

TOSHIBA Photocoupler Photorelay

# TLP197D

PC Card Modems

PBX

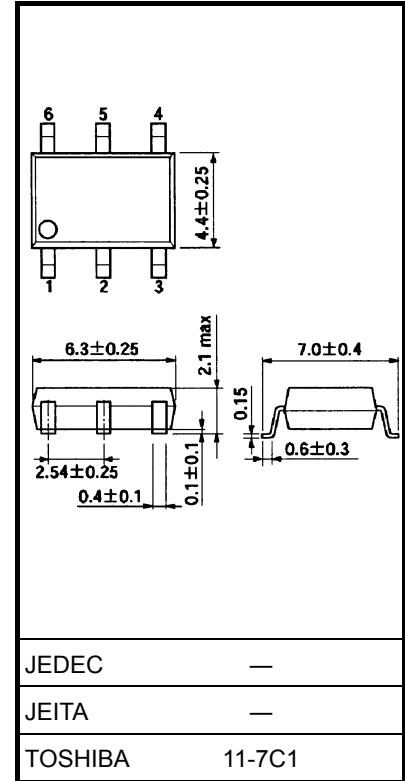
Measurement Equipment

The Toshiba TLP197D consists of an aluminum gallium arsenide infrared emitting diode optically coupled to a photo-MOSFET in a SOP package.

TLP197D is housed in a compact and thin SOP package and has characteristics of high-withstanding voltage and low ON-state resistance, which enable TLP197D to be applied in hook switches, dial-pulse switches for modems and facsimiles, and switches for test circuit switching in PBXes.

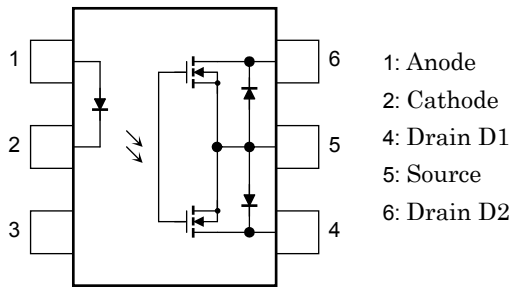
- 6-pin SOP (2.54SOP6): Height = 2.1 mm, pitch = 2.54 mm
- Normally open (1-form-A) device
- Peak OFF-state voltage: 200 V (min)
- Trigger LED current: 3 mA (max)
- ON-state current: 200 mA (max)
- ON-state resistance: 8 Ω (max)
- Isolation voltage: 1500 Vrms (min)
- UL recognized: UL1577, file no. E67349

Unit: mm

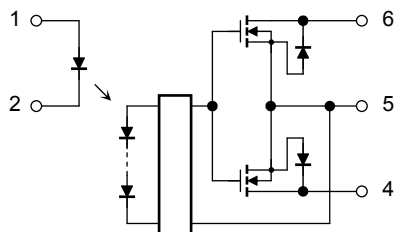


Weight: 0.13 g (typ.)

## Pin Configuration (top view)



## Schematic



## 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	$V_{OFF}$	200	V	
	On-state current	A connection	200	mA	
		B connection	200		
		C connection	400		
	On-state current derating (Ta ≥ 25°C)	A connection	$\Delta I_{ON}/^\circ\text{C}$	-2.0	mA/°C
		B connection	-2.0		
		C connection	-4.0		
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 min, 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).

