



H.B. Compliance Solutions

Intentional Radiator Test Report

For the

Globalstar, Inc.

ST100

Tested under

The FCC Rules contained in Title 47 of the CFR, Part 25 and ISSED RSS-170 Issue 3 Class II
Permissive Change for

Satellite Communications

September 10, 2021

Prepared for:

Globalstar, Inc.

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Prepared By:

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Reviewed By:

A handwritten signature in black ink, appearing to read 'Hoosamuddin Bandukwala'.

Hoosamuddin Bandukwala



Cert # ATL-0062-E

Engineering Statement: The measurements shown in this report were made in accordance with the procedure indicated, and the emissions from this equipment were found to be within the limits applicable. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them. It is further stated that upon the basis of the measurement made, the equipment tested is capable of operation in accordance with the requirements of Part 25 of the FCC Rules under normal use and maintenance. All results contained herein relate only to the sample tested.

Report Status Sheet

| Revision # | Report Date | Reason for Revision |
|------------|--------------------|-------------------------|
| Ø | September 10, 2021 | Initial Issue |
| 1 | November 2, 2021 | Page 11 Unit Correction |

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EXECUTIVE SUMMARY

1. Testing Summary

These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 25. All tests were conducted using measurement procedure from ANSI C63.26-2015 RSS-GEN Issue 5 and RSS-170 Issue 3 as appropriate.

| Test Name | Test Method / FCC Standard | ISED Standard | Result | Comments |
|-----------------------------|----------------------------|-------------------|--------|----------|
| Radiated Spurious Emissions | §2.1053; §25.202(f) | RSS-170 (5.4.3.1) | Pass | |

Class II Permissive Change :

ST100 is enclosed in the GSATSolar housing. A solar panel and battery are also enclosed to provide power to the ST100.

EQUIPMENT CONFIGURATION

1. Overview

H.B Compliance Solutions was contracted by Globalstar to perform testing on the ST100 under the purchase number 17288.

This document describes the test setups, test methods, required test equipment, and the test limit criteria used to perform compliance testing of the Globalstar, ST100.

The tests were based on FCC Part 25 Rules. The tests described in this document were formal tests as described with the objective of the testing was to evaluate compliance of the Equipment Under Test (EUT) to the requirements of the aforementioned specifications. Globalstar should retain a copy of this document and it should be kept on file for at least five years after the manufacturing of the EUT has been permanently discontinued. The results obtained relate only to the item(s) tested.

| | |
|---------------------------------------|--|
| Product Name: | ST100 |
| Model(s) Tested: | ST100 |
| FCC ID: | L2V-ST100 |
| IC ID: | 3989A-ST100 |
| Supply Voltage Input: | Primary Power: 4.2 VDC |
| Frequency Range: | 1611.25MHz to 1618.75MHz |
| No. of Channels: | Four Channel |
| Necessary Bandwidth | N/A |
| Type(s) of Modulation: | BPSK |
| Range of Operation Power: | 0.29W |
| Voltage into final Transistor | 3.3V |
| Current into final Transistor | 475mA |
| Emission Designator: | 2M00G1D |
| Channel Spacing(s) | 2.5MHz |
| Test Item: | Pre-Production |
| Type of Equipment: | Mobile |
| Antenna: | 1.06dBi Integrated PCB Trace Antenna |
| Environmental Test Conditions: | Temperature: 15-35°C Humidity: 30-60% Barometric Pressure: 860-1060 mbar |
| Modification to the EUT: | None |
| Evaluated By: | Staff at H.B. Compliance Solutions |
| Test Date(s): | 09/02/2021 |

2. Test Facility

All testing was performed at H.B. Compliance Solutions. This facility is located at 5005 S. Ash Avenue, Suite # A-10, Tempe AZ-85282. All equipment used in making physical determination is accurate and bears recent traceability to the National Institute of Standards and Technology.

Radiated Emissions measurements from 30MHz to 1GHz were performed in a GTEM chamber (equivalent to an Open Area Test Site). Radiated Emissions Above 1GHz were performed on an Open Area Test Site (OATS). In accordance with §2.948(a)(3), a complete site description is contained at H.B. Compliance Solutions.

