Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

With the principle of “Quality Parts,Customers Priority,Honest Operation,and Considerate Service”,our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!

Contact us

Tel: +86-755-8981 8866 Fax: +86-755-8427 6832
Email & Skype: info@chipsmall.com Web: www.chipsmall.com
Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China

Product Specification

CW Tunable Laser – Butterfly Package

S7500

PRODUCT FEATURES

- Full C-band tuning (89 channels at 50 GHz spacing)
- High, flexibly adjustable output power, from 9 to 13 dBm
- Low power dissipation, typically < 2.2 W at 75°C
- High side-mode suppression ratio > 40 dB
- Dark tuning by reverse biasing the integrated optical amplifier
- Compact, low-profile, hermetic laser package with internal optical isolator
- Integral wavelength locker, allowing stabilization to within ±2.5 GHz over life, compatible with 50 GHz ITU grid spacing
- Polarization maintaining fiber pigtail

APPLICATIONS

- DWDM transmission systems
- Tunable DWDM transponders and transceivers
- Dynamic provisioning and wavelength routing in metro DWDM systems
- Optical packet or burst-mode switching
- Test and measurement

Finisar's S7500 tunable laser incorporates a monolithic InP chip that integrates a tunable MG-Y laser with a semiconductor optical amplifier (SOA). The MG-Y (Modulated Grating Y-branch) laser is an electronically tuned device that can address any wavelength in the C-band. Since no mechanical or thermal adjustments are necessary, channel switching is very fast. The SOA facilitates flexible control of the output power and acts as a shutter when reverse biased, enabling dark tuning between channels.

The devices are packaged into a compact, low-profile hermetically sealed package, with an internal optical isolator and a wavelength locker. The locker monitors both output power and frequency of the light emitted from the chip, enabling a closed loop control that guarantees stability of the frequency and output power over life, to within the requirements of 50 GHz ITU grid spacing applications. The S7500 is provided with polarization maintaining fiber for use with an external modulator. The laser is compliant per RoHS Directive 2011/65/EU [1].

PRODUCT SELECTION

Product code	Description
7500001	Tunable laser, butterfly package, 89 channels at 50 GHz spacing from 191.70 THz to 196.10 THz, 13 dBm output power, 400 µm polarization maintaining fiber pigtail with ST test plug

I. Absolute Maximum Ratings

Stresses in excess of the absolute maximum ratings can cause permanent damage to the device. These are absolute stress ratings only. Functional operation of the device is not implied at these or any other conditions in excess of those given in the operational sections of the data sheet. Exposure to absolute maximum ratings for extended periods can adversely affect device reliability.

Parameter	Symbol	Min	Typ	Max	Unit	Ref.
Storage temperature	T_S	-40		85	°C	
Relative humidity	RH	0		85	%	1
Laser diode reverse voltage (all sections)				3	V	
Laser gain current	I_g			160	mA	
Reflector currents	I_{rl}, I_{rr}			50	mA	
Phase current	I_{pc}			10	mA	
SOA current	I_{SOA}			240	mA	
Photodiode bias voltage	$V_{PD,ref}$, $V_{PD,\lambda}$	-5		0	V	
Photodiode reverse current	$I_{PD,ref}$, $I_{PD,\lambda}$			2	mA	
TEC current	I_{TEC}			1.2	A	
TEC voltage	V_{TEC}			3.5	V	

Notes:
1. Non-condensing.

