

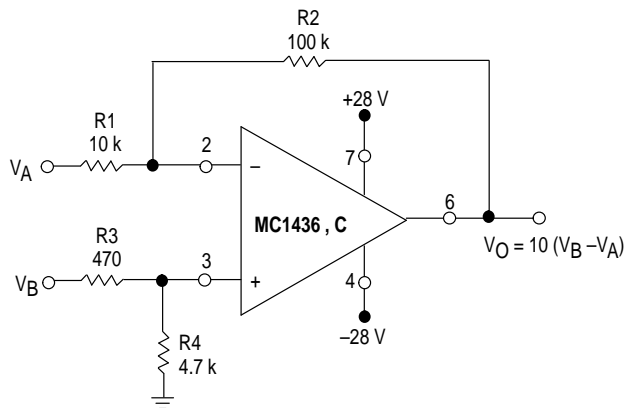
# MC1436, C

## High Voltage, Internally Compensated Operational Amplifiers

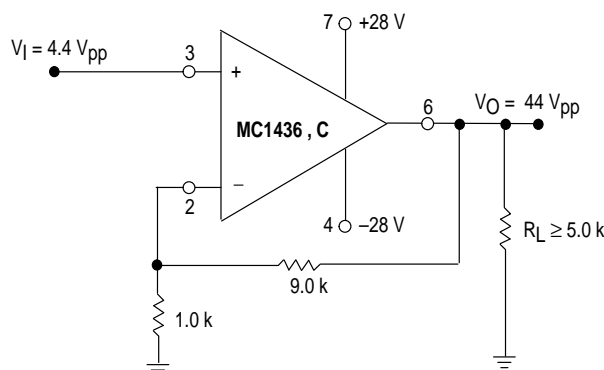
The MC1436, C was designed for use as a summing amplifier, integrator, or amplifier with operating characteristics as a function of the external feedback components.

- Output Voltage Swing:  $\pm 22 V_{pk(min)}$  ( $V_{CC} = +28 V$ ,  $V_{EE} = -28 V$ )
- Fast Slew Rate:  $2.0 V/\mu s$  Typ
- Internally Compensated
- Offset Voltage Null Capability
- Input Overvoltage Protection
- $A_{VOL}$ : 500,000 Typ
- Characteristics Independent of Power Supply Voltages: ( $\pm 5.0 V_{dc}$  to  $\pm 36 V_{dc}$ )

**Figure 1. Differential Amplifier with  $\pm 20 V$  Common Mode Input Voltage Range**

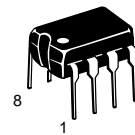


**Figure 2. Typical Noninverting X10 Voltage Amplifier**



### OPERATIONAL AMPLIFIERS

#### SEMICONDUCTOR TECHNICAL DATA

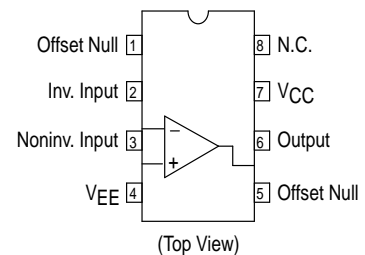


**P1 SUFFIX**  
PLASTIC PACKAGE  
CASE 626



**D SUFFIX**  
PLASTIC PACKAGE  
CASE 751  
(SO-8)

### PIN CONNECTIONS



### ORDERING INFORMATION

Device	Operating Temperature Range	Package
MC1436CD,D	$T_A = 0^\circ$ to $+70^\circ C$	SO-8
MC1436CP1,P1		Plastic DIP

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## MAXIMUM RATINGS (T<sub>A</sub> = +25°C, unless otherwise noted.)

