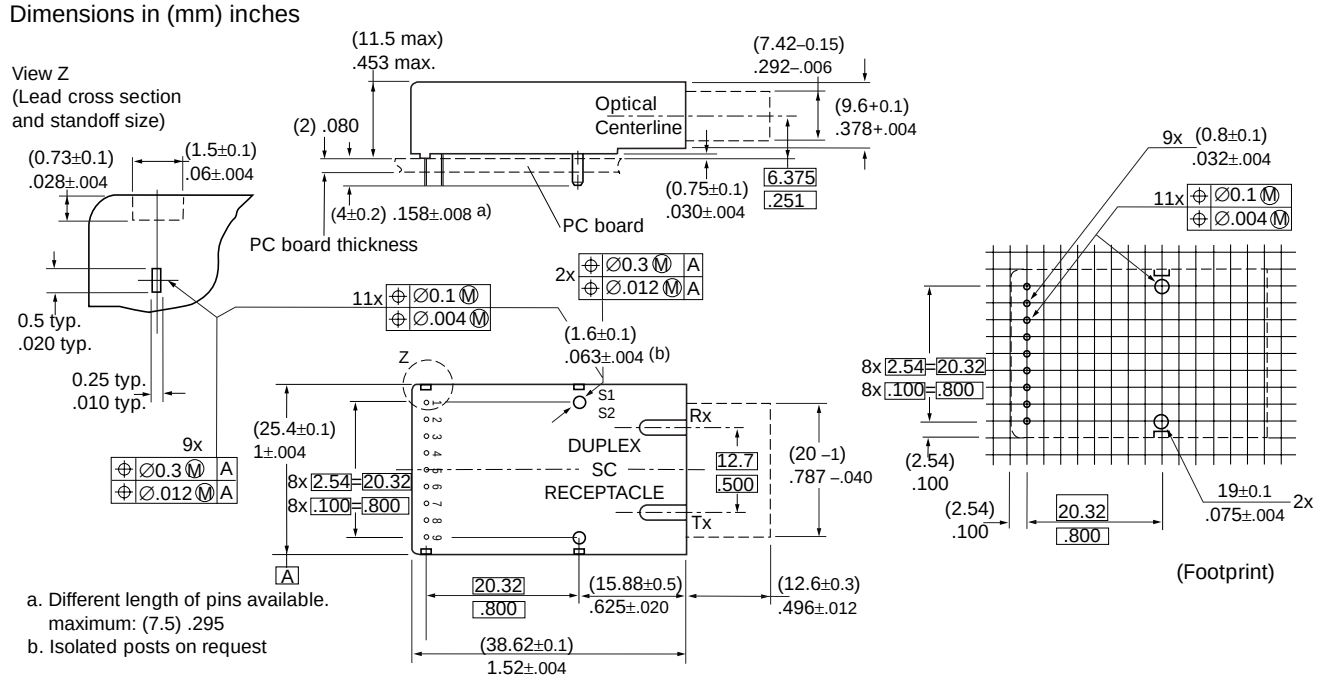
SIEMENS

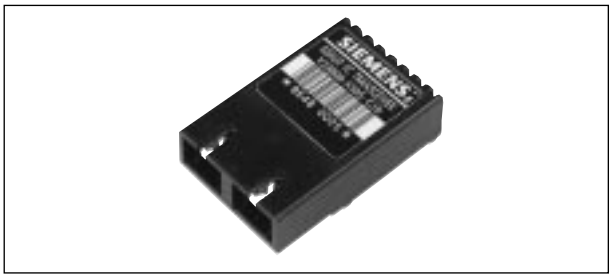
# 5 V V23809-K305-C10
# 3.3 V V23809-K305-C310

## 850 nm Multimode 1.3 GBd Gigabit Ethernet Transceiver 1x9

**Preliminary Data Sheet**




a. Different length of pins available.
maximum: (7.5) .295
b. Isolated posts on request



### FEATURES

- **Compliant with existing standards (IEEE Draft P 802.3z/D2)**
- **Compact integrated transceiver unit with**
  - **VCSEL laser diode transmitter**
  - **Integrated 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 300 m on multimode fiber**

### Maximum Ratings

| | |
|---|---|
| Package Power Dissipation (1) | 1.5 W |
| 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 Gigabit Ethernet multimode transceiver. It is based on the Physical Medium Depend (PMD) sublayer and baseband medium, type 1000BASE-SX (short wavelength).

