

TOSHIBA Photocoupler Photo Relay

TLP197A

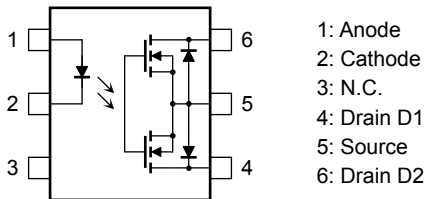
Telecommunication
 Data Acquisition
 Measurement Instrument
 Programmable Control

The TOSHIBA TLP197A consists of an aluminum gallium arsenide 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.

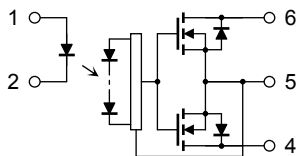
- 6 pin SOP (2.54SOP6): 2.1 mm high, 2.54 mm pitch
- 1-form-A
- Peak off-state voltage: 60 V (min)
- Trigger LED current: 3 mA (max)
- On-state current: 400 mA (max)
- On-state resistance: 2 Ω (max)
- Isolation voltage: 1500 Vrms (min)
- UL recognized: UL1577, file No. E67349

Pin Configurations (top view)

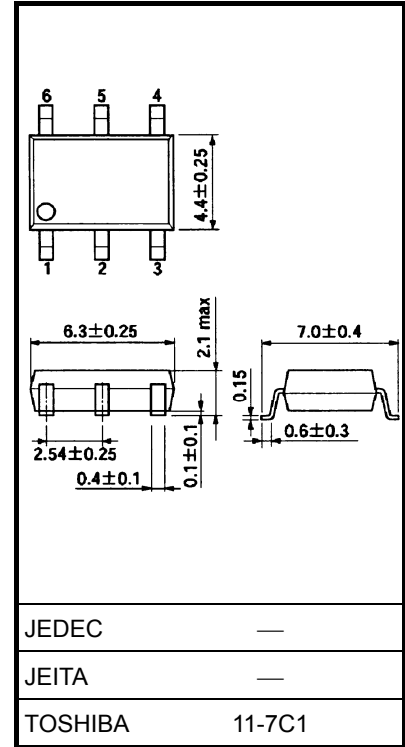


- 1: Anode
- 2: Cathode
- 3: N.C.
- 4: Drain D1
- 5: Source
- 6: Drain D2

Schematic



Unit: mm



Weight: 0.13 g (typ.)

Absolute Maximum Ratings (Ta = 25°C)

Characteristics		Symbol	Rating	Unit	
LED	Forward current	I_F	50	mA	
	Forward current derating (Ta ≥ 25°C)	$\Delta I_F/^\circ\text{C}$	-0.5	mA/°C	
	Peak forward current (100 μs pulse, 100 pps)	I_{FP}	1	A	
	Reverse voltage	V_R	5	V	
	Junction temperature	T_j	125	°C	
Detector	Off-state output terminal voltage	V_{OFF}	60	V	
	On-state RMS current	A connection	I_{ON}	400	mA
		B connection		400	
		C connection		800	
	On-state current derating (Ta ≥ 25°C)	A connection	$\Delta I_{ON}/^\circ\text{C}$	-4.0	mA/°C
		B connection		-4.0	
		C connection		-8.0	
Junction temperature		T_j	125	°C	
Operating temperature range		T_{opr}	-40 to 85	°C	
Storage temperature range		T_{stg}	-55 to 125	°C	
Lead soldering temperature (10 s)		T_{sol}	260	°C	
Isolation voltage (AC, 1 minute, R.H. ≤ 60%) (Note)		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).

