Preliminary

T-41-91

Am79h2000X

1300nm Fiber Optic Transceiver

Advanced Micro Devices

DISTINCTIVE CHARACTERISTICS

- Full electrical and optical FDDI compliance
- FDDI SUPERNET™ and TAXI™ compatible
- Single piece integrated FDDI transmitter/receiver duplex receptacle
- Accepts duplex FDDI Media Interface Connector (MIC)
- Single 5.0 V power supply operation
- 18dB typical loss budget when used with another Am79h2000X Transceiver
- High speed: up to 175 Mbaud
- Differential ECL I/O
- Board footprint occupies as little as 2 square inches
- Low power consumption: 1W typical
- Performance optimized for 125 Mbps operation
- Reliable 1300 nanometer MOVPE ELED
- Reliable InGaAs/InP Planar MOVPE PIN photodiode

GENERAL DESCRIPTION

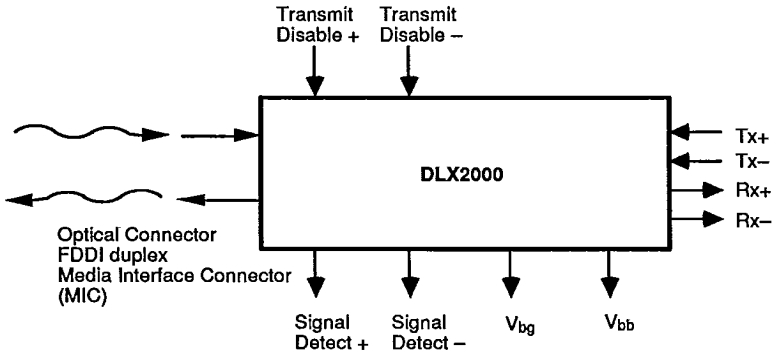
The Am79h2000X is a high-speed fiber optic Transceiver designed for digital data transmission through optical fiber cable.

The Am79h2000 transmitter section converts differential ECL signals to lightwaves in the 1300nm band. The transmitter is entirely isolated from the receiver and operates from a single 5 V power supply, connected for either ECL or pseudo-ECL operation. The transmitter contains a Transmit Disable input allowing control over the optical output level. The InGaAs/InP high-speed ELED is fabricated with the Metal-Organic Vapor Phase Epitaxy (MOVPE) process for high reliability, performance and consistency.

The Am79h2000 receiver section converts lightwaves in the 1300nm band to differential ECL signals. Operation is from a single +5 V power supply. The InGaAs/InP high-performance planar PIN photodiode is manufactured with the MOVPE process for high reliability and product consistency.

The Am79h2000 transceiver is ideally suited for direct interface with the FDDI SUPERNET Encoder/Decoder and ENDEC Data Separator. The unique one piece integrated FDDI duplex receptacle solves the assembly tolerance problems associated with separately mounting a connector receptacle and individual transmitter/receiver modules on your board. For point-to-point applications, the Am79h2000 directly coupled with the TAXIchip™ set provides the complete byte-wide parallel interface to light output solution.

BLOCK DIAGRAM



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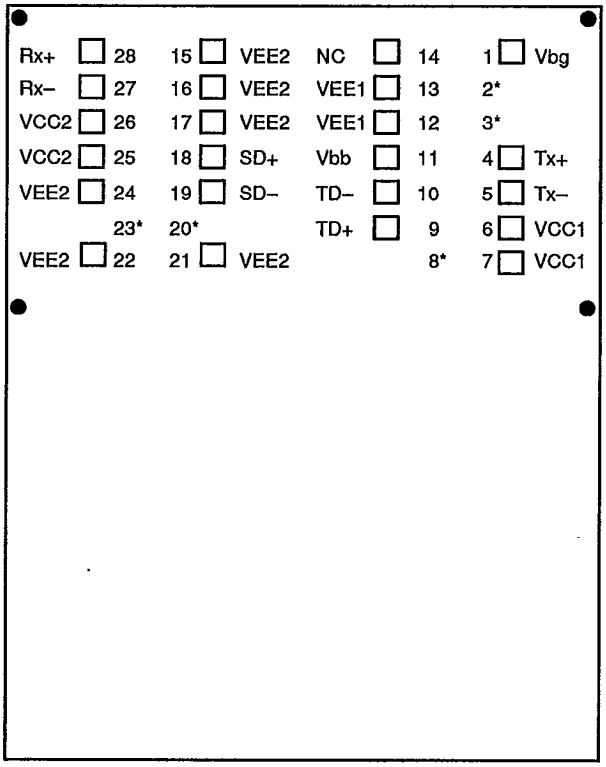
RELATED AMD PRODUCTS

