

TLP3122

1. Applications

- Measuring Instruments
- High-Speed Logic IC Testers
- High-Speed Memory Testers
- Board Testers
- Factory Automation (FA)

2. General

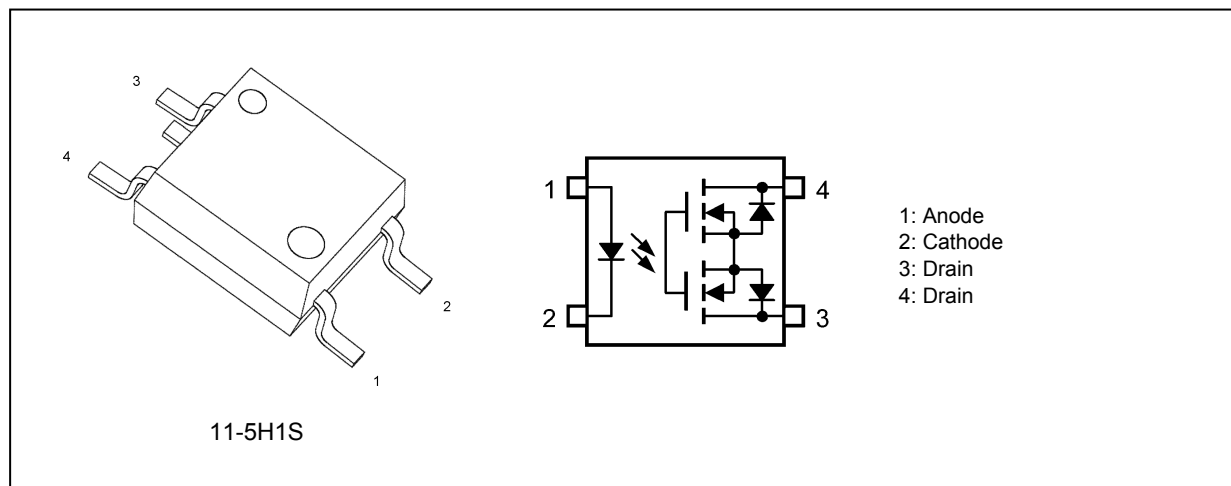
The TOSHIBA TLP3122 consists of a gallium arsenide infrared emitting diode optically coupled to a photo-MOS FET in a plastic SOP package.

The TLP3122 is a bi-directional switch, which can replace mechanical relays in many applications. And its high on-state current maximum rating is suitable to control a power line.

3. Features

- (1) Package: SOP (2.54SOP4) (Height 2.1 mm, pitch 2.54 mm)
- (2) Normally opened (1-Form-A)
- (3) OFF-state output terminal voltage: 60 V (min)
- (4) Trigger LED current: 3 mA (max)
- (5) ON-state current: 1 A (max) ($T_a = 25^\circ\text{C}$)
- (6) ON-state resistance: $0.25\ \Omega$ (max)
- (7) Off-state capacitance: 90 pF (typ.)
- (8) Off-state current: 100 nA (max)
- (9) Isolation voltage: 1500 Vrms (min)

