

TLP281, TLP281-4

**PROGRAMMABLE CONTROLLERS
AC/DC-INPUT MODULE
PC CARD MODEM(PCMCIA)**

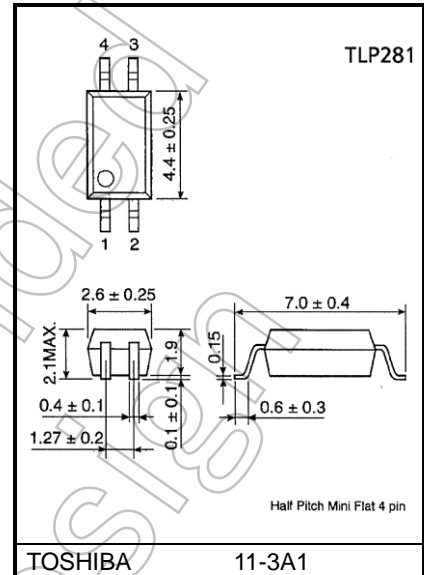
TLP281 and TLP281-4 is a very small and thin coupler, suitable for surface mount assembly in applications such as PCMCIA Fax modem, programmable controllers.

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
- cUL approved: CSA Component Acceptance Service No. 5A
File No.E67349
- Option (V4) type
VDE approved: EN60747-5-5 (Note)

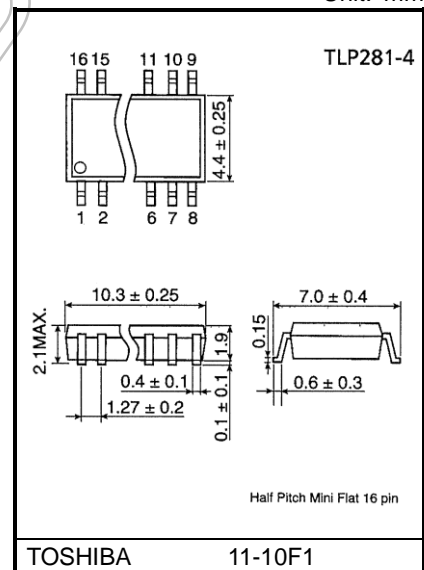
Note: When a EN60747-5-5 approved type is needed, Please designate "Option(V4)"

Unit: mm



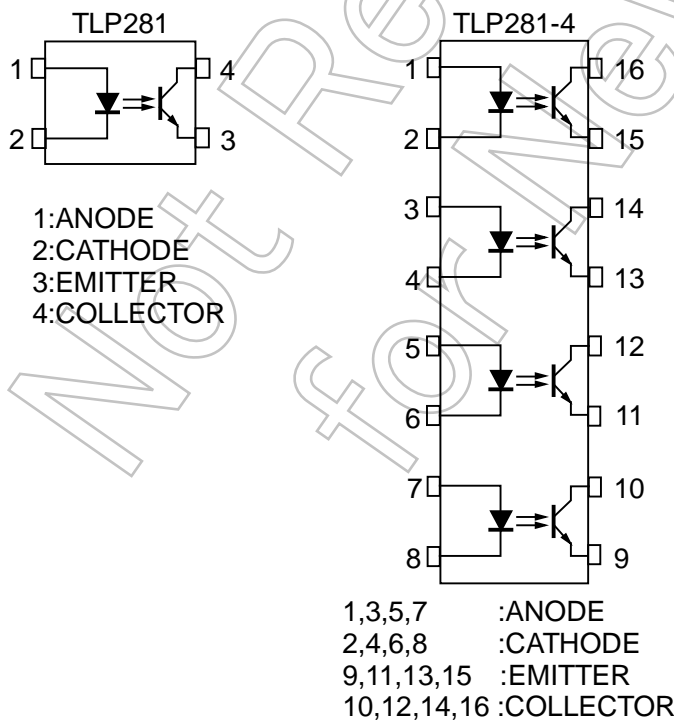
TOSHIBA 11-3A1
Weight: 0.05 g (typ.)

