

SIEMENS

IL485

OPTICALLY COUPLED HIGH SPEED MOSFET DRIVERS OPTOCOUPLER

FEATURES

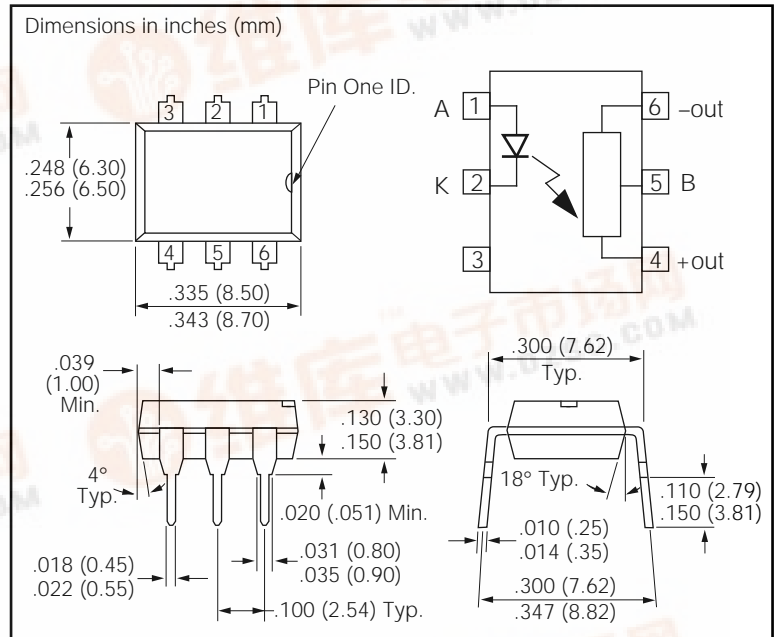
- Fast Turn On
- Fast Turn Off
- Low Input Current
- Isolation Test Voltage, 5300 VAC_{RMS}

APPLICATIONS

- Motor Drive Controls
- IGBT-predrivers
- AC/DC Power Inverters

DESCRIPTION

The IL485 is a photovoltaic generator (optically coupled) designed to drive highly capacitive loads such as the gate of a power MOSFET transistor and at the same time provide isolation and floating voltage supply capability. The coupler consists of a GaAlAs light emitting diode as input control and a custom photo IC chip with photodiode array (PDA) as output device. When the LED is turned on, the emitted light produces a voltage in the PDA. The output of the PDA is used to drive the gate of a power MOSFET. The photo IC chip contains additional circuitry to enhance the switching speeds, (both turn on turn off). The opto-coupler is packaged in a 6 pin DIP.



Maximum Ratings

Emitter

Reverse Voltage	4 V
Forward Current	60 mA
Peak Forward Current	600 mA
Power Dissipation	100 mW
Thermal Resistance	700 °C/W

Detector

Breakdown Voltage (pin 5 to 6)	300 V
Peak Input Current (pin 5 to 4)	50 mA
Reverse Current (pin 5 to 6, V=100 V)	200 nA
Power Dissipation (pin 5 to 4)	150 mW

Package

Insulation Thickness between Emitter and Detector	≥0.4 mm
Isolation Test Voltage (1 sec.)	5300 VAC _{RMS}
Isolation Resistance	
V _{IO} =500 V, T _A =25°C	≥10 ¹² Ω
V _{IO} =500 V, T _A =100°C	≥10 ¹¹ Ω
Comparative Tracking Index per	
DIN IEC 112/VDE 303, Part 1	≥175
Total Power Dissipation	250 mW
Storage Temperature Range	-55°C to +150°C
Operating Temperature Range	-55°C to +100°C
Junction Temperature	100°C
Soldering Temperature (max. 10 sec.,	
dip soldering distance to seating plane >1.5 mm)	260°C

