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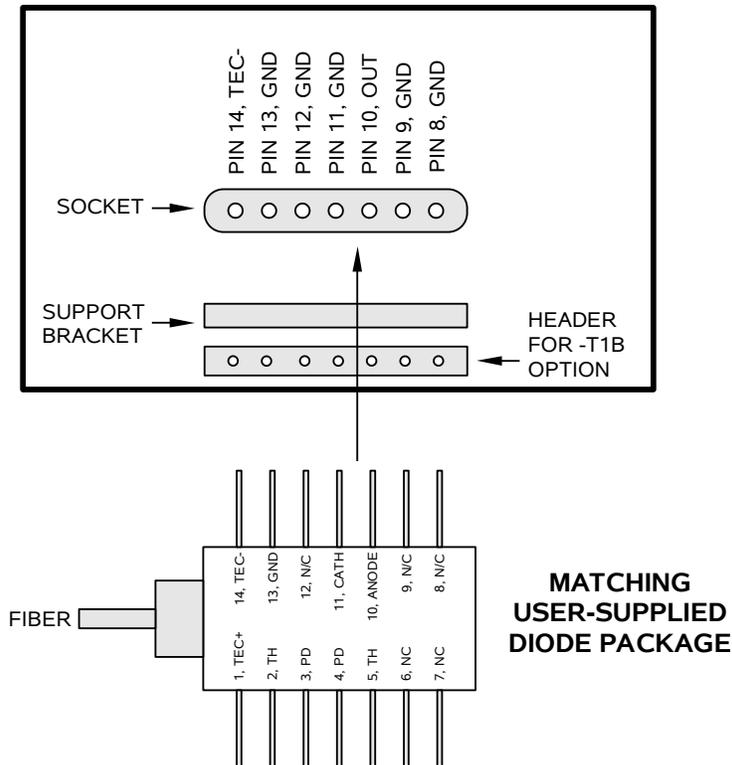
INSTRUCTIONS

MODEL AVX-S1-P1B OR AVX-S2-P1B

PLUG-IN SOCKET OUTPUT MODULE

SERIAL NUMBER: 14153

**"P1B" SOCKET VIEW**



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Manual Reference: /files/server2/officefiles/instructword/avx-s/AVX-S1-P1B,AVX-S2-P1B,ed10.odt.

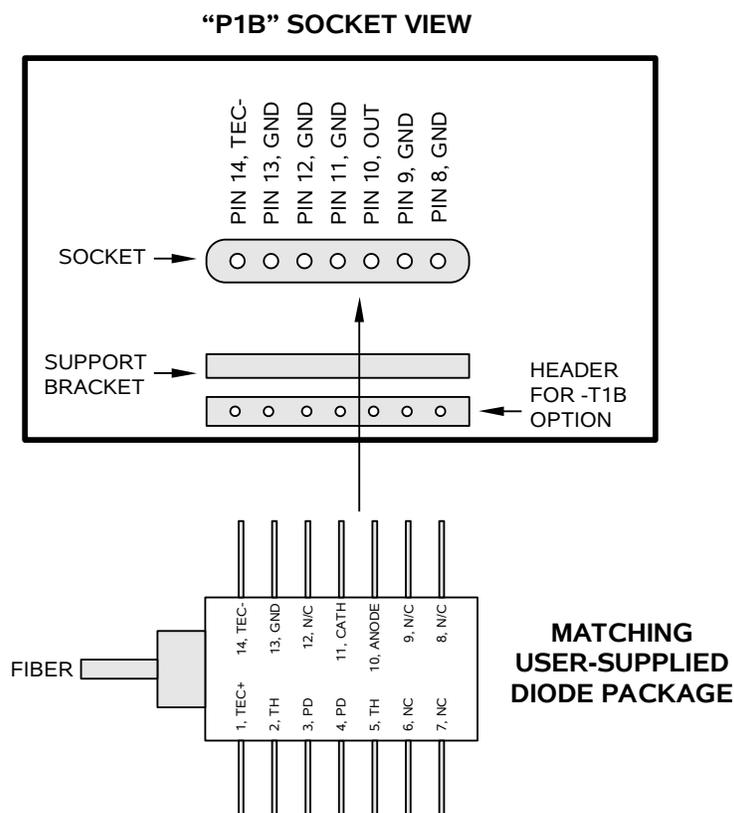
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## INTRODUCTION

The AVX-S series of bias insertion units is designed to combine a pulse signal with a DC bias, and supply the resulting signal to a laser diode, which is inserted into a high quality socket included on the mount. The bias insertion module includes the necessary networks to match the laser diode to the pulse source, as well as networks for applying DC bias to the diode.

