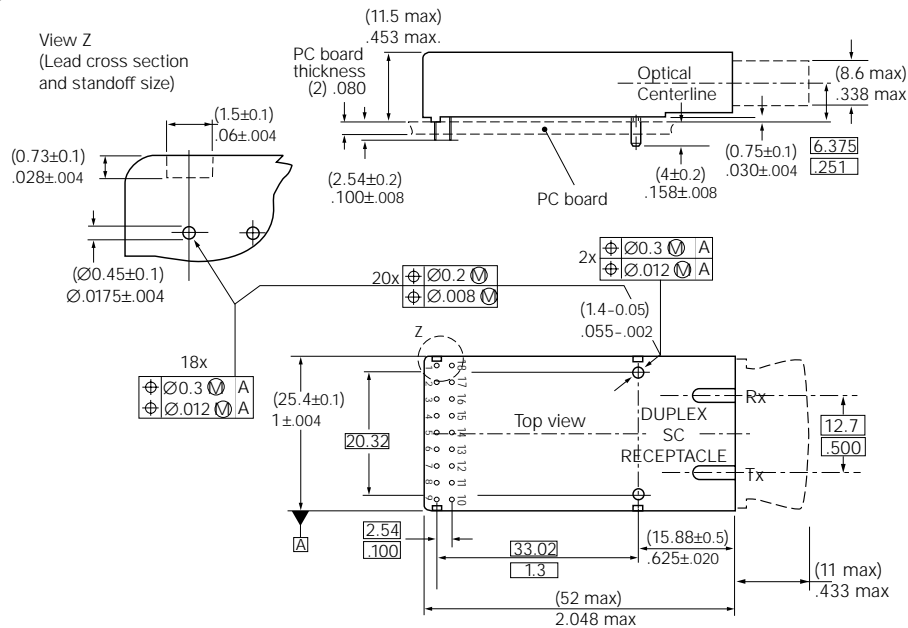


3.3 V V23806-A84-C5

Single Mode 155 MBd ATM/SDH/SONET 2x9 Transceiver with Rx Monitor

Dimensions in (mm) inches



Absolute Maximum Ratings

Exceeding any one of these values may destroy the device immediately.

| | |
|--|---------------|
| Package Power Dissipation ⁽¹⁾ | 1.5 W |
| Supply Voltage ($V_{CC}-V_{EE}$) | 6 V |
| Data Input Levels | $V_{CC}+0.5$ |
| Differential Data Input Voltage | 2.5 V |
| Operating Case Temperature | 0°C to 70°C |
| Storage Ambient Temperature | -40°C to 85°C |
| Soldering Conditions Temp/Time | |
| (MIL-STD 883 C Method 2003) | 250°C/5.5s |

Note

- For $V_{CC}-V_{EE}$ (min., max.). 50% duty cycle. The supply current does not include the load drive current of the receiver output. Add max. 45 mA for the three outputs. Load is 50 Ω to $V_{CC}-2$ V.

FEATURES

- Compliant with ATM, SONET OC-3, SDH STM-1
- Compact integrated transceiver unit with
 - MQW laser diode transmitter
 - InGaAs PIN photodiode receiver
 - Duplex SC receptacle
- Class 1 FDA and IEC laser safety compliant
- FDA Accession No. 9520890-08
- Single power supply (+3.3 V)
- Signal detect indicator
- PECL differential inputs and outputs
- Process plug included
- Wave solderable and washable with process plug inserted
- Analog Rx power monitor output
- Industry multisource 2x9 footprint
- For distances of up to 15 km on single mode fiber

DESCRIPTION

The Infineon single mode ATM transceiver complies with the ATM Forum's *Network Compatible ATM for Local Network Applications* document and ANSI's *Broadband ISDN - Customer Installation Interfaces, Physical Media Dependent Specification*, T1.646-1995, Bellcore-Sonet OC-3/IR-1 and ITU-T G.957 STM-1/S.1.1.

ATM was developed to facilitate solutions in multimedia applications and real time transmission. The data rate is scalable, and the ATM protocol is the basis of the broadband public networks being standardized in the International Telecommunications Union (ITU), the former International Telegraph and Telephone Consultative Committee (CCITT). ATM can also be used in local private applications.

