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NANOSECOND WAVEFORM ELECTRONICS
SINCE 1975

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OTTAWA, CANADA K2C3H5

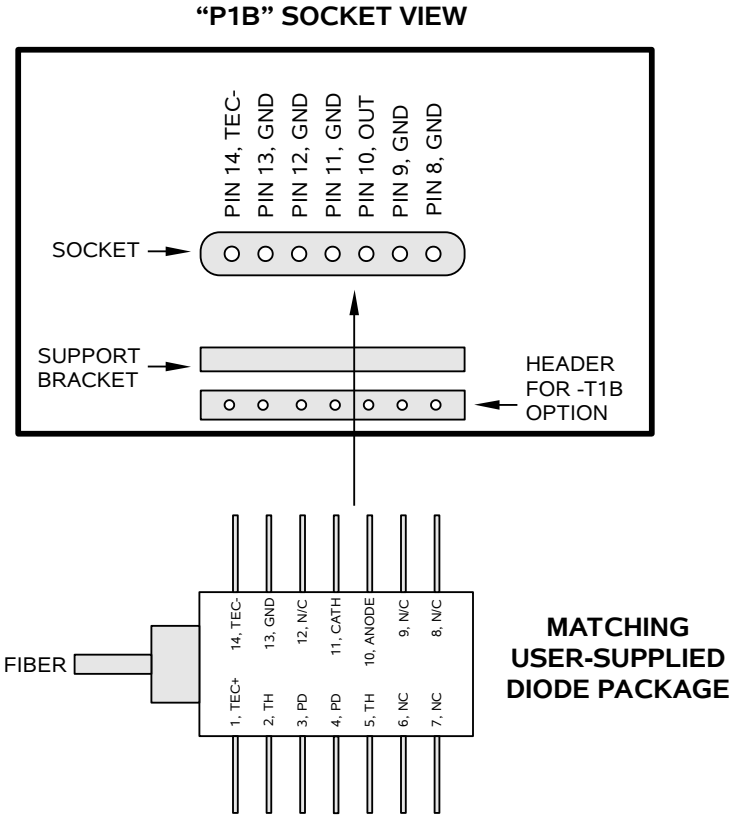
INSTRUCTIONS

MODEL AVX-S1-P1B-T1B-HC

PLUG-IN SOCKET OUTPUT MODULE

SERIAL NUMBER: 13990

"P1B" SOCKET VIEW



MATCHING USER-SUPPLIED DIODE PACKAGE

WARRANTY

Avtech Electrosystems Ltd. warrants products of its manufacture to be free from defects in material and workmanship under conditions of normal use. If, within one year after delivery to the original owner, and after prepaid return by the original owner, this Avtech product is found to be defective, Avtech shall at its option repair or replace said defective item. This warranty does not apply to units which have been dissembled, modified or subjected to conditions exceeding the applicable specifications or ratings. This warranty is the extent of the obligation assumed by Avtech with respect to this product and no other warranty or guarantee is either expressed or implied.

TECHNICAL SUPPORT

Phone: 888-670-8729 (USA & Canada) or +1-613-686-6675 (International)
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Manual Reference: /fileserver1/officefiles/instructword/avx-s/AVX-S1-P1B-T1B-HC,ed1.odt.
Last modified February 29, 2024.

