

FCC Testing of the Iridium Certus ProtoTerminal / 9801CERTUSH2 In accordance with FCC 47 CFR Part 25 and FCC 47 CFR Part 2

Prepared for: Iridium Satellite LLC
1750 Tyson's Boulevard
Suite 1400
McLean
VA 22102
United States

FCC ID: Q639801Certush2

COMMERCIAL-IN-CONFIDENCE

Date: April 2017
Document Number: 75936576-01 | Issue: 01



Product Service

Choose certainty.
Add value.

RESPONSIBLE FOR	NAME	DATE	SIGNATURE
Project Management	Steven White	11 April 2017	
Authorised Signatory	Simon Bennett	11 April 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	Graeme Lawler	11 April 2017	
Testing	Matthew Russell	11 April 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.



DISCLAIMER AND COPYRIGHT

This non-binding report has been prepared by TÜV SÜD Product Service with all reasonable skill and care. The document is confidential to the potential Client and TÜV SÜD Product Service. No part of this document may be reproduced without the prior written approval of TÜV SÜD Product Service. © 2017 TÜV SÜD Product Service.

ACCREDITATION

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).

TÜV SÜD Product Service
is a trading name of TÜV SÜD Ltd
Registered in Scotland at East Kilbride,
Glasgow G75 0QF, United Kingdom
Registered number: SC215164

TÜV SÜD Ltd is a
TÜV SÜD Group Company

Phone: +44 (0) 1489 558100
Fax: +44 (0) 1489 558101
www.tuv-sud.co.uk

TÜV SÜD Product Service
Octagon House
Concorde Way
Fareham
Hampshire PO15 5RL
United Kingdom



Contents

1	Report Summary	2
1.1	Report Modification Record.....	2
1.2	Introduction.....	2
1.3	Brief Summary of Results	3
1.4	Application Form	5
1.5	Product Information	7
1.6	Deviations from the Standard.....	7
1.7	EUT Modification Record	7
1.8	Test Location.....	8
2	Test Details	10
2.1	Occupied Bandwidth	10
2.2	Frequency Tolerance	26
2.3	Spurious Emissions at Antenna Terminals	33
2.4	Equivalent Isotropic Radiated Power	49
2.5	Radiated Spurious Emissions	63
2.6	Limits on Emissions from Mobile Earth Stations for Protection of Aeronautical Radionavigation-Satellite Service.....	75
2.7	Modulation Characteristics	84
3	Measurement Uncertainty	85
ANNEX A	Calculated Total Peak Power EIRP	A.2

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	11 April 2017

Table 1

1.2 Introduction

Applicant	Iridium Satellite LLC
Manufacturer	Iridium Satellite LLC
Model Number(s)	Iridium Certus ProtoTerminal / 9801CertusH2
Serial Number(s)	42290124
Hardware Version(s)	A3
Software Version(s)	A
Number of Samples Tested	1
Test Specification/Issue/Date	FCC 47 CFR Part 25: 2015 FCC 47 CFR Part 2: 2015
Order Number	39103/JEHJ
Date	12-October-2016
Date of Receipt of EUT	03-January-2017
Start of Test	03-January-2017
Finish of Test	29-March-2017
Name of Engineer(s)	Graeme Lawler and Matthew Russell
Related Document(s)	ANSI C63.26 (2015)



Product Service

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
Configuration and Mode: B1 - QPSK				
2.1	2.1049	Occupied Bandwidth	Pass	ANSI C63.26 (2015)
2.2	25.202(d) and 2.1055	Frequency Tolerance	Pass	ANSI C63.26 (2015)
2.3	25.202(f) and 2.1051	Spurious Emissions at Antenna Terminals	Pass	ANSI C63.26 (2015)
2.4	25.204	Equivalent Isotropic Radiated Power	Pass	ANSI C63.26 (2015)
Configuration and Mode: C1 - QPSK				
2.1	2.1049	Occupied Bandwidth	Pass	ANSI C63.26 (2015)
2.2	25.202(d) and 2.1055	Frequency Tolerance	Pass	ANSI C63.26 (2015)
2.3	25.202(f) and 2.1051	Spurious Emissions at Antenna Terminals	Pass	ANSI C63.26 (2015)
2.4	25.204	Equivalent Isotropic Radiated Power	Pass	ANSI C63.26 (2015)
Configuration and Mode: C2 - QPSK				
2.1	2.1049	Occupied Bandwidth	Pass	ANSI C63.26 (2015)
2.2	25.202(d) and 2.1055	Frequency Tolerance	Pass	ANSI C63.26 (2015)
2.3	25.202(f) and 2.1051	Spurious Emissions at Antenna Terminals	Pass	ANSI C63.26 (2015)
2.4	25.204	Equivalent Isotropic Radiated Power	Pass	ANSI C63.26 (2015)
Configuration and Mode: C8 - 16-APSK				
2.1	2.1049	Occupied Bandwidth	Pass	ANSI C63.26 (2015)
2.2	25.202(d) and 2.1055	Frequency Tolerance	Pass	ANSI C63.26 (2015)
2.3	25.202(f) and 2.1051	Spurious Emissions at Antenna Terminals	Pass	ANSI C63.26 (2015)
2.5	25.202(f) and 2.1051.	Radiated Spurious Emissions	Pass	ANSI C63.26 (2015)
2.4	25.204	Equivalent Isotropic Radiated Power	Pass	ANSI C63.26 (2015)



Product Service

Section	Specification Clause	Test Description	Result	Comments/Base Standard
Configuration and Mode: C8 - QPSK				
2.1	2.1049	Occupied Bandwidth	Pass	ANSI C63.26 (2015)
2.2	25.202(d) and 2.1055	Frequency Tolerance	Pass	ANSI C63.26 (2015)
2.3	25.202(f) and 2.1051	Spurious Emissions at Antenna Terminals	Pass	ANSI C63.26 (2015)
2.4	25.204	Equivalent Isotropic Radiated Power	Pass	ANSI C63.26 (2015)
2.6	25.216	Limits on Emissions from Mobile Earth Stations for Protection of Aeronautical Radionavigation-Satellite Service	Pass	ANSI C63.26 (2015)
Configuration and Mode: Iridium Transmit				
2.7	2.1047 (d)	Modulation Characteristics	Declaration	
Configuration and Mode: 2C8 - QPSK				
2.1	2.1049	Occupied Bandwidth	Pass	ANSI C63.26 (2015)
2.3	25.202(f) and 2.1051	Spurious Emissions at Antenna Terminals	Pass	ANSI C63.26 (2015)
2.4	25.204	Equivalent Isotropic Radiated Power		ANSI C63.26 (2015)
Configuration and Mode: 2C8 - 16 APSK				
2.1	2.1049	Occupied Bandwidth	Pass	ANSI C63.26 (2015)
2.3	25.202(f) and 2.1051	Spurious Emissions at Antenna Terminals		ANSI C63.26 (2015)
2.4	25.204	Equivalent Isotropic Radiated Power	Pass	ANSI C63.26 (2015)

Table 2

1.4 Application Form

EQUIPMENT DESCRIPTION	
Model Name/Number	Iridium Certus ProtoTerminal / 9801CertusH2
Part Number	PT-H2
Hardware Version	A3
Software Version	A
FCC ID (if applicable)	Q639801CertusH2
Industry Canada ID (if applicable)	4629A-9801CertusH2
Technical Description (Please provide a brief description of the intended use of the equipment)	Iridium satellite communications terminal

INTENTIONAL RADIATORS									
Technology	Frequency Band (MHz)	Conducted Declared Output Power (dBm)	Antenna Gain (dBi)	Supported Bandwidth (s) (MHz)	Modulation Scheme(s)	ITU Emission Designator	Test Channels (MHz)		
							Bottom	Middle	Top
Iridium	1616-1626	0	48.2	0.0417, 0.0833, 0.333	QPSK, 16APSK	41K7Q7W, 83K3Q7W, 333KQ7W, 666KQ7W	1616	1621	1626

UN-INTENTIONAL RADIATOR	
Highest frequency generated or used in the device or on which the device operates or tunes	2.5 GHz

Power Source			
AC	Single Phase	Three Phase	Nominal Voltage
	47-63 Hz		110-240 VAC
External DC	Nominal Voltage		Maximum Current
Battery	Nominal Voltage		Battery Operating End Point Voltage
Can EUT transmit whilst being charged?			Yes ☐ No ☐

EXTREME CONDITIONS			
Maximum temperature	30	°C	Minimum temperature
			20 °C

Ancillaries
Please list all ancillaries which will be used with the device.
None



Product Service

ANTENNA CHARACTERISTICS			
☐	Antenna connector		State impedance Ohm
☐	Temporary antenna connector		State impedance Ohm
☒	Integral antenna	Type Electronically-scanned array	
☐	External antenna	Type	

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

Name: Jeremy Lavine
Position held: Senior Engineer Date: 17 February 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:

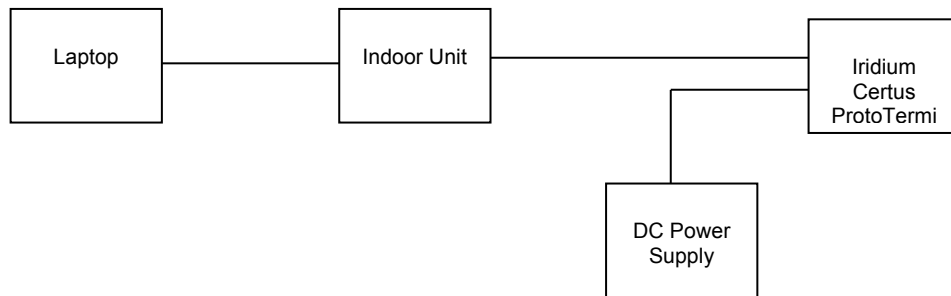


Figure 1 - System Configuration Diagram

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: 42290124			
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	Graeme Lawler	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	Graeme Lawler	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	Graeme Lawler	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 - 16-APSK		
Occupied Bandwidth	Graeme Lawler	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
Configuration and Mode: C8 - QPSK		
Occupied Bandwidth	Graeme Lawler	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: 2C8 - QPSK		
Occupied Bandwidth	Graeme Lawler	UKAS
Spurious Emissions at Antenna Terminals	Graeme Lawler	UKAS
Equivalent Isotropic Radiated Power	Graeme Lawler	UKAS
Configuration and Mode: 2C8 - 16 APSK		
Occupied Bandwidth	Graeme Lawler	UKAS
Spurious Emissions at Antenna Terminals	Graeme Lawler	UKAS
Equivalent Isotropic Radiated Power	Graeme Lawler	UKAS

Table 4

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 / 9801CertusH2, S/N: 42290124 - Modification State 0

2.1.3 Date of Test

07-February-2017 to 20-March-2017

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 18.9 - 19.4 °C

Relative Humidity 34.0 - 43.0 %

2.1.6 Test Results

B1 - QPSK

Occupied Bandwidth (kHz)		
1616.020833 MHz	1621.020833 MHz	1625.979166 MHz
32.57	32.21	32.45

Table 5

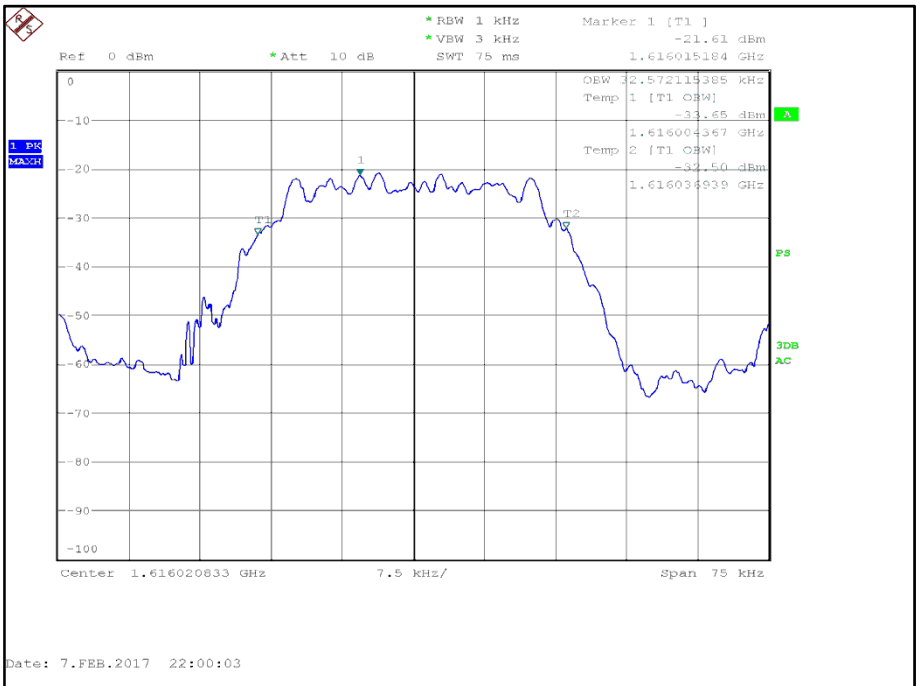


Figure 2 - 1616.020833 MHz

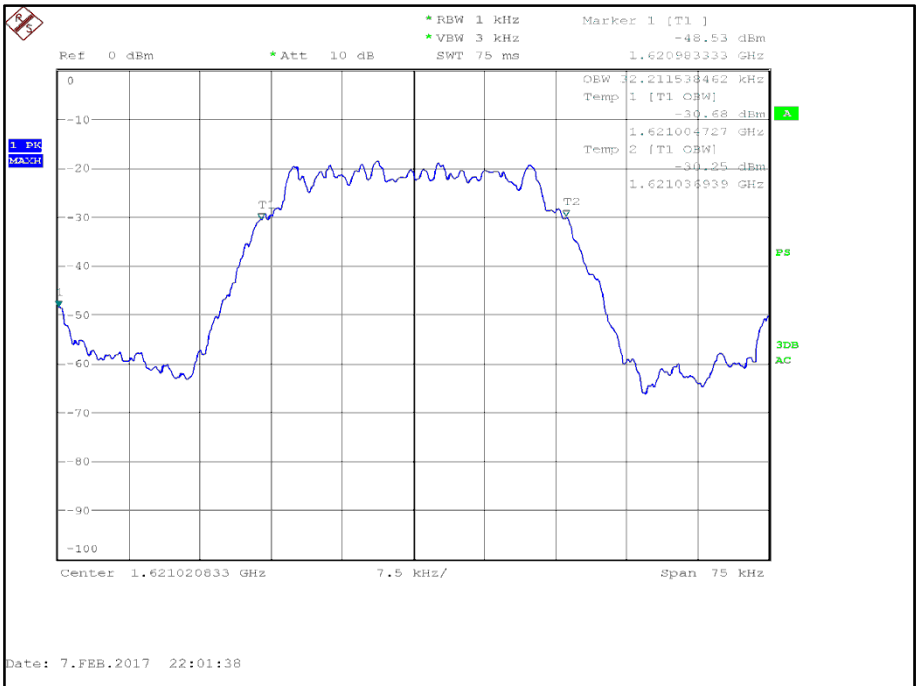


Figure 3 - 1621.020833 MHz



Product Service



Figure 4 - 1625.979166 MHz

FCC 47 CFR Part 2, Limit Clause 2.1049

None specified.



C1 - QPSK

Occupied Bandwidth (kHz)		
1616.020833 MHz	1621.020833 MHz	1625.979166 MHz
32.57	32.69	32.69

Table 6

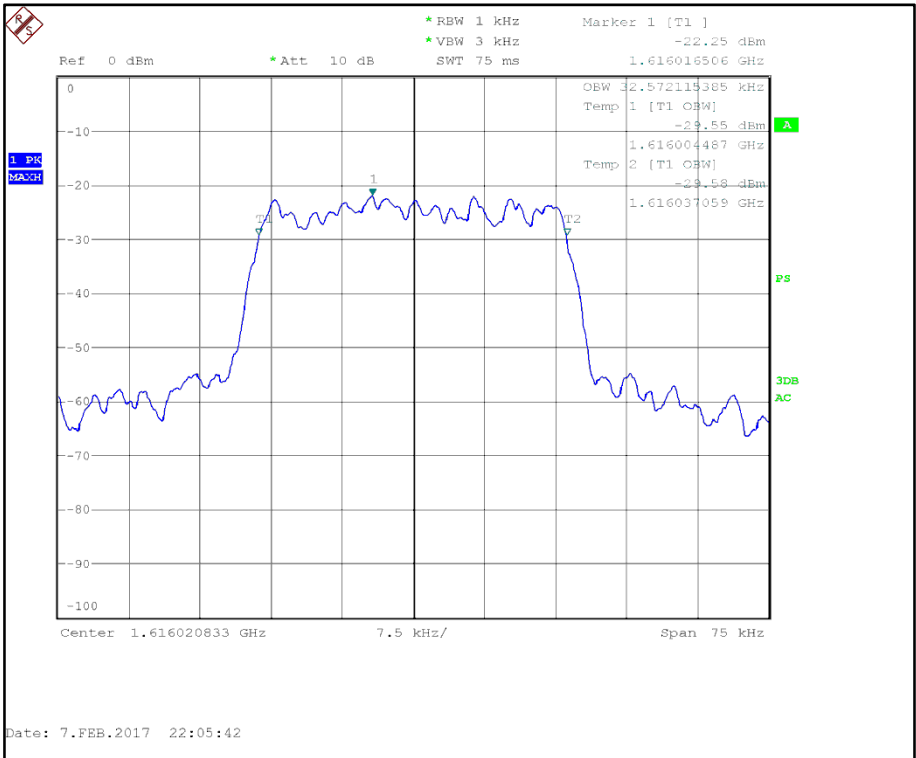


Figure 5 - 1616.020833 MHz

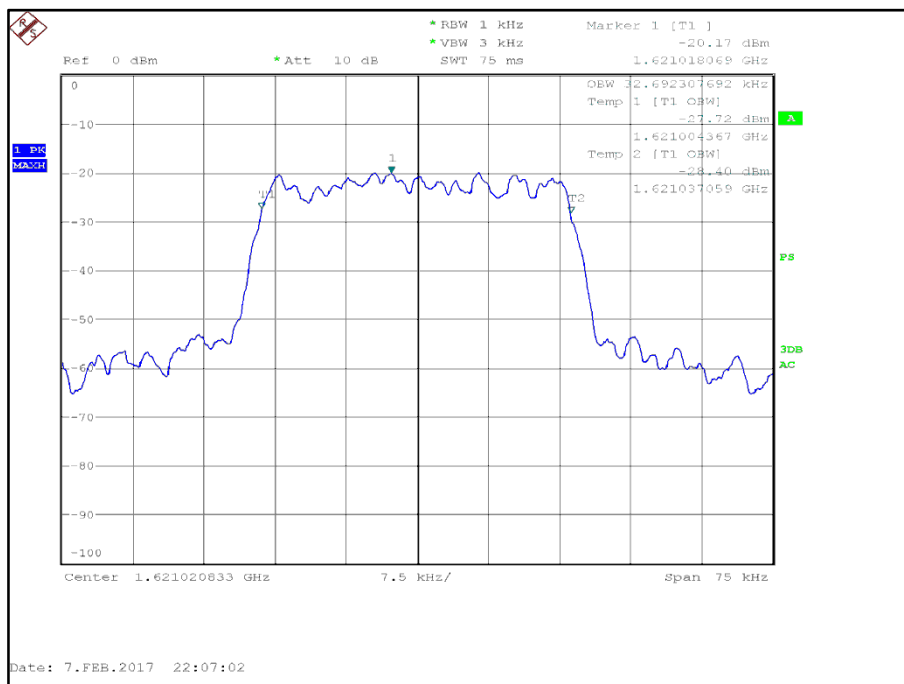


Figure 6 - 1621.020833 MHz

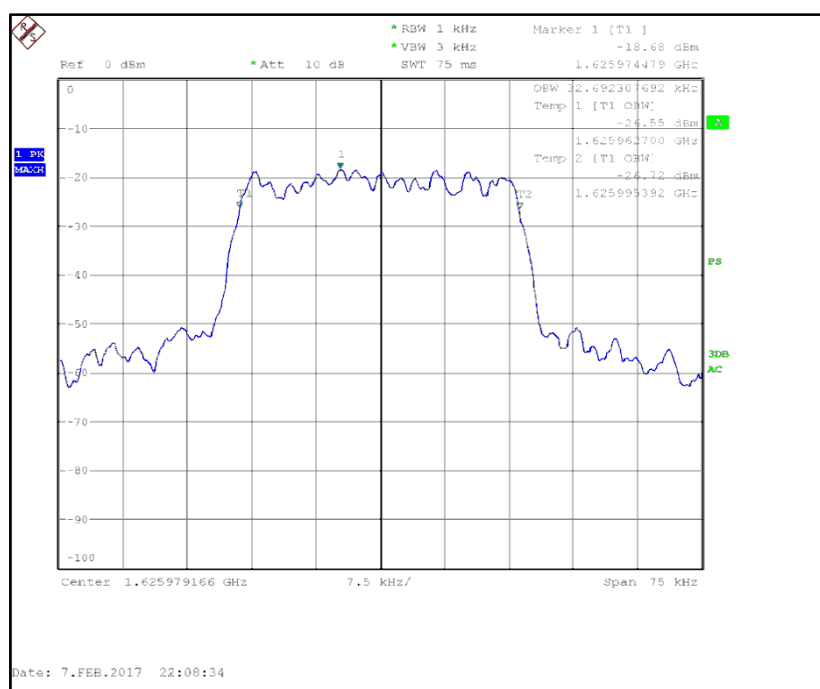


Figure 7 - 1625.979166 MHz

FCC 47 CFR Part 2, Limit Clause 2.1049

None specified.

