

TOSHIBA Photocoupler Photorelay

# TLP197GA

PBX

Telecommunication

Modem·FAX Cards, Modems In PC

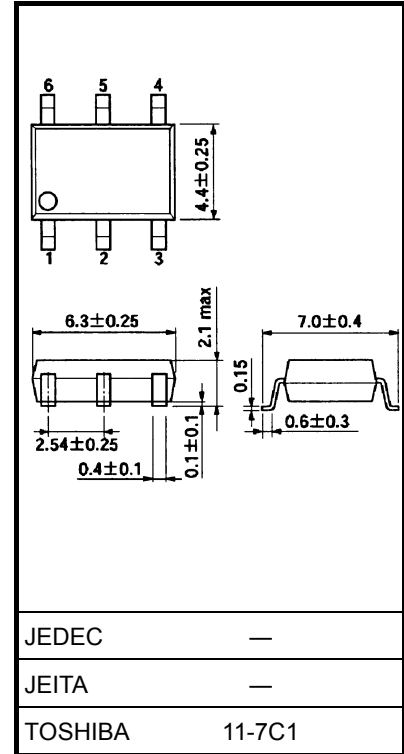
Measurement Instrumentation

Unit: mm

The TOSHIBA TLP197GA 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.

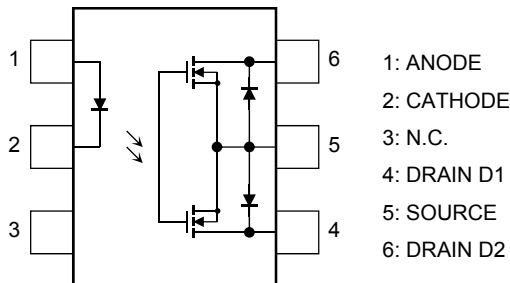
The TLP197GA is suitable for replacement of mechanical relays in many applications which require space savings.

- 6 pin SOP (2.54SOP6): 2.1 mm high, 2.54 mm pitch
- 1-form-A
- Peak off-state voltage: 400 V (min)
- Trigger LED current: 3 mA (max)
- On-state current: 120 mA (max)
- On-state resistance: 35 Ω (max)
- Isolation voltage: 1500 Vrms (min)
- BSI approved: BS EN60065:2002, certificate no.8753  
BS EN60950-1:2002, certificate no.8754

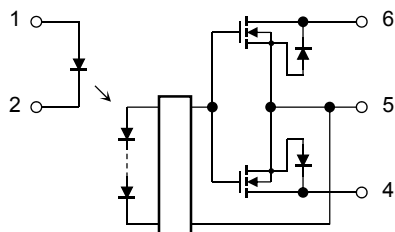


Weight: 0.13 g (typ.)

## Pin Configuration (top view)



## Schematic



Start of commercial production  
2001/06

## 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 |
|   | Peak forward current (100 μs pulse, 100 pps) | $I_{FP}$                    | 1      | A     |
|   | Reverse voltage                              | $V_R$                       | 5      | V     |
|   | Junction temperature                         | $T_j$                       | 125    | °C    |
| Detector  | Off-state output terminal voltage            | $V_{OFF}$                   | 400    | V     |
|   | On-state current                             | A connection                | 120    | mA    |
|   |  | B connection                | 120    |       |
|   |  | C connection                | 240    |       |
|   | On-state current derating (Ta ≥ 25°C)        | A connection                | -1.2   | mA/°C |
|   |  | B connection                | -1.2   |       |
|   |  | C connection                | -2.4   |       |
| Junction temperature                                  | $T_j$  | 125                         | °C     |       |
| Operating temperature range                           | $T_{opr}$                                    | -40 to 85                   | °C     |       |
| Storage temperature range                             | $T_{stg}$                                    | -55 to 125                  | °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).

