

## **PSI-2011-99-11 and PSI-2011-99-44 MODULATOR BIAS CONTROLLER EVALUATION BOARDS**

### **USER GUIDE**

Rev. A

Photonic Systems, Inc.  
900 Middlesex Turnpike  
Building #5  
Billerica, MA 01821

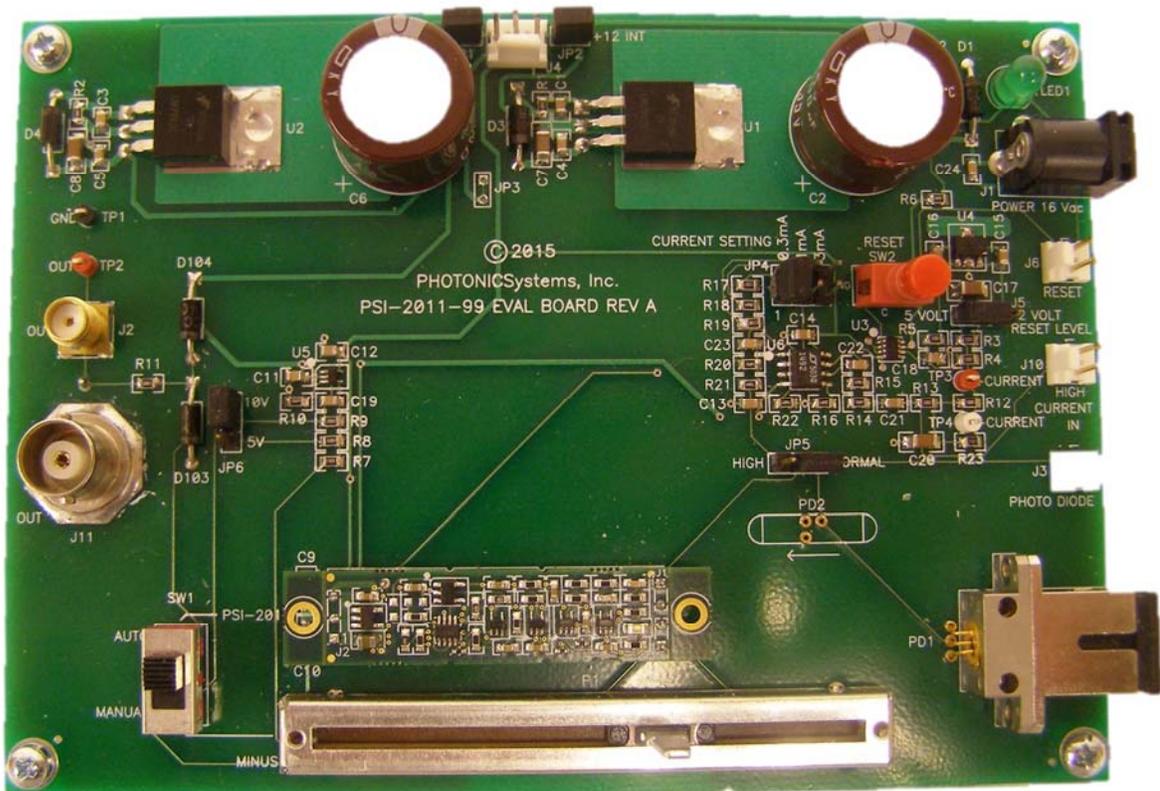
Tel: 978-670-4990  
Fax: 978-670-2510  
[www.photonicsinc.com](http://www.photonicsinc.com)

# 1. DOCUMENT OBJECTIVE

This document describes the basic set-up and operation of the PSI-2011-99-xx Evaluation Board used for the quick set-up and test of the PSI-2011-11 QUAD or PSI-2011-44 MIN modulator bias controllers (MBC). This manual is intended to give the user enough information to place the PSI-2011-99-11 QUAD or PSI-2011-99-44 MBC Evaluation Boards into service using common electronic laboratory tools, instruments and practices. This MBC product is intended for use in applications where precise optical modulator control is required over time and temperature.