Unit: mm



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

Pin Configuration (top view)



Start of commercial production
1996-03

Current Transfer Ratio

| TYPE | Classification (Note 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, Y [■] |
| | Rank GR | 100 | 300 | GR, G, G [■] |
| | Rank BL | 200 | 600 | BL, B |
| | Rank GB | 100 | 600 | GB, GR, G, G [■] , BL, B |
| | 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 |

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

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

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

Not Recommended for New Design

Absolute Maximum Ratings (Ta = 25°C)

| CHARACTERISTIC | | SYMBOL | RATING | | UNIT |
|--|--|-----------------------------|------------------------|-----------------------|-------|
| | | | TLP281 | TLP281-4 | |
| LED | Forward Current | IF | 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 (100 μ s pulse, 100 pps) | IFP | 1 | | A |
| | Reverse Voltage | VR | 5 | | V |
| | Diode power dissipation | PD | 100 | 70 | mW |
| | Diode power dissipation derating | $\Delta P_D/^\circ\text{C}$ | -1.39 (Ta \geq 53°C) | -0.7 (Ta \geq 25°C) | mW/°C |
| | Junction Temperature | Tj | 125 | | °C |
| DETECTOR | Collector-Emitter Voltage | VCEO | 80 | | V |
| | Emitter-Collector Voltage | VECO | 7 | | V |
| | Collector Current | IC | 50 | | mA |
| | Collector Power Dissipation (1 Circuit) | PC | 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 | Tj | 125 | | °C |
| | Operating Temperature Range | Topr | -55 to 100 | | °C |
| Storage Temperature Range | Tstg | -55 to 125 | | °C | |
| Lead Soldering Temperature (10 s) | Tsol | 260 | | °C | |
| Total Package Power Dissipation (1 Circuit) | PT | 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 (AC, 60 s, R.H. \leq 60%) (Note 1) | BVS | 2500 | | 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).

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

Electrical Characteristics (Ta = 25°C)

| CHARACTERISTIC | | SYMBOL | TEST CONDITION | MIN | TYP. | MAX | UNIT |
|--|-------------------------------------|-----------------------|--|-----|------|-----|------|
| LED | Forward Voltage | V _F | I _F = 10 mA | 1.0 | 1.15 | 1.3 | V |
| | Reverse Current | I _R | V _R = 5 V | — | — | 10 | μA |
| | Capacitance | C _T | V = 0 V, f = 1 MHz | — | 30 | — | pF |
| DETECTOR | Collector-Emitter Breakdown Voltage | V _{(BR) CEO} | I _C = 0.5 mA | 80 | — | — | V |
| | Emitter-Collector Breakdown Voltage | V _{(BR) ECO} | I _E = 0.1 mA | 7 | — | — | V |
| | Collector Dark Current (Note 1) | I _{CEO} | V _{CE} = 48 V | — | 0.01 | 0.1 | μA |
| | | | Ambient Light Below (100 lx) (Note 2) | — | 2 | 10 | |
| | | | V _{CE} = 48 V, Ta = 85°C | — | 2 | 50 | μA |
| Ambient Light Below (100 lx) (Note 2) | — | 4 | 50 | | | | |
| Capacitance (Collector to Emitter) | C _{CE} | V = 0 V, f = 1 MHz | — | 10 | — | pF | |

Note 1: Because of the construction, leak current might be increased by ambient light. Please use photocoupler with less ambient light.

Note 2: Irradiation to marking side using standard light bulb.

Coupled Electrical Characteristics (Ta = 25°C)

| CHARACTERISTIC | SYMBOL | TEST CONDITION | MIN | TYP. | MAX | UNIT |
|--------------------------------------|-------------------------------------|---|-----|------|-----|------|
| Current Transfer Ratio | I _C /I _F | I _F = 5 mA, V _{CE} = 5 V Rank GB | 50 | — | 600 | % |
| | | | 100 | — | 600 | |
| Saturated CTR | I _C /I _{F(sat)} | I _F = 1 mA, V _{CE} = 0.4 V Rank GB | — | 60 | — | % |
| | | | 30 | — | — | |
| Collector-Emitter Saturation Voltage | V _{CE(sat)} | I _C = 2.4 mA, I _F = 8 mA | — | — | 0.4 | V |
| | | I _C = 0.2 mA, I _F = 1 mA Rank GB | — | 0.2 | — | |
| | | | — | — | 0.4 | |
| Off-State Collector Current | I _{C(off)} | V _F = 0.7 V, V _{CE} = 48 V | — | — | 10 | μA |

