

NL27WZU04

Dual Unbuffered Inverter

The NL27WZU04 is a high performance dual unbuffered inverter operating from a 1.65 to 5.5 V supply. These devices are well suited for use as oscillators, pulse shapers, and in many other applications requiring a high-input impedance amplifier. For digital applications, the NL27WZ04 is recommended.

- Designed for 1.65 V to 5.5 V V_{CC} Operation
- Unbuffered for Crystal Oscillator and Analog Applications
- LVC MOS Compatible
- Source/Sink ± 16 mA @ 4.5 V V_{CC}
- Near Zero Static Supply Current Substantially Reduces System Power Requirements
- Chip Complexity: FET = 72; Equivalent Gate = 18

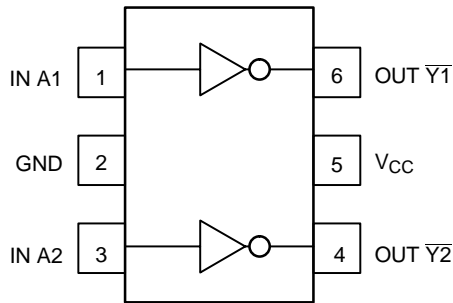


Figure 1. Pinout (Top View)

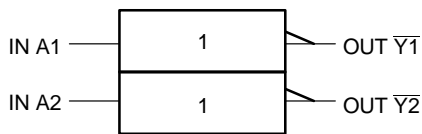


Figure 2. Logic Symbol

FUNCTION TABLE

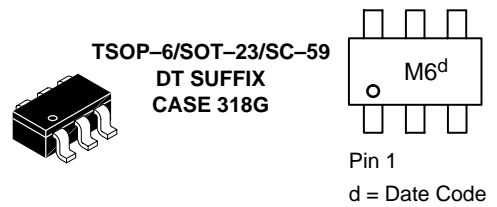
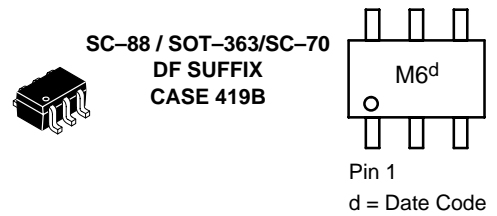
A Input	\bar{Y} Output
L	H
H	L



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MARKING DIAGRAMS



ORDERING INFORMATION

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

PIN ASSIGNMENT

1	IN A1
2	GND
3	IN A2
4	OUT \bar{Y}_2
5	V_{CC}
6	OUT \bar{Y}_1

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MAXIMUM RATINGS (Note 1)

Symbol	Characteristics	Value	Unit
V _{CC}	DC Supply Voltage	-0.5 to +7.0	V
V _I	DC Input Voltage	-0.5 ≤ V _I ≤ V _{CC}	V
V _O	DC Output Voltage	-0.5 to 7.0	V
I _{IK}	DC Input Diode Current V _I < GND	-50	mA
I _{OK}	DC Output Diode Current V _O < GND V _O > V _{CC}	-50 +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
I _{Latch-Up}	Latch-Up Performance Above V _{CC} and Below GND at 85°C (Note 5)	±500	mA

1. Absolute maximum continuous 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.
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}	Supply Voltage Operating Data Retention Only	1.65 1.5	5.5 5.5	V
V _I	Input Voltage	0	5.5	V
V _O	Output Voltage (High or LOW State)	0	V _{CC}	V
T _A	Operating Free-Air Temperature	-40	+85	°C
Δt/ΔV	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	20 10 5	ns/V

