

5046ER Systems fill the need for highly reliable, completely solid state instruments that combine electro-optic light modulators with high speed, high voltage switching drivers capable of producing quarter and halfwave retardation voltages over an optical spectrum of 300 nm to more than 2000 nm by selecting the most appropriate Pockels cell.

With rise and fall times as fast as 3 nanoseconds, 5046ER Systems are exceptionally useful for regenerative amplifier switch in-out, laser pulse slicing, mode locked pulse gating, cavity dumping and Q-switching. The systems are valuable for both intracavity and extracavity applications and offer the latest technology in reliable, lowest radiated noise, solid state, high voltage switching design.

5046ER Systems can be configured for a variety of applications. An extensive selection of components and operating parameters is available. The Power Supply/Timing Generator (PS/TG) is a standard 19" wide X 4.75" high (3U size) rack mountable configuration. The Optical Head Assembly (OHA) options are shown on the next page.

Optical switching is accomplished by Series 1040, 1145 and Q1059P KD*P (DKDP); Series 1147 (RTP) and Series 1150 BBO Pockels cells which rotate the incoming plane of polarization of the laser beam. The cells are designed to match the optical wavelength and the electrical characteristics of the 5046E High Voltage MOSFET Switching Driver Modules.

Series 1040 KD*P Pockels cells are available with apertures of 10, 16 and 20 mm and with single or double crystal configurations.

The Q1059P Series Pockels cells are available with 10 and 12 mm clear apertures.

Series 1145 KD*P cells are miniature devices (19 mm Diameter X 25 mm Long) with 8 mm clear apertures.

Series 1147 Pockels cells utilize RTP (Rubidium Titanyl Phosphate), noted for its ability to produce optical switching without superimposing photoelastic ringing on the transmitted beam. RTP modulators use two crystals, a configuration that provides excellent thermal compensation and stability with low operating voltages.

Series 1150 BBO Pockels cells utilizing Beta Barium Borate ($\beta\text{BaB}_2\text{O}_4$) are currently available in aperture sizes of 3, 4 and 6 mm diameters. BBO is noted for its very low piezoelectric response, ability to tolerate high average power and operate in the UV spectrum.



RoHS 

5046ER Systems incorporate a shielded "OHA" (Optical Head Assembly) enclosure for EMI/RFI suppression and a separate Power Supply-Timing Generator cabinet. The systems are RoHS Compliant.

High average and peak power operation with the standard KD*P devices in the range of 500 to 1100 nm is enhanced by the use of Sol Gel antireflection coatings on the crystal surfaces. Damage thresholds in the range of 10 to 20 GW/cm² with laser pulse widths of less than 10 ps and up to 10 GW/cm² with pulse widths < 1 ns are feasible.

The 5046ER System's High Voltage MOSFET Switch Modules are configured for operation at voltages suitable for half wave operation of KD*P longitudinal field modulators in the 1000 nm range (≈ 7 kV). By simply adjusting the front panel HV control, the driver can operate at the quarter wave voltage (or less) without loss of efficiency or increased rise or fall times. Operation in the half wave mode may obviate the usual requirement for a quarter or half wave plate in the optical train in many regenerative amplifier configurations.

Maximum system repetition rate is determined by the Pockels cell capacitance and high voltage setting. For a Model Q1059P Pockels cell (5 pf) and nominal 7 kV operating voltage, the repetition rate is limited to about 5 kHz. At 4 kV maximum voltage, the repetition rate increases to about 7.5 kHz maximum. For RTP Pockels cells, (C = 5 pf) maximum repetition rate is approximately 7.5 kHz, a benefit of RTP's lower operating voltages. BBO Model 1150-6 mm devices can operate at $\frac{1}{2}$ wave retardation at 800 nm.

CONTINUED - OVER

SERIES 5046ER SYSTEMS

5046ER Systems are self-contained. The Optical Head Assembly and HV Power Supply/Timing Generator are packaged in EMI shielded enclosures. Unshielded, open configurations for OEM and end user packaging are also available. A typical shielded system consists of the following elements:

- 5046ER Rack Mountable HV Power Supply/Timing Generator (PS/TG) & Cable Set
- 5046E OR 5046EM Optical Head Assembly containing: Baseplate and Cover, Gimbals
- 5046 High Voltage Switching Modules (located in the OHA)
- Q1059P Series KD*P Pockels cell, with AR coatings. RTP & BBO devices are available
- Optional Mounted Glan-Air polarizers and thin film polarizers are available

Contact our Engineering Sales Group for alternatives and options to match your application

NOMINAL SPECIFICATIONS

Useful Optical Wavelength Range*:	300 to 2200 nm (depends on Pockels cell crystal)
Optical Rise and Fall Times (10 to 90%):	≈4 ns (with Q1059P or 1147) Pockels cells)
Optical Pulse Width Range, FWHM	<5 ns to ≈1 μs
Repetition Rate, single shot to:	5 kHz
Jitter, System Input to Output:	<1 ns
Input-Output Delay Time, adjustable:	50 ns to ≈1 μs
Input-Output Delay Time: directly into HV Output Module:	≈50 ns
Trigger Input Impedance:	50 ohms
Trigger Input Pulse:	
CW Trigger Input: (for extraction of CW/ML pulses)	+2 to 10 volts, 1 ns to 1 μs width
Trigger/Photo Input: (for extraction of Q-SW/ML pulses)	+/- 100 mV to 3 volts, ≤1 ns to 1 μs width
Dimensions:	
Optical Head Assembly, Standard Size:	5046E: 4H X 4.5W X 9.5L, inches
Miniature Size:	5046EM: 4H X 4.5W X 8.25L inches
Power Supply/Timing Generator Cabinet	5046ER - Rack Mount: 4.75H X 19W X 17.1L, (3U)
Power Requirements:	100/115/230 VAC, 50/60 Hz, 30 watts

* Wavelength range is dependent on choice of electro-optic modulator and crystal material. For instance, for operation at 1064 nm with <20 watts average power and peak power densities of more than 500 MW/cm², the Series 1147 RTP modulators would be likely candidates.

