

TOSHIBA PHOTOCOUPLER GaAs IRED & PHOTO-TRANSISTOR

# TLP283,TLP283-4

## PROGRAMMABLE CONTROLLERS

AC adapters for PDAs/ on-board power supplies

I/O interface boards

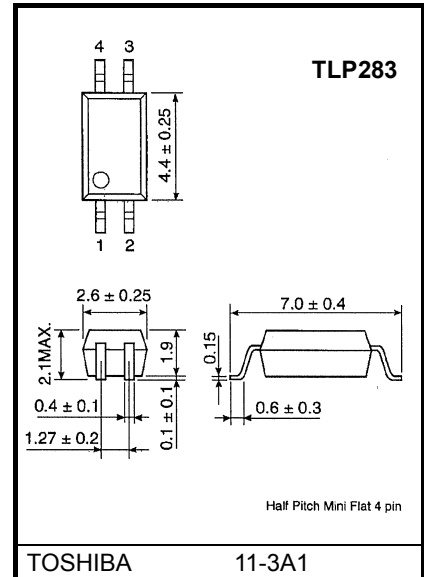
TLP283 and TLP283-4 is a very small and thin coupler,suitable for surface mount assembly in applications such as on-board power supplies,programmable controllers.

TLP283 and TLP283-4 consist of photo transistor,optically coupled to a gallium arsenide infrared emitting diode.

- Collector-Emitter Voltage : 100 V (MIN)
- Current Transfer Ratio : 100% (MIN)@IF=1mA
- 1 Pulse delay time(Note 1) : 100us(MAX)@IF=1mA,RL=10kΩ
- Isolation Voltage : 2500 Vrms (MIN)
- UL Recognized : UL1577 , File No. E67349

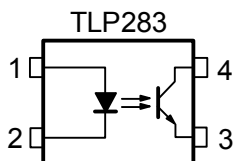
Note 1 : 1 Pulse delay time = tON+tOFF

Unit in mm

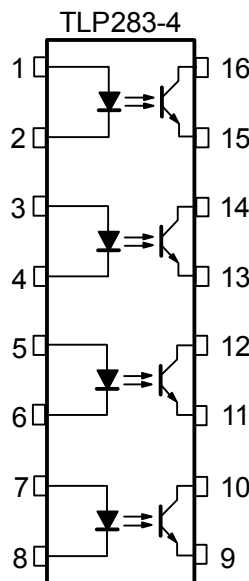


TOSHIBA 11-3A1  
Weight: 0.05 g (typ.)

## Pin Configuration (Top view)

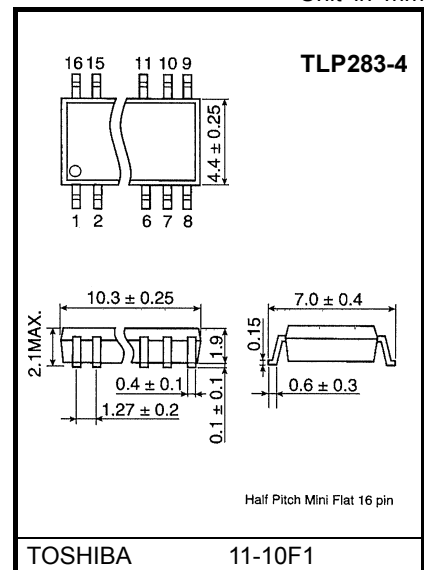


1:ANODE  
2:CATHODE  
3:EMITTER  
4:COLLECTOR



1,3,5,7 :ANODE  
2,4,6,8 :CATHODE  
9,11,13,15 :EMITTER  
10,12,14,16 :COLLECTOR

Unit in mm



TOSHIBA 11-10F1  
Weight: 0.19 g (typ.)

