

## TLP748J

Office Machine  
Household Use Equipment  
Solid State Relay  
Switching Power Supply

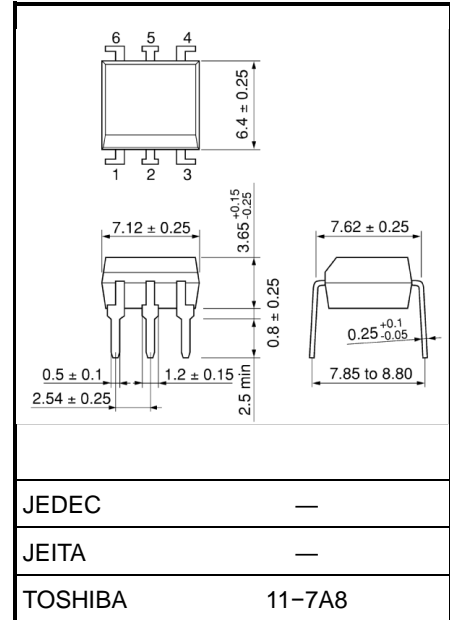
The TOSHIBA TLP748J consists of a photo-thyristor optically coupled to an infrared emitting diode in a six lead plastic DIP package.

- Peak OFF-state voltage: 600 V (min)
- Trigger LED current: 10 mA (max)
- ON-state current: 150 mA (max)
- Isolation voltage: 4000 Vrms (min)
- UL-recognized: UL 1577, File No.E67349
- cUL-recognized: CSA Component Acceptance Service No.5A  
File No.E67349
- VDE-approved: EN 60747-5-5 (Note 1)

Note 1 : When a VDE approved type is needed,  
please designate the **Option(D4)**.

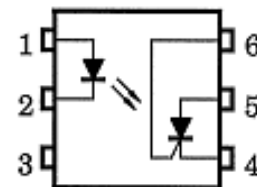
	7.62 mm pitch standard type	10.16 mm pitch TLPxxxxF type
• Creepage distance:	7.0 mm (min)	8.0 mm (min)
Clearance:	7.0 mm (min)	8.0 mm (min)
Insulation thickness:	0.4 mm (min)	0.4 mm (min)

Unit: mm



Weight: 0.42 g (typ.)

### Pin Configuration (top view)



- 1 : ANODE
- 2 : CATHODE
- 3 : N.C.
- 4 : CATHODE
- 5 : ANODE
- 6 : GATE

Start of commercial production  
2008-12

**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> = 27 kΩ)	V <sub>DRM</sub>	600	V
	Peak reverse voltage (R <sub>GK</sub> = 27 kΩ)	V <sub>RDM</sub>	600	V
	ON-state current	I <sub>T(RMS)</sub>	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
Storage temperature range		T <sub>stg</sub>	-55 to 125	°C
Operating temperature range		T <sub>opr</sub>	-40 to 100	°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>	4000	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>	15	—	25	mA
Operating temperature	T <sub>opr</sub>	-25	—	85	°C
Gate to cathode resistance	R <sub>GK</sub>	—	10	27	kΩ
Gate to cathode capacity	C <sub>GK</sub>	—	0.01	0.1	μF

