

TOSHIBA Photocoupler Photorelay

TLP222G, TLP222G-2

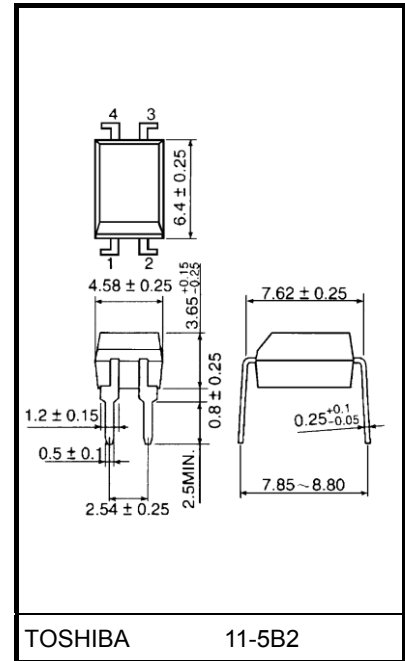
Cordless Telephones
PBX
Modems

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.

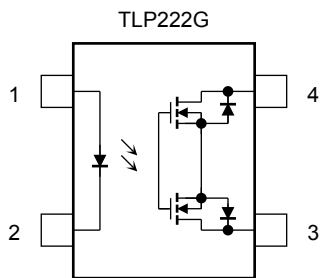
- TLP222G: 4-pin DIP (DIP4), 1-channel type (1-form-A)
- TLP222G-2: 8-pin DIP (DIP8), 2-channel type (2-form-A)
- Peak Off-state voltage: 350 V (min)
- Trigger LED current: 3 mA (max)
- On-state current: 120 mA (max)
- On-state resistance: 35 Ω (max, $t < 1$ s)
- On-state resistance: 50 Ω (max, continuous)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

Unit: mm

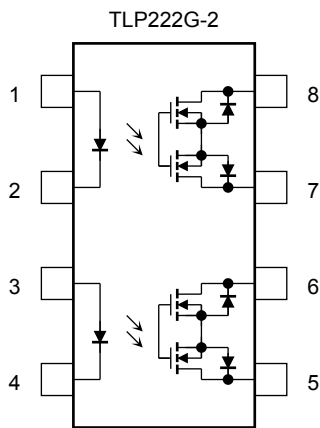


Weight: 0.26 g (typ.)

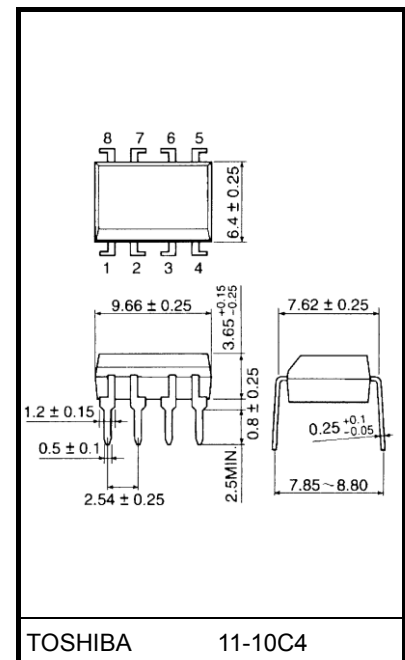
Pin Configuration (top view)



- 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		
Off-state output terminal voltage		V_{OFF}	350	V		
Detector	On-state current	TLP222G	I_{ON}	120	mA	
		TLP222G-2				One channel operation
	On-state current derating (Ta ≥ 25°C)	TLP222G	$\Delta I_{ON} / ^\circ\text{C}$	-1.2	mA/°C	
		TLP222G-2				One channel operation
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	Ω
		$I_{ON} = 120 \text{ mA}, I_F = 5 \text{ mA}, \text{continuous (Note)}$	—	35	50	

Note : Continuous means a state of thermally saturated.

