

TOSHIBA Photocoupler Photorelay

TLP172G

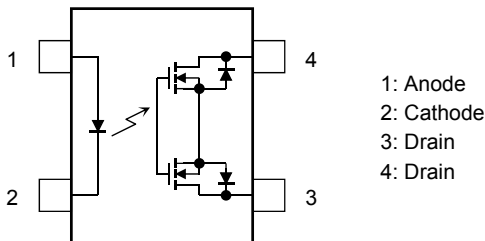
Modem·Fax Cards, Modems in PC  
Telecommunications  
PBX  
Measurement Equipment

The Toshiba TLP172G consists of an aluminum gallium arsenide infrared emitting diode optically coupled to a photo-MOSFET in a SOP, which is suitable for surface mount assembly.

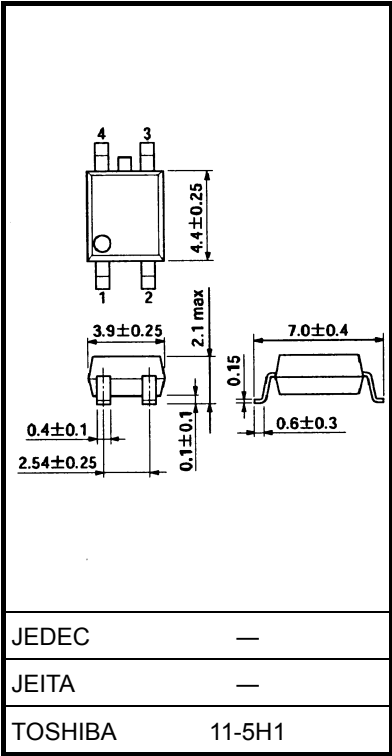
The TLP172G is suitable for the modem applications which require space savings.

- 4-pin SOP (2.54SOP4): Height = 2.1 mm, Pitch = 2.54 mm
- 1-Form-A
- Peak Off-state voltage: 350 V (min)
- Trigger LED current: 3 mA (max)
- On-state current: 110 mA (max)
- On-state resistance: 35 Ω (max t < 1 s)
- On-state resistance: 50 Ω (max continuous)
- Isolation voltage: 1500 Vrms (min)
- UL recognized: UL1577, File No. E67349

Pin Configuration (top view)



Unit: mm



Weight: 0.1 g (typ.)

Start of commercial production  
2001/12

**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     |
|                                                          | Junction temperature                  | $T_j$                          | 125        | °C    |
| Detector                                                 | Off-state output terminal voltage     | $V_{OFF}$                      | 350        | V     |
|                                                          | On-state current                      | $I_{ON}$                       | 110        | mA    |
|                                                          | On-state current derating (Ta ≥ 25°C) | $\Delta I_{ON}/^\circ\text{C}$ | -1.1       | mA/°C |
|                                                          | Junction temperature                  | $T_j$                          | 125        | °C    |
| Storage temperature range                                |                                       | $T_{stg}$                      | -55 to 125 | °C    |
| Operating temperature range                              |                                       | $T_{opr}$                      | -40 to 85  | °C    |
| Lead soldering temperature (10 s)                        |                                       | $T_{sol}$                      | 260        | °C    |
| Isolation voltage<br>(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: Device considered a two-terminal device: LED side pins shorted together, and detector side pins shorted together.

**Recommended Operating Conditions**

| Characteristics       | Symbol    | Min | Typ. | Max | Unit |
|-----------------------|-----------|-----|------|-----|------|
| Supply voltage        | $V_{DD}$  | —   | —    | 280 | V    |
| Forward current       | $I_F$     | 5   | 7.5  | 25  | mA   |
| On-state current      | $I_{ON}$  | —   | —    | 100 | 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       | $C_T$     | $V = 0, f = 1 \text{ MHz}$ | —   | 30   | —   | pF   |
| Detector        | Off-state current | $I_{OFF}$ | $V_{OFF} = 350 \text{ V}$  | —   | —    | 1   | μA   |
|                 | Capacitance       | $C_{OFF}$ | $V = 0, f = 1 \text{ MHz}$ | —   | 30   | —   | pF   |

Coupled Electrical Characteristics (Ta = 25°C)

| Characteristics     | Symbol | Test Condition                     | Min | Typ. | Max | Unit |
|---------------------|--------|------------------------------------|-----|------|-----|------|
| Trigger LED current | IFT    | ION = 110 mA                       | —   | 1    | 3   | mA   |
| Return LED current  | IFC    | IOFF = 100 μA                      | 0.1 | —    | —   | mA   |
| On-state resistance | RON    | ION = 110 mA, IF= 5 mA, t < 1 s    | —   | 25   | 35  | Ω    |
|                     |        | ION = 110 mA, IF= 5 mA, continuous | —   | 35   | 50  |      |