Electrical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition
Input — Emitter						
LED Forward Voltage	V _F	0.9	1.5	2.1	V	I _F =10 mA
LED Junction Capacitance	C _J		25		pF	V _R =0 V, f=1 MHz
MOSFET Driver Output with External Biasing (see Figure 1 and Figure 3)						
Zener Voltage (pin 4 to 6)	V _Z		13		V	I _{ZT} =10 μA
Dynamic Output Voltage (pin 4 to 6)	V _{OUT}	9	11		V	C _L =2000 pF, V _B =20 V I _F =10 mA
Dynamic Output Current (pin 4 to 6)	I _{OUT}		5 15		mA mA	C _L =2000 pF, V _B =20 V I _F =10 mA I _F =40 mA
Dynamic Output Resistance Sourcing (pin 4) Sinking (pin 4)	R _{OUT}		300 20		Ω Ω	I _F =10 mA
Turn-on Time	t _{ON}		3.5	5	μs	C _L =2000 pF, I _F =40 mA Measure at V _{OUT} =5 V, V _B =20 V
Turn-off Time	t _{OFF}		3.5	5	μs	C _L =2000 pF, I _F =40 mA Measure at V _{OUT} =2 V, V _B =20 V
MOSFET Driver Output without External Biasing (see Figure 2 and Figure 3)						
Output Open Circuit Voltage (pin 4 to 6)	V _{OC}	7	10		V	I _F =10 mA
Output Short Circuit Current (pin 4 to 6)	I _{SC}	2.1 8.4	4 16		μA μA	I _F =10 mA I _F =40 mA
Dynamic Output Resistance Sinking (pin 4)	R _{OUT}		20		Ω	I _F =10 mA
Turn-on Time	t _{ON}		650	1000	μs	C _L =2000 pF (see Figure 3) Measure at V _{OUT} =5 V, I _F =40 mA
Turn-off Time	t _{OFF}		3	5	μs	C _L =2000 pF (see Figure 3) Measure at V _{OUT} =2 V, I _F =40 mA
MOSFET Driver Output Switching Speed (see Figure 3, Figure 4, Figure 5)						
Rise time	t _R		500		ns	M1 C _{gs} =2000 pF, V _S =50 V Measure at 90%–10% M1 V _{DS} (see Figure 4)
Turn-on Time	t _{ON}		3.5		μs	
Fall time	t _F		300		ns	
Turn-off Time	t _{OFF}		3.5		μs	
Package Isolation Characteristics						
Input-Output CMRR	dv/dt		15 kV		V/μs	V _{CM} =1000 V
Coupling Capacitance	C _{IO}		1		pF	f=1 MHz

Figure 1. Switching time measurement with external voltage bias

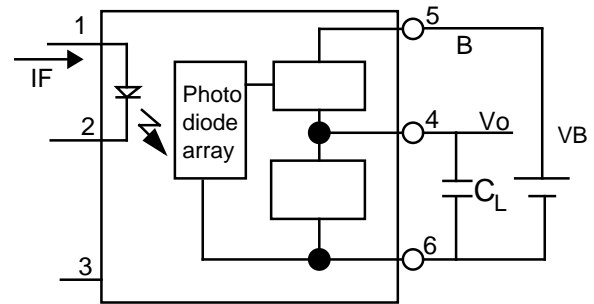


Figure 2. Switching time measurement

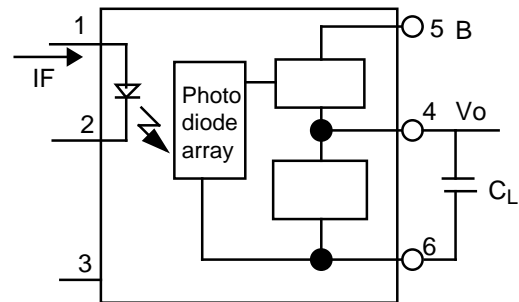


Figure 3. IL485 connected in AC load switching configuration

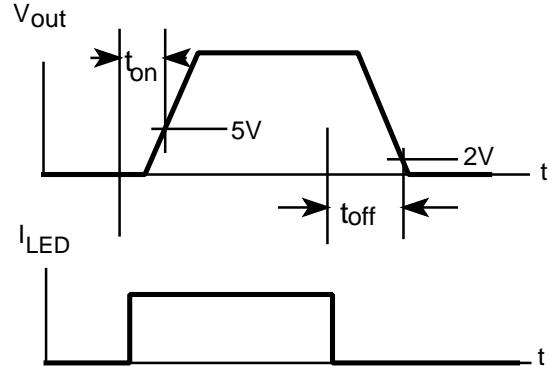


Figure 4. Switching time measurement without voltage bias

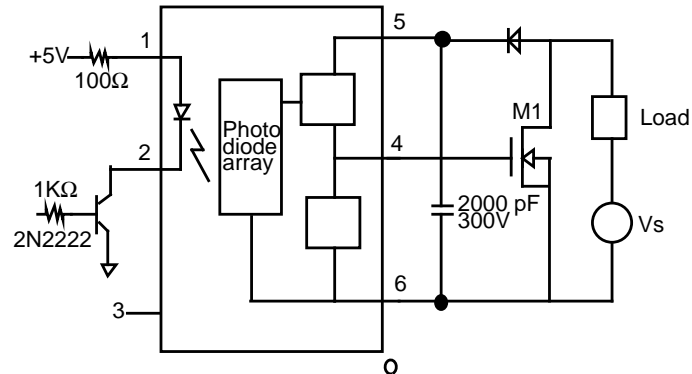


Figure 5. IL485 connected in DC load switching configuration

