

TOSHIBA Photocoupler Photorelay

# TLP192G

PC Card Modems

PBX

STBs (Set-Top Boxes)

Measurement Equipment

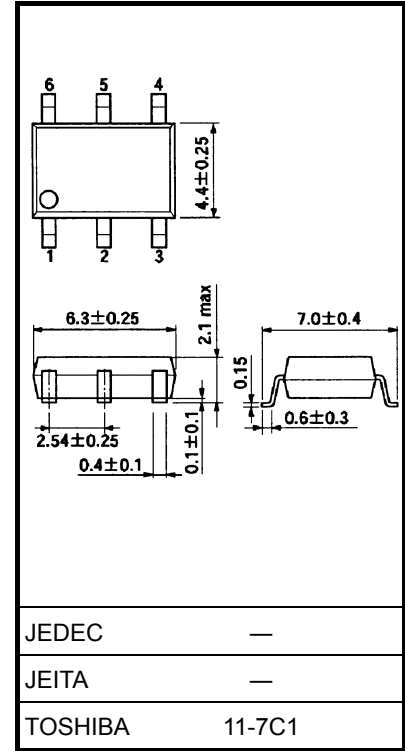
The Toshiba TLP192G consists of a gallium arsenide infrared emitting diode optically coupled to a photo-MOSFET in a 6-pin SOP package.

The TLP192G photorelay features high withstanding voltage between output pins, which makes it suitable for hook relay and dial-pulse applications for modems and facsimiles.

The TLP192G is also ideal for PCMCIA-compliant card modems due to the maximum mounted height as low as 2.1 mm.

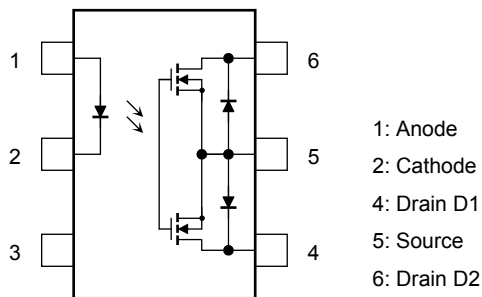
- 6-pin SOP (2.54SOP4): Height = 2.1 mm, Pitch = 2.54 mm
- Normally open (1-form-A) device
- Peak off-state voltage: 350 V (min)
- Trigger LED current: 3 mA (max)
- On-state current: 110 mA (max)
- On-state resistance: 35 Ω (max, t < 1 s)
- On-state resistance: 50 Ω (max, continuous)
- Isolation voltage: 1500 Vrms (min)
- UL recognized: UL1557, File No.E67349

Unit: mm

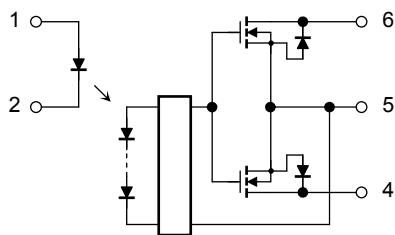


Weight: 0.2 g (typ.)

## 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
	Reverse voltage	$V_R$	5	V
	Junction temperature	$T_j$	125	°C
Detector	Off-state output terminal voltage	$V_{OFF}$	350	V
	On-state current	$I_{ON}$	110	mA
	Forward current derating (Ta ≥ 25°C)	$\Delta I_{ON}/^\circ\text{C}$	-1.1	mA/°C
	Junction temperature	$T_j$	125	°C
Storage temperature range		$T_{stg}$	-55 to 125	°C
Operating temperature range		$T_{opr}$	-40 to 85	°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: LED pins are shorted together. Detector pins are also shorted together.

## Recommended Operating Conditions

Characteristics	Symbol	Min	Typ.	Max	Unit
Supply voltage	$V_{DD}$	—	—	280	V
Forward current	$I_F$	5	10	25	mA
On-state current	$I_{ON}$	—	—	100	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.

## 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	$I_{OFF}$	$V_{OFF} = 350 \text{ V}$	—	—	1	μA
	Capacitance	$C_{OFF}$	$V = 0, f = 1 \text{ MHz}$	—	30	—	pF

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

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Trigger LED current		$I_{FT}$	$I_{ON} = 110 \text{ mA}$	—	1	3	mA
Return LED current		$I_{FC}$	$I_{OFF} = 100 \mu\text{A}$	0.1	—	—	mA
On-state resistance	A connection	$R_{ON}$	$I_{ON} = 110 \text{ mA}, I_F = 5 \text{ mA}, t < 1 \text{ s}$	—	25	35	$\Omega$
			$I_{ON} = 110 \text{ mA}, I_F = 5 \text{ mA}$	—	35	50	
	B connection		$I_{ON} = 110 \text{ mA}, I_F = 5 \text{ mA}$	—	28	40	
	C connection		$I_{ON} = 220 \text{ mA}, I_F = 5 \text{ mA}$	—	14	20	

