

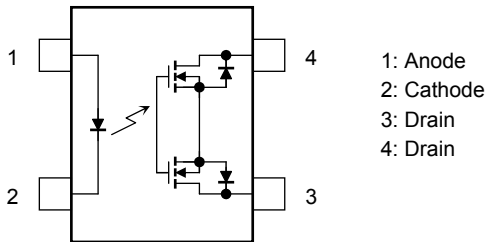
# TLP172A

Telecommunications  
 Control Equipment  
 Data Acquisition System  
 Security Equipment  
 Measurement Equipment

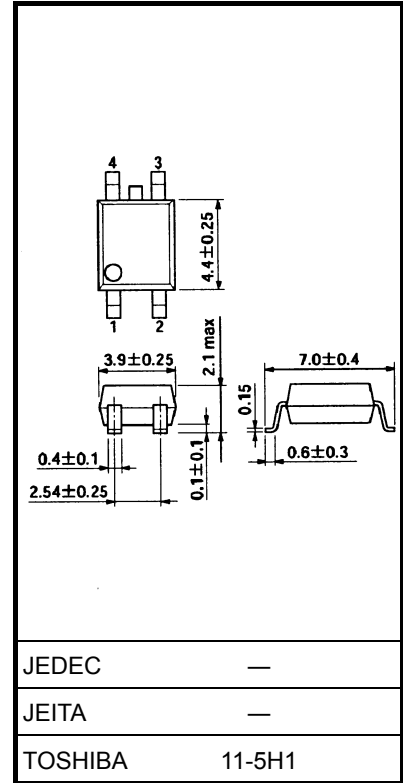
The Toshiba TLP172A consists of a gallium arsenide infrared emitting diode optically coupled to a photo-MOSFET in a 4-pin SOP package. This photorelay has higher output current rating than phototransistor-type photocoupler; hence, it is suitable for use as On/Off control for high current.

- 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.)

## Absolute Maximum Rating (Ta = 25°C)

| Characteristics  |   | Symbol               | Rating     | Unit             |
|--|---|----------------------|------------|------------------|
| LED  | Forward current                         | I <sub>F</sub>       | 50         | mA               |
|  | Forward current derating<br>(Ta ≥ 25°C) | ΔI <sub>F</sub> /°C  | -0.5       | mA/°C            |
|  | Reverse voltage                         | V <sub>R</sub>       | 5          | V                |
|  | Junction temperature                    | T <sub>j</sub>       | 125        | °C               |
| Detector   | Off-state output terminal<br>voltage    | V <sub>OFF</sub>     | 60         | V                |
|  | On-state current                        | I <sub>ON</sub>      | 400        | mA               |
|  | Forward current derating<br>(Ta ≥ 25°C) | ΔI <sub>ON</sub> /°C | -4.0       | mA/°C            |
|  | Junction temperature                    | T <sub>j</sub>       | 125        | °C               |
| Storage temperature  |   | T <sub>stg</sub>     | -55 to 125 | °C               |
| Operating temperature  |   | T <sub>opr</sub>     | -40 to 85  | °C               |
| Lead soldering temperature (10 s)                            |   | T <sub>sol</sub>     | 260        | °C               |
| Isolation voltage<br>(AC, 1 min, R.H. ≤ 60%)<br><br>(Note 1) |   | BV <sub>S</sub>      | 1500       | V <sub>rms</sub> |

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 <sub>DD</sub>  | —   | —    | 48  | V    |
| Forward current       | I <sub>F</sub>   | 5   | 7.5  | 25  | mA   |
| On-state current      | I <sub>ON</sub>  | —   | —    | 400 | mA   |
| Operating temperature | T <sub>opr</sub> | -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 <sub>F</sub>   | I <sub>F</sub> = 10 mA  | 1.0 | 1.15 | 1.3 | V    |
|                 | Reverse current   | I <sub>R</sub>   | V <sub>R</sub> = 5 V    | —   | —    | 10  | μA   |
|                 | Capacitance       | C <sub>T</sub>   | V = 0, f = 1 MHz        | —   | 30   | —   | pF   |
| Detector        | Off-state current | I <sub>OFF</sub> | V <sub>OFF</sub> = 60 V | —   | —    | 1   | μA   |
|                 | Capacitance       | C <sub>OFF</sub> | V = 0, f = 1 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  | $I_{FC}$ | $I_{OFF} = 100 \text{ } \mu\text{A}$          | 0.1 | —    | —   | mA       |
| On-state resistance | $R_{ON}$ | $I_{ON} = 400 \text{ mA}, I_F = 5 \text{ mA}$ | —   | 1    | 2   | $\Omega$ |

