

TOSHIBA PHOTOCOUPLER GaAs IRED & PHOTO-TRIAC

## TLP3020, TLP3021, TLP3022, TLP3023

OFFICE MACHINE  
 HOUSEHOLD USE EQUIPMENT  
 TRIAC DRIVER  
 SOLID STATE RELAY

The TOSHIBA TLP3020, TLP3021, TLP3022 and TLP3023 consist of a photo-triac optically coupled to a gallium arsenide infrared emitting diode in a six lead plastic DIP package.

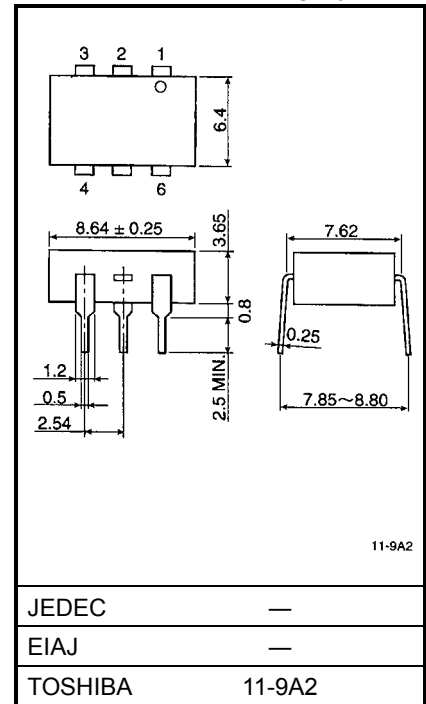
- Peak Off-State Voltage : 400 V (Min.)
- Trigger LED Current : 30mA (Max.) (TLP3020)  
 15 mA (Max.) (TLP3021)  
 10 mA (Max.) (TLP3022)  
 5 mA (Max.) (TLP3023)
- On-State Current : 100 mA (Max.)
- UL Recognized : UL1577, File No. E67349
- Isolation Voltage : 5000 Vrms (Min.)
- Option (D4) Type
- VDE Approved : DIN VDE0884 / 08.87,  
 Certificate No. 68329

Maximum Operating Insulation Voltage: 630 VPK  
 Highest Permissible Over Voltage: 6000 VPK

**Note:** When a VDE0884 approved type is needed, please designate the " Option (D4) "

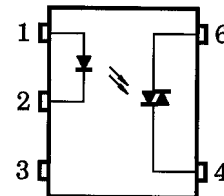
	7.62mm pich standard type	10.16 mm pich (LF2) type
● Creepage Distance :	7.0 mm (Min.)	8.0 mm (Min.)
Clearance :	7.0 mm (Min.)	8.0 mm (Min.)
Insulation Thickness :	0.5 mm (Min.)	0.5 mm (Min.)

Unit: mm



Weight: 0.44g

### PIN CONFIGURATION (TOP VIEW)



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

## 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 (100μs 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	$I_{T(RMS)}$	Ta=25°C 100	mA
	Current		Ta=70°C 50	
	On-Stage Current Derating (Ta ≥ 25°C)	$\Delta I_T/^\circ\text{C}$	-1.1	mA/°C
	Peak On-Stage Current (100μs pulse, 120pps)	$I_{TP}$	2	A
	Peak Nonrepetitive Surge Current (P <sub>W</sub> =10ms, DC=10%)	$I_{TSM}$	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 ~ 150	°C
Operating Temperature Range	$T_{opr}$	-40 ~ 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	V <sub>rms</sub>	

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

CHARACTERISTICS	SYMBOL	MIN	TYP.	MAX	UNIT
Supply Voltage	$V_{AC}$	—	—	120	V <sub>ac</sub>
Forward Current	$I_F^*$	15	20	25	mA
Peak On-Stage Current	$I_{TP}$	—	—	1	A
Operating Temperature	$T_{opr}$	-25	—	85	°C

