ACPL-214

AC Input, Half-Pitch Phototransistor Optocoupler

AVAGO TECHNOLOGIES

Data Sheet

Lead (Pb) Free
RoHS 6 fully compliant

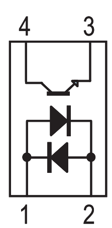
RoHS 6 fully compliant options available;
-xxxE denotes a lead-free product

Description

The ACPL-214 is an AC-input single channel half-pitch phototransistor optocoupler which contains 2 light emitting diodes connected inversely parallel & 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 20% at input current of 1 mA

ACPL-214 pin layout



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

Features

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

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-214-xxxx is pending UL Recognition with 3000 Vrms for 1 minute per UL1577 and is pending approval under CSA Component Acceptance Notice #5, File CA 88324.

Part number	RoHS Compliant Option Rank '0' 20%<CTR<400% I_F=±1mA V_{CE}=5V	RoHS Compliant Option Rank 'A' 50%<CTR<250% I_F=±1mA V_{CE}=5V	Package	Surface Mount	Tape & Reel	IC Orientation	IEC/EN/DIN EN 60747-5-2	Quantity
ACPL-214	-500E	-50AE	SO-4	x	X	0°		3000 pcs per reel
	-560E	-56AE	SO-4	x	X	0°	X	3000 pcs per reel
	-700E	-70AE	SO-4	x	X	180°		3000 pcs per reel
	-760E	-76AE	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:

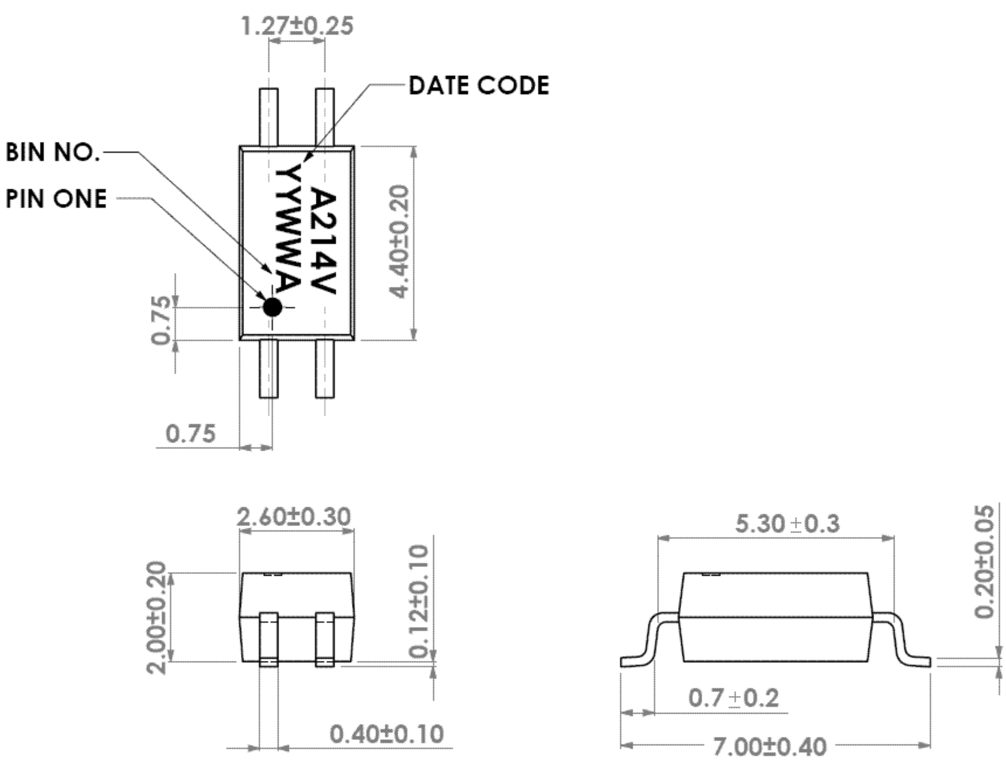
ACPL-214-560E to order product of SO-4 Surface Mount package in Tape & Reel packaging with IEC/EN/DIN EN 60767-5-2 Safety Approval, 20%<CTR<400% and RoHS compliant.

