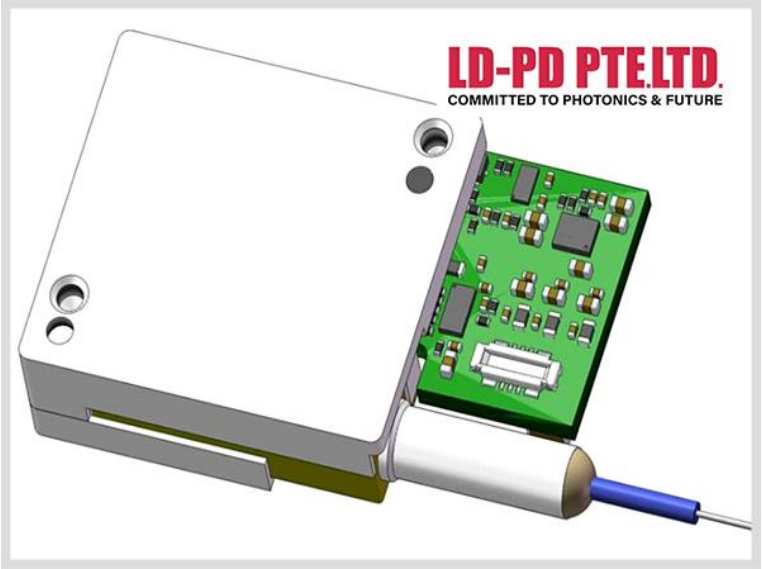
Nano Integrable Tunable Laser

Assembly of C band



Description

LD-PD's Narrow Linewidth Tunable Laser is external-cavity-based, and compatible to OIF iTLA v1.3 electronics and I/O protocol. Leveraging unique technologies of epitaxial engineering and super luminescent diode which has been optimized for tunable lasers, the iTLA features of high power in polarization-maintained fiber, and Relative Intensity Noise lower than -145dB/Hz. Litecore iTLA is a best choice for Optical Coherent Communication (eg. for Silicon Photonics) acting as the external laser sources, and is also deployable in LiDAR for its high-power as well as wavelength tunability in a linear mode.

Physical/Optical Characteristics

Absolute Maximum Ratings and Environment Requirements

The Nano-iTLA will be damaged beyond the following absolute maximum ratings.

Table 1 Absolute Maximum Ratings

#	Parameters	Symbol	Min	Typ	Max	Units
1	Storage Temperature (Case)	Tstg	-40		85	degC
2	Operating Temperature (Case)	Tc	-5		75	degC
3	Total Power Dissipation				3.7	W
4	Operating Relative Humidity	RH	5		85	%
5	Signal in PIN Voltage		-0.5		Vcc+0.3	V
6	Positive Supply Voltage	V3.3+	-0.3		3.6	V

Optical Specifications

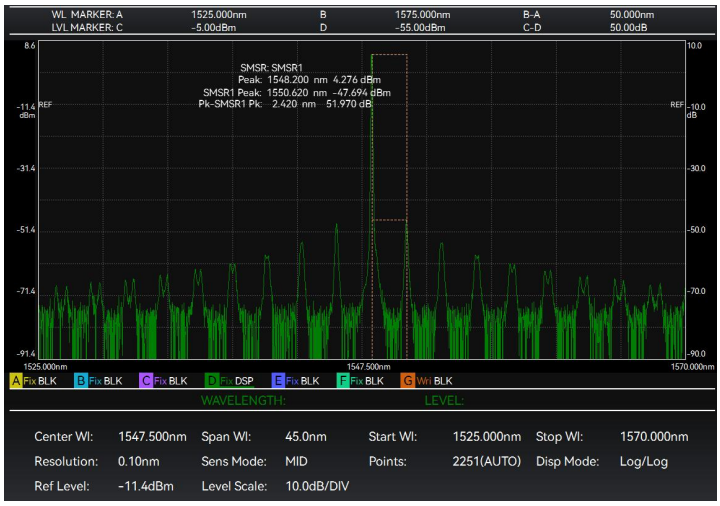
The optical specification of Nano -iTLA is listed in Table 2.

