

MC1458, C

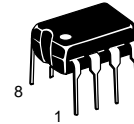
Internally Compensated, High Performance Dual Operational Amplifiers

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

DUAL OPERATIONAL AMPLIFIERS (DUAL MC1741)

SEMICONDUCTOR TECHNICAL DATA



P1 SUFFIX
PLASTIC PACKAGE
CASE 626



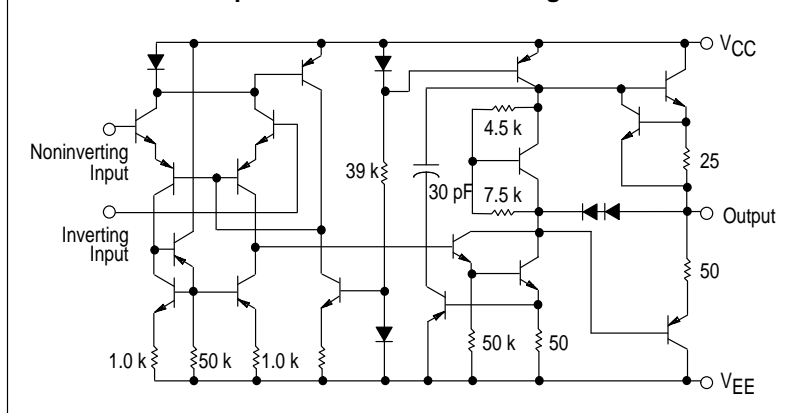
D SUFFIX
PLASTIC PACKAGE
CASE 751
(SO-8)

MAXIMUM RATINGS ($T_A = +25^\circ\text{C}$, unless otherwise noted.)

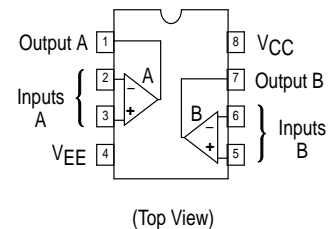
| Rating | Symbol | Value | Unit |
|--|----------------------|-------------|------------------|
| Power Supply Voltage | V_{CC} V_{EE} | +18 -18 | Vdc |
| Input Differential Voltage | V_{ID} | ± 30 | V |
| Input Common Mode Voltage (Note 1) | V_{ICM} | ± 15 | V |
| Output Short Circuit Duration (Note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

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.

Representative Schematic Diagram



PIN CONNECTIONS



ORDERING INFORMATION

| Device | Operating Temperature Range | Package |
|---------------|--|-------------|
| MC1458CD, D | $T_A = 0^\circ$ to $+70^\circ\text{C}$ | SO-8 |
| MC1458CP1, P1 | | Plastic DIP |

MC1458, C

ELECTRICAL CHARACTERISTICS ($V_{CC} = +15\text{ V}$, $V_{EE} = -15\text{ V}$, $T_A = 25^\circ\text{C}$, unless otherwise noted. (Note 3))

| Characteristic | Symbol | MC1458 | | | MC1458C | | | Unit |
|---|-----------------------|----------------------|----------------------|-------------|-----------------------|----------------------|-------------|--|
| | | Min | Typ | Max | Min | Typ | Max | |
| Input Offset Voltage ($R_S \leq 10\text{ k}$) | 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 | – | $M\Omega$ |
| 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 ($V_O = \pm 10\text{ V}$, $R_L = 2.0\text{ k}$) ($V_O = \pm 10\text{ V}$, $R_L = 10\text{ k}$) | A_{VOL} | 20 – | 200 – | – – | – 20 | – 200 | – – | V/mV |
| Output Resistance | r_o | – | 75 | – | – | 75 | – | Ω |
| Common Mode Rejection ($R_S \leq 10\text{ k}$) | CMR | 70 | 90 | – | 60 | 90 | – | dB |
| Supply Voltage Rejection ($R_S \leq 10\text{ k}$) | PSR | – | 30 | 150 | – | 30 | – | $\mu\text{V/V}$ |
| Output Voltage Swing ($R_S \leq 10\text{ k}$) ($R_S \leq 2.0\text{ k}$) | 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) ($V_I = 20\text{ mV}$, $R_L \geq 2.0\text{ k}\Omega$, $C_L \leq 100\text{ pF}$) Rise Time ($V_I = 20\text{ mV}$, $R_L \geq 2.0\text{ k}\Omega$, $C_L \leq 100\text{ pF}$) Overshoot ($V_I = 10\text{ V}$, $R_L \geq 2.0\text{ k}\Omega$, $C_L \leq 100\text{ pF}$) Slew Rate | t_{RLH} os SR | – – – | 0.3 15 0.5 | – – – | – – – | 0.3 15 0.5 | – – – | μs % V/ μs |