Example 2:

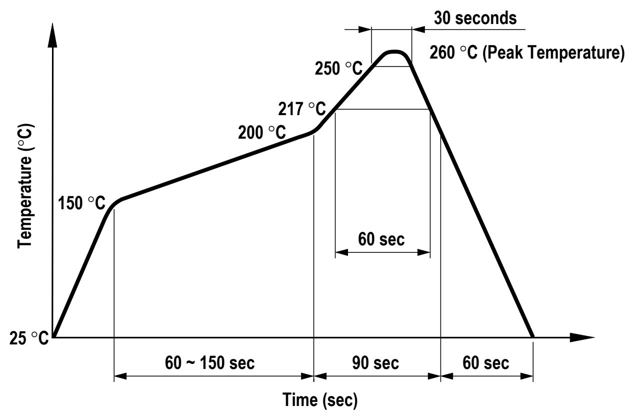
ACPL-214-50AE to order product of SO-4 Surface Mount package in Tape & Reel packaging with 50%<CTR<250% and RoHS compliant.

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

Package Outline Drawings



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 may 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	ACPL-214	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	
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 sec., 1.6 mm below seating plane			

Electrical Specifications

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	$I_F = \pm 20mA$	Fig.6
Terminal Capacitance	C_t	-	60	-	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	$I_E = 100\ \mu A$, $I_F = 0$ mA	
Current Transfer Ratio	CTR	20	-	400	%	$I_F = \pm 1$ mA, $V_{CE} = 5V$	CTR=(I_C/I_F)x 100%
Saturated CTR	$CTR_{(sat)}$	-	100	-	%	$I_F = \pm 1mA$, $V_{CE} = 0.4V$	
Collector-Emitter Saturation Voltage	$V_{CE}(sat)$	-	-	0.4	V	$I_F = \pm 8mA$, $I_C = 2.4mA$	Fig.14
Isolation Resistance	Riso	$5x10^{10}$	$1x10^{11}$	-	Ω	DC500V, R.H. 40~60%	
Floating Capacitance	C_F	-	0.8	1	pF	V = 0, f = 1MHz	
Cut-off Frequency (-3dB)	F_C	-	80	-	kHz	$V_{CC} = 5V$, $I_C = 2$ mA, $R_L = 100\Omega$	Fig. 2,19
Response Time (Rise)	t_r	-	2	-	µs	$V_{CC} = 10V$, $I_C = 2$ mA, $R_L = 100\Omega$	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	VCC = 5V, $I_F = 16$ mA, $R_L = 1.9k\Omega$	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

