

TOSHIBA Photocoupler (GaAs Ired & Photo-Triac)

# TLP361J

Triac Drivers

Programmable Controllers

AC-Output Modules

Solid State Relays

TOSHIBA TLP361J consists of a zero-voltage-crossing turn-on photo-triac optically coupled to a gallium arsenide infrared-emitting diode in a four-lead plastic DIP package.

- Peak off-state voltage: 600 V (Min.)
- Trigger LED current: 10 mA (Max.)
- On-state current: 100 mA (Max.)
- Isolation voltage: 5000 Vrms (Min.)
- Zero crossing Function
- UL recognized: UL1577, file No. E67349
- Option (D4) type

TÜV approved: DIN EN60747-5-2

Certificate No. R50033433

Maximum operating insulation voltage : 890 Vpk

Maximum permissible overvoltage : 8000 Vpk

(Note) When an EN60747-5-2 approved type is needed, please designate "Option (D4)."

•Construction mechanical rating

|                      | 7.62 mm pitch<br>TLPXXX type | 10.16 mm pitch<br>TLPXXX type |
|----------------------|------------------------------|-------------------------------|
| Creepage distance    | 7.0 mm (min)                 | 8.0 mm (min)                  |
| Clearance            | 7.0 mm (min)                 | 8.0 mm (min)                  |
| Insulation thickness | 0.4 mm (min)                 | 0.4 mm (min)                  |

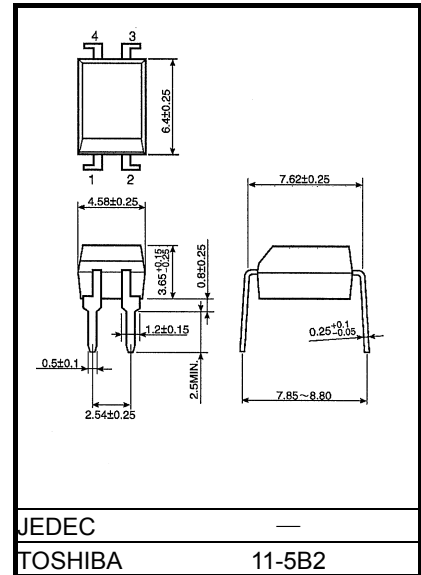
•Trigger LED current

| Classi-<br>fication* | Trigger LED current (mA)                 |      | Marking of<br>classification |
|----------------------|--|------|------------------------------|
|                      | V <sub>T</sub> =3V, T <sub>a</sub> =25°C |      |                              |
|                      | Min.                                     | Max. |                              |
| (IFT7)               |  | 7    | T7                           |
| Standard             | —  | 10   | T7, blank                    |

\*Example: "(IFT7)"; "TLP361J(IFT7)"

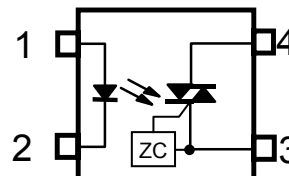
(Note) When specifying the application type name for certification testing, be sure to use the standard product type name, e.g., TLP361J(IFT7): TLP361J

Unit: mm



Weight: 0.26 g (typ.)

Pin Configuration (top view)



- 1: Anode
- 2: Cathode
- 3: Terminal1
- 4: Terminal2

## 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 μs pulse, 100 pps)            | $I_{FP}$                      | 1            | A       |    |
|  | Reverse voltage   | $V_R$                         | 5            | V       |    |
|  | Junction temperature                                    | $T_j$                         | 125          | °C      |    |
| Detector                                   | Off-state output terminal voltage                       | $V_{DRM}$                     | 600          | 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 (100 μs pulse, 120 pps)           | $I_{TP}$                      | 2            | A       |    |
|  | Peak nonrepetitive surge current (Pw = 10 ms, DC = 10%) | $I_{TSM}$                     | 1.2          | A       |    |
|  | Junction temperature                                    | $T_j$                         | 115          | °C      |    |
| Storage temperature range                  | $T_{stg}$   | -55~125                       | °C           |         |    |
| Operating temperature range                | $T_{opr}$   | -40~100                       | °C           |         |    |
| Lead soldering temperature (10s)           | $T_{sol}$   | 260                           | °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: Pins 1 and 2 are shorted together and pins 3 and 4 are shorted together.

