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# TEST REPORT

## ELPRO E2-455-C9
## Digital Transceiver

*tested to the*

## Code of Federal Regulations (CFR) 47

## Part 101 –Fixed Microwave Services

*for*

## ELPRO Technologies, Australia

This Test Report is issued with the authority of:

**Andrew Cutler- General Manager**

ACCREDITED
TESTING LABORATORY

All tests reported herein have been performed in accordance with the laboratory's scope of accreditation

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# 1. COMPLIANCE STATEMENT

The **ELPRO E2-455-C9 Digital Transceiver** complies with the limits defined in 47 CFR Part 101 and 47 CFR Part 2 when tested in-accordance with the test methods described in 47 CFR Part 2, ANSI C63.25 – 2015 and ANSI / TIA-603-E -2016.

# 2. RESULT SUMMARY

The results of testing carried out between the 18th November 2021 and 1st December 2021 are summarised below.

| Clause | Description | Result |
|---|---|---|
| 101.107 | Frequency tolerance | Complies |
| 101.109 | Bandwidth | Complies |
| 101.111 | Emission limitations<br>Spurious emission at antenna port<br>Spurious emissions field strength | Complies<br>Complies<br>Complies |
| 101.113 | Transmitter power limitations | Complies |
| 1.1310 | Radio frequency exposure limits | Complies |

# 3. ATTESTATION

This report describes the tests and measurements performed for the purpose of determining compliance with the specification with the following conditions:

**The client selected the test sample.**

**The report relates only to the sample tested.**

**This report does not contain corrections or erasures.**

Measurement uncertainties with statistical confidence intervals of 95% are shown below test results. Both Class A and Class B uncertainties have been accounted for, as well as influence uncertainties where appropriate.

In addition this equipment has been tested in accordance with the requirements contained in the appropriate Commission regulations.

All compliance statements have been made with respect of the specification limit with no reference to the measurement uncertainty.

To the best of my knowledge, these tests were performed using measurement procedures that are consistent with industry or Commission standards and demonstrate that the equipment complies with the appropriate standards.

I further certify that the necessary measurements were made by EMC Technologies NZ Ltd, 47 MacKelvie Street, Grey Lynn, Auckland, New Zealand.

Andrew Cutler
General Manager
EMC Technologies NZ Ltd

# 4. CLIENT INFORMATION

| | |
|---|---|
| **Company Name** | ELPRO Technologies Pty Ltd |
| **Physical Address** | 29 Lathe Street<br>Virginia<br>Queensland 4014 |
| **Country** | Australia |
| **Contact** | Mr Eric Zhu |

# 5. TEST SAMPLE DESCRIPTION

| | |
|---|---|
| **Brand Name** | ELPRO |
| **Model Number** | E2-455-C9 |
| **Brand Type** | Digital Transceiver |
| **Manufacturer** | ELPRO Technologies Pty. Ltd |
| **Serial Number(s)** | 30057396 |
| **FCC ID** | O9P-E2-455C92 |

**Product Overview:**

The E2-455 is a series of digital radio modules that operate over a number of bands.

The C9 model operates between 928 – 960 MHz providing QAM and FSK modulation for high speed data transfer.

The E2-455 transceiver will be used in conjunction with the ELPRO 415U-2 and 415U-E Host devices to provide radio communications.

The transceiver has the following characteristics:

**Transmitter Type**

This equipment has been classed as a mobile transceiver

**Part 101 Certification Bands**

928.0 - 929.0 MHz
932.5 - 935.0 MHz
941.0 - 960.0 MHz

**Test frequencies**

| Frequency (MHz) | Channel Bandwidths (kHz) | Modulation Type |
|---|---|---|
| 928.500 | 12.5, 25.0 | FSK/QAM |
| 930.000 | 12.5, 25.0 | FSK/QAM |
| 935.000 | 12.5, 25.0 | FSK/QAM |
| 950.000 | 12.5, 25.0 | FSK/QAM |

**Emission designators**

FSK: 11K0F1D and 19K0F1D

QAM: 10K0D1D and 20K0D1D

**Rated Transmitter Output Power**

10 mW (+10.0 dBm) to 10 watts (+40.0 dBm)

The output power form the device reduces by 3 dB when the input voltage drops below 9 Vdc.

**Power Supply**

The product operates with an external DC power supply in the range from 12 Vdc to 30 Vdc
Nominal test voltage is 13.8 Vdc

**Standard Temperature and Humidity**

Temperature: +15 °C to + 30 °C maintained.
Relative Humidity: 20% to 75% observed.

**Standard Test Power Source**

Standard Test Voltage: 13.8 Vdc

**Extreme Temperature**

High Temperature: + 50 °C maintained.
Low Temperature: - 30 °C maintained.

# 6. TEST RESULTS

The following tests have been carried out.

**RF power output**

Measurements were carried out at the RF output terminals of the transmitter using a 30 dB power attenuator and a 50 Ω dummy load.

Measurements were carried out when the transmitter was not being modulated.

Testing was carried out at maximum power output.

Maximum transmitter power - Rated 10.0 W (+40.0 dBm)

| Frequency (MHz) | Voltage (Vdc) | Carrier Power (dBm) | | |
|---|---|---|---|---|
| | | +22˚ C | +55˚ C | -30˚ C |
| 928.500 | 9.0 | 38.5 | 37.9 | 38.9 |
| | 13.8 | 39.9 | 39.3 | 39.3 |
| | 30.0 | 39.3 | 39.3 | 39.2 |
| 950.000 | 9.0 | 37.8 | 37.9 | 38.9 |
| | 13.8 | 39.6 | 39.8 | 39.0 |
| | 30.0 | 39.6 | 39.8 | 39.0 |

**Limits:**

Part 101 does not specify the transmitter output power

**Result:** Complies.
**Measurement Uncertainty**: ± 0.5 dB

**Emission types and bandwidth limitations:**

The following emission types and designators have been declared by the client:

FSK: 11K0F1D for 12.5 kHz channels and 19K0F1D for 25.0 kHz channels

QAM: 10K0D1D for 12.5 kHz channels and 20K0D1D for 25.0 kHz channels

Measurements have been made to verify this declared bandwidth using the various modulation types and data rates that this radio can support at each test frequency.

Measurements were made using a spectrum analyser that was operating in occupied bandwidth mode with the 99% power points being determined automatically.

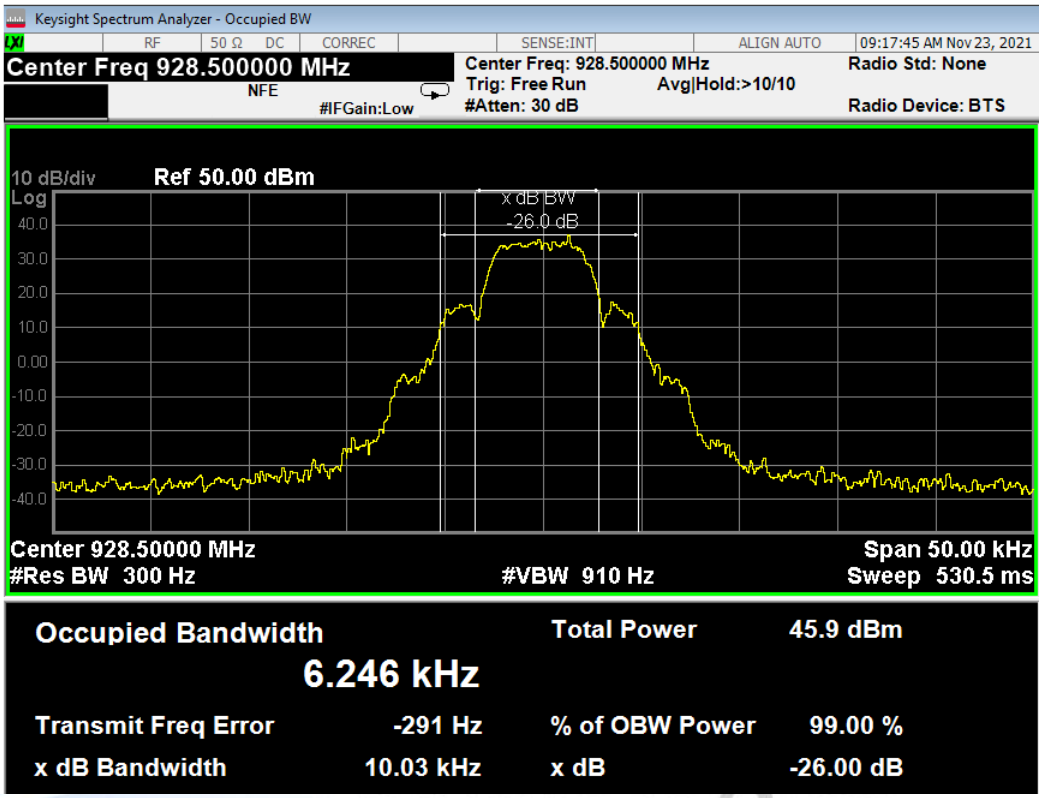
Attached to the input of the spectrum analyser was an external 30 dB attenuator.

**Result:** Complies

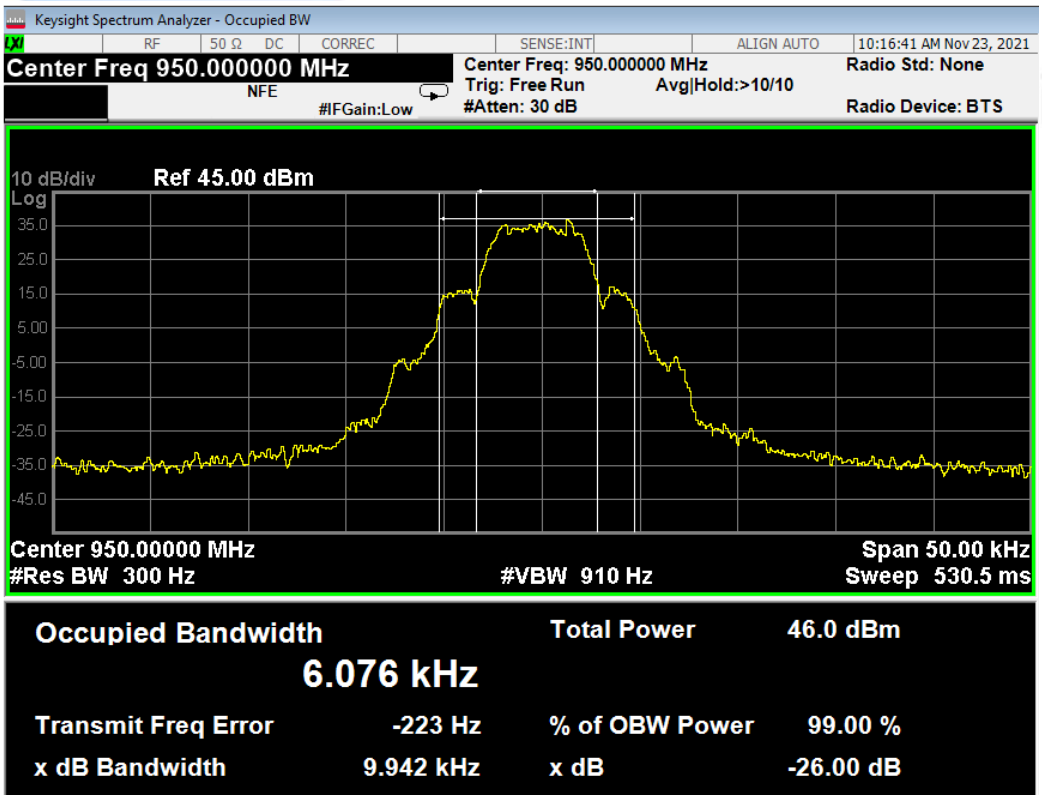
## 2.5 kHz channel bandwidth measurements with plots

| Emission | Frequency (MHz) | Measured (kHz) | Authorized (kHz) |
|---|---|---|---|
| 2FSK | 928.500 | 6.246 | 11.250 kHz |
| | 950.000 | 6.076 | |

