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RC4558

Dual High-Gain Operational Amplifier

Features

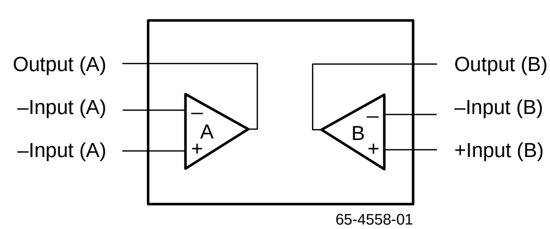
- 2.5 MHz unity gain bandwidth
- Supply voltage ±22V for RM4558 and ±18V for RC/RV4558
- Short-circuit protection
- No frequency compensation required
- No latch-up
- Large common-mode and differential voltage ranges
- Low power consumption
- Parameter tracking over temperature range
- Gain and phase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

Description

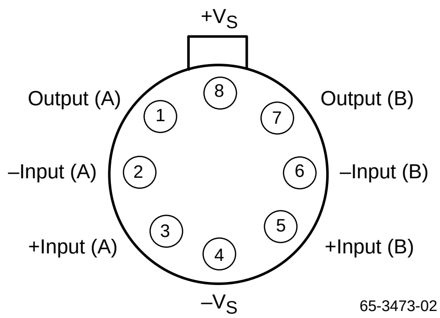
The RC4558 integrated circuit is a dual high-gain operational amplifier internally compensated and constructed on a single silicon IC using an advanced epitaxial process.

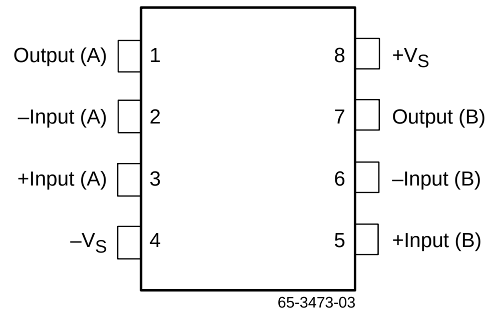
Combining the features of the 741 with the close parameter matching and tracking of a dual device on a monolithic chip results in unique performance characteristics. Excellent channel separation allows the use of this dual device in dense single 741 operational amplifier applications. It is especially 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)[1]

Parameter		Min	Typ	Max	Units
Supply Voltage	RM4558			±22	V
	RC4558			±18	
Input Voltage[2]				±15	V
Differential Input Voltage				30	V
$P_D T_A$ < 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[3]		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_S = ±15V, T_A = +25°C unless otherwise specified)

Parameter	Test Conditions	Typ	Units
Voltage Gain	$R_L \geq 2$ kΩ	±1.0	dB
Input Bias Current	$R_L \geq 2$ kΩ	±15	nA
Input Offset Current	$R_L \geq 2$ kΩ	±7.5	nA

Electrical Characteristics

(V_S = ±15V and T_A = +25°C unless otherwise specified)

Parameters	Test Conditions	RM4558			RC4558			Units
		Min	Typ	Max	Min	Typ	Max	
Input Offset Voltage	$R_S \le 10k\Omega$		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		MΩ
Large Signal Voltage Gain	$R_L \ge 2k\Omega$, V_{OUT} = ±10V	50	300		20	300		V/mV
Output Voltage Swing	$R_L \ge 10k\Omega$	±12	±14		±12	±14		V
	$R_L \ge 2k\Omega$	±10	±13		±10	±13		V
Input Voltage Range		±12	±13		±12	±13		V
Common Mode Rejection Ratio	$R_S \le 10k\Omega$	70	100		70	100		dB
Power Supply Rejection Ratio	$R_S \le 10k\Omega$	76	100		76	100		dB
Power Consumption	$R_L = \infty$		100	170		100	170	mW
Transient Response	V_{IN} = 20 mV							
Rise Time	$R_L = 2k\Omega$		0.3			0.3		µS
Overshoot	$C_L \le 100pF$		35			35		%
Slew Rate	$R_L \ge 2k\Omega$		0.8			0.8		V/µS
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°C ≤ T_A ≤ +125°C, RC = 0° ≤ T_A ≤ +70°C

