MC74HC1G00

Single 2-Input NAND Gate

The MC74HC1G00 is a high speed CMOS 2–input NAND gate fabricated with silicon gate CMOS technology.

The internal circuit is composed of multiple stages, including a buffer output which provides high noise immunity and stable output.

- High Speed: t_{PD} = 7 ns (Typ) at V_{CC} = 5 V
- Low Power Dissipation: I_{CC} = 1 μA (Max) at T_A = 25°C
- High Noise Immunity
- Balanced Propagation Delays ($t_{PLH} = t_{PHL}$)
- Symmetrical Output Impedance ($I_{OH} = I_{OL}$ = 2 mA)
- Chip Complexity: FETs = 40

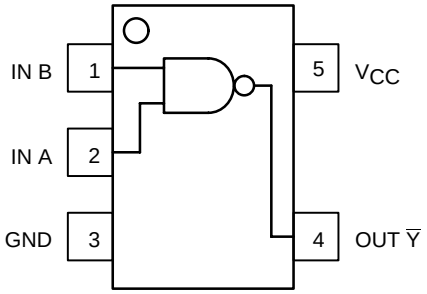


Figure 1. Pinout (Top View)

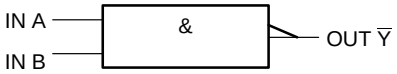


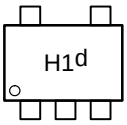
Figure 2. Logic Symbol

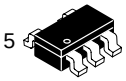
ON Semiconductor™

http://onsemi.com

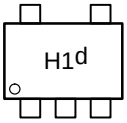
MARKING DIAGRAMS

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





SOT23–5/TSOP–5/SC59–5
DT SUFFIX
CASE 483



d = Date Code

PIN ASSIGNMENT	
1	IN B
2	IN A
3	GND
4	OUT $\overline{Y}$
5	V_{CC}

FUNCTION TABLE

Inputs		Output
A	**B**	$\overline{\mathbf{Y}}$
L	L	H
L	H	H
H	L	H
H	H	L

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 4 of this data sheet.

MAXIMUM RATINGS

Symbol	Parameter		Value	Unit
V_{CC}	DC Supply Voltage		−0.5 to +7.0	V
V_{IN}	DC Input Voltage		−0.5 to V_{CC} +0.5	V
V_{OUT}	DC Output Voltage		−0.5 to V_{CC} +0.5	V
I_{IK}	DC Input Diode Current		±20	mA
I_{OK}	DC Output Diode Current		±20	mA
I_{OUT}	DC Output Sink Current		±12.5	mA
I_{CC}	DC Supply Current per Supply Pin		±25	mA
T_{STG}	Storage Temperature Range		−65 to +150	°C
T_L	Lead Temperature, 1 mm from Case for 10 Seconds		260	°C
T_J	Junction Temperature Under Bias		+150	°C
θ_{JA}	Thermal Resistance	SC70–5/SC–88A (Note 1) TSOP–5	350 230	°C/W
P_D	Power Dissipation in Still Air at 85°C	SC70–5/SC–88A TSOP–5	150 200	mW
MSL	Moisture Sensitivity		Level 1	
F_R	Flammability Rating	Oxygen Index: 28 to 34	UL 94 V–0 @ 0.125 in	
V_{ESD}	ESD Withstand Voltage	Human Body Model (Note 2) Machine Model (Note 3) Charged Device Model (Note 4)	>2000 >200 N/A	V
$I_{LATCH-UP}$	Latch–Up Performance	Above V_{CC} and Below GND at 125°C (Note 5)	±500	mA

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, 20 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.
5. Tested to EIA/JESD78.

