

# RC4558

## Dual High-Gain Operational Amplifier

### Features

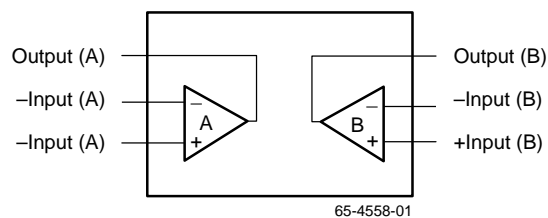
- 2.5 MHz unity gain bandwidth
- Supply voltage  $\pm 22\text{V}$  for RM4558 and  $\pm 18\text{V}$  for RC/RV4558
- Short-circuit protection
- No frequency compensation required
- No latch-up
- Large common-mode and differential voltage ranges
- Low power consumption
- Parameter tracking over temperature range
- Gain and phase match between amplifiers

### Description

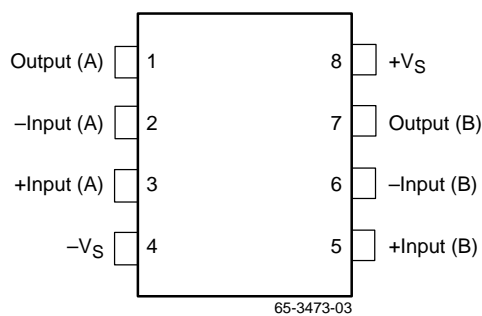
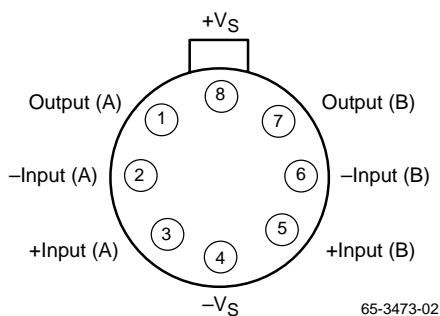
The RC4558 integrated circuit is a dual high-gain operational amplifier internally compensated and constructed on a single silicon IC using an advanced epitaxial process.

Combining the features of the 741 with the close parameter matching and tracking of a dual device on a monolithic chip results in unique performance characteristics. Excellent channel separation allows the use of this dual device in dense single 741 operational amplifier applications. It is especially well suited for applications in differential-in, differential-out as well as in potentiometric amplifiers and where gain and phase matched channels are mandatory.

### Block Diagram



## Pin Assignments



## Absolute Maximum Ratings

(beyond which the device may be damaged)<sup>1</sup>

Parameter		Min	Typ	Max	Units
Supply Voltage	RM4558			±22	V
	RC4558			±18	
Input Voltage <sup>2</sup>				±15	V
Differential Input Voltage				30	V
P <sub>DTA</sub> < 50°C	SOIC			300	mW
	PDIP			468	
	CerDIP			833	
	TO-99			658	
Junction Temperature	SOIC, PDIP			125	°C
	CerDIP, TO-99			175	
Operating Temperature	RM4558	-55		125	°C
	RC4558	0		70	
Lead Soldering Temperature	PDIP, CerDIP, TO-99 (60 sec)			300	°C
	SOIC (10 sec)			260	
Output Short Circuit Duration <sup>3</sup>				Indefinite	

**Notes:**

1. Functional operation under any of these conditions is NOT implied.
2. For supply voltages less than ±15V, the absolute maximum input voltage is equal to the supply voltage.
3. Short circuit may be to ground on one op amp only. Rating applies to +75°C ambient temperature.

## Matching Characteristics

(V<sub>S</sub> = ±15V, T<sub>A</sub> = +25°C unless otherwise specified)

Parameter	Test Conditions	Typ	Units
Voltage Gain	R <sub>L</sub> ≥ 2 kΩ	±1.0	dB
Input Bias Current	R <sub>L</sub> ≥ 2 kΩ	±15	nA
Input Offset Current	R <sub>L</sub> ≥ 2 kΩ	±7.5	nA

## Electrical Characteristics

( $V_S = \pm 15V$  and  $T_A = +25^\circ C$  unless otherwise specified)

