LEYSOP LTD

Manufacturers and suppliers of optical and electro-optical components

PCD-3000 Pockels Cell Pulse Driver

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Operating Instructions

This driver will supply up to 3.0kV at a maximum output current set to ~80mA. Extreme caution is required when using this q-switch driver and the operator must be aware of the lethal nature of high voltage equipment.

The pulser must not be operated out of its case. Only qualified engineers in high voltage engineering should operate this equipment.

Note

This driver is set as version (a). 1. Maximum voltage 3.0kV. Maximum load current ~80 mA. Pulse length ~400ns flat top before recovery time. The maximum repetition rate at 3.0kV with 1m of 50Ω cable is >50kHz. Exceeding this will trigger the current limit. At lower voltages the maximum repetition rate is higher, but is limited internally to 100kHz which is achievable at up to 2kV.

The driver may be operated either in internal or external triggered mode. Output voltage is set using the front panel 10-turn potentiometer and a readout of either the set voltage or operating current may be monitored on the display with the appropriate selection. The load should be connected to the driver at all times when it is being operated and either the supplied lead used or an appropriate alternative. The supplied lead is 1m of 50 Ω cable, terminated at the driver end with an SHV type connector and at the modulator end with appropriate fixings or connector as required. Observe trigger input requirements when externally triggering or false triggering and high jitter rates may be observed. The Sync Out signal is to be connected to 50 impedance loads only (with high impedance loads it may produce too high a voltage). The unit may be switched on and off conveniently during use with the HV Enable switch but for any safety critical operations, such as connecting a modulator the unit must be powered off at the front panel switch and isolated from the mains. In the event of a fault condition occurring (see below for description), this may be reset by briefly pressing the rest button once the cause of the fault has been identified and removed.

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Specification

Repetition Rate	0-100kHz in five decade steps by internal rep rate generator
Output Pulse	Can be supplied in two versions (a) Positive going (pulse to set HT voltage from zero) (b) Negative going (pulse from set HT voltage down to zero)
Pulse Amplitude	Set between 0-3.0kV using visual display
Pulse Rise Time	Nominal <4ns. Load and set voltage dependent
Pulse length	Nominal 400ns at peak voltage (load dependent). Approximately 750ns at 50% (FWHM)
Pulse Recovery Time	Approximately 1.2µs, 90-10% fall time
External Trigger in	+3V to 10V max., >100ns into 50Ω
Pulse Delay Time	Approx. 110ns after trigger in
Synchronisation Output	TTL approx. 50ns after trigger in ~60ns before high voltage pulse
Jitter	Less than 200ps between sync output and pulse output
Overload Protection	(1) Repetition rates above 100kHz (2) HT current above 80mA (3) Output stage temperature overload
Power Input	Universal 90-265V a.c. 47-440Hz via 3A fused IEC inlet
Dimensions	160(h) x 360(w) x 330(d)mm. 9.5kg weight

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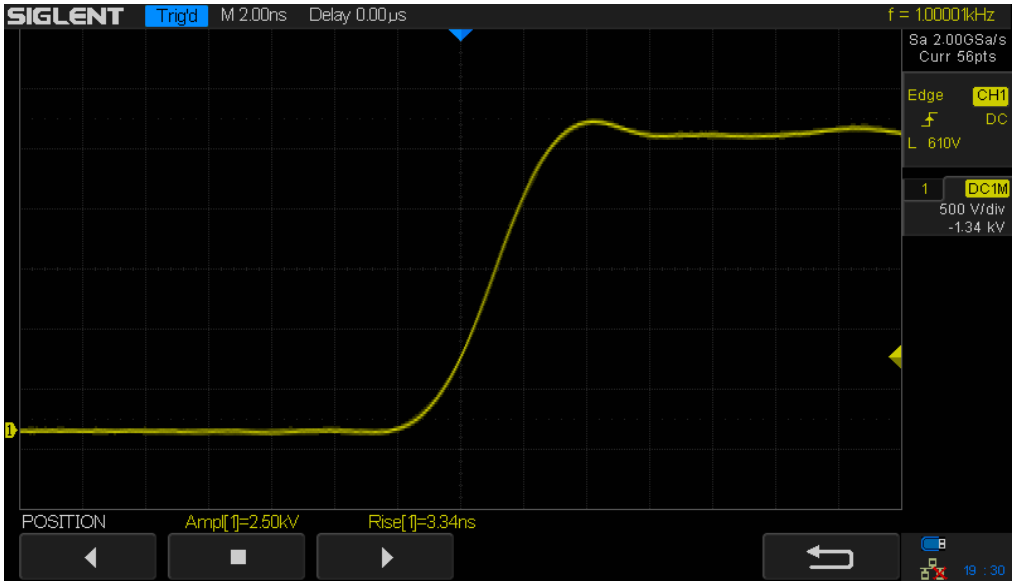

