

ACPL-8x7

Multi-Channel Full-Pitch Phototransistor Optocoupler

Description

The ACPL-827 is a DC-input dual-channel, full-pitch phototransistor optocoupler that contains two light emitting diodes optically coupled to two separate transistors. It is packaged in an 8-pin DIP package.

Likewise, the ACPL-847 is a DC-input quad-channel, full-pitch phototransistor optocoupler that contains four light emitting diodes optically coupled to four separate transistors. It is packaged in a 16-pin DIP package.

Both optocouplers are available in a wide-lead spacing option and a lead bend SMD option with an input-output isolation voltage of 5000 V_{rms} . Response time, t_r , is typically 4 μs and minimum CTR is 50% at input current of 5 mA.

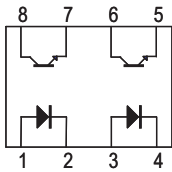
Features

- Current transfer ratio (CTR: min. 50% at $I_F = 5$ mA, $V_{CE} = 5$ V)
- High input-output isolation voltage ($V_{ISO} = 5,000$ V_{rms})
- Response time (t_r : typ. 4 μs at $V_{CE} = 2$ V, $I_C = 2$ mA, $R_L = 100\Omega$)
- Compact dual-in-line package
- Safety and regulatory approvals
 - CSA
 - UL 1577
 - IEC/EN/DIN EN 60747-5-2
- Options available:
 - Leads with 0.4 in. (10.16 mm) spacing (W00)
 - Lead bend for surface mounting (300)
 - Tape and reel for SMD (500) – available only for ACPL-827
 - IEC/EN/DIN EN 60747-5-2 approved (060)
 - Lead free (000E)

Applications

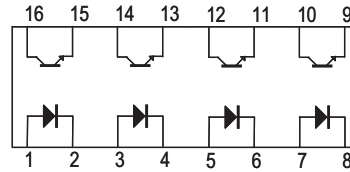
- I/O interface for programmable controllers, computers.
- Sequence controllers.
- System appliances, measuring instruments.
- Signal transmission between circuits of different potentials and impedances.

ACPL-827 Pin Layout



| | |
|----------|-----------|
| Pin 1, 3 | Anode |
| Pin 2, 4 | Cathode |
| Pin 5, 7 | Emitter |
| Pin 6, 8 | Collector |

ACPL-847 Pin Layout



| | |
|--------------------|-----------|
| Pin 1, 3, 5, 7 | Anode |
| Pin 2, 4, 6, 8 | Cathode |
| Pin 9, 11, 13, 15 | Emitter |
| Pin 10, 12, 14, 16 | Collector |

Ordering Information

ACPL-8x7 is UL Recognized with 5000 V_{rms} for 1 minute per UL1577 and is approved under CSA Component Acceptance Notice #5, File CA 88324.

| Part Number | RoHS Compliant Option | | | | Package | No. of Channels | Surface Mount | Gull Wing | Tape & Reel | IEC/EN/DIN EN 60747-5-2 | Quantity |
|-------------|--------------------------------|---------------------------------|---------------------------------|---------------------------------|----------------|-----------------|---------------|-----------|-------------|-------------------------|-------------------|
| | Rank 0 50% <CTR> 600% | Rank B 130% <CTR> 260% | Rank C 200% <CTR> 400% | Rank G 130% <CTR> 400% | | | | | | | |
| ACPL-827 | -000E | -00BE | -00CE | | 300-mil DIP-8 | Dual | | | | | 50 pcs per tube |
| | -300E | -30BE | -30CE | | 300-mil DIP-8 | | x | X | | | 50 pcs per tube |
| | -500E | -50BE | -50CE | | 300-mil DIP-8 | | X | X | X | | 1000 pcs per reel |
| | -060E | -06BE | -06CE | | 300-mil DIP-8 | | | | | X | 50 pcs per tube |
| | -360E | -36BE | -36CE | | 300-mil DIP-8 | | x | X | | X | 50 pcs per tube |
| | -560E | -56BE | -56CE | | 300-mil DIP-8 | | x | X | X | X | 1000 pcs per reel |
| | -W00E | -W0BE | -W0CE | | 400-mil DIP-8 | | | | | | 50 pcs per tube |
| | -W60E | -W6BE | -W6CE | | 400-mil DIP-8 | | | | | X | 50 pcs per tube |
| ACPL-847 | -000E | | | -00GE | 300-mil DIP-16 | Quad | | | | | 25 pcs per tube |
| | -300E | | | -30GE | 300-mil DIP-16 | | X | X | | | 25 pcs per tube |
| | -060E | | | -06GE | 300-mil DIP-16 | | | | | X | 25 pcs per tube |
| | -360E | | | -36GE | 300-mil DIP-16 | | X | X | | X | 25 pcs per tube |
| | -W00E | | | -W0GE | 400-mil DIP-16 | | | | | | 25 pcs per tube |
| | -W60E | | | -W6GE | 400-mil DIP-16 | | | | | X | 25 pcs per tube |

To order, choose a part number from the part number column and combine with the desired option from the option column to form an order entry.