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

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

* $T_{\text{low}} = 0^\circ\text{C}$ for MC1458, C $T_{\text{high}} = +70^\circ\text{C}$ 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.

MC1458, C

Figure 1. Burst Noise versus Source Resistance

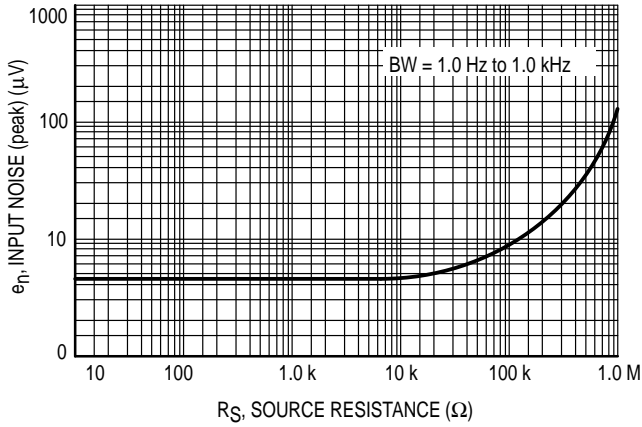


Figure 2. RMS Noise versus Source Resistance

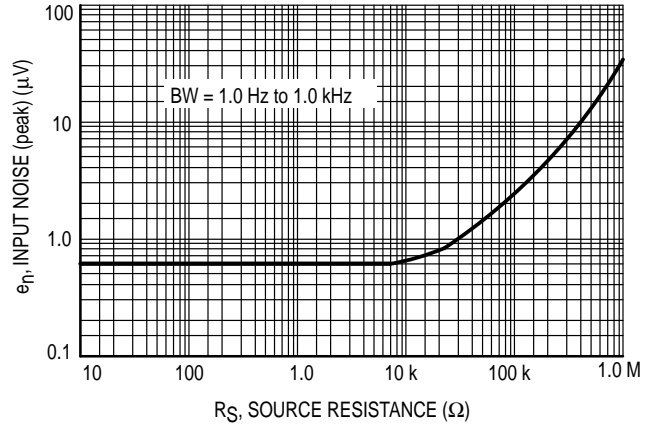