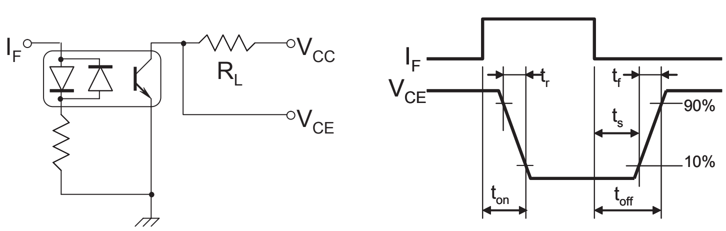


Figure 1. Switching Time Test Circuit

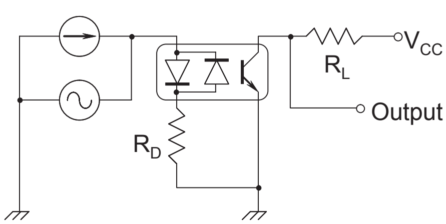


Figure 2. Frequency Response Test Circuit

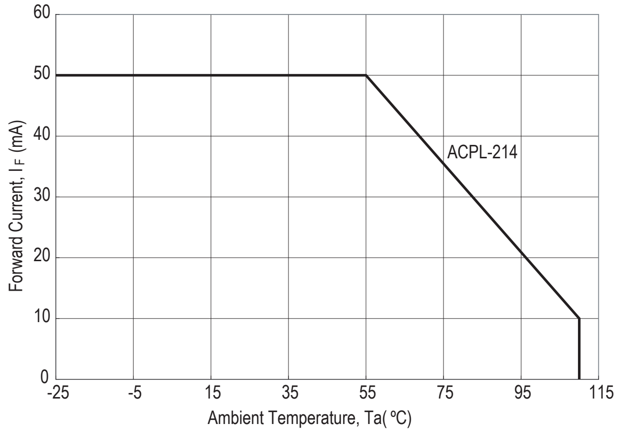


Figure 3. Forward Current vs. Ambient Temperature

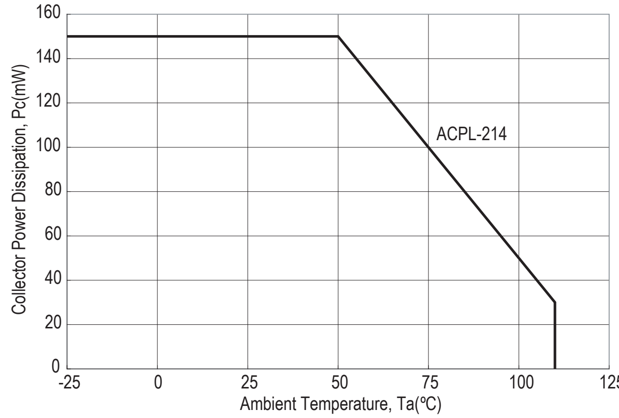


Figure 4. Collector Power Dissipation vs. Ambient Temperature

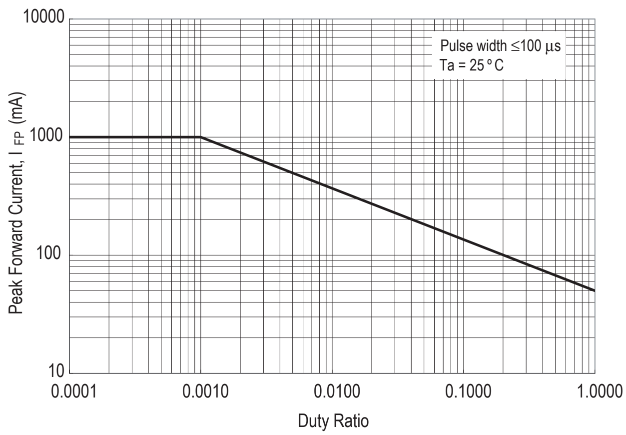


Figure 5. Pulse Forward Current vs. Duty Cycle Ratio

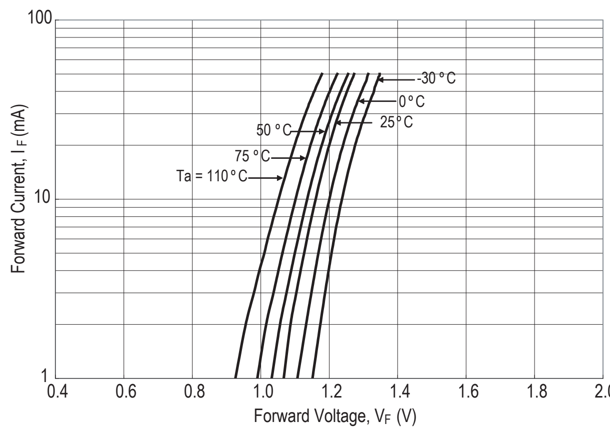


