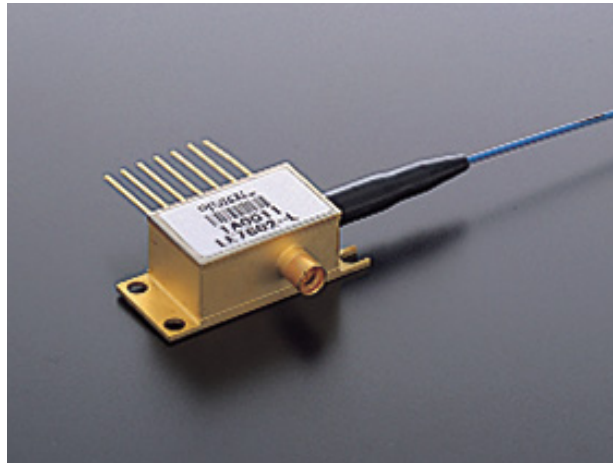

Laser Diode Module

All specifications described herein are subject to change without notice.



FEATURES

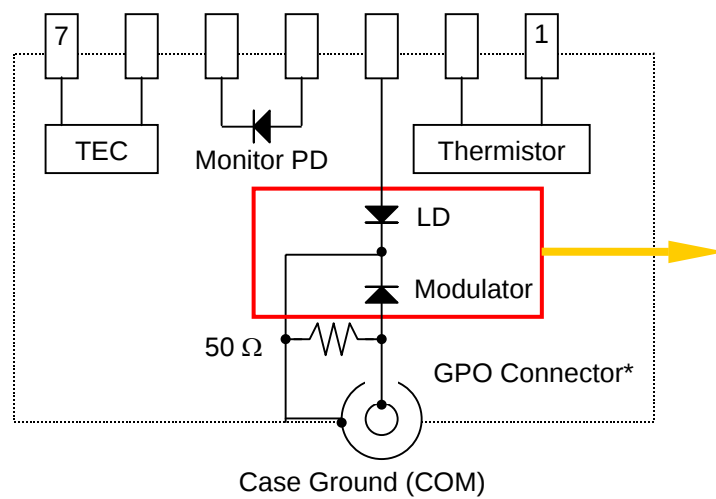
- 10 Gbit/s operation at 1.55 μm wavelength
- Monolithically integrated laser modulator (ILM)
- For use up to 40 km (800 ps/nm)
- Low modulation voltage: less than 2.6 V
- Operating temperature range from -5 to 70 °C
- Built-in optical isolator
- Low profile 7-pin butterfly package with GPO high-frequency connector*
- Wavelengths selectable to ITU-T standard C-band

DESCRIPTION

General

The LE7602-LAC is a 1.55 μm DFB laser diode module with a monolithically integrated external modulator. It enables an intermediate reach of transmissions up to 40 km at 10 Gbit/s. The module is housed in a 7-pin butterfly package with a 50 Ω GPO RF connector* and contains a TE cooler, a thermistor, a monitor photo diode and an optical isolator. Selected wavelength on the ITU grid is also optionally available for WDM application (LE7602-LAxxxC).

Block Diagram



*GPO is a trademark registered by Gilbert Engineering Co., Inc.

PERFORMANCE SPECIFICATIONS

Table 1. Absolute Maximum Ratings

No.	Item	Min	Max	Unit	Conditions
1	Laser Diode Reverse Voltage	-	2	V	CW
2	Laser Diode Forward Current	-	150	mA	CW
3	Optical Output Power	-	10	mW	CW
4	Modulator Reverse Voltage	-	10	V	
5	Modulator Forward Voltage	-	1	V	
6	Monitor Diode Reverse Voltage	-	10	V	
7	Monitor Diode Forward Voltage	-	1	V	
8	Storage Temperature	-40	+85	°C	Case Temperature
9	Operating Temperature	-5	+70	°C	Case Temperature
10	TEC Cooler Current	-	1.6	A	
11	Soldering Temperature	-	260	°C	10 s

Table 2. Electrical and Optical Characteristics (TLD=Tset: Note 4)

