

## About Pharad

Founded in 2003 and located in Hanover, Maryland, Pharad is a customer focused company carrying out innovative research, development, and manufacturing in the areas of highly efficient, electrically small antennas and RF-over-Fiber technologies. Pharad operates an ISO9001: 2008 manufacturing facility that delivers high quality production volume products to a wide range of government and commercial customers. In response to increased customer demand, Pharad formed the **octane**® division in 2007 and we now sell our products through the **octane**® brand.

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# Modulator Bias Controllers

## FEATURES

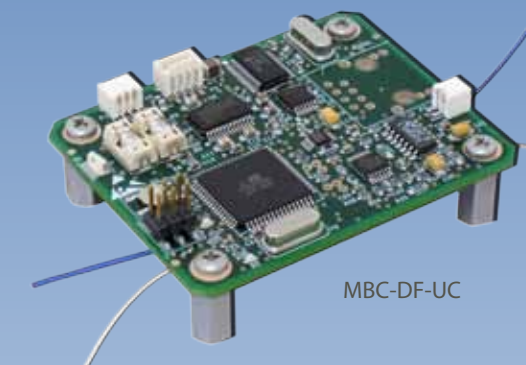
- Precise and stable bias control of optical modulators
- Dither-free operation ensures no unwanted pilot tones
- No external optical couplers required
- Continuous tuning via USB or RS-232 control

## APPLICATIONS

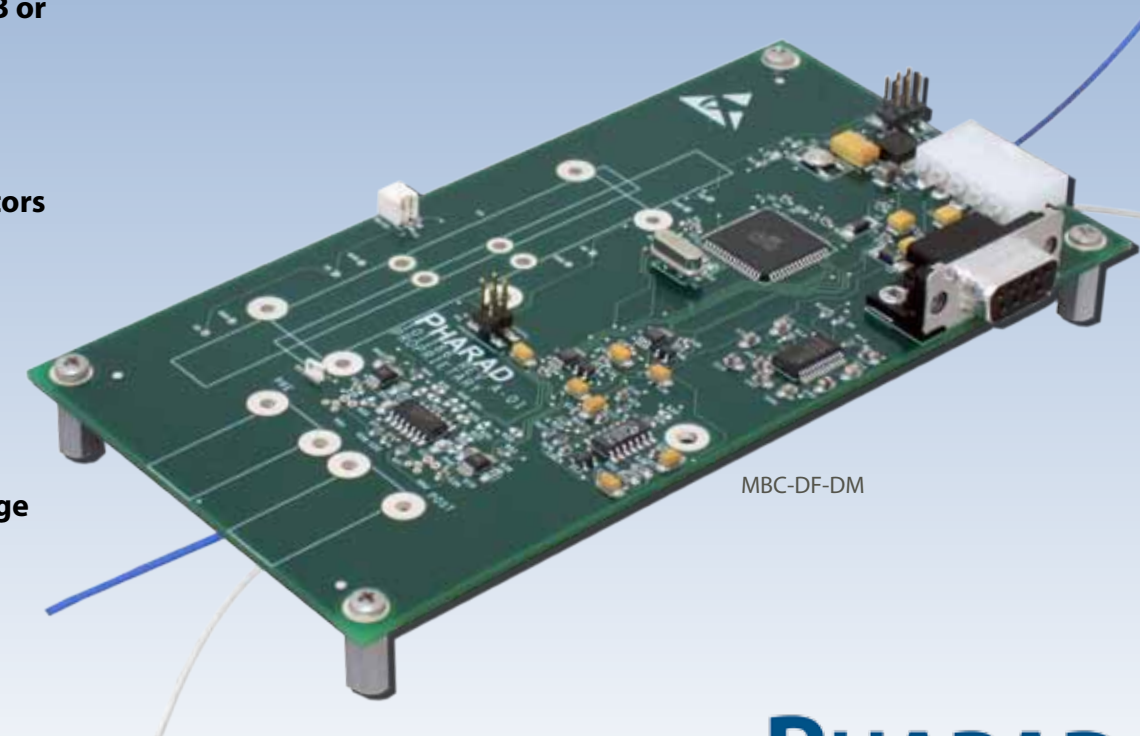
- LiNbO<sub>3</sub>, InP, GaAs modulators
- Analog fiber links

