

TLP161J

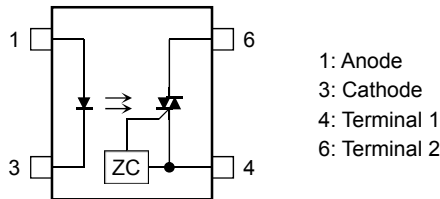
Triac Drive  
Programmable Controllers  
AC-Output Module  
Solid State Relay

The TOSHIBA mini flat coupler TLP161J is a small outline coupler, suitable for surface mount assembly.

The TLP161J consists of a photo triac, optically coupled to a gallium arsenide infrared emitting diode.

- Zero-voltage crossing turn-on
- Peak off-state voltage: 600 V (min)
- Trigger LED current: 10 mA (max)
- On-state current: 70 mA (max)
- Isolation voltage: 2500 Vrms (min)
- UL recognized: UL1577, file No. E67349

Pin Configurations



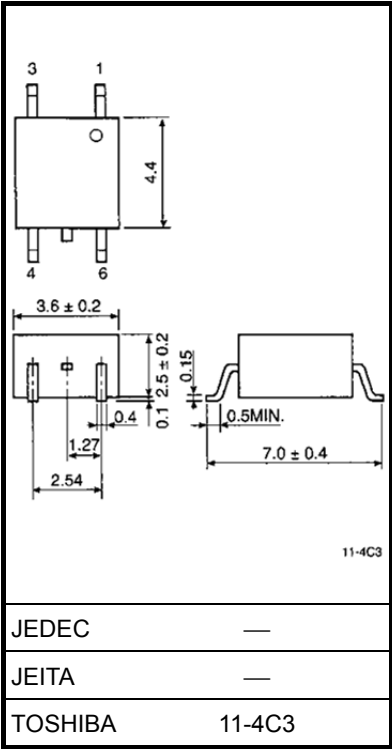
Trigger LED Current

| Classification (*) | Trigger LED Current (mA)                    |     | Marking of Classification |
|--------------------|---------------------------------------------|-----|---------------------------|
|                    | V <sub>T</sub> = 6 V, T <sub>a</sub> = 25°C |     |                           |
|                    | Min                                         | Max |                           |
| (IFT7)             | —                                           | 7   | T7                        |
| Standard           | —                                           | 10  | T7, Blank                 |

\*: Ex. (IFT7): TLP161J (IFT7)

Note: Application type name for certification test, please use standard product type name, i.e.  
TLP161J (IFT7): TLP161J

Unit: mm



Weight: 0.09 g (typ.)

Start of commercial production  
1988/04

## Absolute Maximum Ratings (Ta = 25°C)

| Characteristics                                        |                                                               | Symbol                      | Rating     | Unit  |
|--------------------------------------------------------|---------------------------------------------------------------|-----------------------------|------------|-------|
| LED                                                    | Forward current                                               | $I_F$                       | 50         | mA    |
|                                                        | Forward current derating<br>(Ta ≥ 53°C)                       | $\Delta I_F/^\circ\text{C}$ | -0.7       | mA/°C |
|                                                        | Peak forward current<br>(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                                          | $I_{T(RMS)}$                | 70         | mA    |
|                                                        |                                                               |                             | 40         |       |
|                                                        | On-state current derating<br>(Ta ≥ 25°C)                      | $\Delta I_T/^\circ\text{C}$ | -0.67      | mA/°C |
|                                                        | Peak on-state current<br>(100 μs pulse, 120 pps)              | $I_{TP}$                    | 2          | A     |
|                                                        | Peak non-repetitive surge current<br>(P <sub>W</sub> = 10 ms) | $I_{TSM}$                   | 1.2        | A     |
|                                                        | Junction temperature                                          | $T_j$                       | 115        | °C    |
| Storage temperature range                              |                                                               | $T_{stg}$                   | -55 to 125 | °C    |
| Operating temperature range                            |                                                               | $T_{opr}$                   | -40 to 100 | °C    |
| Lead soldering temperature (10 s)                      |                                                               | $T_{sol}$                   | 260        | °C    |
| Isolation voltage (AC, 1 minute, R.H. ≤ 60%)<br>(Note) |                                                               | $BV_S$                      | 2500       | 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: Device considered a two terminal device: Pins 1 and 3 shorted together and pins 4 and 6 shorted together.

