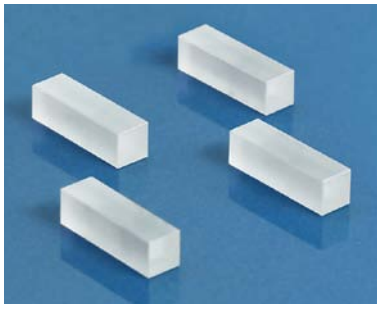
KTP POTASSIUM TITANYL PHOSPHATE



EKSMA OPTICS OFFERS

- Crystal size up to 10×10×20 mm
- Singleband and dualband AR and BBAR coatings
- Standard and customised mounts and housings
- Free technical consulting.

EKSMA OPTICS GUARANTEES

- Accurate quality control
- One month customer's satisfaction term
- Conformity of crystal specifications to highest standards
- Attractive prices
- Fast delivery.

KTP ($KTiOPO_4$) is a nonlinear optical crystal, which possesses excellent nonlinear, electrooptical and acousto-optical properties. A combination of high nonlinear coefficient, wide transparency range, and broad angular as well as thermal acceptances makes KTP very attractive for different nonlinear optical and waveguide applications.

KTP is a standard crystal mostly used in extracavity configuration when a single pass through the crystal is required.

KTP crystals are optimised for SHG intracavity configuration in low peak power CW lasers. Due to the large number of passes through the crystal, low insertion losses and high homogeneity are essential for conversion efficiency. The special highest quality material selected by SHG efficiency mapping of each crystal, fine surface polishing and dual band AR coatings with very low losses allow EKSMA OPTICS to produce KTP crystals suitable for intracavity SHG application.

Fig. 1 represents Type 2 SHG tuning curve of KTP in x-y plane. In x-y plane the slope $\partial(\Delta k)/\partial\theta$ is small. This corresponds to quasi-angular noncritical phase-matching, which ensures the double advantage of a large acceptance angle and a small walk off. Otherwise in x-z plane the slope $\partial(\Delta k)/\partial\lambda$ is almost zero for wavelengths in the range 1.5–2.5 μm and this corresponds to quasi-wavelength noncritical phase-matching, which ensures a large spectral acceptance (see Fig. 2). Wavelength noncritical phase-matching is highly desirable for frequency conversion of short pulses.

As a lasing material for OPG, OPA or OPO, KTP can most usefully be pumped by Nd lasers and their second harmonic or any other source with intermediate wavelength, such as a dye laser (near 600 nm). Fig. 3 and Fig. 4 show the phase-matching angles for OPO/OPA pumped at 532 nm in x-y and x-z plane respectively.

