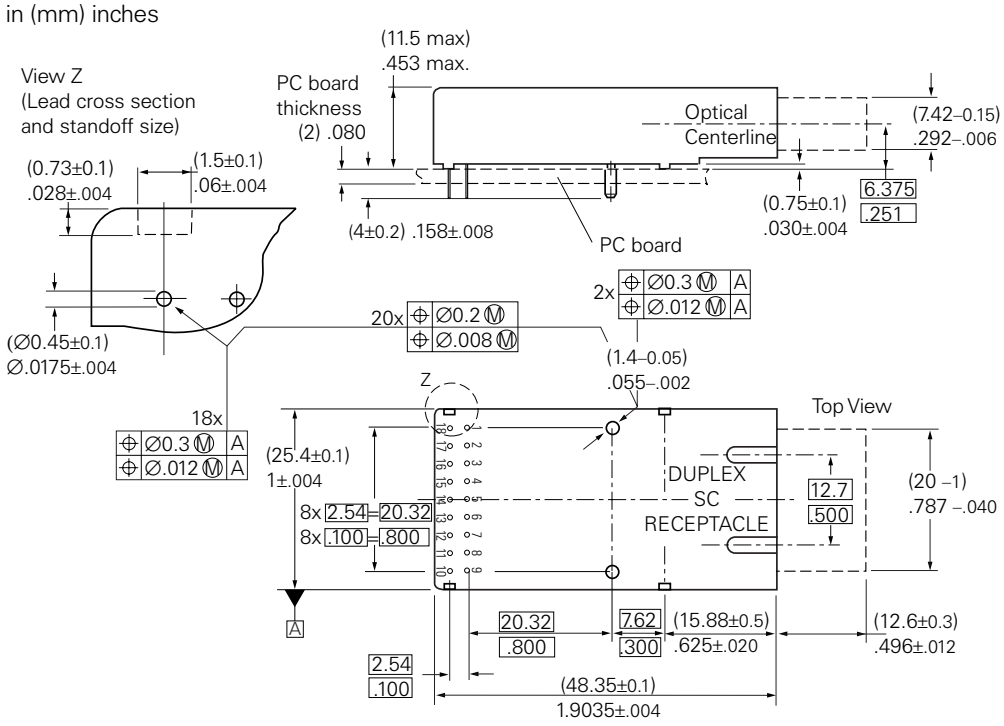
SIEMENS

V23806-A84-C1

Single Mode 155 MBd ATM 2x9 Transceiver

Dimensions in (mm) inches



FEATURES

- **Compliant with existing standards**
- **Compact integrated transceiver unit with**
  - **MQW laser diode transmitter**
  - **InGaAs PIN photodiode receiver**
  - **Duplex SC receptacle**
- **Class 1 FDA laser safety compliant**
- **FDA Accession No. 9520890**
- **IEC Class 3B laser safety compliant**
- **May be upgraded to IEC Class 1 laser safety compliance with external laser shutdown**
- **Single power supply (5V)**
- **Loss of optical signal indicator**
- **Integrated clock recovery module (PLL)**
- **PECL differential inputs and outputs**
- **Process plug included**
- **Wave solderable and washable with process plug inserted**

Absolute Maximum Ratings

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

Package Power Dissipation(1) ..... 1.5 W
Supply Voltage (V_{CC}–V_{EE}) ..... 6 V
Data Input Levels ..... V_{EE} to V_{CC}+0.5 V
Differential Data Input Voltage ..... –2.5 V to 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. Add max. 45 mA for the three outputs. Load is 50 Ω to V_{CC}–2 V.

Pin Description

Pin#	Name	Pin#	Name	Pin#	Name
1	Rx V_{EE}	8	Tx D	14	Pwr Mon
2	Rx D	9	Tx V_{EE}	15	NC
3	Rx Dn	10	NC	16	NC
4	SD	11	Tx Alm	17	NC
5	Rx V_{CC}	11	Tx Alm	18	NC
6	Tx V_{CC}	12	Tx En	S1, S2	V_{EE} (GND)
7	Tx Dn	13	Bias Mon		

DESCRIPTION

This data sheet describes the Siemens single mode ATM transceiver, which 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.

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.

