TDA 200

Trigger Diode Assembly

PicoQuant

User Manual

Document version 2.0

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1. Introduction

The TDA 200 is a trigger diode assembly for use with free running lasers and fluorescence lifetime systems. The TDA 200 contains a high speed silicon PIN photodiode, a short focus collimation lens, an integrated filter holder and threads for a mounting post. The spectral response extends from 350 nm to 1100 nm with a maximum sensitivity at 800 nm. The color and brightness of a multicolor indicator LED corresponds to the energy of the input pulses and the unit can therefore be used as an adjustment tool or signal detector for other instruments. Although the TDA 200 was specifically designed for time-correlated single photon detection, other applications include general photon counting, laser diagnostics, synchronization with pulsed laser systems, and fluorescence spectroscopy.

2. Brief Description and Features

For time-correlated single-photon counting (TCSPC) measurements, a precise synchronization signal from the pulsed excitation system is crucial. PicoQuant laser drivers, such as the PDL 800-D or PDL 828 “Sepia II” already provide an electrical SYNC signal suitable for picosecond timing purposes.

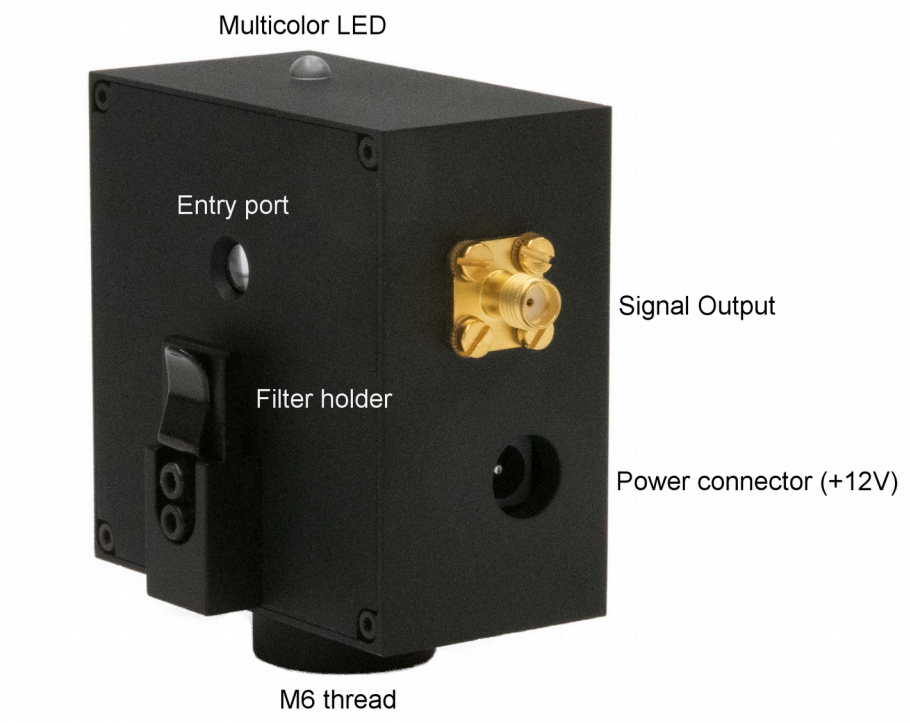
For laser systems without an appropriate electrical SYNC signal, the TDA 200 photodiode is used to synchronize the timing electronics. It is built around a silicon PIN photodiode with an active area of 0.5 mm diameter and can be used from 350 to 1100 nm with peak sensitivity at around 800 nm. When a fraction of the excitation beam is directed towards the TDA 200 unit, it responds to each light pulse with a fast (typically 500 ps) negative output pulse, that can be directly coupled to the TCSPC unit.

The TDA 200 unit features:

- Compact design
- 250 ps pulse rise time
- 500 ps pulse width (FWHM)
- Spectral range from 350 to 1100 nm
- Pulse height indicator independent from laser repetition rate
- Delivered with 12 V DC power supply

3. Operation

3.1. Setting up the TDA 200



1. Connect the 3.5 mm jack plug of the supplied external +12 V power supply to the TDA 200. Install the correct AC mains power plug and connect the power supply unit to the socket.

