# ACPL-217
## DC Input , Half-Pitch Phototransistor Optocoupler

AVAGO TECHNOLOGIES

# Data Sheet

**Lead (Pb) Free**
RoHS 6 fully compliant

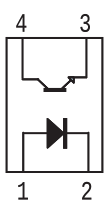
RoHS 6 fully compliant options available;
-xxxE denotes a lead-free product

## Description

The ACPL-217 is a DC-input single channel half-pitch phototransistor optocoupler which contains a light emitting diode optically coupled to a phototransistor. It is packaged in a 4-pin SO package.

The input-output isolation voltage is rated at 3000 Vrms. Response time, tr, is 2µs typically, while minimum CTR is 50% at input current of 5 mA

## ACPL-217 pin layout




| Pin | Description |
|---|---|
| 1 | Anode |
| 2 | Cathode |
| 3 | Emitter |
| 4 | Collector |

## Features

- Current transfer ratio
  (CTR: 50% (min) at $I_F = 5mA$, $V_{CC} = 5V$)
- High input-output isolation voltage
  ($V_{ISO} = 3{,}000V_{RMS}$)
- Non-saturated Response time
  (tr: 2µs (typ) at $V_{CC} = 10V$, $I_C = 2mA$, $R_L = 100\Omega$)
- SO package
- CMR 10kV/µs (typical)
- Safety and regulatory approvals
  - cUL
  - IEC/EN/DIN EN 60747-5-2
- Options available:
  – CTR Ranks 0, A, B, C & D

## Applications

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

## Ordering Information

ACPL-217-xxxx is UL Recognized with 3000 Vrms for 1 minute per UL1577 and Canadian Component Acceptance Notice #5.

| | RoHS Compliant Option | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Part number | Rank '0'<br>50%<br><CTR<<br>600%<br>$I_F$=5mA,<br>$V_{CE}$=5V | Rank 'A'<br>80%<br><CTR<br><160%<br>$I_F$=5mA,<br>$V_{CE}$=5V | Rank 'B'<br>130%<br><CTR<<br>260%<br>$I_F$=5mA,<br>$V_{CE}$=5V | Rank 'C'<br>200%<br><CTR<<br>400%<br>$I_F$=5mA,<br>$V_{CE}$=5V | Rank 'D'<br>300%<br><CTR<<br>600%<br>$I_F$=5mA<br>$V_{CE}$=5V | Package | Surface Mount | Tape & Reel | IC Orientation | IEC/EN/DIN EN 60747-5-2 | Quantity |
| ACPL -217 | -500E | -50AE | -50BE | -50CE | -50DE | SO-4 | x | x | 0° | | 3000 pcs per reel |
| | -560E | -56AE | -56BE | -56CE | -56DE | SO-4 | x | x | 0° | X | 3000 pcs per reel |
| | -700E | -70AE | -70BE | -70CE | -70DE | SO-4 | x | X | 180° | | 3000 pcs per reel |
| | -760E | -76AE | -76BE | -76CE | -76DE | SO-4 | x | x | 180° | X | 3000 pcs per reel |

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:

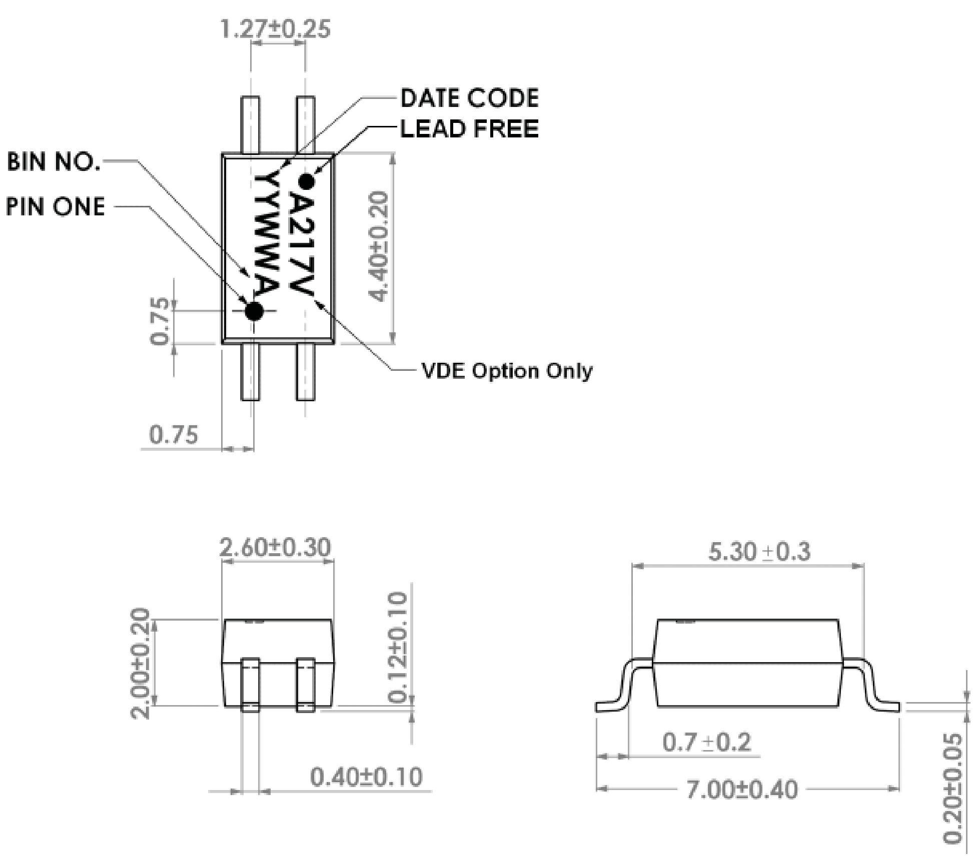
ACPL-217-560E to order product of SO-4 Surface Mount package in Tape & Reel packaging with IEC/EN/DIN EN 60767-5-2 Safety Approval, 50%<CTR<600% and RoHS compliant.

Example 2

ACPL-217-50BE to order product of SO-4 Surface Mount package in Tape & Reel packaging with 130%<CTR<260% and RoHS compliant.

Option datasheets are available. Contact your Avago sales representative or authorized distributor for information.

## Package Outline Drawings



## Solder Reflow Temperature Profile

Recommended reflow condition as per JEDEC Standard, J-STD-020 (latest revision). Non-Halide Flux should be used.

## Absolute Maximum Ratings

| Parameter | Symbol | ACPL-217 | Units | Note |
|---|---|---|---|---|
| Storage Temperature | $T_S$ | -55~125 | °C | |
| Operating Temperature | $T_A$ | -55~110 | °C | |
| Average Forward Current | $I_{F(AVG)}$ | 50 | mA | |
| Pulse Forward Current | $I_{FSM}$ | 1 | A | |
| Reverse Voltage | $V_R$ | 6 | V | |
| LED Power Dissipation | $P_I$ | 65 | mW | |
| Collector Current | $I_C$ | 50 | mA | |
| Collector-Emitter Voltage | $V_{CEO}$ | 80 | V | |
| Emitter-Collector Voltage | $V_{ECO}$ | 7 | V | |
| Isolation Voltage (AC for 1min, R.H. 40~60%) | $V_{ISO}$ | 3000 | $V_{RMS}$ | 1min |
| Collector Power Dissipation | $P_C$ | 150 | mW | |
| Total Power Dissipation | $P_{TOT}$ | 200 | mW | |
| Lead Solder Temperature | | 260°C for 10 seconds | | |

## Electrical Specifications (DC)

Over recommended ambient temperature at 25°C unless otherwise specified.

