



DIG-3115-SMP

Photovoltaic MOSFET / IGBT Driver with Dynamic Discharge*

*US Patent 4,931,656

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 20V
- 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:

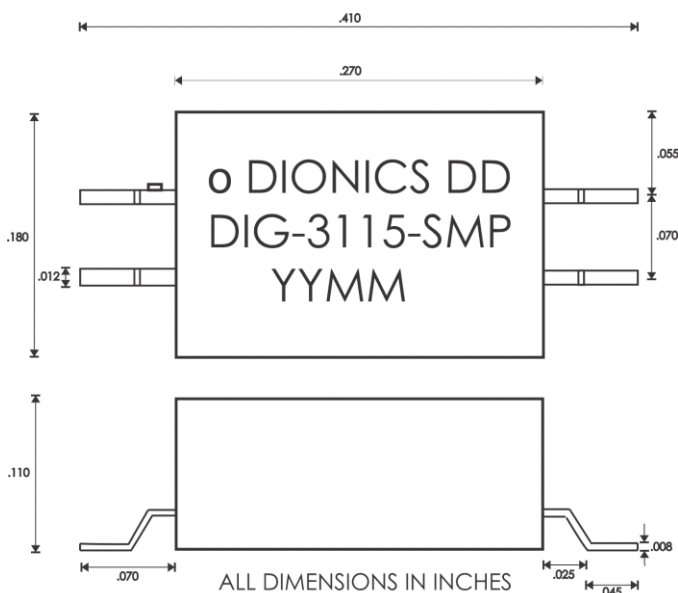
The DIG-3115-SMP Photovoltaic (PV) is a State-of-the-Art, optically coupled floating power source used primarily to control MOSFET/IGBT's when electrical isolation between input and output is required.

In addition to the infrared LED and PV diode array, each of the DIG-3115-SMP devices contains circuitry that rapidly discharges the power MOSFET/IGBT gate when the LED is deactivated. The unique rapid discharge feature of the DIG-3115-SMP makes it particularly useful for high side switching of MOSFET/IGBT's in DC motor control and switching regulator applications.

It is ideal for manual or automatic vacuum-pencil assembly methods, with handling damage almost impossible.

Construction of the DIG-3115-SMP permits use of either standard solder assembly methods (and flux-removal cleaning) or conductive epoxy attachment to substrates. Footprint dimensions are only 0.410 x 0.180 inches, with a height of 0.110 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.



DIG-3115-SMP Layout and Configuration

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

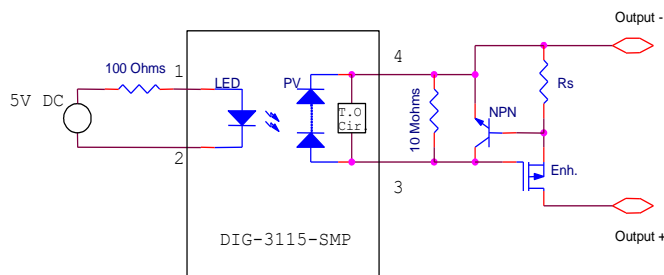
DIG-3115-SMP Photovoltaic MOSFET / IGBT Driver

❖ Absolute Maximum Ratings (T_a = 25°C)		
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

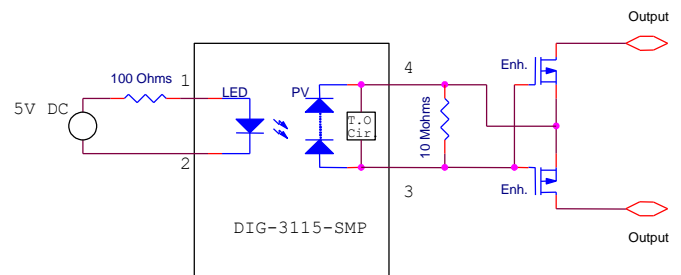
Electrical Characteristics (T_a = 25°C Unless otherwise specified)

<i>Model Number</i>	<i>DIG-1115-SMP</i>				<i>Unit</i>
Parameter & Test Condition	Symbol	Min.	Typ.	Max.	
Open Circuit Voltage	V_{oc}				
I _{led} = 10mA		15.0	16.0	18.0	V
I _{led} = 30 mA; 50% Duty Cycle		16.0	17.0	20.0	V
Short Circuit Current	I_{sc}				
I _{led} = 10 mA; 50% Duty Cycle		15.0	18.0	-	μA
I _{led} = 30 mA; 50% Duty Cycle		45.0	62.0	-	
LED Forward Voltage	V_r				
I _f = 20mA		-	1.3	1.8	V
LED Reverse Current	I_r				
V _r = 5V		0.1	10.0	-	μA
Off State Voltage	V_{off}				
I _{off} = 10μA; I _{led} = 0mA		-	0.65	0.75	V
Isolation Voltage	V_{iso}	1000	-	-	VDC
Temp. Coefficients	⊖ V	-	60	-	mV / °C
	⊖ I	-	0.5	-	%I / °C
Turn-On Time	T_{on}				
I _{led} = 30 mA C=1500pF; V _{oc} to 50%		-	100	-	μs
Turn-Off Time	T_{off}				
I _{led} = 30 mA C=1500pF; V _{oc} to 50%		-	3.0	6.0	μs

Typical Applications



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



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