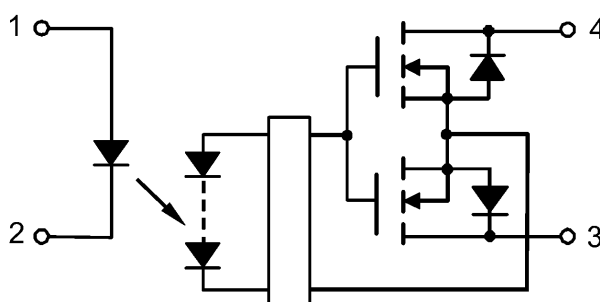
4. Packaging and Pin Assignment



Start of commercial production

2004-06

5. Internal Circuit



6. Absolute Maximum Ratings (Note) (Unless otherwise specified, $T_a = 25\text{ }^{\circ}\text{C}$)

	Characteristics	Symbol	Note	Rating	Unit
LED	Input forward current	I_F		50	mA
	Input forward current derating ($T_a \geq 25\text{ }^{\circ}\text{C}$)	$\Delta I_F / \Delta T_a$		-0.5	mA/ $^{\circ}\text{C}$
	Input forward current (pulsed) (100 μs pulse, 100 pps)	I_{FP}		1	A
	Input reverse voltage	V_R		5	V
	Input power dissipation	P_D		50	mW
	Junction temperature	T_j		125	$^{\circ}\text{C}$
Detector	OFF-state output terminal voltage	V_{OFF}		60	V
	ON-state current	I_{ON}		1	A
	ON-state current derating ($T_a \geq 25\text{ }^{\circ}\text{C}$)	$\Delta I_{ON} / \Delta T_a$		-13.3	mA/ $^{\circ}\text{C}$
	ON-state current (pulsed) ($t = 100\text{ ms}$)	I_{ONP}		3	A
	Output power dissipation	P_O		500	mW
	Junction temperature	T_j		125	$^{\circ}\text{C}$
Common	Storage temperature	T_{stg}		-40 to 125	$^{\circ}\text{C}$
	Operating temperature	T_{opr}		-40 to 85	
	Lead soldering temperature (10 s)	T_{sol}		260	
	Isolation voltage AC, 60 s, R.H. $\leq 60\%$, $T_a = 25\text{ }^{\circ}\text{C}$	BV_S	(Note 1)	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: This device is considered as a two-terminal device: Pins 1 and 2 are shorted together, and pins 3 and 4 are shorted together.

7. Recommended Operating Conditions (Note)

Characteristics	Symbol	Note	Min	Typ.	Max	Unit
Supply voltage	V_{DD}		—	—	48	V
Input forward current	I_F		5	10	25	mA
ON-state current	I_{ON}		—	—	1.3	A
Operating temperature	T_{opr}		-20	—	65	$^{\circ}\text{C}$

Note: The recommended operating conditions are given as a design guide necessary to obtain the intended performance of the device. Each parameter is an independent value. When creating a system design using this device, the electrical characteristics specified in this datasheet should also be considered.

8. Electrical Characteristics (Unless otherwise specified, $T_a = 25\text{ }^{\circ}\text{C}$)

	Characteristics	Symbol	Note	Test Condition	Min	Typ.	Max	Unit
LED	Input forward voltage	V_F		$I_F = 10\text{ mA}$	1.0	1.15	1.3	V
	Input reverse current	I_R		$V_R = 5\text{ V}$	—	—	10	μA
	Input capacitance	C_t		$V = 0\text{ V}$, $f = 1\text{ MHz}$	—	15	—	pF
Detector	OFF-state current	I_{OFF}		$V_{OFF} = 60\text{ V}$	—	0.2	100	nA
	Output capacitance	C_{OFF}		$V = 0\text{ V}$, $f = 1\text{ MHz}$	—	90	—	pF

9. Coupled Electrical Characteristics (Unless otherwise specified, $T_a = 25\text{ }^{\circ}\text{C}$)

Characteristics	Symbol	Note	Test Condition	Min	Typ.	Max	Unit
Trigger LED current	I_{FT}		$I_{ON} = 100\text{ mA}$	—	1	3	mA
Return LED current	I_{FC}		$I_{OFF} = 100\text{ }\mu\text{A}$	0.1	0.8	—	mA
ON-state resistance	R_{ON}		$I_{ON} = 1\text{ A}$, $I_F = 5\text{ mA}$, $t < 1\text{ s}$	—	0.25	0.7	Ω

10. Isolation Characteristics (Unless otherwise specified, $T_a = 25\text{ }^{\circ}\text{C}$)

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

Note 1: This device is considered as a two-terminal device: Pins 1 and 2 are shorted together, and pins 3 and 4 are shorted together.