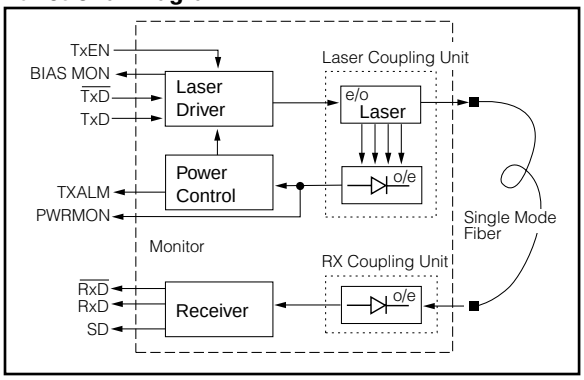
This Siemens single mode ATM transceiver is a single unit comprised of a transmitter, a receiver, and an SC receptacle. This design frees the customer from many alignment and PC board layout concerns. The module is designed for low cost WAN applications. It can be used as the network end device interface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

The transceiver operates at 155.520 Mbits per second from a single power supply (+5 Volt). The full differential data inputs and data and clock outputs are PECL compatible.

Functional Description of 2x9 Pin Row Transceiver

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

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. If no optical input signal is present the receiver data outputs are switched to static low level (RD=low, RDnot=high).

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.

The laser can be switched on with a logical high signal on the Laser Enable pin (LEN). The PWRMON pin shows a voltage reflecting the optical power output. The bias current is monitored on the BIASMON pin. Both signals can be used to supervise the function of the module.

The signal TXALM indicates an increase of the optical output power by more than 2dB. Aging control is possible using the bias monitor output (BIASMON).

To build an IEC Class 1 laser system it is necessary to use an application circuit to switch off the laser if a fault occurs.

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}	4.75	5.0	5.25	V
Supply Current(1)	I_{CC}		150	250	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, 10%–90%	t_R, t_F	0.4		1.3	ns
TxEN Input High Voltage	V_{TIH}	2			V
TxEN Input Low Voltage	V_{TIL}			0.8	
TxEN Input High Current	V_{TIH}			0.8	mA
TxEN Input Low Current	V_{TIL}	–1			
TxALM Output High Voltage	V_{TOH}	3.2			V
TxALM Output Low Voltage	V_{TOL}			0.7	
TxALM Output High Current	I_{TOH}	–3			mA
TxALM Output Low Current	I_{TOL}			3	
Receiver					
Output Current	I_O			25	mA
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
Output Power (Average)	P_O	–15	–11	–8	dBm
Center Wavelength	λ_C	1260		1360	nm
Spectral Width (FWHM)	Δ_λ			7.7	
Output Rise Time	t_R			2.5	ns
Output Fall Time	t_F			3	
Extinction Ratio (Dynamic)	ER	8.2			dB
Eye Diagram(1)					

Note

1. Transmitter meets ANSI T1E1.2, SONET OC-3, and ITU G957 mask patterns.

Receiver Electro-Optical Characteristics

Receiver	Symbol	Min.	Typ.	Max.	Units
Sensitivity (Average Power)(1)	P_{IN}		-33	–29.0	dBm
Saturation (Average Power)	P_{SAT}	–8	–7		
Signal Detect Assert Level(2)	P_{SDA}		–36	–33	
Signal Detect Deassert Level(3)	P_{SDD}	–42	37.5		
Signal Detect Hysteresis	P_{SDA}–P_{SDD}		1.5		dB
Signal Detect Assert Time(4)	t_{ASS}		1		ms
Signal Detect Deassert Time(5)	t_{DAS}		5		
Output Low Voltage(6)	V_{OL}–V_{CC}	–1950		–1630	mV
Output High Voltage(6)	V_{OH}–V_{CC}	–1025		–735	
Output Data Rise /Fall Time, 10%–90%	t_R, t_F			1.3ns	ns
Output SD Rise/Fall Time(7)				40ns	

Notes

1. Minimum average optical power at which the BER is less than 1x10E–10. Measured with a 2^{23}–1 NRZ PRBS as recommended by ANSI T1E1.2, SONET OC-3, and ITU G.957.
2. An increase in optical power above the specified level will switch the SIGNAL DETECT from a Low state to a High state.
3. A decrease in optical signal below the specified level will switch the SIGNAL DETECT from a High state to a Low state.
4. Measured by switching the light from <–40 dBm to –25 dBm.
5. Measured by switching the light from –25 dBm to <–40 dBm. Switching from higher power levels increases this time.
6. PECL compatible. Load is 50 Ω into V_{CC} –2 V. Measured under DC conditions at 25°C. For dynamic measurements a tolerance of 50 mV should be added, V_{CC}=5 V.
7. PECL compatible. A high level on this output shows that an optical signal is applied to the optical input.

