

TOSHIBA Photocoupler Photo Relay

# TLP798GA

Telecommunication

Data Acquisition

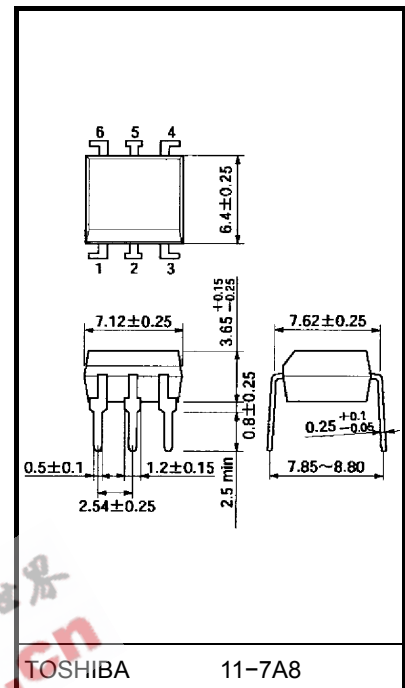
Measurement Instrumentation

Unit in mm

The TOSHIBA TLP798GA consists of an aluminum gallium arsenide infrared emitting diode optically coupled to a photo-MOS FET in a six lead plastic DIP package (DIP6).

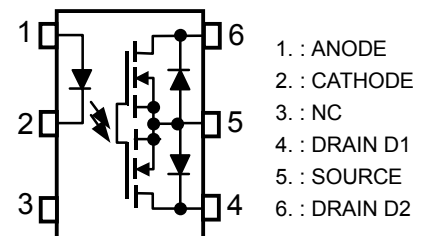
The TLP798GA is a bi-directional switch which can replace mechanical relays in many applications.

- Peak off-state voltage: 400 V (min.)
- On-state current: 150 mA (max.) (A connection)
- On-state resistance: 12 Ω (max.) (A connection)
- Isolation voltage: 5000 Vrms (min.) (A connection)
- Isolation Thickness: 0.4 mm (min.)

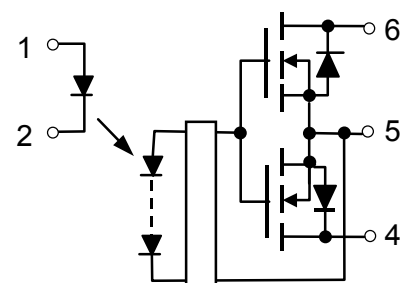


Weight: 0.4 g

### Pin Configuration (top view)



### Schematic



## 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	
	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	
Junction temperature	$T_j$	125	°C		
Storage temperature range	$T_{stg}$	-55~125	°C		
Operating temperature range	$T_{opr}$	-40~85	°C		
Lead soldering temperature (10 s)	$T_{sol}$	260	°C		
Isolation voltage (AC, 1 min., R.H. ≤ 60%)	(Note 2) $BV_S$	5000	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).

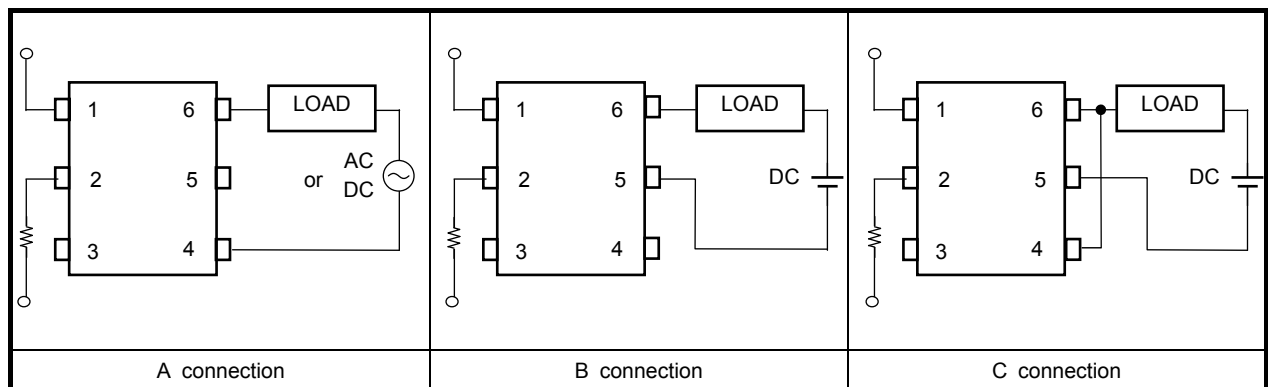
(Note 2): Device considered a two-terminal device: Pins 1, 2 and 3 shorted together, and pins 4, 5 and 6 shorted together.

