# NANOSECOND PHOTOELECTRIC CATALOG

## (2017)

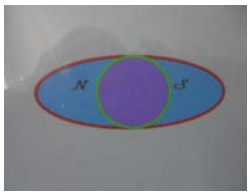
**1. company profile**

JI NAN NANOSECOND photoelectric technology limited company ,focused on crystal materials and components, optical components of the development, production and sales. The company has six experts in crystal production for 20 years and has an excellent team who had rich experience in the processing of the crystal products and optical components, and in close cooperation with the well-known research institutions and university, service for customer of the laser and optical equipment, manufacturing products with exquisite technology, precision instrument and lean management.

The company's main products are laser crystals, nonlinear crystal, electro-optical crystal and E-O Q switch, birefringent crystal, pyroelectric crystal, optical contact crystal components and optical components etc.. Products used in commercial processing machinery, medical, carving, analysis, research, detection, indication, orientation, alignment, display, optical instrument window industry etc..

The company's idea will have been following Confucianism, all customers are our mentor, all partners are our best friends. Ours wish is growth with all customers and partners .

**Phone**:+86-531-88081090
**Mobile phone**:+15628763627
**Email**:sales@nanosecondpe.com
**Website**:www.nanosecondpe.com
**Add.**:No.489, Great bridge town,JINAN,CHINA



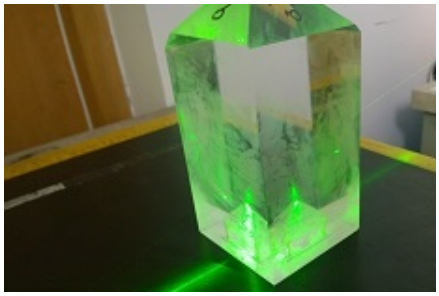
**JINAN NANOSECOND PHOTOELECTRIC TECHNOLOGY CO., LTD**

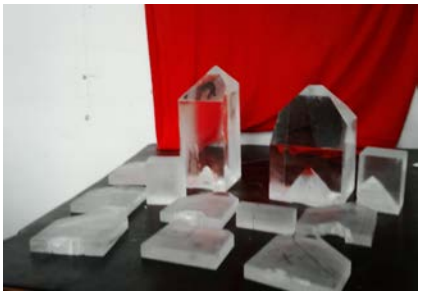
**Parent company:**
**ShanDong Yanggu Constant Crystal Optics ,Inc.**
**Head office:**
**Shandong Yanggu Xiangguang Economic Development Zone**

## 2. Crystal material

### 2.1 DKDP & KDP crystal

■ **DKDP($KD_2PO_4$) crystal**





Growth in aqueous solution by temperature gradient method. The deuterium content is more than 98%. DKDP have high nonlinear coefficient and electro-optic coefficient, transmission range is from 200nm to 2100nm. It has stable quality of Growth. The maximum size of bulk is up to 100*100*220mm.

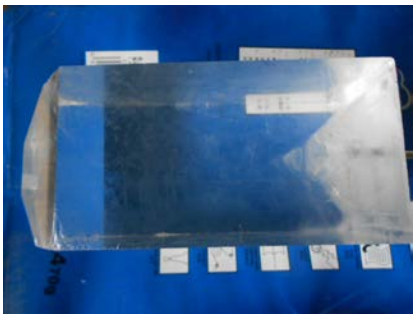
**Application:**

- Electro-opticl modulator, electro-optical deflection, electro-opticl Q-switch.
- SHG, THG, FHG for 1064nm laser, double frequency for dye laser.
- Shutter for high speed photography.
- High power laser frenquency conversion.

**Specification of components:**

| | |
|---|---|
| Dimension tolerance(mm) | ±0.1 |
| Angle tolerance(° ) | <0.1 |
| surface quality (S/D),MIL-PRF-13830B | 40/20 |
| Flatness | Better than λ/10@633nm |
| Transmitting wavefront distortion | Better than λ/8@633nm |
| Parallelism (″) | <10 |
| Perpendicularity (′) | <5 |
| Clear aperture | >90% |
| Coating | AR/AR@1064,R<0.2% |

■ **KDP($KH_2PO_4$) crystal**



Potassium Dihydrogen Phosphate (KDP) are currently used for electro-optical modulation and frequency conversion. N.S.'s KDP have high nonlinear coefficient and high optical damage threshold. It can be used electro-optical modulator, Q- switch and shutters for high speed photography.

