C-Band Integrated Tunable Laser Assembly

Allwave Lasers
Photonic Devices Inc.

C-Band Integrated Tunable Laser Assembly (ITLA) Datasheet

1. Product Information

Part Number：ITLA-50KHz-20mW-1529.16/1567.13nm

Allwave Lasers' Integrated Tunable Laser Assembly (ITLA) has excellent optical performance in terms of high output power stability, high side-mode-suppression ratio (SMSR), ultra-narrow laser linewidth, low relative intensity noise (RIN), and high wavelength control accuracy. These high specifications make the ITLA very suitable for applications of advanced optical communication systems, test and measurement, fiberoptic sensing networks, especially on 40Gbps and 100 Gbps high data rate with advanced modulation scheme optic systems.

Overview: This ITLA integrates cooled external cavity diode laser and thermally-tuned FP filters to achieve single-mode operation at selectable wavelength. the ITLA has those function as follow:

- Narrow linewidth laser output;
- Low Relative Intensity Noise (RIN);
- High Side-Mode Suppression Ratio (SMSR);
- Low power consumption;
- Excellent lasing frequency accuracy;
- Standard ITU grid wavelength tuning;
- Support ITLA module controlling and monitoring functionalities

Application and market: These ITLA modules are one of the core and common components in DWDM fiberoptic networks, which reduce network installation and management costs on multi-channel DWDM systems. Follow the Multi-Source Agreement (MSA) within the OIF, Integrable Tunable Laser Assemblies (ITLA) are mostly interchangeable and flexible for generic 10Gbps systems.

AWlasers'ITLA has excellent frequency accuracy and ultra-narrow line width, it recommended to be used on 40G/100G high data rate systems.

2. Performance Specifications

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	Condition	Min.	Typical	Max.	Unit
Storage Temperature	Ts	-	-40	-	+85	℃
Operating Case Temperature	Top	-	0	-	+50	℃

Electrical Characteristics

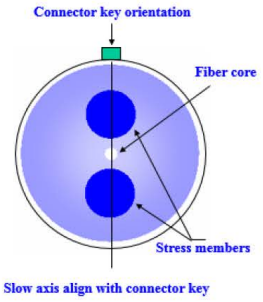
Parameter	Symbol	Condition	Min.	Typical	Max.	Unit
Operating Voltage	V	-	-	5	-	V
Power Consumption	P	@25℃		≤6		W
Max Power Consumption	P_{max}	@0~+50℃		≤10		W

Optical Characteristics (at 25 °C laser temperature)

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Wavelength Tunable Range	λc	TL=15～35℃ CW	1529.16~1567.13(C-band available)			nm
Peak Optical Output Power	P_O	-	13	-	-	dBm
Spectral Linewidth	LW	Full width, half maximum (FWHM)	-	-	50	KHz
Channel Spacing	-		50			GHz
Number of Channels	-	-	96			Ch.
Side-mode Suppression Ratio	SMSR	CW	40	50	-	dB
Optical Isolation	-	-	35	-	-	dB
Relative Intensity Noise	RIN	20-1000MHz	-	-	-140	dB/Hz
Polarization Extinction Ratio	PER	-	20			dB
Voltage Supply	V_{CC}	-	4.75	5	5.25	V
Power Short-term Stability	Pss	Operating case temperature: 0~50℃	≤0.01			dB®15min.
Power Long-term Stability	P_{sL}		≤0.03			dB®8h.
Wavelength Short-term Stability	λss		≤5			pm®15min.
Wavelength Long-term Stability	λ_{sL}		≤10			pm®8h.
Dimension	L×W×H	-	116×63×21.5			mm

