622 Mb/s Logic Interface DFB Laser Transmitter

Preliminary Technical Data

XMT5170-622

Features
- **SONET/SDH Compliant to** STM4 L-4.1
  OC12 LR-1
- **–40°C to +85°C Operation**
- **Compact 20 Pin Package**
- **ECL/PECL Logic Interface**
- **Multisourced Pinout**

Applications
- **SONET/SDH Systems**
- **Fiber to the Home**
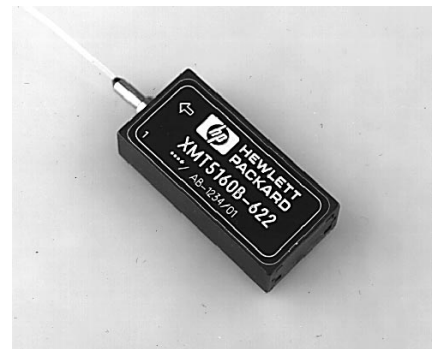- **Data Communications Networks**

Description
The XMT5170-622 is a high performance uncooled optical DFB laser transmitter for CCITT SDH and ANSI SONET applications. It is designed with an ECL/PECL logic interface for 622 MBd transmission.

The transmitter incorporates several features which simplify system design. The XMT5170-622 may be operated with either +5 V or –5 V power supplies. Its standard 10 KH ECL data interface enables direct interface with PECL or ECL logic. The compact transmitter module contains a pigtailed laser, data interface, bias and modulation control circuitry. Thus, no external components or adjustments are necessary. Finally, a laser disable input is provided to shut down the laser for standby or test purposes.

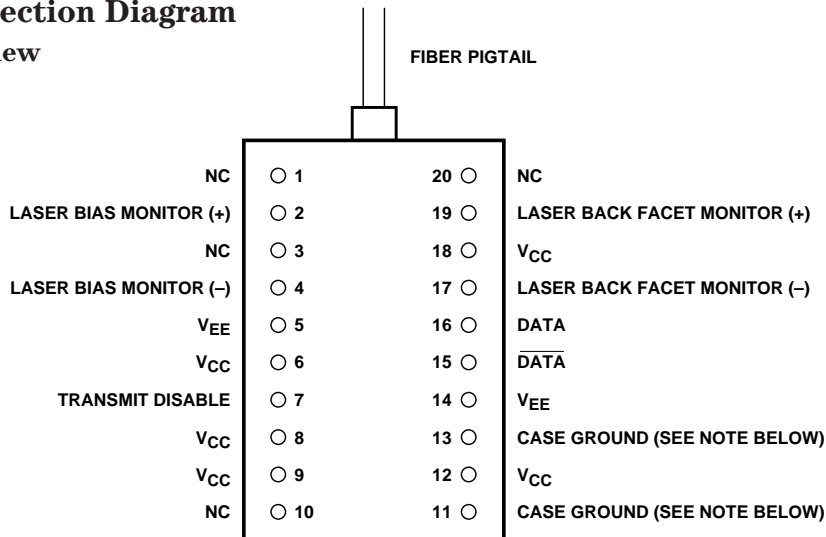The XMT5170-622 includes analog outputs which are proportional to laser current and optical power. These may be used with external circuitry to detect end-of-life, or over temperature conditions.

The transmitter is packaged in a 20 pin 0.4" pitch DIP. Contact your local representative for more details.

Preliminary Product Disclaimer

This preliminary data sheet is provided to assist you in the evaluation of engineering samples of the product which is under development and targeted for release during 1997. Until Hewlett-Packard releases this product for general sales, HP reserves the right to alter prices, specifications, features, capabilities, function, manufacturing release dates, and even general availability of the product at any time.

Connection Diagram
Top View

FIBER PIGTAIL

NC	○ 1	20 ○	NC
LASER BIAS MONITOR (+)	○ 2	19 ○	LASER BACK FACET MONITOR (+)
NC	○ 3	18 ○	V_{CC}
LASER BIAS MONITOR (–)	○ 4	17 ○	LASER BACK FACET MONITOR (–)
V_{EE}	○ 5	16 ○	DATA
V_{CC}	○ 6	15 ○	$\overline{DATA}$
TRANSMIT DISABLE	○ 7	14 ○	V_{EE}
V_{CC}	○ 8	13 ○	CASE GROUND (SEE NOTE BELOW)
V_{CC}	○ 9	12 ○	V_{CC}
NC	○ 10	11 ○	CASE GROUND (SEE NOTE BELOW)

Pin Descriptions

Pins 1, 3, 10, 20, NC:
These pins should not be connected and should be left open circuit on the application PCB.

Pin 2, Laser Bias Monitor (+):
See Figure 1.

Pin 4, Laser Bias Monitor (–):
See Figure 1.

