

Features

- 10Gb/s electroabsorption modulator (EAM) with integrated laser
- 9.9Gb/s to 11.3Gb/s operation
- Modulated optical output powers from -1dBm to +4dBm
- +800, +1600 or +1800 ps/nm dispersion tolerance
- ER > 10.0 dB, EOL, Filtered
- Power dissipation of <2W, allowing use in small form factor transponders
- 7-pin EML-compatible package.
- Wavelengths available on 100GHz ITU grid
- Two channel tunability.
- Full Telcordia GR-468-CORE qualification

Applications

- SONET/ SDH line and client transponders
- DWDM/ CWDM transponders
- Line Cards

Datasheet

LIM10X Data Sheet

Product Overview

Performance -- The LIM10X offers a variety of optical output power, dispersion penalty, and dynamic extinction ratio performance depending on application. Low power consumption allows use in SFF transponders.

Form Factor -- This product family was developed on a single platform enabling a common form factor that is mechanically and electrically compatible with the industry standard EML.

Applications -- This product is ideal for either SONET or SDH transport protocols in TDM, WDM, CWDM, or DWDM systems, with or without FEC. Subsystem applications include 10Gb/s line cards, small form factor (2.2" X 3") transponders.



The products listed in Table 1 are all available with full evaluation kits that include all the necessary hardware and documentation for the customer to evaluate the transmission performance of the LIM10X devices. Contact CyOptics for more detailed information.

Summary of Key Performance Parameters of the LIM10X Products

Product Name	Application		Pout ¹ (dBm)				Dispersion Penalty ² (ps/nm)			ER (dB) ³			DEP ⁴ mW×ps/nm
	TDM	WDM	-1	0	2	4	800 ITU IR2	1600 ITU LR	1800	9.5	9.75	10	
LIM100	C	L	X	X			X	X				X	16,000
LIM102	C	L			X			X				X	25,360
LIM104	C	L				X		X			X		40,190
LIM102ER	C	L			X				X	X			25,425

Notes:

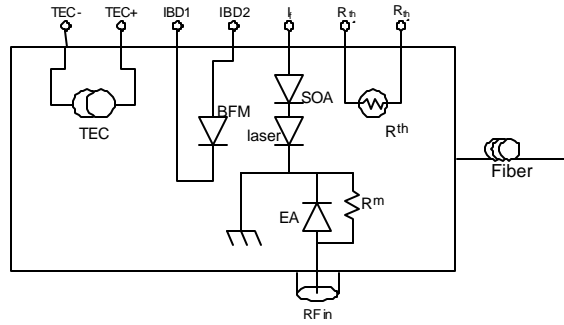
1. Minimum EOL average modulated optical output power, BOL values are +1dB
2. Less than 2dB of dispersion power penalty at 10.7Gb/s.
3. Minimum EOL dynamic extinction ratio, 10.7Gb/s, BOL values are +0.5dB
4. Dispersion × Extinction × Power figure of merit

Available Options (see ordering information):

- Wavelength: L – specified, line-side application, C – wavelength range, client side application.
- Available two-channel tunability
- Output power: -1, 0, +2, +4 dBm end of life, average modulated power.

