NL27WZ14

Dual Schmitt-Trigger Inverter

The NL27WZ14 is a high performance dual inverter with Schmitt- Trigger inputs operating from a 1.65 to 5.5 V supply.

Pin configuration and function are the same as the NL27WZ04, but the inputs have hysteresis and, with its Schmitt trigger function, the NL27WZ14 can be used as a line receiver which will receive slow input signals. The NL27WZ14 is capable of transforming slowly changing input signals into sharply defined, jitter- free output signals. In addition, it has a greater noise margin than conventional inverters. The NL27WZ14 has hysteresis between the positive- going and the negative- going input thresholds (typically 1.0 V) which is determined internally by transistor ratios and is essentially insensitive to temperature and supply voltage variations.

- Designed for 1.65 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
- LVCMOS Compatible
- 24 mA Balanced Output Sink and Source Capability
- Near Zero Static Supply Current Substantially Reduces System Power Requirements
- Current Drive Capability is 24 mA at the Outputs
- Chip Complexity: FET = 72

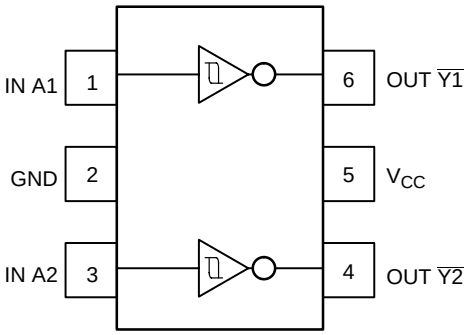

Figure 1. Pinout (Top View)

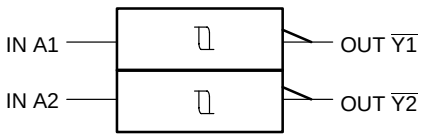

Figure 2. Logic Symbol

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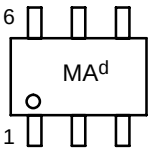
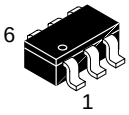
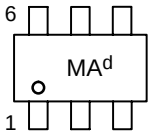
MARKING DIAGRAMS

SC-88/SOT-363/SC70-6
DF SUFFIX
CASE 419B





TSOP-6/SOT-23-6/SC59-6
DT SUFFIX
CASE 318G



MA = Device Marking
d = Date Code

PIN ASSIGNMENT

Pin	Function
1	IN A1
2	GND
3	IN A2
4	OUT $\overline{Y2}$
5	V_{CC}
6	OUT $\overline{Y1}$

FUNCTION TABLE

A Input	$\overline{Y}$ Output
L	H
H	L

ORDERING INFORMATION

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

MAXIMUM RATINGS

Symbol	Characteristics		Value	Unit
V_{CC}	DC Supply Voltage		−0.5 to +7.0	V
V_I	DC Input Voltage		$-0.5 \le V_I \le +7.0$	V
V_O	DC Output Voltage	Output in Z or LOW State (Note 1)	$-0.5 \le V_O \le 7.0$	V
I_{IK}	DC Input Diode Current	V_I < GND	−50	mA
I_{OK}	DC Output Diode Current	V_O < GND	−50	mA
I_O	DC Output Sink Current		±50	mA
I_{CC}	DC Supply Current per Supply Pin		±100	mA
I_{GND}	DC Ground Current per Ground Pin		±100	mA
T_{STG}	Storage Temperature Range		−65 to +150	°C
P_D	Power Dissipation in Still Air	SC-88, TSOP-6	200	mW
θ_{JA}	Thermal Resistance	SC- 88, TSOP- 6	333	°C/W
T_L	Lead Temperature, 1 mm from case for 10 s		260	°C
T_J	Junction Temperature under Bias		+150	°C
V_{ESD}	ESD Withstand Voltage	Human Body Model (Note 2) Machine Model (Note 3) Charged Device Model (Note 4)	> 2000 > 200 N/A	V

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. I_O absolute maximum rating must be observed.
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_{CC}	Supply Voltage	Operating Data Retention Only	2.3 1.5	5.5 5.5	V
V_I	Input Voltage		0	5.5	V
V_O	Output Voltage	(High or LOW State)	0	5.5	V
T_A	Operating Free-Air Temperature		−55	+125	°C
$\Delta t/\Delta V$	Input Transition Rise or Fall Rate	V_{CC} = 2.5 V ±0.2 V V_{CC} =3.0 V ±0.3 V V_{CC} =5.0 V ±0.5 V	0 0 0	No Limit No Limit No Limit	ns/V