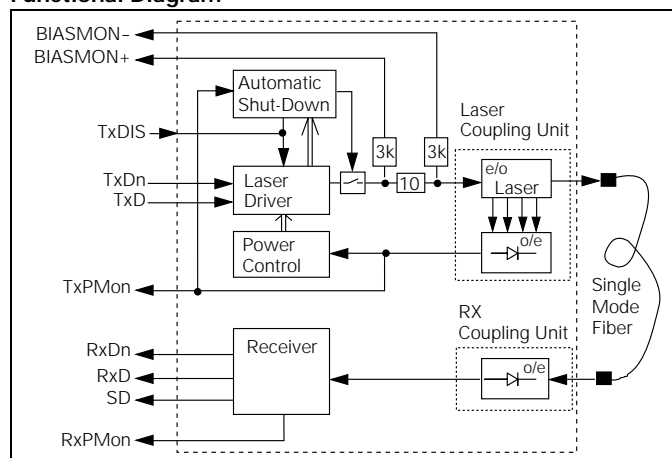
This Infineon single mode ATM transceiver is a single unit comprised of a transmitter, a receiver, and an SC receptacle. This design frees the customer from many alignment and PC board layout concerns. The module is designed for low cost WAN applications. It can be used as the network end device interface in workstations, servers, and storage devices, and in a broad range of network devices such as bridges, routers, and intelligent hubs, and wide area ATM switches.

This transceiver operates at 155.52 Mbit/s from a single power supply (+3.3 V). The differential data inputs, data outputs and signal detect output are PECL compatible.

Functional Description

This transceiver is designed to transmit serial data via single mode cable.

Functional Diagram



The receiver component converts the optical serial data into PECL compatible electrical data (RxD and RxDn). The Signal Detect (SD, active high) shows whether an optical signal is present⁽¹⁾. If no optical input signal is present the receiver data outputs are switched to static low level (RxD=0, RxDn=high).

This transceiver offers the advantage of an analog Rx power monitor (RxPMON) that can prove and control link status, including transmission distances and security of the connection. This output shows an analog voltage that is proportional to the light input within the range of -20 dBm to -30 dBm.

The transmitter part converts electrical PECL compatible serial data (Tx, Txn) into optical serial data. It contains a laser driver circuit that drives the modulation and bias current of the laser diode. The currents are controlled by a power control circuit to guarantee constant output power of the laser over temperature and aging.

The power control uses the output of the monitor PIN diode (mechanically built into the laser coupling unit) as a controlling signal, to prevent the laser power from exceeding the operating limits.

The laser can be switched off with a high signal on the Transmitter Disable pin (TxDis). The TxPMon pin shows a voltage reflecting the optical power output. The bias current is monitored on the BIASMON pins. Both signals can be used to supervise the function of the module.

Aging control is possible using the bias monitor output (BIASMON). The module has an integrated shutdown function that switches the laser off in the event of an internal failure.

The transceiver contains a supervisory circuit to control the power supply. This circuit generates an internal reset signal whenever the supply voltage drops below the reset threshold. It keeps the reset signal active for at least 15 milliseconds after the voltage has risen above the reset threshold. During this time the laser is inactive.

Note

1. We recommend to switch off the transmitter supply (V_{CC-Tx}) if no transmitter input data is applied.

TECHNICAL DATA

The electro-optical characteristics described in the following tables are valid only for use under the recommended operating conditions.

Recommended Operating Conditions

| Parameter | Symbol | Min. | Typ. | Max. | Units |
|------------------------------------|----------------------------------|-------|------|-------|-------|
| Case Temperature | T _C | 0 | | 70 | °C |
| Power Supply Voltage | V _{CC} –V _{EE} | 3.14 | 3.3 | 3.47 | V |
| Supply Current ⁽¹⁾ | I _{CC} | | 150 | 230 | mA |
| Transmitter | | | | | |
| Data Input High Voltage | V _{IH} –V _{CC} | –1165 | | –880 | mV |
| Data Input Low Voltage | V _{IL} –V _{CC} | –1810 | | –1475 | |
| Input Data Rise/Fall Time, 10%–90% | t _R , t _F | 0.4 | | 1.3 | ns |
| TxDis Input High Voltage | V _{TIH} | 2.0 | | | V |
| TxDis Input Low Voltage | V _{TIL} | | | 0.8 | |
| Receiver | | | | | |
| Output Current | I _O | | | 25 | mA |
| Input Center Wavelength | λ _C | 1260 | | 1360 | nm |

Note

- For $V_{CC}-V_{EE}$ (min., max.). 50% duty cycle. The supply current does not include the load drive current of the receiver output. Add max. 45 mA for the three outputs. Load is 50 Ω to $V_{CC}-2$ V.