The AVX-S1-P1B and AVX-S2-P1B are specifically designed to accommodate butterfly-packaged laser diodes with the pinout illustrated below:



## AVAILABLE OPTIONS

A number of options are available for the AVX-S1-P1B and AVX-S2-P1B, including:

- T1B option: Adds a secondary (low-bandwidth) slide-on socket board for pins 1-7 of a butterfly package. A flexible cable connects the slide-on socket to the output module. A male DB-9 connector is provided on the output module, which provides access to the thermal control pins of the diode. DB-9 pin 2 connects to diode pin 2 (TH). DB-9 pin 3 connects to diode pin 5 (TH). DB-9 pin 4 connects to diode pin 1 (TEC+). DB-9 pin 5 connects to diode pin 14 (TEC-). The remaining DB-9 pins are unconnected. Pins 3, 4, 6, and 7 of the diode are grounded. Access to the photodiode, if present, is not provided. This option requires the -P1B option. This option is designed for compatibility with Thorlabs temperature controllers and Lumics laser diodes. It may be suitable for others as well.
- T1D option: This is similar to the -T1B option, except DUT pins 3 and 4 are used for the thermistor, instead of 2 and 5.
- INV option: Adds a polarity-inverting transformer to the input.
- RS33 option: Reduces RS from the standard value of 50 Ohms to 33 Ohms.

## SPECIFICATIONS

Model:	AVX-S1	AVX-S2
Peak diode current ( $I_{PEAK}$ ):	400 mA	2 Amps
Max. input amplitude:	20 Volts	100 Volts
Pulse width (PW):	0.4 - 200 ns	1 - 1000 ns
Rise time (20%-80%):	0.2 ns	0.5 ns
Pulse repetition freq. (PRF) <sup>4</sup> :	DC - 25 MHz	DC - 100 kHz
N (transformer ratio <sup>1,2</sup> ):	+1	
$R_S$ <sup>5,6</sup> :	Standard: 50 $\Omega$ , ½ W With -RS33 option: 33 $\Omega$ , ½ W	50 $\Omega$ , 5 W
Max. DC bias current:	100 mA	
$R_{DC}$ (in series with DC input) <sup>7</sup> :	50 $\Omega$ , ½ W	
Max. DC bias voltage:	50 Volts	
IN connector:	1 SMA	
Included cables <sup>3</sup> :	1	
Other connectors:	MV, MI, MD: SMA (female), DC bias: solder terminal	
Diode socket:	The socket will accept pins 8-14 of a standard butterfly package with 0.5 mm wide pins. A pulse will be applied to the diode anode (pin 10). Pins 8-9 and 11-13 will be grounded. Pin 14 will be made accessible through a solder terminal. Four mounting holes on a 8.9 x 26 mm grid will be provided. The diode parasitic resistance (dV/dI at lasing) must be < 1 Ohm.	
Dimensions:	H x W x D: 42 mm x 67 mm x 76 mm (1.6" x 2.6" x 3.0")	
Material:	Cast aluminum, blue enamel	

- 1) The transformer reduces the input voltage by a factor of N (approx) and increases the current by a factor of N (approx). The load resistance ( $R_S + R_{DIODE}$ ) must equal  $50\Omega / N^2$  (approx).
- 2) A polarity inverting option is available. Add the suffix -INV to the model number to specify this option. "N" is negative ( $\approx -70\%$  of the standard value) when this option is installed.
- 3) 60 cm / 2 ft, SMA male to SMA male.
- 4) These devices are generally intended for use with Avtech pulse generators (in pulse mode), and are not characterized for CW operation. An estimate of the upper bandwidth limit may be made from the rated rise time. The lower end of the CW passband may be estimated using the maximum rated pulse width.
- 5) Do not exceed the rated power dissipation. For pulse mode operation, the power dissipated in  $R_S$  is given by  $(I_{PULSE}^2 \times R_S \times PW \times PRF) + (I_{DC}^2 \times R_S)$ .
- 6) If the diode resistance (dV/dI at lasing) is greater than one-tenth of  $R_S$ ,  $R_S$  should be reduced. Contact a sales engineer for details (info@avtechpulse.com).
- 7) Do not exceed the rated power dissipation. The power dissipated in  $R_{DC}$  is given by  $(I_{DC}^2 \times R_{DC})$ .

