

TOSHIBA Photocoupler Photorelay

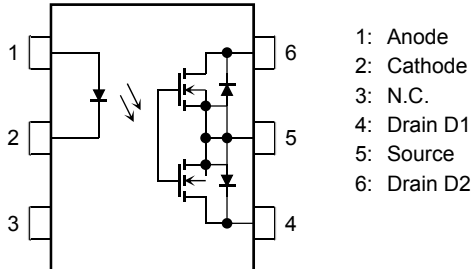
TLP3100

Measurement Equipment
FA (Factory Automation)
Power Line Control

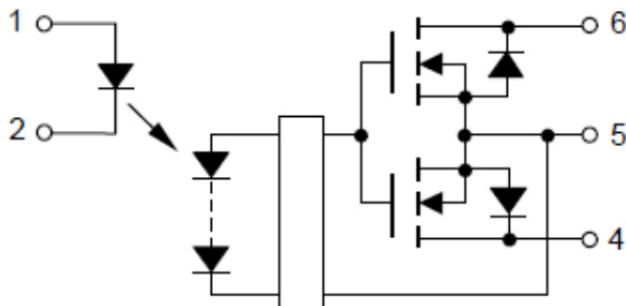
The Toshiba TLP3100 consists of an aluminum gallium arsenide infrared emitting diode optically coupled to a photo-MOSFET in a SOP, which is suitable for surface-mount assembly. The TLP3100 features high ON-state current and low ON-state resistance, hence the TLP3100 is suitable to control a power line.

- 6-pin SOP (2.54SOP6): 2.1 mm high, 2.54 mm pitch
- Normally opened (form A) device
- Peak OFF-state voltage: 20 V (min)
- Trigger LED current: 3 mA (max)
- ON-state current: 2.5 A (max) (Ta=50°C)
- ON-state resistance: 0.02 Ω (typ.), 0.05 Ω (max)
- Capacitance: 1000 pF (typ.)
- OFF-state current: 10 nA (max)
- Isolation voltage: 1500 V_{rms} (min)

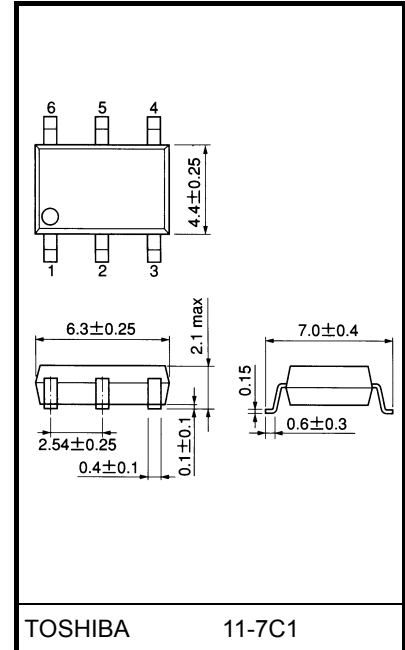
Pin Configuration (top view)



Schematic



Unit: mm



Weight: 0.13 g (typ.)

Start of commercial production
2008/04

Absolute Maximum Ratings (Ta = 25°C)

Characteristics		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}	20	V	
	On-state current	A connection	I_{ON}	2.5	A
		B connection		2.5	
		C connection		5.0	
	On-state current derating (Ta ≥ 50°C)	A connection	$\Delta I_{ON}/^\circ\text{C}$	-33.3	mA/°C
		B connection		-33.3	
		C connection		-66.7	
	Junction temperature		T_j	125	°C
Storage temperature		T_{stg}	-55 to 125	°C	
Operating temperature		T_{opr}	-40 to 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: Pins 1 and 2 shorted together, and pins 3 and 4 shorted together.

