

TOSHIBA Photocoupler Photorelay

TLP222G, TLP222G-2

Cordless Telephones

PBX

Modems

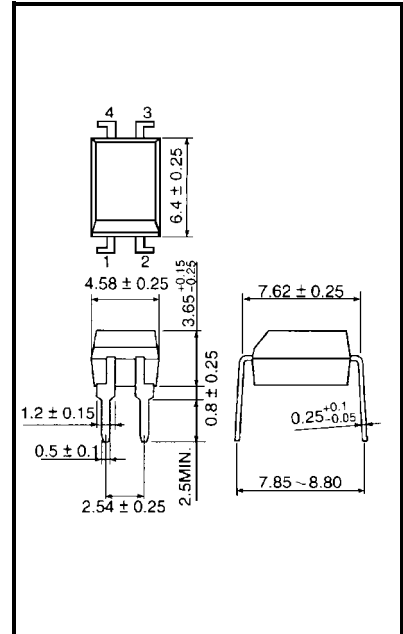
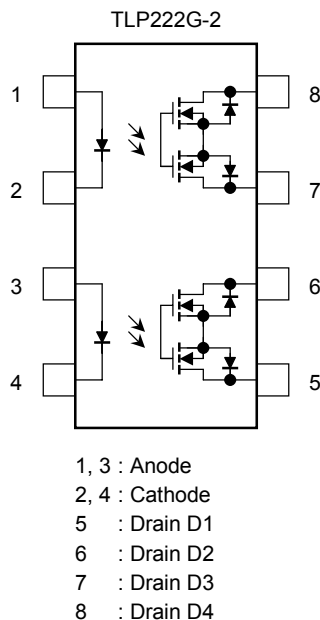
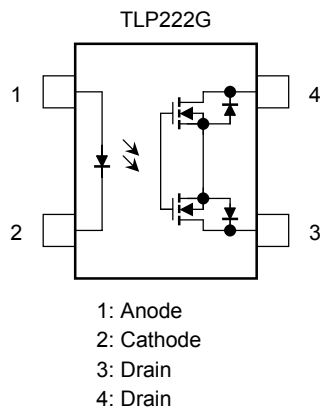
Unit: mm

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.

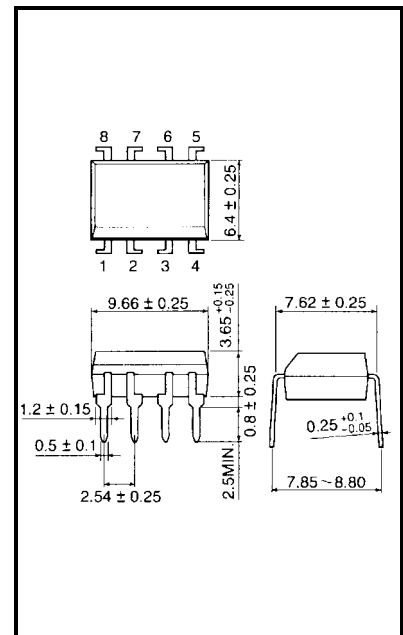
- TLP222G: 4-pin DIP (DIP4), 1-channel type (1-form-A)
- TLP222G-2: 8-pin DIP (DIP8), 2-channel type (2-form-A)
- Peak Off-state voltage: 350 V (min)
- Trigger LED current: 3 mA (max)
- On-state current: 120 mA (max)
- On-state resistance: 35 Ω (max, $t < 1$ s)
- On-state resistance: 50 Ω (max, continuous)
- Isolation voltage: 2500 Vrms (min)

Pin Configuration (top view)



JEDEC	—
JEITA	—
TOSHIBA	11-5B2

Weight: 0.26 g (typ.)



JEDEC	—
JEITA	—
TOSHIBA	11-10C4

Weight: 0.54 g (typ.)

Maximum Rating (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
	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	TLP222G		I _{ON}	120	mA
		TLP222G-2	One channel operation			
			Two channel operations (Note 1)			
	On-state current derating (Ta ≥ 25°C)	TLP222G		ΔI _{ON} /°C	−1.2	mA/°C
		TLP222G-2	One channel operation			
			Two channel operations (Note 1)			
	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 2)				BV _S	2500	Vrms

Note 1: Two channels operating simultaneously.

