

# TLP3111

## Measurement Instruments

Logic IC Testers / Memory Testers

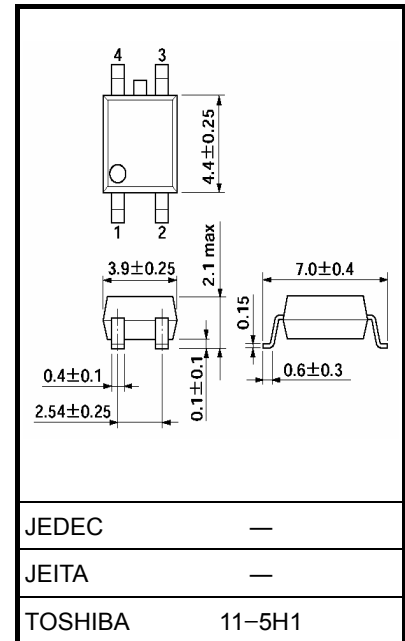
Board Testers / Scanners

The TOSHIBA mini flat photo relay TLP3111 is a small outline photo relay, suitable for surface mount assembly.

The TLP3111 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 TLP3111 to be applied to measurement instruments.(especially to high-frequency measurements)

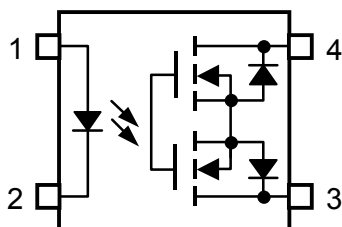
- 1-form-A
- Peak off-state voltage: 80 V(min)
- Trigger LED current: 4 mA(max)
- On-state current: 100 mA(max)
- On-state resistance: 20 Ω (max)
- Isolation voltage: 1500 V<sub>rms</sub>(min)
- UL recognized: UL1577, file No. E67349

Unit in mm



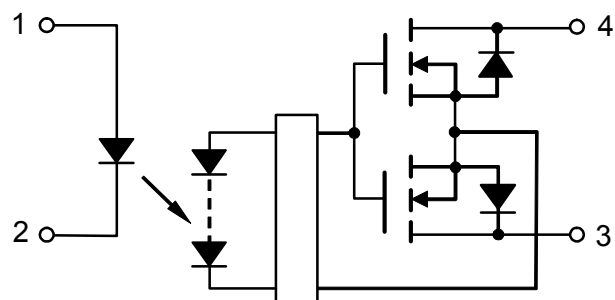
Weight: 0.1 g (typ.)

## Pin Configuration (top view)



- 1 : ANODE
- 2 : CATHODE
- 3 : DRAIN
- 4 : DRAIN

## Schematic



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

Characteristic		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	$V_R$	6	V
	Junction temperature	$T_j$	125	°C
Detector	Off-state output voltage	$V_{OFF}$	80	V
	On-state current	$I_{ON}$	100	mA
	On-State Current Derating (Ta ≥ 25°C)	$\Delta I_{ON}/^\circ\text{C}$	-1.0	mA/°C
	Junction temperature	$T_j$	125	°C
Storage temperature		$T_{stg}$	-40 to 125	°C
Operating temperature		$T_{opr}$	-20 to 85	°C
Soldering temperature (10 s)		$T_{sol}$	260	°C
Isolation voltage (AC, 1 min., R.H. ≤ 60%) (Note 1)		$B_{VS}$	1500	$V_{rms}$

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	$V_{OFF}$	—	—	64	V
Forward current	$I_F$	10	—	30	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.

