

TOSHIBA Photocoupler PHOTORELAY

TLP3121

Measurement Instruments

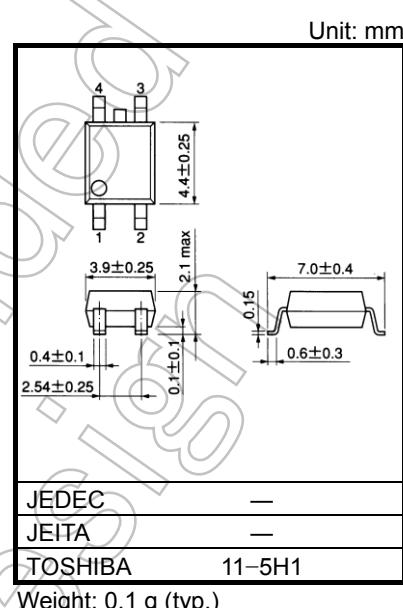
Logic Testers / Memory Testers

Board Testers / Scanners

The TOSHIBA TLP3121 Mini-flat photorelay is a small-outline photorelay, suitable for surface-mount assembly. The TLP3121 consists of a GaAs infrared-emitting diode optically coupled to a photo-MOS FET and housed in a 4-pin package.

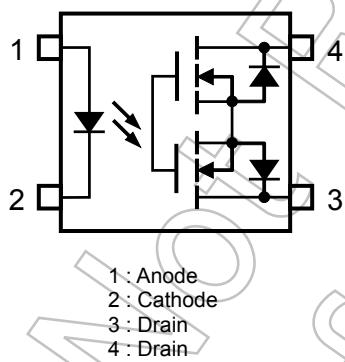
Features

- 4 pin SOP (2.54SOP4) : 2.1 mm high, 2.54 mm pitch
- 1-Form-A
- Peak off-state voltage : 80 V (min)
- Trigger LED current : 4 mA (max)
- ON-State current : 350 mA (max)
- ON-state resistance : 1.2 Ω (max)
- OFF-state capacitance : 40 pF (max)
- Isolation voltage : 1500 Vrms (min)
- UL approved: UL1577, File No.E67349
- cUL approved :CSA Component Acceptance Service No. 5A, File No.E67349



Weight: 0.1 g (typ.)

Pin configuration (top view)

Start of commercial production
2000-12

Absolute Maximum Ratings (Ta = 25°C)

| Characteristic | | Symbol | Rating | Unit |
|---|---|----------------------|------------|---------|
| LED | Forward current | I _F | 50 | mA |
| | Forward current derating (Ta ≥ 25°C) | ΔI _F /°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) | ΔP _D /°C | -0.5 | mW/°C |
| | Junction temperature | T _j | 125 | °C |
| Detector | OFF-state output terminal voltage | V _{OFF} | 80 | V |
| | ON-state current | I _{ON} | 350 | mA |
| | ON-state current derating (Ta ≥ 25°C) | ΔI _{ON} /°C | -3.5 | mA/°C |
| | Output power dissipation | P _O | 147 | mW |
| | Output power dissipation derating (Ta ≥ 25°C) | ΔP _O / °C | -1.47 | mW / °C |
| | Junction temperature | T _j | 125 | °C |
| Storage temperature range | | T _{stg} | -40 to 125 | °C |
| Operating temperature range | | T _{opr} | -20 to 85 | °C |
| Lead soldering temperature (10 s) | | T _{sol} | 260 | °C |
| Isolation voltage (AC, 1 minute, R.H. ≤ 60%) (Note 1) | | B _{VS} | 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

| Characteristic | Symbol | Min | Typ. | Max | Unit |
|-----------------------|------------------|-----|------|-----|------|
| Supply voltage | V _{DD} | — | — | 64 | V |
| Forward current | I _F | 5 | — | 30 | mA |
| On-state current | I _{ON} | — | — | 350 | mA |
| Operating temperature | T _{opr} | 25 | — | 60 | °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.