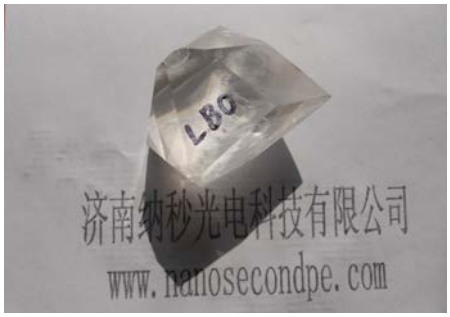
**Application:**

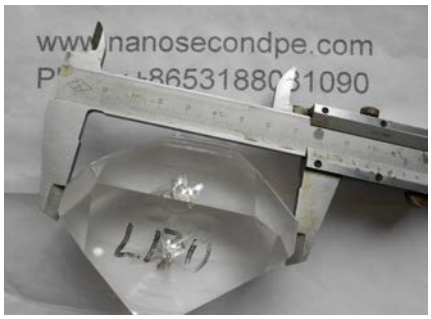
- Electro-optical modulator,Q- switch.
- Second,,third and fourth harmonic generation,double frequency for dye laser.
- Shutter for high speed photography.
- High power laser frequency conversion.

**Specification:**

| | |
|---|---|
| Size(mm) | 10×10×10～150×150×50 |
| Dimension tolerance(mm) | ±0.1 |
| Angle tolerance(˚) | <0.1 |
| Scratch/dig | 40/20 |
| Flatness(633nm) | λ/8 |
| Parallelism(“) | 10 |
| Perpendicularity(‘) | <10 |
| Clear aperture | >90% |
| Coating | AR/AR, $R_{1064}$<0.2%; $R_{532}$<0.5% |
| All sizes are available according to the requirement of the user | |

### 2.2 LBO($LiB_3O_5$) crystal

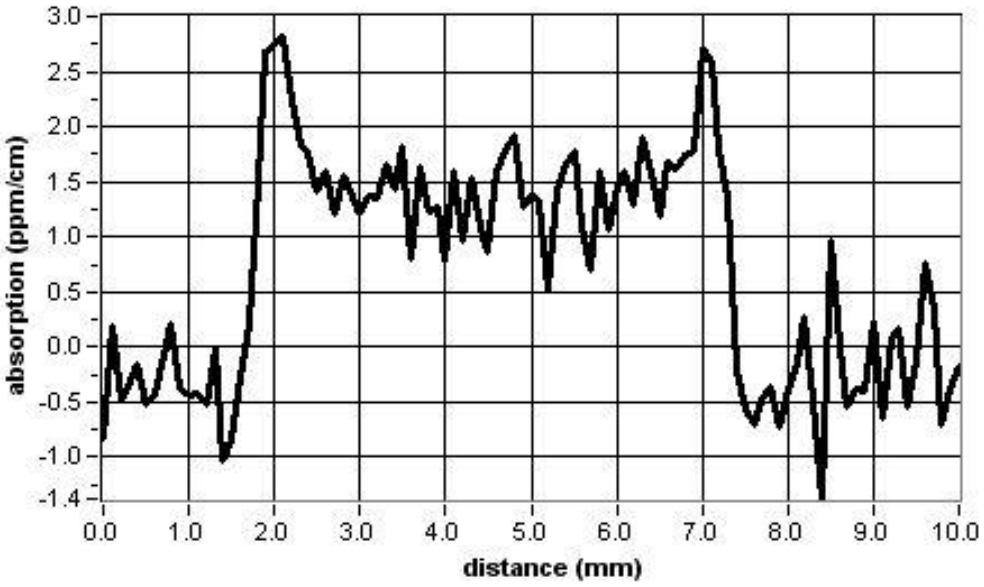



The growth of LBO crystal by melt method, the biggest feature is a good chemical and mechanical properties, high optical homogeneity ($\Delta n=10^{-6}$), Wide acceptance angle and small walk-off, high optical damage threshold, Broad transparency range (160-2600nm), mild deliquescence.

