# FCC Testing of the Iridium Certus ProtoTerminal / 9801CertusH1 In accordance with FCC 47 CFR Part 25 and FCC 47 CFR Part 2

Prepared for: Iridium Satellite LLC
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McLean
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United States

FCC ID: Q639801CertusH1

Product Service

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## COMMERCIAL-IN-CONFIDENCE

Date: March 2017
Document Number: 75936147-01 | Issue: 02

| RESPONSIBLE FOR | NAME | DATE | SIGNATURE |
|---|---|---|---|
| **Project Management** | Steven White | 22 March 2017 | |
| **Authorised Signatory** | Simon Bennett | 22 March 2017 | |

Signatures in this approval box have checked this document in line with the requirements of TÜV SÜD Product Service document control rules.

**ENGINEERING STATEMENT**

The measurements shown in this report were made in accordance with the procedures described on test pages. All reported testing was carried out on a sample equipment to demonstrate limited compliance with FCC 47 CFR Part 25 and FCC 47 CFR Part 2. The sample tested was found to comply with the requirements defined in the applied rules.

| RESPONSIBLE FOR | NAME | DATE | SIGNATURE |
|---|---|---|---|
| **Testing** | Matthew Russell | 22 March 2017 | |
| **Testing** | Graeme Lawler | 22 March 2017 | |

FCC Accreditation
90987 Octagon House, Fareham Test Laboratory

**EXECUTIVE SUMMARY**

A sample of this product was tested and found to be in compliance with FCC 47 CFR Part 25: 2015 and FCC 47 CFR Part 2: 2015.



**ACCREDIATION**

Our UKAS Accreditation does not cover opinions and interpretations and any expressed are outside the scope of our UKAS Accreditation. Results of tests not covered by our UKAS Accreditation Schedule are marked NUA (Not UKAS Accredited).

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Product Service

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# 1 Report Summary

## 1.1 Report Modification Record

Alterations and additions to this report will be issued to the holders of each copy in the form of a complete document.

| Issue | Description of Change | Date of Issue |
|---|---|---|
| 1 | First Issue | 01 March 2017 |
| 2 | Further testing details added as requested by the manufacturer | 22 March 2017 |

**Table 1**

## 1.2 Introduction

| | |
|---|---|
| Applicant | Iridium Satellite LLC |
| Manufacturer | Iridium Satellite LLC |
| Model Number(s) | Iridium Certus ProtoTerminal / 9801CertusH1 |
| Serial Number(s) | 300008080004080 |
| Hardware Version(s) | A2 |
| Software Version(s) | A |
| Number of Samples Tested | 1 |
| Test Specification/Issue/Date | FCC 47 CFR Part 25: 2015<br>FCC 47 CFR Part 2 :2015 |
| Order Number<br>Date | 38114/JEHJ<br>24-August-2016 |
| Date of Receipt of EUT | 04-November-2016 |
| Start of Test | 13-November-2016 |
| Finish of Test | 08-March-2017 |
| Name of Engineer(s) | Matthew Russell and Graeme Lawler |
| Related Document(s) | ANSI C63.26 (2015) |

## 1.3 Brief Summary of Results

A brief summary of the tests carried out in accordance with FCC 47 CFR Part 25 and FCC 47 CFR Part 2 is shown below.

| Section | Specification Clause | | Test Description | Result | Comments/Base Standard |
|---|---|---|---|---|---|
| | Part 25 | Part 2 | | | |
| Configuration and Mode: B1 - QPSK | | | | | |
| 2.1 | - | 2.1049 | Occupied Bandwidth | Pass | ANSI C63.26 |
| 2.2 | 25.202(d) | 2.1055 | Frequency Tolerance | Pass | ANSI C63.26 |
| 2.3 | 25.202(f) | 2.1051 | Spurious Emissions at Antenna Terminals | Pass | ANSI C63.26 |
| 2.4 | 25.204 | - | Equivalent Isotropic Radiated Power | Pass | ANSI C63.26 |
| Configuration and Mode: C1 - QPSK | | | | | |
| 2.1 | - | 2.1049 | Occupied Bandwidth | Pass | ANSI C63.26 |
| 2.2 | 25.202(d) | 2.1055 | Frequency Tolerance | Pass | ANSI C63.26 |
| 2.3 | 25.202(f) | 2.1051 | Spurious Emissions at Antenna Terminals | Pass | ANSI C63.26 |
| 2.4 | 25.204 | - | Equivalent Isotropic Radiated Power | Pass | ANSI C63.26 |
| Configuration and Mode: C2 - QPSK | | | | | |
| 2.1 | - | 2.1049 | Occupied Bandwidth | Pass | ANSI C63.26 |
| 2.2 | 25.202(d) | 2.1055 | Frequency Tolerance | Pass | ANSI C63.26 |
| 2.3 | 25.202(f) | 2.1051 | Spurious Emissions at Antenna Terminals | Pass | ANSI C63.26 |
| 2.4 | 25.204 | - | Equivalent Isotropic Radiated Power | Pass | ANSI C63.26 |

| Section | Specification Clause | | Test Description | Result | Comments/Base Standard |
|---|---|---|---|---|---|
| | Part 25 | Part 2 | | | |
| Configuration and Mode: C8 - QPSK | | | | | |
| 2.1 | - | 2.1049 | Occupied Bandwidth | Pass | ANSI C63.26 |
| 2.2 | 25.202(d) | 2.1055 | Frequency Tolerance | Pass | ANSI C63.26 |
| 2.3 | 25.202(f) | 2.1051 | Spurious Emissions at Antenna Terminals | Pass | ANSI C63.26 |
| 2.4 | 25.204 | - | Equivalent Isotropic Radiated Power | Pass | ANSI C63.26 |
| 2.5 | 25.216 | - | Limits on Emissions from Mobile Earth Stations for Protection of Aeronautical Radionavigation-Satellite Service | Pass | ANSI C63.26 |
| Configuration and Mode: Iridium - Transmit | | | | | |
| 2.6 | - | 2.1047 (d) | Modulation Characteristics | Declaration | |
| Configuration and Mode: C8 - 16-APSK | | | | | |
| 2.1 | - | 2.1049 | Occupied Bandwidth | Pass | ANSI C63.26 |
| 2.2 | 25.202(d) | 2.1055 | Frequency Tolerance | Pass | ANSI C63.26 |
| 2.3 | 25.202(f) | 2.1051 | Spurious Emissions at Antenna Terminals | Pass | ANSI C63.26 |
| 2.7 | 25.202(f) | 2.1051 | Radiated Spurious Emissions | Pass | ANSI C63.26 |
| 2.4 | 25.204 | - | Equivalent Isotropic Radiated Power | Pass | ANSI C63.26<br>FCC Inquiry Tracking Number 609683 |

**Table 2**

Product Service

## 1.4 Application Form

| EQUIPMENT DESCRIPTION | |
|---|---|
| Model Name/Number | Iridium Certus ProtoTerminal / 9801CertusH1 |
| Part Number | PT-H1 |
| Hardware Version | A2 |
| Software Version | A |
| Technical Description (Please provide a brief description of the intended use of the equipment) | Iridium satellite communications terminal |

**POWER SOURCE**

☐ AC mains — State voltage

AC supply frequency 46-63 (Hz)

110-240 VAC

Max Current

Hz

☐ Single phase ☐ Three phase

And / Or

☐ External DC supply

Nominal voltage V Max Current A

Extreme upper voltage V

Extreme lower voltage V

Battery

☐ Nickel Cadmium ☐ Lead acid (Vehicle regulated)

☐ Alkaline ☐ Leclanche

☐ Lithium ☐ Other Details :

Volts nominal.

End point voltage as quoted by equipment manufacturer V

**FREQUENCY INFORMATION**

| | | | | | |
|---|---|---|---|---|---|
| Frequency Range | 1616 to 1626 | MHz | | | |
| Channel Spacing (where applicable) | 41.7 kHz, 83.3 kHz, 333 kHz | | | | |
| Test Frequencies* | Bottom | 1616 | MHz | Channel Number (if applicable) | 1 |
| | Middle | 1621 | MHz | Channel Number (if applicable) | 121 |
| | Top | 1626 | MHz | Channel Number (if applicable) | 240 |

If alternate test modes are available resulting in different test frequencies please specify which mode is applicable:

| POWER CHARACTERISTICS | | | | | | |
|---|---|---|---|---|---|---|
| Maximum TX power | EIRP 33.1 | W | | | | |
| Minimum TX power | | W (if variable) | | | | |
| Is transmitter intended for : | | | | | | |
| Continuous duty | | | ☐ | Yes | ☒ | No |
| Intermittent duty | | | ☒ | Yes | ☐ | No |
| If intermittent state DUTY CYCLE | | | | | | |
| Transmitter ON | 0.03312 seconds | | | | | |
| Transmitter OFF | 0.05688 seconds | | | | | |

| ANTENNA CHARACTERISTICS | | | |
|---|---|---|---|
| ☐ | Antenna connector | State impedance | Ohm |
| ☐ | Temporary antenna connector | State impedance | Ohm |
| ☒ | Integral antenna | State impedance | dBi |

| MODULATION CHARACTERISTICS | | | |
|---|---|---|---|
| ☒ | Amplitude | ☐ | Frequency |
| ☒ | Phase | ☐ | Other (please provide details): |
| Can the transmitter operate un-modulated? | | ☐ | Yes ☒ No |

| CLASS OF EMISSION USED | | |
|---|---|---|
| ITU designation or Class of Emission: | | |
| | 1 | 41K7Q7W |
| | (if applicable) 2 | 83K3Q7W |
| | (if applicable) 3 | 333KQ7W |
| If more than three classes of emission, list separately: | | |

| EXTREME CONDITIONS | | | | | |
|---|---|---|---|---|---|
| Extreme test voltages (Max) | | V | Extreme test voltages (Mix) | | V |
| Nominal DC Voltage | | V | DC Maximum Current | | A |
| Maximum temperature | 30 | °C | Minimum temperature | 20 | °C |

I hereby declare that that the information supplied is correct and complete.

Name: Jeremy Lavine Position held: Senior Engineer
Date: January 27, 2017

## 1.5 Product Information

### 1.5.1 Technical Description

Iridium satellite communications terminal.

### 1.5.2 System Configuration

All testing, unless otherwise stated, was performed with the EUT configured as per the diagram below:

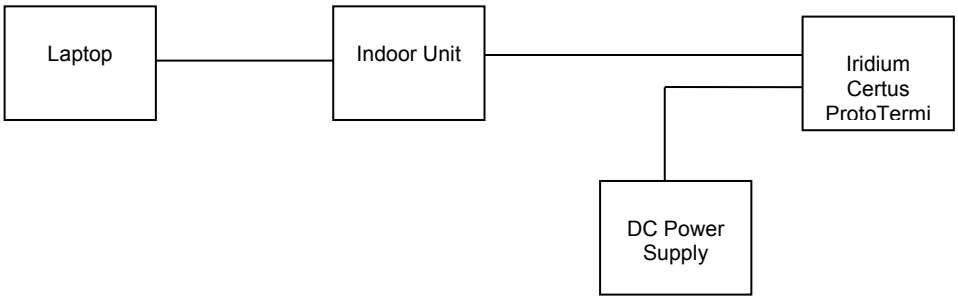


**Figure 1 - System Configuration Diagram**

## 1.6 Deviations from the Standard

No deviations from the applicable test standard were made during testing.

## 1.7 EUT Modification Record

The table below details modifications made to the EUT during the test programme.
The modifications incorporated during each test are recorded on the appropriate test pages.

| Modification State | Description of Modification still fitted to EUT | Modification Fitted By | Date Modification Fitted |
|---|---|---|---|
| Serial Number: N/A | | | |
| 0 | As supplied by the customer | Not Applicable | Not Applicable |

**Table 3**

## 1.8 Test Location

TÜV SÜD Product Service conducted the following tests at our Fareham Test Laboratory.

| Test Name | Name of Engineer(s) | Accreditation |
|---|---|---|
| Configuration and Mode: B1 - QPSK | | |
| Occupied Bandwidth | Matthew Russell | UKAS |
| Frequency Tolerance | Matthew Russell | UKAS |
| Spurious Emissions at Antenna Terminals | Graeme Lawler | UKAS |
| Equivalent Isotropic Radiated Power | Graeme Lawler | UKAS |
| Configuration and Mode: C1 - QPSK | | |
| Occupied Bandwidth | Matthew Russell | UKAS |
| Frequency Tolerance | Matthew Russell | UKAS |
| Spurious Emissions at Antenna Terminals | Graeme Lawler | UKAS |
| Equivalent Isotropic Radiated Power | Graeme Lawler | UKAS |
| Configuration and Mode: C2 - QPSK | | |
| Occupied Bandwidth | Matthew Russell | UKAS |
| Frequency Tolerance | Matthew Russell | UKAS |
| Spurious Emissions at Antenna Terminals | Graeme Lawler | UKAS |
| Equivalent Isotropic Radiated Power | Graeme Lawler | UKAS |
| Configuration and Mode: C8 - QPSK | | |
| Occupied Bandwidth | Matthew Russell | UKAS |
| Frequency Tolerance | Matthew Russell | UKAS |
| Spurious Emissions at Antenna Terminals | Graeme Lawler | UKAS |
| Equivalent Isotropic Radiated Power | Graeme Lawler | UKAS |
| Limits on Emissions from Mobile Earth Stations for Protection of Aeronautical Radionavigation-Satellite Service | Graeme Lawler | UKAS |
| Configuration and Mode: Iridium - Transmit | | |
| Modulation Characteristics | Matthew Russell | UKAS |
| Configuration and Mode: C8 - 16-APSK | | |
| Occupied Bandwidth | Matthew Russell | UKAS |
| Frequency Tolerance | Matthew Russell | UKAS |
| Spurious Emissions at Antenna Terminals | Graeme Lawler | UKAS |
| Radiated Spurious Emissions | Graeme Lawler | UKAS |
| Equivalent Isotropic Radiated Power | Graeme Lawler | UKAS |

**Table 4**

Product Service

Office Address:

Octagon House
Concorde Way
Segensworth North
Fareham
Hampshire
PO15 5RL
United Kingdom

# 2 Test Details

## 2.1 Occupied Bandwidth

### 2.1.1 Specification Reference

FCC 47 CFR Part 2, Clause 2.1049

### 2.1.2 Equipment Under Test and Modification State

Iridium Certus ProtoTerminal / 9801CertusH1, S/N: 300008080004080 - Modification State 0

### 2.1.3 Date of Test

18-November-2016

### 2.1.4 Test Method

This test was performed in accordance with ANSI C63.26, Clause 5.4.4.

### 2.1.5 Environmental Conditions

| | |
|---|---|
| Ambient Temperature | 21.8 °C |
| Relative Humidity | 28.5 % |

### 2.1.6 Test Results

B1 - QPSK

| Occupied Bandwidth (kHz) | | |
|---|---|---|
| 1616.020833 KHz | 1621.020833 KHz | 1625.979166 KHz |
| 32.16 | 32.10 | 31.68 |

**Table 5**

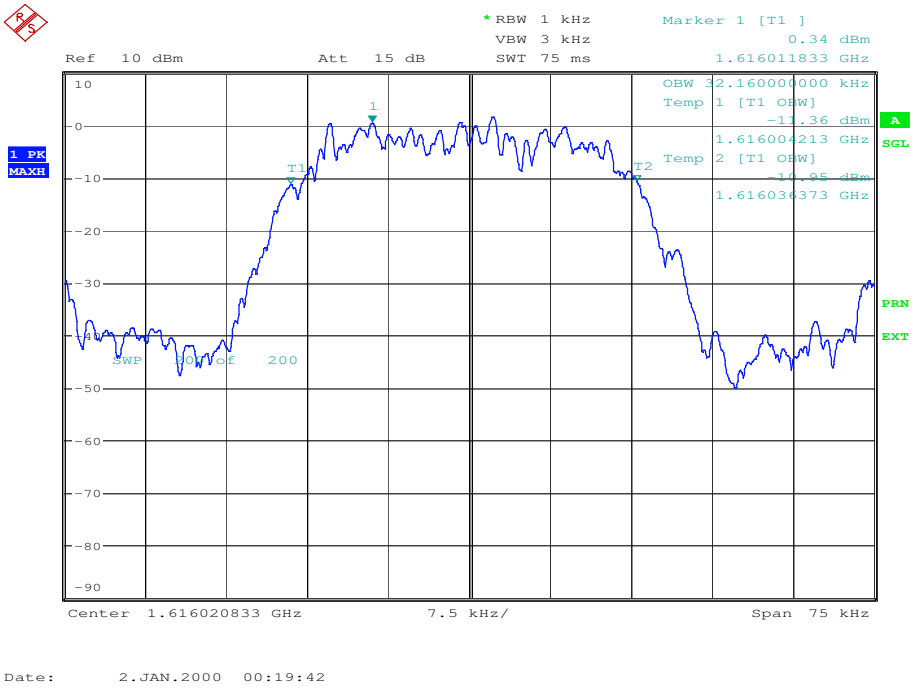


**Figure 2 - 1616.0208033 MHz**

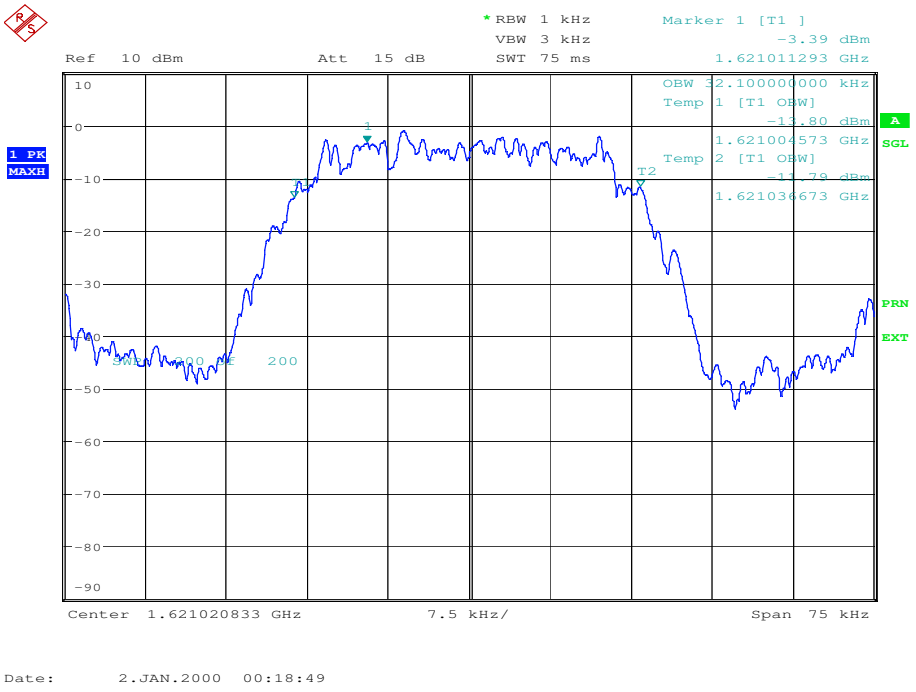


**Figure 3 - 1621.020833 MHz**

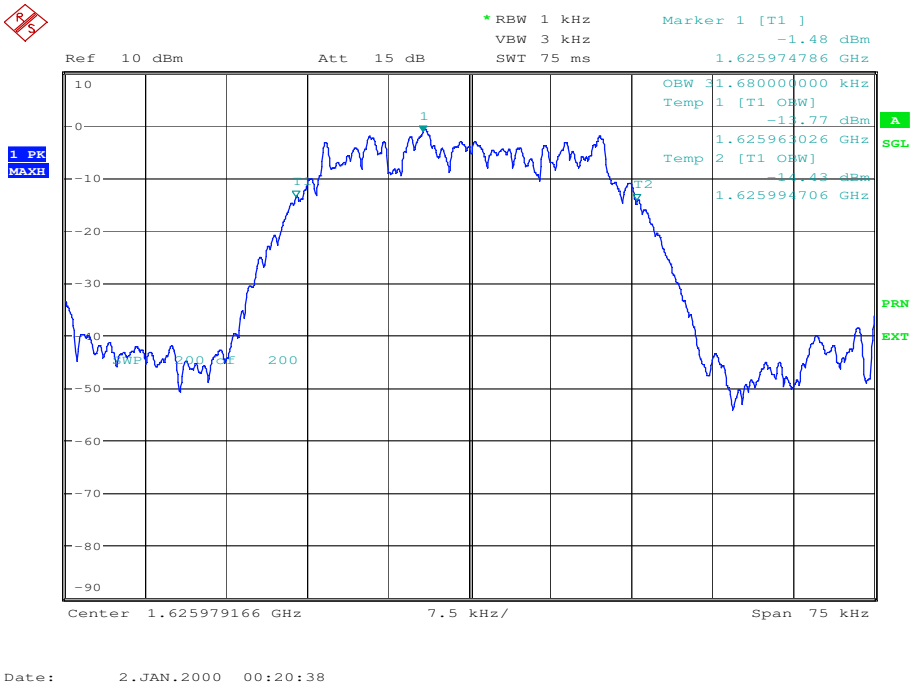


**Figure 4 - 1625.979166 MHz**

## FCC 47 CFR Part 2, Limit Clause 2.1049

None specified.

