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MOTOROLA

MC1458, C

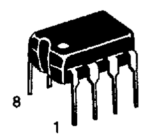
Internally Compensated, High Performance Dual Operational Amplifiers

DUAL OPERATIONAL AMPLIFIERS
(DUAL MC1741)

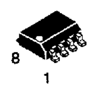
SEMICONDUCTOR TECHNICAL DATA

The MC1458, C was designed for use as a summing amplifier, integrator, or amplifier with operating characteristics as a function of the external feedback components.

- No Frequency Compensation Required
- Short Circuit Protection
- Wide Common Mode and Differential Voltage Ranges
- Low Power Consumption
- No Latch–Up



P1 SUFFIX
PLASTIC PACKAGE
CASE 626



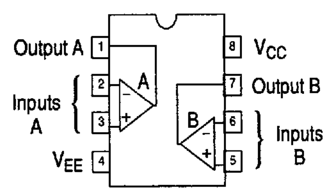
D SUFFIX
PLASTIC PACKAGE
CASE 751
(SO–8)

MAXIMUM RATINGS (T_A = +25°C, unless otherwise noted.)

Rating	Symbol	Value	Unit
Power Supply Voltage	V_{CC} V_{EE}	+18 –18	Vdc
Input Differential Voltage	V_{ID}	±30	V
Input Common Mode Voltage (Note 1)	V_{ICM}	±15	V
Output Short Circuit Duration (Note 2)	t_{SC}	Continuous	
Operating Ambient Temperature Range	T_A	0 to +70	°C
Storage Temperature Range	T_{stg}	–55 to +125	°C
Junction Temperature	T_J	150	°C

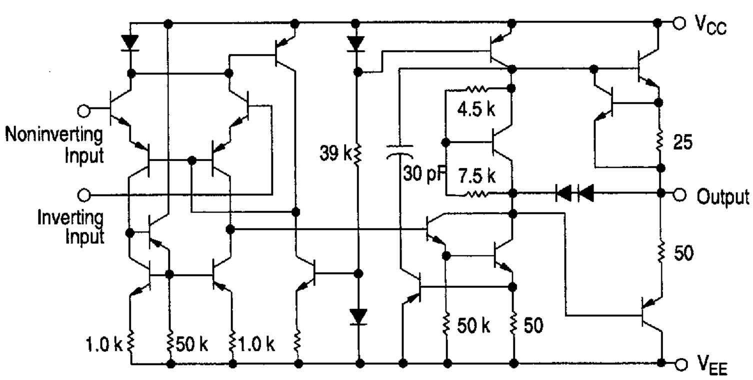
NOTES: 1. For supply voltages less than ±15 V, the absolute maximum input voltage is equal to the supply voltage.
2. Supply voltage equal to or less than 15 V.

PIN CONNECTIONS



(Top View)

Representative Schematic Diagram



ORDERING INFORMATION

Device	Operating Temperature Range	Package
MC1458CD, D	T_A = 0° to +70°C	SO–8
MC1458CP1, P1		Plastic DIP

 Rev 1

ELECTRICAL CHARACTERISTICS (V_{CC} = +15 V, V_{EE} = –15 V, T_A = 25°C, unless otherwise noted. (Note 3))

