

TOSHIBA Photocoupler Photorelay

TLP172A

Telecommunications
Control Equipment
Data Acquisition System
Security Equipment
Measurement Equipment

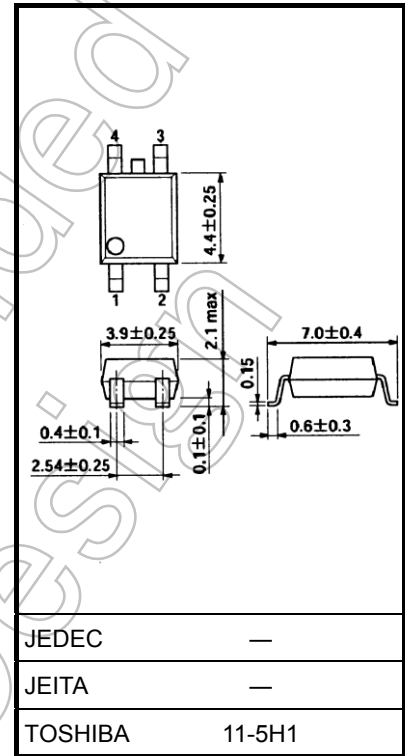
Unit: mm

The Toshiba TLP172A consists of a gallium arsenide infrared emitting diode optically coupled to a photo-MOSFET in a 4-pin SOP package.

Because of the low offset voltage at turn-on, this photorelay is suitable for analog signal switching, eg. micro signal scan circuit of data acquisition system, subscriber circuit of digital exchange, etc.

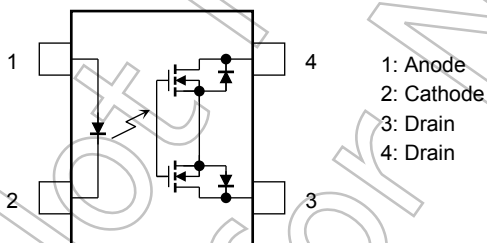
And also photorelay has higher output current rating than phototransistor-type photocoupler, hence, it is suitable for use as On/Off control for high current.

- 4-pin SOP (2.54SOP4): Height = 2.1 mm, pitch = 2.54 mm
- Normally open (1-form-A) device
- Peak off-state voltage: 60 V (min)
- Trigger LED current: 3 mA (max)
- On-state current: 400 mA (max)
- On-state resistance: 2 Ω (max)
- Isolation voltage: 1500 Vrms (min)
- UL recognized: UL1557, File No.E67349
- cUL recognized: CSA Component Acceptance Service No. 5A
File No.E67349



Weight: 0.1 g (typ.)

Pin Configuration (top view)



Start of commercial production
2002-03

Absolute Maximum Ratings (Ta = 25°C)

Characteristics		Symbol	Rating	Unit
LED	Forward current	I_F	50	mA
	Forward current derating (Ta ≥ 25°C)	$\Delta I_F / ^\circ\text{C}$	-0.5	mA/°C
	Reverse voltage	V_R	5	V
	Diode power dissipation	P_D	50	mW
	Diode power dissipation derating (Ta > 25°C)	$\Delta P_D / ^\circ\text{C}$	-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}	400	mA
	Forward current derating (Ta ≥ 25°C)	$\Delta I_{ON} / ^\circ\text{C}$	-4.0	mA/°C
	Output power dissipation	P_O	290	mW
	Output power dissipation derating (Ta ≥ 25°C)	$\Delta P_O / ^\circ\text{C}$	-2.9	mW / °C
	Junction temperature	T_j	125	°C
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, 1 minute, R.H. ≤ 60%) (Note 1)		BV_S	1500	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: LED pins are shorted together. Detector pins are also shorted together.

Recommended Operating Conditions

Characteristics	Symbol	Min	Typ.	Max	Unit
Supply voltage	V_{DD}	—	—	48	V
Forward current	I_F	5	7.5	25	mA
On-state current	I_{ON}	—	—	400	mA
Operating temperature	T_{opr}	-20	—	65	°C

Note: Recommended operating conditions are given as a design guideline to obtain expected performance of the device. Additionally, each item is an independent guideline respectively. In developing designs using this product, please confirm specified characteristics shown in this document.

Electrical Characteristics (Ta = 25°C)

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
LED	Forward voltage	V_F	$I_F = 10 \text{ mA}$	1.0	1.15	1.3	V
	Reverse current	I_R	$V_R = 5 \text{ V}$	—	—	10	μA
	Capacitance between terminals	C_T	$V_F = 0 \text{ V}, f = 1 \text{ MHz}$	—	30	—	pF
Detector	Off-state current	I_{OFF}	$V_{OFF} = 60 \text{ V}$	—	—	1	μA
	Capacitance between terminals	C_{OFF}	$V = 0 \text{ V}, f = 1 \text{ MHz}$	—	130	—	pF

