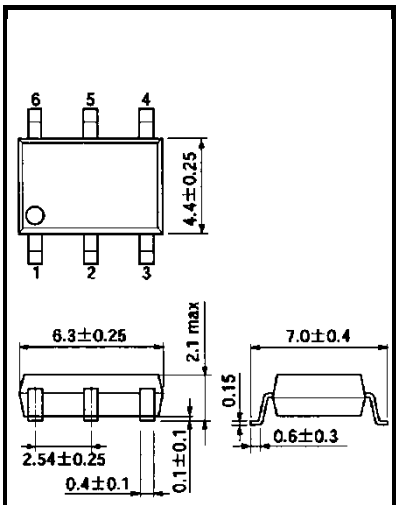
TOSHIBA Photocoupler Photo Relay

TLP197A

Telecommunication
Data Acquisition
Measurement Instrument
Programmable Control

Unit: mm



JEDEC	—
JEITA	—
TOSHIBA	11-7C1

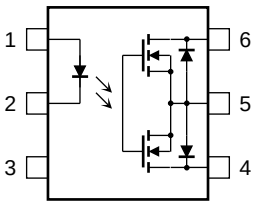
Weight: 0.13 g (typ.)

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.

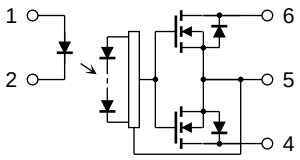
- 6 pin SOP (2.54SOP6): 2.1 mm high, 2.54 mm pitch
- 1-form-A
- Peak off-state voltage: 60 V (min)
- Trigger LED current: 3 mA (max)
- On-state current: 400 mA (max)
- On-state resistance: 2 Ω (max)
- Isolation voltage: 1500 Vrms (min)
- UL approved: UL1577, File No.E67349
- cUL approved :CSA Component Acceptance Service No. 5A, File No.E67349

Pin Configurations (top view)



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

Schematic



Start of commercial production
2001-07

Absolute Maximum Ratings (Ta = 25°C)

Characteristics			Symbol	Rating	Unit
LED	Forward current		I_F	50	mA
	Forward current derating (Ta ≥ 25°C)		ΔI_F/°C	−0.5	mA/°C
	Peak forward current (100 μs pulse, 100 pps)		I_{FP}	1	A
	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}	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	ΔI_{ON}/°C	−4.0	mA/°C
		B connection		−4.0	
		C connection		−8.0	
	Output power dissipation	A connection	P_O	288	mW
		B connection		144	
		C connection		288	
	Output power dissipation derating (Ta ≥ 25°C)	A connection	ΔP_O / °C	−2.88	mW / °C
		B connection		−1.44	
		C connection		−2.88	
	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 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.).

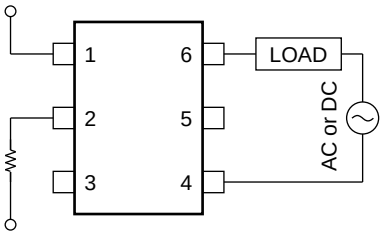
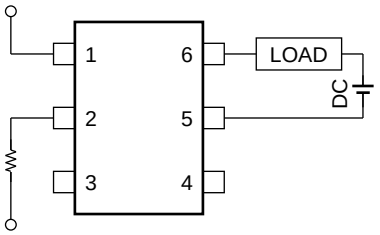
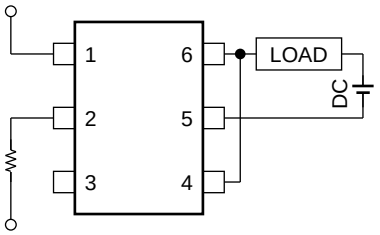
Note 1: Device considered a two-terminal device: Pins 1, 2 and 3 shorted together, and pins 4, 5 and 6 shorted together.

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

		
A connection	B connection	C connection

Individual Electrical Characteristics (Ta = 25°C)

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
LED	Forward voltage	V_F	I_F = 10 mA	1.0	1.15	1.3	V
	Reverse current	I_R	V_R = 5 V	—	—	10	μA
	Capacitance	C_T	VF = 0 V, f = 1 MHz	—	30	—	pF
Detector	Off-state current	I_{OFF}	V_{OFF} = 60 V	—	—	1	μA
	Capacitance	C_{OFF}	V = 0 V, f = 1 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 mA	—	—	3	mA
Close LED current		I_{FC}	I_{OFF} = 100 μA	0.1	—	—	mA
On-state resistance	A connection	R_{ON}	I_{ON} = 400 mA, I_F = 5 mA	—	1	2	Ω
	B connection		I_{ON} = 400 mA, I_F = 5 mA	—	0.5	1	
	C connection		I_{ON} = 800 mA, I_F = 5 mA	—	0.25	—	

