ACPL-224 / ACPL-244

AC Input Multi-Channel 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

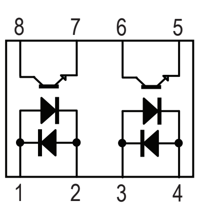
Description

The ACPL-224 is an AC-input dual channel half-pitch phototransistor optocoupler each of which contains 2 light emitting diodes connected inversely parallel & optically coupled to 2 separate phototransistors. It is packaged in an 8-pin SO package.

Likewise, the ACPL-244 is an AC-input quad channel half-pitch phototransistor optocoupler each of which contains 2 light emitting diodes connected inversely parallel & optically coupled to 4 separate phototransistors. It is packaged in a 16-pin SO package.

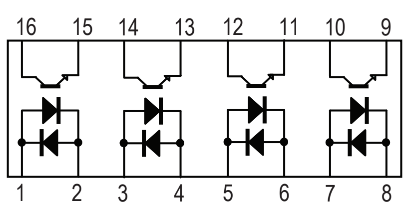
For both devices, the input-output isolation voltage is rated at 3,000 Vrms. Response time, tr, is 2µs typically, while minimum CTR is 20% at input current of ±1 mA.

ACPL-224 pin



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

ACPL-244 pin



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

Features

- Current transfer ratio (CTR: 20% (min) at $I_F = \pm 1mA$, $V_{CE} = 5V$)
- 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
  - UL
  - CSA
  - IEC/EN/DIN EN 60747-5-2
- Options available:
  - CTR Rank '0' only

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-2x4-xxxx is UL Recognized at 3,000 Vrms for 1 minute per UL1577 and is approved under CSA Component Acceptance Notice #5, File CA 88324.

Part number	RoHS Compliant Optiont Rank '0', 20%<CR<400%, I_F=±1mA, V_{CE}=5V	Package	No. Of Channels	Surface Mount	Tape & Reel	IEC / EN / DIN EN 60747-5-2	Quantity
ACPL-224	-500E	SO-8	Dual	X	X		2000 pcs per reel
	-560E	SO-8	Dual	X	X	X	2000 pcs per reel
ACPL-244	-500E	SO-16	Quad	X	X		2000 pcs per reel
	-560E	SO-16	Quad	X	X	X	2000 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-224-560E to order product of Dual Channel SO-8 Surface Mount package in Tape & Reel with IEC/EN/DIN EN 60747-5-2 Safety Approval, 20%<CTR<400% and RoHS compliant.

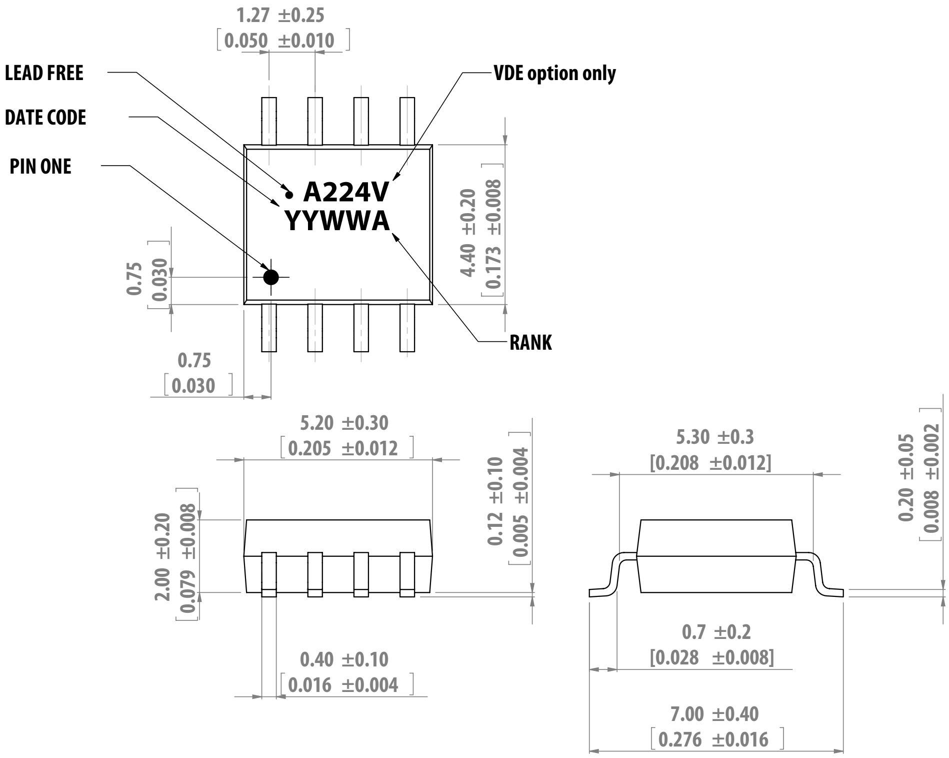
Example 2:

ACPL-244-500E to order product of Quad Channel SO-16 Surface Mount package in Tape and Reel packaging with 20%<CTR<400% and RoHS compliant.

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

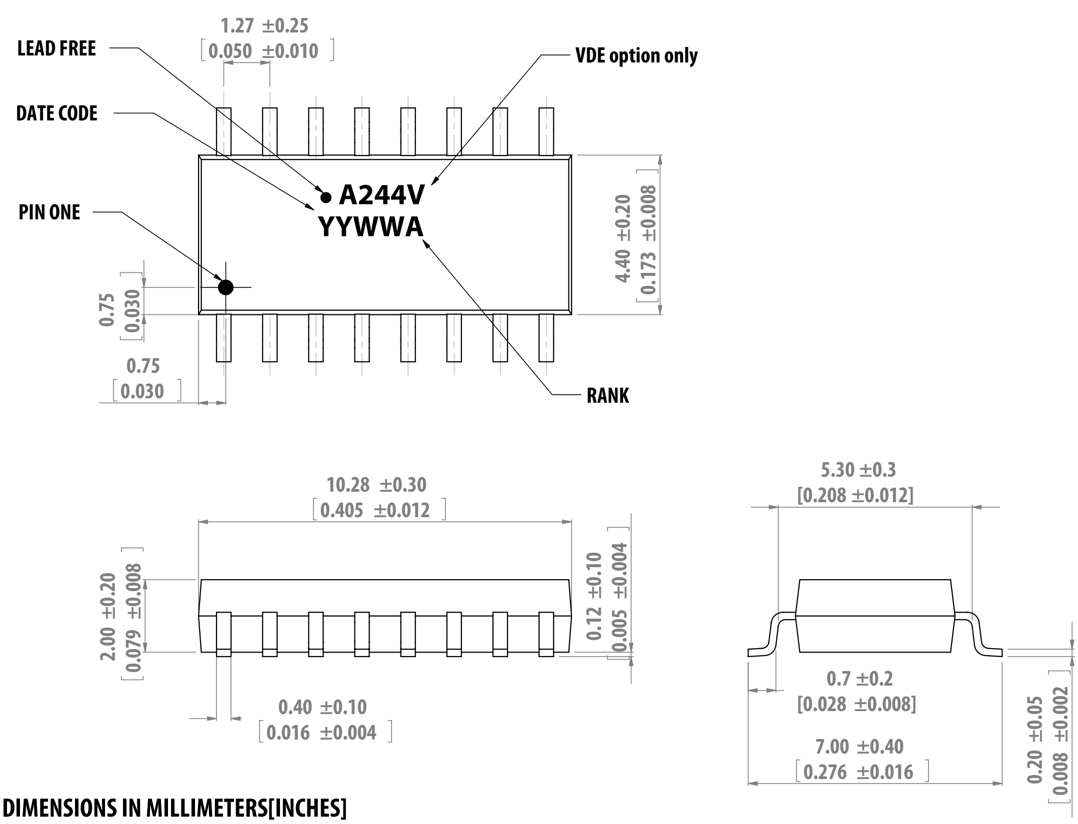
Package Outline Drawings

ACPL-224 Package Outline



DIMENSIONS IN MILLIMETERS [INCHES]

