**Technical Data Sheet**

**February 2002**

SAMSUNG ELECTRONICS

**FIBEROPTICS DIVISION**

# OA40B3A

## 1550 nm Semiconductor Optical Amplifier Module

## Features

- 1550 nm window
- Bi-directional
- High fiber to fiber gain
- Low gain ripple
- Polarization insensitive
- Large optical bandwidth
- Fast switching time
- 14 pin butterfly package
- Thermoelectric cooler


## Applications

- Optical amplification
- Optical gate switching
- Wavelength conversion
- Optical regeneration
- Optical Time Domain Demultiplexing(OTDM)
- Optical signal processing
- Broadband light source
- Four Wave Mixing(FWM)

## Product Code

| Product Code | Gain | Saturation output power |
|---|---|---|
| OA40B3A-0G1 | 15dB | -3dBm |
| OA40B3A-0G2 | 20dB | 2dBm |
| OA40B3A-0G3 | 25dB | 7dBm |

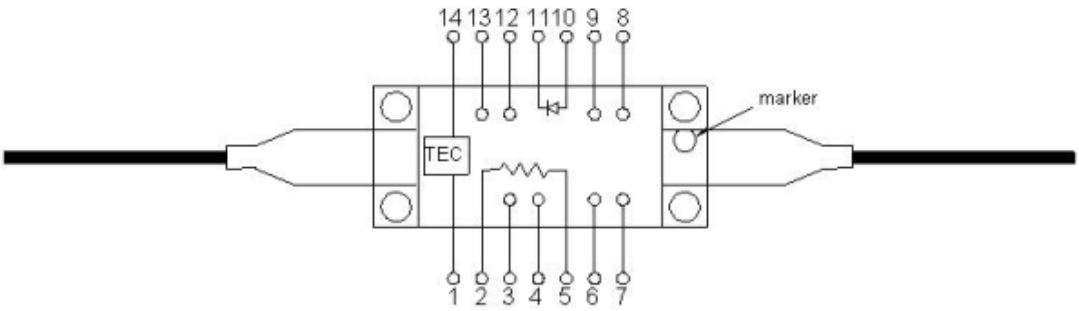
# Description

The OA40B3A semiconductor optical amplifier (SOA) module is the premiere product of Samsung Optoelectronics Division. A polarization independent gain profile based on bulk InP/InGaAsP growth and an extremely low facet reflectivity boast a fiber to fiber gain greater than 25 dB. The typical operating wavelength window is 1530 ~1570 nm and other wavelength windows are available upon requests.

# Pin Information

| OA40B3A | | | |
|---|---|---|---|
| Pin | Definition | Pin | Definition |
| 1 | TEC (+) | 8 | NC(1) |
| 2 | Thermister | 9 | NC(1) |
| 3 | No Connection(NC) | 10 | Amplifier anode (+) |
| 4 | NC(1) | 11 | Amplifier cathode (-) |
| 5 | Thermister | 12 | NC(1) |
| 6 | NC(1) | 13 | NC(1) |
| 7 | NC(1) | 14 | TEC (-) |

(1) Not Connected



# Module Performance Characteristics

**OA40B3A-0G3**

| Parameter | Symbol | Min | Typ. | Max | Unit |
|---|---|---|---|---|---|
| ASE peak ($G_{FF}$=25dB) | $\lambda_{MAX}$ | 1520 | 1540 | 1560 | nm |
| Operating current($G_{FF}$=25dB) | $I_{OP}$ | | 150 | 200 | mA |
| Fiber to fiber gain ($P_{IN}$=-25dBm) | $G_{FF}$ | 25 | | | dB |
| Gain ripple($G_{FF}$=20dB) | $G_{RIP}$ | | | 0.5 | dB |
| Polarization sensitivity($G_{FF}$=25dB) | $\Delta G_{TE/TM}$ | | | 1.0 | dB |
| Noise figure | NF | | | 11 | dB |
| Saturation output power($G_{FF}$>25dB) | $P_{SAT}$ | 7 | | | dBm |
| 3dB optical bandwidth | $\Delta\lambda_{3dB}$ | 40 | | | nm |
| Switching time(10%~90%) | $T_S$ | | | 1 | ns |