## Recommended Operating Conditions

| Characteristic        | Symbol    | Min. | Typ. | Max. | Unit     |
|-----------------------|-----------|------|------|------|----------|
| Supply voltage        | $V_{AC}$  | —    | —    | 240  | $V_{ac}$ |
| 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.

## 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                                  | $C_T$     | $V = 0, f = 1 \text{ MHz}$                                   | —    | 30   | —    | pF               |
| Detector       | Peak off-state current                       | $I_{DRM}$ | $V_{DRM} = 600 \text{ V}$                                    | —    | 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     | $V_{in} = 240 \text{ Vrms}, T_a = 85^\circ\text{C}$ (Note 2) | 200  | 500  | —    | V/ $\mu\text{s}$ |
|                | Critical rate of rise of commutating voltage | dv/dt(c)  | $V_{in} = 60 \text{ Vrms}, I_T = 1.5 \text{ mA}$ (Note 2)    | —    | 0.2  | —    | V/ $\mu\text{s}$ |

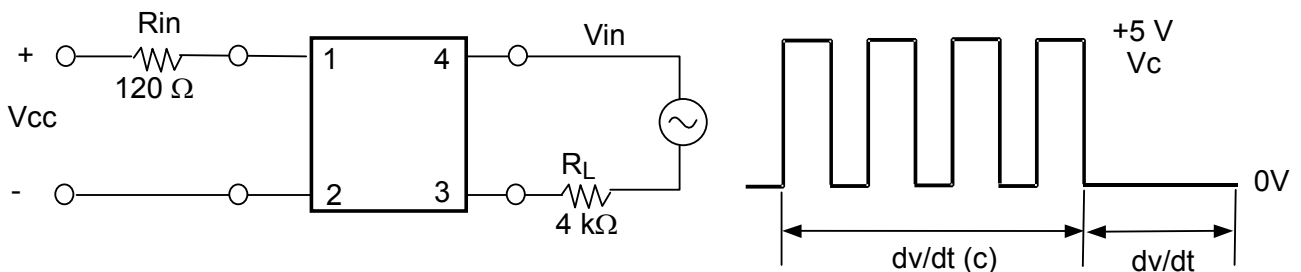
## Coupled Electrical Characteristics (Ta = 25°C)

