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# DID YOU KNOW? PHOTOTRIACS - WHAT IS THE DIFFERENCE BETWEEN ZERO AND NON-ZERO CROSSING?

Phototriacs are used to provide safe and galvanical optical isolation between a low voltage input driving source and a high voltage AC load.

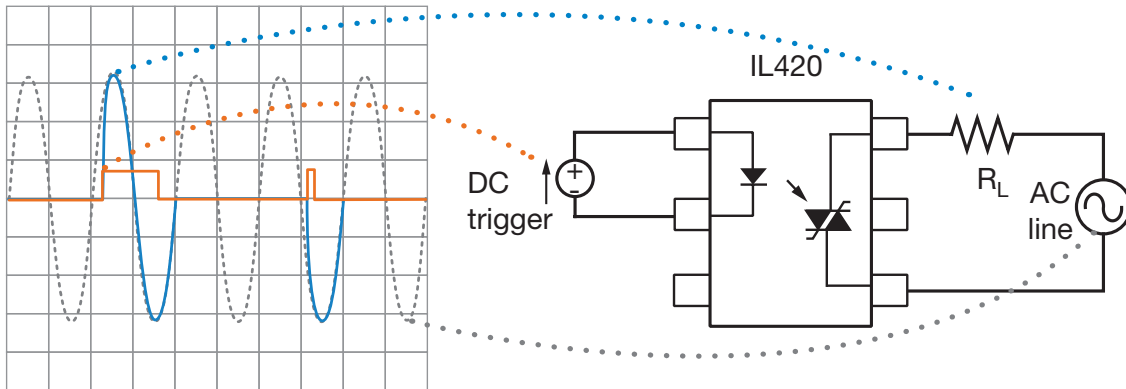
The switching-on reaction follows the ignition of the TRIAC gate, which in the case of a phototriac is the optical trigger via the LED on the input. The switching-off will be at the zero crossing of the AC voltage waveform on the output.

The trigger signal switches on the AC load, independent of the phase angle. For some applications, e.g. dimmers, this is required because the effective output power correlates with the phase angle. Depending on the resulting output AC

and load constellation, this might cause sharp  $dv/dt$  or  $di/dt$  transients, which can result to electromagnetic interference (EMI) and radio frequency interference (RFI). Finally, additional filter networks might be required.

The easiest way to avoid such issues is to switch at the AC voltage zero crossing point. To detect this, an additional circuit is required. A more elegant way is to use Vishay phototriacs, with an integrated zero crossing detection circuit. This "ZCC" inhibits the trigger of the phototriac until a valid zero crossing event is detected, and then releases the trigger.

## Non-Zero Crossing Phototriac Example

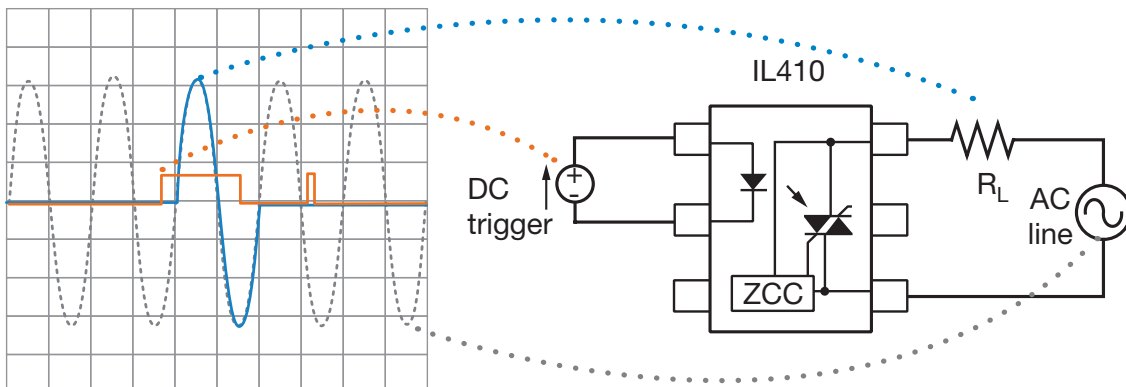


Proposed parts are IL420 and IL4208. For details, please see datasheet: [www.vishay.com/ppg?83629](http://www.vishay.com/ppg?83629)

### Typical Applications:

- Phase angle controller
- E.g. light dimmer / motor control for smooth uninterrupted operation

## Zero Crossing Phototriac Example



Proposed parts are IL410 and IL4108. For details, please see datasheet: [www.vishay.com/ppg?83627](http://www.vishay.com/ppg?83627)

### Typical Applications:

- EMI- / RFI-sensitive applications, simple on / off switching, longer time constants
- E.g. heater, lamp, valve, fan control
- Easy and compact solution

## Resources

- Phototriac Basics Application Note ([www.vishay.com/doc?84780](http://www.vishay.com/doc?84780))
- Phototriacs Frequently Asked Questions (FAQs) ([www.vishay.com/doc?84963](http://www.vishay.com/doc?84963))
- What Are They and What Are They Good for? Did You Know ([www.vishay.com/doc?48625](http://www.vishay.com/doc?48625))
- Phototriac  $dV/dt$  Application Note ([www.vishay.com/doc?84791](http://www.vishay.com/doc?84791))

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