

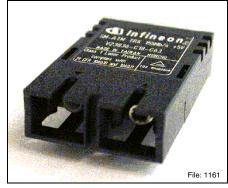
1x9 Transceiver with Duplex SC Receptacle Single Mode 1300 nm 21 km SONET OC-3 / SDH STM-1

V23836-C18-C63 V23836-C18-C363

Preliminary Data Sheet

Features

- Compliant with ATM, SONET OC-3, SDH STM-1
- Industry standard multisource 1x9 footprint
- Meets mezzanine standard height of 9.8 mm
- Compact integrated transceiver unit with
 - FP (Fabry Perot) laser diode transmitter
 - InGaAs PIN photodiode TIA receiver
 - Duplex SC receptacle
- Standard operating temperature range of 0°C to 70°C
- · Class 1 FDA and IEC laser safety compliant
- Single power supply (5 V or 3.3 V)
- Signal detect indicator (PECL)
- PECL differential (DC-coupled) inputs and outputs
- Process plug included
- Input Signal Monitor
- Wave solderable and washable with process plug inserted
- · For distances of up to 21 km on single mode fiber
- 1x9 evaluation board V23806-S84-Z5 available upon request



| Part Number | Voltage |
|-----------------|---------|
| V23836-C18-C63 | 5 V |
| V23836-C18-C363 | 3.3 V |

Preliminary Product Information

1



Pin Configuration

Pin Configuration

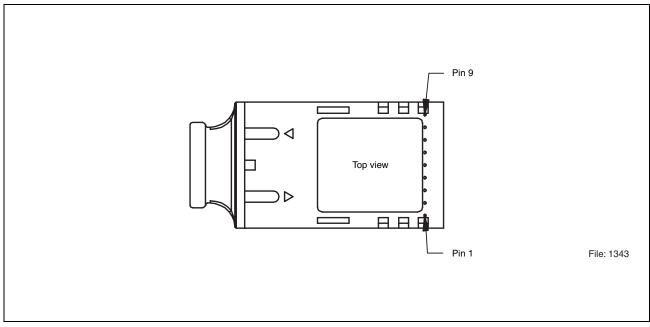


Figure 1

Pin Description

| Pin No. | Symbol | Level/Logic | Function | Description |
|------------|---------------------------|---------------|---------------------|--|
| 1 | V _{EE} Rx | Power Supply | Rx Ground | Negative power supply, normally ground |
| 2 | RD+ | PECL Output | Rx Output Data | Receiver output data |
| 3 | RD- | | | Inverted receiver output data |
| 4 | SD | PECL | Rx Signal Detect | A high level on this output shows that optical data is applied to the optical input. |
| 5 | $V_{\rm CC} R \mathbf{x}$ | Power Supply | Rx 5 V/3.3 V | Positive power supply, 5 V/3.3 V |
| 6 | $V_{\rm CC}$ Tx | | Tx 5 V/3.3 V | |
| 7 | TD- | PECL Input | Tx Input Data | Inverted transmitter input data |
| 8 | TD+ | | | Transmitter input data |
| 9 | V _{EE} Tx | Power Supply | Tx Ground | Negative power supply, normally ground |
| S1/2 | | Mech. Support | Stud Pin | Not connected |



Description

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.

Supported Link Lengths

| Category within Standard | | Reach | | Unit |
|--------------------------|---|-------|--------------------|--------|
| | r | min. | max. ¹⁾ | |
| SDH STM S-1.1 | 0 | 0 | 15,000 | meters |
| SONET OC-3 IR-1 | 0 | 0 | 21,000 | |

¹⁾ Maximum reach over fiber type SM-G.652 as defined by ITU-T G.957 and Telcordia GR-253-CORE standards. Longer reach possible depending upon link implementation.

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 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, as well as wide area ATM switches.