C2 - QPSK

Occupied Bandwidth (kHz)		
1616.041666 MHz	1621.041666 MHz	1625.958332 MHz
64.74	64.58	64.74

Table 7

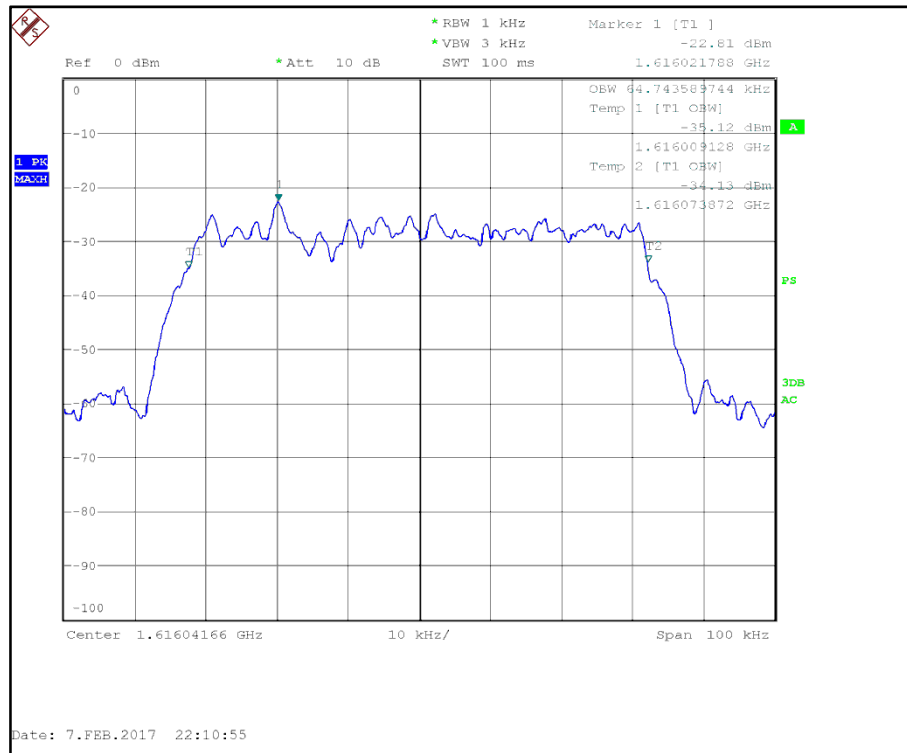


Figure 8 - 1616.041666 MHz

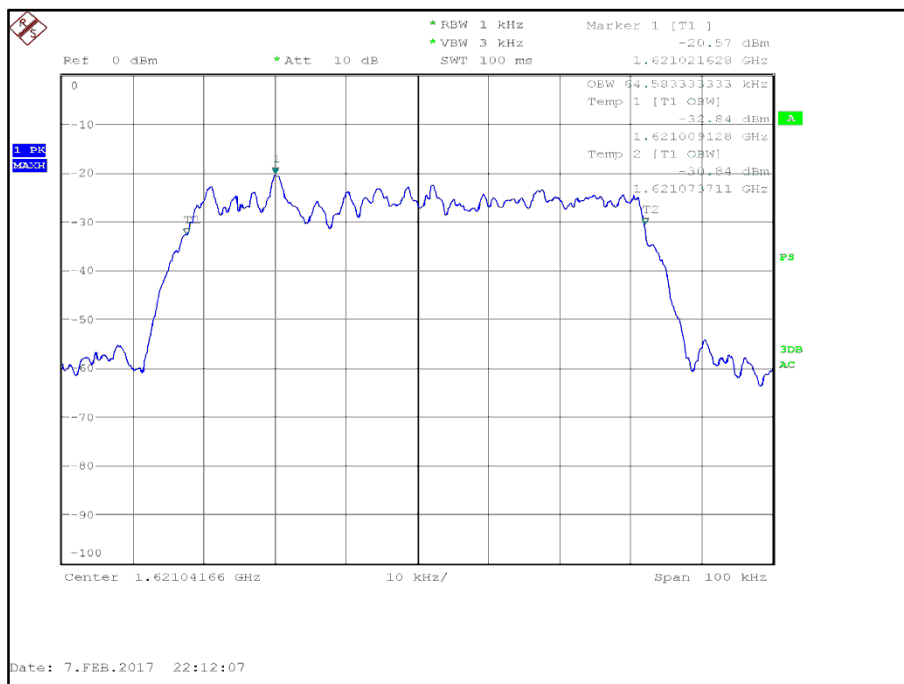


Figure 9 - 1621.041666 MHz

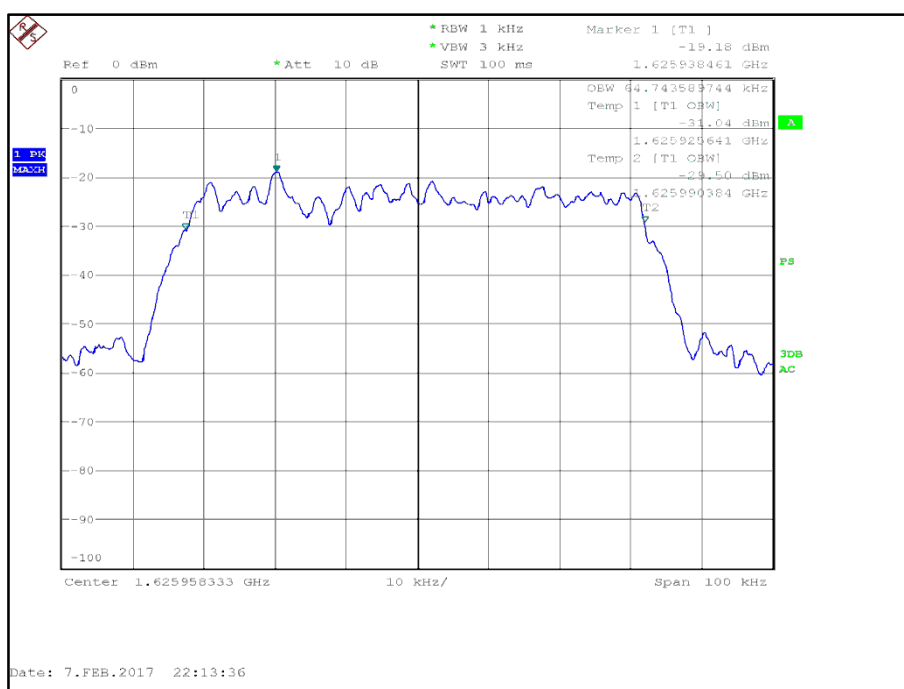


Figure 10 - 1625.958332 MHz

FCC 47 CFR Part 2, Limit Clause 2.1049

None specified.

C8 - 16-APSK

Occupied Bandwidth (kHz)		
1616.166666 MHz	1621.166666 MHz	1625.833333 MHz
260.42	259.62	259.62

Table 8

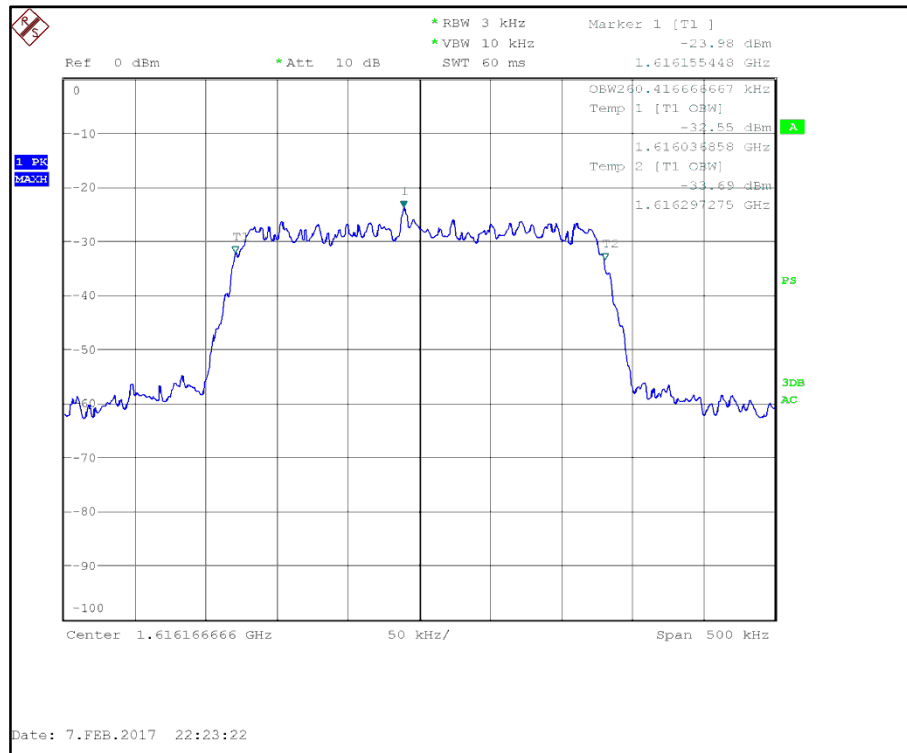


Figure 11 - 1616.166666 MHz

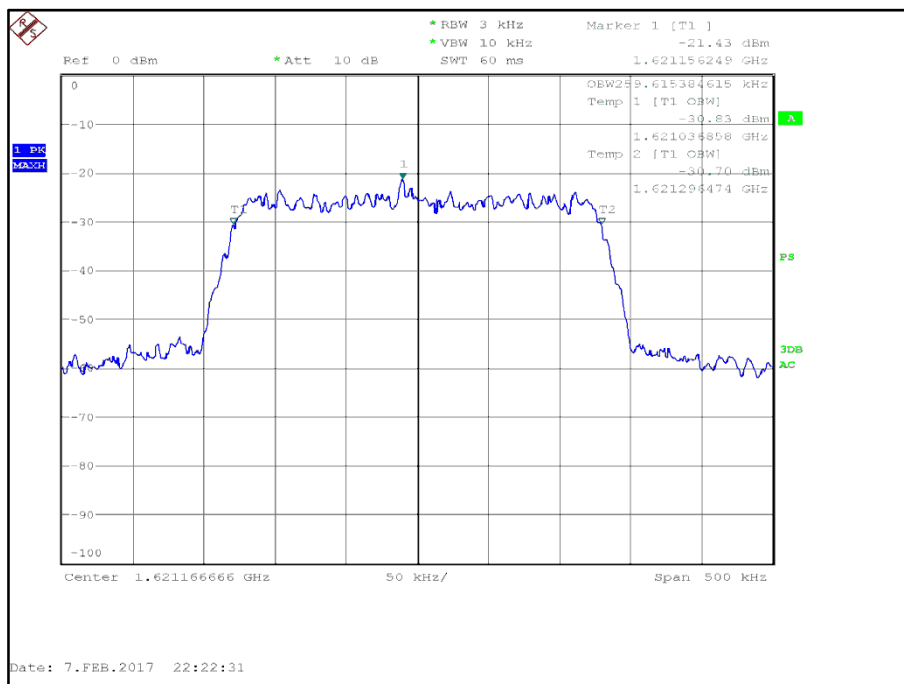


Figure 12 - 1621.166666 MHz

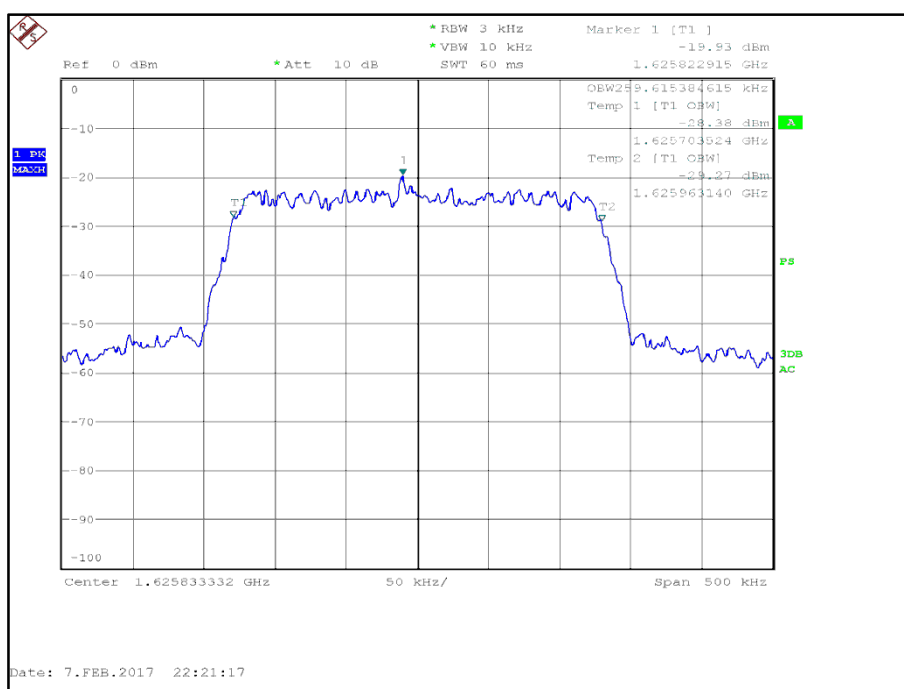


Figure 13 - 1625.833332 MHz

FCC 47 CFR Part 2, Limit Clause 2.1049

None specified.

C8 - QPSK

Occupied Bandwidth (kHz)		
1616.166666 MHz	1621.166666 MHz	1625.833333 MHz
258.01	258.01	258.01

Table 9

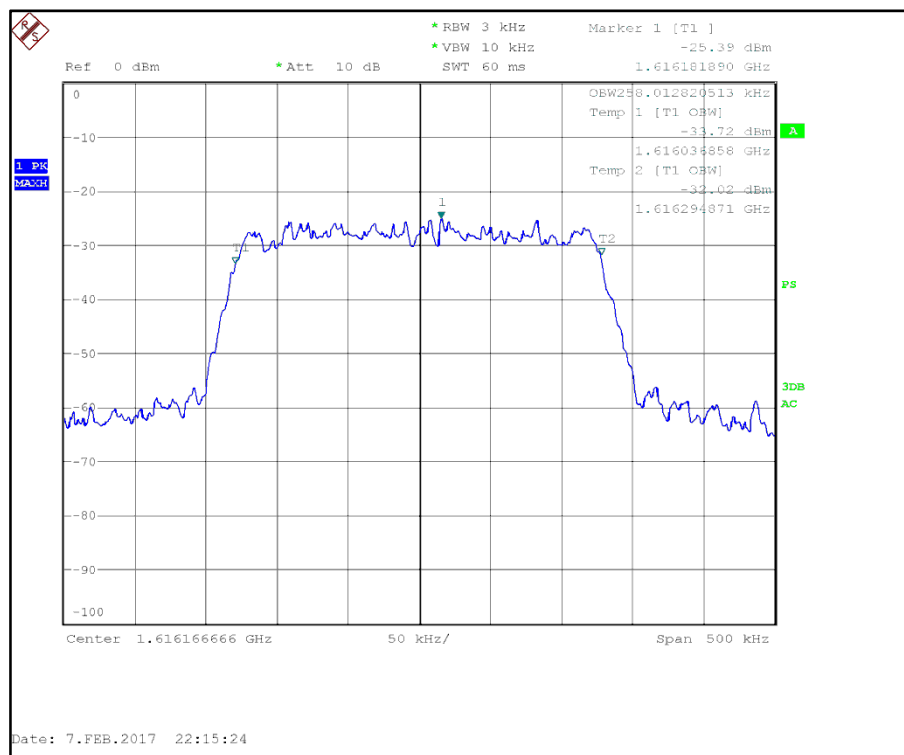


Figure 14 - 1616.166666 MHz

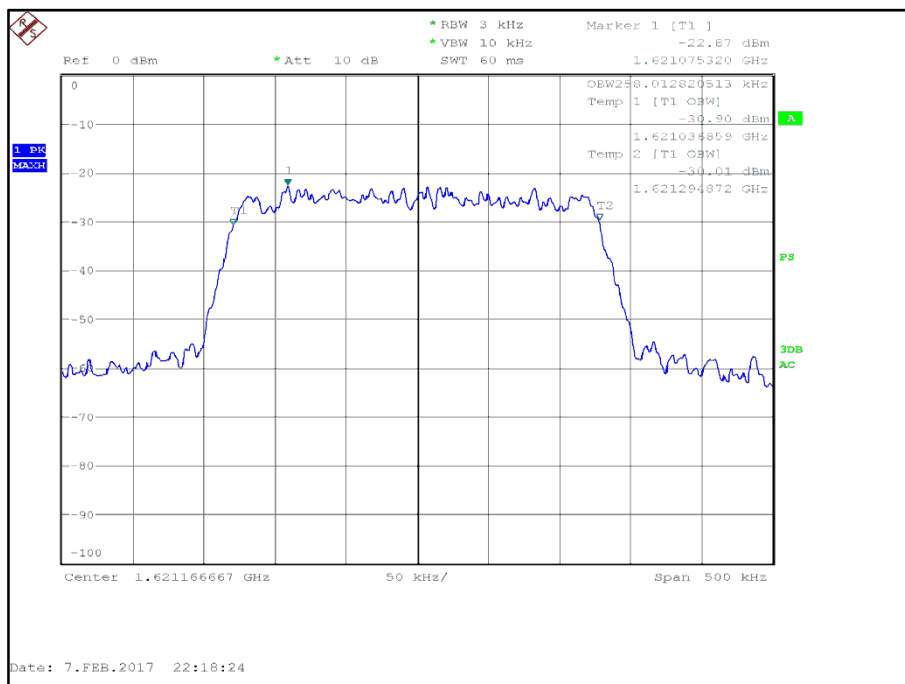


Figure 15 - 1621.166666 MHz

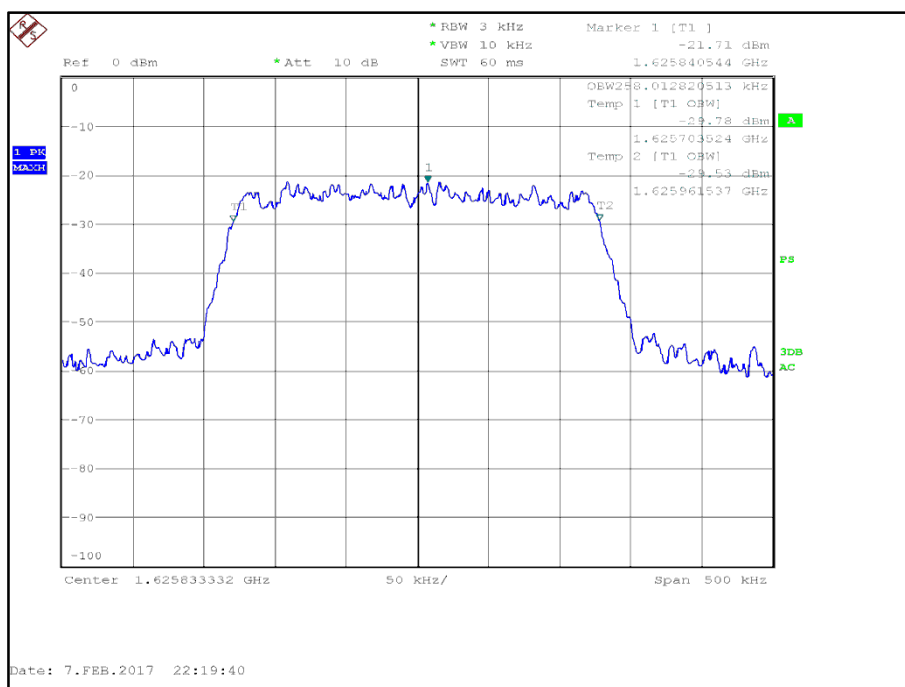


Figure 16 - 1625.833332 MHz

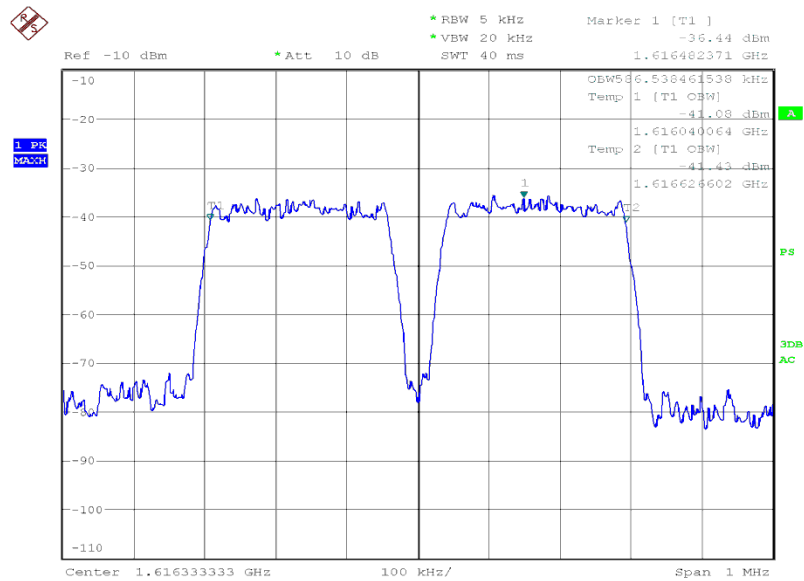
FCC 47 CFR Part 2, Limit Clause 2.1049

None specified.

