

## Absolute Maximum Ratings (Ta=25°C)

| CHARACTERISTIC                                     |                                             |         | SYMBOL                   | RATING     | UNIT             |
|----------------------------------------------------|---------------------------------------------|---------|--------------------------|------------|------------------|
| LED                                                | Forward Current                             |         | I <sub>F</sub>           | 50         | mA               |
|                                                    | Forward Current Derating (Ta≥53°C)          |         | ΔI <sub>F</sub> /°C      | -0.7       | mA /°C           |
|                                                    | Peak Forward Current (100μs pulse, 100pps)  |         | I <sub>FP</sub>          | 1          | A                |
|                                                    | Reverse Voltage                             |         | V <sub>R</sub>           | 5          | V                |
|                                                    | Power Dissipation                           |         | P <sub>D</sub>           | 100        | mW               |
|                                                    | 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>         | 400        | V                |
|                                                    | On-State RMS Current                        | Ta=25°C | I <sub>T(RMS)</sub>      | 100        | mA               |
|                                                    |                                             | Ta=70°C |                          | 50         |                  |
|                                                    | On-State Current Derating (Ta≥25°C)         |         | ΔI <sub>T</sub> /°C      | -1.1       | mA /°C           |
|                                                    | Peak On-State Current (100μs pulse, 120pps) |         | I <sub>TP</sub>          | 2          | A                |
|                                                    | Peak Nonrepetitive Surge Current (Pw=10ms)  |         | I <sub>TSM</sub>         | 1.2        | A                |
|                                                    | Power Dissipation                           |         | P <sub>D</sub>           | 300        | mW               |
|                                                    | Power Dissipation Derating (Ta≥25°C)        |         | ΔP <sub>D</sub> /°C      | -4.0       | mW/°C            |
|                                                    | Junction Temperature                        |         | T <sub>j</sub>           | 115        | °C               |
| Storage Temperature Range                          |                                             |         | T <sub>stg</sub>         | -55 to 150 | °C               |
| Operating Temperature Range                        |                                             |         | T <sub>opr</sub>         | -40 to 100 | °C               |
| Lead Soldering Temperature (10 s)                  |                                             |         | T <sub>sol</sub>         | 260        | °C               |
| Total Package Power Dissipation                    |                                             |         | P <sub>T</sub>           | 330        | mW               |
| Total Package Power Dissipation Derating (Ta≥25°C) |                                             |         | ΔP <sub>T</sub> /°C      | -4.4       | mW /°C           |
| Isolation Voltage (AC,60 s. , R.H.≤60 %)           |                                             |         | (Note 2) BV <sub>S</sub> | 5000       | 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 2) Device considered a two terminal device : Pins 1, 2 and 3 shorted together and pin 4 and pin 6 shorted together.

## Recommended Operating Conditions

| CHARACTERISTIC        | SYMBOL           | MIN. | TYP. | MAX. | UNIT            |
|-----------------------|------------------|------|------|------|-----------------|
| Supply Voltage        | V <sub>AC</sub>  | —    | —    | 120  | V <sub>ac</sub> |
| Forward Current       | I <sub>F</sub> * | 15   | 20   | 25   | mA              |
| Peak On-State Current | I <sub>TP</sub>  | —    | —    | 1    | A               |
| Operating Temperature | T <sub>opr</sub> | -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.

\*In The case of TLP3022

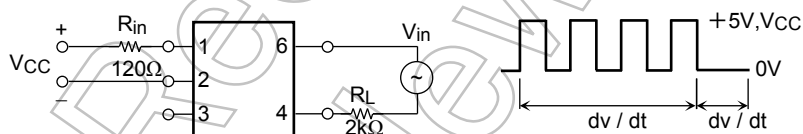
### Individual Electrical Characteristics (Ta=25°C)