| Parameter | Symbol | Min. | Typ. | Max. | Units | Test Conditions | Note |
|---|---|---|---|---|---|---|---|
| Forward Voltage | $V_F$ | - | 1.2 | 1.4 | V | $I_F$ = 20mA | Fig.6 |
| Reverse Current | $I_R$ | - | - | 10 | µA | $V_R$ = 5V | |
| Terminal Capacitance | $C_t$ | - | 30 | - | pF | V = 0, f = 1MHz | |
| Collector Dark Current | $I_{CEO}$ | - | - | 100 | nA | $V_{CE}$ = 48V, $I_F$ = 0 mA | Fig.12 |
| Collector-Emitter Breakdown Voltage | $BV_{CEO}$ | 80 | - | - | V | $I_C$ = 0.5 mA, $I_F$ = 0 mA | |
| Emitter-Collector Breakdown Voltage | $BV_{ECO}$ | 7 | - | - | V | $I_E$ = 100 µA, $I_F$ = 0 mA | |
| Current Transfer Ratio | CTR | 50 | - | 600 | % | $I_F$ = 5 mA, $V_{CE}$ = 5V | CTR=($I_C$/IF )* 100% |
| Saturated CTR | CTR(sat) | - | 100 | - | % | $I_F$=1mA, $V_{CE}$ = 0.4V | |
| Collector-Emitter Saturation Voltage | $V_{CE}$(sat) | - | - | 0.4 | V | $I_F$ = 8mA, $I_C$ = 2.4mA | Fig.14 |
| Isolation Resistance | $R_{ISO}$ | $5x10^{10}$ | $1x10^{11}$ | - | Ω | DC500V, R.H. 40~60% | |
| Floating Capacitance | $C_F$ | - | 0.6 | 1 | pF | V = 0, f = 1MHz | |
| Cut-off Frequency (-3dB) | $F_C$ | - | 80 | - | kHz | $V_{CC}$ = 5V, $I_C$ = 2 mA, $R_L$ = 100Ω | Fig. 2,19 |
| Response Time (Rise) | $t_r$ | - | 2 | - | µs | $V_{CC}$ = 10V, $I_C$ = 2 mA, $R_L$ = 100Ω | Fig. 1 |
| Response Time (Fall) | $t_f$ | - | 3 | - | µs | | |
| Turn-on Time | $t_{on}$ | - | 3 | - | µs | | |
| Turn-off Time | $t_{off}$ | - | 3 | - | µs | | |
| Turn-ON Time | $t_{ON}$ | - | 2 | - | µs | $V_{CC}$ = 5V, $I_F$ = 16 mA, $R_L$ = 1.9kΩ | Fig. 1, 17 |
| Storage Time | $T_S$ | - | 25 | - | µs | | |
| Turn-OFF Time | $t_{OFF}$ | - | 40 | - | µs | | |
| Common Mode Rejection Voltage | CMR | - | 10 | - | kV/µs | Ta=25°C, $R_L$=470Ω, $V_{CM}$=1.5kV(peak), $I_F$=0mA, $V_{CC}$=9V, $V_{np}$=100mV | Fig.20 |