Transmitter Electro-Optical Characteristics

| Transmitter | Symbol | Min. | Typ. | Max. | Units |
|--|-------------|-------|-------|------|-------|
| Output Power (Average) | P_O | -15.0 | -11.0 | -8.0 | dBm |
| Center Wavelength | λ_C | 1274 | | 1356 | nm |
| Spectral Width, RMS | σ_I | | | 2.5 | |
| Output Rise/Fall Time, 20%–80% | t_R, t_F | | | 0.4 | ns |
| Extinction Ratio (Dynamic) | ER | 8.2 | 12 | | dB |
| Eye Diagram ⁽¹⁾ | ED | | | | |
| Reset Threshold for TxV _{CC} ⁽²⁾ | V_{TH} | 2.85 | 2.93 | 3.0 | V |
| Reset Active Time Out ⁽²⁾ | t_{RES} | 15 | 22 | 35 | ms |

Notes

- Transmitter meets ANSI T1E1.2, SONET OC-3, and ITU-T G.957 mask patterns.
- Laser power is shut down if power supply is below V_{TH} and switched on if power supply is above V_{TH} after t_{RES} . The supervisory circuit can be reset by switching TxDis from high to low.

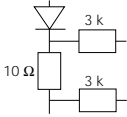
Receiver Electro-Optical Characteristics

| Receiver | Symbol | Min. | Typ. | Max. | Units |
|---|-------------------|-------|------|-------|-------|
| Sensitivity (Average Power) ⁽¹⁾ | P_{IN} | | -34 | -31 | dBm |
| Saturation (Average Power) | P_{SAT} | -8.0 | -3.0 | | |
| Signal Detect Assert Level ⁽²⁾ | P_{SDA} | | -38 | -34 | |
| Signal Detect Deassert Level ⁽³⁾ | P_{SDD} | -44 | -40 | | |
| Signal Detect Hysteresis | $P_{SDA}-P_{SDD}$ | | 2 | | dB |
| Signal Detect Assert Time | t_{ASS} | | 1 | | ms |
| Signal Detect Deassert Time | t_{DAS} | | 5 | | |
| PECL Output Low Voltage ⁽⁴⁾ | $V_{OL}-V_{CC}$ | -1950 | | -1630 | mV |
| PECL Output High Voltage ⁽⁴⁾ | $V_{OH}-V_{CC}$ | -1025 | | -735 | |
| Output Data, Rise/Fall Time, 20%–80% | t_R, t_F | | 0.7 | 1 | ns |
| Output SD, Rise/Fall Time | | | | 40 | |

Notes

- Minimum average optical power at which the BER is less than 1×10^{-10} . Measured with a 2²³-1 NRZ PRBS as recommended by ANSI T1E1.2, SONET OC-3, and ITU-T G.957.
- An increase in optical power of data signal above the specified level will cause the SIGNAL DETECT to switch from a Low state to a High state.
- A decrease in optical power of data signal below the specified level will cause the SIGNAL DETECT to switch from a High state to a Low state.
- PECL compatible. Load is 50 Ω into $V_{CC}-2$ V. Measured under DC conditions at 25°C. For dynamic measurements a tolerance of 50 mV should be added. $V_{CC}=+3.3$ V.

