

μ A1458 • μ A1558 Dual Internally Compensated Operational Amplifiers

Linear Division Operational Amplifiers

Description

The μ A1458, μ A1558 are a monolithic pair of internally frequency compensated high performance amplifiers constructed using the Fairchild Planar Epitaxial process. They are intended for a wide range of analog applications where board space or weight are important. High common mode voltage range and absence of latch up make the μ A1458, μ A1558 ideal for use as voltage followers. The high gain and wide range of operating voltage provide superior performance in integrator, summing amplifier and general feedback applications.

The μ A1458, μ A1558 are short circuit protected and require no external components for frequency compensation. The internal 6.0 db/octave roll off ensures stability in closed loop applications. For single amplifier performance, see the μ A741 data sheet.

The Fairchild μ A1458, μ A1558 slew rate has been improved to 0.8/ μ s typical.

- No Frequency Compensation Required
- Short Circuit Protection
- Large Common Mode And Differential Voltage Ranges
- Low Power Consumption
- No Latch Up
- Mini-Dip Package

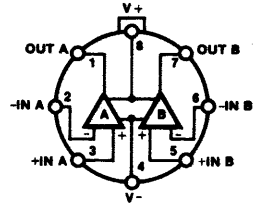
Absolute Maximum Ratings

Storage Temperature Range	
Metal Can and Ceramic DIP	-65°C to +175°C
Molded DIP and SO-8	-65°C to +150°C
Operating Temperature Range	
Extended (μ A1558M)	-55°C to +125°C
Commercial (μ A1458C)	0°C to +70°C
Lead Temperature	
Metal Can and Ceramic DIP (soldering, 60 s)	300°C
Molded DIP and SO-8 (soldering, 10 s)	265°C
Internal Power Dissipation ^{1, 2}	
8L-Metal Can	1.00 W
8L-Ceramic DIP	1.30 W
8L-Molded DIP	0.93 W
SO-8	0.81 W
Supply Voltage	
μ A1558	± 22 V
μ A1458	± 18 V
Differential Input Voltage	
Common Mode Input Swing ³	± 30 V
Output Short Circuit Duration ⁴	Indefinite

Notes

1. $T_{j \text{ Max}}$ = 150°C for the Molded DIP and SO-8, and 175°C for the Metal Can and Ceramic DIP.
2. Ratings apply to ambient temperature at 25°C. Above this temperature, derate the 8L-Metal Can at 6.7 mW/°C, the 8L-Ceramic DIP at

Connection Diagram 8-Lead Metal Package (Top View)



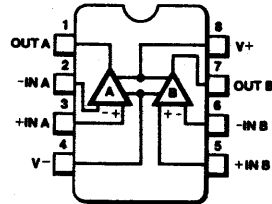
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Lead 4 connected to case.

Order Information

Device Code	Package Code	Package Description
μ A1458HC	5W	Metal
μ A1458CHC	5W	Metal
μ A1558HM	5W	Metal

Connection Diagram 8-Lead DIP and SO-8 Package (Top View)



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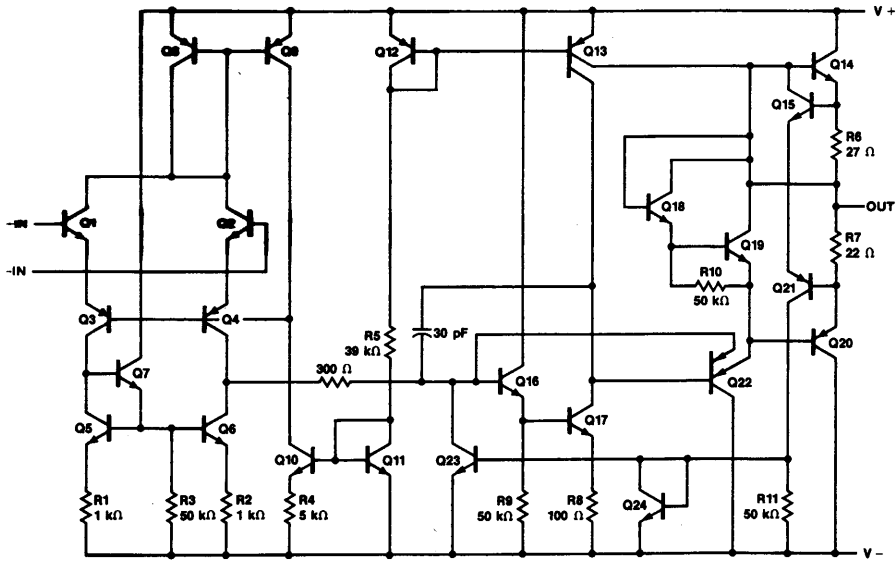
Order Information