2C8 - QPSK

Occupied Bandwidth (kHz)		
1616.333333 MHz	1621.333333 MHz	1625.666666 MHz
586.54	586.54	586.54

Table 10

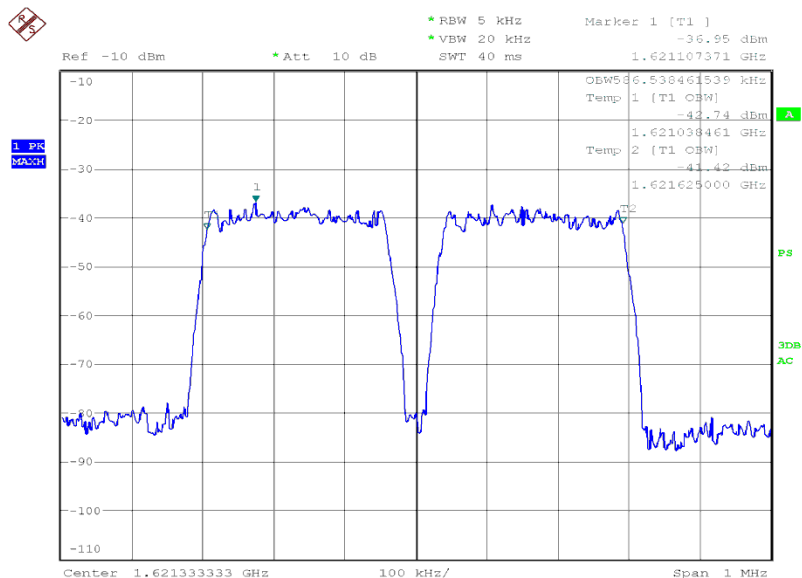


Date: 20.MAR.2017 18:28:29

Figure 17 - 1616.333333 MHz

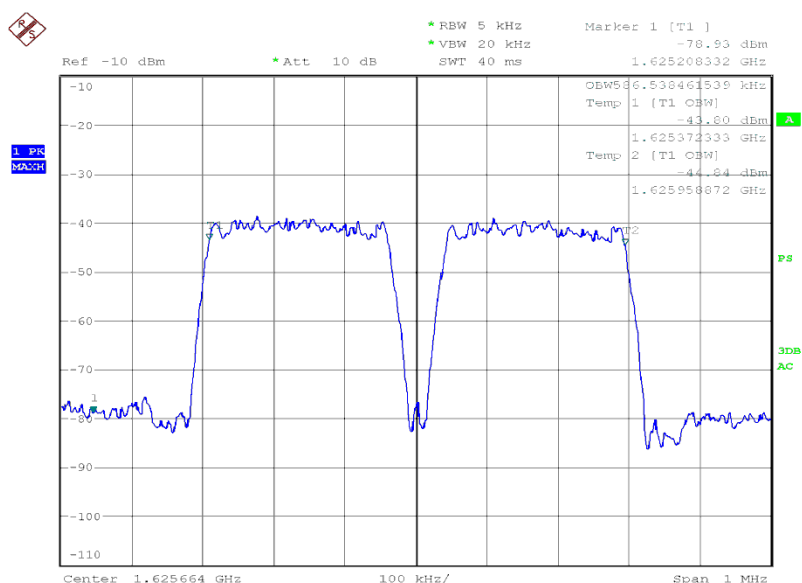


Product Service



Date: 20.MAR.2017 18:26:55

Figure 18 - 1621.333333 MHz



Date: 20.MAR.2017 18:23:58

Figure 19 - 1625.666666 MHz

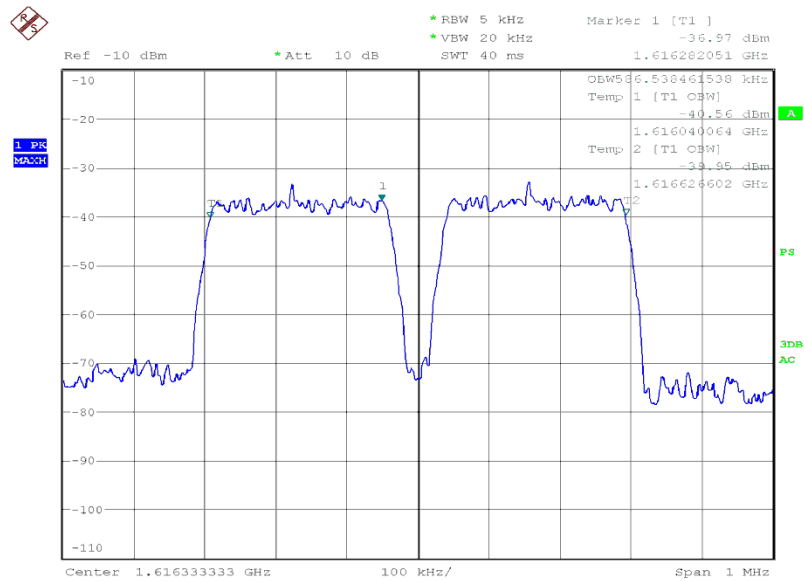
FCC 47 CFR Part 2, Limit Clause 2.1049

None specified.

2C8 - 16 APSK

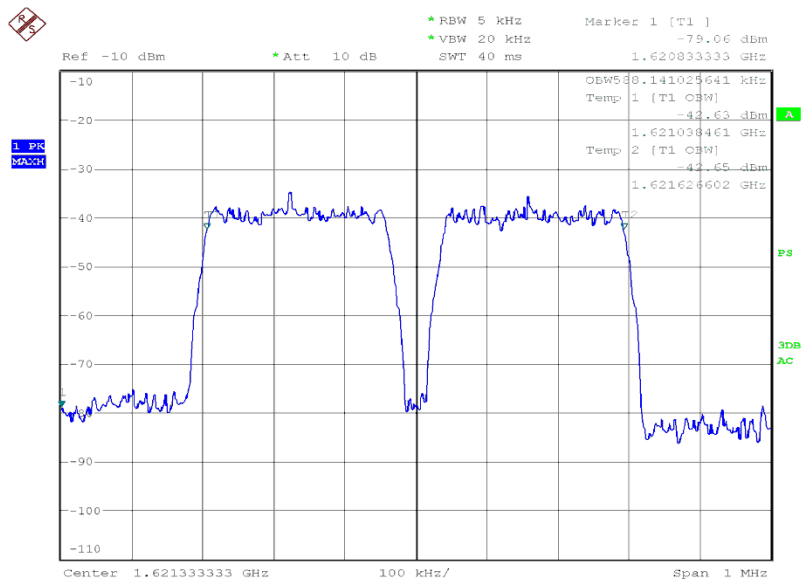
Occupied Bandwidth (kHz)		
1616.333333 MHz	1621.333333 MHz	1625.666666 MHz
586.54	588.14	588.14

Table 11



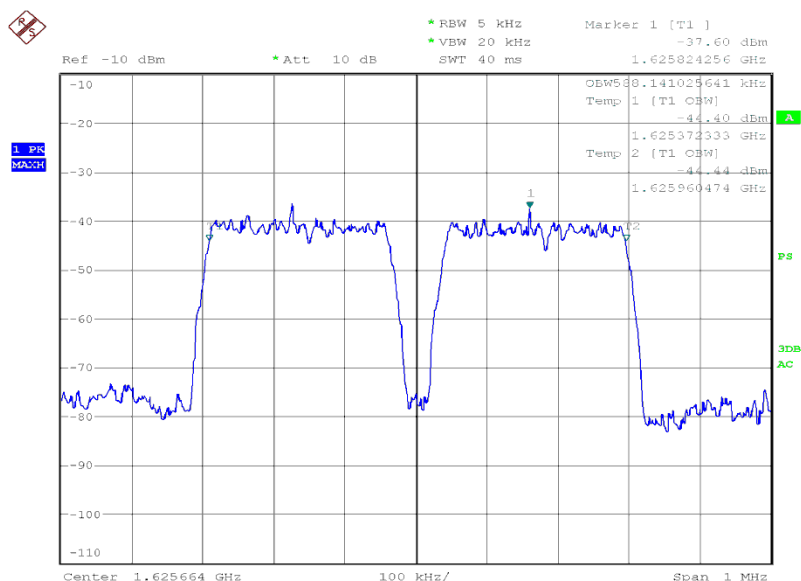
Date: 20.MAR.2017 18:00:33

Figure 20 - 1616.333333 MHz



Date: 20.MAR.2017 18:03:50

Figure 21 - 1621.333333 MHz



Date: 20.MAR.2017 18:25:10

Figure 22 - 1621.666666 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 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
Cable (N-N, 8m)	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
Cable (Yellow, Rx, Km-Km 2m)	Scott Cables	KPS-1501-2000-KPS	4527	6	29-Jul-2015
Double Ridged Waveguide Horn Antenna	ETS-Lindgren	3117	4722	12	27-Feb-2017

Table 12

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 / 9801CertusH2, S/N: 42290124 - Modification State 0

2.2.3 Date of Test

13-February-2017 to 15-February-2017

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	21.8 °C
Relative Humidity	44.1 %

2.2.6 Test Results

B1 - QPSK

Frequency Stability over Variation in Temperature

Test Condition	1621.020833 MHz	
Temperature	Frequency Error (%)	Frequency Error (ppm)
-30.0°C	-0.000014	-0.137259
-20.0°C	0.000045	0.452801
-10.0°C	0.000023	0.227017
0°C	-0.000022	-0.224241
10.0°C	-0.000025	-0.248609
20.0°C	-0.000021	-0.213446
30.0°C	-0.000073	-0.727319
40.0°C	-0.000028	-0.279762
50.0°C	-0.000015	-0.148363

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	-0.248609
48.0 V DC	-0.000024	-0.213446
55.2 V DC	-0.000040	-0.403141

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.

C1 - QPSK

Frequency Stability over Variation in Temperature

Test Condition	1621.020833 MHz	
Temperature	Frequency Error (%)	Frequency Error (ppm)
-30.0°C	0.000083	0.830958
-20.0°C	0.000082	0.816461
-10.0°C	0.000045	0.454343
0°C	0.000017	0.173656
10.0°C	-0.000003	-0.033621
20.0°C	0.000001	0.006786
30.0°C	-0.000029	-0.292717
40.0°C	-0.000002	-0.017582
50.0°C	-0.000002	-0.015114

Table 15

Frequency Stability when Varying Supply Voltage

Test Condition	1621.020833 MHz	
Supply Voltage	Frequency Error (%)	Frequency Error (ppm)
40.8 V DC	-0.000010	-0.101171
48.0 V DC	0.000001	0.006786
55.2 V DC	-0.000013	-0.128623

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.

C2 - QPSK

Frequency Stability over Variation in Temperature

Test Condition	1621.041666 MHz	
Temperature	Frequency Error (%)	Frequency Error (ppm)
-30.0°C	0.000002	0.018198
-20.0°C	0.000074	0.736563
-10.0°C	-0.000004	-0.043491
0°C	0.000023	0.230407
10.0°C	-0.000060	-0.602390
20.0°C	-0.000028	-0.281917
30.0°C	-0.000139	-1.389847
40.0°C	-0.000021	-0.209742
50.0°C	0.000090	0.902506

Table 17

Frequency Stability when Varying Supply Voltage

Test Condition	1621.041666 MHz	
Supply Voltage	Frequency Error (%)	Frequency Error (ppm)
40.8 V DC	-0.000060	-0.602390
48.0 V DC	-0.000028	-0.281917
55.2 V DC	-0.000022	-0.215911

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)
-30.0°C	0.000089	0.885103
-20.0°C	0.000127	1.269394
-10.0°C	0.000227	2.267750
0°C	-0.000075	-0.750756
10.0°C	-0.408101	-0.000041
20.0°C	0.000014	0.142120
30.0°C	-0.000021	-0.214105
40.0°C	-0.000015	-1.530749
50.0°C	-0.000049	-0.489524

Table 19

Frequency Stability when Varying Supply Voltage

Test Condition	1621.166666 MHz	
Supply Voltage	Frequency Error (%)	Frequency Error (ppm)
40.8 V DC	-0.000080	-0.799178
48.0 V DC	0.000014	0.142120
55.2 V DC	-0.000036	-0.355978

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.

C8 - QPSK

Frequency Stability over Variation in Temperature

Test Condition	1621.166666 MHz	
Temperature	Frequency Error (%)	Frequency Error (ppm)
-30.0°C	0.000172	1.717837
-20.0°C	0.000142	1.420829
-10.0°C	-0.000070	-0.698016
0°C	0.000048	0.475830
10.0°C	0.000010	0.099558
20.0°C	-0.000113	-1.128878
30.0°C	-0.000019	-0.186964
40.0°C	0.000041	0.414455
50.0°C	-0.000047	-0.465776

Table 21

Frequency Stability when Varying Supply Voltage

Test Condition	1621.166666 MHz	
Supply Voltage	Frequency Error (%)	Frequency Error (ppm)
40.8 V DC	-0.000050	-0.495692
48.0 V DC	-0.000113	-1.128878
55.2 V DC	0.000021	0.207196

Table 22

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
Hygrometer	Rotronic	HYGROPALM 1	2338	12	21-Sep-2017
Spectrum Analyser	Rohde & Schwarz	FSU26	2747	12	02-Feb-2018
Climatic Chamber	Climatec	CLIMATEC 3	2846	12	01-Jul-2017
Attenuator (20dB, 150W)	Narda	769-20	3367	12	31-May-2017
TRUE RMS MULTIMETER	Fluke	179	4006	12	13-Dec-2017
4 Channel PSU	Rohde & Schwarz	HMP4040	4736	-	TU

Table 23

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 / 9801CertusH2, S/N: 42290124 - Modification State 0

2.3.3 Date of Test

30-January-2017 to 29-March-2017

2.3.4 Test Method

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

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 $10\text{LOG}(1/4) = 6 \text{ dB}$, for B1.

For C1 configurations the bandwidth had to be further reduced to 500 Hz. To compensate the limit was reduced by $10\text{LOG}(0.5/4) = 9 \text{ dB}$

2.3.5 Environmental Conditions

Ambient Temperature	18.3 - 19.4°C
Relative Humidity	42.0 – 55.0 %

2.3.6 Test Results

B1 - QPSK

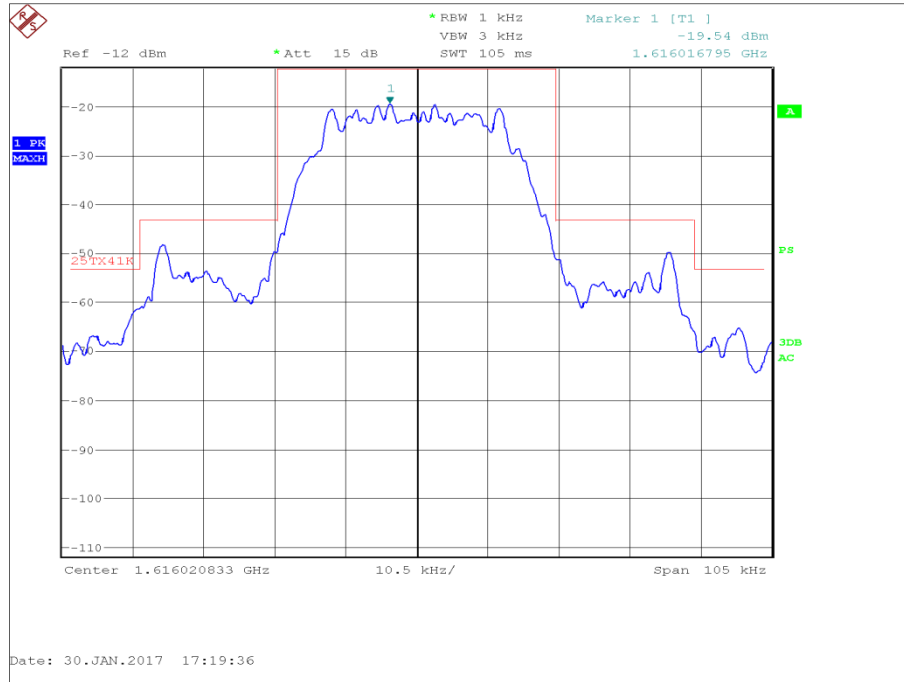


Figure 23 - 1616.020833 MHz - Emission Mask

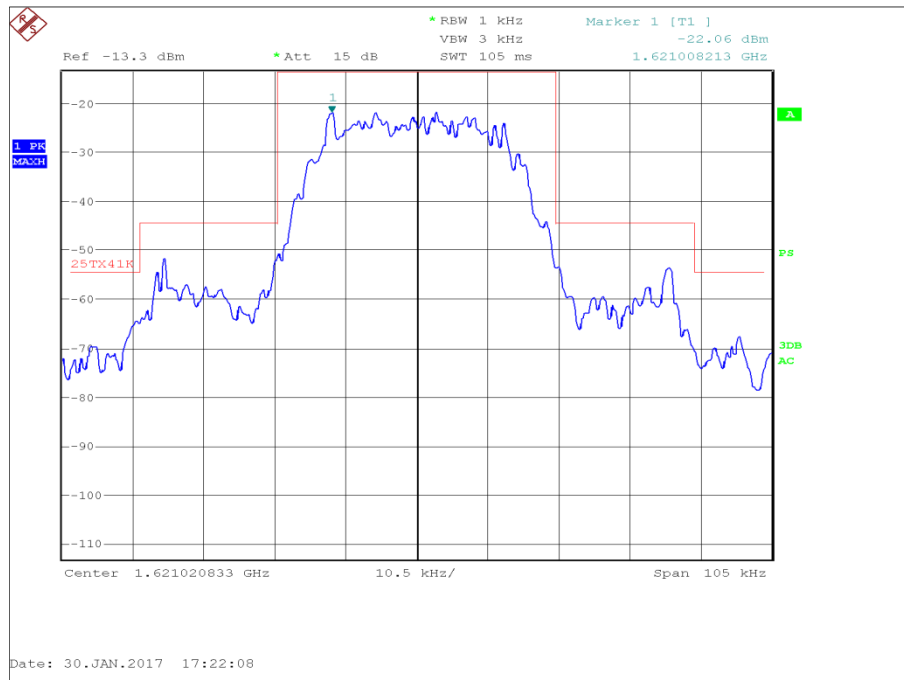


Figure 24 - 1621.020833 MHz - Emission Mask

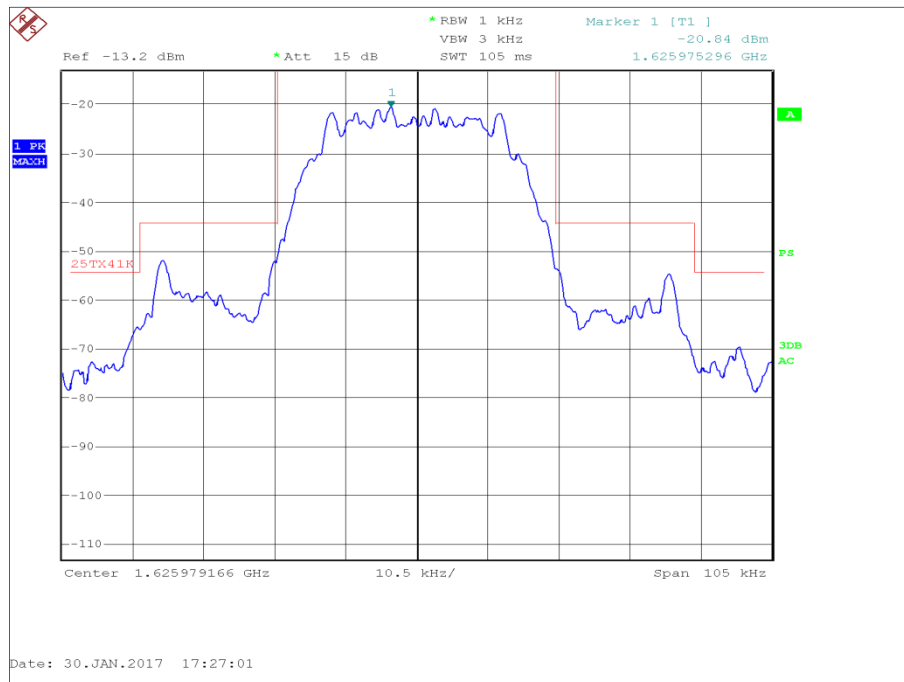


Figure 25 - 1625.979166 MHz - Emission Mask

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.



Product Service

C1 - QPSK



Figure 26 - 1616.020833 MHz - Emission Mask

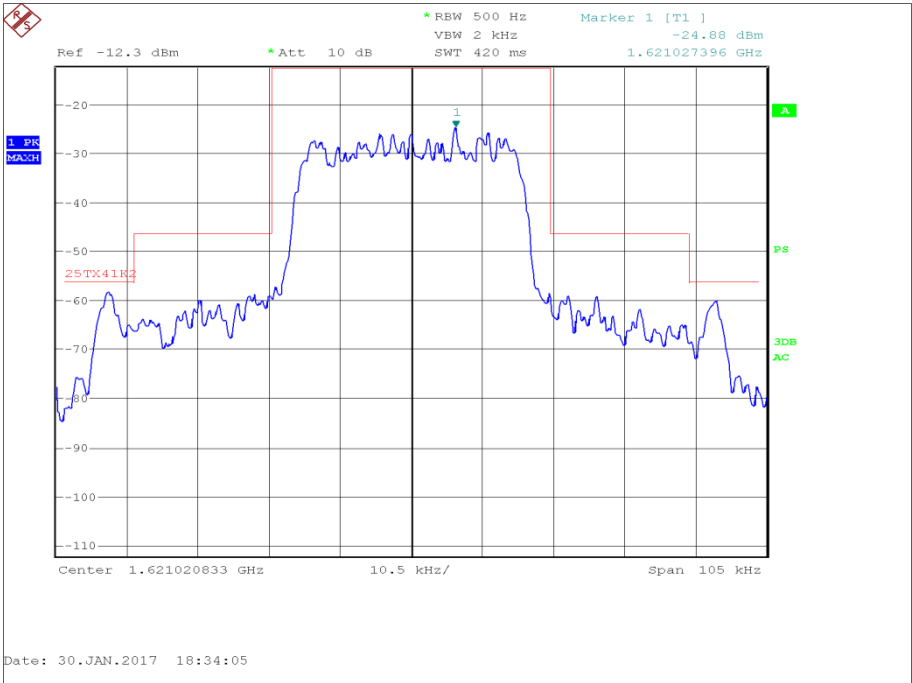


Figure 27 - 1621.020833 MHz - Emission Mask

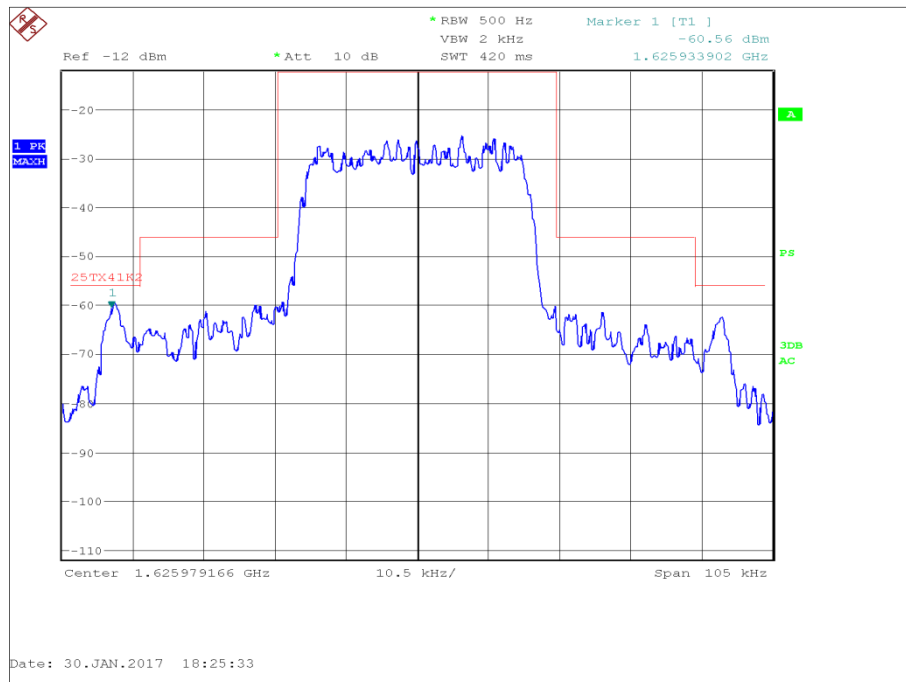


Figure 28 - 1625.979166 MHz - Emission Mask

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.

