μA1558 • μA1458 • μA1458C

INTERNALLY COMPENSATED, HIGH PERFORMANCE DUAL MONOLITHIC OPERATIONAL AMPLIFIER

FAIRCHILD LINEAR INTEGRATED CIRCUITS

GENERAL DESCRIPTION — The 1558 / 1458 are a monolithic pair of Internally 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 1558/1458 ideal for use as voltage followers. The high gain and wide range of operating voltage provides superior performance in integrator, summing amplifier and general feedback applications.

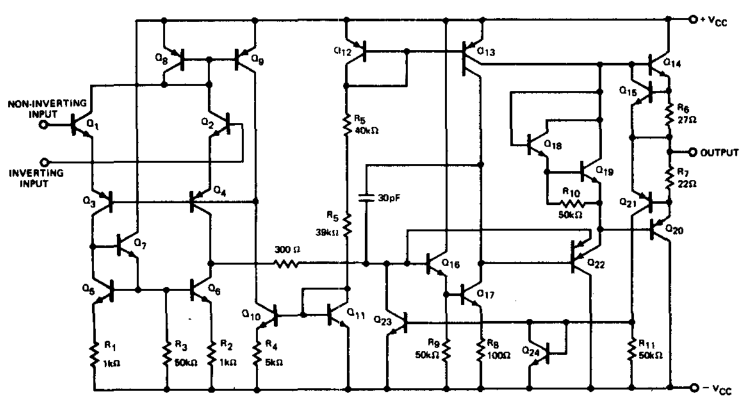
The 1558 / 1458 are short-circuit protected and require no external components for frequency compensation. The internal 6 dB/octave roll-off insures stability in closed loop applications. For single amplifier performance, see the μA741 data sheet.

- **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

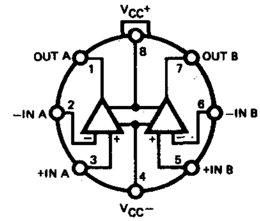
Supply Voltage	
Military (μA1558)	±22 V
Commercial (μA1458 and μA1458C)	±18 V
Internal Power Dissipation (Note 1)	
Metal Can	800 mW
Mini DIP	560 mW
Differential Input Voltage (Note 2)	±30 V
Common-Mode Input Swing (Note 2)	±15 V
Output Short Circuit Duration (Note 3)	Indefinite
Storage Temperature Range	-65°C to +150°C
Operating Temperature Range	
Military (μA1558)	−55°C to +125°C
Commercial (μA1458 and μA1458C)	0°C to 70°C
Lead Temperature	
Metal Can (Soldering, 60 s)	300°C
Mini DIP (Soldering, 10 s)	260°C

EQUIVALENT CIRCUIT
(EACH SIDE)



Notes on following page.

CONNECTION DIAGRAMS
8-LEAD METAL CAN
(TOP VIEW)
PACKAGE OUTLINE 5S
PACKAGE CODE H



ORDER INFORMATION

TYPE	PART NO.
μA1558	μA1558HC
μA1458	μA1458HC
μA1458C	μA1458CHC

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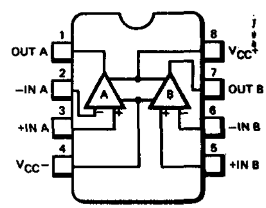
8-LEAD MINI DIP
(TOP VIEW)
PACKAGE OUTLINE 9T 6T
PACKAGE CODE T R



ORDER INFORMATION

TYPE	PART NO.
μA1458	μA1458TC
μA1458C	μA1458CTC
μA1458	μA1458RI
μA1458C	μA1458CRC

*Planar is a patented Fairchild process.

μA1458C

ELECTRICAL CHARACTERISTICS (V_S = ±15V, T_A = 25°C unless otherwise specified)

