



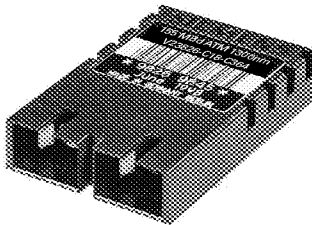
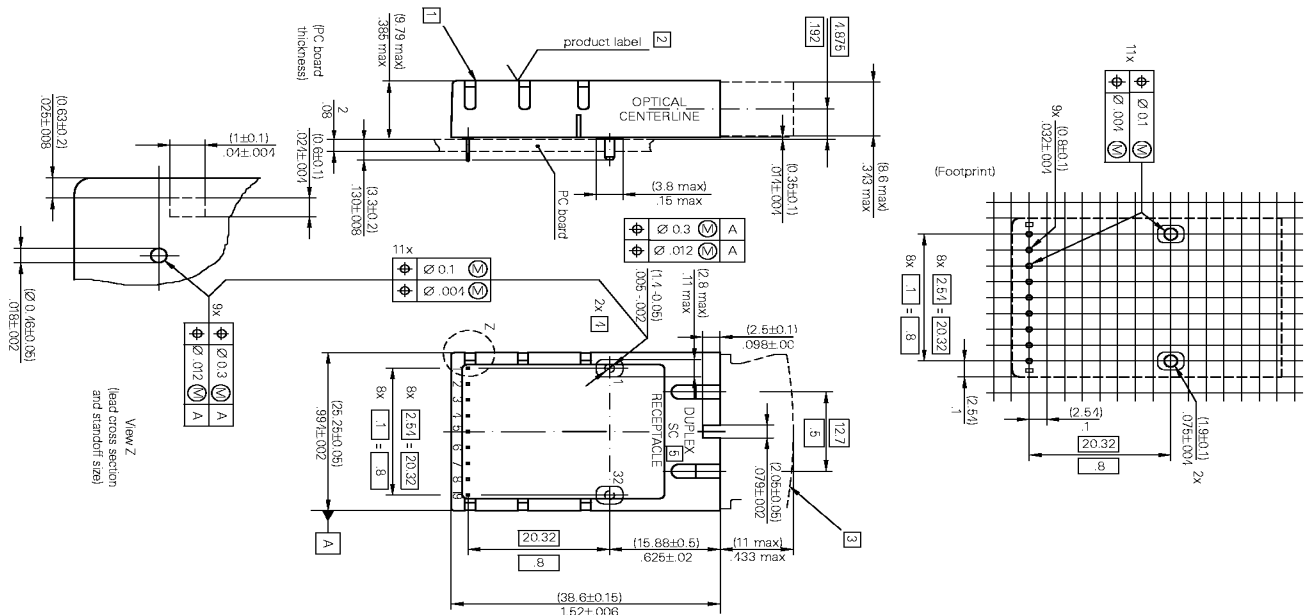
# DC/DC (5 V/3.3 V) **V23826-C18-C64/C364**

## Single Mode 155 MBd ATM/SDH/SONET

### 1x9 Long Haul Transceiver

Preliminary

Dimensions in (mm) inches



- Wave solderable and washable with process plug inserted
- Typical dynamic range of 35 dB
- Industry standard multisource 1x9 footprint
- For distances of min. 40 km on single mode fiber

#### Absolute Maximum Ratings

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

|                                          |                  |
|------------------------------------------|------------------|
| Package Power Dissipation <sup>(1)</sup> | 1.5 W            |
| Supply Voltage ( $V_{CC}-V_{EE}$ )       | 5 V              |
| 3.3 V                                    | 5 V              |
| Data Input Levels                        | $V_{CC} + 0.5$ V |
| Differential Data Input Voltage          | 2.5 V            |
| Operating Ambient Temperature            | 0°C to 70°C      |
| Storage Ambient Temperature              | -40°C to 85°C    |
| Soldering Conditions Temp/Time           |                  |
| (MIL-STD 883C, Method 2003)              | 250°C/5.5s       |

#### Note

1. For  $V_{CC}-V_{EE}$  (min., max.). 50% duty cycle. The supply current does not include the load drive current of the receiver output.