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

Typical Performance Characteristics

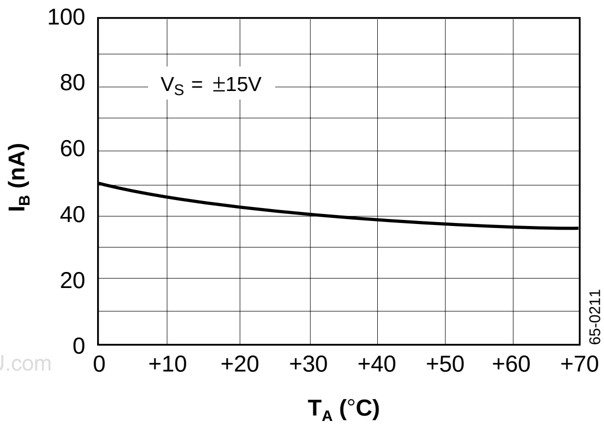


Figure 1. Input Bias Current vs. Temperature

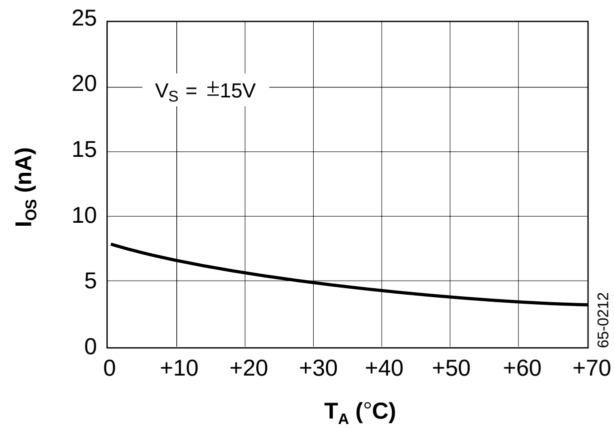


Figure 2. Input Offset Current vs. Temperature

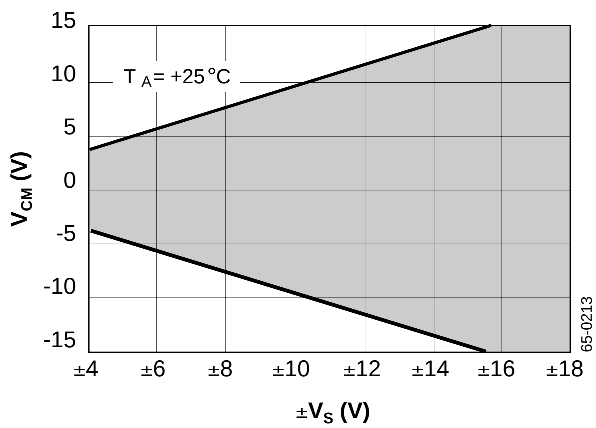


Figure 3. Input Common Mode Voltage Range vs. Supply Voltage

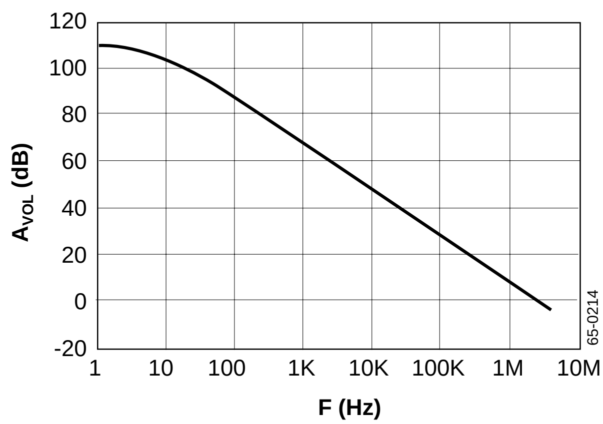


Figure 4. Open Loop Voltage Gain vs. Frequency

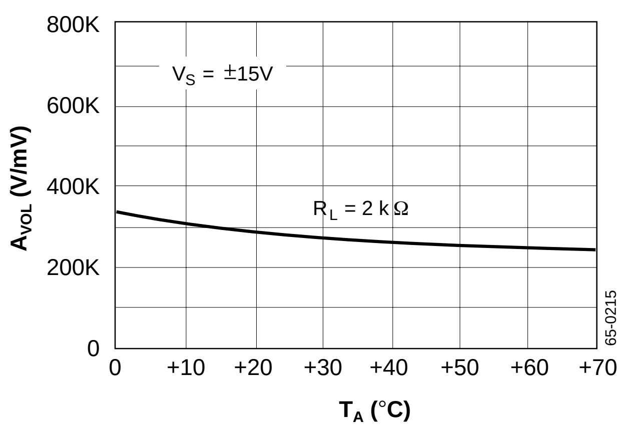


Figure 5. Open Loop Voltage Gain vs. Temperature

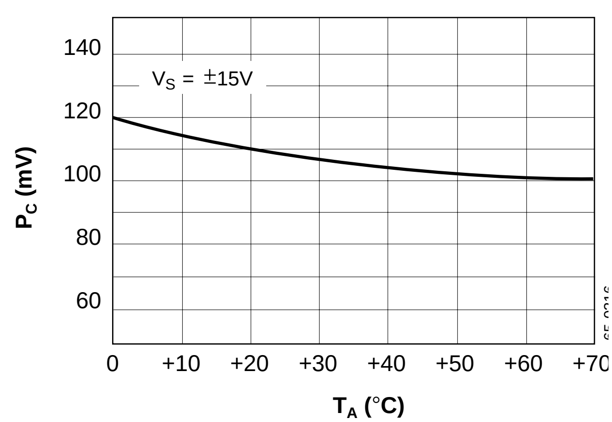


Figure 6. Power Consumption vs. Temperature

Typical Performance Characteristics (continued)