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



Description

Functional Description

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

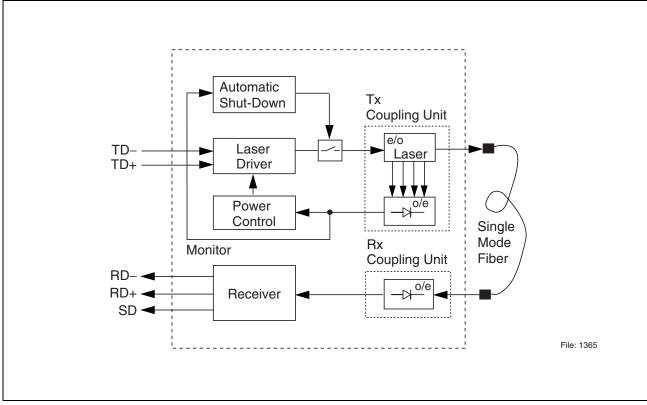


Figure 2 Functional Diagram

The receiver component converts the optical serial data into PECL compatible electrical data (RD+ and RD–). The Signal Detect (SD, active high) shows whether optical data is present¹.

The transmitter converts electrical PECL compatible serial data (TD+ and TD–) into optical serial data.

The transmitter 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.

Single fault condition is ensured by means of an integrated automatic shutdown circuit that disables the laser when it detects transmitter failures or when $V_{\rm CC}$ is too high. A reset is only possible by turning the power off, and then on again.

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



Description

Regulatory Compliance

| Feature | Standard | Comments |
|--|---|---|
| ESD: Electrostatic Discharge | MIL-STD 883D Method 3015.7 | Class 1 (> 1000 V) HBM |
| to the Electrical Pins Immunity: Electrostatic Discharge (ESD) to the Duplex SC Receptacle | JESD22-A114-B EN 61000-4-2 IEC 61000-4-2 | Class 1C Discharges of ±15 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, noise frequency ranges from 10 MHz to 2 GHz. No effect on transceiver performance between the specification limits. |
| Emission: Electromagnetic Interference (EMI) | FCC 47 CFR Part 15 Class B EN 55022 Class B CISPR 22 | Noise frequency range: 30 MHz to 18 GHz; Margins depend on PCB layout and chassis design. |



Technical Data

Technical Data

Absolute Maximum Ratings

| Parameter | Symbol | Limit Values | | Unit |
|---|----------------------------------|--------------|----------------------|------|
| | | min. | max. | |
| Package Power Dissipation ¹⁾ 5 V 3.3 V | | | 1.5 0.9 | W |
| Supply Voltage 5 V 3.3 V | V _{CC} -V _{EE} | | 7 5 | V |
| Data Input Levels | | | V _{CC} +0.5 | V |
| Differential Data Input Voltage Swing | $V_{ID}pk-pk$ | | 5 | V |
| Operating Ambient Temperature | | 0 | 70 | °C |
| Storage Ambient Temperature | | -40 | 85 | °C |
| Soldering Conditions Temp/Time (MIL-STD 883C, Method 2003) | | | 250/10 | °C/s |

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.

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



Technical Data

Recommended Operating Conditions

| Symbol | Values | | | Unit |
|----------------------------------|--|--|--|---|
| | min. | typ. | p. max. | |
| T_{AMB} | 0 | | 70 | °C |
| V _{CC} -V _{EE} | 4.75 3.15 | 5 3.3 | 5.25 3.6 | V |
| I _{CC} | | | 250 | mA |
| | | | | |
| $V_{\rm IH} - V_{\rm CC}$ | -1100 | | -740 | mV |
| $V_{\rm IL} - V_{\rm CC}$ | -2000 | | -1580 | mV |
| t _R , t _F | 0.4 | | 1.3 | ns |
| | - | • | | • |
| λ _C | 1100 | | 1600 | nm |
| | T_{AMB} $V_{CC}-V_{EE}$ I_{CC} I_{CC} $V_{IH}-V_{CC}$ $V_{IL}-V_{CC}$ t_{R}, t_{F} | $\begin{tabular}{ c c c c c } \hline min. \\ \hline T_{AMB} & 0 \\ \hline $V_{CC} - V_{EE}$ \\ 4.75 \\ 3.15 \\ \hline I_{CC} \\ \hline $V_{IH} - V_{CC}$ & -1100 \\ \hline $V_{IL} - V_{CC}$ & -2000 \\ \hline t_{R}, t_{F} & 0.4 \\ \hline \end{tabular}$ | min. typ. T_{AMB} 0 $V_{CC} - V_{EE}$ 4.75 4.75 5 3.15 3.3 I_{CC} -1100 $V_{IL} - V_{CC}$ -2000 t_{R}, t_{F} 0.4 | min. typ. max. T_{AMB} 0 70 $V_{CC} - V_{EE}$ 4.75 5 5.25 3.15 3.3 3.6 I_{CC} 250 -740 $V_{IL} - V_{CC}$ -2000 -1580 t_{R}, t_{F} 0.4 1.3 |

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.