## OPTIONS

- Ultra-compact and direct mount configurations
- Extended wavelength range



MBC-DF-UC



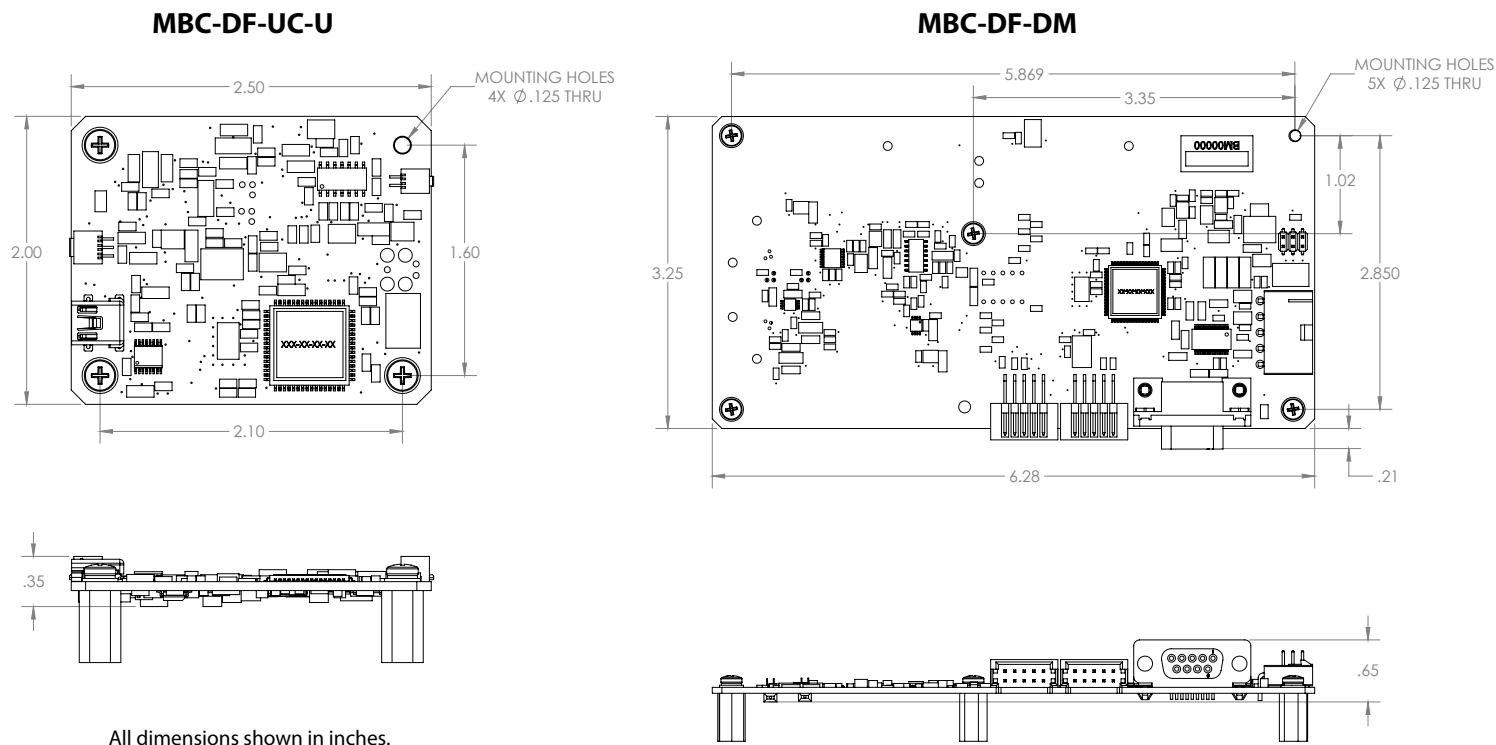
MBC-DF-DM

## Product Description

Pharad has developed a family of dither-free bias controllers for OEM applications that provide accurate and highly stable bias voltage control of electro-optic modulators and operate with modulators having both periodic and non-periodic transfer functions. As the modulator bias point drifts over time, the bias controller automatically adjusts the bias voltage to maintain its set point. The non-dither based control which operates in conjunction with on-board inline optical power monitors ensures unwanted dither tones do not impact link performance, making them the ideal solution for analog applications. The integrated inline power monitors also eliminate the need for user supplied external optical couplers or photodetectors, greatly simplifying experimental set-ups.

The Pharad bias controllers enable continuous tuning and control of the modulator bias voltage on its transfer characteristic via a standard USB or RS-232 communications interface. The OEM boards are offered in two form factors: an ultra-compact version and a direct mount configuration that provides sufficient space and mounting holes for direct attachment of the modulator.

## Board Dimensions



## Ordering Information

**Model:** MBC - DF - UC - X  
**Form Factor:** \_\_\_\_\_  
 UC = Ultra-Compact  
**Interface:** \_\_\_\_\_  
 U = USB Control

**Model:** MBC - DF - DM - X  
**Form Factor:** \_\_\_\_\_  
 DM = Direct Mount  