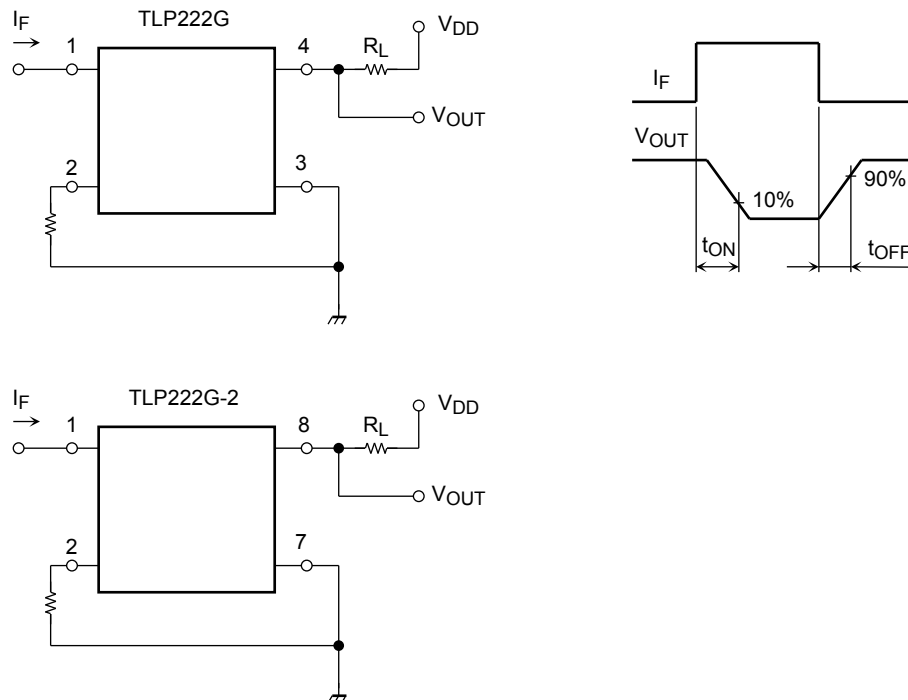
Isolation Characteristics (Ta = 25°C)

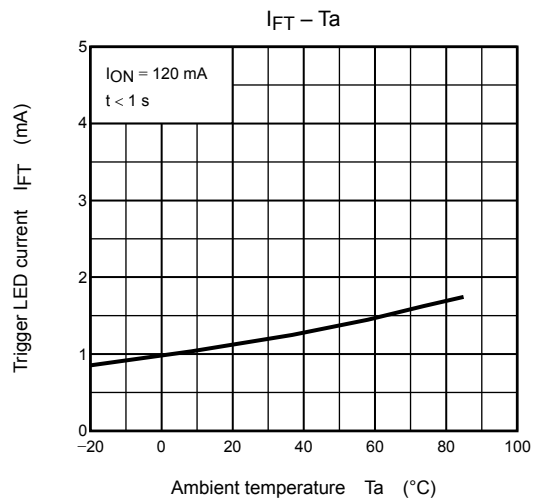
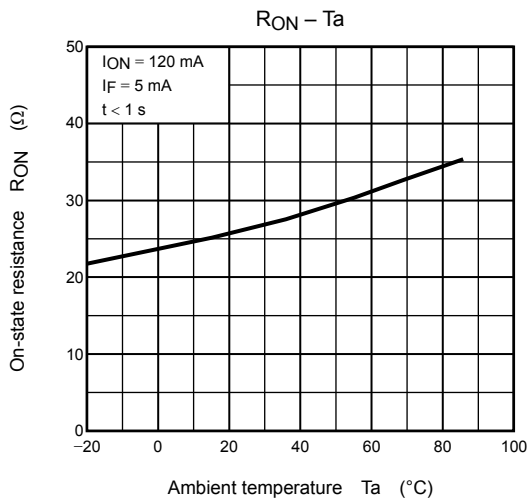
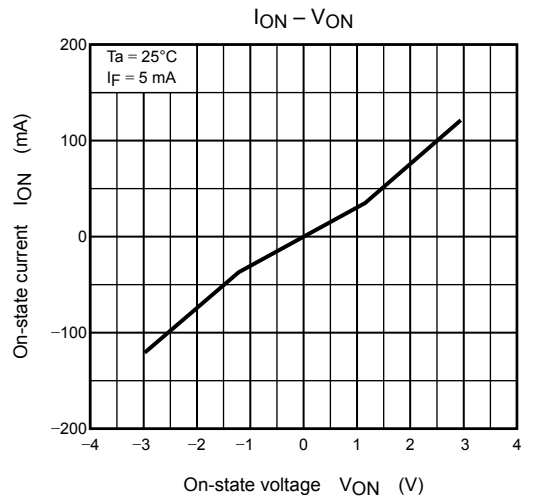
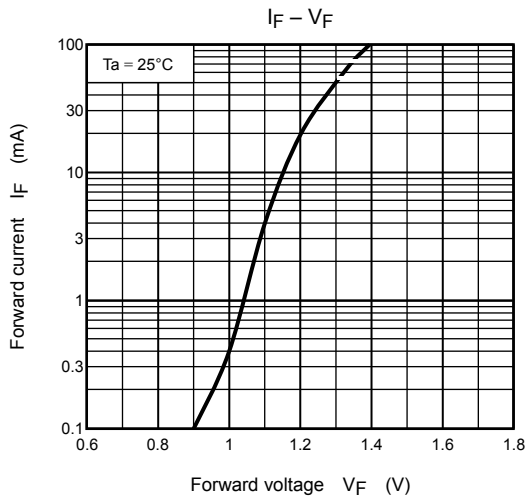
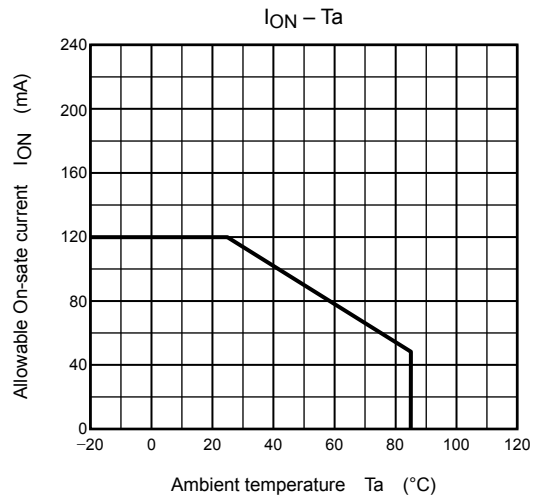
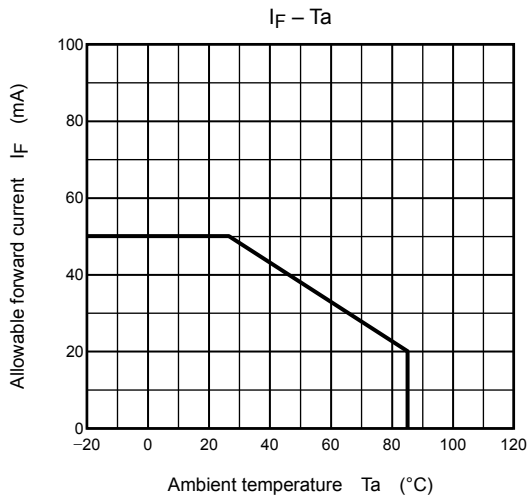
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Capacitance input to output	C_S	$V_S = 0 \text{ V}, f = 1 \text{ MHz}$	—	0.8	—	pF
Isolation resistance	R_S	$V_S = 500 \text{ V}, \text{R.H.} \leq 60\%$	5×10^{10}	10^{14}	—	Ω
Isolation voltage	BV_S	AC, 1 minute	2500	—	—	Vrms
		AC, 1 second, in oil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