ACPL-244 Package Outline



DIMENSIONS IN MILLIMETERS[INCHES]

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-224	ACPL-244	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 (1 channel)	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}	3,000		V_{RMS}	1min
Collector Power Dissipation (1 channel)	P_C	150	100	mW	
Total Power Dissipation	P_{TOT}	200	170	mW	
Lead Solder Temperature	260+0/-5°C for 30 sec., 1.6 mm below seating plane				

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	20	-	400	%	I_F = ±1 mA, V_{CE} = 5V	CTR=(I_C/I_F)* 100%
Saturated CTR	CTR(sat)	-	60	-	%	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	T_a=25°C, R_L=470Ω, V_{CM}=1.5kV(peak), I_F=0mA, V_{CC}=9V, V_{np}=100mV	Fig.20

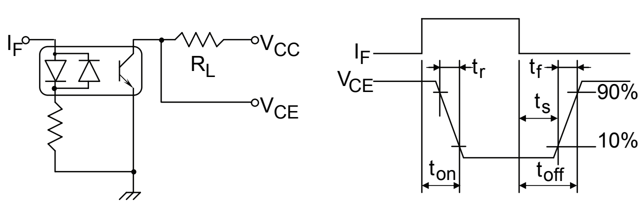


Figure 1. Switching Time Test Circuit

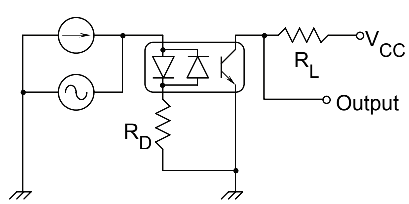


Figure 2. Frequency Response Test Circuit

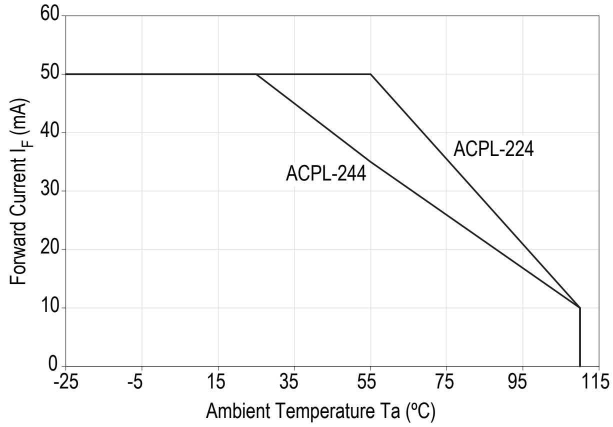


Figure 3. Forward Current vs. Ambient Temperature

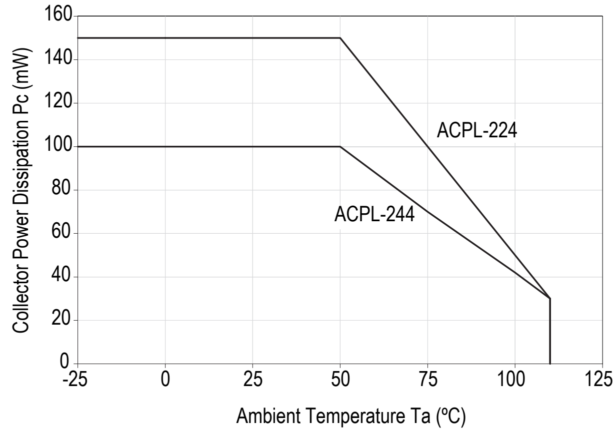


Figure 4. Collector Power Dissipation vs. Ambient Temperature