Pin Description

| Pin Name | | Level | Pin# | Description |
|-------------------|---|-------------------------|------|---|
| NC | | | 1–4 | Pin not connected |
| Bias Mon |  | Analog Voltage | | <p>This output shows an analog voltage that is proportional to the laser bias current. Use this output to check proper laser operation and for end of life indications. Limit: Bias Current $I_{BIAS} < 60 \text{ mA}$</p> $I_{BIAS} = \frac{U}{10 \Omega}$ |
| | | Bias Mon – | 5 | |
| | | Bias Mon + | 6 | |
| TxDis | Tx Disable/Enable | TTL-Input | 7 | A low signal switches the laser on. A high signal switches the laser off. |
| RxPMon | Rx Power Monitor | Analog Voltage | 8 | This output shows an analog voltage that is proportional to the light input. Output voltage RxPMon = 2.5 V \pm 0.3 V at –20 dBm opt. input signal, and RxPMon=0.25 V \pm 0.03 V at –30 dBm opt. input signal. Source Resistance $R_S = 300 \text{ k}\Omega$. |
| TxPMon | Tx Power Monitor | Analog Voltage | 9 | This output shows an analog voltage that is proportional to the light output. This output can be used for laser safety functions. Output Voltage Vmon = 1.2, Source Resistance $R_S = 100 \text{ k}\Omega$ |
| TxV _{EE} | Tx Ground | Power Supply | 10 | Negative power supply, normally ground |
| TxD | Tx Input Data | PECL Input | 11 | Transmitter input data |
| TxDn | | | 12 | Inverted transmitter input data |
| TxV _{CC} | Tx +3.3 V | Power Supply | 13 | Positive power supply, +3.3 V |
| RxV _{CC} | Rx +3.3 V | Power Supply | 14 | |
| SD | Rx Signal Detect | PECL Output active high | 15 | A high level on this output shows that optical data is applied to the optical input. |
| RxDn | Rx Output Data | PECL Output | 16 | Inverted receiver output data. If no optical input signal is present the receiver data outputs are switched to static low level (RxDn = high) |
| RxD | | | 17 | Receiver output data. If no optical input signal is present the receiver data outputs are switched to static low level (RxD = 0) |
| RxV _{EE} | Rx Ground | Power Supply | 18 | Negative power supply, normally ground |
| | Stud Pin | Mech. Support | S1/2 | Not connected |

Regulatory Compliance

| Feature | Standard | Comments |
|---|---------------------------------------|---|
| Electrostatic Discharge (ESD) to the Electrical Pins | MIL-STD 883C Method 3015.4 | Class 1 (>1000 V) |
| Immunity: Electrostatic Discharge (ESD) to the Duplex SC Receptacle | EN 61000-4-2 IEC 61000-4-2 | Discharges of $\pm 15 \text{ kV}$ with an air discharge probe on the receptacle cause no damage. |
| Immunity: Radio Frequency Electromagnetic Field | EN 61000-4-3 IEC 61000-4-3 | With a field strength of 3 V/m rms, noise frequency ranges from 10 MHz to 1 GHz. No effect on transceiver performance between the specification limits. |
| Emission: Electromagnetic Interference (EMI) | FCC Class B EN 55022 Class B CISPR 22 | Noise frequency range: 30 MHz to 1 GHz |

EYE SAFETY

This laser based single mode transceiver is a Class 1 product. It complies with IEC 60825-1 and FDA 21 CFR 1040.10 and 1040.11.

To meet laser safety requirements the transceiver shall be operated within the Absolute Maximum Ratings.

Caution

All adjustments have been made at the factory prior to shipment of the devices. No maintenance or alteration to the device is required.

Tampering with or modifying the performance of the device will result in voided product warranty.

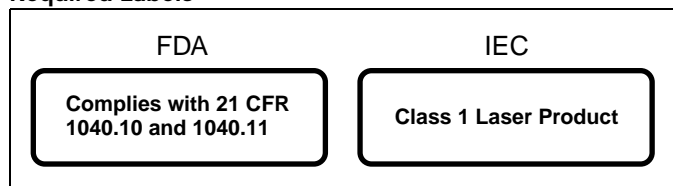
Note

Failure to adhere to the above restrictions could result in a modification that is considered an act of "manufacturing," and will require, under law, recertification of the modified product with the U.S. Food and Drug Administration (ref. 21 CFR 1040.10 (i)).

