

The Optilab LMB-40 is a high performance Lightwave Modulator Board designed for analog photonics applications from DC to 40 GHz. This unit includes a 32 GHz optical intensity modulator and an Automatic Bias Control (ABC) board with four different operating modes. The external laser source can be any polarization maintaining device, such as tunable laser, narrow linewidth laser, making it a versatille solution for OEM-based system integration. Contact Optilab for more information.

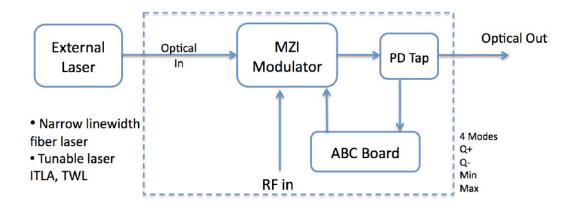
### **Features**

- > 32 GHz S21 bandwidth modulator
- ➤ 1520 nm to 1610 nm wavelength range
- ➤ Automatic Bias Control w/ 4 mode operation
- ➤ Accepts external laser source via input
- > Customizable options:
  - Low Drive Voltage
  - PM Output
  - High Extinction Ratio (>30 dB)
  - Temperature Qualified (-55 °C to +75 °C)

## **Applications**

- > Analog photonics
- ➤ 40 GHz RFoF transmission
- ➤ RF/IF signal distribution
- > Satellite communication
- ➤ Optical communications to 43 Gb/s
- Active mode lock (PM version)
- ➤ Picosecond pulse generation

## Functional Diagram



#### OPTIONS

XX

LMB-40-XX-YY

**LD**: Low Drive Voltage **PM**: Polarization Maintaining

HE: High Extinction Ratio

YY TQ: Temperature Qualifed

#### TECHNICAL INFO

For technical info and support:

sales@optilab.com www.optilab.com

#### WEB ORDER

To order, please click below.