Rating	Symbol	MC1436	MC1436C	Unit
Power Supply Voltage	V <sub>CC</sub> V <sub>EE</sub>	+34 -34	+30 -30	Vdc
Input Differential Voltage Range	V <sub>IDR</sub>	Note 2		V
Input Common Mode Voltage Range	V <sub>ICR</sub>	Note 2		V
Output Short Circuit Duration (V <sub>CC</sub> = V <sub>EE</sub> = 28 Vdc, V <sub>O</sub> = 0)	t <sub>SC</sub>	5.0		sec
Power Dissipation (Package Limitation) Derate above T <sub>A</sub> = +25°C	P <sub>D</sub>	680 4.6		mW mW/°C
Operating Ambient Temperature Range	T <sub>A</sub>	0 to +70		°C
Storage Temperature Range	T <sub>stg</sub>	-65 to +150		°C

## ELECTRICAL CHARACTERISTICS (V<sub>CC</sub> = +28 V, V<sub>EE</sub> = -28 V, T<sub>A</sub> = 25°C, unless otherwise noted.)

Characteristic	Symbol	MC1436			MC1436C			Unit
		Min	Typ	Max	Min	Typ	Max	
Input Bias Current T <sub>A</sub> = +25°C T <sub>A</sub> = T <sub>low</sub> to T <sub>high</sub> (See Note 1)	I <sub>IB</sub>	-	15	40	-	25	90	nAdc
Input Offset Current T <sub>A</sub> = +25°C T <sub>A</sub> = +25°C to T <sub>high</sub> T <sub>A</sub> = T <sub>low</sub> to +25°C	I <sub>IO</sub>	-	5.0	10	-	10	25	nAdc
Input Offset Voltage T <sub>A</sub> = +25°C T <sub>A</sub> = T <sub>low</sub> to T <sub>high</sub>	V <sub>IO</sub>	-	5.0	10	-	5.0	12	mVdc
Differential Input Impedance (Open loop, f ≤ 5.0 Hz)								
Parallel Input Resistance	r <sub>p</sub>	-	10	-	-	10	-	MΩ
Parallel Input Capacitance	C <sub>p</sub>	-	2.0	-	-	2.0	-	pF
Common Mode Input Impedance (f ≤ 5.0 Hz)	z <sub>ic</sub>	-	250	-	-	250	-	MΩ
Input Common Mode Voltage Range	V <sub>ICR</sub>	±22	±25	-	±18	±20	-	Vpk
Equivalent Input Noise Voltage (A <sub>V</sub> = 100, R <sub>S</sub> = 10 kΩ, f = 1.0 kHz, BW = 1.0 Hz)	e <sub>n</sub>	-	50	-	-	50	-	nV/(Hz) <sup>1/2</sup>
Common Mode Rejection (DC)	CMR	70	110	-	50	90	-	dB
Large Signal DC Open Loop Voltage Gain (V <sub>O</sub> = ±10 V, R <sub>L</sub> = 100 kΩ) T <sub>A</sub> = +25°C T <sub>A</sub> = T <sub>low</sub> to T <sub>high</sub> (V <sub>O</sub> = ±10 V, R <sub>L</sub> = 10 kΩ, T <sub>A</sub> = +25°C)	A <sub>VOL</sub>	70,000 50,000 -	500,000 - 200,000	- - -	50,000 - -	500,000 - 200,000	- - -	V/V
Power Bandwidth (Voltage Follower) (A <sub>V</sub> = 1, R <sub>L</sub> = 5.0 kΩ, THD ≤ 5%, V <sub>O</sub> = 40 V <sub>pp</sub> )	BW <sub>p</sub>	-	23	-	-	23	-	kHz
Unity Gain Crossover Frequency (Open loop)	f <sub>c</sub>	-	1.0	-	-	1.0	-	MHz
Phase Margin (Open loop, Unity Gain)	φ <sub>m</sub>	-	50	-	-	50	-	Degrees
Gain Margin	A <sub>M</sub>	-	18	-	-	18	-	dB
Slew Rate (Unity Gain)	SR	-	2.0	-	-	2.0	-	V/μs
Output Impedance (f ≤ 5.0 Hz)	z <sub>O</sub>	-	1.0	-	-	1.0	-	kΩ
Short Circuit Output Current	I <sub>SC</sub>	-	±17	-	-	±19	-	mAdc

NOTES: 1. T<sub>low</sub> = 0°C for MC1436,C T<sub>high</sub> = +70°C for MC1436,C  
2. Either or both input voltages must not exceed the magnitude of V<sub>CC</sub> or V<sub>EE</sub> + 3.0 V.