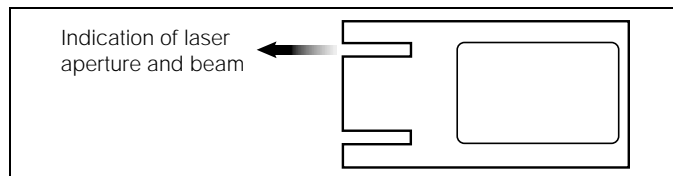
Laser Data

| | |
|--|-----------------------|
| Wavelength | 1300 nm |
| Total output power (as defined by IEC: 50 mm aperture at 10 cm distance) | less than 2 mW |
| Total output power (as defined by FDA: 7 mm aperture at 20 cm distance) | less than 180 μ W |
| Beam divergence | 4° |

Required Labels

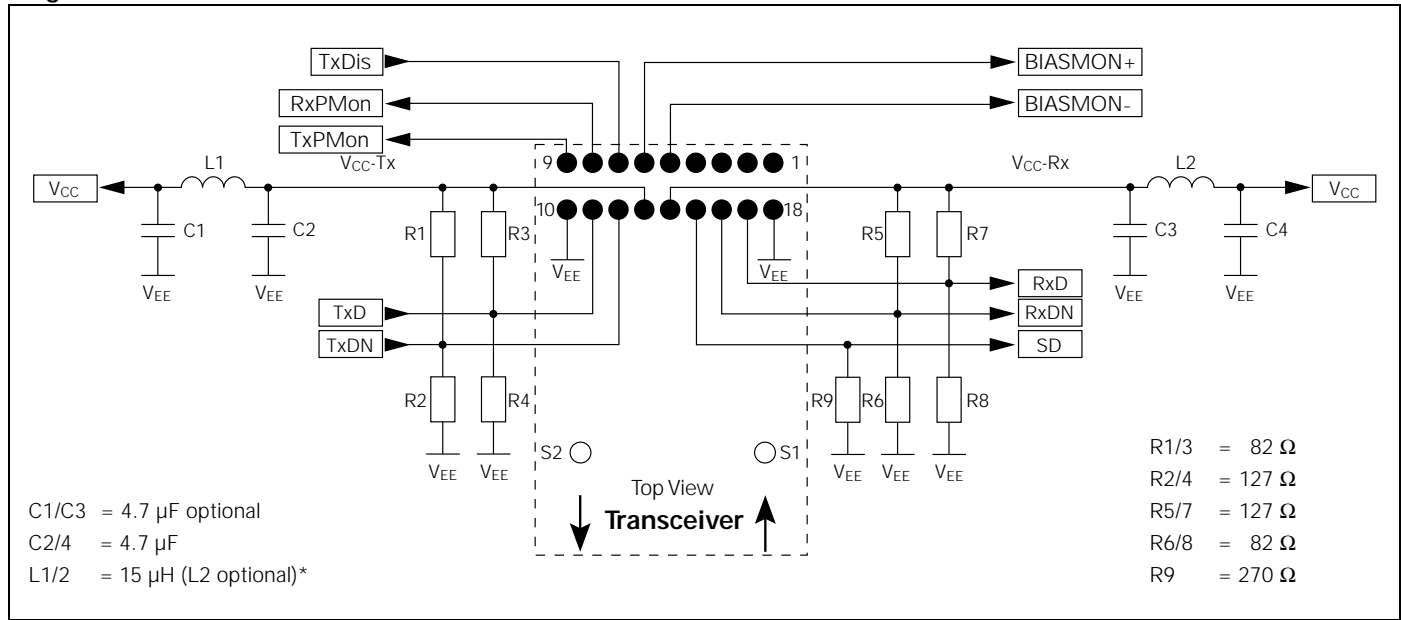


Laser Emission



APPLICATION NOTE

Single Mode 155 MBd ATM 2x9 Transceiver



* Recommended choke is Siemens Matsushita B78108-S1153-K or B78148-S1153-K ($Q_{min}=60$, max. DC resistance = 0.6 Ω).

The power supply filtering is recommended for good EMI performance. Use short tracks from the inductor L1/L2 to the module V_{CC-Rx}/V_{CC-Tx} . We recommend a V_{EE} plane under the module for getting good EMI performance. The transceiver contains an automatic shutdown circuit. Reset is only possible

when the power is turned off, and then on again ($V_{CC-Tx} = 0$ V). The receiver data signals should be terminated with 50 Ω at the far end. Terminations should be placed very close to the receiver data pins in combination with AC coupling.

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