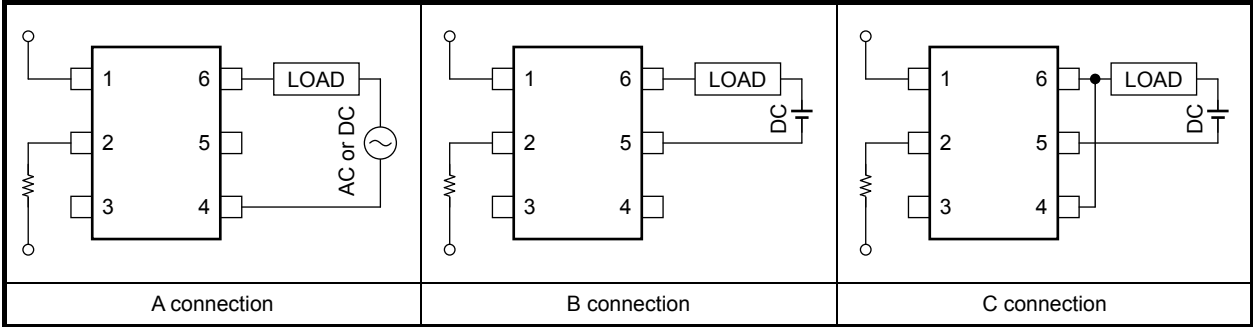
Note: Device considered a two-terminal device: Pins 1, 2 and 3 shorted together, and pins 4, 5 and 6 shorted together.

Recommended Operating Conditions

Characteristics	Symbol	Min	Typ.	Max	Unit
Supply voltage	V_{DD}	—	—	48	V
Forward current	I_F	5	7.5	25	mA
On-state current	I_{ON}	—	—	300	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 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	μA
	Capacitance	C_T	$V = 0, f = 1 \text{ MHz}$	—	30	—	pF
Detector	Off-state current	I_{OFF}	$V_{OFF} = 60 \text{ V}$	—	—	1	μA
	Capacitance	C_{OFF}	$V = 0, f = 1 \text{ MHz}$	—	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	Ω
	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	—	

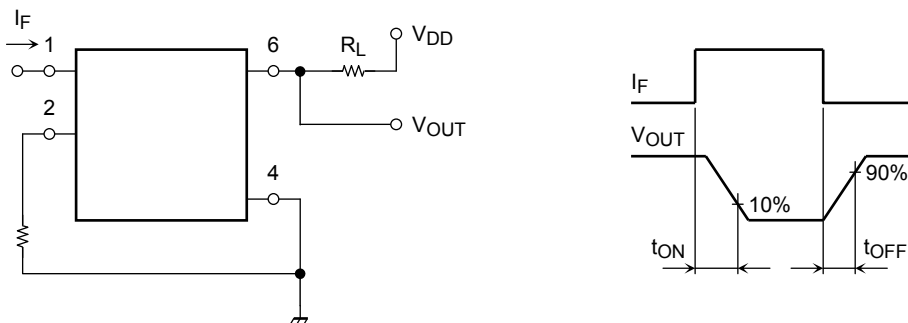
Isolation Characteristics (Ta = 25°C)

