

# NL17SZ126

## Non-inverting 3-State Buffer

The NL17SZ126 is a high performance dual noninverting buffer operating from a 2.3 V to 5.5 V supply.

- Extremely High Speed:  $t_{PD}$  2.6 ns (typical) at  $V_{CC} = 5$  V
- Designed for 2.3 V to 5.5 V  $V_{CC}$  Operation
- Over Voltage Tolerant Inputs and Outputs
- LVTTL Compatible – Interface Capability With 5 V TTL Logic with  $V_{CC} = 3$  V
- LVC MOS Compatible
- 24 mA Balanced Output Sink and Source Capability
- Near Zero Static Supply Current Substantially Reduces System Power Requirements
- 3-State OE Input is Active HIGH
- Replacement for NC7SZ126
- Chip Complexity = 36 Feet

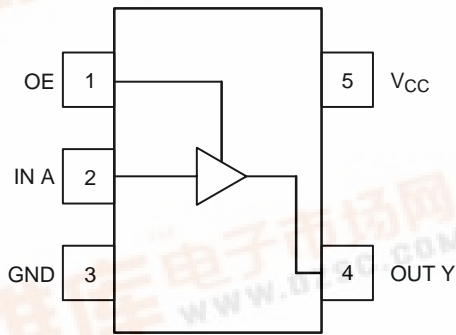


Figure 1. Pinout (Top View)



Figure 2. Logic Symbol



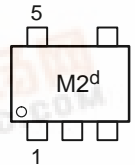
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### MARKING DIAGRAMS



SC70-5/SC-88A/SOT-353  
DF SUFFIX  
CASE 419A



d = Date Code

### PIN ASSIGNMENT

1	OE
2	IN A
3	GND
4	OUT Y
5	$V_{CC}$

### FUNCTION TABLE

OE Input	A Input	Y Output
H	L	L
H	H	H
L	X	Z

X = Don't Care

### ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 5 of this data sheet.



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## MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V <sub>CC</sub>	DC Supply Voltage	-0.5 to +7.0	V
V <sub>IN</sub>	DC Input Voltage	-0.5 to +7.0	V
V <sub>OUT</sub>	DC Output Voltage	-0.5 to +7.0	V
I <sub>IK</sub>	DC Input Diode Current	-50	mA
I <sub>OK</sub>	DC Output Diode Current	-50	mA
I <sub>OUT</sub>	DC Output Sink Current	±50	mA
I <sub>CC</sub>	DC Supply Current per Supply Pin	±100	mA
T <sub>STG</sub>	Storage Temperature Range	-65 to +150	°C
T <sub>L</sub>	Lead Temperature, 1 mm from Case for 10 Seconds	260	°C
T <sub>J</sub>	Junction Temperature Under Bias	+150	°C
θ <sub>JA</sub>	Thermal Resistance	SC-70/SC-88A	°C/W
P <sub>D</sub>	Power Dissipation in Still Air at 85°C	SC-70/SC-88A	mW
MSL	Moisture Sensitivity	Level 1	
F <sub>R</sub>	Flammability Rating	Oxygen Index: 28 to 34	UL 94 V-0 @ 0.125 in
V <sub>ESD</sub>	ESD Withstand Voltage	Human Body Model (Note 2) Machine Model (Note 3) Charged Device Model (Note 4)	> 2000 > 200 N/A

Maximum Ratings are those values beyond which damage to the device may occur. Exposure to these conditions or conditions beyond those indicated may adversely affect device reliability. Functional operation under absolute maximum-rated conditions is not implied. Functional operation should be restricted to the Recommended Operating Conditions.

1. Measured with minimum pad spacing on an FR4 board, using 10 mm-by-1 inch, 2-ounce copper trace with no air flow.
2. Tested to EIA/JESD22-A114-A.
3. Tested to EIA/JESD22-A115-A.
4. Tested to JESD22-C101-A.

## RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Min	Max	Unit
V <sub>CC</sub>	DC Supply Voltage	2.0	5.5	V
V <sub>IN</sub>	DC Input Voltage	0	5.5	V
V <sub>OUT</sub>	DC Output Voltage	0	5.5	V
T <sub>A</sub>	Operating Temperature Range	-40	+85	°C
t <sub>r</sub> , t <sub>f</sub>	Input Rise and Fall Time	V <sub>CC</sub> = 3.0 V ±0.3 V V <sub>CC</sub> = 5.0 V ±0.5 V	0 100	ns/V

## DEVICE JUNCTION TEMPERATURE VERSUS TIME TO 0.1% BOND FAILURES

Junction Temperature °C	Time, Hours	Time, Years
80	1,032,200	117.8
90	419,300	47.9
100	178,700	20.4
110	79,600	9.4
120	37,000	4.2
130	17,800	2.0
140	8,900	1.0

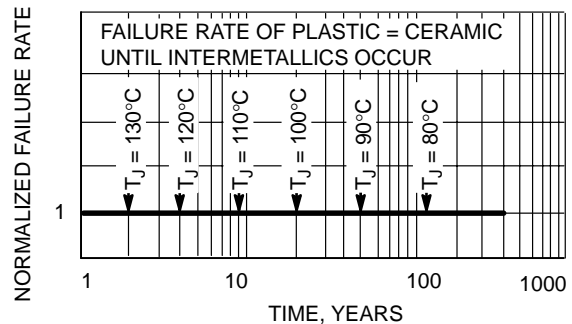


Figure 3. Failure Rate versus Time Junction Temperature

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## DC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Condition	V <sub>CC</sub> (V)	T <sub>A</sub> = 25°C			-40°C ≤ T <sub>A</sub> ≤ 85°C		Unit
				Min	Typ	Max	Min	Max	
V <sub>IH</sub>	High-Level Input Voltage		2.3 to 5.5	0.7 V <sub>CC</sub>			0.7 V <sub>CC</sub>		V
V <sub>IL</sub>	Low-Level Input Voltage		2.3 to 5.5			0.3 V <sub>CC</sub>		0.3 V <sub>CC</sub>	V
V <sub>OH</sub>	High-Level Output Voltage V <sub>IN</sub> = V <sub>IH</sub>	I <sub>OH</sub> = 100 μA I <sub>OH</sub> = -8 mA I <sub>OH</sub> = -12 mA I <sub>OH</sub> = -16 mA I <sub>OH</sub> = -24 mA I <sub>OH</sub> = -32 mA	2.3 to 5.5 2.3 2.7 3.0 3.0 4.5	V <sub>CC</sub> - 0.1 1.9 2.2 2.4 2.3 3.8	V <sub>CC</sub> 2.1 2.4 2.7 2.5 4.0		V <sub>CC</sub> - 0.1 1.9 2.2 2.4 2.3 3.8		V
V <sub>OL</sub>	Low-Level Output Voltage V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub>	I <sub>OL</sub> = 100 μA I <sub>OL</sub> = 8 mA I <sub>OL</sub> = 12 mA I <sub>OL</sub> = 16 mA I <sub>OL</sub> = 24 mA I <sub>OL</sub> = 32 mA	2.3 to 5.5 2.3 2.7 3.0 3.0 4.5		0.20 0.22 0.28 0.38 0.42	0.1 0.3 0.4 0.4 0.55 0.55	0.1 0.3 0.4 0.4 0.55 0.55		V
I <sub>IN</sub>	Input Leakage Current	V <sub>IN</sub> = V <sub>CC</sub> or GND	0 to 5.5			±0.1		±1.0	μA
I <sub>OFF</sub>	Power Off-Output Leakage Current	V <sub>OUT</sub> = 5.5 V	0			1		10	μA
I <sub>CC</sub>	Quiescent Supply Current	V <sub>IN</sub> = V <sub>CC</sub> or GND	5.5			1		10	μA
I <sub>OZ</sub>	3-State Output Leakage	0 V ≤ V <sub>OUT</sub> ≤ 5.5 V V <sub>IN</sub> = V <sub>IL</sub> or V <sub>IH</sub>	2.3 to 5.5			±0.5		±5	μA

