 dB |

## 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 6,000MHz | ± 4.95 dB |

Uncertainty figures are valid to a confidence level of 95%.

## Result Summary

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.

| FCC Part | | | |
|---|---|---|---|
| **Test Type** | **Regulation** | **Measurement Method** | **Result** |
| AGC Threshold | FCC KDB 935210 D05, v01r04, Section 4.2 | ANSI TIA-603- E-2016 | PASS |
| Out of Band Rejection | FCC KDB 935210 D05, v01r04, Section 4.3 | ANSI TIA-603- E-2016 | PASS |
| Input-versus-output Signal Comparison | FCC KDB 935210 D05, v01r04, Section 4.4 | ANSI TIA-603- E-2016 | PASS |
| Input/output Power and Amplifier/Booster Gain | FCC KDB 935210 D05, v01r04, Section 4.5 | ANSI TIA-603- E-2016 | PASS |
| Noise Figure | FCC KDB 935210 D05, v01r04, Section 4.6 | ANSI TIA-603- E-2016 | PASS |
| Measuring out-of-band/out-of-block (including intermodulation) and spurious emissions | FCC KDB 935210 D05, v01r04, Section 4.7 | ANSI TIA-603- E-2016 | PASS |
| Frequency stability | FCC KDB 935210 D05, v01r04, Section 4.8 | ANSI TIA-603- E-2016 | PASS |
| Spurious emissions radiated measurements | FCC KDB 935210 D05, v01r04, Section 4.9 | ANSI C63.4:2014 | PASS |

## AGC Threshold

| | | | |
|---|---|---|---|
| Governing Doc | FCC Part 2 2.1046(a)<br>FCC Part 90.219(d) | Room Temperature (°C) | 23.6 |
| Test Procedure | ANSI/TIA-603- E-2016; FCC KDB 935210 D05, v01r04; | Relative Humidity (%) | 39.9 |
| Test Location | Richmond | Barometric Pressure (kPa) | 102.1 |
| Test Engineer | Jeremy Lee | Date | 15 July 2020 |
| EUT Voltage | ☒ +48VDC | ☐ 120VAC @ 60Hz | |

| Test Equipment Used | Manufacturer | Model | Serial Number | Calibration date | Calibration due |
|---|---|---|---|---|---|
| Signal Generator | Keysight | N5172B | MY53050270 | 06/12/19 | 06/12/21 |
| Spectrum Analyzer | Keysight | N9010A | MY50520285 | 07/29/19 | 07/23/21 |

| | |
|---|---|
| Frequency Range: | ☒ 896 MHz – 901 MHz; ☒ 806 MHz – 816 MHz; ☒ 799 MHz – 805 MHz |
| Detector: | ☒ Peak |
| Type of Facility: | ☒ Test bench |
| Distance: | ☒ Direct |
| Arrangement of EUT: | ☒ Table-top only ☐ Floor-standing only ☐ Rack Mounted |

Output Power is
less than 37.7 dBm in band 900,
less than 37.5 dBm in band 800,
and less than 37.3 dBm in band 700.

Compliant ☒ Non-Compliant ☐ Not Applicable ☐

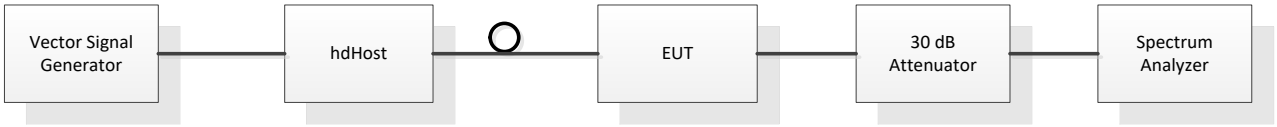
***Test setup***

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) |
|---|---|---|---|---|
| 896 - 901 | 896.0125 | -55.9 | 37.7 | 5.888 |
| | 937.5 | -56.4 | 37.4 | 5.495 |
| | 900.9875 | -56.9 | 37.3 | 5.370 |
| 806 - 816 | 806.0125 | -54.9 | 37.3 | 5.370 |
| | 811 | -54.2 | 37.3 | 5.370 |
| | 815.9875 | -52.7 | 37.5 | 5.623 |
| 799 - 805 | 799.0125 | -53.3 | 37.2 | 5.248 |
| | 802 | -51.6 | 37.3 | 5.370 |
| | 804.9875 | -50.1 | 37.1 | 5.129 |

## Occupied Bandwidth

| | | | |
|---|---|---|---|
| Governing Doc | FCC Part 2 2.1049 | Room Temperature (°C) | 23.6 |
| Test Procedure | ANSI/TIA-603- E-2016; FCC KDB 935210 D05, v01r04 | Relative Humidity (%) | 39.9 |
| Test Location | Richmond | Barometric Pressure (kPa) | 102.1 |
| Test Engineer | Jeremy Lee | Date | 15 July 2020 |
| EUT Voltage | ☒ +48VDC | ☐ 120VAC @ 60Hz | |

| Test Equipment Used | Manufacturer | Model | Serial Number | Calibration date | Calibration due |
|---|---|---|---|---|---|
| Signal Generator | Keysight | N5172B | MY53050270 | 06/12/19 | 06/12/21 |
| Spectrum Analyzer | Keysight | N9010A | MY50520285 | 07/29/19 | 07/29/21 |

| | |
|---|---|
| Frequency Range: | ☒ 799 MHz – 805 MHz ☒ 806 MHz – 816 MHz ☒ 896 MHz – 901 MHz |
| Detector: | ☒ Peak |
| Type of Facility: | ☒ Test bench |
| Distance: | ☒ Direct |
| Arrangement of EUT: | ☒ Table-top only ☐ Floor-standing only ☐ Rack Mounted |

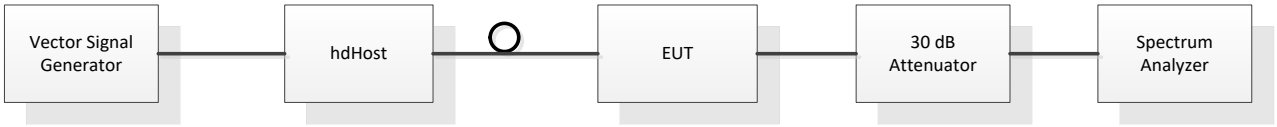
Output signal has an occupied channel bandwidth less than the designated channel bandwidth on any location on the operating band.

- C4FM < 12.5 kHz
- CQPSK < 6.25 kHz
- HDQPSK < 12.5 kHz
- 4 kHz FM with 1kHz deviation < 12.5 kHz

Compliant ☒ Non-Compliant ☐ Not Applicable ☐

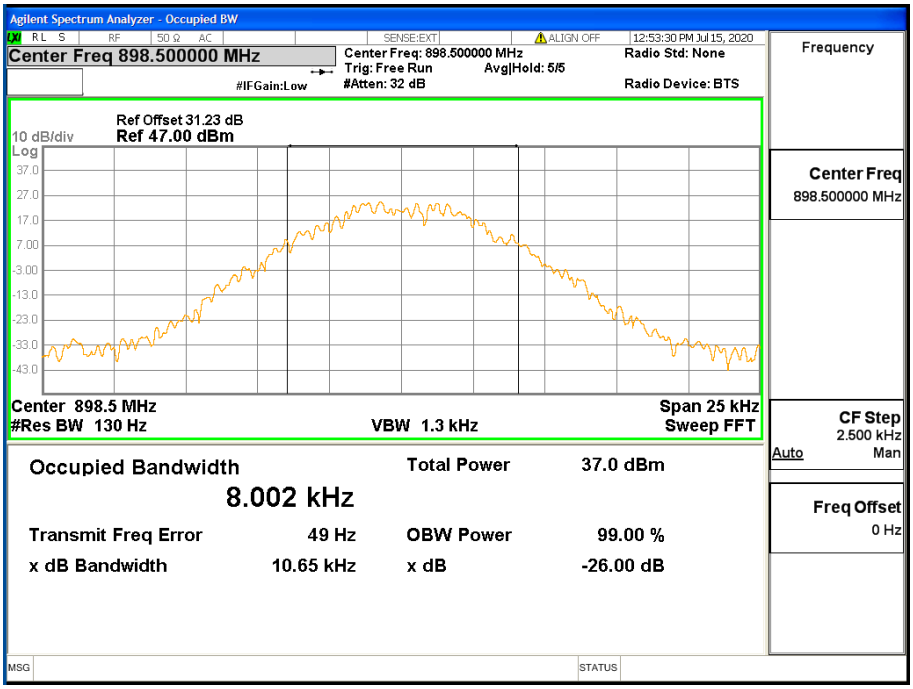
***Test setup***

| Description of test set-up: |
| --- |
| 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<br>The EUT was set to **Operation Mode #1 with configuration Mode #1.**<br>The occupied bandwidth of UL output is measured under one input conditions:<br>- Nominal: with input 0.5dB below AGC threshold |

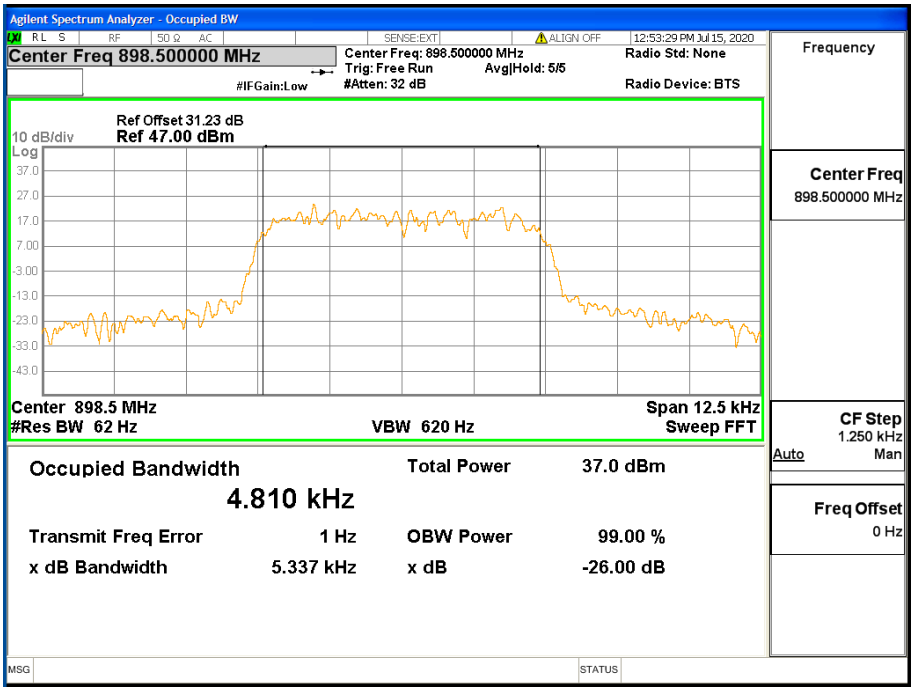


**Results – Occupied Bandwidth (OBW)**

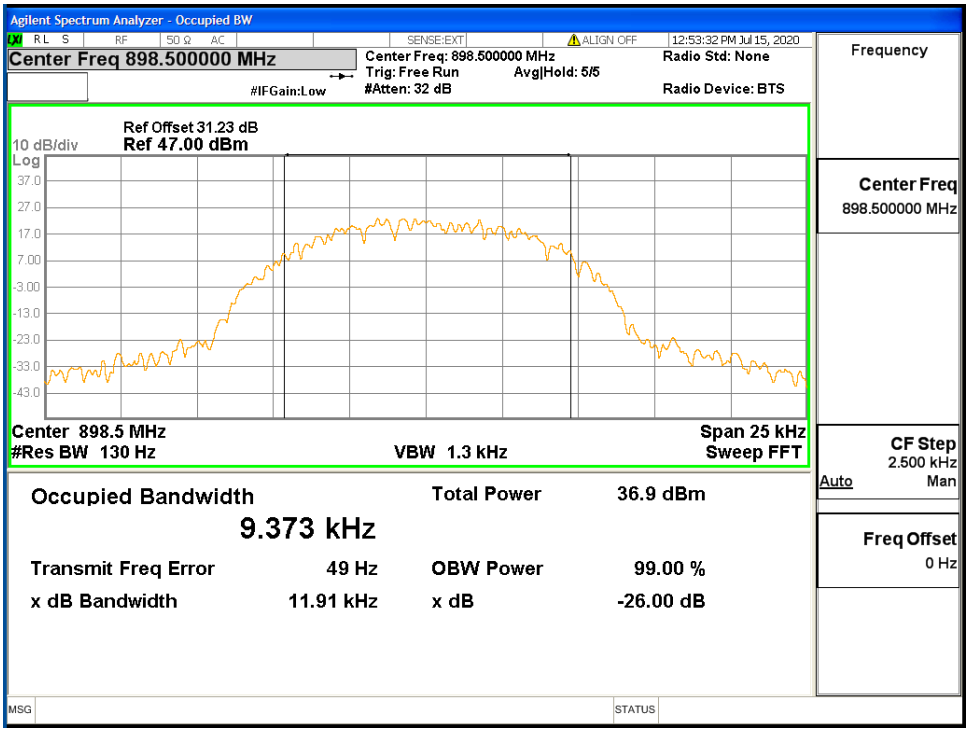
C4FM Signal at 898.50 MHz



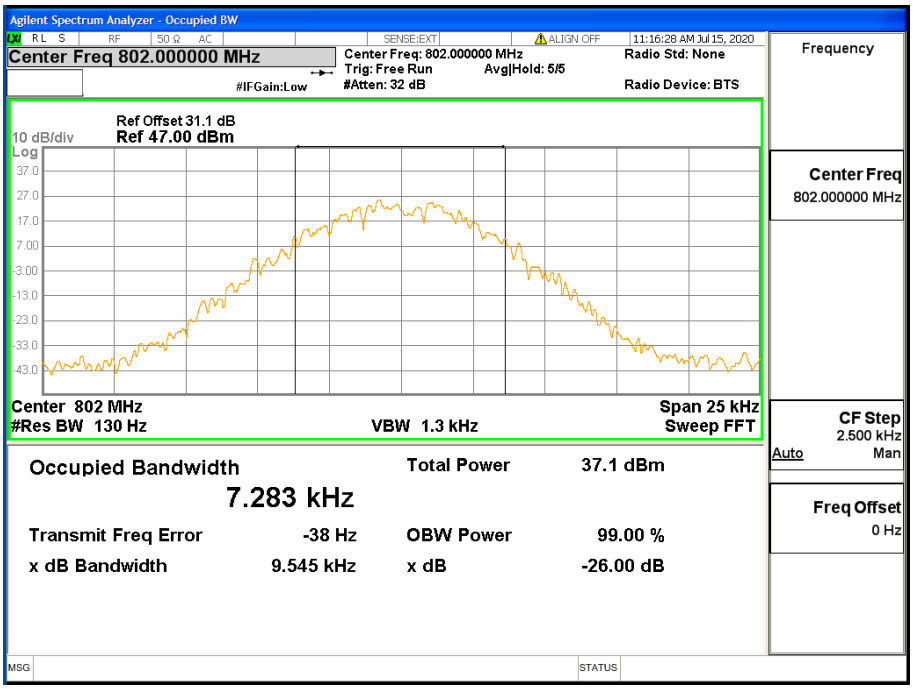

CQPSK Signal at 898.50 MHz



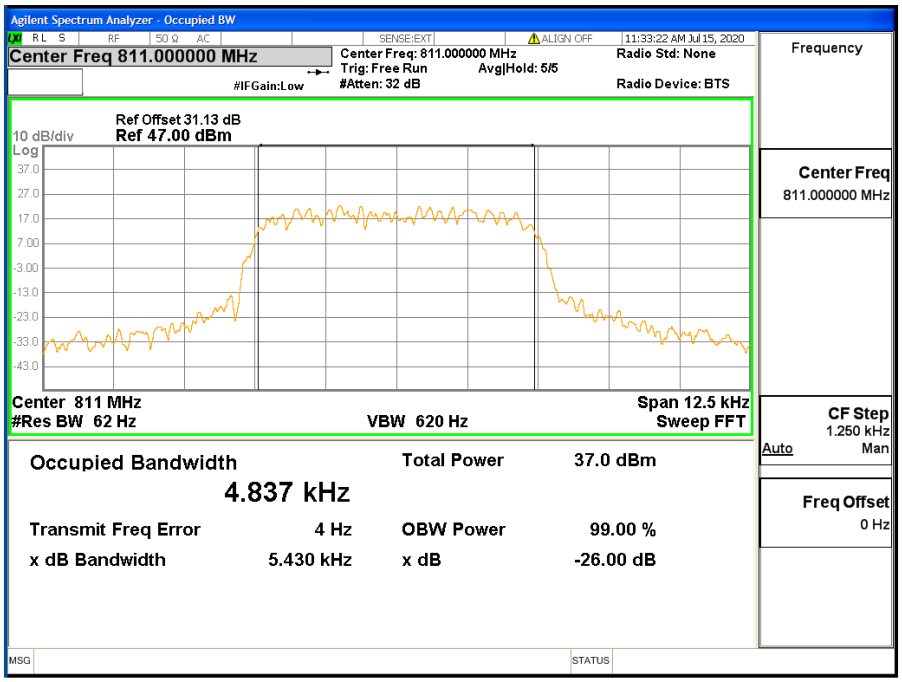
HDQPSK Signal at 898.50 MHz



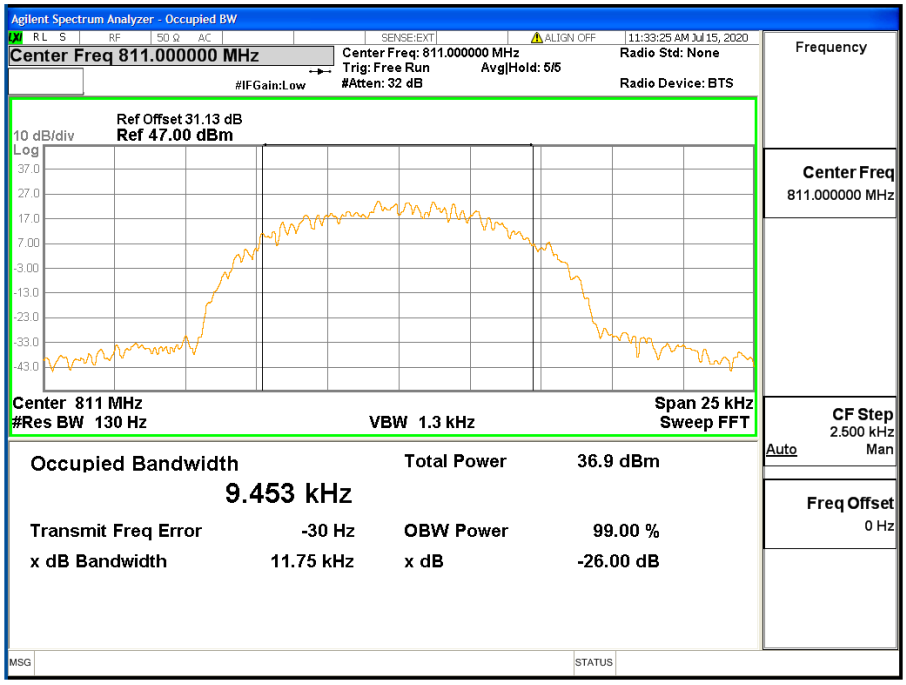

C4FM Signal at 811 MHz



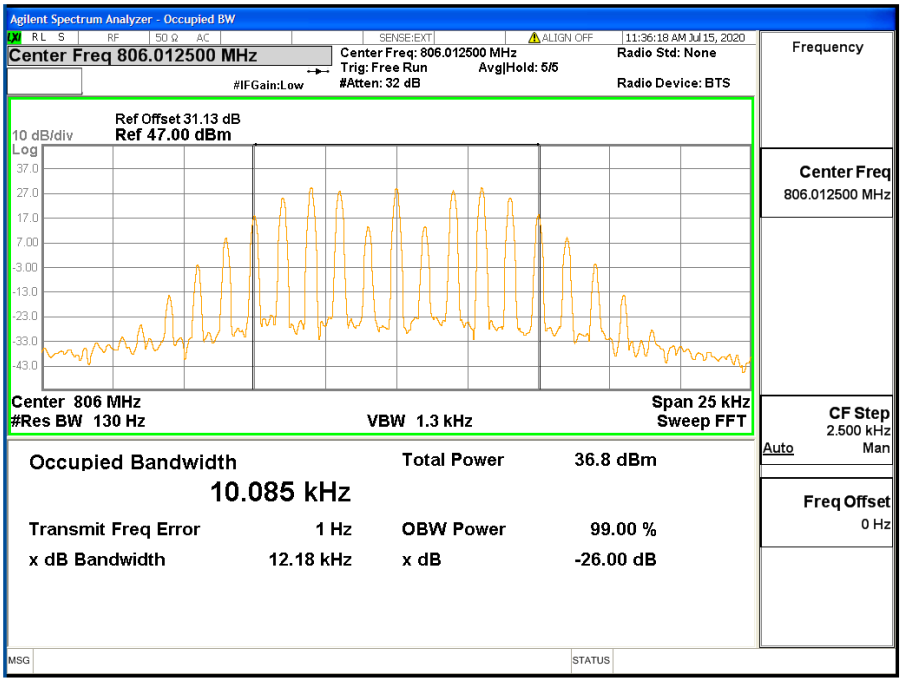
CQPSK Signal at 811 MHz



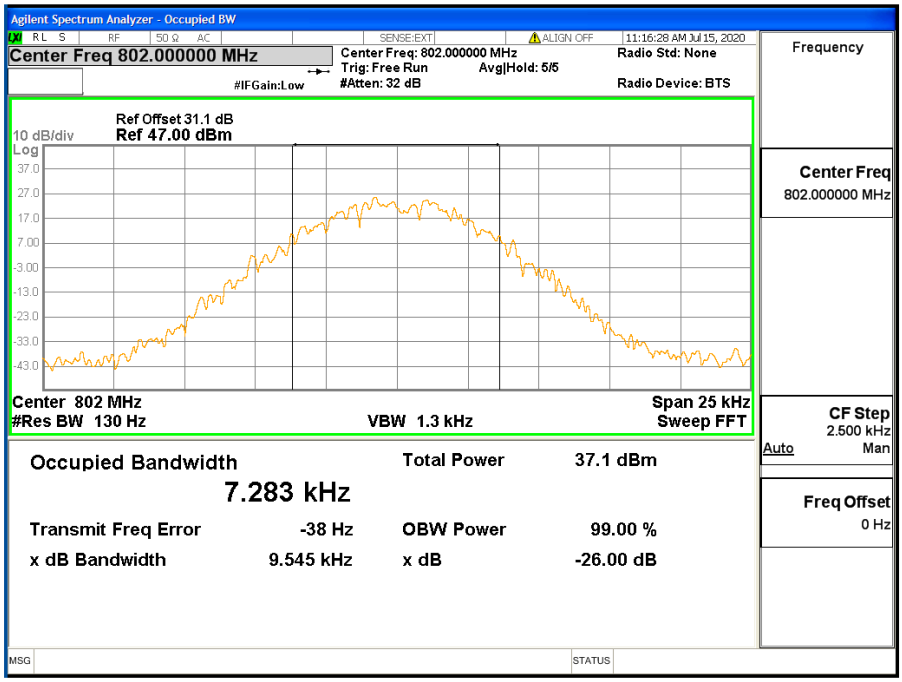

HDQPSK Signal at 811 MHz



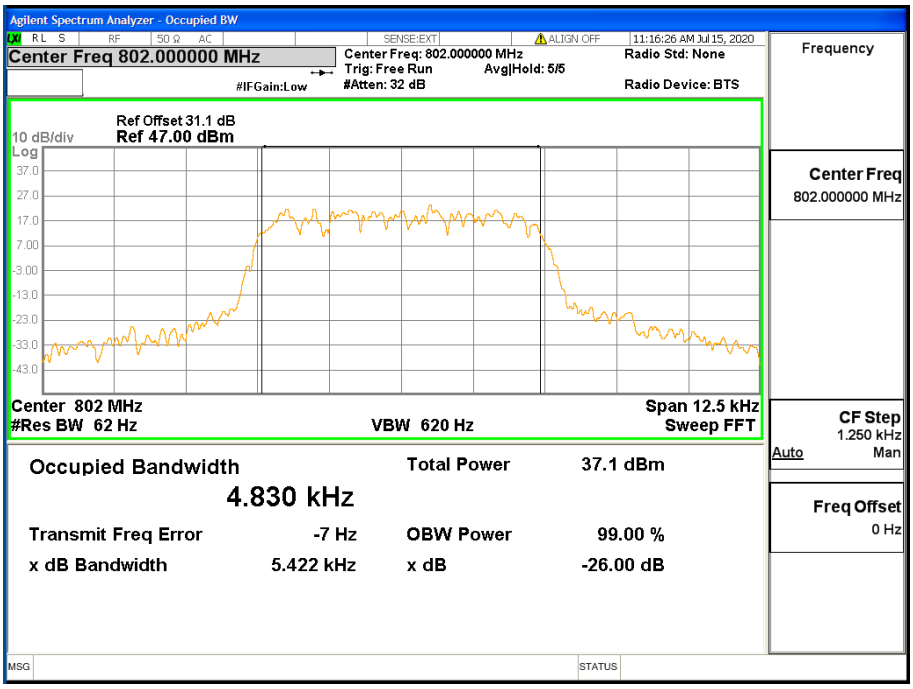
FM Signal at 806.0125 MHz



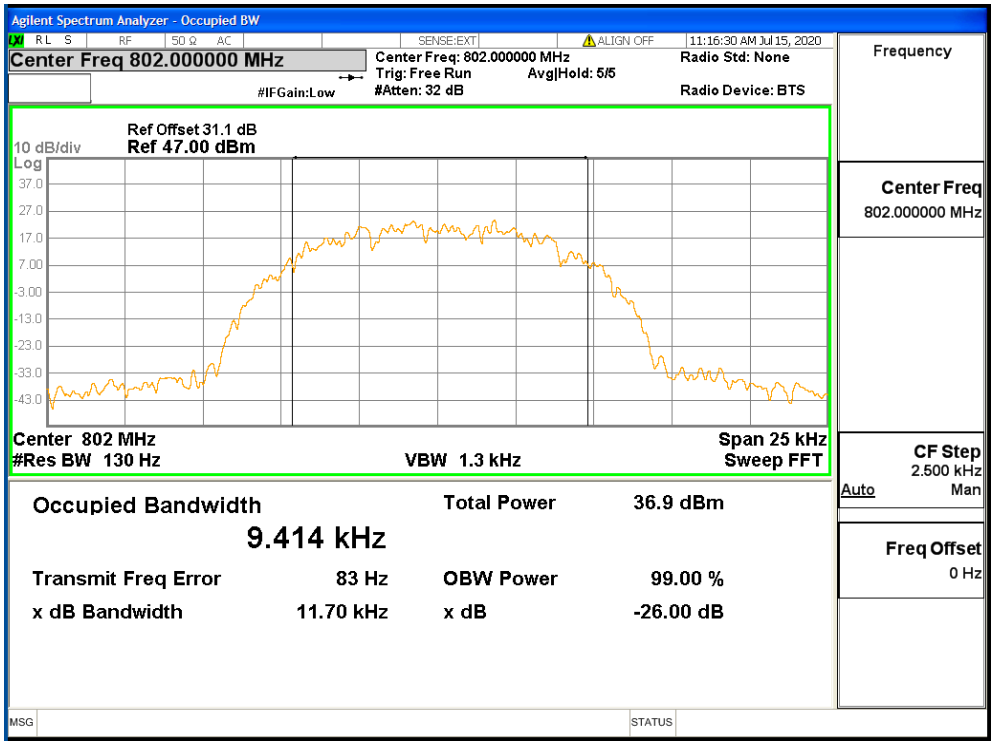

C4FM Signal at 802.00MHz



CQPSK Signal at 802.00MHz




HDQPSK Signal at 802.00MHz



## Out of Band Rejection

| | | | |
|---|---|---|---|
| Governing Doc | FCC Part 2 2.1046(a)<br>FCC Part 90.219(d) | Room Temperature (°C) | 23.6 |
| Test Procedure | ANSI/TIA-603- E;<br>FCC KDB 935210 D05, v01r04 | Relative Humidity (%) | 39.9 |
| Test Location | Richmond | Barometric Pressure (kPa) | 102.1 |
| Test Engineer | Jeremy Lee | Date | 15 July 2020 |
| EUT Voltage | ☒ +48VDC ☐ 120VAC @ 60Hz | | |

| Test Equipment Used | Manufacturer | Model | Serial Number | Calibration date | Calibration due |
|---|---|---|---|---|---|
| Signal Generator | Keysight | N5172B | MY53050270 | 06/12/19 | 08/12/21 |
| Spectrum Analyzer | Keysight | N9010A | MY50520285 | 07/29/19 | 08/23/21 |

| | |
|---|---|
| Frequency Range: | ☒ Product Passband ± 250% |
| Detector: | ☒ Peak |
| RBW/VBW: | ☒ 1 to 5% of the EUT passband / ≥ 3 X RBW |
| Type of Facility: | ☒ Tabletop |
| Distance: | ☒ Direct |

Compliant ☒ Non-Compliant ☐ Not Applicable ☐

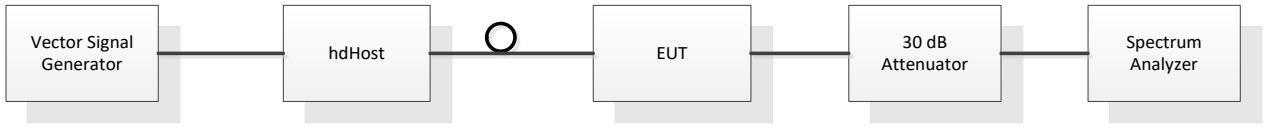
***Test setup***

Description of test set-up:

The procedure used was ANSI/TIA-603-E-2016 and FCC KDB 935210 D05 Indus Booster Basic Meas v01r04. The signal booster was set to maximum gain. A swept CW signal was set to the range of ±250 % of the product pass band. The CW ampltitude was set to 3 dB below the AGC threshold so that the ALC should not activate throughout the test.

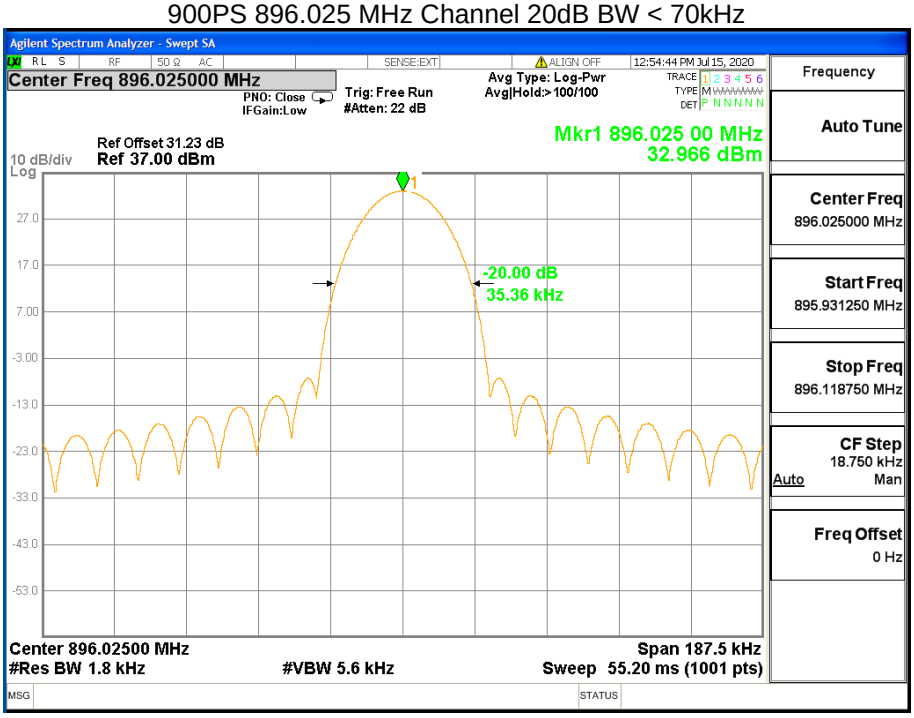
After the max-hold sweep trace was completed, a marker was set to the peak amplitude, and a 20dB bandwidth was measured between two additional markers fall 20 dB from the peak.

