Fiber Amplifier Specifications

The fiber amplifier shall meet the following performance, physical (size and mass), and environmental specifications as described below. The fiber amplifier shall use space-grade, radiation-tolerant, parts in compliance for operation in space. Additionally, the fiber amplifier shall use parts and materials that can comply with the vacuum environment of space (e.g., non-outgassing materials).

1. Performance

Saturated Output Power	5.0 W or greater
Gain	34 dB or greater
Input Power	1 – 5 mW
Power Stability	+/-3% at 25 ºC over 4 hours
Spectral Range	1550 – 1560 nm
Modes of Operation	CW and Quasi-CW
Quasi-CW Operation	5 to 10 msec pulses at 30 Hz
Pulse rise time	less than 1.5 msec
Polarization Extinction Ratio	20 dB or greater
Noise Figure	less than 5.0 dB
Residual Pump Power	less than -50 dB
Input Isolation	50 dB or greater
Output Isolation	30 dB or greater

2. Electrical/Power Interfaces

Commands and Communication	RS-232
Supply Voltage(s)	DC

3. Package

Dimensional Envelop	equal or less than 140mmW x 250mmL x 60mmH (it is highly desirable to limit the package height to less than 39mm)
Mass	equal or less than 1.5 kg
Mounting	4 or more threaded holes
Input and Output Fiber Optic Cable	Polarization maintaining, 50 cm long, .9 mm jacket
Fiber Optic Connectors	FC/APC

4. Thermal

Operating temperature range (case)	0 to + 45 ºC
Power Dissipation	70 W at 45 ºC case temperature when operated continuously

5. TRL 6 Qualification Compliance and Testing

The compliance of the unit will be verified through either analyses or tests. The testing will be conducted per Telcordia GR-468 (Industry standard titled: "*Generic Reliability Assurance Requirements for Optoelectronic Devices Used in Telecommunications Equipment*"), issued in September 2004. These tests include: thermal cycling; thermal shock, mechanical shock, vibration, fiber pull, and Electro-static Discharge (ESD). The changes in output power and noise must be shown to be within specification after each of the Telcordia test regimens.

Note that while the Telcordia testing regimens are quite comprehensive, they do not include tests that are specific for space flight such as the effects of vacuum and radiation. The compliance with the vacuum and radiation verification environments of space will be shown analytically. The analysis must show tolerance to Gamma radiation exposer of at least 100 krad total dose at 25 degrees centigrade, and operation in 1.5×10^{-5} Torr ambient pressure. The required tests are provided in the table below.

TEST	**CONDITION**	**UNITS**
High Temperature Storage	85 C, 1000 hrs	3
Low Temperature Storage	– 40 C, 72 h	3
Thermal Cycling	-40 C to +85 C, 100 cycles	3
Actively Monitored Thermal Cycling (not a Telcordia test)	0 to 50 C, monitor power and wavelength @ 10 deg intervals, 3 cycles	3
Thermal Shock	0 C to 100 C, 20 cycles	3
Mechanical Shock	500 G, 1 ms, 5 cycles/axis	3
Vibration	20 G, 20 to 2000 Hz	3

Deliverables

The final deliverables include:

- Detailed design documents, materials list, test procedures, and test results.
- 2 operational seed laser units meeting the specified requirements defined above.
- Relevant instruction manuals.