

TOSHIBA Photocoupler GaAs Ired & Photo-Thyristor

# TLP541G, TLP542G

Programmable Controllers

AC-Output Module

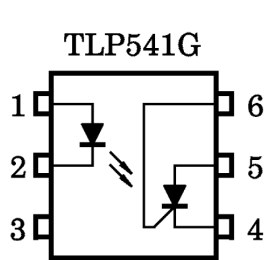
Solid State Relay

The TOSHIBA TLP541G consists of a photo-thyristor optically coupled to a gallium arsenide infrared emitting diode in a six lead plastic DIP package.

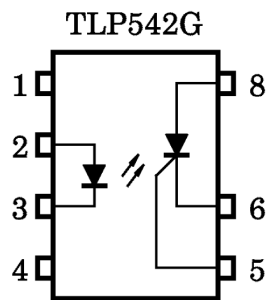
The TOSHIBA TLP542G consists of a photo-thyristor optically coupled to a gallium arsenide infrared emitting diode in a seven lead plastic DIP package.

- Peak off-state voltage: 400 V (min.)
- Trigger LED current: 7 mA (max.)
- On-state current: 150 mA (max.)
- Isolation voltage: 2500 V<sub>rms</sub> (min.)
- UL recognized: UL1577, file no. E67349

### Pin Configuration (top view)

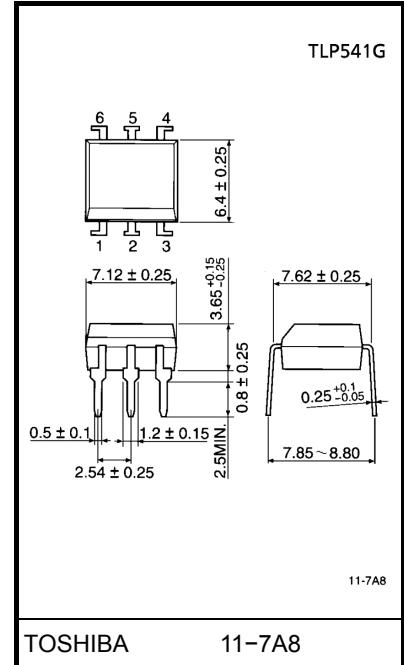


- TLP541G**
- 1 : ANODE
  - 2 : CATHODE
  - 3 : N.C.
  - 4 : CATHODE
  - 5 : ANODE
  - 6 : GATE



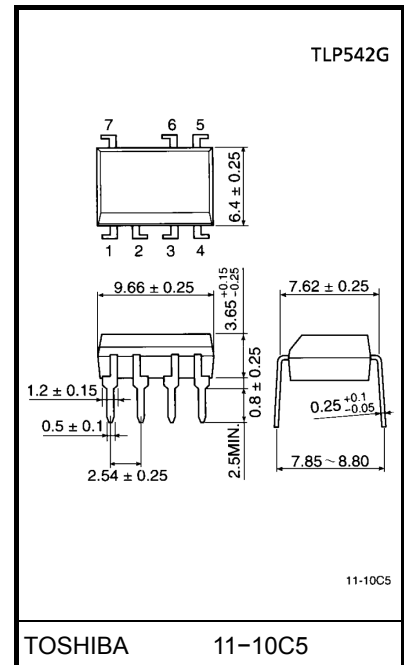
- TLP542G**
- 1 : N.C.
  - 2 : ANODE
  - 3 : CATHODE
  - 4 : N.C.
  - 5 : GATE
  - 6 : CATHODE
  - 7 : ANODE

Unit in mm



TOSHIBA 11-7A8

Weight: 0.4 g



TOSHIBA 11-10C5

Weight: 0.53 g

## Maximum Ratings (Ta = 25°C)

Characteristic		Symbol	Rating	Unit
LED	Forward current	$I_F$	70	mA
	Forward current derating (Ta ≥ 25°C)	$\Delta I_F / ^\circ\text{C}$	-0.7	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	Peak forward voltage (RGK = 27kΩ)	$V_{DRM}$	400	V
	Peak reverse voltage (RGK = 27kΩ)	$V_{RRM}$	400	V
	On-state current	$I_T$ (RMS)	150	mA
	On-state current derating (Ta ≥ 25°C)	$\Delta I_T / ^\circ\text{C}$	-2.0	mA / °C
	Peak one cycle surge current	$I_{TSM}$	2	A
	Peak reverse gate voltage	$V_{GM}$	-5	V
	Junction temperature	$T_j$	100	°C
Storage temperature range		$T_{stg}$	-55~125	°C
Operating temperature range		$T_{opr}$	-30~100	°C
Lead soldering temperature (10 s)		$T_{sol}$	260	°C
Isolation voltage (AC, 1 min., R.H. ≤ 60%) (Note)		$BV_S$	2500	$V_{rms}$

(Note) Device considered a two terminal device: LED side pins shorted together and detector side pins shorted together.

