Photocouplers Photorelay

TLP3545

1. Applications

- Mechanical relay replacements
- Security Systems
- Measuring Equipments
- Factory Automation (FA)
- Amusement Equipments

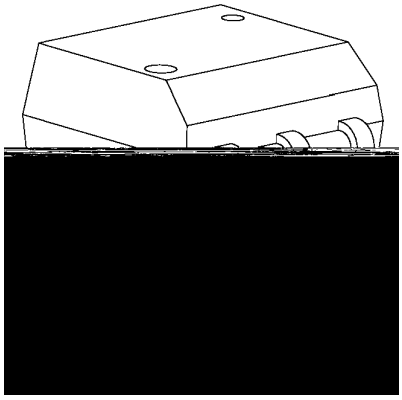
2. General

The TLP3545 photorelay consists of a photo MOSFET optically coupled to an infrared light emitting diode. It is housed in a 6-pin DIP package. The low ON-state resistance and the high permissible ON-state current of the the TLP3545 make it suitable for power line control applications.

3. Features

(1) Normally off (1-Form-A)
(2) OFF-state output terminal voltage: 60 V (min)
(3) Trigger LED current: 3 mA (max)
(4) ON-state current: 3.0 A (max) (A connection)
(5) ON-state resistance: 70 mΩ (max) (A connection)
(6) Isolation voltage: 2500 Vrms (min)
(7) Safety standards
UL-approved: UL1577 File No.E67349
cUL-approved: CSA Component Acceptance Service No.5A, File No.E67349

4. Packaging and Pin Configuration



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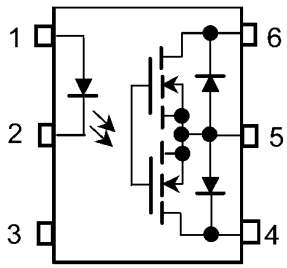

1: Anode
2: Cathode
3: N.C.
4: Drain
5: Source
6: Drain

5. Internal Circuit

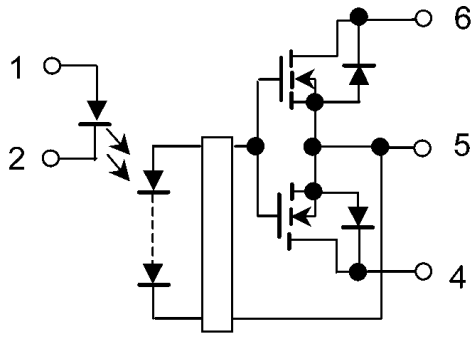

Fig. 5.1 Internal Circuit

6. Absolute Maximum Ratings (Note) (Unless otherwise specified, T_a = 25°C)

Characteristics			Symbol	Note	Rating	Unit
LED	Input forward current		I_F		30	mA
	Input forward current derating	($T_a \geq 25°C$)	$\Delta I_F/\Delta T_a$		-0.3	mA/°C
	Input forward current (pulsed)	(100 μs pulse, 100 pps)	I_{FP}		1	A
	Input reverse voltage		V_R		5	V
	Input power dissipation		P_D		50	mW
	Junction temperature		T_j		125	°C
Detector	OFF-state output terminal voltage		V_{OFF}		60	V
	ON-state current (A connection)		I_{ON}	(Note 1)	3	A
	ON-state current (B connection)		I_{ON}	(Note 1)	3	
	ON-state current (C connection)		I_{ON}	(Note 1)	6	
	ON-state current derating (A connection)	($T_a \geq 25°C$)	$\Delta I_{ON}/\Delta T_a$	(Note 1)	-30	mA/°C
	ON-state current derating (B connection)	($T_a \geq 25°C$)	$\Delta I_{ON}/\Delta T_a$	(Note 1)	-30	
	ON-state current derating (C connection)	($T_a \geq 25°C$)	$\Delta I_{ON}/\Delta T_a$	(Note 1)	-60	
	ON-state current (pulsed)	(t = 100 ms, Duty = 1/10)	I_{ONP}		9	A
	Output power dissipation		P_O		500	mW
	Junction temperature		T_j		125	°C
Common	Storage temperature		T_{stg}		-55 to 125	
	Operating temperature		T_{opr}		-40 to 85	
	Lead soldering temperature	(10 s)	T_{sol}		260	
	Isolation voltage	AC, 1 min, R.H. ≤ 60%	BV_S	(Note 2)	2500	Vrms

7. Recommended Operating Conditions (Note)

Characteristics	Symbol	Note	Min	Typ.	Max	Unit
Supply voltage	V_{DD}		—	—	48	V
Input forward current	I_F		5	10	25	mA
ON-state current (A connection)	I_{ON}		—	—	3	A
Operating temperature	T_{opr}		-20	—	65	°C

Note: The recommended operating conditions are given as a design guide necessary to obtain the intended performance of the device. Each parameter is an independent value. When creating a system design using this device, the electrical characteristics specified in this datasheet should also be considered.

