TOSHIBA Photocoupler GaAs IRed & Photo−Triac

TLP525G, TLP525G−2, TLP525G−4

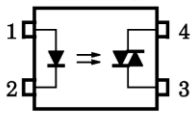
Triac Drive
Programmable Controllers
AC−Output Module
Solid State Relay

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: 400 V (min)
- Trigger LED current: 10 mA (max)
- Peak on−stage current: 2 Apk (max)
- Isolation voltage: 2500 V_{rms} (min)
- UL approved: UL1577, File No.E67349
- cUL approved :CSA Component Acceptance Service No. 5A, File No.E67349

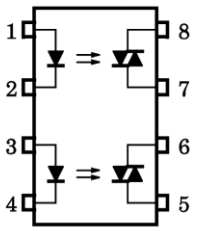
Pin Configurations (top view)

TLP525G



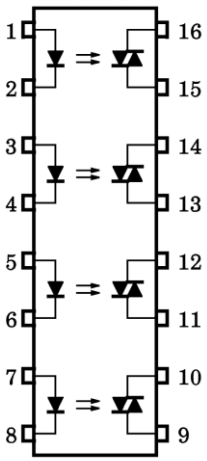
1 : ANODE
2 : CATHODE
3 : TERMINAL 1
4 : TERMINAL 2

TLP525G−2



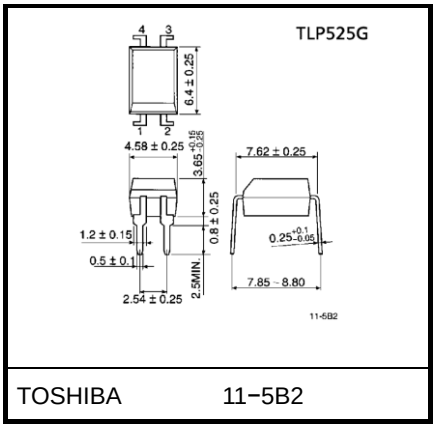
1, 3 : ANODE
2, 4 : CATHODE
5, 7 : TERMINAL 1
6, 8 : TERMINAL 2

TLP525G−4



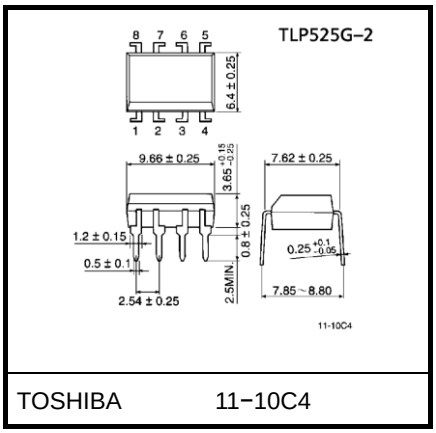
1, 3, 5, 7 : ANODE
2, 4, 6, 8 : CATHODE
9, 11, 13, 15 : TERMINAL 1
10, 12, 14, 16 : TERMINAL 2

Unit: mm



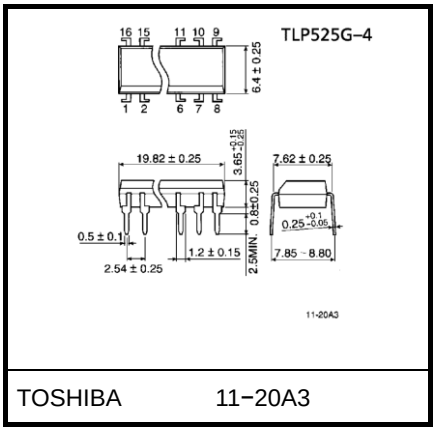
TOSHIBA 11−5B2

Weight: 0.26g (typ.)



TOSHIBA 11−10C4

Weight: 0.54g (typ.)



TOSHIBA 11−20A3

Weight: 1.1g (typ.)

