

TOSHIBA Photocoupler Photorelay

TLP192G

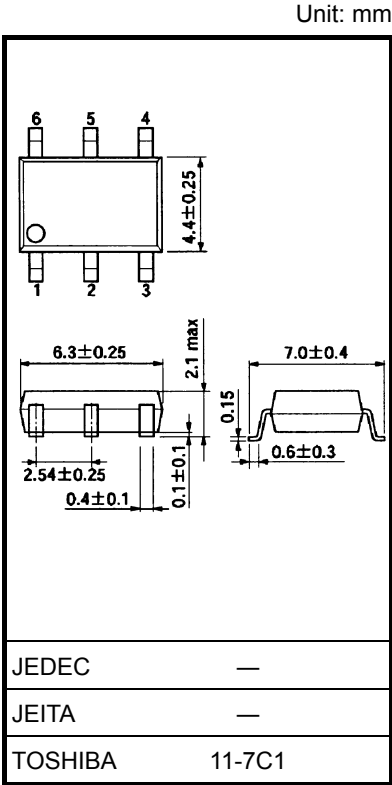
PC Card Modems
PBX
STBs (Set-Top Boxes)
Measurement Equipment

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.

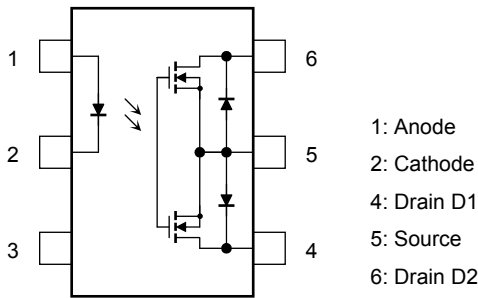
The TLP192G is also ideal for PCMCIA-compliant card modems due to the maximum mounted height as low as 2.1 mm.

- 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

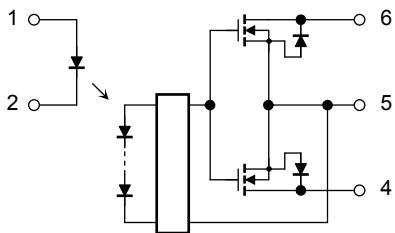


Weight: 0.2 g (typ.)

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}	$I_{OFF} = 100 \text{ } \mu\text{A}$	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	Ω
			$I_{ON} = 110 \text{ mA}, I_F = 5 \text{ mA}$	—	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	

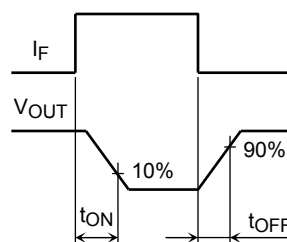
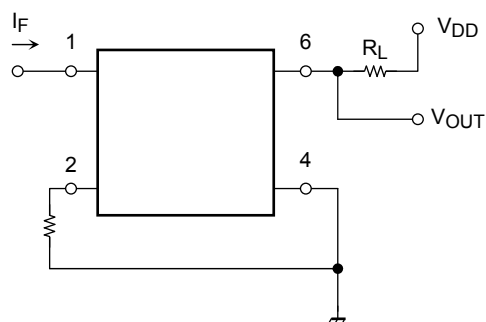
Isolation Characteristics (Ta = 25°C)

