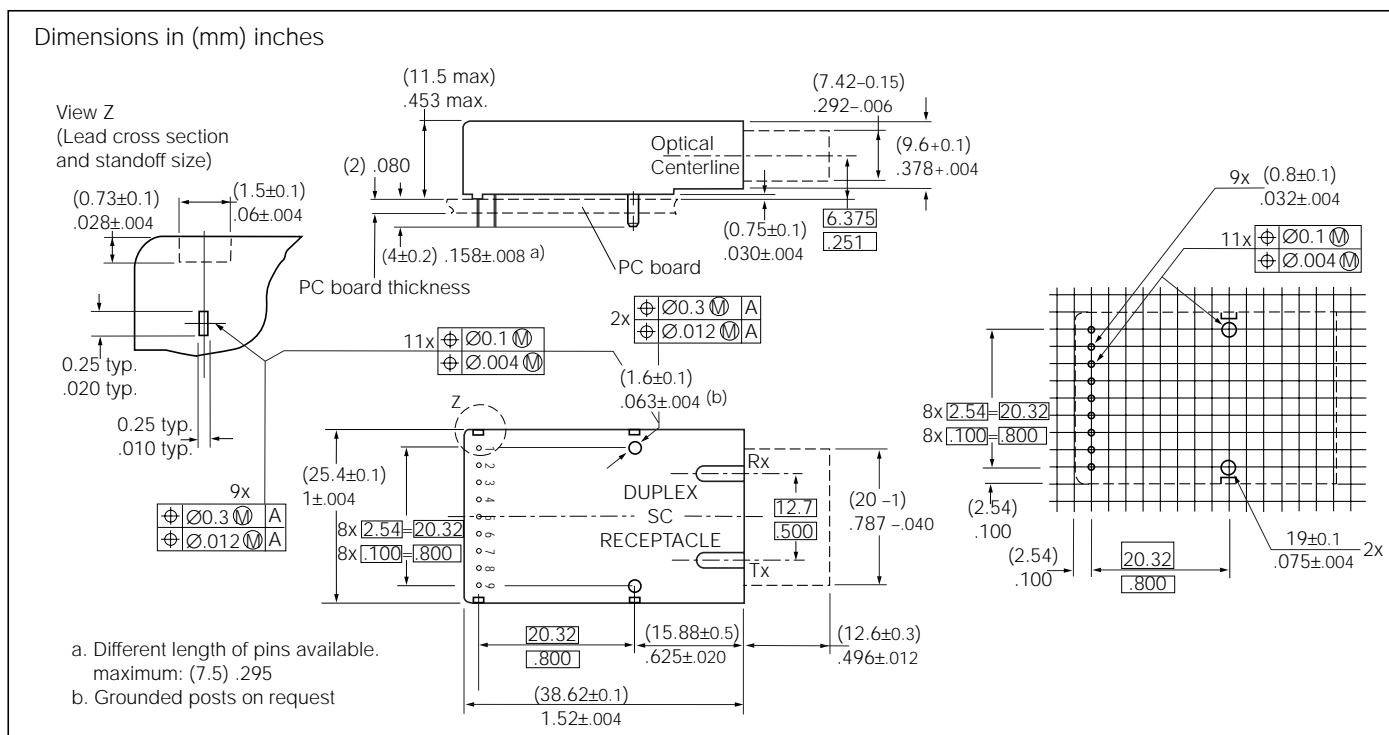


SIEMENS

5 V V23809-K15-C10 3.3 V V23809-K15-C310 1300 nm Single Mode 1.3 Gb/s Gigabit Ethernet Transceiver 1x9

Preliminary Data Sheet



FEATURES

- Compliant with existing standards (IEEE Draft P 802.3z/D1)
- 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 and 3.3 V)
- Signal detect indicator
- PECL differential inputs and outputs
- Wave solderable and washable
- Process plug included
- For distances of up to 3 km on single mode fiber, and up to 500 m (under development) on multimode fiber

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⁾	Tbd
Supply voltage ($V_{CC}-V_{EE}$)	6 V
Data Input Levels (PECL)	$V_{CC}-0.5$ 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 Siemens single mode transceiver. It is based on the Physical Medium Depend (PMD) sublayer and baseband medium, type 1000BASE-LX (Long Wavelength Laser).

