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Photocouplers Photorelay

TLP175A

1. Applications

- Mechanical relay replacements
- Security Systems
- Measuring Instruments
- Factory Automation (FA)
- Amusement Equipment
- Smart Meters
- Electricity Meters

2. General

The TLP175A photorelay consists of a photo MOSFET optically coupled to an infrared LED. It is housed in a 4-pin SO6 package. This photorelay requires 1mA of LED current to turn it on. It is suitable for applications that need electrical power savings.

3. Features

(1) Normally opened (1-Form-A)
(2) OFF-state output terminal voltage: 60 V (min)
(3) Trigger LED current: 1 mA (max)
(4) ON-state current: 100 mA (max)
(5) ON-state resistance: 50 Ω (max)
(6) Isolation voltage: 3750 Vrms (min)
(7) Safety Standards
UL-recognized: UL 1577, File No.E67349
cUL-recognized: CSA Component Acceptance Service No.5A File No.E67349
VDE-approved: EN 60747-5-5, EN 62368-1 **(Note 1)**
CQC-approved: GB4943.1, GB8898 Thailand Factory

仅适用于海拔 2000m 以下地区安全使用

Note 1: When a VDE approved type is needed, please designate the **Option (V4)**.

Start of commercial production
2012-08

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2019-10-11
Rev.5.0

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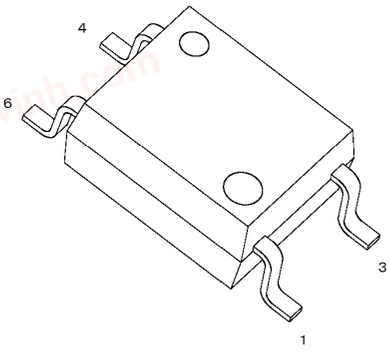
4. Packaging and Pin Assignment



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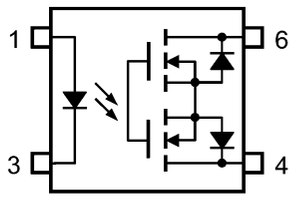
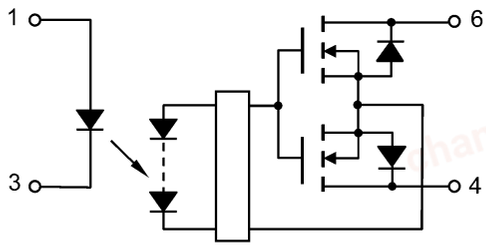


1: Anode
3: Cathode
4: Drain
6: Drain

5. Internal Circuit



6. Mechanical Parameters

Characteristics	TLP175A	Unit
Creepage distances	5.0 (min)	mm
Clearance distances	5.0 (min)	
Internal isolation thickness	0.4 (min)	

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7. 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
	Input power dissipation derating	($T_a \geq 25$ °C)	$\Delta P_D/\Delta T_a$		-0.5	mW/°C
	Junction temperature		T_j		125	°C
Detector	OFF-state output terminal voltage		V_{OFF}		60	V
	ON-state current		I_{ON}		100	mA
	ON-state current derating	($T_a \geq 25$ °C)	$\Delta I_{ON}/\Delta T_a$		-1.0	mA/°C
	ON-state current (pulsed)	(t = 100 ms, duty = 1/10)	I_{ONP}		300	mA
	Output power dissipation		P_O		200	mW
	Output power dissipation derating	($T_a \geq 25$ °C)	$\Delta P_O/\Delta T_a$		-2.0	mW/°C
	Junction temperature		T_j		125	°C
Common	Storage temperature		T_{stg}		-55 to 125	°C
	Operating temperature		T_{opr}		-40 to 85	°C
	Lead soldering temperature	(10 s)	T_{sol}		260	°C
	Isolation voltage	(AC, 60 s, R.H. ≤ 60 %)	BV_S	(Note 1)	3750	Vrms

Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings.
Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/"Derating Concept and Methods") and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

Note 1: This device is considered as a two-terminal device: Pins 1 and 3 are shorted together, and pins 4 and 6 are shorted together.

