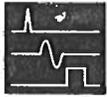


**AVTECH**



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INSTRUCTIONS

MODEL AVO-2-A-P-SMA PULSE GENERATOR

S.N.:

MODEL AVX-S3A LASER DIODE BIAS INSERTION UNIT

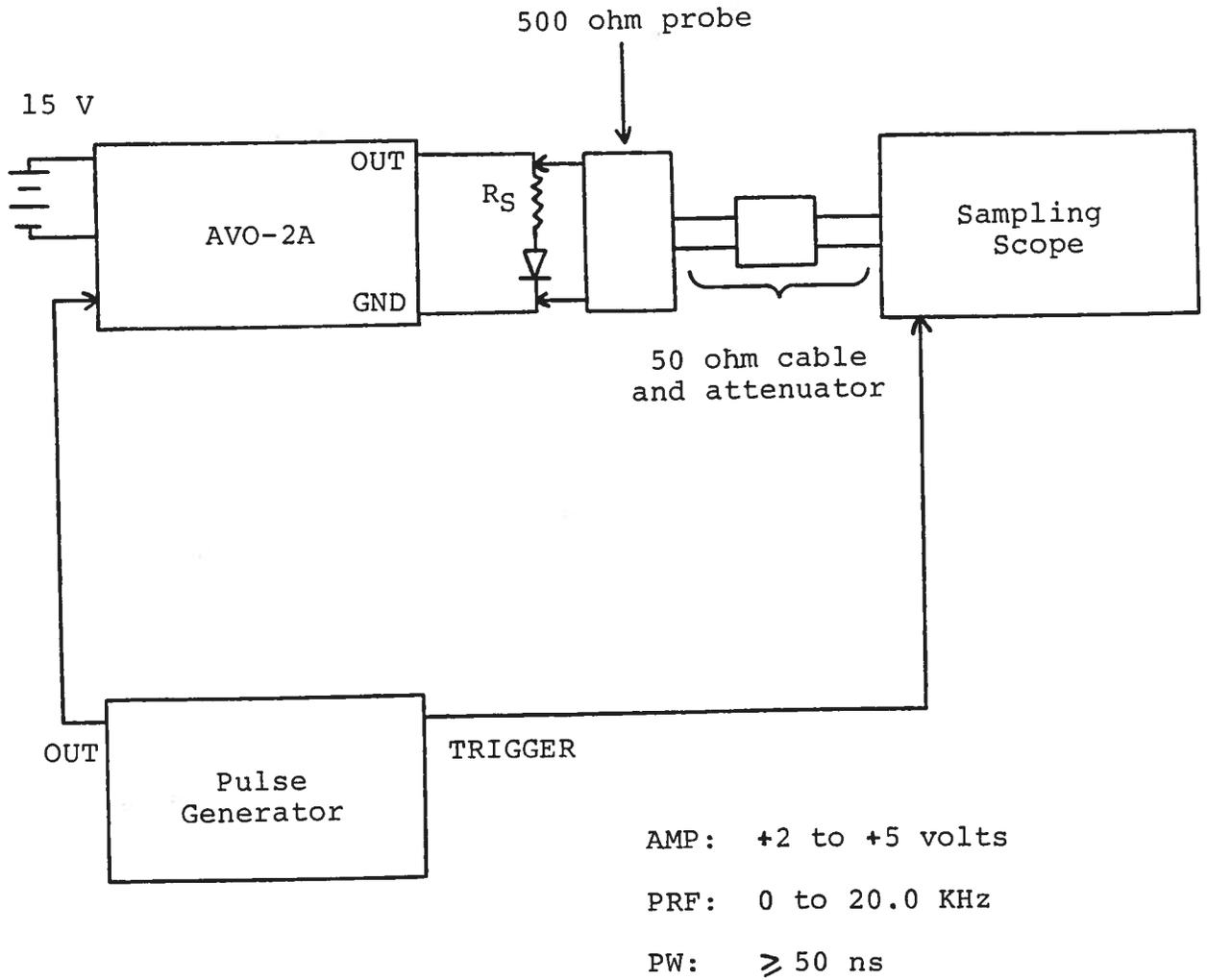
S.N.:

## 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 disassembled, modified or subjected to conditions exceeding the applicable specifications or ratings. This warranty is the extent of the obligation or liability assumed by Avtech with respect to this product and no other warranty or guarantee is either expressed or implied.

