

TOSHIBA PHOTOCOUPLER PHOTO RELAY

# TLP3131

MEASUREMENT INSTRUMENTS  
 LOGIC IC TESTERS / MEMORY TESTERS  
 BOARD TESTERS / SCANNERS

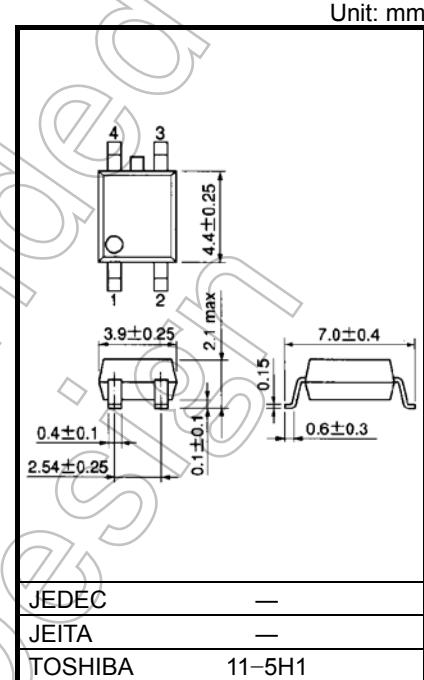
The TOSHIBA TLP3131 Mini-flat photorelay is a small-outline photorelay, suitable for surface-mount assembly. The TLP3131 consists of a GaAs infrared-emitting diode optically coupled to a photo-MOS FET and housed in a 4-pin package.

The TLP3131 features low CR product and especially low ON-state resistance, allowing high ON-state current.

Its characteristics also include low OFF-state current and low output pin capacitance, enabling it to be used in high-frequency measuring instruments.

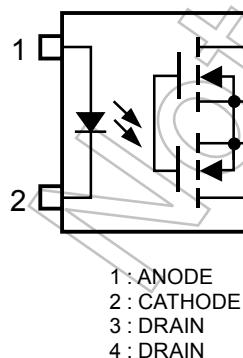
## Features

- 4 pin SOP (2.54SOP4) : 2.1 mm high, 2.54 mm pitch
- 1-Form-A
- Peak Off-State Voltage : 20 V (min)
- Trigger LED Current : 4 mA (max)
- On-State Current : 300 mA (max)
- On-State Resistance : 1.5  $\Omega$  (max), 1.0  $\Omega$  (typ.)
- Output Capacitance : 12.0 pF (max), 5.0 pF (typ.)
- Isolation Voltage : 1500 Vrms (min)
- UL approved: UL1577, File No.E67349
- cUL approved :CSA Component Acceptance Service No. 5A, File No.E67349

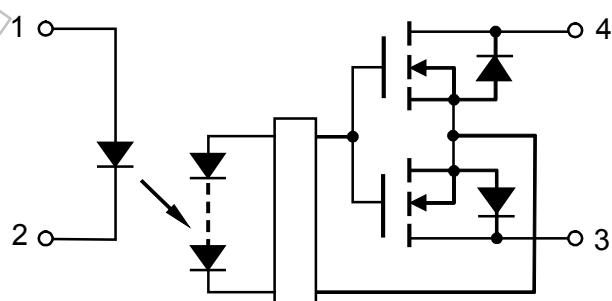


Weight: 0.1 g (typ.)

## Pin Configuration (top view)



## Schematic

Start of commercial production  
2001-03

## 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>	5	V
	Diode Power Dissipation	P <sub>D</sub>	50	mW
	Diode Power Dissipation Derating (Ta ≥ 25°C)	ΔP <sub>D</sub> /°C	-0.5	mW/°C
	Junction Temperature	T <sub>j</sub>	125	°C
DETECTOR	Off-State Output Terminal Voltage	V <sub>OFF</sub>	20	V
	On-State Current	I <sub>ON</sub>	300	mA
	On-State Current Derating (Ta ≥ 25°C)	ΔI <sub>ON</sub> /°C	-3.0	mA/°C
	Output Power Dissipation	P <sub>O</sub>	135	mW
	Output Power Dissipation Derating (Ta ≥ 25°C)	ΔP <sub>O</sub> /°C	-1.35	mW/°C
	Junction Temperature	T <sub>j</sub>	125	°C
Storage Temperature Range		T <sub>stg</sub>	-40 to 125	°C
Operating Temperature Range		T <sub>opr</sub>	-20 to 85	°C
Lead Soldering Temperature (10 s)		T <sub>sol</sub>	260	°C
Isolation Voltage (AC, 1 minute, 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 2 shorted together, and pins 3 and 4 shorted together.

