

Fig. 1 – LC TOSA (10T3001) is shown.

Features

- Industry-leading uncooled 1310 10Gbps EML
- High stability optical train with isolator
- LC / SC receptacle, or fiber pigtail
- 0°C - 75°C TOSA case operation with high mask margin for SR-1 OC-192 and 10GbE
- Enables sub-2.5W multi-rate XFP with path to 1.5W 10GbE
- Compact TO41 package with 7-pin flex interconnect
- RoHS compliant

Applications

- High port density 10G TX for XFP, X2 and XENPAK
- 10G TX for 300-pin MSA transponders
- SR-1 OC-192/STM-64 & 10GBASE-LR/LW TX along with 8.5G/10G FC and VSR
- TX w/FEC for SONET at 10.7Gbps & 10GbE at 11.1Gbps

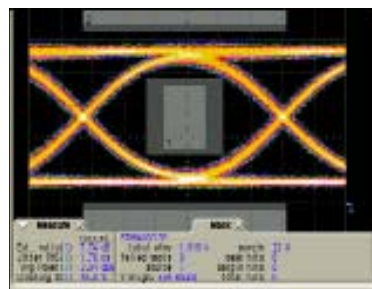
Datasheet

10T300x – 10Gbps 1310nm Uncooled Electroabsorption Modulated Laser (EML) TOSA Commercial Temperature Range (0°C to 75°C) with LC / SC Receptacle, or Fiber Pigtail - Multirate

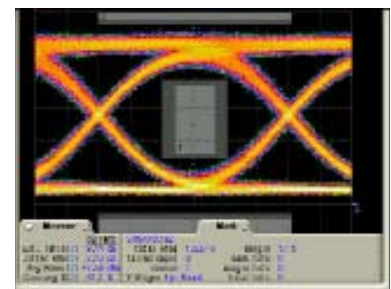
Product Overview

The 10T300x TOSA features CyOptics' (formerly Apogee Photonics') 1310 nm uncooled EMLs for outstanding DC and RF performance over a wide temperature range in a low-cost TO-41-based TOSA. The device features high-stability optics with isolation, thermistor-based temperature monitoring, modulator-based power monitoring.

A key feature that distinguishes the CyOptics 1310 EML TOSA from 1310 nm directly modulated laser based TOSAs is that the EML-TOSA provides high eye-margins with good extinction ratios over the entire temperature operating range. This is achieved by optimization of the modulator for high bandwidth and high extinction with low modulator drive voltages, while the single-frequency laser is optimized for output power, temperature stability, reliability and spectral quality.



T_{case}=0°C



T_{case}=75°C

Mask Margin	22%	Mask Margin	17%
Extinction Ratio (dB)	7.74	Extinction Ratio (dB)	9.14
V _{pp} (V)	2.0	V _{pp} (V)	2.0
Laser Current (mA)	80	Laser Current (mA)	110
Output Power (dBm)	-3.04	Output Power (dBm)	-2.56

Fig. 2 - Typical Filtered OC-192 Optical Eye & Data at 0°C and 75°C TOSA Case for 10T300x.

Table 1 - Optical and Electrical Specifications*

Parameter	Symbol (unit)	Min	Max
Operating Wavelength ⁽¹⁾	λ (nm)	1290	1330
Operating Temperature (Case)	T _{op} (°C)	0	75
Optical Output Power, Average in fiber ⁽²⁾	P _{fiber,avg} (dBm)	-2.75	-1.5
Optical Modulation Amplitude ⁽²⁾	P _{OMA} (dBm)	-4.2	1.0
Operating Current	I _{OP} (mA)	-	110
Modulator DC Bias ⁽³⁾	V _{mbias} (V)	+1.0	+5.6
RF Input Swing ⁽⁴⁾	V _{mpp} (V)	2.2	-
Extinction Ratio ^(5,6,8,9)	ER (dB)	7.0	-
Rise & Fall Times ⁽⁷⁾	t _r , t _f (ps)	-	35
Mask Margin ^(6,4)			
10.3125Gbps – 10GBASE-LR	MM (%)	20	-
9.953Gbps – OC192	MM (%)	12	-
Side Mode Suppression Ratio ⁽¹⁰⁾	SMSR (dB)	30	
Thermistor Resistance at 25°C	R _{th} (kΩ)	9.5	10.5
Tracking Error ⁽¹¹⁾	TE (dB)	-0.75	0.75
Relative Intensity Noise	RIN (dB/Hz)	-	-130
Modulator Photocurrent ⁽¹²⁾	I _{Mod} (mA)	1.0	9.0

