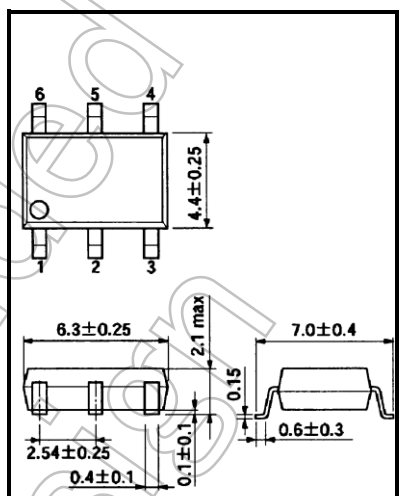
TOSHIBA Photocoupler Photorelay

TLP192G

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

Unit: mm



JEDEC	—
JEITA	—
TOSHIBA	11-7C1

Weight: 0.13 g (typ.)

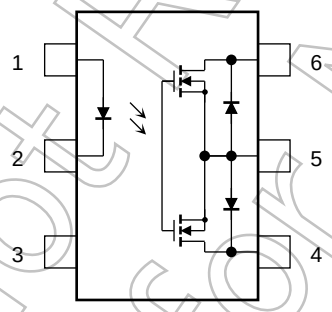
The Toshiba TLP192G consists of an infrared emitting diode optically coupled to a photo-MOSFET in a 6-pin SOP package.

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.

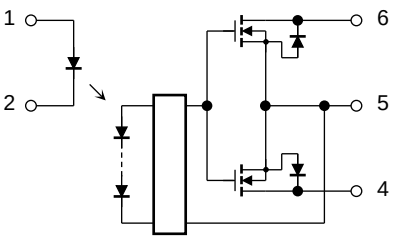
- 6-pin SOP (2.54SOP6): Height = 2.1 mm, Pitch = 2.54 mm
- Normally open (1-form-A) device
- Peak off-state voltage: 350 V (min)
- Trigger LED current: 3 mA (max)
- On-state current: 110 mA (max)
- On-state resistance: 35 Ω (max, t < 1 s)
- On-state resistance: 50 Ω (max, continuous)
- Isolation voltage: 1500 Vrms (min)
- UL-recognized: UL 1577, File No.E67349
- cUL-recognized: CSA Component Acceptance Service No.5A
  File No.E67349

Pin Configuration (top view)



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

Schematic



Start of commercial production
2002-01

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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
	Reverse voltage	V_R	5	V
	Diode power dissipation	P_D	50	mW
	Diode power dissipation derating (Ta ≥ 25°C)	$\triangle P_D$ /°C	-0.5	mW/°C
	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)	ΔI_{ON}/°C	-1.1	mA/°C
	Output power dissipation	P_O	300	mW
	Output power dissipation derating (Ta ≥ 25°C)	ΔP_O / °C	-3.0	mW /°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, 60 s, 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 mA	1.0	1.15	1.3	V
	Reverse current	I_R	V_R = 5 V	—	—	10	μA
	Capacitance	C_T	V = 0 V, f = 1 MHz	—	30	—	pF
Detector	Off-state current	I_{OFF}	V_{OFF} = 350 V	—	—	1	μA
	Capacitance	C_{OFF}	V = 0 V, f = 1 MHz	—	30	—	pF

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Coupled Electrical Characteristics (Ta = 25°C)

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

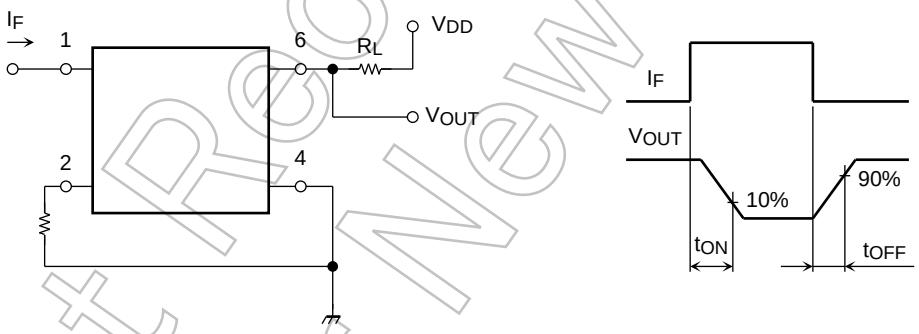
Isolation Characteristics (Ta = 25°C)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Capacitance input to output	C_S	V_S = 0 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, 60 s	1500	—	—	Vrms

