

Pockels Cells

Pockels cells devices are fabricated from KD*P (DKDP), RTP, BBO and Lithium Niobate. Our business partner, Fastpulse Technology, Inc., Lasermetrics Division integrates its E-O crystal devices with its high voltage, nanosecond switching time electronic drivers to provide convenient, highly reliable optical switching systems for regenerative amplifiers, Q-switching and optical chopping applications. Crystals are selected for purity and perfection resulting in the lowest possible operating voltages and the highest contrast ratios.

*Export or re-export of this product may require U.S. Government approval. For details, contact us.



Q-Switches / Electro-Optic Modulators / Pockels Cells

KD*P Pockels Cells

- **1040 SERIES** POCKELS CELL ELECTRO-OPTIC LIGHT MODULATORS ([See the data sheet attached.](#))
- **MODEL CF1043** POCKELS CELLS LARGE APERTURE DKDP ELECTRO-OPTIC LIGHT MODULATORS
- **1058 SERIES** ELECTRO-OPTIC Q-SWITCHES ([See the data sheet attached.](#))
- **Q1059P SERIES** POCKELS CELL Q-SWITCHES / MODULATORS ([See the data sheet attached.](#))
- **1070 SERIES** 50 OHM IMPEDANCE ELECTRO-OPTIC MODULATORS
- **MODELS 1111 / 1112** PICOSECOND POCKELS CELLS
- **1144 SERIES** LARGE APETURE POCKELS CELLS
- **1145 SERIES** POCKELS CELL ELECTRO-OPTIC Q-SWITCHES
- **1148 SERIES** 1" DIAMETER DKDP POCKELS CELL ELECTRO-OPTIC Q-SWITCHES ([See the data sheet attached.](#))

RTP Cells

- **1147 SERIES** RTP ELECTRO-OPTIC MODULATORS AND Q-SWITCHES

BBO Cells

- **1150 SERIES** BBO POCKELS CELL Q-SWITCHES

Transverse Field KD*P Modulator

- **3079 SERIES** LOW VOLTAGE LIGHT MODULATORS

Here are the data sheets of our popular Pockels Cells used for Q-Switches: [1148 series](#), [1040 series](#), [1058 series](#), and [1059 series](#). For technical details, contact us: sales@newsourcetechnology.com.

NEW**SOL GEL
AR COATINGS
Are Standard
On All Models
In This Series**

Lasermetrics 1148 E-O Modulator/Q-switches are intended for OEM systems that incorporate 1" (25.4 mm) diameter Pockels cells. The small diameter permits drop-in replacement in existing systems requiring a 1" diameter cell. The 1148 features unique all-gold electrical contacts for highest pulse repetition rates (5 kHz) and high voltage requirements. The 1148 accommodates the most demanding high peak power laser applications. All models within the series utilize an enhanced, cement free internal crystal support and superior sealing system. The devices incorporate highest quality crystals, fused quartz windows and high damage threshold antireflection coatings.

E-O performance of the 1148 Series is based on highly deuterated (98+ %D, potassium dideuterium phosphate)-DKDP (KD* P) crystals, selected for the absence of strain and stria, lowest residual birefringence and wavefront distortion. The cylindrical ring electrode-crystal configuration produces the most uniform retardation field currently available. Crystals are mounted in durable and mechanically stable Delrin thermoplastic housings. Stainless Steel window holders with thin, low diffraction ceramic aperture plates are used in all models. Windows are bubble and strain-free fused quartz with high efficiency antireflection coatings.

Sol Gel antireflection coatings are applied to the crystal for highest peak and average power applications. Sol Gel coatings are extremely efficient, having reflectance losses of about 0.05%. Damage threshold for Sol Gel coatings is at least as high as that of the KD* P crystal material

While Sol Gel crystal coatings have largely replaced Index Matching Fluid (IMF) for the visible through Near IR, these coatings are not efficient in the UV range below 400 nm. For UV applications, when IMF is required to minimize reflection losses at the window-crystal interfaces, we recommend our Series 1040 – which includes models with apertures from 10 to 20 mm.



This new 10 mm aperture cell is the latest in our extensive line of DKDP Pockels cells and is based on our popular Q1059 series.

A variety of antireflection coatings options are available. The 1148 model can be specified with wedged or parallel window surfaces and with the crystal cut at a desired off-axis or wedge angle.

In very fast pulse gating applications, with laser pulses widths less than 100 picoseconds, the 1148 Series has a nominal damage threshold of 20 Gigawatts/cm². In Q-switching applications with pulse widths less than or equal to 10 nanoseconds the 1148 Series will tolerate more than 850 Megawatts/cm².

Lasermetrics 5055 and 5056 Q-switch drivers, and 5046ER & 5046SC Laser Pulse Gating/Extraction / Picking Systems and 8025RS HV Pulse Generator can be used with all models within the 1148 series.