Parameters	Test Conditions	RM4558			RC4558			Units
		Min	Typ	Max	Min	Typ	Max	
Input Offset Voltage	$R_S \leq 10k\Omega$		1.0	5.0		2.0	6.0	mV
Input Offset Current			5.0	200		5.0	200	nA
Input Bias Current			40	500		40	500	nA
Input Resistance		0.3	1.0		0.3	1.0		M $\Omega$
Large Signal Voltage Gain	$R_L \geq 2k\Omega$ , $V_{OUT} = \pm 10V$	50	300		20	300		V/mV
Output Voltage Swing	$R_L \geq 10k\Omega$	$\pm 12$	$\pm 14$		$\pm 12$	$\pm 14$		V
	$R_L \geq 2k\Omega$	$\pm 10$	$\pm 13$		$\pm 10$	$\pm 13$		V
Input Voltage Range		$\pm 12$	$\pm 13$		$\pm 12$	$\pm 13$		V
Common Mode Rejection Ratio	$R_S \leq 10k\Omega$	70	100		70	100		dB
Power Supply Rejection Ratio	$R_S \leq 10k\Omega$	76	100		76	100		dB
Power Consumption	$R_L = \infty$		100	170		100	170	mW
Transient Response	$V_{IN} = 20\text{ mV}$							
Rise Time	$R_L = 2k\Omega$		0.3			0.3		$\mu S$
Overshoot	$C_L \leq 100pF$		35			35		%
Slew Rate	$R_L \geq 2k\Omega$		0.8			0.8		V/ $\mu S$
Channel Separation	$F = 10kHz$ , $R_S = 1k\Omega$		90			90		dB
Unity Gain Bandwidth (Gain = 1)		2.5	3.0		2.0	3.0		MHz

The following specifications apply for RM =  $-55^\circ C \leq T_A \leq +125^\circ C$ , RC =  $0^\circ \leq T_A \leq +70^\circ C$

Parameters	Test Conditions	RM4558			RC4558			Units
		Min	Typ	Max	Min	Typ	Max	
Input Offset Voltage	$R_S \leq 10k\Omega$			6.0			7.5	mV
Input Offset Current								
RC4558				500			300	nA
Input bias Current								
RC4558				1500			800	nA
Large Signal Voltage Gain	$R_L \geq 2k\Omega$ , $V_{OUT} = \pm 10$	25			15			V/mV
Output Voltage Swing	$R_L \geq 2k\Omega$	$\pm 10$			$\pm 10$			V
Power Consumption	$R_L = \infty$		120	200		120	200	mW

