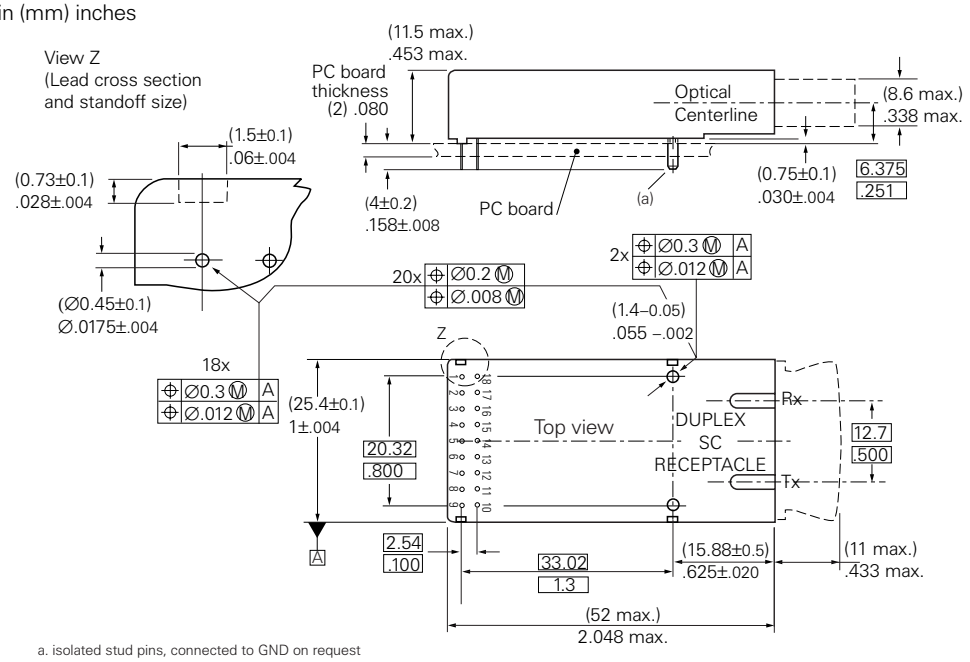
SIEMENS

V23806-A84-C51

Single Mode 622 MBd ATM 2x9 Transceiver with Clock Recovery

Dimensions in (mm) inches



a. isolated stud pins, connected to GND on request

FEATURES

- **Compliant with existing standards**
- **Compact integrated transceiver unit with**
  - **– MQW laser diode transmitter**
  - **– InGaAs PIN photodiode receiver**
  - **– Duplex SC receptacle**
- **Class 1 FDA and IEC laser safety compliant**
- **FDA Accession No. 9520890-03**
- **Single power supply (+5 V)**
- **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)	Tbd W
Supply Voltage (V_{CC}–V_{EE})	6 V
Data Input Levels	V_{EE} to V_{CC}
Differential Data Input Voltage	–2.5 V to 2.5 V
Operating Case Temperature	0 °C to 70 °C
Storage Ambient Temperature	–40 °C to 85 °C
Soldering Conditions Temp/Time (MIL-STD 883 C 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.

DESCRIPTION

The Siemens 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.

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.

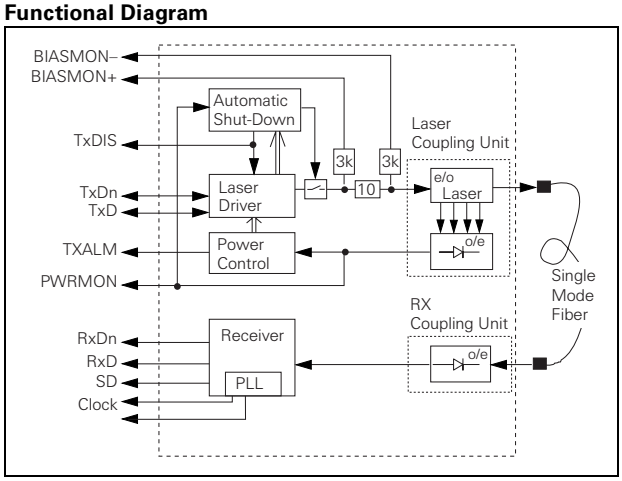
This Siemens single mode ATM transceiver is a single unit comprised of a transmitter, a receiver, a clock recovery module, and an SC receptacle. This design frees the customer from many alignment and PC board layout concerns. The module is designed for low cost WAN applications. It can be used as the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

This transceiver operates at 622.080 Mbits per second from a single power supply (+5 Volt). The differential data inputs, data outputs, clock outputs and signal detect output 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 (RxD and RxDn). It provides also a recovered in-phase clock and clock not signal. 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 part converts electrical PECL compatible serial data (TxD and TxDn) 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 off with a logical high signal on the Transmitter Disable pin (TxDIS). The PWRMON pin shows a voltage reflecting the optical power output. The bias current is monitored on the BIASMON pins. Both signals can be used to supervise the function of the module.