Caution

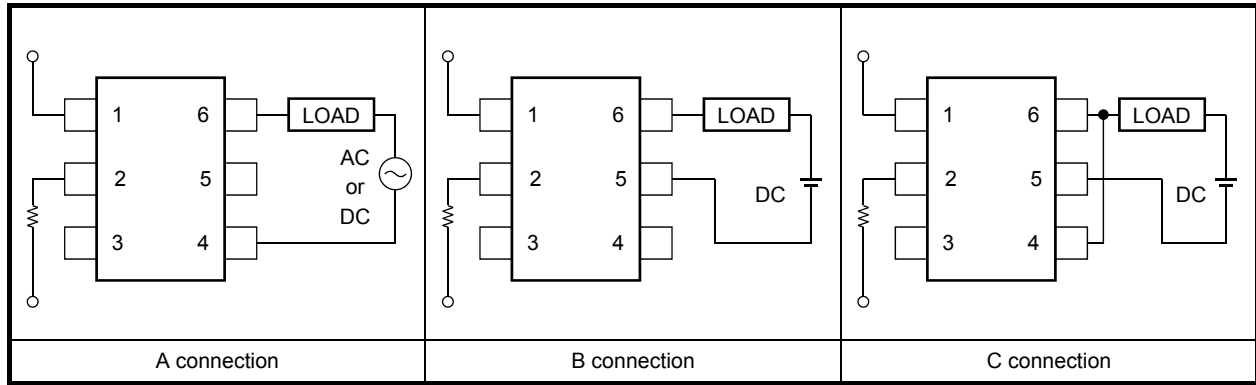
This device is sensitive to electrostatic discharge. When using this device, please ensure that all tools and equipment are earthed.

Recommended Operating Conditions

Characteristics	Symbol	Min	Typ.	Max	Unit
Supply voltage	V_{DD}	—	—	20	V
Forward current	I_F	5	10	20	mA
Operating temperature	T_{opr}	-20	—	65	°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.

Circuit Connections



Individual Electrical Characteristics (Ta = 25°C)

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
LED	Forward current	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}	$V_{OFF} = 20 \text{ V}$	—	—	10	nA
	Capacitance	C_{OFF}	$V = 0, f = 1 \text{ MHz}$	—	1000	—	pF

Coupled Electrical Characteristics (Ta = 25°C)

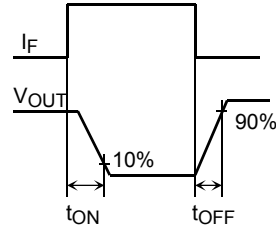
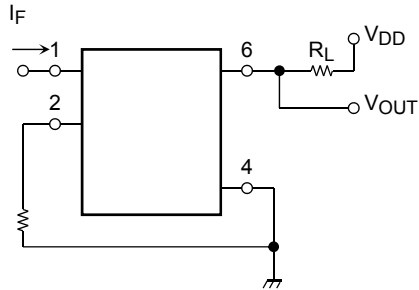
Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Trigger LED current		I_{FT}	$I_{ON} = 100 \text{ mA}$	—	—	3	mA
Return LED current		I_{FC}	$I_{OFF} = 10 \mu\text{A}$	0.1	—	—	mA
On-state resistance	A connection	R_{ON}	$I_{ON} = 2.0 \text{ A}, I_F = 5 \text{ mA}, t < 1\text{s}$	—	0.02	0.05	Ω
	B connection		$I_{ON} = 2.0 \text{ A}, I_F = 5 \text{ mA}, t < 1\text{s}$	—	0.01	0.025	
	C connection		$I_{ON} = 4.0 \text{ A}, I_F = 5 \text{ mA}, t < 1\text{s}$	—	0.005	—	

Isolation Characteristics (Ta = 25°C)

