

TOSHIBA PHOTOCOUPLER GaAs IRED & PHOTO-TRANSISTOR

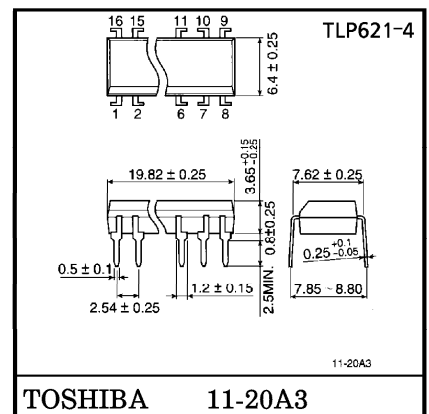
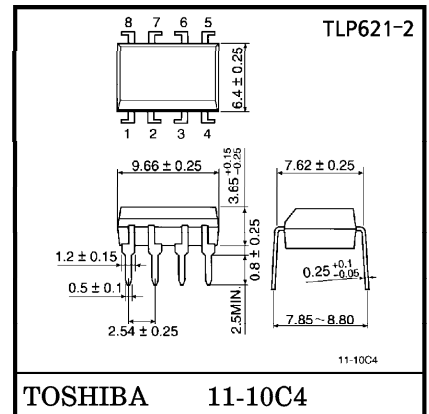
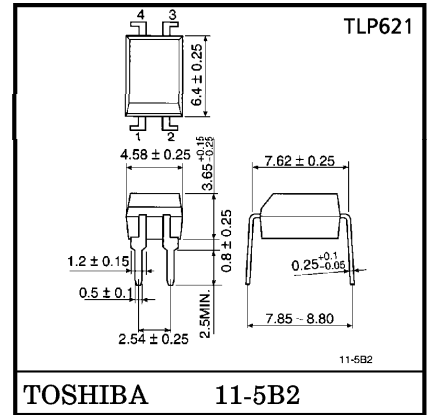
TLP621, TLP621-2, TLP621-4

PROGRAMMABLE CONTROLLER
AC / DC - INPUT MODULE
SOLID STATE RELAY

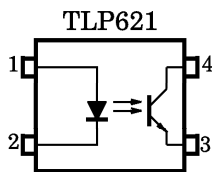
The TOSHIBA TLP621, -2, and -4 consists of a photo-transistor optically coupled to a gallium arsenide infrared emitting diode. The TLP621-2 offers two isolated channels in an eight lead plastic DIP, which the TLP621-4 provides four isolated channels in a sixteen plastic DIP.

- Collector-Emitter Voltage : 55V (Min.)
 - Current Transfer Ratio : 50% (Min.)
- Rank GB : 100% (Min.)

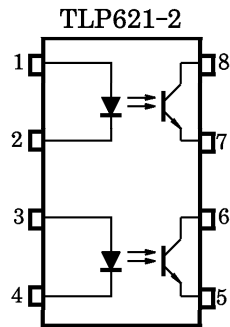
Unit in mm



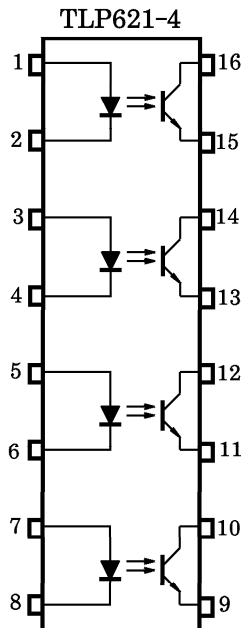
PIN CONFIGURATIONS (TOP VIEW)



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



1, 3 : ANODE
2, 4 : CATHODE
5, 7 : EMITTER
6, 8 : COLLECTOR



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

● Current Transfer Ratio

| TYPE | CLASSI- FICATION *1 | CURRENT TRANSFER RATIO (%) (I_C / I_F) | | MARKING OF CLASSIFICATION |
|----------|---------------------------|--|------|---|
| | | $I_F = 5\text{mA}$, $V_{CE} = 5\text{V}$, $T_a = 25^\circ\text{C}$ | | |
| | | MIN. | MAX. | |
| TLP621 | (None) | 50 | 600 | BLANK, Y, Y [■] , G, G [■] , B, B [■] , GB |
| | Rank Y | 50 | 150 | Y, Y [■] |
| | Rank GR | 100 | 300 | G, G [■] |
| | Rank BL | 200 | 600 | B, B [■] |
| | Rank GB | 100 | 600 | G, G [■] , B, B [■] , GB |
| TLP621-2 | (None) | 50 | 600 | BLANK, GR, BL, GB |
| TLP621-4 | Rank GB | 100 | 600 | GR, BL, GB |

