

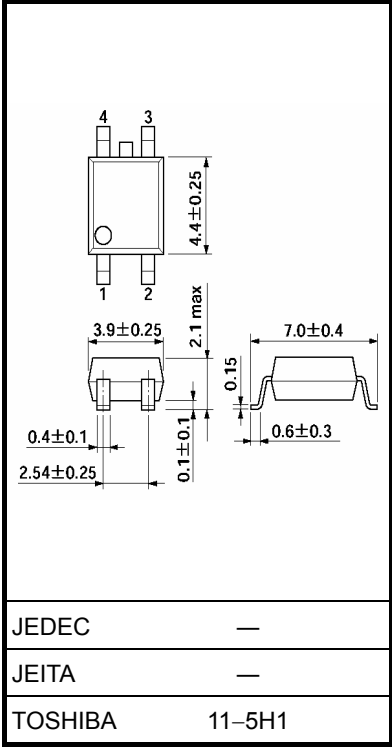
TLP3110

Measurement Instruments  
Logic IC Testers / Memory Testers  
Board Testers / Scanners

The TOSHIBA mini flat photo relay TLP3110 is a small outline photo relay, suitable for surface mount assembly.  
The TLP3110 consists of a GaAs infrared emitting diode optically coupled to a photo-MOSFET in a 4 pin lead package, and has characteristics of small off-state current and small output terminal capacitance, which enable the TLP3110 to be applied to measurement instruments.

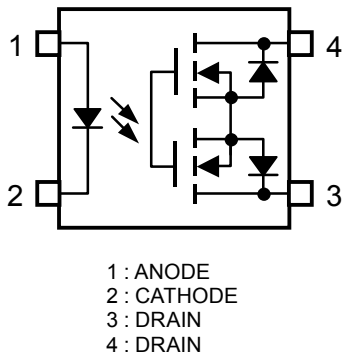
- 1-form-A
- Peak off-state voltage: 60 V (min)
- Trigger LED current: 4 mA (max)
- On-state current: 350 mA (max)
- On-state resistance: 1.2 Ω (max)
- Isolation voltage: 1500 V<sub>rms</sub> (min)
- UL recognized: UL1577, file No. E67349

Unit in mm

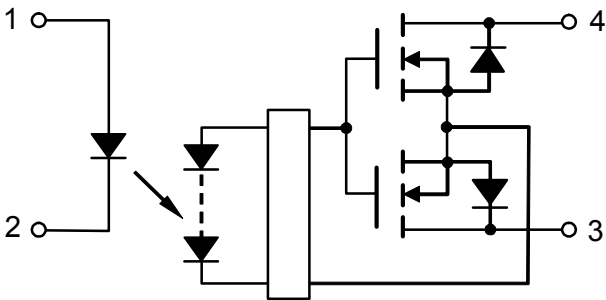


Weight: 0.1 g (typ.)

Pin Configuration (top view)



Schematic



## Absolute Maximum Ratings (Ta = 25°C)

| Characteristic                                      |                                       | Symbol               | Rating     | Unit             |
|---|---------------------------------------|----------------------|------------|------------------|
| LED   | Forward current                       | I <sub>F</sub>       | 50         | mA               |
|   | Forward current derating (Ta ≥ 25°C)  | ΔI <sub>F</sub> /°C  | −0.5       | mA/°C            |
|   | Reverse voltage                       | V <sub>R</sub>       | 6          | V                |
|   | Junction temperature                  | T <sub>j</sub>       | 125        | °C               |
| Detector  | Off-state output voltage              | V <sub>OFF</sub>     | 60         | V                |
|   | On-state current                      | I <sub>ON</sub>      | 350        | mA               |
|   | On-State Current Derating (Ta ≥ 25°C) | ΔI <sub>ON</sub> /°C | −3.5       | mA/°C            |
|   | Junction temperature                  | T <sub>j</sub>       | 125        | °C               |
| Storage temperature                                 |                                       | T <sub>stg</sub>     | −40 to 125 | °C               |
| Operating temperature                               |                                       | T <sub>opr</sub>     | −20 to 85  | °C               |
| Soldering temperature (10 s)                        |                                       | T <sub>sol</sub>     | 260        | °C               |
| Isolation voltage (AC, 1 min., R.H. ≤ 60%) (Note 1) |                                       | B <sub>VS</sub>      | 1500       | V <sub>rms</sub> |

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: Pins 1 and 3 shorted together, and pins 4 and 6 shorted together.

