

TOSHIBA PHOTOCOUPLER GaAs IRED & PHOTO-TRIAC

# TLP3041(S),TLP3042(S),TLP3043(S)

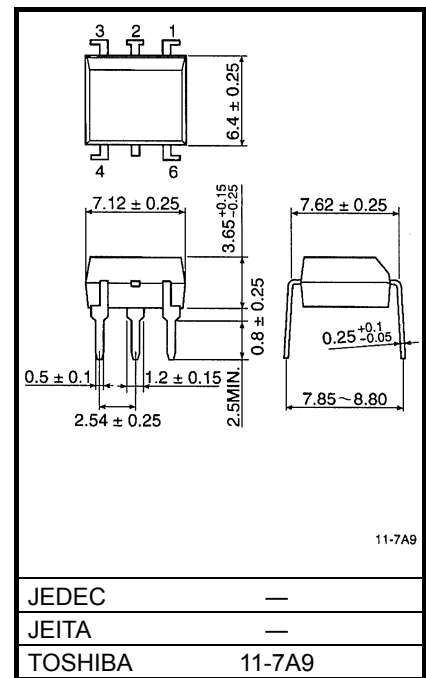
Unit: mm

OFFICE MACHINE  
HOUSEHOLD USE EQUIPMENT  
TRIAC DRIVER  
SOLID STATE RELAY

The TOSHIBA TLP3041 (S), TLP3042 (S), TLP3043 (S) consist of a zero voltage crossing turn-on photo-triac optically coupled to a gallium arsenide infrared emitting diode in a six lead plastic DIP package.

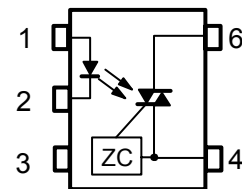
- Peak Off-State Voltage : 400 V (min)
- Trigger LED Current : 15 mA (max) (TLP3041(S))  
10 mA (max) (TLP3042(S))  
5 mA (max) (TLP3043(S))
- On-State Current : 100 mA (max)
- Isolation Voltage : 5000 Vrms (min)
- UL Recognized : UL1577, File No. E67349
- SEMKO Approved : SS EN60065  
SS EN60950, File No.9841109
- BSI Approved : BS EN60065, File No.8385  
BS EN60950, File No.8386
- Option (D4) type  
VDE approved: DIN EN60747-5-2  
Approved No. 40009302  
Maximum operating insulation voltage: 890V<sub>PK</sub>  
Highest permissible over voltage: 8000V<sub>PK</sub>  
(Note):When a EN60747-5-2 approved type is needed,  
please designate the "Option (D4)"

	7.62 mm pich	10.16 mm pich
	Standard Type	TLPxxxxF Type
Creepage Distance	7.0 mm (Min)	8.0 mm (Min)
Clearance	7.0 mm (Min)	8.0 mm (Min)
Insulation Thickness	0.5 mm (Min)	0.5 mm (Min)



weight: 0.39g (typ.)

