

TOSHIBA Photocoupler GaAs IRed & Photo-Triac

# TLP525G, TLP525G-2, TLP525G-4

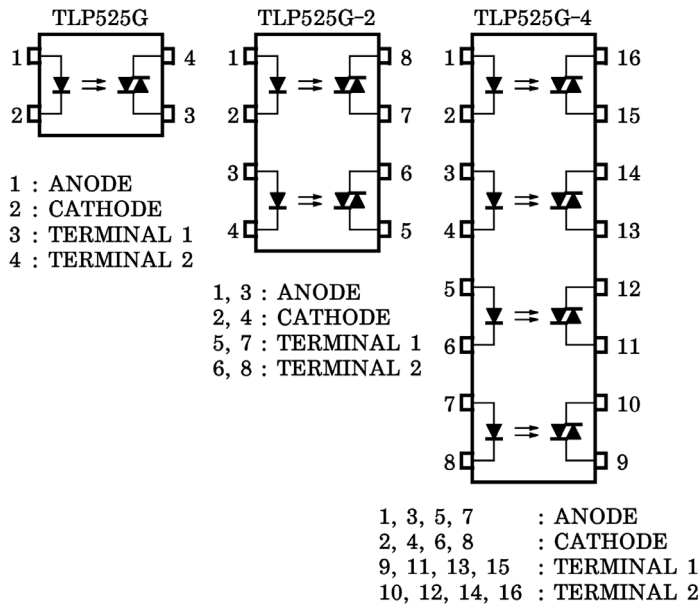
- Triac Drive
- Programmable Controllers
- AC-Output Module
- Solid State Relay

The TOSHIBA TLP525G, -2 and -4 consist of a photo-triac optically coupled to a gallium arsenide infrared emitting diode.

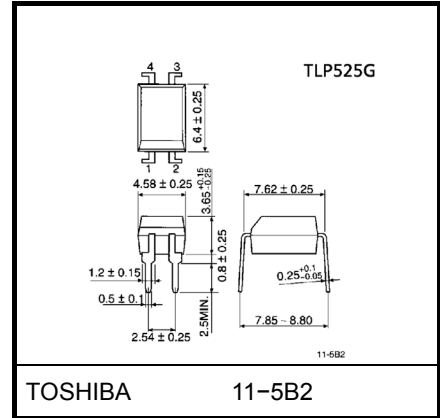
The TLP525G-2 offers two isolated channels in an eight lead plastic DIP package, while the TLP525G-4 provides four isolated channels in a sixteen lead plastic DIP package.

- Peak off-stage voltage: 400V (min.)
- Trigger LED current: 10mA (max.)
- Peak on-stage current: 2Apk (max.)
- Isolation voltage: 2500V<sub>rms</sub> (min.)
- UL recognized: File no.E67349

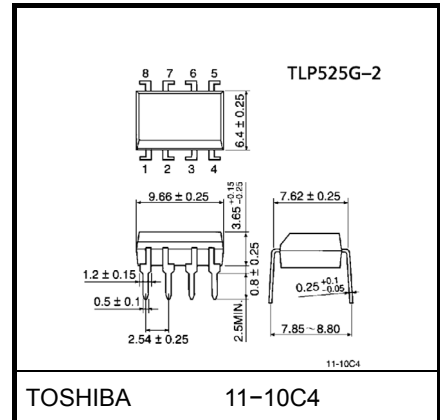
## Pin Configurations (top view)