## Caution

This device is sensitive to electrostatic discharge. When using this device, please ensure that all tools and equipment are earthed.

## Recommended Operating Conditions

CHARACTERISTIC	SYMBOL	MIN	TYP.	MAX	UNIT
Supply Voltage	V <sub>DD</sub>	—	—	20	V
Forward Current	I <sub>F</sub>	10	—	30	mA
On-State Current	I <sub>ON</sub>	—	—	300	mA
Operating Temperature	T <sub>opr</sub>	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 <sub>F</sub>	I <sub>F</sub> = 10 mA	1.0	1.15	1.3	V
	Reverse Current	I <sub>R</sub>	V <sub>R</sub> = 5 V	—	—	10	μA
	Capacitance between terminals	C <sub>T</sub>	V <sub>F</sub> = 0 V, f = 1 MHz	—	15	—	pF
DETECTOR	Off-State Current	I <sub>OFF</sub>	V <sub>OFF</sub> = 20 V, Ta = 50°C	—	—	1000	pA
	Capacitance between terminals	C <sub>OFF</sub>	V = 0 V, f = 100 MHz, t < 1 s	—	5.0	12.0	pF

Coupled Electrical Characteristics ( $T_a = 25^\circ\text{C}$ )

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN	TYP.	MAX	UNIT
Trigger LED Current	$I_{FT}$	$I_{ON} = 100 \text{ mA}$	—	—	4	mA
Return LED Current	$I_{FC}$	$I_{OFF} = 10 \mu\text{A}$	0.2	0.75	—	mA
On-State Resistance	$R_{ON}$	$I_{ON} = 300 \text{ mA}, I_F = 5 \text{ mA}, t < 1 \text{ s}$	—	1	1.5	$\Omega$

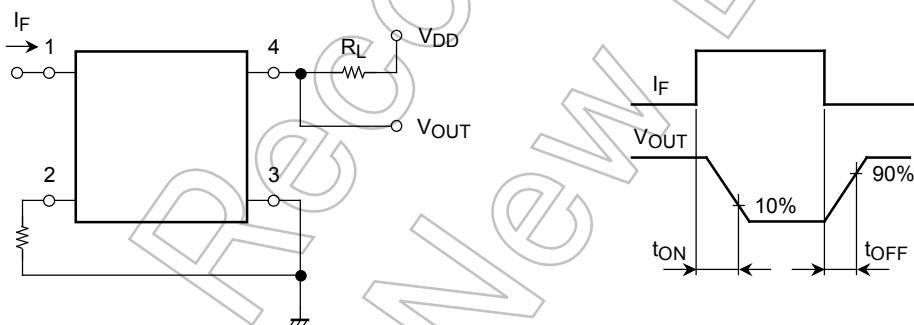
Isolation Characteristics ( $T_a = 25^\circ\text{C}$ )

