AVTECH ELECTROSYSTEMS LTD.

NANOSECOND WAVEFORM ELECTRONICS
SINCE 1975

P.O. BOX 265
OGDENSBURG, NY
U.S.A. 13669-0265
TEL: (315) 472-5270
FAX: (613) 226-2802

TEL: 1-800-265-6681
FAX: 1-800-561-1970

e-mail: info@avtechpulse.com
http://www.avtechpulse.com

P.O. BOX 5120 STN. F
OTTAWA, ONTARIO
CANADA K2C 3H4
TEL: (613) 226-5772
FAX: (613) 226-2802

INSTRUCTIONS

MODEL AVO-9A-N-LK PULSE GENERATOR
MODEL AVX-S1 BIAS INSERTION UNIT

S.N.:

EC Declaration of Conformity

We

Avtech Electrosystems Ltd.
P.O. Box 5120, Stn. F
Ottawa, Ontario
Canada K2C 3H4

declare that the AVO-9A-N-LK
pulse generator meets the intent of Directive 89/336/EEC 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

CE

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: 613-226-5772 or 1-800-265-6681
Fax: 613-226-2802 or 1-800-561-1970

E-mail: info@avtechpulse.com
World Wide Web: http://www.avtechpulse.com

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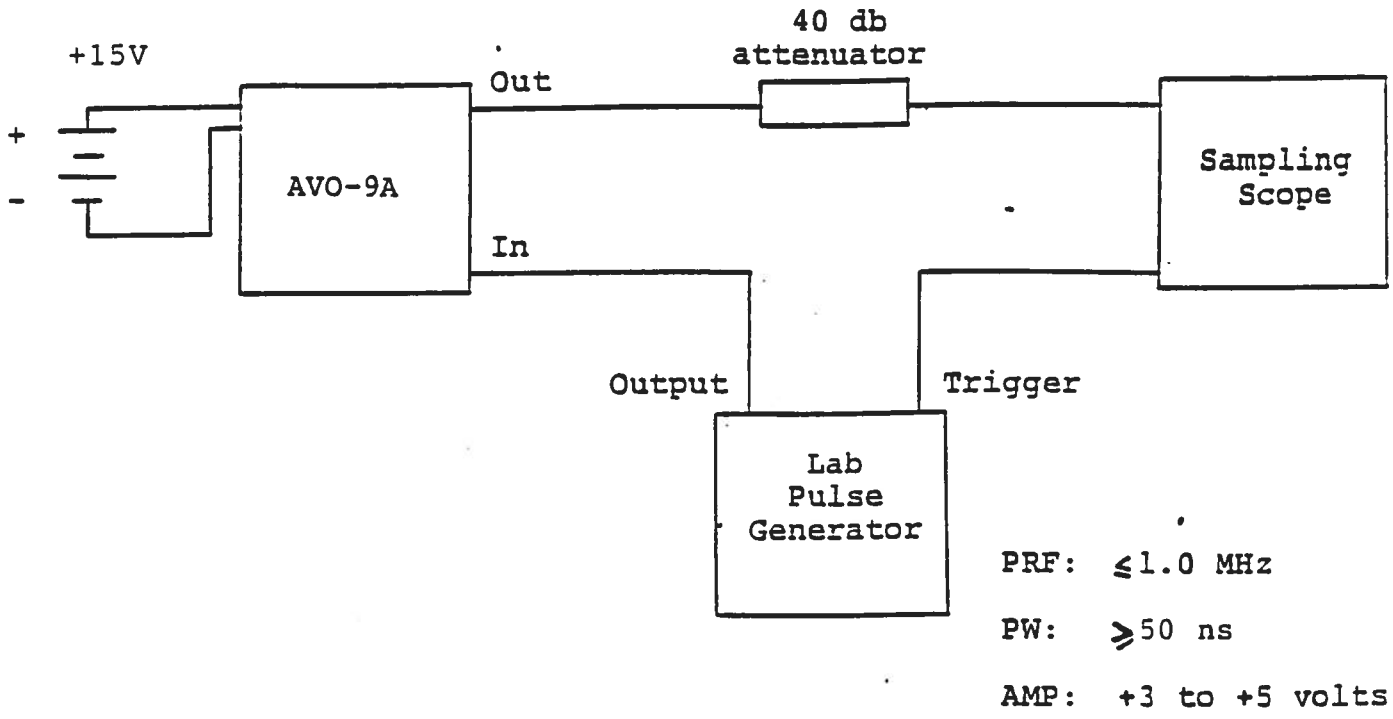
FIG. 1: PULSE GENERATOR TEST ARRANGEMENT