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter		Min	Max	Unit
V_{CC}	DC Supply Voltage		2.0	6.0	V
V_{IN}	DC Input Voltage		0.0	V_{CC}	V
V_{OUT}	DC Output Voltage		0.0	V_{CC}	V
T_A	Operating Temperature Range		−55	+125	°C
t_r , t_f	Input Rise and Fall Time	V_{CC} = 2.0 V V_{CC} = 3.0 V V_{CC} = 4.5 V V_{CC} = 6.0 V	0 0 0 0	1000 600 500 400	ns

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

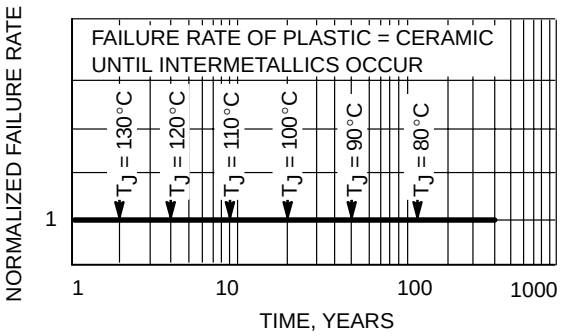


Figure 3. Failure Rate vs. Time Junction Temperature

DC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Test Conditions	V_{CC} (V)	T_A = 25°C Min	T_A = 25°C Typ	T_A = 25°C Max	$T_A \le 85°C$ Min	$T_A \le 85°C$ Max	$-55°C \le T_A \le 125°C$ Min	$-55°C \le T_A \le 125°C$ Max	Unit
V_{IH}	Minimum High–Level Input Voltage		2.0 3.0 4.5 6.0	1.5 2.1 3.15 4.20			1.5 2.1 3.15 4.20		1.5 2.1 3.15 4.20		V
V_{IL}	Maximum Low–Level Input Voltage		2.0 3.0 4.5 6.0			0.5 0.9 1.35 1.80		0.5 0.9 1.35 1.80		0.5 0.9 1.35 1.80	V
V_{OH}	Minimum High–Level Output Voltage $V_{IN} = V_{IH}$ or V_{IL}	$V_{IN} = V_{IH}$ or V_{IL} $I_{OH} = -20$ μA	2.0 3.0 4.5 6.0	1.9 2.9 4.4 5.9	2.0 3.0 4.5 6.0		1.9 2.9 4.4 5.9		1.9 2.9 4.4 5.9		V
		$V_{IN} = V_{IH}$ or V_{IL} $I_{OH} = -2$ mA $I_{OH} = -2.6$ mA	4.5 6.0	4.18 5.68	4.31 5.80		4.13 5.63		4.08 5.58		
V_{OL}	Maximum Low–Level Output Voltage $V_{IN} = V_{IH}$ or V_{IL}	$V_{IN} = V_{IH}$ or V_{IL} $I_{OL} = 20$ μA	2.0 3.0 4.5 6.0		0.0 0.0 0.0 0.0	0.1 0.1 0.1 0.1		0.1 0.1 0.1 0.1		0.1 0.1 0.1 0.1	V
		$V_{IN} = V_{IH}$ or V_{IL} $I_{OL} = 2$ mA $I_{OL} = 2.6$ mA	4.5 6.0		0.17 0.18	0.26 0.26		0.33 0.33		0.40 0.40	
I_{IN}	Maximum Input Leakage Current	$V_{IN} = 6.0$ V or GND	6.0			±0.1		±1.0		±1.0	μA
I_{CC}	Maximum Quiescent Supply Current	$V_{IN} = V_{CC}$ or GND	6.0			1.0		10		40	μA

AC ELECTRICAL CHARACTERISTICS (Input $t_r = t_f = 6.0$ ns)

Symbol	Parameter	Test Conditions	T_A = 25°C Min	T_A = 25°C Typ	T_A = 25°C Max	$T_A \le 85°C$ Min	$T_A \le 85°C$ Max	$-55°C \le T_A \le 125°C$ Min	$-55°C \le T_A \le 125°C$ Max	Unit
t_{PLH}, t_{PHL}	Maximum Propagation Delay, Input A or B to $\overline{Y}$	$V_{CC} = 5.0$ V $C_L = 15$ pF		3.5	15		20		25	ns
		$V_{CC} = 2.0$ V $C_L = 50$ pF $V_{CC} = 3.0$ V $V_{CC} = 4.5$ V $V_{CC} = 6.0$ V		19 10.5 7.5 6.5	100 27 20 17		125 35 25 21		155 90 35 26	
t_{TLH}, t_{THL}	Output Transition Time	$V_{CC} = 5.0$ V $C_L = 15$ pF		3	10		15		20	ns
		$V_{CC} = 2.0$ V $C_L = 50$ pF $V_{CC} = 3.0$ V $V_{CC} = 4.5$ V $V_{CC} = 6.0$ V		25 16 11 9	125 35 25 21		155 45 31 26		200 60 38 32	
C_{IN}	Maximum Input Capacitance			5	10		10		10	pF