## C1 - QPSK

| Occupied Bandwidth (kHz) | | |
|---|---|---|
| 1616.020833 KHz | 1621.020833 KHz | 1625.979166 KHz |
| 32.52 | 32.70 | 32.64 |

**Table 6**

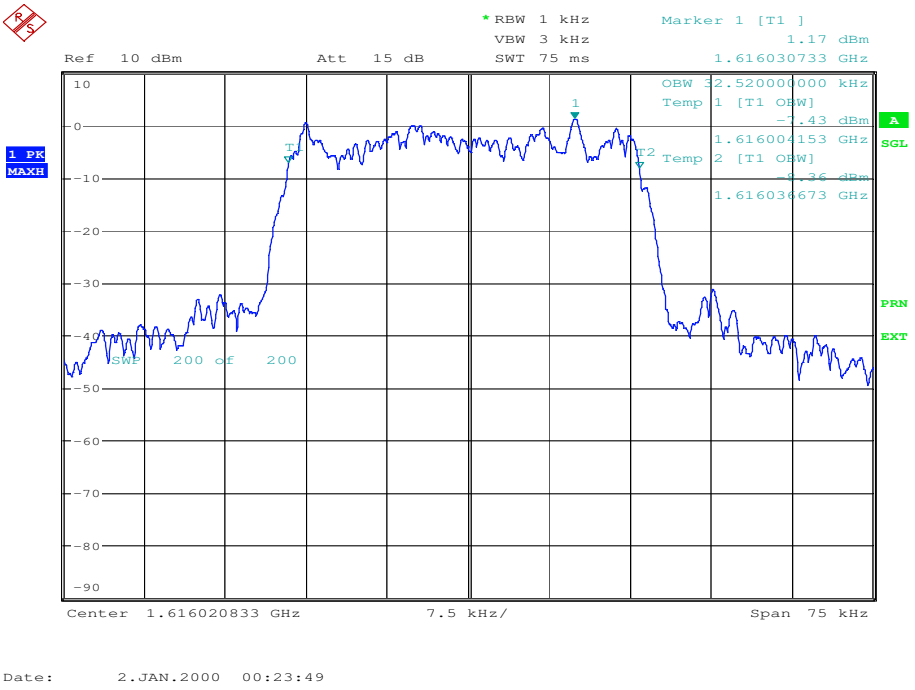


**Figure 5 - 1616.020833 MHz**

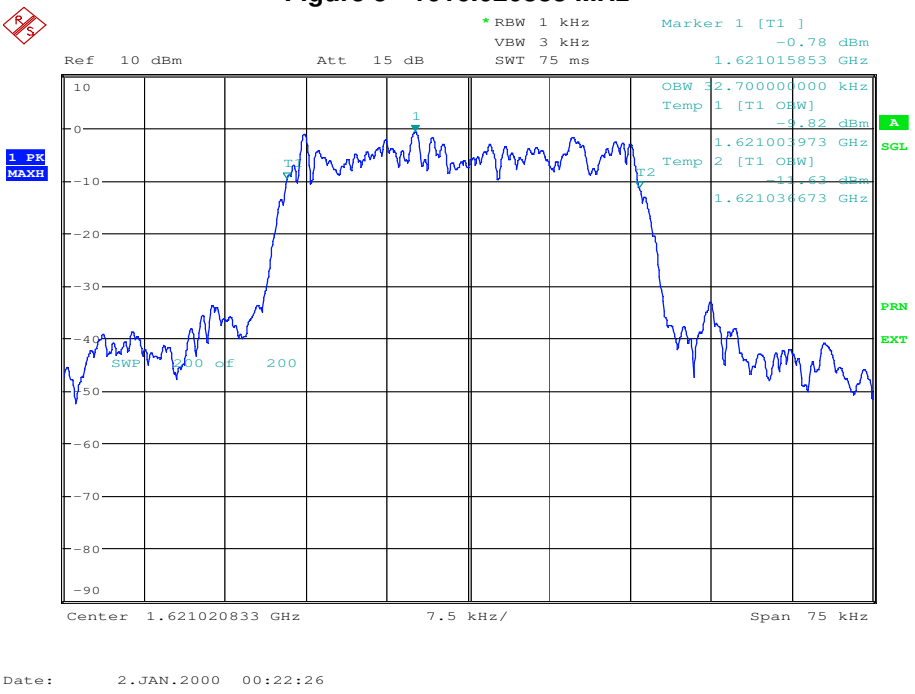


**Figure 6 - 1621.020833 MHz**

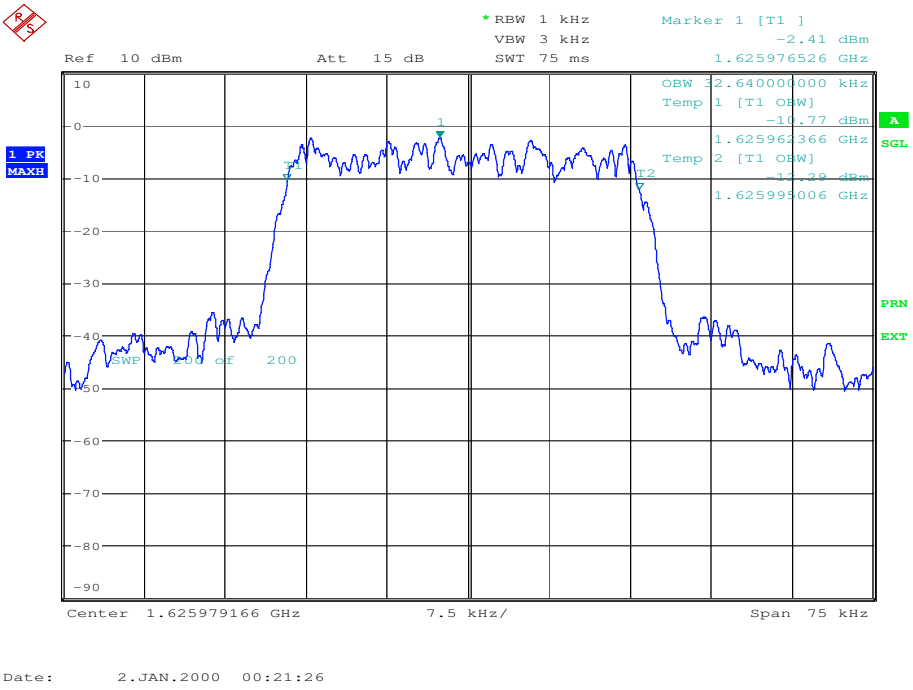


**Figure 7 - 1625.979166 MHz**

FCC 47 CFR Part 2, Limit Clause 2.1049

None specified.

C2 - QPSK

| Occupied Bandwidth (kHz) | | |
|---|---|---|
| 1616.041666 KHz | 1621.041666 KHz | 1625.958332 KHz |
| 64.24 | 64.32 | 64.08 |

**Table 7**

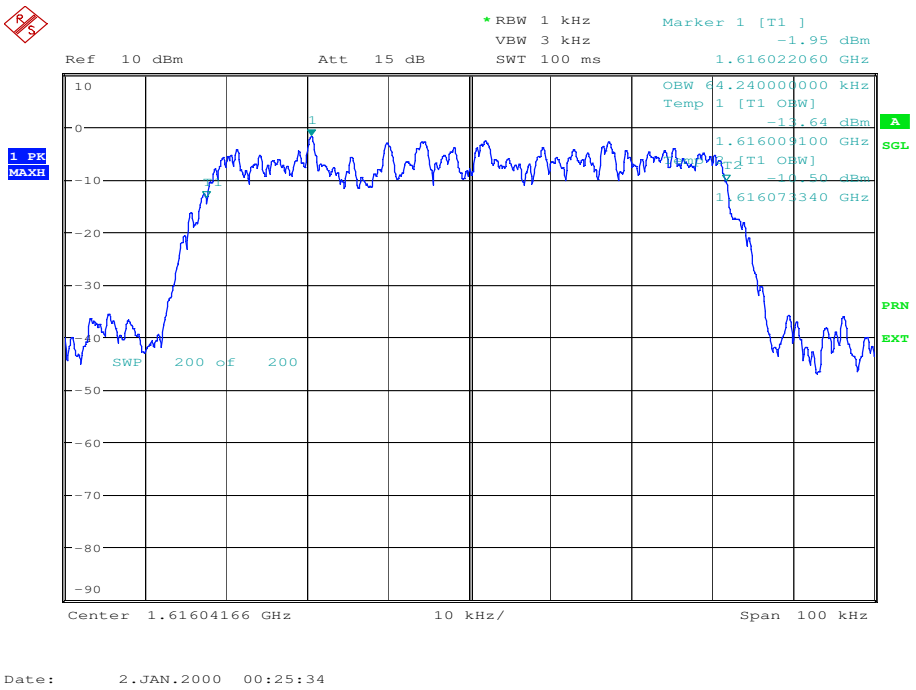


**Figure 8 - 1616.041666 MHz**

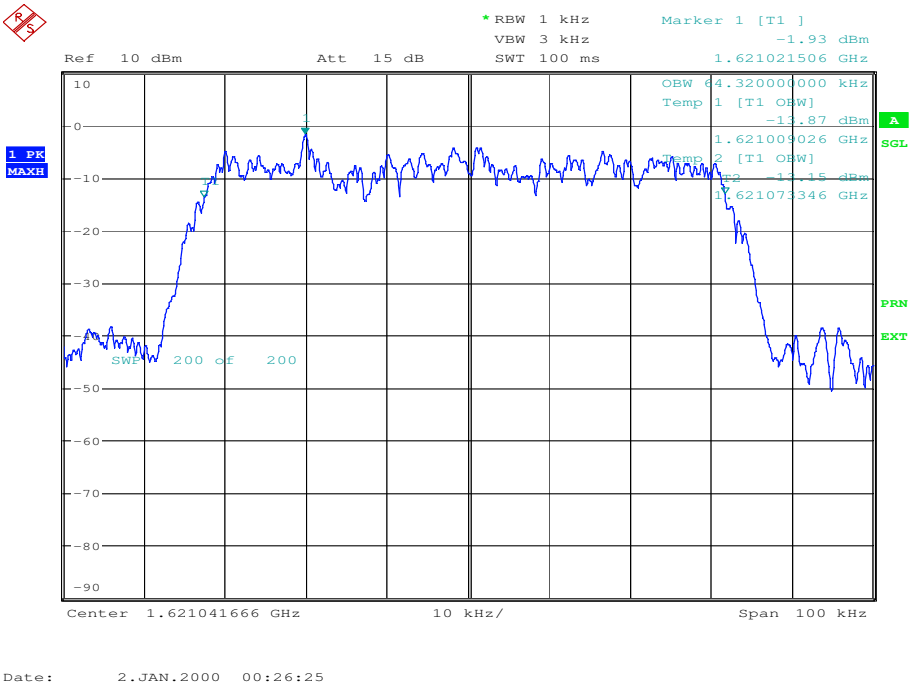


**Figure 9 - 1621.041666 MHz**

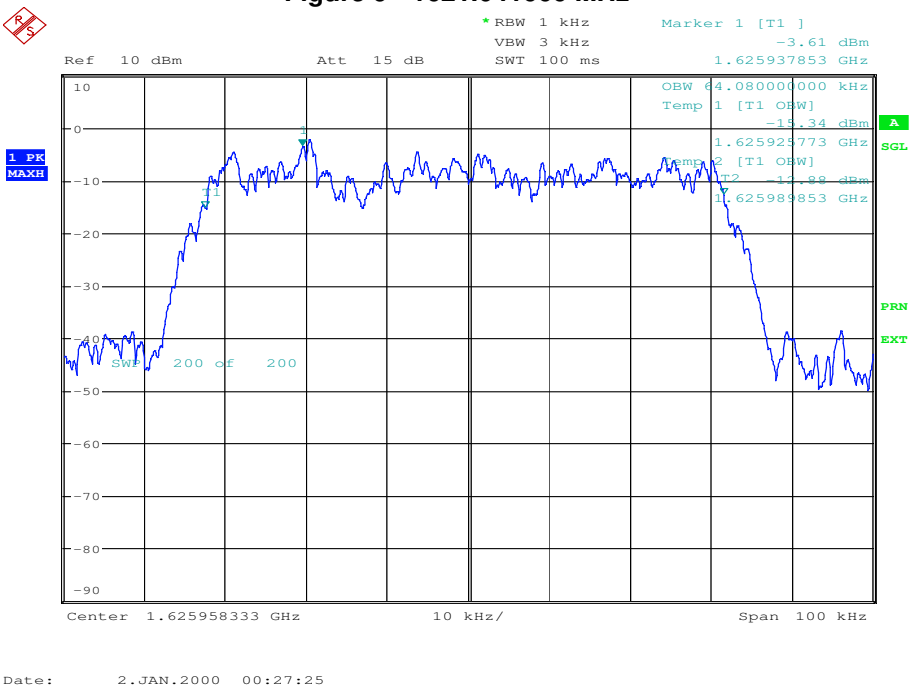


**Figure 10 - 1625.958332 MHz**

FCC 47 CFR Part 2, Limit Clause 2.1049

None specified.

C8 - QPSK

| Occupied Bandwidth (kHz) | | |
|---|---|---|
| 1616.166666 KHz | 1621.166666 KHz | 1625.833332 KHz |
| 256.80 | 256.40 | 256.00 |

**Table 8**

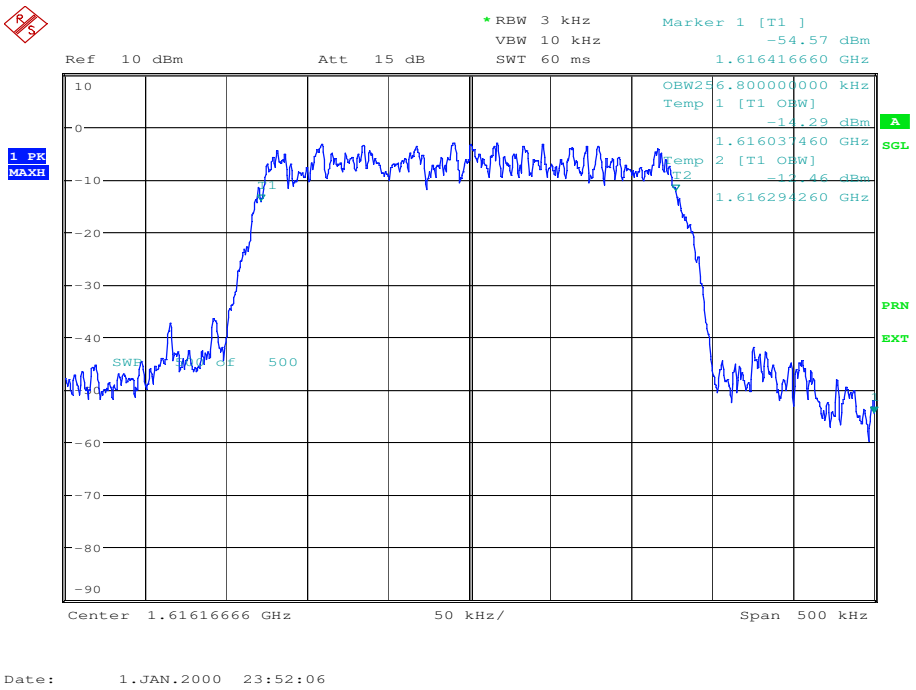


**Figure 11 - 1616.166666 MHz**

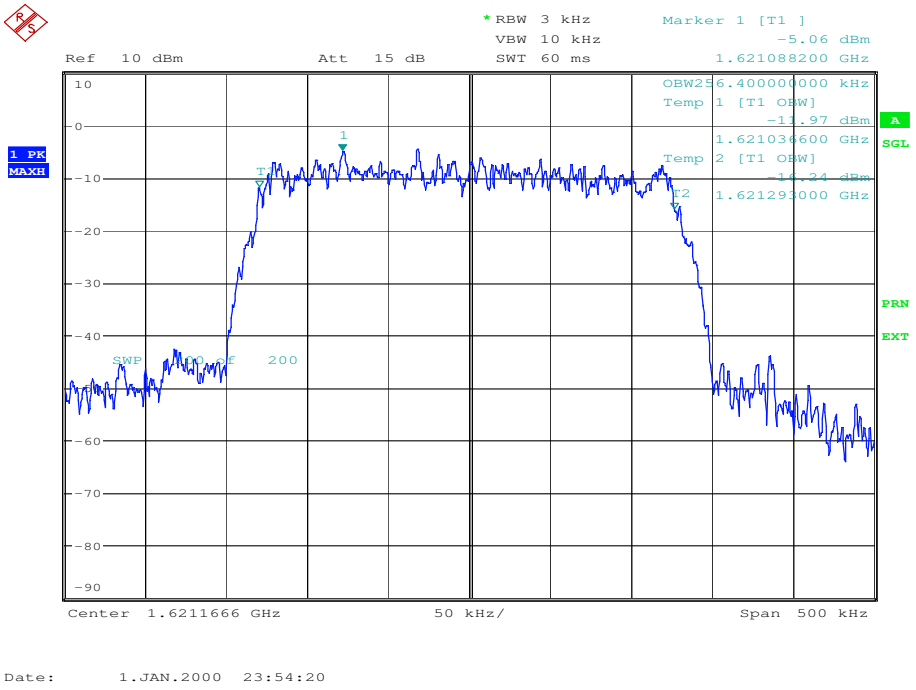


**Figure 12 - 1621.166666 MHz**

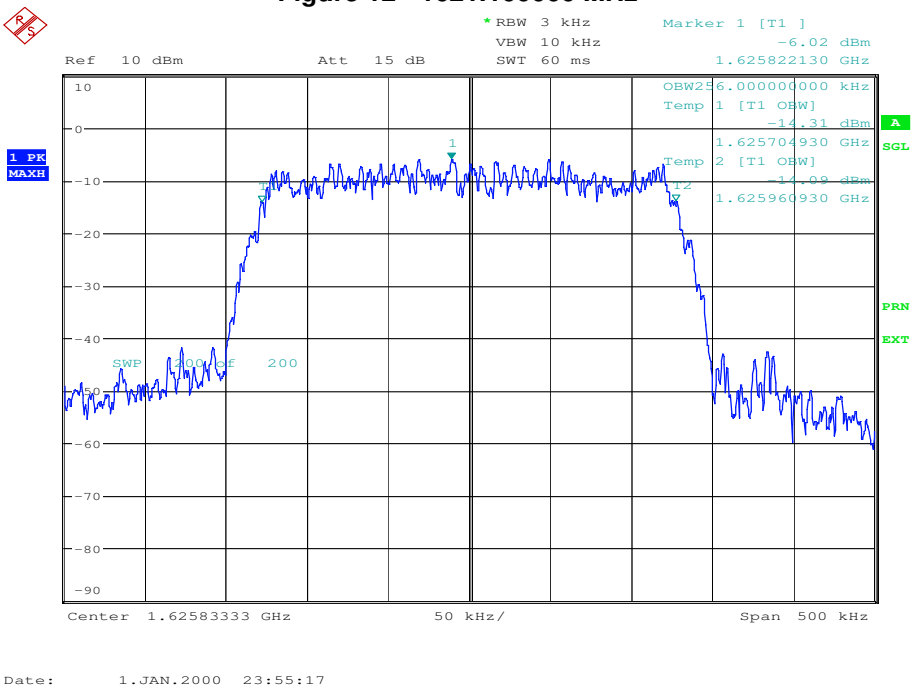


**Figure 13 - 1625.833332 MHz**

FCC 47 CFR Part 2, Limit Clause 2.1049

None specified.

C8 - 16-APSK

| Occupied Bandwidth (kHz) | | |
|---|---|---|
| 1616.166666 KHz | 1621.166666 KHz | 1625.833332 KHz |
| 259.20 | 260.80 | 259.20 |

**Table 9**

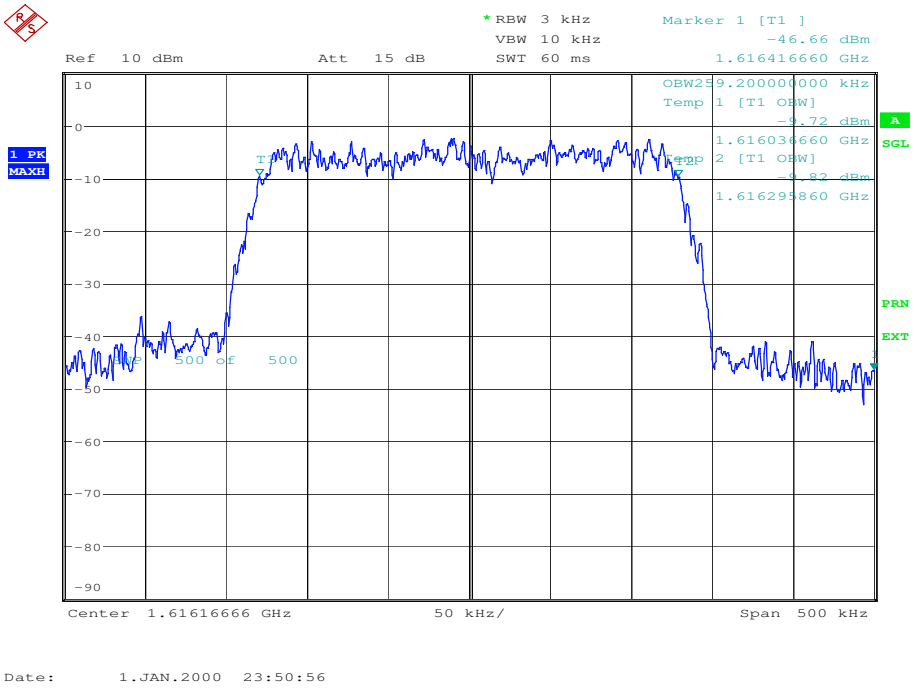


**Figure 14 - 1616.166666 MHz**

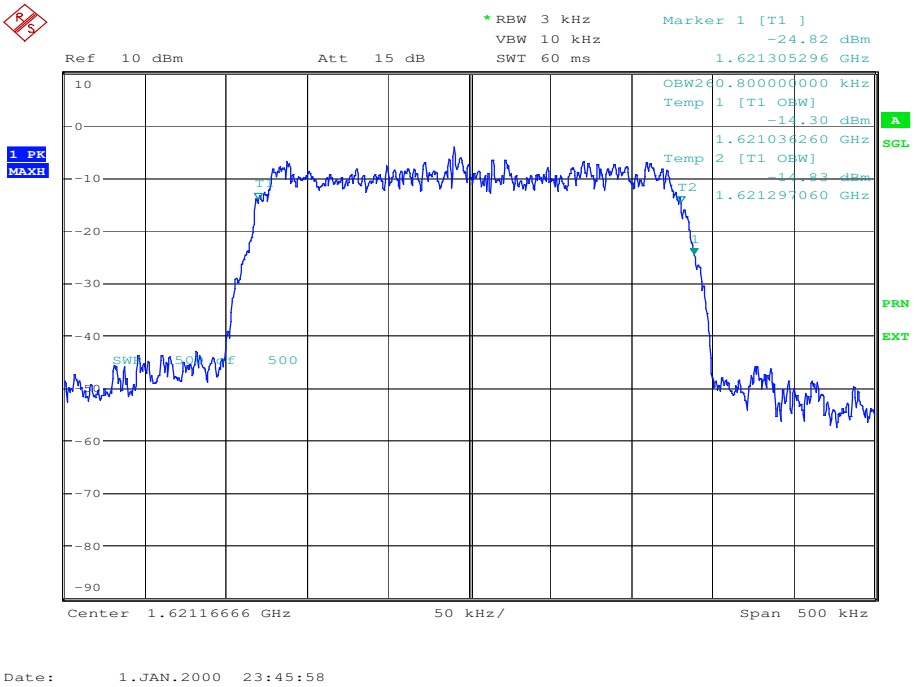


**Figure 15 - 1621.166666 MHz**

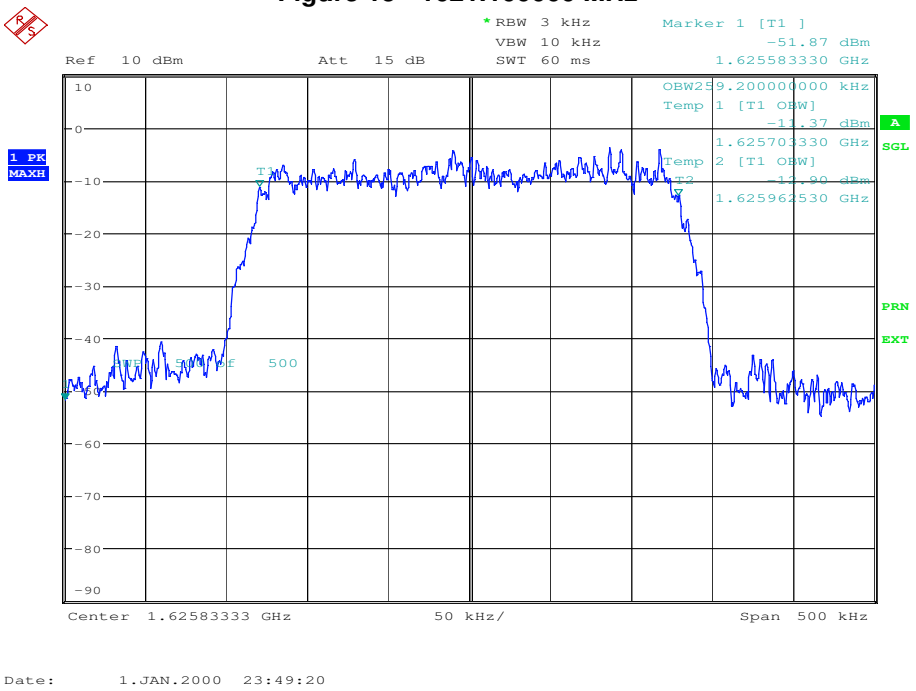


**Figure 16 - 1625.833332 MHz**

FCC 47 CFR Part 2, Limit Clause 2.1049

None specified.