DC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Condition	V_{CC} (V)	T_A = 25°C Min	T_A = 25°C Typ	T_A = 25°C Max	−40°C ≤ T_A ≤ 85°C Min	−40°C ≤ T_A ≤ 85°C Max	−55°C ≤ T_A ≤ 125°C Min	−55°C ≤ T_A ≤ 125°C Max	Unit
V_T+	Positive Input Threshold Voltage		2.3 2.7 3.0 4.5 5.5	1.0 1.2 1.3 1.9 2.2	1.5 1.7 1.9 2.7 3.3	1.8 2.0 2.2 3.1 3.6	1.0 1.2 1.3 1.9 2.2	1.8 2.0 2.2 3.1 3.6	1.0 1.2 1.3 1.9 2.2	1.8 2.0 2.2 3.1 3.6	V
V_T-	Negative Input Threshold Voltage		2.3 2.7 3.0 4.5 5.5	0.4 0.5 0.6 1.0 1.2	0.75 0.87 1.0 1.5 1.9	1.15 1.4 1.5 2.0 2.3	0.4 0.5 0.6 1.0 1.2	1.15 1.4 1.5 2.0 2.3	0.4 0.5 0.6 1.0 1.2	1.15 1.4 1.5 2.0 2.3	V
V_H	Input Hysteresis Voltage		2.3 2.7 3.0 4.5 5.5	0.25 0.3 0.4 0.6 0.7	0.75 0.83 0.93 1.2 1.4	1.1 1.15 1.2 1.5 1.7	0.25 0.3 0.4 0.6 0.7	1.1 1.15 1.2 1.5 1.7	0.25 0.3 0.4 0.6 0.7	1.1 1.15 1.2 1.5 1.7	V
V_{OH}	High- Level Output Voltage V_{IN} = V_{IH} or V_{IL}	I_{OH} = -100 μA I_{OH} = −3 mA I_{OH} = −8 mA I_{OH} = −12 mA I_{OH} = −16 mA I_{OH} = −24 mA I_{OH} = −32 mA	1.65 to 5.5 1.65 2.3 2.7 3.0 3.0 4.5	V_{CC} - 0.1 1.29 1.9 2.2 2.4 2.3 3.8	V_{CC} 1.52 2.1 2.4 2.7 2.5 4.0		V_{CC} - 0.1 1.29 1.9 2.2 2.4 2.3 3.8		V_{CC} - 0.1 1.29 1.8 2.1 2.3 2.2 3.7		V
V_{OL}	Low- Level Output Voltage V_{IN} = V_{IH} or V_{IL}	I_{OL} = 100 μA I_{OL} = 4 mA I_{OL} = 8 mA I_{OL} = 12 mA I_{OL} = 16 mA I_{OL} = 24 mA I_{OL} = 32 mA	1.65 to 5.5 1.65 2.3 2.7 3.0 3.0 4.5		0.08 0.2 0.22 0.28 0.38 0.42	0.1 0.24 0.3 0.4 0.4 0.55 0.55		0.1 0.24 0.3 0.4 0.4 0.55 0.55		0.1 0.24 0.4 0.5 0.5 0.55 0.65	V
I_{IN}	Input Leakage Current	V_{IN} = V_{CC} or GND	0 to 5.5			±0.1		±1.0		±1.0	μA
I_{OFF}	Power Off- Output Leakage Current	V_{OUT} = 5.5 V	0			1		10		10	μA
I_{CC}	Quiescent Supply Current	V_{IN} = V_{CC} or GND	5.5			1		10		10	μA

AC ELECTRICAL CHARACTERISTICS (Input t_r = t_f = 3.0 ns)

Symbol	Parameter	Condition	V_{CC} (V)	T_A = 25°C Min	T_A = 25°C Typ	T_A = 25°C Max	−40°C ≤ T_A ≤ 85°C Min	−40°C ≤ T_A ≤ 85°C Max	−55°C ≤ T_A ≤ 125°C Min	−55°C ≤ T_A ≤ 125°C Max	Unit
t_{PLH} t_{PHL}	Propagation Delay Input A to Y (Figure 3 and 4)	R_L = 1 MΩ, C_L = 15 pF	2.5 ± 0.2	1.8	4.3	7.4	1.8	8.1	1.8	9.1	ns
		R_L = 1 MΩ, C_L = 15 pF R_L = 500 Ω, C_L = 50 pF	3.3 ± 0.3	1.5 1.8	3.3 4.0	5.0 6.0	1.5 1.8	5.5 6.6	1.5 1.8	6.5 7.6	
		R_L = 1 MΩ, C_L = 15 pF R_L = 500 Ω, C_L = 50 pF	5.0 ± 0.5	1.0 1.2	2.7 3.2	4.1 4.9	1.0 1.2	4.5 5.4	1.0 1.2	5.5 6.4	