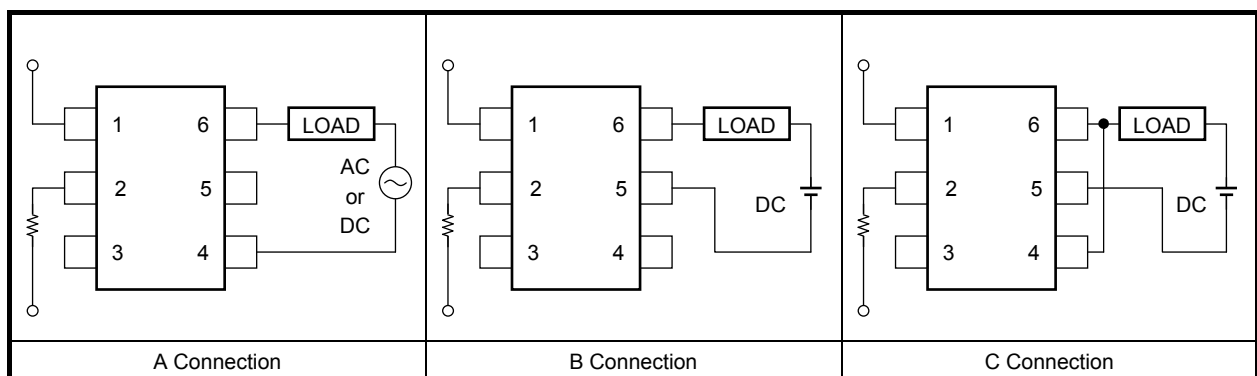
Note 1: Pins 1, 2 and 3 are shorted together, and pins 4, 5 and 6 are shorted together.

## Recommended Operating Conditions

Characteristics	Symbol	Min	Typ.	Max	Unit
Supply voltage	$V_{DD}$	—	—	160	V
Forward current	$I_F$	5	7.5	25	mA
On-state current	$I_{ON}$	—	—	130	mA
Operating temperature	$T_{opr}$	-20	—	60	°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



## 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	$C_T$	$V = 0, f = 1 \text{ MHz}$	—	30	—	pF
Detector	Off-state current	$I_{OFF}$	$V_{OFF} = 200 \text{ V}$	—	—	1	$\mu\text{A}$
	Capacitance	$C_{OFF}$	$V = 0, f = 1 \text{ MHz}$	—	100	—	pF

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

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Trigger LED current		$I_{FT}$	$I_{ON} = 200 \text{ mA}$	—	1	3	mA
Return LED current		$I_{FC}$	$I_{OFF} = 100 \mu\text{A}$	0.1	—	—	mA
On-state resistance	A connection	$R_{ON}$	$I_{ON} = 200 \text{ mA}, I_F = 5 \text{ mA}$	—	5	8	$\Omega$
	B connection		$I_{ON} = 200 \text{ mA}, I_F = 5 \text{ mA}$	—	3	5	
	C connection		$I_{ON} = 400 \text{ mA}, I_F = 5 \text{ mA}$	—	1.4	—	

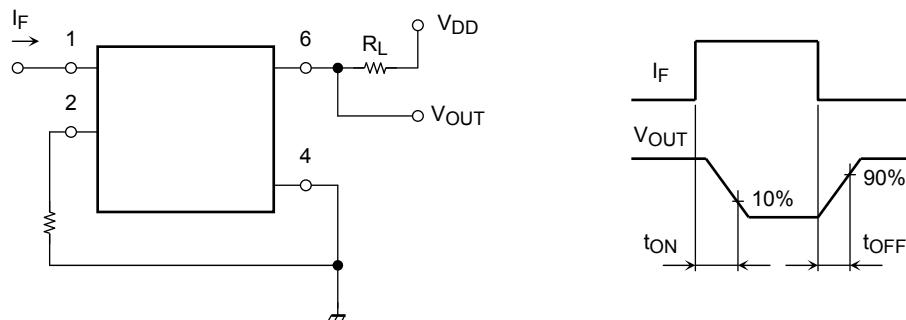
## Isolation Characteristics (Ta = 25°C)