11. Switching Characteristics (Unless otherwise specified, $T_a = 25\text{ }^{\circ}\text{C}$)

Characteristics	Symbol	Note	Test Condition	Min	Typ.	Max	Unit
Turn-on time	t_{ON}		See Fig. 11.1. $R_L = 200\text{ }\Omega$, $V_{DD} = 20\text{ V}$, $I_F = 5\text{ mA}$	—	1.4	3	ms
Turn-off time	t_{OFF}		See Fig. 11.1. $R_L = 200\text{ }\Omega$, $V_{DD} = 20\text{ V}$, $I_F = 5\text{ mA}$	—	0.6	1	ms

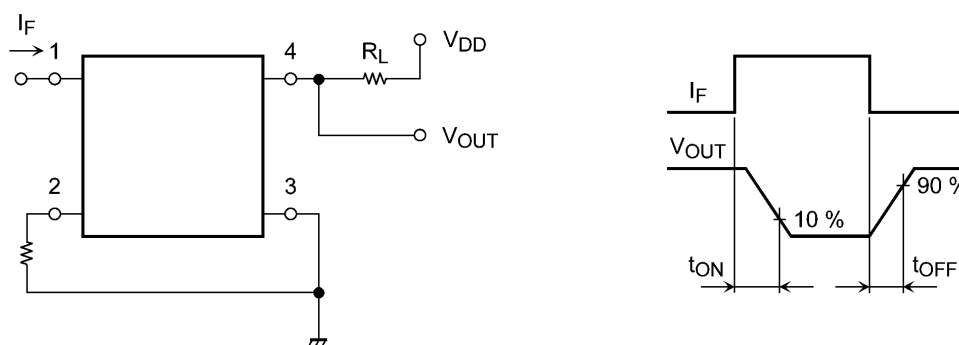


Fig. 11.1 Switching Time Test Circuit and Waveform

