

TOSHIBA Photocoupler Photo Relay

# TLP227G, TLP227G-2

Cordless Telephone  
PBX  
Modem

Unit: mm

The TOSHIBA TLP227G series consist of a gallium arsenide infrared emitting diode optically coupled to a photo-MOS FET in a plastic DIP package.

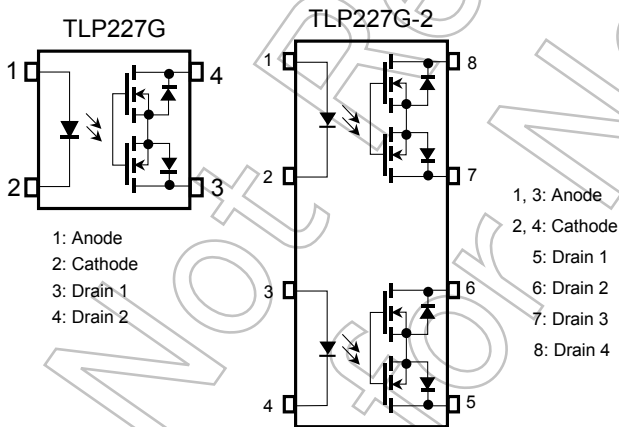
The TLP227G series are a bi-directional switch which can replace mechanical relays in many applications.

- TLP227G: 4 pin DIP(DIP4), 1 channel type(1 form A)
- TLP227G-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)
- Isolation voltage: 2500 Vrms (min)
- Isolation thickness: 0.4mm(min)
- UL approved: UL1577, File No.E67349 Under application
- cUL approved :CSA Component Acceptance Service No. 5A, File No.E67349

Option (V4) VDE approved : DIN EN60747-5-5 (Note 1)

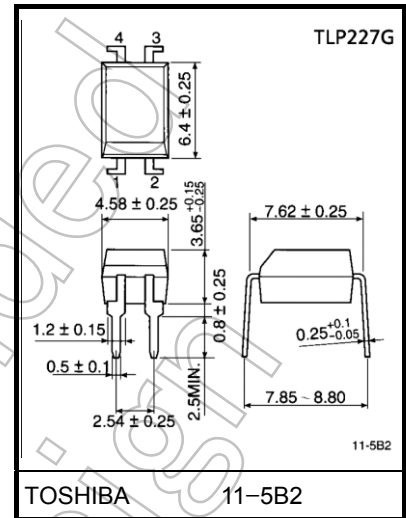
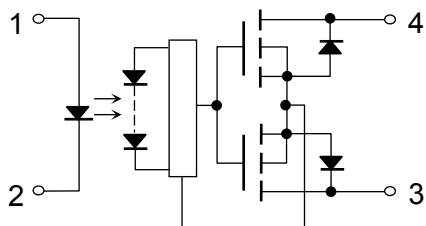
(Note 1) : When a EN60747-5-5 approved type is needed, please designate "Option(V4)"

## Pin Configuration (top view)



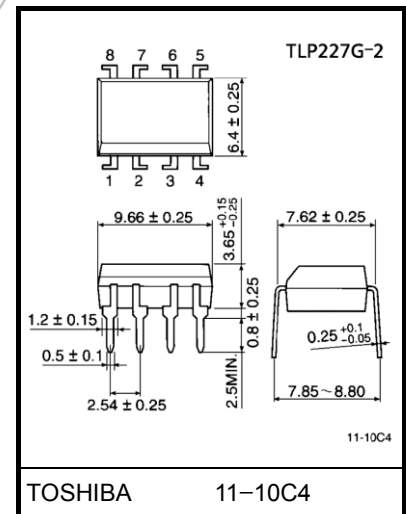
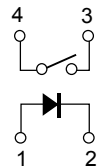
## Internal Circuit

(TLP227G)



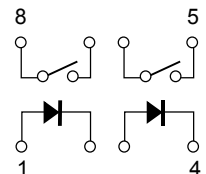
Weight: 0.26g (typ.)

1 Form A



Weight: 0.54g (typ.)

