

TOSHIBA Photocoupler Photorelay

# TLP172A

Telecommunications  
 Control Equipment  
 Data Acquisition System  
 Security Equipment  
 Measurement Equipment

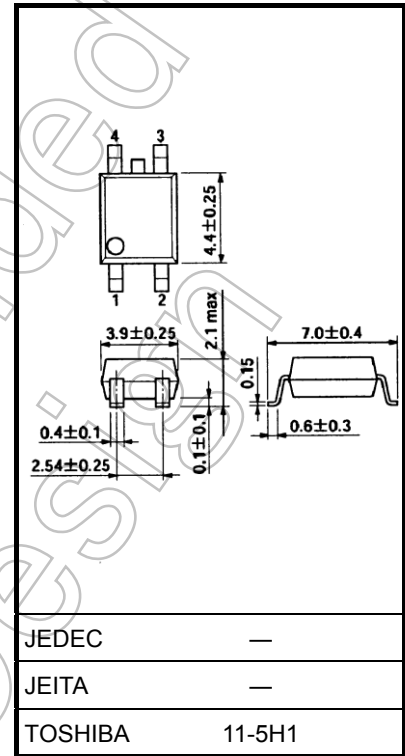
Unit: mm

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.

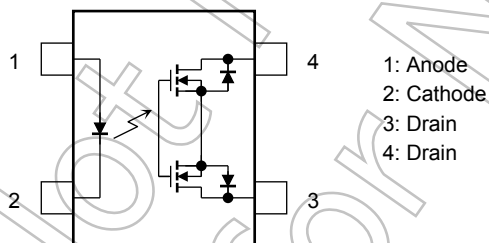
And also photorelay has higher output current rating than phototransistor-type photocoupler, hence, it is suitable for use as On/Off control for high current.

- 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)



- 1: Anode
- 2: Cathode
- 3: Drain
- 4: Drain

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)	$\Delta I_F / ^\circ C$	-0.5	mA/°C
	Reverse voltage	$V_R$	5	V
	Diode power dissipation	$P_D$	50	mW
	Diode power dissipation derating (Ta > 25°C)	$\Delta P_D / ^\circ C$	-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)	$\Delta I_{ON} / ^\circ C$	-4.0	mA/°C
	Output power dissipation	$P_O$	290	mW
	Output power dissipation derating (Ta ≥ 25°C)	$\Delta P_O / ^\circ C$	-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	$\Omega$

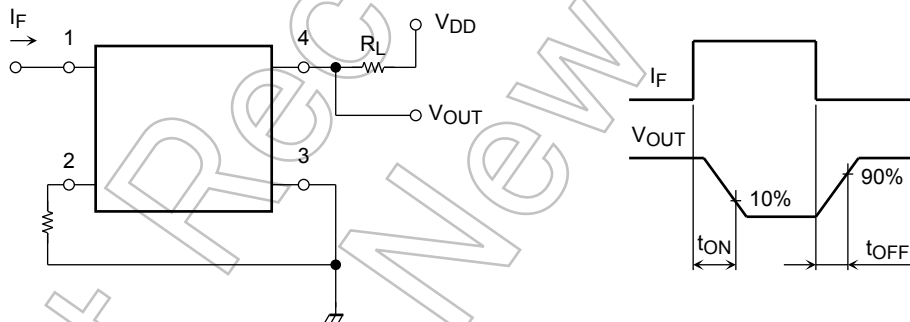
**Isolation Characteristics (Ta = 25°C)**