**OA40B3A-0G2**

| Parameter | Symbol | Min | Typ. | Max | Unit |
|---|---|---|---|---|---|
| ASE peak (Gff=20dB) | $\lambda_{MAX}$ | 1520 | 1540 | 1560 | nm |
| Operating current(Gff=20dB) | $I_{OP}$ | 80 | | | mA |
| Fiber to fiber gain (Pin=-25dBm) | $G_{FF}$ | 20 | | | dB |
| Gain ripple(Gff=20dB) | $G_{RIP}$ | | | 0.5 | dB |
| Polarization sensitivity(Gff=20dB) | $\Delta G_{TE/TM}$ | | | 1.0 | dB |
| Noise figure | NF | | | 11 | dB |
| Saturation output power(Gff=20dB) | $P_{SAT}$ | 2 | | | dBm |
| 3dB optical bandwidth | $\Delta\lambda_{3dB}$ | 40 | | | nm |
| Switching time(10%~90%) | $T_S$ | | | 1 | ns |

**OA40B3A-0G1**

| Parameter | Symbol | Min | Typ. | Max | Unit |
|---|---|---|---|---|---|
| ASE peak (Gff=15dB) | $\lambda_{MAX}$ | 1520 | 1540 | 1560 | nm |
| Operating current(Gff=15dB) | $I_{OP}$ | 50 | | | mA |
| Fiber to fiber gain (Pin=-25dBm) | $G_{FF}$ | 15 | | | dB |
| Gain ripple(Gff=15dB) | $G_{RIP}$ | | | 0.5 | dB |
| Polarization sensitivity(Gff=15dB) | $\Delta G_{TE/TM}$ | | | 1.0 | dB |
| Noise figure | NF | | | 11 | dB |
| Saturation output power( Gff=15dB) | $P_{SAT}$ | -3 | | | dBm |
| 3dB optical bandwidth | $\Delta\lambda_{3dB}$ | 40 | | | nm |
| Switching time(10%~90%) | $T_S$ | | | 2 | ns |