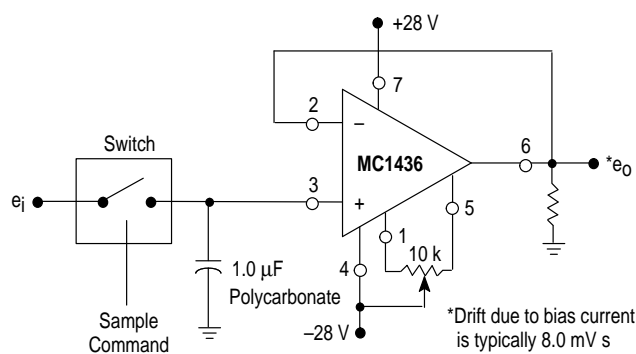
# MC1436, C

**ELECTRICAL CHARACTERISTICS** ( $V_{CC} = +28\text{ V}$ ,  $V_{EE} = -28\text{ V}$ ,  $T_A = 25^\circ\text{C}$ , unless otherwise noted.)

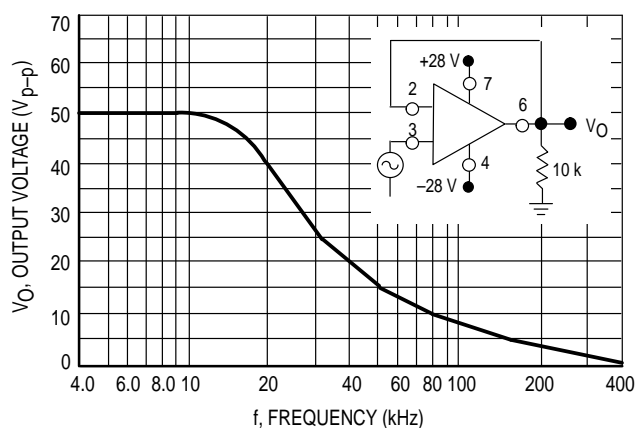
Characteristic	Symbol	MC1436			MC1436C			Unit
		Min	Typ	Max	Min	Typ	Max	
Output Voltage Range ( $R_L = 5.0\text{ k}\Omega$ ) $V_{CC} = +28\text{ Vdc}$ , $V_{EE} = -28\text{ Vdc}$ $V_{CC} = +36\text{ Vdc}$ , $V_{EE} = -36\text{ Vdc}$	$V_O$	$\pm 20$	$\pm 22$	—	$\pm 20$	$\pm 22$	—	$V_{pk}$
Power Supply Rejection $V_{EE} = \text{Constant}$ , $R_S \leq 10\text{ k}\Omega$ $V_{CC} = \text{Constant}$ , $R_S \leq 10\text{ k}\Omega$	PSR + PSR -	—	35	200	—	50	—	$\mu\text{V/V}$
Power Supply Current (See Note 2)	$I_{CC}$ $I_{EE}$	—	2.6	5.0	—	2.6	5.0	$\text{mA}_{dc}$
DC Quiescent Power Consumption ( $V_O = 0$ )	$P_C$	—	146	280	—	146	280	$\text{mW}$

**NOTES:** 2.  $V_{CC} = V_{EE} = 5.0\text{ Vdc}$  to  $30\text{ Vdc}$  for MC1436  
 $V_{CC} = V_{EE} = 5.0\text{ Vdc}$  to  $28\text{ Vdc}$  for MC1436C