2. Attach a suitable optical mounting post to the bottom of the TDA 200 (M6 thread)

3. Connect the output signal from the TDA 200 to the device that is to be triggered.

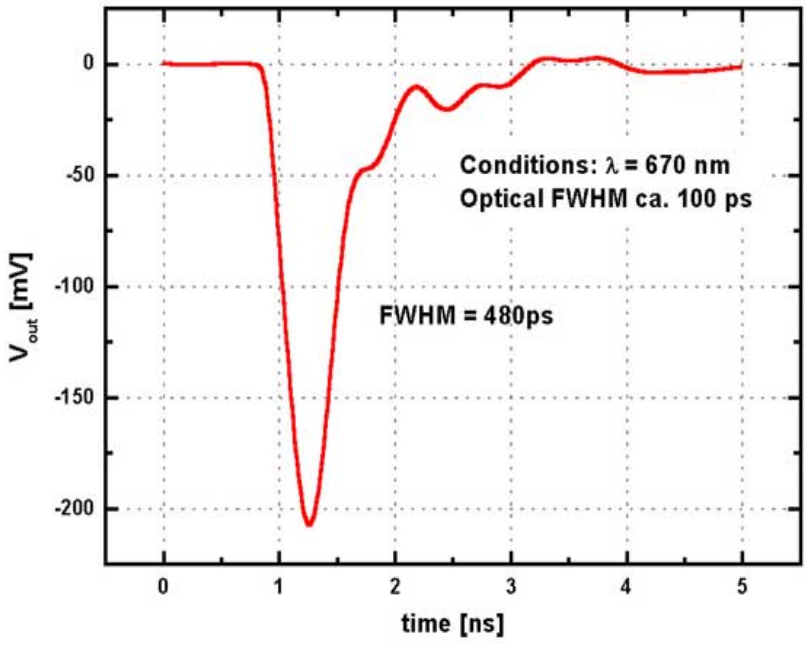
4. Point the entry port (PIN diode) of the TDA 200 at the light source to be monitored.

5. Use the multicolor LED indicator to optimize the amount of light falling on the PIN diode. The LED will emit green light when the peak amplitude of the SYNC output pulse reaches -100 mV. If the peak amplitude reaches -350 mV, the LED will emit red light. Note, that the output must be properly terminated (50 Ohms), otherwise the color information is invalid.

6. If necessary, change the location of the TDA 200 so that the detected light source always generates suitable SYNC pulses. If the light source is too bright, place a suitable filter into the holder in front of the sensor's entry port. Overexposure of the PIN diode does not damage the TDA 200, but it may produce output pulses with higher than -1 V peak amplitude.

3.2. Typical time response of TDA 200

For time-correlated single-photon counting (TCSPC) measurements, detectors must have pulse widths or rise times of just a few tens of picoseconds. The typical response time of a TDA 200 is shown in the graph below.



