

# LambdaFLEX™ Negative Chirp Tunable XFP Module

TL8900NACND



The Lumentum LambdaFLEX tunable XFP module is a high performance tunable pluggable transceiver for use in the C-band window covering 1528 nm to 1566 nm. The module supports data rates from 9.95 Gbps to 11.35 Gbps and is provided in an XFP, MSA-compliant package.

The optical transmitter utilizes the Lumentum LambdaFLEX tunable ILMZ chip to provide a high performance, low cost 10G transceiver. Channel tuning is supported on the ITU-T 50 GHz grid across full C-band with  $\pm 2.5$  GHz stability. Wavelength and frequency tuning modes are supported in accordance with SFF-8477.

The receive path comprises an APD receiver with linear amplifier and CDR. For optimum system performance in noise loaded applications, support is provided for external control of the receiver decision threshold.

An external 2-wire serial interface is provided to support extensive control, monitor and diagnostic functions in accordance with INF 8077i.

#### Key Features

- XFP MSA INF 8077i Rev 4.5 compliant
- Wavelength and frequency tuning
- Data rate: 9.95 - 11.35 Gbps
- Full C-band, 96 channel, 50 GHz spacing
- Negative chirp transmitter
- APD receiver with adjustable RxDTV
- Optional internal RxDTV control
- No reference clock required
- XFI electrical interface
- On board enhanced digital diagnostics
- Field-upgradeable firmware
- Maximum 2.5 W power dissipation
- Transmit disable and loss-of-signal functions
- XFI and lineside loopback support
- Telcordia GR-468 qualified
- RoHS 6/6 compliant

#### Applications

- Supports 80 km link distances
- 10G Gigabit Ethernet 10GBASE-ER/EW
- 10G Fibre Channel
- Dispersion limited, high OSNR metro

## Operating Characteristics

All parametric limits detailed are for a case temperature range of -5°C to 70°C.

### Operating Characteristics - Transmitter

Parameter	Symbol	Min	Typ	Max	Unit	Conditions
Data rate		9.95		11.35	Gbps	NRZ
Frequency range		191.35		196.10	THz	50 GHz grid, 96 channels
Frequency accuracy		-2.5		+2.5	GHz	EOL
Optical transmit power	P <sub>o</sub>		+0.5		dBm	SOL, 25°C
Optical transmit power	P <sub>o</sub>	-1		+3.0	dBm	EOL
Shuttered output power			-45	-40	dBm	
Optical power stability	ΔP <sub>out</sub>	-1.0		+1.0	dB	All channels, SOL
Side mode suppression	SMSR	35			dB	±2.5 nm, modulated
Spectral width	Δλ		0.3	0.5	nm	-20 dB, modulated
Extinction ratio	ER	9.5			dB	Filtered, 10.709 Gbps
Eye diagram compliance	GR-253, ITU-T G.691					
Mask margin		10			%	
OSNR		50	55		dB	0.1nm RBW
SBS threshold		18			dBm	50 km SMF
Tuning speed				50	ms	
Laser enable (turn on) time				50	ms	To >90% power
Laser disable (turn off) time				10	μs	To <10% power
Module initialisation time				20	s	

### Operating Characteristics - Receiver

Parameter	Symbol	Min	Typ	Max	Unit	Conditions
Data rate		9.95		11.35	Gbps	NRZ
Input operating wavelength	λ	1525		1575	nm	
Receiver sensitivity			-26		dBm	10.709 Gbps, 1E-12, OSNR>35 dB, optimised RxDTV
Maximum input power (overload)	Pin MAX	-5			dBm	
LOS assert	PA	-33		-28.5	dBm	
LOS de-assert	PD	-32.5		-26.5	dBm	
LOS Hysteresis	PD - PA	0.5		4	dB	
LOS assert time	T <sub>A</sub>			100	μs	
LOS de-assert time	T <sub>D</sub>			100	μs	

### System Performance

Parameter	Min	Max	OSNR	BER	Conditions
Noise loaded	-400 ps/nm	1500 ps/nm	19 dB	1E-04	10.709 Gbps, -10 to -20 dBm, 0.25 nm filter, optimised RxDTV
Unamplified links	0 ps/nm	1600 ps/nm	>35 dB	1E-12	10.709 Gbps, -22 dBm, 0.25 nm filter, optimised RxDTV

## Power Supplies

Parameter	Symbol	Min	Typ	Max	Unit	Notes
1.8 V supply	Vcc2	1.71	1.8	1.89	V	VPS not supported
3.3 V supply	Vcc3	3.15	3.3	3.45	V	
5.0 V supply	Vcc5	4.75	5.0	5.25	V	
Supply current, 1.8 V			160	200	mA	
Supply current, 3.3 V			310	400	mA	
Supply current, 5.0 V			100	200	mA	
Inrush current limit				100	mA/ $\mu$ s	
Total power consumption				2.5	W	Power Level 2 MSA Classification