## Recommended Operating Conditions

| Characteristic        | Symbol           | Min. | Typ. | Max. | Unit |
|-----------------------|------------------|------|------|------|------|
| Supply voltage        | V <sub>OFF</sub> | —    | —    | 48   | V    |
| Forward current       | I <sub>F</sub>   | 10   | —    | 30   | mA   |
| On-state current      | I <sub>ON</sub>  | —    | —    | 350  | mA   |
| Operating temperature | T <sub>opr</sub> | −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.

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

| Characteristic |                   | Symbol           | Test Condition                      | Min. | Typ. | Max. | Unit |
|----------------|-------------------|------------------|-------------------------------------|------|------|------|------|
| LED            | Forward voltage   | V <sub>F</sub>   | I <sub>F</sub> = 20 mA              | 1.0  | 1.2  | 1.4  | V    |
|                | Reverse voltage   | I <sub>R</sub>   | V <sub>R</sub> = 6 V                | —    | —    | 10   | μA   |
|                | Capacitance       | C <sub>T</sub>   | V = 0, f = 1 MHz                    | —    | 15   | —    | pF   |
| Detector       | Off-state current | I <sub>OFF</sub> | V <sub>OFF</sub> = 30 V, Ta = 50 °C | —    | 0.4  | 1    | nA   |
|                | Capacitance       | C <sub>OFF</sub> | V = 0, f = 1 MHz                    | —    | 100  | 150  | pF   |

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

| Characteristic      | Symbol   | Test Condition                                   | Min. | Typ. | Max. | Unit     |
|---------------------|----------|--|------|------|------|----------|
| Trigger LED current | $I_{FT}$ | $I_{ON} = 350 \text{ mA}$                        | —    | —    | 4    | mA       |
| On-state resistance | $R_{ON}$ | $I_{ON} = 350 \text{ mA}$ , $I_F = 5 \text{ mA}$ | —    | 0.7  | 1.2  | $\Omega$ |
| Return LED Current  | $I_{FC}$ | $I_{OFF} = 10 \mu\text{A}$                       | 0.2  | —    | —    | mA       |

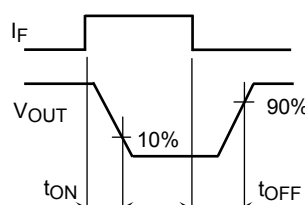
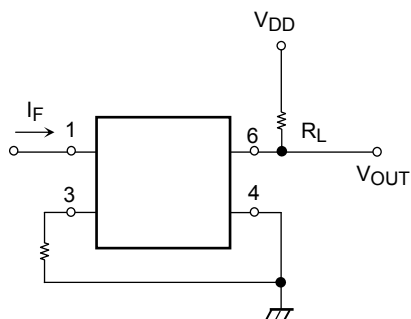
## Isolation Characteristics (Ta = 25°C)