#### FEATURES

- Compliant with ATM, SONET OC-3, SDH STM-1
- Meets mezzanine standard height of 9.8 mm
- 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. 9520890-15
- Single power supply (5 V or 3.3 V)
- Signal detect indicator
- PECL differential inputs and outputs
- Process plug included
- Input Signal Monitor

## 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/LR-1 and ITU-T G.957 STM-1/L.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.

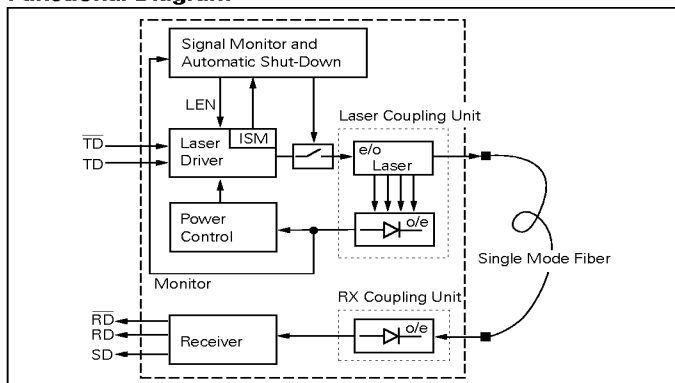
The Infineon single mode ATM long haul transceiver is a single unit comprised of a transmitter, a receiver, and an SC receptacle. This design frees the customer from many alignment and PC board layout concerns. The module is designed for low cost WAN applications. It can be used as the network end device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

This transceiver operates at 155.520 Mbit/s from a single power supply (+5 V or +3.3 Volt). The differential data inputs and outputs are PECL compatible.

## Functional Description

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

## Functional Diagram



The transmitter converts electrical PECL compatible serial data (TD and TDnot) 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.

This transceiver contains an Input Signal Monitor (ISM), that switches the optical power off if a continuously low level is applied at Data Input.

The receiver component converts the optical serial data into PECL compatible electrical data (RD and RDnot). The Signal Detect (SD, active high) shows whether optical data is present<sup>(1)</sup>.

This module is a Class 1 laser product, due to an integrated automatic shutdown circuit that disables the laser when it detects transmitter failures.

Single fault condition is ensured by means of an integrated automatic shutdown circuit that disables the laser when it detects transmitter failures. A reset is only possible by turning the power off, and then on again.

The transceiver contains a supervisory circuit to monitor the power supply. This circuit makes 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   |
|------------------------------------|-------------------|-------|-------|------|---------|
| Ambient Temperature                | $T_{AMB}$         | 0     |       | 70   | °C      |
| Power Supply Voltage               | $V_{CC}-V_{EE}$   | 3.3 V | 3.1   | 3.3  | 3.5     |
|                                    |                   | 5 V   | 4.75  | 5    | 5.25    |
| Supply Current <sup>(1)</sup>      | $I_{CC}$          | 3.3 V |       | 250  | mA      |
|                                    |                   | 5 V   |       | 270  |         |
| <b>Transmitter</b>                 |                   |       |       |      |         |
| 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  |
| <b>Receiver</b>                    |                   |       |       |      |         |
| Output Current                     | $I_O$             |       |       | 25   | mA      |
| Input Center Wavelength            | $\lambda_C$       |       | 1260  |      | 1360 nm |

## Note

1. For  $V_{CC}-V_{EE}$  (min., max.). 50% duty cycle. The supply current does not include the load drive current of the receiver output.