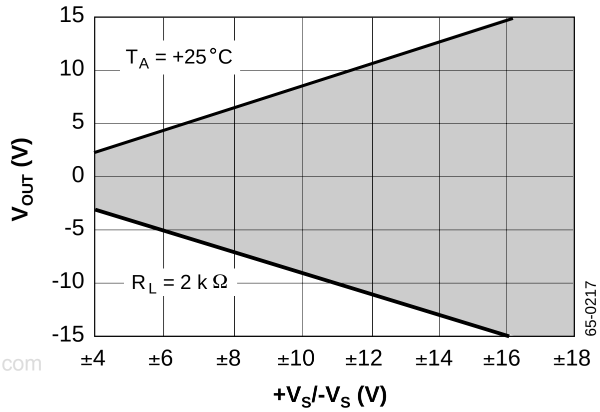


Figure 7. Output Voltage Swing vs. Supply Voltage

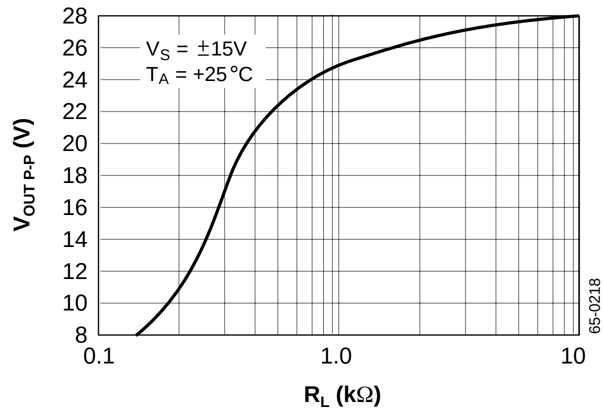


Figure 8. Output Voltage Swing vs. Load Resistance

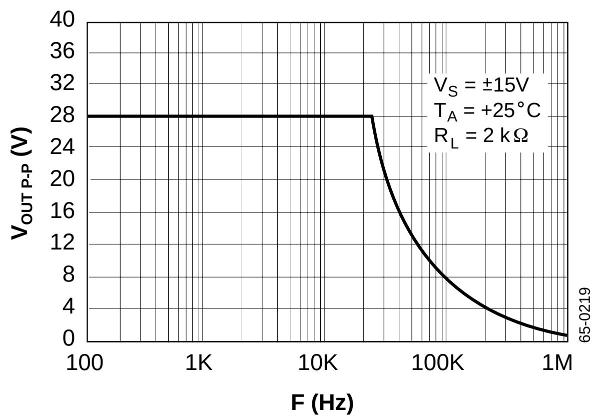


Figure 9. Output Voltage Swing vs. Freqeuncy

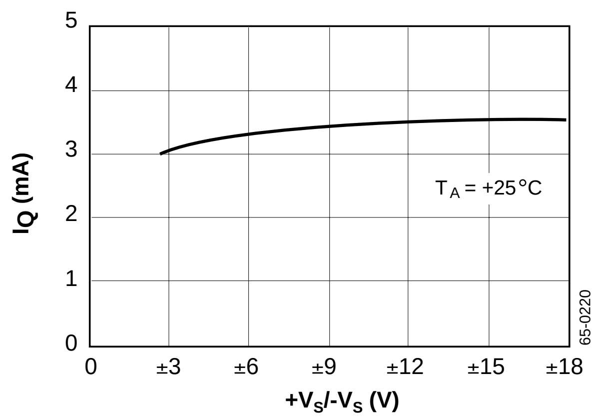


Figure 10. Quiescent Current vs. Supply Voltage

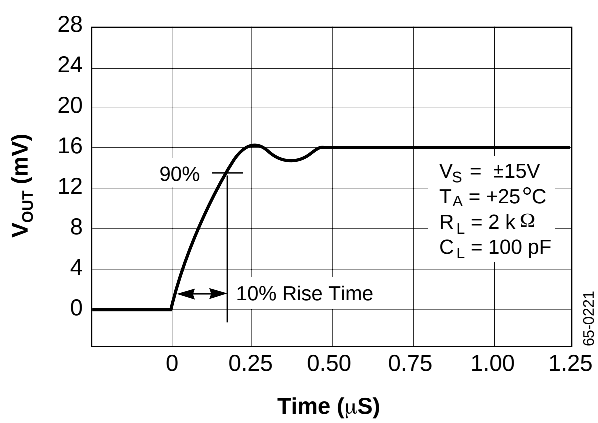


Figure 11. Transient Response Output Voltage vs. Time

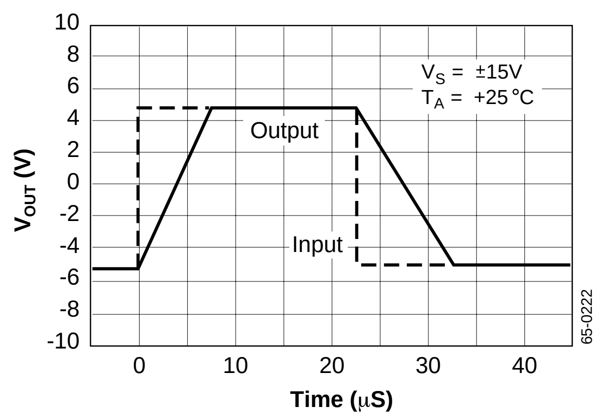


Figure 12. Follower Large Signal Pulse Response Output Voltage vs. Time

Typical Performance Characteristics (continued)