(AVX-S1 MODULE REMOVED)



GENERAL OPERATING INSTRUCTIONS

1) The bandwidth capability of components and instruments used to display the pulse generator output signal (attenuators, cables, connectors, etc.) should exceed ten gigahertz.

2) The use of 40 db attenuator will insure a peak input signal to the sampling scope of less than one volt.

3) In general, the source pulse generator trigger delay control should be set in the 0.1 to 1.0 usec range. Other settings should be as shown in the above diagram.

4) The Model AVO-9A pulse generator can withstand an infinite VSWR on the output port.

5) WARNING: Model AVO-9A may fail if triggered at a PRF greater than 1.0 MHz.

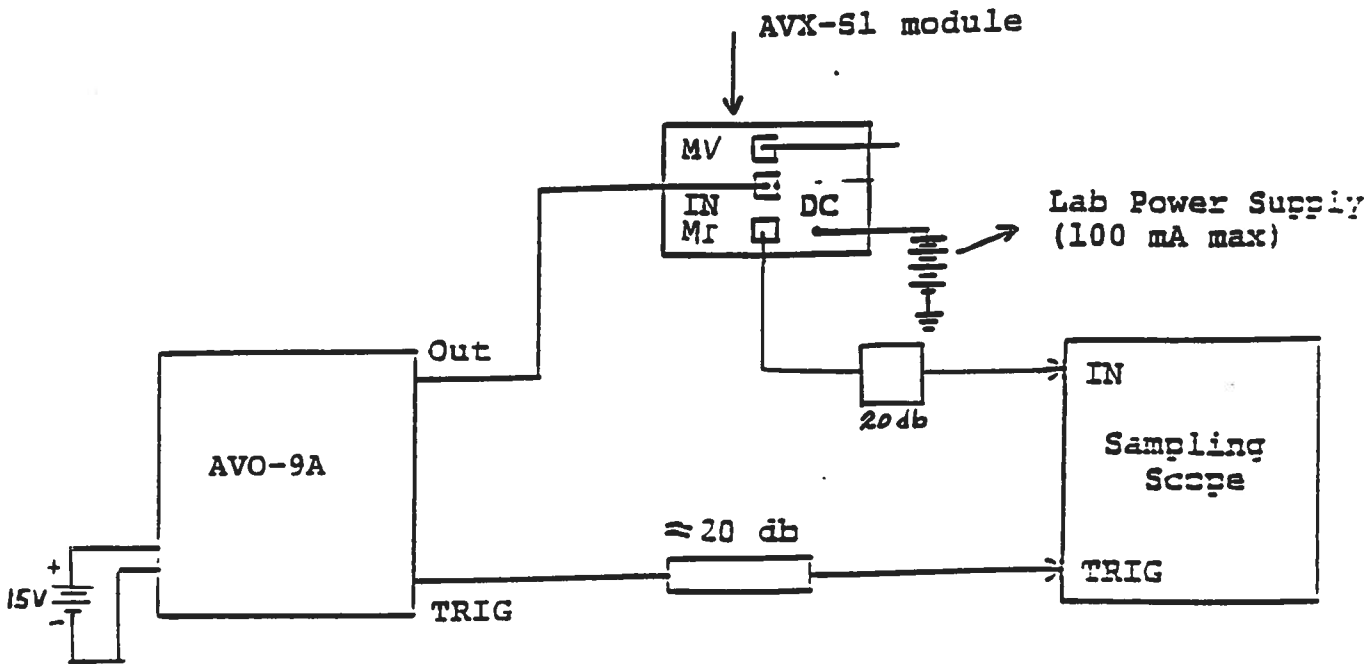
6) The output pulse width is controlled by means of the one turn potentiometer (PW). The pot should initially be set maximum clockwise and the pulse width adjusted using an oscilloscope.