Coupled Electrical Characteristics (Ta = 25°C)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Trigger LED current	I_{FT}	$I_{ON} = 400 \text{ mA}$	—	1.6	3	mA
Return LED current	I_{FC}	$I_{OFF} = 100 \mu\text{A}$	0.1	—	—	mA
On-state resistance	R_{ON}	$I_{ON} = 400 \text{ mA}, I_F = 5 \text{ mA}$	—	1	2	Ω

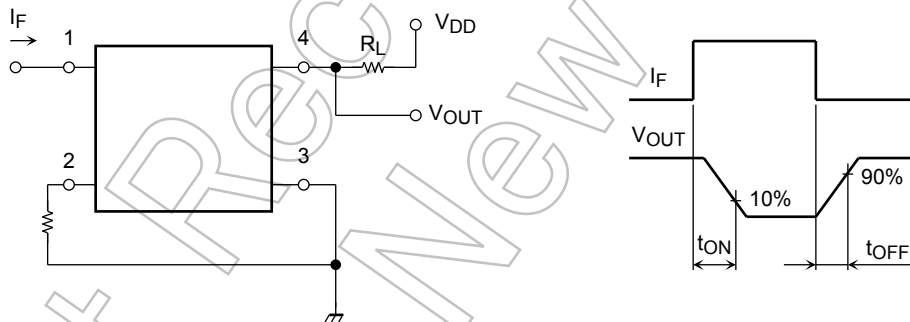
Isolation Characteristics (Ta = 25°C)

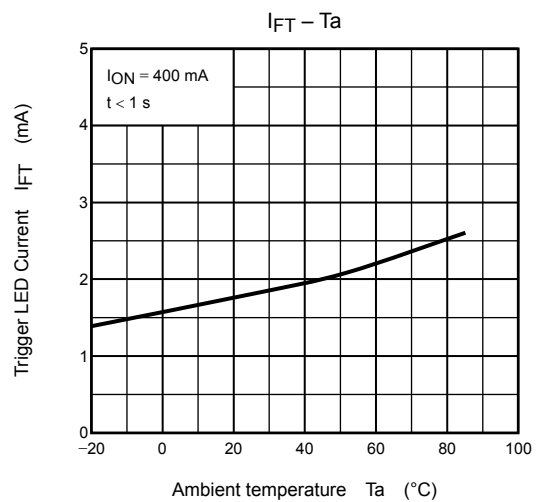
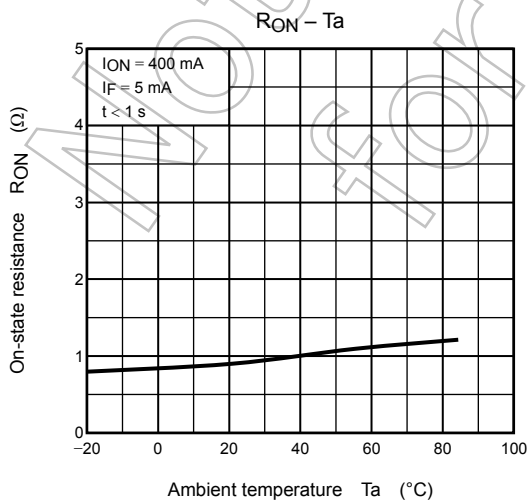
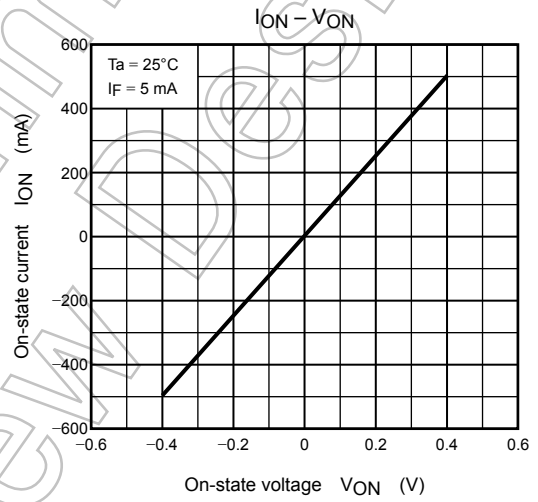
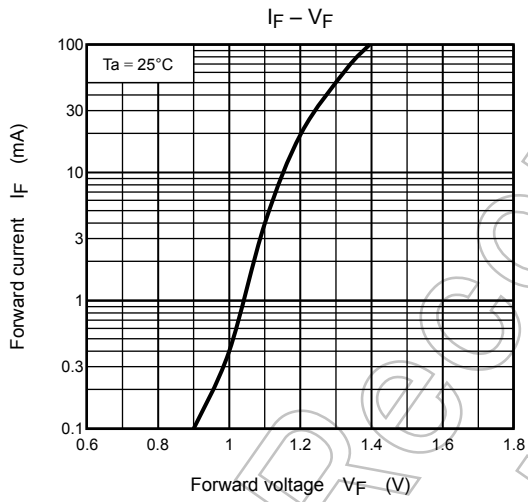
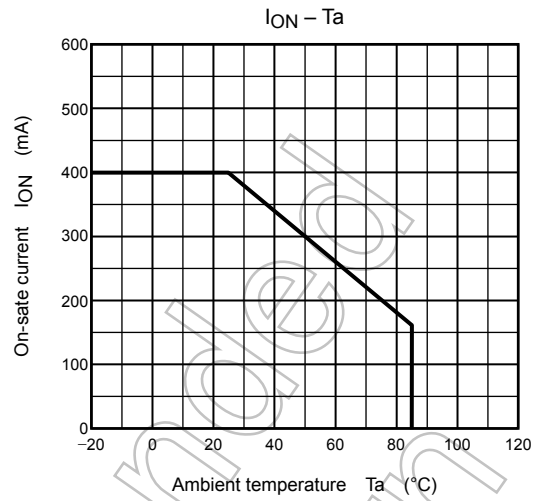
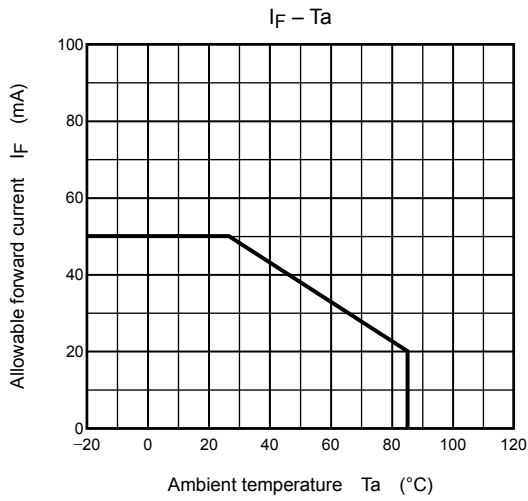
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Capacitance input to output	C_S	$V_S = 0 \text{ V}, f = 1 \text{ MHz}$	—	0.8	—	pF
Isolation resistance	R_S	$V_S = 500 \text{ V}, \text{R.H.} \leq 60\%$	5×10^{10}	10^{14}	—	Ω
Isolation voltage	BV_S	AC, 1 minute	1500	—	—	Vrms
		AC, 1 second, in oil	—	3000	—	—
		DC, 1 minute, in oil	—	3000	—	Vdc