The appropriate fiber optic cable is 9mm (mode field diameter) single mode fiber (up to 3 km) with Duplex SC connector.

The Siemens single mode 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

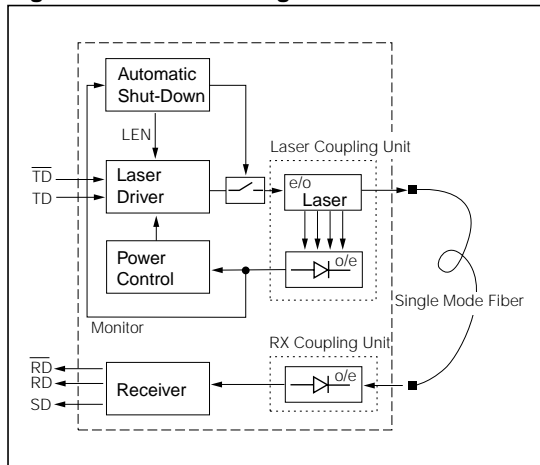
for low cost LAN, WAN and Gigabit Ethernet applications. It can be used as the network end device interface in mainframes, workstations, servers, and storage devices, and in a broad range of network devices such as bridges, routers, intelligent hubs, and local and wide area switches.

This transceiver operates at 1.3 Gbits per second from a single power supply (+5 Volt or 3.3 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 into the laser coupling unit) for the controlling function to prevent the laser power from exceeding the operating limits.

This module assures 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	K15–C10	V _{CC} –V _{EE}	4.75	5.0	5.25	V
	K15–C310		3	3.3	3.6	
Supply Current ⁽¹⁾	K15–C10	I _{CC}		tbd	tbd	mA
	K15–C310				tbd	

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	1270		1355	nm
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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 $50\ \Omega$ to $V_{CC}-2\ \text{V}$.

Electro-Optical Characteristics

Transmitter	Symbol	Min.	Typ.	Max.	Units
Launched Power (Average) ⁽¹⁾	P_O	-13		-3	dBm
Center Wavelength	λ_C	1270		1355	nm
Spectral Width (RMS)	$\sigma\lambda$			4	
Relative Intensity Noise	RIN			-116	dB/Hz
Extinction Ratio (dynamic)	ER	9			dB
Reset Threshold ⁽²⁾	T_{th}		2.9		V
Reset Time Out ⁽²⁾	T_{res}	140	240	560	ms
Receiver	Symbol	Min.	Typ.	Max.	Units
Sensitivity (Average Power) ⁽³⁾	P_{IN}		-22	-20	dBm
Saturation (Average Power)	P_{SAT}			-3	
Signal Detect Assert Level ⁽⁴⁾	P_{SDA}		TBD		
Signal Detect Deassert Level ⁽⁵⁾	P_{SDD}	TBD			
Signal Detect Hysteresis	$P_{SDA}-P_{SDD}$		1.5		dB
Output LO Voltage ⁽⁶⁾	$V_{OL}-V_{CC}$	-1950		-1600	mV
Output HI Voltage ⁽⁶⁾	$V_{OH}-V_{CC}$	-980		-720	
Output Data Rise/Fall Time, 20-80%	t_R, t_F			375	ps
Return Loss of Receiver	A_{RL}	12			dB

Notes

- Into single mode fiber, $9\ \mu\text{m}$ diameter
- 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} .
- Minimum average optical power at which the BER is less than 1×10^{-12} or lower. Measured with a 2^7-1 NRZ PRBS and $ER=9\ \text{dB}$.
- 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.
- A decrease in optical power below the specified level will cause the SIGNAL DETECT to change from a HI state to a LO state.
- PECL 10K compatible. Load is $50\ \Omega$ into $V_{CC}-2\ \text{V}$. Measured under DC conditions. For dynamic measurements a tolerance of 50 mV should be added. $V_{CC}=5\ \text{V}$.

