

TOSHIBA Photocoupler Photo Relay

# TLP598GA

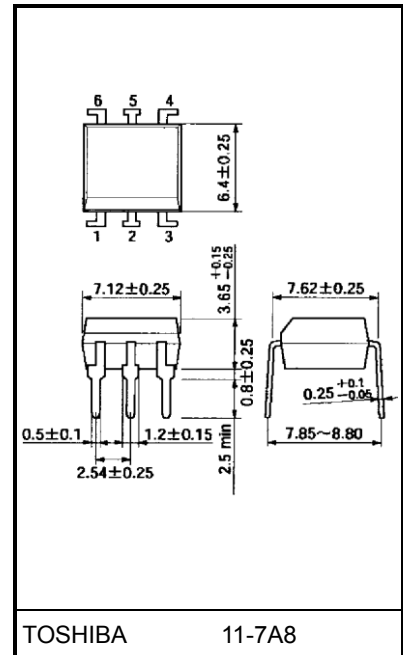
Telecommunication  
 Data Acquisition  
 Measurement Instrumentation

The TOSHIBA TLP598GA consists of an aluminum gallium arsenide infrared emitting diode optically coupled to a photo-MOS FET in a six lead plastic DIP package (DIP6).

The TLP598GA is a bi-directional switch which can replace mechanical relays in many applications.

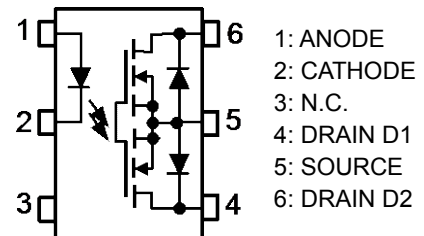
- Peak off-state voltage: 400 V (min)
- On-state current: 150 mA (max)
- On-state resistance: 12 Ω (max)
- Isolation voltage: 2500 Vrms (min)
- UL approved: UL1577, File No.E67349

Unit: mm

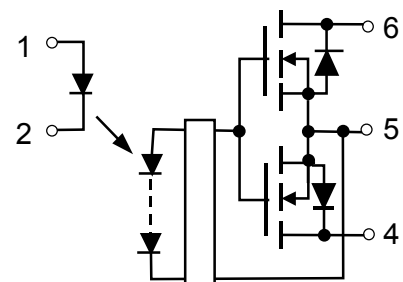


Weight: 0.4 g (typ.)

### Pin Configuration (top view)



### Schematic



Start of commercial production  
 2004-08

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

Characteristic		Symbol	Rating	Unit	
LED	Forward current	$I_F$	30	mA	
	Forward current derating (Ta ≥ 25°C)	$\Delta I_F / ^\circ\text{C}$	-0.3	mA / °C	
	Peak forward current (100 μs pulse, 100 pps)	$I_{FP}$	1	A	
	Reverse voltage	$V_R$	5	V	
	Diode power dissipation	$P_D$	50	mW	
	Diode power dissipation derating (Ta > 25°C)	$\Delta P_D / ^\circ\text{C}$	-0.5	mW / °C	
	Junction temperature	$T_j$	125	°C	
Detector	Off-state output terminal voltage		$V_{OFF}$	400	V
	On-state RMS current	A connection	$I_{ON}$	150	mA
		B connection		200	
		C connection		300	
	On-state current derating (Ta ≥ 25°C)	A connection	$\Delta I_{ON} / ^\circ\text{C}$	-1.5	mA / °C
		B connection		-2.0	
		C connection		-3.0	
	Output power dissipation	A connection	$P_O$	270	mW
		B connection		240	
		C connection		270	
	Output power dissipation derating (Ta ≥ 25°C)	A connection	$\Delta P_O / ^\circ\text{C}$	-2.7	mW / °C
B connection		-2.4			
C connection		-2.7			
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, 60 s, R.H. ≤ 60%) (Note 1)		$BV_S$	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).