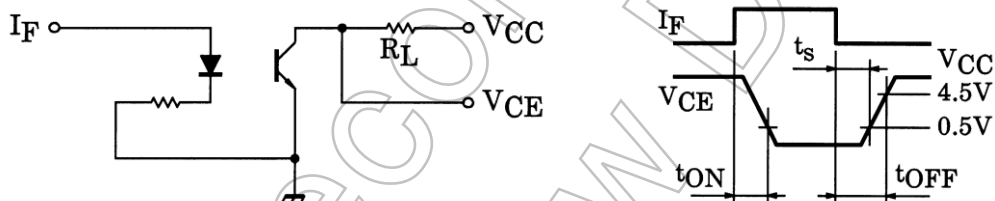
Isolation Characteristics (Ta = 25°C)

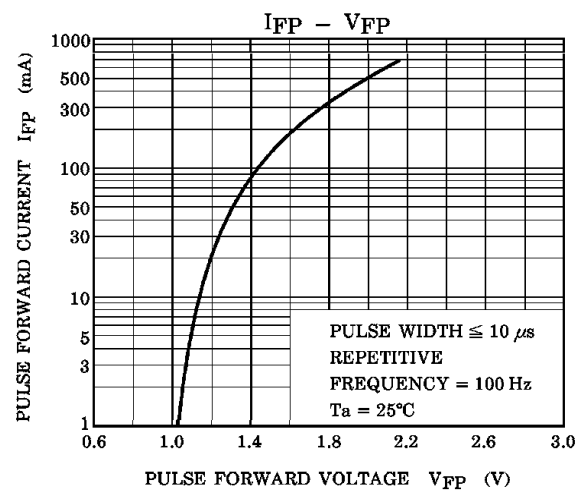
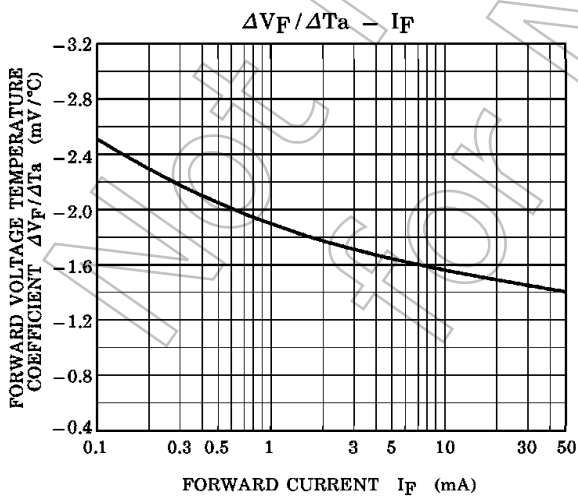
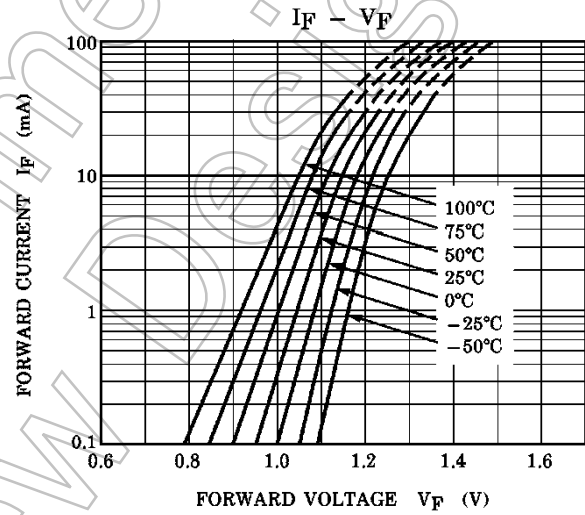
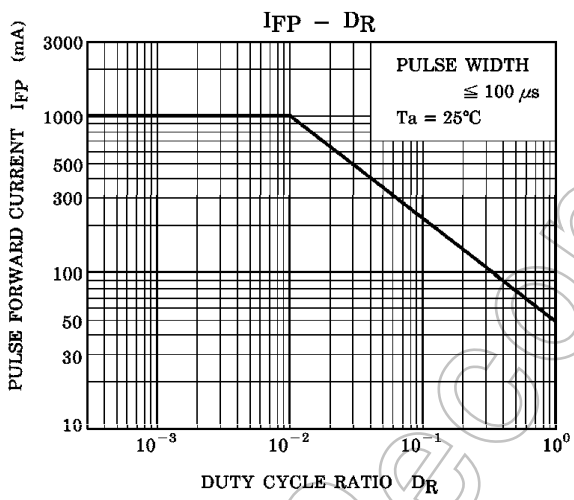
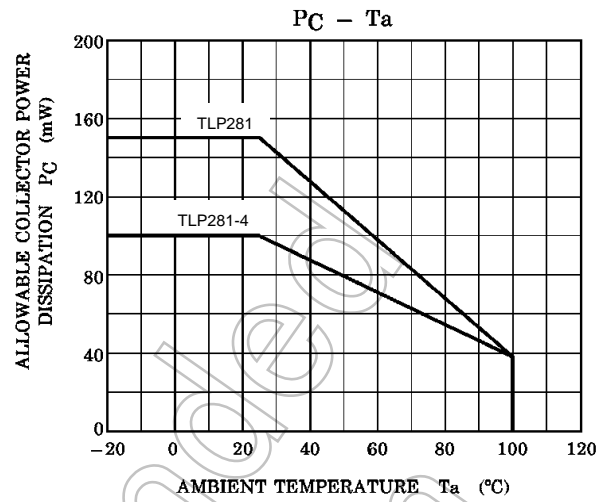
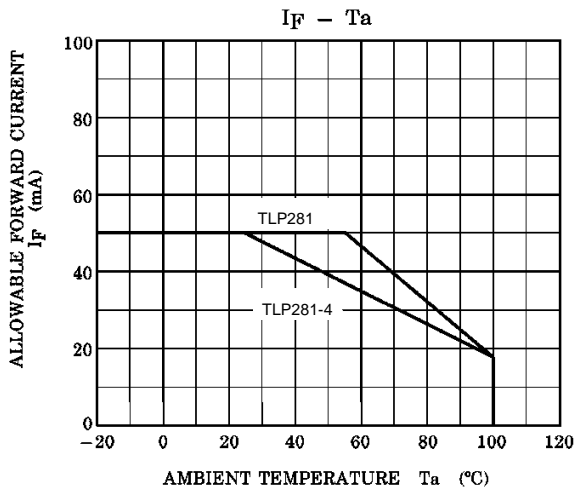
| CHARACTERISTIC | SYMBOL | TEST CONDITION | MIN | TYP. | MAX | UNIT |
|-------------------------------|-----------------|------------------------------------|--------------------|------------------|-----|------------------|
| Capacitance (Input to Output) | C _S | V _S = 0 V, f = 1 MHz | — | 0.8 | — | pF |
| Isolation Resistance | R _S | V _S = 500 V, R.H. ≤ 60% | 5×10 ¹⁰ | 10 ¹⁴ | — | Ω |
| Isolation Voltage | BV _S | AC, 60 s | 2500 | — | — | V _{rms} |
| | | AC, 1 s, in oil | — | 5000 | — | |
| | | DC, 60 s, in oil | — | 5000 | — | V _{dc} |

