HA16631P, HA16631MP

Read Amplifier

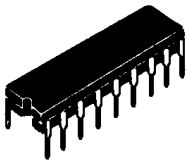
Description

The HA16631P and HA16631MP monolithic read amplifiers for flexible disk drives provide wave-shaped output signals. The differentiator, zero-volt comparator generate data pulses from the amplified signals from the magnetic head and waveform shaper section.

Features

- Combines all the flexible disk read amplifier function active circuits in one chip
- Direct connection with TTLs

HA16631P

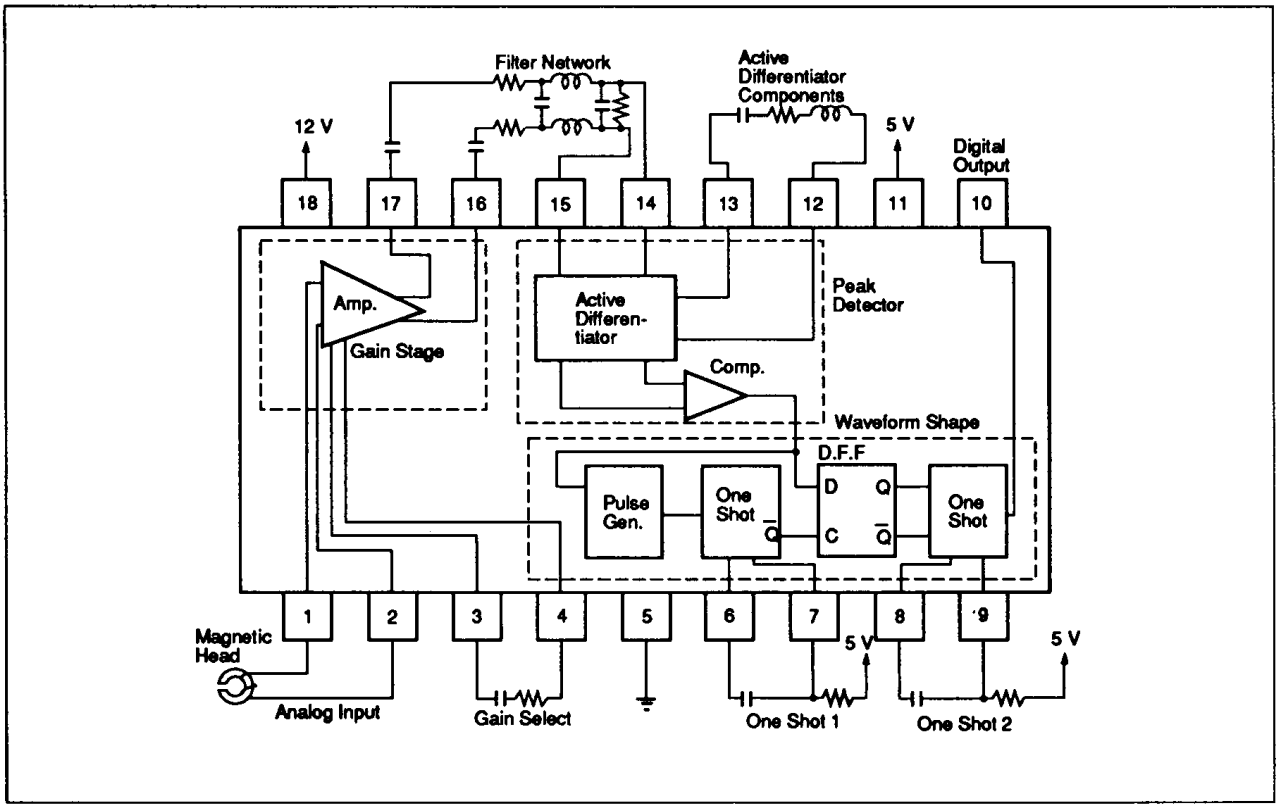


(DP-18A)

HA16631MP

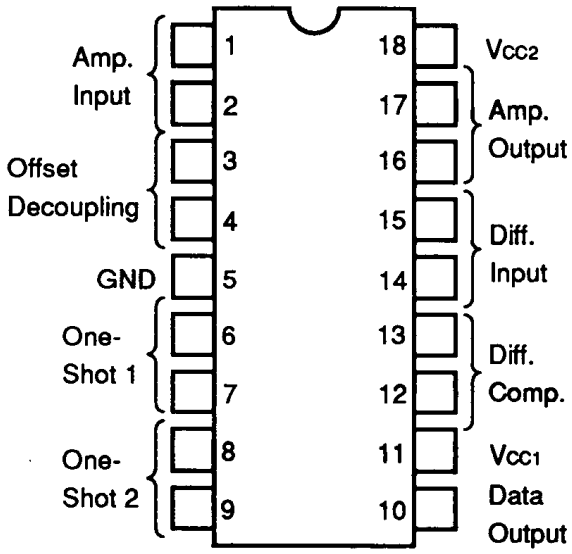
(MP-18)

Block Diagram



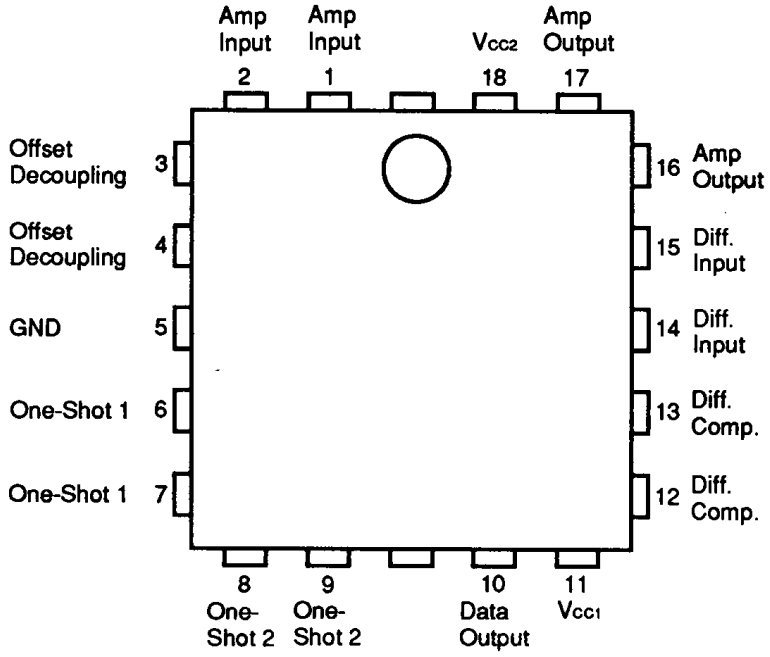
Pin Arrangement

HA16631P



(Top view)

HA16631MP



(Top view)

Absolute Maximum Ratings (Ta = 25°C)

Item	Symbol	Rating	Unit
Power supply voltage (Pin 11)	V_{CC1}	7.0	V
Power supply voltage (Pin 18)	V_{CC2}	16	V
Input voltage (Pins 1 and 2)	V_{IN}	–0.2 to +7.0	V
Output voltage (Pin 10)	V_O	–0.2 to +7.0	V
Differential input voltage (Pins 1 and 2)	V_{IN} (diff)	0 to +5.0	V
Operating temperature	Topr	0 to +70	°C
Storage temperature	Tstg	–55 to +125	°C

Electrical Characteristics

Operating Power Supply Voltage Range (T_a = 25°C)

Item	Symbol	Min	Typ	Max	Unit	Test Condition	Test Circuit
Power supply voltage range	V_{CC1R}	4.75	5.00	5.25	V		
Power supply voltage range	V_{CC2R}	10.0	12.0	14.0	V		

Amplifier Section (T_a = 25°C, V_{CC1} = 5.0 V, V_{CC2} = 12.0 V, unless otherwise specified)

Item	Symbol	Min	Typ	Max	Unit	Test Condition	Test Circuit
Differential voltage gain	A_{VD}	80	110	140	V/V	f = 250 kHz, V_{IN} = 5 m Vrms V_{CC1R}, V_{CC2R}	Fig. 2
Input bias current	I_{IB}	—	1	9	µA	V_{CC2} = 12 V, V_{CM} = 4 V	Fig. 4
Common mode voltage range	V_{CM}	1.85	—	6.2	V		Fig. 2
Output distortion ratio	THD	—	1.5	5	%	f = 1 kHz, V_{IN} = 25 mVp-p V_{CC1R}, V_{CC2R}	Fig. 2
Differential output voltage swing	V_{OD}	3.0	4.2	—	Vp-p	V_{CC1R}, V_{CC2R}	Fig 2
Output source current	I_O	—	8.0	—	mA		Fig. 8
Output sink current (Pins 16 and 17)	I_{OS}	2.8	4	—	mA	V_{CC1R}, V_{CC2R}	Fig. 9
Input resistance	r_{IN}	30	120	—	kΩ		Fig. 5
Output resistance	r_O	—	15	—	Ω		Fig. 6
Common mode rejection ratio	CMRR	50	—	—	dB	f = 100 kHz, V_{IN} = 200 mVp-p	Fig. 11

Item	Symbol	Min	Typ	Max	Unit	Test Condition	Test Circuit
Power supply rejection ratio V_{CC1}	$PSRR_1$	50	—	—	dB	V_{CC} = 12.0 V 4.75 V ≦ V_{CC1} ≦ 5.25 V	Fig. 10
Power supply rejection ratio V_{CC2}	$PSRR_2$	60	—	—	dB	V_{CC1} = 5.0 V 10.0 V ≦ V_{CC2} ≦ 14.0 V	Fig. 10
Differential output offset voltage	V_{DO}	—	—	0.4	V		Fig. 7
Common mode output voltage	V_{CO}	—	3.1	—	V		Fig. 7
Effective differential emitter resistance (Pins 3 and 4)	R_{EFF}	370	570	770	Ω		Fig. 3

Peak Detector Section (Ta = 25°C, V_{CC1} = 5.0 V, V_{CC2} = 12.0 V, unless otherwise specified)

Item	Symbol	Min	Typ	Max	Unit	Test Condition	Test Circuit
Sink current (Pins 12 and 13)	I_{SD}	1.0	1.5	—	mA		Fig. 12
Peak shift	Ps	—	—	5	%	f = 250 kHz, V_{IN} = 1.0 Vp-p	Fig. 13
Input resistance	r_{ID}	—	30	—	kΩ		Fig. 17
Outupt resistance	r_{OP}	—	40	—	Ω		

Waveform Shaper Section (Ta = 25°C, V_{CC1R}, V_{CC2R}, unless otherwise specified)

Item	Symbol	Min	Typ	Max	Unit	Test Condition	Test Circuit
Output voltage H (Pin 10)	V_{OH}	2.7	—	—	V	V_{CC1} = 4.75 V V_{CC2} = 12.0 V, I_{OH} = −0.4 mA	Fig. 15
Output voltage L (Pin 10)	V_{OL}	—	—	0.5	V	V_{CC1} = 4.75 V V_{CC2} = 12.0 V, I_{OL} = 8 mA	Fig. 16
Rising time (Pin 10)	t_{TLH}	—	—	25	ns	V_{CC1} = 5.0 V, V_{CC2} = 12.0 V V_{out} = 0.5 V → 2.7 V	Fig. 14
Falling time (Pin 10)	t_{THL}	—	—	25	ns	V_{CC1} = 5.0 V, V_{CC2} = 12.0 V V_{out} = 2.7 V → 0.5 V	Fig. 14
Timing range #1	$t_{1A, B}$	600	—	2000	ns	f = 125 kHz	
		600	—	1000	ns	f = 250 kHz	
Timing accuracy #1	t_1	850	1000	1150	ns	$t_1 = 0.625 C_1R_1 + 150$ C_1 = 200 pF, R_1 = 6.8 kΩ	Fig. 14
Timing capacitance #1	C_1	150	—	680	pF		Fig. 14
Timing resistance #1	R_1	1.5	—	10	kΩ		Fig. 14
Timing range #2	$t_{2A, B}$	150	—	1000	ns	f = 125 kHz	
		150	—	750	ns	f = 250 kHz	
Timing accuracy #2	t_2	170	200	230	ns	$t_1 = 0.625 C_1R_1$ C_1 = 200 pF, R_1 = 1.6 kΩ	Fig. 14
Timing capacitance #2	C_2	100	—	800	pF		Fig. 14
Timing resistance #2	R_2	1.5	—	10	kΩ		Fig. 14