### Typical Performance Characteristics

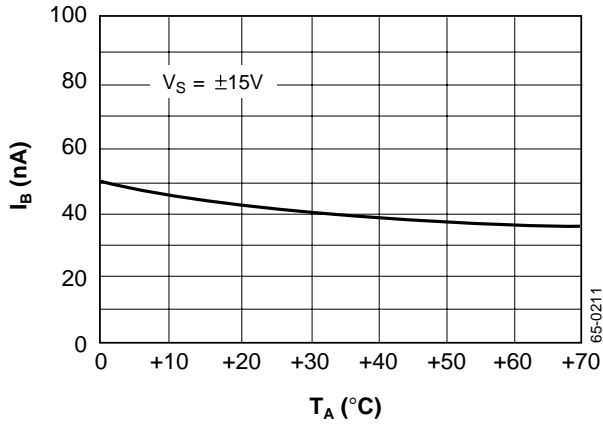


Figure 1. Input Bias Current vs. Temperature

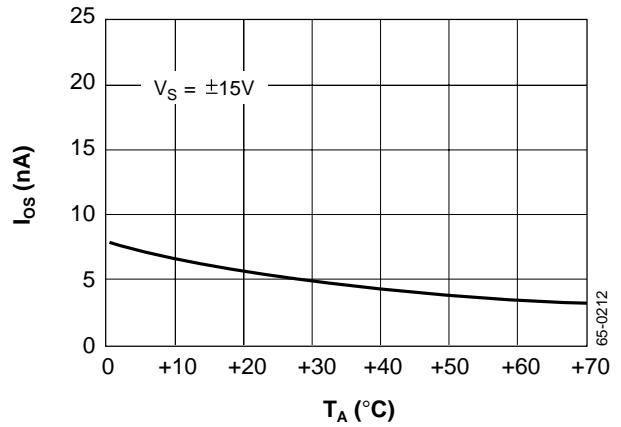


Figure 2. Input Offset Current vs. Temperature

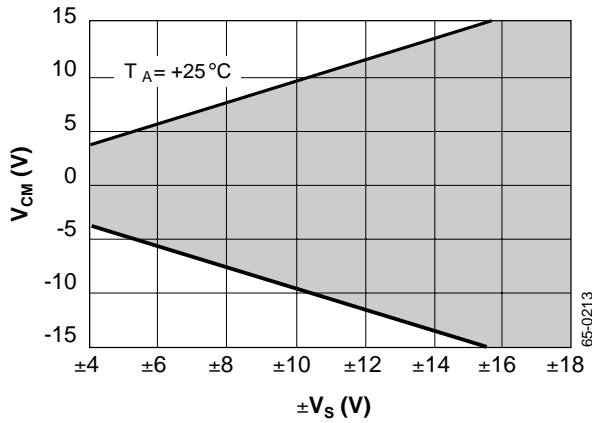


Figure 3. Input Common Mode Voltage Range vs. Supply Voltage

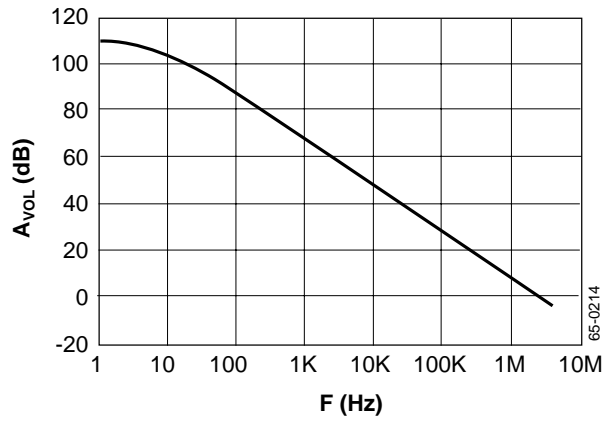


Figure 4. Open Loop Voltage Gain vs. Frequency

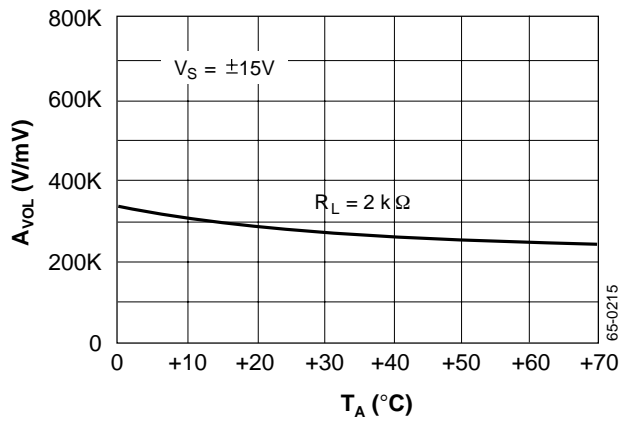


Figure 5. Open Loop Voltage Gain vs. Temperature

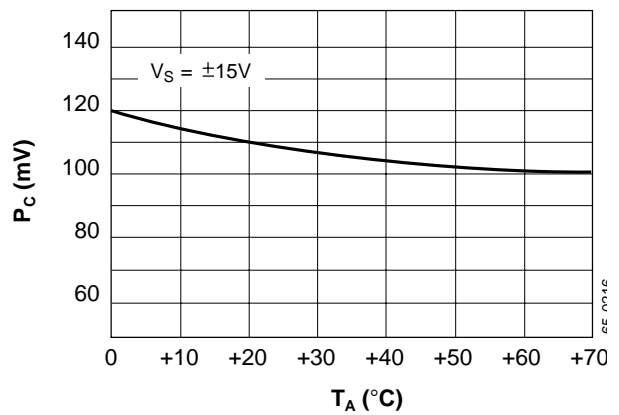


Figure 6. Power Consumption vs. Temperature

Typical Performance Characteristics (continued)