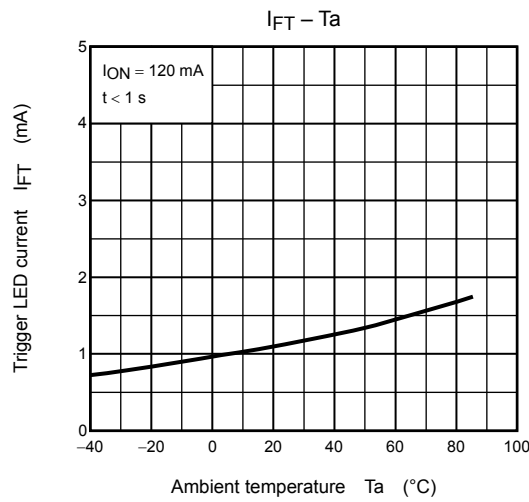
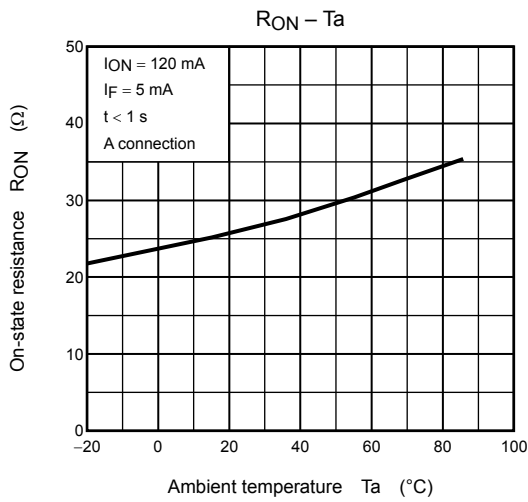
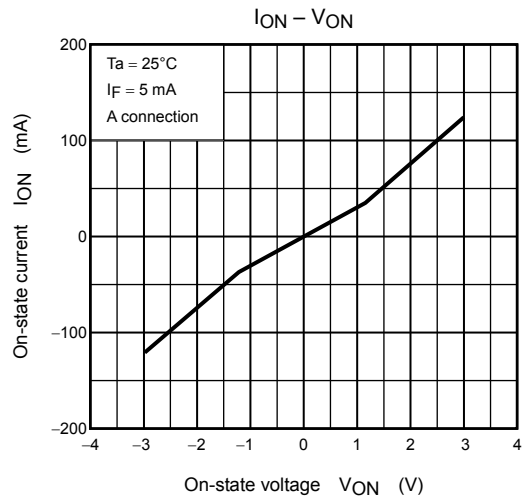
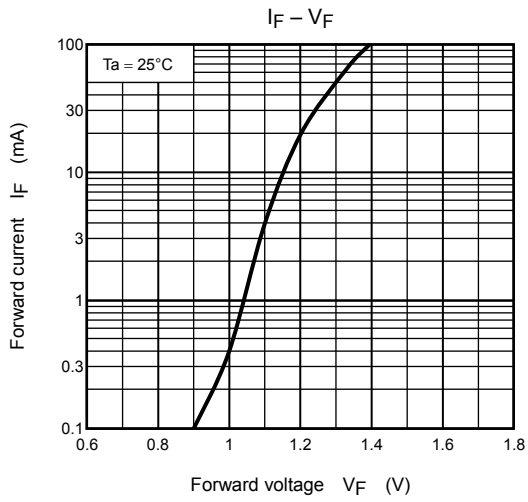
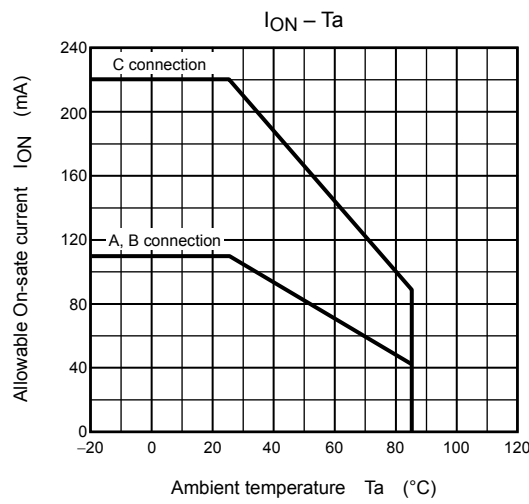
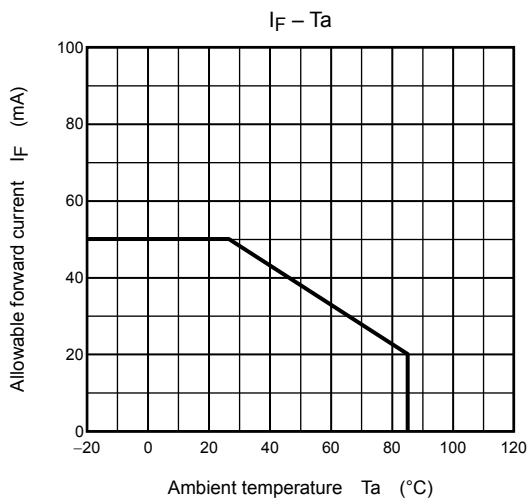
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Capacitance input to output	C_S	$V_S = 0 \text{ V}, f = 1 \text{ MHz}$	—	0.8	—	pF
Isolation resistance	R_S	$V_S = 500 \text{ V}, \text{R.H.} \leq 60\%$	5×10^{10}	10^{14}	—	Ω
Isolation voltage	BV_S	AC, 1 min	1500	—	—	Vrms
		AC, 1 s, in oil	—	3000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

