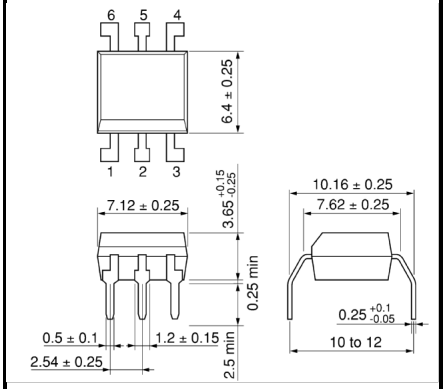
TOSHIBA Photocoupler IRED & Photo-Thyristor

TLP748JF

Office Machine
Household Use Equipment
Solid State Relay
Switching Power Supply

Unit: mm



JEDEC	—
JEITA	—
TOSHIBA	11−7A802

Weight: 0.42 g (typ.)

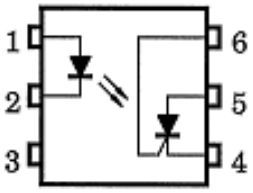
The TOSHIBA TLP748JF consists of a photo−thyristor optically coupled to an infrared emitting diode in a six lead plastic DIP package.

- 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)**.

Pin Configuration (top view)



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

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

Start of commercial production
2008-12

Absolute Maximum Ratings (Ta = 25°C)

Characteristic		Symbol	Rating	Unit
LED	Forward current	I_F	50	mA
	Forward current derating (Ta ≥ 53 °C)	ΔI_F / °C	−0.7	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	100	mW
	Diode power dissipation derating (Ta ≥ 53°C)	$\triangle P_D$ /°C	-1.4	mW/°C
Detector	Peak forward voltage (R_{GK} = 27 kΩ)	V_{DRM}	600	V
	Peak reverse voltage (R_{GK} = 27 kΩ)	V_{RRM}	600	V
	ON−state current	$I_{T(RMS)}$	150	mA
	ON−state current derating (Ta ≥ 25°C)	ΔI_T / °C	−2.0	mA / °C
	Peak ON−state current (100 μs pulse, 120 pps)	I_{TP}	3	A
	Peak one cycle surge current	I_{TSM}	2	A
	Peak reverse gate voltage	V_{GM}	5	V
	Output power dissipation	P_O	150	mW
	Output power dissipation derating (Ta ≥ 25°C)	ΔP_O / °C	−1.5	mW / °C
Storage temperature range		T_{stg}	−55 to 125	°C
Operating temperature range		T_{opr}	−40 to 100	°C
Lead soldering temperature (10 s)		T_{sol}	260	°C
Isolation voltage (AC, 60 s, R.H.≤ 60 %) (Note 1)		BV_S	4000	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 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_{AC}	—	—	240	V_{ac}
Forward current	I_F	15	—	25	mA
Operating temperature	T_{opr}	−25	—	85	°C
Gate to cathode resistance	R_{GK}	—	10	27	kΩ
Gate to cathode capacity	C_{GK}	—	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.

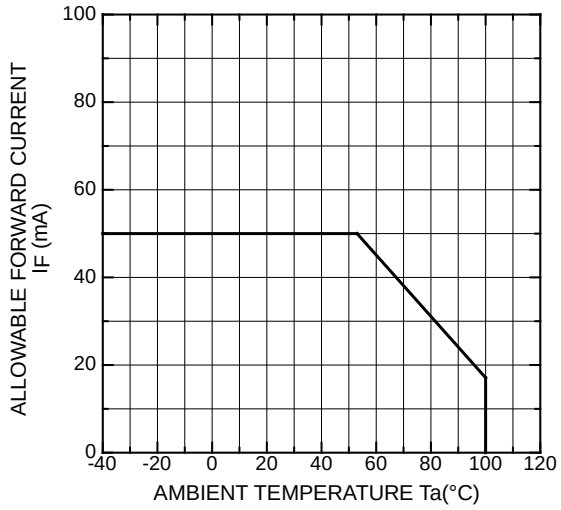
Individual Electrical Characteristics (Ta = 25°C)