Test Circuits

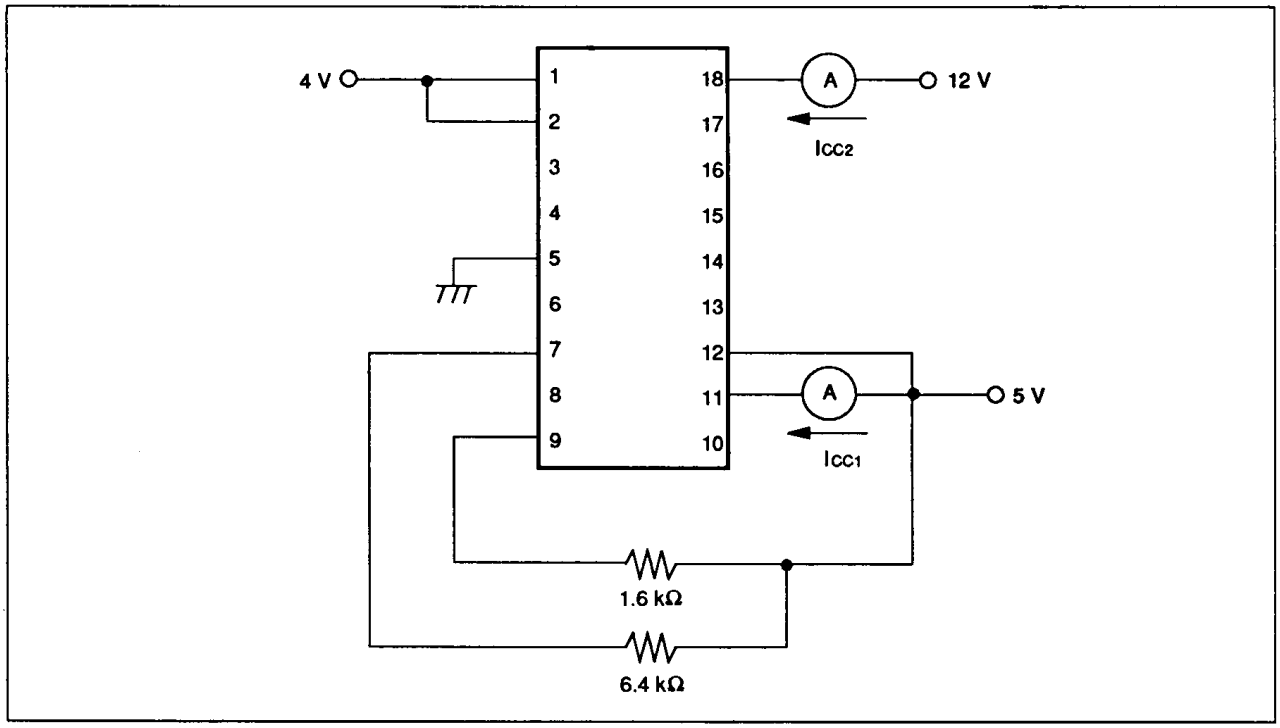


Figure 1 Power Supply Current

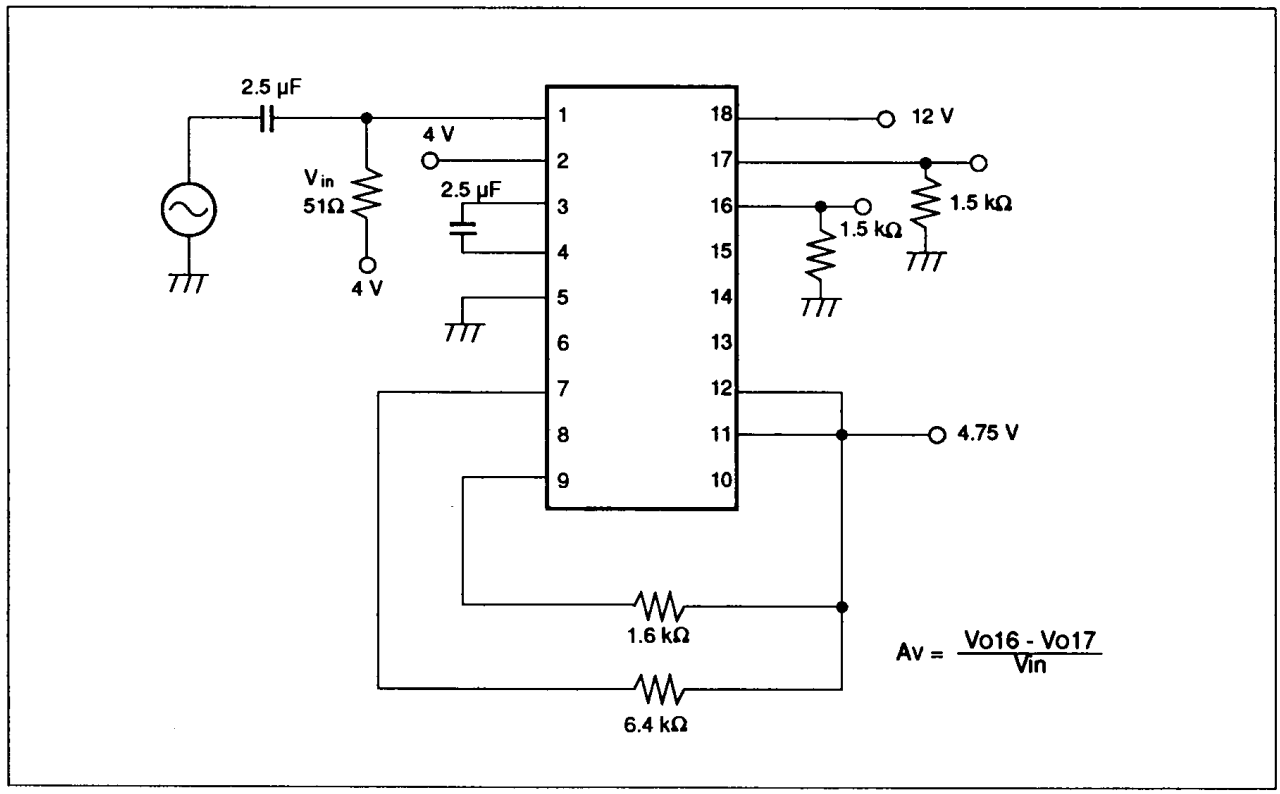


Figure 2 Voltage Gain, Band-width, Output Voltage Swing, Output Distortion Ratio

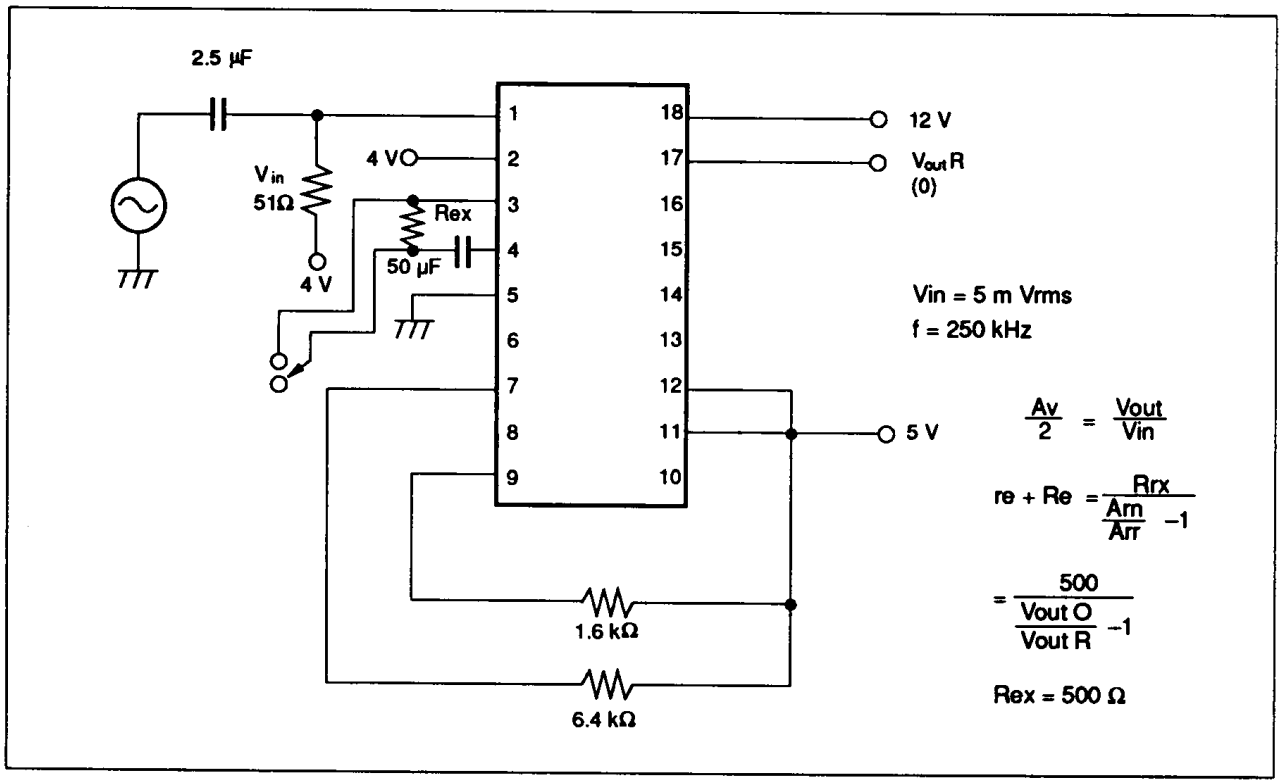


Figure 3 Pre-Amplifier Section Effective Emitter Resistance (Pins 3 and 4)

