Photocouplers Infrared LED & Photo Diode

TLX9906

1. Applications

- Automotive
- MOSFET Gate Drivers

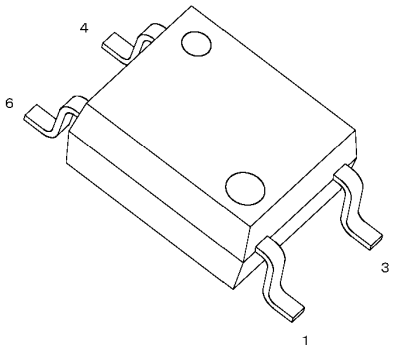
2. General

The TLX9906 is a photocoupler in the SO6 package that consists of an infrared light emitting diode optically coupled to a photodiode array. The photodiodes are connected in series, making the TLX9906 suitable for MOS gate drive applications.

3. Features

(1) Open voltage: 7 V (min)
(2) Short current: 12 μA (min)
(3) Isolation voltage: 3750 Vrms (min)
(4) AEC-Q101 qualified

4. Packaging and Pin Assignment



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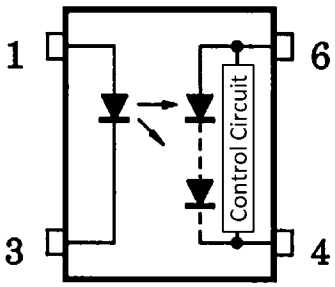


1: Anode (Input)
3: Cathode (Input)
4: Cathode (Output)
6: Anode (Output)

5. Absolute Maximum Ratings (Note) (Unless otherwise specified, T_a = 25 °C)

	Characteristics		Symbol	Note	Rating	Unit
LED	Input forward current		I_F		30	mA
	Input forward current	(T_a = 125°C)	I_F		10	
	Input forward current derating	($T_a \geq$ 100 °C)	$\Delta I_F/\Delta T_a$		-0.8	mA/°C
	Input power dissipation		P_D		50	mW
	Input power dissipation derating	($T_a \geq$ 100 °C)	$\Delta P_D/\Delta T_a$		-1.3	mW/°C
	Input reverse voltage		V_R		3	V
Detector	Output forward current		I_{FD}		50	μA
	Output reverse voltage		V_{RD}		10	V
	Output power dissipation	(-40 °C ≤ T_a ≤ 125 °C)	P_O		0.5	mW
Common	Operating temperature		T_{opr}		-40 to 125	°C
	Storage temperature		T_{stg}		-55 to 150	°C
	Lead soldering temperature	(10 s)	T_{sol}		260	°C
	Isolation voltage	AC, 60 s, R.H. ≤ 60 %	BV_S	(Note 1)	3750	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 3 are shorted together, and pins 4 and 6 are shorted together.

6. Recommended Operating Conditions (Note)

Characteristics	Symbol	Note	Min	Typ.	Max	Unit
Input forward current	I_F		—	12	15	mA
Operating temperature	T_{opr}		-40	—	105	°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 data sheet should also be considered.

7. Electrical Characteristics (Unless otherwise specified, T_a = 25 °C)

	Characteristics	Symbol	Note	Test Condition	Min	Typ.	Max	Unit
LED	Input forward voltage	V_F		I_F = 10 mA	1.5	1.65	1.8	V
	Input reverse current	I_R		V_R = 3 V	—	—	10	μA
	Input capacitance	C_t		V = 0 V, f = 1 MHz	—	45	—	pF

8. Coupled Electrical Characteristics (Unless otherwise specified, T_a = 25 °C)

Characteristics	Symbol	Note	Test Condition	Min	Typ.	Max	Unit
Trigger LED current	I_{FT}		$V_{OC} \geq$ 5 V	—	—	3	mA
Open voltage	V_{OC}		I_F = 10 mA	7	9	—	V
			I_F = 10 mA, T_a = 125°C	—	5	—	V
Short-circuit current	I_{SC}		I_F = 10 mA	12	30	—	μA
			I_F = 10 mA, T_a = 125°C	—	12	—	μA

9. Isolation Characteristics (Unless otherwise specified, T_a = 25 °C)

Characteristics	Symbol	Note	Test Condition	Min	Typ.	Max	Unit
Total capacitance (input to output)	C_S	(Note 1)	V_S = 0 V, f = 1 MHz	—	0.8	—	pF
Isolation resistance	R_S	(Note 1)	V_S = 500 V, R.H. ≤ 60 %	10^{12}	10^{14}	—	Ω
Isolation voltage	BV_S	(Note 1)	AC, 60 s	3750	—	—	Vrms

Note 1: This device is considered as a two-terminal device: Pins 1 and 3 are shorted together, and pins 4 and 6 are shorted together.

