

TOSHIBA Photocoupler Photorelay

# TLP172G

Modem-Fax Cards, Modems in PC  
Telecommunications  
PBX  
Measurement Equipment

Unit: mm

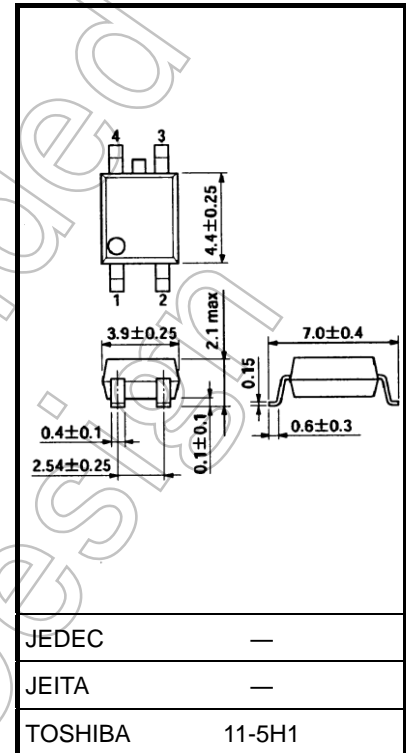
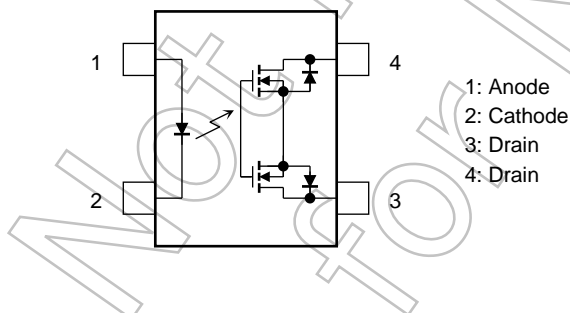
The Toshiba TLP172G consists of an aluminum gallium arsenide infrared emitting diode optically coupled to a photo-MOSFET in a SOP, which is suitable for surface mount assembly.

The TLP172G is suitable for the modem applications which require space savings.

- 4-pin SOP (2.54SOP4): Height = 2.1 mm, Pitch = 2.54 mm
- 1-Form-A
- Peak Off-state voltage: 350 V (min)
- Trigger LED current: 3 mA (max)
- On-state current: 110 mA (max)
- On-state resistance: 35 Ω (max t < 1 s)
- On-state resistance: 50 Ω (max continuous)
- Isolation voltage: 1500 Vrms (min)
- UL recognized: UL1577, File No. E67349
- cUL recognized: CSA Component Acceptance Service No. 5A  
File No. E67349
- Option (V4) VDE approved: EN60747-5-5 (Note1)

**(Note 1) When a VDE approved type is needed, please designate the "Option(V4)"**

### Pin Configuration (top view)



Weight: 0.1 g (typ.)

Start of commercial production  
2001/12

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

Characteristics		Symbol	Rating	Unit
LED	Forward current	I <sub>F</sub>	50	mA
	Forward current derating (Ta ≥ 25°C)	ΔI <sub>F</sub> /°C	-0.5	mA/°C
	Reverse voltage	V <sub>R</sub>	5	V
	Diode power dissipation	P <sub>D</sub>	50	mW
	Diode power dissipation derating (Ta >25°C)	ΔP <sub>D</sub> /°C	-0.5	mW/°C
	Junction temperature	T <sub>j</sub>	125	°C
Detector	Off-state output terminal voltage	V <sub>OFF</sub>	350	V
	On-state current	I <sub>ON</sub>	110	mA
	On-state current derating (Ta ≥ 25°C)	ΔI <sub>ON</sub> /°C	-1.1	mA/°C
	Output power dissipation	P <sub>C</sub>	300	mW
	Output power dissipation derating (Ta ≥ 25°C)	ΔP <sub>C</sub> /°C	-3.0	mW / °C
	Junction temperature	T <sub>j</sub>	125	°C
Storage temperature range		T <sub>stg</sub>	-55 to 125	°C
Operating temperature range		T <sub>opr</sub>	-40 to 85	°C
Lead soldering temperature (10 s)		T <sub>sol</sub>	260	°C
Isolation voltage (AC, 1 minute, R.H. ≤ 60%) (Note 1)		BVS	1500	V <sub>rms</sub>