Note: This device is sensitive to electrostatic discharge (ESD). Extreme ESD conditions should be guarded against by using proper antistatic precautions for the worktable, operator, solder iron, soldering equipment and so on.

8. Recommended Operating Conditions (Note)

Characteristics	Symbol	Note	Min	Typ.	Max	Unit
Supply voltage	V_{DD}		—	—	48	V
Input forward current	I_F		2	5	15	mA
ON-state current	I_{ON}		—	—	80	
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 data sheet should also be considered.

9. 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	1.1	1.27	1.4	V
	Input reverse current	I_R		V_R = 5 V	—	—	10	μA
	Input capacitance	C_t		V = 0 V, f = 1 MHz	—	50	—	pF
Detector	OFF-state current	I_{OFF}		V_{OFF} = 60 V	—	—	1	μA
	Output capacitance	C_{OFF}		V = 0 V, f = 1 MHz	—	10	—	pF

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

Characteristics	Symbol	Note	Test Condition	Min	Typ.	Max	Unit
Trigger LED current	I_{FT}		I_{ON} = 100 mA, t < 1 s	—	0.2	1	mA
Return LED current	I_{FC}		I_{OFF} = 100 μA	0.01	—	—	mA
ON-state resistance	R_{ON}		I_{ON} = 100 mA, I_F = 2 mA, t < 1 s	—	25	50	Ω

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

Characteristics	Symbol	Note	Test Condition	Min	Typ.	Max	Unit
Total capacitance (input to output)	C_S	(Note 1)	V_S = 0 V, f = 1 MHz	—	0.8	—	pF
Isolation resistance	R_S	(Note 1)	V_S = 500 V, R.H. ≤ 60 %	10^{12}	10^{14}	—	Ω
Isolation voltage	BV_S	(Note 1)	AC, 60 s	3750	—	—	Vrms

Note 1: This device is considered as a two-terminal device: Pins 1 and 3 are shorted together, and pins 4 and 6 are shorted together.

12. 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. 12.1. R_L = 200 Ω, V_{DD} = 10 V, I_F = 2 mA	—	1	5	ms
Turn-off time	t_{OFF}			—	1	5	

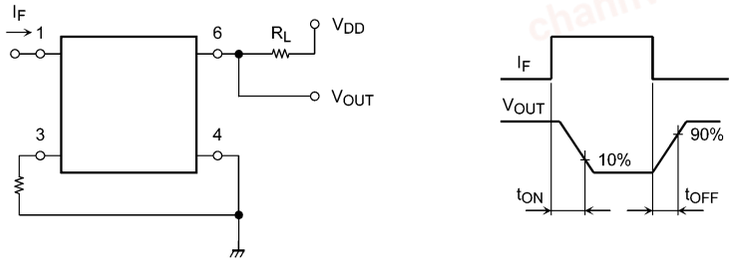

Fig. 12.1 Switching Time Test Circuit and Waveform

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13. Characteristics Curves and Circuit Connections

