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Report On

FCC and Industry Canada Testing of the
Iridium Extreme 9575N

In accordance with FCC 47 CFR Part 25, FCC 47 CFR Part 2, Industry
Canada RSS-170 and Industry Canada RSS-GEN

COMMERCIAL-IN-CONFIDENCE

FCC ID: Q639575N
IC: 4629A-9575N

Document 75934781 Report 09 Issue 2

August 2016



Product Service

TÜV SÜD Product Service, Octagon House, Concorde Way, Segensworth North,
Fareham, Hampshire, United Kingdom, PO15 5RL
Tel: +44 (0) 1489 558100. Website: www.tuv-sud.co.uk

COMMERCIAL-IN-CONFIDENCE

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Document 75934781 Report 09 Issue 2

August 2016

PREPARED FOR

Iridium Satellite LLC
1750 Tysons Boulevard
Suite 1400
McLean
VA 22102
United States

PREPARED BY

Natalie Bennett
Senior Administrator, Project Support

APPROVED BY

Nic Forsyth
Authorised Signatory

DATED

30 August 2016

This report has been up-issued to Issue 2 to amend the serial numbers.

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, FCC 47 CFR Part 2, Industry Canada RSS-170 and Industry Canada RSS-GEN. The sample tested was found to comply with the requirements defined in the applied rules.

Test Engineer(s);

J Tuckwell

M Russell



T Guy



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SECTION 1

REPORT SUMMARY

FCC and Industry Canada Testing of the
Iridium Extreme 9575N

In accordance with FCC 47 CFR Part 25, FCC 47 CFR Part 2, Industry Canada RSS-170 and
Industry Canada RSS-GEN



Product Service

1.1 INTRODUCTION

The information contained in this report is intended to show the verification of FCC and Industry Canada Testing of the Iridium Extreme 9575N to the requirements of FCC 47 CFR Part 25, FCC 47 CFR Part 2, Industry Canada RSS-170 and Industry Canada RSS-GEN.

Objective	To perform FCC and Industry Canada Testing to determine the Equipment Under Test's (EUT's) compliance with the Test Specification, for the series of tests carried out.
Manufacturer	Iridium Satellite LLC
Model Number(s)	Iridium Extreme 9575N
Serial Number(s)	P1638-GR-072 (E10006)
Number of Samples Tested	1
Test Specification/Issue/Date	FCC 47 CFR Part 25 (2015) FCC 47 CFR Part 2 (2015) Industry Canada RSS-170 (Issue 3, 2015) Industry Canada RSS-GEN (Issue 4, 2014)
Incoming Release Date	Application Form 12 July 2016
Disposal Reference Number Date	Held Pending Disposal Not Applicable Not Applicable
Order Number Date	35884 04 May 2016
Start of Test	9 July 2016
Finish of Test	22 July 2016
Name of Engineer(s)	J Tuckwell M Russell T Guy
Related Document(s)	ANSI C63.4 (2013)



1.2 BRIEF SUMMARY OF RESULTS

A brief summary of the tests carried out in accordance with FCC 47 CFR Part 25, FCC 47 CFR Part 2, Industry Canada RSS-170 and Industry Canada RSS-GEN is shown below.

Section	Specification Clause				Test Description	Result	Comments/Base Standard
	Part 25	Part 2	RSS-170	RSS-GEN			
Transmit							
2.1	-	2.1047(d)	-	-	Modulation Characteristics	-	Customer Declaration
2.2	-	2.1049	-	6.6	Occupied Bandwidth	Pass	
2.3	25.202(d)	2.1055	5.2	-	Frequency Tolerance	Pass	
2.4	25.202(f)	2.1051	5.4.3.1	6.13	Spurious Emissions at Antenna Terminals	Pass	
2.5	25.202(f)	2.1053	5.4.3.1	6.13	Radiated Spurious Emissions	Pass	
2.6	25.204	-	5.3	-	Conducted Output Power	Pass	
2.7	25.216	-	5.4.3	-	Limits on Emissions from Mobile Earth Stations for Protection of Aeronautical Radionavigation-Satellite Service	Pass	



Product Service

1.3 APPLICATION FORM

EQUIPMENT DESCRIPTION	
Model Name/Number	Iridium Extreme / 9575N
Part Number	IRIDN0215
Hardware Version	Application Board: Rev K Sim Board: Rev C 9523N: rev D/V3, P1638-CN-028 V0.4, P1638-CN-030 V0.2, Engineering Mod #40 (P1638-HLOG-005 V1.49)
Software Version	HL16001 (Bluecore: 7662_3, ATmega: 7600, Transceiver: DB16003)
FCC ID (if applicable)	G639575N
Industry Canada ID (if applicable)	4629A-9575N
Technical Description (Please provide a brief description of the intended use of the equipment)	Satellite phone for use with the Iridium satellite network.

POWER SOURCE			
☒	AC mains	State voltage 100~240V AC to 6V DC (AC to DC power adaptor)	
AC supply frequency	50~60 (Hz)		
100~240	VAC		
150mA	Max Current		
A			
(AC/DC adaptor or input)			
50~60	Hz		
☒	Single phase	☐	Three phase
And / Or			
☒	External DC supply		
Nominal voltage	Battery Terminal Voltage = 3.7 V	Max Current	Battery Terminal Current = 2.2A
Extreme upper voltage	Battery Terminal Voltage = 4.2 V		
Extreme lower voltage	Battery Terminal Voltage = 3.1V (in call mode)/3.3V (in idle mode) V		
Battery			
☐	Nickel Cadmium	☐	Lead acid (Vehicle regulated)
☐	Alkaline	☐	Ledanche
☒	Lithium	☐	Other Details:
3.7V	Volts nominal.		
End point voltage as quoted by equipment manufacturer	2.75	V	



FREQUENCY INFORMATION					
Frequency Range	1616 to 1626	MHz			
Channel Spacing (where applicable)	41.667kHz				
Receiver Frequency Range (if different)	1616 to 1626.5	MHz			
Channel Spacing (if different)					
Test Frequencies*	Bottom	1616.02 0833	MHz	Channel Number (if applicable)	1
	Middle	1621.02 0833	MHz	Channel Number (if applicable)	121
	Top	1625.97 9167	MHz	Channel Number (if applicable)	240
Intermediate Frequencies	0.2MHz, 0.4MHz, 0.6MHz, 0.8MHz, 16.8MHz 26MHz, 14.8MHz, 0.032768MHz MHz				
Highest Internally Generated Frequency :	3254.6 MHz				



Product Service

POWER CHARACTERISTICS			
Maximum TX power	5.888W (37.7dBm) average in transmit burst	W	
Minimum TX power	0.933W 29.7dBm) average in transmit burst	W (if variable)	
Is transmitter intended for :			
Continuous duty		☐ Yes	☒ No
Intermittent duty		☒ Yes	☐ No
If intermittent state DUTY CYCLE			
Transmitter ON	8.28m seconds		
Transmitter OFF	81.72 m seconds		

ANTENNA CHARACTERISTICS				
☒	Antenna connector		State impedance	50 Ohm
☐	Temporary antenna connector		State impedance	Ohm
☒	Integral antenna	Type RHP Quadri filar Helix Antenna	State gain	3.0 dBi
☒	External antenna	Type Passive	State gain	3.0 dBi

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

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

BATTERY POWER SUPPLY			
Model name/number	Iridium m Extreme Battery	Identification/Part number	BAT31 001
Manufacturer	Iridium/Palladium Energy	Country of Origin	Assembled in China (Cells manuf actured in



Product Service

Japan)

ANCILLARIES (If applicable)			
Model name/number	AC Travel Charge r (Note: there are other ancilla ries which are not listed here due to lack of space)	Identification/Part number	ACTC0 401
Manufacturer	Iridiu m	Country of Origin	Germa ny

EXTREME CONDITIONS			
Extreme test voltages (Max)	Battery Termin al V V e=4.2V DC	Extreme test voltages (Min)	Batter y Termi nal V V e=3.1V (in call mode) /3.3V(in idle mode)
Nominal DC Voltage	Battery Termin al V V e=3.7V DC	DC Maximum Current	Battery Termin al A Curren t=2.2A
Maximum temperature	55 °C	Minimum temperature	-10 °C

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

Name: Jonathan Jones

Position held:

Senior Engineer

Date: 12/07/2016



Product Service

1.4 PRODUCT INFORMATION

1.4.1 Technical Description

The Equipment Under Test (EUT) was a Iridium Extreme 9575N. A full technical description can be found in the manufacturer's documentation.

1.5 TEST CONDITIONS

For all tests the EUT was set up in accordance with the relevant test standard and to represent typical operating conditions. Tests were applied with the EUT situated in a shielded enclosure.

The EUT was powered from a 3.7 V Battery charging via AC/DC adapter through 100 V AC supply.

FCC Measurement Facility Registration Number
90987 Octagon House, Fareham Test Laboratory

Industry Canada Company Address Code
IC2932B-1 Octagon House, Fareham Test Laboratory

1.6 DEVIATIONS FROM THE STANDARD

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

1.7 MODIFICATION RECORD

Modification 0 - No modifications were made to the test sample during testing.



Product Service

SECTION 2

TEST DETAILS

FCC and Industry Canada Testing of the
Iridium Extreme 9575N

In accordance with FCC 47 CFR Part 25, FCC 47 CFR Part 2, Industry Canada RSS-170 and
Industry Canada RSS-GEN



Product Service

2.1 MODULATION CHARACTERISTICS

2.1.1 Specification Reference

FCC 47 CFR Part 2, Clause 2.1047(d)

2.1.2 Equipment Under Test

Iridium Extreme 9575N

2.1.3 Test Results

Transmit, Modulation Characteristics, Customer Description

Traffic, broadcast, and ring alert channels use differentially encoded quadrature phase shift keyed (DE-QPSK) modulation with 40% square root raised cosine pulse shaping. The burst transmission rate is 25ksps or 50 kbps. The phase of the QPSK symbol states relative to the carrier phase is (Symbol State/Phase in deg): 00/0, 01/-90, 10/+90, 11/180. The acquisition channel uses differentially encoded binary phase shift keyed (DE-BPSK) with 40% square root raised cosine pulse shaping. The burst rate on these channels is 25 kbps. The sync channel uses 25 kbps DE-BPSK on the uplink and 50 kbps DE-QPSK on the downlink. Both with 40% square root raised cosine pulse shaping.

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.



Product Service

2.2 OCCUPIED BANDWIDTH

2.2.1 Specification Reference

FCC 47 CFR Part 2, Clause 2.1049
Industry Canada RSS-GEN, Clause 6.6

2.2.2 Equipment Under Test and Modification State

Iridium Extreme 9575N S/N: P1638-GR-072 (E10006) - Modification State 0

2.2.3 Date of Test

18 July 2016

2.2.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.2.5 Test Procedure

The EUT was connected to a spectrum analyser via a cable and attenuator. The EUT was configured to transmit on bottom, middle and top channels at maximum power with modulation. The spectrum analyser was configured with an RBW of 910 Hz and VBW of 9.1 kHz using a peak detector and max hold trace. The Occupied bandwidth measurement function of the analyser was then utilized to make the measurement and the 99% occupied bandwidth was recorded.

2.2.6 Environmental Conditions

Ambient Temperature	23.6°C
Relative Humidity	66.9%



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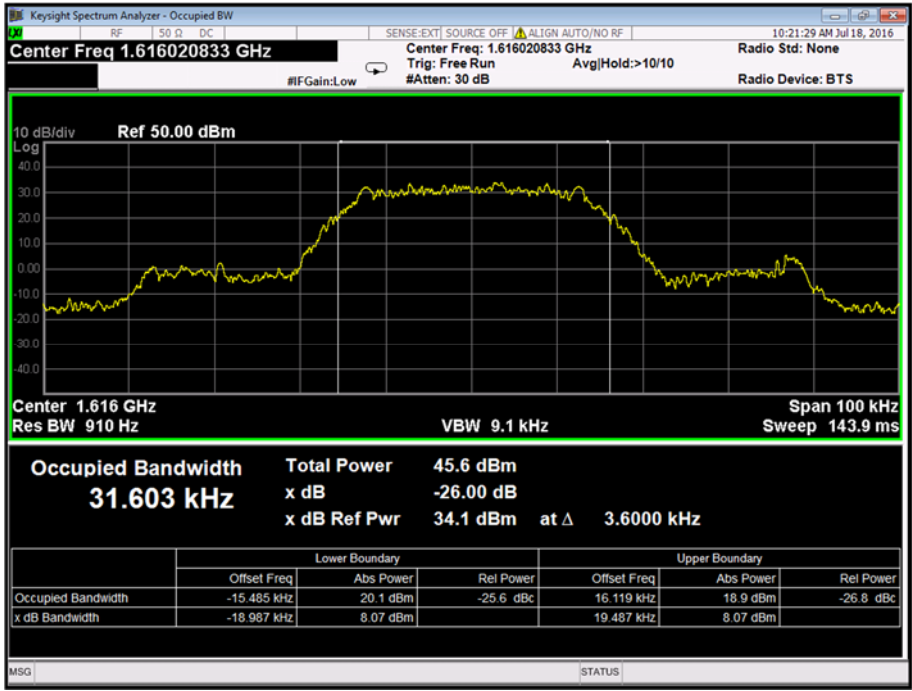
2.2.7 Test Results

