

TOSHIBA Photocoupler GaAs Ired & Photo-Transistor

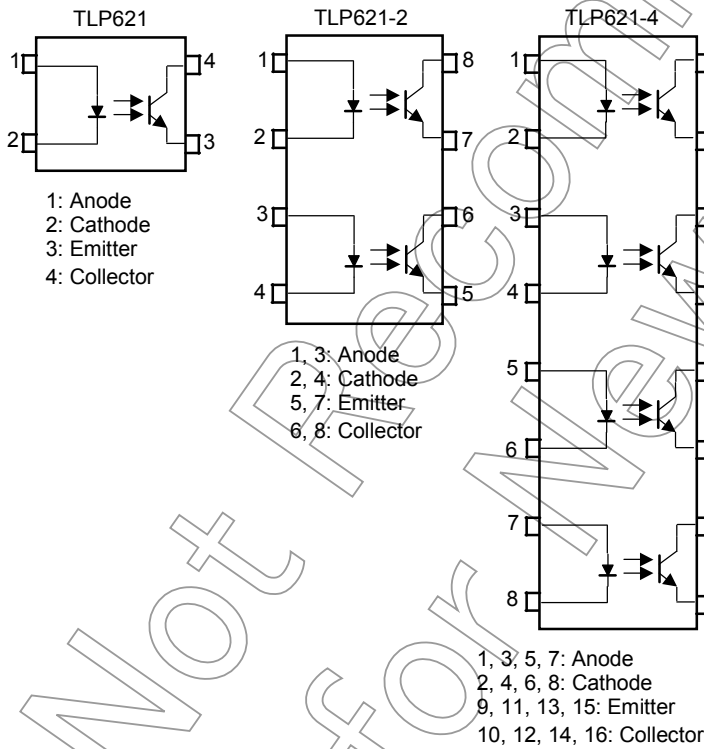
TLP621, TLP621-2, TLP621-4

Programmable Controller
AC / DC-Input Module
Solid State Relay

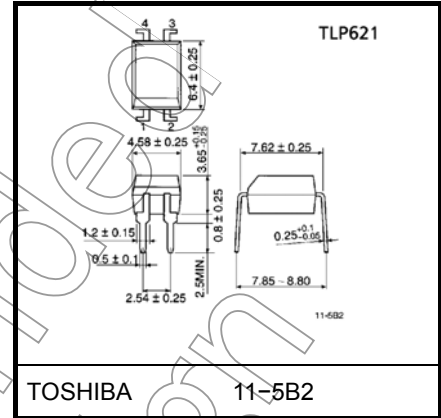
The TOSHIBA TLP621, -2 and -4 consists of a photo-transistor optically coupled to a gallium arsenide infrared emitting diode. The TLP621-2 offers two isolated channels in an eight lead plastic DIP, which the TLP621-4 provides four isolated channels in a sixteen plastic DIP.

- Collector-emitter voltage: 55 V (min.)
- Current transfer ratio: 50% (min.)
Rank GB: 100% (min.)

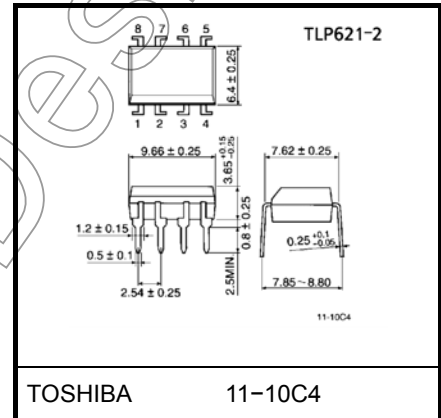
Pin Configurations (top view)



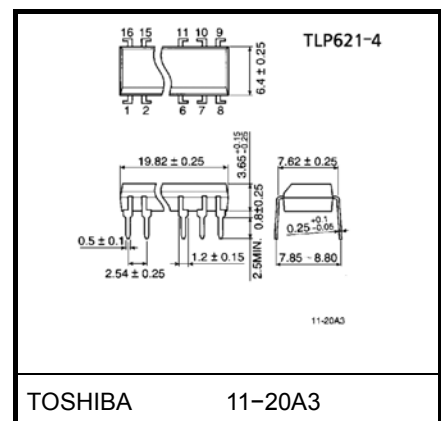
Unit in mm



Weight: 0.26 g (typ.)