## GENERAL INFORMATION

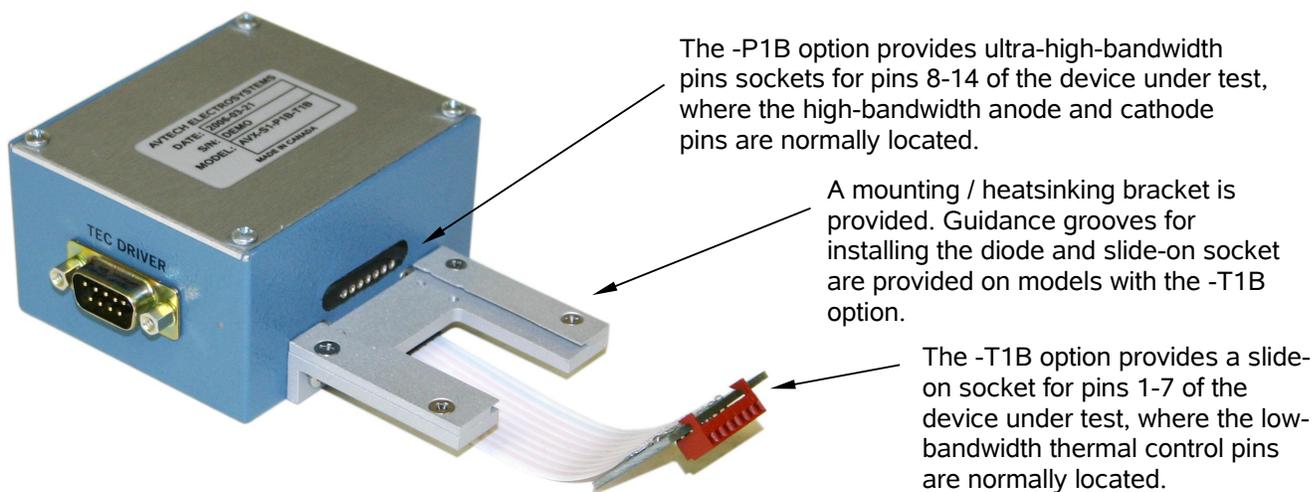
### INSTALLING THE DEVICE UNDER TEST

The AVX-S1-P1B and AVX-S2-P1B have a “P1B” high-speed socket for pins 8-14 of the diode under test. If the “-T1B” option has been specified, a slide-on socket for pins 1-7 of the diode will also be present.

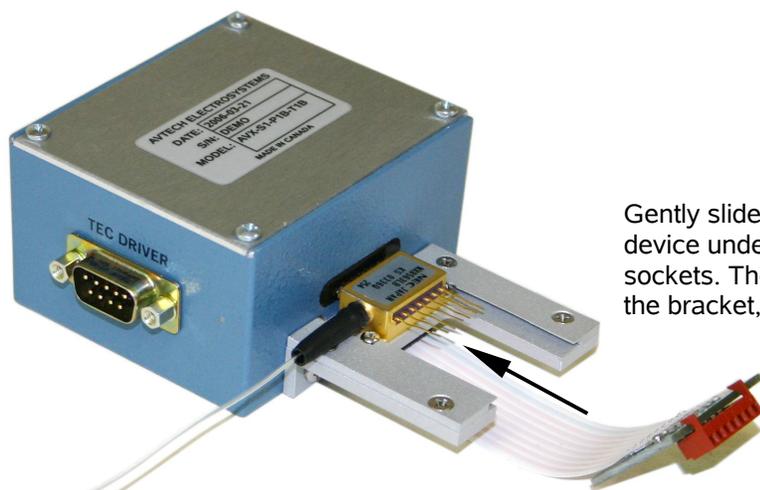
The “P1B” socket consists of seven high-bandwidth pin sockets. This socket arrangement will accept pins 8-14 of a standard butterfly package with 0.5 mm wide pins. A positive pulse will be applied to the diode anode (pin 10). Pins 8-9 and 11-13 will be grounded.

The optional “T1B” socket consists of a low-bandwidth slide-on socket board for pins 1-7 of a butterfly package. A flexible cable connects the slide-on socket to the output module. A male DB-9 connector is provided on the output module, which provides access to the thermal control pins of the diode. DB-9 pin 2 connects to diode pin 2 (TH). DB-9 pin 3 connects to diode pin 5 (TH). DB-9 pin 4 connects to diode pin 1 (TEC+). DB-9 pin 5 connects to diode pin 14 (TEC-). The remaining DB-9 pins are unconnected. Pins 3, 4, 6, and 7 of the diode are grounded. Access to the photodiode, if present, is not provided. This option is designed for compatibility with Thorlabs temperature controllers and Lumics laser diodes. It may be suitable for others as well.