C2 - QPSK

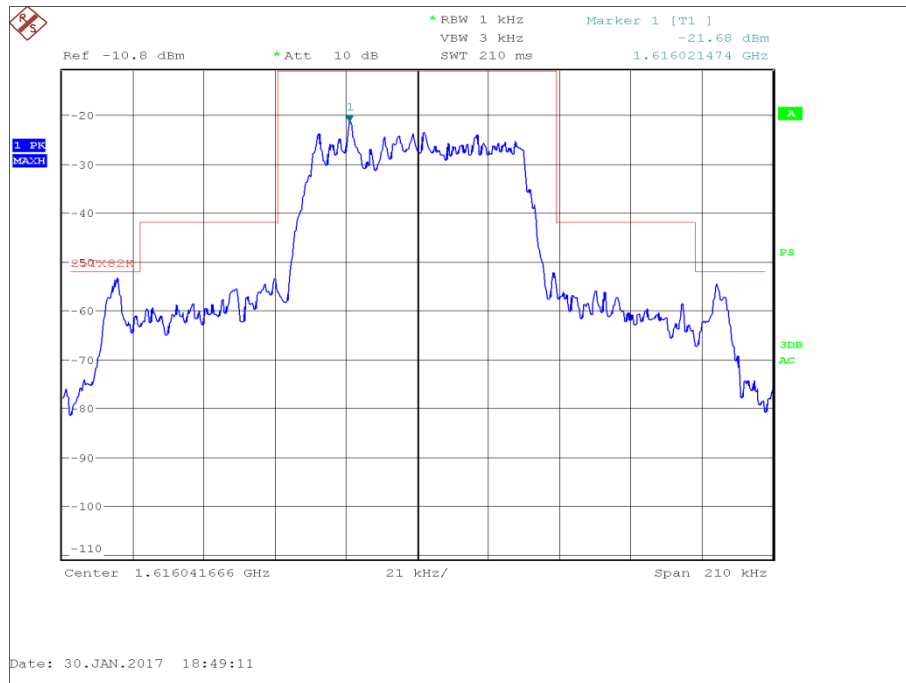


Figure 29 - 1616.04166 MHz - Emission Mask

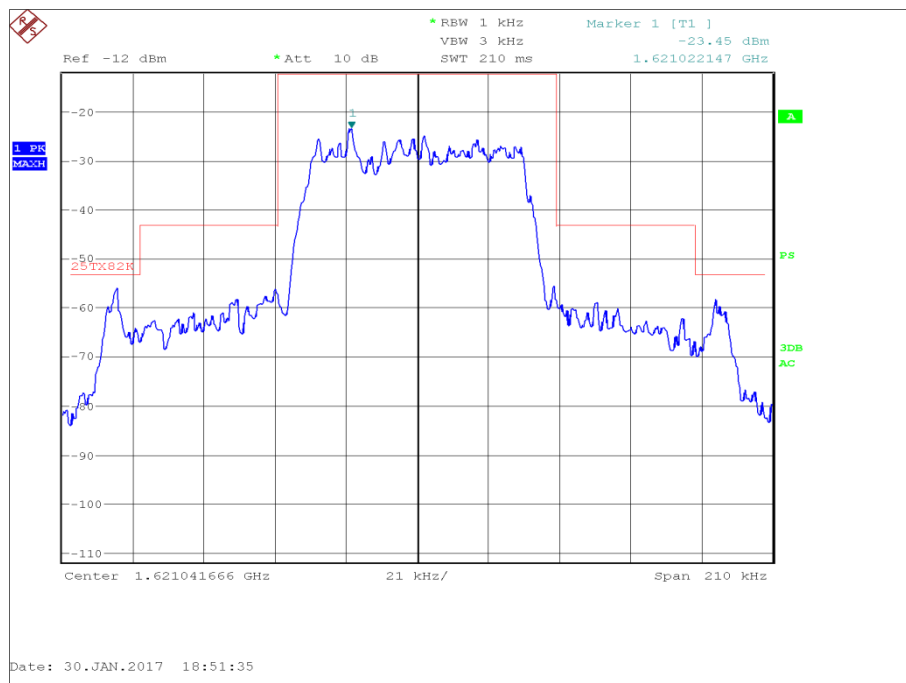


Figure 30 - 1621.04166 MHz - Emission Mask

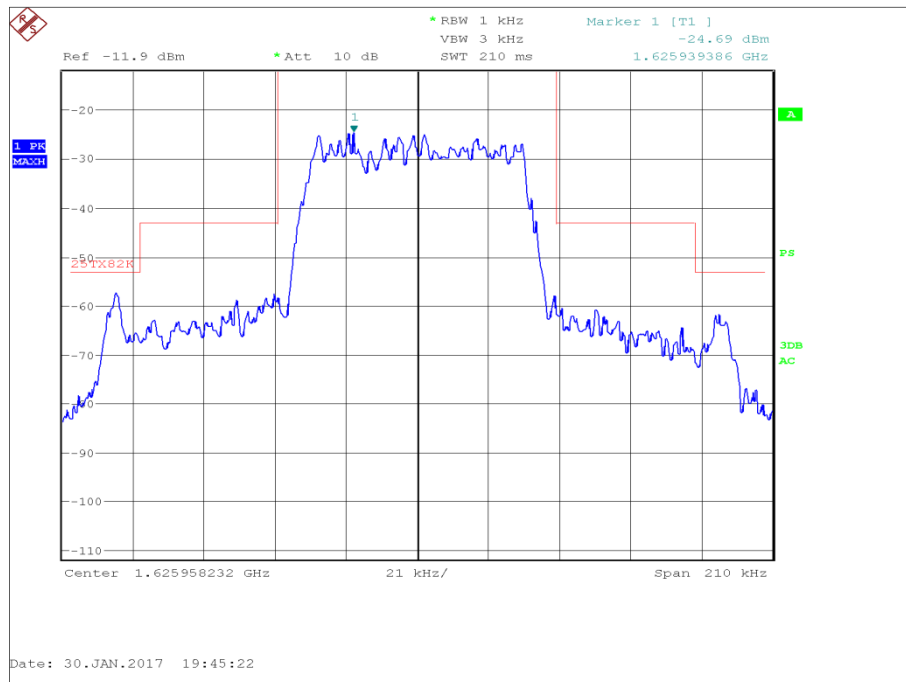


Figure 31 - 1625.958332 MHz - Emission Mask

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:

- 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.

C8 - 16-APSK

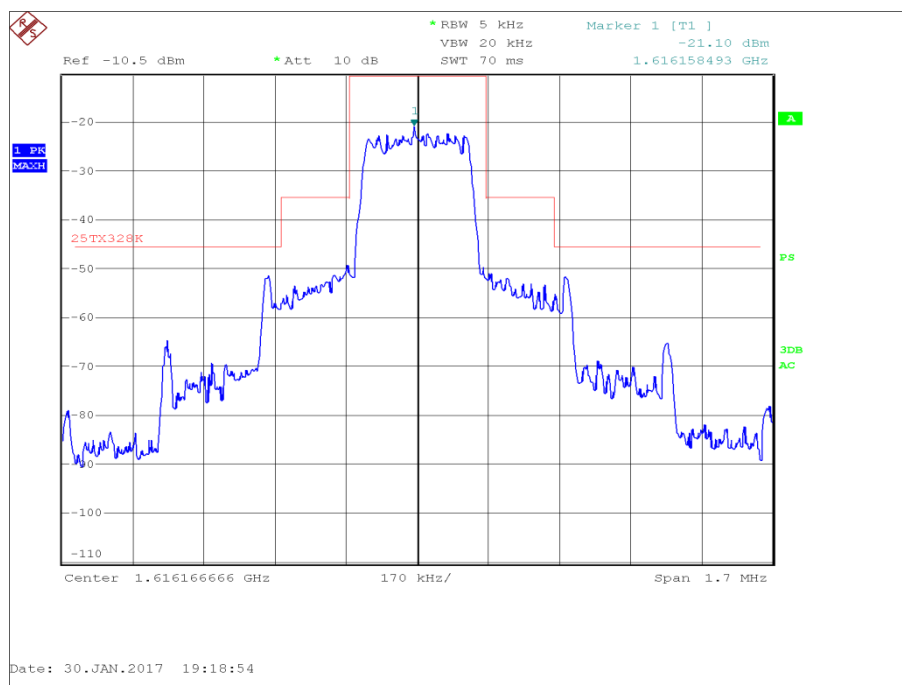


Figure 32 - 1616.166666 MHz - Emission Mask

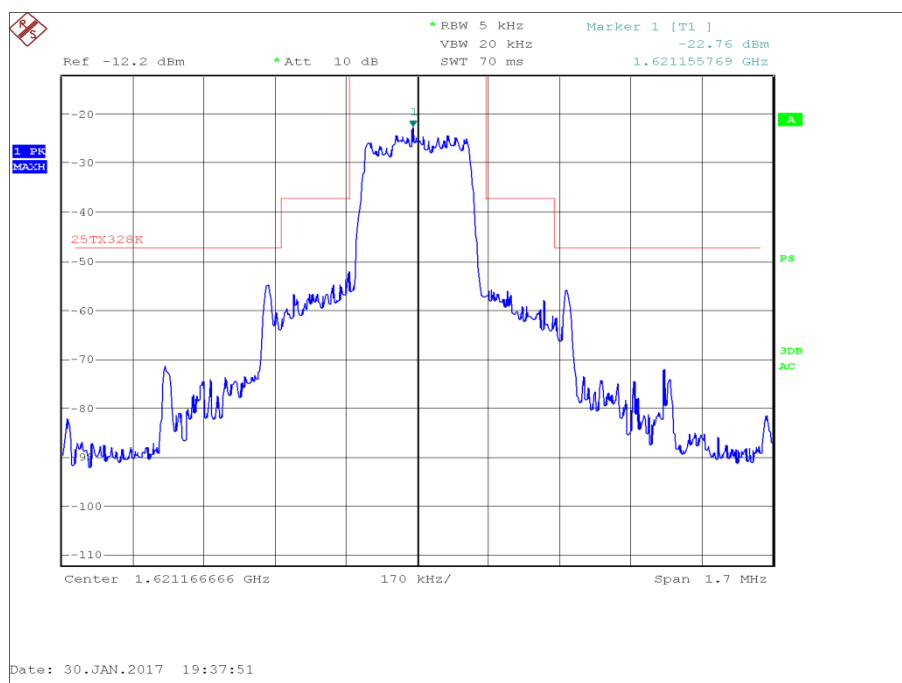


Figure 33 - 1621.166666 MHz - Emission Mask

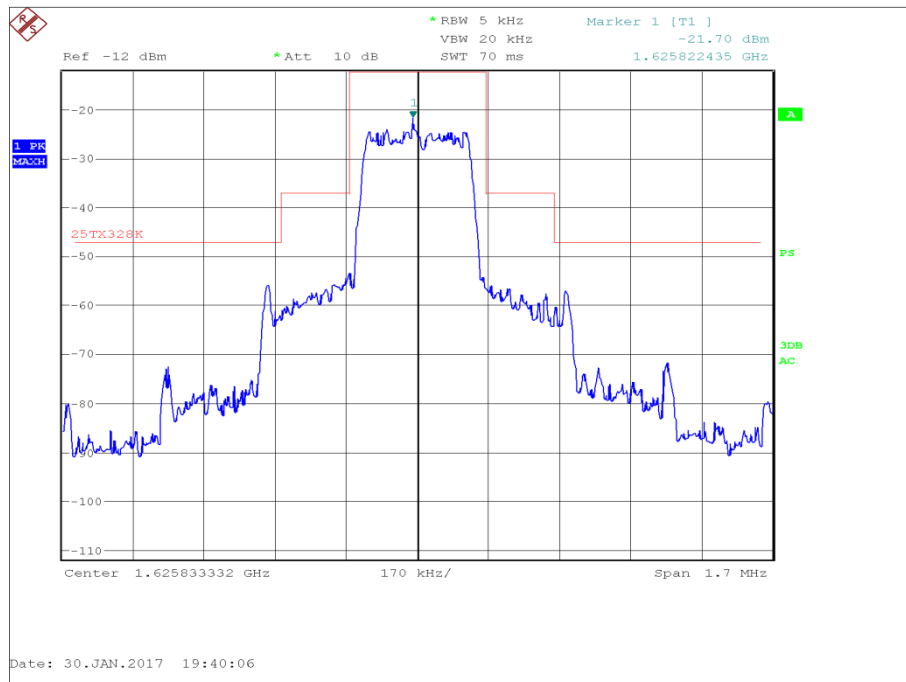


Figure 34 - 1625.833333 MHz - Emission Mask

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.



C8 - QPSK

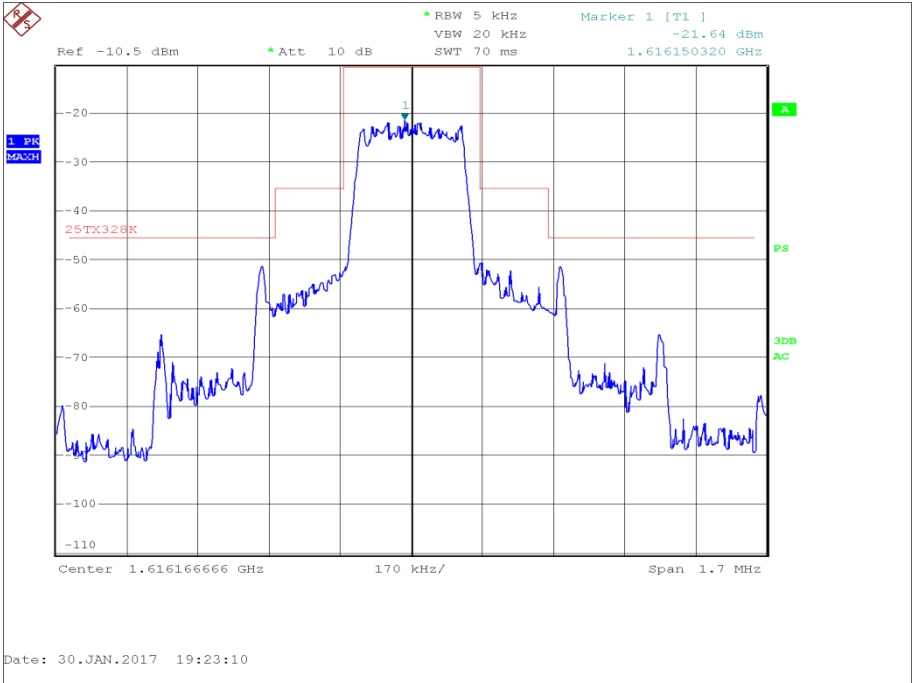


Figure 35 - 1616.166666 MHz - Emission Mask

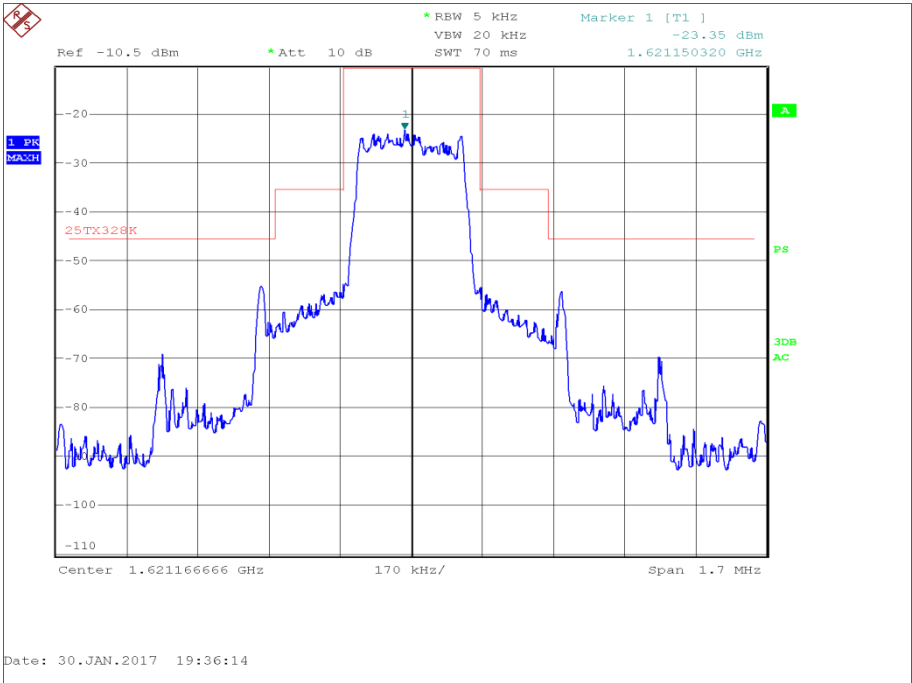


Figure 36 - 1621.166666 MHz - Emission Mask

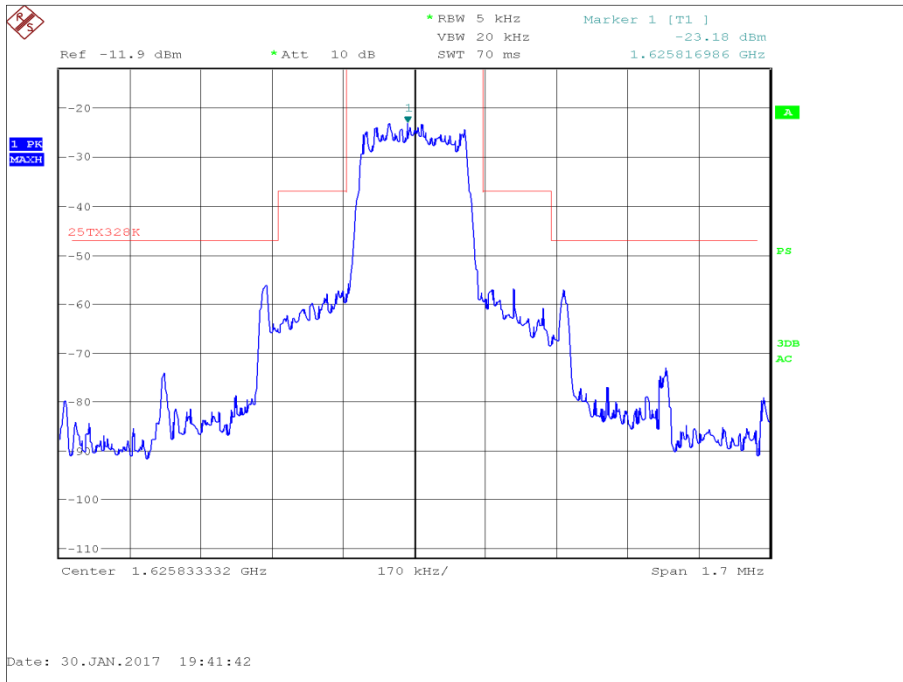


Figure 37 - 1625.833333 MHz - Emission Mask

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.