Interface Connectoer

No.	Type
1	FC/APC Adaptor
2	Mini USB
3	Power supply:+5V/3A

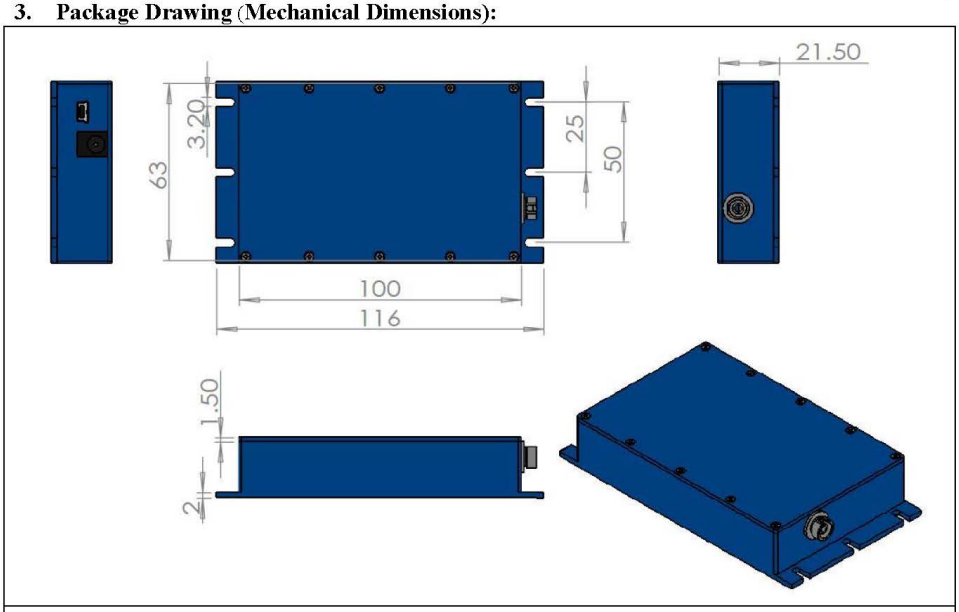


Fiber Pigtail Specifications

Parameters	Description
Fiber Type	PMF-1550
Jacket Type	900μm loose tube
Connector Type	FC/APC

Note: The PM fiber and the connector key are aligned to the slow axis

3. Package Drawing (Mechanical Dimensions):



Dimensions are in millimeters.

Cautions: When you connect an ITLA to your communication control board, do not supply power immediately before measurement of the connection circuit to make sure the connection between ITLA and the control board is correct. This connection verification is to make sure that the PIN1 (near the white dot) on both (ITLA and communication board) the connector to be though use a digital multimeter's OHM stage.

Communication protocol: The user can communicate with the product through a standard RS-232 interface. Essentially, this is a handshake model with 4 consecutive bytes being sent in either direction before a response (again 4 bytes) is required. Details can be found in section 8 and 9 of the MSA.

The packets sent by the user will need to have the following configuration:

Inbound Byte 0							
0x0(To be defined by transport layer)					0x0	0x0	R/W(0/1)
31	30	29	28	27	26	25	24
Inbound Byte 1							
Register Number (0x00 – 0xff)							
23	22	21	20	19	18	17	16
Inbound Byte 2							
Data 15:8							
15	14	13	12	11	10	9	8
Inbound Byte 3							
Data 7:0							

7	6	5	4	3	2	1	0

Here, byte 2 and 3 contain the data (16 bits, values 0 – 65535). Byte 1 contains the target register (linked to the function that you want to address) and the first byte contains some control information. In bit 24 the user indicates if a read (value = 0) or a write (value = 1) is desired to the register. Bit 27 contains the LstRsp bit, which is useful in case of communication errors. When this bit is set to 1 the rest of the packet is ignored and the product returns the last response. Bits 31-28 contain the checksum, which is calculated to detect errors in the data transmission.