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 <sub>DD</sub>	—	—	280	V
Forward current	I <sub>F</sub>	5	7.5	25	mA
On-state current	I <sub>ON</sub>	—	—	100	mA
Operating temperature	T <sub>opr</sub>	-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 <sub>F</sub>	I <sub>F</sub> = 10 mA	1.0	1.15	1.3	V
	Reverse current	I <sub>R</sub>	V <sub>R</sub> = 5 V	—	—	10	μA
	Capacitance	C <sub>T</sub>	V = 0 V, f = 1 MHz	—	30	—	pF
Detector	Off-state current	I <sub>OFF</sub>	V <sub>OFF</sub> = 350 V	—	—	1	μA
	Capacitance	C <sub>OFF</sub>	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 <sub>FT</sub>	I <sub>ON</sub> = 110 mA	—	1	3	mA
Return LED current	I <sub>FC</sub>	I <sub>OFF</sub> = 100 μA	0.1	—	—	mA
On-state resistance	R <sub>ON</sub>	I <sub>ON</sub> = 110 mA, I <sub>F</sub> = 5 mA, t < 1 s	—	25	35	Ω
		I <sub>ON</sub> = 110 mA, I <sub>F</sub> = 5 mA, continuous	—	35	50	

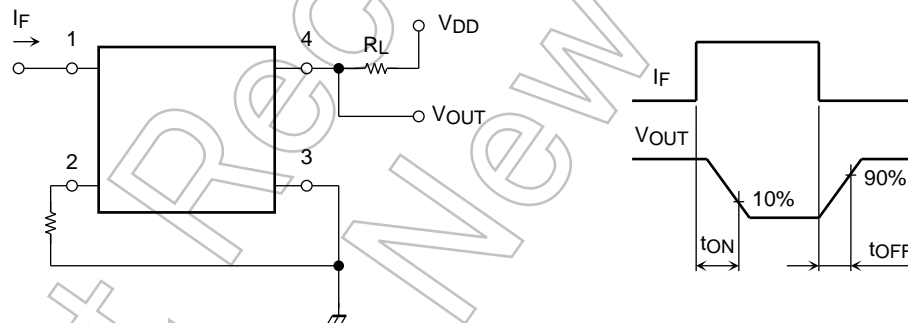
**Isolation Characteristics (Ta = 25°C)**