13.1. Characteristics Curves (Note)

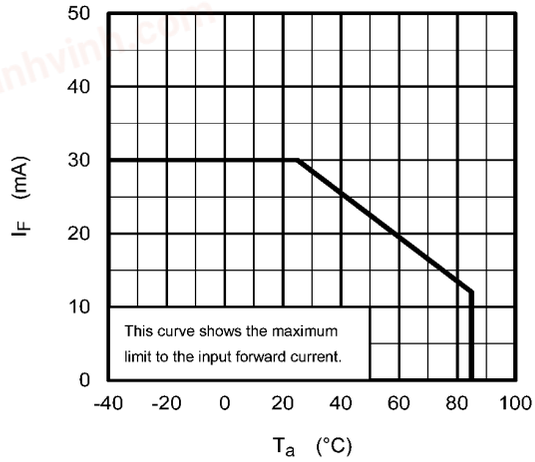

Fig. 13.1.1 I_F - T_a

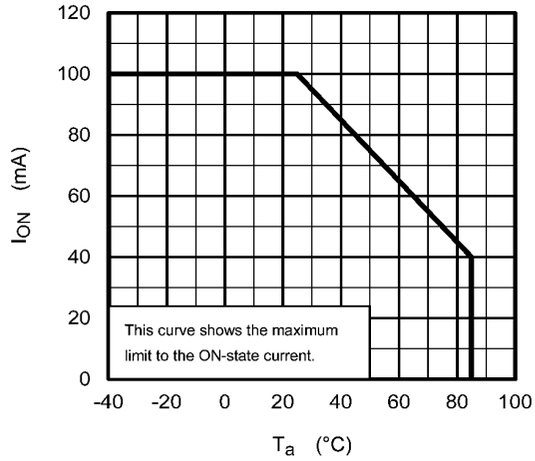

Fig. 13.1.2 I_{ON} - T_a

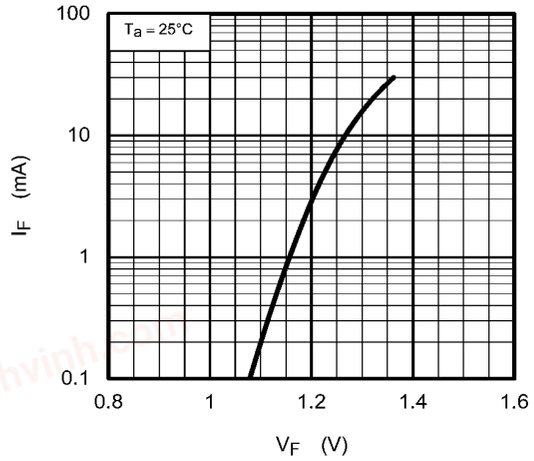

Fig. 13.1.3 I_F - V_F

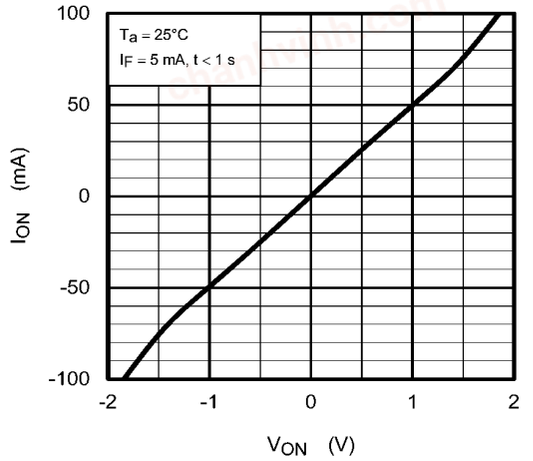