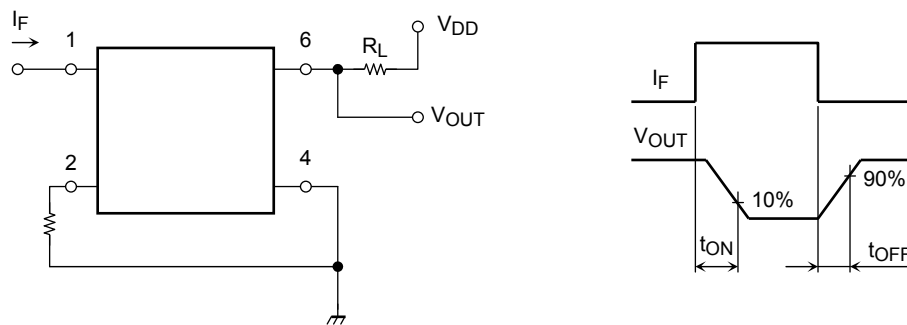
**Isolation Characteristics (Ta = 25°C)**

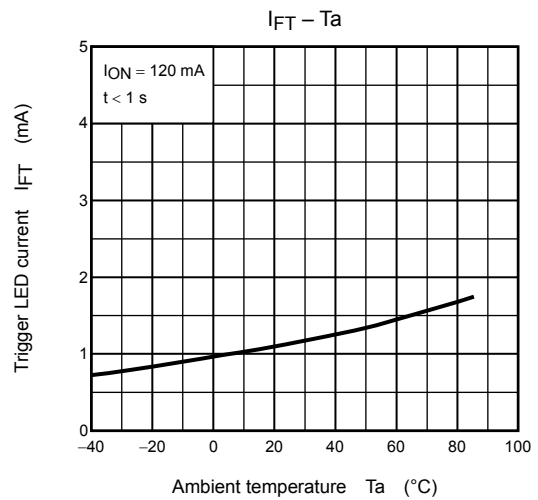
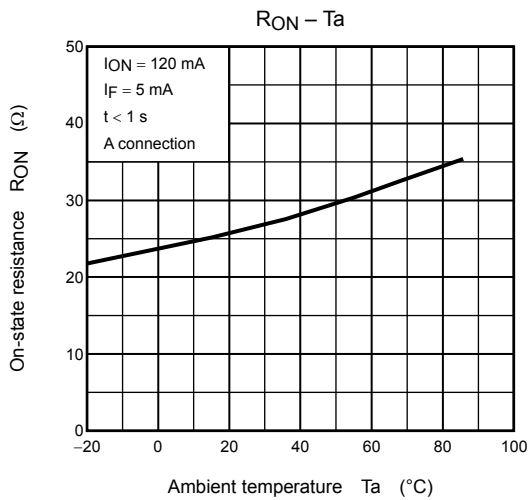
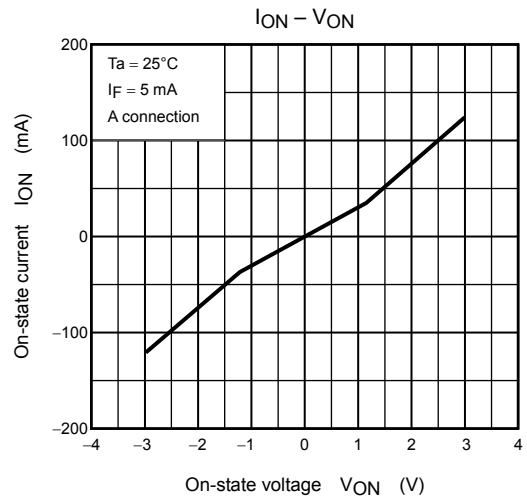
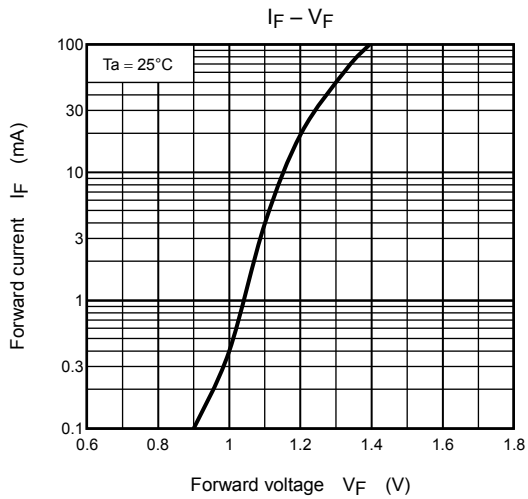
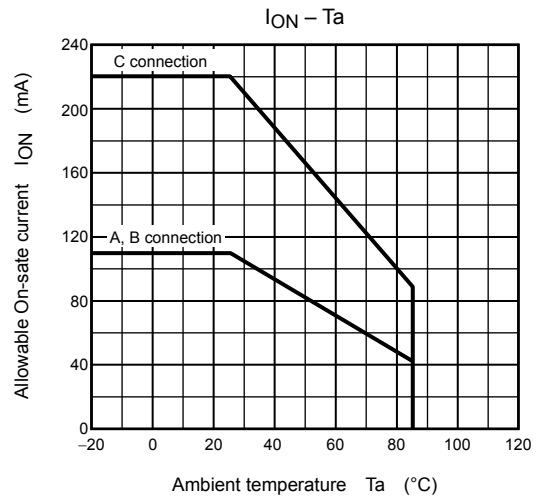
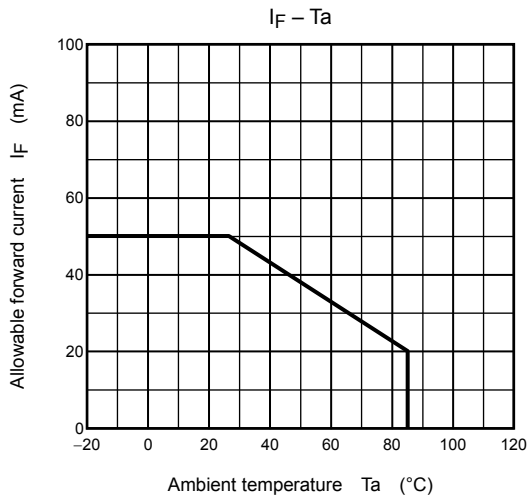
Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Capacitance input to output		$C_S$	$V_S = 0 \text{ V}, f = 1 \text{ MHz}$	—	0.8	—	pF
Isolation resistance		$R_S$	$V_S = 500 \text{ V}, \text{R.H.} \leq 60\%$	$5 \times 10^{10}$	$10^{14}$	—	$\Omega$
Isolation voltage	$BV_S$	AC, 1 min	1500	—	—	Vrms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