\*: In the case of TLP3022

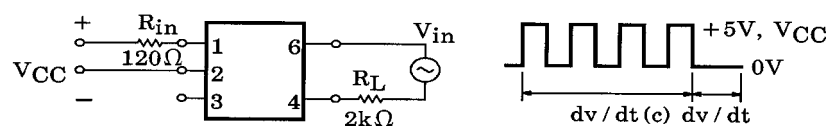
## INDIVIDUAL ELECTRICAL CHARACTERISTICS (Ta=25°C)

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	$I_{\text{DRM}}$	$V_{\text{DRM}}=400\text{V}$	—	10	100	nA
	Peak On-Stage Voltage	$V_{\text{TM}}$	$I_{\text{TM}}=100\text{mA}$	—	1.7	3.0	V
	Holding Current	$I_H$	—	—	0.6	—	mA
	Critical Rate of Rise of Off-State Voltage	$dv / dt$	$V_{\text{in}}=120\text{Vrms}, T_a=85^\circ\text{C}$ (Fig.1)	200	500	—	$\text{V}/\mu\text{s}$
	Critical Rate of Rise of Commutating Voltage	$dv / dt(c)$	$V_{\text{in}}=30\text{Vrms}, I_F=15\text{mA}$ (Fig.1)	—	0.2	—	$\text{V}/\mu\text{s}$

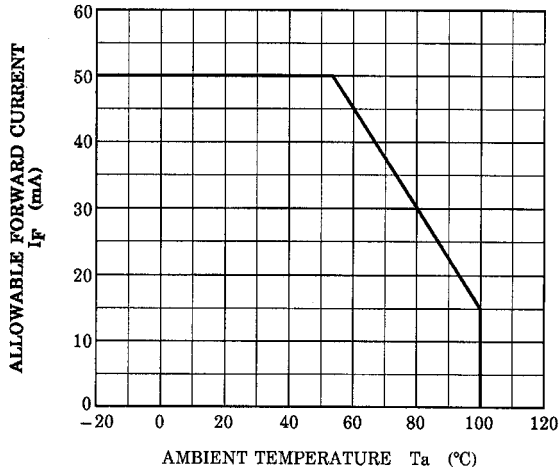
## COUPLED ELECTRICAL CHARACTERISTICS (Ta=25°C)

CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN	TYP.	MAX	UNIT
Trigger LED Current	TLP3020	$I_{\text{FT}}$	$V_T=3\text{V}$	—	—	30	mA
	TLP3021			—	—	15	
	TLP3022			—	5	10	
	TLP3023			—	—	5	
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		$B_{\text{VS}}$	AC, 1 minute	—	—	—	$V_{\text{rms}}$
			AC, 1 second (in oil)	—	10000	—	$V_{\text{dc}}$
			DC, 1 minute (in oil)	—	10000	—	

