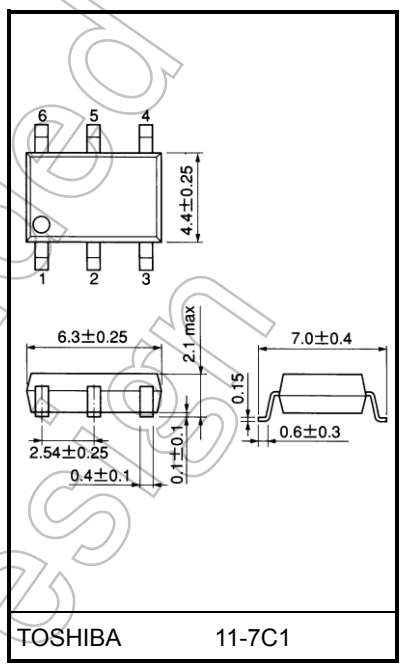
TOSHIBA Photocoupler Photorelay

TLP3100

Measurement Equipment
FA (Factory Automation)
Power Line Control

Unit: mm

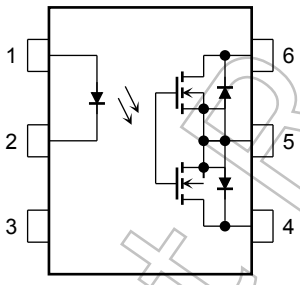


Weight: 0.13 g (typ.)

The Toshiba TLP3100 consists of an 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.

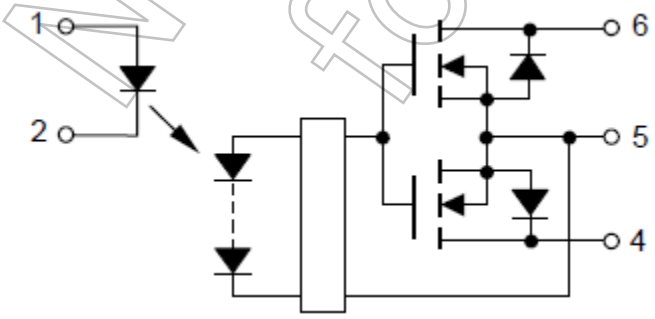
- 6-pin SOP (2.54SOP6): 2.1 mm high, 2.54 mm pitch
- Normally opened (form A) device
- Peak OFF-state voltage: 20 V (min)
- Trigger LED current: 3 mA (max)
- ON-state current: 2.5 A (max) (Ta=50°C)
- ON-state resistance: 0.02 Ω (typ.), 0.05 Ω (max)
- Capacitance between output terminals: 1000 pF (typ.)
- OFF-state current: 10 nA (max)
- Isolation voltage: 1500 V_{rms} (min)
- UL-recognized: UL 1577, File No.E67349
- cUL-recognized: CSA Component Acceptance Service No.5A
  File No.E67349

Pin Configuration (top view)



1: Anode
2: Cathode
3: N.C.
4: Drain D1
5: Source
6: Drain D2

Schematic



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)		ΔI_F/°C	−0.3	mA/°C
	Reverse voltage		V_R	5	V
	Diode power dissipation		P_D	50	mW
	Diode power dissipation derating (Ta ≥ 25°C)		ΔP_D /°C	-0.5	mW/°C
	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	ΔI_{ON}/°C	−33.3	mA/°C
		B connection		−33.3	
		C connection		−66.7	
	Output power dissipation		P_O	364.5	mW
	Output power dissipation derating (Ta ≥ 50°C)		ΔP_O / °C	−4.86	mW / °C
	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, 60 s, 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