Start of commercial production
1985-01

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 / °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
	Input power dissipation		P_D	50	60	mW
	Input power dissipation derating		ΔP_D /°C	-0.69(Ta ≥ 53°C)	-0.6(Ta ≥ 25°C)	mW/°C
	Junction temperature		T_j	125		°C
Detector	Off−state output terminal voltage		V_{DRM}	400		V
	On−state RMS current	Ta = 25°C	$I_{T\ (RMS)}$	100	80	mA
		Ta = 70°C		50	40	
	On−state current derating (Ta ≥ 25°C)		I_T / °C	−1.1	−0.9	mA / °C
	Peak on state current		I_{TP}	2 (100μs pulse, 120pps)		A
	Peak non-repetitive surge current (P_W = 10ms)		I_{TSM}	1.2		A
	Output power dissipation		Po	300	240	mW
	Output power dissipation derating (Ta ≥ 25°C)		ΔP_O / °C	−3.0	-2.4	mW / °C
	Junction temperature		T_j	115		°C
Storage temperature range			T_{stg}	−55 to 125		°C
Operating temperature range			T_{opr}	−40 to 100		°C
Lead soldering temperature			T_{sol}	260 (10s)		°C
Isolation voltage		(Note)	BV_S	2500 (AC, 1minute, R.H. ≤ 60%)		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: 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	Vac
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.

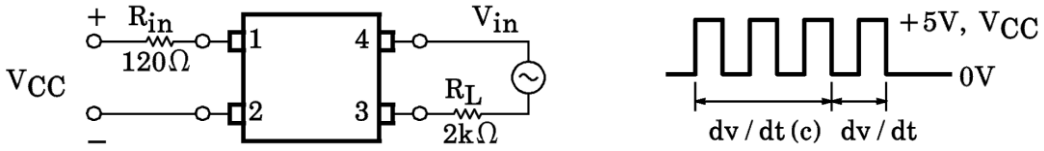
Individual Electrical Characteristics (Ta = 25°C)

	Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
LED	Forward voltage	V_F	I_F = 10mA	1.0	1.15	1.3	V
	Reverse current	I_R	V_R = 5V	—	—	10	μA
	Capacitance	C_T	VF = 0 V, f = 1MHz	—	30	—	pF
Detector	Peak off−state current	I_{DRM}	V_{DRM} = 400V	—	10	100	nA
	Peak on−state voltage	V_{TM}	I_{TM} = 100mA	—	1.7	3.0	V
	Holding current	I_H	—	—	0.6	—	mA
	Critical rate of rise of off−state voltage	dv / dt	V_{in} = 120V_{rms}, Ta = 85°C (Figure 1)	200	500	—	V / μs
	Critical rate of rise of commutating voltage	dv / dt (c)	V_{in} = 30V_{rms}, I_T = 15mA (Figure 1)	—	0.2	—	V / μs

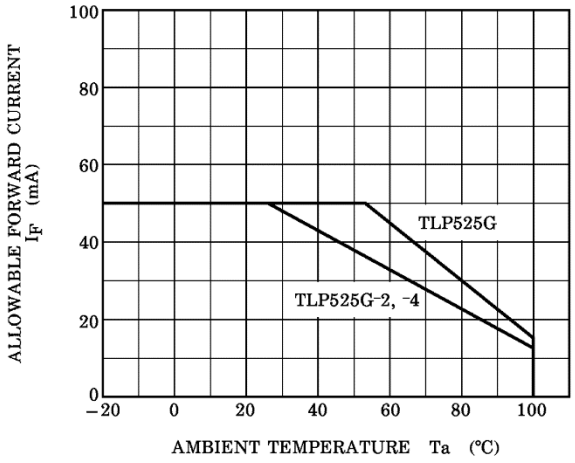
Coupled Electrical Characteristics (Ta = 25°C)

Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Trigger LED current	I_{FT}	V_T = 3V	—	5	10	mA
Capacitance input to output	C_S	V_S = 0 V, f = 1MHz	—	0.8	—	pF
Isolation resistance	R_S	V_S = 500V, R.H. ≤ 60%	5×10^{10}	10^{14}	—	Ω
Isolation voltage	BV_S	AC, 1 minute	2500	—	—	Vrms
		AC, 1 second, in oil	—	5000	—	
		DC, 1 minute, in oil	—	5000	—	Vdc