Contact CyOptics for other combinations of features and performance levels

Electrical Schematic and Pin Assignments



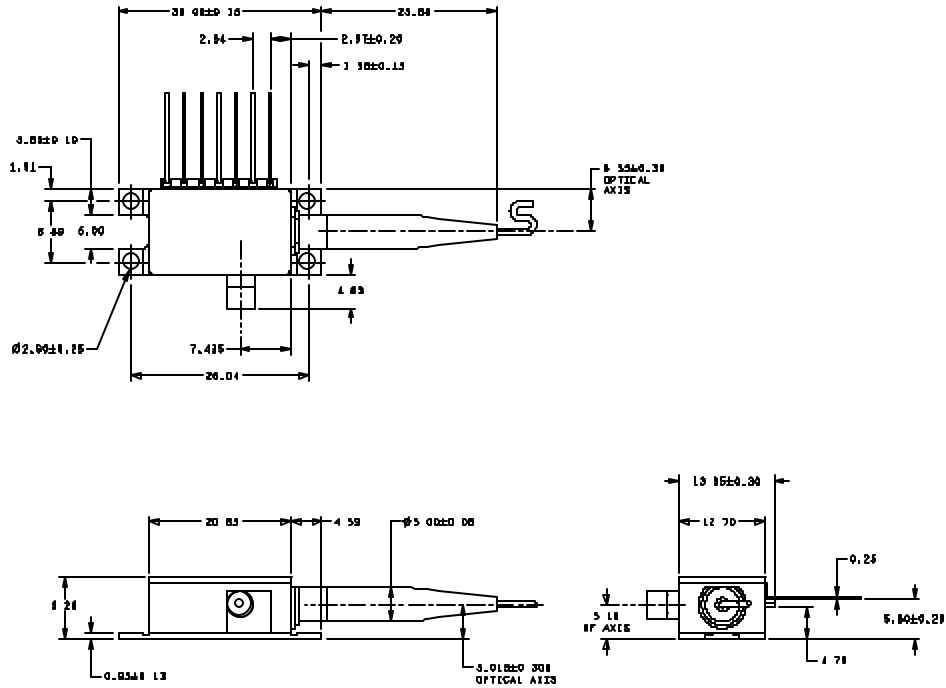
LIM10X

Figure 1a: LIM10X

Pin Assignments

PIN	LIM100, LIM102 LIM104, LIM100ER
1	R_{th}^-
2	R_{th}^+
3	I_F
4	IBD Anode
5	IBD Cathode
6	TEC+
7	TEC-

All dimensions are in mm. Please note that the drawings shown are for illustration only and that the up-to-date controlled engineering drawings need to be requested and used for mechanical designs employing this product.



Optional 8.0mm version, contact CyOptics if you would like to order this option:

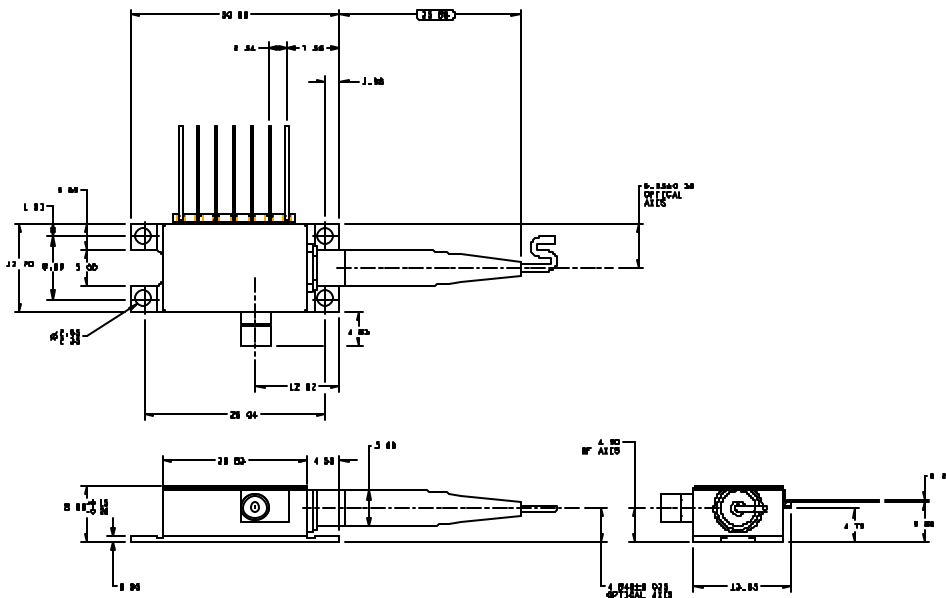


Figure 2: Outline Diagram of LIM10X Product

Specifications subject to change without notice

LIM10X



General Electrical and Optical Characteristics

These specifications are representative of the performance of the LIM10X series of products. Specific versions customized to your needs are available by contacting CyOptics.

Parameter	Symbol (unit)		Product			
			LIM100	LIM102	LIM104	LIM102ER
Operating Wavelength ⁽¹⁾	λ (nm)	Min	1528			1528
		Typ Max	1610			1610
Operating Temperature ⁽¹⁾	T_{op} (C)	Min	25			
		Typ	35			
		Max	40			
Dispersion Power Penalty @ 1600ps/nm ⁽²⁾	DP (dB)	Typ	2.0			-
		Max	2.0			-
Dispersion Power Penalty @ 1800ps/nm ⁽²⁾	DP (dB)	Typ	-	-	-	2.0
		Max	-	-	-	2.0
Mean (Modulated) output power options ⁽²⁾	P_{out} (dBm)	Min	-1.0, 0.0	+2.0	+4.0	2.0
		Max	2.5	2.5	2.8	2.8
Required RF Peak-to-Peak Voltage	V_{RF} (V)	Min	10			9.75
		Typ	10			9.5
Mark ("One" Level) Voltage ⁽³⁾	V_M (V)	Min	-0.75			
Laser Threshold Current	I_{TH} (mA)	Typ	15			
		Max	30			
Laser Forward Current	I_F (mA)	Typ	40	60	70	60
		Max	60	75	85	75
Laser Forward Voltage	V_F (V)	Typ	2.1	2.4	2.5	2.4
		Max	2.4	2.6	2.7	2.6
Side-mode Suppression Ratio	SMSR (dB)	Min	35			
		Typ	35			
RF Return Loss ⁽⁴⁾ (0 < f < 6 GHz)	S11 (dB)	Typ	-12.0			
		Max	-10.0			
RF Return Loss ⁽⁴⁾ (6 < f < 10 GHz)	S11 (dB)	Typ	-7.0			
		Max	-6.0			

