TOSHIBA Photocoupler Photorelay

TLP222G, TLP222G-2

Cordless Telephones

PBX

Modems

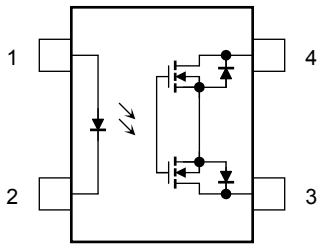
The Toshiba TLP222G series consist of a gallium arsenide infrared emitting diode optically coupled to a photo-MOSFET in a DIP package.

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)
- BSI approved: BS EN60065:2002, certificate no.8773
  BS EN60950-1:2002, certificate no.8774

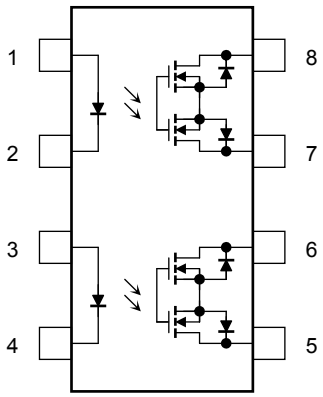
Pin Configuration (top view)

TLP222G



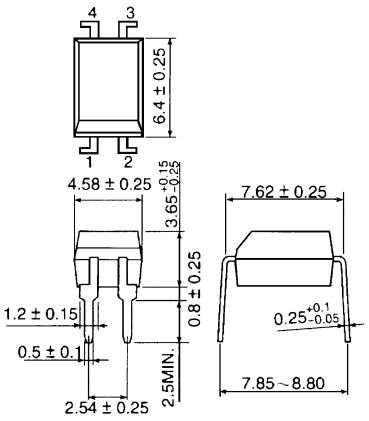
1: Anode
2: Cathode
3: Drain
4: Drain

TLP222G-2



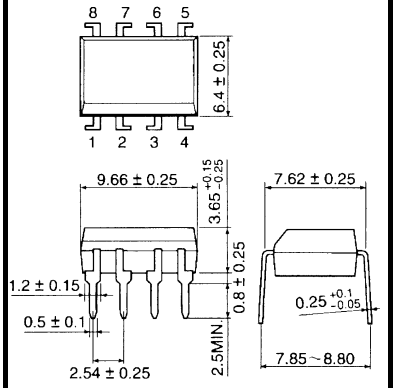
1, 3 : Anode
2, 4 : Cathode
5 : Drain D1
6 : Drain D2
7 : Drain D3
8 : Drain D4

Unit: mm



JEDEC	—
JEITA	—
TOSHIBA	11-5B2

Weight: 0.26 g (typ.)



JEDEC	—
JEITA	—
TOSHIBA	11-10C4

Weight: 0.54 g (typ.)

Absolute 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: 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

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 mA	1.0	1.15	1.3	V
	Reverse current	I_R	V_R = 5 V	—	—	10	μA
	Capacitance	C_T	V = 0, f = 1 MHz	—	30	—	pF
Detector	Off-state current	I_{OFF}	V_{OFF} = 350 V	—	—	1	μA
	Capacitance	C_{OFF}	V = 0, 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 mA	—	1	3	mA
Return LED current	I_{FC}	I_{OFF} = 100 μA	0.1	—	—	mA
On-state resistance	R_{ON}	I_{ON} = 120 mA, I_F = 5 mA, t < 1 s	—	25	35	Ω
		I_{ON} = 120 mA, I_F = 5 mA, continuous	—	35	50	

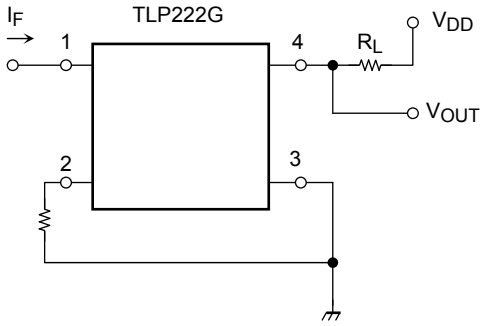
Isolation Characteristics (Ta = 25°C)

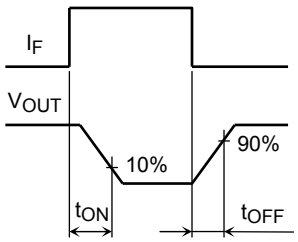
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Capacitance input to output	C_S	V_S = 0 V, f = 1 MHz	—	0.8	—	pF
Isolation resistance	R_S	V_S = 500 V, R.H. ≦ 60%	5×10^{10}	10^{14}	—	Ω
Isolation voltage	BV_S	AC, 1 min	2500	—	—	Vrms
		AC, 1 s, in oil	—	5000	—	
		DC, 1 min, in oil	—	5000	—	Vdc