12.5 kHz – 928.5 MHz - 2FSK



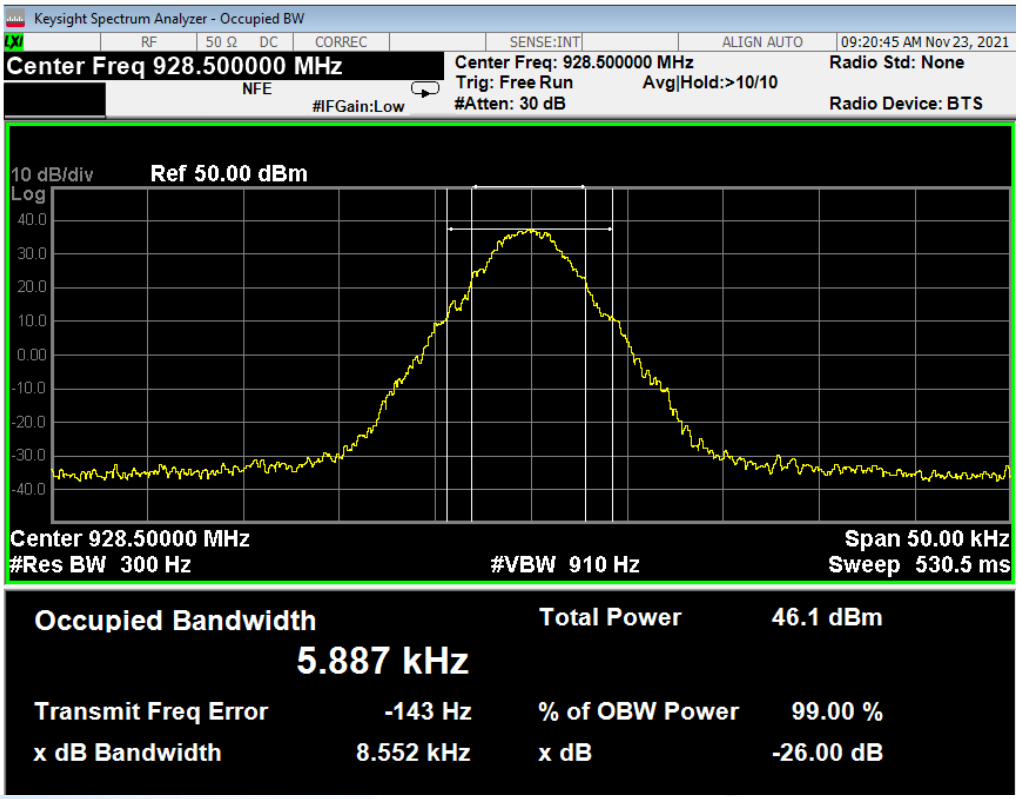

12.5 kHz – 950.0 MHz - 2FSK



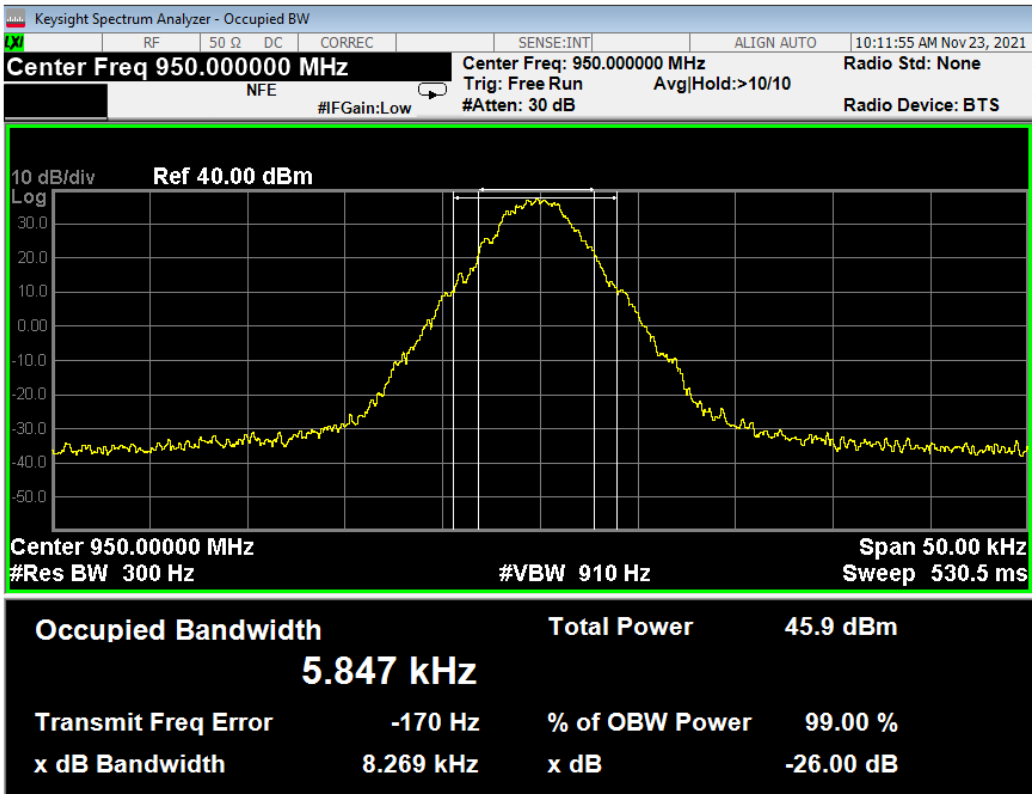
## 12.5 kHz channel bandwidth measurements with plots

| Emission | Frequency (MHz) | Measured (kHz) | Authorized (kHz) |
|---|---|---|---|
| 4FSK | 928.500 | 5.887 | 11.250 kHz |
| | 950.000 | 5.847 | |

12.5 kHz – 928.5 MHz - 4FSK



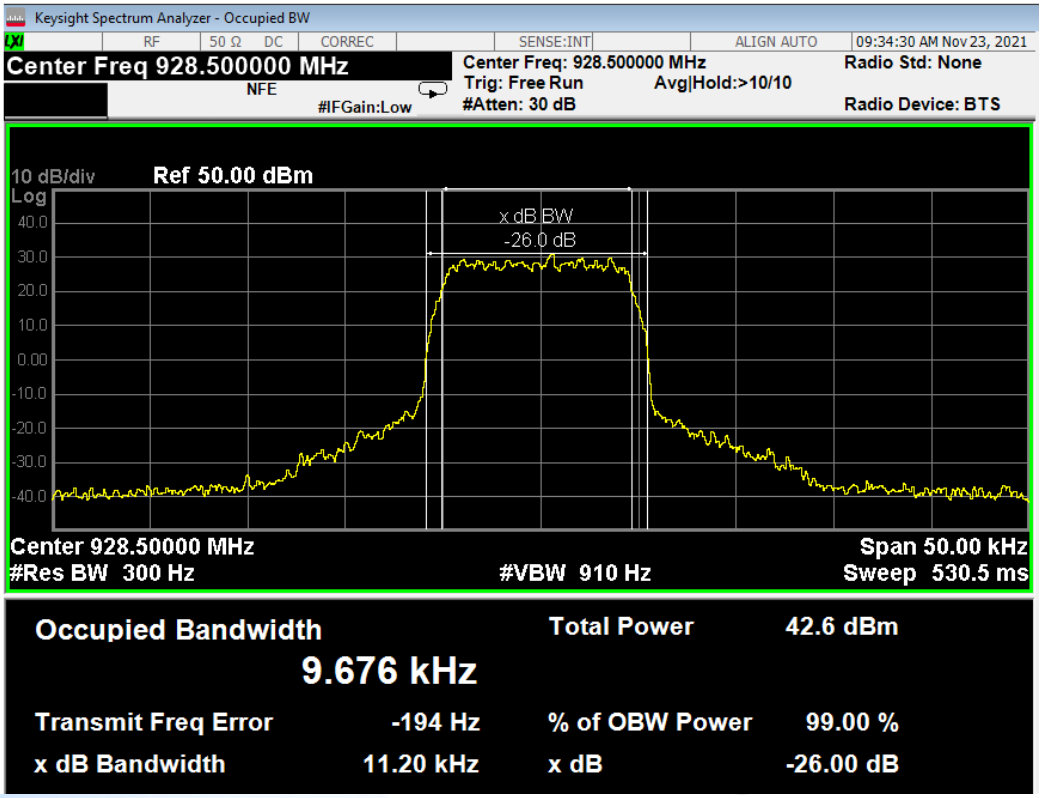

12.5 kHz – 950.0 MHz - 4FSK



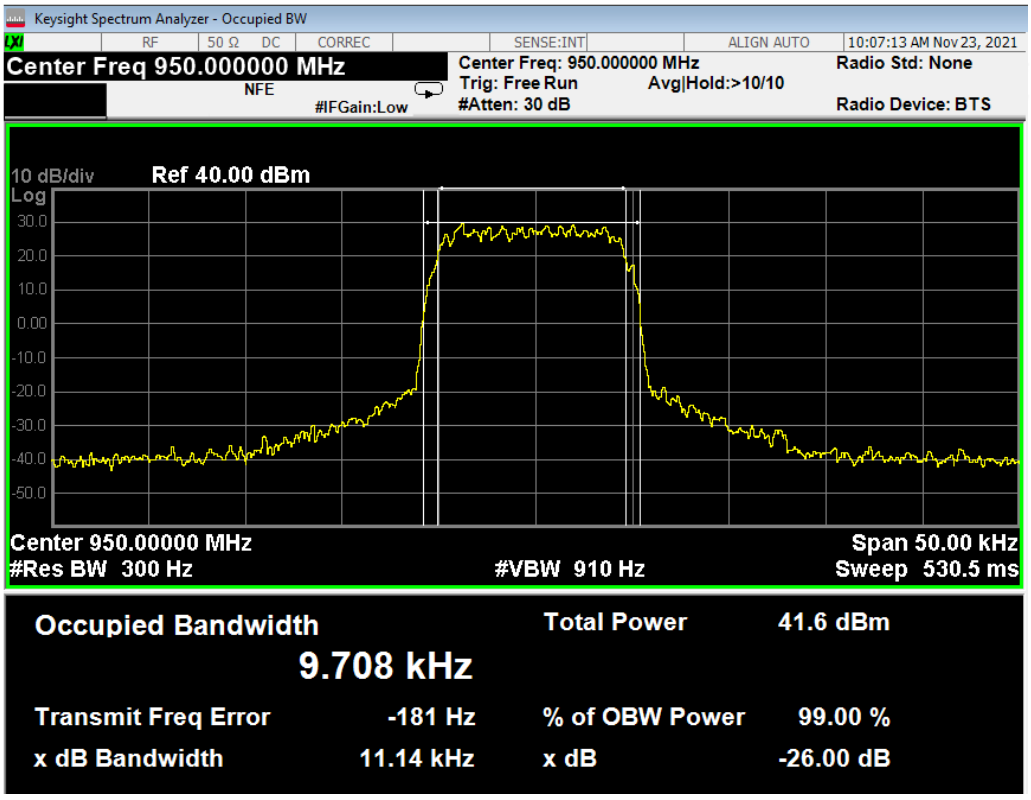
**12.5 kHz channel bandwidth measurements with plots**

| Emission | Frequency (MHz) | Measured (kHz) | Authorized (kHz) |
|---|---|---|---|
| **4QAM** | 928.500 | 9.676 | 11.250 kHz |
| | 950.000 | 9.708 | |