12. Characteristics Curves (Note)

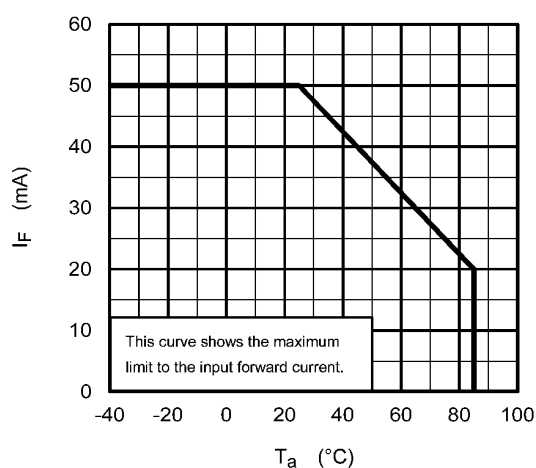


Fig. 12.1 $I_F - T_a$

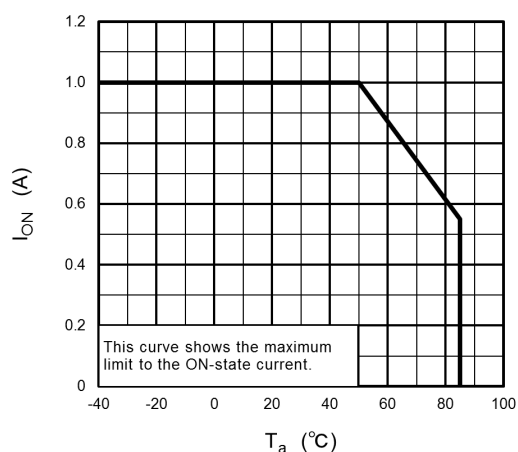


Fig. 12.2 $I_{ON} - T_a$

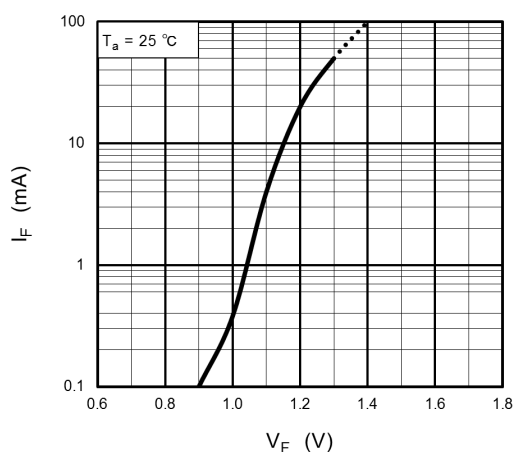


Fig. 12.3 $I_F - V_F$

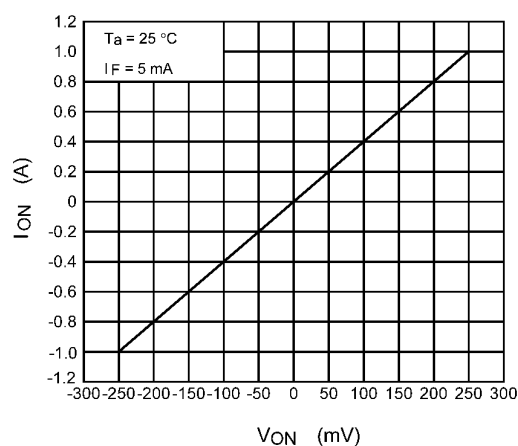


Fig. 12.4 $I_{ON} - V_{ON}$

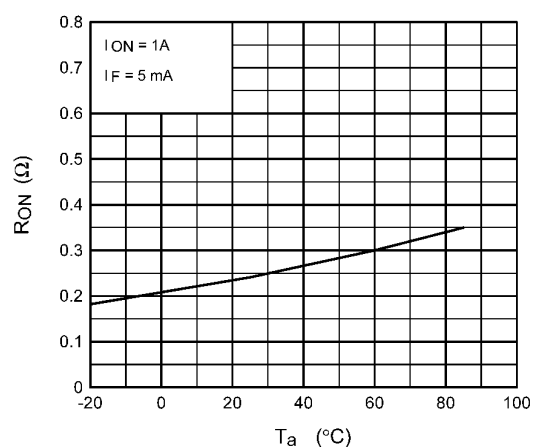


Fig. 12.5 $R_{ON} - T_a$

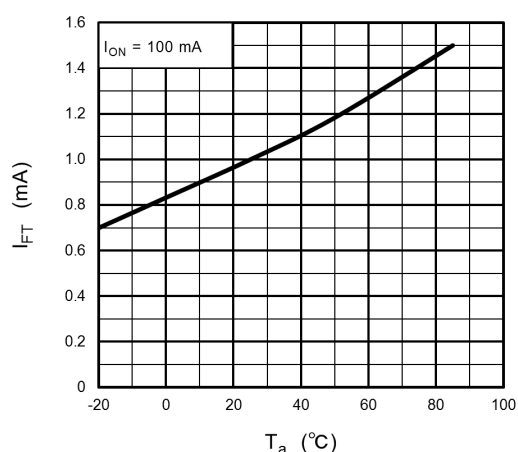


Fig. 12.6 $I_{FT} - T_a$