The appropriate fiber optic cable is 62.5 mm or 50 mm multimode fiber with duplex SC connector.

The Siemens Gigabit Ethernet multimode 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

*(continued next page)*

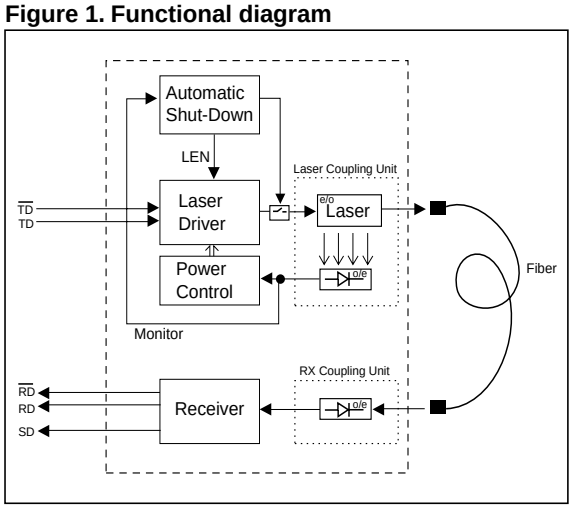
*(continued from previous page)* interface in mainframes, workstations, servers, and storage devices, and in a broad range of network devices such as bridges, routers, intelligent hubs, and local and wide area switches.

This transceiver operates at 1.3 Gbits per second from a single power supply (+5 V or 3.3 V). 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 multimode 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.

## TECHNICAL DATA

### Recommended Operating Conditions

| Parameter | | Symbol | Min. | Typ. | Max. | Units |
|---|---|---|---|---|---|---|
| Case Temperature | | $T_C$ | 0 | | 70 | ˚C |
| Power Supply Voltage | (K305–C10) | $V_{cc}$–$V_{ee}$ | 4.75 | 5.0 | 5.25 | V |
| | (K305–C310) | | 3.0 | 3.3 | 3.6 | |
| Supply Current | (K305–C10)(1) | $I_{cc}$ | | TBD | TBD | mA |
| | (K301–C310)(1) | | | | 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 | | $\lambda_C$ | 1270 | | 1355 | mm |

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.

### Electro-Optical Characteristics

| Transmitter | Symbol | Min. | Typ. | Max. | Units |
|---|---|---|---|---|---|
| Launched Power (Average)(1) | $P_o$ | –10 | | –4 | dBm |
| Center Wavelength | $I_c$ | 830 | 850 | 860 | nm |
| Spectral Width (RMS) | $\sigma_\lambda$ | | | 0.85 | |
| Relative Intensity Noise | RIN | | | –117 | dB/Hz |
| Extinction Ratio (dynamic) | ER | 9 | | | dB |
| Reset Threshold(2) | $V_{th}$ | | 2.9 | | V |
| Reset Time Out(2) | $T_{res}$ | 140 | 240 | 560 | ms |
| **Receiver** | **Symbol** | **Min.** | **Typ.** | **Max.** | **Units** |
| Sensitivity (Average Power)(3) | $P_{IN}$ | | –19 | –17 | dBm |
| Saturation (Average Power) | $P_{SAT}$ | | | 0 | |
| Signal Detect Assert Level(4) | $P_{SDA}$ | | TBD | TBD | |
| Signal Detect Deassert Level(5) | $P_{SDD}$ | TBD | 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

1. Into multimode fiiber, 62.5 µm or 50 µm diameter.
2. Laser power is shut down if power supply is below $V_{TH}$ and switched on if power supply is above $V_{TH}$ after $T_{res}$.
3. Minimum average optical power at which the BER is less than 1 x 10E-12 or lower. Measured with a $2^7$-1 NRZ PRBS and ER=9dB.
4. 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.
5. A decrease in optical power below the specified level will cause the SIGNAL DETECT to change from a HI state to a LO state.
6. PECL 10K compatible. Load is 50 Ω into $V_{cc}$–2 V. 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 |
|---|---|---|---|---|
| RxVee | Rx Ground | Power Supply | 1 | Negative power supply, normally ground |
| RD | Rx Output Data | PECL Output | 2 | Receiver output date |
| RDn | | | 3 | Inverted receiver output data |
| SD | RX Signal Detect | PECL Outpu active high | 4 | A high level on this output shows that there is an optical signal. |
| RxVcc | Rx 3V/5V | Power Supply | 5 | Positive power supply, 3 V/5 V |
| TxVcc | Tx 3V/5V | | 6 | |
| TDn | Tx Input Data | PECL Input | 7 | Inverted transmitter input data |
| TD | | | 8 | Transmitter input data |
| TxVee | Tx Ground | Power Supply | 9 | Negative power supply, normally ground |
| Case | Support | Mech. Support | S1/2 | Support stud (floating) |

## LASER SAFETY

This multimode Gigabit Ethernet 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 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 +5V at the power source. The temperature of the module case must be in the temperature range given in the recommended case operating limits. These limits guarantee the laser safety.

