

TOSHIBA Photocoupler Photorelay

# TLP222G, TLP222G-2

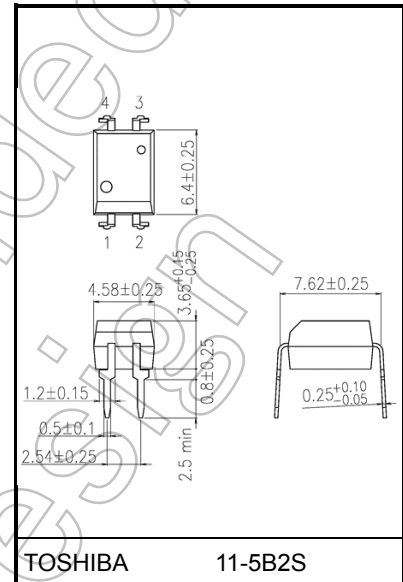
Cordless Telephones  
PBX  
Modems

The Toshiba TLP222G series consist of an 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.

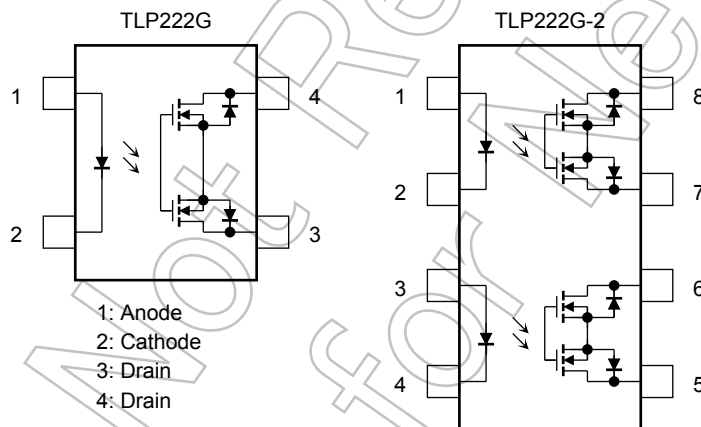
- TLP222G: 4-pin DIP (DIP4), 1-channel type (1-form-A)
- TLP222G-2: 8-pin DIP (DIP8), 2-channel type (2-form-A)
- Peak Off-state voltage: 350 V (min)
- Trigger LED current: 3 mA (max)
- On-state current: 120 mA (max)
- On-state resistance: 35 Ω (max,  $t < 1$  s)
- On-state resistance: 50 Ω (max, continuous)
- Isolation voltage: 2500 Vrms (min)
- UL-recognized: UL 1577, File No.E67349
- cUL-recognized: CSA Component Acceptance Service No.5A  
File No.E67349

Unit: mm



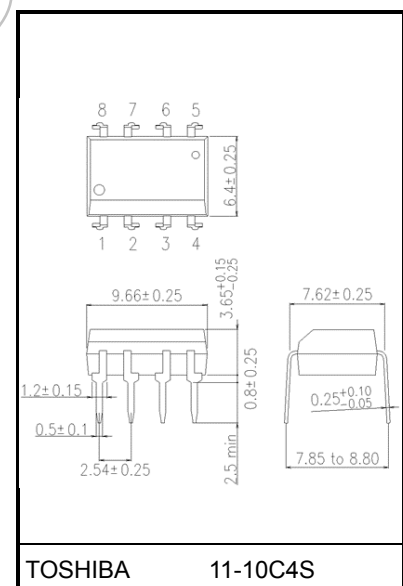
Weight: 0.26 g (typ.)