** Please contact CyOptics for your custom requirements.*

Notes:

1. Laser wavelength measured at I_{OP} @ T_{OP}.
2. I_{OP}, optimal V_{mbias} and V_{mpp}, over operating temperature range. It excludes tracking error.
3. Positive polarity.
4. Data (compliment) input. V_{mp-p} is defined as the peak-to-peak swing from driver when measured with 50Ω termination.
5. For the ER specified here, CyOptics deploys a 100Ω termination across the modulator to increase applied swing voltage across the modulator.
6. Mask margin and ER measurements with 2³¹-1 PRBS input and filtered eye.
7. EML rise and fall times estimated after accounting for contribution from measurement system. Calculated from 20%-80% measurement. Unfiltered eye.
8. Extinction ratio increases with increasing temperature for a constant input swing voltage.
9. V_{mp-p} = 2.2V
10. V_{mbias} = 0V
11. TE = connector repeatability + I_{mod} curve fitting error + thermal stability induced error.
12. DC component indicates outgoing power.



Table 2 - Absolute Maximum Ratings

Stresses in excess of the absolute maximum ratings can cause permanent device damage, and affect device reliability. Functional operation of the device is not implied at these conditions.

Parameter		Min	Max	Unit
Storage Temperature		-40	90	°C
Laser Reverse Voltage	CW		2	V
Laser Forward Current	CW		180	mA
Peak Optical Output Power	CW, from fiber		6	dBm
Modulator Bias Voltage	Reverse biased w/ positive voltage	-0.3	8	V
Modulator Photo Current*			12	mA
Electrostatic Discharge	C=100pF, R=1.5kΩ, Human Body Model		250	V _{ESD}

* Please make certain precautions are taken to prevent $I_{Mod} > 12mA$.

Reliability

Reliability is consistent with Telcordia GR-468-CORE requirements.

RoHS

The 10T300x TOSA is compliant with RoHS directive 2002/95/EC plus amendments

Laser Safety

This is an FDA class IIIB and IEC class 1 laser product in accordance with CDRH 21 CFR 1040 and IEC/EN 60825/A2: 2001 Laser Safety requirements.

ESD

This part is sensitive to electrostatic discharge. Please follow JEDEC standard JESD625-A guidelines during handling.