**Options:** \_\_\_\_\_  
 W = Wide Wavelength Range<sup>+</sup>  
<sup>+</sup>User supplied external optical couplers required

## Product Specifications

PARAMETERS	MIN	TYP	MAX	UNIT	
<b>OPTICAL</b>					
Wavelength Range	MBC-DF-UC MBC-DF-UC-U MBC-DF-DM	1540		1610	nm
	MBC-DF-DM-W	1100		1650	
Input Fiber	Polarization Maintaining (PM)				
Output Fiber	Single Mode (SM)				
Connectors	FC/APC (PM Input, SM Output)				
Input (Pre-Modulator) & Output (Post-Modulator) Optical Power <sup>^</sup>	MBC-DF-UC MBC-DF-UC-U MBC-DF-DM	-6.5		19	dBm
	MBC-DF-DM-W	-15.0		3	
Insertion Loss <sup>+</sup>			0.1	dB	

## BIAS CONTROL

Reconfigurable Bias Phase <sup>#</sup>	20	90	160	degree	
Modulator Bias Voltage Resolution <sup>*</sup>	10			mV	
Modulator Bias Phase Stability <sup>*</sup>		± 1.0		degree	
Modulator DC Bias Voltage Range	MBC-DF-UC MBC-DF-DM MBC-DF-DM-W	-11.7		+11.7	V
	MBC-DF-UC-U	-14.5		+14.3	

## ELECTRICAL

Power Supply Voltages	MBC-DF-UC MBC-DF-UC-U		±15		VDC
	MBC-DF-DM MBC-DF-DM-W		±12		
Power Supply Current			100		mA

## GENERAL

Operating Temperature		0		70	°C
Board Dimensions	MBC-DF-UC	2.5 × 2.0 × 0.63			inches
	MBC-DF-UC-U	2.5 × 2.0 × 0.35			
	MBC-DF-DM MBC-DF-DM-W	6.3 × 3.2 × 0.65			
Communications	MBC-DF-UC MBC-DF-DM MBC-DF-DM-W	RS-232			
	MBC-DF-UC-U	USB			

<sup>^</sup>Into onboard fiber optic tap optical power monitors or user supplied external couplers.

<sup>+</sup>Connector loss or external coupler loss not included.

<sup>\*</sup>Quadrature = 90 degrees. Bias phase can be selected for positive or negative slope of modulator transfer characteristic.

<sup>#</sup>At quadrature in a laboratory environment.