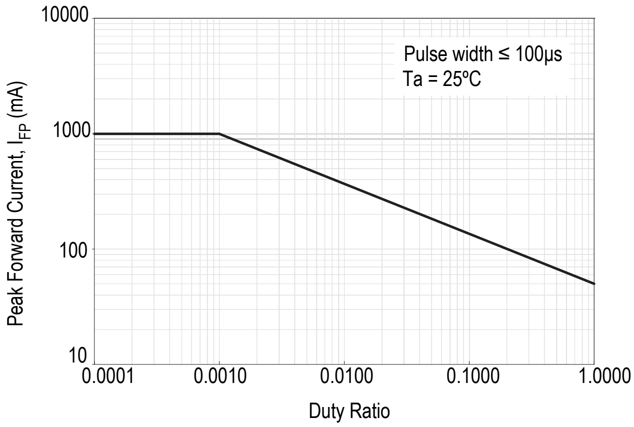


Figure 5. Pulse Forward Current vs. Duty Cycle Ratio

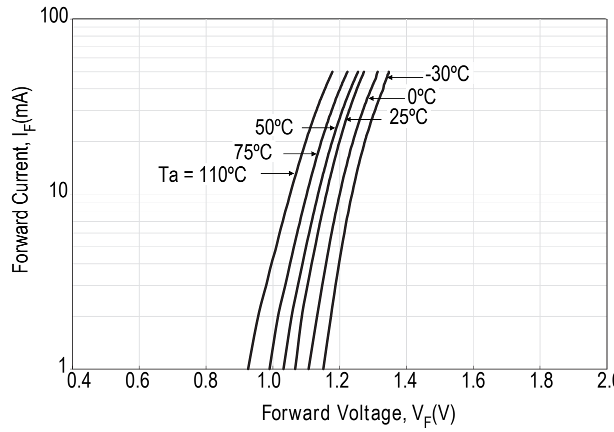


Figure 6. Forward Current vs. Forward Voltage

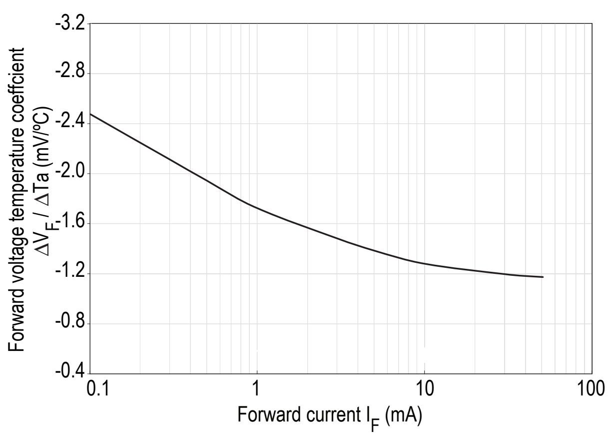


Figure 7. Forward Voltage Temperature Coefficient vs. Forward Current

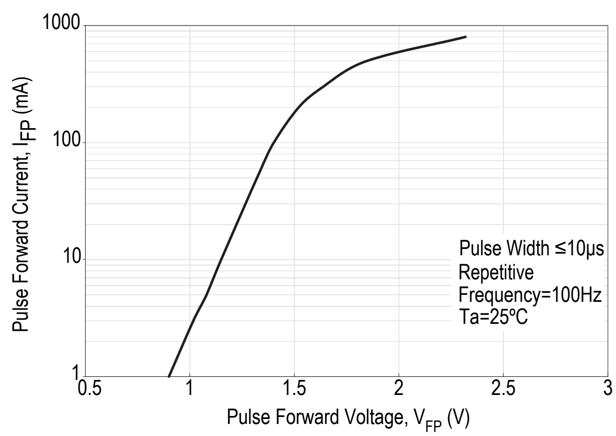


Figure 8. Pulse Forward Current vs. Pulse Forward Voltage

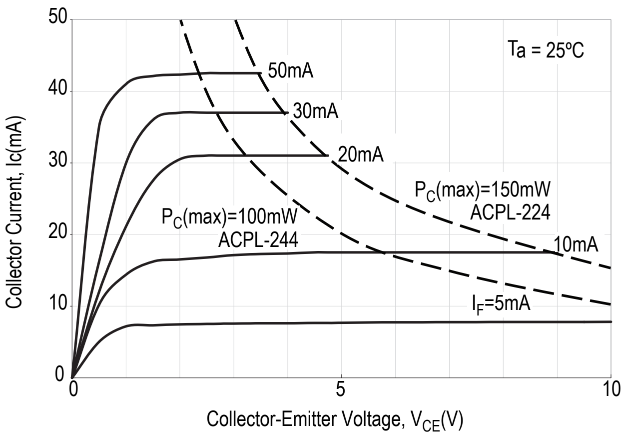


Figure 9. Collector Current vs. Collector-Emitter Voltage

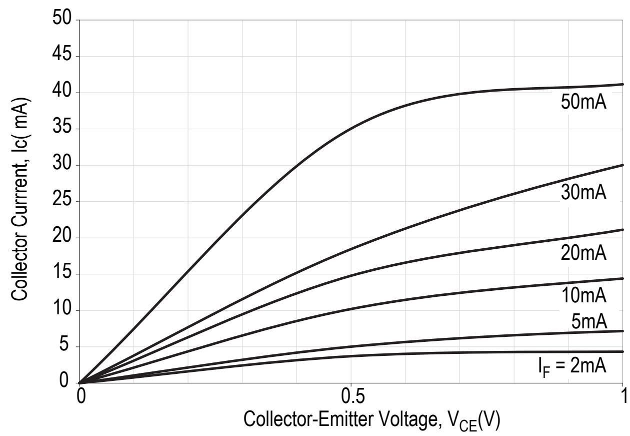


