HEWLETT® PACKARD

Laser Transmitter for Single Mode Fiber Optic Systems

Technical Data

XMT3150-PT
XMT3350-PT

Features

- **SONET/SDH Compatible**
- **Reliable 1300 nm MOVPE BH Laser**
- **Single +5 Volt Supply**
- **Compact 16-pin DIP Plastic Package**
- **Speeds to 250 Mbits/second**
- **Low Power Consumption: 500 mW Typical**
- **Low Profile, 0.375" Maximum Height**
- **Mean Output Power: XMT3150-PT: -2 dBm XMT3350-PT: -10 dBm**
- **Class 1 Laser Product (CDRH)**

Applications

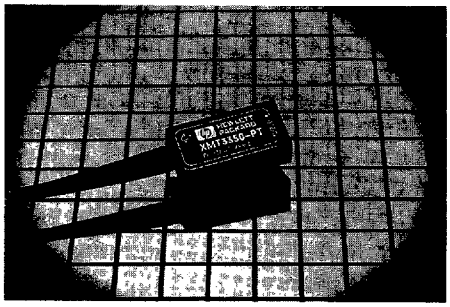
- **SONET/SDH Systems**
- **Local Area Networks**
- **Point to Point Communications**
- **Digital Television**
- **Military Communications and Control Systems**
- **Switching Systems**
- **Intra-Office Networks**

Description

The XMT3150-PT and XMT3350-PT series laser transmitters convert serial ECL signals to lightwaves in the 1300 nanometer band at data rates from 50 to 250 Mbit/s. They are generally suitable for serial optical data communication over single mode fiber.

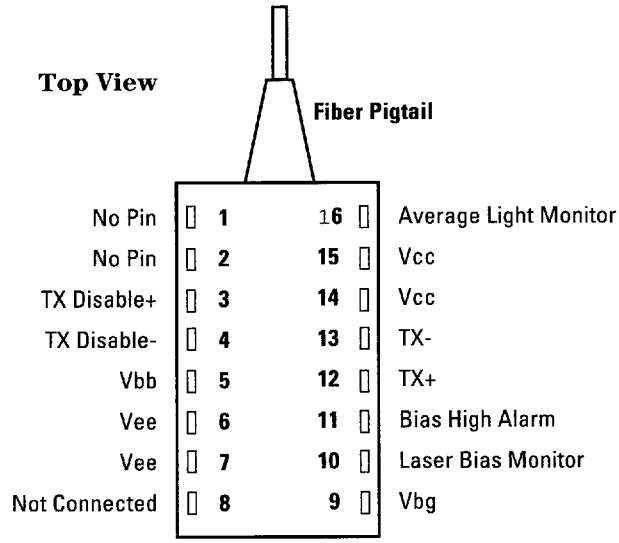
The transmitters operate from either positive or negative 5 volt power supplies allowing use with most standard logic systems. The logic interface circuits are ECL comparators which can be configured to connect directly to ECL, P-ECL (+5 volt referenced ECL) or CMOS logic.

The buried heterostructure laser and planar monitor detector are fabricated by the Metal Organic Vapor Phase Epitaxy (MOVPE) process for high reliability, performance and consistency.



For greater reliability the laser and monitor PIN are hermetically sealed in a metal subassembly inside the plastic 16-pin DIP package.

Connection Diagram



Pin Descriptions:

Pin 12, 13 TX+, TX-:
These pins are the serial data input pins for the transmitter. They are inputs to an ECL comparator. TX+ more positive than TX- defines the high output power state. The pins can be directly connected to complementary signals of almost any 5 volt logic family.

Pin 3, 4 TX Disable+, TX Disable-:
Transmitter Output Disable and its complement are inputs to an ECL comparator. If the TX Disable pin is maintained at a voltage at least 100 mV more positive than its complement the optical output will be disabled (no power) regardless of the signals on TX.