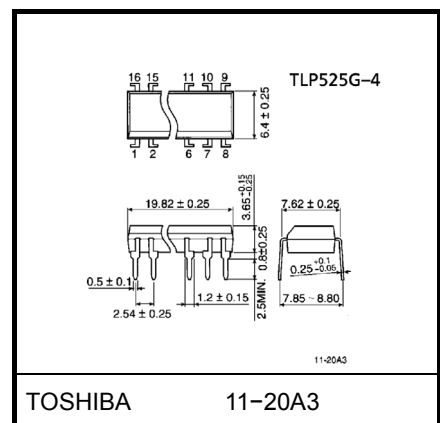
Unit in mm



Weight: 0.26g



Weight: 0.54g



Weight: 1.1g

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

Characteristic		Symbol	Rating		Unit	
			TLP525G	TLP525G-2 TLP525G-4		
LED	Forward current	$I_F$	50	50	mA	
	Forward current derating	$I_F / ^\circ\text{C}$	-0.7 (Ta ≥ 53°C)	-0.5 (Ta ≥ 25°C)	mA / °C	
	Pulse forward current	$I_{FP}$	1 (100µs pulse, 100pps)		A	
	Reverse voltage	$V_R$	5		V	
	Junction temperature	$T_j$	125		°C	
Detector	Off-state output terminal voltage	$V_{DRM}$	400		V	
	On-state RMS current	$I_T$ (RMS)	Ta = 25°C	100	80	mA
			Ta = 70°C	50	40	
	On-state current derating (Ta ≥ 25°C)	$I_T / ^\circ\text{C}$	-1.1	-0.9	mA / °C	
	Peak on state current	$I_{TP}$	2 (100µs pulse, 120pps)		A	
	Peak nonrepetitive surge current (PW = 10ms, DC = 10%)	$I_{TSM}$	1.2		A	
	Junction temperature	$T_j$	115		°C	
Storage temperature range	$T_{stg}$	-55~125		°C		
Operating temperature range	$T_{opr}$	-40~100		°C		
Lead soldering temperature	$T_{sol}$	260 (10s)		°C		
Isolation voltage	(Note) $BV_S$	2500 (AC, 1min., R.H. ≤ 60%)		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: 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 <sub>ac</sub>
Forward current	$I_F$	15	20	25	mA
Peak on-state current	$I_{TP}$	—	—	1	A
Operating temperature	$T_{opr}$	-25	—	85	°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.

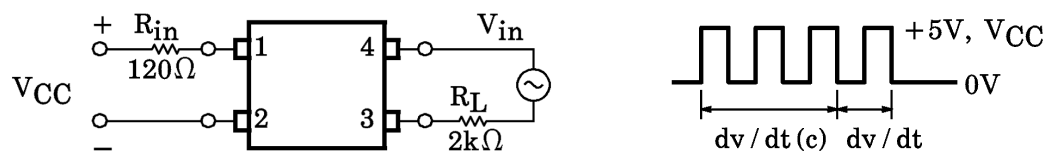
## Individual Electrical Characteristics (Ta = 25°C)

