

TLP130

Programmable Controllers
AC / DC-Input Module
Telecommunication

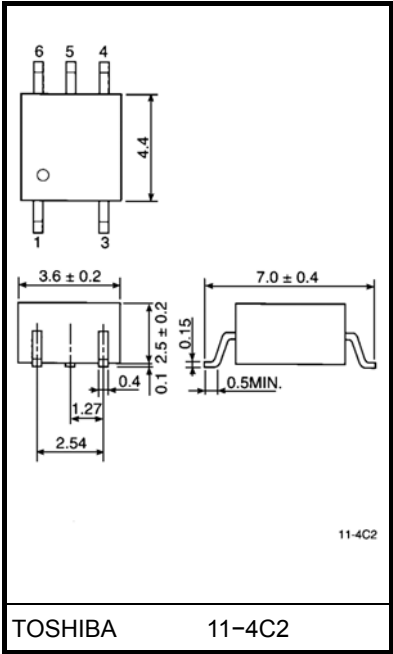
The TOSHIBA mini flat coupler TLP130 is a small outline coupler, suitable for surface mount assembly.
TLP130 consists of a photo transistor, optically coupled to two gallium arsenide infrared emitting diode connected inverse parallel, and operate directly by AC input current.

- Collector-emitter voltage: 80V(min.)
- Current transfer ratio: 50%(min.)
Rank GB: 100%(min.)
- Isolation voltage: 3750Vrms(min.)
- UL recognized: UL1577, file no.E67349
- Current transfer ratio

| Classi- fication | Current Transfer Ratio | | Marking Of Classification |
|---------------------|---|------|------------------------------|
| | I _F = 5mA, V _{CE} = 5V, T _a = 25°C | | |
| | Min. | Max. | |
| Standard | 50 | 600 | Blank, Y, GR, GB |
| Rank GB | 100 | 600 | GB,GR |

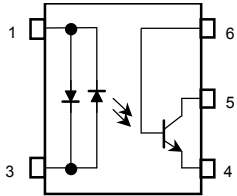
(Note) Application type name for certification test,
please use standard product type name, i.e.
TLP130(GB): TLP130

Unit in mm



Weight: 0.09 g (typ.)

Pin Configurations (top view)



- 1 : Anode, Cathode
- 3 : Cathode, Anode
- 4 : Emitter
- 5 : Collector
- 6 : Base

Absolute Maximum Ratings (Ta = 25°C)

| Characteristic | | Symbol | Rating | Unit |
|--|---|-------------------------|---------|---------|
| LED | Forward current | $I_{F(RMS)}$ | 50 | mA |
| | Forward current derating (Ta≥53°C) | $\Delta I_F / ^\circ C$ | -0.7 | mA / °C |
| | Peak forward current (100μs pulse, 100pps) | I_{FP} | 1 | A |
| | Junction temperature | T_j | 125 | °C |
| Detector | Collector-emitter voltage | V_{CEO} | 80 | V |
| | Collector-base voltage | V_{CBO} | 80 | V |
| | Emitter-collector voltage | V_{ECO} | 7 | V |
| | Emitter-base voltage | V_{EBO} | 7 | V |
| | Collector current | I_C | 50 | mA |
| | Peak collector current (10ms pulse, 100pps) | I_{CP} | 100 | mA |
| | Power dissipation | P_C | 150 | mW |
| | Power dissipation derating (Ta≥25°C) | $\Delta P_C / ^\circ C$ | -1.5 | 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 (10s) | | T_{sol} | 260 | °C |
| Total package power dissipation | | P_T | 200 | mW |
| Total package power dissipation derating (Ta≥25°C) | | $\Delta P_T / ^\circ C$ | -2.0 | mW / °C |
| Isolation voltage (AC, 1min., RH ≤ 60%) (Note 1) | | BV_S | 3750 | 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: Pins 1 and 3 shorted together and pins 4, 5 and 6 shorted together.

Recommended Operating Conditions

| Characteristic | Symbol | Min. | Typ. | Max. | Unit |
|-----------------------|--------------|------|------|------|------|
| Supply voltage | V_{CC} | — | 5 | 48 | V |
| Forward current | $I_{F(RMS)}$ | — | 16 | 25 | mA |
| Collector current | I_C | — | 1 | 10 | mA |
| Operating temperature | T_{opr} | -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.