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

| CHARACTERISTIC  |   | SYMBOL                        | RATING                          |                       | UNIT    |
|---|---|-------------------------------|---------------------------------|-----------------------|---------|
|   |   |                               | TLP283                          | TLP283-4              |         |
| LED   | Forward Current   | $I_F$                         | 50                              |                       | mA      |
|   | Forward Current Derating  | $\Delta I_F / ^\circ\text{C}$ | -0.7 (Ta $\geq$ 53°C)           | -0.5 (Ta $\geq$ 25°C) | mA / °C |
|   | Pulse Forward Current   | $I_{FP}$                      | 1                               |                       | A       |
|   | Reverse Voltage   | $V_R$                         | 5                               |                       | V       |
|   | Junction Temperature  | $T_j$                         | 125                             |                       | °C      |
| DETECTOR  | Collector-Emitter Voltage   | $V_{CEO}$                     | 100                             |                       | V       |
|   | Emitter-Collector Voltage   | $V_{ECO}$                     | 7                               |                       | V       |
|   | Collector Current   | $I_C$                         | 50                              |                       | mA      |
|   | Collector Power Dissipation (1 Circuit)                           | $P_C$                         | 150                             | 100                   | mW      |
|   | Collector Power Dissipation Derating (Ta $\geq$ 25°C) (1 Circuit) | $\Delta P_C / ^\circ\text{C}$ | -1.5                            | -1.0                  | mW / °C |
|   | Junction Temperature  | $T_j$                         | 125                             |                       | °C      |
| Operating Temperature Range   |   | $T_{opr}$                     | -55~100                         |                       | °C      |
| Storage Temperature Range   |   | $T_{stg}$                     | -55~125                         |                       | °C      |
| Lead Soldering Temperature  |   | $T_{sol}$                     | 260 (10s)                       |                       | °C      |
| Total Package Power Dissipation (1 Circuit)                           |   | $P_T$                         | 200                             | 170                   | mW      |
| Total Package Power Dissipation Derating (Ta $\geq$ 25°C) (1 Circuit) |   | $\Delta P_T / ^\circ\text{C}$ | -2.0                            | -1.7                  | mW / °C |
| Isolation Voltage (Note2)   |   | $BV_S$                        | 2500(AC, 1min, R.H. $\leq$ 60%) |                       | 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).

(Note2) Device considered a two terminal device : LED side pins shorted together and DETECTOR side pins shorted together.

## 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                         | $C_T$                      | $V = 0, f = 1 \text{ MHz}$  | —    | 30       | —        | pF            |
| DETECTOR                           | Collector-Emitter Breakdown Voltage | $V_{(BR)CEO}$              | $I_C = 0.5 \text{ mA}$  | 100  | —        | —        | V             |
|                                    | Emitter-Collector Breakdown Voltage | $V_{(BR)ECO}$              | $I_E = 0.1 \text{ mA}$  | 7    | —        | —        | V             |
|                                    | Collector Dark Current (Note3)      | $I_{CEO}$                  | $V_{CE} = 48 \text{ V},$<br>Ambient Light Below (100 lx)                        | —    | 0.01 (2) | 0.1 (10) | $\mu\text{A}$ |
|                                    |                                     |                            | $V_{CE} = 48 \text{ V}, T_a = 85^\circ\text{C}$<br>Ambient Light Below (100 lx) | —    | 2 (4)    | 50 (50)  | $\mu\text{A}$ |
| Capacitance (Collector to Emitter) | $C_{CE}$                            | $V = 0, f = 1 \text{ MHz}$ | —   | 10   | —        | pF       |               |

(Note3) Because of the construction, leak current might be increased by ambient light.  
Please use photocoupler with less ambient light.