Example 1:

ACPL-827-36GE to order product of 300-mil DIP-8 Dual Channel DC Gull Wing Surface Mount package in Tube packaging with 130%<CTR>400%, IEC/EN/DIN EN 60747-5-2 Safety Approval and RoHS compliant.

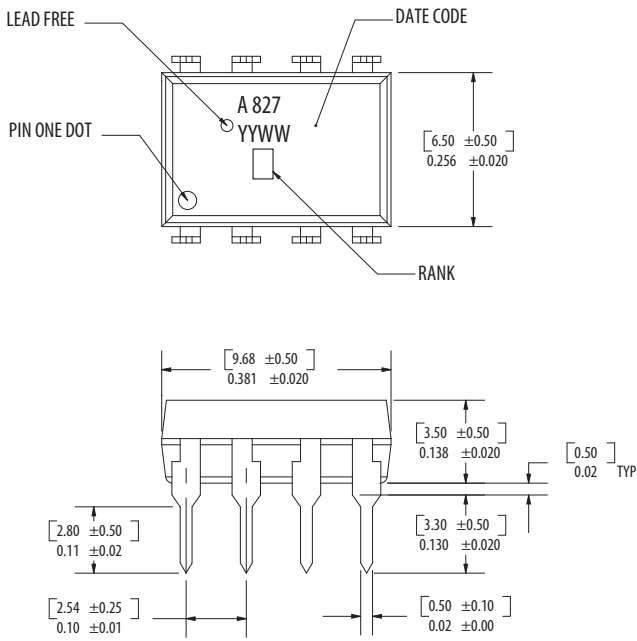
Example 2:

ACPL-847-W00E to order product of 400-mil DIP-16 Quad Channel DC package in Tube packaging with 50%<CTR>600% and RoHS compliant.

Option data sheets are available. Contact your Broadcom sales representative or authorized distributor for information.