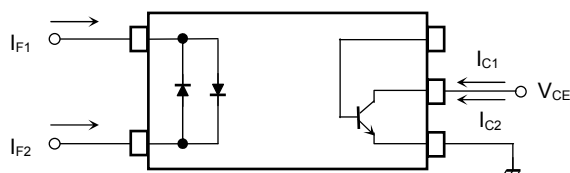
Individual Electrical Characteristics (Ta = 25°C)

| Characteristic | | Symbol | Test Condition | Min. | Typ. | Max. | Unit |
|----------------|-------------------------------------|---------------|---|------|------|------|---------------|
| LED | Forward voltage | V_F | $I_F = \pm 10\text{mA}$ | 1.0 | 1.15 | 1.3 | V |
| | Capacitance | C_T | $V = 0, f = 1\text{MHz}$ | — | 60 | — | 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-base breakdown voltage | $V_{(BR)CBO}$ | $I_C = 0.1\text{mA}$ | 80 | — | — | V |
| | Emitter-base breakdown voltage | $V_{(BR)EBO}$ | $I_E = 0.1\text{mA}$ | 7 | — | — | V |
| | Collector dark current | I_{CEO} | $V_{CE} = 48\text{V}$ | — | 10 | 100 | nA |
| | | | $V_{CE} = 48\text{V}, T_a = 85^\circ\text{C}$ | — | 2 | 50 | μA |
| | Collector dark current | I_{CER} | $V_{CE} = 48\text{V}, T_a = 85^\circ\text{C}$ $R_{BE} = 1\text{M}\Omega$ | — | 0.5 | 10 | μA |
| | Collector dark current | I_{CBO} | $V_{CB} = 10\text{V}$ | — | 0.1 | — | nA |
| | DC forward current gain | h_{FE} | $V_{CE} = 5\text{V}, I_C = 0.5\text{mA}$ | — | 400 | — | — |
| | 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 | $I_F = \pm 5\text{mA}, V_{CE} = 5\text{V}$ Rank GB | 50 | — | 600 | % |
| | | | 100 | — | 600 | |
| Saturated CTR | $I_C / I_{F(\text{sat})}$ | $I_F = \pm 1\text{mA}, V_{CE} = 0.4\text{V}$ Rank GB | — | 60 | — | % |
| | | | 30 | — | — | |
| Base photo-current | I_{PB} | $I_F = \pm 5\text{mA}, V_{CB} = 5\text{V}$ | — | 10 | — | μA |
| Collector-emitter saturation voltage | $V_{CE(\text{sat})}$ | $I_C = 2.4\text{mA}, I_F = \pm 8\text{mA}$ | — | — | 0.4 | V |
| | | $I_C = 0.2\text{mA}, I_F = \pm 1\text{mA}$ | — | 0.2 | — | |
| | | Rank GB | — | — | 0.4 | |
| Off-state collector current | $I_{C(\text{off})}$ | $I_F = \pm 0.7\text{mA}, V_{CE} = 48\text{V}$ | — | 1 | 10 | μA |
| CTR symmetry | $I_{C(\text{ratio})}$ | $I_C(I_F = -5\text{mA}) / I_C(I_F = 5\text{mA})$ (Note 2) | 0.33 | — | 3 | — |

(Note 2) $I_{C(\text{ratio})} = \frac{I_{C2}(I_F = I_{F2}, V_{CE} = 5\text{V})}{I_{C1}(I_F = I_{F1}, V_{CE} = 5\text{V})}$



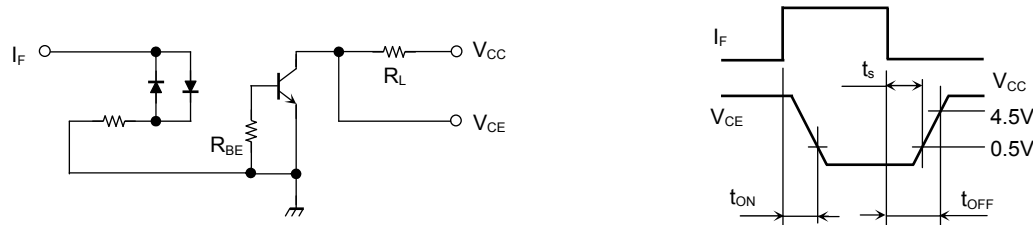
Isolation Characteristics (Ta = 25°C)

