

TOSHIBA Photocoupler Photo Relay

# TLP197A

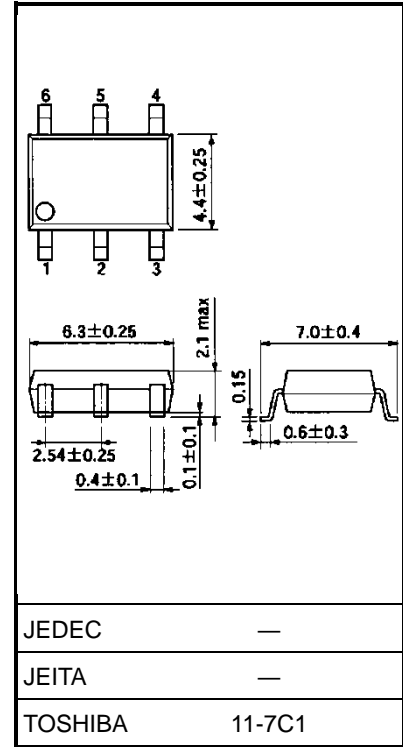
Telecommunication  
 Data Acquisition  
 Measurement Instrument  
 Programmable Control

The TOSHIBA TLP197A consists of an infrared emitting diode optically coupled to a photo-MOS FET in a SOP, which is suitable for surface mount assembly.

The TLP197A is suitable for replacement of mechanical relays in many applications which require space savings.

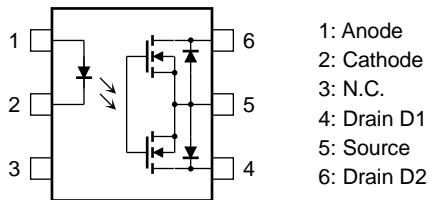
- 6 pin SOP (2.54SOP6): 2.1 mm high, 2.54 mm pitch
- 1-form-A
- Peak off-state voltage: 60 V (min)
- Trigger LED current: 3 mA (max)
- On-state current: 400 mA (max)
- On-state resistance: 2 Ω (max)
- Isolation voltage: 1500 Vrms (min)
- UL-recognized: UL 1577, File No.E67349
- cUL-recognized: CSA Component Acceptance Service No.5A  
 File No.E67349

Unit: mm

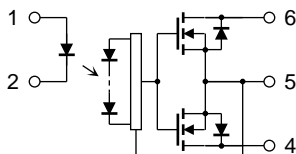


Weight: 0.13 g (typ.)

## Pin Configurations (top view)



## Schematic



Start of commercial production  
 2001-07

**Absolute Maximum Ratings (Ta = 25°C)**

Characteristics		Symbol	Rating	Unit	
LED	Forward current	I <sub>F</sub>	50	mA	
	Forward current derating (Ta ≥ 25°C)	ΔI <sub>F</sub> /°C	-0.5	mA/°C	
	Peak forward current (100 μs pulse, 100 pps)	I <sub>FP</sub>	1	A	
	Reverse voltage	V <sub>R</sub>	5	V	
	Diode power dissipation	P <sub>D</sub>	50	mW	
	Diode power dissipation derating (Ta ≥ 25°C)	ΔP <sub>D</sub> /°C	-0.5	mW/°C	
	Junction temperature	T <sub>j</sub>	125	°C	
Detector	Off-state output terminal voltage		V <sub>OFF</sub>	60	V
	On-state RMS current	A connection	I <sub>ON</sub>	400	mA
		B connection		400	
		C connection		800	
	On-state current derating (Ta ≥ 25°C)	A connection	ΔI <sub>ON</sub> /°C	-4.0	mA/°C
		B connection		-4.0	
		C connection		-8.0	
	Output power dissipation	A connection	P <sub>O</sub>	288	mW
		B connection		144	
		C connection		288	
	Output power dissipation derating (Ta ≥ 25°C)	A connection	ΔP <sub>O</sub> /°C	-2.88	mW / °C
		B connection		-1.44	
		C connection		-2.88	
Junction temperature		T <sub>j</sub>	125	°C	
Operating temperature range		T <sub>opr</sub>	-40 to 85	°C	
Storage temperature range		T <sub>stg</sub>	-55 to 125	°C	
Lead soldering temperature (10 s)		T <sub>sol</sub>	260	°C	
Isolation voltage (AC, 60 s, R.H. ≤ 60 %)(Note 1)		BV <sub>S</sub>	1500	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.).

