

## Professional high-speed optical transceiver

**OPN-S8G85-3D05SC / OPN-S8G85-3D05SCI**  
**OPN-S8G85-3D05SC-EMG / OPN-S8G85-3D05SCI-EMG**  
**OPN-S8G85-3D05FC / OPN-S8G85-3D05FCI**  
**OPN-S8G85T-3D05SC / OPN-S8G85T-3D05SCI**  
**OPN-S8G85T-3D05SC-EMG / OPN-S8G85T-3D05SCI-EMG**  
**OPN-S8G85T-3D05FC / OPN-S8G85T-3D05FCI**  
**3.3V / 850 nm / 1.25 Gbps RoHS Compliant Optical Multi-Mode Transceiver**

## PRODUCT FEATURES

- Duplex SC Multi-Mode Transceiver
- Compliant with IEEE-802.3z 1000BASE-SX
  - Industry Standard 1 x 9 Footprint
  - 850 nm VCSEL Transmission
- 0 to 70°C Operating: OPN-S8G85-3D05SC
- -50 to 85°C Operating: OPN-S8G85-3D05SCI
  - Single +3.3 V Power Supply
  - RoHS Compliant
- 300 meter with 62.5/125 µm MMF
- 550 meter with 50/125 µm MMF
- LVPECL Signal Detect Output: OPN-S8G85-3D05SC
- LVTTTL Signal Detect Output: OPN-S8G85T-3D05SC
  - Wave Solderable
- Class 1 Laser International Safety Standard IEC 60825-1 Compliant

## APPLICATIONS

- Switch to Switch Interface
- High Speed Interface for File Servers
- High Performance Desktops

## PRODUCT DESCRIPTION

The OPN-S8G85-3D05SCI series multi-mode transceiver is a low power, high performance module for bi-directional serial optical data communications such Gigabit Ethernet and Fibre Channel. This module is designed for multi-mode fiber and operates at a nominal wavelength of 850 nm. The transmitter section uses a multiple quantum well VCSEL and is a class 1 laser compliant according to International Safety Standard IEC-60825-1. The receiver section uses an integrated GaAs detector preamplifier (IDP) mounted in an optical header and a limiting post-amplifier IC. A PECL logic interface simplifies interface to external circuitry.

## ORDER INFORMATION

| P/No.              | Distance (m) | Wavelength (nm) | Voltage (V) | Package | Temp. (°C) | TX Power (dBm) | RX Sens. (dBm) | Signal Detect | RoHS Compliant |
|--------------------|--------------|-----------------|-------------|---------|------------|----------------|----------------|---------------|----------------|
| OPN-S8G85-3D05SC   | 300 / 550*   | 850             | 3.3         | 1X9 SC  | 0 to 70    | -4 to -9.5     | -18            | LVPECL        | Yes            |
| OPN-S8G85T-3D05SC  | 300 / 550*   | 850             | 3.3         | 1X9 SC  | 0 to 70    | -4 to -9.5     | -18            | LVTTTL        | Yes            |
| OPN-S8G85-3D05FC   | 300 / 550*   | 850             | 3.3         | 1X9 FC  | 0 to 70    | -4 to -9.5     | -18            | LVPECL        | Yes            |
| OPN-S8G85T-3D05FC  | 300 / 550*   | 850             | 3.3         | 1X9 FC  | 0 to 70    | -4 to -9.5     | -18            | LVTTTL        | Yes            |
| OPN-S8G85-3D05SCI  | 300 / 550*   | 850             | 3.3         | 1X9 SC  | -50 to 85  | -4 to -9.5     | -18            | LVPECL        | Yes            |
| OPN-S8G85T-3D05SCI | 300 / 550*   | 850             | 3.3         | 1X9 SC  | -50 to 85  | -4 to -9.5     | -18            | LVTTTL        | Yes            |
| OPN-S8G85-3D05FCI  | 300 / 550*   | 850             | 3.3         | 1X9 FC  | -50 to 85  | -4 to -9.5     | -18            | LVPECL        | Yes            |
| OPN-S8G85T-3D05FCI | 300 / 550*   | 850             | 3.3         | 1X9 FC  | -50 to 85  | -4 to -9.5     | -18            | LVTTTL        | Yes            |