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

Transmitter Electro-Optical Characteristics

| Parameter | Symbol | Values | | | Unit |
|--|-----------------|-----------|------|------|------|
| | | min. | typ. | max. | |
| Launched Power (Average) ¹⁾ | Po | -15 | | -8 | dBm |
| Center Wavelength | λ _C | 1260 | | 1360 | nm |
| Spectral Width (RMS) | σι | | | 7.7 | nm |
| Extinction Ratio (Dynamic) | ER | 8.2 | | | dB |
| Reset Threshold ²⁾ | V _{TH} | 2.7 | | 2.9 | V |
| Eye Diagram ³⁾ | ED | Compliant | | | |

 $^{\scriptscriptstyle 1)}$ Into single mode fiber, 9 μm diameter.

²⁾ Laser power is shut down if power supply is below V_{TH} min. and switched on if power supply is above V_{TH} max.

³ Transmitter meets ANSI T1E1.2, SONET OC-3 and ITU-T G.957 mask patterns.



Technical Data

Receiver Electro-Optical Characteristics

| Parameter | Symbol | Values | | | Unit |
|---|-------------------------------|--------|------|------------|------|
| | | min. | typ. | max. | |
| Sensitivity (Average Power) ¹⁾ 5 V 3.3 V | P _{IN} | | -36 | -28 -31 | dBm |
| Saturation (Average Power) | P _{SAT} | -8 | | | dBm |
| Signal Detect Assert Level ²⁾ | P _{SDA} | | | -34 | dBm |
| Signal Detect Deassert Level ³⁾ | P _{SDD} | -44 | | | dBm |
| Signal Detect Hysteresis | $P_{\rm SDA} \ -P_{\rm SDD}$ | 1 | 2 | 5 | dB |
| Signal Detect Assert Time | t _{ASS} | | 75 | 100 | μs |
| Signal Detect Deassert Time | t _{DAS} | | 80 | 350 | μs |
| Output Low Voltage ⁴⁾ | $V_{\rm OL}-V_{\rm CC}$ | -2000 | | -1580 | mV |
| Output High Voltage ⁴⁾ | $V_{\text{OH}}-V_{\text{CC}}$ | -1100 | | -740 | mV |
| Output Data Rise/Fall Time, 20% - 80% | $t_{\rm R}, t_{\rm F}$ | | 1.1 | | ns |
| Output SD Rise/Fall Time | | | 10 | 40 | ns |

¹⁾ Minimum average optical power at which the BER is less than 1x10⁻¹⁰ or lower. Measured with a 2²³–1 NRZ PRBS as recommended by ANSI T1E1.2, SONET OC-3 and ITU-T G.957. BOL value –31 dBm max.

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, PECL for Signal Detect, PECL compatible. Load is 50 Ω into V_{CC} -2 V for data, 510 Ω to V_{EE} for Signal Detect. Measured under DC conditions. For dynamic measurements a tolerance of 50 mV should be added. V_{CC} = 5 V/3.3 V. T_{AMB} = 25°C.



Eye Safety

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 except for deviations pursuant to Laser Notice 50, dated July 26, 2001.

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

Attention: 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 | 1310 nm |
|--|---------|
| Accessible Emission Limit | 15.6 mW |
| (as defined by IEC: 7 mm aperture at 14 mm distance) | |

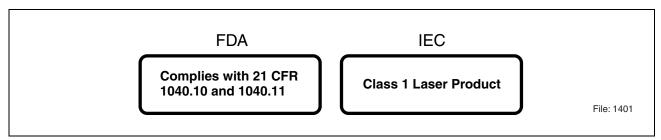


Figure 3 Required Labels

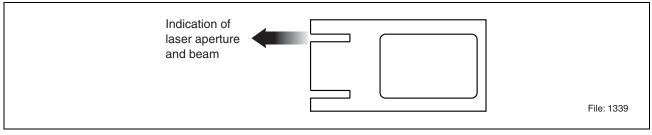


Figure 4 Laser Emission



Application Notes

Application Notes

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.

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.

