

# ACPL-217

## DC Input , Half-Pitch Phototransistor Optocoupler



### Data Sheet



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

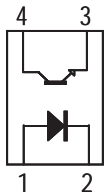
RoHS 6 fully compliant options available;  
-xxxE denotes a lead-free product

#### 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,  $t_r$ , is 2 $\mu$ s 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  $I_F = 5\text{mA}$ ,  $V_{CC} = 5\text{V}$ )
- High input-output isolation voltage ( $V_{ISO} = 3,000V_{RMS}$ )
- Non-saturated Response time ( $t_r$ : 2 $\mu$ s (typ) at  $V_{CC} = 10\text{V}$ ,  $I_C = 2\text{mA}$ ,  $R_L = 100\Omega$ )
- SO package
- CMR 10kV/ $\mu$ s (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'	Rank 'A'	Rank 'B'	Rank 'C'	Rank 'D'	Package	Surface Mount	Tape & Reel	IC Orientation	IEC/EN/DIN EN 60747-5-2	Quantity
	50% <CTR< 600%	80% <CTR< <160%	130% <CTR< 260%	200% <CTR< 400%	300% <CTR< 600%						
	I <sub>F</sub> =5mA, V <sub>CE</sub> =5V	I <sub>F</sub> =5mA, V <sub>CE</sub> =5V	I <sub>F</sub> =5mA, V <sub>CE</sub> =5V	I <sub>F</sub> =5mA, V <sub>CE</sub> =5V	I <sub>F</sub> =5mA, V <sub>CE</sub> =5V						
	-500E	-50AE	-50BE	-50CE	-50DE	SO-4	x	x	0°		3000 pcs per reel
ACPL	-560E	-56AE	-56BE	-56CE	-56DE	SO-4	x	x	0°	X	3000 pcs per reel
-217	-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:

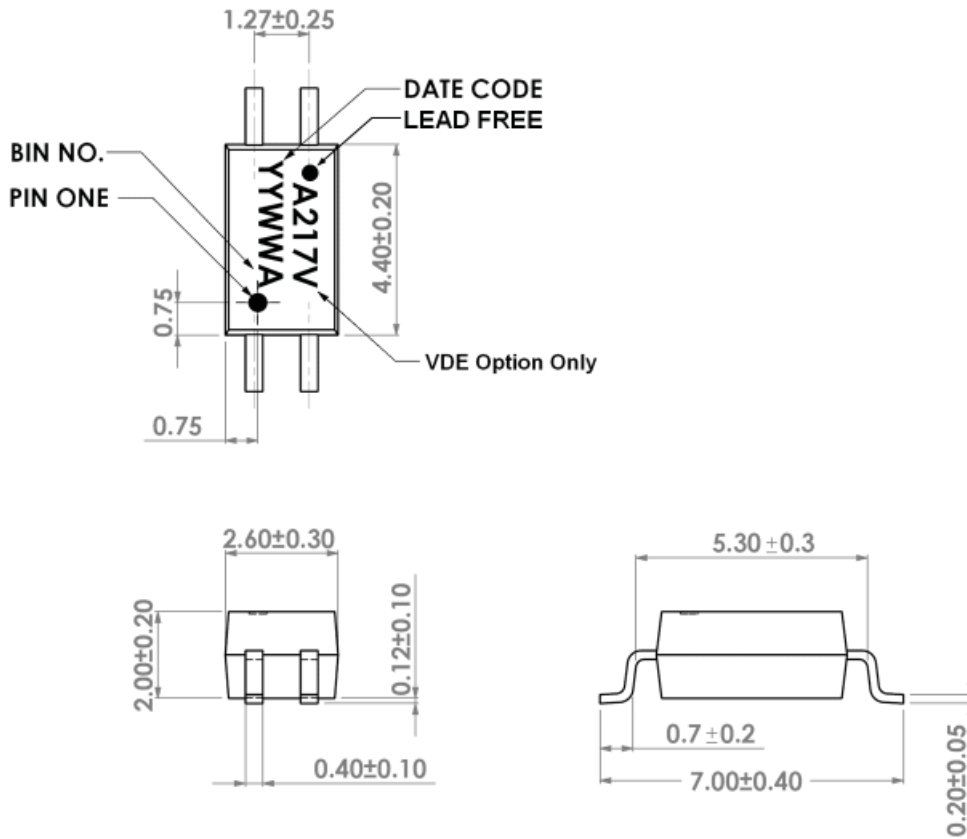
ACPL-217-560E to order product of SO-4 Surface Mount package in Tape & Reel packaging with IEC/EN/DIN EN 60767-5-2 Safety Approval, 50%<CTR<600% and RoHS compliant.