2C8 - QPSK

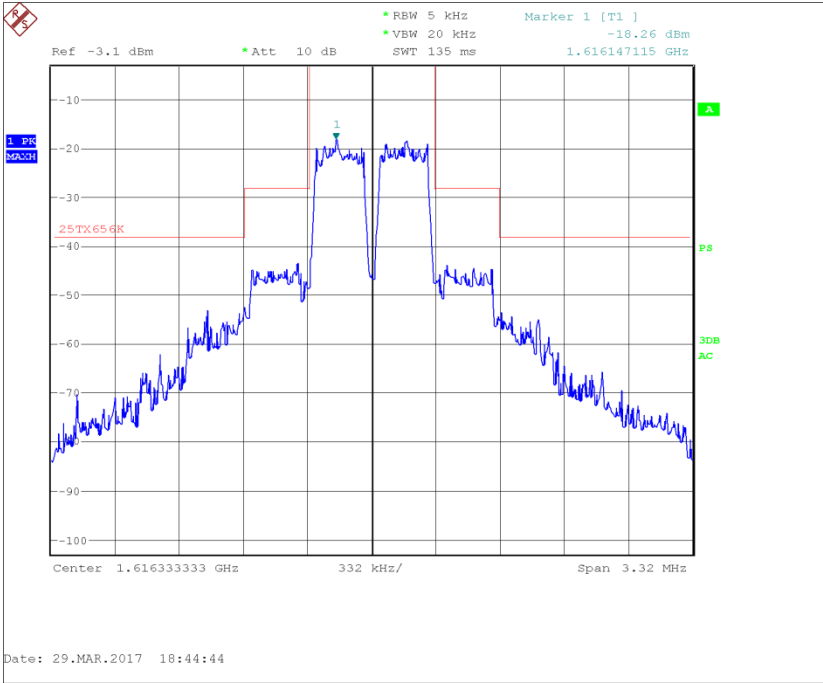


Figure 38 – 1616.333333 MHz - Emission Mask

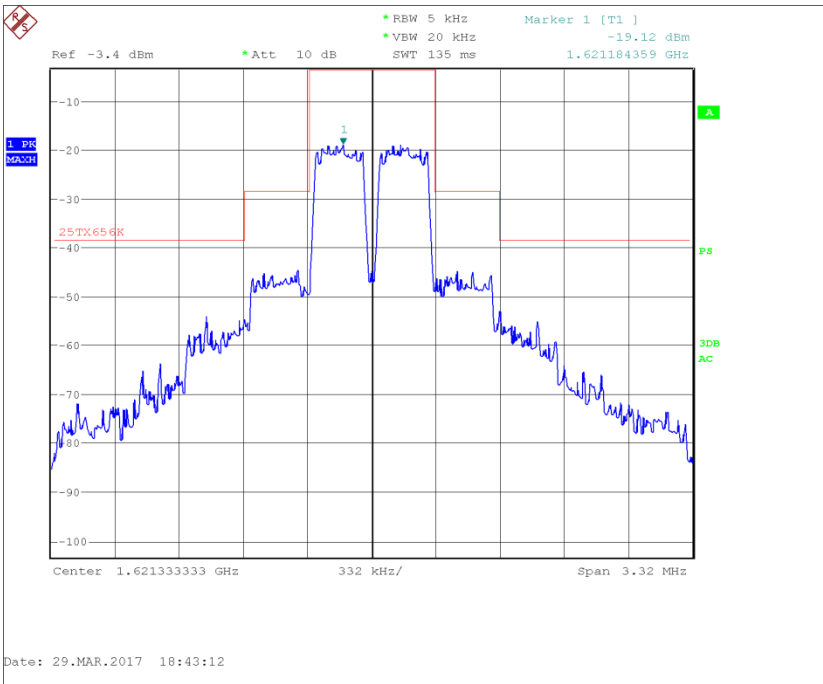


Figure 39 – 1621.333333 MHz - Emission Mask

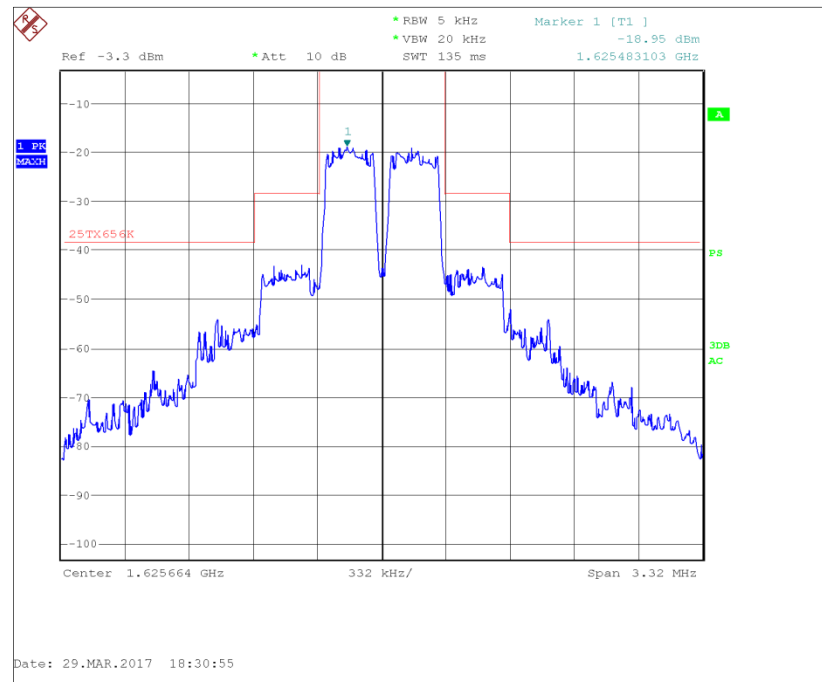


Figure 40 – 1625.66666 MHz - Emission Mask

FCC 47 CFR Part 2, 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.



2C8 - 16 APSK

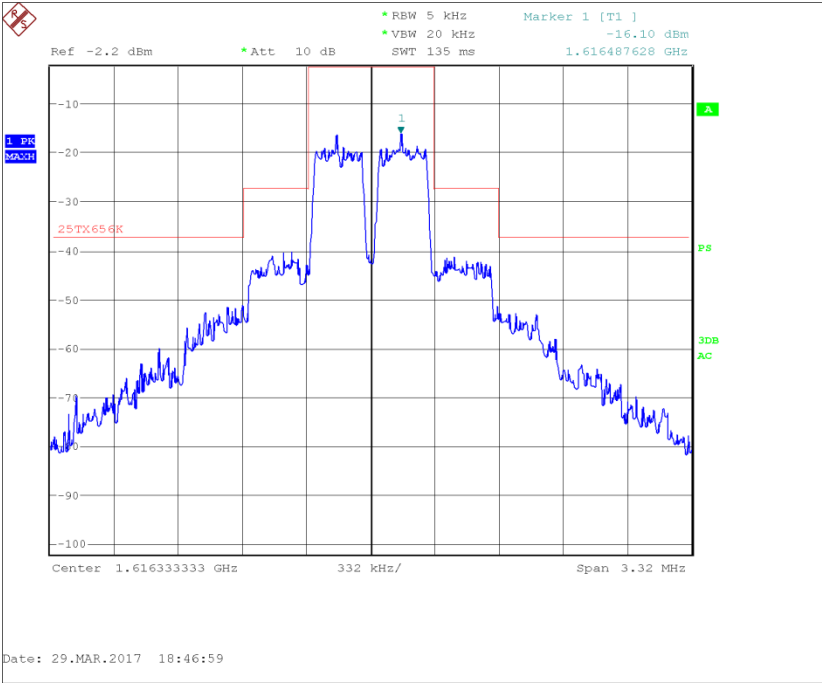


Figure 41 – 1616.333333 MHz - Emission Mask

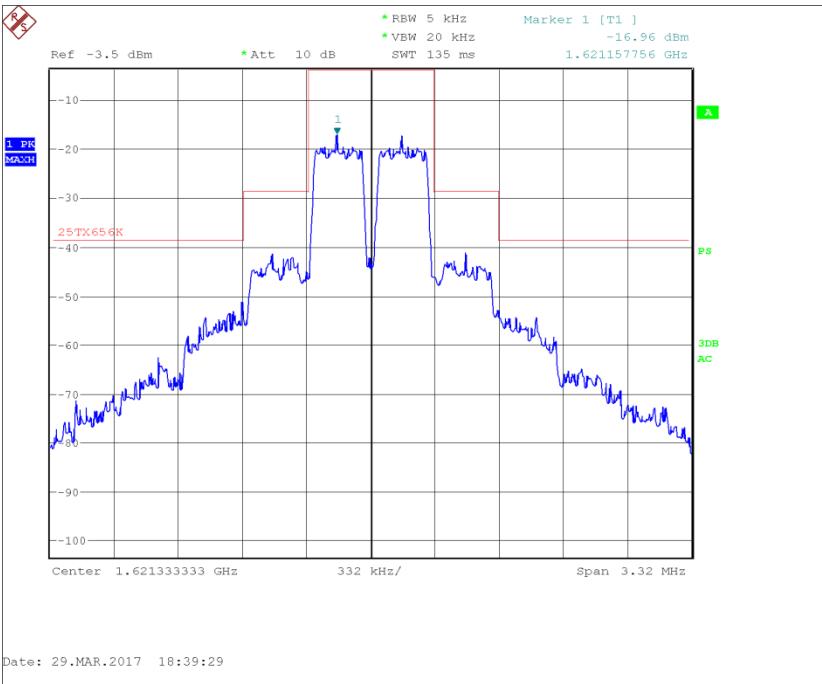


Figure 42 – 1621.333333 MHz - Emission Mask

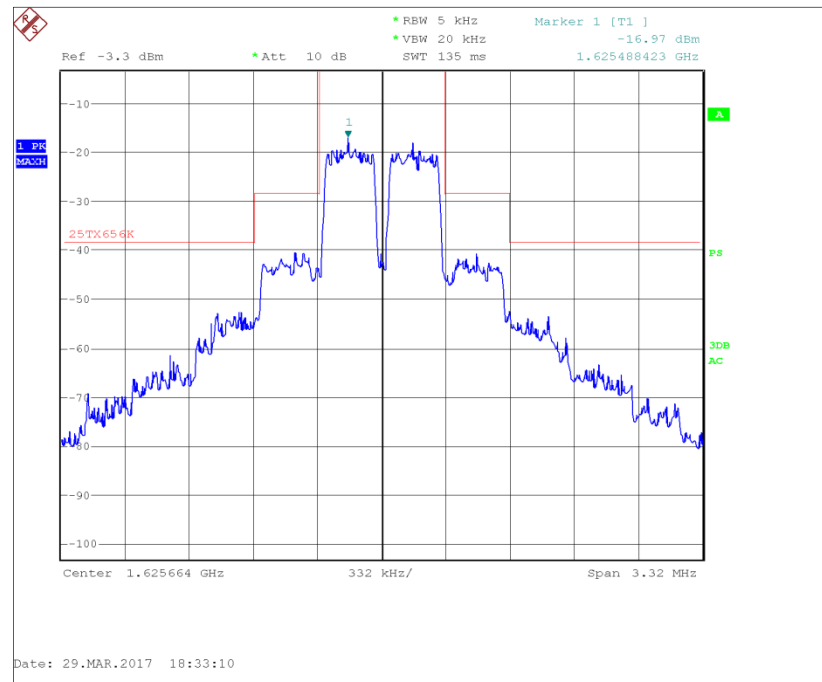


Figure 43 – 1625.66666 MHz - Emission Mask

FCC 47 CFR Part 2, 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.

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
Cable (N-N, 8m)	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
Cable (Yellow, Rx, Km-Km 2m)	Scott Cables	KPS-1501-2000-KPS	4527	6	29-Jul-2015
Double Ridged Waveguide Horn Antenna	ETS-Lindgren	3117	4722	12	27-Feb-2017

Table 24

TU - Traceability Unscheduled

O/P Mon – Output Monitored using calibrated equipment

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 / 9801CertusH2, S/N: 42290124 - Modification State 0

2.4.3 Date of Test

03-January-2017 to 29-March-2017

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 $\Theta = 0^\circ$ are required, measurements were made at the lowest supported value of Θ which is 20°. Where measurements of $\Theta = 30^\circ$ 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 measurements for 2C8 configurations were performed at the request of the manufacturer using the worst case position of azimuth and elevation (APV) as found from the measurements taken for C8 - 16-APSK.

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 19.4 - 19.6 °C
Relative Humidity 28.0 - 43.0 %

2.4.6 Test Results

Relative Total EIRP Measurements

EIRP (dBm)		
1616.020833 MHz	1621.020833 MHz	1625.979166 MHz
43.16*	42.80*	43.61*

Table 25 - B1 QPSK

EIRP (dBm)		
1616.020833 MHz	1621.020833 MHz	1625.979166 MHz
43.63*	43.87*	44.29*

Table 26 - C1 - QPSK

EIRP (dBm)		
1616.04166 MHz	1621.041666 MHz	1625.958332 MHz
44.09*	44.27*	45.14*

Table 27 - C2 - QPSK

EIRP (dBm)		
1616.166666 MHz	1621.166666 MHz	1625.833333 MHz
44.88*	44.58*	45.48*

Table 28 - C8 - 16 APSK

EIRP (dBm)		
1616.166666 MHz	1621.166666 MHz	1625.833333 MHz
44.27*	44.48*	45.20*

Table 29 - C8 - QPSK

*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	33.76
1	0	90	Horizontal	Horizontal	33.59
1	0	90	60 Deg	Vertical	38.98
1	0	90	60 Deg	Horizontal	40.99
1	0	60	Horizontal	Vertical	35.18
1	0	60	Horizontal	Horizontal	36.09
1	0	60	60 Deg	Vertical	40.51
1	0	60	60 Deg	Horizontal	43.14
9	30	60	Horizontal	Vertical	37.36
9	30	60	Horizontal	Horizontal	36.55
9	30	60	60 Deg	Vertical	42.60
9	30	60	60 Deg	Horizontal	41.83
10	60	60	Horizontal	Vertical	35.82
10	60	60	Horizontal	Horizontal	35.50
10	60	60	60 Deg	Vertical	41.73
10	60	60	60 Deg	Horizontal	39.47
11	90	60	Horizontal	Vertical	34.54
11	90	60	Horizontal	Horizontal	33.22
11	90	60	60 Deg	Vertical	40.73
11	90	60	60 Deg	Horizontal	39.39
17	270	60	Horizontal	Vertical	33.64
17	270	60	Horizontal	Horizontal	32.73
17	270	60	60 Deg	Vertical	36.84
17	270	60	60 Deg	Horizontal	40.23
18	300	60	Horizontal	Vertical	33.45
18	300	60	Horizontal	Horizontal	34.43
18	300	60	60 Deg	Vertical	37.85
18	300	60	60 Deg	Horizontal	42.21
19	330	60	Horizontal	Vertical	33.22
19	330	60	Horizontal	Horizontal	32.52
19	330	60	60 Deg	Vertical	38.83
19	330	60	60 Deg	Horizontal	42.75
20	0	39	Horizontal	Vertical	37.97
20	0	39	Horizontal	Horizontal	38.96



APV Value	Azimuth Φ	Elevation Θ	EUT Orientation	Test Antenna Polarity	Final EIRP/5 kHz
20	0	39	60 Deg	Vertical	40.90
20	0	39	60 Deg	Horizontal	42.21
23	60	39	Horizontal	Vertical	38.28
23	60	39	Horizontal	Horizontal	38.52
23	60	39	60 Deg	Vertical	42.66
23	60	39	60 Deg	Horizontal	40.47
35	300	39	Horizontal	Vertical	37.74
35	300	39	Horizontal	Horizontal	37.40
35	300	39	60 Deg	Vertical	37.99
35	300	39	60 Deg	Horizontal	41.29
38	0	20	Horizontal	Vertical	36.97
38	0	20	Horizontal	Horizontal	38.46
38	0	20	60 Deg	Vertical	36.50
38	0	20	60 Deg	Horizontal	37.84
40	30	20	Horizontal	Vertical	39.93
40	30	20	Horizontal	Horizontal	39.02
40	30	20	60 Deg	Vertical	39.19
40	30	20	60 Deg	Horizontal	37.18
41	45	20	Horizontal	Vertical	40.25
41	45	20	Horizontal	Horizontal	39.89
41	45	20	60 Deg	Vertical	39.61
41	45	20	60 Deg	Horizontal	37.90
42	60	20	Horizontal	Vertical	37.77
42	60	20	Horizontal	Horizontal	39.58
42	60	20	60 Deg	Vertical	39.82
42	60	20	60 Deg	Horizontal	39.61
44	90	20	Horizontal	Vertical	39.84
44	90	20	Horizontal	Horizontal	39.71
44	90	20	60 Deg	Vertical	38.54
44	90	20	60 Deg	Horizontal	38.16
56	270	20	Horizontal	Vertical	38.94
56	270	20	Horizontal	Horizontal	38.37
56	270	20	60 Deg	Vertical	37.12
56	270	20	60 Deg	Horizontal	40.30
58	300	20	Horizontal	Vertical	38.06
58	300	20	Horizontal	Horizontal	38.84
58	300	20	60 Deg	Vertical	36.80



APV Value	Azimuth Φ	Elevation Θ	EUT Orientation	Test Antenna Polarity	Final EIRP/5 kHz
58	300	20	60 Deg	Horizontal	39.54
60	330	20	Horizontal	Vertical	40.27
60	330	20	Horizontal	Horizontal	40.72
60	330	20	60 Deg	Vertical	38.94
60	330	20	60 Deg	Horizontal	40.44

Table 30

Maximum result = 43.14 dBm



1621.166666 MHz

APV Value	Azimuth Φ	Elevation Θ	EUT Orientation	Test Antenna Polarity	Final EIRP/5 kHz
1	0	90	Horizontal	Vertical	32.61
1	0	90	Horizontal	Horizontal	31.31
1	0	90	60 Deg	Vertical	39.39
1	0	90	60 Deg	Horizontal	39.23
1	0	60	Horizontal	Vertical	34.53
1	0	60	Horizontal	Horizontal	35.37
1	0	60	60 Deg	Vertical	41.51
1	0	60	60 Deg	Horizontal	42.28
9	30	60	Horizontal	Vertical	37.06
9	30	60	Horizontal	Horizontal	34.87
9	30	60	60 Deg	Vertical	43.14
9	30	60	60 Deg	Horizontal	41.10
10	60	60	Horizontal	Vertical	36.61
10	60	60	Horizontal	Horizontal	36.51
10	60	60	60 Deg	Vertical	43.05
10	60	60	60 Deg	Horizontal	38.43
11	90	60	Horizontal	Vertical	35.24
11	90	60	Horizontal	Horizontal	32.49
11	90	60	60 Deg	Vertical	41.02
11	90	60	60 Deg	Horizontal	38.50
17	270	60	Horizontal	Vertical	33.55
17	270	60	Horizontal	Horizontal	31.06
17	270	60	60 Deg	Vertical	37.43
17	270	60	60 Deg	Horizontal	38.77
18	300	60	Horizontal	Vertical	33.10
18	300	60	Horizontal	Horizontal	31.87
18	300	60	60 Deg	Vertical	38.73
18	300	60	60 Deg	Horizontal	41.84
19	330	60	Horizontal	Vertical	32.72
19	330	60	Horizontal	Horizontal	31.56
19	330	60	60 Deg	Vertical	38.30
19	330	60	60 Deg	Horizontal	41.48
20	0	39	Horizontal	Vertical	37.98
20	0	39	Horizontal	Horizontal	37.72
20	0	39	60 Deg	Vertical	40.84
20	0	39	60 Deg	Horizontal	40.95
23	60	39	Horizontal	Vertical	38.90



APV Value	Azimuth Φ	Elevation Θ	EUT Orientation	Test Antenna Polarity	Final EIRP/5 kHz
23	60	39	Horizontal	Horizontal	37.53
23	60	39	60 Deg	Vertical	42.93
23	60	39	60 Deg	Horizontal	40.10
35	300	39	Horizontal	Vertical	38.05
35	300	39	Horizontal	Horizontal	35.33
35	300	39	60 Deg	Vertical	38.77
35	300	39	60 Deg	Horizontal	41.01
38	0	20	Horizontal	Vertical	36.49
38	0	20	Horizontal	Horizontal	35.76
38	0	20	60 Deg	Vertical	37.00
38	0	20	60 Deg	Horizontal	36.35
40	30	20	Horizontal	Vertical	40.78
40	30	20	Horizontal	Horizontal	38.76
40	30	20	60 Deg	Vertical	40.34
40	30	20	60 Deg	Horizontal	37.33
41	45	20	Horizontal	Vertical	40.59
41	45	20	Horizontal	Horizontal	38.98
41	45	20	60 Deg	Vertical	40.42
41	45	20	60 Deg	Horizontal	38.10
42	60	20	Horizontal	Vertical	39.14
42	60	20	Horizontal	Horizontal	39.48
42	60	20	60 Deg	Vertical	39.35
42	60	20	60 Deg	Horizontal	37.83
44	90	20	Horizontal	Vertical	39.69
44	90	20	Horizontal	Horizontal	38.61
44	90	20	60 Deg	Vertical	39.25
44	90	20	60 Deg	Horizontal	38.98
56	270	20	Horizontal	Vertical	38.80
56	270	20	Horizontal	Horizontal	37.75
56	270	20	60 Deg	Vertical	35.59
56	270	20	60 Deg	Horizontal	40.01
58	300	20	Horizontal	Vertical	38.01
58	300	20	Horizontal	Horizontal	38.21
58	300	20	60 Deg	Vertical	37.38
58	300	20	60 Deg	Horizontal	38.03
60	330	20	Horizontal	Vertical	40.37
60	330	20	Horizontal	Horizontal	39.16
60	330	20	60 Deg	Vertical	40.04



APV Value	Azimuth Φ	Elevation Θ	EUT Orientation	Test Antenna Polarity	Final EIRP/5 kHz
60	330	20	60 Deg	Horizontal	39.40

Table 31

Maximum result = 43.14 dBm



1625.833332 MHz

APV Value	Azimuth Φ	Elevation Θ	EUT Orientation	Test Antenna Polarity	Final EIRP/5 kHz
1	0	90	Horizontal	Vertical	33.29
1	0	90	Horizontal	Horizontal	31.48
1	0	90	60 Deg	Vertical	38.93
1	0	90	60 Deg	Horizontal	39.30
1	0	60	Horizontal	Vertical	33.96
1	0	60	Horizontal	Horizontal	34.09
1	0	60	60 Deg	Vertical	41.30
1	0	60	60 Deg	Horizontal	42.46
9	30	60	Horizontal	Vertical	36.50
9	30	60	Horizontal	Horizontal	33.89
9	30	60	60 Deg	Vertical	41.51
9	30	60	60 Deg	Horizontal	40.87
10	60	60	Horizontal	Vertical	36.06
10	60	60	Horizontal	Horizontal	35.35
10	60	60	60 Deg	Vertical	41.91
10	60	60	60 Deg	Horizontal	37.59
11	90	60	Horizontal	Vertical	34.57
11	90	60	Horizontal	Horizontal	32.10
11	90	60	60 Deg	Vertical	40.70
11	90	60	60 Deg	Horizontal	37.46
17	270	60	Horizontal	Vertical	33.98
17	270	60	Horizontal	Horizontal	32.05
17	270	60	60 Deg	Vertical	38.37
17	270	60	60 Deg	Horizontal	39.93
18	300	60	Horizontal	Vertical	33.65
18	300	60	Horizontal	Horizontal	33.61
18	300	60	60 Deg	Vertical	39.19
18	300	60	60 Deg	Horizontal	42.50
19	330	60	Horizontal	Vertical	32.41
19	330	60	Horizontal	Horizontal	30.69
19	330	60	60 Deg	Vertical	38.72
19	330	60	60 Deg	Horizontal	41.40
20	0	39	Horizontal	Vertical	37.55
20	0	39	Horizontal	Horizontal	37.47
20	0	39	60 Deg	Vertical	41.06
20	0	39	60 Deg	Horizontal	41.35



APV Value	Azimuth Φ	Elevation Θ	EUT Orientation	Test Antenna Polarity	Final EIRP/5 kHz
23	60	39	Horizontal	Vertical	39.47
23	60	39	Horizontal	Horizontal	37.51
23	60	39	60 Deg	Vertical	41.82
23	60	39	60 Deg	Horizontal	38.47
35	300	39	Horizontal	Vertical	38.50
35	300	39	Horizontal	Horizontal	36.70
35	300	39	60 Deg	Vertical	38.23
35	300	39	60 Deg	Horizontal	42.03
38	0	20	Horizontal	Vertical	36.78
38	0	20	Horizontal	Horizontal	36.23
38	0	20	60 Deg	Vertical	38.03
38	0	20	60 Deg	Horizontal	37.20
40	30	20	Horizontal	Vertical	40.82
40	30	20	Horizontal	Horizontal	39.94
40	30	20	60 Deg	Vertical	40.57
40	30	20	60 Deg	Horizontal	36.66
41	45	20	Horizontal	Vertical	40.72
41	45	20	Horizontal	Horizontal	38.89
41	45	20	60 Deg	Vertical	40.20
41	45	20	60 Deg	Horizontal	35.70
42	60	20	Horizontal	Vertical	38.96
42	60	20	Horizontal	Horizontal	39.12
42	60	20	60 Deg	Vertical	39.53
42	60	20	60 Deg	Horizontal	38.73
44	90	20	Horizontal	Vertical	39.28
44	90	20	Horizontal	Horizontal	38.57
44	90	20	60 Deg	Vertical	38.11
44	90	20	60 Deg	Horizontal	38.22
56	270	20	Horizontal	Vertical	38.81
56	270	20	Horizontal	Horizontal	36.70
56	270	20	60 Deg	Vertical	36.90
56	270	20	60 Deg	Horizontal	39.46
58	300	20	Horizontal	Vertical	37.77
58	300	20	Horizontal	Horizontal	37.38
58	300	20	60 Deg	Vertical	36.82
58	300	20	60 Deg	Horizontal	37.43
60	330	20	Horizontal	Vertical	40.57
60	330	20	Horizontal	Horizontal	38.73



APV Value	Azimuth Φ	Elevation Θ	EUT Orientation	Test Antenna Polarity	Final EIRP/5 kHz
60	330	20	60 Deg	Vertical	39.92
60	330	20	60 Deg	Horizontal	39.21

Table 32

Maximum result = 42.50 dBm

FCC 47 CFR Part 25, Limit Clause 25.204

+40 dBW in any 4 kHz band for $\theta \leq 0^\circ$

+40 + 3 θ dBW in any 4 kHz band for $0^\circ < \theta \leq 5^\circ$

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.