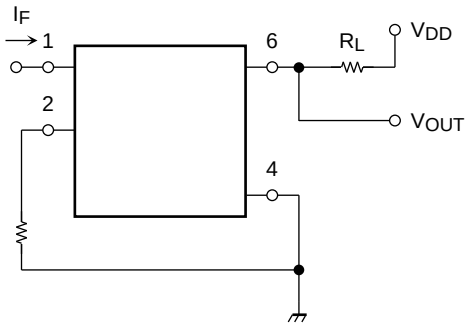
Isolation Characteristics (Ta = 25°C)

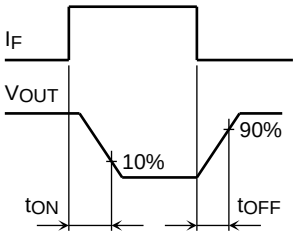
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Capacitance input to output	C_S	V_S = 0 V, f = 1 MHz	—	0.8	—	pF
Isolation resistance	R_S	V_S = 500 V, R.H. ≤ 60%	5×10^{10}	10^{14}	—	Ω
Isolation voltage	BV_S	AC, 1 minute	1500	—	—	Vrms
		AC, 1 second (in oil)	—	3000	—	
		DC, 1 minute (in oil)	—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

Switching Characteristics (Ta = 25°C)

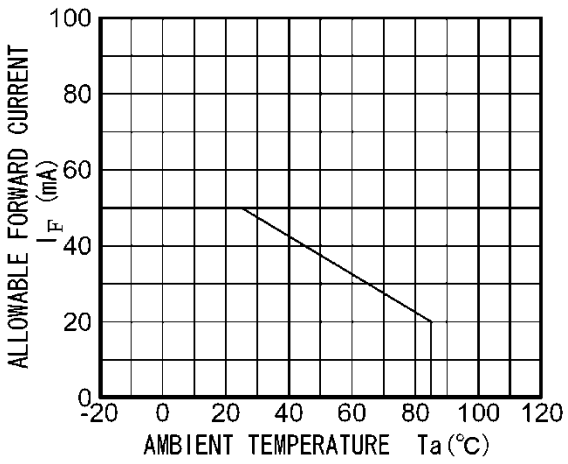
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Turn-on time	t_{ON}	R_L = 200 Ω (Note) V_{DD} = 20 V, I_F = 5 mA	—	0.6	2	ms
Turn-off time	t_{OFF}		—	0.1	1	ms

