



# Single Angled Facet (SAF) Laser Diode

1550 nm semiconductor gain chip

## Quantum Photonics®

(Preliminary)

### DESCRIPTION

Quantum Photonics' Single Angled Facet (SAF) gain chip is based on high-power InP ridge waveguide laser diode technology. Laser cavity oscillation is prevented by active waveguide engineering to produce a front angled facet which in combination with anti-reflection coating ensures a broadband low facet reflectivity. Optional mode transformers monolithically incorporated at the facets using Quantum Photonics' patented Passive Active Resonant Coupler (PARC) integration technology provide nearly circular beam characteristics enhancing chip coupling efficiency. This unique combination of ridge waveguide laser design, broadband low angled facet reflectivity, and integrated mode transformers make the SAF ideally suited for use as the gain component in high-power widely-tunable external cavity lasers.

### FEATURES

- ▲ MQW optimized for C-band or L-band laser wavelengths
- ▲ High output power based on 100 mW Fabry-Perot laser diode design
- ▲ Low front facet reflectivity ( $R < 10^{-4}$ )
- ▲ Integrated mode transformer for circular output beam pattern
- ▲ Numerous packaging options including SAF heatsink, chip-on-submount (CoS), TO-can, and bare die

### APPLICATION

- ▲ Gain medium for widely tunable external cavity semiconductor lasers
- ▲ Gain medium for narrow linewidth fiber Bragg grating lasers
- ▲ High-power amplified spontaneous emission (ASE) superluminescent sources

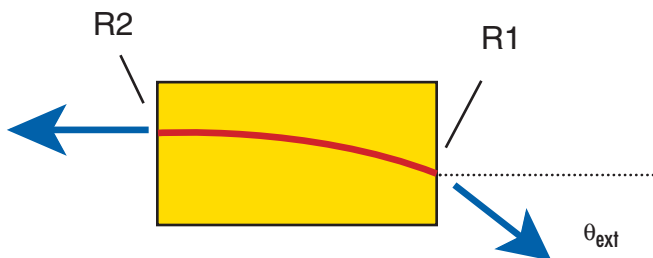


Fig. 1: Top View of Single Angled Facet (SAF) Gain Chip

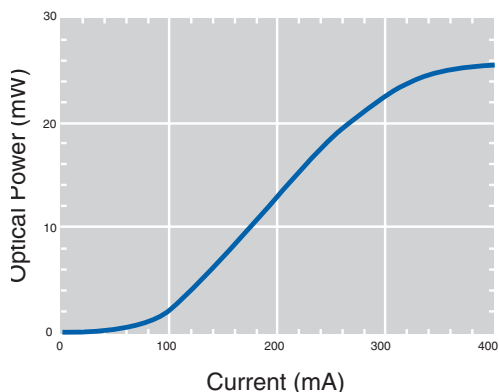


Fig. 2: Typical ASE Output Power

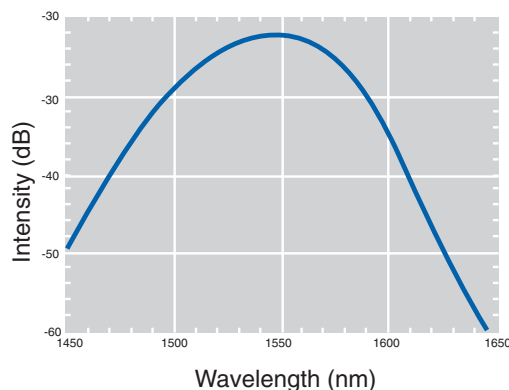


Fig. 3: Optical Spectrum ( $I = 200$  mA)

# ELECTRICAL/OPTICAL CHARACTERISTICS (CW, T = 25 ° C)

| Parameter                        | Symbol                  | Test Condition  | Typical Specification | Unit    | Comments                                        |               |
|----------------------------------|-------------------------|-----------------|-----------------------|---------|-------------------------------------------------|---------------|
| ASE peak wavelength              | $\lambda_{\text{peak}}$ | I = 200 mA      | 1550                  | nm      | L-band, 1300 nm, optional                       |               |
| ASE spectral bandwidth (-3 dB)   | $\Delta\lambda$         | I = 200 mA      | 50                    | nm      |                                                 |               |
| Operating Current                | I <sub>op</sub>         |                 | 300                   | mA      |                                                 |               |
| Operating Voltage                | V <sub>op</sub>         | I <sub>op</sub> | 1.5                   | V       |                                                 |               |
| Front (angled) facet reflectance | R1                      | 1520-1580       | <0.01                 | %       | L-band, 1300 nm, optional                       |               |
| Rear facet reflectance           | R2                      | 1520-1580       | >5                    | %       | Customer specified                              |               |
| Lateral Beam Exit Angle          | $\theta_{\text{ext}}$   |                 | 26                    | degrees | See Fig. 1, other angles optional               |               |
| Chip Length                      | L                       |                 | 1.0                   | mm      | L = 0.6 mm optional                             |               |
| Beam Divergence Angle (FWHM)     |                         |                 |                       |         | Mode Trans A*                                   | Mode Trans B* |
| -transverse                      | $\theta_{\text{t}}$     | I <sub>op</sub> | 36                    | degrees | 30                                              | 26            |
| -parallel                        | $\theta_{\text{p}}$     | I <sub>op</sub> | 14                    | degrees | 30                                              | 25            |
| Fabry-Perot Laser Diode Equiv.   |                         |                 |                       |         | L = 1 mm, HR = 90%,<br>AR= 2% (no angled facet) |               |
| Threshold Current                | I <sub>th</sub>         |                 | 50                    | mA      |                                                 |               |
| Slope efficiency                 | S                       |                 | 0.4                   | W/A     |                                                 |               |
| Output power                     | P <sub>0</sub>          | I = 300 mA      | 100                   | mW      |                                                 |               |

PACKAGING OPTIONS: SAF heatsink, chip-on-submount (CoS), TO-9\*, TO-5.6\*, bare die

\* Available 2Q'02

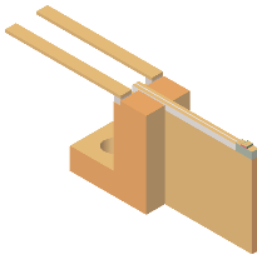


Fig. 4: SAF mounted flush on SAF heatsink

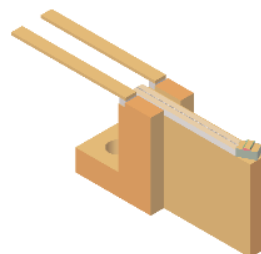


Fig. 5: SAF mounted at 26° angle on SAF heatsink