

TOSHIBA Photocoupler Photorelay

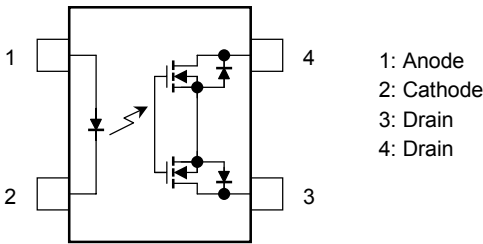
TLP172A

Telecommunications  
Control Equipment  
Data Acquisition System  
Security Equipment  
Measurement Equipment

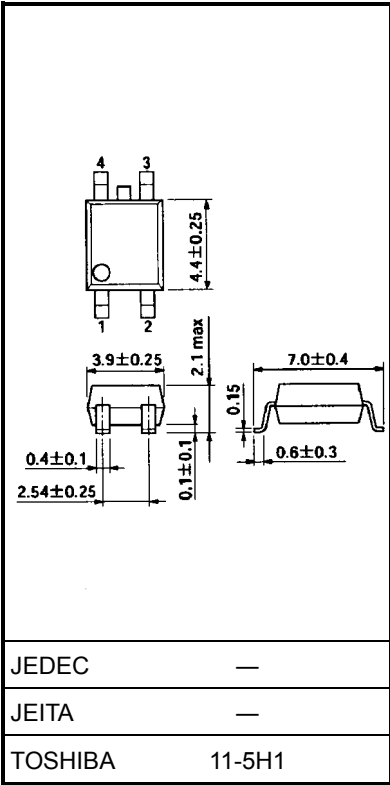
The Toshiba TLP172A consists of a gallium arsenide infrared emitting diode optically coupled to a photo-MOSFET in a 4-pin SOP package. This photorelay has higher output current rating than phototransistor-type photocoupler; hence, it is suitable for use as On/Off control for high current.

- 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

Pin Configuration (top view)



Unit: mm



Weight: 0.1 g (typ.)

## Maximum Rating (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     |
|                                                       | 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 |
|                                                       | 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 min, R.H. ≤ 60%)<br>(Note 1) |                                      | $BV_S$                         | 1500       | Vrms  |

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   |

## 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       | $C_T$     | $V = 0, f = 1\text{ MHz}$ | —   | 30   | —   | pF   |
| Detector        | Off-state current | $I_{OFF}$ | $V_{OFF} = 60\text{ V}$   | —   | —    | 1   | μA   |
|                 | Capacitance       | $C_{OFF}$ | $V = 0, f = 1\text{ MHz}$ | —   | 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  | $I_{FC}$ | $I_{OFF} = 100\text{ μA}$                   | 0.1 | —    | —   | mA   |
| On-state resistance | $R_{ON}$ | $I_{ON} = 400\text{ mA}, I_F = 5\text{ mA}$ | —   | 1    | 2   | Ω    |

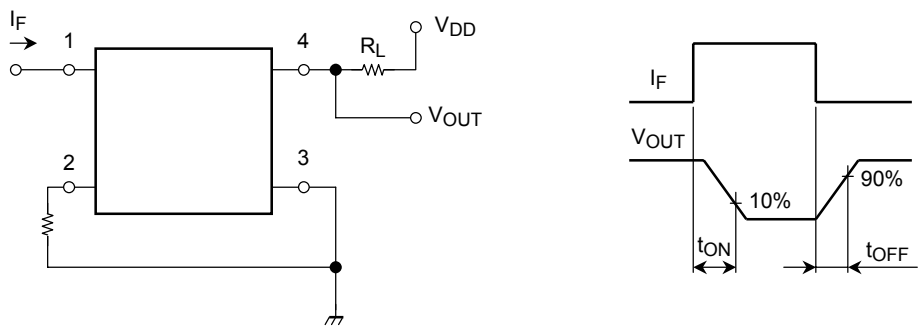
Isolation Characteristics (Ta = 25°C)