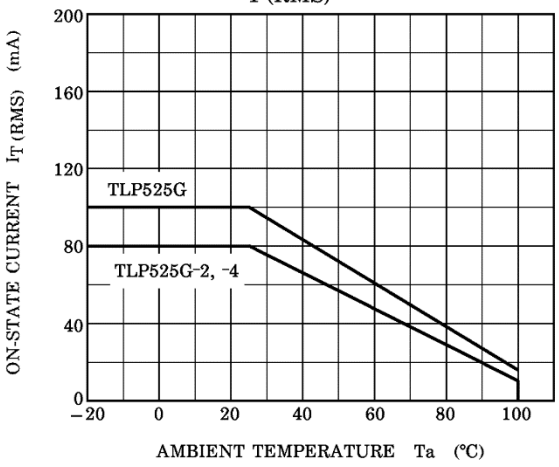
Fig.1 dv / dt Test Circuit



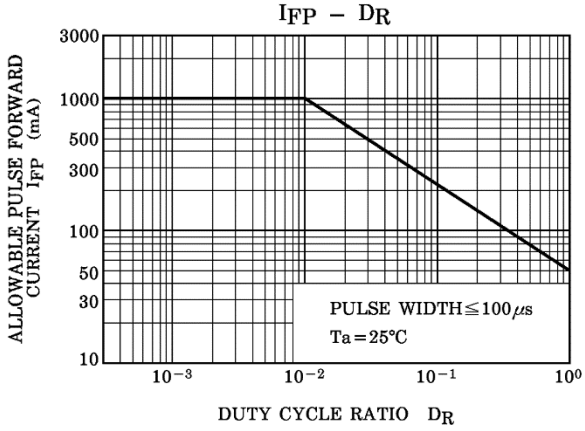
I_F – Ta



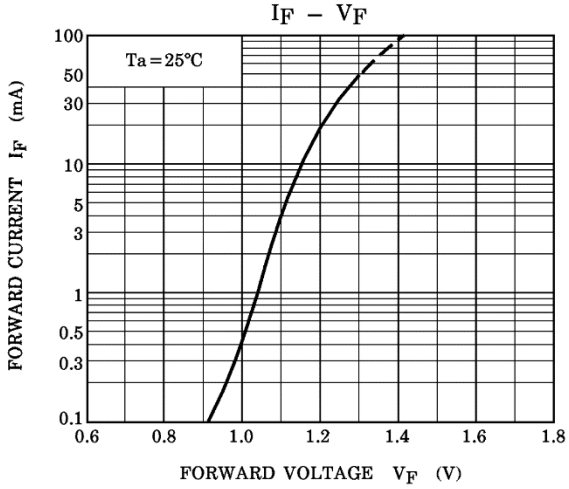
$I_{T\,(RMS)}$ – Ta



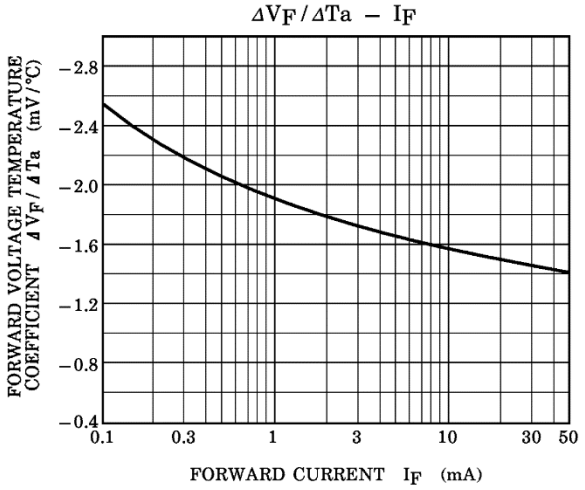
I_{FP} – D_R



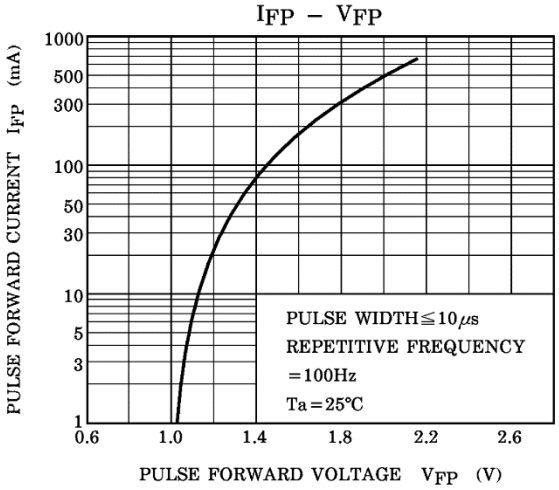
I_F – V_F



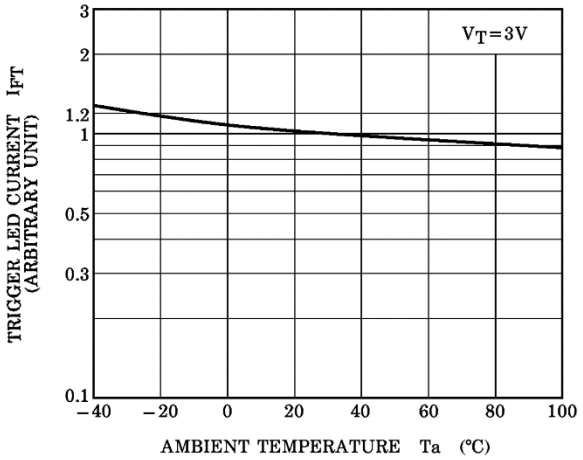
$\Delta V_F / \Delta Ta$ – I_F