**Feature:**

- Large size
- Ultra low absorption
- The high laser damage threshold



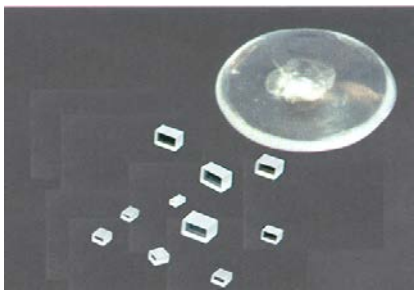

**Application:**

- Frequency conversion: Used for SHG and THG, The light - light conversion efficiency is very high. Suitable for high power laser
- Optical parametric amplifier (OPA) and optical parametric oscillator (OPO).
- For 1064nm, 1319nm sum frequency, the output laser can produce 589nm.
- Optical switch.

**Specification of components:**

| | |
|---|---|
| Dimension tolerance(mm) | ±0.1 |
| Angle tolerance(° ) | <0.1 |
| Surface quality (S/D),MIL-PRF-13830B | 10/5 |
| Flatness | Better than λ/10@633nm |
| Transmitting wavefront distortion | Better than λ/8@633nm |
| Parallelism (″) | <10 |
| Perpendicularity (′) | <5 |
| Clear aperture | >90% |
| Coating | AR:R<0.2% |
| Price(USD/pc) | On request |

### 2.3 β-BBO(β-$B_aB_2O_4$) crystal



BBO crystal growth by melt method has a good optical homogeneity, high doubling efficiency, Wide acceptance angle to temperature, high damage threshold, transmission range is from 190 to 3500nm, moderate deliquescence.

**Application:**

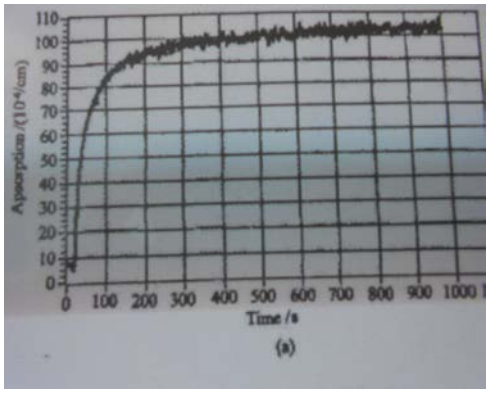
- Second, third, fourth and fifth harmonic generation for Nd:YAG and Nd:YLF laser. SHG, THG, FHG for Ti:Sappire and Alexandrite laser. frequency doubling, tripling and mixing of Dye laser. frequency doubling of Argon Ion,Ruby and Copper-Vapor lasers, It is able to output visible light and up to deep UV light.
- Optical parametric amplifier (OPA) and optical parametric oscillator (OPO). BBO can be used in optical parametric oscillation and amplification to output the atmosphere window wavelength by generating low frequency laser.
- Electro-opticl Q- switch.
- The application of R&D ,the solid-state tunable laser, ultrafast pulsed laser, deep UV laser.

**Specification of components:**

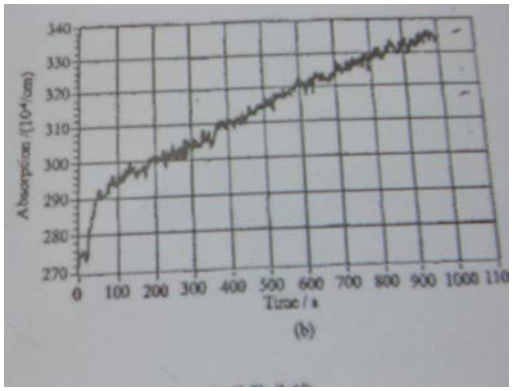
| | |
|---|---|
| Dimension tolerance(mm) | ±0.1 |
| Angle tolerance(° ) | <0.1 |
| Surface quality (S/D),MIL-PRF-13830B | 10/5 |
| Flatness | Better than λ/10@633nm |
| Transmitting wavefront distortion | Better than λ/8@633nm |
| Parallelism (″) | <10 |
| Perpendicularity (′) | <5 |
| Clear aperture | >90% |
| Coating | (BB)ARcoating,Pcoating,R<0.2% |
| Price(USD/pc) | On request |

### 2.4 GTR-KTP/KTP($KT_iOPO_4$) crystal

Using new chemical techniques to purify materials, controlling conditions of growth, it is possible to make low absorptive KTP. It is called gray track resistance KTP (GTR-KTP) ,and absorption of GTR-KTP is shown below.