7) The output pulse amplitude is controlled by means of the one turn potentiometer (AMP). The pulse width may change by several nanoseconds as the output amplitude is reduced from maximum to minimum. Therefore it is convenient to first set the desired amplitude and then set the desired pulse width. Rotation of the PW pot causes the position of the falling edge of the pulse to change.

8) Some properties of the output pulse may change as a function of the amplitude pot setting. For some demanding applications, it may be desirable to use a combination of external attenuators and the amplitude pot to achieve the desired output amplitude.

FIG. 2: PULSE GENERATOR TEST ARRANGEMENT

(AVX-S1 MODULE CONNECTED)



CONNECTING THE AVO-9A TO THE AVX-S1

1) A general description of the AVX-S1 module is given in the enclosed data sheet.

2) The AVX-S1 module should be connected to the AVO-9A-C mainframe via the supplied 24" RG174 cable. The diode current may be monitored by connecting the MI and MV output ports to the sampling scope via 20 dB attenuators. The output amplitude and diode current (I_D, Amp) are related as follows:

$$I_D = 0.2\ (V_{MI} - V_{MV})$$

The laser diode voltage is given by the following:

$$V_D = 10\ V_{MV}$$

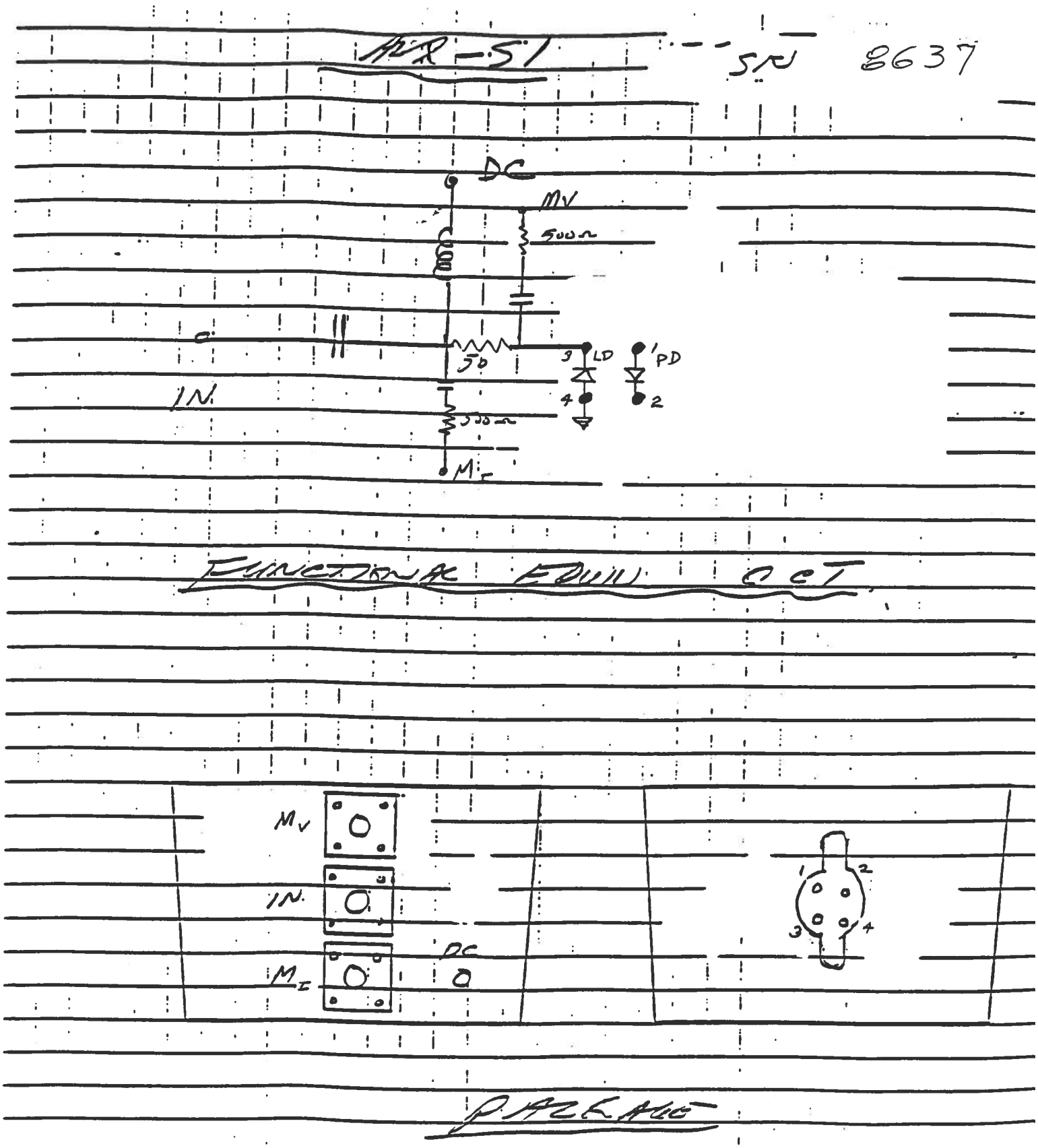
3) The laser diode plugs directly into the socket on the side of the AVX-S1 module. CAUTION: The diode will be damaged if the package is not inserted properly into the socket (i.e. the laser diode cathode must be contacting the lower left pin socket on the AVX-S1 unit).