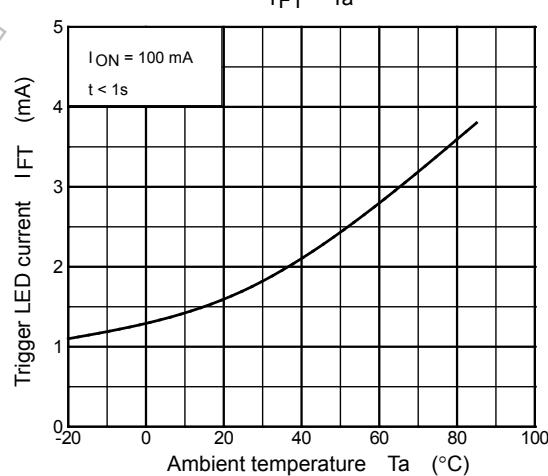
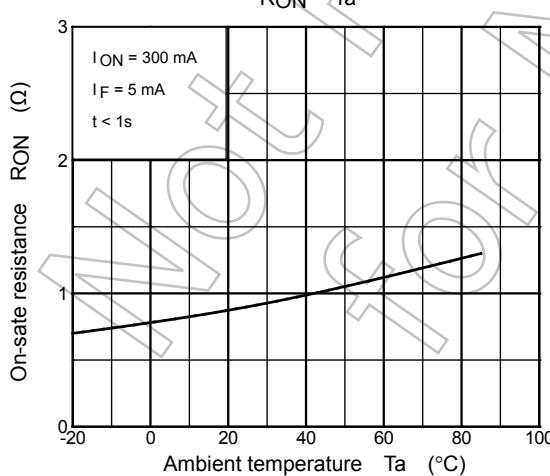
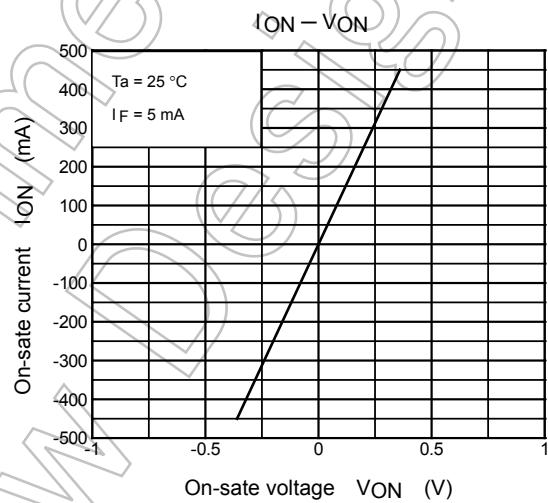
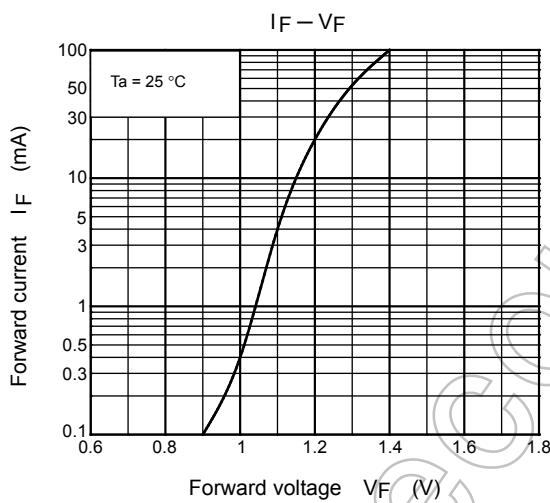
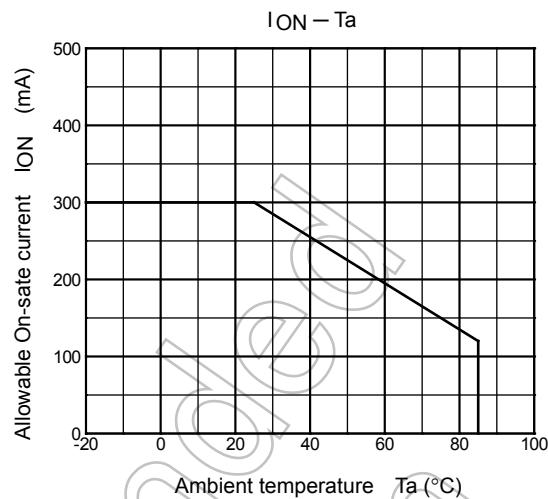
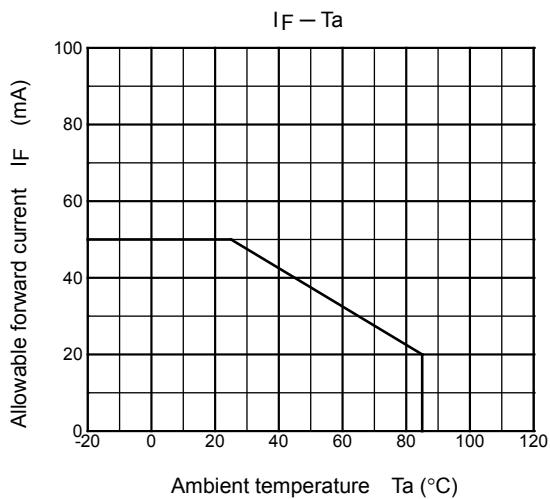
CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN	TYP.	MAX	UNIT
Capacitance Input to Output	$C_S$	$V_S = 0 \text{ V}, f = 1 \text{ MHz}$	—	0.8	—	pF
Isolation Resistance	$R_S$	$V_S = 500 \text{ V}, \text{R.H.} \leq 60\%$	$5 \times 10^{10}$	$10^{14}$	—	$\Omega$
Isolation Voltage	$B_VS$	AC, 1 minute	1500	—	—	Vrms
		AC, 1 second (in oil)	—	3000	—	
		DC, 1 minute (in oil)	—	3000	—	Vdc