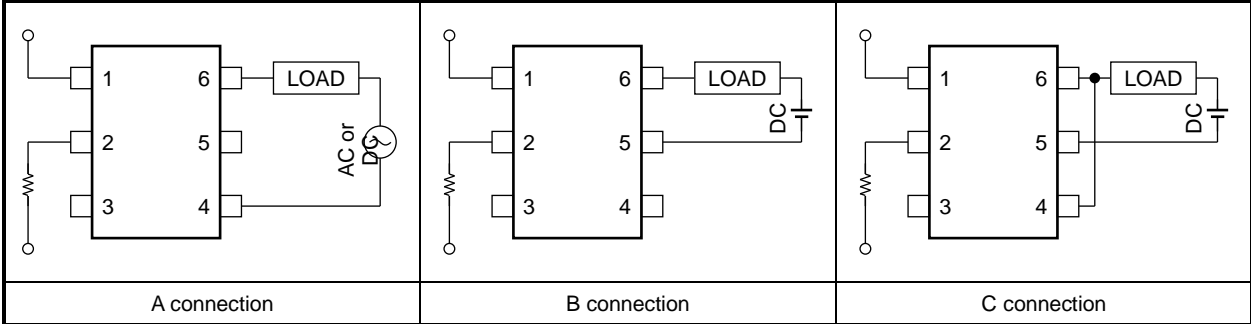
Note 1: Device considered a two-terminal device: Pins 1, 2 and 3 shorted together, and pins 4, 5 and 6 shorted together.

**Recommended Operating Conditions**

Characteristics	Symbol	Min	Typ.	Max	Unit
Supply voltage	V <sub>DD</sub>	—	—	48	V
Forward current	I <sub>F</sub>	5	7.5	25	mA
On-state current	I <sub>ON</sub>	—	—	300	mA
Operating temperature	T <sub>opr</sub>	-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 voltage	$V_F$	$I_F = 10 \text{ mA}$	1.0	1.15	1.3	V
	Reverse current	$I_R$	$V_R = 5 \text{ V}$	—	—	10	$\mu\text{A}$
	Capacitance	$C_T$	$V_F = 0 \text{ V}, f = 1 \text{ MHz}$	—	30	—	pF
Detector	Off-state current	$I_{OFF}$	$V_{OFF} = 60 \text{ V}$	—	—	1	$\mu\text{A}$
	Capacitance	$C_{OFF}$	$V = 0 \text{ V}, f = 1 \text{ MHz}$	—	130	—	pF

## Coupled Electrical Characteristics (Ta = 25°C)

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Trigger LED current		$I_{FT}$	$I_{ON} = 400 \text{ mA}$	—	—	3	mA
Close LED current		$I_{FC}$	$I_{OFF} = 100 \mu\text{A}$	0.1	—	—	mA
On-state resistance	A connection	$R_{ON}$	$I_{ON} = 400 \text{ mA}, I_F = 5 \text{ mA}$	—	1	2	$\Omega$
	B connection		$I_{ON} = 400 \text{ mA}, I_F = 5 \text{ mA}$	—	0.5	1	
	C connection		$I_{ON} = 800 \text{ mA}, I_F = 5 \text{ mA}$	—	0.25	—	

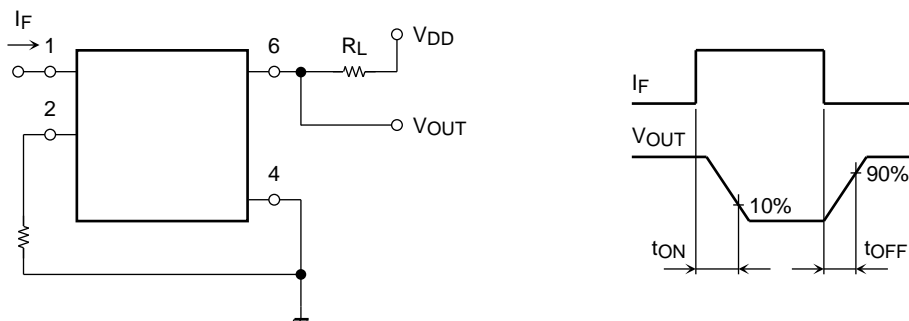
## Isolation Characteristics (Ta = 25°C)