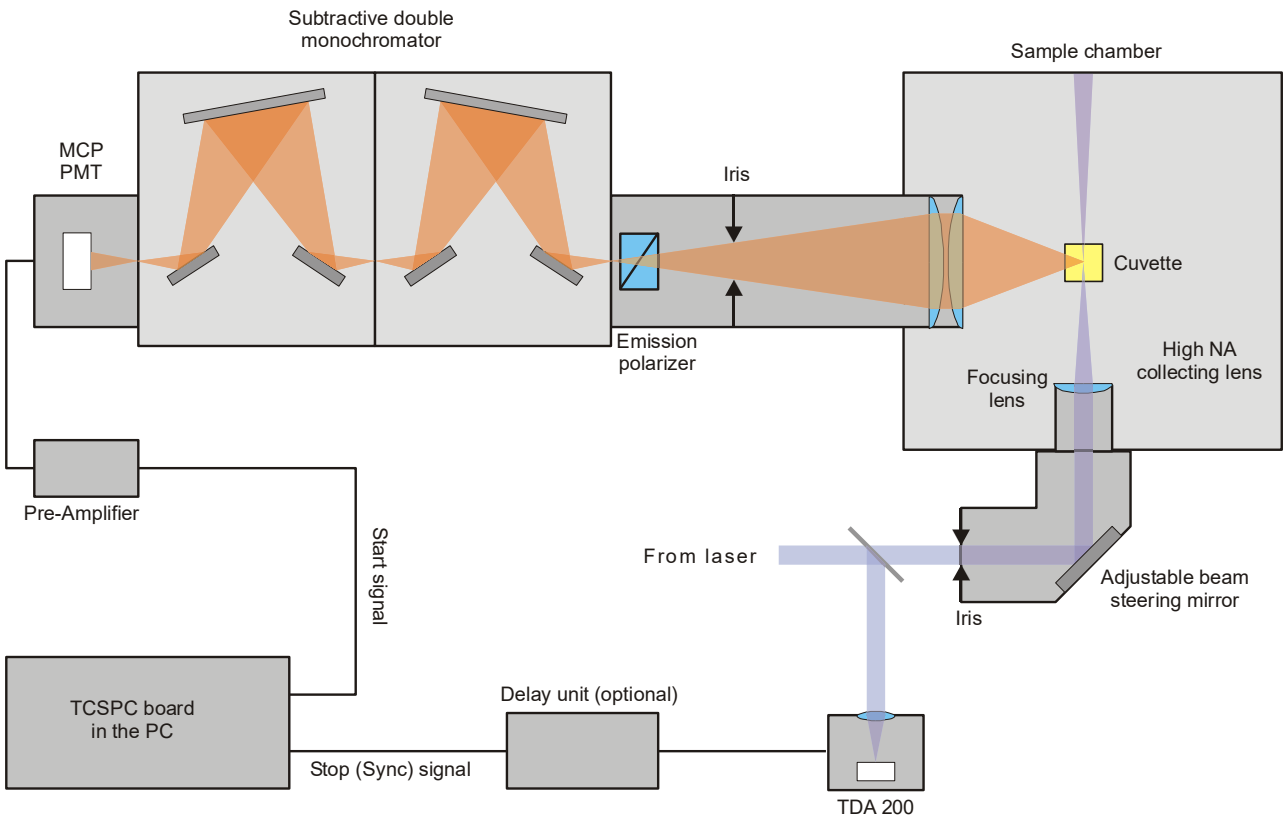
4. Applications

4.1. Typical Applications

- Synchronization with pulsed laser systems
- Ultra sensitive analysis
- Time-resolved fluorescence and luminescence spectroscopy
- Laser diagnostics
- General purpose photon counting and low light level detection

4.2. Application Example: Fluorescence Spectroscopy

The TDA 200 can be used in time-resolved fluorescence spectroscopy experiments. In the example below, a TDA 200 detects optical pulses from a laser and generates synchronous electrical output. The SYNC signal from the TDA 200 are fed to a TCSPC unit to trigger the timing circuits for time-correlated single photon counting (TCSPC) measurement.



5. Technical Data / Specifications

Electrical Parameters

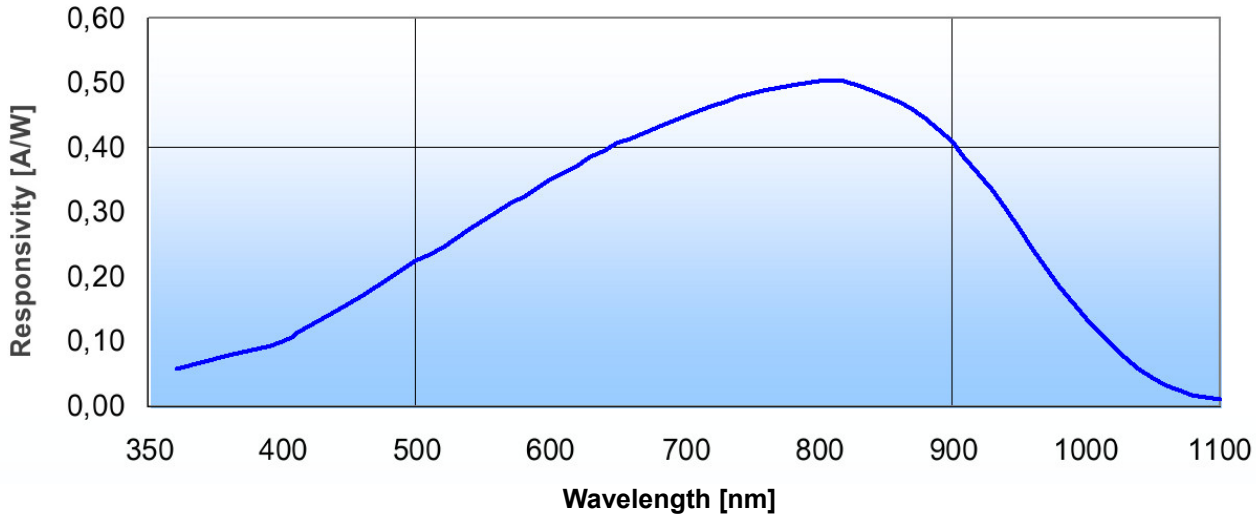
Rise time..... typically 250 ps
Pulse width (FWHM)..... typically 500 ps
Spectral Range..... 350 nm to 1100 nm (peak around 800 nm)
Active area..... 0.5 mm x 0.5 mm

Output signal..... negative pulse, typically 0 to -1.0 V, SMA socket
LED monitoring..... green at >100 mV, red at > 350 mV

Dimensions..... 30 × 60 × 60 mm (width × length × height)
Post holder..... M6 thread, 8 mm depth

Input line voltage..... 100 V to 240 V AC, 50/60 Hz

Spectral responsivity of the PIN diode



Retraction of Old Devices

Waste electrical products must not be disposed of with household waste. This equipment should be taken to your local recycling center for safe treatment.
WEEE–Reg.–No. DE 96457402

6. Support

6.1. Returning Products for Repair

If you have serious problems that require the device to be sent in for inspection / repair, please contact us at: info@picoquant.com and request a RMA number before shipping the device. Observe precautions against static discharge under all circumstances in handling, packaging and shipping. Use original or equally protective packaging material. Inappropriate packaging voids any warranty.

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8. Further Reading

8.1. PicoQuant Bibliography

PicoQuant maintains a database of publications mentioning PicoQuant devices. It can be found at our website http://www.picoquant.com/biblio It is a valuable source if you would like to know which laboratories are using PicoQuant products or how broad the field of various applications is.

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