Test facility H.B. Compliance Solutions is an ANAB accredited test site. The ANAB certificate number is L2458. The scope of accreditation can be found on ANAB website www.anab.org



3. Description of Test Sample

The Globalstar ST100 is an IoT board which is a simplex Satellite transmitter designed to send small packets of user defined data to a network of low earth orbiting (LEO) satellites using the Globalstar simplex satellite network. This module is used inside the GSatSolar which is a Satellite transmitter designed to send GPS location data to a network of low earth orbiting (LEO) satellites. The received data is then delivered to a telematics platform or other processor to visualize and utilize the data. The GSatSolar is powered by a battery. The GSatSolar features a solar charging circuit that allows battery charging from the built in solar panel. The GSat Solar contains a satellite transmitter, GPS receiver, motion sensor, Bluetooth Low Energy transceiver, solar charger, and antennas for each of the radio subsystems.

4. Equipment Configuration

| Ref. ID | Name / Description | Model Number | Serial Number |
|---------|------------------------|--------------|---------------|
| # 2 | Globalstar (GSatSolar) | | |

Table 1. Equipment Configuration

5. Support Equipment

All support equipment supplied is listed in the following Support Equipment List.

| Ref ID | Name / Description | Manufacturer | Model # | Serial # |
|--------|--------------------|-----------------|------------|------------|
| #2 | DC Power Supply | Hewlett Packard | E3610A | KR83021468 |
| #3 | Cell Phone | LG | RS988 (G5) | None |

Table 2. Support Equipment

6. Ports and Cabling Information

| Ref ID | Port name on the EUT | Cable Description | Qty. | Length (m) | Shielded? (Y/N) | Termination Box ID & Port ID |
|--------|----------------------|-------------------|------|------------|-----------------|------------------------------|
| #4 | Power | 2 wire | 1 | 2 | N | DC Power Supply |

Table 3. Ports and Cabling Information

7. Method of Monitoring EUT Operation

A test receiver will be used to monitor the data transmission from the EUT.

8. Mode of Operation

The EUT will be configured to transmit at maximum power level. Test mode was provided using a Nordic Semiconductor nRF UART application on an cellphone to set the frequency, power level and change the device from CW to Modulation mode. These settings were created for testing purpose only.

9. Modifications

9.1 Modifications to EUT

No modifications were made to the EUT

9.2 Modifications to Test Standard

No Modifications were made to the test standard.

10. Disposition of EUT

The test sample including all support equipment submitted to H.B Compliance Solutions for testing will be returned to Globalstar upon completion of testing & certification

Criteria for Intentional Radiators

1. Radiated Spurious Emissions

| | | | |
|-----------------------------|--|--------------------------|------------|
| Test Requirement(s): | §2.1053, §25.202(f) and RSS-170 §5.4.3.1 | Test Engineer(s): | Sean E. |
| Test Results: | Pass | Test Date(s): | 09/02/2021 |

Test Procedures: As required by 47 CFR 2.1053 and RSS-170 §5.4.3.1, field strength of radiated spurious measurements were made in accordance with the procedures of the ANSI C63.26-2015.

The EUT was placed on a non-reflective table inside a 3-meter open area test site. The EUT was set on continuous transmit.

The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3 orthogonal axes. The frequency range up to the 10th harmonic was investigated.

To get a maximum emission level from the EUT, the EUT was rotated throughout the X-axis, Y-axis and Z-axis. Worst case is X-axis

Test Setup:

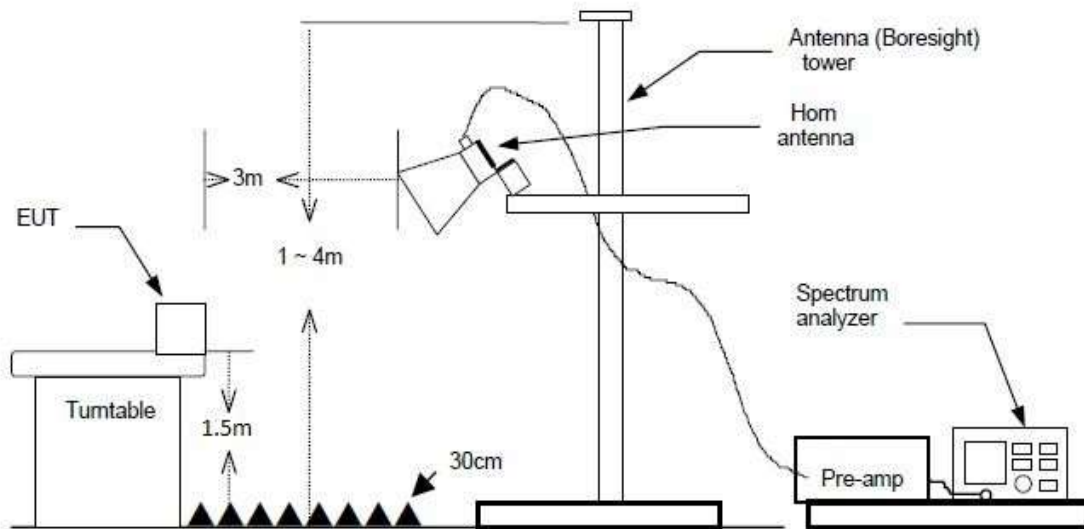


Figure 4 – Radiated Spurious Emissions

Test Results:

| Frequency (MHz) | Measured Amplitude (dBuV/m) | Equivalent Radiated Power (dBm) | Antenna Polarity (V/H) | Spurious Limit (dBm) | Margin | Comment |
|-----------------|-----------------------------|---------------------------------|------------------------|----------------------|--------|-------------|
| 1611.25 | 93.537 | -3.84 | Horizontal | - | - | Fundamental |
| 3222.5 | 41.638 | -55.74 | Horizontal | -13 | -42.74 | |

Table 6 - Spurious Radiated Emission Data – Low Band

| Frequency (MHz) | Measured Amplitude (dBuV/m) | Equivalent Radiated Power (dBm) | Antenna Polarity (V/H) | Spurious Limit (dBm) | Margin (dB) | Comment |
|-----------------|-----------------------------|---------------------------------|------------------------|----------------------|-------------|-------------|
| 1618.75 | 92.197 | -5.18 | Horizontal | - | - | Fundamental |
| 3237.5 | 43.118 | -54.26 | Horizontal | -13 | -41.26 | |

Table 7– Spurious Radiated Emission Data – High Band

NOTE: There were no detectable emissions above the 2nd harmonic. Measurement was made at the 10th harmonic.

Test Equipment

| Equipment | Manufacturer | Model | Serial # | Last Cal Date | Cal Due Date |
|---------------------|-----------------|-------------|-------------|---------------|--------------|
| Spectrum Analyzer | Hewlett Packard | 8563E | 3821A09316 | Apr/28/21 | Apr/28/22 |
| Attenuator 20dB | Weinschel | 41-20-12 | 86332 | May/27/21 | May/27/22 |
| Variable Attenuator | JFW | 50R-320-SMA | 7054221439 | NCR | None |
| Signal Generator | Agilent | E4432B | US40053021 | Sep/23/20 | Sep/23/21 |
| Signal Generator | Agilent | E4432B | US38220446 | NCR | None |
| Horn Antenna | Com-Power | AHA-118 | 071150 | Dec/17/20 | Dec/17/22 |
| Horn Antenna | Com-Power | AH-118 | 71350 | NCR | None |
| Antenna | EMCO | GTEM 5417 | 1063 | Verified | |
| Attenuator 10dB | Huber+Suhner | 6810.17.A | 747300 | May/27/21 | May/27/23 |
| Digital Multimeter | Fluke | 77 III | 72550270 | Apr/26/21 | Apr/26/22 |
| Power Supply | Hewlett Packard | 6236B | 2735A-19608 | NCR | None |

Table 10 – Test Equipment List

***Statement of Traceability:** Test equipment is maintained and calibrated on a regular basis. All calibrations have been performed by a 17025 accredited test facility, traceable to National Institute of Standards and Technology (NIST)

6. Measurement Uncertainty

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. These measurements figures are calculated in accordance with ETSI TR 100 028 Parts 1 and 2. Instrumentation measurement uncertainty has **not** been taken into account to determine compliance.

The following measurement uncertainty values have been calculated as show in the table below:

| Measured Parameter | Measurement Unit | Frequency Range | Expanded Uncertainty |
|--------------------------------|------------------|-----------------|----------------------|
| Conducted Emissions (AC Power) | dBuV or dBuA | 150kHz – 30MHz | ± 4.3dB |
| Radiated Emissions below 1GHz | dBuV/m | 30 – 1000MHz | ± 5.6dB |
| Radiated Emissions above 1GHz | dBuV/m | 1 – 26.5GHz | ± 4.1dB |

The reported expanded uncertainty has been estimated at a 95% confidence level (k=2)

END OF TEST REPORT