AVTECH ELECTROSYSTEMS LTD.

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SINCE 1975

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INSTRUCTIONS

MODEL AVO-9A-P1C-T1C-N-MAPA

300 mA, 250 ps RISE TIME

HIGH PERFORMANCE LASER DIODE DRIVER MODULE

WITH PLUG-IN SOCKET OUTPUT

FOR BUTTERFLY-PACKAGED LASER DIODES

SERIAL NUMBER: _____

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

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Manual Reference: /fileserver1/officefiles/instructword/avo-9/AVO-9A-P1C-T1C-N-MAPA,ed1.odt.
Last modified February 29, 2024.

INTRODUCTION

The AVO-9A-P1C-T1C-N-MAPA is a high performance DC-powered laser diodr driver module capable of generating up to 300 mA of current into diode loads, at repetition rates up to 100 kHz. The pulse width is fixed at 1 ns ± 10%. The rise times are less than 250 ps, and the fall times are less than 350 ps.

The AVO-9A-P1C-T1C-N-MAPA module provides a socket into which the user's laser diode may be inserted. The module internally generates voltage pulses of between 0 and -20V. The module contains the necessary elements to match the laser diode to the pulse generator mainframe. A DC bias current of 0 to 100 mA may be applied to the laser diode by applying the desired DC current to a terminal pin on the module. The module includes an SMA output connector that provides an attenuated coincident replica of the diode current.

The AVO-9A-P1C-T1C-N-MAPA must be triggered by an externally-generated TTL-level pulse.

This instrument is intended for use in research, development, test and calibration laboratories by qualified personnel.

SPECIFICATIONS

Model:	AVO-9A-P1C-T1C-N-MAPA
Amplitude, standard:	30 to 300 mA
Allowed load voltage range:	0 to 3V
Pulse width (FWHM):	1 ns ± 10%
Maximum PRF:	100 kHz
Rise time (20%-80%):	≤ 250 ps
Fall time (80%-20%):	≤ 350 ps
Polarity:	Positive
Propagation delay:	≤ 150 ns (Ext trig in to pulse out)
Jitter:	± 35 ps ± 0.015% of sync delay (Ext trig in to pulse out)
DC offset or bias insertion:	Apply required DC bias current in the range of 0-100 mA to solder terminal on output module.
Trigger required:	+3 to +5V (TTL), ≥ 50 ns, 50 Ω input impedance
Connectors: Out: Other:	-P1C socket, -T1C socket Trig, Monitor: SMA
Power requirements:	+24V DC and -24V DC
Dimensions (H×W×D):	43 mm x 76 mm x 200 mm
Temperature range:	+5°C to +40°C

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.
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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 72/23/EEC as amended by 93/68/EEC. 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 2002/95/EC (RoHS)

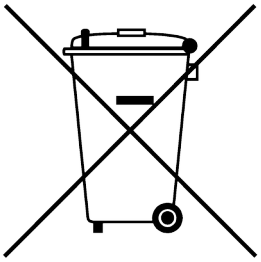
This instrument is exempt from Directive 2002/95/EC of the European Parliament and of the Council of 27 January 2003 on the Restriction of the use of certain Hazardous Substances (RoHS) in electrical and electronic equipment. Specifically, Avtech instruments are considered "Monitoring and control instruments" (Category 9) as defined in Annex 1A of Directive 2002/96/EC. The Directive 2002/95/EC only applies to Directive 2002/96/EC categories 1-7 and 10, as stated in the "Article 2 - Scope" section of Directive 2002/95/EC.

DIRECTIVE 2002/96/EC (WEEE)

