Using a photo diode in half bridge

Using a FE-389-TA configured for half bridge, arrange the other arm of the bridge as shown in figure 1.

Application Note
AN-PD1 Iss1 10/7/24
Paul Sanders

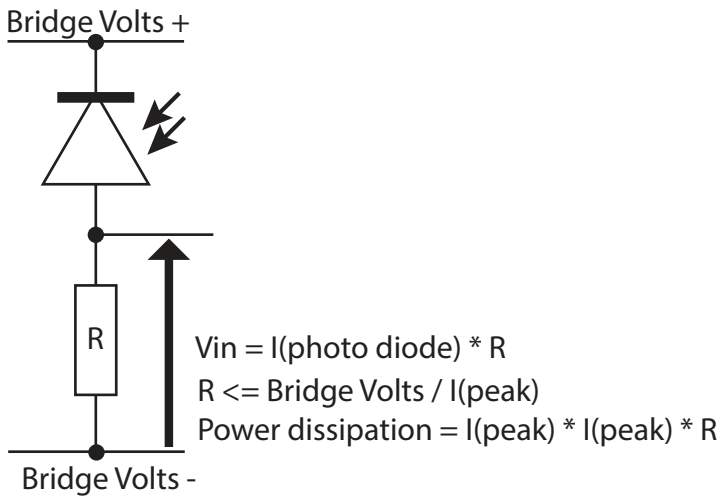

Figure 1

A reverse voltage is applied to the photo diode. As light falls on the photo diode this will cause a photo current to flow, this current will then generate a voltage across R that is proportional to the light intensity. Photo diodes are available in a number of forms, wavelengths from IR to UV, with or without day light filters, and physical size of the photo collection area.

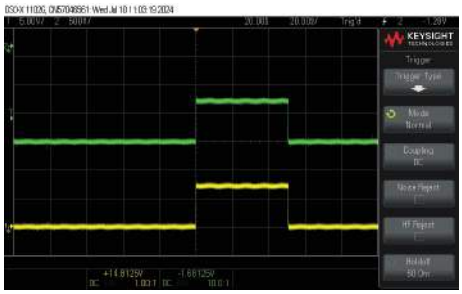

Figure 2

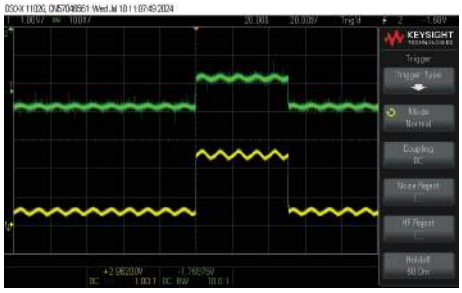

Figure 3

Figure 2 shows the amplifier output in yellow (gain x10, filter out) and the voltage across a 10K resistor in green, Photo current (I) = 7.50V/10/10k = 75uA.

Figure 3 shows the amplifier output in yellow (gain x20, filter out) and the voltage across a 10K resistor in green, Photo current (I) = 2V / 20 / 10k = 10uA.

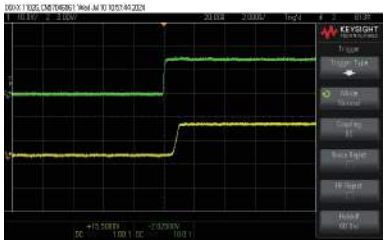

Figure 4

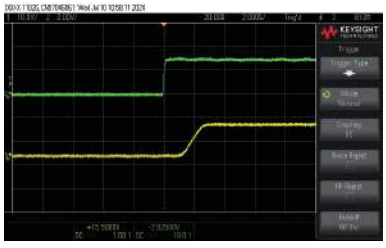

Figure 5

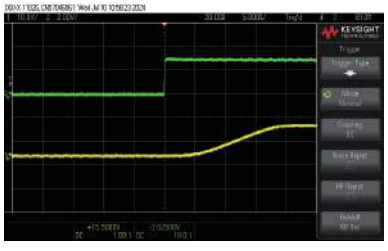

Figure 6

Figures 4 to 6 show the effect of system bandwidth on edge measurements. It is key for analysis of edges to have a greater bandwidth as possible, Figure 4 > 1MHz, Figure 5 = 300kHz, Figure 6 = 30kHz. Square waves are made up of a number of sinusoidal components when these are filtered out the edge tends more towards a sinusoid. The green trace shows the applied light source and the yellow trace shows the amplifier response at the 3 described filter settings.

The FE-389-TA offers a filter out setting of >1MHz bandwidth and the FE-(H)389-TA > 2MHz.
These are a vast improvement on the FE-379-TA at 50kHz and FE-(H)379-TA at 500kHz respectively.

When measuring any phenomena such as light (as shown here), dynamic pressure (Hopkinson Split Bar), or Gibbs phenomena for over shoot and under shoot, a FE-(H)389-TA is recommended to yield results that closely relate in shape and time domain to the applied stimulus.