## Transmitter Electro-Optical Characteristics

| Transmitter                                          | Symbol           | Min. | Typ. | Max. | Units |
|------------------------------------------------------|------------------|------|------|------|-------|
| Output Power (Average) <sup>(1)</sup>                | P <sub>O</sub>   | -5   | -3   | -0   | dBm   |
| Center Wavelength                                    | $\lambda_C$      | 1280 |      | 1335 | nm    |
| Spectral Width (FWHM)                                | D <sub>I</sub>   |      | 2.4  | 3    |       |
| Output Rise Time                                     | t <sub>R</sub>   |      |      | tbd  | ns    |
| Output Fall Time                                     | t <sub>F</sub>   |      |      |      |       |
| Extinction Ratio (Dynamic)                           | ER               | 10   |      |      | dB    |
| Reset Threshold for TxV <sub>CC</sub> <sup>(2)</sup> | V <sub>TH</sub>  | 2.4  | 2.7  | 3    | V     |
| Reset Active Time Out <sup>(2)</sup>                 | t <sub>RES</sub> | 15   | 25   | 35   | ms    |
| Eye Diagram <sup>(3)</sup>                           |                  |      |      |      |       |

### Notes

1. Into single mode fiber, 9  $\mu$ m diameter
2. Laser power is shut down if power supply is below V<sub>TH</sub> and switched on if power supply is above V<sub>TH</sub> after t<sub>RES</sub>.
3. Transmitter meets ANSI T1E1.2, SONET OC-3, and ITU-T G.957 mask patterns.

## Receiver Electro-Optical Characteristics

| Receiver                                    | Symbol                             |       | Min.  | Typ. | Max.  | Units |
|---------------------------------------------|------------------------------------|-------|-------|------|-------|-------|
| Sensitivity (Average Power) <sup>(1)</sup>  | P <sub>IN</sub>                    | 3.3 V |       | -35  | -34   | dBm   |
|                                             |                                    | 5 V   |       |      |       |       |
| Saturation (Average Power)                  | P <sub>SAT</sub>                   | 3.3 V | -8    |      |       |       |
|                                             |                                    | 5 V   |       |      |       |       |
| Signal Detect Assert Level <sup>(2)</sup>   | P <sub>SDA</sub>                   |       |       |      | -38   |       |
| Signal Detect Deassert Level <sup>(3)</sup> | P <sub>SDD</sub>                   |       | -45   |      |       |       |
| Signal Detect Hysteresis                    | P <sub>SDA</sub> -P <sub>SDD</sub> |       | 1     |      | 6     | dB    |
| Output Low Voltage <sup>(4)</sup>           | V <sub>OL</sub> -V <sub>CC</sub>   |       | -1950 |      | -1620 | mV    |
| Output High Voltage <sup>(4)</sup>          | V <sub>OH</sub> -V <sub>CC</sub>   |       | -1025 |      | -720  |       |
| Output Data, Rise/Fall Time, 20%-80%        | t <sub>R</sub> , t <sub>F</sub>    |       |       |      | tbd   | ns    |
| Output SD Rise/Fall Time <sup>(5)</sup>     |                                    |       |       |      |       |       |

### Notes

1. Minimum average optical power at which the BER is less than 1x10<sup>-10</sup>. Measured with a 2<sup>23</sup>-1 NRZ PRBS as recommended by ANSI T1E1.2, SONET OC-3, and ITU-T G.957.
2. 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.
3. 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.

4. DC/DC for data, DC/DC PECL for Signal Detect, PECL compatible. Load is 50  $\Omega$  into V<sub>CC</sub>-2 V for data, 500  $\Omega$  to V<sub>EE</sub> for Signal Detect. Measured under DC conditions. For dynamic measurements a tolerance of 50 mV should be added. V<sub>CC</sub>=3.3 V / 5 V. T<sub>AMB</sub>=25°C.
5. PECL compatible. A high level on this output shows that an optical signal is applied to the optical input.