### 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	IF	50	mA		
	Forward current derating (Ta ≥ 25°C)	ΔIF/°C	-0.5	mA/°C		
	Peak forward current (100 μs pulse, 100 pps)	IFP	1	A		
	Reverse voltage	VR	5	V		
	Diode power dissipation	Pd	50	mW		
	Diode power dissipation derating (Ta ≥ 25°C)	ΔPd/°C	-0.5	mW/°C		
	Junction temperature	Tj	125	°C		
Off-state output terminal voltage		VOFF	350	V		
Detector	On-state current	TLP222G	ION	120	mA	
		TLP222G-2				One channel operation
	On-state current derating (Ta ≥ 25°C)	TLP222G	ΔION/°C	-1.2	mA/°C	
		TLP222G-2				One channel operation
Output power dissipation		PO	450	mW		
Output power dissipation derating (Ta ≥ 25°C)		ΔPO/°C	-4.5	mW/°C		
Junction temperature		Tj	125	°C		
Storage temperature range		Tstg	-55 to 125	°C		
Operating temperature range		Topr	-40 to 85	°C		
Lead soldering temperature (10 s)		Tsol	260	°C		
Isolation voltage (AC, 60 s, R.H. ≤ 60 %)		(Note 1) BVs	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	VDD	—	—	280	V
Forward current	IF	5	7.5	25	mA
On-state current	ION	—	—	100	mA
Operating temperature	Topr	-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	VF	IF = 10 mA	1.0	1.15	1.3	V
	Reverse current	IR	VR = 5 V	—	—	10	μA
	Capacitance	CT	VF = 0 V, f = 1 MHz	—	30	—	pF
Detector	Off-state current	IOFF	VOFF = 350 V	—	—	1	μA
	Capacitance	COFF	V = 0 V, f = 1 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.

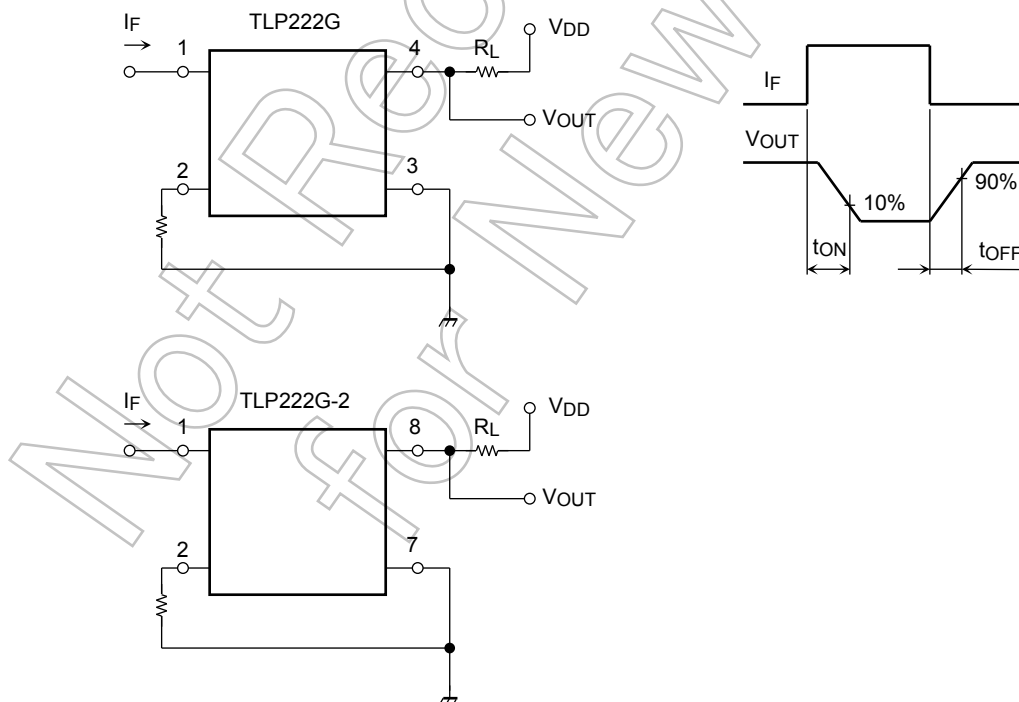
### Isolation Characteristics (Ta = 25°C)