Pin 5, 9 Vbb, Vbg:
These pins are voltage reference outputs. Vbg defines a TTL logic threshold - nominally 1.3 volts above Vee. Vbb defines an ECL logic threshold - nominally 1.3 volts below Vcc. These pins are normally used to configure the TX inputs to accept single-ended logic signals. To use TTL or CMOS signals, connect TX- to Vbg and use TX+ as a standard TTL input. To use single-ended ECL or P-ECL, connect TX- to Vbb.

Pin 10 Laser Bias Monitor (LBM):
The Laser Bias Monitor is an analog output pin. It maintains a voltage relative to Vee which is proportional to the laser bias current (8 mV/mA typical). The laser bias current approximates the laser's lasing threshold.

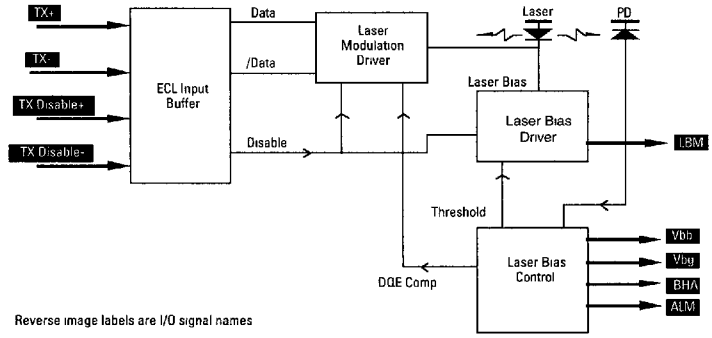
Pin 11 Bias High Alarm (BHA):
The Bias High Alarm is a TTL compatible comparator output indicating excessive laser bias current. Logic HIGH at this output indicates laser bias current has exceeded 75 mA.

Pin 14, 15 Vcc:
These are the positive power supply pins. They may be connected to ground or +5 volt but must be positive with respect to Vee.

Pin 6, 7 Vee:
These are the negative power supply pins. They may be connected to ground or -5 volt but must be negative with respect to Vcc.

Pin 16 Average Light Monitor (ALM):
This output voltage level is directly proportional to the photo current. A "high light" and "low light" alarm can be implemented using this output. In normal operation this output is approximately equal to Vbg.

Block Diagram



Functional Description

The XMT3150-PT and XMT3350-PT are pigtailed logic interface laser transmitters. They contain circuitry to control the average laser power, to compensate for changes in laser slope efficiency as well as a laser bias alarm and reference circuits. The result is an optical interface module for single mode fiber which is cost effective, simple to use and has CCITT compliant performance.

Circuit and Signal Descriptions

The block diagram of the XMT3150-PT and XMT3350-PT circuit elements is shown above. The ECL input buffer is a standard 10 KH series ECL comparator. The differential input has a wide input common mode range allowing it to be connected to TTL and CMOS logic as well as ECL and PECL. The transmitters also feature disable inputs which completely power down the laser drive circuits resulting in no optical power output. This allows the part to be used in hot-standby and network applications where no output is allowed in the quiescent state. The laser modulation driver supplies pulse current to the laser corresponding to the serial input bit pattern. The laser bias driver supplies bias current to the laser which is nominally equal to the lasers threshold current.

Laser Bias Monitor (LBM) provides an analog output voltage which is proportional to the laser bias current.

The laser bias control takes input from the laser back facet monitor detector and generates signals which control the laser bias and compensate the modulation current for changes in the laser slope efficiency. This compensation tends to stabilize the extinction ratio against thermally induced changes.

The BHA output is a flag which signals high laser bias current. This condition can exist if the temperature of the module is too high or if the laser degraded. BHA is a comparator output which interfaces directly with TTL logic.

There are two reference voltage outputs provided on the XMT3150-PT and XMT3350-PT. Vbb is the familiar ECL threshold level which is commonly found in ECL systems. It's voltage is nominally 1.3 Volts below Vcc. It can be used to bias one side of the differential inputs if a single-ended ECL or PECL signal is to be used. The Vbg output is nominally 1.3 Volts above Vee and serves the same purpose for TTL signals.