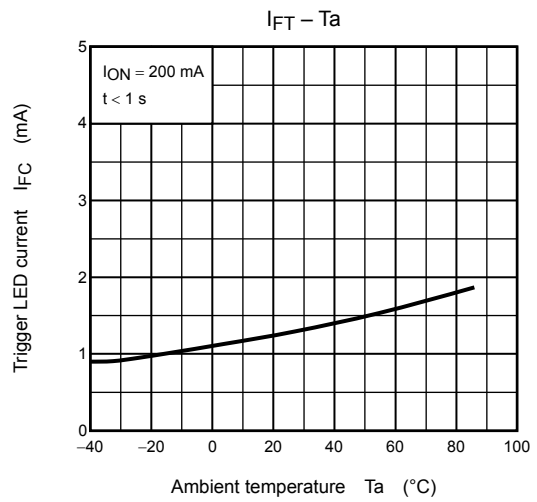
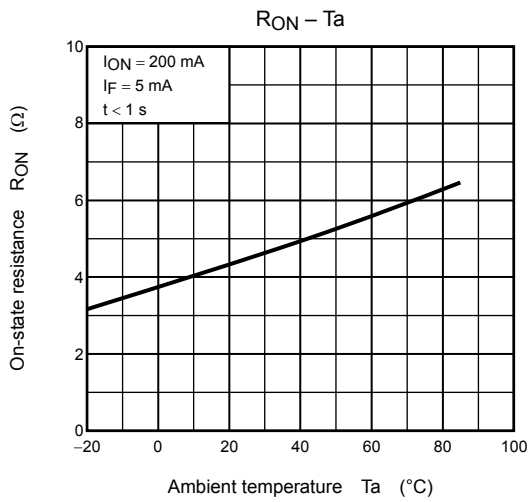
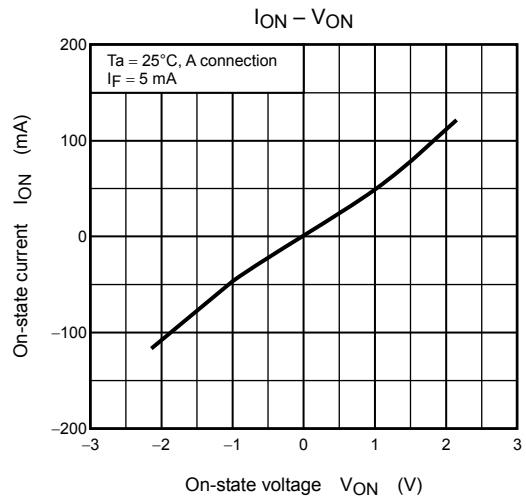
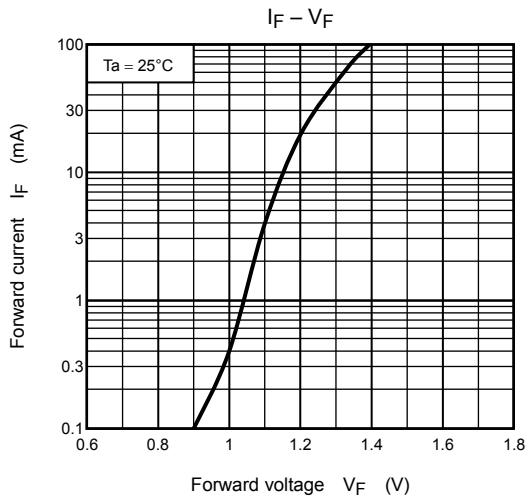
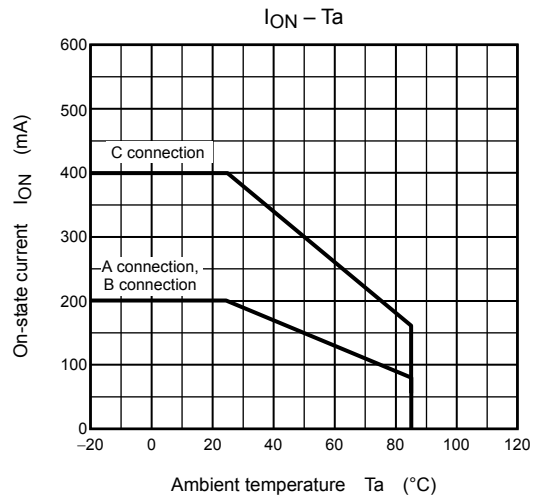
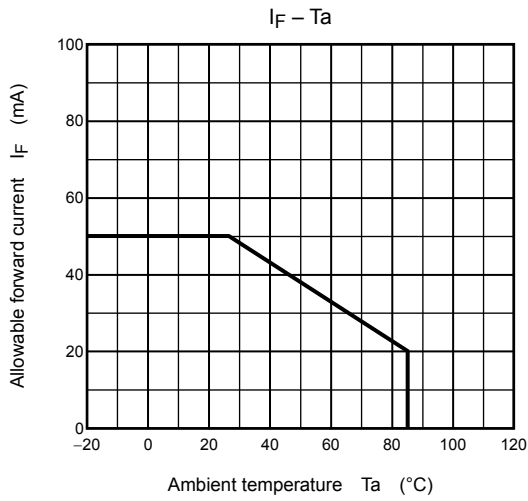
Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Capacitance input to output		$C_S$	$V_S = 0, f = 1 \text{ MHz}$	—	0.8	—	pF
Isolation resistance		$R_S$	$V_S = 500 \text{ V}, \text{R.H.} \leq 60\%$	$5 \times 10^{10}$	$10^{14}$	—	$\Omega$
Isolation voltage		$BV_S$	AC, 1 min	1500	—	—	Vrms
			AC,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