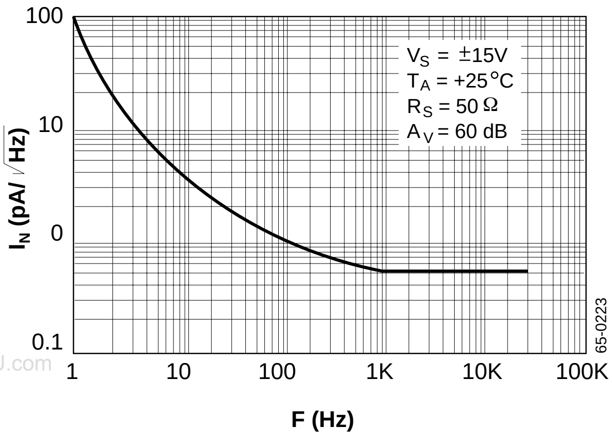


Figure 13. Input Noise Current Density vs. Frequency

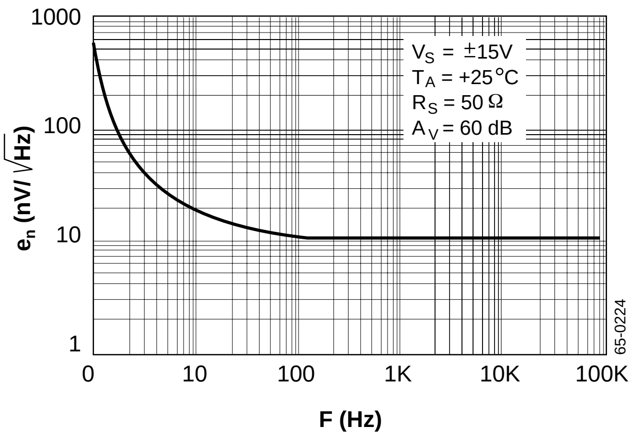


Figure 14. Input Noise Voltage Density vs. Frequency

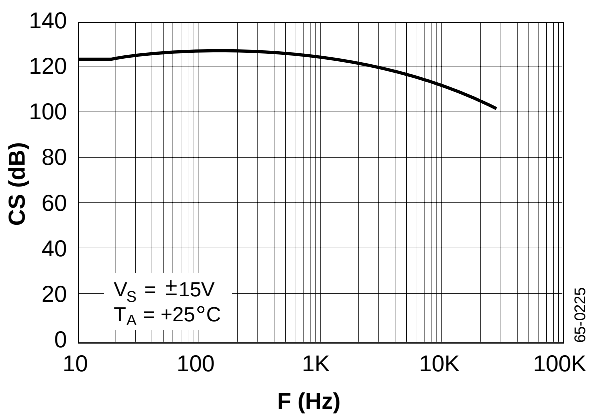


Figure 15. Channel Separation vs. Frequency

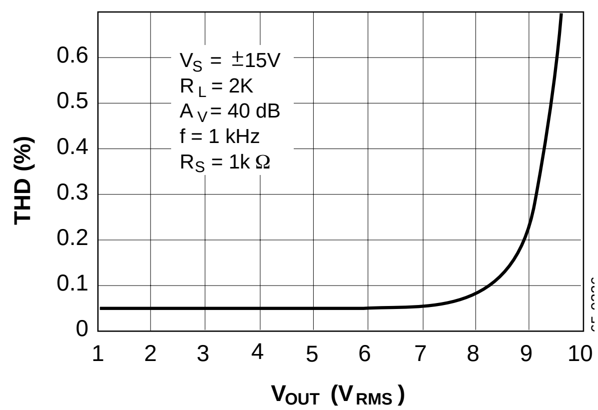


Figure 16. Total Harmonic Distortion vs Output Voltage

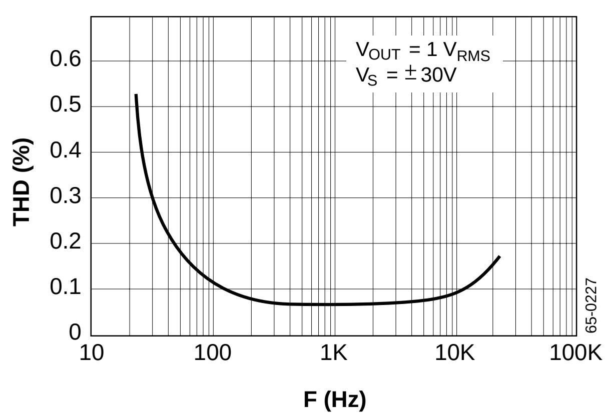


Figure 17. Distortion vs. Frequency

Typical Applications