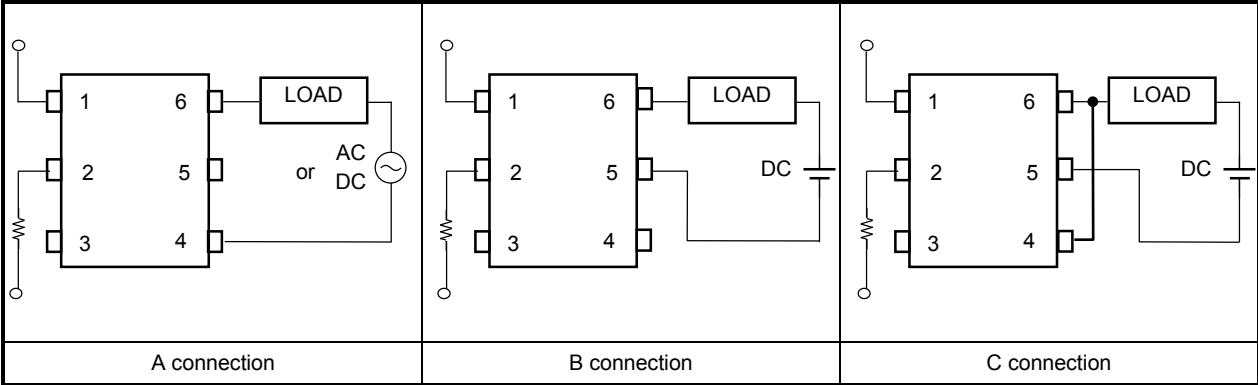
Note 1: Device considered a two-terminal device: Pins 1, 2 and 3 shorted together, and pins 4, 5 and 6 shorted together.

## Recommended Operating Conditions

Characteristic	Symbol	Min	Typ.	Max	Unit
Supply voltage	$V_{DD}$	—	—	320	V
Forward current	$I_F$	5	7.5	20	mA
On-state current (A connection)	$I_{ON}$	—	—	150	mA
Operating temperature	$T_{opr}$	-20	—	80	°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.

**Circuit Connections**



## Electrical Characteristics (Ta = 25°C)

Characteristic		Symbol	Test Condition	Min	Typ.	Max	Unit
LED	Forward voltage	V <sub>F</sub>	I <sub>F</sub> = 10 mA	1.18	1.33	1.48	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> = 400 V	—	—	1	μA
	Capacitance	C <sub>OFF</sub>	V = 0 V, f = 1 MHz	—	—	—	pF

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

Characteristic		Symbol	Test Condition	Min	Typ.	Max	Unit
Trigger LED current		I <sub>FT</sub>	I <sub>ON</sub> = 150 mA	—	1	3	mA
On-state resistance	A connection	R <sub>ON</sub>	I <sub>ON</sub> = 150 mA, I <sub>F</sub> = 5 mA	—	8	12	Ω
	B connection		I <sub>ON</sub> = 200 mA, I <sub>F</sub> = 5 mA	—	4	6	
	C connection		I <sub>ON</sub> = 300 mA, I <sub>F</sub> = 5 mA	—	2	3	

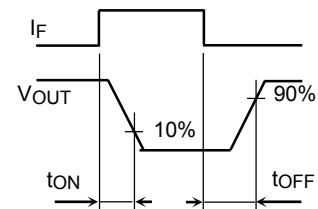
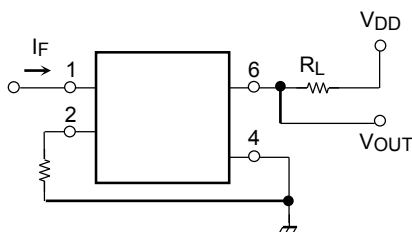
## Isolation Characteristics (Ta = 25°C)