Note: Distance 300 m for 62.5/125µm MMF, 550 m for 50/125 µm MMF

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| Absolute Maximum Ratings |        |          |          |       |                                       |
|--------------------------|--------|----------|----------|-------|---------------------------------------|
| Parameter                | Symbol | Min      | Max      | Units | Notes                                 |
| Storage Temperature      | Tstg   | -50      | 85       | °C    |                                       |
| Operating Temperature    | Topr   | 0<br>-50 | 70<br>85 | °C    | OPN-S8G85-3D05SC<br>OPN-S8G85-3D05SCI |
| Soldering Temperature    | ---    |          | 260      | °C    | 10 seconds on leads only              |
| Power Supply Voltage     | Vcc    | -0.5     | 3.6      | V     |                                       |
| Input Voltage            | ---    | GND      | Vcc      | V     |                                       |
| Output Current           | Iout   | 0        | 30       | mA    |                                       |

| Recommended Operating Conditions |        |          |      |          |                                                 |
|----------------------------------|--------|----------|------|----------|-------------------------------------------------|
| Parameter                        | Symbol | Min      | Typ  | Max      | Units                                           |
| Power Supply Voltage             | Vcc    | 3.1      | 3.3  | 3.5      | V                                               |
| Operating Temperature            | Topr   | 0<br>-50 |      | 70<br>85 | °C / OPN-S8G85-3D05SC<br>°C / OPN-S8G85-3D05SCI |
| Data Rate                        |        | 100      | 1250 |          | Mb/s                                            |

| Transmitter Specifications (0°C < Topr < 70°C, 3.1V < Vcc < 3.5V) |                                   |      |     |       |       |                   |
|-------------------------------------------------------------------|-----------------------------------|------|-----|-------|-------|-------------------|
| Parameter                                                         | Symbol                            | Min  | Typ | Max   | Units | Notes             |
| <b>Optical</b>                                                    |                                   |      |     |       |       |                   |
| Optical Transmit Power<br>62.5/125μm, NA=0.275 Fiber              | Po                                | -9.5 | --- | -4    | dBm   |                   |
| Optical Transmit Power<br>50/125μm, NA=0.20 Fiber                 | Po                                | -9.5 | --- | -4    | dBm   |                   |
| Output Center Wavelength                                          | λ                                 | 830  | 850 | 860   | nm    |                   |
| Output Spectrum Width                                             | Δλ                                | ---  | --- | 0.85  | nm    | RMS(σ)            |
| Extinction Ratio                                                  | ER                                | 9    | --- | ---   | dB    |                   |
| Output Eye                                                        | Compliant with IEEE 802.3z        |      |     |       |       |                   |
| Optical Rise Time                                                 | tr                                |      |     | 0.26  | ns    | 20% to 80% Values |
| Optical Fall Time                                                 | tf                                |      |     | 0.26  | ns    | 20% to 80% Values |
| Relative Intensity Noise                                          | RIN                               |      |     | -117  | dB/Hz |                   |
| Total Jitter                                                      | TJ                                |      |     | 227   | ps    |                   |
| Coupled Power Ratio                                               | CPR                               | 9    |     |       | dB    |                   |
| <b>Electrical</b>                                                 |                                   |      |     |       |       |                   |
| Power Supply Current                                              | Icc                               |      |     | 120   | mA    | 1                 |
| Data Input Current – Low                                          | IL                                | -350 |     |       | μA    |                   |
| Data Input Current – High                                         | I <sub>IH</sub>                   |      |     | 350   | μA    |                   |
| Differential Input Voltage                                        | V <sub>IH</sub> - V <sub>IL</sub> | 300  |     |       | mV    |                   |
| Data Input Voltage – Low                                          | V <sub>IL</sub> - V <sub>CC</sub> | -2.0 |     | -1.58 | V     | 2                 |
| Data Input Voltage -- High                                        | V <sub>IH</sub> - V <sub>CC</sub> | -1.1 |     | -0.74 | V     | 2                 |