*1 : Ex. Rank GB : TLP621 (GB)

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

TLP621 (GB) : TLP621
TLP621-2 (GB) : TLP621-2

| | MADE IN JAPAN | | MADE IN THAILAND | |
|----------------|---------------|----|------------------|----|
| UL Recognized | E67349 | *2 | E152349 | *2 |
| BSI Approved | 6508, 7445 | *3 | 6505, 7445 | *3 |
| SEMKO Approved | 9735090 / 01 | *4 | — | |

*2 UL1577

*3 BS EN60065 : 1994, BS EN60950 : 1992

*4 EN60950 (Approved is TLP621 only)

- Option (D4) type

VDE Approved : DIN VDE0884/06.92, Certificate No. 68384

Maximum Operating Insulation Voltage : 890V_{PK}

Highest Permissible Over Voltage : 8000V_{PK}

(Note) When a VIDE0884 approved type is needed, please disignate the “Option (D4)”

| | 7.62mm pich standard type | 10.16mm pich (LF2) type |
|----------------------|------------------------------|----------------------------|
| ● Creepage Distance | : 6.4mm (Min.) | 8.0mm (Min) |
| Clearance | : 6.4mm (Min.) | 8.0mm (Min) |
| Insulation Thickness | : 0.4mm (Min.) | 0.4mm (Min) |

MAXIMUM RATINGS (Ta = 25°C)

| CHARACTERISTIC | | SYMBOL | RATING | | UNIT |
|--|---|---------------------|------------------------------|----------------------|------------------|
| | | | TLP621 | TLP621-2 TLP621-4 | |
| LED | Forward Current | I _F | 60 | 50 | mA |
| | Forward Current Derating | ΔI _F /°C | -0.7 (Ta>39°C) | -0.5 (Ta=25°C) | mA/°C |
| | Pulse Forward Current | I _{FP} | 1 (100μs pulse, 100pps) | | A |
| | Power Dissipation | P _D | 100 | 70 | mW |
| | Power Dissipation Derating | ΔP _D /°C | -1.0 | -0.7 | mW/°C |
| | Reverse Voltage | V _R | 5 | | V |
| | Junction Temperature | T _j | 125 | | °C |
| DETECTOR | Collector-Emitter Voltage | V _{CEO} | 55 | | 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 (1 Circuit, Ta ≥ 25°C) | ΔP _C /°C | -1.5 | -1.0 | mW/°C |
| | Junction Temperature | T _j | 125 | | °C |
| Storage Temperature Range | | T _{stg} | -55~125 | | °C |
| Operating Temperature Range | | T _{opr} | -55~100 | | °C |
| Lead Soldering Temperature | | T _{sol} | 260 (10s) | | °C |
| Total Package Power Dissipation | | P _T | 250 | 150 | mW |
| Total Package Power Dissipation Derating (Ta ≥ 25°C) | | ΔP _T /°C | -2.5 | -1.5 | mW/°C |
| Isolation Voltage (Note 1) | | BV _S | 5000 (AC, 1min., R.H. ≤ 60%) | | V _{rms} |

(Note 1) Device considered a two terminal : LED side pins shorted together, and DETECTOR side pins shorted together.

RECOMMENDED OPERATING CONDITIONS

| CHARACTERISTIC | SYMBOL | MIN. | TYP. | MAX. | UNIT |
|-----------------------|------------------|------|------|------|------|
| Supply Voltage | V _{CC} | — | 5 | 24 | V |
| Forward Current | I _F | — | 16 | 20 | mA |
| Collector Current | I _C | — | 1 | 10 | mA |
| Operating Temperature | T _{opr} | -25 | — | 85 | °C |