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

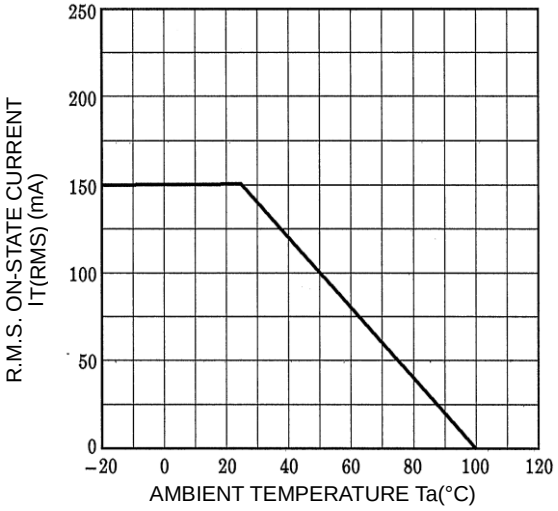
Coupled Characteristics (Ta = 25°C)

Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Trigger LED current	I_{FT}	V_{AK} = 6 V, R_{GK} = 27 kΩ	—	—	10	mA
Turn−on time	t_{ON}	I_F = 30 mA, V_{AA} = 50 V R_{GK} = 27 kΩ	—	15	—	μs
Capacitance (input to output)	C_S	V_S = 0 V, f = 1 MHz	—	0.8	—	pF
Isolation resistance	R_S	V_S = 500 V, R.H.≤ 60 %	1×10^{12}	10^{14}	—	Ω
Isolation voltage	BV_S	AC, 60 s	4000	—	—	V_{rms}