PARAMETERS	CONDITIONS	MIN	TYP	MAX	UNITS
Input Offset Voltage	$R_S \leq 10k\Omega$		2.0	10	mV
Input Offset Current			.03	0.3	μA
Input Bias Current			0.2	0.7	μA
Differential Input Impedance					
Parallel Input Resistance	f = 20Hz, Open Loop		1.0		MΩ
Parallel Input Capacitance	f = 20Hz, Open Loop		6.0		pF
Common-Mode Input Impedance	f = 20Hz		200		MΩ
Common-Mode Input Voltage Swing		±11	±13		V
Equivalent Input Noise Voltage	A_V = 100, R_S = 10kΩ, f = 1.0kHz, BW = 1.0Hz		45		nV/√Hz
Common-Mode Rejection Ratio	f = 100Hz	60	90		dB
Open-Loop Voltage Gain	V_{OUT} = ±10V, R_L = 10kΩ	20k	100k		V/V
Power Bandwidth	A_V = 1, R_L = 2.0kΩ, THD ≤ 5%, $V_{OUT} = 20V_{p-p}$		14		kHz
Unity Gain Crossover Frequency (Open-Loop)			1.1		MHz
Phase Margin (Open Loop)			65		Degrees
Gain Margin			11		dB
Slew Rate	A_V = 1		0.8		V/μs
Output Impedance	f = 20Hz		75		Ω
Short-Circuit Output Current			20		mA
Output Voltage Swing	R_L = 10kΩ	±11	±14		V
Power Supply Sensitivity					
V_{CC-} = Constant	$R_S \leq 10k\Omega$		30		μV/V
V_{CC+} = Constant	$R_S \leq 10k\Omega$		30		μV/V
Power Supply Current	I_+		2.3	8.0	mA
	I_-		2.3	8.0	mA
Power Dissipation	V_{OUT} = 0		70	240	mW

The Following Specifications Apply For 0°C ≤ T_A ≤ +70°C

PARAMETERS	CONDITIONS	MIN	TYP	MAX	UNITS
Input Offset Voltage	$R_S \leq 10k\Omega$			12	mV
Input Offset Current				0.4	μA
Input Bias Current				1.0	μA
Open Loop Voltage Gain	V_{OUT} = ±10V, R_L = 10kΩ	15k			V/V
Output Voltage Swing	R_L = 2.0kΩ	±9.0	±13		V
Average Temperature Coefficient of Input Offset Voltage	R_S = 50Ω		15		μV/°C

TYPICAL PERFORMANCE CURVES FOR μA1558, μA1458 AND μA1458C

($V_{CC} = +15V$, $V_{CC-} = -15V$, $T_A = 25°C$ unless otherwise noted)

OPEN-LOOP VOLTAGE GAIN AS A FUNCTION OF POWER SUPPLY VOLTAGES

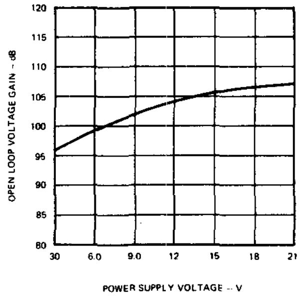


Fig. 1

OPEN-LOOP FREQUENCY RESPONSE

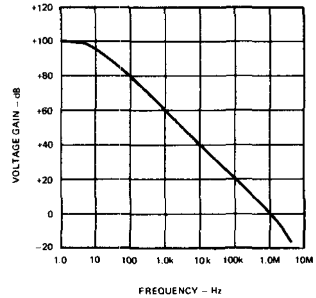


Fig. 2

POWER BANDWIDTH (LARGE SIGNAL SWING AS A FUNCTION OF FREQUENCY)