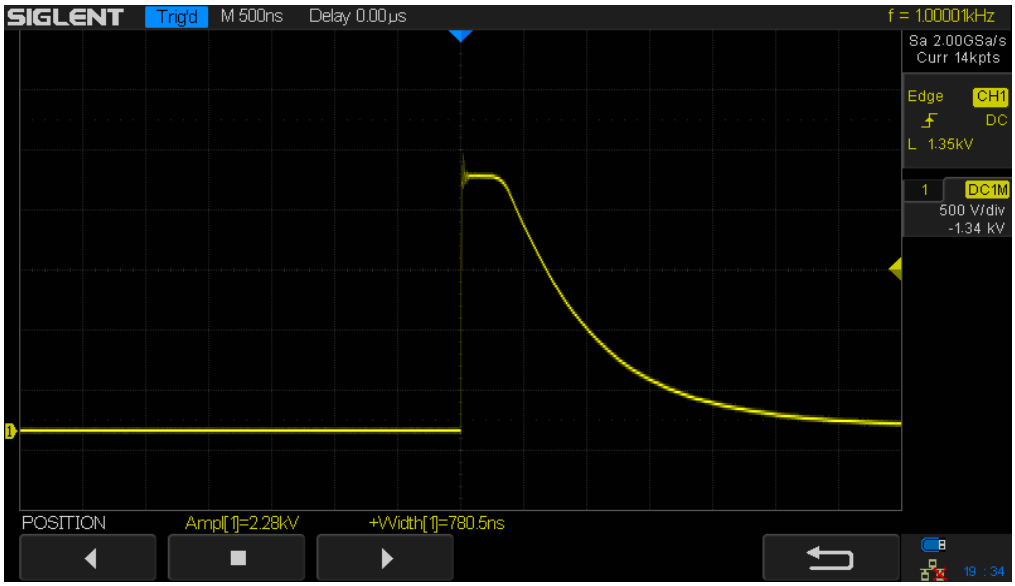

Typical Electrical Responses Measured with 1m 50Ω Cable

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Circuit Description

The main PCB assembly contains the trigger circuits and the monitoring circuit.

The output unit is a potted and sealed high voltage MOSFET circuit that either switches the 3kV supply to the output cable through a 50Ω resistor (R1) (version a) or shorts the output cable to earth through R1 (version b). The MOSFET circuit has a fixed on time of approximately 400ns and the recovery time for both versions is set by a second resistor R2.

The recovery time is therefore dependant on the capacitance of the MOSFET circuit, the output cable and the q-switch.

The trigger output has an internal rep rate generator and an external trigger pulse conditioning circuit. The maximum repetition rate of the external trigger is limited by an over-speed circuit set to 100kHz.

The monitor circuit monitors the HT current, the external trigger rep rate and the temperature of the MOSFET output stage. If any of these three exceed the set levels then the HT power supply is switched off and the appropriate indicator flashes. The driver can be reset by pressing the reset button after the fault condition has been removed.

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Fault Conditions

1. When operating with an external trigger the repetition rate has exceeded 100kHz
2. Current Limit

   The HT current has exceeded the factory set limit

   Possible causes

   a. There is a short circuit in the q-switch or its 50Ω cable
   b. The repetition rate is too high for the output voltage or the cable length chosen.
   c. There is a fault in the MOSFET output module.

3. Over Temp

   This fault condition occurs if the power dissipated in the MOSFET module exceeds allowable levels and the module temperature reaches a maximum set level of ~70°C. If overheating is suspected, remove the internal/external triggering signal and switch of the HV Enable, but leave the unit connected to the mains supply and powered on so that the fans may continue to cool the internal components.

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