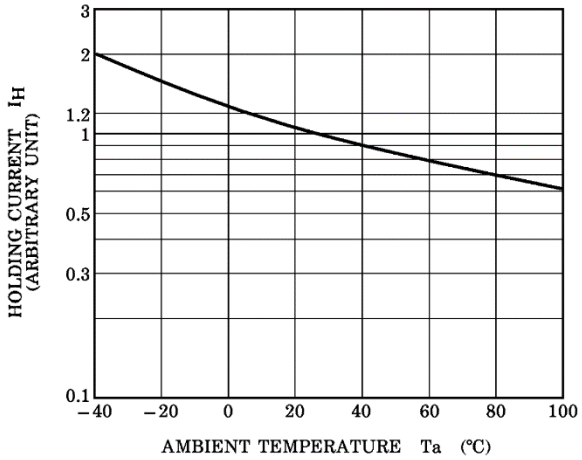
I_{FP} – V_{FP}



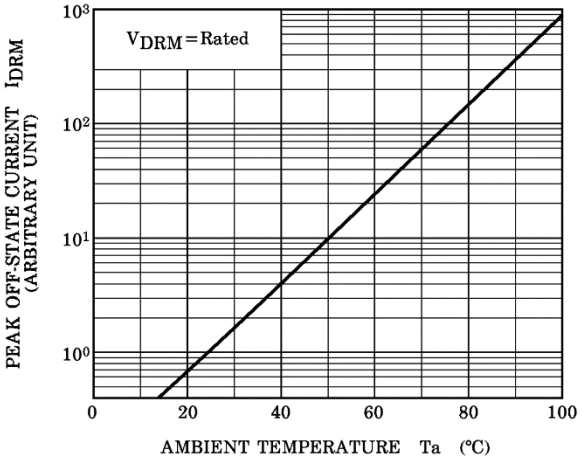
NORMALIZED I_{FT} − Ta



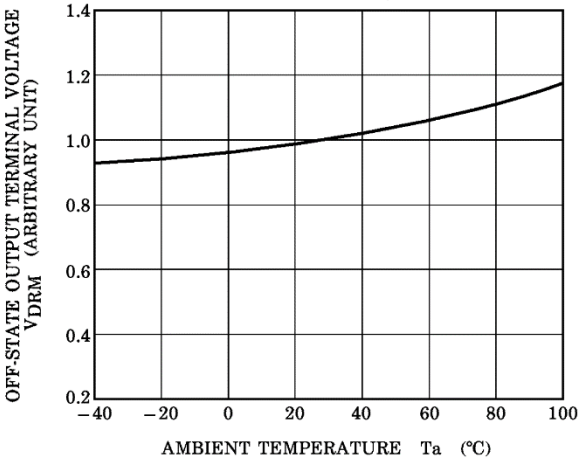
NORMALIZED I_H − Ta



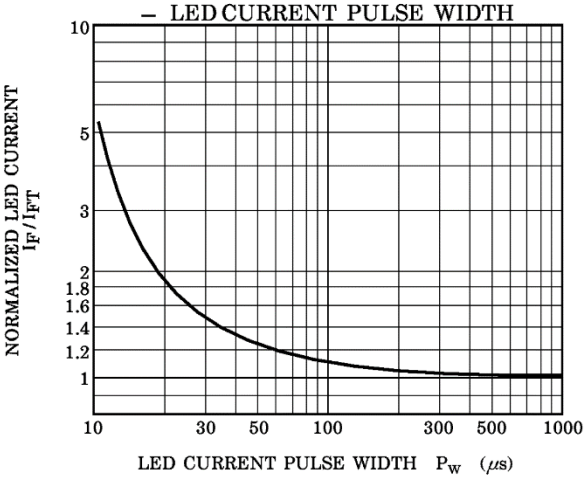
NORMALIZED I_{DRM} − Ta



NORMALIZED V_{DRM} − Ta



NORMALIZED LED CURRENT − LED CURRENT PULSE WIDTH



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