Individual Electrical Characteristics (Ta = 25°C)

| Characteristic | | Symbol | Test Condition | Min | Typ. | Max | Unit |
|----------------|-------------------------------|------------------|------------------------------------|-----|------|------|------|
| LED | Forward voltage | V _F | I _F = 10 mA | 1.0 | 1.15 | 1.3 | V |
| | Reverse current | I _R | V _R = 5 V | — | — | 10 | μA |
| | Capacitance between terminals | C _T | V _F = 0 V, f = 1 MHz | — | 15 | — | pF |
| Detector | Off-state current | I _{OFF} | V _{OFF} = 30 V, Ta = 50°C | — | 200 | 1000 | pA |
| | Capacitance between terminals | C _{OFF} | V = 0 V, f = 100 MHz | — | 30 | 40 | pF |

Coupled Electrical Characteristics (Ta = 25°C)

| Characteristic | Symbol | Test Condition | Min | Typ. | Max | Unit |
|---------------------|-----------------|---|-----|------|-----|------|
| Trigger LED current | I _{FT} | I _{ON} = 350 mA | — | 1 | 4 | mA |
| Return LED current | I _{FC} | I _{OFF} = 10 µA | 0.2 | — | — | mA |
| On-state resistance | R _{ON} | I _{ON} = 350 mA, I _F = 5 mA | — | 1.0 | 1.2 | Ω |

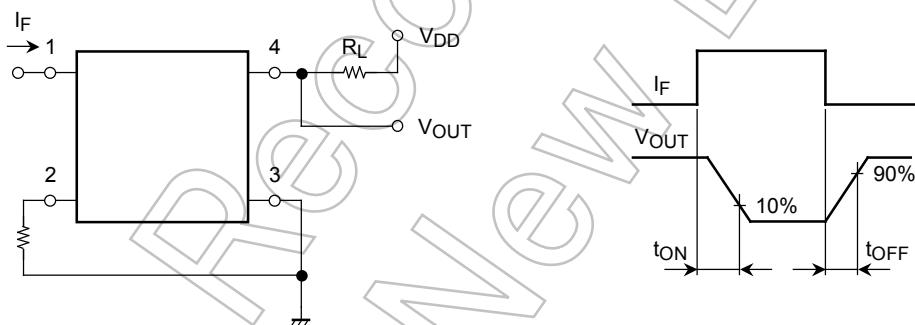
Isolation Characteristics (Ta = 25°C)

