Report on the FCC Testing of the

Quake Global Inc
Satellite Modem, Model: QLocate (1158-5010)
Test Board, Model: N/A

In accordance with FCC 47 CFR Part 25 and FCC 47 CFR Part 2

Prepared for: Quake Global Inc
4933 Paramount Drive
San Diego, California, CA92123
UNITED STATES

FCC ID: PB5NQLOCATE

Product Service

Choose certainty.
Add value.

COMMERCIAL-IN-CONFIDENCE

Document Number: 75941975-02 | Issue: 02

RESPONSIBLE FOR	NAME	DATE	SIGNATURE
Project Management	Natalie Bennett	29 August 2018	
Authorised Signatory	Matthew Russell	29 August 2018	

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	Jack Tuckwell	29 August 2018	
Testing	Mehadi Choudhury	29 August 2018	

FCC Accreditation
90987 Octagon House, Fareham Test Laboratory

EXECUTIVE SUMMARY
A sample of this product was tested and found to be compliant with FCC 47 CFR Part 25: 2017 and FCC 47 CFR Part 2: 2017.

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

TUV SUD 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

Product Service

Contents

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	03 July 2018
2	To amend the FCC ID	29 August 2018

1.2 Introduction

Applicant	Quake Global Inc
Manufacturer	Quake Global Inc
Model Number(s)	Satellite Modem: QLocate (1158-5010) Test Board: N/A
Declared Variant(s)	QLocate (1158-5002) QLocate (1158-5003)
Serial Number(s)	Satellite Modem: IMEI: 300234030631340, S/N: MX1749024710101 Test Board:N/A
Hardware Version(s)	Rev X1
Software Version(s)	TA16005
Number of Samples Tested	1 of each
Test Specification/Issue/Date	FCC 47 CFR Part 25: 2017 FCC 47 CFR Part 2: 2017
Order Number Date	PO9851 15-February-2018
Date of Receipt of EUT	23-March-2018 and 29-March-2018
Start of Test	10-April-2018
Finish of Test	15-June-2018
Name of Engineer(s)	Jack Tuckwell and Mehadi Choudhury
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
	Part 25	Part 2			
Configuration and Mode: DC Powered - Transmit					
2.1	25.202(f)	2.1051	Radiated Spurious Emissions	Pass	ANSI C63.26 (2015)
2.2	25.202(f)	2.1051	Spurious Emissions at Antenna Terminals	Pass	ANSI C63.26 (2015)

Product Service

1.4 Application Form

EQUIPMENT DESCRIPTION	
Model Name/Number	QLocate
Part Number	1158-5002/5003
Hardware Version	Rev X1
Software Version	TA16005
FCC ID (if applicable)	PB5NQLOCATE
Industry Canada ID (if applicable)	4650A-QLOCATE
Technical Description (Please provide a brief description of the intended use of the equipment)	Qlocate is an Iridium Short Burst Data Transceiver available on two configurations, as a simple SBD transceiver and also one with integrated GPS/GLONASS receiver.

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 to 1626.5	32	3	31.5 kHz per channel	DEQPSK		1616.0 20833	1620.9 79087	1625.9 79007

UN-INTENTIONAL RADIATOR	
Highest frequency generated or used in the device or on which the device operates or tunes	1626.5 MHz
Lowest frequency generated or used in the device or on which the device operates or tunes	1608.0 MHz
Class A Digital Device (Use in commercial, industrial or business environment) ☒ Class B Digital Device (Use in residential environment only) ☐	

Power Source			
AC	Single Phase	Three Phase	Nominal Voltage
	N/A	N/A	N/A
External DC	Nominal Voltage		Maximum Current
	5 V		1.5 A
Battery	Nominal Voltage		Battery Operating End Point Voltage
	N/A		N/A
Can EUT transmit whilst being charged?			Yes ☐ No ☐

EXTREME CONDITIONS					
Maximum temperature	85	°C	Minimum temperature	-40	°C

Ancillaries
Please list all ancillaries which will be used with the device.
Dual Band Antenna for SAT and GPS Power Supply for +5 V RS-232 Comm port

ANTENNA CHARACTERISTICS					
☒	Antenna connector		State impedance	50	Ohm
☐	Temporary antenna connector		State impedance		Ohm
☐	Integral antenna	Type			
☒	External antenna	Type	Passive		

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

Name: David Mitchell

Position held: VP, Customer Support Date: 23 March 2018

1.5 Product Information

1.5.1 Technical Description

Qlocate is an Iridium Short Burst Data transceiver available on two configurations, as a simple SBD transceiver and also one with integrated GPS/GLONASS receiver.

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
Satellite Modem: Serial Number: IMEI: 300234030631340, S/N: MX1749024710101			
0	As supplied by the customer	Not Applicable	Not Applicable
Test Board: Serial Number: N/A			
0	As supplied by the customer	Not Applicable	Not Applicable

Table 1

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: DC Powered - Transmit		
Radiated Spurious Emissions	Jack Tuckwell	UKAS
Spurious Emissions at Antenna Terminals	Mehadi Choudhury	UKAS

Table 2

Office Address:

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

2 Test Details

2.1 Radiated Spurious Emissions

2.1.1 Specification Reference

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

2.1.2 Equipment Under Test and Modification State

Satellite Modem, QLocate (1158-5010), S/N: IMEI: 300234030631340, S/N: MX1749024710101 - Modification State 0
Test Board, S/N: N/A - Modification State 0

2.1.3 Date of Test

10-April-2018 and 15-June-2018

2.1.4 Test Method

The test was performed in accordance with KDB 971168 D01, Clause 7.

2.1.5 Environmental Conditions

Ambient Temperature	20.0 to 21.0 °C
Relative Humidity	40.0 to 43.0 %

2.1.6 Test Results

DC Powered - Transmit

Frequency (MHz)	Level (dBm)
*	

Table 3 - 1616.02833 MHz, 30 MHz to 1 GHz, Results Table

*No emissions were found within 6 dB of the limit.

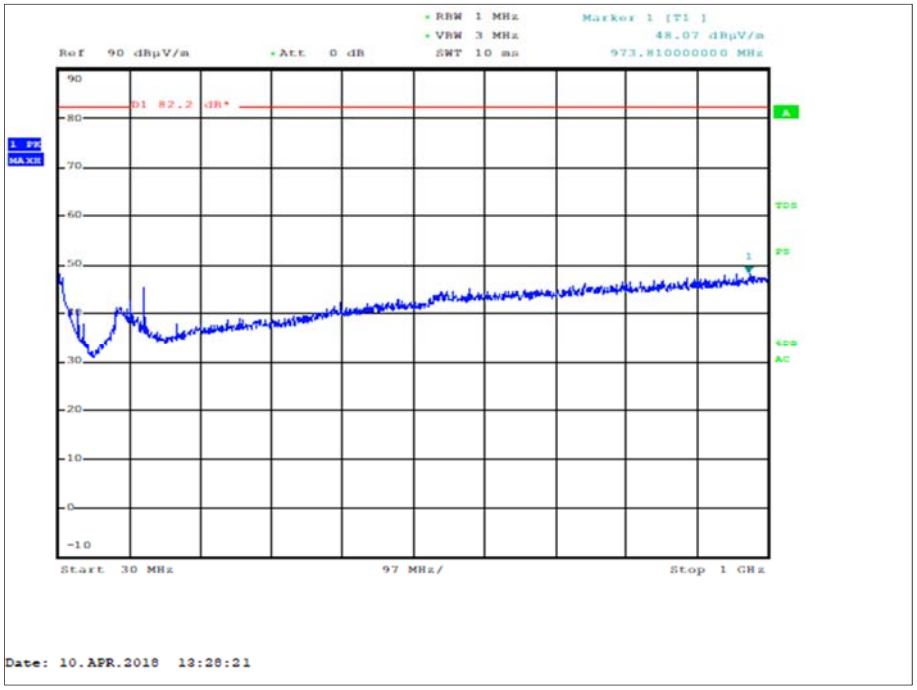

Figure 1 - 1616.02833 MHz - 30 MHz to 1 GHz
Polarity: Horizontal and Vertical (Combined), EUT Orientation: X

Frequency (MHz)	Level (dBm)
*	

Table 4 - 1616.02833 MHz, 1 GHz to 18 GHz - Results Table

*No emissions were found within 6 dB of the limit.