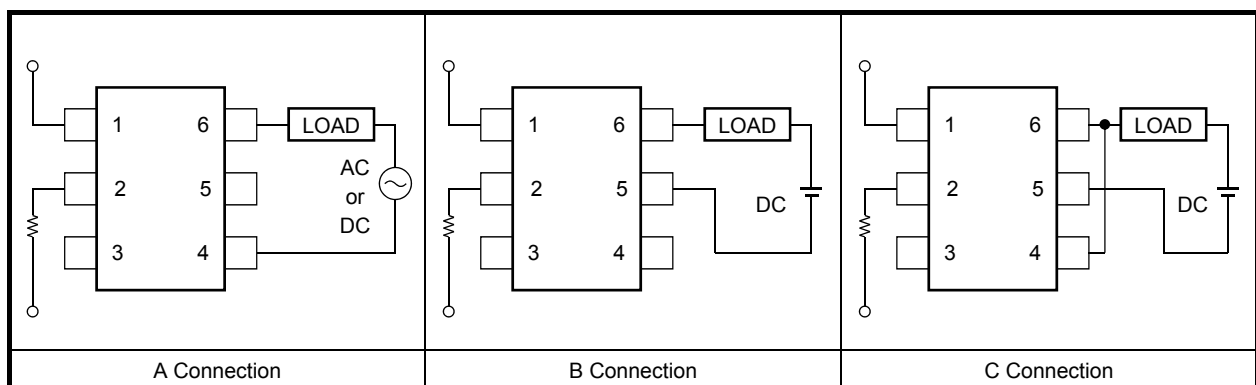
Note 1: Device considered a two-terminal device: LED side pins shorted together, and DETECTOR side pins shorted together.

## Recommended Operating Conditions

| Characteristics       | Symbol    | Min | Typ. | Max | Unit |
|-----------------------|-----------|-----|------|-----|------|
| Supply voltage        | $V_{DD}$  | —   | —    | 320 | V    |
| Forward current       | $I_F$     | 5   | 7.5  | 25  | mA   |
| On-state current      | $I_{ON}$  | —   | —    | 120 | 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.

## Circuit Connections



## Individual 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  | $\mu\text{A}$ |
|                 | Capacitance       | $C_T$     | $V = 0, f = 1 \text{ MHz}$ | —   | 30   | —   | pF            |
| Detector        | Off-state current | $I_{OFF}$ | $V_{OFF} = 400 \text{ V}$  | —   | —    | 1   | $\mu\text{A}$ |
|                 | Capacitance       | $C_{OFF}$ | $V = 0, f = 1 \text{ MHz}$ | —   | 70   | —   | pF            |

## Coupled Electrical Characteristics (Ta = 25°C)

| 項目                  |              | 記号       | 測定条件  | 最小  | 標準 | 最大 | 単位       |
|---------------------|--------------|----------|---|-----|----|----|----------|
| Trigger LED current |              | $I_{FT}$ | $I_{ON} = 120 \text{ mA}$                     | —   | 1  | 3  | mA       |
| Return LED current  |              | $I_{FC}$ | $I_{OFF} = 100 \mu\text{A}$                   | 0.1 | —  | —  | mA       |
| On-state resistance | A connection | $R_{ON}$ | $I_{ON} = 120 \text{ mA}, I_F = 5 \text{ mA}$ | —   | 17 | 35 | $\Omega$ |
|                     | B connection |          | $I_{ON} = 120 \text{ mA}, I_F = 5 \text{ mA}$ | —   | 11 | 20 |          |
|                     | C connection |          | $I_{ON} = 240 \text{ mA}, I_F = 5 \text{ mA}$ | —   | 6  | —  |          |

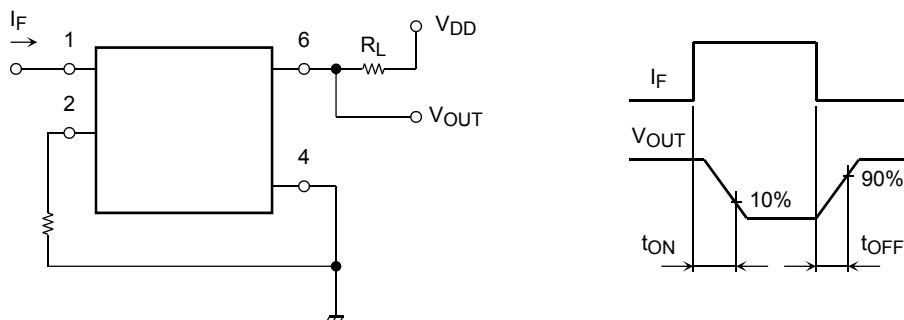
## Isolation Characteristics (Ta = 25°C)