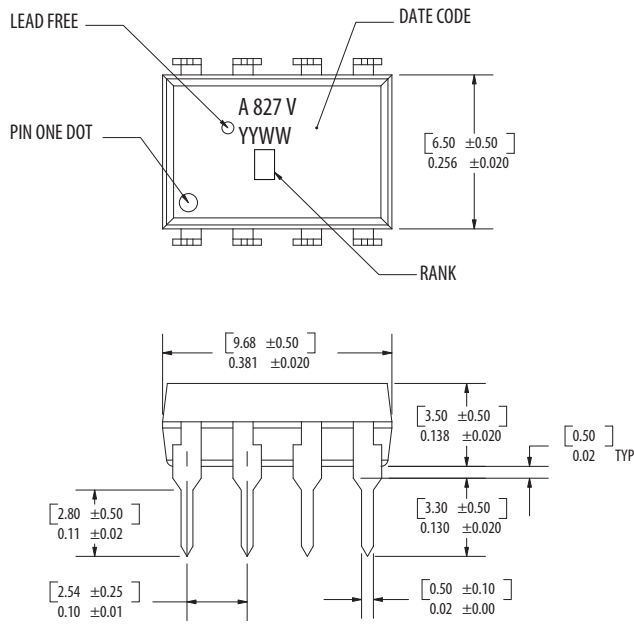
Package Outline Drawings

ACPL-827 Package Outline



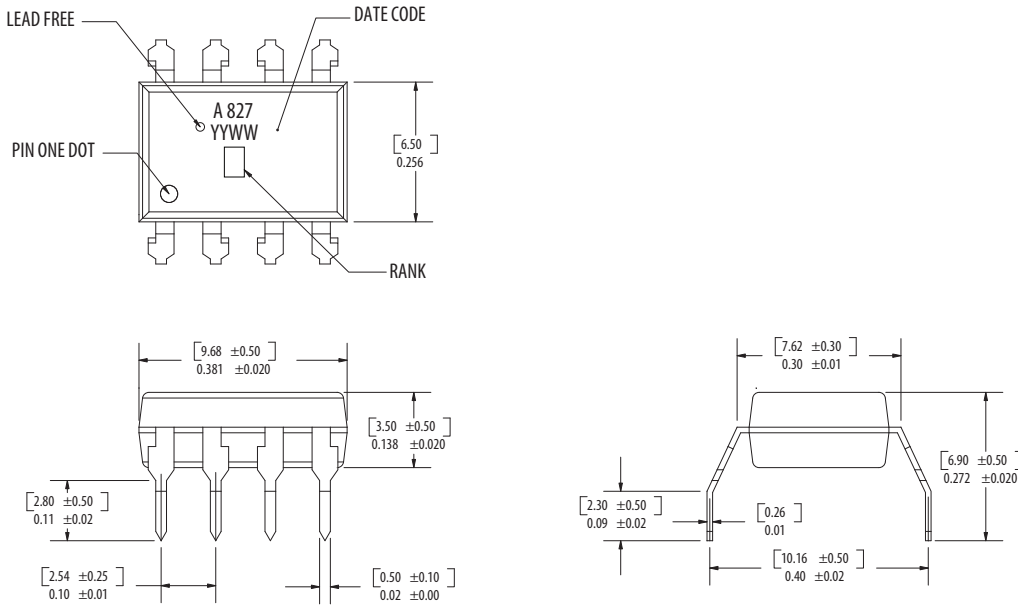
Note: Dimensions are in [millimeters] and inches.

ACPL-827 Package Outline – Option 060



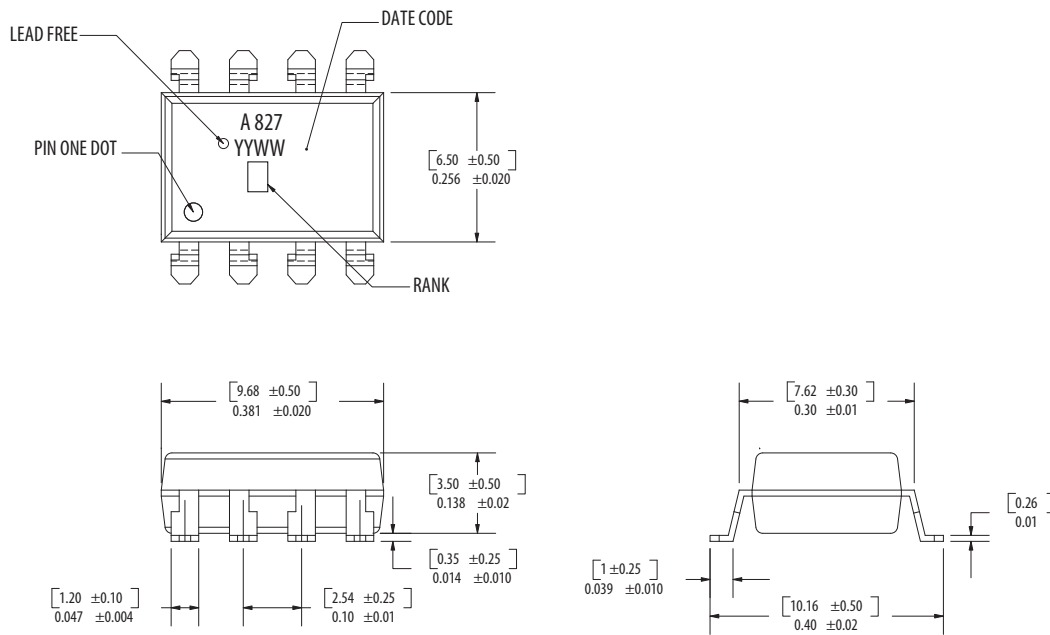
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ACPL-827 Package Outline – Option W00