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

Characteristic		Symbol	Test Condition	Min.	Typ.	Max.	Unit
LED	Forward voltage	$V_F$	$I_F = 20 \text{ mA}$	1.0	1.2	1.4	V
	Reverse voltage	$I_R$	$V_R = 6 \text{ V}$	—	—	10	$\mu\text{A}$
	Capacitance	$C_T$	$V = 0, f = 1 \text{ MHz}$	—	15	—	pF
Detector	Off-state current	$I_{OFF}$	$V_{OFF} = 30 \text{ V}, T_a = 50^\circ\text{C}$	—	0.05	1	nA
	Capacitance	$C_{OFF}$	$V = 0, f = 1 \text{ MHz}$	—	11	15	pF

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

Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Trigger LED current	$I_{FT}$	$I_{ON} = 100 \text{ mA}$	—	—	4	mA
On-state resistance	$R_{ON}$	$I_{ON} = 100 \text{ mA}, I_F = 5 \text{ mA}$	—	12	20	$\Omega$
Return LED Current	$I_{FC}$	$I_{OFF} = 10 \mu\text{A}$	0.2	—	—	mA

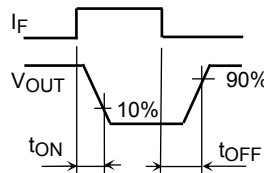
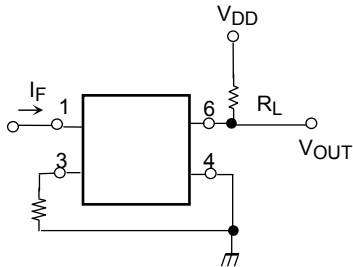
## Isolation Characteristics (Ta = 25°C)