Part No.	Description
Am79C81A	Ram Buffer Controller
Am79C82A	Data Path Controller
Am79C83	Fiber Optric Ring Media Access Controller
Am7984A	Encoder Decoder (ENDEC)
Am7985A	ENDEC Data Separator
Am7968-125	TAXIchip Transmitter
Am7969-125	TAXIchip Receiver

CONNECTION DIAGRAM
(Bottom View)



*No pin

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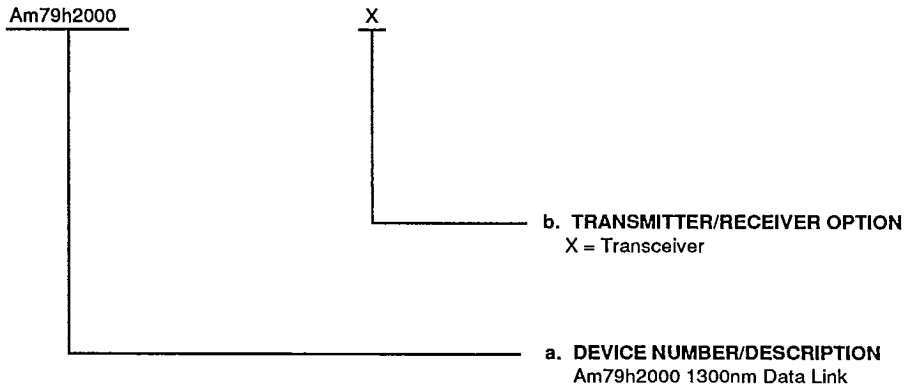
ORDERING INFORMATION

Standard Products

AMD products are available in several package and operating ranges. The order number (valid combination) is formed by a ombination of:

a. **Device Number**
b. **Transmit/Receive Option**



Valid Combinations
Am79h2000X

Valid Combinations

Valid Combinations list configurations planned to be supported in volume for this device. Consult the local AMD sales office to confirm availability of specific valid combinations, to check on newly released combinations, and to obtain additional data on AMD's standard military grade products.

NOTICE

SEE ORDER OF DATA FOR ERRATA INFORMATION

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PIN DESCRIPTION

Tx+, Tx–
Transmit Data+, Transmit Data– (Differential ECL Inputs)

Tx+ and Tx– are the digital logic inputs for the transmitter. A logic one at the inputs results in HIGH Optical Output.

TD+, TD–
Transmit Disable+, Transmit Disable– (Differential ECL Inputs)

The Transmit Disable inputs control the optical output independently of the input data at Tx+ or Tx–. A logical one to the transmit disable inputs disables the optical port. In a pseudo-ECL system (V_{CC} = +5.0 V), with TD– connected to V_{bg}, a TTL HIGH at TD+ will disable the output. To hardwire the transmitter enabled, regardless of power supply configuration, connect Transmit Disable+ to V_{bg} and Transmit Disable– to V_{bb}.

V_{bb}, V_{bg}
Output Voltage References

V_{bb} and V_{bg} are internally generated voltage references used to bias Transmit Disable and Transmit Data inputs for single-ended operation.

V_{CC1}, V_{CC2}
Power Supply

V_{CC1} is the transmitter V_{CC} connection. V_{CC2} is the receiver V_{CC} connection. V_{CC1} is at ground potential for direct ECL interface. For TTL, pseudo-ECL or CMOS levels, V_{CC1} is a +5.0 V nominal power supply pin. V_{CC2} is always a +5.0 V nominal power supply pin.

V_{EE1}, V_{EE2}
Power Supply

V_{EE1} is the transmitter V_{EE} connection. V_{EE2} is the receiver V_{EE} connection. V_{EE1} is a -5.2 V nominal supply for direct ECL interface. For TTL, CMOS or pseudo-ECL levels, V_{EE1} is at ground potential. V_{EE2} is always at ground potential.

Rx+, Rx–
Received Data+, Received Data– (Differential ECL Outputs)

Rx+ and Rx– are the digital logic outputs for the receiver. A logic one at the output corresponds to HIGH optical input.

SD+, SD–
Signal Detect+, Signal Detect– (Differential ECL Outputs)

Signal Detect is an optical power alarm indicating insufficient optical intensity for conversion. A logic zero (Signal Detect+ = LOW, Signal Detect– = HIGH) indicates that the optical signal is too weak for conversion.