3.7 V DC Supply

Transmit, Occupied Bandwidth Results

1616.0208333 MHz	1621.0208333 MHz	1625.979166 MHz
kHz	kHz	kHz
31.603	31.511	31.420

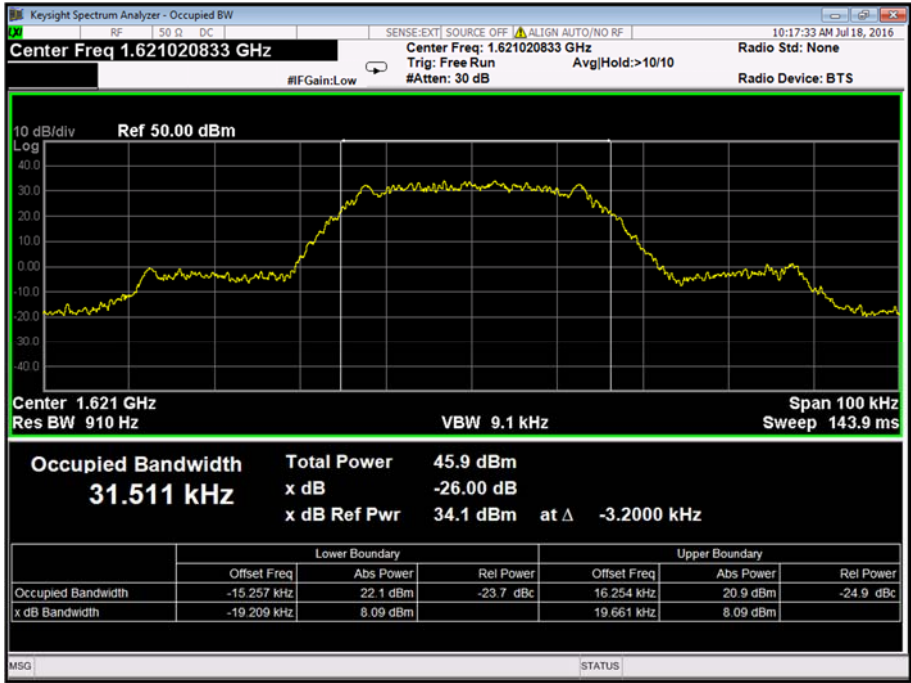
Transmit, 1616.0208333 MHz, Occupied Bandwidth Plot



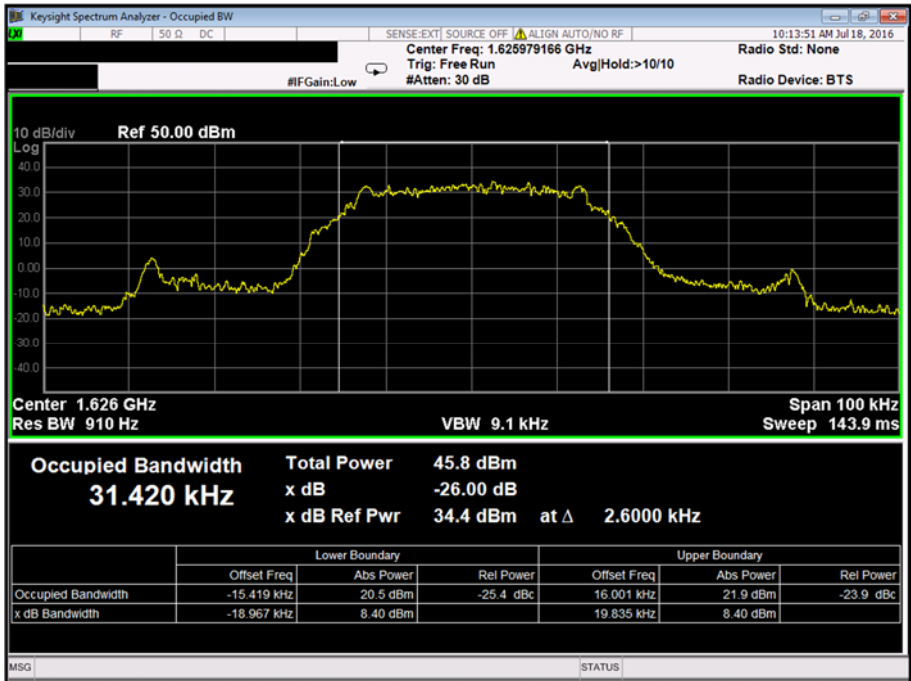


Product Service

Transmit, 1621.0208333 MHz, Occupied Bandwidth Plot



Transmit, 1625.979166 MHz, Occupied Bandwidth Plot





Product Service

FCC 47 CFR Part 2, Limit Clause 2.1049

None specified.

Industry Canada RSS-GEN, Limit Clause

None specified.



Product Service

2.3 FREQUENCY TOLERANCE

2.3.1 Specification Reference

FCC 47 CFR Part 25, Clause 25.202(d)
FCC 47 CFR Part 2, Clause 2.1055
Industry Canada RSS-170, Clause 5.2

2.3.2 Equipment Under Test and Modification State

Iridium Extreme 9575N S/N: P1638-GR-072 (E10006) - Modification State 0

2.3.3 Date of Test

22 July 2016

2.3.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.3.5 Test Procedure

The test was performed in accordance with FCC Part 2, clause 2.1055.

Remarks

The frequency error was determined by finding the midpoint between the upper and lower points containing the 99% occupied bandwidth.

The voltage on the external DC power supply was set to the voltage corresponding to 3.1, 3.7 and 4.2 V DC as measured at the EUT battery terminals during the transmitted burst using an oscilloscope.

2.3.6 Environmental Conditions

Ambient Temperature	22.9°C
Relative Humidity	53.3%



2.3.7 Test Results

3.7 V DC Supply

Transmit, 1621.0208333 MHz, Frequency Stability Under Temperature Variations Results

Temperature Interval	Frequency Error	
	%	ppm
-30 °C	-0.00012	-1.160
-20 °C	-0.00009	-0.934
-10 °C	-0.00006	-0.554
0 °C	-0.00004	-0.440
+10 °C	-0.00011	-1.120
+20 °C	-0.00007	-0.727
+30 °C	-0.00004	-0.396
+40 °C	-0.00004	-0.374
+50 °C	-0.00002	-0.176

Transmit, 1621.0208333 MHz, Frequency Stability Under Voltage Variations Results

DC Voltage	Frequency Error	
	%	ppm
3.7 V DC	-0.00007	-0.727
3.2 V DC	-0.00003	-0.266
4.2 V DC	-0.00004	-0.416

FCC 47 CFR Part 2, Limit Clause 25.202(d)

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

Industry Canada RSS-170, Limit Clause 5.2

For mobile earth station equipment, the carrier frequency shall not depart from the reference frequency by more than ± 10 ppm.



2.4 SPURIOUS EMISSIONS AT ANTENNA TERMINALS

2.4.1 Specification Reference

FCC 47 CFR Part 25, Clause 25.202(f),
FCC 47 CFR Part 2, Clause 2.1051
Industry Canada RSS-170, Clause 5.4.3.1
Industry Canada RSS-GEN, Clause 6.13

2.4.2 Equipment Under Test and Modification State

Iridium Extreme 9575N S/N: P1638-GR-072 (E10006) - Modification State 0

2.4.3 Date of Test

18 July 2016

2.4.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.4.5 Test Procedure

For emissions within 250% of the authorized bandwidth (41.66 kHz):

The EUT was connected to a spectrum analyser via a cable and attenuator. The offset was the sum of the path loss, as measured using a network analyser, the antenna gain, as declared by the manufacturer and a measurement bandwidth correction factor of $10 \log(4)$ as a 1 kHz RBW was used as opposed to a 4 kHz RBW. The reference level was set to the EIRP result as measured for 25.204. The spectrum analyser gated trigger was used to measure only over the average part of the burst.

For emissions greater than 250% of the authorized bandwidth (41.66 kHz):

The EUT was connected to a spectrum analyser via a cable and attenuator. For frequencies greater than 3 GHz a high pass filter with a 3 GHz cut off frequency was used. The offset was the sum of the path loss, as measured using a network analyser and the antenna gain, as declared by the manufacturer.

2.4.6 Environmental Conditions

Ambient Temperature	20.5°C
Relative Humidity	55.8%

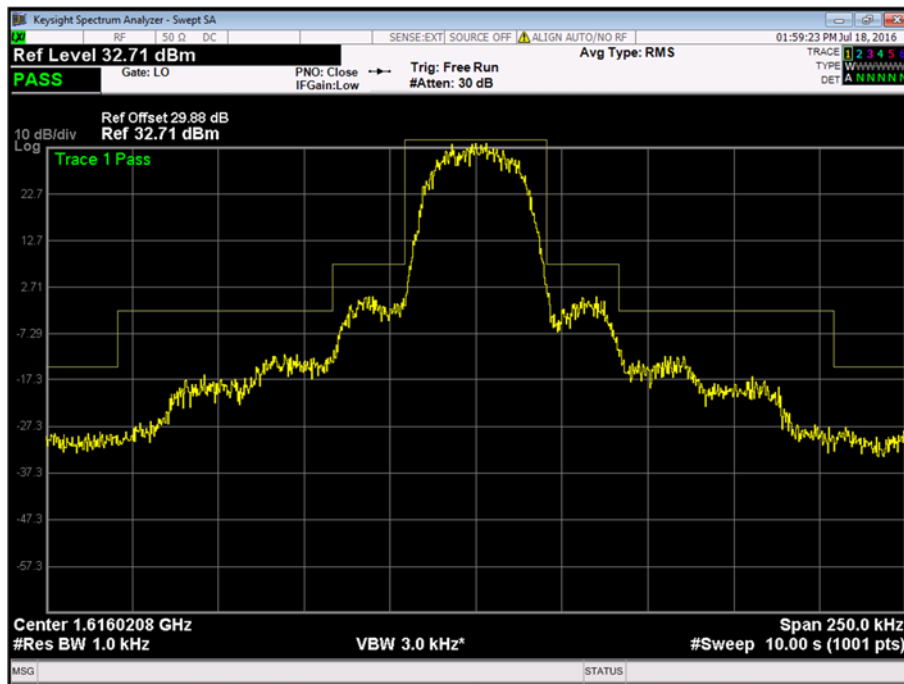


Product Service

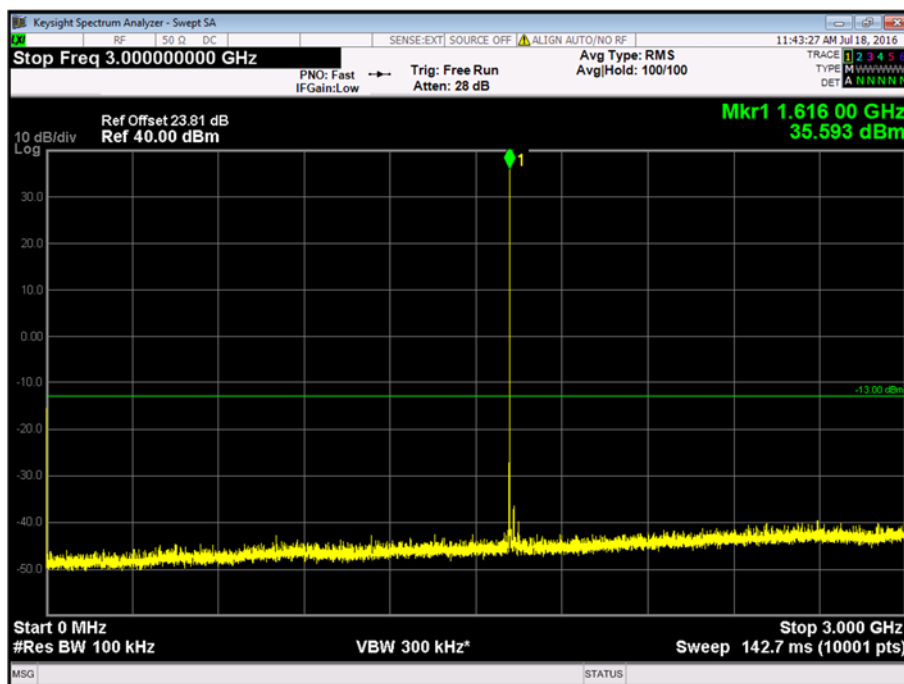
2.4.7 Test Results

3.7 V DC Supply

Transmit, 1616.0208333 MHz, Mask, Spurious Emissions at Antenna Terminals Plot



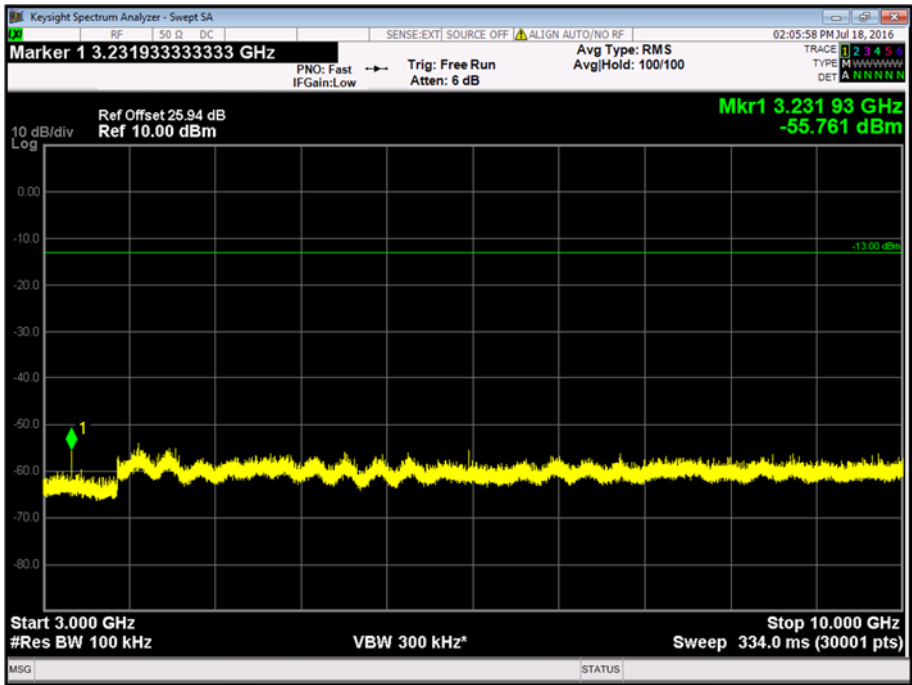
Transmit, 1616.0208333 MHz, 9 kHz to 3 GHz, Spurious Emissions at Antenna Terminals Plot