Fig. 13.1.4 I_{ON} - V_{ON}

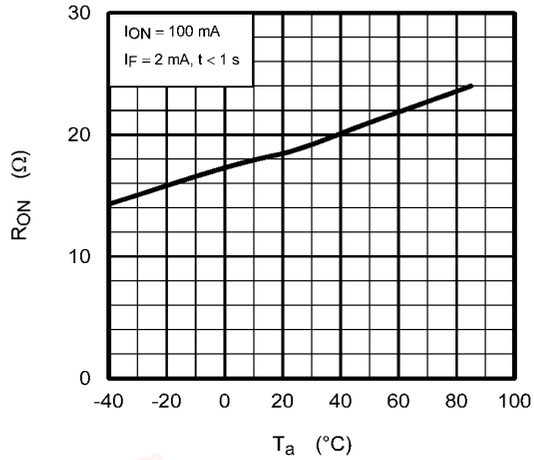

Fig. 13.1.5 R_{ON} - T_a

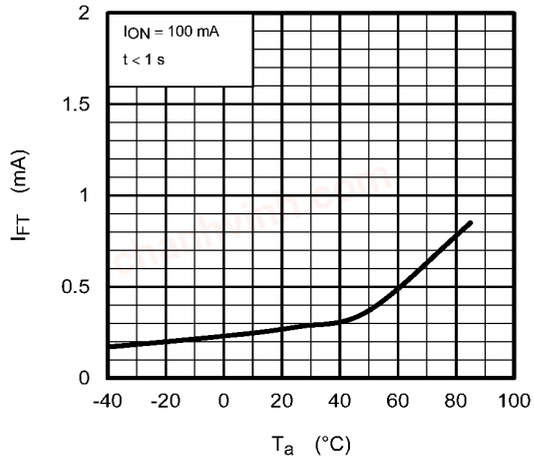

Fig. 13.1.6 I_{FT} - T_a

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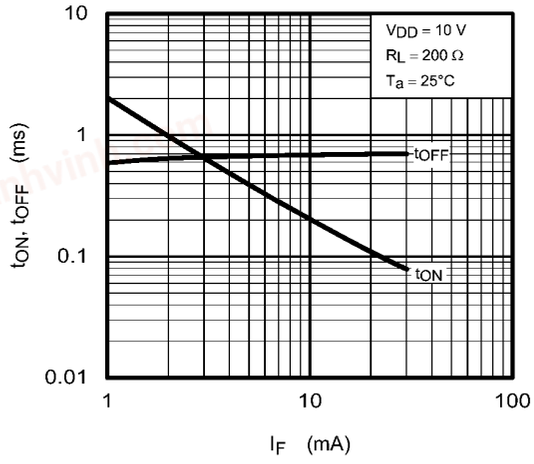

