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A Simple nanosecond Pulse Generator for Light Emitting Diode

A low-cost and portable pulsed light emitting diode (LED) source is a very important component for time-resolved spectroscopy which is widely used in medical, environmental, photochemistry and photo-physics applications. Typically, the light source with ultrafast short pulse and high repetition rate is very expensive. In this work, therefore, we present the simple nanosecond light pulse driver circuit using commercial light emitting diodes (LEDs) with peak emission wavelength of 460 nm, 532 nm, and 620 nm. A Schmitt trigger was used to provide a square wave signal with a repetition rate of 1.5 MHz. A high-speed "NOT" and "AND" gate were used to produce a nanosecond pulse output with less than 100 ns pulse width. The pulse duration can be adjusted by RC trigger time. Later the nanosecond pulse drive the LED through a high-speed transistor. The pulse duration independences of the output spectral and photon flux per pulse were observed. The bias voltage dependences of the output spectral, photon flux per pulse, and optical pulse width are characterized and discussed.

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