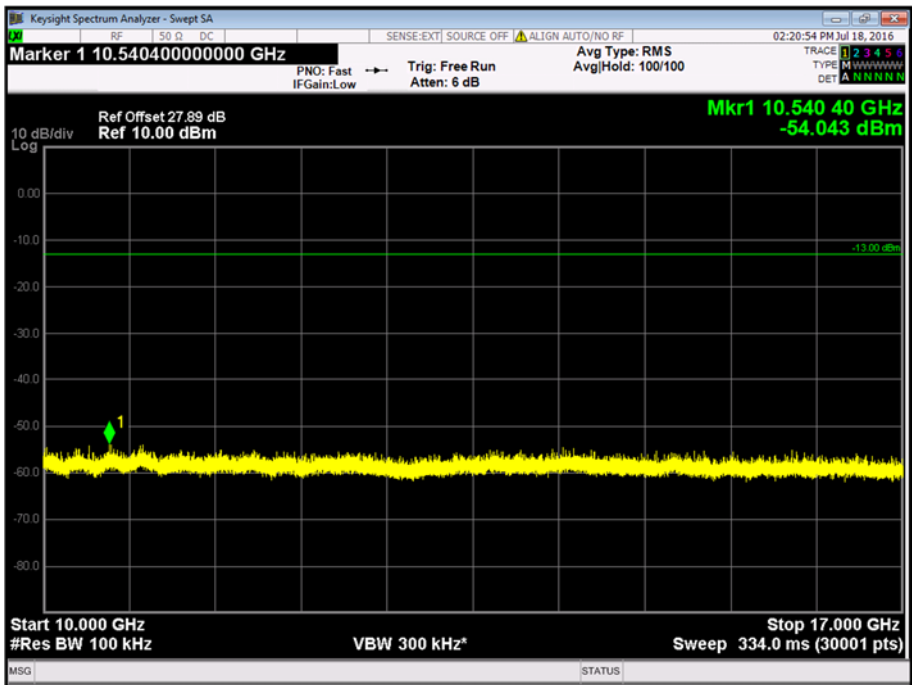


Product Service

Transmit, 1616.0208333 MHz, 3 GHz to 10 GHz, Spurious Emissions at Antenna Terminals Plot

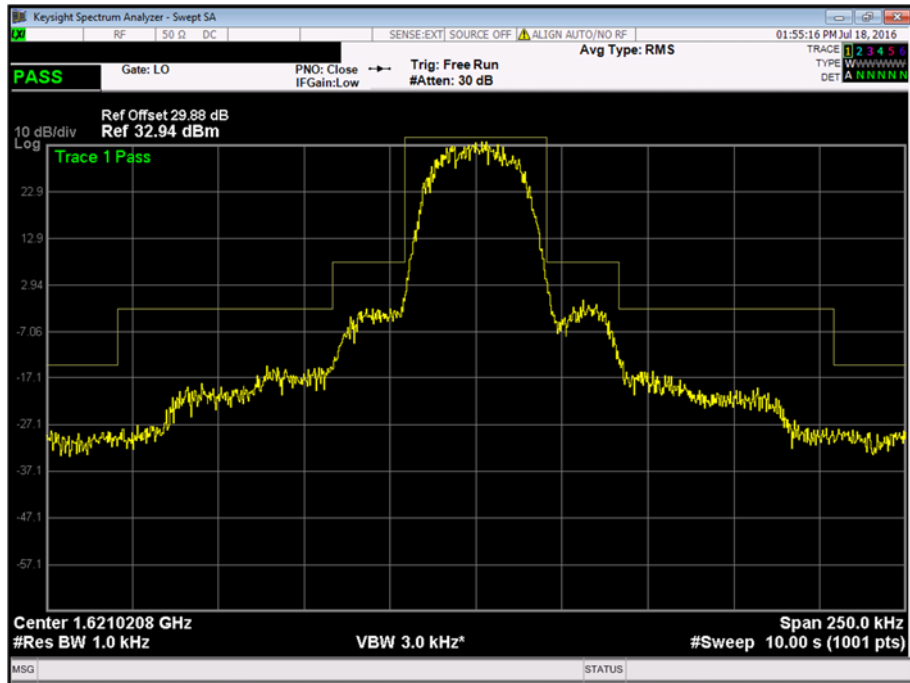
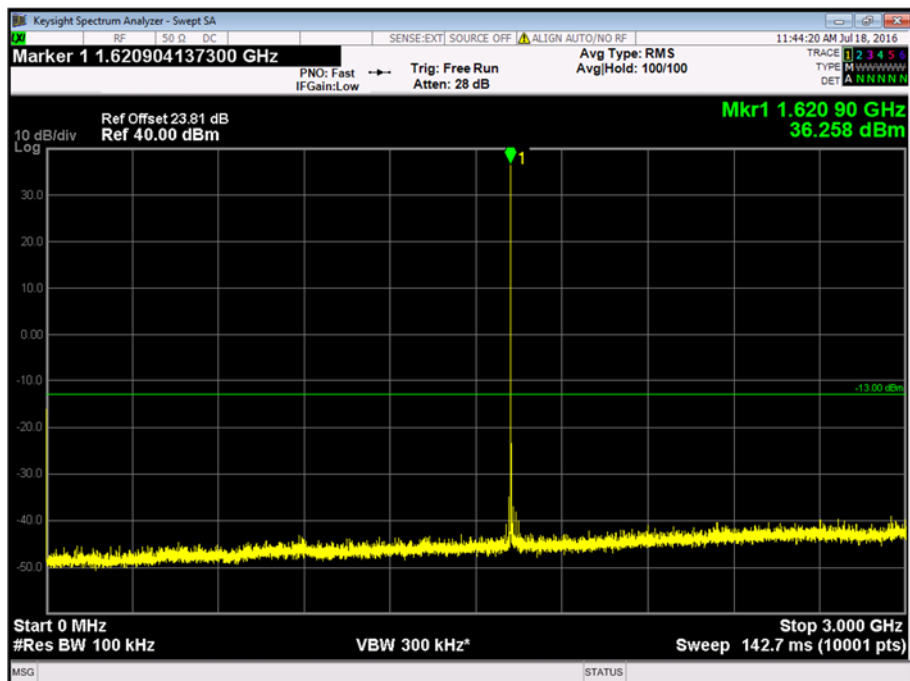


Transmit, 1616.0208333 MHz, 10 GHz to 17 GHz, Spurious Emissions at Antenna Terminals Plot





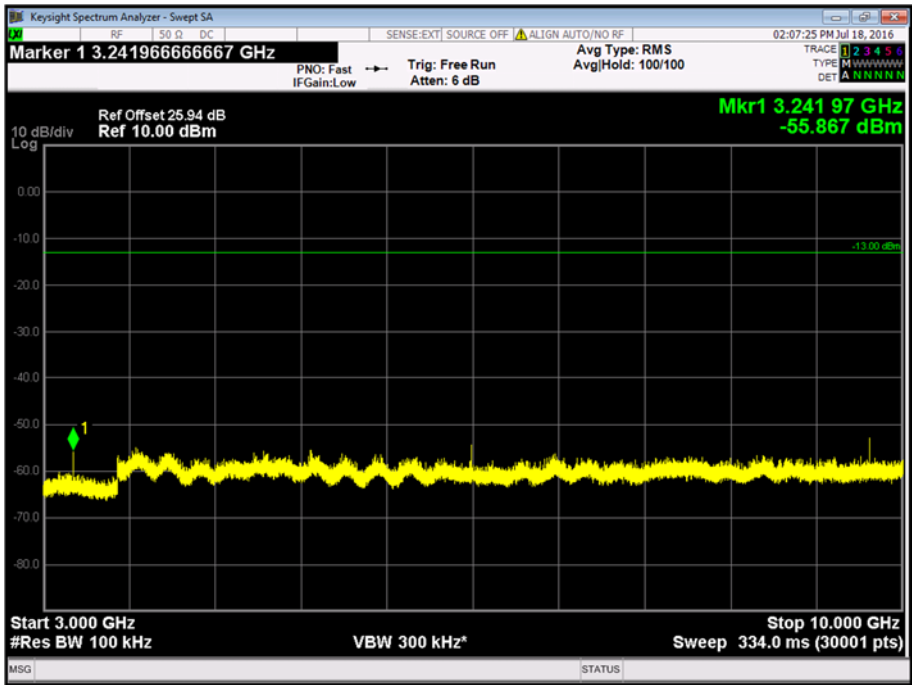
Product Service

Transmit, 1621.0208333 MHz, Mask, Spurious Emissions at Antenna Terminals PlotTransmit, 1621.0208333 MHz, 9 kHz to 3 GHz, Spurious Emissions at Antenna Terminals Plot

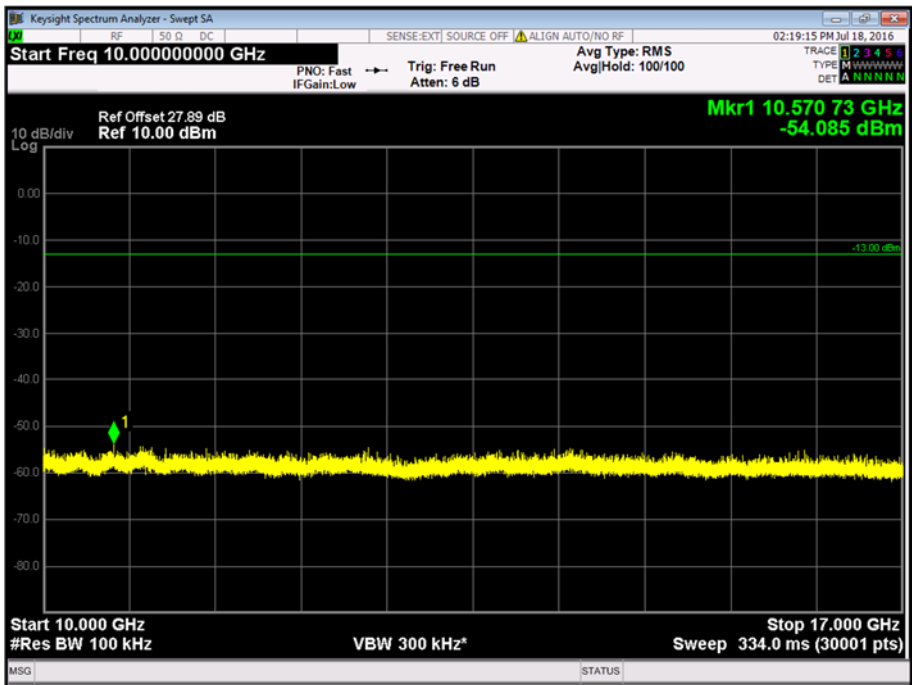


Product Service

Transmit, 1621.0208333 MHz, 3 GHz to 10 GHz, Spurious Emissions at Antenna Terminals Plot