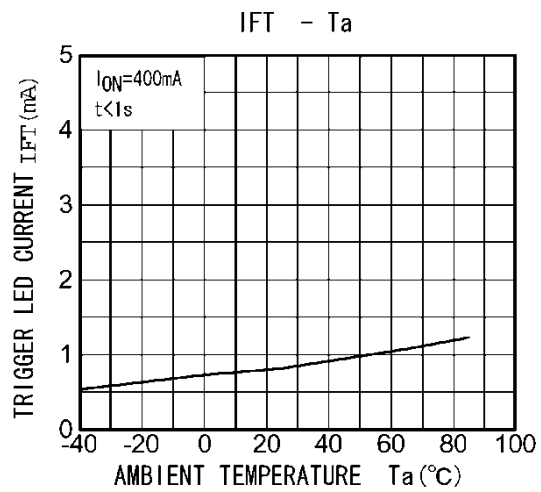
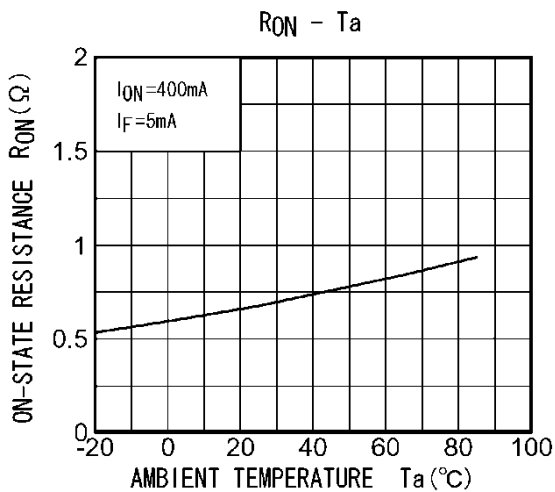
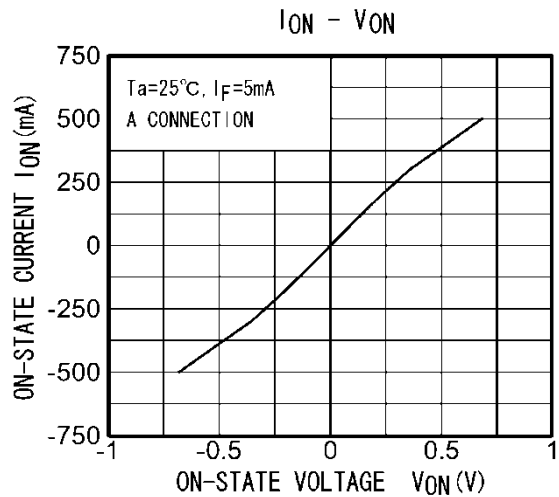
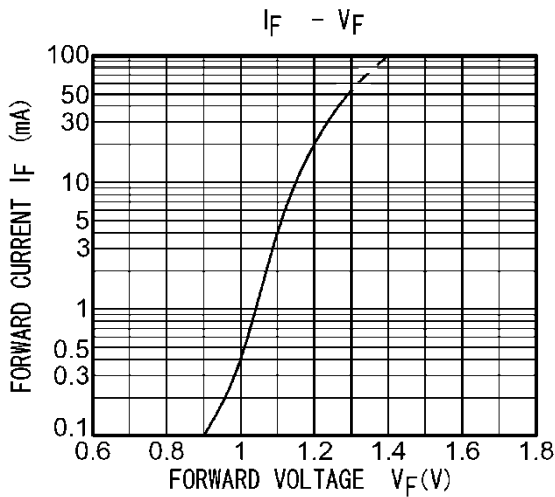
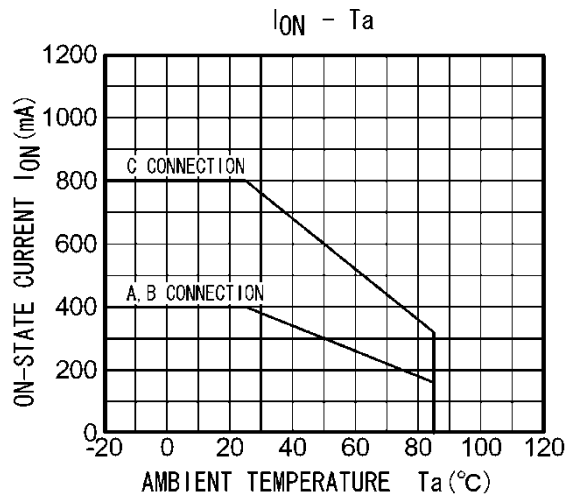
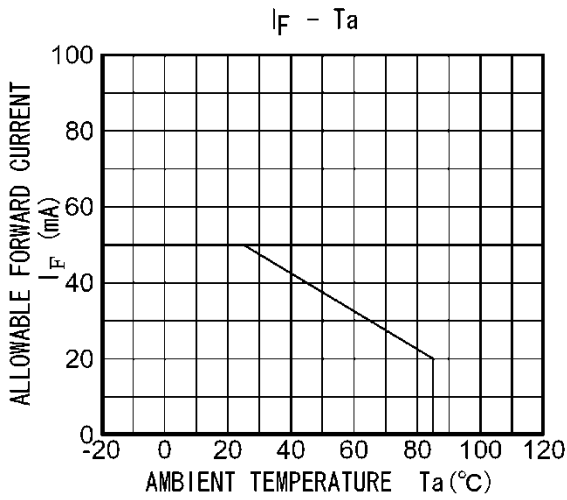
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Capacitance input to output	$C_S$	$V_S = 0 \text{ V}, f = 1 \text{ MHz}$	—	0.8	—	pF
Isolation resistance	$R_S$	$V_S = 500 \text{ V}, \text{R.H.} \leq 60 \%$	$5 \times 10^{10}$	$10^{14}$	—	$\Omega$
Isolation voltage	$BV_S$	AC, 60 s	1500	—	—	Vrms