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

| CHARACTERISTIC                       | SYMBOL                   | TEST CONDITION                               | MIN. | TYP. | MAX. | UNIT          |
|--------------------------------------|--------------------------|--|------|------|------|---------------|
| Current Transfer Ratio               | $I_C / I_F$              | $I_F = 1 \text{ mA}, V_{CE} = 5 \text{ V}$   | 100  | —    | 400  | %             |
| Saturated CTR                        | $I_C / I_F (\text{sat})$ | $I_F = 1 \text{ mA}, V_{CE} = 0.4 \text{ V}$ | 50   | —    | —    | %             |
| Collector-Emitter Saturation Voltage | $V_{CE (\text{sat})}$    | $I_C = 0.2 \text{ mA}, I_F = 1 \text{ mA}$   | —    | 0.2  | 0.4  | V             |
| Off-State Collector Current          | $I_C (\text{off})$       | $V_F = 0.7 \text{ V}, V_{CE} = 48 \text{ V}$ | —    | —    | 10   | $\mu\text{A}$ |

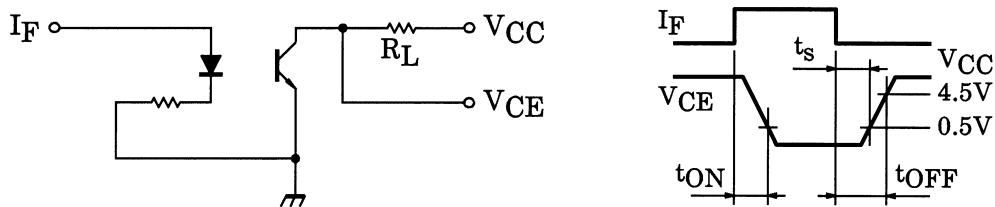
## Isolation Characteristics (Ta = 25°C)