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DC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Condition	V _{CC} (V)	T _A = 25°C			-40°C ≤ T _A ≤ 85°C		Unit
				Min	Typ	Max	Min	Max	
V _{IH}	High-Level Input Voltage		1.65 to 1.85	0.85 V _{CC}			0.85 V _{CC}		V
			2.3 to 5.5	0.8 V _{CC}			0.8 V _{CC}		
V _{IL}	Low-Level Input Voltage		1.65 to 1.85			0.15 V _{CC}		0.15 V _{CC}	V
			2.3 to 5.5			0.2 V _{CC}		0.2 V _{CC}	
V _{OH}	High-Level Output Voltage V _{IN} = V _{IL}	I _{OH} = -100 μA	1.65 to 5.5	V _{CC} -0.1			V _{CC} -0.1		V
		V _{IN} = GND	I _{OH} = -3 mA	1.65	1.29	1.52		1.29	
	I _{OH} = -4 mA		2.3	1.9	2.1		1.9		
	I _{OH} = -6 mA		2.7	2.2	2.3		2.2		
	I _{OH} = -8 mA		3.0	2.4	2.6		2.4		
	I _{OH} = -12 mA		3.0	2.3	2.5		2.3		
	I _{OH} = -16 mA	4.5	3.8	4.2		3.8			
V _{OL}	Low-Level Output Voltage V _{IN} = V _{IH}	I _{OL} = 100 μA	1.65 to 5.5			0.1		0.1	V
		V _{IN} = V _{CC}	I _{OL} = 3 mA	1.65		0.08	0.24		
	I _{OL} = 4 mA		2.3		0.12	0.3		0.3	
	I _{OL} = 6 mA		2.7		0.20	0.4		0.4	
	I _{OL} = 8 mA		3.0		0.24	0.4		0.4	
	I _{OL} = 12 mA		3.0		0.26	0.55		0.55	
	I _{OL} = 16 mA	4.5		0.31	0.55		0.55		
I _{IN}	Input Leakage Current	V _{IN} = V _{CC} or GND	5.5			±0.1		±1.0	μA
I _{CC}	Maximum Quiescent Supply Current	V _{IN} = V _{CC} or GND	1.65 to 5.5			1.0		10	μA

AC ELECTRICAL CHARACTERISTICS t_R = t_F = 2.5 ns; C_L = 50 pF; R_L = 500 Ω

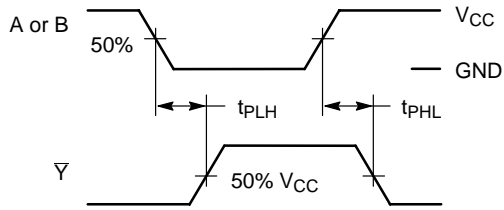
Symbol	Parameter	Condition	V _{CC} (V)	T _A = 25°C			-40°C ≤ T _A ≤ 85°C		Unit
				Min	Typ	Max	Min	Max	
t _{PLH} t _{PHL}	Propagation Delay Input A to Y (Figure 3 and 4)	R _L = 1 MΩ, C _L = 50 pF	1.8 ± 0.15	1.5	5.5	1.8	1.5	11.0	ns
		R _L = 1 MΩ, C _L = 15 pF	2.5 ± 0.2	1.2	3.3	5.7	1.2	6.3	
		R _L = 1 MΩ, C _L = 15 pF	3.3 ± 0.3	0.8	2.7	4.1	0.8	4.5	
		R _L = 500 Ω, C _L = 50 pF		1.2	4.0	6.4	1.2	7.0	
		R _L = 1 MΩ, C _L = 15 pF	5.0 ± 0.5	0.5	2.2	3.3	0.5	3.6	
		R _L = 500 Ω, C _L = 50 pF		0.8	3.4	5.6	0.8	6.2	

CAPACITIVE CHARACTERISTICS

Symbol	Parameter	Condition	Typical	Unit
C _{IN}	Input Capacitance	V _{CC} = 5.5 V, V _I = 0 V or V _{CC}	7	pF
C _{OUT}	Output Capacitance	V _{CC} = 5.5 V, V _I = 0 V or V _{CC}	8	pF
C _{PD}	Power Dissipation Capacitance (Note 6)	10 MHz, V _{CC} = 5.5 V, V _I = 0 V or V _{CC}	25	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} • V_{CC} • f_{in} + I_{CC}. C_{PD} is used to determine the no-load dynamic power consumption; P_D = C_{PD} • V_{CC}² • f_{in} + I_{CC} • V_{CC}.