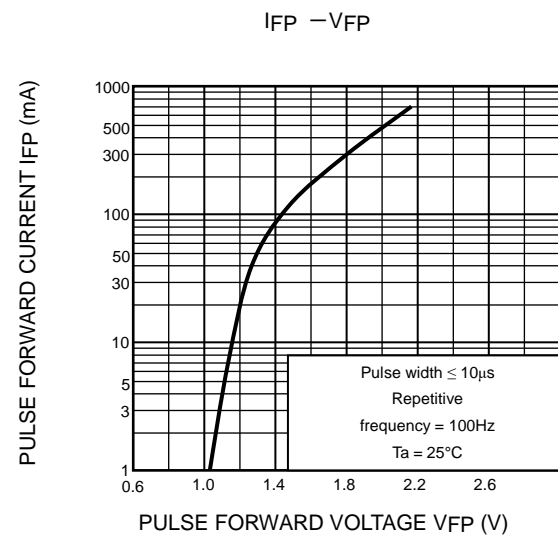
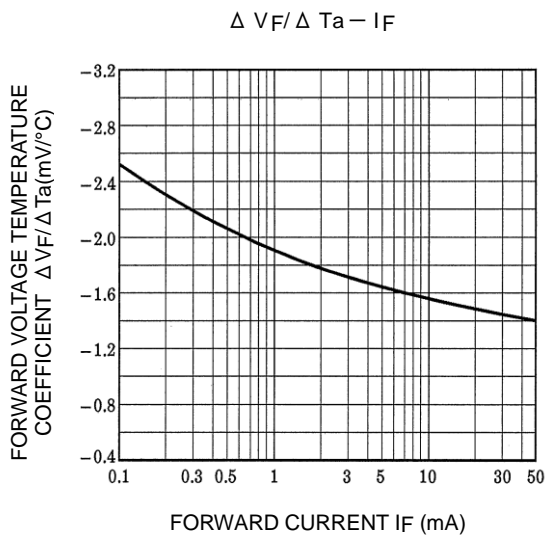
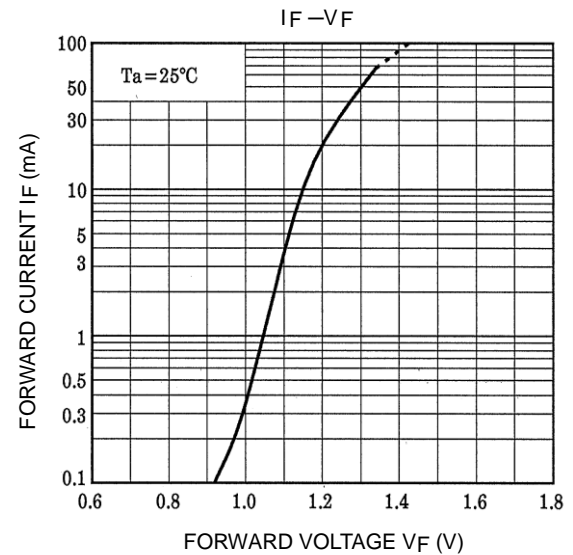
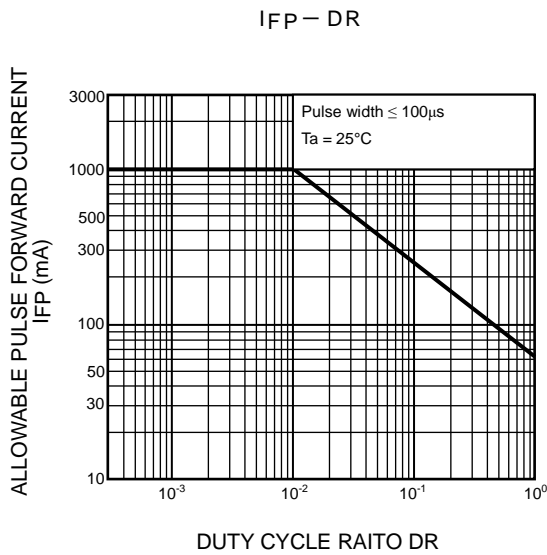
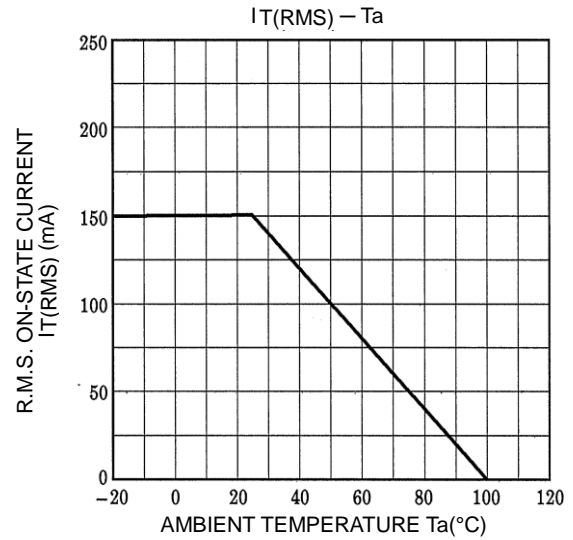
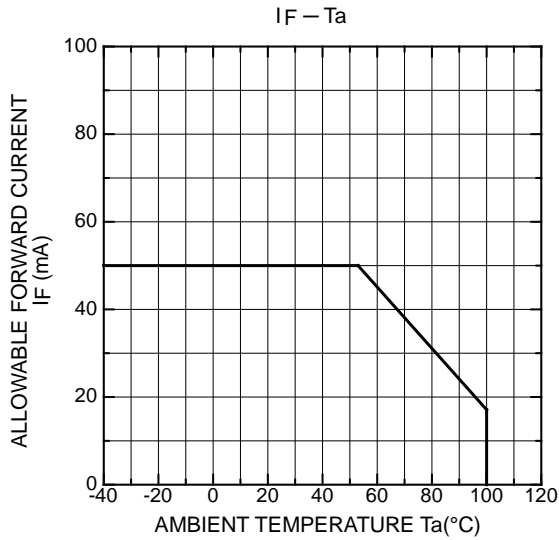
Note: Recommended operating conditions are given as a design guideline to obtain expected performance of the device. Additionally, each item is an independent guideline respectively. In developing designs using this product, please confirm specified characteristics shown in this document.

