

## TLP168J

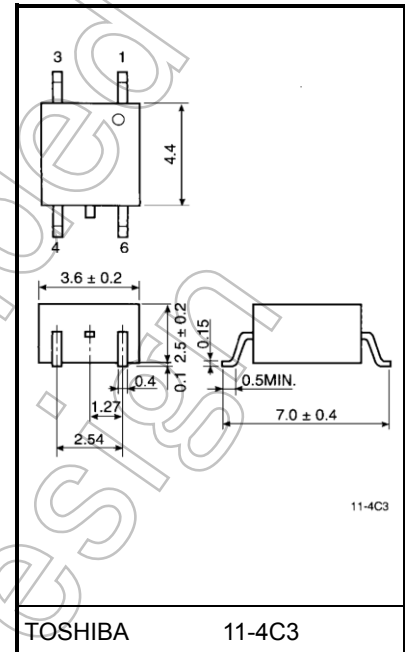
Triac Driver  
Programmable Controllers  
AC-Output Modules  
Solid State Relays

The TOSHIBA mini-flat coupler TLP168J is a small-outline coupler suitable for surface mount assembly.  
The TLP168J consists of a GaAlAs infrared emitting diode optically coupled to a triac-output photocoupler.

- Peak off-state voltage: 600 V (min)
- Trigger LED current: 3 mA (max)
- On-state current: 70 mA (max)
- Isolation voltage: 2500 Vrms (min)
- UL approved: UL1577, File No.E67349
- cUL approved : CSA Component Acceptance Service  
No. 5A, File No.E67349
- Option (V4) VDE approved : EN60747-5-5 (Note1)

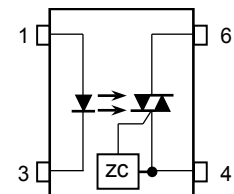
**Note 1: When a EN60747-5-5 approved type is needed,  
please designate "Option(V4)"**

Unit: mm



Weight: 0.09 g (typ.)

### Pin Configurations (top view)



- 1: Anode
- 3: Cathode
- 4: Triac Terminal
- 6: Triac Terminal

Start of commercial production  
1993-01

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

| Characteristic                              |  | Symbol               | Rating     | Unit             |
|---|--|----------------------|------------|------------------|
| LED   | Forward current  | I <sub>F</sub>       | 20         | mA               |
|   | Forward current derating (Ta ≥ 25°C)                         | ΔI <sub>F</sub> / °C | -0.2       | mA / °C          |
|   | Peak forward current (100 μs pulse, 100 pps)                 | I <sub>FP</sub>      | 1          | A                |
|   | Reverse voltage  | V <sub>R</sub>       | 5          | V                |
|   | Diode power dissipation                                      | P <sub>D</sub>       | 100        | mW               |
|   | Diode power dissipation derating (Ta ≥ 25°C)                 | ΔP <sub>D</sub> / °C | -1.0       | mW/°C            |
|   | Junction temperature   | T <sub>j</sub>       | 125        | °C               |
| Detector                                    | Off-state output terminal voltage                            | V <sub>DRM</sub>     | 600        | V                |
|   | On-state RMS current   | I <sub>T(RMS)</sub>  | 70         | mA               |
|   |  |                      | 40         |                  |
|   | On-state current derating (Ta ≥ 25°C)                        | ΔI <sub>T</sub> / °C | -0.67      | mA / °C          |
|   | Peak on-state current<br>(100 μs pulse, 120 pps)             | I <sub>TP</sub>      | 2          | A                |
|   | Peak non-repetitive surge current<br>(P <sub>W</sub> =10 ms) | I <sub>TSM</sub>     | 1.2        | A                |
|   | Output power dissipation                                     | P <sub>O</sub>       | 200        | mW               |
|   | Output power dissipation derating (Ta ≥ 25°C)                | ΔP <sub>O</sub> / °C | -2.0       | mW / °C          |
|   | Junction temperature   | T <sub>j</sub>       | 115        | °C               |
| Storage temperature range                   |  | T <sub>stg</sub>     | -55 to 125 | °C               |
| Operating temperature range                 |  | T <sub>opr</sub>     | -40 to 100 | °C               |
| Lead soldering temperature (10 s)           |  | T <sub>sol</sub>     | 260        | °C               |
| Isolation voltage<br>(AC, 60 s, R.H. ≤ 60%) |  | BV <sub>S</sub>      | 2500       | V <sub>rms</sub> |

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 and 3 shorted together and Pin 4 and 6 shorted together.