## AC ELECTRICAL CHARACTERISTICS (t<sub>R</sub> = t<sub>F</sub> = 3.0 ns)

Symbol	Parameter	Condition	V <sub>CC</sub> (V)	T <sub>A</sub> = 25°C			-40°C ≤ T <sub>A</sub> ≤ 85°C		Unit
				Min	Typ	Max	Min	Max	
t <sub>PLH</sub> t <sub>PHL</sub>	Propagation Delay AN to YN (Figures 4, and 5, Table 1)	R <sub>L</sub> = 1 MΩ    C <sub>L</sub> = 15 pF	2.5 ± 0.2	1.0		7.5	1.0	8	ns
		R <sub>L</sub> = 1 MΩ    C <sub>L</sub> = 15 pF R <sub>L</sub> = 500 Ω    C <sub>L</sub> = 50 pF	3.3 ± 0.3	0.8 1.2		5.2 5.7	0.8 1.2	5.5 6.0	
		R <sub>L</sub> = 1 MΩ    C <sub>L</sub> = 15 pF R <sub>L</sub> = 500 Ω    C <sub>L</sub> = 50 pF	5.0 ± 0.5	0.5 0.8		4.5 5.0	0.5 0.8	4.8 5.3	
t <sub>PZH</sub> t <sub>PZL</sub>	Output Enable Time (Figures 6, 7 and 8, Table 1)	R <sub>L</sub> = 250 Ω    C <sub>L</sub> = 50 pF	2.5 ± 0.2	1.8		8.5	1.8	9.0	ns
			3.3 ± 0.3	1.2		6.2	1.2	6.5	
			5.0 ± 0.5	0.8		5.5	0.8	5.8	
t <sub>PZH</sub> t <sub>PZL</sub>	Output Enable Time (Figures 6, 7 and 8, Table 1)	R <sub>L</sub> and R1 = 500 Ω    C <sub>L</sub> = 50 pF	2.5 ± 0.2	1.5		8.0	1.5	8.5	ns
			3.3 ± 0.3	0.8		5.7	0.8	6.0	
			5.0 ± 0.5	0.3		4.7	0.3	5.0	

## CAPACITIVE CHARACTERISTICS

Symbol	Parameter	Condition	Typical	Unit
C <sub>IN</sub>	Input Capacitance	V <sub>CC</sub> = 5.5 V, V <sub>I</sub> = 0 V or V <sub>CC</sub>	2.5	pF
C <sub>OUT</sub>	Output Capacitance	V <sub>CC</sub> = 5.5 V, V <sub>I</sub> = 0 V or V <sub>CC</sub>	2.5	pF
C <sub>PD</sub>	Power Dissipation Capacitance (Note 5)	10 MHz, V <sub>CC</sub> = 3.3 V, V <sub>I</sub> = 0 V or V <sub>CC</sub> 10 MHz, V <sub>CC</sub> = 5.5 V, V <sub>I</sub> = 0 V or V <sub>CC</sub>	9 11	pF

5. C<sub>PD</sub> is defined as the value of the internal equivalent capacitance which is calculated from the operating current consumption without load. Average operating current can be obtained by the equation: I<sub>CC(OPR)</sub> = C<sub>PD</sub> • V<sub>CC</sub> • f<sub>in</sub> + I<sub>CC</sub>. C<sub>PD</sub> is used to determine the no-load dynamic power consumption; P<sub>D</sub> = C<sub>PD</sub> • V<sub>CC</sub><sup>2</sup> • f<sub>in</sub> + I<sub>CC</sub> • V<sub>CC</sub>.

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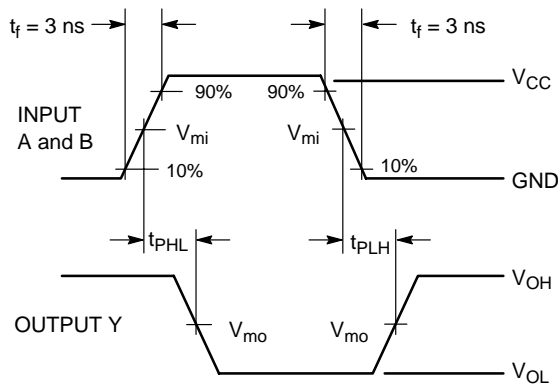
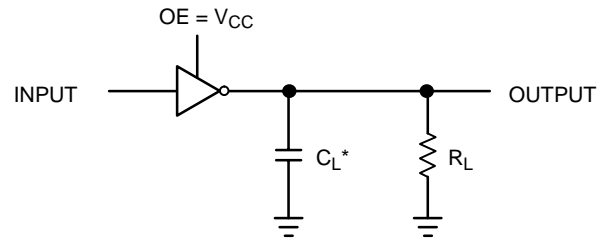
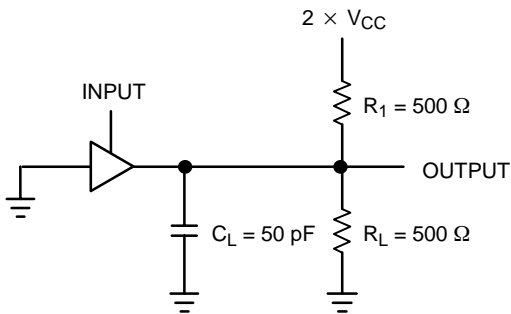