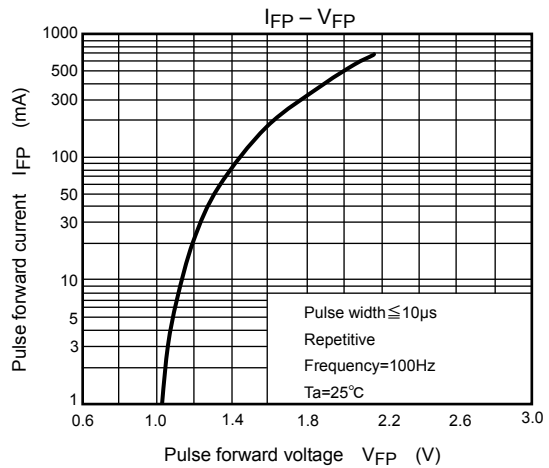
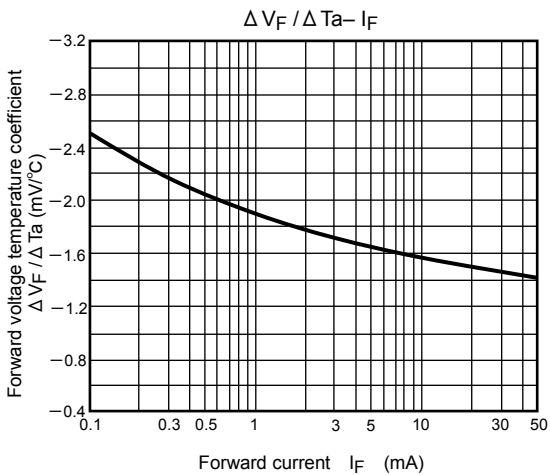
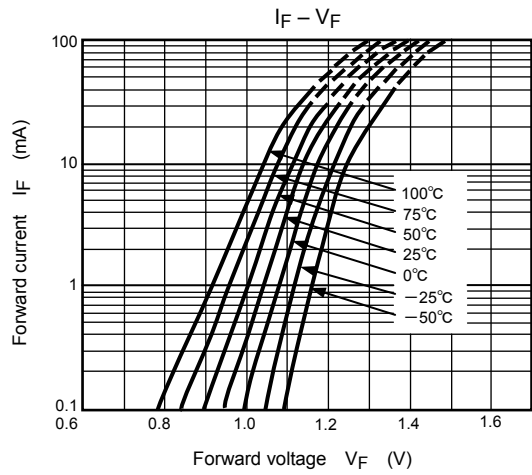
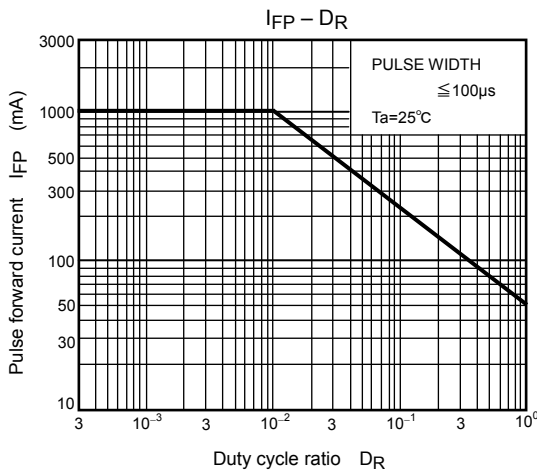
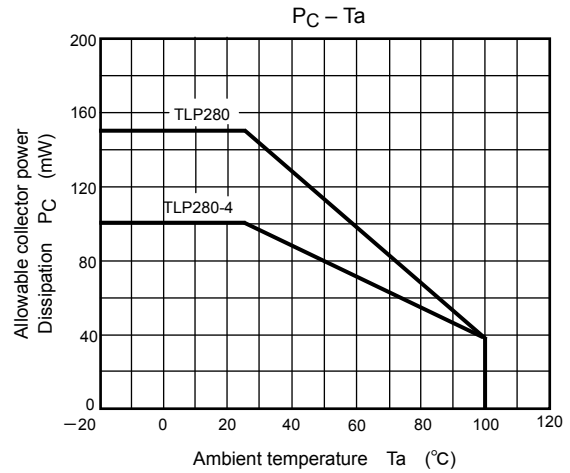
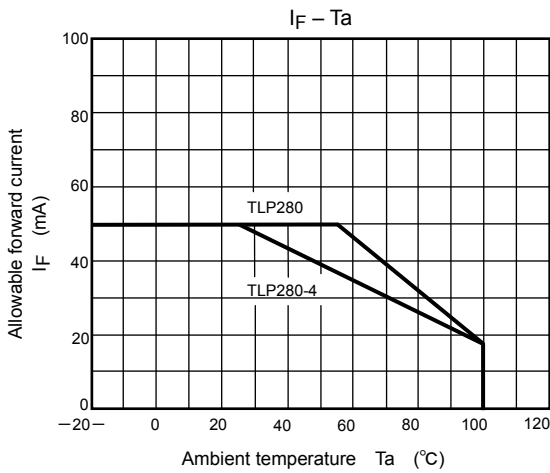
| CHARACTERISTIC                | SYMBOL | TEST CONDITION                               | MIN.               | TYP.      | MAX. | UNIT     |
|-------------------------------|--------|--|--------------------|-----------|------|----------|
| Capacitance (Input to Output) | $C_S$  | $V_S = 0 \text{ V}, f = 1 \text{ MHz}$       | —                  | 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, 1 minute                                 | 2500               | —         | —    | Vrms     |
|                               |        | AC, 1 second, in OIL                         | —                  | 5000      | —    | —        |
|                               |        | DC, 1 minute, in OIL                         | —                  | 5000      | —    | Vdc      |

