

TOSHIBA Photocoupler Photorelay

TLP172G

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

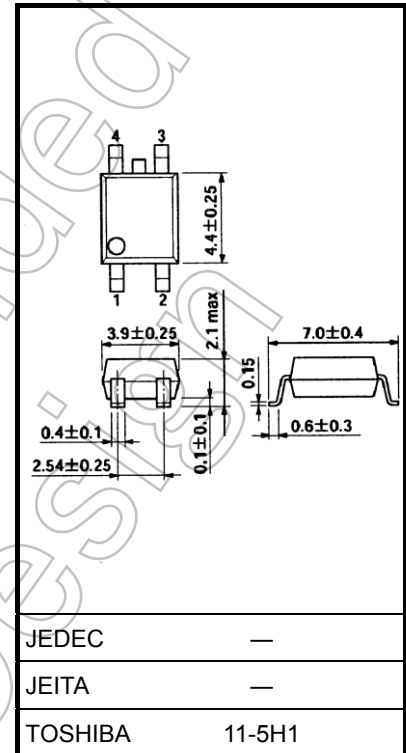
Unit: mm

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.

Because of the high-voltage MOSFET used to the output terminals, TLP172G is suitable for a hook relay of a modem, a facsimile, and a dial pulse relay

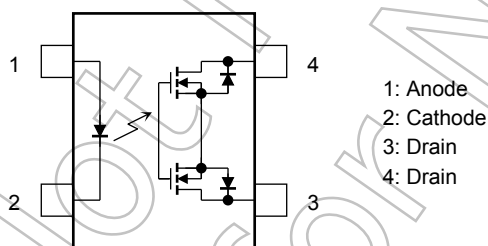
The TLP172G is suitable for the modem applications which require space savings.

- 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
- cUL recognized: CSA Component Acceptance Service No. 5A
 File No. E67349



Weight: 0.1 g (typ.)

Pin Configuration (top view)



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 |
| | 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} | 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 |
| | Output power dissipation | P_O | 300 | mW |
| | Output power dissipation derating (Ta ≥ 25°C) | $\Delta P_O / ^\circ\text{C}$ | -3.0 | mW / °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 (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 between terminals | C_T | $V_F = 0 \text{ V}, f = 1 \text{ MHz}$ | — | 30 | — | pF |
| Detector | Off-state current | I_{OFF} | $V_{OFF} = 350 \text{ V}$ | — | — | 1 | μA |
| | Capacitance between terminals | C_{OFF} | $V = 0 \text{ V}, f = 1 \text{ MHz}$ | — | 30 | — | pF |

Coupled Electrical Characteristics (Ta = 25°C)

| Characteristics | Symbol | Test Condition | Min | Typ. | Max | Unit |
|---------------------|----------|--|-----|------|-----|----------|
| Trigger LED current | I_{FT} | $I_{ON} = 110 \text{ mA}$ | — | 1 | 3 | mA |
| Return LED current | I_{FC} | $I_{OFF} = 100 \mu\text{A}$ | 0.1 | — | — | mA |
| On-state resistance | R_{ON} | $I_{ON} = 110 \text{ mA}, I_F = 5 \text{ mA}, t < 1 \text{ s}$ | — | 25 | 35 | Ω |
| | | $I_{ON} = 110 \text{ mA}, I_F = 5 \text{ mA}, \text{continuous}$ | — | 35 | 50 | |

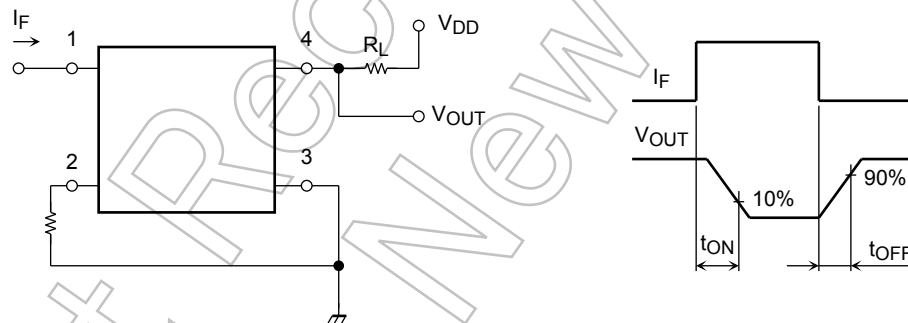
Isolation Characteristics (Ta = 25°C)

