

TOSHIBA PHOTOCOUPLER GaAs IRED & PHOTO-TRIAC

TLP3021(S), TLP3022(S), TLP3023(S)

OFFICE MACHINE
 HOUSEHOLD USE EQUIPMENT
 TRIAC DRIVER
 SOLID STATE RELAY

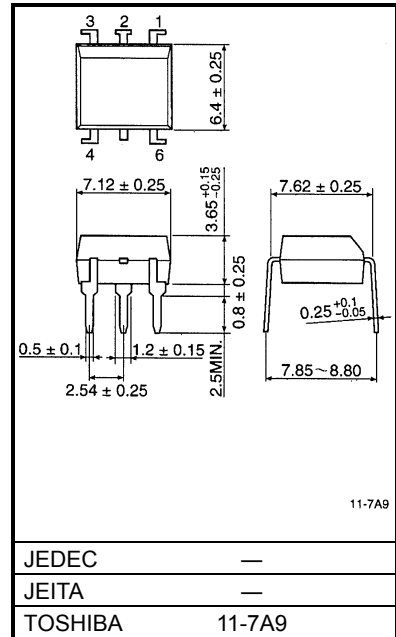
The TOSHIBA TLP3021 (S), TLP3022 (S) and TLP3023 (S) consist of photo-triac optically coupled to a gallium arsenide infrared emitting diode in a six lead plastic DIP.

- Peak Off-State Voltage : 400 V (min)
- Trigger LED Current : 15 mA (max) (TLP3021(S))
 10 mA (max) (TLP3022(S))
 5 mA (max) (TLP3023(S))
- On-State Current : 100 mA (max)
- Isolation Voltage : 5000Vrms(Min)
- UL Recognized : UL1577, File No. E67349
- SEMKO Approved : SS EN60065
 SS EN60950, File No. 9841105
- 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_{PK}
 Highest permissible over voltage: 8000V_{PK}
 (Note): When a EN60747-5-2 approved type is needed,
 please designate the "Option (D4)"

● Construction Mechanical Rating

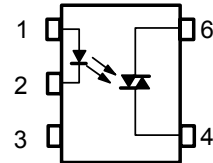
	7.62 mm pich Standard Type	10.16 mm pich TLPxxxxF Type
Creepage Distance	7.0 mm (Min)	8.0 mm (Min)
Clearance	7.0 mm (Min)	8.0 mm (Min)
Insulation Thickness	0.5 mm (Min)	0.5 mm (Min)

Unit: mm



Weight: 0.39g (typ.)

**Pin Configuration
(top view)**



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

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 (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-State RMS Current	Ta=25°C	$I_{T(RMS)}$	100	mA
		Ta=70°C		50	
	On-State Current Derating (Ta≥25°C)	$\Delta I_T / ^\circ\text{C}$	-1.1	mA / °C	
	Peak On-State Current (100µs pulse, 120pps)	I_{TP}	2	A	
	Peak Nonrepetitive Surge Current (Pw=10ms)	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, 1min., R.H.≤60%)	(Note 2) 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 2) Device considered a two terminal device :Pins1,2 and 3 shorted together and pin4 and pin6 shorted together.

Recommended Operating Conditions

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT
Supply Voltage	V_{AC}	—	—	120	V_{ac}
Forward Current	I_F^*	15	20	25	mA
Peak On-State 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

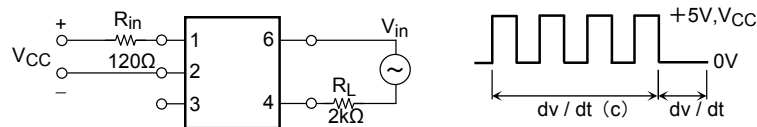
Individual Electrical Characteristics (Ta=25°C)

