

# TLP3554

## 1. Applications

- Mechanical relay replacements
- Security Systems
- Measuring Instruments
- Factory Automation (FA)
- Amusement Equipment

## 2. General

The TLP3554 photorelay consists of a photo MOSFET optically coupled to an infrared light emitting diode. It is housed in a 4-pin DIP package. The low ON-state resistance and the high permissible ON-state current of the the TLP3554 make it suitable for power line control applications.

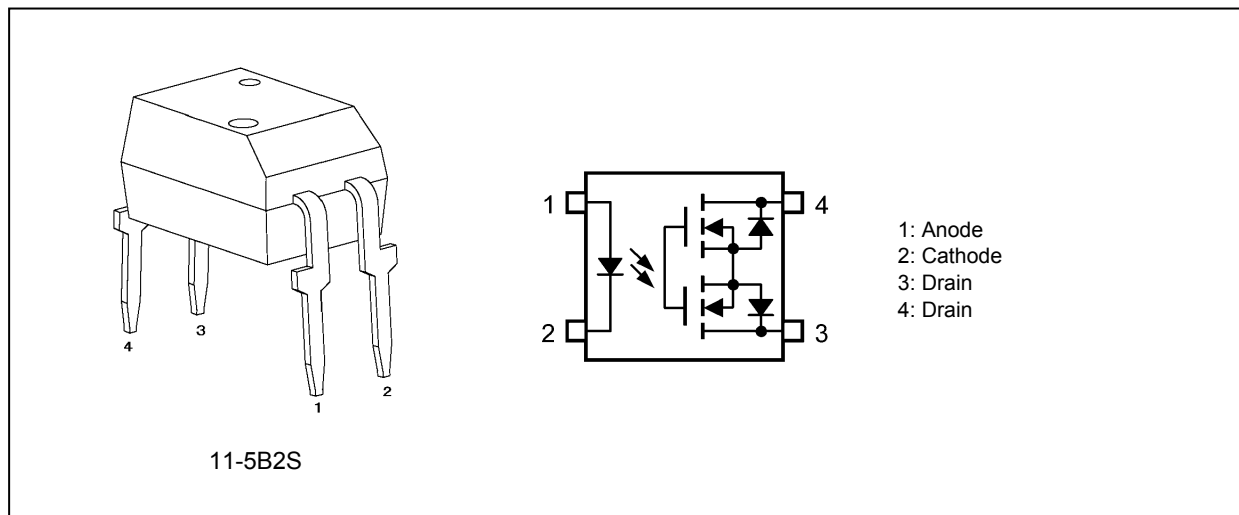
## 3. Features

- (1) Normally opened (1-Form-A)
- (2) OFF-state output terminal voltage: 40 V (min)
- (3) Trigger LED current: 3 mA (max)
- (4) ON-state current: 2.5 A (max)
- (5) ON-state resistance: 150 m $\Omega$  (max)
- (6) Isolation voltage: 2500 Vrms (min)
- (7) Safety standards