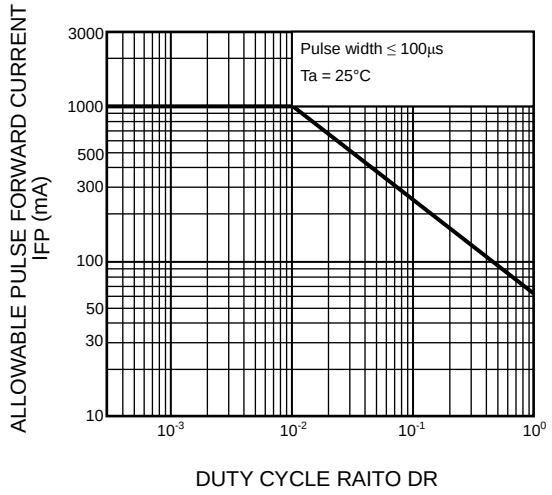
$I_F - Ta$



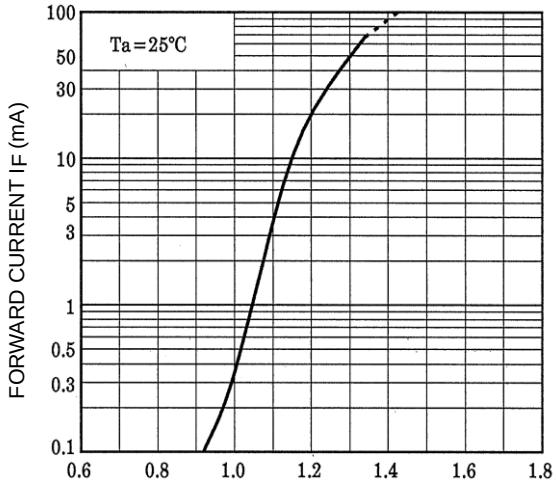
$I_{T(RMS)} - Ta$



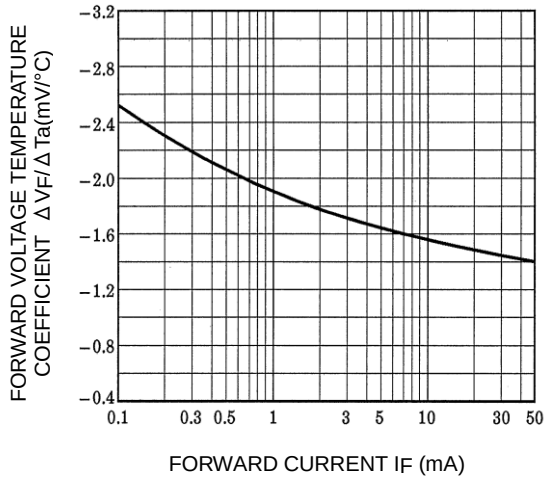
$I_{FP} - DR$



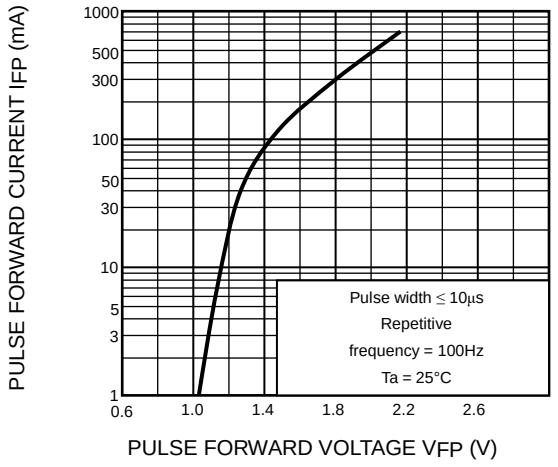
$I_F - V_F$



$\Delta V_F / \Delta Ta - I_F$

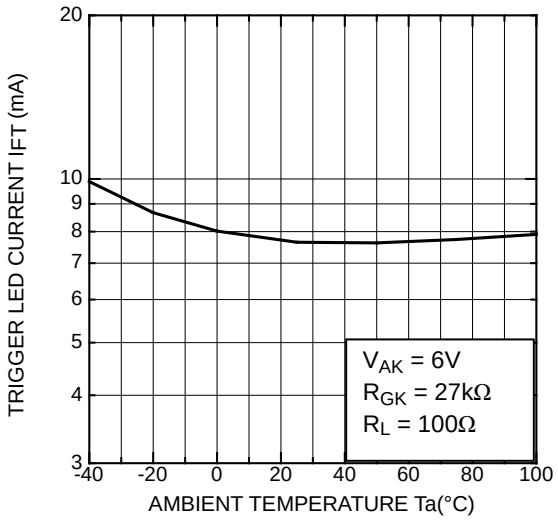


$I_{FP} - V_{FP}$

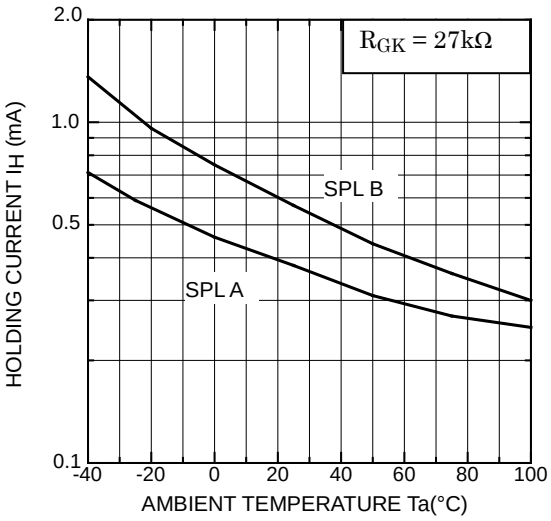


NOTE: The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.

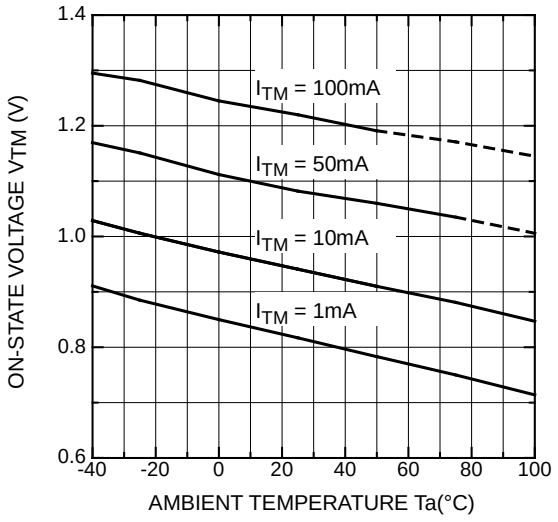
I_{FT} – Ta



I_H – Ta



V_{TM}-Ta



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

EN 60747-5-5 Option (D4) Specification

Types : TLP48JF

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

Ex.: TLP748JF (D4,F) D4 : EN 60747 option
F : [[G]]/RoHS COMPATIBLE (Note 1)

Note: Use TOSHIBA standard type number for safety standard application.
Ex.: TLP748JF (D4,F) → TLP748JF