1148 Series devices are guaranteed against defects in materials and workmanship for one year.

NOTES:

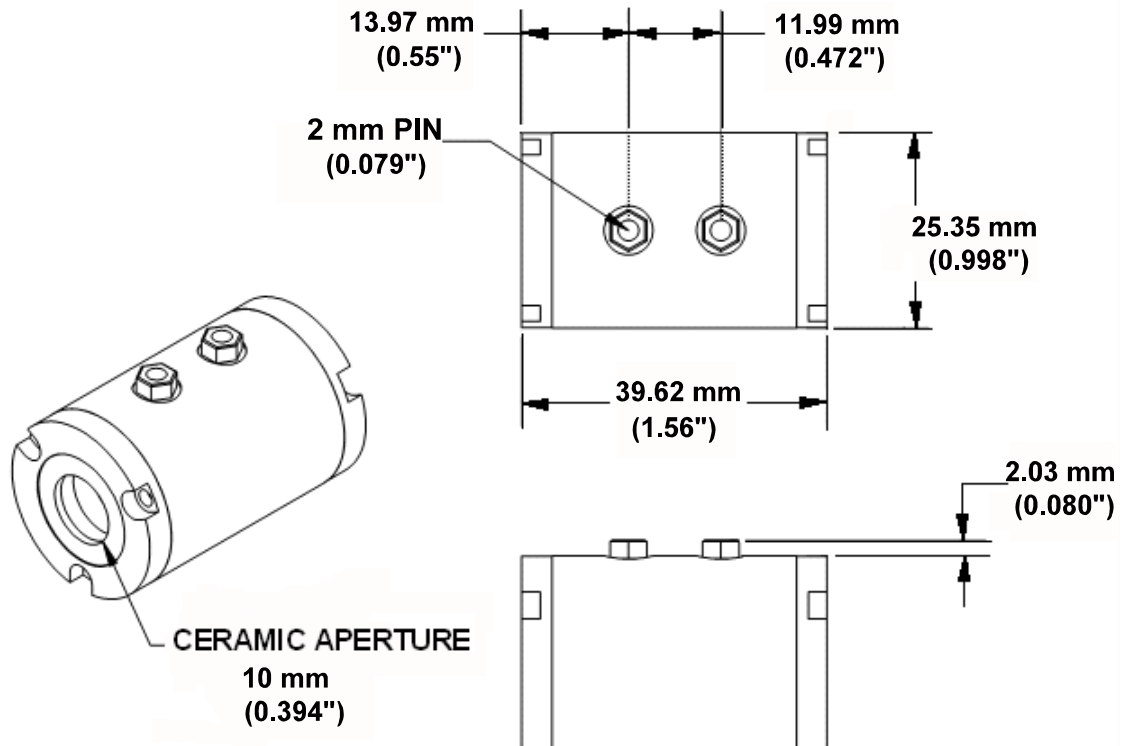
Drop in replacement for most 1 inch diameter Q-switches currently in use.

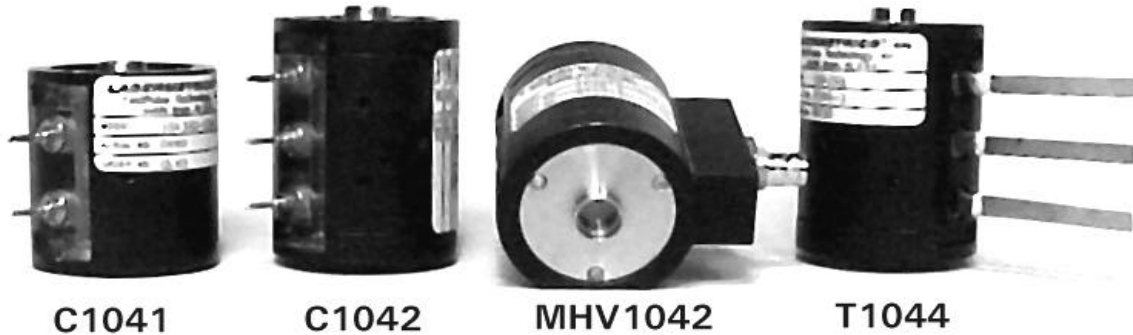
Available with permanently connected, high voltage insulated wire leads and flush terminals.