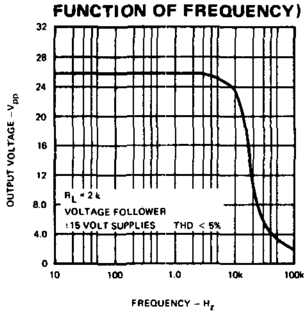


Fig. 3

POWER DISSIPATION AS A FUNCTION OF POWER SUPPLY VOLTAGE

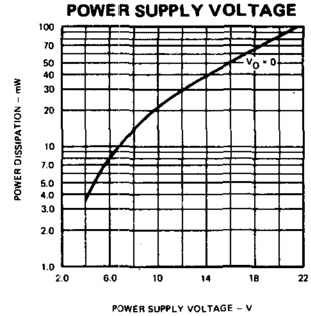


Fig. 4

OUTPUT VOLTAGE SWING AS A FUNCTION OF LOAD RESISTANCE

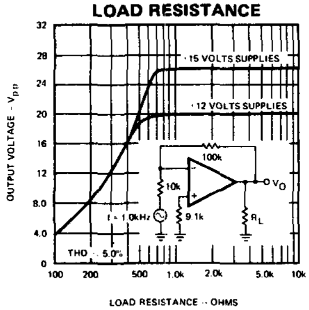


Fig. 5

OUTPUT NOISE AS A FUNCTION OF SOURCE RESISTANCE

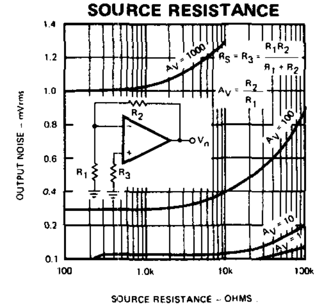


Fig. 6

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HIGH-IMPEDANCE, HIGH-GAIN INVERTING AMPLIFIER

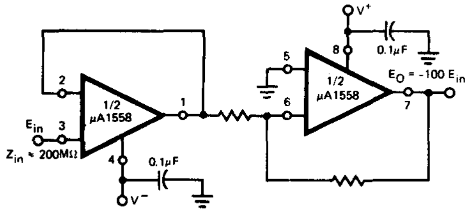
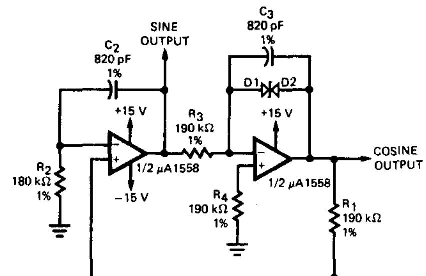


Fig. 7

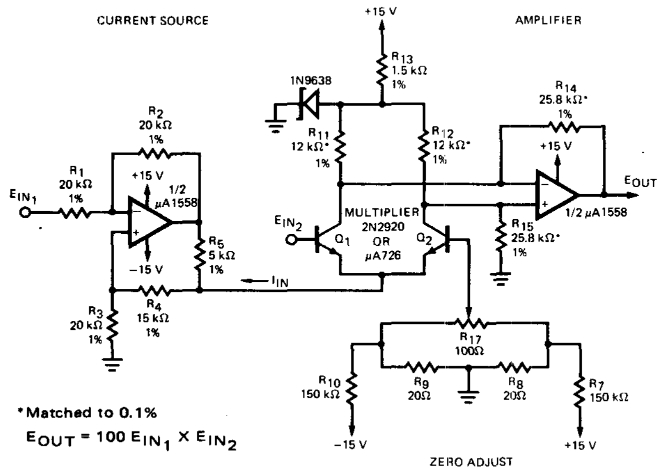
QUADRATURE OSCILLATOR



$$f = \frac{1}{2\pi\sqrt{C_2R_2C_3R_3}} \quad (R_1C_1 = R_2C_2)$$

Fig. 8

ANALOG MULTIPLIER

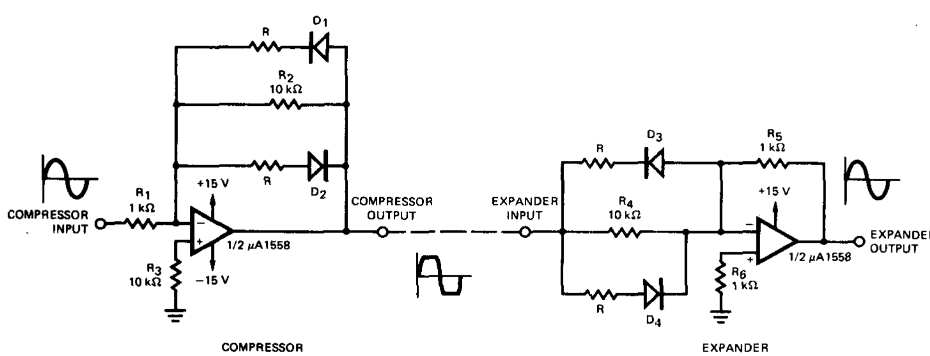


*Matched to 0.1%

$E_{OUT} = 100\ E_{IN_1} \times E_{IN_2}$

Fig. 9

COMPRESSOR/EXPANDER AMPLIFIERS



MAXIMUM COMPRESSION EXPANSION RATIO = R_1/R (10 kΩ > R ⩾ 0)

NOTE: DIODES D_1 THROUGH D_4 ARE MATCHED FD6666 OR EQUIVALENT.

Fig.10