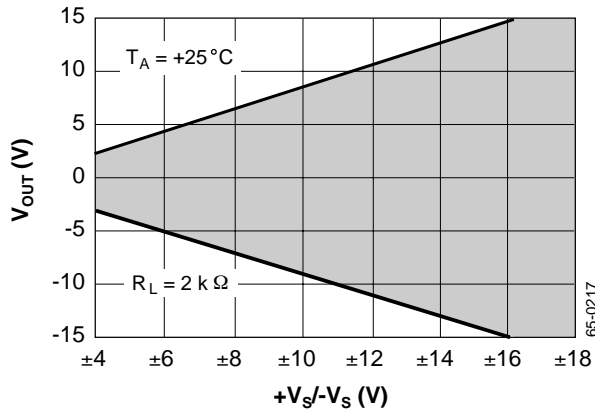


Figure 7. Output Voltage Swing vs. Supply Voltage

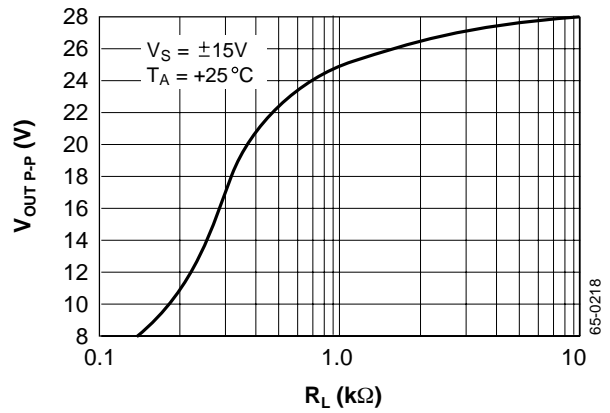


Figure 8. Output Voltage Swing vs. Load Resistance

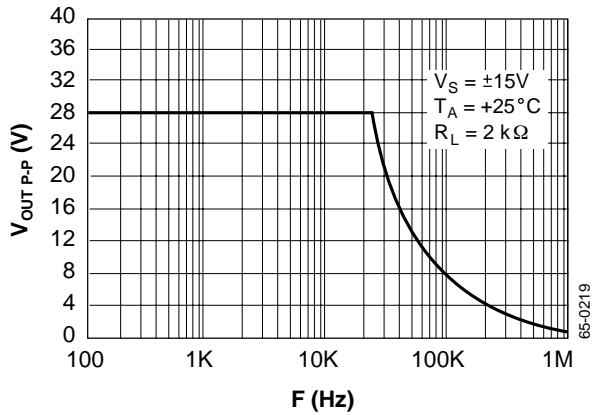


Figure 9. Output Voltage Swing vs. Frequency

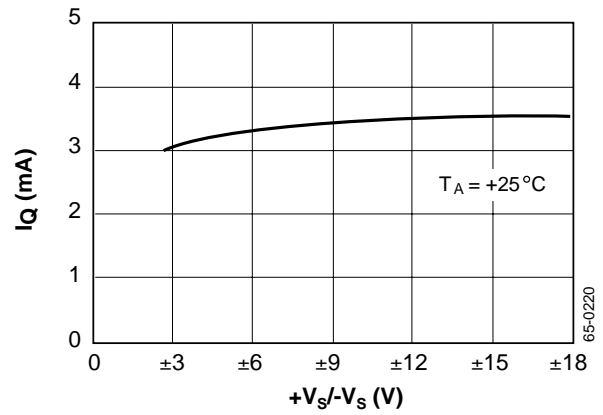


Figure 10. Quiescent Current vs. Supply Voltage

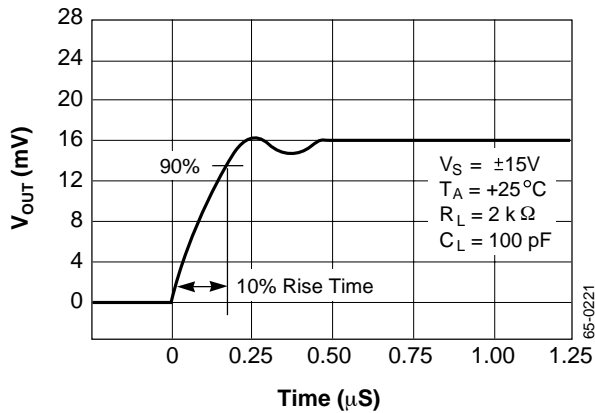


Figure 11. Transient Response Output Voltage vs. Time

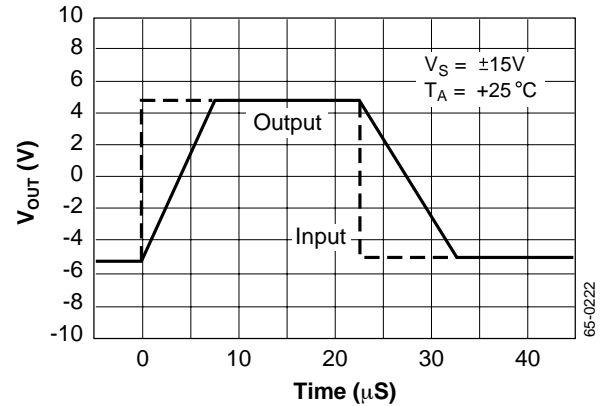


Figure 12. Follower Large Signal Pulse Response Output Voltage vs. Time

Typical Performance Characteristics (continued)

