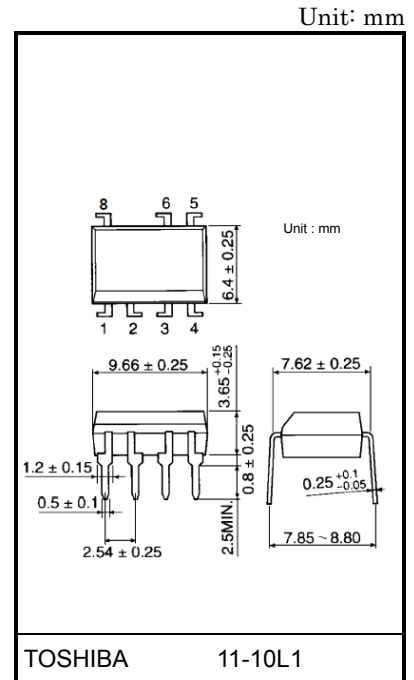


# TLP549J

Office Machine  
 Household Use Equipment  
 Solid State Relay  
 Switching Power Supply

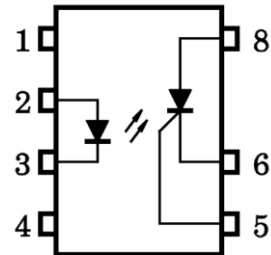
The TOSHIBA TLP549J consists of a photo-thyristor optically coupled to an infrared emitting diode in a seven lead plastic DIP package.

- Peak off-state voltage: 600 V (min)
- Trigger LED current: 7 mA (max)
- On-state current: 150 mA (max)
- Isolation voltage: 2500 V<sub>rms</sub> (min)
- UL-recognized: UL 1577, File No.E67349



Weight: 0.53 g (typ.)

### Pin Configuration (top view)



- 1: N.C.
- 2: ANODE (LED)
- 3: CATHODE (LED)
- 4: N.C.
- 5: GATE
- 6: CATHODE (SCR)
- 8: ANODE (SCR)

Start of commercial production  
 2009-07

## 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         |
|  | Diode power dissipation                       | $P_D$                         | 100        | mW        |
|  | Diode power dissipation derating (Ta ≥ 53°C)  | $\Delta P_D / ^\circ\text{C}$ | -1.4       | mW/°C     |
| Detector   | Peak forward voltage (RGK = 27kΩ)             | $V_{DRM}$                     | 600        | V         |
|  | Peak reverse voltage (RGK = 27kΩ)             | $V_{RRM}$                     | 600        | V         |
|  | On-state current                              | $I_T$ (RMS)                   | 150        | mA        |
|  | On-state current derating (Ta ≥ 25°C)         | $\Delta I_T / ^\circ\text{C}$ | -2.0       | mA / °C   |
|  | Peak on-state current (100 μs pulse, 120 pps) | $I_{TP}$                      | 3          | A         |
|  | Peak one cycle surge current                  | $I_{TSM}$                     | 2          | A         |
|  | Peak reverse gate voltage                     | $V_{GM}$                      | 5          | V         |
|  | Output power dissipation                      | $P_O$                         | 150        | mW        |
|  | Output power dissipation derating (Ta ≥ 25°C) | $\Delta P_O / ^\circ\text{C}$ | -1.5       | mW / °C   |
| Operating temperature range                        |   | $T_{opr}$                     | -40 to 100 | °C        |
| Storage temperature range                          |   | $T_{stg}$                     | -55 to 125 | °C        |
| Lead soldering temperature (10 s)                  |   | $T_{sol}$                     | 260        | °C        |
| Isolation voltage (AC, 60 s, R.H. ≤ 60 %) (Note 1) |   | $BV_S$                        | 2500       | $V_{rms}$ |

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, 3 and 4 shorted together and pins 5, 6 and 8 shorted together.