4) A forward DC bias may be applied to the laser diode by connecting a DC potential of 0 to +5 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.

5) For additional assistance:

Tel: (613) 226-5772
Fax: (613) 226-2802

FIG. 3: FUNCTIONAL EQUIVALENT CIRCUIT



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Fax Ref. No:	3701	From:	Avtech Electrosystems Ltd.
To:	University of Aarhus	Our Fax No:	(613) 226-2802
	Denmark	Date:	June 19, 1998.
Attn:	Christian Schori	Receivers Fax No:	011 45 86 12 07 40
Phone:		No. of pages:	2
Subject:	Your fax of June 12 re AVO-9A-LK	C.C.	

1) Price and delivery are as follows:

Quote No:	8768.
Model AVO-9A-LK:	$2,097.00 US each, Ex Works Ottawa, Canada.
Delivery:	60-90 days ARO.
Prepaid shipping via Federal Express:	$140.00 US.
Terms:	Net 30 days.

Please note that the above price includes the AVX-S1 style output module with a socket to accept the FLD3F8KM/LK.

2) Thank you for your continuing interest in our products. Please contact me if you require any additional information.

Regards,

Dr. Walter Chudobiak
Chief Engineer

WC:pr

RECEIVED JUN 1 2 1998

University of Aarhus
Institute of Physics and Astronomy
Ny Munkegade. DK-8000. Aarhus C.
Denmark

Christian Schori
Phone : (+45) 8942 3629
Fax : (+45) 8612 0740
E-Mail : schori@dfi.aau.dk
Office : 520-429

6/12 ,1998

Dear Mr. Chudobiak,

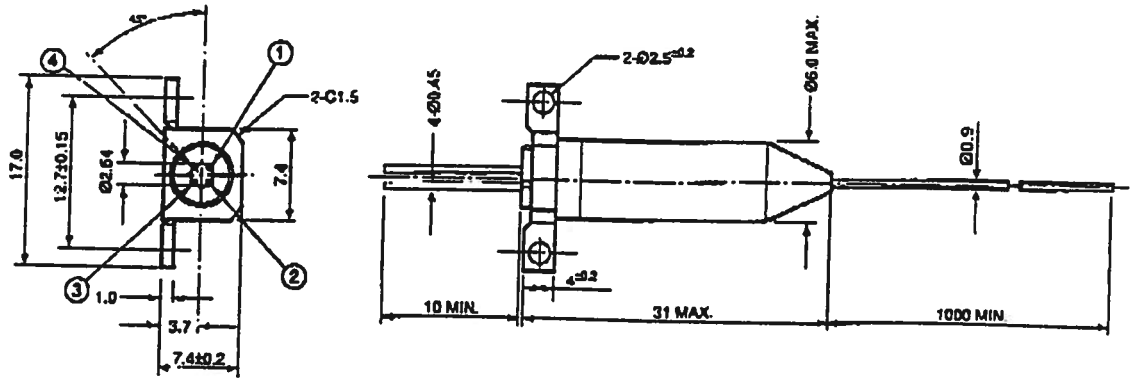
I would like to order your Laser-diode-driver with the following model number :