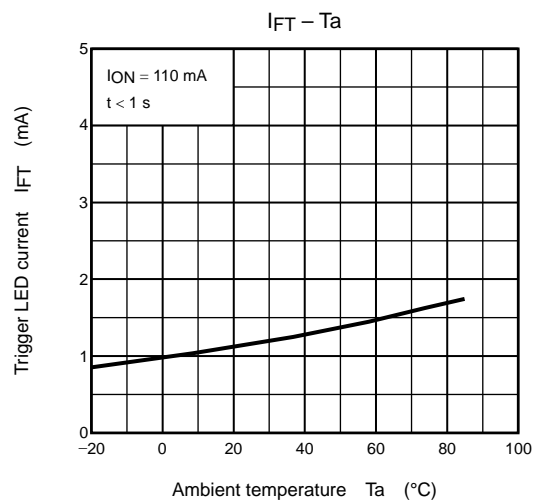
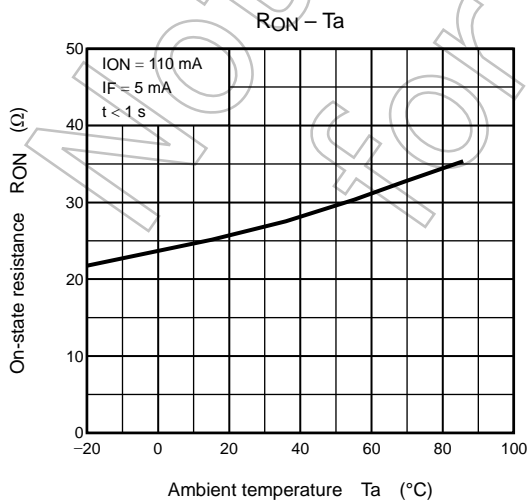
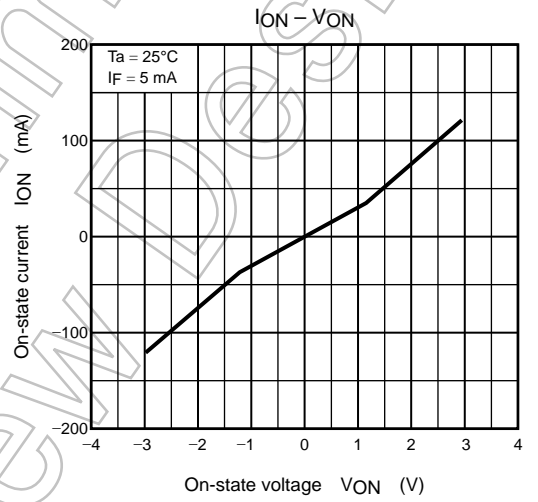
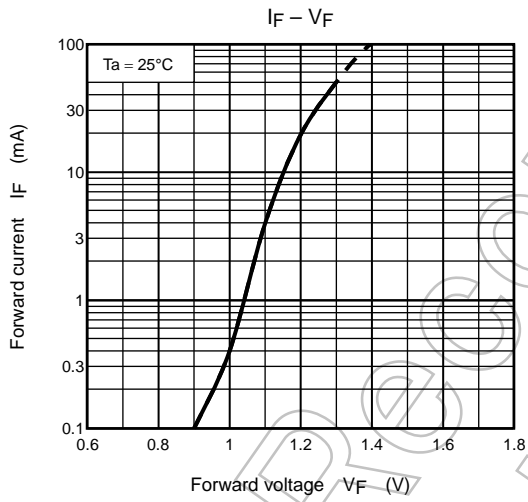
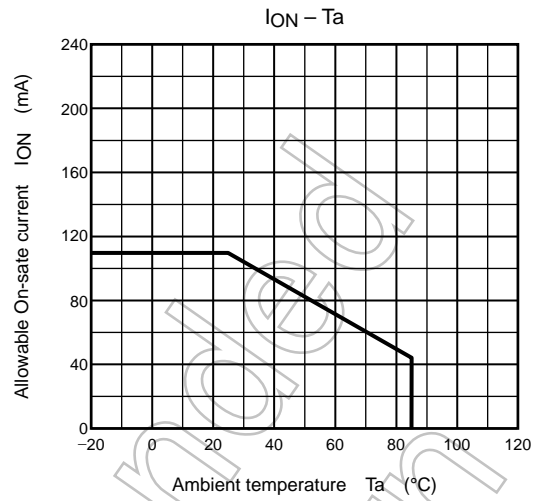
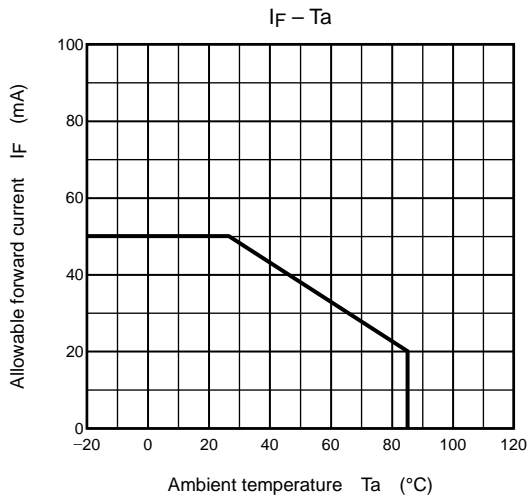
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Capacitance input to output	C <sub>S</sub>	V <sub>S</sub> = 0 V, f = 1 MHz	—	0.8	—	pF
Isolation resistance	R <sub>S</sub>	V <sub>S</sub> = 500 V, R.H. ≤ 60%	5 × 10 <sup>10</sup>	10 <sup>14</sup>	—	Ω
Isolation voltage	B <sub>V</sub> <sub>S</sub>	AC, 1 minute	1500	—	—	V <sub>rms</sub>
		AC, 1 second, in oil	—	3000	—	
		DC, 1 minute, in oil	—	3000	—	V <sub>dc</sub>

