

TOSHIBA Photocoupler Photorelay

# TLP222G, TLP222G-2

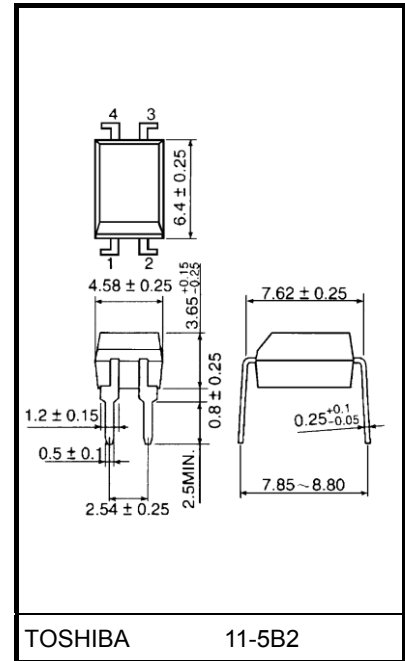
Cordless Telephones  
PBX  
Modems

Unit: mm

The Toshiba TLP222G series consist of a gallium arsenide infrared emitting diode optically coupled to a photo-MOSFET in a DIP package.

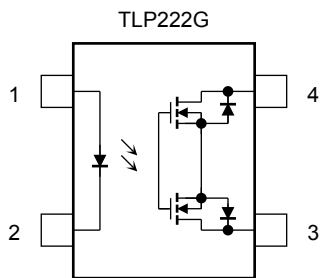
The TLP222G series are a bi-directional switch, which can replace mechanical relays in many applications.

- TLP222G: 4-pin DIP (DIP4), 1-channel type (1-form-A)
- TLP222G-2: 8-pin DIP (DIP8), 2-channel type (2-form-A)
- Peak Off-state voltage: 350 V (min)
- Trigger LED current: 3 mA (max)
- On-state current: 120 mA (max)
- On-state resistance: 35 Ω (max,  $t < 1$  s)
- On-state resistance: 50 Ω (max, continuous)
- Isolation voltage: 2500 Vrms (min)
- UL approved : UL1577, File No.E67349
- cUL approved :CSA Component Acceptance Service  
No. 5A, File No.E67349

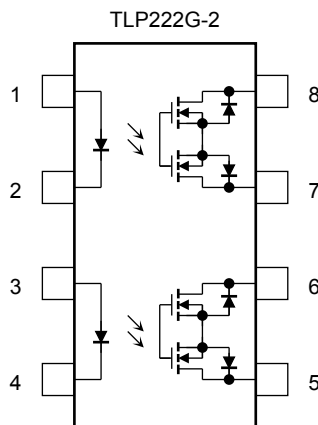


Weight: 0.26 g (typ.)

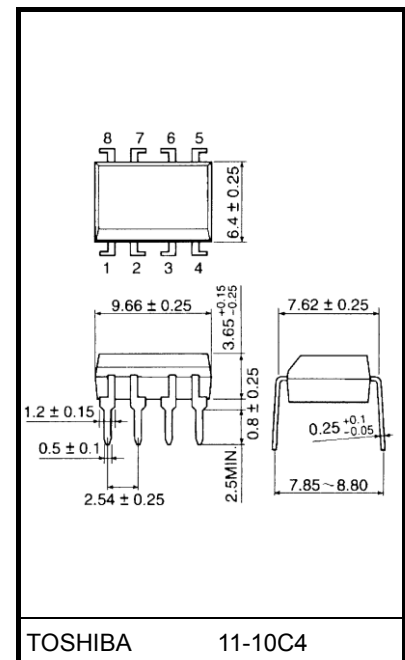
## Pin Configuration (top view)



- 1: Anode
- 2: Cathode
- 3: Drain
- 4: Drain



- 1, 3 : Anode
- 2, 4 : Cathode
- 5 : Drain D1
- 6 : Drain D2
- 7 : Drain D3
- 8 : Drain D4



Weight: 0.54 g (typ.)