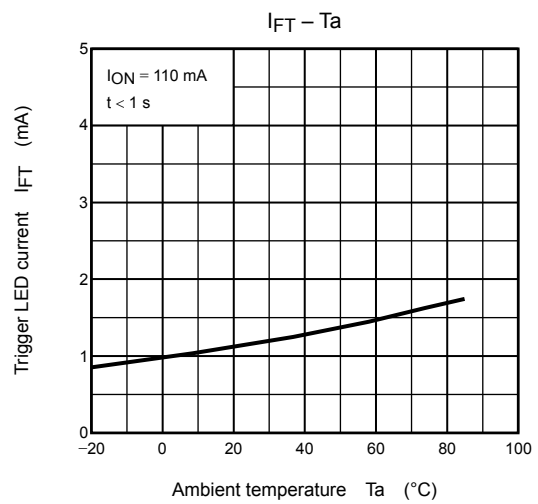
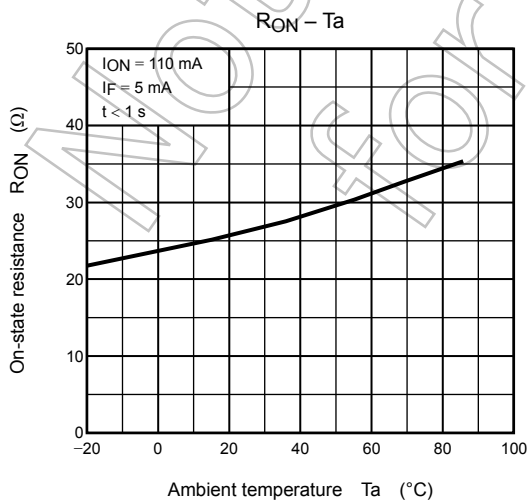
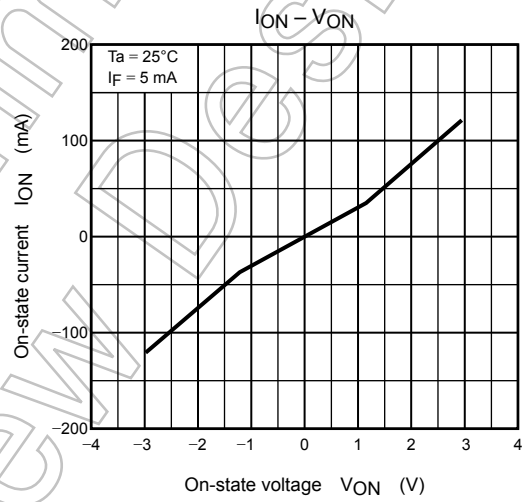
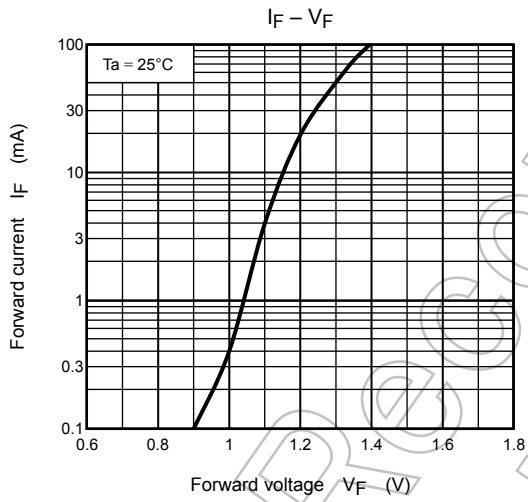
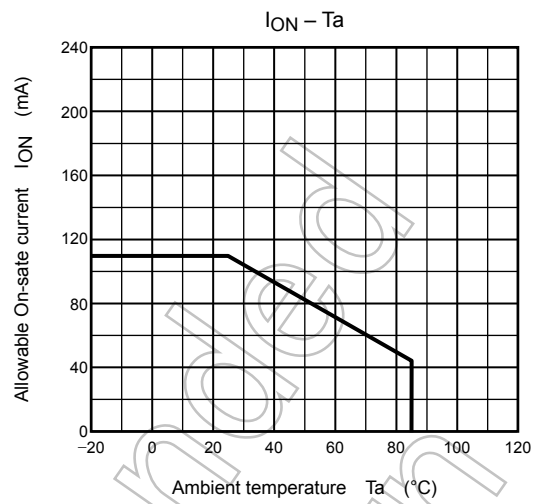
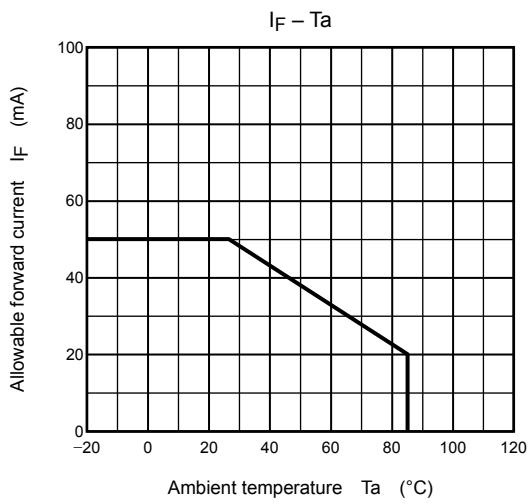
| Characteristics | Symbol | Test Condition | Min | Typ. | Max | Unit |
|-----------------------------|--------|--|--------------------|-----------|-----|----------|
| Capacitance input to output | C_S | $V_S = 0 \text{ V}, f = 1 \text{ MHz}$ | — | 0.8 | — | pF |
| Isolation resistance | R_S | $V_S = 500 \text{ V}, \text{R.H.} \leq 60\%$ | 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 |