## Recommended Operating Conditions

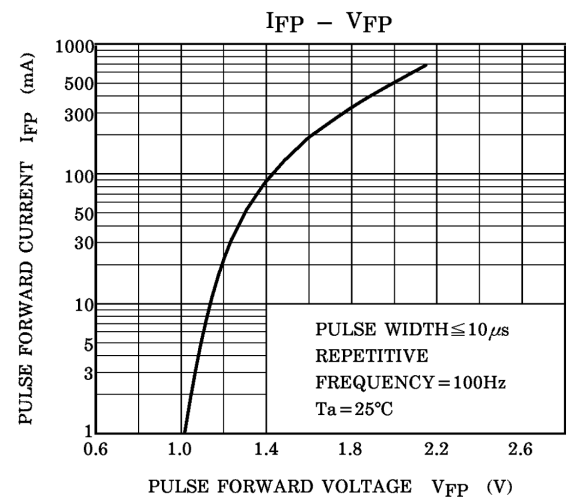
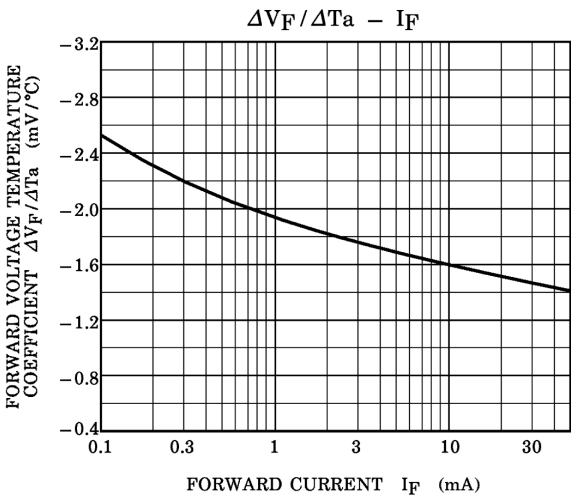
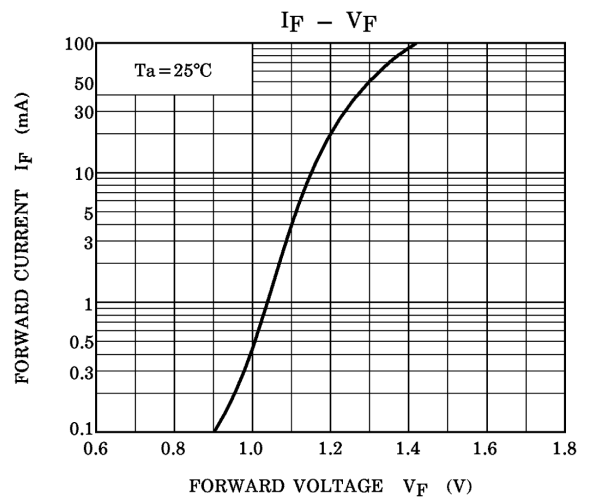
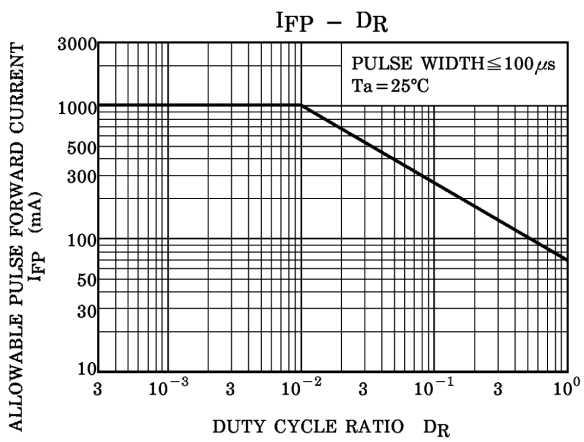
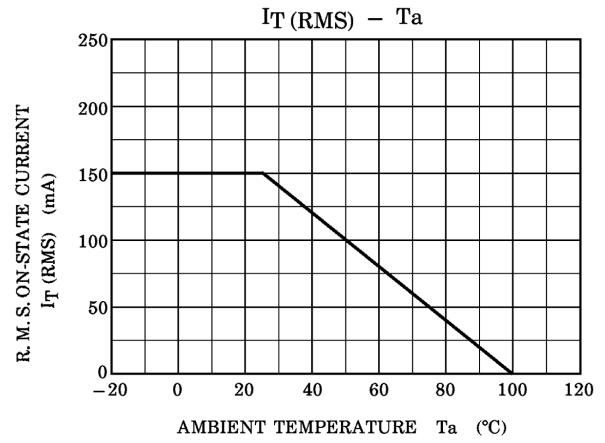
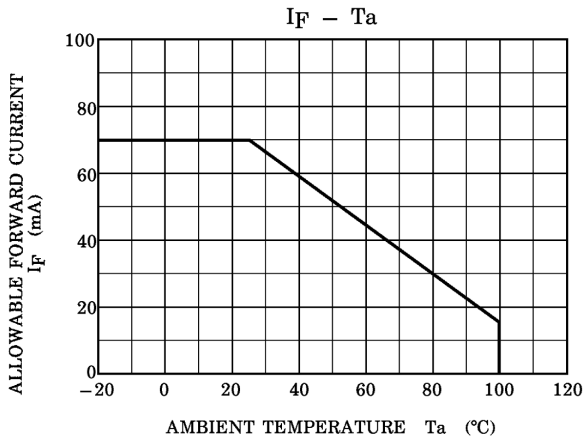
Characteristic	Symbol	Min.	Typ.	Max.	Unit
Supply voltage	$V_{AC}$	—	—	120	$V_{ac}$
Forward current	$I_F$	10	16	25	mA
Operating temperature	$T_{opr}$	-30	—	85	°C
Gate to cathode resistance	$R_{GK}$	—	27	33	kΩ
Gate to cathode capacity	$C_{GK}$	—	0.01	0.1	μF