## Power Supply Noise Tolerance

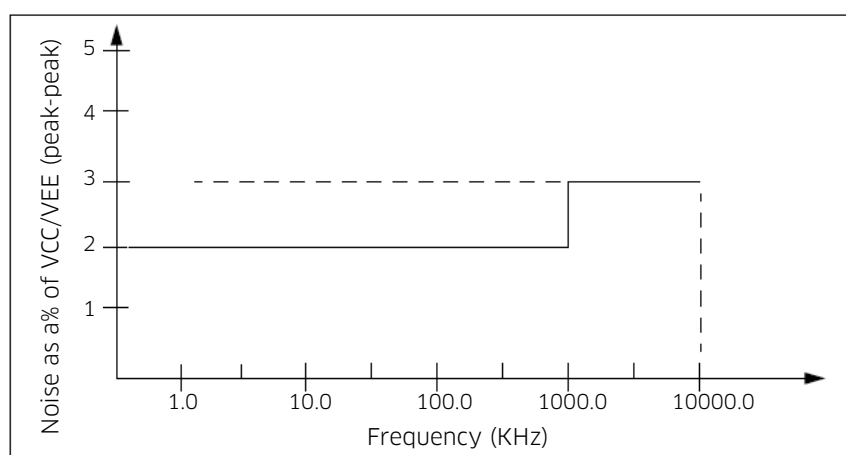


Figure 2 Power noise requirement

## Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit	Notes
Storage temperature	Tstg	-40	85	°C	
Case temperature		-5	75	°C	
ESD		500		V	High speed i/o pins
		2000			All other pins
Optical input power			+12	dBm	

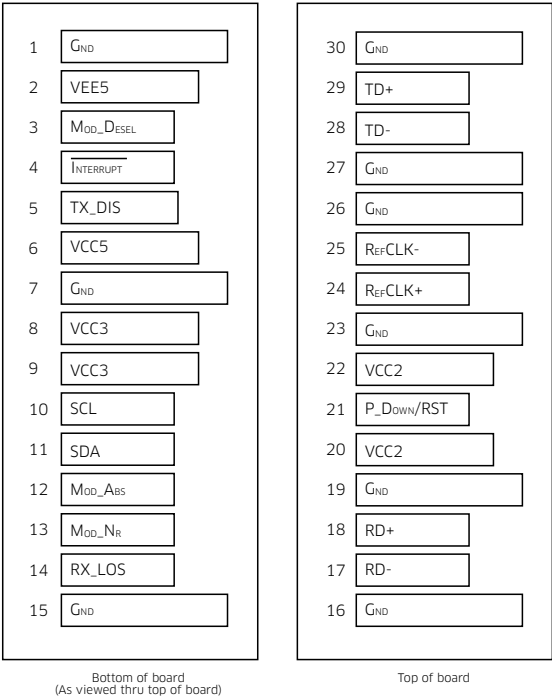
**Pinout Definition**

Pin	Logic	Symbol	Name/Description	Note
1		GND	Module Ground	1
2		VEE5	Optional -5.2V Power Supply	
3	LVTTL-I	Mod_DeSel	Module De-select; When held low allows module to respond to 2-wire serial interface	
4	LVTTL-O	Interrupt	Interrupt ; Indicates presence of an important condition which can be read over the 2-wire serial interface	2
5	LVTTL-I	TX_DIS	Transmitter Disable; Turns off transmitter laser output	
6		VCC5	+5V Power Supply	
7		GND	Module Ground	1
8		VCC3	+3.3 V Power Supply	
9		VCC3	+3.3 V Power Supply	
10	LVTTL-I/O	SCL	2-Wire Serial Interface Clock	2
11	LVTTL-I/O	SDA	2-Wire Serial Interface Data Line	2
12	LVTTL-O	Mod_Abs	Indicates Module is not present. Grounded in the Module	2
13	LVTTL-O	Mod_NR	Module Not Ready; Indicating Module Operational Fault	2
14	LVTTL-O	RX_LOS	Receiver Loss Of Signal Indicator	2
15		GND	Module Ground	1
16		GND	Module Ground	1
17	CML-O	RD-	Receiver Inverted Data Output	
18	CML-O	RD+	Receiver Non-Inverted Data Output	
19		GND	Module Ground	1
20		VCC2	+1.8 V Power Supply	3
21	LVTTL-I	P_Down/RST	Power down; When high, requires the module to limit power consumption to 1.5W or below. 2-Wire serial interface must be functional in the low power mode. Reset; The falling edge initiates a complete reset of the module including the 2-wire serial interface, equivalent to a power cycle.	
22		VCC2	+1.8 V Power Supply	3
23		GND	Module Ground	1
24	PECL-I	RefCLK+	Not required	
25	PECL-I	RefCLK-	Not required	
26		GND	Module Ground	1
27		GND	Module Ground	1
28	CML-I	TD-	Transmitter Inverted Data Input	
29	CML-I	TD+	Transmitter Non-Inverted Data Input	
30		GND	Module Ground	1