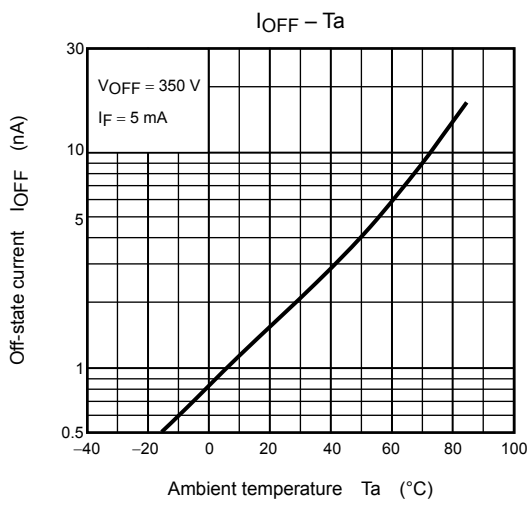
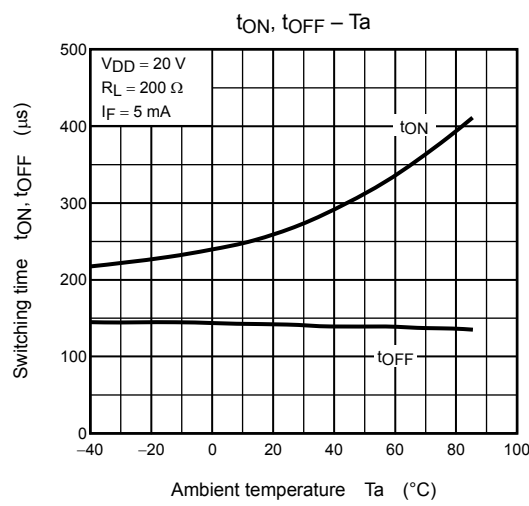
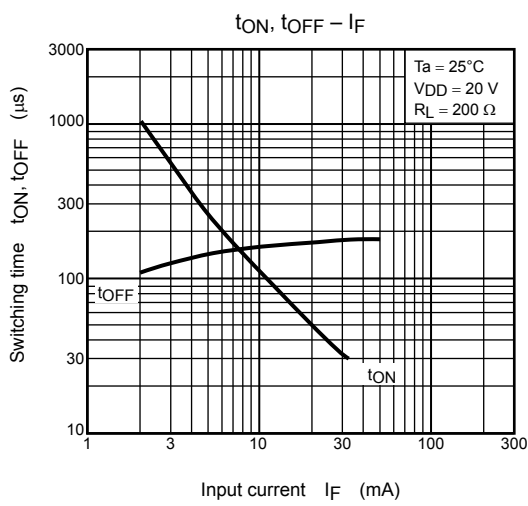
Switching Characteristics (Ta = 25°C)

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

Note 2: Switching time test circuit







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