Note: Switching time test circuit

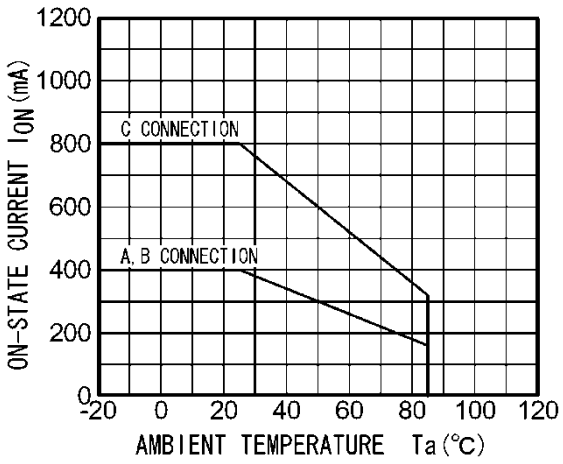




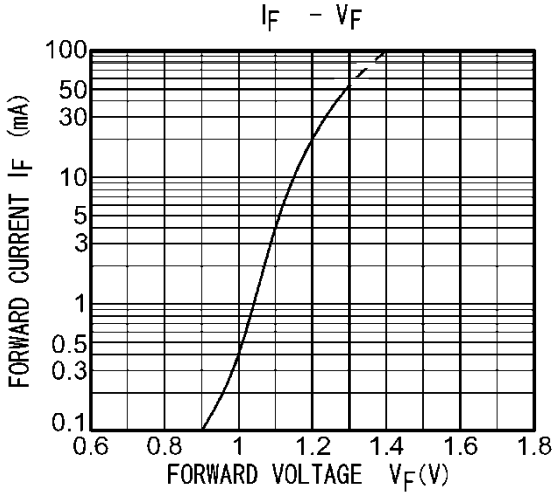
I_F – Ta



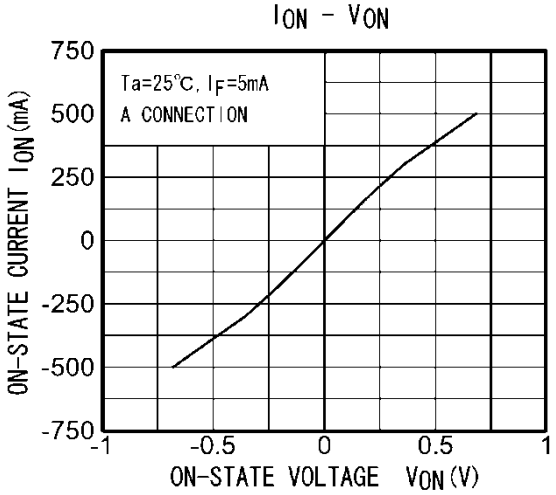
I_{ON} – Ta



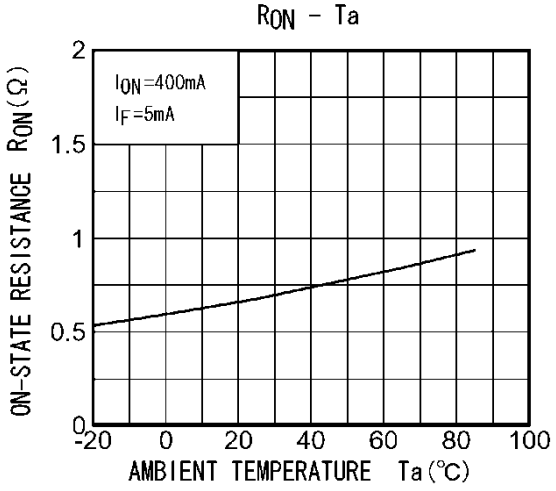
I_F – V_F



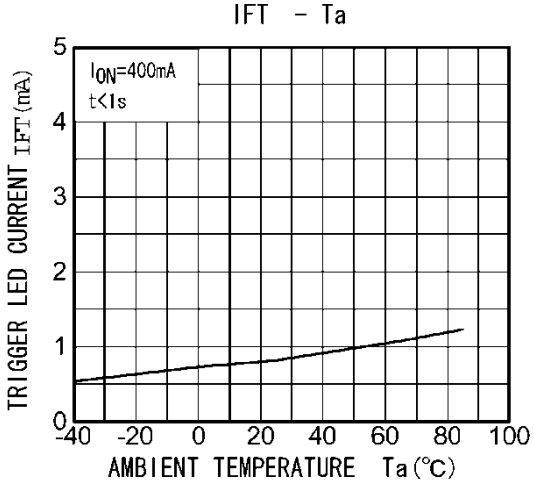
I_{ON} – V_{ON}



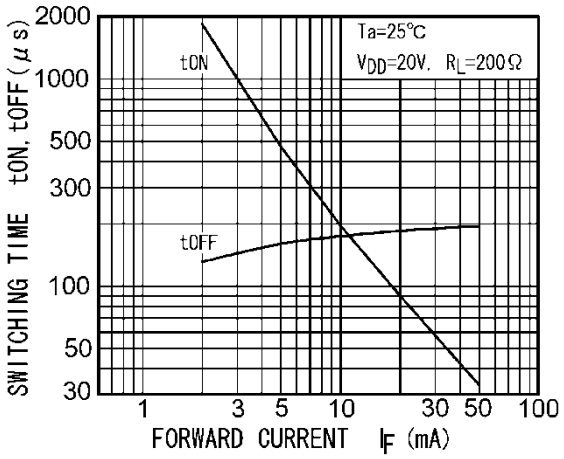
R_{ON} – Ta



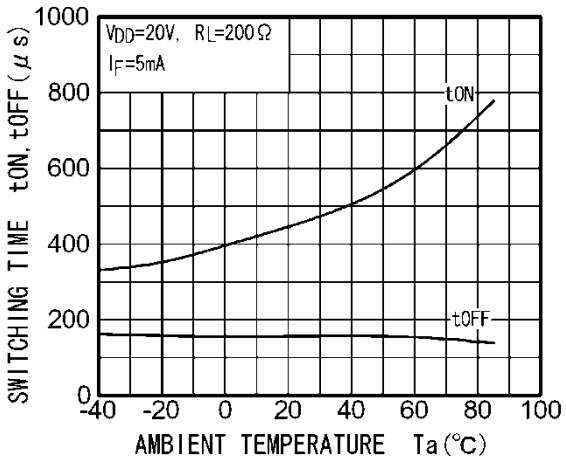
IFT – Ta



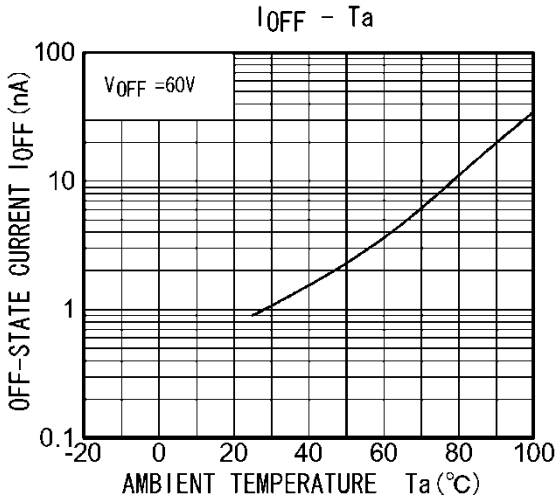
tON, tOFF – I_F



tON, tOFF – Ta



I_{OFF} – Ta



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