		Typical @ 25°C, V_{CC} = 5.0 V	
C_{PD}	Power Dissipation Capacitance (Note 6)	10	pF

6. C_{PD} 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: $I_{CC(OPR)} = C_{PD} \bullet V_{CC} \bullet f_{in} + I_{CC}$. C_{PD} is used to determine the no–load dynamic power consumption; $P_D = C_{PD} \bullet V_{CC}^2 \bullet f_{in} + I_{CC} \bullet V_{CC}$.

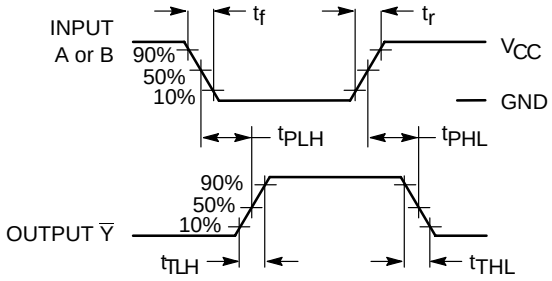
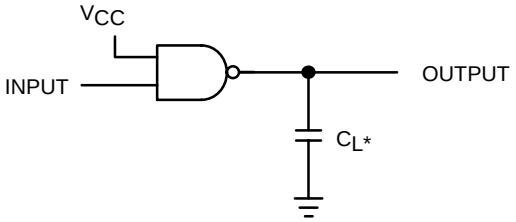


Figure 4. Switching Waveforms



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

Figure 5. Test Circuit

DEVICE ORDERING INFORMATION

Device Order Number	Device Nomenclature						Package Type (Name/SOT#/ Common Name)	Tape and Reel Size
	Logic Circuit Indicator	Temp Range Identifier	Technology	Device Function	Package Suffix	Tape and Reel Suffix		
MC74HC1G00DFT1	MC	74	HC1G	00	DF	T1	SC70–5/SC–88A/ SOT–353	178 mm (7 in) 3000 Unit
MC74HC1G00DFT2	MC	74	HC1G	00	DF	T2	SC70–5/SC–88A/ SOT–353	178 mm (7 in) 3000 Unit
MC74HC1G00DTT1	MC	74	HC1G	00	DT	T1	SOT23–5/TSOP–5/ SC59–5	178 mm (7 in) 3000 Unit