### Pin Configuration (top view)



- 1: Anode
- 2: Cathode
- 3: N.C.
- 4: Terminal 1
- 6: Terminal 2

ZC:Zero-cross Circuit

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

CHARACTERISTIC		SYMBOL	RATING	UNIT
LED	Forward Current	$I_F$	50	mA
	Forward Current Derating (Ta ≥ 53°C)	$\Delta I_F / ^\circ\text{C}$	-0.7	mA / °C
	Peak Forward Current (100 $\mu\text{s}$ pulse, 100pps)	$I_{FP}$	1	A
	Power Dissipation	$P_D$	100	mW
	Power Dissipation Derating (Ta ≥ 25°C)	$\Delta P_D / ^\circ\text{C}$	-1.0	mW / °C
	Reverse Voltage	$V_R$	5	V
	Junction Temperature	$T_j$	125	°C
DETECTOR	Off-State Output Terminal Voltage	$V_{DRM}$	400	V
	On-Stage RMS Current	$I_{T(RMS)}$	100	mA
	Current		50	
	On-State Current Derating (Ta ≥ 25°C)	$\Delta I_T / ^\circ\text{C}$	-1.1	mA / °C
	Peak On-Stage Current (100 $\mu\text{s}$ pulse, 120pps)	$I_{TP}$	2	A
	Peak Nonrepetitive Surge Current ( $P_W = 10\text{ms}$ )	$I_{TSM}$	1.2	A
	Power Dissipation	$P_D$	300	mW
	Power Dissipation Derating (Ta ≥ 25°C)	$\Delta P_D / ^\circ\text{C}$	-4.0	mW / °C
	Junction Temperature	$T_j$	115	°C
	Storage Temperature Range	$T_{stg}$	-55 to 150	°C
Operating Temperature Range	$T_{opr}$	-40 to 100	°C	
Lead Soldering Temperature (10s)	$T_{sol}$	260	°C	
Total Package Power Dissipation	$P_T$	330	mW	
Total Package Power Dissipation Derating (Ta ≥ 25°C)	$\Delta P_T / ^\circ\text{C}$	-4.4	mW / °C	
Isolation Voltage (AC, 1 min., R.H. ≤ 60%) (Note 1)	$BV_S$	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 1: Device considered a two terminal device: Pins 1, 2 and 3 shorted together and pins 4 and 6 shorted together.

## Recommended Operating Conditions

CHARACTERISTIC	SYMBOL	MIN	TYP.	MAX	UNIT
Supply Voltage	$V_{AC}$	—	—	120	Vac
Forward Current	$I_F^*$	15	20	25	mA
Peak On-Stage Current	$I_{TP}$	—	—	1	A
Operating Temperature	$T_{opr}$	-25	—	85	°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.

\* : In the case of TLP3042

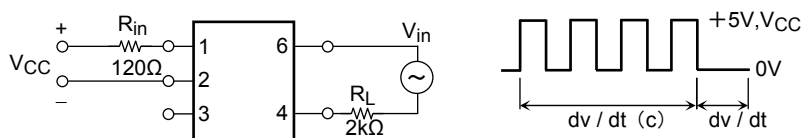
## Individual Electrical Characteristics (Ta = 25°C)

