

- No Piezoelectric Ringing
- High Damage Threshold
- High Extinction Ratio
- Low Insertion Loss
- Non-Hygroscopic
- Thermally Compensated

RTP (rubidium titanyl phosphate -  $\text{RbTiOPO}_4$ ), used in the company's 1147 Series Pockels cells, is a very desirable crystal material for electro-optic modulators and Q-switches. It combines several features of  $\text{KD}^*\text{P}$  and Lithium Niobate and has one major advantage over both: RTP exhibits virtually no piezo-electric effect with electrical signals between DC and 100 kHz. There is no ringing superimposed on the transmitted optical beam passing through the crystal. Modulators and Q-switches made with RTP can be utilized with high power lasers operating at high repetition rates.

Freedom from piezoelectric ringing enables the use of RTP devices in high repetition rate mode locked laser pulse extraction, laser pulse slicing, chopping and gating systems as well as in Q-switching applications. Tests conducted at up to 100 kHz reveal no ringing in the optical waveform.

RTP has a useful optical wavelength range from 350 nm to 4300 nm. Transmittance, in the 400 to 1100 nm range, with hard, V type high efficiency Anti-Reflection coatings is 98.5%. Standard AR wavelengths, at the present time, are 1064 nm and 700-900 nm. A-R coatings for other wavelengths are available.

Typical extinction ratios of RTP devices are greater than 200:1 ( $>20$  db) measured at 633 nm. Wavefront distortion is  $<1/8$  Wave at 633 nm. Thermal stability is excellent over a broad temperature range. The electro-optic coefficient for RTP is temperature insensitive from about 10 °C to more than 50 °C. Because RTP crystals are not hygroscopic, in an appropriately clean, dust-free, enclosure, all devices within the series can be used without protective windows.



The damage threshold of RTP is of the same order as deuterated  $\text{KD}^*\text{P}$ , approximately 850  $\text{MW}/\text{cm}^2$  for a 10 nanoseconds wide Q-switched pulse at 1064 nm. In gating applications with laser pulses  $<100$  picoseconds, the damage threshold is in the 10  $\text{GW}/\text{cm}^2$  range.

Operating voltages for the 1147 Series are lower than those experienced for  $\text{KD}^*\text{P}$  and BBO in the same aperture sizes. A typical device (Model 1147-6-1064) with a 5.5 mm clear aperture and AR coatings for 1064 nm has a half wave retardation voltage of 2400 Volts. Capacitance is also low: for the Series 1147, it is about 5 picofarads. RTP has a high ( $>10^{11}$  Ohms) resistivity and does not exhibit gray track laser damage.

The 1147 Series has an industry standard 35 mm diameter, convenient for optical mounts. The size is compatible with the company's Series 1059  $\text{KD}^*\text{P}$  devices and may be easily replace them in many of the company's E-O systems.

Series 1147 devices are being used in the FastPulse Technology's Models 5046E, 5046SC, and 5057 Laser Pulse Extraction / Chopping Systems, as well as the 5048, 5056, and 5060 Q-switching Systems and 8025S HV Generator.

# 1147 SERIES - NOMINAL SPECIFICATIONS

Model Number	1147-4	1147-6	1147-8
Aperture Diameter, mm	3.5	5.5	7.5
Crystal Material	RTP (rubidium titanyl phosphate - $\text{RbTiOPO}_4$ )		
Peak Optical Power Density Capability (Uniform Beam, no Hot Spots)	850 MW/cm <sup>2</sup> for pulses < 10 nsec wide 10 GW/cm <sup>2</sup> for pulses < 100 psec wide		
$\lambda$ Range for Peak Power Density	400-1300 nanometers		
Transmission	> 98% from 400 nm to 1064 nm		
1/2 Wave Retardation Voltage, Volts			
@ 633 nm	800	1200	1800
@ 800 nm	1100	1650	2475
@ 1064 nm	1600	2400	3600
Extinction Ratio, with Full Aperture Beam	> 200:1 at 633 nanometers		
Rise Time, picoseconds	< 350		
Capacitance, picofarads	< 5		
Weight, grams (approximate)	125		