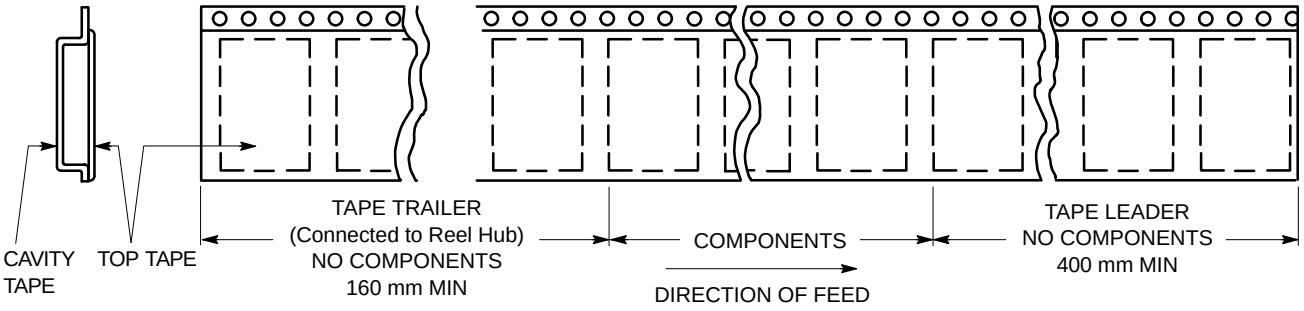


Figure 6. Tape Ends for Finished Goods

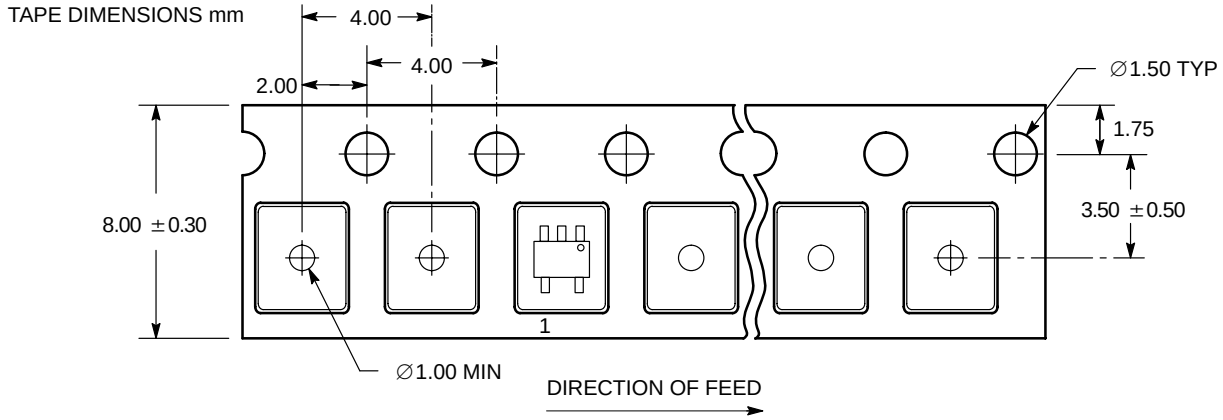


Figure 7. SC−70−5/SC−88A/SOT−353 DFT1 Reel Configuration/Orientation

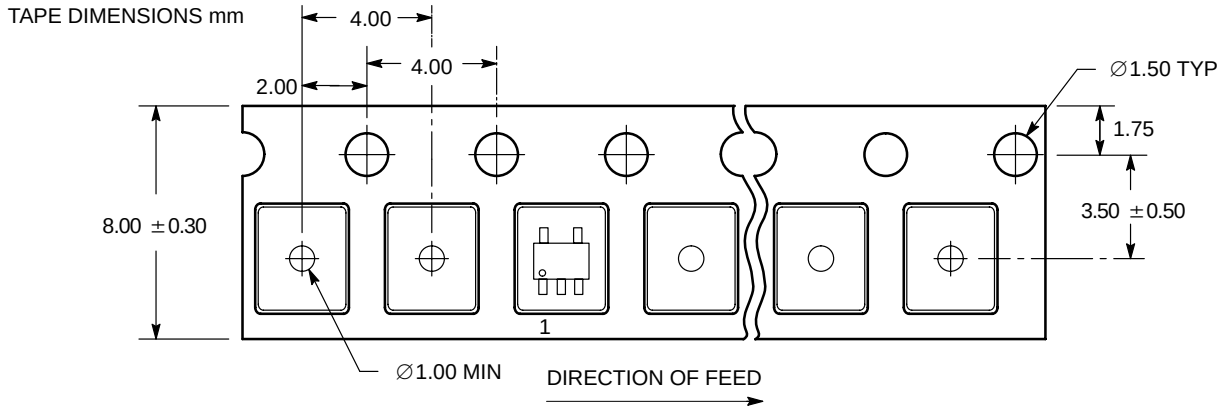


Figure 8. SC−70/SC−88A/SOT−353 DFT2 and SOT23−5/TSOP−5/SC59−5 DTT1 Reel Configuration/Orientation