Characteristic	Symbol	MC1458			MC1458C			Unit
		Min	Typ	Max	Min	Typ	Max	
Input Offset Voltage (R_S ≤ 10 k)	V_{IO}	–	2.0	6.0	–	2.0	1.0	mV
Input Offset Current	I_{IO}	–	20	200	–	20	300	nA
Input Bias Current	I_{IB}	–	80	500	–	80	700	nA
Input Resistance	r_i	0.3	2.0	–	–	2.0	–	MΩ
Input Capacitance	C_i	–	1.4	–	–	1.4	–	pF
Offset Voltage Adjustment Range	V_{IOR}	–	±15	–	–	±15	–	mV
Common Mode Input Voltage Range	V_{ICR}	±12	±13	–	±11	±13	–	V
Large Signal Voltage Gain (V_O = ±10 V, R_L = 2.0 k) (V_O = ±10 V, R_L = 10 k)	A_{VOL}	 20 –	 200 –	 – –	 – 20	 – 200	 – –	V/mV
Output Resistance	r_o	–	75	–	–	75	–	Ω
Common Mode Rejection (R_S ≤ 10 k)	CMR	70	90	–	60	90	–	dB
Supply Voltage Rejection (R_S ≤ 10 k)	PSR	–	30	150	–	30	–	µV/V
Output Voltage Swing (R_S ≤ 10 k) (R_S ≤ 2.0 k)	V_O	 ±12 ±10	 ±14 ±13	 – –	 ±11 ±9.0	 ±14 ±13	 – –	V
Output Short Circuit Current	I_{SC}	–	20	–	–	20	–	mA
Supply Currents (Both Amplifiers)	I_D	–	2.3	5.6	–	2.3	8.0	mA
Power Consumption	P_C	–	70	170	–	70	240	mW
Transient Response (Unity Gain) (V_I = 20 mV, R_L ≥ 2.0 kΩ, C_L ≤ 100 pF) Rise Time (V_I = 20 mV, R_L ≥ 2.0 kΩ, C_L ≤ 100 pF) Overshoot (V_I = 10 V, R_L ≥ 2.0 kΩ, C_L ≤ 100 pF) Slew Rate	 t_{TLH} os SR	 – – –	 0.3 15 0.5	 – – –	 – – –	 0.3 15 0.5	 – – –	 µs % V/µs

ELECTRICAL CHARACTERISTICS (V_{CC} = +15 V, V_{EE} = –15 V, T_A = T_{high} to T_{low}, unless otherwise noted. (Note 3))*

Characteristic	Symbol	MC1458			MC1458C			Unit
		Min	Typ	Max	Min	Typ	Max	
Input Offset Voltage (R_S ≤ 10 kΩ)	V_{IO}	–	–	7.5	–	–	12	mV
Input Offset Current (T_A = 0° to +70°C)	I_{IO}	–	–	300	–	–	400	nA
Input Bias Current (T_A = 0° to +70°C)	I_{IB}	–	–	800	–	–	1000	nA
Output Voltage Swing (R_s ≤ 10 k) (R_s ≤ 2 k)	V_O	 ±12 ±10	 ±14 ±13	 – –	 – ±9.0	 – ±13	 – –	V
Large Signal Voltage Gain (V_O = ±10 V, R_L = 2 k) (V_O = ±10 V, R_L = 10 k)	A_{VOL}	 15 –	 – –	 – –	 – 15	 – –	 – –	V/mV

*T_{low} = 0°C for MC1458, C T_{high} = +70°C for MC1458, C

NOTE: 3. Input pins of an unused amplifier must be grounded for split supply operation or biased at least 3.0 V above V_{EE} for single supply operation.