Start of commercial production  
2001-12

## Absolute Maximum Rating (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	
	Diode power dissipation	$P_D$	50	mW	
	Diode power dissipation derating (Ta ≥ 25°C)	$\Delta P_D / ^\circ\text{C}$	-0.5	mW/°C	
	Junction temperature	$T_j$	125	°C	
Detector	Off-state output terminal voltage		$V_{OFF}$	350	V
	On-state current	TLP222G	$I_{ON}$	120	mA
		TLP222G-2			
				Two channel operations	
	On-state current derating (Ta ≥ 25°C)	TLP222G	$\Delta I_{ON} / ^\circ\text{C}$	-1.2	mA/°C
		TLP222G-2			
				Two channel operations	
	Output power dissipation		$P_O$	450	mW
	Output power dissipation derating (Ta ≥ 25°C)		$\Delta P_O / ^\circ\text{C}$	-4.5	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, 1 minute, R.H. ≤ 60%) (Note 1)		$BV_S$	2500	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: LED side pins shorted together and detector side pins shorted together.

## Recommended Operating Conditions

Characteristics	Symbol	Min	Typ.	Max	Unit
Supply voltage	$V_{DD}$	—	—	280	V
Forward current	$I_F$	5	7.5	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	$C_T$	$V_F = 0 \text{ V}, f = 1 \text{ MHz}$	—	30	—	pF
Detector	Off-state current	$I_{OFF}$	$V_{OFF} = 350 \text{ V}$	—	—	1	μA
	Capacitance	$C_{OFF}$	$V = 0 \text{ V}, f = 1 \text{ MHz}$	—	30	—	pF

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

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Trigger LED current	$I_{FT}$	$I_{ON} = 120 \text{ mA}$	—	1	3	mA
Return LED current	$I_{FC}$	$I_{OFF} = 100 \mu\text{A}$	0.1	—	—	mA
On-state resistance	$R_{ON}$	$I_{ON} = 120 \text{ mA}, I_F = 5 \text{ mA}, t < 1 \text{ s}$	—	25	35	$\Omega$
		$I_{ON} = 120 \text{ mA}, I_F = 5 \text{ mA}, \text{continuous (Note)}$	—	35	50	

Note : Continuous means a state of thermally saturated.

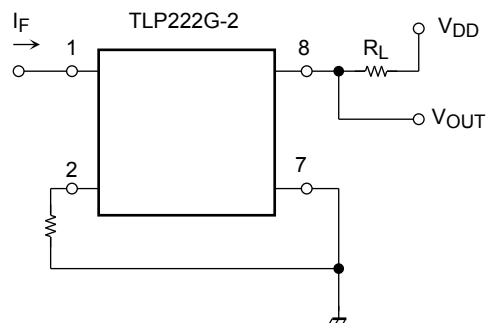
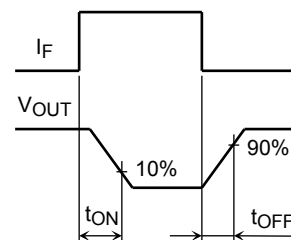
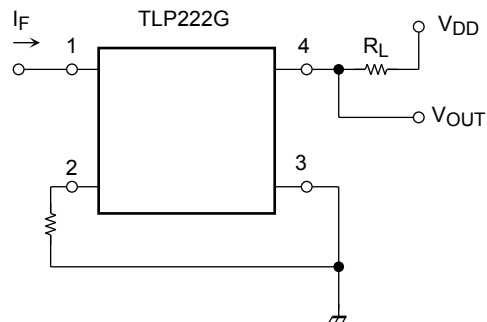
## Isolation Characteristics (Ta = 25°C)