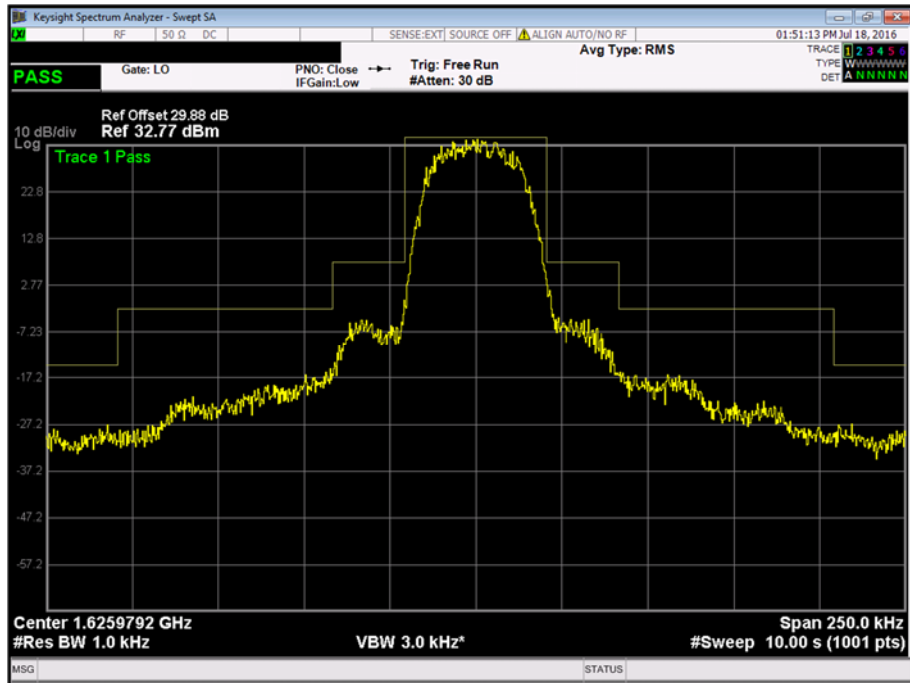
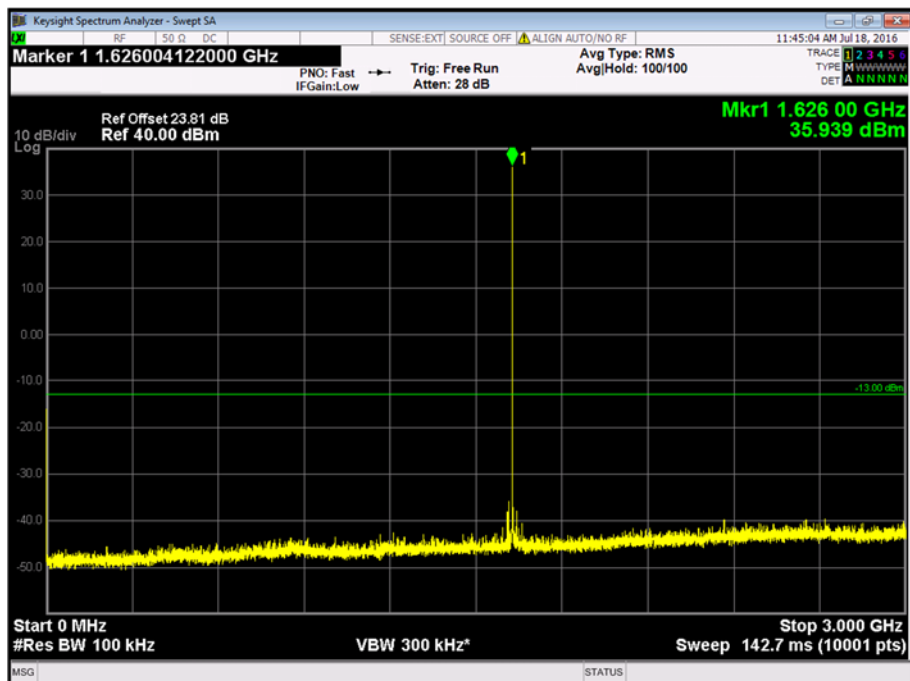


Transmit, 1621.0208333 MHz, 10 GHz to 17 GHz, Spurious Emissions at Antenna Terminals Plot





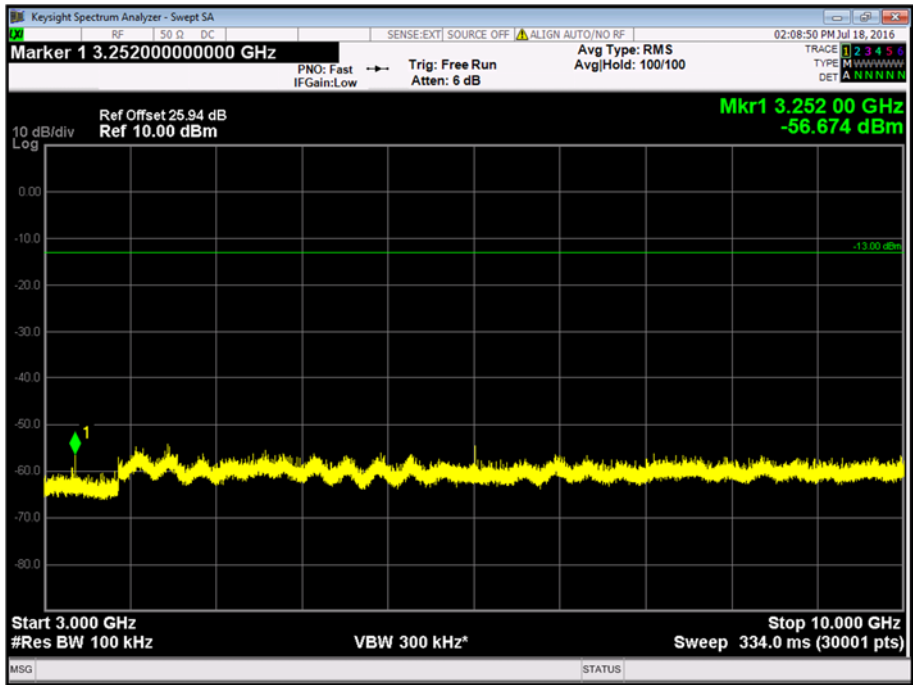
Product Service

Transmit, 1625.979166 MHz, Mask, Spurious Emissions at Antenna Terminals PlotTransmit, 1625.979166 MHz, 9 kHz to 3 GHz, Spurious Emissions at Antenna Terminals Plot

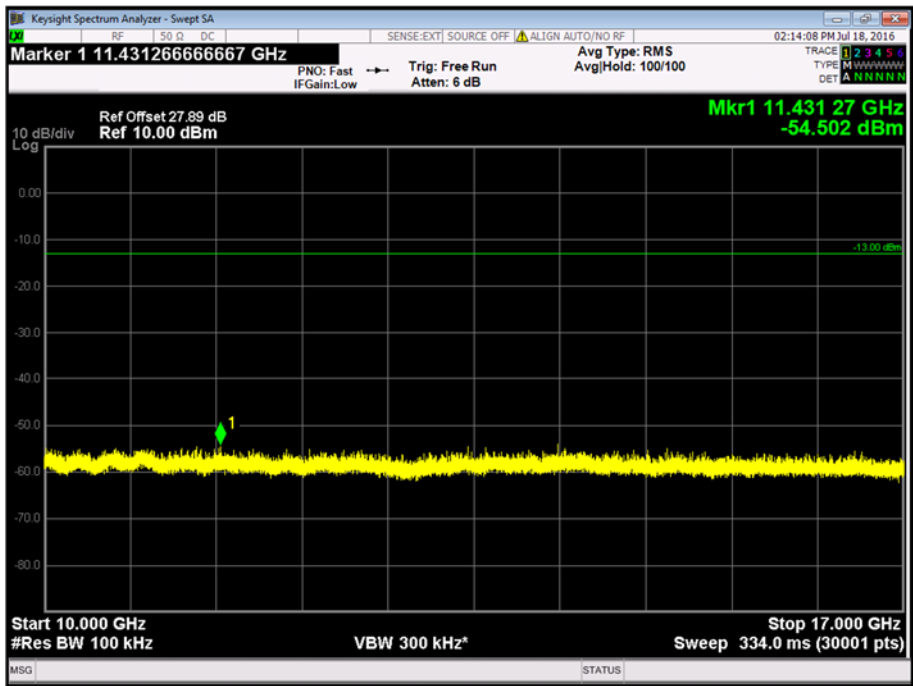


Product Service

Transmit, 1625.979166 MHz, 3 GHz to 10 GHz, Spurious Emissions at Antenna Terminals Plot



Transmit, 1625.979166 MHz, 10 GHz to 17 GHz, Spurious Emissions at Antenna Terminals Plot



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.

Industry Canada RSS-170, Limit Clause 5.4.3.1

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 occupied bandwidth or necessary bandwidth, whichever is greater
- 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 occupied bandwidth or necessary bandwidth, whichever is greater
- 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 occupied bandwidth or necessary bandwidth, whichever is greater.



Product Service

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 2.1053
Industry Canada RSS-170, Clause 5.4.3.1
Industry Canada RSS-GEN, Clause 6.13

2.5.2 Equipment Under Test and Modification State

Iridium Extreme 9575N S/N: P1638-GR-072 (E10006) - Modification State 0

2.5.3 Date of Test

9 July 2016

2.5.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.5.5 Test Procedure

For radiated testing, a preliminary profile of the Spurious Radiated Emissions was obtained up to the 10th harmonic by operating the EUT on a remotely controlled turntable within a semi-anechoic chamber. Measurements of emissions from the EUT were obtained with the Measurement Antenna in both Horizontal and Vertical Polarisations. The profiling produced a list of the worst-case emissions together with the EUT azimuth and antenna polarisation.

Using the information from the preliminary profiling of the EUT, the list of emissions was then confirmed or updated under Alternative Open Site conditions. Emission levels were maximised by adjusting the antenna height, antenna polarisation and turntable azimuth.

The EUT was set to transmit on maximum power with both channels operating simultaneously.

For any emissions found the EUT was then removed from the chamber and replaced with a substitution antenna. Using a signal generator the level was adjusted to achieve the same value on the measuring instrument as previously recorded with the EUT. The final result was determined by a calculation using the signal generator level, antenna gain and cable loss.

The measurements were performed at a 3m distance unless otherwise stated.

2.5.6 Environmental Conditions

Ambient Temperature	21.9°C
Relative Humidity	53.0%



Product Service

2.5.7 Test Results

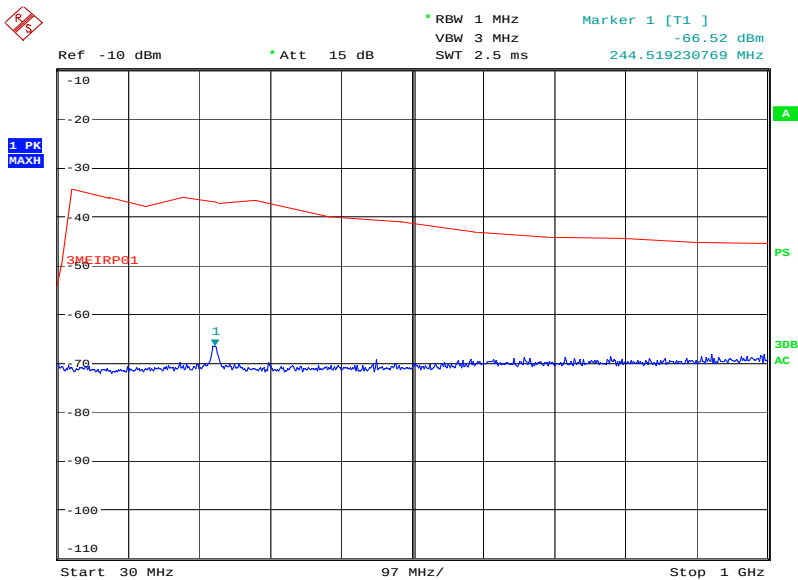
3.7 V DC Supply

Transmit, 1616.0208333 MHz, 30 MHz to 17 GHz, Radiated Spurious Emissions Results

