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.

: 400 V (Min.) • Peak Off-State Voltage

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

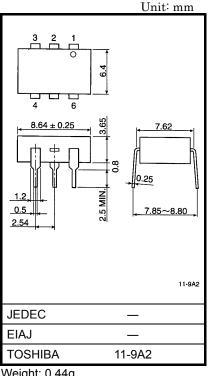
 VDE Approved : DIN EN 60747-5-2, Certificate No. 40009302

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)"

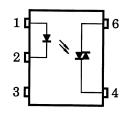
7.62mm pich

| | | | standard type | (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)



ANODE

CATHODE

3: N.C.

4: TERMINAL 1

6: TERMINAL 2

10.16 mm pich



Absolute Maximum Ratings (Ta=25°C)

| CHARACTERISTIC | | SYMBOL | RATING | UNIT | | |
|---|--|---------|---------------------|-------------------|-------|--|
| | 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) | | l _{FP} | 1 | А | |
| LED | Power Dissipation | ı | 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 | | Tj | 125 | °C | |
| | Off-State Output Terminal Voltage | | V_{DRM} | 400 | V | |
| | On-Stage RMS | Ta=25°C | IT(DUO) | 100 | mA | |
| | Current | Ta=70°C | I _{T(RMS)} | 50 | IIIA | |
| ~ | On-State Current Derating (Ta ≥ 25°C) | | ΔI _T /°C | -1.1 | mA/°C | |
| DETECTOR | Peak On-Stage Current (100 µs pulse, 120pps) | | I _{TP} | 2 | А | |
| DET | Peak Nonrepetitive Surge Current (P _W =10ms, DC=10%) | | I _{TSM} | 1.2 | А | |
| | Power Dissipation | | P _D | 300 | mW | |
| | Power Dissipation Derating (Ta ≥ 25°C) | | ΔP _D /°C | -4.0 | mW/°C | |
| | Junction Temperature | | Tj | 115 | °C | |
| Stora | ge Temperature Rar | nge | 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 | | | PT | 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) | | | BVS | 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

| CHARACTERISTICS | SYMBOL | MIN | TYP. | MAX | UNIT |
|-----------------------|------------------|-----|------|-----|------|
| Supply Voltage | V_{AC} | _ | _ | 120 | Vac |
| Forward Current | l _F * | 15 | 20 | 25 | mA |
| Peak On-Stage Current | I _{TP} | _ | _ | 1 | А |
| 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.

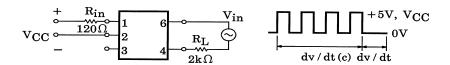
Individual Electrical Characteristics (Ta=25°C)

| CHARACTERISTIC | | SYMBOL | TEST CONDITION | MIN | TYP. | MAX | UNIT |
|----------------|--|------------------|---|-----|------|-----|------|
| | Forward Voltage | V _F | I _F =10mA | 1.0 | 1.15 | 1.3 | V |
| LED | Reverse Current | I _R | V _R =5V | _ | _ | 10 | μА |
| | Capacitance | C _T | V=0, f=1MHz | _ | 10 | _ | pF |
| | Peak Off-State Current | I _{DRM} | V _{DRM} =400V | _ | 10 | 100 | nA |
| œ | Peak On-Stage Voltage | V _{TM} | I _{TM} =100mA | _ | 1.7 | 3.0 | V |
| DETECTOR | Holding Current | lн | _ | _ | 0.6 | _ | mA |
| | Critical Rate of Rise of Off- State Voltage | dv / dt | V _{in} =120Vrms, Ta=85°C (Fig.1) | 200 | 500 | _ | V/μs |
| | Critical Rate of Rise of Commutating Voltage | dv / dt(c) | V _{in} =30Vrms, IF=15mA (Fig.1) | | 0.2 | _ | V/µs |

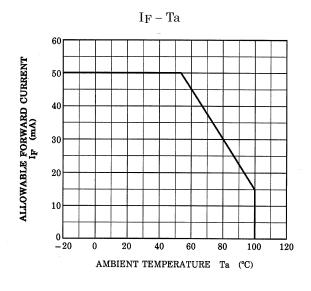
Coupled Electrical Characteristics (Ta=25°C)