CAPACITIVE CHARACTERISTICS

Symbol	Parameter	Condition	Typical	Unit
C_{IN}	Input Capacitance	V_{CC} =5.5 V, V_I = 0 V or V_{CC}	2.5	pF
C_{PD}	Power Dissipation Capacitance (Note 5)	10 MHz, V_{CC} = 3.3 V, V_I = 0 V or V_{CC} 10 MHz, V_{CC} = 5.0 V, V_I = 0 V or V_{CC}	11 12.5	pF

5. 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; $P_D = C_{PD} \bullet V_{CC}^2 \bullet f_{in} + I_{CC} \bullet V_{CC}$.

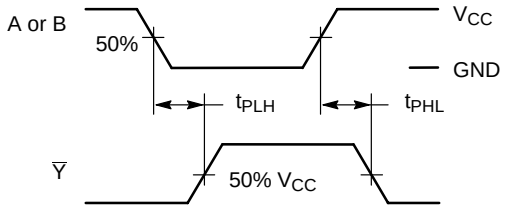
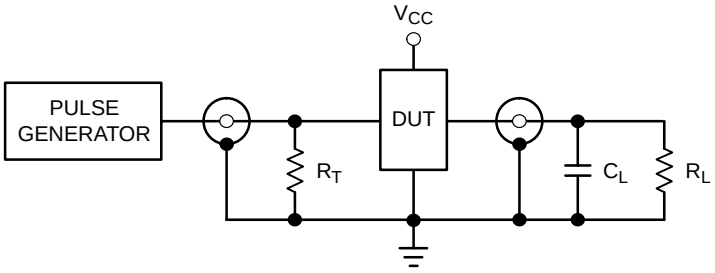


Figure 3. Switching Waveforms



$R_T = C_L$ or equivalent (includes jog and probe capacitance)
$R_T = Z_{OUT}$ of pulse generator (typically 50 Ω)

Figure 4. Test Circuit

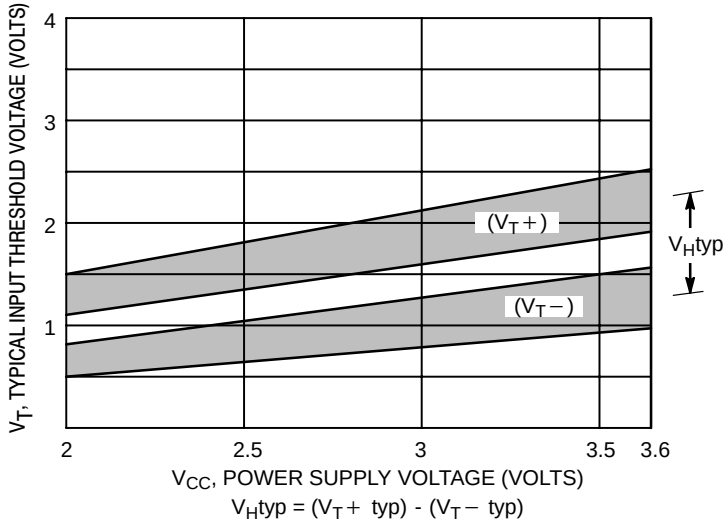
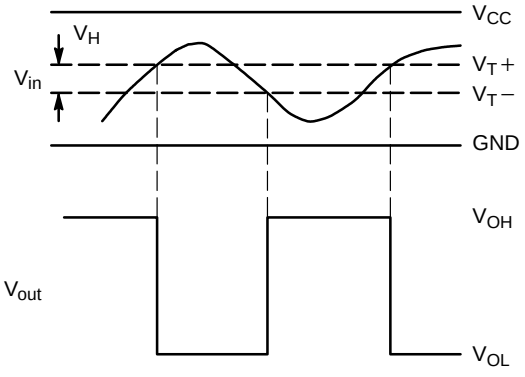
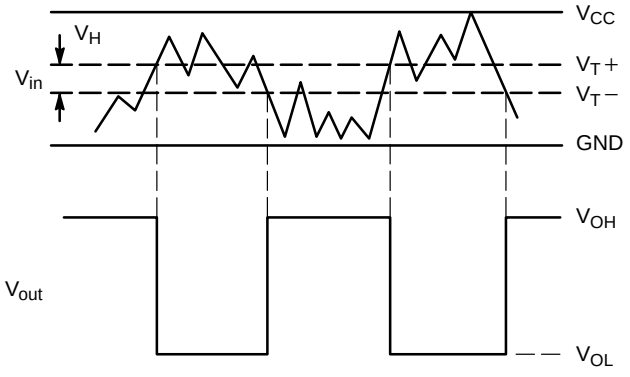