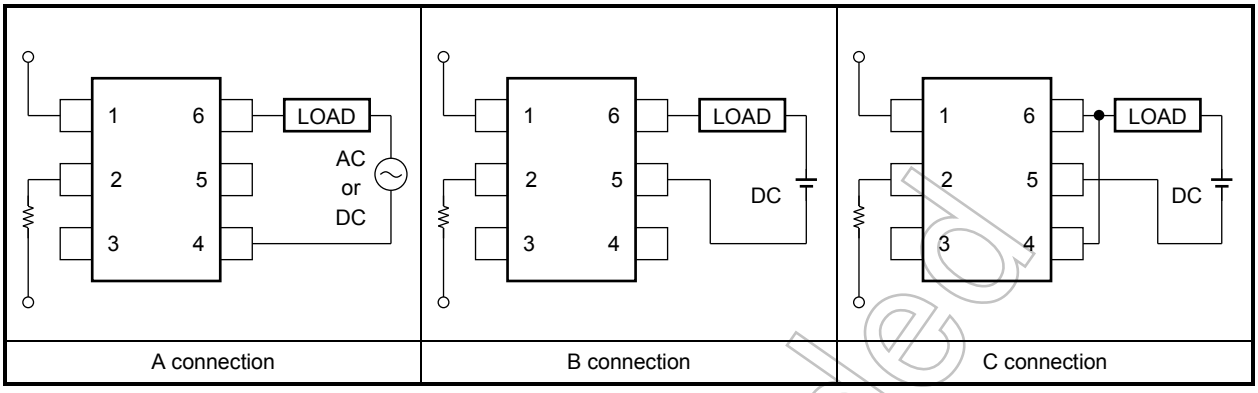
This device is sensitive to electrostatic discharge. When using this device, please ensure that all tools and equipment are earthed.

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



A connection	B connection	C connection

Individual Electrical Characteristics (Ta = 25°C)

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
LED	Forward current	V_F	I_F = 10 mA	1.18	1.33	1.48	V
	Reverse current	I_R	V_R = 5 V	—	—	10	μA
	Capacitance between terminals	C_T	V_F = 0 V, f = 1 MHz	—	70	—	pF
Detector	OFF-state current	I_{OFF}	V_{OFF} = 20 V	—	—	10	nA
	Capacitance between terminals	C_{OFF}	V = 0 V, f = 1 MHz	—	1000	—	pF

Coupled Electrical Characteristics (Ta = 25°C)

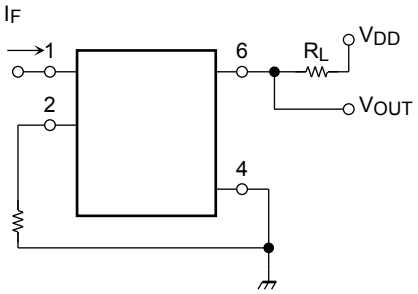
Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Trigger LED current		I_{FT}	I_{ON} = 100 mA	—	—	3	mA
Return LED current		I_{FC}	I_{OFF} = 10 μA	0.1	—	—	mA
On-state resistance	A connection	R_{ON}	I_{ON} = 2.0 A, I_F = 5 mA, t<1 s	—	0.02	0.05	Ω
	B connection		I_{ON} = 2.0 A, I_F = 5 mA, t<1 s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

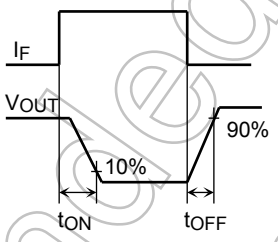
Isolation Characteristics (Ta = 25°C)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Capacitance input to output	C_S	V_S = 0 V, f = 1 MHz	—	0.8	—	pF
Isolation resistance	R_S	V_S = 500 V, R.H. ≤ 60 %	5×10^{10}	10^{14}	—	Ω
Isolation voltage	BV_S	AC, 60 s	1500	—	—	Vrms

Switching Characteristics (Ta = 25°C)

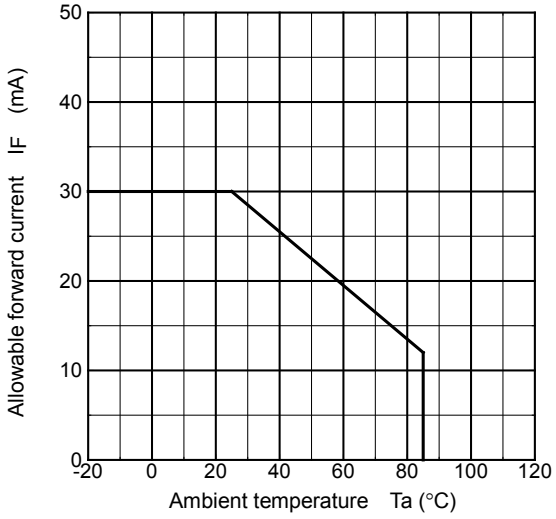
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Turn-ON time	t_{ON}	R_L = 200 Ω	—	1.5	5.0	ms
Turn-OFF time	t_{OFF}	V_{DD} = 10 V, I_F = 5 mA (Note 2)	—	0.1	1.0	