Device Code	Package Code	Package Description
μ A1458RC	6T	Ceramic DIP
μ A1458SC	KC	Molded Surface Mount
μ A1458TC	9T	Molded DIP
μ A1458CRC	6T	Ceramic DIP
μ A1458CTC	9T	Molded DIP
μ A1558RM	6T	Ceramic DIP

8.7 mW/°C, the 8L-Molded DIP at 7.5 mW/°C, and the SO-8 at 6.5 mW/°C.

3. For supply voltages less than ± 15 V, the absolute maximum input voltage is equal to the supply voltage.
4. Short circuit may be to ground or either supply. Rating applies to +125°C case temperature or 70°C ambient temperature.

Equivalent Circuit (1/2 of Circuit)



EO00011F

μA1458 • μA1558

μA1458 and μA1458C

Electrical Characteristics $T_A = 25^\circ\text{C}$, $V_{CC} = \pm 15\text{ V}$, unless otherwise specified.

Symbol	Characteristic	Condition	μA1458			μA1458C			Unit
			Min	Typ	Max	Min	Typ	Max	
V_{IO}	Input Offset Voltage	$R_S \leq 10\text{ k}\Omega$		2.0	6.0		2.0	10	mV
I_{IO}	Input Offset Current			0.03	0.2		0.03	0.3	μA
I_{IB}	Input Bias Current			0.2	0.5		0.2	0.7	μA
Z_I	Input Impedance		0.3	1.0			1.0		MΩ
I_{CC}	Supply Current			2.3	5.6		2.3	8.0	mA
P_c	Power Consumption	$V_O = 0\text{ V}$		70	170		70	240	mW
CMR	Common Mode Rejection		70	90		60	90		dB
V_{IR}	Input Voltage Range		±12	±13		±11	±13		V
PSRR	Power Supply Rejection Ratio	$R_S \leq 10\text{ k}\Omega$		30	150		30		μV/V
I_{OS}	Output Short Circuit Current			20			20		mA
A_{VS}	Large Signal Voltage Gain	$V_O = \pm 10\text{ V}$, $R_L \geq 2.0\text{ k}\Omega$	20	100		20	100		V/mV
V_{OP}	Output Voltage Swing	$R_L = 10\text{ k}\Omega$	±12	±14		±11	±14		V
f_c	Unity Gain Crossover Frequency			1.1			1.1		MHz
SR	Slew Rate	$A_V = 1.0$		0.8			0.8		V/μs

The following specifications apply for $0^\circ\text{C} \leq T_A \leq +70^\circ\text{C}$

V_{IO}	Input Offset Voltage	$R_S \leq 10\text{ k}\Omega$			7.5			12	mV
$\Delta V_{IO}/\Delta T$	Input Offset Voltage Temperature Sensitivity	$R_S = 50\ \Omega$		15			15		μV/°C
I_{IO}	Input Offset Current				0.3			0.4	μA
I_{IB}	Input Bias Current				0.8			1.0	μA
A_{VS}	Large Signal Voltage Gain	$V_O = \pm 10\text{ V}$, $R_L \geq 2.0\text{ k}\Omega$	15			15			V/mV
V_{OP}	Output Voltage Swing	$R_L = 2.0\text{ k}\Omega$	±10	±13		±9.0	±13		V

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Electrical Characteristics $T_A = 25^\circ\text{C}$, $V_{CC} = \pm 15\text{ V}$, unless otherwise specified.