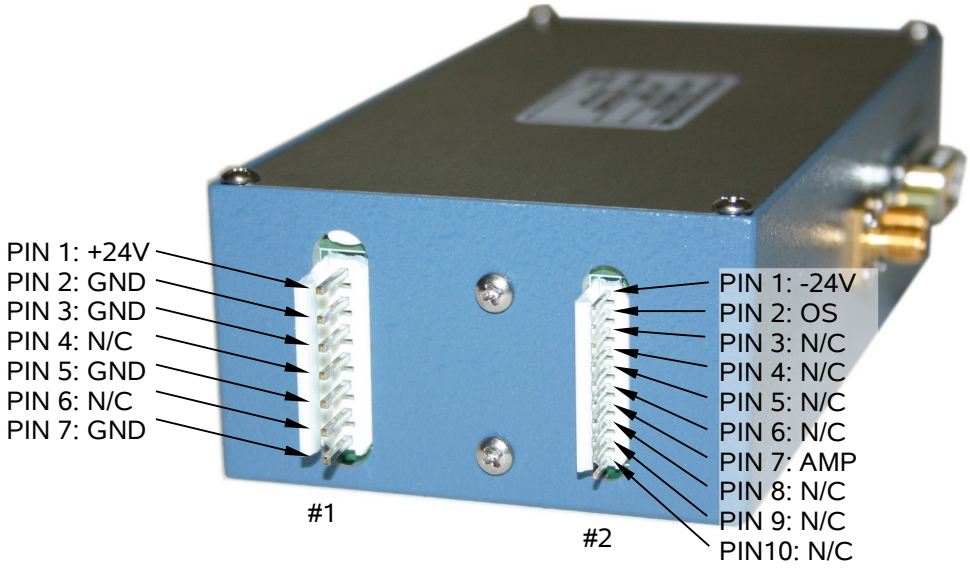
European customers who have purchased this equipment directly from Avtech will have completed a “WEEE Responsibility Agreement” form, accepting responsibility for WEEE compliance (as mandated in Directive 2002/96/EC of the European Union and local laws) on behalf of the customer, as provided for under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



TERMINAL CONNECTORS



Connectors #1 and #2 are shown above. These supply the DC power and the amplitude and pulse width signals to the module, as well as any required DC offset for the output.

+24V must be connected to pin 1 of connector #1.

-24V must be connected to pin 1 of connector #2.

Ground must be connected to pin 2 of connector #1.

The output amplitude is controlled by the voltage (in the range of 0 to +10V) applied to pin 7 of connector #2. The input impedance is several kilohms or higher.

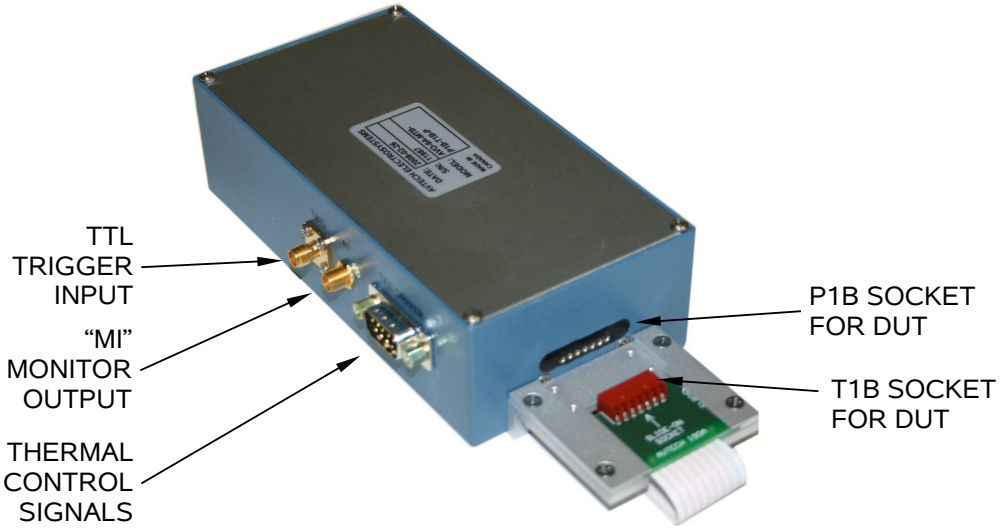
The output pulse width is nominally fixed at 1 ns ± 10%. It can actually be varied over a small range for calibration purposes using the screwdriver-adjustable trimpot that is accessible from the top cover.

A DC bias may be applied to the laser diode by connecting a DC potential of 0 to -10 Volts to the OS terminal, pin 2 of connector #2. The application of a small forward bias often yields a more ideal diode current waveform (as observed on the MI port).

Connector #1 is an AMP 640445-7 connector. This connector is shipped with a mating AMP 640600-7 insulation-displacement connector installed, for the convenience of the user. The 640600-7 is designed to accept AWG #20 hookup wire.

