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TOSHIBA Photocoupler GaAs Ired & Photo-Thyristor

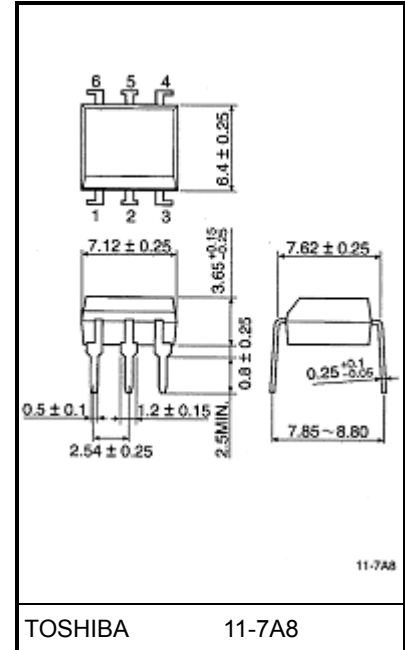
# TLP548J

Office Machine  
 Household Use Equipment  
 Solid State Relay  
 Switching Power Supply

The TOSHIBA TLP548J consists of a photo-thyristor optically coupled to a gallium arsenide infrared emitting diode in a six lead plastic DIP package.

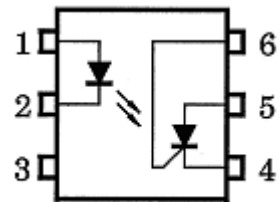
- Peak off-state voltage: 600 V (min)
- Trigger LED current: 7 mA (max)
- On-state current: 150 mA (max)
- Isolation voltage: 2500 Vrms (min)
- UL approved: UL1577, File No.E67349

Unit: mm



TOSHIBA 11-7A8  
 Weight: 0.4 g (typ.)

### Pin Configuration (top view)



- 1: ANODE (LED)
- 2: CATHODE (LED)
- 3: N.C.
- 4: CATHODE (SCR)
- 5: ANODE (SCR)
- 6: GATE

Start of commercial production  
 2009-07

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

Characteristic		Symbol	Rating	Unit
LED	Forward current	I <sub>F</sub>	50	mA
	Forward current derating (Ta ≥ 53°C)	ΔI <sub>F</sub> / °C	-0.7	mA / °C
	Peak forward current (100 μs pulse, 100 pps)	I <sub>FP</sub>	1	A
	Reverse voltage	V <sub>R</sub>	5	V
	Diode power dissipation	P <sub>D</sub>	100	mW
	Diode power dissipation derating (Ta ≥ 53°C)	ΔP <sub>D</sub> / °C	-1.4	mW / °C
Detector	Peak forward voltage (R <sub>GK</sub> = 27kΩ)	V <sub>DRM</sub>	600	V
	Peak reverse voltage (R <sub>GK</sub> = 27kΩ)	V <sub>RDM</sub>	600	V
	On-state current	I <sub>T</sub> (RMS)	150	mA
	On-state current derating (Ta ≥ 25°C)	ΔI <sub>T</sub> / °C	-2.0	mA / °C
	Peak on-state current (100 μs pulse, 120 pps)	I <sub>TP</sub>	3	A
	Peak one cycle surge current	I <sub>TSM</sub>	2	A
	Peak reverse gate voltage	V <sub>GM</sub>	5	V
	Output power dissipation	P <sub>O</sub>	150	mW
	Output power dissipation derating (Ta ≥ 25°C)	ΔP <sub>O</sub> / °C	-1.5	mW / °C
Operating temperature range		T <sub>opr</sub>	-40 to 100	°C
Storage temperature range		T <sub>stg</sub>	-55 to 125	°C
Lead soldering temperature (10 s)		T <sub>sol</sub>	260	°C
Isolation voltage (AC, 60 s, R.H. ≤ 60%) (Note 1)		BV <sub>S</sub>	2500	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 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 <sub>AC</sub>	—	—	240	V <sub>ac</sub>
Forward current	I <sub>F</sub>	10	—	25	mA
Operating temperature	T <sub>opr</sub>	-25	—	85	°C
Gate to cathode resistance	R <sub>GK</sub>	—	27	33	kΩ
Gate to cathode capacity	C <sub>GK</sub>	—	0.01	0.1	μF