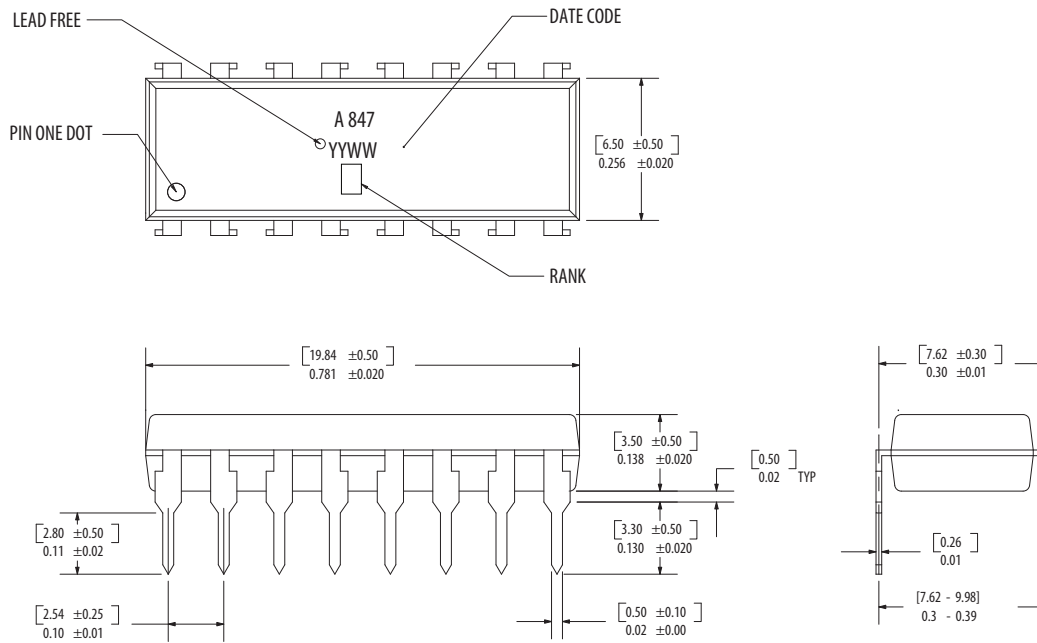
Note: Dimensions are in [millimeters] and inches.

ACPL-827 Package Outline – Option 300



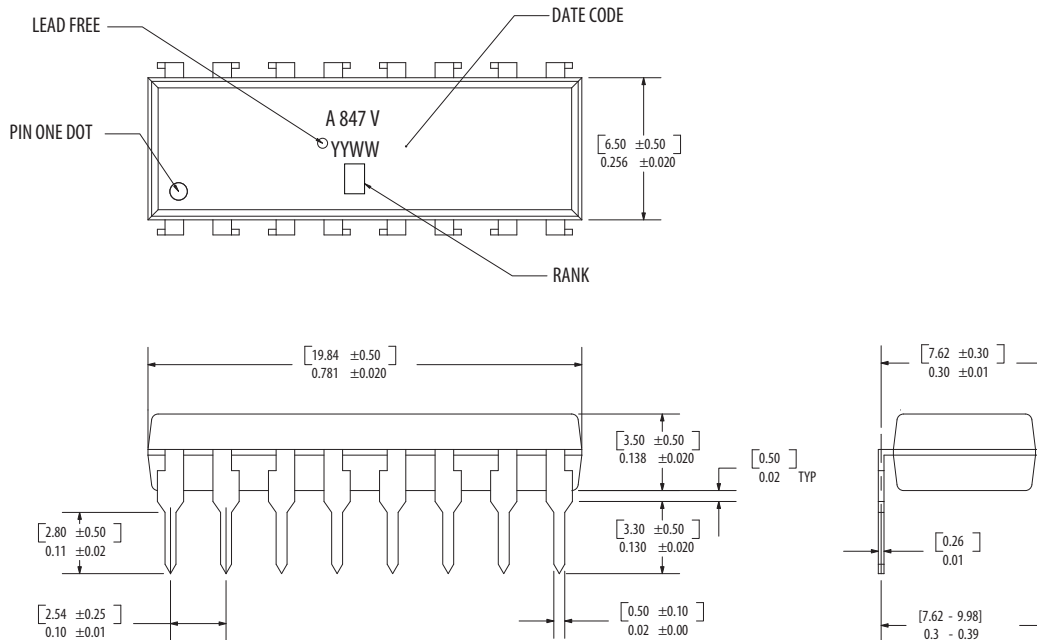
Note: Dimensions are in [millimeters] and inches.