Switching Characteristics (Ta = 25°C)

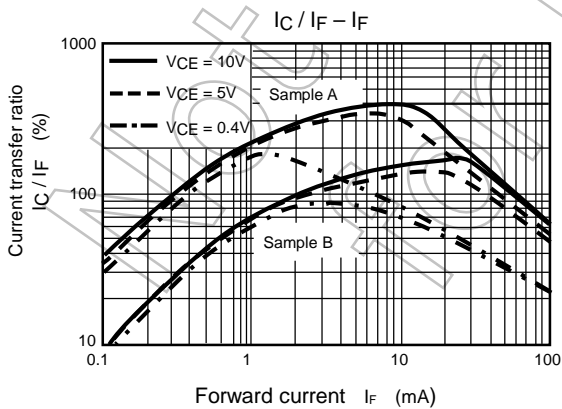
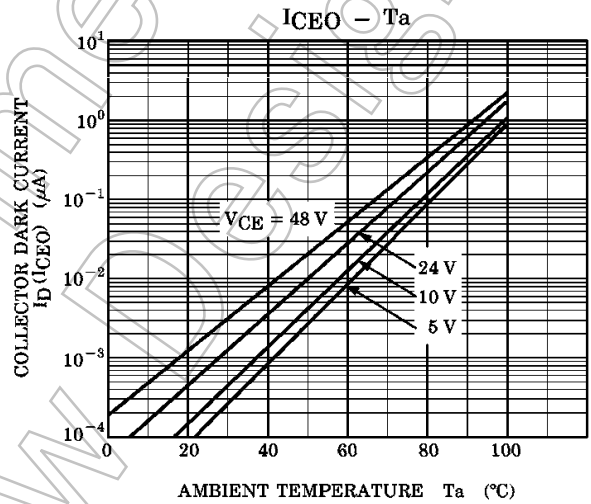
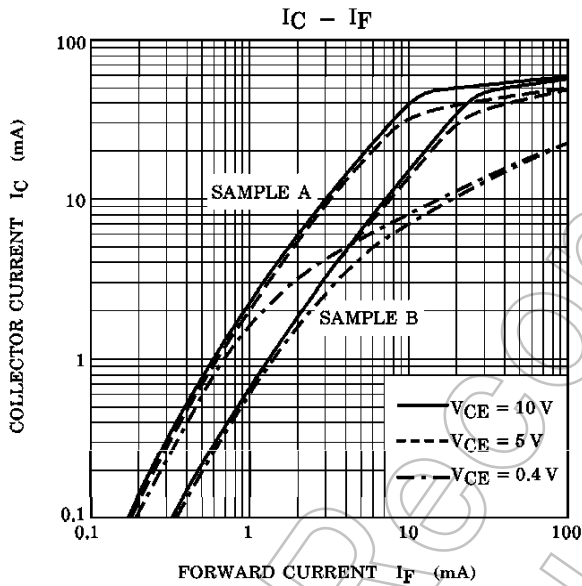
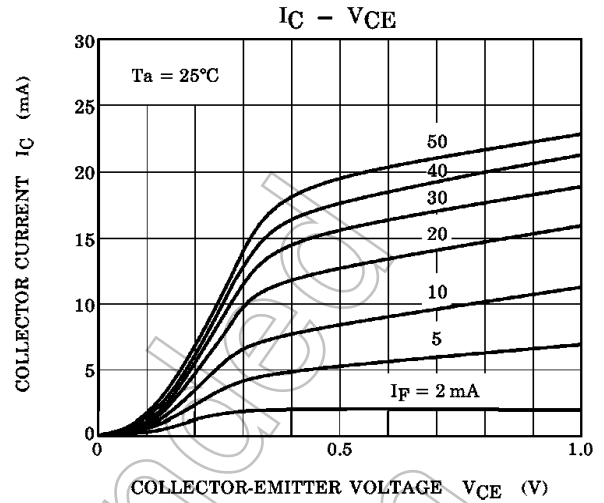
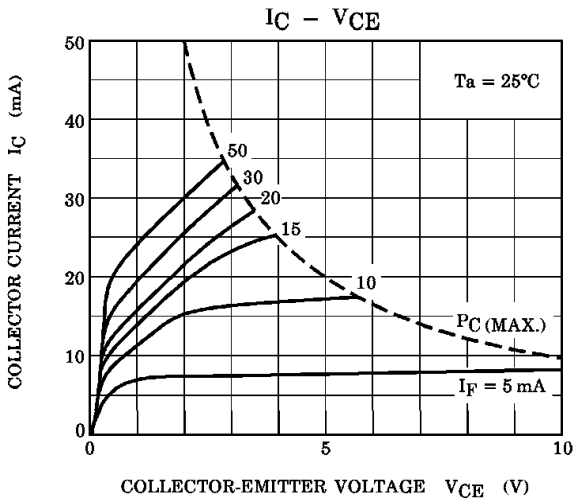
| CHARACTERISTIC | SYMBOL | TEST CONDITION | MIN | TYP. | MAX | UNIT |
|----------------|------------------|---|-----|------|-----|------|
| Rise Time | t _r | V _{CC} = 10 V, I _C = 2 mA R _L = 100 Ω | — | 2 | — | μs |
| Fall Time | t _f | | — | 3 | — | |
| Turn-On Time | t _{on} | | — | 3 | — | |
| Turn-Off Time | t _{off} | | — | 3 | — | |
| Turn-On Time | t _{ON} | R _L = 1.9 kΩ V _{CC} = 5 V, I _F = 16 mA (Fig. 1) | — | 2 | — | μs |
| Storage Time | t _s | | — | 25 | — | |
| Turn-Off Time | t _{OFF} | | — | 40 | — | |