Frequency (MHz)	Emission Results (dBm)
*	

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

Transmit, 1616.0208333 MHz, 30 MHz to 1 GHz, Radiated Spurious Emissions Plot

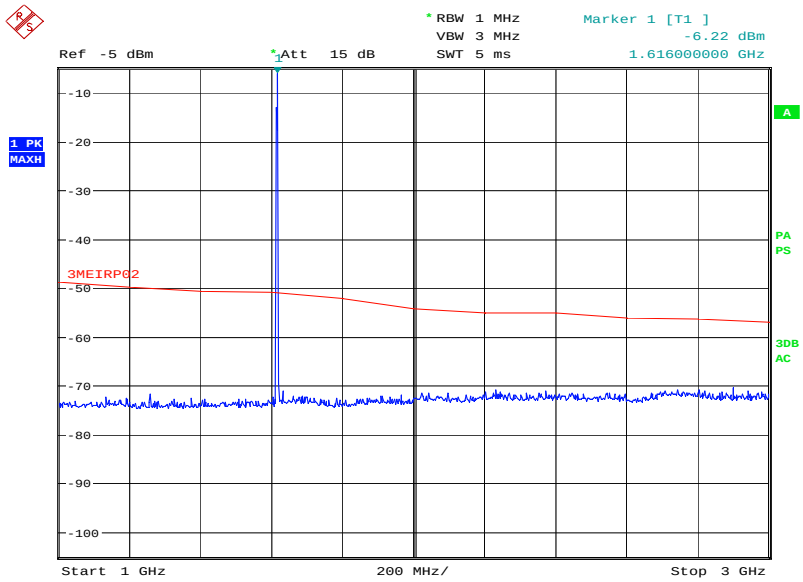


Date: 9.JUL.2016 14:54:42



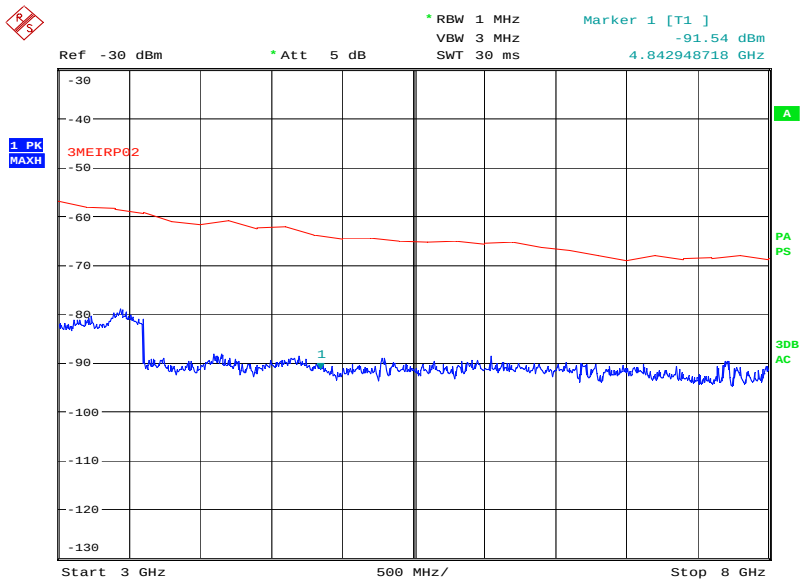
Product Service

Transmit, 1616.0208333 MHz, 1 GHz to 3 GHz, Radiated Spurious Emissions Plot



Date: 9.JUL.2016 13:12:03

Transmit, 1616.0208333 MHz, 3 GHz to 8 GHz, Radiated Spurious Emissions Plot

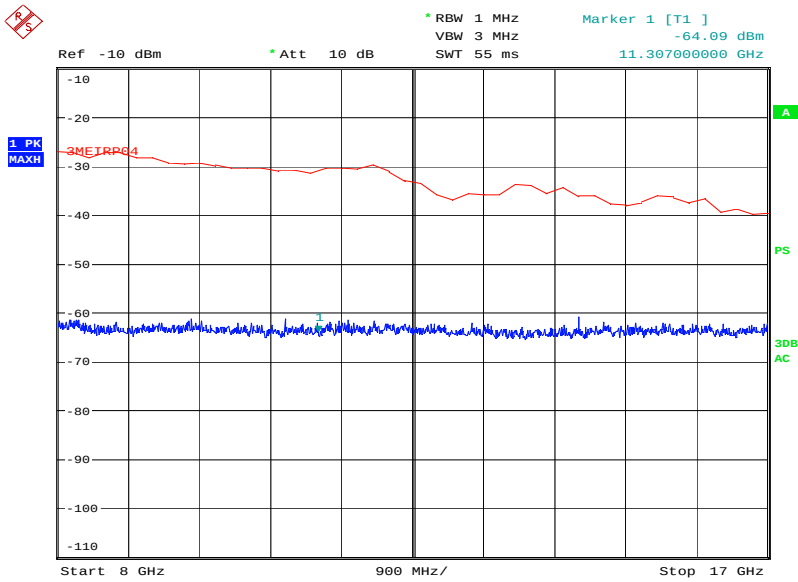


Date: 9.JUL.2016 13:08:21



Product Service

Transmit, 1616.0208333 MHz, 8 GHz to 17 GHz, Radiated Spurious Emissions Plot



Date: 9.JUL.2016 14:04:13



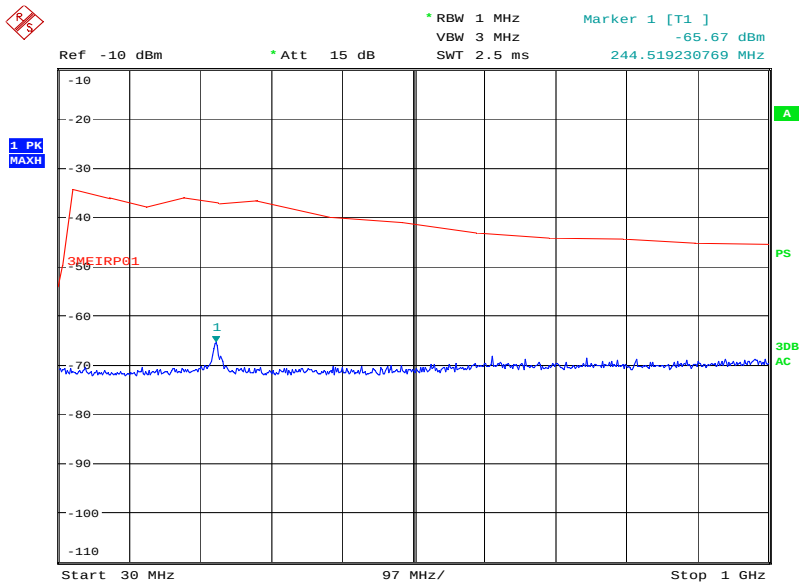
Product Service

Transmit, 1621.0208333 MHz, 30 MHz to 17 GHz, Radiated Spurious Emissions Results

Frequency (MHz)	Emission Results (dBm)
*	

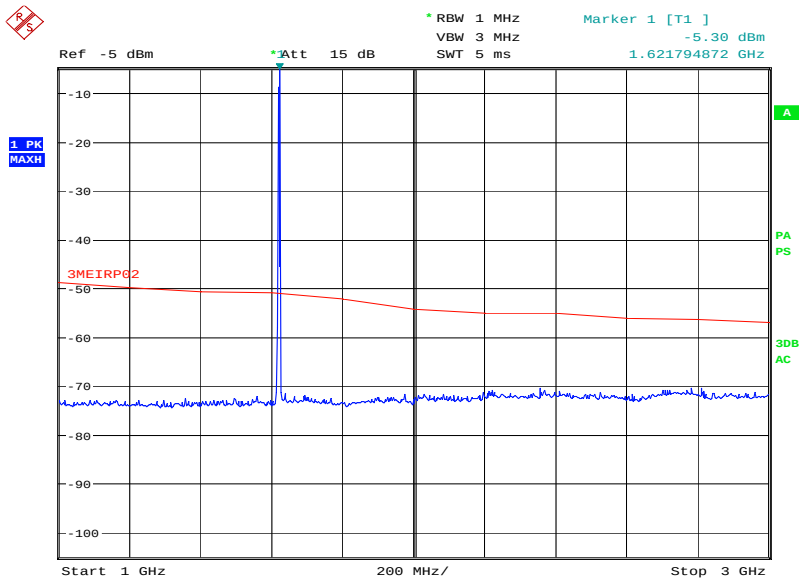
*No emissions were detected within 10 dB of the limit.

Transmit, 1621.0208333 MHz, 30 MHz to 1 GHz, Radiated Spurious Emissions Plot



Date: 9.JUL.2016 14:47:28

Transmit, 1621.0208333 MHz, 1 GHz to 3 GHz, Radiated Spurious Emissions Plot

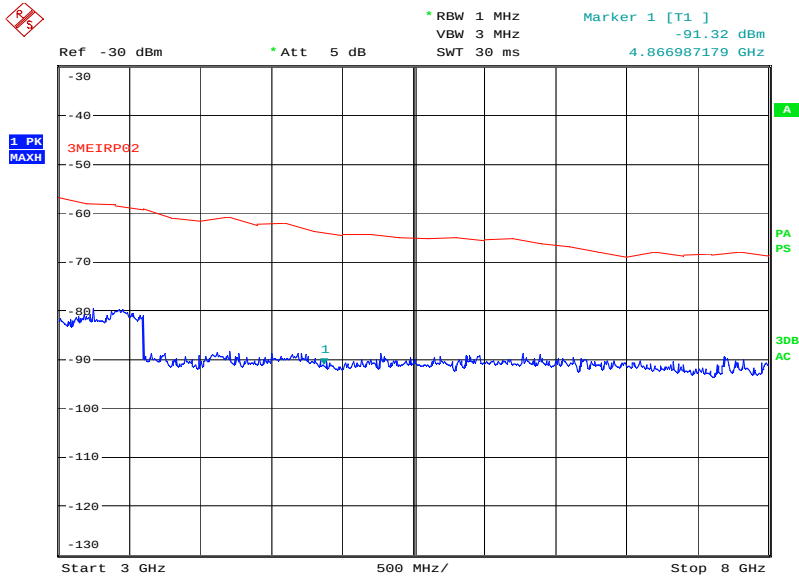


Date: 9.JUL.2016 12:54:22



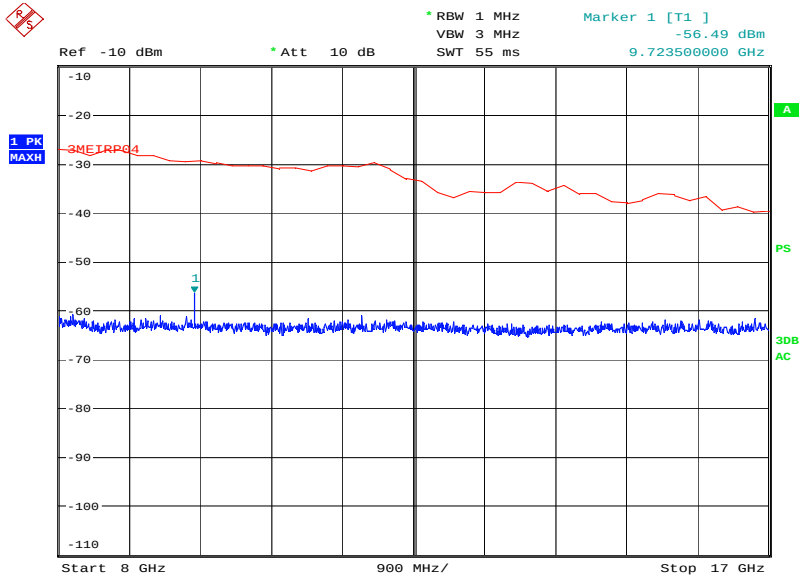
Product Service

Transmit, 1621.0208333 MHz, 3 GHz to 8 GHz, Radiated Spurious Emissions Plot



Date: 9.JUL.2016 13:00:15

Transmit, 1621.0208333 MHz, 8 GHz to 17 GHz, Radiated Spurious Emissions Plot



Date: 9.JUL.2016 14:09:45



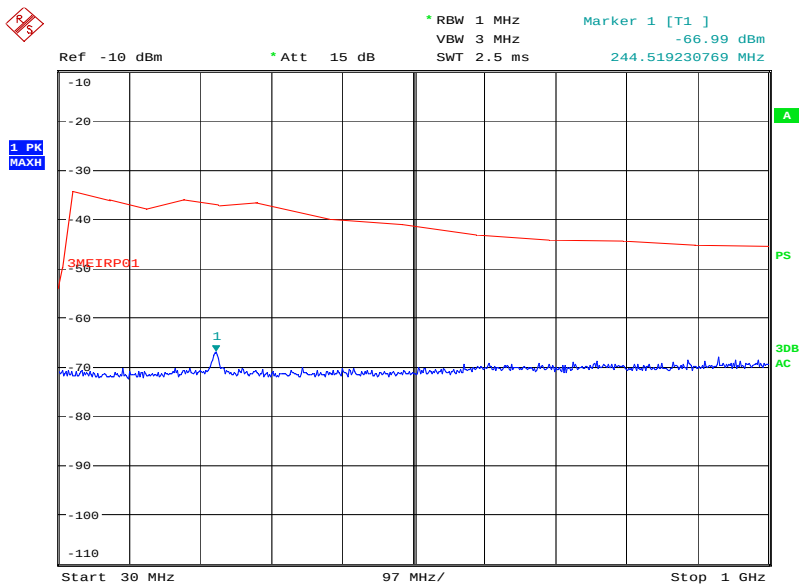
Product Service

Transmit, 1621.0208333 MHz, 30 MHz to 17 GHz, Radiated Spurious Emissions Results

Frequency (MHz)	Emission Results (dBm)
*	

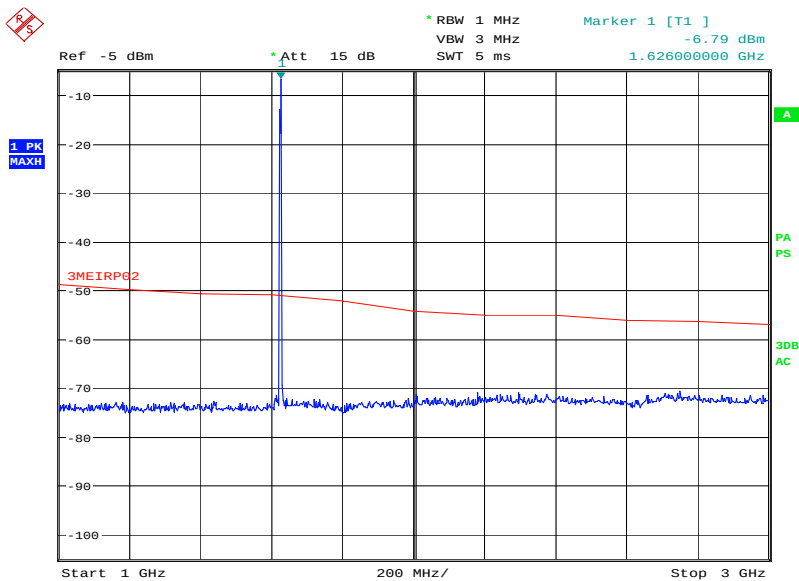
*No emissions were detected within 10 dB of the limit.