## Recommended Operating Conditions

| Characteristic        | Symbol           | Min | Typ. | Max | Unit            |
|-----------------------|------------------|-----|------|-----|-----------------|
| Supply voltage        | V <sub>AC</sub>  | —   | —    | 240 | V <sub>ac</sub> |
| Forward current       | I <sub>F</sub>   | 4.5 | 6    | 7.5 | mA              |
| Peak on-state current | I <sub>TP</sub>  | —   | —    | 1   | A               |
| Operating temperature | T <sub>opr</sub> | -10 | —    | 85  | °C              |

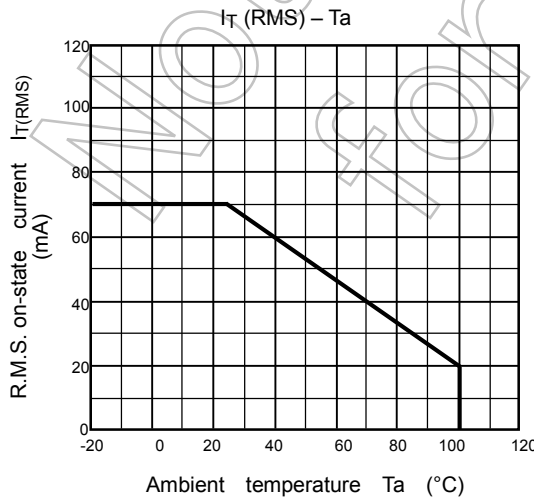
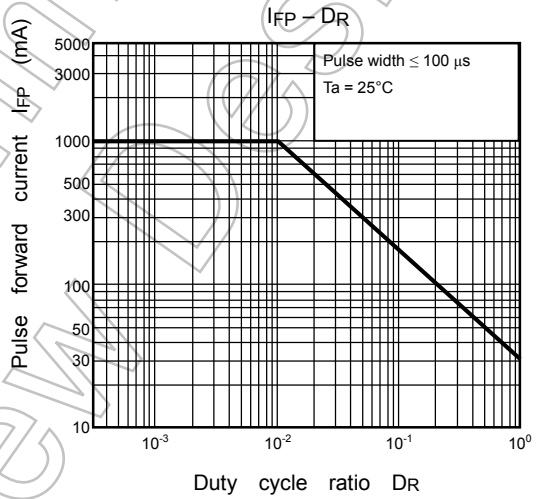
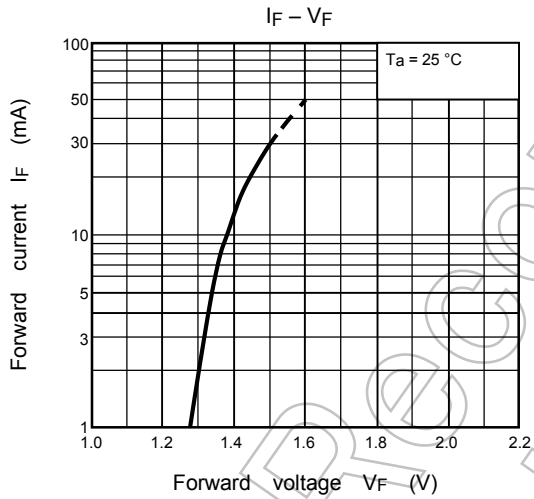
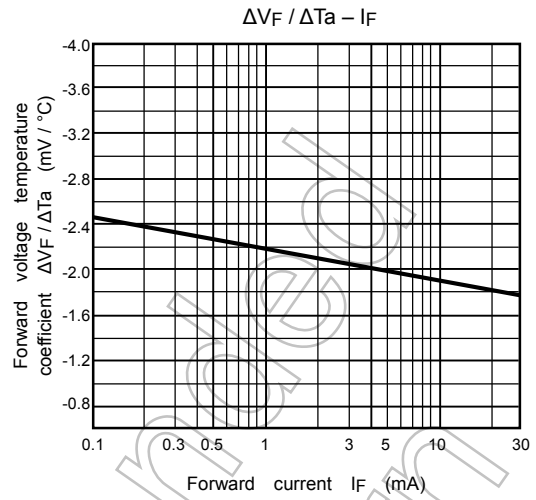
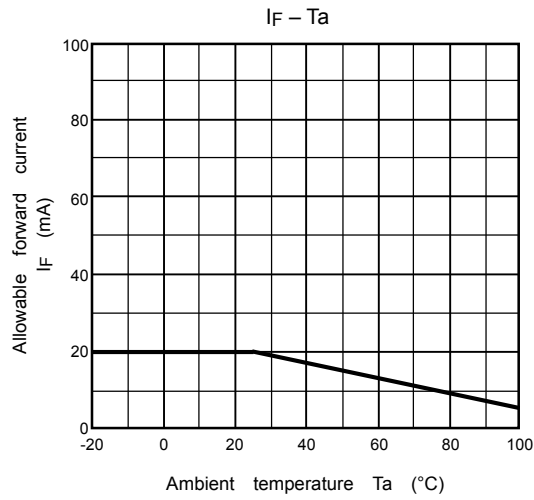
Note: Recommended operating conditions are given as a design guideline to obtain expected performance of the device. Additionally, each item is an independent guideline respectively. In developing designs using this product, please confirm specified characteristics shown in this document.

