

TOSHIBA PHOTOCOUPLER GaAs IRED & PHOTO-TRIAC
TLP3020,TLP3021,TLP3022,TLP3023

OFFICE MACHINE
HOUSEHOLD USE EQUIPMENT
TRIAC DRIVER
SOLID STATE RELAY

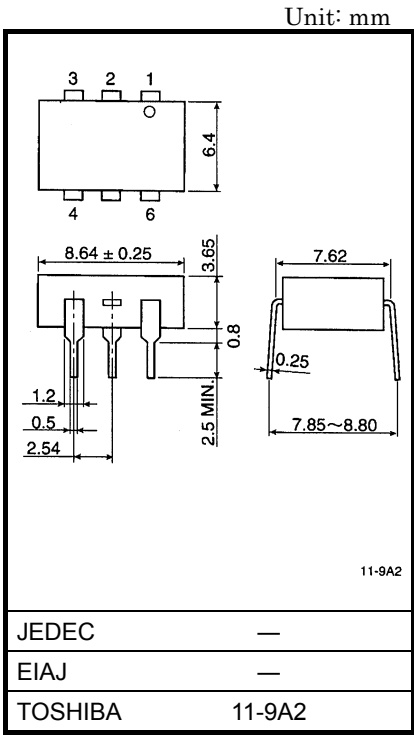
The TOSHIBA TLP3020, TLP3021, TLP3022 and TLP3023 consist of a photo-triac optically coupled to a gallium arsenide infrared emitting diode in a six lead plastic DIP package.

- 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 EN 60747-5-2,
Certificate No. 40009302

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

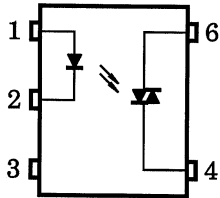
Note: When a EN 60747-5-2 approved type is needed, please designate the "Option (D4) "

	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.)



Weight: 0.44g

PIN CONFIGURATION (TOP VIEW)



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 (100μs pulse, 100pps)		I _{FP}	1	A
	Power Dissipation		P _D	100	mW
	Power Dissipation Derating (Ta ≥ 25°C)		ΔP _D /°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	Ta=25°C	I _T (RMS)	100	mA
	Current	Ta=70°C		50	
	On-State Current Derating (Ta ≥ 25°C)		ΔI _T /°C	-1.1	mA/°C
	Peak On-Stage Current (100μs pulse, 120pps)		I _{TP}	2	A
	Peak Nonrepetitive Surge Current (P _W =10ms, DC=10%)		I _{TSM}	1.2	A
	Power Dissipation		P _D	300	mW
	Power Dissipation Derating (Ta ≥ 25°C)		ΔP _D /°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)			ΔP _T /°C	-4.4	mW/°C
Isolation Voltage (AC, 1 min., R.H. ≤ 60%) (Note 1)			BV _S	5000	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 and 6 shorted together.

Recommended Operating Conditions

CHARACTERISTICS	SYMBOL	MIN	TYP.	MAX	UNIT
Supply Voltage	V_{AC}	—	—	120	V _{ac}
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 TLP3022

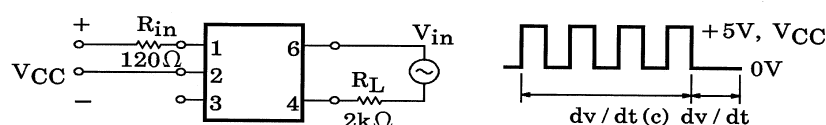
Individual Electrical Characteristics (Ta=25°C)

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	μA
	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	$dv/dt(c)$	$V_{in}=30\text{Vrms}, I_F=15\text{mA}$ (Fig.1)	—	0.2	—	$\text{V}/\mu\text{s}$

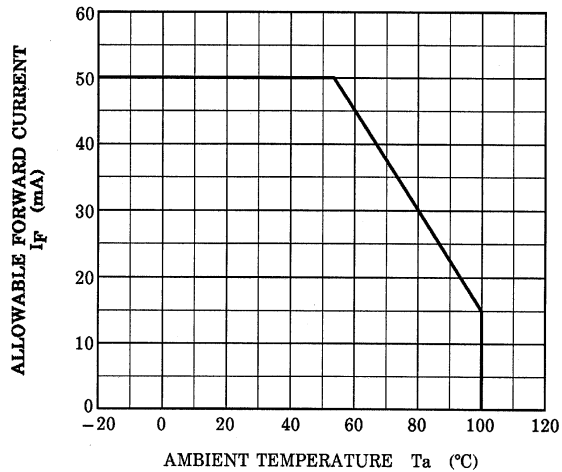
Coupled Electrical Characteristics (Ta=25°C)

CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN	TYP.	MAX	UNIT
Trigger LED Current	TLP3020	I_{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. $\leq 60\%$)	5×10^{10}	10^{14}	—	Ω
Isolation Voltage		B_{VS}	AC, 1 minute	—	—	—	V_{rms}
			AC, 1 second (in oil)	—	10000	—	V_{dc}
			DC, 1 minute (in oil)	—	10000	—	

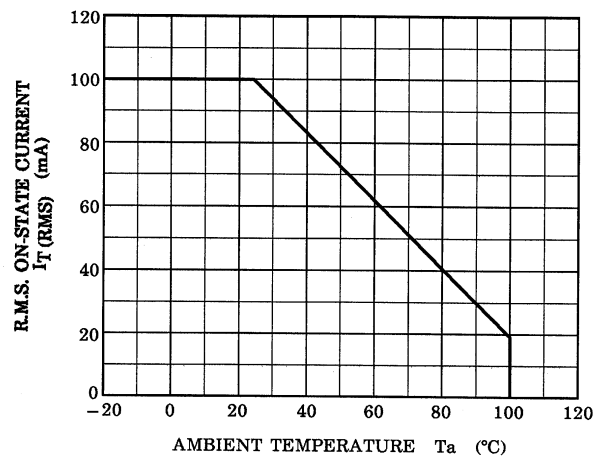
Fig. 1 dv/dt TEST CIRCUIT



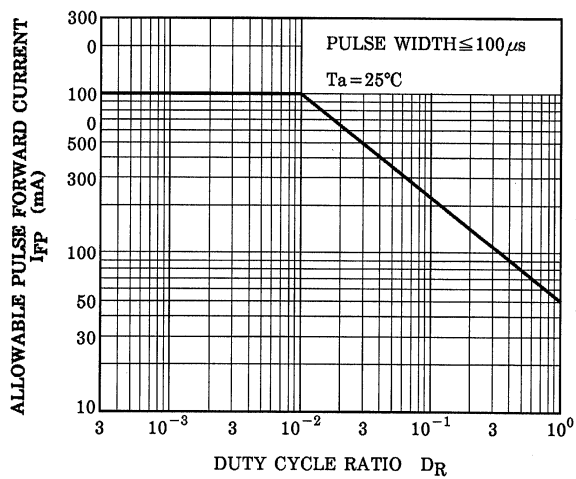
$I_F - T_a$



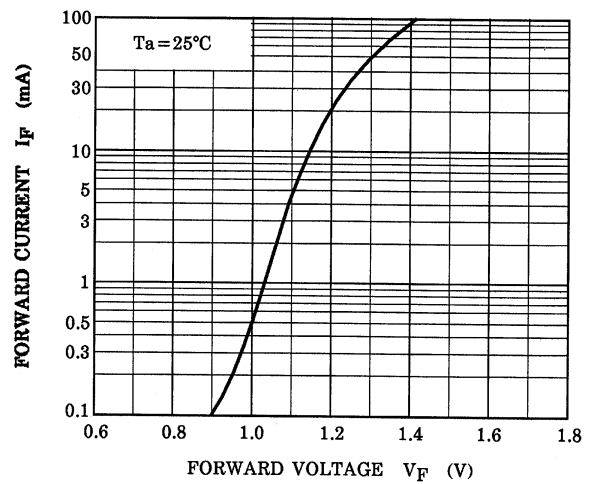
$I_T (RMS) - T_a$



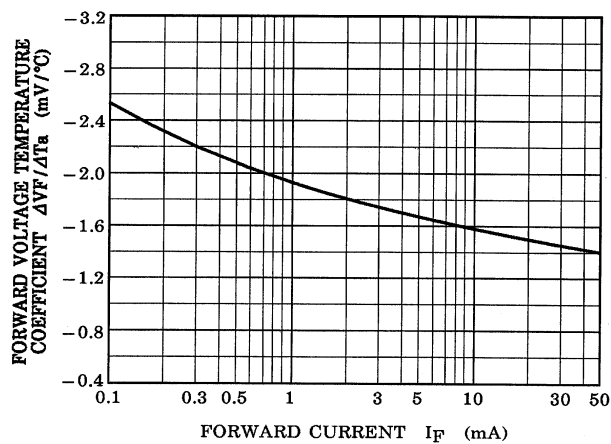
$I_{FP} - D_R$



