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ACPL-214

AC Input, Half-Pitch Phototransistor Optocoupler



Data Sheet

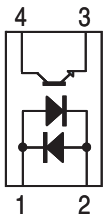


Description

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, t_r , is 2 μ s 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 $I_F = \pm 1\text{mA}$, $V_{CC} = 5\text{V}$)
- High input-output isolation voltage ($V_{ISO} = 3,000V_{RMS}$)
- Non-saturated Response time (t_r : 2 μ s (typ) at $V_{CC} = 10\text{V}$, $I_C = 2\text{mA}$, $R_L = 100\Omega$)
- SO package
- CMR 10kV/ μ s (typical)
- Safety and regulatory approvals
 - cUL
 - 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 UL Recognized with 3000 Vrms for 1 minute per UL1577 and Canadian Component Acceptance Notice #5.

Part number	RoHS Compliant Option		Package	Surface Mount	Tape & Reel	IC Orientation	IEC/EN/DIN EN 60747-5-2	Quantity
	Rank '0'	Rank 'A'						
	20%<CTR<400% I _F =±1mA V _{CE} =5V	50%<CTR<250% I _F =±1mA V _{CE} =5V						
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:

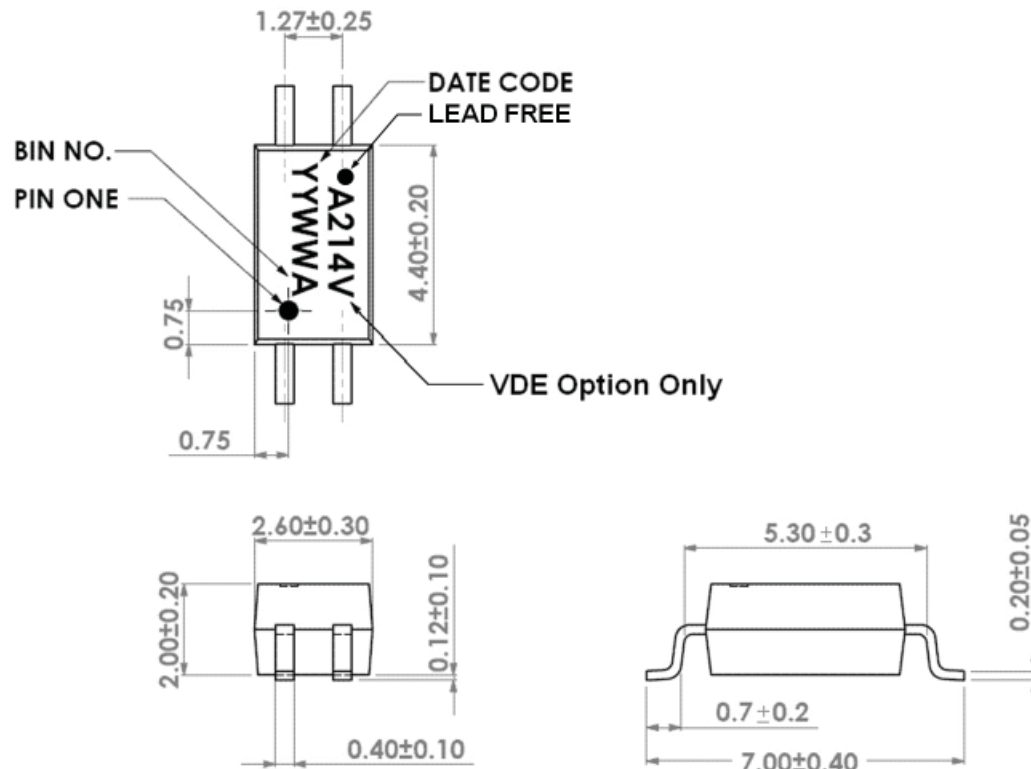
ACPL-214-560E to order product of SO-4 Surface Mount package in Tape & Reel packaging with IEC/EN/DIN EN 60767-5-2 Safety Approval, 20%<CTR<400% and RoHS compliant.