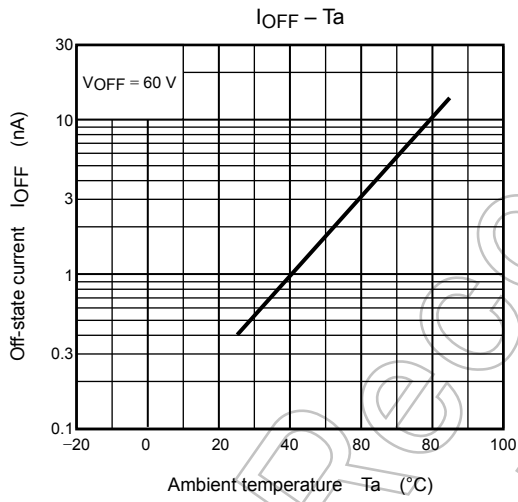
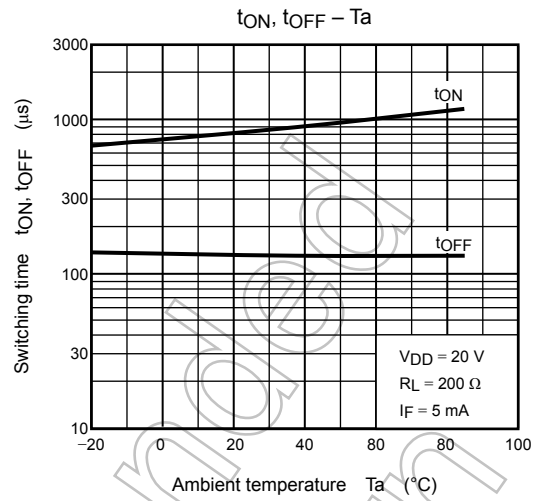
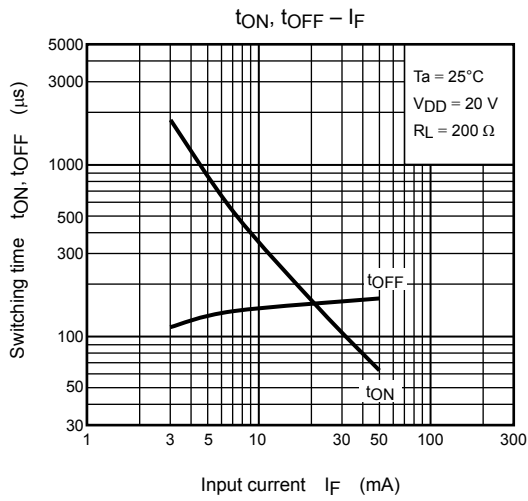
Switching Characteristics (Ta = 25°C)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Turn-on time	t_{ON}	$R_L = 200 \Omega$ (注 2)	—	0.8	2	ms
Turn-off time	t_{OFF}	$V_{DD} = 20 \text{ V}, I_F = 5 \text{ mA}$	—	0.1	0.5	

Note 2: Switching time test circuit







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