Figure 10. Collector Current vs. Small Collector-Emitter Voltage

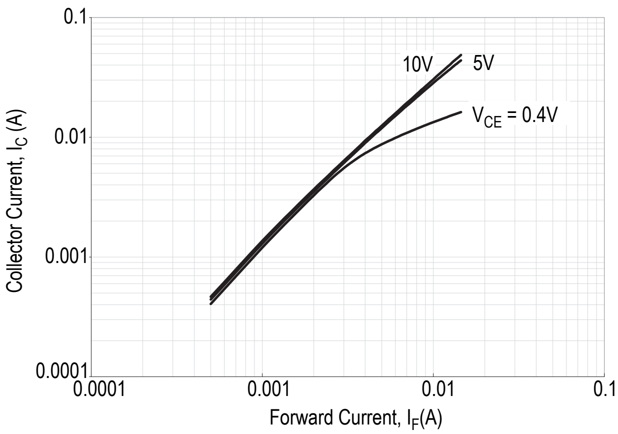


Figure 11. Collector Current vs. Forward Current

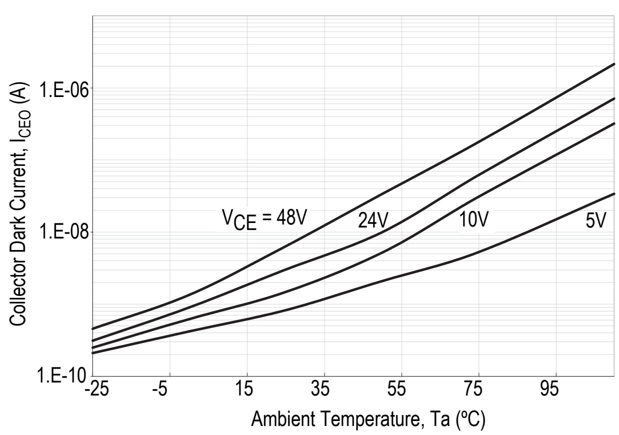


Figure 12. Collector Dark Current vs. Ambient Temperature

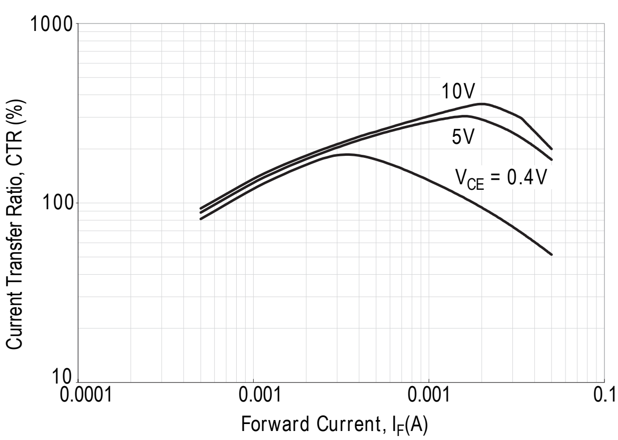


Figure 13. Current Transfer Ratio vs. Forward Current

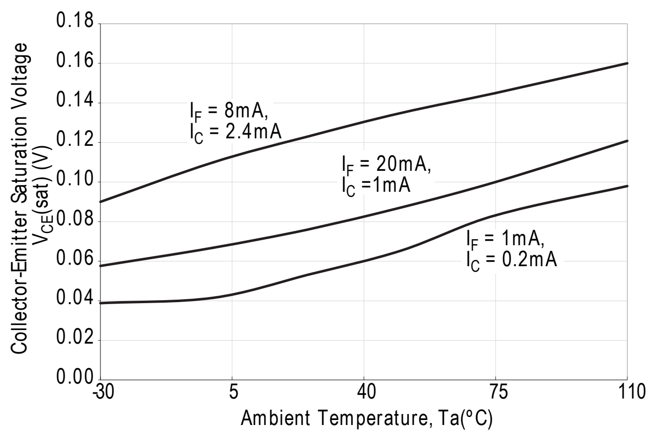


Figure 14. Collector-Emitter Saturation Voltage vs. Ambient Temperature

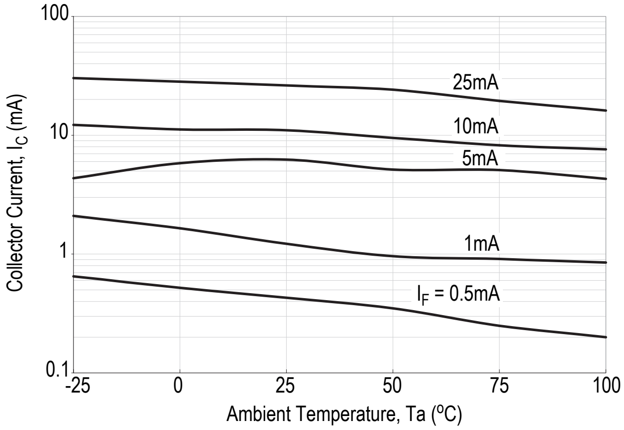


Figure 15. Collector Current vs. Ambient Temperature