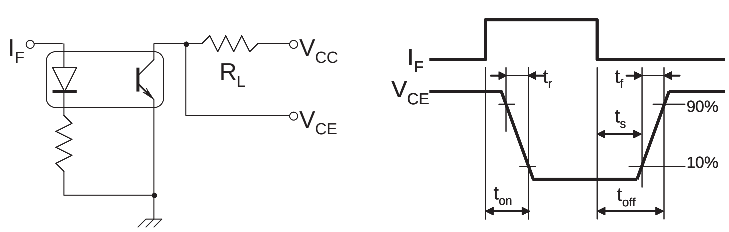



**Figure 1. Switching Time Test Circuit**

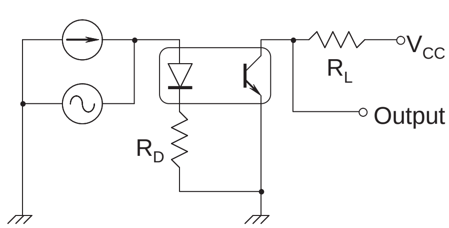



**Figure 2. Frequency Response Test Circuit**

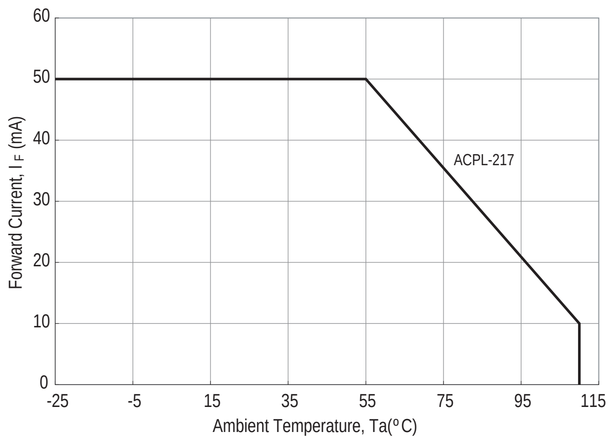



**Figure 3. Forward Current vs. Ambient Temperature.**

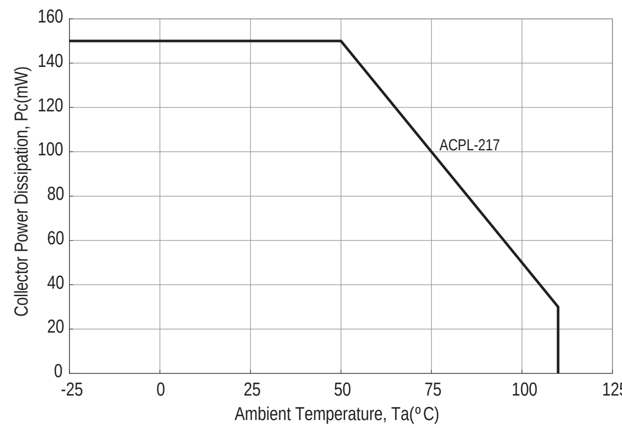



**Figure 4. Collector Power Dissipation vs. Ambient Temperature**

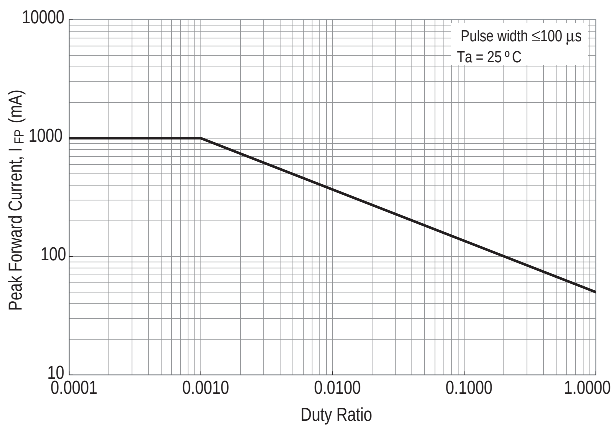



**Figure 5. Pulse Forward Current vs. Duty Cycle Ratio**

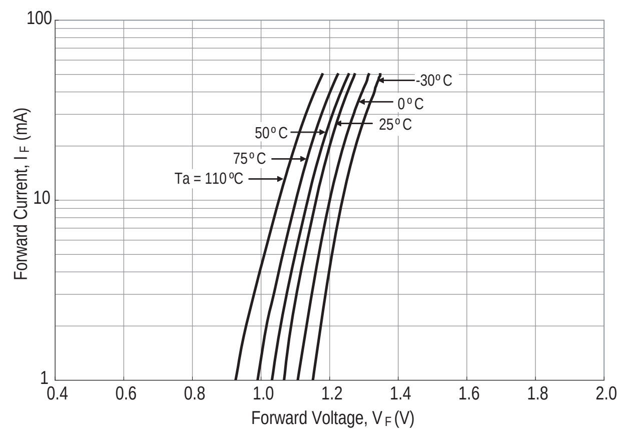