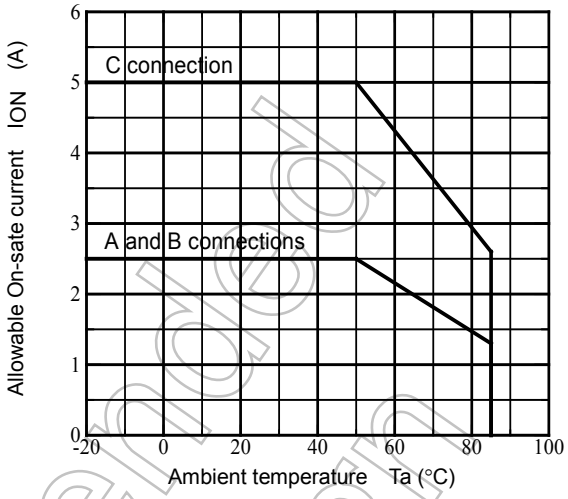


Note 2: Switching time test circuit

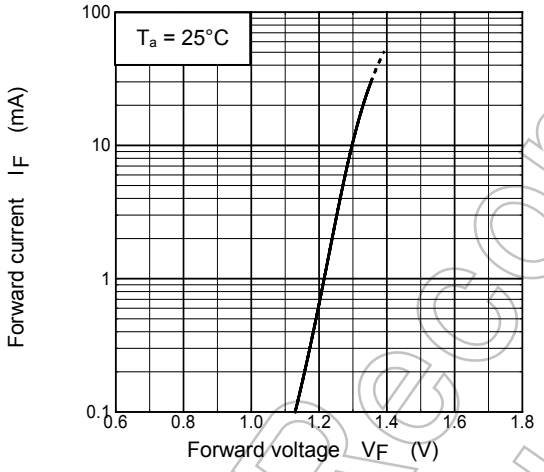
$I_F - Ta$



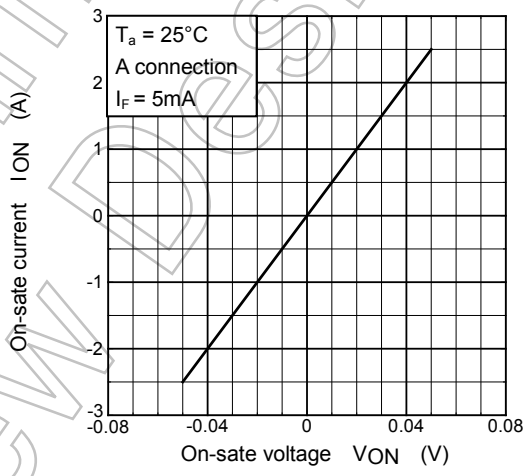
$I_{ON} - Ta$



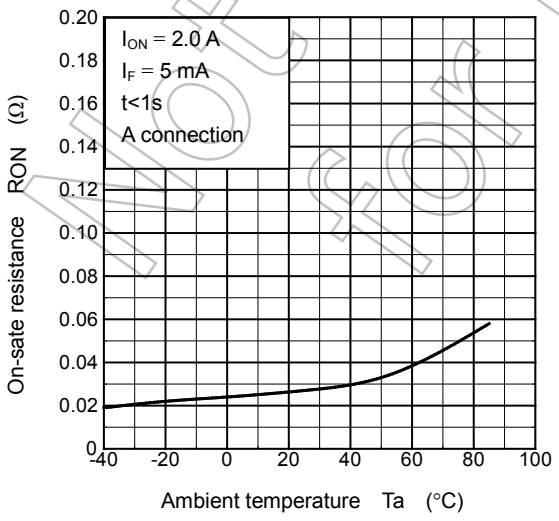
$I_F - V_F$



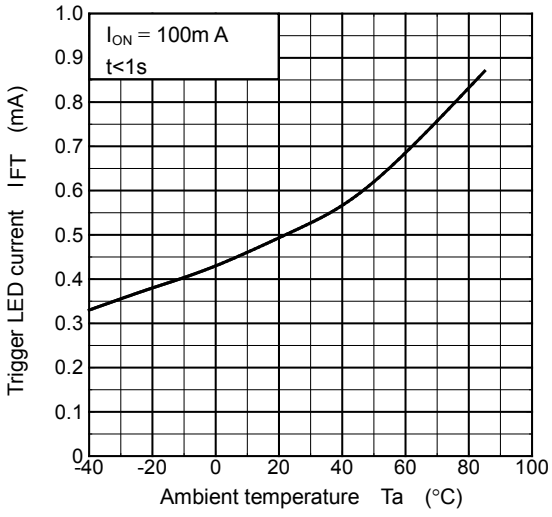
$I_{ON} - V_{ON}$



$R_{ON} - Ta$