Figure 4. Switching Waveform



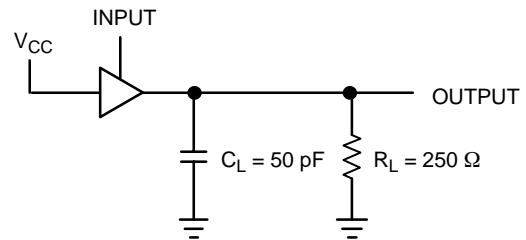
\*Includes all probe and jig capacitance.  
A 1-MHz square input wave is recommended for propagation delay tests.

Figure 5.  $T_{PLH}$  or  $T_{PHL}$



A 1-MHz square input wave is recommended for propagation delay tests.

Figure 6.  $T_{PZL}$  or  $T_{PLZ}$



A 1-MHz square input wave is recommended for propagation delay tests.

Figure 7.  $T_{PZH}$  or  $T_{PHZ}$

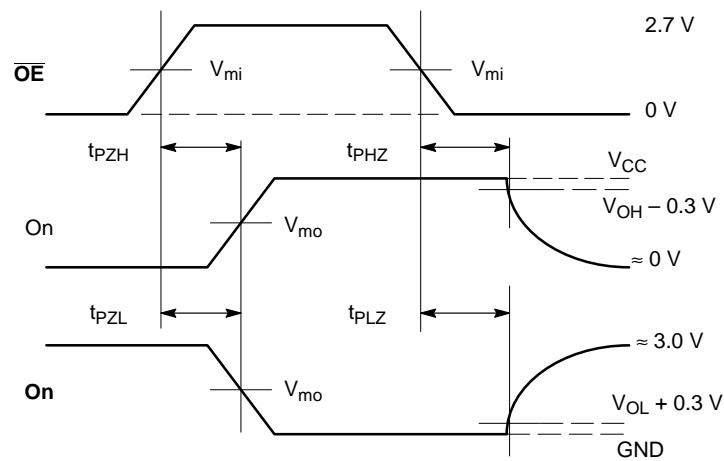


Figure 8. AC Output Enable and Disable Waveform

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**Table 1. Output Enable and Disable Times**

$t_R = t_F = 2.5$  ns, 10% to 90%;  $f = 1$  MHz;  $t_W = 500$  ns

Symbol	$V_{CC}$		
	$3.3\text{ V} \pm 0.3\text{ V}$	$2.7\text{ V}$	$2.5\text{ V} \pm 0.2\text{ V}$
$V_{mi}$	1.5 V	1.5 V	$V_{CC}/2$
$V_{mo}$	1.5 V	1.5 V	$V_{CC}/2$

## DEVICE ORDERING INFORMATION

Device Order Number	Device Nomenclature							Package Type	Tape and Reel Size
	Logic Circuit Indicator	No. of Gates per Package	Temp Range Identifier	Technology	Device Function	Package Suffix	Tape and Reel Suffix		
NL17SZ126	NL	1	7	SZ	126	DF	T2	SC70-5/SC-88A/ SOT-353	178 mm (7"), 3000 Units