Pin Description 2x9 Pin Row

Pin Name		Level	Pin #	Description
RxV_{EE}	Rx Ground	Power Supply	1	Negative power supply, normally ground
RxD	Rx Output Data	PECL Output	2	Receiver output data
RxDn			3	Inverted receiver output data
SD	RX Signal Detect	PECL-Output active high	4	High level on this output shows an optical signal is applied to the optical input.
RxV_{CC}	Rx +5 V	Power Supply	5	Positive power supply, +5 V
TxV_{CC}	Tx +5 V		6	
TxDn	Tx Input Data	PECL Input	7	Inverted transmitter input data
TxD			8	Transmitter input data
TxV_{EE}	Tx Ground	Power Supply	9	Negative power supply, normally ground
NC			10	Pin not connected
Tx Alm	Tx+2dB Alarm	TTL Output active high	11	High level on this output indicates an increase of optical operating power output of+2 dB.
TxEn	Tx Enable	TTL-Input active high	12	High level on this input switches the laser on. High>2.0; Low<0.8
Bias Mon	Bias Monitor	Analog Voltage	13	Shows an analog voltage that is proportional to the laser bias current. Use to check proper laser operation and for end of life indications. Limit: Bias Current I_{BIAS}<60mA Output Voltage V_O=V_{CC}–I_{BIAS} * 42 Ω, Source Resistance R_S=500 Ohm
Pwr Mon(1)	Power Monitor		14	Shows an analog voltage that is proportional to the light output and can be used for laser safety functions. Output Voltage Vmon=2.0±0.2 V, Source Resistance R_S=100 kΩ
NC			15–18	Pins not connected

Note

1. For laser fault supervision, check that this output meets the criteria 1.5 V<V_{OUT}<2.5 V. If it does not, switch off laser via TX En pin.

LASER SAFETY

This single mode ATM transceiver is an FDA Class 1 laser product. It complies with FDA 21 CFR 1040.10 and 1040.11.

This transceiver is an IEC Class 3B laser product per IEC 825-1. It may be upgraded to an IEC Class 1 laser product when operated with external shutdown circuitry in accordance with the Application Note in this document.

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 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 +5V at the power source. The operating temperature of the module 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 shall be terminated with an optical connector or with a dust plug.

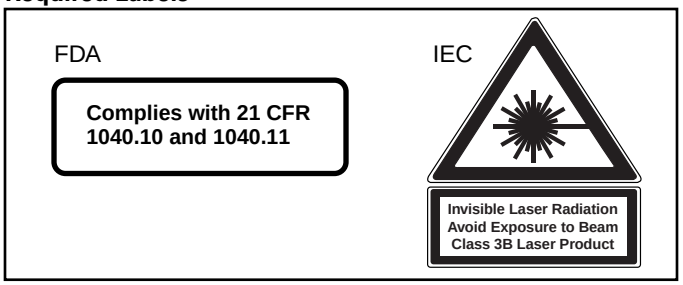
Note

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)).

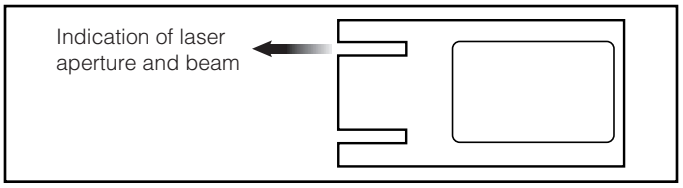
Laser Data

Wavelength	1300 nm
Total output power (as defined by IEC: 50 mm aperture at 10 cm distance)	2 mW
Maximum output power (as defined by IEC 825-1 under fault condition)	30 mW
Total output power (as defined by FDA: 7 mm aperture at 20 cm distance)	180 µW
Beam divergence	4°

