

TOSHIBA PHOTOCOUPLER GaAs IRED & PHOTO-TRANSISTOR

TLP281, TLP281-4

PROGRAMMABLE CONTROLLERS

AC/DC-INPUT MODULE

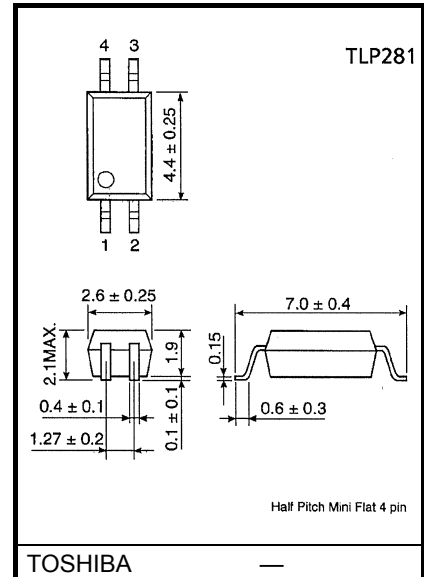
PC CARD MODEM(PCMCIA)

TLP281 and TLP281-4 is a very small and thin coupler, suitable for surface mount assembly in applications such as PCMCIA Fax modem, programmable controllers.

TLP281 and TLP281-4 consist of photo transistor, optically coupled to a gallium arsenide infrared emitting diode.

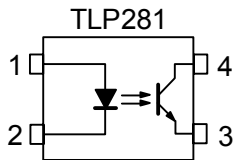
- Collector-Emitter Voltage : 80 V (MIN)
- Current Transfer Ratio : 50% (MIN)
Rank GB : 100% (MIN)
- Isolation Voltage : 2500 Vrms (MIN)
- UL Recognized : UL1577 , File No. E67349
- BSI Approved : BS EN 60065: 2002,
: BS EN 60950-1: 2002
Certificate No. 8143, 8144

Unit in mm

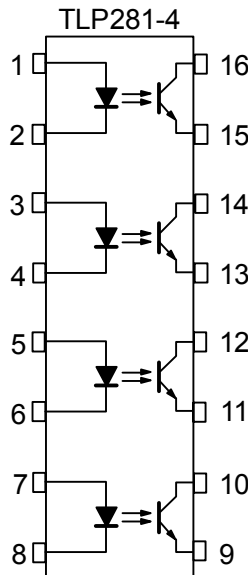


TOSHIBA
Weight: 0.05 g

Pin Configuration (top view)

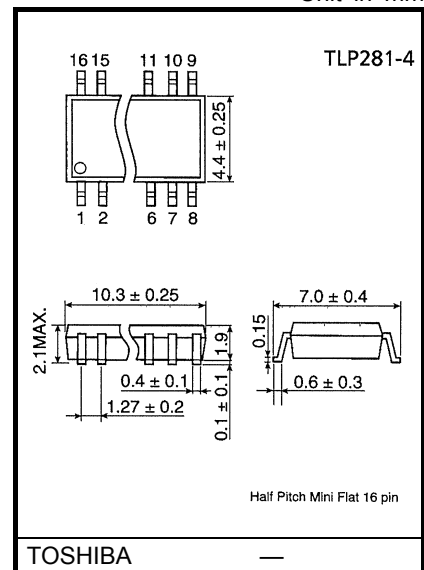


- 1: ANODE
2: CATHODE
3: EMITTER
4: COLLECTOR



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

Unit in mm



TOSHIBA
Weight: 0.19 g

| 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 | |
| TLP281 | Blank | 50 | 600 | Blank, Y [■] , YE, G, G [■] , GR, B, BL, GB |
| | Rank Y | 50 | 150 | YE |
| | Rank GR | 100 | 300 | GR |
| | Rank BL | 200 | 600 | BL |
| | Rank GB | 100 | 600 | GB |
| | Rank YH | 75 | 150 | Y [■] |
| | Rank GRL | 100 | 200 | G |
| | Rank GRH | 150 | 300 | G [■] |
| | Rank BLL | 200 | 400 | B |
| TLP281-4 | Blank | 50 | 600 | Blank, GB |
| | Rank GB | 100 | 600 | GB |