Switching Characteristics (Ta = 25°C)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Turn-on time	t_{ON}	R_L = 200 Ω V_{DD} = 20 V, I_F = 5 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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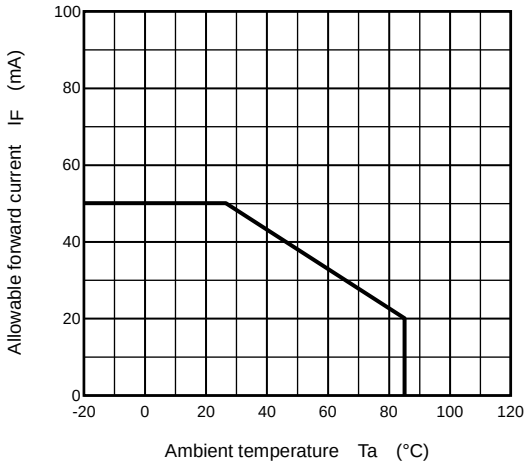
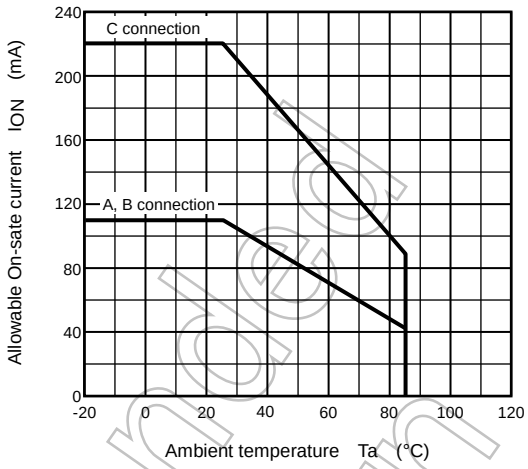
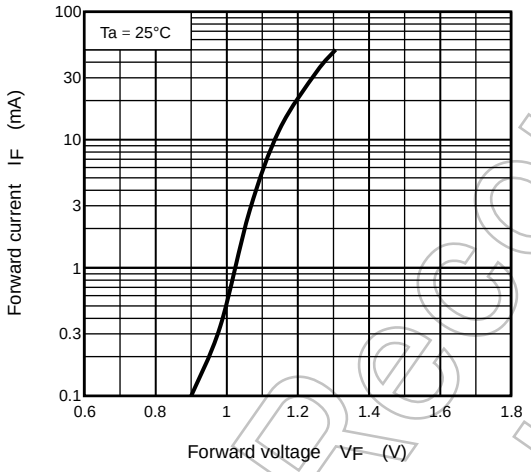
I_F – Ta