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

Recommended reflow condition as per JEDEC Standard, J-STD-020 (latest revision). 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 1 min, 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

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	$I_F = \pm 20\text{mA}$	Fig.6
Terminal Capacitance	C_t	-	60	-	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	20	-	400	%	$I_F = \pm 1\text{mA}, V_{CE} = 5\text{V}$	$CTR = (I_C/I_F) \times 100\%$
Saturated CTR	$CTR_{(sat)}$	-	100	-	%	$I_F = \pm 1\text{mA}, V_{CE} = 0.4\text{V}$	
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	-	-	0.4	V	$I_F = \pm 8\text{mA}, I_C = 2.4\text{mA}$	Fig.14
Isolation Resistance	R_{iso}	5×10^{10}	1×10^{11}	-	Ω	DC500V, R.H. 40~60%	
Floating Capacitance	C_F	-	0.8	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	-	μs	$V_{CC} = 10\text{V}, I_C = 2\text{mA}, R_L = 100\Omega$	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	$V_{CC} = 5\text{V}, I_F = 16\text{mA}, R_L = 1.9\text{k}\Omega$	Fig. 1, 17
Storage Time	T_S	-	25	-	μs		
Turn-OFF Time	t_{OFF}	-	40	-	μs		
Common Mode Rejection Voltage	CMR	-	10	-	kV/ μs	$T_a = 25^\circ\text{C}, R_L = 470\Omega, V_{CM} = 1.5\text{kV(peak)}, I_F = 0\text{mA}, V_{CC} = 9\text{V}, V_{np} = 100\text{mV}$	Fig.20