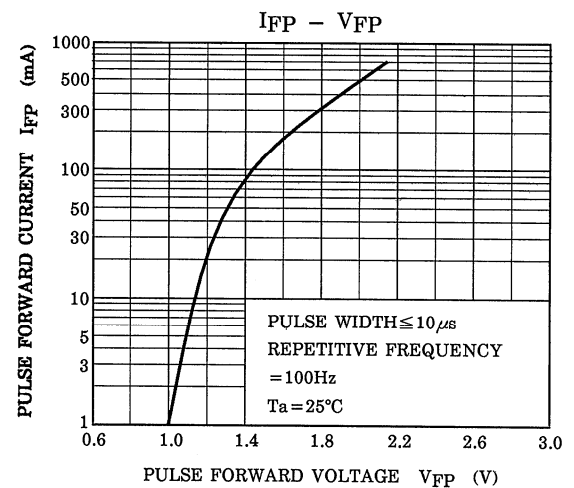
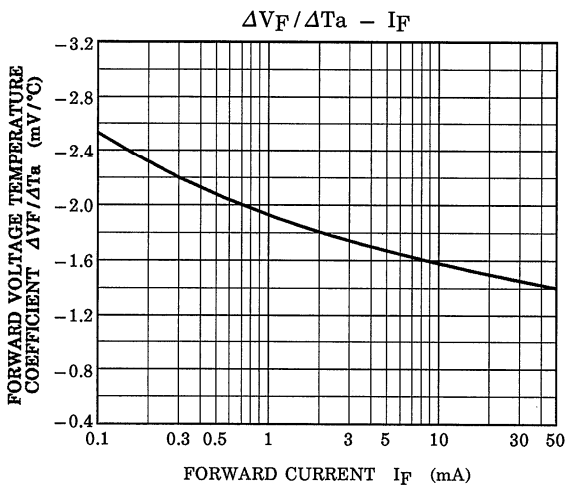
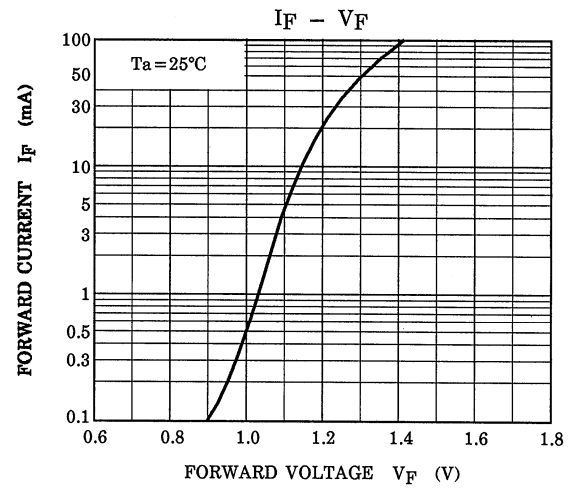
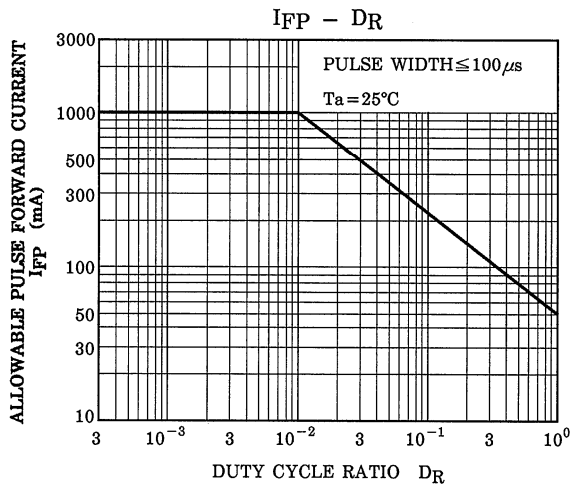
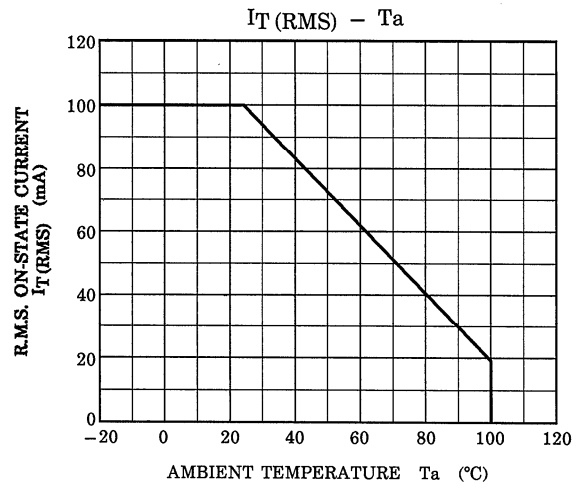
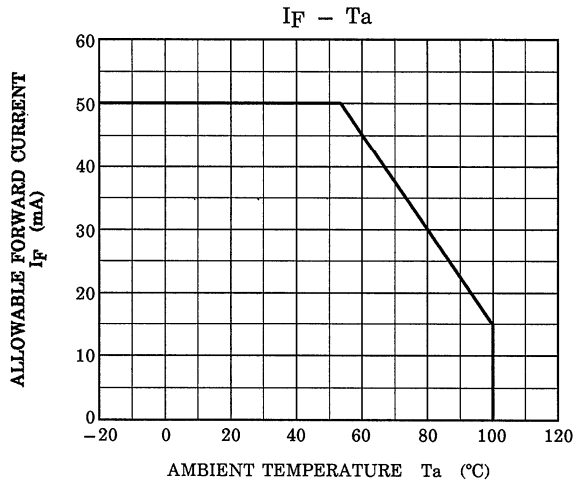
CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN	TYP.	MAX	UNIT
LED	Forward Voltage	$V_F$	$I_F = 10\text{mA}$	1.0	1.15	1.3	V
	Reverse Current	$I_R$	$V_R = 5\text{V}$	—	—	10	$\mu\text{A}$
	Capacitance	$C_T$	$V = 0, f = 1\text{MHz}$	—	10	—	pF
DETECTOR	Peak Off-State Current	$I_{DRM}$	$V_{DRM} = 400\text{V}$	—	10	100	nA
	Peak On-Stage Voltage	$V_{TM}$	$I_{TM} = 100\text{mA}$	—	1.7	3.0	V
	Holding Current	$I_H$	—	—	0.6	—	mA
	Critical Rate of Rise of Off-State Voltage	$dv / dt$	$V_{in} = 120\text{Vrms}, T_a = 85^\circ\text{C}$ (Fig.1)	200	500	—	$\text{V} / \mu\text{s}$
	Critical Rate of Rise of Commutating Voltage	$dv / dt(c)$	$V_{in} = 30\text{Vrms}, I_T = 15\text{mA}$ (Fig.1)	—	0.2	—	$\text{V} / \mu\text{s}$