Block Diagram

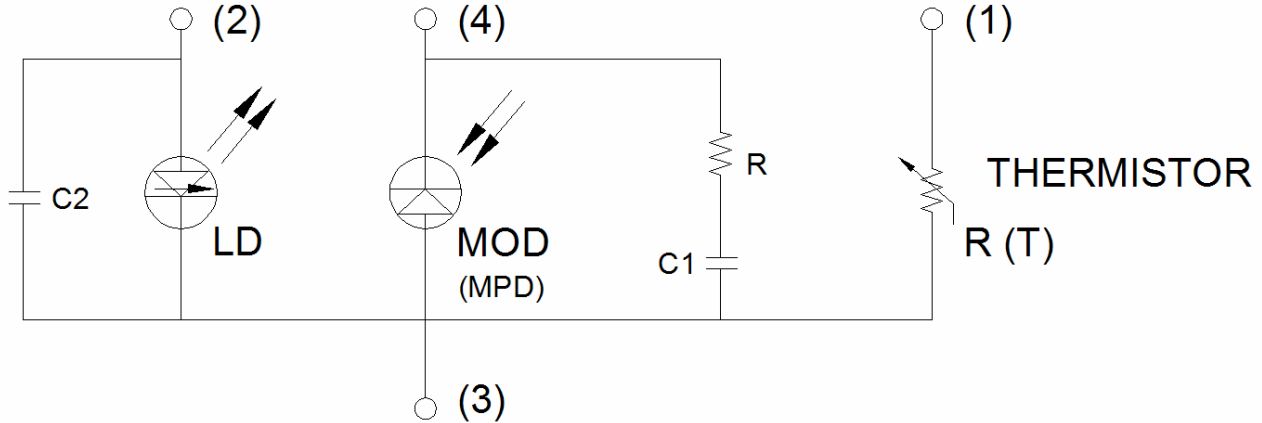


Table 3. Pin assignments for 10T300x

3a: Pin assignment 10T3001 and 10T3004

Flex Pad	TOSA Pin	Description
1	3	GND
2	4	Modulator Cathode
3	3	GND
4	1	Thermistor
5	3	GND
6	2	Laser Anode
7	3	GND