12.5 kHz – 928.5 MHz - 4QAM



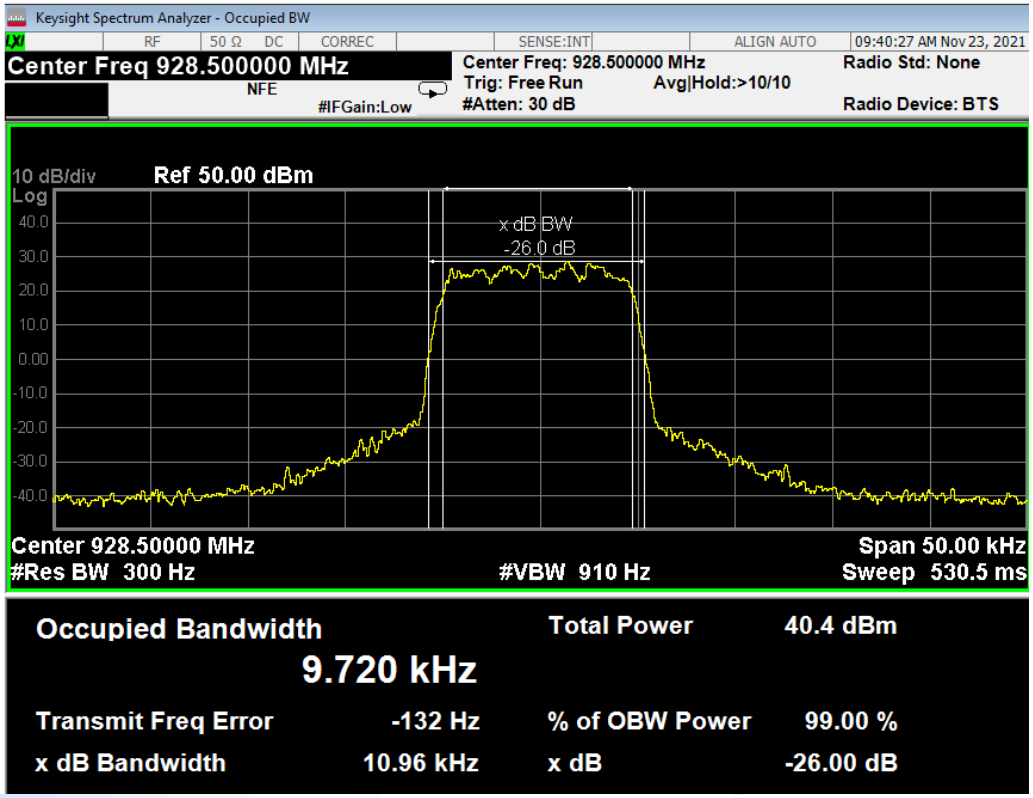

12.5 kHz – 950.0 MHz - 4QAM



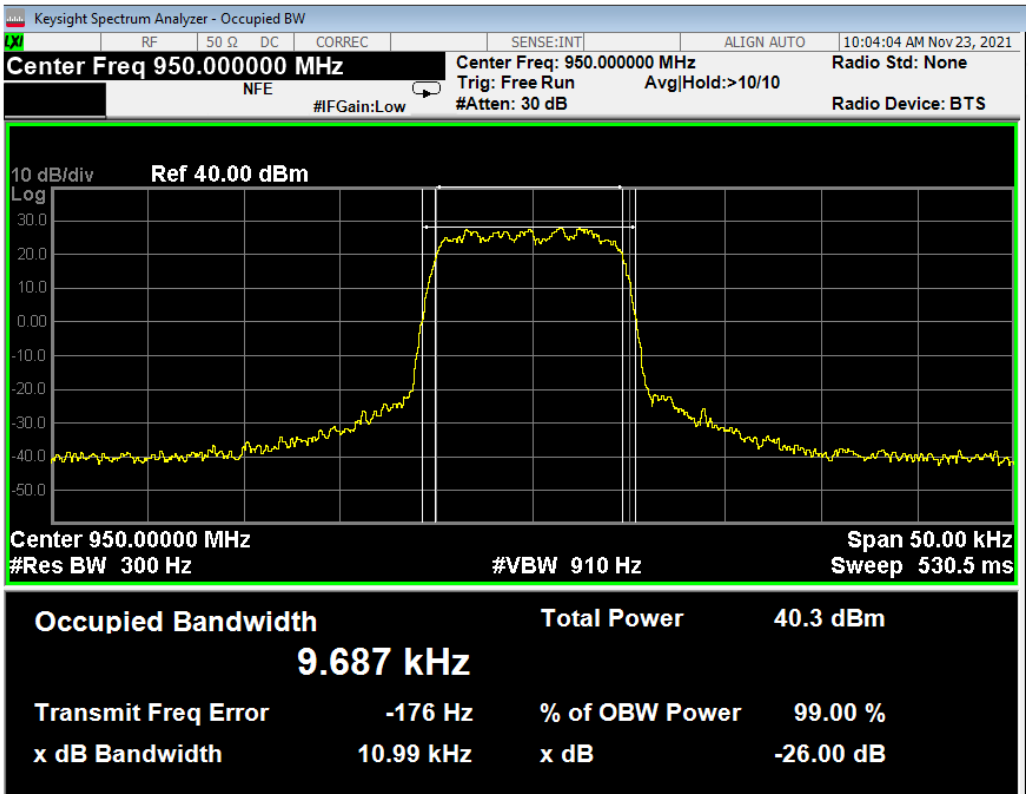
**12.5 kHz channel bandwidth measurements with plots**

| Emission | Frequency (MHz) | Measured (kHz) | Authorized (kHz) |
|---|---|---|---|
| **16QAM** | 928.500 | 9.720 | 11.250 kHz |
| | 950.000 | 9.687 | |

12.5 kHz – 928.5 MHz - 16QAM



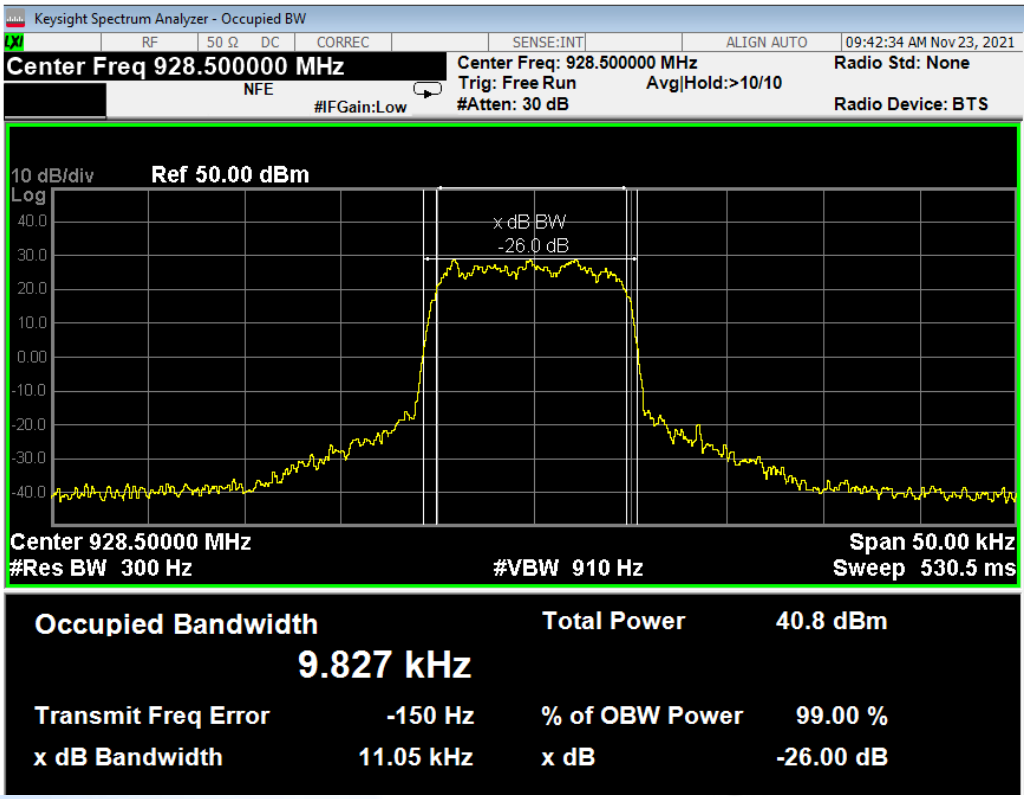

12.5 kHz – 950.0 MHz - 16QAM



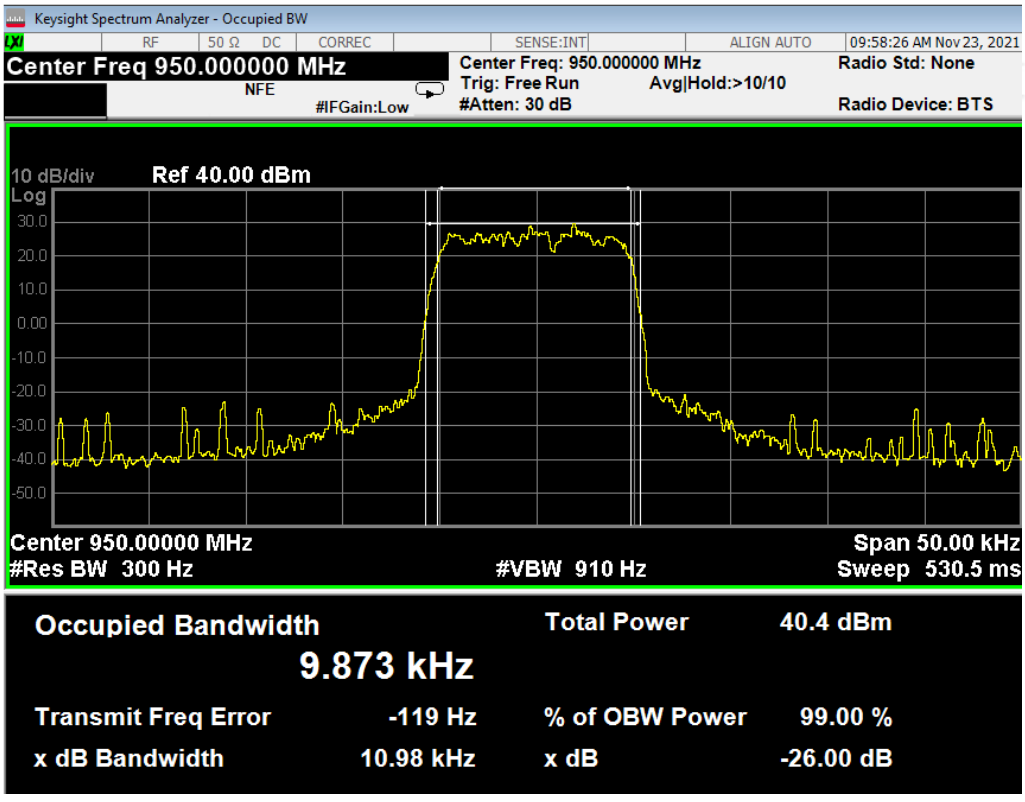
## 12.5 kHz channel bandwidth measurements with plots

| Emission | Frequency (MHz) | Measured (kHz) | Authorized (kHz) |
|---|---|---|---|
| **64QAM** | 928.500 | 9.827 | 11.250 kHz |
| | 950.000 | 9.873 | |

12.5 kHz – 928.5 MHz - 64QAM



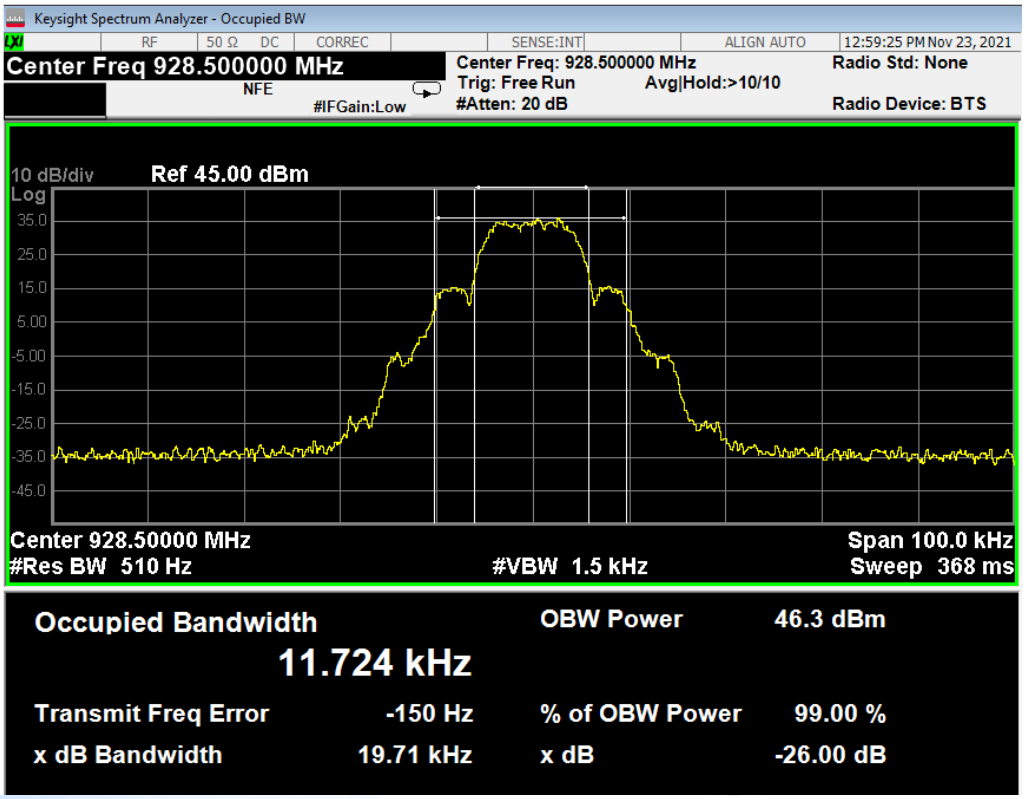

12.5 kHz – 950.0 MHz - 64QAM



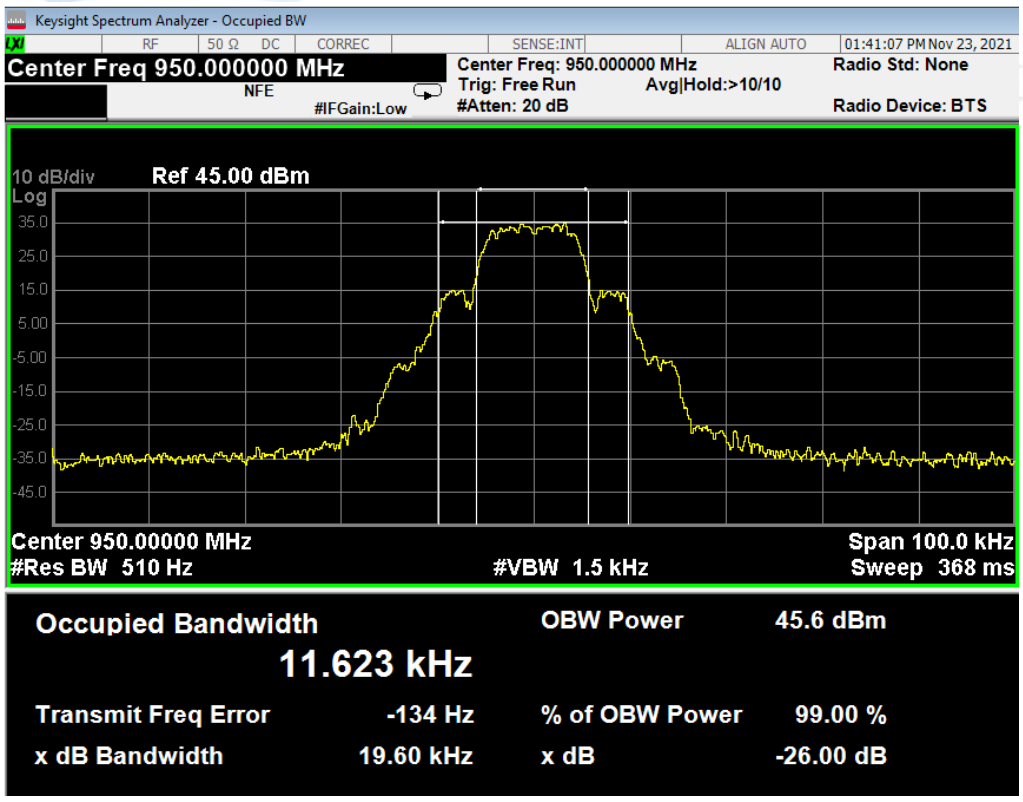
**25.0 kHz channel bandwidth measurements with plots**

| Emission | Frequency (MHz) | Measured (kHz) | Authorized (kHz) |
|---|---|---|---|
| **2FSK** | 928.500 | 11.724 | 20.0 kHz |
| | 950.000 | 11.623 | |