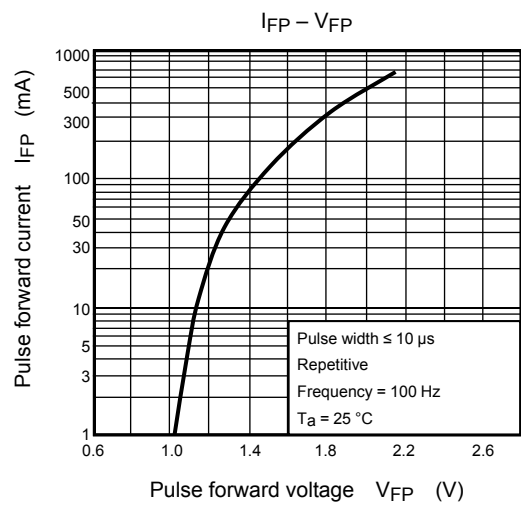
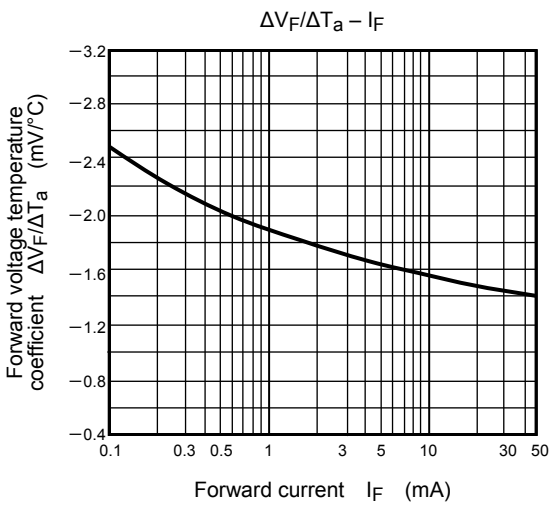
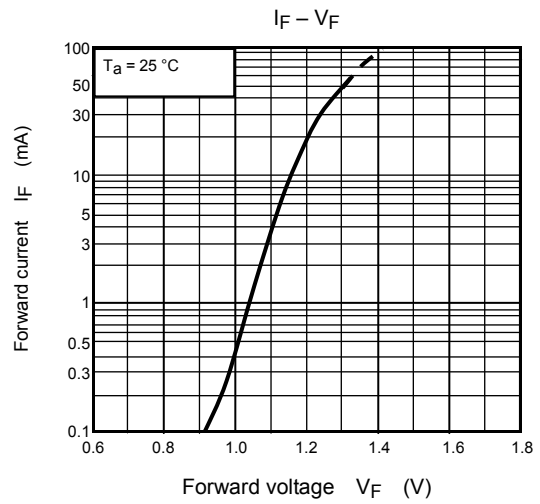
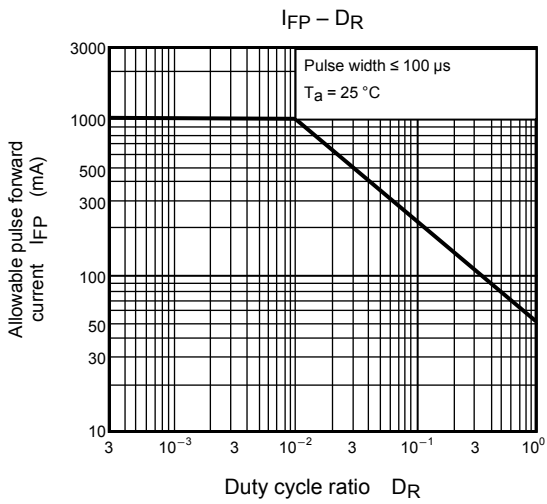
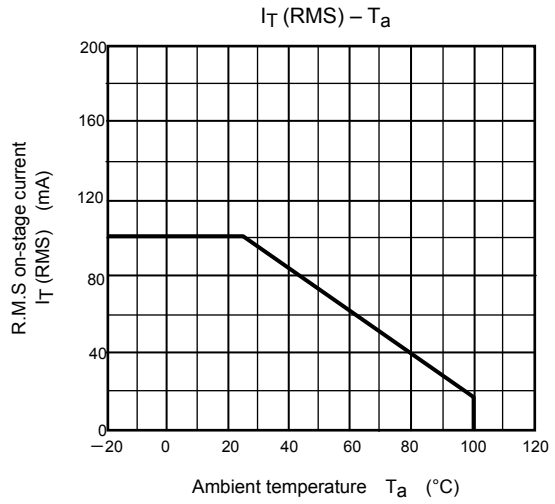
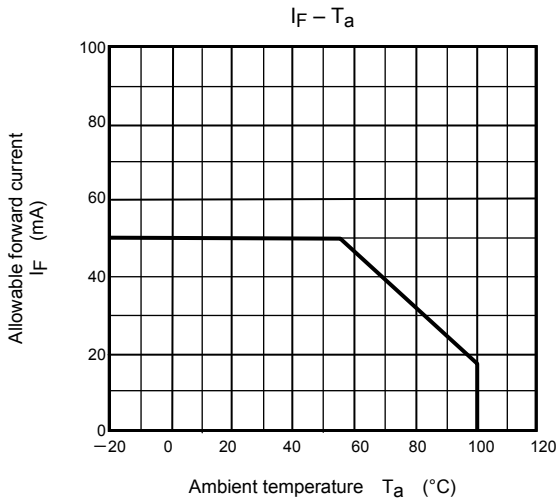
| Characteristic             | Symbol   | Test Condition  | Min. | Typ. | Max. | Unit          |
|----------------------------|----------|---|------|------|------|---------------|
| Trigger LED current        | $I_{FT}$ | $V_T = 3 \text{ V}$   | —    | —    | 10   | mA            |
| Inhibit voltage            | $V_{IH}$ | $I_F = \text{Rated } I_{FT}$  | —    | —    | 20   | V             |
| Leakage in inhibited state | $I_{IH}$ | $I_F = \text{Rated } I_{FT}$<br>$V_T = \text{Rated } V_{DRM}$                                   | —    | 200  | 600  | $\mu\text{A}$ |
| Turn-on time               | $t_{ON}$ | $V_D = 3 \rightarrow 1.5 \text{ V}, R_L = 20 \Omega$<br>$I_F = \text{Rated } I_{FT} \times 1.5$ | —    | 30   | 100  | $\mu\text{s}$ |