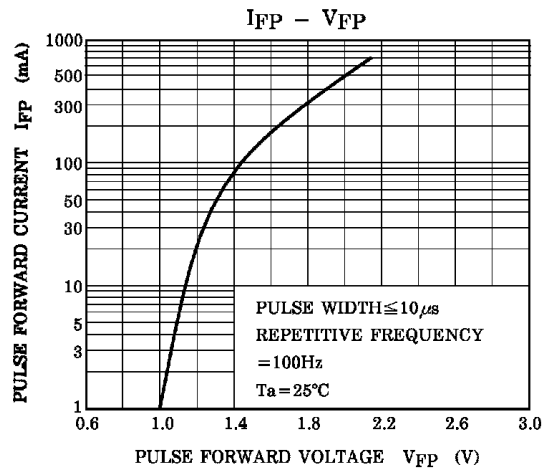
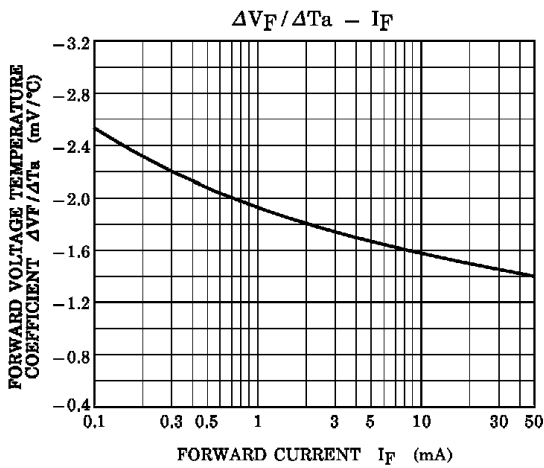
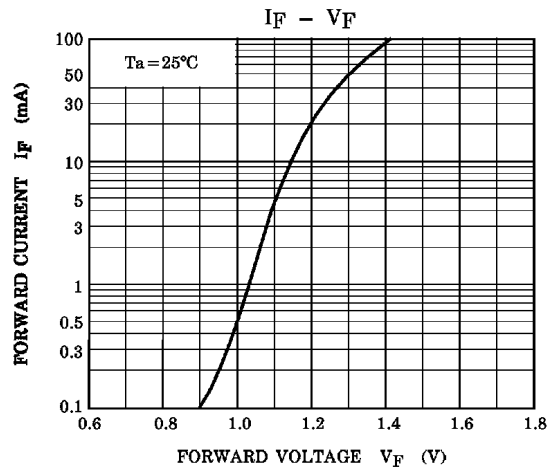
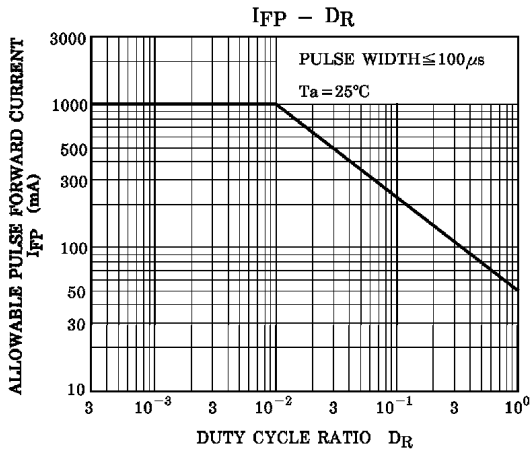
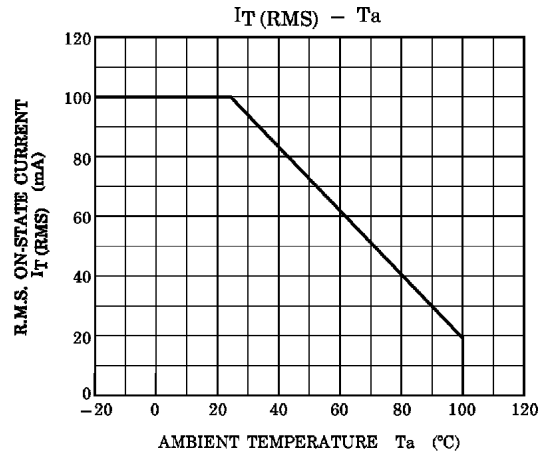
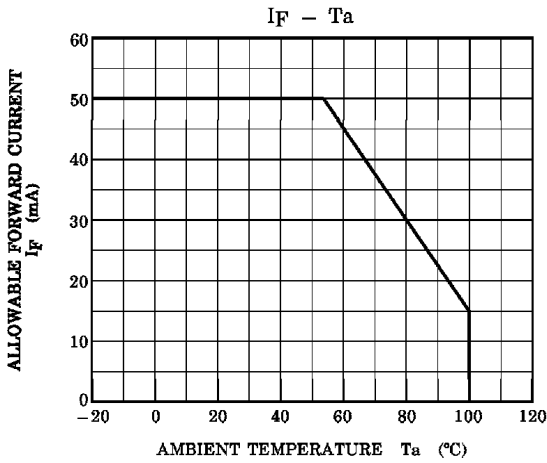
CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
LED	Forward Voltage	V_F	$I_F = 10 \text{ mA}$	1.0	1.15	1.3	V
	Reverse Current	I_R	$V_R = 5 \text{ V}$	—	—	10	μA
	Capacitance	C_T	$V = 0, f = 1\text{MHz}$	—	10	—	pF
DIODE	Peak Off-State Current	I_{DRM}	$V_{DRM} = 400\text{V}$	—	10	1000	nA
	Peak On-State 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)