Pin assignment for 10T3005

Flex Pad	TOSA Pin	Description
1		
2		
3	3	GND
4	4	Modulator Cathode
5	3	GND
6		
7	2	Laser Anode
8	1	Thermistor

Thermistor Information

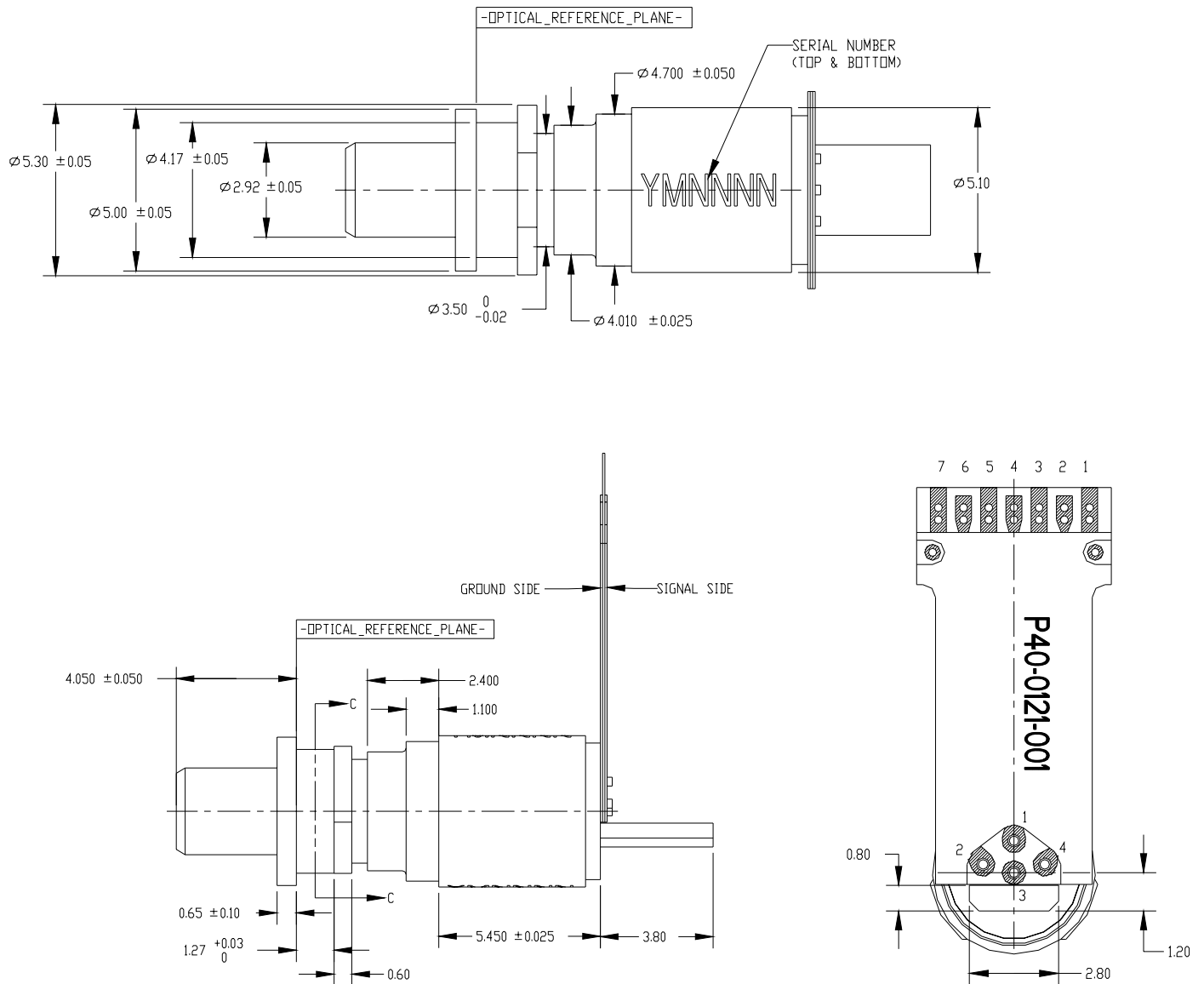
$$T = \frac{1}{A + B \cdot \ln(R_{th}) + C \cdot [\ln(R_{th})]^3}$$

