

2.5Gb/s Buried Het 8x50GHz Tunable Laser

LC25FT

This laser module employs the Bookham Technology gain coupled SLMQW buried heterostructure DFB laser chip, and has been designed specifically for use in Wavelength Division Multiplexed (WDM) 2.5Gb/s long distance optical fiber trunk systems.

The device is packaged in a hermetically sealed 14-pin butterfly package incorporating an isolator and locking optics to lock and stabilize wavelength and power of the laser over life.

The module is thermally tunable by means of the internal thermo-electric cooler over eight adjacent 50GHz ITU WDM channels.

The device is available with a number of power options and wavelength schemes that are customised to individual customer requirements.

Features

- 2.5Gb/s operation
- Tunable over eight ITU channels at 50GHz channel spacing
- Integrated wavelength locking optics
- Entire C-band ITU wavelengths available (1528 to 1563nm)
- Narrow spectral linewidth
- Hermetically sealed 14-pin butterfly package with optical isolator
- Internal TEC with precision NTC thermistor
- Extended reach performance up to 360km with low dispersion penalty

Applications

- Cost effective metropolitan or long haul networks
- Stock inventory / Spares reduction
- Network protection
- Low speed routing / Network Reconfiguration



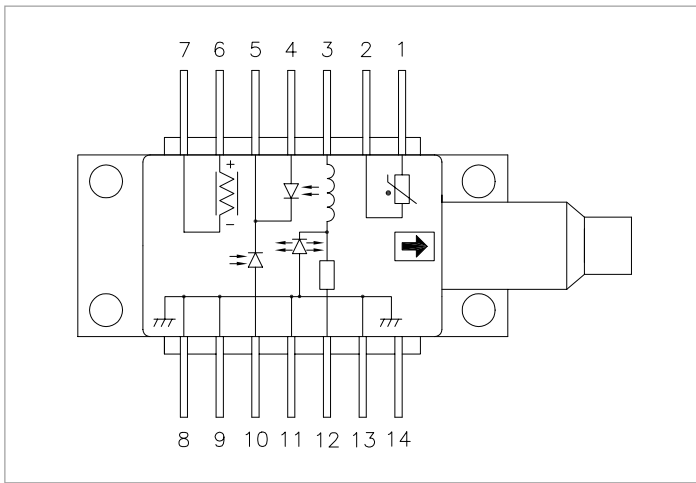


Figure 1: Schematic diagram

Characteristics

Parameter	Conditions	Min	Typ	Max	Unit
Threshold current (I_{th})			10	22	mA
Slope efficiency	2mW	0.04		0.09	mW/mA
	3mW	0.06		0.13	
	4mW	0.08		0.17	
RF input reflection coef (S_{11})	(1)			-10	dB
Forward voltage			1.3	1.8	V
Peak wavelength (λ_p)	(2)	1527		1563	nm
Dispersion penalty	(3)			2	dB
Time averaged spectral linewidth	Modulated. At -20dB		0.4	0.6	nm
SMSR		34	40		dB
Optical rise/fall time	(4)			125	ps
Power monitor current		50		1000	μ A
Wavelength monitor current	Locked to λ_p	40		1000	μ A
		50		700	μ A
Monitor dark current				100	nA
Thermistor resistance		3.75		20.7	k Ω
Heatpump current	$\Delta T = 60^\circ\text{C}$		0.5	1.2	A
Heatpump voltage	$\Delta T = 60^\circ\text{C}$		1.0	2.4	V
Power to wavelength monitor ratio to achieve λ_p		0.5	1.1	2.5	
Change of λ with sub mount temp.			0.095		nm/ $^\circ\text{C}$
Locked center wavelength accuracy	0 to 70°C case temperature (5)	-1.5		+0.8	GHz
Total modulated spectral width over all conditions and life	2.5Gb/s modulation EOL	-9 (72)		9 (72)	GHz (pm)

(1) 50 Ω measurement system, f = dc – 3GHz

(2) Submount temperature between 12.0 $^\circ\text{C}$ & 47.5 $^\circ\text{C}$ start of life to achieve required λ_p

(3) Dispersion penalty is compliant to a link length of 175km or 360km using an extinction ratio of 10dB. Fiber dispersion characteristics are derived from the following equation.

$$D(\lambda) = \frac{S_o}{4} \left(\lambda - \frac{\lambda_0^4}{\lambda^3} \right) ps / (nm.km)$$

Where $S_o = 0.092ps/(nm^2km)$ and $\lambda_0 = 1302nm$.