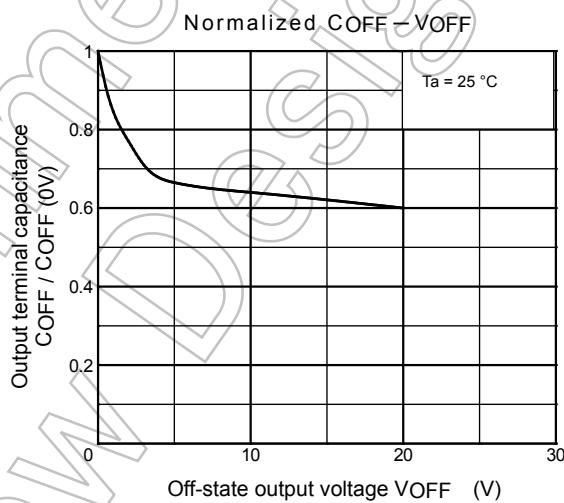
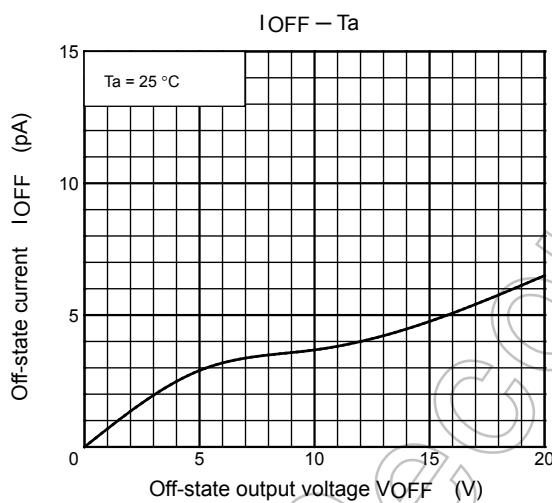
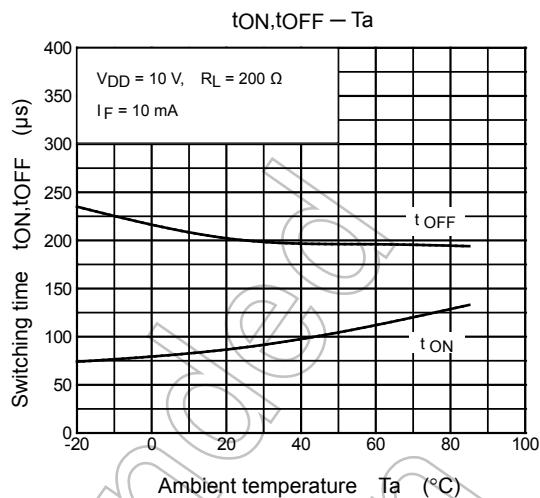
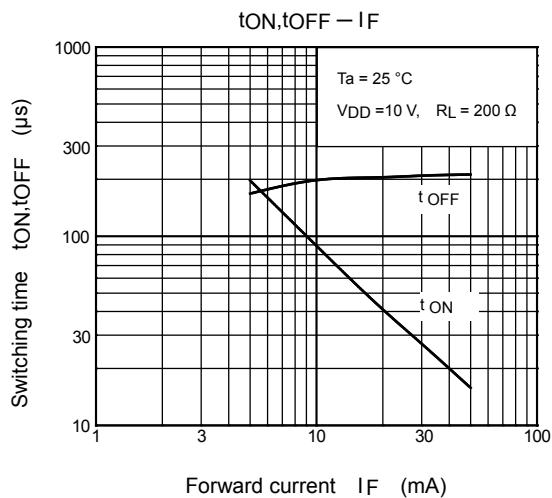
Switching Characteristics ( $T_a = 25^\circ\text{C}$ )

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN	TYP.	MAX	UNIT
Turn-on Time	$t_{ON}$	$R_L = 200 \Omega$ $V_{DD} = 10 \text{ V}, I_F = 10 \text{ mA}$	—	—	500	$\mu\text{s}$
Turn-off Time	$t_{OFF}$		—	—	500	

NOTE 2: SWITCHING TIME TEST CIRCUIT







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