



MODULAR DEVICES, INC.

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An ISO 9001:2015 Registered Company

New Product Release:

Introducing MDI's 3844 Inrush/Outrush Limiter Switch

Many spacecraft power electronics applications require current limitations on turn on. Relatively large capacitor values in EMI filters or DC-DC converters may cause large inrush currents at turn on unless controlled by an inrush limiter.

Some spacecraft applications have high peak current draw at low duty cycles. In these applications, a large capacitor may be used to supply the peak currents, while a DC-DC converter supplies the average current to the capacitor. Often, the DC-DC converter is unable to initially charge the output capacitor due to current limiting. A solution is to use an outrush limiter between the DC-DC converter and the large capacitor.

With the addition of an inrush or outrush limiting resistor, Model 3844 can provide control of inrush or outrush currents.

Model 3844 is a 10 Ampere rated Inrush Limiter Switch. It contains a low resistance high side switch, which bypasses an external current limiting resistor after a programmable time delay. It also has an input inhibit not and an output inhibit release (which can enable downstream DC-DC converters).

Model 3844 is rated at 10 amperes pass through current and operates from an 18 VDC to 160 VDC input voltage. Model 3843 is packaged in a 1.08" by 1.08" by 0.375" package. A flanged package is also available.

Sizing the inrush resistor:

Divide the maximum input voltage by the desired peak inrush current to get the ohmic value of the resistor.

Multiply the resistor value by the capacitance to be charged to get the inrush time constant.

Using a multiple of three RC time constants to ensure 99% capacitor charging, compute the recommended inrush limiter switch delay. Select an appropriate delay capacitor.

The energy stored in the load capacitor is $0.5CV^2$. Divide the stored energy (in watt seconds) by the inrush time constant to get an initial resistor wattage.

Using surge rating guidance from the resistor manufacturer, determine the actual resistor wattage rating to handle the inrush surge.

The resistor should be mounted so it is thermally able to dissipate the surge power.

The Data Sheet can be found [here](#)