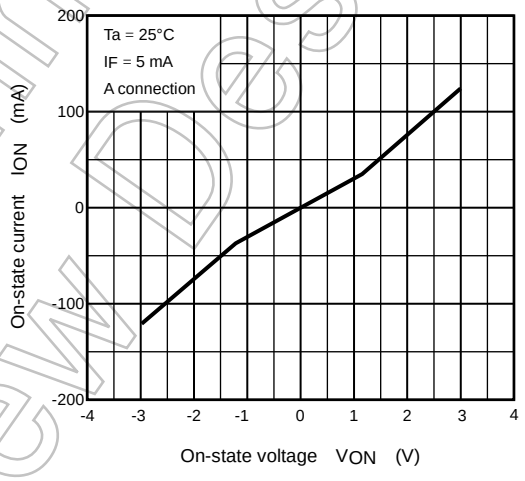
I_{ON} – Ta



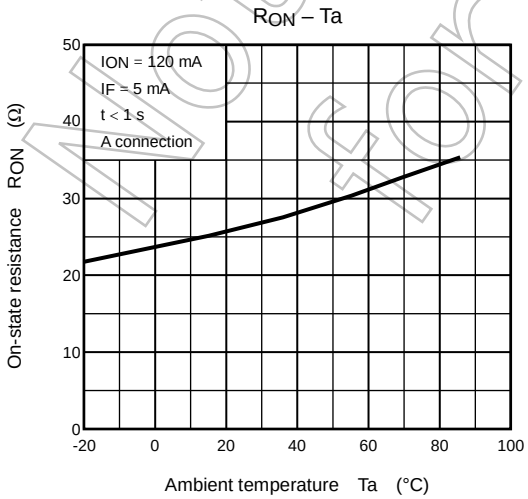
I_F – V_F



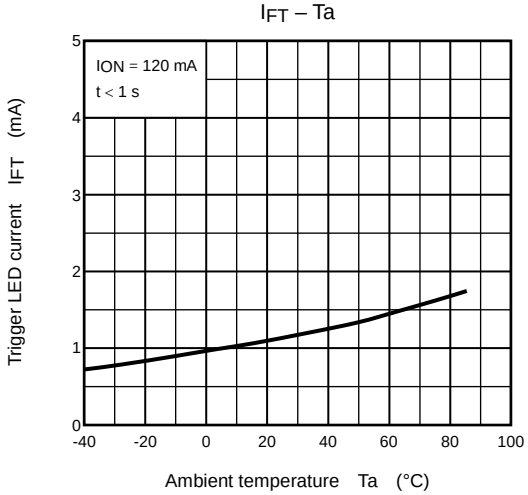
I_{ON} – V_{ON}



R_{ON} – Ta



I_{FT} – Ta



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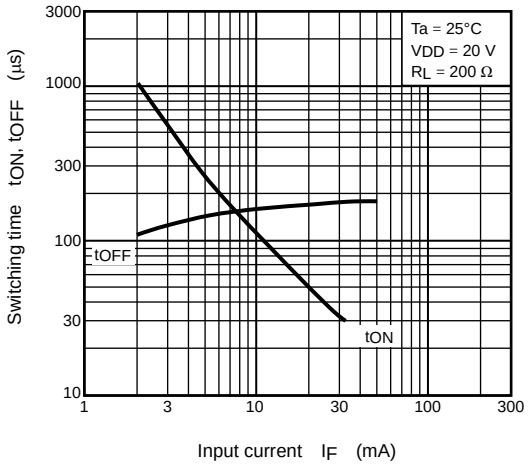
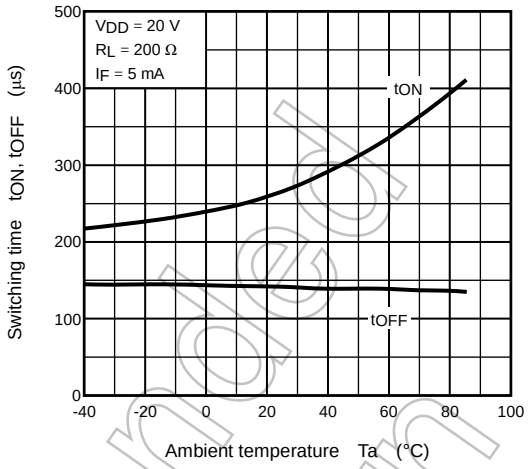
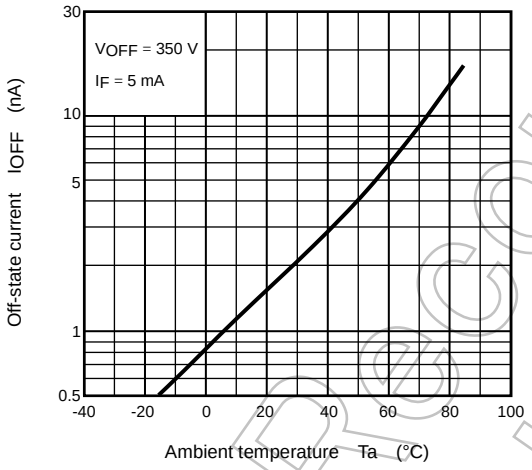
t_{ON}, t_{OFF} – I_F



t_{ON}, t_{OFF} – Ta



I_{OFF} – Ta



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