Weight: 0.54 g (typ.)



Weight: 1.1 g (typ.)

• 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 TLP621-4 | (None) | 50 | 600 | Blank, GR, BL, GB |
| | 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: 2002, BS EN60950-1: 2002

*4 EN60950 (approved is TLP621 only)

Not Recommended for New Design

- Option (D4) type
VDE approved: DIN EN 60747-5-2, certificate no. 40009302
Maximum operating insulation voltage: 890 VPK
Highest permissible over voltage: 8000 VPK

(Note) When a EN 60747-5-2 approved type is needed, please designate the "Option (D4)"

| | 7.62 mm pich standard type | 10.16 mm pich (LF2) type |
|----------------------|-------------------------------|-----------------------------|
| • Creepage distance | : 6.4 mm (min.) | 8.0 mm (min) |
| Clearance | : 6.4 mm (min.) | 8.0 mm (min) |
| Insulation thickness | : 0.4 mm (min.) | 0.4 mm (min) |

Not Recommended
for New Design

Absolute 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 (10 s) | | °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: 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: 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 |

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 | $I_F = 10 \text{ mA}$ | 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 | $V_{CE(\text{sat})}$ | $I_C = 2.4 \text{ mA}, I_F = 8 \text{ mA}$ | — | — | 0.4 | V |
| | | $I_C = 0.2 \text{ mA}, I_F = 1 \text{ mA}$ Rank GB | — | 0.2 | — | |
| | | | — | — | 0.4 | |

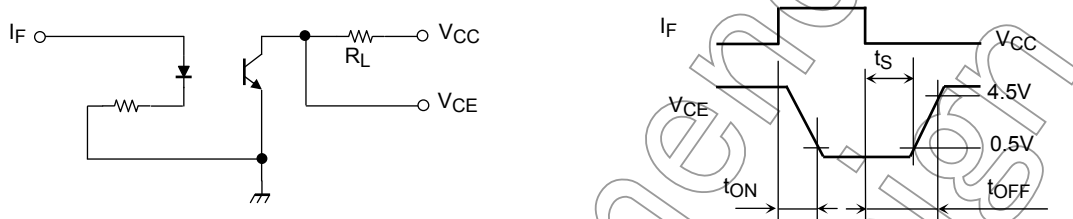
Isolation Characteristics (Ta = 25°C)