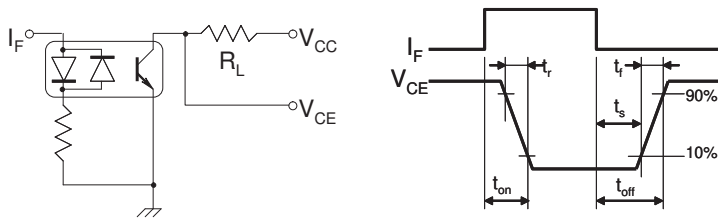


Figure 1. Switching Time Test Circuit

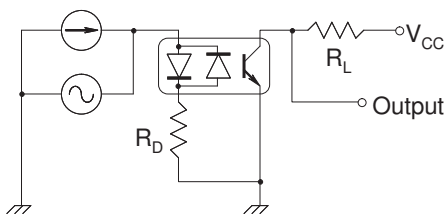


Figure 2. Frequency Response Test Circuit

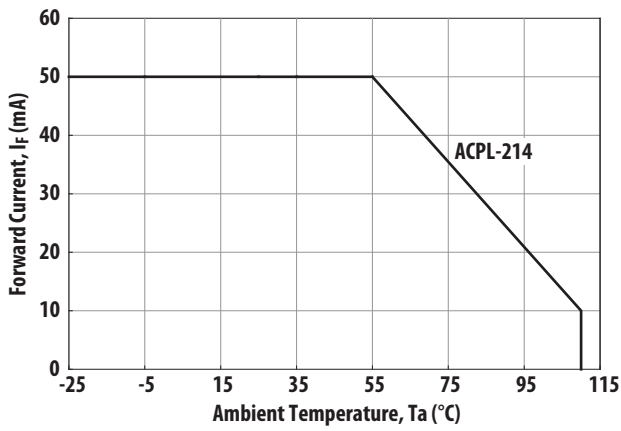


Figure 3. Forward Current vs. Ambient Temperature

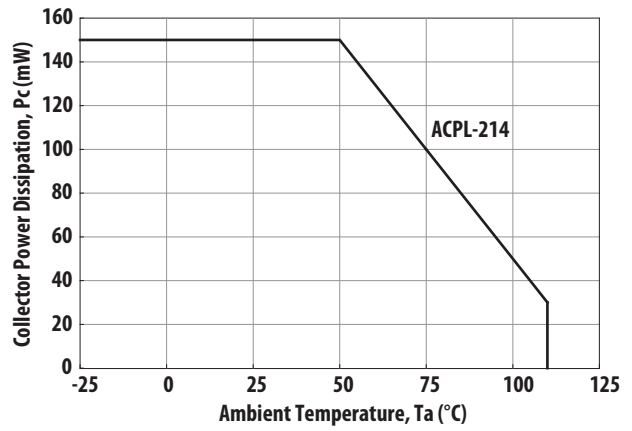


Figure 4. Collector Power Dissipation vs. Ambient Temperature

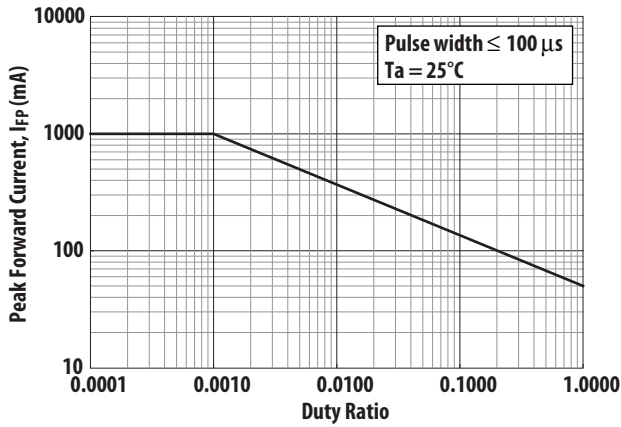


Figure 5. Pulse Forward Current vs. Duty Cycle Ratio

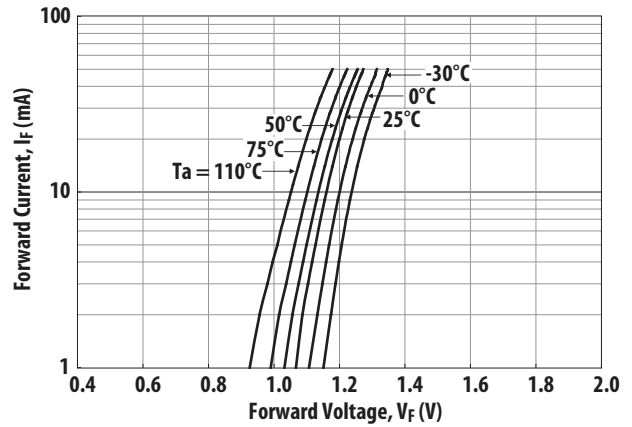