(a) GTR-KTP




(b) KTP

**Features of GTR-KTP:**

- low absorption at 1064 and 532nm.
- The optical conversion efficiency increase 20%.
- Damage threshold is higher（>2.0GW/cm$^2$,1064nm,10ns,10HZ）.

**Application:**

- Frequency doubling of 1064nm, output high power green laser. THG of 1319nm, output 440nm blue laser. Used in medical, mechanical, ocean optics, military and other industries.
- Optical parametric oscillation and amplification, output tuning laser from 600nm to 4500nm. widely used for ranging, communication, space exploration.
- Electro-optic modulation, optical switch, positioning coupling.
- Optical waveguide, improve the photoelectric device integration degree.

**Specification of components:**

| | |
|---|---|
| Dimension tolerance(mm) | ±0.1 |
| Angle tolerance(° ) | <0.1 |
| Surface quality (S/D),MIL-PRF-13830B | 10/5 |
| Flatness | Better than λ/10@633nm |
| Transmitting wavefront distortion | Better than λ/10@633nm |
| Parallelism (″) | <10 |
| Perpendicularity (′) | <5 |
| Clear aperture | >90% |
| Coating | AR,R<0.2%, HR,R>99.8% |
| Price(USD/pc) | On request |

Our company's cryctal components of GTR-KTP and KTP, the wavefront distortion is small, can use in high quality laser beam device.

**Service:**

- Accurate quality control.
- Quick delivery.
- Free technical support.
- Free components repair.

## 2.5 KTA($KTiOAsO_4$) crystal

**Application:**

- Optical Parametric Oscillation (OPO).
- Large nonlinear coefficients ,broad angular and temperature bandwith.
- Low dielectric constants, low ionic conductivities . Lower absorption in the 3-4 um spectr um range than KTP.
- Resistant to high intensity laser radiation.
- Frequency doubling (SHG @1083nm-3789nm).
- Sum and Difference Frequency Generation (SFG)/( DFG).

**Specification:**

| | |
|---|---|
| Dimension tolerance(mm) | ±0.1 |
| Angle tolerance(° ) | <0.1 |
| Surface quality (S/D),MIL-PRF-13830B | 10/5 |
| Flatness | Better than λ/10@633nm |
| Transmitting wavefront distortion | Better than λ/10@633nm |
| Parallelism (″) | <10 |
| Perpendicularity (′) | <5 |
| Clear aperture | >90% |
| Coating | AR,BBAR |
| Optical damage threshold | 1.0 GW/$cm^2$ ,10ns pulses @ 1064 nm |
| Price(USD/pc) | On request |

## 2.6 RTP($RbTiOPO_4$) crystal

**Properties**:

| | |
|---|---|
| Chemical formula | RbTiOPO4 |
| Crystal structure | Orthorhombic |
| Point group | mm2 |
| Lattice parameters, Å | a =12.96，b =10.56，c =6.49 |
| refractive index(1064nm) | nx=1.86,ny=1.85, nz=1.78, |
| Transparency range,nm | 350-4500 |
| Residual absorption | 100ppm/cm@1064nm,1%/cm@532 nm |
| Electro-optical constants (@ 633 nm, 1 kHz),pm/v | r33 =39.0n,r13 =12.5,r23 =17.0 |
| Dielectric constant(εeff) | 13 |
| Hygroscopic susceptibility | None |
| Density, g/cm$^3$ | 3.6 |
| Z-axis conductivity (25℃), Ω$^{-1}$.cm$^{-1}$ | $10^{-11}$ — $10^{-12}$ |
| Aperture mm$^2$ | up to 20x20 |
| Length mm | up to 40x40 |

**Applications:**

- E-O modulators,E-O Q-switch.
- Frequency double.

**Specification:**

| | |
|---|---|
| Dimension tolerance(mm) | ±0.1 |
| Angle tolerance(° ) | <0.1 |
| Surface quality (S/D),MIL-PRF-13830B | 10/5 |
| Flatness | Better than λ/10@633nm |
| Transmitting wavefront distortion | Better than λ/10@633nm |
| Parallelism (″) | <10 |
| Perpendicularity (′) | <5 |
| Clear aperture | >90% |
| Optical damage threshold | 1.0 GW/cm2 ,10ns pulses @ 1064 nm |
| Price(USD/pc) | On request |

### 2.7 $N_d$:$YVO_4$ & $YVO_4$ crystal

■ **$N_d$:$YVO_4$**

Because of large emission cross section, low lasing threshold, high slope efficiency, high

absorption over a wide puming wavelength, good chemical and mechanical properties, $N_d$:$YVO_4$ is a kind of laser crystal material. Initially ,it is used for the small power DPSS, Along with the development of LD and laser systems, the power of DPSS is able to be up to tens of watts. Output power is good stability, Laser beam there is high polarization and good model.