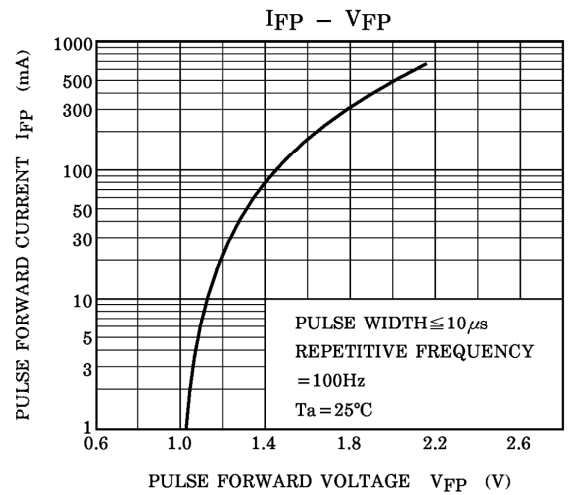
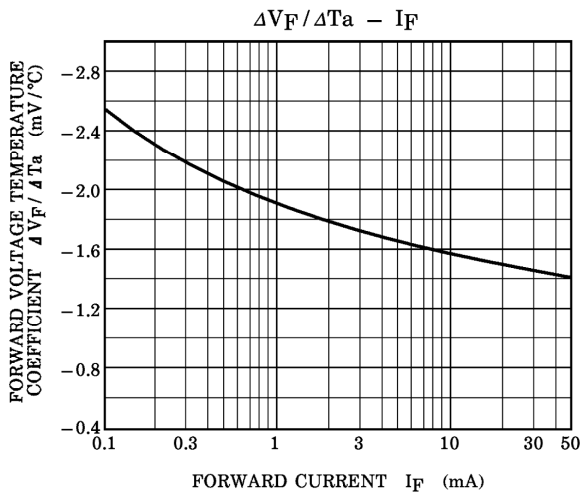
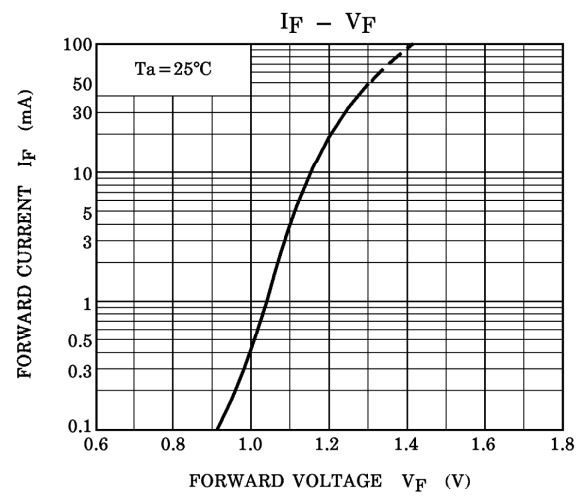
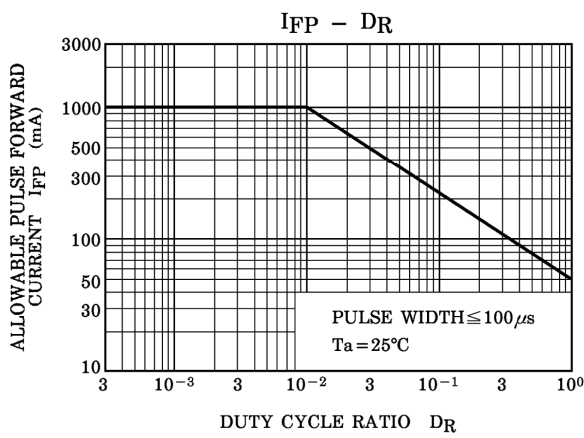
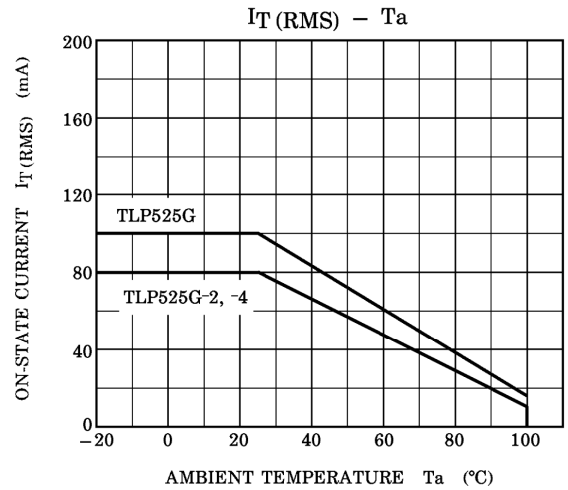
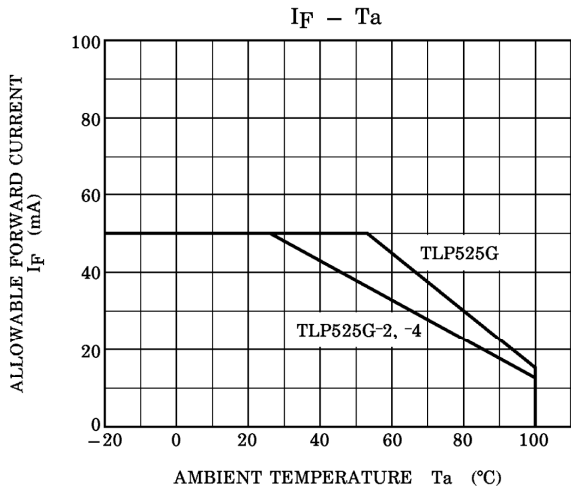
Characteristic		Symbol	Test Condition	Min.	Typ.	Max.	Unit
LED	Forward voltage	$V_F$	$I_F = 10\text{mA}$	1.0	1.15	1.3	V
	Reverse current	$I_R$	$V_R = 5\text{V}$	—	—	10	$\mu\text{A}$
	Capacitance	$C_T$	$V = 0, f = 1\text{MHz}$	—	30	—	pF
Detector	Peak off-state current	$I_{DRM}$	$V_{DRM} = 400\text{V}$	—	10	100	nA
	Peak on-state voltage	$V_{TM}$	$I_{TM} = 100\text{mA}$	—	1.7	3.0	V
	Holding current	$I_H$	—	—	0.2	—	mA
	Critical rate of rise of off-state voltage	$dv/dt$	$V_{in} = 120\text{V}_{\text{rms}}, T_a = 85^\circ\text{C}$ (Figure 1)	200	500	—	V/ $\mu\text{s}$
	Critical rate of rise of commutating voltage	$dv/dt(c)$	$V_{in} = 30\text{V}_{\text{rms}}, I_T = 15\text{mA}$ (Figure 1)	—	0.2	—	V/ $\mu\text{s}$

