

Preliminary

TOSHIBA Photocoupler Photorelay

TLP197D

PC Card Modems

PBX

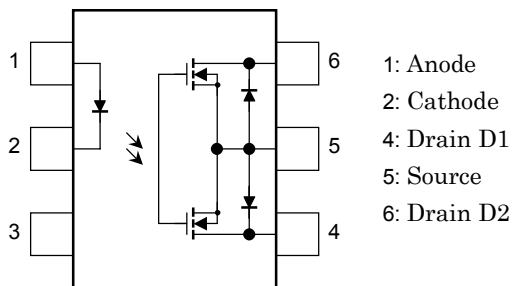
Measurement Equipment

The Toshiba TLP197D consists of an aluminum gallium arsenide infrared emitting diode optically coupled to a photo-MOSFET in a SOP package.

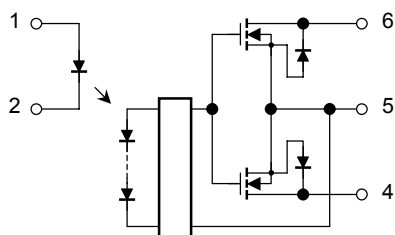
TLP197D is housed in a compact and thin SOP package and has characteristics of high-withstanding voltage and low ON-state resistance, which enable TLP197D to be applied in hook switches, dial-pulse switches for modems and facsimiles, and switches for test circuit switching in PBXes.

- 6-pin SOP (2.54SOP6): Height = 2.1 mm, pitch = 2.54 mm
- Normally open (1-form-A) device
- Peak OFF-state voltage: 200 V (min)
- Trigger LED current: 3 mA (max)
- ON-state current: 200 mA (max)
- ON-state resistance: 8 Ω (max)
- Isolation voltage: 1500 Vrms (min)
- UL recognized: UL1577, file no. E67349

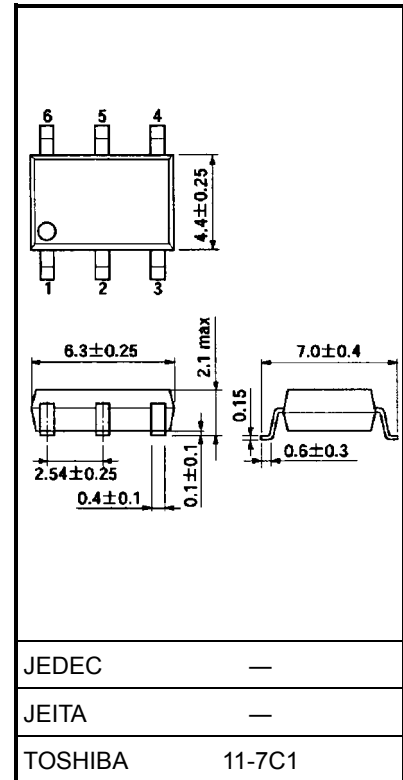
Pin Configuration (top view)



Schematic



Unit: mm



Weight: 0.13 g (typ.)

Maximum Ratings (Ta = 25°C)