Power Density Measurements (2C8 - QPSK)

1616.333333 MHz

APV Value	Azimuth Φ	Elevation Θ	EUT Orientation	Test Antenna Polarity	Final EIRP/5 kHz
1	0	60	60 Deg	H	35.71

Table 33

1621.333333 MHz

APV Value	Azimuth Φ	Elevation Θ	EUT Orientation	Test Antenna Polarity	Final EIRP/5 kHz
9	30	60	60 Deg	V	35.42

Table 34

1625.666666 MHz

APV Value	Azimuth Φ	Elevation Θ	EUT Orientation	Test Antenna Polarity	Final EIRP/5 kHz
18	300	60	60 Deg	H	35.10

Table 35

FCC 47 CFR Part 25, Limit Clause 25.204

+40 dBW in any 4 kHz band for $\theta \leq 0^\circ$

+40 + 3 θ dBW in any 4 kHz band for $0^\circ < \theta \leq 5^\circ$

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.



Power Density Measurements (2C8 - 16 APSK)

1616.333333 MHz

APV Value	Azimuth Φ	Elevation Θ	EUT Orientation	Test Antenna Polarity	Final EIRP/5 kHz
1	0	60	60 Deg	H	37.65

Table 36

1621.333333 MHz

APV Value	Azimuth Φ	Elevation Θ	EUT Orientation	Test Antenna Polarity	Final EIRP/5 kHz
9	30	60	60 Deg	V	37.16

Table 37

1625.666666 MHz

APV Value	Azimuth Φ	Elevation Θ	EUT Orientation	Test Antenna Polarity	Final EIRP/5 kHz
18	300	60	60 Deg	H	37.18

Table 38

FCC 47 CFR Part 25, Limit Clause 25.204

+40 dBW in any 4 kHz band for $\theta \leq 0^\circ$

+40 + 3 θ dBW in any 4 kHz band for $0^\circ < \theta \leq 5^\circ$

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.

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
Hygrometer	Rotronic	HYGROPALM 1	2338	12	21-Sep-2017
Antenna (DRG Horn)	ETS-Lindgren	3115	3125	12	25-Jul-2017
Cable (N-N, 8m)	Rhophase	NPS-2302-8000-NPS	3248	-	TU
Signal Generator: 10MHz to 20GHz	Rohde & Schwarz	SMR20	3475	12	24-Apr-2017
EMI Test Receiver	Rohde & Schwarz	ESU40	3506	12	12-Nov-2017
Tilt Antenna Mast	mature GmbH	TAM 4.0-P	3916	-	TU
Mast Controller	mature GmbH	NCD	3917	-	TU
Cable 1503 2M 2.92(P)m 2.92(P)m	Rhophase	KPS-1503A-2000-KPS	4293	12	23-Jan-2018
1501A 4.0M Km Km Cable	Rhophase	KPS-1501A-4000-KPS	4301	12	03-Aug-2017
Cable (Rx, Nm-Nm, 5m)	Scott Cables	SLU18-NMNM-05.00M	4482	6	06-Jun-2017
Cable (Yellow, Rx, Km-Km 2m)	Scott Cables	KPS-1501-2000-KPS	4527	6	29-Jul-2015
Double Ridged Waveguide Horn Antenna	ETS-Lindgren	3117	4722	12	27-Feb-2017
Double Ridged Waveguide Horn Antenna	ETS-Lindgren	3117	4722	12	17-Feb-2018
1 - 18GHz DRG Antenna	ETS-Lindgren	3117	4738	12	04-Feb-2017

Table 39

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

2.5 Radiated Spurious Emissions

2.5.1 Specification Reference

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

2.5.2 Equipment Under Test and Modification State

Iridium Certus ProtoTerminal / 9801CertusH2,S/N: 42290124 - Modification State 0

2.5.3 Date of Test

06-February-2017 to 08-February-2017

2.5.4 Test Method

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

The limit line has been adjusted by a correction factor equal to the system path loss.