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Electrical and Optical Characteristics – Con't

Parameter	Symbol (unit)					
			LIM100	LIM102	LIM104	LIM102ER
Wavelength Tolerance ⁽⁵⁾ “L” (line side) versions	$\Delta\lambda$ (pm)	Min Max	-100 +100			
Back Detector Diode						
Back Detector Diode Current ($V_{BD}=-5V$)	I_{BD} (μA)	Min Max	100 1000			
Thermistor						
Thermistor Resistance @ 25°C	R_{th} (k Ω)	Min Typ Max	9.8 10.0 10.2			
Thermoelectric Cooler						
Max TEC Voltage	V_{TEC} (V)	TDM WDM	1.7 1.9			
Max TEC Current	I_{TEC} (A)	TDM WDM	1.3 1.6			
Max TEC Power ⁽⁶⁾	P_{TEC} (W)	TDM WDM	2.0 2.75			
T_{op}	(C)	Min TDM Min WDM	35 25			
Optical Isolation						
Output Optical Return Loss	(dB)	Typ Max	-30 -27			
Package						
Case Operating Temperature	T_{case} (C)	Min Max	-5 75 for TDM 70 for WDM			

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Notes

- (1) Operation at a desired ITU for “L” (Line-side) versions may require an operating temperature from 25°C to 40°C. Specific wavelength availability is listed in the ordering options.
- (2) Parameters are specified under the following conditions:
 - $T = T_{op}$
 - RF Input = V_{RF} , $2^{31}-1$ 10.7Gb/s PRBS
 - Rated power output
 - “Min” is EOL
- (3) Mark Voltage is determined at the point where $T = T_{op}$ (for the desired ITU channels), RF Input = V_{RF} , PRBS of $2^{31}-1$ at 10.7Gb/s, and dispersion penalty is $< 2.0\text{dB}$. Driver output offset voltage is measured into a perfect 50ohm load.
- (4) S_{21} and S_{11} are measured at $T_{op} = 25\text{C}$, Modulator Bias Voltage = -1.8V .
- (5) Wavelength Tolerance is specified at $T_{op} = 35\text{C}$, $I_F = I_{op}$ and includes wavelength tracking, package relaxation and ageing. Contact CyOptics for your specific conditions and needs.
- (6) Maximum TEC voltage and maximum TEC current will not occur simultaneously. CyOptics provides an option of using 1A maximum TEC. Contact CyOptics for your specific conditions and needs.

Absolute Maximum Ratings

Stresses in excess of the absolute maximum ratings can cause permanent device damage, and affect device reliability. Functional operation of the device is not implied at these conditions.

Parameter	Min	Max	Unit
Storage Temperature	-40	85	°C
Operating Temperature	-5	75	°C
Laser Reverse Voltage		3	V
Laser Forward Current		100	mA
Peak Optical Output Power		9	dBm
Modulator DC Reverse Voltage		3	V
Modulator Forward Voltage		1	V
Back Detector Diode Reverse Voltage		10	V
Back Detector Diode Forward Voltage		1	V

Reliability

Reliability is consistent with Telcordia GR-468-CORE requirements.

RoHS

This product is compliant with RoHS directive 2002/95/EC plus amendments.

Laser Safety Classification

This is a FDA class I and IEC class 1 laser product in accordance with CDRH 21 CFR 1040 and IEC/EN 60825/A2: 2001 Laser Safety requirements.

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ESD

This part is sensitive to electrostatic discharge. Please follow JEDEC standard JESD625-A guidelines during handling.

Ordering Information

Product code	Description
A11-V016-XXY	LIM100, 10Gbps, 0dBm, 1600ps/nm, 7-pin package
A11-V018-XXY	LIM102, 10Gbps, 2dBm, 1600ps/nm, 7-pin package
A11-V012-XXY	LIM104, 10Gbps, 4dBm, 1600ps/nm, 7-pin package
Replace V in the product code with: 0 – 9.2mm package 1 – 8.0mm package	Replace X in the product code with: 1 – 1.0m Fiber with LC/UPC 2 – 1.0m Fiber with FC/UPC 3 – 1.0m Fiber with SC/UPC 4 – 1.5m Fiber with SC/UPC 5 – 1.0m Fiber with FC/APC 6 – 1.0m Fiber with SC/APC 7 – 68cm Fiber with MU/UPC 8 – 2.0m Fiber with SC/UPC

The “YY” designator identifies the wavelength channel.

Non-WDM codes (TDM) are designated as “YY” = 01.

For CWDM or DWDM LIM, 2x100GHz and 4x100GHz tunable LIM, contact CyOptics.

Please contact CyOptics for any detailed ordering information and for custom LIM10X products.

Additional Information

For the latest specifications, additional product information, worldwide sales and distribution locations, and information about CyOptics:

Web: <http://www.cyoptics.com>

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Fax: +1 484-397-3592

DS07-107h: 120607

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