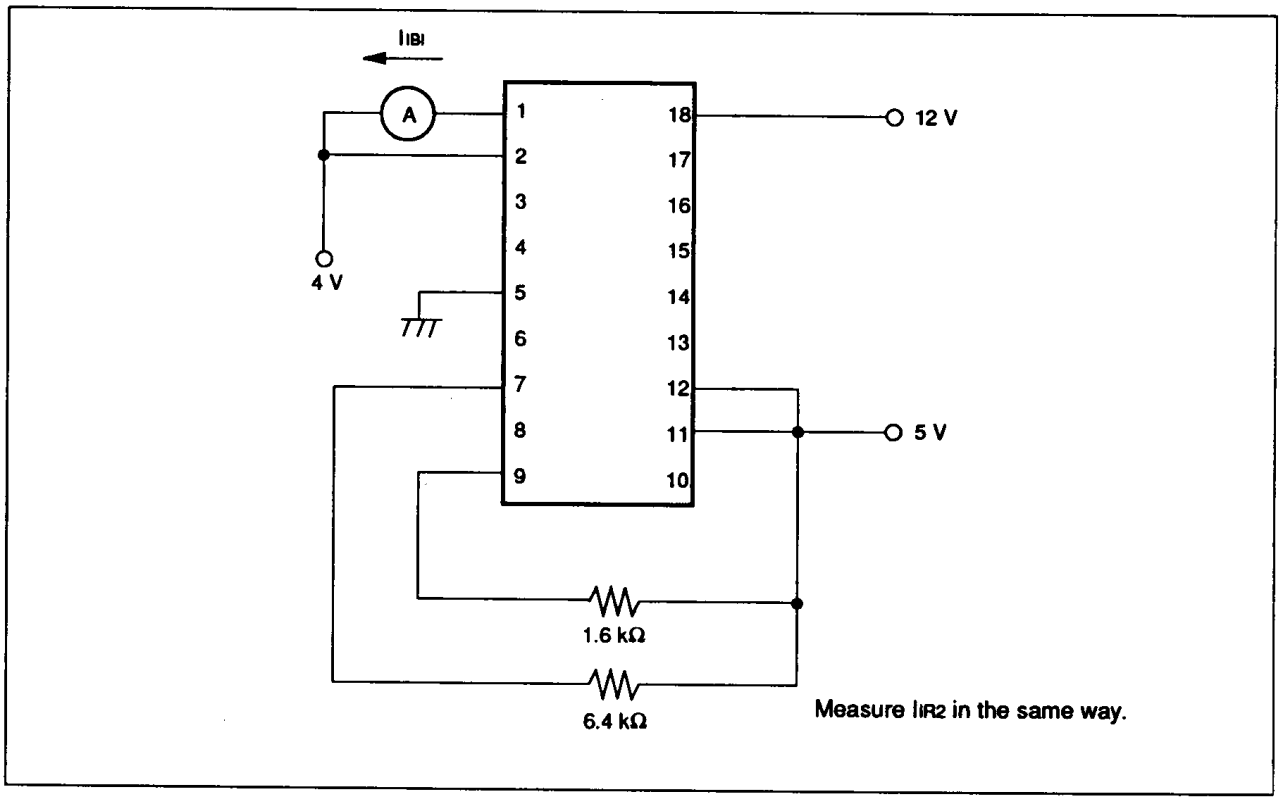


Figure 4 Input Bias Current

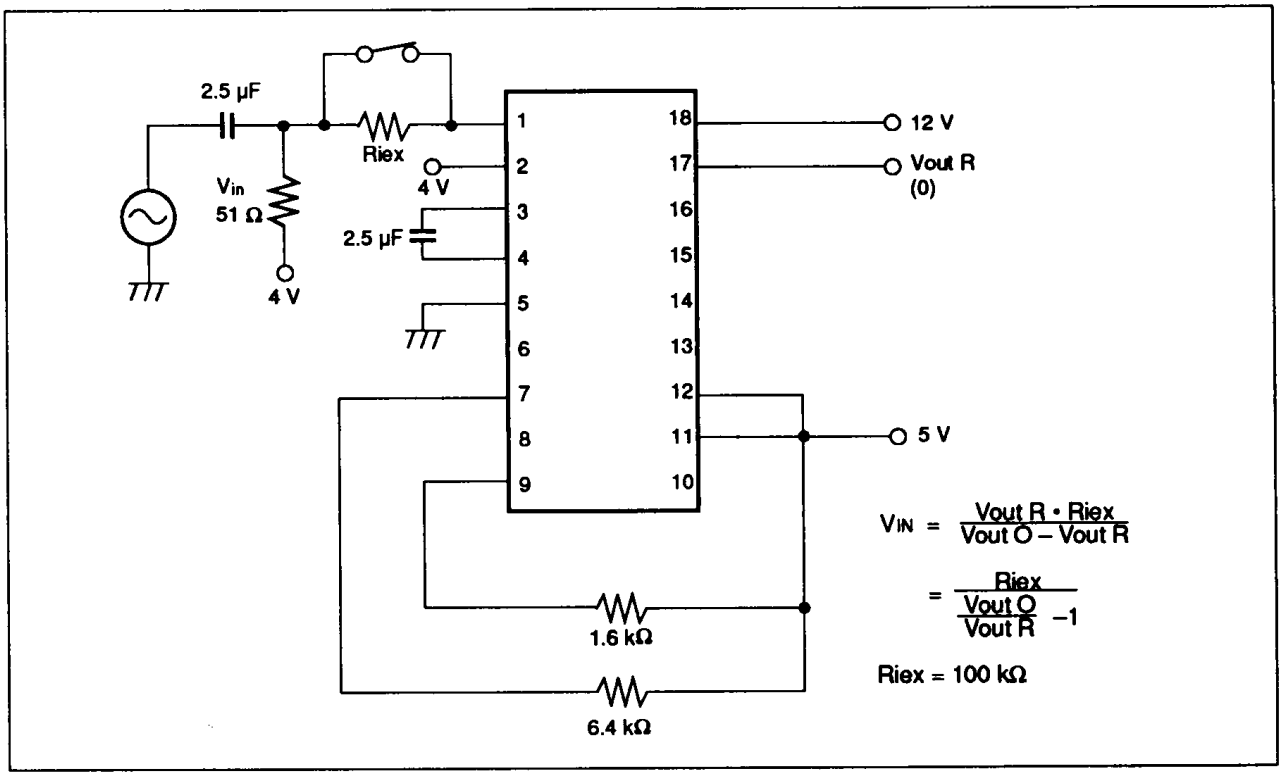


Figure 5 Input Resistance

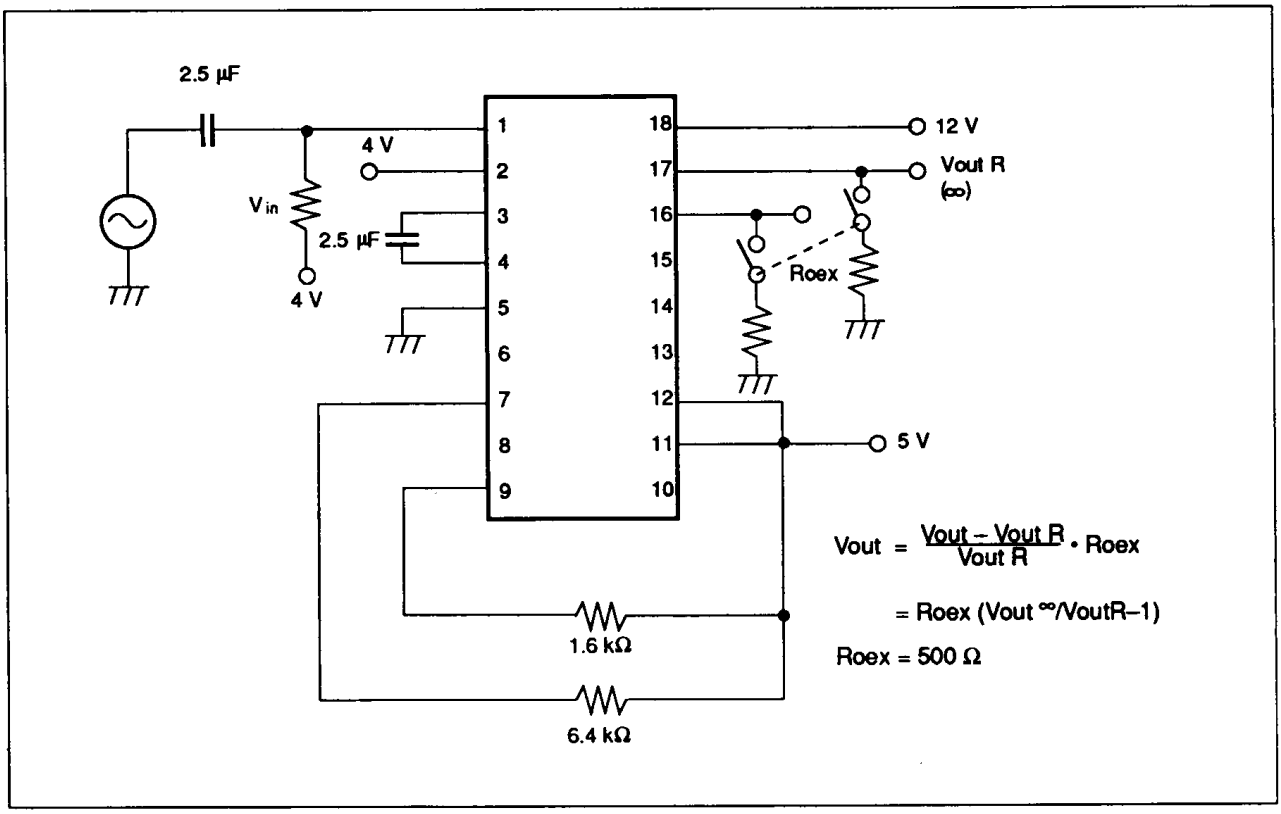


Figure 6 Output Resistance

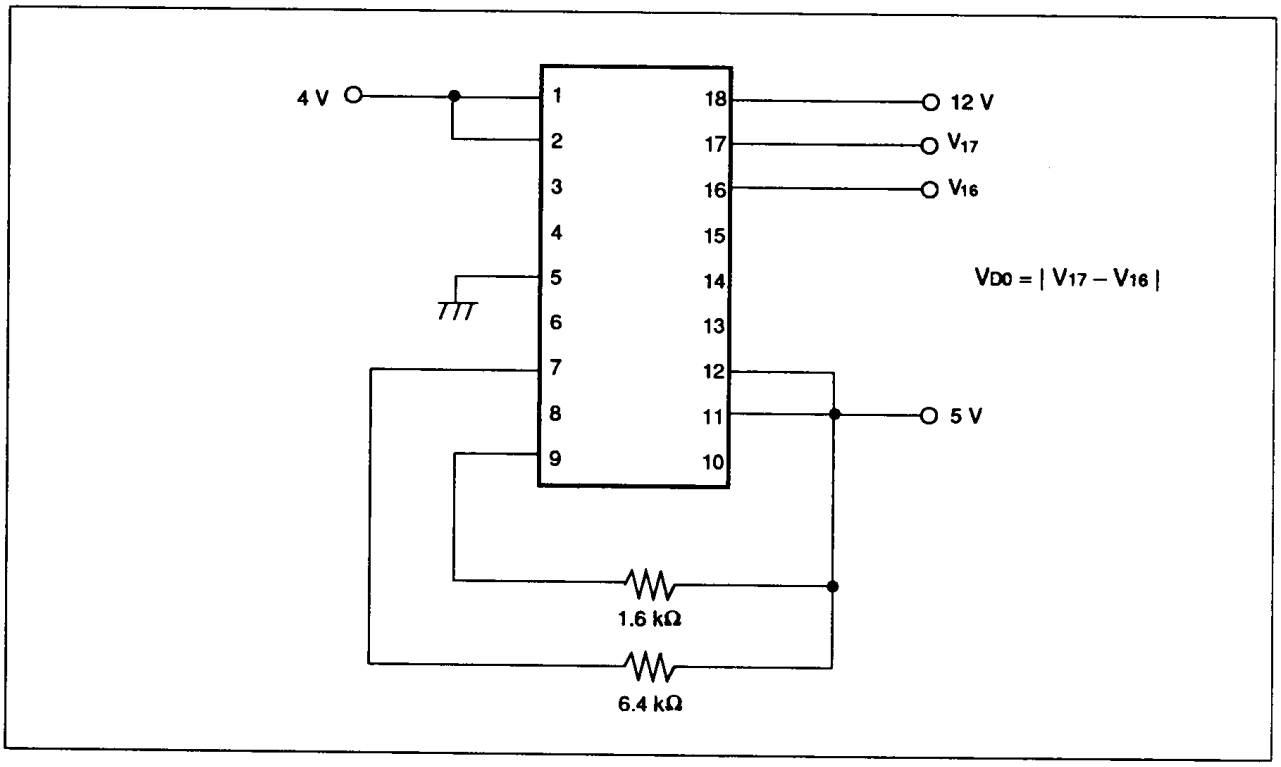


Figure 7 Differential Output Offset Voltage, Common Mode Output Voltage