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

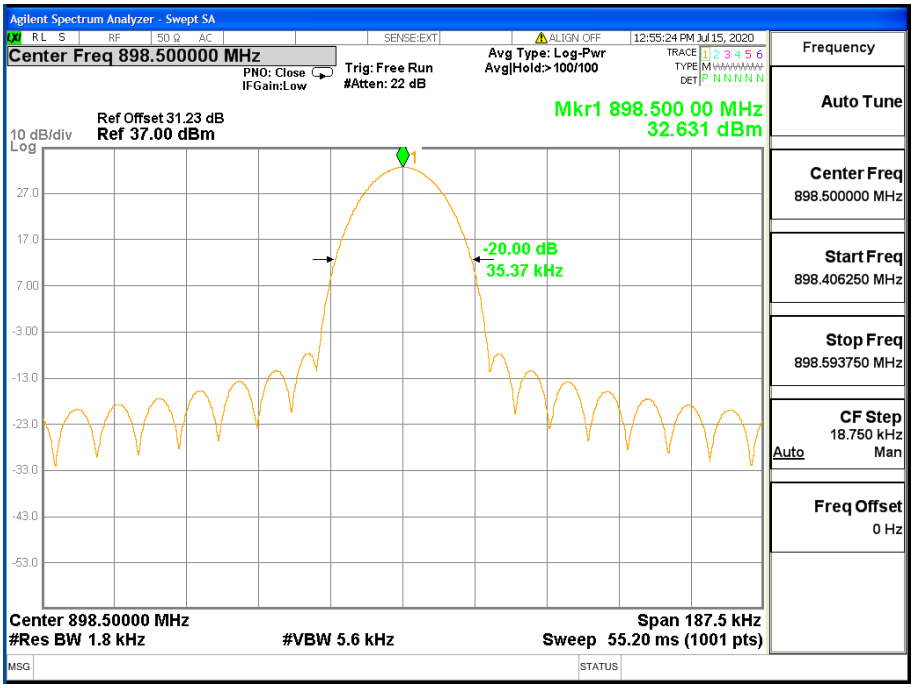


## Results

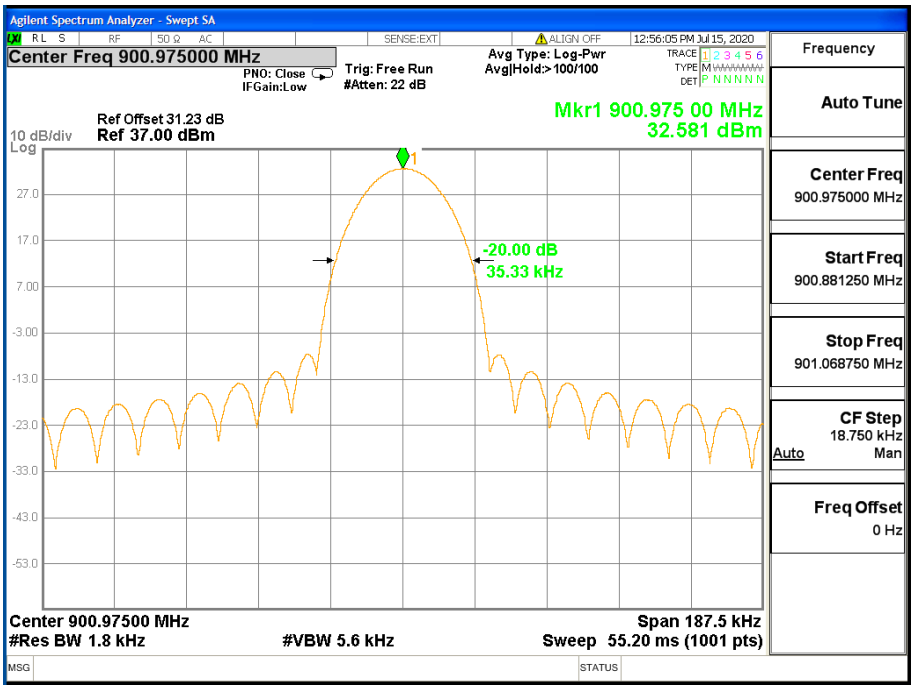
900PS 896.025 MHz Channel 20dB BW < 70kHz



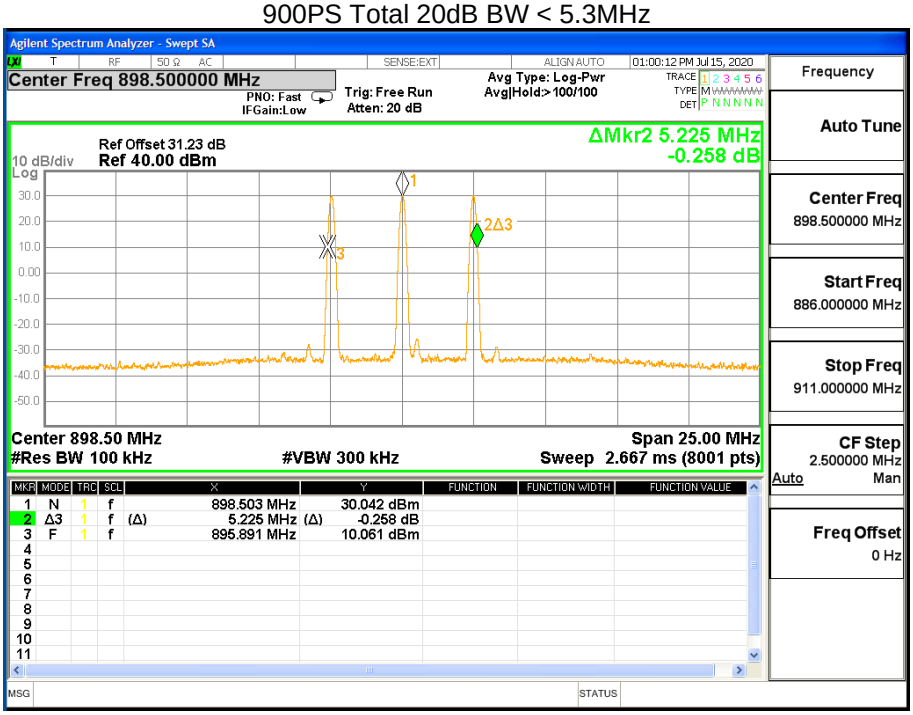

900PS 898.5 MHz Channel 20dB BW < 70kHz



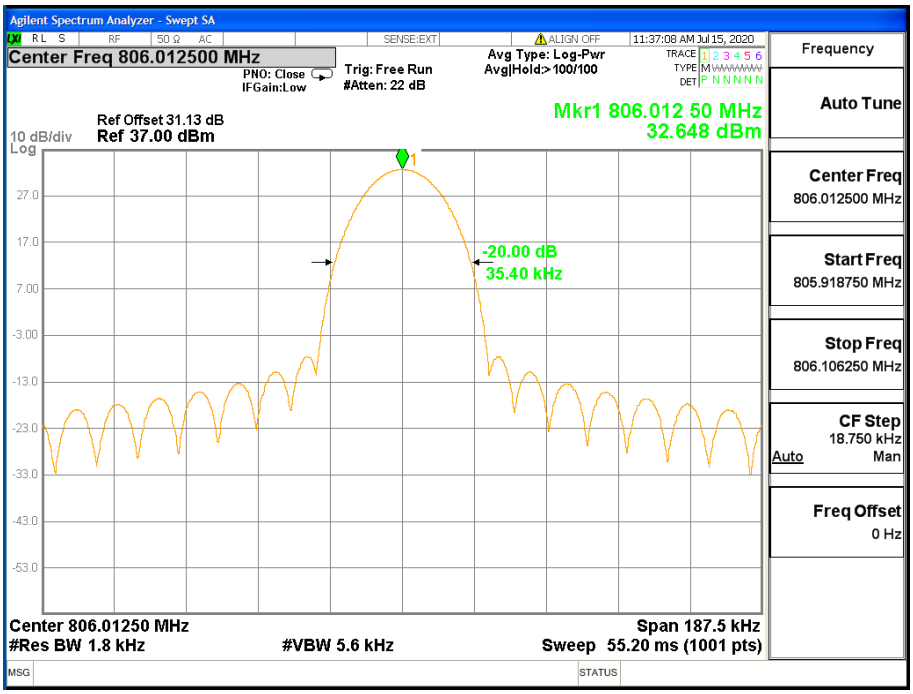
900PS 900.975 MHz Channel 20dB BW < 70kHz



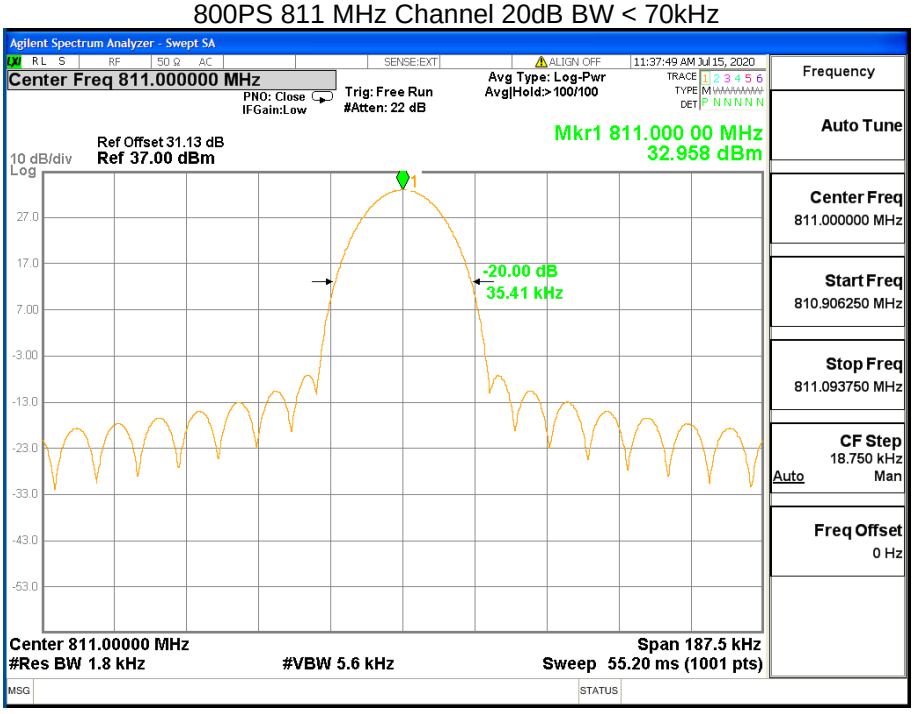

900PS Total 20dB BW < 5.3MHz



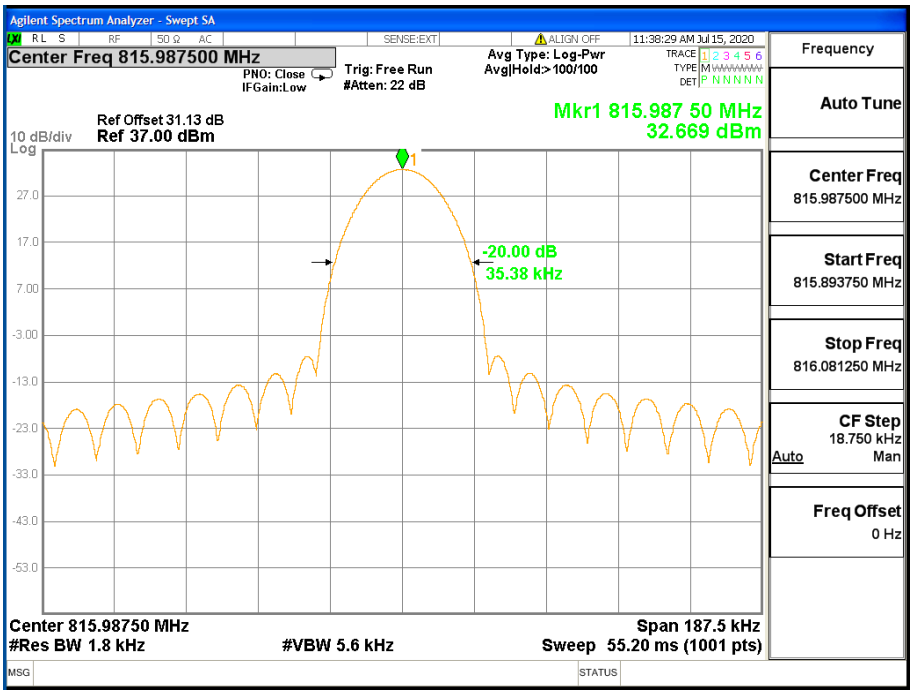
800PS 806.0125 MHz Channel 20dB BW < 70kHz



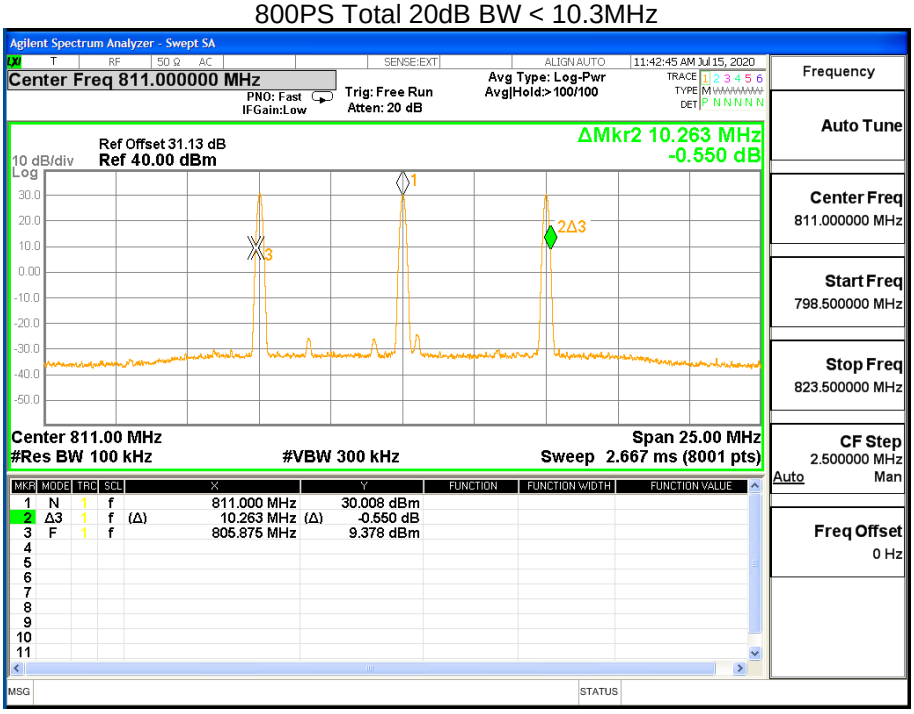

800PS 811 MHz Channel 20dB BW < 70kHz



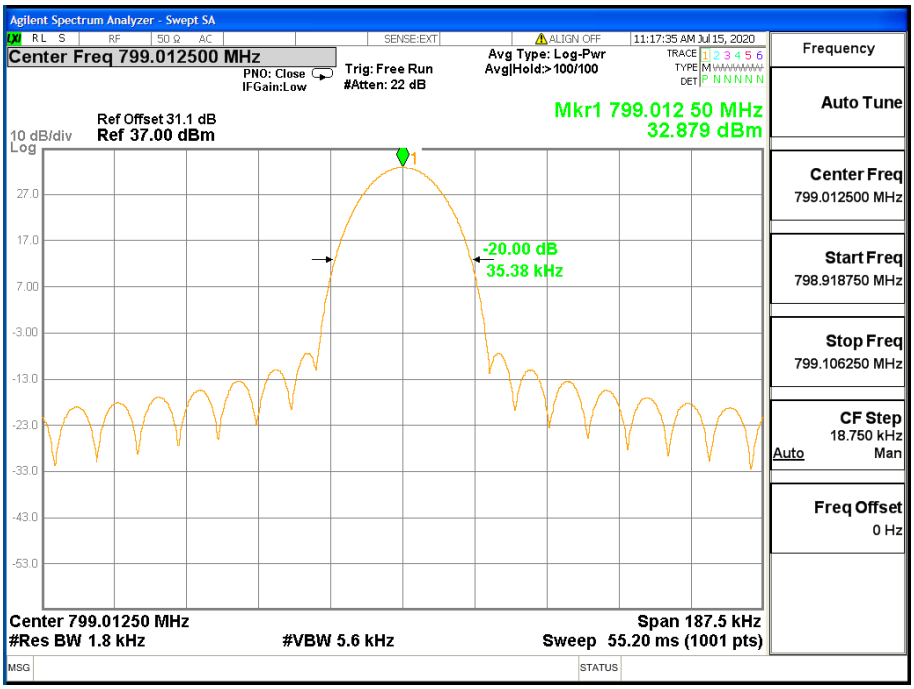
800PS 815.9875 MHz Channel 20dB BW < 70kHz



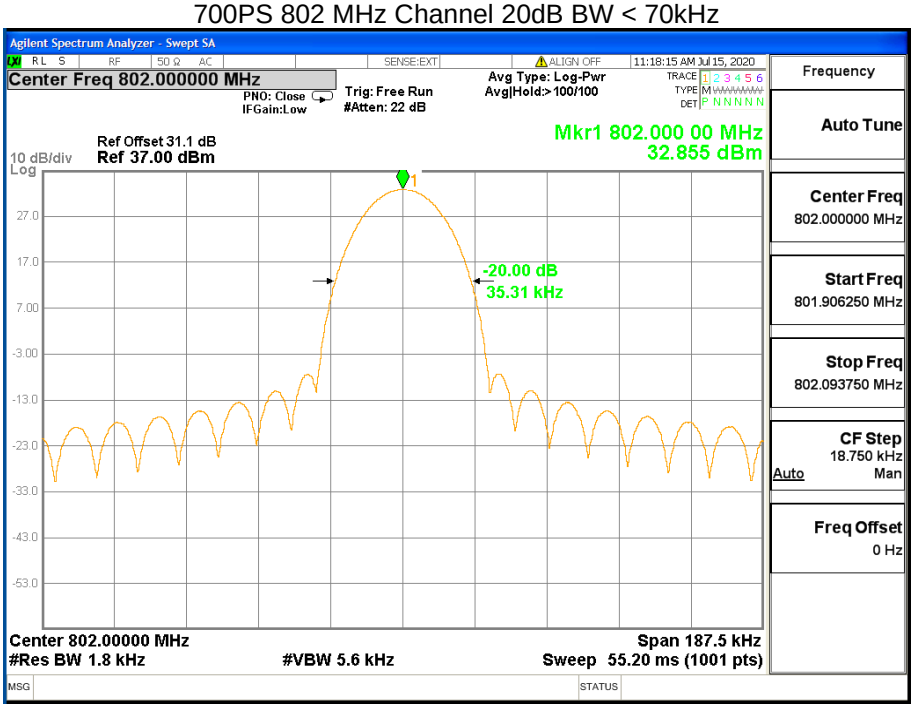

800PS Total 20dB BW < 10.3MHz



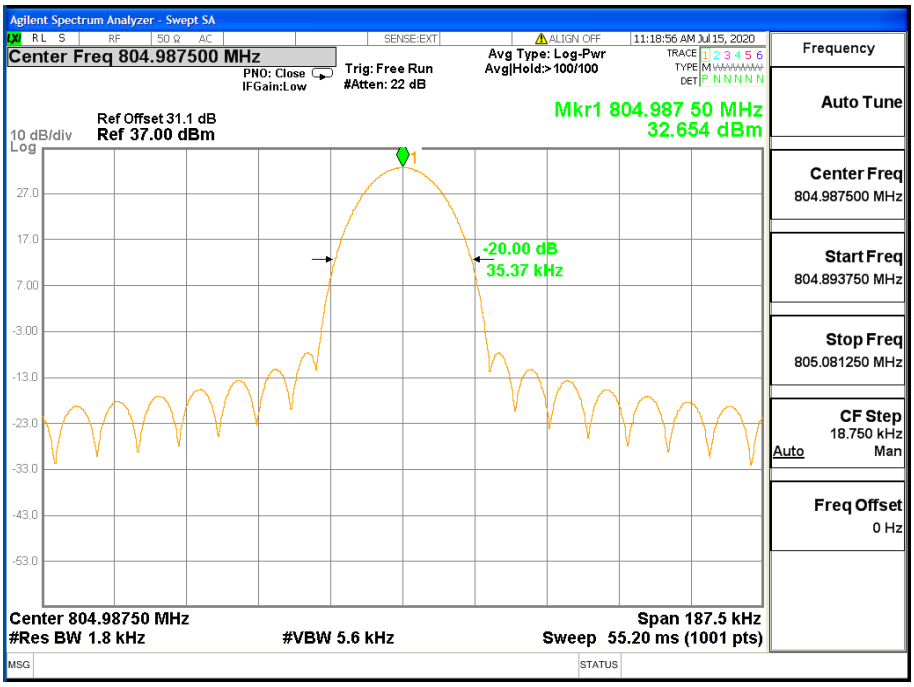
700PS 799.0125 MHz Channel 20dB BW < 70kHz



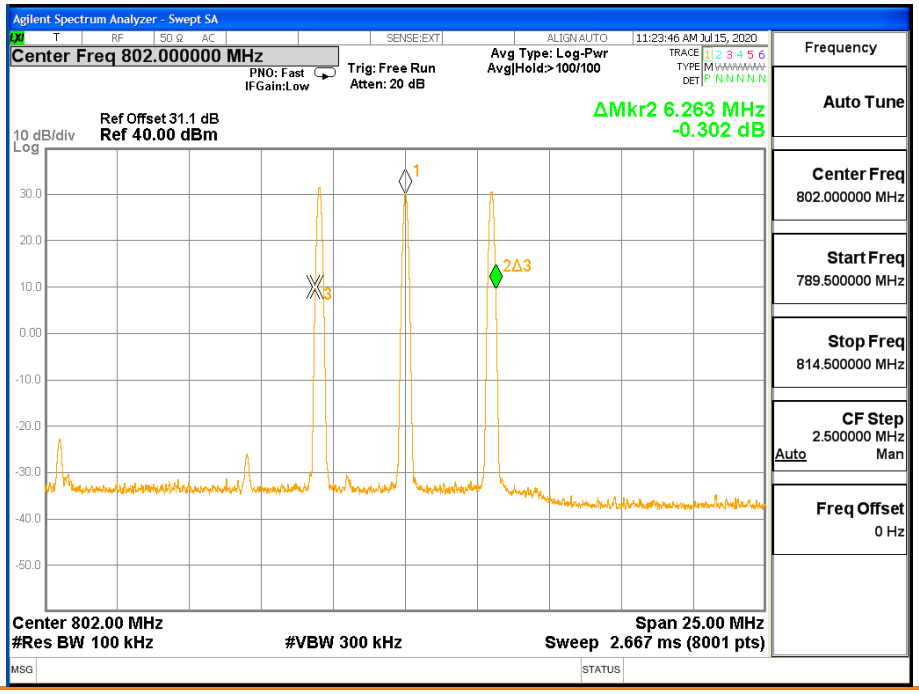

700PS 802 MHz Channel 20dB BW < 70kHz



700PS 804.9875 MHz Channel 20dB BW < 70kHz




700PS Total 20dB BW < 6.3MHz



## Input-Versus-Output Signal Comparison

| | | | |
|---|---|---|---|
| Governing Doc | FCC Part 90.210 (j) (h) (g) (c) (d) and (e) | Room Temperature (°C) | 23.6 |
| Test Procedure | ANSI/TIA-603- E;<br>FCC KDB 935210 D05, v01r04 | Relative Humidity (%) | 39.9 |
| Test Location | Richmond | Barometric Pressure (kPa) | 102.1 |
| Test Engineer | Jeremy Lee | Date | 15 July 2020 |
| EUT Voltage | ☒ +48VDC ☐ 120VAC @ 60Hz | | |

| Test Equipment Used | Manufacturer | Model | Serial Number | Calibration date | Calibration due |
|---|---|---|---|---|---|
| Signal Generator | Keysight | N5172B | MY53050270 | 06/12/19 | 06/12/21 |
| Spectrum Analyzer | Keysight | N9010A | MY50520285 | 07/29/19 | 07/23/21 |

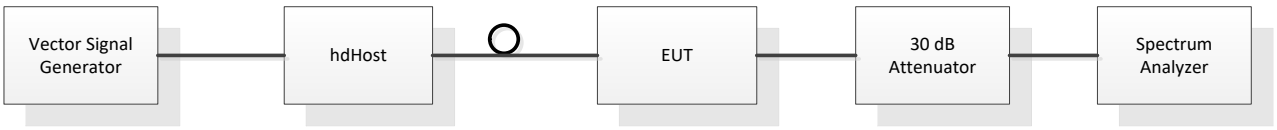
| | |
|---|---|
| Frequency Range: | ☒ 799 MHz – 805 MHz ☒ 806 MHz – 816 MHz ☒ 896 MHz – 901 MHz |
| Detector: | ☒ Peak |
| RBW/VBW: | ☒100 Hz |
| Type of Facility: | ☒ Testbench |
| Distance: | ☒ direct connect |
| Arrangement of EUT: | ☒ Table-top only ☐ Floor-standing only ☐ Rack Mounted |

Based on FCC Part90.210, transmitters without audio low pass filter used in frequency band
799 - 805 MHz must comply to emission mask C;
806 - 809 MHz must comply to emission mask H;
809 - 816 MHz must comply to emission mask D;
896 - 901 MHz must comply to emission mask J;

Signal of all types of modulation is contained within the emission mask.

Compliant ☒ Non-Compliant ☐ Not Applicable ☐

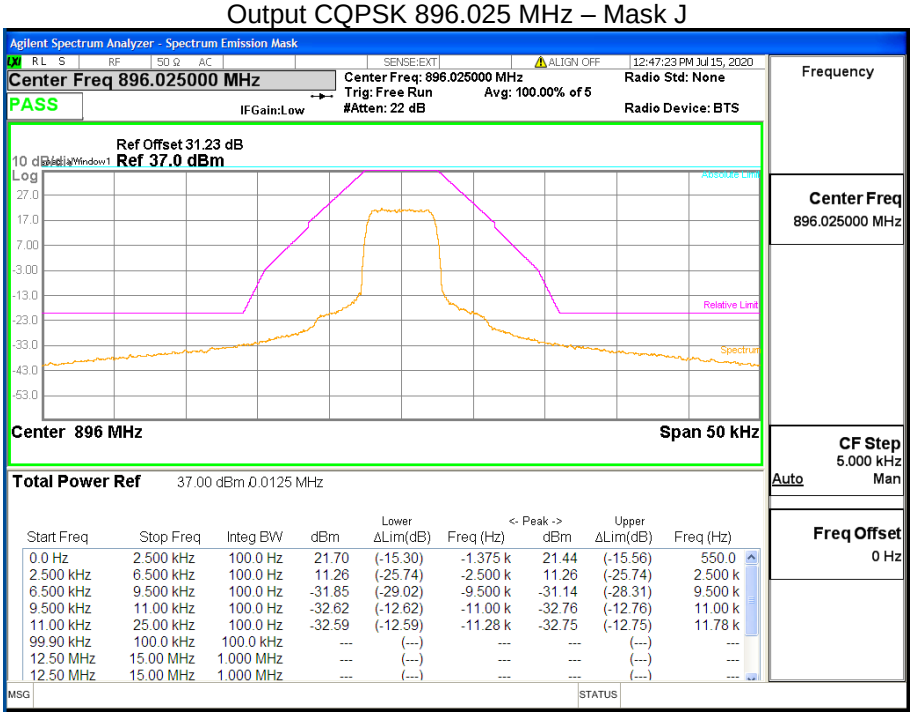
***Test setup***

| Description of test set-up: |
| --- |
| 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.<br>The EUT was set to **Operation Mode #1 with configuration Mode #1.** |
|  |

## Results

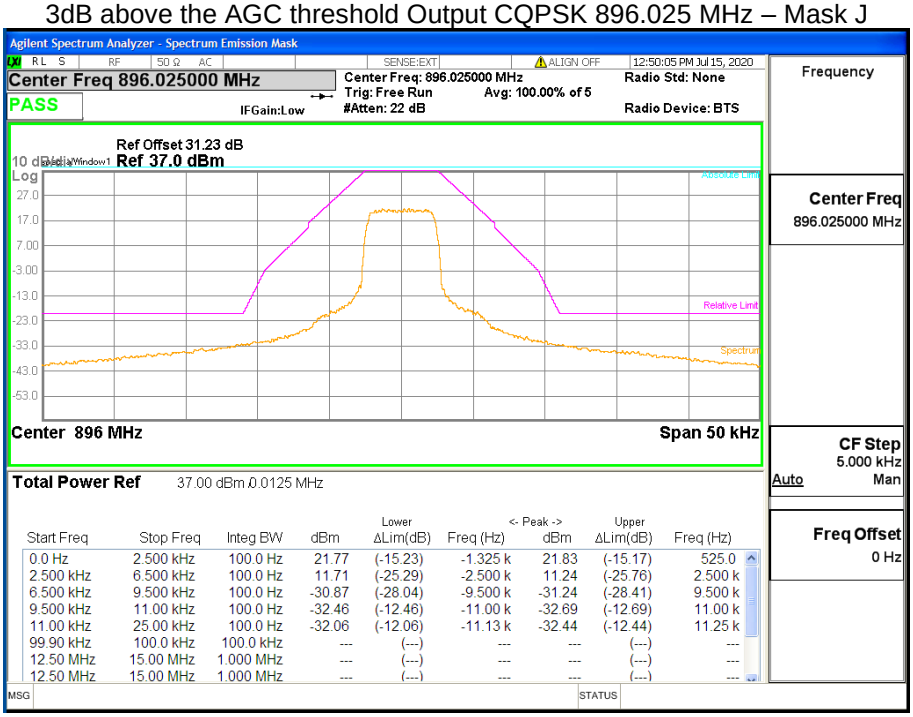
******900PS******

Output CQPSK 896.025 MHz – Mask J



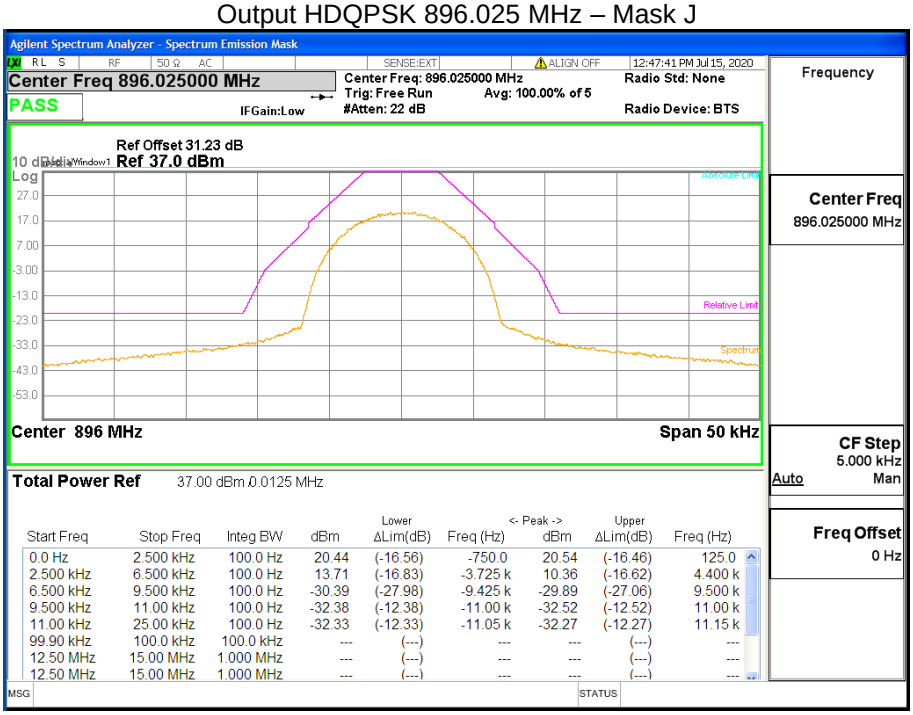

| Start Freq | Stop Freq | Integ BW | dBm | Lower ΔLim(dB) | Lower Freq (Hz) | <- Peak -> dBm | Upper ΔLim(dB) | Upper Freq (Hz) |
|---|---|---|---|---|---|---|---|---|
| 0.0 Hz | 2.500 kHz | 100.0 Hz | 21.70 | (-15.30) | -1.375 k | 21.44 | (-15.56) | 550.0 |
| 2.500 kHz | 6.500 kHz | 100.0 Hz | 11.26 | (-25.74) | -2.500 k | 11.26 | (-25.74) | 2.500 k |
| 6.500 kHz | 9.500 kHz | 100.0 Hz | -31.85 | (-29.02) | -9.500 k | -31.14 | (-28.31) | 9.500 k |
| 9.500 kHz | 11.00 kHz | 100.0 Hz | -32.62 | (-12.62) | -11.00 k | -32.76 | (-12.76) | 11.00 k |
| 11.00 kHz | 25.00 kHz | 100.0 Hz | -32.59 | (-12.59) | -11.28 k | -32.75 | (-12.75) | 11.78 k |
| 99.90 kHz | 100.0 kHz | 100.0 kHz | --- | (---) | --- | --- | (---) | --- |
| 12.50 MHz | 15.00 MHz | 1.000 MHz | --- | (---) | --- | --- | (---) | --- |
| 12.50 MHz | 15.00 MHz | 1.000 MHz | --- | (---) | --- | --- | (---) | --- |

3dB above the AGC threshold Output CQPSK 896.025 MHz – Mask J



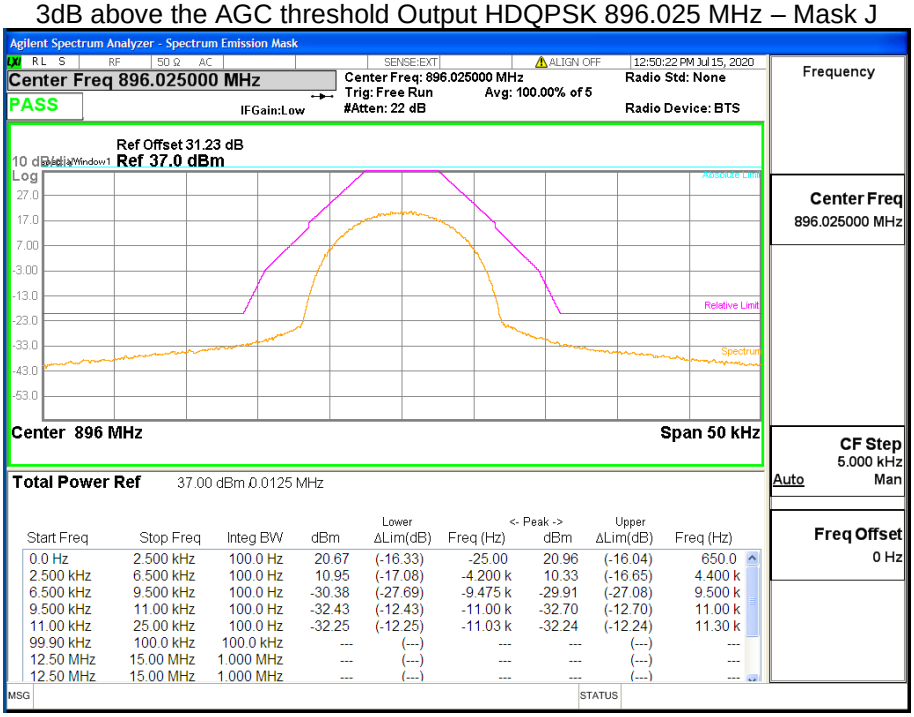

| Start Freq | Stop Freq | Integ BW | dBm | Lower ΔLim(dB) | Lower Freq (Hz) | <- Peak -> dBm | Upper ΔLim(dB) | Upper Freq (Hz) |
|---|---|---|---|---|---|---|---|---|
| 0.0 Hz | 2.500 kHz | 100.0 Hz | 21.77 | (-15.23) | -1.325 k | 21.83 | (-15.17) | 525.0 |
| 2.500 kHz | 6.500 kHz | 100.0 Hz | 11.71 | (-25.29) | -2.500 k | 11.24 | (-25.76) | 2.500 k |
| 6.500 kHz | 9.500 kHz | 100.0 Hz | -30.87 | (-28.04) | -9.500 k | -31.24 | (-28.41) | 9.500 k |
| 9.500 kHz | 11.00 kHz | 100.0 Hz | -32.46 | (-12.46) | -11.00 k | -32.69 | (-12.69) | 11.00 k |
| 11.00 kHz | 25.00 kHz | 100.0 Hz | -32.06 | (-12.06) | -11.13 k | -32.44 | (-12.44) | 11.25 k |
| 99.90 kHz | 100.0 kHz | 100.0 kHz | --- | (---) | --- | --- | (---) | --- |
| 12.50 MHz | 15.00 MHz | 1.000 MHz | --- | (---) | --- | --- | (---) | --- |
| 12.50 MHz | 15.00 MHz | 1.000 MHz | --- | (---) | --- | --- | (---) | --- |

Output HDQPSK 896.025 MHz – Mask J



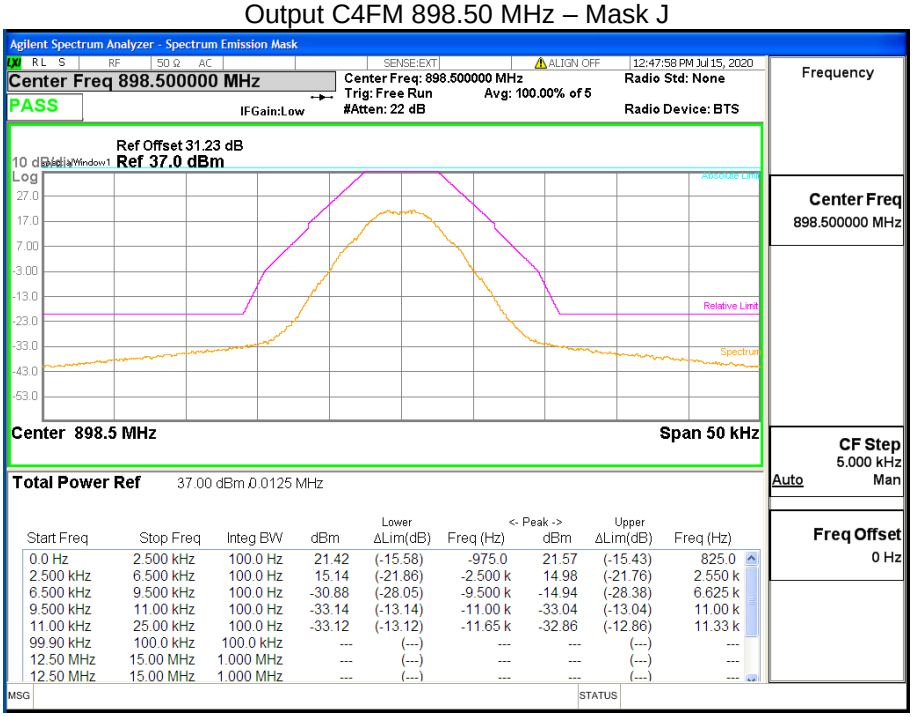

| Start Freq | Stop Freq | Integ BW | dBm | Lower ΔLim(dB) | Lower Freq (Hz) | <- Peak -> dBm | Upper ΔLim(dB) | Upper Freq (Hz) |
|---|---|---|---|---|---|---|---|---|
| 0.0 Hz | 2.500 kHz | 100.0 Hz | 20.44 | (-16.56) | -750.0 | 20.54 | (-16.46) | 125.0 |
| 2.500 kHz | 6.500 kHz | 100.0 Hz | 13.71 | (-16.83) | -3.725 k | 10.36 | (-16.62) | 4.400 k |
| 6.500 kHz | 9.500 kHz | 100.0 Hz | -30.39 | (-27.98) | -9.425 k | -29.89 | (-27.06) | 9.500 k |
| 9.500 kHz | 11.00 kHz | 100.0 Hz | -32.38 | (-12.38) | -11.00 k | -32.52 | (-12.52) | 11.00 k |
| 11.00 kHz | 25.00 kHz | 100.0 Hz | -32.33 | (-12.33) | -11.05 k | -32.27 | (-12.27) | 11.15 k |
| 99.90 kHz | 100.0 kHz | 100.0 kHz | --- | (---) | --- | --- | (---) | --- |
| 12.50 MHz | 15.00 MHz | 1.000 MHz | --- | (---) | --- | --- | (---) | --- |
| 12.50 MHz | 15.00 MHz | 1.000 MHz | --- | (---) | --- | --- | (---) | --- |