No.	Item	Symbol	Min.	Typ.	Max.	Unit	Conditions
1	Fiber Output Power	Pf	-1	-	-	dBm	Modulated average output (Note 1)
2	Peak Wavelength	λ_p	1,530	-	1,565	nm	Note 1, 5
3	Side-mode Suppression Ratio	Sr	35	-	-	dB	Note 1
4	Dispersion Penalty	Pd	-	-	2	dB	@800 ps/nm fiber (Notes 1 and 2)
5	Optical Rise/Fall Times	tr/tf	-	45	50	ps	10-90 % (Note 1)
6	RF Extinction Ratio	ER	10			dB	Notes 1 and 3
7a	Modulation Voltage	Vmod	-	-	2.6	V	Peak to peak ER=10 dB (Note 1)
7b	Offset Voltage	V _{MARK}	-0.9	-	-0.2	V	DC offset to modulator (Note 1)
8	Input Impedance	Z _{in}	-	50	-	Ω	I _F = 0 mA
9	RF Input Return Loss	S ₁₁	8	-	-	dB	I _F , V _{MARK} , f=10 GHz
10	Small Signal Bandwidth	S ₂₁	9	11	-	GHz	3 dB down, I _F , V _{MARK}
11	LD Threshold Current	I _{th}	5	-	30	mA	CW
12	LD Operating Current	I _F	50	-	100	mA	BOL
13	Laser Forward Voltage	V _F	-	-	1.8	V	CW, I _F
14	Monitor PD Current	I _m	40	-	1,100	μ A	CW, I _F , V _{RP} =5 V
15	Monitor PD Dark Current	I _d	-	-	0.5	μ A	CW, I _F , V _{RP} =5 V
16	Thermistor Resistance	R _{th}	-	9.99	-	k Ω	TLD=25 °C
17	Thermistor B Constant	B	3,800	3,900	4,000	K	
18	TE Cooler Voltage	V _c			2.0	V	ΔT (T _c -TLD)
19	TE Cooler Current	I _c			1.3	A	=45 °C, CW, I _F

Note 1. 10 Gbit/s, PBRs=2³¹-1 NRZ, Mark Density 50 %, I_F,
V_{MARK}: a certain point between -0.2 V and -0.9 V
V_{mod}: a certain point between 1 V and 2.6 V (peak to peak)
Wavelength on the ITU grid is optional.

Note 2. Measured by the Hitachi transmission test set using a single mode fiber with a total dispersion of 800 ps/nm at 1550 nm.

Note 3. The 4th order Bessel-Thompson filter (f_c=7.5 GHz) inserted

Note 4. Tset(=Laser Set Temperature): a certain point between 15 °C and 35 °C except where noted

Note 5. Please refer to the ORDERING INFORMATION for the P/N and wavelength of LE7602-LAXxxC for WDM applications.