Figure 5. Typical Input Threshold, V_T+, V_T- versus Power Supply Voltage



(a) A Schmitt-Trigger Squares Up Inputs With Slow Rise and Fall Times



(b) A Schmitt-Trigger Offers Maximum Noise Immunity

Figure 6. Typical Schmitt-Trigger Applications

DEVICE ORDERING INFORMATION

Device Order Number	Device Nomenclature							Package Type (Name/SOT#/ Common Name)	Tape and Reel Size
	Circuit Indicator	No. of Gates per Package	Temp Range Identifier	Technology	Device Function	Package Suffix	Tape & Reel Suffix		
NL27WZ14DFT2	NL	2	7	WZ	14	DF	T2	SC-88/SOT-363 /SC70-6	178 mm 3000 Units
NL27WZ14DTT1	NL	2	7	WZ	14	DT	T1	TSOP-6/SOT-23-6 /SC59-6	178 mm 3000 Units

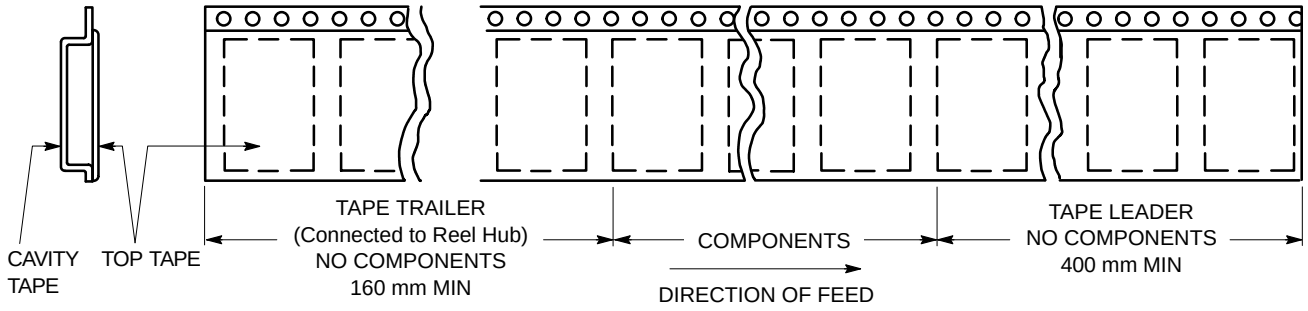


Figure 7. Tape Ends for Finished Goods

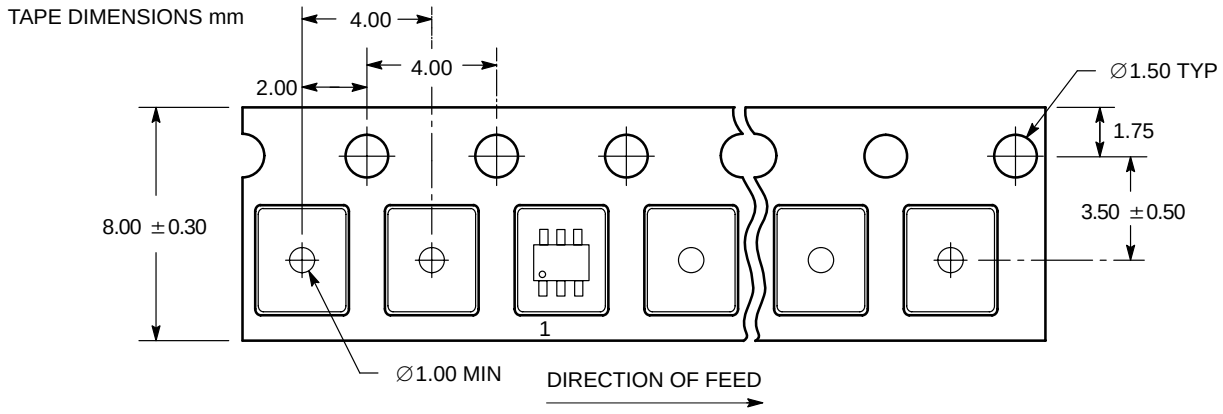


Figure 8. SC70-6/SC-88/SOT-363 DFT2 and SOT23-6/TSOP-6/SC59-6 DTT1 Reel Configuration/Orientation

