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SOLID STATE RELAYS : “Roll-Your-Own” Can Be Cheaper!

Solid State Relays (SSRs) utilizing power MOSFET-outputs and Photovoltaic (PV) inputs can often be cheaper and more effective when built up on your own board using separate components than if purchased fully-assembled in a single package. This is particularly true when the end application involves high-power output current levels of 10 Amps and higher, and especially when hi-rel Military performance is required. The SSRs with the required high-power electrical performance either may not be available at all in a single package, or may be prohibitively expensive. In general, this traces to a combination of the high cost for the technology in packaging and the relatively low volume market for such devices. If you're not too pressed for board space, consider “rolling-your-own” from separate components.

First, from a widely available supplier base, choose a MOSFET that meets your needs for output current, stand-off voltage, on-resistance and switching speed. For a DC circuit, you'll only need one. For an AC/DC option, you'll need two of them, with their Source pins tied together as one terminal, their Gate pins tied together as another terminal, and the two Drains acting as outputs. These MOSFETs will already be housed in appropriate packages that are able to dissipate the heat generated and also supply hi-rel construction. Whether the single MOSFET (DC) or the linked-up pair of MOSFETs (AC/DC) you now have the output of your SSR.

The SSR input, which turns the MOSFETs On or Off, is provided by use of a Dionics-USA, Inc. PV MOSFET-Driver, a device that supplies the Gate-drive needed for On-Off control. This device, typically in a 6-pin or 8-pin DIP, is mounted on the board near the Source and Gate terminals of the power MOSFET(s). A useful one to consider is the DIG-21-8-30-DD, which not only provides the needed Gate drive, but also contains an internal “Dynamic Discharge” to give your SSR fast turn-off times. Current, about 10 mA to 30 mA typically, must be supplied to an internal LED, which then illuminates a nearby Photovoltaic IC chip. The output of the PV IC chip, typically 10-volts, is externally connected to the Gate and Source terminals of the nearby power MOSFETs, thereby controlling their conduction. Thus, 10 mA into the LED controls many Amps of current through the MOSFETs. All this is accomplished with the added benefit of optical-isolation between the SSR's input and output, adding to the general reliability of its performance.

The cost and availability of these separate components is much better than that of the same components mounted in single, very expensive package. The trade-off is just a small amount of extra board space for the “roll-your-own” style, often a small price to pay.

Spec sheets for our various PV Mosfet Drivers (and other devices) are available on our web-site.