With no diode installed, the output module will look similar to this:



The diode is first installed by sliding pins 8-14 into the “P1B” pin sockets, as shown below:



Gently slide the high-bandwidth side of the device under test into the matching pin sockets. The device can be screwed down to the bracket, if desired.

If present, the T1B slide-on socket assembly can then be slid onto pins 1-7, as shown below:



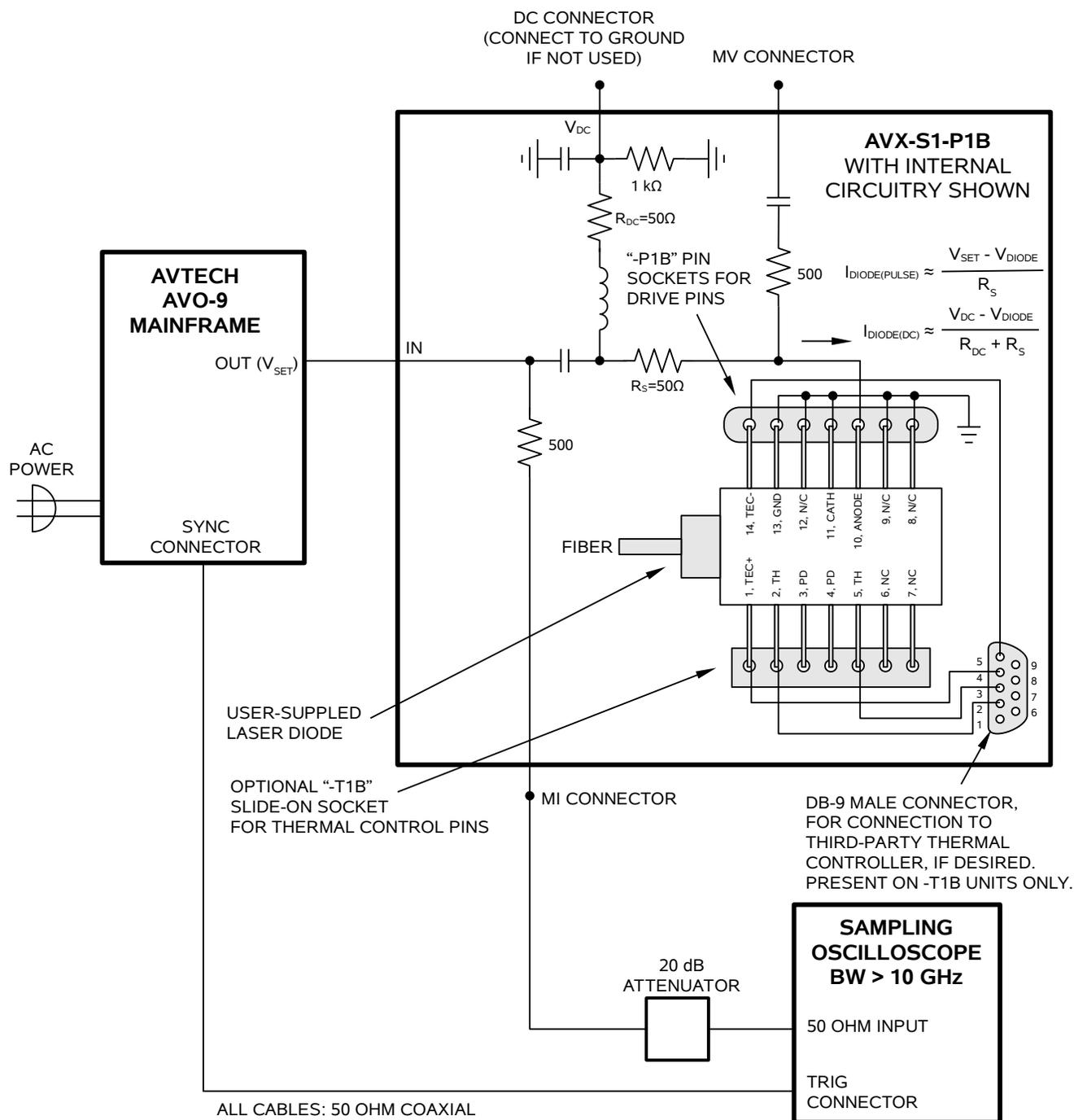
Gently slide the low-bandwidth slide-on socket onto the matching pins of the device under test. The slide-on socket is connected to the output module using a short length of flexible ribbon cable. The thermoelectric cooler and thermistor pins are made accessible to the user through the “TEC DRIVER” DB-9 connector, which will mate to cables from common third-party TEC controllers.