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

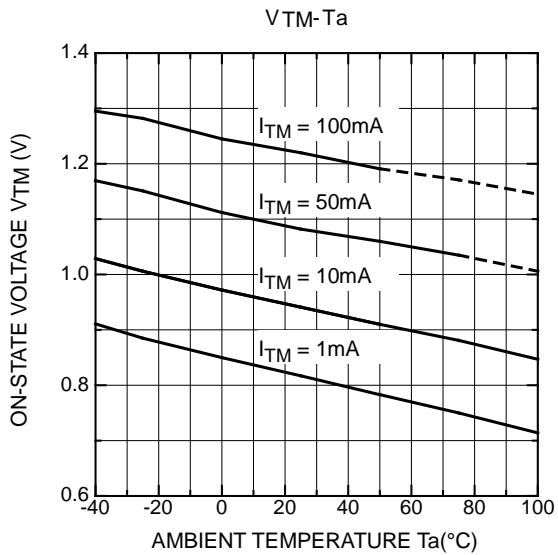
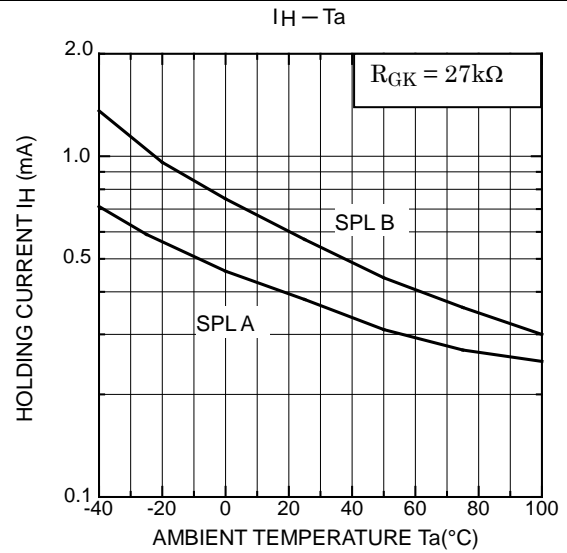
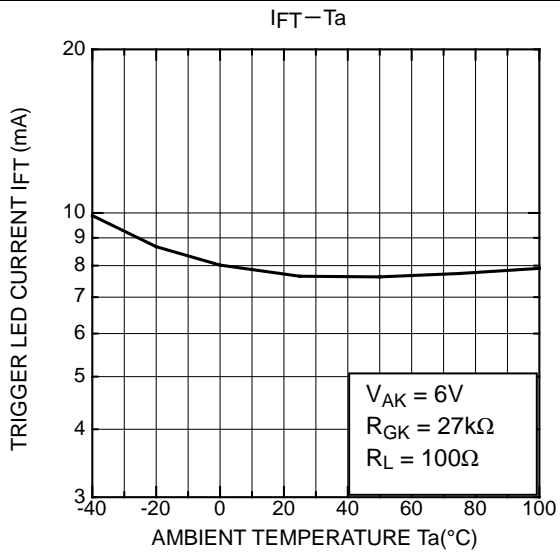
Characteristic		Symbol	Test Condition	Min	Typ.	Max	Unit
LED	Forward voltage	$V_F$	$I_F = 10 \text{ mA}$	1.0	1.15	1.3	V
	Reverse current	$I_R$	$V_R = 5 \text{ V}$	—	—	10	$\mu\text{A}$
	Capacitance	$C_T$	$V_F = 0 \text{ V}, f = 1 \text{ MHz}$	—	30	—	pF
Detector	OFF-state current	$I_{DRM}$	$V_{AK} = 600 \text{ V}, R_{GK} = 27 \text{ k}\Omega$	—	—	5	$\mu\text{A}$
	Reverse current	$I_{RRM}$	$V_{KA} = 600 \text{ V}, R_{GK} = 27 \text{ k}\Omega$	—	—	5	$\mu\text{A}$
	ON-state voltage	$V_{TM}$	$I_{TM} = 100 \text{ mA}$	—	—	1.45	V
	Holding current	$I_H$	$R_{GK} = 27 \text{ k}\Omega$	—	—	1	mA
	OFF-state dv / dt	dv / dt	$V_{AK} = 420 \text{ V}, R_{GK} = 27 \text{ k}\Omega$	5	—	—	V/ $\mu\text{s}$
	Capacitance	$C_j$	$V = 0 \text{ V}, f = 1 \text{ MHz}$				
			Anode to gate	—	5	—	pF
			Gate to cathode	—	500	—	