## Recommended Operating Conditions

| Characteristics       | Symbol    | Min | Typ. | Max | Unit |
|-----------------------|-----------|-----|------|-----|------|
| Supply voltage        | $V_{AC}$  | —   | —    | 240 | Vac  |
| Forward current       | $I_F$     | 15  | 20   | 25  | mA   |
| Peak on-state current | $I_{TP}$  | —   | —    | 1   | A    |
| Operating temperature | $T_{opr}$ | -25 | —    | 85  | °C   |

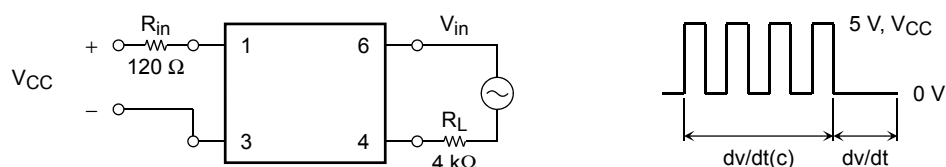
Note: Recommended operating conditions are given as a design guideline to obtain expected performance of the device. Additionally, each item is an independent guideline respectively. In developing designs using this product, please confirm specified characteristics shown in this document.

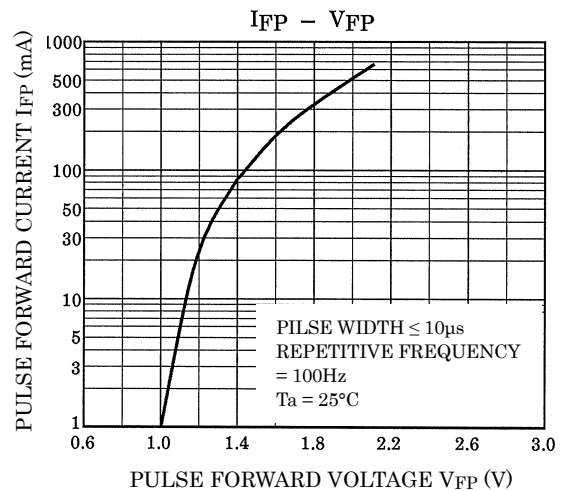
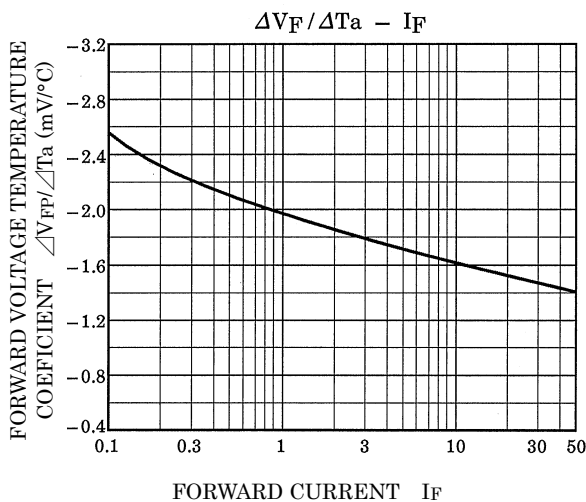
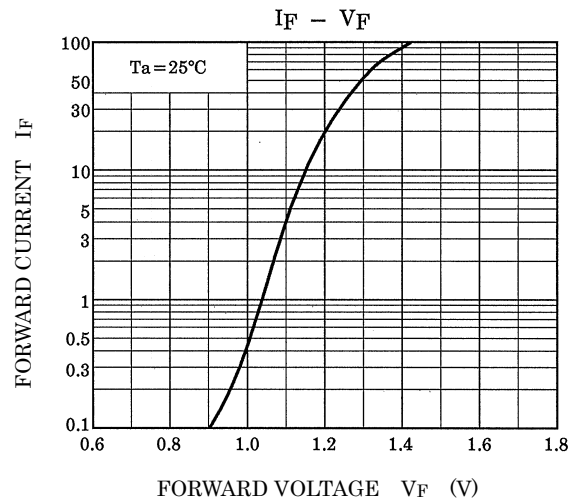
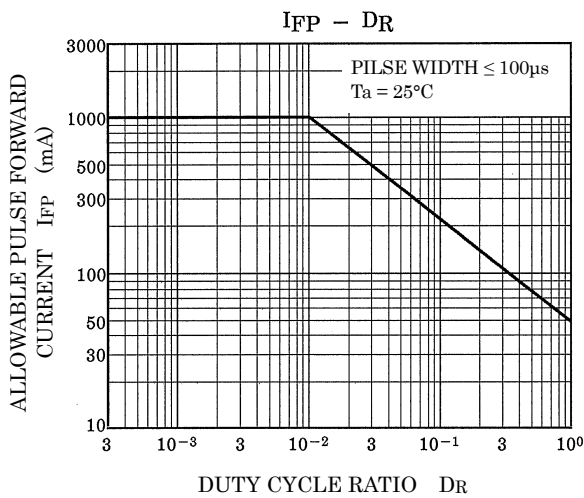
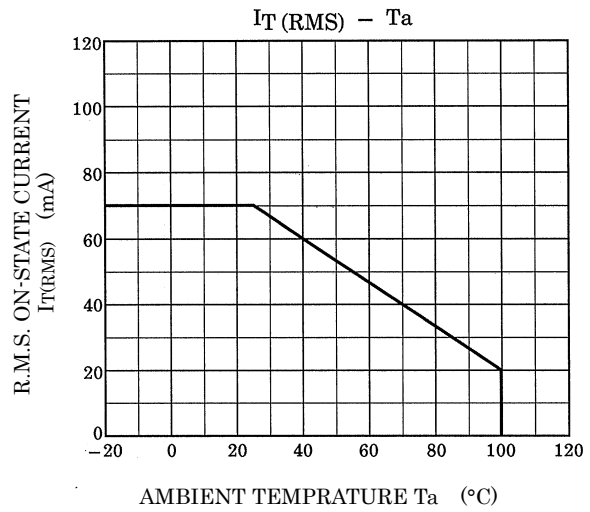
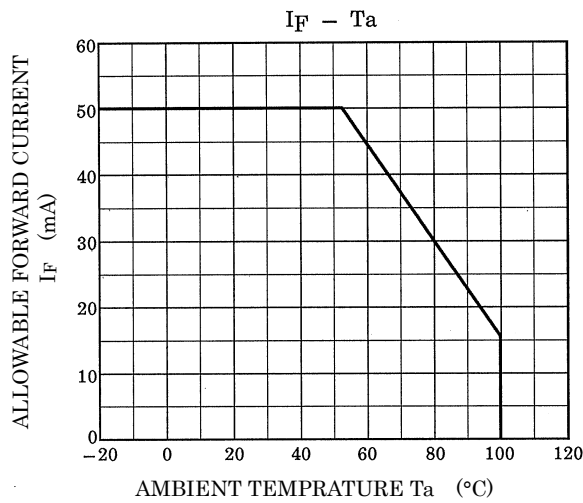
## Individual Electrical Characteristics (Ta = 25°C)