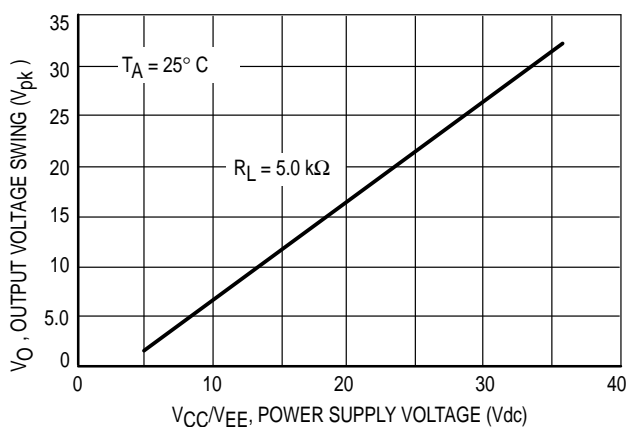
**Figure 3. Low-Drift Sample and Hold**



**Figure 4. Power Bandwidth**



**Figure 5. Peak Output Voltage Swing versus Power Supply Voltage**



**Figure 6. Open Loop Frequency Response**

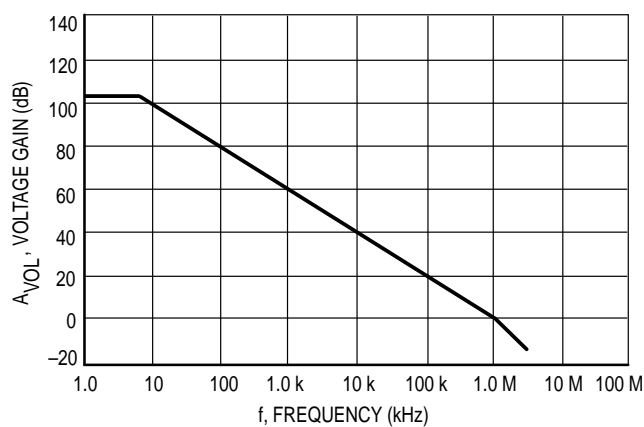


Figure 7. Output Short Circuit Current versus Temperature

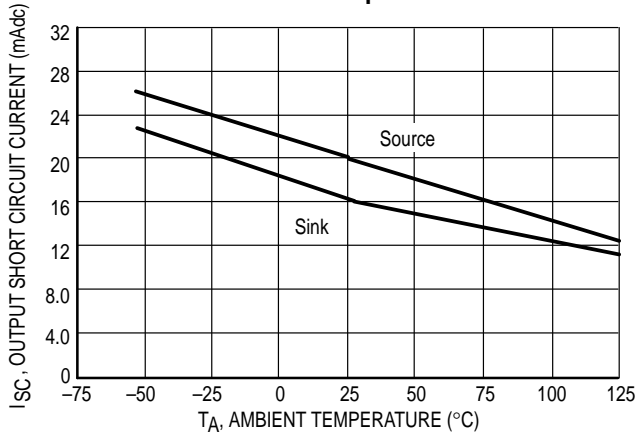