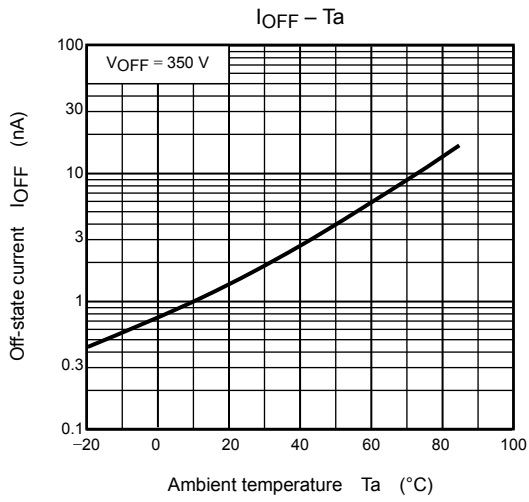
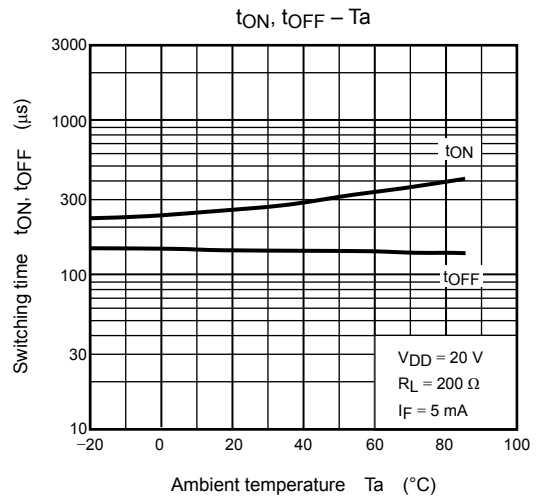
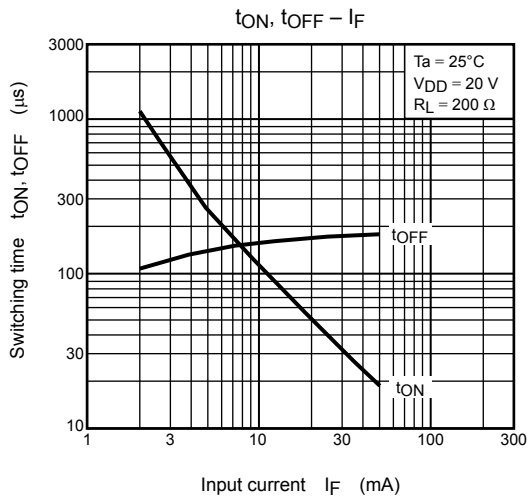
Switching Characteristics (Ta = 25°C)

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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