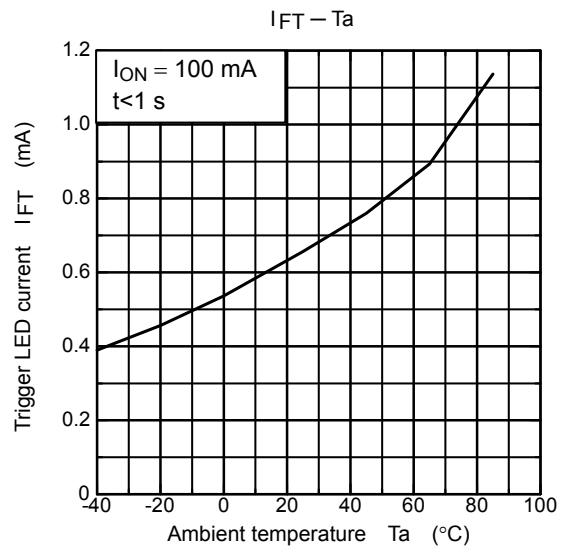
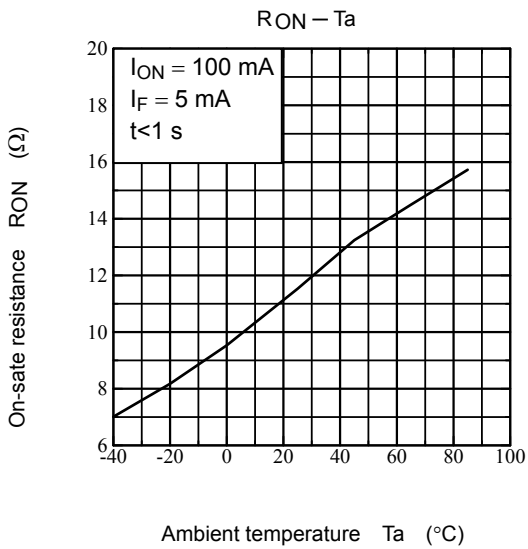
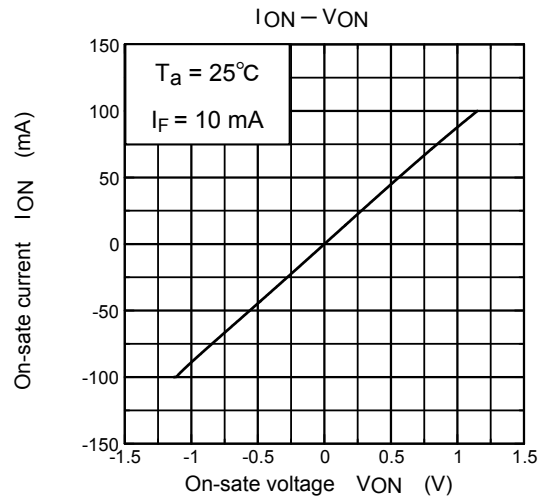
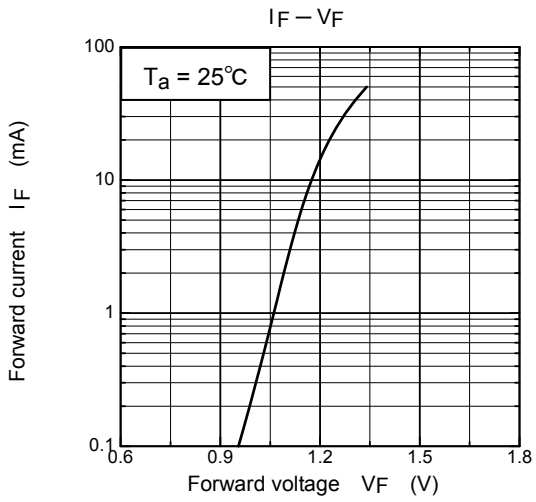
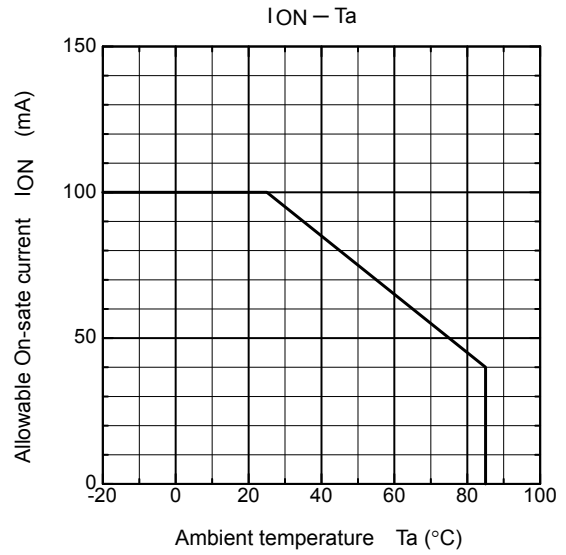
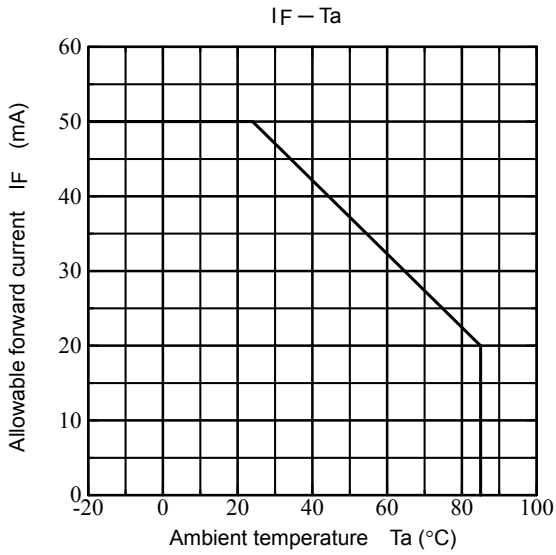
Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Capacitance input to output	$C_S$	$V_S = 0 \text{ V}, f = 1 \text{ MHz}$	—	0.8	—	pF
Isolation resistance	$R_S$	$V_S = 500 \text{ V}, \text{R.H.} \leq 60\%$	$5 \times 10^{10}$	$10^{14}$	—	$\Omega$
Isolation voltage	$B_{VS}$	AC, 1 minute	1500	—	—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

