



FEATURES

- Designed for Mach-Zehnder modulators
- Min, Max, Quad modes and any other operating point
- High sensitivity < 30 dBm
- High stability

APPLICATIONS

- LiNbO₃, InP, GaAs modulators
- Digital NRZ, RZ, QPSK modulators polarization
- Analog applications
- Pulse applications

OPTIONS

- Internal photodiode and tap coupler
- Bench-top and board versions
- Ditherless version for sensitive analogue applications

Photline Technologies MBC are a family of automatic bias controllers specially designed to lock the operating point of LiNbO₃ Mach-Zehnder modulators and ensure a stable operation over time and environmental conditions.

MBC controllers are continuously tunable bias controllers, meaning they allow operation of the modulator at any point of its transfer function and thus can be used for a large variety of applications. They are easy to implement, and are available as bench top instruments and OEM boards.

MBC-DG series controllers are especially well suited for digital and pulse applications, when MBC-AN series are optimized for analog applications.

Principle

MBC-DG controllers are dither signal based : a low amplitude, low frequency tone signal is superimposed to the modulation signal. The resulting optical modulation is then detected and a digital signal processing based on a FFT analysis principle allows to lock the operating point at the desired position.

Performance Highlights

Parameter	Min	Typ	Max	Unit
DC bias voltage	-10	-	+10	V
Input current	3	-	500	mA
Locking range	-	360	-	Degree
Locking accuracy at Quad [†]	89.5	90	90.5	Degree
Extinction ratio at MIN mode		ER ¹ ± 0.05	-	dB

[†] ER : modulator nominal Extinction Ratio value

Electrical Characteristics

Parameter	Symbol	Condition	Min	Typ	Max	Unit
DC bias voltage	V_{bias}	by 0.1 V bias voltage step	-10	-	+10	V
Input photocurrent	I_{ph}	total range over 4 user selectable gains	3	-	500	mA
		gain 1	100	-	500	mA
		gain 2	20	-	200	mA
		gain 3	10	-	100	mA
		gain 4	3	-	30	mA
Photocurrent dynamic range	DI_{ph}	total range over 4 user selectable gains	-	22	-	dB
		range over 1 user selectable gain	7	8	10	dB

Optical Characteristics

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Wavelength	λ	-	780		2 000	nm
Input optical power	P_{IN}	with internal PD and tap coupler option	-	-4	-	dBm
Optical dynamic range	DP_{IN}	total range over 4 user selectable gains & with internal PD and tap coupler option	-	22	-	dBm
		range over 1 user selectable gain with internal PD and tap coupler option	-	8	-	dBm

Bias Control Characteristics

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Locking range	DQ	by manual & automatic control	-	360	-	Degree
Locking accuracy	Q	at Quad ²	89.5	90	90.5	Degree
Extinction ratio	ER	MIN mode, with proper modulator and with internal PD and tap coupler option			50 ²	dB
Extinction ratio stability	S_{ER}	MIN mode, with proper modulator and with internal PD and tap coupler option, over 1 hour	-	± 0.05	-	dB
Dither frequency	f_{dither}	by 40 Hz frequency step	400	-	1 400	Hz
Dither amplitude	V_{dither}	by 10 mV amplitude step	50	-	1 000	V

² the modulator must show a very high Extinction Ratio value

MBC-DG-BT - Bench-top version

The MBC-DG-BT is a bench-top instrument. Its intuitive front panel allows to adjust the bias control parameters : dithering amplitude and frequency, operating point position on the transfer curve... so as to optimize the modulated optical signal and its stability. Different digital modulation formats (NRZ, RZ, DPSK) require specific operating points and bias control parameters. That is also true for pulse signals with different duty cycles.

The MBC-DG-BT can operate with a photocurrent signal delivered by a user provided photodiode or from an optional internal photodiode / tap coupler set (OPT-PD/TAP-xxxxx). It comes with a RS-232 interface and a LabView driver for virtual instrument remote control.

Using an internal monitoring photodiode: the advantage of this scheme is it avoid the optical losses due to a tapping coupler. Moreover the set up is more compact than the one using an external fiber coupler.



