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TOSHIBA Photocoupler Photorelay

# TLP4192G

Telecommunication

Measurement Equipment

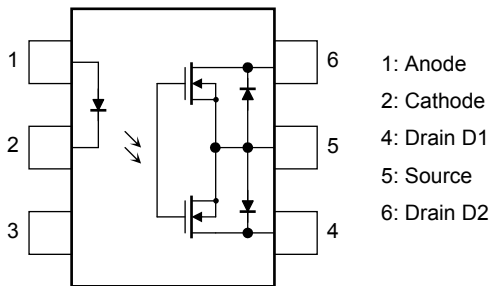
Security Equipment

FA

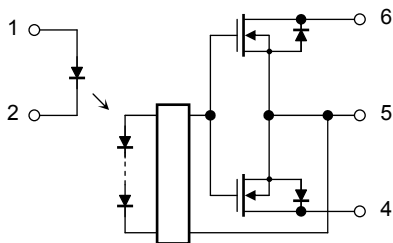
The Toshiba TLP4192G consists of an aluminum gallium arsenide infrared emitting diode optically coupled to a photo-MOSFET in a SOP package. This 1-form-B (NC) photorelay features a withstanding voltage of 350 V.

- 6-pin SOP (2.54SOP6): Height = 2.1 mm, pitch = 2.54 mm
- Normally closed (1-form-B) device
- Peak off-state voltage: 350 V (min)
- Trigger LED current: 3 mA (max)
- On-state current: 90 mA (max)
- On-state resistance: 50 Ω (max)
- Isolation voltage: 1500 Vrms (min)
- UL Recognized: UL1577, File No. E67349

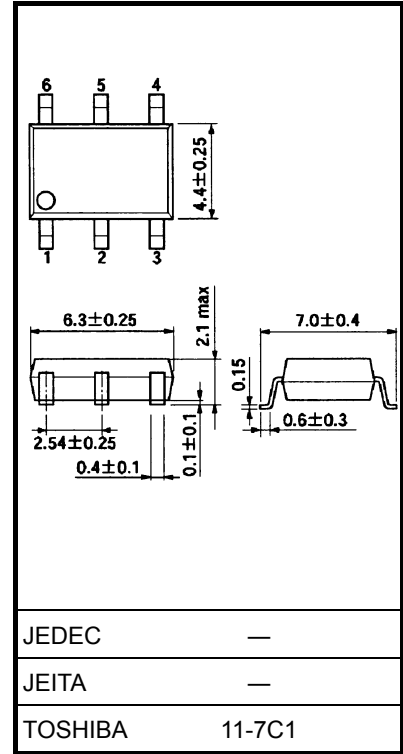
### Pin Configuration (top view)



### 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	$V_{OFF}$	350	V	
	On-state current	A connection	$I_{ON}$	90	mA
		B connection		90	
		C connection		180	
	On-state current derating (Ta ≥ 25°C)	A connection	$\Delta I_{ON}/^\circ\text{C}$	-0.9	mA/°C
		B connection		-0.9	
		C connection		-1.8	
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).

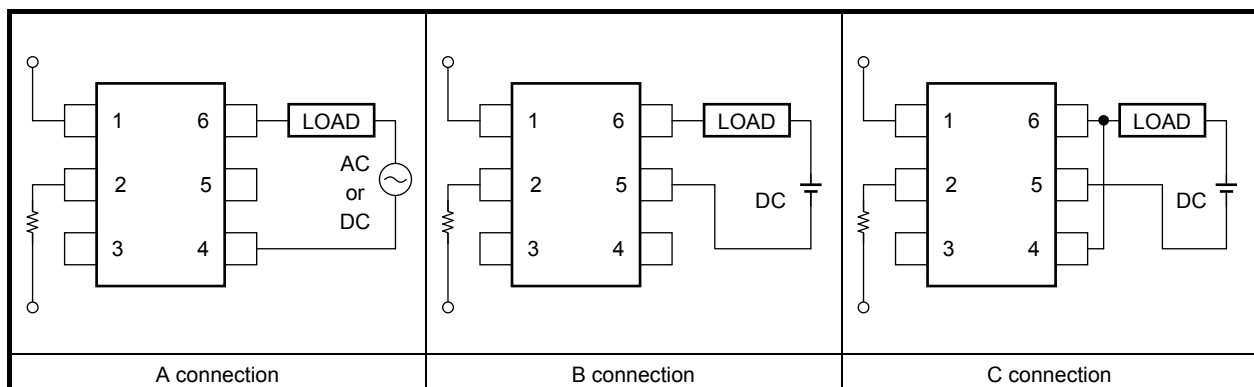
Note 1: Pins 1, 2 and 3 are shorted together, and pins 4, 5 and 6 are shorted together.