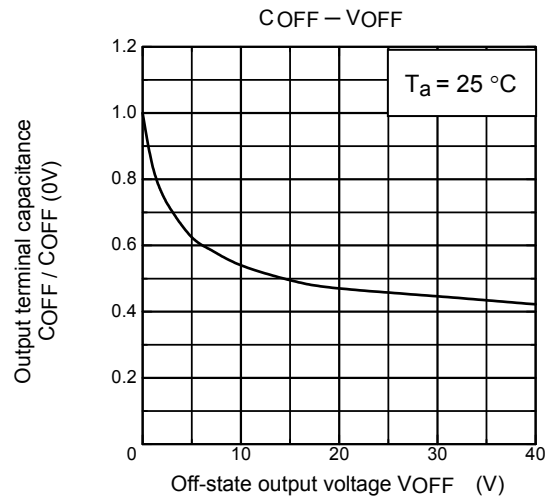
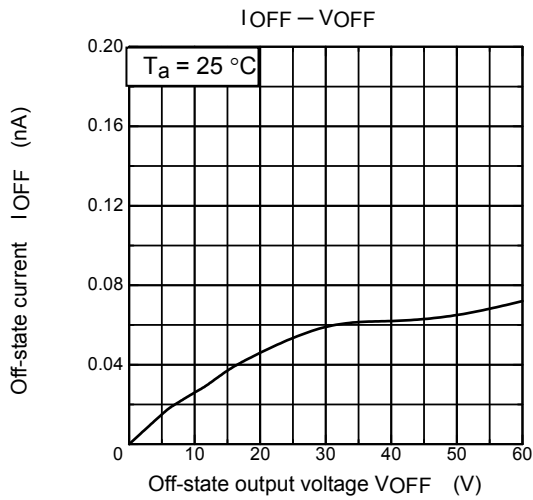
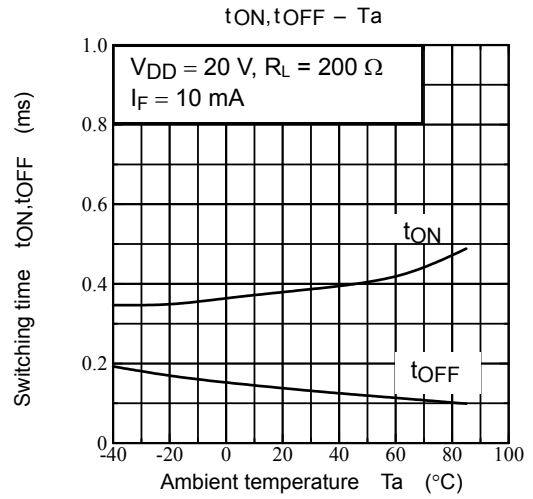
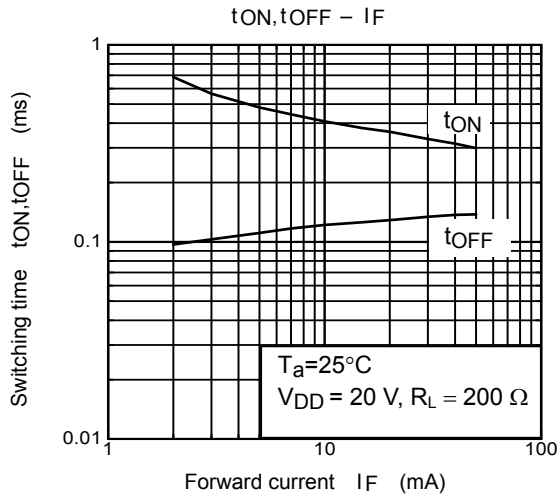
## Switching Characteristics (Ta = 25°C)

Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Turn-on time	$t_{ON}$	$R_L = 200 \Omega$ (Note2)	—	—	1	ms
Turn-off time	$t_{OFF}$	$V_{DD} = 20 \text{ V}, I_F = 10 \text{ mA}$	—	—	1	

(Note2): Switching time test circuit







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