



LH1485AT/AAB/AABTR

Optically Coupled High Speed MOSFET Drivers

FEATURES

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

AGENCY APPROVALS

- UL – File No. E52744
- BS/BABT Cert. No. 7980

APPLICATIONS

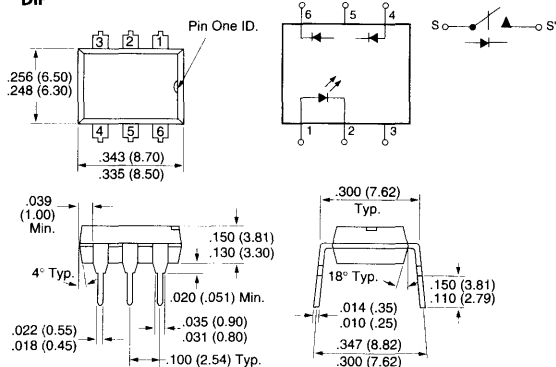
- Motor Drive Controls
- IGBT-predrivers
- AC/DC Power Inverters
- See Application Note 56

DESCRIPTION

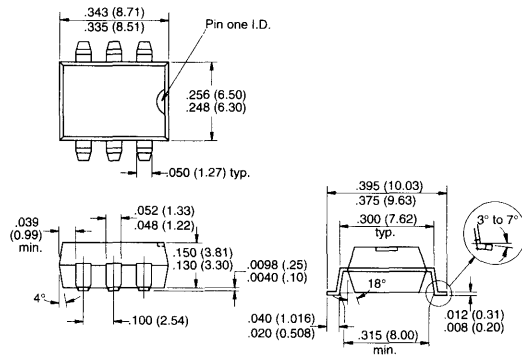
The LH1485 is a photovoltaic generator (optically coupled) designed to drive highly capacitive loads such as the gate of a power MOSFET transistor and at the same time provide isolation and floating voltage supply capability. The coupler consists of a GaAlAs light emitting diode as input control and 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 optocoupler is packaged in a 6 pin DIP.

Package Dimensions in Inches (mm)

DIP



SMD



Part Identification

Part Number	Description
LH1485AT	6-pin DIP
LH1485AAB	6-pin SMD, Tubes
LH1485AABTR	6-pin SMD, Tape and Reel



Absolute Maximum Ratings, $T_A=25^\circ\text{C}$ (except where noted)

Stresses in excess of the absolute Maximum Ratings can cause permanent damage to the device. These are absolute stress ratings only. Functional operation of the device is not implied at these or any other conditions in excess of those given in the operational sections of this document. Exposure to absolute Maximum Ratings for extended periods of time can adversely affect reliability.

Emitter

Reverse Voltage	4.0 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, $V=100\text{ V}$)	200 nA
Power Dissipation (pin 5 to 4)	150 mW

Package

Insulation Thickness between Emitter and Detector	$\geq 0.4\text{ mm}$
Isolation Test Voltage (1.0 s).....	$5300\text{ VAC}_{\text{RMS}}$
Isolation Resistance	
$V_{\text{IO}}=500\text{ V}, T_A=25^\circ\text{C}$	$\geq 10^{12}\ \Omega$
$V_{\text{IO}}=500\text{ V}, T_A=100^\circ\text{C}$	$\geq 10^{11}\ \Omega$
Comparative Tracking Index per	
DIN IEC 112/VDE 303, Part 1	≥ 175
Total Power Dissipation	250 mW
Storage Temperature Range	-55°C to $+150^\circ\text{C}$
Operating Temperature Range.....	-55°C to $+100^\circ\text{C}$
Junction Temperature	100°C
Soldering Temperature (max. 10 s, dip soldering distance to seating plane $> 1.5\text{ mm}$).....	260°C

Electrical Characteristics, $T_A=25^\circ\text{C}$

Minimum and maximum values are testing requirements. Typical values are characteristics of the device and are the result of engineering evaluations. Typical values are for information only and are not part of the testing requirements.

Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition
Input — Emitter						
LED Forward Voltage	V_F	0.9	1.5	2.1	V	$I_F=10\text{ mA}$
LED Junction Capacitance	C_J	—	25	—	pF	$V_R=0\text{ V}, f=1.0\text{ MHz}$
MOSFET Driver Output with External Biasing (see Figure 1 and Figure 3)						
Zener Voltage (pin 4 to 6)	V_Z	—	13	—	V	$I_{ZT}=10\ \mu\text{A}$
Dynamic Output Voltage (pin 4 to 6)	V_{OUT}	9.0	11	—	V	$C_L=2000\text{ pF}, V_B=20\text{ V}, I_F=10\text{ mA}$
Dynamic Output Current (pin 4 to 6)	I_{OUT}	—	5.0	—	mA	$C_L=2000\text{ pF}, V_B=20\text{ V}, I_F=10\text{ mA}$
		—	15	—		$C_L=2000\text{ pF}, V_B=20\text{ V}, I_F=40\text{ mA}$
Dynamic Output Resistance	Sourcing (pin 4)	R_{OUT}	—	300	Ω	$I_F=10\text{ mA}$
	Sinking (pin 4)		—	20		
Turn-on Time	t_{on}	—	3.5	5.0	μs	$C_L=2000\text{ pF}, I_F=40\text{ mA}$ Measure at $V_{\text{OUT}}=5.0\text{ V}, V_B=20\text{ V}$
Turn-off Time	t_{off}	—	3.5	5.0	μs	$C_L=2000\text{ pF}, I_F=40\text{ mA}$ Measure at $V_{\text{OUT}}=2.0\text{ V}, V_B=20\text{ V}$

Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition
MOSFET Driver Output without External Biasing (see Figure 2 and Figure 3)						
Output Open Circuit Voltage (pin 4 to 6)	V_{OC}	8.0	10	—	V	$I_F=10$ mA
Output Short Circuit Current (pin 4 to 6)	I_{SC}	2.1	4.0	—	μ A	$I_F=10$ mA
		8.4	16	—		
Dynamic Output Resistance Sinking (pin 4)	R_{OUT}	—	20	—	Ω	$I_F=10$ mA
Turn-on Time	t_{on}	—	650	1000	μ s	$C_L=2000$ pF (see Figure 3) Measure at $V_{OUT}=5.0$ V, $I_F=40$ mA
Turn-off Time	t_{off}	—	3.0	5.0	μ s	$C_L=2000$ pF (see Figure 3) Measure at $V_{OUT}=2.0$ V, $I_F=40$ mA
MOSFET Driver Output Switching Speed (see Figure 3, Figure 4, Figure 5)						
Rise time	t_r	—	500	—	ns	$M1$ Cgs=2000 pF, $V_S=50$ V Measure at 90%–10% M1 V_{DS} (see Figure 4)
Turn-on Time	t_{on}	—	3.5	—	μ s	
Fall time	t_f	—	300	—	ns	
Turn-off Time	t_{off}	—	3.5	—	μ s	
Package Isolation Characteristics						
Input-Output CMRR	dv/dt	—	15 kV	—	V/ μ s	$V_{CM}=1000$ V
Coupling Capacitance	C_{IO}	—	1.0	—	pF	$f=1.0$ MHz

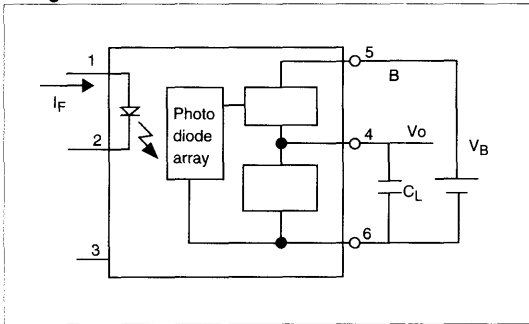
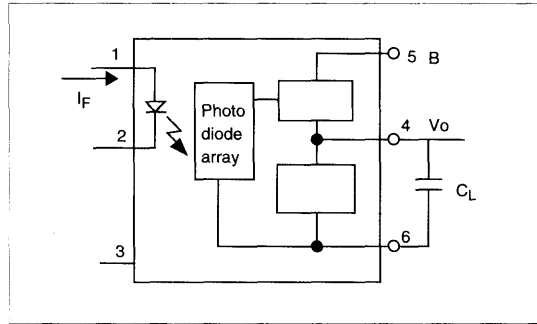
Figure 1. Switching Time Measurement With External Voltage Bias

Figure 2. Switching Time Measurement Without Voltage Bias


Figure 3. Switching Time Measurement

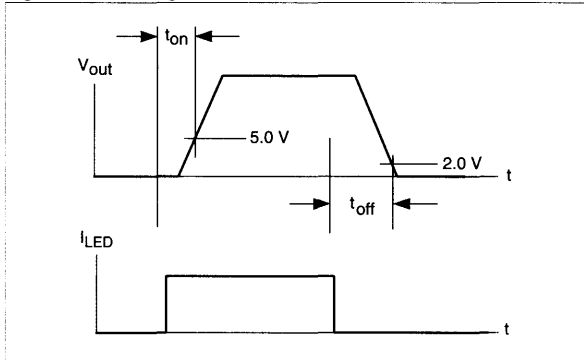


Figure 4. LH1485 Connected in DC Load Switching Configuration

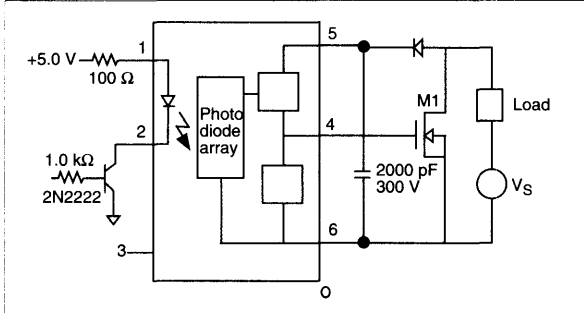


Figure 5. LH1485 Connected in AC Load Switching Configuration