### Optilab Advantage

- ➤ Innovation
- > Performance
- ➤ Quality
- ➤ Customization
- ➤ Warranty

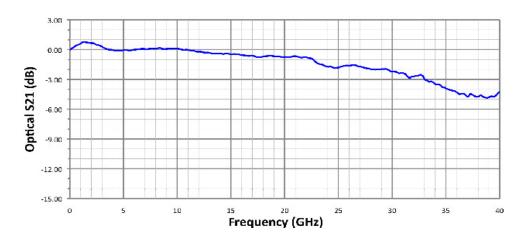
General Specifications       1520 nm to 1610 nm         Laser Source       User's external Input         Optical Input Level       +20 dBm max         RF Return Loss       >15 dB @ 10 GHz; >10 dB @ 30 GHz         Impedance       50 Ω         Operating Frequency Range       DC to 40 GHz         Input RF Voltage       27 dBm max.         Optical Output Level       7 dBm @ +14 dBm input typ.         S21 Bandwidth       3 dB, 32 GHz typ.         Modulator Bias Mode       4 Automatic bias control modes, selectable by software         Extinction Ratio       25 dB typ.; >30 dB (HE version)         Modulator Voltage V <sub>PI</sub> 6.4 V typ. @10 GHz, 8.3 V typ. @30 kHz; 2.5 V typ. @10 GHz, 4.3 V typ. @30 GHz (LD Version)         Analog Link Performance       IIP3 @7 GHz       29 dBm typ.; (LD version)         If dB Conpression Point @10 GHz       29 dBm typ.; (LD version)         Mechanical Specifications       4 dBm typ.; (LD version)         Operating Temperature (standard)       -30 °C to +60 °C         Operating Temperature (TQ version)       -55 °C to +75 °C         Storage Temperature       -60 °C to +90 °C         Power Supply Requirements       ±5V, 1A typ.         Optical Connectors       FC/APC         Fiber Type       PANDA input, SMF-28 output; PANDA input/output (PM version				
Laser Source  Optical Input Level  Appendence  Operating Frequency Range  Input RF Voltage  Optical Output Level  Appendence  Optical Output Level  Appendence  Optical Output Level  To dBm max.  Optical Output Level  To dBm (0 +14 dBm input typ.)  S21 Bandwidth  Appendence  Extinction Ratio  Appendence  Extinction Ratio  Appendence  Extinction Ratio  Appendence  IIP3 (0 F GHz)  Analog Link Performance  IIP3 (0 F GHz)  Analog Link Performance  IIP3 (0 F GHz)  Analog Link Performance  IIP3 (0 F GHz)  Appendence Appendence  Appendence Appendence  IIP3 (0 F GHz)  Appendence Appendence Appendence  IIP3 (0 F GHz)  Appendence Appendence Appendence  IIP3 (0 F GHz)  Appendence Ap	General Specifications			
Optical Input Level +20 dBm max.  RF Return Loss >15 dB @ 10 GHz; >10 dB @ 30 GHz Impedance 50 \( \Omega\$ Operating Frequency Range Input RF Voltage 27 dBm max.  Optical Output Level 7 dBm @ +14 dBm input typ.  S21 Bandwidth 3 dB, 32 GHz typ.  Modulator Bias Mode 4 Automatic bias control modes, selectable by software  Extinction Ratio 25 dB typ.; >30 dB (HE version)  Modulator Voltage V <sub>Pl</sub> 25 dB typ. @30 kHz; 2.5 V typ. @10 GHz, 4.3 V typ. @30 GHz (LD Version)  Analog Link Performance  IIP3 @7 GHz 29 dBm typ.; 25 dBm typ. (LD version)  1 dB Conpression Point @10 GHz 8 dBm typ. (LD version)  Mechanical Specifications  Operating Temperature (standard) -30 °C to +60 °C  Operating Temperature (TQ version) -55 °C to +75 °C  Storage Temperature (TQ version) -55 °C to +90 °C  Power Supply Requirements ±5V, 1A typ.  Optical Connectors FC/APC  Fiber Type PANDA input, SMF-28 output; PANDA input/output (PM version)  V connector; V connector V Connector or GPPO (LD version)	1 0	1520 nm to 1610 nm		
RF Return Loss	Laser Source	User's external Input		
Impedance  Operating Frequency Range Input RF Voltage Optical Output Level S21 Bandwidth  Modulator Bias Mode Extinction Ratio  Official Output Voltage Vpi  Modulator Voltage Vpi  Analog Link Performance  IIP3 @7 GHz  Mechanical Specifications Operating Temperature (standard) Operating Temperature Power Supply Requirements Optical Connector  Power Connector  Operating Tomperator  Fiber Type  Pawer Supply Requirements  Dott to 40 GHz Analog Link Deversion)  Dott to 40 GHz Analog Link Performance  150 Q Amm max.  27 dBm max. Analog Link performance  25 dB typ. 30 dB (HE version)  6.4 V typ. @10 GHz, 8.3 V typ. @30 GHz (LD Version)  4.3 V typ. @30 GHz (LD Version)  16 dBm typ.; 8 dBm typ. (LD version)  16 dBm typ.; 8 dBm typ. (LD version)  7-55 °C to +75 °C  For to +90 °C  PANDA input, SMF-28 output; PANDA input/output (PM version)  V connector; V connector or GPPO (LD version)  Power Connector  4 Pin Molex	Optical Input Level	+20 dBm max.		
Operating Frequency Range   DC to 40 GHz	RF Return Loss	>15 dB @ 10 GHz; >10 dB @ 30 GHz		
Input RF Voltage  Optical Output Level  7 dBm @ +14 dBm input typ.  S21 Bandwidth  3 dB, 32 GHz typ.  4 Automatic bias control modes, selectable by software  Extinction Ratio  25 dB typ.; >30 dB (HE version)  6.4 V typ. @10 GHz, 8.3 V typ. @30 kHz; 2.5 V typ. @10 GHz, 4.3 V typ. @30 GHz (LD Version)  Analog Link Performance  IIP3 @7 GHz  29 dBm typ.; 25 dBm typ. (LD version)  1 dB Conpression Point @10 GHz  8 dBm typ.; 8 dBm typ. (LD version)  Mechanical Specifications  Operating Temperature (standard)  Operating Temperature (TQ version)  Storage Temperature  -60 °C to +50 °C  Power Supply Requirements  -55 °C to +75 °C  Storage Temperature  -60 °C to +90 °C  Power Supply Requirements  -55 °C to +75 °C  Fiber Type  PANDA input, SMF-28 output; PANDA input/output (PM version)  RF Input Connector  V connector; V connector; V connector or GPPO (LD version)	Impedance	50 Ω		