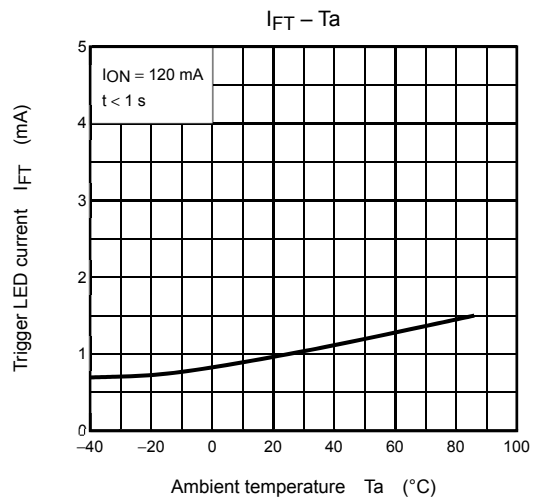
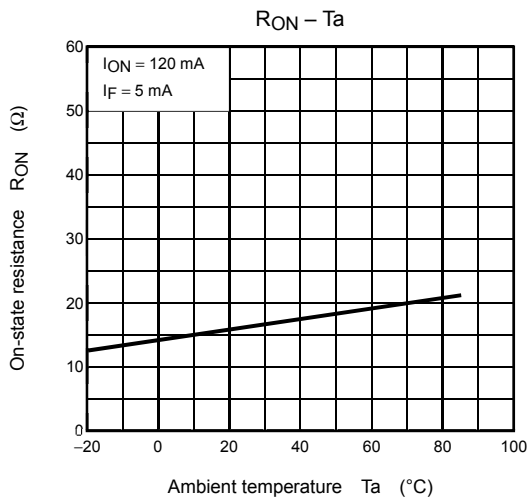
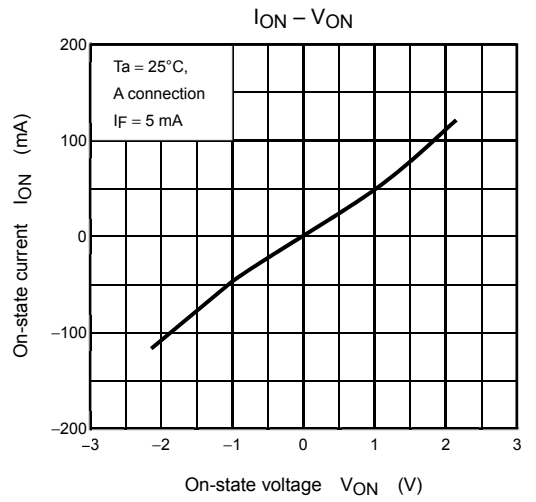
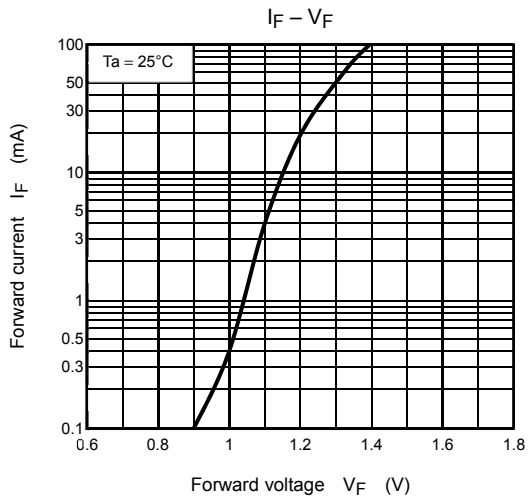
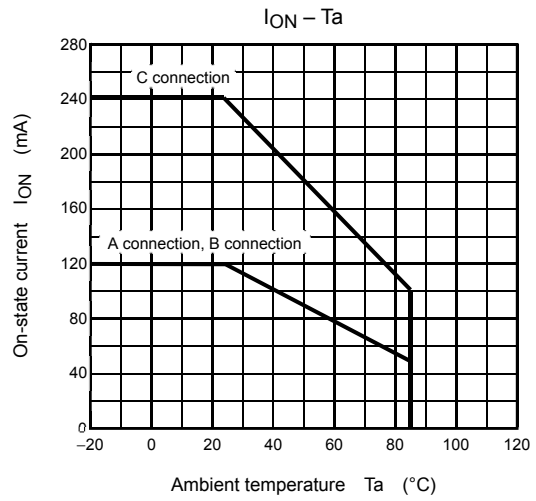
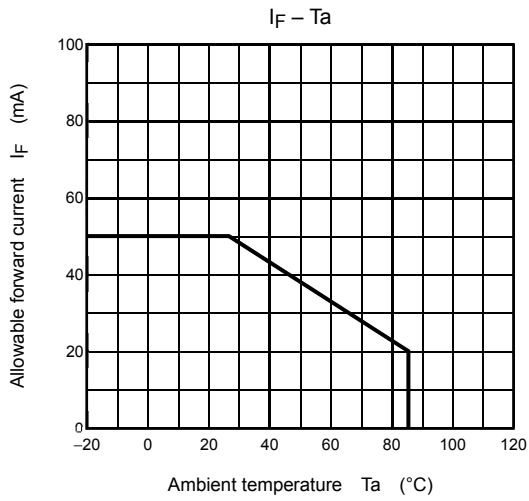
| Characteristics             | Symbol | Test Condition                               | Min                | Typ.      | Max | Unit     |
|-----------------------------|--------|--|--------------------|-----------|-----|----------|
| Capacitance input to output | $C_S$  | $V_S = 0, f = 1 \text{ MHz}$                 | —                  | 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      | —   |          |
|                             |        | DC, 1 minute, in oil                         | —                  | 3000      | —   | Vdc      |

