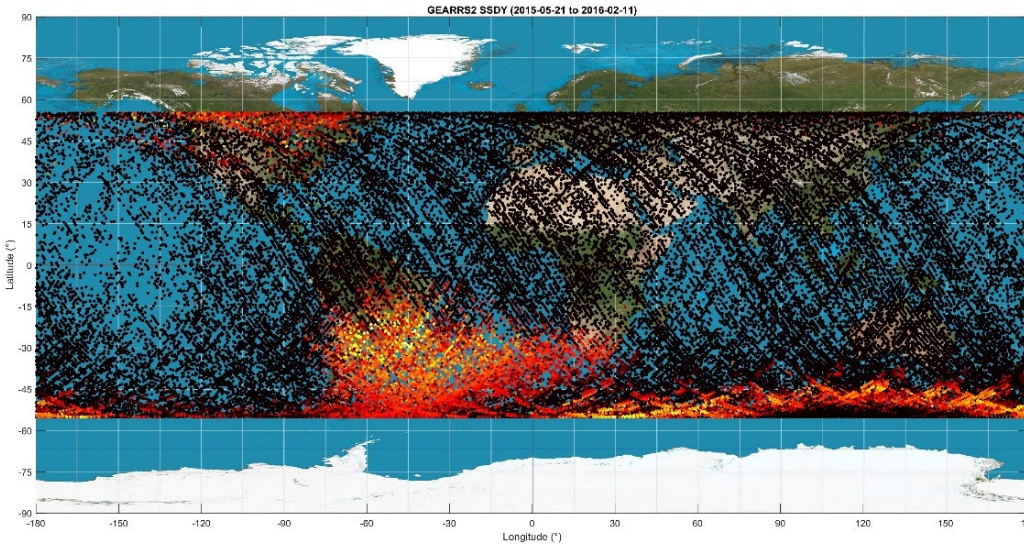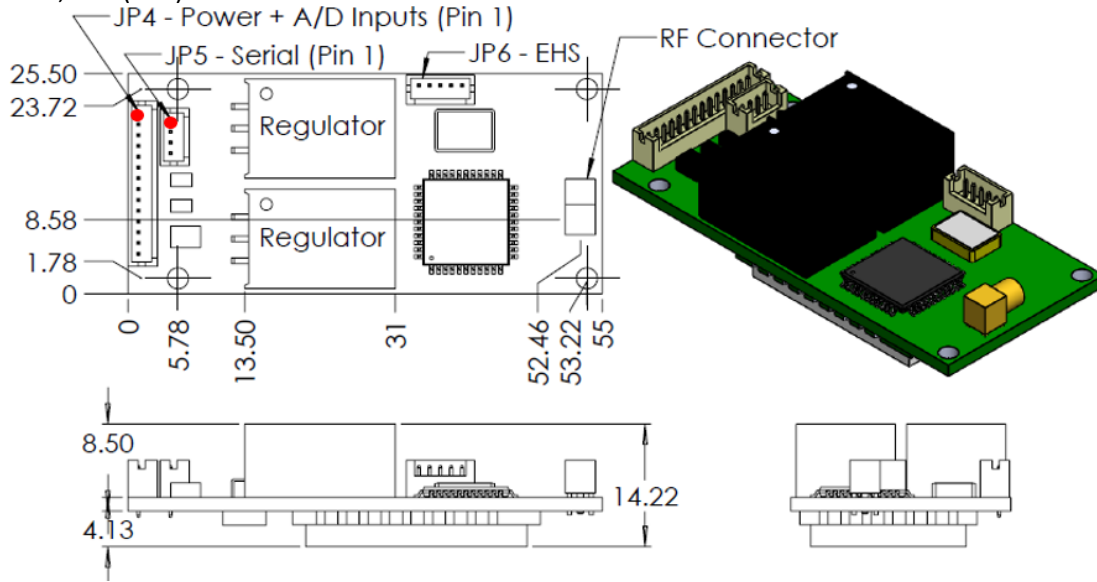# EyeStar-S3 Satellite Simplex Communications System

End-to-End System, Globalstar Connected, Max 600 Kbytes/day, Anywhere-Anytime, 100% On-orbit success, Flight Ready, TRL 9, Compliant with new FCC requirements

Features

- Flight Ready
  - 80+ Simplex units launched, with 100% mission success
  - Technical Readiness Level 9
  - Orbit tested from 110 to 700 km
  - FCC & Globalstar license compliant
  - Commercial & Research Link
  - Ideal for Beacon, GPS, summary data
- Good link from tumbling satellite (<~3 rpm and 360-degree link)
- Smart Zenith sensor to enforce FCC compliance
- Good polar link, no drop outs
- Microchip Flight micro-controller included, analog and digital IO
- Ground Segment Included
  - No Ground Station Required
  - Near Real-time data to your server
  - Console display software included
- Fully Operational Globalstar & NSL ground segment for data &display
- 8 Bytes/sec, data transferred continuously,
- About 95% data throughput
- RF packets received a few seconds after first turn-on for con-ops
- Near Real-time data latency: ~1s
- Globalstar ~30 satellites at 1414km
- Globalstar Capacity for TT&C for 1000's of satellites
- Ideal for Multi-Satellites: Unified/ Time-Ordered Small Sat Database
- Critical Piece for Mission Success
- Fits PocketQube Specifications

