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BROADCOM®

Data Sheet

ACPL-217

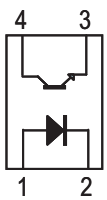
DC-Input, Half-Pitch Phototransistor Optocoupler

Description

The Broadcom® ACPL-217 is a DC-input, single-channel, half-pitch phototransistor optocoupler that 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 $3750V_{RMS}$. Response time, t_r, is 2 µs typically, while minimum CTR is 50% at an 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% (minimum) at I_F = 5 mA, V_{CC} = 5V
- High input-output isolation voltage (V_{ISO}): $3750V_{RMS}$
- Non-saturated response time (t_r): 2 µs (typical) at V_{CC} = 10V, I_C = 2 mA, R_L = 100Ω
- SO package
- CMR: 10 kV/µs (typical)
- Safety and regulatory approvals
  - cUL
  - IEC/EN/DIN EN 60747-5-5
- Available options
  - CTR Ranks 0, A, B, C, and D

Applications

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

CAUTION! It is advised that normal static precautions be taken in handling and assembly of this component to prevent damage and/or degradation which may be induced by ESD.

The components featured in this data sheet are not to be used in military or aerospace applications or environments.

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Ordering Information

ACPL-217-xxxx is UL recognized with 3750V_{RMS} for 1 minute per UL1577 and Canadian Component Acceptance Notice #5.

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

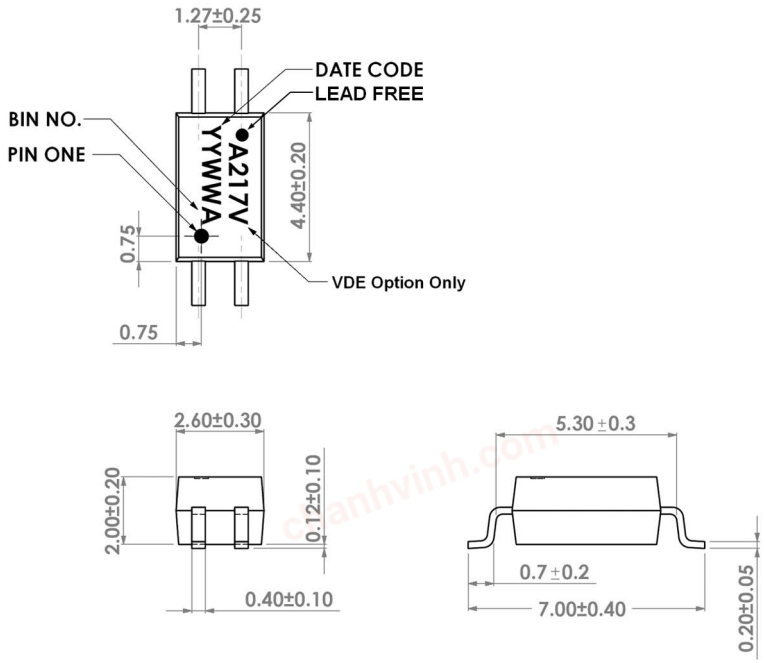
To order, choose a part number from the part number column and combine with the desired option from the option column to form an order entry.

Example: Specify ACPL-217-560E to order the following product: SO-4 Surface Mount package in Tape and Reel packaging, with IEC/EN/DIN EN 60747-5-5 Safety Approval, 50% < CTR < 600%, that is RoHS compliant.

Example: Specify ACPL-217-50BE to order the following product: SO-4 Surface Mount package in Tape and Reel packaging, 130% < CTR < 260%, that is RoHS compliant.

Option data sheets are available. Contact your Broadcom sales representative or authorized distributor for information.

Package Outline Drawings



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Solder Reflow Temperature Profile

Recommended reflow condition as per JEDEC Standard, J-STD-020 (latest revision). Use non-halide flux.