| 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} |

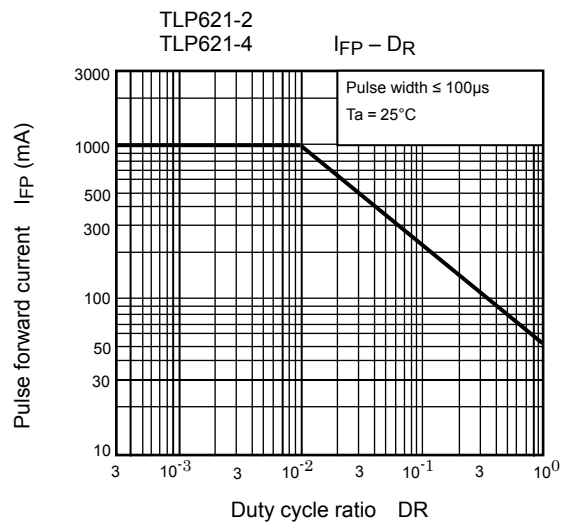
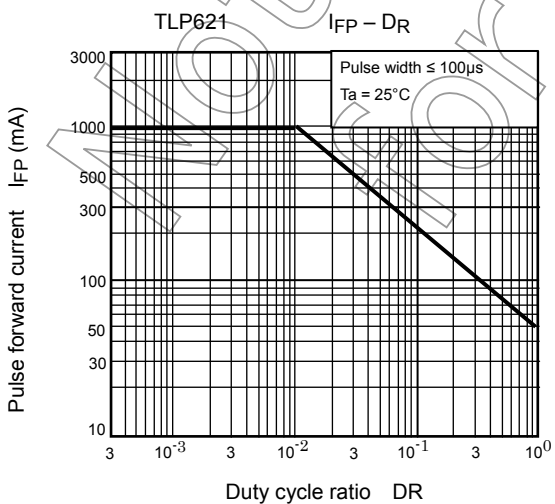
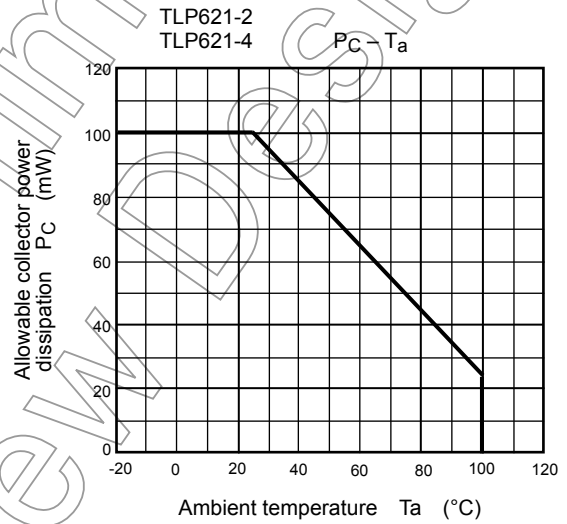
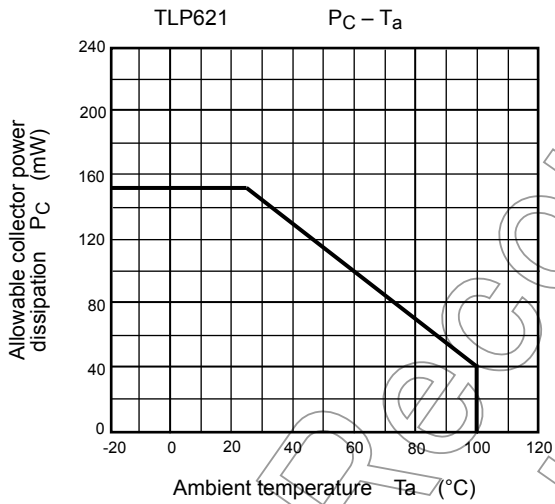
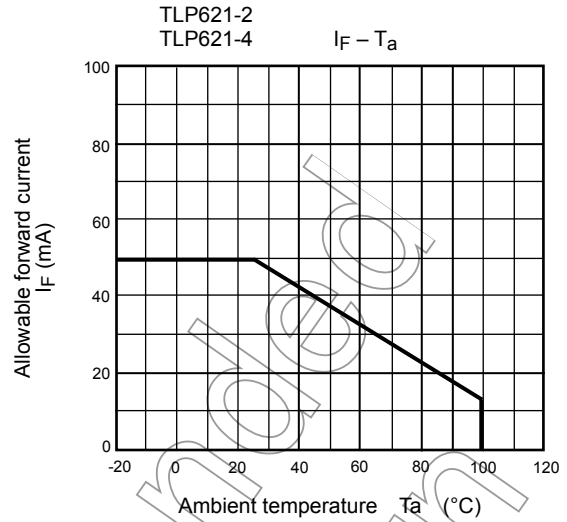
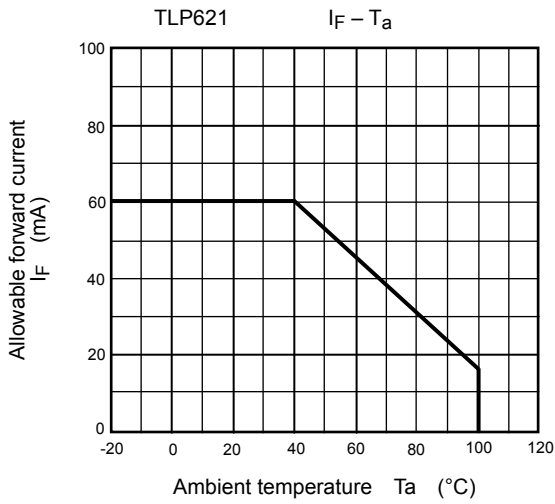
Switching Characteristics (Ta = 25°C)