10. Switching Characteristics (Unless otherwise specified, T_a = 25 °C)

Characteristics	Symbol	Note	Test Condition	Min	Typ.	Max	Unit
Turn-on time	t_{on}		I_F = 10 mA, C_L = 1000 pF See Fig. 10.1.	—	0.2	1	ms
Turn-off time	t_{off}			—	0.2	1	

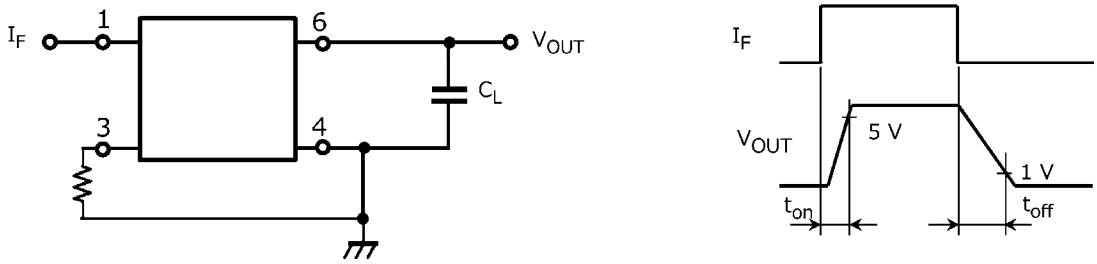


Fig. 10.1 Switching Time Test Circuit and Waveform

11. Characteristics Curves (Note)

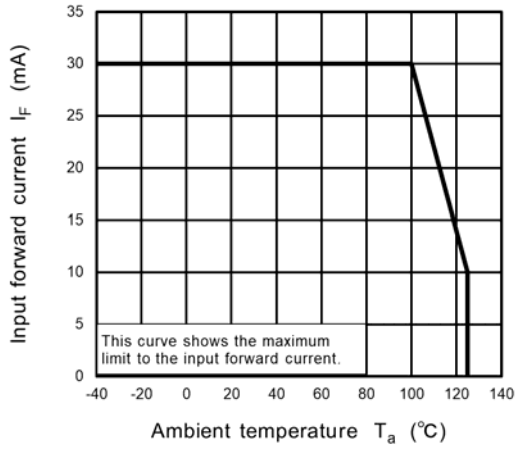