ACPL-847 Package Outline



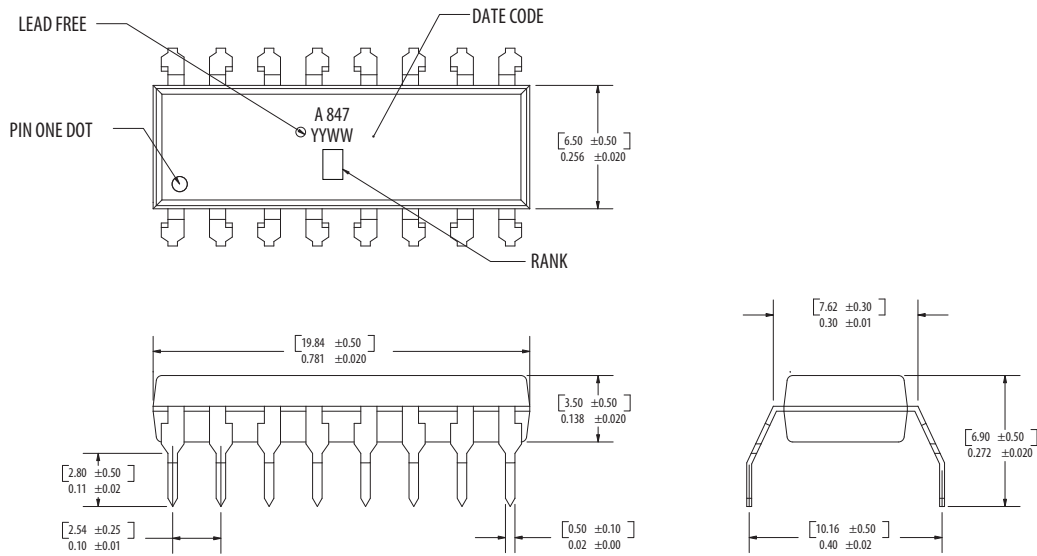
Note: Dimensions are in [millimeters] and inches.

ACPL-847 Package Outline - Option 060



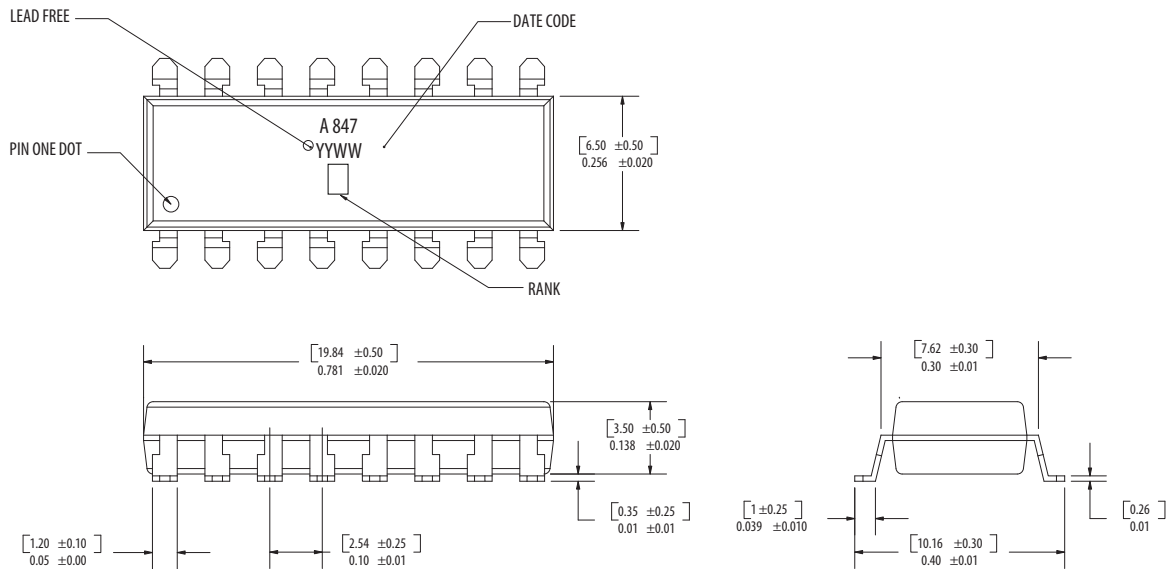
Note: Dimensions are in [millimeters] and inches.

ACPL-847 Package Outline - Option W00



Note: Dimensions are in [millimeters] and inches.

ACPL-847 Package Outline - Option 300

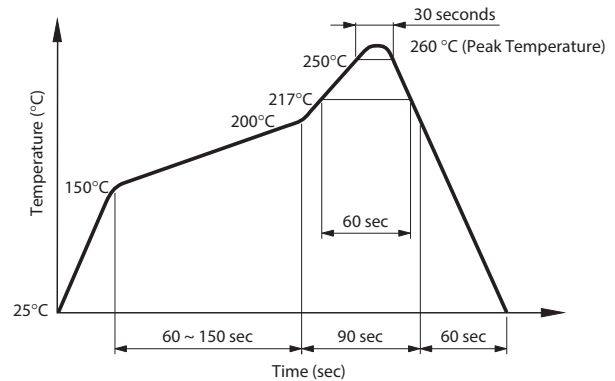


Note: Dimensions are in [millimeters] and inches.