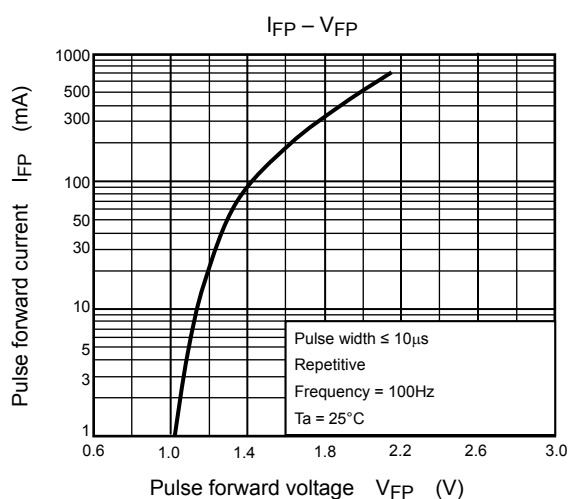
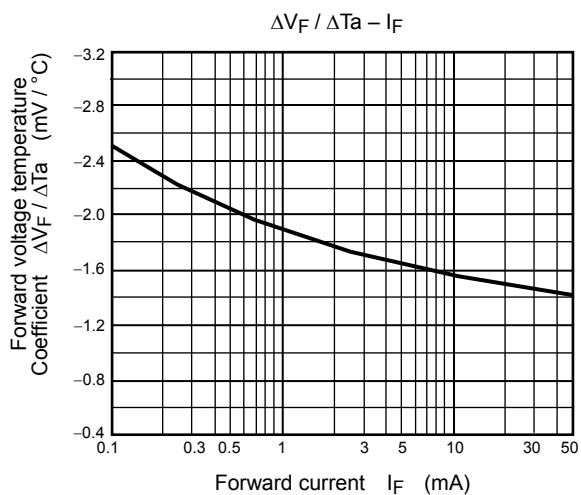
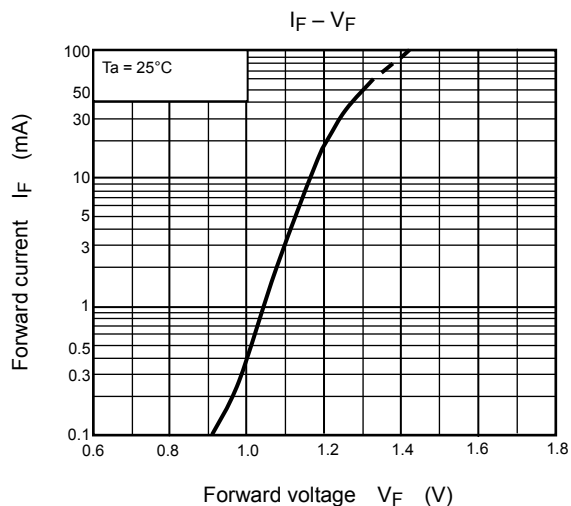
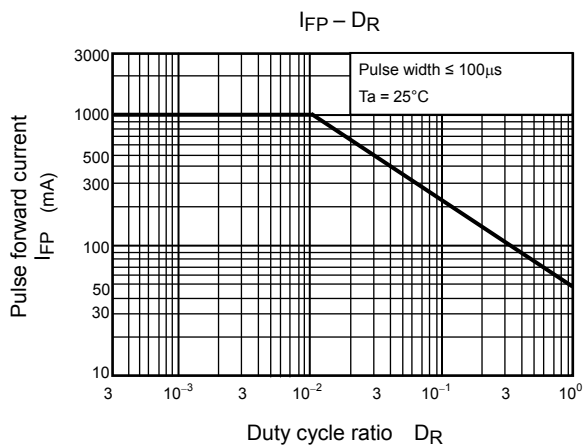
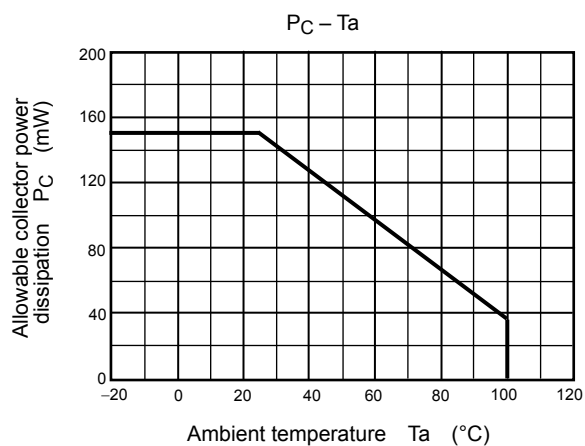
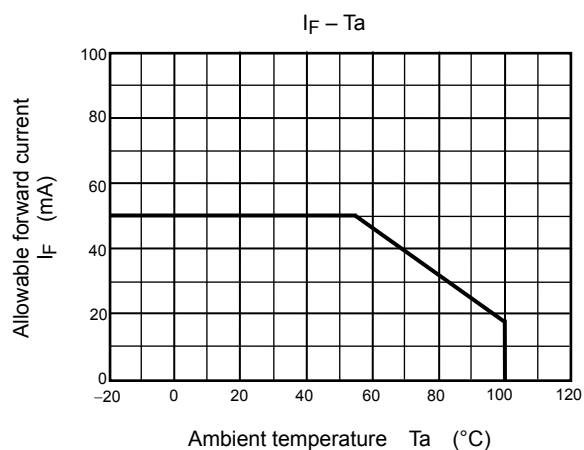
| Characteristic | Symbol | Test Condition | Min. | Typ. | Max. | Unit |
|-----------------------------|--------|----------------------|--------------------|------------------|------|------|
| Capacitance input to output | CS | VS=0, f=1MHz | — | 0.8 | — | pF |
| Isolation resistance | RS | VS=500V | 5×10 ¹⁰ | 10 ¹⁴ | — | Ω |
| Isolation voltage | BVS | AC, 1minute | 3750 | — | — | Vrms |
| | | AC, 1second, in oil | — | 10000 | — | |
| | | DC, 1 minute, in oil | — | 10000 | — | Vdc |

