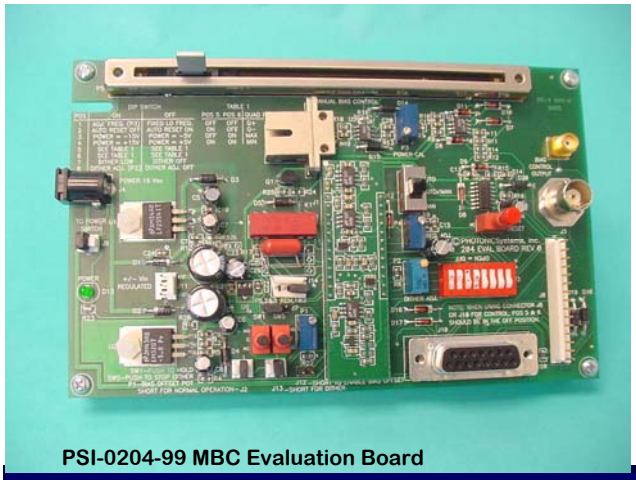
PHOTONICSystems, Inc.®
We Light the Way®

PSI-0204-99
Optical Modulator Bias Controller Evaluation Kit
For use with PSI-0204-11 chip-scale MBC



PSI-0204-99 MBC Evaluation Board

Features and Benefits

- ✓ Complete evaluation kit for PSI-0204-11 Modulator Bias Controller
- ✓ Includes all control components to test MBC with your application
- ✓ Dither based control compatible with most optical modulators
- ✓ Includes sample MBC, AC power supply and DC electrical connectors.

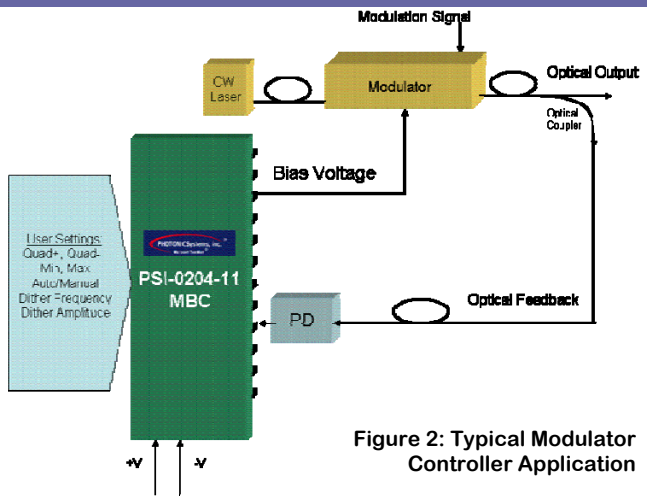


Figure 2: Typical Modulator Controller Application

Applications

- **Modulator design**
- **Integrated Modulator/Transmitters**
- **Fiber optic component evaluation**
- **Photonic Test Systems**
- **Spectroscopy systems**
- **Analog communications systems**
- **Telecom transmission**

Product Description

The PSI—0204-99 optical modulator bias controller (MBC) evaluation kit provides a complete laboratory solution for evaluation of the PSI-0204-11 chip-scale MBC. The chip-scale controller provides control of external optical modulators from a single, small form factor circuit board. When operated with lithium niobate ($LiNbO_3$), modulators, the PSI-0204-11 provides automatic or manual bias control. Users may select automatic tracking of Quad +, Quad -, Minimum or Maximum bias points as shown in Figure 1. Operation at an externally set manual bias point may also be selected.

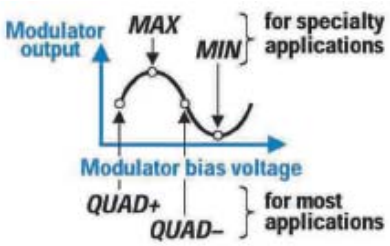
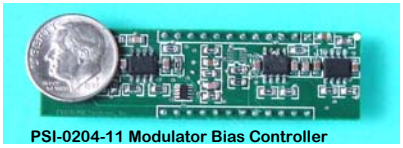


Figure 1– Modulator Transfer Function

The chip-scale device evaluation board provides a simple means to make all necessary electrical and optical connections to an MBC under evaluation. A 24 pin socket on top of the board hosts the device under test. All electrical and optical connections are made to the device including power, user-defined settings and bias voltage output. An on-board photodetector completes the optical feedback loop from a user's modulator and laser system. Controls are provided to set manual bias point, automatic bias point, bias offset, dither amplitude and dither frequency. Push buttons allow for temporary hold of a bias point, dither disable and forced reset. A bias monitor port is provided as are connections through either a D-type or Molex connector. The kit is shipped complete with a sample MBC, AC power supply, and connectors.