25.0 kHz – 928.5 MHz - 2FSK



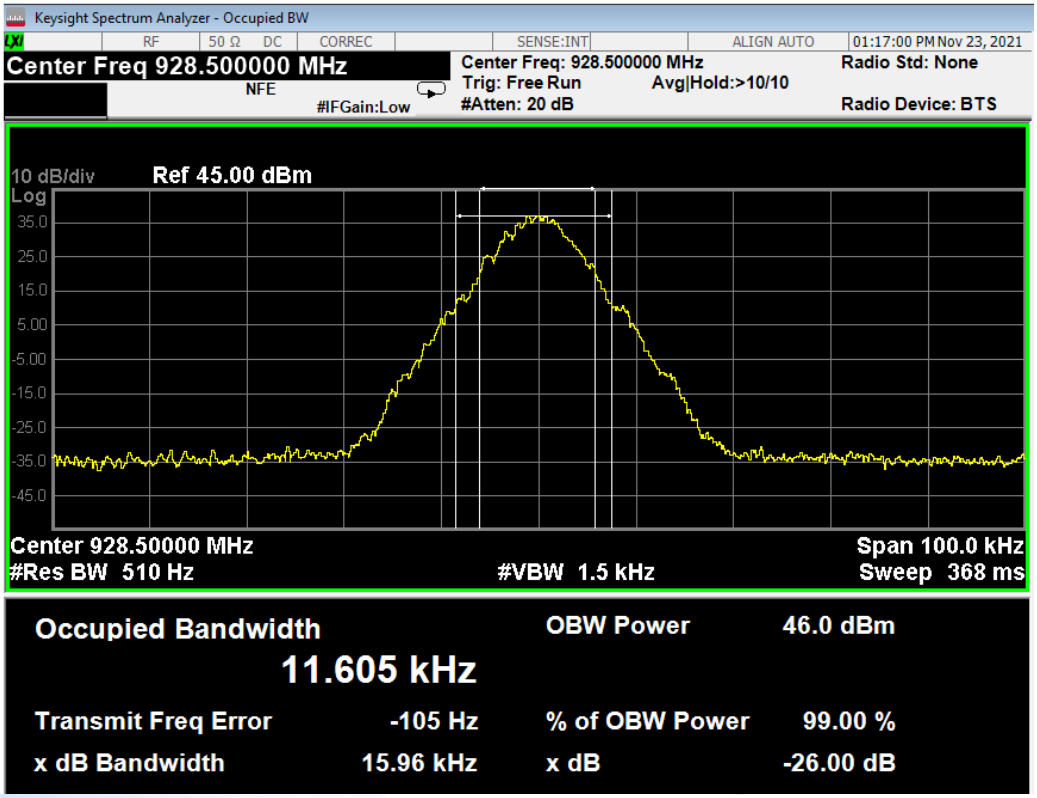

25.0 kHz – 950.0 MHz - 2FSK



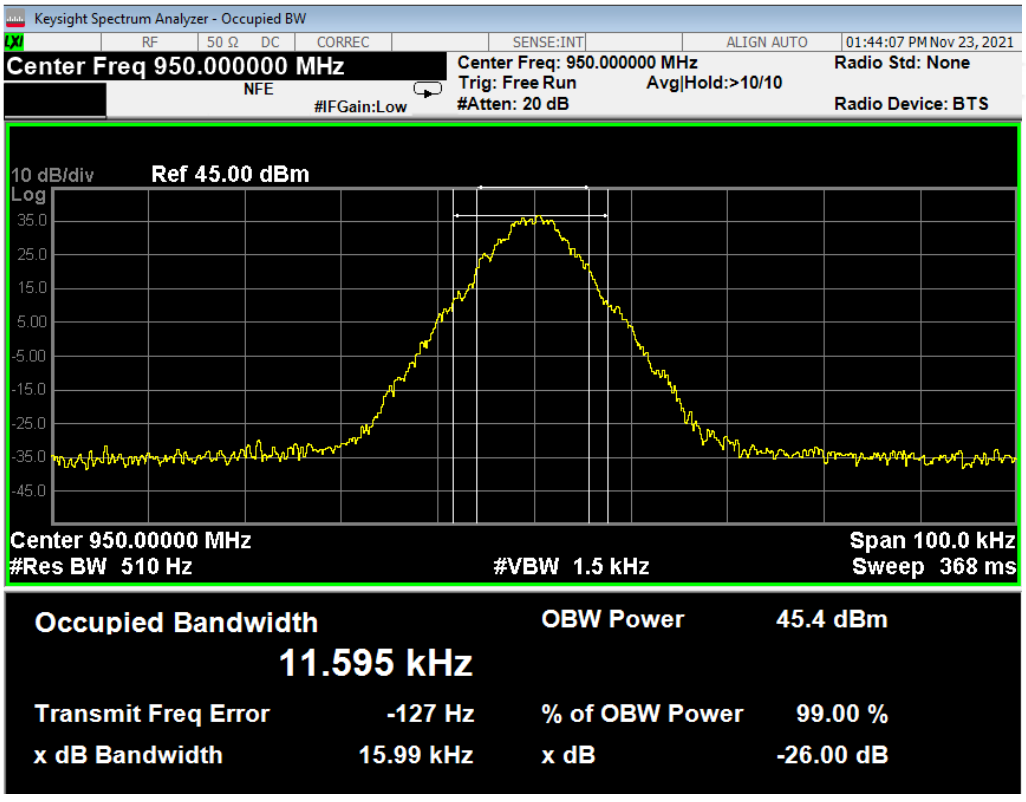
**25.0 kHz channel bandwidth measurements with plots**

| Emission | Frequency (MHz) | Measured (kHz) | Authorized (kHz) |
|---|---|---|---|
| **4FSK** | 928.500 | 11.605 | 20.0 kHz |
| | 950.000 | 11.595 | |

25.0 kHz – 928.5 MHz - 4FSK



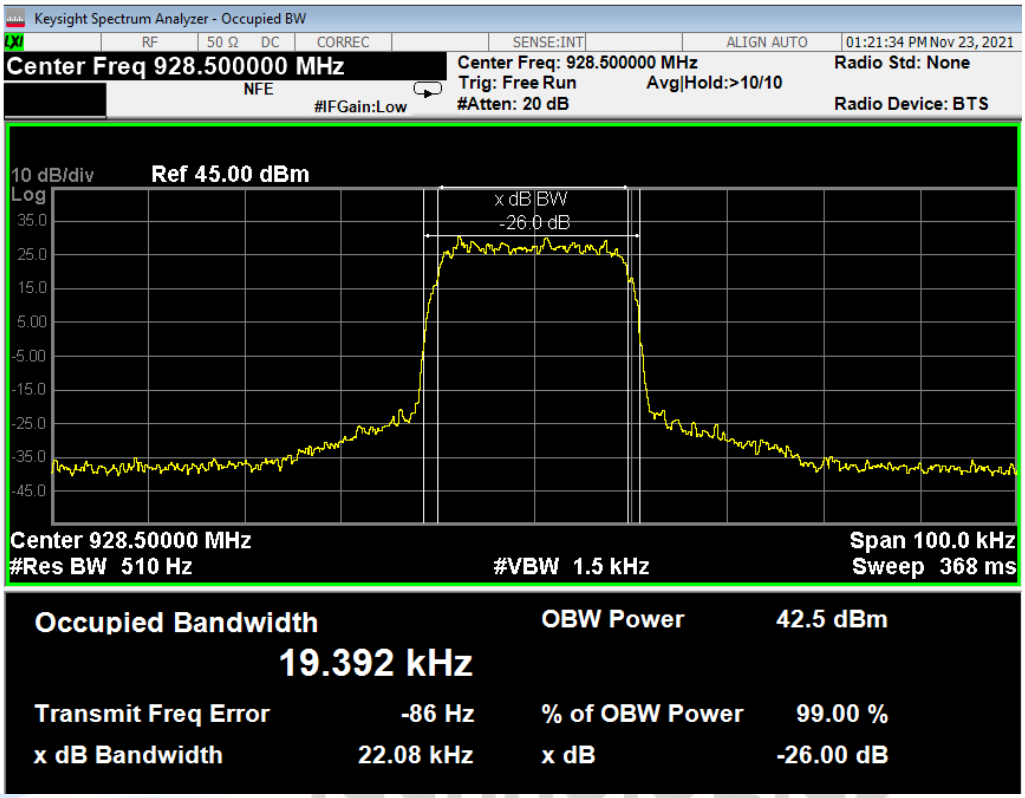

25.0 kHz – 950.0 MHz - 4FSK



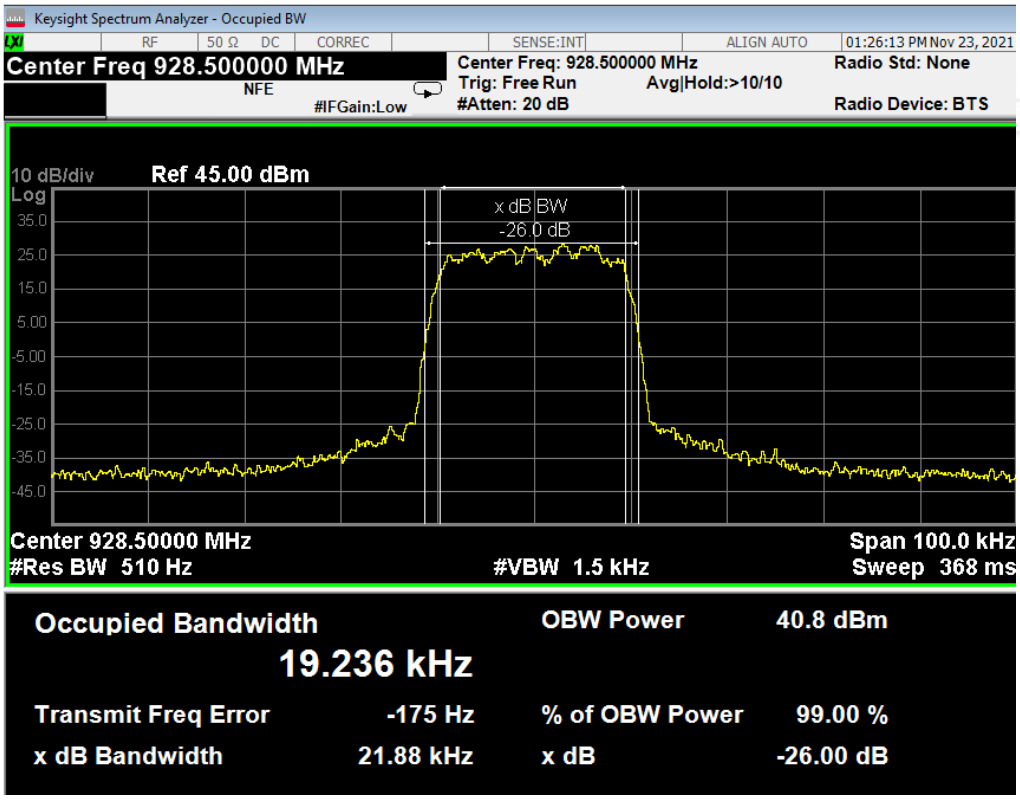
**25.0 kHz channel bandwidth measurements with plots**

| Emission | Frequency (MHz) | Measured (kHz) | Authorized (kHz) |
|---|---|---|---|
| **4QAM** | 928.500 | 19.392 | 20.0 kHz |
| **16QAM** | 928.500 | 19.236 | |