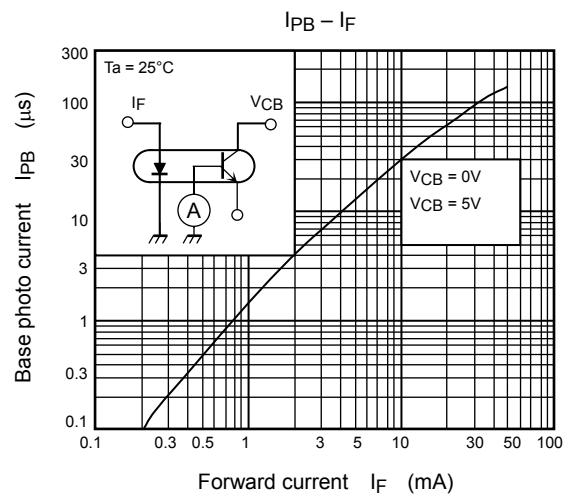
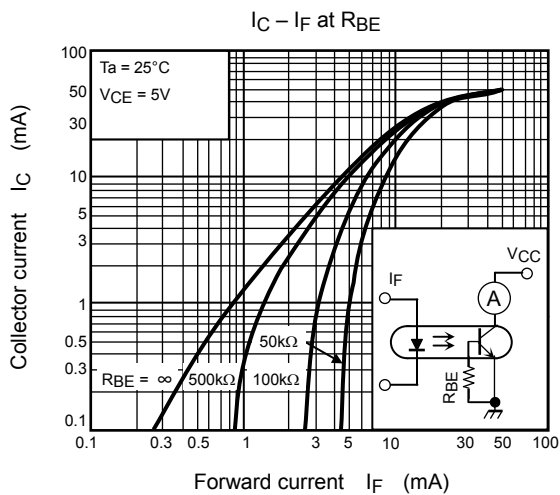
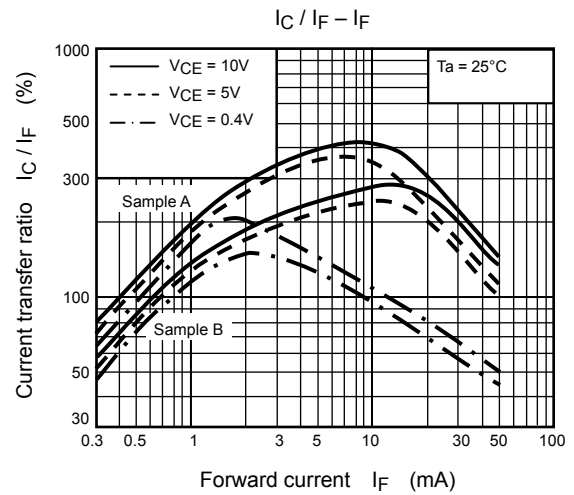
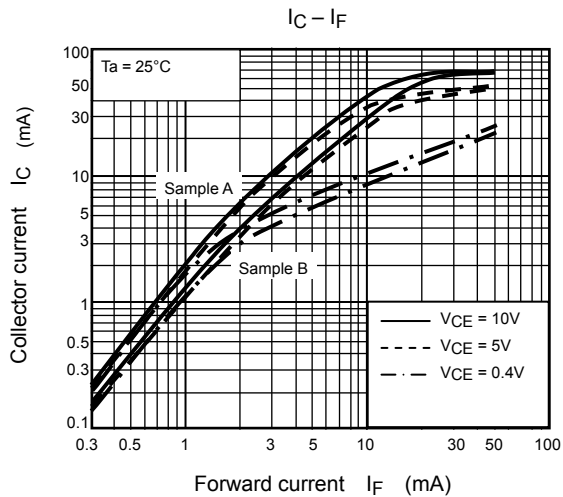
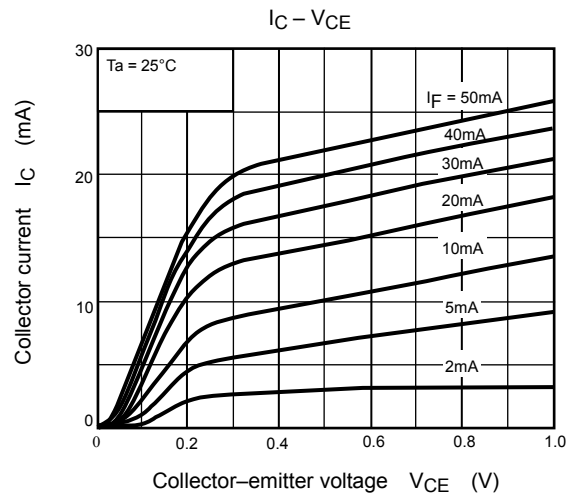
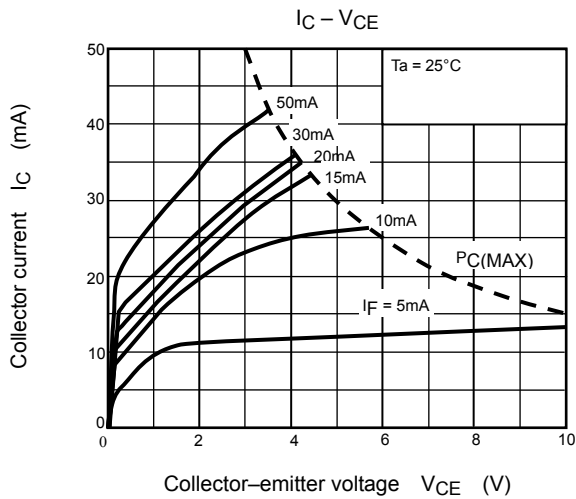
Switching Characteristics (Ta = 25°C)