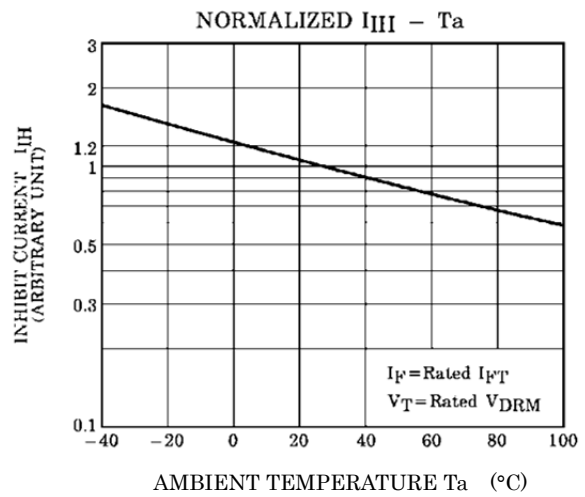
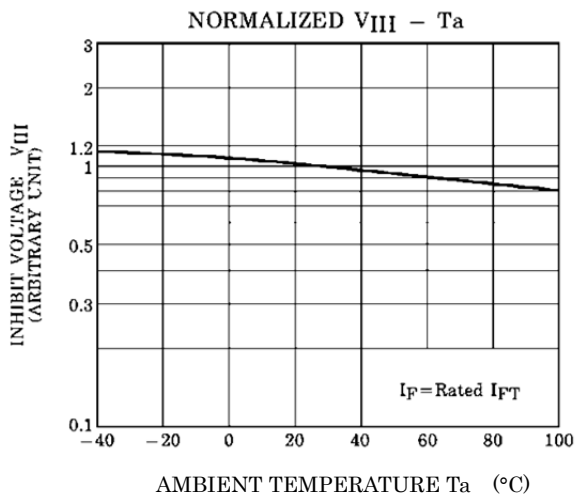
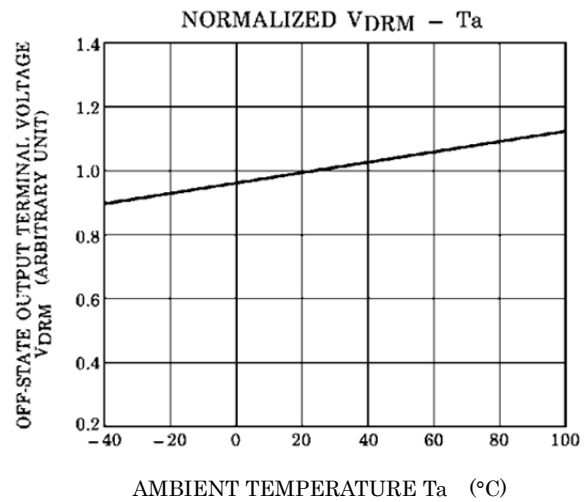
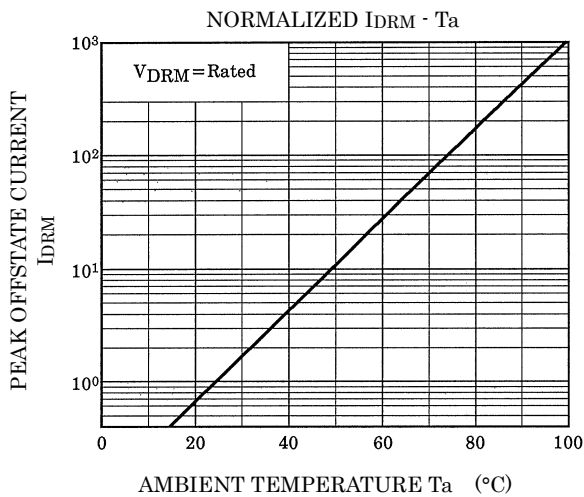
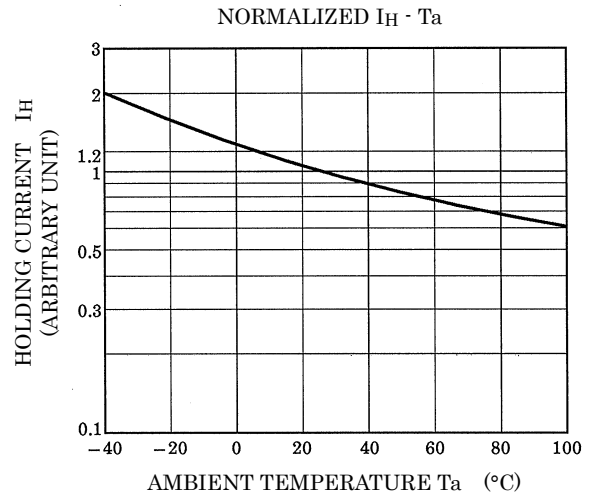
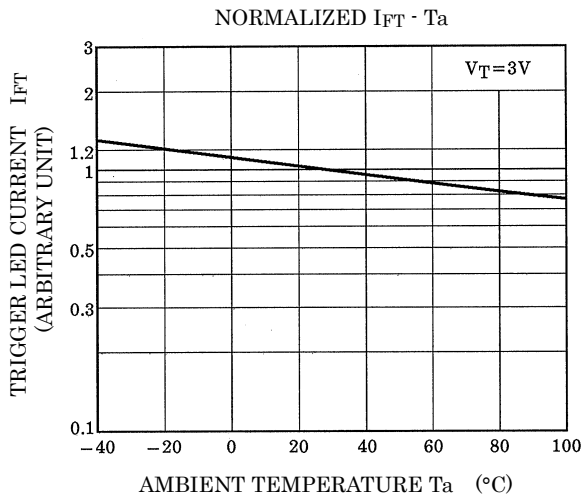
| Characteristics |                                              | Symbol           | Test Condition                                                        | Min | Typ. | Max  | Unit             |
|-----------------|----------------------------------------------|------------------|-----------------------------------------------------------------------|-----|------|------|------------------|
| 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                       | $I_{\text{DRM}}$ | $V_{\text{DRM}} = 600 \text{ V}$                                      | —   | 10   | 1000 | nA               |
|                 | Peak on-state voltage                        | $V_{\text{TM}}$  | $I_{\text{TM}} = 70 \text{ mA}$                                       | —   | 1.7  | 2.8  | V                |
|                 | Holding current                              | $I_H$            | —                                                                     | —   | 0.6  | —    | mA               |
|                 | Critical rate of rise of off-state voltage   | $dv/dt$          | $V_{\text{in}} = 240 \text{ Vrms}, T_a = 85^\circ\text{C}$ (Figure 1) | 200 | 500  | —    | V/ $\mu\text{s}$ |
|                 | Critical rate of rise of commutating voltage | $dv/dt(c)$       | $V_{\text{in}} = 60 \text{ Vrms}, I_T = 15 \text{ mA}$ (Figure 1)     | —   | 0.2  | —    | V/ $\mu\text{s}$ |

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

| Characteristics               | Symbol          | Test Condition                                                          | Min                | Typ.      | Max | Unit          |
|-------------------------------|-----------------|-------------------------------------------------------------------------|--------------------|-----------|-----|---------------|
| Trigger LED current           | $I_{\text{FT}}$ | $V_T = 6 \text{ V}$                                                     | —                  | 5         | 10  | mA            |
| Inhibit voltage               | $V_{\text{IH}}$ | $I_F = \text{Rated } I_{\text{FT}}$                                     | —                  | —         | 50  | V             |
| Leakage in inhibited state    | $I_{\text{IH}}$ | $I_F = \text{Rated } I_{\text{FT}}, V_T = \text{Rated } V_{\text{DRM}}$ | —                  | 200       | 600 | $\mu\text{A}$ |
| 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                                                            | 2500               | —         | —   | Vrms          |
|                               |                 | AC, 1 second, in oil                                                    | —                  | 5000      | —   |               |
|                               |                 | DC, 1 minute, in oil                                                    | —                  | 5000      | —   | Vdc           |

Figure 1  $dv/dt$  Test Circuit





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