**Figure 6. Forward Current vs. Forward Voltage**

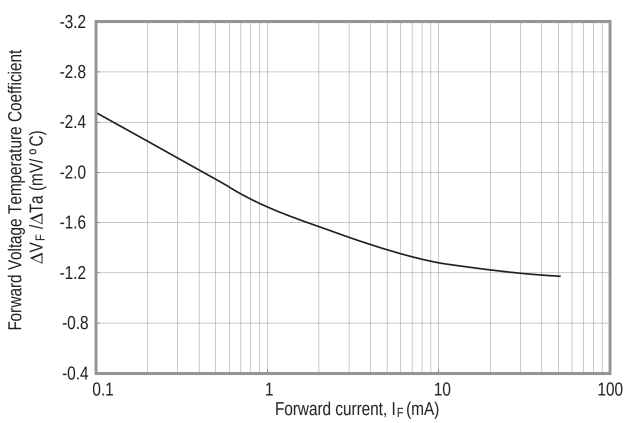



**Figure 7. Forward Voltage Temperature Coefficient vs. Forward Current**

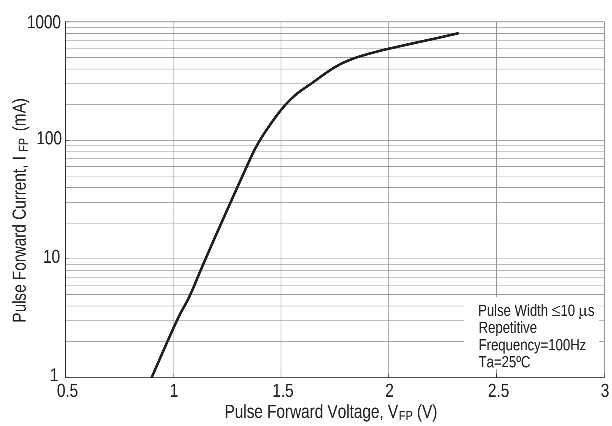



**Figure 8. Pulse Forward Current vs. Pulse Forward Voltage**

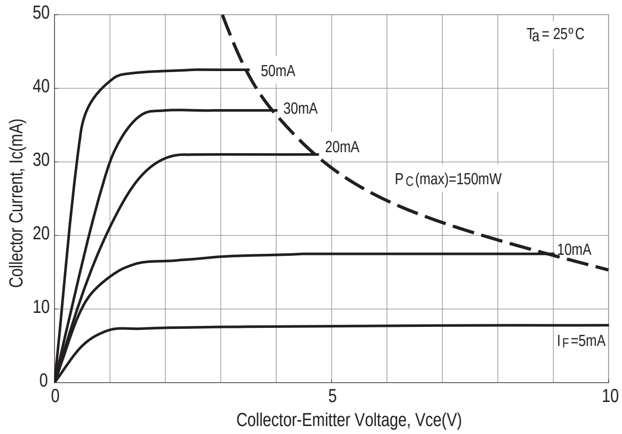



**Figure 9. Collector Current vs. Collector-Emitter Voltage**

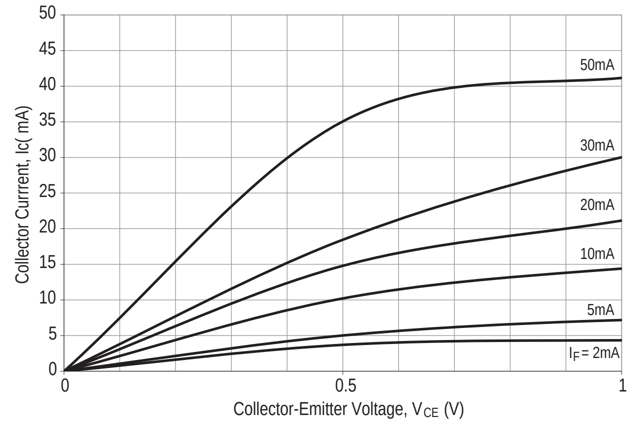



**Figure 10. Collector Current vs. Small Collector-Emitter Voltage**

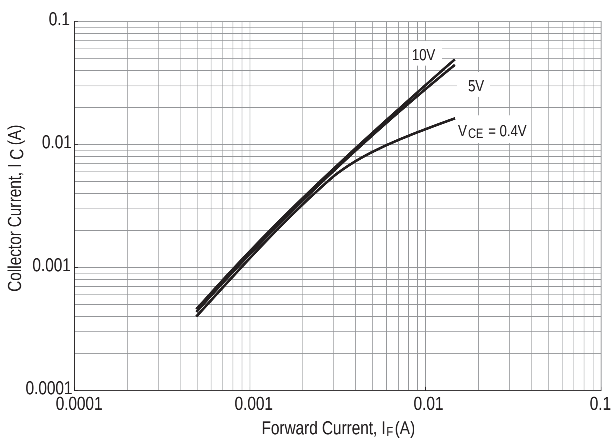