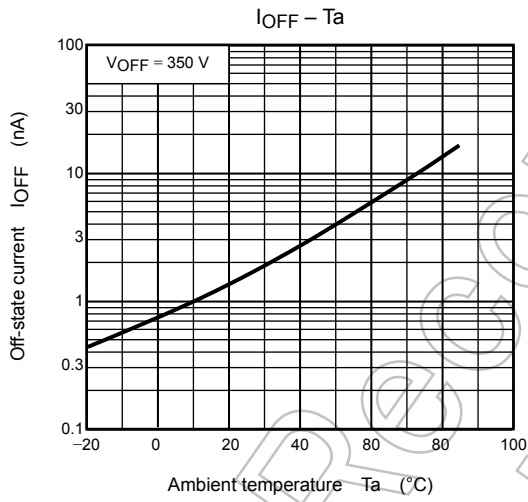
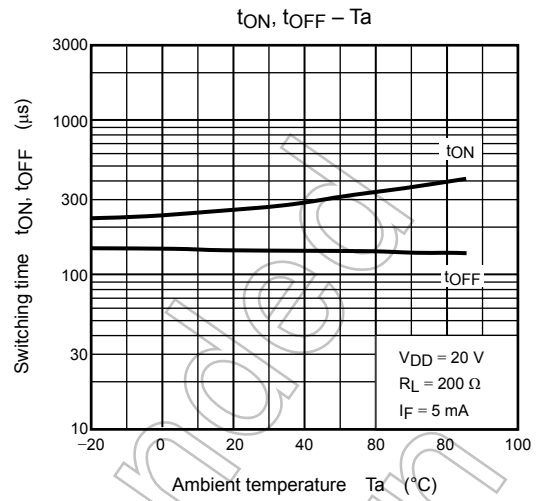
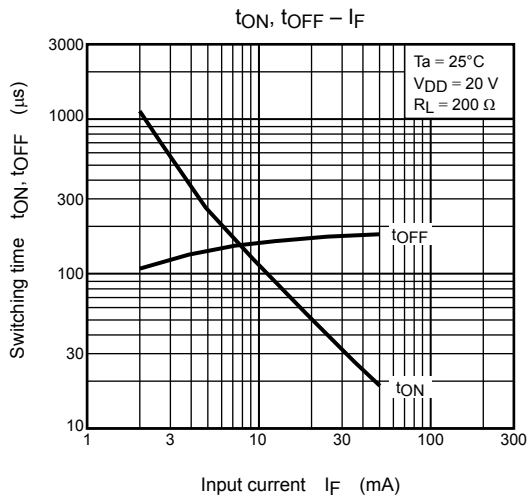
Switching Characteristics (Ta = 25°C)

| Characteristics | Symbol | Test Condition | Min | Typ. | Max | Unit |
|-----------------|-----------|--|-----|------|-----|------|
| Turn-on time | t_{ON} | $R_L = 200 \Omega$ $V_{DD} = 20 \text{ V}, I_F = 5 \text{ mA}$ (Note 2) | — | 0.3 | 1 | ms |
| Turn-off time | t_{OFF} | | — | 0.1 | 1 | |

Note 2: Switching time test circuit







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