UL-approved: UL1577 File No.E67349

cUL-approved: CSA Component Acceptance Service No.5A, File No.E67349

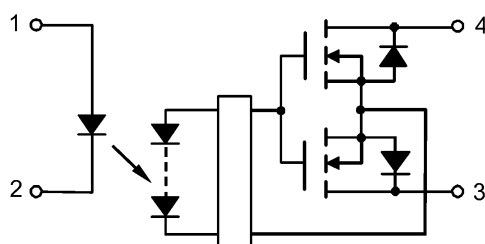
## 4. Packaging and Pin Assignment



Start of commercial production

2011-11

**5. Internal Circuit**



**6. Absolute Maximum Ratings (Note) (Unless otherwise specified, T<sub>a</sub> = 25 °C)**

	Characteristics	Symbol	Note	Rating	Unit
LED	Input forward current	I <sub>F</sub>		30	mA
	Input forward current derating (T <sub>a</sub> ≥ 25 °C)	ΔI <sub>F</sub> /ΔT <sub>a</sub>		-0.3	mA/°C
	Input forward current (pulsed) (100 μs pulse, 100 pps)	I <sub>FP</sub>		1	A
	Input reverse voltage	V <sub>R</sub>		5	V
	Input power dissipation	P <sub>D</sub>		50	mW
	Junction temperature	T <sub>J</sub>		125	°C
Detector	OFF-state output terminal voltage	V <sub>OFF</sub>		40	V
	ON-state current	I <sub>ON</sub>		2.5	A
	ON-state current derating (T <sub>a</sub> ≥ 25 °C)	ΔI <sub>ON</sub> /ΔT <sub>a</sub>		-25	mA/°C
	ON-state current (pulsed) (t = 100 ms, Duty = 1/10)	I <sub>ONP</sub>		7.5	A
	Output power dissipation	P <sub>O</sub>		500	mW
	Junction temperature	T <sub>J</sub>		125	°C
Common	Storage temperature	T <sub>stg</sub>		-55 to 125	°C
	Operating temperature	T <sub>opr</sub>		-40 to 85	
	Lead soldering temperature (10 s)	T <sub>sol</sub>		260	
	Isolation voltage AC, 60 s, R.H. ≤ 60 %	BV <sub>S</sub>	(Note 1)	2500	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: 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 <sub>DD</sub>		—	—	32	V
Input forward current	I <sub>F</sub>		5	10	25	mA
ON-state current	I <sub>ON</sub>		—	—	2.5	A
Operating temperature	T <sub>opr</sub>		-20	—	65	°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	$V_F$		$I_F = 10\text{ mA}$	1.18	1.33	1.48	V
	Input reverse current	$I_R$		$V_R = 5\text{ V}$	—	—	10	$\mu\text{A}$
	Input capacitance	$C_t$		$V = 0\text{ V}, f = 1\text{ MHz}$	—	70	—	pF
Detector	OFF-state current	$I_{OFF}$		$V_{OFF} = 40\text{ V}$	—	—	1	$\mu\text{A}$
	Output capacitance	$C_{OFF}$		$V = 0\text{ V}, f = 1\text{ MHz}$	—	300	—	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	$I_{FT}$		$I_{ON} = 1.0\text{ A}$	—	0.5	3	mA
	Return LED current	$I_{FC}$		$I_{OFF} = 10\text{ }\mu\text{A}$	0.1	—	—	
	ON-state resistance	$R_{ON}$		$I_{ON} = 2.0\text{ A}, I_F = 5\text{ mA}, t < 1\text{ s}$	—	50	150	m $\Omega$

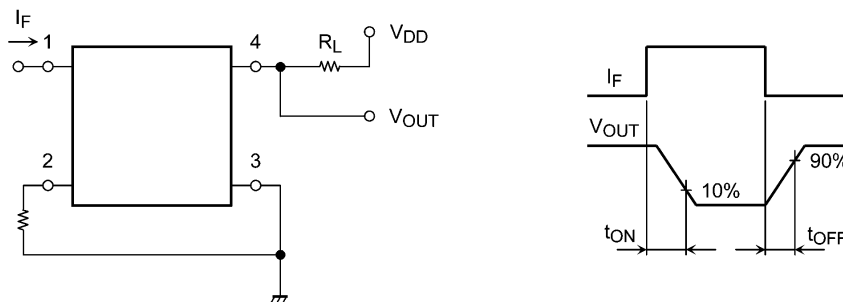
**10. Isolation Characteristics (Unless otherwise specified,  $T_a = 25\text{ }^\circ\text{C}$ )**

	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)	$V_S = 500\text{ V}, R.H. \leq 60\%$	$5 \times 10^{10}$	$10^{14}$	—	$\Omega$
	Isolation voltage	$BV_S$	(Note 1)	AC, 60 s	2500	—	—	Vrms
				AC, 1 s in oil	—	5000	—	
				DC, 60 s in oil	—	5000	—	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.