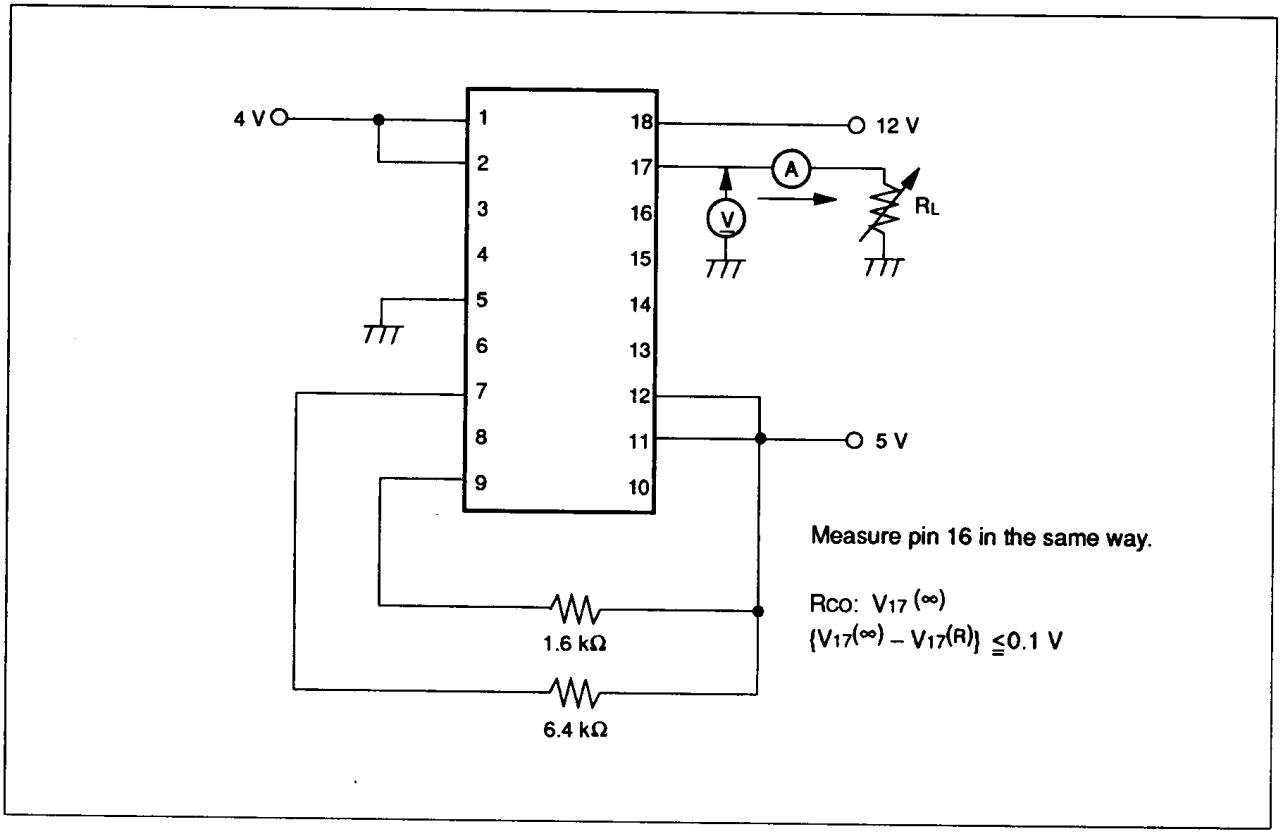


Figure 8 Output Source Current

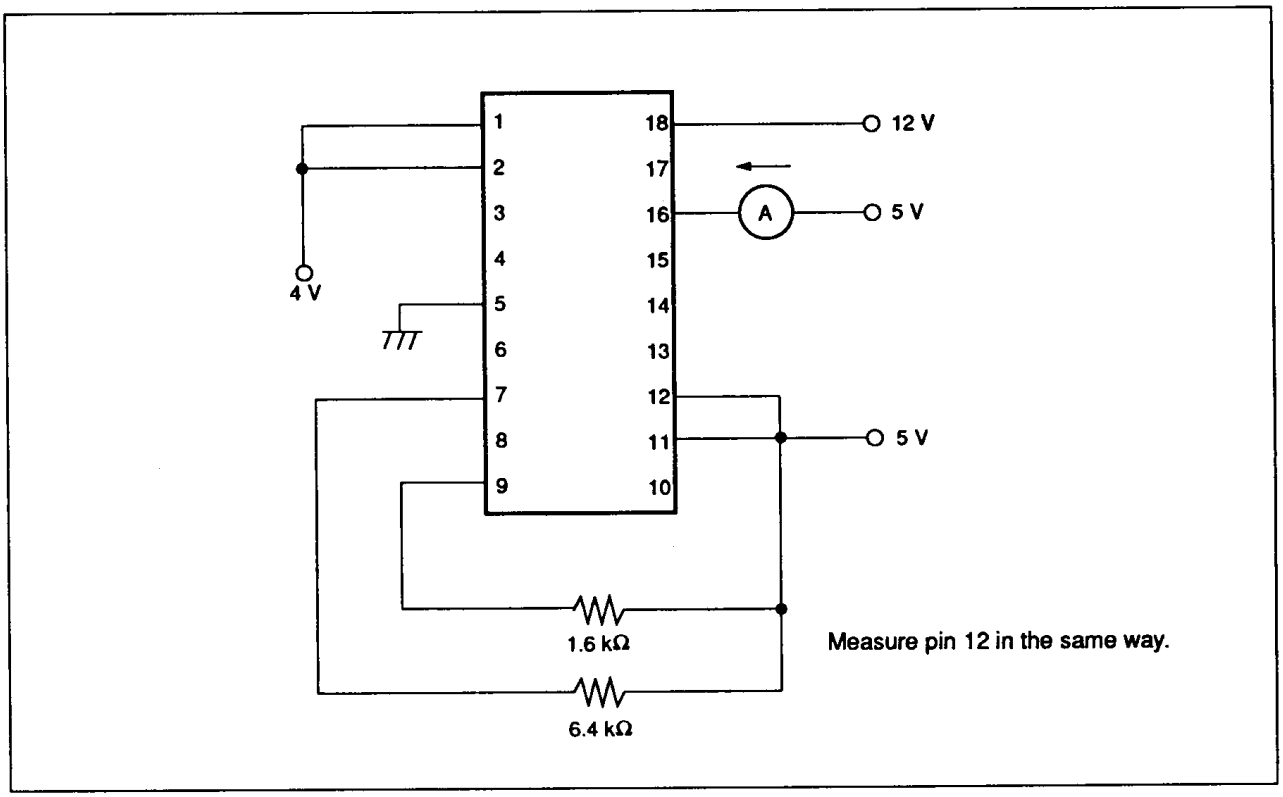


Figure 9 Output Sink Current

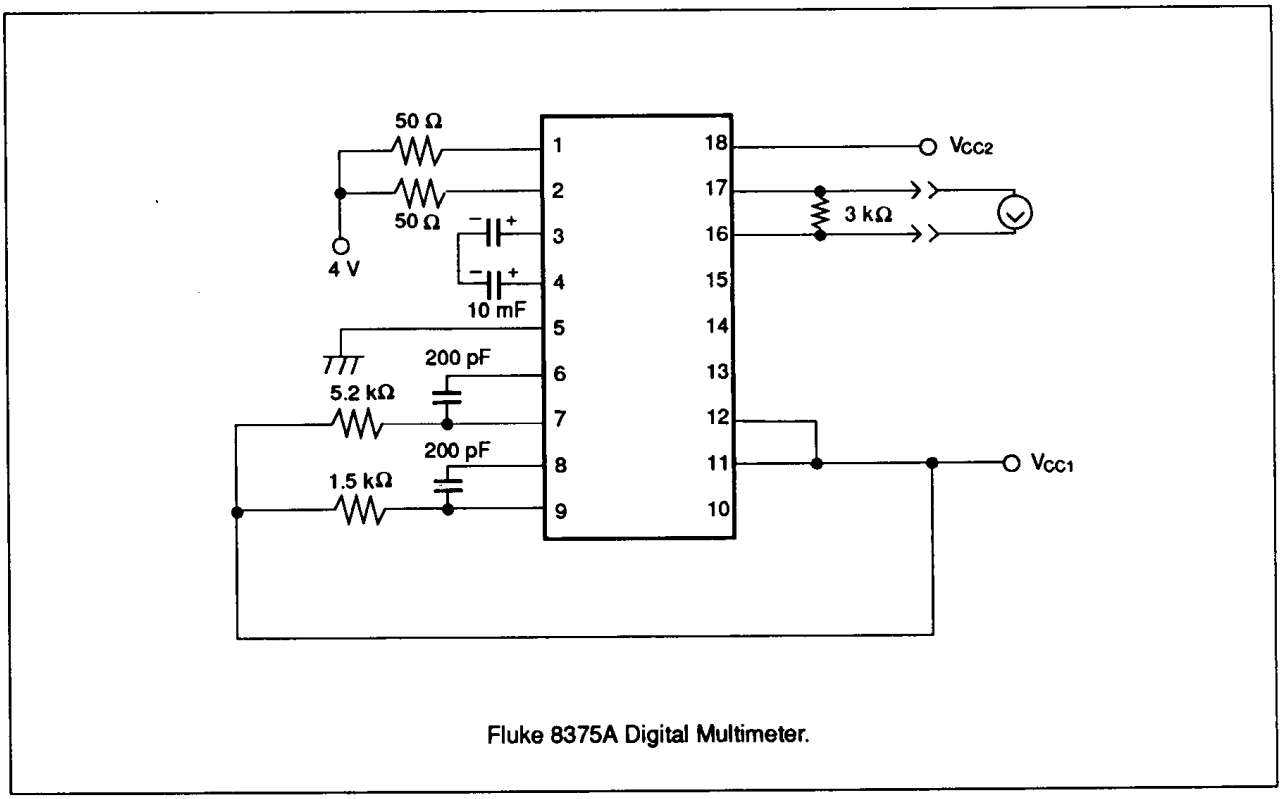


Figure 10 Power Supply Rejection Ratio

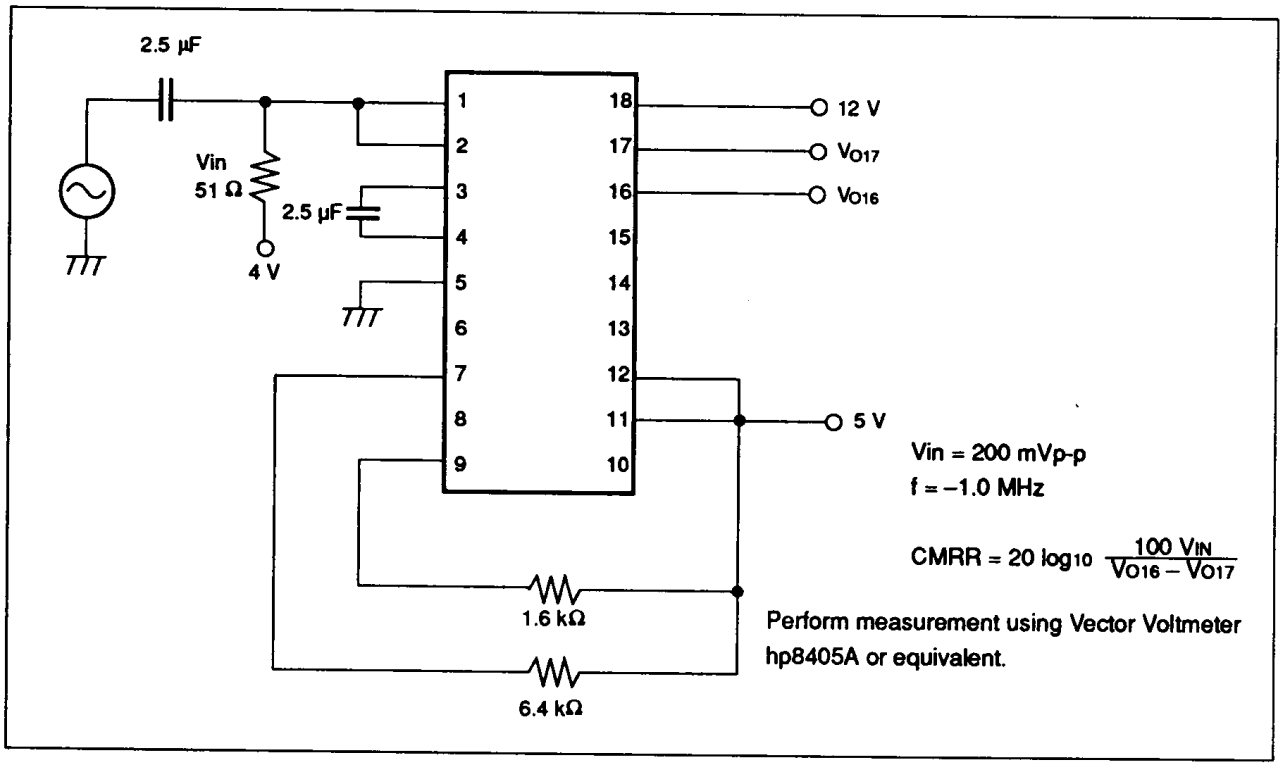


Figure 11 Common Mode Rejection Ratio