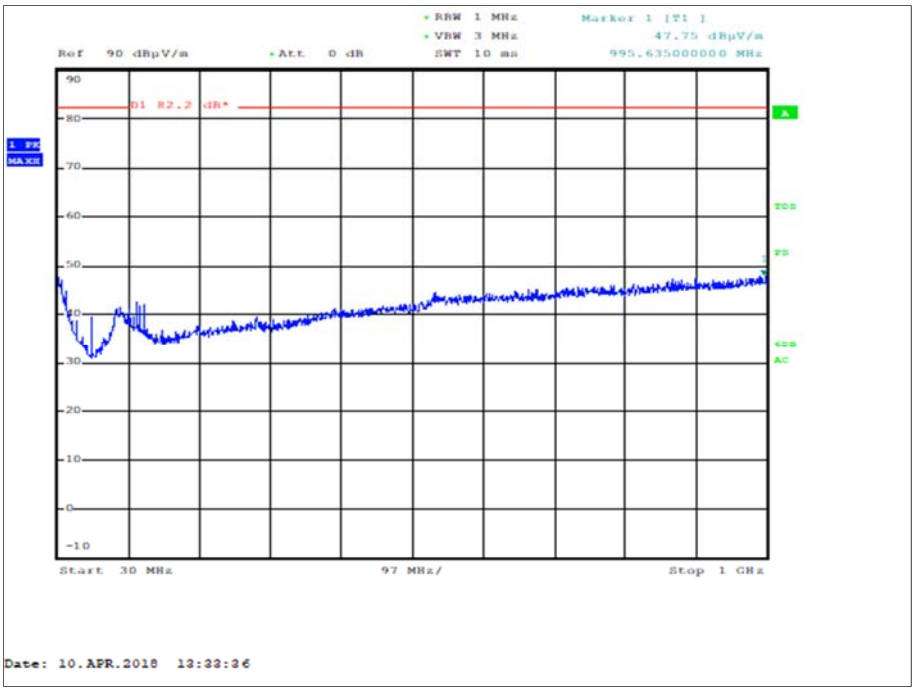

Figure 2 - 1616.02833 MHz - 30 MHz to 1 GHz
Polarity: Horizontal and Vertical (Combined), EUT Orientation: Y

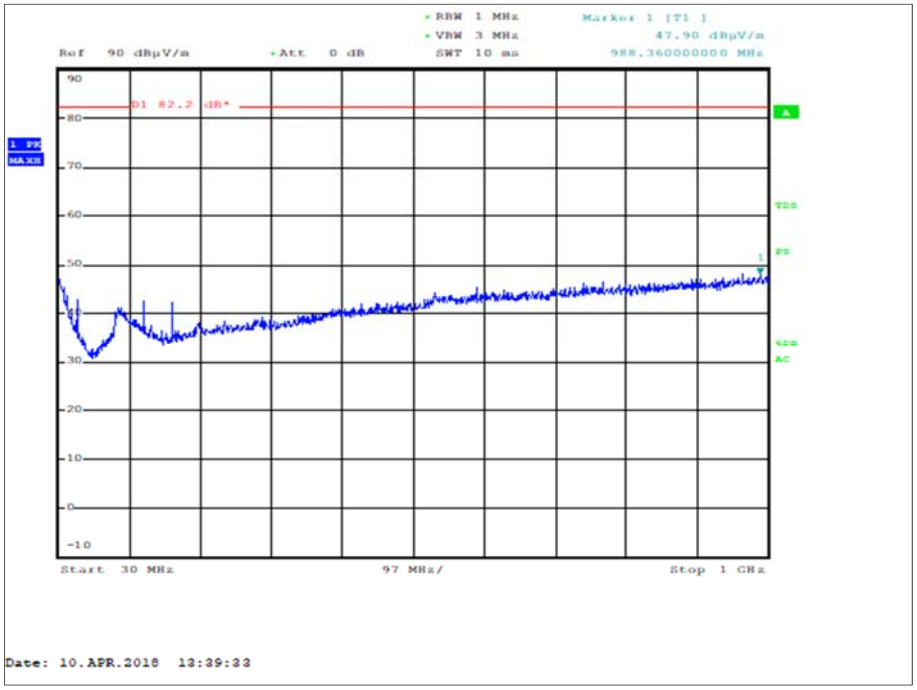

Figure 3 - 1616.02833 MHz - 30 MHz to 1 GHz
Polarity: Horizontal and Vertical (Combined), EUT Orientation: Z

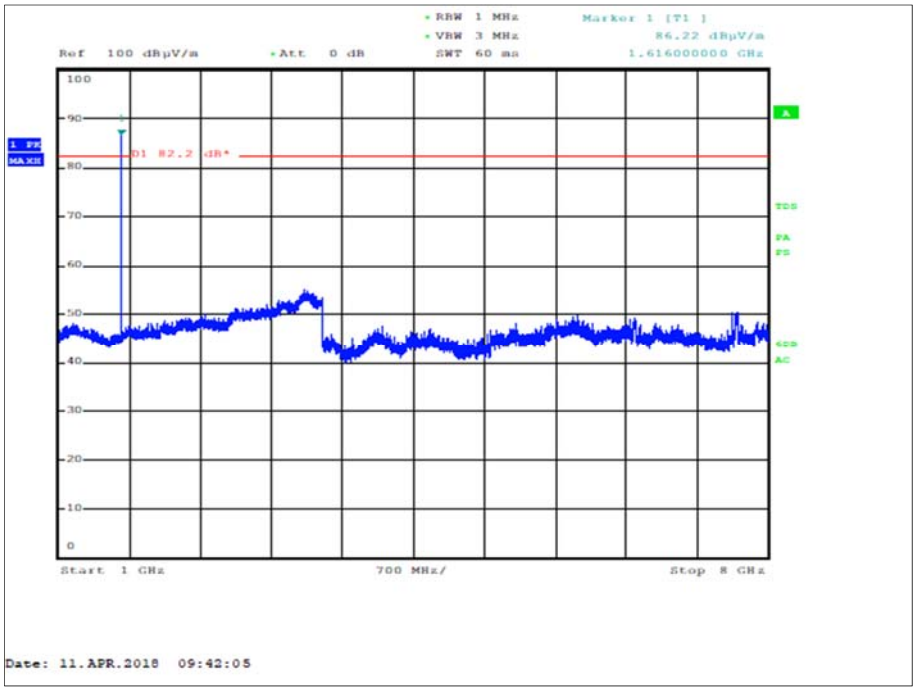

Figure 4 - 1616.02833 MHz - 1 GHz to 8 GHz
Polarity: Horizontal and Vertical (Combined), EUT Orientation: X

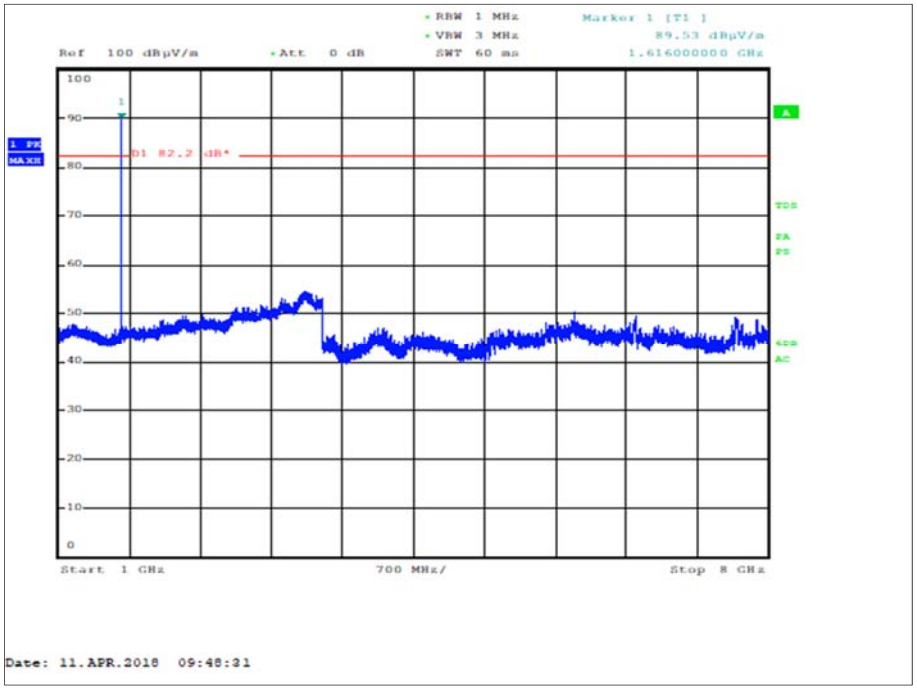

Figure 5 - 1616.02833 MHz - 1 GHz to 8 GHz
Polarity: Horizontal and Vertical (Combined), EUT Orientation: Y

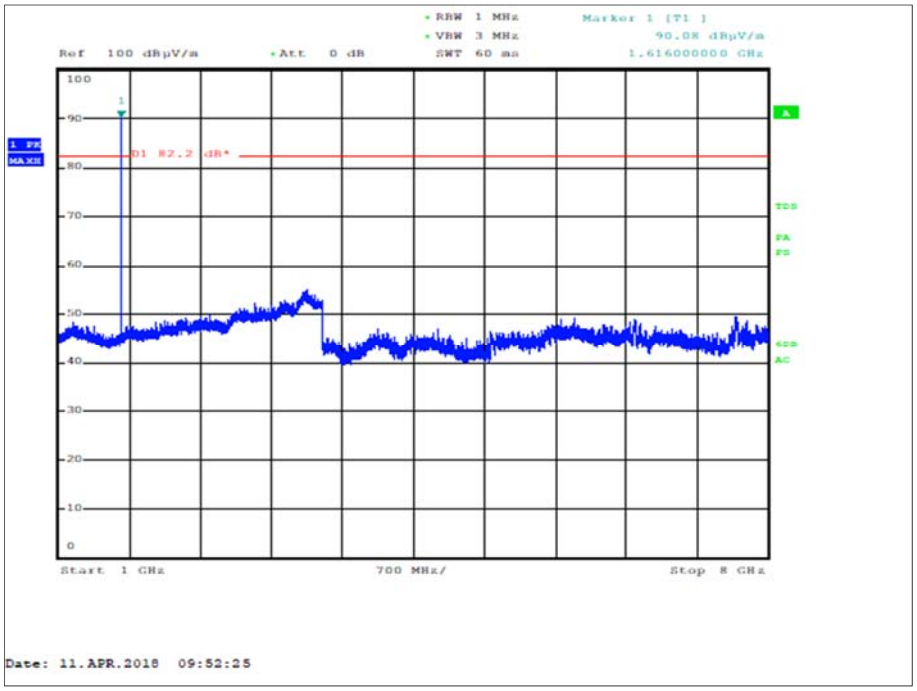

Figure 6 - 1616.02833 MHz - 1 GHz to 8 GHz
Polarity: Horizontal and Vertical (Combined), EUT Orientation: Z