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

	Characteristics	Symbol	Note	Test Condition	Min	Typ.	Max	Unit
LED	Input forward voltage	V_F		I_F = 10 mA	1.18	1.33	1.48	V
	Input reverse current	I_R		V_R = 5 V	—	—	10	μA
	Input capacitance	C_t		V = 0 V, f = 1 MHz	—	70	—	pF
Detector	OFF-state current	I_{OFF}		V_{OFF} = 60 V	—	—	1	μA
	Output capacitance	C_{OFF}		V = 0 V, f = 1 MHz	—	1000	—	pF

11. Switching Characteristics (Unless otherwise specified, T_a = 25°C)

Characteristics	Symbol	Note	Test Condition	Min	Typ	Max	Unit
Turn-on time	t_{ON}		See Fig. 11.1. R_L = 200 Ω, V_{DD} = 20 V, I_F = 5 mA	—	2	5	ms
Turn-off time	t_{OFF}			—	0.1	1	
Turn-on time	t_{ON}		See Fig. 11.1. R_L = 200 Ω, V_{DD} = 20 V, I_F = 10 mA	—	1	3	
Turn-off time	t_{OFF}			—	0.1	1	

Fig. 11.1 Switching Time Test Circuit

12. Characteristics Curves and Circuit Connections

12.1. Characteristics Curves (Note)

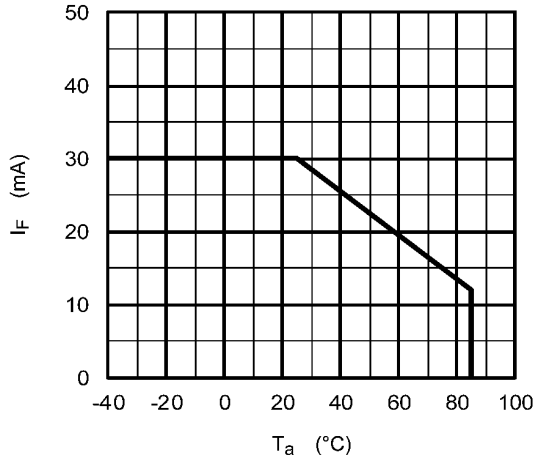

Fig. 12.1.1 I_F - T_a

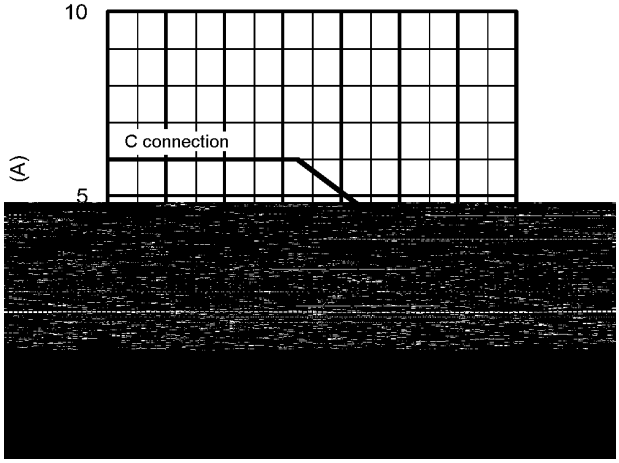

Fig. 12.1.2 I_{ON} - T_a

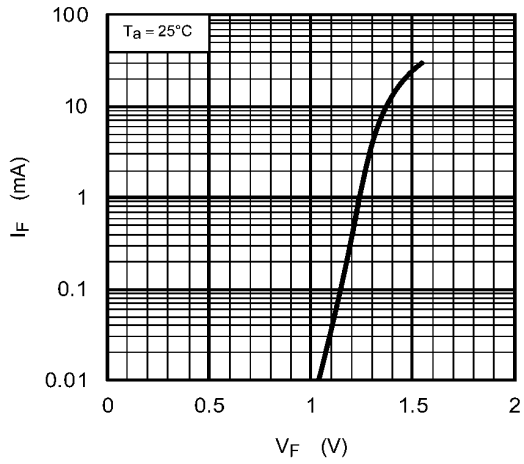

Fig. 12.1.3 I_F - V_F

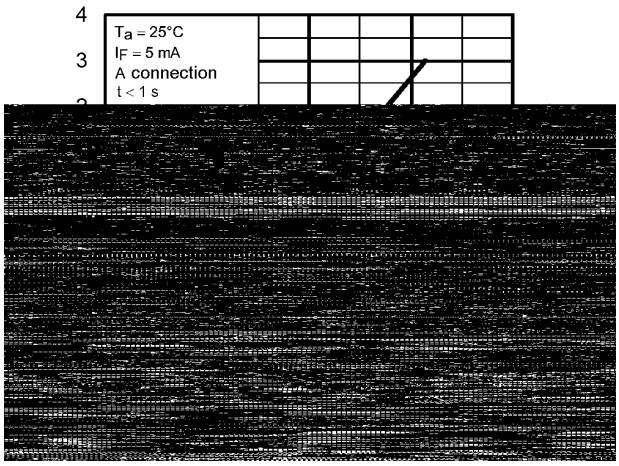

Fig. 12.1.4 I_{ON} - V_{ON}

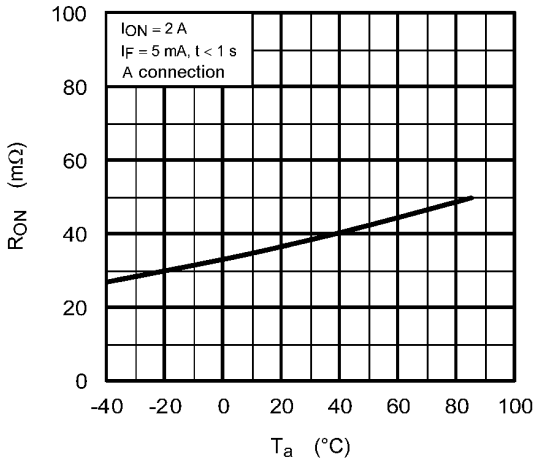

Fig. 12.1.5 R_{ON} - T_a

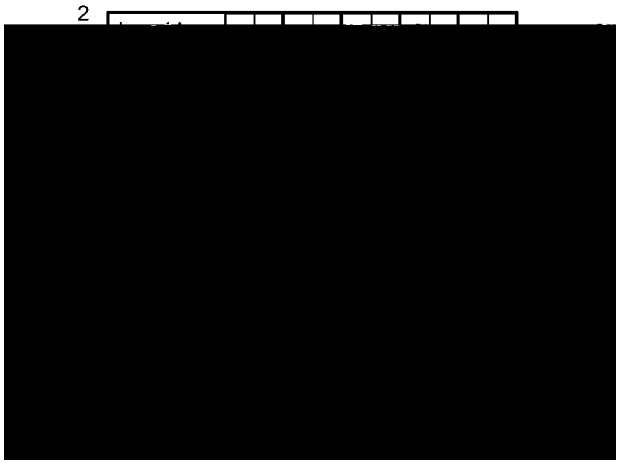

Fig. 12.1.6 I_{FT} - T_a

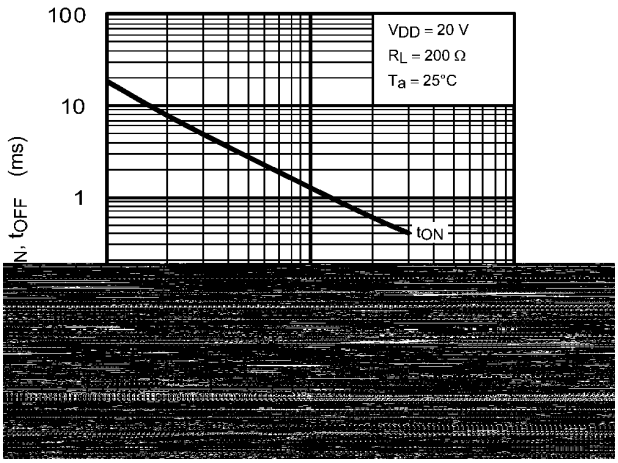

Fig. 12.1.7 t_{ON}, t_{OFF} - I_F

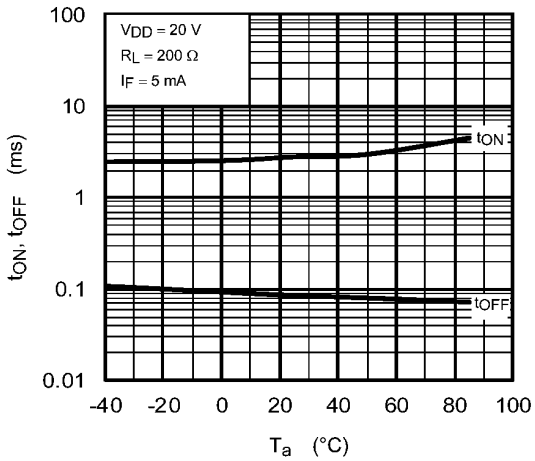

Fig. 12.1.8 t_{ON}, t_{OFF} - T_a

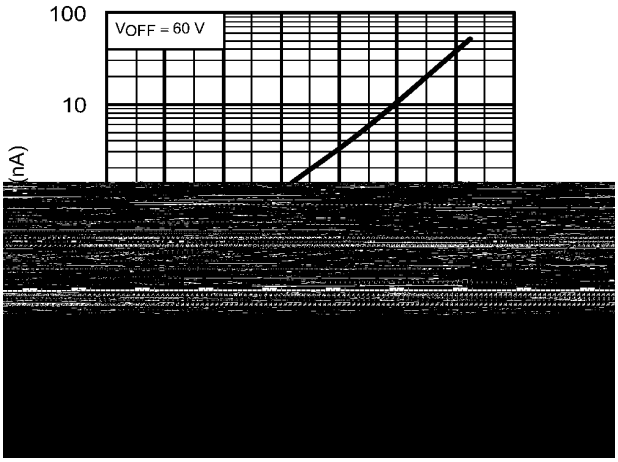

Fig. 12.1.9 I_{OFF} - T_a

Note: The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.

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