II. Electrical & Thermal Characteristics

Parameter	Symbol	Min	Typ	Max	Unit	Ref.
Operating case temperature	T_{OP}	-5		75	°C	
Laser chip temperature	T_L	25		30	°C	
Laser gain current	I_g		98	100	mA	
Reflector currents (left, right)	I_{rl} , I_{rr}			33	mA	
Phase current	I_{pc}			7.5	mA	
SOA current	I_{SOA}		90	167	mA	
Photodiode bias voltage	$V_{PD,ref}$, $V_{PD,\lambda}$	-3		0	V	
Thermistor resistance	R_{th}		10		kΩ	1
Thermistor sensitivity index	β		3930		K	1
TEC current	I_{TEC}		<0.75	0.85	A	2
TEC voltage	V_{TEC}		<2.5	2.8	V	2
Total power dissipation	P_{tot}		<2.2	2.8	W	2

Notes:
1. With the laser chip temperature set to 25°C.
2. In steady state, with the laser chip temperature set to 25°C, and a case temperature of 75°C.

III. Optical Characteristics (T_{OP} = -5 to75°C)

Parameter	Symbol	Min	Typ	Max	Unit	Ref.
Output power	P_{max}	13			dBm	1
Output power variation over life	ΔP	-0.5		0.5	dB	2
Output power adjustment range		4			dB	3
Output power when disabled				-35	dBm	4
Lowest emission frequency	ν_{min}	191.15	191.70		THz	
Highest emission frequency	ν_{max}		196.10	196.25	THz	
Lowest emission wavelength	λ_{min}	1527.6	1528.8		nm	
Highest emission wavelength	λ_{max}		1563.9	1568.4	nm	
Channel spacing (ITU grid)			50		GHz	
Number of channels		89				5
Frequency accuracy	Δν	-2.5		2.5	GHz	6
Side-mode suppression ratio	SMSR	40			dB	
Optical signal-to-noise ratio	OSNR	50	55		dB	7
Linewidth	LW			5	MHz	8
Relative intensity noise	RIN			-140	dB/Hz	9
Back reflection tolerance				-14	dB	
Optical isolation		40			dB	
Polarization extinction ratio	PER	20			dB	

Notes:

1. For all channels, BOL
2. With closed loop control on SOA current to maintain a fixed reference PD current.
3. Range over which the output power can be adjusted by changing the SOA current, down from the output power P_{max}, while maintaining all other optical specifications.
4. Output power with reverse biased SOA; used in order to block the laser output, e.g. while tuning to another channel.
5. Consecutive channels at 50 GHz spacing within the [ν_{min} … ν_{max}] range. Default start frequency is 191.70 THz (start wavelength 1563.9 nm). Custom tuning ranges are available upon request. Contact Finisar Sales for details.
6. With closed loop control on the left reflector, right reflector, and phase current, in order to maintain a fixed ratio of the etalon and reference PD currents. See Finisar application note AN-2095 for details.
7. In a 0.1 nm wide band.
8. Intrinsic Lorentzian linewidth, measured e.g. using a phase noise spectral density measurement, disregarding low frequency phase noise originating from the drive circuitry.
9. Average value over the frequency range from 0.1 GHz to 10.0 GHz.

V. Wavelength Locker

Parameter		Symbol	Min	Typ	Max	Unit	Ref.
Reference PD responsivity (relative to fiber-coupled power)		$I_{PD,ref}/P$	10		25	µA/mW	
Normalized locker ratio at ITU channel		R	40		75	%	1
Locker slope	@ ITU channel	dR/dν	3		7	%/GHz	2
	@ ±5 GHz offset		1.7		9.0		

Notes:

1. The normalized locker ratio R is defined as the normalized ratio of the etalon photodiode current $I_{PD,\lambda}$ to the reference photodiode current $I_{PD,ref}$ as expressed by the equation:

$$R = \frac{I_{PD,\lambda}}{I_{PD,ref}} \Big/ \left[\frac{I_{PD,\lambda}}{I_{PD,ref}}\right]_{MAX}$$

2. The locker slope is defined as the derivative of the normalized locker ratio R with respect to the emission frequency ν.