Solder Reflow Temperature Profile

1. One-time soldering reflow is recommended within the condition of temperature and time profile shown at right.
2. When using another soldering method such as infrared ray lamp, the temperature might rise partially in the mold of the device. Keep the temperature on the package of the device within the condition of (1) above.

NOTE: Non-halide flux should be used.



Absolute Maximum Ratings

| Parameter | Symbol | Min. | Max. | Units | Note |
|--------------------------------------------------|--------------|-----------------------------------------------|------|-----------|------|
| Storage Temperature | T_S | -55 | 125 | °C | |
| Operating Temperature | T_A | -30 | 100 | °C | |
| Average Forward Current | $I_{F(AVG)}$ | — | 50 | mA | |
| Input Power Dissipation | P_I | — | 70 | mW | |
| Input Reverse Voltage | V_R | — | 6 | V | |
| Collector Current | I_C | — | 50 | mA | |
| Collector-Emitter Voltage | V_{CEO} | — | 70 | V | |
| Emitter-Collector Voltage | V_{ECO} | — | 6 | V | |
| Isolation Voltage (AC for 1 min, R.H. 40% ~ 60%) | V_{ISO} | — | 5000 | V_{rms} | |
| Collector Power Dissipation | P_C | — | 150 | mW | |
| Total Power Dissipation | P_{TOT} | — | 200 | mW | |
| Lead Solder Temperature | | 260°C for 10 sec., 1.6 mm below seating plane | | | |

Electrical Specifications (DC)

Over recommended operating conditions unless otherwise specified.

| Parameter | Symbol | Min. | Typ. | Max. | Units | Test Conditions | Note |
|--------------------------------------|---------------|--------------------|--------------------|------|---------------|----------------------------------------------------------|---------------------------------|
| Forward Voltage | V_F | — | 1.2 | 1.4 | V | $I_F = 20 \text{ mA}$ | |
| Reverse Current | I_R | — | — | 10 | μA | $V_R = 4\text{V}$ | |
| Terminal Capacitance | C_t | — | 30 | 250 | pF | $V = 0, f = 1 \text{ kHz}$ | |
| Collector Dark Current | I_{CEO} | — | — | 100 | nA | $V_{CE} = 20\text{V}, I_F = 0 \text{ mA}$ | |
| Collector-Emitter Breakdown Voltage | BV_{CEO} | 70 | — | — | V | $I_C = 0.1 \text{ mA}, I_F = 0 \text{ mA}$ | |
| Emitter-Collector Breakdown Voltage | BV_{ECO} | 6 | — | — | V | $I_E = 10 \mu\text{A}, I_F = 0 \text{ mA}$ | |
| Collector Current | I_C | 2.5 | — | 30 | mA | $I_F = 5 \text{ mA}, V_{CE} = 5\text{V}$ | $CTR = (I_C/I_F) \times 100\%$ |
| Current Transfer Ratio | CTR | 50 | — | 600 | % | | |
| Collector-Emitter Saturation Voltage | $V_{CE(sat)}$ | — | 0.1 | 0.2 | V | $I_F = 20 \text{ mA}, I_C = 1 \text{ mA}$ | |
| Isolation Resistance | R_{ISO} | 5×10^{10} | 1×10^{11} | — | Ω | DC500V, R.H. 40% ~ 60% | |
| Floating Capacitance | C_F | — | 0.6 | 1 | pF | $V = 0, f = 1 \text{ MHz}$ | |
| Cut-off Frequency (-3 dB) | F_C | — | 80 | — | kHz | $V_{CE} = 5\text{V}, I_C = 2 \text{ mA}, RL = 100\Omega$ | See Figure 12 . |
| Response Time (Rise) | t_r | — | 4 | 18 | μs | $V_{CE} = 2\text{V}, I_C = 2 \text{ mA}, RL = 100\Omega$ | See Figure 12 . |
| Response Time (Fall) | t_f | — | 3 | 18 | μs | | |