**Application:**

- Laser medical, biochemical inspection.
- Mechanical and materials processing, architecture, mining—measurement, positioning and pointing.
- Phase delay, polarizing in optical system.
- Adjusting to military equipment.

■ **$YVO_4$**

$YVO_4$ crystal has a wide tiansparency range(400-5000nm) and large birefringence. It is an excellent synthetic substitute for Calcite($CaCO_3$) and Rutile($TiO_2$) crystal.

**Application:**

- Optical polarization components.
- Optical communication devices: optical isolators, circulators, beam displacer.

**Specification of components ($N_d$:$YVO_4$/$YVO_4$):**

| | |
|---|---|
| Dimension tolerance(mm) | ±0.1 |
| Angle tolerance(° ) | <0.1 |
| Surface quality (S/D),MIL-PRF-13830B | 10/5 |
| Flatness | Better than λ/10@633nm |
| Transmitting wavefront distortion | Better than λ/8@633nm |
| Parallelism (″) | <10 |
| Perpendicularity (′) | <5 |
| Clear aperture | >90% |
| Coating | AR,R<0.5%, HR,R>99.8% |
| Price(USD/pc) | On request |

### 2.8 Yb:KYW crystal


Yb:KYW crystal is an excellent laser gain material and are used as a lasing materials to generate ultrashort high power pulses. Yb:KYW can be used as ultrashort pulses amplifiers too. It is one of the best materials for high power thin disk lasers. Its broad spectral emission band 1023-1060nm allows the generation of ultrashort(80 -200 fs) high power pulses. Its wide absorption spectrum at 981 nm and high absorption of pump radiation allow an efficient use of diode laser pumping.Yb: KYW has the advantage of larger absorption cross section, which decreases the minimum pump intensity necessary

to achieve transparency in the quasi-two-level system of ytterbium.

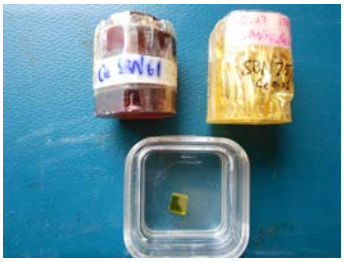
**Basic Properties :**

| | |
|---|---|
| Crystal structure | monoclinic |
| Yb3+ concentration | 0.5-100% |
| Point group | C2/c |
| Cell Parameters | a=8.13Å;b= 10.36 Å; c = 7.59 Å; β=94.26° |
| Melting Point: | 1045℃ |
| Density, g/cm3 | 6.61 |
| Mohs hardness | 4.0 |
| Transmission range | 350–5500 nm |
| Refractive indices(1064nm,25°c) | $N_p$=1.9688,$N_m$=2.0065,$N_g$=2.0507 |
| Lasing Wavelength | 1023-1060nm |
| Absorption band | 981nm(FWHM 8nm) |
| Absorption cross section | 1.33×10-19cm$^2$ |
| Stimulated emission cross section (E‖a) | 3×10-20cm$^2$ |
| Fluorescent lifetime | 0.6ms (10% doping) |
| Thermal conductivity | 3.6W/m.K |

**Specifications of Yb:KYW :**

| | |
|---|---|
| Orientation | [010], Nm axis is parallel to input/output faces |
| Standard Dopant concentration (at. %) | 10% |
| Maximum length | 40mm |
| Size tolerance, mm | ±0.1 |
| Parallelism | 10″ |
| Flatness | λ/10@633nm |
| Perpendicularity | < 10' |
| Surface quality | 10/5 (MIL-PRF-13830B) |

## 2.9 SBN($S_{r1-x}Ba_xN_{b2}O_6$) crystal



SBN is a excellent pyroelectric crystal. pyroelectric coefficient is the biggest, It has a wide tiansparency range (400-5000nm). chemical and mechanical performance is good. In using,it need not any additional window material. thermic sensitivity is high , reaction time is short, It is easy for miniaturization of equipment.