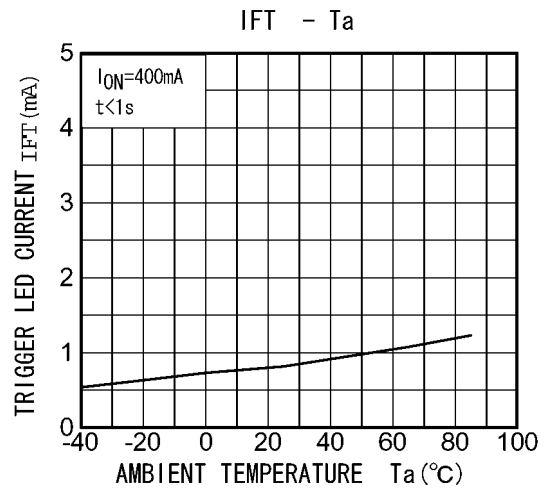
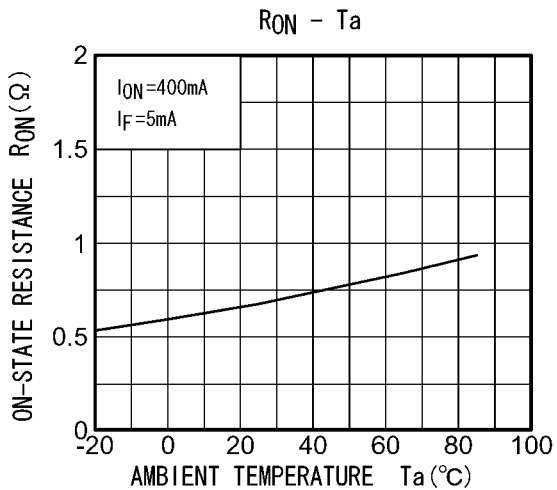
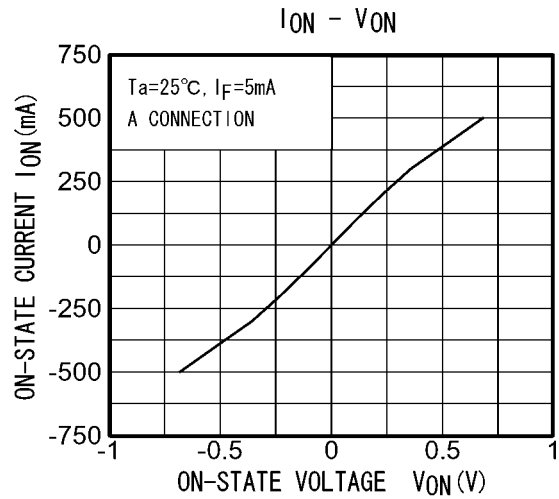
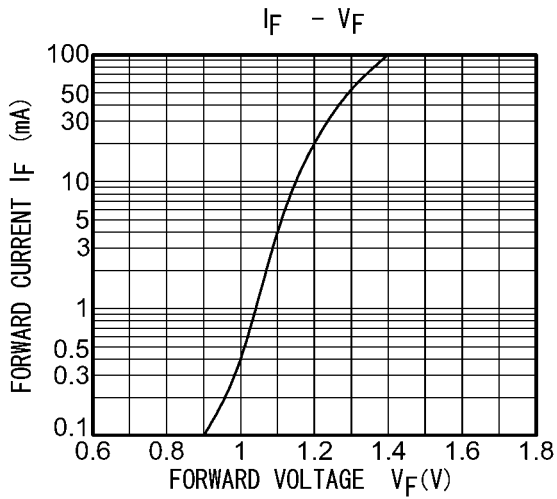
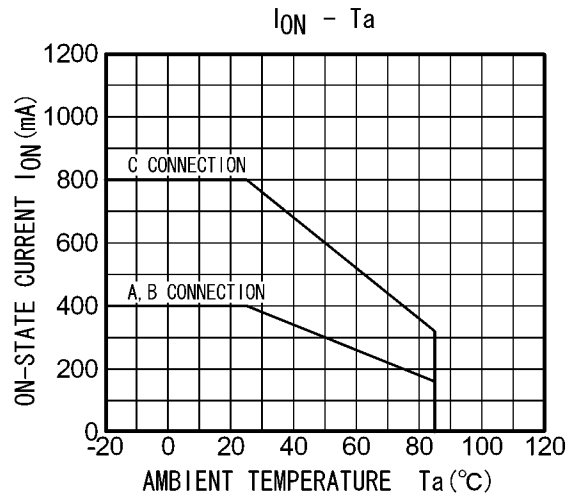
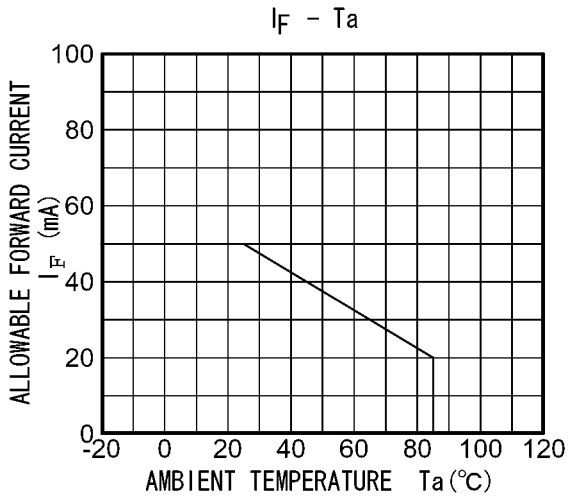
Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Capacitance input to output		C_S	$V_S = 0 \text{ V}, f = 1 \text{ MHz}$	—	0.8	—	pF
Isolation resistance		R_S	$V_S = 500 \text{ V}, \text{R.H.} \leq 60\%$	5×10^{10}	10^{14}	—	Ω
Isolation voltage		BV_S	AC, 1 minute	1500	—	—	Vrms
			AC, 1 s (in oil)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