## Switching Characteristics (Ta = 25°C)

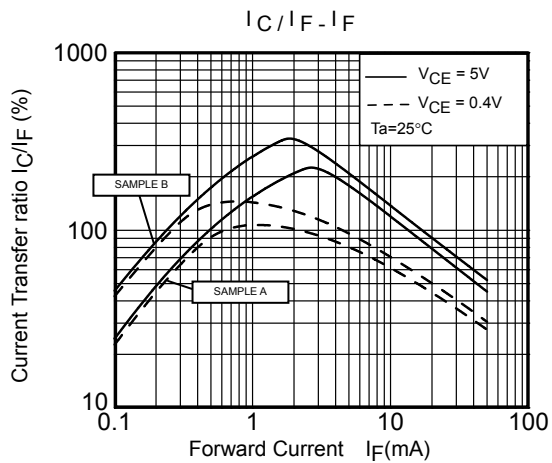
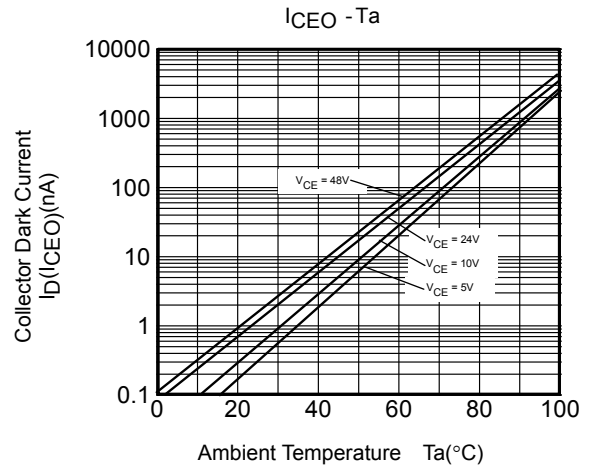
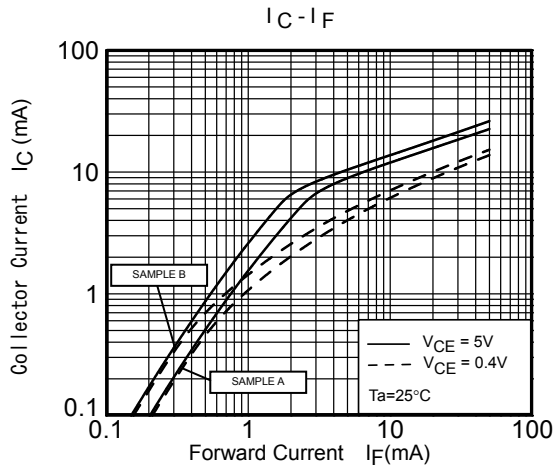
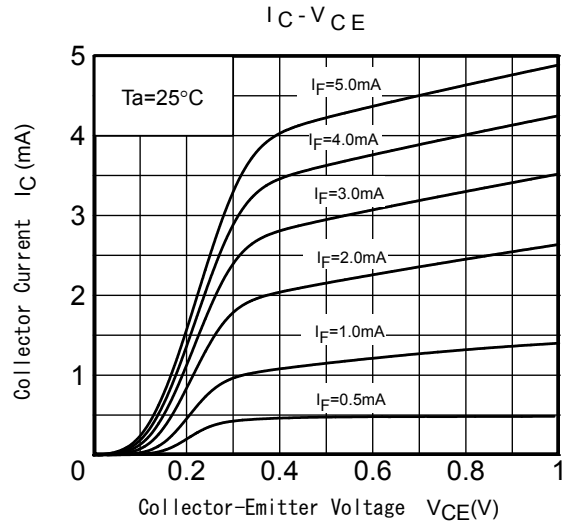
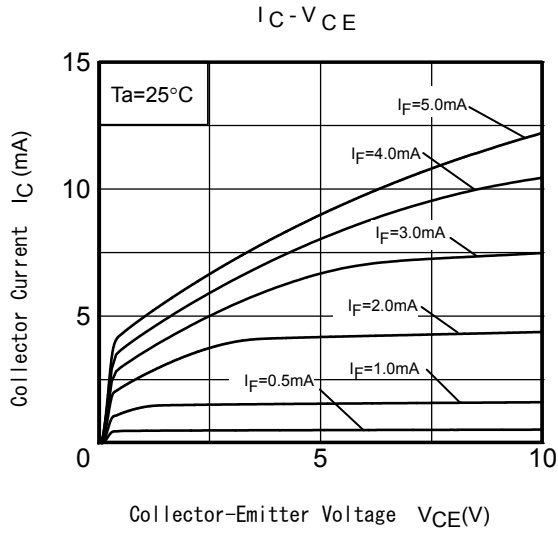
| CHARACTERISTIC     | SYMBOL             | TEST CONDITION   | MIN. | TYP. | MAX. | UNIT          |
|--------------------|--------------------|--|------|------|------|---------------|
| Turn-On Time       | $t_{ON}$           | $V_{CC} = 5 \text{ V}, I_F = 1 \text{ mA}$<br>$R_L = 10 \text{ k}\Omega$ | —    | 7.5  | 20   | $\mu\text{s}$ |
| Turn-Off Time      | $t_{OFF}$          |  | —    | 70   | 90   |               |
| 1 Pulse delay time | $t_{ON} + t_{OFF}$ |  | —    | 80   | 100  |               |