## Recommended Operating Conditions

| Characteristic              | Symbol    | Min | Typ. | Max | Unit     |
|-----------------------------|-----------|-----|------|-----|----------|
| Supply voltage              | $V_{AC}$  | —   | —    | 240 | $V_{ac}$ |
| Forward current             | $I_F$     | 10  | —    | 25  | mA       |
| Operating temperature       | $T_{opr}$ | -25 | —    | 85  | °C       |
| Gate to cathode resistance  | $R_{GK}$  | —   | 27   | 33  | kΩ       |
| Gate to cathode capacitance | $C_{GK}$  | —   | 0.01 | 0.1 | μF       |

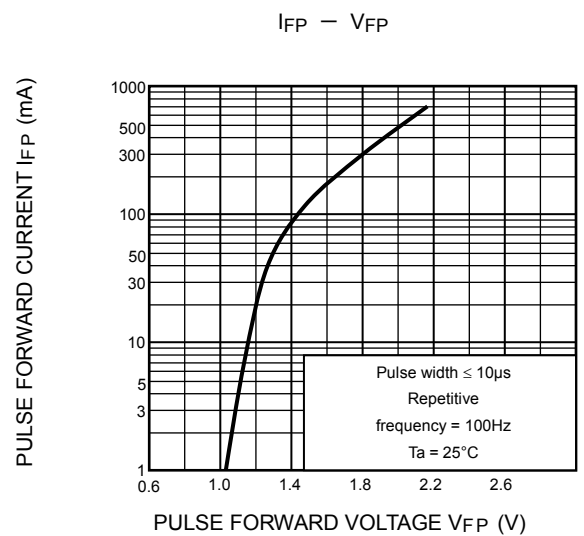
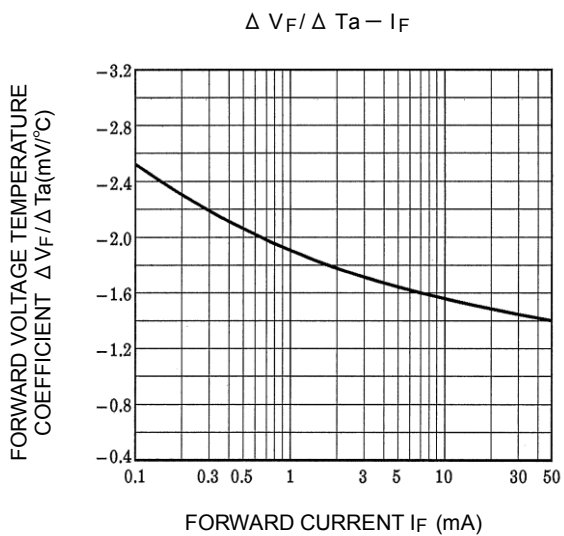
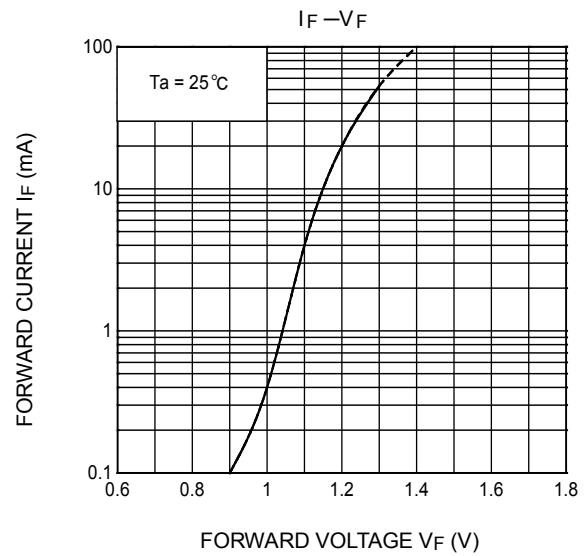
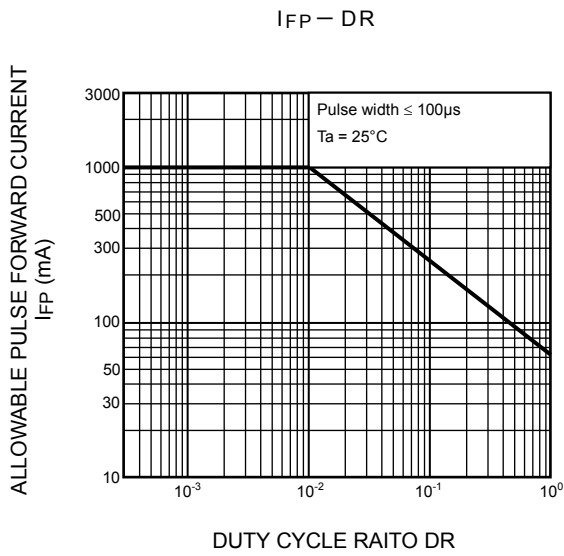
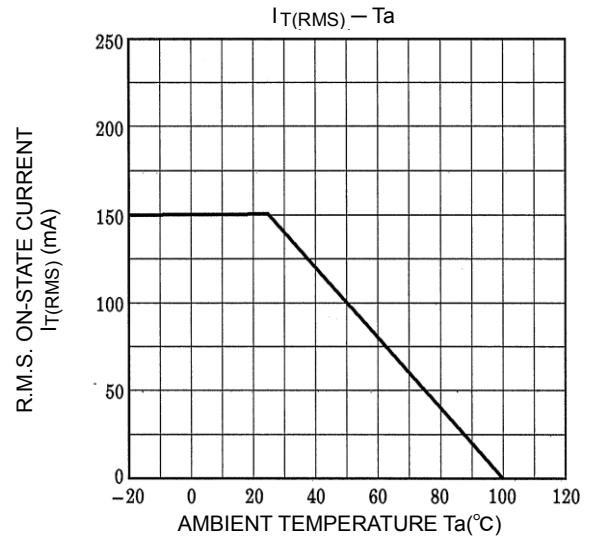
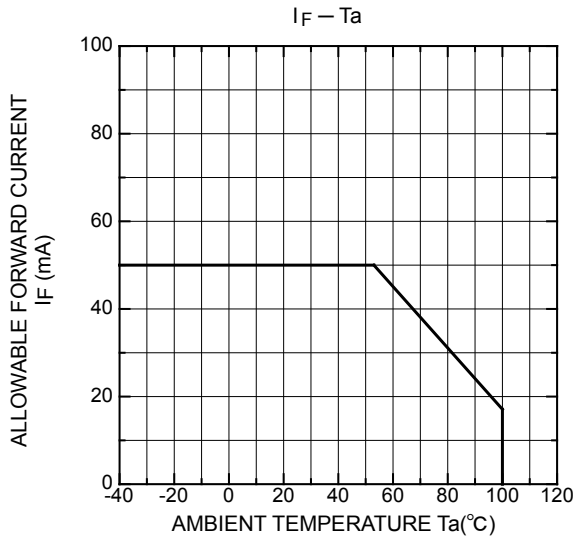
Note 2: Recommended operating conditions are given as a design guideline to obtain expected performance of the device. Additionally, each item is an independent guideline respectively. In developing designs using this product, please confirm specified characteristics shown in this document.