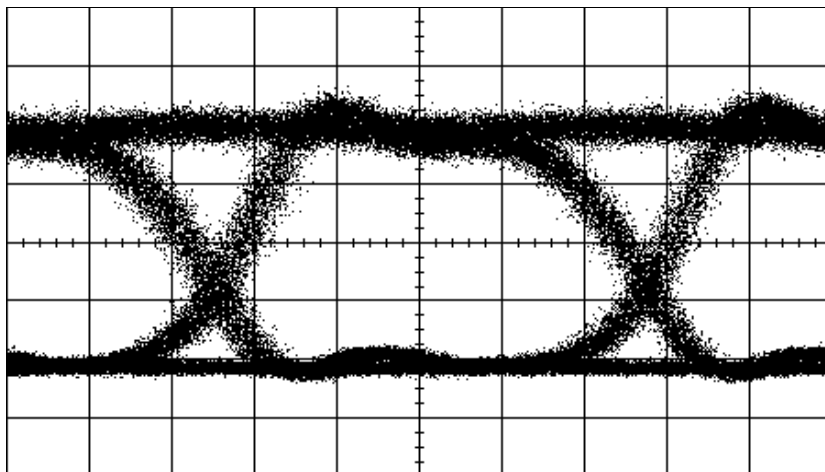


Fig. 1 Typical Optical Output Waveform 9.95 Gbit/s Unfiltered

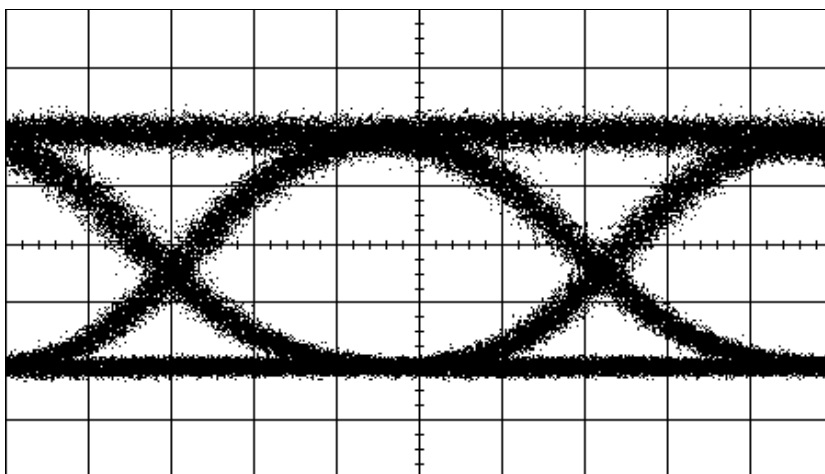
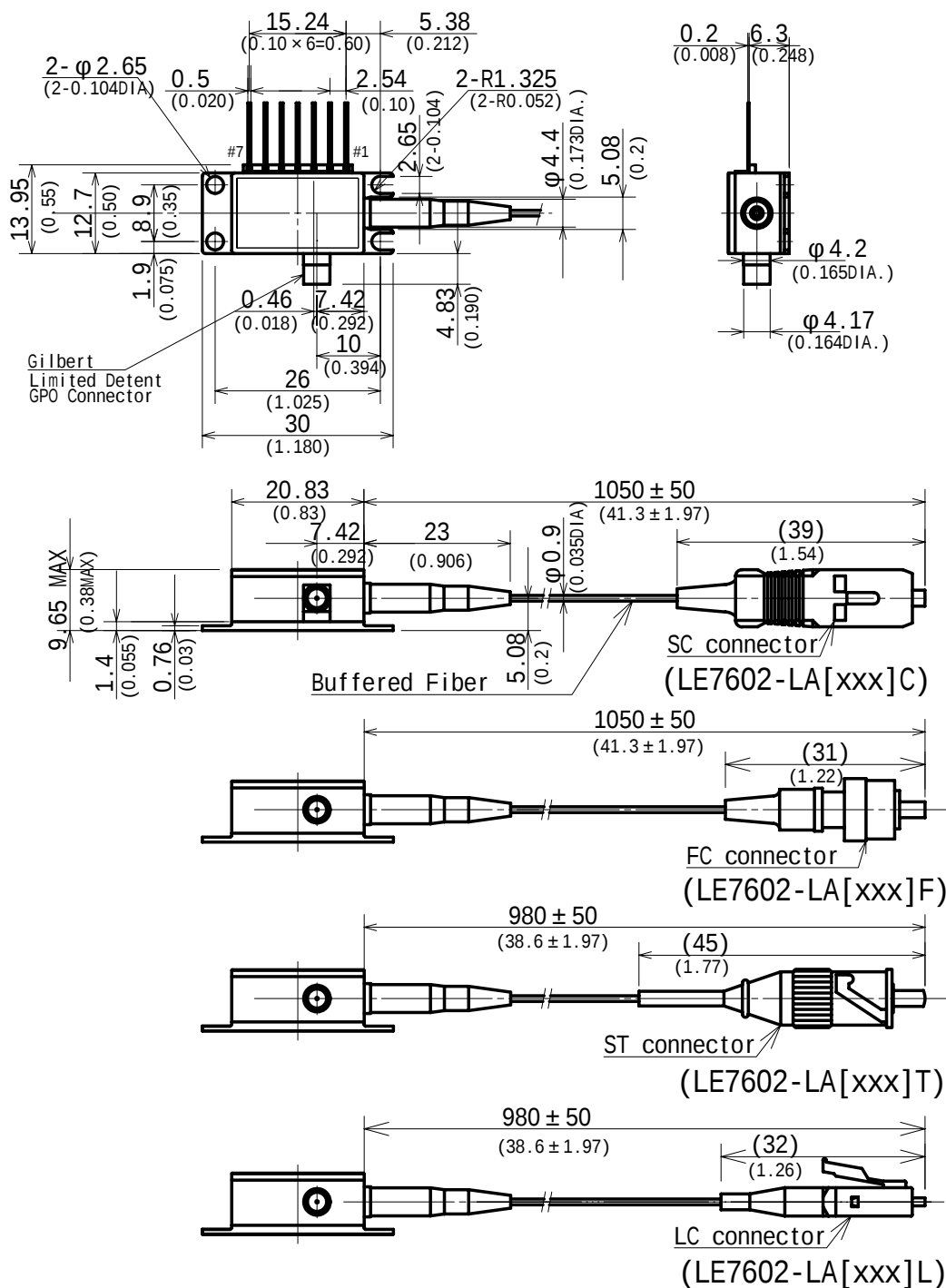