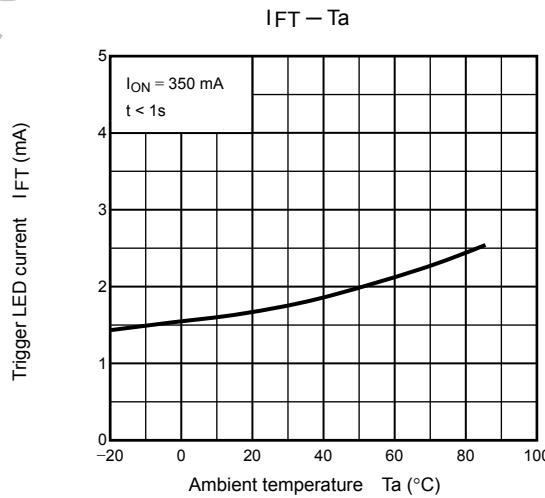
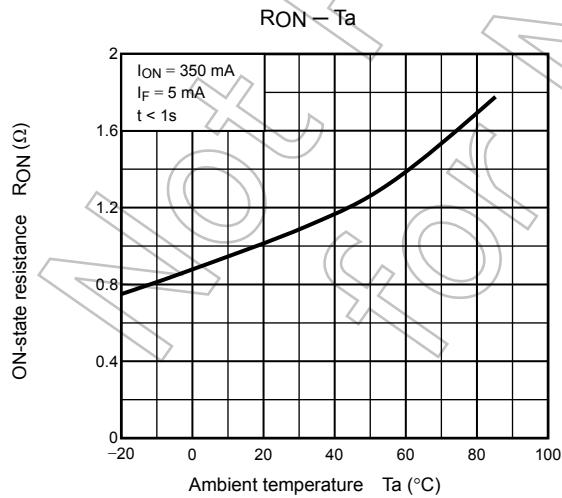
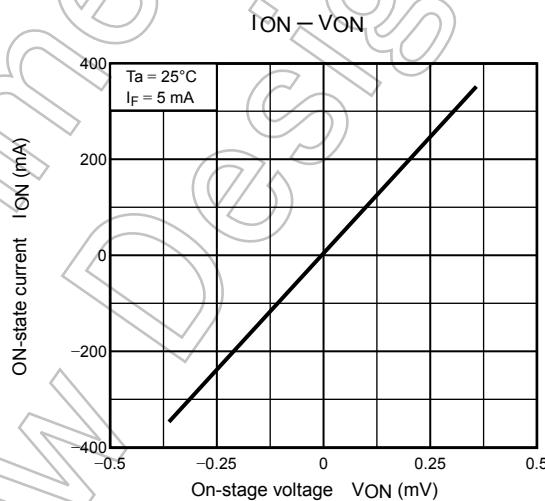
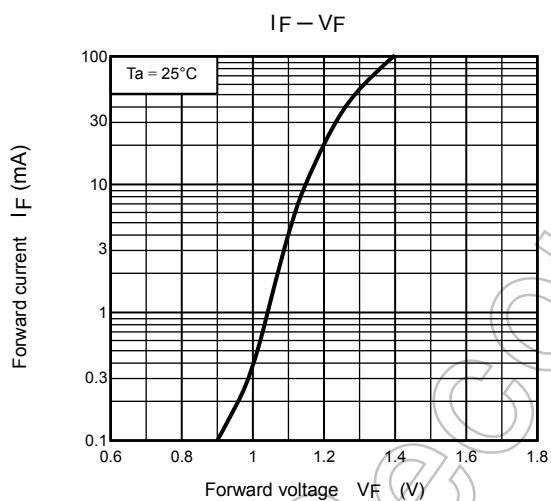
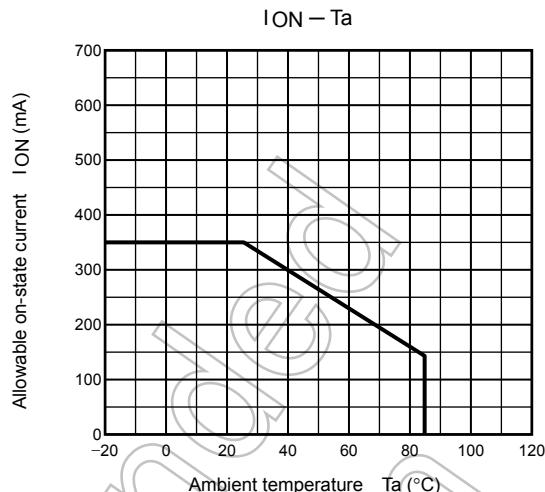
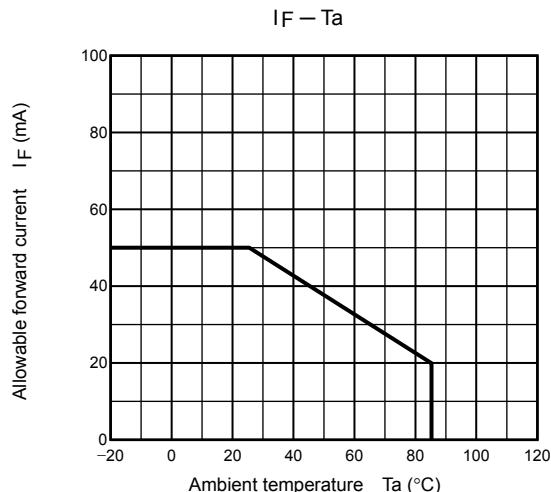
| Characteristic | Symbol | Test Condition | Min | Typ. | Max | Unit |
|-----------------------------|----------------|------------------------------------|----------------------|------------------|-----|------------------|
| Capacitance input to output | C _S | V _S = 0 V, f = 1 MHz | — | 0.8 | — | pF |
| Isolation resistance | R _S | V _S = 500 V, R.H. ≤ 60% | 5 × 10 ¹⁰ | 10 ¹⁴ | — | Ω |
| Isolation voltage | BVs | AC, 1 minute | 1500 | — | — | V _{rms} |
| | | AC, 1 second (in oil) | — | 3000 | — | |
| | | DC, 1 minute (in oil) | — | 3000 | — | V _{dc} |

