

- Laser Pulse Picking
- Fast rise and fall times, ON & OFF switching
- REGENERATIVE AMPLIFIER switch in-out
- Laser Synchronization up to 100 MHz lasers
- User friendly intuitive controls for fast set up
- Adjustable HV manual and voltage control 0-5V
- EMI shielding, critical to sensitive lab equipment
- Includes HVPS, Cables, Pockels cell and Gimbal
- Q-switching & Laser Cavity Dumping
- DKDP 10mm Aperture Pockels cell included
- Pockels cell options include DKDP, BBO and RTP



Fig 1 5046ER-VC Rack with 5046E OHA

5046ER Systems fill the need for highly reliable, completely solid state instruments that combine electro-optic modulator "Pockels cell" with high speed, high voltage switching driver capable of producing Quarterwave and Halfwave retardation voltages.

5046ER-VC Systems includes;

- Power Supply - Timing Generator 19" rack cabinet
- Shielded "OHA" Optical Head Assembly enclosure for EMI/RFI suppression, with
- Internal Pockels cell and tilt gimbal mount.
- Interconnecting Cable Set

SPECIFICATIONS

Useful Optical Wavelength Range:	240-2200nm (with proper Pockels cell selection)
Optical Rise and Fall Times (10-90%):	~ 3ns (10mm aperture cell 5pF)
HV Pulse Width "Gate" Range, FWHM	~ 8ns to 1µs Adjustable
Sync Timing function (Timing Generator)	Timing and Delay adjust for Laser up to 100MHz.
Repetition Rate, single shot to:	5kHz max at max voltage (4-7pF cell)
Input-Output Delay Adjust (150ns -1150ns)	150ns propagation delay MIN plus up to 1000ns Delay adjust
Input-Output Delay of OHA switches	~ 45ns (included in system full delay 150ns)
Internal Trigger Input: (non-syncing mode):	0.5-5V TRIG Factory Set MIN (Adjustable to 50mV min)
Internal Photo Input (w/12V bias output)	Neg 500mV Photo Factory set (Adjustable to 50mV min)
External (CW)	"EXT Mode" synchronization has 2 triggering inputs
Trigger Input:(extraction of CW/ML pulses)	+0.5 to 10 volts, 2ns to 1000ns width (100MHz max)
GATE Input (command trigger)	2-5V (25ns Min, 1us max. single shot to 5kHz
Jitter, System Input to Output:	< 250ps with typical PW and delay settings (<1ns max)
Jitter, OHA switches	< 50ps
HV Operating Range for output spaces"	1kV to 10kVDC
HV Adjustment Control (Knob and voltage)	"VC" voltage control 0-5V, ~200ms time constant.
OPTICAL HEAD Assembly OHA "black box"	ON and OFF Pulse Switches, Gimbal & Pockels cell
Dimensions Optical Head Assembly	EMI Shielded prevents noise to photodetector signals
5046E with MGC-145 gimbal, micrometer type	4H x 4.5W x 9.5L, inches, C/L 2.6" (66mm)
5046EM with MG-CL38 gimbal (no micrometers)	4H x 4.5W x 8.25L inches, C/L 2" (51mm)
Power Supply/ Timing Generator Cabinet	5046ER-VC Rack Mount: 4.75"H x 19"W x 15" Depth (3U)
Power Requirements:	100/115/230 VAC, 50/60Hz, ~ 45watts
Cable Set	(1) SHV, (1) MHV, (2) BNC length 1.2m (4ft)
Option Vertical Optical head (NEW 2020)	5046EV & 5046EMV
Option Lower price PS rack	5046ER-VC-2KHz PS-TG Same except max 2kHz rate.

The Power Supply/Timing Generator (PS/TG) is housed in a standard 19" wide (3U size) rack mountable configuration. New in 2019 with 6cm depth reduction. Voltage is adjustable by two methods, via a manual knob or voltage control by applying a 0 - 5 volt control voltage. The driver can operate at the HWV (half wave voltage) or less without loss of efficiency or increased rise or fall times. The timing generator circuits provide pulsing of the cell up to 5kHz synchronized with up to a 100MHz pulsed laser.