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1148 SERIES - NOMINAL SPECIFICATIONS

Aperture Diameter	10 mm diameter
Crystal Material	98.5+ % Deuterated DKDP (KD* P)
Peak Optical Power	1 Gigawatt/cm ² for pulses < 10 nsec wide
Density Capability (Uniform Beam, no Hot Spots)	10 Gigawatts/cm ² for pulses < 200 psec wide 20 Gigawatts/cm ² for pulses < 10 psec wide
Wavelength Range for Peak Power Density	530 to 1100 nanometers
Transmission, with "V" AR coatings	> 98% from 500 nm to 1064 nanometers
Quarter Wave Retardation Voltage	@ 694 nm: 2.1 kilovolts @ 1064 nm: 3.2 kilovolts
Extinction Ratio (Contrast Ratio) at 1064 nm	
75% of Full Aperture, Intrinsic:	> 2500:1
With ½ wave retardation voltage:	> 2000:1
Single Pass Wavefront Error	< 1/8 wave
Intrinsic Rise Time	< 350 picoseconds
Capacitance	< 5 picofarads
Weight (approximate)	50 grams





1040 Series Pockels cell light modulators are designed for high speed laser shutter and pulse chopper applications external or internal to the laser cavity. They are also utilized as Q-Switches, cavity dumpers and polarization rotators. The basic mechanical design is configured to accept a variety of connection devices to meet most system requirements.

Basically capacitive in impedance, they utilize low inductance, wide copper tab leads to minimize device RC and L/R time constants thereby allowing switching times as fast as 300 picoseconds in 10 millimeter aperture models. Miniature banana pins, useful for direct connection to printed circuit board drivers, as well as N, BNC, HN, MHV and SHV type connectors for cable impedance matching are available. For capacitive or source terminated use, tab leads are located on one side while the "straight through" configuration, with matching input and output copper tab leads, is used for load terminated applications.

The 1040 Series mechanical configuration yields the lowest capacitance devices for a given aperture size. It facilitates experimentation and impedance matching with transmission lines, Blumlein structures, spark gaps, and solid state FET or avalanche transistor type drivers.

Low capacitance of both single and dual crystal types simplifies their use with resonated electrical drives in UHF applications. Dual crystal types operate at one half the voltage of single crystal types.

Crystals used in the 1040 Series are KD*P ($98 \pm D_2\%$, KD_2PO_4) grown and fabricated at Lasermetrics. They are selected to be free from strain, stria, inclusions, lowest residual birefringence and wavefront distortion. The standard optical finish on crystals is: flatness $1/8$ wave; parallelism 10 arcseconds. Windows are bubble and strain-free fused quartz with a 10-5 optical finish. Wedged crystals and windows as well as integrally mounted polarizers, antireflection coatings and index matching fluids are available options.

Sol Gel antireflection coatings can be applied to crystals for highest peak and average power applications. Sol Gel coatings are extremely efficient, having reflection losses of 0.05% per surface. Damage threshold for Sol Gel coatings is at least as high as that of the KD*P crystal material. They are available for the wavelength range of 532 to 1100 nanometers.

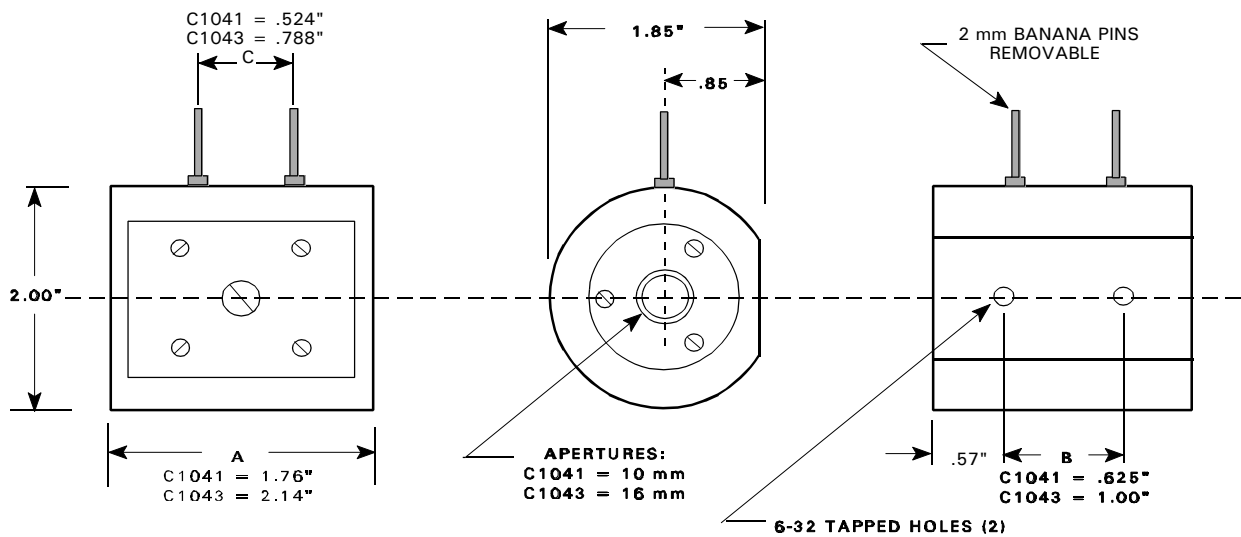
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1040 SERIES - NOMINAL SPECIFICATIONS