Figure 1. Burst Noise versus Source Resistance

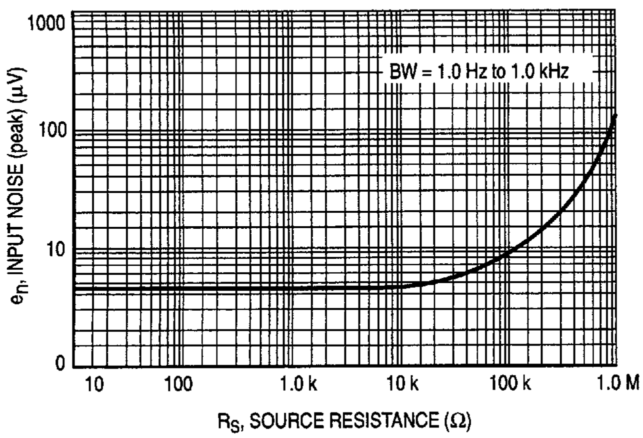


Figure 2. RMS Noise versus Source Resistance

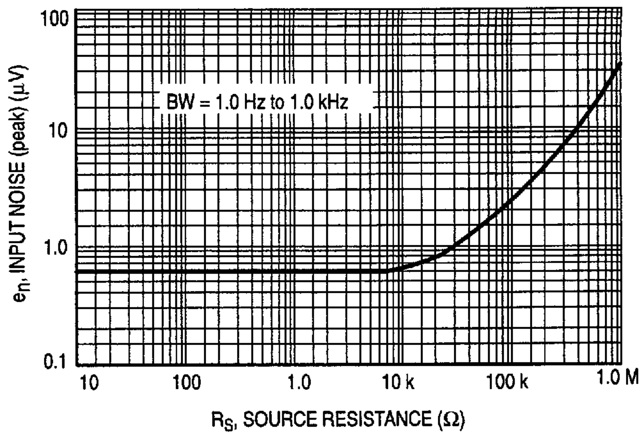


Figure 3. Output Noise versus Source Resistance

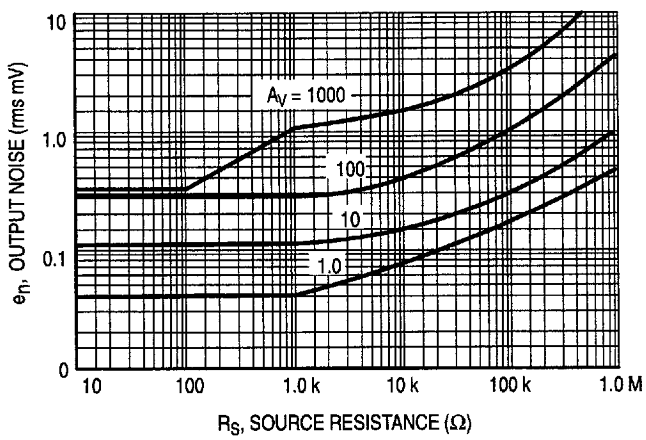


Figure 4. Spectral Noise Density

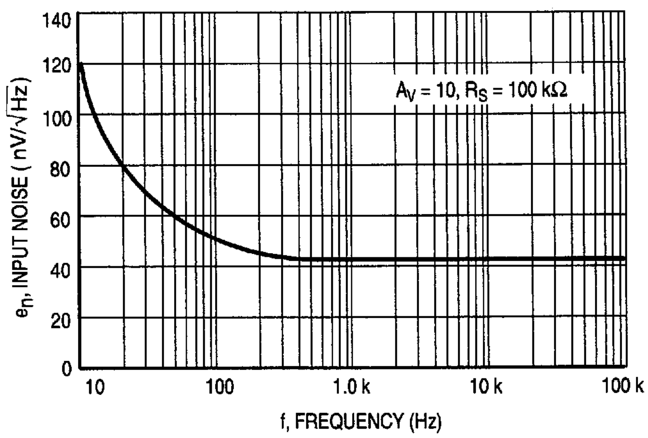
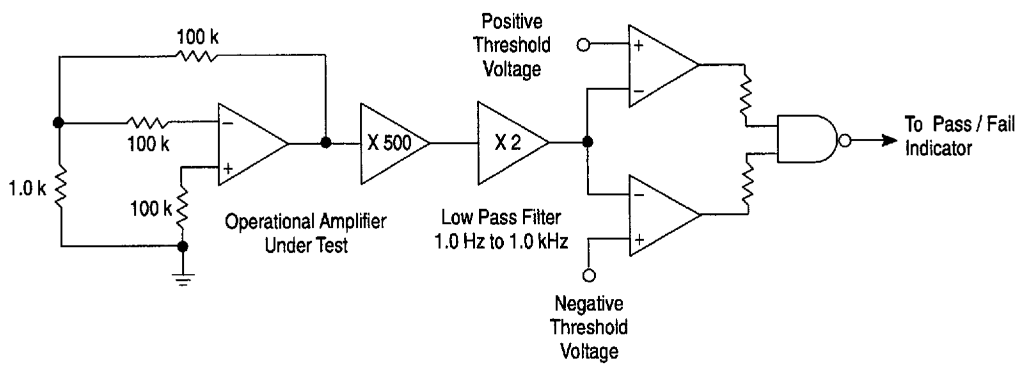


Figure 5. Burst Noise Test Circuit



Unlike conventional peak reading or RMS meters, this system was especially designed to provide the quick response time essential to burst (popcorn) noise testing.

The test time employed is 10 sec and the 20 μV peak limit refers to the operational amplifier input thus eliminating errors in the closed loop gain factor of the operational amplifier .