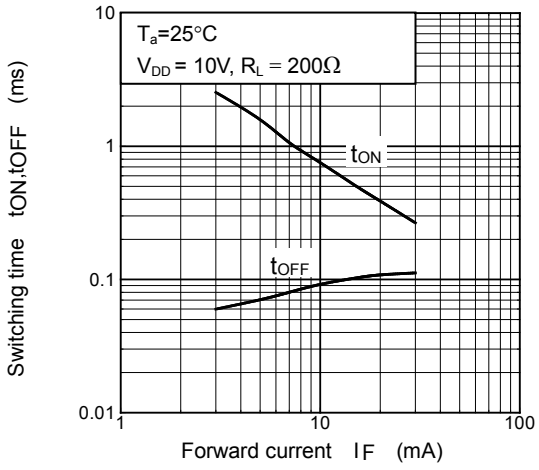


$I_{FT} - Ta$

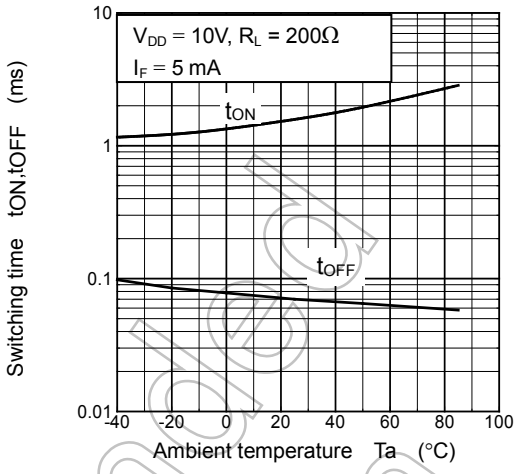


NOTE: The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.

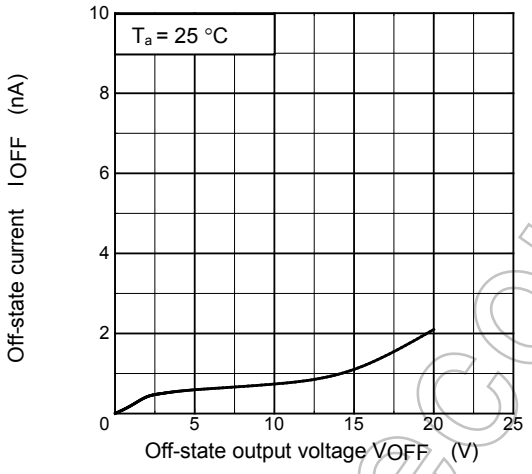
tON,tOFF – IF



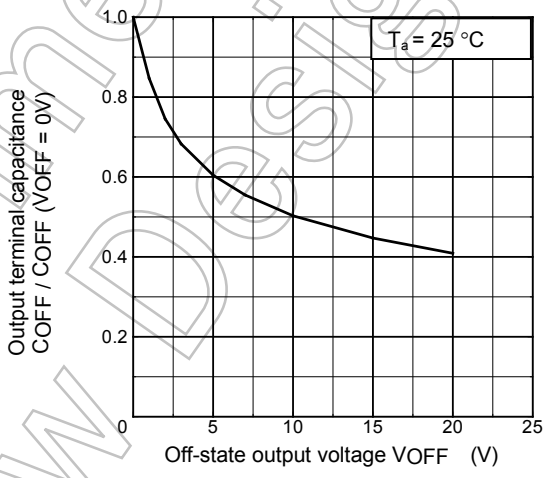
tON,tOFF – Ta



IOFF –VOFF



COFF – VOFF



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