Connector #2 is an AMP 1-640456-0 connector. This connector is shipped with a mating AMP 4-640621-0 insulation-displacement connector installed, for the convenience of the user. The 4-640621-0 is designed to accept AWG #24 hookup wire.

SIGNAL CONNECTORS



The externally-generated TTL trigger signal must be applied to the SMA connector shown above. The input impedance is 50 Ohms.

An oscilloscope may be used to monitor the MI monitor outputs, as discussed in later sections.

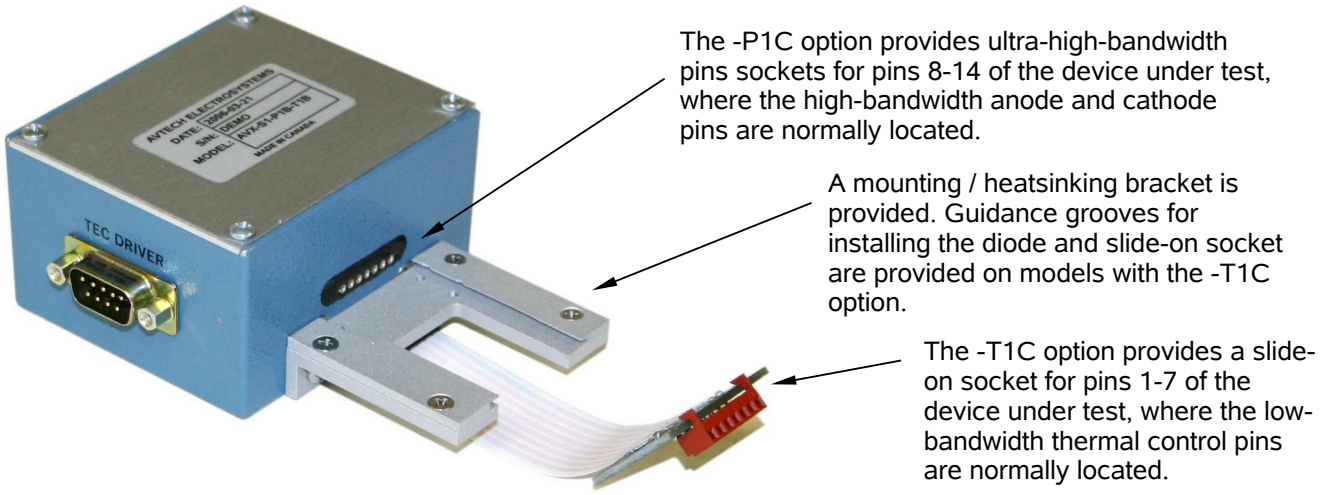
INSTALLING THE DEVICE UNDER TEST

The AVO-9A-P1C-T1C-N-MAPA has a “P1C” high-speed socket for pins 8-14 of the diode under test. If the “-T1C” option has been specified, a slide-on socket for pins 1-7 of the diode will also be present.

The “P1C” 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 negative pulse will be applied to the diode cathode (pin 12). Pins 8-11 and 13-14 will be grounded. The laser input impedance (dV/dI at lasing) must be 25 Ohms (+/- 5 Ohms).

The optional “T1C” 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 P1Baccess to the thermal control pins of the diode. DB-9 pin 2 connects to diode pin 1 (TH). DB-9 pin 3 connects to diode pin 2 (TH). DB-9 pin 4 connects to diode pin 6 (TEC+). DB-9 pin 5 connects to diode pin 7 (TEC-). The remaining DB-9 pins are unconnected. Pins 4 and 5 of the diode are grounded. Pin 3 is unconnected. Access to the photodiode, if present, is not provided. This option is designed for compatibility with Thorlabs temperature controllers and certain QPhotonics 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 “P1C” 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 T1C slide-on socket assembly can then be slid onto pins 1-7, as shown below:

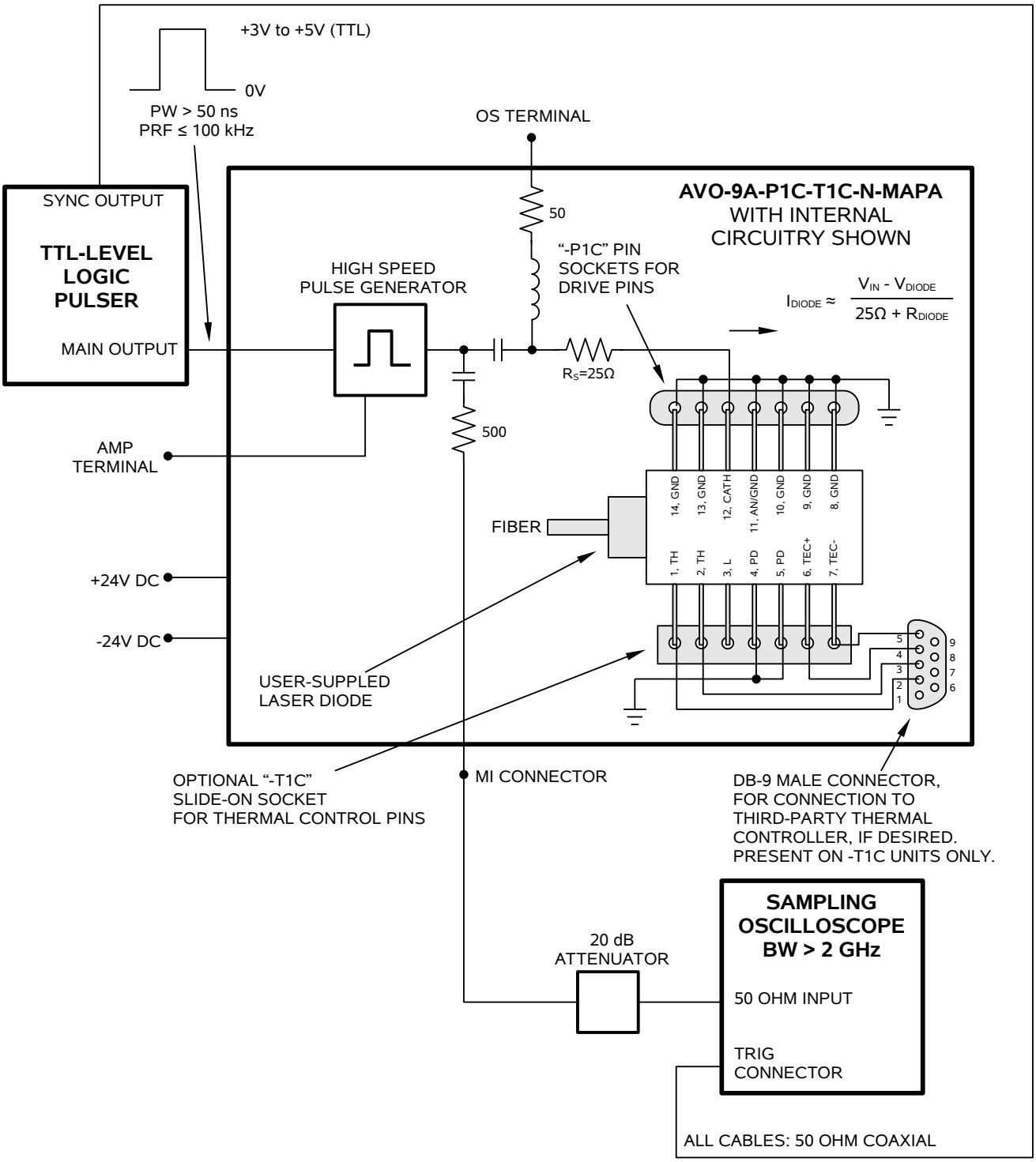
To optional third-party TEC controller.

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.)

NORMAL TEST ARRANGEMENT

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



THERMAL CONTROL (-T1C UNITS)

Models with the “-T1C” 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.

AMPLITUDE CONTROL

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

$$I_{DIODE} = (V_{SET} - V_{DIODE}) / (25\Omega + R_{DIODE})$$

where V_{SET} is the amplitude of the internal high-speed voltage pulse generator (between 0 and -20V), V_{DIODE} is the forward voltage drop across the diode (typically -2 or -3V), and R_{DIODE} is typically 25Ω (± 5Ω).

PROTECTING YOUR INSTRUMENT

DO NOT EXCEED 100 kHz

The output stage may be damaged if triggered by an external signal at a pulse repetition frequency greater than 100 kHz.

PERFORMANCE CHECKSHEET