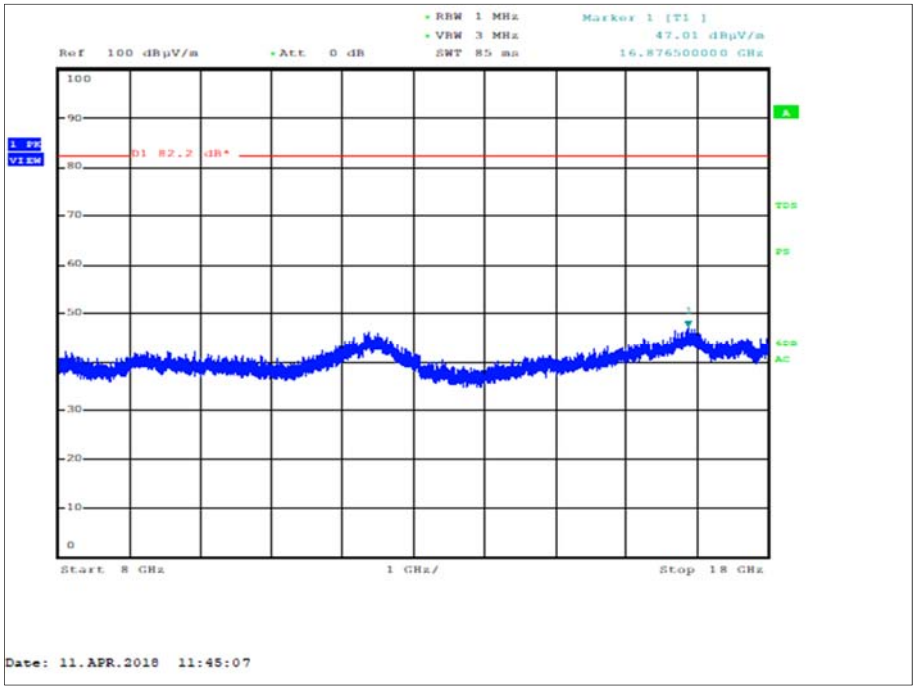

Figure 7 - 1616.02833 MHz - 8 GHz to 18 GHz
Polarity: Horizontal and Vertical (Combined), EUT Orientation: X

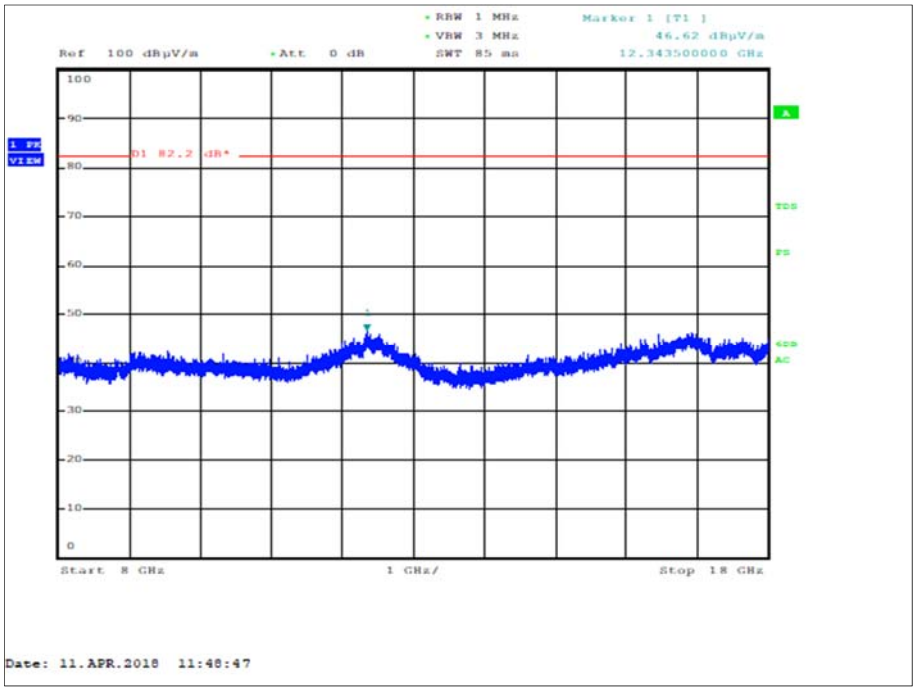

Figure 8 - 1616.02833 MHz - 8 GHz to 18 GHz
Polarity: Horizontal and Vertical (Combined), EUT Orientation: Y

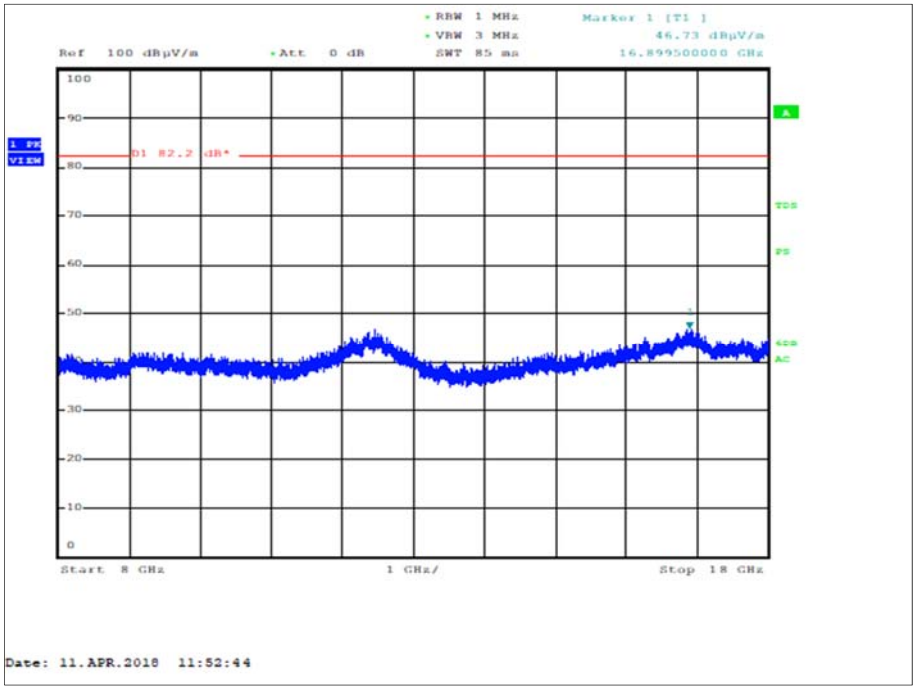

Figure 9 - 1616.02833 MHz - 8 GHz to 18 GHz
Polarity: Horizontal and Vertical (Combined), EUT Orientation: Z

Frequency (MHz)	Level (dBm)
*	

Table 5 - 1625.979007 MHz, 30 MHz to 1 GHz, Results Table

*No emissions were found within 6 dB of the limit.

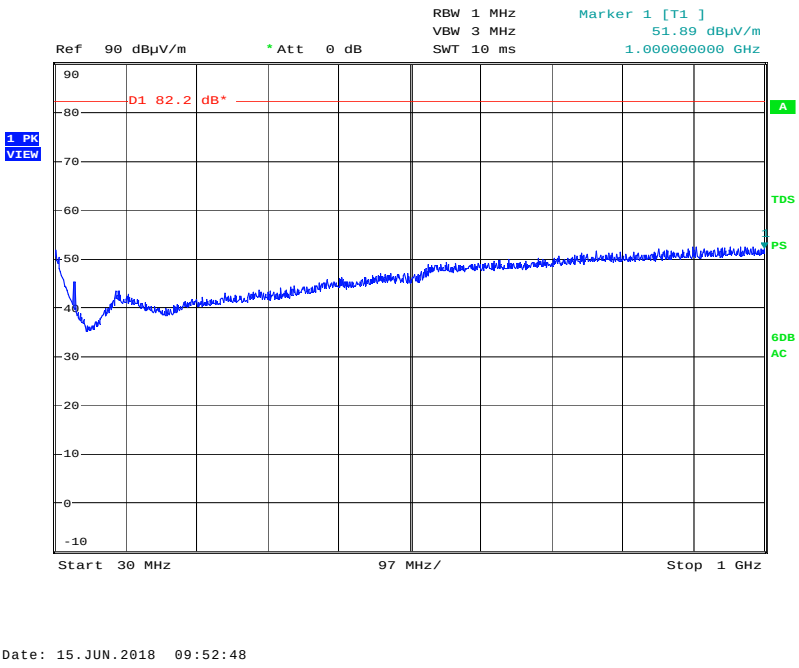

Figure 10 - 1625.979007 MHz - 30 MHz to 1 GHz
Polarity: Horizontal and Vertical (Combined), EUT Orientation: X

Frequency (MHz)	Level (dBm)
*	

Table 6 - 1625.979007 MHz, 1 GHz to 18 GHz - Results Table

*No emissions were found within 6 dB of the limit.