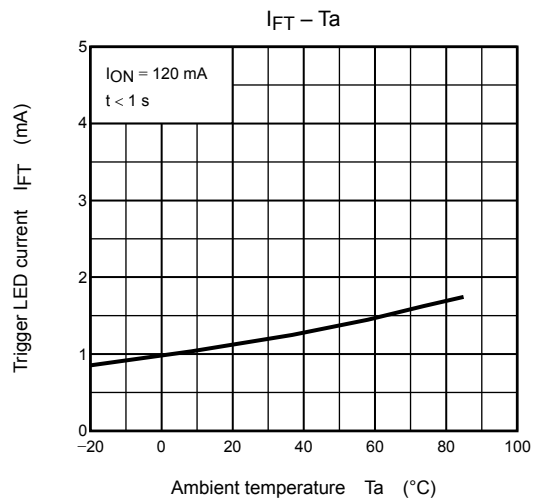
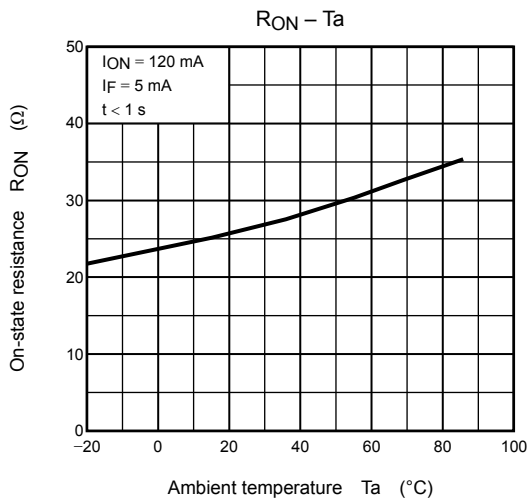
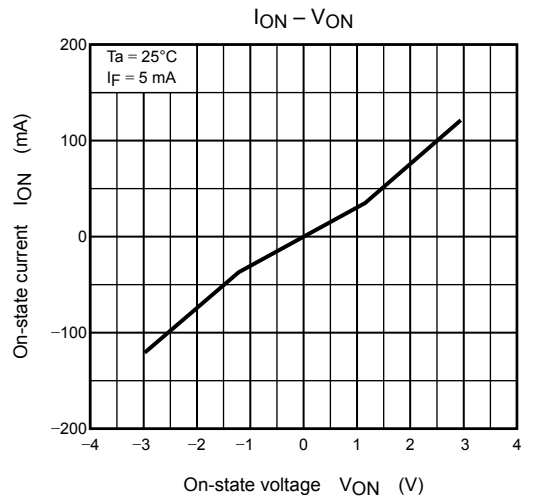
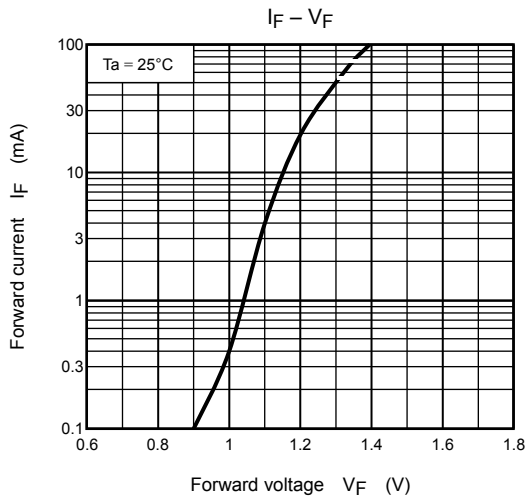
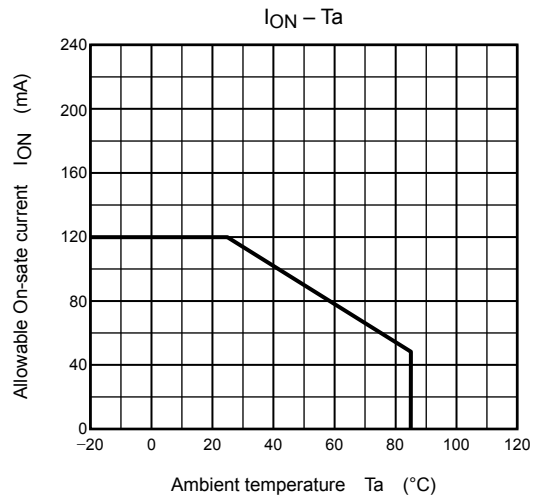
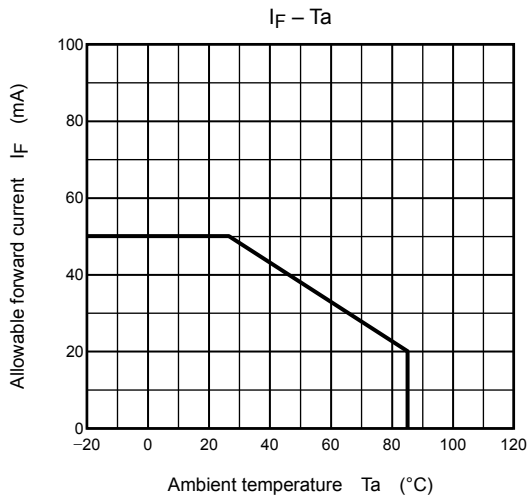
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Capacitance input to output	$C_S$	$V_S = 0 \text{ V}, f = 1 \text{ MHz}$	—	0.8	—	pF
Isolation resistance	$R_S$	$V_S = 500 \text{ V}, \text{R.H.} \leq 60\%$	$5 \times 10^{10}$	$10^{14}$	—	$\Omega$
Isolation voltage	$BV_S$	AC, 1 minute	2500	—	—	Vrms
		AC, 1 second, in oil	—	5000	—	Vrms
		DC, 1 minute, in oil	—	5000	—	Vdc