## 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



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

Characteristic		Symbol	Test Condition	Min.	Typ.	Max.	Unit
LED	Forward voltage	$V_F$	$I_F = 10 \text{ mA}$	1.18	1.33	1.48	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	$I_{OFF}$	$V_{OFF} = 400 \text{ V}$	—	—	1	$\mu\text{A}$
	Capacitance	$C_{OFF}$	$V = 0, f = 1 \text{ MHz}$	—	—	—	pF

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

Characteristic		Symbol	Test Condition	Min.	Typ.	Max.	Unit
Trigger LED current		$I_{FT}$	$I_{ON} = 150 \text{ mA}$	—	1	3	mA
On-state resistance	A connection	$R_{ON}$	$I_{ON} = 150 \text{ mA}, I_F = 5 \text{ mA}$	—	8	12	$\Omega$
	B connection		$I_{ON} = 200 \text{ mA}, I_F = 5 \text{ mA}$	—	4	6	
	C connection		$I_{ON} = 300 \text{ mA}, I_F = 5 \text{ mA}$	—	2	3	

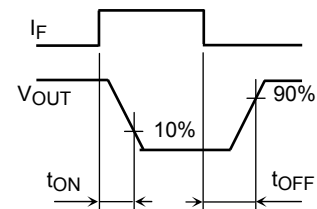
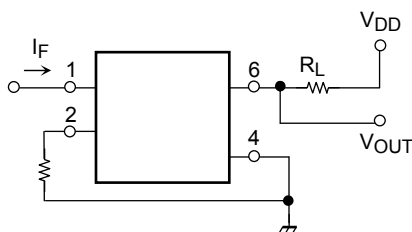
## Isolation Characteristics (Ta = 25°C)

