

# TLP3123

## Measurement Instruments

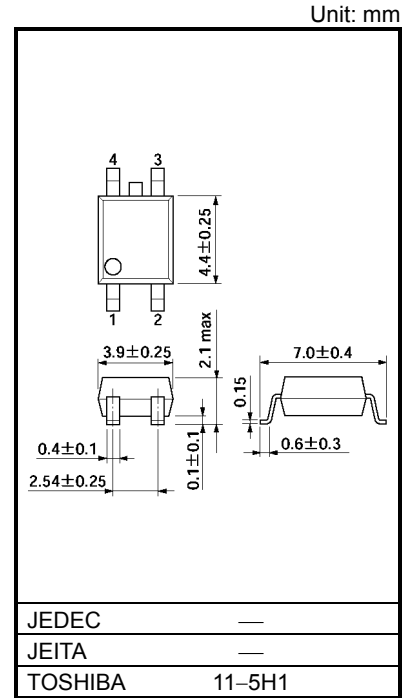
## Power Line Control

## FA (Factory Automation)

The TOSHIBA TLP3123 consists of a gallium arsenide infrared emitting diode optically coupled to a photo-MOS FET in a plastic SOP package. The TLP3123 is a bi-directional switch, which can replace mechanical relays in many applications. And its high on-state current maximum rating and low on-state resistance is suitable to control a power line.

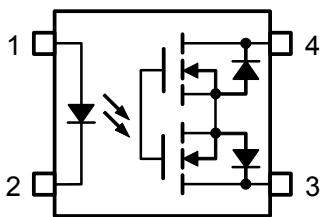
## Features

- 4 pin SOP (2.54SOP4) : 2.1 mm high, 2.54 mm pitch
- 1-Form-A
- Peak off-state voltage : 40 V (Min.)
- Trigger LED current : 3 mA (Max.)
- On-state current : 1 A (Max.)
- On-state resistance : 0.1 Ω (Typ.)
- Off-state capacitance : 300 pF (Typ.)
- Off-state current : 1 nA (Max.)
- Isolation voltage : 1500 Vrms (Min.)



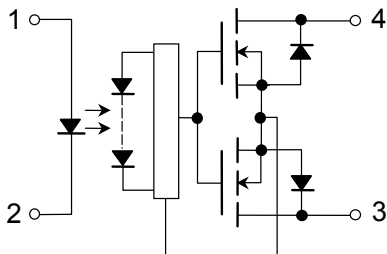
Weight: 0.1 g (Typ.)

## 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	$I_F$	30	mA
	Forward current derating (Ta ≥ 25°C)	$\Delta I_F/^\circ\text{C}$	-0.3	mA/°C
	Reverse voltage	$V_R$	5	V
	Junction temperature	$T_j$	125	°C
Detector	Off-state output terminal voltage	$V_{OFF}$	40	V
	On-state current	$I_{ON}$	1	A
	On-state current derating (Ta ≥ 50°C)	$\Delta I_{ON}/^\circ\text{C}$	-13.3	mA/°C
	Pulse on-state current (t = 100 ms)	$I_{ONP}$	2	A
	Power dissipation (Ta = 50°C)	PO	130	mW
	Junction temperature	$T_j$	125	°C
Storage temperature range		$T_{stg}$	-55~125	°C
Operating temperature range		$T_{opr}$	-40~85	°C
Lead soldering temperature (10 s)		$T_{sol}$	260	°C
Isolation voltage (AC, 1 minute, R.H. ≤ 60%) (Note 1)		$BV_S$	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	$V_{DD}$	—	—	32	V
Forward current	$I_F$	5	10	20	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	$V_F$	$I_F = 10 \text{ mA}$	1.18	1.33	1.48	V
	Reverse current	$I_R$	$V_R = 5 \text{ V}$	—	—	10	μA
	Capacitance	$C_T$	$V = 0, f = 1 \text{ MHz}$	—	70	—	pF
Detector	Off-state current	$I_{OFF}$	$V_{OFF} = 30 \text{ V}$	—	—	1	nA
	Capacitance	$C_{OFF}$	$V = 0, f = 1 \text{ MHz}$	—	300	—	pF

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

Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Trigger LED current	$I_{FT}$	$I_{ON} = 100 \text{ mA}$	—	1	3	mA
Return LED current	$I_{FC}$	$I_{OFF} = 100 \mu\text{A}$	0.1	0.8	—	mA
On-state resistance	$R_{ON}$	$I_{ON} = 1 \text{ A}, I_F = 5 \text{ mA}$		0.1	0.13	$\Omega$