The Average Light Monitor (ALM) output is referenced to Vbg and is proportional to the back facet monitor current. This output allows the user to configure more complex alarms by providing external comparators and threshold controls. A "high light" or "low light" alarm can be designed using this output.

Operation

The XMT3150-PT and XMT3350-PT are simple to operate. In its minimum configuration all that is necessary is to connect power, ground and ECL or PECL signals.

Base-Line-Wander

The laser output is controlled by the back facet monitor detector which measures average power. This means that under conditions of no logic input transitions the optical power will converge to its preset level. For signals that have significant dc content, or which have long periods without transitions, the output signal can become distorted. The best solution to this is to provide a scrambled or coded signal which avoids these conditions. The ideal input signal is balanced to 50% duty cycle over a period shorter than 1 us.

Performance Specifications

Absolute Maximum Limit Ratings

Parameter	Symbol	Minimum	Maximum	Units
Power Supply Voltage	Vcc/Vee	0	6	V
Input Voltage		Vee	Vcc	V
Output Currents	Vbb, Vbg	-1	1	mA
LBM		-0.5	0.5	nA
BHA		-10	10	mA
ALM		-1	1	µA
Storage Temperature	Ts	-40	85	°C
Soldering Temperature/Time		-	240/10	°C/sec

Performance Specification [Note 1]

Parameter		Symbol	Minimum	Typical	Maximum	Units
Central Wavelength	XMT3150-PT	λc	1280	1310	1335	nm
	XMT3350-PT	λc	1260	1310	1360	nm
Wavelength Temperature Coefficient			-	0.40	0.50	nm/°C
Spectral Width	XMT3150-PT	ΔλRMS	-	-	4.0	nm
	XMT3350-PT	ΔλRMS			7.7	nm
Optical Output Power: (average 50% duty cycle)	XMT3150-PT		-5.0	-	0	dBm
	XMT3350-PT		-15.0	-	-8.0	dBm
Optical Rise and Fall Time: (10% - 90%/90% - 10%)		tr,tf	-	-	2.0	ns
Extinction Ratio			8.2		-	dB
Low Frequency Cut Off			-	50	-	Hz
Extinguished Optical Power [3]			-	-	30	nW
Duty Cycle Distortion (peak) [2]		DCD	-	-	0.6	ns
Differential Input to Switch Optical Output			-	100	-	mV
High Level Input Current			-	50	-	µA
Output Voltage at LBM (with respect to Vee)			-	8.2	-	mV/mA
Output Voltage, BHA Logic HIGH (with respect to Vcc)		Voh	-2.0	-	-	V
Logic LOW (with respect to Vee)		Vol	-	-	0.7	V

Notes:
1. Through specified operating conditions.
2. Measured with 62.5 MHz square wave.
3. Transmit Disable input HIGH.

Performance Specification [Contd)

Parameter	Symbol	Minimum	Typical	Maximum	Units
Operating Power Supply Voltage	Vcc	4.5	5.0	5.7	V
Current Consumption [1]	I out	-	100	180	mA
Operating Temperature	Top	0	-	65	°C
Transmit Disable Response Time (to enable)		-	9	-	ms
(to disable)		-	-	500	ns
Output Voltage at Vbb (with respect to Vcc)		-1.5	-	-1.1	V
Output Voltage at Vbg (with respect to Vee)		1.1	-	1.5	V