Absolute Maximum Ratings

Parameter	Symbol	ACPL-217	Unit	Note
Storage Temperature	T_S	–55 to 125	°C	—
Operating Temperature	T_A	–55 to 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 1 minute, RH = 40% to 60%)	V_{ISO}	3750	V_{RMS}	1 minute
Collector Power Dissipation	P_C	150	mW	—
Total Power Dissipation	P_{TOT}	200	mW	—
Lead Solder Temperature	260°C for 10 seconds			

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Electrical Specifications (DC)

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

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Conditions	Note
Forward Voltage	V_F	—	1.2	1.4	V	I_F = 20 mA	Figure 6
Reverse Current	I_R	—	—	10	µA	V_R = 5V	
Terminal Capacitance	C_t	—	30	—	pF	V = 0, f = 1 MHz	
Collector Dark Current	I_{CEO}	—	—	100	nA	V_{CE} = 48V, I_F = 0 mA	Figure 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/I_F) * 100%
Saturated CTR	CTR(sat)	—	100	—	%	I_F = 1 mA, V_{CE} = 0.4V	
Collector-Emitter Saturation Voltage	V_{CE}(sat)	—	—	0.4	V	I_F = 8 mA, I_C = 2.4 mA	Figure 14
Isolation Resistance	R_{ISO}	5×10^{10}	1×10^{11}	—	Ω	DC = 500V, RH = 40% ~ 60%	
Floating Capacitance	C_F	—	0.6	1	pF	V = 0, f = 1 MHz	
Cut-off Frequency (–3 dB)	F_C	—	80	—	kHz	V_{CC} = 5V, I_C = 2 mA, R_L = 100Ω	Figure 2, Figure 19
Response Time (Rise)	t_r	—	2	—	µs	V_{CC} = 10V, I_C = 2 mA, R_L = 100Ω	Figure 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 = 1.9 kΩ	Figure 1, Figure 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} = 1.5 kV(peak), I_F = 0 mA, V_{CC} = 9V, V_{np} = 100 mV	Figure 20

Figure 1: Switching Time Test Circuit

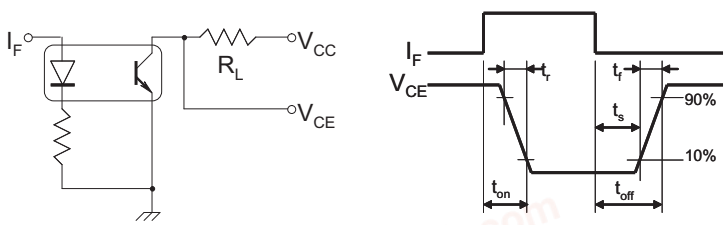

Figure 2: Frequency Response Test Circuit

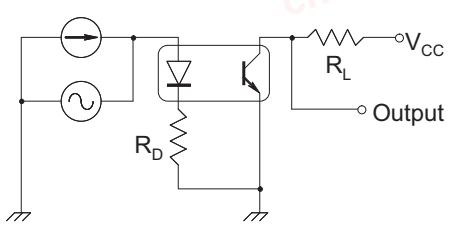

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Figure 3: Forward Current vs. Ambient Temperature