V_{CC} SerDes 5 V / 3.3 V $V_{\mathsf{EE}}\mathsf{Tx}$ Vcc Е C6 TD+ Tx+ ECL/PECL Laser R10 Driver Driver TD Tx-R8 V_{CC}Tx V_{CC} 5 V / 3.3 V C1 Infineon Transceiver **V**CCRx 5 Serializer/ C3 Deserializer C2 Signal Detec SD SD to upper level R1 R2 R9 -1) Limiting RD+ RD+ 3 C4 Amplifier RD-Receiver PLL etc. -|| ^{C5} RD-RD-2 RD+ $V_{\mathsf{EE}}\mathsf{Rx}$ R5 ВЗ **R** C1/2/3 = 4.7 µF R10/11 $= 82 \Omega (5 V)$ C4/5/6/7 = 100 nF = 127 Ω (3.3 V) L1/2 $= 1 \mu H$ (depends on SerDes chip used) R5/6 $= 270 \Omega (5 V)$ Place R1/2/3/4 close to SerDes chip, depends on SerDes chip $= 150 \Omega (3.3 V)$ used, see application note of SerDes supplier. R7/8 $= 127 \Omega (5 V)$ Place R5/6/7/8/10/11 close to Infineon transceiver. 1) Design criterion of the capacitor used is the resonant $= 82 \Omega (3.3 V)$

Single Mode 155 Mbit/s ATM 1x9 Transceiver, DC/DC PECL Version

frequency and its value must be in the order of the nominal data rate. Short trace lengths are mandatory.

File: 1389

Figure 5

R9

(depends on SerDes chip used) $= 510 \Omega (5 V)$

 $= 270 \Omega (3.3 V)$



Application Notes

This application note assumes Fiber Optic transceivers using 5 V/3.3 V power supply and SerDes Chips using either 3.3 V or 5 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).

Value of R1...R4 may vary as long as proper 50 Ω termination to V_{EE} or 100 Ω differential is provided. The power supply filtering is required for good EMI performance. Use short tracks from the inductor L1/L2 to the module $V_{\text{CC}}\text{Rx}/V_{\text{CC}}\text{Tx}$. Further application notes for electrical interfacing are available upon request. Ask for Appnote 82.

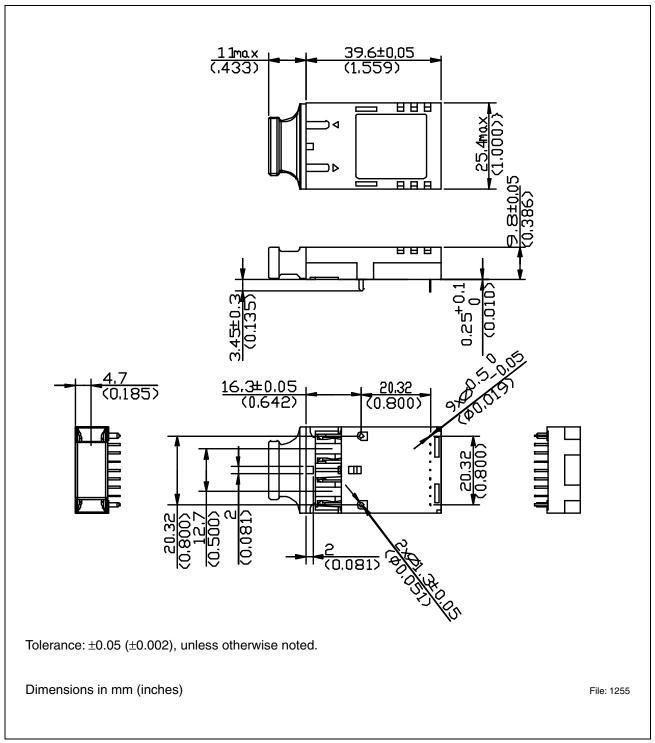
We strongly recommend a $V_{\rm EE}$ plane under the module for getting good EMI performance.

The transceiver contains an automatic shutdown circuit. Reset is only possible if the power is turned off, and then on again. ($V_{CC}Tx$ switched below V_{TH}).



Package Outlines

Package Outlines





V23836-C18-C63 V23836-C18-C363

| Revision History: | | 2004-02-13 | DS0 |
|--------------------------|----------|-------------------------------------|-----|
| Previous Ve | ersion: | none | |
| Page | Subjects | (major changes since last revision) | |
| | | | |

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