Figure 8. Input Bias Current versus Temperature

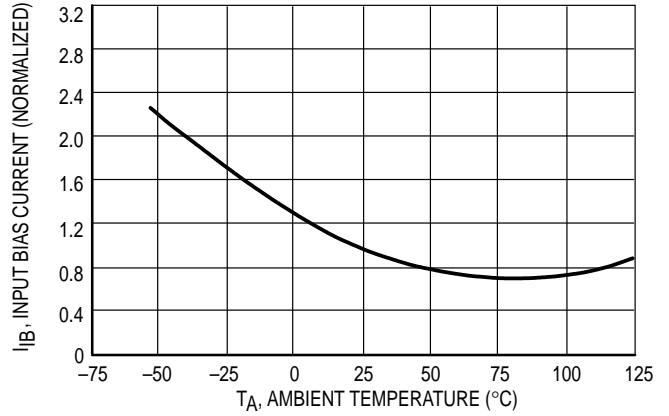


Figure 9. Inverting Feedback Model

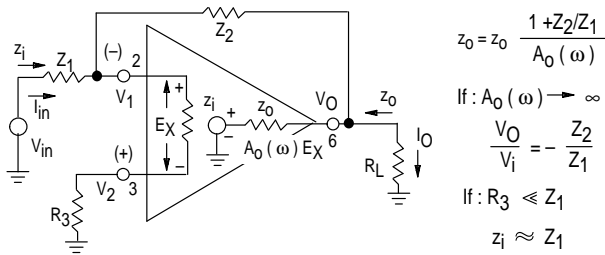


Figure 10. Noninverting Feedback Model

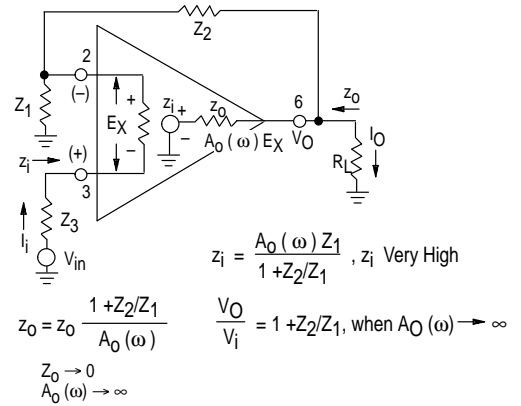
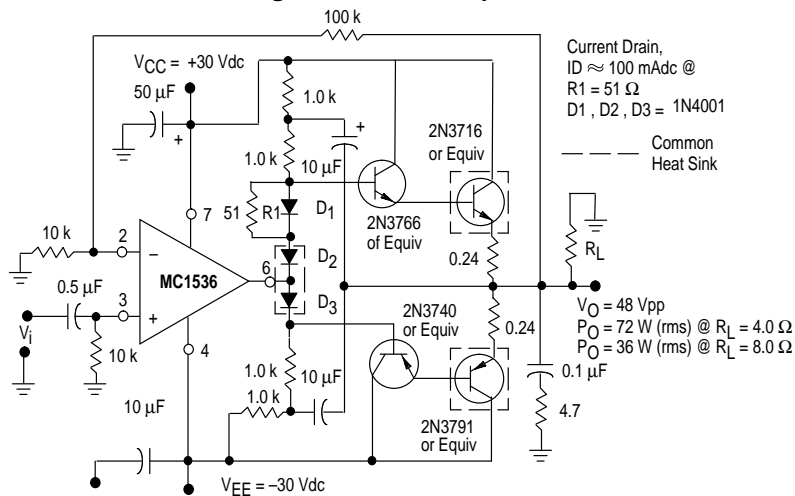
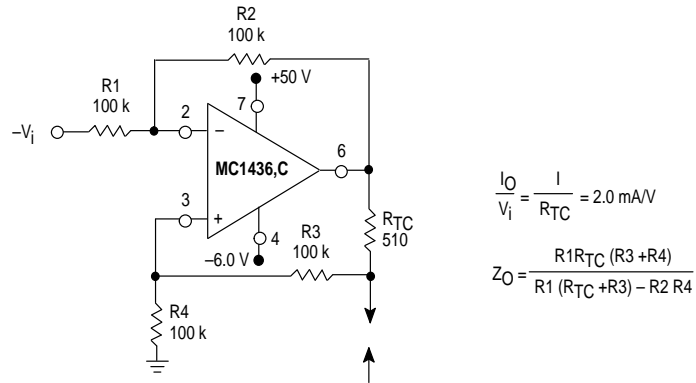