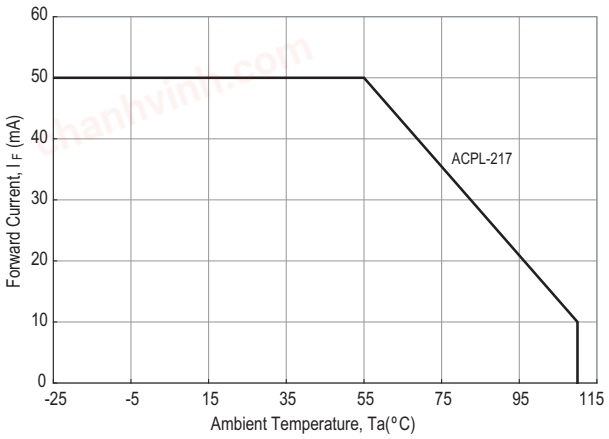

Figure 4: Collector Power Dissipation vs. Ambient Temperature

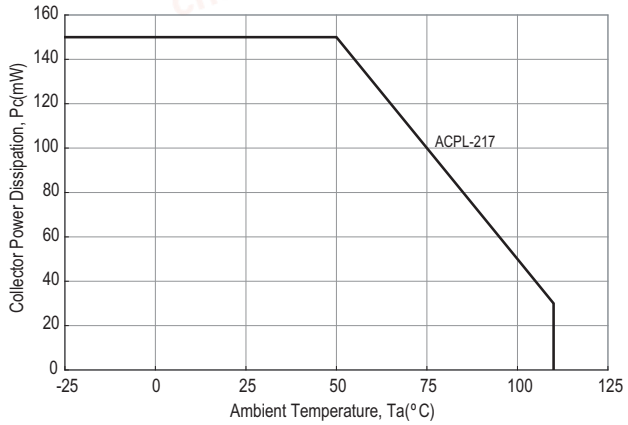

Figure 5: Pulse Forward Current vs. Duty Cycle Ratio

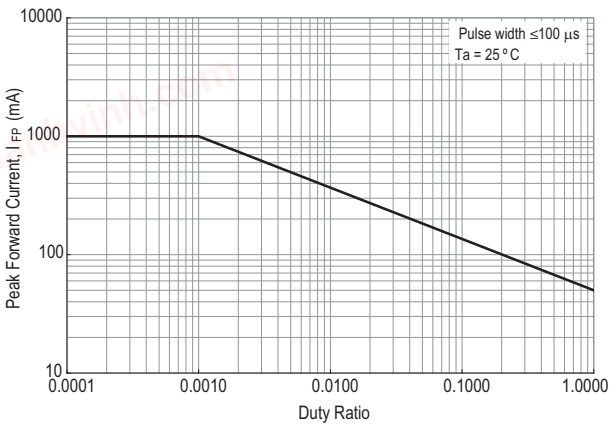

Figure 6: Forward Current vs. Forward Voltage

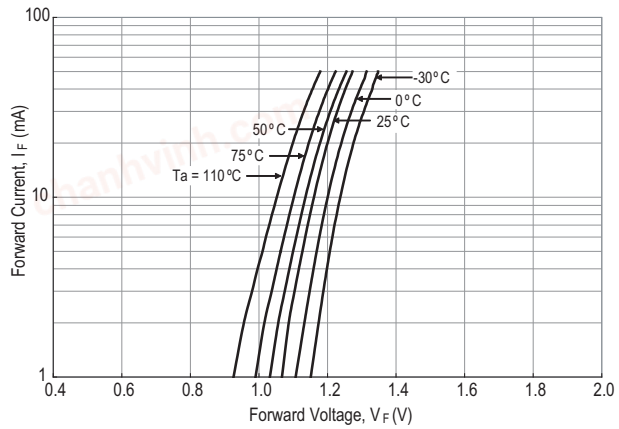

Figure 7: Forward Voltage Temperature Coefficient vs. Forward Current

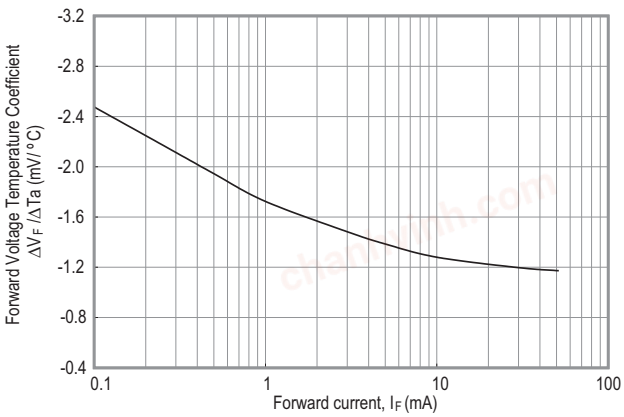

Figure 8: Pulse Forward Current vs. Pulse Forward Voltage

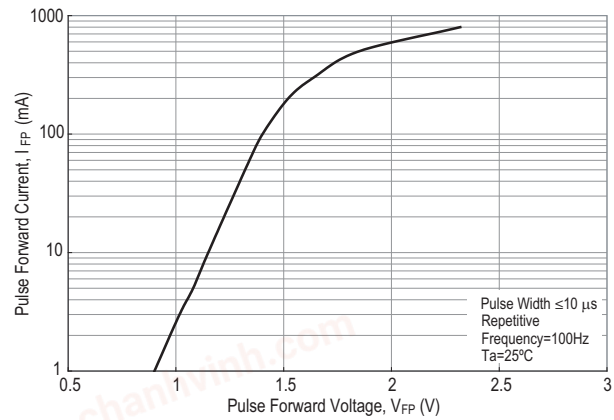

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Figure 9: Collector Current vs. Collector-Emitter Voltage