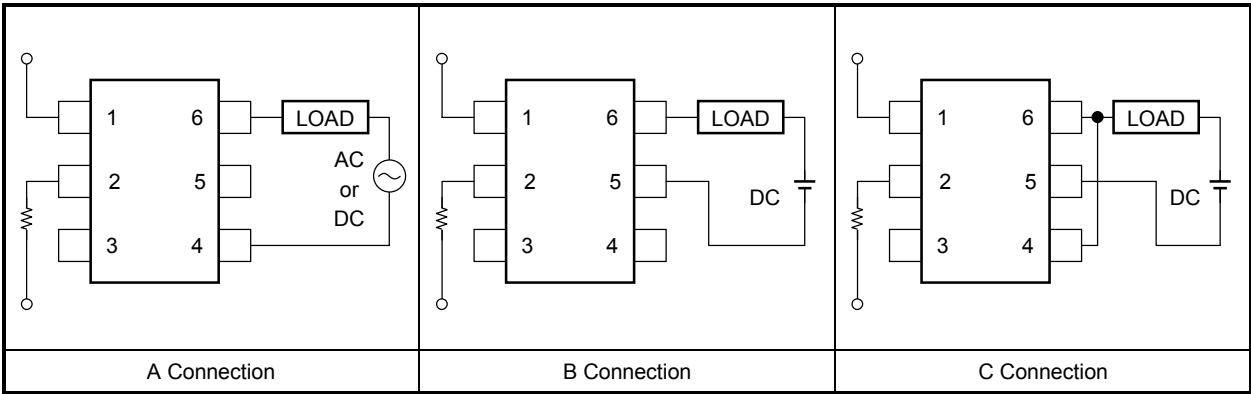
| Characteristics | | | Symbol | Rating | Unit |
|---|--|------------------|----------------------|------------------|-------|
| LED | Forward current | | I _F | 50 | mA |
| | Forward current derating (T _a ≥ 25°C) | | ΔI _F /°C | −0.5 | mA/°C |
| | Peak forward current (100 μs pulse, 100 pps) | | I _{FP} | 1 | A |
| | Reverse voltage | | V _R | 5 | V |
| | Junction temperature | | T _j | 125 | °C |
| Detector | Off-state output terminal voltage | | V _{OFF} | 200 | V |
| | On-state current | A connection | I _{ON} | 200 | mA |
| | | B connection | | 200 | |
| | | C connection | | 400 | |
| | On-state current derating (T _a ≥ 25°C) | A connection | ΔI _{ON} /°C | −2.0 | mA/°C |
| | | B connection | | −2.0 | |
| | | C connection | | −4.0 | |
| | 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 min, R.H. ≤ 60%) (Note 1) | | BV _S | 1500 | V _{rms} | |

Note 1: Pins 1, 2 and 3 are shorted together, and pins 4, 5 and 6 are shorted together.

Recommended Operating Conditions

| Characteristics | Symbol | Min | Typ. | Max | Unit |
|-----------------------|--------|-----|------|-----|------|
| Supply voltage | VDD | — | — | 160 | V |
| Forward current | IF | 5 | 7.5 | 25 | mA |
| On-state current | ION | — | — | 130 | mA |
| Operating temperature | Topr | −20 | — | 60 | °C |

Circuit Connections



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} | $V_{OFF} = 200 \text{ V}$ | — | — | 1 | μA |
| | Capacitance | C_{OFF} | $V = 0, f = 1 \text{ MHz}$ | — | 100 | — | pF |

Coupled Electrical Characteristics (Ta = 25°C)

| Characteristics | | Symbol | Test Condition | Min | Typ. | Max | Unit |
|---------------------|--------------|----------|---|-----|------|-----|----------|
| Trigger LED current | | I_{FT} | $I_{ON} = 200 \text{ mA}$ | — | 1 | 3 | mA |
| Return LED current | | I_{FC} | $I_{OFF} = 100 \mu\text{A}$ | 0.1 | — | — | mA |
| On-state resistance | A connection | R_{ON} | $I_{ON} = 200 \text{ mA}, I_F = 5 \text{ mA}$ | — | 5 | 8 | Ω |
| | B connection | | $I_{ON} = 200 \text{ mA}, I_F = 5 \text{ mA}$ | — | 3 | 5 | |
| | C connection | | $I_{ON} = 400 \text{ mA}, I_F = 5 \text{ mA}$ | — | 1.4 | — | |

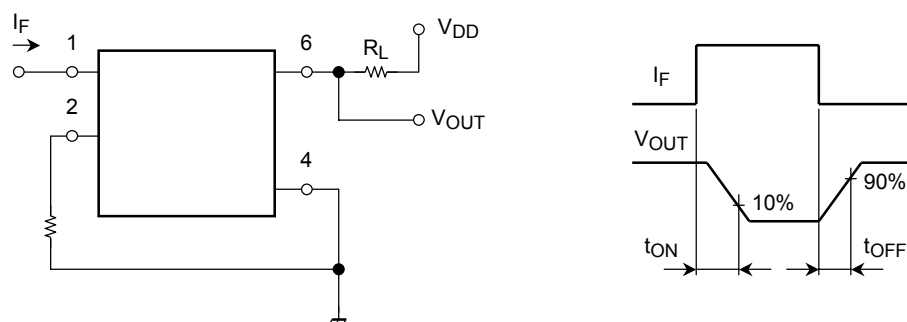
Isolation Characteristics (Ta = 25°C)

