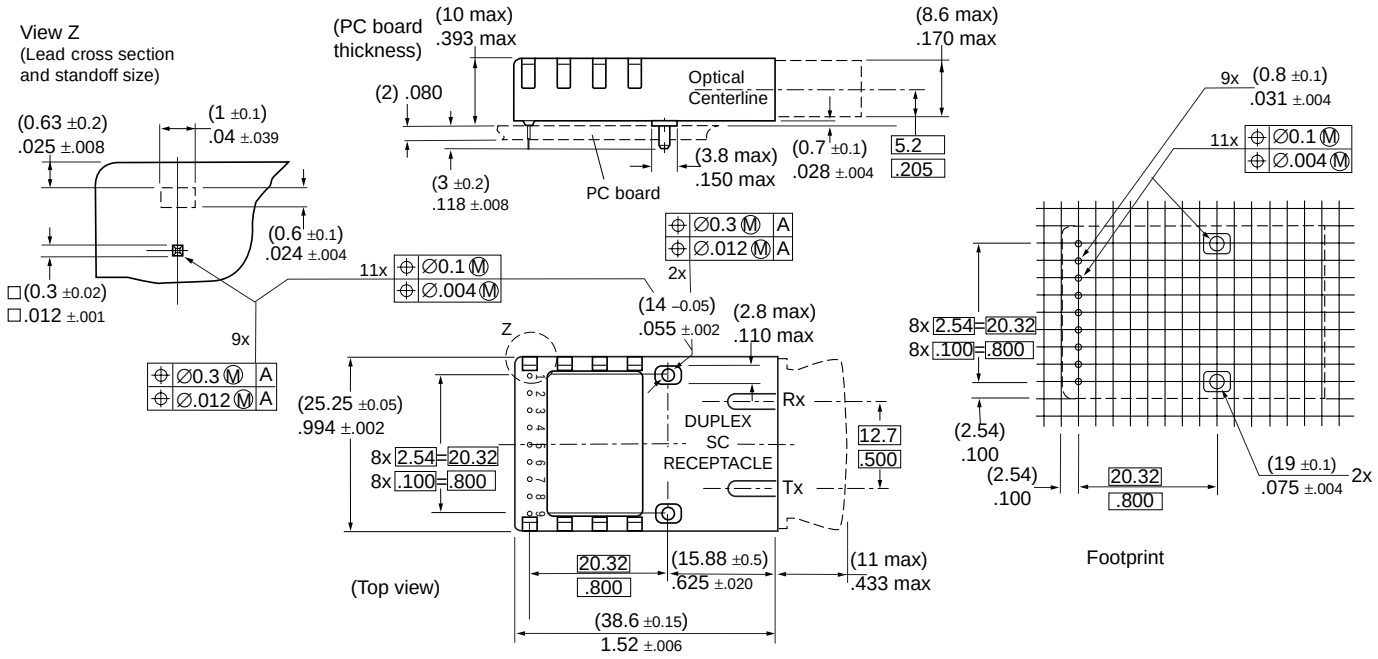
SIEMENS

11 dB V23809-A3-C10
7 dB V23809-A3-C11

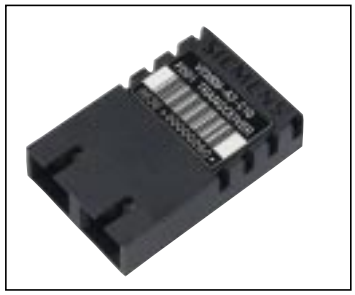
Multimode 1300 nm LED Fast Ethernet/FDDI 130 MBd Transceiver

Dimensions in (mm) inches



FEATURES

- **Fully compliant with all major existing standards**
- **Compact integrated transceiver unit with duplex SC receptacle**
- **Single power supply with 3.0 V to 5.5 V range**
- **Extremely low power consumption < 0.7 W at 3.3 V**
- **Excellent EMI performance**
- **PECL 100K compatible differential inputs and outputs**
- **System is optimized for 62.5/50 µm graded index fiber**
- **Industry standard multisource footprint**
- **Very low profile for high slot density**
- **Wave solderable and washable with process plug**
- **Test board available**
- **UL-94 V-0 certified**
- **ESD Class 2, per MIL-STD 883 Method 3015**
- **Compliant with FCC (Class B) and EN 55022**
- **For distances of up to 2 km**