Figure 1: Forward Current vs. Ambient Temperature

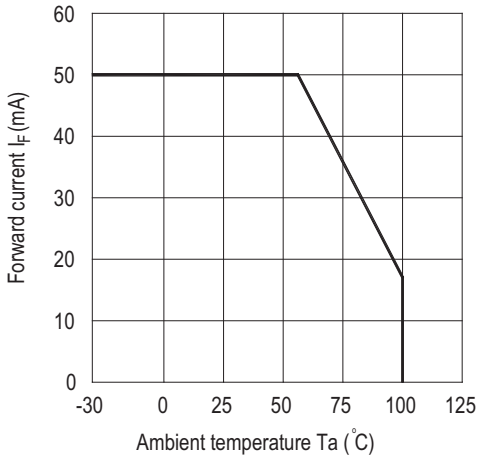


Figure 2: Collector Power Dissipation vs. Ambient Temperature

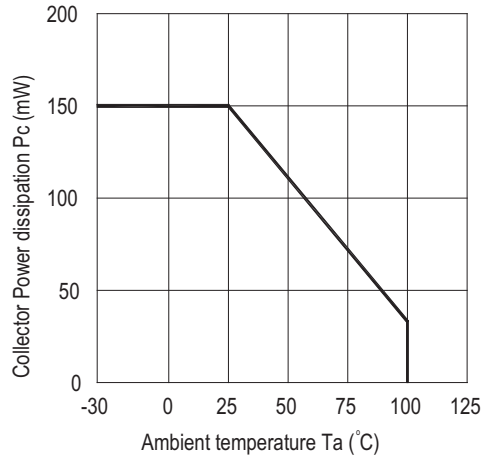


Figure 3: Collector-Emitter Saturation Voltage vs. Forward Current

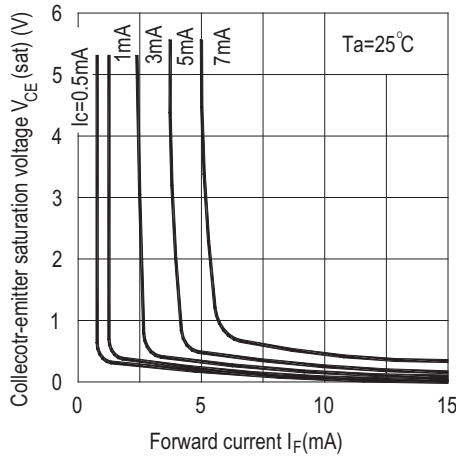


Figure 4: Forward Current vs. Forward Voltage

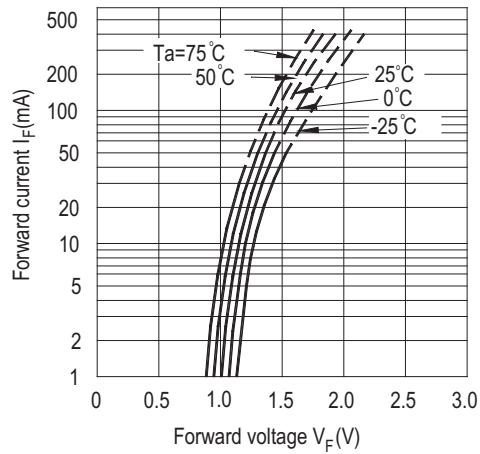


Figure 5: Current Transfer Ratio vs. Forward Current

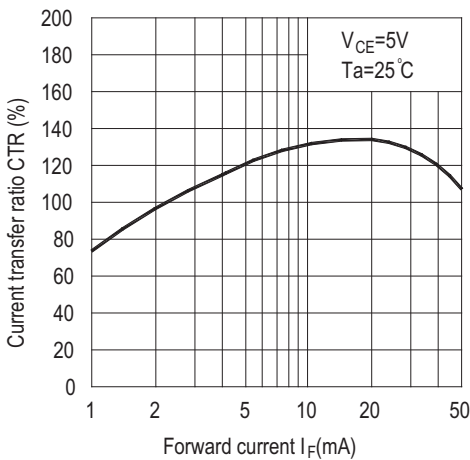


Figure 6: Collector Current vs. Collector-Emitter Voltage

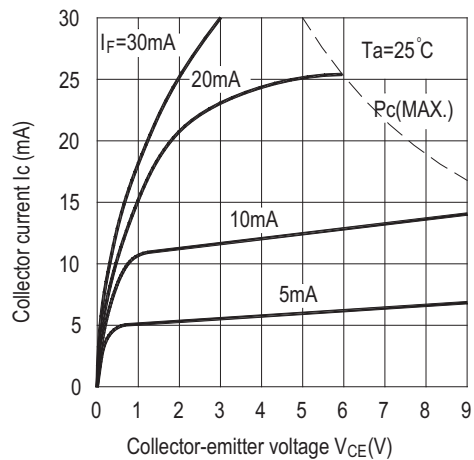