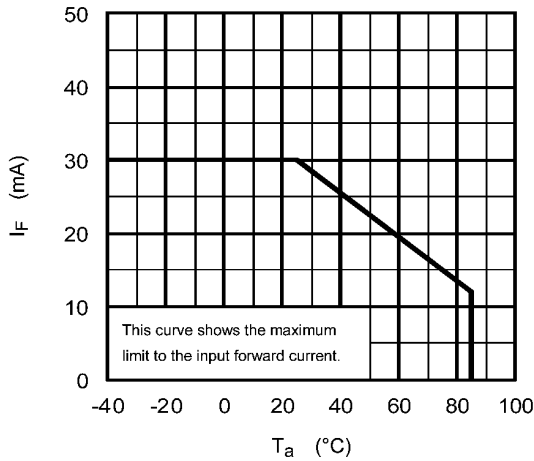
**11. Switching Characteristics (Unless otherwise specified,  $T_a = 25\text{ }^\circ\text{C}$ )**

	Characteristics	Symbol	Note	Test Condition	Min	Typ.	Max	Unit
	Turn-on time	$t_{ON}$		See Fig. 11.1. $R_L = 200\text{ }\Omega, V_{DD} = 20\text{ V}, I_F = 5\text{ mA}$	—	0.8	5	ms
	Turn-off time	$t_{OFF}$			—	0.3	1	
	Turn-on time	$t_{ON}$		See Fig. 11.1. $R_L = 200\text{ }\Omega, V_{DD} = 20\text{ V}, I_F = 10\text{ mA}$	—	0.4	3	
	Turn-off time	$t_{OFF}$			—	0.3	1	

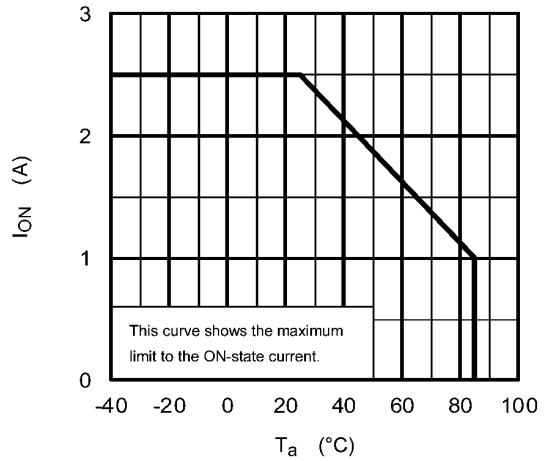


**Fig. 11.1 Switching Time Test Circuit**

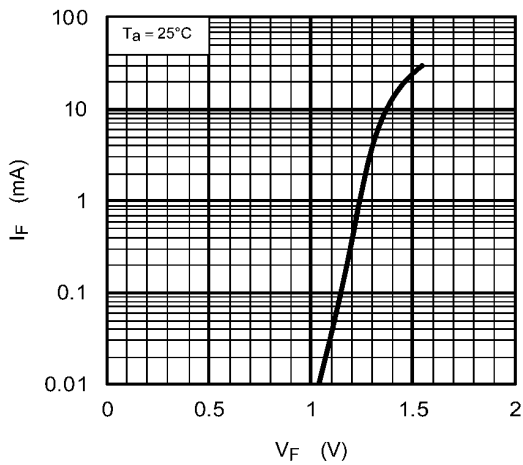
**12. Characteristics Curves (Note)**



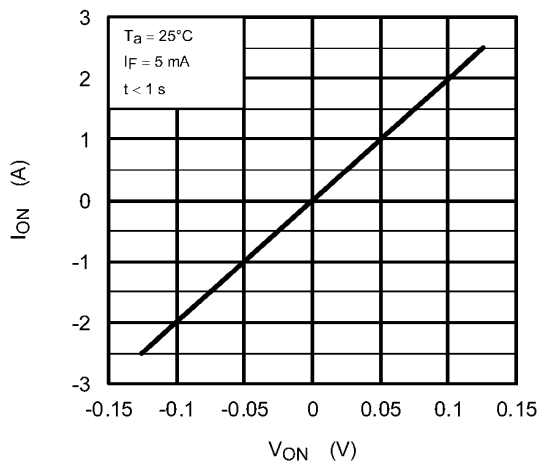
**Fig. 12.1 I<sub>F</sub> - T<sub>a</sub>**