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 <sub>S</sub>	-55~125	°C	
Operating Temperature	T <sub>A</sub>	-55~110	°C	
Average Forward Current	I <sub>F(AVG)</sub>	50	mA	
Pulse Forward Current	I <sub>FSM</sub>	1	A	
Reverse Voltage	V <sub>R</sub>	6	V	
LED Power Dissipation	P <sub>I</sub>	65	mW	
Collector Current	I <sub>C</sub>	50	mA	
Collector-Emitter Voltage	V <sub>CEO</sub>	80	V	
Emitter-Collector Voltage	V <sub>ECO</sub>	7	V	
Isolation Voltage (AC for 1min, R.H. 40~60%)	V <sub>ISO</sub>	3000	V <sub>RMS</sub>	1min
Collector Power Dissipation	P <sub>C</sub>	150	mW	
Total Power Dissipation	P <sub>TOT</sub>	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	$I_F = 20\text{mA}$	Fig.6
Reverse Current	$I_R$	-	-	10	$\mu\text{A}$	$V_R = 5\text{V}$	
Terminal Capacitance	$C_t$	-	30	-	pF	$V = 0, f = 1\text{MHz}$	
Collector Dark Current	$I_{CEO}$	-	-	100	nA	$V_{CE} = 48\text{V}, I_F = 0\text{mA}$	Fig.12
Collector-Emitter Breakdown Voltage	$BV_{CEO}$	80	-	-	V	$I_C = 0.5\text{mA}, I_F = 0\text{mA}$	
Emitter-Collector Breakdown Voltage	$BV_{ECO}$	7	-	-	V	$I_E = 100\mu\text{A}, I_F = 0\text{mA}$	
Current Transfer Ratio	CTR	50	-	600	%	$I_F = 5\text{mA}, V_{CE} = 5\text{V}$	$CTR = (I_C/I_F) * 100\%$
Saturated CTR	CTR(sat)	-	100	-	%	$I_F = 1\text{mA}, V_{CE} = 0.4\text{V}$	
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	-	-	0.4	V	$I_F = 8\text{mA}, I_C = 2.4\text{mA}$	Fig.14
Isolation Resistance	$R_{ISO}$	$5 \times 10^{10}$	$1 \times 10^{11}$	-	$\Omega$	DC500V, R.H. 40~60%	
Floating Capacitance	$C_F$	-	0.6	1	pF	$V = 0, f = 1\text{MHz}$	
Cut-off Frequency (-3dB)	$F_C$	-	80	-	kHz	$V_{CC} = 5\text{V}, I_C = 2\text{mA}, R_L = 100\Omega$	Fig. 2,19
Response Time (Rise)	$t_r$	-	2	-	$\mu\text{s}$	$V_{CC} = 10\text{V}, I_C = 2\text{mA}, R_L = 100\Omega$	Fig. 1
Response Time (Fall)	$t_f$	-	3	-	$\mu\text{s}$		
Turn-on Time	$t_{on}$	-	3	-	$\mu\text{s}$		
Turn-off Time	$t_{off}$	-	3	-	$\mu\text{s}$		
Turn-ON Time	$t_{ON}$	-	2	-	$\mu\text{s}$	$V_{CC} = 5\text{V}, I_F = 16\text{mA}, R_L = 1.9\text{k}\Omega$	Fig. 1, 17
Storage Time	$T_S$	-	25	-	$\mu\text{s}$		
Turn-OFF Time	$t_{OFF}$	-	40	-	$\mu\text{s}$		
Common Mode Rejection Voltage	CMR	-	10	-	kV/ $\mu\text{s}$	$T_a = 25^\circ\text{C}, R_L = 470\Omega, V_{CM} = 1.5\text{kV(peak)}, I_F = 0\text{mA}, V_{CC} = 9\text{V}, V_{np} = 100\text{mV}$	Fig.20