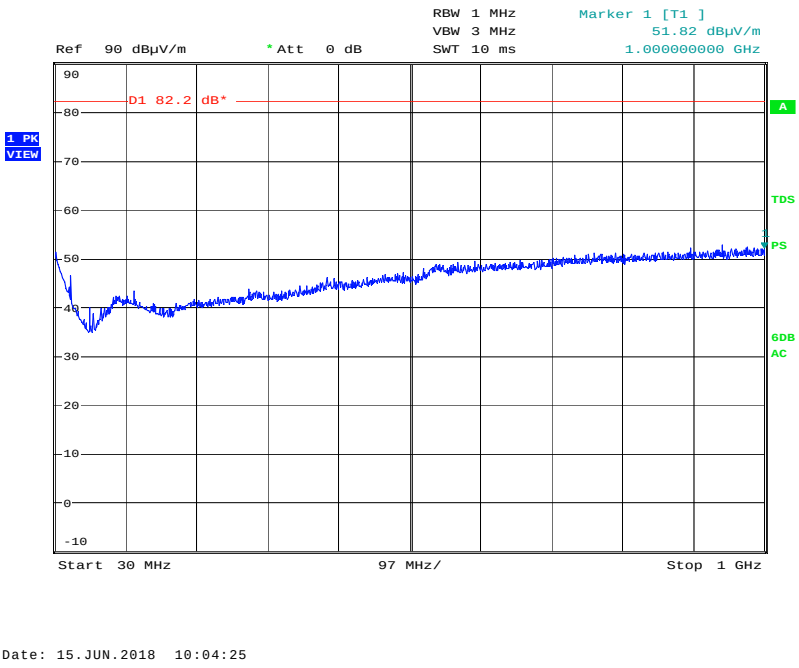

Figure 11 - 1625.979007 MHz - 30 MHz to 1 GHz
Polarity: Horizontal and Vertical (Combined), EUT Orientation: Y

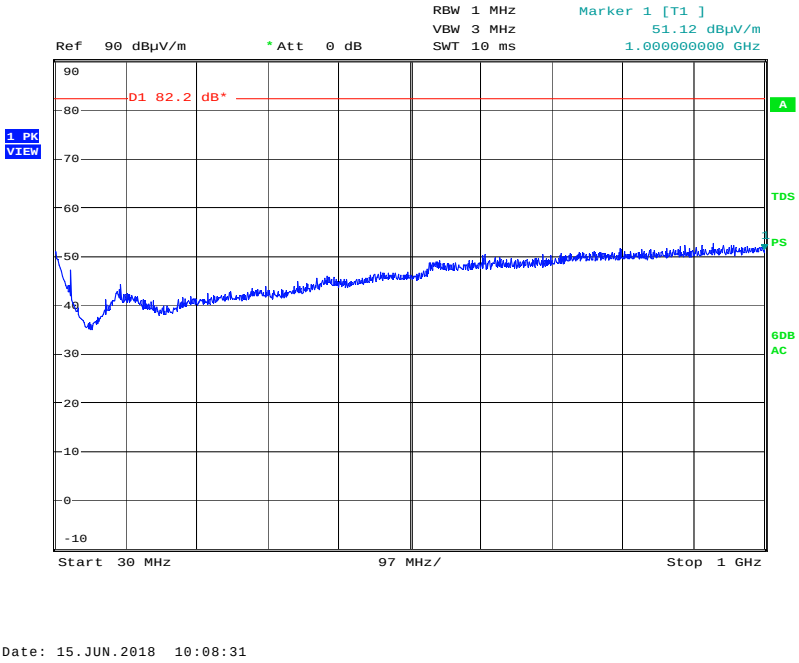

Figure 12 - 1625.979007 MHz - 30 MHz to 1 GHz
Polarity: Horizontal and Vertical (Combined), EUT Orientation: Z

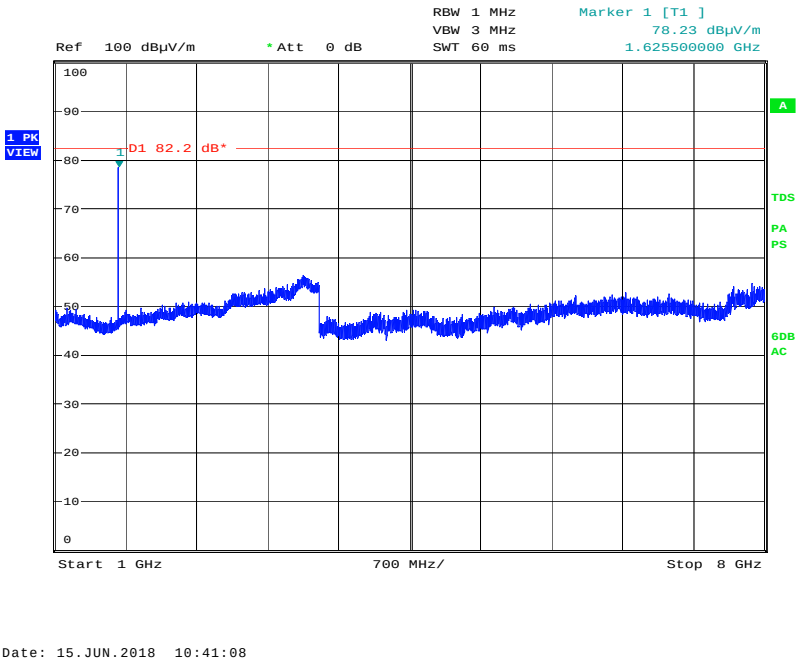

Figure 13 - 1625.979007 MHz - 1 GHz to 8 GHz
Polarity: Horizontal and Vertical (Combined), EUT Orientation: X

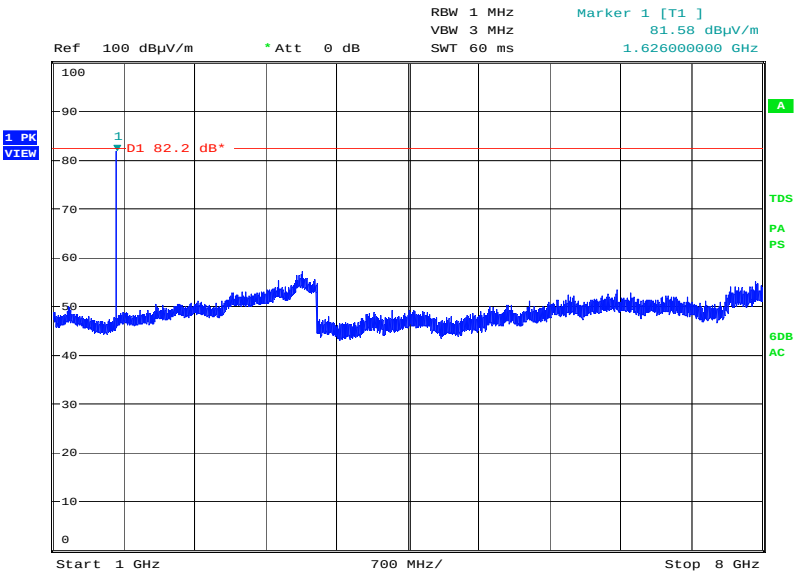

Figure 14 - 1625.979007 MHz - 1 GHz to 8 GHz
Polarity: Horizontal and Vertical (Combined), EUT Orientation: Y

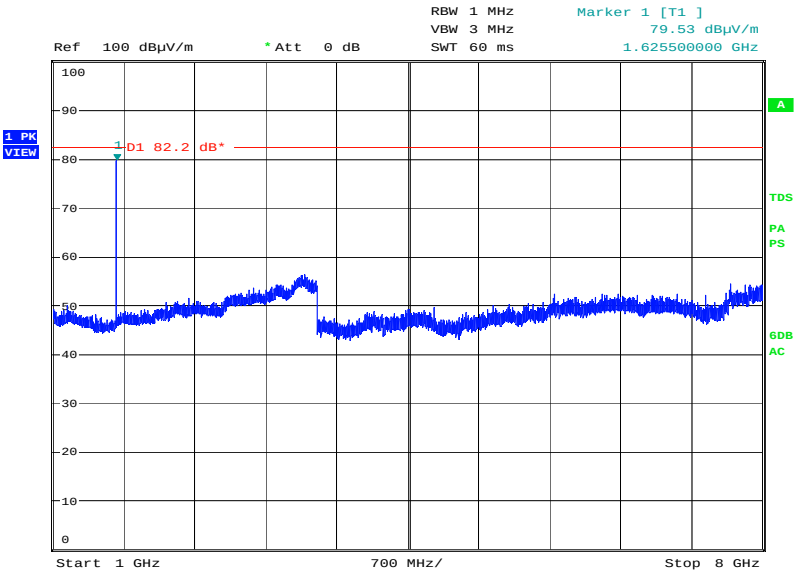

Figure 15 - 1625.979007 MHz - 1 GHz to 8 GHz
Polarity: Horizontal and Vertical (Combined), EUT Orientation: Z

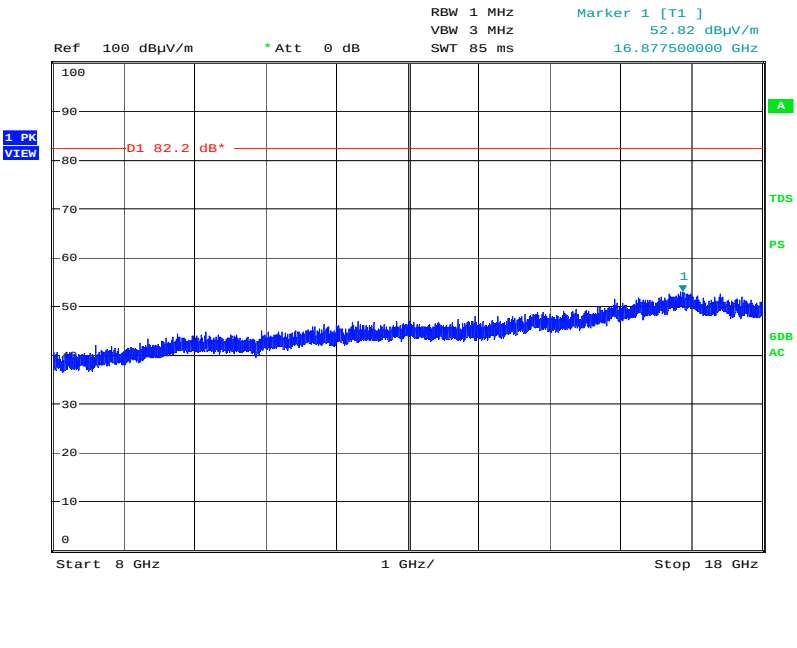

Figure 16 - 1625.979007 MHz - 8 GHz to 18 GHz
Polarity: Horizontal and Vertical (Combined), EUT Orientation: X