The signal TXALM (optional) indicates an increasing of the optical output power of more than 2dB. Aging control is possible using the bias monitor output (BIASMON). The module has an integrated shutdown function that switches the laser off in the event of an internal failure.

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
Case Temperature	T_C	0		70	°C
Power Supply Voltage	V_{CC}–V_{EE}	4.75	5	5.25	V
Supply Current(1)	I_{CC}		230	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	0.4		1.3	ns
TxDis Input High Voltage	V_{TIH}	2			V
TxDis Input Low Voltage	V_{TIL}			0.8	
TxDis Input High Current	V_{TIH}			0.8	mA
TxDis 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. 75 mA for the five 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	–15.0	–11.0	–8.0	dBm
Center Wavelength	λ_C	1274		1356	nm
Spectral Width, RMS	σ_λ			2.5	
Output Rise Time, 20%–80%	t_R		240	700	ps
Output Fall Time, 20%–80%	t_F		240	700	
Extinction Ratio (Dynamic)	ER	8.2			dB
Eye Diagram(1)	ED				
Reset Threshold for TxV_{CC}(2)	V_{TH}	4.25	4.38	4.5	V
Reset Active Time Out(2)	t_{RES}	140	240	560	ms

Notes

1. Transmitter meets ANSI T1E1.2, SONET OC-12, and ITU G.957 mask patterns.
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}. The supervisory circuit can be reset by switching TxDis from high to low.

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

Receiver Electro-Optical Characteristics

Receiver	Symbol	Min.	Typ.	Max.	Units
Sensitivity (Average Power)(1)	P_{IN}		–33	–29	dBm
Saturation (Average Power)	P_{SAT}	–8.0	–3.0		
Signal Detect Assert Level(2)	P_{SDA}			–29	
Signal Detect Deassert Level(3)	P_{SDD}	44			
Signal Detect Hysteresis	P_{SDA}–P_{SDD}		1.5		dB
Signal Detect Assert Time	t_{ASS}		1		ms
Signal Detect Deassert Time	t_{DAS}		5		
PECL Output Low Voltage(4)	V_{OL}–V_{CC}	–1950		–1630	mV
PECL Output High Voltage(4)	V_{OH}–V_{CC}	–1025		–735	
Output Data, Rise/Fall Time, 10%–90%	t_R, t_F			1	ns
Output SD, Rise/Fall Time				40	
Jitter Tolerance(5)	J_{To}				UI
Jitter Transfer(5)	J_{Tr}				
Jitter Generation(5)	J_{Ge}				

Notes

1. Minimum average optical power at which the BER is less than 1 x 10^{E-10}. Measured with a 2^{23}-1 NRZ PRBS as recommended by ANSI T1E1.2, SONET OC-12, and ITU G.957.
2. An increase in optical power 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 below the specified level will cause the SIGNAL DETECT to switch from a High state to a Low state.
4. 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.
5. In accordance with ITU G. 958 and 825. Details to be specified.

LASER SAFETY

This single mode ATM 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 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 case 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.

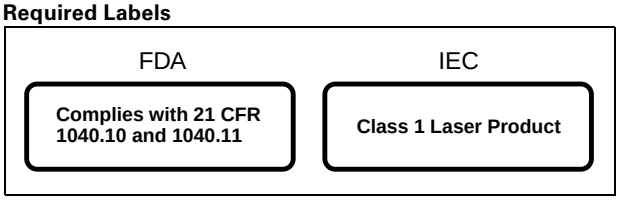
Note

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)).

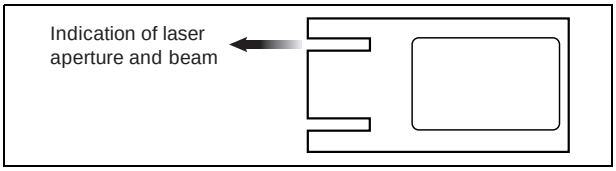
Laser Data

Wavelength	1300 nm
Total output power (as defined by IEC: 50 mm aperture at 10 cm distance)	2 mW
Total output power (as defined by FDA: 7 mm aperture at 20 cm distance)	180 µW
Beam divergence	4°

