Radio Frequency Subsystem (RFS)

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Power amps operated separately during normal operation. Safety interlock and internal limiting prevent accidental overstress of the amplifier in the event that the output is connected to the input with DC power applied.
# Trade Study

<table>
<thead>
<tr>
<th>Configuration</th>
<th>Total DC Power</th>
<th>Total Mass</th>
<th>Savings</th>
<th>Max Data Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>GTO</td>
<td>Mission</td>
<td>Safe</td>
<td></td>
</tr>
<tr>
<td>20W SSPA</td>
<td>44</td>
<td>114</td>
<td>44</td>
<td>34.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6W (No SSPA)</td>
<td>46</td>
<td>46</td>
<td>46</td>
<td>29.9</td>
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</table>

* Does not count any additional cost to upgrade ground equipment for G/T = 26
* Does not include SSPA engineering support through integration & launch or other associated SSPA costs. Total savings approx. 480K
Max Data Rate Vs. Antenna Angle (no SSPA)

INSTRUMENT SIDE

30 degrees

500 Kbps

250 Kbps

30 degrees

70 degrees

160 Kbps

85 degrees

80 Kbps

130 Kbps

70 degrees

160 Kbps

80 Kbps

250 Kbps

250 Kbps

500 Kbps

AKM SIDE

30 degrees
RF Test Rack

**Transponder Interface**
Conic

**TLM Receiver**
MR-1400 (NRL)

**PSK Subcarrier Demod**
329A (NRL)

**Bit Sync**
TBD

**Viterbi Decoder**
TBD

**Clock & Data To Frame Sync**

**Bit Error Rate Tester**
NRL

- Test interface to send commands and monitor telemetry of transponder during test.

- **TLM Receiver, MR-1400 (NRL)**
  - S-Band Receiver, PM / BPSK
  - Downconverts RF to IF
  - Demodulates Direct BPSK and Outputs NRZ-M baseband
  - Or Outputs BPSK Modulated 1.7 MHz Subcarrier

- **PSK Subcarrier Demod, 329A (NRL)**
  - Demodulates 1kbps BPSK from 1.7 MHz Subcarrier
  - Outputs NRZ-M baseband

- **Bit Sync, TBD**
  - Translates NRZ-M baseband to TTL clock & Data
  - 2kps / 818kps (encoded) or 1kps / 409kps (unencoded)

- **Viterbi Decoder, TBD**
  - Decodes clock & data symbols and provides TTL clock & data output at 1kps or 409kps

- **Bit Error Rate Tester, NRL**
  - Bit error rate tester, capable of CCSDS convolutional encoding, 2kpbs for uplink test, 1kpbs, and 409kpbs for downlink tests.
**Status**

- **Transponder**
  
  Specification Released To Vendors. Needs To Be Updated.

- **Antennas**
  
  Fabricated Engineering Model “Ball” Antenna & Performed Initial Tests

- **Diplexers**
  
  Re-tuned ICM Diplexer EM Model To Fame Frequencies

- **SSPA (If Required)**
  
  Working Breadboard (20W) Tested Over Temperature

  Brassboard Integration In Progress

- **Other**
  
  Received NTIA Stage 2 Approval