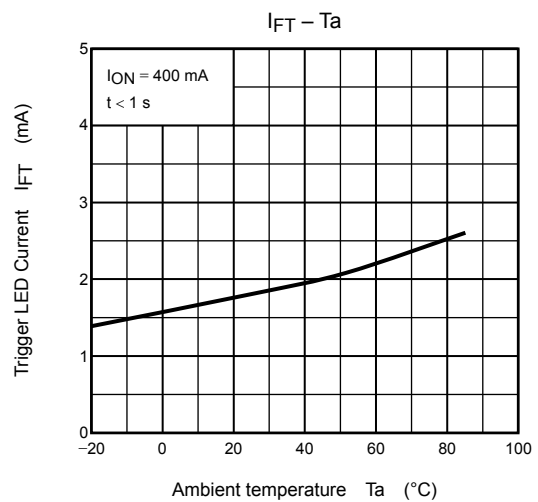
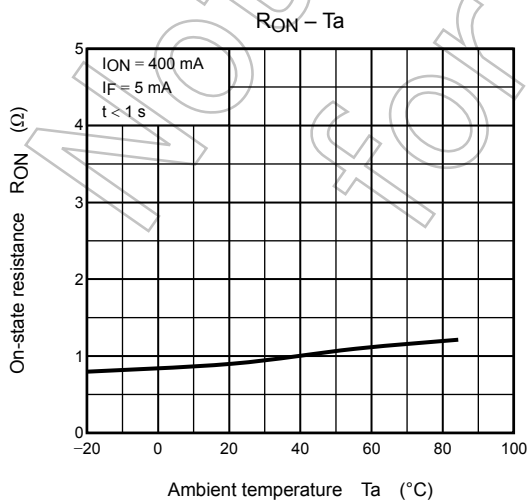
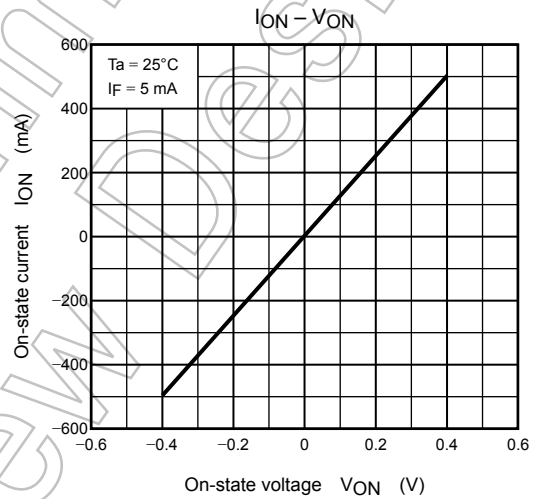
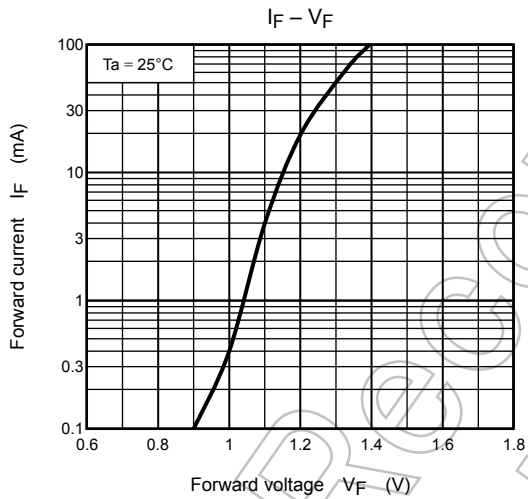
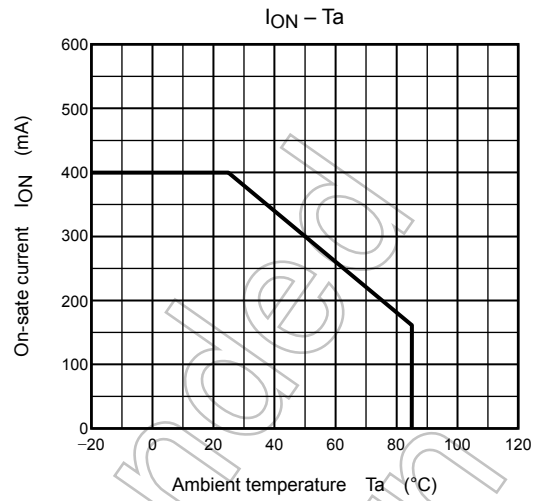
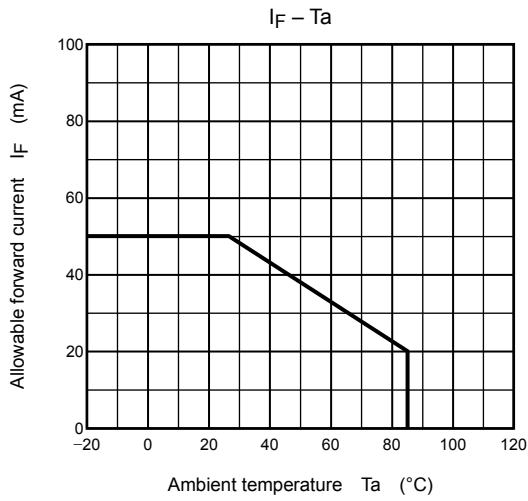
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Capacitance input to output	$C_S$	$V_S = 0 \text{ V}, f = 1 \text{ MHz}$	—	0.8	—	pF
Isolation resistance	$R_S$	$V_S = 500 \text{ V}, \text{R.H.} \leq 60\%$	$5 \times 10^{10}$	$10^{14}$	—	$\Omega$
Isolation voltage	$BV_S$	AC, 1 minute	1500	—	—	Vrms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