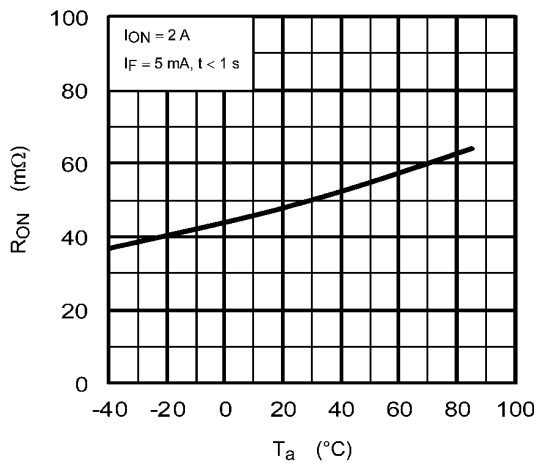
**Fig. 12.2 I<sub>ON</sub> - T<sub>a</sub>**



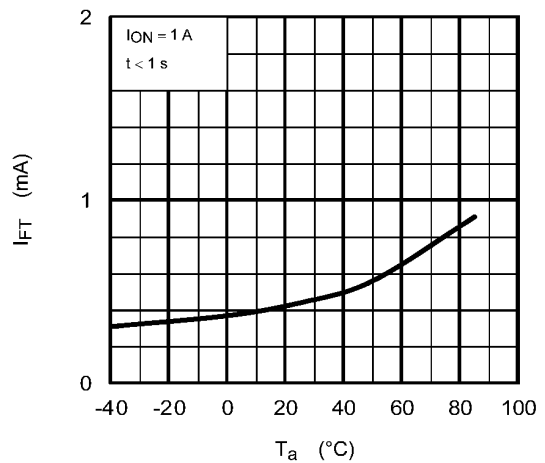
**Fig. 12.3 I<sub>F</sub> - V<sub>F</sub>**



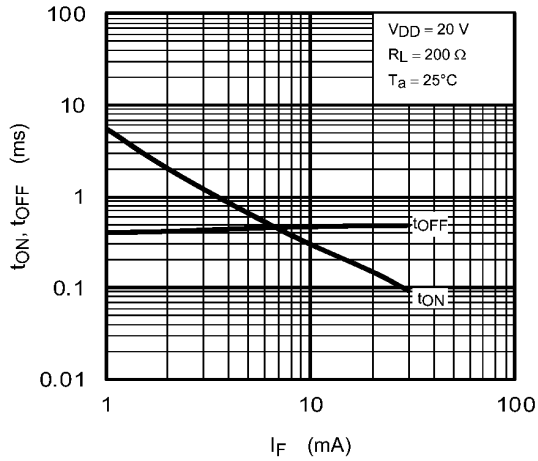
**Fig. 12.4 I<sub>ON</sub> - V<sub>ON</sub>**



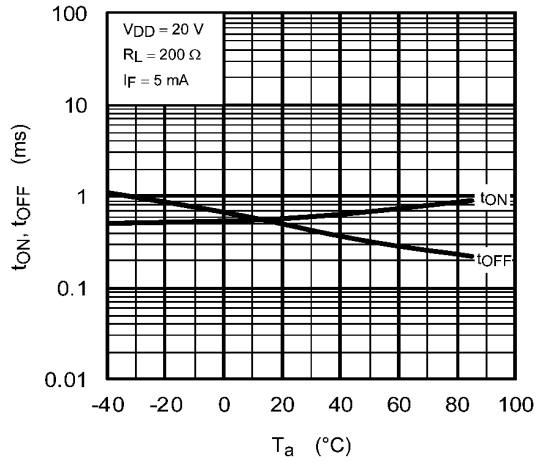
**Fig. 12.5 R<sub>ON</sub> - T<sub>a</sub>**