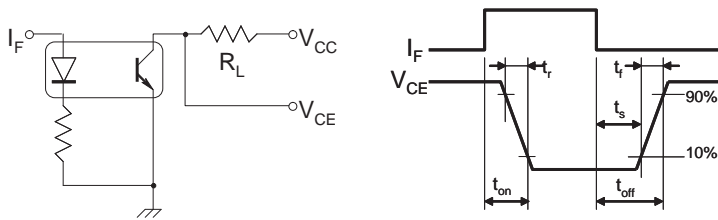


Figure 1. Switching Time Test Circuit

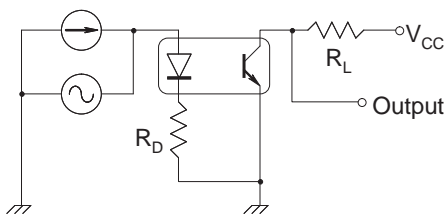


Figure 2. Frequency Response Test Circuit

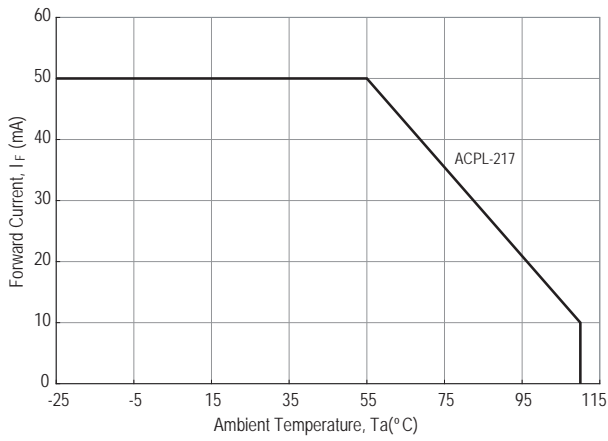


Figure 3. Forward Current vs. Ambient Temperature.