## Coupled Characteristics (Ta = 25°C)

Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Trigger LED current	$I_{FT}$	$V_{AK} = 6 \text{ V}, R_{GK} = 27 \text{ k}\Omega$	—	—	10	mA
Turn-on time	$t_{ON}$	$I_F = 30 \text{ mA}, V_{AA} = 50 \text{ V}$ $R_{GK} = 27 \text{ k}\Omega$	—	15	—	$\mu\text{s}$
Capacitance (input to output)	$C_S$	$V_S = 0 \text{ V}, f = 1 \text{ MHz}$	—	0.8	—	pF
Isolation resistance	$R_S$	$V_S = 500 \text{ V}, R.H. \leq 60 \%$	$1 \times 10^{12}$	$10^{14}$	—	$\Omega$
Isolation voltage	$BV_S$	AC, 60 s	4000	—	—	V <sub>rms</sub>



NOTE: The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.



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## EN 60747-5-5 Option (D4) Specification

Types : TLP748J

Type designations for "option: (D4)", which are tested under EN 60747 requirements.

Ex.: TLP748J (D4,F)

D4 : EN 60747 option

F : [[G]]/RoHS COMPATIBLE (Note 1)

Note: Use TOSHIBA standard type number for safety standard application.

Ex.: TLP748J (D4,F) → TLP748



Note 1: Please contact your Toshiba sales representative for details on environmental information such as the product's RoHS compatibility.

RoHS is the Directive 2011/65/EU of the European Parliament and of the Council of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment.

### EN 60747 Isolation Characteristics

Description		Symbol	Rating	Unit
Application classification for rated mains voltage ≤ 300V <sub>rms</sub> for rated mains voltage ≤ 600V <sub>rms</sub>			I-IV I-III	—
Climatic classification			40/ 100 / 21	—
Pollution degree			2	—
Maximum operating insulation voltage	TLPxxx type	V <sub>IORM</sub>	890	V <sub>pk</sub>
	TLPxxxFtype		1130	
Input to output test voltage, method A V <sub>pr</sub> = 1.6 × V <sub>IORM</sub> , type and sample test t <sub>p</sub> = 10 s, partial discharge < 5pC	TLPxxx type	V <sub>pr</sub>	1424	V <sub>pk</sub>
	TLPxxxFtype		1808	
Input to output test voltage, method B V <sub>pr</sub> = 1.875 × V <sub>IORM</sub> , 100% production test t <sub>p</sub> = 1 s, partial discharge < 5pC	TLPxxx type	V <sub>pr</sub>	1670	V <sub>pk</sub>
	TLPxxxFtype		2120	
Highest permissible overvoltage (transient overvoltage, t <sub>pr</sub> = 60 s)		V <sub>TR</sub>	8000	V <sub>pk</sub>
Safety limiting values (max. permissible ratings in case of fault, also refer to thermal derating curve) current (input current I <sub>F</sub> , P <sub>si</sub> = 0) power (output or total power dissipation) temperature		I <sub>si</sub> P <sub>si</sub> T <sub>s</sub>	400 700 150	mA mW °C
Insulation resistance, input-output	V <sub>io</sub> = 500V, T <sub>a</sub> = 25°C V <sub>io</sub> = 500V, T <sub>a</sub> = 100°C V <sub>io</sub> = 500V, T <sub>a</sub> = T <sub>s</sub>	R <sub>si</sub>	≥ 10 <sup>12</sup> ≥ 10 <sup>11</sup> ≥ 10 <sup>9</sup>	Ω

## Insulation Related Specifications

		 7.62mm pitch TLPxxx type	 10.16mm pitch TLPxxxF type
Minimum creepage distance	Cr	7.0mm	8.0mm
Minimum clearance	Cl	7.0mm	8.0mm
Minimum insulation thickness	ti	0.4mm	
Comperative tracking index	CTI	175	

1. If a printed circuit is incorporated, the creepage distance and clearance may be reduced below this value. (e.g. at a standard distance between soldering eye centres of 7.5mm). If this is not permissible, the user shall take suitable measures.
2. This photocoupler is suitable for 'safe electrical isolation' only within the safety limit data. Maintenance of the safety data shall be ensured by means of protective circuits.