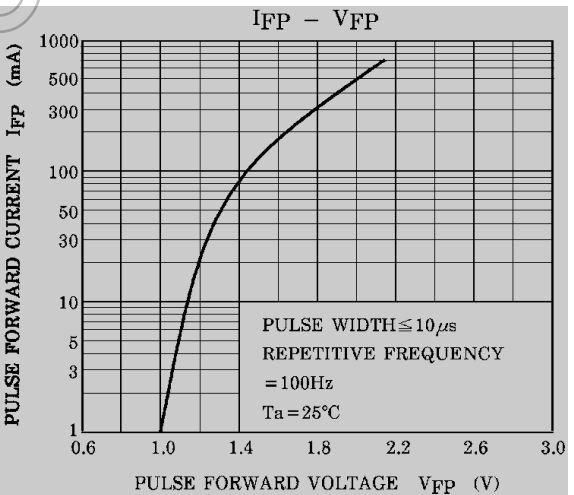
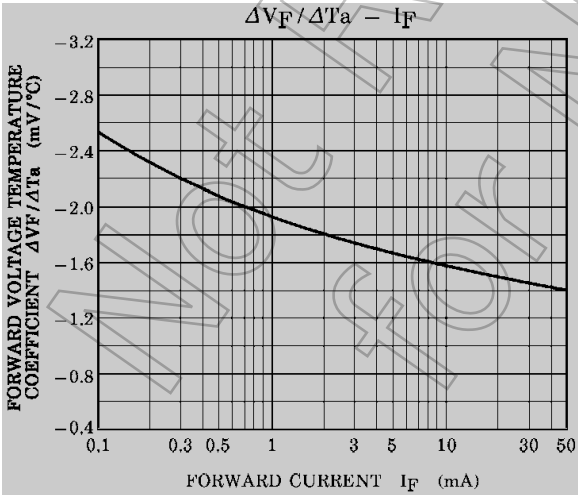
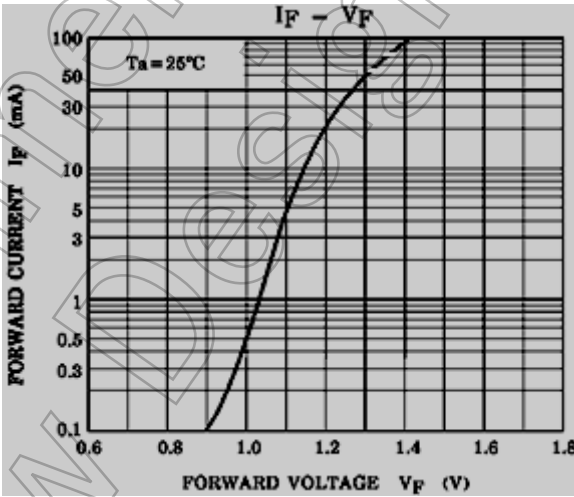
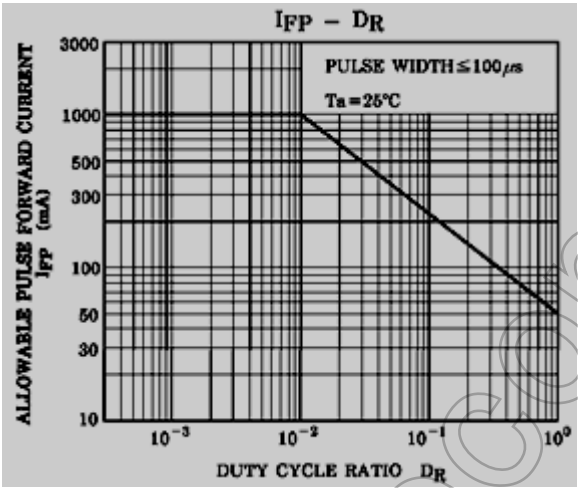
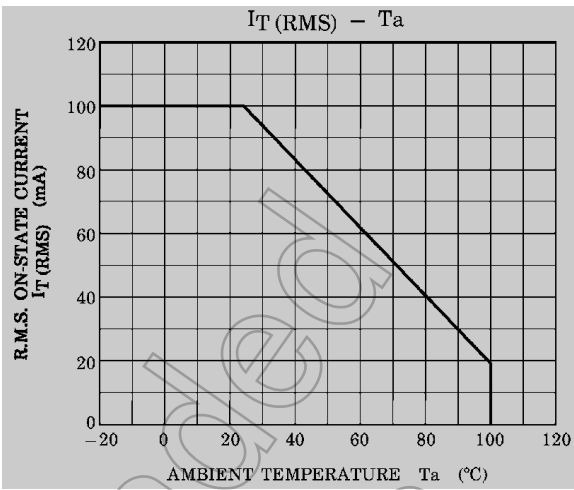
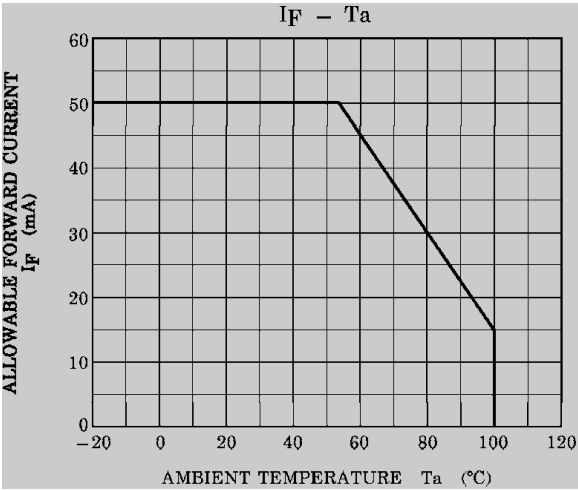
| CHARACTERISTIC |                                              | SYMBOL     | TEST CONDITION                                              | MIN. | TYP. | MAX. | UNIT             |
|----------------|----------------------------------------------|------------|-------------------------------------------------------------|------|------|------|------------------|
| 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                                  | $C_T$      | $V = 0 \text{ V}, f = 1 \text{ MHz}$                        | —    | 10   | —    | pF               |
| DETECTOR       | Peak Off-State Current                       | $I_{DRM}$  | $V_{DRM} = 400 \text{ V}$                                   | —    | 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   | $dv/dt$    | $V_{in} = 120 \text{ Vrms}, T_a = 85^\circ\text{C}$ (Fig.1) | 200  | 500  | —    | V/ $\mu\text{s}$ |
|                | Critical Rate of Rise of Commutating Voltage | $dv/dt(c)$ | $V_{in} = 30 \text{ Vrms}, I_T = 15 \text{ mA}$ (Fig.1)     | —    | 0.2  | —    | V/ $\mu\text{s}$ |