3dB above the AGC threshold Output HDQPSK 896.025 MHz – Mask J

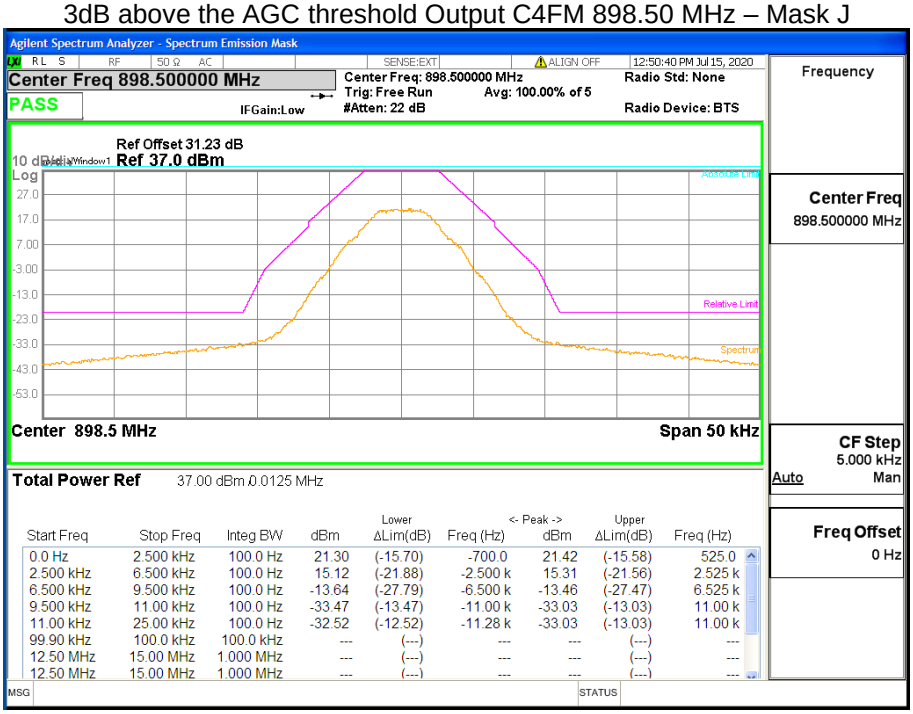



| Start Freq | Stop Freq | Integ BW | dBm | Lower ΔLim(dB) | Lower Freq (Hz) | <- Peak -> dBm | Upper ΔLim(dB) | Upper Freq (Hz) |
|---|---|---|---|---|---|---|---|---|
| 0.0 Hz | 2.500 kHz | 100.0 Hz | 20.67 | (-16.33) | -25.00 | 20.96 | (-16.04) | 650.0 |
| 2.500 kHz | 6.500 kHz | 100.0 Hz | 10.95 | (-17.08) | -4.200 k | 10.33 | (-16.65) | 4.400 k |
| 6.500 kHz | 9.500 kHz | 100.0 Hz | -30.38 | (-27.69) | -9.475 k | -29.91 | (-27.08) | 9.500 k |
| 9.500 kHz | 11.00 kHz | 100.0 Hz | -32.43 | (-12.43) | -11.00 k | -32.70 | (-12.70) | 11.00 k |
| 11.00 kHz | 25.00 kHz | 100.0 Hz | -32.25 | (-12.25) | -11.03 k | -32.24 | (-12.24) | 11.30 k |
| 99.90 kHz | 100.0 kHz | 100.0 kHz | --- | (---) | --- | --- | (---) | --- |
| 12.50 MHz | 15.00 MHz | 1.000 MHz | --- | (---) | --- | --- | (---) | --- |
| 12.50 MHz | 15.00 MHz | 1.000 MHz | --- | (---) | --- | --- | (---) | --- |

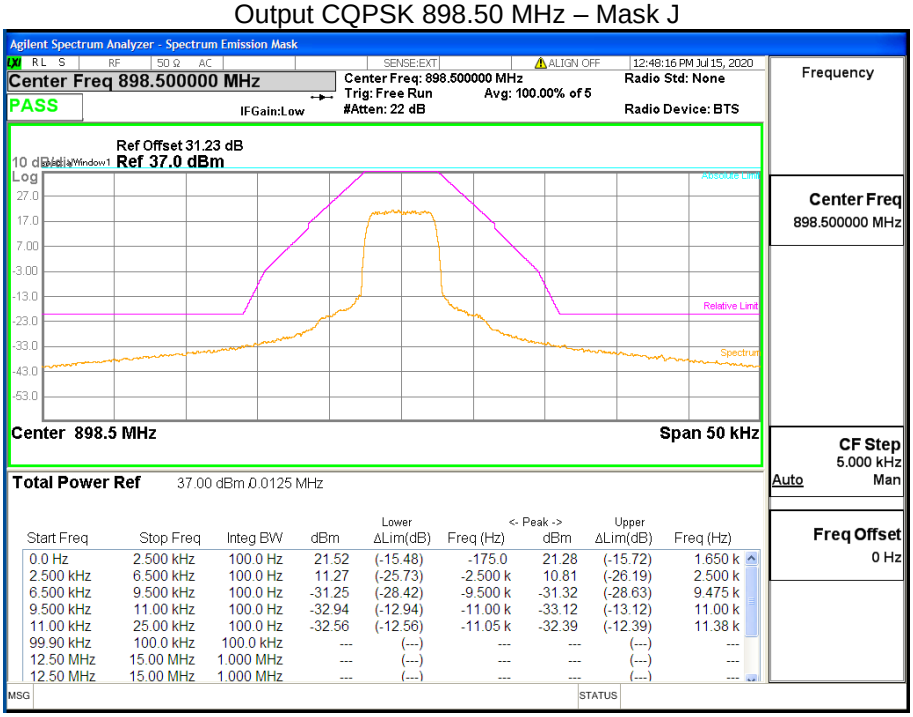
Output C4FM 898.50 MHz – Mask J



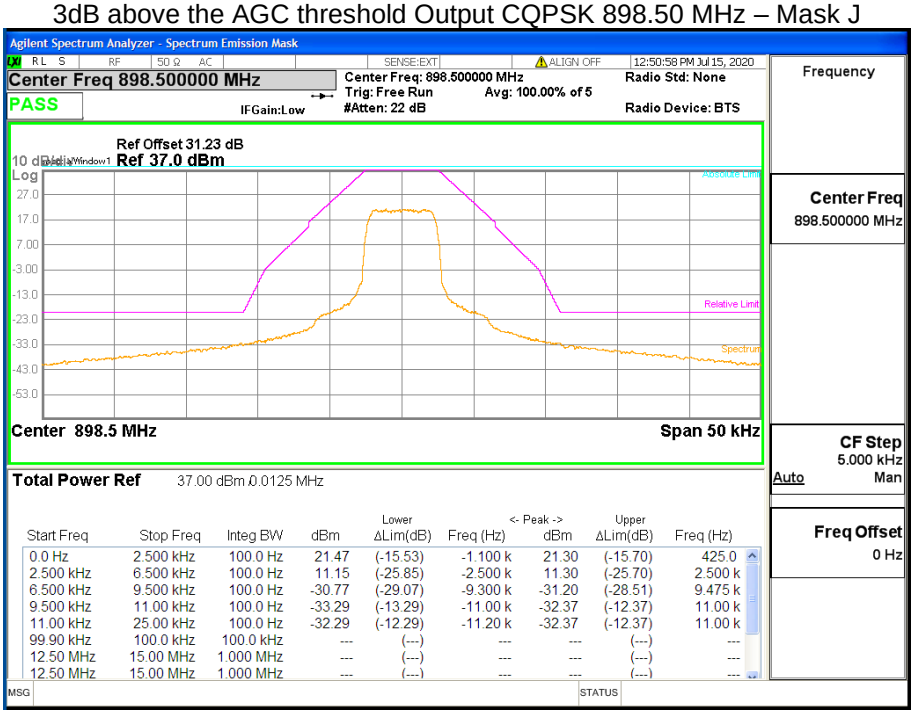

3dB above the AGC threshold Output C4FM 898.50 MHz – Mask J



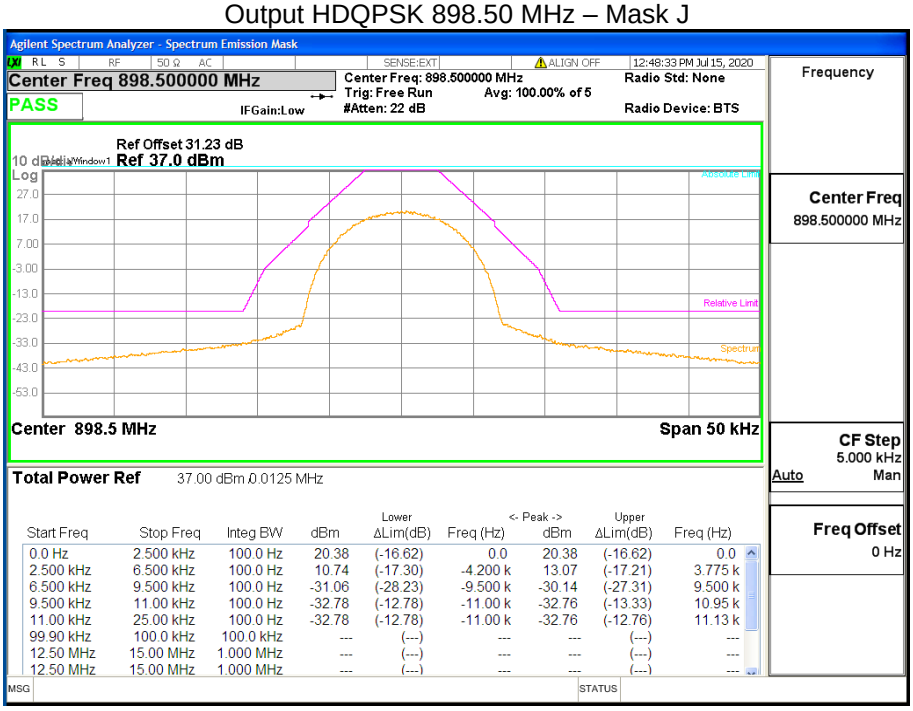
Output CQPSK 898.50 MHz – Mask J



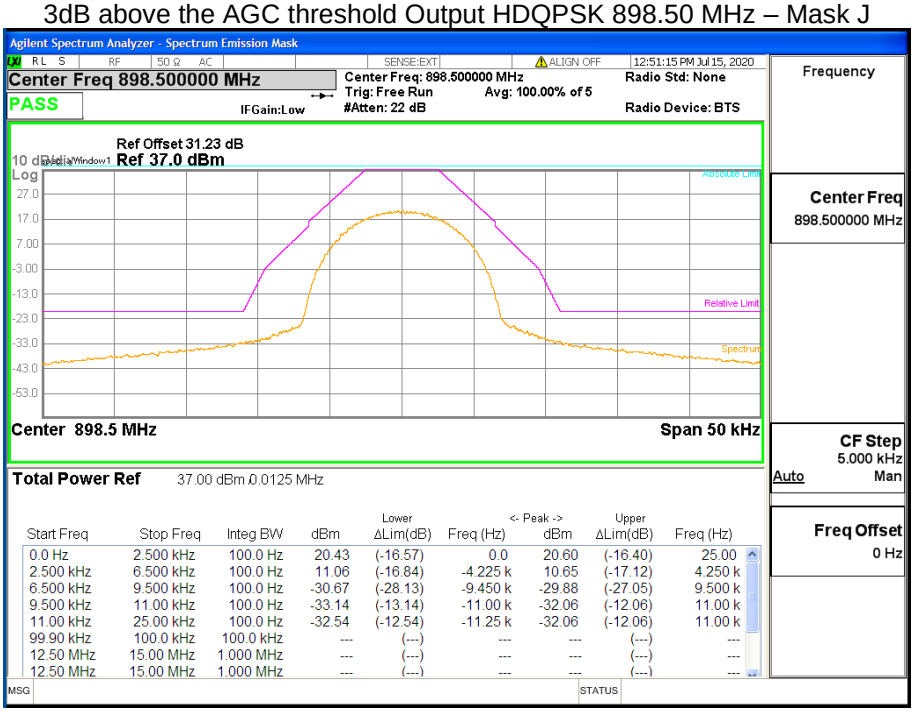

3dB above the AGC threshold Output CQPSK 898.50 MHz – Mask J



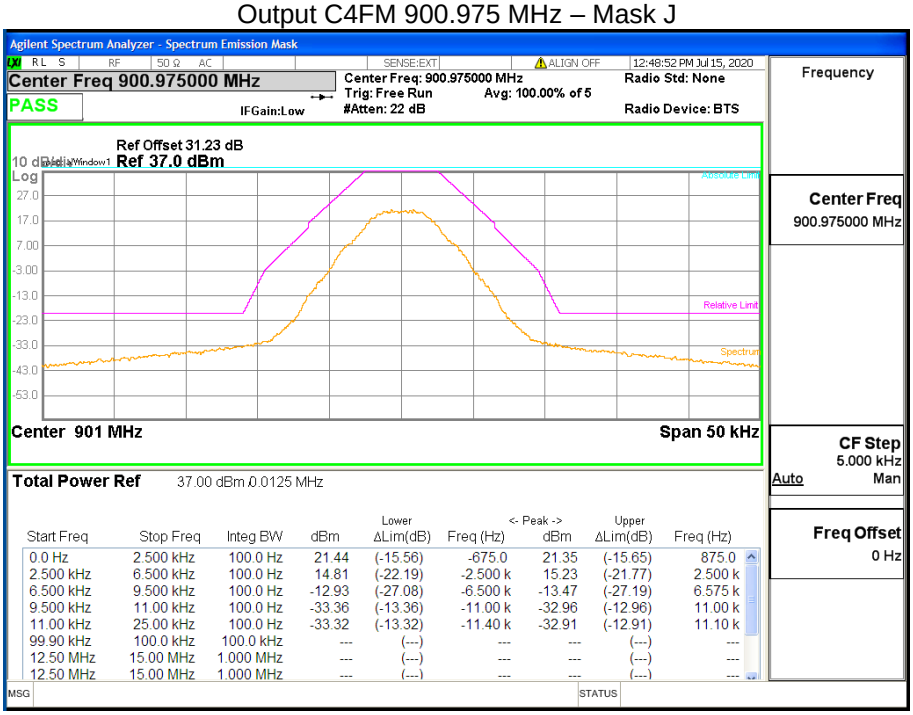
Output HDQPSK 898.50 MHz – Mask J




3dB above the AGC threshold Output HDQPSK 898.50 MHz – Mask J

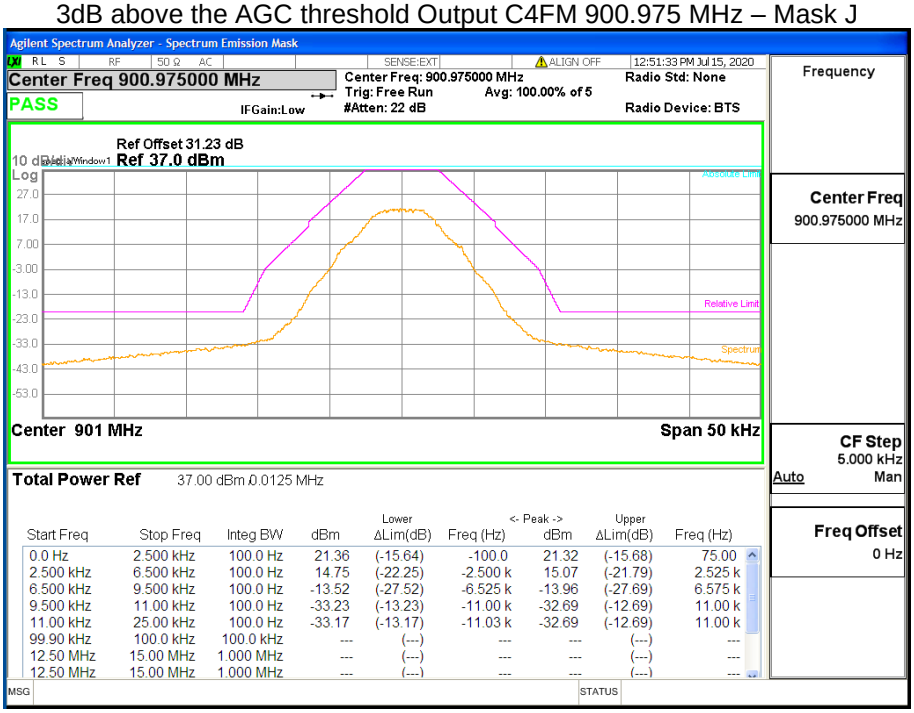


Output C4FM 900.975 MHz – Mask J



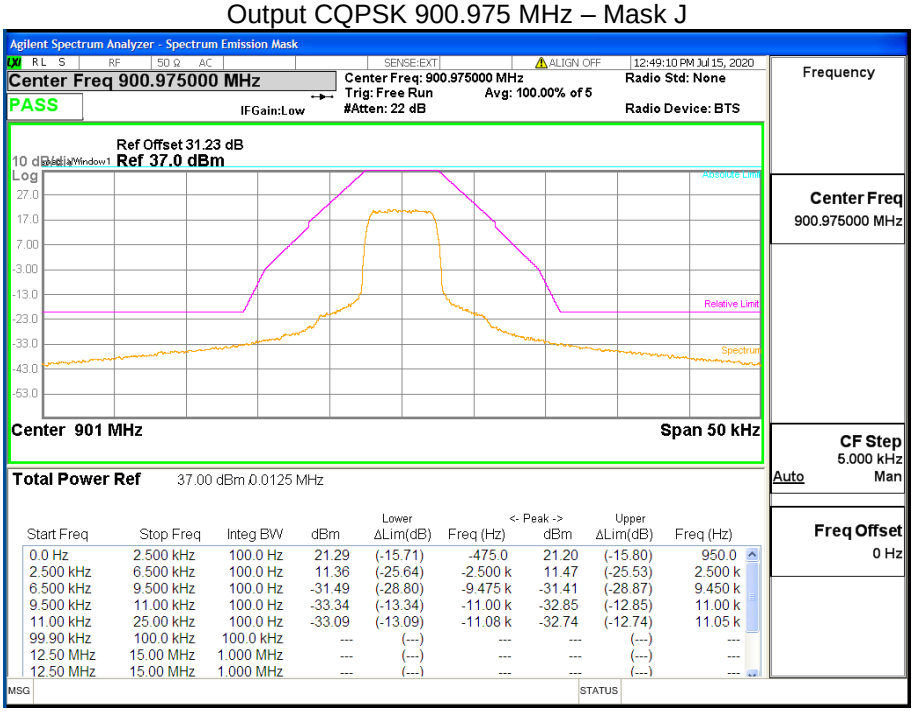

| Start Freq | Stop Freq | Integ BW | dBm | Lower ΔLim(dB) | Lower Freq (Hz) | <- Peak -> dBm | Upper ΔLim(dB) | Upper Freq (Hz) |
|---|---|---|---|---|---|---|---|---|
| 0.0 Hz | 2.500 kHz | 100.0 Hz | 21.44 | (-15.56) | -675.0 | 21.35 | (-15.65) | 875.0 |
| 2.500 kHz | 6.500 kHz | 100.0 Hz | 14.81 | (-22.19) | -2.500 k | 15.23 | (-21.77) | 2.500 k |
| 6.500 kHz | 9.500 kHz | 100.0 Hz | -12.93 | (-27.08) | -6.500 k | -13.47 | (-27.19) | 6.575 k |
| 9.500 kHz | 11.00 kHz | 100.0 Hz | -33.36 | (-13.36) | -11.00 k | -32.96 | (-12.96) | 11.00 k |
| 11.00 kHz | 25.00 kHz | 100.0 Hz | -33.32 | (-13.32) | -11.40 k | -32.91 | (-12.91) | 11.10 k |
| 99.90 kHz | 100.0 kHz | 100.0 kHz | --- | (---) | --- | --- | (---) | --- |
| 12.50 MHz | 15.00 MHz | 1.000 MHz | --- | (---) | --- | --- | (---) | --- |
| 12.50 MHz | 15.00 MHz | 1.000 MHz | --- | (---) | --- | --- | (---) | --- |

3dB above the AGC threshold Output C4FM 900.975 MHz – Mask J



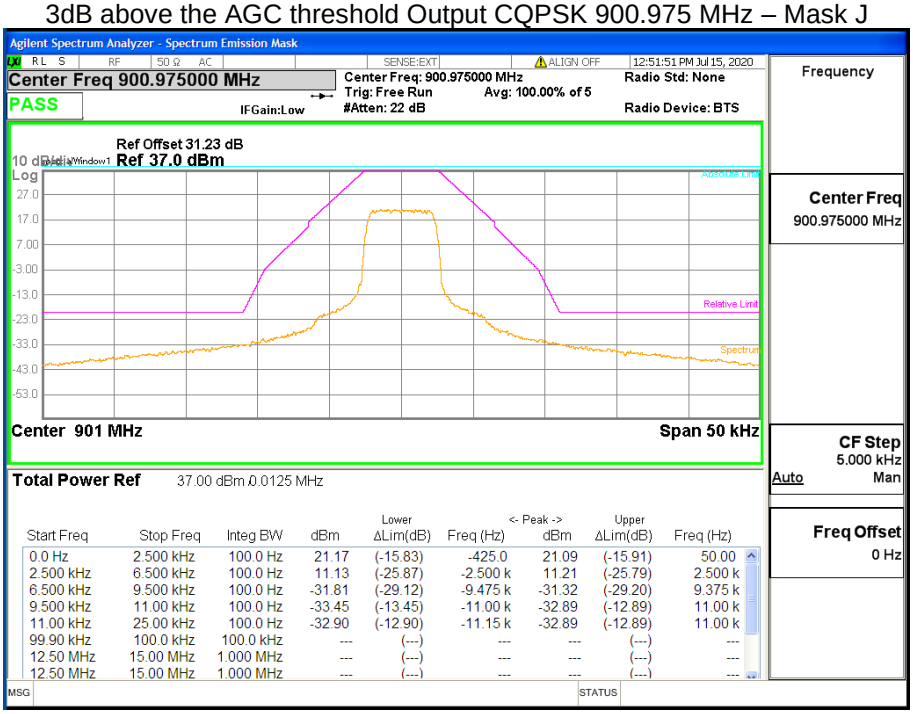

| Start Freq | Stop Freq | Integ BW | dBm | Lower ΔLim(dB) | Lower Freq (Hz) | <- Peak -> dBm | Upper ΔLim(dB) | Upper Freq (Hz) |
|---|---|---|---|---|---|---|---|---|
| 0.0 Hz | 2.500 kHz | 100.0 Hz | 21.36 | (-15.64) | -100.0 | 21.32 | (-15.68) | 75.00 |
| 2.500 kHz | 6.500 kHz | 100.0 Hz | 14.75 | (-22.25) | -2.500 k | 15.07 | (-21.79) | 2.525 k |
| 6.500 kHz | 9.500 kHz | 100.0 Hz | -13.52 | (-27.52) | -6.525 k | -13.96 | (-27.69) | 6.575 k |
| 9.500 kHz | 11.00 kHz | 100.0 Hz | -33.23 | (-13.23) | -11.00 k | -32.69 | (-12.69) | 11.00 k |
| 11.00 kHz | 25.00 kHz | 100.0 Hz | -33.17 | (-13.17) | -11.03 k | -32.69 | (-12.69) | 11.00 k |
| 99.90 kHz | 100.0 kHz | 100.0 kHz | --- | (---) | --- | --- | (---) | --- |
| 12.50 MHz | 15.00 MHz | 1.000 MHz | --- | (---) | --- | --- | (---) | --- |
| 12.50 MHz | 15.00 MHz | 1.000 MHz | --- | (---) | --- | --- | (---) | --- |

Output CQPSK 900.975 MHz – Mask J



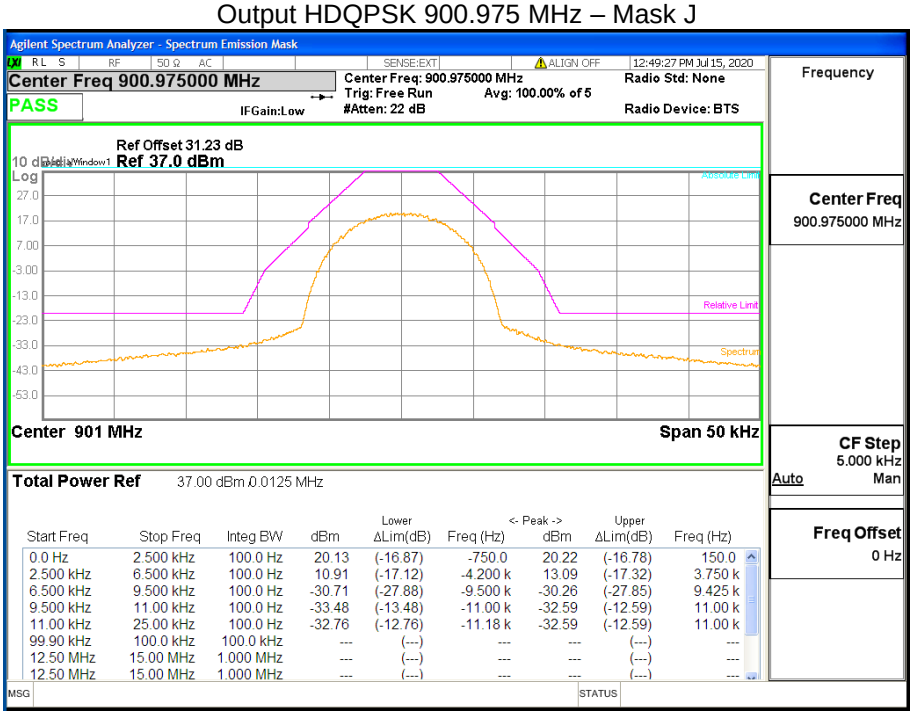

| Start Freq | Stop Freq | Integ BW | dBm | Lower ΔLim(dB) | Lower Freq (Hz) | <- Peak -> dBm | Upper ΔLim(dB) | Upper Freq (Hz) |
|---|---|---|---|---|---|---|---|---|
| 0.0 Hz | 2.500 kHz | 100.0 Hz | 21.29 | (-15.71) | -475.0 | 21.20 | (-15.80) | 950.0 |
| 2.500 kHz | 6.500 kHz | 100.0 Hz | 11.36 | (-25.64) | -2.500 k | 11.47 | (-25.53) | 2.500 k |
| 6.500 kHz | 9.500 kHz | 100.0 Hz | -31.49 | (-28.80) | -9.475 k | -31.41 | (-28.87) | 9.450 k |
| 9.500 kHz | 11.00 kHz | 100.0 Hz | -33.34 | (-13.34) | -11.00 k | -32.85 | (-12.85) | 11.00 k |
| 11.00 kHz | 25.00 kHz | 100.0 Hz | -33.09 | (-13.09) | -11.08 k | -32.74 | (-12.74) | 11.05 k |
| 99.90 kHz | 100.0 kHz | 100.0 kHz | --- | (---) | --- | --- | (---) | --- |
| 12.50 MHz | 15.00 MHz | 1.000 MHz | --- | (---) | --- | --- | (---) | --- |
| 12.50 MHz | 15.00 MHz | 1.000 MHz | --- | (---) | --- | --- | (---) | --- |

3dB above the AGC threshold Output CQPSK 900.975 MHz – Mask J

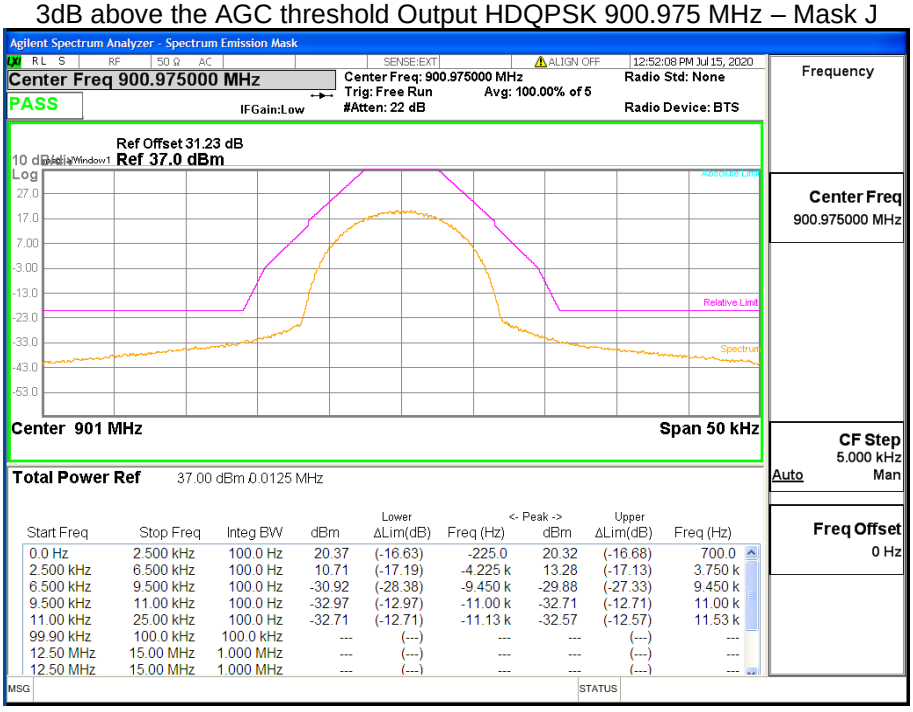



| Start Freq | Stop Freq | Integ BW | dBm | Lower ΔLim(dB) | Lower Freq (Hz) | <- Peak -> dBm | Upper ΔLim(dB) | Upper Freq (Hz) |
|---|---|---|---|---|---|---|---|---|
| 0.0 Hz | 2.500 kHz | 100.0 Hz | 21.17 | (-15.83) | -425.0 | 21.09 | (-15.91) | 50.00 |
| 2.500 kHz | 6.500 kHz | 100.0 Hz | 11.13 | (-25.87) | -2.500 k | 11.21 | (-25.79) | 2.500 k |
| 6.500 kHz | 9.500 kHz | 100.0 Hz | -31.81 | (-29.12) | -9.475 k | -31.32 | (-29.20) | 9.375 k |
| 9.500 kHz | 11.00 kHz | 100.0 Hz | -33.45 | (-13.45) | -11.00 k | -32.89 | (-12.89) | 11.00 k |
| 11.00 kHz | 25.00 kHz | 100.0 Hz | -32.90 | (-12.90) | -11.15 k | -32.89 | (-12.89) | 11.00 k |
| 99.90 kHz | 100.0 kHz | 100.0 kHz | --- | (---) | --- | --- | (---) | --- |
| 12.50 MHz | 15.00 MHz | 1.000 MHz | --- | (---) | --- | --- | (---) | --- |
| 12.50 MHz | 15.00 MHz | 1.000 MHz | --- | (---) | --- | --- | (---) | --- |

Output HDQPSK 900.975 MHz – Mask J

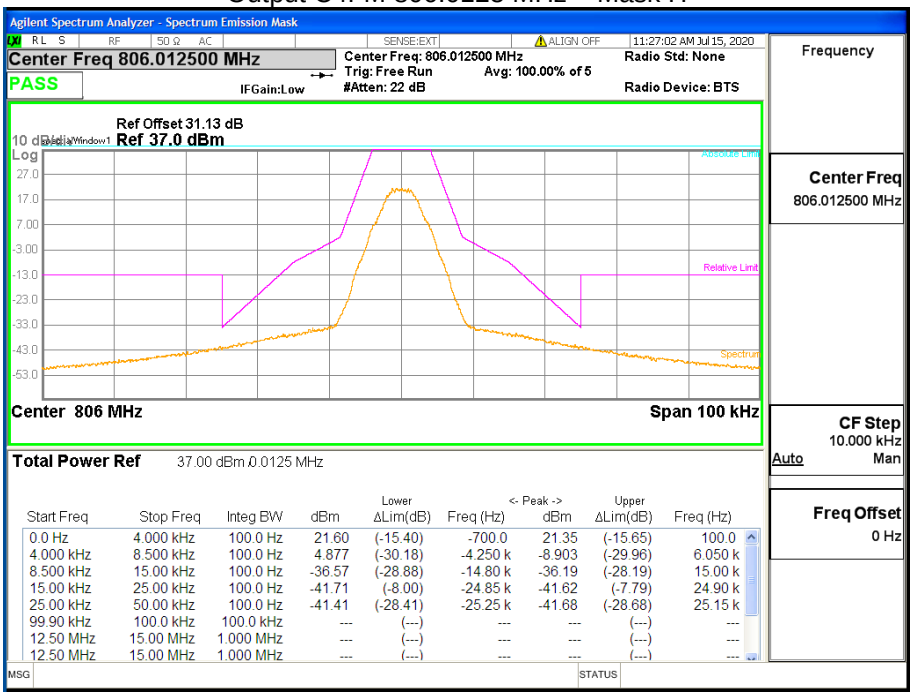



3dB above the AGC threshold Output HDQPSK 900.975 MHz – Mask J

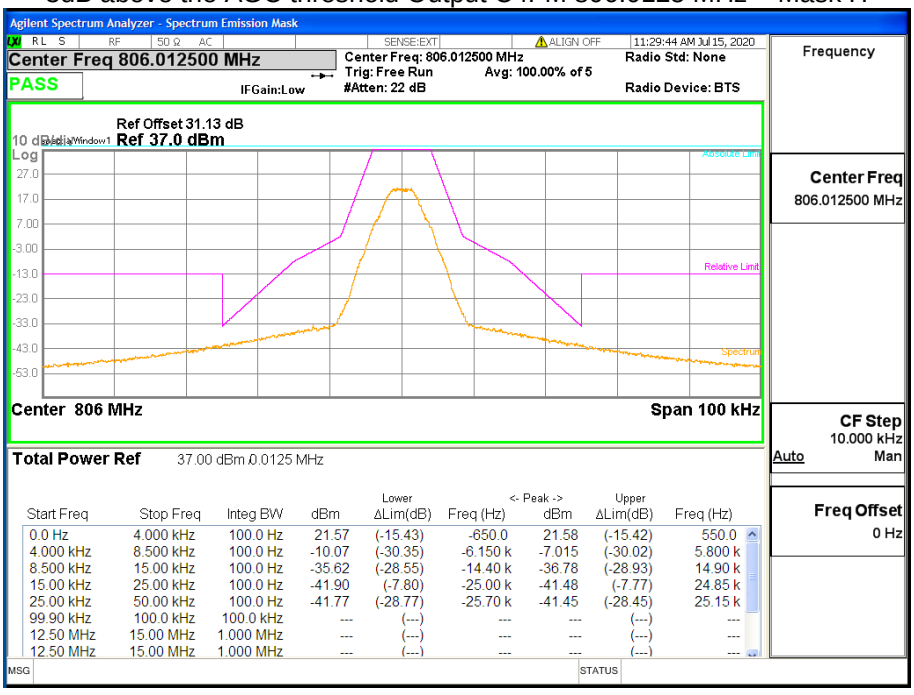


******800PS******

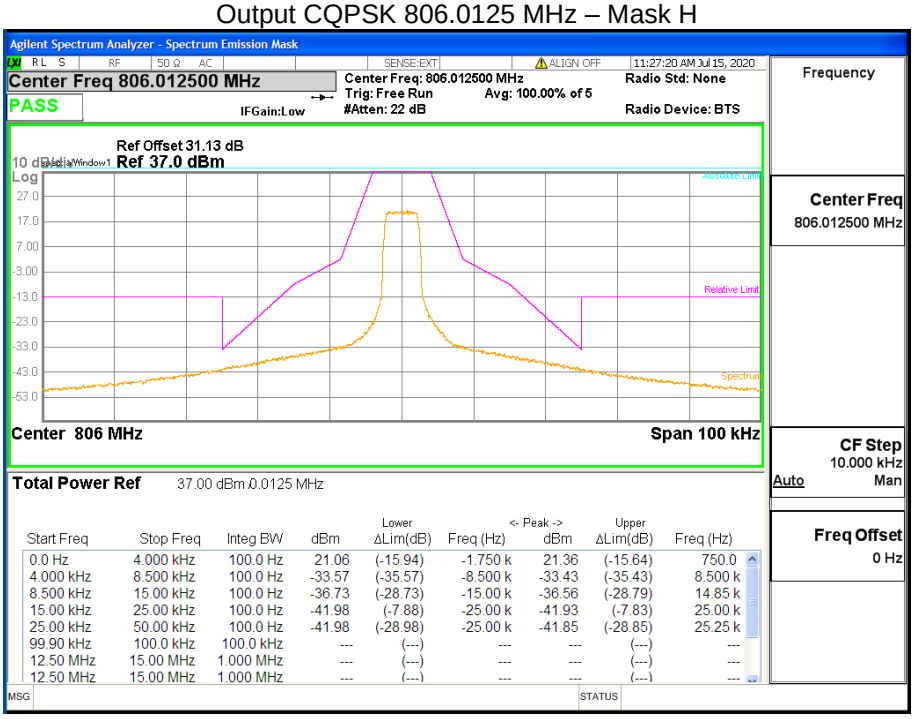
Output C4FM 806.0125 MHz – Mask H




3dB above the AGC threshold Output C4FM 806.0125 MHz – Mask H

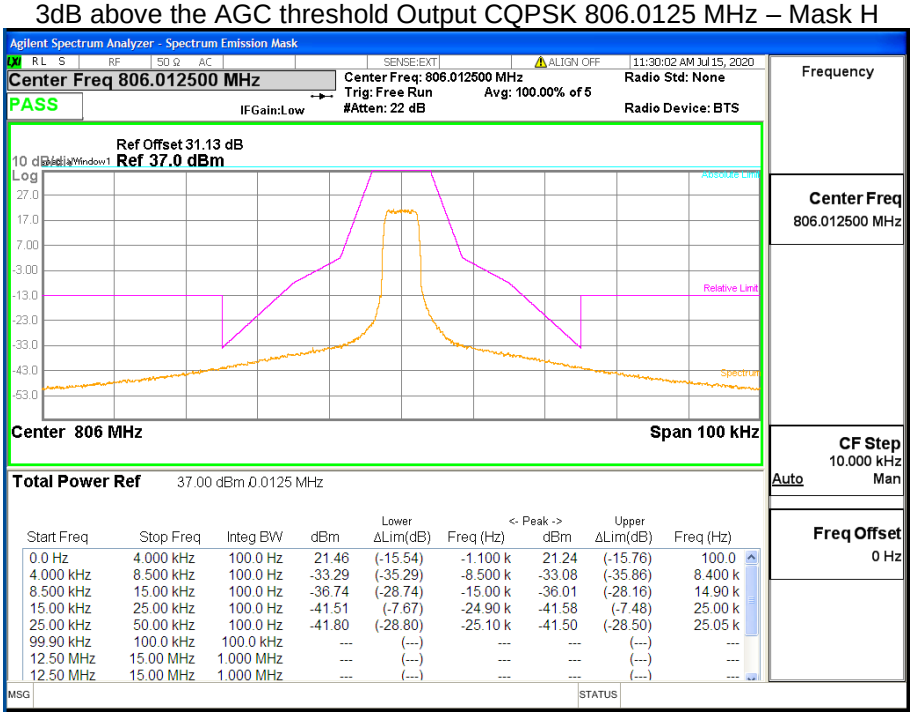


Output CQPSK 806.0125 MHz – Mask H



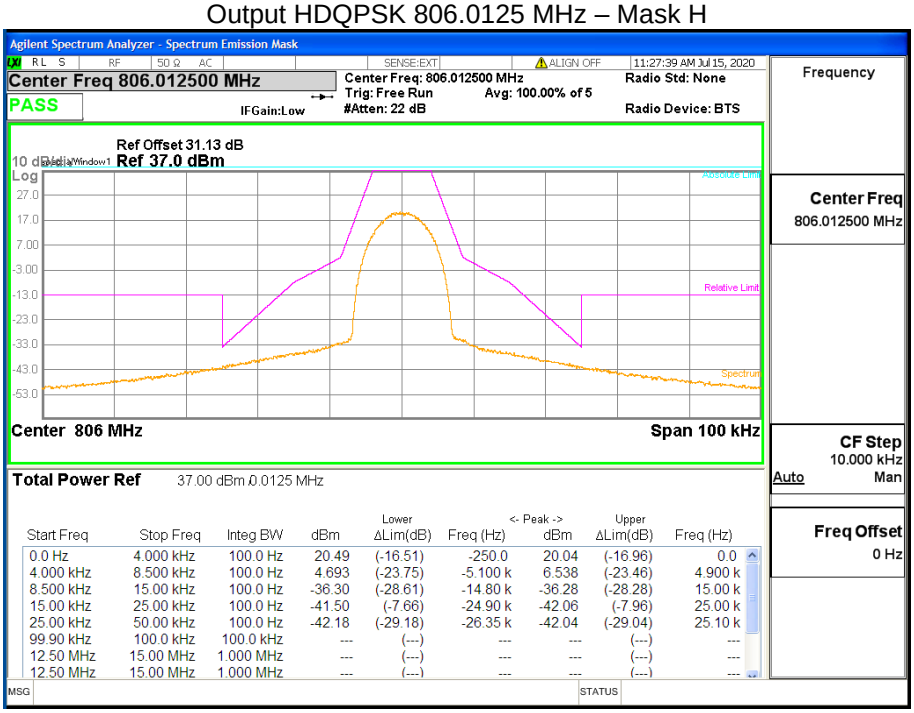

| Start Freq | Stop Freq | Integ BW | dBm | Lower ΔLim(dB) | Lower Freq (Hz) | <- Peak -> dBm | Upper ΔLim(dB) | Upper Freq (Hz) |
|---|---|---|---|---|---|---|---|---|
| 0.0 Hz | 4.000 kHz | 100.0 Hz | 21.06 | (-15.94) | -1.750 k | 21.36 | (-15.64) | 750.0 |
| 4.000 kHz | 8.500 kHz | 100.0 Hz | -33.57 | (-35.57) | -8.500 k | -33.43 | (-35.43) | 8.500 k |
| 8.500 kHz | 15.00 kHz | 100.0 Hz | -36.73 | (-28.73) | -15.00 k | -36.56 | (-28.79) | 14.85 k |
| 15.00 kHz | 25.00 kHz | 100.0 Hz | -41.98 | (-7.88) | -25.00 k | -41.93 | (-7.83) | 25.00 k |
| 25.00 kHz | 50.00 kHz | 100.0 Hz | -41.98 | (-28.98) | -25.00 k | -41.85 | (-28.85) | 25.25 k |
| 99.90 kHz | 100.0 kHz | 100.0 kHz | --- | (---) | --- | --- | (---) | --- |
| 12.50 MHz | 15.00 MHz | 1.000 MHz | --- | (---) | --- | --- | (---) | --- |
| 12.50 MHz | 15.00 MHz | 1.000 MHz | --- | (---) | --- | --- | (---) | --- |

