

FEATURES

- 1500 Vrms input/output isolation
- High-surge capability
- Low ON-resistance
- Clean, bounce-free switching
- dv/dt typically better than 500 V/ μ s
- Low power consumption
- Monolithic IC reliability

APPLICATIONS

- Telecom switching
- Transducer driver
- High-voltage testers
- Industrial controls
- Triac predriver
- Isolation switching

DESCRIPTION

The LH1191 High-Voltage, Solid State Relay is a single pole, normally open switch (1 Form A) that can replace electromechanical relays in many applications. The relay features logic-level input control of isolated high-voltage switch outputs. The output is rated at 280 V and can handle loads up to 120 mA. The relay can switch both ac and dc loads and is ideal for audio frequency or dc applications. Typical ON-resistance at 25 mA is 25 Ω .

The LH1191 relay consists of a GaAlAs LED that optically couples control signals to a monolithic integrated circuit. Optical coupling provides 1500 Vrms of input/output isolation. The integrated circuit is a dielectrically isolated, high-voltage die comprised of photodiode arrays, switch control circuitry, and high-voltage DMOS transistor switches.

In operation, the device is exceptionally linear up to 55 mA. Beyond 55 mA, the incremental resistance decreases, thereby minimizing internal power dissipation. Overload currents are clamped at 210 mA by internal current limiting. An extended clamp condition, which increases relay temperature, results in a reduction in clamp current, thereby further reducing internal power dissipation and preserving the relay's integrity. The relay is packaged in a 6-pin, plastic DIP (LH1191AT1) or in a 6-pin, surface-mount, gull-wing configuration (LH1191AAB1).

Absolute Maximum Ratings $T_A=25^\circ\text{C}$

Stresses exceeding the values listed under Absolute Maximum Ratings can cause permanent damage to the device. This is an absolute stress rating only. Functional operation of the device at these or any other conditions

in excess of those indicated in the operational sections of this data sheet is not implied. Exposure to maximum-rating conditions for extended periods of time can adversely affect the device reliability.

Rating	Symbol	Value	Unit
Ambient Operating Temperature Range	T_A	-40 to +85	$^\circ\text{C}$
Storage Temperature Range	T_{stg}	-40 to +100	$^\circ\text{C}$
Pin Soldering Temperature (t=7 s max.)	T_S	270	$^\circ\text{C}$
Input/Output Isolation Voltage (t=60 s min.)	V_{ISO}	1500	Vrms
LED Input Ratings:			
Continuous forward current	I_F	20	mA
Reverse voltage	V_R	10	V
Output Operation:			
dc or peak ac load voltage ($I_L \leq 50 \mu\text{A}$)	V_L	280	V
Continuous dc load current	I_L	135	mA
Power Dissipation	P_{DISS}	500	mW

Recommended Operating Conditions $T_A=25^\circ\text{C}$

(unless otherwise specified)

Parameter	Symbol	Min	Typ	Max	Unit
LED Forward Current for Switch Turn-on ($T_A=-40^\circ\text{C}$ to $+85^\circ\text{C}$)	I_{FON}	6	10	20	mA
Continuous dc Load Current	I_L	—	55	120	mA
ac rms Load Current	—	—	35	85	mA

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 purposes only and are not part of the testing requirements.

Characteristics	Symbol	Test Condition	Min	Typ	Max	Unit
LED Forward Current for Switch Turn-on	I_{Fon}	I_L (min)=120 mA, $V_L=\pm 7$ V, t=10 ms	—	1.3	2.5	mA
LED Forward Current for Switch Turn-off	I_{Foff}	$I_F=0.2$ mA, $V_L=\pm 250$ V	0.2	1.2	—	mA
LED Forward Voltage	V_F	$I_F=10$ mA	1.15	1.22	1.45	V
ON-resistance	R_{ON}	$I_F=5$ mA, $I_L= \pm 25$ mA	11	25	33	Ω
Current Limit	I_{LMT}	$I_F=5$ mA, $V_L=\pm 7$ V, t=10 ms	140	210	260	mA
Output Off-state Leakage Current	—	$I_F=0$, $V_L=\pm 100$ V	—	0.03	200	nA
Turn-on Time	t_{on}	$I_F=5$ mA, $V_L=+150$ V, $R_L=4$ k Ω	—	1.4	2.0	ms
Turn-off Time	t_{off}	$I_F=5$ mA, $V_L=+150$ V, $R_L=4$ k Ω	—	0.9	2.0	ms
Feedthrough Capacitance Pin 4 to 6	—	$I_F=0$, $V_L=4$ Vp-p, 1 kHz	—	24	—	pF