About the PSI-0204-11 Chip-scale MBC

Designed for easy integration into the user's optical system, these controllers maintain constant bias point operation by compensating for drift in a modulator's transfer function. An external modulation fiber optical transmitter is shown in Figure 2 to illustrate how the controller is typically used. Through use of an optical coupler and photodetector, a portion of the transmitted light is detected and fed to the MBC. The dither tone is applied to the bias voltage output and sampled as a control mechanism. User settings determine bias point selection, dither frequency and amplitude.



PSI-0204-11 Modulator Bias Controller

Beyond standard specifications, PSI can modify the PSI-0204-11 to meet the exact requirements of your application. Smaller package sizes are offered for operation at a single bias point; other designs may also result in micro-miniature packages.

Phone: 978-670-4990
E-mail: info@photonicsinc.com
www.photonicsinc.com

PHOTONICSystems, Inc.®
We Light the Way®

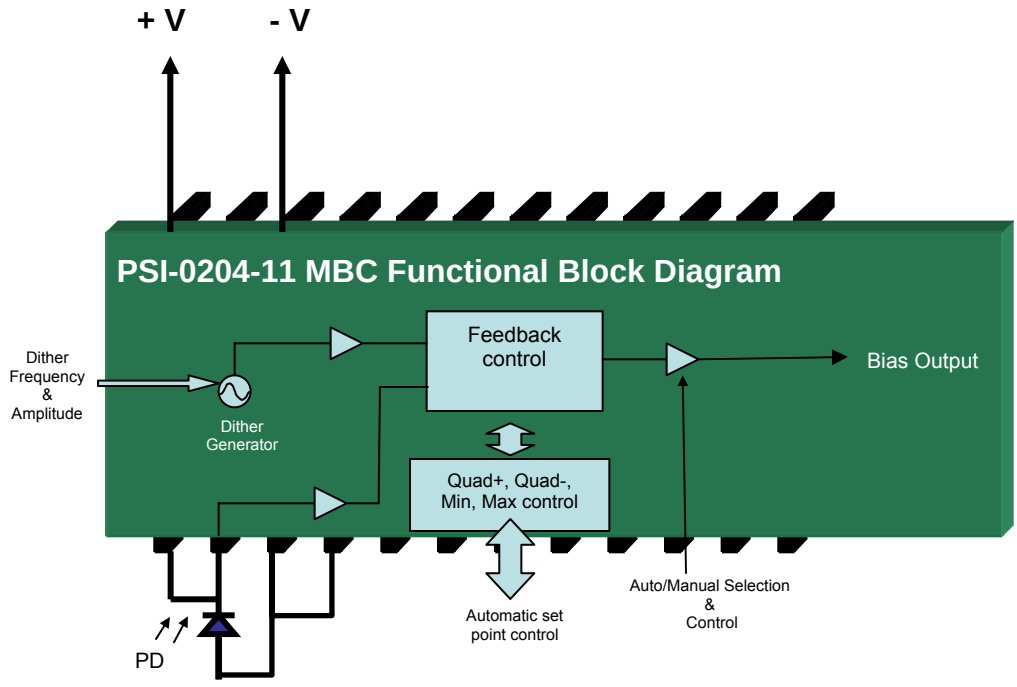
Specifications

Parameter	Typical Value	Units
Modulating Signal	Analog small or large signal or DPSK	—
Modulators Supported	$LiNbO_3$	—
Modulator/Bias-T Load Capacitance	< 0.2	μ F
Output DC Bias Port Impedance	100	ohms
Output DC Bias Voltage	0.3 less than supply voltage	Volts
Dither Frequency	1	KHz
Dither Amplitude	20 to 200; user defined	mVpp
Bias Point Error @Quad + or Quad - point, 5 to 50 μa photo detector current [1]	1 @1% dither of V_π	degrees
Bias Point Error @Max or Min point, 10 to 100 μa photo detector current [1]	< 0.1	degrees
DC Power Supply	+/- 12 to +/-18	Volts
DC Operating Current	< 12	mA
Operating Temperature Range	0 to +50	degrees C
MBC Board Dimensions	2.5 x 0.7 (6.4 x 1.7cm) ; 24 pin dual in-line package, 0.6" width	inches

1. Equivalent to -23 to -13 dBm of optical power (at quadrature) applied to Fermionics FD-300 or equivalent photo detector. Wider dynamic range controllers available at additional cost; contact PSI for details.