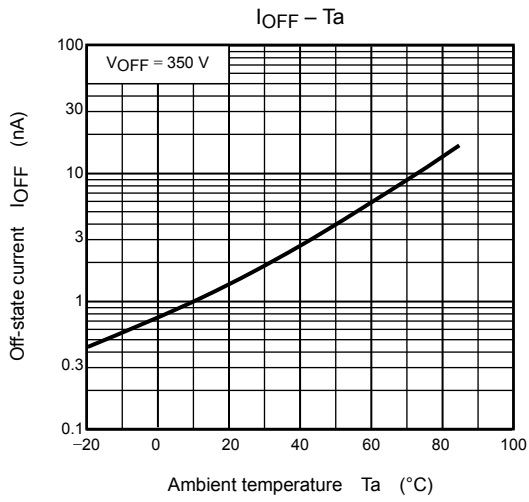
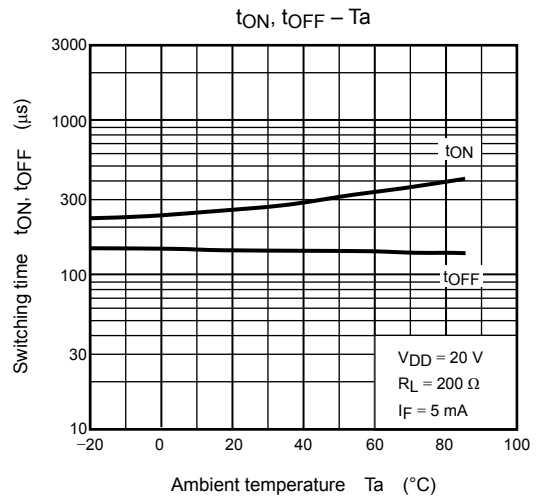
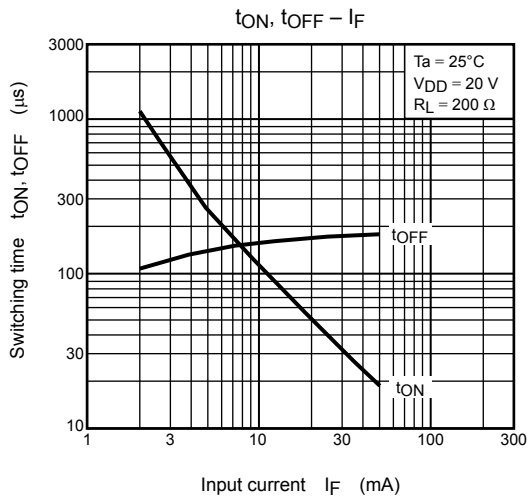
## Switching Characteristics (Ta = 25°C)

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)	—	0.3	1	ms
Turn-off time	$t_{OFF}$		—	0.1	1	

Note : Switching time test circuit







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