Figure 3. Output Noise versus Source Resistance

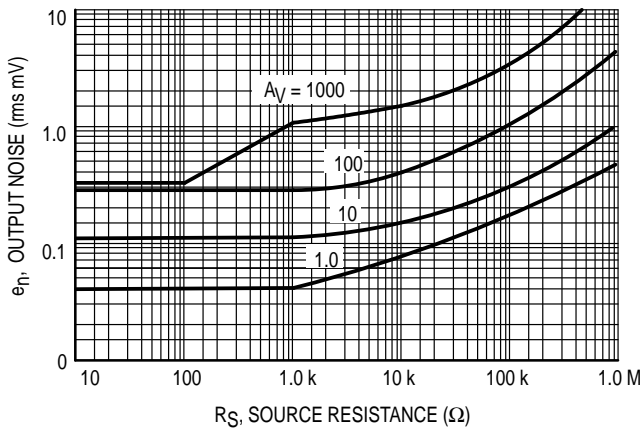


Figure 4. Spectral Noise Density

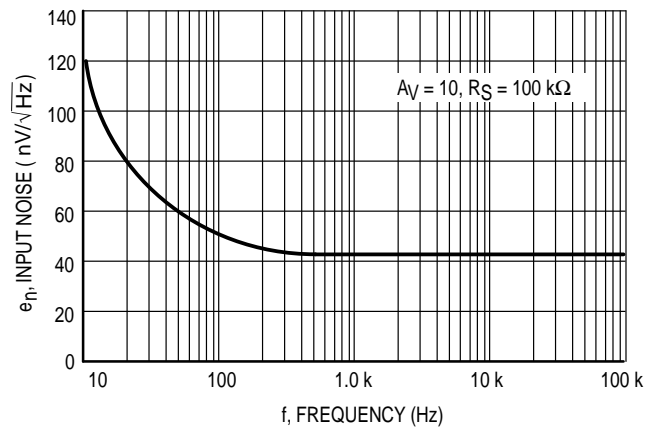
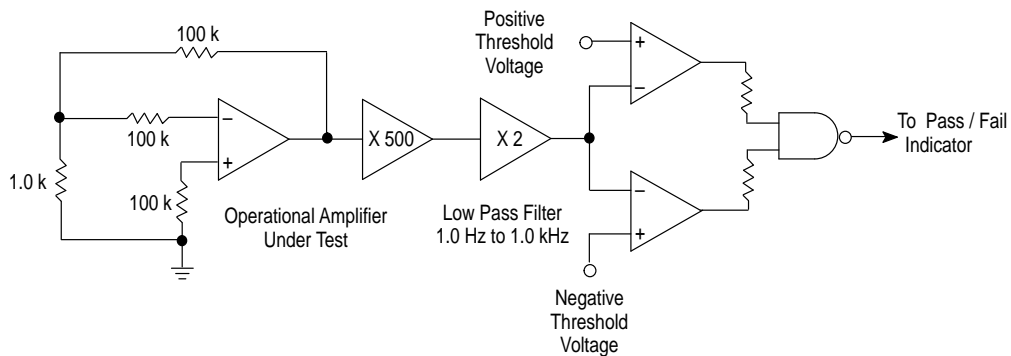


Figure 5. Burst Noise Test Circuit



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 μ V 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)**

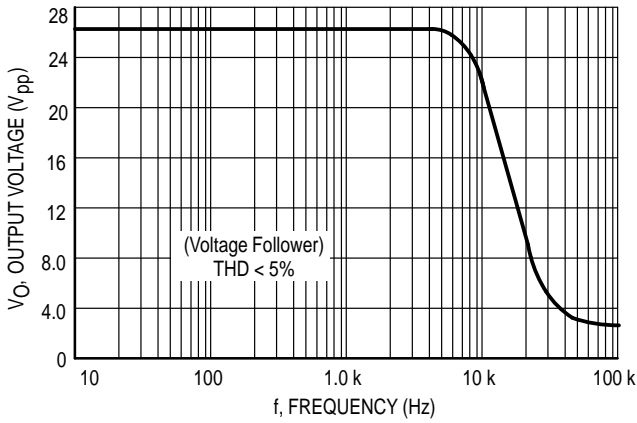
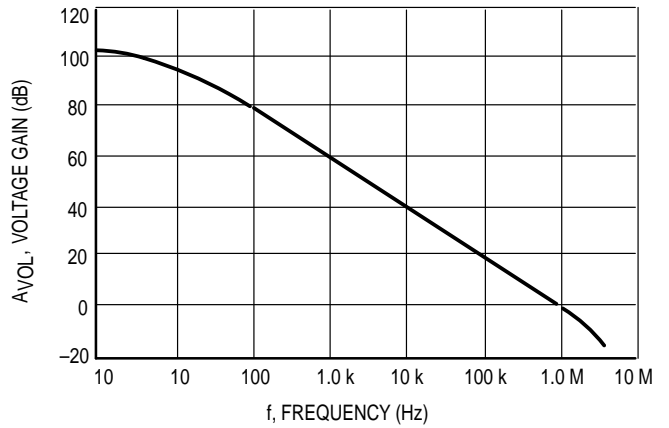
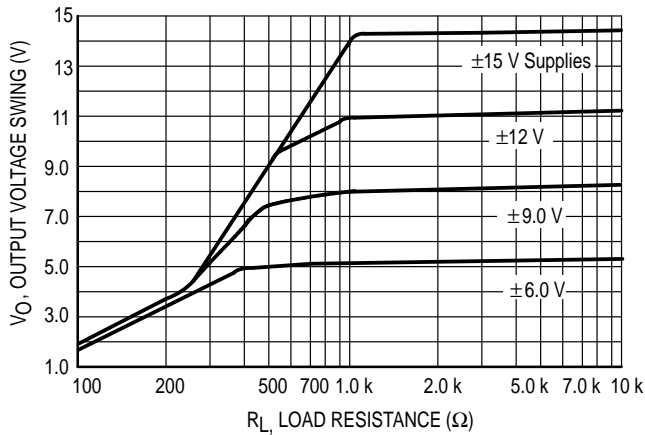