Photonic Systems, Inc. (PSI) is a recognized expert in the design, analysis and implementation of high performance fiber optic systems.

With decades of collective experience, the PSI team offers comprehensive fiber optic engineering solutions to government, military and commercial customers.



Phone: 978-670-4990
E-mail: info@photonicsinc.com
www.photonicsinc.com

PHOTONICSystems, Inc.
WE LIGHT THE WAY

900 Middlesex Turnpike, Bldg 5
Billerica, MA 01821

Rev E 9/28/06; Specifications subject to change without notice

Modulator Bias Controller Device Function and Pin Descriptions

Pin	Function	Description
1	PD Bias	Provides internally generated bias voltage for photodetector. Normally connected together with Pin 2 to the PD cathode.
2	PD Cathode	Photodetector cathode connection. Normally connected to Pin 1 for PD bias.
3	Ground	Device Ground
4	Ground	Device Ground
5	Master	Output of PD preamplifier. Normally connected to pin 6. May be used for control of slaved bias controllers.
6	Slave	Input to dither detection circuitry. Normally connected to pin 5. May be used for control from a master bias controller.
7	Ground	Device Ground
8	Intg. In	Control loop integrator input. Normally unused, this input allows for modification of the bias control response time.
9	-Intg. –B	Control loop integrator differential input. Normally connected to pin 10, this input allows for modification of the bias control response time.
10	+Intg. +B	Control loop integrator differential input. Normally connected to pin 9, this input allows for modification of the bias control response time.
11	Bias Out	Bias output
12	Manual Bias In	Input for control of bias in manual mode. Input voltage ranges from –V to + V for control of bias voltage over Max to Min.
13	Dither Out– Lo Adj	Low dither voltage output. May be used for fine adjustment of dither amplitude. Normally not used.
14	Dither In	Dither input. Normally connected to pin 15 through a user selectable resistance to set dither amplitude. May be used to implement adjustable dither in conjunction with pin 15.
15	Dither Out Adj	Dither generator output. Normally connected to pin 14 through a user selectable resistance to set dither amplitude. May be used to implement adjustable dither in conjunction with pin 14.
16	Auto Bias Select 2	Input to set auto bias point in conjunction with pin 17. See table 1 below. Device employs internal 200k pull up resistor.
17	Auto Bias Select 1	Input to set auto bias point in conjunction with pin 16. See table 1 below. Device employs internal 200k pull up resistor.
18	Freq. Adj (future use)	No connection- Dither frequency control in future release; not supported at this time.
19	+Vlog Out	4.5 volt reference output. Normally not used.
20	Reset	Control loop reset input. Ground for normal operation, allow high for reset; device employs 200k pull up resistor.
21	Auto/Manual Select	Selects Automatic or manual bias point control. Connect to ground for automatic control; open for manual control. Device employs internal 200k pull up resistor.
22	-V	Negative power supply connection. Acceptable range from –4.75 to –18 volts
23	Ground	Device Ground
24	+V	Positive power supply connection. Acceptable range from 4.75 to 18 volts

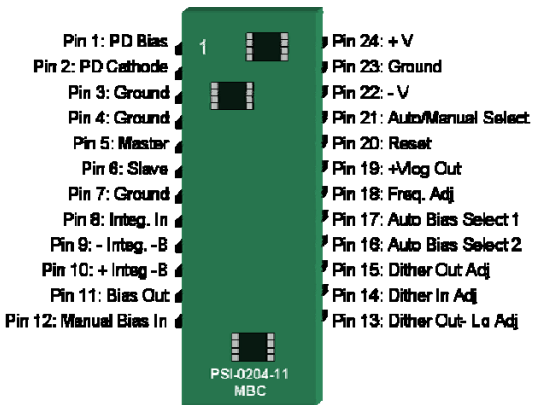
PHOTONICSystems, Inc.
WE LIGHT THE WAY

900 Middlesex Turnpike, Bldg 5
Billerica, MA 01821

Phone: 978-670-4990
E-mail: info@photonicsinc.com
www.photonicsinc.com

MBC Pin Bias Point	Position 5	Position 6
Q+	Open	Open
Q-	Ground	Open
Max	Open	Ground
Min	Ground	Ground

Table 1: Auto bias control point settings.