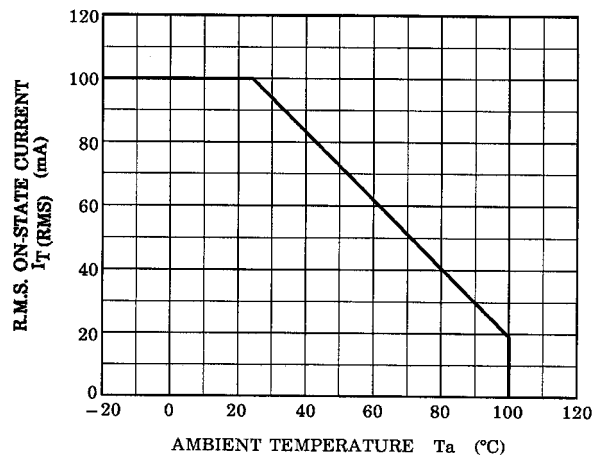
Fig. 1 dv/dt TEST CIRCUIT



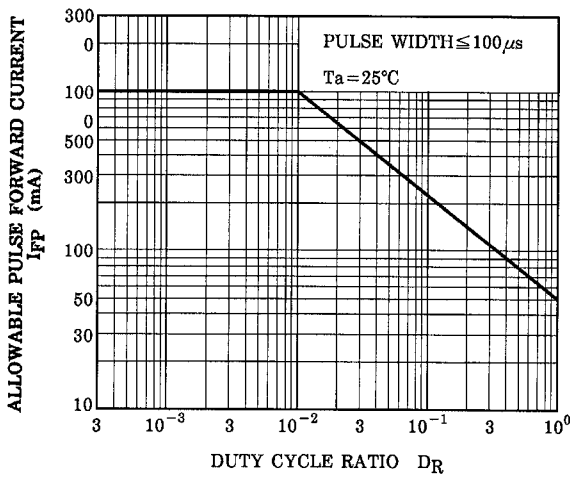
$I_F - T_a$



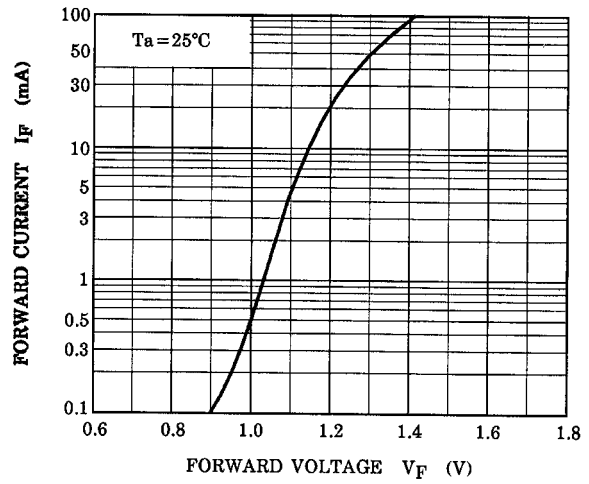
$I_T (RMS) - T_a$



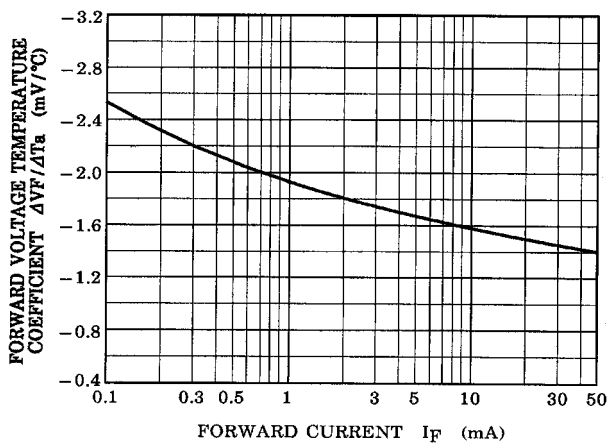
$I_{FP} - D_R$



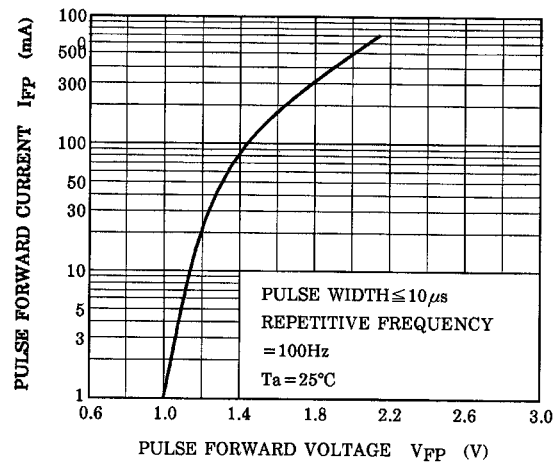
$I_F - V_F$



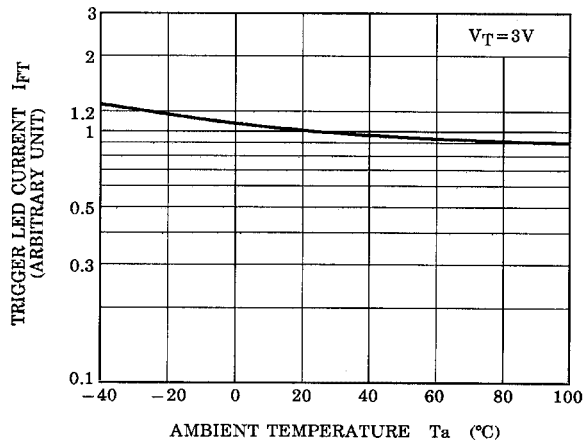
$\Delta V_F / \Delta T_a - I_F$



