Voltage Multipliers, Inc.

Opto-coupler Notes

Definitions

Opto: From the word “optics”, meaning the science of light and vision.
Example: Optical illusion, fiber optics.

Coupler: From the word “coupling”, meaning a link or device connecting two things.
Example: A “coupling” between two railroad cars.

Gain: What you get out divided by what you put in. (Output divided by input).
Example: Financial gain = Ending balance divided by total investment.
Example: Current gain = Output current divided by input current.

What is an opto-coupler?

An opto-coupler is a device used to electrically interface between two current- isolated systems. It does this by way of light transmission.

How does it work?

When connected in a linear regulator configuration, the external system supplies current to the Light Emitting Diodes (LEDs). Refer to OC-100 and/or OC-250 data sheet.

As the level of LED current fluctuates, so does the light intensity of the LED.

The light from the LED falls on the light- sensitive junctions of the high voltage diode. The high voltage diode is reverse-biased, so that the leakage current through the diode varies in response to the light levels from the LEDs.

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General Maximum & Electrical characteristics

Block diagram - two main areas

- Light emitting diode - a.k.a. LEDs
  Forward current
- Photo diode - a.k.a. HV diode, RZ 464 or Z100SG with thin glass
  Reverse voltage

Absolute maximum ratings

Electrical characteristics

- LED
- Photodiode

Description of the OC-100 and OC-250 devices

Assembly methods

OC-100

The 10KV diode and two LEDs are precisely positioned in a mold and injection molded with an optically clear potting material.

The diode is coated with a thin layer of glass, which makes the junctions more sensitive to light.

OC-250

Three OC-100 assemblies are soldered together (in series) and potted in a shell with a standard hard epoxy. Normal potting procedures are followed.

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Physical characteristics

OC-100

A six leaded device containing one HV diode and two LED's. The LED's are positioned on either side of the HV diode to maximize the exposure of the junctions to light emitted from the LEDs.

Approximate physical dimensions are 1" length x .45" width x .32" height.

OC-250

A four terminal device - two flying leads and two solder turrets - that contains three HV diodes and six LED's.

Approximate physical dimensions are 2.10" length x 1.40" width x 1.0" height.

Opto-coupler Advantages

- High isolation voltage
- High voltage (Up to 25KV)
- Remote sensing
- Excellent voltage gain ratio

Typical opto-coupler uses:

- Elimination of ground loops
- Interfacing circuits operating at different voltage levels
- Increasing the noise immunity of a system
- Reducing effects of electrical noise (motor control systems)
- Protection of equipment & user from high voltages
- Interfacing safe & hazardous areas in intrinsic safety applications

Typical opto-coupler applications

- HV switching
- Contact closure
- External voltage sensing
- HV isolation
- Mass spectrometry

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