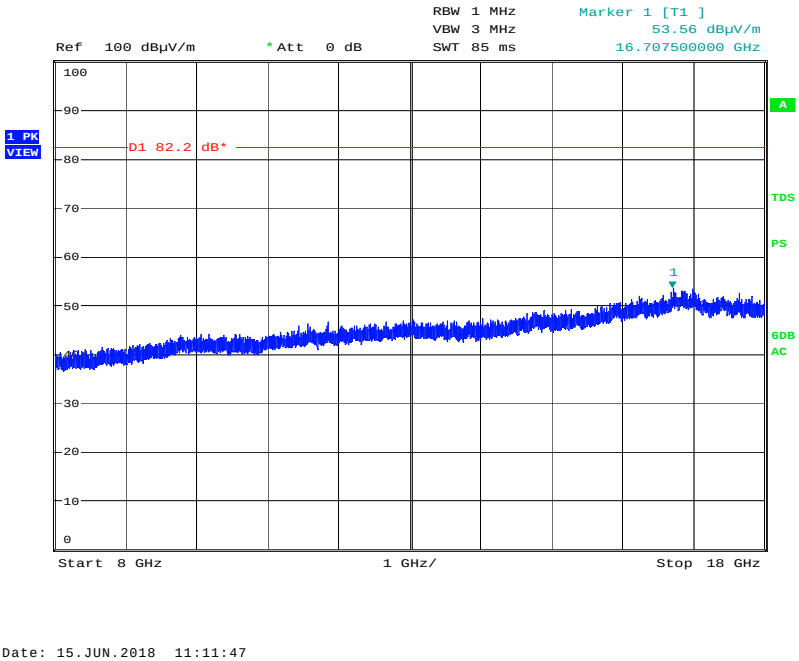

Figure 17 - 1625.979007 MHz - 8 GHz to 18 GHz
Polarity: Horizontal and Vertical (Combined), EUT Orientation: Y

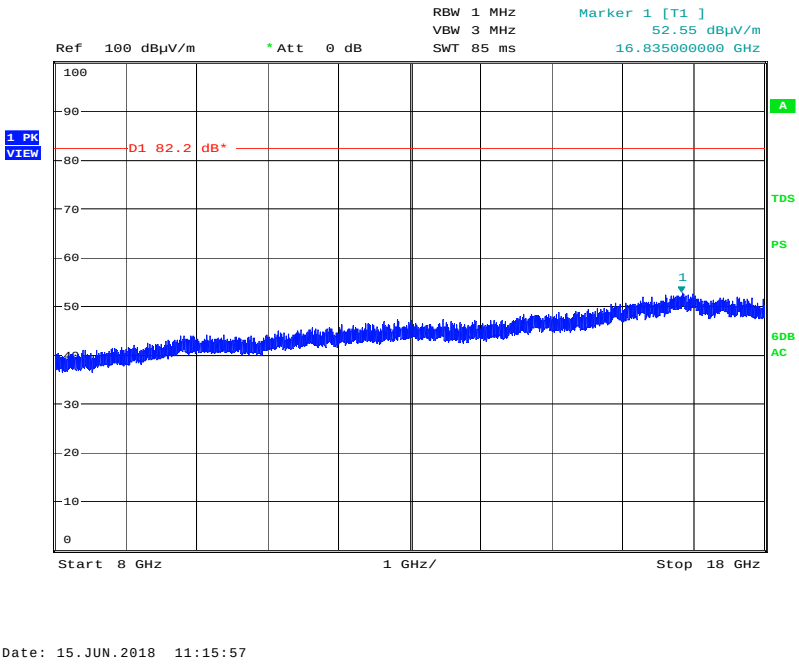

Figure 18 - 1625.979007 MHz - 8 GHz to 18 GHz
Polarity: Horizontal and Vertical (Combined), EUT Orientation: Z

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:

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;
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;
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.

2.1.7 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
Antenna (Bilog)	Schaffner	CBL6143	287	24	18-Apr-2018
Pre-Amplifier	Phase One	PS04-0086	1533	12	12-Jan-2019
Screened Room (5)	Rainford	Rainford	1545	36	9-Jun-2018
Turntable Controller	Inn-Co GmbH	CO 1000	1606	-	TU
Hygromer	Rotronic	A1	2138	12	21-Feb-2019
Antenna (Bilog)	Chase	CBL6143	2904	24	8-Aug-2019
Cable (N-N, 8m)	Rhophase	NPS-2302-8000-NPS	3248	12	2-May-2018
EMI Test Receiver	Rohde & Schwarz	ESU40	3506	12	22-Nov-2018
Tilt Antenna Mast	maturo Gmbh	TAM 4.0-P	3916	-	TU
Mast Controller	maturo Gmbh	NCD	3917	-	TU
1GHz to 8GHz Low Noise Amplifier	Wright Technologies	APS04-0085	4365	12	18-Oct-2018
Cable (Rx, Km-Km 2m)	Scott Cables	KPS-1501-2000-KPS	4526	6	22-May-2018
Cable (Rx, SMAm-SMAm 0.5m)	Scott Cables	SLSLL18-SMSM-00.50M	4528	6	15-Aug-2018
Double Ridged Waveguide Horn Antenna	ETS-Lindgren	3117	4722	12	1-Mar-2019
Mast Controller	Maturo Gmbh	NCD	4810	-	TU
Tilt Antenna Mast	Maturo Gmbh	TAM 4.0-P	4811	-	TU
Double Ridge Broadband Horn Antenna	Schwarzbeck	BBHA 9120 B	4848	12	12-Feb-2019
4dB Attenuator	Pasternack	PE7047-4	4935	12	28-Nov-2018

TU - Traceability Unscheduled

2.2 Spurious Emissions at Antenna Terminals

2.2.1 Specification Reference

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

2.2.2 Equipment Under Test and Modification State

Satellite Modem, QLocate (1158-5010), S/N: IMEI: 300234030631340, S/N: MX1749024710101 - Modification State 0

2.2.3 Date of Test

25-April-2018

2.2.4 Test Method

The test was performed in accordance with KDB 971168 D01, Clause 6.