### Usage Restrictions

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

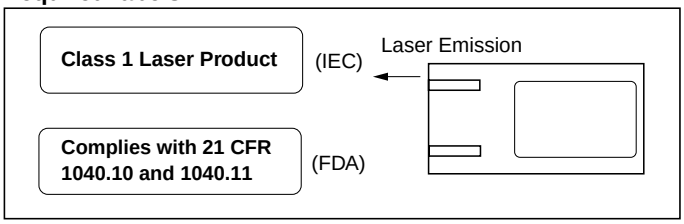
Note:

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)).

### Laser data

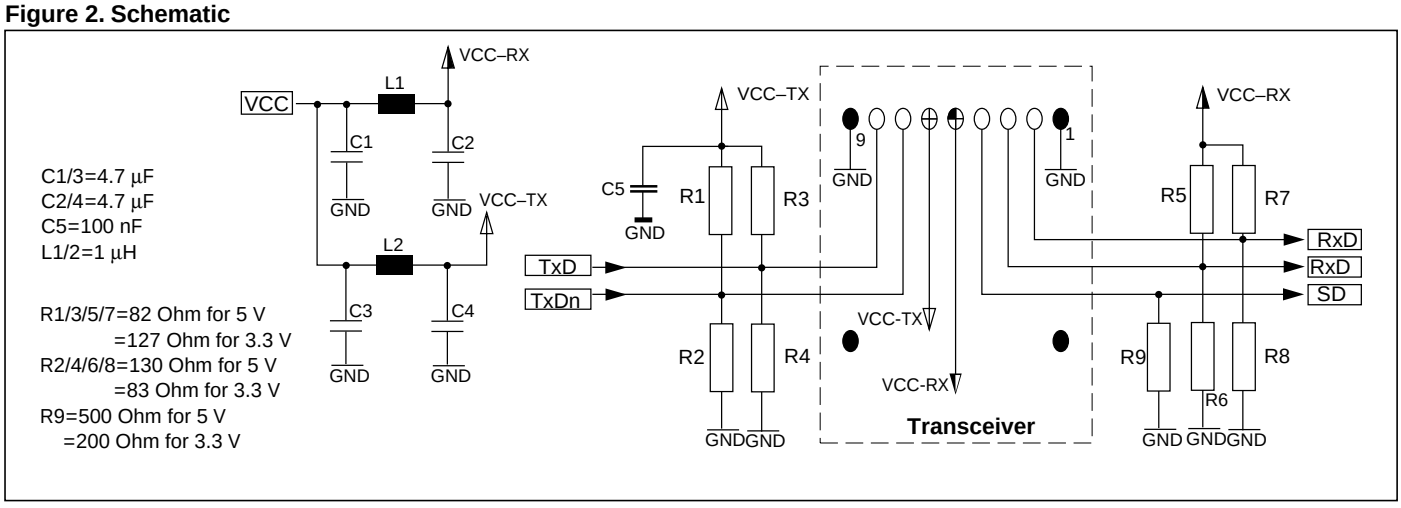
| | |
|---|---|
| Wavelength | 850 nm |
| Total output power (as defined by IEC: 50 mm aperture at 10 cm distance) | <380 µW |
| Total output power (as defined FDA: 7 mm aperture at 20 cm distance) | <70 µW |
| Beam divergence | 12° |

### Required labels




## APPLICATION NOTE FOR 1X9 PIN ROW TRANSCEIVER

**Figure 2. Schematic**




The power supply filtering is required for good EMI performance. Use short tracks from the inductor L1/L2 to the module $V_{CC}$–RX/$V_{CC}$–TX.The transceiver contains an automatic shutdown circuit. Reset is only possible if the power is turned off, then on again. ($V_{CC}$–TX switched below $V_{TH}$). **Application board available on request.**