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

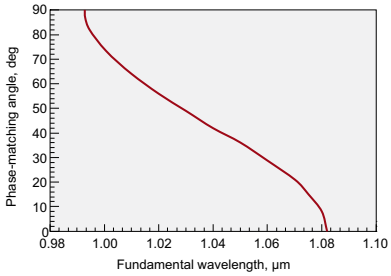


Fig. 1. *Type 2 SHG in x-y plane*

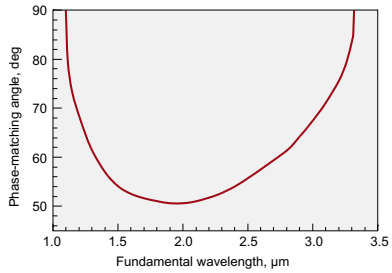


Fig. 2. *Type 2 SHG in x-z plane*

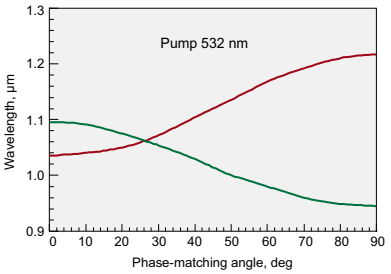


Fig. 3. *OPO tuning curve in x-y plane*

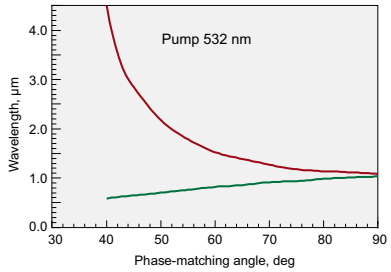


Fig. 4. *OPO tuning curve in x-z plane*

PHYSICAL PROPERTIES

Crystal structure	orthorhombic
Point group	mm2
Space group	$Pna2_1$
Lattice constants, Å	a = 6.404, b = 10.616, c = 12.814, z = 8
Density, g/cm^3	3.01
Melting point, °C	1172
Transition temperature, °C	936
Mohs hardness	5
Thermal expansion coefficients, °C^{-1}	$a_x = 11\times10^{-6}$, $a_y = 9\times10^{-6}$, $a_z = 0.6\times10^{-6}$
Thermal conductivity, W/cm°C	13
Not hygroscopic	

OPTICAL PROPERTIES

Transparency	350–4400 nm	
Refractive indices	at 1064 nm	at 532 nm
	$n_x = 1.7404$	$n_x = 1.7797$
	$n_y = 1.7479$	$n_y = 1.7897$
	$n_z = 1.8296$	$n_z = 1.8877$
Thermooptic coefficients in 0.4 – 1.0 μm range	$\partial n_x/\partial T = 1.1\times10^{-5}\,(K)^{-1}$	
	$\partial n_y/\partial T = 1.3\times10^{-5}\,(K)^{-1}$	
	$\partial n_z/\partial T = 1.6\times10^{-5}\,(K)^{-1}$	
Wavelength dispersion of refractive indices	$n_x^2 = 3.0067 + 0.0395/(\lambda^2 - 0.04251) - 0.01247\times\lambda^2$	
	$n_y^2 = 3.0319 + 0.04152/(\lambda^2 - 0.04586) - 0.01337\times\lambda^2$	
	$n_z^2 = 3.3134 + 0.05694/(\lambda^2 - 0.05941) - 0.016713\times\lambda^2$	

NONLINEAR PROPERTIES

Phase matching range for:	
Type 2 SHG in x-y plane	0.99÷1.08 μm
Type 2 SHG in x-z plane	1.1÷3.4 μm
For Type 2, SHG @ 1064 nm, cut angle θ=90°, φ=23.5°	
Walk-off	4 mrad
Angular acceptances	Δθ = 55 mrad × cm
	Δφ = 10 mrad × cm
Thermal acceptance	ΔT = 22 K × cm
Spectral acceptance	Δν = 0.56 nm × cm
Up to 80% extracavity SHG efficiency	
Effective nonlinearity	
x-y plane	$d_{eoe} = d_{oee} = d_{15}\sin^2\varphi + d_{24}\cos^2\varphi$
x-z plane	$d_{oeo} = d_{eoo} = d_{24}\sin\theta$
	$d_{31} = \pm 1.95$ pm/V $d_{32} = \pm 3.9$ pm/V
	$d_{33} = \pm 15.3$ pm/V $d_{24} = d_{32}$ $d_{15} = d_{31}$
Damage threshold	>500 MW/cm^2 *for pulses λ=1064 nm, τ=10 ns, 10 Hz, TEM_{00}*

STANDARD SPECIFICATIONS

Flatness	λ/8 at 633 nm
Parallelism	< 20 arcsec
Surface quality	10-5 scratch & dig (MIL-PRF-13830B)
Perpendicularity	< 5 arcmin
Angle tolerance	< 30 arcmin
Aperture tolerance	± 0.1 mm
Clear aperture	90% of full aperture

STANDARD CRYSTALS LIST

Code	Size, mm	θ	φ	Coating	Application	Price, EUR
KTP-401	3x3x5	90	23.5	AR/AR @ 1064+532 nm	SHG @ 1064 nm	76
KTP-402	3x3x10	90	23.5	AR/AR @ 1064+532 nm	SHG @ 1064 nm	109
KTP-403	4x4x6	90	23.5	AR/AR @ 1064+532 nm	SHG @ 1064 nm	118
KTP-404	7x7x9	90	23.5	AR/AR @ 1064+532 nm	SHG @ 1064 nm	529

RELATED PRODUCTS

Crystal Oven TC1
See page 2.27

Ring Holders for Nonlinear Crystals
See page 2.24

Nonlinear Crystal Oven CH7
See page 2.30

Positioning Mount 840-0199 for Nonlinear Crystal Housing
See page 2.26