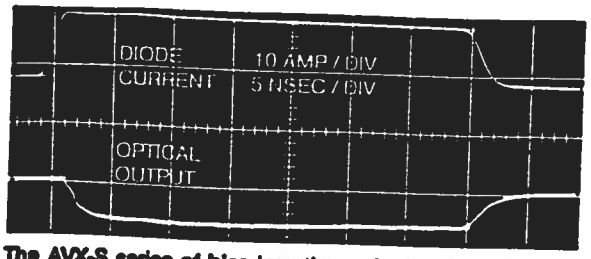
Model: AVO-9A-LK

Below I send you the detailed package description (Fujitsu diode,model: FLD3F8KM/LK) Please confirm this order and inform me of your payment conditions and delivery terms. I am very interested in getting the diode-driver as fast as possible, so if there is any way to have it send express please let me know (also the price) so we can arrange for it.

Best Regards. Christian Schori.

"LK" PACKAGE





- Socket mounting of laser diodes
- Peak currents from 100 mA to 48 Amps
- Pulse widths from 0.4 to 200 ns
- Rise times from 0.2 to 2.0 ns
- Pulse or CW RF
- Diode current and voltage monitor options

The AVX-S series of bias insertion units is designed for applying pulse or RF CW signals and DC bias to laser diodes which insert 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 or RF source as well as networks for applying DC bias to the diode. Optional outputs allow for monitoring of the laser diode current, voltage and a photo detector diode output. Readily available socket configurations (TO-18, TO-5, TO-3, OP-3) are shown on the following page. Note that the laser diodes are not supplied with the AVX-S series.

The AVX-S series includes 3 basic models namely the AVX-S1, AVX-S2 and the AVX-S3. The basic functional equivalent circuit for the three models are shown below. Model AVX-S1 is specifically designed for ultra high-speed, low current applications (rise times as low as 200 ps, bandwidths to 1 GHz, I <1.0 ampere). Model AVX-S1 is employed in the AVO-9-C series of diode drivers. Model AVX-S2 is intended for application with rise times greater than 2 ns and currents above 1 ampere. Model AVX-S3 is specifically designed for use with the AVO-2 and AVO-5 series pulse generators (which provide currents in the range of 5 to 50 amperes).

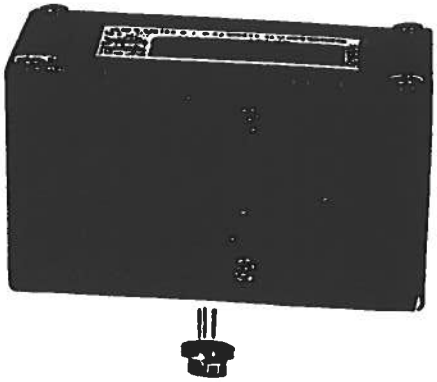
The input series blocking capacitor in Models AVX-S1 and AVX-S2 presents a low impedance to RF CW signals and to baseband pulses while the shunt indicator presents a high impedance to RF (or pulse) signals but an extremely low impedance to the DC bias. The resistor in series with the laser diode is selected to insure that the impedance at the IN port is 50 ohms. Normally a laser diode resistance of 3 ohms is assumed.

The optional diode current monitor (M_I) provides an output waveform (to 50 ohms) which is an attenuated replica of the laser diode current. The output amplitude (V_{MI}, volts) and diode current (I_D, Amps) are related as follows:

-S1: $I_D = 0.2V_{MI}$ -S2: $I_D = V_{MI}$

The optional diode voltage monitor (MV) provides an output waveform that may be related to the voltage across the laser diode (V_D, volts) as follows:

-S1: $V_D = 10\,(V_{MV} - V_{MI})$ -S2: $V_D = 10\,V_{MV}$



Model AVX-S3 is available in four different versions (AVX-S3A, AVX-S3B, AVX-S3C and AVX-S3D) all of which include a matching transformer which effectively boosts the laser diode current beyond that provided by the pulse source.