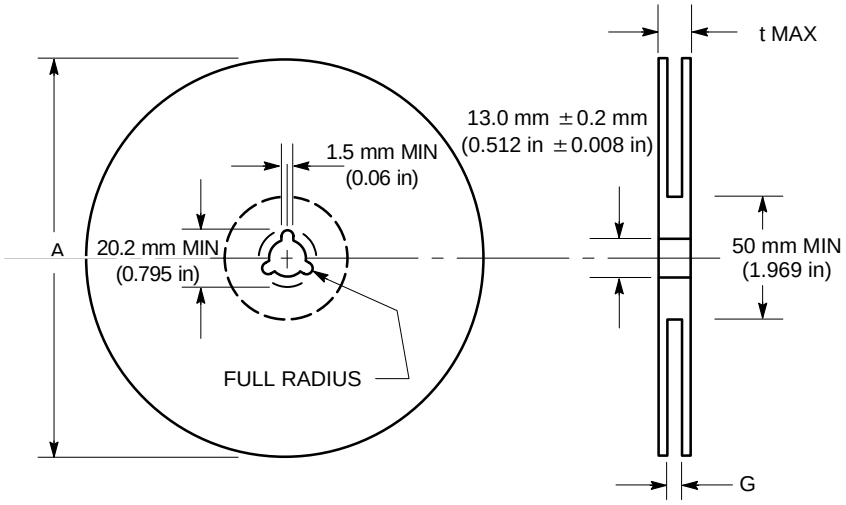


Figure 9. Reel Dimensions

REEL DIMENSIONS

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

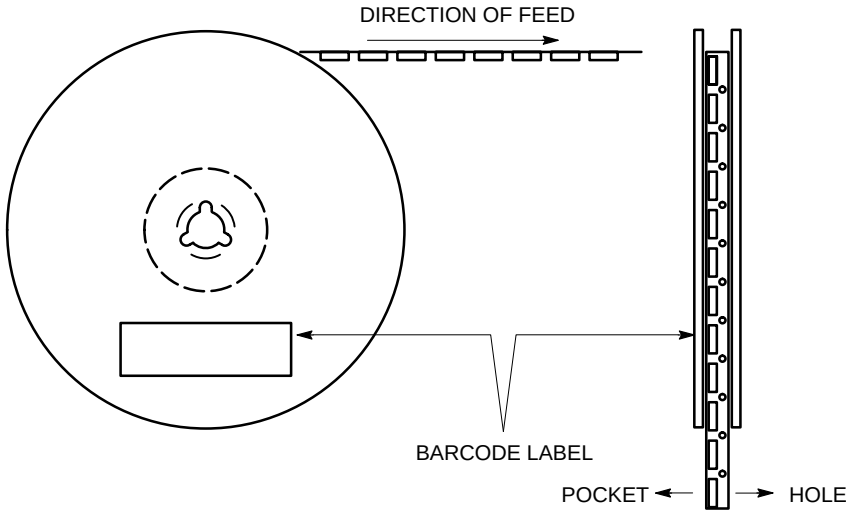
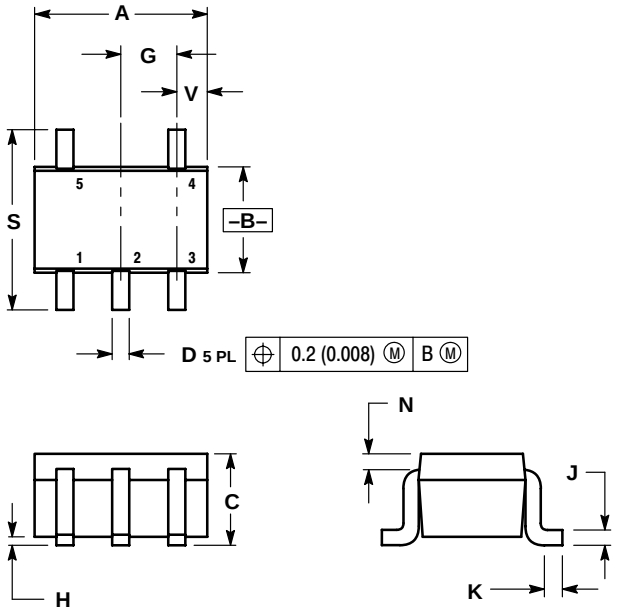