(4) Measurements determined from 20 - 80% Pk - Pk

(5) With respect to 25 $^\circ\text{C}$ case temperature

Absolute Maximum Ratings

Parameter	Min	Typ	Max
Case operating temperature	0	+70	°C
Laser submount operating temperature	9	49	°C
Storage temperature	-40	85	°C
Laser current above I_{th}		100	mA
Laser reverse voltage		1.0	V
Laser reverse current		10	μA
Monitor diode bias		-10	V
Heat Pump Current		1.3	A
Heatpump voltage		2.6	V
Fiber bend radius	30		mm

Reliability/Quality

Meets Qualification requirements of Telcordia GR-468-CORE for central office environment.

Operating reliability <500 FITs¹ in 15 years.

1 - Assumes laser submount is held within the range 11°C to 47.5°C by the internal thermoelectric cooler and the product is deployed in equal quantities on each of the eight channels with a mean forward current of 35mA. End of life limits based on 10mA increase in I_{th} and 25% change in laser efficiency. FIT rate data for other end of life criteria, including minimum extinction ratio requirements, are available upon request.

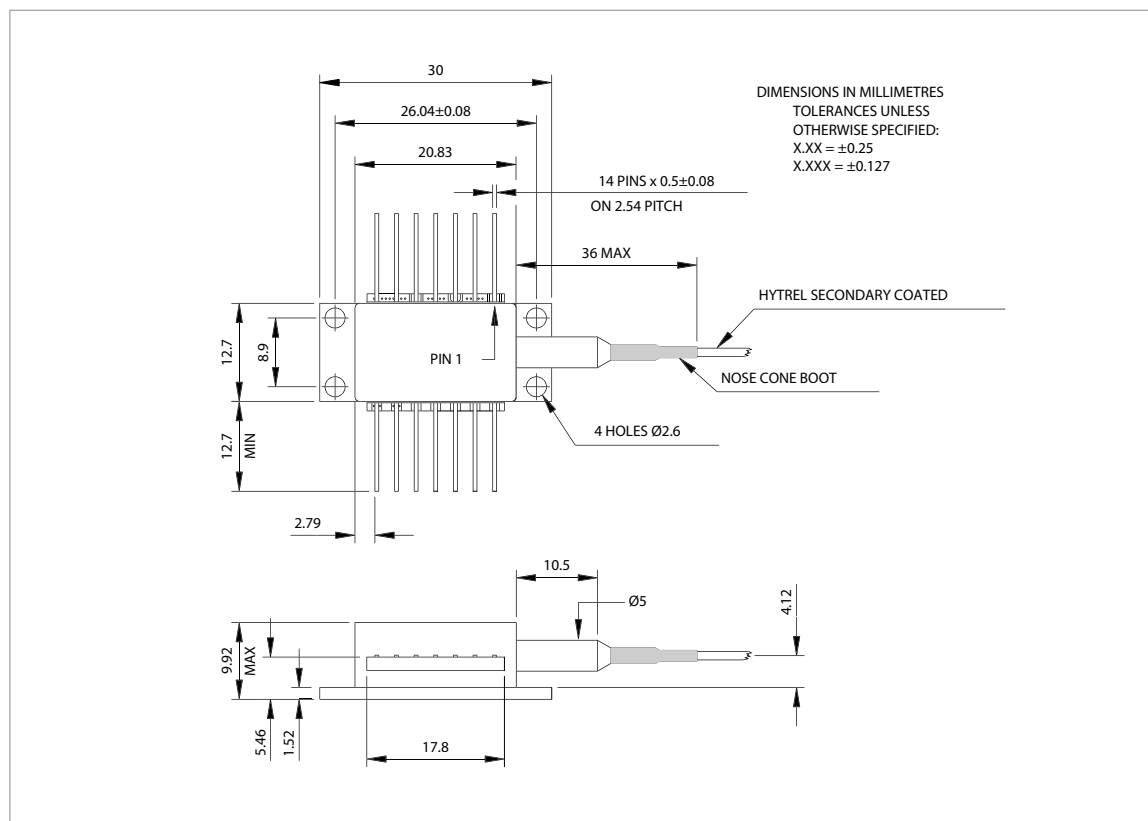


Figure 2: Outline Drawing and pin out Information

Connections

Pin #	Function	Pin #	Function
1	Thermistor	8	Case ground
2	Thermistor	9	Case ground
3	Laser DC bias (-)	10	Wavelength monitor anode
4	Power monitor anode	11	Laser case ground
5	Both monitor cathodes (+)	12	Laser modulation (-)
6	TEC (+)	13	Laser case ground
7	TEC (-)	14	N/C

Instructions for use – LC25FT

Pin 1 and Pin 2 Thermistor

The thermistor is initially used in a control loop in conjunction with the thermo-electric cooler to maintain the laser submount temperature at the required value. Once the initial sub-mount temperature is achieved control of the TEC current is handed over to the etalon locking circuit to achieve fine tuning. Operating current should be less than 100 μ A to prevent self-heating errors.