Fig. 1

AVO-2A TEST ARRANGEMENT  
(WITHOUT THE AVX-S3A MODULE)



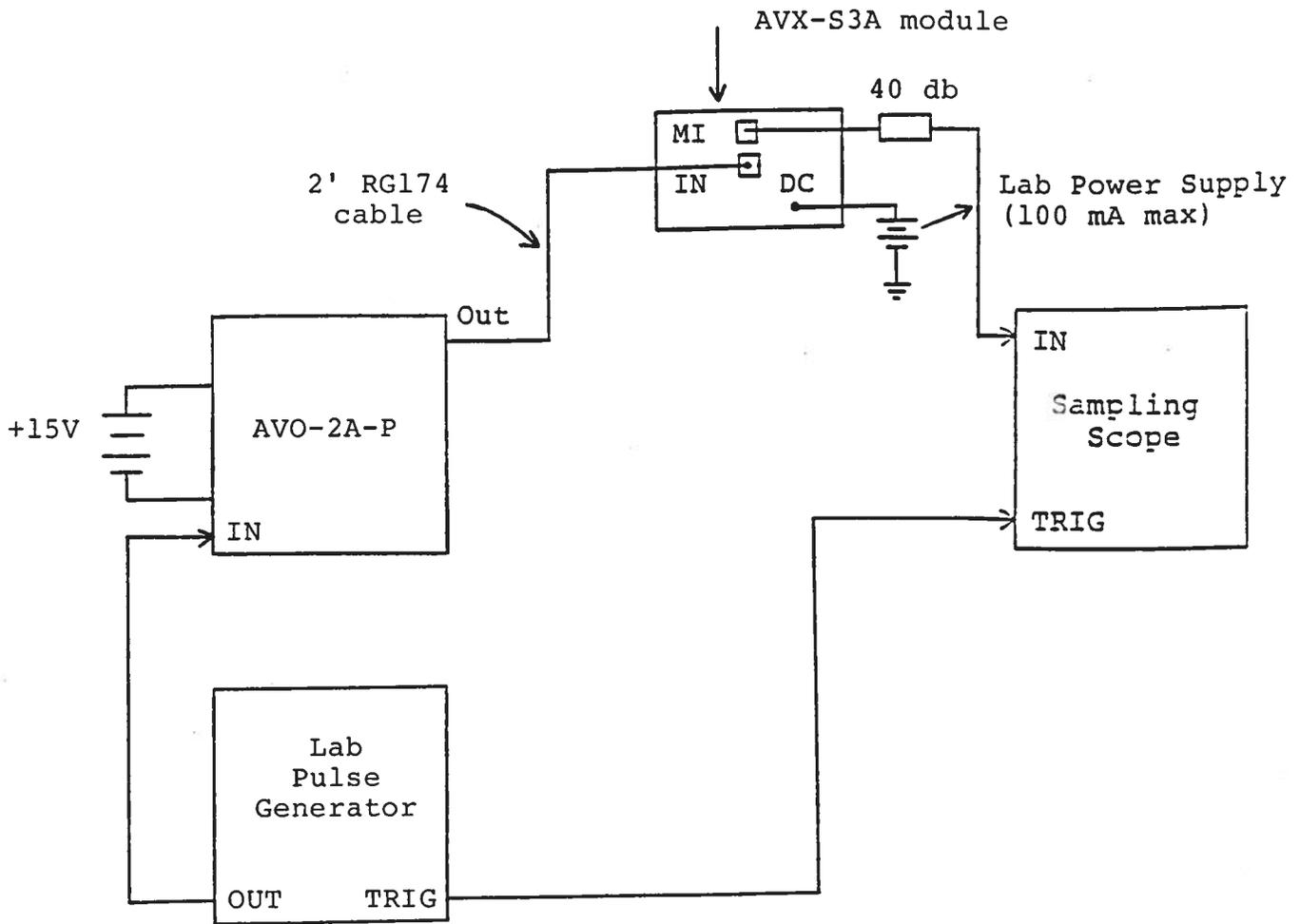
Notes:

- 1) The laser diode is connected in series with a current limiting resistor ( $8.0 < R_e < 10$  ohm) between the GND and OUT terminals on the front panel. 1/4 watt carbon film or carbon composition resistors may be used but all leads must be as short as possible ( $< 0.1$  inch). Solder leads directly to the GND and OUT terminals.
- 2) The amplitude of the diode current is determined primarily by the setting of the rear panel AMP pot control, and to a lesser extent by the limiting resistor  $R_e$  and by the series resistance of the laser diode.
- 3) Either a sampling oscilloscope or a high speed real time oscilloscope ( $BW > 1000$  MHz) may be used to monitor the voltage across the current limiting resistor and therefore the laser diode current. If a sampling scope is used at least 50 db attenuation should be used to insure a scope input voltage of less than 1.0 volt since the peak pulse voltage between the OUT and GND terminals may be as high as 120 volts.
- 4) The output pulse width is controlled by means of the PW pot control. The pot should be set mid-range initially and the desired pulse width set using a scope. The waveform will degenerate to an impulse and eventually vanish as the pot is turned fully counter-clockwise.
- 5) In general the pulse generator trigger delay control should be set in 0.1 to 1.0 us range. Other settings should be as shown in the above diagram.
- 6) **WARNING:** The unit may fail if triggered at a PRF exceeding 20 kHz.

Fig. 2

PULSE GENERATOR TEST ARRANGEMENT

(AVX-S3A MODULE CONNECTED)



AMP: +2 to +5 Volts  
PRF: 0 to 20 kHz  
PW:  $\geq$  50 ns

- 1) A general description of the AVX-S3A module is given in the enclosed data sheet.
- 2) The AVX-S3A module should be connected to the AVO-2A-SMA mainframe via the supplied 24" RG174 cable. The diode current may be monitored by connecting the MI output port to the sampling scope via a 40 db attenuator. The output amplitude ( $V_{MI}$ , volts) and diode current ( $I_D$ , Amp) are related as follows:

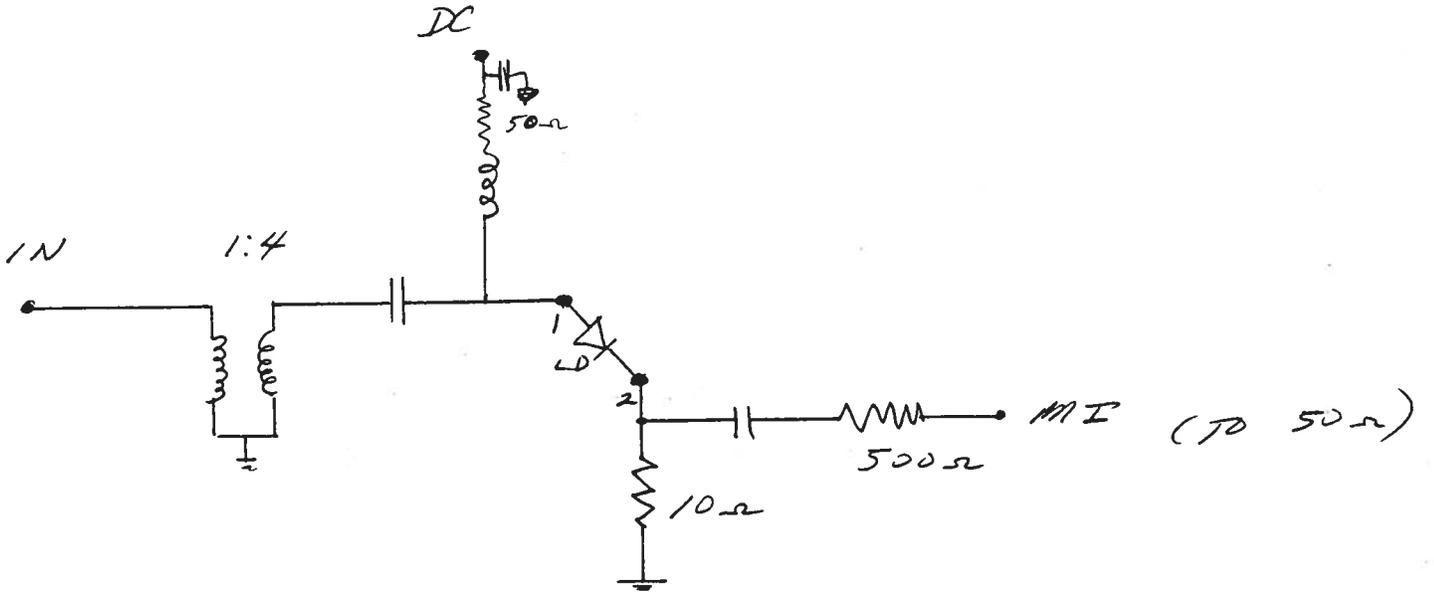
$$I_D = V_{MI}$$

- 3) The laser diode plugs directly into the socket on the side of the AVX-S3A module.
- 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.

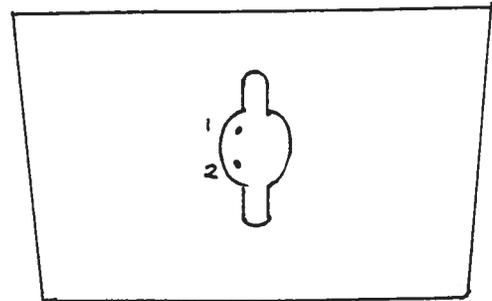
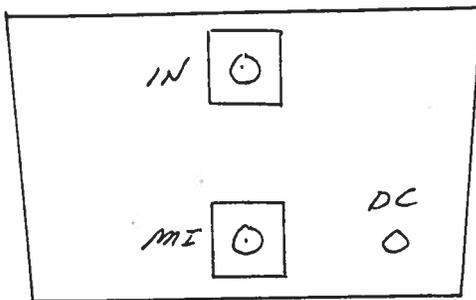
MX-53A

SN 6574

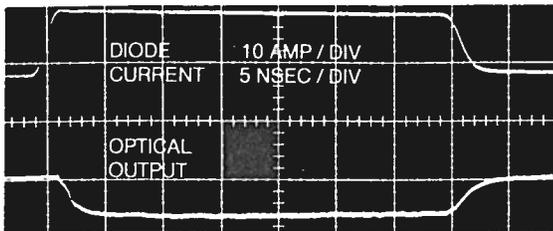
FEB 1993



FUNCTIONAL EQUIV Ckt



PACKAGE



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 inductor 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:

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

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

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

- 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

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):

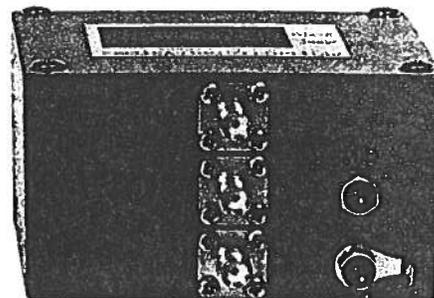
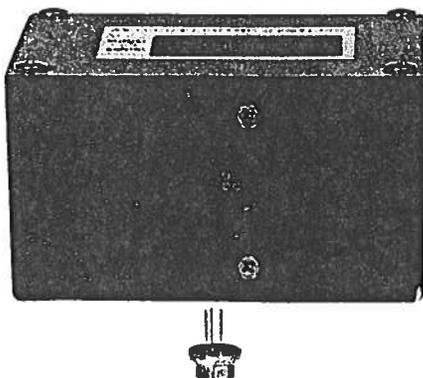
$$I_D = \frac{10V_{MI}}{R_S} \quad V_D = 10(V_{MV} - V_{MI})$$

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

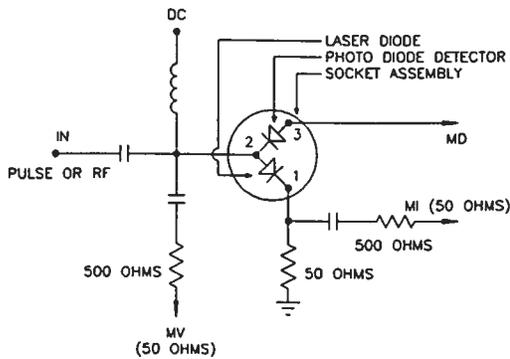
When ordering members of the AVX-S family, the customer must specify the basic model number (eg. AVX-S1) and the following additional information.