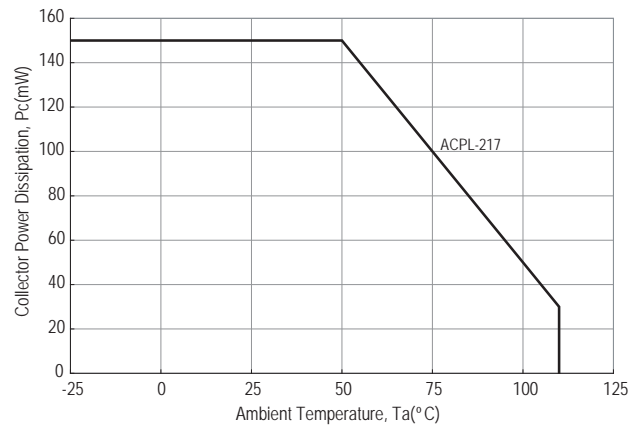


Figure 4. Collector Power Dissipation vs. Ambient Temperature

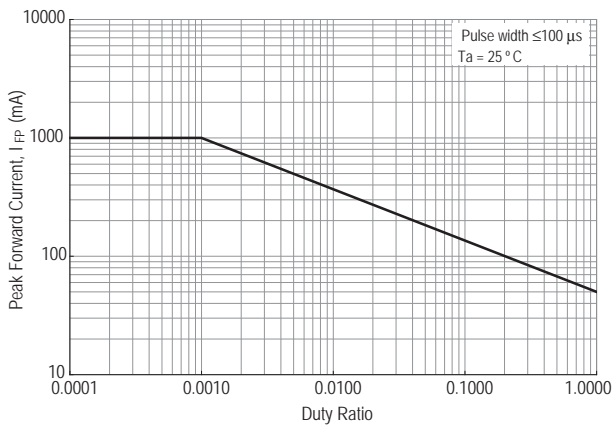


Figure 5. Pulse Forward Current vs. Duty Cycle Ratio

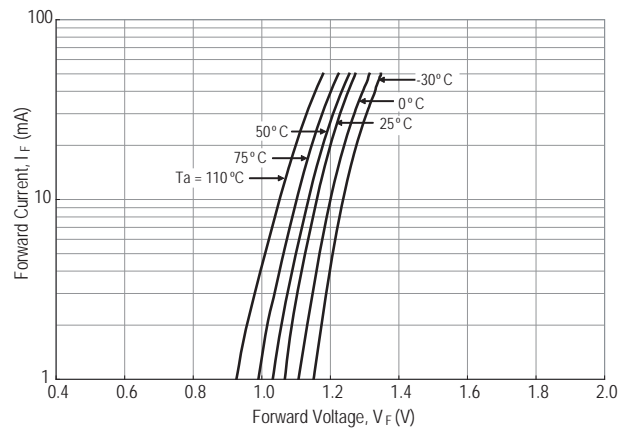


Figure 6. Forward Current vs. Forward Voltage

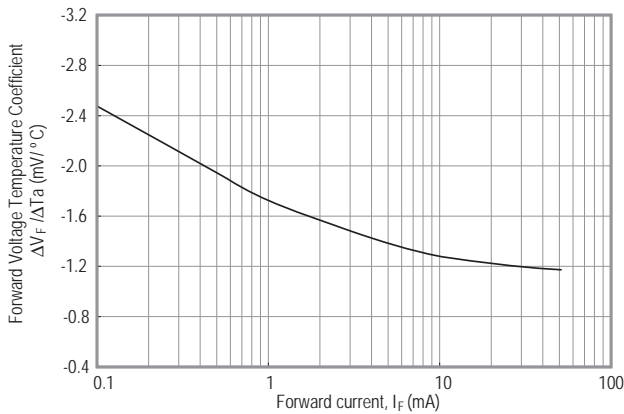


Figure 7. Forward Voltage Temperature Coefficient vs. Forward Current

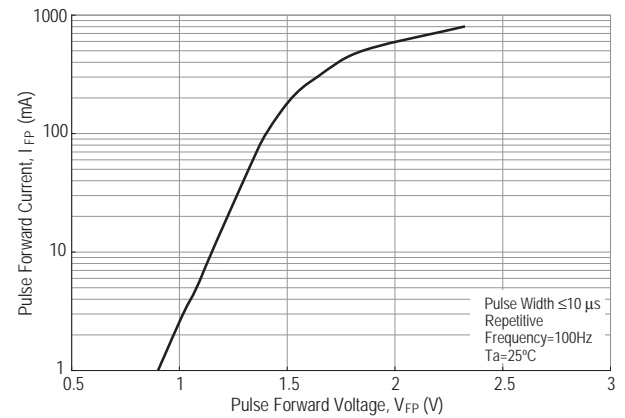
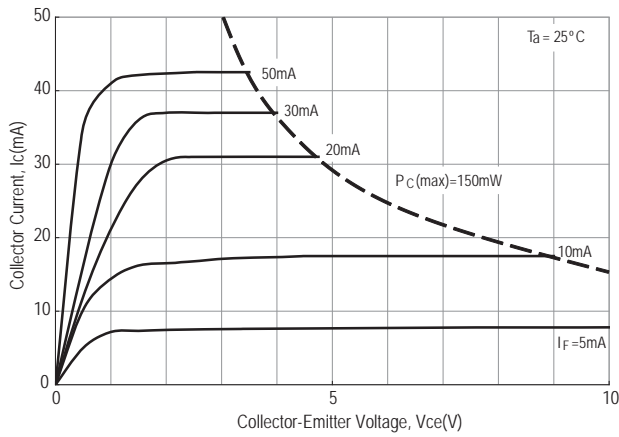
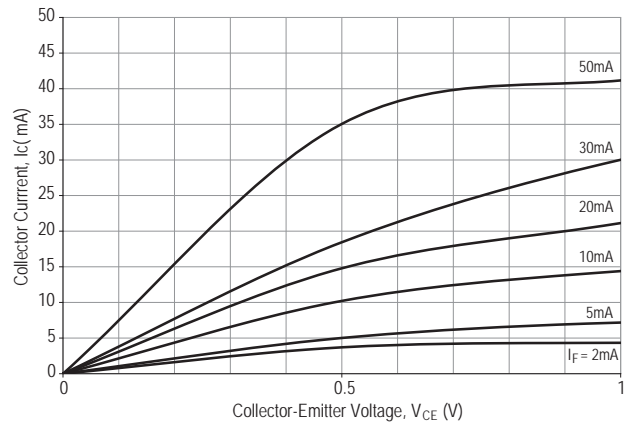


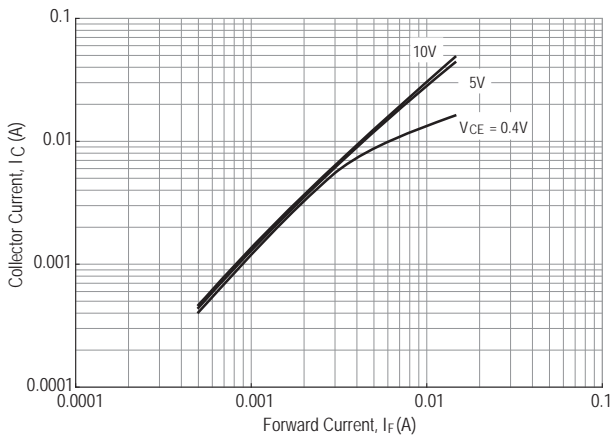
Figure 8. Pulse Forward Current vs. Pulse Forward Voltage