*1: Ex. rank GB: TLP281 (GB)

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

TLP281 (GB): TLP281-1, TLP281-4 (GB): TLP281-4

Absolute Maximum Ratings (Ta = 25°C)

| CHARACTERISTIC | | SYMBOL | RATING | | UNIT |
|---|---|-------------------------------|---------------------------------|-----------------------|---------|
| | | | TLP281 | TLP281-4 | |
| 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} | 80 | | 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 (Note1) | | 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).

(Note1) 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 | μA |
| | Capacitance | C_T | $V = 0, f = 1 \text{ MHz}$ | — | 30 | — | pF |
| DETECTOR | Collector-Emitter Breakdown Voltage | $V_{(BR) CEO}$ | $I_C = 0.5 \text{ mA}$ | 80 | — | — | V |
| | Emitter-Collector Breakdown Voltage | $V_{(BR) ECO}$ | $I_E = 0.1 \text{ mA}$ | 7 | — | — | V |
| | Collector Dark Current (Note2) | I_{CEO} | $V_{CE} = 48 \text{ V}$, Ambient Light Below (100 lx) | — | 0.01 (2) | 0.1 (10) | μA |
| | | | $V_{CE} = 48 \text{ V}$, Ta = 85°C Ambient Light Below (100 lx) | — | 2 (4) | 50 (50) | μA |
| Capacitance (Collector to Emitter) | C_{CE} | $V = 0, f = 1 \text{ MHz}$ | — | 10 | — | pF | |

(Note 2) 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 | $I_F = 5 \text{ mA}, V_{CE} = 5 \text{ V}$ 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 | — | |
| Off-State Collector Current | $I_C (\text{off})$ | $V_F = 0.7 \text{ V}, V_{CE} = 48 \text{ V}$ | — | — | 10 | μA |

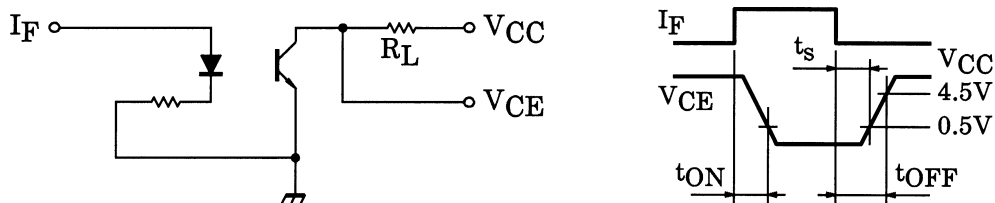
Isolation Characteristics (Ta = 25°C)