## Isolation Characteristics (Ta = 25°C)

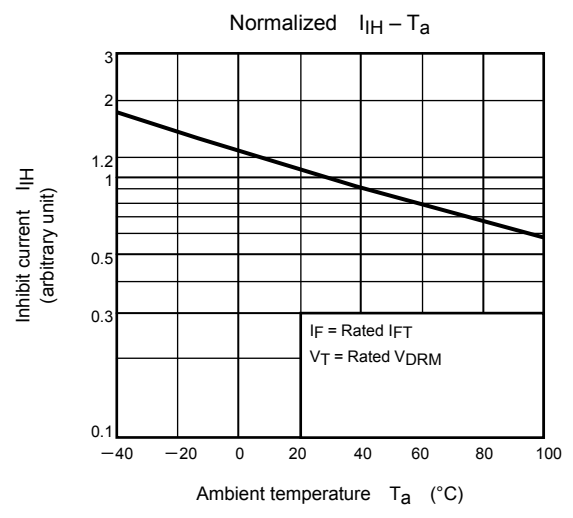
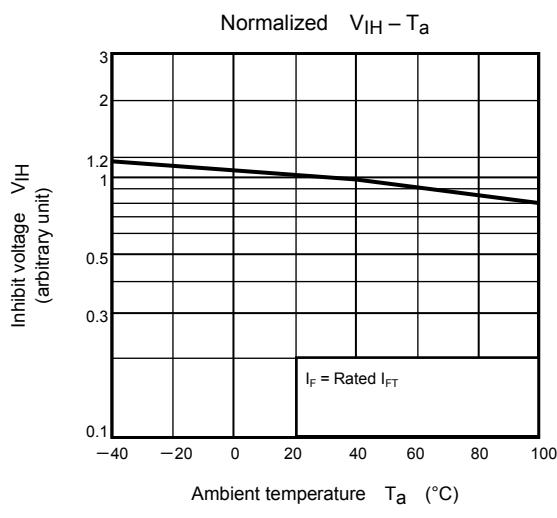
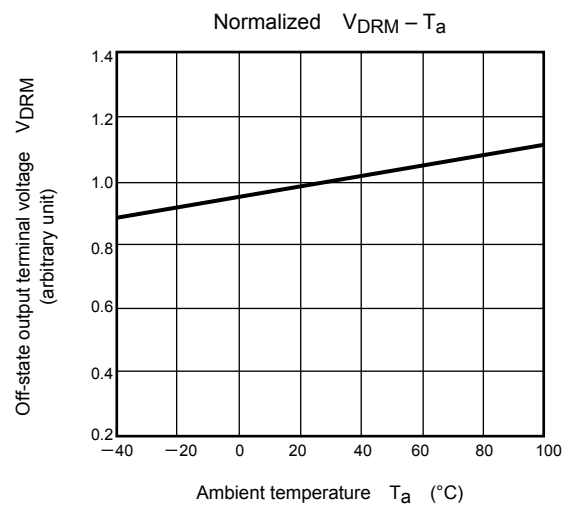
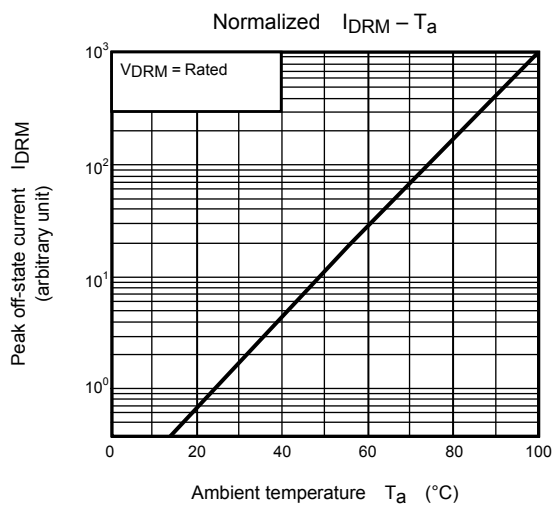
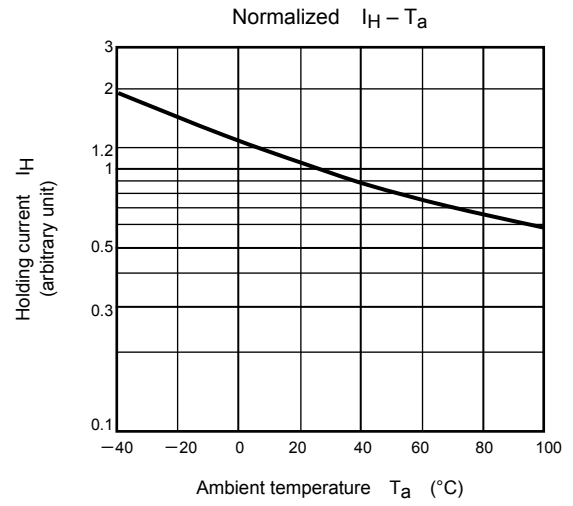
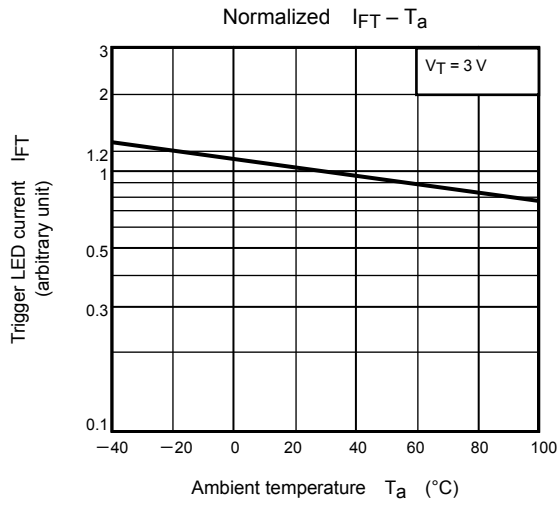
| Characteristic                | Symbol | Test Condition                               | Min.               | Typ.      | Max. | Unit     |
|-------------------------------|--------|--|--------------------|-----------|------|----------|
| Capacitance (input to output) | $C_S$  | $V_S = 0, f = 1 \text{ MHz}$                 | —                  | 0.8       | —    | pF       |
| Isolation resistance          | $R_S$  | $V_S = 500 \text{ V}, \text{R.H.} \leq 60\%$ | $1 \times 10^{12}$ | $10^{14}$ | —    | $\Omega$ |
| Isolation voltage             | $BV_S$ | AC, 1 minute                                 | 5000               | —         | —    | Vrms     |
|                               |        | AC, 1 second, in oil                         | —                  | 10000     | —    | Vrms     |
|                               |        | DC, 1 minute, in oil                         | —                  | 10000     | —    | Vdc      |

(Note 2): dv/dt test circuit





\*: The above graphs show typical characteristics.



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