Figure 11. Audio Amplifier

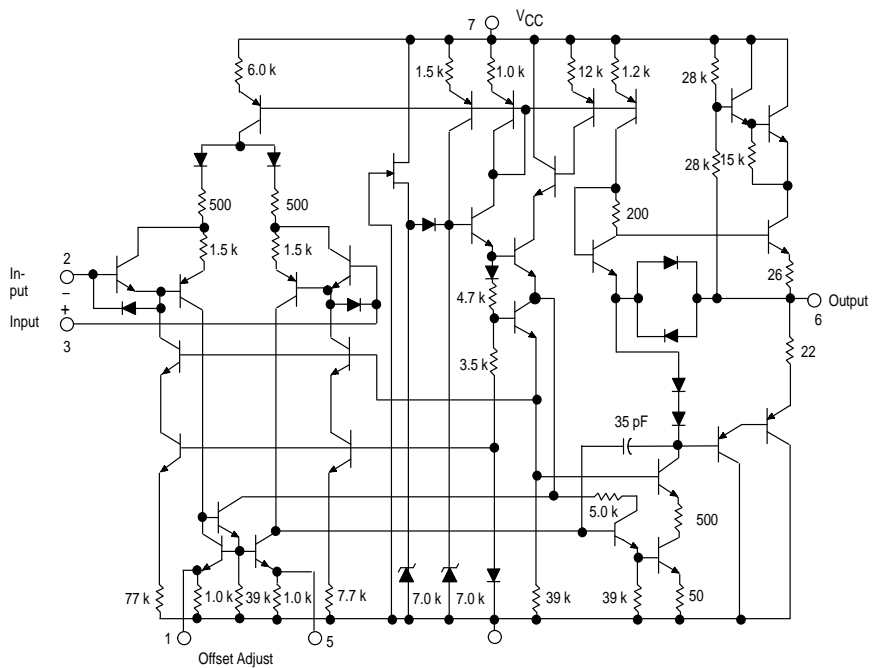


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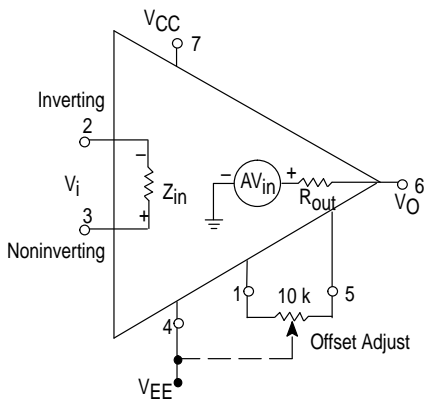
**Figure 12. Voltage Controlled Current Source or Transconductance Amplifier with 0 V to 40 V Compliance**



**Figure 13. Representative Schematic Diagram**



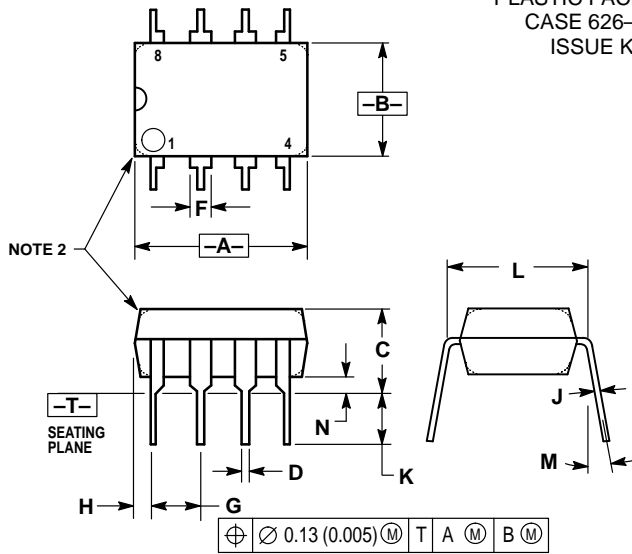
**Figure 14. Equivalent Circuit**



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## OUTLINE DIMENSIONS

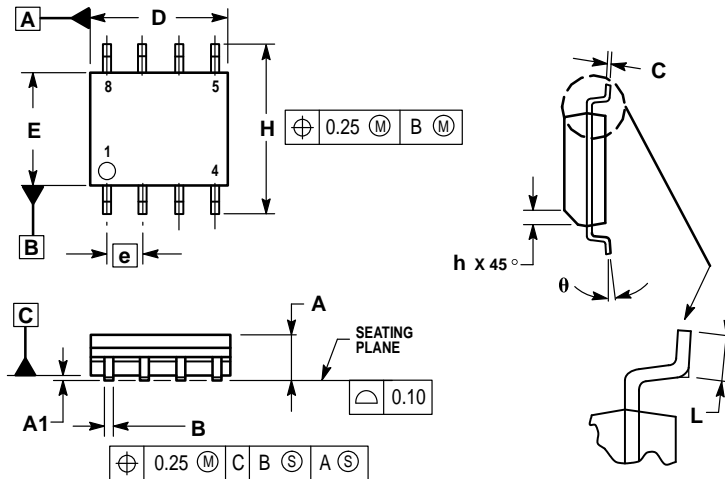
### P1 SUFFIX PLASTIC PACKAGE CASE 626-05 ISSUE K



- 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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