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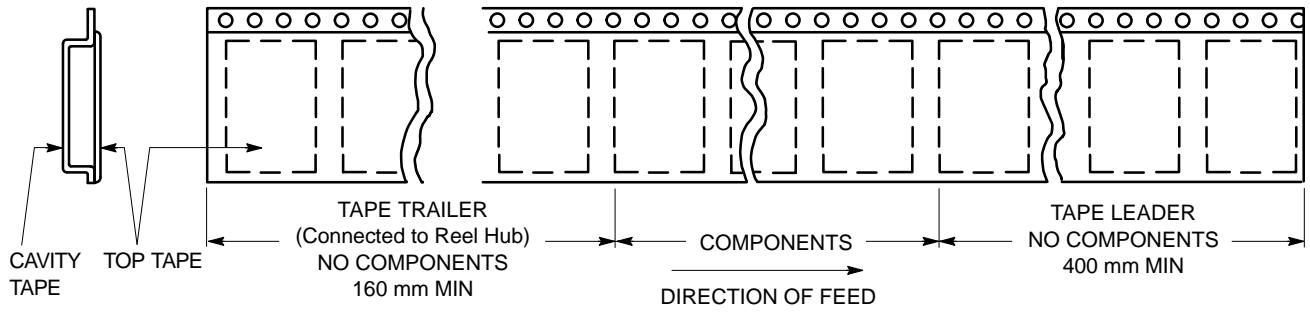


Figure 9. Tape Ends for Finished Goods

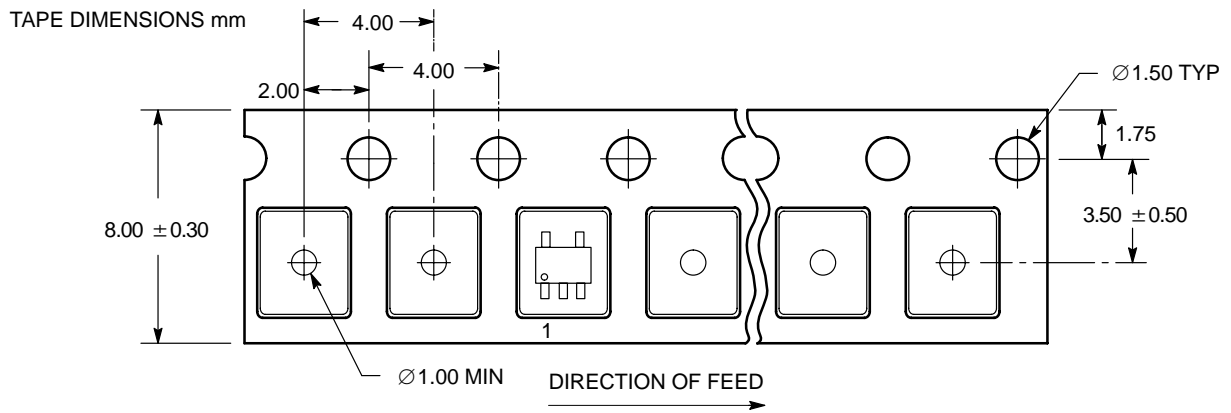


Figure 10. SC-70/SC-88A/SOT-353 DFT2 Reel Configuration/Orientation

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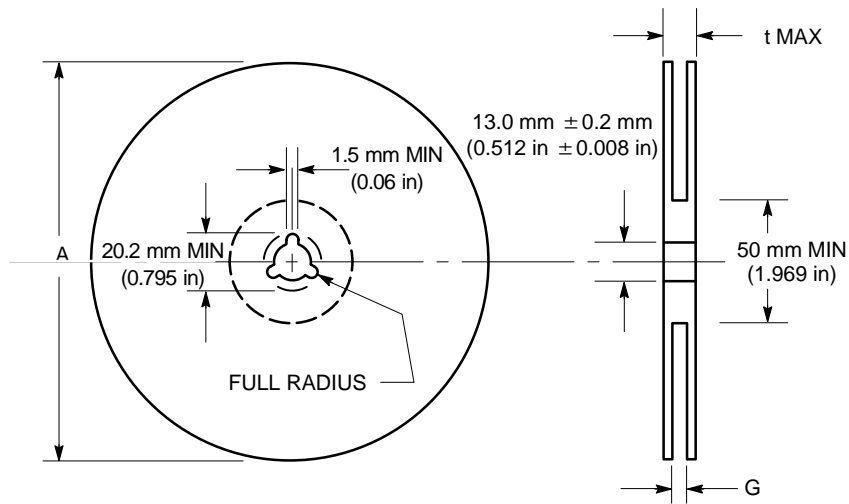


Figure 11. Reel Dimensions

## REEL DIMENSIONS

Tape Size	T and R Suffix	A Max	G	t Max
8 mm	T1, T2	178 mm (7")	8.4 mm, + 1.5 mm, -0.0 (0.33 in + 0.059 in, -0.00)	14.4 mm (0.56 in)