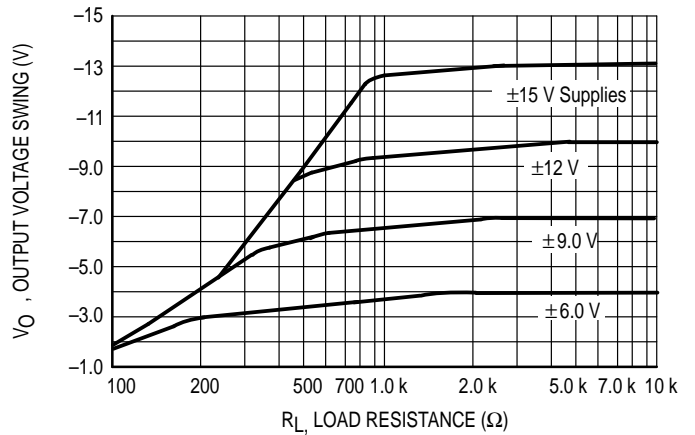
Figure 7. Open Loop Frequency Response



**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)**

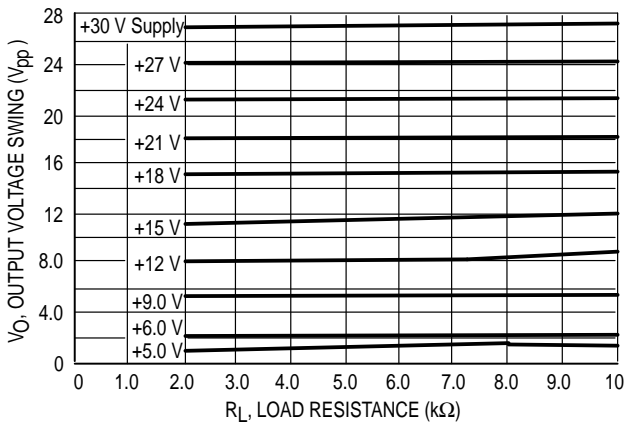
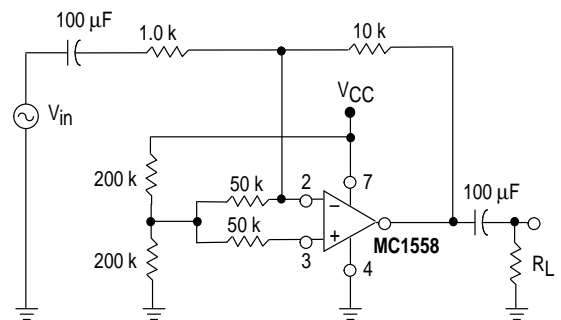


Figure 11. Single Supply Inverting Amplifier



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Figure 12. Noninverting Pulse Response