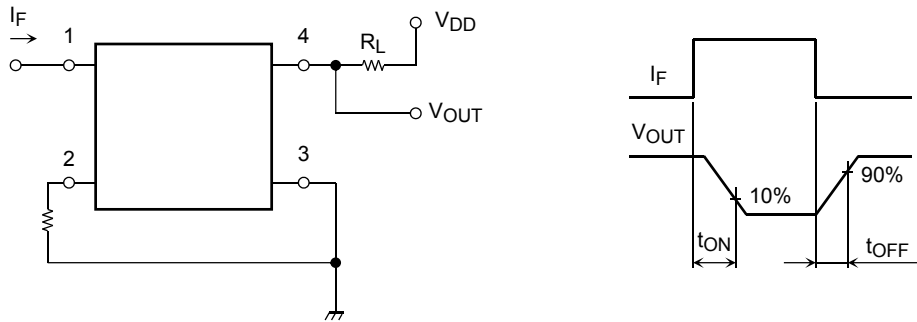
Isolation Characteristics (Ta = 25°C)

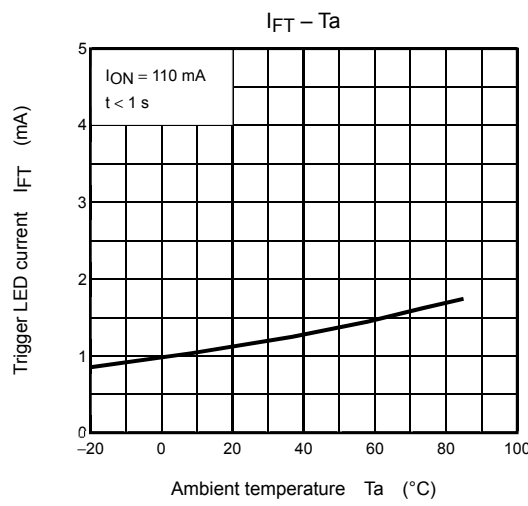
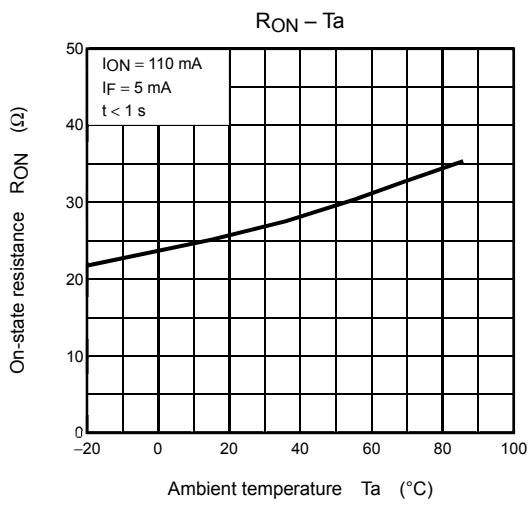
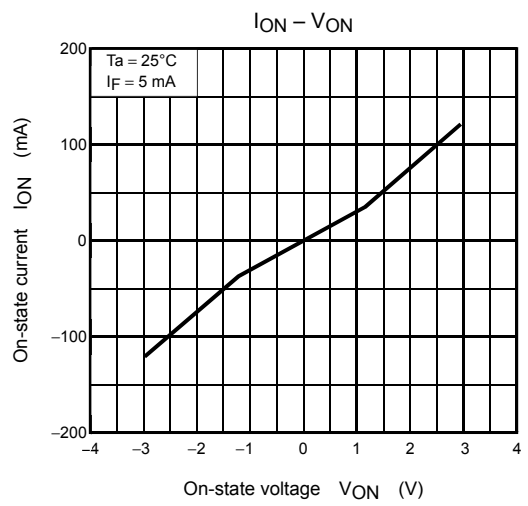
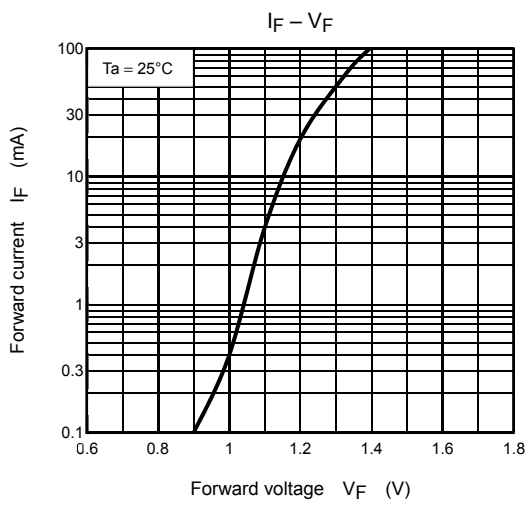
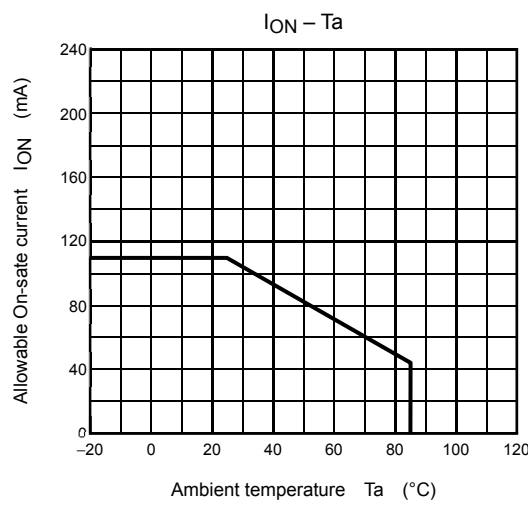
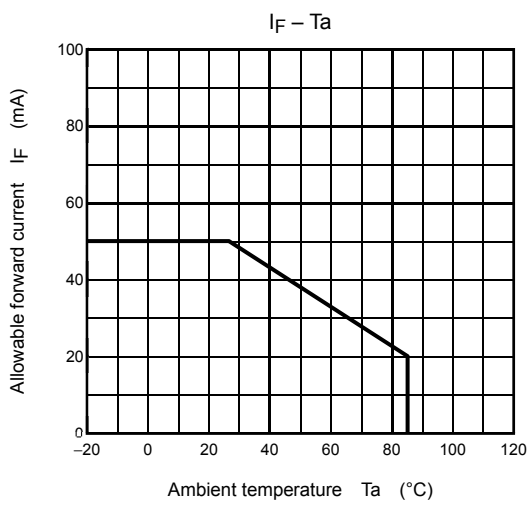
| Characteristics             | Symbol | Test Condition         | Min                  | Typ.             | Max | Unit |
|-----------------------------|--------|------------------------|----------------------|------------------|-----|------|
| Capacitance input to output | CS     | VS = 0 V, f = 1 MHz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