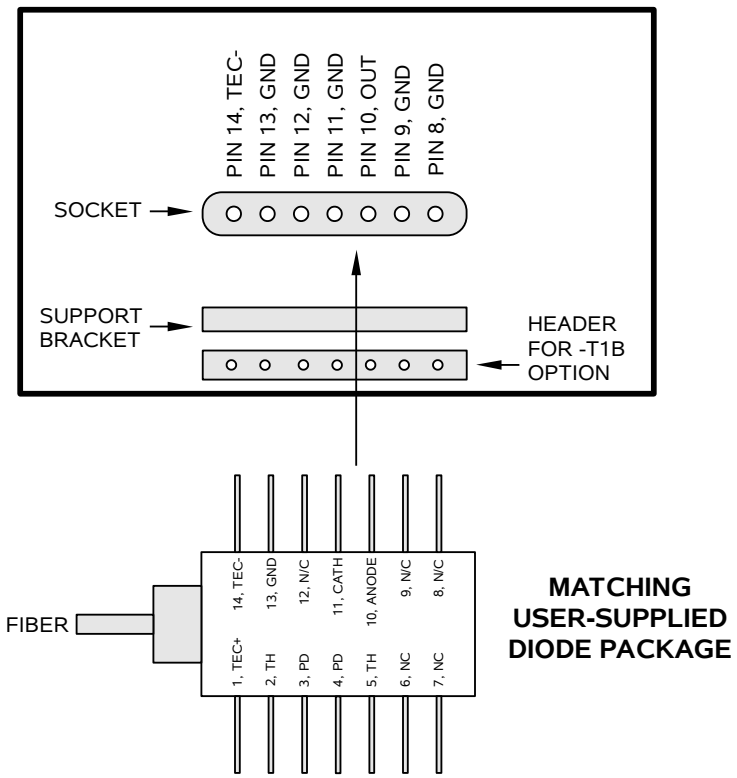
INTRODUCTION

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 is specifically designed to accommodate butterfly-packaged laser diodes with the pinout illustrated below.

This output module is intended for use with the AVO-9L-B-P-AC03-P1B-T1B pulser mainframe (S/N 12504), replacing the original output module. Please see the AVO-9L-B-P-AC03-P1B-T1B manual for additional details.

"P1B" SOCKET VIEW



MATCHING USER-SUPPLIED DIODE PACKAGE

SPECIFICATIONS

Model:	AVX-S1-P1B-T1B-HC
For use with:	AVO-9L-B-P-AC03-P1B-T1B pulser mainframe (S/N 12504)
Peak diode current (I_{PEAK}):	2 A
Max. input amplitude:	50 Volts
Pulse width (PW):	0.4[1] - 20 ns
Rise time (20%-80%):	0.2 ns[1]
Pulse repetition freq. (PRF)[8]:	DC - 20 kHz
Pulse input impedance:	50 Ω
N (transformer ratio[2,3]):	+2
R_S[9,10]:	11 Ω, ½ W
Max. DC bias current:	100 mA
R_{DC} (in series with DC input)[11]:	10 Ω, ½ W
Max. DC bias voltage:	50 Volts
IN connector:	1 SMA
Included cables[7]:	1
Other connectors:	MV, MI, MD: SMA (female), DC bias: solder terminal
Diode socket:	Refer to manual text
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) Lower pulse widths (to 0.2 ns) and faster rise times (0.1 ns) may be possible for laser diode packages with very low parasitic inductance. The -P0 and -P2 packages generally have very low inductance. The -P1, -P3, and -TO3 packages normally have somewhat higher parasitic inductance.
2) 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 50Ω / N^2 (approx).
3) A polarity inverting option is available. Add the suffix -INV to the model number to specify this option. "N" is negative (≈ -70% of the standard value) when this option is installed.
4) Generic option. A drawing showing the diode package size and electrical pinout must be provided by the end-user, and the model number & price may change.
5) -P1B (specific pinout option). No further drawings are required. 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. A low-bandwidth slide-on socket can also be provided for pins 1-7 of the diode, with the thermal control pins brought out to a standard DB-9 connector (-T1B option).
6) -P1C (specific pinout option). No further drawings are required. The socket will accept pins 8-14 of a standard butterfly package with 0.5 mm wide pins. A negative pulse will be applied to the diode cathode (pin 12). Pins 8-11 and 13-14 will be grounded. Four mounting holes on a 8.9 x 26 mm grid will be provided. The laser input impedance (dV/dI at lasing) must be 25 Ω (+/- 5 Ω). If the internal resistance is 0 Ω (instead of 25 Ω), use the -P1CR0 suffix instead. Not available on AVX-S3 models. A low-bandwidth slide-on socket can also be provided for pins 1-7 of the diode, with the thermal control pins brought out to a standard DB-9 connector (-T1C option).
7) 60 cm / 2 ft, SMA male to SMA male.
8) 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.
9) Do not exceed the rated power dissipation. For pulse mode operation, the power dissipated in R_S is given by ($I_{PULSE}^2 \times R_S \times PW \times PRF$) + ($I_{DC}^2 \times R_S$).
10) 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).
11) Do not exceed the rated power dissipation. The power dissipated in R_{DC} is given by ($I_{DC}^2 \times R_{DC}$).