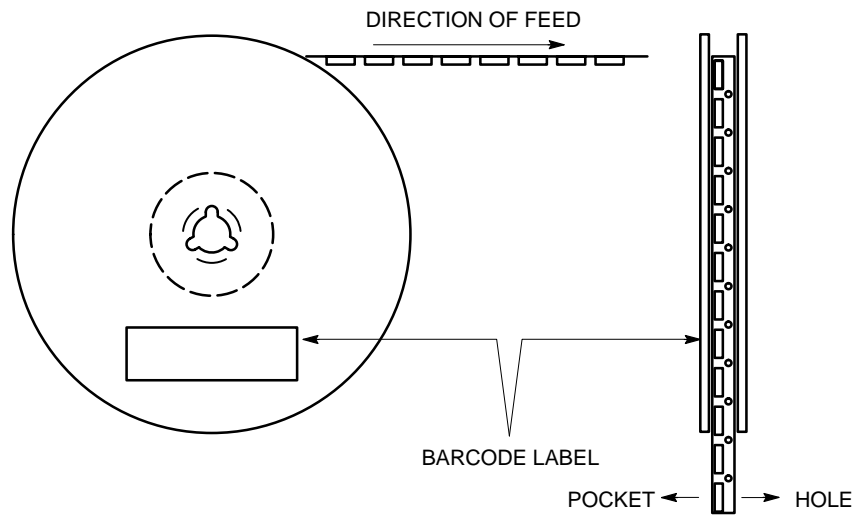
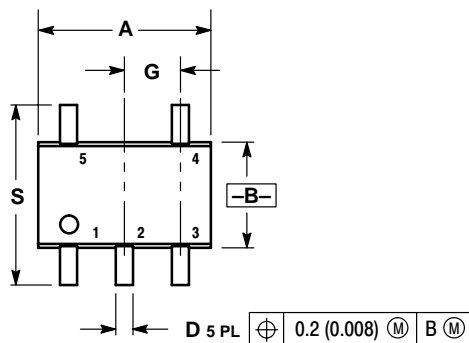


Figure 12. Reel Winding Direction

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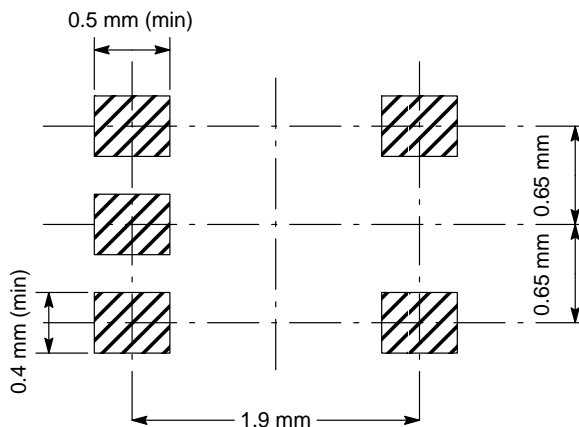
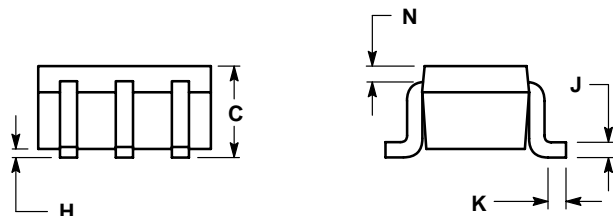
## PACKAGE DIMENSIONS


SC70-5/SC-88A/SOT-353  
DF SUFFIX  
5-LEAD PACKAGE  
CASE 419A-02  
ISSUE F



- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
  2. CONTROLLING DIMENSION: INCH.
  3. 419A-01 OBSOLETE. NEW STANDARD 419A-02.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.071	0.087	1.80	2.20
B	0.045	0.053	1.15	1.35
C	0.031	0.043	0.80	1.10
D	0.004	0.012	0.10	0.30
G	0.026 BSC		0.65 BSC	
H	---	0.004	---	0.10
J	0.004	0.010	0.10	0.25
K	0.004	0.012	0.10	0.30
N	0.008 REF		0.20 REF	
S	0.079	0.087	2.00	2.20



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