25.0 kHz – 928.5 MHz - 4QAM



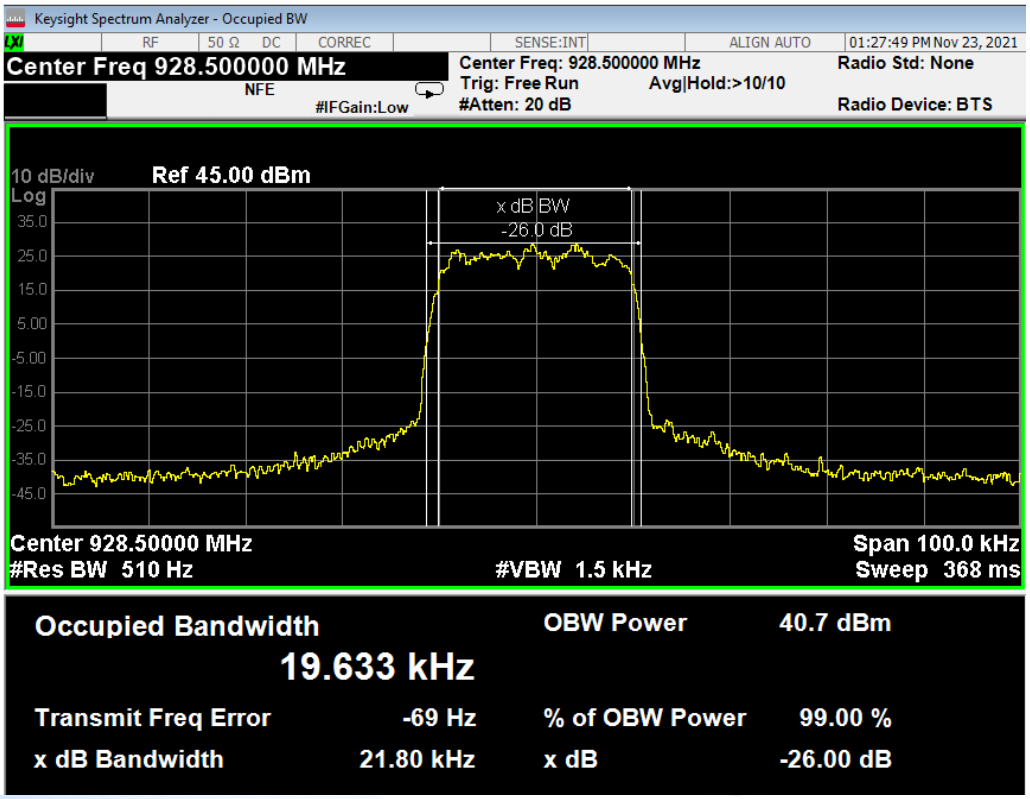

25.0 kHz – 928.5 MHz - 16QAM



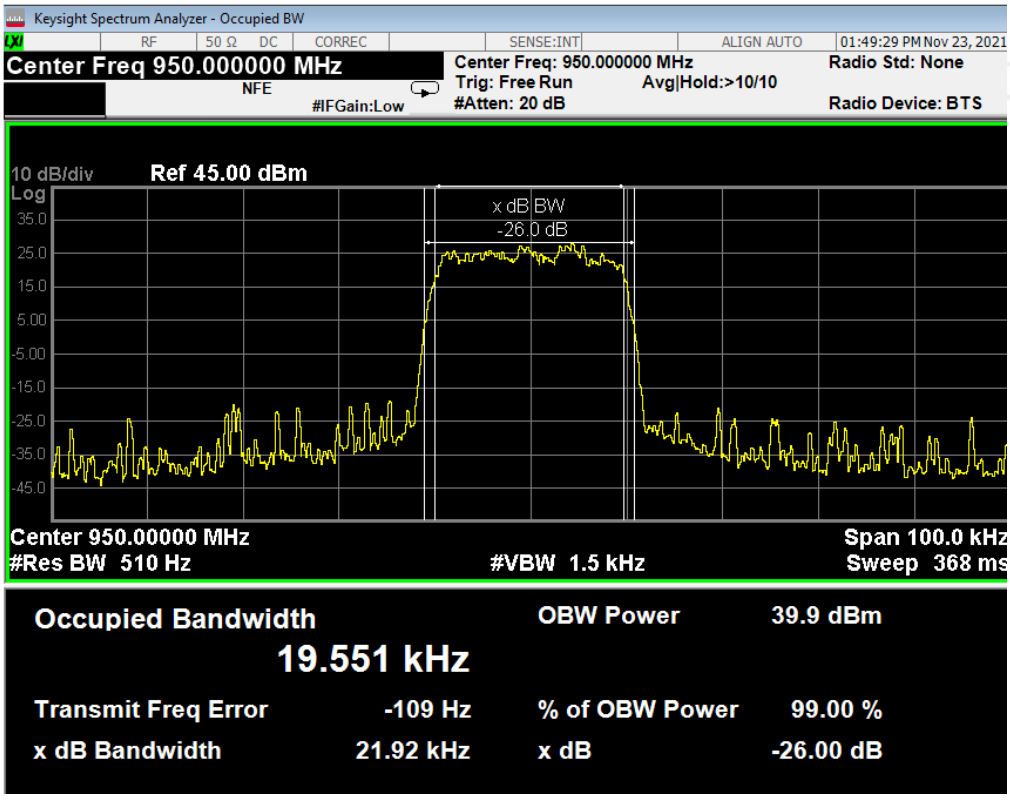
**25.0 kHz channel bandwidth measurements with plots**

| Emission | Frequency (MHz) | Measured (kHz) | Authorized (kHz) |
|---|---|---|---|
| **64QAM** | 928.500 | 19.633 | 20.0 kHz |
| | 950.000 | 19.551 | |

25.0 kHz – 928.5 MHz - 16QAM




25.0 kHz – 950.0 MHz - 16QAM



**Spectrum Masks**

The spectrum masks are defined in:

As this transmitter uses digital modulation in the 900 MHz multiple address frequencies with 12.5 kHz and 25.0 kHz authorised bandwidths the emission masks as per section 101.111 (a) (5) and (6) have been applied.

When the 12.5 kHz bandwidth mask (a)(5) was applied.

When the 25.0 kHz bandwidth mask (a)(6) was applied.

The reference level for the following emission mask measurements has been determined using a resolution bandwidth of 120 kHz using a peak detector when the transmitter was operating in each of the modulation modes.

A 30 dB attenuator was placed between the output of transmitter and the input of spectrum analyser.

The transmitter was modulated using modulation sources internal to the transmitter as supplied by the client.

The reference level for the following emission mask measurements has been determined using a resolution bandwidth of 120 kHz with the transmitter modulated. The Resolution bandwidth for mask measurements has been set to 300 Hz.

For all measurements a 30 dB attenuator is placed between the transmitter and the spectrum analyser.

Measurements were made in peak hold mode using a peak detector.

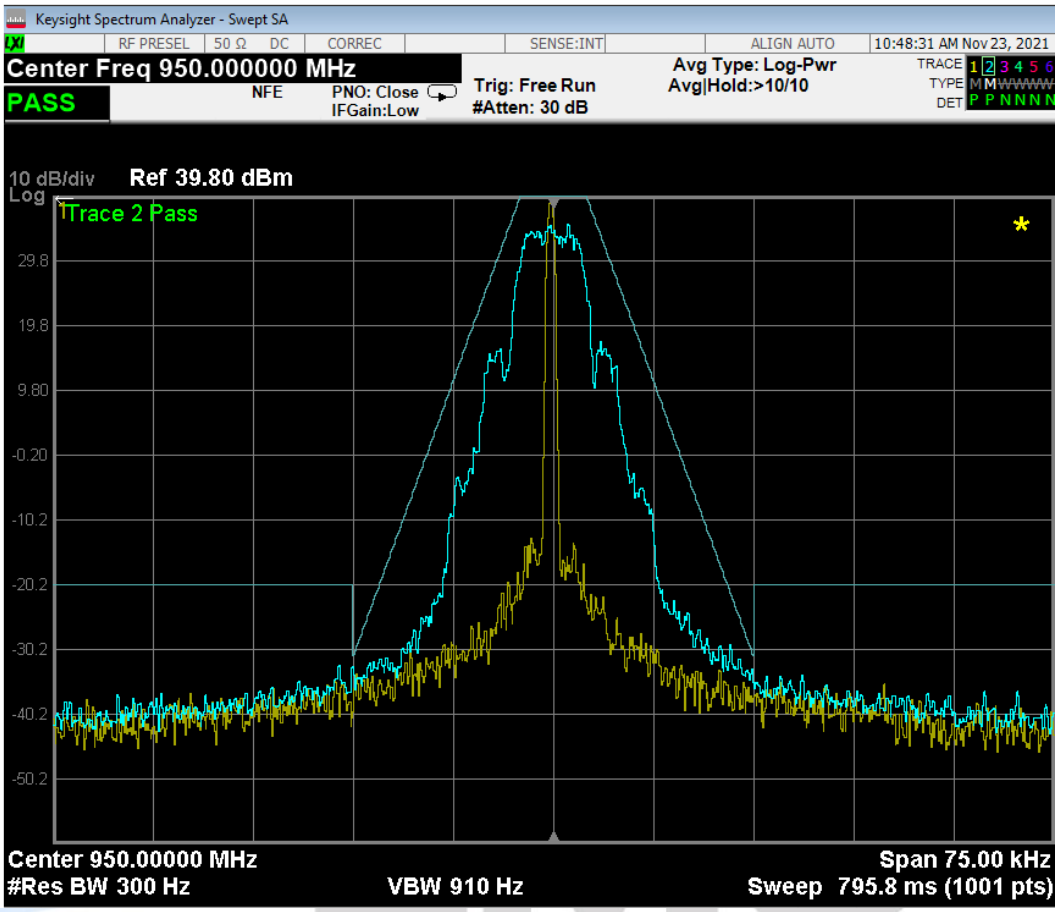
The product was operated at the maximum transmit power.

The blue trace corresponds to the modulated peak when the transmitter was modulated using the modulation sources internal to the transmitter as supplied by the client

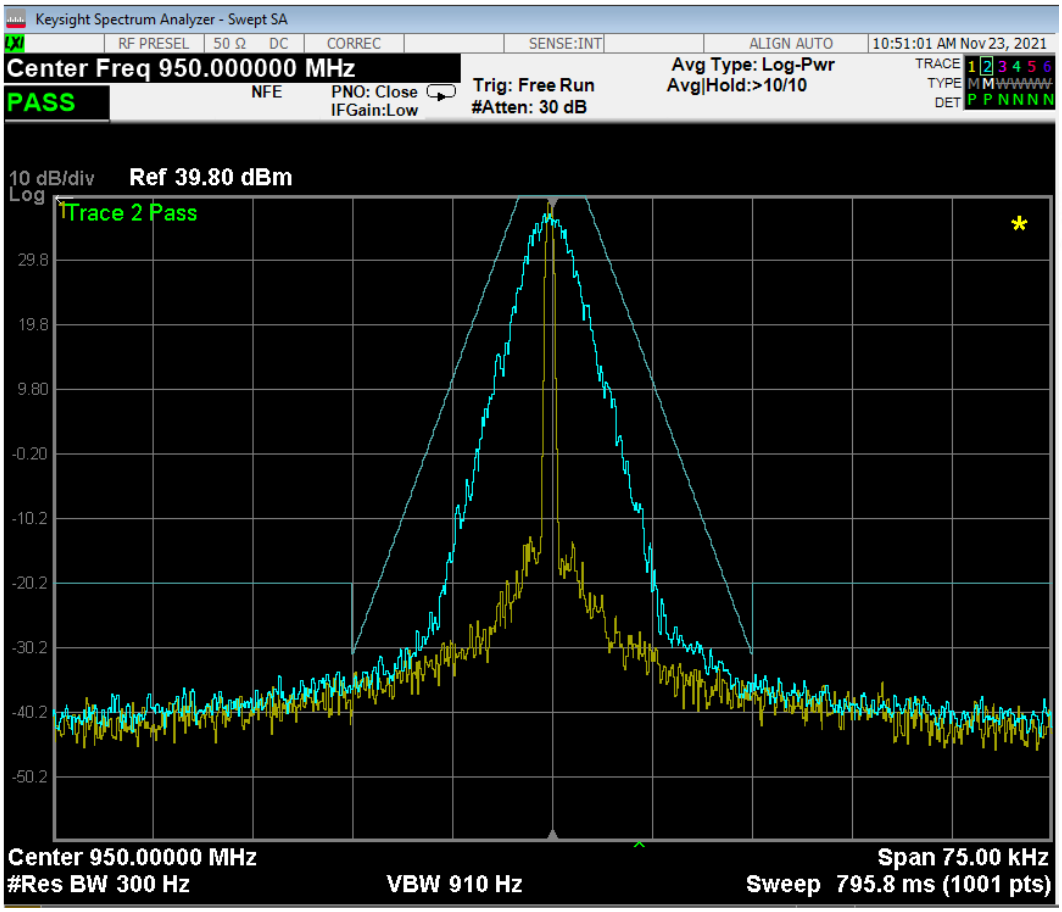
The yellow trace corresponds to the unmodulated RF output has also been included in the plots.