Note 2: 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

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}	$I_{ON} = 120 \text{ mA}$	—	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
		$I_{ON} = 120 \text{ mA}$, $I_F = 5 \text{ mA}$, continuous	—	35	50	

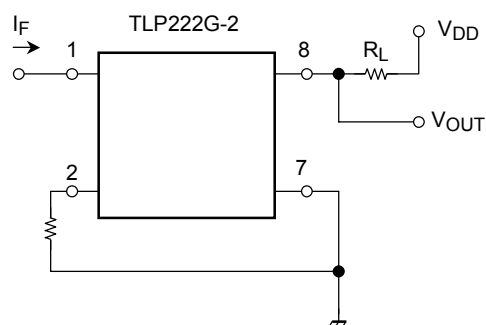
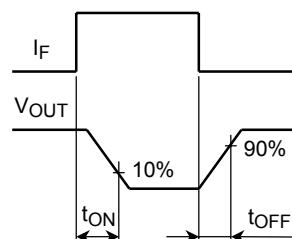
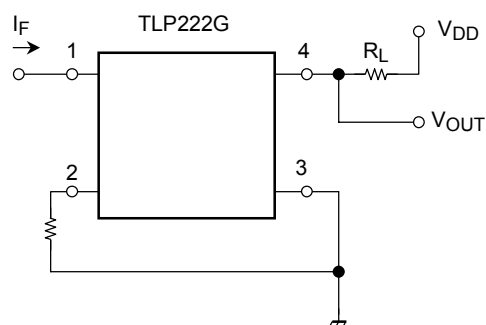
Isolation Characteristics (Ta = 25°C)