Fig. 2 Typical Optical Output Waveform 9.95 Gbit/s Filtered

Table 5. Pin Configuration

Pin #	Description	Remarks
1	Thermistor	
2	Thermistor	
3	LD Anode	
4	Monitor PD Anode	
5	Monitor PD Cathode	
6	TE Cooler (+)	
7	TE Cooler (-)	

Mechanical Dimensions



Dimensions: mm (inches)

Tolerance : $\pm$ 0.5 mm

Note:

The standard connector type is SC. (LE7602-LAC and -LAXxxC)

The FC, LC and ST connectors are optional. (LE7602-LAF, -LAXxxF, -LAL, -LAXxxL -LAT and -LAXxxT)

A connector cap will be attached.

PART NUMBER AND ORDERING INFORMATION

ITU (ch)	Freq (THz)	Lambda (nm)	P/N
18	191.80	1563.05	LE7602-LA180C
19	191.90	1562.23	LE7602-LA190C
20	192.00	1561.42	LE7602-LA200C
21	192.10	1560.61	LE7602-LA210C
22	192.20	1559.79	LE7602-LA220C
23	192.30	1558.98	LE7602-LA230C
24	192.40	1558.17	LE7602-LA240C
25	192.50	1557.36	LE7602-LA250C
26	192.60	1556.56	LE7602-LA260C
27	192.70	1555.75	LE7602-LA270C
28	192.80	1554.94	LE7602-LA280C
29	192.90	1554.13	LE7602-LA290C
30	193.00	1553.33	LE7602-LA300C
31	193.10	1552.52	LE7602-LA310C
32	193.20	1551.72	LE7602-LA320C
33	193.30	1550.92	LE7602-LA330C
34	193.40	1550.12	LE7602-LA340C
35	193.50	1549.32	LE7602-LA350C
36	193.60	1548.51	LE7602-LA360C
37	193.70	1547.72	LE7602-LA370C
38	193.80	1546.92	LE7602-LA380C
39	193.90	1546.12	LE7602-LA390C
40	194.00	1545.32	LE7602-LA400C
41	194.10	1544.53	LE7602-LA410C
42	194.20	1543.73	LE7602-LA420C
43	194.30	1542.94	LE7602-LA430C
44	194.40	1542.14	LE7602-LA440C
45	194.50	1541.35	LE7602-LA450C
46	194.60	1540.56	LE7602-LA460C
47	194.70	1539.77	LE7602-LA470C
48	194.80	1538.98	LE7602-LA480C
49	194.90	1538.19	LE7602-LA490C
50	195.00	1537.40	LE7602-LA500C
51	195.10	1536.61	LE7602-LA510C
52	195.20	1535.82	LE7602-LA520C
53	195.30	1535.04	LE7602-LA530C
54	195.40	1534.25	LE7602-LA540C
55	195.50	1533.47	LE7602-LA550C
56	195.60	1532.68	LE7602-LA560C
57	195.70	1531.90	LE7602-LA570C
58	195.80	1531.12	LE7602-LA580C
59	195.90	1530.33	LE7602-LA590C
60	196.00	1529.55	LE7602-LA600C

In case of ordering other connector version, the last letter of the P/N must be changed into corresponding letter such as “F”, “L” and “T”.

USER INFORMATION

Handling Precautions

CAUTION: Take proper electrostatic-discharge (ESD) precautions while handling these devices. These devices are sensitive to ESD.

Laser Safety

10 mW max @ 1.55 μm : Class 3b product

This product complies with IEC 60825-1 and 21 CFR 1040.10.



Document number: **FOD-DS-00073**

Document Category: Product Specifications (Data Sheet)
Revision: 1.1 (May, 2002)
Product Name: LE7602-LAC, LE7602-LAxxxC



Laser Diode Module

LE7602-LAC, LE7602-LAxxxC

Revision History

Rev.	Date	Page/Line/Fig/Table	Modification	Note
0.0	March 21, 2000			Draft
0.1	June 13, 2000	Description	Totally revised	
0.2	October 12, 2000	Page 1,3 Page 4	Top S11, S21, Tset	
1.0	May 17, 2001		New P/N and WDM version added S21, Tset, Lambda	
1.1	May 20, 2002		LC Connector version added	