## Pin Description

| Pin Name          |                  | Level / Logic           | Pin# | Description                                                                          |
|-------------------|------------------|-------------------------|------|--------------------------------------------------------------------------------------|
| RxV <sub>EE</sub> | Rx Ground        | Power Supply            | 1    | Negative power supply, normally ground                                               |
| RD                | Rx Output Data   | PECL Output             | 2    | Receiver output data                                                                 |
| RDn               |                  |                         | 3    | Inverted receiver output data                                                        |
| SD                | Rx Signal Detect | PECL Output active high | 4    | A high level on this output shows that optical data is applied to the optical input. |
| RxV <sub>CC</sub> | Rx +3.3V / 5 V   | Power Supply            | 5    | Positive power supply, +3.3V / 5 V                                                   |
| TxV <sub>CC</sub> | Tx +3.3V / 5 V   |                         | 6    | Positive power supply, +3.3V / 5 V                                                   |
| TDn               | Tx Input Data    | PECL Input              | 7    | Inverted transmitter input data                                                      |
| TD                |                  |                         | 8    | Transmitter input data                                                               |
| TxV <sub>EE</sub> | Tx Ground        | Power Supply            | 9    | 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 1000-4-2             | Discharges of $\pm 15$ kV with an air discharge probe on the receptacle cause no damage.                                                               |
| Immunity: Radio Frequency Electromagnetic Field                     | EN 61000-4-3 IEC 1000-4-3             | With a field strength of 3 V/m rms, noise frequency ranges from 3 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 6 GHz, margins depend on PCB layout and chassis design.                                                               |

## LASER SAFETY

This single mode transceiver is a Class 1 laser product. It complies with IEC 825-1 and FDA 21 CFR 1040.10 and 1040.11. The laser Class 1 is guaranteed within the Absolute Maximum Ratings.

### Caution

**The use of optical instruments with this product will increase eye hazard!**

**Do not view into the open optical port for more than 60 seconds.**

### Usage Restrictions

The optical ports of the modules must be terminated with an optical connector or with a dust plug.

#### 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)].

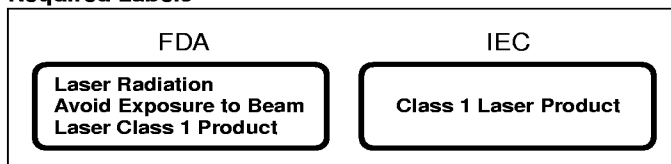
## APPLICATION NOTE

ATM transceivers and matching circuits are high frequency components and shall be terminated as recommended in the application notes for proper EMI performance. Electromagnetic emission may be caused by these components.

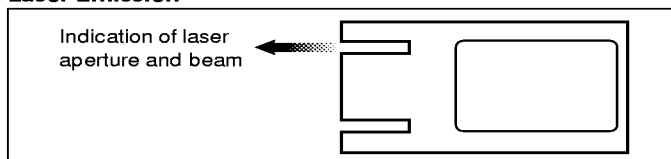
## Laser Data

|                                                                          |             |
|--------------------------------------------------------------------------|-------------|
| Wavelength                                                               | 1300 nm     |
| Total output power (as defined by IEC: 50 mm aperture at 10 cm distance) | 8 mW        |
| Total output power (as defined by FDA: 7 mm aperture at 20 cm distance)  | 800 $\mu$ W |
| Beam divergence                                                          | 4°          |