**Notes : Tcase = 25°C, Tsubmount = 25°C, BOL**

**The characteristics are guaranteed for a back-reflection, <-40dB at the pigtail ends**

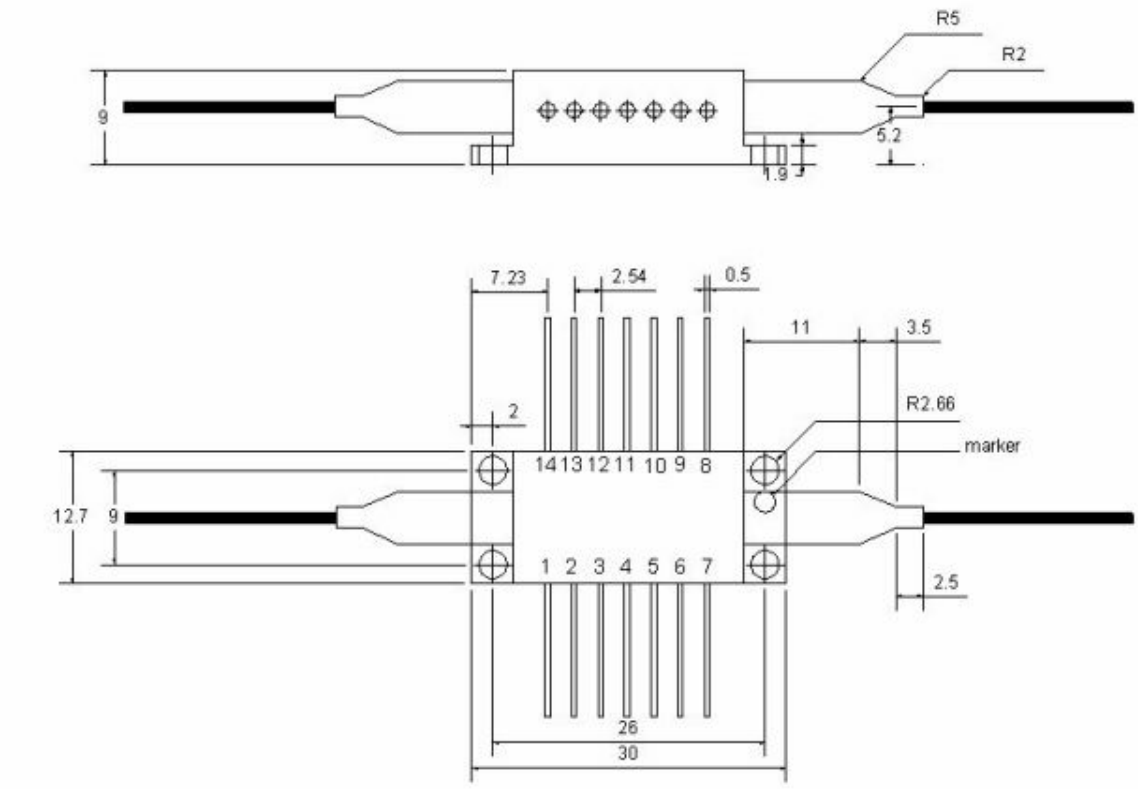
## Absolute Maximum Ratings

These are absolute maximum ratings only. Higher stress than these ratings may adversely affect device reliability or cause permanent damage to the device.

| Parameter | Symbol | Min | Max | Unit |
|---|---|---|---|---|
| Forward driving current | $I_F$ | - | 250 | mA |
| Reverse voltage | $V_R$ | - | 0.5 | V |
| TEC voltage | $T_{TEC}$ | - | 4 | V |
| TEC current | $I_{TEC}$ | - | 1.5 | A |
| Operating case temperature | $T_{OPC}$ | 0 | 70 | °C |

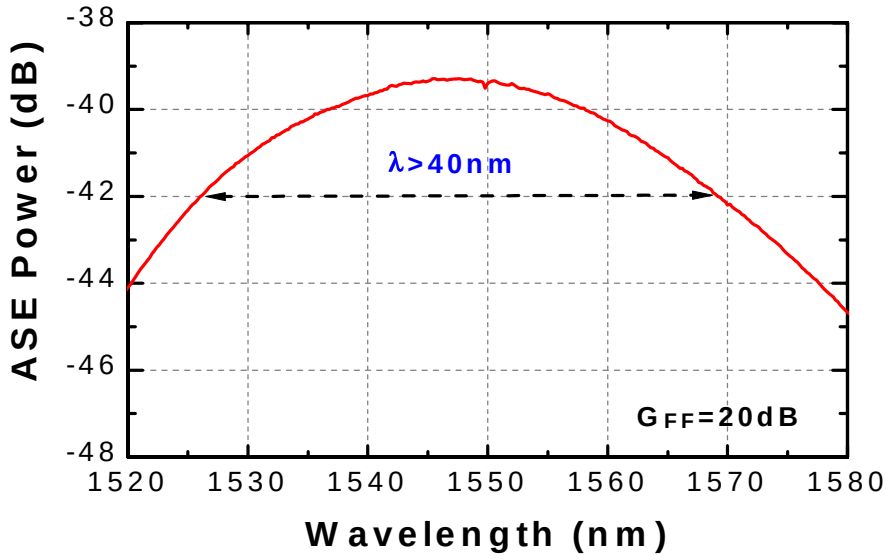
# Outline Diagram

Dimensions are in millimeters [inches]. Tolerances are ±0.127mm [±0.005].