### 2.1.7 Test Location and Test Equipment Used

This test was carried out in Climatec 3 Chamber.

| Instrument | Manufacturer | Type No | TE No | Calibration Period (months) | Calibration Due |
|---|---|---|---|---|---|
| RF Coupler | TUV SUD Product Service | RFC1 | 414 | - | TU |
| Spectrum Analyser | Rohde & Schwarz | FSU26 | 2747 | 12 | 29-Jan-2017 |
| Climatic Chamber | Climatec | CLIMATEC 3 | 2846 | 12 | 01-Jul-2017 |
| TRUE RMS MULTIMETER | Fluke | 179 | 4006 | 12 | 09-Dec-2016 |
| 4 Channel PSU | Rohde & Schwarz | HMP4040 | 4736 | - | TU |

**Table 10**

TU - Traceability Unscheduled

## 2.2 Frequency Tolerance

### 2.2.1 Specification Reference

FCC 47 CFR Part 25, Clause 25.202(d)
FCC 47 CFR Part 2, Clause 2.1055

### 2.2.2 Equipment Under Test and Modification State

Iridium Certus ProtoTerminal / 9801CertusH1, S/N: 300008080004080 - Modification State 0

### 2.2.3 Date of Test

17-November-2016 to 18-November-2016

### 2.2.4 Test Method

This test was performed in accordance with ANSI C63.26, Clause 5.6.

### 2.2.5 Environmental Conditions

| | |
|---|---|
| Ambient Temperature | 19.6 - 21.8 °C |
| Relative Humidity | 28.5 - 68.9 % |

### 2.2.6 Test Results

B1 - QPSK

Frequency Stability over Variation in Temperature

| Test Condition | 1621.020833 MHz | |
|---|---|---|
| Temperature | Frequency Error (%) | Frequency Error (ppm) |
| -30°C | 0.000019 | 0.190929 |
| -20°C | 0.000059 | 0.592836 |
| -10°C | 0.000024 | 0.243982 |
| 0°C | -0.000030 | -0.295801 |
| 10°C | -0.000010 | -0.096236 |
| 20°C | -0.000010 | -0.096853 |
| 30°C | -0.000010 | -0.096853 |
| 40°C | -0.000009 | -0.092843 |
| 50°C | -0.000011 | -0.111658 |

**Table 11**

Frequency Stability when Varying Supply Voltage

| Test Condition | 1621.020833 MHz | |
|---|---|---|
| Supply Voltage | Frequency Error (%) | Frequency Error (ppm) |
| 40.8 V DC | -0.000005 | -0.049660 |
| 48.0 V DC | -0.000010 | -0.096853 |
| 55.2 V DC | -0.000020 | -0.196790 |

**Table 12**

FCC 47 CFR Part 25, Limit Clause 25.202(d)

The carrier frequency of each earth station transmitter authorized in these services shall be maintained within 0.001 percent of the reference frequency.

C1 - QPSK

Frequency Stability over Variation in Temperature

| Test Condition | 1621.020833 MHz | |
|---|---|---|
| Temperature | Frequency Error (%) | Frequency Error (ppm) |
| -30°C | 0.000006 | 0.061381 |
| -20°C | 0.000039 | 0.394504 |
| -10°C | 0.000016 | 0.155766 |
| 0°C | -0.000014 | -0.140652 |
| 10°C | -0.000034 | -0.337750 |
| 20°C | -0.000044 | -0.437379 |
| 30°C | -0.000063 | -0.634477 |
| 40°C | -0.000075 | -0.750761 |
| 50°C | -0.000011 | -0.110733 |

**Table 13**

Frequency Stability when Varying Supply Voltage

| Test Condition | 1621.020833 MHz | |
|---|---|---|
| Supply Voltage | Frequency Error (%) | Frequency Error (ppm) |
| 40.8 V DC | 0.000025 | 0.254778 |
| 48.0 V DC | -0.000044 | -0.437379 |
| 55.2 V DC | -0.000026 | -0.256628 |

**Table 14**

FCC 47 CFR Part 25, Limit Clause 25.202(d)

The carrier frequency of each earth station transmitter authorized in these services shall be maintained within 0.001 percent of the reference frequency.

C2 - QPSK

Frequency Stability over Variation in Temperature

| Test Condition | 1621.041666 MHz | |
|---|---|---|
| Temperature | Frequency Error (%) | Frequency Error (ppm) |
| -30°C | 0.000001 | 0.005860 |
| -20°C | 0.000032 | 0.316463 |
| -10°C | 0.000007 | 0.065082 |
| 0°C | -0.000071 | -0.711579 |
| 10°C | -0.000077 | -0.768025 |
| 20°C | -0.000067 | -0.671482 |
| 30°C | 0.000050 | 0.502146 |
| 40°C | -0.000040 | -0.401902 |
| 50°C | 0.000039 | -0.386788 |

**Table 15**

Frequency Stability when Varying Supply Voltage

| Test Condition | 1621.041666 MHz | |
|---|---|---|
| Supply Voltage | Frequency Error (%) | Frequency Error (ppm) |
| 40.8 V DC | -0.000002 | -0.018507 |
| 48.0 V DC | -0.000067 | -0.671482 |
| 55.2 V DC | -0.000037 | -0.371366 |

**Table 16**

FCC 47 CFR Part 25, Limit Clause 25.202(d)

The carrier frequency of each earth station transmitter authorized in these services shall be maintained within 0.001 percent of the reference frequency.

C8 - QPSK

Frequency Stability over Variation in Temperature

| Test Condition | 1621.166666 MHz | |
|---|---|---|
| Temperature | Frequency Error (%) | Frequency Error (ppm) |
| -30°C | 0.000075 | 0.751249 |
| -20°C | 0.000001 | 0.012275 |
| -10°C | -0.000034 | 0.338583 |
| 0°C | -0.000074 | -0.739961 |
| 10°C | -0.000075 | -0.74952 |
| 20°C | -0.000063 | -0.627079 |
| 30°C | 0.000011 | 0.112512 |
| 40°C | 0.000067 | 0.666125 |
| 50°C | -0.000040 | -0.396998 |

**Table 17**

Frequency Stability when Varying Supply Voltage

| Test Condition | 1621.166666 MHz | |
|---|---|---|
| Supply Voltage | Frequency Error (%) | Frequency Error (ppm) |
| 40.8 V DC | -0.000001 | -0.013015 |
| 48.0 V DC | -0.000063 | -0.627079 |
| 55.2 V DC | -0.000063 | -0.628005 |

**Table 18**

FCC 47 CFR Part 25, Limit Clause 25.202(d)

The carrier frequency of each earth station transmitter authorized in these services shall be maintained within 0.001 percent of the reference frequency.

C8 - 16-APSK

Frequency Stability over Variation in Temperature

| Test Condition | 1621.166666 MHz | |
|---|---|---|
| Temperature | Frequency Error (%) | Frequency Error (ppm) |
| -30°C | -0.000066 | -0.659155 |
| -20°C | 0.000075 | 0.747240 |
| -10°C | -0.000086 | -0.859011 |
| 0°C | 0.000139 | 1.392146 |
| 10°C | 0.000047 | 0.466886 |
| 20°C | -0.000024 | -0.240629 |
| 30°C | 0.000026 | 0.259011 |
| 40°C | -0.000008 | -0.081485 |
| 50°C | 0.000028 | 0.279984 |

**Table 19**

Frequency Stability when Varying Supply Voltage

| Test Condition | 1621.166666 MHz | |
|---|---|---|
| Supply Voltage | Frequency Error (%) | Frequency Error (ppm) |
| 40.8 V DC | -0.000024 | -0.240012 |
| 48.0 V DC | -0.000024 | -0.240629 |
| 55.2 V DC | -0.000098 | -0.983613 |

**Table 20**

FCC 47 CFR Part 25, Limit Clause 25.202(d)

The carrier frequency of each earth station transmitter authorized in these services shall be maintained within 0.001 percent of the reference frequency.

### 2.2.7 Test Location and Test Equipment Used

This test was carried out in Climatec 3 Chamber.

| Instrument | Manufacturer | Type No | TE No | Calibration Period (months) | Calibration Due |
|---|---|---|---|---|---|
| Rubidium Frequency Standard | Quartzlock | A10-B | 92 | 12 | 18-Feb-2017 |
| RF Coupler | TUV SUD Product Service | RFC1 | 414 | - | TU |
| Spectrum Analyser | Rohde & Schwarz | FSU26 | 2747 | 12 | 29-Jan-2017 |
| Climatic Chamber | Climatec | CLIMATEC 3 | 2846 | 12 | 01-Jul-2017 |
| TRUE RMS MULTIMETER | Fluke | 179 | 4006 | 12 | 09-Dec-2016 |
| 4 Channel PSU | Rohde & Schwarz | HMP4040 | 4736 | - | TU |

**Table 21**

TU - Traceability Unscheduled

## 2.3 Spurious Emissions at Antenna Terminals

### 2.3.1 Specification Reference

FCC 47 CFR Part 25, Clause 25.202(f)
FCC 47 CFR Part 2, Clause 2.1051

### 2.3.2 Equipment Under Test and Modification State

Iridium Certus ProtoTerminal / 9801CertusH1, S/N: 300008080004080 - Modification State 0

### 2.3.3 Date of Test

04-December-2016

### 2.3.4 Test Method

This test was performed in accordance with ANSI C63.26 clause 5.5.

For B1 and C1 configurations, the RBW of the spectrum analyser was reduced to 1 kHz so that the true spectral shape of the emission could be seen. To compensate the limit was reduced by 10LOG(1/4) = 6 dB, for B1 and C1 configurations.

### 2.3.5 Environmental Conditions

| | |
|---|---|
| Ambient Temperature | 19.6 - 21.8 °C |
| Relative Humidity | 24.0 - 26.0 % |

### 2.3.6 Test Results

B1 - QPSK

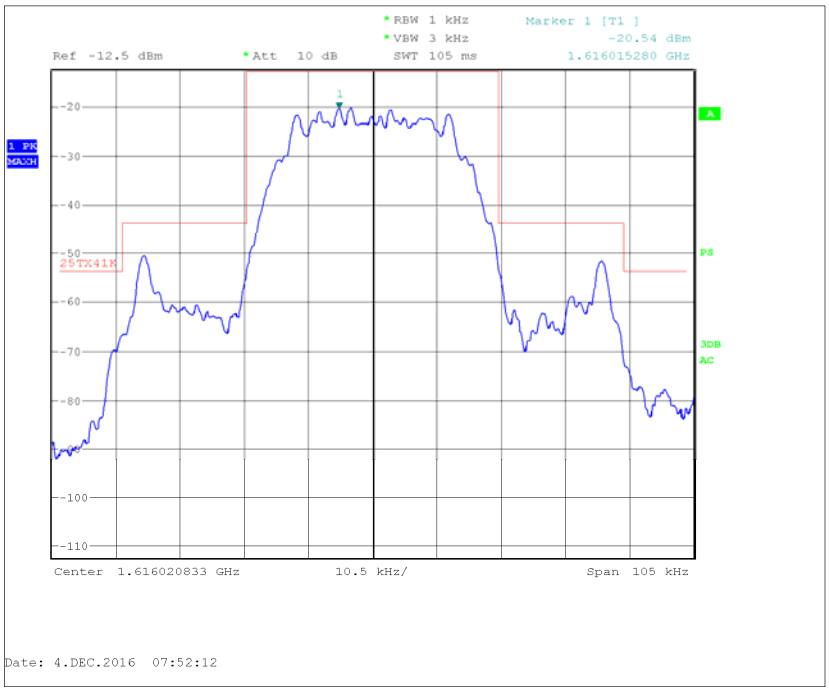


**Figure 17 - 1616.020833 MHz - Emission Mask**


**Figure 18 - 1621.020833 MHz - Emission Mask**


**Figure 19 - 1625.979166 MHz - Emission Mask**

FCC 47 CFR Part 25, Limit Clause 25.202(f)

The average power of unwanted emissions shall be attenuated below the average output power, P(dBW), of the transmitter, as specified below:

1) 25 dB in any 4 kHz band, the centre frequency of which is offset from the channel frequency by more than 50%, up to and including 100% of the authorised bandwidth;
2) 35 dB in any 4 kHz band, the centre frequency of which is offset from the channel frequency by more than 100%, up to and including 250% of the authorised bandwidth;
3) 43 + 10 Log p (watts) in any 4 kHz band, the centre frequency of which is offset from the channel frequency by more than 250% of the authorised bandwidth.

C1 - QPSK

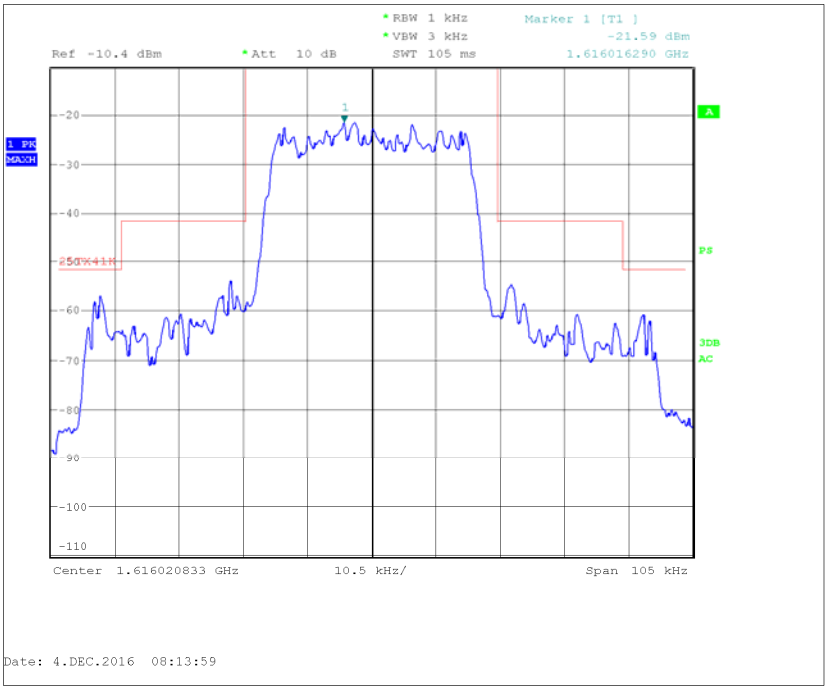


**Figure 20 - 1616.020833 MHz - Emission Mask**

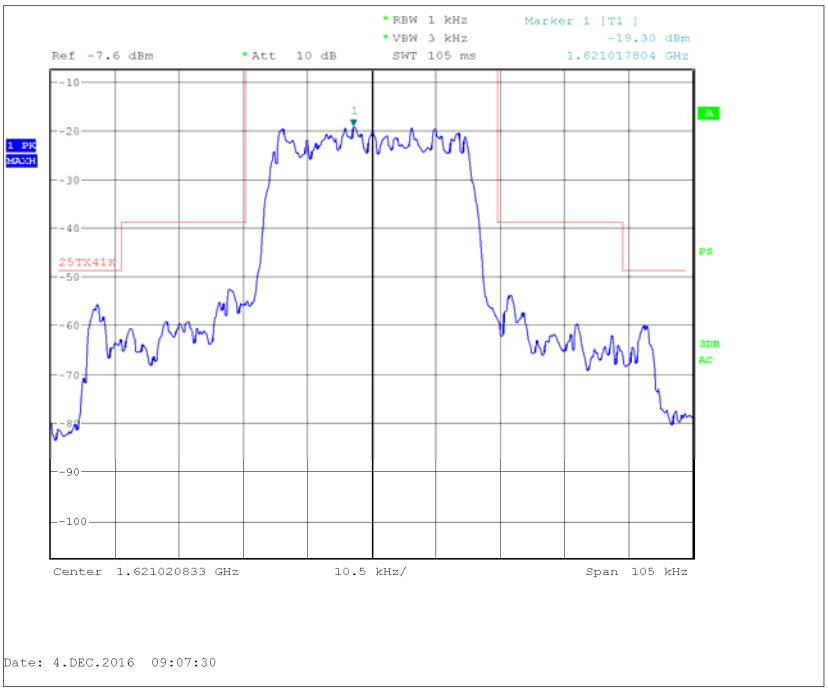


**Figure 21 - 1621.020833 MHz - Emission Mask**


**Figure 22 - 1625.979166 MHz - Emission Mask**

FCC 47 CFR Part 25, Limit Clause 25.202(f)

The average power of unwanted emissions shall be attenuated below the average output power, P(dBW), of the transmitter, as specified below:

4) 25 dB in any 4 kHz band, the centre frequency of which is offset from the channel frequency by more than 50%, up to and including 100% of the authorised bandwidth;
5) 35 dB in any 4 kHz band, the centre frequency of which is offset from the channel frequency by more than 100%, up to and including 250% of the authorised bandwidth;
6) 43 + 10 Log p (watts) in any 4 kHz band, the centre frequency of which is offset from the channel frequency by more than 250% of the authorised bandwidth.