2.2.5 Environmental Conditions

Ambient Temperature	22.8 °C
Relative Humidity	36.6 %

2.2.6 Test Results

DC Powered - Transmit

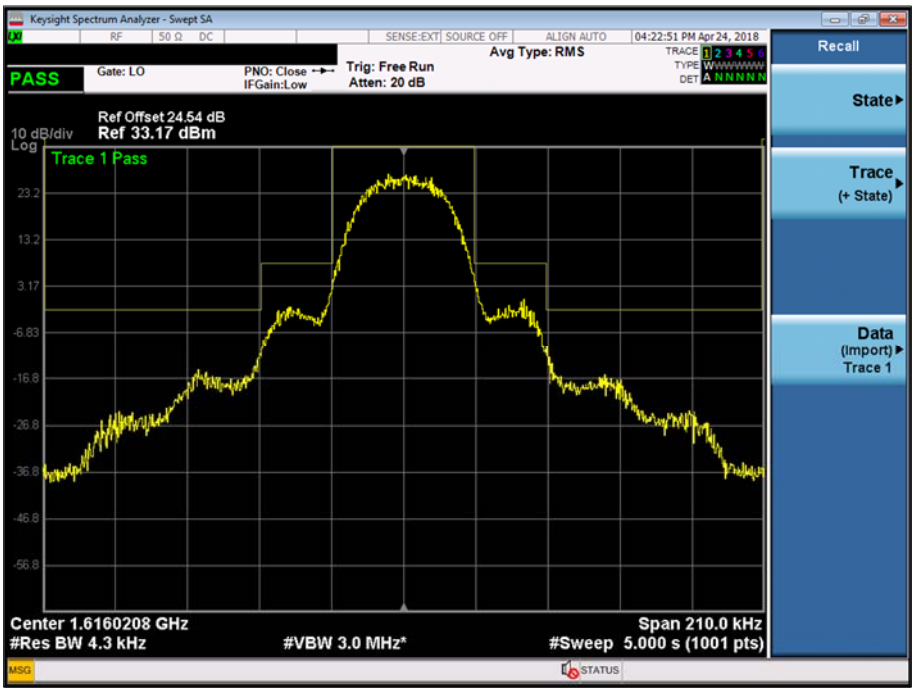

Figure 19 - 1616.02833 MHz - Emission Mask

Figure 20 - 1616.02833 MHz - 9 kHz to 150 kHz

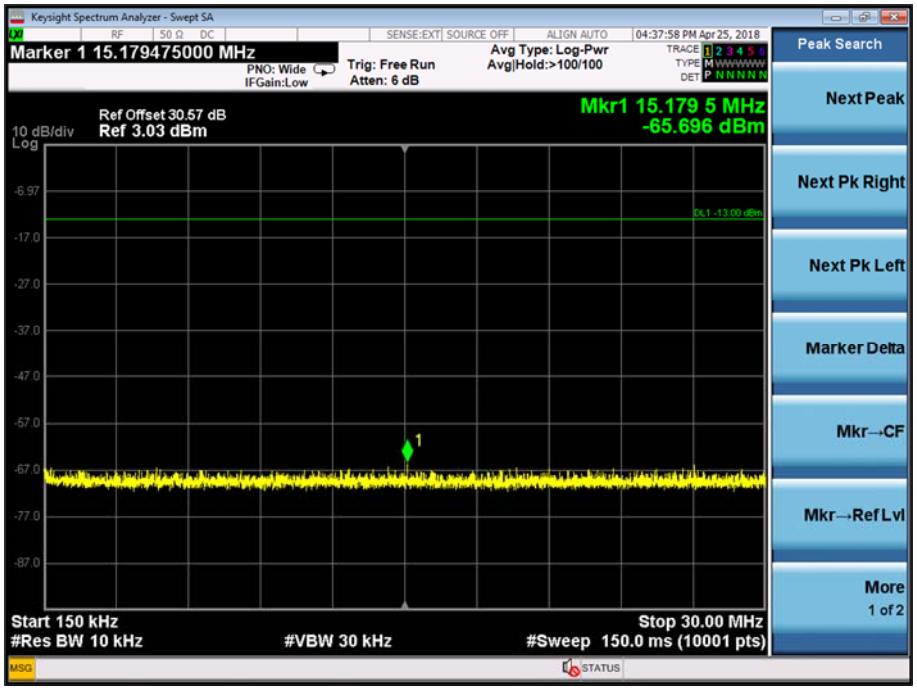

Figure 21 - 1616.02833 MHz - 150 kHz to 30 MHz

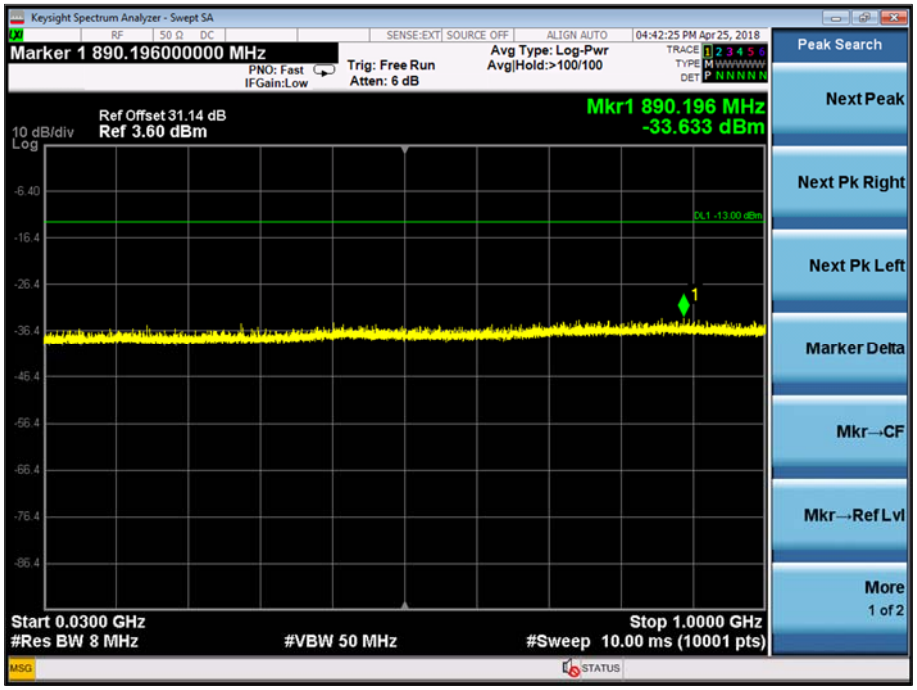

Figure 22 - 1616.02833 MHz - 30 MHz to 1 GHz

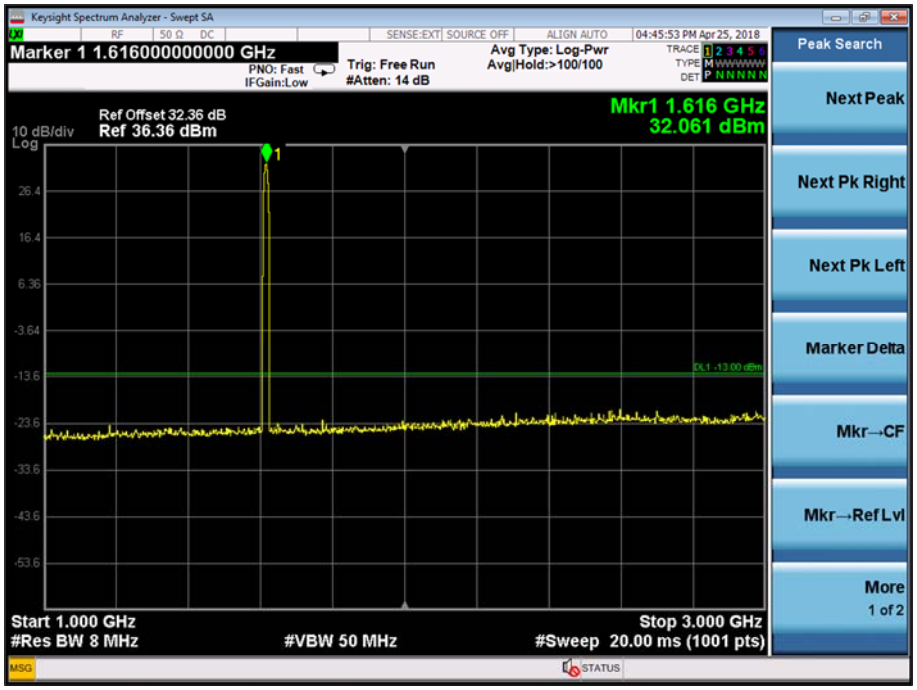

Figure 23 - 1616.02833 MHz - 1 GHz to 3 GHz

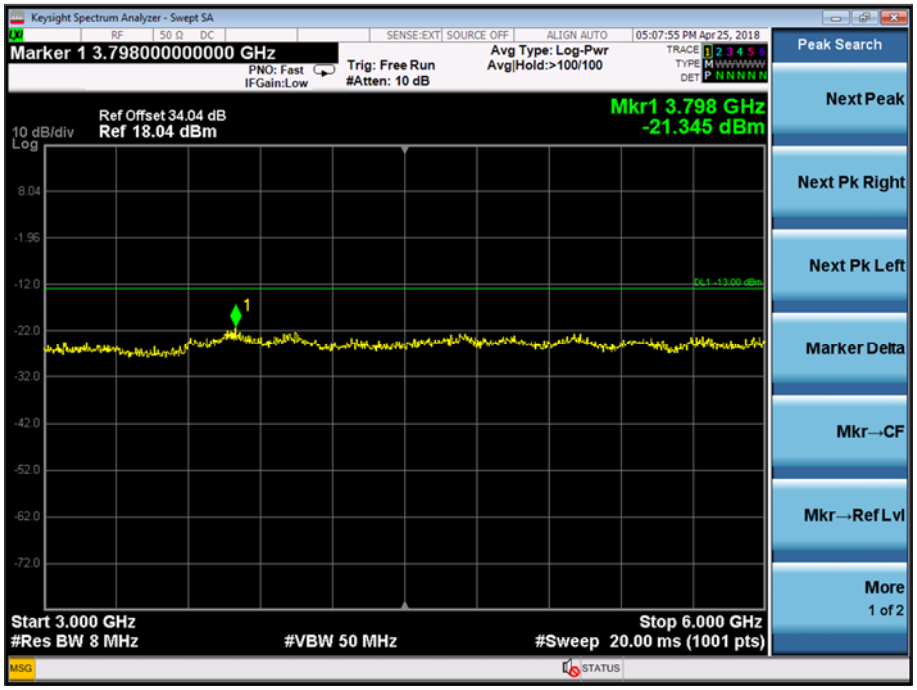

Figure 24 - 1616.02833 MHz - 3 GHz to 6 GHz

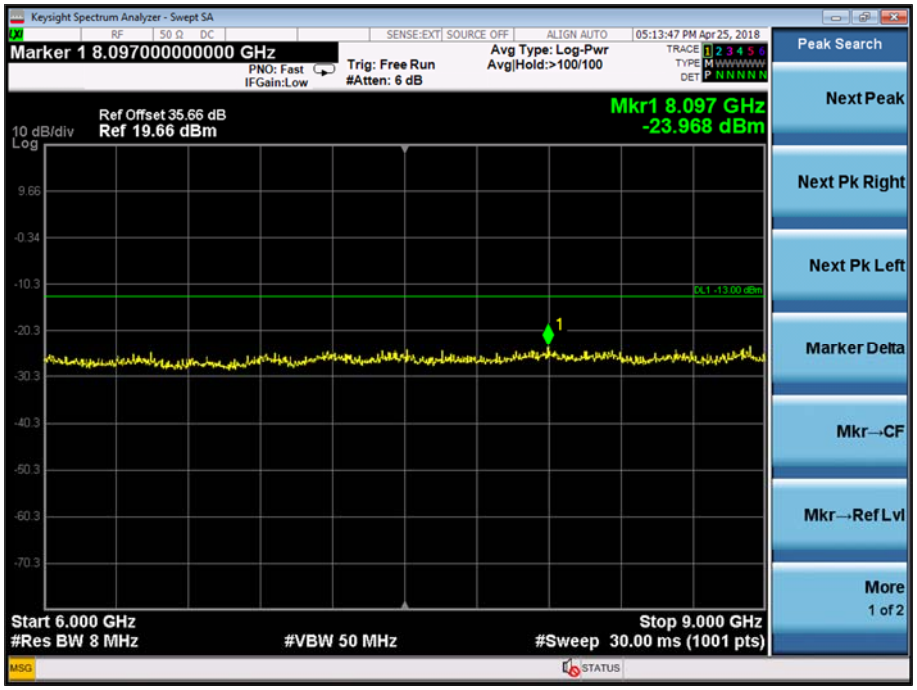

Figure 25 - 1616.02833 MHz - 6 GHz to 9 GHz

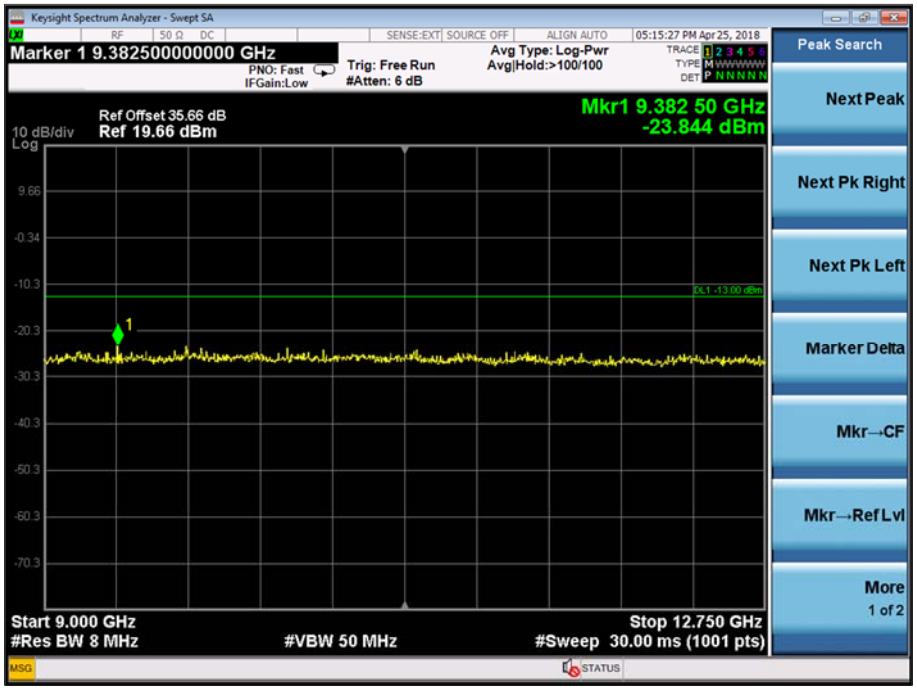

Figure 26 - 1616.02833 MHz - 9 GHz to 12.75 GHz

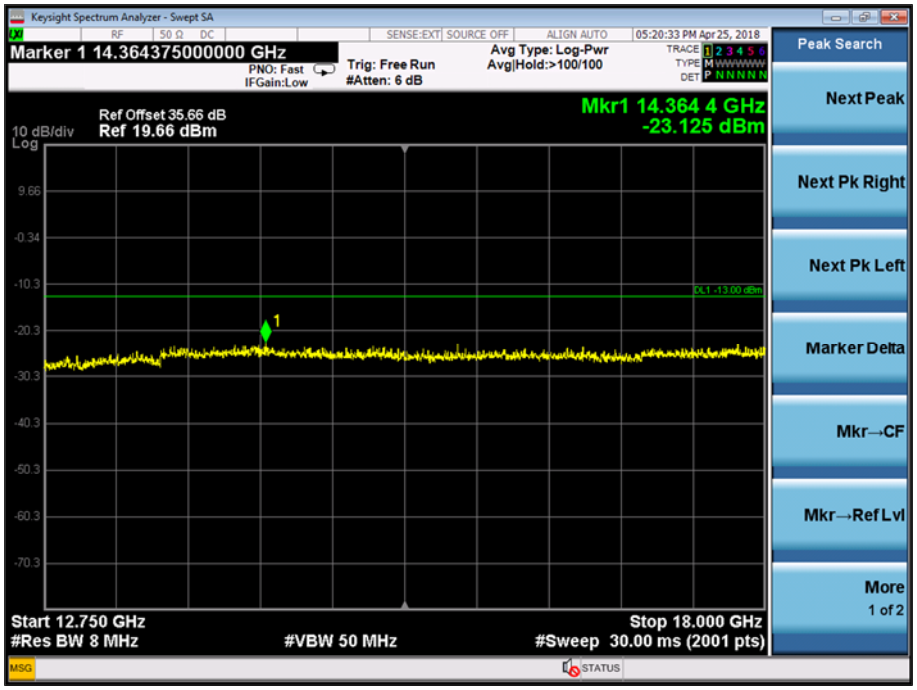

Figure 27 - 1616.02833 MHz - 12.75 GHz to 18 GHz

Figure 28 - 1625.979007 MHz - Emission Mask