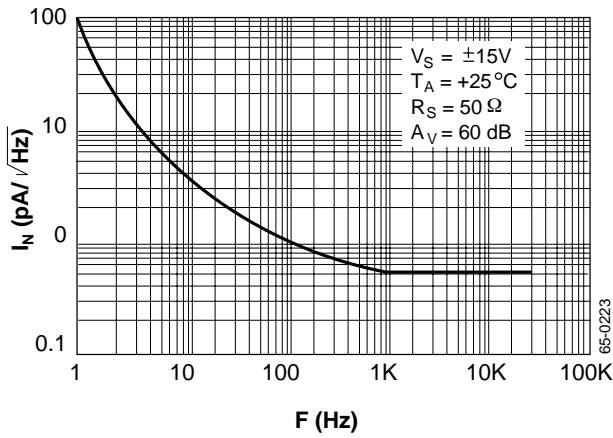


Figure 13. Input Noise Current Density vs. Frequency

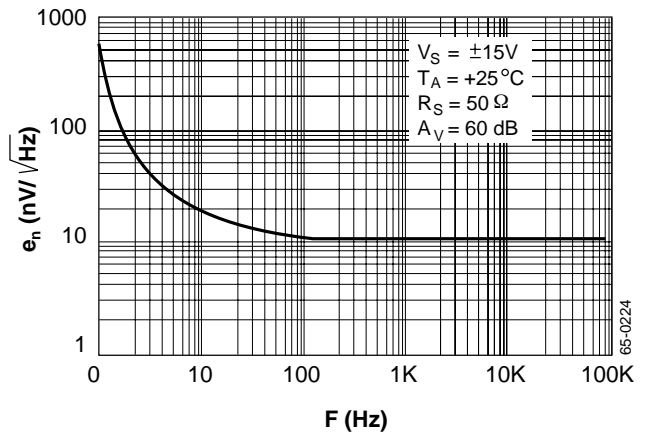


Figure 14. Input Noise Voltage Density vs. Frequency

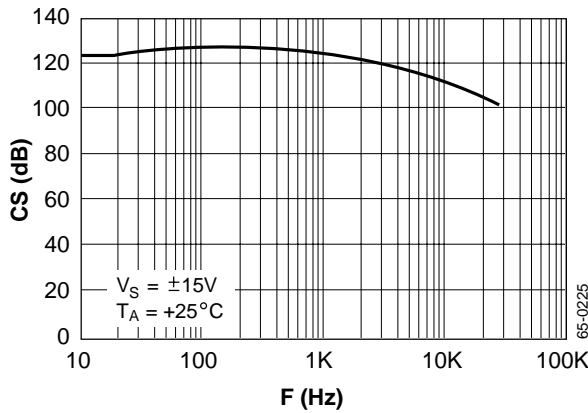


Figure 15. Channel Separation vs. Frequency

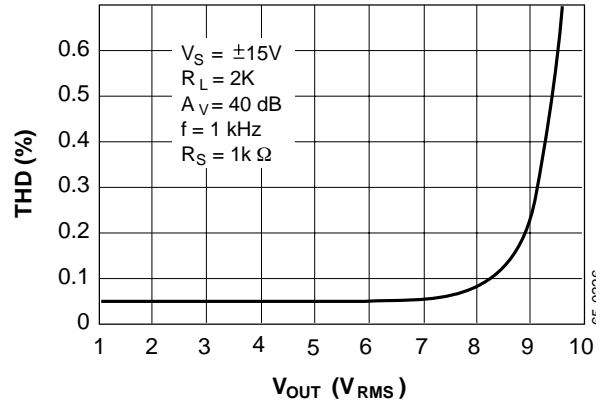


Figure 16. Total Harmonic Distortion vs Output Voltage

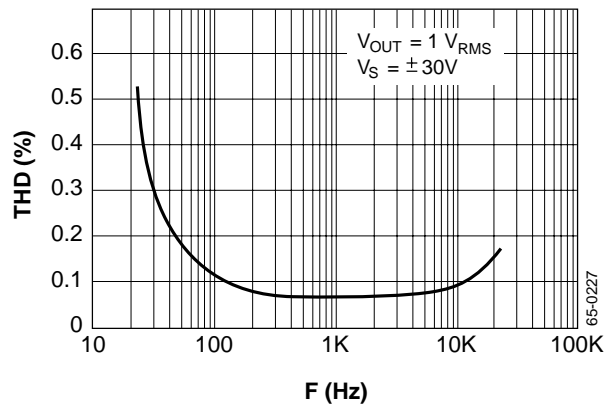


Figure 17. Distortion vs. Frequency

# Typical Applications

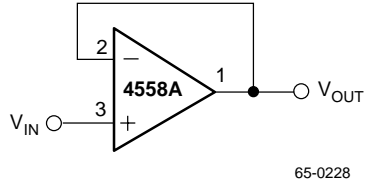


Figure 18. Voltage Follower

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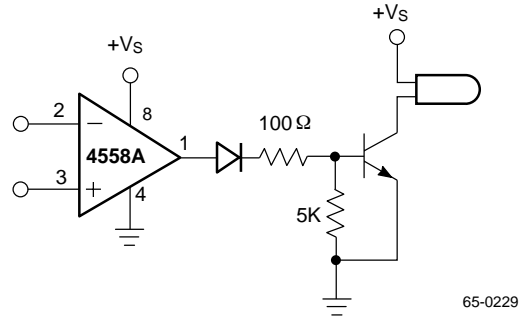