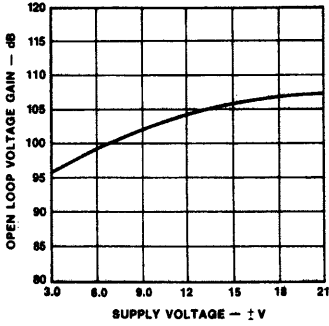
Symbol	Characteristic	Condition	μA1558			Unit
			Min	Typ	Max	
V_{IO}	Input Offset Voltage	$R_S \leq 10\text{ k}\Omega$		1.0	5.0	mV
I_{IO}	Input Offset Current			0.03	0.2	μA
I_{IB}	Input Bias Current			0.2	0.5	μA
Z_I	Input Impedance		0.3	1.0		MΩ
I_{CC}	Supply Current			2.3	5.0	mA
P_C	Power Consumption	$V_O = 0\text{ V}$		70	150	mW
CMR	Common Mode Rejection		70	90		dB
V_{IR}	Input Voltage Range		± 12	± 13		V
PSRR	Power Supply Rejection Ratio	$R_S \leq 10\text{ k}\Omega$		30	150	μV/V
I_{OS}	Output Short Circuit Current			20		mA
A_{VS}	Large Signal Voltage Gain	$V_O = \pm 10\text{ V}$, $R_L \geq 2.0\text{ k}\Omega$	50	200		V/mV
V_{OP}	Output Voltage Swing	$R_L = 10\text{ k}\Omega$	± 12	± 14		V
f_c	Unity Gain Crossover Frequency			1.1		MHz
SR	Slew Rate	$A_V = 1.0$		0.8		V/μs

The following specifications apply for $-55^\circ\text{C} \leq T_A \leq +125^\circ\text{C}$

V_{IO}	Input Offset Voltage	$R_S \leq 10\text{ k}\Omega$			6.0	mV
$\Delta V_{IO}/\Delta T$	Input Offset Voltage Temperature Sensitivity	$R_S = 50\ \Omega$		15		μV/°C
I_{IO}	Input Offset Current				0.5	μA
I_{IB}	Input Bias Current				1.5	μA
A_{VS}	Large Signal Voltage Gain	$V_O = \pm 10\text{ V}$, $R_L \geq 2.0\text{ k}\Omega$	25			V/mV
V_{OP}	Output Voltage Swing	$R_L = 2.0\text{ k}\Omega$	± 10	± 13		V

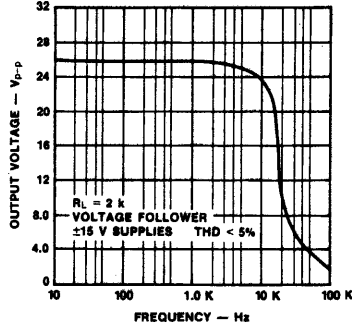
Typical Performance Curves $T_A = 25^\circ C$, $V_{CC} = \pm 15 V$, unless otherwise specified

Voltage Gain vs Supply Voltage



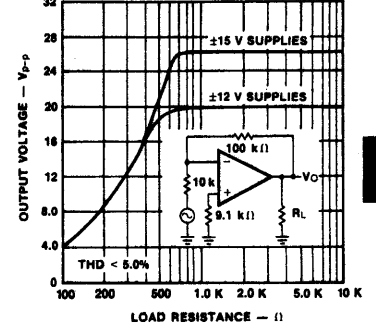
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Power Bandwidth (Large Signal Swing vs Frequency)



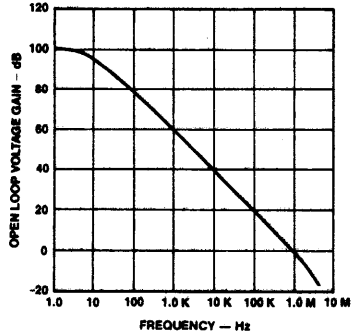
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Output Voltage Swing vs Load Resistance