Fig. 11.1 I_F - T_a

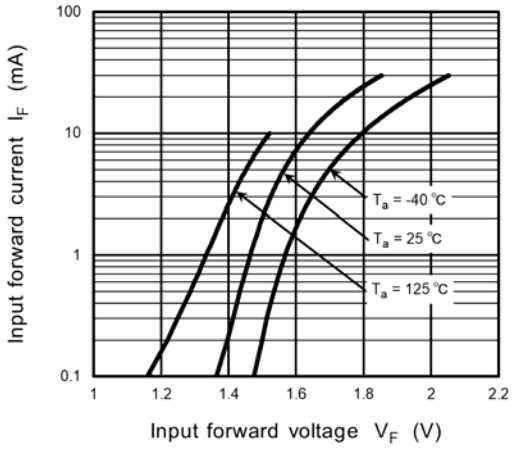


Fig. 11.2 I_F - V_F

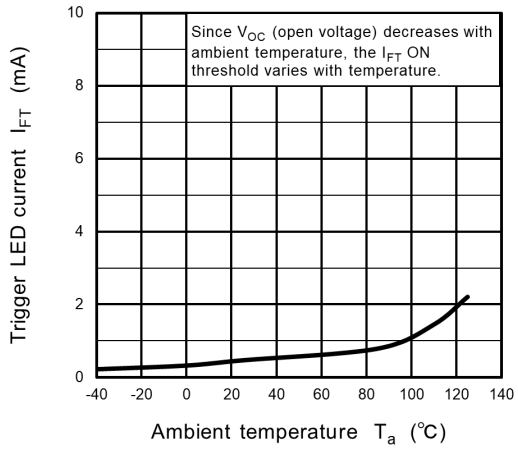


Fig. 11.3 I_{FT} - T_a

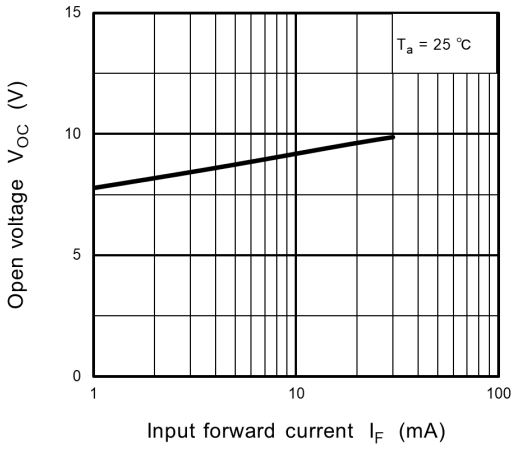


Fig. 11.4 V_{OC} - I_F

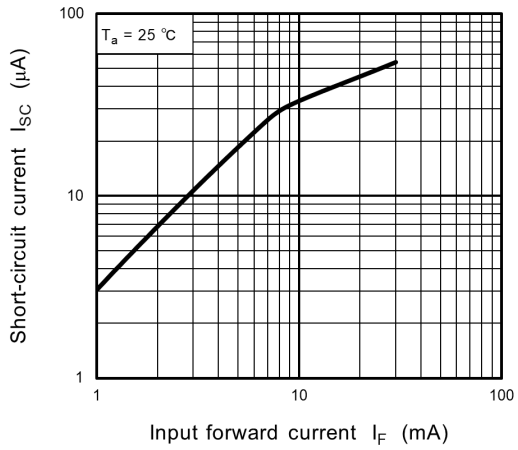


Fig. 11.5 I_{SC} - I_F

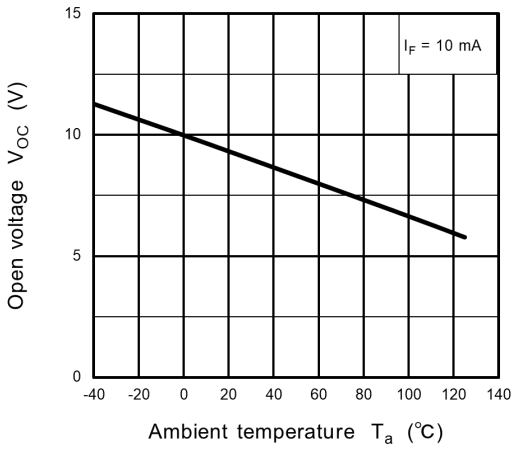


Fig. 11.6 V_{OC} - T_a

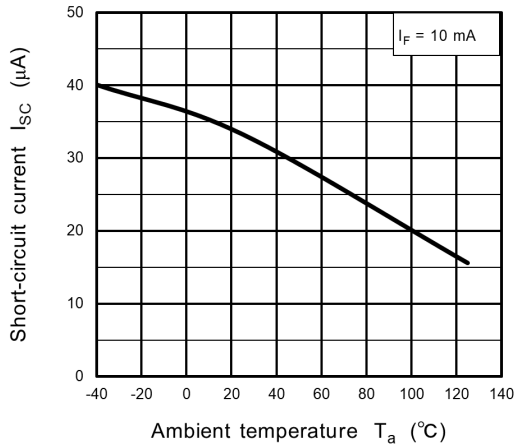