Figure 6. Forward Current vs. Forward Voltage

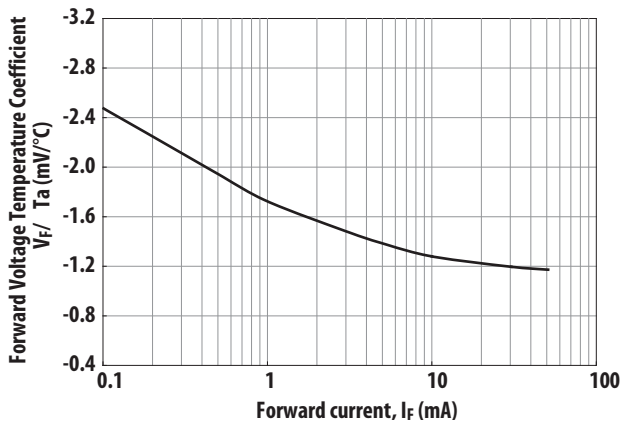


Figure 7. Forward Voltage Temperature Coefficient vs. Forward Current

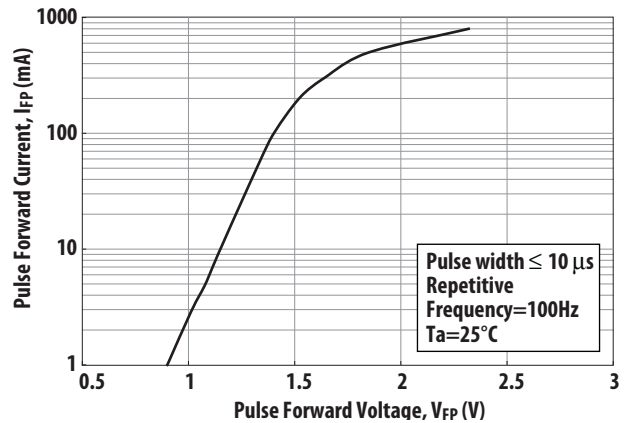


Figure 8. Pulse Forward Current vs. Pulse Forward Voltage

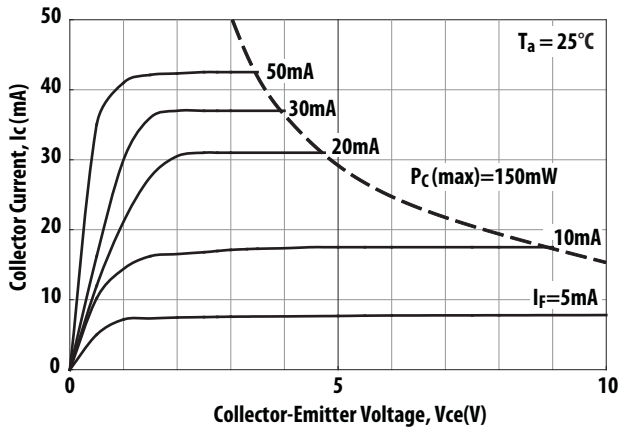


Figure 9. Collector Current vs. Collector-Emitter Voltage

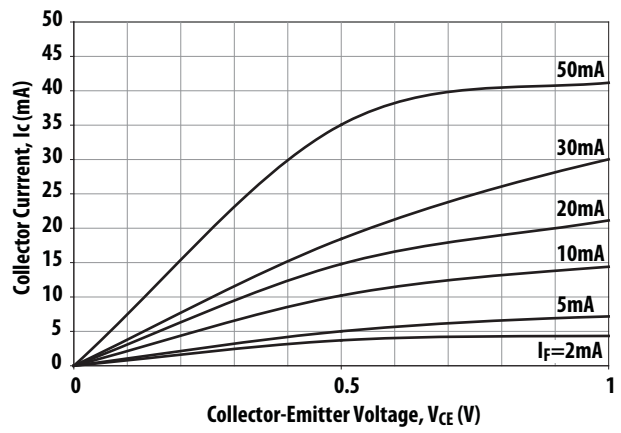


Figure 10. Collector Current vs. Small Collector-Emitter Voltage

