

**BOA1410S**

### Description

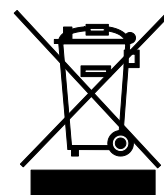
Thorlabs' BOA1410S Booster Optical Amplifier (BOA) is designed to amplify polarized optical signals in the E-band. The semiconductor device is housed in a standard 14-pin butterfly package with FC/APC connectors. Single mode fiber is used on both input and output sides. An integrated TEC and thermistor provide temperature control to stabilize the gain and optical spectrum.

### Specifications

CW;  $T_{CHIP} = 25\text{ }^{\circ}\text{C}$ ;  $T_{CASE} = 0 - 70\text{ }^{\circ}\text{C}$

| BOA1410S Specifications   |             |         |               |         |
|---|-------------|---------|---------------|---------|
|   | Symbol      | Min     | Typical       | Max     |
| Center Wavelength <sup>a</sup>  | $\lambda_C$ | 1390 nm | 1410 nm       | 1430 nm |
| Operating Current   | $I_{OP}$    | -       | 600 mA        | 700 mA  |
| Optical 3 dB Bandwidth  | BW          | 87 nm   | 95 nm         | -       |
| Small Signal Gain @ $P_{IN} = -20\text{ dBm}^{b,c}$   | G           | 24 dB   | 28 dB         | -       |
| Saturation Output Power (@ -3 dB) <sup>b,c</sup>  | $P_{SAT}$   | 14 dBm  | 16 dBm        | -       |
| Gain Ripple (RMS) <sup>b,d</sup>  | $\delta G$  | -       | -             | 0.3 dB  |
| Noise Figure <sup>b,c</sup>   | NF          | -       | 7.0 dB        | 10 dB   |
| Forward Voltage <sup>b</sup>  | $V_F$       | -       | 1.7 V         | 2.0 V   |
| TEC Operation (Typical/Max @ $T_{CASE} = 25\text{ }^{\circ}\text{C} / 70\text{ }^{\circ}\text{C}$ ) |             |         |               |         |
| TEC Current   | $I_{TEC}$   | -       | 0.4 A         | 1.5 A   |
| TEC Voltage   | $V_{TEC}$   | -       | 0.5 V         | 4.0 V   |
| Thermistor Resistance   | $R_{TH}$    | -       | 10 k $\Omega$ | -       |

- This is the center wavelength of the amplified spontaneous emission (ASE). An operating wavelength of 1411 nm was selected for testing to yield the specified saturated output power ( $P_{SAT}$ ).
- At  $I_{OP}$ .
- At 1411 nm
- Water absorption dips in the spectrum contribute to ripple. RMS ripple is used instead of peak-to-peak ripple in order to reduce the effect of water absorption on the accuracy of this calculation. Actual ripple may be smaller if water absorption is excluded.