C2 - QPSK

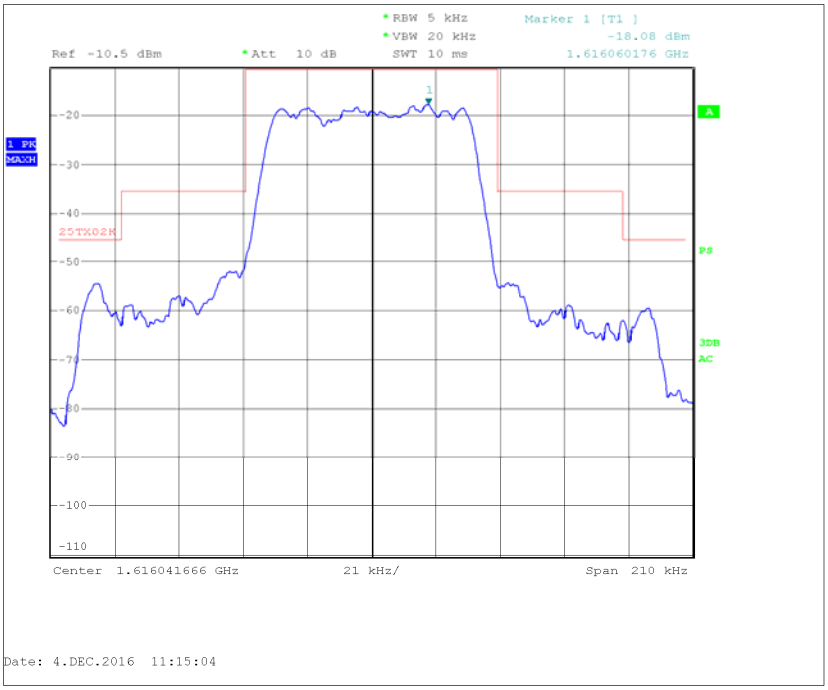


**Figure 23 - 1616.041666 MHz - Emission Mask**

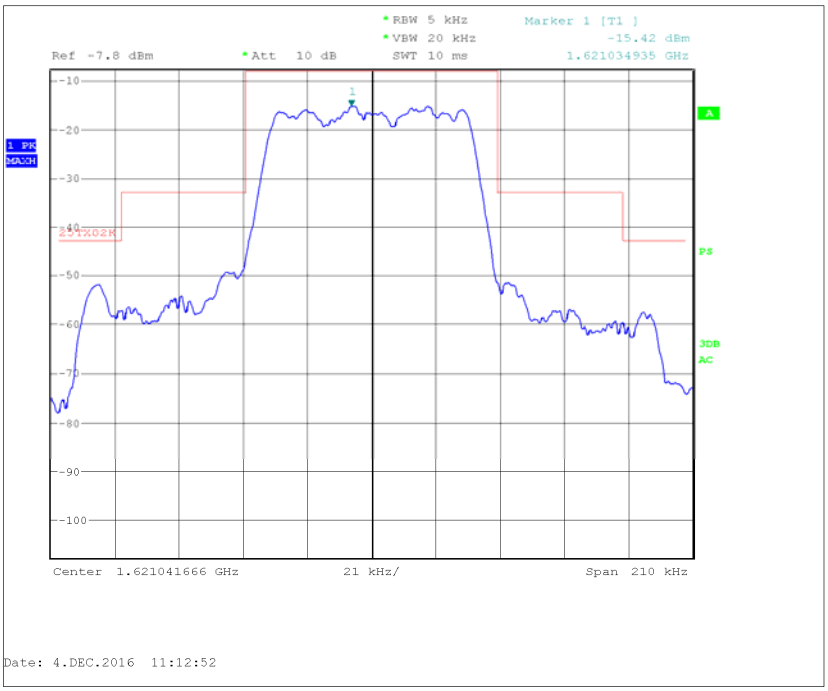


**Figure 24 - 1621.041666 MHz - Emission Mask**

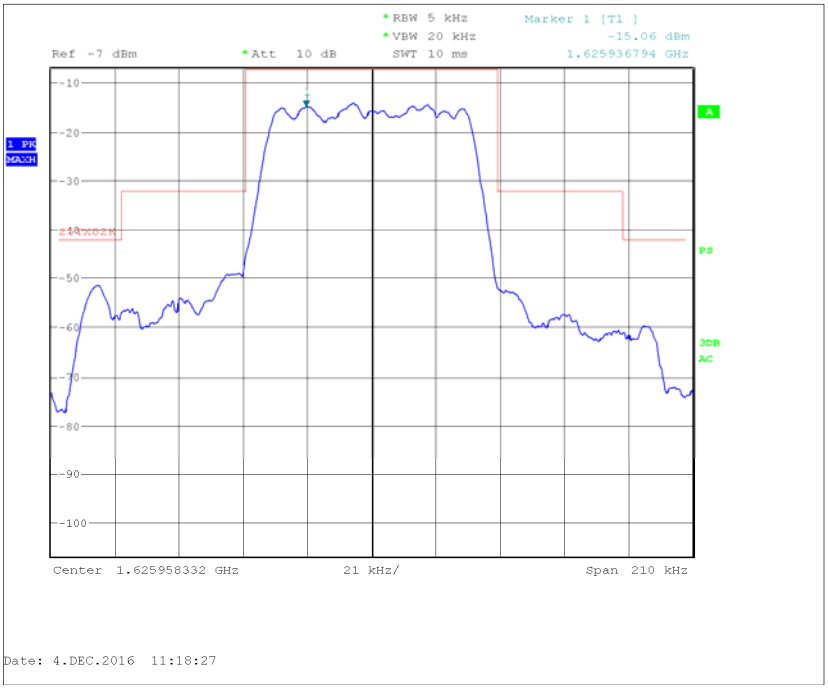


**Figure 25 - 1625.958332 MHz - Emission Mask**

FCC 47 CFR Part 25, Limit Clause 25.202(f)

The average power of unwanted emissions shall be attenuated below the average output power, P(dBW), of the transmitter, as specified below:

7) 25 dB in any 4 kHz band, the centre frequency of which is offset from the channel frequency by more than 50%, up to and including 100% of the authorised bandwidth;
8) 35 dB in any 4 kHz band, the centre frequency of which is offset from the channel frequency by more than 100%, up to and including 250% of the authorised bandwidth;
9) 43 + 10 Log p (watts) in any 4 kHz band, the centre frequency of which is offset from the channel frequency by more than 250% of the authorised bandwidth.

C8 - QPSK

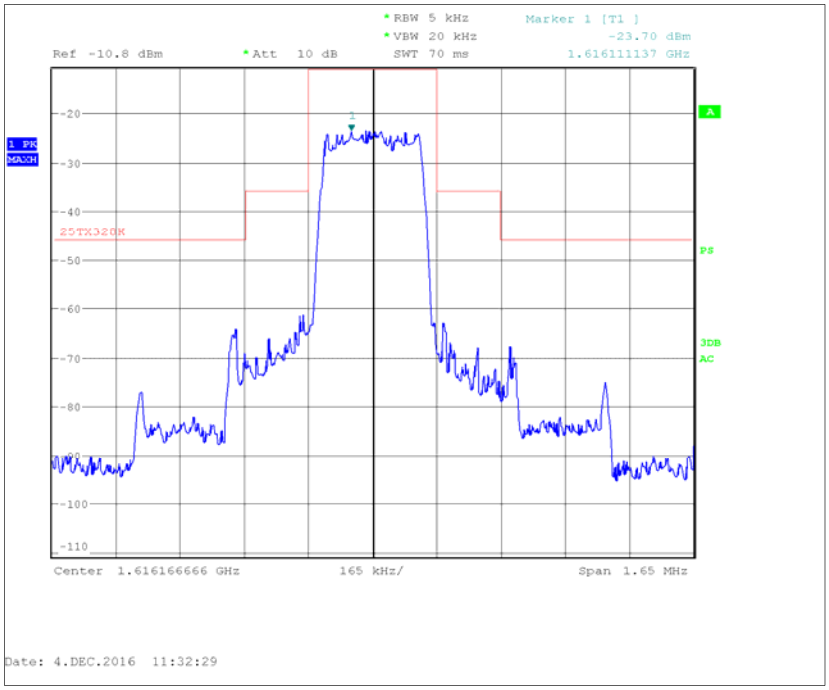


**Figure 26 - 1616.166666 MHz - Emission Mask**

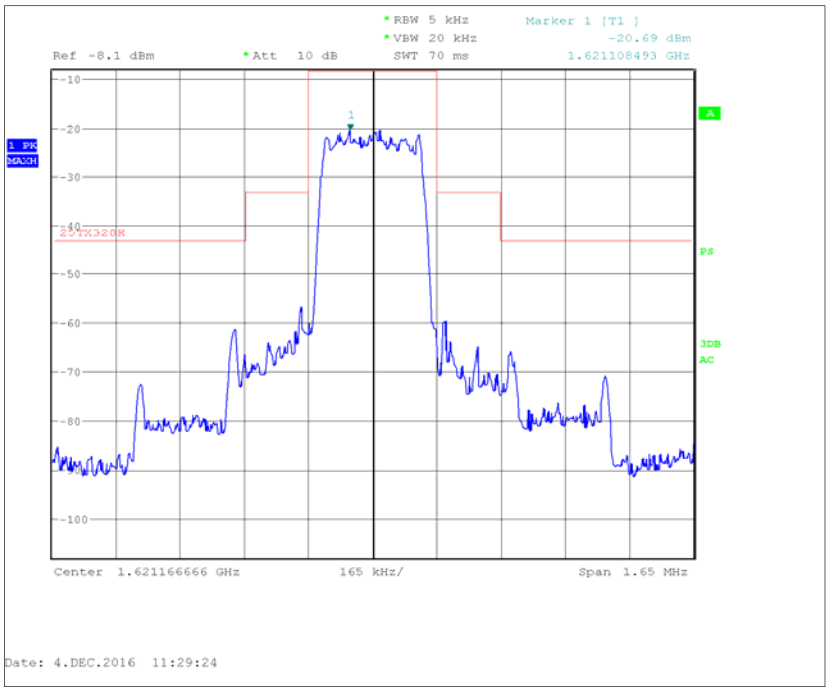


**Figure 27 - 1621.166666 MHz – Emission Mask**

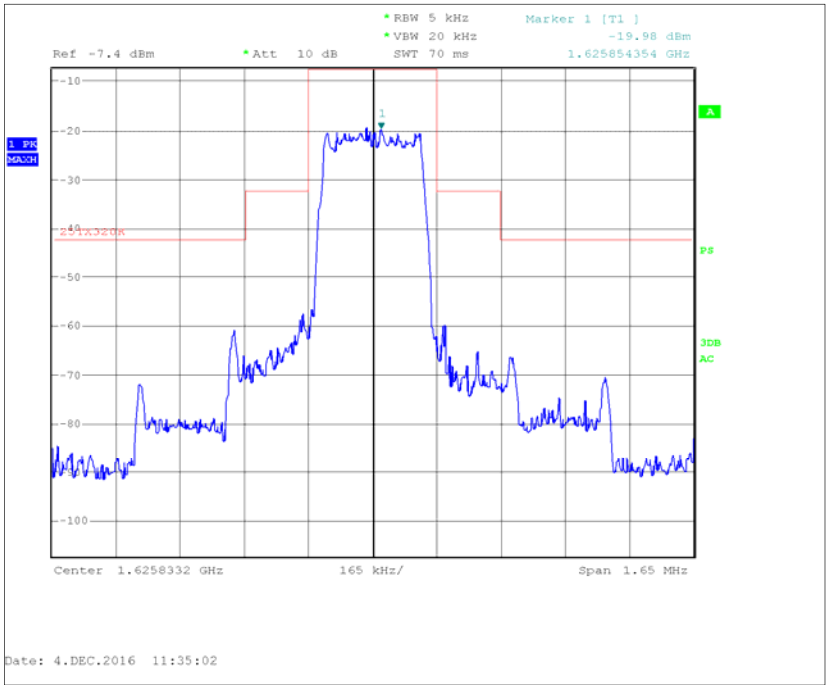


**Figure 28 - 1625.833332 MHz - Emission Mask**

FCC 47 CFR Part 25, Limit Clause 25.202(f)

The average power of unwanted emissions shall be attenuated below the average output power, P(dBW), of the transmitter, as specified below:

10) 25 dB in any 4 kHz band, the centre frequency of which is offset from the channel frequency by more than 50%, up to and including 100% of the authorised bandwidth;
11) 35 dB in any 4 kHz band, the centre frequency of which is offset from the channel frequency by more than 100%, up to and including 250% of the authorised bandwidth;
12) 43 + 10 Log p (watts) in any 4 kHz band, the centre frequency of which is offset from the channel frequency by more than 250% of the authorised bandwidth.

C8 - 16-APSK

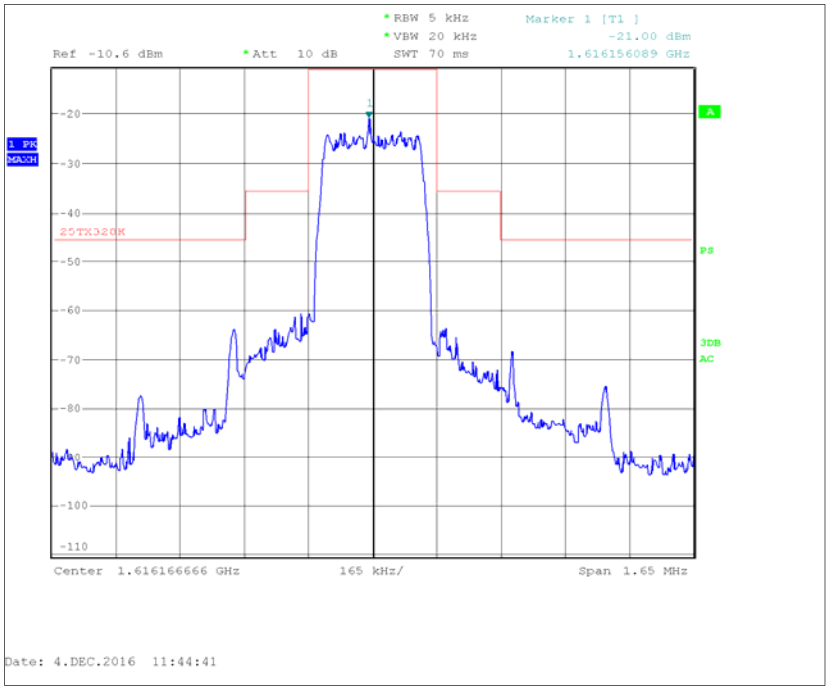


**Figure 29 - 1616.166666 MHz - Emission Mask**

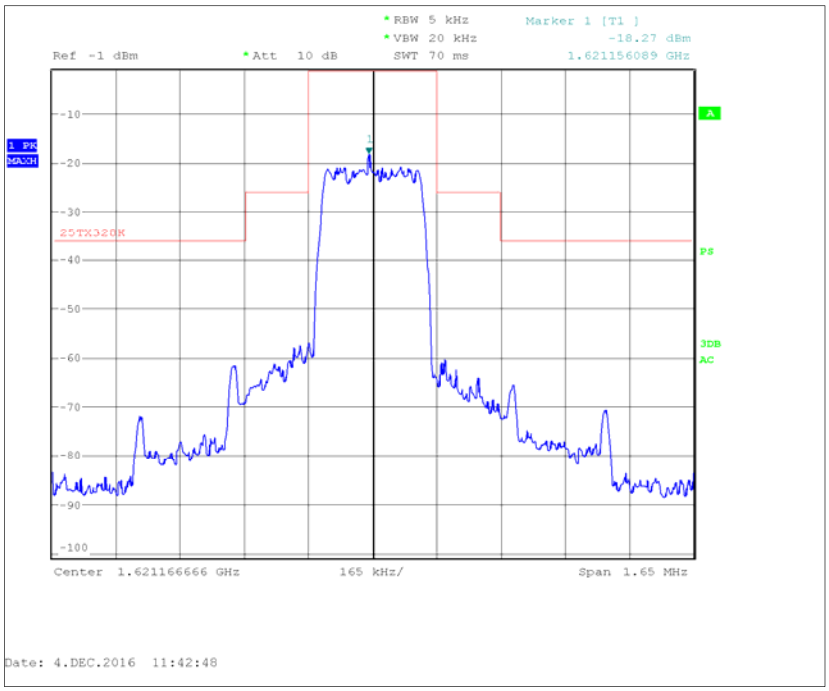


**Figure 30 - 1621.166666 MHz - Emission Mask**

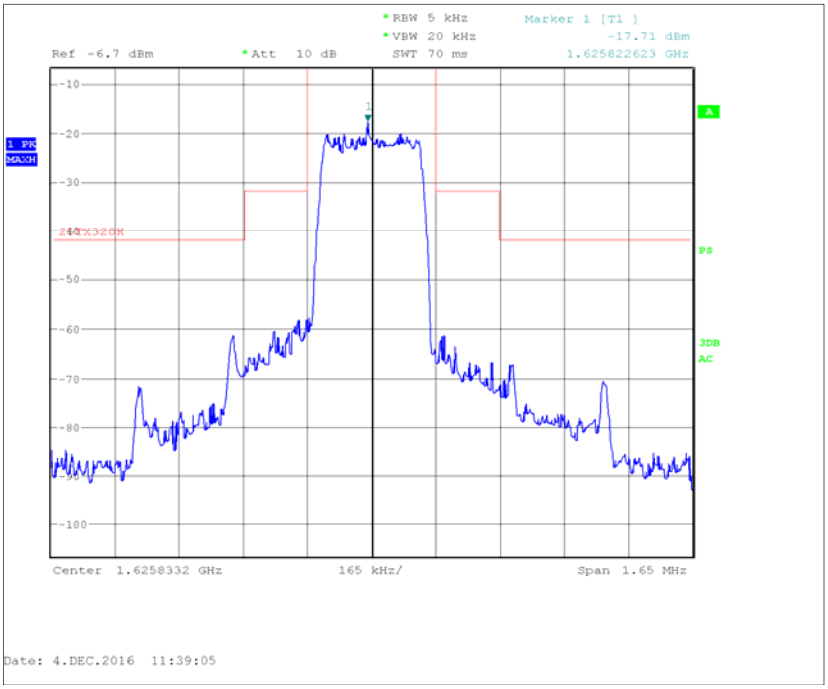


**Figure 31 - 1625.833332 MHz - Emission Mask**

FCC 47 CFR Part 25, Limit Clause 25.202(f)

The average power of unwanted emissions shall be attenuated below the average output power, P(dBW), of the transmitter, as specified below:

13) 25 dB in any 4 kHz band, the centre frequency of which is offset from the channel frequency by more than 50%, up to and including 100% of the authorised bandwidth;
14) 35 dB in any 4 kHz band, the centre frequency of which is offset from the channel frequency by more than 100%, up to and including 250% of the authorised bandwidth;
15) 43 + 10 Log p (watts) in any 4 kHz band, the centre frequency of which is offset from the channel frequency by more than 250% of the authorised bandwidth.

### 2.3.7 Test Location and Test Equipment Used

This test was carried out in EMC Chamber 5.

| Instrument | Manufacturer | Type No | TE No | Calibration Period (months) | Calibration Due |
|---|---|---|---|---|---|
| Hygrometer | Rotronic | A1 | 1388 | 12 | 13-Apr-2017 |
| Screened Room (5) | Rainford | Rainford | 1545 | 36 | 20-Dec-2017 |
| Turntable Controller | Inn-Co GmbH | CO 1000 | 1606 | - | TU |
| Hygrometer | Rotronic | HYGROPALM 1 | 2338 | 12 | 21-Sep-2017 |
| 8m Cable | Rhophase | NPS-2302-8000-NPS | 3248 | - | TU |
| EMI Test Receiver | Rohde & Schwarz | ESU40 | 3506 | 12 | 12-Nov-2017 |
| Tilt Antenna Mast | maturo Gmbh | TAM 4.0-P | 3916 | - | TU |
| Mast Controller | maturo Gmbh | NCD | 3917 | - | TU |
| Double Ridged Waveguide Horn Antenna | ETS-Lindgren | 3117 | 4722 | 12 | 29-Dec-2016 |
| 4 Channel PSU | Rohde & Schwarz | HMP4040 | 4736 | - | TU |

**Table 22**

TU - Traceability Unscheduled

## 2.4 Equivalent Isotropic Radiated Power

### 2.4.1 Specification Reference

FCC 47 CFR Part 25, Clause 25.204

### 2.4.2 Equipment Under Test and Modification State

Iridium Certus ProtoTerminal / 9801CertusH1, S/N: 300008080004080 - Modification State 0

### 2.4.3 Date of Test

13-November-2016 to 23-November-2016

### 2.4.4 Test Method

Total EIRP measurements were performed in a radiated configuration in accordance with ANSI C63.26, clause 5.2.3.3 in order to determine the configuration with the highest output power.

Power density in a 5 kHz resolution bandwidth was performed in a radiated configuration in accordance with ANSI C63.26, clause 5.2.3.5 and 6.3 in the configuration with highest total EIRP. Measurements were made with a peak detector and max hold trace.

The EUT supports spherical beam-forming however the steering of the elevation of the beam is restricted from 20° to 90°. In ANSI C63.26, clause 6.3.2.2, where measurements at Θ = 0° are required, measurements were made at the lowest supported value of Θ which is 20°. Where measurements of Θ = 30° are required, measurements were made at the next available setting which is 39°.

From the list of Elevation and Azimuth required to test not all combinations were supported by the EUT. The combinations that could not be tested were as follows:

| Elevation (Θ) | Not Supported Angles of Azimuth specified to test by ANSI C63.26 clause 6.3.2.2. |
|---|---|
| 20 | - |
| 39 | -90, -30, +30 and +90 |
| 60 | -45 and +45 |
| 90 | -45 and +45 |

This method was used as per the pre-approval guidance issued in FCC inquiry 609683.

It was neither practical, nor representative of normal operation for the EUT to be vertically mounted, therefore the EUT was placed in the worst case condition with respect to vertical polarization of the EUT which was confirmed by the manufacturer as 60 degrees with respect to the horizontal ground plane.

A final EIRP value was obtained by using the substitution method described in ANSI C63.26, clause 5.5.3.

EIRP results integrated over the measured occupied bandwidth of the EUT, have been calculated and are reported in Annex A of the present document at the request of the manufacturer.

### 2.4.5 Environmental Conditions

| | |
|---|---|
| Ambient Temperature | 19.2 - 20.0 °C |
| Relative Humidity | 36.0 - 37.0 % |

### 2.4.6 Test Results

Relative Total EIRP Measurements

B1 - QPSK

| EIRP (dBm) | | |
|---|---|---|
| 1616.166666 MHz | 1621.166666 MHz | 1625.833332 MHz |
| 34.80* | 34.69* | 33.50* |

**Table 23**

C1 - QPSK

| EIRP (dBm) | | |
|---|---|---|
| 1616.166666 MHz | 1621.166666 MHz | 1625.833332 MHz |
| 36.98* | 37.18* | 36.00* |

**Table 24**

C2 - QPSK

| EIRP (dBm) | | |
|---|---|---|
| 1616.166666 MHz | 1621.166666 MHz | 1625.833332 MHz |
| 37.13* | 37.45* | 36.08* |

**Table 25**

C8 - QPSK

| EIRP (dBm) | | |
|---|---|---|
| 1616.166666 MHz | 1621.166666 MHz | 1625.833332 MHz |
| 36.83* | 37.19* | 35.82* |

**Table 26**

C8 - 16-APSK

| EIRP (dBm) | | |
|---|---|---|
| 1616.166666 MHz | 1621.166666 MHz | 1625.833332 MHz |
| 37.45* | 37.81* | 36.16* |

**Table 27**

*The measurements obtained above are relative measurements purely to determine the worst case modulation and channel scheme. The results recorded above were not made in the highest combination of azimuth and elevation nor were they maximised for height/orientation and angle of the measurement antenna and EUT.