Model AVX-S3A is designed to match 50 ohm pulse generators such as Model AVO-2-C to 12 ohm loads with peak currents of 5 amperes. Consequently, the resistor R_S in the equivalent circuit for this model is 10 ohm. This resistor is accessible in all AVX-S3 models and may be changed by the user (by desoldering). The series resistance of the laser diode and the resistor R_S must equal the pulse generator source impedance divided by N^2. Consequently, if the series resistance of the laser diode is relatively high, it then may be necessary to reduce the value of R_S. Model AVX-S3B is designed to match 50 ohm pulse generators such as Model AVO-5-C to 3 ohms and will provide peak diode currents up to 28 amperes. Model AVX-S3C is designed to match Models AVO-2W-C and AVO-2-C (25 ohm source impedance) to load resistance of about 5 ohms and will provide peak diode currents as high as 10 amperes. Model AVX-S3D is designed for use with Model AVO-5B-C and will provide up to 48 amperes of diode current.

Two optional SMA output connectors provide attenuated coincident replicas of the diode current (-MI option) and diode voltage (-MV option) as per the following relationships (Amps, Volts):

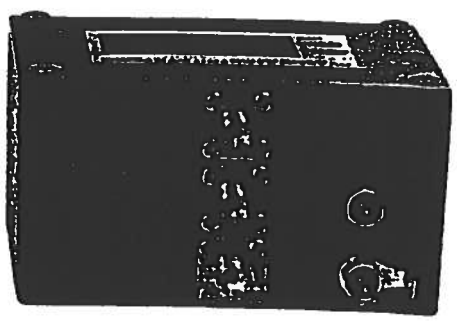
$$I_D = \frac{10\,V_{MI}}{R_S} \qquad V_D = 10\,(V_{MV} - V_{MI})$$

All AVX-S3 units include two foot long input cables with SMA male connectors.

When ordering members of the AVX-S family, the customer must specify the basic model number (eg. AVX-S1) and the following additional information.

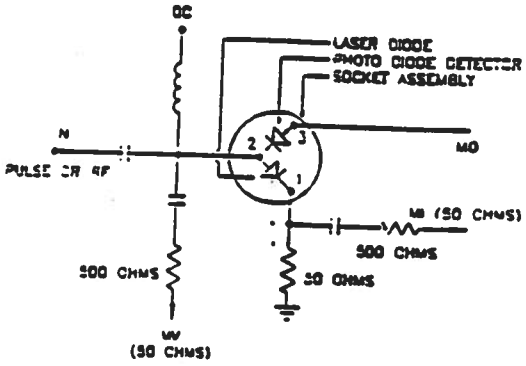
a) Diode package type (eg. TO-18) and the required pin connections (eg. anode, cathode, ground etc). See the following page for readily available package mounting. Contact Avtech for special or different packages.
b) Desired options (eg. -MI, -MV, -MD).

Contact Avtech for your special requirements.