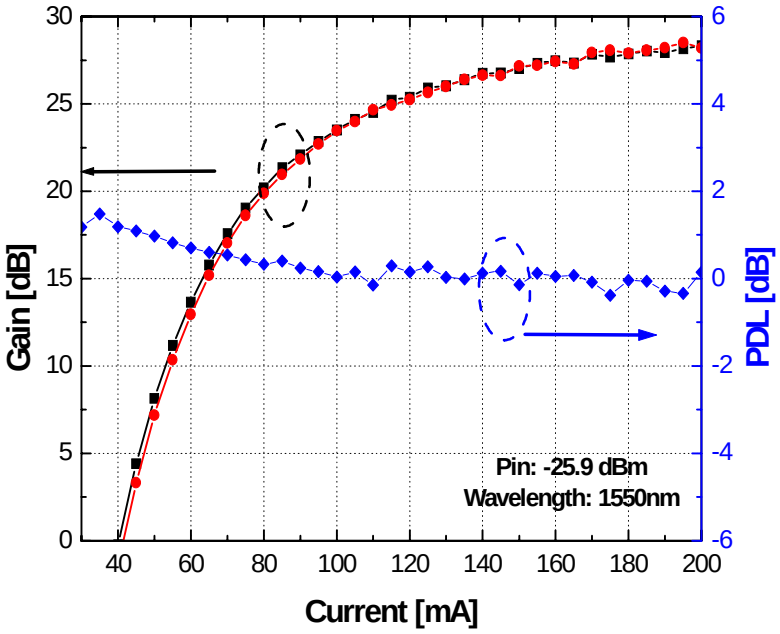
# Performance Characteristics

## 1. Amplified Spontaneous Emission (ASE) Spectra



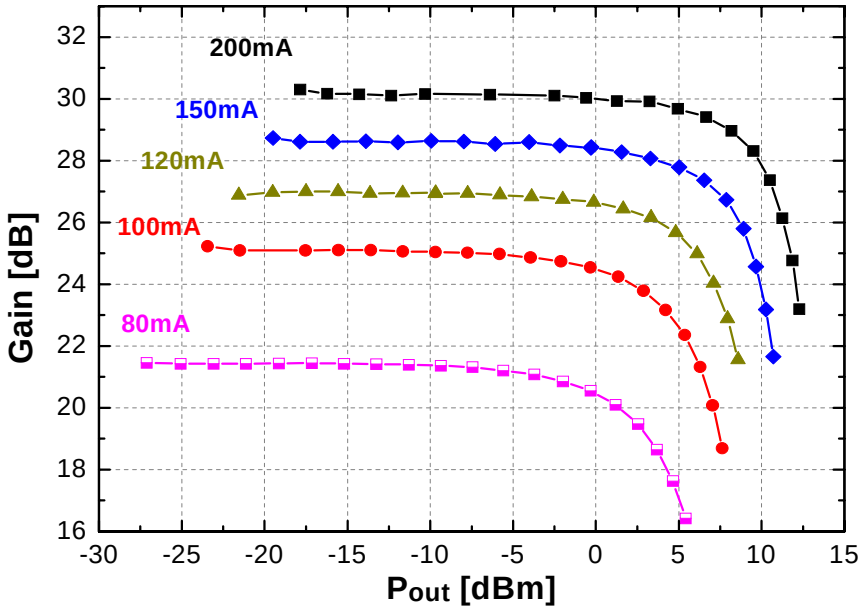

Gain ripple is less than 0.2dB at fiber to fiber gain 20dB
3dB optical bandwidth is wider than 40nm

## 2. Gain Characteristics



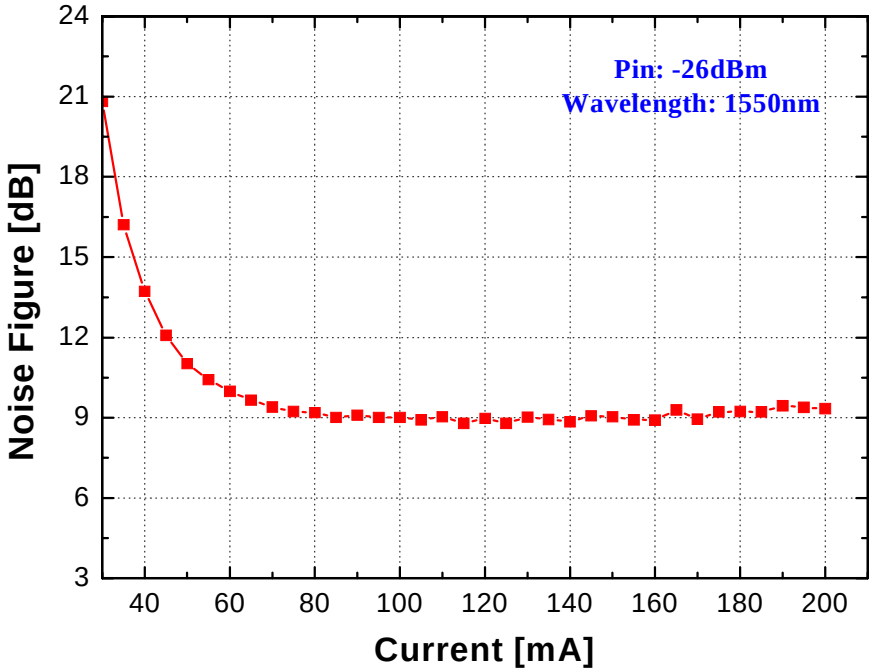

Fiber to fiber gain is larger than 25dB.
Gain difference in TE and TM polarization is less than 1dB