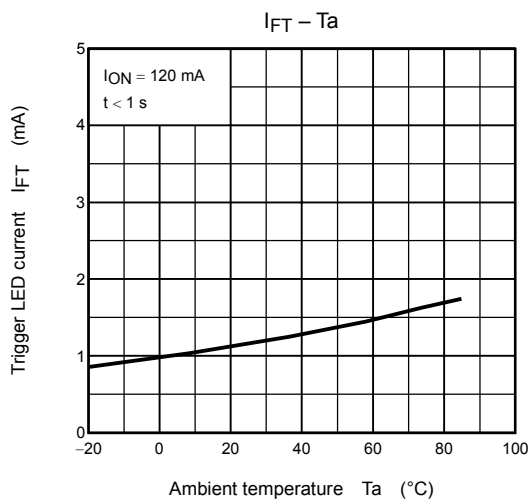
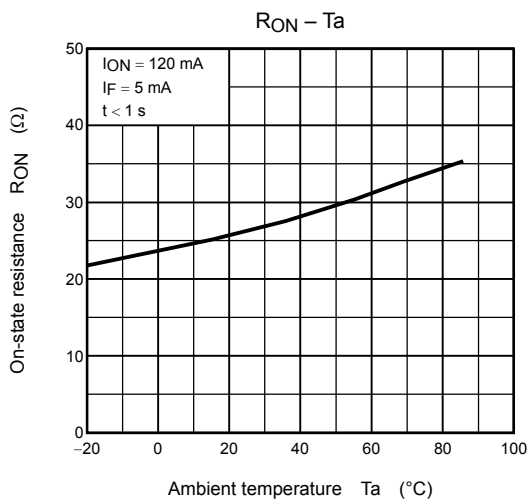
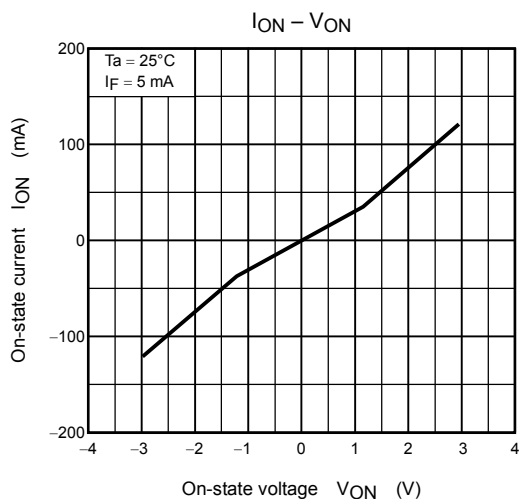
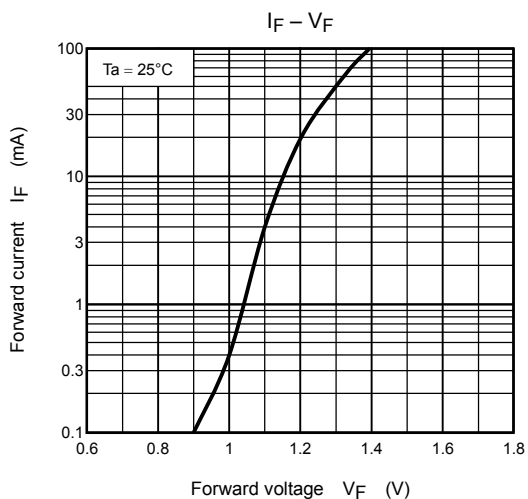
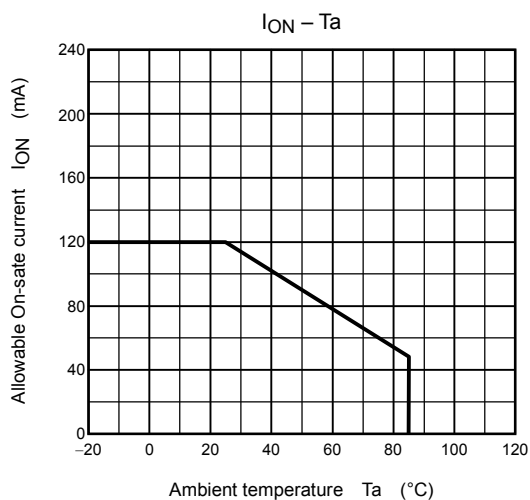
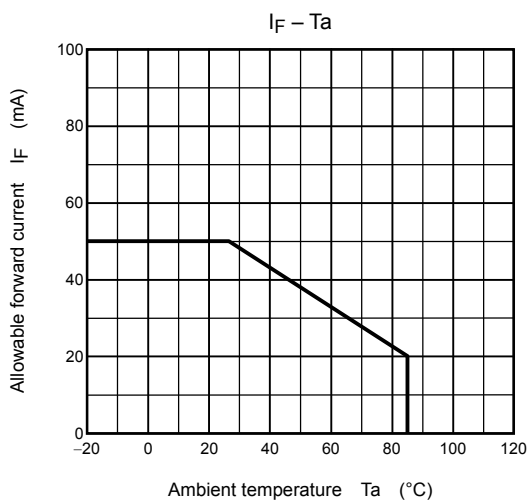
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Capacitance input to output	C_S	$V_S = 0 \text{ V}$, $f = 1 \text{ MHz}$	—	0.8	—	pF
Isolation resistance	R_S	$V_S = 500 \text{ V}$, R.H. $\leq 60\%$	5×10^{10}	10^{14}	—	Ω
Isolation voltage	BV_S	AC, 1 min	2500	—	—	Vrms
		AC, 1 s, in oil	—	5000	—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