## Recommended Operating Conditions

Characteristics	Symbol	Min	Typ.	Max	Unit
Supply voltage	$V_{DD}$	—	—	280	V
Forward current	$I_F$	5	—	25	mA
On-state current	$I_{ON}$	—	—	90	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



## 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	$I_{OFF}$	$V_{OFF} = 350 \text{ V}, I_F = 5 \text{ mA}$	—	—	1	$\mu\text{A}$
	Capacitance	$C_{OFF}$	$V = 0, f = 1 \text{ MHz}, I_F = 5 \text{ mA}$	—	30	—	pF

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

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Trigger LED current		$I_{FC}$	$I_{OFF} = 10 \mu\text{A}$	—	1	3	mA
Return LED current		$I_{FT}$	$I_{ON} = 90 \text{ mA}$	0.1	—	—	mA
On-state resistance	A connection	$R_{ON}$	$I_{ON} = 90 \text{ mA}$	—	27	50	$\Omega$
	B connection		$I_{ON} = 90 \text{ mA}$	—	20	43	
	C connection		$I_{ON} = 180 \text{ mA}$	—	10	—	

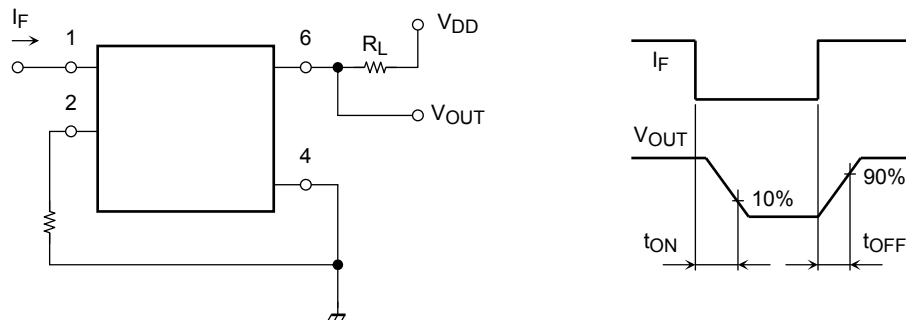
## Isolation Characteristics (Ta = 25°C)