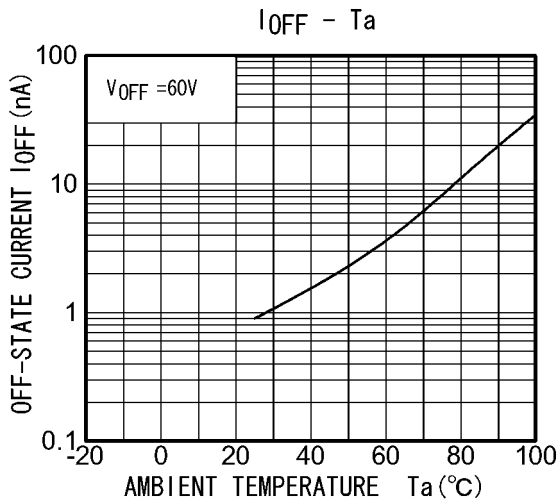
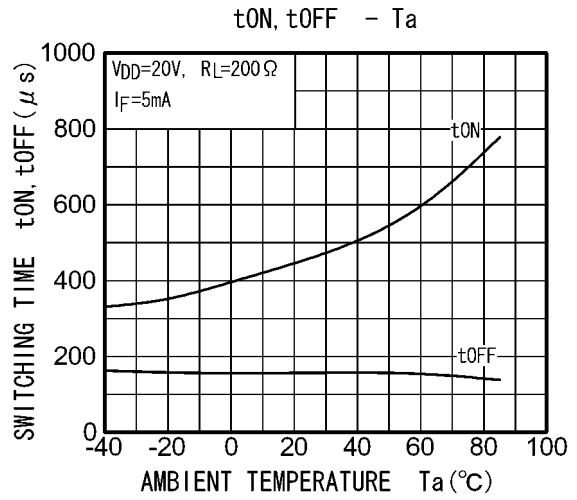
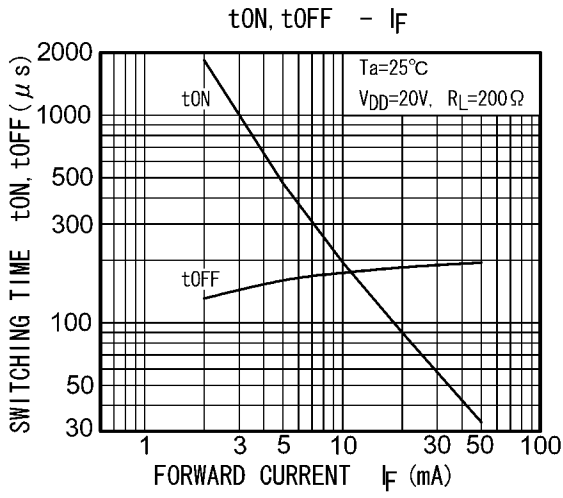
Switching Characteristics (Ta = 25°C)

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

Note: Switching time test circuit







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