APPLICATIONS

- **Fast Ethernet**
- **LCF-FDDI short links (500 m)**
- **FDDI (Backbone, 2.000 m and more)**
- **High speed computer links**
- **Local area networks**
- **High definition digital television**
- **Switching systems**

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 (PD)
5 V ..... 1 W
3.3 V ..... 0.7 W
Supply voltage (V_{CC}–V_{EE}) ..... –0.5 to 7 V
Data Input Levels (V_{IN}) PECL ..... V_{EE}–V_{CC} V
Differential Data Input Voltage (ΔV_{IN}) ..... 3 V
Operating Case Temperature (T_{case}) ..... 0 to 85°C
Storage Ambient temperature (T_{stg}) .....–40°C to 85°C
Humidity/temperature Test Condition(R_H) ..... 85/85%°C
Soldering Conditions Temp/Time
(T_{sold}) MIL-STD 883C, Method 2003.....270/10°C/s
ESD Resistance, all pins to V_{EE}, Human Body (ESD) 1.5kV

DESCRIPTION

This data sheet describes the Siemens FDDI/Fast Ethernet Transceiver, which belongs to the Siemens Multistandard Transceiver Family. It is fully compliant with the current Fiber Distributed Data Interface (FDDI) Low Cost Fiber Physical Layer Medium Dependent (LCF-PMD) draft standard (1) and the FDDI PMD standard (2).

FDDI is a Dual Token Ring standard developed in the U.S. by the Accredited National Standards Committee(ANSC) X3T9, within the Technical Committee X3T9.5. It is applied to the local area networks of stations transferring data at 100 Mbits/s with a 125 MBaud transmission rate. LCF FDDI is specially developed for short distance applications of up to 500 m (Fiber to the Desk) as compared to 2 km for backbone applications.

Fast Ethernet is being developed because of the higher bandwidth need in local area networking, based on the proven effectiveness of millions of installed Ethernet systems.

The Siemens low cost multistandard transceiver is a single unit comprised of a transmitter, a receiver and an SC receptacle. This frees the customer from many alignment and PC board layout concerns. The modules are designed for low cost applications.

The inputs/outputs are PECL compatible and the unit operates from 3.0 V to 5.5 V power supply. As an option, the data output stages can be switched to static levels during absence of light as indicated by the Signal Detect function.It can be directly interfaced with available chipsets.

The excellent performance of the Siemens Multistandard Transceiver Family is the result of long term experience. The reliability of our modules is proven by high volume production.

1) FDDI Token Ring, Low Cost Fiber Physical Layer Medium Dependent (LCF-PMD) ANSI X3T9.5 / 92 LCF-PMD / Proposed Rev. 1.3, September 1, 1992. Draft Proposed American National Standard

2) FDDI Token Ring, Physical Layer Medium Dependent (PMD) ANSI X3.166-1990 American National Standard; ISO/IEC 9314-3: 1990

Recommended Operating Conditions

Parameter	Sym.	Min.	Typ.	Max.	Units
Ambient Temperature	T_C	0		70	°C
Power Supply Voltage	$V_{CC}–V_{ee}$	3		5.5	V
Supply Current 3.3 V	I_{CC}			190	mA
Supply Current 5 V(1)				210	
Transmitter					
Data Input High Voltage	$V_{IH}–V_{CC}$	–1165		–880	mV
Data Input Low Voltage	$V_{IL}–V_{CC}$	–1810		–1475	
Threshold Voltage	$V_{bb}–V_{CC}$	–1420		–1240	
Input Data, Rise/Fall Time, 20–80%	t_R, t_F	0.4		1.3	ns
Data High Time(2)	t_{on}			1000	
Receiver					
Output Current	I_o			25	mA
Input duty Cycle Distortion	t_{DCD}			1.0	ns
Input Data Dependent Jitter	t_{DDj}				
Input Random Jitter	t_{Rj}			0.76	
Input Center Wavelength	I_C	1260		1380	nm
Electrical Output Load(3)	R_L		50		Ω

Notes:

1. For $V_{CC}–V_{EE}$ (min.,max.) 50% duty cycle. The supply current (Icc2 + Icc3) does not include the load drive current (Icc1). Add max. 45mA for the three outputs. Load is 50 Ω into V_{CC} –2V
2. To maintain good LED reliability, the device should not be held in the ON-state for more than the specified time. Normal operation should be done with 50% duty cycle
3. To achieve proper PECL output levels the 50 Ω termination should be done to V_{CC} –2V. For correct termination see the application note,