Notes and References

1) 100% on-orbit success
2) Coverage Maps Available.
3) ICD and STEP Files Available
4) AIAA Small Sat Paper: (SSC14-WK-6), 2014 First results TSAT/Globalstar, Voss
5) AIAA Small Sat Paper: (SSC16-WK-11), Globalstar link results, Voss
6) Data Cost Table available
7) Simplex inventory in Stock

Specifications

Mechanical:
- Dimensions: 15 X 26 X 55 mm
- Weight: 22g
- I/O Interface: DF13, 14-Pin
- Comm Port: DF13, 4-Pin
- Antenna: SMA TX ceramic patch 25 mm side square by 7 mm high
- Cooling: Thermal radiator shield
- Enclosure: Open or Shielded

Electrical:
- Input voltage range: 6 - 36 V
- Idle Current @6 V: 29.7 mA (0.18 W)
- Idle Current @15 V: 16.8 mA (0.25 W)
- Tx Current @6 V: 264 mA (1.58 W)
- Tx Current @15 V: 111 mA (1.66 W)

RF:
- Aerospace Modem Globalstar STX-3
- Tx: 1616.25 MHz downlink
- BPSK Modulation
- Radio Astronomy freq. exclusion
- Passive patch antenna
- Antenna Gain: 68 mW
- ERP: 20 dBm
- EIRP: 632 mW (-1.99 dBW)

Data I/O:
- Data input: 38.4 Kbps
- Comm Port: Tx, Rx, Busy, GND
- Effective throughput: 8 Bytes/s
- TTL serial Interface

Microcontroller:
- Ck Freq: 20 MHz
- 10 I/O Lines: User defined, configurable for analog, digital, one wire, counter rate, or comm ports
- Include Temp and Bus Voltage
- Flight Beacon firmware
- Custom firmware

Note: Specifications subject to change without notice (please check with us for updated information)

Environmental/Flight Testing

Based on S2 and S3 Performance:
Temperature:
- Passive heat sink/radiator
- Antenna: -50 to +85 C
- Radio: -30 to +60 C
- Non-Operational: -60 to +100 C

Vibration:
- Delta: 30g
- Atlas Rocket/PPOD: 28g
- Orbital/Nanoracks: 20g
- SpaceX/Rocket Lab/PDOD: 20g

Dose Radiation:
- Spot Shielding
- 9 months in 350 by 700 km orbit
- No dose problems or upsets in SAMA

QA Radio Testing:
- Vibration, Vacuum, Thermal testing
- Multi-day Burn-in
- Final System Testing
- Server/Radio Testing
- Certification

In-Orbit Reliability:
- 100% mission success for all Simplex missions

Customers:
- AFRL, NASA Langley, NASA GSFC, Pumpkin Inc., Nanoracks, many Universities

Options

- Flight Model (FM): S3F
- Engineering Model (EM): S3E
- Power isolated unit
- Custom modification support
- Pumpkin/PC104 Standard form factor
- Smaller form antenna
- Integrated receiver PCB

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Example of EyeStar Simplex energetic particle data from several orbits of GEARRS2. Small gaps in track show duty cycle of transmitter and long gaps due to sun sync of 78 packets of data sequence to save system power. Note the South Atlantic Magnetic Anomaly (SAMA) and the Aurora Oval. GEARRS simplex coverage maps (Ref. 4,5) are very uniform over the entire earth with a weaker coverage area in the Pacific Ocean. The 53 deg. latitude cutoff is due to the GEARRS2 Sat. inclination and not due to the Globalstar link.
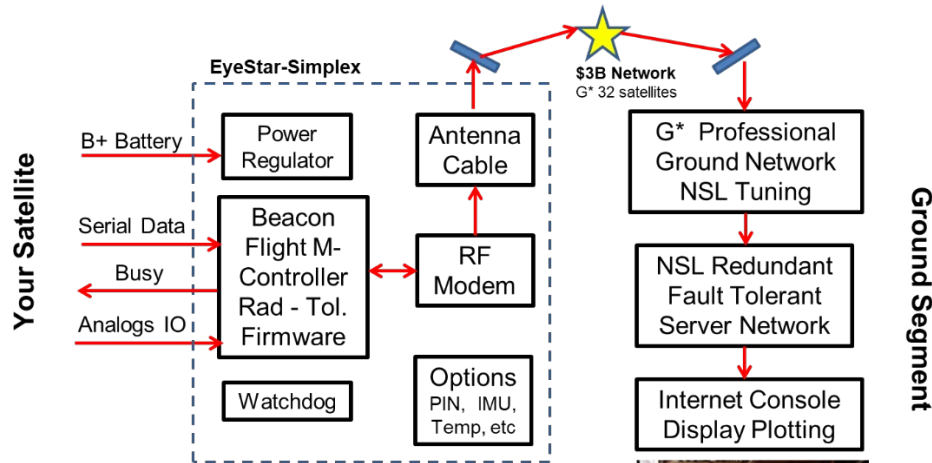
PCB, Shielding, Layout, EMI Test, Globalstar/NSL Value Added Reseller (VAR) Product, ICD, Engineering Model (EM), Firmware Options, Quality Assurance, Burn-in, Certification, Flight Model (FM), FCC Compliant, NSL Support

Much More than a Modem!

•NSL Inc. is a certified **Value Added Reseller** (VAR) of Globalstar Satellite radios with our heritage of approved FCC, EMI, & Globalstar EyeStar products (http://www.globalstar.com/en/index.php?cid=2560).