FUNCTIONAL DESCRIPTION

Am79h2000 Transmitter Section

The transmitter converts a digital electrical input signal to an optic output signal. Tx+ and Tx– input serial electrical data to the transmitter for conversion to the 1300nm light output. The data is received through a differential comparator which requires a minimum 100mv signal swing. A logic one at the Tx inputs results in HIGH optical output. The Tx inputs can be driven directly from an ECL or pseudo-ECL source with proper line termination. To drive the transmitter data inputs from a TTL or CMOS logic level, Tx– is connected to V_{bg} and the input data to Tx+.

The Transmit Disable function of the Am79h2000 fully extinguishes the optical output signal irrespective of the Tx data inputs. The transmit disable signals are received through a differential comparator input. A logic one (TD+ more positive than TD– by 200 mV) disables the optical output. Output biases V_{bg} and V_{bb} may be used to provide a variety of active control possibilities, or to hardwire the transmitter enabled. To hardwire the transmitter enabled connect TD+ to V_{bg} and TD– to V_{bb}. To enable the transmitter with an active HIGH signal, connect TD+ to V_{bg} and logic HIGH control to TD– enables the output. To disable with an active HIGH level, connect TD– to V_{bg} and a control signal HIGH to TD+ disables the transmitter.

Am79h2000 Receiver Section

The receiver converts optical input signals to digital electrical output signals. The Rx+ and Rx– outputs are complementary pseudo-ECL. HIGH optical input corresponds to a logic one at the outputs.

The Am79h2000 Receiver contains complementary 'signal detect' outputs that flag low optical signal power. When the optical signal is sufficient, the signal detect output is a logical one. The assert/deassert parameters comply with the specifications of the FDDI PMD standard. The assert light level is typically –34dBm and the deassert level is –36dBm. Either or both signal detect outputs may be left unconnected.

ABSOLUTE MAXIMUM RATINGS

Power Supply Voltage (V_{CC} or V_{EE})	0 to +6.0 V
Input Voltage	V_{EE} to V_{CC} V
Optical Input Power	1 mW
Output Current (V_{bb} and V_{bg}) .	−1 to 1 mA
Output Current (Data and Signal Detect outputs)	+30 mA
Storage Temperature	−20 to+85 °C
Relative Humidity	non-condensing (%RH)
Soldering Temperature	240/10° C/secs

Stresses above those listed under Absolute Maximum Ratings may cause permanent device failure. Functionality at or above these limits is not implied. Exposure to Absolute Maximum Ratings, for extended periods of time, may affect device reliability.

OPERATING RANGES

Temperature (T_a)	0 to +70°C
Supply Voltage $\|V_{CC}-V_{EE}\|$	+4.5 to +5.7 V

Operating ranges define those limits between which the functionality of the device is guaranteed.

TRANSMITTER
PERFORMANCE CHARACTERISTICS over operating range unless otherwise specified

PARAMETER	MIN	TYP	MAX	UNITS
Center Wavelength	1270	1300	1380	nm
Spectral Width (FWHM)		80	120	nm
Optical Output Power (average 50% duty cycle into 62.5 µm core; 0.275 NA fiber)	−18.5 (14)	−15.5 (28)	−14.0 (40)	dBm (µW)
Optical Rise and Fall Time (10%–90%)	0.6	2	3	ns
Total Pulse Width Distortion (peak)[1]			0.6	ns
Extinguished Optical Output Power[2]		0	30	nW
Minimum Differential Input for Full Optical Response		100		mV
High Level Input Current		50		µA
Transmit Disable Response Time		100	1000	ns
Output Voltage at V_{bb} with Respect to V_{CC}	−1.5	−1.3	−1.1	V
Output Voltage at Vbg with Respect to V_{EE}	1.1	1.3	1.5	V
Current Consumption [3]		120	160	mA
Transmission Distance[4]	5			Km

Notes:

1. With FDDI Standard Test Pattern.
2. With Logical 0 data input or Logical 1 Transmit Disable input.
3. Typical consumption figure is at 25°C, 5.0 V supply. Maximum consumption is at 70°C, 5.7 V supply.
4. With fiber of appropriate intermodal bandwidth.