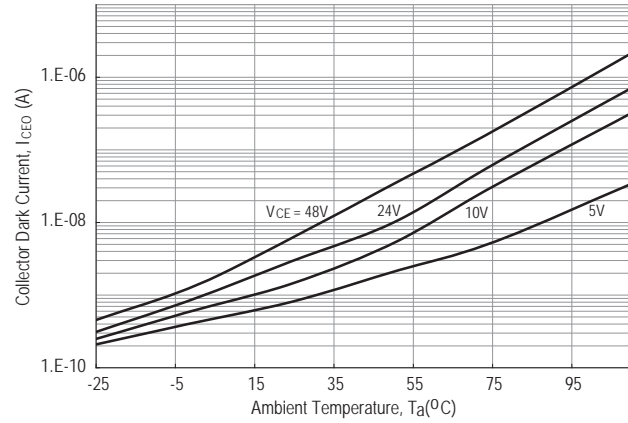
**Figure 9. Collector Current vs. Collector-Emitter Voltage**



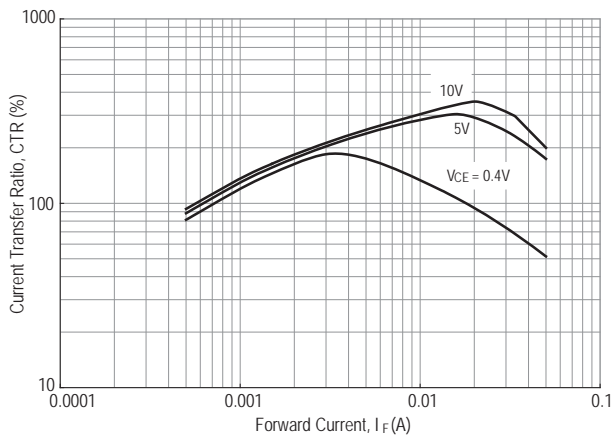
**Figure 10. Collector Current vs. Small Collector-Emitter Voltage**



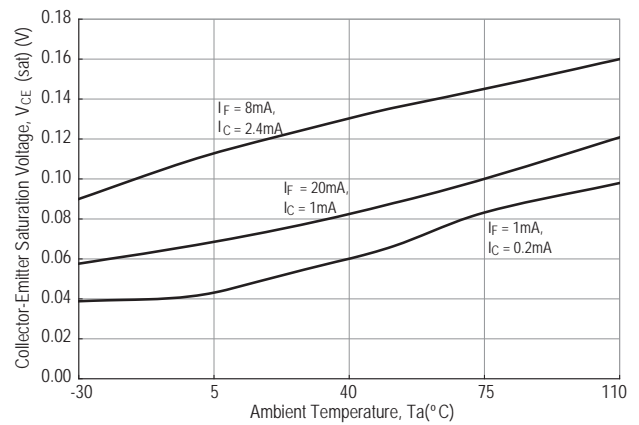
**Figure 11. Collector Current vs. Forward Current**