Figure 19. Lamp Driver

65-0229

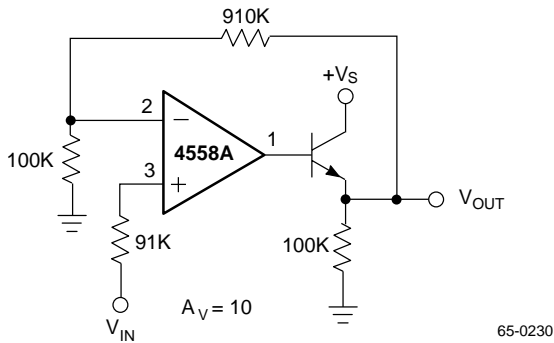


Figure 20. Power Amplifier

65-0230

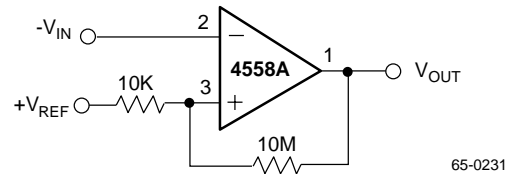


Figure 21. Comparator With Hysteresis

65-0231

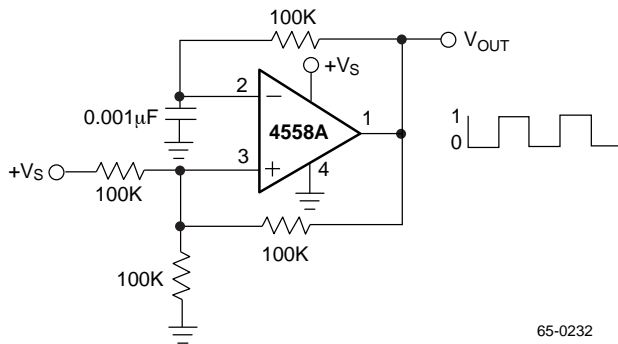


Figure 22. Squarewave Oscillator

65-0232

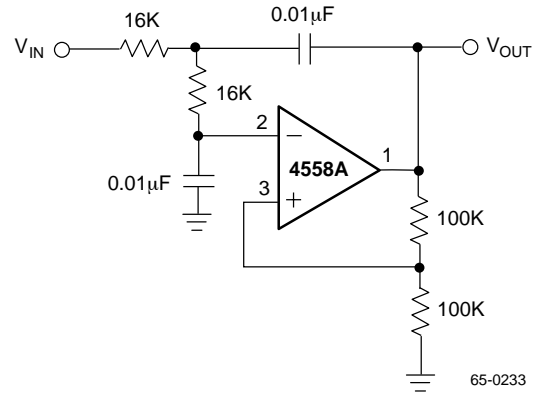
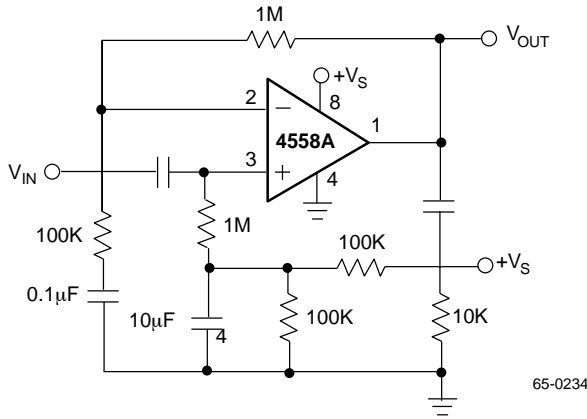


Figure 23. DC Coupled 1kHz Low-Pass Active Filter

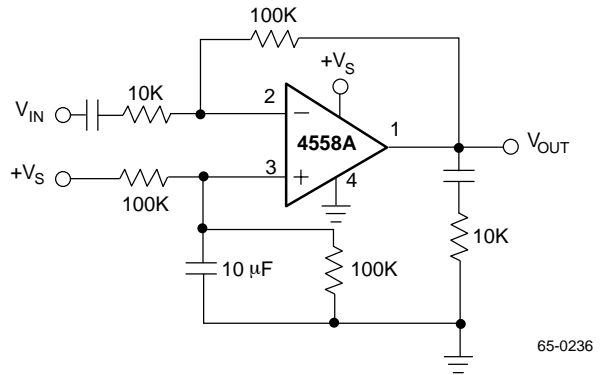
65-0233

Typical Applications (continued)