2.5.5 Environmental Conditions

Ambient Temperature 19.4 °C
Relative Humidity 32.0 %

2.5.6 Test Results

C8 - 16-APSK

30 MHz to 1 GHz

Frequency (MHz)	Result (dBm)
*	

Table 40

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



Product Service

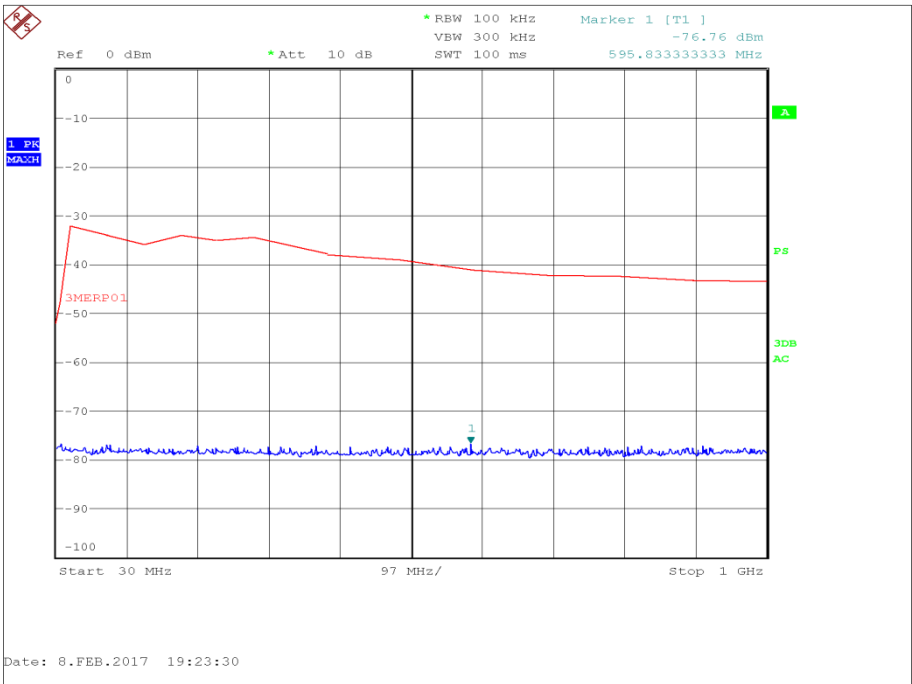


Figure 44 - 1616.166666 MHz - Test Frequency Range 30 MHz to 1 GHz



1 GHz to 17 GHz

Frequency (MHz)	Result (dBm)
*	

Table 41

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

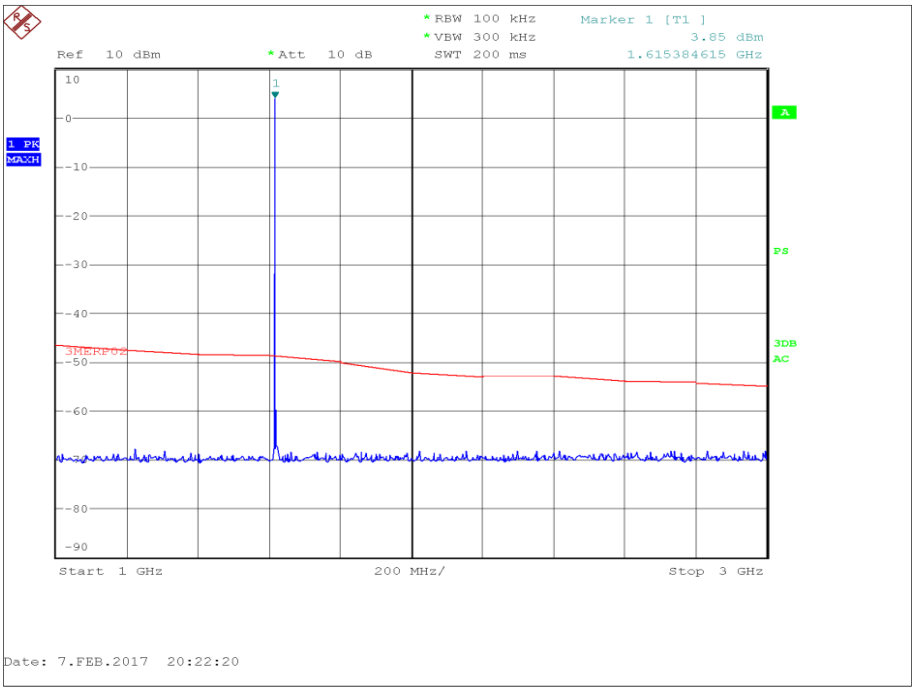


Figure 45 - 1616.166666 MHz - Test Frequency Range 1 GHz to 3 GHz

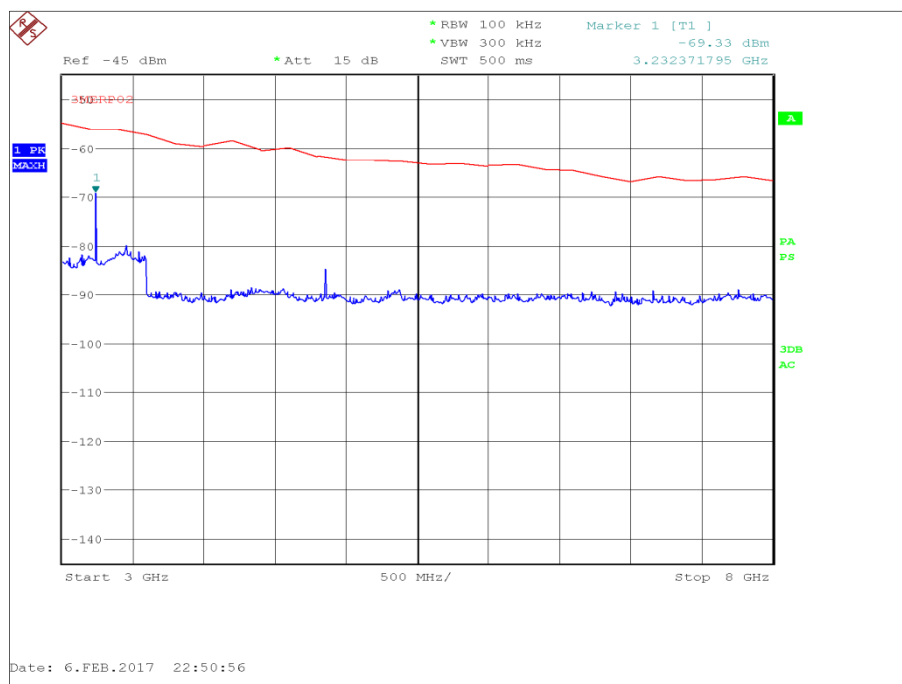


Figure 46 - 1616.166666 MHz - Test Frequency Range 3 GHz to 8 GHz

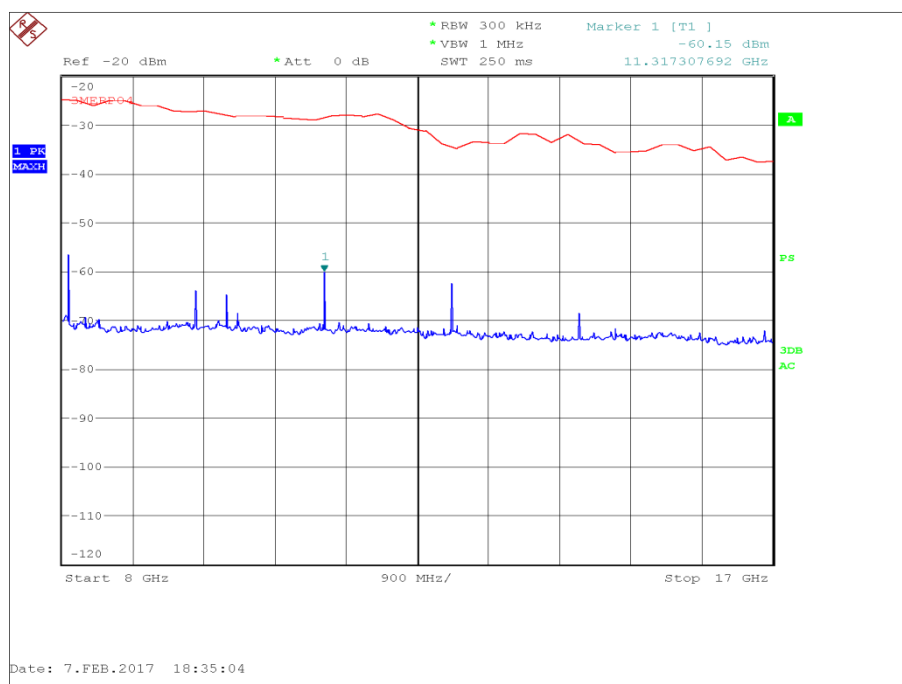


Figure 47 - 1616.166666 MHz - Test Frequency Range 8 GHz to 17 GHz



30 MHz to 1 GHz

Frequency (MHz)	Result (dBm)
*	

Table 42 - 30 MHz to 1 GHz Emissions Results

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

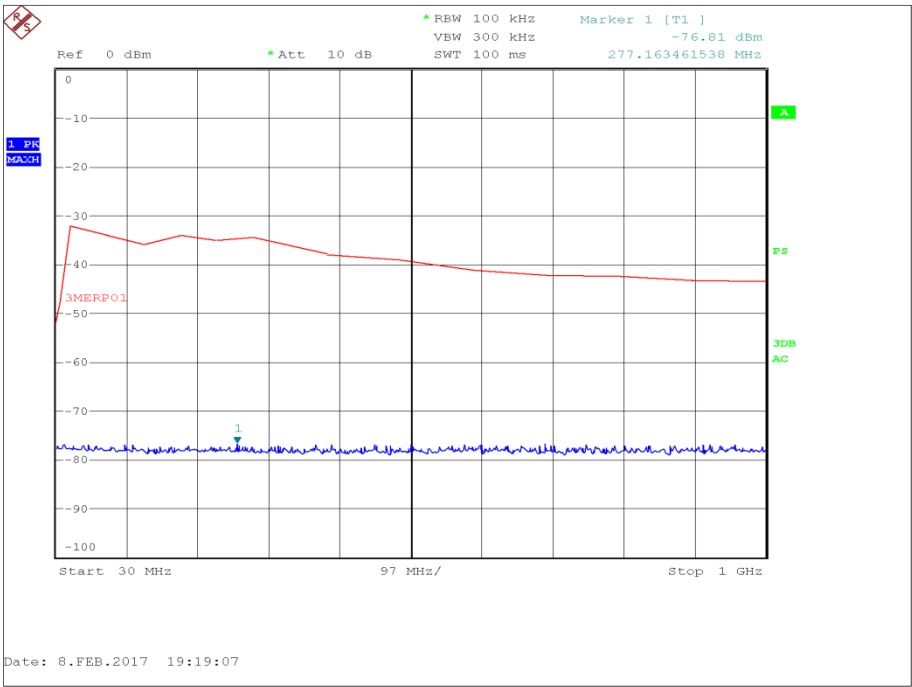


Figure 48 - 1621.166666 MHz - Test Frequency Range 30 MHz to 1 GHz



1 GHz to 17 GHz

Frequency (MHz)	Result (dBm)
*	

Table 43

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

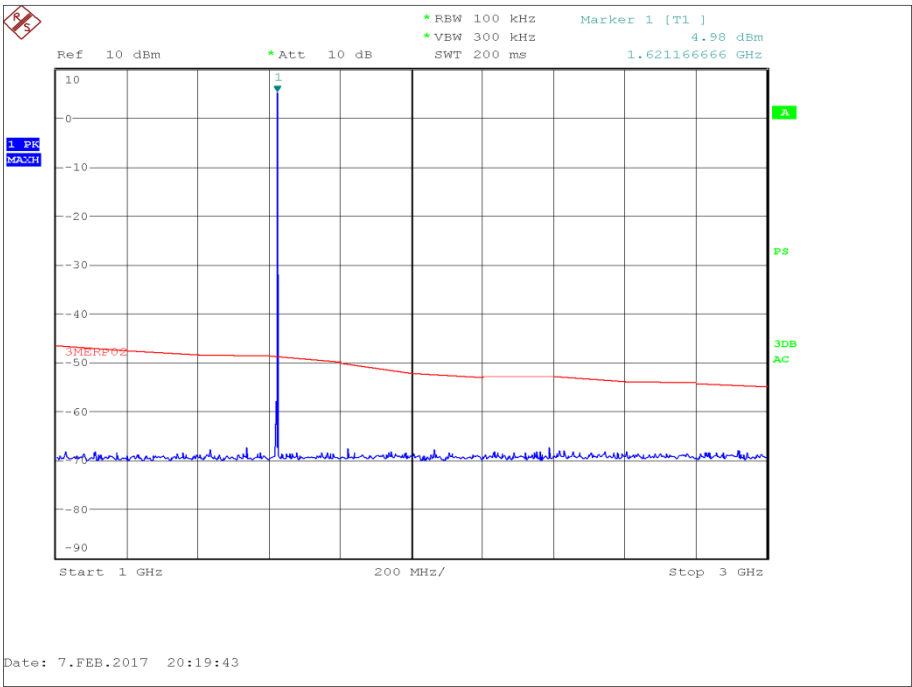


Figure 49 - 1621.166666 MHz - Test Frequency Range 1 GHz to 3 GHz



Product Service

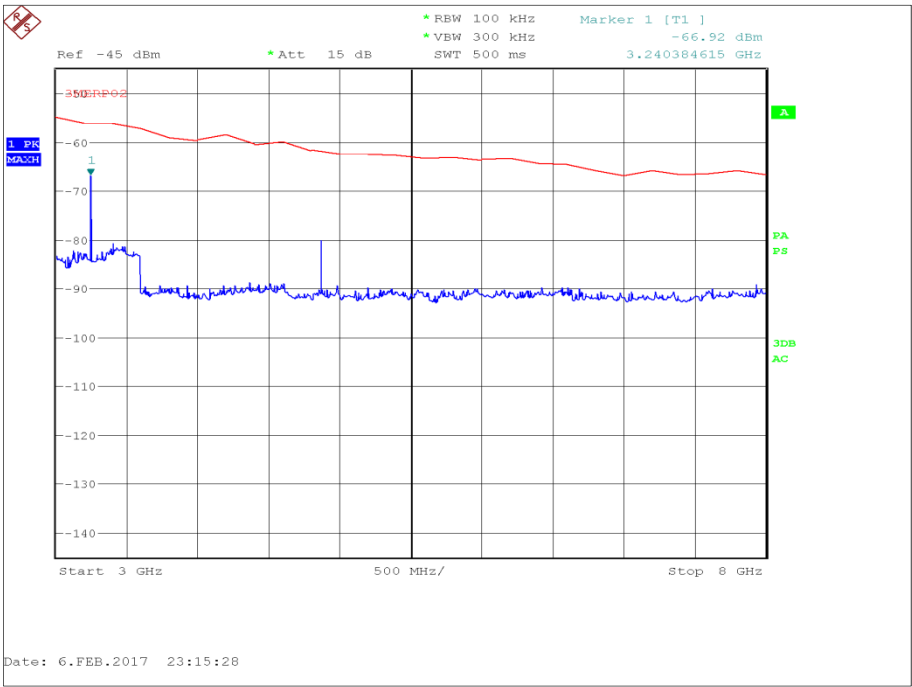


Figure 50 - 1621.166666 MHz - Test Frequency Range 3 GHz to 8 GHz

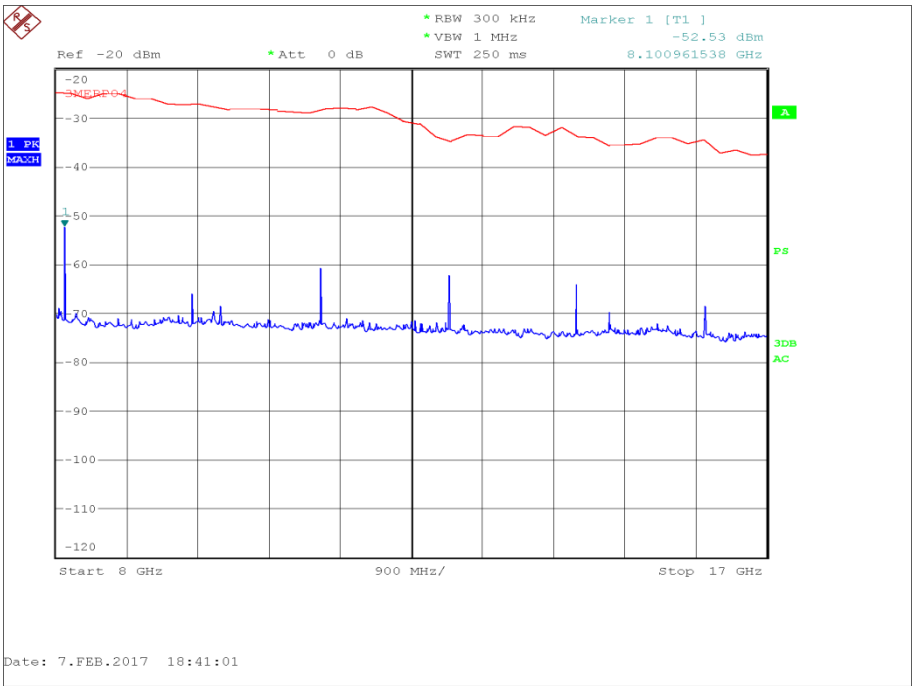


Figure 51 - 1621.166666 MHz - Test Frequency Range 8 GHz to 17 GHz



30 MHz to 1 GHz

Frequency (MHz)	Result (dBm)
*	

Table 44

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

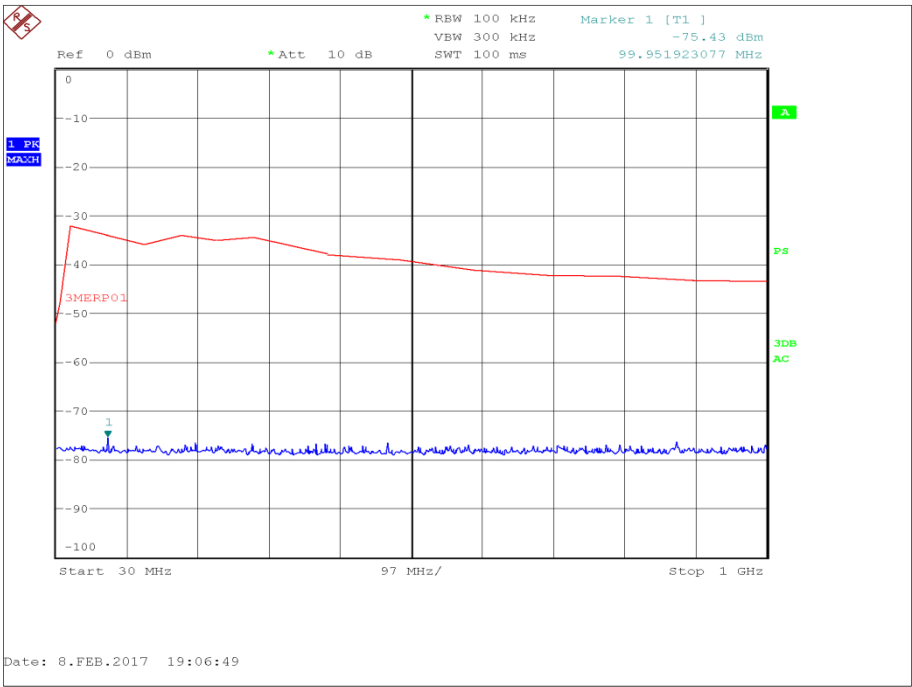


Figure 52 - 1625.833333 MHz - Test Frequency Range 30 MHz to 1 GHz



1 GHz to 17 GHz

Frequency (MHz)	Result (dBm)
3251.665	-17.01

Table 45

No other emissions were found within 10 dB of the limit.

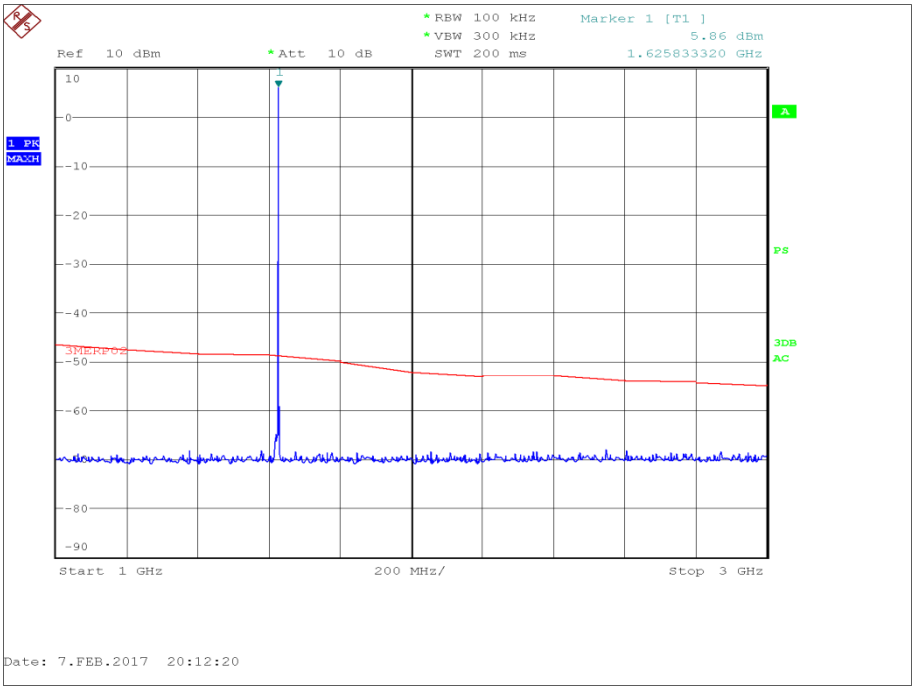


Figure 53 - 1625.833333 MHz - Test Frequency Range 1 GHz to 3 GHz

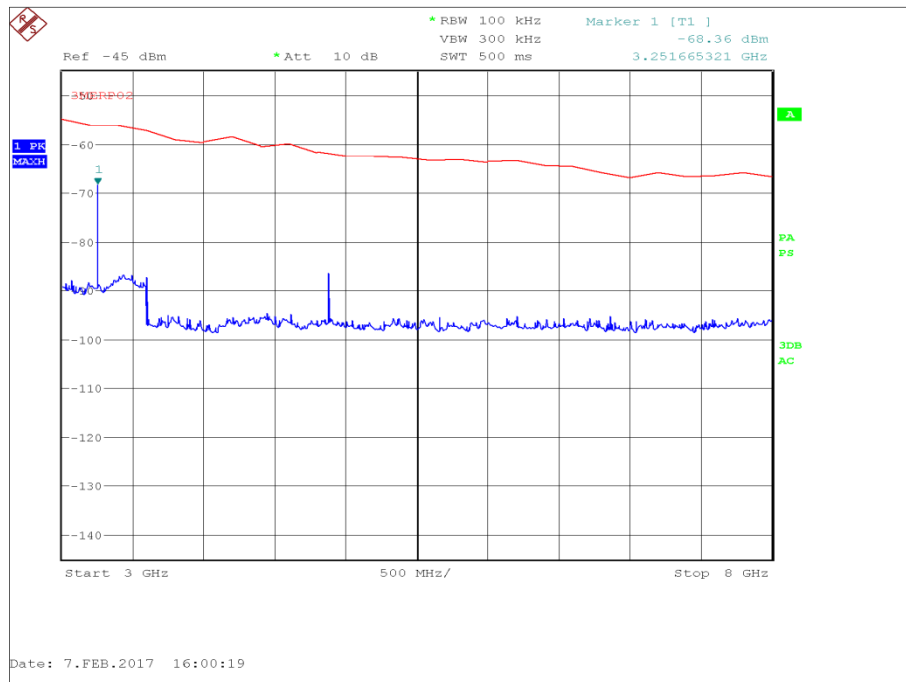


Figure 54 - 1625.833333 MHz - Test Frequency Range 3 GHz to 8 GHz

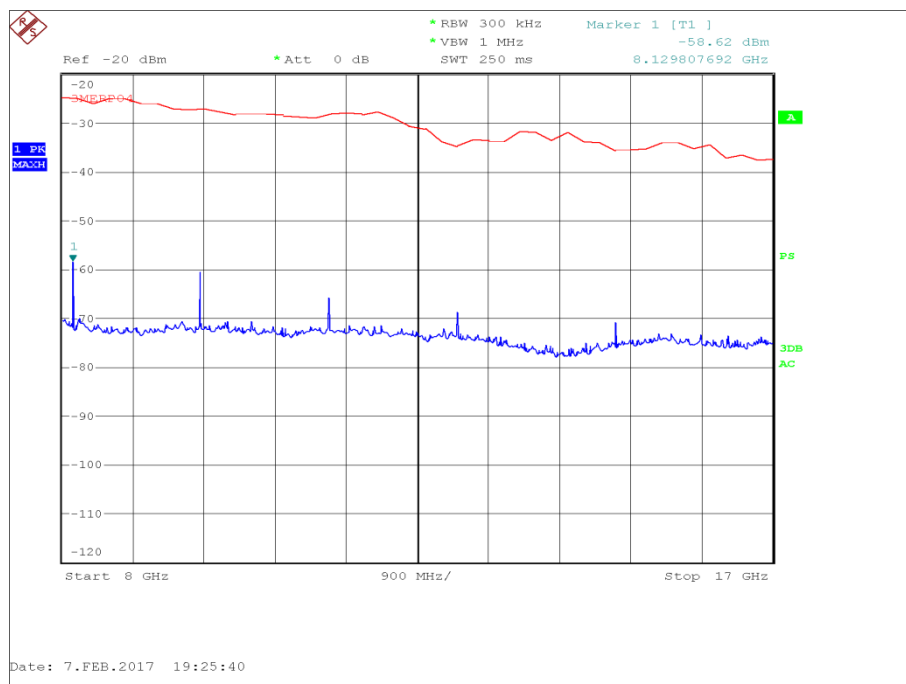


Figure 55 - 1625.833333 MHz - Test Frequency Range 8 GHz to 17 GHz



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.

2.5.7 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
Antenna (Double Ridge Guide, 1GHz-18GHz)	EMCO	3115	234	12	29-Apr-2017
Signal Generator (10MHz to 40GHz)	Rohde & Schwarz	SMR40	1002	12	14-Oct-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
Hygrometer	Rotronic	HYGROPALM 1	2338	12	21-Sep-2017
Antenna (Bilog)	Chase	CBL6143	2904	24	11-Jun-2017
Antenna (DRG Horn)	ETS-Lindgren	3115	3125	12	25-Jul-2017
Cable (N-N, 8m)	Rhophase	NPS-2302-8000-NPS	3248	-	O/P Mon
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	mature GmbH	TAM 4.0-P	3916	-	TU
Mast Controller	mature GmbH	NCD	3917	-	TU
1501A 4.0M Km Km Cable	Rhophase	KPS-1501A-4000-KPS	4301	12	03-Aug-2017
Suspended Substrate Highpass Filter	Advance Power Components	11SH10-3000/X18000-O/O	4411	12	23-Mar-2017
Suspended Substrate Highpass Filter	Advance Power Components	11SH10-3000/X18000-O/O	4412	12	23-Mar-2017
Cable (Rx, Nm-Nm, 5m)	Scott Cables	SLU18-NMNM-05.00M	4482	6	06-Jun-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	27-Feb-2017

Table 46

TU - Traceability Unscheduled

O/P Mon – Output Monitored using calibration equipment



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

2.6.1 Specification Reference

FCC 47 CFR Part 25, Clause 25.216

2.6.2 Equipment Under Test and Modification State

Iridium Certus ProtoTerminal / 9801CertusH2, S/N: 42290124 - Modification State 0

2.6.3 Date of Test

07-February-2017 and 08-March-2017

2.6.4 Test Method

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

The limit line has been adjusted by a correction factor equal to the system path loss.