**Result:** Complies.

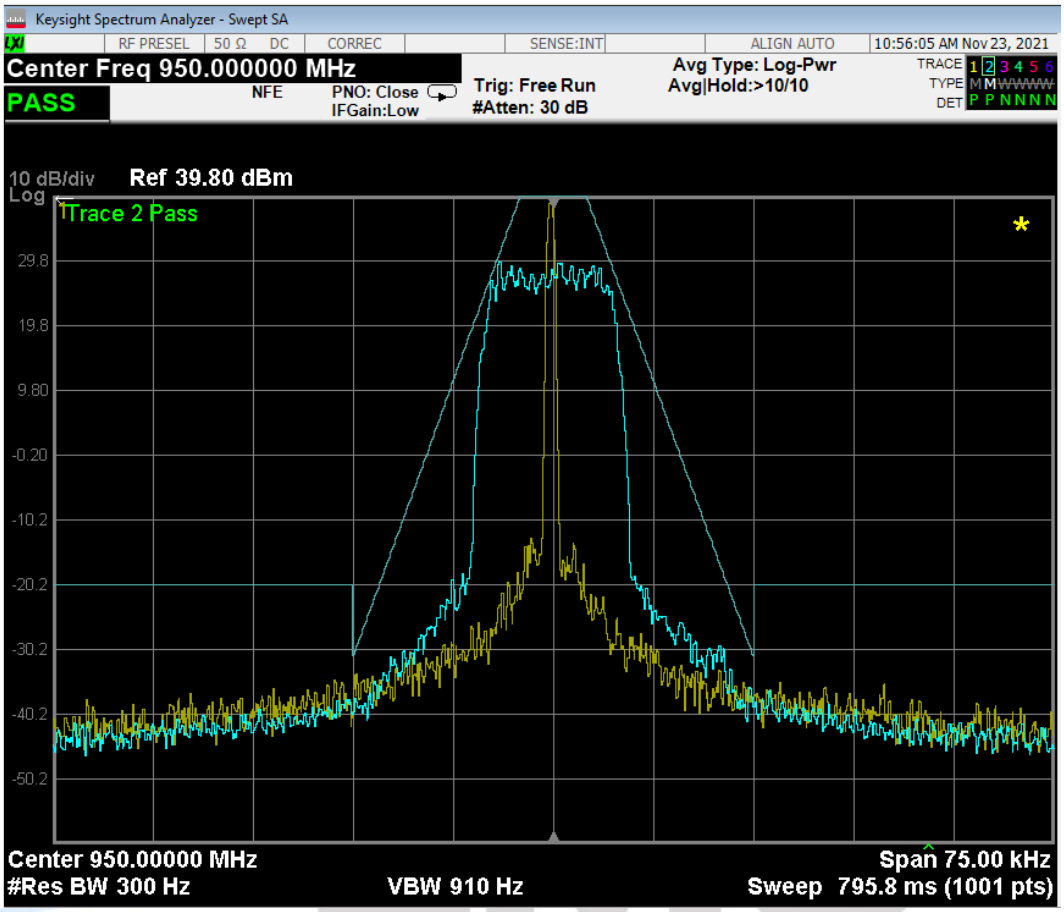
## 950 MHz, 12.5 kHz bandwidth, Part 101(a)(5) mask, 2FSK



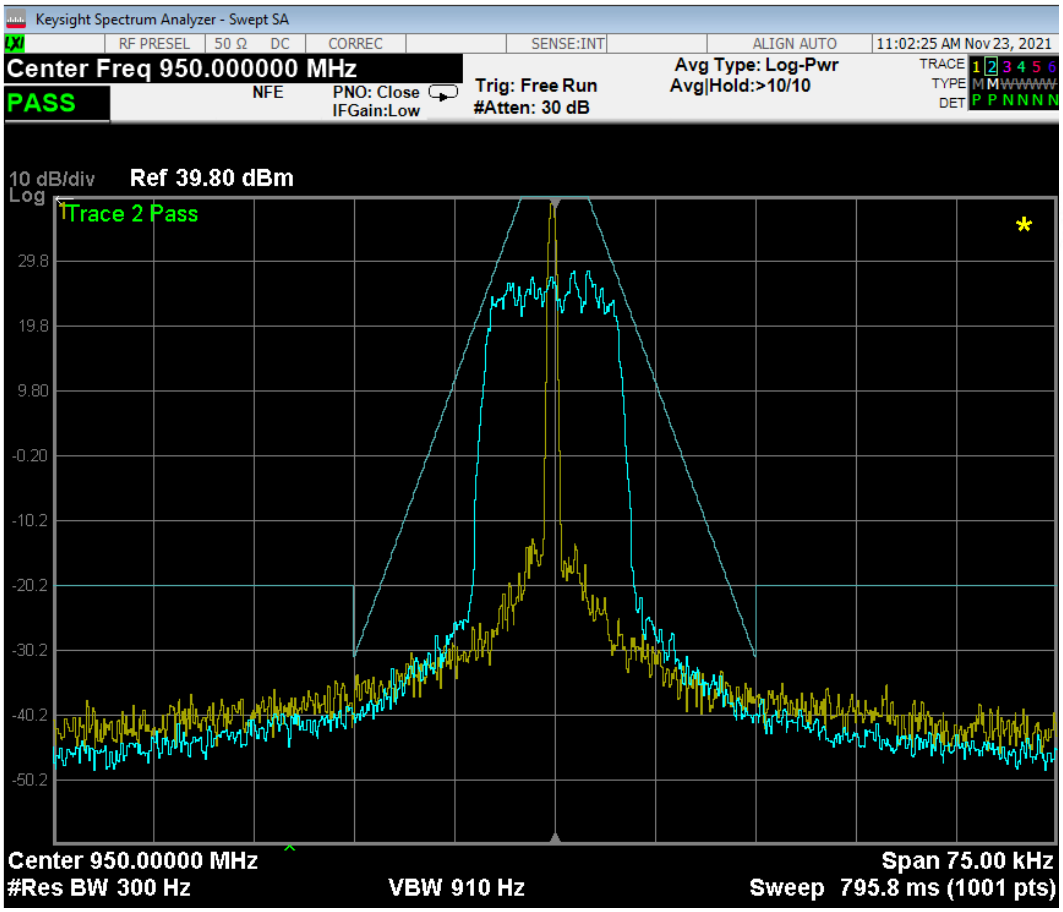

## 950 MHz, 12.5 kHz bandwidth, Part 101(a)(5) mask, 4FSK



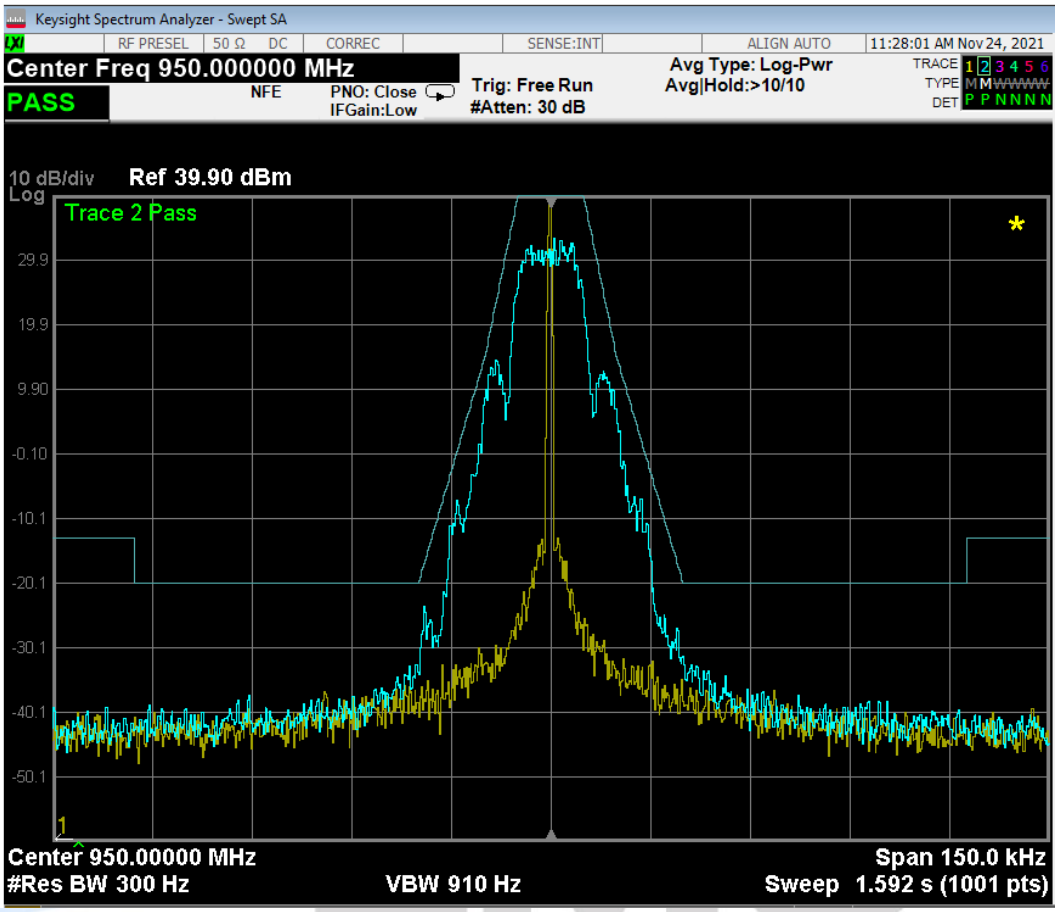
## 950 MHz, 12.5 kHz bandwidth, Part 101(a)(5) mask, 4QAM



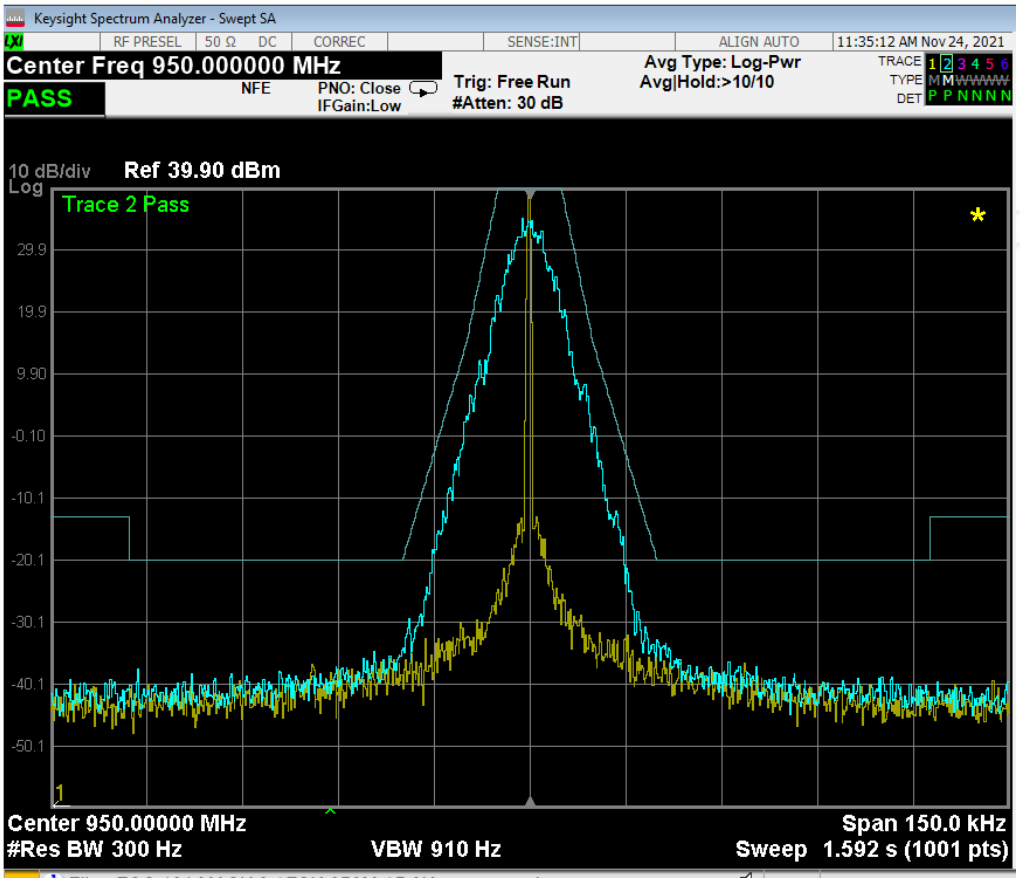

## 950 MHz, 12.5 kHz bandwidth, Part 101(a)(5) mask, 16QAM



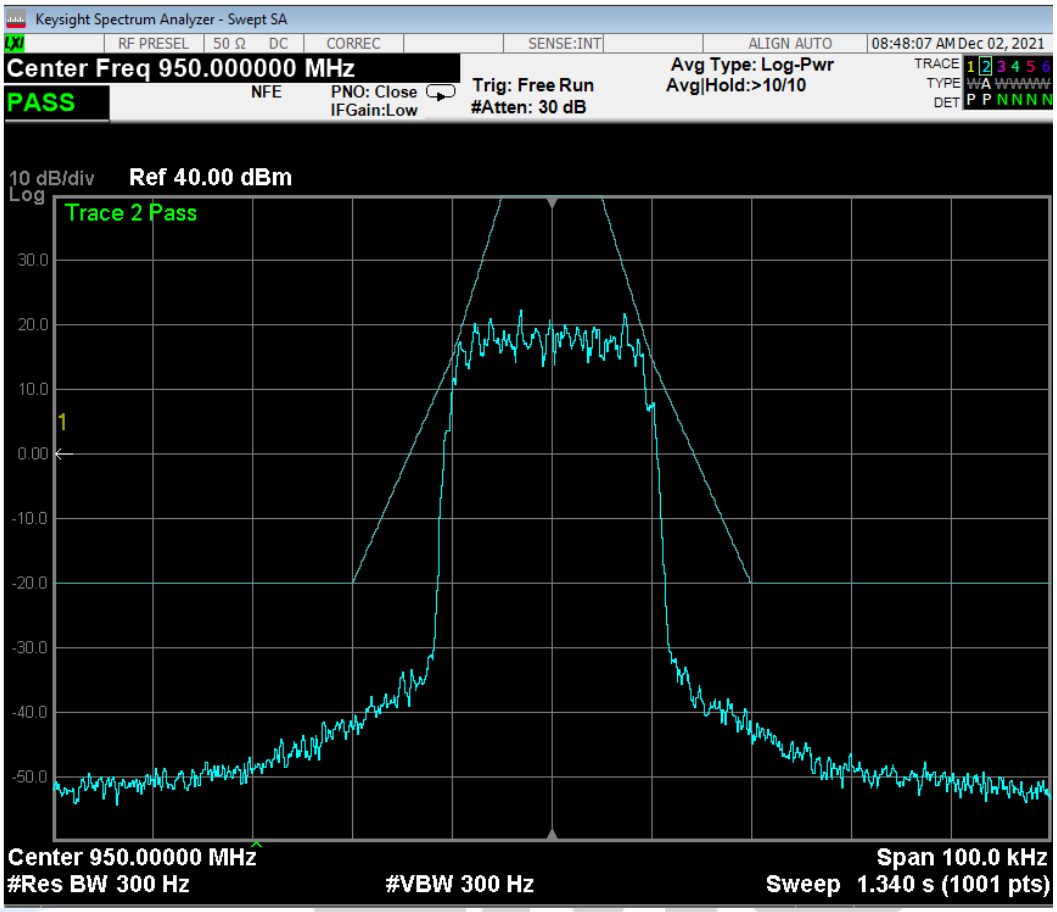
## 950 MHz, 25.0 kHz bandwidth, Part 101(a)(6) mask, 2FSK