Figure 6. Power Bandwidth (Large Signal Swing versus Frequency)

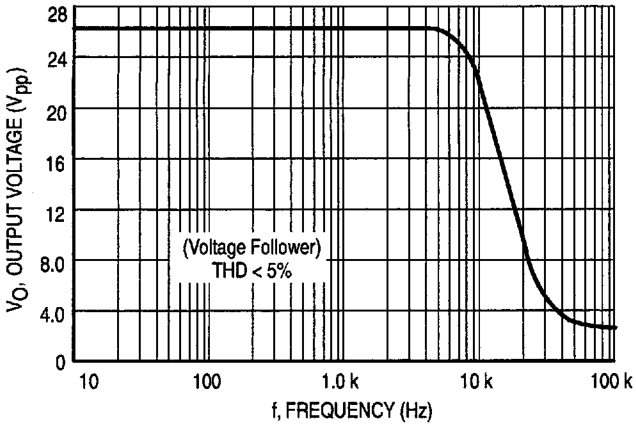


Figure 7. Open Loop Frequency Response

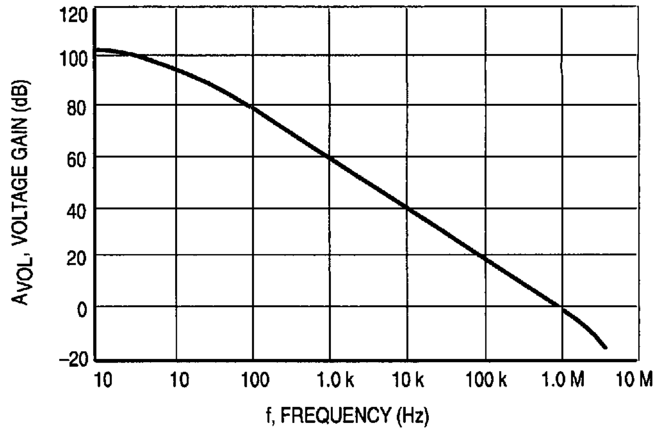


Figure 8. Positive Output Voltage Swing versus Load Resistance

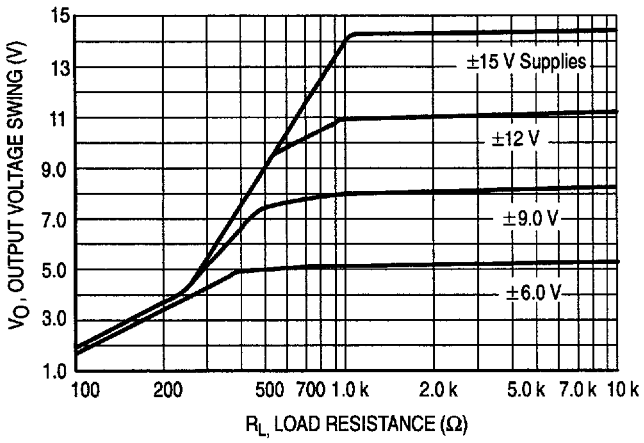


Figure 9. Negative Output Voltage Swing versus Load Resistance

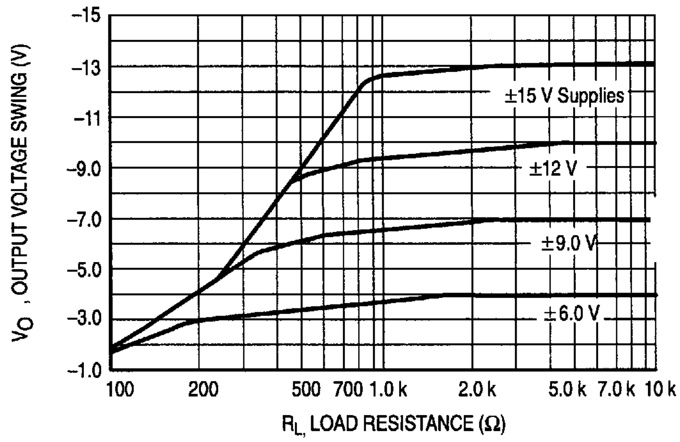


Figure 10. Output Voltage Swing versus Load Resistance (Single Supply Operation)