Figure 6. Forward Current vs. Forward Voltage

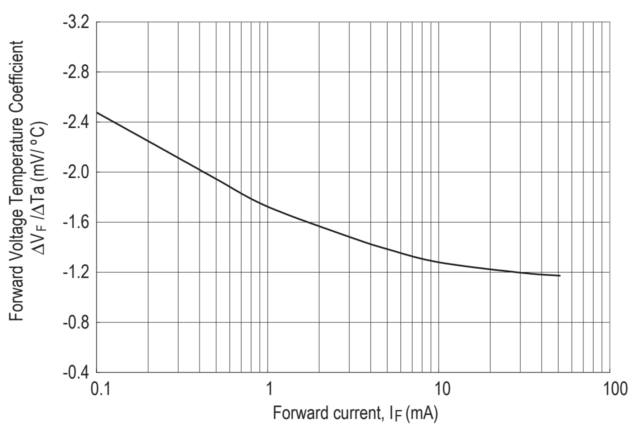


Figure 7. Forward Voltage Temperature Coefficient vs. Forward Current

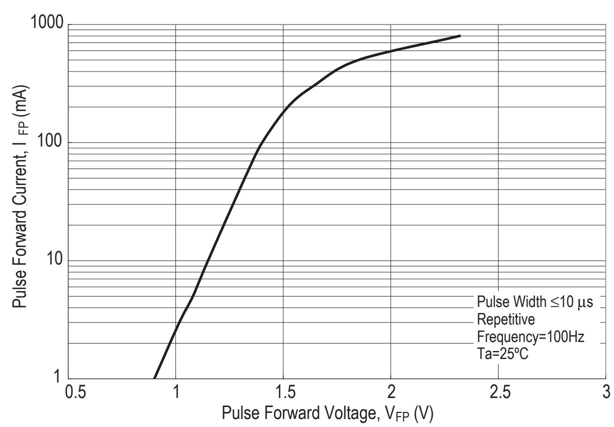


Figure 8. Pulse Forward Current vs. Pulse Forward Voltage

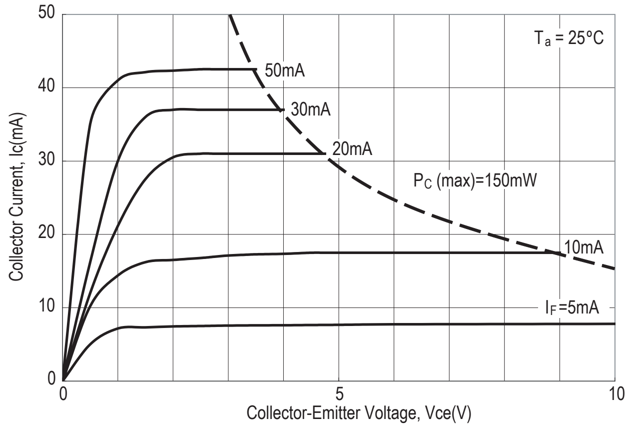


Figure 9. Collector Current vs. Collector-Emitter Voltage

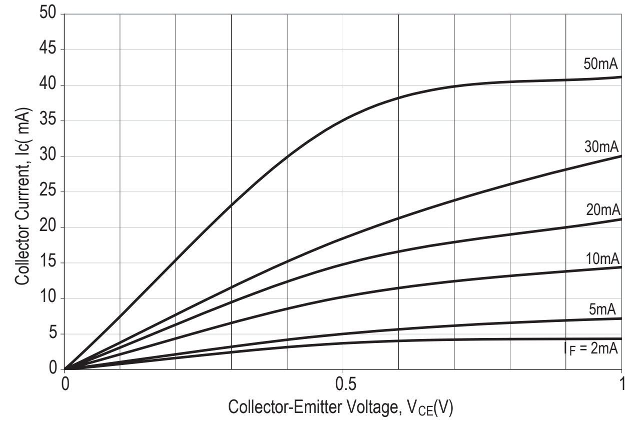


Figure 10. Collector Current vs. Small Collector¬-Emitter Voltage

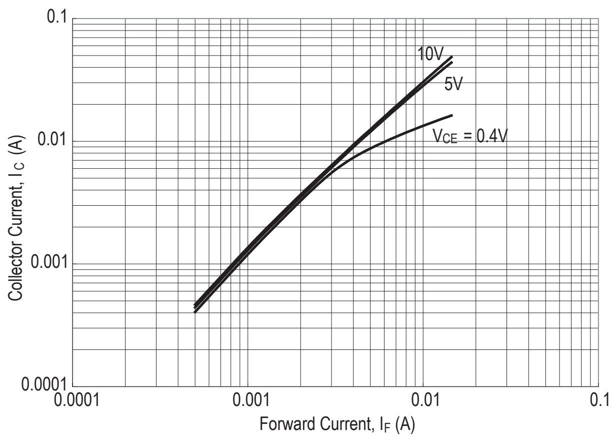


