# Laser Trigger Module User Guide

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## 1 Introduction

The Laser Trigger Module internally mounted photodiode to pick up a weak reflection from the outgoing laser beam. The optical signal is then preamplified, discriminated and amplified so that it can drive a Licel Rack8-3U, a trigger generator or individual transient recorders.


## 2 Power supply

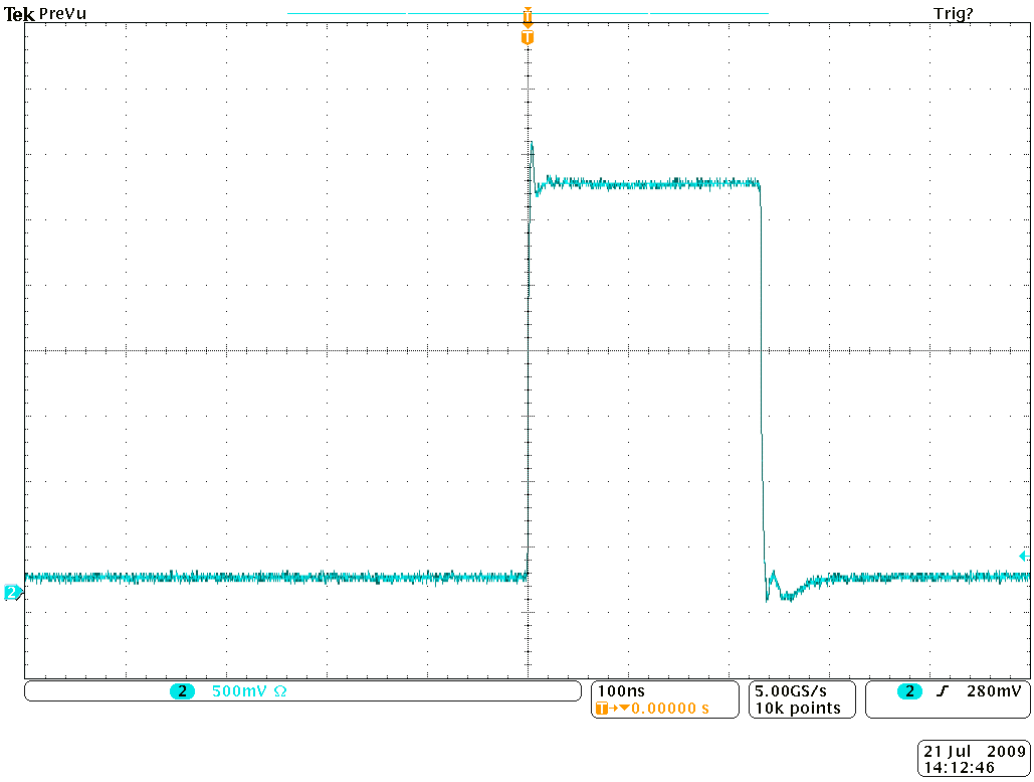
The unit can be either connected to Rack8-3U with a usual transient recorder power cable or to external supply which must deliver +5V and -5V with 100mA.