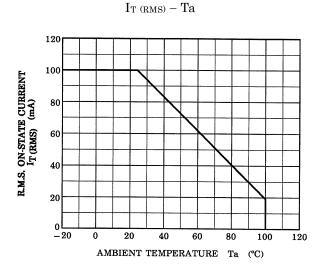
| CHARACTERISTIC | | SYMBOL | TEST CONDITION | MIN | TYP. | MAX | UNIT | |
|-----------------------------|---------|-----------------|-----------------------------------|--------------------|------------------|-----|------------------|--|
| | TLP3020 | I _{FT} | V _T =3V | _ | _ | 30 | - mA | |
| Trigger LED Current | TLP3021 | | | _ | _ | 15 | | |
| Trigger LED Current | TLP3022 | | | _ | 5 | 10 | | |
| | TLP3023 | | | _ | _ | 5 | | |
| Capacitance Input to Output | | CS | V _S =0, f=1MHz | _ | 0.8 | _ | pF | |
| Isolation Resistance | | R _S | V _S =500V (R.H. ≤ 60%) | 5×10 ¹⁰ | 10 ¹⁴ | _ | Ω | |
| Isolation Voltage | | | AC, 1 minute | | _ | _ | V _{rms} | |
| | | B _{VS} | AC, 1 second (in oil) | _ | 10000 | _ | . V. | |
| | | | DC, 1 minute (in oil) | _ | 10000 | _ | V _{dc} | |

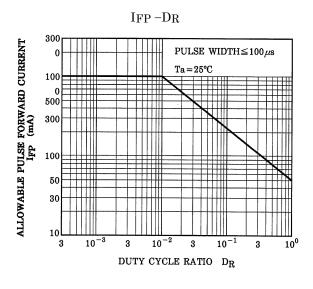
Fig. 1 dv/dt TEST CIRCUIT

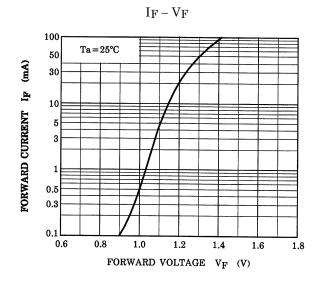


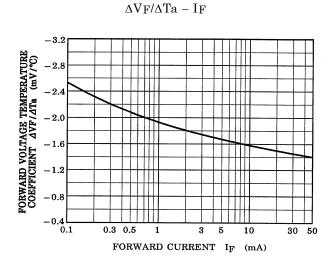
^{*:} In the case of TLP3022

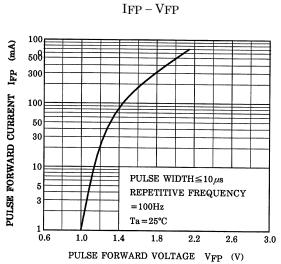




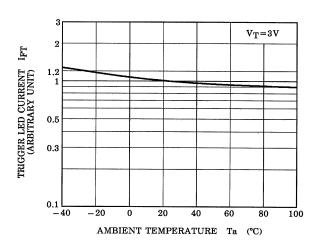




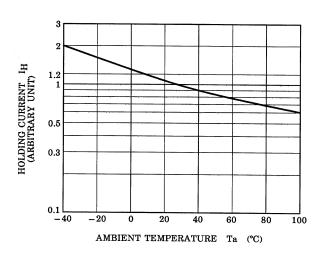




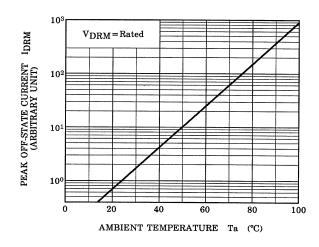
 $NORMALIZED I_{FT} - Ta$



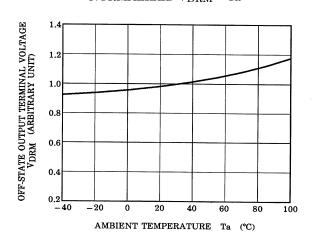
NORMALIZED I_H – Ta



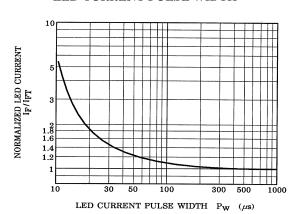
NORMALIZED IDRM - Ta



NORMALIZED V_{DRM} - Ta



NORMALIZED LED CURRENT
– LED CURRENT PULSE WIDTH



RESTRICTIONS ON PRODUCT USE

20070701-EN

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