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RECEIVER

PERFORMANCE CHARACTERISTICS over operating range unless otherwise specified

PARAMETER	MIN	TYP	MAX	UNITS
Optical Input Center Wavelength	1270	1300	1380	nm
Sensitivity for 2.5E–10 BER at 125 Mbaud[1,6]		–34 (0.4)	–31 (0.8)	dBm (μW)
Maximum Operating Optical Input Power[1,6]	–14 (40)	–12 (63)		dBm (μW)
Input Pulse Duration (0 or 1)	5		1000	ns
Input Duty Cycle	40	50	60	%
Total Pulse Width Distortion (peak)[1,2]			0.7	ns
Signal Detect must Assert Input Power			–31	dBm
BER at which Signal Detect must De-Assert			0.01	BER
Signal Detect Hysteresis	1.5			dB
Signal Detect Assertion Time			100	μs
Signal Detect De-Assertion Time			350	μs
Rx+ and Rx– Output Rise and Fall Times	0.5	1	1.5	ns
Output High Voltage with Respect to V_{CC}[3]	–1.0		–0.7	V
Output Low Voltage with Respect to V_{CC}[3]	–2.0		–1.6	V
Current Consumption [4,5]		80	120	mA
Operating Distance[7]	5			Km

Notes:

1. With FDDI Standard Test Pattern, both Receiver data outputs PECL terminated.
2. At –20 dBm Average Optical Input Power.
3. All outputs are 10KH ECL, with V_{EE} grounded, and V_{CC} + 5V nominal (Pseudo-ECL).
4. Typical consumption figure is at 25°C, 5.0V supply. Maximum consumption is at 70°C, 5.7 V supply.
5. Excludes current drawn from output loads.
6. Average optical input power from 62.5 μm core; 0.275 NA fiber.
7. With fiber of appropriate intermodal bandwidth.

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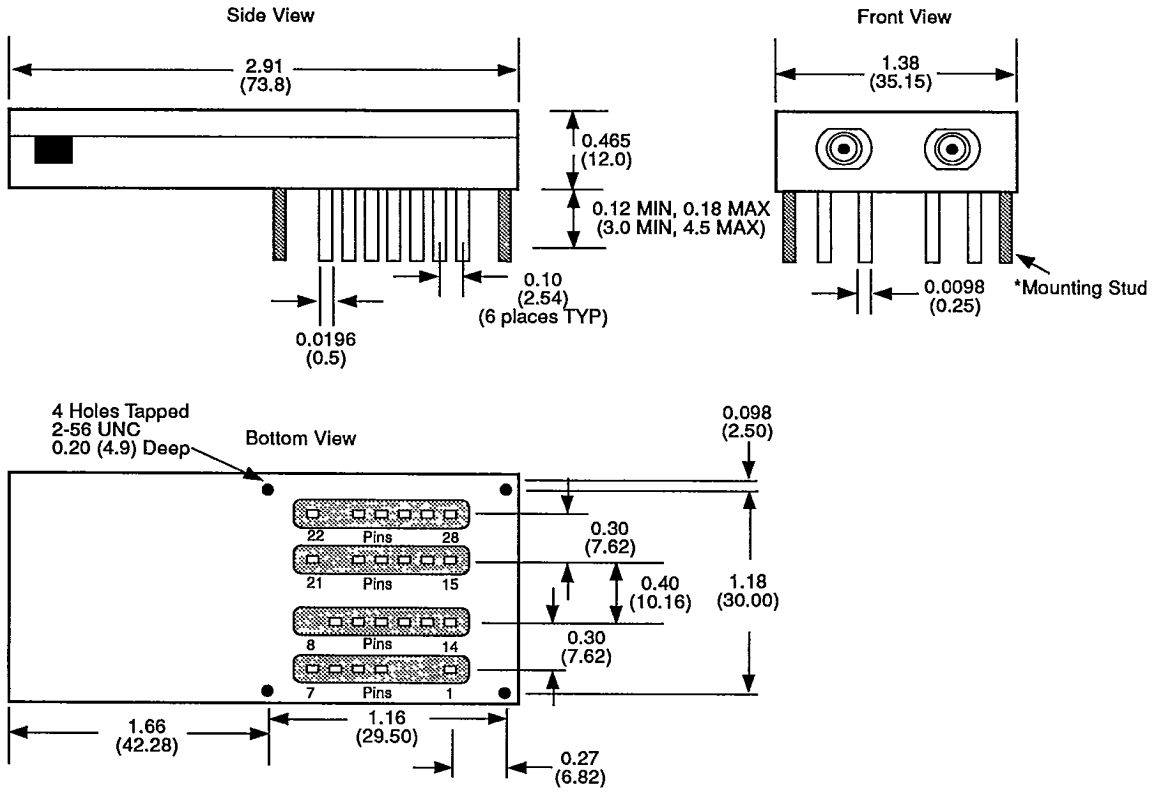
PHYSICAL DIMENSION*



*Printed Circuit Board mounting included:
(mounting studs shown for reference only)
4 Each 2-56 UNC x .635 Long Studs
4 Each 2-56 Nuts

12688–003A

* For reference only. All dimensions are measured in inches (millimeters). BSC is an ANSI standard for Basic Space Centering.