Power Density Measurements (C8 - 16-APSK)

1616.166666 MHz

| APV Value | Azimuth Φ | Elevation Θ | EUT Orientation | Test Antenna Polarity | Final EIRP/5 kHz |
|---|---|---|---|---|---|
| 1 | 0 | 90 | Horizontal | Vertical | 27.64 |
| 1 | 0 | 90 | Horizontal | Horizontal | 26.88 |
| 1 | 0 | 90 | 60 Deg | Vertical | 33.25 |
| 1 | 0 | 90 | 60 Deg | Horizontal | 35.33 |
| 1 | 0 | 60 | Horizontal | Vertical | 26.80 |
| 1 | 0 | 60 | Horizontal | Horizontal | 27.10 |
| 1 | 0 | 60 | 60 Deg | Vertical | 25.85 |
| 1 | 0 | 60 | 60 Deg | Horizontal | 28.69 |
| 9 | 30 | 60 | Horizontal | Vertical | 30.27 |
| 9 | 30 | 60 | Horizontal | Horizontal | 29.19 |
| 9 | 30 | 60 | 60 Deg | Vertical | 28.68 |
| 9 | 30 | 60 | 60 Deg | Horizontal | 27.85 |
| 10 | 60 | 60 | Horizontal | Vertical | 29.73 |
| 10 | 60 | 60 | Horizontal | Horizontal | 30.15 |
| 10 | 60 | 60 | 60 Deg | Vertical | 32.69 |
| 10 | 60 | 60 | 60 Deg | Horizontal | 34.14 |
| 11 | 90 | 60 | Horizontal | Vertical | 29.83 |
| 11 | 90 | 60 | Horizontal | Horizontal | 30.10 |
| 11 | 90 | 60 | 60 Deg | Vertical | 33.88 |
| 11 | 90 | 60 | 60 Deg | Horizontal | 33.47 |
| 17 | -90 | 60 | Horizontal | Vertical | 29.97 |
| 17 | -90 | 60 | Horizontal | Horizontal | 26.90 |
| 17 | -90 | 60 | 60 Deg | Vertical | 35.64 |
| 17 | -90 | 60 | 60 Deg | Horizontal | 34.91 |
| 18 | -60 | 60 | Horizontal | Vertical | 29.99 |
| 18 | -60 | 60 | Horizontal | Horizontal | 30.46 |
| 18 | -60 | 60 | 60 Deg | Vertical | 32.95 |
| 18 | -60 | 60 | 60 Deg | Horizontal | 32.39 |
| 19 | -30 | 60 | Horizontal | Vertical | 29.31 |
| 19 | -30 | 60 | Horizontal | Horizontal | 28.31 |
| 19 | -30 | 60 | 60 Deg | Vertical | 27.45 |
| 19 | -30 | 60 | 60 Deg | Horizontal | 28.98 |
| 20 | 0 | 39 | Horizontal | Vertical | 34.18 |
| 20 | 0 | 39 | Horizontal | Horizontal | 32.19 |
| 20 | 0 | 39 | 60 Deg | Vertical | 26.02 |
| 20 | 0 | 39 | 60 Deg | Horizontal | 25.49 |

| APV Value | Azimuth Φ | Elevation Θ | EUT Orientation | Test Antenna Polarity | Final EIRP/5 kHz |
|---|---|---|---|---|---|
| 23 | 60 | 39 | Horizontal | Vertical | 34.45 |
| 23 | 60 | 39 | Horizontal | Horizontal | 32.37 |
| 23 | 60 | 39 | 60 Deg | Vertical | 32.93 |
| 23 | 60 | 39 | 60 Deg | Horizontal | 35.55 |
| 35 | -60 | 39 | Horizontal | Vertical | 33.59 |
| 35 | -60 | 39 | Horizontal | Horizontal | 32.89 |
| 35 | -60 | 39 | 60 Deg | Vertical | 31.52 |
| 35 | -60 | 39 | 60 Deg | Horizontal | 31.78 |
| 38 | 0 | 20 | Horizontal | Vertical | 32.01 |
| 38 | 0 | 20 | Horizontal | Horizontal | 31.85 |
| 38 | 0 | 20 | 60 Deg | Vertical | 28.49 |
| 38 | 0 | 20 | 60 Deg | Horizontal | 30.46 |
| 40 | 30 | 20 | Horizontal | Vertical | 35.43 |
| 40 | 30 | 20 | Horizontal | Horizontal | 33.45 |
| 40 | 30 | 20 | 60 Deg | Vertical | 28.68 |
| 40 | 30 | 20 | 60 Deg | Horizontal | 26.36 |
| 41 | 45 | 20 | Horizontal | Vertical | 32.98 |
| 41 | 45 | 20 | Horizontal | Horizontal | 31.06 |
| 41 | 45 | 20 | 60 Deg | Vertical | 26.98 |
| 41 | 45 | 20 | 60 Deg | Horizontal | 29.21 |
| 42 | 60 | 20 | Horizontal | Vertical | 33.02 |
| 42 | 60 | 20 | Horizontal | Horizontal | 32.07 |
| 42 | 60 | 20 | 60 Deg | Vertical | 32.67 |
| 42 | 60 | 20 | 60 Deg | Horizontal | 32.98 |
| 44 | 90 | 20 | Horizontal | Vertical | 33.34 |
| 44 | 90 | 20 | Horizontal | Horizontal | 31.26 |
| 44 | 90 | 20 | 60 Deg | Vertical | 34.49 |
| 44 | 90 | 20 | 60 Deg | Horizontal | 35.51 |
| 56 | -90 | 20 | Horizontal | Vertical | 33.42 |
| 56 | -90 | 20 | Horizontal | Horizontal | 33.29 |
| 56 | -90 | 20 | 60 Deg | Vertical | 34.46 |
| 56 | -90 | 20 | 60 Deg | Horizontal | 35.30 |
| 58 | -60 | 20 | Horizontal | Vertical | 34.82 |
| 58 | -60 | 20 | Horizontal | Horizontal | 33.31 |
| 58 | -60 | 20 | 60 Deg | Vertical | 32.79 |
| 58 | -60 | 20 | 60 Deg | Horizontal | 30.56 |
| 60 | -30 | 20 | Horizontal | Vertical | 35.51 |
| 60 | -30 | 20 | Horizontal | Horizontal | 35.61 |

| APV Value | Azimuth Φ | Elevation Θ | EUT Orientation | Test Antenna Polarity | Final EIRP/5 kHz |
|---|---|---|---|---|---|
| 60 | -30 | 20 | 60 Deg | Vertical | 28.01 |
| 60 | -30 | 20 | 60 Deg | Horizontal | 28.3 |

**Table 28**

Maximum Results = 35.64 dBm

1621.166666 MHz

| APV Value | Azimuth Φ | Elevation Θ | EUT Orientation | Test Antenna Polarity | Final EIRP/5 kHz |
|---|---|---|---|---|---|
| 1 | 0 | 90 | Horizontal | Vertical | 28.33 |
| 1 | 0 | 90 | Horizontal | Horizontal | 27.93 |
| 1 | 0 | 90 | 60 Deg | Vertical | 33.94 |
| 1 | 0 | 90 | 60 Deg | Horizontal | 35.61 |
| 1 | 0 | 60 | Horizontal | Vertical | 28.39 |
| 1 | 0 | 60 | Horizontal | Horizontal | 27.51 |
| 1 | 0 | 60 | 60 Deg | Vertical | 28.00 |
| 1 | 0 | 60 | 60 Deg | Horizontal | 29.05 |
| 9 | 30 | 60 | Horizontal | Vertical | 30.90 |
| 9 | 30 | 60 | Horizontal | Horizontal | 29.38 |
| 9 | 30 | 60 | 60 Deg | Vertical | 29.97 |
| 9 | 30 | 60 | 60 Deg | Horizontal | 27.91 |
| 10 | 60 | 60 | Horizontal | Vertical | 30.09 |
| 10 | 60 | 60 | Horizontal | Horizontal | 29.25 |
| 10 | 60 | 60 | 60 Deg | Vertical | 33.70 |
| 10 | 60 | 60 | 60 Deg | Horizontal | 34.16 |
| 11 | 90 | 60 | Horizontal | Vertical | 30.97 |
| 11 | 90 | 60 | Horizontal | Horizontal | 29.43 |
| 11 | 90 | 60 | 60 Deg | Vertical | 35.37 |
| 11 | 90 | 60 | 60 Deg | Horizontal | 36.49 |
| 17 | -90 | 60 | Horizontal | Vertical | 30.47 |
| 17 | -90 | 60 | Horizontal | Horizontal | 27.36 |
| 17 | -90 | 60 | 60 Deg | Vertical | 36.33 |
| 17 | -90 | 60 | 60 Deg | Horizontal | 35.08 |
| 18 | -60 | 60 | Horizontal | Vertical | 29.40 |
| 18 | -60 | 60 | Horizontal | Horizontal | 30.89 |
| 18 | -60 | 60 | 60 Deg | Vertical | 34.23 |
| 18 | -60 | 60 | 60 Deg | Horizontal | 32.94 |
| 19 | -30 | 60 | Horizontal | Vertical | 30.53 |
| 19 | -30 | 60 | Horizontal | Horizontal | 28.80 |
| 19 | -30 | 60 | 60 Deg | Vertical | 29.79 |
| 19 | -30 | 60 | 60 Deg | Horizontal | 29.63 |
| 20 | 0 | 39 | Horizontal | Vertical | 34.51 |
| 20 | 0 | 39 | Horizontal | Horizontal | 33.35 |
| 20 | 0 | 39 | 60 Deg | Vertical | 27.08 |
| 20 | 0 | 39 | 60 Deg | Horizontal | 27.01 |
| 23 | 60 | 39 | Horizontal | Vertical | 35.14 |
| 23 | 60 | 39 | Horizontal | Horizontal | 33.11 |

| APV Value | Azimuth Φ | Elevation Θ | EUT Orientation | Test Antenna Polarity | Final EIRP/5 kHz |
|---|---|---|---|---|---|
| 23 | 60 | 39 | 60 Deg | Vertical | 34.13 |
| 23 | 60 | 39 | 60 Deg | Horizontal | 35.94 |
| 35 | -60 | 39 | Horizontal | Vertical | 35.07 |
| 35 | -60 | 39 | Horizontal | Horizontal | 32.99 |
| 35 | -60 | 39 | 60 Deg | Vertical | 33.21 |
| 35 | -60 | 39 | 60 Deg | Horizontal | 31.58 |
| 38 | 0 | 20 | Horizontal | Vertical | 33.19 |
| 38 | 0 | 20 | Horizontal | Horizontal | 32.75 |
| 38 | 0 | 20 | 60 Deg | Vertical | 28.99 |
| 38 | 0 | 20 | 60 Deg | Horizontal | 30.48 |
| 40 | 30 | 20 | Horizontal | Vertical | 36.44 |
| 40 | 30 | 20 | Horizontal | Horizontal | 34.26 |
| 40 | 30 | 20 | 60 Deg | Vertical | 30.79 |
| 40 | 30 | 20 | 60 Deg | Horizontal | 25.64 |
| 41 | 45 | 20 | Horizontal | Vertical | 33.64 |
| 41 | 45 | 20 | Horizontal | Horizontal | 32.13 |
| 41 | 45 | 20 | 60 Deg | Vertical | 28.12 |
| 41 | 45 | 20 | 60 Deg | Horizontal | 29.10 |
| 42 | 60 | 20 | Horizontal | Vertical | 34.05 |
| 42 | 60 | 20 | Horizontal | Horizontal | 32.58 |
| 42 | 60 | 20 | 60 Deg | Vertical | 32.76 |
| 42 | 60 | 20 | 60 Deg | Horizontal | 33.66 |
| 44 | 90 | 20 | Horizontal | Vertical | 35.09 |
| 44 | 90 | 20 | Horizontal | Horizontal | 32.81 |
| 44 | 90 | 20 | 60 Deg | Vertical | 35.05 |
| 44 | 90 | 20 | 60 Deg | Horizontal | 36.25 |
| 56 | -90 | 20 | Horizontal | Vertical | 34.51 |
| 56 | -90 | 20 | Horizontal | Horizontal | 33.73 |
| 56 | -90 | 20 | 60 Deg | Vertical | 33.78 |
| 56 | -90 | 20 | 60 Deg | Horizontal | 35.60 |
| 58 | -60 | 20 | Horizontal | Vertical | 34.82 |
| 58 | -60 | 20 | Horizontal | Horizontal | 32.68 |
| 58 | -60 | 20 | 60 Deg | Vertical | 32.99 |
| 58 | -60 | 20 | 60 Deg | Horizontal | 29.94 |
| 60 | -30 | 20 | Horizontal | Vertical | 36.39 |
| 60 | -30 | 20 | Horizontal | Horizontal | 34.68 |
| 60 | -30 | 20 | 60 Deg | Vertical | 27.32 |
| 60 | -30 | 20 | 60 Deg | Horizontal | 26.54 |

**Table 29**

Maximum Results = 36.49 dBm

1625.833332 MHz

| APV Value | Azimuth Φ | Elevation Θ | EUT Orientation | Test Antenna Polarity | Final EIRP/5 kHz |
|---|---|---|---|---|---|
| 1 | 0 | 90 | Horizontal | Vertical | 27.97 |
| 1 | 0 | 90 | Horizontal | Horizontal | 28.85 |
| 1 | 0 | 90 | 60 Deg | Vertical | 34.06 |
| 1 | 0 | 90 | 60 Deg | Horizontal | 36.25 |
| 1 | 0 | 60 | Horizontal | Vertical | 28.47 |
| 1 | 0 | 60 | Horizontal | Horizontal | 28.09 |
| 1 | 0 | 60 | 60 Deg | Vertical | 28.14 |
| 1 | 0 | 60 | 60 Deg | Horizontal | 29.54 |
| 9 | 30 | 60 | Horizontal | Vertical | 31.02 |
| 9 | 30 | 60 | Horizontal | Horizontal | 31.22 |
| 9 | 30 | 60 | 60 Deg | Vertical | 30.09 |
| 9 | 30 | 60 | 60 Deg | Horizontal | 28.46 |
| 10 | 60 | 60 | Horizontal | Vertical | 29.92 |
| 10 | 60 | 60 | Horizontal | Horizontal | 28.72 |
| 10 | 60 | 60 | 60 Deg | Vertical | 33.08 |
| 10 | 60 | 60 | 60 Deg | Horizontal | 33.88 |
| 11 | 90 | 60 | Horizontal | Vertical | 30.78 |
| 11 | 90 | 60 | Horizontal | Horizontal | 29.07 |
| 11 | 90 | 60 | 60 Deg | Vertical | 35.08 |
| 11 | 90 | 60 | 60 Deg | Horizontal | 36.69 |
| 17 | -90 | 60 | Horizontal | Vertical | 30.00 |
| 17 | -90 | 60 | Horizontal | Horizontal | 28.47 |
| 17 | -90 | 60 | 60 Deg | Vertical | 35.80 |
| 17 | -90 | 60 | 60 Deg | Horizontal | 35.62 |
| 18 | -60 | 60 | Horizontal | Vertical | 31.54 |
| 18 | -60 | 60 | Horizontal | Horizontal | 30.93 |
| 18 | -60 | 60 | 60 Deg | Vertical | 34.18 |
| 18 | -60 | 60 | 60 Deg | Horizontal | 32.89 |
| 19 | -30 | 60 | Horizontal | Vertical | 30.96 |
| 19 | -30 | 60 | Horizontal | Horizontal | 28.42 |
| 19 | -30 | 60 | 60 Deg | Vertical | 29.86 |
| 19 | -30 | 60 | 60 Deg | Horizontal | 31.93 |
| 20 | 0 | 39 | Horizontal | Vertical | 35.68 |
| 20 | 0 | 39 | Horizontal | Horizontal | 34.07 |

| APV Value | Azimuth Φ | Elevation Θ | EUT Orientation | Test Antenna Polarity | Final EIRP/5 kHz |
|---|---|---|---|---|---|
| 20 | 0 | 39 | 60 Deg | Vertical | 28.12 |
| 20 | 0 | 39 | 60 Deg | Horizontal | 27.55 |
| 23 | 60 | 39 | Horizontal | Vertical | 34.83 |
| 23 | 60 | 39 | Horizontal | Horizontal | 31.99 |
| 23 | 60 | 39 | 60 Deg | Vertical | 33.25 |
| 23 | 60 | 39 | 60 Deg | Horizontal | 36.01 |
| 35 | -60 | 39 | Horizontal | Vertical | 34.89 |
| 35 | -60 | 39 | Horizontal | Horizontal | 33.29 |
| 35 | -60 | 39 | 60 Deg | Vertical | 33.09 |
| 35 | -60 | 39 | 60 Deg | Horizontal | 32.29 |
| 38 | 0 | 20 | Horizontal | Vertical | 33.83 |
| 38 | 0 | 20 | Horizontal | Horizontal | 32.60 |
| 38 | 0 | 20 | 60 Deg | Vertical | 28.60 |
| 38 | 0 | 20 | 60 Deg | Horizontal | 31.16 |
| 40 | 30 | 20 | Horizontal | Vertical | 36.03 |
| 40 | 30 | 20 | Horizontal | Horizontal | 33.21 |
| 40 | 30 | 20 | 60 Deg | Vertical | 29.83 |
| 40 | 30 | 20 | 60 Deg | Horizontal | 24.39 |
| 41 | 45 | 20 | Horizontal | Vertical | 33.73 |
| 41 | 45 | 20 | Horizontal | Horizontal | 31.02 |
| 41 | 45 | 20 | 60 Deg | Vertical | 26.66 |
| 41 | 45 | 20 | 60 Deg | Horizontal | 27.80 |
| 42 | 60 | 20 | Horizontal | Vertical | 33.89 |
| 42 | 60 | 20 | Horizontal | Horizontal | 33.36 |
| 42 | 60 | 20 | 60 Deg | Vertical | 31.26 |
| 42 | 60 | 20 | 60 Deg | Horizontal | 32.91 |
| 44 | 90 | 20 | Horizontal | Vertical | 34.93 |
| 44 | 90 | 20 | Horizontal | Horizontal | 33.63 |
| 44 | 90 | 20 | 60 Deg | Vertical | 33.72 |
| 44 | 90 | 20 | 60 Deg | Horizontal | 36.61 |
| 56 | -90 | 20 | Horizontal | Vertical | 35.02 |
| 56 | -90 | 20 | Horizontal | Horizontal | 35.06 |
| 56 | -90 | 20 | 60 Deg | Vertical | 34.02 |
| 56 | -90 | 20 | 60 Deg | Horizontal | 35.77 |
| 58 | -60 | 20 | Horizontal | Vertical | 34.49 |
| 58 | -60 | 20 | Horizontal | Horizontal | 34.18 |
| 58 | -60 | 20 | 60 Deg | Vertical | 32.49 |
| 58 | -60 | 20 | 60 Deg | Horizontal | 30.67 |

| APV Value | Azimuth Φ | Elevation Θ | EUT Orientation | Test Antenna Polarity | Final EIRP/5 kHz |
|---|---|---|---|---|---|
| 60 | -30 | 20 | Horizontal | Vertical | 36.23 |
| 60 | -30 | 20 | Horizontal | Horizontal | 35.24 |
| 60 | -30 | 20 | 60 Deg | Vertical | 27.08 |
| 60 | -30 | 20 | 60 Deg | Horizontal | 26.72 |

**Table 30**

Maximum Results = 36.69 dBm

FCC 47 CFR Part 25, Limit Clause 25.204

+40 dBW in any 4 kHz band for θ ≤ 0°
+40 + 3θ dBW in any 4 kHz band for 0° < θ ≤ 5°
For angles of elevation of the horizon greater than 5° there shall be no restriction as to the equivalent isotropically radiated power transmitted by an earth station towards the horizon.

### 2.4.7 Test Location and Test Equipment Used

This test was carried out in EMC Chamber 5.

| Instrument | Manufacturer | Type No | TE No | Calibration Period (months) | Calibration Due |
|---|---|---|---|---|---|
| Signal Generator | Marconi | 2031 | 53 | 12 | 28-Nov-2017 |
| Signal Generator (10MHz to 40GHz) | Rohde & Schwarz | SMR40 | 1002 | 12 | 14-Oct-2017 |
| Hygrometer | Rotronic | A1 | 1388 | 12 | 13-Apr-2017 |
| Screened Room (5) | Rainford | Rainford | 1545 | 36 | 20-Dec-2017 |
| Turntable Controller | Inn-Co GmbH | CO 1000 | 1606 | - | TU |
| Antenna (DRG Horn) | ETS-Lindgren | 3115 | 3125 | 12 | 25-Jul-2017 |
| 8m Cable | Rhophase | NPS-2302-8000-NPS | 3248 | - | TU |
| Signal Generator: 10MHz to 20GHz | Rohde & Schwarz | SMR20 | 3475 | 12 | 26-Feb-2017 |
| EMI Test Receiver | Rohde & Schwarz | ESU40 | 3506 | 12 | 12-Nov-2017 |
| 7m Armoured RF Cable | SSI Cable Corp. | 1501-13-13-7m WA(-) | 3600 | - | TU |
| 10 mohm Resistor | Cropico | RS3 | 3616 | 48 | 12-Mar-2017 |
| Tilt Antenna Mast | maturo Gmbh | TAM 4.0-P | 3916 | - | TU |
| Mast Controller | maturo Gmbh | NCD | 3917 | - | TU |
| Digital thermo Hygrometer | Radio Spares | 1260 | 4300 | 12 | 23-Aug-2017 |
| 1501A 4.0M Km Km Cable | Rhophase | KPS-1501A-4000-KPS | 4301 | 12 | 03-Aug-2017 |
| Cable (Yellow, Rx, Km-Km 2m) | Scott Cables | KPS-1501-2000-KPS | 4527 | - | O/P Mon |
| Double Ridged Waveguide Horn Antenna | ETS-Lindgren | 3117 | 4722 | 12 | 29-Dec-2016 |
| 4 Channel PSU | Rohde & Schwarz | HMP4040 | 4736 | - | TU |

**Table 31**

TU - Traceability Unscheduled
O/P Mon – Output Monitored using calibration equipment

## 2.5 Limits on Emissions from Mobile Earth Stations for Protection of Aeronautical Radionavigation-Satellite Service

### 2.5.1 Specification Reference

FCC 47 CFR Part 25, Clause 25.216

### 2.5.2 Equipment Under Test and Modification State

Iridium Certus ProtoTerminal / 9801CertusH1, S/N: 300008080004080 - Modification State 0

### 2.5.3 Date of Test

28-November-2016 and 08-March-2017

### 2.5.4 Test Method

This test was performed in accordance with ANSI C63.26, Clause 5.5.

### 2.5.5 Environmental Conditions

| | |
|---|---|
| Ambient Temperature | 19.0 °C |
| Relative Humidity | 29.0 % |

### 2.5.6 Test Results

C8 - QPSK

1616.166666 MHz – Broadband Emission Results

| Frequency (MHz) | Level (dBW) |
|---|---|
| * | |

**Table 32**

*No emissions were detected within 10 dB of the limit.