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 | μA |
| | Capacitance | C_T | $V = 0, f = 1\text{MHz}$ | — | 30 | — | pF |
| DETECTOR | Collector-Emitter Breakdown Voltage | $V_{(BR)CEO}$ | $I_C = 0.5\text{mA}$ | 55 | — | — | V |
| | Emitter-Collector Breakdown Voltage | $V_{(BR)ECO}$ | $I_E = 0.1\text{mA}$ | 7 | — | — | V |
| | Collector Dark Current | I_{CEO} | $V_{CE} = 24\text{V}$ | — | 10 | 100 | nA |
| | | | $V_{CE} = 24\text{V}, T_a = 85^\circ\text{C}$ | — | 2 | 50 | μA |
| Capacitance (Collector to Emitter) | C_{CE} | $V = 0, f = 1\text{MHz}$ | — | 10 | — | pF | |

COUPLED ELECTRICAL CHARACTERISTICS (Ta = 25°C)

| CHARACTERISTIC | SYMBOL | TEST CONDITION | MIN. | TYP. | MAX. | UNIT |
|--------------------------------------|--------------------------|---|------|------|------|------|
| Current Transfer Ratio | I_C / I_F | $I_F = 5\text{mA}, V_{CE} = 5\text{V}$ Rank GB | 50 | — | 600 | % |
| | | | 100 | — | 600 | |
| Saturated CTR | $I_C / I_F (\text{sat})$ | $I_F = 1\text{mA}, V_{CE} = 0.4\text{V}$ Rank GB | — | 60 | — | % |
| | | | 30 | — | — | |
| Collector-Emitter Saturation Voltage | $V_{CE} (\text{sat})$ | $I_C = 2.4\text{mA}, I_F = 8\text{mA}$ $I_C = 0.2\text{mA}, I_F = 1\text{mA}$ Rank GB | — | — | 0.4 | V |
| | | | — | 0.2 | — | |
| | | | — | — | 0.4 | |

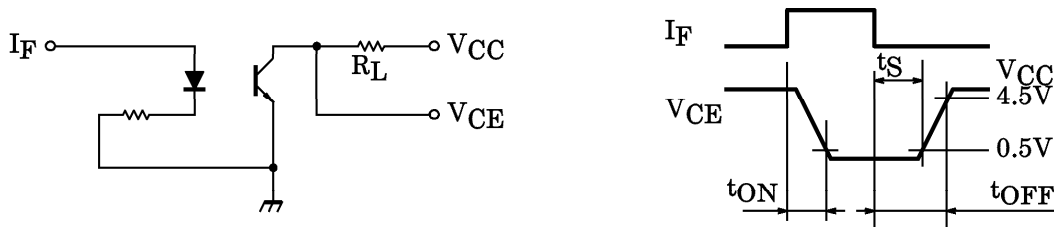
ISOLATION CHARACTERISTICS (Ta = 25°C)