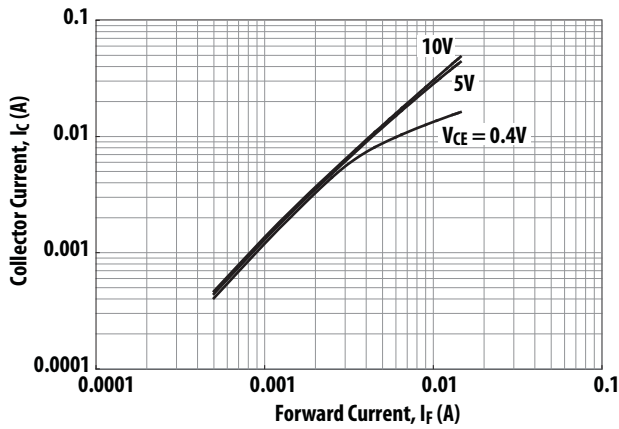


Figure 11. Collector Current vs. Forward Current

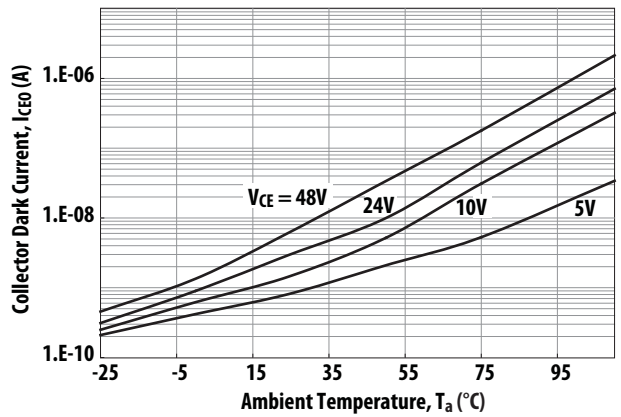


Figure 12. Collector Dark Current vs. Ambient Temperature

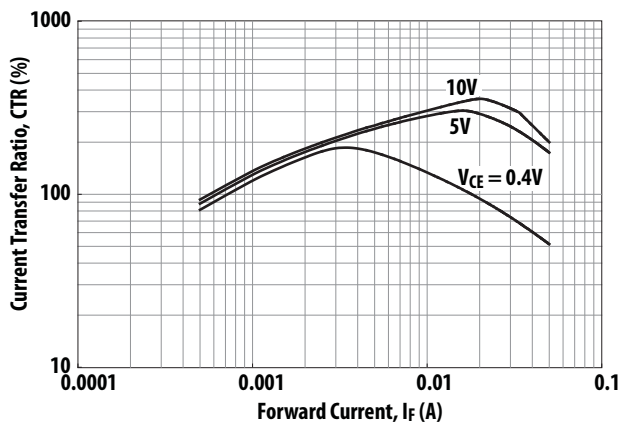


Figure 13. Current Transfer Ratio vs. Forward Current

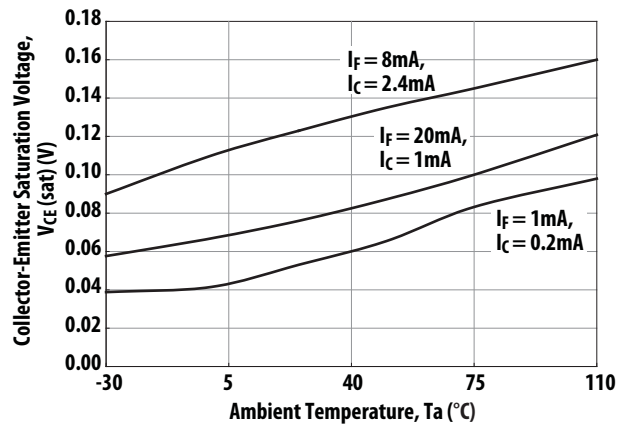


Figure 14. Collector-Emitter Saturation Voltage vs. Ambient Temperature

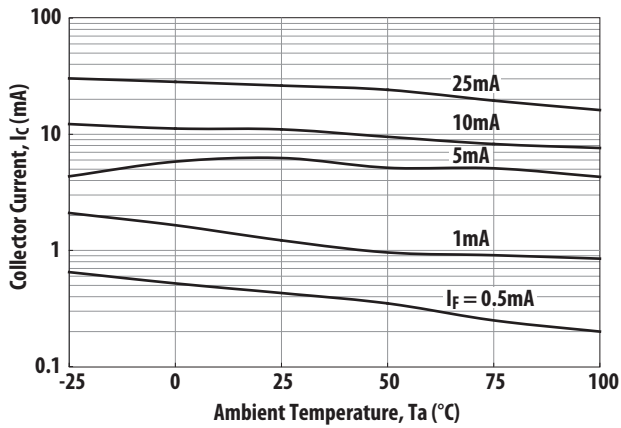


Figure 15. Collector Current vs. Ambient Temperature