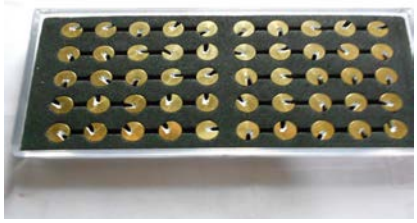
**Application:**

- Image amplification,imaginary holographic storage,image edge detect.
- Infrared spectrometer, infrared remote sensing.
- Thermal radiation detector, infrared laser detector.

**Specification of components**

| | |
|---|---|
| Dimension tolerance(mm) | ±0.1 |
| Angle tolerance(° ) | <0.1 |
| Surface quality (S/D),MIL-PRF-13830B | 20/10 |
| Flatness | Better than λ/10@633nm |
| Transmitting wavefront distortion | Better than λ/8@633nm |
| Parallelism (″) | <10 |
| Perpendicularity (′) | <5 |
| Clear aperture | >90% |
| Price(USD/pc) | On request |
| Free polarization service | |

## 2.10 Optical contact crystal components



Nd:YVO4 and KTP are combined together by Van Der Waals force, is called optical contact crystal components. It need not adjustment between Nd:YVO4 and KTP crystal. In using is easy.

**Application:**

- Green laser source.

- Mini-projector, laser display.
- Mechanical and materials processing, architecture, mining—measurement, positioning and pointing.
- Adjusting to military equipment.

**Specification of components:**

| | | |
|---|---|---|
| Crystalsize,mm | 0.8×0.8×2.5 | 2×2×4 |
| Cell size,mm | Φ7.5×4/Φ8×4 | No cell |
| Input wavelength,nm | 808 | 808 |
| Output wavelength,nm | 532 | 532 |
| Beam mode | $TEM_{00}$ | $TEM_{00}$ |
| Pump power,mW | 200-1000 | 200-2000 |
| Output power,mW | 5-250 | 10-600 |
| Price(USD/pc) | On request | |

## 2.11 Optical components

**Prism**

**Prism&window**

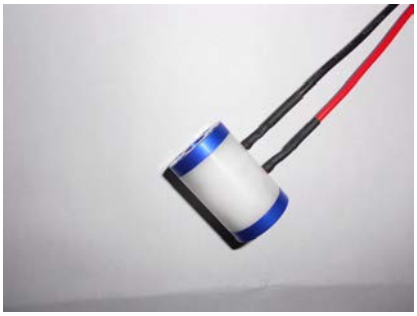
**Material:**BK7,H-K9L, JGS1, JGS2, JGS3

**Specification of components:**

| | |
|---|---|
| Dimension tolerance | ±0.1mm |
| Surface quality | 10/5(S/D),MIL-PRF-13830B |
| Flatness | Better than λ/10@633nm |
| Transmitting wavefront distortion | Better than λ/10@633 |
| Parallelism | 5',1′, 10″ |
| Angle tolerance | 3″～3′ |
| Chamfer | 0.25mmx45° |
| Clear aperture | >90% |
| Coating | AR,BBAR,R<0.2;HR,R>99.8% |
| Price(USD/pc) | 0n request |

## 3. E/O Q-switch(Pockels cell)

### 3.1 DKDP(KD*P) E/O Q- switch

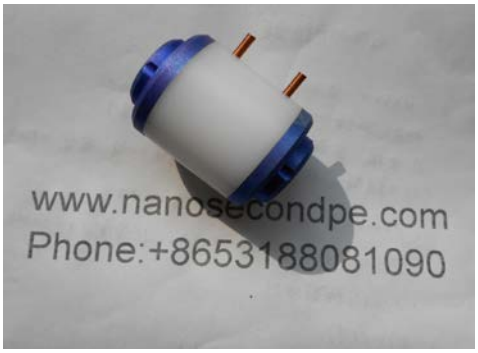


Q- switch produced by our company has stable performance at working, good repeatability, narrow pulse width, high transmittance, low loss, convenient installation. **According to customer specifications for making as well**. Compared with other Q- switch manufacturers, Q- switch in our company has the processing precision, high output power, output mode is good, low half wave voltage, high sensitivity, simple adjustment, high and low temperature resistance advantages.