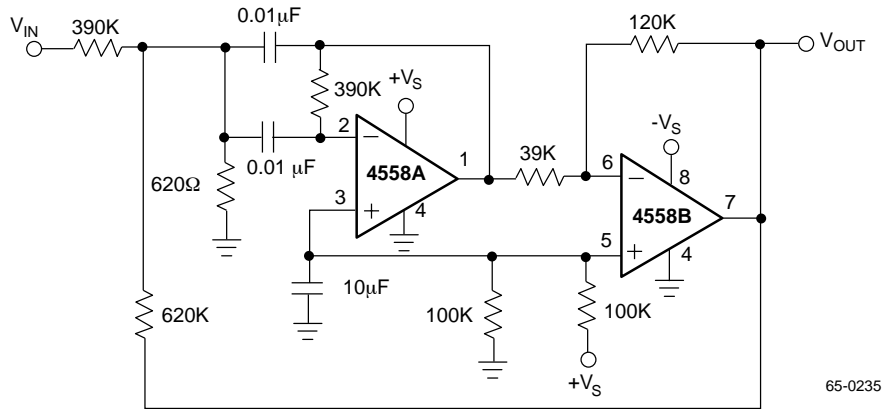
65-0234

Figure 24. AC Coupled Non-Inverting Amplifier



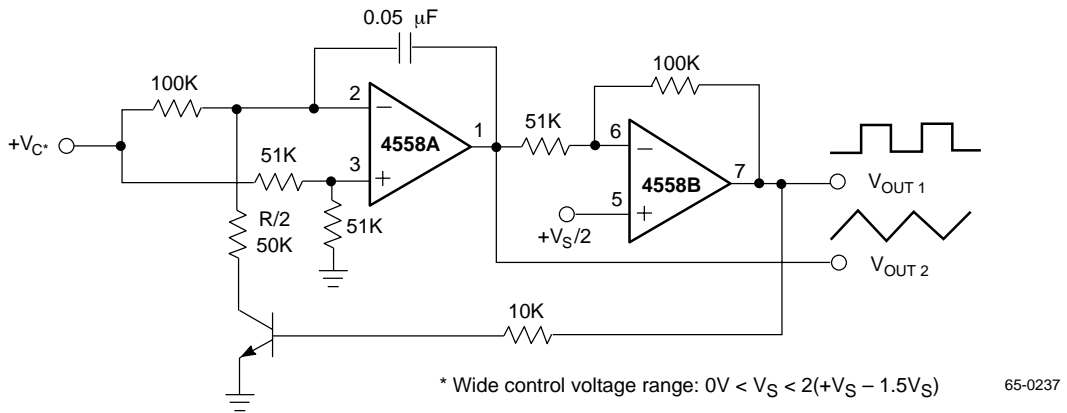
65-0236

Figure 25. AC Coupled Inverting Amplifier



65-0235

Figure 26. 1kHz Bandpass Active Filter



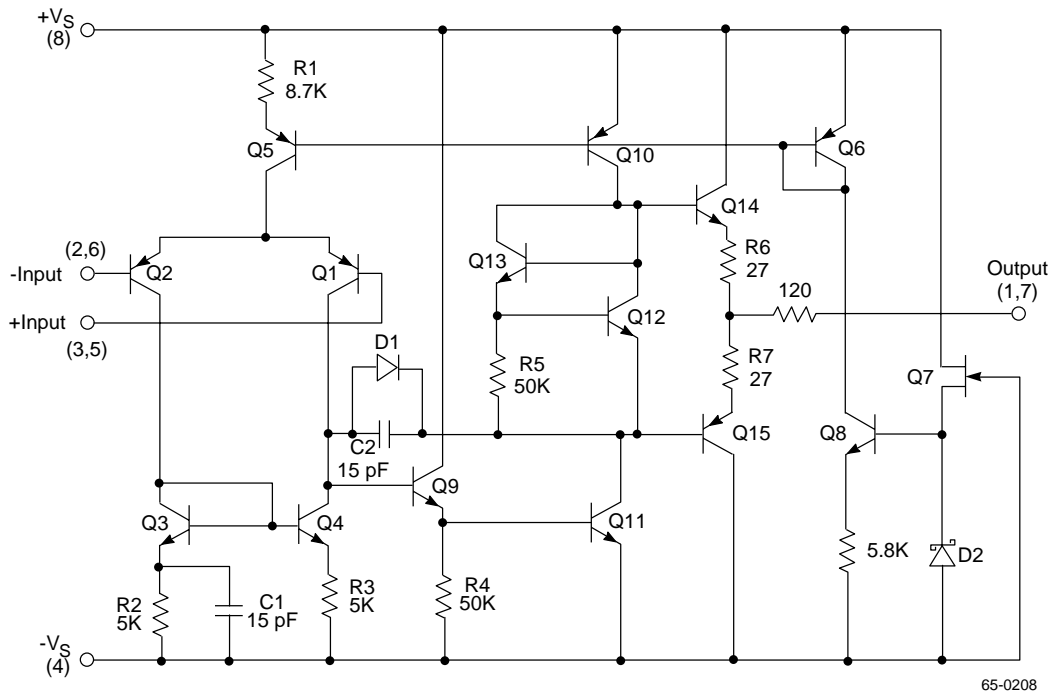
\* Wide control voltage range:  $0V < V_S < 2(+V_S - 1.5V_S)$

65-0237

Figure 27. Voltage Controlled Oscillator (VCO)



# Simplified Schematic Diagram



## Ordering Information

Product Number	Temperature Range	Screening	Package
RC4558M	0° to 70°C	Commercial	8 Pin Wide SOIC
RC4558N	0° to 70°C	Commercial	8 Pin Plastic DIP
RM4558D	0° to 70°C	Commercial	8 Pin Ceramic DIP
RM4558D/883B	-55°C to +125°C	Military	8 Pin Ceramic DIP

**Note:**

1. /883B suffix denotes MIL-STD-883, Par. 1.2.1 compliant device.

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2. A critical component in any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.