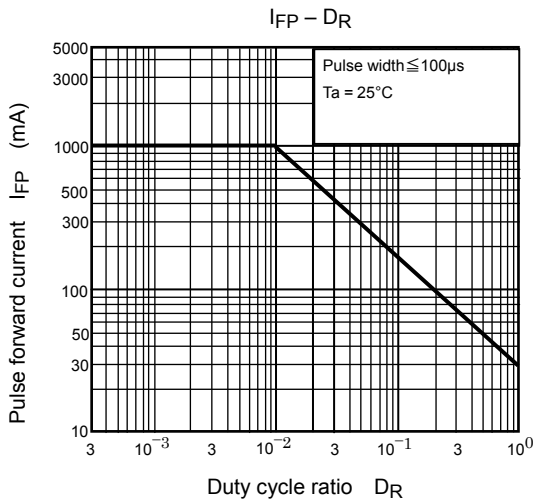
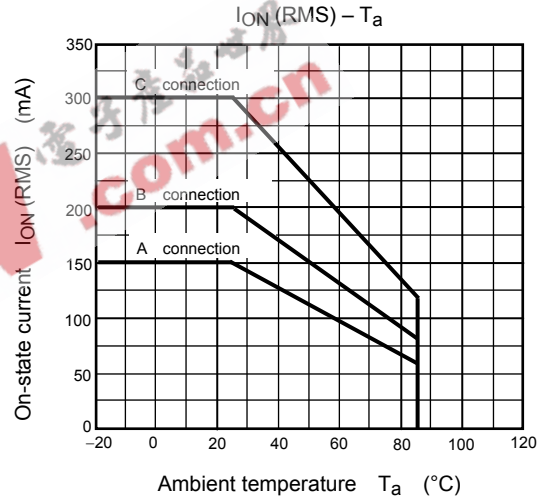
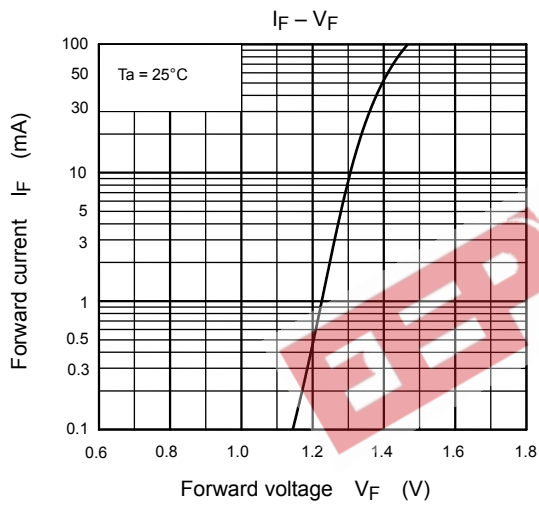
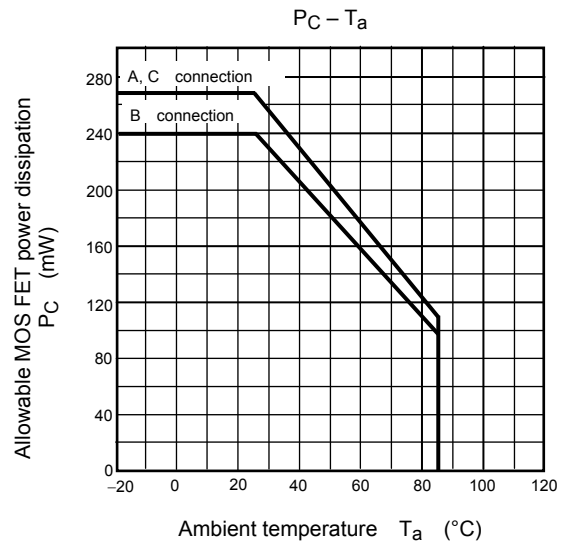
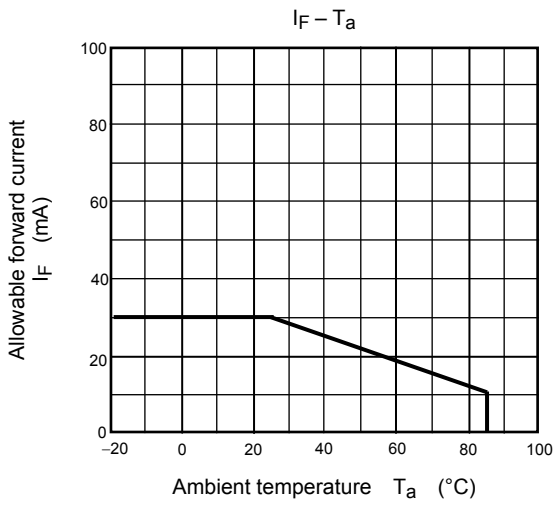
Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Capacitance input to output	$C_S$	$V_S = 0, f = 1 \text{ MHz}$	—	0.8	—	pF
Isolation resistance	$R_S$	$V_S = 500 \text{ V}, \text{R.H.} \leq 60\%$	$5 \times 10^{10}$	$10^{14}$	—	$\Omega$
Isolation voltage	$BV_S$	AC, 1 minute	5000	—	—	Vrms
		AC, 1 second (in oil)	—	10000	—	VDC
		DC, 1 minute (in oil)	—	10000	—	VDC

## Switching Characteristics (Ta = 25°C)

Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Turn-on time	$t_{ON}$	$V_{DD} = 20 \text{ V}, R_L = 200 \Omega$ $I_F = 5 \text{ mA}$ (Note 3)	—	0.3	1.0	ms
Turn-off time	$t_{OFF}$		—	0.2	1.0	

(Note 3): Switching time test circuit





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