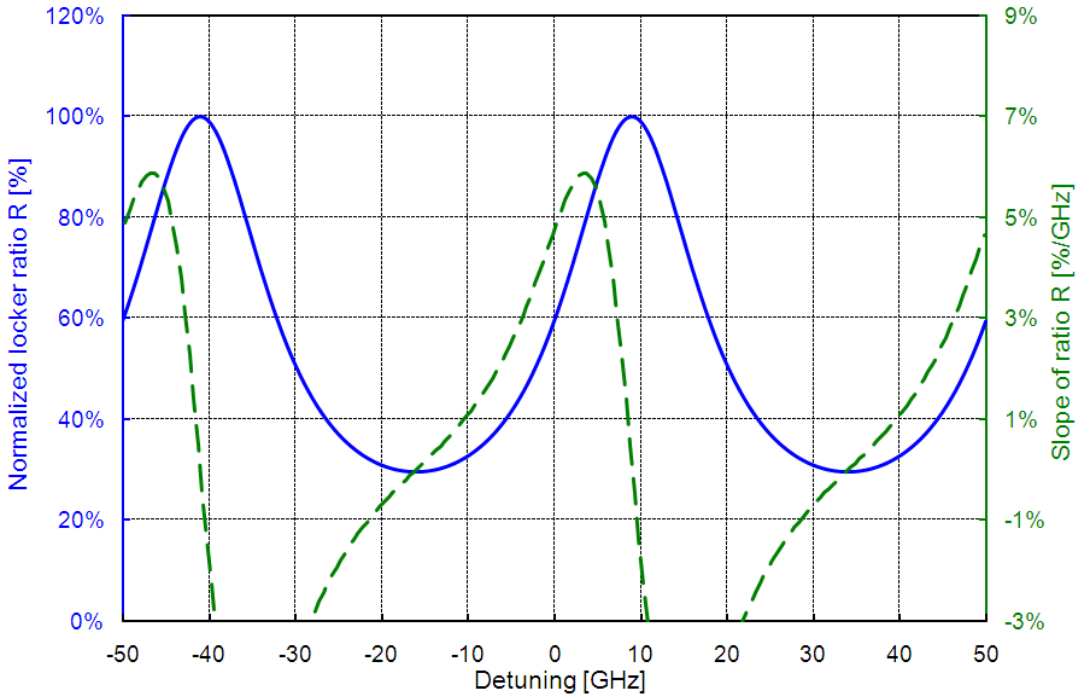


Figure 1 Typical locker response curve.

VI. Fiber Connection

Parameter	Symbol	Min	Typ	Max	Unit	Ref.
Fiber type		Polarization maintaining single-mode fiber				1
Fiber length		0.9			m	
Mode field diameter		9.5	10.5	11.5	µm	
Fiber cladding diameter		122	125	128	µm	
Fiber polymer coating diameter		380	400	420	µm	
Polarization orientation		Parallel to slow axis of PM fiber				
Fiber bend radius		20			mm	
Fiber proof strength		200			kpsi	
		1.38			GPa	

Notes:

1. Fujikura SM15-PS-U40A-H PANDA or equivalent.

VII. Pin Descriptions

Pin	Symbol	Name/Description	Ref.
1	TEC (-)	Thermo-electric cooler (-)	
2	TEC (+)	Thermo-electric cooler (+)	
3	Th	Laser thermistor	
4		Not connected	
5	GND (Th, PD)	Thermistor ground, photodiode common cathode	
6	PD,λ	Etalon photodiode anode	
7	PD,ref	Reference photodiode anode	
8		Not connected	
9	SOA	SOA anode	
10	LD,gain (g)	Laser gain section anode	
11	LD,phase (pc)	Laser phase section anode	
12	LD,left (lr)	Laser left reflector anode	
13	LD.right (rr)	Laser right reflector anode	
14	GND (LD, SOA)	Laser + SOA common cathode	
15		Not connected	
16		Not connected	
17		Not connected	
18		Not connected	
19		Not connected	
20		Not connected	
21		Not connected	

VIII. Mechanical Dimensions

Dimensions are in millimeters.