# 2. PSI-2011-XX-99 FEATURES

- Evaluation platform for PSI-2011-11 and PSI-2011-44 modulator bias controllers
- The PSI-2011-99-11 includes one QUAD, the PSI-2011-99-44 includes one MIN MBC
- Includes integral SC connector photodetector (PD1)
- Optional tap monitor photodiode (SM or PM fiber available (PD2)
- Optional photocurrent connection from external photodiode
- Includes power supply or can be user configured for DC power
- Slider control for precise adjustment of manual bias set point
- Reset button or use external reset option



### 3. BASIC CONFIGURATION SET-UP

The simple configuration is by use of an optical connection to either Photodiode PD1 (SC connection) or to the optional power monitor photodiode PD2. Depending on PD1 & PD2 are options when ordering the evaluation board. The sensitivity of PD1 is approximately 1mA/mW of optical power at 1550nm. PD2 the power monitor photodiode can be order in sensitivities ranging from 1mA/W to 60/mA/W. PD2 can be ordered in either single mode or polarizing maintaining.

The electrical configuration for the above input is the following:

- 1) Place jumper block on JP1 this connects the internal -12 volts to the evaluation board circuitry.
- 2) Place jumper block on JP2 this connects the internal +12 volts to the evaluation board circuitry.
- 3) Place jumper block on JP5 between the pin marked NORMAL and the center pin. This connects the photodiode to the input of the PSI controller board.
- 4) SW1 switch to the Auto position. This connects the output of the PSI controller board to the outputs J2, J11 and TP2. TP1 is connected to ground.
- 5) Connect one of the outputs to the modulator bias control pins.
- 6) Connect the 16 VAC power module into J1.

This completes the required evaluation board set up.

The unit is now configured to control by the use of the on board photodiode or an external photodiode connected to J3. Note: the PSI controller board has a 10K resistor to a +5 Volt supply for biasing the photodiode. This configuration is set up for a maximum photocurrent of 200uA at maximum optical bias. The 3 inputs are now connected directly into the PSI-2011-XX MBC but only one photodiode should be active at the same time.

### 4. OPTIONAL CONFIGURATIONS

#### Manual Bias Control

To assist in checking the system there is a slide pot P1 on the evaluation board. This pot is labeled Minus and Plus at the ends of the pot. The range of this pot voltage is either +/-10 Volts or +/- 5 Volts. This is determined by the jumper block position on JP6. JP6 is labeled 5V and 10V place the jumper on the center pin and desired voltage range for slide pot P1. When SW1 is in the manual position, the slide pot will set the voltage at the outputs. Now that the slide pot determines the bias point the voltage can be changed so that the modulator will adjusted through the range of control of the modulator. The user should see the optical power swing through Max, Quad+, Min, and Quad-, as the pot is swept.

Place SW1 back into the AUTO mode for operation using the PSI 2011-XX MBC.

#### Current Range Adjustment

The evaluation board has circuitry for operation of input currents higher than the standard 200uA at Max optical power. The evaluation board can be set for 3mA, 1mA, or 0.3mA input current. When using higher photodiode currents connect the photodiode to J10 on the

evaluation board. Photodiodes PD1 or PD2 can also be used in the higher current mode, make the following connection. Move the jumper block on JP5 to the "High" position. Connect a jumper wire from pin (1 / "Normal") of JP5 to pin 1 of J10. J10 pin 1 is the +5 Volt bias to be connected to the cathode of the on board or external photodiode. J10 pin 2 connect to the anode of the photodiode. Other electrical settings are the following:

- 1) Set jumper block JP4 with a jumper to one of the 3 positions. The correct position is the closest to your maximum current without exceeding it, i.e. if the input current is 0.301 then connect to the 1mA position.
- 2) Place jumper block on JP5 between the pin marked HIGH and the center pin.

The AUTO/MANUAL switch controls the same as the previous set up.