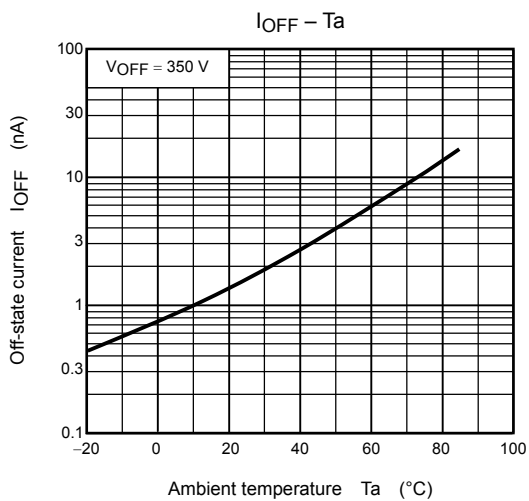
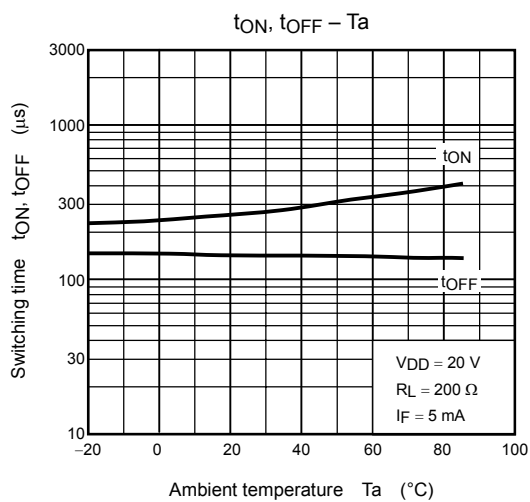
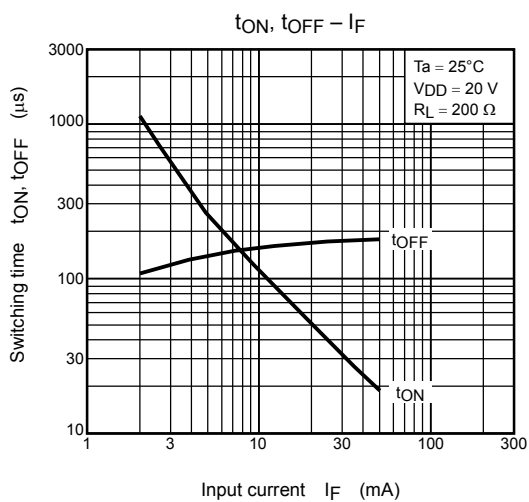
Switching Characteristics (Ta = 25°C)

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 3)	—	0.3	1	ms
Turn-off time	t_{OFF}		—	0.1	1	

Note 3: Switching time test circuit







RESTRICTIONS ON PRODUCT USE

000707EBC

- TOSHIBA is continually working to improve the quality and reliability of its products. Nevertheless, semiconductor devices in general can malfunction or fail due to their inherent electrical sensitivity and vulnerability to physical stress. It is the responsibility of the buyer, when utilizing TOSHIBA products, to comply with the standards of safety in making a safe design for the entire system, and to avoid situations in which a malfunction or failure of such TOSHIBA products could cause loss of human life, bodily injury or damage to property.
In developing your designs, please ensure that TOSHIBA products are used within specified operating ranges as set forth in the most recent TOSHIBA products specifications. Also, please keep in mind the precautions and conditions set forth in the "Handling Guide for Semiconductor Devices," or "TOSHIBA Semiconductor Reliability Handbook" etc..
- The TOSHIBA products listed in this document are intended for usage in general electronics applications (computer, personal equipment, office equipment, measuring equipment, industrial robotics, domestic appliances, etc.). These TOSHIBA products are neither intended nor warranted for usage in equipment that requires extraordinarily high quality and/or reliability or a malfunction or failure of which may cause loss of human life or bodily injury ("Unintended Usage"). Unintended Usage include atomic energy control instruments, airplane or spaceship instruments, transportation instruments, traffic signal instruments, combustion control instruments, medical instruments, all types of safety devices, etc.. Unintended Usage of TOSHIBA products listed in this document shall be made at the customer's own risk.
- Gallium arsenide (GaAs) is a substance used in the products described in this document. GaAs dust and fumes are toxic. Do not break, cut or pulverize the product, or use chemicals to dissolve them. When disposing of the products, follow the appropriate regulations. Do not dispose of the products with other industrial waste or with domestic garbage.
- The products described in this document are subject to the foreign exchange and foreign trade laws.
- The information contained herein is presented only as a guide for the applications of our products. No responsibility is assumed by TOSHIBA CORPORATION for any infringements of intellectual property or other rights of the third parties which may result from its use. No license is granted by implication or otherwise under any intellectual property or other rights of TOSHIBA CORPORATION or others.
- The information contained herein is subject to change without notice.