Figure 11. Collector Current vs. Forward Current

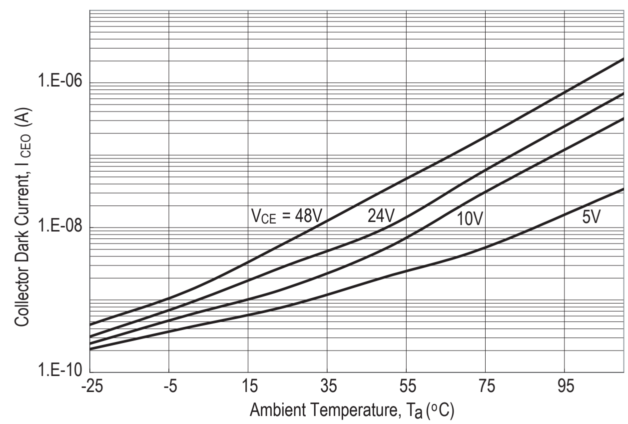


Figure 12. Collector Dark Current vs. Ambient Temperature

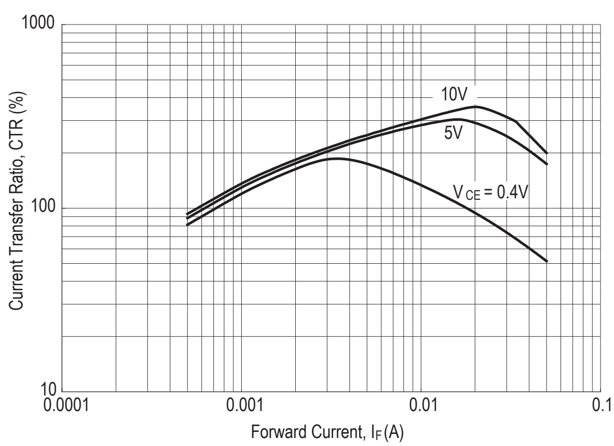


Figure 13. Current Transfer Ratio vs. Forward Current

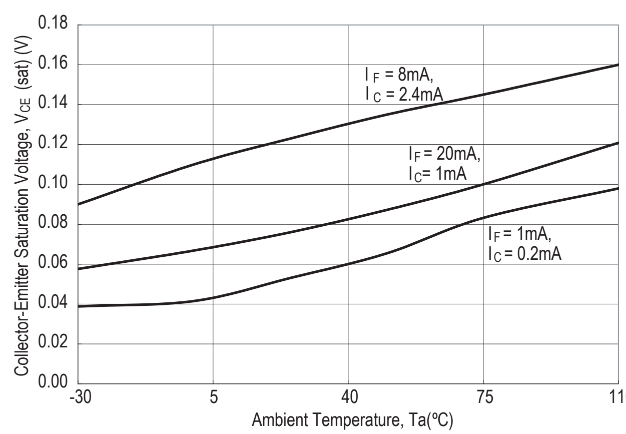


Figure 14. Collector-Emitter Saturation Voltage vs. Ambient Temperature

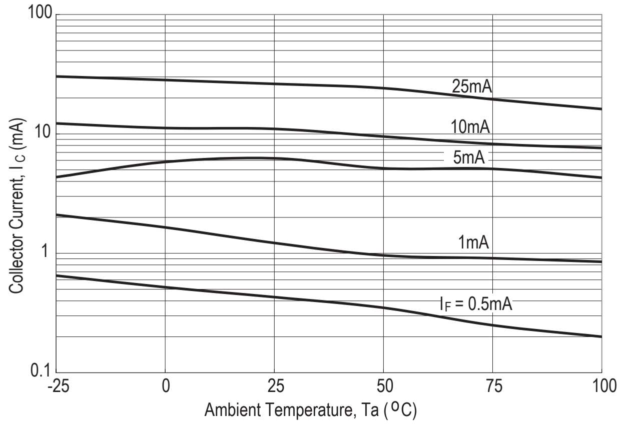


Figure 15. Collector Current vs. Ambient Temperature

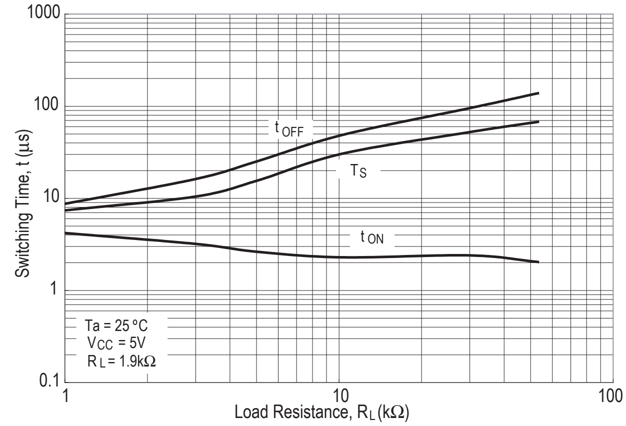