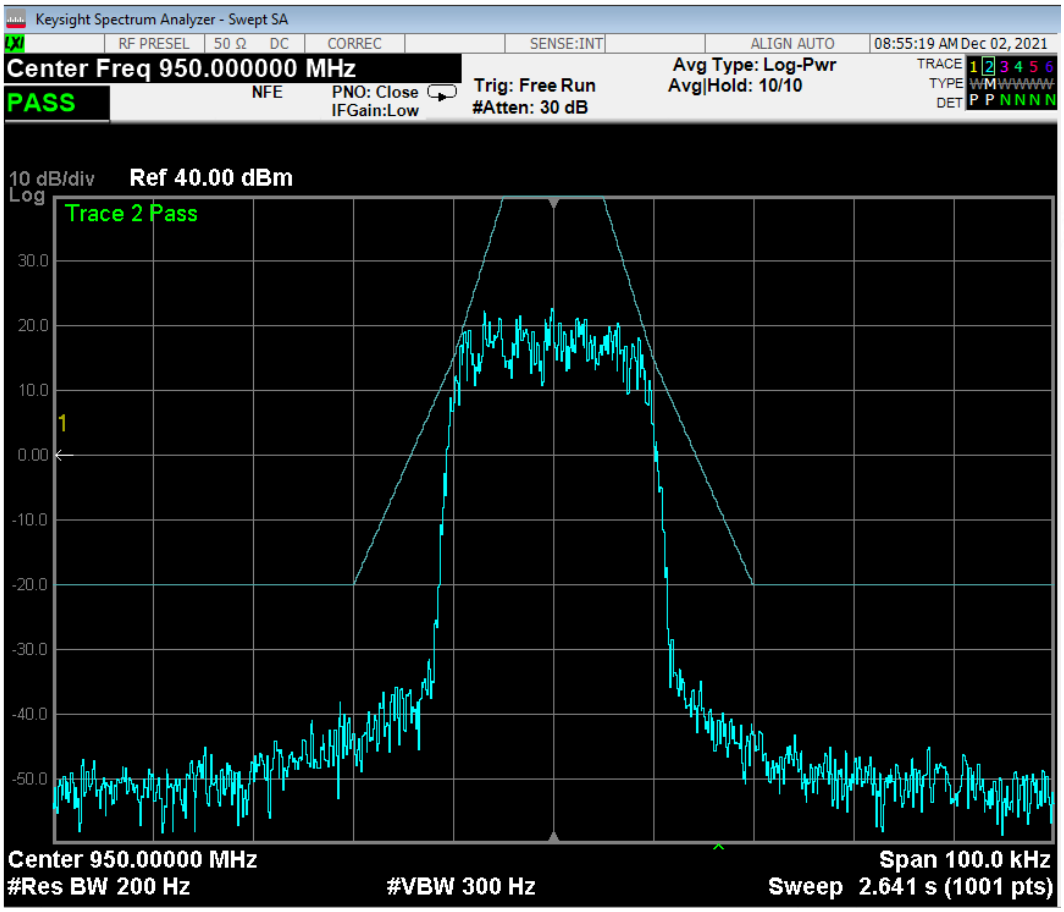

## 950 MHz, 25.0 kHz bandwidth, Part 101(a)(6) mask, 4FSK



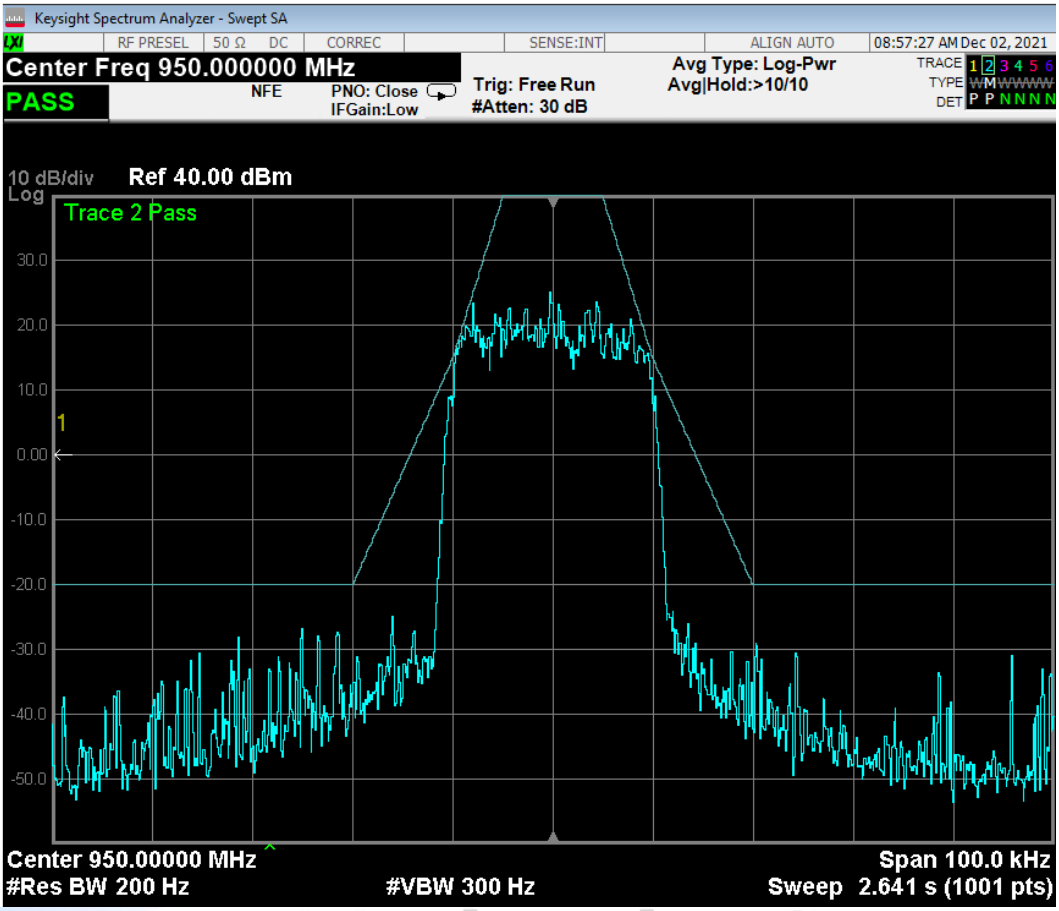
## 950 MHz, 25.0 kHz bandwidth, Part 101(a)(6) mask, 4QAM




## 950 MHz, 25.0 kHz bandwidth, Part 101(a)(6) mask, 16QAM



## 950 MHz, 25.0 kHz bandwidth, Part 101(a)(6) mask, 64QAM



**Transmitter spurious emissions at the antenna terminals**

The test was carried out using the unmodulated output which was identified to produce the worst case results.

The resolution bandwidth of the instrument was set to 100 kHz for frequencies below 1 GHz and to 1 MHz for harmonics measured above 1 GHz.

The transmitter output power is rated at 10 Watt (high power) and was sufficiently attenuated using an external power attenuator and internal attenuator in the spectrum analyser.

**Frequency:** 928.500 MHz

| Spurious emission (MHz) | Emission level (dBm) | Limit (dBm) |
|---|---|---|
| 1857.000 | <-45.0 | -20.0 |
| 2785.500 | <-45.0 | -20.0 |
| 3714.000 | <-45.0 | -20.0 |
| 4642.500 | <-45.0 | -20.0 |
| 5571.000 | <-45.0 | -20.0 |
| 6499.500 | <-45.0 | -20.0 |
| 7428.000 | <-45.0 | -20.0 |
| 8356.500 | <-45.0 | -20.0 |
| 9285.000 | <-45.0 | -20.0 |
| Other emissions observed | | |
| 618.990 MHz | -28.0 | -20.0 |

**Frequency:** 950.0 MHz

| Spurious emission (MHz) | Emission level (dBm) | Limit (dBm) |
|---|---|---|
| 1900.000 | <-45.0 | -20.0 |
| 2850.000 | <-45.0 | -20.0 |
| 3800.000 | <-45.0 | -20.0 |
| 4750.000 | <-45.0 | -20.0 |
| 5700.000 | <-45.0 | -20.0 |
| 6650.000 | <-45.0 | -20.0 |
| 7600.000 | <-45.0 | -20.0 |
| 8550.000 | <-45.0 | -20.0 |
| 9500.000 | <-45.0 | -20.0 |
| Other emissions observed | | |
| 633.340 MHz | -32.0 | -20.0 |

**Limit:**

The Part 101(a)(5) mask states that on any frequency removed from the centre of the authorized bandwidth by a displacement frequency greater than 15 kHz:

At least 50 plus 10 log10(P) or 70 decibels, whichever is the lesser attenuation.

For P = 10 W, the limit applicable has been found to be -20.0 dBm.

**Transmitter spurious emissions at the antenna terminals cont.**

The spurious emission limit defined by mask Part 101(a)(5) has been applied as this transmitter can operate using channel bandwidth of 12.5 kHz.

Part 2.1051 states that emissions greater than 20 dB below the limit need not be specified.

Part 2.1057 states that the spectrum should be investigated up to the 10th harmonic if the transmitter operates below 10 GHz.

**Result:** Complies.

**Measurement Uncertainty**: ± 3.3 dB

**Field strength of the transmitter spurious emissions**

**Nominal Frequency:** 928.5 MHz

| Frequency (MHz) | Level (dBuV/m) | Level (dBm) | Limit (dBm) | Polarity | Margin (dB) | Result |
|---|---|---|---|---|---|---|
| 1857.000 | < 55.0 | < -42.4 | -20.0 | Vertical | > 22.4 | Pass |
| 1857.000 | < 55.0 | < -42.4 | -20.0 | Horizontal | > 22.4 | Pass |
| 2785.500 | 55.8 | -41.6 | -20.0 | Vertical | 21.6 | Pass |
| 2785.500 | < 55.0 | < -42.4 | -20.0 | Horizontal | > 22.4 | Pass |
| 3714.000 | < 55.0 | < -42.4 | -20.0 | Vertical | > 22.4 | Pass |
| 2785.500 | < 55.0 | < -42.4 | -20.0 | Horizontal | > 22.4 | Pass |
| 4642.500 | < 60.0 | < -37.4 | -20.0 | Vertical | > 17.4 | Pass |
| 4642.500 | < 60.0 | < -37.4 | -20.0 | Horizontal | > 17.4 | Pass |
| 5571.000 | < 60.0 | < -37.4 | -20.0 | Vertical | > 17.4 | Pass |
| 5571.000 | < 60.0 | < -37.4 | -20.0 | Horizontal | > 17.4 | Pass |
| 6499.500 | < 65.0 | < -32.4 | -20.0 | Vertical | > 12.4 | Pass |
| 6499.500 | < 65.0 | < -32.4 | -20.0 | Horizontal | > 12.4 | Pass |
| 7428.000 | < 65.0 | < -32.4 | -20.0 | Vertical | > 12.4 | Pass |
| 7428.000 | < 65.0 | < -32.4 | -20.0 | Horizontal | > 12.4 | Pass |
| 8356.500 | < 65.0 | < -32.4 | -20.0 | Vertical | > 12.4 | Pass |
| 8356.500 | < 65.0 | < -32.4 | -20.0 | Horizontal | > 12.4 | Pass |
| 9285.000 | < 65.0 | < -32.4 | -20.0 | Vertical | > 12.4 | Pass |
| 9285.000 | < 65.0 | < -32.4 | -20.0 | Horizontal | > 12.4 | Pass |

**Nominal Frequency:** 950.0 MHz

| Frequency (MHz) | Level (dBuV/m) | Level (dBm) | Limit (dBm) | Polarity | Margin (dB) | Result |
|---|---|---|---|---|---|---|
| 1900.000 | < 55.0 | < -42.4 | -20.0 | Vertical | > 22.4 | Pass |
| 1900.000 | < 55.0 | < -42.4 | -20.0 | Horizontal | > 22.4 | Pass |
| 2850.000 | 61.3 | -36.1 | -20.0 | Vertical | 16.1 | Pass |
| 2850.000 | 58.3 | -39.1 | -20.0 | Horizontal | 19.1 | Pass |
| 3800.000 | < 55.0 | < -42.4 | -20.0 | Vertical | > 22.4 | Pass |
| 3800.000 | < 55.0 | < -42.4 | -20.0 | Horizontal | > 22.4 | Pass |
| 4750.000 | < 60.0 | < -37.4 | -20.0 | Vertical | > 17.4 | Pass |
| 4750.000 | < 60.0 | < -37.4 | -20.0 | Horizontal | > 17.4 | Pass |
| 5700.000 | < 60.0 | < -37.4 | -20.0 | Vertical | > 17.4 | Pass |
| 5700.000 | < 60.0 | < -37.4 | -20.0 | Horizontal | > 17.4 | Pass |
| 6650.000 | < 65.0 | < -32.4 | -20.0 | Vertical | > 12.4 | Pass |
| 6650.000 | < 65.0 | < -32.4 | -20.0 | Horizontal | > 12.4 | Pass |
| 7600.000 | < 65.0 | < -32.4 | -20.0 | Vertical | > 12.4 | Pass |
| 7600.000 | < 65.0 | < -32.4 | -20.0 | Horizontal | > 12.4 | Pass |
| 8550.000 | < 65.0 | < -32.4 | -20.0 | Vertical | > 12.4 | Pass |
| 8550.000 | < 65.0 | < -32.4 | -20.0 | Horizontal | > 12.4 | Pass |
| 9500.000 | < 65.0 | < -32.4 | -20.0 | Vertical | > 12.4 | Pass |
| 9500.000 | < 65.0 | < -32.4 | -20.0 | Horizontal | > 12.4 | Pass |

The transmitter was tested while transmitting continuously on high power (10 watts) while attached to a dummy load.