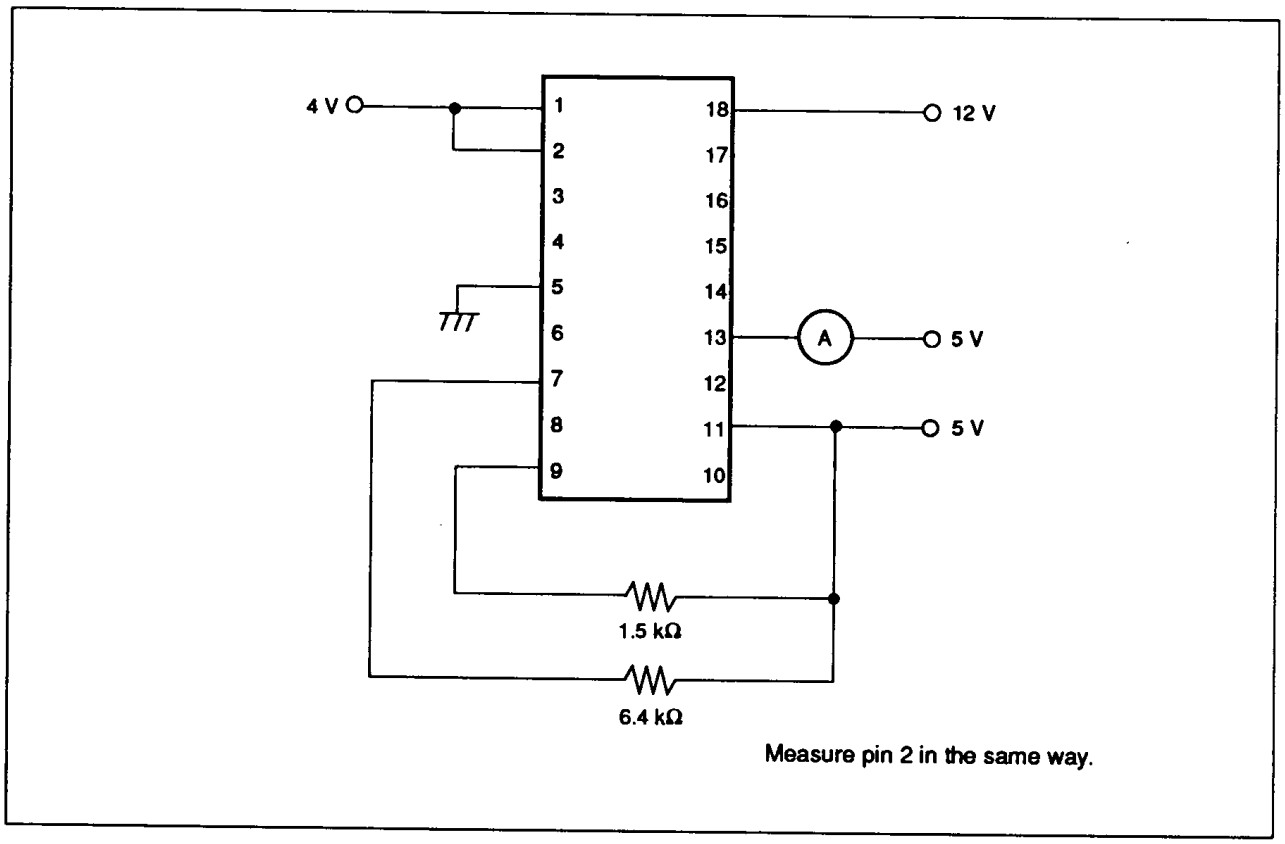


Figure 12 Differentiator Output Sink Current

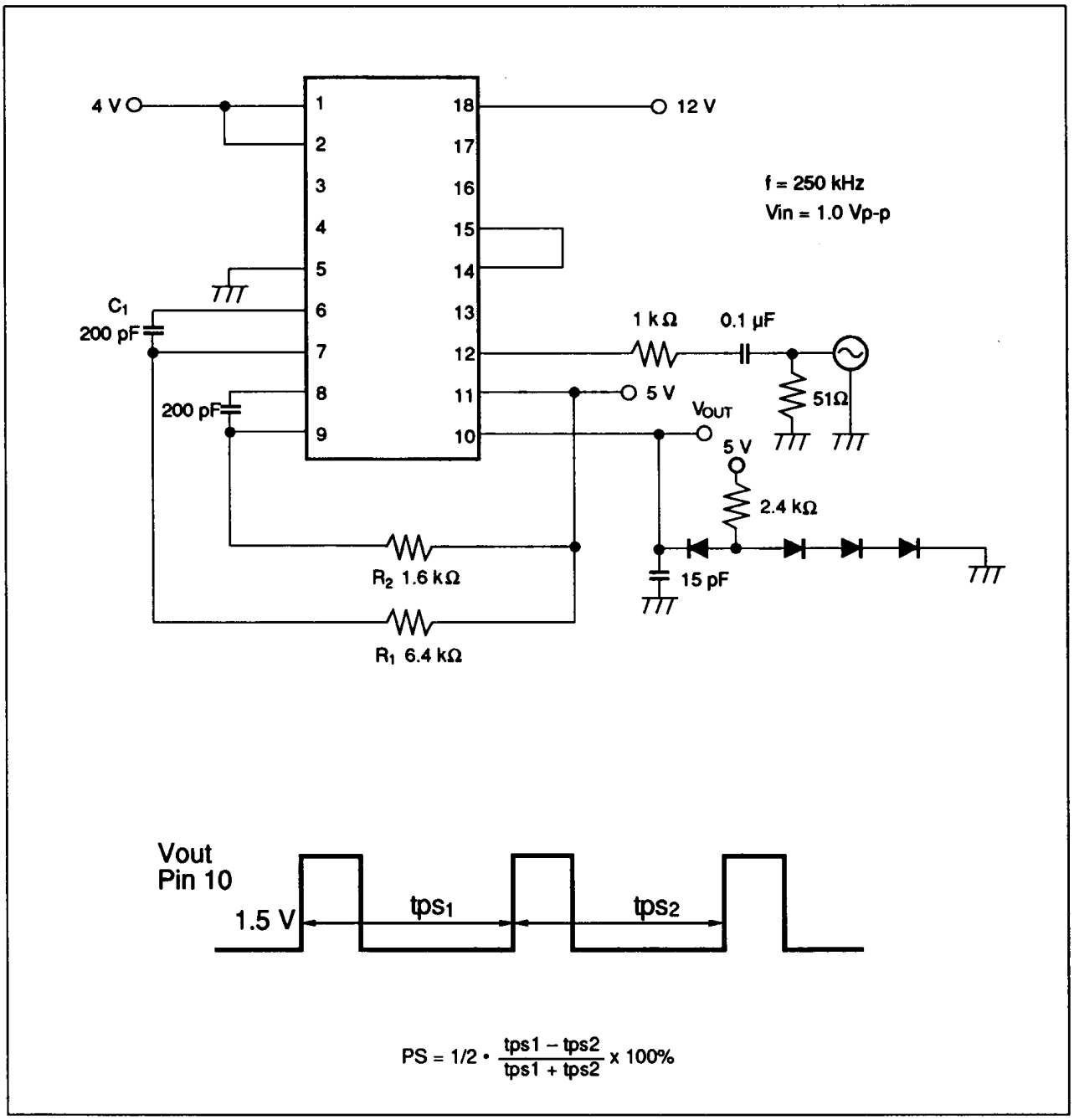


Figure 13 Peak Shift

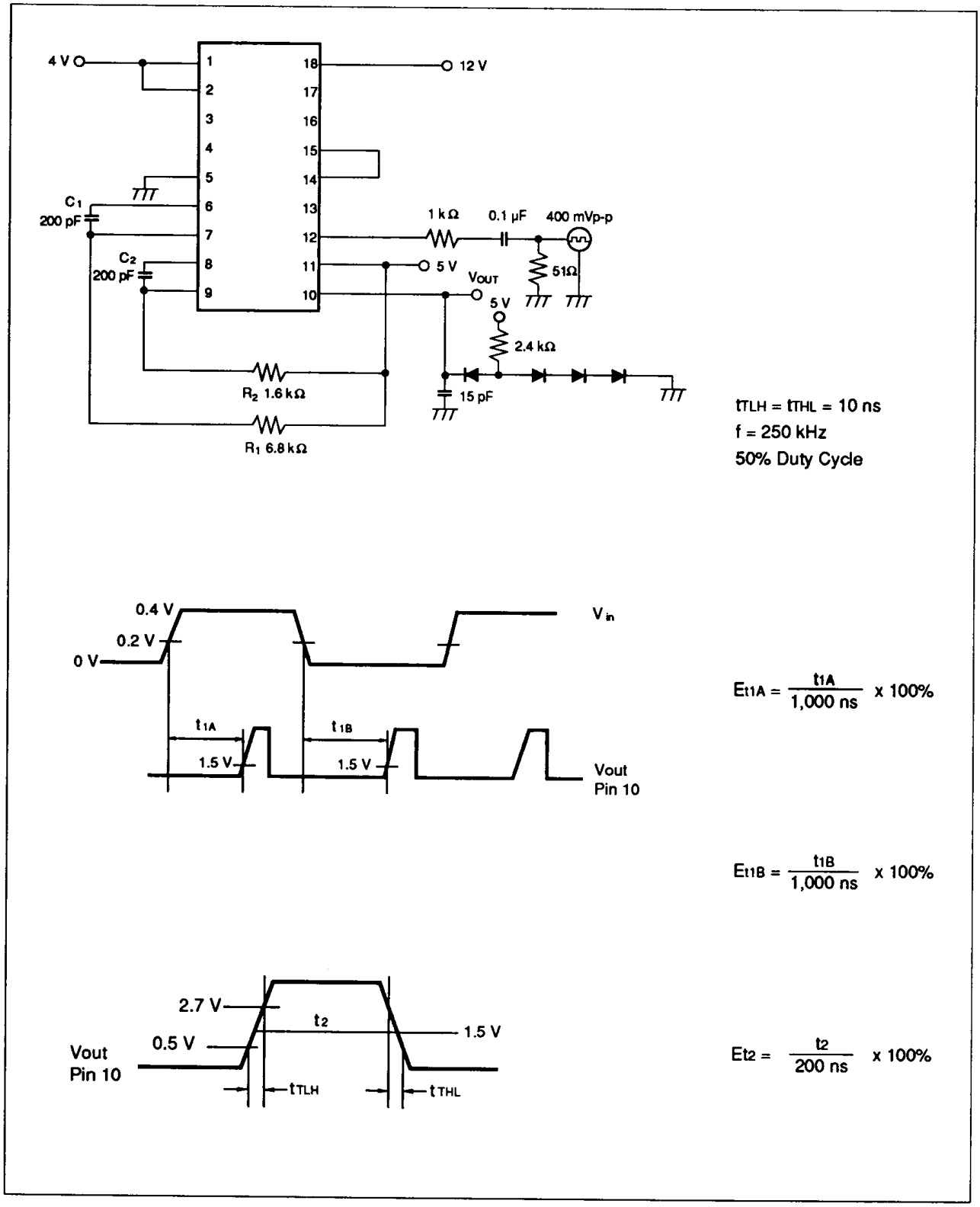


Figure 14 Timing Accuracy, Rising Time, Falling Time

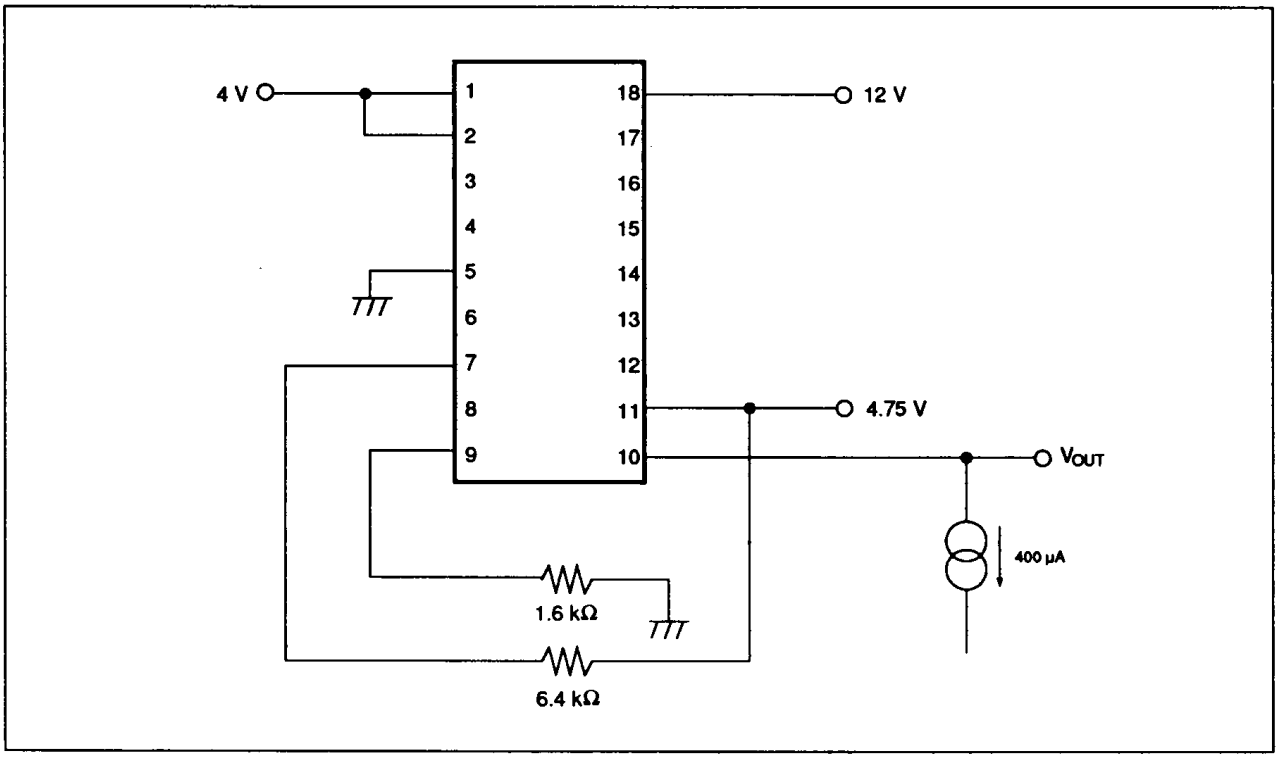


Figure 15 Output Voltage High (Pin 10)