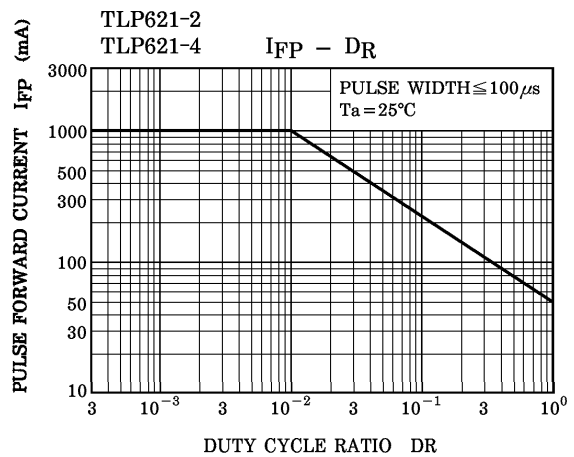
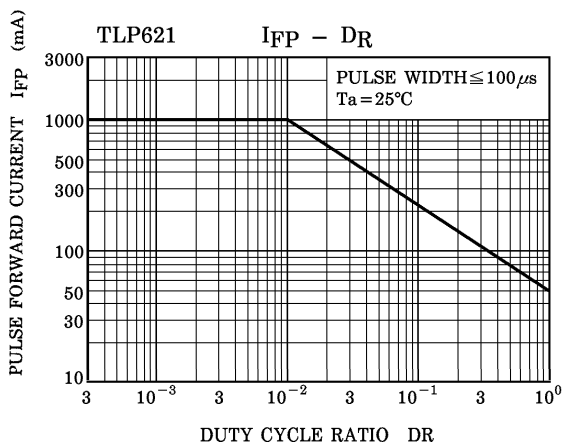
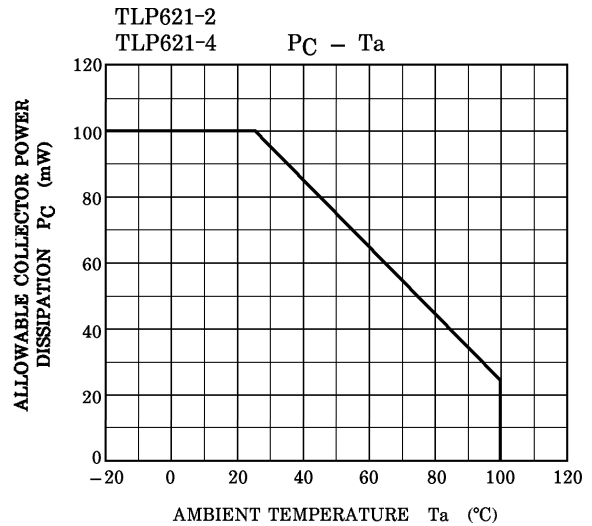
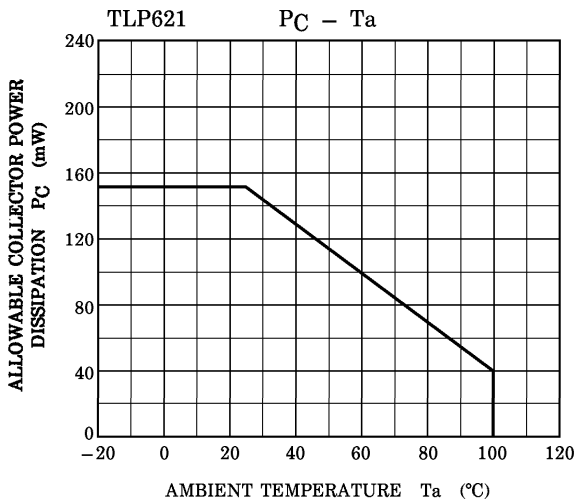
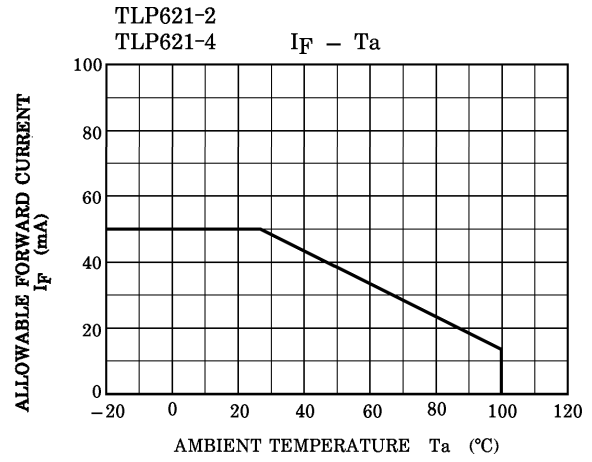
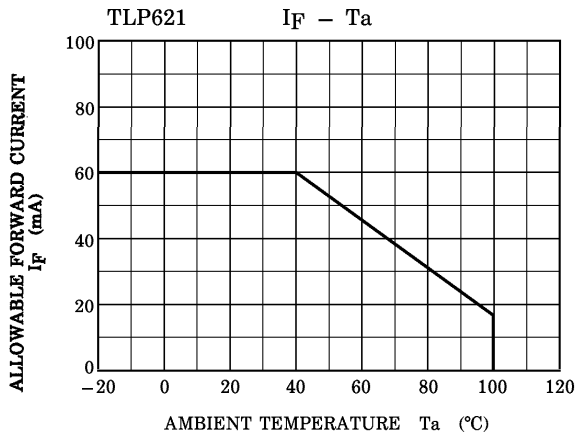
| CHARACTERISTIC | SYMBOL | TEST CONDITION | MIN. | TYP. | MAX. | UNIT |
|-------------------------------|--------|----------------------------|--------------------|-----------|------|------------------|
| Capacitance (Input to Output) | C_S | $V_S = 0, f = 1\text{MHz}$ | — | 0.8 | — | pF |
| Isolation Resistance | R_S | $V_S = 500\text{V}$ | 1×10^{12} | 10^{14} | — | Ω |
| Isolation Voltage | BV_S | AC, 1 minute | 5000 | — | — | V_{rms} |
| | | AC, 1 second, in oil | — | 10000 | — | |
| | | DC, 1 minute, in oil | — | 10000 | — | V_{dc} |

