



# DIONICS-USA INCORPORATED

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## CR54-2SM

### Surface Mount Photovoltaic MOSFET / IGBT Driver

#### Features:

- Optically Isolated; High Isolation Resistance
- Constructed For Surface Mount Assembly
- Suitable For Manual or Automatic Placement
- Sturdy Construction, Immune To Handling Damage
- Hermetic Construction
- Dielectrically Isolated PV IC Construction
- High Open Circuit Voltage Up To 19.5V
- Fast Turn On, Turn Off & Active Gate Discharge

#### Applications:

- MOSFET/IGBT Driver
- Medical Implant Application
- Aerospace/Aircraft Solid-State Relays
- A.T.E. (Automatic Test Equipment)
- Medical Test Equipment
- Isolation Amplifiers
- Load Control From Microprocessor I/O Ports
- Thermocouple Open Detectors

#### Description:

The surface mount CR54-2SM Photovoltaic (PV) is a State-of-the-Art, optically coupled floating power source used primarily to control MOSFET/IGBT's when electrical / optical isolation between input and output is required.

In addition to the infrared LED and PV diode array, each of the CR54-2SM devices contains circuitry that rapidly discharges the power MOSFET/IGBT gate when the LED is deactivated. The unique rapid discharge feature of the CR54-2SM makes it particularly useful for high side switching of MOSFET/IGBT's in DC motor control and switching regulator applications. The rugged design features a metal top and metal bottom.

It is therefore ideal for manual or automatic vacuum-pencil assembly methods, with handling damage almost impossible. Construction of the CR54-2SM permits use of either standard solder assembly methods (and flux-removal cleaning) or conductive epoxy attachment to substrates. Footprint dimensions are only 0.360 with a height of 0.197 inches max.

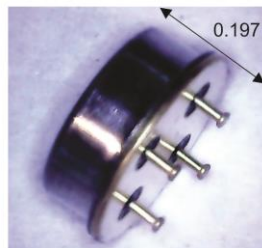
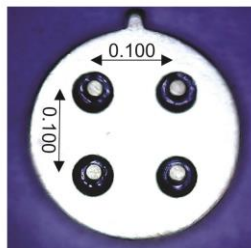
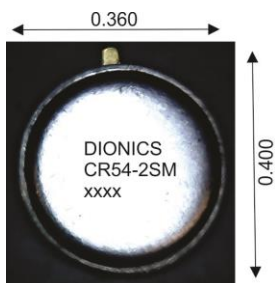
The typical input circuit to the LED is a limiting resistor connected in series with the LED. When activated, the LED emits infrared light towards the photovoltaic diode array, which then responds by generating an open circuit voltage ( $V_{oc}$ ) and disabling the turn off circuitry. The self-limiting photovoltaic output of the diode array is floating and therefore, can be safely applied directly to the MOSFET/IGBT, regardless of the source potential of the MOSFET/IGBT. When the LED is deactivated, the active turn-off circuit discharges the capacitive input of the MOSFET/IGBT. The active turn-off circuitry is designed such that the turn-off time of the MOSFET/IGBT is relatively independent of the input capacitance over a range of 300 to 15000 pF.

#### CR54-2SM Layout and Configuration

0.360x0.400x0.197h

0.100 spacing

0.197 total height  
Posts are 0.03 wide  
Posts are 0.65 long



Lead Number	Function
1	+ Input
2	- Input
3	+ $V_o$
4	- $V_o$

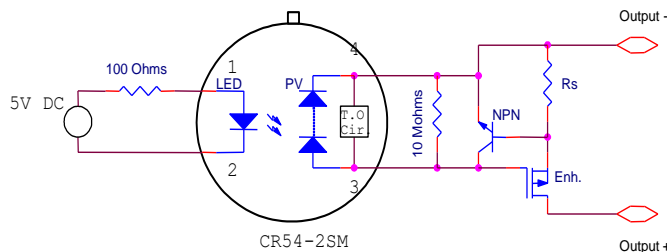
## CR54-2SM Photovoltaic MOSFET/IGBT Driver

<b>❖ Absolute Maximum Ratings (T<sub>a</sub> = 25°C)</b>		
LED Forward Current	Steady State Peak 10% Duty Cycle	100 mA
LED Forward Current		150 mA
LED Reverse Voltage		10V
Output Discharge Current		15mA
Operating Temperature Range		-55°C to 125 °C
Storage Temperature		-55°C to 150 °C

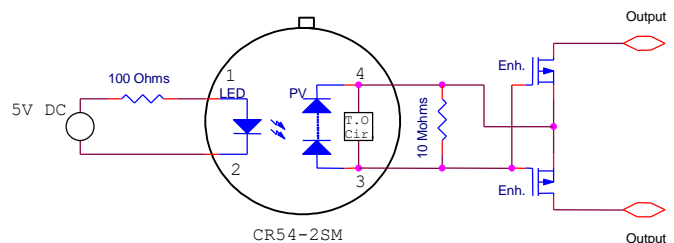
### **Electrical Characteristics (T<sub>a</sub> = 25°C Unless otherwise specified)**

<i>Model Number</i>	<b>CR54-2SM</b>				<i>Unit</i>
<b>Parameter &amp; Test Condition</b>	<b>Symbol</b>	<b>Min.</b>	<b>Typ.</b>	<b>Max.</b>	
<b>Open Circuit Voltage</b>					
I <sub>led</sub> = 10mA	<b>V<sub>oc</sub></b>	14.0	15.0	18.0	<b>V</b>
I <sub>led</sub> = 30 mA; 50% Duty Cycle		15.0	16.0	19.5	<b>V</b>
<b>Short Circuit Current</b>					
I <sub>led</sub> = 10mA	<b>I<sub>sc</sub></b>	-	11.0	-	<b>μA</b>
I <sub>led</sub> = 30 mA; 50% Duty Cycle		30.0	35.0	-	<b>μA</b>
<b>LED Forward Voltage</b>					
I <sub>f</sub> = 20mA	<b>V<sub>f</sub></b>	-	2.6	3.4	<b>V</b>
<b>LED Reverse Current</b>					
V <sub>r</sub> = 5V	<b>I<sub>r</sub></b>	0.1	10.0	-	<b>μA</b>
<b>Off State Voltage</b>					
I <sub>off</sub> = 10μA; I <sub>led</sub> = 0mA	<b>V<sub>off</sub></b>	-	0.65	0.75	<b>V</b>
<b>Isolation Voltage</b>	<b>V<sub>iso</sub></b>	1000	-	-	<b>VDC</b>
<b>Temp. Coefficients</b>	<b>⊖ V</b>	-	60	-	<b>mV / °C</b>
I <sub>led</sub> = 10mA	<b>⊖ I</b>	-	0.5	-	<b>%I / °C</b>
<b>Turn-On Time</b>					
I <sub>led</sub> = 30 mA C=1500pF; V <sub>oc</sub> to 50%	<b>T<sub>on</sub></b>	-	100	-	<b>μs</b>
<b>Turn-Off Time</b>					
I <sub>led</sub> = 30 mA C=1500pF; V <sub>oc</sub> to 50%	<b>T<sub>off</sub></b>	-	3.0	6.0	<b>μs</b>

### Typical Applications



*Power MOSFET Photovoltaic N/O Relays  
With Short Circuit Protection*



*Power MOSFET Photovoltaic  
SPST N/O AC-DC Relays*