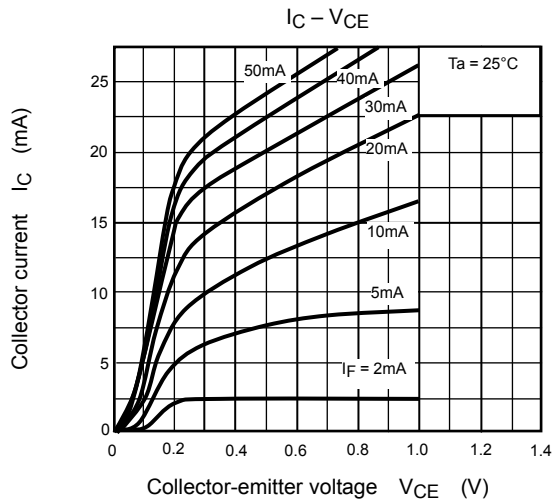
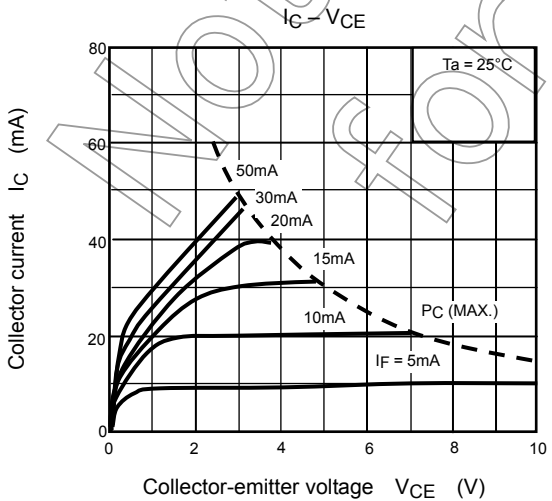
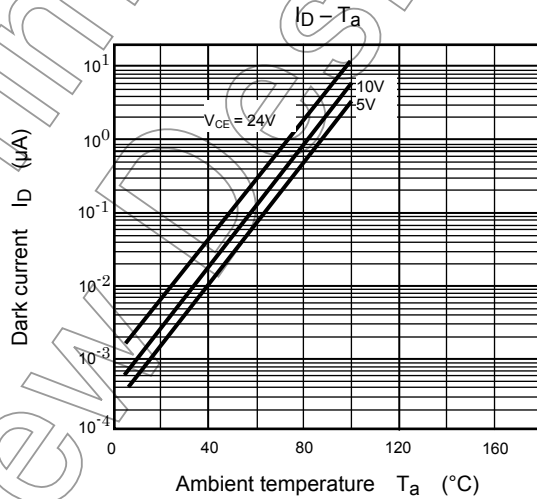
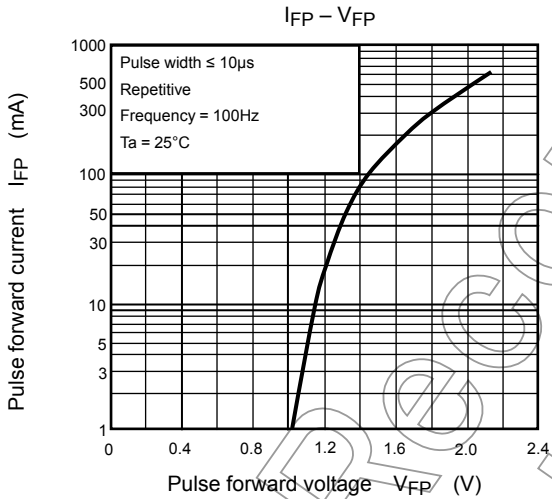
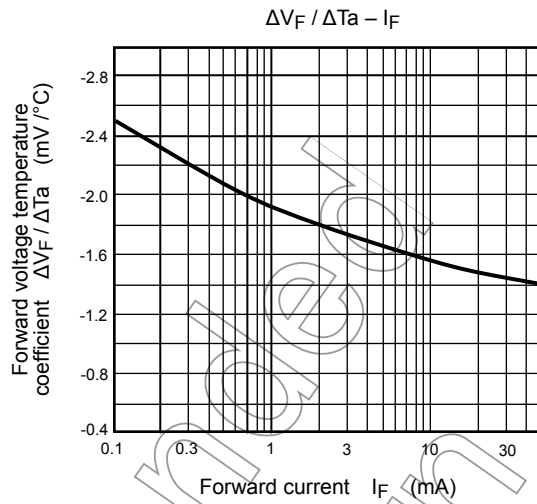
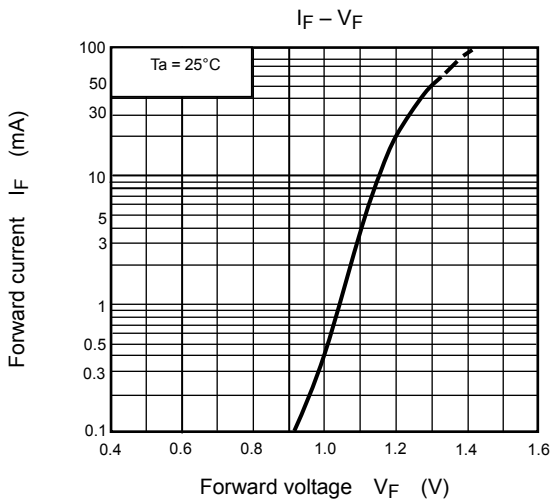
| Characteristic | Symbol | Test Condition | Min. | Typ. | Max. | Unit |
|----------------|-----------|---|------|------|------|---------------|
| Rise time | t_r | $V_{CC} = 10\text{ V}, I_C = 2\text{ mA}$ $R_L = 100\Omega$ | — | 2 | — | μs |
| Fall time | t_f | | — | 3 | — | |
| Turn-on time | t_{on} | | — | 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 | | — | 15 | — | |
| Turn-off time | t_{OFF} | | — | 25 | — | |