Pins 5, 14, V_{EE}:
These pins are connected to ground in +5 V systems and –5 V in negative supply systems.
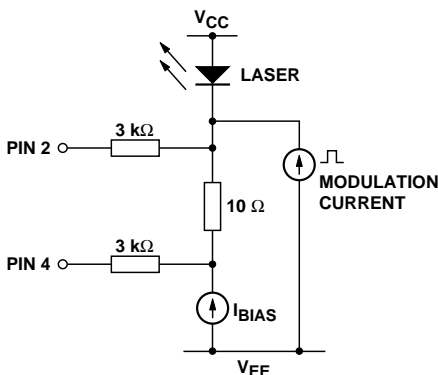
Pins 6, 8, 9, 12, 18, V_{CC}:
These pins are connected to +5 V for positive supply systems and ground for –5.2 V systems.

Pin 7, Transmit Disable:
Pin 7 floats to V_{EE} when open circuited, enabling the transmitter. It must be biased within 3 V of V_{CC} to disable.

Pins 11, 13, Ground:
The XMT5170-622 case is plastic, therefore pins are not connected.

Pins 15, 16, $\overline{DATA}$, DATA:
These are differential ECL inputs. If open circuited they float to V_{BB} (V_{CC} –1.3 V).

Pin 17, Laser Back Facet Monitor (–):
See Figure 2.

Pin 19, Laser Back Facet Monitor (+):
See Figure 2.

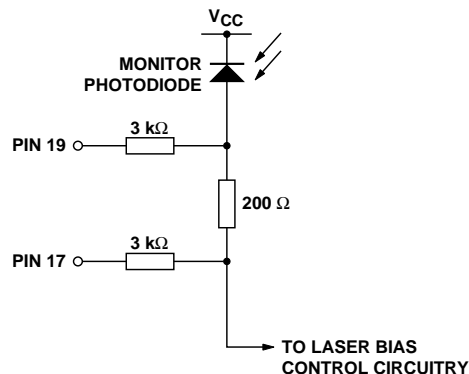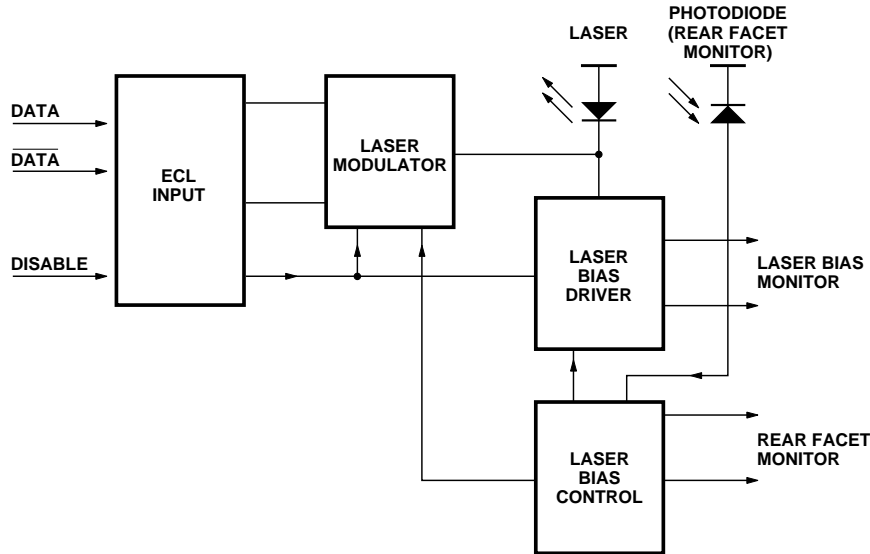**Figure 1. Laser Bias Monitor Circuitry.**

Figure 2. Back Facet Monitor Circuitry.

XMT5170-622 Block Diagram

Functional Description

The ECL input allows operation from many logic families and both single-ended or differential signals. For single-ended operation both DATA and $\overline{\text{DATA}}$ are internally tied to a V_{BB}. The unused input then requires no connection or biasing.

The disable function disables the laser bias and modulator. The switching threshold is V_{CC} –3.2 V. If this input is not connected the module is enabled. This input may be connected to a CMOS HI or tied to V_{CC} to disable.

The module provides the necessary bias and modulation control to maintain the extinction ratio at better than 10 dB and the waveform is compliant with SONET/SDH Eyemask standard G.957.

The laser bias control loop compensates for temperature induced variations in laser performance. The bias current monitor indicates the amount of dc current supplied to the laser. (This is approximately the laser threshold current).

The rear facet monitor is a signal proportional to the laser output power. This can be used as part of a HI/LO light alarm.

In the absence of data the laser will emit a mean optical power within the specified limits. The extinction ratio and duty cycle distortion are specified assuring a 50% duty cycle at the correct data rate.

Performance Specifications
Absolute Maximum Ratings

Absolute maximum limits mean that no catastrophic damage will occur if the product is subjected to these ratings for short periods, provided each limiting parameter is in isolation and all other parameters have values within the performance specification. It should not be assumed that limiting values of more than one parameter can be applied to the product at the same time.