1. Maximum current is specified at Vcc=Maximum @ maximum temperature.

2. These inputs are compatible with 10K, 10KH and 100K ECL and LVPECL inputs.

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| Receiver Specifications (0°C < Topr < 70°C, 3.1V < Vcc < 3.5V) |                                   |      |     |       |       |                         |
|----------------------------------------------------------------|-----------------------------------|------|-----|-------|-------|-------------------------|
| Parameter                                                      | Symbol                            | Min  | Typ | Max   | Units | Notes                   |
| <b>Optical</b>                                                 |                                   |      |     |       |       |                         |
| Sensitivity                                                    | ---                               | ---  | --- | -18   | dBm   | 1                       |
| Maximum Input Power                                            | Pin                               | 0    |     | ---   | dBm   |                         |
| Signal Detect -- Asserted                                      | Pa                                | ---  | --- | -18   | dBm   | Transition: low to high |
| Signal Detect -- Deasserted                                    | Pd                                | -30  | --- | ---   | dBm   | Transition: high to low |
| Signal detect -- Hysteresis                                    |                                   |      | 3   |       | dB    |                         |
| Wavelength of Operation                                        |                                   | 770  | --- | 860   | nm    |                         |
| <b>Electrical</b>                                              |                                   |      |     |       |       |                         |
| Power Supply Current                                           | Icc                               |      |     | 100   | mA    | 2                       |
| Data Output Voltage – Low                                      | V <sub>OL</sub> - V <sub>CC</sub> | -2.0 |     | -1.58 | V     | 3                       |
| Data Output Voltage – High                                     | V <sub>OH</sub> - V <sub>CC</sub> | -1.1 |     | -0.74 | V     | 3                       |
| Signal Detect Output Voltage -- Low                            | V <sub>OL</sub> - V <sub>CC</sub> | -2.0 |     | -1.58 | V     | OPN-S8G85-3D05SC        |
| Signal Detect Output Voltage -- High                           | V <sub>OH</sub> - V <sub>CC</sub> | -1.1 |     | -0.74 | V     |                         |
| Signal Detect Output Voltage -- Low                            | V <sub>SDL</sub>                  |      |     | 0.5   | V     | OPN-S8G85T-3D05SC       |
| Signal Detect Output Voltage -- High                           | V <sub>SDH</sub>                  | 2.0  |     |       | V     |                         |

1. Minimum sensitivity and saturation levels at BER=1E-12 for a 2<sup>7</sup>-1 PRBS at ER=9 dB. For example, an OMA of 22μW is approximately equal to an average power of -18.4 dBm, average with an Extinction ratio of 9 dB.