3dB above the AGC threshold Output CQPSK 806.0125 MHz – Mask H



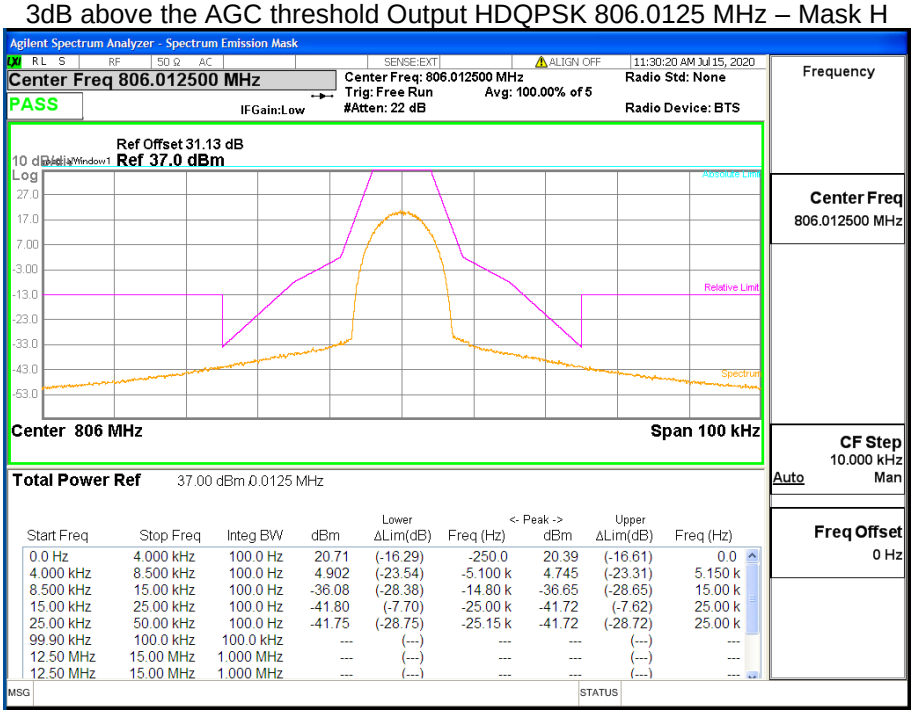

| Start Freq | Stop Freq | Integ BW | dBm | Lower ΔLim(dB) | Lower Freq (Hz) | <- Peak -> dBm | Upper ΔLim(dB) | Upper Freq (Hz) |
|---|---|---|---|---|---|---|---|---|
| 0.0 Hz | 4.000 kHz | 100.0 Hz | 21.46 | (-15.54) | -1.100 k | 21.24 | (-15.76) | 100.0 |
| 4.000 kHz | 8.500 kHz | 100.0 Hz | -33.29 | (-35.29) | -8.500 k | -33.08 | (-35.86) | 8.400 k |
| 8.500 kHz | 15.00 kHz | 100.0 Hz | -36.74 | (-28.74) | -15.00 k | -36.01 | (-28.16) | 14.90 k |
| 15.00 kHz | 25.00 kHz | 100.0 Hz | -41.51 | (-7.67) | -24.90 k | -41.58 | (-7.48) | 25.00 k |
| 25.00 kHz | 50.00 kHz | 100.0 Hz | -41.80 | (-28.80) | -25.10 k | -41.50 | (-28.50) | 25.05 k |
| 99.90 kHz | 100.0 kHz | 100.0 kHz | --- | (---) | --- | --- | (---) | --- |
| 12.50 MHz | 15.00 MHz | 1.000 MHz | --- | (---) | --- | --- | (---) | --- |
| 12.50 MHz | 15.00 MHz | 1.000 MHz | --- | (---) | --- | --- | (---) | --- |

Output HDQPSK 806.0125 MHz – Mask H



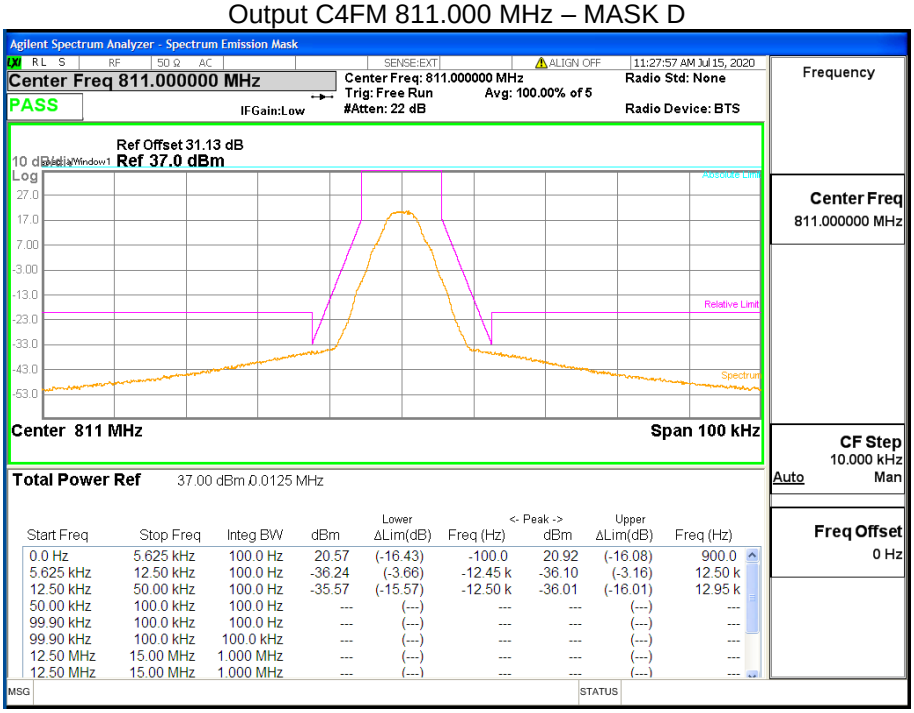

| Start Freq | Stop Freq | Integ BW | dBm | Lower ΔLim(dB) | Lower Freq (Hz) | <- Peak -> dBm | Upper ΔLim(dB) | Upper Freq (Hz) |
|---|---|---|---|---|---|---|---|---|
| 0.0 Hz | 4.000 kHz | 100.0 Hz | 20.49 | (-16.51) | -250.0 | 20.04 | (-16.96) | 0.0 |
| 4.000 kHz | 8.500 kHz | 100.0 Hz | 4.693 | (-23.75) | -5.100 k | 6.538 | (-23.46) | 4.900 k |
| 8.500 kHz | 15.00 kHz | 100.0 Hz | -36.30 | (-28.61) | -14.80 k | -36.28 | (-28.28) | 15.00 k |
| 15.00 kHz | 25.00 kHz | 100.0 Hz | -41.50 | (-7.66) | -24.90 k | -42.06 | (-7.96) | 25.00 k |
| 25.00 kHz | 50.00 kHz | 100.0 Hz | -42.18 | (-29.18) | -26.35 k | -42.04 | (-29.04) | 25.10 k |
| 99.90 kHz | 100.0 kHz | 100.0 kHz | --- | (---) | --- | --- | (---) | --- |
| 12.50 MHz | 15.00 MHz | 1.000 MHz | --- | (---) | --- | --- | (---) | --- |
| 12.50 MHz | 15.00 MHz | 1.000 MHz | --- | (---) | --- | --- | (---) | --- |

3dB above the AGC threshold Output HDQPSK 806.0125 MHz – Mask H



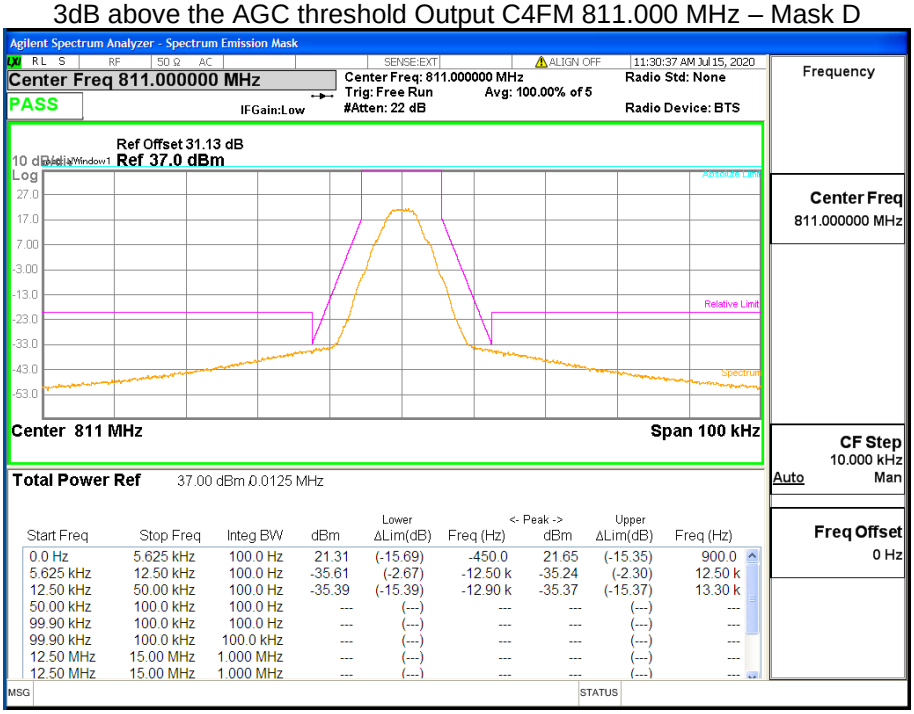

| Start Freq | Stop Freq | Integ BW | dBm | Lower ΔLim(dB) | Lower Freq (Hz) | <- Peak -> dBm | Upper ΔLim(dB) | Upper Freq (Hz) |
|---|---|---|---|---|---|---|---|---|
| 0.0 Hz | 4.000 kHz | 100.0 Hz | 20.71 | (-16.29) | -250.0 | 20.39 | (-16.61) | 0.0 |
| 4.000 kHz | 8.500 kHz | 100.0 Hz | 4.902 | (-23.54) | -5.100 k | 4.745 | (-23.31) | 5.150 k |
| 8.500 kHz | 15.00 kHz | 100.0 Hz | -36.08 | (-28.38) | -14.80 k | -36.65 | (-28.65) | 15.00 k |
| 15.00 kHz | 25.00 kHz | 100.0 Hz | -41.80 | (-7.70) | -25.00 k | -41.72 | (-7.62) | 25.00 k |
| 25.00 kHz | 50.00 kHz | 100.0 Hz | -41.75 | (-28.75) | -25.15 k | -41.72 | (-28.72) | 25.00 k |
| 99.90 kHz | 100.0 kHz | 100.0 kHz | --- | (---) | --- | --- | (---) | --- |
| 12.50 MHz | 15.00 MHz | 1.000 MHz | --- | (---) | --- | --- | (---) | --- |
| 12.50 MHz | 15.00 MHz | 1.000 MHz | --- | (---) | --- | --- | (---) | --- |

Output C4FM 811.000 MHz – MASK D



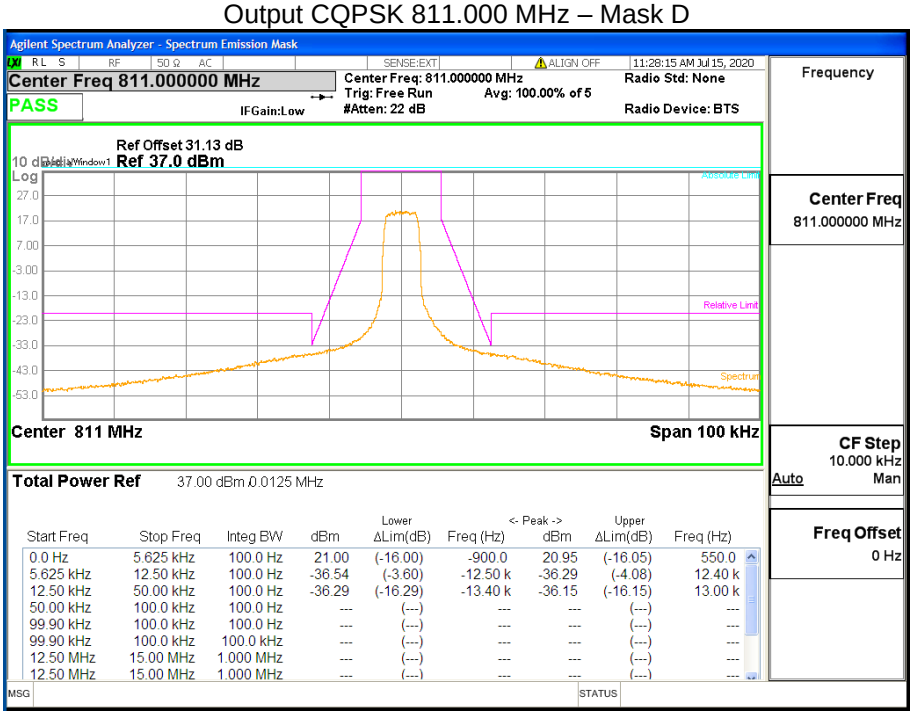

| Start Freq | Stop Freq | Integ BW | dBm | Lower ΔLim(dB) | Lower Freq (Hz) | <- Peak -> dBm | Upper ΔLim(dB) | Upper Freq (Hz) |
|---|---|---|---|---|---|---|---|---|
| 0.0 Hz | 5.625 kHz | 100.0 Hz | 20.57 | (-16.43) | -100.0 | 20.92 | (-16.08) | 900.0 |
| 5.625 kHz | 12.50 kHz | 100.0 Hz | -36.24 | (-3.66) | -12.45 k | -36.10 | (-3.16) | 12.50 k |
| 12.50 kHz | 50.00 kHz | 100.0 Hz | -35.57 | (-15.57) | -12.50 k | -36.01 | (-16.01) | 12.95 k |
| 50.00 kHz | 100.0 kHz | 100.0 Hz | --- | (---) | --- | --- | (---) | --- |
| 99.90 kHz | 100.0 kHz | 100.0 Hz | --- | (---) | --- | --- | (---) | --- |
| 99.90 kHz | 100.0 kHz | 100.0 kHz | --- | (---) | --- | --- | (---) | --- |
| 12.50 MHz | 15.00 MHz | 1.000 MHz | --- | (---) | --- | --- | (---) | --- |
| 12.50 MHz | 15.00 MHz | 1.000 MHz | --- | (---) | --- | --- | (---) | --- |

3dB above the AGC threshold Output C4FM 811.000 MHz – Mask D

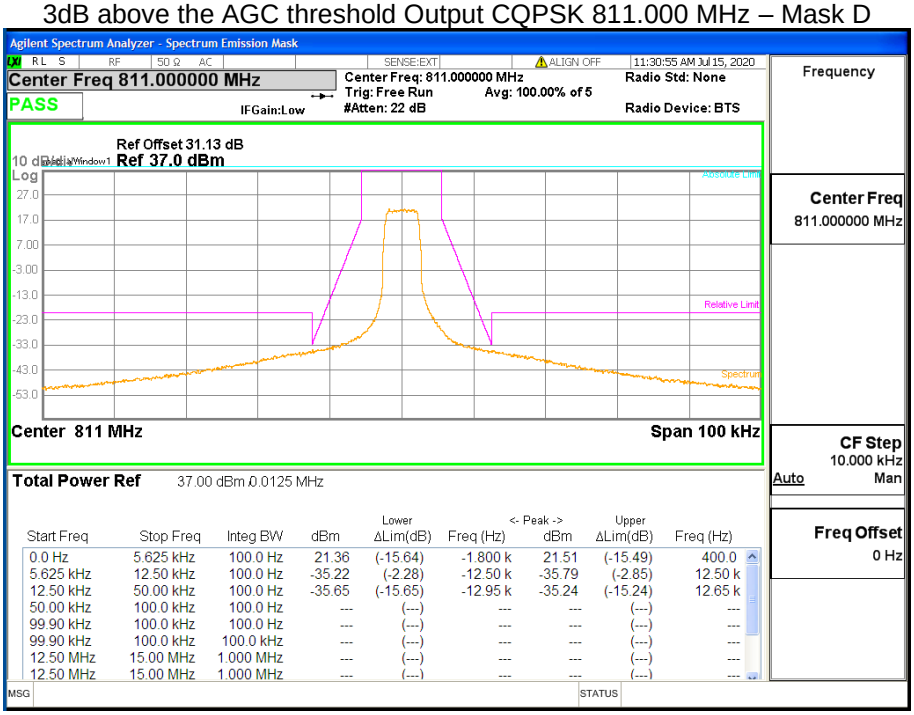



| Start Freq | Stop Freq | Integ BW | dBm | Lower ΔLim(dB) | Lower Freq (Hz) | <- Peak -> dBm | Upper ΔLim(dB) | Upper Freq (Hz) |
|---|---|---|---|---|---|---|---|---|
| 0.0 Hz | 5.625 kHz | 100.0 Hz | 21.31 | (-15.69) | -450.0 | 21.65 | (-15.35) | 900.0 |
| 5.625 kHz | 12.50 kHz | 100.0 Hz | -35.61 | (-2.67) | -12.50 k | -35.24 | (-2.30) | 12.50 k |
| 12.50 kHz | 50.00 kHz | 100.0 Hz | -35.39 | (-15.39) | -12.90 k | -35.37 | (-15.37) | 13.30 k |
| 50.00 kHz | 100.0 kHz | 100.0 Hz | --- | (---) | --- | --- | (---) | --- |
| 99.90 kHz | 100.0 kHz | 100.0 Hz | --- | (---) | --- | --- | (---) | --- |
| 99.90 kHz | 100.0 kHz | 100.0 kHz | --- | (---) | --- | --- | (---) | --- |
| 12.50 MHz | 15.00 MHz | 1.000 MHz | --- | (---) | --- | --- | (---) | --- |
| 12.50 MHz | 15.00 MHz | 1.000 MHz | --- | (---) | --- | --- | (---) | --- |

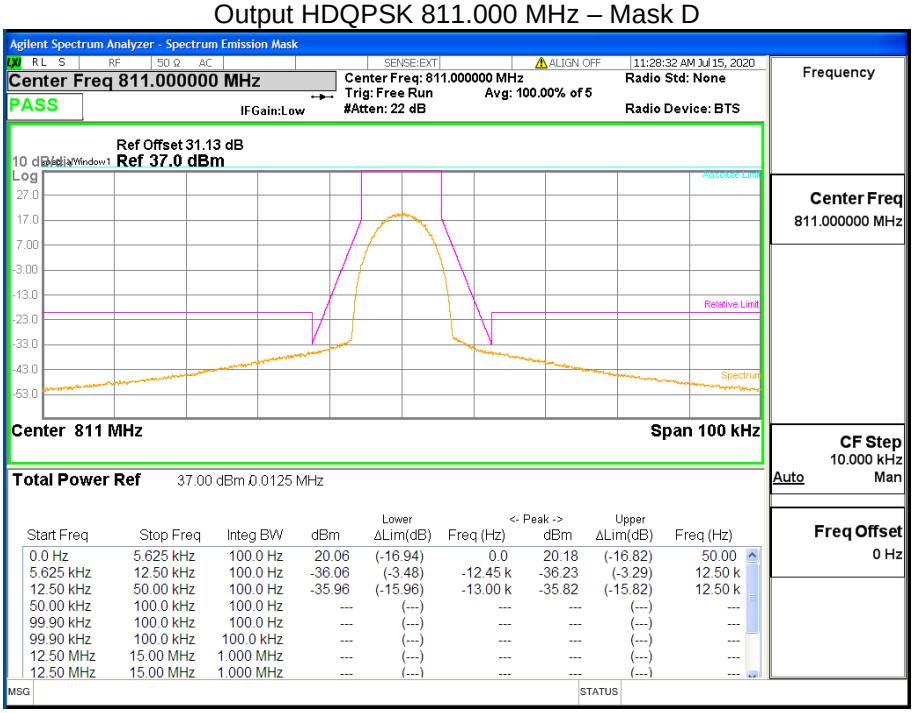
Output CQPSK 811.000 MHz – Mask D




3dB above the AGC threshold Output CQPSK 811.000 MHz – Mask D

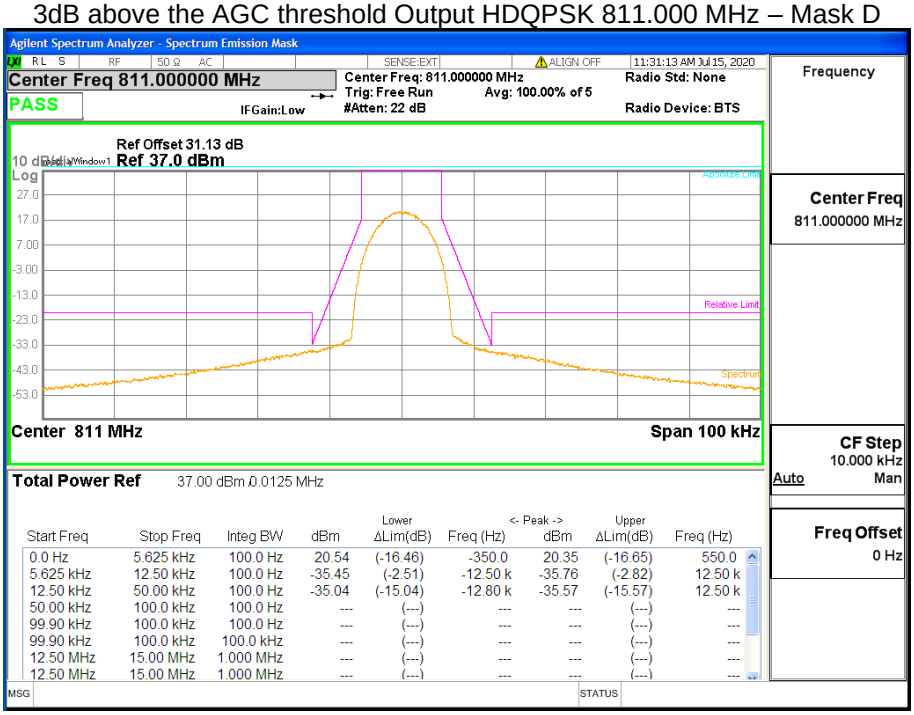


Output HDQPSK 811.000 MHz – Mask D



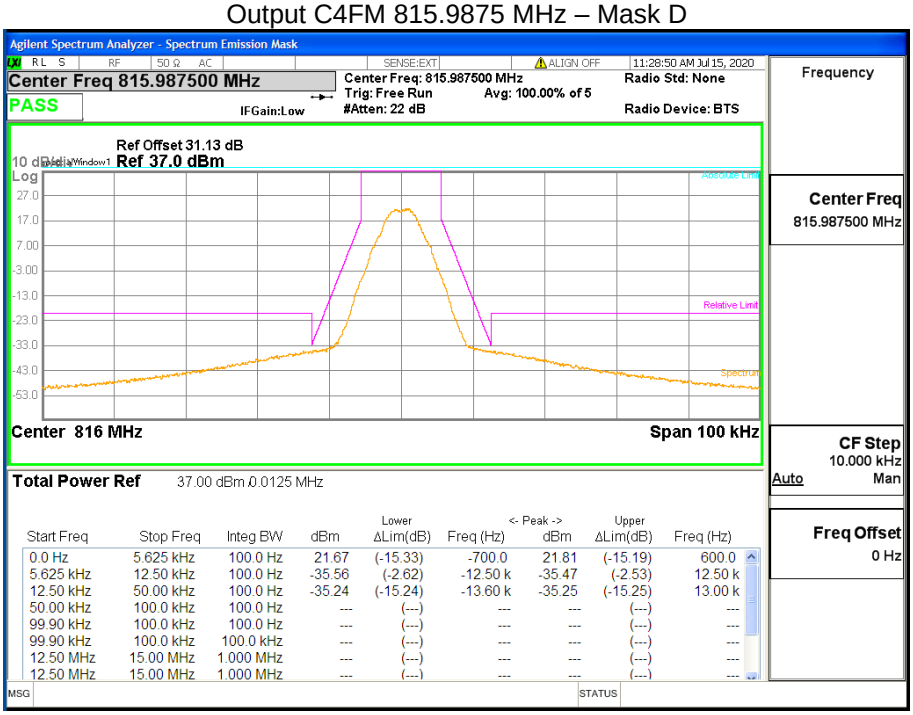

| Start Freq | Stop Freq | Integ BW | dBm | Lower ΔLim(dB) | Lower Freq (Hz) | <- Peak -> dBm | Upper ΔLim(dB) | Upper Freq (Hz) |
|---|---|---|---|---|---|---|---|---|
| 0.0 Hz | 5.625 kHz | 100.0 Hz | 20.06 | (-16.94) | 0.0 | 20.18 | (-16.82) | 50.00 |
| 5.625 kHz | 12.50 kHz | 100.0 Hz | -36.06 | (-3.48) | -12.45 k | -36.23 | (-3.29) | 12.50 k |
| 12.50 kHz | 50.00 kHz | 100.0 Hz | -35.96 | (-15.96) | -13.00 k | -35.82 | (-15.82) | 12.50 k |
| 50.00 kHz | 100.0 kHz | 100.0 Hz | --- | (---) | --- | --- | (---) | --- |
| 99.90 kHz | 100.0 kHz | 100.0 Hz | --- | (---) | --- | --- | (---) | --- |
| 99.90 kHz | 100.0 kHz | 100.0 kHz | --- | (---) | --- | --- | (---) | --- |
| 12.50 MHz | 15.00 MHz | 1.000 MHz | --- | (---) | --- | --- | (---) | --- |
| 12.50 MHz | 15.00 MHz | 1.000 MHz | --- | (---) | --- | --- | (---) | --- |

3dB above the AGC threshold Output HDQPSK 811.000 MHz – Mask D



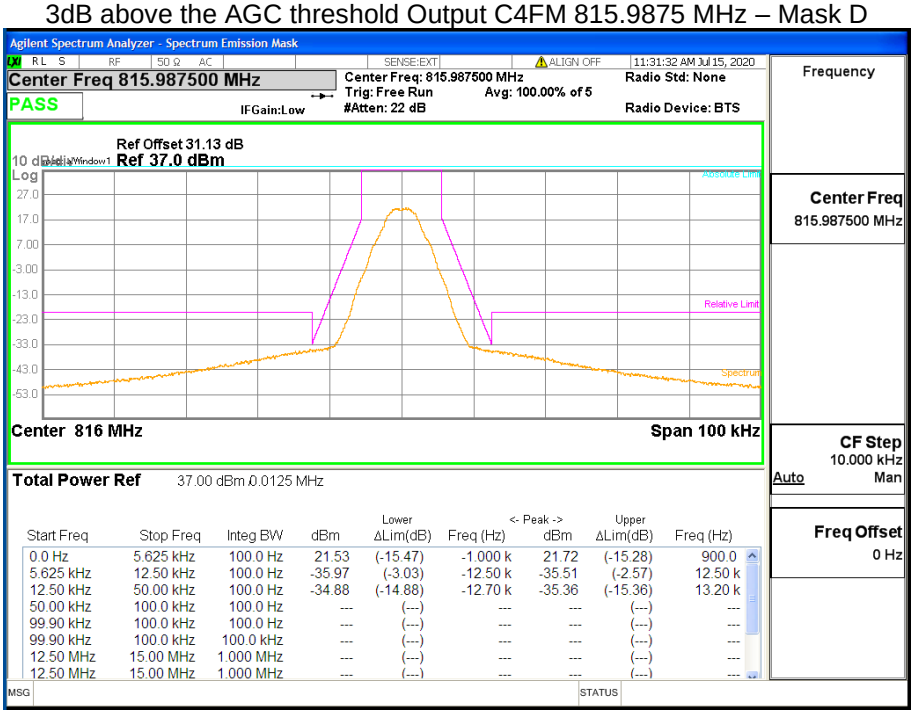

| Start Freq | Stop Freq | Integ BW | dBm | Lower ΔLim(dB) | Lower Freq (Hz) | <- Peak -> dBm | Upper ΔLim(dB) | Upper Freq (Hz) |
|---|---|---|---|---|---|---|---|---|
| 0.0 Hz | 5.625 kHz | 100.0 Hz | 20.54 | (-16.46) | -350.0 | 20.35 | (-16.65) | 550.0 |
| 5.625 kHz | 12.50 kHz | 100.0 Hz | -35.45 | (-2.51) | -12.50 k | -35.76 | (-2.82) | 12.50 k |
| 12.50 kHz | 50.00 kHz | 100.0 Hz | -35.04 | (-15.04) | -12.80 k | -35.57 | (-15.57) | 12.50 k |
| 50.00 kHz | 100.0 kHz | 100.0 Hz | --- | (---) | --- | --- | (---) | --- |
| 99.90 kHz | 100.0 kHz | 100.0 Hz | --- | (---) | --- | --- | (---) | --- |
| 99.90 kHz | 100.0 kHz | 100.0 kHz | --- | (---) | --- | --- | (---) | --- |
| 12.50 MHz | 15.00 MHz | 1.000 MHz | --- | (---) | --- | --- | (---) | --- |
| 12.50 MHz | 15.00 MHz | 1.000 MHz | --- | (---) | --- | --- | (---) | --- |

Output C4FM 815.9875 MHz – Mask D



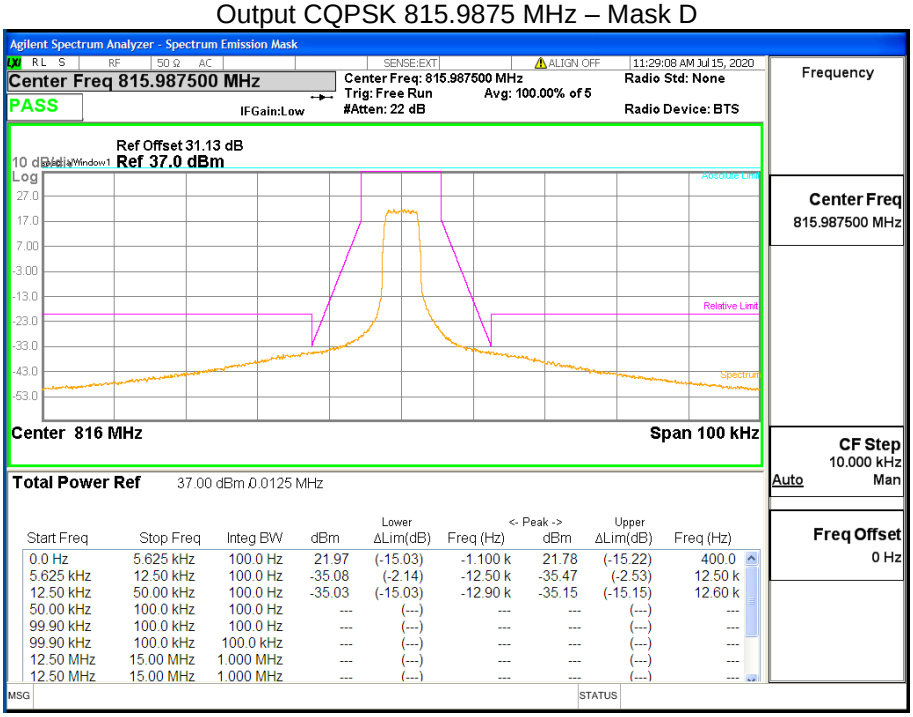

| Start Freq | Stop Freq | Integ BW | dBm | Lower ΔLim(dB) | Lower Freq (Hz) | <- Peak -> dBm | Upper ΔLim(dB) | Upper Freq (Hz) |
|---|---|---|---|---|---|---|---|---|
| 0.0 Hz | 5.625 kHz | 100.0 Hz | 21.67 | (-15.33) | -700.0 | 21.81 | (-15.19) | 600.0 |
| 5.625 kHz | 12.50 kHz | 100.0 Hz | -35.56 | (-2.62) | -12.50 k | -35.47 | (-2.53) | 12.50 k |
| 12.50 kHz | 50.00 kHz | 100.0 Hz | -35.24 | (-15.24) | -13.60 k | -35.25 | (-15.25) | 13.00 k |
| 50.00 kHz | 100.0 kHz | 100.0 Hz | --- | (---) | --- | --- | (---) | --- |
| 99.90 kHz | 100.0 kHz | 100.0 Hz | --- | (---) | --- | --- | (---) | --- |
| 99.90 kHz | 100.0 kHz | 100.0 kHz | --- | (---) | --- | --- | (---) | --- |
| 12.50 MHz | 15.00 MHz | 1.000 MHz | --- | (---) | --- | --- | (---) | --- |
| 12.50 MHz | 15.00 MHz | 1.000 MHz | --- | (---) | --- | --- | (---) | --- |