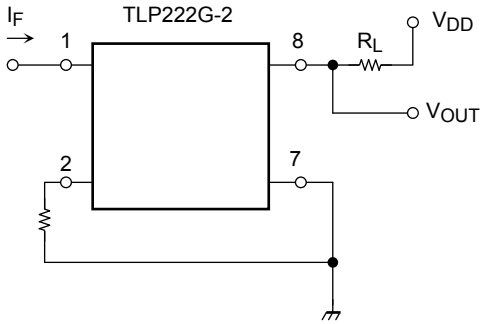
Switching Characteristics (Ta = 25°C)

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

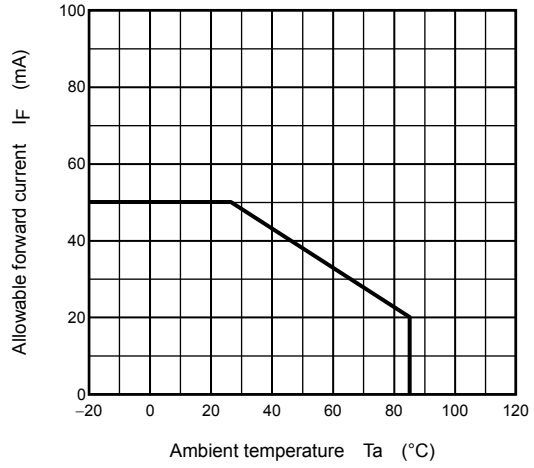
Note 3: Switching time test circuit



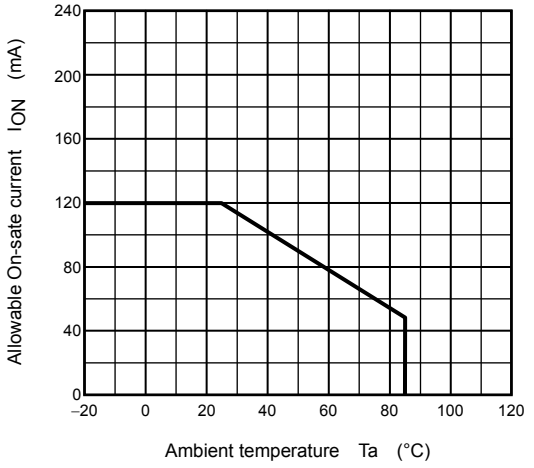




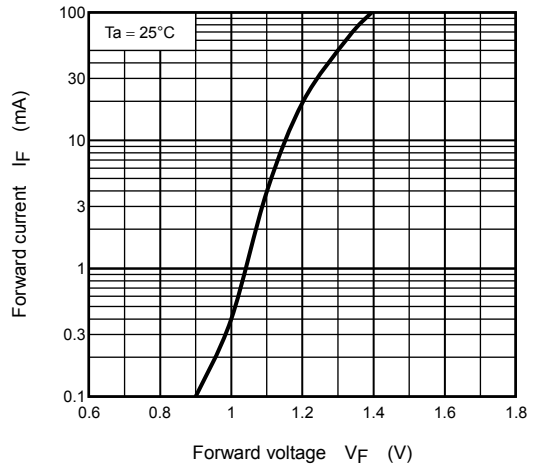
I_F – Ta



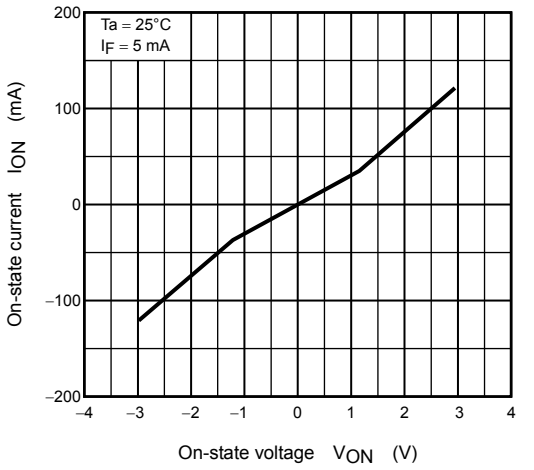
I_{ON} – Ta