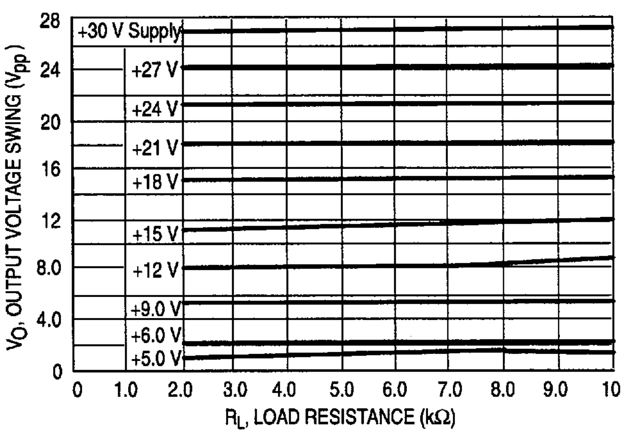


Figure 11. Single Supply Inverting Amplifier

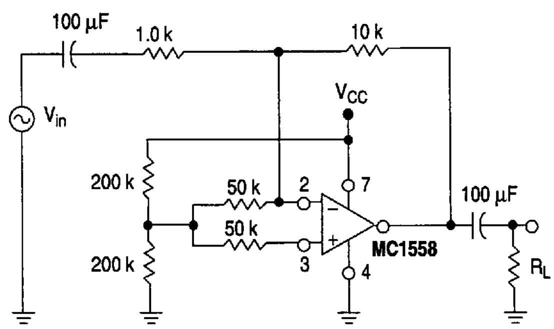


Figure 12. Noninverting Pulse Response

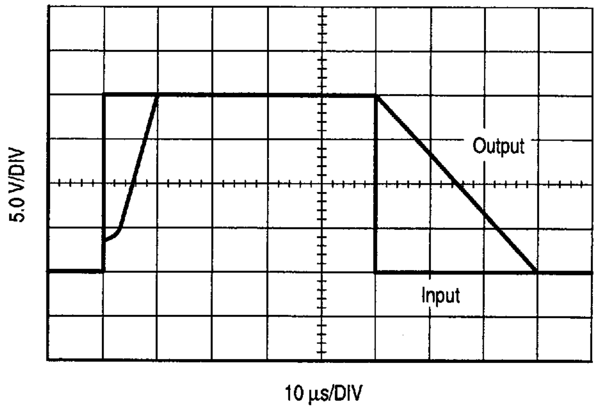


Figure 13. Transient Response Test Circuit

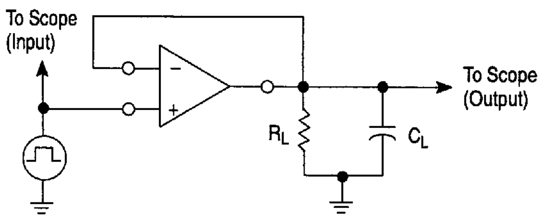


Figure 14. Unused OpAmp

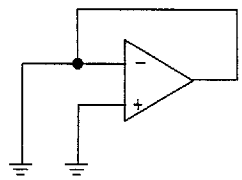
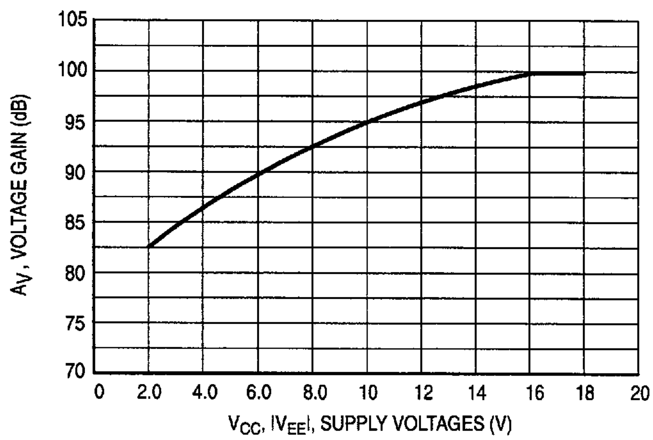
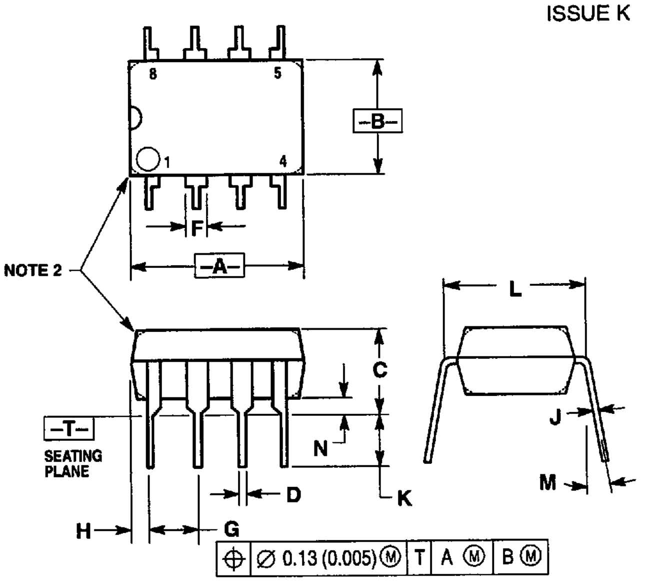