3dB above the AGC threshold Output C4FM 815.9875 MHz – Mask D

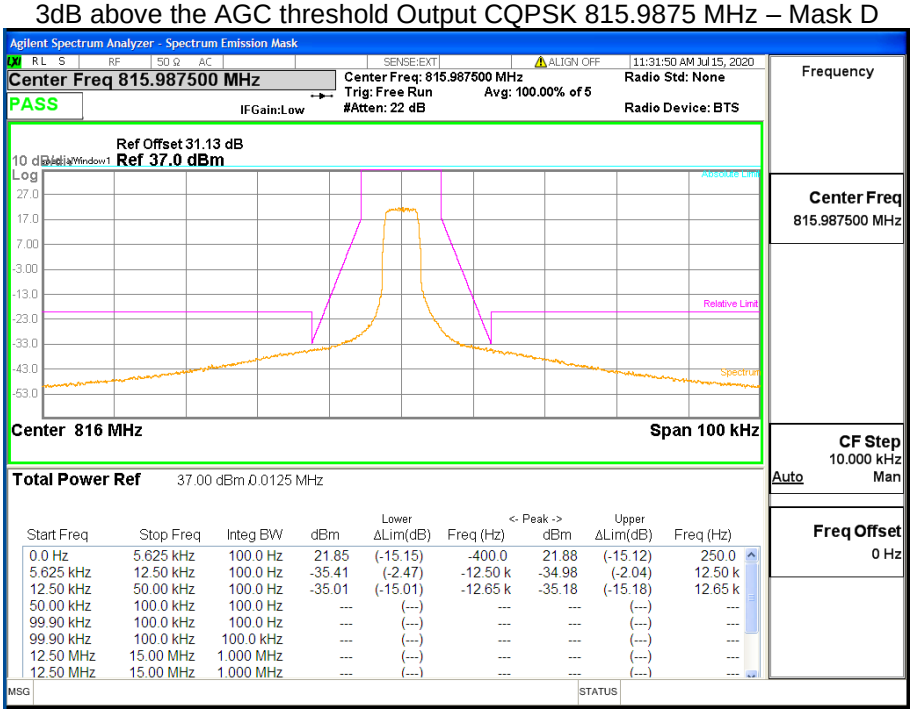



| Start Freq | Stop Freq | Integ BW | dBm | Lower ΔLim(dB) | Lower Freq (Hz) | <- Peak -> dBm | Upper ΔLim(dB) | Upper Freq (Hz) |
|---|---|---|---|---|---|---|---|---|
| 0.0 Hz | 5.625 kHz | 100.0 Hz | 21.53 | (-15.47) | -1.000 k | 21.72 | (-15.28) | 900.0 |
| 5.625 kHz | 12.50 kHz | 100.0 Hz | -35.97 | (-3.03) | -12.50 k | -35.51 | (-2.57) | 12.50 k |
| 12.50 kHz | 50.00 kHz | 100.0 Hz | -34.88 | (-14.88) | -12.70 k | -35.36 | (-15.36) | 13.20 k |
| 50.00 kHz | 100.0 kHz | 100.0 Hz | --- | (---) | --- | --- | (---) | --- |
| 99.90 kHz | 100.0 kHz | 100.0 Hz | --- | (---) | --- | --- | (---) | --- |
| 99.90 kHz | 100.0 kHz | 100.0 kHz | --- | (---) | --- | --- | (---) | --- |
| 12.50 MHz | 15.00 MHz | 1.000 MHz | --- | (---) | --- | --- | (---) | --- |
| 12.50 MHz | 15.00 MHz | 1.000 MHz | --- | (---) | --- | --- | (---) | --- |

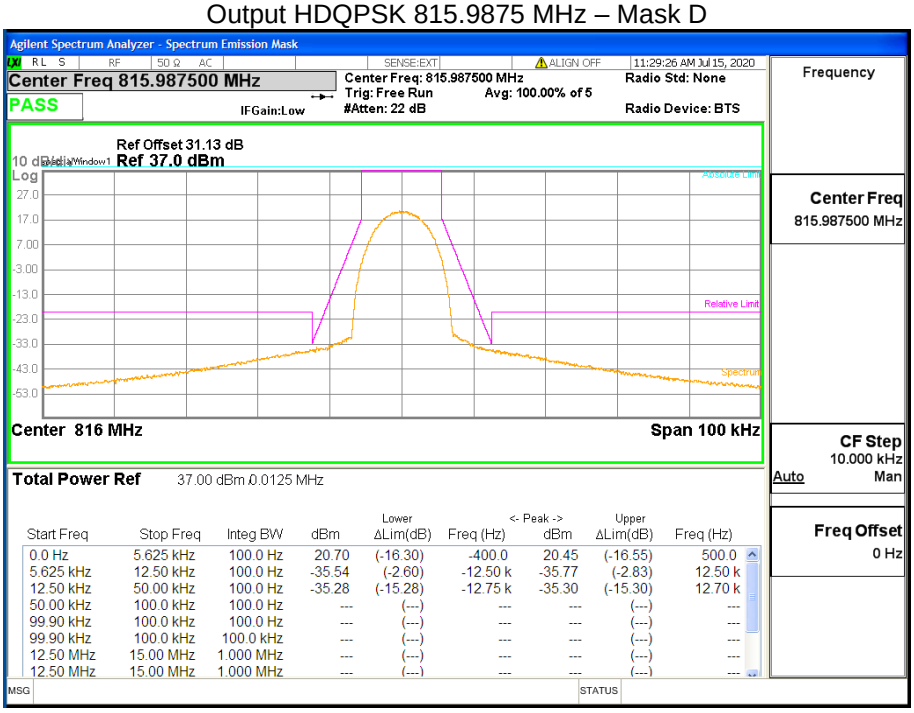
Output CQPSK 815.9875 MHz – Mask D




3dB above the AGC threshold Output CQPSK 815.9875 MHz – Mask D

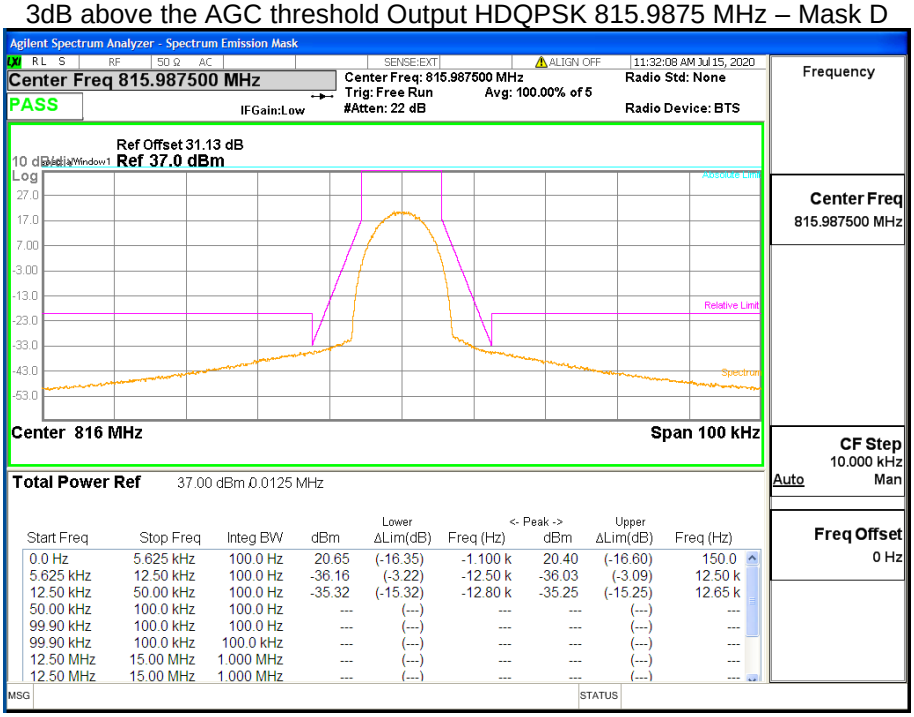


Output HDQPSK 815.9875 MHz – Mask D



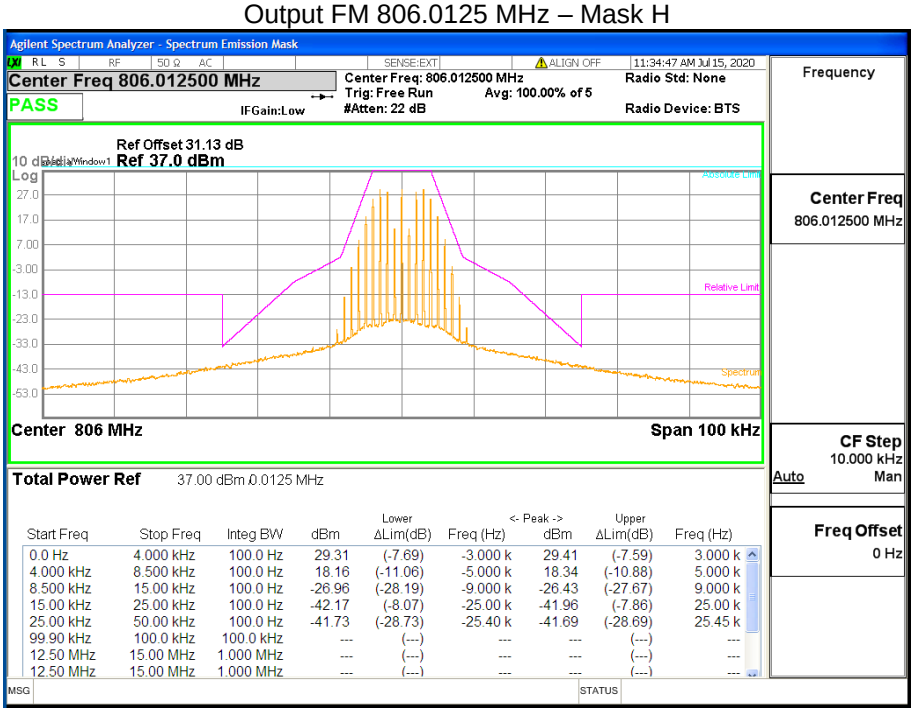

| Start Freq | Stop Freq | Integ BW | dBm | Lower ΔLim(dB) | Lower Freq (Hz) | <- Peak -> dBm | Upper ΔLim(dB) | Upper Freq (Hz) |
|---|---|---|---|---|---|---|---|---|
| 0.0 Hz | 5.625 kHz | 100.0 Hz | 20.70 | (-16.30) | -400.0 | 20.45 | (-16.55) | 500.0 |
| 5.625 kHz | 12.50 kHz | 100.0 Hz | -35.54 | (-2.60) | -12.50 k | -35.77 | (-2.83) | 12.50 k |
| 12.50 kHz | 50.00 kHz | 100.0 Hz | -35.28 | (-15.28) | -12.75 k | -35.30 | (-15.30) | 12.70 k |
| 50.00 kHz | 100.0 kHz | 100.0 Hz | --- | (---) | --- | --- | (---) | --- |
| 99.90 kHz | 100.0 kHz | 100.0 Hz | --- | (---) | --- | --- | (---) | --- |
| 99.90 kHz | 100.0 kHz | 100.0 kHz | --- | (---) | --- | --- | (---) | --- |
| 12.50 MHz | 15.00 MHz | 1.000 MHz | --- | (---) | --- | --- | (---) | --- |
| 12.50 MHz | 15.00 MHz | 1.000 MHz | --- | (---) | --- | --- | (---) | --- |

3dB above the AGC threshold Output HDQPSK 815.9875 MHz – Mask D



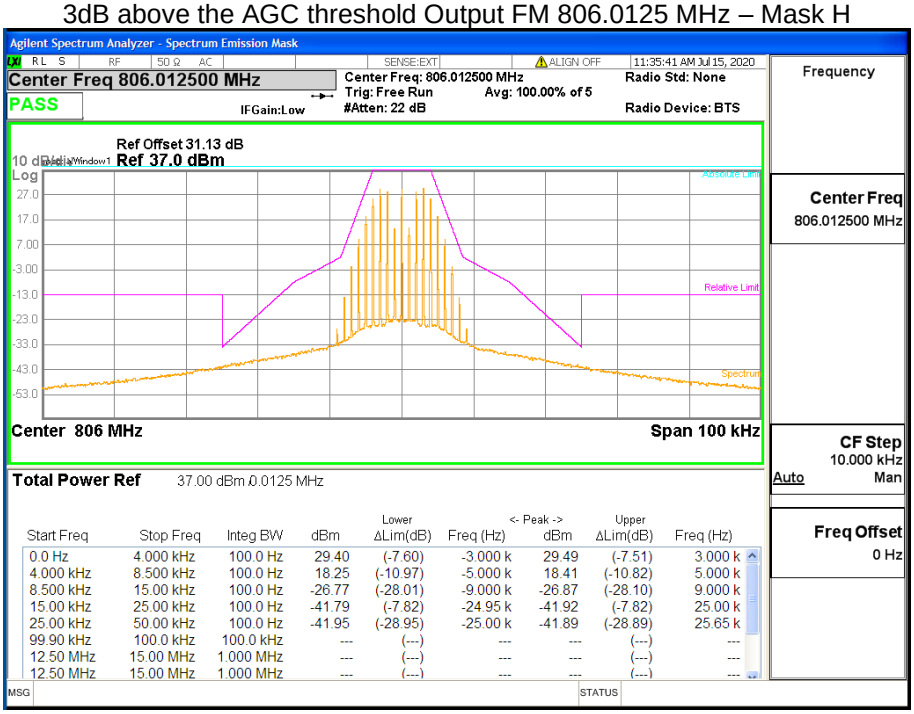

| Start Freq | Stop Freq | Integ BW | dBm | Lower ΔLim(dB) | Lower Freq (Hz) | <- Peak -> dBm | Upper ΔLim(dB) | Upper Freq (Hz) |
|---|---|---|---|---|---|---|---|---|
| 0.0 Hz | 5.625 kHz | 100.0 Hz | 20.65 | (-16.35) | -1.100 k | 20.40 | (-16.60) | 150.0 |
| 5.625 kHz | 12.50 kHz | 100.0 Hz | -36.16 | (-3.22) | -12.50 k | -36.03 | (-3.09) | 12.50 k |
| 12.50 kHz | 50.00 kHz | 100.0 Hz | -35.32 | (-15.32) | -12.80 k | -35.25 | (-15.25) | 12.65 k |
| 50.00 kHz | 100.0 kHz | 100.0 Hz | --- | (---) | --- | --- | (---) | --- |
| 99.90 kHz | 100.0 kHz | 100.0 Hz | --- | (---) | --- | --- | (---) | --- |
| 99.90 kHz | 100.0 kHz | 100.0 kHz | --- | (---) | --- | --- | (---) | --- |
| 12.50 MHz | 15.00 MHz | 1.000 MHz | --- | (---) | --- | --- | (---) | --- |
| 12.50 MHz | 15.00 MHz | 1.000 MHz | --- | (---) | --- | --- | (---) | --- |

Output FM 806.0125 MHz – Mask H



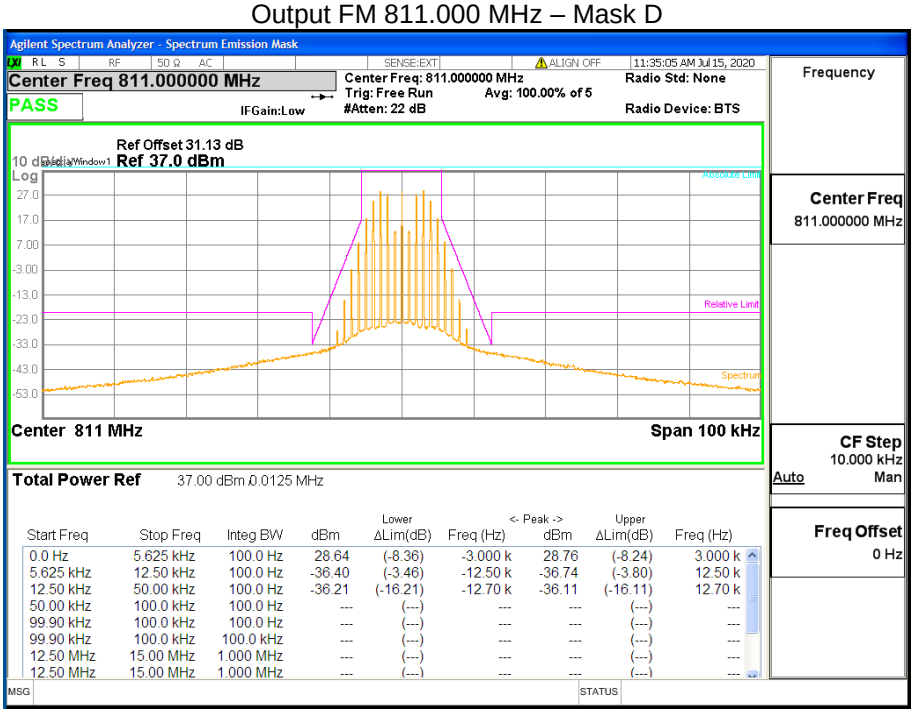

| Start Freq | Stop Freq | Integ BW | dBm | Lower ΔLim(dB) | Lower Freq (Hz) | <- Peak -> dBm | Upper ΔLim(dB) | Upper Freq (Hz) |
|---|---|---|---|---|---|---|---|---|
| 0.0 Hz | 4.000 kHz | 100.0 Hz | 29.31 | (-7.69) | -3.000 k | 29.41 | (-7.59) | 3.000 k |
| 4.000 kHz | 8.500 kHz | 100.0 Hz | 18.16 | (-11.06) | -5.000 k | 18.34 | (-10.88) | 5.000 k |
| 8.500 kHz | 15.00 kHz | 100.0 Hz | -26.96 | (-28.19) | -9.000 k | -26.43 | (-27.67) | 9.000 k |
| 15.00 kHz | 25.00 kHz | 100.0 Hz | -42.17 | (-8.07) | -25.00 k | -41.96 | (-7.86) | 25.00 k |
| 25.00 kHz | 50.00 kHz | 100.0 Hz | -41.73 | (-28.73) | -25.40 k | -41.69 | (-28.69) | 25.45 k |
| 99.90 kHz | 100.0 kHz | 100.0 kHz | --- | (---) | --- | --- | (---) | --- |
| 12.50 MHz | 15.00 MHz | 1.000 MHz | --- | (---) | --- | --- | (---) | --- |
| 12.50 MHz | 15.00 MHz | 1.000 MHz | --- | (---) | --- | --- | (---) | --- |

3dB above the AGC threshold Output FM 806.0125 MHz – Mask H



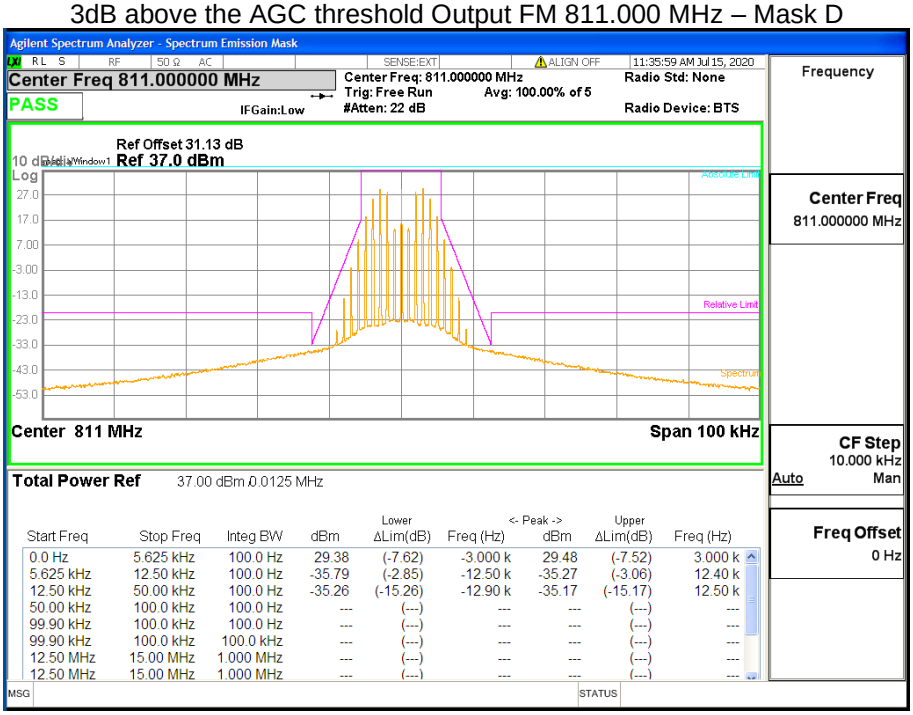

| Start Freq | Stop Freq | Integ BW | dBm | Lower ΔLim(dB) | Lower Freq (Hz) | <- Peak -> dBm | Upper ΔLim(dB) | Upper Freq (Hz) |
|---|---|---|---|---|---|---|---|---|
| 0.0 Hz | 4.000 kHz | 100.0 Hz | 29.40 | (-7.60) | -3.000 k | 29.49 | (-7.51) | 3.000 k |
| 4.000 kHz | 8.500 kHz | 100.0 Hz | 18.25 | (-10.97) | -5.000 k | 18.41 | (-10.82) | 5.000 k |
| 8.500 kHz | 15.00 kHz | 100.0 Hz | -26.77 | (-28.01) | -9.000 k | -26.87 | (-28.10) | 9.000 k |
| 15.00 kHz | 25.00 kHz | 100.0 Hz | -41.79 | (-7.82) | -24.95 k | -41.92 | (-7.82) | 25.00 k |
| 25.00 kHz | 50.00 kHz | 100.0 Hz | -41.95 | (-28.95) | -25.00 k | -41.89 | (-28.89) | 25.65 k |
| 99.90 kHz | 100.0 kHz | 100.0 kHz | --- | (---) | --- | --- | (---) | --- |
| 12.50 MHz | 15.00 MHz | 1.000 MHz | --- | (---) | --- | --- | (---) | --- |
| 12.50 MHz | 15.00 MHz | 1.000 MHz | --- | (---) | --- | --- | (---) | --- |

Output FM 811.000 MHz – Mask D



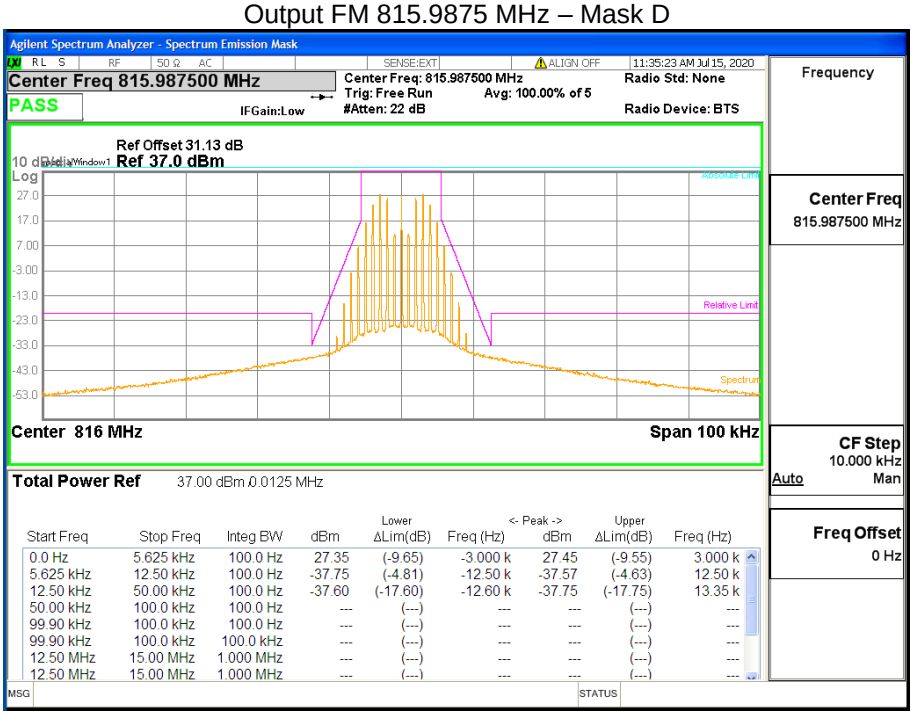

| Start Freq | Stop Freq | Integ BW | dBm | Lower ΔLim(dB) | Lower Freq (Hz) | <- Peak -> dBm | Upper ΔLim(dB) | Upper Freq (Hz) |
|---|---|---|---|---|---|---|---|---|
| 0.0 Hz | 5.625 kHz | 100.0 Hz | 28.64 | (-8.36) | -3.000 k | 28.76 | (-8.24) | 3.000 k |
| 5.625 kHz | 12.50 kHz | 100.0 Hz | -36.40 | (-3.46) | -12.50 k | -36.74 | (-3.80) | 12.50 k |
| 12.50 kHz | 50.00 kHz | 100.0 Hz | -36.21 | (-16.21) | -12.70 k | -36.11 | (-16.11) | 12.70 k |
| 50.00 kHz | 100.0 kHz | 100.0 Hz | --- | (---) | --- | --- | (---) | --- |
| 99.90 kHz | 100.0 kHz | 100.0 Hz | --- | (---) | --- | --- | (---) | --- |
| 99.90 kHz | 100.0 kHz | 100.0 kHz | --- | (---) | --- | --- | (---) | --- |
| 12.50 MHz | 15.00 MHz | 1.000 MHz | --- | (---) | --- | --- | (---) | --- |
| 12.50 MHz | 15.00 MHz | 1.000 MHz | --- | (---) | --- | --- | (---) | --- |

3dB above the AGC threshold Output FM 811.000 MHz – Mask D

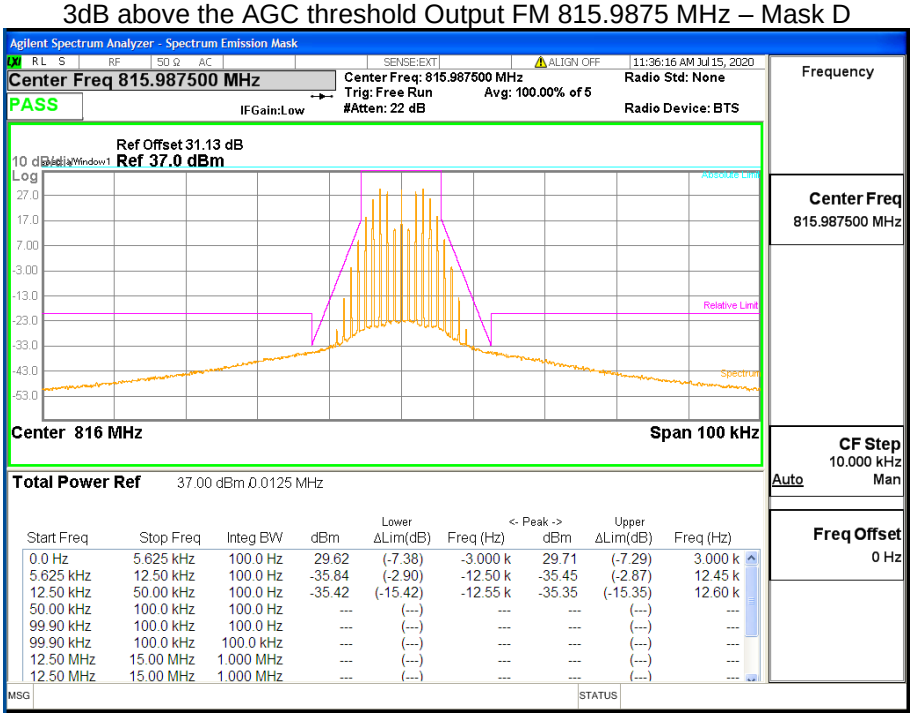



| Start Freq | Stop Freq | Integ BW | dBm | Lower ΔLim(dB) | Lower Freq (Hz) | <- Peak -> dBm | Upper ΔLim(dB) | Upper Freq (Hz) |
|---|---|---|---|---|---|---|---|---|
| 0.0 Hz | 5.625 kHz | 100.0 Hz | 29.38 | (-7.62) | -3.000 k | 29.48 | (-7.52) | 3.000 k |
| 5.625 kHz | 12.50 kHz | 100.0 Hz | -35.79 | (-2.85) | -12.50 k | -35.27 | (-3.06) | 12.40 k |
| 12.50 kHz | 50.00 kHz | 100.0 Hz | -35.26 | (-15.26) | -12.90 k | -35.17 | (-15.17) | 12.50 k |
| 50.00 kHz | 100.0 kHz | 100.0 Hz | --- | (---) | --- | --- | (---) | --- |
| 99.90 kHz | 100.0 kHz | 100.0 Hz | --- | (---) | --- | --- | (---) | --- |
| 99.90 kHz | 100.0 kHz | 100.0 kHz | --- | (---) | --- | --- | (---) | --- |
| 12.50 MHz | 15.00 MHz | 1.000 MHz | --- | (---) | --- | --- | (---) | --- |
| 12.50 MHz | 15.00 MHz | 1.000 MHz | --- | (---) | --- | --- | (---) | --- |