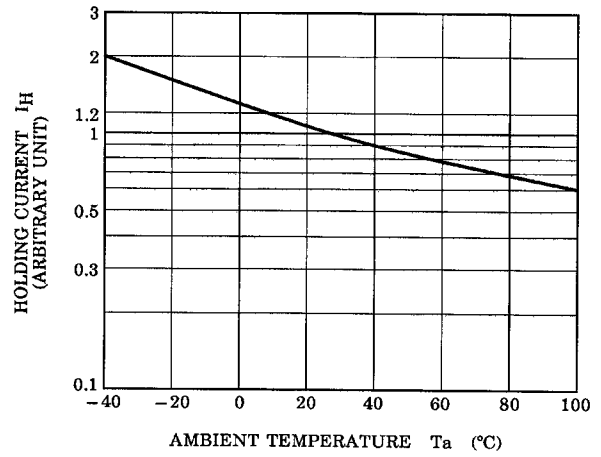
$I_{FP} - V_{FP}$



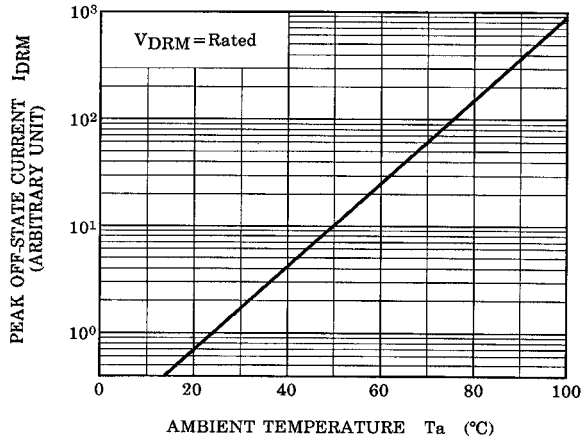
NORMALIZED  $I_{FT} - T_a$



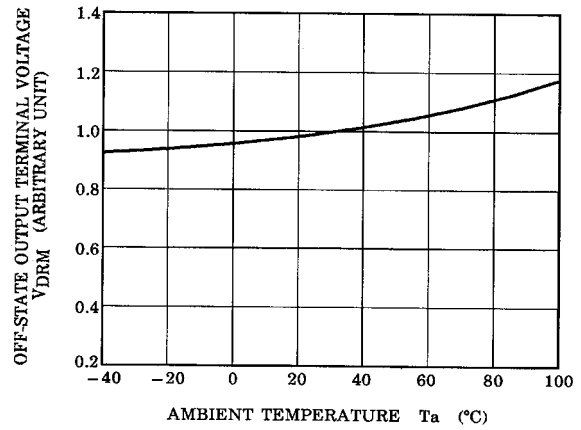
NORMALIZED  $I_H - T_a$



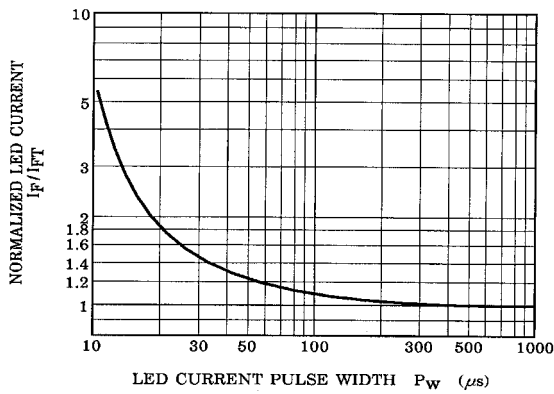
NORMALIZED  $I_{DRM} - T_a$



NORMALIZED  $V_{DRM} - T_a$



NORMALIZED LED CURRENT  
- LED CURRENT PULSE WIDTH



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