2 Form A



Start of commercial production  
1995-11

**Absolute Maximum Ratings (Ta = 25°C)**

Characteristic		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 (100µs pulse, 100pps)	$I_{FP}$	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	TLP227G	$I_{ON}$	120	mA	
		TLP227G-2		One channel		120
				Both channel (Note 1)		100
	On-state current derating (Ta ≥ 25°C)	TLP227G	$\Delta I_{ON} / ^\circ\text{C}$	-1.2	mA / °C	
		TLP227G-2		One channel		-1.2
				Both channel (Note 1)		-1.0
	Output power dissipation	TLP227G	$P_O$	432	mW	
		TLP227G-2		600		
	Output power dissipation derating (Ta ≥ 25°C)	TLP227G	$\Delta P_O / ^\circ\text{C}$	-4.32	mW / °C	
TLP227G-2		-6.0				
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 2) $BV_S$	2500	$V_{rms}$			

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): 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**

Characteristic	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.

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

Characteristic		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	$\mu\text{A}$
	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	$\mu\text{A}$
	Capacitance	$C_{OFF}$	$V = 0 \text{ V}, f = 1 \text{ MHz}$	—	40	—	pF

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

Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Trigger LED current	$I_{FT}$	$I_{ON} = 120 \text{ mA}$	—	2	3	mA
On-state resistance	$R_{ON}$	$I_{ON} = 120 \text{ mA}, I_F = 5 \text{ mA}$	—	22	35	$\Omega$
		$I_{ON} = 20 \text{ to } 120 \text{ mA}, I_F = 5 \text{ mA}$	—	26	40	
Return LED current	$I_{FC}$	$I_{OFF} = 100 \mu\text{A}$	0.1	—	—	mA

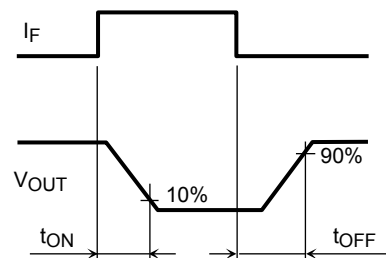
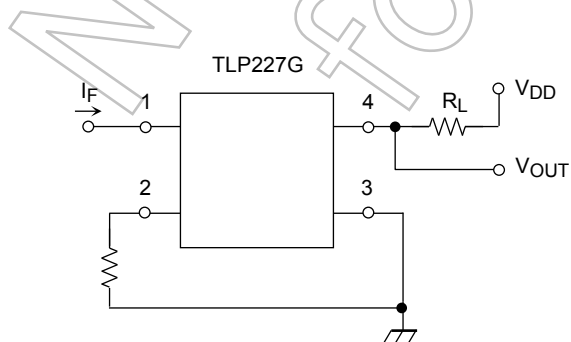
## Isolation Characteristics (Ta = 25°C)