**Specification of Q- switch:**

| Model | NSP-D-08 | NSP-D-10 | NSP-D-12 |
|---|---|---|---|
| Crystal size,mm | Φ08×20 | Φ10×20 | Φ12×25 |
| Cell size,mm | Φ25/Φ32×38 | Φ25/Φ32×38 | Φ25/Φ32×40 |
| Clear aperture,mm | Φ7.5 | Φ9.5 | Φ11.5 |
| Wavefront Distortion | <λ/8@633nm | <λ/8@633nm | <λ/8@633nm |
| Extinction Ratio | 3000:1 | 3000:1 | 3000:1 |
| λ/4wave voltage,V(1064nm) | 3400 | 3400 | 3400 |
| Pulse width, ns | 10 | 10 | 10 |
| Output ratio,% | 70 | 70 | 70 |
| Insertion loss，% | 3 | 3 | 3 |
| Capacitance,pF | 3 | 3 | 5 |
| Optical transmision,% | 98 | 98 | 98 |
| Coating | AR/AR@1064nm, R<0.2% | | |
| Repetition frequency | <100HZ | | |
| Work temperature,℃ | -40 — +50 | | |
| Price(USD/each) | 750 | 895 | 1180 |

### 3.2 RTP E/O Q-switch




RTP electro-optic Q- switch ( Pockels cell ) produced by our company,are mainly used in high repetition frequency laser. Its haracteristics are: repetition frequency can reach 500kHz, low half wave voltage, no piezoelectric effect, through a wide range of wavelength, without additional temperature compensation device. Can be customized according to customer requirements specifications.

**Specification of Q- switch:**

| Model | NSP-R-03 | NSP-R-04 | NSP-R-06 |
|---|---|---|---|
| Clear aperture，mm | Φ2.8 | Φ3.8 | Φ5.8 |
| Cell size，mm | Φ35×50 | Φ35×50 | Φ35×50 |
| Parallelism | 10″ | 10″ | 10″ |
| Wavefront Distortion | <λ/8@633nm | <λ/8@633nm | <λ/8@633nm |
| Extinction Ratio | >200:1 | >200:1 | >200:1 |
| λ/2wave voltage,V(1064nm) | <1200 | <1600 | <2100 |
| Capacitance | 3pF | 3pF | 5pF |
| Coating | AR/AR@1064nm,R<0.2. or on request | | |
| Repetition frequency | <500kHZ | | |
| Damage threshold | 800MW/cm2(1064nm,10ns) | | |
| Price(USD/each) | On request | | |

### 3.3 Water Cooled BBO Pockels cell (NEW)

**Feature:**

- Water cooling medium, the laser beam performance is more stable
- The ability to resist laser damage is stronger

**Specification of Q- switch:**

| Items | NSP-B-3 | NSP-B-4 | NSP-B-5 | NSP-B-6 | NSP-B-7 |
|---|---|---|---|---|---|
| Clear aperture diameter, mm | 2.6 | 3.6 | 4.6 | 5.6 | 6.6 |
| Crystal size , mm | 3x3x20 | 4x4x20 | 5x5x20 | 6x6x20 | 7x7x20 |
| Quarter wave voltage(@1064 nm), kV DC | 1.8kV | 2.4kV | 3.0kV | 3.4kV | 4.0kV |
| Capacitance, pF | <5 | <5 | <5 | <5 | <5 |
| Contrast ratio | >30dB | >30dB | >30dB | >30dB | >30dB |
| Single pass insertion loss@1064nm | <1.5% | <1.5% | <1.5% | <1.5% | <1.5% |
| Cell size, mm | ϕ60x/76 | ϕ60x76 | ϕ60x76 | ϕ60x76 | ϕ60x76 |
| Damage threshold, @1064nm, 10HZ, 10ns | 10J/cm$^2$ | | | | |

## Informations:

**Phone**:+86-531-88081090
**Mobile phone**:+15628763627
**Email**:sales@nanosecondpe.com
**Website**:www.nanosecondpe.com
**Add**:No.489, Great bridge town,JINAN,CHINA

**JINAN NANOSECOND PHOTOELECTRIC TECHNOLOGY CO., LTD**

**Parent company:**
**ShanDong Yanggu Constant Crystal Optics ,Inc.**
**Head office:**
**Shandong Yanggu Xiangguang Economic Development Zone**
**Phone:+86 635 2952888**
**Fax:+86 635 2952233**
**E-mail:adalee@sdhengjing.com**
**Website:www.sdhengjing.com**