## 3 SMA Fiber

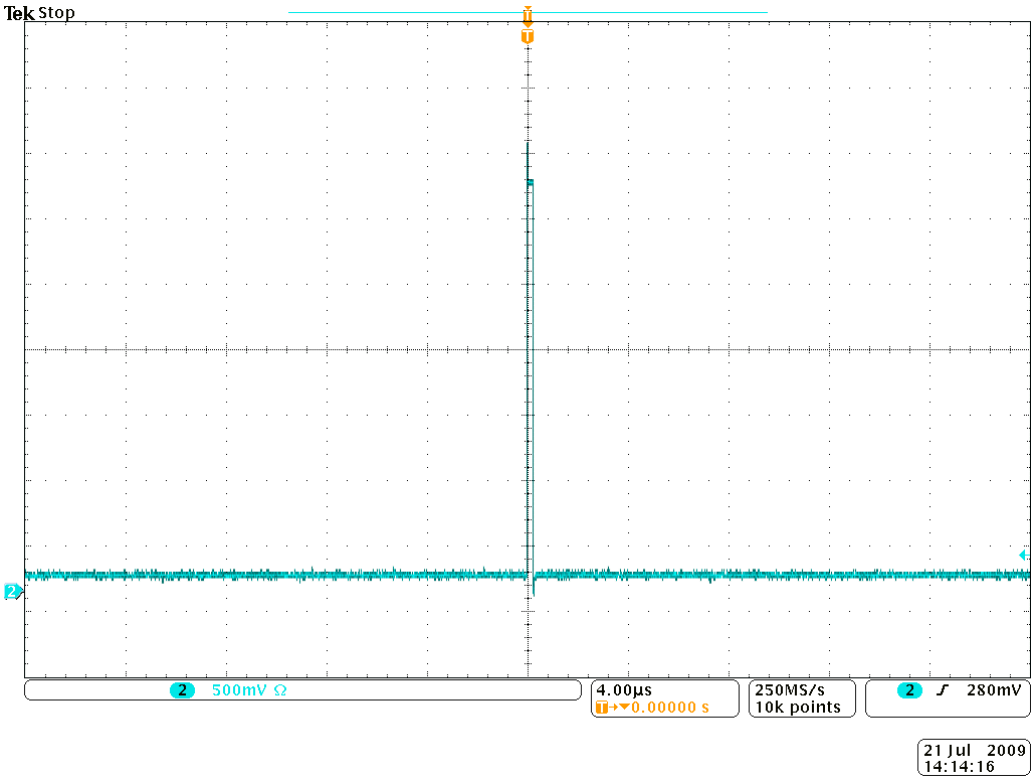
The user needs to supply a multimode SMA fiber with a with a core between 200 and $1000\,\mu\mathrm{m}$ .

## 4 Setup

Once the unit is powered plug a multimode SMA fiber into the module and mount the other side close to the laser beam so that it picks up a reflection. The trigger output of the module should be connected first to a oscilloscope. Terminate the input at the oscilloscope with $50\Omega$. Select 100ns per div as the horizontal scale and 1V/div as the vertical scale. Turn the know till a trigger signal like the shown one appears.




Decrease the timing resolution and verify that no double trigger appears.




Use this signal to trigger the Rack8-U or a trigger generator or SPS.

# 5 Optimizing the trigger threshold

1. connect the Q-switch output to your scope/Ch1 (50 Ohm termination) and trigger on this channel.
2. connect the optical trigger module output pulse to your scope/ch2 (high impedance termination) using a

BNC T-piece and connect the other T-piece output to the transient recorder rack global trigger input. This terminates the cable with 1 kOhm at the cable end. The BNC T-piece with 1 MOhm is in the middle of the cable assembly. You will see a distorted pulse shape due to the transformer in our isolated rack-trigger input. Don't be confused, only the rising edge is important.

3. Watch the timing difference of both pulses in high resolution (some ns/cm scope horizontal setting).
4. When you increase the discriminator level of your optical trigger module by turning the potentiometer, you will "walk upwards"on the incoming photodiode pulse. The delay between the 2 pulses will slightly increase.
5. Again you will find a minimum threshold (noise level, no correlation between Q-switch and laser trigger output) and a maximum threshold (no output of the laser trigger module).
6. Go into the middle of them
7. Write down the min. threshold, the max. threshold, the final potentiometer reading in the middle position and the measured delay Q-switch $\rightarrow$ optical trigger output pulse when connected to the TR-rack.
8. Make these measurements part of the lidar calibration routine which should run regularly to avoid that changes in the setup go unnoticed and the trigger becomes unstable.
9. The advantage of writing down the potentiometer readings is, that you will see a trend of your optical coupling and you start with a confirmed valid trigger setup.