Figure 29 - 1625.979007 MHz - 9 kHz to 150 kHz

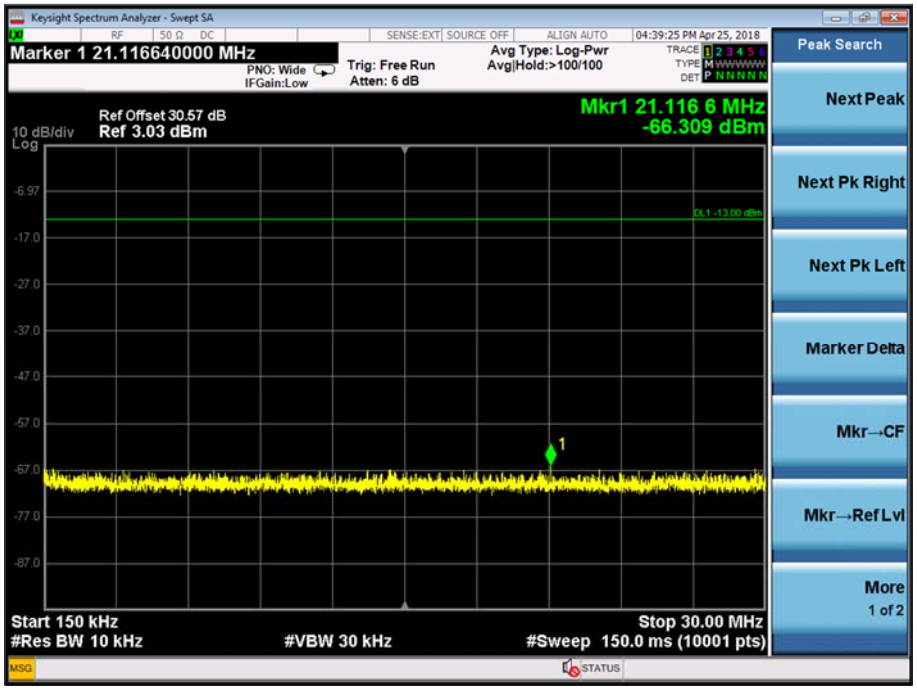

Figure 30 - 1625.979007 MHz - 150 kHz to 30 MHz

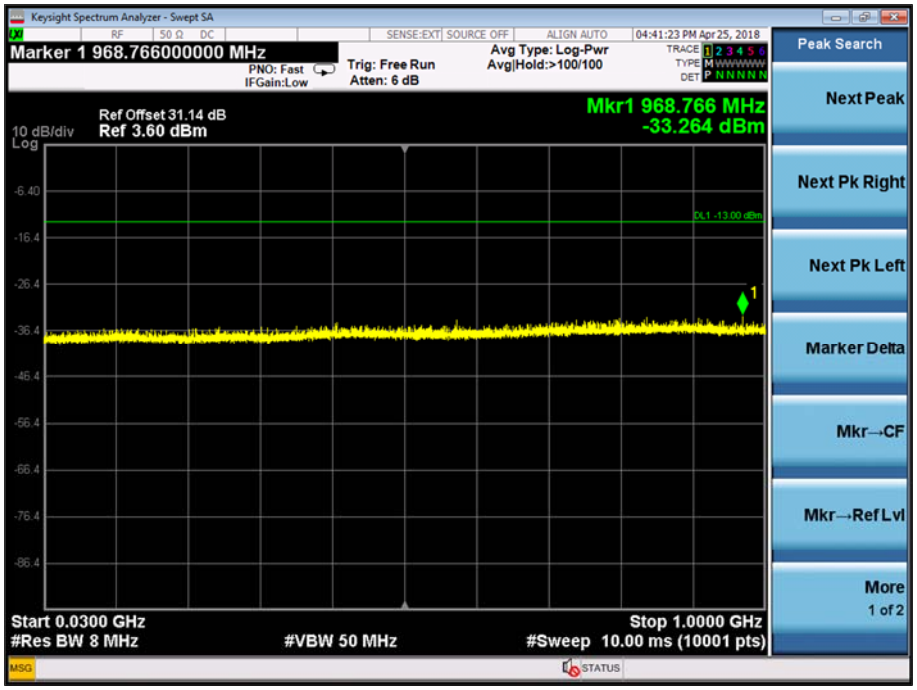

Figure 31 - 1625.979007 MHz - 30 MHz to 1 GHz

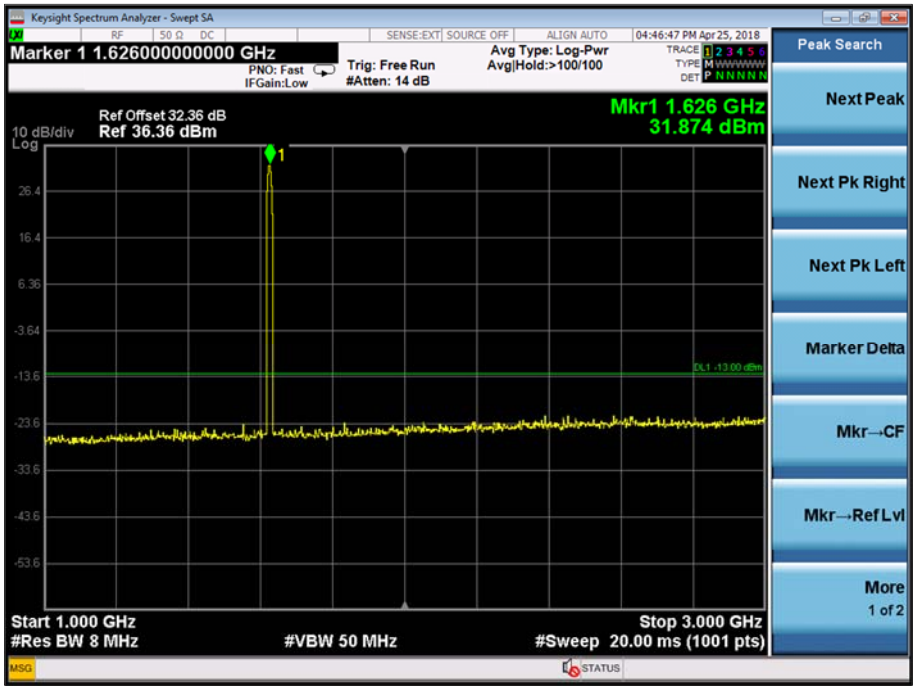

Figure 32 - 1625.979007 MHz - 1 GHz to 3 GHz

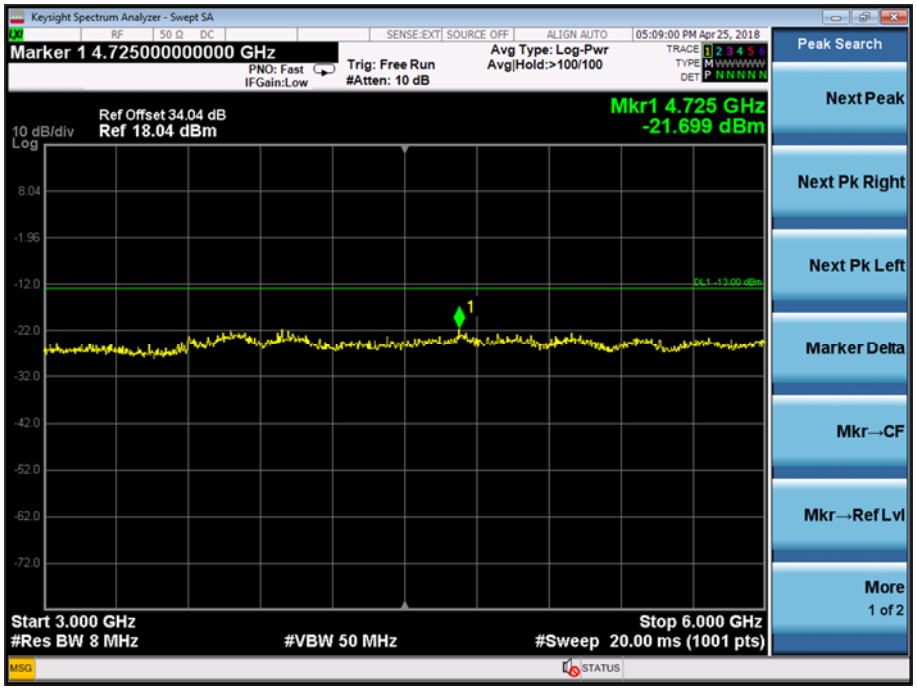

Figure 33 - 1625.979007 MHz - 3 GHz to 6 GHz

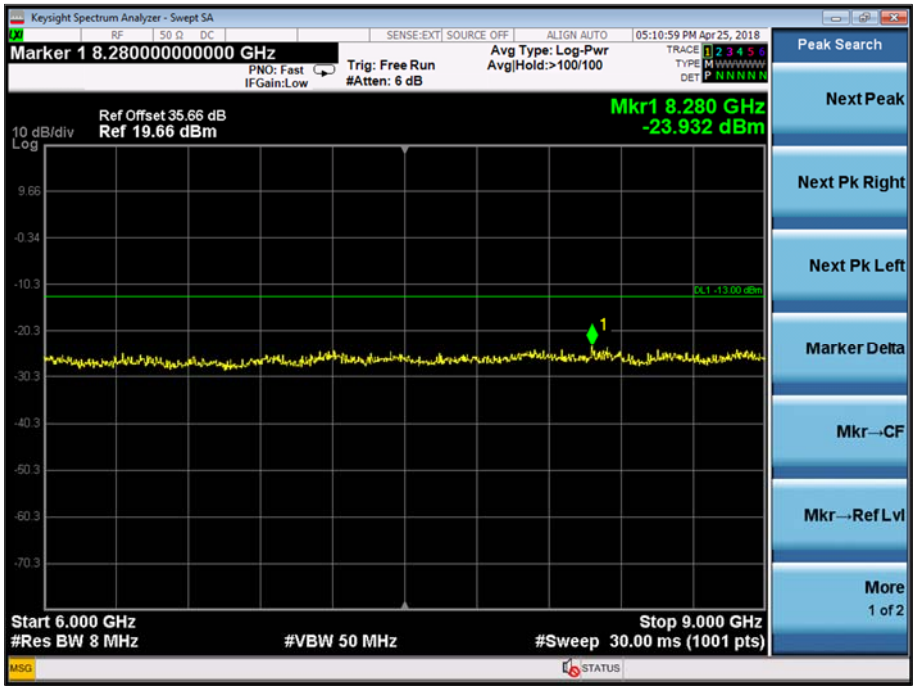

Figure 34 - 1625.979007 MHz - 6 GHz to 9 GHz

Figure 35 - 1625.979007 MHz - 9 GHz to 12.75 GHz

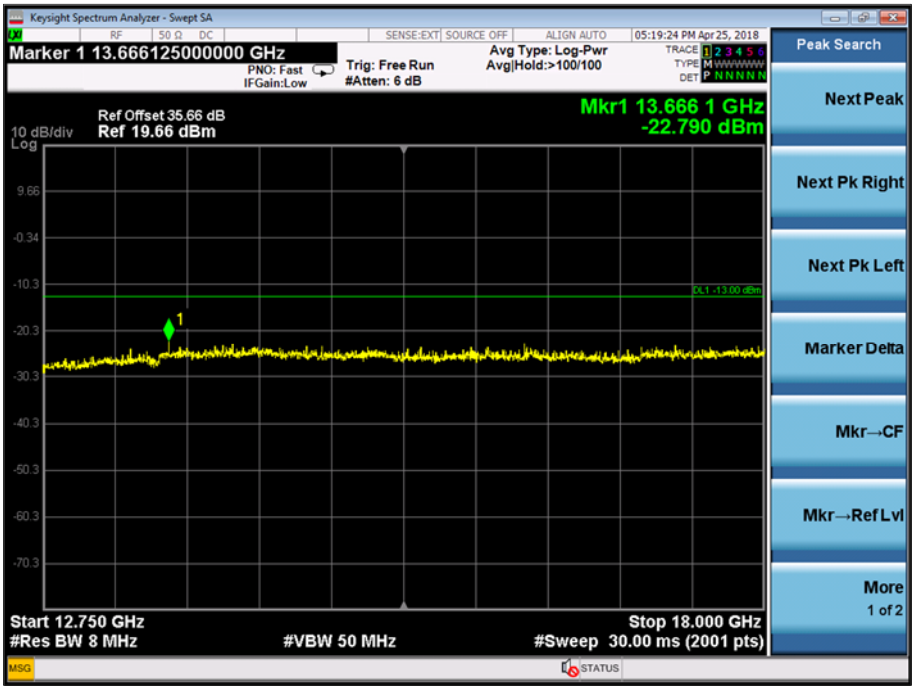

Figure 36 - 1625.979007 MHz - 12.75 GHz to 18 GHz

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:

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.

2.2.7 Test Location and Test Equipment Used

This test was carried out in RF Laboratory 1.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
Attenuator (30dB/50W)	Aeroflex / Weinschel	47-30-34	3164	12	11-Jul-2018