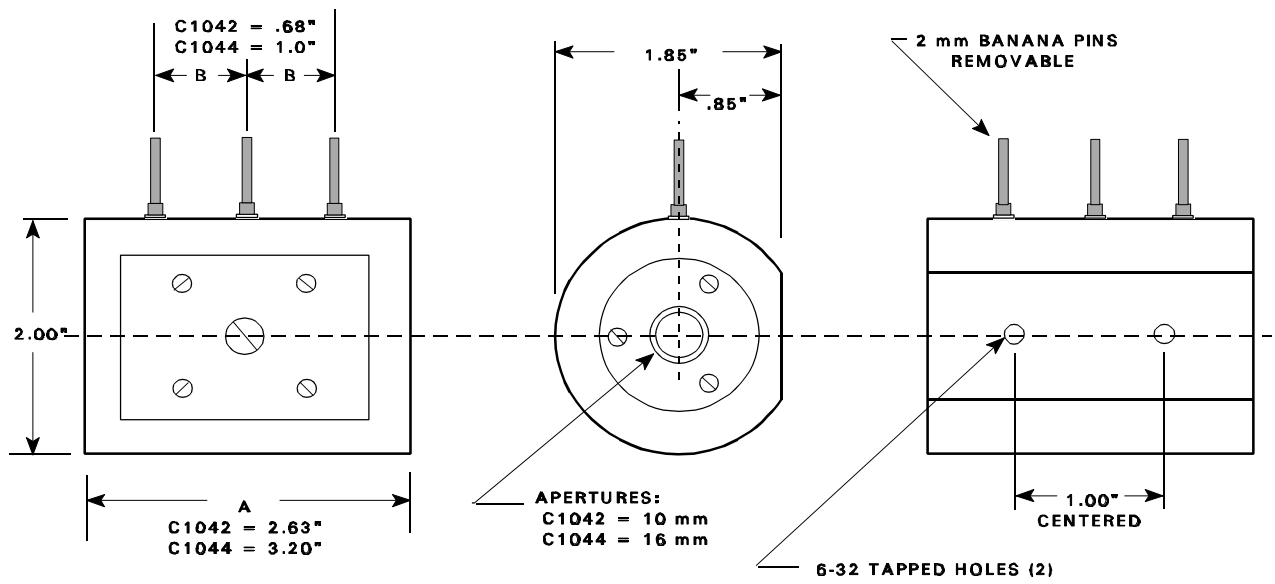
MODEL	1041	1043	1042	1044
Aperture Diameter, mm	10	16	10	16
Number of Crystals	1	1	2	2
Crystal Material	98.5% + % Deuterated D-KDP KD*P)			
Peak Optical Power Density Capability, Uniform Beam, No Hot Spots, sol gel coatings	750 Megawatts/cm ² for pulses < 20 nsec wide 10 Gigawatts/cm ² for pulses < 500 psec wide 20 Gigawatts/cm ² for pulses < 100 psec wide			
λ Range for Peak Power Density	400 to 1100 nanometers			
Transmission, 400 to 1064 nm	98%	98%	95%	95%
Quarter Wave Retardation Voltage kV @694 nm kV @1064 nm	2.1 3.2	2.2 3.3	1.1 1.7	1.2 1.7
Extinction Ratio (Contrast Ratio), Full Aperture Beam, @633 nm	1000:1	800:1	800:1	700:1
Rise Time, 10% to 90%, picoseconds	300	350	450	500
Capacitance, picofarads	5	11	8	17
Weight, kilograms	0.18	0 18.	0.22	0.22