(The SMA connectors which connect to the cabling from the mainframe are on the module side opposite the pin socket. They are not visible in these photos.)

To optional third-party TEC controller.

## NORMAL TEST ARRANGEMENT

To fully test the instrument, and for normal operation, the output module must be connected as shown below. The basic functional equivalent circuit of the output module is shown.



### THERMAL CONTROL (-T1B and -T1D UNITS)

Models with the -T1B or -T1D options include a DB-9 male connector that will mate to third-party temperature controllers. These third-party controller provide a means of controlling the thermoelectric cooler that is typically present in butterfly-packaged laser

diodes, if desired. The need for cooling is dependent on the user's application. Cooling is generally recommended by device manufacturers.

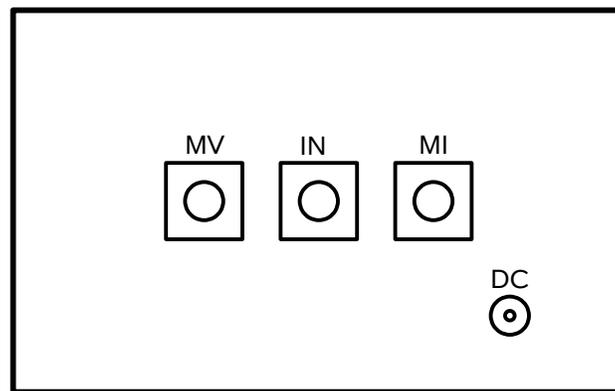
On units with the -T1B option, DB9 connector pins 2 and 3 connect to DUT pins 2 and 5. DUT pins 3 and 4 are grounded.

On units with the -T1D option, DB9 connector pins 2 and 3 connect to DUT pins 3 and 4. DUT pins 2 and 5 are grounded.

### SIGNAL CONNECTORS ON THE OUTPUT MODULE

An oscilloscope may be used to monitor the MI and MV outputs. A forward DC bias may be applied to the laser diode by connecting a DC potential of 0 to +10 Volts to the DC solder terminal. The application of a small forward bias often yields a more ideal diode current waveform (as observed on the MI port).

⚠ Note that the DC port must be shorted to ground if a bias is not applied. Waveform distortions will occur otherwise.



**AVX-S1-P1B OUTPUT MODULE, CONNECTOR VIEW**

### AMPLITUDE CONTROL

The pulse current through the diode load installed in the output module is given by:

$$I_{\text{DIODE}} = (V_{\text{SET}} - V_{\text{DIODE}}) / R_{\text{S}}$$

where  $V_{\text{SET}}$  is the amplitude setting on the pulser,  $V_{\text{DIODE}}$  is the forward voltage drop across the diode (typically 2 or 3V), and  $R_{\text{S}}$  is 50 Ohms on standard units (33 Ohms on units with the -RS33 option).

Standard AVX-S1-P1B models require a positive pulse ( $V_{\text{SET}} > 0$ ) on the input, in order to forward bias the device anode.

### -INV OPTION

Models with the -INV option have a polarity inverting transformer on the input. This is useful if the user has a pulse generator that generates negative amplitudes only. (The standard AVX-S1-P1B requires a positive pulse for normal operation.)

The amplitude control equation becomes:

$$I_{\text{DIODE}} = (-V_{\text{SET}} - V_{\text{DIODE}}) / R_{\text{S}}$$

### COMPATIBLE PULSE GENERATORS

The AVX-S1-P1B and AVX-S2-P1B are designed for use with high-speed Avtech pulse generators, such as those in the AVP, AVPP, AVMP, AVMM, AVMR, AVN, and other families. The AVX-S1-P1B and AVX-S2-P1B may also be suitable for use with other pulse generators. Contact Avtech ([info@avtechpulse.com](mailto:info@avtechpulse.com)) if you need assistance selecting a pulse generator.

Models in the Avtech AVO-9 series include a pulse generator and an AVX-S series output module in a complete “bundle”. See <http://www.avtechpulse.com/laser/> for details.

PERFORMANCE CHECKSHEET