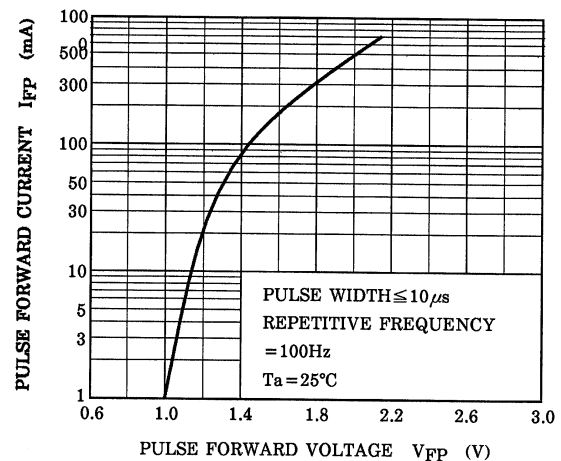
$I_F - V_F$



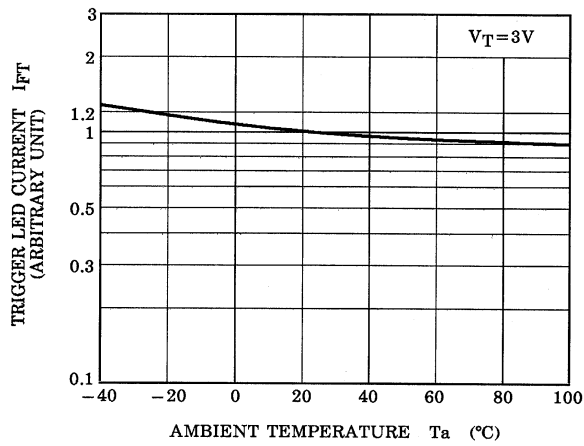
$\Delta V_F / \Delta T_a - I_F$



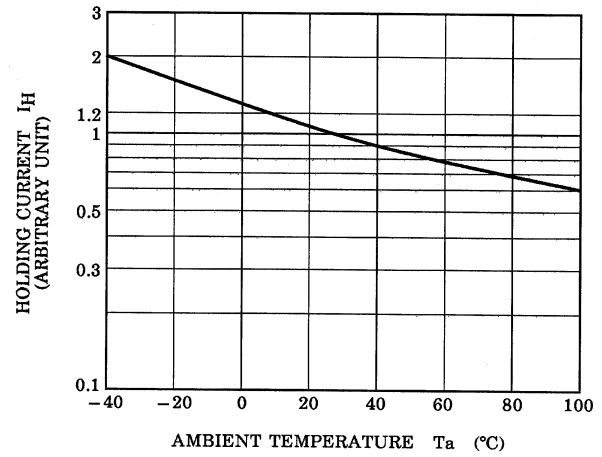
$I_{FP} - V_{FP}$



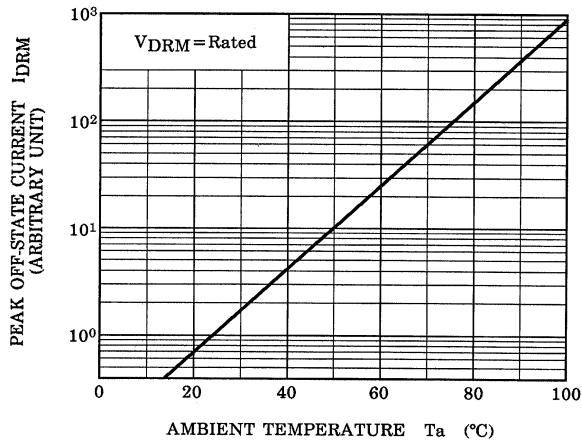
NORMALIZED I_{FT} - T_a



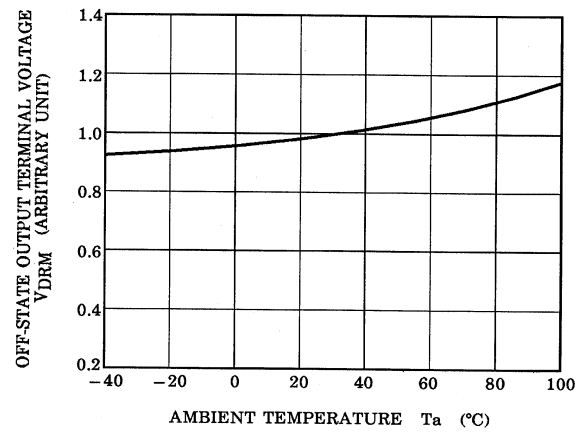
NORMALIZED I_H - T_a



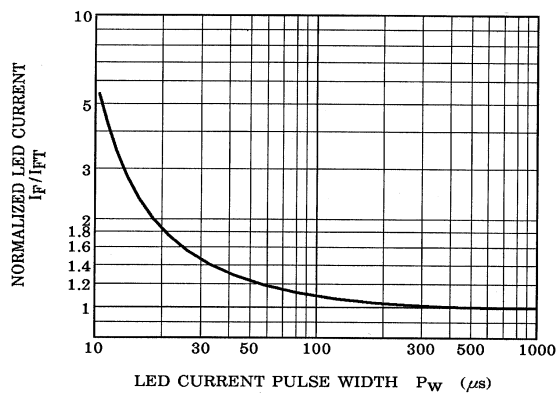
NORMALIZED I_{DRM} - T_a



NORMALIZED V_{DRM} - T_a



NORMALIZED LED CURRENT
- LED CURRENT PULSE WIDTH



RESTRICTIONS ON PRODUCT USE

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