REGULATORY NOTES

FCC PART 18

This device complies with part 18 of the FCC rules for non-consumer industrial, scientific and medical (ISM) equipment.

This instrument is enclosed in a rugged metal chassis and uses a filtered power entry module (where applicable). The main output signal is provided on a shielded connector that is intended to be used with shielded coaxial cabling and a shielded load. Under these conditions, the interference potential of this instrument is low.

If interference is observed, check that appropriate well-shielded cabling is used on the output connectors. Contact Avtech (info@avtechpulse.com) for advice if you are unsure of the most appropriate cabling. Also, check that your load is adequately shielded. It may be necessary to enclose the load in a metal enclosure.

If any of the connectors on the instrument are unused, they should be covered with shielded metal “dust caps” to reduce the interference potential.

This instrument does not normally require regular maintenance to minimize interference potential. However, if loose hardware or connectors are noted, they should be tightened. Contact Avtech (info@avtechpulse.com) if you require assistance.

EC DECLARATION OF CONFORMITY

CE

We Avtech Electrosystems Ltd.
P.O. Box 5120, LCD Merivale
Ottawa, Ontario
Canada K2C 3H5

declare that this pulse generator meets the intent of Directive 2004/108/EG for Electromagnetic Compatibility. Compliance pertains to the following specifications as listed in the official Journal of the European Communities:

EN 50081-1 Emission

EN 50082-1 Immunity

and that this pulse generator meets the intent of the Low Voltage Directive 2006/95/EC. Compliance pertains to the following specifications as listed in the official Journal of the European Communities:

EN 61010-1:2001 Safety requirements for electrical equipment for measurement, control, and laboratory use

DIRECTIVE 2011/65/EU (RoHS)

We Avtech Electrosystems Ltd.
P.O. Box 5120, LCD Merivale
Ottawa, Ontario
Canada K2C 3H5

declare that, to the best of our knowledge, all electrical and electronic equipment (EEE) sold by the company are in compliance with Directive 2011/65/EU of the European Parliament and of the Council of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (also known as “RoHS Recast”). In addition, this declaration of conformity is issued under the sole responsibility of Avtech Electrosystems Ltd. Specifically, products manufactured do not contain the substances listed in the table below in concentrations greater than the listed maximum value.

Material/Substance	*Threshold level*
Lead (Pb)	< 1000 ppm (0.1% by mass)
Mercury (Hg)	< 1000 ppm (0.1% by mass)
Hexavalent Chromium (Cr6+)	< 1000 ppm (0.1% by mass)
Polybrominated Biphenyls (PBB)	< 1000 ppm (0.1% by mass)
Polybrominated Diphenyl ethers (PBDE)	< 1000 ppm (0.1% by mass)
Cadmium (Cd)	< 100 ppm (0.01% by mass)
Bis(2-ethylhexyl) phthalate (DEHP)	< 1000 ppm (0.1% by mass)
Butyl benzyl phthalate (BBP)	< 1000 ppm (0.1% by mass)
Dibutyl phthalate (DBP)	< 1000 ppm (0.1% by mass)
Diisobutyl phthalate (DIBP)	< 1000 ppm (0.1% by mass)

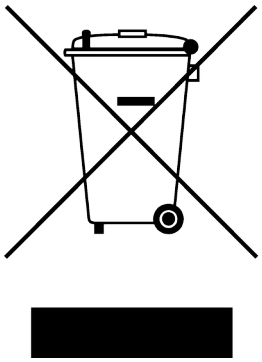
DIRECTIVE 2002/96/EC (WEEE)

European customers who have purchased this equipment directly from Avtech will have completed a “WEEE Responsibility Agreement” form, accepting responsibility for WEEE compliance (as mandated in Directive 2002/96/EC of the European Union and local

laws) on behalf of the customer, as provided for under Article 9 of Directive 2002/96/EC.

Customers who have purchased Avtech equipment through local representatives should consult with the representative to determine who has responsibility for WEEE compliance. Normally, such responsibilities with lie with the representative, unless other arrangements (under Article 9) have been made.