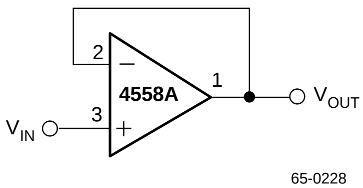


Figure 18. Voltage Follower

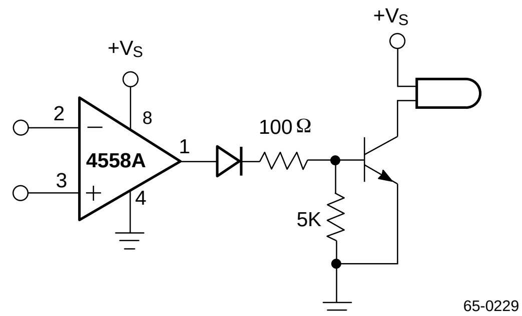


Figure 19. Lamp Driver

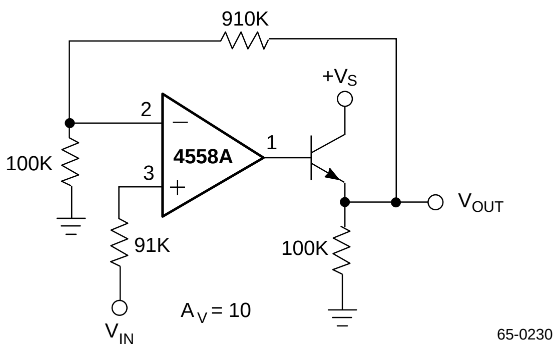


Figure 20. Power Amplifier

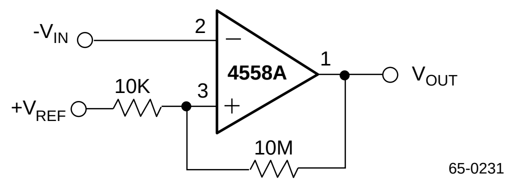


Figure 21. Comparator With Hysteresis

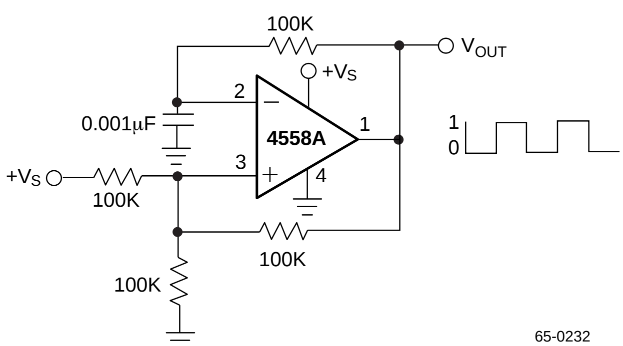


Figure 22. Squarewave Oscillator

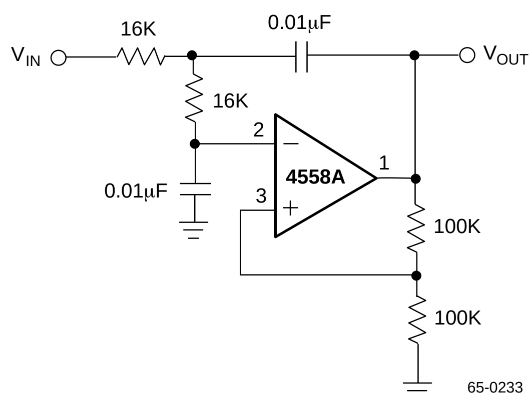


Figure 23. DC Coupled 1kHz Low-Pass Active Filter

Typical Applications (continued)