Figure 16. Switching Time vs. Load Resistance

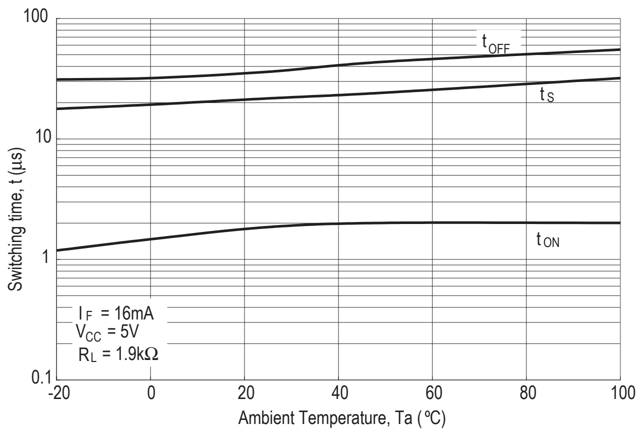


Figure 17. Switching Time vs. Ambient Temperature

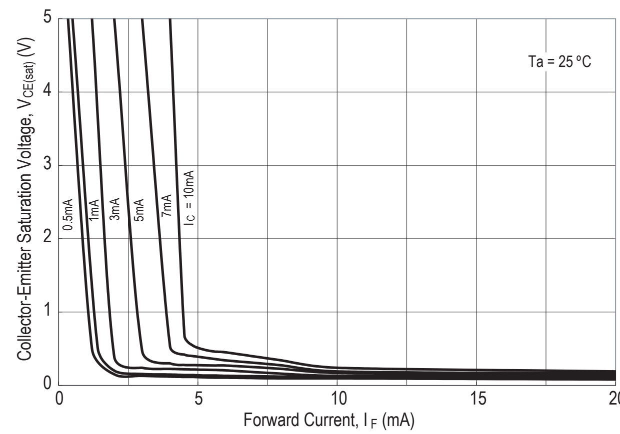


Figure 18. Collector-Emitter Saturation Voltage vs. Forward Current

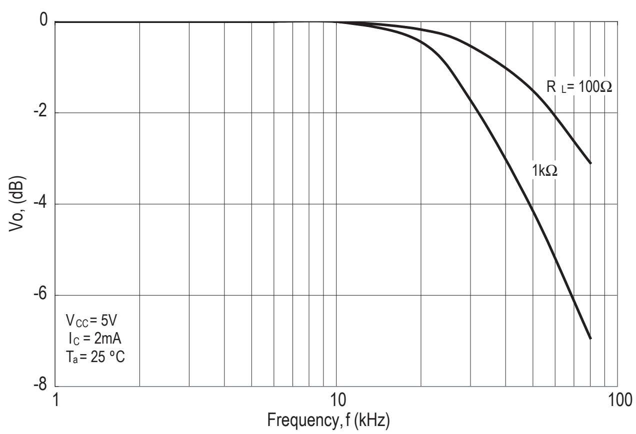


Figure 19. Frequency Response

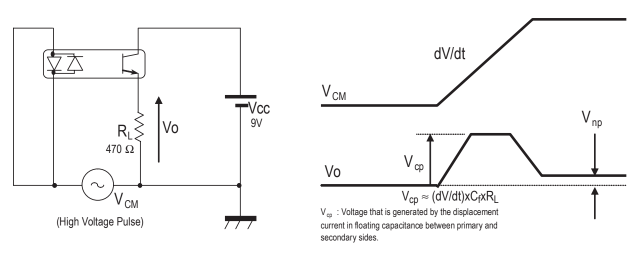


Figure 20. CMR Test Circuit

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

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