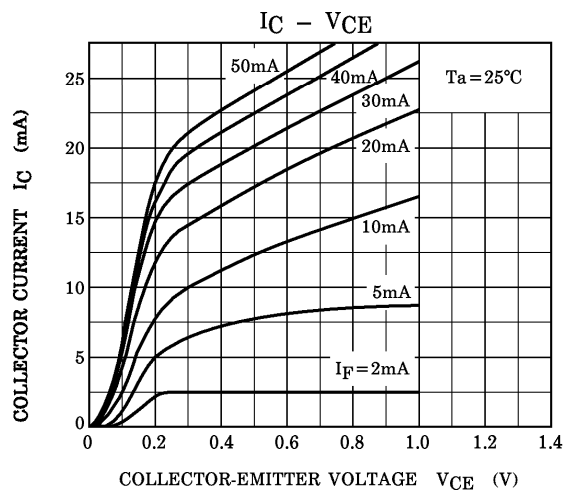
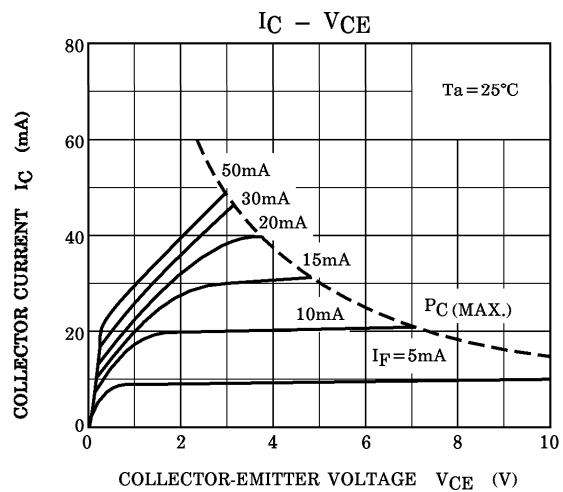
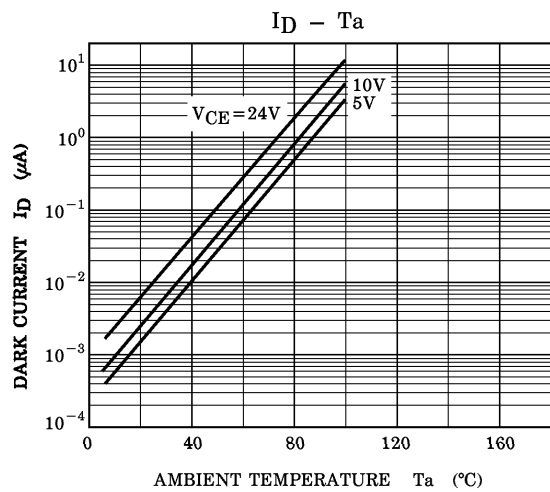
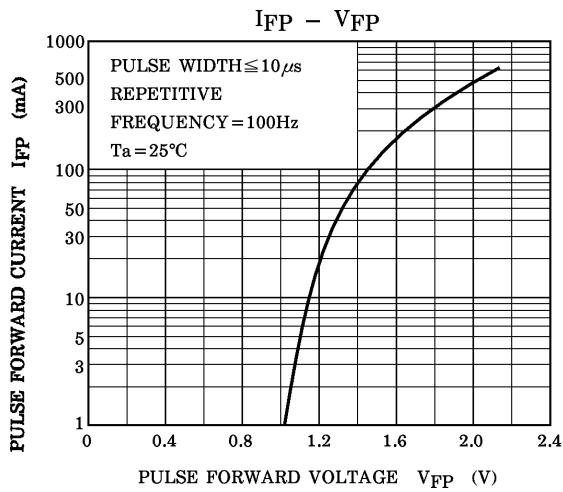
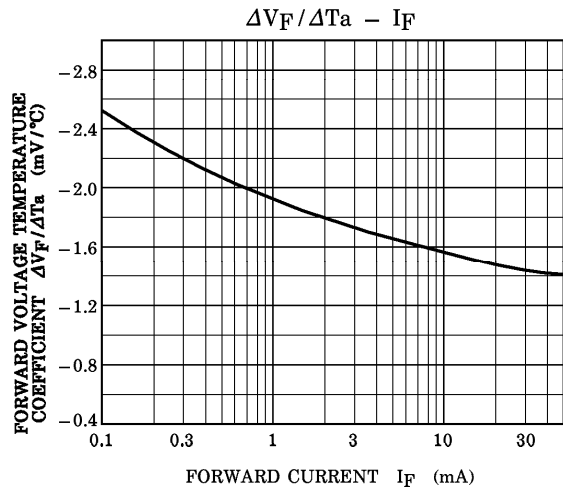
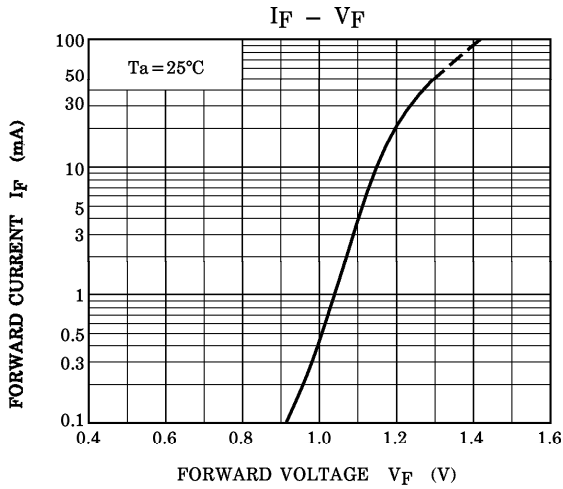
SWITCHING CHARACTERISTICS (Ta = 25°C)