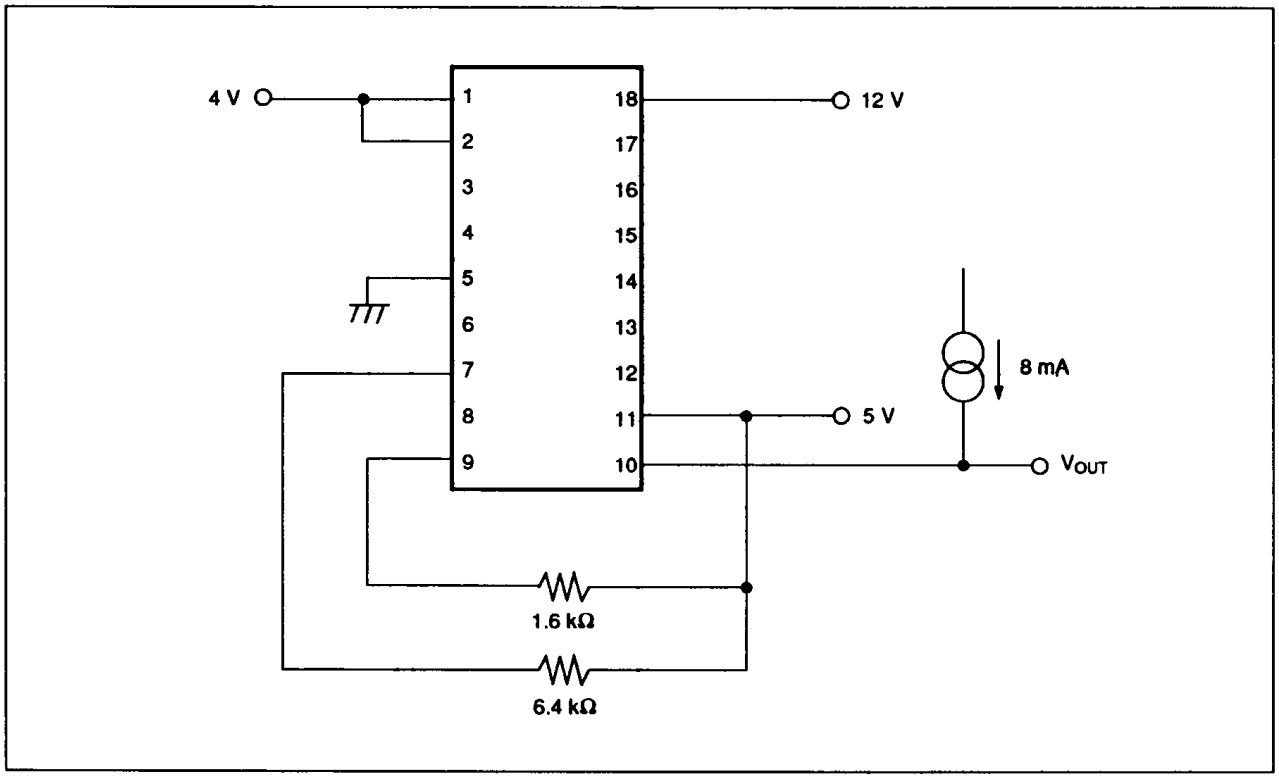


Figure 16 Output Voltage Low (Pin 10)