where,

- T is estimated temperature in Kelvin
- $R_{th}(T)$ = measured thermistor resistance
- $R_0 = 10k\Omega$ at $25^\circ C$
- $A = 1.129 \cdot 10^{-3}$
- $B = 2.341 \cdot 10^{-4}$
- $C = 8.775 \cdot 10^{-8}$

Outline Diagram TOSA with LC receptacle (10T3001)

All dimensions are in mm. Please note that the drawings shown are for illustration only and that the up-to-date controlled engineering drawings need to be requested and used for mechanical designs employing this product.

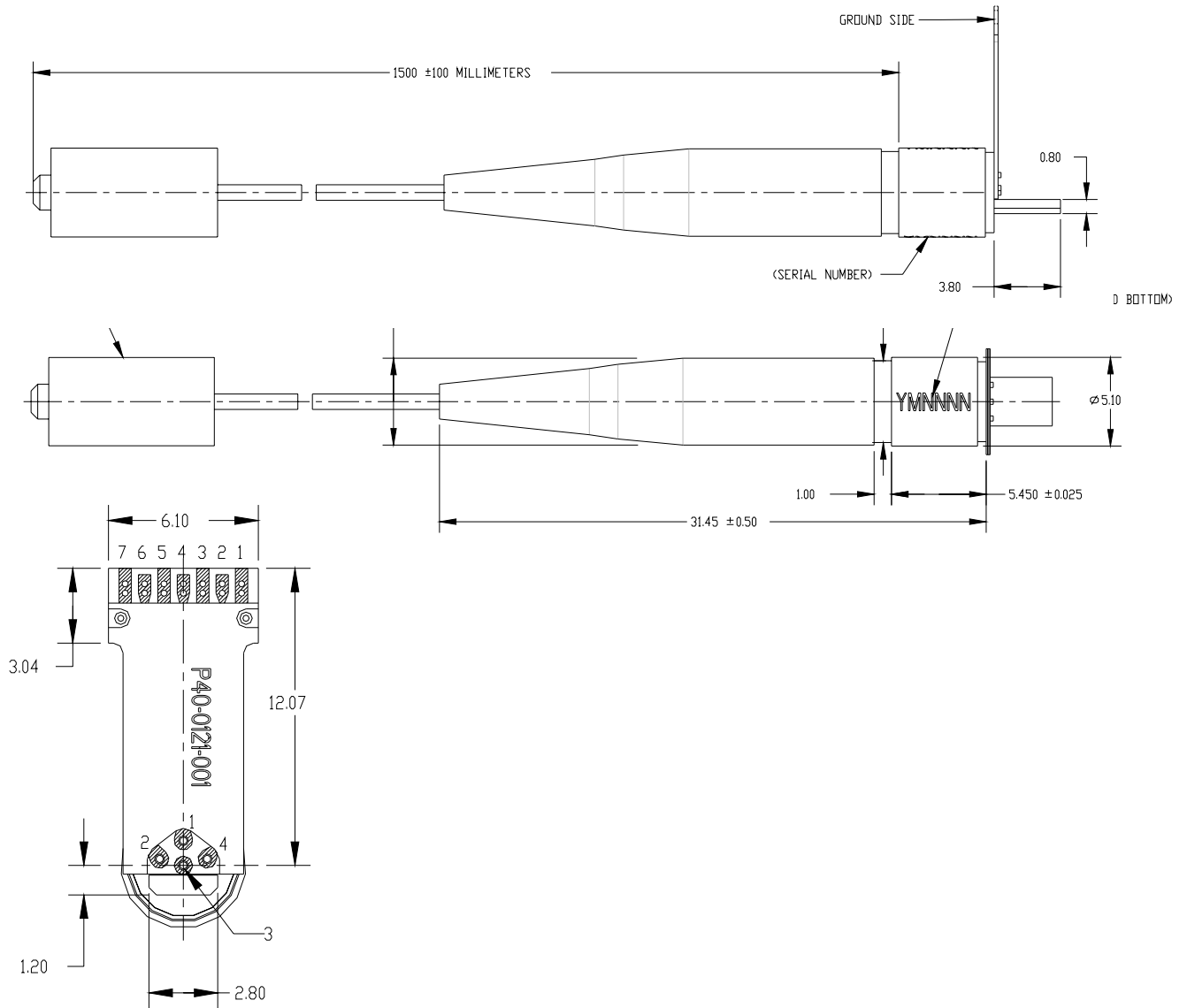


Notes

1. Customer requirements will determine specifics of mechanical mounting, heat-sinking, & DC isolation.
2. TOSA case is tied to Ground. For isolation recommendations, please contact CyOptics.

Outline Diagram TOSA with fiber pigtail with LC connector (10T3004)

All dimensions are in mm. Please note that the drawings shown are for illustration only and that the up-to-date controlled engineering drawings need to be requested and used for mechanical designs employing this product.