CONFIGURATIONS AND DIMENSIONS

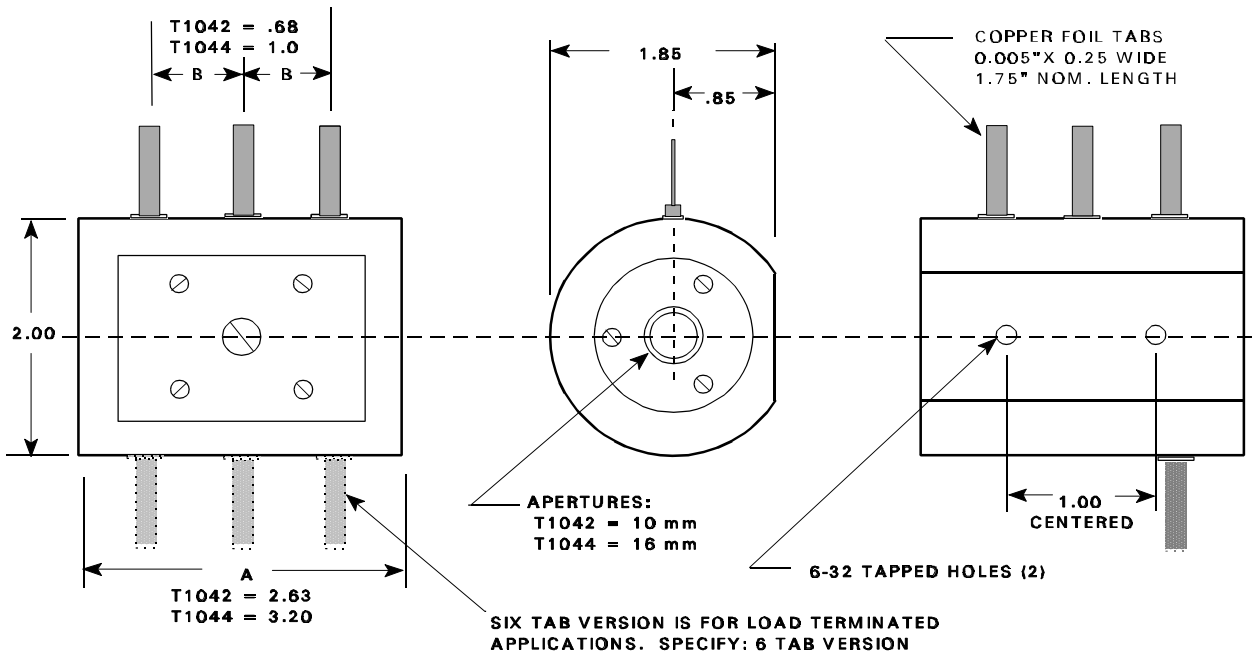
Contact Engineering Sales for details on available connectors and configurations



MODELS 1041 & 1043 SINGLE CRYSTAL MODULATORS

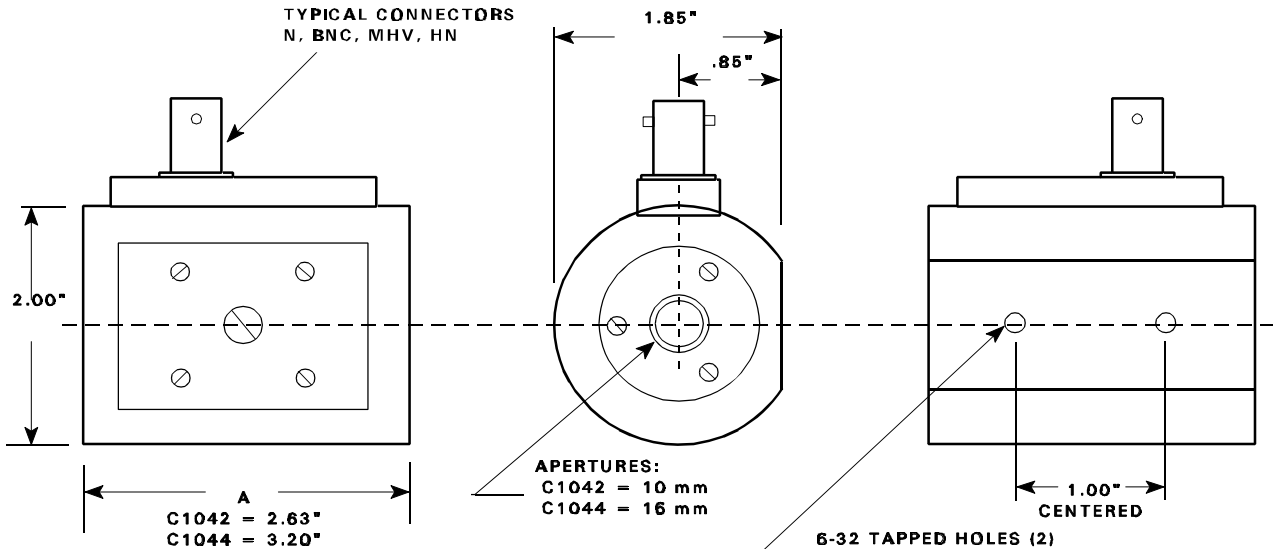


MODELS C1042 & C1044 DUAL CRYSTAL MODULATORS



**MODELS T1042 & T1044 DUAL CRYSTAL MODULATORS
WITH COPPER TAB LEADS**

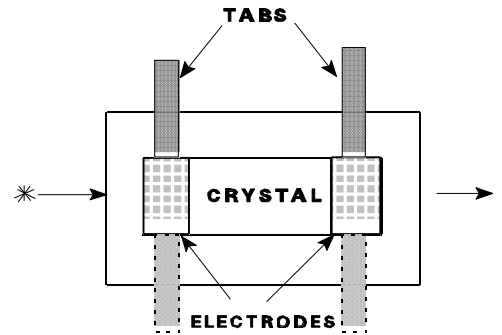
SHOWN: MODELS MHV1042 & MHV1044 DUAL CRYSTAL MODULATORS WITH MHV CONNECTORS. ALL MODELS IN THE 1040 SERIES ARE AVAILABLE WITH A VARIETY OF CONNECTORS AND CONFIGURATIONS.