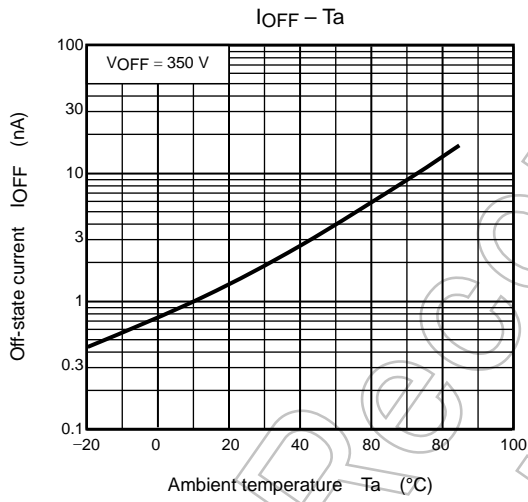
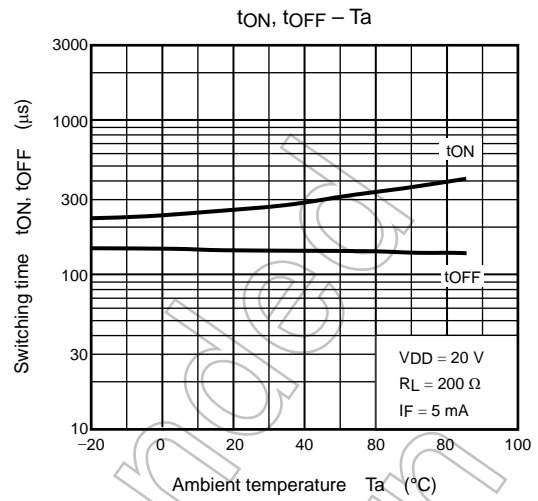
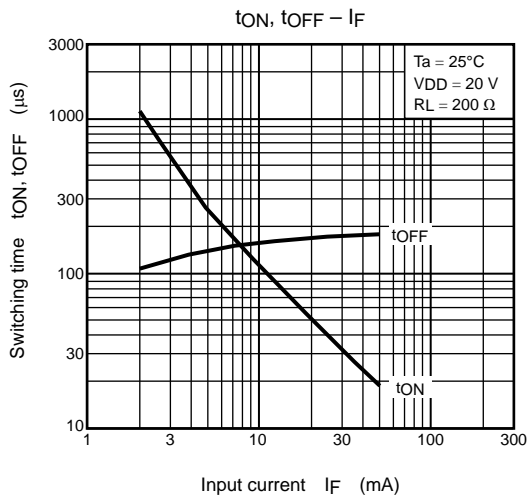
**Switching Characteristics (Ta = 25°C)**

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Turn-on time	t <sub>ON</sub>	R <sub>L</sub> = 200 Ω V <sub>DD</sub> = 20 V, I <sub>F</sub> = 5 mA (Note 2)	—	0.3	1	ms
Turn-off time	t <sub>OFF</sub>		—	0.1	1	

Note 2: Switching time test circuit







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