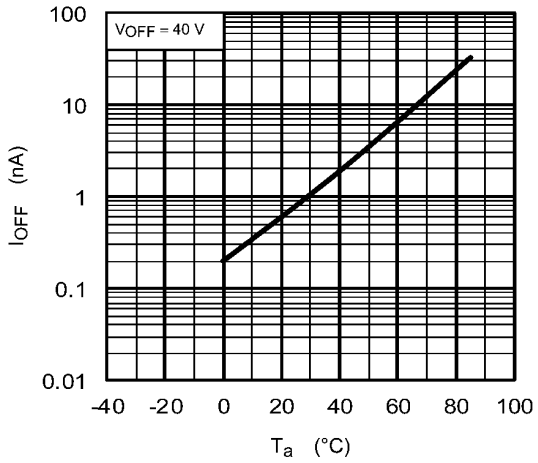
**Fig. 12.6 I<sub>FT</sub> - T<sub>a</sub>**



**Fig. 12.7  $t_{ON}$ ,  $t_{OFF}$  -  $I_F$**



**Fig. 12.8  $t_{ON}$ ,  $t_{OFF}$  -  $T_a$**

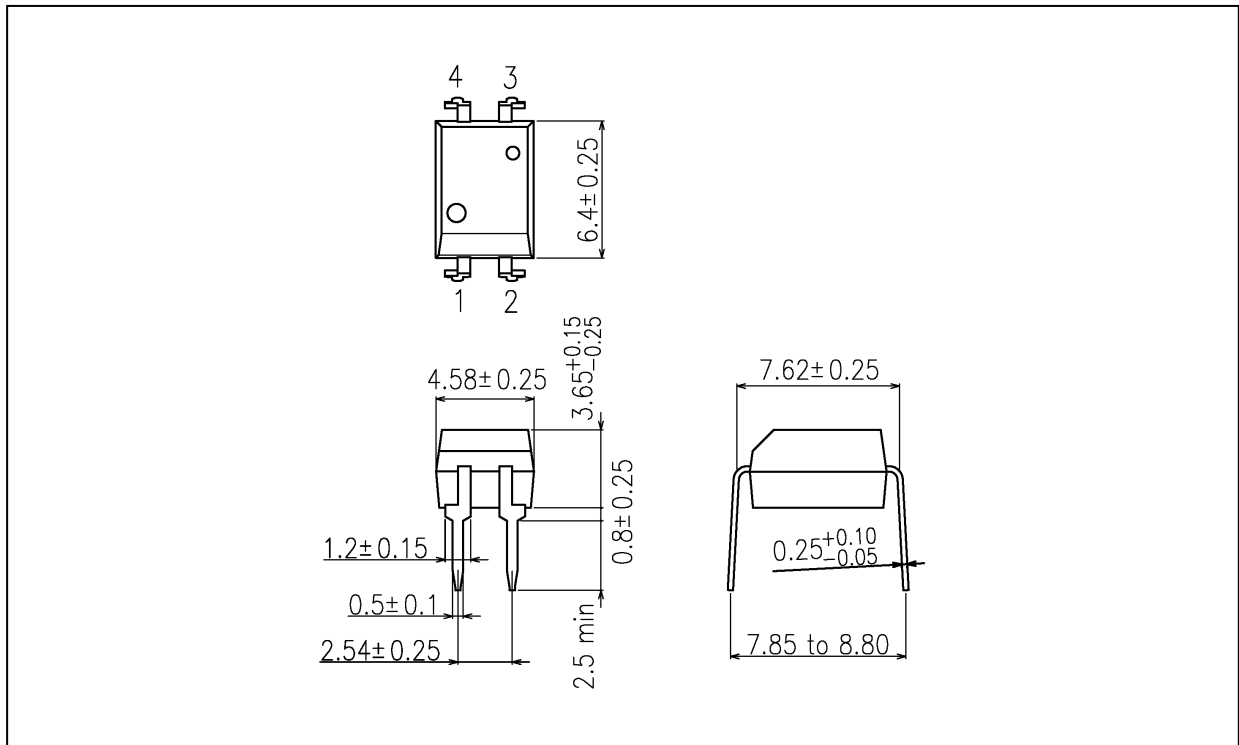


**Fig. 12.9  $I_{OFF}$  -  $T_a$**

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

**Package Dimensions**

Unit: mm



Weight: 0.26 g (typ.)

Package Name(s)
TOSHIBA: 11-5B2S

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