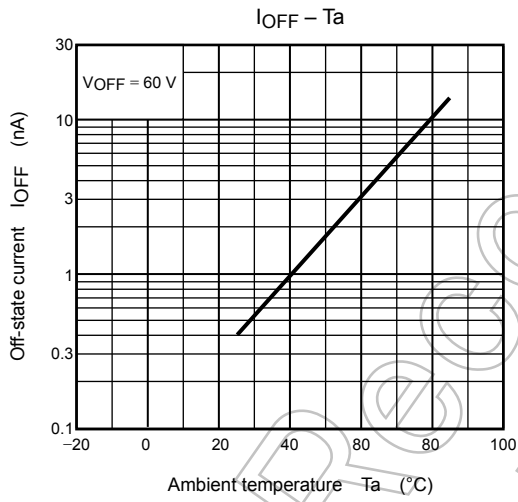
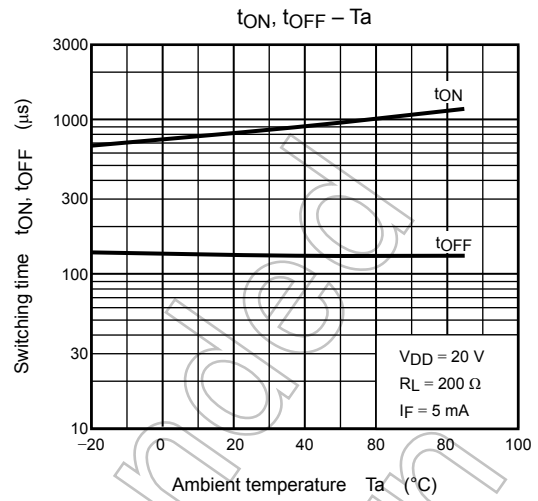
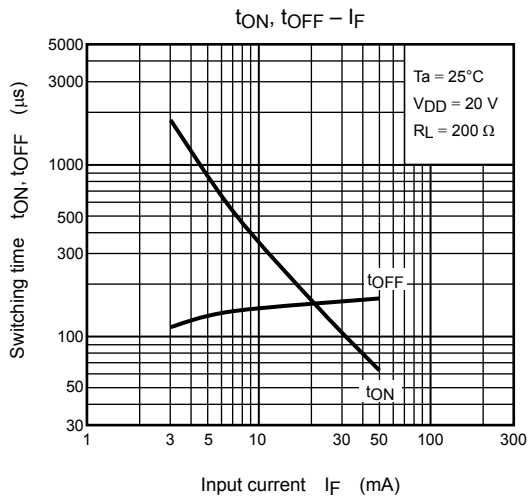
**Switching Characteristics (Ta = 25°C)**

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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