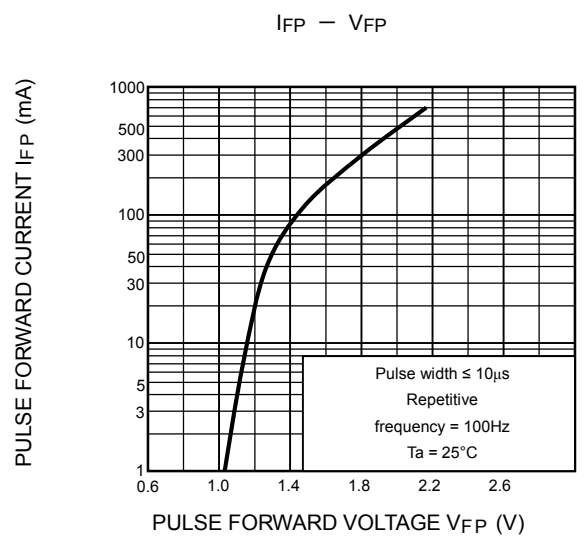
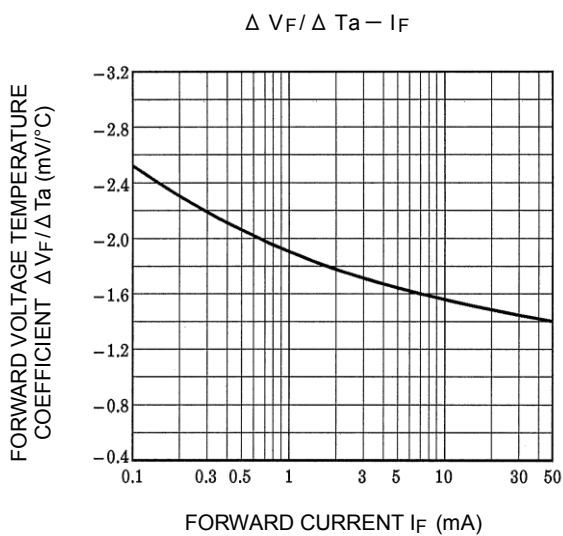
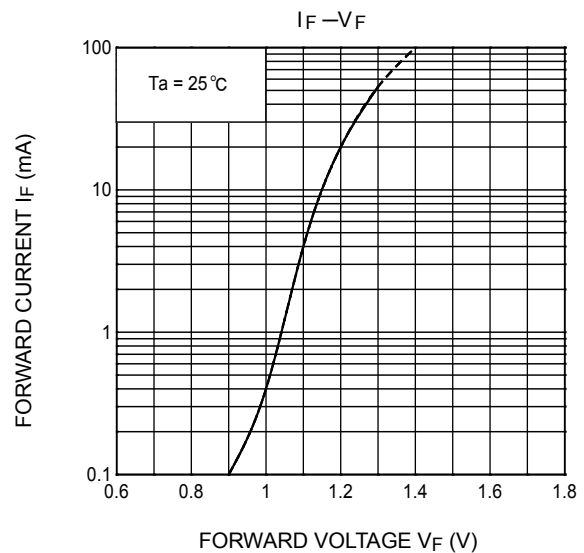
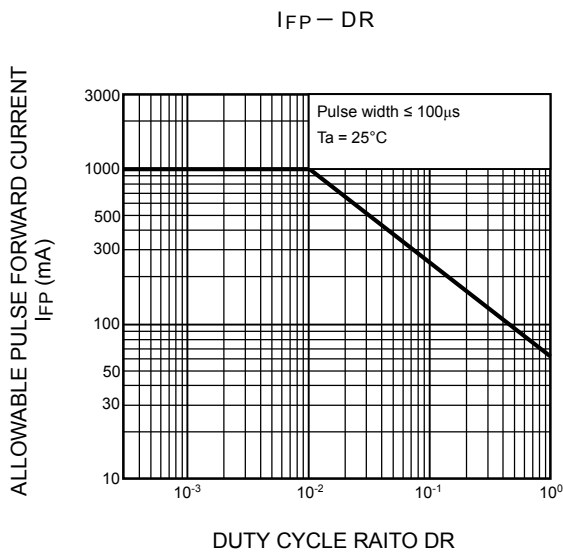
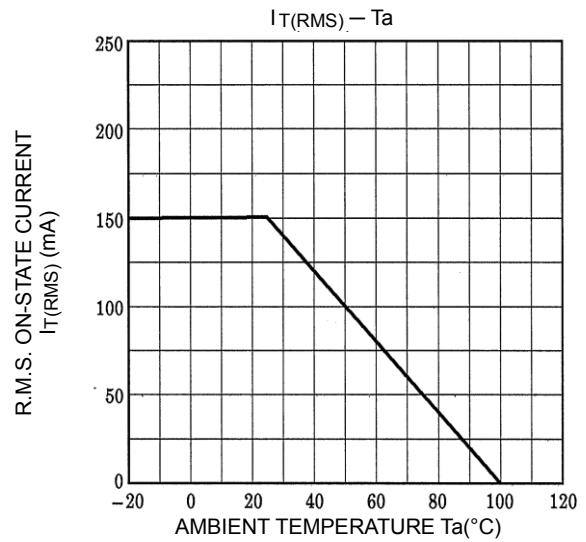
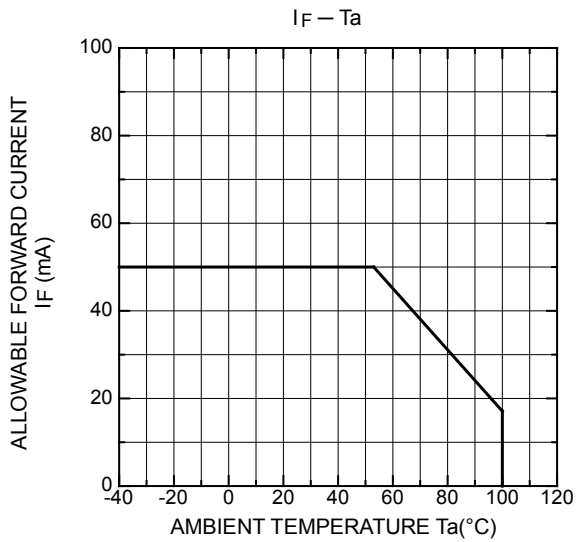
Note: Recommended operating conditions are given as a design guideline to obtain expected performance of the device. Additionally, each item is an independent guideline respectively. In developing designs using this product, please confirm specified characteristics shown in this document.