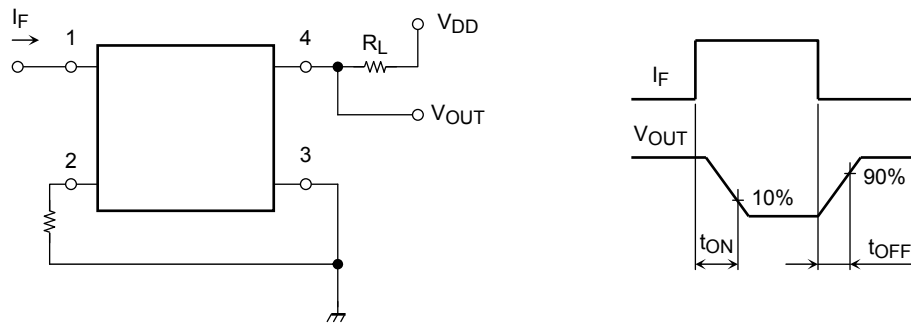
## Isolation Characteristics (Ta = 25°C)

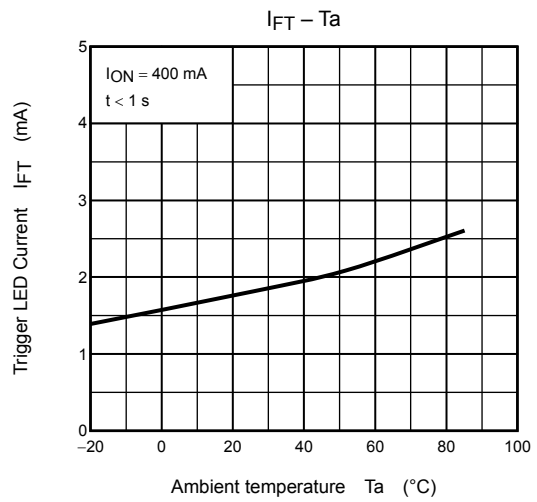
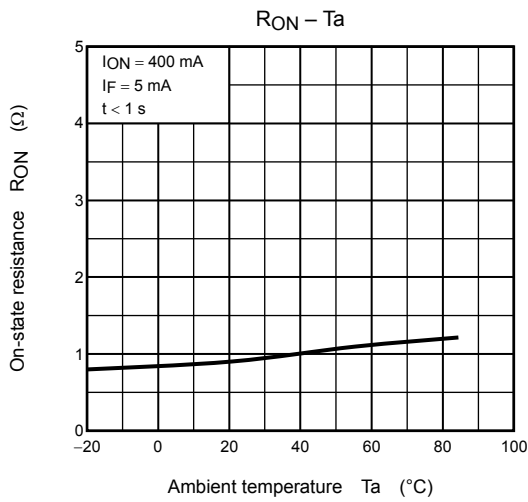
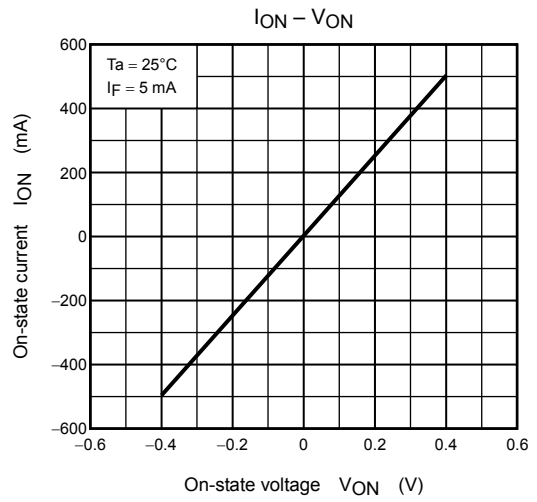
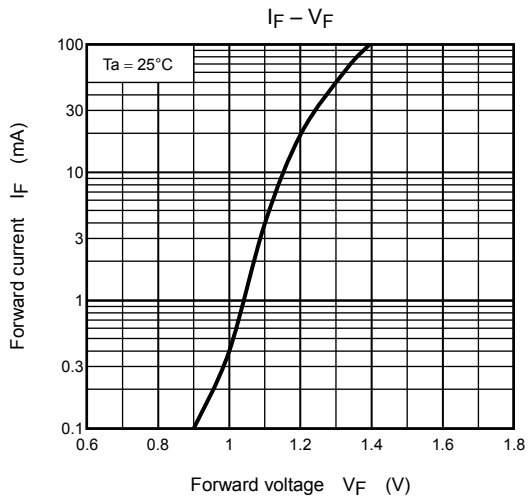
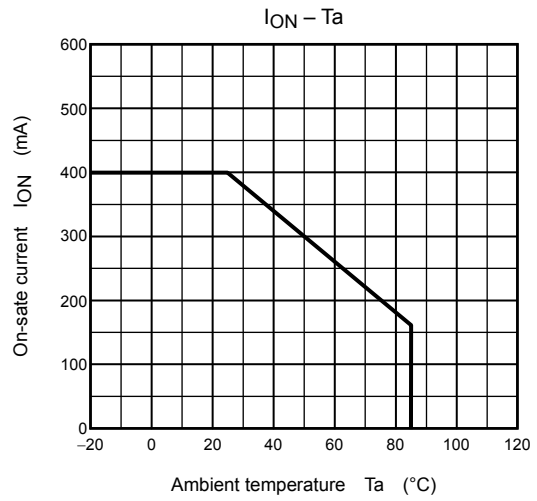
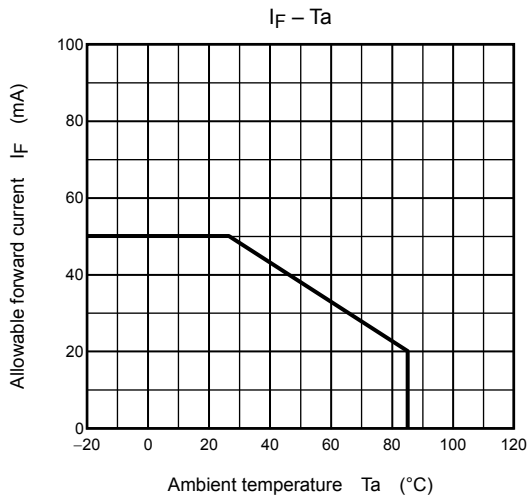
| Characteristics             | Symbol          | Test Condition                     | Min                  | Typ.             | Max | Unit |
|-----------------------------|-----------------|------------------------------------|----------------------|------------------|-----|------|
| Capacitance input to output | C <sub>S</sub>  | V <sub>S</sub> = 0 V, f = 1 MHz    | —                    | 0.8              | —   | pF   |
| Isolation resistance        | R <sub>S</sub>  | V <sub>S</sub> = 500 V, R.H. ≤ 60% | 5 × 10 <sup>10</sup> | 10 <sup>14</sup> | —   | Ω    |
| Isolation voltage           | BV <sub>S</sub> | AC, 1 min                          | 1500                 | —                | —   | Vrms |
|                             |                 | AC, 1 s, in oil                    | —                    | 3000             | —   |      |
|                             |                 | DC, 1 min, in oil                  | —                    | 3000             | —   | Vdc  |