Figure 7: Relative Current Transfer Ratio vs. Ambient Temperature

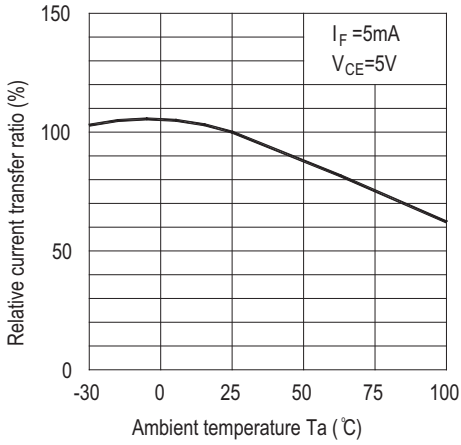


Figure 8: Collector-Emitter Saturation Voltage vs. Ambient Temperature

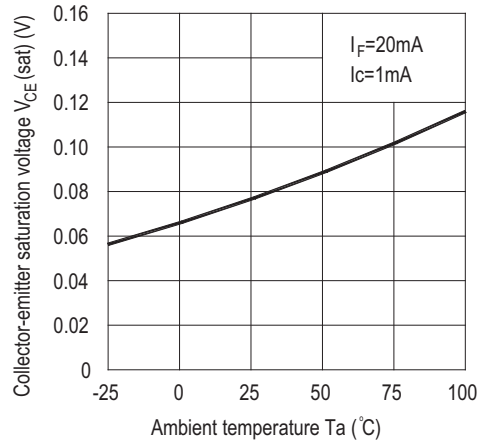


Figure 9: Collector Dark Current vs. Ambient Temperature

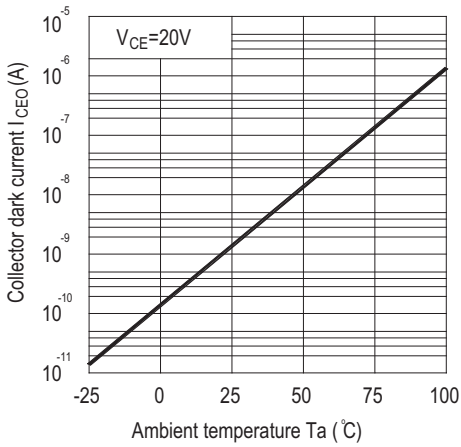


Figure 10: Response Time vs. Load Resistance

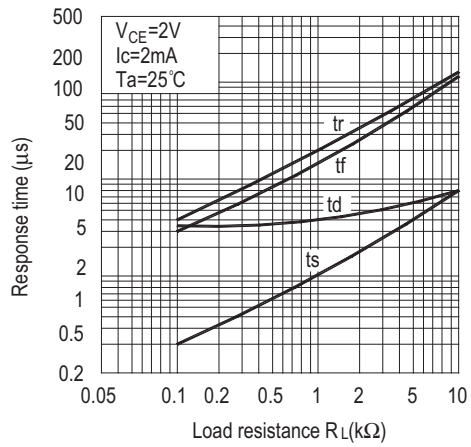


Figure 11: Frequency Response

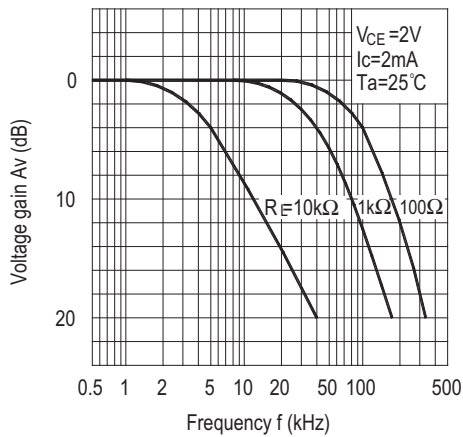


Figure 12: Test Circuit for Response Time

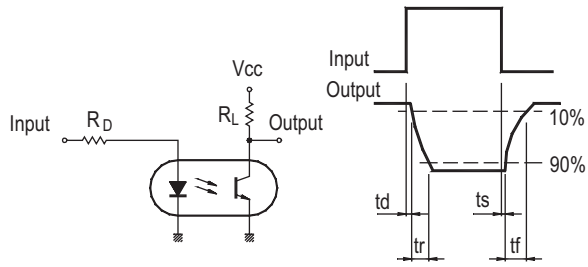


Figure 13: Test Circuit for Frequency Response