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_{rms} for rated mains voltage≤600V_{rms}			 I-IV I-III	—
Climatic classification			40/ 100 / 21	—
Pollution degree			2	—
Maximum operating insulation voltage	TLPxxx type	V_{IORM}	890	Vpk
	TLPxxxFtype		1130	
Input to output test voltage, method A Vpr=1.6×V_{IORM}, type and sample test tp=10 s, partial discharge<5pC	TLPxxx type	Vpr	1424	Vpk
	TLPxxxFtype		1808	
Input to output test voltage, method B Vpr=1.875×V_{IORM}, 100% production test t_p=1 s, partial discharge<5pC	TLPxxx type	Vpr	1670	Vpk
	TLPxxxFtype		2120	
Highest permissible overvoltage (transient overvoltage, t_{pr} = 60 s)		V_{TR}	8000	Vpk
Safety limiting values (max. permissible ratings in case of fault, also refer to thermal derating curve) current (input current I_F, P_{si} = 0) power (output or total power dissipation) temperature		 Isi Psi Ts	 400 700 150	 mA mW °C
Insulation resistance, input-output	V_{IO} =500V, Ta=25°C	Rsi	≥10^{12}	Ω
	V_{IO} =500V, Ta=100°C		≥10^{11}	
	V_{IO} =500V, Ta=Ts		≥10^{9}	

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_1, t_2	= 1 to 10 s
t_3, t_4	= 1 s
t_p(Measuring time for partial discharge)	= 10 s
t_b	= 12 s
t_{ini}	= 60 s

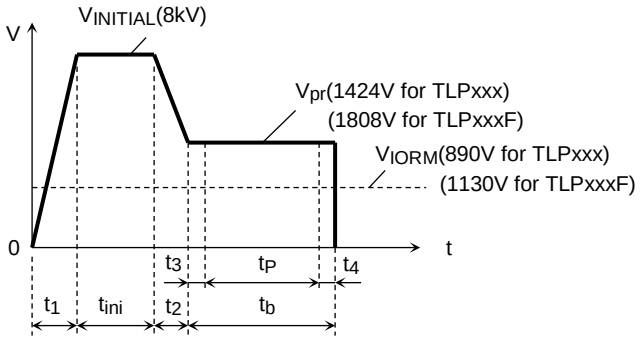


Figure 2 Partial discharge measurement procedure according to EN 60747
Non-destructive test for100% inspection.

Method B

(for sample test,non-destructive test)

t_3, t_4	= 0.1 s
t_p(Measuring time for partial discharge)	= 1 s
t_b	= 1.2 s

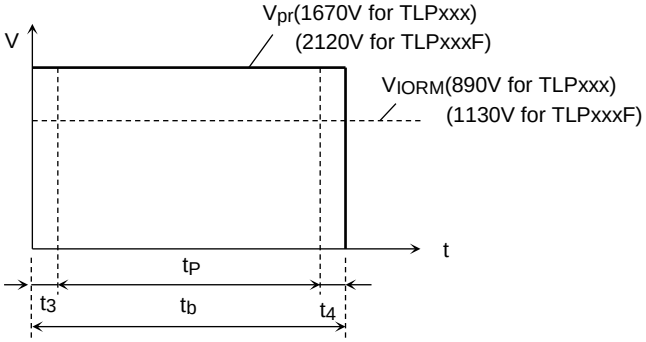
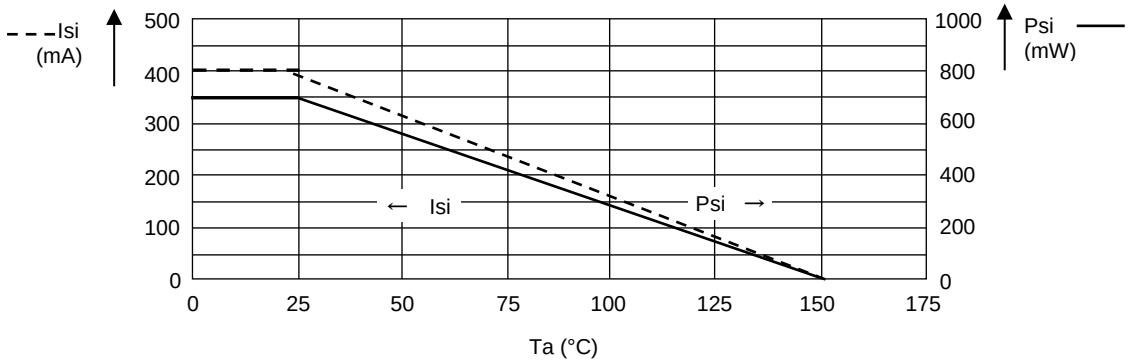


Figure 3 Dependency of maximum safety ratings on ambient temperature (for photodetector failure)



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