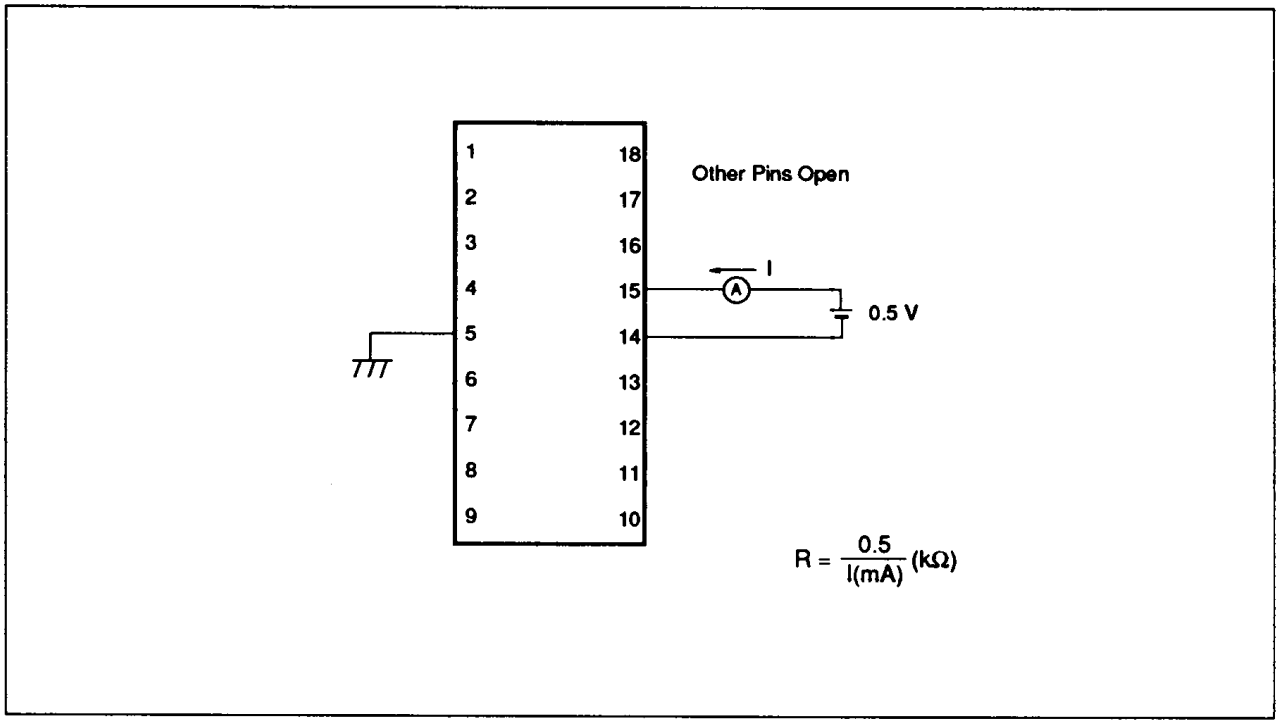


Figure 17 Input Resistance

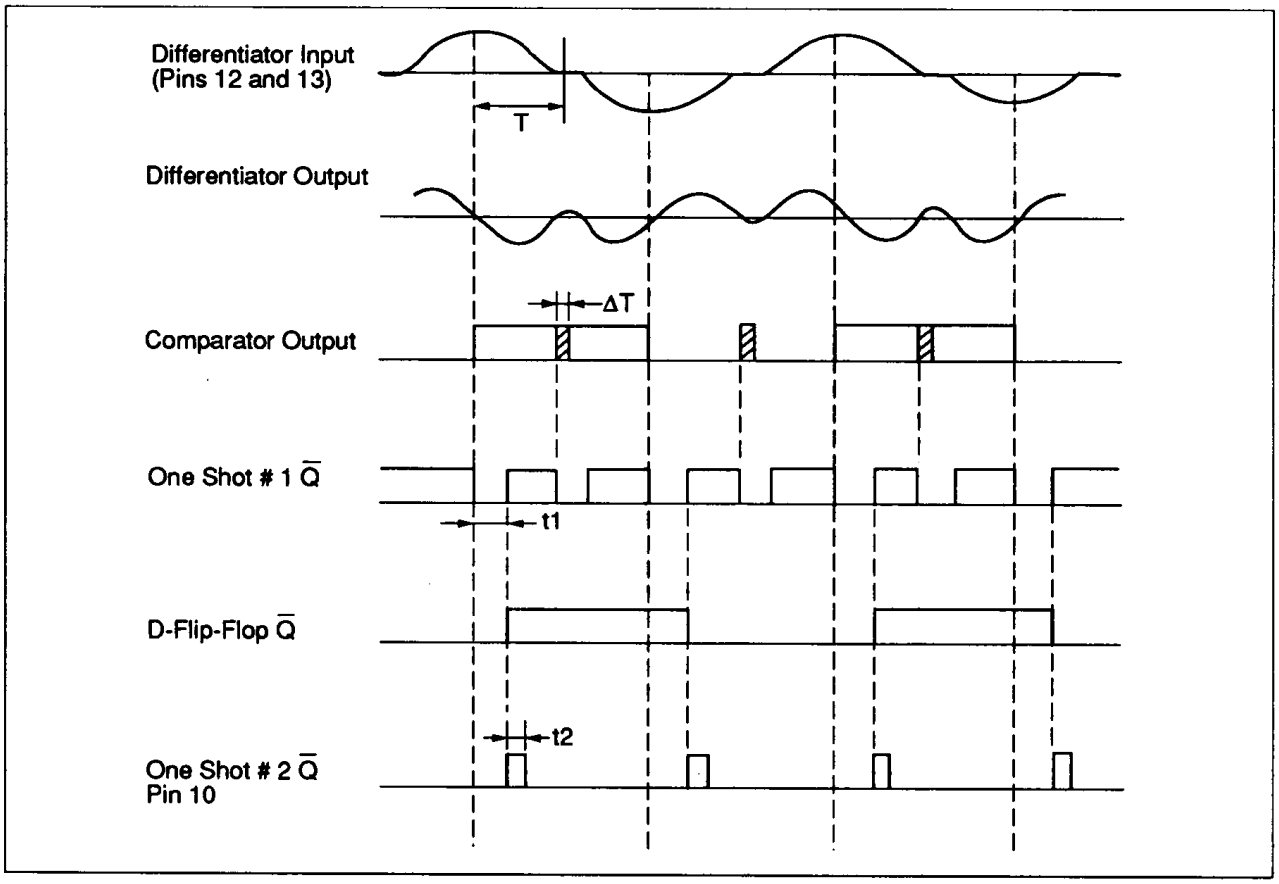


Figure 18 Timing Waveforms

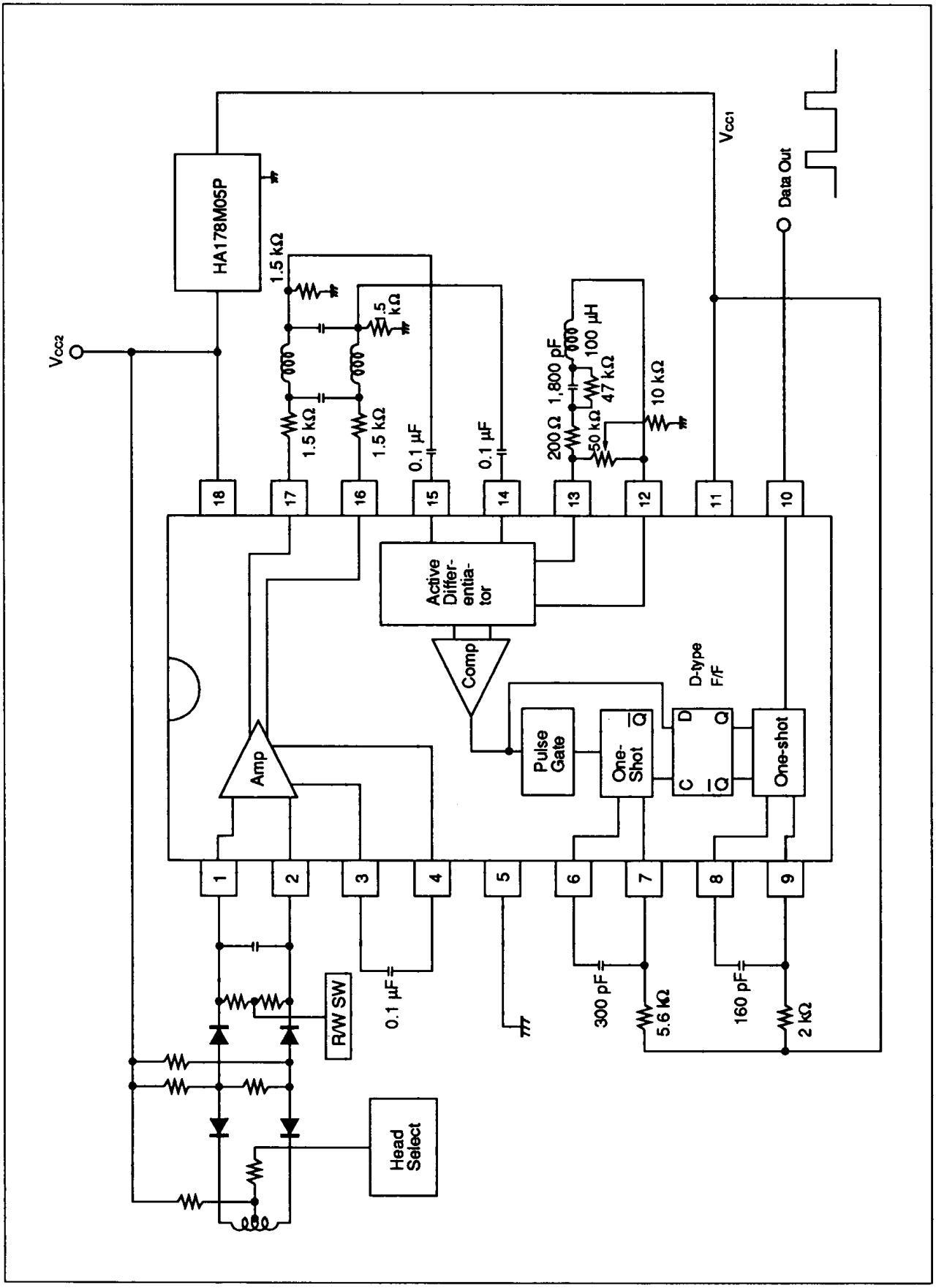


Figure 19 Circuit Example

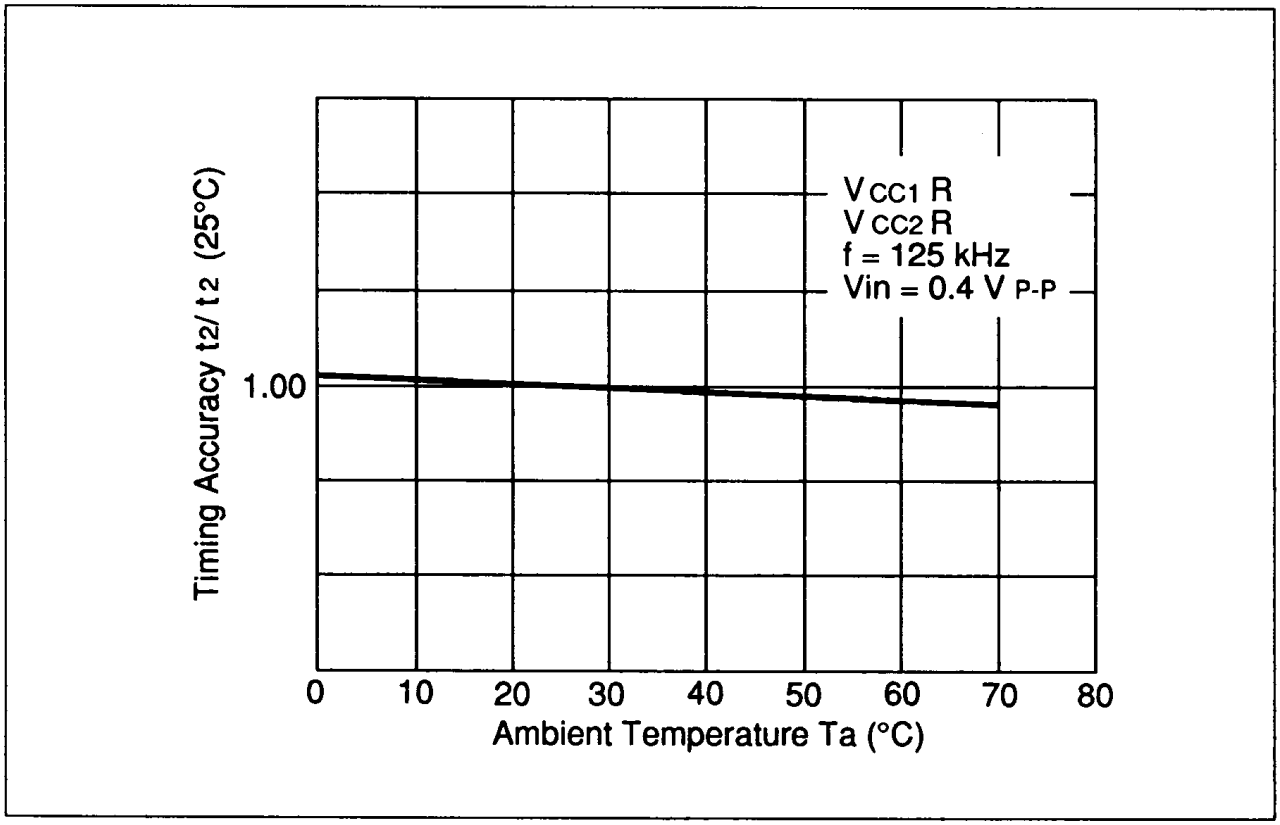


Figure 20 Timing Accuracy vs Ambient Temperature

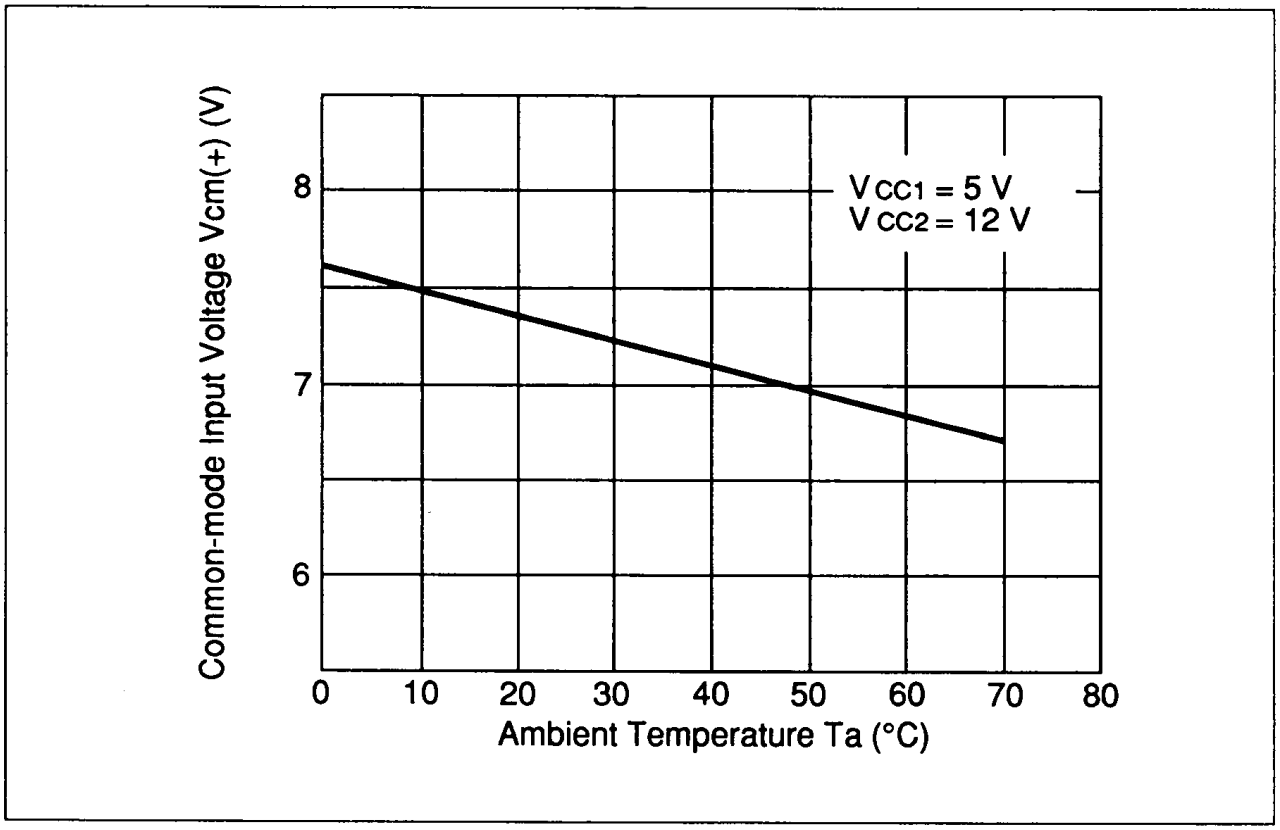


Figure 21 Common-Mode Input Voltage vs Ambient Temperature

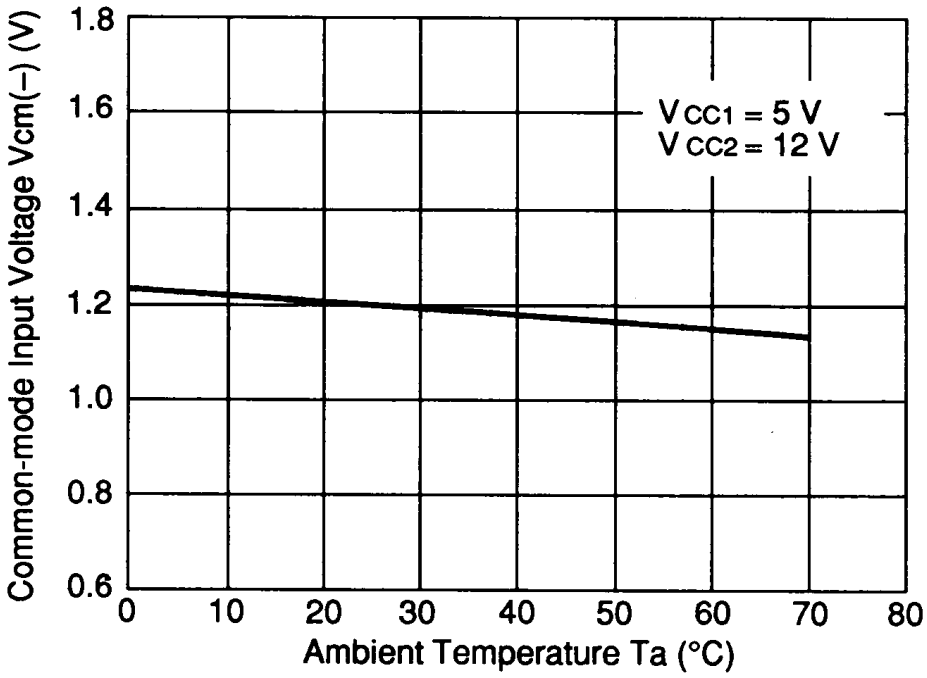


Figure 22 Common-Mode Input Voltage vs Ambient Temperature