**Figure 11. Collector Current vs. Forward Current**

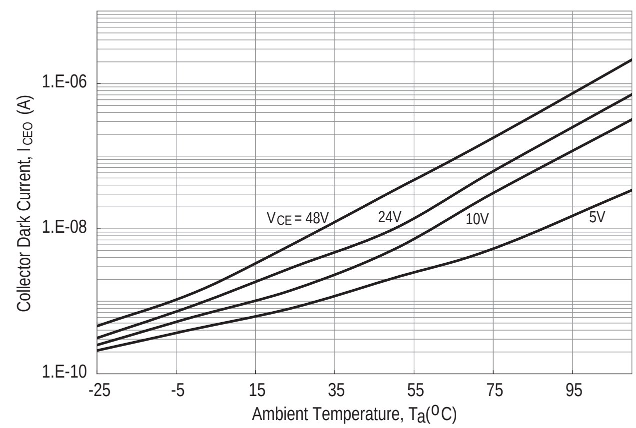



**Figure 12. Collector Dark Current vs. Ambient Temperature**

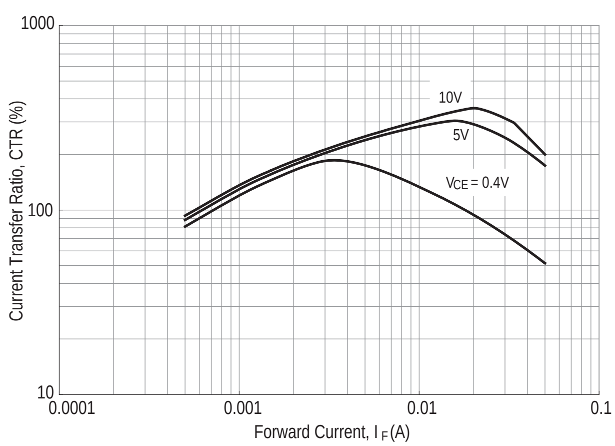



**Figure 13. Current Transfer Ratio vs. Forward Current**

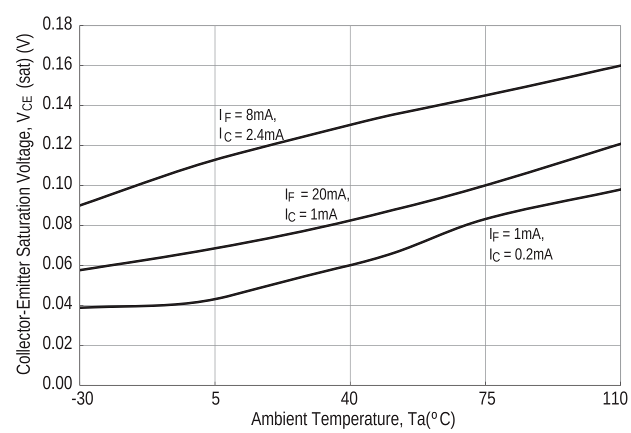



**Figure 14. Collector-Emitter Saturation Voltage vs. Ambient Temperature**

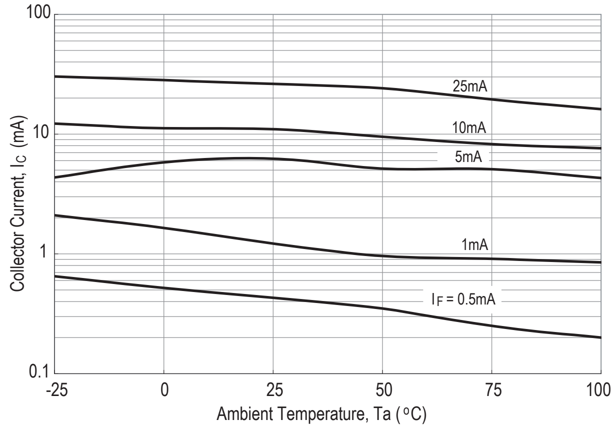



**Figure 15. Collector Current vs. Ambient Temperature**

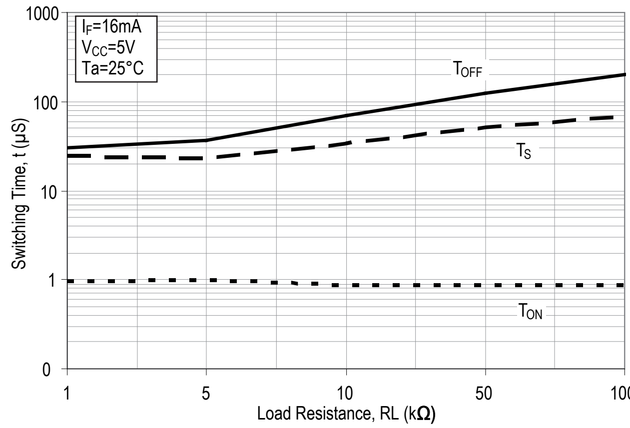