Optical Output Level  521 Bandwidth  3 dB, 32 GHz typ.  4 Automatic bias control modes, selectable by software  Extinction Ratio  25 dB typ.; >30 dB (HE version)  6.4 V typ. @10 GHz, 8.3 V typ. @30 kHz; 2.5 V typ. @10 GHz, 4.3 V typ. @30 GHz (LD Version)  Analog Link Performance  IIP3 @7 GHz  29 dBm typ.; 25 dBm typ. (LD version)  1 dB Conpression Point @10 GHz  Mechanical Specifications  Operating Temperature (standard) Operating Temperature (TQ version)  50 c to +60 °C  Storage Temperature  Fower Supply Requirements  Detail Connectors  Fiber Type  PANDA input, SMF-28 output; PANDA input/output (PM version)  V connector; V connector of GPPO (LD version)  Power Connector  Power Connector	Operating Frequency Range	DC to 40 GHz		
S21 Bandwidth   3 dB, 32 GHz typ.	Input RF Voltage	27 dBm max.		
Modulator Bias Mode  Extinction Ratio  25 dB typ.; >30 dB (HE version)  6.4 V typ. @10 GHz, 8.3 V typ. @30 GHz (LD Version)  Analog Link Performance  IIP3 @7 GHz  1 dB Conpression Point @10 GHz  Mechanical Specifications  Operating Temperature (standard)  Operating Temperature (standard)  Operating Temperature (TQ version)  Storage Temperature  Power Supply Requirements  Fiber Type  PANDA input, SMF-28 output; PANDA input/output (PM version)  V connector; V connector or GPPO (LD version)  A Automatic bias control modes, selectable by software  25 dB typ.; 25 dB typ. @10 GHz, 8.3 V typ. @30 GHz (LD Version)  4 Automatic bias control modes, selectable by software  25 dB typ.; 25 dB typ. @10 GHz, 8.3 V typ. @30 GHz (LD Version)  16 dBm typ.; 8 dBm typ. (LD version)  17 d CD version)  18 dBm typ.; 19 dBm typ.; 10 dBm ty	Optical Output Level	7 dBm @ +14 dBm input typ.		
Selectable by software	S21 Bandwidth	3 dB, 32 GHz typ.		
Solid Brain	Modulator Bias Mode	•		
Modulator Voltage V <sub>Pl</sub> 8.3 V typ. @30 kHz; 2.5 V typ. @10 GHz, 4.3 V typ. @30 GHz (LD Version)  Analog Link Performance  IIP3 @7 GHz  29 dBm typ.; 25 dBm typ. (LD version)  16 dBm typ.; 8 dBm typ. (LD version)  Mechanical Specifications  Operating Temperature (standard)  Operating Temperature (TQ version)  Storage Temperature  -60 °C to +90 °C  Power Supply Requirements  55V, 1A typ.  Optical Connectors  FC/APC  PANDA input, SMF-28 output; PANDA input/output (PM version)  RF Input Connector  V connector; V connector or GPPO (LD version)  Power Connector	Extinction Ratio			
Analog Link Performance  IIP3 @7 GHz  29 dBm typ.; 25 dBm typ. (LD version)  1 dB Conpression Point @10 GHz  Mechanical Specifications  Operating Temperature (standard)  Operating Temperature (TQ version)  Storage Temperature  -60 °C to +90 °C  Power Supply Requirements  Deptical Connectors  FC/APC  Fiber Type  RF Input Connector  Power Connector  Power Connector  A Pin Molex	Modulator Voltage V <sub>PI</sub>	8.3 V typ. @30 kHz; 2.5 V typ. @10 GHz,		
25 dBm typ. (LD version)  1 dB Conpression Point @10 GHz  Mechanical Specifications  Operating Temperature (standard)  Operating Temperature (TQ version)  Storage Temperature  -60 °C to +75 °C  Power Supply Requirements  Optical Connectors  FC/APC  PANDA input, SMF-28 output; PANDA input/output (PM version)  RF Input Connector  V connector; V connector or GPPO (LD version)  Power Connector  4 Pin Molex	Analog Link Performance	7, 2		
Mechanical Specifications  Operating Temperature (standard) -30 °C to +60 °C  Operating Temperature (TQ version) -55 °C to +75 °C  Storage Temperature -60 °C to +90 °C  Power Supply Requirements ±5V, 1A typ.  Optical Connectors FC/APC  Fiber Type PANDA input, SMF-28 output; PANDA input/output (PM version)  V connector; V connector V connector or GPPO (LD version)  Power Connector 4 Pin Molex	IIP3 @7 GHz			
Operating Temperature (standard) Operating Temperature (TQ version) -55 °C to +75 °C Storage Temperature -60 °C to +90 °C Power Supply Requirements ±5V, 1A typ. Optical Connectors FC/APC PANDA input, SMF-28 output; PANDA input/output (PM version)  RF Input Connector V connector; V connector or GPPO (LD version)  Power Connector 4 Pin Molex	1 dB Conpression Point @10 GHz			
Operating Temperature (TQ version)  Storage Temperature  -60 °C to +90 °C  Power Supply Requirements  ±5V, 1A typ.  Optical Connectors  FC/APC  PANDA input, SMF-28 output; PANDA input/output (PM version)  V connector; V connector; V connector or GPPO (LD version)  Power Connector  4 Pin Molex				
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Fiber Type  PANDA input, SMF-28 output; PANDA input/output ( <b>PM version</b> )  V connector; V connector or GPPO ( <b>LD version</b> )  Power Connector  4 Pin Molex	Power Supply Requirements	±5V, 1A typ.		
PANDA input/output (PM version)  RF Input Connector  V connector; V connector or GPPO (LD version)  Power Connector  4 Pin Molex	Optical Connectors	FC/APC		
Power Connector  V connector or GPPO (LD version)  4 Pin Molex	Fiber Type			
	RF Input Connector			
Remote Control USB 2.0 software included	Power Connector	4 Pin Molex		
	Remote Control	USB 2.0 software included		