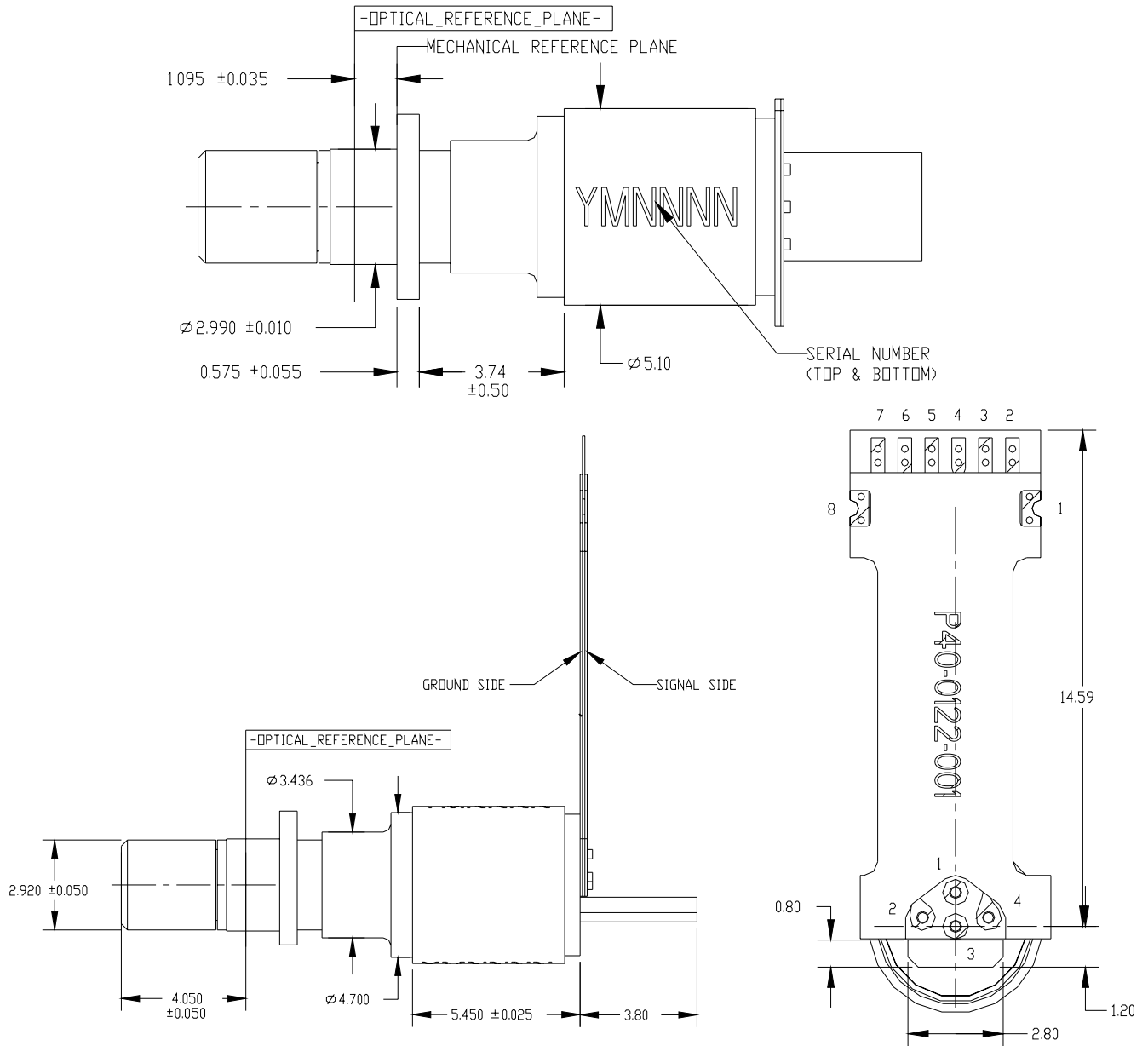


Notes

1. Customer requirements will determine specifics of mechanical mounting, heat-sinking & DC isolation.
2. TOSA case is tied to Ground. For isolation recommendations, please contact CyOptics.

Outline Diagram TOSA with LC/XMD receptacle (10T3005)

All dimensions are in mm. Please note that the drawings shown are for illustration only and that the up-to-date controlled engineering drawings need to be requested and used for mechanical designs employing this product.



Notes

1. Customer requirements will determine specifics of mechanical mounting, heat-sinking, & DC isolation.
2. TOSA case is tied to Ground. For isolation recommendations, please contact CyOptics.



Ordering Information

Product code	Description	Ordering Code
10T3001	1310nm EML LC TOSA - CT - MR (LC receptacle)	A15-0003-201
10T3004	1310nm EML PT TOSA - CT - MR (fiber pigtail with LC connector)	A15-0003-A01
10T3005	1310nm EML LC TOSA - CT - MR (LC/XMD receptacle, XMD flex)	A15-0003-401

Additional Information

For the latest specifications, additional product information, worldwide sales and distribution locations, and information about CyOptics:

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