Dionics Inc.

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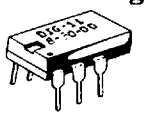
Photovoltaic MOSFET Driver with active Dynamic Discharge*

DIG-11-8-30-DD
DIG-12-8-30-DD
DIG-22-8-30-DD



FEATURES	*APPLICATIONS*
* FAST TURN OFF, ACTIVE GATE DISCHARGE	* GATE DRIVE FOR POWER MOSFETS
* ISOLATED VOLTAGE GENERATION	* INDUSTRIAL CONTROL
* OPTICAL ISOLATION	* SOLID STATE RELAYS (NO/NC)
* LOGIC CIRCUIT COMPATIBILITY	* AUTOMATIC TEST EQUIPMENT
* HIGH ISOLATION VOLTAGE	* POWER ANALOG SWITCHING
* HIGH PHOTO-VOLTAIC EFFICIENCY	* DC MOTOR CONTROL
* PURE DC GATE DRIVE	* SWITCHING POWER SUPPLIES
* SELF-LIMITED GATE VOLTAGE	* IGBT DRIVER

***DESCRIPTION**

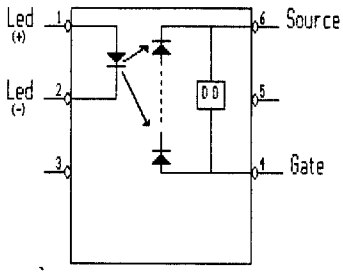
The photovoltaic MOSFET driver is a state-of-the-art, optically coupled floating power source used primarily to control MOSFETS when electrical isolation between input and output is required.

In addition to the infrared LED and photovoltaic diode array, each of the "DD" (dynamic discharge) products contains circuitry that rapidly discharges the power MOSFET gate when the LED is deactivated. The unique rapid discharge feature of the photovoltaic MOSFET drivers makes them particularly useful for high side switching of n-channel MOSFETS in solid state relays, dc motor control and switching regulator applications.

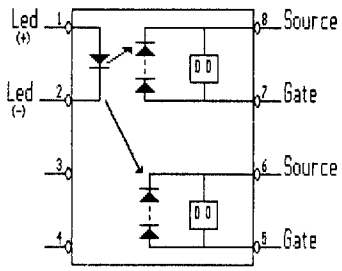
The typical input circuit to the LED is a limiting resistor connected in series with the LED. When activated, the LED emits infrared light towards the photovoltaic diode array which then responds by generating an open circuit voltage (Voc) and disabling the "turn off" circuitry. The self-limited photovoltaic output of the diode array is floating and therefore, can be safely applied directly to the gate and source of a MOSFET, regardless of the source potential of the MOSFET. When the LED is deactivated, the active "turn-off" circuit discharges the capacitive input of the MOSFET. The active "turn-off" circuitry is designed such that the turn-off time of the MOSFET is relatively independent of the input capacitance of the MOSFET over a range of 50 to 5000pf.

Standard packages include low cost plastic mini-dips and hermetic 8 pin ceramic side brazed dips.

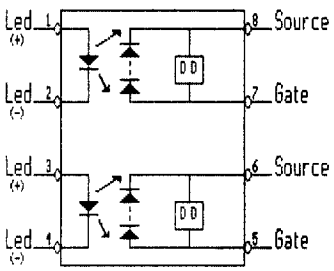
PIN CONNECTIONS



DIG-11-8-30-DD



DIG-12-8-30-DD
CERAMIC PKG. ONLY



DIG-22-8-30-DD
CERAMIC PKG. ONLY

Connections shown are for n-channel fets; for p-channel use reverse

***PATENT 4,931,656**

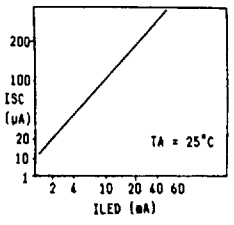
ABSOLUTE MAXIMUM RATINGS

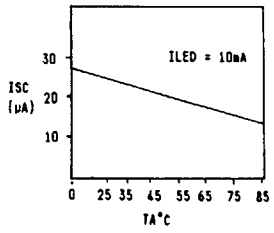
LED FORWARD CURRENT	STEADY STATE	100mA
LED FORWARD CURRENT	PEAK 10% DUTY CYCLE	250mA
LED REVERSE VOLTAGE		10V
OUTPUT DISCHARGE CURRENT		50mA
OPERATING TEMPERATURE RANGE	(PLASTIC D.I.P.)	-20 TO 85°C
OPERATING TEMPERATURE RANGE	(SIDE BRAZED D.I.P.)	-50 TO 125°C
STORAGE TEMPERATURE		-50 TO 125°C
POWER DISSIPATION		250mW
ISOLATION VOLTAGE		2500V DC

