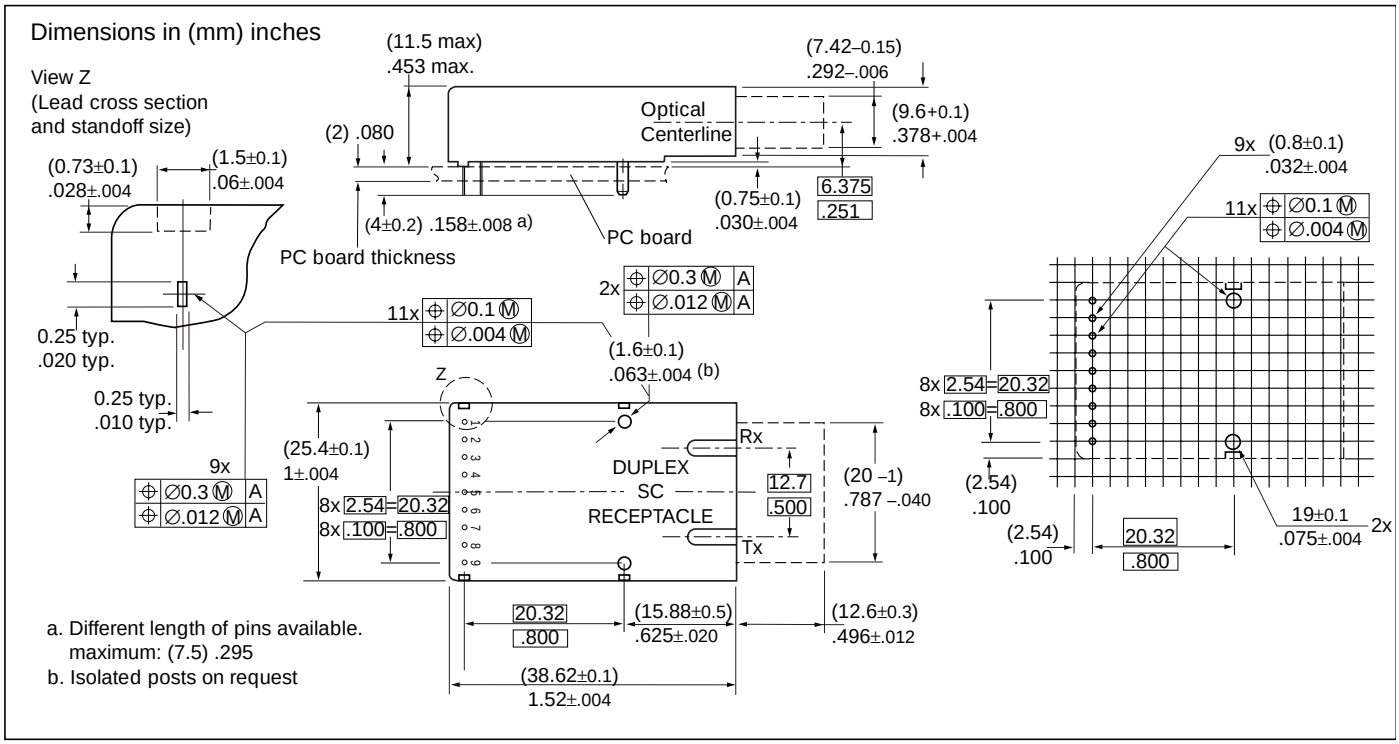
V23809-J17-C10

Single Mode 1.0625 GBd FC Laser Transceiver 1x9



FEATURES

- **Compliant with existing standards**
- **Compact integrated transceiver unit with**
  - **MQW laser diode transmitter**
  - **InGaAs PIN-photo diode receiver**
  - **Duplex SC receptacle**
- **Class 1 FDA and IEC laser safety compliant**
- **Single power supply (5 V)**
- **Signal detect indicator**
- **PECL differential inputs and outputs**
- **Wave solderable and washable with included process plug**
- **Performance exceeds FC 100-SM-LL-I**
- **Link length typical up to 10 Km**
- **Typical loss budget of more than 20 dB**

Maximum Ratings (Absolute maximum stress)

Exceeding any one of these values may destroy the device immediately. However, the electro-optical characteristics described in the following tables are only valid for use under the recommended operating conditions.

Package Power Dissipation (1)	1.5 W
Supply voltage (V_{CC}–V_{EE})	6 V
Data Input Levels (PECL)	V_{CC}–0.7 V
Differential Data Input Voltage	3 V
Operating Case Temperature	0 to 70°C
Storage Ambient temperature	–40°C to 85°C
Soldering Conditions Temp/Time (MIL-STD 883C, Method 2003)	250/5.5°C/s

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. Add max. 45 mA for the three outputs. Load is 50 Ω to V_{CC}–2 V.