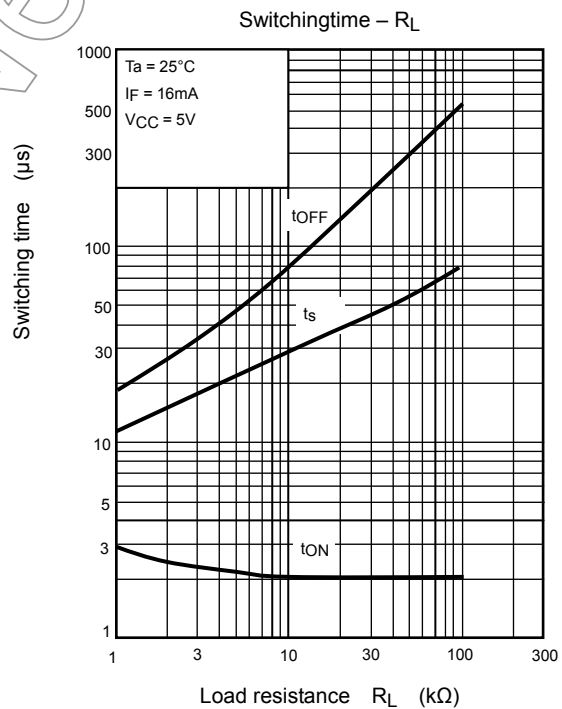
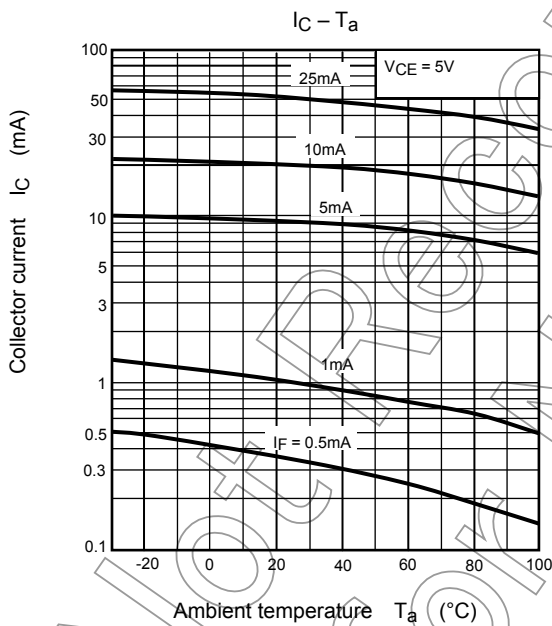
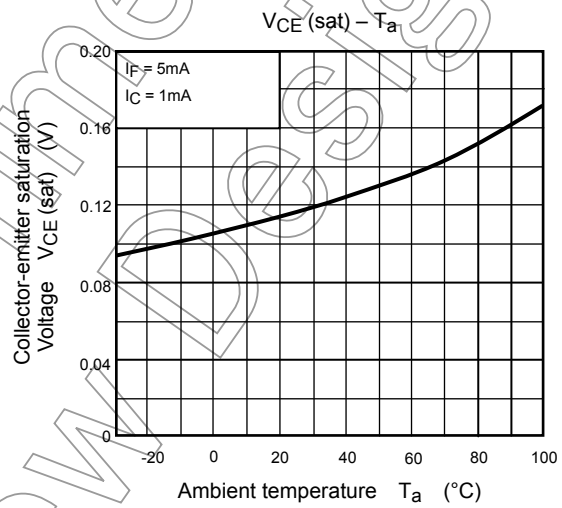
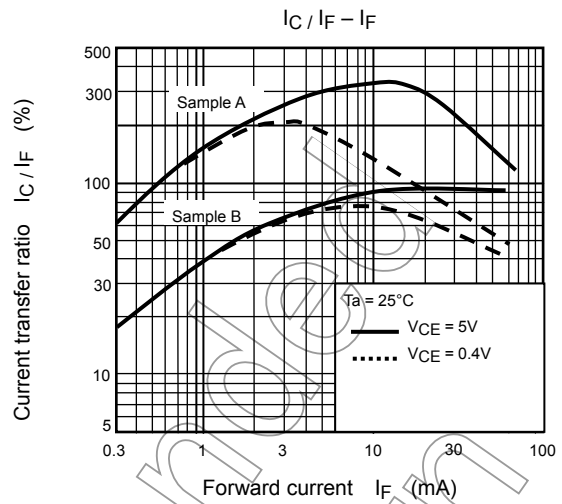
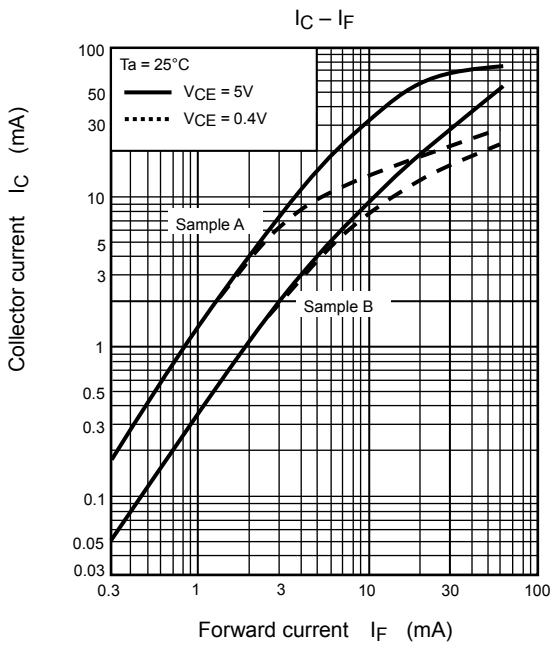
Fig. 1 Switching time test circuit



Not Recommended for New Designs







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