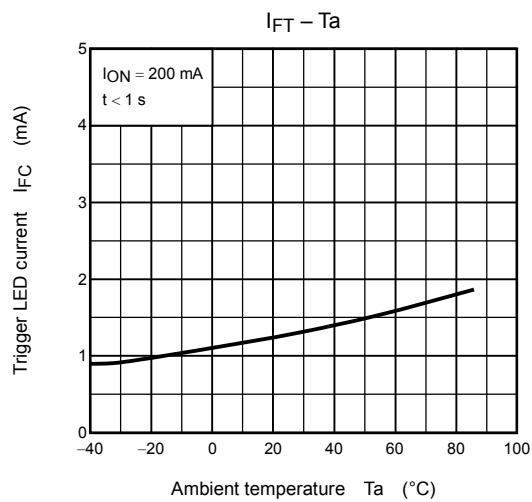
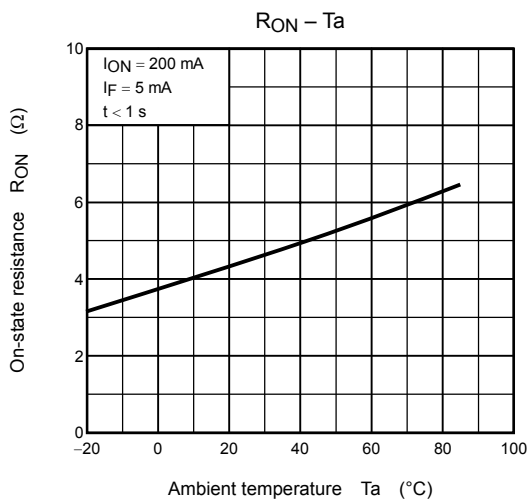
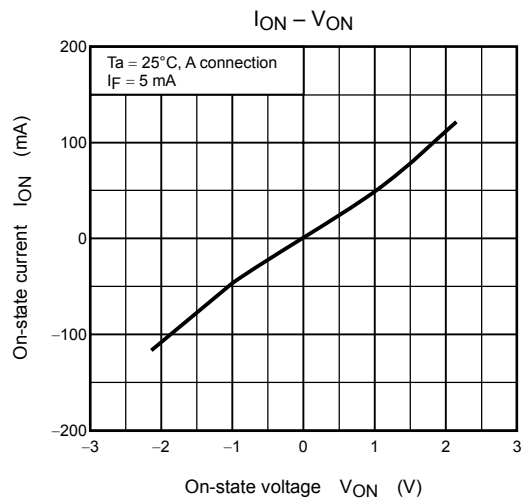
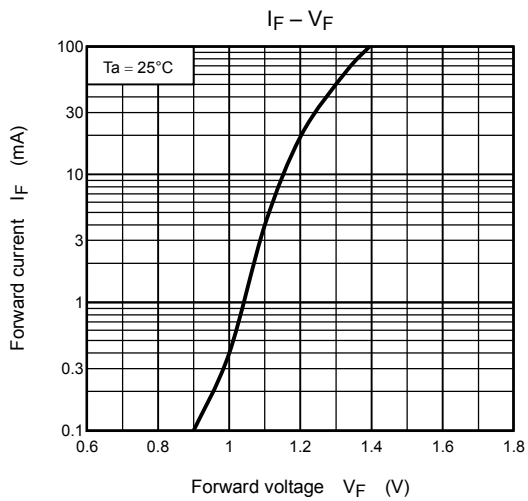
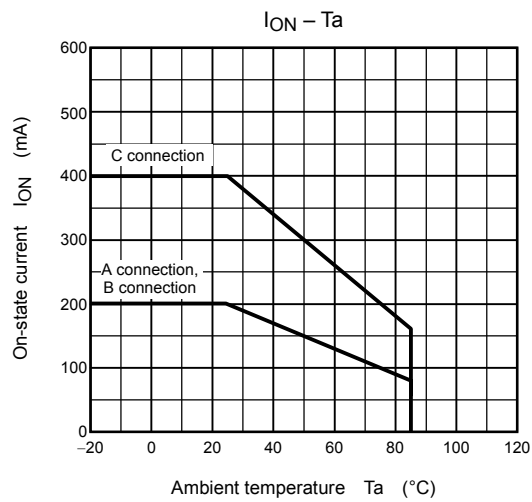
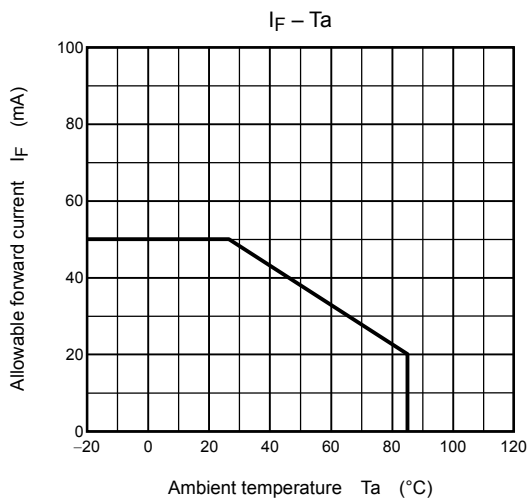
| Characteristics | | Symbol | Test Condition | Min | Typ. | Max | Unit |
|-----------------------------|--|--------|--|--------------------|-----------|-----|----------|
| Capacitance input to output | | C_S | $V_S = 0, f = 1 \text{ MHz}$ | — | 0.8 | — | pF |
| Isolation resistance | | R_S | $V_S =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