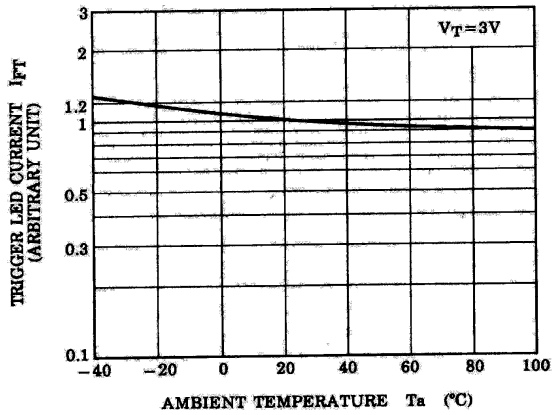
CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Trigger LED Current	TLP3021(S)	I_{FT}	$V_T = 3\text{V}$	—	—	15	mA
	TLP3022(S)			—	5	10	
	TLP3023(S)			—	—	5	
Capacitance (Input to Output)		C_S	$V_S = 0, f = 1\text{MHz}$	—	0.8	—	pF
Isolation Resistance		R_S	$V_S = 500\text{V} (\text{R.H.} \leq 60\%)$	5×10^{10}	10^{14}	—	Ω
Isolation Voltage		BV_S	AC, 1minute	5000	—	—	Vrms
			AC, 1second, in oil	—	10000	—	
			DC, 1minute, in oil	—	10000	—	Vdc

Fig. 1 dv/dt test circuit

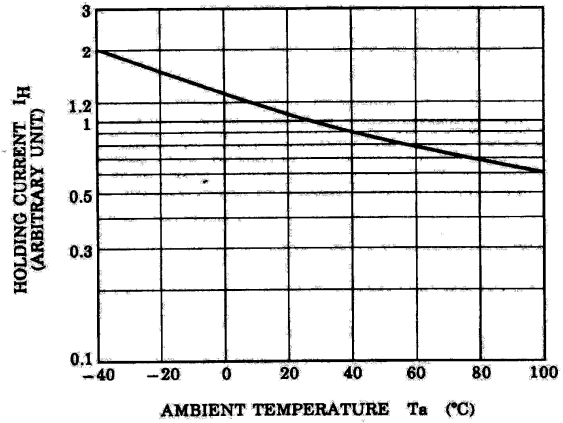




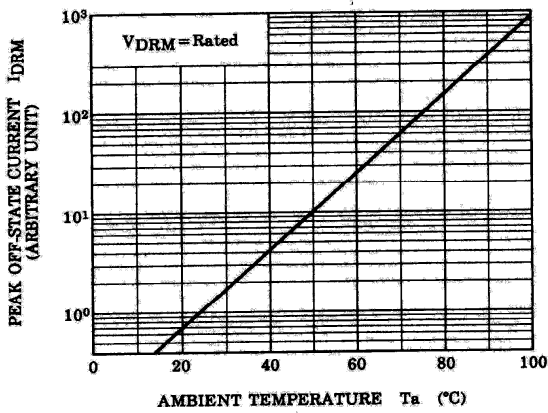
NORMALIZED $I_{FT} - T_a$



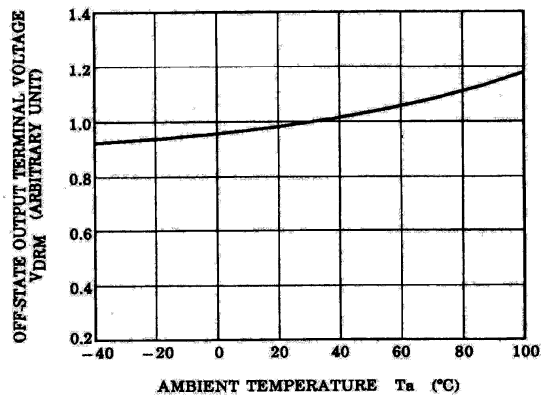
NORMALIZED $I_H - T_a$



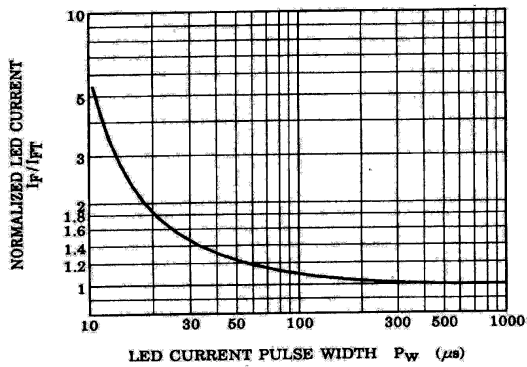
NORMALIZED $I_{DRM} - T_a$



NORMALIZED $V_{DRM} - T_a$



NORMALIZED LED CURRENT
- LED CURRENT PULSE WIDTH



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