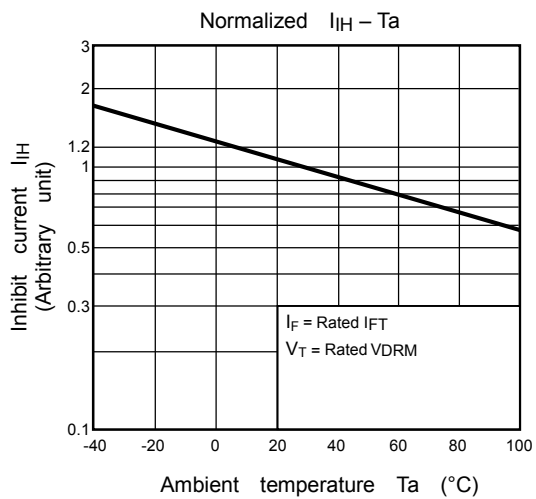
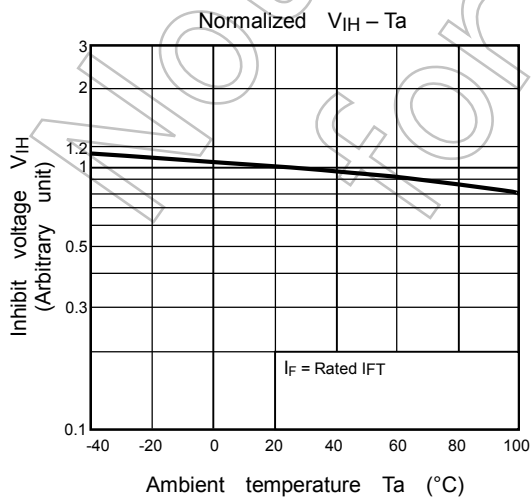
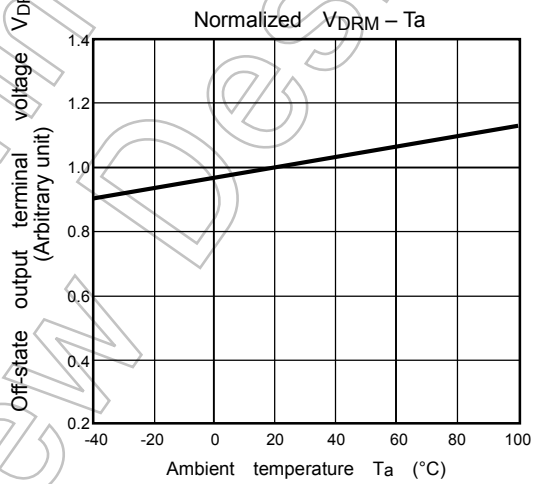
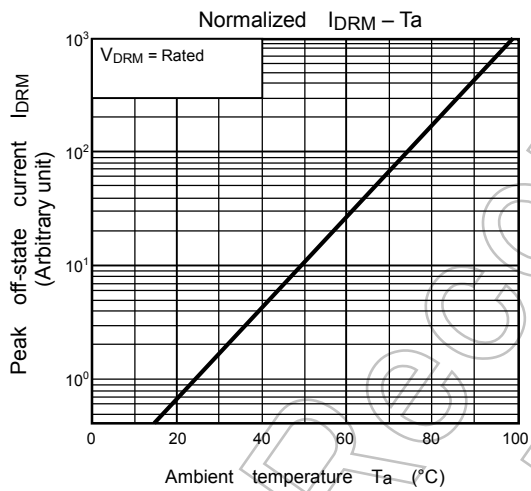
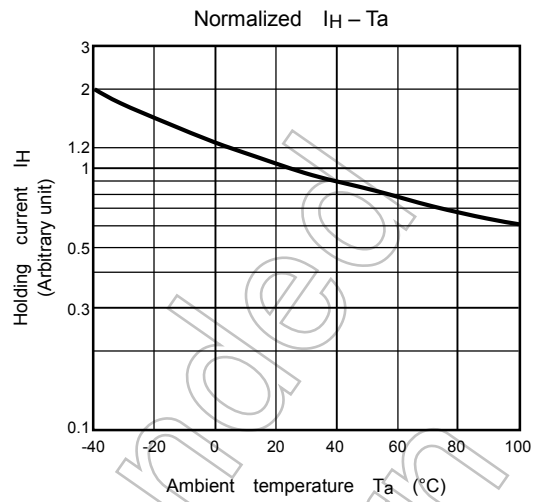
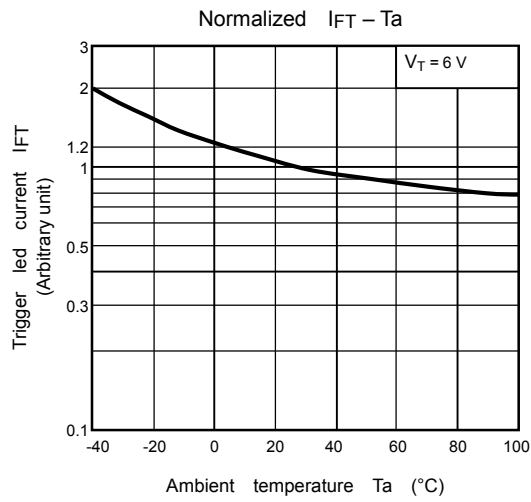
## Electrical Characteristics (Ta = 25°C)