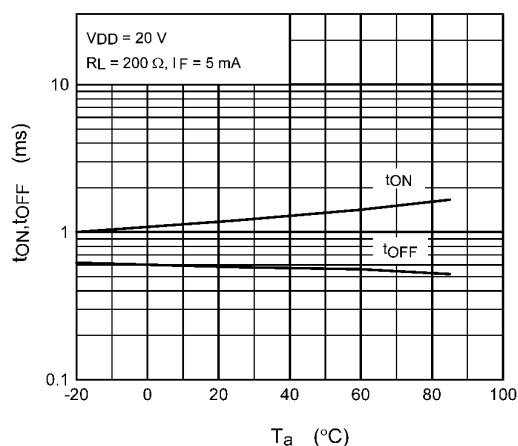


Fig. 12.7 $t_{ON}, t_{OFF} - T_a$

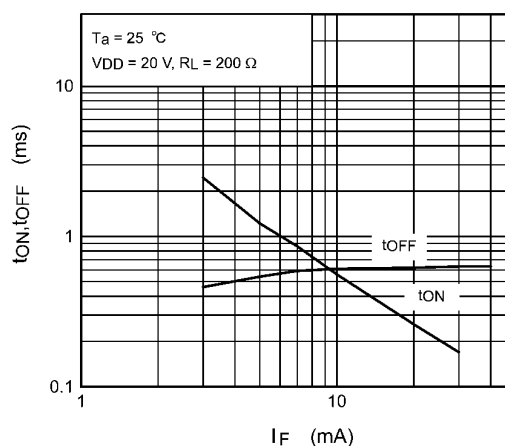


Fig. 12.8 $t_{ON}, t_{OFF} - I_F$

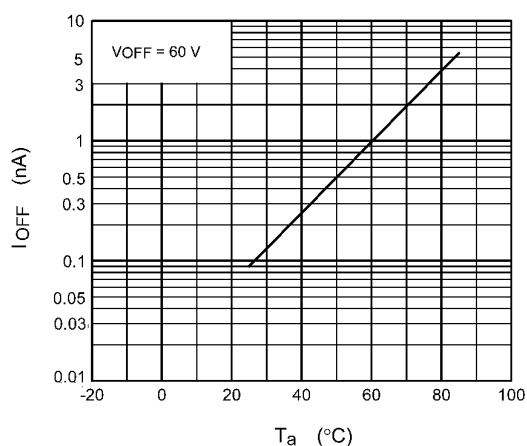
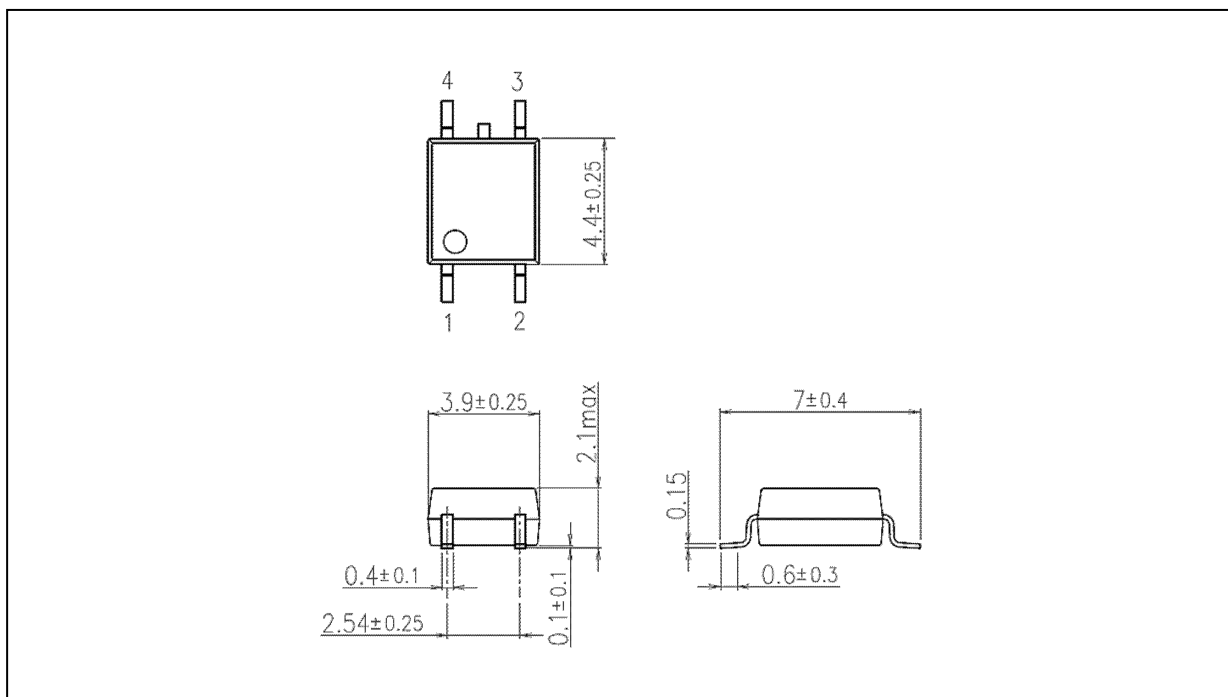


Fig. 12.9 $I_{OFF} - T_a$

Note: The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.

Package Dimensions

Unit: mm



Weight: 0.1 g (typ.)

Package Name(s)
TOSHIBA: 11-5H1S

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