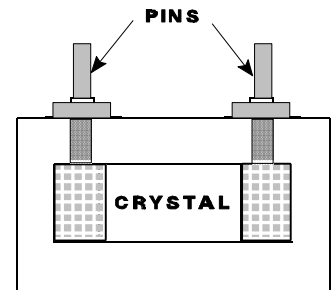
Terminal & Electrode Configurations

(Note: coaxial connectors are available on all models)

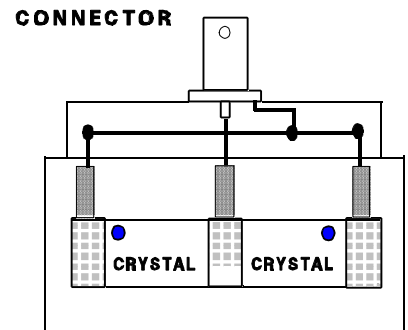
Copper tab leads minimize lead inductance and rise time. For transmission line connection, tabs can be integrated on both sides of the crystal housing for soldering directly to the input driving and output load cables. The output cable is usually terminated with a resistor which matches the cable characteristic impedance, thus preventing electrical reflections.



Miniature Pin Connectors provide the same electrical configurations as tabs. Pin connectors are preferred for ease and reliability of connection. Mating connectors are supplied with the Pockels cell and are also available from electronic supply stores. Standard housing connectors are female. Male connectors (As indicated) are also available standards items.



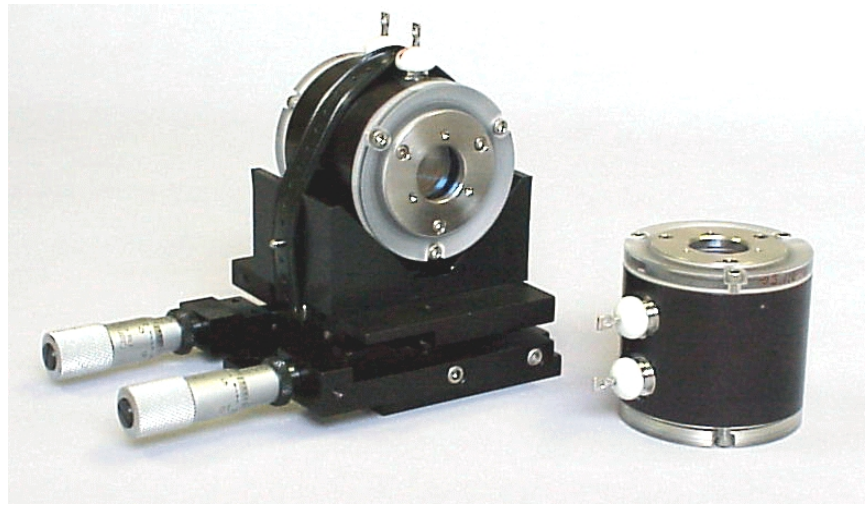
Dual Crystal Configurations: Copper tab leads, miniature pin connectors, coaxial connectors or cables. Crystals are optically in series and electrically in parallel. The dual crystal configuration reduces the required drive voltage by a factor of two compared to a single crystal device since each crystal contributes $\frac{1}{2}$ of the polarization rotation necessary for rotating the input plane of polarization. Note that for a given aperture size, housing & crystal dimensions are identical for all configurations. Dots on the crystals indicate positive direction of the Z crystallographic axis.



Three Electrode, Double Length, Single Crystal units with three independent electrodes are available for specialized switching applications. The configuration is similar to a dual crystal device (shown to the right) but utilizes a double length crystal and each electrode is attached to separate tab leads or pin connectors.

SOL GEL
AR COATINGS
Are Available
On All Models
In This Series

RoHS2



Model 1058-16 Mounted on MGV-145 Pitch/Azimuth Gimbal

Lasermetrics 1058 Q-switches are large aperture electro-optic devices that are used in high energy lasers having beam diameters up to 20 mm diameter. The 1058 Series was used in the earliest Ruby and Nd:YAG medical lasers and the latest, improved versions are presently used in several medical laser systems marketed throughout the world. They will reliably accommodate the most demanding high peak power laser applications. All models within the series utilize an enhanced internal crystal support and superior sealing system. The devices incorporate highest quality crystals, fused quartz windows and high damage threshold antireflection coatings.