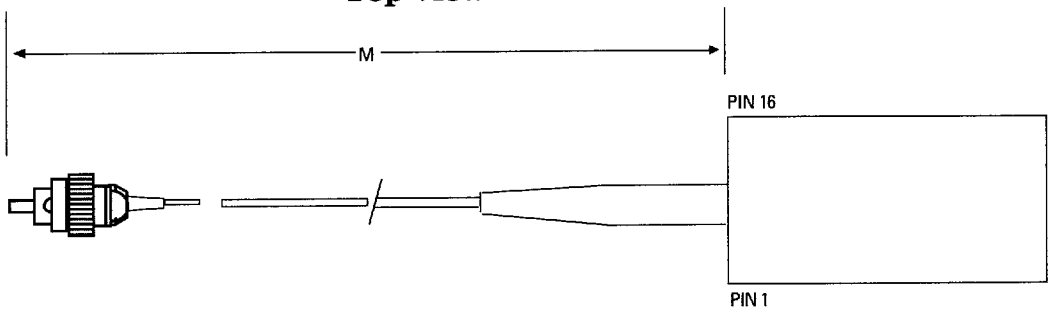
Notes:
1. Typical consumption figure is at 25°C, 5.0 volt supply. Maximum consumption is at 65°C, 5.7 volt supply.

Drawing Dimensions

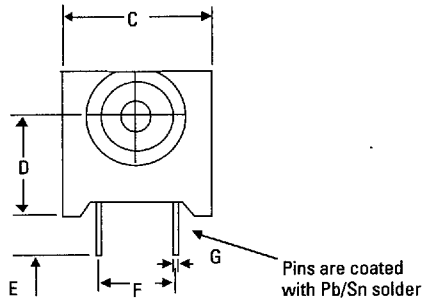
DIM	MIN	NOM	MAX
A	-	-	26.30
B	-	-	42.00
C	-	-	13.60
D	-	6.00	-
E	2.6	-	3.2
F	-	7.62	-
G	-	0.38	-
H	4.04	-	-
J	-	2.54	-
K	-	0.50	-
L	-	-	9.52
M	400	-	-

All dimensions in mm

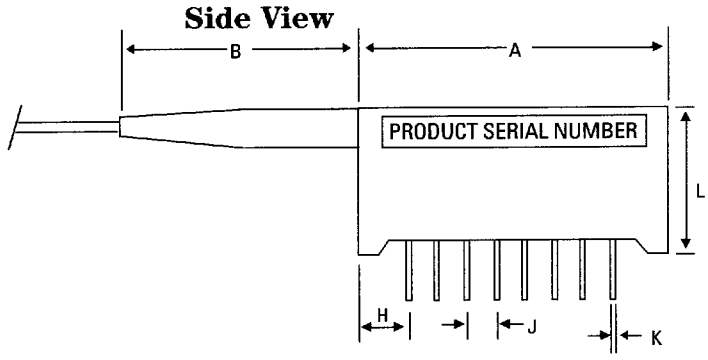
Top View



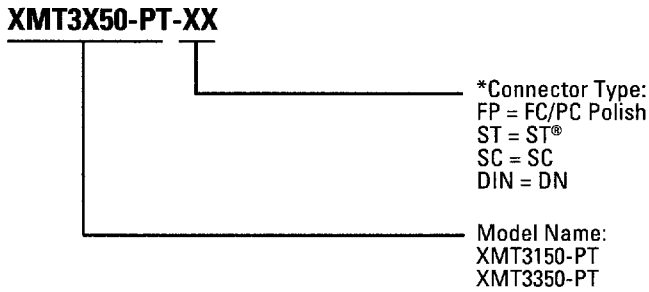
Front View



Side View



Ordering Information



Allowable Part Numbers:
XMT3150-PT-FP
XMT3150-PT-ST
XMT3150-PT-SC
XMT3150-PT-DN
XMT3350-PT-FP
XMT3350-PT-ST
XMT3350-PT-SC
XMT3350-PT-DN

*Other connectors available upon request

Class I Laser Product: This product conforms to the applicable requirements of 21 CFR 1040 at the date of manufacture
Date of Manufacture: _____
Hewlett-Packard Ltd, Whitehouse Rd, Ipswich, England

Handling Precautions

1. The XMT3150-PT and XMT3350-PT can be damaged by current surges or overvoltage.
   Power supply transient precautions should be taken.
2. Normal handling precautions for electrostatic sensitive devices should be taken.

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