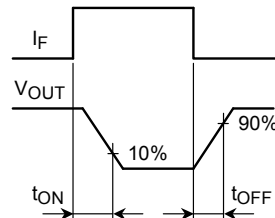
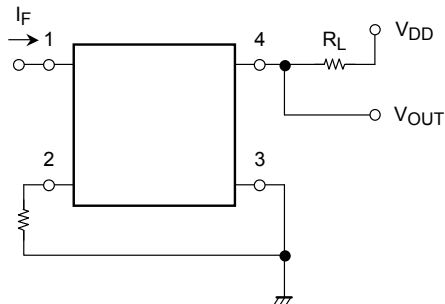
## Isolation Characteristics (Ta = 25°C)

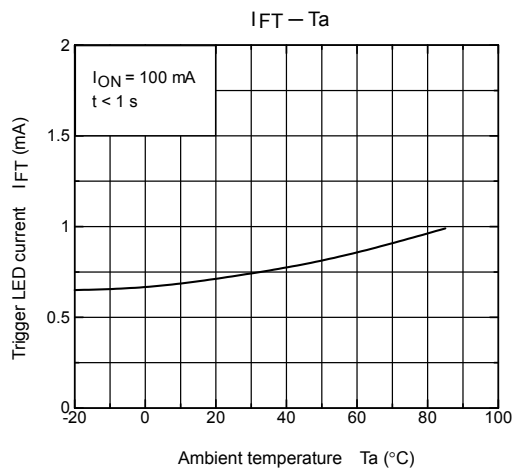
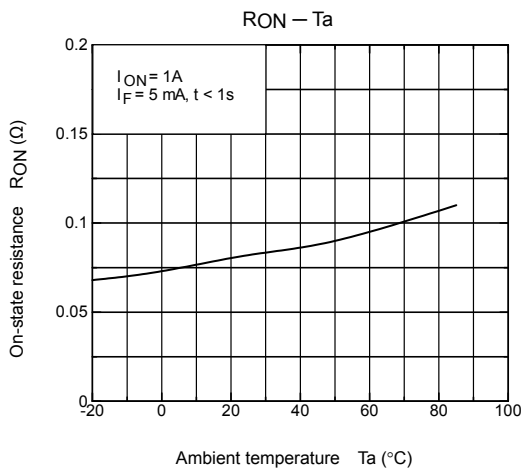
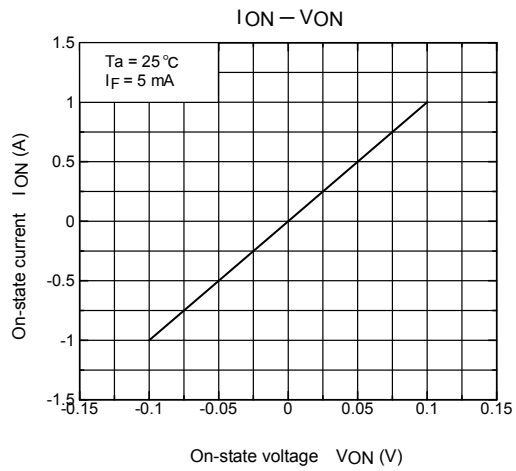
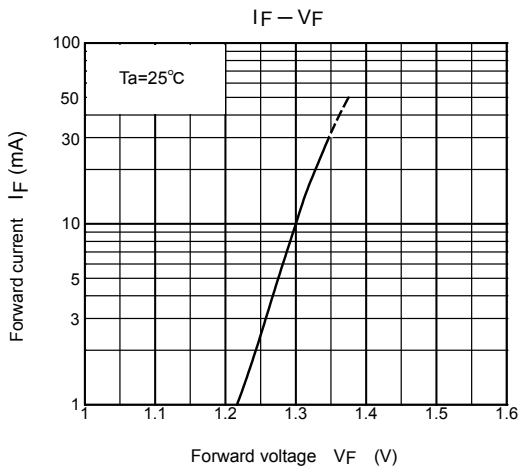
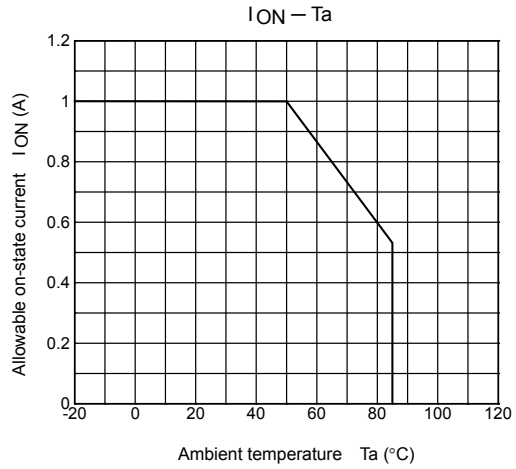
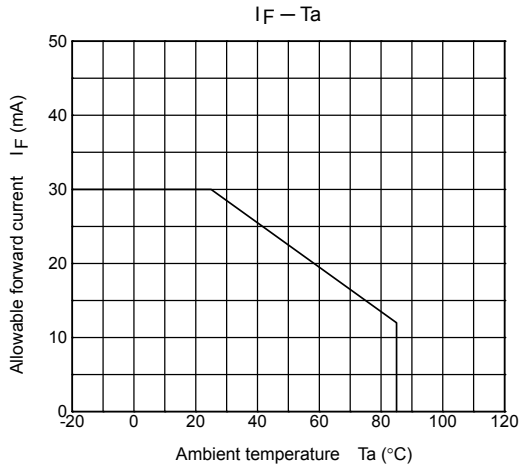
Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Capacitance input to output	$C_S$	$V_S = 0 \text{ V}, f = 1 \text{ MHz}$	—	0.8	—	pF
Isolation resistance	$R_S$	$V_S = 500 \text{ V}, \text{R.H.} \leq 60\%$	$5 \times 10^{10}$	$10^{14}$	—	$\Omega$
Isolation voltage	$BV_S$	AC, 1 minute	1500	—	—	Vrms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