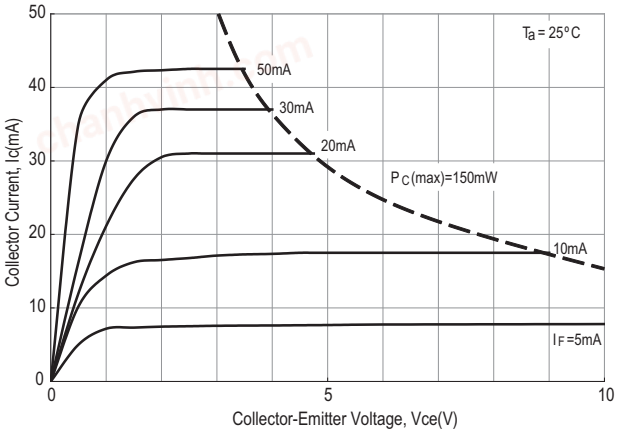

Figure 10: Collector Current vs. Small Collector-Emitter Voltage

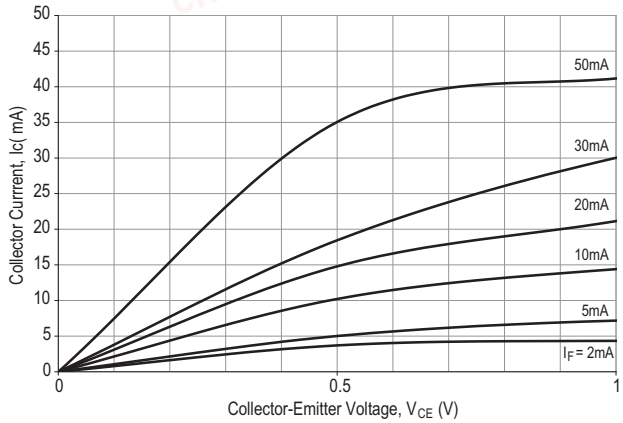

Figure 11: Collector Current vs. Forward Current

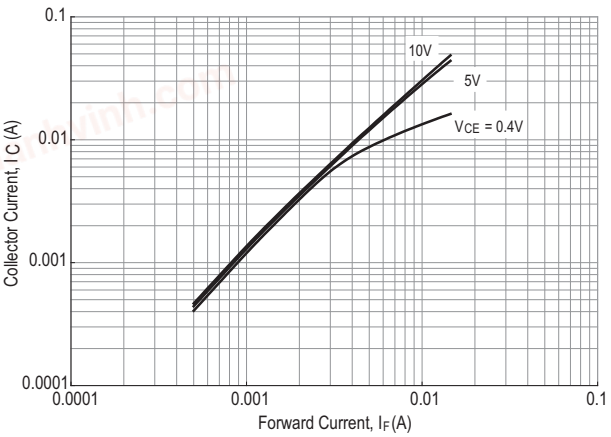

Figure 12: Collector Dark Current vs. Ambient Temperature

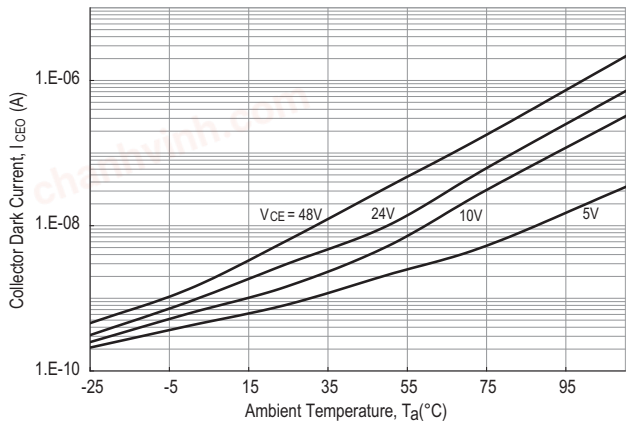

