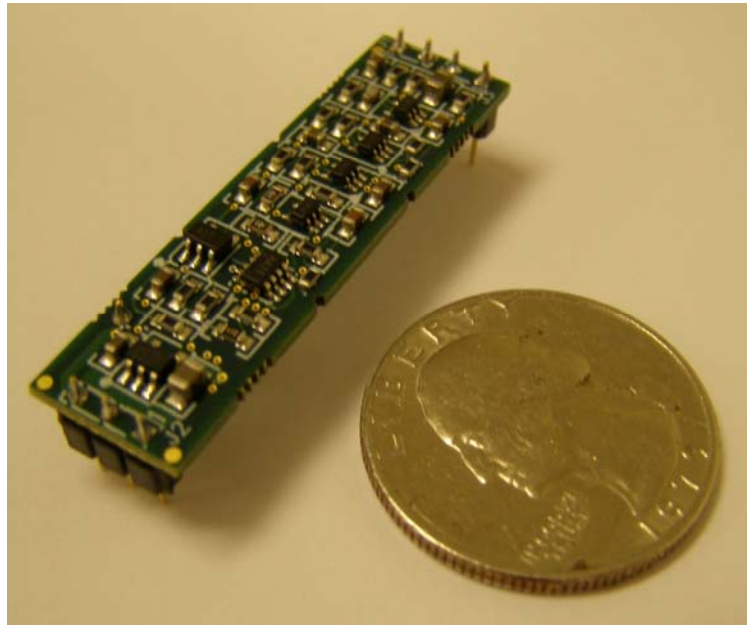




PSI-2011-44 MIN MODULATOR BIAS CONTROLLER BOARD

USER GUIDE
Rev A



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1 DOCUMENT SCOPE:

This document describes basic set-up and operation of the Photonic Systems, Inc. PSI-2011-44 MIN miniature Mach-Zender (MZ) modulator bias controller (MBC) board. This manual is intended to give the user enough information to place the controller into service using common electronic laboratory tools, instruments and practices. This product is sold as a MBC intended for use in applications where precise MIN bias point optical modulator control is required over time and temperature.

2 PRODUCT DESCRIPTION

2.1 PSI-2011-44 MIN Modulator Bias Controller Features

- Dither based bias control
- Compatible with most MZ optical modulators – factory set V_{π} @DC required
- Factory adjustable dither amplitude: 20 to 330mVpp
- Compatible with wide power supply range: +/-8V to +/- 13V (Note +/-15Volts can be used with the adapter board)
- Includes auto-reset
- Low operating current: <10mA typical
- Wide operating temperature range: -20° to +70° C
- Small Size: 1.65" x 0.45", 7-pins

2.2 Overview of the chip-scale bias controller

The PSI-2011-44 MIN modulator bias controller offers a drop-in solution for precise control of Mach-Zender fiber optic modulators. This controller accurately prevents bias point drift away from the MIN bias point.

Control of your optical modulator is simplified through use of the PSI-2011-44 in your system. This device is based on Photonic Systems experience in design of fiber optic systems and components. Intended for use in OEM optical links or customized experiments with optical modulators, the chip-scale bias controller offers users drop-in modulator control, speeding development time and allowing for greater concentration on other design issues.

The controller's internal dither generator is factory adjustable for amplitude. When used in conjunction with an optical photodetector, lock is automatically established on the MIN bias point.

The PSI-2011-44 chip scale modulator bias controller provides precise control of optical modulators with an error of less than 1° at 1% dither of modulator V_{π} operating. Operating from dual power supplies between +/-8 to +/-13VDC, the device draws less than 10mA minimizing power consumption within the optical transmitter. The device is the smallest modulator bias controller available from PSI, measuring only 1.65 x .045 inches.

2.2.1 Functional description

The PSI-2011-44 MIN modulator bias controller (MBC) operates by adding a very small amplitude dither signal to the DC bias applied to an optical modulator. This dither signal is later detected as a portion of the light output from the modulator under control through an optical coupler and photodetector. The MBC maintains a constant modulator bias point by continuously adjusting the bias voltage to a MIN set point.

At time of order, the dither generator amplitude can be factory adjusted by PSI to meet applications specific requirements. Dither amplitude may be adjusted between 20 and 330mVpp.

An external photodetector is required to complete the feedback path with the modulator under control. This photodetector is connected to the controller with the cathode at J1-pin 1 and the anode at J1-pin 2.

The PSI-2011-44 is contained on a 1.65" x 0.45", 7 pin, 0.45" wide printed circuit board with plug-in connection pins protruding from the bottom of the board.

2.2.2 PSI-2011-44 Specifications

Parameter	Value	Units
Modulating Signal	Analog small	—
Modulators Supported	LiNbO ₃	—
Output DC Bias Voltage	0.3 less than supply voltage	volts
Maximum Output load capacitance	≤0.2	μF
Dither Frequency	1.0	KHz
Dither Amplitude, peak to peak, 30-320uA at MAX	20 to 330 (factory set)	mVpp
Bias Point Error @ MIN , 15 to 160 μA photodetector current ¹	≤1° @1% dither of V_{π^2}	degrees
DC Power Supply ³	+/- 8 to +/-13	volts
DC Operating Current	<10	mA
Operating Temperature Range	-20 to +70	°C
MBC Board Dimensions	1.65 x 0.45 (6.4 x 1.7cm) ; 7- pin package	inches