Transmit, 1625.979166 MHz, 30 MHz to 1 GHz, Radiated Spurious Emissions Plot



Date: 9.JUL.2016 14:42:03

Transmit, 1621.0208333 MHz, 1 GHz to 3 GHz, Radiated Spurious Emissions Plot

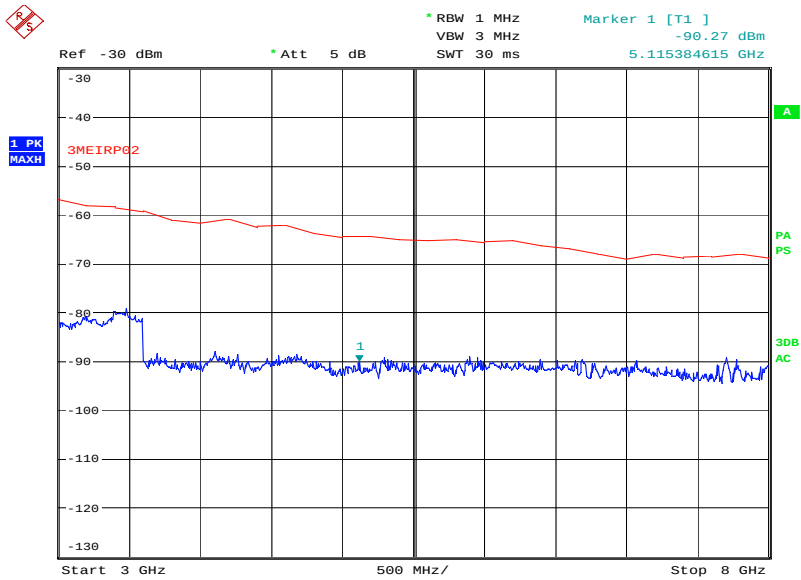


Date: 9.JUL.2016 13:21:20



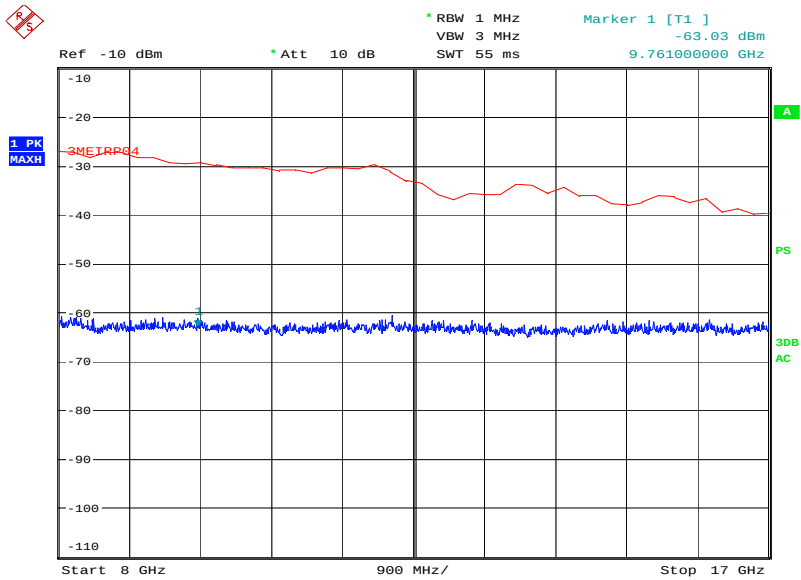
Product Service

Transmit, 1621.0208333 MHz, 3 GHz to 8 GHz, Radiated Spurious Emissions Plot



Date: 9.JUL.2016 13:24:35

Transmit, 1621.0208333 MHz, 8 GHz to 17 GHz, Radiated Spurious Emissions Plot



Date: 9.JUL.2016 14:35:12

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.

Industry Canada RSS-170, Limit Clause 5.4.3.1

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 occupied bandwidth or necessary bandwidth, whichever is greater
- 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 occupied bandwidth or necessary bandwidth, whichever is greater
- 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 occupied bandwidth or necessary bandwidth, whichever is greater.



Product Service

2.6 CONDUCTED OUTPUT POWER

2.6.1 Specification Reference

FCC 47 CFR Part 25, Clause 25.204
Industry Canada RSS-170, Clause 5.3

2.6.2 Equipment Under Test and Modification State

Iridium Extreme 9575N S/N: P1638-GR-072 (E10006) - Modification State 0

2.6.3 Date of Test

18 July 2016

2.6.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.6.5 Test Procedure

The EUT was connected to a spectrum analyser via a cable and 20dB attenuator. The path loss was measured using a network analyser and entered as a reference level offset into the instrumentation. The spectrum analyser was configured with an RBW of 3.9 kHz and VBW of 12 kHz. $10\log(4/3.9) = 0.11$ dB was added to the reference level offset to make the result relative to any 4 kHz band as per the requirement in 25.204(a). The 3.0 dBi antenna gain as declared by the manufacturer was also included in this offset to report the result as EIRP. The transmit power was measured over the active part of the burst using an RMS detector, the spectrum analyser sweep time was set to 10s and the peak result recorded.

2.6.6 Environmental Conditions

Ambient Temperature	23.1°C
Relative Humidity	66.9%



Product Service

2.6.7 Test Results

3.7 V DC Supply

Transmit, EIRP, Conducted, Power Limits Results

1616.0208333 MHz	1621.0208333 MHz	1625.979166 MHz
dBW	dBW	dBW
2.71	2.94	2.77

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.

Industry Canada RSS-170, Limit Clause 5.3

The application for MES certification shall state the MES e.i.r.p. that is necessary for satisfactory communication. The maximum permissible e.i.r.p. will be the stated necessary e.i.r.p. plus a 2 dB margin. If a detachable antenna is used, the certification application shall state the recommended antenna type and manufacturer, the antenna gain and the maximum transmitter output power at the antenna terminal.



2.7 LIMITS ON EMISSIONS FROM MOBILE EARTH STATIONS FOR PROTECTION OF AERONAUTICAL RADIONAVIGATION-SATELLITE SERVICE

2.7.1 Specification Reference

FCC 47 CFR Part 25, Clause 25.216
Industry Canada RSS-170, Clause 5.4.3

2.7.2 Equipment Under Test and Modification State

Iridium Extreme 9575N S/N: P1638-GR-072 (E10006) - Modification State 0

2.7.3 Date of Test

18 July 2016 & 19 July 2016

2.7.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.7.5 Test Procedure

The EUT was set to transmit at maximum power using modulation as described in the manufacturers application form. The EUT was connected to a spectrum analyser via a cable and attenuator. The path loss was measured using a vector network analyser and entered as a reference level offset in the EUT. The gated trigger of the analyser was used so that average measurements were taken over a 2 ms period of the active burst.

Any spur within 20 dB of -70 dBm/MHz was investigated further to determine the bandwidth of the emission. Each spur was individually investigated and the RBW of the analyser was reduced to allow an approximation of the emission bandwidth of the spur. It was confirmed that any discrete emissions have a power density less than -80 dBm/MHz. Measurements of the bottom channel in the frequency range 1605 MHz to 1610 MHz had a reduced limit of $10\log(1000/100) = 10$ dB as the RBW was reduced to 100 kHz.

For emissions in the carrier off state, the EUT was configured in a state of continuous non-transmission.

2.7.6 Environmental Conditions

Ambient Temperature	21.7 - 23.0°C
Relative Humidity	66.4 - 67.6%



Product Service

2.7.7 Test Results

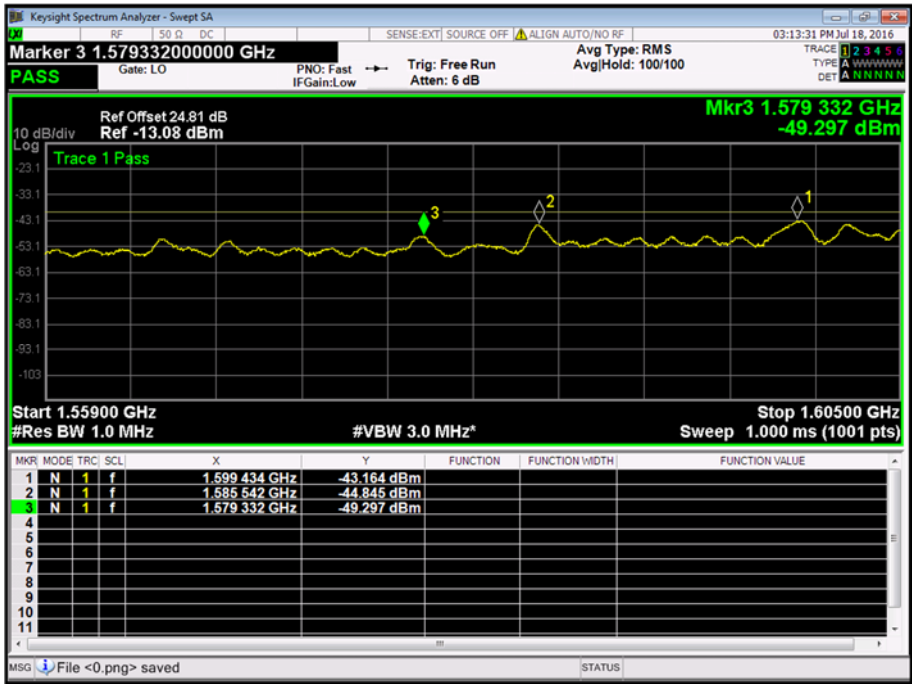
3.7 V DC Supply

Transmit, 1616.0208333 MHz, EIRP Density – Broadband Emissions, Limits on Emissions from Mobile Earth Stations for Protection of Aeronautical Radionavigation-Satellite Service Results

Frequency (MHz)	dBW
1599.4	-73.16
1585.5	-74.19

No other emissions within 6 dB of the limit were detected.

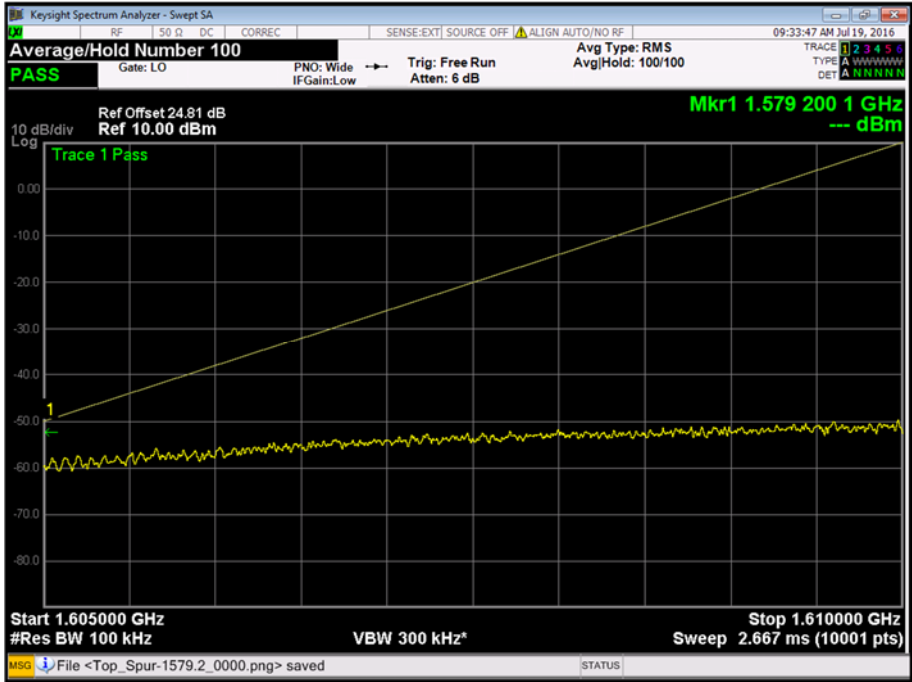
Transmit, 1616.0208333 MHz, EIRP Density – Broadband Emissions, 1559 MHz to 1605 MHz, Limits on Emissions from Mobile Earth Stations for Protection of Aeronautical Radionavigation-Satellite Service Plot





Product Service

Transmit, 1616.0208333 MHz, EIRP Density – Broadband Emissions, 1605 MHz to 1610 MHz, Limits on Emissions from Mobile Earth Stations for Protection of Aeronautical Radionavigation-Satellite Service Plot





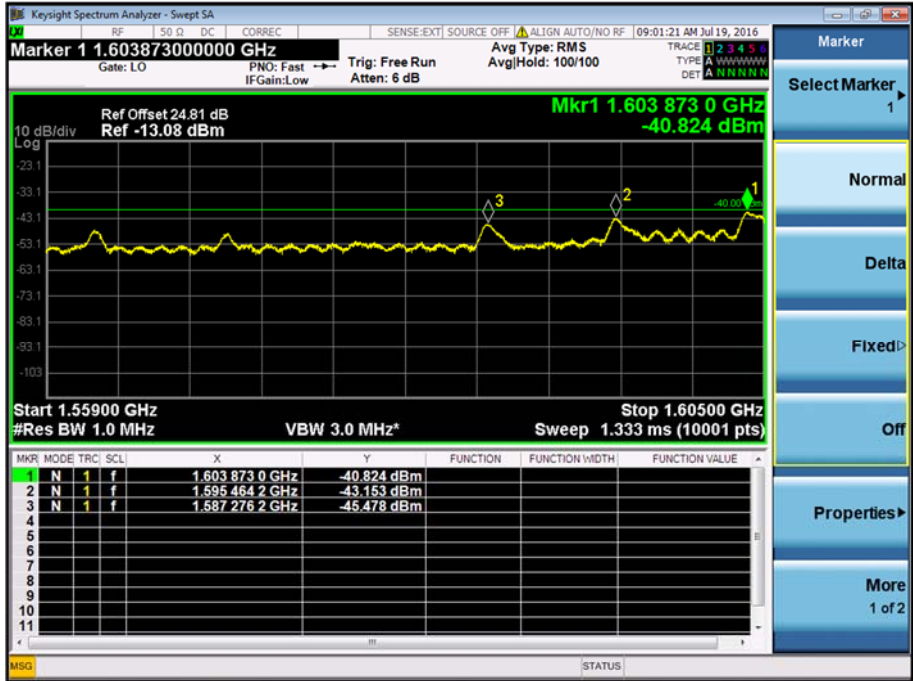
Product Service

Transmit, 1621.0208333 MHz, EIRP Density – Broadband Emissions, Limits on Emissions from Mobile Earth Stations for Protection of Aeronautical Radionavigation-Satellite Service Results

Frequency (MHz)	Frequency (MHz)
1603.90	-70.82
1595.46	-73.15
1587.30	-75.48

No other emissions within 6 dB of the limit were detected.