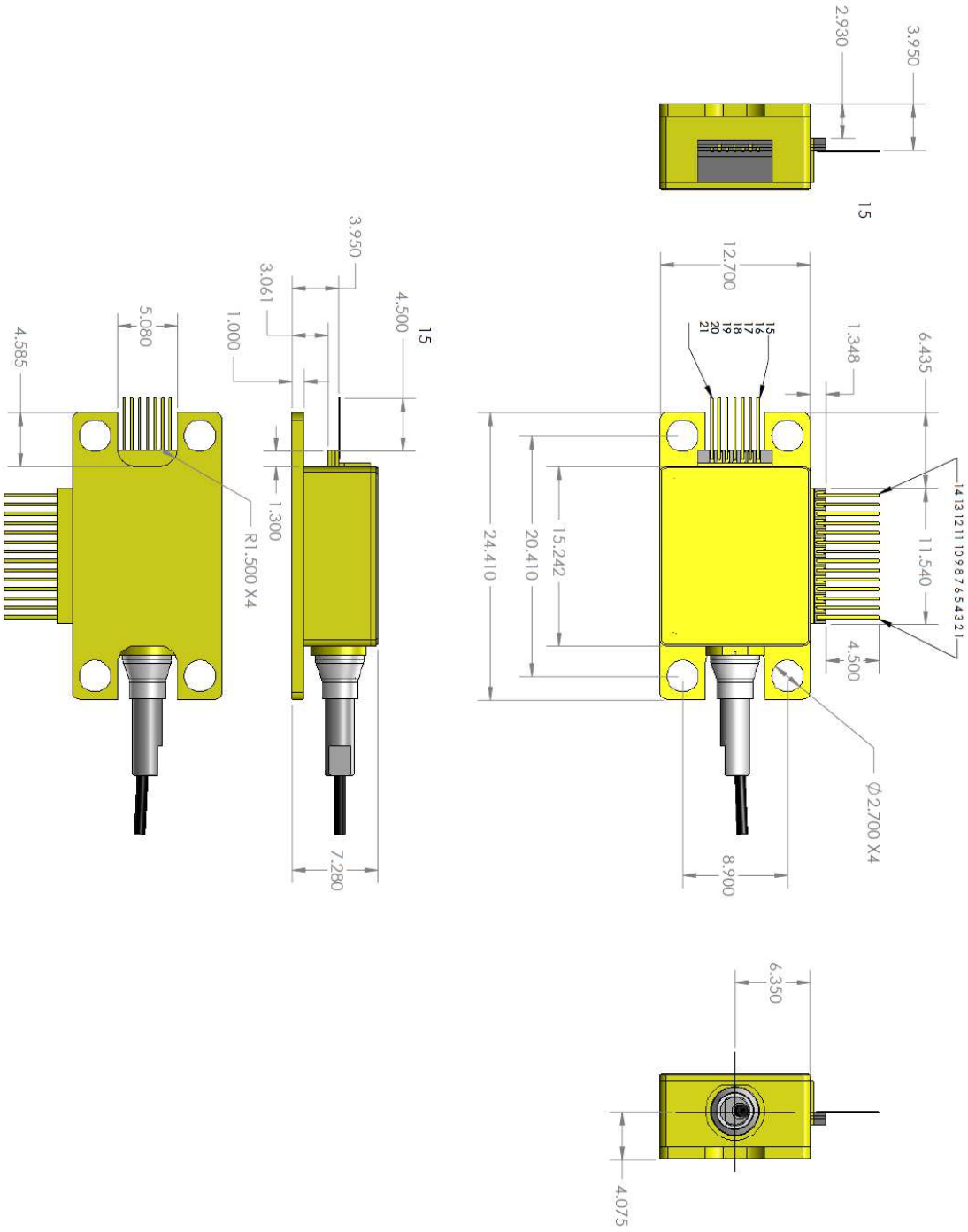


Figure 2 Mechanical drawing of the S7500 tunable laser.