1058 Series E-O performance is based on highly deuterated (98+%)D-KDP (KD*P) crystals, selected for the absence of strain and stria, lowest residual birefringence and wavefront distortion. A cylindrical ring electrode-crystal configuration produces the most uniform retardation field currently available. Crystals are mounted in durable and mechanically stable aluminum housings. Stainless steel aperture plates are used in all models. Windows are bubble and strain-free fused quartz with high efficiency antireflection coatings.

Sol Gel antireflection coatings can be applied to the crystal for highest peak and average power applications in the wavelength range of 650 nm to 1100 nm. Sol Gel coatings are extremely efficient, having reflectance losses of $\approx 0.05\%$.

Damage threshold for Sol Gel coatings is at least as high as that of the KD*P crystal material. For many low repetition rate applications index matching fluid is employed in the hermetically sealed, vacuum tested housing to minimize reflection losses at the window-crystal interfaces.

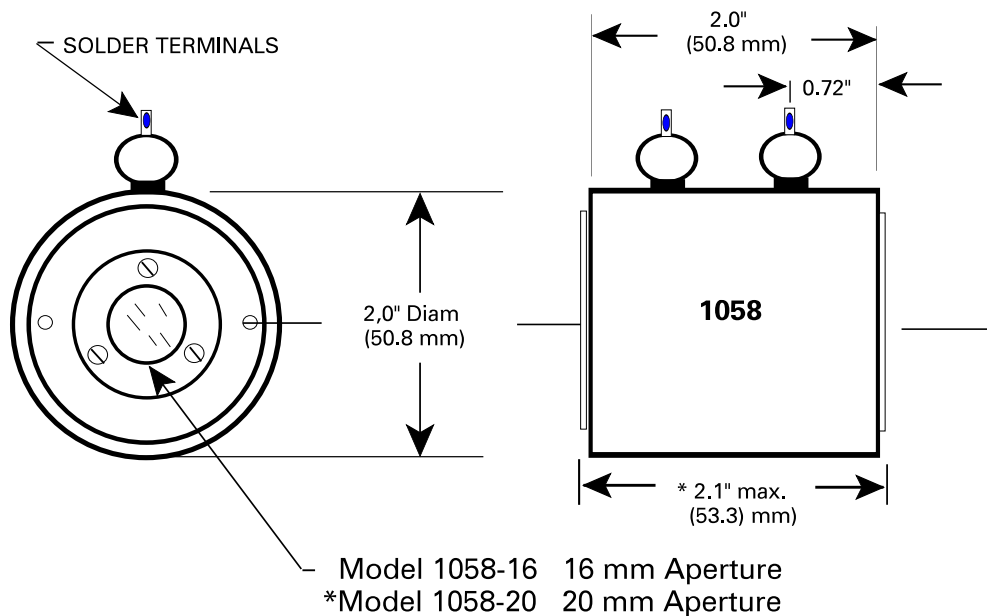
A variety of antireflection coatings and index matching fluid options are available. A key feature of the 1058 Series is the user's ability to adjust the alignment of the fused quartz windows. This may be done while the device is in position in the laser optical train. Simple hex wrench adjustments can tilt each window to be precisely on or off-axis by as much as 2 degrees. All models can be specified with wedged or parallel window surfaces and with the crystal cut at a desired off-axis or wedge angle.

In fast pulse gating applications, with laser pulses less than 100 picoseconds width, the 1058 Series has a damage threshold of ≥ 20 Gigawatts/cm². In Q-switching the devices will tolerate in excess of 850 Megawatts/cm² at less than 10 nanosecond pulse width.

Lasermetrics Q-switch drivers 5055SC, 5056, 8025RS pulse choppers; 5046ER and 5046SC pulse extractors, can be used with all 1058 models within the series. 1058 models have been particularly useful in polarization rotation, circular dichroism and range gating studies.

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1058 SERIES - NOMINAL SPECIFICATIONS	1058-16	1058-20
Aperture Diameter, mm	16	20
Crystal Material	98.5 + % Deuterated D-KDP (KD*P)	
Peak Optical Power Density Capability (Uniform Beam, no Hot Spots)	850 Megawatt/cm ² for pulses < 20 nsec wide 10 Gigawatt/cm ² for pulses < 500 psec wide ≥ 20 Gigawatt/cm ² for pulses < 100 psec wide	
λ Range for Peak Power Density	450-1100 nanometers	
Transmission Range with appropriate AR coatings	~ 98% from ~400 nm to 1064 nm	
¼ Wave Retardation Voltage, @ 694 nm @ 1064 nm	~ 2.1 kilovolts	~ 2.3 kilovolts
	~ 3.2 kilovolts	~ 3.5 kilovolts
Extinction Ratio (Contrast Ratio) with Full Aperture Beam	≥ 1000:1 at 633 nm	
Rise Time	< 350 picoseconds	
Capacitance	~ 6 picofarads	
Weight (approximate)	90 grams	



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- 10 mm & 12 mm Apertures
- Sol Gel AR Coatings on Crystal
- Highest Extinction Ratio
- Lowest Insertion Loss
- Highest Damage Threshold



Lasermetrics Q1059P E-O Modulator/Q-switches are electro-optic devices used in many laser systems world-wide. The 1059P Series originated in 1970 and have been continuously upgraded and improved. They will accommodate the most demanding high peak power laser applications. All models within the series utilize an enhanced internal crystal support and superior sealing system. The devices incorporate highest quality crystals, fused quartz windows and high damage threshold antireflection coatings.