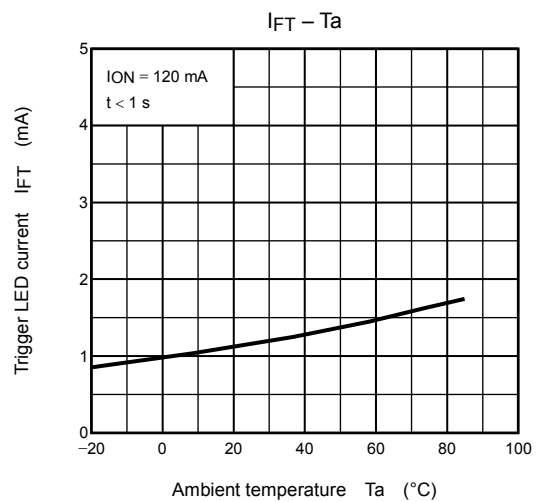
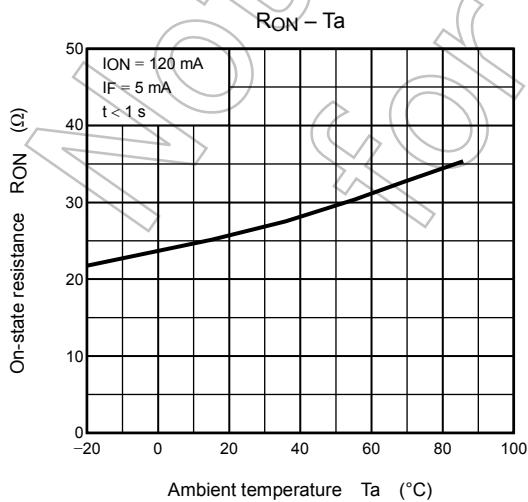
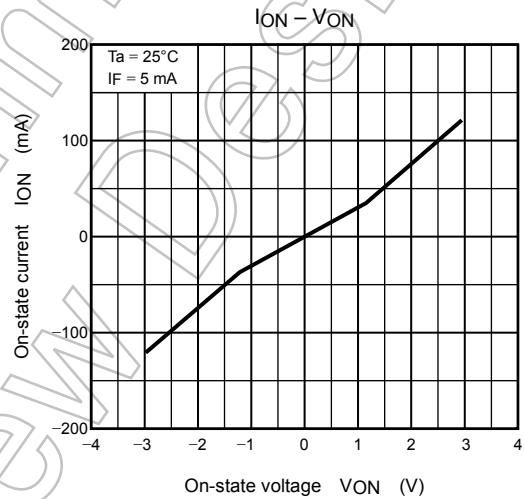
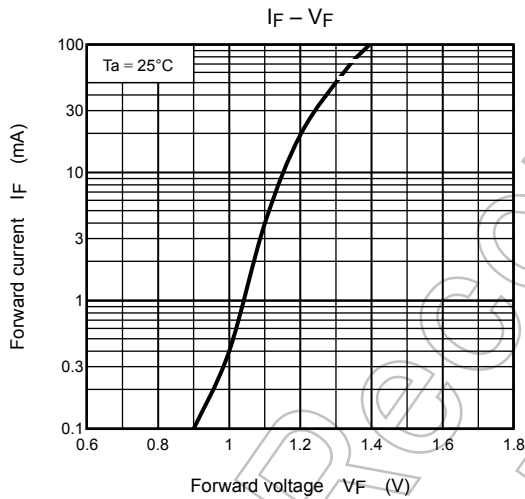
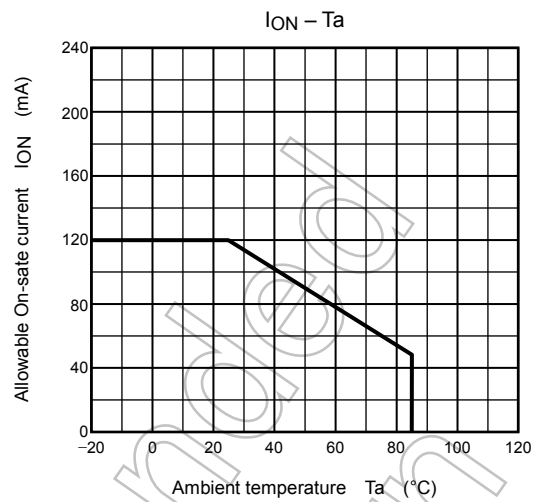
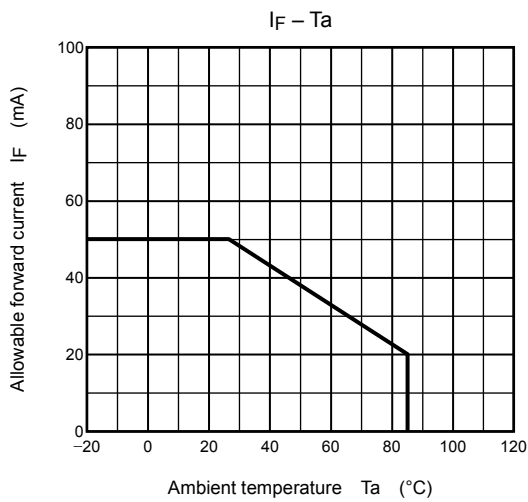
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Capacitance input to output	$C_S$	$V_S = 0 \text{ V}, f = 1 \text{ MHz}$	—	0.8	—	pF
Isolation resistance	$R_S$	$V_S = 500 \text{ V}, \text{R.H.} \leq 60 \%$	$5 \times 10^{10}$	$10^{14}$	—	$\Omega$
Isolation voltage	$BV_S$	AC, 60 s	2500	—	—	Vrms