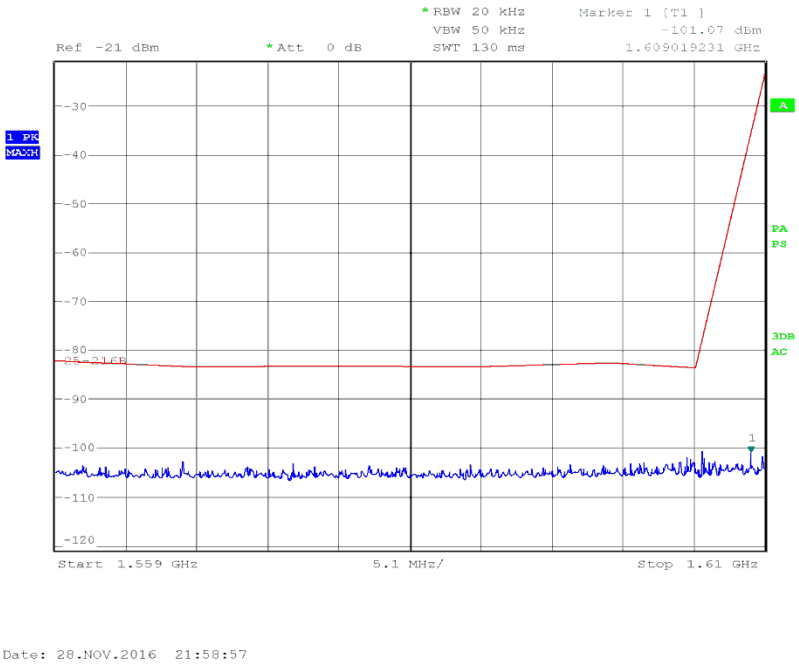


**Figure 32 - Broadband Emissions Result - 1616.166666 MHz**

1616.166666 MHz – Discrete Emission Results

| Frequency (MHz) | Level (dBW) |
|---|---|
| * | |

**Table 33**

*No emissions were detected within 10 dB of the limit.

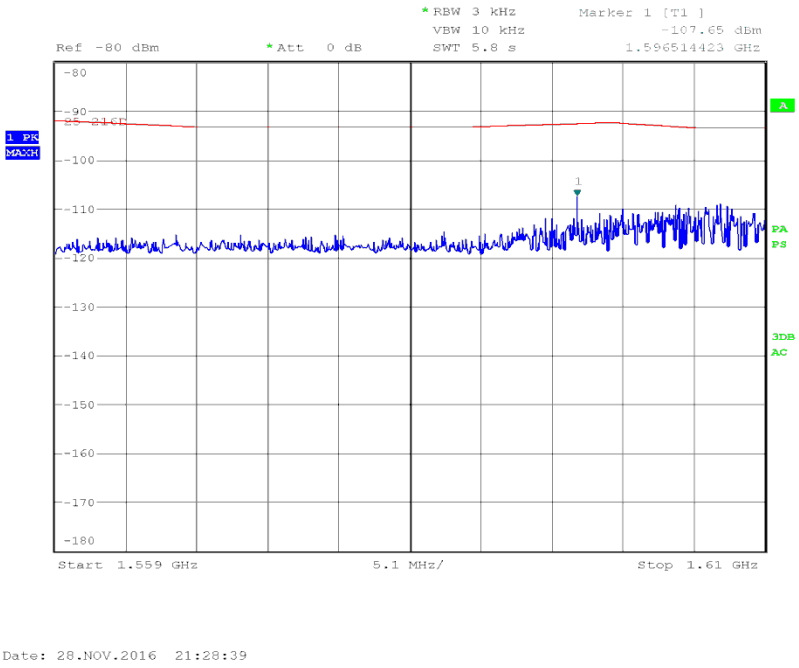


**Figure 33 - Discrete Emissions Result - 1616.166666 MHz**

1621.166666 MHz – Broadband Emission Results

| Frequency (MHz) | Level (dBW) |
|---|---|
| * | |

**Table 34**

*No emissions were detected within 10 dB of the limit.

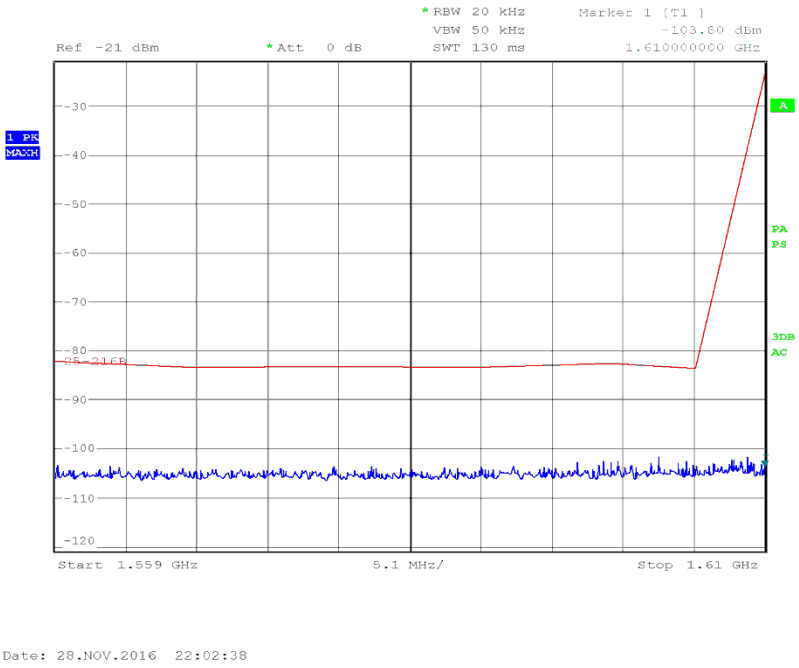


**Figure 34 - Broadband Emissions Results - 1621.166666 MHz**

1621.166666 MHz – Discrete Emission Results

| Frequency (MHz) | Level (dBW) |
|---|---|
| * | |

**Table 35**

*No emissions were detected within 10 dB of the limit.

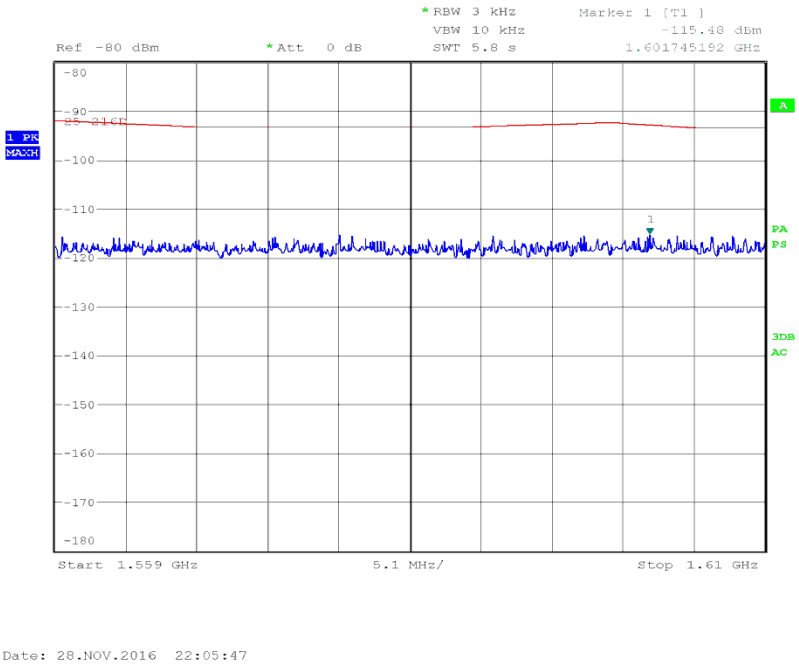


**Figure 35 - Discrete Emissions Results - 1621.166666 MHz**

1625.833332 MHz – Broadband Emission Results

| Frequency (MHz) | Level (dBW) |
|---|---|
| * | |

**Table 36**

*No emissions were detected within 10 dB of the limit.

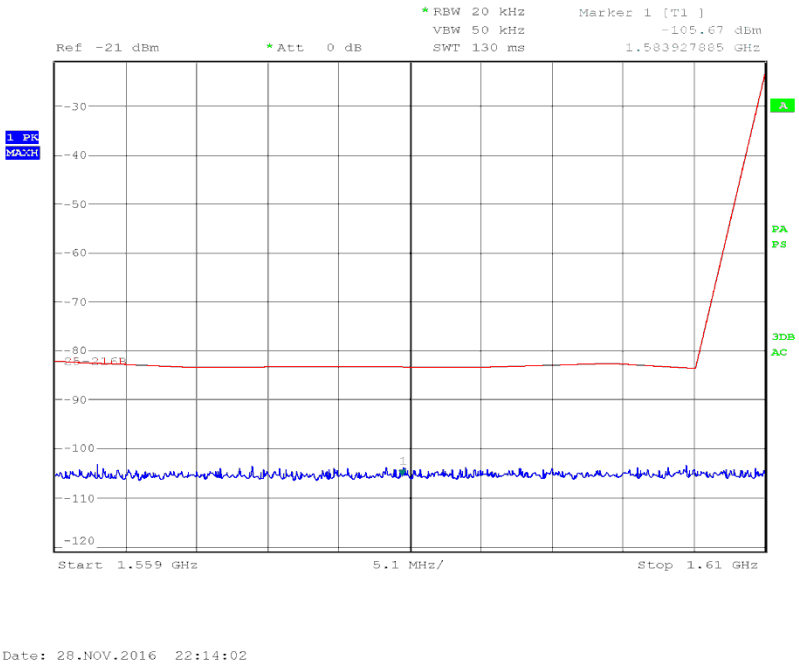


**Figure 36 - Broadband Emissions Results - 1625.833332 MHz**

1625.833332 MHz – Discrete Emission Results

| Frequency (MHz) | Level (dBW) |
|---|---|
| * | |

**Table 37**

*No emissions were detected within 10 dB of the limit.

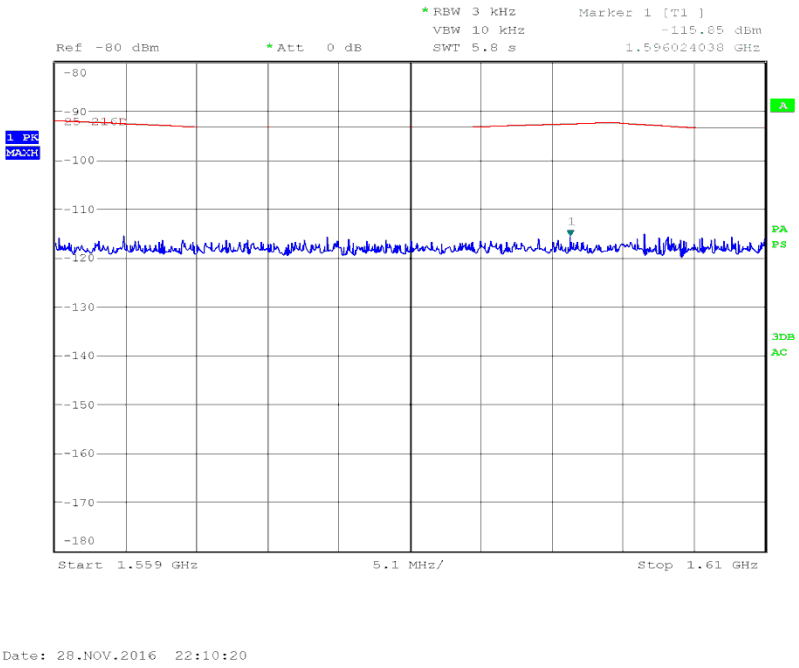


**Figure 37 - Discrete Emissions Results - 1625.833332 MHz**

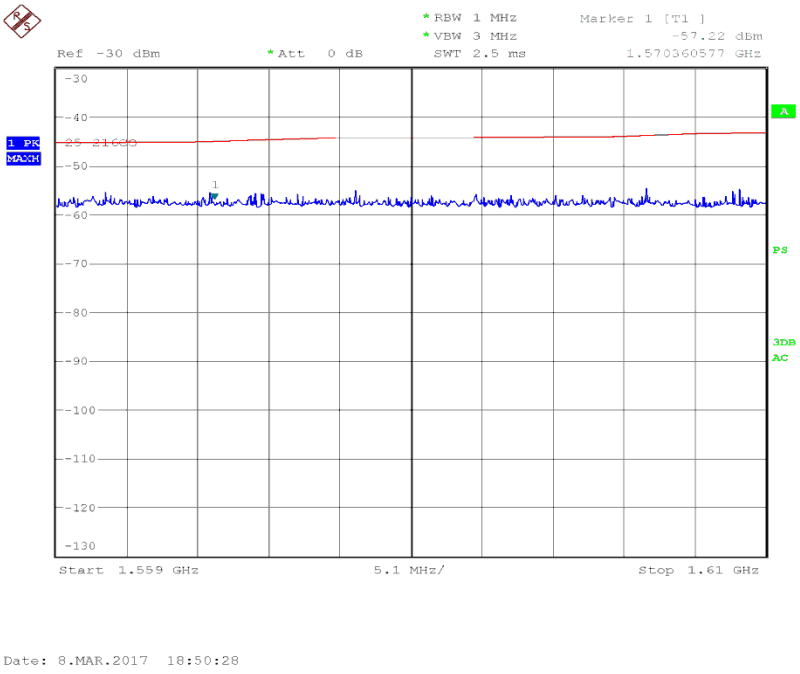


**Figure 38 - Carrier Off Emissions**

FCC 47 CFR Part 25, Limit Clause 25.216

25.216(c) The e.i.r.p. density of emissions from mobile earth stations placed in service after July 21, 2002 with assigned uplink frequencies between 1610 MHz and 1660.5 MHz shall not exceed -70 dBW/MHz, averaged over any 2 millisecond active transmission interval, in the band 1559–1605 MHz. The e.i.r.p. of discrete emissions of less than 700 Hz bandwidth from such stations shall not exceed -80 dBW, averaged over any 2 millisecond active transmission interval, in the 1559–1605 MHz band.

25.216(g) Mobile earth stations manufactured more than six months after FEDERAL REGISTER publication of the rule changes adopted in FCC 03–283 with assigned uplink frequencies in the 1610–1626.5 MHz band shall suppress the power density of emissions in the 1605–1610 MHz band-segment to an extent determined by linear interpolation from -70 dBW/MHz at 1605 MHz to -10 dBW/MHz at 1610 MHz averaged over any 2 millisecond active transmission interval. The e.i.r.p of discrete emissions of less than 700 Hz bandwidth from such stations shall not exceed a level determined by linear interpolation from -80 dBW at 1605 MHz to -20 dBW at 1610 MHz, averaged over any 2 millisecond active transmission interval.

### 2.5.7 Test Location and Test Equipment Used

This test was carried out in EMC Chamber 5.

| Instrument | Manufacturer | Type No | TE No | Calibration Period (months) | Calibration Due |
|---|---|---|---|---|---|
| Tuneable Notch Filter | K&L Microwave | 5TNF-1500/3000-N/N | 435 | - | TU |
| Hygrometer | Rotronic | A1 | 1388 | 12 | 13-Apr-2017 |
| Screened Room (5) | Rainford | Rainford | 1545 | 36 | 20-Dec-2017 |
| Turntable Controller | Inn-Co GmbH | CO 1000 | 1606 | - | TU |
| 8m Cable | Rhophase | NPS-2302-8000-NPS | 3248 | - | TU |
| Signal Generator: 10MHz to 20GHz | Rohde & Schwarz | SMR20 | 3475 | 12 | 26-Feb-2017 |
| EMI Test Receiver | Rohde & Schwarz | ESU40 | 3506 | 12 | 12-Nov-2017 |
| Handheld Digital Multimeter | Agilent Technologies | U1241A | 3625 | 12 | 30-Sep-2017 |
| Tilt Antenna Mast | maturo Gmbh | TAM 4.0-P | 3916 | - | TU |
| Mast Controller | maturo Gmbh | NCD | 3917 | - | TU |
| Cable (Yellow, Rx, Km-Km 2m) | Scott Cables | KPS-1501-2000-KPS | 4527 | - | O/P Mon |
| Cable (Rx, SMAm-SMAm 0.5m) | Scott Cables | SLSLL18-SMSM-00.50M | 4528 | 6 | 03-Feb-2017 |
| Double Ridged Waveguide Horn Antenna | ETS-Lindgren | 3117 | 4722 | 12 | 29-Dec-2016 |
| 4 Channel PSU | Rohde & Schwarz | HMP4040 | 4736 | - | TU |
| 1 - 18GHz DRG Antenna | ETS-Lindgren | 3117 | 4738 | 12 | 04-Feb-2017 |

**Table 38**

TU - Traceability Unscheduled
O/P Mon – Output Monitored using calibrated equipment

## 2.6 Modulation Characteristics

### 2.6.1 Specification Reference

FCC 47 CFR Part 2, Clause 2.1047 (d)

### 2.6.2 Equipment Under Test

Iridium Certus ProtoTerminal / 9801CertusH1

### 2.6.3 Test Results

Iridium - Transmit

In its BASELINE mode the Traffic, Broadcast, Acquisition and Ring alert channels all use differentially encoded quaternary phase shift keyed (DE-QPSK) modulation with 40% square-root raised cosine pulse shaping, and a symbol transmission rate of 25ksps.

In its NEXT mode other Traffic channel modulation schemes are used with selectable bandwidths. Most of these traffic channels use quaternary phase shift keyed (QPSK) modulation with 20% square-root raised cosine pulse shaping, and a symbol transmission rate selected from 30ksps, 60ksps, 120ksps, or 240ksps, depending on the channel operating bandwidth. The highest symbol rate traffic channel also uses a 16APSK modulation scheme with 20% square-root raised cosine pulse shaping, at a symbol transmission rate of 240ksps.

FCC 47 CFR Part 2, Limit Clause 2.1047 (d)

A curve or equivalent data which shows that the equipment will meet the modulation requirements of the rules under which the equipment is to be licensed.

## 2.7 Radiated Spurious Emissions

### 2.7.1 Specification Reference

FCC 47 CFR Part 25, Clause 25.202(f)
FCC 47 CFR Part 2, Clause 2.1051.

### 2.7.2 Equipment Under Test and Modification State

Iridium Certus ProtoTerminal / 9801CertusH1, S/N: 300008080004080 - Modification State 0

### 2.7.3 Date of Test

13-November-2016 to 23-November-2016

### 2.7.4 Test Method

This test was performed in accordance with ANSI C63.26, clause 5.5.

### 2.7.5 Environmental Conditions

| | |
|---|---|
| Ambient Temperature | 19.6 °C |
| Relative Humidity | 26.0 % |

### 2.7.6 Test Results

C8 - 16-APSK

30 MHz to 1 GHz

| Frequency (MHz) | Result (dBm) |
|---|---|
| * | |

**Table 39**

*No emissions were found within 20 dB of the limit.

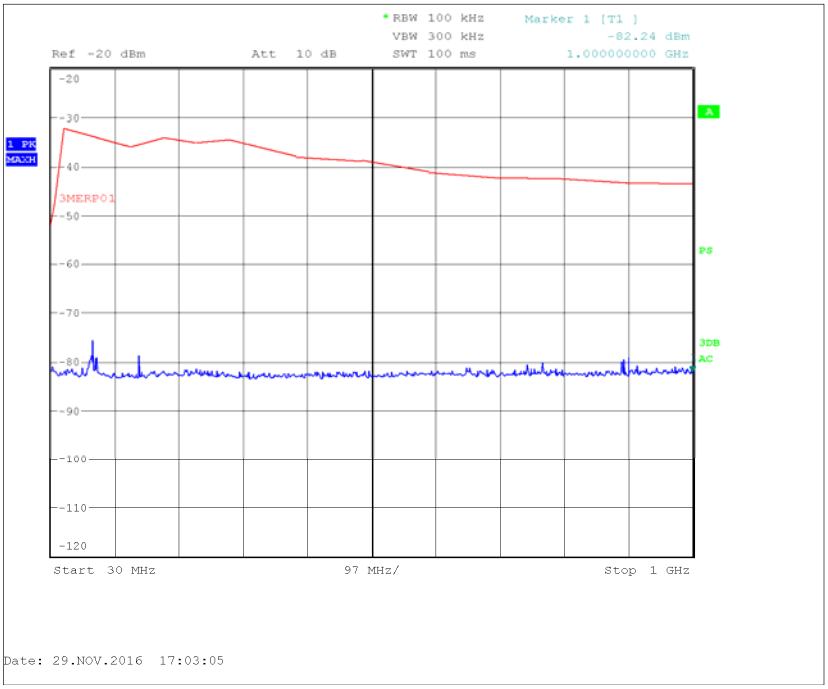


**Figure 39 - 1616.166666 MHz – Frequency Range Under Test: 30 MHz to 1 GHz**

1 GHz to 17 GHz

| Frequency (MHz) | Result (dBm) |
|---|---|
| * | |

**Table 40**

*No emissions were found within 20 dB of the limit.