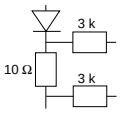
Required Labels



Laser Emission

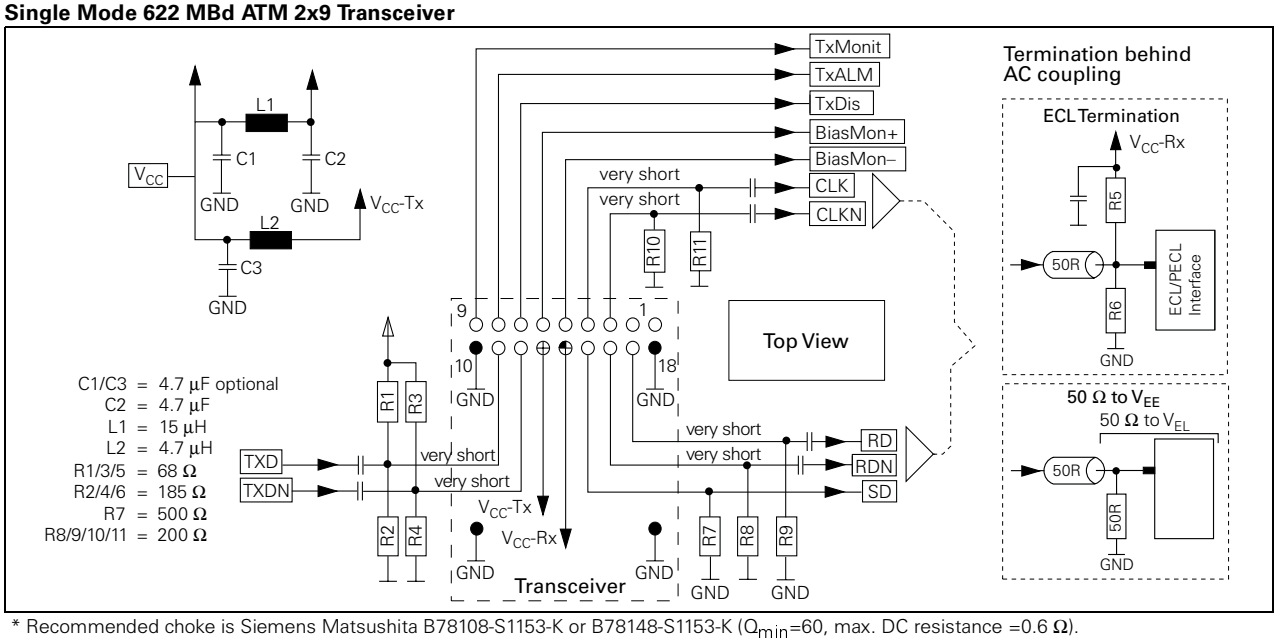


Pin Description

Pin Name		Level	Pin#	Description
NC			1–2	Pin not connected
RxCLKn	Clock Output Not	PECL Output	3	Inverted receiver clock output
RxCLK	Clock Output		4	Receiver clock output
Bias Mon	Bias Monitor 	Analog Voltage Bias Mon – Bias Mon +	 5 6	This output shows an analog voltage that is proportional to the laser bias current. Use this output to check proper laser operation and for end of life indications. Limit: Bias Current I_{BIAS} <60 mA
TxDis	Tx Disable/Enable	TTL-Input active	7	A falling slope switches the laser on. A rising slope switches the laser off. High >3.5 V; Low <0.8 V
Tx Alm (optional)	Tx+2dB Alarm	TTL Output active	8	A high level on this output indicates an increase in optical operating power output of+2 dB.
Pwr Mon	Power Monitor	Analog Voltage	9	This output shows an analog voltage that is proportional to the light output. This output can be used for laser safety functions. Output Voltage Vmon=1.2±0.2 V, Source Resistance R_S=100 kΩ
TxV_{EE}	Tx Ground	Power Supply	10	Negative power supply, normally ground
TxD	Tx Input Data	PECL Input	11	Transmitter input data
TxDn			12	Inverted transmitter input data
TxV_{CC}	Tx +5 V	Power Supply	13	Positive power supply, +5 V
RxV_{CC}	Rx +5 V	Power Supply	14	
SD	RX Signal Detect	PECL Output active high	15	A high level on this output shows that an optical signal is applied to the optical input.
RxDn	Rx Output Data	PECL Output	16	Inverted receiver output data
RxD			17	Receiver output data
RxV_{EE}	Rx Ground	Power Supply	18	Negative power supply, normally ground

APPLICATION NOTE

Single Mode 622 MBd ATM 2x9 Transceiver



* Recommended choke is Siemens Matsushita B78108-S1153-K or B78148-S1153-K (Q_{min}=60, max. DC resistance =0.6 Ω).

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 should be connected to this GND plane. The transceiver contains an automatic shutdown circuit.

Reset is only possible when the power is turned off, and then on again (V_{CC}TX=0 V), or by disabling the transmitter with TxDIS and enabling it after at least 500 ms. The receiver data signals should be terminated with 50 Ω at the far end. 200 Ω terminations should be placed very close to the receiver data pins in combination with AC coupling.

Siemens Microelectronics, Inc. • Optoelectronics Division • 19000 Homestead Road • Cupertino, CA 95014 USA
Siemens Semiconductor Group • Fiber Optics • Wernerwerkdamm 16 • Berlin D-13623, Germany
Siemens K.K. • Fiber Optics • Takanawa Park Tower • 20-14, Higashi-Gotanda, 3-Chome • Shinagawa-ku • Tokyo 141, Japan
www.smi.siemens.com/opto/fo/fo.html (USA) • www.siemens.de/Semiconductor/products/37/376.htm (Germany)