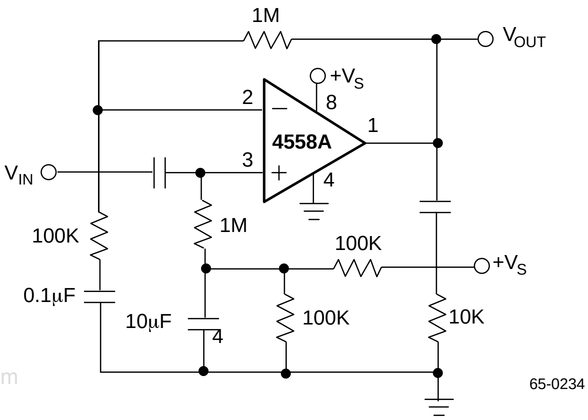


Figure 24. AC Coupled Non-Inverting Amplifier

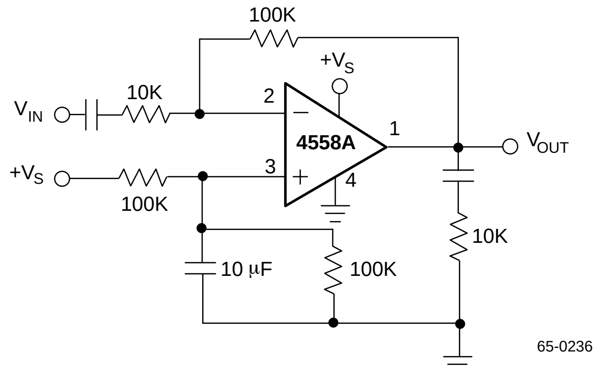


Figure 25. AC Coupled Inverting Amplifier

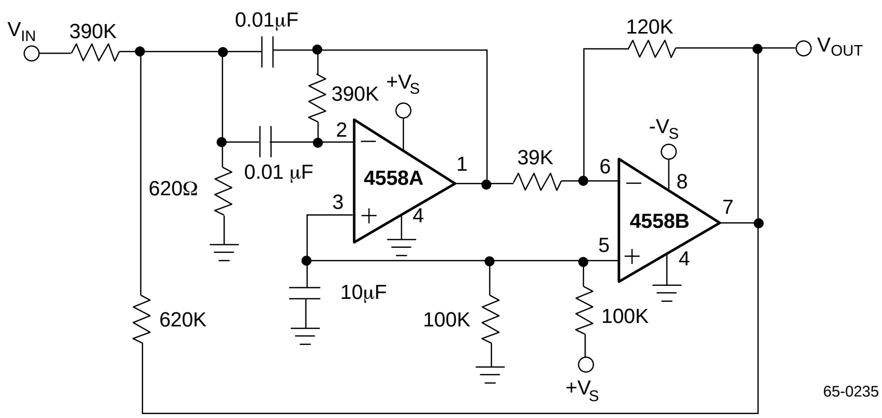


Figure 26. 1kHz Bandpass Active Filter