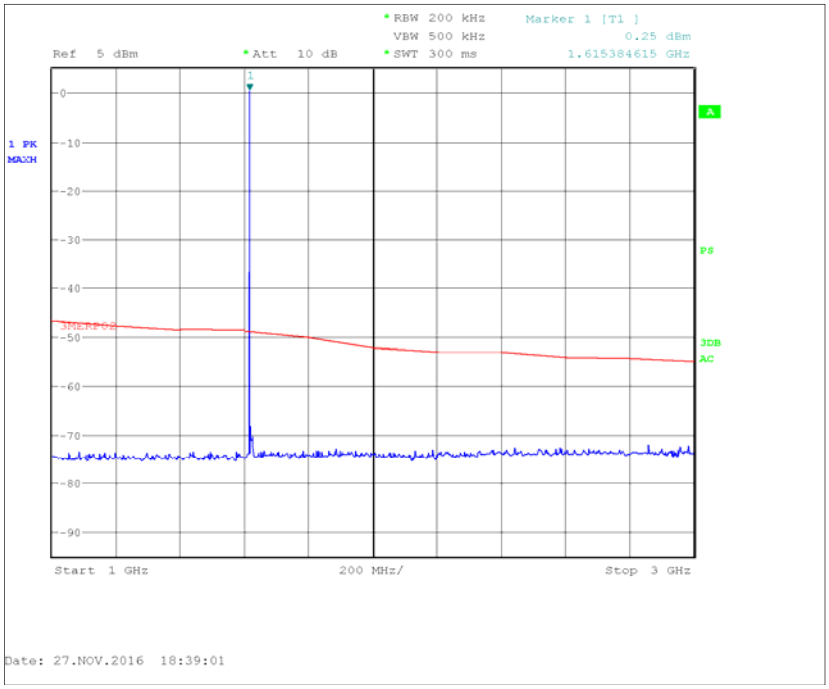


**Figure 40 - 1616.166666 MHz - Frequency Range Under Test: 1 GHz to 3 GHz**

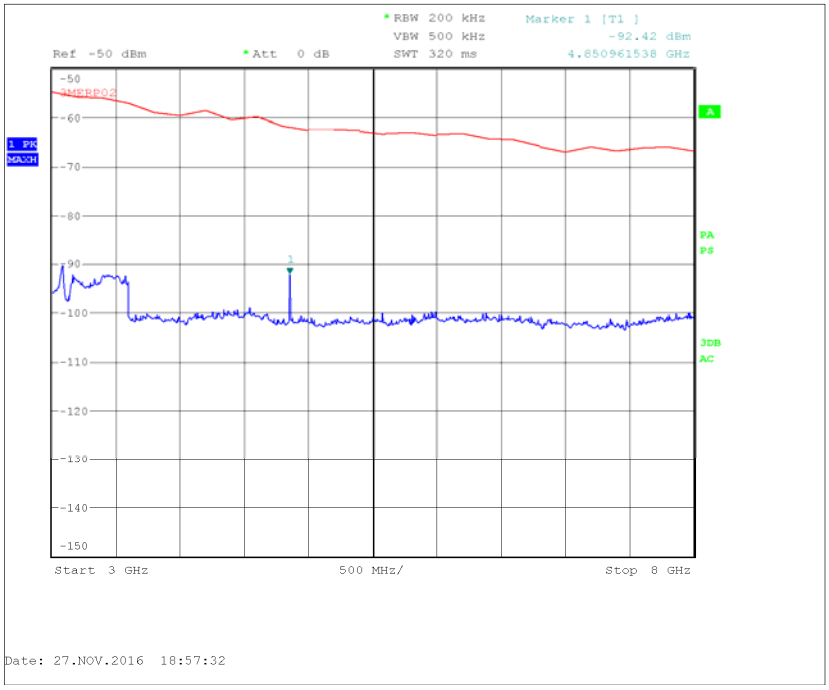


**Figure 41 - 1616.166666 MHz - Frequency Range Under Test: 3 GHz to 8 GHz**

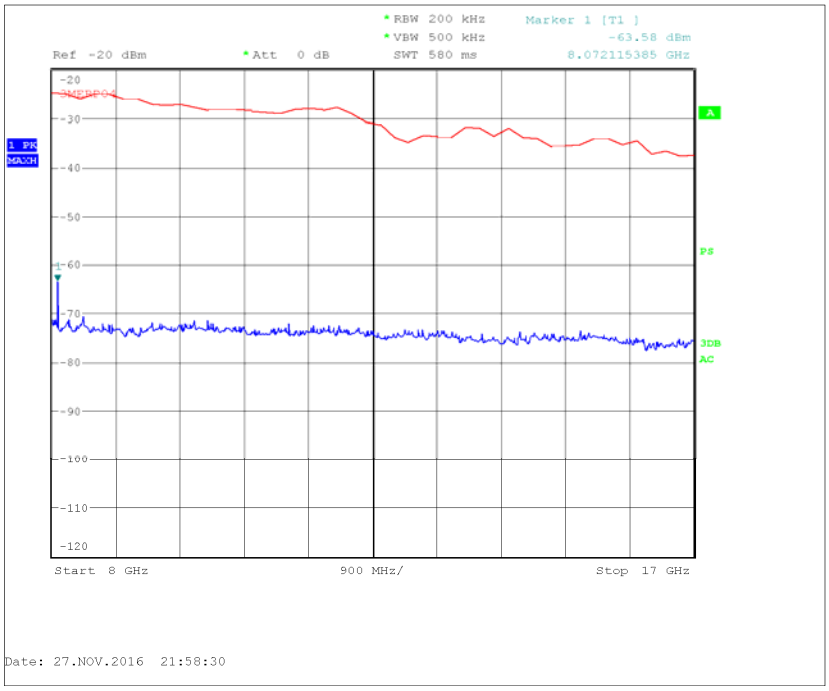


**Figure 42 - 1616.166666 MHz - Frequency Range Under Test: 8 GHz to 17 GHz**

30 MHz to 1 GHz

| Frequency (MHz) | Result (dBm) |
|---|---|
| * | |

**Table 41**

*No emissions were found within 20 dB of the limit.

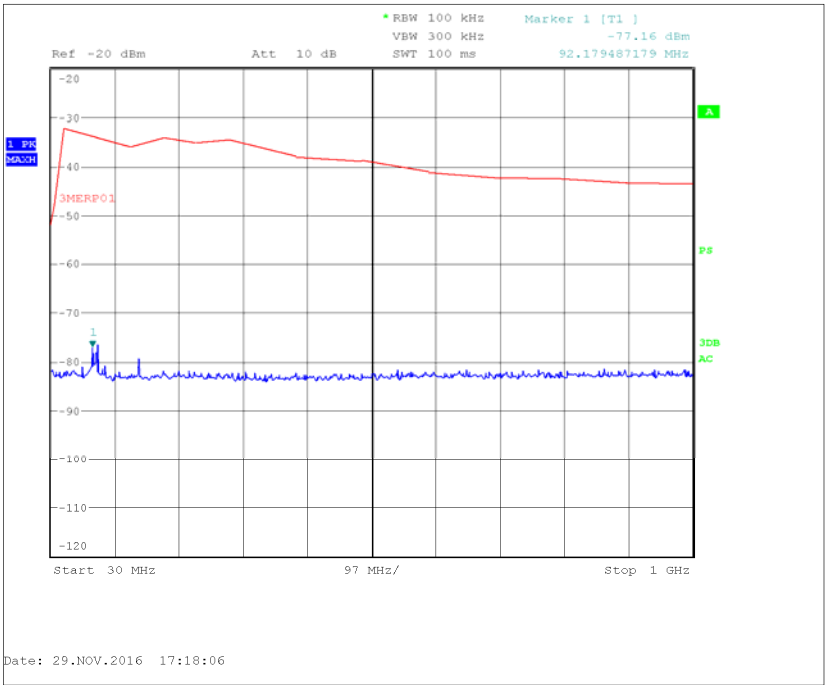


**Figure 43 - 1621.166666 MHz - Frequency Range Under Test: 30 GHz to 1 GHz**

1 GHz to 17 GHz

| Frequency (MHz) | Result (dBm) |
|---|---|
| 3242.334 | -25.75 |

**Table 42**

No other emissions were found within 20 dB of the limit.

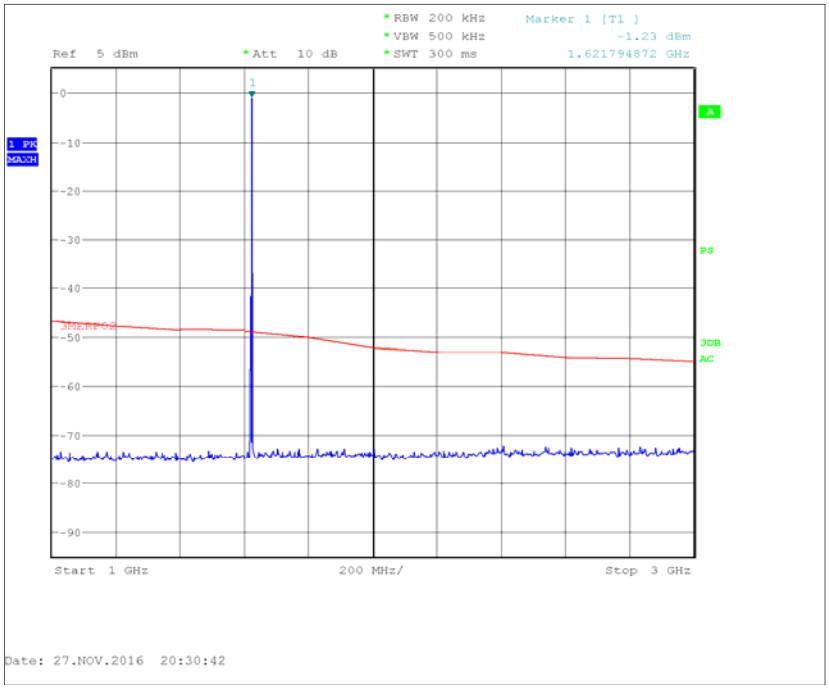


**Figure 44 - 1621.166666 MHz - Frequency Range Under Test: 1 GHz to 3 GHz**

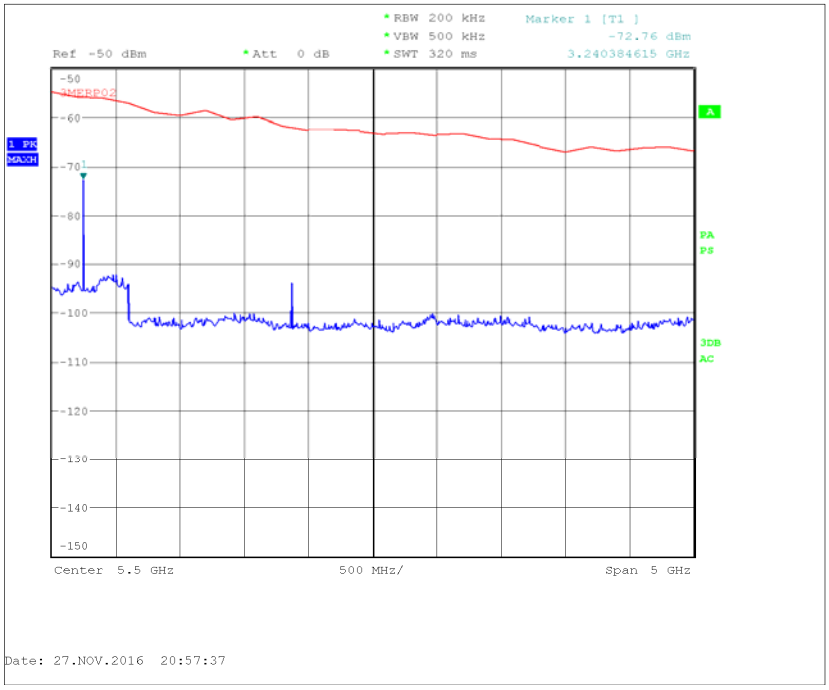


**Figure 45 - 1621.166666 MHz - Frequency Range Under Test: 3 GHz to 8 GHz**

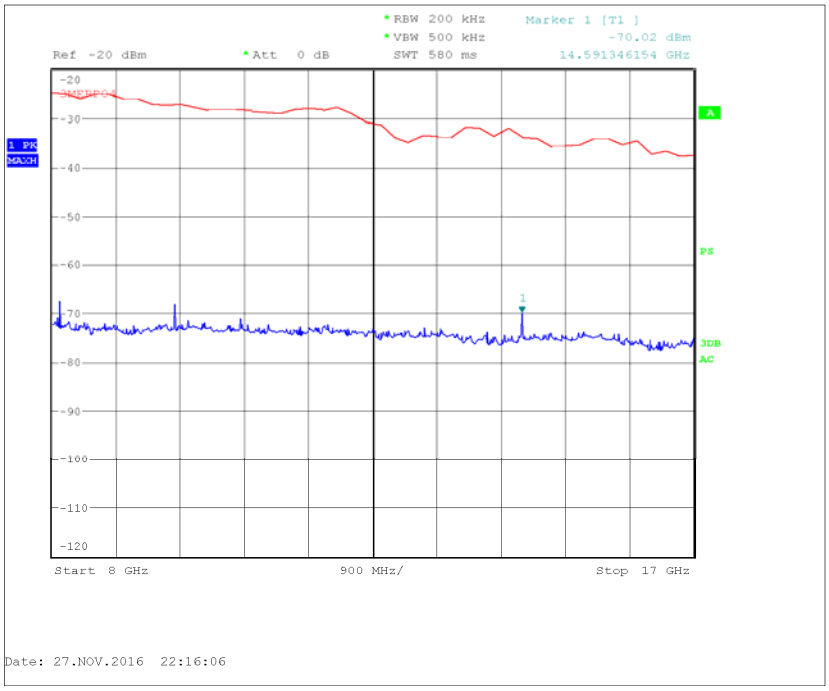


**Figure 46 - 1621.166666 MHz - Frequency Range Under Test: 8 GHz to 17 GHz**

30 MHz to 1 GHz

| Frequency (MHz) | Result (dBm) |
|---|---|
| * | |

**Table 43**

*No emissions were found within 20 dB of the limit.

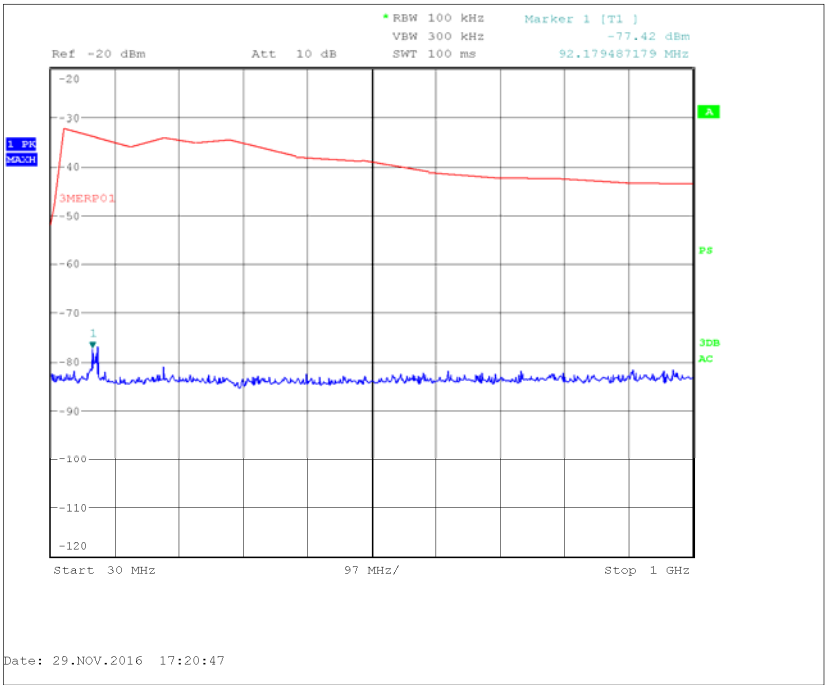


**Figure 47 - 1625.833332 MHz - Frequency Range Under Test: 30 MHz to 1 GHz**

1 GHz to 17 GHz

| Frequency (MHz) | Result (dBm) |
|---|---|
| 3251.606 | -30.49 |

**Table 44**

No other emissions were found within 20 dB of the limit.

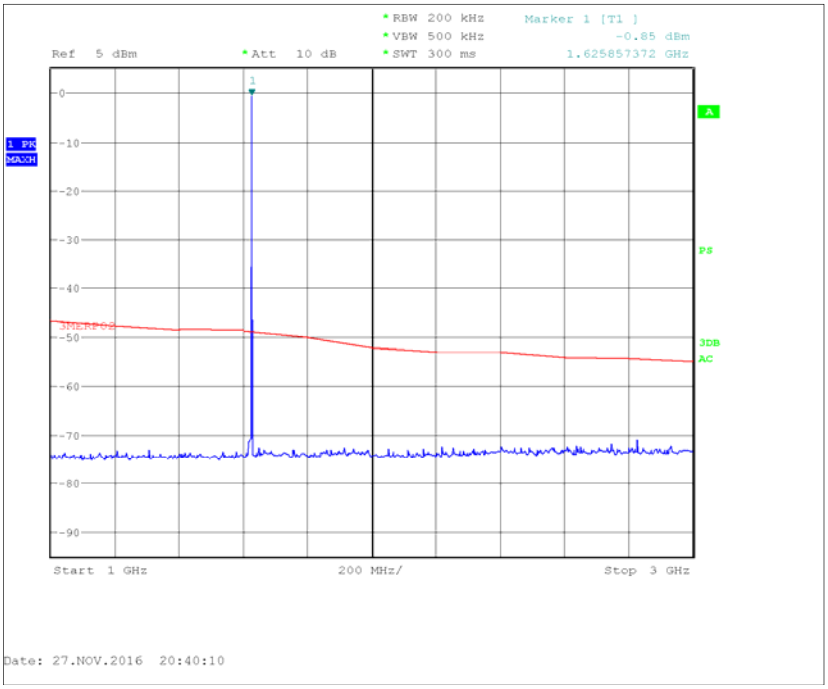


**Figure 48 - 1625.833332 MHz - Frequency Range Under Test: 1 GHz to 3 GHz**

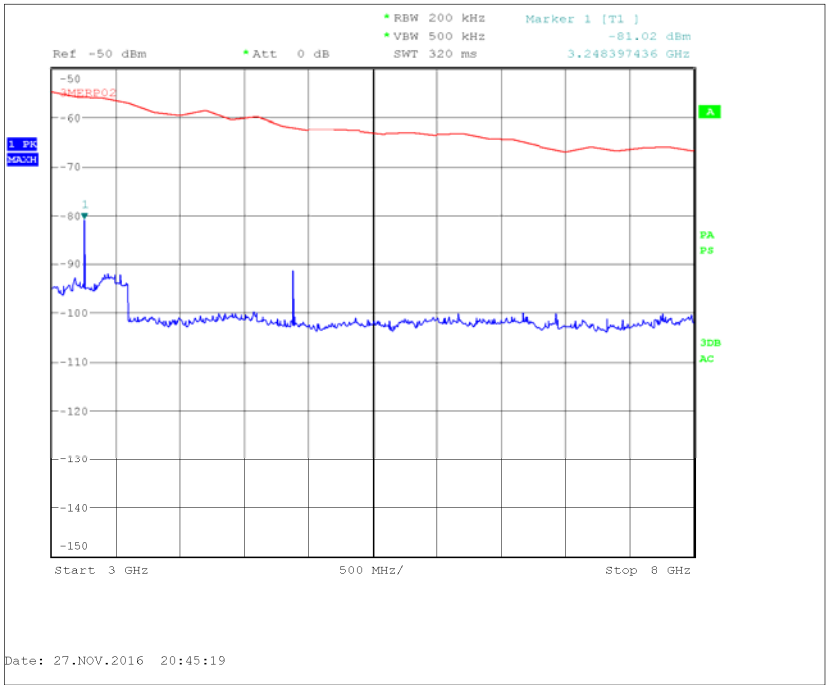


**Figure 49 - 1625.833332 MHz - Frequency Range Under Test: 3 GHz to 8 GHz**

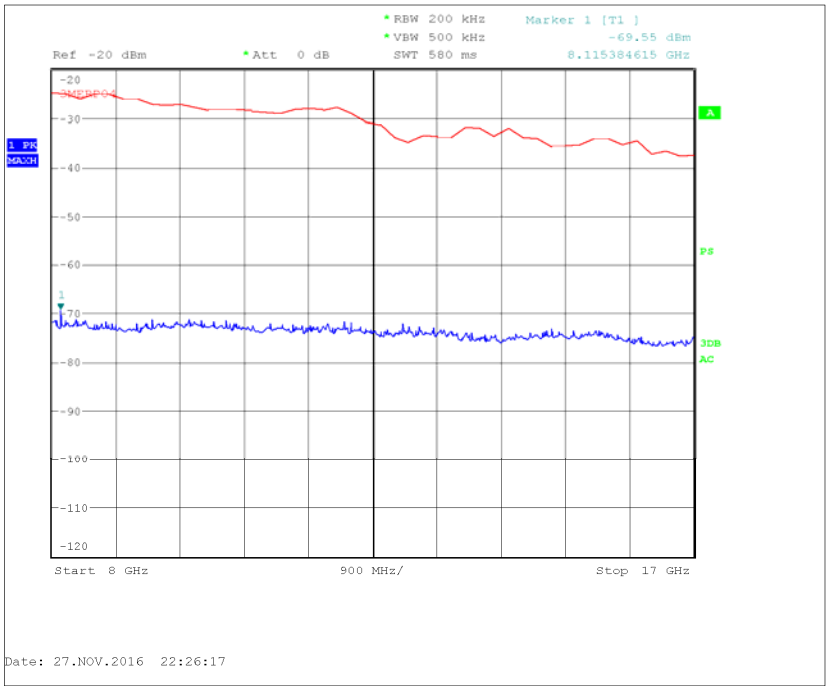


**Figure 50 - 1625.833332 MHz - Frequency Range Under Test: 8 GHz to 17 GHz**

FCC 47 CFR Part 25, Limit Clause 25.202(f)

The average power of unwanted emissions shall be attenuated below the average output power, P(dBW), of the transmitter, as specified below:

1) 25 dB in any 4 kHz band, the centre frequency of which is offset from the channel frequency by more than 50%, up to and including 100% of the authorised bandwidth;
2) 35 dB in any 4 kHz band, the centre frequency of which is offset from the channel frequency by more than 100%, up to and including 250% of the authorised bandwidth;
3) 43 + 10 Log p (watts) in any 4 kHz band, the centre frequency of which is offset from the channel frequency by more than 250% of the authorised bandwidth.