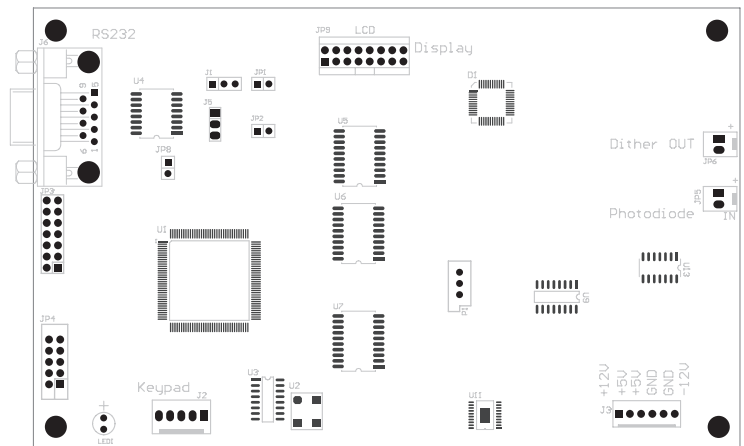
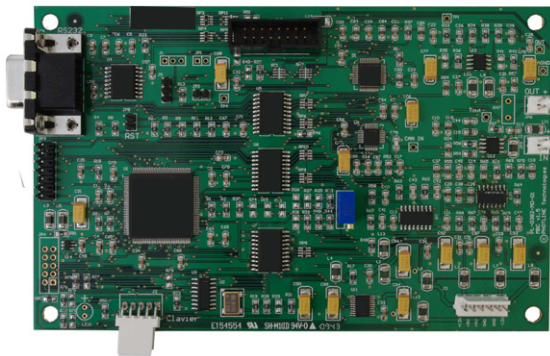
Dimensions	
Dimensions (W x H x D)	24 cm x 8.5 cm x 16 cm
Weight	1.5 kg - 3.3 pounds
Power supply (rear panel)	100-120 V / 220-240 V automatic switch, 50-60 Hz
Interfaces	
Bias voltage output	2 mm jack (cables supplied)
Photocurrent input	2 mm jack (cables supplied)
Optical input (with OPT PD/TAP)	FC/PC bulkhead
Remote Control	
Type	RS-232 or USB with Labview driver
Connector	Sub-D 9 pins / USB type B

Ordering information

Bench-top Modulator Bias Controller MBC-DG-BT
 Photodiode and tap coupler set, 800 nm region OPT-PD/TAP-800
 Photodiode and tap coupler set, 1000 nm region OPT-PD/TAP-1000
 Photodiode and tap coupler set, 1300-1550 nm region OPT-PD/TAP-1550
 USB option for remote interface OPT-USB

MBC-DG-board : OEM version

The MBC-DG-board is an OEM board designed for integration in systems and comes with an embedded intensity modulator. The MBC-DG-board offers a similar performance than the MBC-DG-BT bench top instrument. The bias control parameters of the board can be adjusted through the RS-232 interface. A LabView driver is supplied with the board, as well as the complete communication protocol.



Parameter	
Dimensions (L x W x H)	160 mm x 100 mm x 27 mm
Supply voltages	+12 / -12V / +5 V
Remote control	RS-232 with LabView driver
Connector	Sub-D 9 pins

Ordering information

Board Modulator Bias Controller MBC-DG-Board
 Photodiode and tap coupler set, 800 nm region OPT-PD/TAP-800
 Photodiode and tap coupler set, 1000 nm region OPT-PD/TAP-1000
 Photodiode and tap coupler set, 1300-1550 nm region OPT-PD/TAP-1550

About us

Photline Technologies is a provider of Fiber Optics Modulation Solutions based on the company LiNbO_3 modulators and high-speed electronics modules. Photline Technologies offers high speed and high data rate modulation solutions for the telecommunication industry and the defense, aerospace, instruments and sensors markets. The products offered by the company include : comprehensive range of intensity and phase modulators (800 nm, 1060 nm, 1300 nm, 1550 nm), RF drivers and modules, transmitters and modulation units.

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