Output FM 815.9875 MHz – Mask D

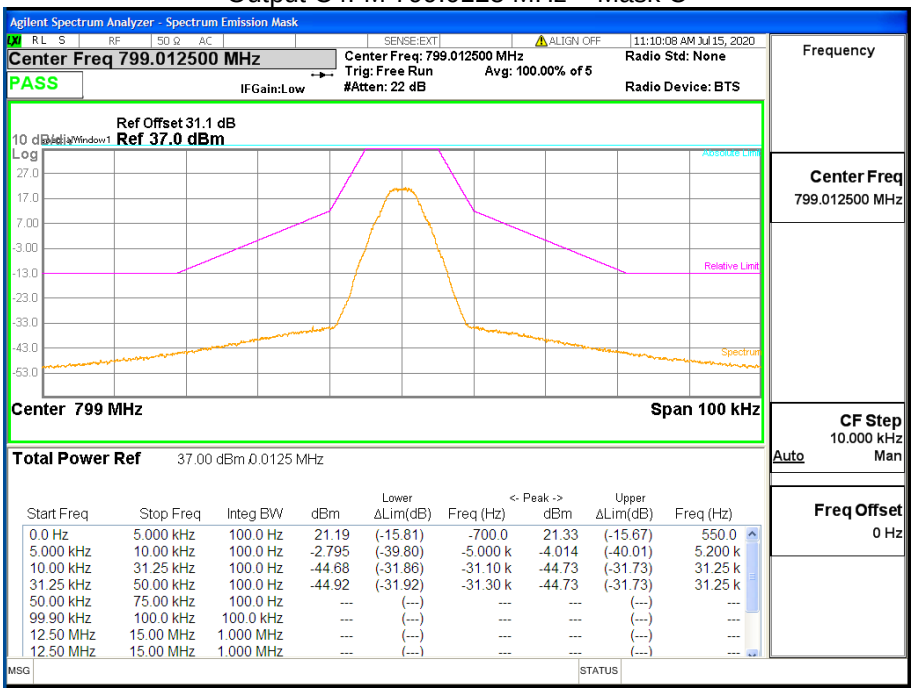



3dB above the AGC threshold Output FM 815.9875 MHz – Mask D

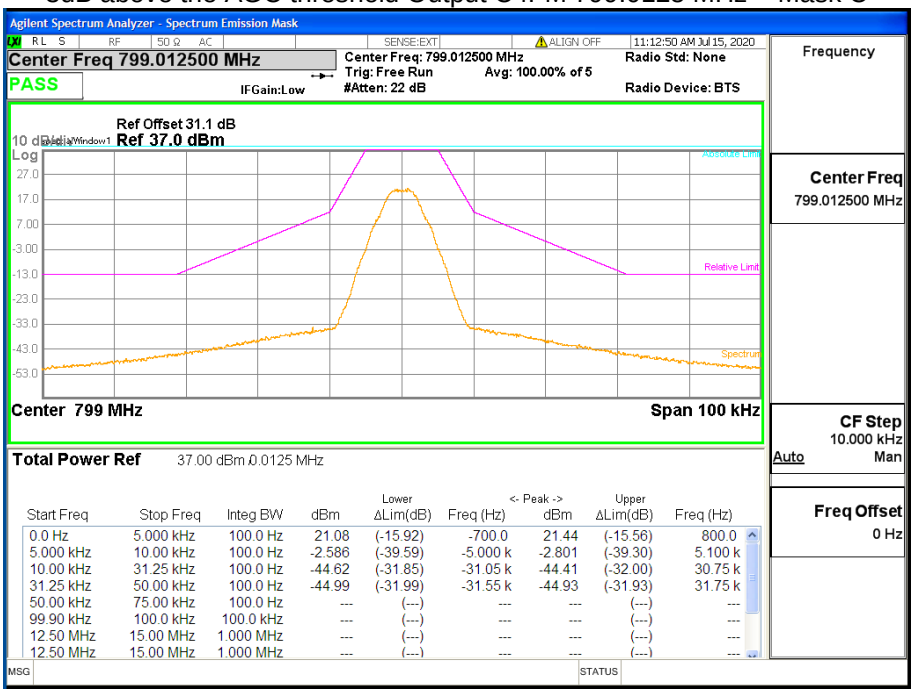


******700PS******

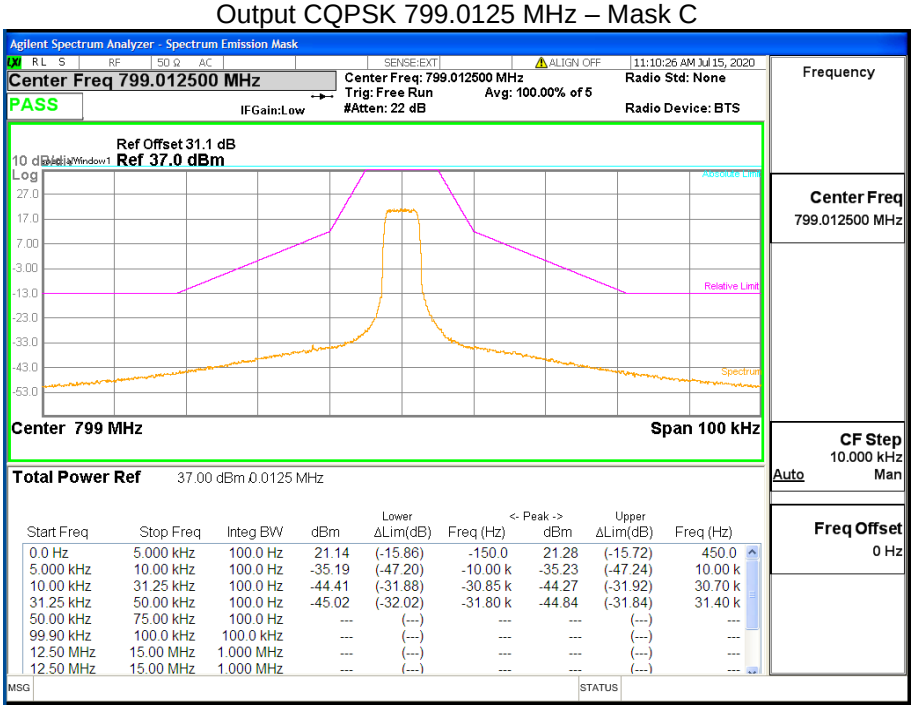
Output C4FM 799.0125 MHz – Mask C



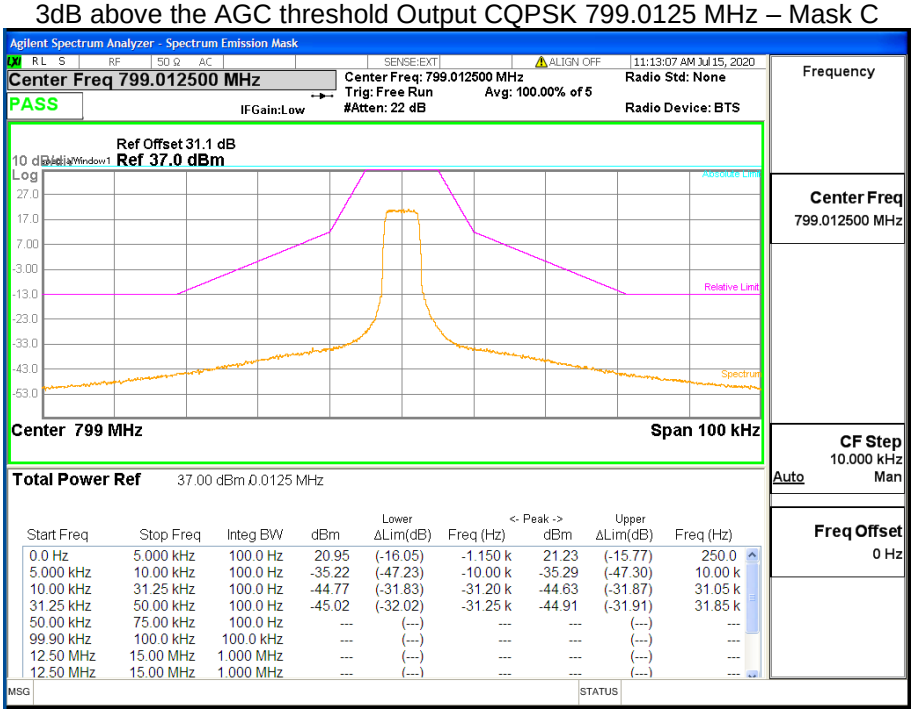

3dB above the AGC threshold Output C4FM 799.0125 MHz – Mask C



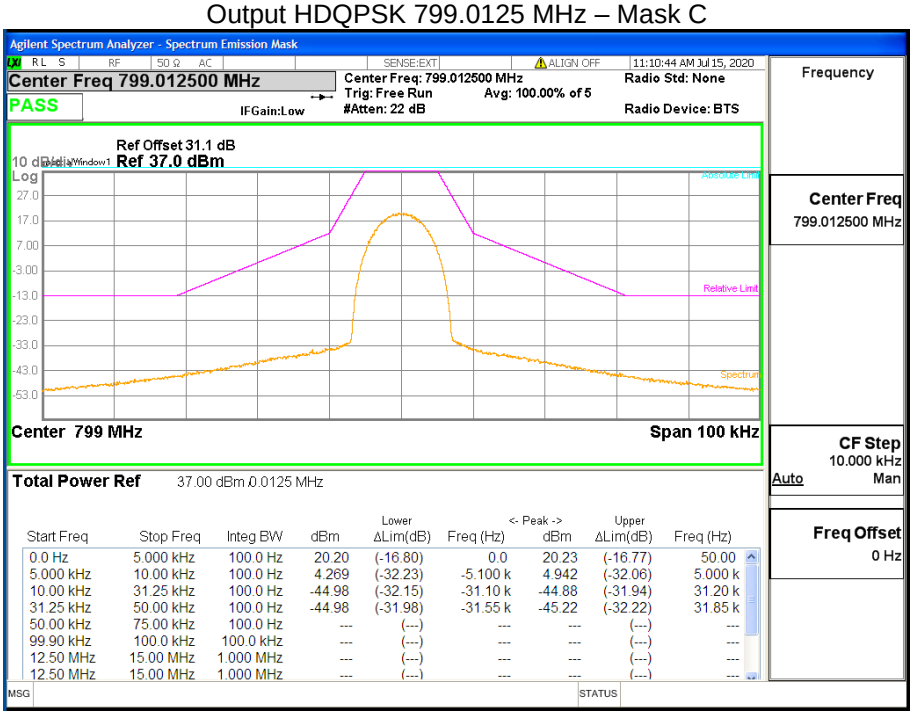
Output CQPSK 799.0125 MHz – Mask C




3dB above the AGC threshold Output CQPSK 799.0125 MHz – Mask C

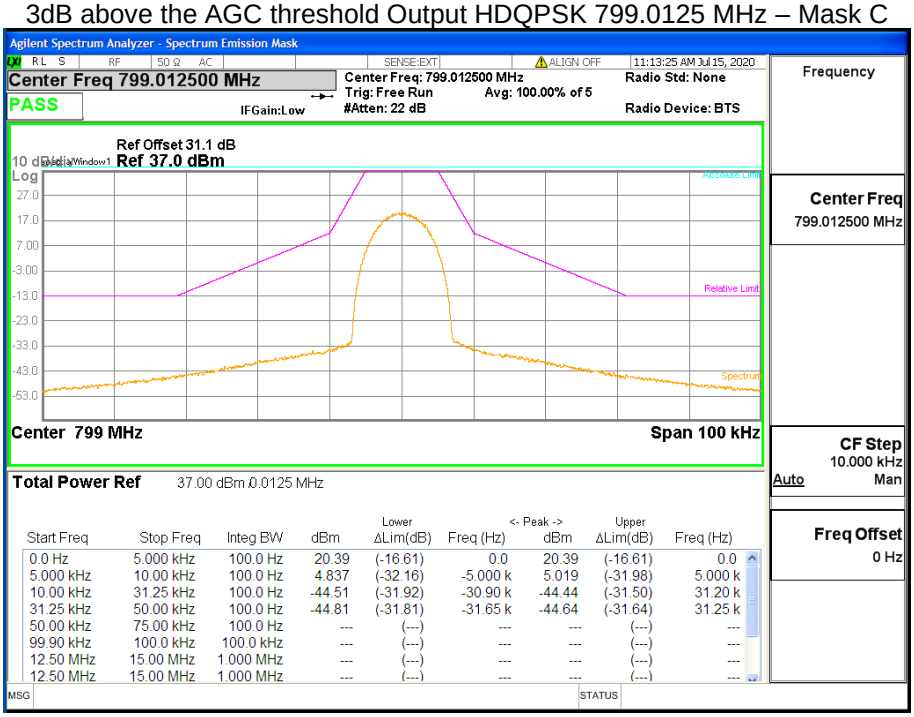


Output HDQPSK 799.0125 MHz – Mask C



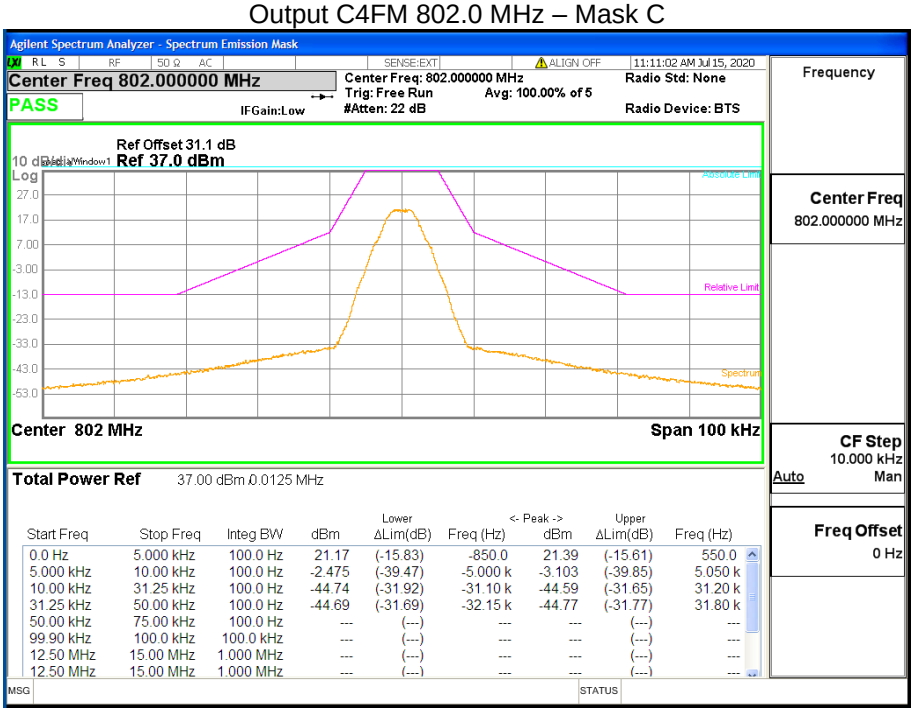

| Start Freq | Stop Freq | Integ BW | dBm | Lower ΔLim(dB) | Lower Freq (Hz) | <- Peak -> dBm | Upper ΔLim(dB) | Upper Freq (Hz) |
|---|---|---|---|---|---|---|---|---|
| 0.0 Hz | 5.000 kHz | 100.0 Hz | 20.20 | (-16.80) | 0.0 | 20.23 | (-16.77) | 50.00 |
| 5.000 kHz | 10.00 kHz | 100.0 Hz | 4.269 | (-32.23) | -5.100 k | 4.942 | (-32.06) | 5.000 k |
| 10.00 kHz | 31.25 kHz | 100.0 Hz | -44.98 | (-32.15) | -31.10 k | -44.88 | (-31.94) | 31.20 k |
| 31.25 kHz | 50.00 kHz | 100.0 Hz | -44.98 | (-31.98) | -31.55 k | -45.22 | (-32.22) | 31.85 k |
| 50.00 kHz | 75.00 kHz | 100.0 Hz | --- | (---) | --- | --- | (---) | --- |
| 99.90 kHz | 100.0 kHz | 100.0 kHz | --- | (---) | --- | --- | (---) | --- |
| 12.50 MHz | 15.00 MHz | 1.000 MHz | --- | (---) | --- | --- | (---) | --- |
| 12.50 MHz | 15.00 MHz | 1.000 MHz | --- | (---) | --- | --- | (---) | --- |

3dB above the AGC threshold Output HDQPSK 799.0125 MHz – Mask C

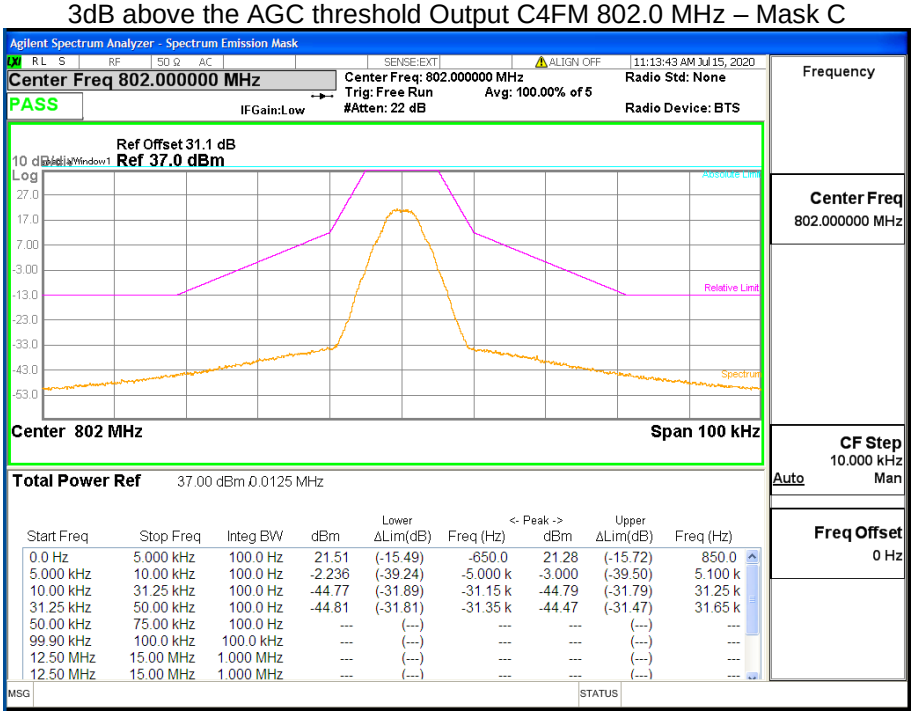



| Start Freq | Stop Freq | Integ BW | dBm | Lower ΔLim(dB) | Lower Freq (Hz) | <- Peak -> dBm | Upper ΔLim(dB) | Upper Freq (Hz) |
|---|---|---|---|---|---|---|---|---|
| 0.0 Hz | 5.000 kHz | 100.0 Hz | 20.39 | (-16.61) | 0.0 | 20.39 | (-16.61) | 0.0 |
| 5.000 kHz | 10.00 kHz | 100.0 Hz | 4.837 | (-32.16) | -5.000 k | 5.019 | (-31.98) | 5.000 k |
| 10.00 kHz | 31.25 kHz | 100.0 Hz | -44.51 | (-31.92) | -30.90 k | -44.44 | (-31.50) | 31.20 k |
| 31.25 kHz | 50.00 kHz | 100.0 Hz | -44.81 | (-31.81) | -31.65 k | -44.64 | (-31.64) | 31.25 k |
| 50.00 kHz | 75.00 kHz | 100.0 Hz | --- | (---) | --- | --- | (---) | --- |
| 99.90 kHz | 100.0 kHz | 100.0 kHz | --- | (---) | --- | --- | (---) | --- |
| 12.50 MHz | 15.00 MHz | 1.000 MHz | --- | (---) | --- | --- | (---) | --- |
| 12.50 MHz | 15.00 MHz | 1.000 MHz | --- | (---) | --- | --- | (---) | --- |

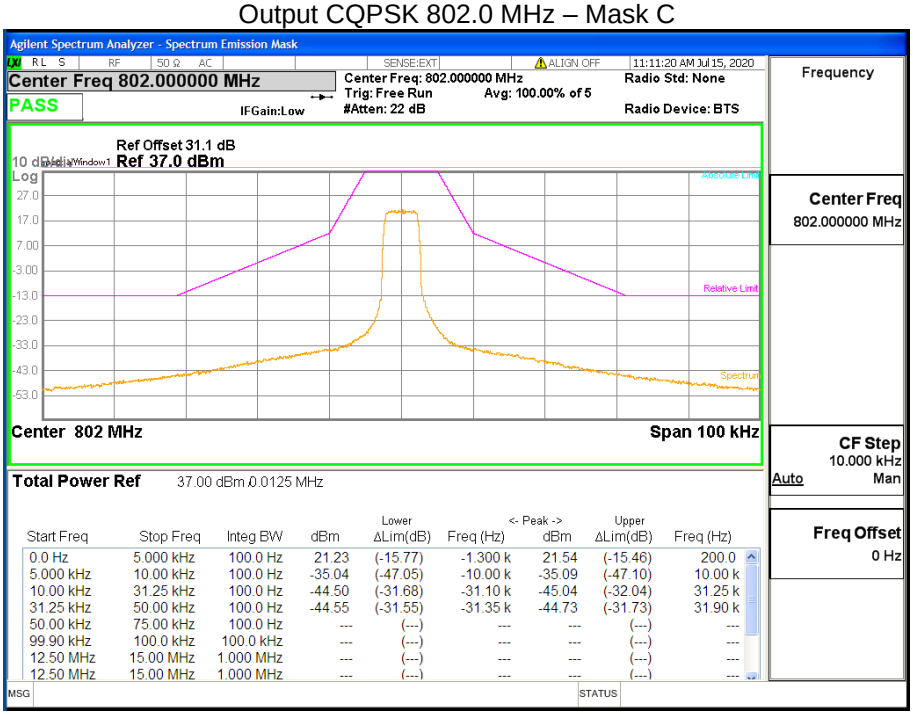
Output C4FM 802.0 MHz – Mask C



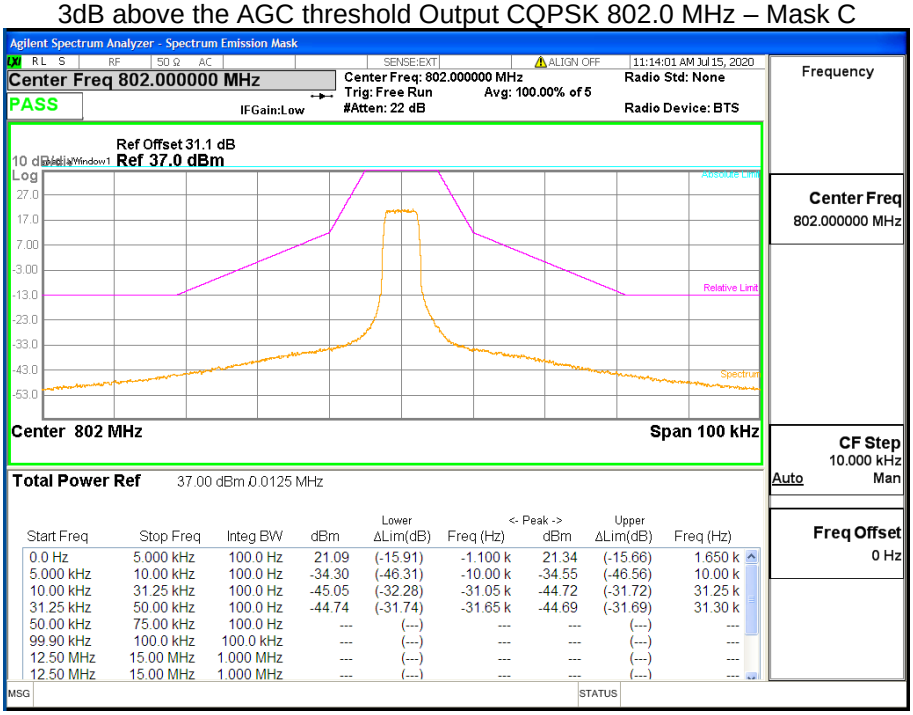

3dB above the AGC threshold Output C4FM 802.0 MHz – Mask C



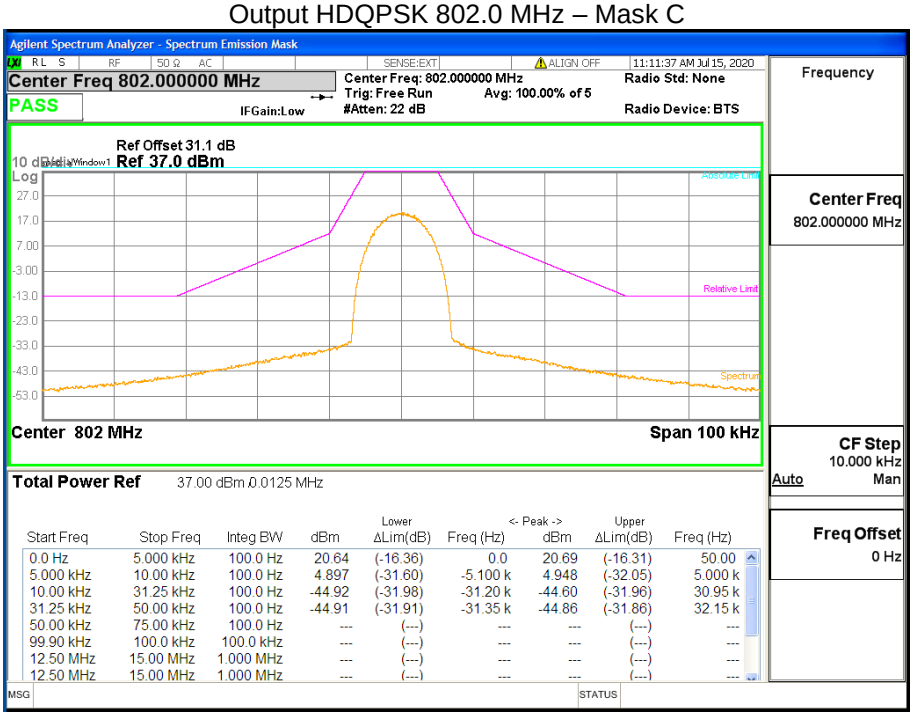
Output CQPSK 802.0 MHz – Mask C




3dB above the AGC threshold Output CQPSK 802.0 MHz – Mask C

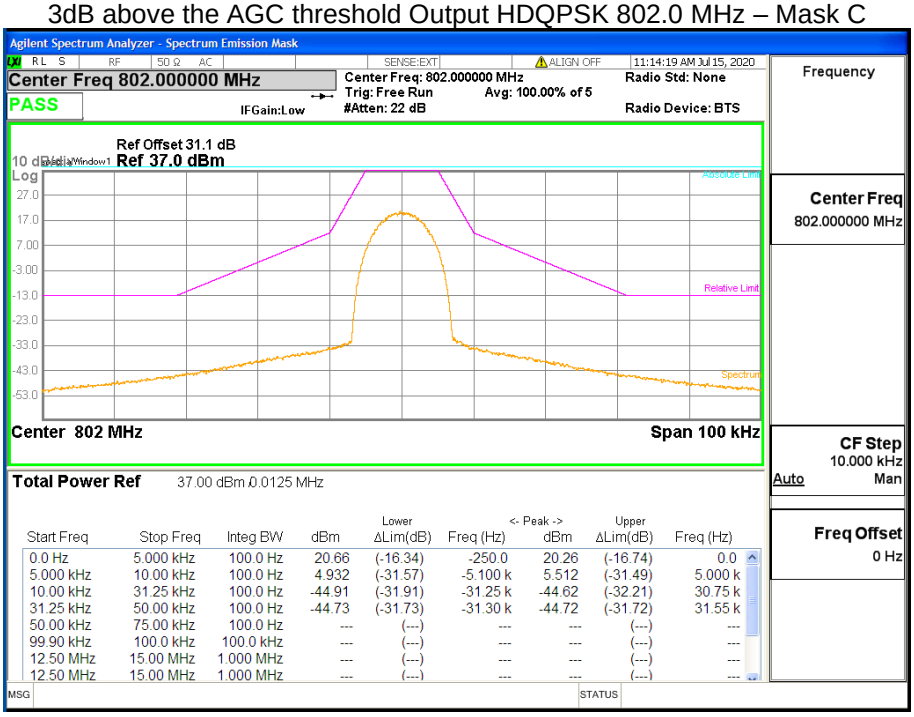


Output HDQPSK 802.0 MHz – Mask C



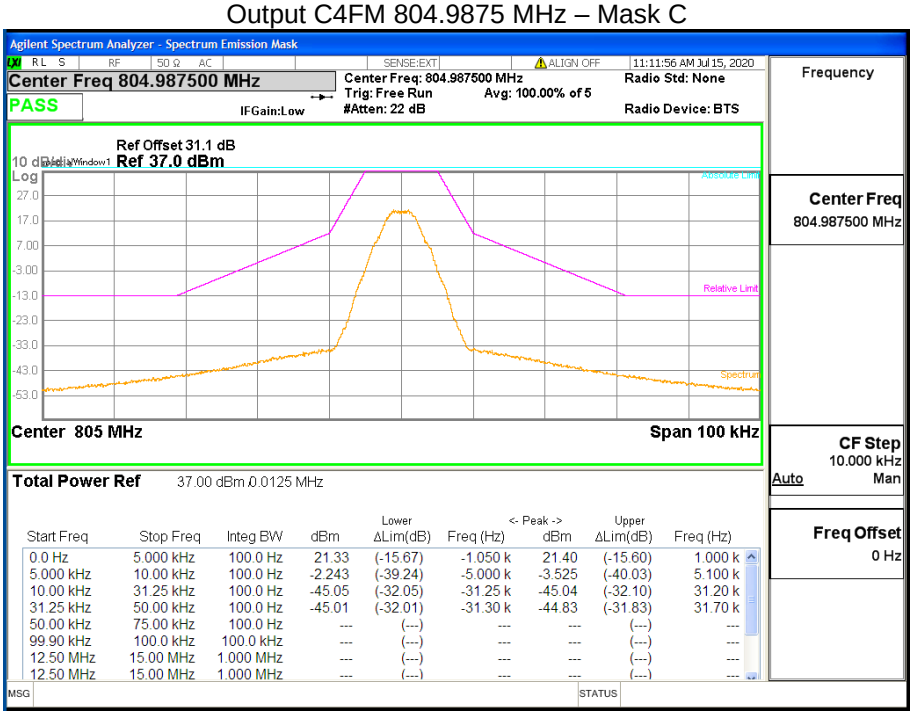

| Start Freq | Stop Freq | Integ BW | dBm | Lower ΔLim(dB) | Lower Freq (Hz) | <- Peak -> dBm | Upper ΔLim(dB) | Upper Freq (Hz) |
|---|---|---|---|---|---|---|---|---|
| 0.0 Hz | 5.000 kHz | 100.0 Hz | 20.64 | (-16.36) | 0.0 | 20.69 | (-16.31) | 50.00 |
| 5.000 kHz | 10.00 kHz | 100.0 Hz | 4.897 | (-31.60) | -5.100 k | 4.948 | (-32.05) | 5.000 k |
| 10.00 kHz | 31.25 kHz | 100.0 Hz | -44.92 | (-31.98) | -31.20 k | -44.60 | (-31.96) | 30.95 k |
| 31.25 kHz | 50.00 kHz | 100.0 Hz | -44.91 | (-31.91) | -31.35 k | -44.86 | (-31.86) | 32.15 k |
| 50.00 kHz | 75.00 kHz | 100.0 Hz | --- | (---) | --- | --- | (---) | --- |
| 99.90 kHz | 100.0 kHz | 100.0 kHz | --- | (---) | --- | --- | (---) | --- |
| 12.50 MHz | 15.00 MHz | 1.000 MHz | --- | (---) | --- | --- | (---) | --- |
| 12.50 MHz | 15.00 MHz | 1.000 MHz | --- | (---) | --- | --- | (---) | --- |

3dB above the AGC threshold Output HDQPSK 802.0 MHz – Mask C

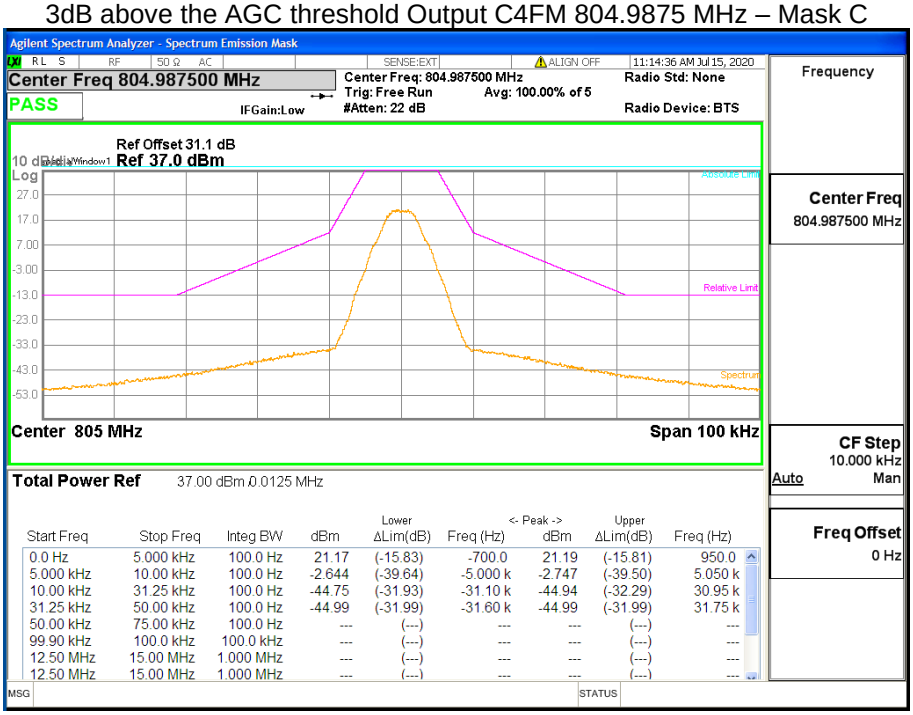



| Start Freq | Stop Freq | Integ BW | dBm | Lower ΔLim(dB) | Lower Freq (Hz) | <- Peak -> dBm | Upper ΔLim(dB) | Upper Freq (Hz) |
|---|---|---|---|---|---|---|---|---|
| 0.0 Hz | 5.000 kHz | 100.0 Hz | 20.66 | (-16.34) | -250.0 | 20.26 | (-16.74) | 0.0 |
| 5.000 kHz | 10.00 kHz | 100.0 Hz | 4.932 | (-31.57) | -5.100 k | 5.512 | (-31.49) | 5.000 k |
| 10.00 kHz | 31.25 kHz | 100.0 Hz | -44.91 | (-31.91) | -31.25 k | -44.62 | (-32.21) | 30.75 k |
| 31.25 kHz | 50.00 kHz | 100.0 Hz | -44.73 | (-31.73) | -31.30 k | -44.72 | (-31.72) | 31.55 k |
| 50.00 kHz | 75.00 kHz | 100.0 Hz | --- | (---) | --- | --- | (---) | --- |
| 99.90 kHz | 100.0 kHz | 100.0 kHz | --- | (---) | --- | --- | (---) | --- |
| 12.50 MHz | 15.00 MHz | 1.000 MHz | --- | (---) | --- | --- | (---) | --- |
| 12.50 MHz | 15.00 MHz | 1.000 MHz | --- | (---) | --- | --- | (---) | --- |

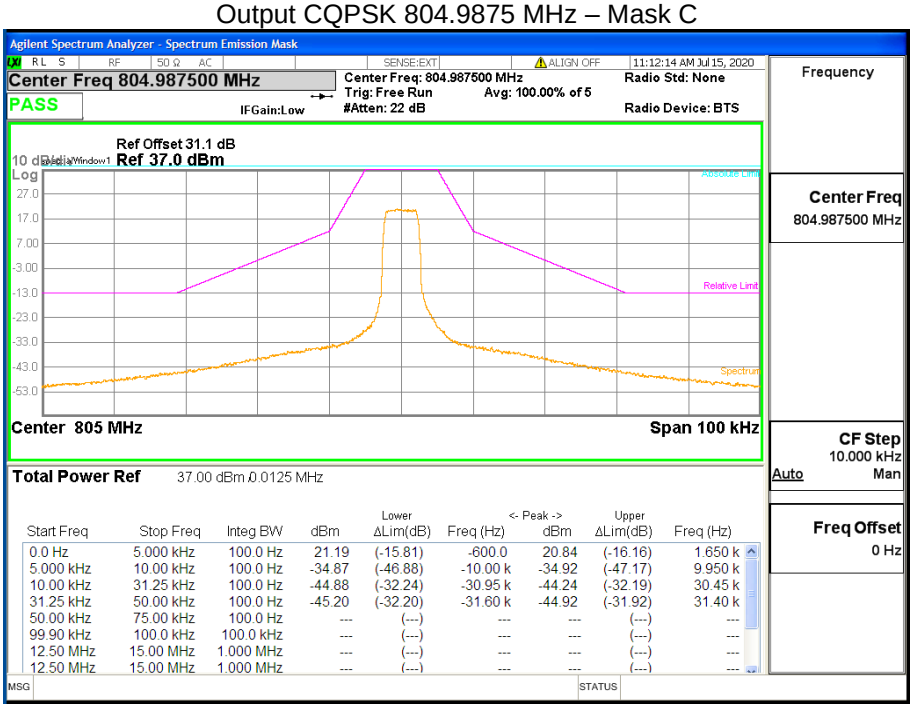
Output C4FM 804.9875 MHz – Mask C




3dB above the AGC threshold Output C4FM 804.9875 MHz – Mask C

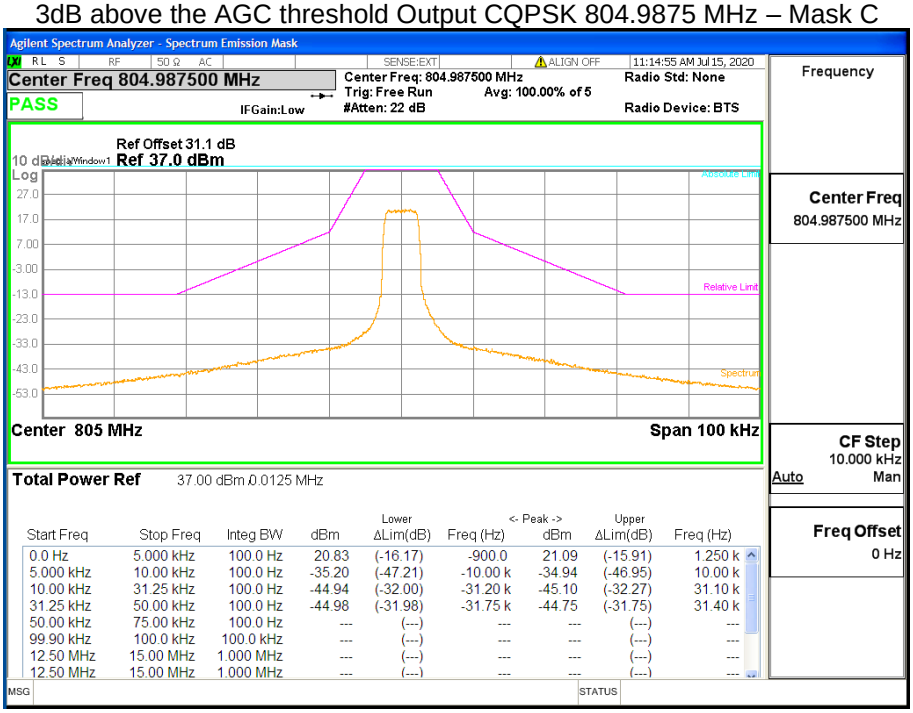


Output CQPSK 804.9875 MHz – Mask C



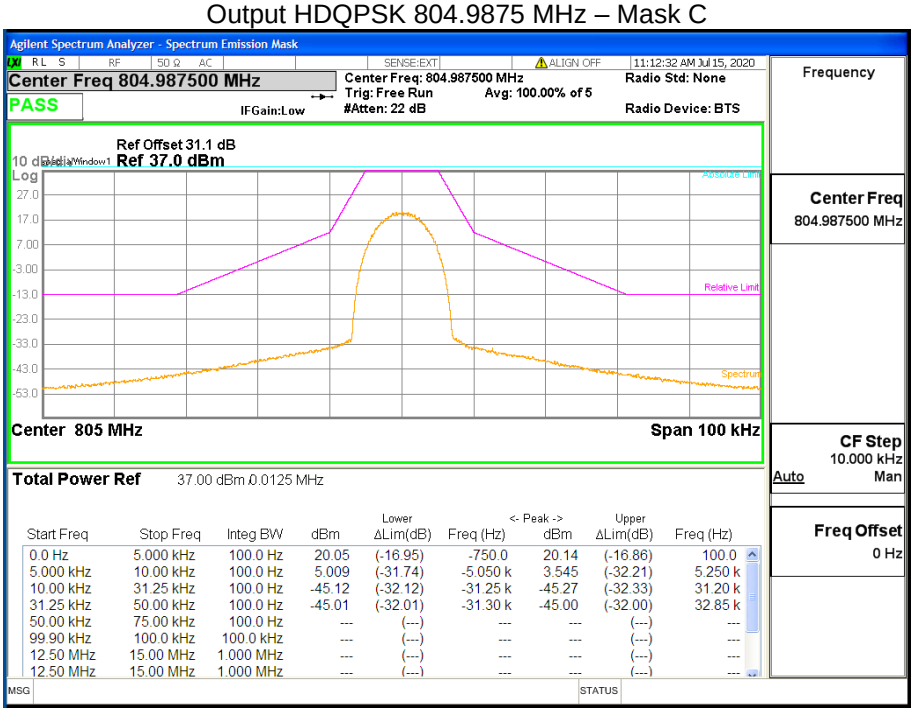

| Start Freq | Stop Freq | Integ BW | dBm | Lower ΔLim(dB) | Lower Freq (Hz) | <- Peak -> dBm | Upper ΔLim(dB) | Upper Freq (Hz) |
|---|---|---|---|---|---|---|---|---|
| 0.0 Hz | 5.000 kHz | 100.0 Hz | 21.19 | (-15.81) | -600.0 | 20.84 | (-16.16) | 1.650 k |
| 5.000 kHz | 10.00 kHz | 100.0 Hz | -34.87 | (-46.88) | -10.00 k | -34.92 | (-47.17) | 9.950 k |
| 10.00 kHz | 31.25 kHz | 100.0 Hz | -44.88 | (-32.24) | -30.95 k | -44.24 | (-32.19) | 30.45 k |
| 31.25 kHz | 50.00 kHz | 100.0 Hz | -45.20 | (-32.20) | -31.60 k | -44.92 | (-31.92) | 31.40 k |
| 50.00 kHz | 75.00 kHz | 100.0 Hz | --- | (---) | --- | --- | (---) | --- |
| 99.90 kHz | 100.0 kHz | 100.0 kHz | --- | (---) | --- | --- | (---) | --- |
| 12.50 MHz | 15.00 MHz | 1.000 MHz | --- | (---) | --- | --- | (---) | --- |
| 12.50 MHz | 15.00 MHz | 1.000 MHz | --- | (---) | --- | --- | (---) | --- |

3dB above the AGC threshold Output CQPSK 804.9875 MHz – Mask C

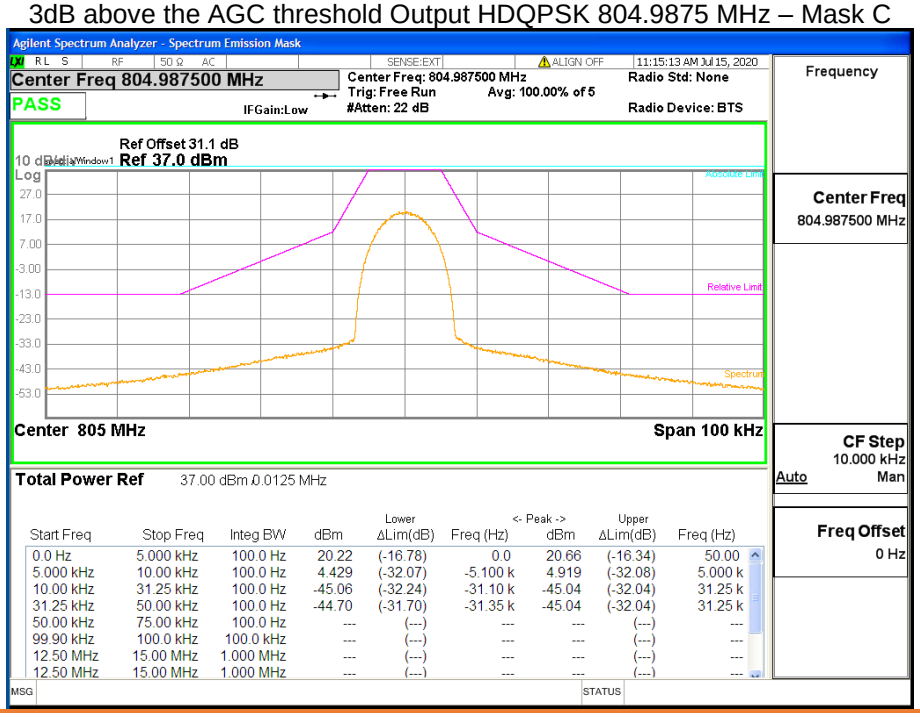



| Start Freq | Stop Freq | Integ BW | dBm | Lower ΔLim(dB) | Lower Freq (Hz) | <- Peak -> dBm | Upper ΔLim(dB) | Upper Freq (Hz) |
|---|---|---|---|---|---|---|---|---|
| 0.0 Hz | 5.000 kHz | 100.0 Hz | 20.83 | (-16.17) | -900.0 | 21.09 | (-15.91) | 1.250 k |
| 5.000 kHz | 10.00 kHz | 100.0 Hz | -35.20 | (-47.21) | -10.00 k | -34.94 | (-46.95) | 10.00 k |
| 10.00 kHz | 31.25 kHz | 100.0 Hz | -44.94 | (-32.00) | -31.20 k | -45.10 | (-32.27) | 31.10 k |
| 31.25 kHz | 50.00 kHz | 100.0 Hz | -44.98 | (-31.98) | -31.75 k | -44.75 | (-31.75) | 31.40 k |
| 50.00 kHz | 75.00 kHz | 100.0 Hz | --- | (---) | --- | --- | (---) | --- |
| 99.90 kHz | 100.0 kHz | 100.0 kHz | --- | (---) | --- | --- | (---) | --- |
| 12.50 MHz | 15.00 MHz | 1.000 MHz | --- | (---) | --- | --- | (---) | --- |
| 12.50 MHz | 15.00 MHz | 1.000 MHz | --- | (---) | --- | --- | (---) | --- |

Output HDQPSK 804.9875 MHz – Mask C




3dB above the AGC threshold Output HDQPSK 804.9875 MHz – Mask C



## Input/output Power and Amplifier/Booster Gain

| | | | |
|---|---|---|---|
| Governing Doc | FCC Part 90.219 | Room Temperature (°C) | 23.6 |
| Test Procedure | ANSI/TIA-603- E; FCC KDB 935210 D05, v01r04 | Relative Humidity (%) | 39.9 |
| Test Location | Richmond | Barometric Pressure (kPa) | 102.1 |
| Test Engineer | Jeremy Lee | Date | 15 July 2020 |
| EUT Voltage | ☒ +48VDC ☐ 120VAC @ 60Hz | | |

| Test Equipment Used | Manufacturer | Model | Identifier | Calibration date | Calibration due |
|---|---|---|---|---|---|
| Signal Generator | Keysight | N5172B | MY53050270 | 06/12/19 | 06/12/21 |
| Spectrum Analyzer | Keysight | N9010A | MY50520285 | 07/29/19 | 07/23/21 |

| | |
|---|---|
| Span: | ☒ Max Gain Frequency ± 1500kHz |
| Detector: | ☒ Peak |
| RBW/VBW: | ☒100k Hz/ 300 kHz |
| Type of Facility: | ☒ Tabletop |
| Distance: | ☒ Direct |

Maximum booster gain is 93.8 dB.