DESCRIPTION

This data sheet describes the Siemens single mode FC transceiver, which complies with the Fibre Channel Physical and Signaling Interface (FC-PH), ANSI X3T11 Fiber Channel Physical Standard Class 100-SM-LL-I, Revision 4.3.

The appropriate fiber optic cable is 9 µm (mode field diameter) single mode fiber with Duplex SC connector.

The Siemens single mode FC transceiver is a single unit comprised of a transmitter, a receiver and an SC receptacle. It thereby frees the customer from many alignment and PC board layout concerns. The module is designed for low cost LAN and WAN applications. It can be used as the

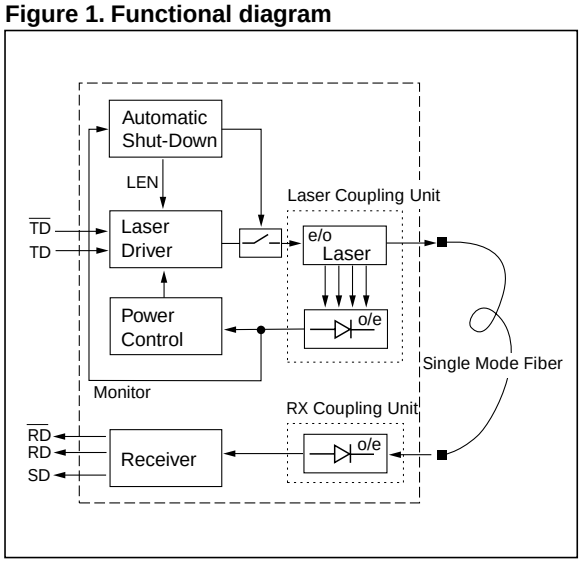
DESCRIPTION (continued) network end device interface in workstations, servers, and storage devices, and in a broad range of network devices such as bridges, routers, intelligent hubs, and local and wide area switches.

This transceiver operates at 1.0625 Gbits per second from a single power supply (+5 Volt). The full differential data inputs and outputs are PECL compatible.

Functional Description of 1x9 Pin Row Transceiver

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

Figure 1. Functional diagram



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

The transmitter converts electrical PECL compatible serial data (TD and TDnot) into optical serial data. It contains a laser driver circuit which drives the modulation and bias current of the laser diode. The currents are controlled by a power control circuit to guarantee a constant output power of the laser over temperature and aging. The power control uses the output of the monitor pin diode (mechanically built in the laser coupling unit) for the controlling function to prevent the laser power from exceeding the operating limits.

This module ensures single fault condition with an integrated automatic shutdown circuit, which disables the laser when it detects transmitter failures. A reset is only possible by turning the power off, then on again.

The transceiver contains a supervisory circuit to control the power supply. This circuit makes an internal reset signal whenever the supply voltage declines below the reset threshold. It keeps the reset signal active for at least 140 milliseconds after the voltage has risen above the reset threshold. During this time the laser is inactive.

Recommended Operating Conditions

Parameter	Symbol	Min.	Typ.	Max.	Units
Case Temperature	T_C	0		70	°C
Power Supply Voltage	V_{CC}–V_{EE}	4.75	5.0	5.25	V
Supply Current(1)	I_{CC}		150	300	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	100		750	ps
Receiver					
Input Center Wavelength	λ_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. 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
Launched Power (Average)(1)	P_O	–12	–7	–3	dBm
Center Wavelength	I_C	1274		1356	nm
Spectral Width (RMS)	σ_λ			3	
Relative Intensity Noise	RIN			–116	dB/Hz
Extinction Ratio (dynamic)	ER	9			dB

Note

1. Values will be modified to FC Standard; valid only for engineering samples.

Receiver Electro-Optical Characteristics

Receiver	Symbol	Min.	Typ.	Max.	Units
Sensitivity (Average Power)(1)	P_{IN}	–20	28.5		dBm
Saturation (Average Power)	P_{SAT}	–3	–4		
Signal Detect Assert Level(2)	P_{SDA}		–32		
Signal Detect Deassert Level(3)	P_{SDD}		–34		
Signal Detect Hysteresis	P_{SDA}– P_{SDD}		1.5		dB
Output LO Voltage(4)	V_{OL}–V_{CC}	–1950		–1600	mV
Output HI Voltage(4)	V_{OH}-V_{CC}	–980		–720	
Output Data Rise/Fall Time, 20–80%	t_R, t_F		300	375	ps
Return Loss of Receiver	A_{RL}	12			dB

Notes

1. Minimum average optical power at which the BER is less than 1 x 10E-12. Measured with a 2^{23}-1 NRZ PRBS.
2. An increase in optical power above the specified level will cause the SIGNAL DETECT output to switch from a LO state to a HI state.
3. A decrease in optical power below the specified level will cause the SIGNAL DETECT to change from a HI state to a LO state.
4. PECL 10K compatible. Load is 50 Ω into V_{CC} –2V. Measured under DC conditions. For dynamic measurements a tolerance of 50 mV should be added, V_{CC}=5 V.