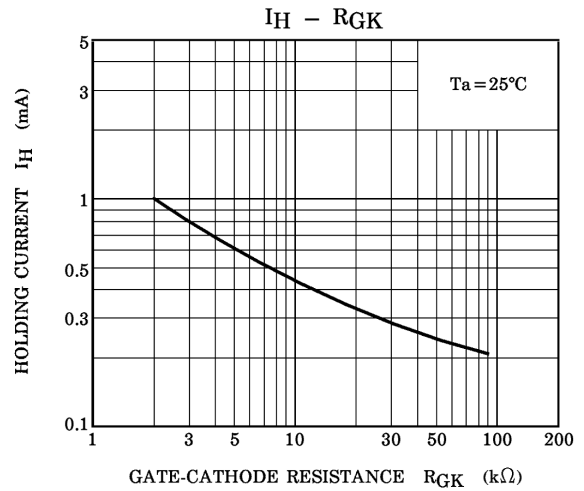
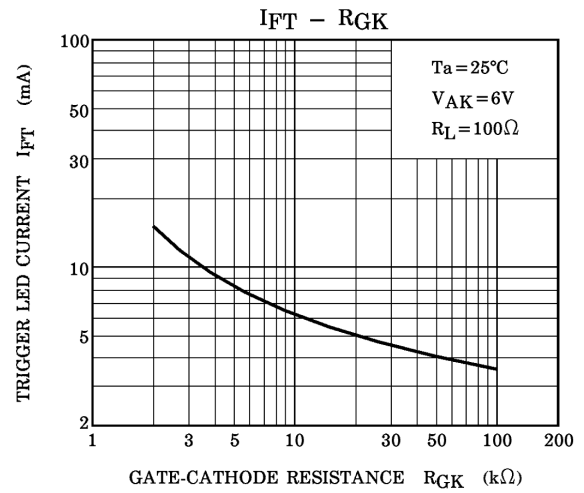
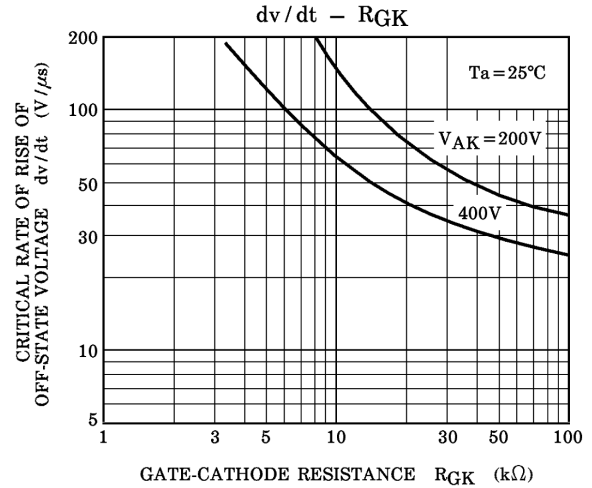
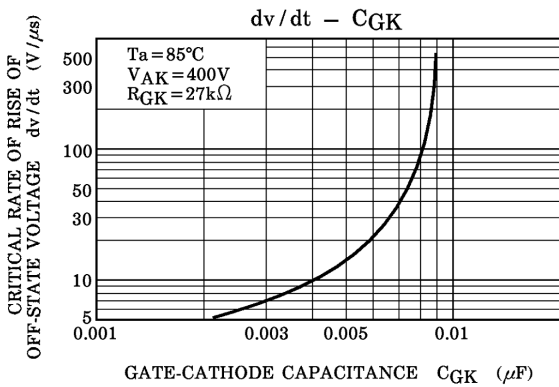
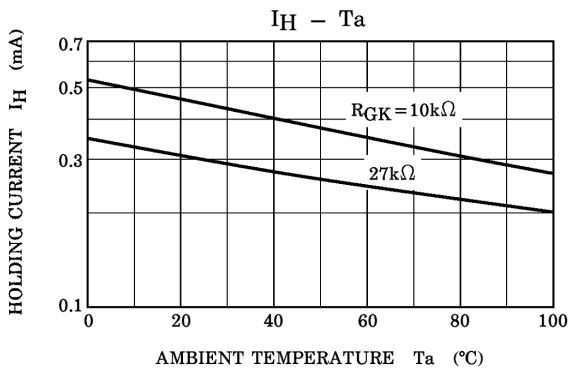
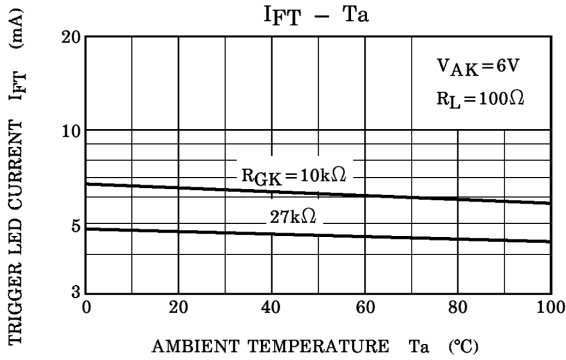
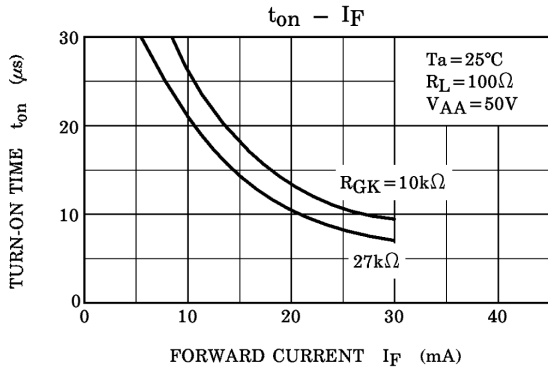
## Individual Electrical Characteristics (Ta = 25°C)