### 2.7.7 Test Location and Test Equipment Used

This test was carried out in EMC Chamber 5.

| Instrument | Manufacturer | Type No | TE No | Calibration Period (months) | Calibration Due |
|---|---|---|---|---|---|
| Antenna (Double Ridge Guide, 1GHz-18GHz) | EMCO | 3115 | 234 | 12 | 29-Apr-2017 |
| Hygrometer | Rotronic | A1 | 1388 | 12 | 13-Apr-2017 |
| Pre-Amplifier | Phase One | PS04-0086 | 1533 | 12 | 29-Jul-2017 |
| Screened Room (5) | Rainford | Rainford | 1545 | 36 | 20-Dec-2017 |
| Turntable Controller | Inn-Co GmbH | CO 1000 | 1606 | - | TU |
| Antenna (Bilog) | Chase | CBL6143 | 2904 | 24 | 11-Jun-2017 |
| 8m Cable | Rhophase | NPS-2302-8000-NPS | 3248 | - | TU |
| Signal Generator: 10MHz to 20GHz | Rohde & Schwarz | SMR20 | 3475 | 12 | 26-Feb-2017 |
| EMI Test Receiver | Rohde & Schwarz | ESU40 | 3506 | 12 | 12-Nov-2017 |
| Tilt Antenna Mast | maturo Gmbh | TAM 4.0-P | 3916 | - | TU |
| Mast Controller | maturo Gmbh | NCD | 3917 | - | TU |
| Cable 1503 2M 2.92(P)m 2.92(P)m | Rhophase | KPS-1503A-2000-KPS | 4293 | 12 | 09-Jun-2016 |
| Suspended Substrate Highpass Filter | Advance Power Components | 11SH10-3000/X18000-O/O | 4411 | 12 | 23-Mar-2017 |
| Cable (Yellow, Rx, Km-Km 2m) | Scott Cables | KPS-1501-2000-KPS | 4527 | - | O/P Mon |
| Cable (Rx, SMAm-SMAm 0.5m) | Scott Cables | SLSLL18-SMSM-00.50M | 4528 | 6 | 03-Feb-2017 |
| Double Ridged Waveguide Horn Antenna | ETS-Lindgren | 3117 | 4722 | 12 | 29-Dec-2016 |
| 4 Channel PSU | Rohde & Schwarz | HMP4040 | 4736 | - | TU |

**Table 45**

TU - Traceability Unscheduled
O/P Mon – Output Monitored using calibration equipment

# 3 Measurement Uncertainty

For a 95% confidence level, the measurement uncertainties for defined systems are:

| Test Name | Measurement Uncertainty |
|---|---|
| Occupied Bandwidth | ± 4.76 kHz |
| Frequency Tolerance | ± 3.54 Hz |
| Spurious Emissions at Antenna Terminals | ± 3.08 dB |
| Equivalent Isotropic Radiated Power | Conducted: ± 0.7 dB<br>Radiated: ± 6.3 dB (1 GHz to 18 GHz) |
| Limits on Emissions from Mobile Earth Stations for Protection of Aeronautical Radionavigation-Satellite Service | Radiated: ± 6.3 dB<br>Conducted: ± 3.45 dB |
| Modulation Characteristics | - |
| Radiated Spurious Emissions | 30 MHz to 1 GHz: ± 5.1 dB<br>1 GHz to 18 GHz: ± 6.3 dB |

**Table 46**

# ANNEX A

# CALCULATED TOTAL PEAK POWER EIRP

Total Peak Power EIRP Results

The total EIRP, which was determined by integrating the power over the occupied bandwidth of the EUT as per the tables below are included in this test report at the request of the manufacturer. The results are derived by calculation from the measured EIRP Peak Power Spectral Density Results reported in section 2.4 of this report.

The following formula was used to derive the total power:

$P_{WIDEBAND} = P_{EIRP/5\ kHz} + 10 * LOG(OBW/5)$

Where OBW = the 99% occupied bandwidth measured in section 2.1.

1616.166666 MHz

| APV Value | Azimuth Φ | Elevation Θ | EUT Orientation | Test Antenna Polarity | Integrated Power over EUT OCB (dBm) |
|---|---|---|---|---|---|
| 1 | 0 | 90 | Horizontal | Vertical | 44.80 |
| 1 | 0 | 90 | Horizontal | Horizontal | 44.04 |
| 1 | 0 | 90 | 60 Deg | Vertical | 50.41 |
| 1 | 0 | 90 | 60 Deg | Horizontal | 52.49 |
| 1 | 0 | 60 | Horizontal | Vertical | 43.96 |
| 1 | 0 | 60 | Horizontal | Horizontal | 44.26 |
| 1 | 0 | 60 | 60 Deg | Vertical | 43.01 |
| 1 | 0 | 60 | 60 Deg | Horizontal | 45.85 |
| 9 | 30 | 60 | Horizontal | Vertical | 47.43 |
| 9 | 30 | 60 | Horizontal | Horizontal | 46.35 |
| 9 | 30 | 60 | 60 Deg | Vertical | 45.84 |
| 9 | 30 | 60 | 60 Deg | Horizontal | 45.01 |
| 10 | 60 | 60 | Horizontal | Vertical | 46.89 |
| 10 | 60 | 60 | Horizontal | Horizontal | 47.31 |
| 10 | 60 | 60 | 60 Deg | Vertical | 49.85 |
| 10 | 60 | 60 | 60 Deg | Horizontal | 51.30 |
| 11 | 90 | 60 | Horizontal | Vertical | 46.99 |
| 11 | 90 | 60 | Horizontal | Horizontal | 47.26 |
| 11 | 90 | 60 | 60 Deg | Vertical | 51.04 |
| 11 | 90 | 60 | 60 Deg | Horizontal | 50.63 |
| 17 | -90 | 60 | Horizontal | Vertical | 47.13 |
| 17 | -90 | 60 | Horizontal | Horizontal | 44.06 |
| 17 | -90 | 60 | 60 Deg | Vertical | 52.80 |
| 17 | -90 | 60 | 60 Deg | Horizontal | 52.07 |
| 18 | -60 | 60 | Horizontal | Vertical | 47.15 |
| 18 | -60 | 60 | Horizontal | Horizontal | 47.62 |
| 18 | -60 | 60 | 60 Deg | Vertical | 50.11 |
| 18 | -60 | 60 | 60 Deg | Horizontal | 49.55 |

| APV Value | Azimuth Φ | Elevation Θ | EUT Orientation | Test Antenna Polarity | Integrated Power over EUT OCB (dBm) |
|---|---|---|---|---|---|
| 19 | -30 | 60 | Horizontal | Vertical | 46.47 |
| 19 | -30 | 60 | Horizontal | Horizontal | 45.47 |
| 19 | -30 | 60 | 60 Deg | Vertical | 44.61 |
| 19 | -30 | 60 | 60 Deg | Horizontal | 46.14 |
| 20 | 0 | 39 | Horizontal | Vertical | 51.34 |
| 20 | 0 | 39 | Horizontal | Horizontal | 49.35 |
| 20 | 0 | 39 | 60 Deg | Vertical | 43.18 |
| 20 | 0 | 39 | 60 Deg | Horizontal | 42.65 |
| 23 | 60 | 39 | Horizontal | Vertical | 51.61 |
| 23 | 60 | 39 | Horizontal | Horizontal | 49.53 |
| 23 | 60 | 39 | 60 Deg | Vertical | 50.09 |
| 23 | 60 | 39 | 60 Deg | Horizontal | 52.71 |
| 35 | -60 | 39 | Horizontal | Vertical | 50.75 |
| 35 | -60 | 39 | Horizontal | Horizontal | 50.05 |
| 35 | -60 | 39 | 60 Deg | Vertical | 48.68 |
| 35 | -60 | 39 | 60 Deg | Horizontal | 48.94 |
| 38 | 0 | 20 | Horizontal | Vertical | 49.17 |
| 38 | 0 | 20 | Horizontal | Horizontal | 49.01 |
| 38 | 0 | 20 | 60 Deg | Vertical | 45.65 |
| 38 | 0 | 20 | 60 Deg | Horizontal | 47.62 |
| 40 | 30 | 20 | Horizontal | Vertical | 52.59 |
| 40 | 30 | 20 | Horizontal | Horizontal | 50.61 |
| 40 | 30 | 20 | 60 Deg | Vertical | 45.84 |
| 40 | 30 | 20 | 60 Deg | Horizontal | 43.52 |
| 41 | 45 | 20 | Horizontal | Vertical | 50.14 |
| 41 | 45 | 20 | Horizontal | Horizontal | 48.22 |
| 41 | 45 | 20 | 60 Deg | Vertical | 44.14 |
| 41 | 45 | 20 | 60 Deg | Horizontal | 46.37 |
| 42 | 60 | 20 | Horizontal | Vertical | 50.18 |
| 42 | 60 | 20 | Horizontal | Horizontal | 49.23 |
| 42 | 60 | 20 | 60 Deg | Vertical | 49.83 |
| 42 | 60 | 20 | 60 Deg | Horizontal | 50.14 |
| 44 | 90 | 20 | Horizontal | Vertical | 50.50 |
| 44 | 90 | 20 | Horizontal | Horizontal | 48.42 |
| 44 | 90 | 20 | 60 Deg | Vertical | 51.65 |
| 44 | 90 | 20 | 60 Deg | Horizontal | 52.67 |
| 56 | -90 | 20 | Horizontal | Vertical | 50.58 |
| 56 | -90 | 20 | Horizontal | Horizontal | 50.45 |

| APV Value | Azimuth Φ | Elevation Θ | EUT Orientation | Test Antenna Polarity | Integrated Power over EUT OCB (dBm) |
|---|---|---|---|---|---|
| 56 | -90 | 20 | 60 Deg | Vertical | 51.62 |
| 56 | -90 | 20 | 60 Deg | Horizontal | 52.46 |
| 58 | -60 | 20 | Horizontal | Vertical | 51.98 |
| 58 | -60 | 20 | Horizontal | Horizontal | 50.47 |
| 58 | -60 | 20 | 60 Deg | Vertical | 49.95 |
| 58 | -60 | 20 | 60 Deg | Horizontal | 47.72 |
| 60 | -30 | 20 | Horizontal | Vertical | 52.67 |
| 60 | -30 | 20 | Horizontal | Horizontal | 52.77 |
| 60 | -30 | 20 | 60 Deg | Vertical | 45.17 |
| 60 | -30 | 20 | 60 Deg | Horizontal | 45.46 |

**Table 47**

Maximum Result = 52.71 dBm

1621.166666 MHz

| APV Value | Azimuth Φ | Elevation Θ | EUT Orientation | Test Antenna Polarity | Integrated Power over EUT OCB (dBm) |
|---|---|---|---|---|---|
| 1 | 0 | 90 | Horizontal | Vertical | 45.50 |
| 1 | 0 | 90 | Horizontal | Horizontal | 45.10 |
| 1 | 0 | 90 | 60 Deg | Vertical | 51.11 |
| 1 | 0 | 90 | 60 Deg | Horizontal | 52.78 |
| 1 | 0 | 60 | Horizontal | Vertical | 45.56 |
| 1 | 0 | 60 | Horizontal | Horizontal | 44.68 |
| 1 | 0 | 60 | 60 Deg | Vertical | 45.17 |
| 1 | 0 | 60 | 60 Deg | Horizontal | 46.22 |
| 9 | 30 | 60 | Horizontal | Vertical | 48.07 |
| 9 | 30 | 60 | Horizontal | Horizontal | 46.55 |
| 9 | 30 | 60 | 60 Deg | Vertical | 47.14 |
| 9 | 30 | 60 | 60 Deg | Horizontal | 45.08 |
| 10 | 60 | 60 | Horizontal | Vertical | 47.26 |
| 10 | 60 | 60 | Horizontal | Horizontal | 46.42 |
| 10 | 60 | 60 | 60 Deg | Vertical | 50.87 |
| 10 | 60 | 60 | 60 Deg | Horizontal | 51.33 |
| 11 | 90 | 60 | Horizontal | Vertical | 48.14 |
| 11 | 90 | 60 | Horizontal | Horizontal | 46.60 |
| 11 | 90 | 60 | 60 Deg | Vertical | 52.54 |
| 11 | 90 | 60 | 60 Deg | Horizontal | 53.66 |
| 17 | -90 | 60 | Horizontal | Vertical | 47.64 |
| 17 | -90 | 60 | Horizontal | Horizontal | 44.53 |
| 17 | -90 | 60 | 60 Deg | Vertical | 53.50 |
| 17 | -90 | 60 | 60 Deg | Horizontal | 52.25 |
| 18 | -60 | 60 | Horizontal | Vertical | 46.57 |
| 18 | -60 | 60 | Horizontal | Horizontal | 48.06 |
| 18 | -60 | 60 | 60 Deg | Vertical | 51.40 |
| 18 | -60 | 60 | 60 Deg | Horizontal | 50.11 |
| 19 | -30 | 60 | Horizontal | Vertical | 47.70 |
| 19 | -30 | 60 | Horizontal | Horizontal | 45.97 |
| 19 | -30 | 60 | 60 Deg | Vertical | 46.96 |
| 19 | -30 | 60 | 60 Deg | Horizontal | 46.80 |
| 20 | 0 | 39 | Horizontal | Vertical | 51.68 |
| 20 | 0 | 39 | Horizontal | Horizontal | 50.52 |
| 20 | 0 | 39 | 60 Deg | Vertical | 44.25 |
| 20 | 0 | 39 | 60 Deg | Horizontal | 44.18 |
| 23 | 60 | 39 | Horizontal | Vertical | 52.31 |
| 23 | 60 | 39 | Horizontal | Horizontal | 50.28 |

| APV Value | Azimuth Φ | Elevation Θ | EUT Orientation | Test Antenna Polarity | Integrated Power over EUT OCB (dBm) |
|---|---|---|---|---|---|
| 23 | 60 | 39 | 60 Deg | Vertical | 51.30 |
| 23 | 60 | 39 | 60 Deg | Horizontal | 53.11 |
| 35 | -60 | 39 | Horizontal | Vertical | 52.24 |
| 35 | -60 | 39 | Horizontal | Horizontal | 50.16 |
| 35 | -60 | 39 | 60 Deg | Vertical | 50.38 |
| 35 | -60 | 39 | 60 Deg | Horizontal | 48.75 |
| 38 | 0 | 20 | Horizontal | Vertical | 50.36 |
| 38 | 0 | 20 | Horizontal | Horizontal | 49.92 |
| 38 | 0 | 20 | 60 Deg | Vertical | 46.16 |
| 38 | 0 | 20 | 60 Deg | Horizontal | 47.65 |
| 40 | 30 | 20 | Horizontal | Vertical | 53.61 |
| 40 | 30 | 20 | Horizontal | Horizontal | 51.43 |
| 40 | 30 | 20 | 60 Deg | Vertical | 47.96 |
| 40 | 30 | 20 | 60 Deg | Horizontal | 42.81 |
| 41 | 45 | 20 | Horizontal | Vertical | 50.81 |
| 41 | 45 | 20 | Horizontal | Horizontal | 49.30 |
| 41 | 45 | 20 | 60 Deg | Vertical | 45.29 |
| 41 | 45 | 20 | 60 Deg | Horizontal | 46.27 |
| 42 | 60 | 20 | Horizontal | Vertical | 51.22 |
| 42 | 60 | 20 | Horizontal | Horizontal | 49.75 |
| 42 | 60 | 20 | 60 Deg | Vertical | 49.93 |
| 42 | 60 | 20 | 60 Deg | Horizontal | 50.83 |
| 44 | 90 | 20 | Horizontal | Vertical | 52.26 |
| 44 | 90 | 20 | Horizontal | Horizontal | 49.98 |
| 44 | 90 | 20 | 60 Deg | Vertical | 52.22 |
| 44 | 90 | 20 | 60 Deg | Horizontal | 53.42 |
| 56 | -90 | 20 | Horizontal | Vertical | 51.68 |
| 56 | -90 | 20 | Horizontal | Horizontal | 50.90 |
| 56 | -90 | 20 | 60 Deg | Vertical | 50.95 |
| 56 | -90 | 20 | 60 Deg | Horizontal | 52.77 |
| 58 | -60 | 20 | Horizontal | Vertical | 51.99 |
| 58 | -60 | 20 | Horizontal | Horizontal | 49.85 |
| 58 | -60 | 20 | 60 Deg | Vertical | 50.16 |
| 58 | -60 | 20 | 60 Deg | Horizontal | 47.11 |
| 60 | -30 | 20 | Horizontal | Vertical | 53.56 |
| 60 | -30 | 20 | Horizontal | Horizontal | 51.85 |
| 60 | -30 | 20 | 60 Deg | Vertical | 44.49 |
| 60 | -30 | 20 | 60 Deg | Horizontal | 43.71 |

**Table 48**

Maximum Result = 53.66 dBm

1625.833332 MHz

| APV Value | Azimuth Φ | Elevation Θ | EUT Orientation | Test Antenna Polarity | Integrated Power over EUT OCB (dBm) |
|---|---|---|---|---|---|
| 1 | 0 | 90 | Horizontal | Vertical | 45.12 |
| 1 | 0 | 90 | Horizontal | Horizontal | 46.00 |
| 1 | 0 | 90 | 60 Deg | Vertical | 51.21 |
| 1 | 0 | 90 | 60 Deg | Horizontal | 53.40 |
| 1 | 0 | 60 | Horizontal | Vertical | 45.62 |
| 1 | 0 | 60 | Horizontal | Horizontal | 45.24 |
| 1 | 0 | 60 | 60 Deg | Vertical | 45.29 |
| 1 | 0 | 60 | 60 Deg | Horizontal | 46.69 |
| 9 | 30 | 60 | Horizontal | Vertical | 48.17 |
| 9 | 30 | 60 | Horizontal | Horizontal | 48.37 |
| 9 | 30 | 60 | 60 Deg | Vertical | 47.24 |
| 9 | 30 | 60 | 60 Deg | Horizontal | 45.61 |
| 10 | 60 | 60 | Horizontal | Vertical | 47.07 |
| 10 | 60 | 60 | Horizontal | Horizontal | 45.87 |
| 10 | 60 | 60 | 60 Deg | Vertical | 50.23 |
| 10 | 60 | 60 | 60 Deg | Horizontal | 51.03 |
| 11 | 90 | 60 | Horizontal | Vertical | 47.93 |
| 11 | 90 | 60 | Horizontal | Horizontal | 46.22 |
| 11 | 90 | 60 | 60 Deg | Vertical | 52.23 |
| 11 | 90 | 60 | 60 Deg | Horizontal | 53.84 |
| 17 | -90 | 60 | Horizontal | Vertical | 47.15 |
| 17 | -90 | 60 | Horizontal | Horizontal | 45.62 |
| 17 | -90 | 60 | 60 Deg | Vertical | 52.95 |
| 17 | -90 | 60 | 60 Deg | Horizontal | 52.77 |
| 18 | -60 | 60 | Horizontal | Vertical | 48.69 |
| 18 | -60 | 60 | Horizontal | Horizontal | 48.08 |
| 18 | -60 | 60 | 60 Deg | Vertical | 51.33 |
| 18 | -60 | 60 | 60 Deg | Horizontal | 50.04 |
| 19 | -30 | 60 | Horizontal | Vertical | 48.11 |
| 19 | -30 | 60 | Horizontal | Horizontal | 45.57 |
| 19 | -30 | 60 | 60 Deg | Vertical | 47.01 |
| 19 | -30 | 60 | 60 Deg | Horizontal | 49.08 |
| 20 | 0 | 39 | Horizontal | Vertical | 52.83 |
| 20 | 0 | 39 | Horizontal | Horizontal | 51.22 |
| 20 | 0 | 39 | 60 Deg | Vertical | 45.27 |
| 20 | 0 | 39 | 60 Deg | Horizontal | 44.70 |
| 23 | 60 | 39 | Horizontal | Vertical | 51.98 |

| APV Value | Azimuth Φ | Elevation Θ | EUT Orientation | Test Antenna Polarity | Integrated Power over EUT OCB (dBm) |
|---|---|---|---|---|---|
| 23 | 60 | 39 | Horizontal | Horizontal | 49.14 |
| 23 | 60 | 39 | 60 Deg | Vertical | 50.40 |
| 23 | 60 | 39 | 60 Deg | Horizontal | 53.16 |
| 35 | -60 | 39 | Horizontal | Vertical | 52.04 |
| 35 | -60 | 39 | Horizontal | Horizontal | 50.44 |
| 35 | -60 | 39 | 60 Deg | Vertical | 50.24 |
| 35 | -60 | 39 | 60 Deg | Horizontal | 49.44 |
| 38 | 0 | 20 | Horizontal | Vertical | 50.98 |
| 38 | 0 | 20 | Horizontal | Horizontal | 49.75 |
| 38 | 0 | 20 | 60 Deg | Vertical | 45.75 |
| 38 | 0 | 20 | 60 Deg | Horizontal | 48.31 |
| 40 | 30 | 20 | Horizontal | Vertical | 53.18 |
| 40 | 30 | 20 | Horizontal | Horizontal | 50.36 |
| 40 | 30 | 20 | 60 Deg | Vertical | 46.98 |
| 40 | 30 | 20 | 60 Deg | Horizontal | 41.54 |
| 41 | 45 | 20 | Horizontal | Vertical | 50.88 |
| 41 | 45 | 20 | Horizontal | Horizontal | 48.17 |
| 41 | 45 | 20 | 60 Deg | Vertical | 43.81 |
| 41 | 45 | 20 | 60 Deg | Horizontal | 44.95 |
| 42 | 60 | 20 | Horizontal | Vertical | 51.04 |
| 42 | 60 | 20 | Horizontal | Horizontal | 50.51 |
| 42 | 60 | 20 | 60 Deg | Vertical | 48.41 |
| 42 | 60 | 20 | 60 Deg | Horizontal | 50.06 |
| 44 | 90 | 20 | Horizontal | Vertical | 52.08 |
| 44 | 90 | 20 | Horizontal | Horizontal | 50.78 |
| 44 | 90 | 20 | 60 Deg | Vertical | 50.87 |
| 44 | 90 | 20 | 60 Deg | Horizontal | 53.76 |
| 56 | -90 | 20 | Horizontal | Vertical | 52.17 |
| 56 | -90 | 20 | Horizontal | Horizontal | 52.21 |
| 56 | -90 | 20 | 60 Deg | Vertical | 51.17 |
| 56 | -90 | 20 | 60 Deg | Horizontal | 52.92 |
| 58 | -60 | 20 | Horizontal | Vertical | 51.64 |
| 58 | -60 | 20 | Horizontal | Horizontal | 51.33 |
| 58 | -60 | 20 | 60 Deg | Vertical | 49.64 |
| 58 | -60 | 20 | 60 Deg | Horizontal | 47.82 |
| 60 | -30 | 20 | Horizontal | Vertical | 53.38 |
| 60 | -30 | 20 | Horizontal | Horizontal | 52.39 |
| 60 | -30 | 20 | 60 Deg | Vertical | 44.23 |

| APV Value | Azimuth Φ | Elevation Θ | EUT Orientation | Test Antenna Polarity | Integrated Power over EUT OCB (dBm) |
|---|---|---|---|---|---|
| 60 | -30 | 20 | 60 Deg | Horizontal | 43.87 |

**Table 49**

Maximum Result = 53.84 dBm