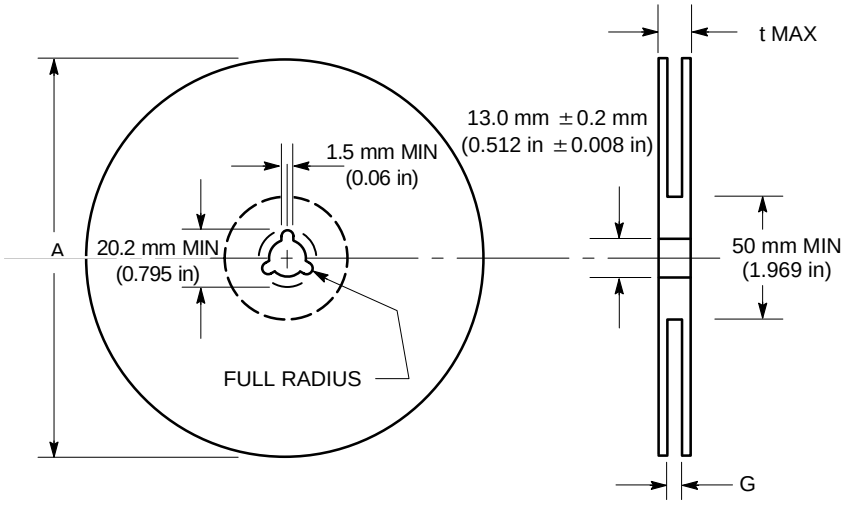


Figure 9. Reel Dimensions

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)

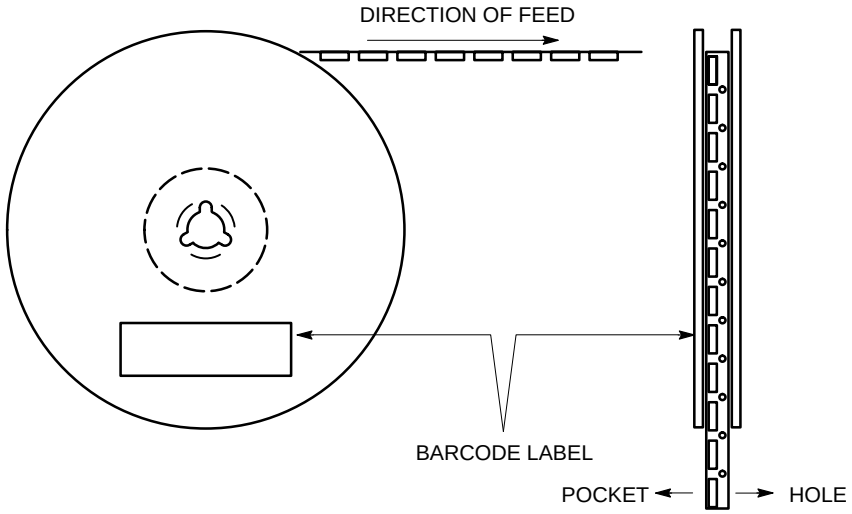
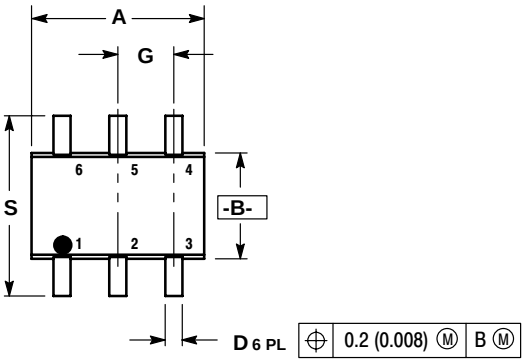
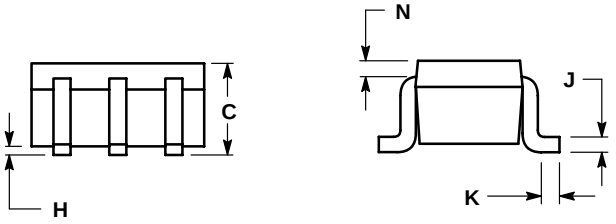