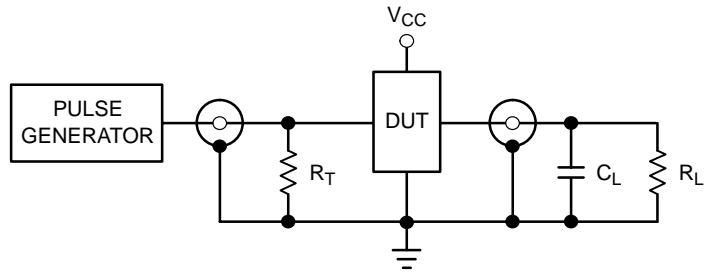
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PROPAGATION DELAYS

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

Figure 3. Switching Waveforms



$C_L = 50 \text{ pF}$ or equivalent (includes jig and probe capacitance)
 $R_L = R_1 = 500 \Omega$ or equivalent
 $R_T = Z_{OUT}$ of pulse generator (typically 50Ω)

Figure 4. Test Circuit

DEVICE ORDERING INFORMATION

Device Order Number	Device Nomenclature							Package Type (Name/SOT# / Common Name)	Tape and Reel Size
	Logic Circuit Indicator	No. of Gates per Package	Temp Range Identifier	Technology	Device Function	Package Suffix	Tape & Reel Suffix		
NL27WZU04DFT2	NL	2	7	WZ	U04	DF	T2	SC-88 / SOT-363 / SC-70	178 mm (7") 3000 Unit
NL27WZU04DTT1	NL	2	7	WZ	U04	DT	T1	TSOP-6 / SOT-23 / SC-59	178 mm (7") 3000 Unit