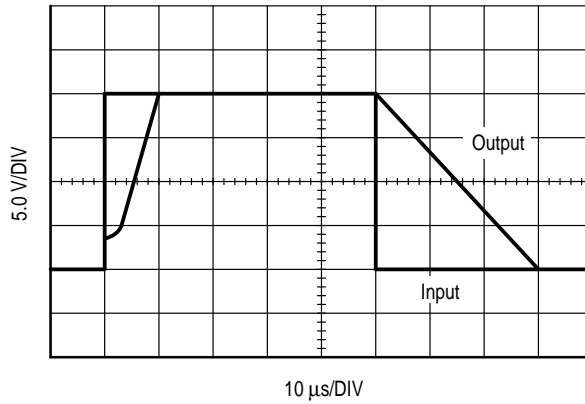


Figure 13. Transient Response Test Circuit

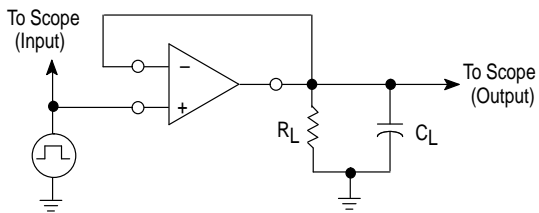


Figure 14. Unused OpAmp

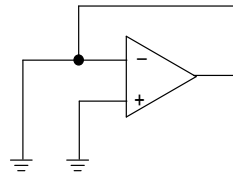
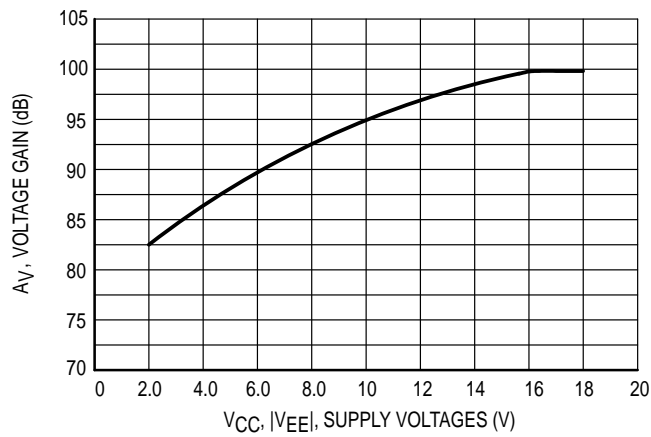


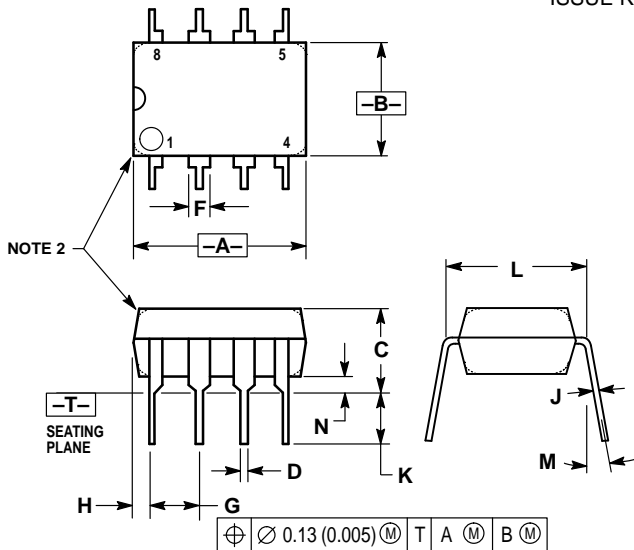
Figure 15. Open Loop Voltage Gain versus Supply Voltage



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OUTLINE DIMENSIONS

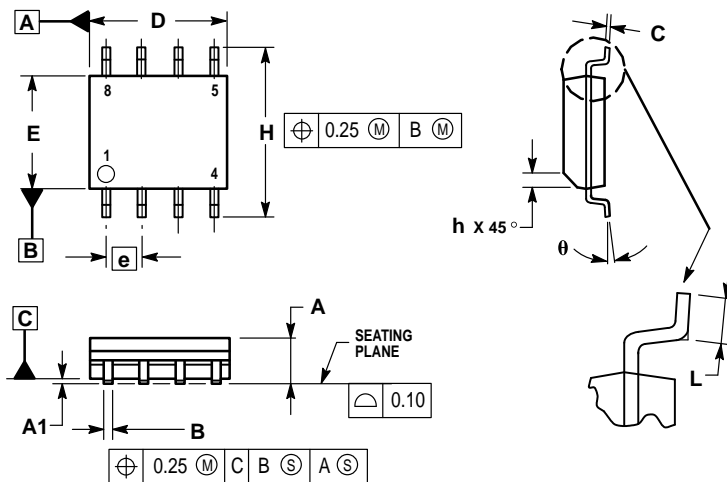
P1 SUFFIX PLASTIC PACKAGE CASE 626-05 ISSUE K



- 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 | | INCHES | |
|-----|-------------|-------|-----------|-------|
| | MIN | MAX | MIN | 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 | 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° |

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MC1458/D