## Required Labels



## Laser Emission

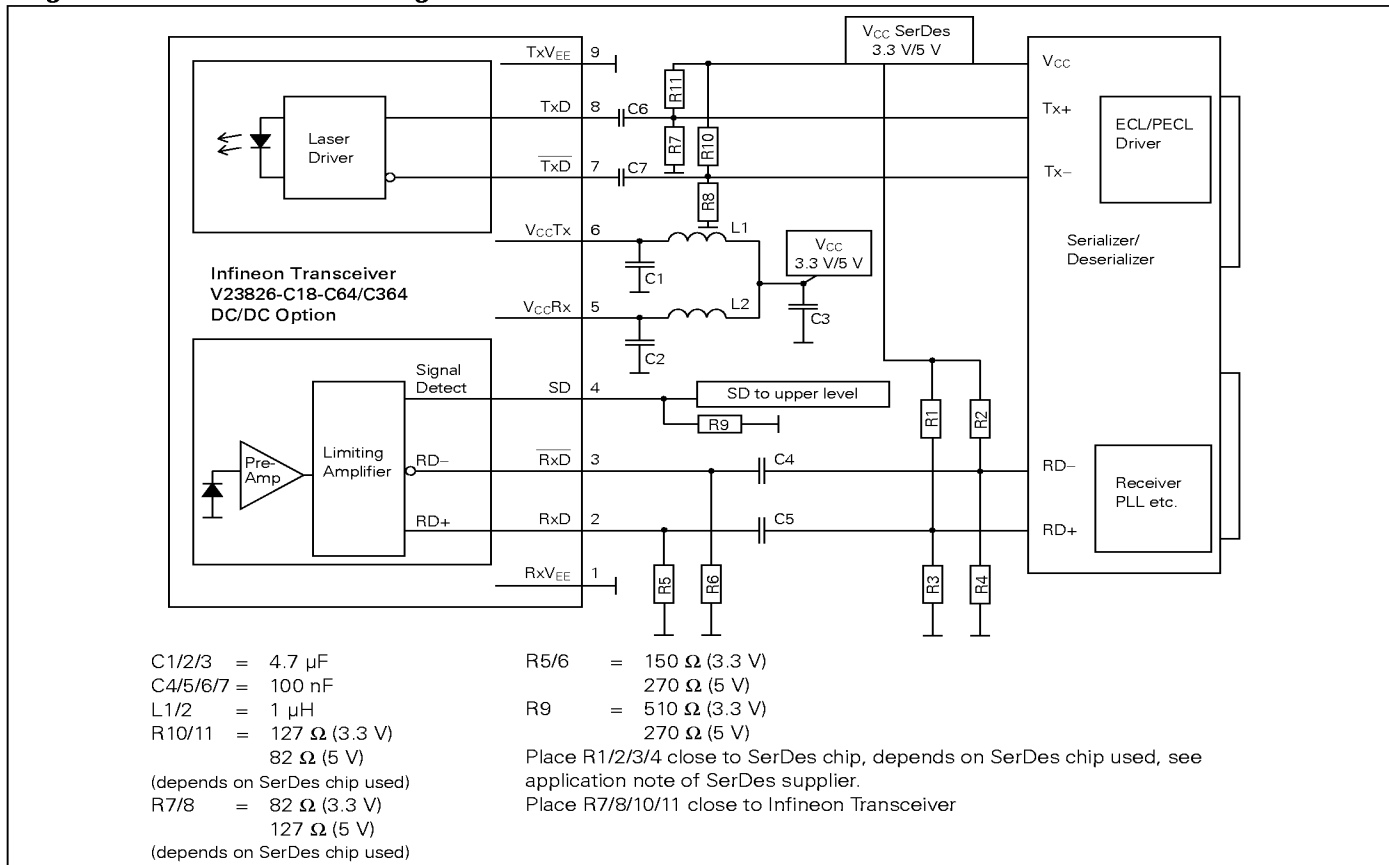


To prevent emissions it is recommended that cutouts for the fiber connectors be designed as small as possible.

It is recommended that the Tx plug and the Rx plug be separated with a bar that divides the duplex SC opening.

## APPLICATION NOTE

### Single Mode 155 MBd ATM 1x9 Long Haul Transceiver



This Application Note assumes Fiber Optic Transceivers using 5 V power supply and SerDes Chips using 3.3 V power supply. It also assumes no self biasing at the receiver data inputs (RD+/RD-) of the SerDes chip (Refer to the manufacturer data sheet for other applications). 3.3 V-Transceivers can be directly connected to SerDes-Chips using standard PECL Termination network.

Value of R1...R4 may vary as long as proper 50  $\Omega$  termination to  $V_{EE}$  or 100  $\Omega$  differential is provided. The power supply filtering is required for good EMI performance. Use short tracks from the inductor L1/L2 to the module  $V_{CCRx}/V_{CCTx}$ . Further application notes for electrical interfacing are available upon request. Ask for Appnote 82. We strongly recommend a  $V_{EE}$  plane under the module for getting good EMI performance. The transceiver contains an automatic shutdown circuit. Reset is only possible if the power is turned off, and then on again. ( $V_{CCTx}$  switched below  $V_{TH}$ ).

Application Board available on request.

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