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	$C_T$	$V = 0, f = 1 \text{ MHz}$	—	30	—	pF	
Detector	Off-state current	$I_{DRM}$	$V_{AK} = 400 \text{ V}$ $R_{GK} = 27 \text{ k}\Omega$	Ta = 25°C	—	10	5000	nA
				Ta = 100°C	—	1	100	$\mu\text{A}$
	Reverse current	$I_{RRM}$	$V_{KA} = 400 \text{ V}$ $R_{GK} = 27 \text{ k}\Omega$	Ta = 25°C	—	10	5000	nA
				Ta = 100°C	—	1	100	$\mu\text{A}$
	On-state voltage	$V_{TM}$	$I_{TM} = 100 \text{ mA}$	—	0.9	1.3	V	
	Holding current	$I_H$	$R_{GK} = 27 \text{ k}\Omega$	—	0.2	1	mA	
	Off-state dv/dt	dv/dt	$V_{AK} = 280 \text{ V}, R_{GK} = 27 \text{ k}\Omega$	5	10	—	V/ $\mu\text{s}$	
Capacitance	$C_j$	$V = 0, f = 1 \text{ MHz}$	Anode to gate	—	20	—	pF	
			Gate to cathode	—	350	—		

## Coupled Characteristics (Ta = 25°C)

Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Trigger LED current	$I_{FT}$	$V_{AK} = 6 \text{ V}, R_{GK} = 27 \text{ k}\Omega$	1	4	7	mA
Turn-on time	$t_{on}$	$I_F = 50 \text{ mA}, R_{GK} = 27 \text{ k}\Omega$	—	10	—	$\mu\text{s}$
Capacitance (input to output)	$C_S$	$V_S = 0, f = 1 \text{ MHz}$	—	0.8	—	pF
Isolation resistance	$R_S$	$V_S = 500 \text{ V}, \text{R.H.} \leq 60\%$	—	$10^{11}$	—	$\Omega$
Isolation voltage	$BV_S$	AC, 1 minute	2500	—	—	$V_{rms}$





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