

SPECIFICATIONS

1. Introduction

The Advanced Technology Branch of the U. S. Naval Research Laboratory has a requirement for a high peak-power amplifier of 10-30 picosecond (psec) laser pulses in the optical C-band. The amplifier must be capable of producing linearly polarized laser output pulses with full width at half-maximum (FWHM) durations of 10 psec and 30 psec in the tunable wavelength range of 1535 to 1560nm at a repetition rate of 2 kilohertz and with peak powers of 3.3 megawatts.

2. The contractor shall deliver, install and demonstrate a laser system in accordance with the following specifications.

a. Input Specifications:

1) wavelength:	1535-1560nm
2) energy per pulse:	≥ 5 nanojoules
3) pulsewidth:	10-100 picoseconds
4) repetition rate:	2 kilohertz (kHz)
5) beam quality:	single spatial mode
6) input interface:	FC/APC connector
7) polarization:	random or linearly polarized

b. Output Specifications:

1) output polarization:	$> 100:1$ linearly polarized
2) peak output power:	3.3 MW
3) energy per pulse:	33 microjoules @ 10 psec; 100 microjoules for pulsewidth ≥ 30 psec
4) wavelength:	same as input
5) pulsewidth:	$< 10\%$ change from input
6) output repetition rate:	2 kHz (same as input)
7) beam quality:	single spatial mode, TEM_{00} ; $M^2 < 1.5$
8) output interface:	free space
9) beam diameter:	≤ 5 millimeters

3. The contractor must measure the system parameters which are listed below. The contractor shall supply the measurement data to the government.

- a. Average output power versus wavelength with constant input pulse energy at 2 kHz repetition rate.

- b. Average output power versus pump current at several fixed input wavelengths (spaced at most every 5 nanometers over the tuning range), repetition rate of 2 kHz, and at pulsewidths of 10 psec and 30 psec.
- c. Output power stability at fixed input wavelength, repetition rate of 2 kHz, and for constant input power.
- d. M^2

4. General specifications:

- a. The laser amplifier trigger input signal requirements must be TTL. In addition, the laser amplifier must have an electronic output (also TTL) for synchronization with the amplifier output pulse.
- b. The laser amplifier front panel must have controls for changing the pump laser current (i.e. output power).
- c. Input power supply requirements must be 115 VAC, 60 Hz.
- d. Operating temperature range must be a minimum of 15 degrees C to 30 degrees C.
- e. If the laser amplifier requires water and/or gas for cooling, the amplifier chassis must have appropriate fittings installed for same and the manufacturer should supply a fitting which mates to the chassis fittings.

5. Delivery, documentation, and warranty:

- a. As part of the installation, the contractor shall perform a demonstration of the laser system operation and precautions to observe while operating. The contractor shall also perform a demonstration and measurement of the full system output power with pulsewidths of 10 psec and 30+ psec.
- b. The contractor shall provide the measurement and test data from Section 3 above. The contractor shall provide a full set of printed documentation at the time of delivery of the amplifier. This must include one hard copy of all operations and maintenance manuals, as well as one additional copy of any software and any manuals for the software included with the system.