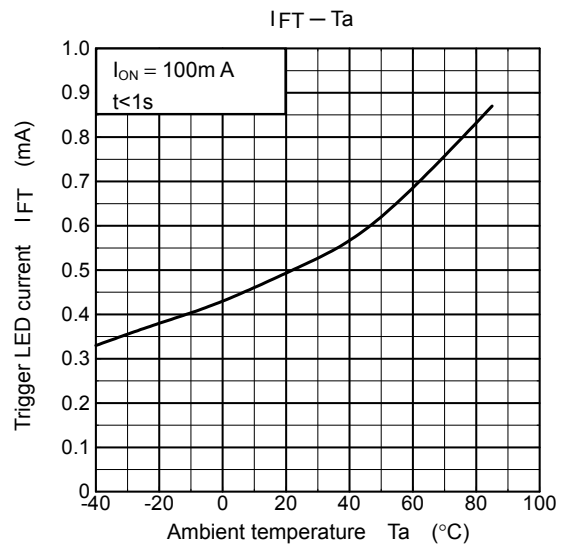
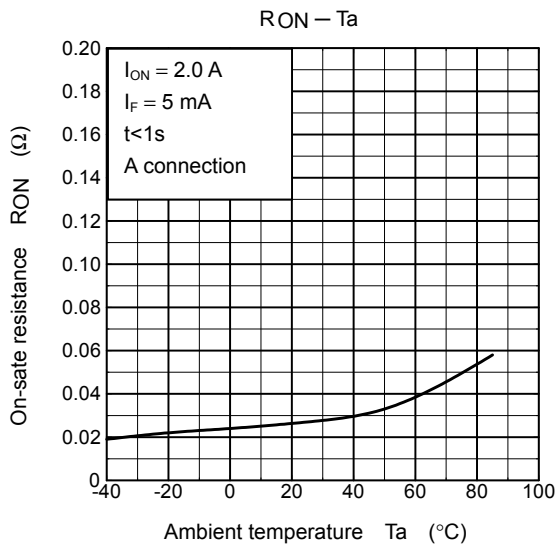
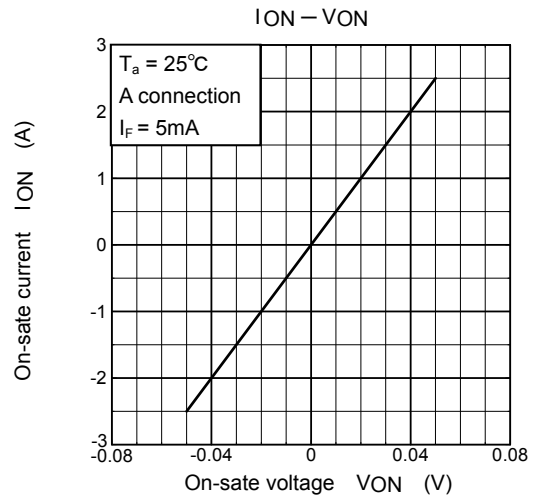
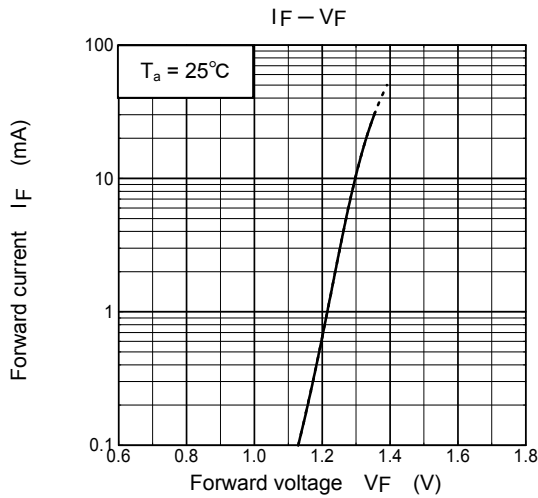
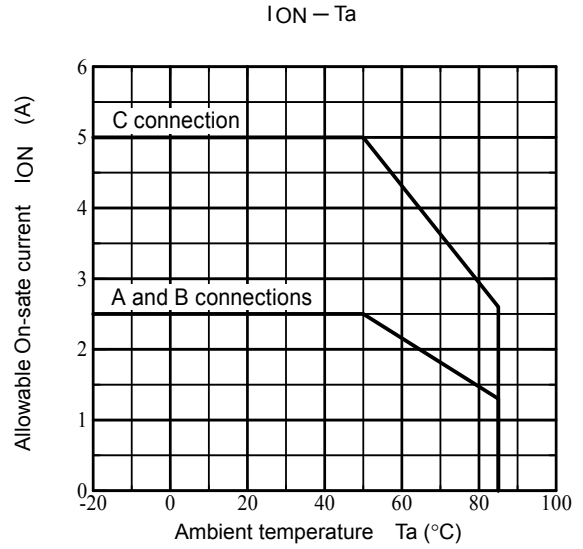
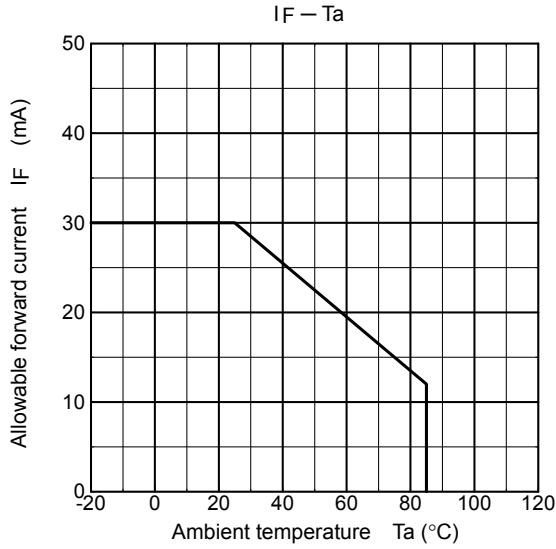
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Capacitance input to output	C_S	$V_S = 0 \text{ V}, f = 1 \text{ MHz}$	—	0.8	—	pF
Isolation resistance	R_S	$V_S = 500 \text{ V}, \text{R.H.} \leq 60\%$	5×10^{10}	10^{14}	—	Ω
Isolation voltage	BV_S	AC, 1 minute	1500	—	—	Vrms
		AC, 1 second (in oil)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