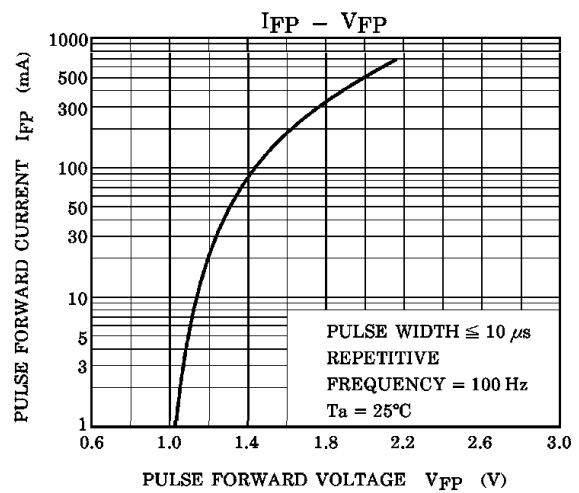
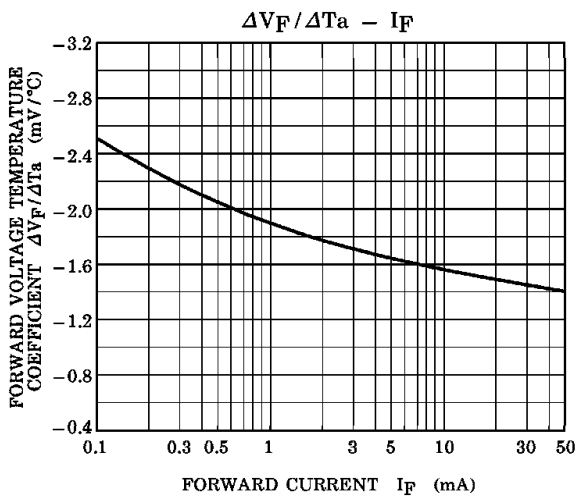
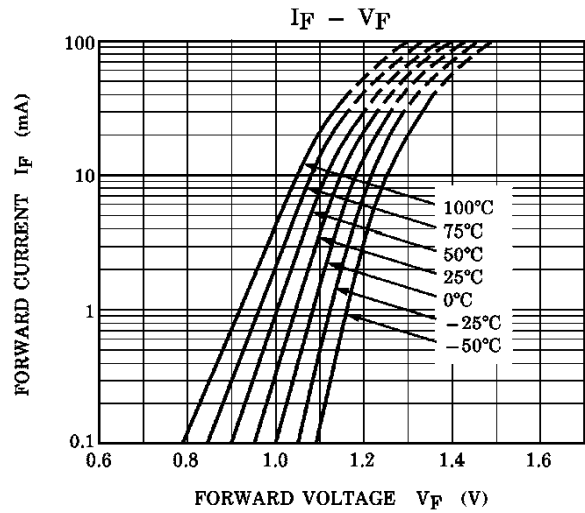
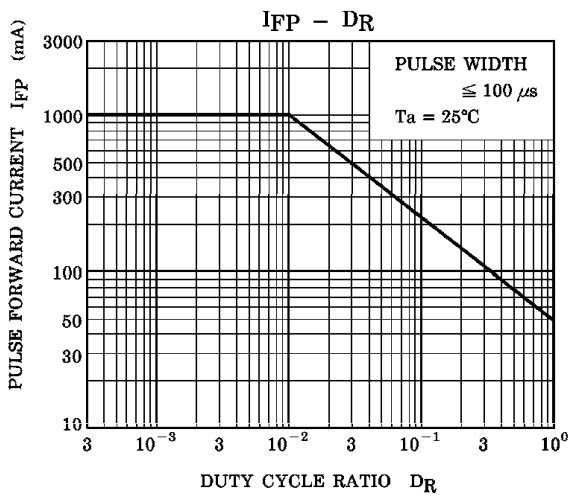
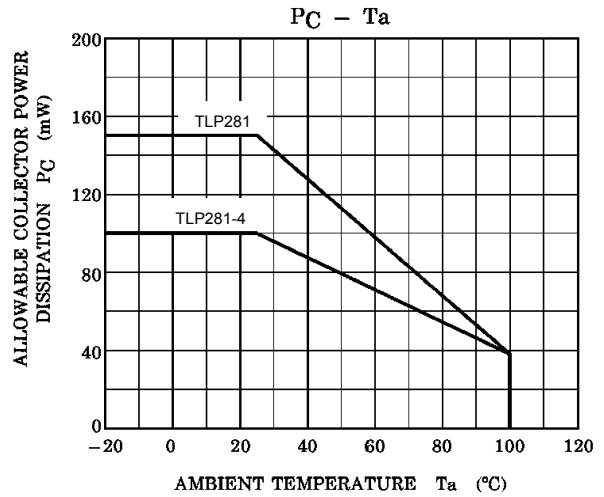
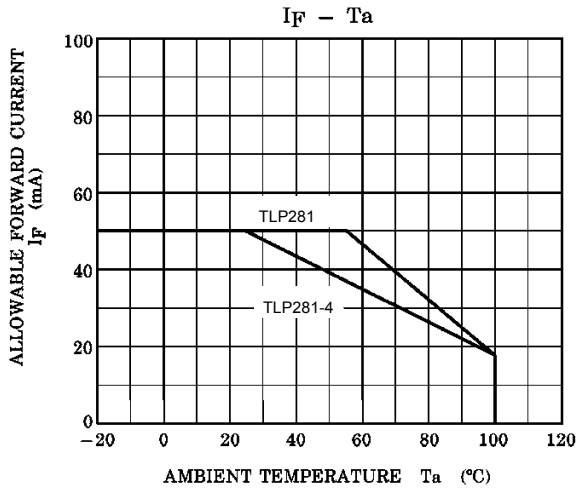
| CHARACTERISTIC | SYMBOL | TEST CONDITION | MIN. | TYP. | MAX. | UNIT |
|-------------------------------|--------|--|--------------------|-----------|------|------------------|
| Capacitance (Input to Output) | C_S | $V_S = 0 \text{ V}, f = 1 \text{ MHz}$ | — | 0.8 | — | pF |
| Isolation Resistance | R_S | $V_S = 500 \text{ V}, \text{R.H.} \leq 60\%$ | 5×10^{10} | 10^{14} | — | Ω |
| Isolation Voltage | BV_S | AC, 1 minute | 2500 | — | — | V_{rms} |
| | | AC, 1 second, in OIL | — | 5000 | — | V_{dc} |
| | | DC, 1 minute, in OIL | — | 5000 | — | |