Pin 3 Laser DC bias (-)

Laser bias current (negative with respect to package ground) is applied via this pin, which forms one side of the bias-T connection to the laser cathode.

Pin 4 & 10 Monitor anodes, Pin 5 Common Monitor cathode

The output from the wavelength monitor on pin 10 provides the frequency reference, whilst the power monitor on pin 4 is independent of frequency and a function of laser output power only. The laser wavelength is matched to a 50GHz ITU grid by adjusting the ratio of the outputs from pins 4 and 10. Odd and even channels have reversed locking slopes.

A reverse bias must be applied equally across each of the monitors; applying 5V to pin 5 commonly achieves this.

Pin 6 TEC (+), Pin 7 TEC (-)

Applying a positive voltage on pin 6 with respect to pin 7 will cause the internal sub mount to be cooled relative to the case temperature. Reversing the polarity will raise the sub mount temperature relative to the case.

Pin 8, 9, 11, 13 Case ground

These pins must be grounded in all applications.

Pin 12 Laser modulation (-)

The data input (modulation current) is applied via this pin which is a nominal 25 Ω impedance coplanar line. A maximum end of life modulation current of 60mA should be provisioned.

Pin 14 N/C

This pin is not connected. It should be grounded if possible.

Ordering Information

LC25FT [Wavelength] ****	[Power Option]	[Reach]	[Connector]
	E = 2mWpk	A = 175km	C28 = SC/PC
	C = 3mWpk	B = 360km	C34 = FC/PC
	A = 4mWpk		C57 = LC
			C59 = MU

Fiber Length 1130 to 1190 mm.

Other connector types are available on request.

**** = Last four digits of first channel / shortest wavelength

E.g. **LC25FT4532CA-C28** can be tuned to the following channels:

1545.32nm
1545.72nm
1546.12nm
1546.52nm
1546.92nm
1547.32nm
1547.72nm
1548.12nm

Note that wavelength ranges always start (shortest wavelength) with a 100GHz channel i.e. LC25FT4572CA-C28 is not an available code, the next product code after LC25FT4532CA-C28 is LC25FT4612CA-C28

E.g. **LC25FT4532AA-C28** is a 4mW 1545.32nm device with an SC/PC connector for use in a 175km application.

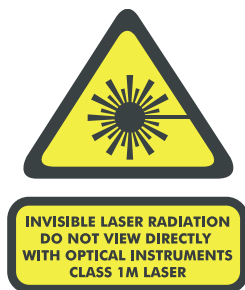
E.g. **LC25FT4532CB-C28** is a 3mW 1545.32nm device with an SC/PC connector for use in a 360 km application.

Lead Trimming option

Devices can be supplied with the leads trimmed to a length of 3.81mm typ.

This option can be specified by adding a 'K' suffix after the reach option.

e.g. LC25FT4532AAK-C28 is a 4mW 1545.32 nm to 1547.72nm device with an SC/PC connector and lead length of 3.81mm (typical) for use in a 175km application.



REFERENCE IEC 60825-1: Edition 1.2



THIS PRODUCT COMPLIES WITH 21 CFR 1040.10



Site Approvals:



TL9000 Rev 3.0 (ISO9001:2000)
FM15040



ISO14001:1996
EMS35100



Thinking optical solutions

North America

Bookham Technology Inc.
49 Buford Highway
Suwanee
GA 30024
USA

• Tel: +1 678 482 4021

• Fax: +1 678 482 4022

Europe

Bookham Technology plc
Brixham Road
Paignton
Devon
TQ4 7BE
UK

• Tel: +44 (0) 1803 66 2875

• Fax: +44 (0) 1803 66 2801

Asia

Bookham Technology plc
Hong Kong Representative Office
Rm 2207-9
Tower 2
Lippo Centre
Admiralty, Central
Hong Kong

• Tel: +852 2530 8822

• Fax: +852 2530 8102

sales@bookham.com

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