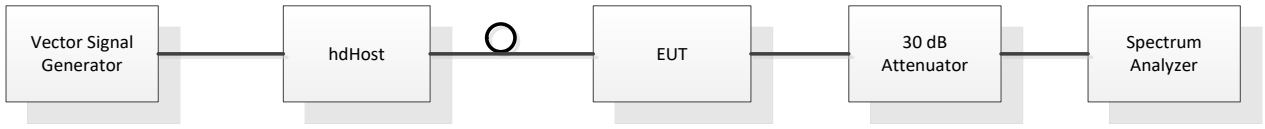
Compliant ☒ Non-Compliant ☐ Not Applicable ☐

***Test setup***

Description of test set-up:

The procedure used was ANSI/TIA-603-E-2016 and FCC KDB 935210 D05 Indus Booster Basic Meas v01r04:. A CW tone was input at the frequency where the system gain is the maximum in the pass band, with the nominal input power level -58 dBm. The spectrum analyzer was connected to the output RF port via a 50 Ohm 30 dB attenuator. The maximum hold trace and peak detector was used to capture the output power. The output power minus the input power (-58 dBm) equals to the booster gain in dB.

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



**Results**

| Test Band | Frequency (MHz) | Input Power (dBm) | Output Power (dBm) | Gain (dB) |
|---|---|---|---|---|
| 900PS | 898.5 | -56.4 | 37.4 | 93.8 |
| 800PS | 811 | -54.2 | 37.3 | 91.5 |
| 700PS | 802 | -51.6 | 37.3 | 88.9 |

## Noise Figure

| | | | |
|---|---|---|---|
| Governing Doc | FCC Part 90.219 | Room Temperature (°C) | 23.6 |
| Test Procedure | ANSI/TIA-603- E; FCC KDB 935210 D05, v01r04 | Relative Humidity (%) | 39.9 |
| Test Location | Richmond | Barometric Pressure | 102.1 |
| Test Engineer | Jeremy Lee | Date | 15 July 2020 |
| EUT Voltage | ☒ DC ☐ 120VAC @ 60Hz | | |

| Test Equipment Used | Manufacturer | Model | Serial Number | Calibration date | Calibration due |
|---|---|---|---|---|---|
| Spectrum Analyzer | Keysight | N9010A | MY50520285 | 07/29/19 | 07/23/21 |

| | |
|---|---|
| Frequency Range: | ☒ 2 times of the passband on each band |
| Detector: | ☒ Average |
| RBW: | ☒ 910 kHz |
| Type of Facility: | ☒ Tabletop |
| Distance: | ☒ Direct |

Noise Figure on each band is less than the 9 dB required.

Compliant ☒ Non-Compliant ☐ Not Applicable ☐

***Test setup***

Description of test set-up:

Based on FCC KDB 935210 D05 Indus Booster Basic Meas v01r04: 2020, the system maximum gain and the noise density is measured.Measurements were performed within the EUT's passband.

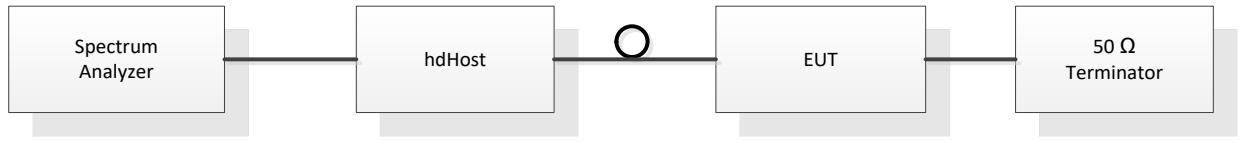
The noise figure is then calculated by NF = NP – Gain + KTB Noise; where

NP is in band noise power per Herz,

Gain is measured at the maximum noise frequence with -55 dBm input signal in UL.

KTB Noise is 174dB/Hz at room temperature.

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



**Results**

| Test Band | Link | Gain (dB) | kToB (dBm/Hz) | Measured Value (dBm/Hz) | Noise Figure (dB) |
|---|---|---|---|---|---|
| 900PS | DownLink | 93.7 | -174 | -74.49 | 5.81 |
| 800PS | DownLink | 91.6 | -174 | -76.1 | 6.3 |
| 700PS | DownLink | 88.9 | -174 | -77.95 | 7.15 |

## Out-Of-Band / Out-Of-Block Intermodulation and Spurious Emissions

| | | | |
|---|---|---|---|
| Governing Doc | FCC Part 90.219 | Room Temperature (°C) | 23.6 |
| Test Procedure | ANSI/TIA-603- E; FCC KDB 935210 D05, v01r04 | Relative Humidity (%) | 39.9 |
| Test Location | Richmond | Barometric Pressure (kPa) | 102.1 |
| Test Engineer | Jeremy Lee | Date | 15 July 2020 |
| EUT Voltage | ☒ +48VDC ☐ 120VAC @ 60Hz | | |

| Test Equipment Used | Manufacturer | Model | Serial Number | Calibration date | Calibration due |
|---|---|---|---|---|---|
| Signal Generator | Keysight | N5172B | MY53050270 | 06/12/19 | 06/12/21 |
| Spectrum Analyzer | Keysight | N9010A | MY50520285 | 07/29/19 | 07/29/21 |

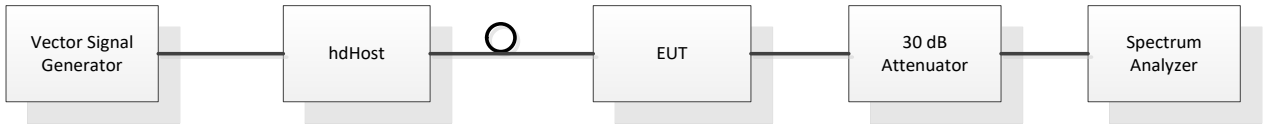
| | |
|---|---|
| Frequency Range: | ☒ Max Gain Frequency ± 50kHz |
| Detector: | ☒ Average |
| RBW/VBW: | ☒100/910Hz |
| Type of Facility: | ☒ Tabletop |
| Distance: | ☒ Direct |

On 900 band, 800 band and 700 band: The intermodulation product of 2 tone is below the -13dBm emission limit with input power

- 0.5dBm below AGC threshold and
- 3 dB above AGC threshold

Compliant ☒ Non-Compliant ☐ Not Applicable ☐

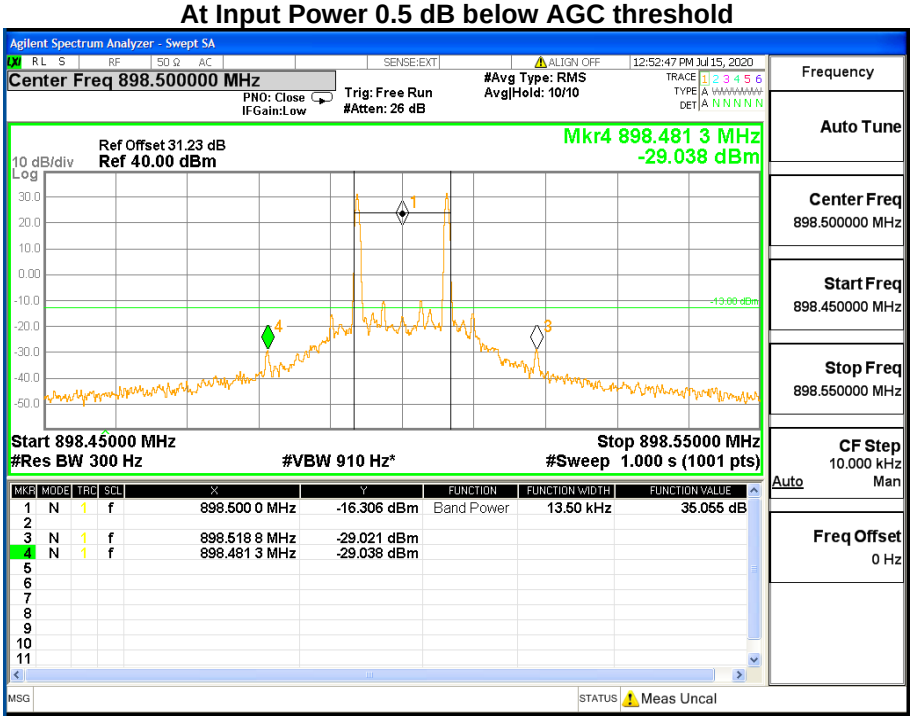
***Test setup***

| Description of test set-up: |
| --- |
| The procedure used was ANSI/TIA-603-E-2016. Two tones (CW) method was used. The input power to the amplifier was set at maximum drive level by combining the two tones. The two tones were chosen in such a way (1) the third order intermodulation product frequencies are located within the pass band of the DUT and (2) they produce the worst-case emissions out of band. All signals were modulated.<br>Based on FCC KDB 935210 D05 Indus Booster Basic Meas v01r04: 2020, the two tone was located on either side of the maximum gain frequence in the passing band, and separated with the available spacing, which is 12.5kHz.<br>Measurements were performed with modulated -tone at identical input amplitude which produced integrated maximum rated output power.<br><br>The EUT was set to **Operation Mode #1 with configuration Mode #1.** |
|  |

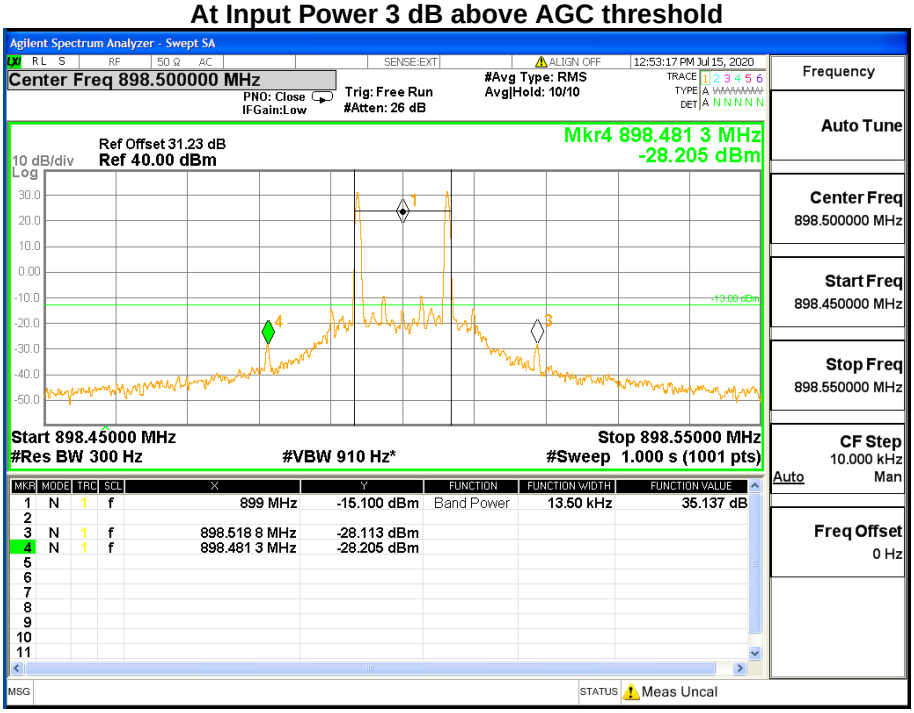
**Results Screenshots**

898.50 MHz:

**At Input Power 0.5 dB below AGC threshold**

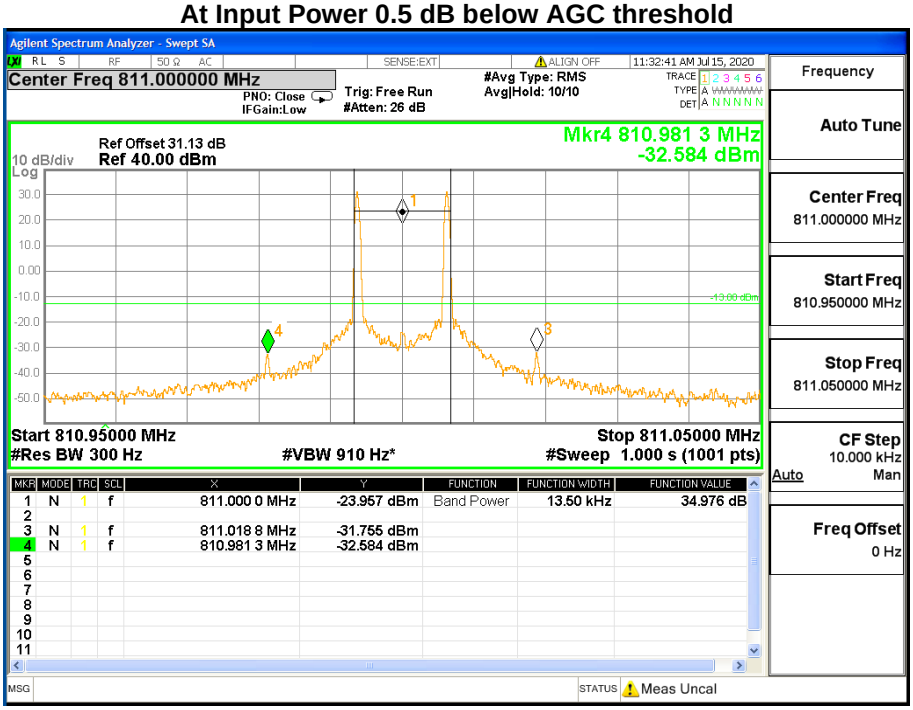



**At Input Power 3 dB above AGC threshold**

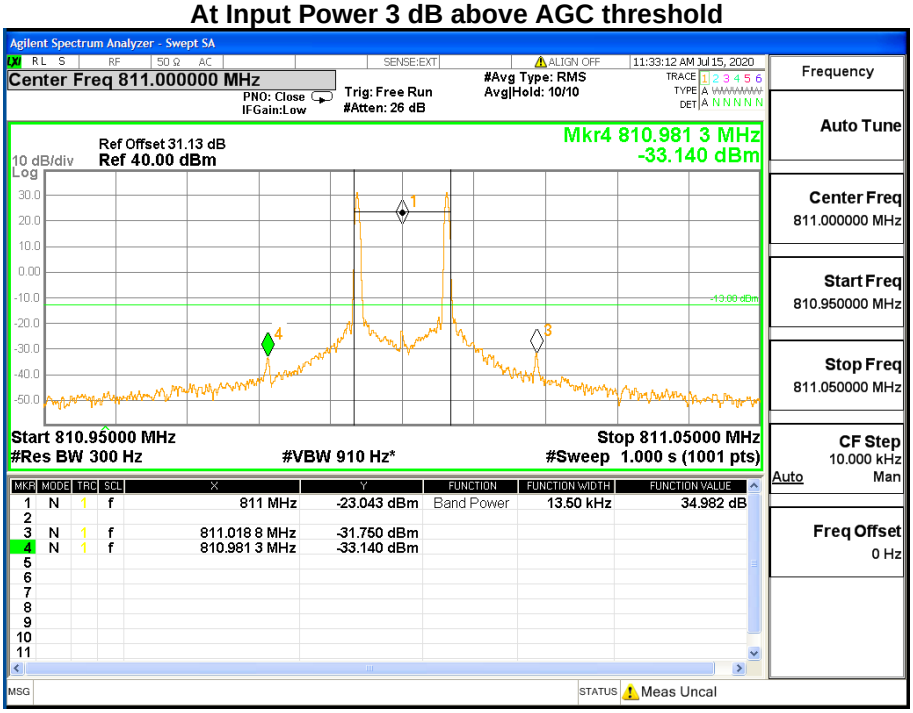


811 MHz:

**At Input Power 0.5 dB below AGC threshold**

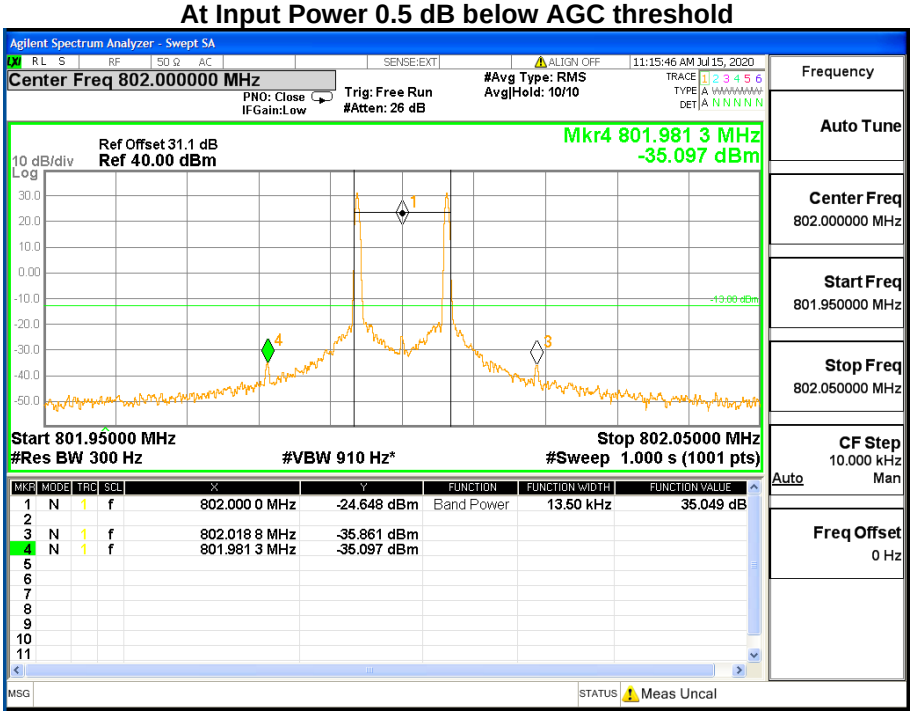



**At Input Power 3 dB above AGC threshold**

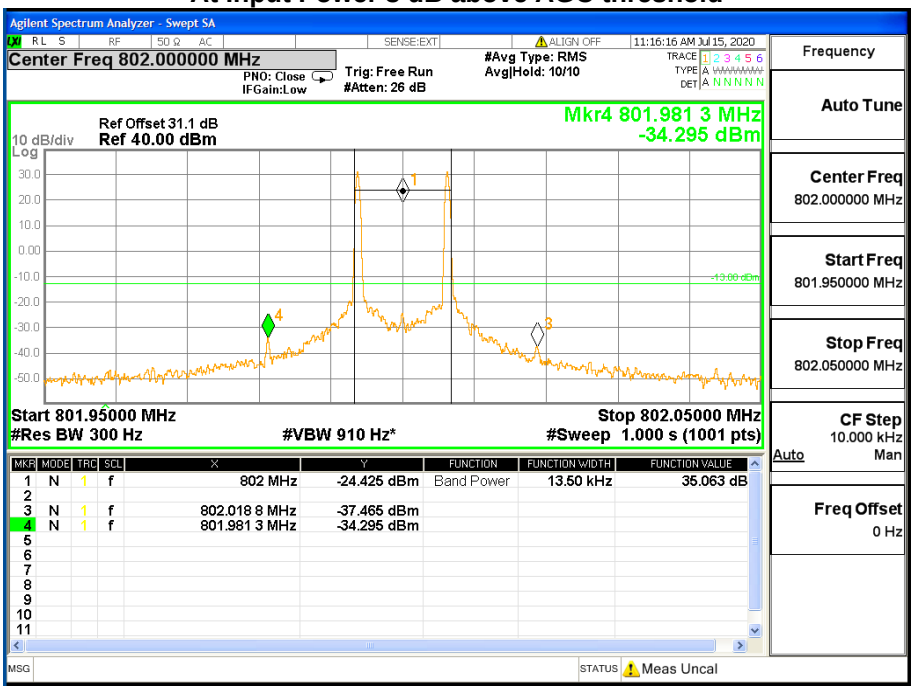


802 MHz:

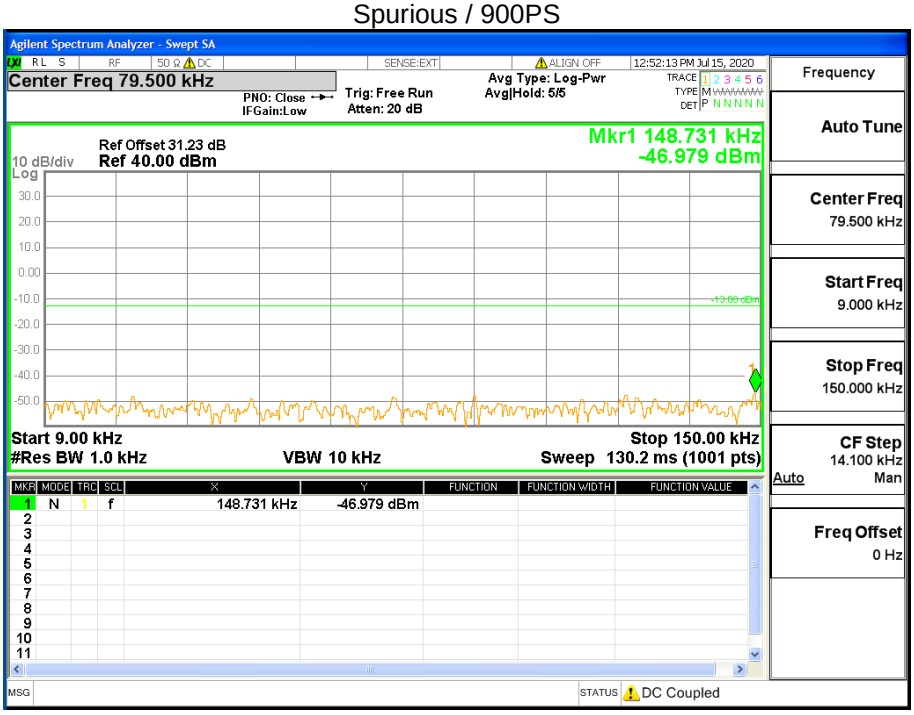
**At Input Power 0.5 dB below AGC threshold**