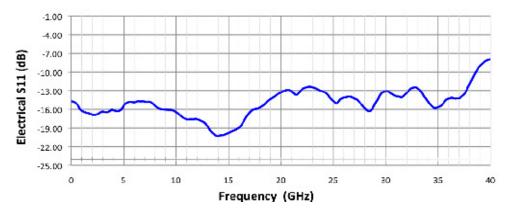
### Bias Control Mode

Mode	Operation Conditions
Q+	Set to quadrature point of positive slope for linear analog modulation
Q-	Set to quadrature point of negative slope for linear analog modulation
Min	Set to min. point of operation for pulse generator or digital modulation
Max	Set to max. point of operation for pulse generator or digital modulation



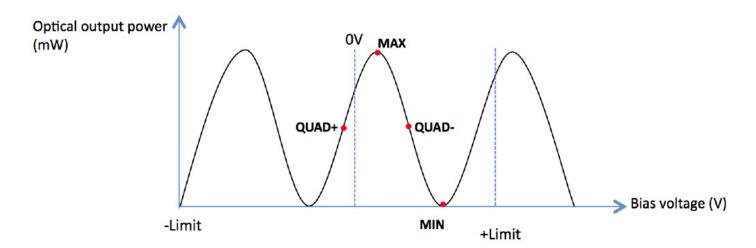
## Typical S21 and S11 Bandwidth





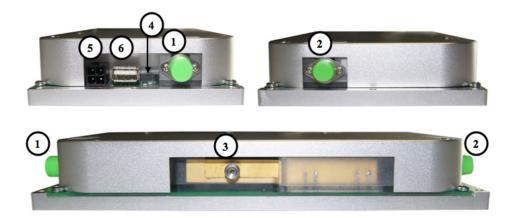
## Bias Setting Modes for LMB

Based on sophisticated phase measurement of this small dither signal, LMB-20 can provides four selectable operating modes: quadrature (Quad +), inverted quadrature (Quad -), minimum (Min), or maximum (Max) points.



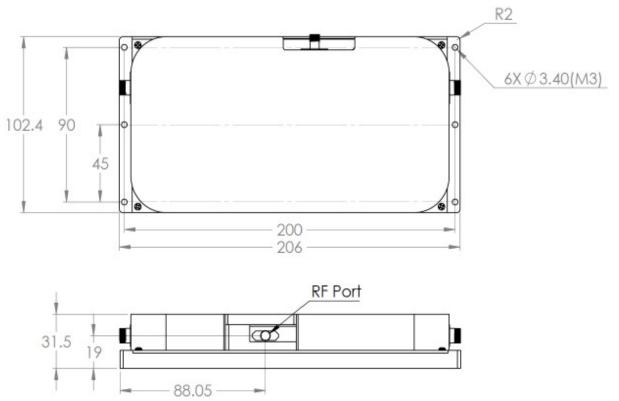


## **Detailed Layout**



No.	Feature
1	Optical Input Port
2	Optical Output Port
3	RF Input Port
4	LED Indicators
5	DC Connection Port
6	USB Control and Monitor Port

## Mechanical Drawing



Unit: mm



Precision Power Supply for LMB (optional)

Front



Back



General Specifications		
Parameters	Specifications	
Input AC Voltage (VAC)	85-240	
Input AC Current (A)	≤0.5	
Input AC Frequency (HZ)	50-60	
Transfer Efficiency	≤85%	
DC Output Current (A)	4 A max.	
DC Output Voltage (V)	±5 V	
DC Voltage Ripple	≤2%	
DC Connectors	Molex 4 Pin	
Communication Connectors	DB-9 and USB 2.0	
Dimensions (mm)	153x115x33	