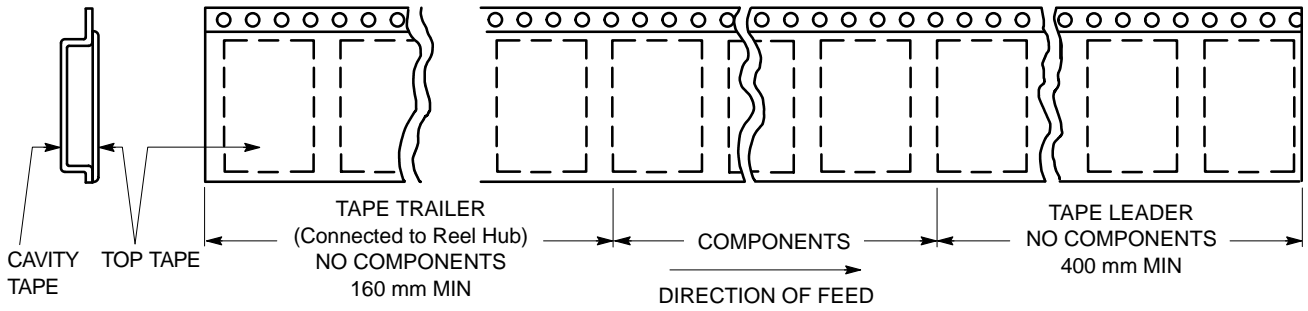


Figure 5. Tape Ends for Finished Goods

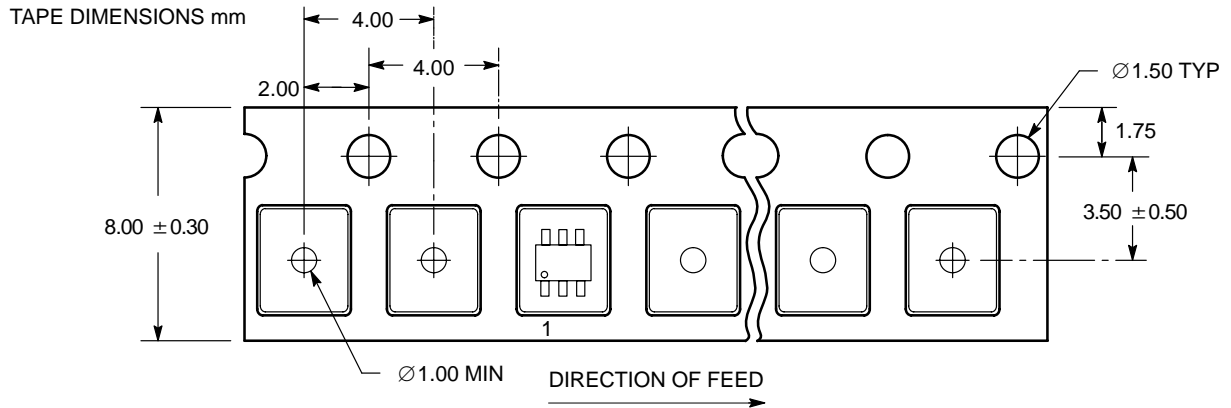


Figure 6. SC70-6/SC-88/SOT-363 DFT2 and SOT23-6/TSOP-6/SC59-6 DTT1 Reel Configuration/Orientation

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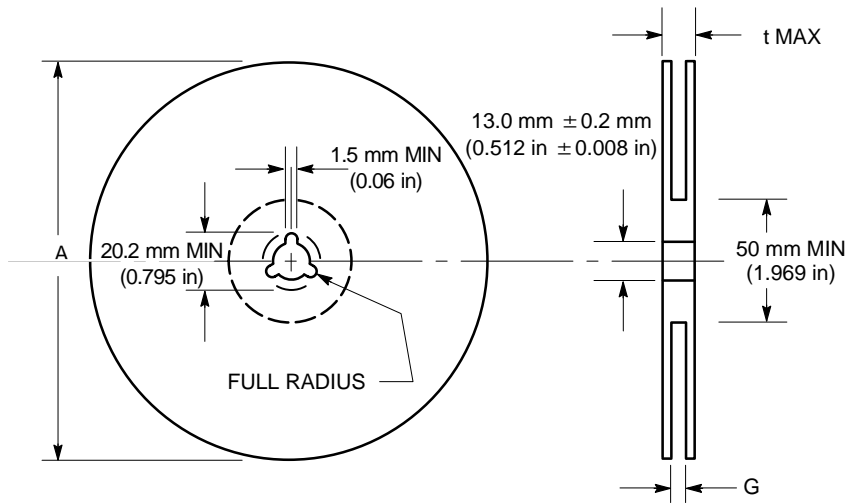


Figure 7. Reel Dimensions

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)

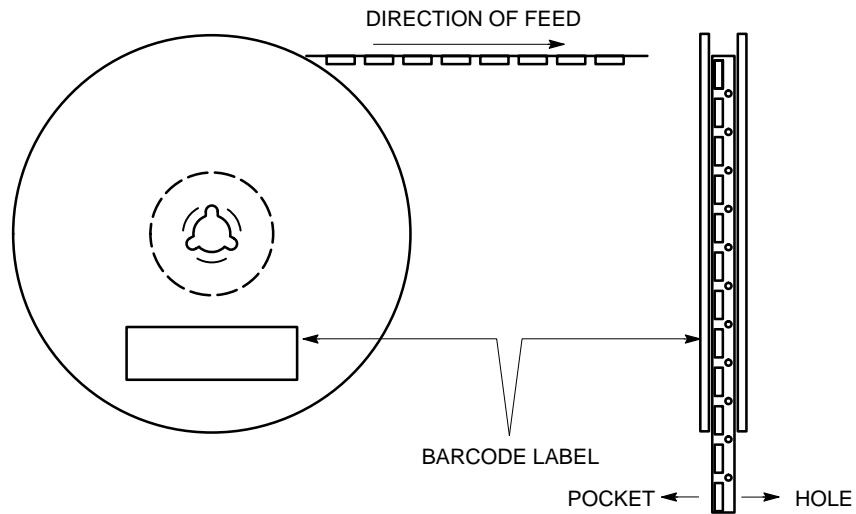
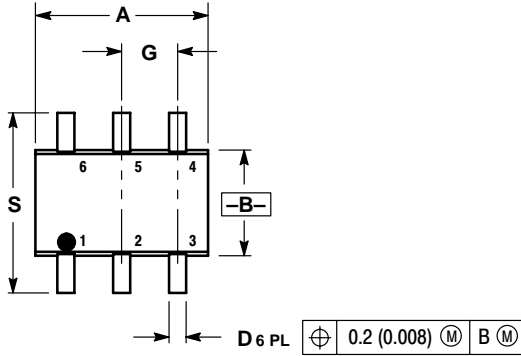