Figure 13: Current Transfer Ratio vs. Forward Current

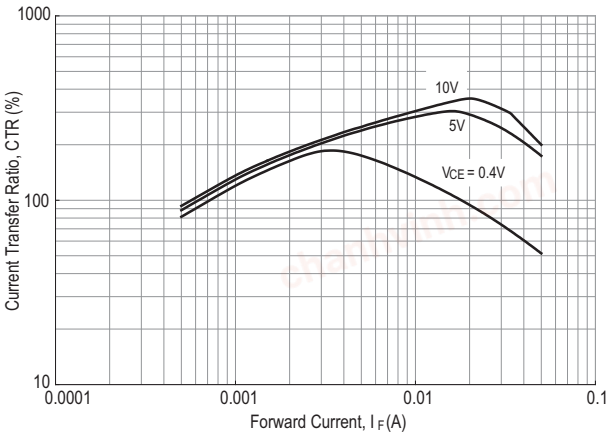

Figure 14: Collector-Emitter Saturation Voltage vs. Ambient Temperature

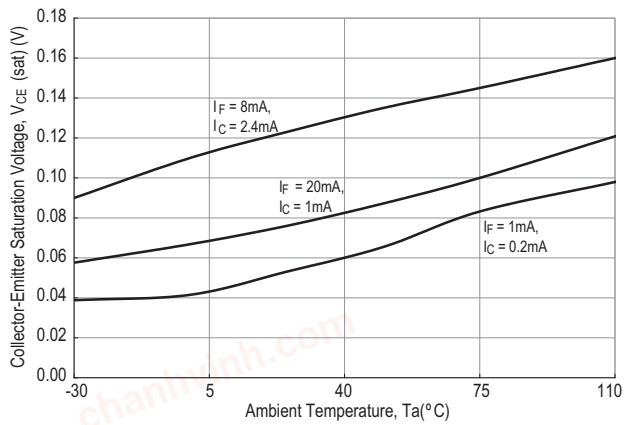

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Figure 15: Collector Current vs. Ambient Temperature

