Photonics On Crystals

POC-OC-122459-Tm:YLF Crystal Datasheet

1 Main Features:

- Strong absorption bands optimized for laser diode pumping.
- Weak thermal lensing for stable operation.
- High polarization purity suitable for advanced laser designs.
- Cross-relaxation process creates higher ion efficiency.
- Custom crystal specifications available upon request.

---

2. Material General Description:

Tm:YLF (Thulium-doped Lithium Yttrium Fluoride) crystal is an advanced laser medium featuring high absorption peaks around 792 nm, making it ideal for laser diode pumping. Its unique cross-relaxation process doubles the number of ions in the upper laser level, enhancing the efficiency of each pump photon. Tm:YLF crystals are widely used as a pump source for Ho:YAG lasers due to the good overlap of their emission and absorption spectra. Additionally, the thermal refractive index of Tm:YLF decreases with temperature, leading to a negative thermal lens effect, which, when combined with end-face bulging compensation, ensures excellent beam stability and performance. This crystal's superior polarization purity and stable operation make it ideal for high-precision applications.

---

3. General Application and Examples:

Tm:YLF crystals are used in a variety of applications, including:

- **LiDAR Systems**: Used in remote sensing for environmental monitoring and mapping.
- **Pump Source for Ho:YAG Lasers**: Facilitates efficient energy transfer and polarized laser output.
- **Medical Lasers**: Ideal for surgical and therapeutic applications requiring precise output and stability.
- **Industrial Lasers**: Enables high-powered, efficient cutting and welding operations.
- **Defense Systems**: Suitable for range-finding, target designation, and secure communication lasers.

By leveraging Tm:YLF's unique properties, these applications achieve high power output, precise targeting, and low thermal distortion, making this crystal indispensable in cutting-edge laser systems.

---

4. Chemical, Physical, and Structural Properties:

Property	**Specification**
Orientation	c-cut
Clear Aperture	>90%
Face Dimensions Tolerance	±0.1 mm
Length Tolerance	±0.1 mm
Parallelism Error	<20 arcsec
Perpendicularity Error	<10 arcmin
Protective Chamfers	<0.1 mm at 45°
Surface Quality	20-10 S-D
Surface Flatness	λ/10 @ 632.8 nm
Crystal Structure	Tetragonal
Density	3.99 g/cm³
Thermal Conductivity	6 W/m·K
Mohs Hardness	5
dn/dT	-4.6 x 10^-6 (°C)^-1
Typical Doping Level	2-4 at.%

---

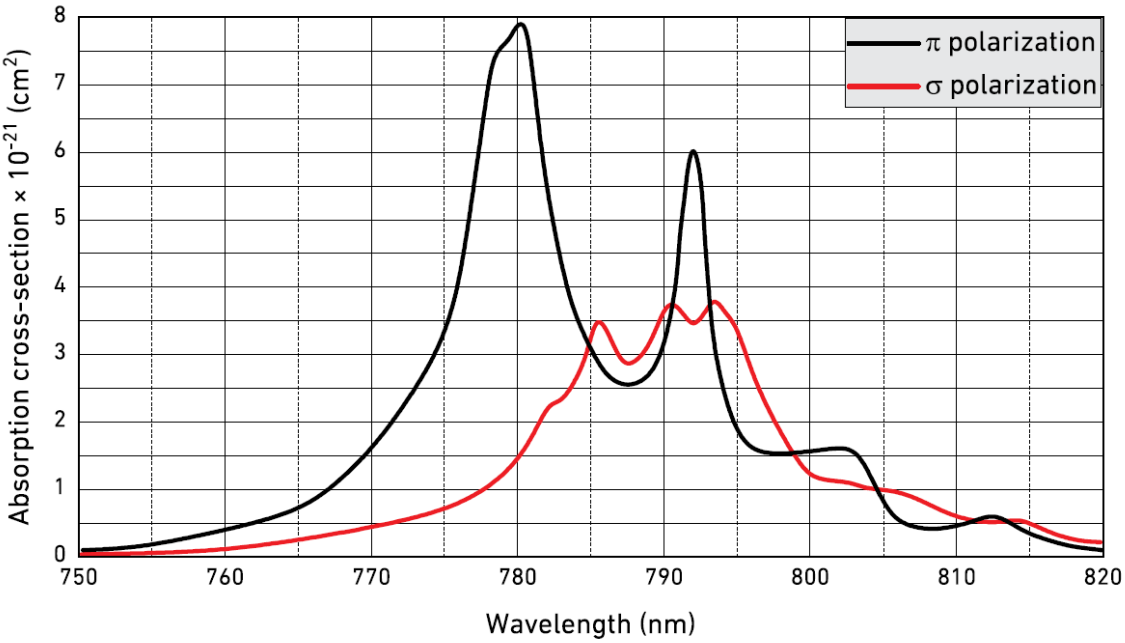
5. Optical, Laser, or Nonlinear Optical Properties:

Optical Property	Specification
Absorption Peak Wavelength	792 nm
Absorption Cross-Section at Peak	0.55 x 10^-19 cm^2
Absorption Bandwidth at Peak	~5 nm
Laser Wavelength	1900 nm
Lifetime of Tm^{3+} Energy Level	16 ms
Emission Cross-Section @ 1900 nm	0.4 x 10^-19 cm^2
Refractive Index @ 1064 nm	n_o = 1.448, n_e = 1.446

---

6. Spectrum Transmission Curves:

- Absorption and emission spectra have been optimized for diode pumping at 792 nm and laser output at 1900 nm. This data is critical for system design and alignment.



---

7. Coating Specification:

Coating	Specification
Anti-Reflective Coating (AR)	R < 0.3% @ 792 nm and 1800-1960 nm
Custom Coating Options	Available upon request

---

8. Standard Fabrication Specifications:

Https://www.poc.com.sg Photonics on Crystals, A brand of *Shapeoptics Holdings*
Add: Prestige Centre, #09-10, 71 BUKIT BATOK CRESCENT , Singapore 658071 Tel: +65-90799669

Photonics On Crystals

Specification	Value
Orientation	c-cut
Face Dimensions Tolerance	±0.1 mm
Surface Quality	20-10 S-D
Surface Flatness	λ/10 @ 632.8 nm
Parallelism Error	<20 arcsec
Protective Chamfers	<0.1 mm at 45°
Laser-Induced Damage Threshold (LIDT)	>10 J/cm² @ 1900 nm, 10 ns

---

9. POC Strength and Capabilities:

Photonics On Crystals (POC) specializes in providing high-quality laser crystals tailored to advanced applications. With years of experience in manufacturing, POC delivers superior optical and thermal performance, enabling precision in high-power laser systems. Our state-of-the-art fabrication techniques ensure strict tolerances, superior coatings, and customizable designs for a wide range of applications, including LiDAR, medical, and industrial sectors. Partnering with POC ensures access to cutting-edge photonic solutions.

---

10. Standard Products:

Face Dimensions	Length	End Faces	Doping	Coatings	Price (USD)
3 x 3 mm	8 mm	Brewster-angle cut	3%	Uncoated	540
3 x 3 mm	8 mm	Right-angle cut	3%	AR@792 nm + 1800-1960 nm	590
Custom Size	Custom	Upon Request	Custom	Upon Request	Custom Pricing

---

If you need further customization or additional product details, feel free to contact **Photonics On Crystals (POC)**. We specialize in providing advanced solutions for photonic applications.