The device was tested on an open area test site at a distance of 3 metres.

**Field strength of the transmitter spurious emissions cont.**

Testing was carried out at EMC Technologies NZ Ltd Open Area Test Site which is located at Driving Creek, Orere Point, Auckland.

The level recorded is the signal generator output level in dBm less any gains / losses due to the coax cable and the dipole antenna.

**Limit:**

All spurious emissions are to be attenuated by at least 60 dB from below the mean power of the transmitter.

The maximum rated power of 10.0 watts which gives a limit of –20 dBm.

No measurements were made above the 10$^{th}$ harmonic.

**Result:** Complies.
**Measurement Uncertainty**: ± 4.1 dB

**Frequency Stability**

Frequency stability measurements were between - 30 °C and + 50°C in 10°C increments.

At each temperature the transmitter was given a period of 30 minutes to stabilise.

The transmitter was then turned on and the frequency error measured after a period of 1 minute.

**Frequency:** 950.000 MHz

| Temperature (°C) | 9.0 Vdc (Hz) | 13.8 Vdc (Hz) | 30.0 Vdc (Hz) |
|---|---|---|---|
| **+50** | -260 | -260 | -260 |
| **+40** | -210 | -210 | -210 |
| **+30** | -180 | -180 | -180 |
| **+20** | -210 | -210 | -210 |
| **+10** | -200 | -200 | -200 |
| **0** | -200 | -200 | -200 |
| **-10** | -200 | -200 | -200 |
| **-20** | -250 | -250 | -250 |
| **-30** | -260 | -260 | -260 |

**Limits:**

Part 101.107 (a) states that for multiple address master stations a frequency tolerance of +/- 0.00015 % will apply.

Transmitter was tested on 950.0 MHz: +/- 0.00015 % = +/- 1425 Hz.

**Result:** Complies.
**Measurement Uncertainty:** ± 30 Hz

**Exposure of humans to RF fields**

As per FCC KDB 447498 D01 and Section 2.1091 radio frequency transmitters are required to be operated in a manner that ensures the public is not exposed to RF energy levels.

Calculations have been made using the General Public/Uncontrolled Exposure limits that are defined in Section 1.1310.

Minimum safe distances have been calculated below.

Power density, $mW/cm^2 = E^2/3770$

- General Population / Uncontrolled exposure is (f/1500) $mW/cm^2$

As this radio will operate in various Part 101 bands between 928 - 960 MHz all calculations have been made at 928 MHz which is the lowest frequency of operation in the USA that will give the worst case result.

**For an Uncontrolled Environment**

Power Density = 1.0 $mW/cm^2 = E^2/3770$

$E = \sqrt{1.0*3770}$

E = 61.4 V/m

The rated power of 10 Watts (+40 dBm) has been used in the safe distance calculations to give the worst case results.

A worst case scenario duty cycle of 100% has been used for the calculations.

The client has stated that the device can be connected to the antenna models listed below.

**Antenna Models:**

| Manufacturer | Model Number | Gain in dB with cable loss | Numeric gain |
|---|---|---|---|
| ELPRO | UDP400-C | 0.6 | 1.15 |
| ELPRO | BU-3/400 | 1.2 | 1.35 |
| ELPRO | BU-6/400 | 4.2 | 2.65 |
| ELPRO | YU3/400 | 2.2 | 1.65 |
| ELPRO | YU6/400 | 5.2 | 3.35 |
| ELPRO | YU9/400 | 2.4 | 1.75 |
| ELPRO | YU16/400 | 7.4 | 5.50 |

**Exposure of humans to RF fields cont.**

The minimum distance from the antenna at which the MPE is met is calculated from the following:

Field strength in V/m (FS)
Transmit power in watts (P)
Transmit antenna gain (G)
Transmitter duty cycle (DC)
Separation distance in metres (D)

The calculation is as follows:

FS = (√ (30 * P * G * DC)) / D

| Gain in dB With cable loss | Numeric gain | Minimum safe distance (d) (cm) |
|---|---|---|
| 0.6 | 1.15 | 30.0 |
| 1.2 | 1.35 | 32.7 |
| 4.2 | 2.65 | 45.9 |
| 2.2 | 1.65 | 36.2 |
| 5.2 | 3.35 | 51.6 |
| 2.4 | 1.75 | 37.3 |
| 7.4 | 5.50 | 66.1 |

Sample calculation is given below

D = (√ (30 * P * G * DC)) / FS

D = (√ (30 * 10 * 1.15 * 1)) / 61.4

D = 0.30 m or 30 cm

**Result:** Complies if the safe distances defined for this environment are applied.

# 7. TEST EQUIPMENT USED

| Instrument | Manufacturer | Model | Serial No | Asset Ref | Cal Due | Period |
|---|---|---|---|---|---|---|
| Aerial Controller | EMCO | 1090 | 9112-1062 | RFS 3710 | Not applic | Not applic |
| Aerial Mast | EMCO | 1070-1 | 9203-1661 | RFS 3708 | Not applic | Not applic |
| Biconical Antenna | Schwarzbeck | BBA 9106 | - | 3680 | 1 Jan 2022 | 3 years |
| Horn Antenna | EMCO | 3115 | 9511-4629 | E1526 | 1 Jan 2022 | 3 years |
| Log Periodic | Schwarzbeck | VUSLP 9111 | 9111-112 | EMC4025 | 1 Jan 2022 | 3 years |
| Modulation Analyzer | Rohde & Schwarz | FMA | 837807/020 | E1552 | 3 June 2023 | 2 year |
| Oscilloscope | Tektronix | TDS754A | - | E1569 | 3 June 2023 | 2 year |
| Power Attenuator | JFW | 50FH-030-100 | - | - | Not applicable | N/a |
| Thermal chamber | Contherm | M180F | 86025 | - | Not applicable | N/a |
| Signal Generator | Rohde & Schwarz | SMHU | | E1493 | 28 May 2023 | 2 years |
| Power meter | Hewlett Packard | 436A | 2512A22439 | E1198 | 17 Jun 2023 | 2.5 years |
| Mains Network | R & S | ESH2-Z5 | 881362/032 | 3628 | 12 Oct 2022 | 2 years |
| Receiver | R & S | ESIB 40 | 100295 | INV0818 | 3 June 2023 | 2 year |
| Spectrum Analyser | Keysight | N9038A | MY57290153 | E4033 | 29 Jan 2022 | 1 year |
| Turntable | EMCO | 1080-1-2.1 | 9109-1578 | RFS 3709 | Not applicable | N/a |
| VHF Balun | Schwarzbeck | VHA 9103 | 9594 | 3696 | 1 Jan 2022 | 3 years |
| Heliax cable | Andrews | L6PNM-RPD | 22869 | Oats Cable | 30 Dec 2022 | 1 year |
| Succoflex cable | Huber and Suhner | 104 3m n-n | 339901/4 | 13938 | 10 Nov 2022 | 1 year |
| Succoflex cable | Huber and Suhner | 104 1m n-n | 340521/4 | 13937 | 10 Nov 2022 | 1 year |

At the time of testing all test equipment was within calibration.

# 8. ACCREDITATIONS

Testing was carried out in accordance with EMC Technologies NZ Ltd designation as a FCC Accredited Laboratory by International Accreditation New Zealand, designation number: NZ0002 under the APEC TEL MRA.

All testing was carried out in accordance with the terms of EMC Technologies (NZ) Ltd International Accreditation New Zealand (IANZ) Accreditation to NZS/ISO/IEC 17025.

All measurement equipment has been calibrated in accordance with the terms of the EMC Technologies (NZ) Ltd International Accreditation New Zealand (IANZ) Accreditation to NZS/ISO/IEC 17025.

International Accreditation New Zealand has International Laboratory Accreditation Council (ILAC) Mutual Recognition Arrangements for testing and calibration with various accreditation bodies in a number of economies.

This includes NATA (Australia), UKAS (UK), SANAS (South Africa), NVLAP (USA), A2LA (USA), SWEDAC (Sweden).

Further details can be supplied on request.

# 9. PHOTOGRAPHS

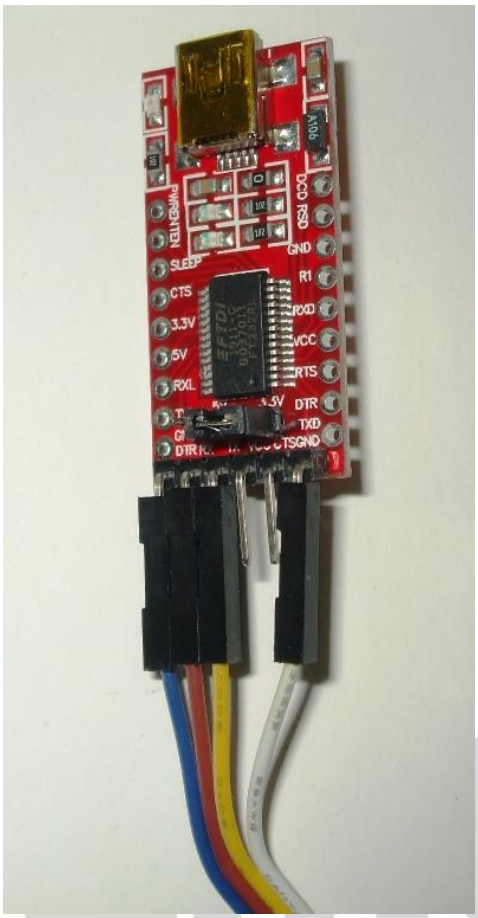
Top view

Side View

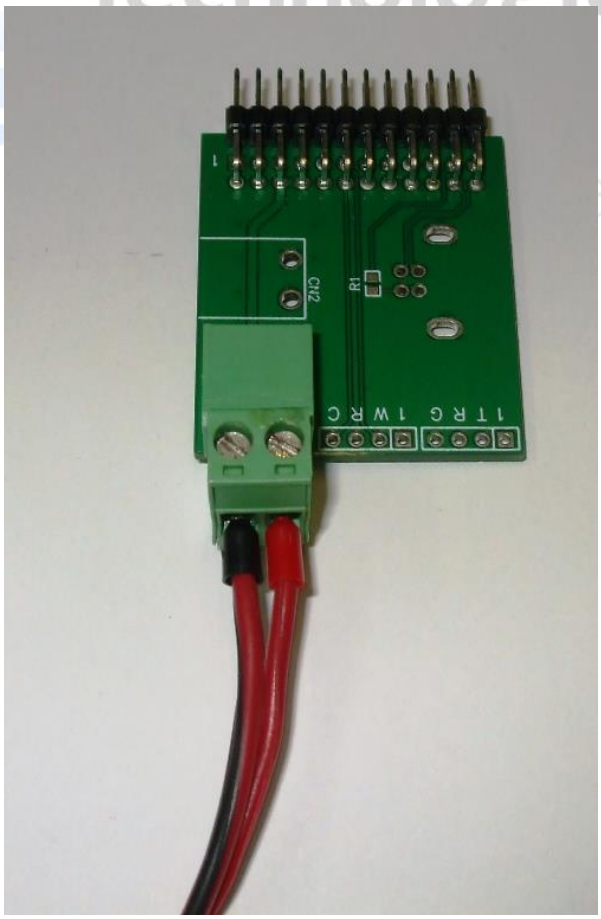
Back view

Label

Ancillary to connect product to test laptop




Ancillary to connect product to Voltage input source



Radiated emissions test setup