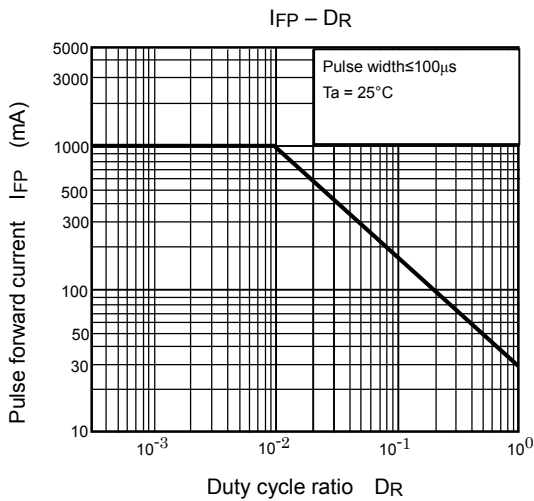
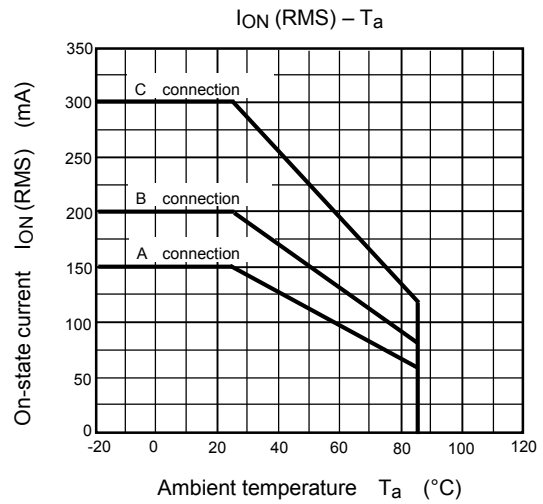
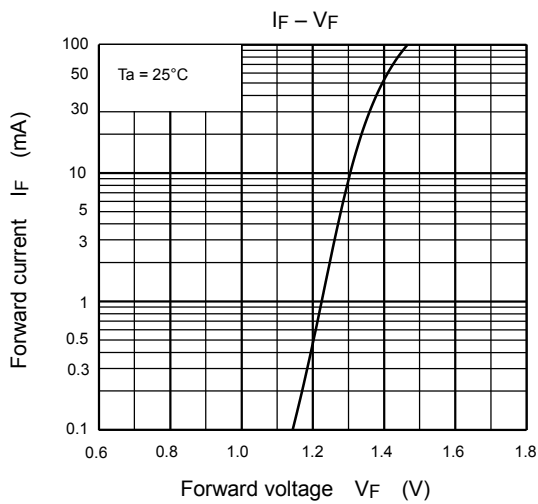
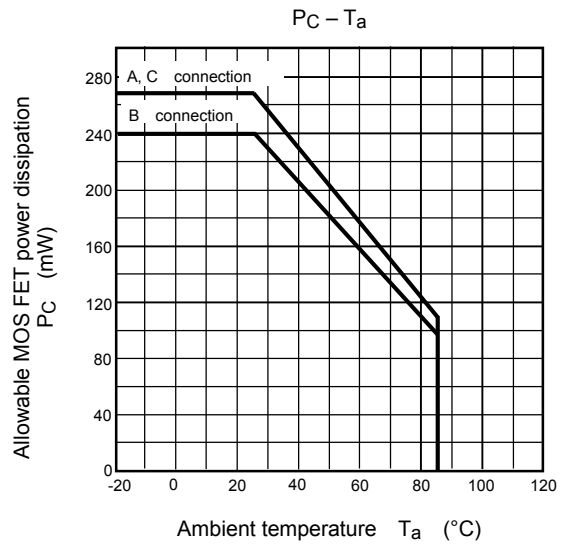
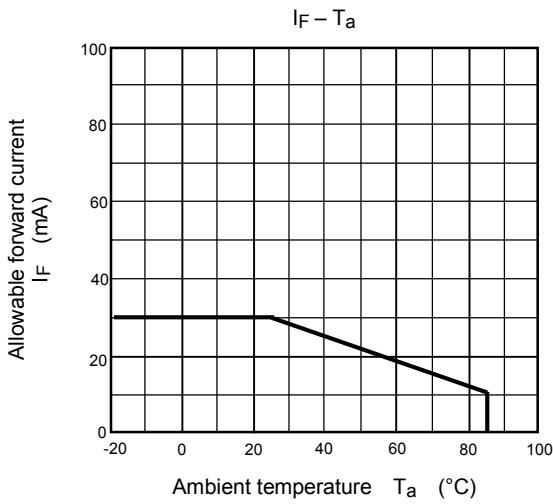
Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Capacitance input to output	C <sub>S</sub>	V <sub>S</sub> = 0, f = 1 MHz	—	0.8	—	pF
Isolation resistance	R <sub>S</sub>	V <sub>S</sub> = 500 V, R.H. ≤ 60%	5 × 10 <sup>10</sup>	10 <sup>14</sup>	—	Ω
Isolation voltage	BV <sub>S</sub>	AC, 60 s	2500	—	—	V <sub>rms</sub>
		AC, 1 s (in oil)	—	5000	—	V <sub>rms</sub>
		DC, 60 s (in oil)	—	5000	—	V <sub>DC</sub>

## Switching Characteristics (Ta = 25°C)

Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Turn-on time	t <sub>ON</sub>	V <sub>DD</sub> = 20 V, R <sub>L</sub> = 200 Ω I <sub>F</sub> = 5 mA (Note 2)	—	0.3	1.0	ms
Turn-off time	t <sub>OFF</sub>		—	0.2	1.0	

Note 2: Switching time test circuit





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