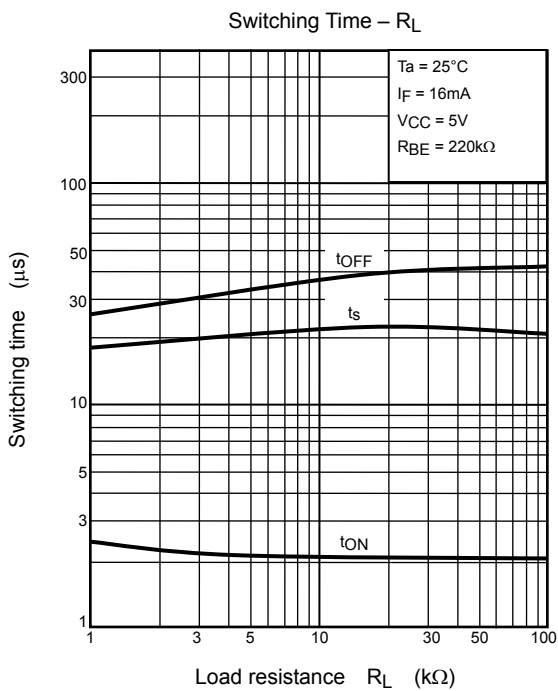
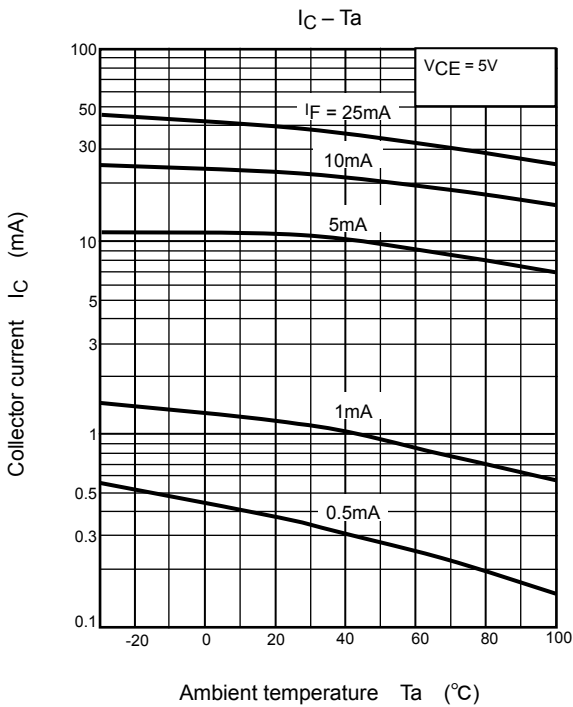
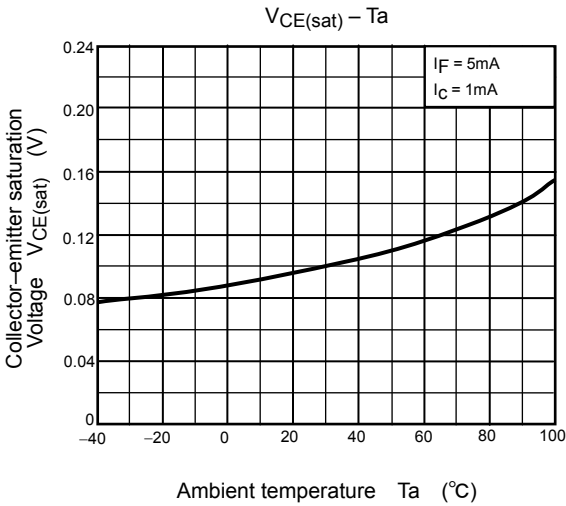
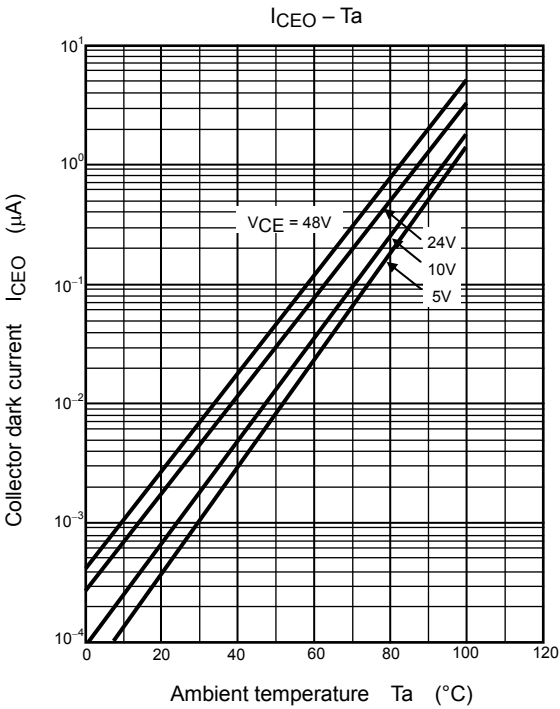
| Characteristic | Symbol | Test Condition | Min. | Typ. | Max. | Unit |
|----------------|--------|--|------|------|------|------|
| Rise time | tr | VCC = 10V, IC = 2mA RL = 100Ω | — | 2 | — | μs |
| Fall time | tf | | — | 3 | — | |
| Turn-on time | ton | | — | 3 | — | |
| Turn-off time | toff | | — | 3 | — | |
| Turn-on time | tON | RL = 1.9 kΩ (Fig.1) RBE = OPEN VCC = 5 V, IF = ±16mA | — | 2 | — | μs |
| Storage time | ts | | — | 25 | — | |
| Turn-off time | tOFF | | — | 40 | — | |
| Turn-on time | tON | RL = 1.9kΩ (Fig.1) RBE = 220kΩ VCC = 5 V, IF = ±16mA | — | 2 | — | μs |
| Storage time | ts | | — | 20 | — | |
| Turn-off time | tOFF | | — | 30 | — | |