E-O performance of the Q1059P Series is based on highly deuterated (98+ %D, Potassium Dideuterium Phosphate (known as DKDP or KD*P) crystals, selected for absence of strain and stria, lowest residual birefringence and wave front distortion. A cylindrical ring electrode-crystal configuration produces the most uniform retardation field currently available. Crystals are mounted in durable and mechanically stable thermoplastic housings. Stainless steel or Ceramic aperture plates are used in all models. Windows are bubble and strain-free fused quartz with high efficiency antireflection coatings.

Sol Gel antireflection coatings are applied to the crystal for highest peak and average power applications. Sol Gel coatings are extremely efficient, having reflectance losses of about 0.05%. Damage threshold for Sol Gel coatings is at least as high as for the KD*P crystal material

While Sol Gel crystal coatings have largely replaced Index Matching Fluid (IMF) for the visible through Near IR, these coatings are not efficient in the UV range below 400 nm. For UV applications, when IMF is required to minimize reflection losses at the window-crystal interfaces, we recommend our Series 1040 – which includes models with apertures from 10 to 20 mm.

A variety of antireflection coatings options are available. A key feature of the Q1059P Series is the user's ability to adjust the alignment of the fused quartz windows. This may be done while the device is in position in the laser optical train. Simple hex wrench adjustments can tilt each window to be precisely on or off-axis by as much as 2 degrees. The Q1059P model can be specified with wedged or parallel window surfaces and with the crystal cut at a desired off-axis or surface wedge angle.

In very fast pulse gating applications, with laser pulses widths less than 100 picoseconds, the Q1059P Series has a nominal damage threshold of 20 Gigawatts/cm². In Q-switching the devices will tolerate in excess of 850 Megawatts/cm² at less than 10 nanoseconds pulse width.

Lasermetrics Q-switch drivers 5055, 5056, 5046ER & 5046SC Laser Pulse Gating/ Extraction / Chopping Systems and 8025RS HV Pulse Amplifiers are compatible with all Q1059P models within the series.

Q1059P Series devices are guaranteed against defects in materials and workmanship for one year.

NOTES:

1. A 12 mm aperture unit with same outer dimensions as 10 mm aperture model is available as Model Q1059P12SG
2. Ceramic aperture plates (stops) are used in 10 and 12 mm aperture models (Type A aperture plate).
3. Terminals: Removable pin terminals with either 4-40 thread and nuts or solder cups may be specified.

Q1059P SERIES - NOMINAL SPECIFICATIONS

Aperture Diameter	10 mm diameter *(12 mm in Model Q1059P12)
Crystal Material	> 98.5 + % Deuterated DKDP (KD*P)
Peak Optical Power	850 Megawatts/cm ² for pulses < 10 nsec wide
Density Capability	10 Gigawatts/cm ² for pulses < 500 psec wide
(Uniform Beam, no Hot Spots)	20 Gigawatts/cm ² for pulses < 100 psec wide
Range for Peak Power Density	400-1100 nanometers
Transmission, with "V" AR coatings	> 98% from 400 nm to 1064 nm
Quarter Wave Retardation Voltage	@ 694 nm: 2.1 kilovolts DC @ 1064 nm: 3.2 kilovolts DC
Extinction Ratio (Contrast Ratio) with Full Aperture Beam	> 1000:1 at 633 nm
Intrinsic Rise Time	< 350 picoseconds
Capacitance*	< 6 picofarads
Weight (approximate)	90 grams

Ordering Information Examples: Q1059PSG-1064-A – for 10 mm aperture, AR coatings for 1064 nm with Type A aperture plate and ceramic aperture stop.

For 12 mm aperture unit: Q1059P12SG-694-B – for 12 mm aperture, AR coatings for 694 nm with Type B aperture plate.

Electrical Connection: 2 mm pin terminals: Terminals are removable with multiple spring compression contacts in the female connector. Unless otherwise specified, type S is supplied.

Solder Cup Terminal: This is the standard terminal; specify "S" type terminals.

Threaded Post Terminal: supplied with 4-40 screw thread, nuts and washers. Specify "T" terminals.