| Characteristic |  | Symbol           | Test Condition                                    | Min | Typ. | Max  | Unit   |
|----------------|--|------------------|---|-----|------|------|--------|
| LED            | Forward voltage                              | V <sub>F</sub>   | I <sub>F</sub> = 10 mA                            | 1.2 | 1.4  | 1.7  | V      |
|                | Reverse current                              | I <sub>R</sub>   | V <sub>R</sub> = 3 V                              | —   | —    | 10   | μA     |
|                | Capacitance                                  | C <sub>T</sub>   | V <sub>F</sub> = 0 V, f = 1 MHz                   | —   | 30   | —    | pF     |
| Detector       | Peak off-state current                       | I <sub>DRM</sub> | V <sub>DRM</sub> = 600 V                          | —   | 10   | 1000 | nA     |
|                | Peak on-state voltage                        | V <sub>TM</sub>  | I <sub>TM</sub> = 70 mA                           | —   | 1.7  | 2.8  | V      |
|                | Holding current                              | I <sub>H</sub>   | —   | —   | 0.6  | —    | mA     |
|                | Critical rate of rise of off-state voltage   | dv / dt          | V <sub>in</sub> = 240 Vrms, Ta = 85°C             | 200 | 500  | —    | V / μs |
|                | Critical rate of rise of commutating voltage | dv / dt(c)       | V <sub>in</sub> = 60 Vrms, I <sub>T</sub> = 15 mA | —   | 0.2  | —    | V / μs |

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

| Characteristic                | Symbol          | Test Condition  | Min                | Typ.             | Max | Unit |
|-------------------------------|-----------------|---|--------------------|------------------|-----|------|
| Trigger LED current           | I <sub>FT</sub> | V <sub>T</sub> = 3V   | —                  | —                | 3   | mA   |
| Inhibit voltage               | V <sub>IH</sub> | I <sub>F</sub> = Rated I <sub>FT</sub>  | —                  | —                | 50  | V    |
| Leakage in inhibited state    | I <sub>IH</sub> | I <sub>F</sub> = Rated I <sub>FT</sub><br>V <sub>T</sub> = Rated V <sub>DRM</sub> | —                  | 200              | 600 | μA   |
| Capacitance (input to output) | C <sub>S</sub>  | V <sub>S</sub> = 0 V, f = 1 MHz   | —                  | 0.8              | —   | pF   |
| Isolation resistance          | R <sub>S</sub>  | V <sub>S</sub> = 500 V, R.H. ≤ 60%  | 5×10 <sup>10</sup> | 10 <sup>14</sup> | —   | Ω    |
| Isolation voltage             | BVs             | AC, 60 s  | 2500               | —                | —   | Vrms |
|                               |                 | AC, 1 s, in oil   | —                  | 5000             | —   |      |
|                               |                 | DC, 60 s, in oil  | —                  | 5000             | —   | Vdc  |





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