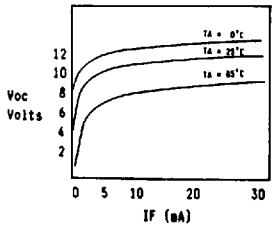
ELECTRICAL CHARACTERISTICS (Ta=25°C)

PARAMETER	SYMBOL	TEST CONDITIONS	SINGLE CHANNEL MIN.	TYP.	MAX.	UNITS
OPEN CIRCUIT VOLTAGE*	Voc	Iled = 2mA	8.5	9.5	-	V
		Iled = 10mA	9.5	10.5	-	V
		Iled = 30mA 50% Duty Cycle	10.5	11.5	-	V
SHORT CIRCUIT CURRENT	ISC	Iled = 2mA	1.0	3.0	-	µA
		Iled = 10mA	10.0	11.0	-	µA
		Iled = 30mA 50% Duty Cycle	30.0	31.0	-	µA
LED FORWARD VOLTAGE	Vf led	Iled = 20mA 11-8-30-DD	-	1.3	1.7	V
		12-8-30-DD	-	2.6	3.4	V
		22-8-30-DD	-	1.3	1.7	V
LED REVERSE CURRENT	Ir led	Vr = -5V	-	-0.1	10.0	µA
OFF STATE VOLTAGE	Voff	Ioff = -10uA , Iled = 0	-	0.65	1.0	V
ISOLATION VOLTAGE	Viso	Inputs to Outputs	2500	-	-	Vdc
TEMPERATURE COEFFICIENT	⊖ V	Iled = 10mA	-	-45.0	-	mV / C
	⊖ I		-	0.5	-	% / C
TURN ON TIME	Ton	Cl=1500pf, Iled=30mA, Voc to 50%	-	100.0	-	µS
TURN OFF TIME **	Toff	Cl=1500pf, Iled= 0mA, Voc to 10%	-	3.0	6.0	µS

Typical Characteristics (Single Channel)







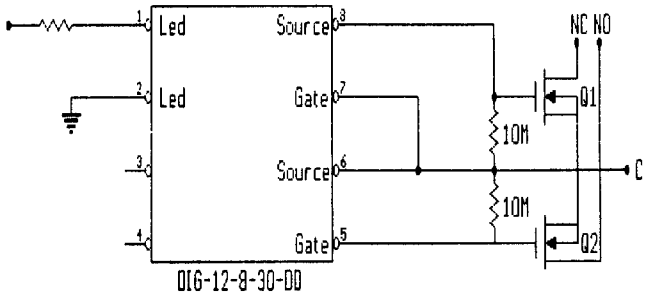
* Ceramic version differs; contact factory for specifications

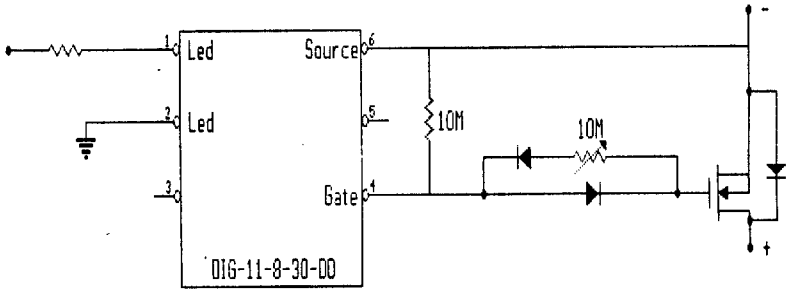
** For proper turn-off operation, gate must be charged to 90% of its final value before turn-off is initiated.