Parameter	Minimum	Nominal	Maximum	Units	Notes
Supply Voltage	-	-	7	V	-
Operating Case Temperature					
XMT5170A-622	–40	-	+85	℃	-
XMT5170B-622	0	-	+70	℃	-
Storage Temperature	–40	-	+85	℃	-
Fiber Tensile Strength	10	-	-	N/10s	1
Fiber Bend Radius	32	-	-	mm	-
Lead Soldering (Temperature/Time)	-	-	+260/10	℃/Sec	-

Characteristics

Parameter	Minimum	Nominal	Maximum	Units	Notes
Center Wavelength	1280	-	1335	nm	2
Spectral Width (–20 dB)	-	-	1	nm	-
Side Mode Suppression Ratio (SMSR)	30	-	-	dB	-
Average Output Power	–3	-	+2	dBm	3
Extinction Ratio	10	-	-	dB	-
Bias Monitor	-	0.1	-	mA/mV	4
Rear Facet Monitor Output	5	-	100	mV	5
Supply Voltage	4.75	5.0	5.5	V	6
Supply Current	-		150	mA	7
Tx Disable	V_{CC} –3.2	-	V_{CC}	V	-
Output Waveform	SONET/SDH Eyemask Compliant G.957				

Notes:

1. In a coaxial direction with fiber feedthrough.
2. Over operating temperature range. A narrower operating temperature range will result in a smaller center wavelength spread. Contact Hewlett-Packard for details.
3. Other output power options are available. Contact Hewlett-Packard for details.
4. Common mode signal V_{EE} + 3.5 V nominal.
5. Common mode signal V_{EE} + 1.2 V nominal.
6. With V_{EE} connected to -5 V, V_{CC} must be at 0 V. With V_{CC} at +5 V, V_{EE} must be at 0 V.
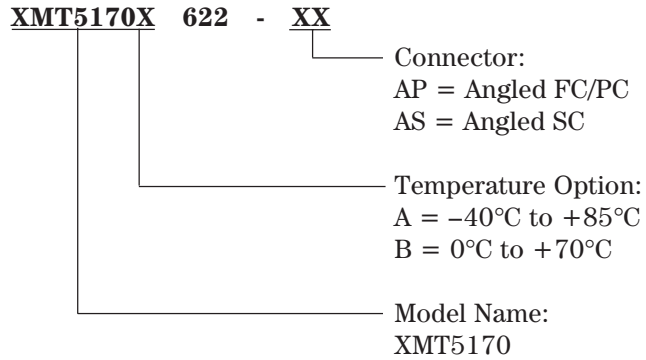7. End of life at Tmax.

Drawing Dimensions
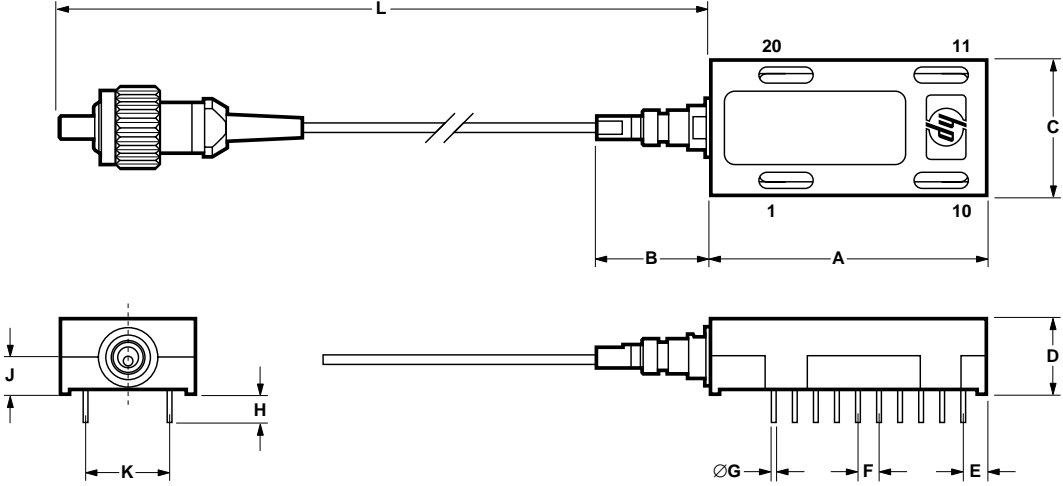
DIM.	MIN.	NOM.	MAX.
A	32.9	–	33.2
B	–	–	17.5
C	16.0	–	16.3
D	–	–	9.27
E	2.6	–	2.95
F	–	2.54	–
∅G	–	0.46	–
H	2.7	–	3.2
J	–	–	4.64
K	–	10.16	–
L	400	–	1220

ALL DIMENSIONS IN MILLIMETERS

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Ordering Information

<u>**XMT5170X**</u>   **622**   -   <u>**XX**</u>

Connector:
AP = Angled FC/PC
AS = Angled SC

Temperature Option:
A = −40°C to +85°C
B = 0°C to +70°C

Model Name:
XMT5170

Allowable part numbers:
XMT5170A-622-AP
XMT5170A-622-AS
XMT5170B-622-AP
XMT5170B-622-AS

Handling Precautions

1. Normal handling precautions for electrostatic sensitive devices should be taken.
2. Semiconductor lasers can be damaged by overloading or by current surges. Appropriate transient protection should be taken.