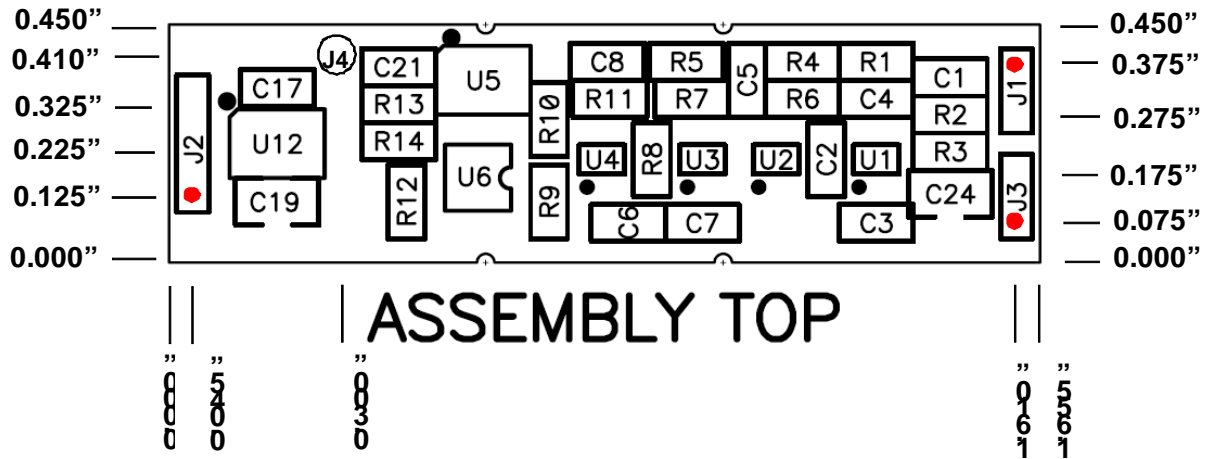
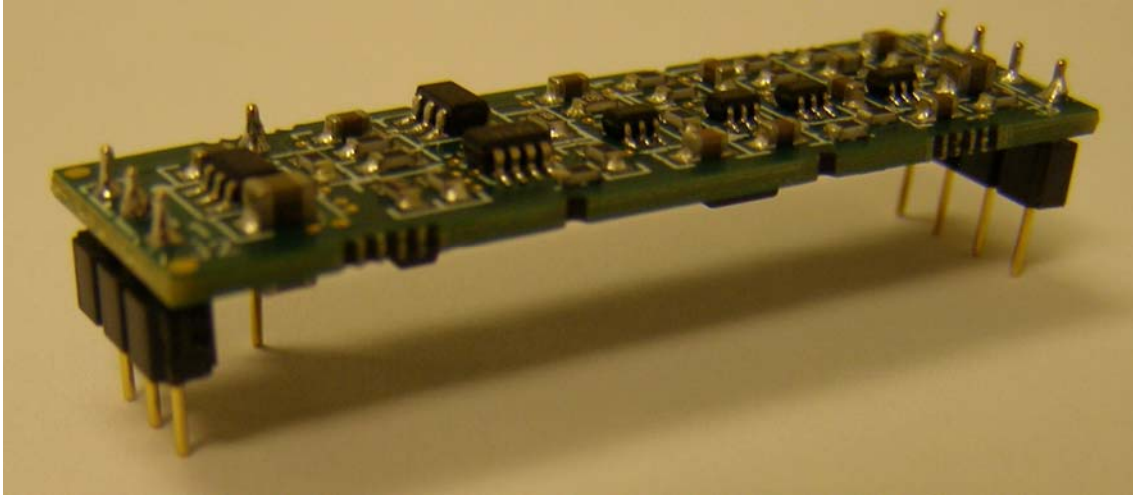
¹ Equivalent to -8 to -18 dBm of optical power (at quadrature) applied to Fermionics FD-300 or equivalent photo detector. Wider dynamic range controllers available; contact PSI for details.

² 1% dither corresponds to a peak dither voltage of $0.01 \times V_{\pi}$.

³ The MBC will operate at DC power supply voltages as low as +/- 8volts. PSI tests and specifies all parameters based on operation at +/- 12 volts.

2.2.3 Mechanical Specifications

The photograph and drawing below show top view, bottom view and dimensions for the PSI-2011-44 MIN modulator bias controller. All dimensions are in inches. Tolerances are +/- 0.005 unless otherwise noted.



The red dot shown on connectors J1, J2, and J3 is the location of pin #1

2.2.4 Device Pin Descriptions

Pin	Function	Description
J1 pin1	PD Bias	Connect to external photodiode cathode.
J1 pin2	PD Anode	Photodiode anode (analog ground)
J2 pin1	+V	Positive power supply connection. Acceptable range from +8 to +13 volts; specifications valid at +12 volts.
J2 pin2	Ground	Device Ground
J2 pin3	-V	Negative power supply connection. Acceptable range from -8 to -13 volts; specifications valid when operated at -12 volts.
J3 pin1	Bias Out	To Modulator Bias
J3 pin2	Ground	Device Ground
J4 pin1	Reset	Short to ground to reset MBC

3 WARRANTY

Photonic Systems, Inc. warrants the PSI-2011-44 MIN modulator bias controller to be free of defects in materials and workmanship for 1 year from the date of delivery. Products must be returned to the manufacturer for service and/or repair at the buyer's shipping expense. The buyer must contact PSI and receive a valid return material authorization (RMA) number prior to returning any products.

The warranty is void if the unit has been subjected to abuse and/or attempts to alter and/or repair it without the prior written approval of Photonic Systems, Inc., or if the unit shows evidence of component tampering while the unit is in the buyer's possession.

Following the warranty period, charges for parts and labor will be as required to repair the unit. Prices for modifications, revisions and non-warranty parts and service, together with labor necessary, will be quoted upon request.

Except as expressly provided above, there is no warranty or guarantee of merchantability or fitness for a particular purpose or of any other kind, express or implied, with respect to the unit or parts furnished or the services performed by the manufacturer. In no event shall the manufacturer be liable for any consequential damages.