## Electrical Characteristics (Ta = 25°C)

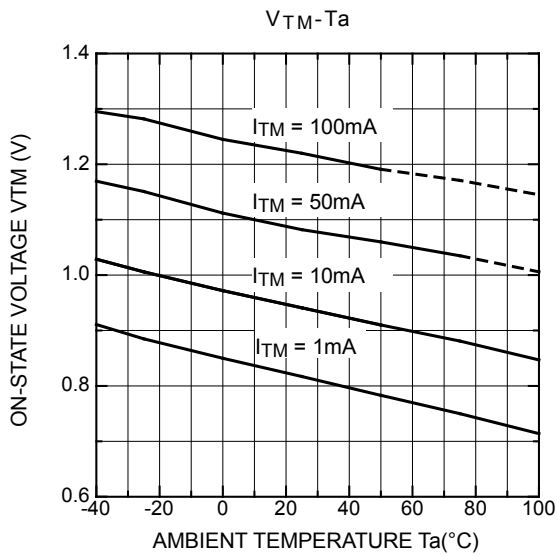
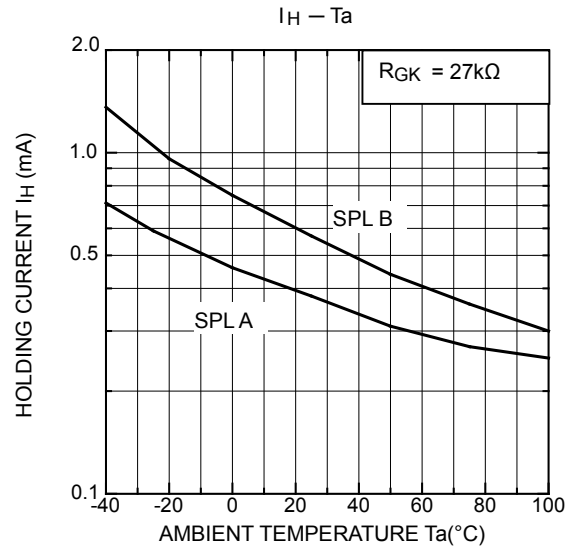
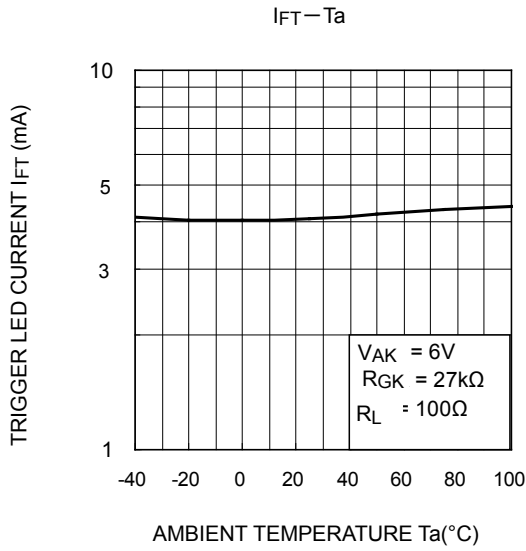
Characteristic		Symbol	Test Condition	Min	Typ.	Max	Unit
LED	Forward voltage	V <sub>F</sub>	I <sub>F</sub> = 10 mA	1.0	1.15	1.3	V
	Reverse current	I <sub>R</sub>	V <sub>R</sub> = 5 V	—	—	10	μA
	Capacitance	C <sub>T</sub>	V <sub>F</sub> = 0 V, f = 1 MHz	—	30	—	pF
Detector	Off-state current	I <sub>DRM</sub>	V <sub>AK</sub> = 600 V, R <sub>GK</sub> = 27 kΩ	—	—	5	μA
	Reverse current	I <sub>RRM</sub>	V <sub>KA</sub> = 600 V, R <sub>GK</sub> = 27 kΩ	—	—	5	μA
	On-state voltage	V <sub>TM</sub>	I <sub>TM</sub> = 100 mA, I <sub>F</sub> = 7 mA	—	1.25	1.45	V
	Holding current	I <sub>H</sub>	R <sub>GK</sub> = 27 kΩ	—	0.5	1	mA
	Off-state dv/dt	dv/dt	V <sub>AK</sub> = 420 V, R <sub>GK</sub> = 27 kΩ	5	—	—	V/μs
	Capacitance	C <sub>j</sub>	V = 0 V, f = 1 MHz	Anode to gate		—	5
		Gate to cathode		—	500	—	

## Coupled Characteristics (Ta = 25°C)

Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Trigger LED current	I <sub>FT</sub>	V <sub>AK</sub> = 6 V, R <sub>GK</sub> = 27 kΩ	—	3	7	mA
Turn-on time	t <sub>ON</sub>	I <sub>F</sub> = 30 mA, V <sub>AA</sub> = 50 V, R <sub>GK</sub> = 27 kΩ	—	10	—	μs
Capacitance (input to output)	C <sub>S</sub>	V <sub>S</sub> = 0 V, 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	—	
		DC, 60 s, in oil	—	5000	—	V <sub>dc</sub>



\*: The above graphs show typical characteristics.



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