2. The current excludes the output load current.

3. These outputs are compatible with 10K, 10KH and 100K ECL and PECL outputs.

## CONNECTION DIAGRAM

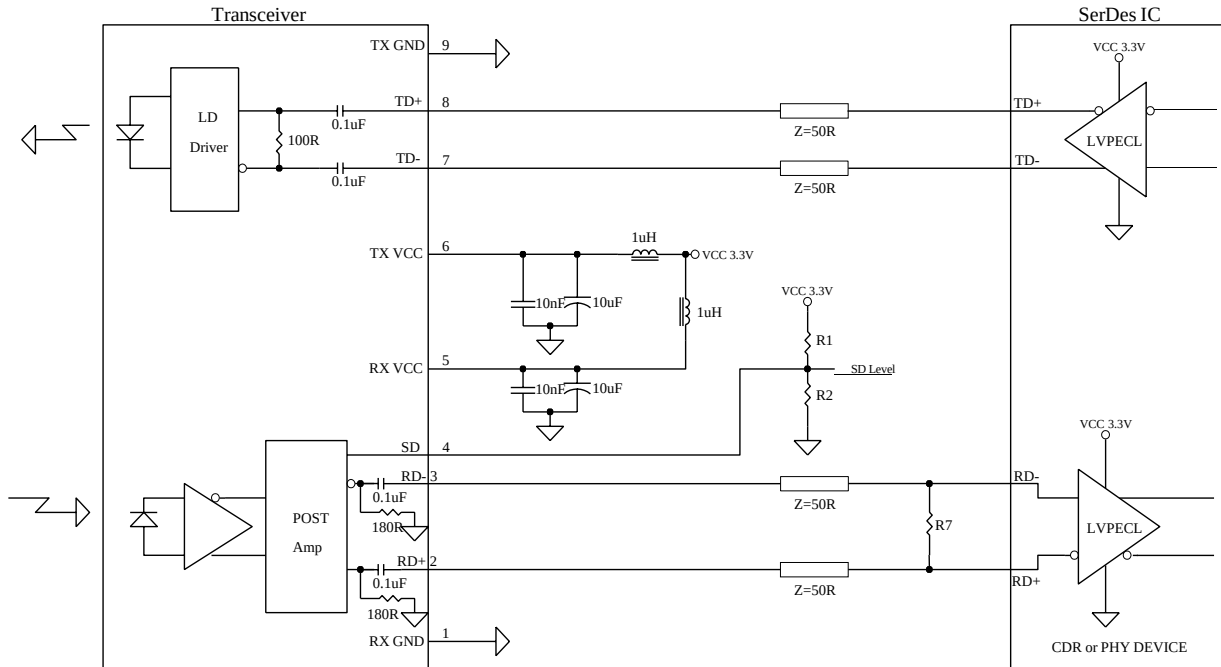
|                           |            |     |
|---------------------------|------------|-----|
| Receiver Signal Ground    | 1 (Rx GND) | ○   |
| Receiver Data Out         | 2 (RD+)    | N/C |
| Receiver Data Out Bar     | 3 (RD-)    |     |
| Signal Detect             | 4 (SD)     |     |
| Receiver Power Supply     | 5 (Rx Vcc) |     |
| Transmitter Power Supply  | 6 (Tx Vcc) |     |
| Transmitter Data In Bar   | 7 (TD-)    |     |
| Transmitter Data In       | 8 (TD+)    | N/C |
| Transmitter Signal Ground | 9 (Tx GND) | ○   |

TOP VIEW

| PIN | Symbol | Notes                                                     |
|-----|--------|-----------------------------------------------------------|
| 1   | Rx GND | Directly connect this pin to the receiver ground plane    |
| 2   | RD+    | See recommended circuit schematic                         |
| 3   | RD-    | See recommended circuit schematic                         |
| 4   | SD     | Active high on this indicates a received optical signal   |
| 5   | Rx Vcc | +3.3V dc power for the receiver section                   |
| 6   | Tx Vcc | +3.3V dc power for the transmitter section                |
| 7   | TD-    | See recommended circuit schematic                         |
| 8   | TD+    | See recommended circuit schematic                         |
| 9   | Tx GND | Directly connect this pin to the transmitter ground plane |

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### RECOMMENDED CIRCUIT SCHEMATIC



For TTL SD Level, R1=R2=N.C., R7=100 ohm

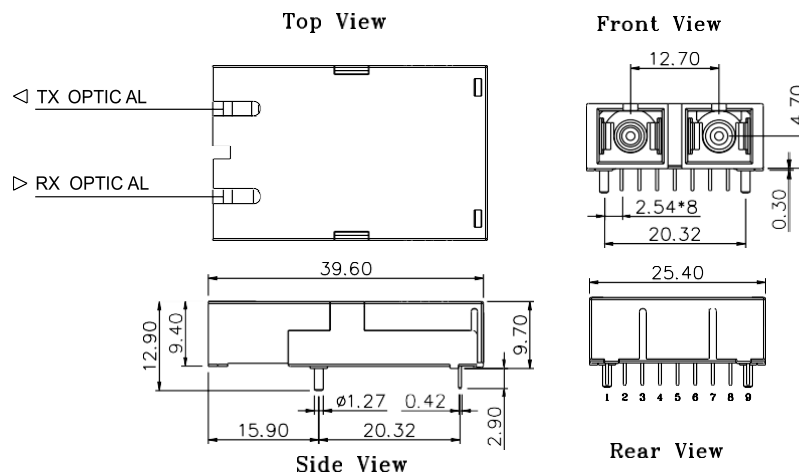
For PECL SD Level, R1=130 ohm, R2=82 ohm, R7=100 ohm

The split-load terminations for ECL signals need to be located at the input of devices receiving those ECL signals. The power supply filtering is required for good EMI performance. Use short tracks from the inductor L1/L2 to the module Rx Vcc and Tx Vcc. A GND plane under the module is required for good EMI and sensitivity performance.