Table 2 Optical Specifications

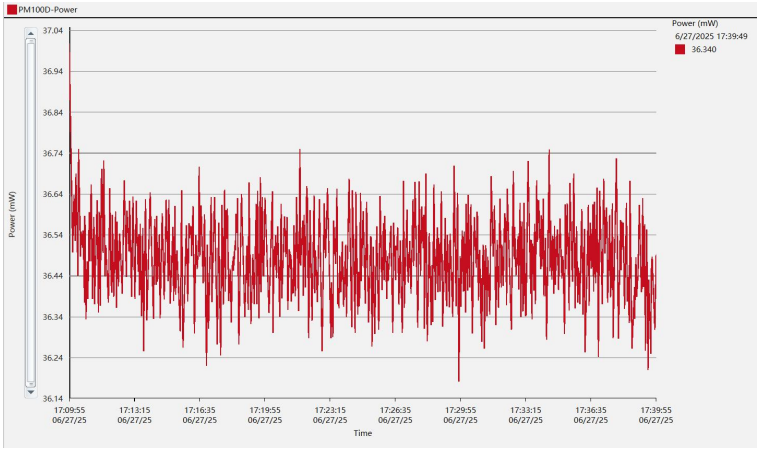
#	Parameters	Symbol	Min	Typ	Max	Units
7	Frequency	F	191.30		196.05	THz
8	Wavelength	λ	1529.163		1567.133	nm
9	Frequency Error (BOL)	ΔFBOL	-1.5		+1.5	GHz
	Frequency Error (EOL)	ΔFEOL	-2.5		+2.5	GHz
10	Fiber Output Power (over lifetime and operating condition)	Pout	11		16	dBm
11	Output power variation across tuning range	ΔP			1	dB
12	Optical Power Accuracy (BOL)	PsBOL			+/-0.5	dB
	Optical Power Accuracy (EOL)	PsEOL			+/-1.0	dB
13	Relative Intensity Noise	RIN			-145	dB/Hz
14	Side-Mode Suppression Ratio	SMSR	45			dB
15	Spectral Linewidth	δf			100	KHz
16	Optical Isolation	ISO	25			dB
17	Polarization Extinction Ratio over Tuning rang	PER	20			dB
18	Channel Space	f	0.1			GHz

Optical Spectrum Test

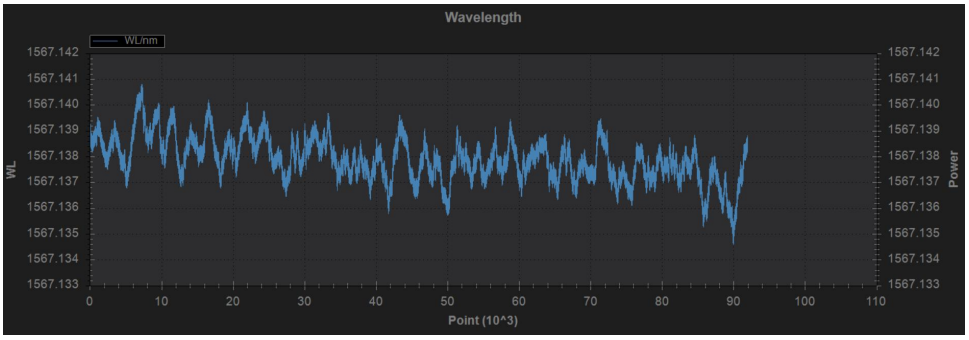
SMSR Test(51.97dB)



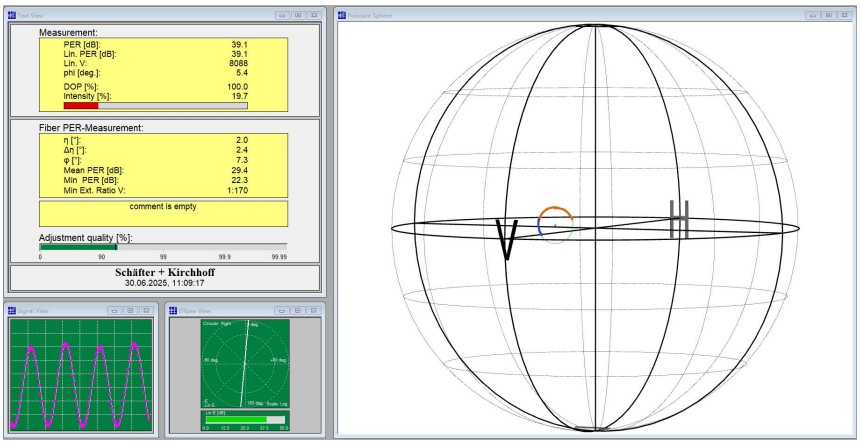
Power Stability



Wavelength Stability



Polarization Extinction Ratio



Mechanical and Electrical Interface

The mechanical and electrical specifications are listed in Table 3. The Figure2 depicts the mechanical outline of Nano - iTLA. The pin assignment of electrical interface is shown in Table 4, and the following Table 5 details the pin function. The electrical characteristics compliant to the OIF MSA 1.3 are listed in Table 6.