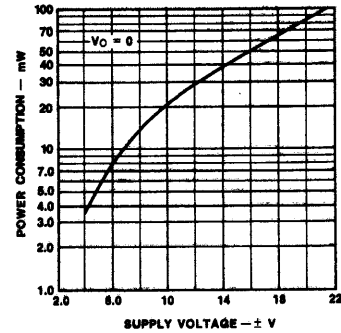
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Open Loop Frequency Response



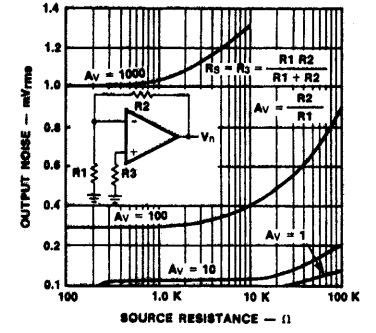
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Power Consumption vs Supply Voltage



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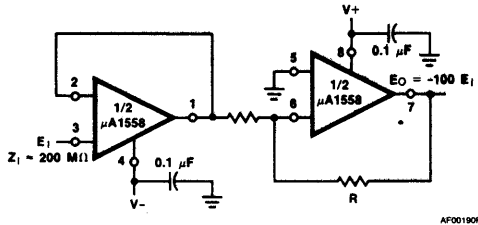
Output Noise vs Source Resistance



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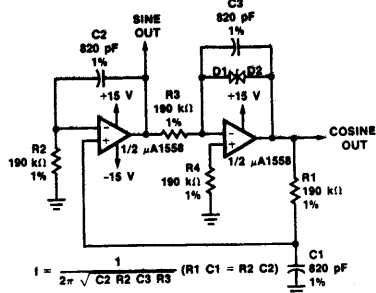
Typical Applications

High Impedance, High Gain Inverting Amplifier



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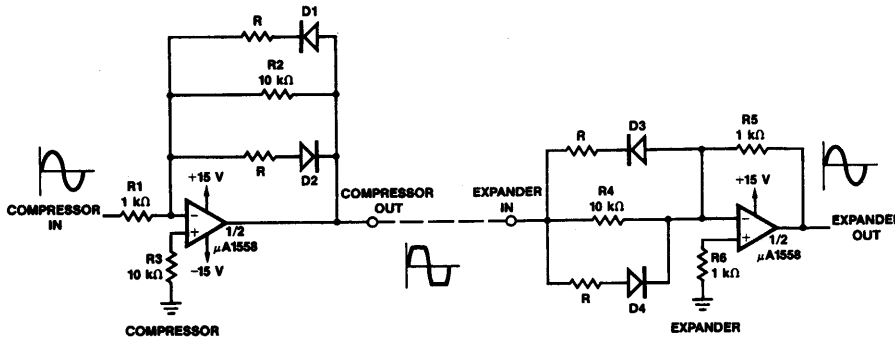
Quadrature Oscillator



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Typical Applications (Cont.)

Compressor/Expander Amplifiers

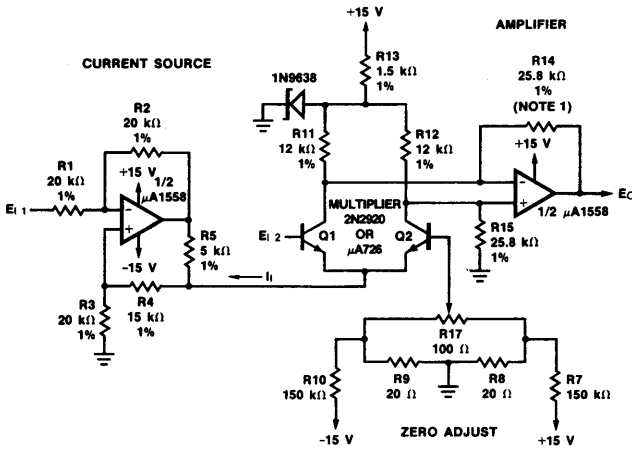


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Notes

Maximum compression expansion ratio = R_1/R ($10 \text{ k}\Omega > R \geq 0$)
 Diodes D1 through D4 are matched FD6666 or equivalent

Analog Multiplier



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Note

1. Matched to 0.1%
 $E_0 = 100 E_{i1} \times E_{i2}$