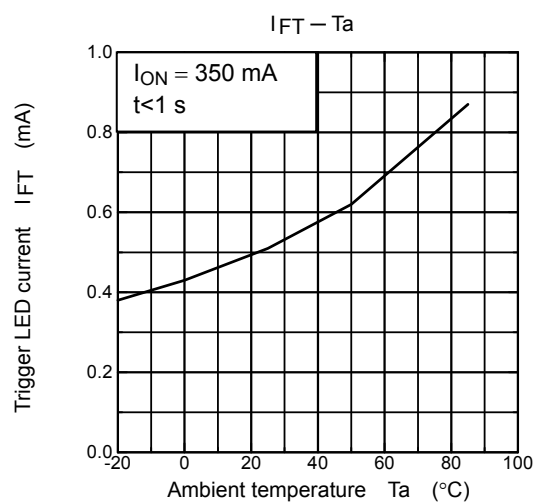
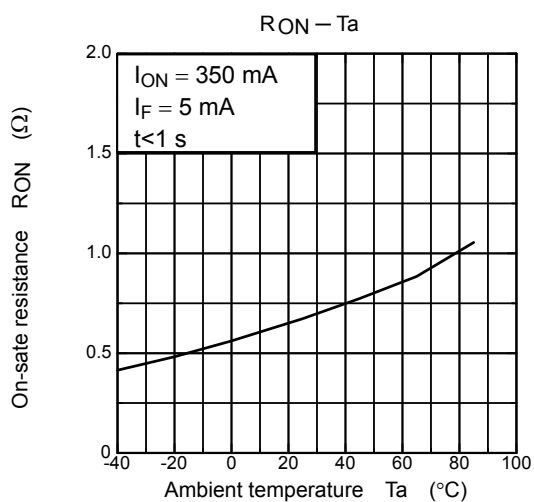
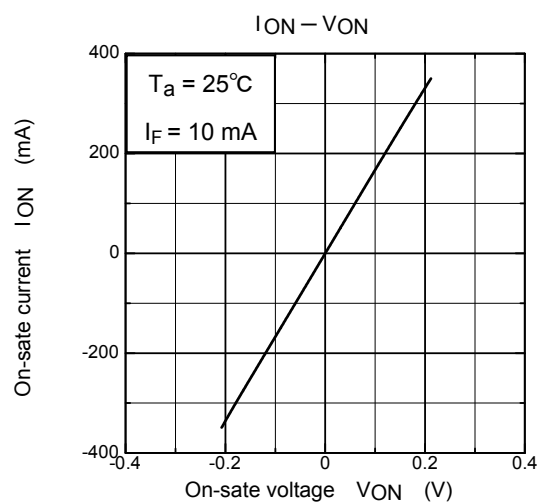
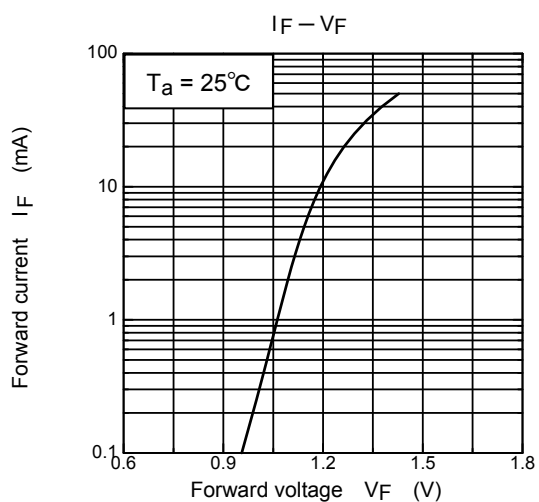
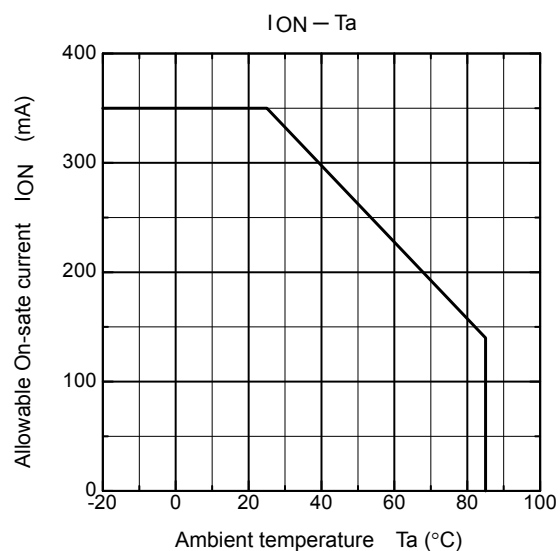
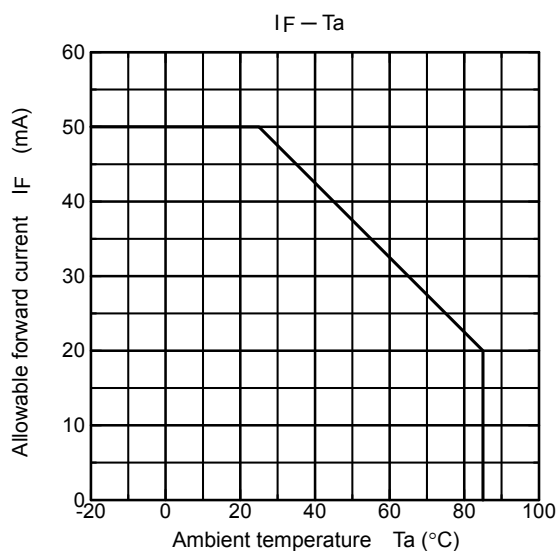
| Characteristic              | Symbol   | Test Condition                            | Min.               | Typ.      | Max. | Unit      |
|-----------------------------|----------|---|--------------------|-----------|------|-----------|
| Capacitance input to output | $C_S$    | $V_S = 0 \text{ V}$ , $f = 1 \text{ MHz}$ | —                  | 0.8       | —    | pF        |
| Isolation resistance        | $R_S$    | $V_S = 500 \text{ V}$ , R.H. $\leq 60\%$  | $5 \times 10^{10}$ | $10^{14}$ | —    | $\Omega$  |
| Isolation voltage           | $B_{VS}$ | AC, 1 minute                              | 1500               | —         | —    | $V_{rms}$ |
|                             |          | AC, 1 second (in oil)                     | —                  | 3000      | —    |           |
|                             |          | DC, 1 minute (in oil)                     | —                  | 3000      | —    | $V_{dc}$  |