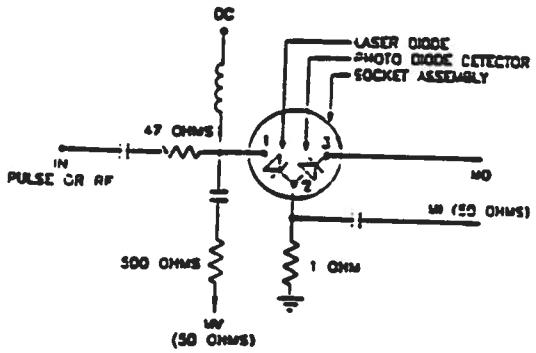


SPECIFICATIONS

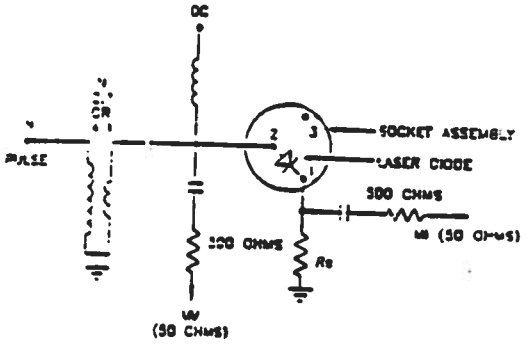
Model:	AVX-S1	AVX-S2	AVX-S3A	AVX-S3B	AVX-S3C	AVX-S3D
Peak diode current:	400 mA	2 Amps	5 Amps	28 Amps	10 Amps	48 Amps
Max. input amplitude:	20 volts	100 volts	150 volts	350 volts	150 volts	150 volts
Pulse width (nsec):	0.4 - 200	1 - 1000	2 - 100	2 - 100	2 - 100	5 - 500
Rise time (nsec):	0.2	0.5	0.5	1.0	0.5	2.0
Pulse PRF range:	DC - 0.5 GHz	DC - 100 MHz	DC - 10 MHz	DC-10 MHz	DC - 10 MHz	DC - 1 MHz
CW frequency range:	10 MHz - 1.0 GHz	1 - 200 MHz	-	-	-	-
Max. bias current:	100 mA	100 mA	100 mA	100 mA	100 mA	100 mA
Max. bias voltage:	50 volts	50 volts	50 volts	50 volts	50 volts	50 volts
Input impedance:	50 ohms	50 ohms	50 ohms	50 ohms	25 ohms	12 ohms
N:	-	-	2	4	2	4
Rs (ohms):	-	-	10	3	5	0.7
IN connector:	SMA					
Monitor connector:	SMA					
Bias connector:	Solder pin					
Size (in):	1.6 x 2.6 x 3.0					
Material:	Cast aluminum, blue enamel					
Mounting:	Any					



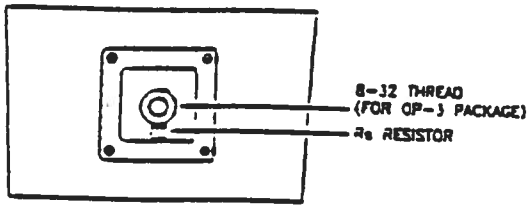
AVX-S1 FUNCTIONAL EQUIVALENT CIRCUIT



AVX-S2 FUNCTIONAL EQUIVALENT CIRCUIT

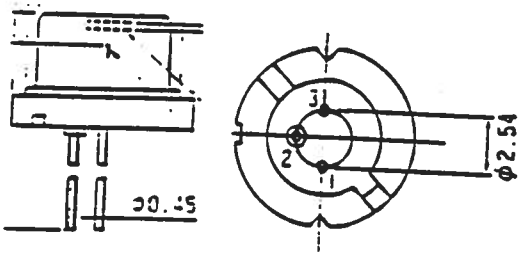


AVX-S3 FUNCTIONAL EQUIVALENT CIRCUIT

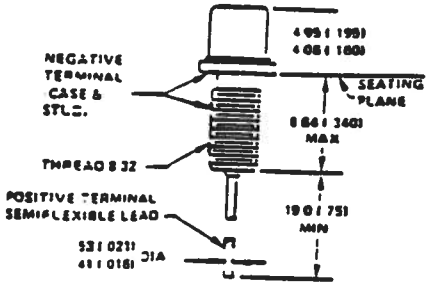


AVX-S3 INPUT ASSEMBLY (FOR OP-3 PACKAGE)

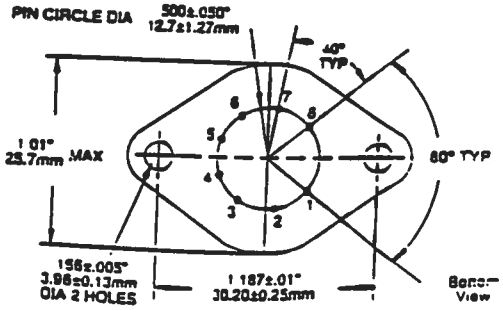
TO-18



OP-3



TO-3 8 PIN



TYPICAL PACKAGES

PERFORMANCE CHECK SHEET

August 28/98.

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