The Optical Head Assembly OHA contains the HV Pulse Switch Modules. These are designed for voltages suitable for up to 1/2 wave operation of KD*P Pockels cells at 1064nm. Pockels cell voltage is linear with wavelength, and voltage is adjusted for the specific cell and wavelength. The ON and OFF switches incorporate reliable MOSFET technology. The 5046ER series Systems provide rise and fall times as fast as 3ns. The 5046 series systems can be utilized for both intracavity and extracavity applications.



Fig 2 5046ER-VC System with cable connections

The 5046 series driver's performance limits were designed based on the operating limits of popular DKDP pockels cells. Piezo response of DKDP crystal defines 5kHz and pulse width 1 μ s as the upper practical limits. The specific Pockels cell may define optimal OPTICAL performance criteria that are lower than the driver's maximum ratings.

Optical switching is accomplished with a voltage potential applied across a Pockels cell. Pockels cells switched at HWV rotate the incoming plane of polarization of the laser beam 90 degrees in response to the electrical voltage. This fast ON and OFF switching of the Pockels cell all occurs as fast as 8ns, the gated pulse width and can be adjusted up to 1us pulse width. Applications desiring circular polarization are switched at QWV quarter wave voltage.

When picking pulses from a 80 MHz laser the pulse width is typically set to pick single pulses and PW adjust control is set to \sim 10-15ns at some rate up to 5kHz. As the HV PW is increased the driver will pick a pulse train. DKDP Pockels cells operate best when operated with short HV pulses cell ON time of \sim 200ns or less. Operating with longer HV pulses results in piezo ringing and cell leakage resulting in lower extinction.

Pockels cell model Q1059PSG with 10mm aperture is standard with the system. Common upgrades include 12mm and 16mm aperture DKDP cells. Our full line of Pockels cells are available to optimize the 5046ER system for your application including Series 1147 RTP and Series 1150 BBO cells. These cover an optical spectrum of 240 nm to 2500nm. FastPulse DKDP Pockels cells include models from our Q1059, CF1043, CF1042 and 1144 product lines covering the UV to 1064nm and up to 30mm apertures. FastPulse Technology is a vertically integrated company. Our DKDP is grown in house and fabricated into Pockels then installed and tested with the driver.

Pockels cells are mounted, on a tilt gimbal, within the OHA. NEW: A vertical oriented OHA model 5046EV now allows a smaller foot print configuration. This is an option and must be specified at time of order.



Fig 3 5046E and 5046EM OHA, Optical Head assemblies shown.

Driver Product lines with higher repetition rates up to 100kHz are offered with our **5100ERW series** drivers. The series 8025RS Pulsers provide long pulse widths (50ns to 10's seconds) and high duty cycle. These drivers required either RTP (series 1147) or BBO (series 1150) Pockels cell for high pulse rate and long pulse width applications. These crystals have greatly reduced or no piezo ringing. All drivers include interconnecting cables, along with a User's Guide Manual (see website) with illustrations on setup and configurations.

The **NEW** vertical Optical Head design option provides a smaller footprint and directs the connecting cables upwards away from your optical system and beam paths. There are 3 different mounting/clamping methods provided by this design see fig 8.

- Direct clamping into base cut out notches as in figure 4.
- Extending base/feet. The underside of driver also has (4) M6 Tapped holes on 75mm x 100mm grid spacing for attaching common post bases.
- As in figure 5 when orienting on the long face two interior slots accommodate 1/4-20 and M6 SHCS on 1" or 25mm optical tables. Unlike the standard OHA design (Fig 6 and 7 below) the micrometers are oriented upwards (fig 5) for easy access and adjustment.

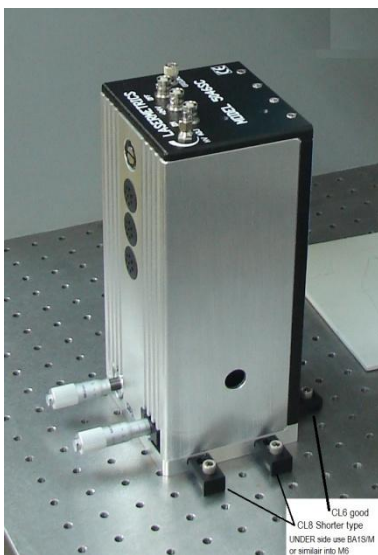


Fig 4 & 5 **NEW** Vertical Optical Head Assembly. Model 5046SCV shown. The vertical type OHA is also an option in our 5046ER-VC System as 5046EV-OHA.