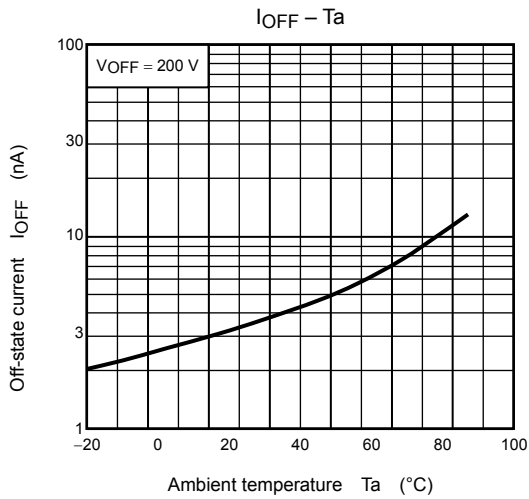
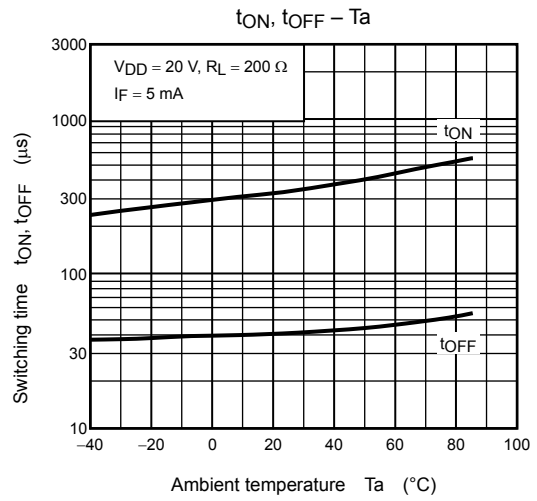
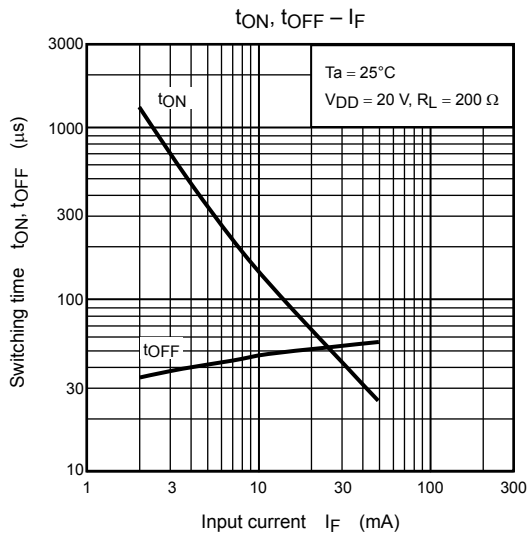
## Switching Characteristics (Ta = 25°C)

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Turn-on time	$t_{ON}$	$R_L = 200 \Omega$ (Note 2)	$V_{DD} = 20 \text{ V}, I_F = 5 \text{ mA}$	—	0.6	1.5	ms
Turn-off time	$t_{OFF}$			—	0.1	1.0	ms

Note 2: Switching time test circuit







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