Table 3 Mechanical and Electrical Specifications

#	Parameters	Specification
19	Mechanical Dimensions	25*15.6*5.65
20	Fiber Type	PANDA Fiber, or equivalents
21	Minimum Fiber Bend Radius	Equal or better than 5mm
22	Fiber Length	100+/-10cm
23	Connector	LC/UPC
24	Polarization Orientation	Parallel to slow axis
25	Electrical Interface	Molex 5054761010

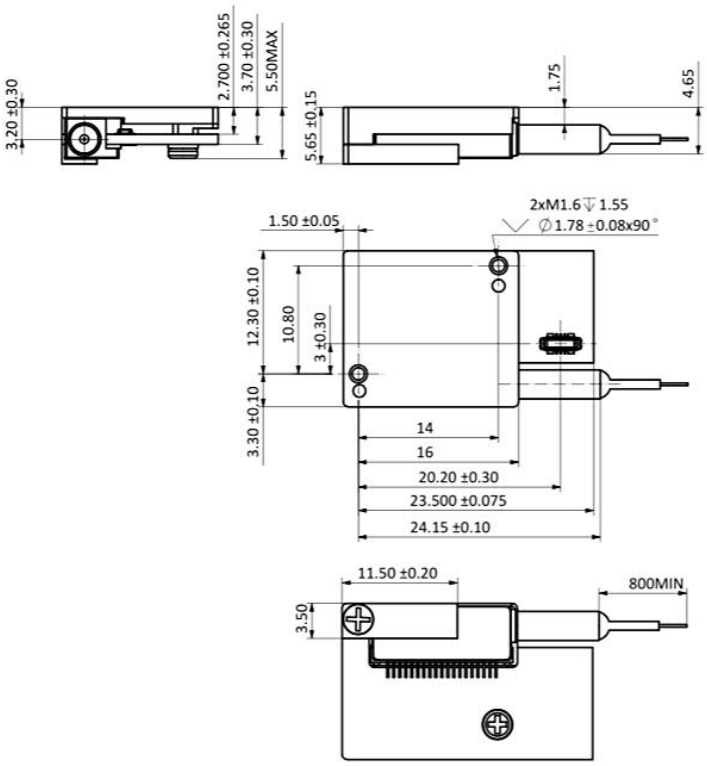


Figure 2 Mechanical and Electrical Interface

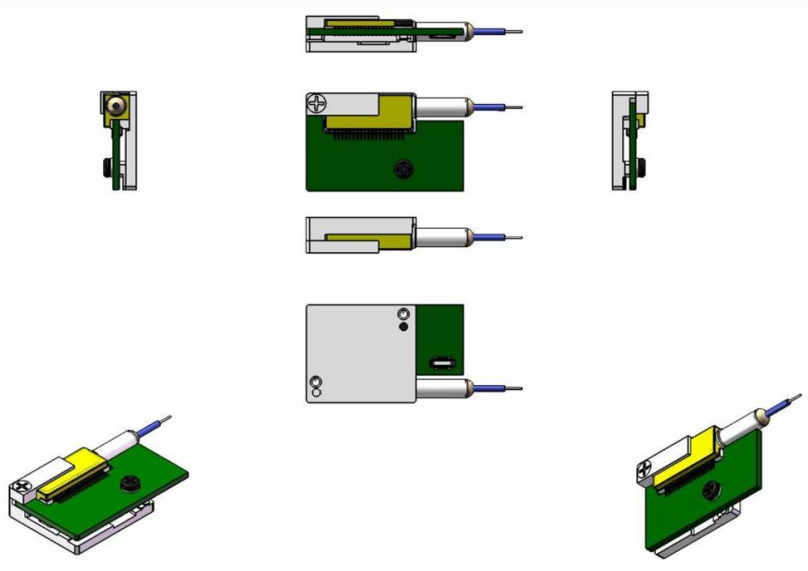


Figure 3 3D-Model of Nano-iTLA

Table 4 Pin Assignment

Pin#	Name	Names	Pin#
1	+3.3V Supply	NC	2
3	MS	RST	4
5	SRQ	TxD	6
7	DIS	RxD	8
9	GND	NC	10