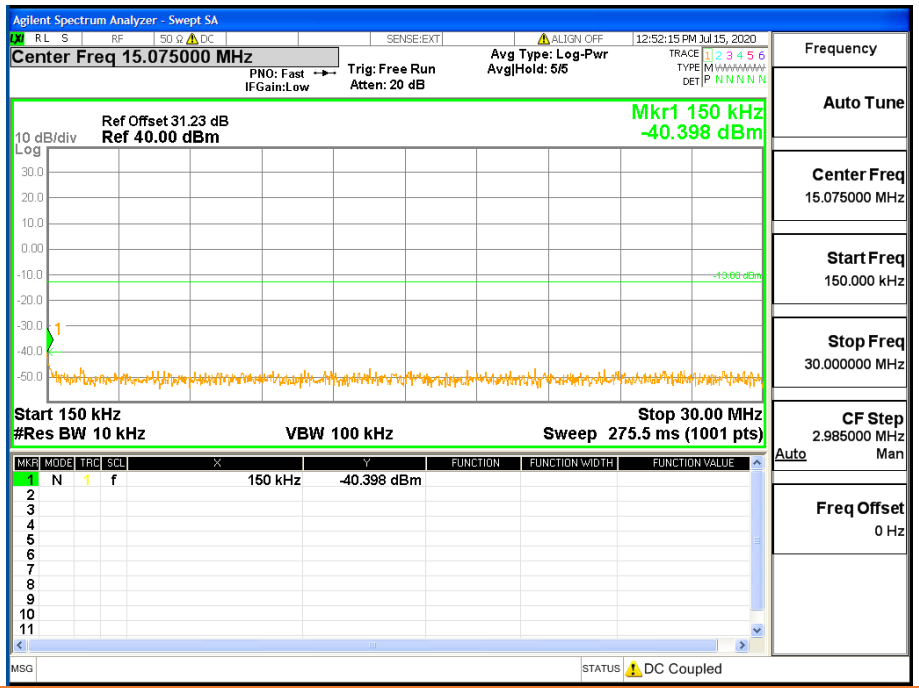


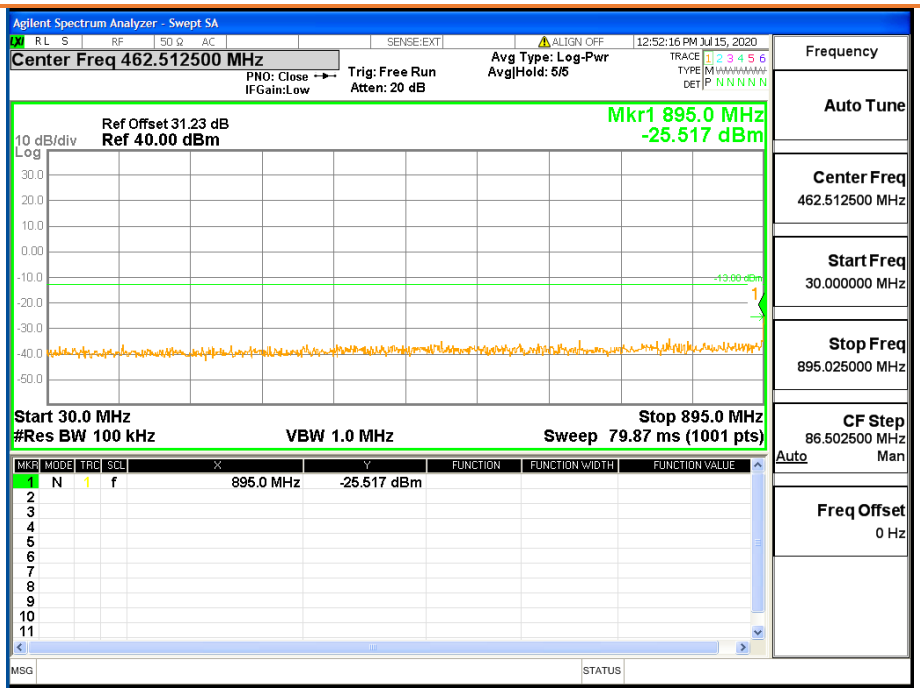

**At Input Power 3 dB above AGC threshold**

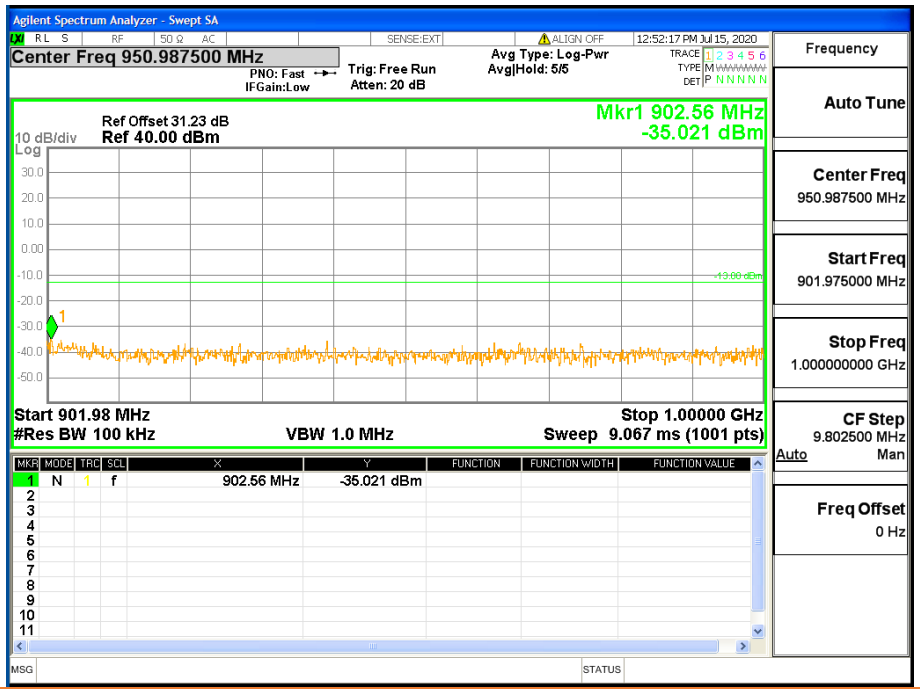


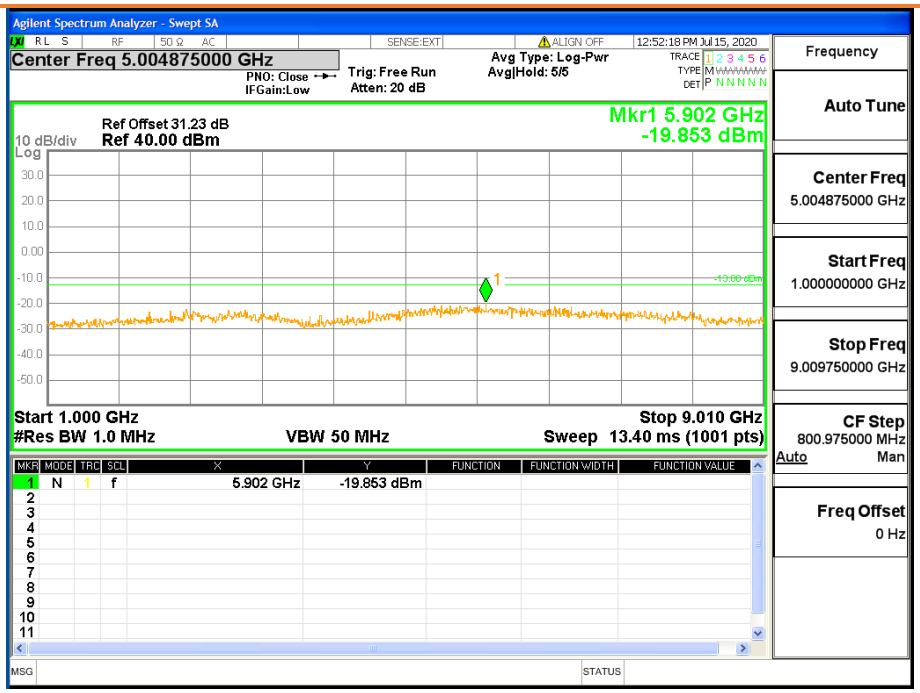
Spurious / 900PS



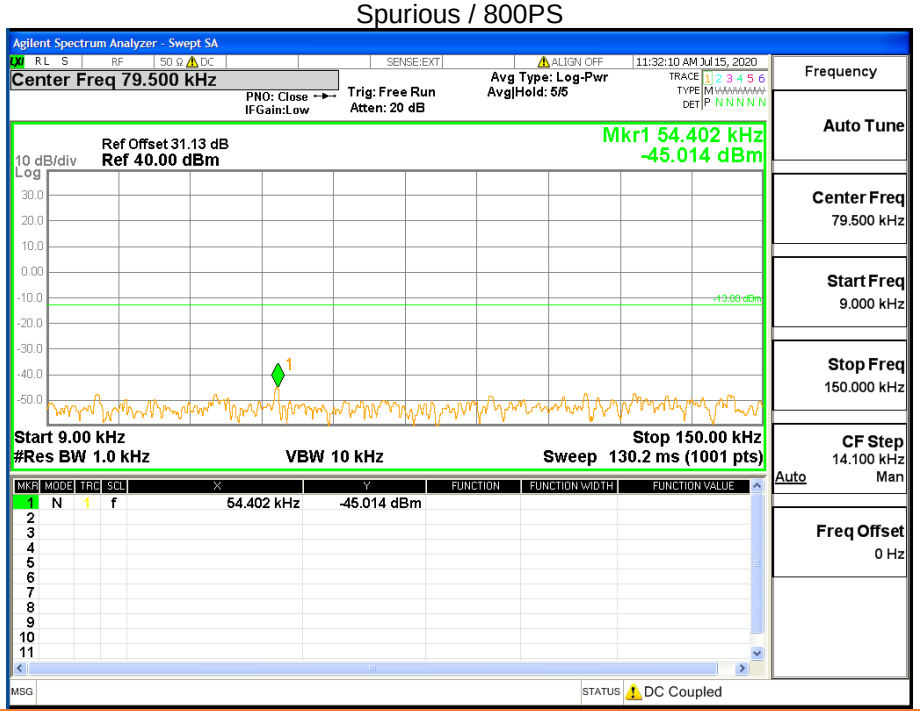



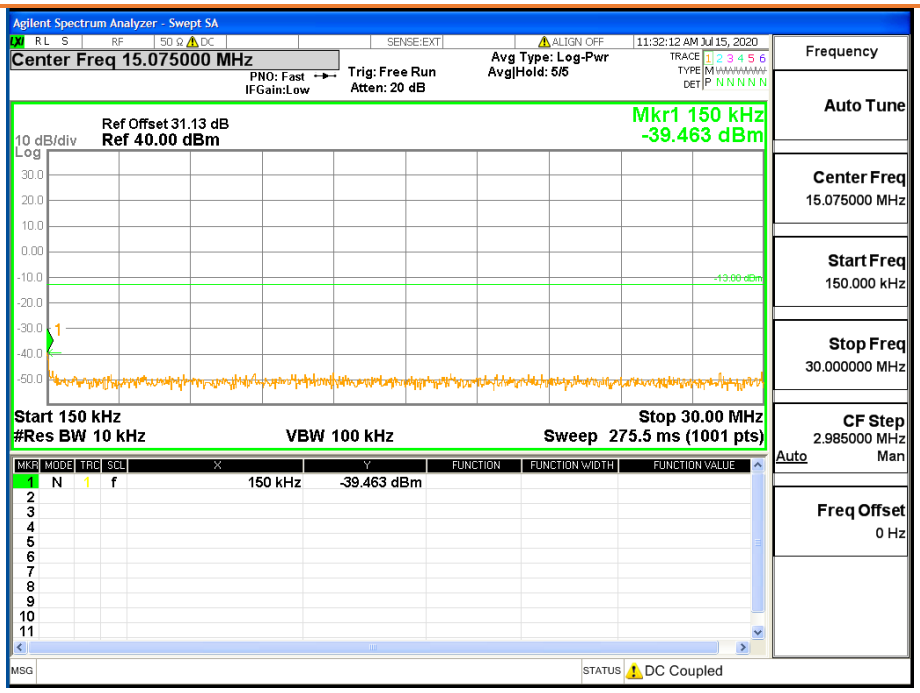


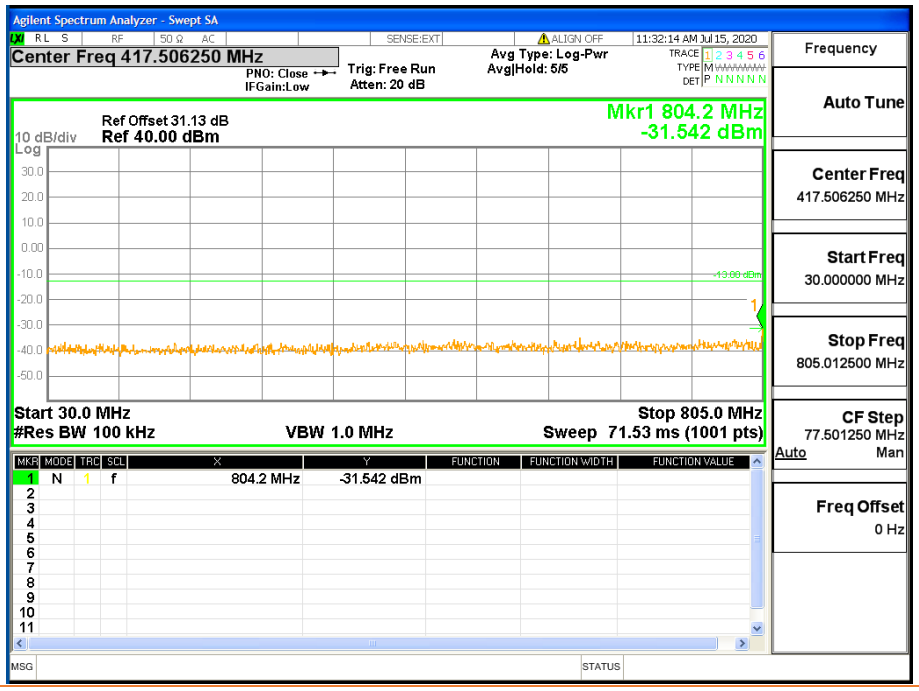



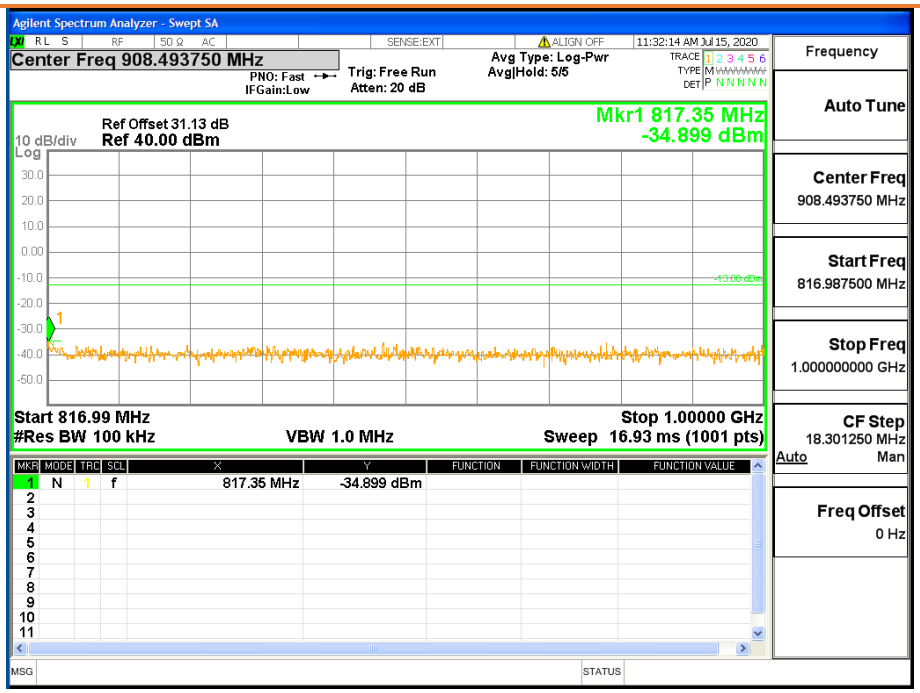


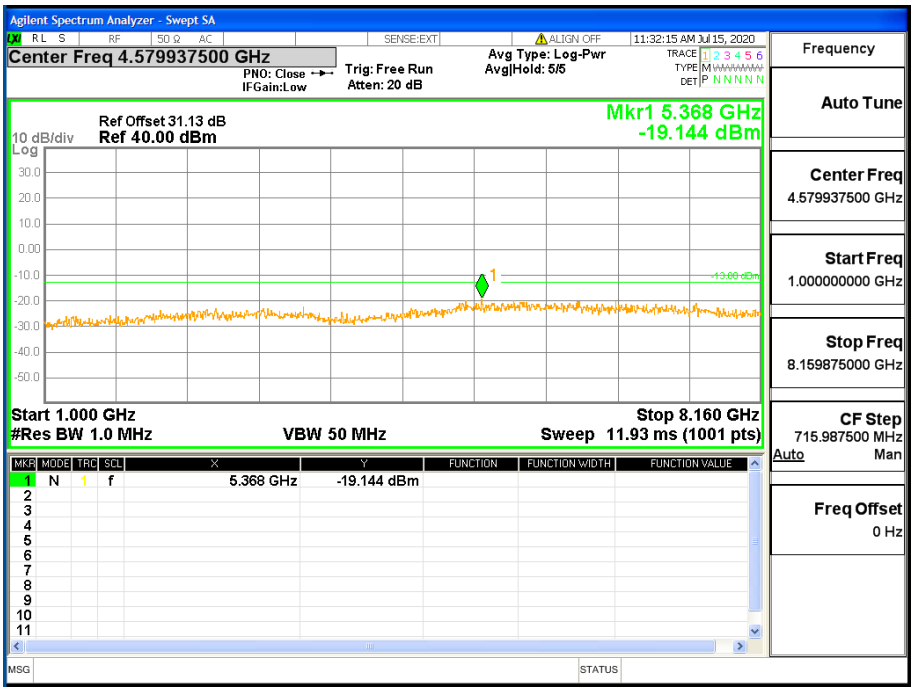

Spurious / 800PS



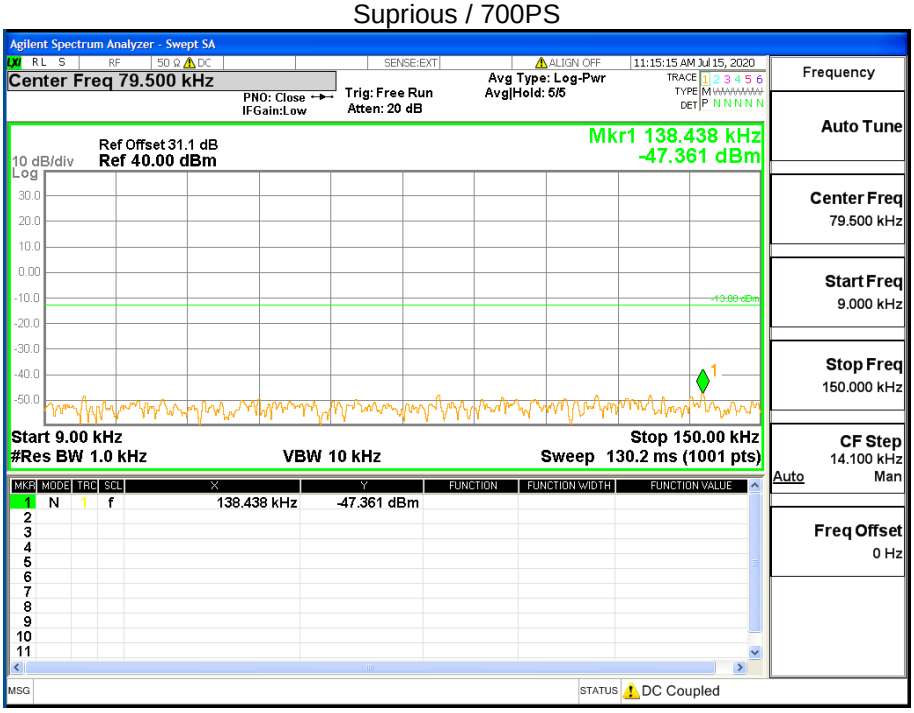


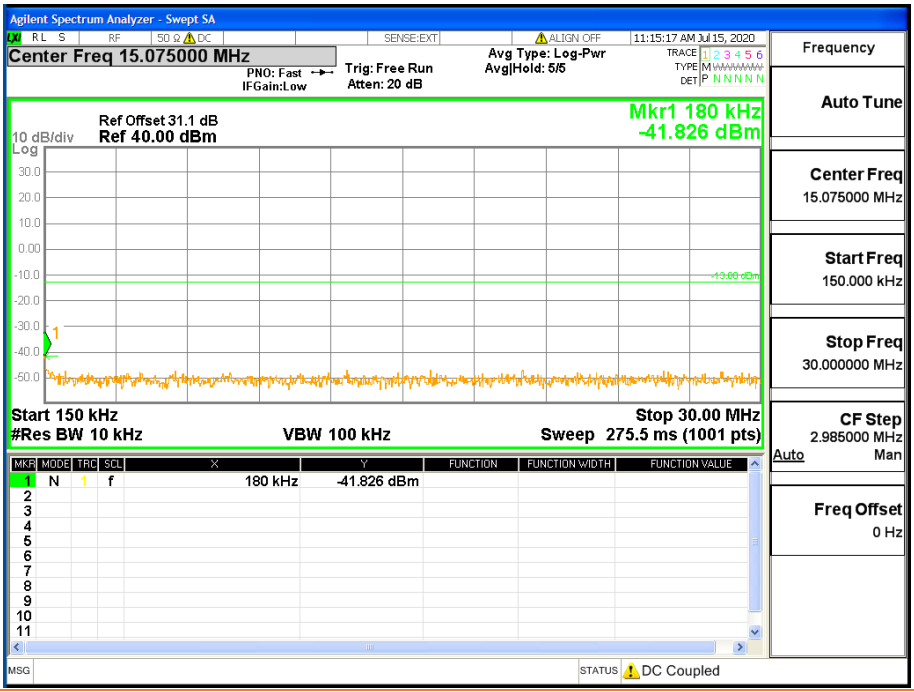



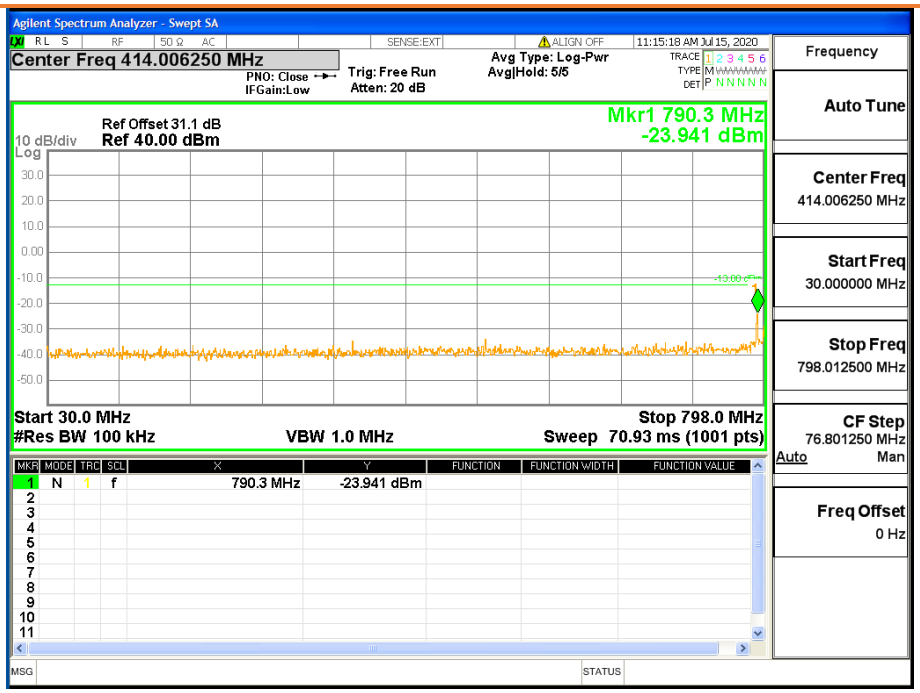


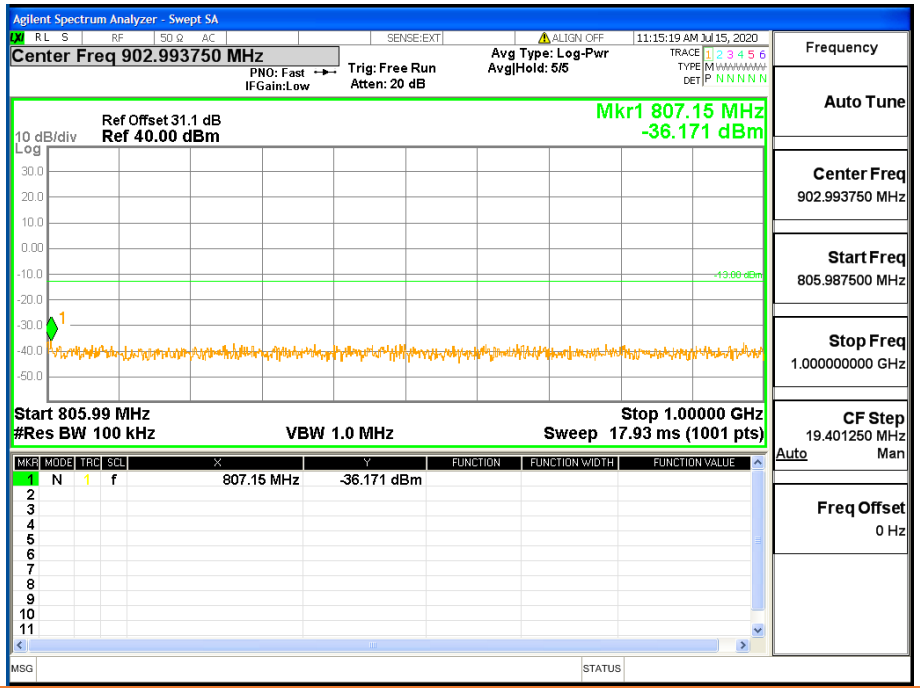



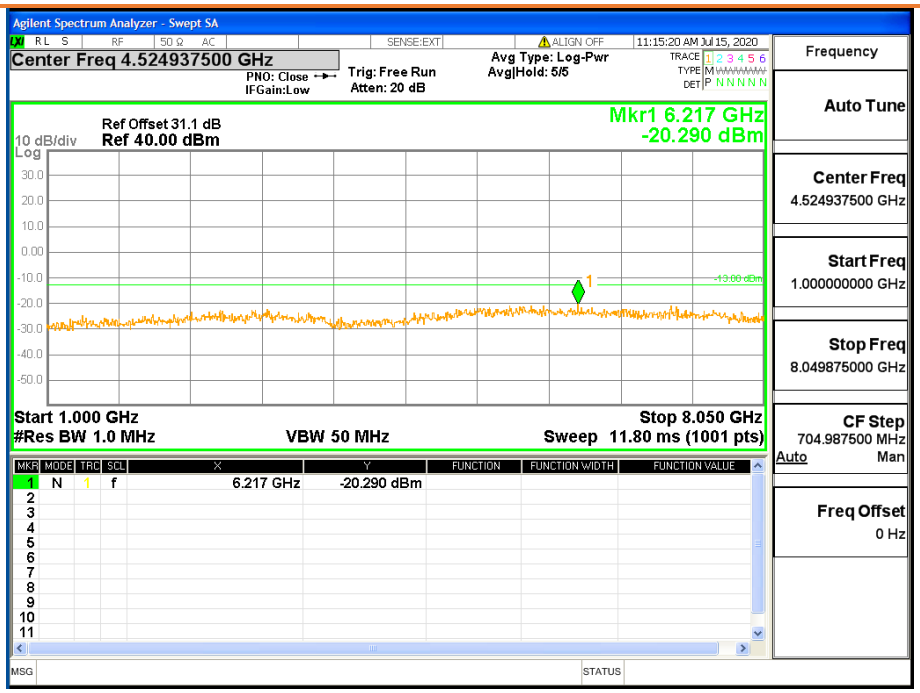
Suprious / 700PS







## Frequency Stability

The AH37 and hd37 are sychronized to the same reference clock. Therefore there is no frequency error after down and up frequency conversion are performed.

The frequency stability check is not applicable to the EUT.

## Spurious emissions radiated measurements

| | | | |
|---|---|---|---|
| Governing Doc | FCC Part 2.1053,<br>FCC Part 90.210<br>& FCC Part 90.219 | Room Temperature (°C) | 23.6 to 23.9 |
| Test Procedure | ANSI C63.4 | Relative Humidity (%) | 38.1 to 39.9 |
| Test Location | Richmond | Barometric Pressure (kPa) | 102.1 to 102.2 |
| Test Engineer | Daniel Lee | Date | 08 June 2020 |
| EUT Voltage | ☒ +48VDC | ☐ 120VAC @ 60Hz | |

| Test Equipment Used | Manufacturer | Model | Identifier | Calibration date | Calibration due |
|---|---|---|---|---|---|
| EMC Analyzer | KeySight | N9038A | 702 | 27-May-2020 | 27-May-2021 |
| Broadband Antenna | Sunol | JB1 | 967 | 12-Oct-2018 | 12-Oct-2020 |
| LPDA Antenna | Schwarzbeck Mess | VUSLP9111B | 996 | 26-Mar-2019 | 26-Mar-2021 |
| BiCon Antenna | A.H Systems | SAS-540 | 1115 | 29-Apr-2019 | 29-Apr-2021 |
| Horn Antenna | A.H Systems | SAS-571 | 227C | 18-Oct-2018 | 18-Oct-2020 |
| Motion Controller | Sunol | SC104V | 235A | IHC[1] | IHC[1] |
| Antenna Tower | Sunol | TWR95-4 | 235B | IHC[1] | IHC[1] |
| Turn Table | Sunol | SM46C | 235C | IHC[1] | IHC[1] |
| EMC Shielded Enclosure | USC | USC-26 | 374 | IHC[1] | IHC[1] |
| RF Cable | MRO | n/a | n/a | IHC[2] | IHC[2] |
| RF Preamplifier | Agilent | 8449B | 273 | IHC[2] | IHC[2] |
| AC Power Source | California Instruments | 5001i | 059 | IHC[3] | IHC[3] |
| Used Software | ☒ Tile 7! v7.3.0.6 | | | | |
| Used Template | _FCC_RadEmi_30-300MHz_Final_20190716<br>_FCC_RadEmi_300-1000MHz_Final_20190716<br>_FCC_RadEmi_1-10GHz_90SPUR_20190716 | | | | |

Note1) In House Calibration Ref. # 4
Note2) In House Calibration Ref. # 6
Note3) In House Calibration Ref. # 7

| | | | |
|---|---|---|---|
| Frequency Range: | ☒ 9kHz-30MHz | ☒ 30-1000MHz | ☒ 1-18GHz |
| Detector: | ☒ Peak (for Prescan) | ☒ Quasi-Peak(for Formal) ) | ☒ Average(for Formal) |
| RBW/VBW: | ☒ 9/30kHz | ☒ 120/300kHz | ☒ 1/3MHz |
| Type of Facility: | ☒ SAC | ☒ FSOATS | ☐ *in-situ* |
| Distance: | ☒ 3meter | ☐ 10meter | ☐ 1meter |
| Arrangement of EUT: | ☒ Table-top only | ☐ Floor-standing only | ☐ Rack Mounted |

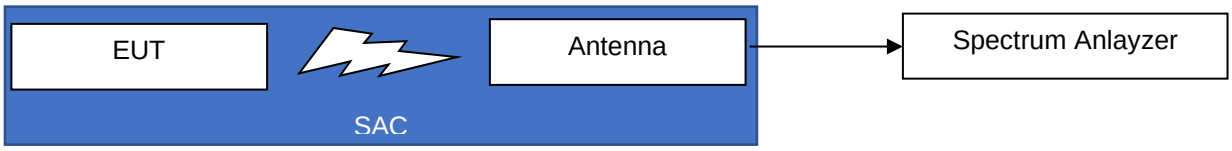
Compliant ☒ Non-Compliant ☐ Not Applicable ☐

**Test setup**

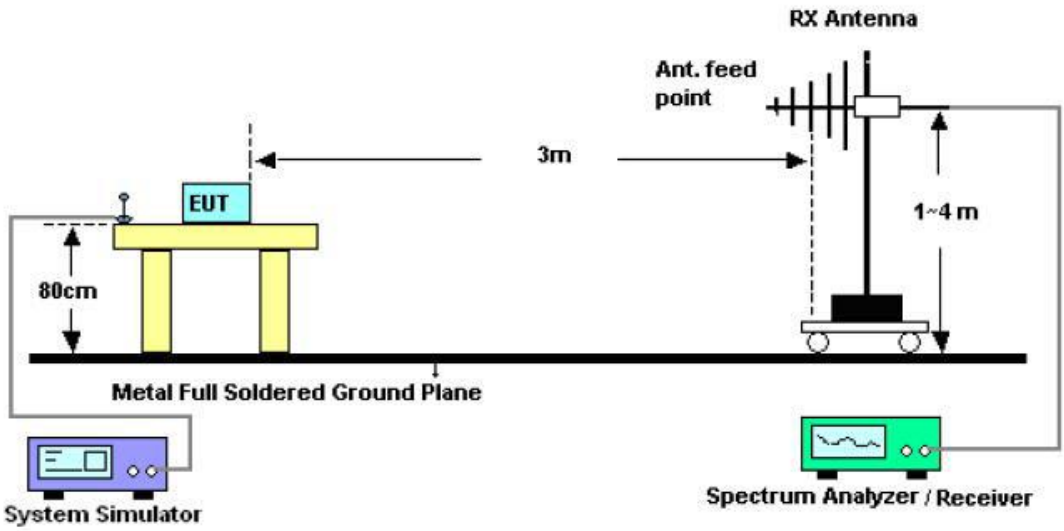
Description of test set-up:

The EUT was placed on a nonconducting platform (i.e., an “EUT support table”), of nominal size 1 m by 1.5 m, whose top surface is nominally 80 cm above the reference ground plane. The EUT was set up on 3 meters away from the EUT. The EUT was set continually on its Radio, 5W Max., which was downlinked from airHost. And the output of RF was terminated via 30dB attenuator, for rejecting the high power of carrier. The lowest, middle and highest channels were used for measuring of all radiated spurious emisions .

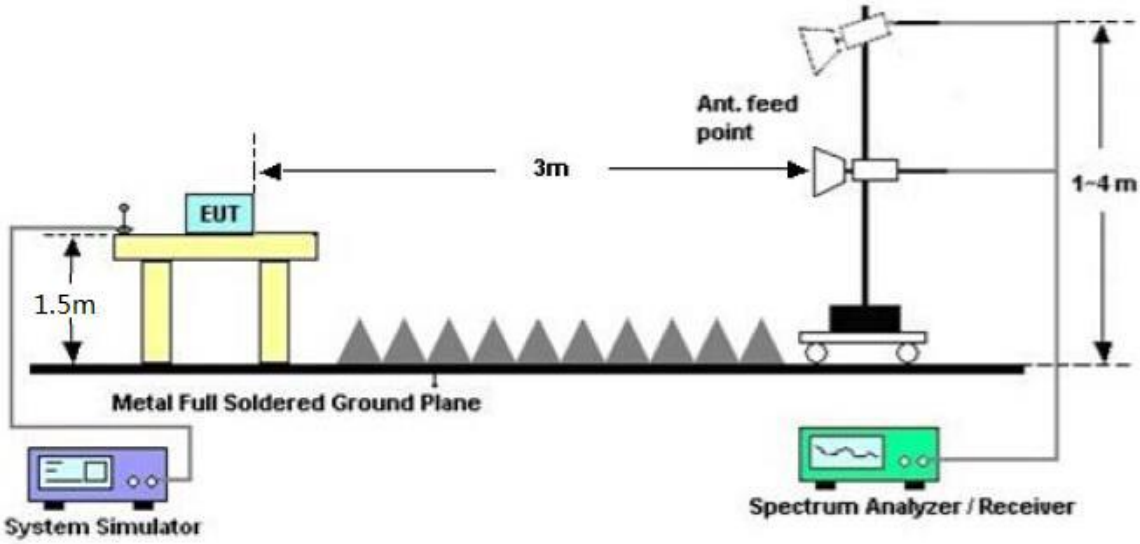
The EUT was set to **Operation Mode #1 with configuration Mode #1.**




- Radiated Emission 30 to 1,000MHz, with JB-1



- Radiated Emission 1 to 18GHz, with SAS-571




**Measurement Procedure**

Testing was performed in accordance with the test standard(s) referenced in the test summary section of this report. The Equipment Under Test (EUT) was configured based upon the requirements of the applicable test standard. Initially, the primary emission frequencies are identified by positioning a broadband receive antenna three meter from the EUT.

Scans were made with an EMC Analyzer, controlled by EMC Test Software, Tile7!, from 30kHz to 10GHz with the receiver in the peak mode. The receiver IF bandwidth was 9kHz,120 kHz or 1MHz as appropriate for the frequency and scan step was about 30kHz. To ensure that the maximum emission at each discrete frequency of interest is observed, the receive antenna is varied in height from one to four meters and rotated to produce horizontal and vertical polarities while the turntable is rotated to determine the worst emitting configuration. Under 30MHz was only tested at 1meter height and Antenna was changed both polarization, Horizontal and Vertical. Measurements were then made using CISPR quasi peak when the peak readings were within 10dB of the limit line. The numerical results are included herein to demonstrate compliance.

*Test Result*

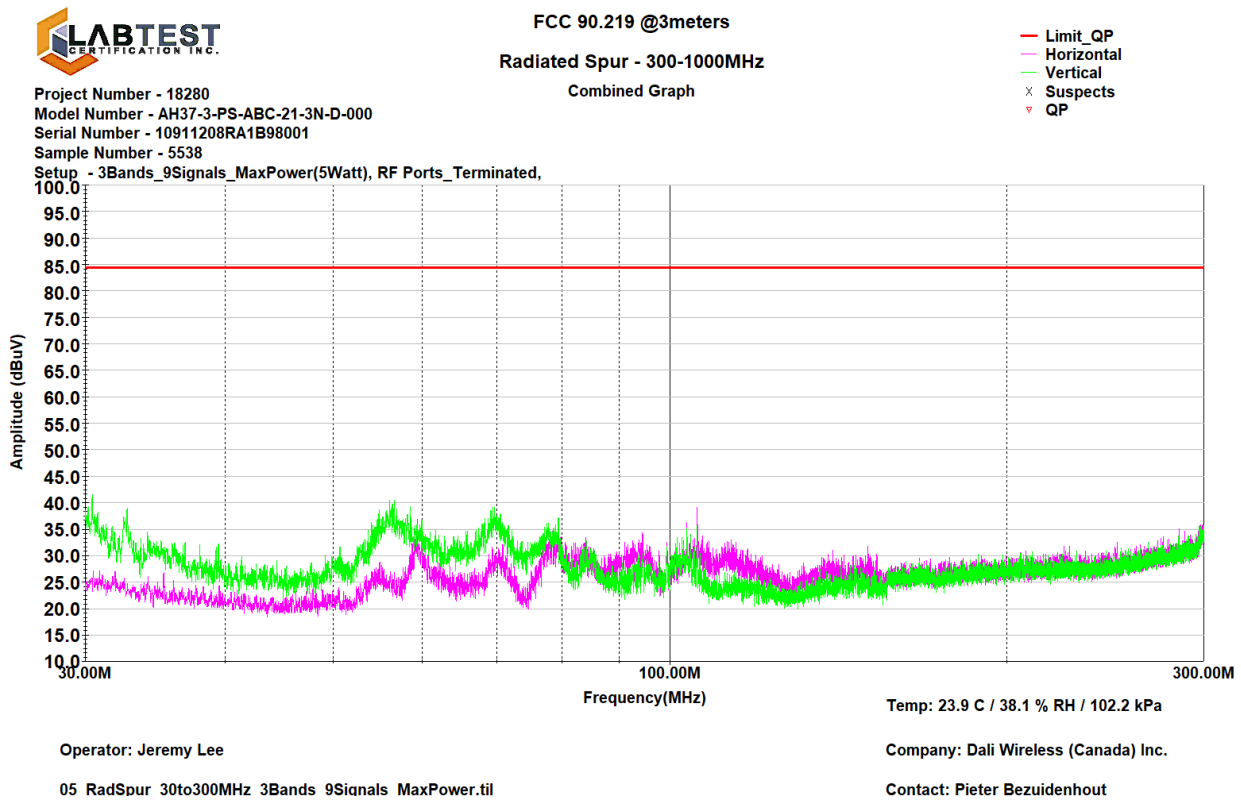
The output of EUT was set to 5 Watts(+37dBm), the PASS level of Spurious is: 43 + 10log(P) = 43 + 10log(5) = 50dB attenuation = -13dBm Since of radiated measurement was performed at 3 meters, the limit line was converted to dBuV/m using the formulas ad outlined in KDB 971168: -13 dBm ERP = 84.38 dBuV/m at 3 meters. Spurious Emission level (dBuV/m) = Detected level (dBuV) + Path Loss(dB) + Antenna Factor (dB/m) - Preamplifier's Gain (dB)

***Graphical Representation for Emission - Radiated 30kHz to 30MHz***

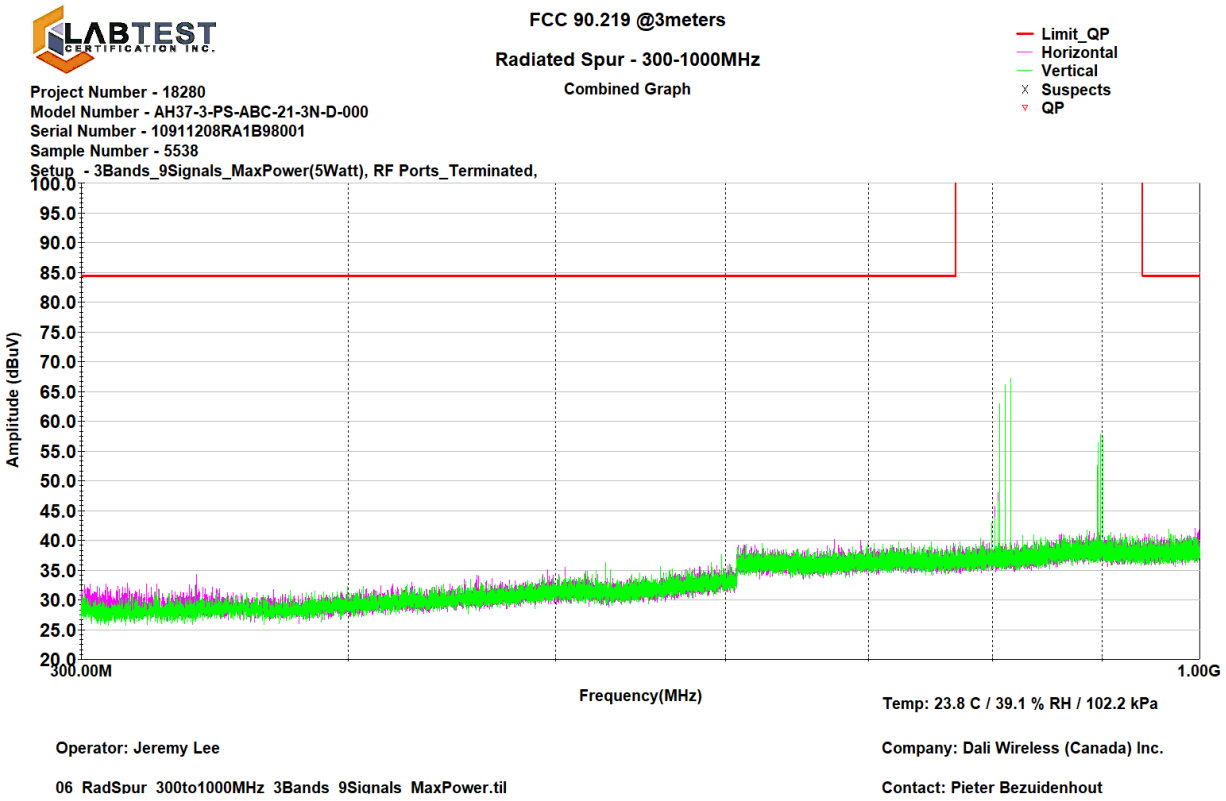
Spectrum was scanned manually from 30kHz to 30MHz. No automated plot is available for this frequency range. No spurious emissions from the product were detectable

***Graphical Representation for Emission - Radiated 30MHz to 1GHz***

- 30 to 300MHz with SAS-540



- 300 to 1,000MHz with VUSLP9111B



***Graphical Representation for Emission - Radiated 1 to 10GHz***

- 1 to 10GHz with SAS-572

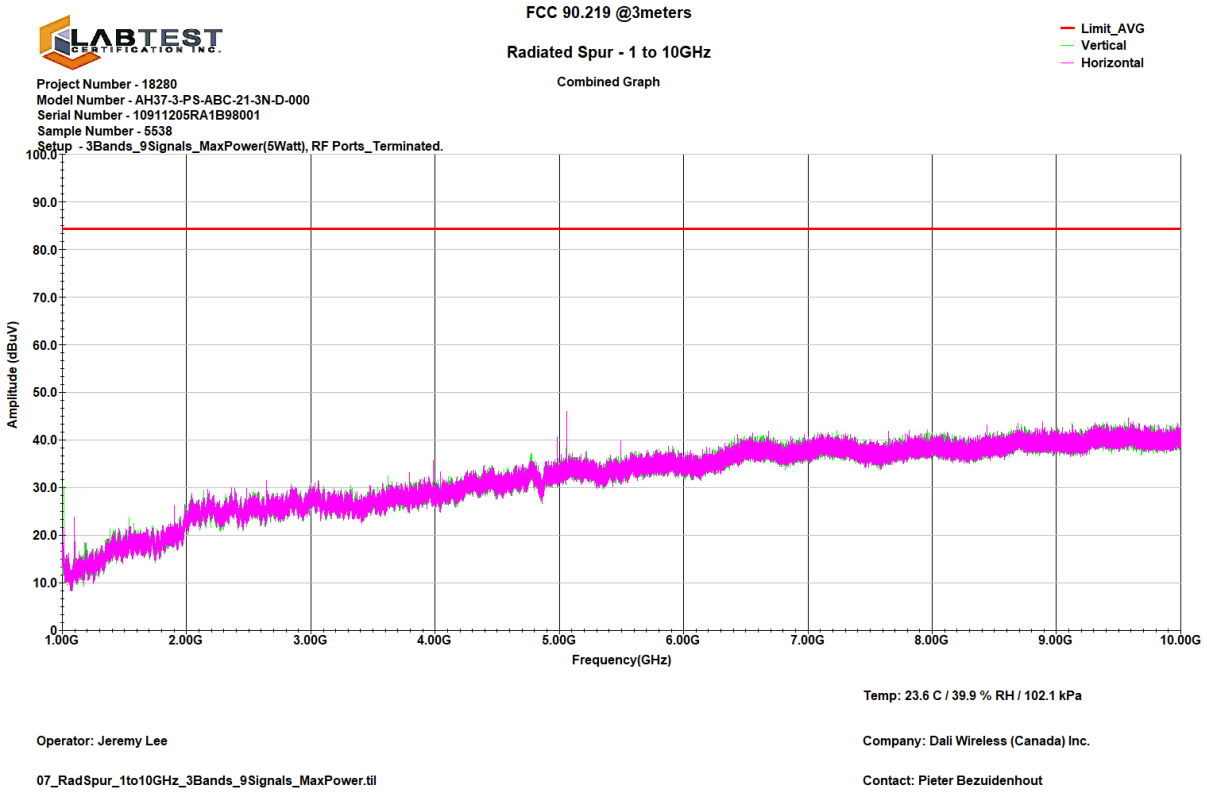



***Table Representation for Emission - Radiated 30MHz to 10GHz***

No Emissions were measured. All emissions detected, other than the fundamental, were related to the Digital Mode circuitry. No Transmitter Spurious Emissions were detectable and are greater than 20dB below the limit line.

**END OF REPORT**