- 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.
- Desired options (eg. -MI, -MV, -MD).

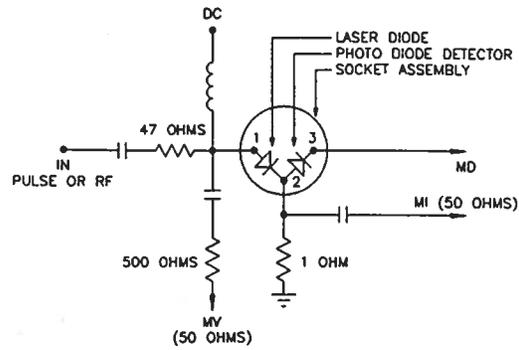
Contact Avtech for your special requirements.



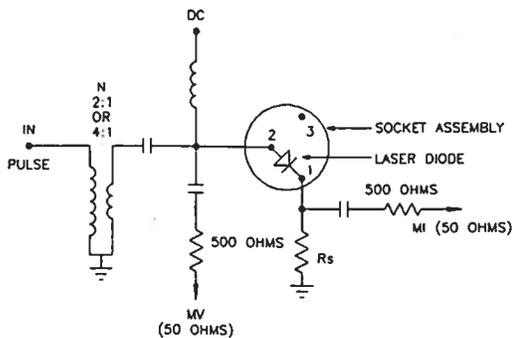
Model:	AVX-S1	AVX-S2	AVX-S3A	AVX-S3B	AVX-S3C	AVX-S3D
Peak diode current:	400 mA	2 Amps	5 Amps	28 Amps	10 Amps	48 Amps
Max. input amplitude:	20 volts	100 volts	150 volts	350 volts	150 volts	150 volts
Pulse width (ns):	0.4 - 200	1 - 1000	2 - 100	2 - 100	2 - 100	5 - 500
Rise time (ns):	0.2	0.5	0.5	1.0	0.5	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
R <sub>S</sub> (ohms):	-	-	10	3	5	0.7
IN connector:	SMA					
Monitor connector:	SMA					
Bias connector:	Solder pin					
Dimensions (H x W x D):	41 mm x 66 mm x 76 mm (1.6" x 2.6" x 3.0")					
Material:	Cast aluminum, blue enamel					
Mounting:	Any					



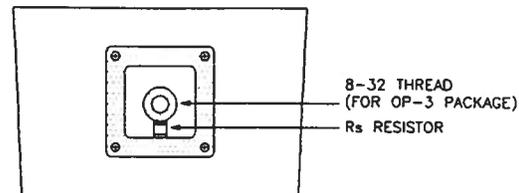
AVX-S1 FUNCTIONAL EQUIVALENT CIRCUIT



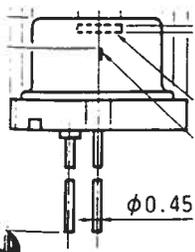
AVX-S2 FUNCTIONAL EQUIVALENT CIRCUIT



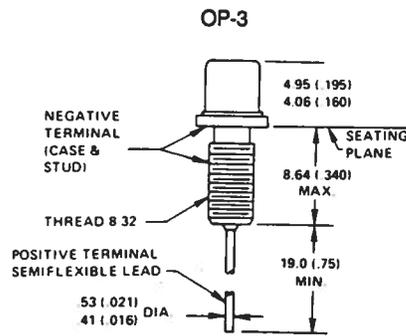
AVX-S3 FUNCTIONAL EQUIVALENT CIRCUIT



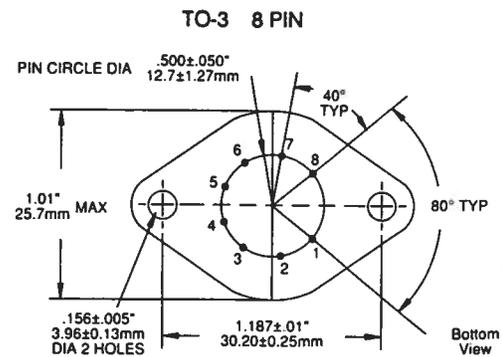
AVX-S3 INPUT ASSEMBLY (FOR OP-3 PACKAGE)



TO-18



OP-3



TO-3 8 PIN

TYPICAL PACKAGES

02.24.93