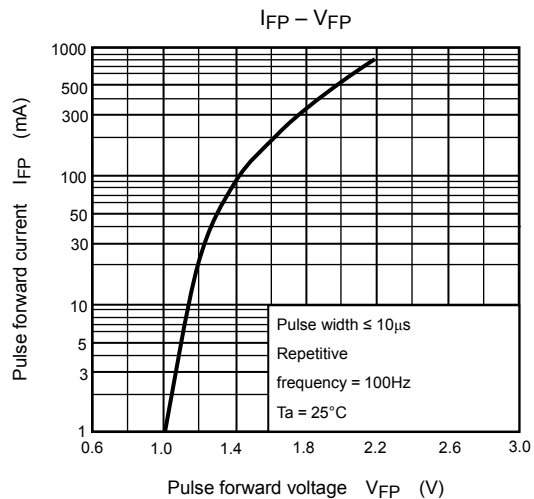
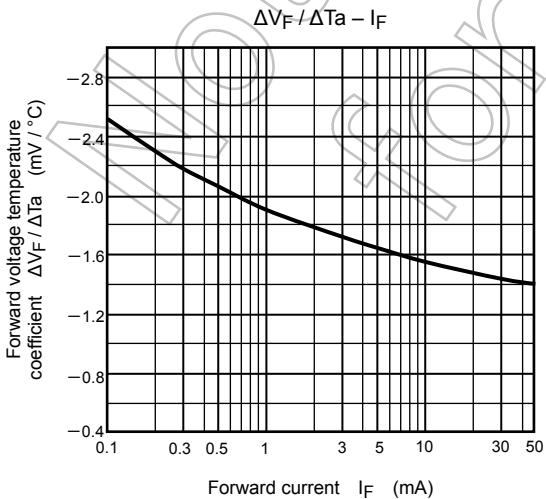
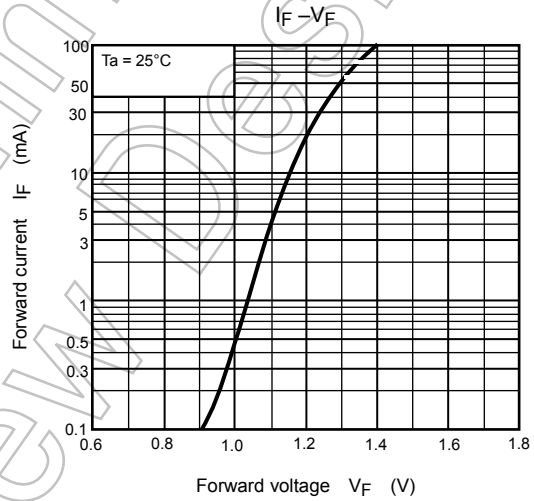
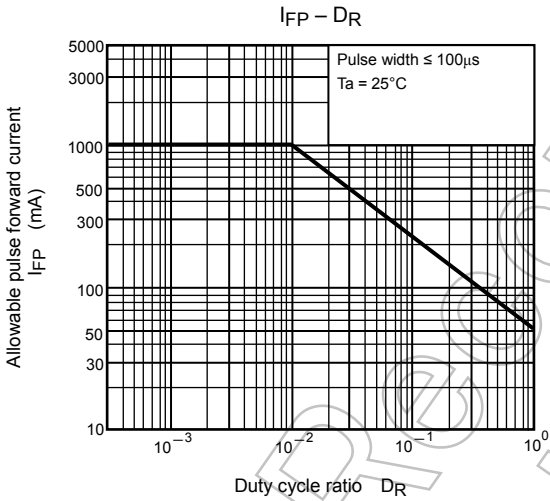
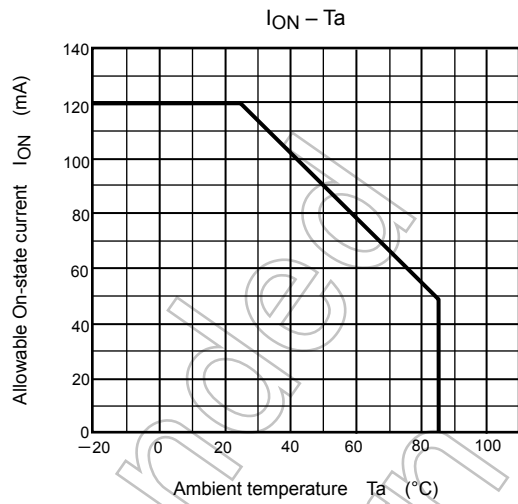
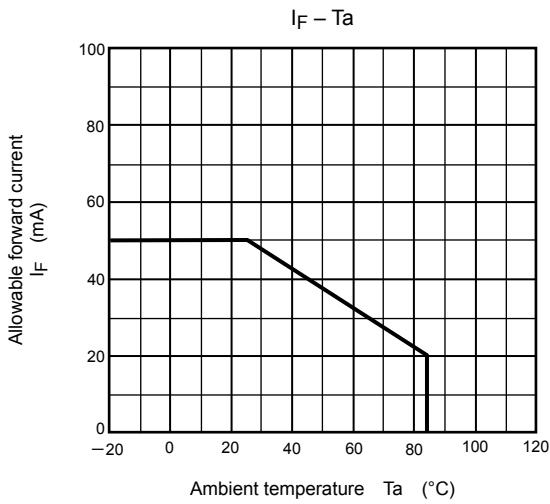
Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Capacitance input to output	$C_S$	$V_S = 0 \text{ V}, f = 1 \text{ MHz}$	—	0.8	—	pF
Isolation resistance	$R_S$	$V_S = 500 \text{ V}, \text{R.H.} \leq 60\%$	$5 \times 10^{10}$	$10^{14}$	—	$\Omega$
Isolation voltage	$BV_S$	AC, 1 minute	2500	—	—	$V_{\text{rms}}$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