**Figure 16. Switching Time vs. Load Resistance**

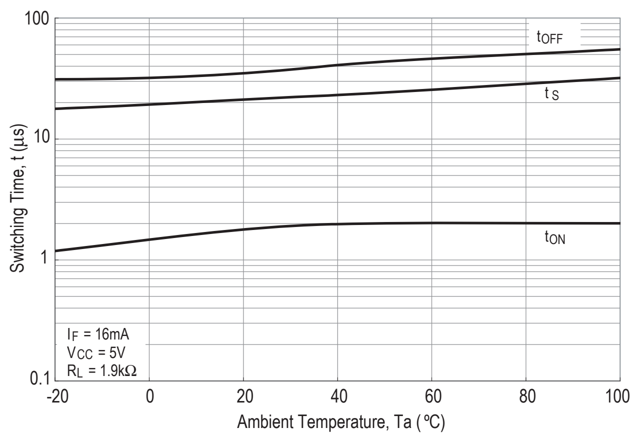



**Figure 17. Switching Time vs. Ambient Temperature**

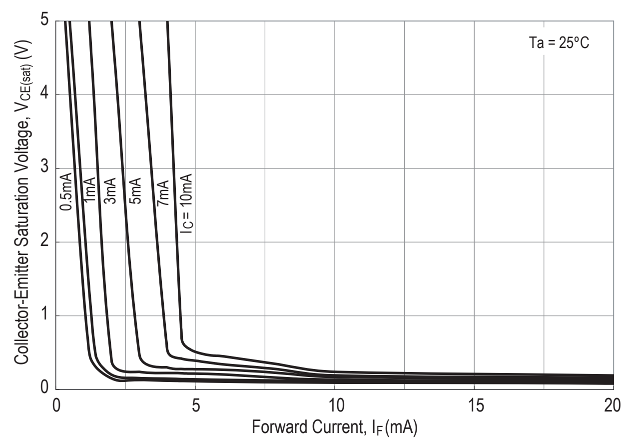



**Figure 18. Collector-Emitter Saturation Voltage vs. Forward Current**

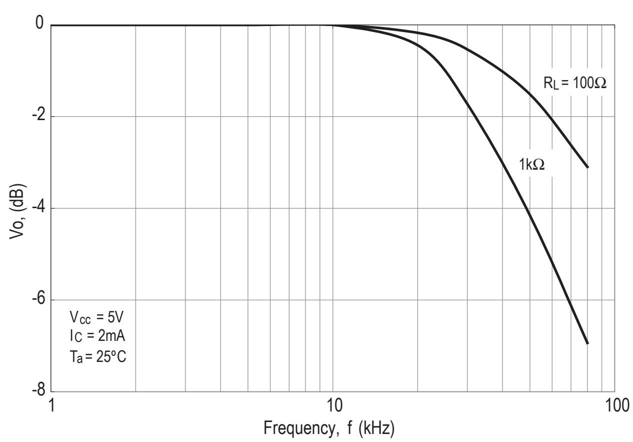



**Figure 19. Frequency Response**

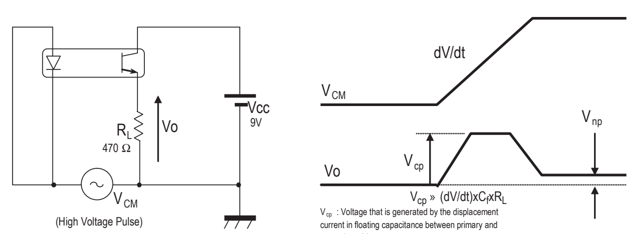



**Figure 20. CMR Test Circuit**

For product information and a complete list of distributors, please go to our web site: **www.avagotech.com**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