Figure 10. Reel Winding Direction

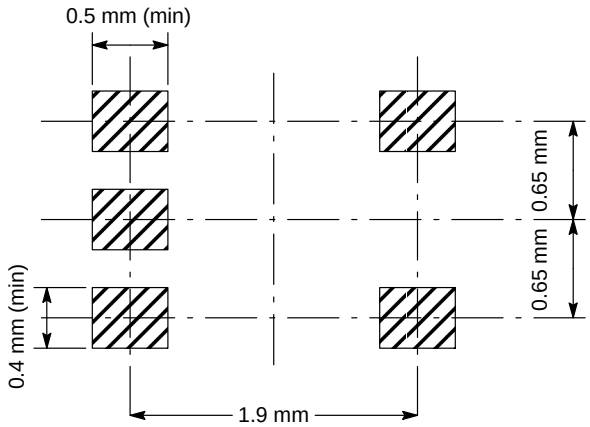
PACKAGE DIMENSIONS

SC70–5/SC–88A/SOT–353
DF SUFFIX
5–LEAD PACKAGE
CASE 419A–01
ISSUE E



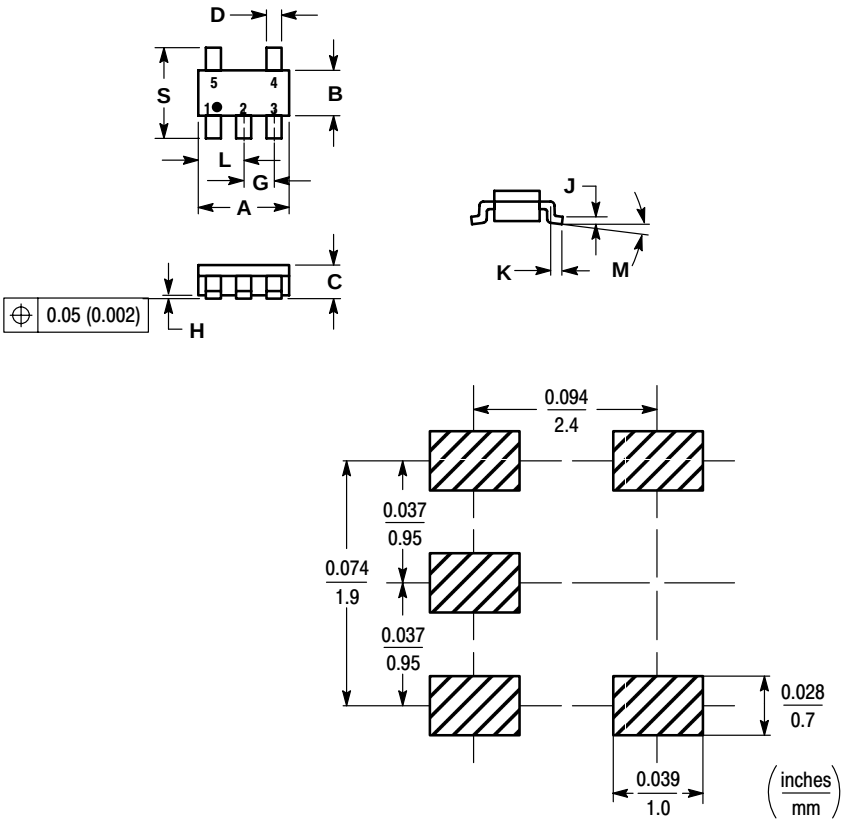
NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.

	INCHES		MILLIMETERS	
DIM	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
V	0.012	0.016	0.30	0.40



PACKAGE DIMENSIONS

SOT23–5/TSOP–5/SC59–5
DT SUFFIX
5–LEAD PACKAGE
CASE 483–01
ISSUE A



NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	2.90	3.10	0.1142	0.1220
B	1.30	1.70	0.0512	0.0669
C	0.90	1.10	0.0354	0.0433
D	0.25	0.50	0.0098	0.0197
G	0.85	1.00	0.0335	0.0413
H	0.013	0.100	0.0005	0.0040
J	0.10	0.26	0.0040	0.0102
K	0.20	0.60	0.0079	0.0236
L	1.25	1.55	0.0493	0.0610
M	0°	10°	0°	10°
S	2.50	3.00	0.0985	0.1181

PUBLICATION ORDERING INFORMATION

Literature Fulfillment:
Literature Distribution Center for ON Semiconductor
P.O. Box 5163, Denver, Colorado 80217 USA
Phone: 303–675–2175 or 800–344–3860 Toll Free USA/Canada
Fax: 303–675–2176 or 800–344–3867 Toll Free USA/Canada
Email: ONlit@hibbertco.com

N. American Technical Support: 800–282–9855 Toll Free USA/Canada

JAPAN: ON Semiconductor, Japan Customer Focus Center
4–32–1 Nishi–Gotanda, Shinagawa–ku, Tokyo, Japan 141–0031
Phone: 81–3–5740–2700
Email: r14525@onsemi.com

ON Semiconductor Website: http://onsemi.com

For additional information, please contact your local Sales Representative.