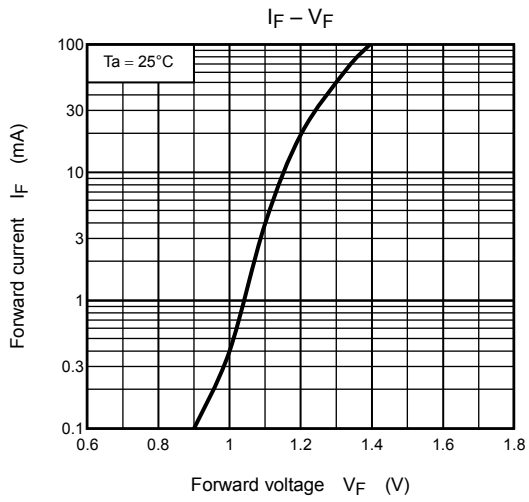
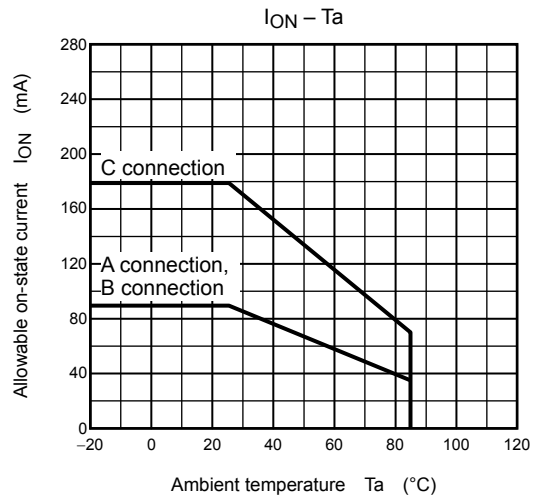
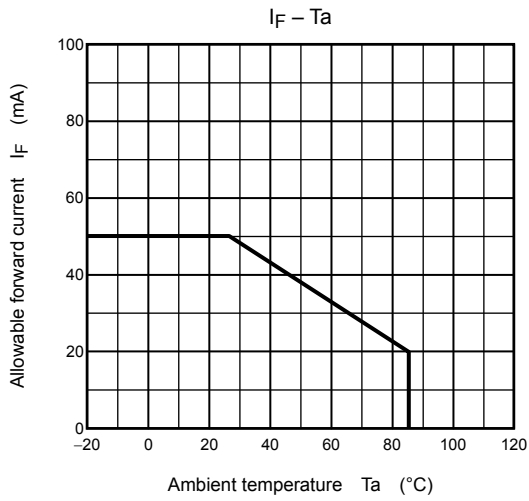
Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Capacitance input to output		$C_S$	$V_S = 0, f = 1 \text{ MHz}$	—	0.8	—	pF
Isolation resistance		$R_S$	$V_S = 500 \text{ V}, \text{R.H.} \leq 60\%$	$5 \times 10^{10}$	$10^{14}$	—	$\Omega$
Isolation voltage		$BV_S$	AC, 1 min	1500	—	—	Vrms
			AC,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