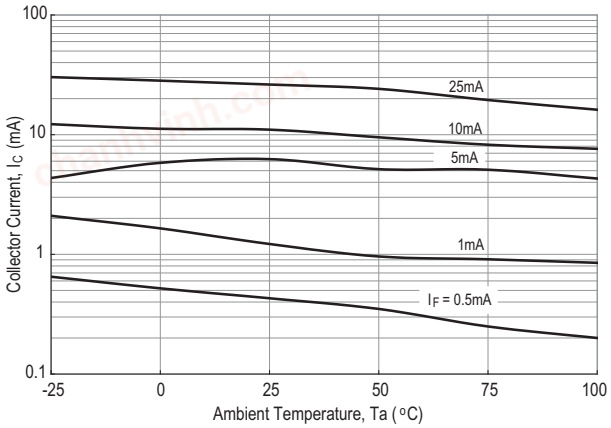


Figure 16: Switching Time vs. Load Resistance

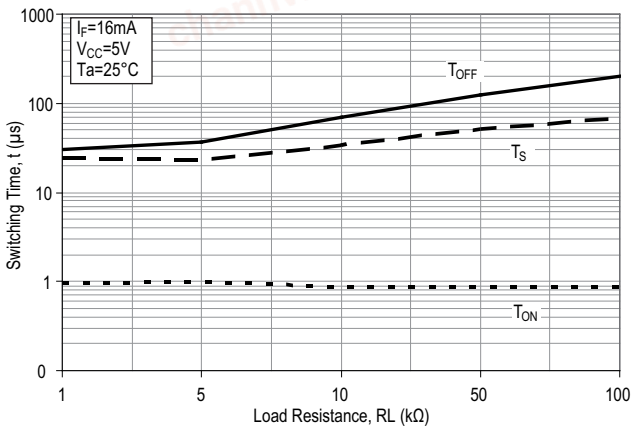


Figure 17: Switching Time vs. Ambient Temperature

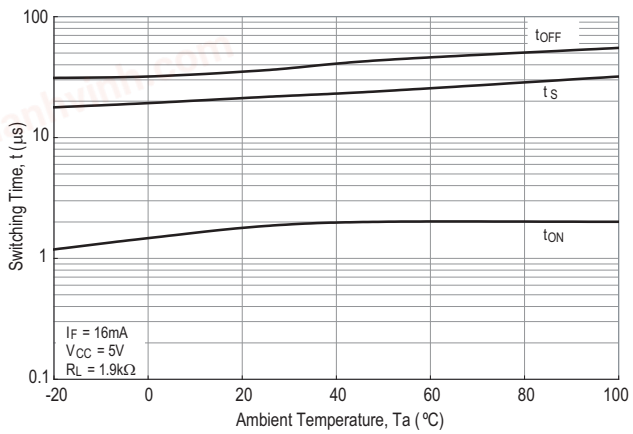


Figure 18: Collector-Emitter Saturation Voltage vs. Forward Current

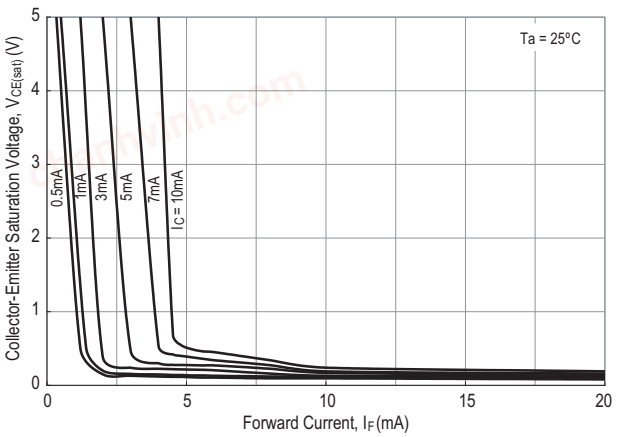


Figure 19: Frequency Response

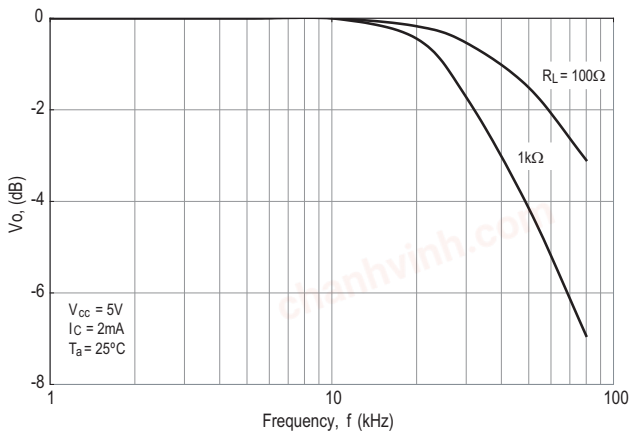
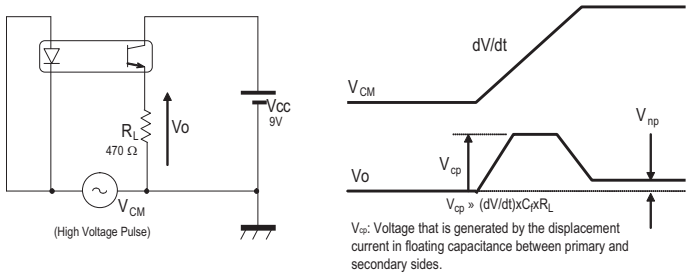


Figure 20: CMR Test Circuit



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