(Fig.1) SWITCHING TIME TEST CIRCUIT

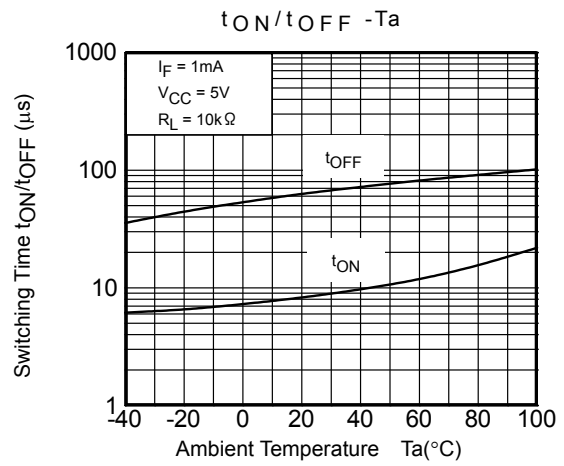
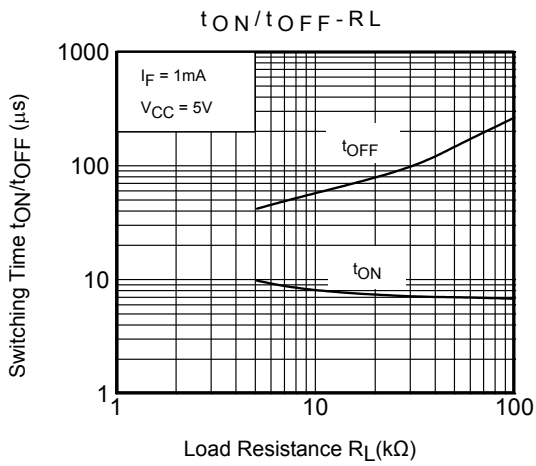
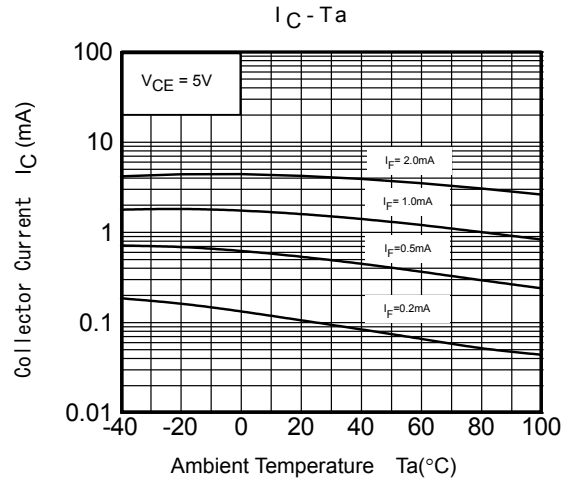
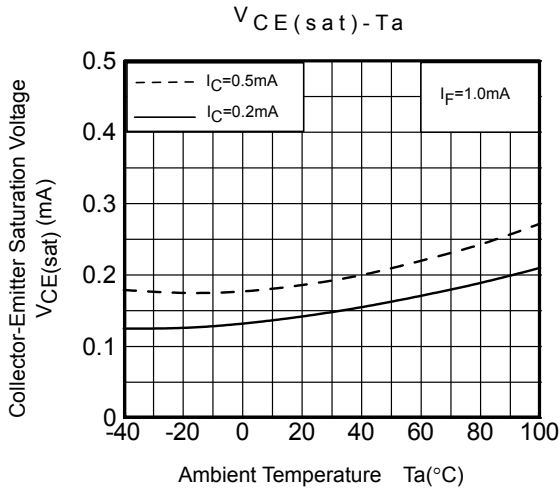