Table 5 Pin Functions

#	Pin Name	Pin#	Type	Description
26	+3.3V Supply	1	Power	+3.3V Power Supply; tied together in iTLA27
Ground		9	Power	Tied together in iTLA
28	DIS	7	LVTTL input Active Low	Disable laser output via Hardware control (i.e. bypass firmware) : Low = laser output OFF High = laser output controlled by protocol
29	SRQ	5	LVTTL output Active Low	Litecore to report a variety of conditions for service. Low = SRQ is asserted and SRQ conditions can be read, cleared and re-configured by host
30	MS	3	LVTTL input Low-to-high	low to high transition to reset RS232 interface; i.e., clear input buffers and terminate current package.
31	TxD	6	LVTTL output	Transmit data from iTLA to a host
32	RxD	8	LVTTL input	Receivedata by iTLA from a host
33	RST	4	LVTTL input Active Low	When low, laser output be disabled and iTLA stays in reset (i.e. RS232 off) (must remain high for laser to operate)

Table 6 Electrical Characteristics

#	Parameter		Symbol	Min	Typ.	Max	Unit
34	+3.3 Supply voltage		VCC	3.13	3.3	3.47	V
35	+3.3 Supply current		ICC	-		1500	mA (Peak1)
36	Power Dissipation(EOL)		PD			3.7	W
37	Input voltage, low		VIL	0.0		0.8	V
38	Input voltage, high		VIH	2.0		VCC	V
39	Output voltage, low	(IOL= 4 mA)	VOL	0.0		0.6	V
40	Output voltage, high	(IOH= -4 mA)	VOH	2.4		VCC	V

41	Power Supply noise (for power supplied to the module) (100Hz to 200MHz)				1	%rms
42	RS-232 communication speed		9600	9600	115200	baud

1The instantaneous current cannot exceed 1.5 amps.

7 Timing and Warm-up Specifications

Table 7 Timing and Warm -Up

#	Parameters	Symbol	Min	Typ	Max	Units
43	Time to light from LsEnable				1	Second
44	Channel/Frequency Tuning Time				30	Second
45	0.1GHz Frequency-Step Fine Tuning Time	tF			1	Second
46	Power Adjustment Time	tP			10	Second
47	Warm-up till Freq & Power Locked	TWU			30	Second
48	Cold-up till Freq & Power Locked	TCU			60	Second

8 Firmware Interface

The table 8 listed some of commands enabled. All the commands are compliant to the OIF MSA 1.3. Additionally, digital dither is not supported in the Litecore iTLA C band

Table 8 Table of Registers (Commands)

#	Command	RegisterName	Read/Write	Non-volatile (NV)	Description
49	0x30	Channel	RW	NV	Setting valid channel causes a tuning operation to occur. Also see the optional MHz resolution ChannelH register 0x65.
50	0x31	PWR	RW	NV	Sets the optical power set point as encoded as dBm*100.
51	0x32	ResEna	RW		Reset/Enable - Enable output, hard and soft reset.
52	0x35	FCF1	RW	NV	Allows the first channel's frequency to be defined for channel numbering. (THz)Also see the optional MHz resolution FCF3 register 0x67.
53	0x36	FCF2	RW	NV	Allows the first channel's frequency to be defined for channel

					numbering. (GHz*10) Also see the optional MHz resolution FCF3 register 0x67.
54	0x37-0x3F	Reserved			Reserved for OIF configuration registers.
55	0x40	LF1	R		Returns channel's frequency as THz. Also see the optional MHz resolution LF3 register 0x68.
56	0x41	LF2	R		Returns channel's frequency as GHZ*10. Also see the optional MHz resolution LF3 register 0x68.
57	0x42	OOP	R		Returns the optical power encoded as dBm*100.
58	0x43	CTemp	R		Returns the current temperature (monitored by the temperature alarm) encoded as °C*100.
59	0x44-0x4E	Reserved			Reserved for OIF status registers.
60	0x4F	FTFR	R		Returns min/max fine tune frequency range (MHz).
61	0x50	OPSL	R		Returns themin possible optical power setting.
62	0x51	OPSH	R		Returns the max possible optical power setting.
63	0x52	LFL1	R		Laser's first frequency (THz). Also see the optional MHz resolution LFL3 register 0x69.
64	0x53	LFL2	R		Laser's first frequency (GHz*10). Also see the optional MHz resolution LFL3 register 0x69.
65	0x54	LFH1	R		Laser's last frequency (THz). Also see the optional MHz resolution LFH3 register 0x6A.
66	0x55	LFH2	R		Laser's last frequency (GHz*10). Also see the optional MHz resolution LFH3 register 0x6A.
67	0x56	LGrid	R		Laser's minimum supported grid spacing (GHz*10). Also see the optional MHz resolution LGrid2 register 0x6B.