Fig.1: SWITCHING TIME TEST CIRCUIT

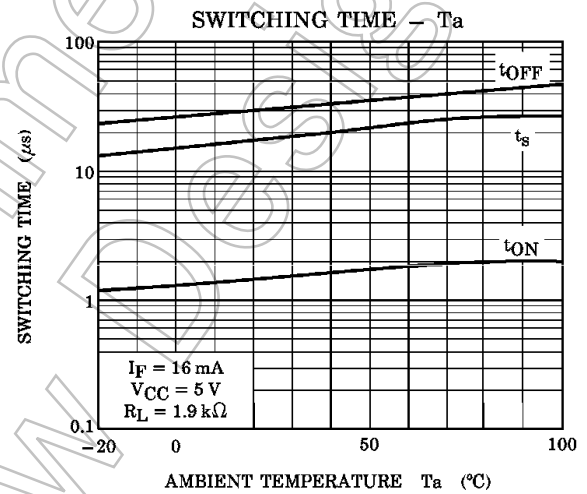
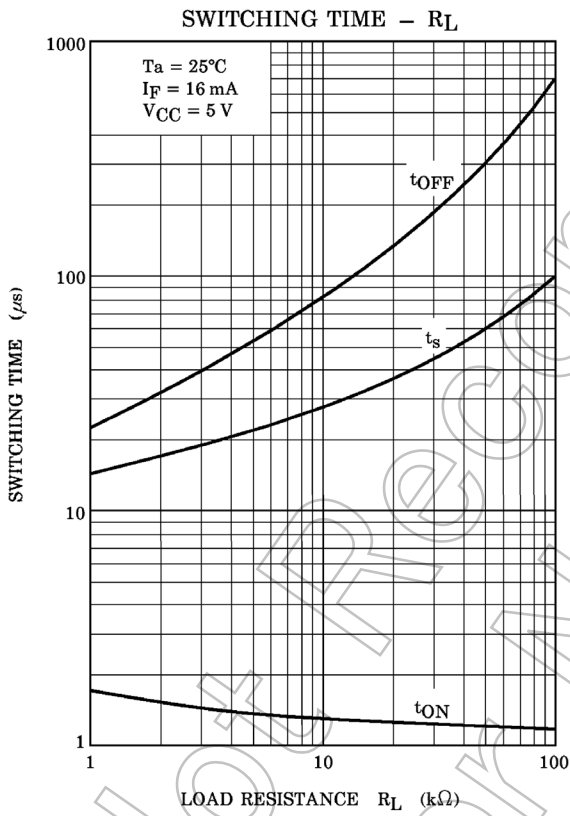
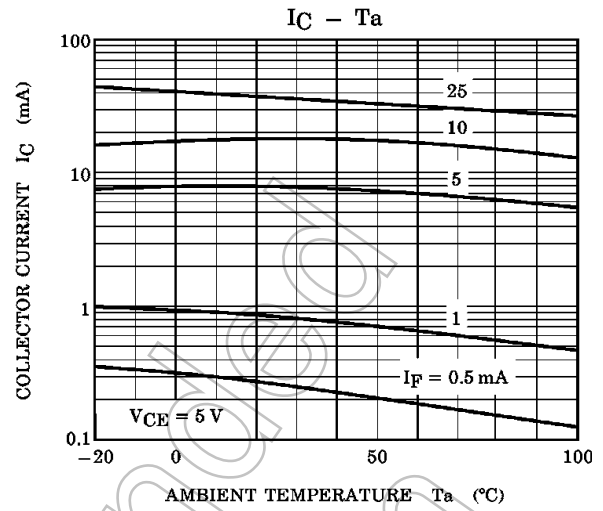
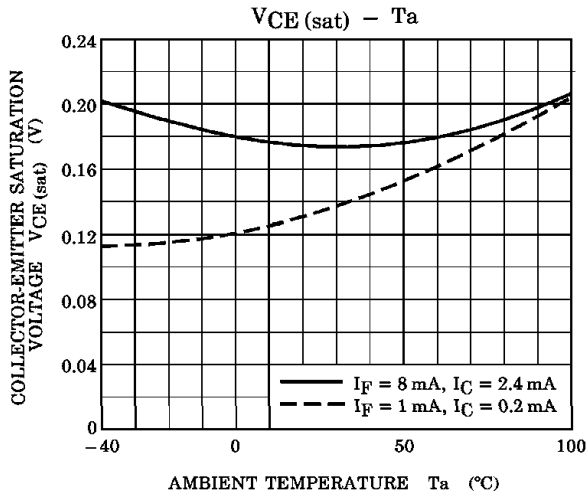




*The above graphs show typical characteristic.



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