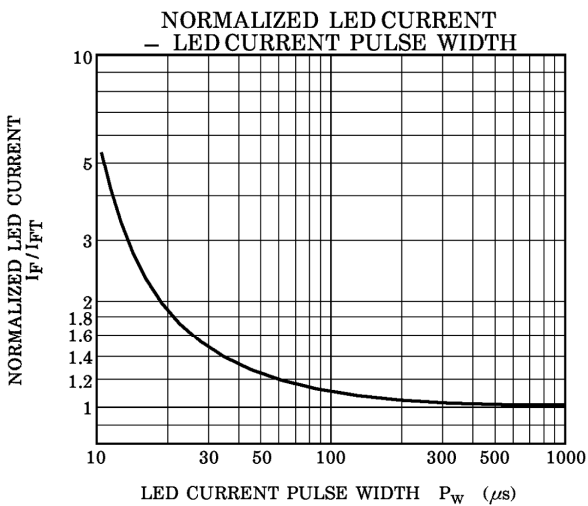
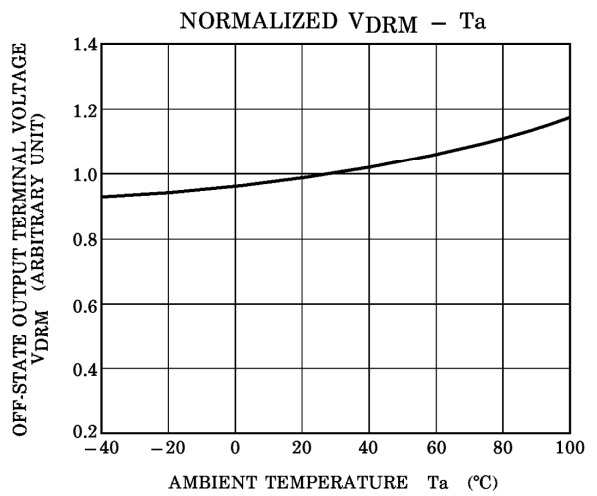
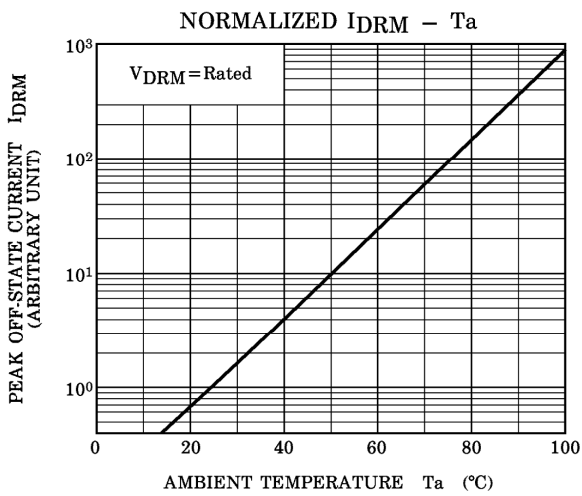
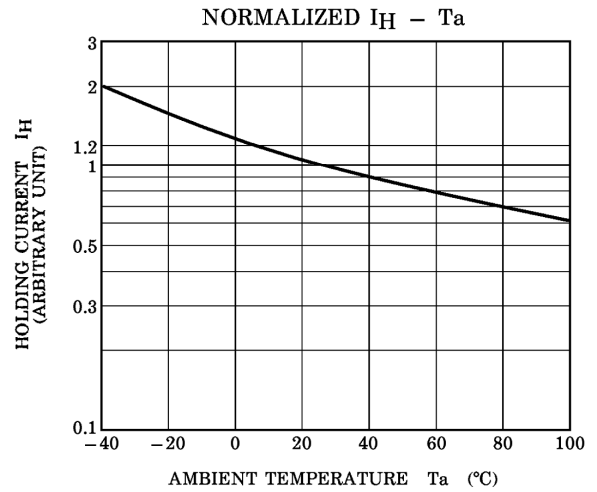
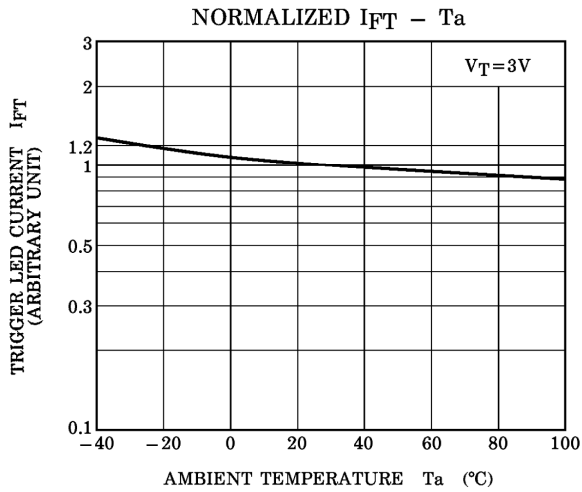
## Coupled Electrical Characteristics (Ta = 25°C)

Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Trigger LED current	$I_{FT}$	$V_T = 3\text{V}$	—	5	10	mA
Capacitance input to output	$C_S$	$V_S = 0, f = 1\text{MHz}$	—	0.8	—	pF
Isolation resistance	$R_S$	$V_S = 500\text{V}, \text{R.H.} \leq 60\%$	$5 \times 10^{10}$	$10^{14}$	—	$\Omega$
Isolation voltage	$BV_S$	AC, 1 minute	2500	—	—	V <sub>rms</sub>
		AC, 1 second, in oil	—	5000	—	
		DC, 1 minute, in oil	—	5000	—	V <sub>dc</sub>

Fig.1  $dv/dt$  Test Circuit







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