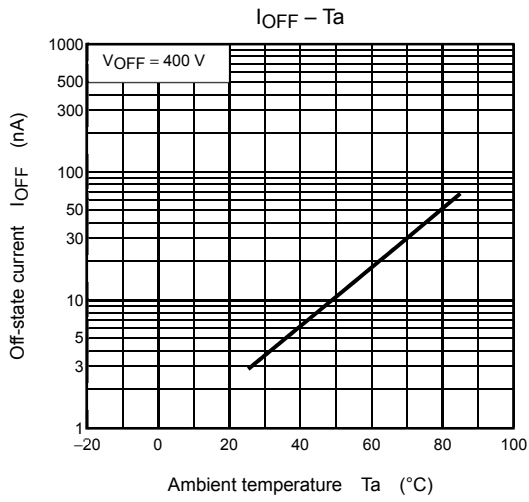
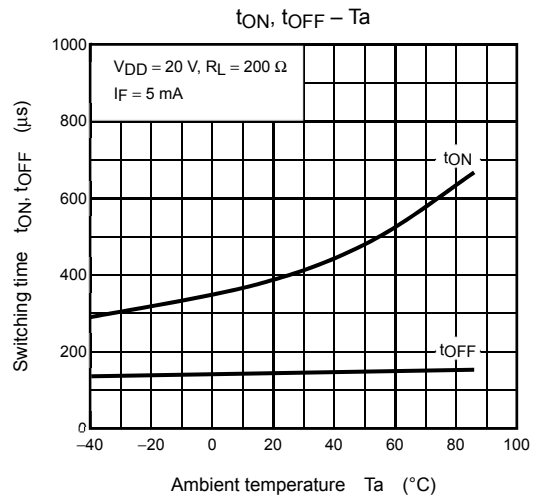
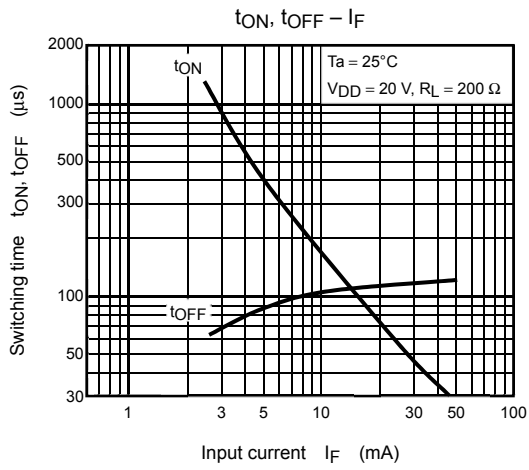
## Switching Characteristics (Ta = 25°C)

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

Note 2: Switching time test circuit







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