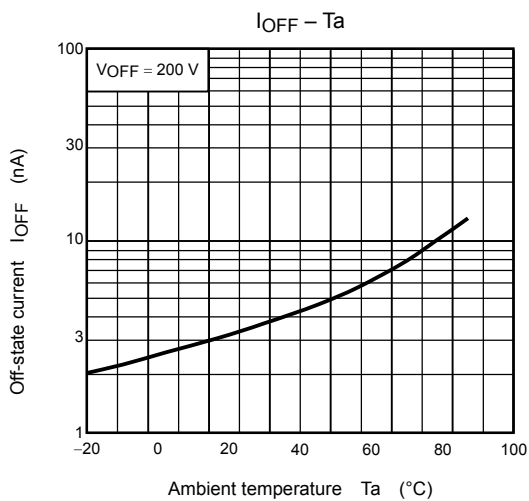
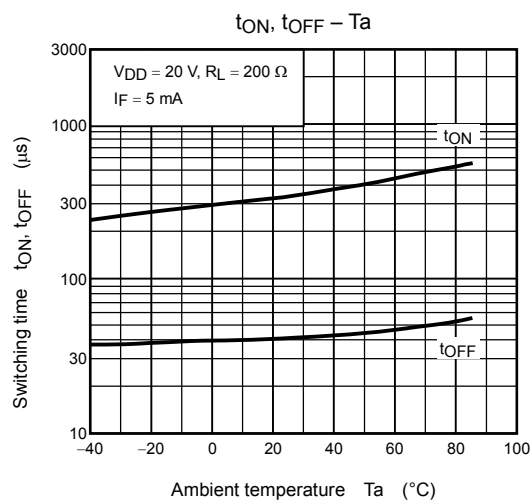
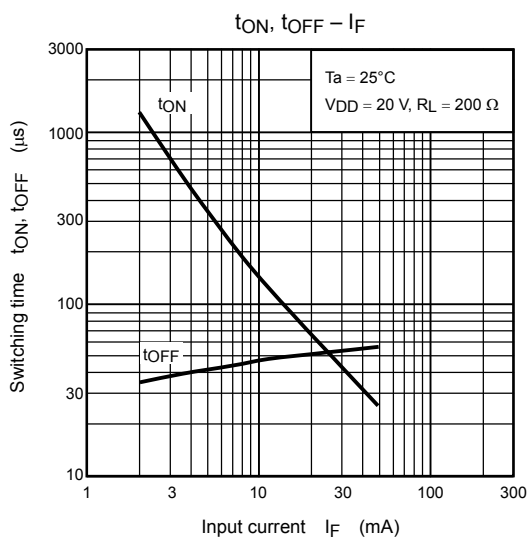
Switching Characteristics (Ta = 25°C)

| Characteristics | | Symbol | Test Condition | Min | Typ. | Max | Unit |
|-----------------|-----------|-----------------------------|---|-----|------|-----|------|
| Turn-on time | t_{ON} | $R_L = 200 \Omega$ (Note 2) | $V_{DD} = 20 \text{ V}, I_F = 5 \text{ mA}$ | — | 0.6 | 1.5 | ms |
| Turn-off time | t_{OFF} | | | — | 0.1 | 1.0 | ms |

Note 2: Switching time test circuit







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