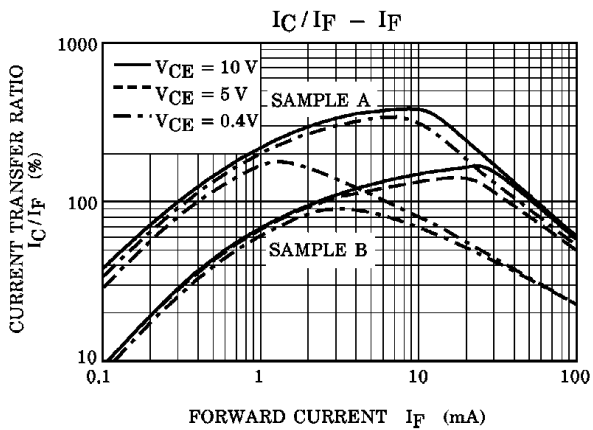
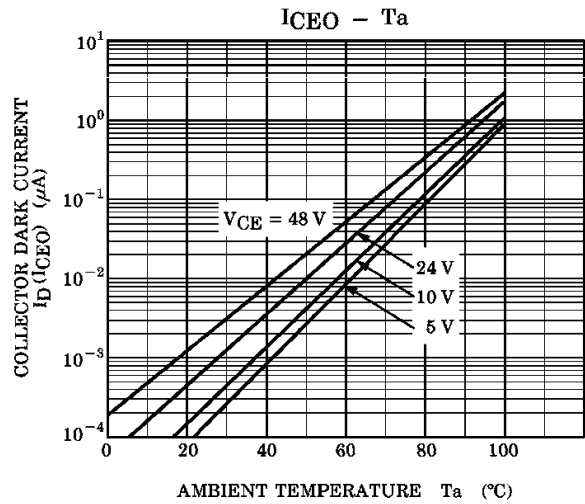
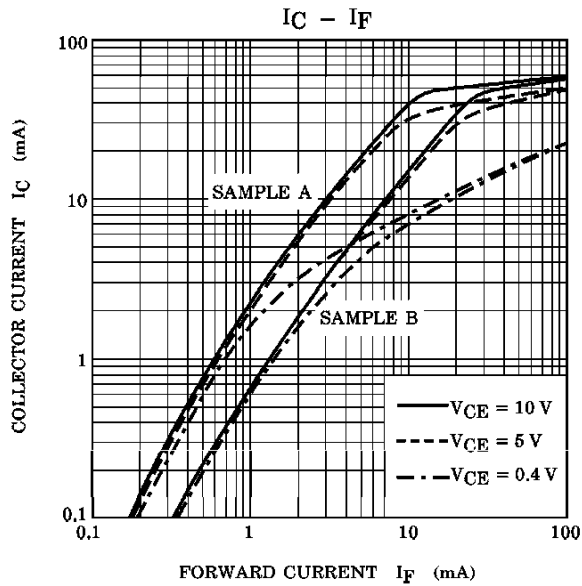
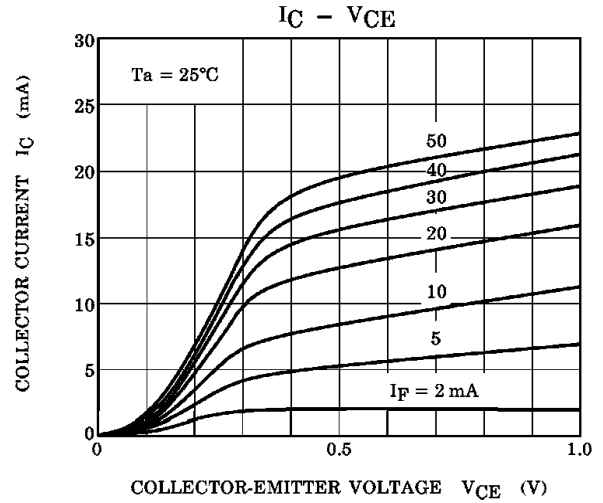
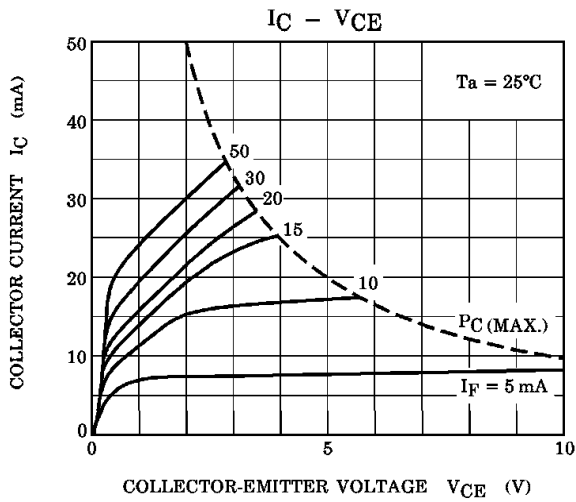
Switching Characteristics (Ta = 25°C)

