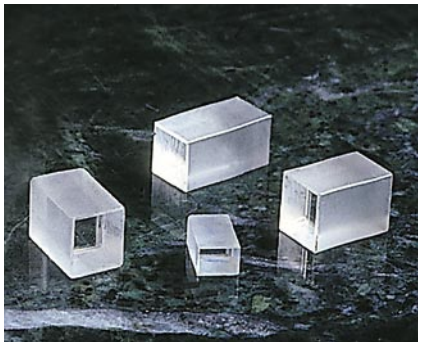
BBO BETA BARIUM BORATE



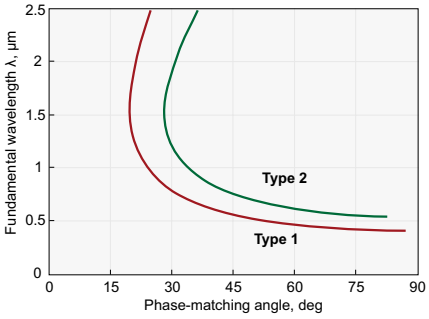
- **wide transparency region**
- **broad phase-matching range**
- **large nonlinear coefficient**
- **high damage threshold**
- **wide thermal acceptance bandwidth**
- **high optical homogenity**

As a result of its excellent properties BBO has a number of advantages for different applications:

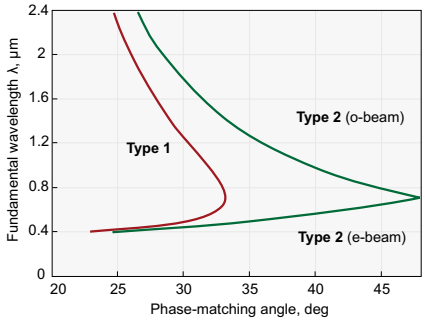
- harmonic generations (up to fifth) of Nd doped lasers
- frequency doubling and tripling of ultrashort pulse Ti:Sapphire and Dye lasers
- optical parametric oscillators (OPO) at both Type 1(ooe) and Type 2 (eoe) phase-matching
- frequency doubling of Argon ion and Copper vapour laser radiation
- electro-optic crystal for Pockels cells
- ultrashot pulse duration measurements by autocorrelation.

EKSMA OPTICS OFFERS

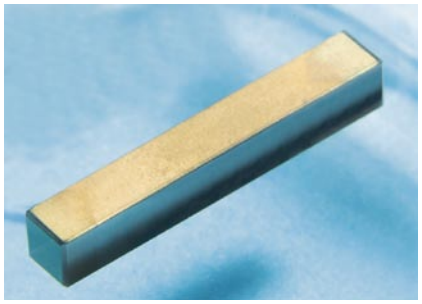
- crystal aperture up to 22 × 22 mm
- crystal length up to 20 mm
- thin crystals down to 5 μm thickness
- AR, BBAR, P-coating
- BBO with gold electrodes for e/o applications
- different mounting and repolishing services
- accurate quality control
- attractive prices and fast delivery
- one month customer's satisfaction term.



SHG tuning curve of BBO



OPO tuning curves of BBO at 355 nm pump



BBO with gold electrodes for e/o applications

PHYSICAL AND OPTICAL PROPERTIES

Chemical formula	BaB_2O_4	
Crystal structure	trigonal, 3m	
Optical symmetry	Negative Uniaxial ($n_o > n_e$)	
Space group	R3c	
Density	3.85 g/cm^3	
Mohs hardness	5	
Optical homogeneity	$\partial n = 10^{-6}$ cm^{-1}	
Transparency region at "0" transmittance level	189 – 3500 nm	
Linear absorption coefficient at 1064 nm	< 0.1% cm^{-1}	
Refractive indices	n_o	n_e
at 1064 nm	1.6551	1.5426
at 532 nm	1.6750	1.5555
at 355 nm	1.7055	1.5775
at 266 nm	1.7571	1.6139
at 213 nm	1.8465	1.6742
Sellmeier equations (λ, μm)	$n_o^2 = 2.7405 + 0.0184 / (\lambda^2 - 0.0179) - 0.0155\ \lambda^2$	
	$n_e^2 = 2.3730 + 0.0128 / (\lambda^2 - 0.0156) - 0.0044\ \lambda^2$	
Phase matching range Type 1 SHG	410 – 3300 nm	
Phase matching range Type 2 SHG	530 – 3300 nm	
Walk-off angle	55.9 mrad (Type 1 SHG 1064 nm)	
Angular acceptance	1.2 mrad × cm (Type 1 SHG 1064 nm)	
Thermal acceptance	70 K × cm (Type 1 SHG 1064 nm)	
Nonlinearity coefficients	$d_{22} = \pm(2.22 \pm 0.09)$ pm/V	
	$d_{31} = \pm(0.16 \pm 0.08)$ pm/V	
Effective nonlinearity expressions	$d_{ooe} = d_{31} \sin\theta - d_{22} \cos\theta \sin 3\varphi$	
	$d_{eoe} = d_{oee} = d_{22} \cos^2\theta \cos 3\varphi$	
Damage threshold for TEM_{00} 1064 nm	> 0.5 GW/cm^2 at 10 ns	
	~ 50 GW/cm^2 at 1 ps	