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

| CHARACTERISTIC                |            | SYMBOL   | TEST CONDITION                               | MIN.               | TYP.      | MAX. | UNIT     |
|-------------------------------|------------|----------|----------------------------------------------|--------------------|-----------|------|----------|
| Trigger LED Current           | TLP3021(S) | $I_{FT}$ | $V_T = 3 \text{ V}$                          | —                  | —         | 15   | mA       |
|                               | TLP3022(S) |          |                                              | —                  | 5         | 10   |          |
|                               | TLP3023(S) |          |                                              | —                  | —         | 5    |          |
| Capacitance (Input to Output) |            | $C_S$    | $V_S = 0 \text{ V}, f = 1 \text{ MHz}$       | —                  | 0.8       | —    | 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                                     | 5000               | —         | —    | Vrms     |

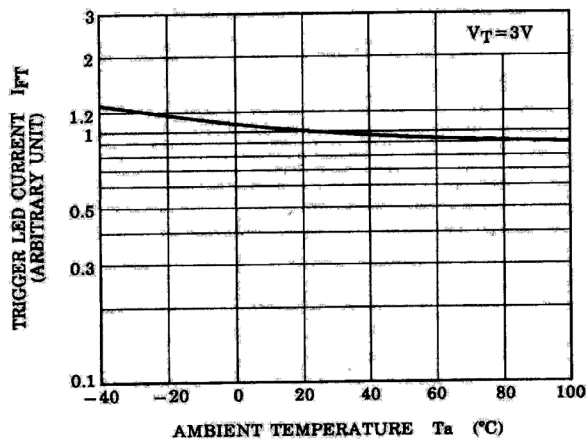
Fig. 1  $dv/dt$  test circuit



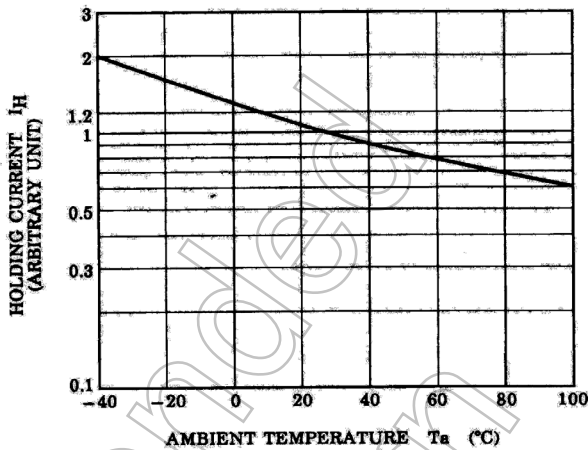


NOTE: The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.

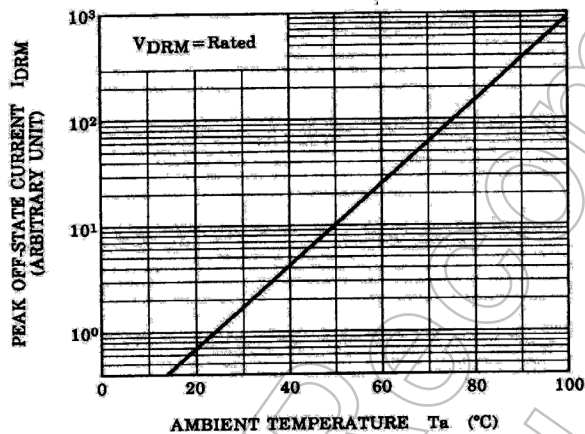
NORMALIZED  $I_{FT} - T_a$



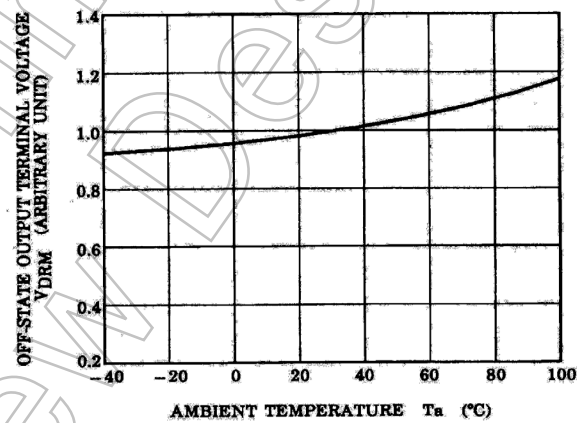
NORMALIZED  $I_H - T_a$



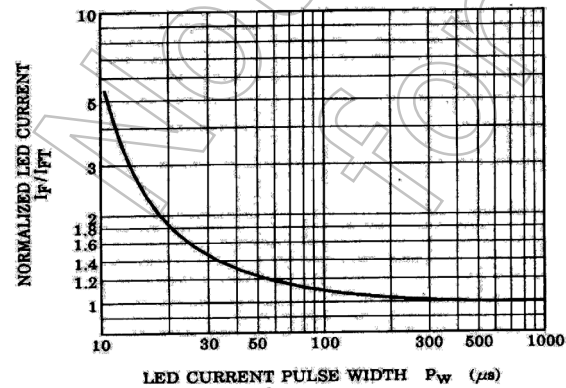
NORMALIZED  $I_{DRM} - T_a$



NORMALIZED  $V_{DRM} - T_a$



NORMALIZED LED CURRENT  
- LED CURRENT PULSE WIDTH



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