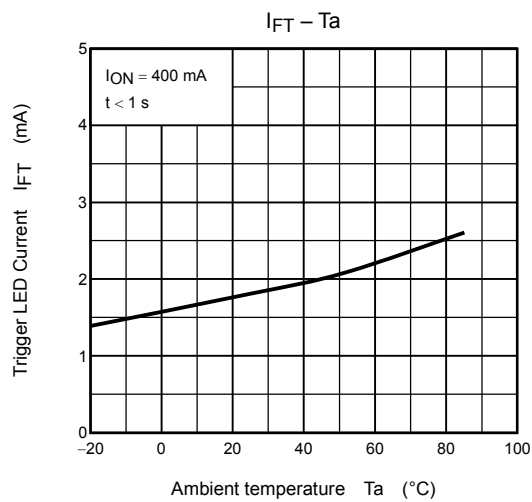
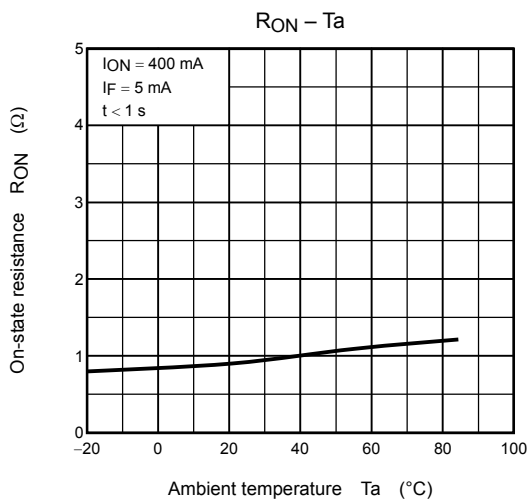
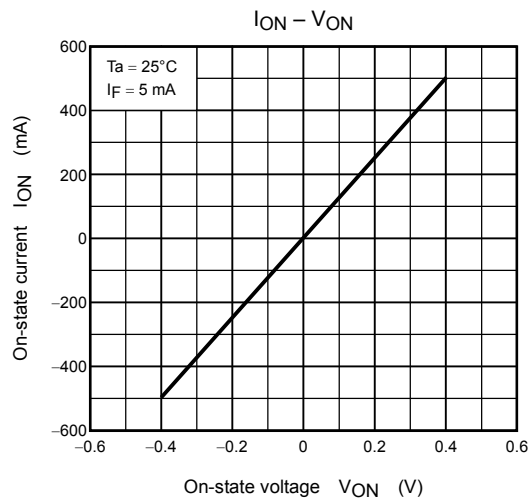
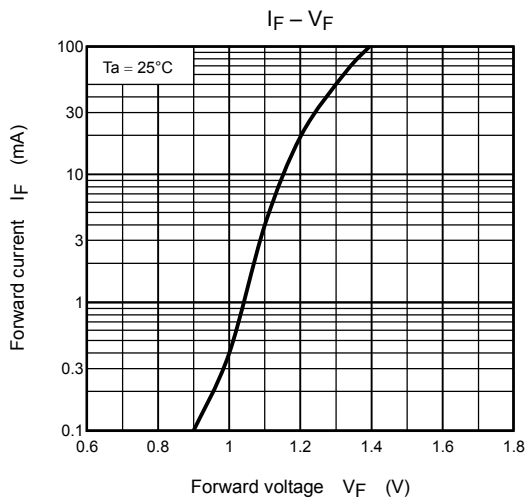
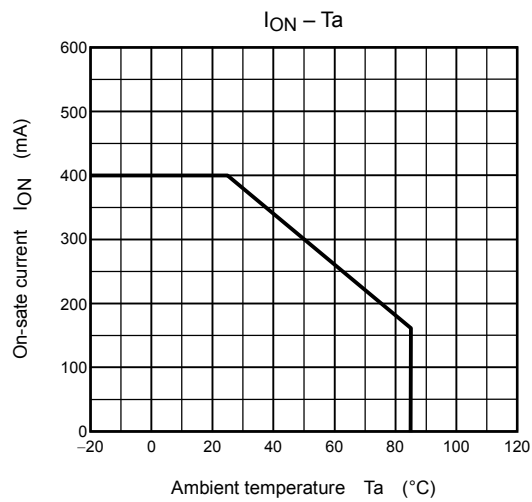
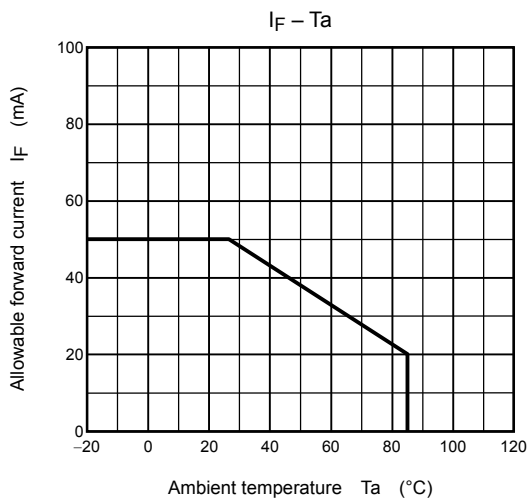
| Characteristics             | Symbol | Test Condition         | Min                | Typ.      | Max | Unit |
|-----------------------------|--------|------------------------|--------------------|-----------|-----|------|
| Capacitance input to output | CS     | VS = 0 V, f = 1 MHz    | —                  | 0.8       | —   | pF   |
| Isolation resistance        | RS     | VS = 500 V, R.H. ≤ 60% | $5 \times 10^{10}$ | $10^{14}$ | —   | Ω    |
| Isolation voltage           | BVS    | AC, 1 min              | 1500               | —         | —   | Vrms |
|                             |        | AC, 1 s, in oil        | —                  | 3000      | —   |      |
|                             |        | DC, 1 min, in oil      | —                  | 3000      | —   | Vdc  |