Note: The above marking is applied to the photocouplers that have been qualified according to option (D4) of EN 60747.

Marking on product for EN 60747:



Marking on Packing for EN 60747:



Figure 1 Partial discharge measurement procedure according to EN 60747  
Destructive test for qualification and sampling tests.

Method A

(for type and sampling tests,  
destructive tests)

- t<sub>1</sub>, t<sub>2</sub> = 1 to 10 s
- t<sub>3</sub>, t<sub>4</sub> = 1 s
- t<sub>p</sub>(Measuring time for  
partial discharge) = 10 s
- t<sub>b</sub> = 12 s
- t<sub>ini</sub> = 60 s

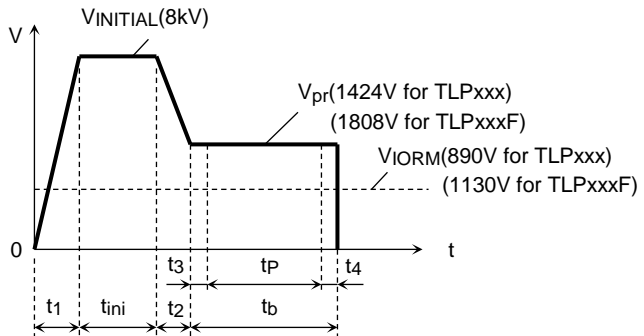


Figure 2 Partial discharge measurement procedure according to EN 60747  
Non-destructive test for 100% inspection.

Method B

(for sample test, non-  
destructive test)

- t<sub>3</sub>, t<sub>4</sub> = 0.1 s
- t<sub>p</sub>(Measuring time for  
partial discharge) = 1 s
- t<sub>b</sub> = 1.2 s

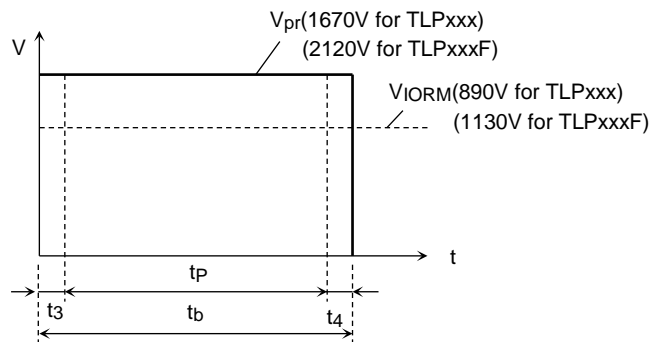
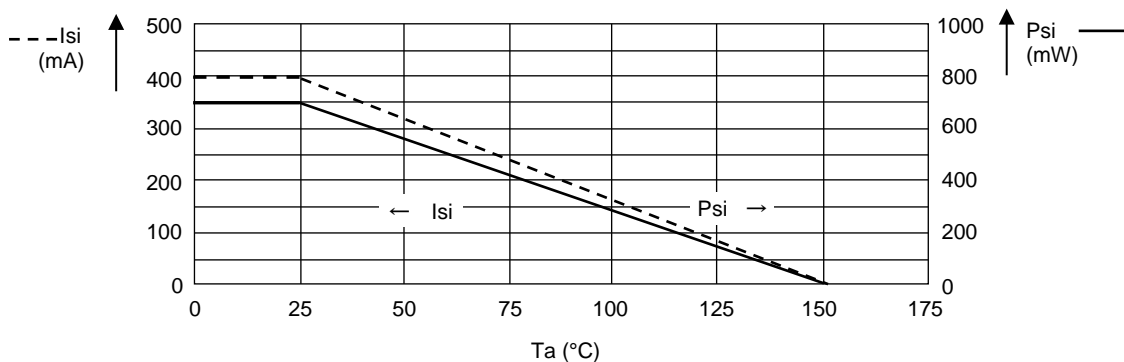


Figure 3 Dependency of maximum safety ratings on ambient temperature (for  
photodetector failure)





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