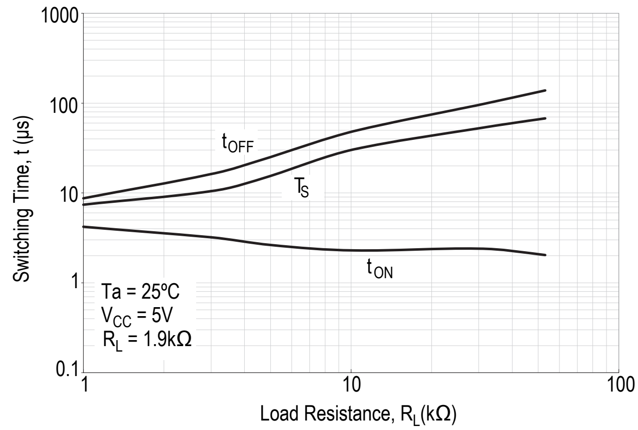


Figure 16. Switching Time vs. Load Resistance

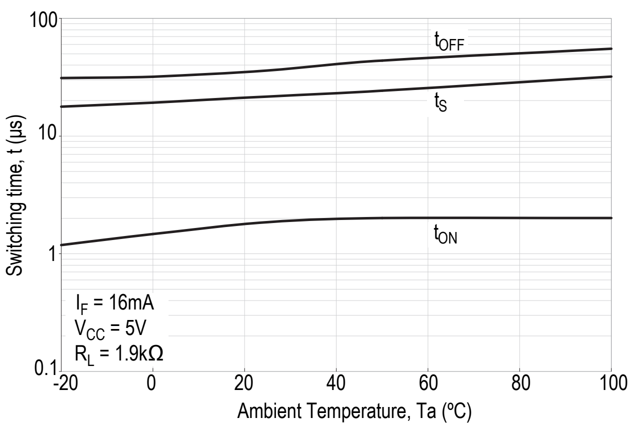


Figure 17. Switching Time vs. Ambient Temperature

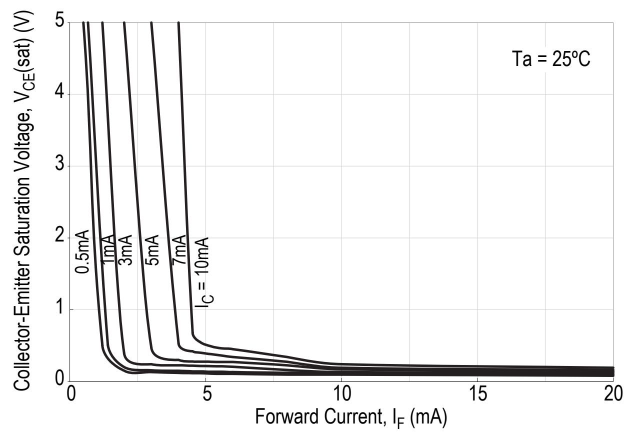


Figure 18. Collector-Emitter Saturation Voltage vs. Forward Current

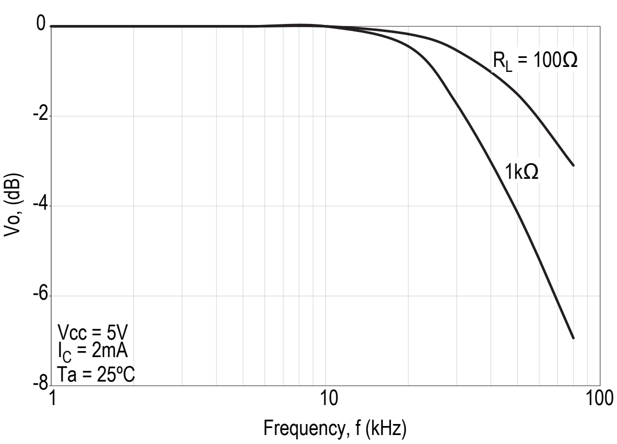


Figure 19. Frequency Response

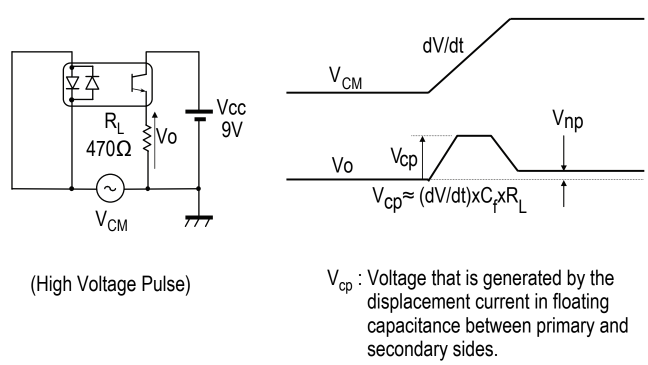


Figure 20. CMR Test Circuit

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

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