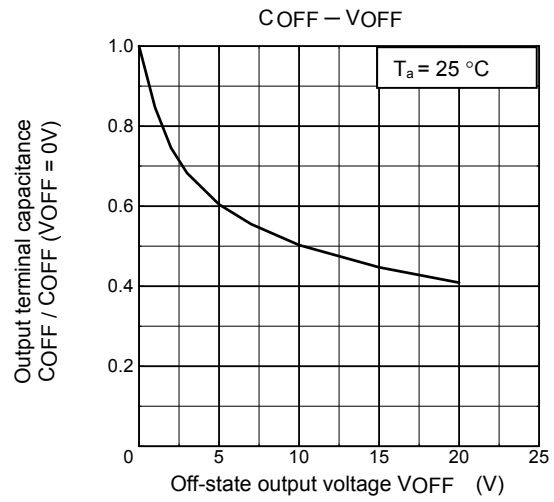
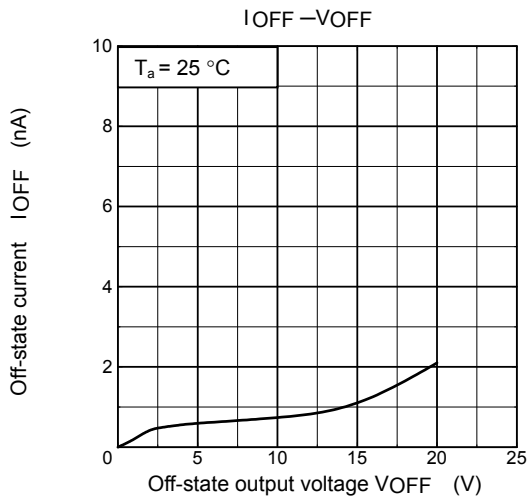
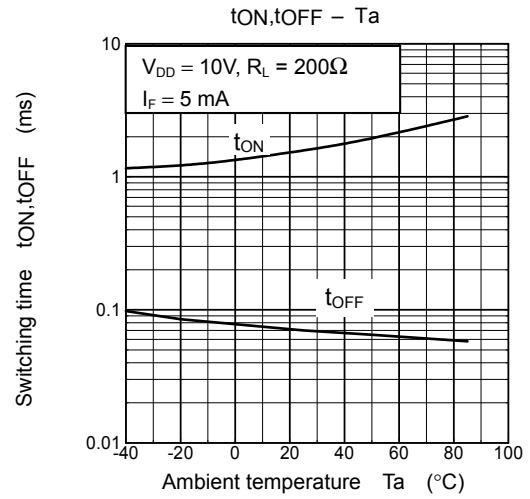
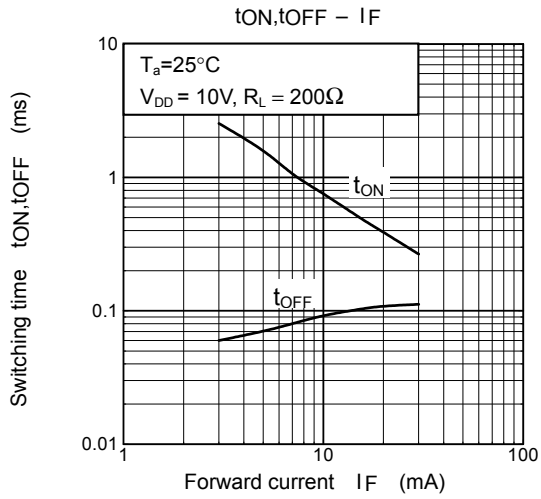
Switching Characteristics (Ta = 25°C)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Turn-ON time	t_{ON}	$R_L = 200 \Omega$ $V_{DD} = 10 \text{ V}, I_F = 5 \text{ mA}$ (Note 2)	—	1.5	5.0	ms
Turn-OFF time	t_{OFF}		—	0.1	1.0	



Note 2: Switching time test circuit





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