## 3. Saturation Output Power ($P_{SAT}$)



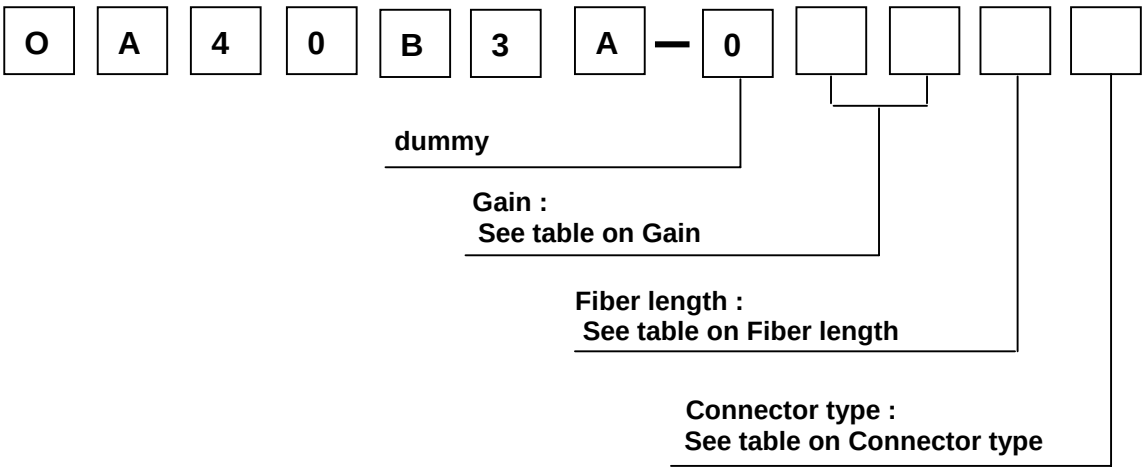

Saturation output power is larger than 7dBm at 200mA

## 4. Noise Figure (NF)




Noise figure is less than 11dB

# Ordering Information




## Output Connector

| Code | Fiber to fiber gain | Saturation output power |
|---|---|---|
| G1 | ≥15dB | ≥ -3dBm |
| G2 | ≥20dB | ≥ 2dBm |
| G3 | ≥25dB | ≥ 7dBm |

## Fiber Length

| Code | Fiber Length |
|---|---|
| A | 0.5m |
| B | 1.0m |
| C | 1.5m |
| D | 2.0m |
| E | 2.5m |

## Fiber Connector

| Code | Connector Type |
|---|---|
| 1 | FC/PC |
| 2 | FC/APC |
| 3 | ST |
| 4 | SC |
| 5 | Biconic |
| 6 | No connector |

# Handling Precaution

## Power Sequence

Following the turn-on sequence is required to avoid possible damage to the module from power supply switching transients.

1. All ground connections
2. Most negative supply
3. Most positive supply
4. All remaining connections

* Reverse the order for the proper turn-off sequence

## Electrostatic Discharge

**Caution: The device is susceptible to damage as a result of electrostatic discharge**

Widely accepted human-body model (resistance=1.5KΩ, Capacitance=100pF) for susceptibility testing and protection-design is employed as a circuit parameter.

| Parameter | Value | Unit |
|---|---|---|
| Human-body model | >400 | V |

# Laser Safety Information

## Class IIIb Laser Product

This product complies with 21 CFR 1040.10. and 1040.11.

single-mode fiber pigtail and connector

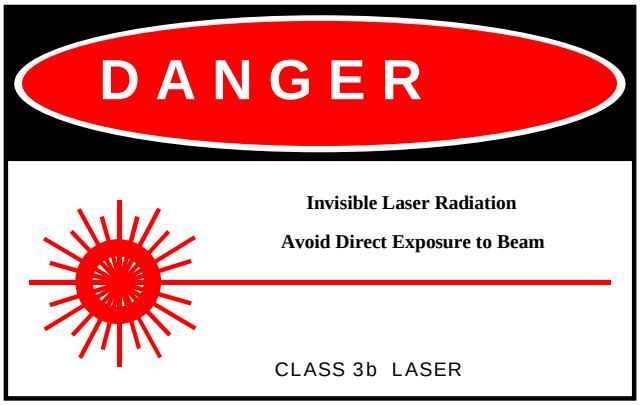
Wavelength=1250~1650 nm

Maximum power = 50 mW

Label is not affixed to the module because of size constraints but is contained in the shipping carton.

Product is not shipped with power supply

**Caution: Use of controls, adjustments, and procedures other than those specified herein may result in hazardous laser radiation exposure**



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