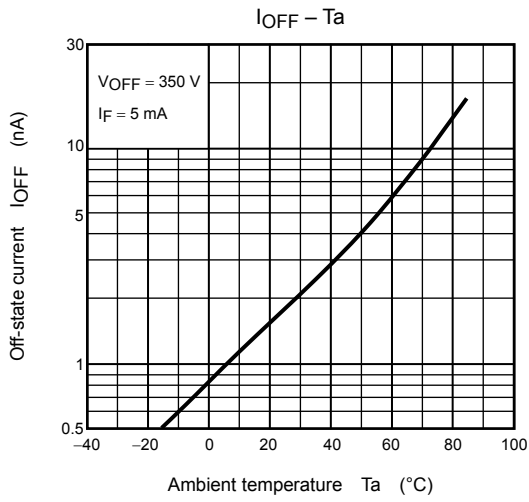
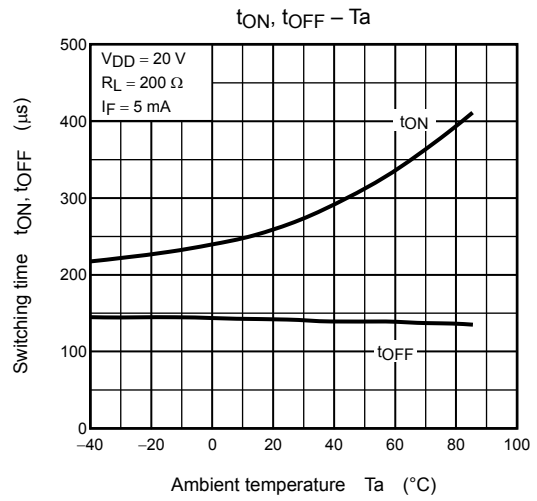
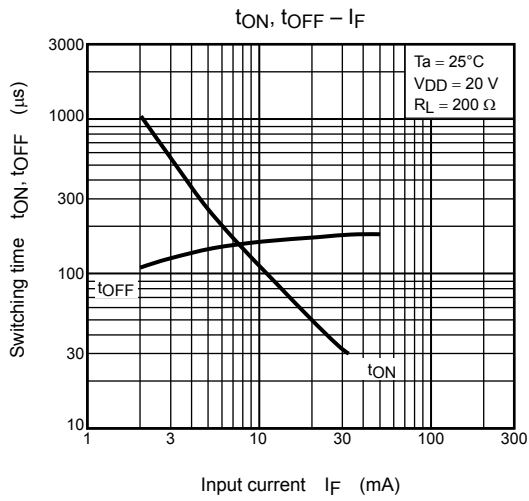
**Switching Characteristics (Ta = 25°C)**

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Turn-on time	$t_{ON}$	$t_{OFF}$	$R_L = 200 \Omega$ $V_{DD} = 20 \text{ V}, I_F = 5 \text{ mA}$ (Note 2)	—	0.3	1	ms
Turn-off time				—	0.1	1	

Note 2: Switching time test circuit







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