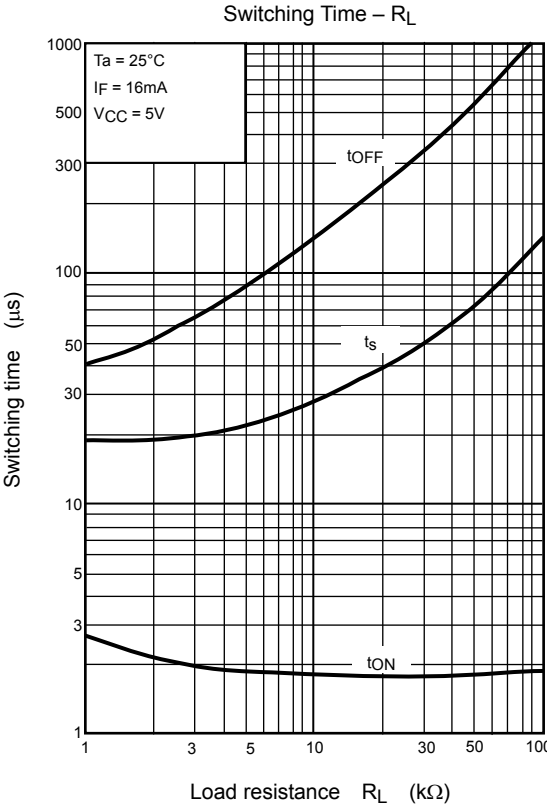
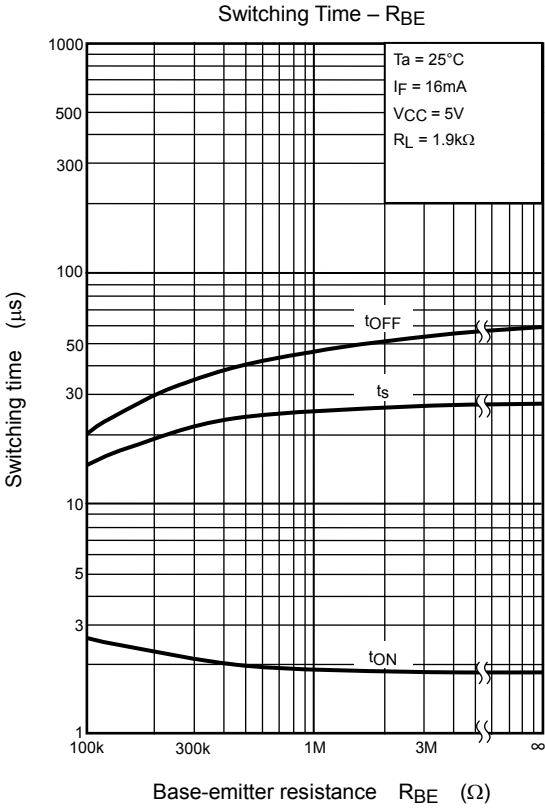
Fig. 1 Switching time test circuit











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