Reliability (Qualification Results)

Test Temperature (HTB)	85°C / 358K
Reference Temperature	25°C / 298K
Duration of HTB Test	> 5000 hrs
Activation Energy	0.7 eV
Confidence Level	60 %
Number of tested modules	> 120

Transmitter Electro-Optical Characteristics under recommended operation conditions

Transmitter	Sym.	Min.	Typ.	Max.	Units
Data Rate	DR			13	MBaud
Launched Power (Average) into 62.5 µm Fiber for –A3–C11(1, 4)	P_O	–22	–18	–14	dBm
Launched Power (Average) into 62.5 µm Fiber for –A3–C10(1, 4)		–20	–16		
Center Wavelength(2, 4)	l_C	1270		1380	nm
Spectral Width (FWHM)–A3–C11(3, 4)	$\Delta\lambda$			250	
Spectral Width (FWHM)–A3–C10(3, 4)				200	
Output Time, Rise/Fall–A3–C10, 10–90%(5)	t_R	0.6		3	ns
Output Time, Rise/Fall–A3–C11, 10–90%(5)	t_F			4	
Temperature Coefficient, Optical Optput Power	TCp			0.03	dB/°C
Extinction Ratio (dynamic)(4, 6)	ER			10	%
Optical Power Low(7)	P_{TD}			–45	dBm
Duty Cycle Distortion(8, 9)	t_{DCD}			1	ns
Data Dependent Jitter(8, 10)	t_{DDJ}			0.6	
Random Jitter(8, 11)	t_{RJ}			0.76	

Notes

1. Measured at the end of 5 meters of 62.5/125/0.275 graded index fiber using calibrated power meter and a precision test ferrule. Cladding modes are removed. Values valid for EOL and worst-case temperature.
2. Center wavelength is defined as the midpoint between the two 50% levels of the optical spectrum of the LED.
3. Spectral width (full width, half max.) is defined as the difference between 50% levels of the optical spectrum of the LED.
4. The input data pattern is the Halt Line State (12.5 MHz square wave).
5. 10 to 90% levels. Measured using the Halt Line State 12.5 MHz square wave pattern with an optoelectronic measurement system (detector and oscilloscope) having 3 dB bandwidth ranging from less than 0.1MHz to more than 750 MHz.
6. Extinction Ratio is defined as PL/PH x 100%. Measurement system as in Note 5.
7. Optical Power Low is the output power level when a steady-state low data pattern (FDDI Quiet Line State) is used to drive the transmitter. Value valid <1 ms after input low.
8. Test method as for FDDI-PMD. Jitter values are peak-to-peak.
9. DCD is defined as 0.5 [(width of wider state)–(width of narrower state)]. It is measured with stream of Idle Symbols (62.5 MHz square wave).
10. DDJ is measured with the same pattern as for FDDI-PMD.
11. RJ is measured with the Halt Line State (12.5 MHz square wave).

Receiver Electro-Optical Characteristics

Receiver	Sym.	Min.	Typ.	Max.	Units
Data Rate	DR	5		135	MBaud
Sensitivity (Average Power)–A3–C11(1)	P_{IN}		–33	–29	dBm
Sensitivity (Average Power) Center–A3–C11(2)			–35		
Sensitivity (Average Power)–A3–C10(1)			–34	–31	
Sensitivity (Average Power) Center–A3–C10(2)			–36		
Saturation (Average Power)(2)	P_{SAT}	–14	–11		
Duty Cycle Distortion(3, 6)	t_{DCD}			1	ns
Deterministic Jitter(4, 6)	t_{DJ}			1	
Random Jitter(5, 6)	t_{RJ}				
Signal Detect Assert Level(7)	P_{SDA}	–43.5		–30	dBm
Signal Detect Deassert Level(8)	P_{SDD}	–4.5		–31.5	
Signal Detect Hysteresis	P_{SDA}–P_{SDD}	1.5			dB
Output LO Voltage(9)	V_{OL}–V_{CC}	–1810		–1620	mV
Output HI Voltage(9)	V_{OH}–V_{CC}	–1025		–880	
Output Data Rise/Fall Time, 20–80%	t_R, t_F			1.3	ns
Output SD Rise/FallTime, 20–80%		12		40	