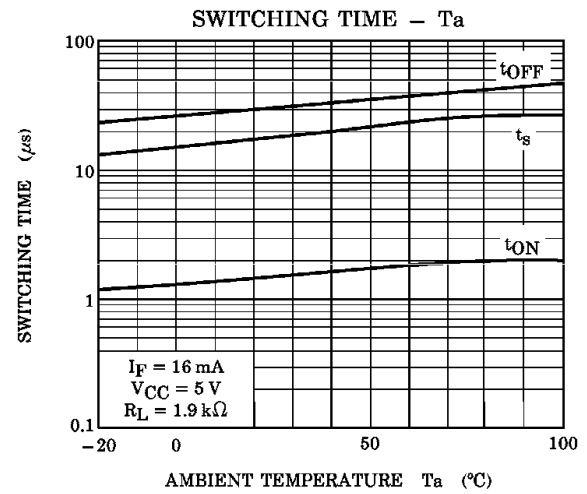
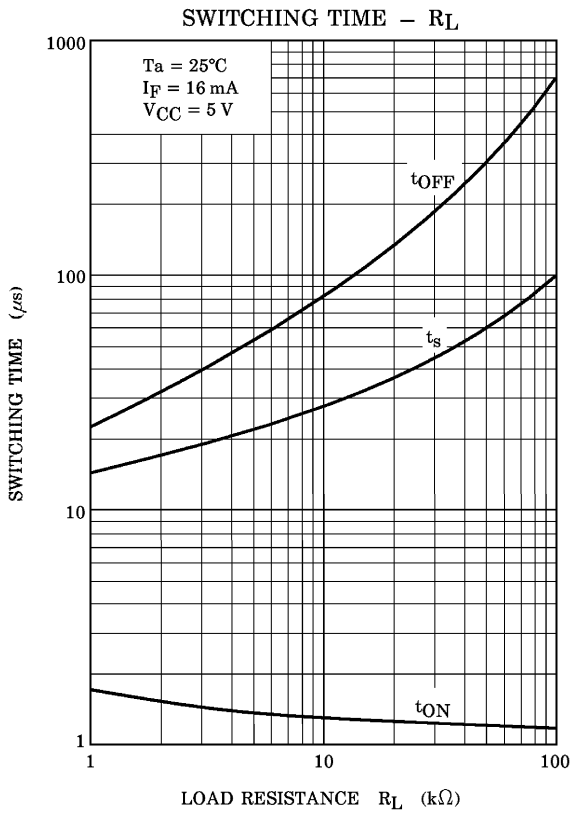
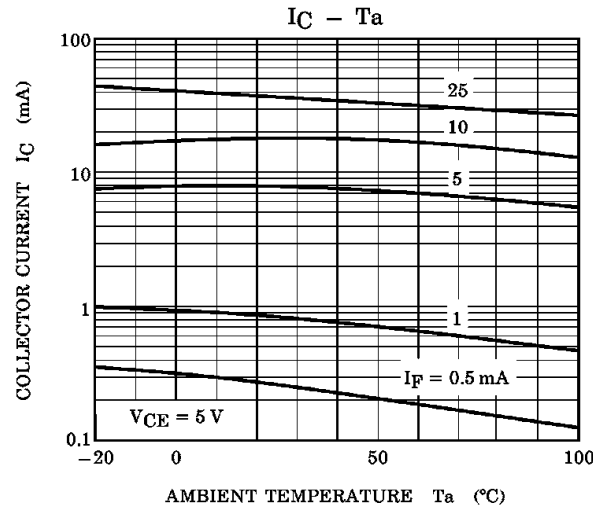
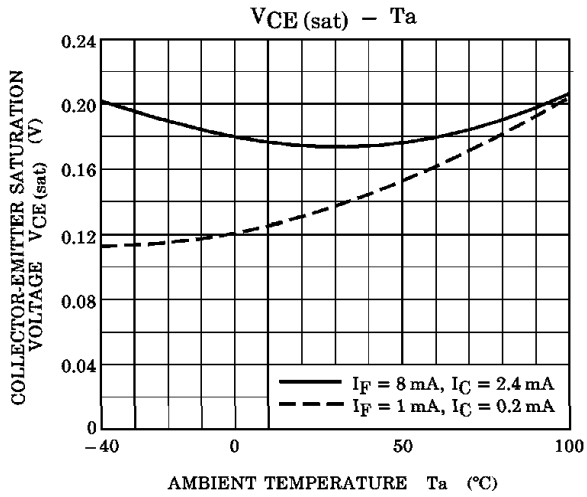
| CHARACTERISTIC | SYMBOL | TEST CONDITION | MIN. | TYP. | MAX. | UNIT |
|----------------|------------------|--|------|------|------|---------------|
| Rise Time | t_r | $V_{CC} = 10 \text{ V}, I_C = 2 \text{ mA}$ $R_L = 100 \Omega$ | — | 2 | — | μs |
| Fall Time | t_f | | — | 3 | — | |
| Turn-On Time | t_{on} | | — | 3 | — | |
| Turn-Off Time | t_{off} | | — | 3 | — | |
| Turn-On Time | t_{ON} | $R_L = 1.9 \text{ k}\Omega$ (Fig.1) $V_{CC} = 5 \text{ V}, I_F = 16 \text{ mA}$ | — | 2 | — | μs |
| Storage Time | t_s | | — | 25 | — | |
| Turn-Off Time | t_{OFF} | | — | 40 | — | |

(Fig.1) SWITCHING TIME TEST CIRCUIT









RESTRICTIONS ON PRODUCT USE

20070701-EN

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