*** Typical Applications**

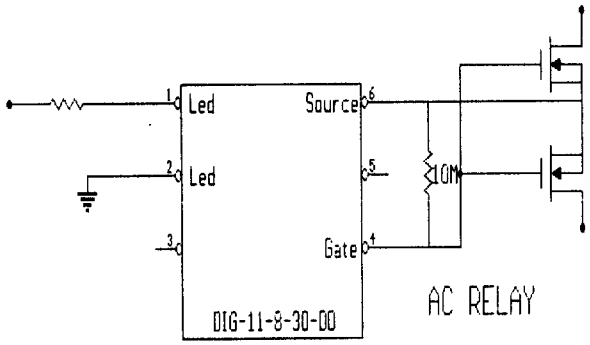
SINGLE POLE DOUBLE THROW DC RELAY

Q1 = SIEMENS BSS-129 DEPLETION FET
Q2 = SIEMENS BSS-101 ENHANCEMENT FET

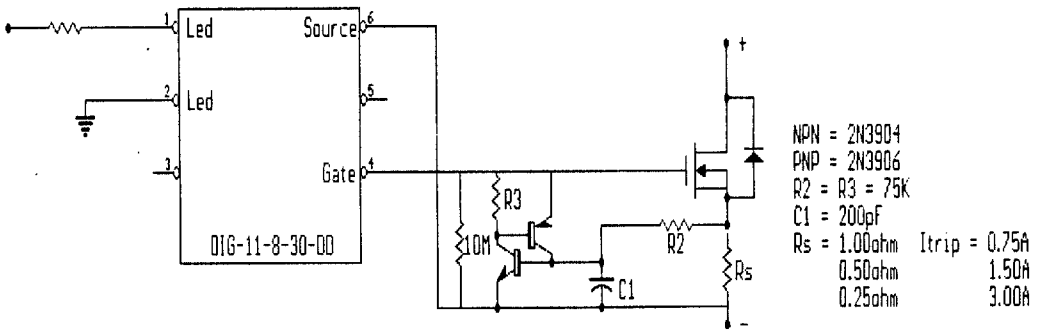




DC RELAY SYMMETRICAL Ton AND Toff

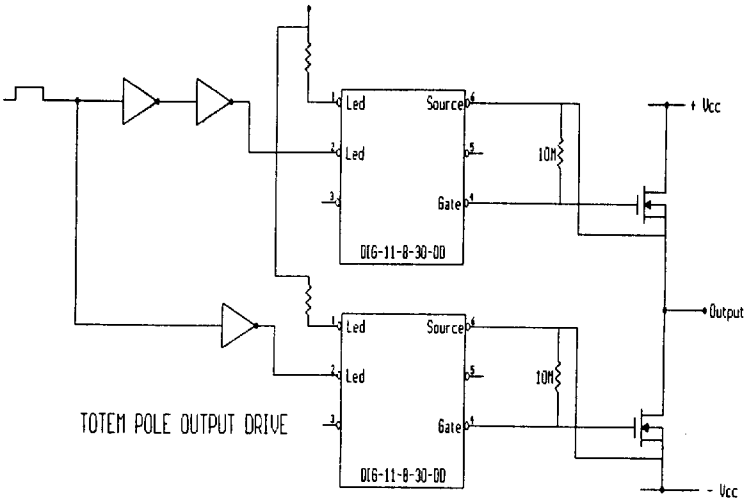


AC RELAY

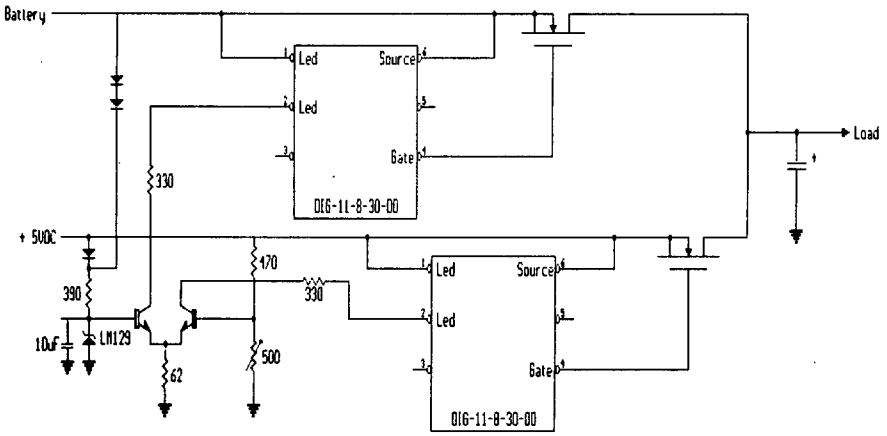


DC RELAY WITH SHORT CIRCUIT PROTECTION

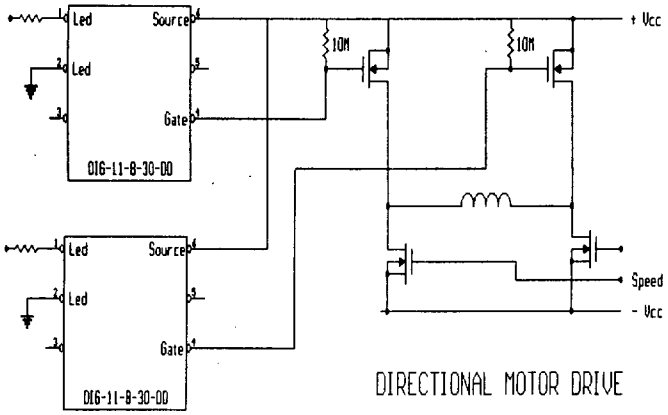
*** Typical Applications (continued)**



TOTEM POLE OUTPUT DRIVE



BATTERY BACKUP SWITCHING



DIRECTIONAL MOTOR DRIVE

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