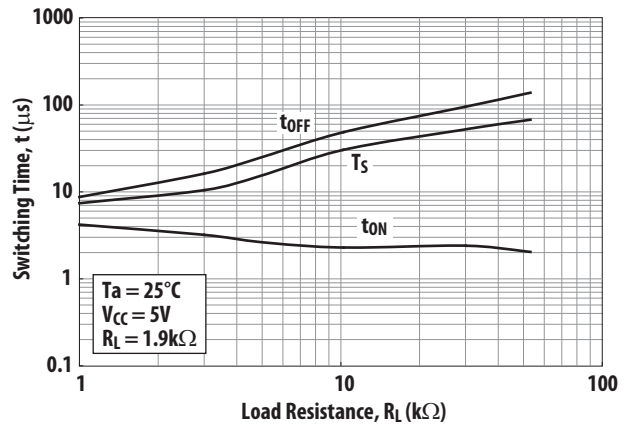


Figure 16. Switching Time vs. Load Resistance

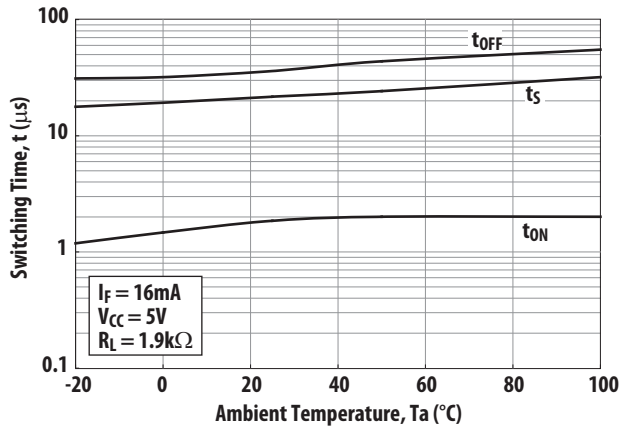


Figure 17. Switching Time vs. Ambient Temperature

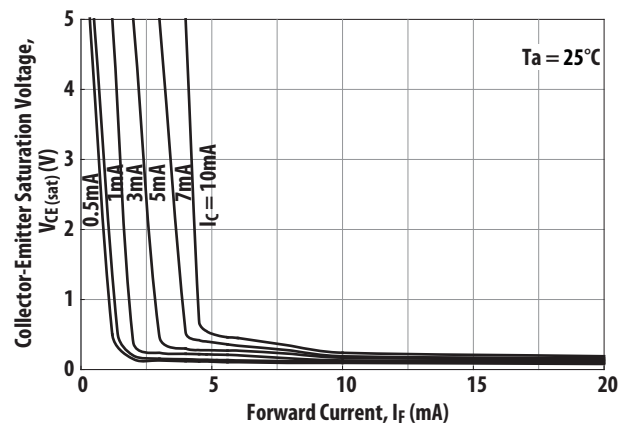


Figure 18. Collector-Emitter Saturation Voltage vs. Forward Current

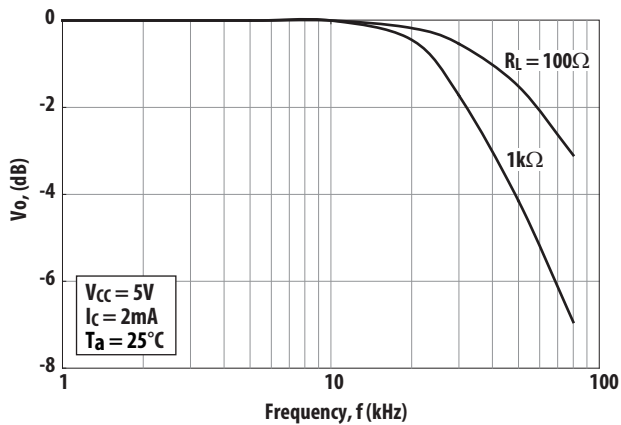


Figure 19. Frequency Response

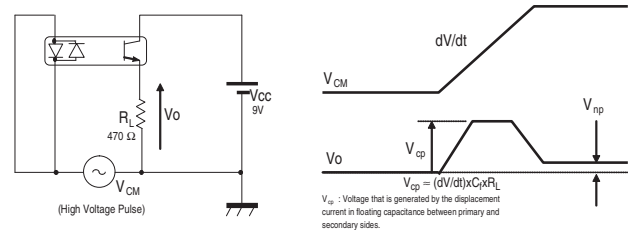


Figure 20. CMR Test Circuit

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