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

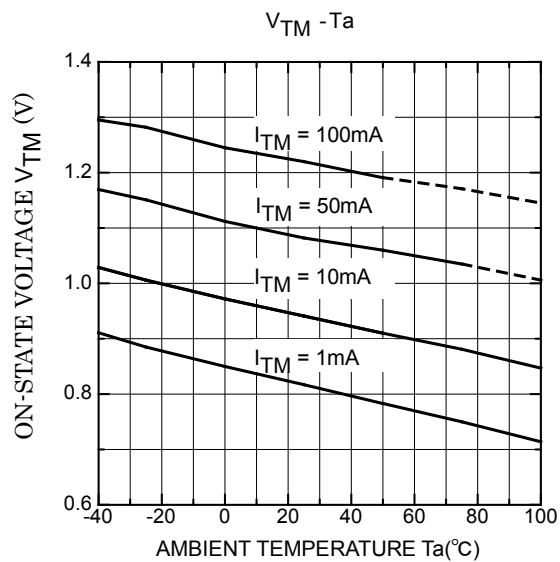
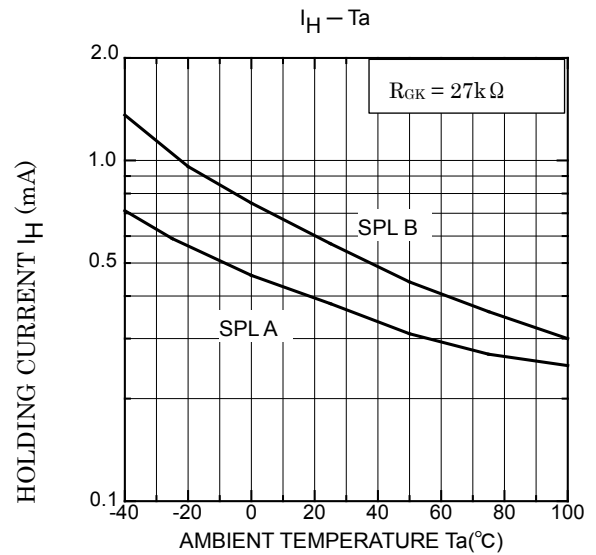
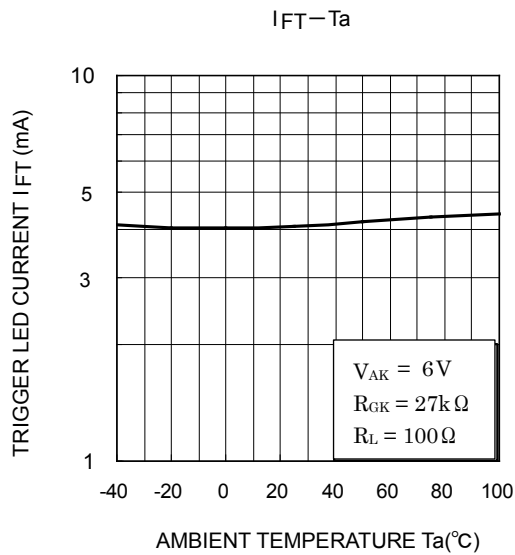
| Characteristic |                   | Symbol          | Test Condition  | Min           | Typ. | Max  | Unit             |
|----------------|-------------------|-----------------|---|---------------|------|------|------------------|
| LED            | Forward voltage   | $V_F$           | $I_F = 10 \text{ mA}$                                 | 1.0           | 1.15 | 1.3  | V                |
|                | Reverse current   | $I_R$           | $V_R = 5 \text{ V}$                                   | —             | —    | 10   | $\mu\text{A}$    |
|                | Capacitance       | $C_T$           | $V_F = 0 \text{ V}, f = 1 \text{ MHz}$                | —             | 30   | —    | $\text{pF}$      |
| Detector       | Off-state current | $I_{DRM}$       | $V_{AK} = 600 \text{ V}, R_{GK} = 27 \text{ k}\Omega$ | —             | —    | 5    | $\mu\text{A}$    |
|                | Reverse current   | $I_{RRM}$       | $V_{KA} = 600 \text{ V}, R_{GK} = 27 \text{ k}\Omega$ | —             | —    | 5    | $\mu\text{A}$    |
|                | On-state voltage  | $V_{TM}$        | $I_{TM} = 100 \text{ mA}, I_F = 7 \text{ mA}$         | —             | 1.25 | 1.45 | V                |
|                | Holding current   | $I_H$           | $R_{GK} = 27 \text{ k}\Omega$                         | —             | 0.5  | 1    | mA               |
|                | Off-state dv/dt   | dv/dt           | $V_{AK} = 420 \text{ V}, R_{GK} = 27 \text{ k}\Omega$ | 5             | —    | —    | V/ $\mu\text{s}$ |
|                | Capacitance       | $C_j$           | $V = 0 \text{ V}, f = 1 \text{ MHz}$                  | Anode to gate |      | —    | 5                |
|                |                   | Gate to cathode |   | —             | 500  | —    |                  |

## Coupled Characteristics (Ta = 25°C)

| Characteristic                | Symbol   | Test Condition  | Min                | Typ.      | Max | Unit          |
|-------------------------------|----------|---|--------------------|-----------|-----|---------------|
| Trigger LED current           | $I_{FT}$ | $V_{AK} = 6 \text{ V}, R_{GK} = 27 \text{ k}\Omega$                       | —                  | 3         | 7   | mA            |
| Turn-on time                  | $t_{on}$ | $I_F = 30 \text{ mA}, V_{AA} = 50 \text{ V}, R_{GK} = 27 \text{ k}\Omega$ | —                  | 10        | —   | $\mu\text{s}$ |
| Capacitance (input to output) | $C_S$    | $V_S = 0 \text{ V}, f = 1 \text{ MHz}$                                    | —                  | 0.8       | —   | $\text{pF}$   |
| Isolation resistance          | $R_S$    | $V_S = 500 \text{ V}, \text{R.H.} \leq 60 \%$                             | $5 \times 10^{10}$ | $10^{14}$ | —   | $\Omega$      |
| Isolation voltage             | $BV_S$   | AC, 60 s  | 2500               | —         | —   | $V_{rms}$     |



NOTE: The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.



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