Guide to Selecting a Bias-T Laser Diode Mount

TECH NOTE

This Tech Note discusses the differences between the three Bias-T mount options offered by ILX Lightwave. The Bias-T mounts allow butterfly and DIL lasers without internal Bias-T circuitry to be modulated from 10 MHz to 800 MHz. If the laser package has an internal Bias-T or electroabsorption modulator, then the LDM-4984RF or LDM-4984EA mount is appropriate.

BIAS-T CIRCUIT DESCRIPTION

A "Bias-T" is a three-terminal circuit used to combine a high frequency AC signal to a DC signal into a single output. The frequency response with the Bias-T depends on component selection, so the Bias-T must be properly tuned for the range of operation. The circuit in ILX Lightwave Bias-T mount options is tuned to operate between 10 MHz and 800 MHz. Outside of that frequency range there will be some attenuation of the modulation signal.

In order to directly modulate a laser module, the signals can be combined prior to the mount with an external Bias-T, or within the mount with a built-in Bias-T. The two configurations are compared in Figure 1. ILX Lightwave offers three Bias-T mount options which combine the high frequency AC and DC signals in the mount and reduce the complexity of the bench-top setup by eliminating an external Bias-T component.

LASER DIODE MOUNT DESCRIPTION

The laser diode mounts follow the typical ILX Lightwave LDM-4980 Series design, but are distinguished by the SMA electrical connector located on the end of the mount. This SMA connector is the 50 Ω matched RF signal input, and is represented by the "AC" label in Figure 1. The mounts also have the standard 9-pin connectors; the laser source interconnect cable is represented by the "DC" label in Figure 1.

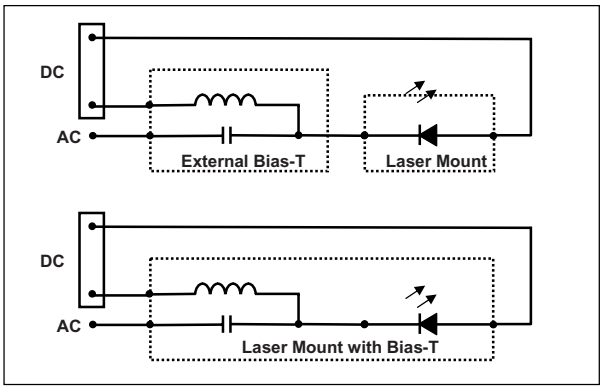

Figure 1. Bias-T and Mount Configurations

LDM-4980 Series Bias-T mounts are available for two different laser packages: the LDM-4982 for 14-pin DIL, and the LDM-4984 for 14-pin butterfly. Each can be ordered with Bias-T and/or the TE550 Case Temperature Control option.

The 14-pin DIL mount has one Bias-T pinout option (BT481) and the 14-pin butterfly mount has two options (BT482A or BT482B). The pinouts are described in Table 1.

Table 1
Bias-T Pin Out Options

Package Style	DIL	Butterfly	
Wiring Option	BT 481	BT 482A	BT 482B
Pin 1	*	*	*
Pin 2	*	*	*
Pin 3	*	*	*
Pin 4	*	*	*
Pin 5	*	*	*
Pin 6	*	*	*
Pin 7	*	*	*
Pin 8	*	*	*
Pin 9	Cathode	Cathode	*
Pin 10	Anode	Anode	Anode
Pin 11	*	*	Cathode
Pin 12	*	*	*
Pin 13	*	*	*
Pin 14	*	*	*

* User configurable pin assignment.

- Mini-DIL packages will modulate properly only if the laser cathode and anode are wired to pins 9 and 10, respectively.

1-800-459-9459 U.S. and Canada
www.ilxlightwave.com
International: 406-556-2481

REV01.012605

Guide to Selecting a Bias-T Laser Diode Mount ...continued

The laser cathode connection is hard-wired on the Bias-T mounts, and is not user-configurable. The laser anode lead must be connected to pin 10 for the bias signal to operate properly. All other pins are user-configurable via the screw terminal blocks inside the mount case, and are used to configure the photodiode, thermistor, and TEC of the laser.

The mount is simple to configure. The pin-out of the laser package must be known, then it is a matter of connecting the flying leads in the mount to the appropriate internal screw-terminal which connects the 9-pin D-sub connector pin to the laser.

Laser current and temperature control interconnect cables are attached to the 9-pin connectors between the mount and current source/temperature controller. If the mount is equipped with the TE550 Case Temperature Control option then a second temperature control interconnect cable is also attached to a second temperature controller. (See Figure 2)

Once the laser and temperature controllers are connected, the current and temperature limits should be set by programming them into the controllers. Next, a function generator is connected to the 50 Ω SMA connector on the end of the mount. (See Figure 2)

Actual frequency and modulation response will depend on the laser used. The laser will be driven by the combination of the DC bias current plus the RF current. The RF input signal is created by a 50 Ω matched function generator voltage. The nominal Bias-T transfer function is 20 mA/V, but will vary by frequency.

Care should be taken not to drive the laser with a negative signal. This can damage a laser. The RF

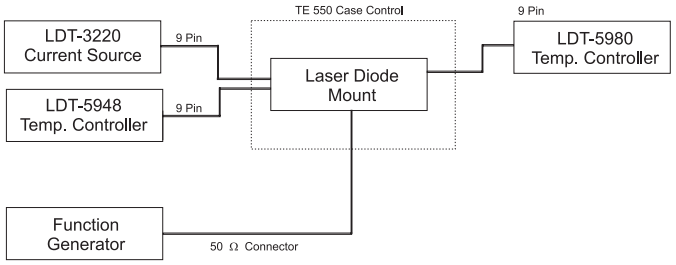

Figure 2. Laser Diode RF Control Setup

generator should be set up either with a DC offset to avoid allowing a negative pulse or the DC bias current should be set high enough that +/- signal from the RF input will not drive less than 0 mA to the laser.

In practice, set the DC bias to a safe level within the operating range of the laser under test. Turn on the ILX temperature controller and then the laser DC current source. Starting at 0V, increase the RF voltage while observing the laser's output with an optical detector and oscilloscope. Again, care should be taken not to exceed the laser's maximum input drive current or output optical power.

For test and setup purposes, a 1 Ohm resistor may be substituted in place of the laser. An oscilloscope may be used to monitor the voltage signal across the resistor. Because R=1 Ω, the voltage signal will be equal to the current signal. Adjustments to the drive signal may then be made without concern for laser damage.