The ISIS High Data-rate S-band Transmitter is a CubeSat compatible Transmitter designed to meet the needs of high data-rate downlinks of up to 4.3 Mbps (usable information bit-rate at CCSDS transfer frame level). The transmitter can be used for both TT&C or PDT downlinks. The S-band transmitter is flexible, implementing CCSDS as data link layer protocol and allowing in-flight configuration of data-rate, modulation scheme, frequency, and RF output power.

**DESCRIPTION**
The ISIS High Data-rate S-band Transmitter is a CubeSat compatible Transmitter designed to meet the needs of high data-rate downlinks of up to 4.3 Mbps (usable information bit-rate at CCSDS transfer frame level). The transmitter can be used for both TT&C or PDT downlinks. The S-band transmitter is flexible, implementing CCSDS as data link layer protocol and allowing in-flight configuration of data-rate, modulation scheme, frequency, and RF output power.

**FEATURES**
- Operates in EESS/SRS/SOS allocation band
- CCSDS compliant
- Data-rate and RF power re-configurable in-flight
- RF power control loop to maintain constant RF power over the temperature range and Frequency band
- SFCG Spectral mask compliant (Recommendation: SFCG-21-2R4)
- Safety watchdog
- Adjustable RF output power from 27 to 33dBm (0.5dB steps)
- RF output tolerant to full mismatch

**CONFIGURATIONS AND OPTIONS**
- Default RF parameters:
  - transmit frequency
  - modulation scheme
  - roll-off
  - symbol rate
  - transmit power
  - CCSDS Spacecraft Identifier
- I²C and CAN watchdog implementation
- CSKB-lite connector configuration
- Grounding interface configuration

Flight heritage since 2018
PRODUCT PROPERTIES

- Operates in the 2200-2290 MHz EESS/SRS/SOS allocation
- CCSDS compliant channel coding ensures compatibility off-the-shelf demodulators as well as various groundstation networks
- Compatibility with the following demodulators has been verified:
  - Zodiac CORTEX CRT
  - Teledyne Qubeflex
  - Amergint satTRAC
  - RT Logic / KRATOS quantumGND
  - Antwerp Space Omnisat LT
- Compatibility with KSAT-lite groundstation network has been verified
- Strong Forward Error Correction (FEC) to maximize link throughput
- No need for data pre-processing: all channel coding is performed inside the transmitter
- Up to 4.3 Mbit/s useful datarate (at CCSDS TM Transfer Frame level)
- In-flight configurable RF parameters (frequency, data-rate, RF power, FEC parameters)
- Data interfaces: LVDS (payload data), I2C (housekeeping)
- Safety watchdog
- Adjustable RF output power from 27 to 33 dBm
- Power control loop to keep RF output power constant over varying operating conditions
- IPC-A-610 Class 3 assembly

PERFORMANCE

<table>
<thead>
<tr>
<th>Test</th>
<th>QT</th>
<th>AT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Functional</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Vibration</td>
<td>✓</td>
<td>-</td>
</tr>
<tr>
<td>Mechanical Shock</td>
<td>✓</td>
<td>-</td>
</tr>
<tr>
<td>Thermal Cycling</td>
<td>✓</td>
<td>-</td>
</tr>
<tr>
<td>Thermal Vacuum</td>
<td>✓</td>
<td>-</td>
</tr>
</tbody>
</table>

*QT is performed on the design/qualification model
*AT is performed on the unit to be shipped

QUALIFICATION AND ACCEPTANCE TESTING

<table>
<thead>
<tr>
<th>Test</th>
<th>QT</th>
<th>AT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Functional</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Vibration</td>
<td>✓</td>
<td>-</td>
</tr>
<tr>
<td>Mechanical Shock</td>
<td>✓</td>
<td>-</td>
</tr>
<tr>
<td>Thermal Cycling</td>
<td>✓</td>
<td>-</td>
</tr>
<tr>
<td>Thermal Vacuum</td>
<td>✓</td>
<td>-</td>
</tr>
</tbody>
</table>

*QT is performed on the design/qualification model
*AT is performed on the unit to be shipped