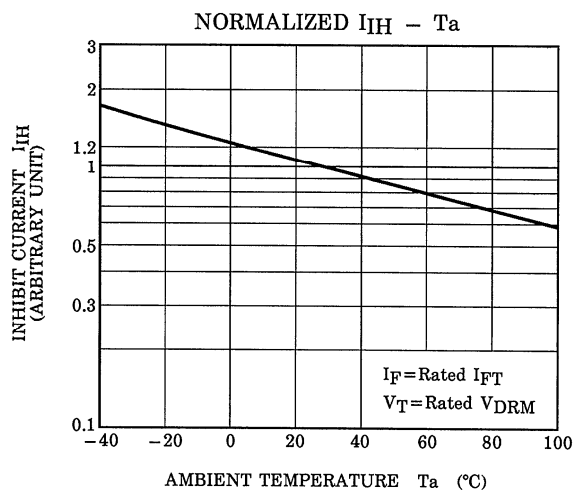
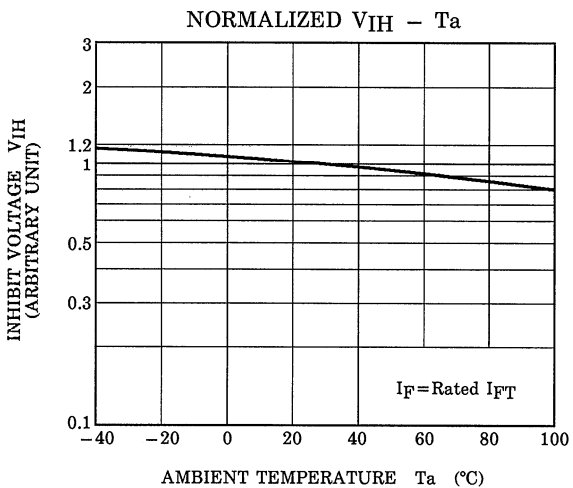
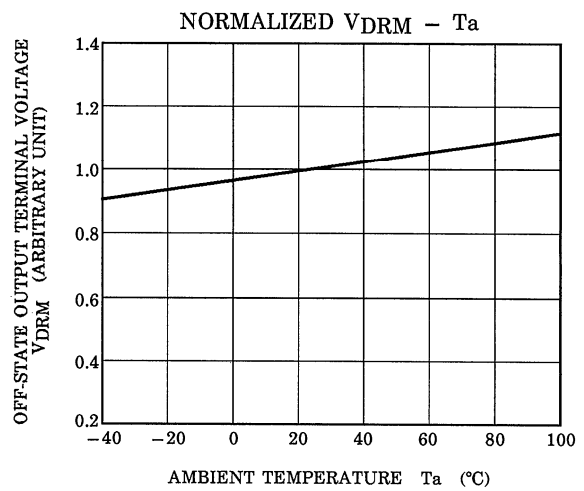
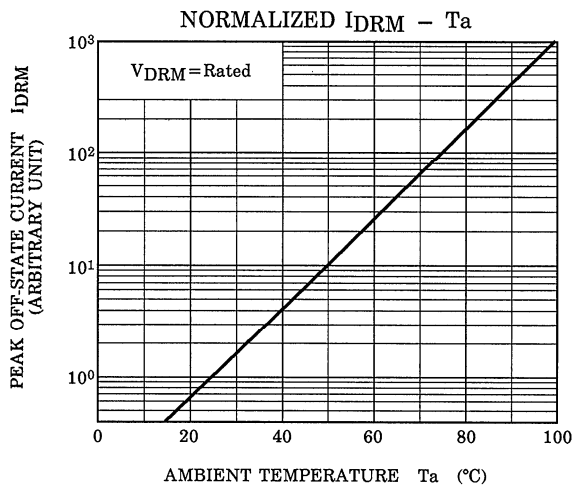
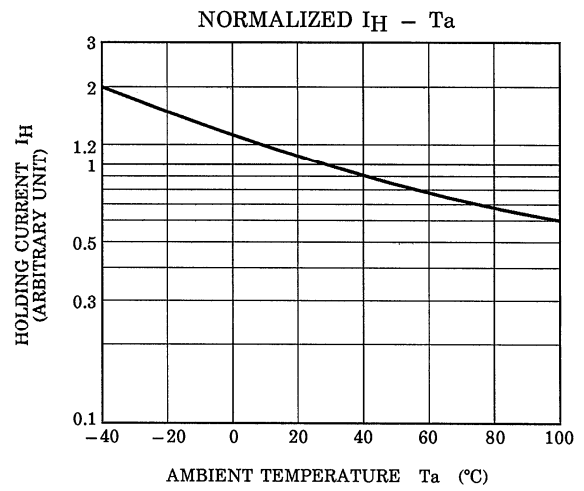
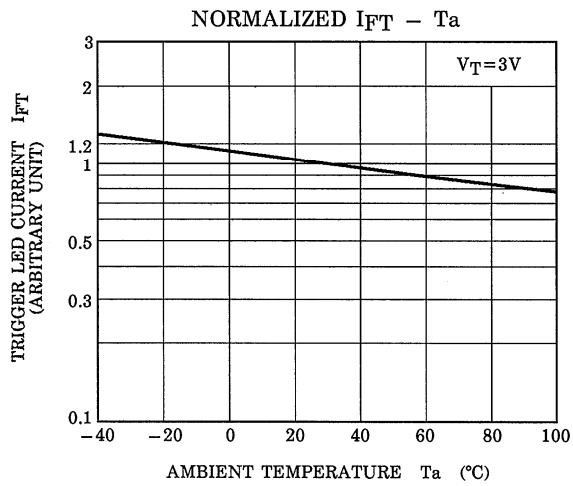
## Coupled Electrical Characteristics (Ta = 25°C)

CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN	TYP.	MAX	UNIT
Trigger LED Current	TLP3041(S)	$I_{FT}$	$V_T = 3\text{V}$	—	—	15	mA
	TLP3042(S)			—	5	10	
	TLP3043(S)			—	—	5	
Inhibit Voltage	$V_{IH}$	$I_F = \text{Rated } I_{FT}$	—	—	40	V	
Leakage in Inhibited State	$I_{IH}$	$I_F = \text{Rated } I_{FT}$ $V_T = \text{Rated } V_{DRM}$	—	100	300	$\mu\text{A}$	
Capacitance Input to Output	$C_S$	$V_S = 0, f = 1\text{MHz}$	—	0.8	—	pF	
Isolation Resistance	$R_S$	$V_S = 500\text{V}$ (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	—		
		DC, 1 minute (in oil)	—	10000	—	Vdc	

Fig. 1  $dv / dt$  test circuit







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