

- ~3 ns Rise & Fall times
- ~6 ns to 2  $\mu$ s Gate Widths
- DKDP, BBO, RTP Pockels Cells
- Long Lifetime, Highest Reliability
- Apertures from 3 to 25 mm

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 (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 several types and Series of Pockels cells: KD\*P (DKDP) Series 1040, 1145, 1148 and Q1059P; RTP Series 1147 and BBO Series 1150. These series include models with apertures ranging from 6 to 20 mm. Pockels cells rotate the incoming plane of polarization of the laser beam in response to an electrical voltage. The cells are designed to match the optical wavelength and electrical characteristics of the 5046E High Voltage MOSFET Switching Driver Modules.

5046ER Systems incorporate a shielded "OHA" (Optical Head Assembly) enclosure for EMI/RFI suppression and a separate Power Supply-Timing Generator cabinet. All interconnecting cables are provided, along with a Users Guide with illustrations on setup and configurations.



RoHS 

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/cm<sup>2</sup> with laser pulse widths of less than 10 ps and up to 10 GW/cm<sup>2</sup> with pulse widths <1 ns are feasible.

The 5046ER System's High Voltage MOSFET Switch Modules are configured for operation at voltages suitable for 1/4 to 1/2 wave operation of KD\*P longitudinal field modulators in the 1000 nm range ( $\approx$  7 kV). By simply adjusting the front panel HV control, or applying a 1 - 10 Volt control voltage, the driver can operate at the 1/4 wave voltage (or less) without loss of efficiency or increased rise or fall times. Operation in the 1/2 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 10 mm aperture 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 1/2 wave retardation at 800 nm.

Pockels cells are normally mounted, on a gimbal, within the OHA. In cases where the cell must be located externally, in an optical assembly or beam path, the cell can be mounted external to the OHA and connected with shielded wires.

## SERIES 5046ER SYSTEMS

5046ER Systems are self-contained. The Optical Head Assembly (OHA) 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%):	~3 ns (with Q1059P or 1147) Pockels cells
Optical Pulse Width Range, FWHM	<5 ns to ~1 $\mu$ s
Repetition Rate, single shot to:	5 kHz
Jitter, System Input to Output:	<1 ns
Input-Output Delay Time, adjustable:	50 ns to ~1 $\mu$ s
Input-Output Delay Time: directly into ON or OFF	
Trigger Inputs on OHA Module	~50 ns
Trigger Input Impedance:	50 ohms
Trigger Input Pulses:	
CW Trigger Input: (for extraction of CW/ML pulses)	+2 to 10 volts, 1 ns to 1 $\mu$ s width
Trigger/Photo Input: (for extraction of Q-SW/ML pulses):	+/- 100 mV to 3 volts, $\leq$ 1 ns to 1 $\mu$ s width
EXT GATE Input (Command Trigger)	1.5 V (10 ns min., 1 $\mu$ s max.)
HV Voltage Control: via Control Knob or BNC Input:	BNC Input: 1 Volt in per 1 kV out , ~150 ms time constant
HV Operating Range for nominal output specs:	1 kV to 10kVDC
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 E-O modulator, antireflection coatings and crystal material. For instance, for operation at 1064 nm with >10 watts average power and peak power densities of more than 500 MW/cm<sup>2</sup>, the Series 1147 RTP modulators with AR coatings for 1064 nm would be likely candidates.