**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**

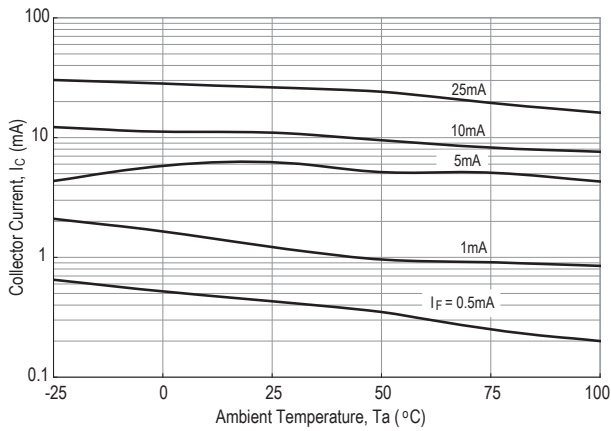


Figure 15. Collector Current vs. Ambient Temperature

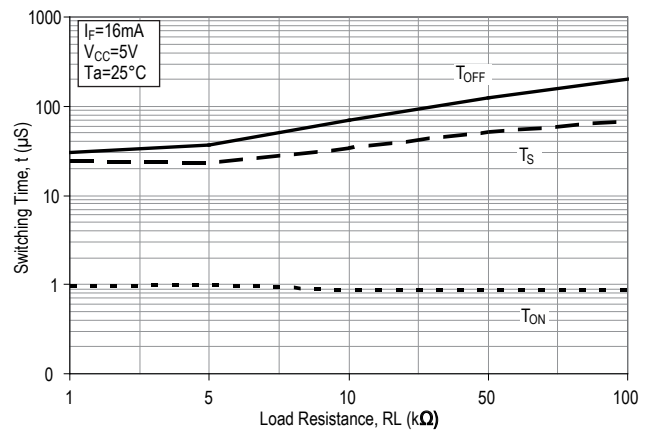


Figure 16. Switching Time vs. Load Resistance

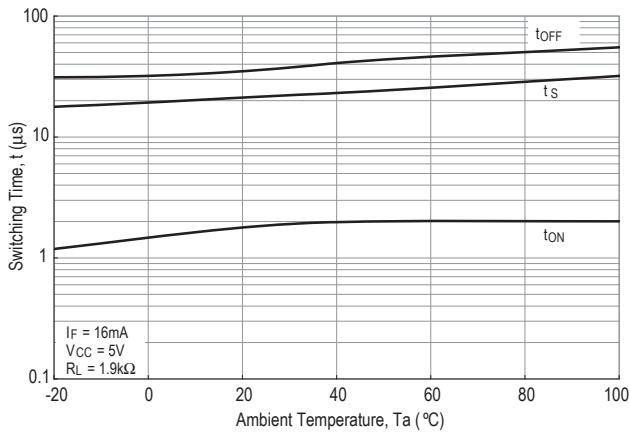


Figure 17. Switching Time vs. Ambient Temperature

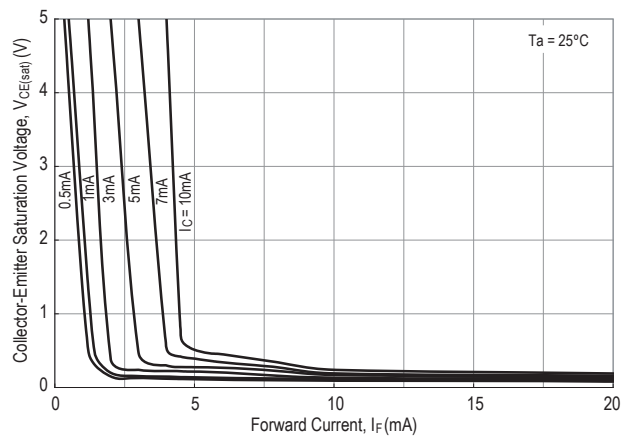


Figure 18. Collector-Emitter Saturation Voltage vs. Forward Current

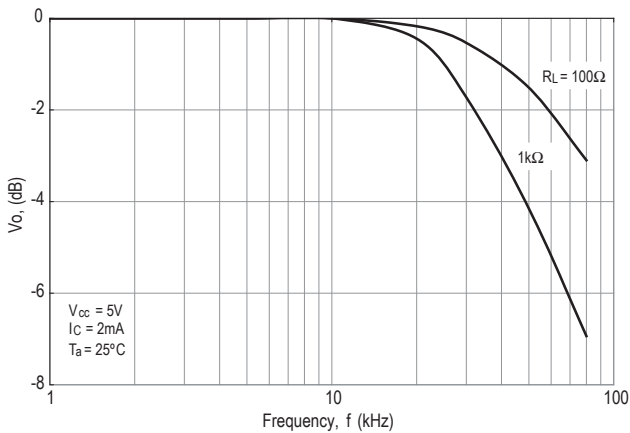


Figure 19. Frequency Response

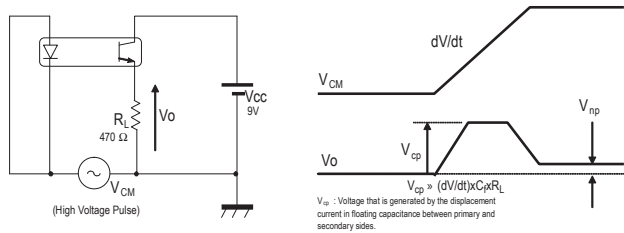


Figure 20. CMR Test Circuit

For product information and a complete list of distributors, please go to our web site: [www.avagotech.com](http://www.avagotech.com)

Avago, Avago Technologies, and the A logo are trademarks of Avago Technologies in the United States and other countries. Data subject to change. Copyright © 2005-2011 Avago Technologies. All rights reserved. AV02-0470EN - August 3, 2011