PIN Description

Pin Name		Level/Logic	Pin#	Description
R_xV_{ee}	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	High level on this output shows there is an optical signal.
R_xV_{CC}	Rx +5 V	Power Supply	5	Positive power supply, +5 V
T_xV_{CC}	Tx +5 V		6	
TDn	Tx Input Data	PECL Input	7	Inverted transmitter input data
TD			8	Transmitter input data
T_xV_{ee}	Tx Ground	Power Supply	9	Negative power supply, normally ground
Case	Ground		S1/2	CASE/V_{EE}, Support Stud (GND)

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 transceiver must be operated under the recommended operating conditions.

Caution

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

General Restrictions

Classification is valid only if the module is operated within the specified temperature and voltage limits. The system using the module must provide power supply protection that guarantees that the system power source will cease to provide power if the maximum recommended operation limit or more is detected on the +5 V at the power source. The temperature of the module case must be in the temperature range given in the recommended operating limits. These limits guarantee the laser safety.

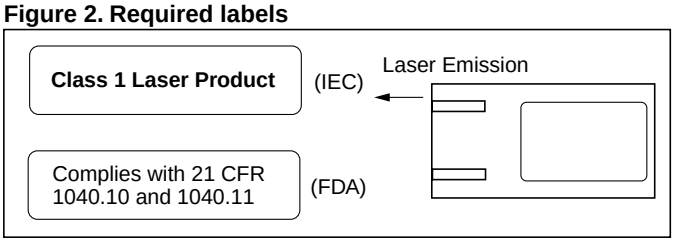
Usage Restrictions

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

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)).

Figure 2. Required labels

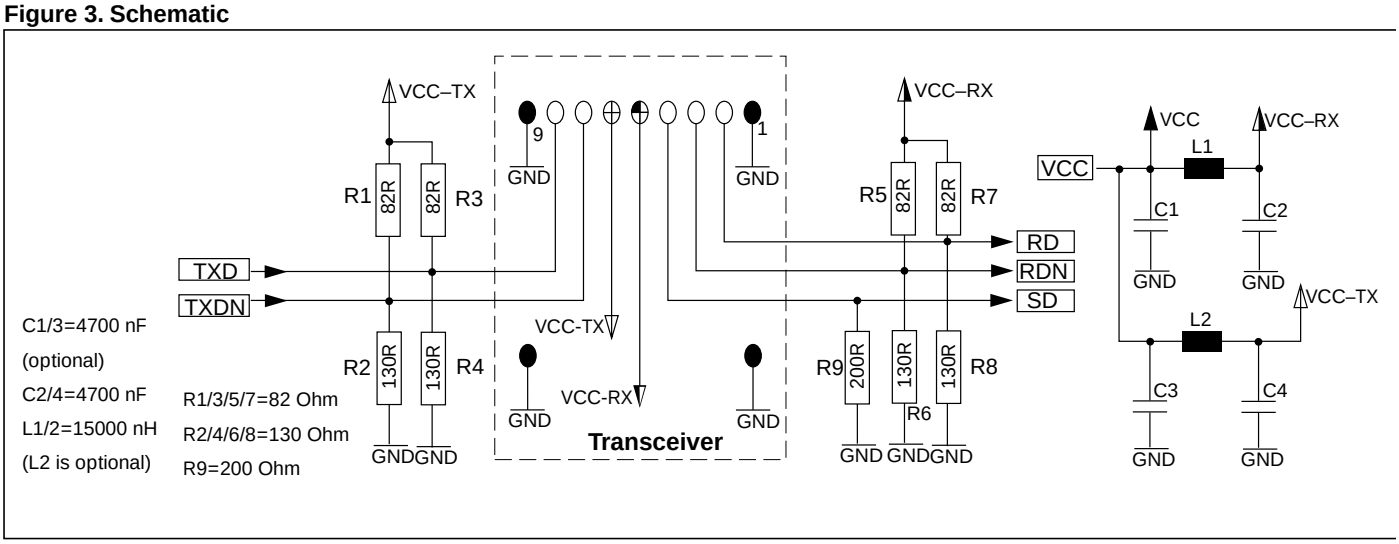


Laser Data

Wavelength	1300 nm
Total output power (as defined by IEC: 50 mm aperture at 10 cm distance)	1 mW
Total output power (as defined by FDA: 7 mm aperture at 20 cm distance)	180 µW
Beam divergence	4°

APPLICATION NOTE FOR 1X9 PIN ROW TRANSCEIVER

Figure 3. Schematic



The power supply filtering is required for good EMI performance. Use short tracks from the inductor L1/L2 to the module VCC-RX/VCC-TX.

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

Application board available.