The checksum is calculated as follows:

```
Unsigned char CRC_BIP4(unsigned char *data)

{unsigned char bip8 = (data0 & 0x0f)^data[1]^data[2]^data[3];

unsigned char bip4 = ( bip8 & 0xf0)>>4) ^ ( bip8 & 0x0f);

 return bip4;

 }
```

Using Standard OIF MSA commands

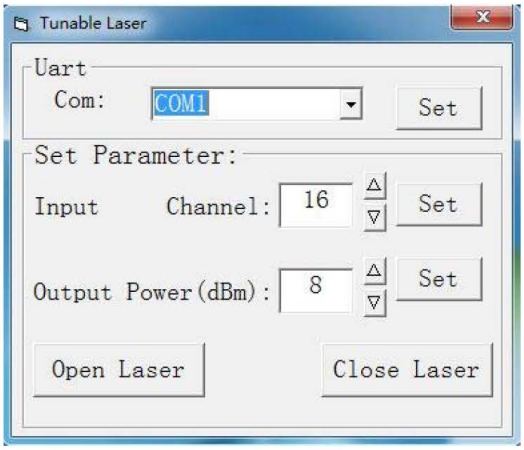
Command	**Register**	**R/W**	**Function**
nop	0x00	R	NOP / status
devTyp	0x01	R	Device Type
mfgr	0x02	R	Manufacturer
model	0x03	R	Only Model ID
serNo	0x04	R	Serial Number
Command	**Register**	**R/W**	**Function**
release	0x06	R	Release Info
relBack	0x07	R	Backwards Release Compatibility
genCfg	0x08	RW	General Module Configuration
ioCap	0x0D	RW	IO Capabilities
LstResp	0x13	R	Returns Last Response
dlConfig	0x14	RW	Download Configuration
dlStatus	0x15	R	Download Status
statusF	0x20	RW	Fatal Status
statusW	0x21	RW	Warning Status
fPowTh	0x22	RW	Fatal Power Threshold
wPowTh	0x23	RW	Warning Power Threshold
fFreqTh	0x24	R	Fatal Frequency Threshold
wFreqTh	0x25	R	Warning Frequency Threshold
fThermTh	0x26	R	Fatal Thermal Threshold

wThermTh	0x27	R	Warning Thermal Threshold
srqT	0x28	RW	SRQ
fatalT	0x29	RW	Fatal
almT	0x2A	RW	Alarm
channel	0x30	RW	Channel Set-point
pwr	0x31	RW	Power Set-point
resena	0x32	RW	Device enable
mcb	0x33	RW	Module Configuration Behaviour
grid	0x34	RW	Grid
fcf	0x35, 0x36	RW	First Channel Frequency
fcf1	0x35	RW	First Channel Frequency (THz part)
fcf2	0x36	RW	First Channel Frequency (GHz part)
lf	0x40, 0x41	RW	Read Only Laser Frequency
oop	0x42	RW	Read Only Optical Output Power
ctemp	0x43	R	Laser temperature
opsl	0x50	R	Power Lower Limit Device Capability
opsh	0x51	R	Power Upper Limit Device Capability
lfl	0x52, 0x53	R	Frequency Lower Limit Device Capability
lfh	0x54, 0x55	R	Frequency Upper Limit Device Capability
lgrid	0x56	R	Grid Lower limit Device Capability
currents	0x57	R	Device Currents (gain chip & TEC)
temps	0x58	R	Device Temperatures (gain chip & case)
ditherE	0x59	RW	Dither Enable (SBSS & TxTrace)
ditherR	0x5A	RW	Dither Rate (SBSS)
ditherF	0x5B	RW	Dither Frequency (SBSS)
Command	**Register**	**R/W**	**Function**
ditherA	0x5C	RW	Dither Amplitude (SBSS)
fAgeTh	0x5F	RW	Fatal Age Threshold
wAgeTh	0x60	RW	Warning Age Threshold
age	0x61	R	Read Only Age
ftf	0x62	RW	Fine Tune Frequency

The command use can refer to MSA of OIF, and we can provide a control program software upon request for our customer to use and control our ITLA modules.

4. Software Ooperation

The software interface is shown in the diagram.



Operation steps

1: Power supply and connect serial port line

2: Install serial port driver

3: Select serial port and click the Set

4: Keyboard input power value and Channel number(1~96)

5: Click the Open Laser

6: You can change the wavelength by changing the number of channels.

7: Minimum spacing 50GHz

8: Click the Close Laser