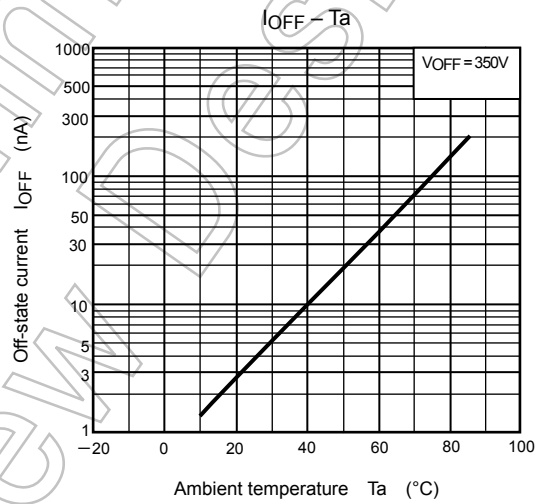
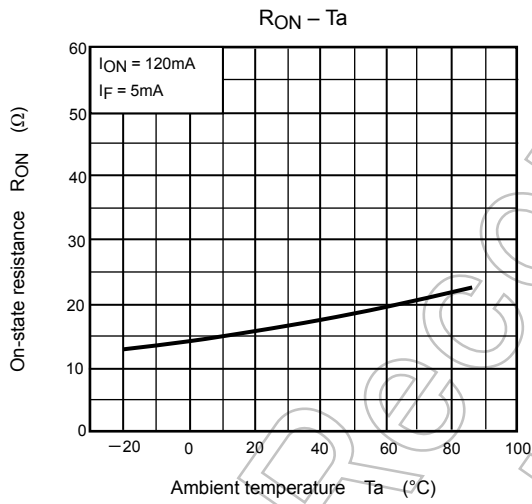
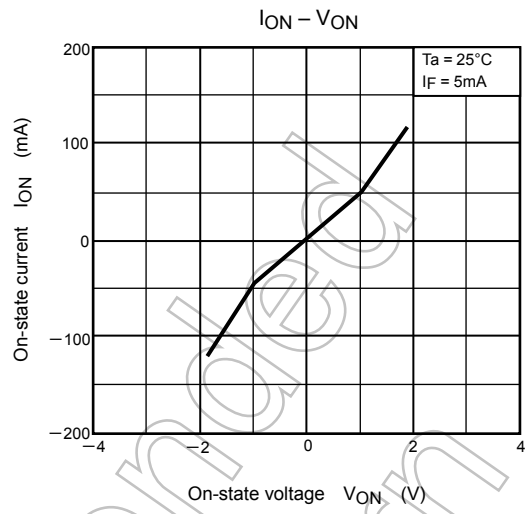
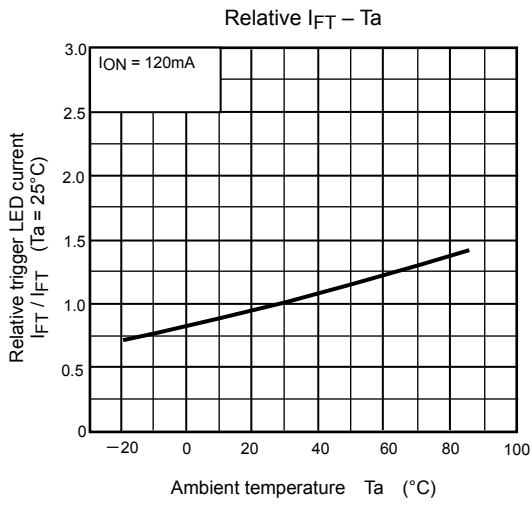
## Switching Characteristics (Ta = 25°C)

Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Turn-on time	$t_{ON}$	$R_L = 200 \Omega$	—	0.3	1	ms
Turn-off time	$t_{OFF}$	$V_{DD} = 20 \text{ V}, I_F = 5 \text{ mA}$ (Note 3)	—	0.1	1	

(Note 3) : Switching Time Test Circuit







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