Requirements for WEEE compliance may include registration of products with local governments, reporting of recycling activities to local governments, and financing of recycling activities.



GENERAL INFORMATION

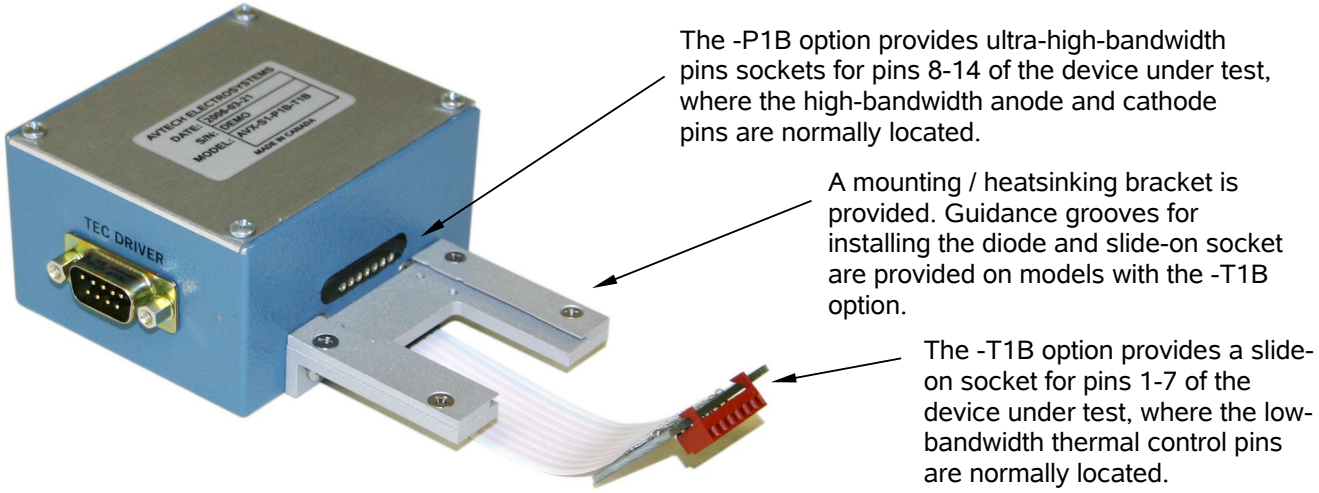
INSTALLING THE DEVICE UNDER TEST

The AVX-S1-P1B has 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:

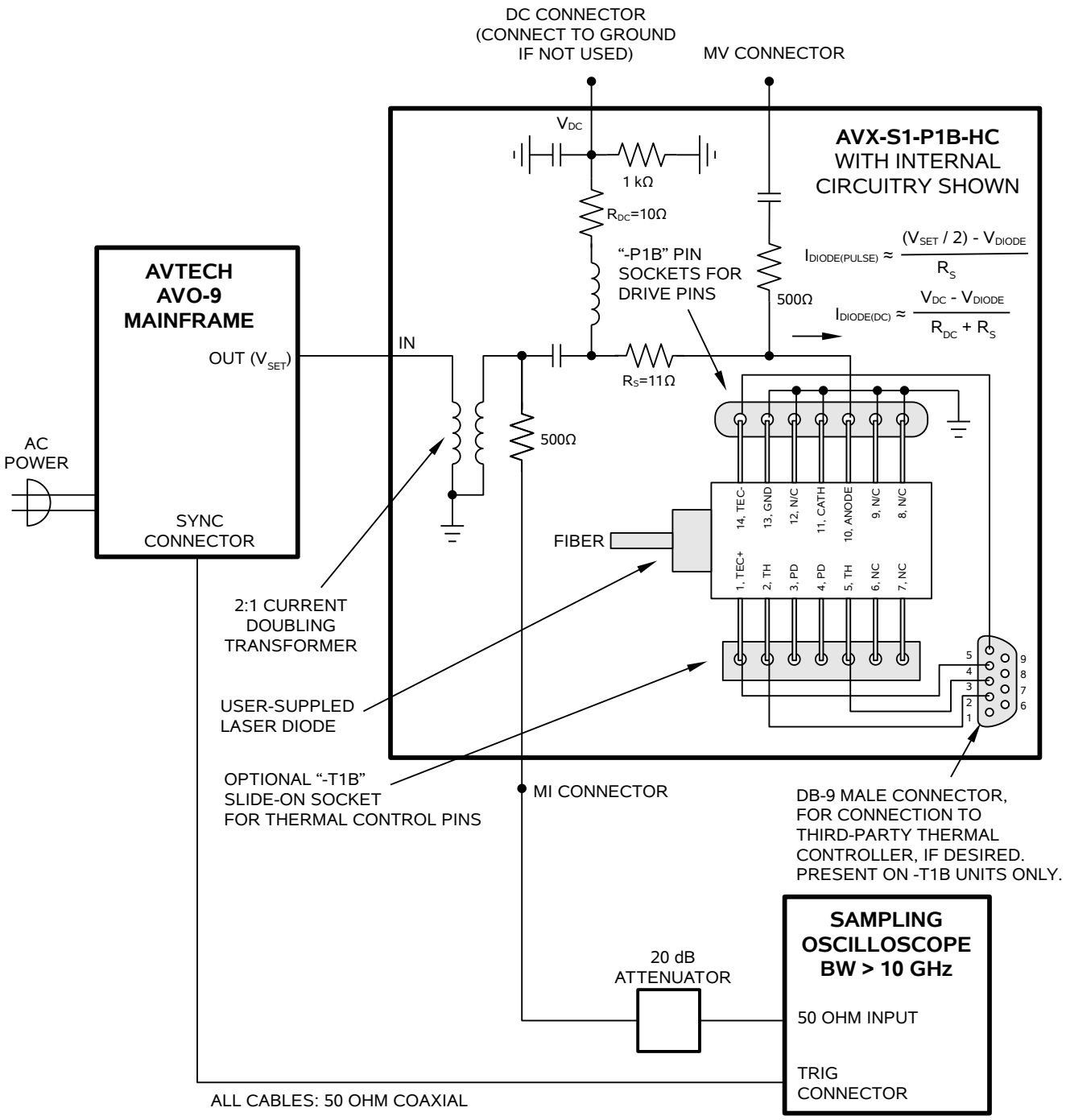
Gently slide the low-bandwidth slide-on socket onto the matching pins of the device under test. The slide-on socket is connected to the output module using a short length of flexible ribbon cable. The thermoelectric cooler and thermistor pins are made accessible to the user through the “TEC DRIVER” DB-9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



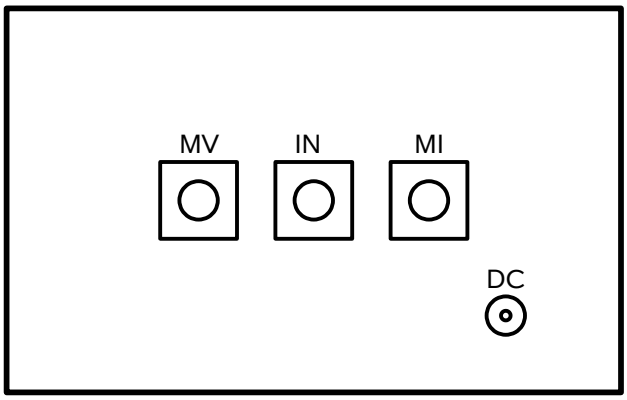
THERMAL CONTROL (-T1B UNITS)

Models with the "-T1B" option 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.

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 small voltage 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).



AVX-S1-P1B OUTPUT MODULE, CONNECTOR VIEW

AMPLITUDE CONTROL

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

$$I_{DIODE} = (V_{SET} / 2) - V_{DIODE}) / 11\Omega$$

where V_{SET} is the amplitude setting on the mainframe (typically up to +50V), and V_{DIODE} is the forward voltage drop across the diode (typically +2 or +3V).

Ideally, $(11\Omega + dV_{DIODE}/dI) \approx 12.5\Omega$ for an optimal transmission line impedance match.

COMPATIBLE PULSE GENERATORS

This output module is intended for use with the AVO-9L-B-P-AC03-P1B-T1B pulser mainframe (S/N 12504), replacing the original output module. Please see the AVO-9L-B-P-AC03-P1B-T1B manual for additional details.