2.6.5 Environmental Conditions

Ambient Temperature 18.9 °C

Relative Humidity 34.0 %

2.6.6 Test Results

C8 – QPSK

1616.166666 MHz – Broadband Emission Results

Frequency (MHz)	Level (dBW)
*	

Table 47

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

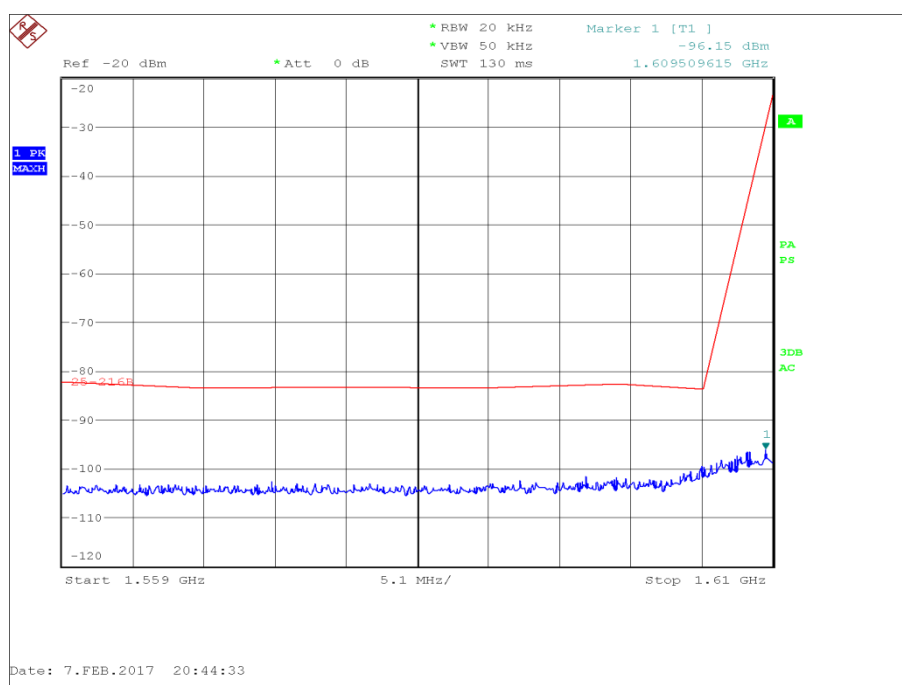


Figure 56 - 1616.166666 MHz – Broadband Emission Plot



1616.166666 MHz – Discrete Emission Results

Frequency (MHz)	Level (dBW)
*	

Table 48

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

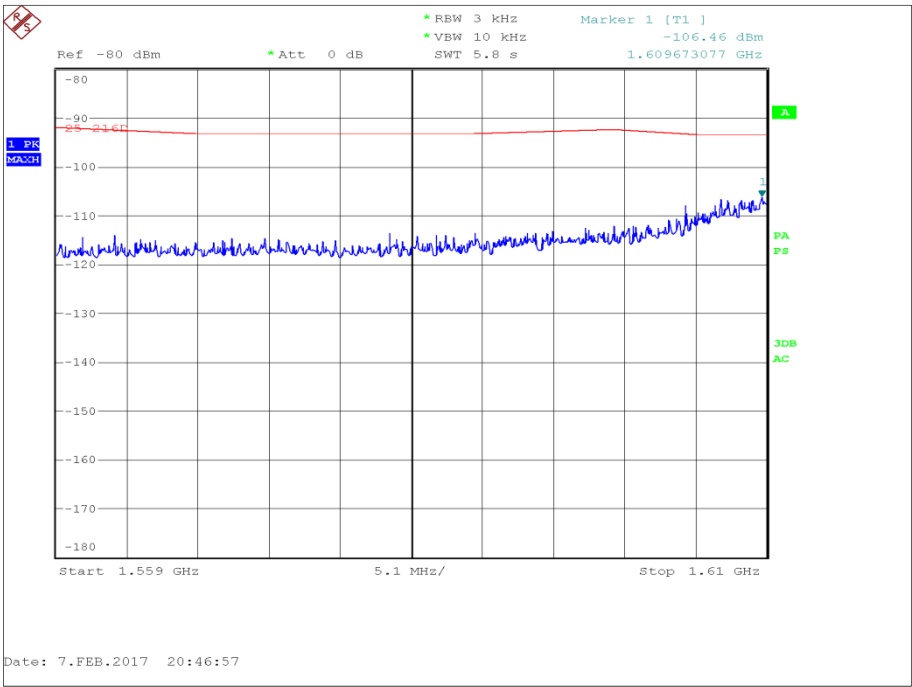


Figure 57 - 1616.166666 MHz – Discrete Emission Plot



1621.166666 MHz – Broadband Emission Results

Frequency (MHz)	Level (dBW)
*	

Table 49

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

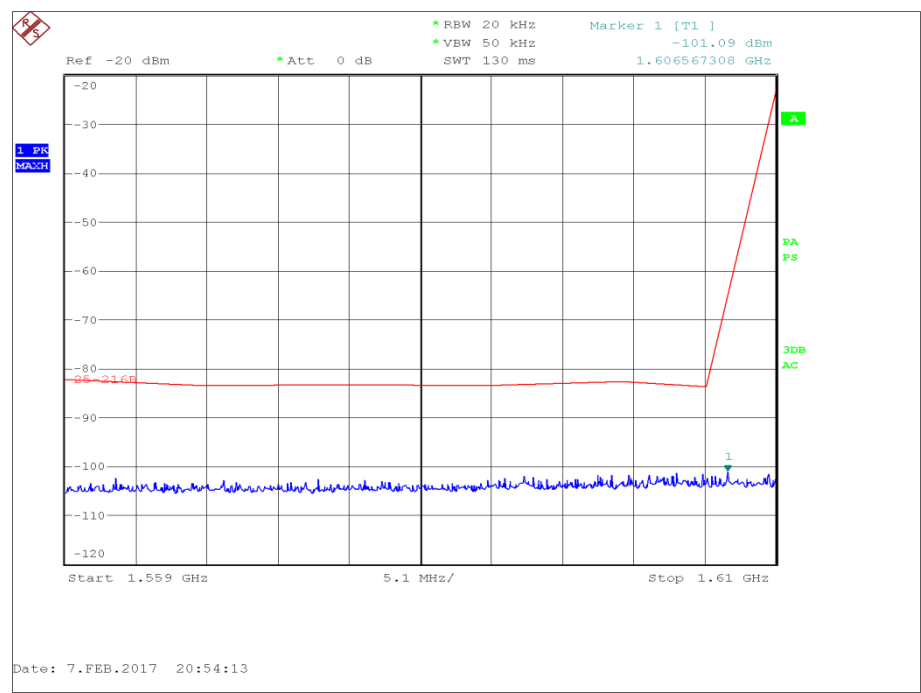


Figure 58 - 1621.166666 MHz – Broadband Emission Plot



1621.166666 MHz – Discrete Emission Results

Frequency (MHz)	Level (dBW)
*	

Table 50

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

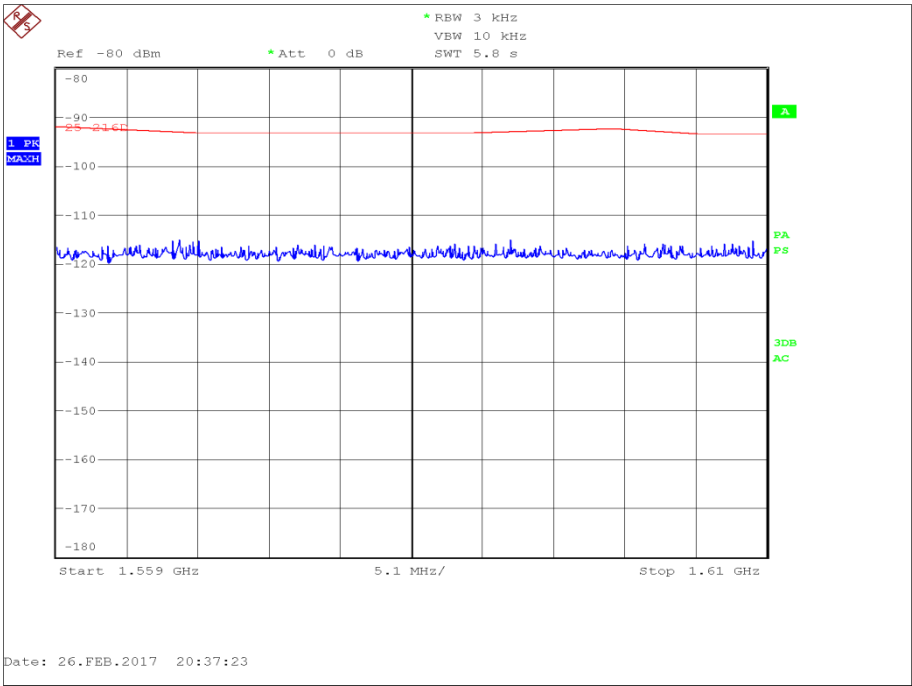


Figure 59 - Discrete Emissions Results - 1621.166666 MHz



1625.833332 MHz – Broadband Emission Results

Frequency (MHz)	Level (dBW)
*	

Table 51

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

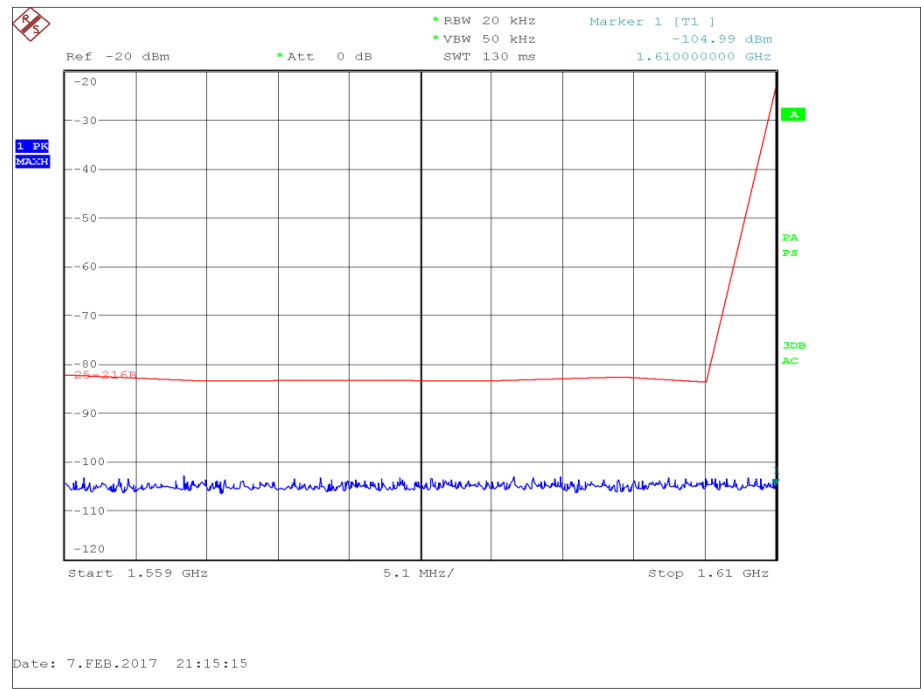


Figure 60 - Broadband Emissions Results - 1625.833332 MHz



1625.833332 MHz – Discrete Emission Results

Frequency (MHz)	Level (dBW)
*	

Table 52

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

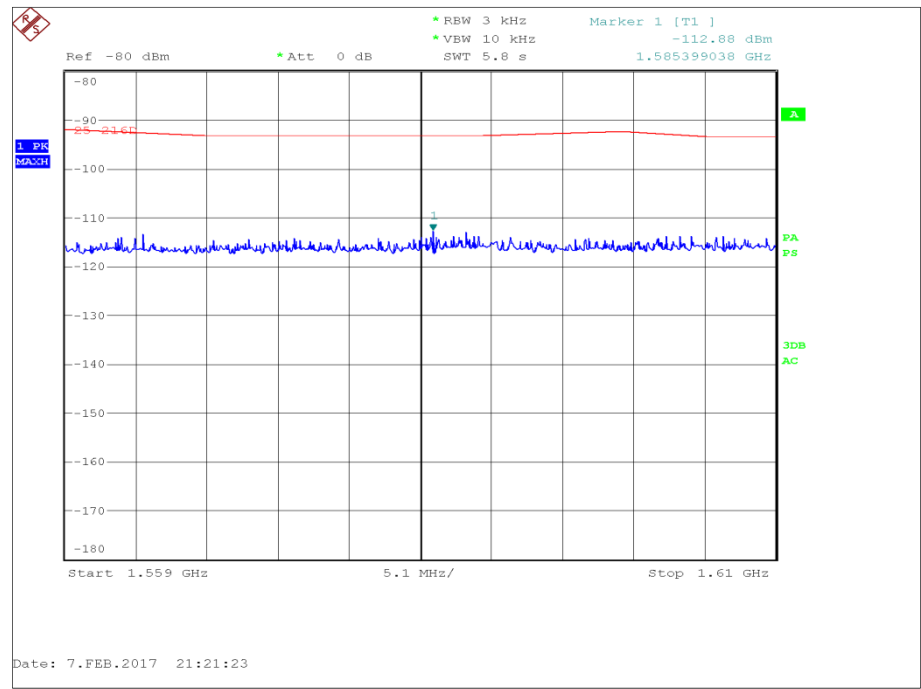
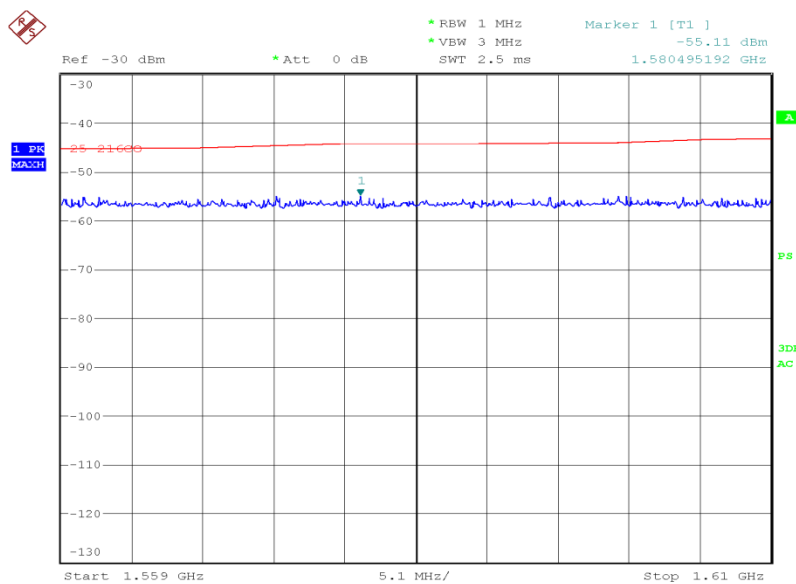


Figure 61 - Discrete Emissions Results - 1625.833332 MHz



Date: 8.MAR.2017 18:22:11

Figure 62 - Carrier Off State 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.

25.216(i) The e.i.r.p density of carrier-off state emissions from 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 between 1 and 3 GHz shall not exceed -80 dBW/MHz in the 1559–1610 MHz band averaged over any two millisecond interval.

2.6.7 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
Tuneable Notch Filter	K&L Microwave	5TNF-1500/3000-N/N	435		TU
Signal Generator (10MHz to 40GHz)	Rohde & Schwarz	SMR40	1002	12	14-Oct-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
Cable (N-N, 8m)	Rhophase	NPS-2302-8000-NPS	3248	-	O/P Mon
EMI Test Receiver	Rohde & Schwarz	ESU40	3506	12	12-Nov-2017
Tilt Antenna Mast	mature GmbH	TAM 4.0-P	3916	-	TU
Mast Controller	mature GmbH	NCD	3917	-	TU
1501A 4.0M Km Km Cable	Rhophase	KPS-1501A-4000-KPS	4301	12	03-Aug-2017
Cable (Rx, Nm-Nm, 5m)	Scott Cables	SLU18-NMNM-05.00M	4482	6	06-Jun-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	27-Feb-2017

Table 53

TU - Traceability Unscheduled

O/P Mon – Output Monitored using calibrated equipment



2.7 Modulation Characteristics

2.7.1 Specification Reference

FCC 47 CFR Part 2, Clause 2.1047 (d)

2.7.2 Equipment Under Test and Modification State

Iridium Certus ProtoTerminal / 9801CertusH2, S/N: 42290124 - Modification State 0

2.7.3 Declaration

Iridium - Transmit

Modulation characteristics description as provided by the customer...
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.

Table 54

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.

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 Radiated: ± 6.3 dB (1 GHz to 18 GHz)
Radiated Spurious Emissions	30 MHz to 1 GHz: ± 5.1 dB 1 GHz to 18 GHz: ± 6.3 dB
Limits on Emissions from Mobile Earth Stations for Protection of Aeronautical Radionavigation-Satellite Service	Radiated: ± 6.3 dB Conducted: ± 3.45 dB
Modulation Characteristics	-

Table 55



Product Service

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:

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

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	50.95
1	0	90	Horizontal	Horizontal	50.78
1	0	90	60 Deg	Vertical	56.17
1	0	90	60 Deg	Horizontal	58.18
1	0	60	Horizontal	Vertical	52.37
1	0	60	Horizontal	Horizontal	53.28
1	0	60	60 Deg	Vertical	57.70
1	0	60	60 Deg	Horizontal	60.33
9	30	60	Horizontal	Vertical	54.55
9	30	60	Horizontal	Horizontal	53.74
9	30	60	60 Deg	Vertical	59.79
9	30	60	60 Deg	Horizontal	59.02
10	60	60	Horizontal	Vertical	53.01
10	60	60	Horizontal	Horizontal	52.69
10	60	60	60 Deg	Vertical	58.92
10	60	60	60 Deg	Horizontal	56.66
11	90	60	Horizontal	Vertical	51.73
11	90	60	Horizontal	Horizontal	50.41
11	90	60	60 Deg	Vertical	57.92
11	90	60	60 Deg	Horizontal	56.58
17	-90	60	Horizontal	Vertical	50.83
17	-90	60	Horizontal	Horizontal	49.92
17	-90	60	60 Deg	Vertical	54.03
17	-90	60	60 Deg	Horizontal	57.42
18	-60	60	Horizontal	Vertical	50.64
18	-60	60	Horizontal	Horizontal	51.62
18	-60	60	60 Deg	Vertical	55.04



APV Value	Azimuth Φ	Elevation Θ	EUT Orientation	Test Antenna Polarity	Integrated Power over EUT OCB (dBm)
18	-60	60	60 Deg	Horizontal	59.40
19	-30	60	Horizontal	Vertical	50.41
19	-30	60	Horizontal	Horizontal	49.71
19	-30	60	60 Deg	Vertical	56.02
19	-30	60	60 Deg	Horizontal	59.94
20	0	39	Horizontal	Vertical	55.16
20	0	39	Horizontal	Horizontal	56.15
20	0	39	60 Deg	Vertical	58.09
20	0	39	60 Deg	Horizontal	59.40
23	60	39	Horizontal	Vertical	55.47
23	60	39	Horizontal	Horizontal	55.71
23	60	39	60 Deg	Vertical	59.85
23	60	39	60 Deg	Horizontal	57.66
35	-60	39	Horizontal	Vertical	54.93
35	-60	39	Horizontal	Horizontal	54.59
35	-60	39	60 Deg	Vertical	55.18
35	-60	39	60 Deg	Horizontal	58.48
38	0	20	Horizontal	Vertical	54.16
38	0	20	Horizontal	Horizontal	55.65
38	0	20	60 Deg	Vertical	53.69
38	0	20	60 Deg	Horizontal	55.03
40	30	20	Horizontal	Vertical	57.12
40	30	20	Horizontal	Horizontal	56.21
40	30	20	60 Deg	Vertical	56.38
40	30	20	60 Deg	Horizontal	54.37
41	45	20	Horizontal	Vertical	57.44
41	45	20	Horizontal	Horizontal	57.08
41	45	20	60 Deg	Vertical	56.80
41	45	20	60 Deg	Horizontal	55.09
42	60	20	Horizontal	Vertical	54.96
42	60	20	Horizontal	Horizontal	56.77
42	60	20	60 Deg	Vertical	57.01
42	60	20	60 Deg	Horizontal	56.80
44	90	20	Horizontal	Vertical	57.03
44	90	20	Horizontal	Horizontal	56.90
44	90	20	60 Deg	Vertical	55.73
44	90	20	60 Deg	Horizontal	55.35



APV Value	Azimuth Φ	Elevation Θ	EUT Orientation	Test Antenna Polarity	Integrated Power over EUT OCB (dBm)
56	-90	20	Horizontal	Vertical	56.13
56	-90	20	Horizontal	Horizontal	55.56
56	-90	20	60 Deg	Vertical	54.31
56	-90	20	60 Deg	Horizontal	57.49
58	-60	20	Horizontal	Vertical	55.25
58	-60	20	Horizontal	Horizontal	56.03
58	-60	20	60 Deg	Vertical	53.99
58	-60	20	60 Deg	Horizontal	56.73
60	-30	20	Horizontal	Vertical	57.46
60	-30	20	Horizontal	Horizontal	57.91
60	-30	20	60 Deg	Vertical	56.13
60	-30	20	60 Deg	Horizontal	57.63

Table 56

Maximum result = 60.33 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	49.80
1	0	90	Horizontal	Horizontal	48.50
1	0	90	60 Deg	Vertical	56.58
1	0	90	60 Deg	Horizontal	56.42
1	0	60	Horizontal	Vertical	51.72
1	0	60	Horizontal	Horizontal	52.56
1	0	60	60 Deg	Vertical	58.70
1	0	60	60 Deg	Horizontal	59.47
9	30	60	Horizontal	Vertical	54.25
9	30	60	Horizontal	Horizontal	52.06
9	30	60	60 Deg	Vertical	60.33
9	30	60	60 Deg	Horizontal	58.29
10	60	60	Horizontal	Vertical	53.80
10	60	60	Horizontal	Horizontal	53.70
10	60	60	60 Deg	Vertical	60.24
10	60	60	60 Deg	Horizontal	55.62
11	90	60	Horizontal	Vertical	52.43
11	90	60	Horizontal	Horizontal	49.68
11	90	60	60 Deg	Vertical	58.21
11	90	60	60 Deg	Horizontal	55.69
17	-90	60	Horizontal	Vertical	50.74
17	-90	60	Horizontal	Horizontal	48.25
17	-90	60	60 Deg	Vertical	54.62
17	-90	60	60 Deg	Horizontal	55.96
18	-60	60	Horizontal	Vertical	50.29
18	-60	60	Horizontal	Horizontal	49.06
18	-60	60	60 Deg	Vertical	55.92
18	-60	60	60 Deg	Horizontal	59.03
19	-30	60	Horizontal	Vertical	49.91
19	-30	60	Horizontal	Horizontal	48.75
19	-30	60	60 Deg	Vertical	55.49
19	-30	60	60 Deg	Horizontal	58.67
20	0	39	Horizontal	Vertical	55.17
20	0	39	Horizontal	Horizontal	54.91
20	0	39	60 Deg	Vertical	58.03
20	0	39	60 Deg	Horizontal	58.14



APV Value	Azimuth Φ	Elevation Θ	EUT Orientation	Test Antenna Polarity	Integrated Power over EUT OCB (dBm)
23	60	39	Horizontal	Vertical	56.09
23	60	39	Horizontal	Horizontal	54.72
23	60	39	60 Deg	Vertical	60.12
23	60	39	60 Deg	Horizontal	57.29
35	-60	39	Horizontal	Vertical	55.24
35	-60	39	Horizontal	Horizontal	52.52
35	-60	39	60 Deg	Vertical	55.96
35	-60	39	60 Deg	Horizontal	58.20
38	0	20	Horizontal	Vertical	53.68
38	0	20	Horizontal	Horizontal	52.95
38	0	20	60 Deg	Vertical	54.19
38	0	20	60 Deg	Horizontal	53.54
40	30	20	Horizontal	Vertical	57.97
40	30	20	Horizontal	Horizontal	55.95
40	30	20	60 Deg	Vertical	57.53
40	30	20	60 Deg	Horizontal	54.52
41	45	20	Horizontal	Vertical	57.78
41	45	20	Horizontal	Horizontal	56.17
41	45	20	60 Deg	Vertical	57.61
41	45	20	60 Deg	Horizontal	55.29
42	60	20	Horizontal	Vertical	56.33
42	60	20	Horizontal	Horizontal	56.67
42	60	20	60 Deg	Vertical	56.54
42	60	20	60 Deg	Horizontal	55.02
44	90	20	Horizontal	Vertical	56.88
44	90	20	Horizontal	Horizontal	55.80
44	90	20	60 Deg	Vertical	56.44
44	90	20	60 Deg	Horizontal	56.17
56	-90	20	Horizontal	Vertical	55.99
56	-90	20	Horizontal	Horizontal	54.94
56	-90	20	60 Deg	Vertical	52.78
56	-90	20	60 Deg	Horizontal	57.20
58	-60	20	Horizontal	Vertical	55.20
58	-60	20	Horizontal	Horizontal	55.40
58	-60	20	60 Deg	Vertical	54.57
58	-60	20	60 Deg	Horizontal	55.22
60	-30	20	Horizontal	Vertical	57.56
60	-30	20	Horizontal	Horizontal	56.35



APV Value	Azimuth Φ	Elevation Θ	EUT Orientation	Test Antenna Polarity	Integrated Power over EUT OCB (dBm)
60	-30	20	60 Deg	Vertical	57.23
60	-30	20	60 Deg	Horizontal	56.59

Table 57

Maximum result = 60.33 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	50.48
1	0	90	Horizontal	Horizontal	48.67
1	0	90	60 Deg	Vertical	56.12
1	0	90	60 Deg	Horizontal	56.49
1	0	60	Horizontal	Vertical	51.15
1	0	60	Horizontal	Horizontal	51.28
1	0	60	60 Deg	Vertical	58.49
1	0	60	60 Deg	Horizontal	59.65
9	30	60	Horizontal	Vertical	53.69
9	30	60	Horizontal	Horizontal	51.08
9	30	60	60 Deg	Vertical	58.70
9	30	60	60 Deg	Horizontal	58.06
10	60	60	Horizontal	Vertical	53.25
10	60	60	Horizontal	Horizontal	52.54
10	60	60	60 Deg	Vertical	59.10
10	60	60	60 Deg	Horizontal	54.78
11	90	60	Horizontal	Vertical	51.76
11	90	60	Horizontal	Horizontal	49.29
11	90	60	60 Deg	Vertical	57.89
11	90	60	60 Deg	Horizontal	54.65
17	-90	60	Horizontal	Vertical	51.17
17	-90	60	Horizontal	Horizontal	49.24
17	-90	60	60 Deg	Vertical	55.56
17	-90	60	60 Deg	Horizontal	57.12
18	-60	60	Horizontal	Vertical	50.84
18	-60	60	Horizontal	Horizontal	50.80
18	-60	60	60 Deg	Vertical	56.38
18	-60	60	60 Deg	Horizontal	59.69
19	-30	60	Horizontal	Vertical	49.60
19	-30	60	Horizontal	Horizontal	47.88
19	-30	60	60 Deg	Vertical	55.91
19	-30	60	60 Deg	Horizontal	58.59
20	0	39	Horizontal	Vertical	54.74
20	0	39	Horizontal	Horizontal	54.66
20	0	39	60 Deg	Vertical	58.25



APV Value	Azimuth Φ	Elevation Θ	EUT Orientation	Test Antenna Polarity	Integrated Power over EUT OCB (dBm)
20	0	39	60 Deg	Horizontal	58.54
23	60	39	Horizontal	Vertical	56.66
23	60	39	Horizontal	Horizontal	54.70
23	60	39	60 Deg	Vertical	59.01
23	60	39	60 Deg	Horizontal	55.66
35	-60	39	Horizontal	Vertical	55.69
35	-60	39	Horizontal	Horizontal	53.89
35	-60	39	60 Deg	Vertical	55.42
35	-60	39	60 Deg	Horizontal	59.22
38	0	20	Horizontal	Vertical	53.97
38	0	20	Horizontal	Horizontal	53.42
38	0	20	60 Deg	Vertical	55.22
38	0	20	60 Deg	Horizontal	54.39
40	30	20	Horizontal	Vertical	58.01
40	30	20	Horizontal	Horizontal	57.13
40	30	20	60 Deg	Vertical	57.76
40	30	20	60 Deg	Horizontal	53.85
41	45	20	Horizontal	Vertical	57.91
41	45	20	Horizontal	Horizontal	56.08
41	45	20	60 Deg	Vertical	57.39
41	45	20	60 Deg	Horizontal	52.89
42	60	20	Horizontal	Vertical	56.15
42	60	20	Horizontal	Horizontal	56.31
42	60	20	60 Deg	Vertical	56.72
42	60	20	60 Deg	Horizontal	55.92
44	90	20	Horizontal	Vertical	56.47
44	90	20	Horizontal	Horizontal	55.76
44	90	20	60 Deg	Vertical	55.30
44	90	20	60 Deg	Horizontal	55.41
56	-90	20	Horizontal	Vertical	56.00
56	-90	20	Horizontal	Horizontal	53.89
56	-90	20	60 Deg	Vertical	54.09
56	-90	20	60 Deg	Horizontal	56.65
58	-60	20	Horizontal	Vertical	54.96
58	-60	20	Horizontal	Horizontal	54.57
58	-60	20	60 Deg	Vertical	54.01
58	-60	20	60 Deg	Horizontal	54.62



APV Value	Azimuth Φ	Elevation Θ	EUT Orientation	Test Antenna Polarity	Integrated Power over EUT OCB (dBm)
60	-30	20	Horizontal	Vertical	57.76
60	-30	20	Horizontal	Horizontal	55.92
60	-30	20	60 Deg	Vertical	57.11
60	-30	20	60 Deg	Horizontal	56.40

Table 58

Maximum result = 59.65 dBm

2C8 - QPSK

1616.333333 MHz

APV Value	Azimuth Φ	Elevation Θ	EUT Orientation	Test Antenna Polarity	Integrated Power over EUT OCB (dBm)
1	0	60	60 Deg	H	56.41

Table 59

1621.333333 MHz

APV Value	Azimuth Φ	Elevation Θ	EUT Orientation	Test Antenna Polarity	Integrated Power over EUT OCB (dBm)
9	30	60	60 Deg	V	56.12

Table 60

1625.666666 MHz

APV Value	Azimuth Φ	Elevation Θ	EUT Orientation	Test Antenna Polarity	Integrated Power over EUT OCB (dBm)
18	300	60	60 Deg	H	55.87

Table 61

2C8 - 16 APSK

1616.333333 MHz

APV Value	Azimuth Φ	Elevation Θ	EUT Orientation	Test Antenna Polarity	Integrated Power over EUT OCB (dBm)
1	0	60	60 Deg	H	58.35

Table 62

1621.333333 MHz

APV Value	Azimuth Φ	Elevation Θ	EUT Orientation	Test Antenna Polarity	Integrated Power over EUT OCB (dBm)
9	30	60	60 Deg	V	57.86

Table 63

1625.666666 MHz

APV Value	Azimuth Φ	Elevation Θ	EUT Orientation	Test Antenna Polarity	Integrated Power over EUT OCB (dBm)
18	300	60	60 Deg	H	57.88

Table 64