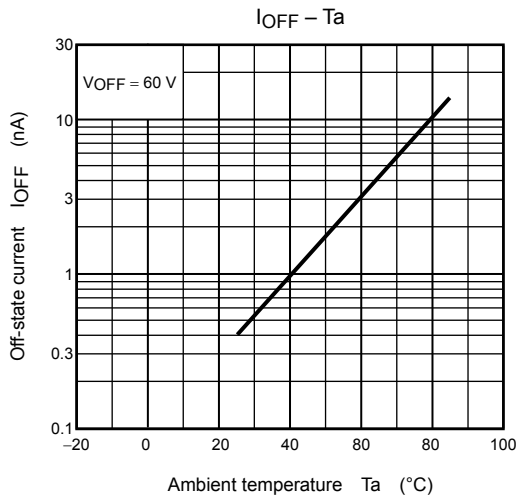
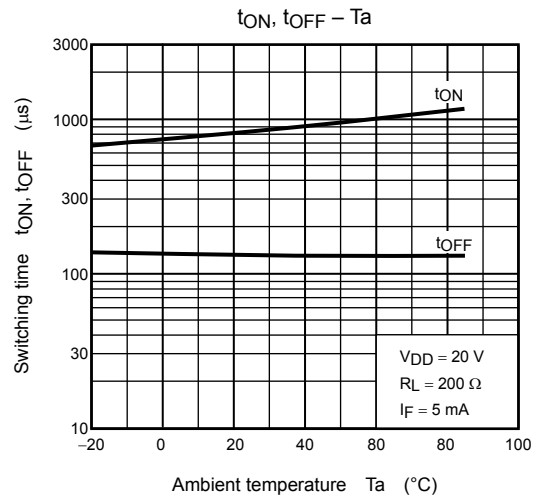
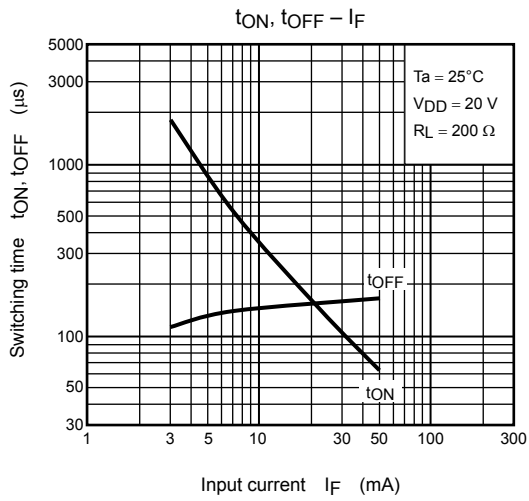
## Switching Characteristics (Ta = 25°C)

| Characteristics | Symbol           | Test Condition                                | Min | Typ. | Max | Unit |
|-----------------|------------------|---|-----|------|-----|------|
| Turn-on time    | t <sub>ON</sub>  | R <sub>L</sub> = 200 Ω (注 2)                  | —   | 0.8  | 2   | ms   |
| Turn-off time   | t <sub>OFF</sub> | V <sub>DD</sub> = 20 V, I <sub>F</sub> = 5 mA | —   | 0.1  | 0.5 |      |

Note 2: Switching time test circuit







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20070701-EN

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