PIN Description

Pin Name		Level/Logic	Pin#	Description
R _x V _{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 _x V _{CC}	Rx3 V/5 V	Power Supply	5	Positive power supply, 3 V/5 V
T _x V _{CC}	Tx3 V/5 V		6	
TDn	Tx Input Data	PECL Input	7	Inverted transmitter input data
TD			8	Transmitter input data
T _x V _{ee}	Tx Ground	Power Supply	9	Negative power supply, normally ground
Case	Support	Mech. Support	S1/2	Support stud (floating)

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 only valid 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.

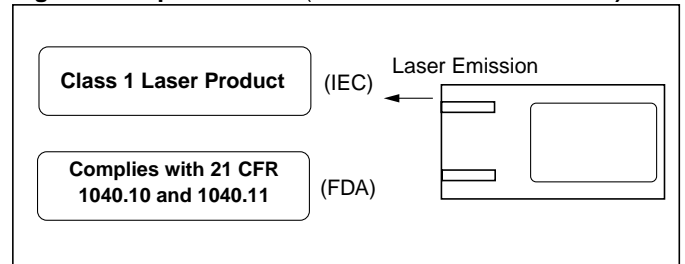
Usage Restrictions

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

Figure 2. Required labels (to be defined for U.S. market)

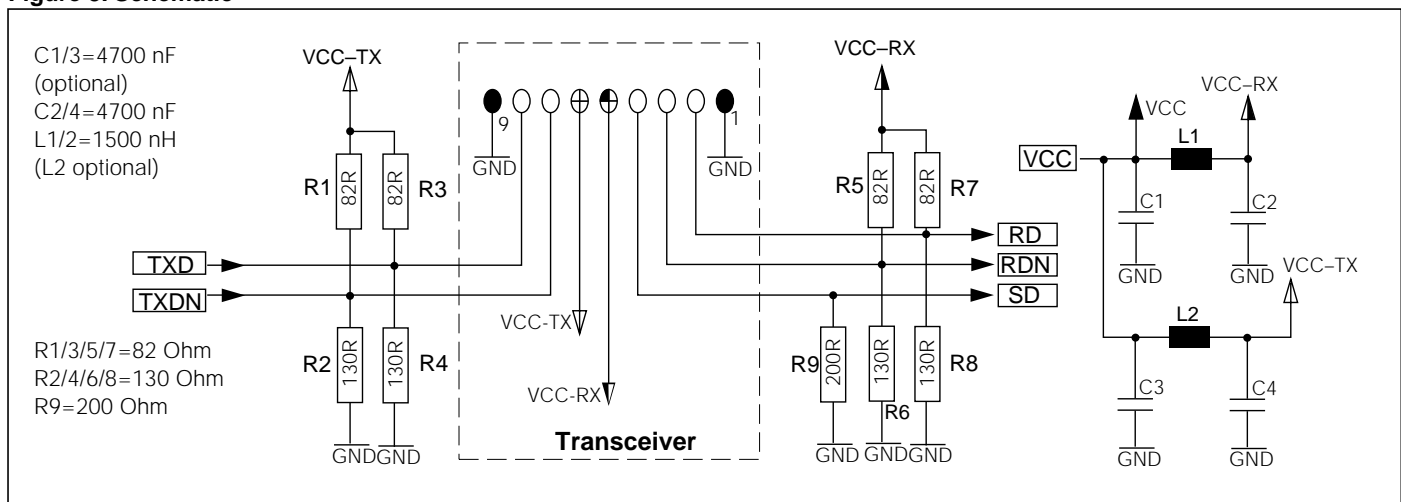


Laser Data

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°

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 (VCC-TX switched below V_{TH}).