Figure 8. Reel Winding Direction

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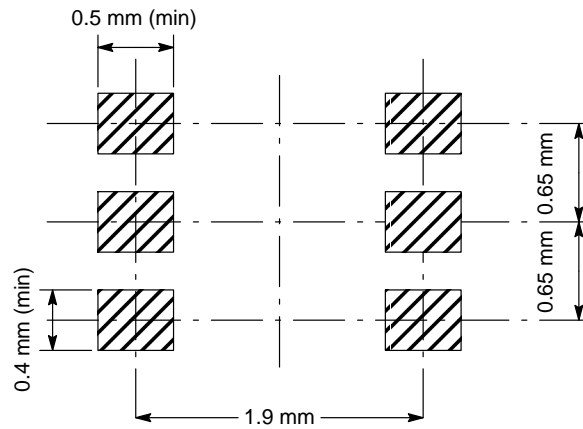
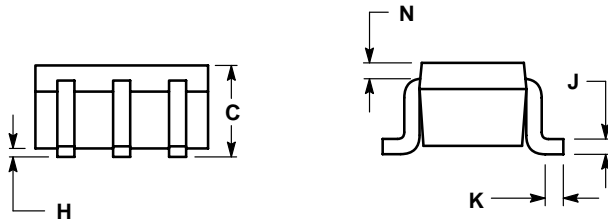
PACKAGE DIMENSIONS

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



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

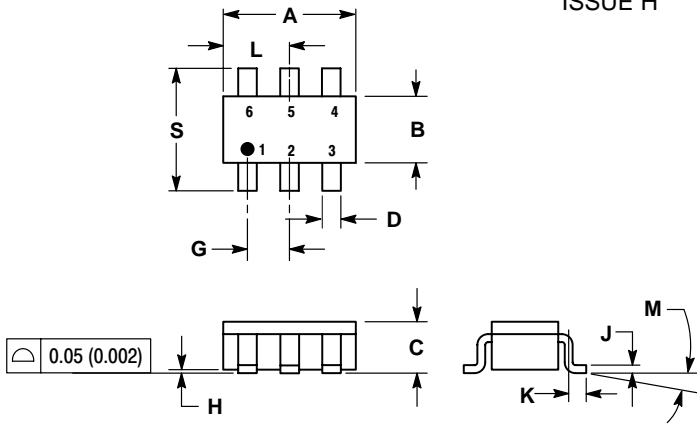
DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.071	0.087	1.80	2.20
B	0.045	0.053	1.15	1.35
C	0.031	0.043	0.80	1.10
D	0.004	0.012	0.10	0.30
G	0.026 BSC		0.65 BSC	
H	---	0.004	---	0.10
J	0.004	0.010	0.10	0.25
K	0.004	0.012	0.10	0.30
N	0.008 REF		0.20 REF	
S	0.079	0.087	2.00	2.20



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PACKAGE DIMENSIONS

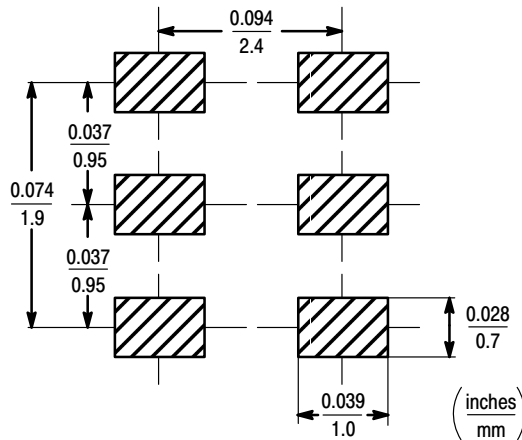
SOT23-6/TSOP-6/SC59-6
DT SUFFIX
CASE 318G-02
ISSUE H




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.

DIM	MILLIMETERS		INCHES	
	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



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