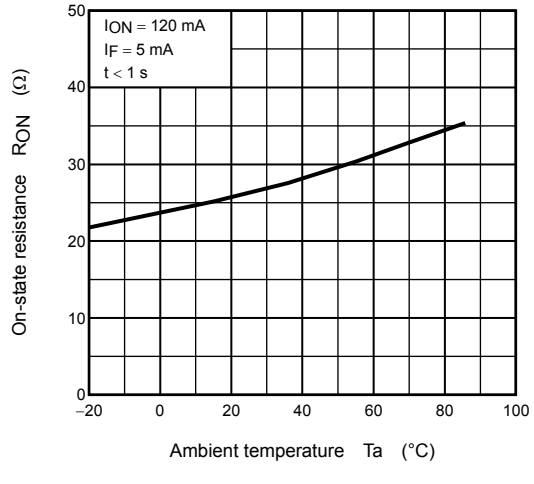
I_F – V_F



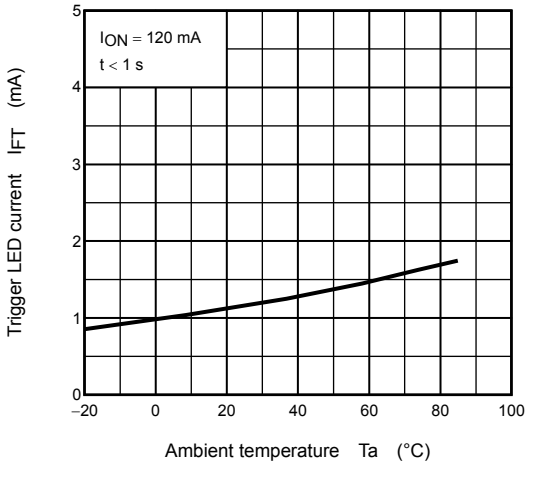
I_{ON} – V_{ON}



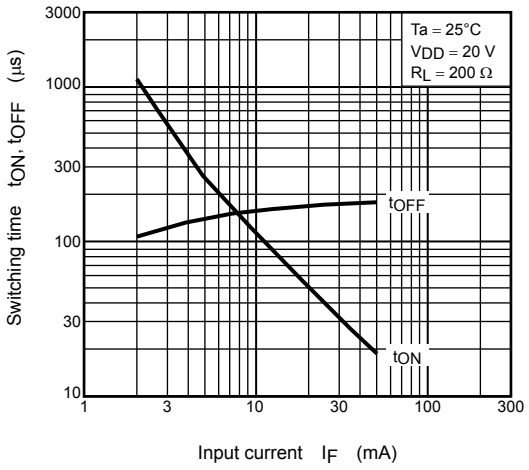
R_{ON} – Ta



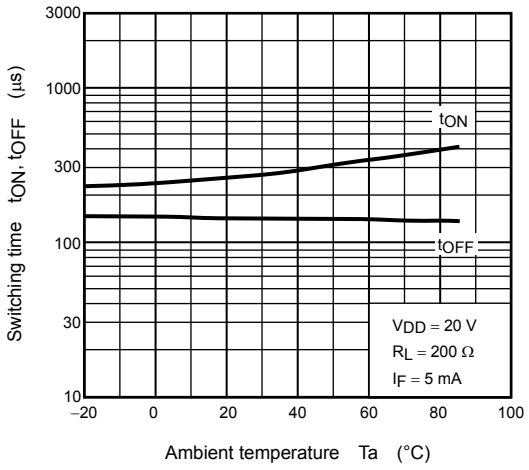
I_{FT} – Ta



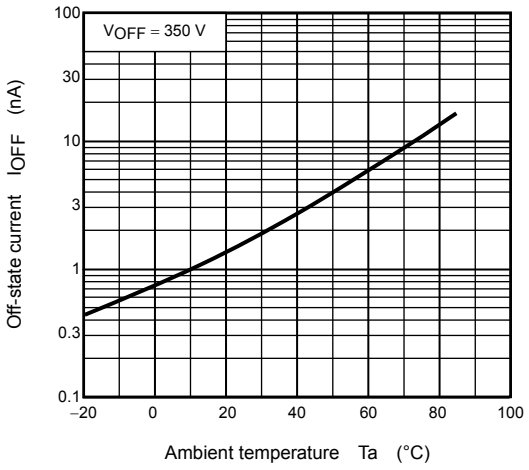
t_{ON}, t_{OFF} – I_F



t_{ON}, t_{OFF} – Ta



I_{OFF} – Ta



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