Attenuator (10dB, 50W)	Aeroflex / Weinschel	47-10-34	3166	12	20-Oct-2018
Hygrometer	Rotronic	I-1000	3220	12	30-Aug-2018
Function Generator	Thurlby Thandar Instruments	TG2000	3334	-	TU
Network Analyser	Rohde & Schwarz	ZVA 40	3548	12	2-Oct-2018
'3.5mm' - '3.5mm' RF Cable (2m)	Rhophase	3PS-1803-2000-3PS	3702	12	9-Feb-2019
Calibration Unit	Rohde & Schwarz	ZV-Z54	4368	12	6-Mar-2019
Frequency Standard	Spectracom	Secure Sync 1200-0408-0601	4393	6	20-Oct-2018
Suspended Substrate Highpass Filter	Advance Power Components	11SH10-3000/X18000-O/O	4412	12	25-Apr-2018
2 metre SMA Cable	IW Microwave	3PS-1806LC-788-3PS	4829	-	O/P Mon

Table 7

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

3 Measurement Uncertainty

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

Test Name	Measurement Uncertainty
Radiated Spurious Emissions	30 MHz to 1 GHz: ± 5.2 dB 1 GHz to 18 GHz: ± 6.3 dB
Spurious Emissions at Antenna Terminals	± 3.08 dB

Table 8