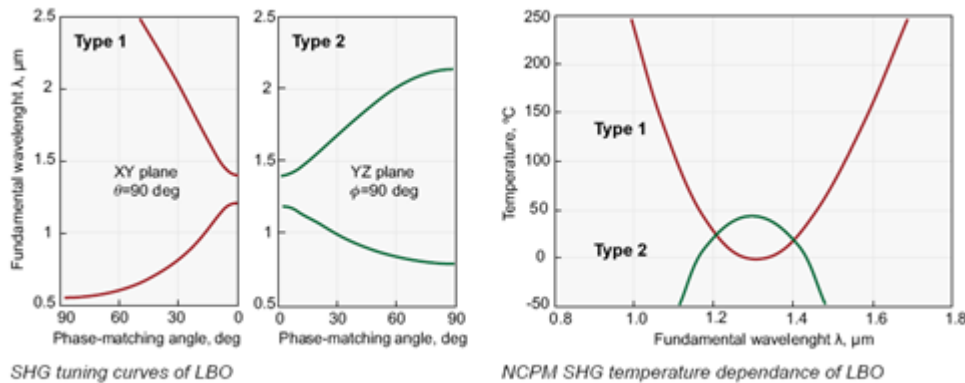


LBO Crystals and Components

Lithium Triborate (LiB₃O₅ or LBO) is an excellent nonlinear crystal with wide transparency range, relative large effective nonlinear coefficient, high damage threshold and good chemical and mechanical properties. LBO allows temperature-controlled Non-Critical Phase-Matching (NCPM) for 1.0-1.3 μm, Type I SHG, and also provides room temperature NCPM for Type II SHG at 0.8-1.1 μm. It also possesses a relatively large angular acceptance bandwidth, reducing the beam quality requirements for pump lasers.



ULTI Crystal can provide large aperture LBO crystals which can be used for harmonic generation and OPO of high average/peak power Q-switched Neodymium lasers, where other crystals can't withstand. Non-critical phase matching in wide range achievable by temperature tuning allows to employ long crystals without any walk-off influence on nonlinear interaction efficiency. Especially this application is attractive for CW and quasi-CW lasers.

We offer Positioning Mount for Nonlinear Crystal Housing.

The Physical and Optical Properties of LBO Crystals

Properties	Values		
Chemical formula	LiB ₃ O ₅		
Crystal structure	orthorhombic, mm ₂		
Optical symmetry	Negative biaxial		
Space group	Pna21		
Density	2.47 g/cm ³		
Mohs hardness	6		
Optical homogeneity	Δn = 10 ⁻⁶ cm ⁻¹		
Transparency region at "0" transmittance level	155 – 3200 nm		
Linear absorption coefficient at 1064 nm	< 0.01 % cm ⁻¹		
Refractive indices:	nx	ny	nz
at 1064 nm	1.5656	1.5905	1.6055
at 532 nm	1.5785	1.6065	1.6212

at 355 nm	1.5971	1.6275	1.6430
Sellmeier equations (λ , μm) n_x	$n_{x2} = 2.4542 + 0.0113 / (\lambda^2 - 0.0114) - 0.0139 \lambda^2$		
	$n_{y2} = 2.5390 + 0.0128 / (\lambda^2 - 0.0119) - 0.0185 \lambda^2$		
	$n_{z2} = 2.5865 + 0.0131 / (\lambda^2 - 0.0122) - 0.0186 \lambda^2$		
Phase matching range Type 1	SHG 554 – 2600 nm		
Phase matching range Type 2	SHG 790 – 2150 nm		
NCPM SHG temperature dependence:			
Type 1 range 950 – 1300 nm	$T1 = -1893.3\lambda^4 + 8886.6\lambda^3 - 13019.8\lambda^2 + 5401.5\lambda + 863.9$		
Type 1 range 1300 – 1800 nm	$T2 = 878.1\lambda^4 - 6954.5\lambda^3 + 20734.2\lambda^2 - 26378\lambda + 12020$		
Type 2 range 1100 – 1500 nm	$T3 = -21630.6\lambda^4 + 112251\lambda^3 - 220460\lambda^2 + 194153\lambda - 64614.5$		
NCPM SHG at 1064 nm Type 1 temperature	149 °C		
NCPM SHG at 1319 nm Type 2 temperature	43 °C		
Walk-off angle	4 mrad (Type 1 SHG 1064 nm)		
Thermal acceptance	6.4 Kxcm (Type 1 SHG 1064 nm)		
Angular acceptance	6.5 mradxcm (Type 1 SHG 1064 nm)		
	248 mradxcm (Type 1 NCPM SHG 1064 nm)		
Nonlinearity coefficients:	$d_{31} = (1.09 \pm 0.09) \text{ pm/V}$		
	$d_{32} = (1.17 \pm 0.14) \text{ pm/V}$		
Effective nonlinearity:			
XY plane	$d_{\text{ooe}} = d_{32} \cos\phi$		
YZ plane	$d_{\text{oeo}} = d_{\text{eoo}} = d_{31} \cos\theta$		
Damage threshold for TEM00 1064 nm	> 10 GW/cm ² at 10 ns		

Standard Processing Specifications Of LBO Crystals

Specifications	Capability
Flatness	$\lambda/8$ at 633 nm
Parallelism	< 20 arcsec
Surface quality	10/5 scratch/dig as per MIL-O-13830A
Perpendicularity	< 5 arcmin
Angle tolerance	< 30 arcmin
Aperture tolerance	$\pm 0.1 \text{ mm}$
Clear aperture	90% of full aperture

Notes

- »| Our inspection standard is comply with MIL standard and ISO9001 standard
- »| OEM Specifications are available upon requested



Standard Product List

Code	Size,mm	θ	φ	Coating	Application	Price
LBO-101	3x3x10	90	11.6	AR/AR@1064+532nm	SHG@1064	Contact us
LBO-102	3x3x15	90	11.6	AR/AR@1064+532nm	SHG@1064	Contact us
LBO-103	5x5x15	90	11.6	AR/AR@1064+532nm	SHG@1064	Contact us
LBO-104	3x3x15	90	0	AR/AR@1064+532nm	NCPM SHG@1064,T=149°C	Contact us
LBO-105	3x3x20	90	0	AR/AR@1064+532nm	NCPM SHG@1064,T=149°C	Contact us
LBO-106	3x3x10	42.2	90	AR/AR@1064+532/355nm	SHG@1064	Contact us
LBO-107	3x3x15	42.2	90	AR/AR@1064+532/355nm	SHG@1064	Contact us
LBO-108	5x5x15	42.2	90	AR/AR@1064+532/355nm	SHG@1064	Contact us

Notes

- »| LBO has a very low susceptibility to moisture. Users are advised to provide dry conditions for both the use and preservation of LBO.
- »| Polished surfaces of LBO requires precautions to prevent any damage.
- »| 149 °C temperature is required to achieve Non-Critical Phase Matching (NCPM) in LBO at type 1 SHG of 1064 nm application.
- »| For thin LBO crystal, ULTICRYSTAL can provide free holder for you.
- »| The custom sizes is available upon requested