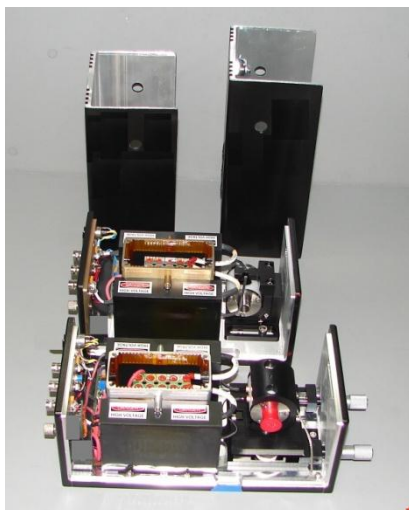


Fig 6 & 7. Standard OHA Optical Head Assembly 5046SC, 5046E (Micrometers protrude from rear) and shorter 5046SCM and 5046EM these 2 styles orient the long base plate to optical table mounting surface.

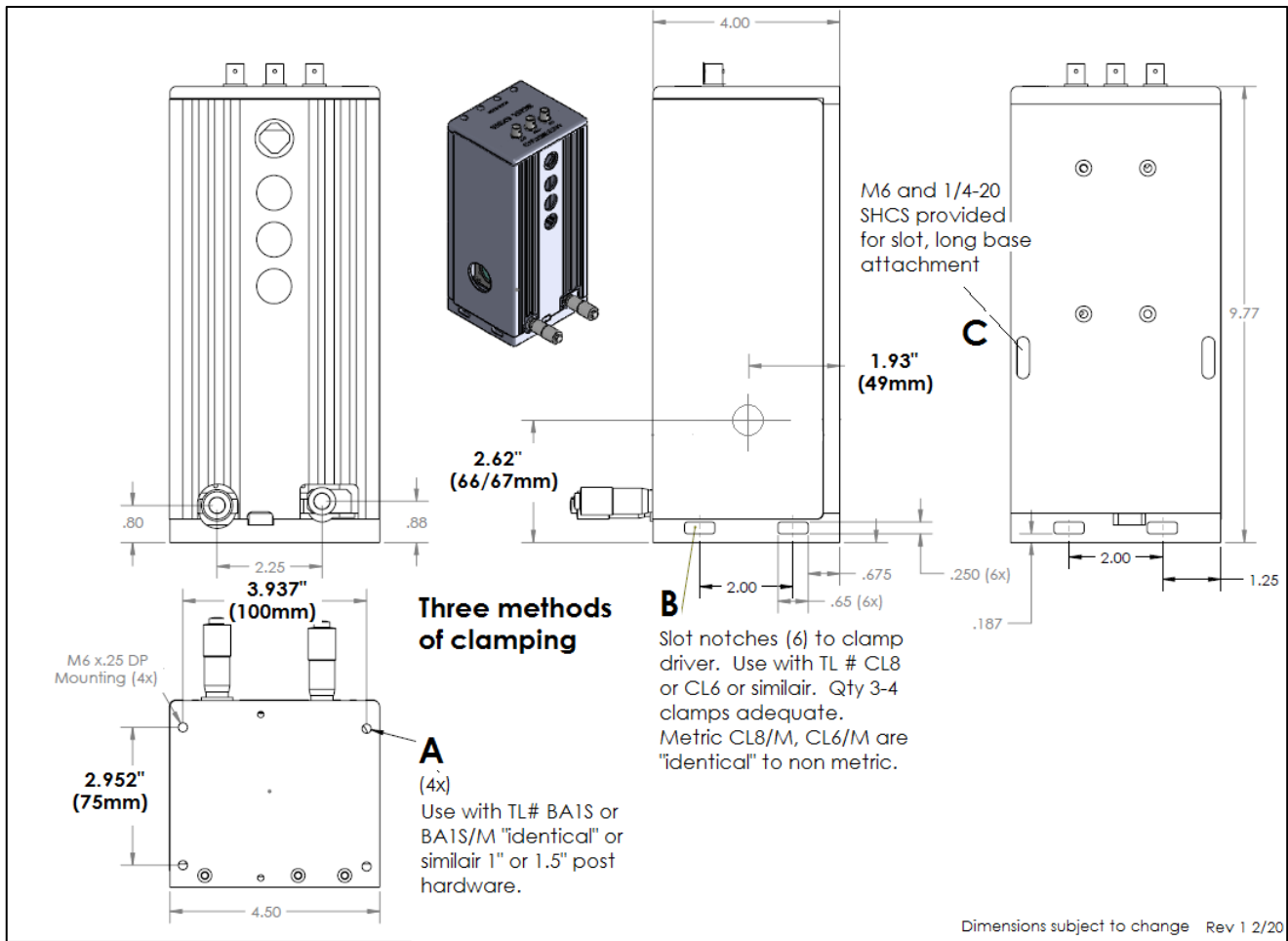


Figure 8: Outline dimensions VERTICAL type OHA Model 5046EV (and 5046SCV)

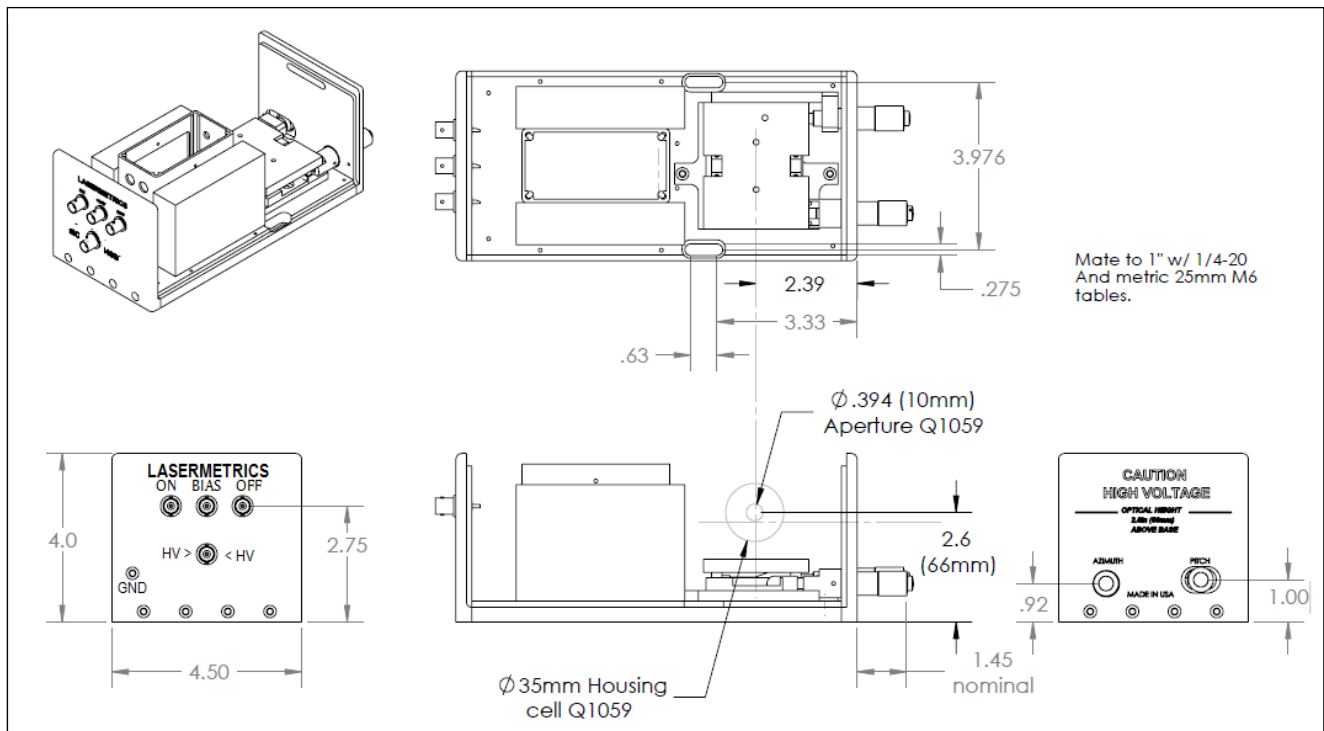


Figure 9: Outline dimensions STANDARD OHA Model 5046E (and 5046SC)