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DIG-1115-SMP 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 20V
- Fast Turn On, Turn Off & Active Gate Discharge

Applications:

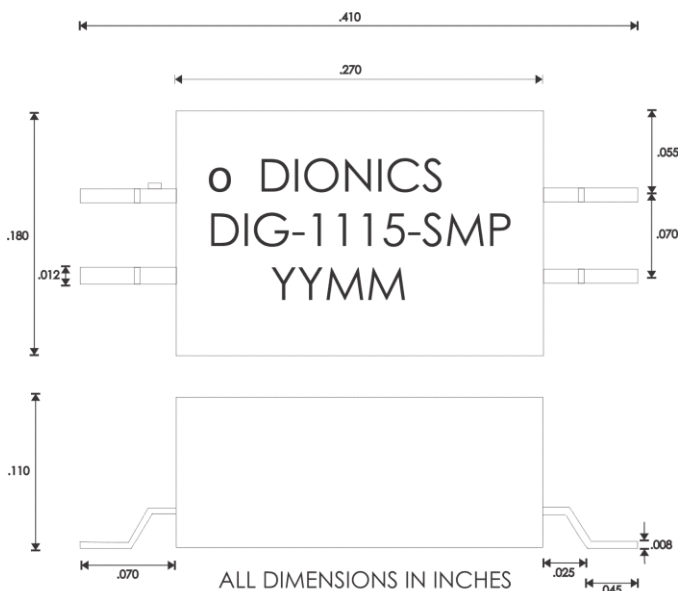
- MOSFET/IGBT Driver
- Medical Implant Application
- Aerospace/Aircraft Solid-State Relays
- A.T.E. (Automatic Test Equipment)
- Medical Test Equipment
- Isolation Amplifiers
- Load Control From Microprocessor I/O Ports
- Thermocouple Open Detectors

Description:

The DIG-1115-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-1115-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-1115-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-1115-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-1115-SMP Layout and Configuration

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

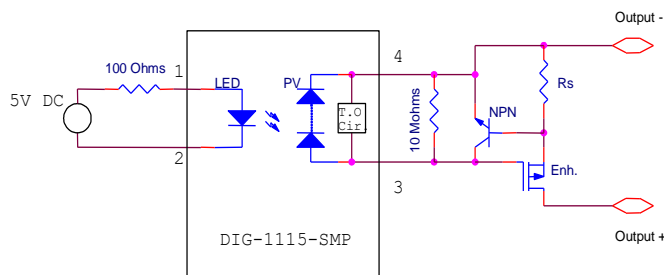
DIG-1115-SMP Photovoltaic MOSFET/IGBT Driver

| ❖ 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 |

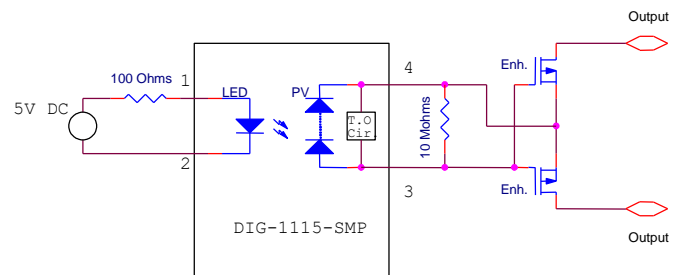
Electrical Characteristics (T_a = 25°C Unless otherwise specified)

| <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 | | 14.0 | 15.0 | 18.0 | V |
| I _{led} = 30 mA; 50% Duty Cycle | | 15.0 | 16.0 | 20.0 | V |
| Short Circuit Current | I_{sc} | | | | |
| I _{led} = 10 mA; 50% Duty Cycle | | 7.0 | 8.0 | | μA |
| I _{led} = 30 mA; 50% Duty Cycle | | 25.0 | 28.0 | - | |
| LED Forward Voltage | V_r | | | | |
| I _f = 20mA | | - | 1.3 | 1.7 | 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*