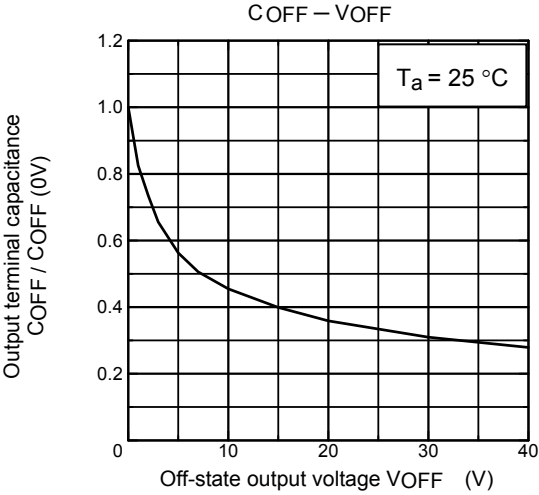
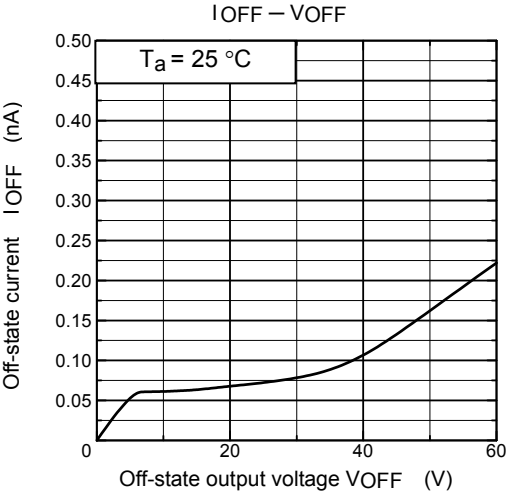
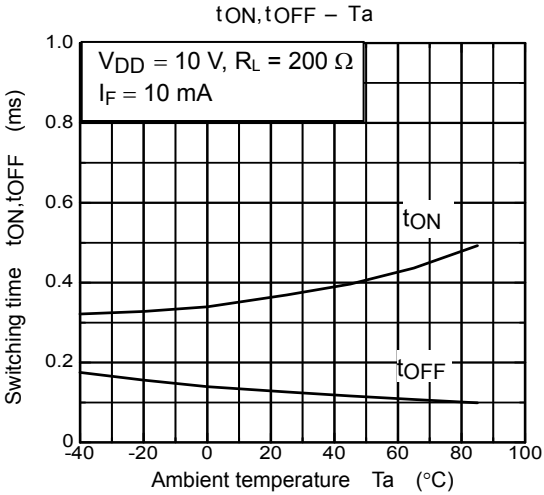
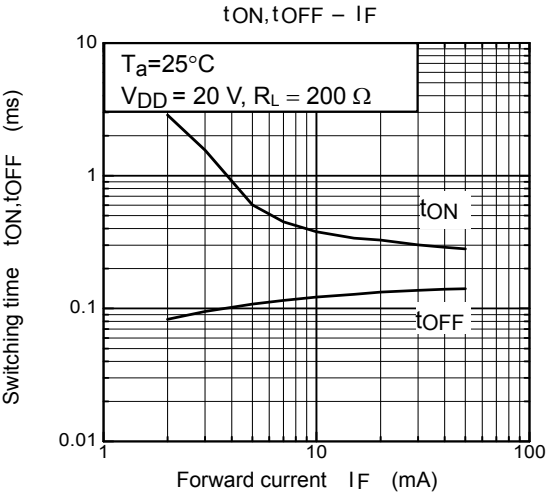
## Switching Characteristics (Ta = 25°C)

| Characteristic | Symbol    | Test Condition   | Min. | Typ. | Max. | Unit |
|----------------|-----------|--|------|------|------|------|
| Turn-on time   | $t_{ON}$  | $R_L = 200 \Omega$ (Note 2)<br>$V_{DD} = 20 \text{ V}$ , $I_F = 10 \text{ mA}$ | —    | —    | 1    | ms   |
| Turn-off time  | $t_{OFF}$ |  | —    | —    | 1    |      |

(Note 2): Switching time test circuit







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