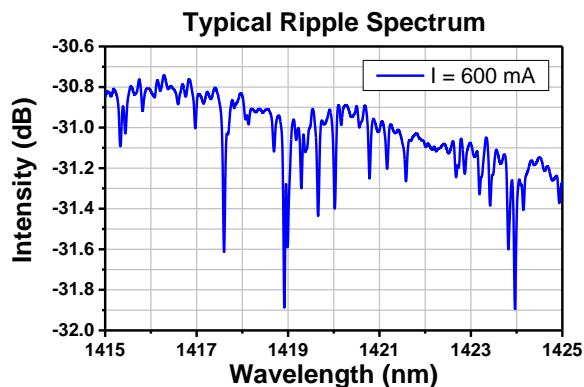
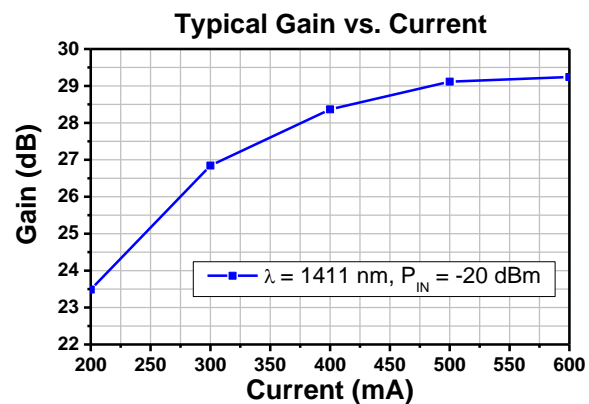
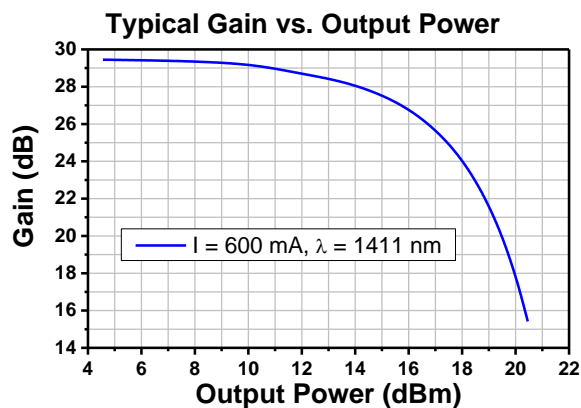
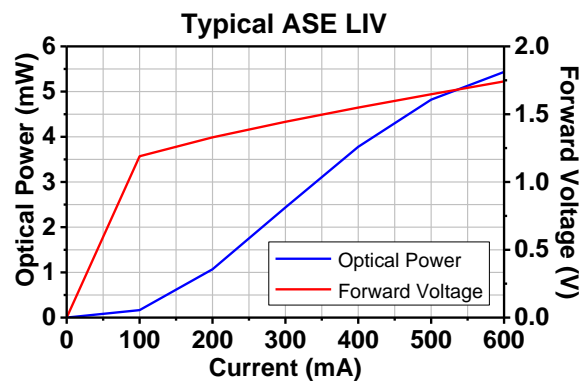
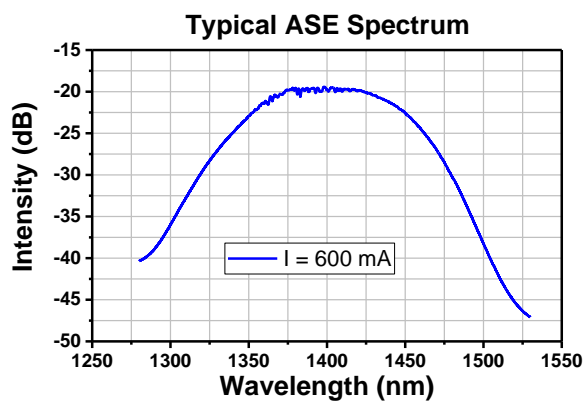
| BOA1410S Absolute Maximum Ratings <sup>a</sup> |            |                       |                       |
|--|------------|-----------------------|-----------------------|
|  | Symbol     | Min                   | Max                   |
| Operating Current                              | $I_{OP}$   | -                     | 700 mA                |
| Optical Output Power, CW                       | $P_{OUT}$  | -                     | 130 mW                |
| Chip Temperature (TEC)                         | $T_{CHIP}$ | 10 $^{\circ}\text{C}$ | 30 $^{\circ}\text{C}$ |
| Case Temperature                               | $T_{CASE}$ | 0 $^{\circ}\text{C}$  | 70 $^{\circ}\text{C}$ |

- Absolute maximum rating specifications should never be exceeded. Operating at or beyond these conditions can permanently damage the amplifier.

| Fiber Specifications             |   |
|----------------------------------|---|
|                                  | Value   |
| Fiber Type                       | SMF28e <sup>a</sup>                                 |
| Mode Field Diameter <sup>b</sup> | 9.2 ± 0.4 μm at 1310 nm<br>10.4 ± 0.5 μm at 1550 nm |
| Numeric Aperture                 | 0.14  |
| Fiber Pigtail Length             | 1.5 m   |
| Connector                        | FC/APC, 2.0 mm Narrow Key                           |

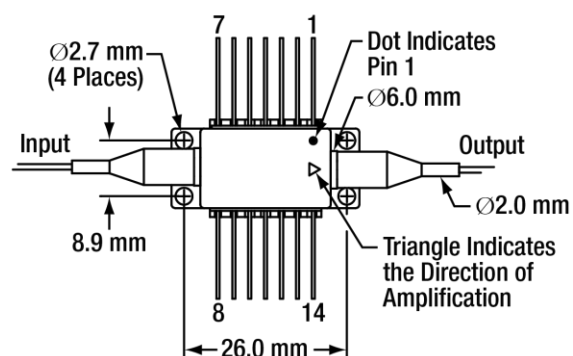
- a. The fiber used in the BOA1410S optical amplifier is similar to our PM1300-XP fiber.
- b. Mode Field Diameter is specified as a nominal value.

## Performance Plots



The sharp dips in the ripple spectrum are mostly caused by water absorption in the measurement setup.

## Drawings



### Pin Identification

- |               |                    |
|---------------|--------------------|
| 1. TEC +      | 14. TEC -          |
| 2. Thermistor | 13. Ground         |
| 3. Not Used   | 12. Not Used       |
| 4. Not Used   | 11. Device Cathode |
| 5. Thermistor | 10. Device Anode   |
| 6. Not Used   | 9. Not Used        |
| 7. Not Used   | 8. Not Used        |

Recommended mounting torque is 10 - 20 oz-in (0.07 - 0.14 N-m)