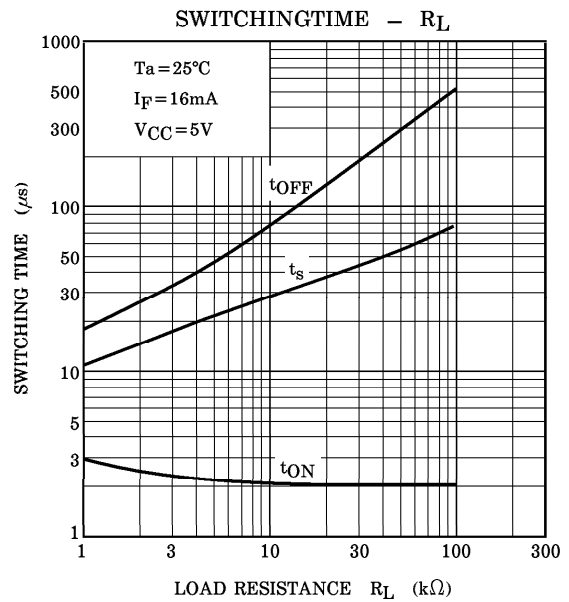
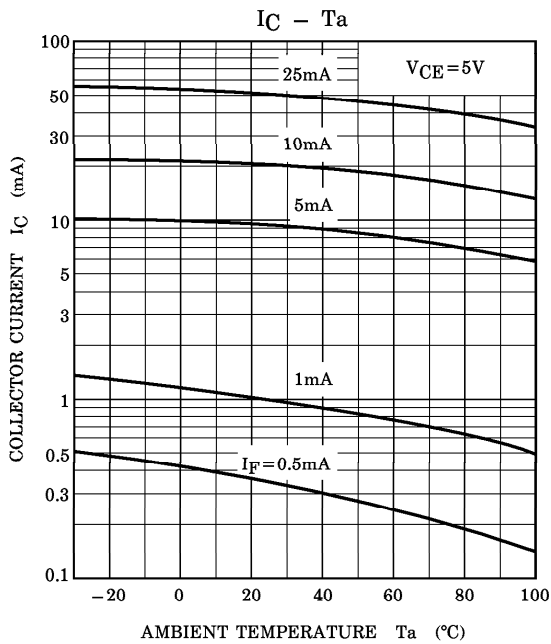
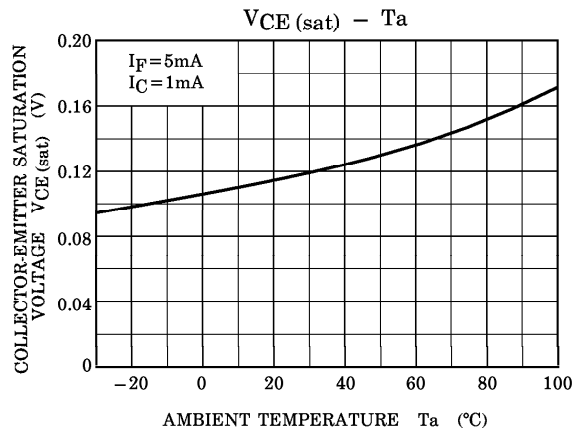
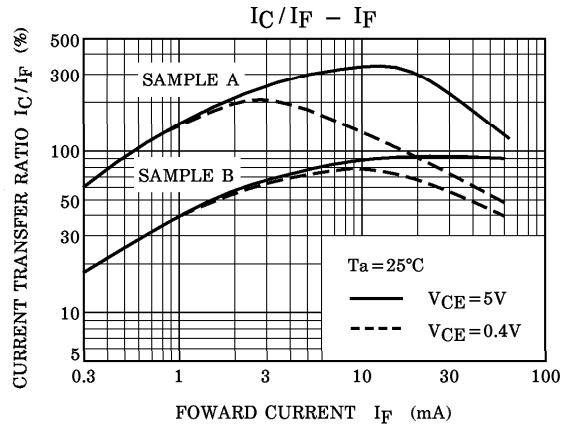
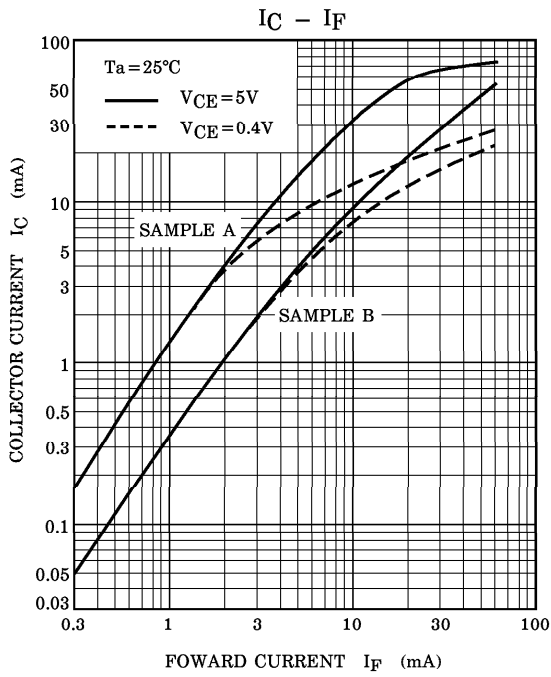
| CHARACTERISTIC | SYMBOL | TEST CONDITION | MIN. | TYP. | MAX. | UNIT |
|----------------|-----------|---|------|------|------|---------|
| Rise Time | t_r | $V_{CC} = 10V, I_C = 2mA$ $R_L = 100\Omega$ | — | 2 | — | μs |
| Fall Time | t_f | | — | 3 | — | |
| Turn-on Time | t_{on} | | — | 3 | — | |
| Turn-off Time | t_{off} | | — | 3 | — | |
| Turn-on Time | t_{ON} | $R_L = 1.9k\Omega$ (Fig.1) $V_{CC} = 5V, I_F = 16mA$ | — | 2 | — | μs |
| Storage Time | t_S | | — | 15 | — | |
| Turn-off Time | t_{OFF} | | — | 25 | — | |

Fig.1 SWITCHING TIME TEST CIRCUIT









RESTRICTIONS ON PRODUCT USE

000707EBC

- 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.
- Gallium arsenide (GaAs) is a substance used in the products described in this document. GaAs dust and fumes are toxic. Do not break, cut or pulverize the product, or use chemicals to dissolve them. When disposing of the products, follow the appropriate regulations. Do not dispose of the products with other industrial waste or with domestic garbage.
- The products described in this document are subject to the foreign exchange and foreign trade laws.
- The information contained herein is presented only as a guide for the applications of our products. No responsibility is assumed by TOSHIBA CORPORATION for any infringements of intellectual property or other rights of the third parties which may result from its use. No license is granted by implication or otherwise under any intellectual property or other rights of TOSHIBA CORPORATION or others.
- The information contained herein is subject to change without notice.