Figure 10. Reel Winding Direction

PACKAGE DIMENSIONS

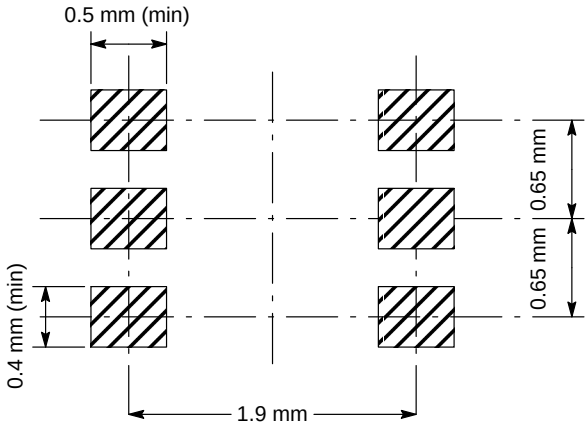
SC70-6/SC-88/SOT-363
DF SUFFIX
CASE 419B-02
ISSUE P





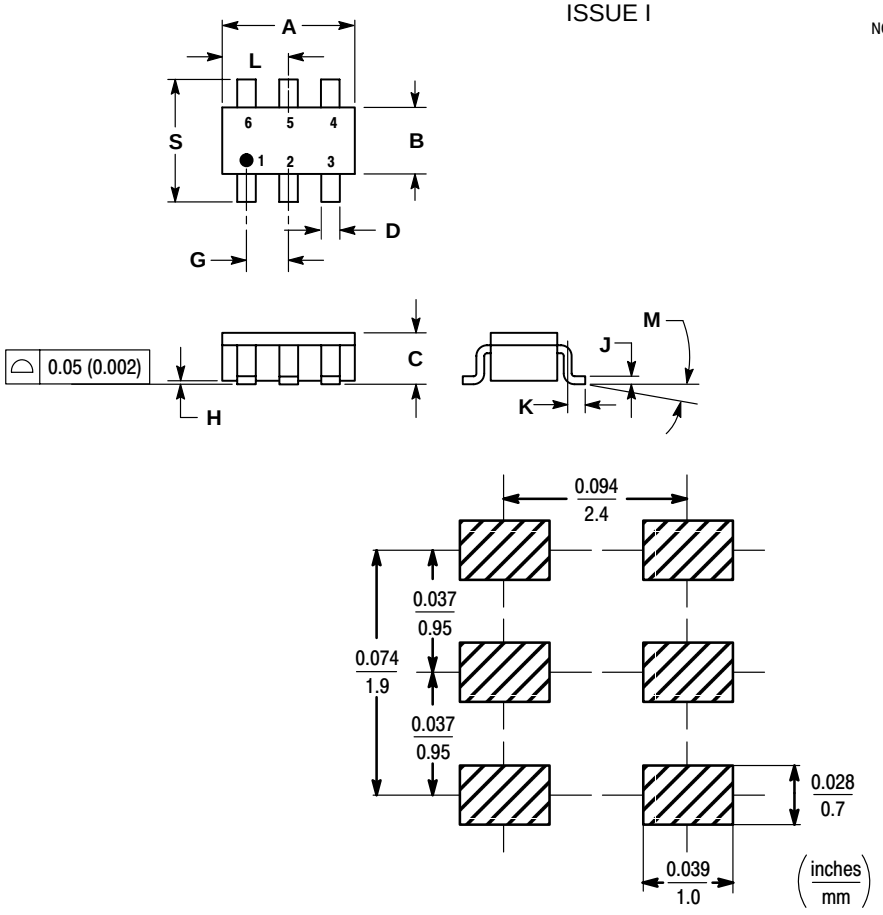
NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. 419B-01 OBSOLETE, NEW STANDARD 419B-02.

	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



PACKAGE DIMENSIONS

SOT23-6/TSOP-6/SC59-6
DT SUFFIX
CASE 318G-02
ISSUE I



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.
4. DIMENSIONS A AND B DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.

	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	1.05	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

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2-9-1 Kamimeguro, Meguro-ku, Tokyo, Japan 153-0051
Phone: 81-3-5773-3850

ON Semiconductor Website: http://onsemi.com

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