Fig. 11.7 I_{SC} - T_a

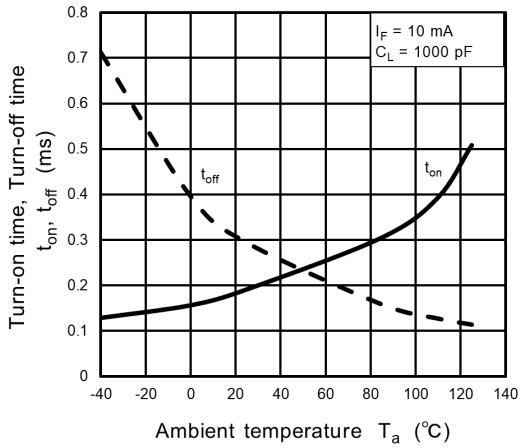


Fig. 11.8 t_{on},t_{off} - T_a

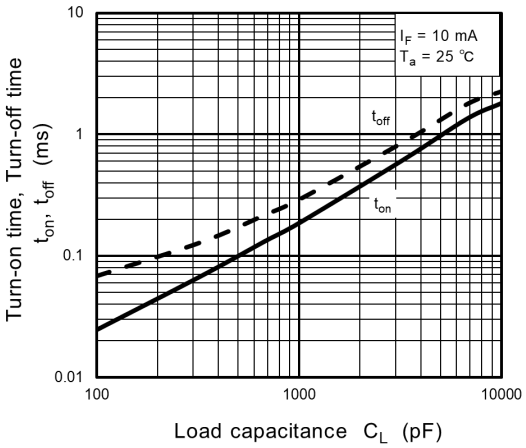
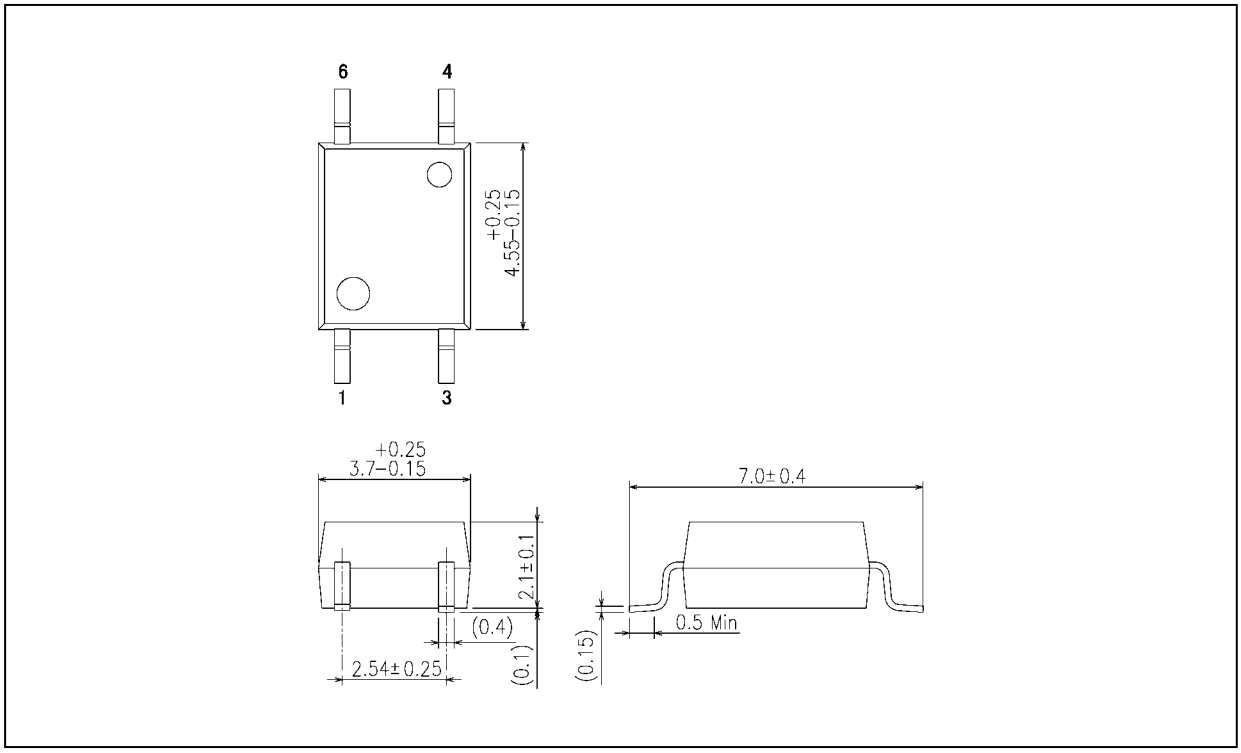


Fig. 11.9 t_{on}, t_{off} - C_L

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

Package Dimensions

Unit: mm



Weight: 0.08 g (typ.)

Package Name(s)
TOSHIBA: 11-4M1S

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