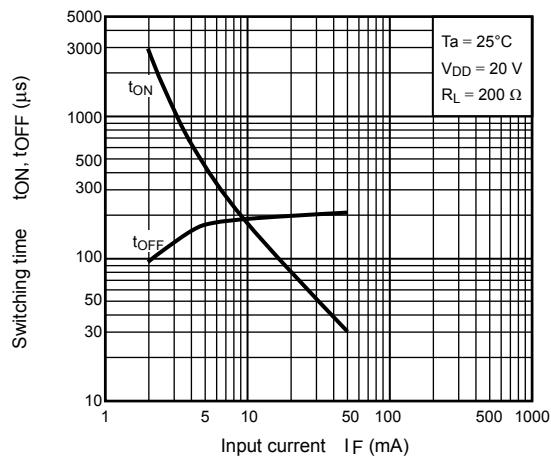
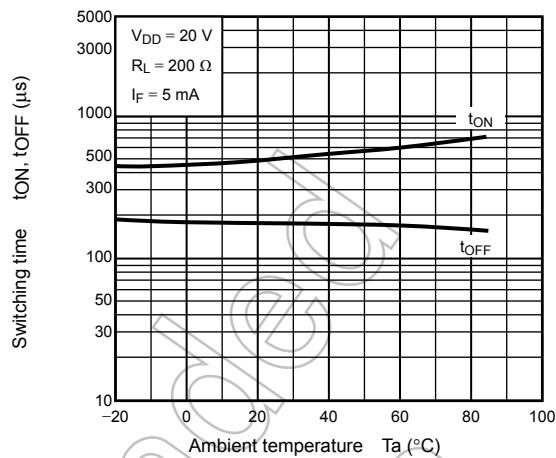
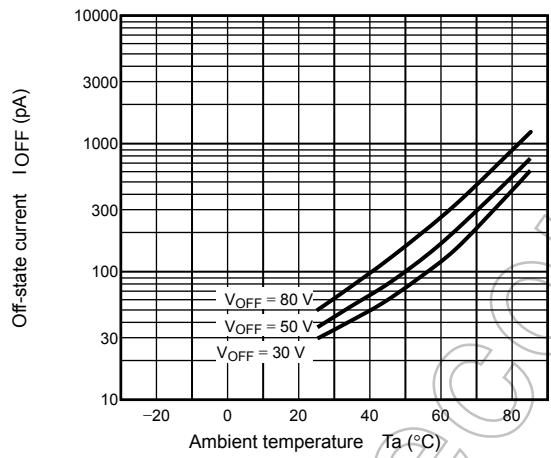
Switching Characteristics (Ta = 25°C)

| Characteristic | Symbol | Test Condition | Min | Typ. | Max | Unit |
|----------------|------------------|---|-----|------|-----|------|
| Turn-on time | t _{ON} | R _L = 200 Ω V _{DD} = 20 V, I _F = 5 mA | — | 300 | 500 | µs |
| Turn-off time | t _{OFF} | | — | 300 | 500 | |

Note 2 : switching time test circuit





t_{ON,tOFF} – I_Ft_{ON,tOFF} – T_a I_{OFF} – T_a 

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