PHOTONICSystems, Inc.®
We Light the Way®

PSI-0204-99 Modulator Bias Controller Evaluation Kit

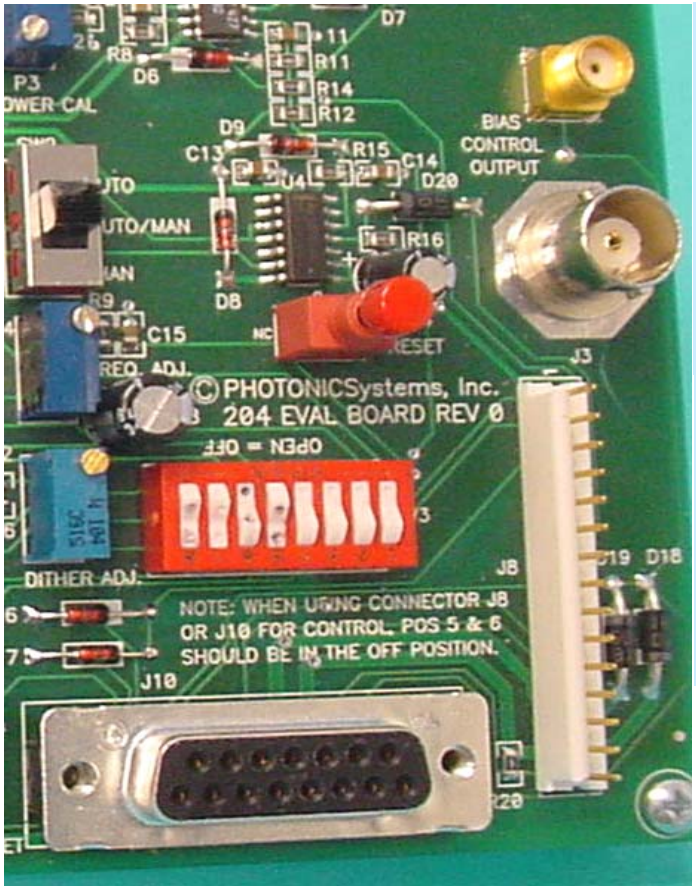
Using the Evaluation Board-

Most functions of the PSI-0204-99 Modulator Bias Controller evaluation board are set up through an 8 position DIP switch bank (SW3) located at the lower right of the board. These switches enable the dither generator at a fixed frequency and amplitude, enable automatic reset, set the automatic bias control point and determine set +/-15 volt supply operation. Prior to applying power to the evaluation board, ensure that the switches are set according to your application and the tables below.

POS	ON	OFF (CLOSED)
1	Adjustable Dither Frequency	Fixed Frequency (1KHz)
2	Auto Reset Off	Auto Reset On
3	Power= -15V	Power= -5V
4	Power=+15V	Power=+5V
5	Bias Mode (See Table 2)	Bias Mode (See Table 2)
6	Bias Mode (See Table 2)	Bias Mode (See Table 2)
7	Dither Low	Dither Off
8	Dither Adj. (P2)	Dither Adj. Off

MBC Pin Bias Point	Pin 17	Pin 16
Q+	Open	Open
Q-	Ground	Open
Max	Open	Ground
Min	Ground	Ground

Auto bias control point settings.



J8 or J10 pin	*Description*
1	Q+/-
2	Min/Max
3	Min
4	+5 volts
5	Power Switch 1
6	Power Switch 2
7	Reset Input; Ground to force reset
8	Bias Output
9	Power Meter
10	Auto/manual Select
11	Ground
12	Bias Wiper (Manual Control)
13	V-
14	V+
15	Power LED

All functions and interface points on the evaluation board may be accessed in several ways. The controller's output is accessible through either a BNC, SMA, D-sub or in-line connector. This allows for easy connection to the modulator under control along with a monitoring instrument. All other functions may be accessed through either the D-Sub (J10) or in-line connector (J8) as illustrated here.