### PACKAGE DIAGRAM

Units in mm

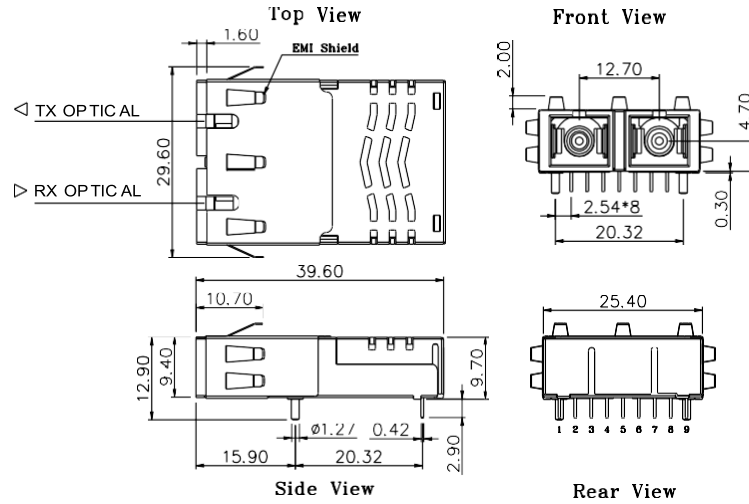
#### 1) SC Type



OPN-S8G85-3D05SC / OPN-S8G85T-3D05SC /  
OPN-S8G85-3D05SCI/ OPN-S8G85T-3D05SCI

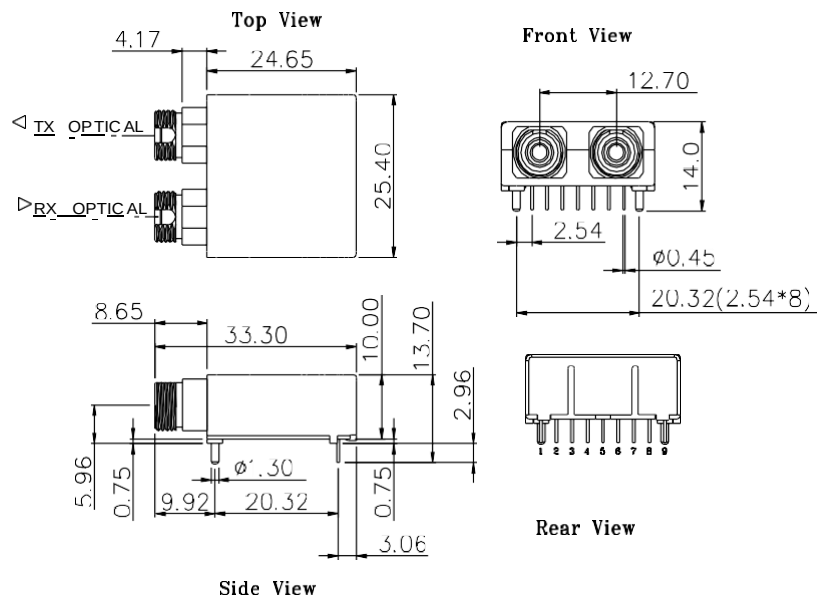
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### 2) SC Type With Extended Shielding



OPN-S8G85-3D05SC-EMG / OPN-S8G85T-3D05SC-EMG /  
OPN-S8G85-3D05SCI-EMG / OPN-S8G85T-3D05SCI-EMG

### 3) FC Type



OPN-S8G85-3D05FC / OPN-S8G85T-3D05FC /  
OPN-S8G85-3D05FCI / OPN-S8G85T-3D05FCI

**Note:** Specifications subject to change without notice.