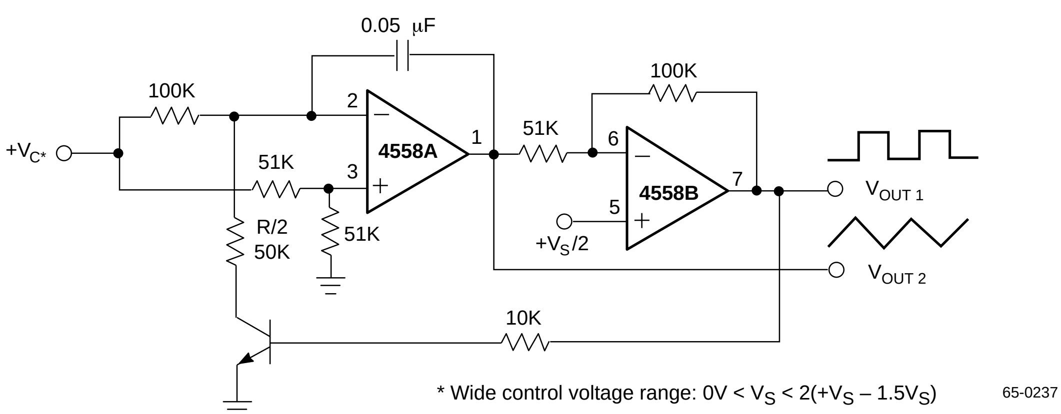
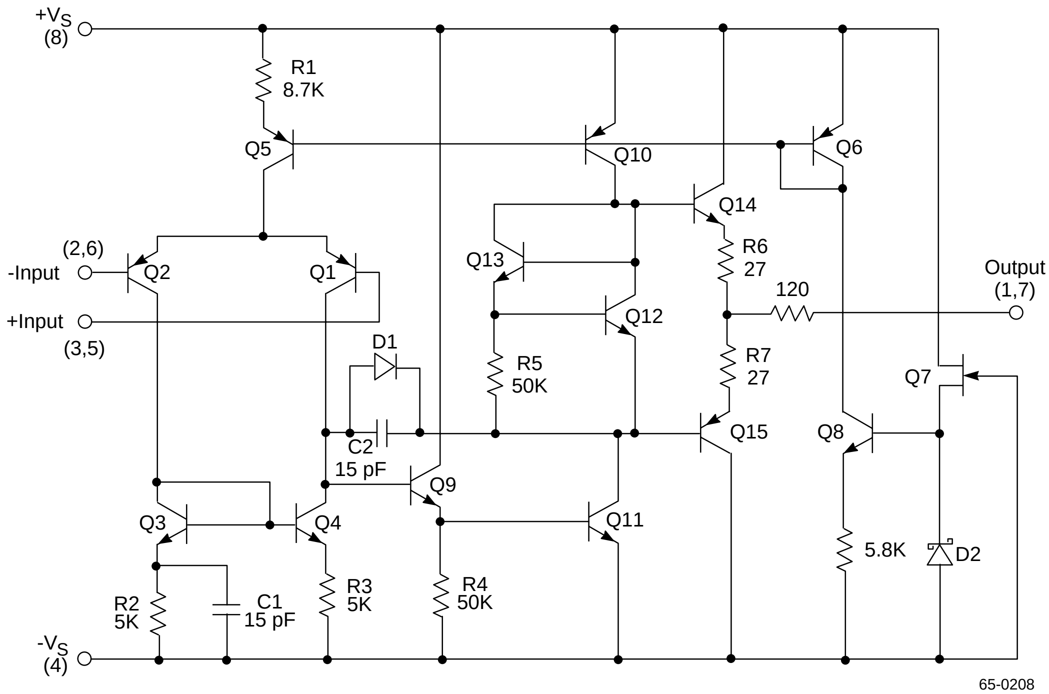


Figure 27. Voltage Controlled Oscillator (VCO)

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.

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