## Note:

1. Module ground pins GND are isolated from the module case and chassis ground within the module.
2. Shall be pulled up with 4.7k-10kOhms to a voltage between 3.15 V and 3.45 V on the host board.
3. Variable power supply (VPS) function is not supported.

Mechanical and Pin Out Detail



30

GND

29

TD+

28

TD-

27

GND

26

GND

25

RefCLK-

24

RefCLK+

23

GND

22

VCC2

21

P\_Down/RST

20

VCC2

19

GND

18

RD+

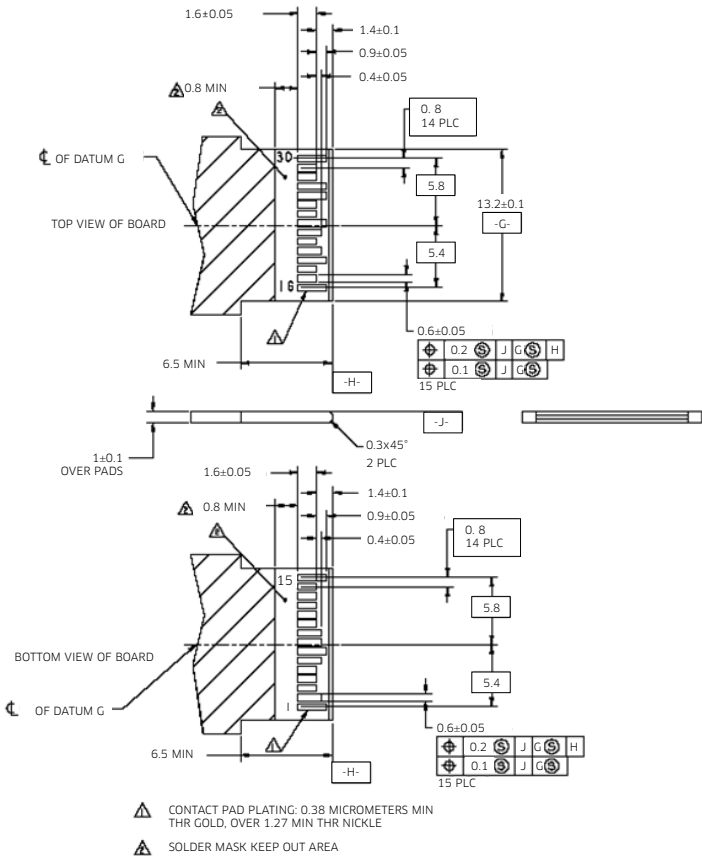
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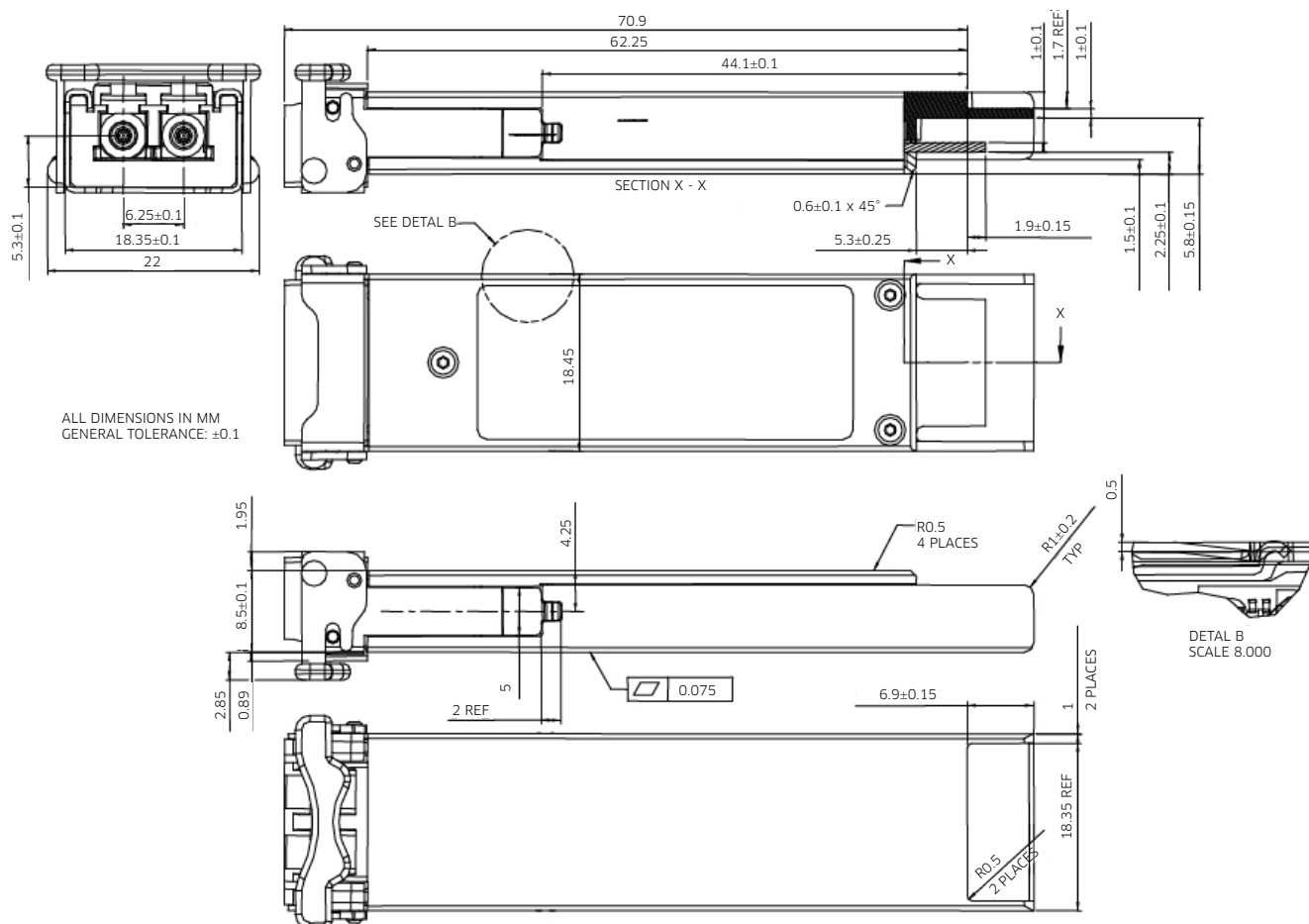
RD-