IX. Patents

This product is protected under U.S. Patent Numbers 6,728,279 and 7,058,096, as well as other patents pending worldwide.

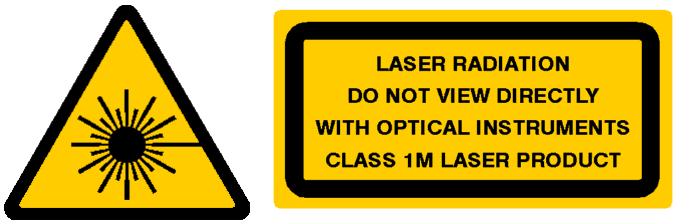
X. Electrostatic Discharge

S7500 tunable lasers have been tested according to TIA-455-129 (FOTP-129) [2] "Procedures for Applying Human Body Model Electrostatic Discharge Stress to Package Optoelectronic Components". The S7500 tunable laser is classified as HBM ESDS Component Sensitivity Class 1A (per ESDA/JEDEC JS-001-2010 [3]).

CAUTION: **This device is susceptible to damage as a result of electrostatic discharge. Take proper precautions during both handling and testing. Follow guidelines such as JEDEC standard JESD625-A (December 1999) [4].**

XI. Laser Safety

The S7500 tunable laser is classified as class 1M per IEC standard 60825-1 (2007-03) [5]. This product complies with FDA/CDRH, 21 CFR 1040.10 and 1040.11 [6] except for deviations pursuant to Laser Notice No. 50, dated June 24, 2007 [7].



CAUTION: **Invisible Laser Radiation - Do not view directly with optical instruments (magnifiers). Viewing the laser output with certain optical instruments (e.g., eye loupes, magnifiers, and microscopes) within a distance of 100 mm may pose an eye hazard. Laser power up to 100 mW at 1.55 µm could be accessible if optical connector is open or fiber is broken. Use of controls, adjustments, and procedures other than those specified herein may result in hazardous laser radiation exposure.**

XII. References

1. Directive 2011/65/EU of the European Council Parliament and of the Council, "on the restriction of the use of certain hazardous substances in electrical and electronic equipment". Certain products may use one or more exemptions as allowed by the Directive.
2. TIA-455-129 (FOTP-129) "Procedures for Applying Human Body Model Electrostatic Discharge Stress to Package Optoelectronic Components"
3. ESDA/JEDEC JS-001-2010 "ESDA/JEDEC Joint Standard for Electrostatic Discharge Sensitivity Testing – Human Body Model (HBM) – Component Level"
4. JEDEC JESD625-A (December 1999) "Requirements for Handling Electrostatic-Discharge-Sentitive (ESDS) Devices"
5. IEC 60825-1 (March 2007) "Safety of laser products – Part 1: Equipment classification and requirements"
6. FDA/CDRH, 21 CFR 1040.10 & 1040.11 "Title 21 – Food and Drugs; Chapter I – Food and Drug Administration, Department of Health and Human Services; Subchapter J – Radiological Health; Part 1040 – Performance Standards for Light-Emitting Products; Sec. 1040.10 Laser Products & Sec. 1040.11 Specific Purpose Laser Products"
7. FDA/CDRH Laser Notice No. 50 (June 24, 2007) "Guidance for Industry and FDA Staff Laser Products – Conformance with IEC 60825-1 and IEC 60601-2-22; Guidance for Industry and FDA Staff (Laser Notice No. 50)"

XIII. Revision History

Revision	Date	Description
7500001-A	2011-10-22	First release
7500001-B	2011-12-08	Updated laser safety information
C1	2015-11-09	Updated logo and RoHS statement.

XIV. For More Information

Finisar Corporation
1389 Moffett Park Drive
Sunnyvale, CA 94089-1133
Tel: +1-408-548-1000
Fax: +1-408-541-6138
sales@finisar.com
www.finisar.com