### **Reset Function**

The RESET switch, resets the controller board to 0 Volt while depressed about 3 seconds after release of SW2 the unit will seek the bias point it was designed. The other way of resetting the controller is by connecting to J6. When J6 pin 1 is connected to ground (J6 pin 2) this will cause a reset, reset will continue until approximately 3 seconds after removal of the short. J6 has a pull up resistor of 100K. This pull up can be selected to pull up to either +5 volts or +12 volts by jumper selection at J5.

Test points TP3 red & TP4 white can be used to measure the photodiode current in the HIGH current mode. TP3 & TP4 are test points across a 100 ohm biasing resistor. The use of a voltmeter at this point could be useful in the selection of the proper selection of jumper placement on JP5. Suggested method for selection/verification of correct gain setting at JP5, the optical power of the system can be manually swept through the max power point. With a voltmeter across TP3 & TP4 note the maximum voltage. A maximum voltage of:

- 30 mVolts or less set to 0.3 mA
- 100 mVolts or less set to 1.0 mA
- 300 mVolts or less set to 3.0 mA

### **Power Supply**

J4 can be used to power the evaluation board if the included AC supply is not used.

Remove jumpers from JP1 & JP2. Connect power to J4.

- J4 pin 1 = +12V
- J4 pin 2 = ground
- J4 pin 3 = -12V

LED1 indicates the presence of +12 volts

## APPENDIX 1: OPTICAL CONNECTOR CLEANING PRECAUTION

It is very important that the following three procedures be observed when inserting optical fiber ends into the optical connector(s). Please note: Damage to the Optical Connector on the photodiode caused by failure to follow these instructions is not covered by the warranty.

- 1 Before inserting a fiber into the optical connector, clean it using alcohol and a lint-free wipe or with a Connector Cleaner sold expressly for this purpose. Then spray the connector with compressed air. It is vitally important that this be done each and every time you insert a fiber into one of the two optical connectors of the unit.
- 2 After removing a fiber from either the optical connector, replace the dust cover that was provided for the connector.
- 3 By always following procedures 1 and 2, you are assuring that Optical Connector(s) remain in pristine condition. Therefore, it should never be necessary to attempt to clean the connectors. Do not insert anything into these connectors, except for optical connectors that have been cleaned as outlined in procedure 1 above, or the dust covers as mentioned in procedure 2 above.

## APPENDIX 2: ESD HANDLING PRECAUTION

The PSI-2011-99 MBC evaluation board is shipped in electrostatic safe packaging. Upon arrival, you should take care to protect the circuits from exposure to electrostatic discharge (ESD). While every effort is made to protect internal components through design practices, it is essential that you properly handle the modules to avoid damage from ESD.

PSI recommends the following:

- I. Unpack the PSI-2011-99 for identification, inspection, testing or inventory control only at a static safe workstation, at which:
  - I. The workstation has a static dissipative work surface, and is properly grounded to allow drainage of charges at a safe, controlled rate.
  - II. Personnel are grounded with a wrist strap or foot strap to the grounded dissipative mat, floor or workstation.
  - III. The workstation chair or stool is static dissipative and conductively grounded to the grounded dissipative or conductive floor mat or floor.
  - IV. There are no static-generating materials, such as food wrappers, plastic sheet protectors, polystyrene foam containers or other untreated nonconductors.
  
- II. Avoid contact during transport with ungrounded personnel or other conductors.
  
- III. Store spare units in a conductive, grounded cabinet that provides physical separation and high-density, vertical storage on grounded permanently static-dissipative shelving. Keep cabinet doors closed to shield from any static charges or fields in the vicinity.
  
- IV. Use ESD precautions when handling cords, wiring connectors and plugs which are directly connected to peripherals or the modules.

## **WARRANTY**

Photonic Systems, Inc. warrants the PSI-2011-99 (hereafter called "the unit") to be free of defects in materials and workmanship for 1 year from the date of delivery. The unit must be returned to the manufacturer for service and/or repair at the buyer's expense.

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 optical connectors are damaged 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.