Required Labels



Laser Emission

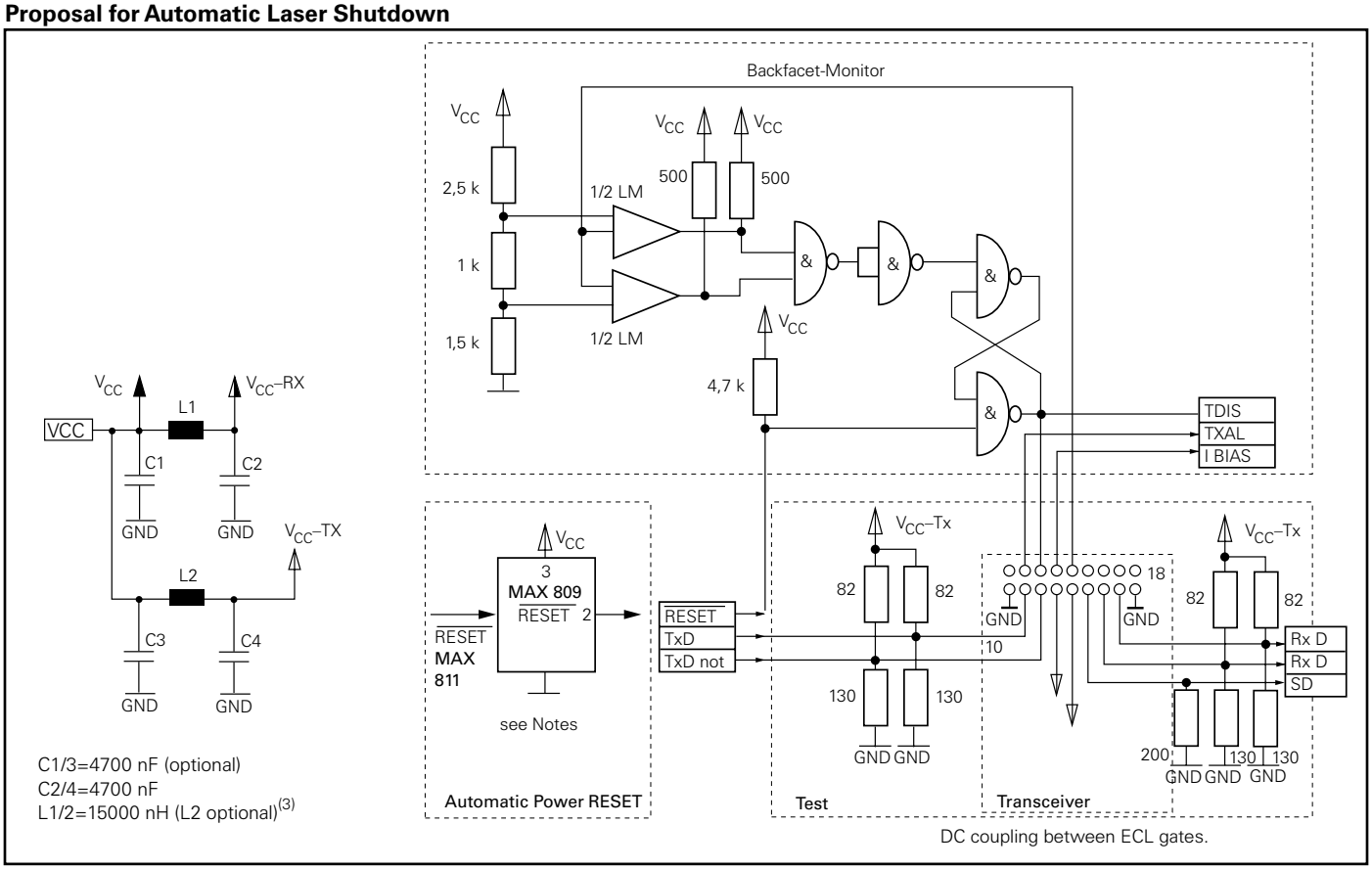


Regulatory Compliance

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 ±15kV 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 10 V/m rms, noise frequency ranges from 10 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 1 GHz

APPLICATION NOTE FOR 2X9 PIN ROW TRANSCEIVER

Proposal for Automatic Laser Shutdown



Notes

1. Minimum length of RESET pulse is 3 ms.
2. After switch on (V_{CC}) manual RESET necessary or automatic RESET with IC (e. g. MAX 809).
3. Recommended choke is Siemens Matsushita B78108-S1153-K or B78148 S1153-K (Q_{min}=60, max. DC resistance=0.6 Ohm)

$\overline{\text{RESET}}$	Function	C	Laser	TDIS
low	Norm	high	ON	high
	Fail	low		
high	Norm	high		high*
	Fail	low	OFF	low

Depends on previous flip-flop state.

The shutdown circuit checks the monitor voltage (PWRMON). A deviation of ±0.5 V shuts down the laser in the circuit shown above. The transceiver can be reenabled using the reset circuit.

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.

A GND plane under the module is required for good EMI and sensitivity performance. Studs must be connected to this GND plane.