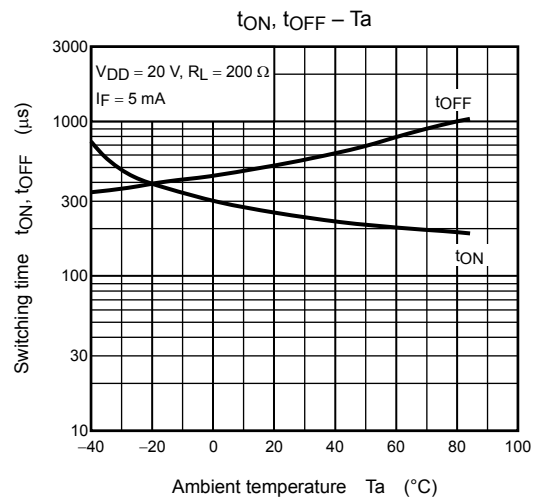
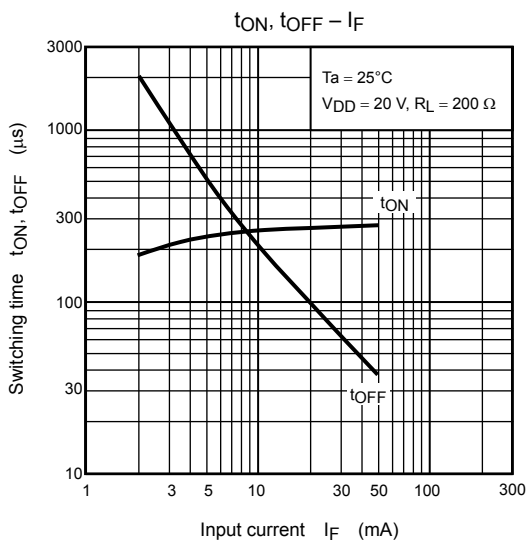
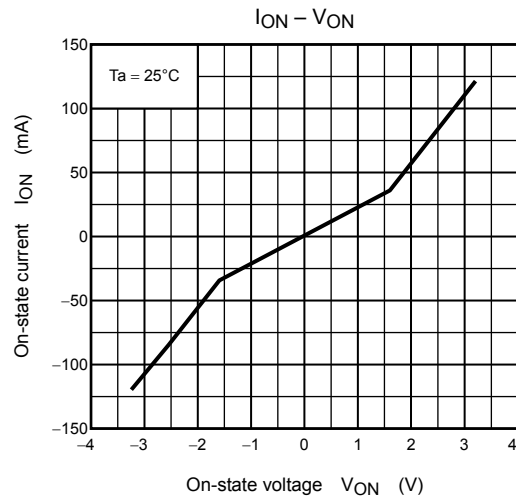
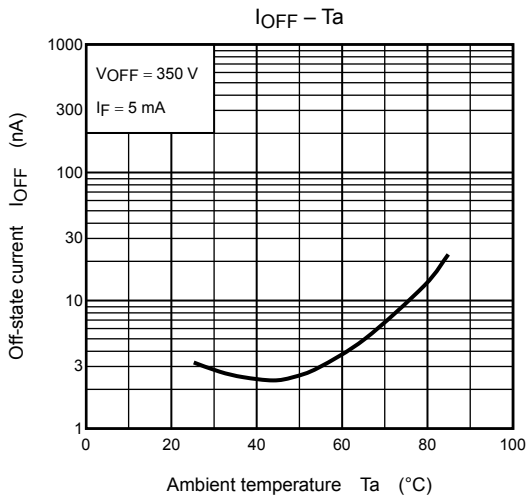
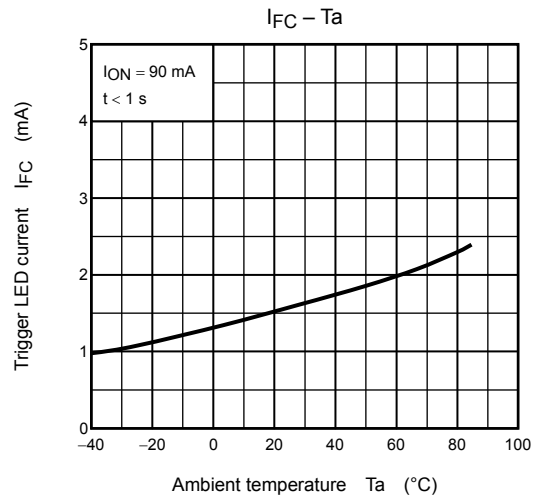
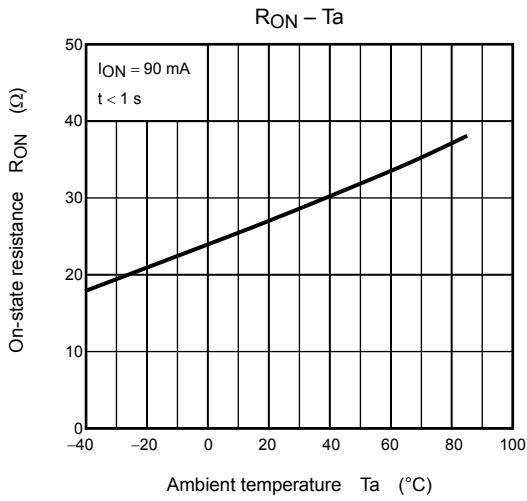
## Switching Characteristics (Ta = 25°C)

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Turn-on time	$t_{ON}$	$R_L = 200 \Omega$ $V_{DD} = 20 \text{ V}, I_F = 5 \text{ mA}$	(Note 2)	—	0.25	0.5	ms
Turn-off time	$t_{OFF}$			—	0.5	1	ms

Note 2: Switching time test circuit







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