Notes

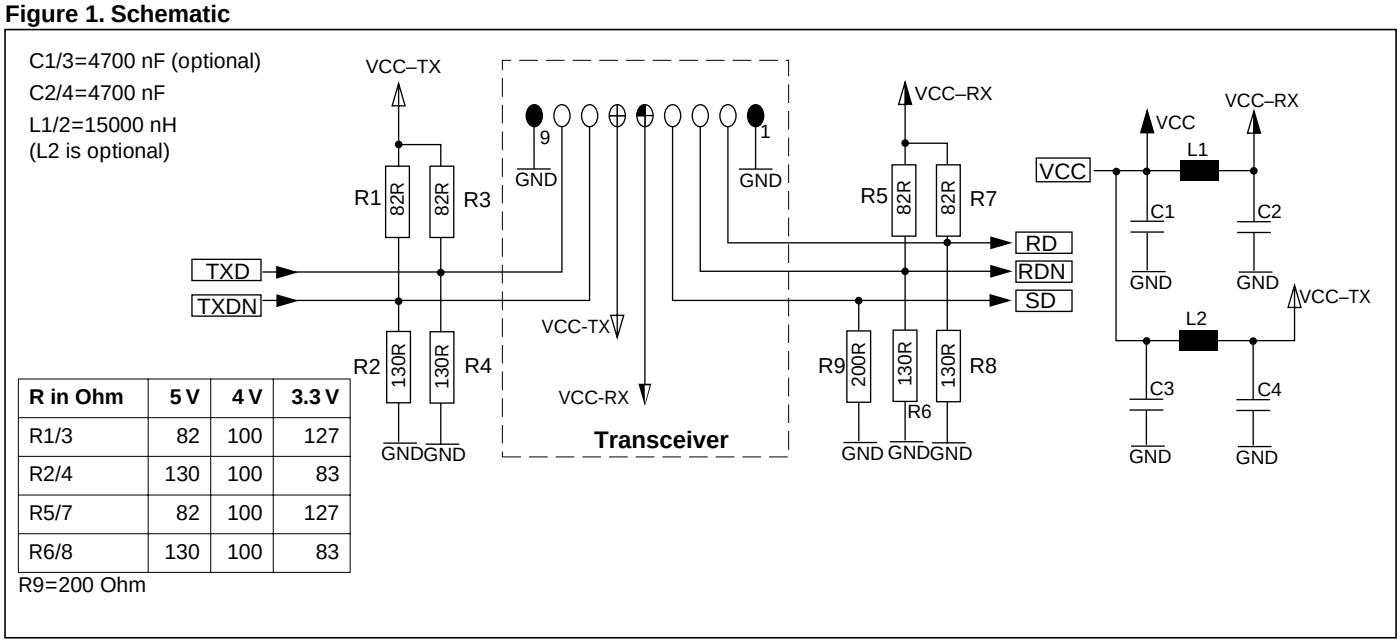
1. For a bit error rate (BER) of less than 1x10E-12 over a receiver eye opening of least 1.5 ns. Measured with a 2^{23}-1 PRBS at 155 MBd.
2. For a BER of less than 1x10E-12. Measured in the center of the eye opening with a 2^{23}-1 PRBS at 155 MBd.
3. Measured at an average optical power level of -20 dBm with a 62.5 MHz square wave.
4. Measured at an average optical power level of -20 dBm.
5. Measured at -33 dBm average power.
6. All jitter values are peak-to-peak.
7. An increase in optical power through the specified level will cause the SIGNAL detect output to switch from a LO state to a HI state.
8. A decrease in optical power through the specified level will cause the SIGNAL detect output to switch from a HI state to a LO state.
9. ECL 100K 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 for 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
RxSD	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, +5V
T_xV_{CC}	Tx +5 V		6	
TxDn	Tx Input Data	PECL Input	7	Inverted transmitter input data
TxD			8	Transmitter input data
T_xV_{ee}	Tx Ground	Power Supply	9	Negative power supply, normally ground
Case	Support	Not connected	S1/S2	Support stud, not connected

APPLICATION NOTE FOR 1X9 PIN ROW TRANSCEIVER

Figure 1. Schematic



R in Ohm	5 V	4 V	3.3 V
R1/3	82	100	127
R2/4	130	100	83
R5/7	82	100	127
R6/8	130	100	83

R9=200 Ohm

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.

A GND plane under the module is recommended for good EMI and sensitivity performance.