### Switching Characteristics (Ta = 25°C)

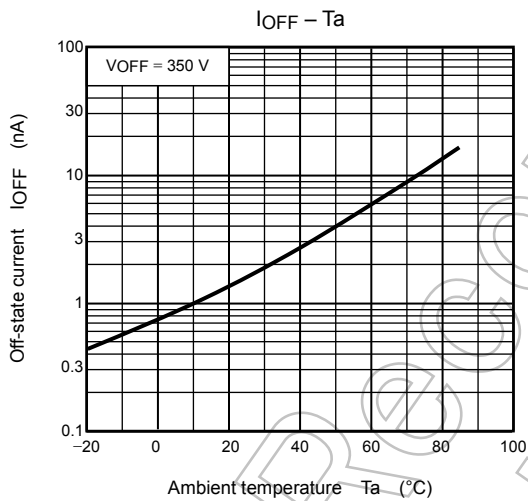
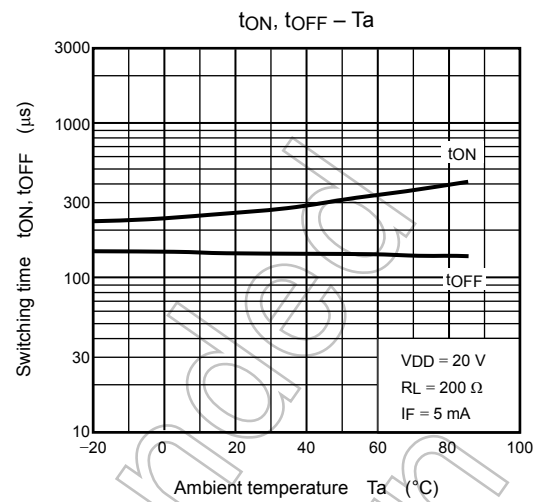
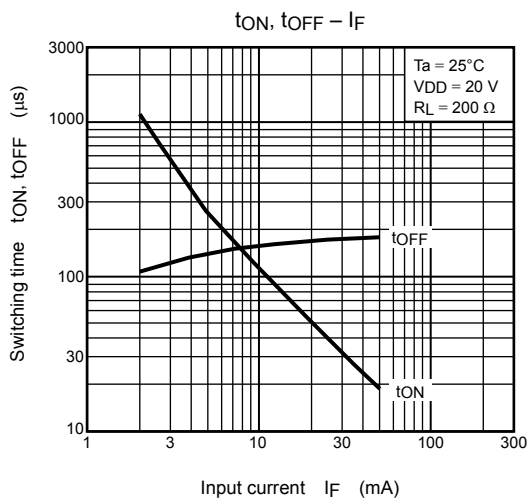
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Turn-on time	$t_{ON}$	$R_L = 200 \Omega$ $V_{DD} = 20 \text{ V}, I_F = 5 \text{ mA}$ (Note)	—	0.3	1	ms
Turn-off time	$t_{OFF}$		—	0.1	1	

Note : Switching time test circuit





NOTE: The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.



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