16

GND

Top of board





### RoHS Compliance

Lumentum is fully committed to environment protection and sustainable development and has set in place a comprehensive program for removing polluting and hazardous substances from all of its products. The relevant evidence of RoHS compliance is held as part of our controlled documentation for each of our compliant products. RoHS compliance parts are available to order, please refer to the ordering information section for further details.

### Laser Safety

The transceiver is certified as a Class 1 laser product per international standard IEC 60825-1:2014 3rd edition and is considered non-hazardous when operated within the limits of this specification.

The transceiver complies with 21 CFR 1040.10 except for conformance with IEC 60825-1 Ed.3 as described in Laser Notice No.56 dated May 8, 2019.



**INVISIBLE LASER RADIATION**  
**CLASS 1 LASER PRODUCT**  
per IEC 60825-1: 2014  
 $\lambda = 1528 - 1615\text{nm}, < 10\text{mW}$

### Caution

Operating this product in a manner inconsistent with intended usage and specifications may result in hazardous radiation exposure.

Use of controls or adjustments or performance of procedures other than these specified in this product data sheet may result in hazardous radiation exposure.

Tampering with this laser product or operating this product outside the limits of the specification may be considered an act of manufacturing and may require recertification of the modified product.

Viewing the laser output with certain optical instruments (for example, eye loupes, magnifiers, microscopes) within a distance of 100mm may pose an eye hazard.

### Electrostatic Discharge (ESD)

#### Handling

Normal ESD precautions are required during the handling of this module. This transceiver is shipped in ESD protective packaging. It should be removed from the packaging and otherwise handled only in an ESD protected environment utilizing standard grounded benches, floor mats, and wrist straps.



### Ordering Information:

For more information on this or other products and their availability, please contact your local Lumentum account manager or Lumentum directly at [customer.service@lumentum.com](mailto:customer.service@lumentum.com).

Description	Product Code
Tunable XFP module, C band, negative chirp, LambdaFLEX	TL8900NACND

Evaluation board available on request.



North America  
Toll Free: 844 810 LITE (5483)

Outside North America  
Toll Free: 800 000 LITE (5483)

China  
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