Transmit, 1621.0208333 MHz, EIRP Density – Broadband Emissions, 1559 MHz to 1605 MHz, Limits on Emissions from Mobile Earth Stations for Protection of Aeronautical Radionavigation-Satellite Service Plot





Product Service

Transmit, 1621.0208333 MHz, EIRP Density – Broadband Emissions, 1605 MHz to 1610 MHz, Limits on Emissions from Mobile Earth Stations for Protection of Aeronautical Radionavigation-Satellite Service Plot





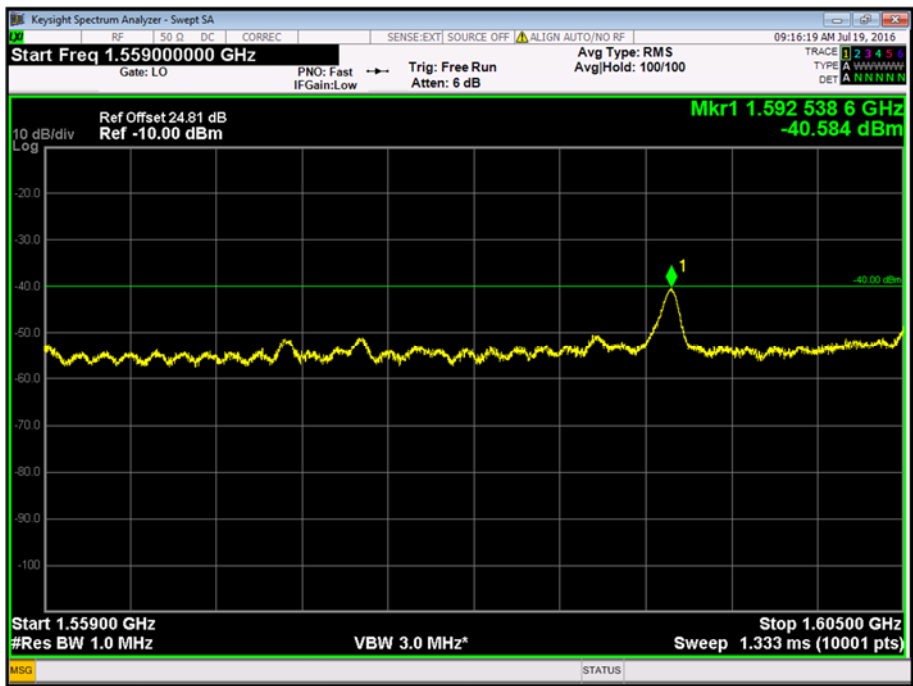
Product Service

Transmit, 1625.979166 MHz, EIRP Density – Broadband Emissions, Limits on Emissions from Mobile Earth Stations for Protection of Aeronautical Radionavigation-Satellite Service Results

Frequency (MHz)	dBW
1592.5	-70.58

No other emissions within 6 dB of the limit were detected.

Transmit, 1625.979166 MHz, EIRP Density – Broadband Emissions, 1559 MHz to 1605 MHz, Limits on Emissions from Mobile Earth Stations for Protection of Aeronautical Radionavigation-Satellite Service Plot





Product Service

Transmit, 1625.979166 MHz, EIRP Density – Broadband Emissions, 1605 MHz to 1610 MHz,
Limits on Emissions from Mobile Earth Stations for Protection of Aeronautical Radionavigation-
Satellite Service Plot





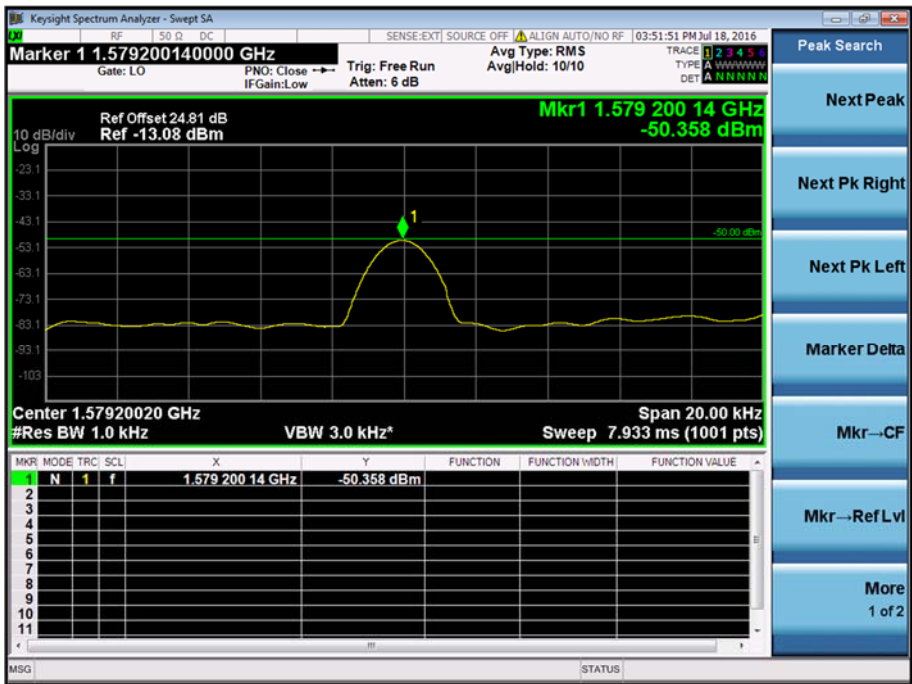
Product Service

Transmit, 1616.0208333 MHz, EIRP Density – Discrete Emissions, Limits on Emissions from Mobile Earth Stations for Protection of Aeronautical Radionavigation-Satellite Service Results

Frequency (MHz)	dBW
1579.2	-80.36

No other emissions within 6 dB of the limit were detected.

Transmit, 1616.0208333 MHz, EIRP Density – Discrete Emissions, Limits on Emissions from Mobile Earth Stations for Protection of Aeronautical Radionavigation-Satellite Service Plot





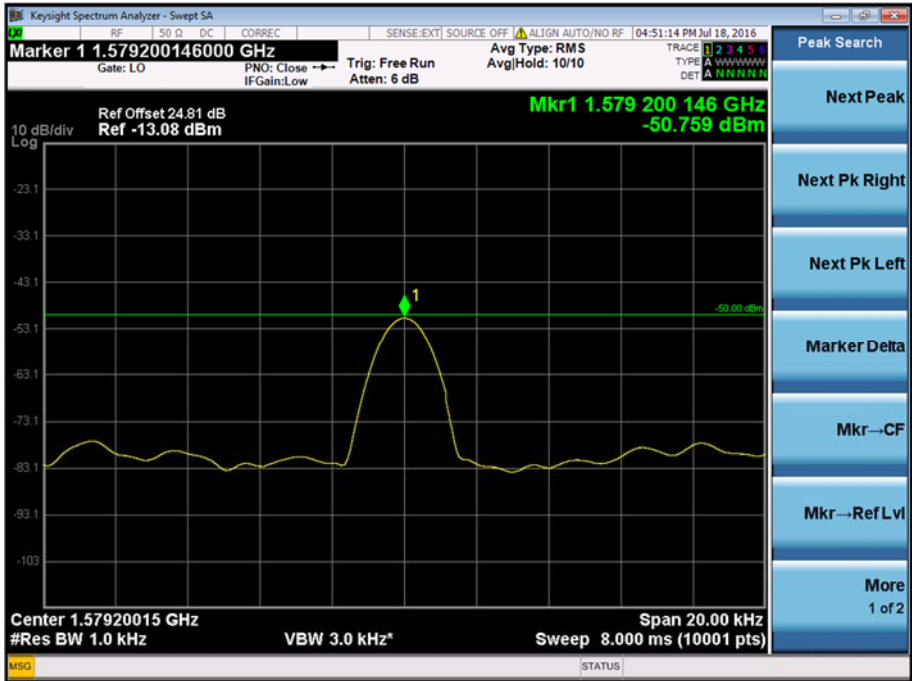
Product Service

Transmit, 1621.0208333 MHz, EIRP Density – Discrete Emissions, Limits on Emissions from Mobile Earth Stations for Protection of Aeronautical Radionavigation-Satellite Service Results

Frequency (MHz)	dBW
1579.2	-80.76

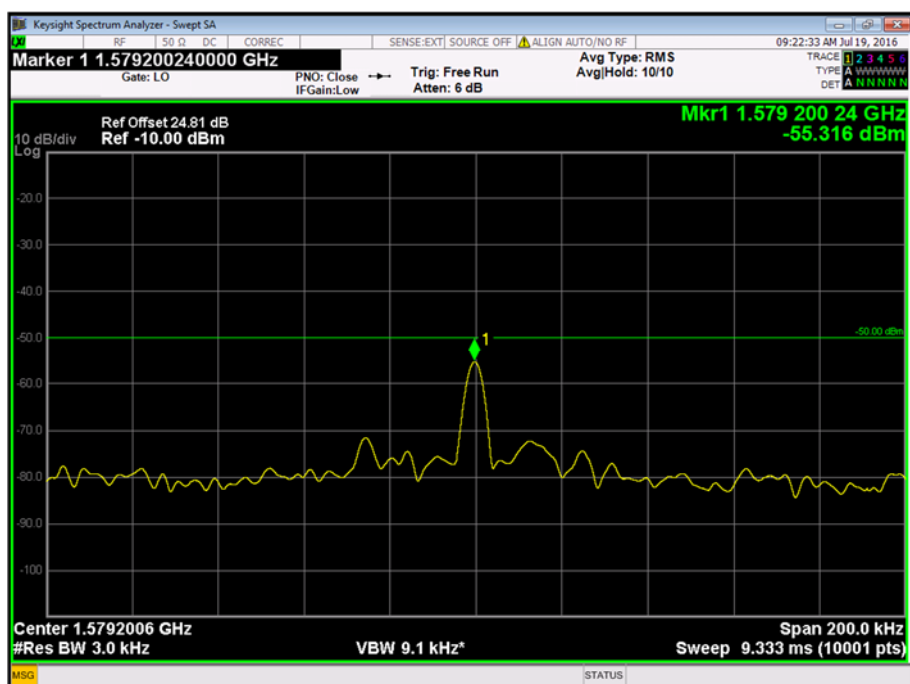
No other emissions within 6 dB of the limit were detected.

Transmit, 1621.0208333 MHz, EIRP Density – Discrete Emissions, Limits on Emissions from Mobile Earth Stations for Protection of Aeronautical Radionavigation-Satellite Service Plot



Frequency (MHz)	dBW
1579.2	-85.32

Transmit, 1625.979166 MHz, EIRP Density – Discrete Emissions, Limits on Emissions from Mobile Earth Stations for Protection of Aeronautical Radionavigation-Satellite Service Plot





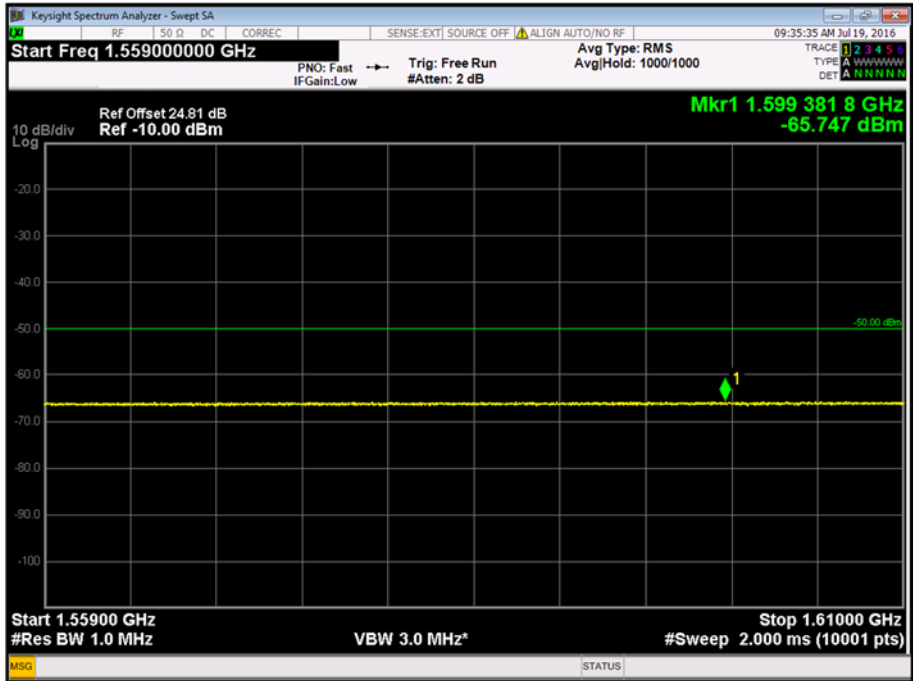
Product Service

Transmit, 1616.0208333 MHz, EIRP Density – Carrier-off State Emissions, Limits on Emissions from Mobile Earth Stations for Protection of Aeronautical Radionavigation-Satellite Service

Frequency (MHz)	dBW
*	

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

Transmit, 1616.0208333 MHz, EIRP Density – Carrier-off State Emissions, Limits on Emissions from Mobile Earth Stations for Protection of Aeronautical Radionavigation-Satellite Service Plot