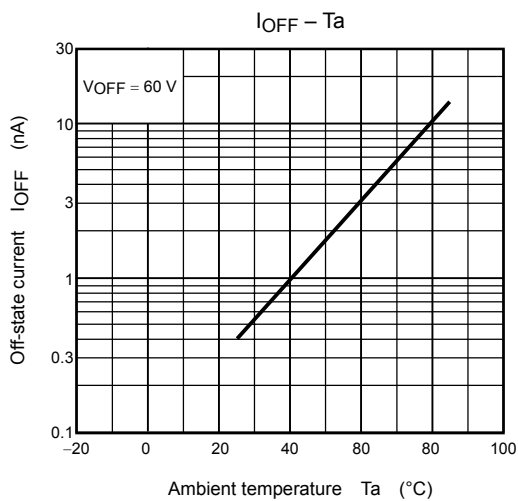
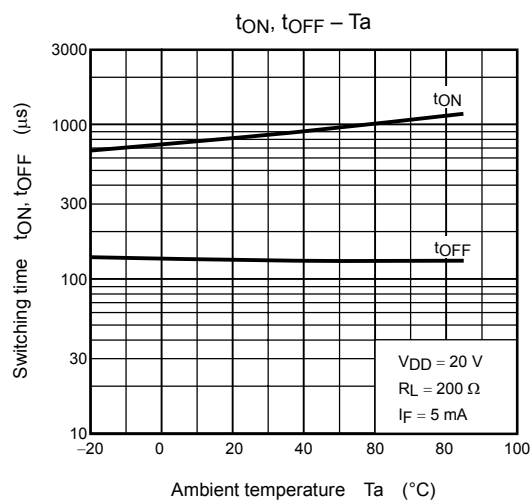
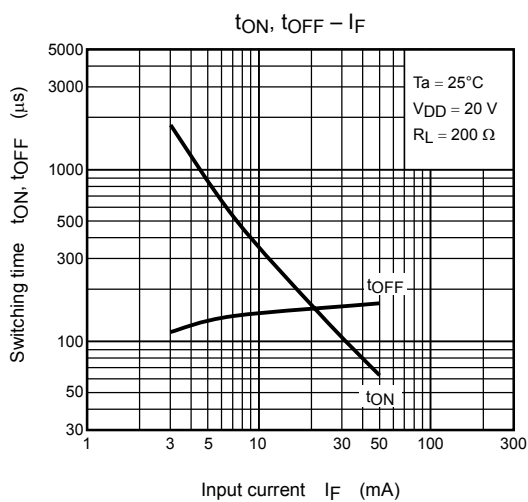
Switching Characteristics (Ta = 25°C)

| Characteristics | Symbol | Test Condition                            | Min | Typ. | Max | Unit |
|-----------------|--------|-------------------------------------------|-----|------|-----|------|
| Turn-on time    | tON    | RL = 200 Ω (注 2)<br>VDD = 20 V, IF = 5 mA | —   | 0.8  | 2   | ms   |
| Turn-off time   | tOFF   |                                           | —   | 0.1  | 0.5 |      |

Note 2: Switching time test circuit







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