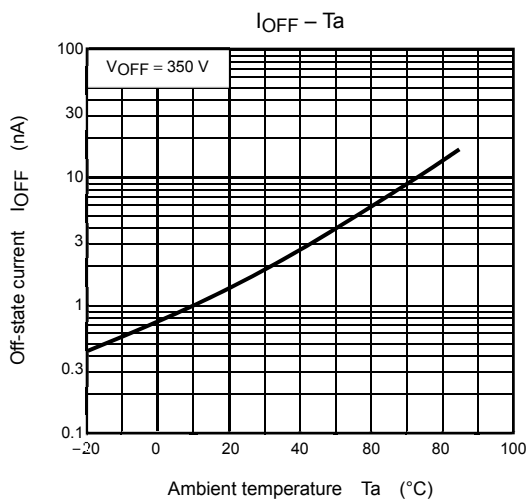
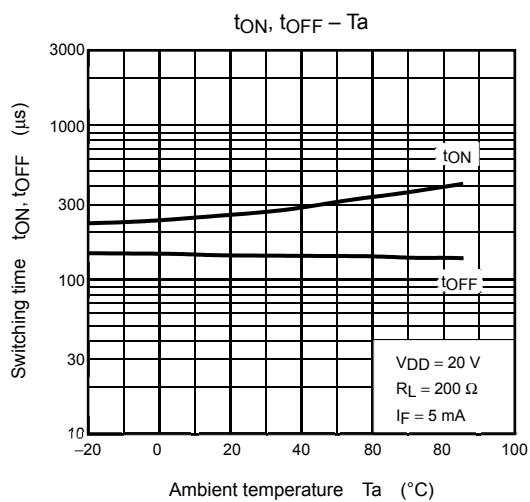
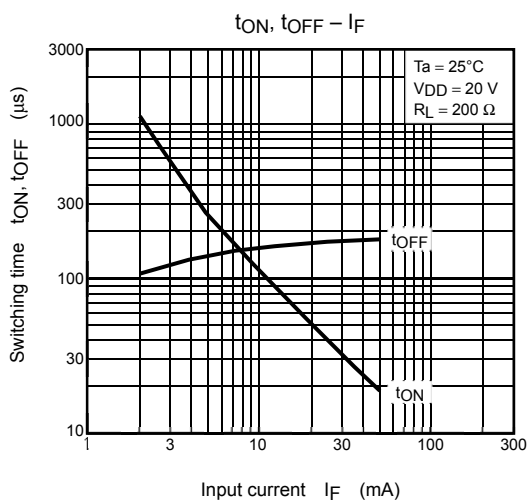
Switching Characteristics (Ta = 25°C)

| Characteristics | Symbol | Test Condition                               | Min | Typ. | Max | Unit |
|-----------------|--------|----------------------------------------------|-----|------|-----|------|
| Turn-on time    | tON    | RL = 200 Ω<br>VDD = 20 V, IF = 5 mA (Note 2) | —   | 0.3  | 1   | ms   |
| Turn-off time   | tOFF   |                                              | —   | 0.1  | 1   |      |

Note 2: Switching time test circuit







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