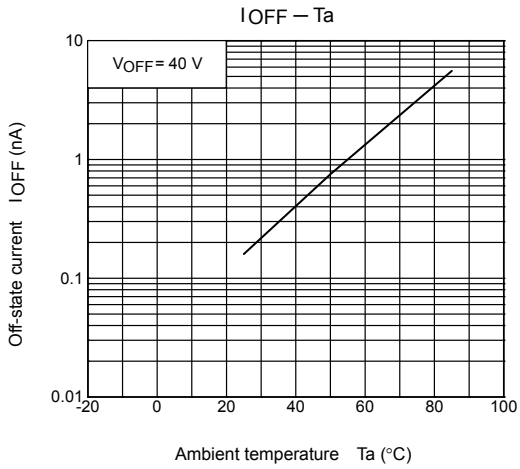
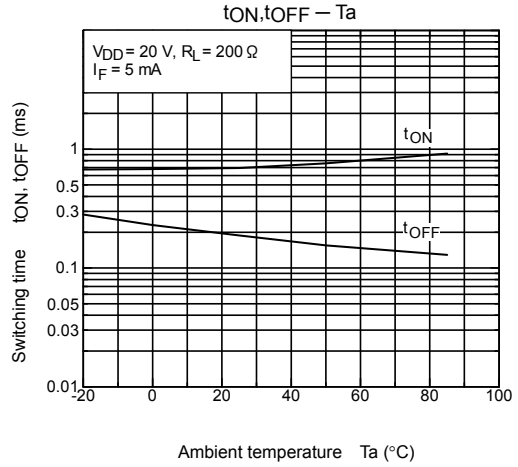
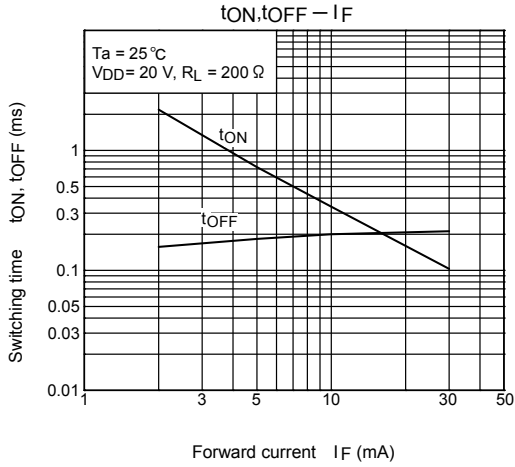
## Switching Characteristics (Ta = 25°C)

Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Turn-on time	$t_{ON}$	$R_L = 200 \Omega$ $V_{DD} = 20 \text{ V}, I_F = 5 \text{ mA}$ (Note 2)	—	1.2	3	ms
Turn-off time	$t_{OFF}$		—	0.2	0.5	

(Note 2) : switching time test circuit







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