\*: The above graphs show typical characteristics.



\*: The above graphs show typical characteristics.



\*: The above graphs show typical characteristics.

**RESTRICTIONS ON PRODUCT USE**

20070701-EN

- The information contained herein is subject to change without notice.
- TOSHIBA is continually working to improve the quality and reliability of its products. Nevertheless, semiconductor devices in general can malfunction or fail due to their inherent electrical sensitivity and vulnerability to physical stress. It is the responsibility of the buyer, when utilizing TOSHIBA products, to comply with the standards of safety in making a safe design for the entire system, and to avoid situations in which a malfunction or failure of such TOSHIBA products could cause loss of human life, bodily injury or damage to property.  
In developing your designs, please ensure that TOSHIBA products are used within specified operating ranges as set forth in the most recent TOSHIBA products specifications. Also, please keep in mind the precautions and conditions set forth in the "Handling Guide for Semiconductor Devices," or "TOSHIBA Semiconductor Reliability Handbook" etc.
- The TOSHIBA products listed in this document are intended for usage in general electronics applications (computer, personal equipment, office equipment, measuring equipment, industrial robotics, domestic appliances, etc.). These TOSHIBA products are neither intended nor warranted for usage in equipment that requires extraordinarily high quality and/or reliability or a malfunction or failure of which may cause loss of human life or bodily injury ("Unintended Usage"). Unintended Usage include atomic energy control instruments, airplane or spaceship instruments, transportation instruments, traffic signal instruments, combustion control instruments, medical instruments, all types of safety devices, etc.. Unintended Usage of TOSHIBA products listed in this document shall be made at the customer's own risk.
- The products described in this document shall not be used or embedded to any downstream products of which manufacture, use and/or sale are prohibited under any applicable laws and regulations.
- The information contained herein is presented only as a guide for the applications of our products. No responsibility is assumed by TOSHIBA for any infringements of patents or other rights of the third parties which may result from its use. No license is granted by implication or otherwise under any patents or other rights of TOSHIBA or the third parties.
- GaAs(Gallium Arsenide) is used in this product. The dust or vapor is harmful to the human body. Do not break, cut, crush or dissolve chemically.
- Please contact your sales representative for product-by-product details in this document regarding RoHS compatibility. Please use these products in this document in compliance with all applicable laws and regulations that regulate the inclusion or use of controlled substances. Toshiba assumes no liability for damage or losses occurring as a result of noncompliance with applicable laws and regulations.

## Looking for pricing, stock, or lifecycle information?

Click below to explore more details on WIN SOURCE:

- [View TLP283\(TP,F\) on WIN SOURCE](#)
- [Toshiba Semiconductor and Storage Information](#)

## Optimize Your Supply Chain with WIN SOURCE Solutions

- ✓ Global Sourcing Solution
- ✓ Obsolete Management
- ✓ Cost Control Management
- ✓ Shortage Management
- ✓ Alternative Solution
- ✓ Excess Inventory Management