Figure 15. Open Loop Voltage Gain versus Supply Voltage



OUTLINE DIMENSIONS

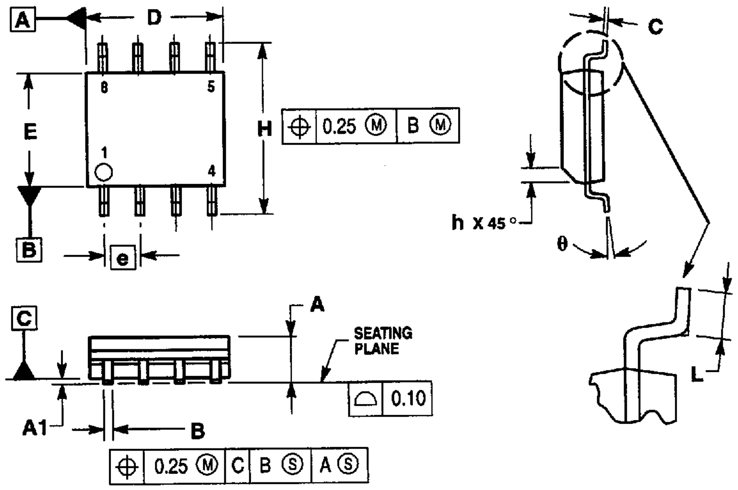
P1 SUFFIX
PLASTIC PACKAGE
CASE 626–05
ISSUE K



NOTES:
1. DIMENSION L TO CENTER OF LEAD WHEN FORMED PARALLEL.
2. PACKAGE CONTOUR OPTIONAL (ROUND OR SQUARE CORNERS).
3. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.

DIM	MILLIMETERS MIN	MILLIMETERS MAX	INCHES MIN	INCHES MAX
A	9.40	10.16	0.370	0.400
B	6.10	6.60	0.240	0.260
C	3.94	4.45	0.155	0.175
D	0.38	0.51	0.015	0.020
F	1.02	1.78	0.040	0.070
G	2.54 BSC		0.100 BSC	
H	0.76	1.27	0.030	0.050
J	0.20	0.30	0.008	0.012
K	2.92	3.43	0.115	0.135
L	7.62 BSC		0.300 BSC	
M	—	10°	—	10°
N	0.76	1.01	0.030	0.040

D SUFFIX
PLASTIC PACKAGE
CASE 751–05
(SO–8)
ISSUE R



NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. DIMENSIONS ARE IN MILLIMETERS.
3. DIMENSION D AND E DO NOT INCLUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION 0.15 PER SIDE.
5. DIMENSION B DOES NOT INCLUDE MOLD PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.127 TOTAL IN EXCESS OF THE B DIMENSION AT MAXIMUM MATERIAL CONDITION.

DIM	MILLIMETERS MIN	MILLIMETERS MAX
A	1.35	1.75
A1	0.10	0.25
B	0.35	0.49
C	0.18	0.25
D	4.80	5.00
E	3.80	4.00
e	1.27 BSC	
H	5.80	6.20
h	0.25	0.50
L	0.40	1.25
θ	0°	7°