## Switching Characteristics (Ta = 25°C)

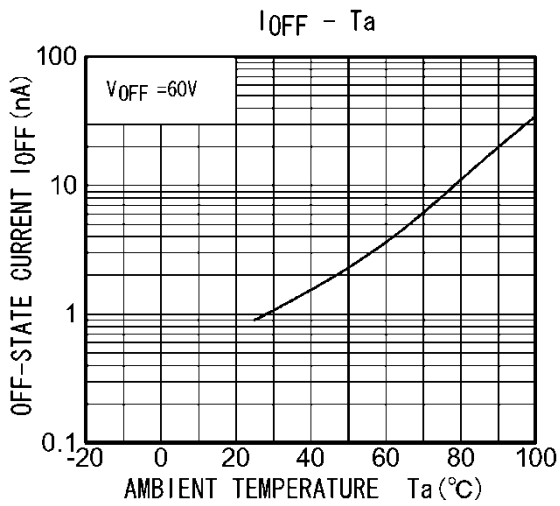
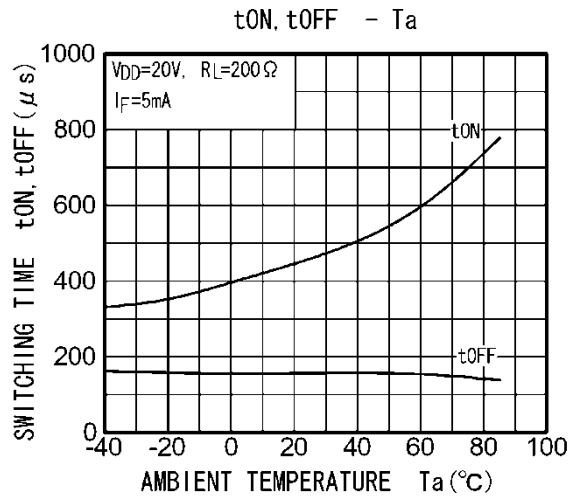
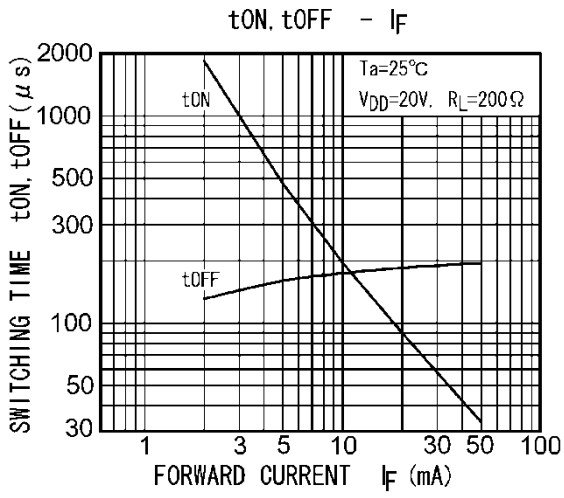
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Turn-on time	$t_{ON}$	$R_L = 200 \Omega$ $V_{DD} = 20 \text{ V}, I_F = 5 \text{ mA}$ (Note)	—	0.6	2	ms
Turn-off time	$t_{OFF}$		—	0.1	1	ms

Note: Switching time test circuit





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



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