STANDARD SPECIFICATIONS

Flatness	up to λ/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	± 0.1 mm
Clear aperture	90% of full aperture

Optolita UAB • Tel.: +370 5 272 99 00 • Fax: +370 5 272 92 99 • info@eksmaoptics.com • www.eksmaoptics.com

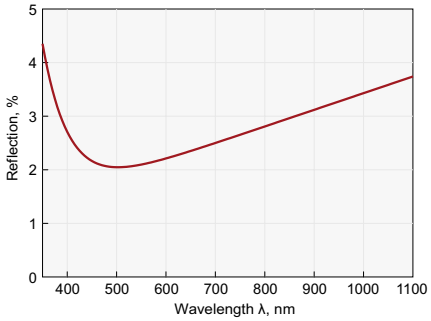
STANDARD CRYSTALS LIST

Catalogue number	Size, mm	θ, deg	φ, deg	Coating	Application	Price, EUR
BBO-601H	6×6×0.1	29.2	90	P/P @ 400-800 nm	SHG @ 800 nm, Type 1	505
BBO-602H	6×6×0.2	29.2	90	P/P @ 400-800 nm	SHG @ 800 nm, Type 1	505
BBO-603H	6×6×0.5	29.2	90	P/P @ 400-800 nm	SHG @ 800 nm, Type 1	410
BBO-604H	6×6×1	29.2	90	P/P @ 400-800 nm	SHG @ 800 nm, Type 1	310
BBO-605H	6×6×2	29.2	90	P/P @ 400-800 nm	SHG @ 800 nm, Type 1	310
BBO-609H	6×6×0.1	44.3	90	P/P @ 400-800/266 nm	THG @ 800 nm, Type 1	505
BBO-610H	6×6×0.2	44.3	90	P/P @ 400-800/266 nm	THG @ 800 nm, Type 1	505
BBO-611H	6×6×0.5	44.3	90	P/P @ 400-800/266 nm	THG @ 800 nm, Type 1	410
BBO-612H	6×6×1	44.3	90	P/P @ 400-800/266 nm	THG @ 800 nm, Type 1	310
BBO-1001H	10×10×0.1	29.2	90	P/P @ 400-800 nm	SHG @ 800 nm, Type 1	725
BBO-1002H	10×10×0.2	29.2	90	P/P @ 400-800 nm	SHG @ 800 nm, Type 1	725
BBO-1003H	10×10×0.5	29.2	90	P/P @ 400-800 nm	SHG @ 800 nm, Type 1	660
BBO-1004H	10×10×1	29.2	90	P/P @ 400-800 nm	SHG @ 800 nm, Type 1	625

To order unmounted BBO crystals, please remove letter H from code and deduct 50 EUR from price for ring holder.

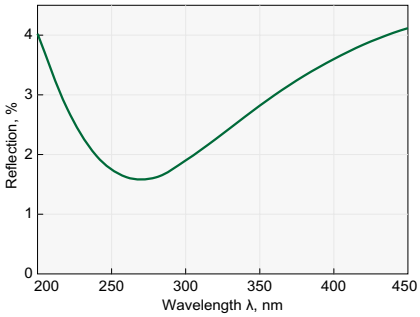
For safe and convenient handling of BBO crystals, we highly recommend open ring holders. Standard BBO crystals are provided mounted into 25.4 mm diameter ring holder.

P-protective coating. It's a single or two layers antireflection coating made at specified wavelength range. Typical reflection values are R<2% in the mid range, R<4% at the edges. P coating is recommended for ultra-short pulses applications and features low dispersion.

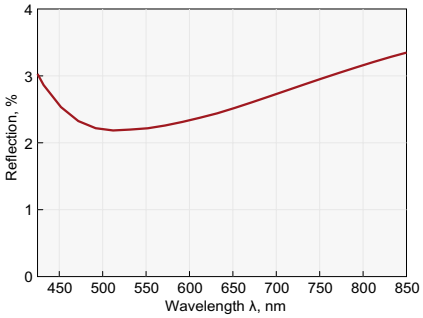


Typical P-coating for BBO SHG@800 nm application

Delivery from stock!



Typical coating for BBO THG@800 nm or SHG@532 nm applications (output face P@266 nm)



Typical coating for BBO SHG@532 nm application (input face P@532 nm)

Thin BBO crystals for SHG and THG of Ti:Sapphire laser wavelength

Femto Line *see pages: 4.22*

BBO crystals for SHG of Yb:KGW/KYW laser frequency conversion

Femto Line *see pages: 4.28*

Please contact EKSMA OPTICS for special OEM and large volume pricing.

HOUSING ACCESSORIES

- Ring Holders for Nonlinear Crystals
  See page 2.24 for more information.

- Positioning Mount 840-0199 for Nonlinear Crystal Housing

  Accepts crystals with aperture up to 12x12 mm and thichness up to 3 mm.

  See page 2.26 for more information.