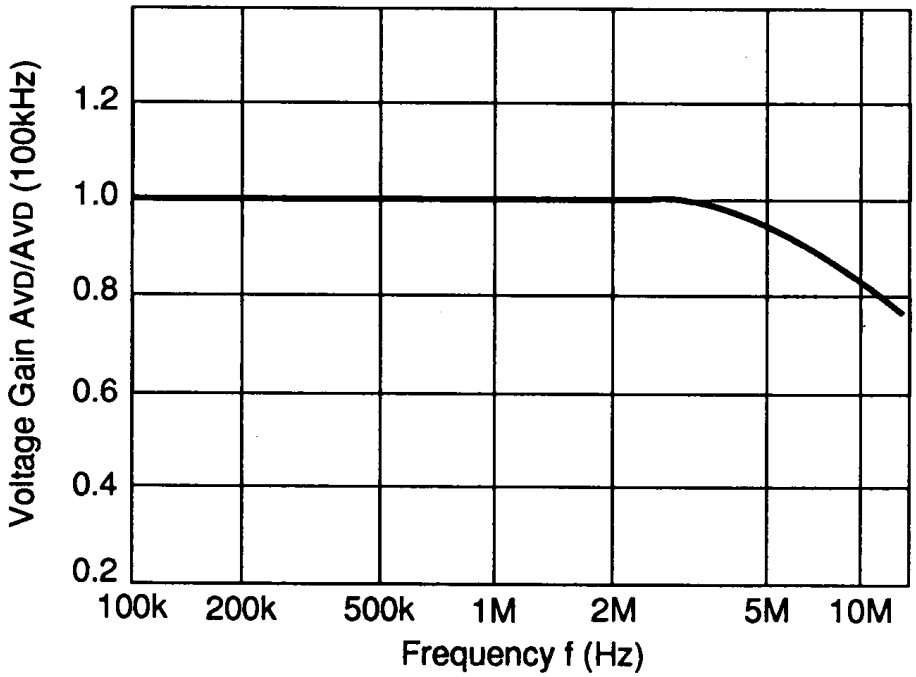


Figure 23 Voltage Gain vs Frequency

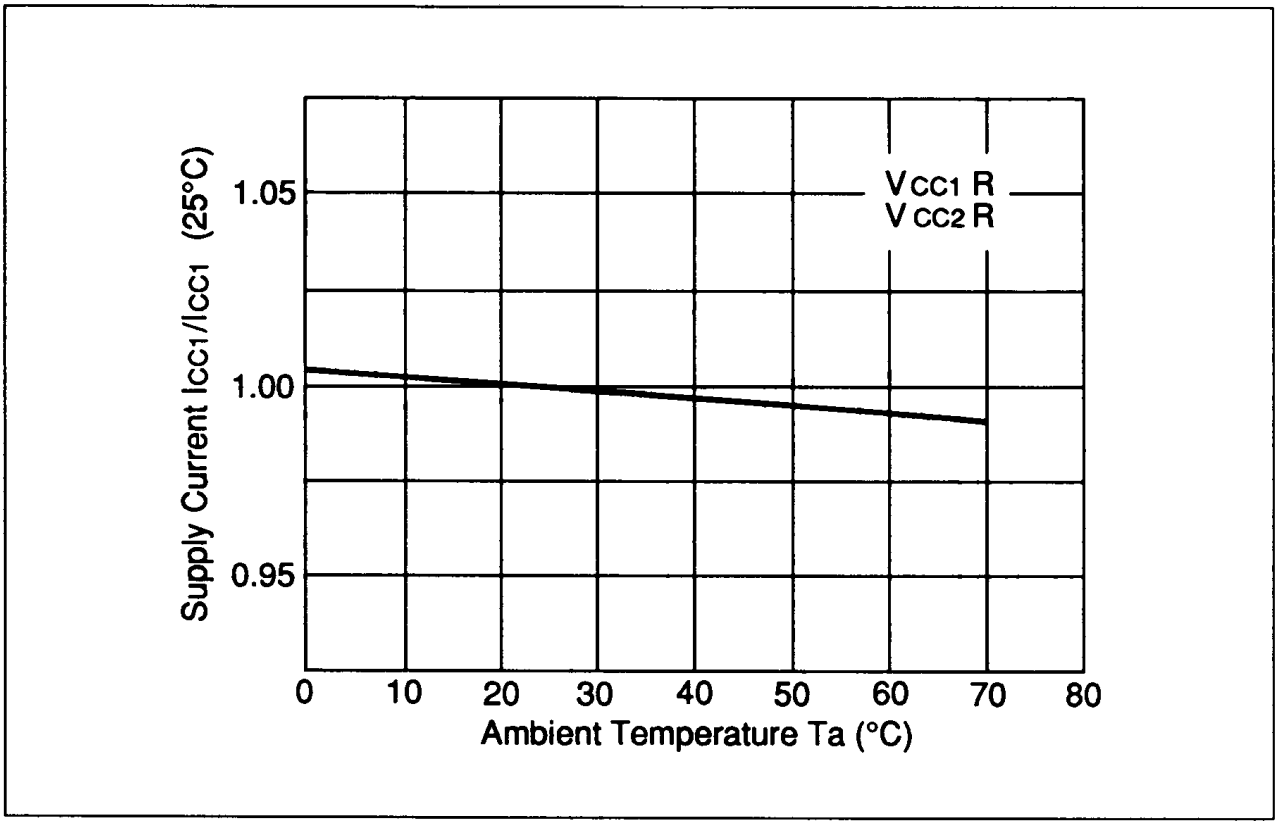


Figure 24 Supply Current vs Ambient Temperature (1)

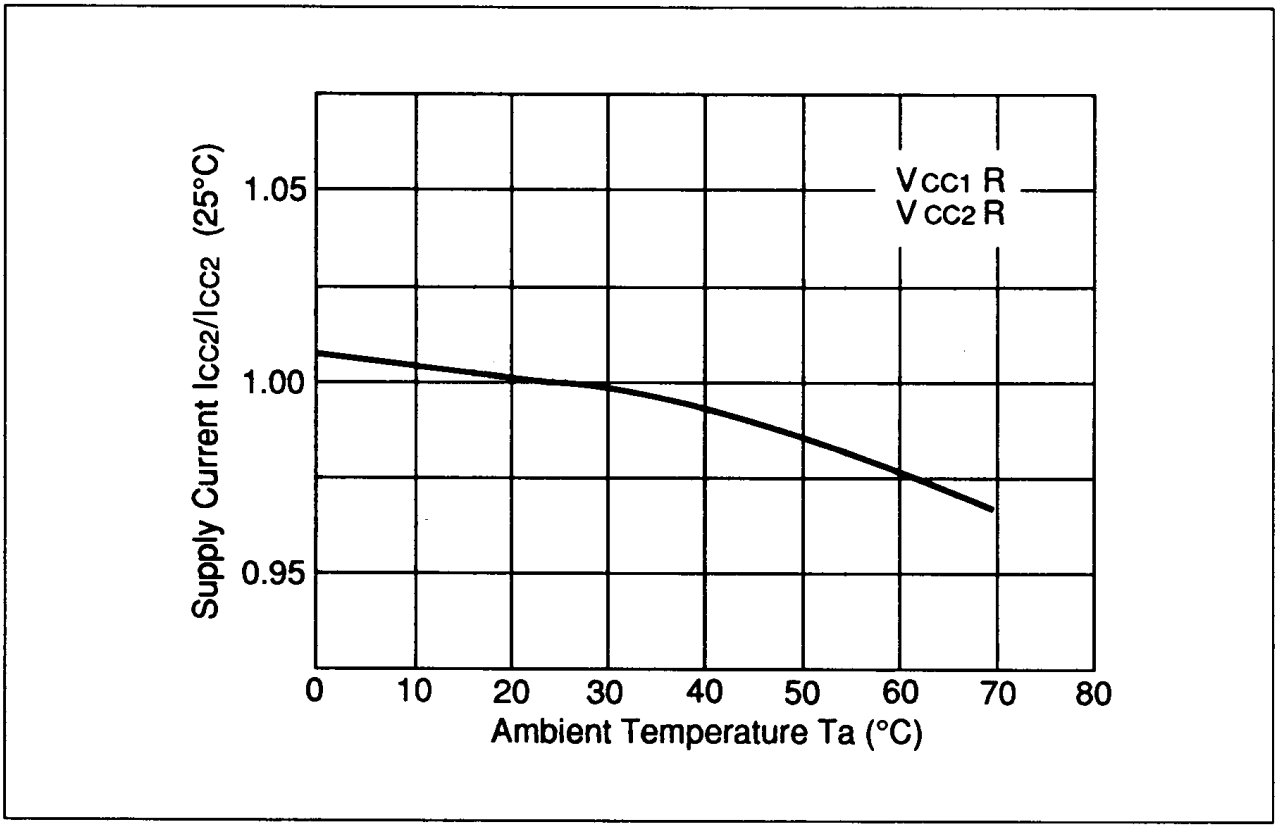


Figure 25 Supply Current vs Ambient Temperature (2)

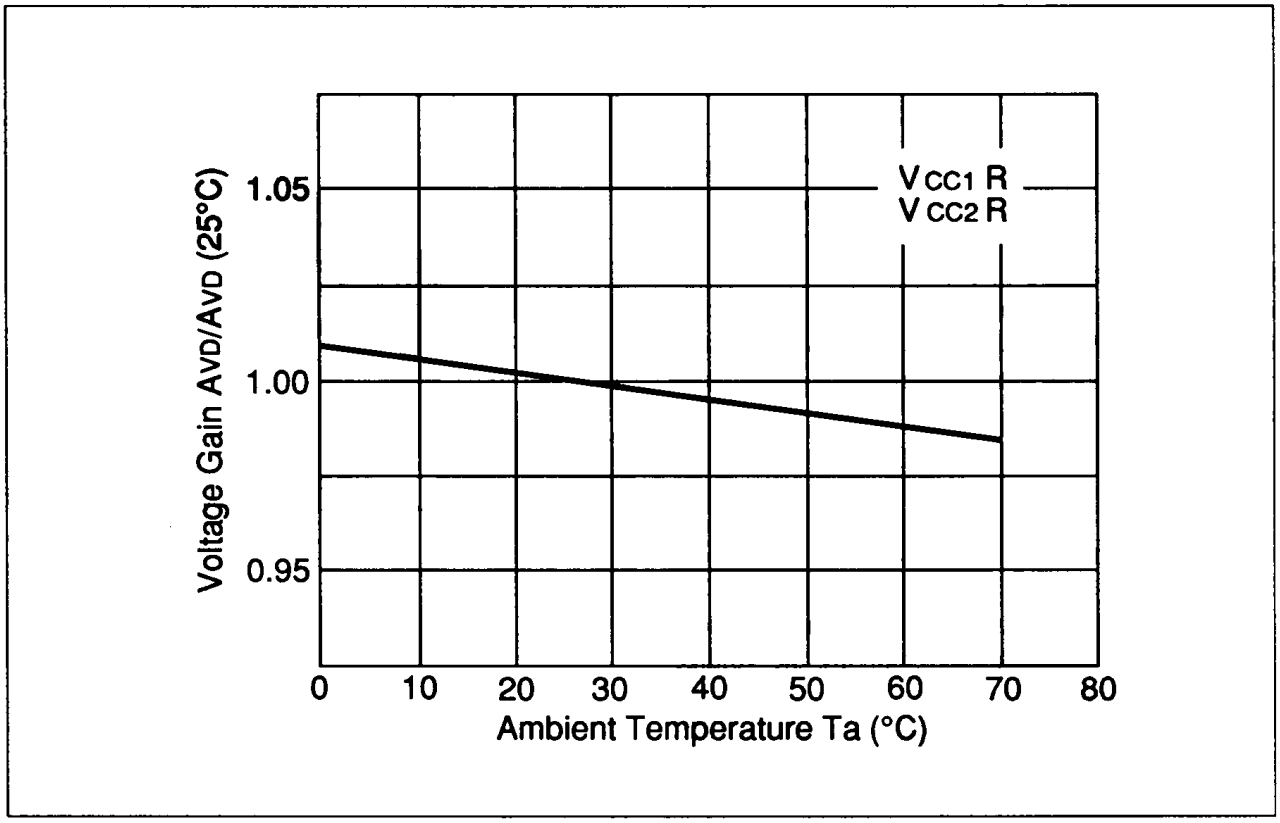


Figure 26 Voltage Gain vs Ambient Temperature

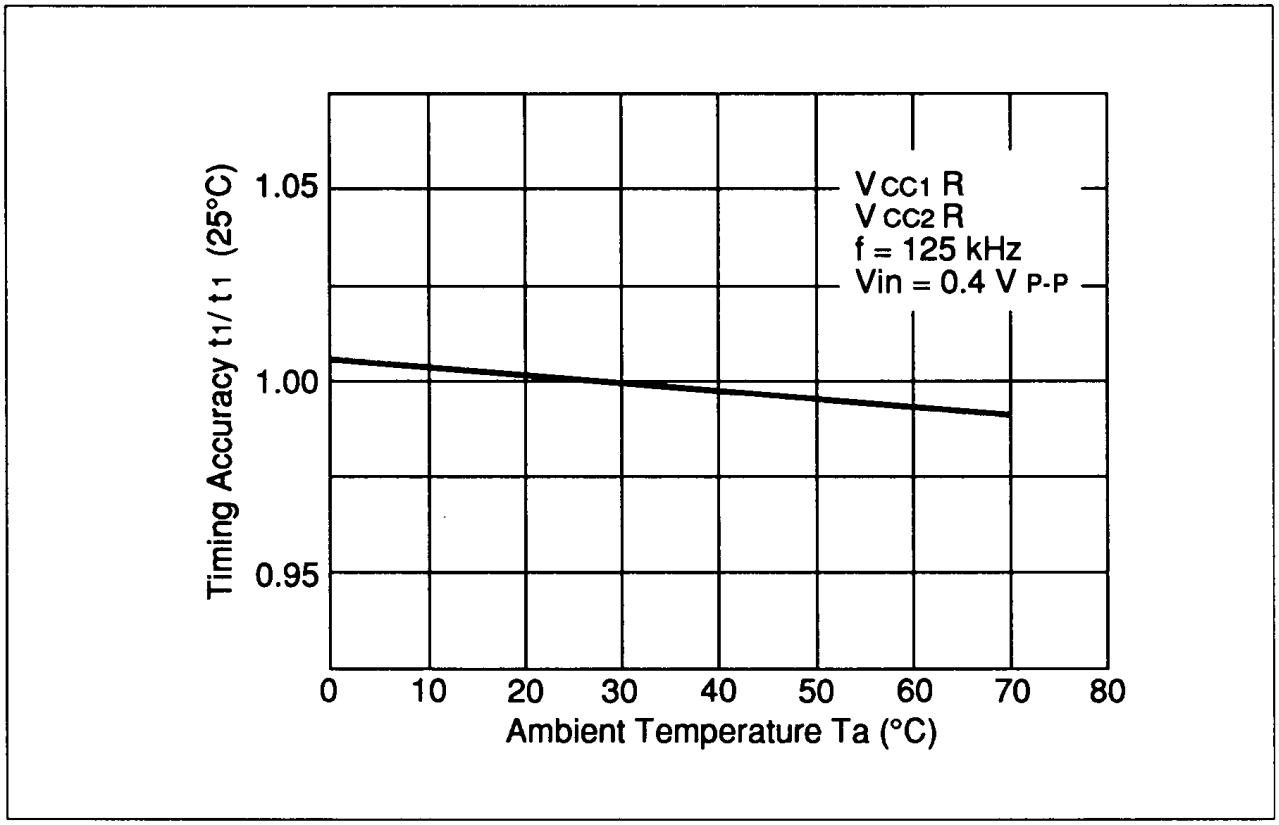


Figure 27 Timing Accuracy vs Ambient Temperature