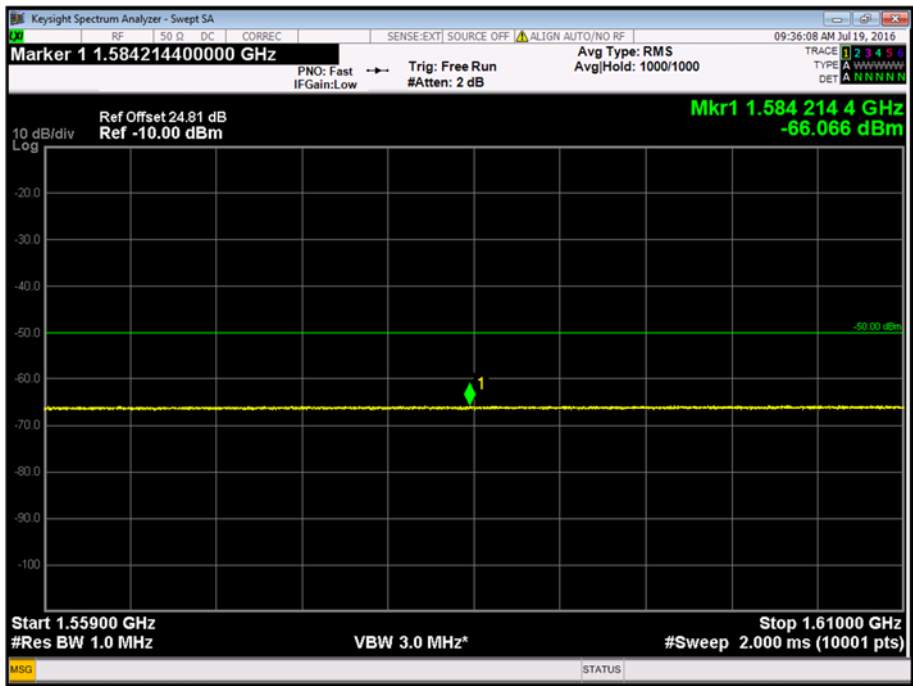
Product Service

Transmit, 1621.0208333 MHz, EIRP Density – Carrier-off State Emissions, Limits on Emissions from Mobile Earth Stations for Protection of Aeronautical Radionavigation-Satellite Service

Frequency (MHz)	dBW
*	

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

Transmit, 1621.0208333 MHz, EIRP Density – Carrier-off State Emissions, Limits on Emissions from Mobile Earth Stations for Protection of Aeronautical Radionavigation-Satellite Service Plot





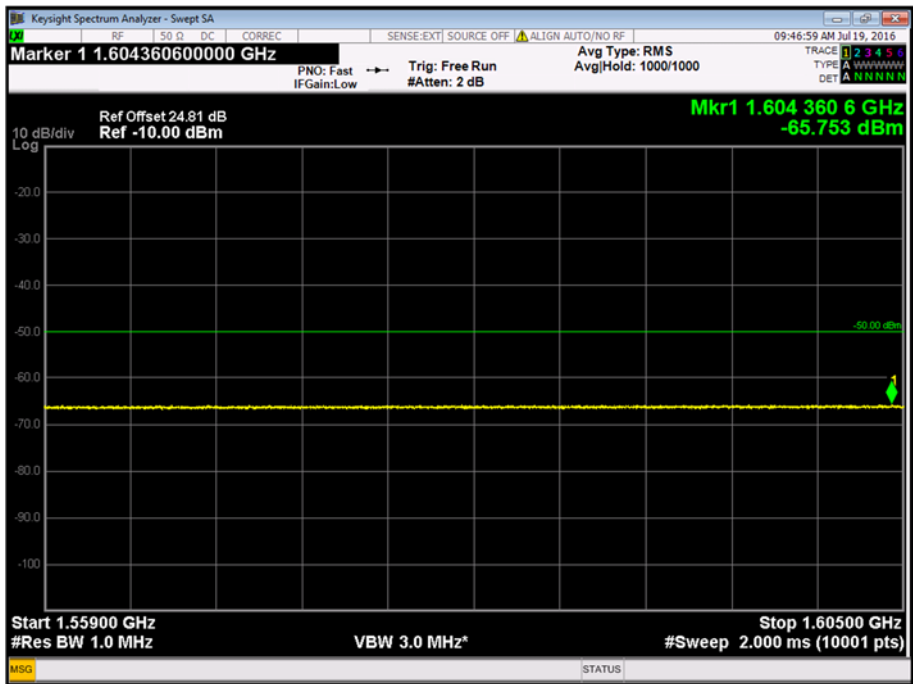
Product Service

Transmit, 1625.979166 MHz, EIRP Density – Carrier-off State Emissions, Limits on Emissions from Mobile Earth Stations for Protection of Aeronautical Radionavigation-Satellite Service

Frequency (MHz)	dBW
*	

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

Transmit, 1625.979166 MHz, EIRP Density – Carrier-off State Emissions, Limits on Emissions from Mobile Earth Stations for Protection of Aeronautical Radionavigation-Satellite Service Plot



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.

Industry Canada RSS-170, Limit Clause 5.4.3.2Band 1610 to 1626.5 MHz

- -70 dBW/MHz at 1605 MHz, linearly interpolated to -10 dBW/MHz at 1610 MHz for broadband emissions.
- -80 dBW/MHz at 1605 MHz, linearly interpolated to -20 dBW/MHz at 1610 MHz for discrete emissions.

Band 1626.5 to 1660.5 MHz

- -70 dBW/MHz at 1605 MHz, linearly interpolated to -46 dBW/MHz at 1610 MHz for broadband emissions.
- -80 dBW/MHz at 1605 MHz, linearly interpolated to -56 dBW/MHz at 1610 MHz for discrete emissions.



Product Service

SECTION 3

TEST EQUIPMENT USED



3.1 TEST EQUIPMENT USED

List of absolute measuring and other principal items of test equipment.

Instrument	Manufacturer	Type No.	TE No.	Calibration Period (months)	Calibration Due
Section 2.2 - Occupied Bandwidth					
10dB/1W SMA Attenuator dc - 18GHz	Sealectro	60-674-1010-89	3	12	30-Jun-2017
Rubidium Standard	Rohde & Schwarz	XSRM	1316	6	3-Sep-2016
Power Supply	Iso-tech	IPS 2010	2439	-	O/P Mon
Power Supply	Iso-tech	IPS 2010	2440	-	O/P Mon
Attenuator (10dB, 50W)	Aeroflex / Weinschel	47-10-34	3166	12	16-Sep-2016
Hygrometer	Rotronic	I-1000	3220	12	19-Aug-2016
TRUE RMS MULTIMETER	Fluke	179	4006	12	9-Dec-2016
Frequency Standard	Spectracom	Secure Sync 1200-0408-0601	4393	6	3-Sep-2016
1 metre SMA Cable	Florida Labs	SMS-235SP-39.4-SMS	4514	12	16-Feb-2017
PXA Signal Analyser	Keysight Technologies	N9030A	4654	12	8-Oct-2016
Section 2.3 - Frequency Tolerance					
Temperature Chamber	Montford	2F3	467	-	O/P Mon
Rubidium Standard	Rohde & Schwarz	XSRM	1316	6	3-Sep-2016
Attenuator (10dB, 10W)	Trilithic	HFP-50N	1377	12	23-Oct-2016
Power Supply	Iso-tech	IPS 2010	2439	-	O/P Mon
Power Supply	Iso-tech	IPS 2010	2440	-	O/P Mon
Attenuator (10dB, 50W)	Aeroflex / Weinschel	47-10-34	3166	12	16-Sep-2016
Thermocouple Thermometer	Fluke	51	3174	12	9-Dec-2016
Hygrometer	Rotronic	I-1000	3220	12	19-Aug-2016
TRUE RMS MULTIMETER	Fluke	179	4006	12	9-Dec-2016
Oscilloscope	Agilent Technologies	DSO9104A	4142	12	2-Sep-2016
Frequency Standard	Spectracom	Secure Sync 1200-0408-0601	4393	6	3-Sep-2016
2 metre N-Type Cable	IW Microwave	NPS-1806LC-788-NPS	4503	12	26-May-2017
Section 2.4 - Spurious Emissions at Antenna Terminals					
10dB/1W SMA Attenuator dc - 18GHz	Sealectro	60-674-1010-89	3	12	30-Jun-2017
Rubidium Standard	Rohde & Schwarz	XSRM	1316	6	3-Sep-2016
Power Supply	Iso-tech	IPS 2010	2439	-	O/P Mon
Power Supply	Iso-tech	IPS 2010	2440	-	O/P Mon
Attenuator (10dB, 50W)	Aeroflex / Weinschel	47-10-34	3166	12	16-Sep-2016
Hygrometer	Rotronic	I-1000	3220	12	19-Aug-2016
Function Generator	Thurlby Thandar Instruments	TG2000	3334	-	TU
Network Analyser	Rohde & Schwarz	ZVA 40	3548	12	2-Sep-2016
TRUE RMS MULTIMETER	Fluke	179	4006	12	9-Dec-2016
Calibration Unit	Rohde & Schwarz	ZV-Z54	4368	12	7-Sep-2016
Frequency Standard	Spectracom	Secure Sync 1200-0408-0601	4393	6	3-Sep-2016
Suspended Substrate Highpass Filter	Advance Power Components	11SH10-3000/X18000-O/O	4412	12	23-Mar-2017
1 metre SMA Cable	Florida Labs	SMS-235SP-39.4-SMS	4514	12	16-Feb-2017
PXA Signal Analyser	Keysight Technologies	N9030A	4654	12	8-Oct-2016



Instrument	Manufacturer	Type No.	TE No.	Calibration Period (months)	Calibration Due
Section 2.5 - Radiated Spurious Emissions					
Dual Power Supply Unit	Thurlby	PL320	288	-	TU
Pre-Amplifier	Phase One	PS04-0086	1533	12	30-Jul-2016
Screened Room (5)	Rainford	Rainford	1545	36	20-Dec-2017
Turntable Controller	Inn-Co GmbH	CO 1000	1606	-	TU
Hygrometer	Rotronic	Hygropalm	2404	12	21-Aug-2016
Programmable Power Supply	Iso-tech	IPS 2010	2435	-	O/P Mon
Antenna (Bilog)	Chase	CBL6143	2904	24	11-Jun-2017
EMI Test Receiver	Rohde & Schwarz	ESU40	3506	12	2-Nov-2016
Tilt Antenna Mast	matur GmbH	TAM 4.0-P	3916	-	TU
Mast Controller	matur GmbH	NCD	3917	-	TU
Suspended Substrate Highpass Filter	Advance Power Components	11SH10-3000/X18000-O/O	4411	12	23-Mar-2017
Double Ridged Waveguide Horn Antenna	ETS-Lindgren	3117	4722	12	29-Dec-2016
Section 2.6 – Conducted Output Power					
10dB/1W SMA Attenuator dc - 18GHz	Sealectro	60-674-1010-89	3	12	30-Jun-2017
Rubidium Standard	Rohde & Schwarz	XSRM	1316	6	3-Sep-2016
Power Supply	Iso-tech	IPS 2010	2439	-	O/P Mon
Power Supply	Iso-tech	IPS 2010	2440	-	O/P Mon
Attenuator (10dB, 50W)	Aeroflex / Weinschel	47-10-34	3166	12	16-Sep-2016
Hygrometer	Rotronic	I-1000	3220	12	19-Aug-2016
Function Generator	Thurlby Thandar Instruments	TG2000	3334	-	TU
Network Analyser	Rohde & Schwarz	ZVA 40	3548	12	2-Sep-2016
TRUE RMS MULTIMETER	Fluke	179	4006	12	9-Dec-2016
Calibration Unit	Rohde & Schwarz	ZV-Z54	4368	12	7-Sep-2016
Frequency Standard	Spectracom	Secure Sync 1200-0408-0601	4393	6	3-Sep-2016
1 metre SMA Cable	Florida Labs	SMS-235SP-39.4-SMS	4514	12	16-Feb-2017
PXA Signal Analyser	Keysight Technologies	N9030A	4654	12	8-Oct-2016
Section 2.7 - Limits on Emissions from Mobile Earth Stations for Protection of Aeronautical Radionavigation-Satellite Service					
10dB/1W SMA Attenuator dc - 18GHz	Sealectro	60-674-1010-89	3	12	30-Jun-2017
Rubidium Standard	Rohde & Schwarz	XSRM	1316	6	3-Sep-2016
Power Supply	Iso-tech	IPS 2010	2439	-	O/P Mon
Power Supply	Iso-tech	IPS 2010	2440	-	O/P Mon
Attenuator (10dB, 50W)	Aeroflex / Weinschel	47-10-34	3166	12	16-Sep-2016
Hygrometer	Rotronic	I-1000	3220	12	19-Aug-2016
Function Generator	Thurlby Thandar Instruments	TG2000	3334	-	TU
Network Analyser	Rohde & Schwarz	ZVA 40	3548	12	2-Sep-2016
TRUE RMS MULTIMETER	Fluke	179	4006	12	9-Dec-2016
Calibration Unit	Rohde & Schwarz	ZV-Z54	4368	12	7-Sep-2016
Frequency Standard	Spectracom	Secure Sync 1200-0408-0601	4393	6	3-Sep-2016
1 metre SMA Cable	Florida Labs	SMS-235SP-39.4-SMS	4514	12	16-Feb-2017
PXA Signal Analyser	Keysight Technologies	N9030A	4654	12	8-Oct-2016

TU – Traceability Unscheduled

O/P MON – Output Monitored with Calibrated Equipment



3.2 MEASUREMENT UNCERTAINTY

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

Test Discipline	MU
Occupied Bandwidth	± 16.74 kHz
Modulation Characteristics	-
Frequency Tolerance	± 3.54 Hz
Spurious Emissions at Antenna Terminals	± 3.08 dB
Conducted Output Power	± 0.70 dB
Limits on Emissions from Mobile Earth Stations for Protection of Aeronautical Radionavigation-Satellite Service	± 3.08 dB
Radiated Spurious Emissions	30 MHz to 1 GHz: ± 5.1 dB 1 GHz to 17 GHz: ± 6.3 dB



Product Service

SECTION 4

ACCREDITATION, DISCLAIMERS AND COPYRIGHT



Product Service

4.1 ACCREDITATION, DISCLAIMERS AND COPYRIGHT



This report relates only to the actual item/items tested.

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
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TÜV SÜD Product Service

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