Fig. 13.1.7 t_{ON}, t_{OFF} - I_F

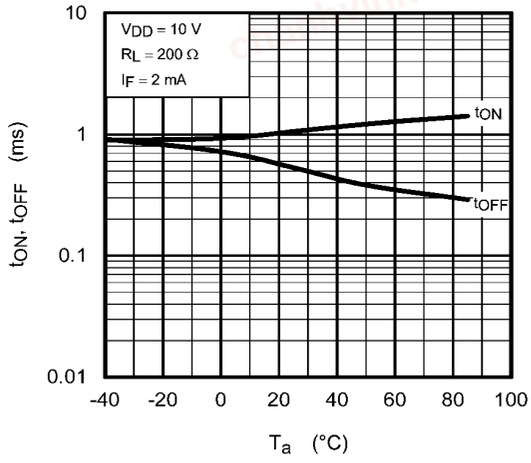

Fig. 13.1.8 t_{ON}, t_{OFF} - T_a

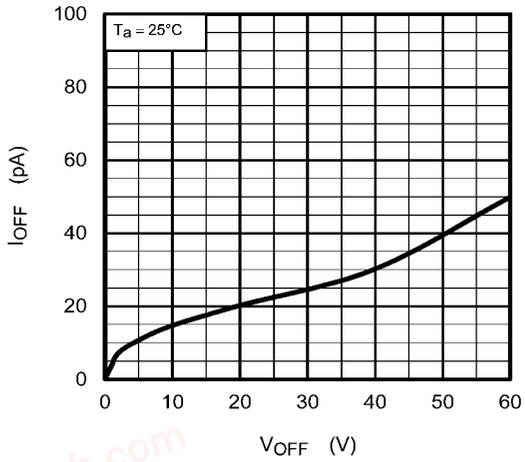

Fig. 13.1.9 I_{OFF} - V_{OFF}

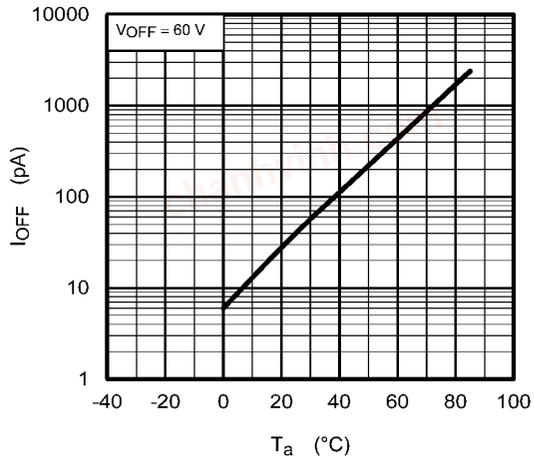

Fig. 13.1.10 I_{OFF} - T_a

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

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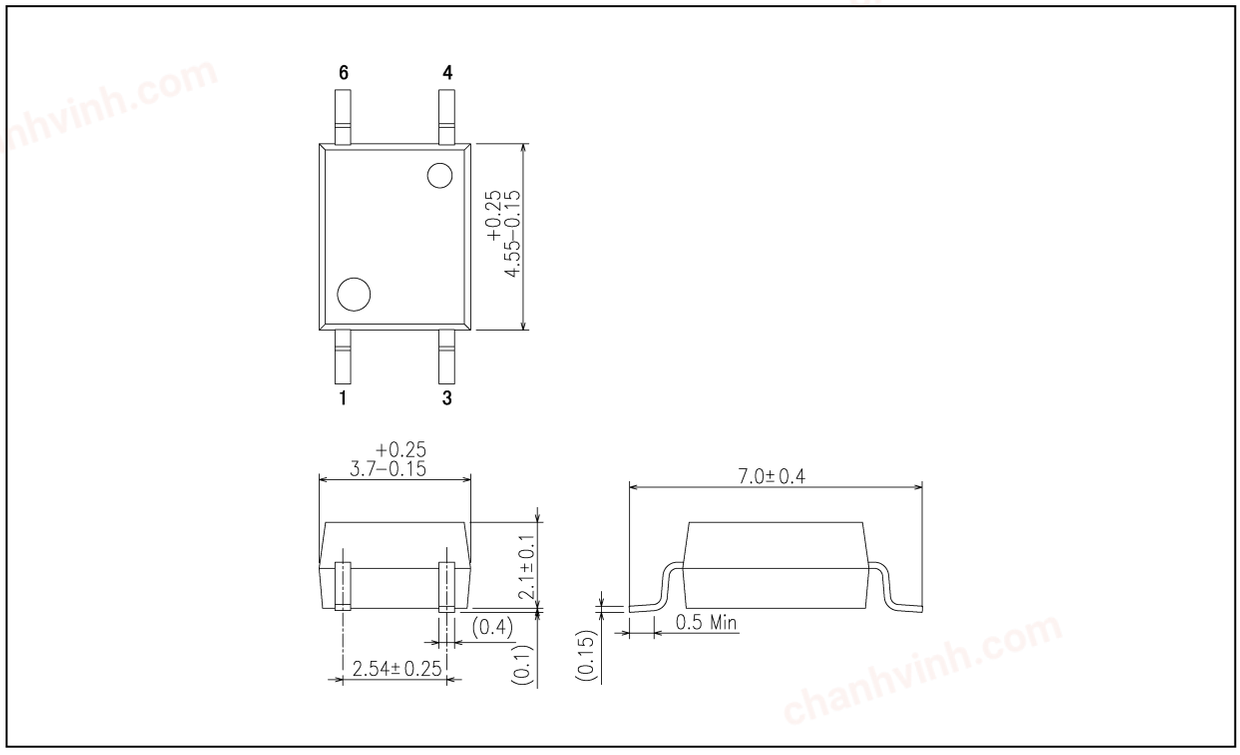
Package Dimensions

Unit: mm



Weight: 0.08 g (typ.)

Package Name(s)
TOSHIBA: 11-4M1S

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