NL27WZ14

Product Preview

Dual Schmitt-Trigger Inverter

With 5 V–Tolerant Inputs

The NL27WZ14 is a high performance dual inverter with Schmitt–Trigger inputs operating from a 2.3 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 2.3 V to 5.5 V V_{CC} Operation
- 5 V Tolerant Inputs – Interface Capability With 5 V TTL Logic
- LVTTL Compatible
- LVCMOS Compatible
- 24 mA Balanced Output Sink and Source Capability
- Near Zero Static Supply Current (10 μA) Substantially Reduces System Power Requirements
- Current Drive Capability is 24 mA at the Outputs

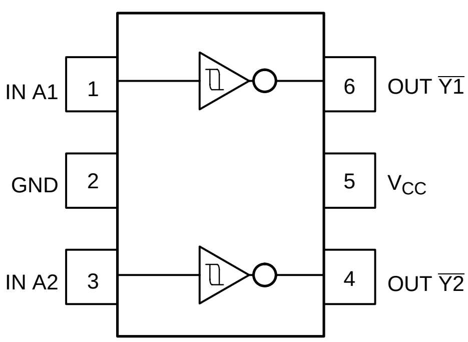

Figure 1. 6–Lead SOT–363 Pinout (Top View)

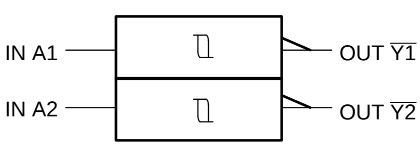

Figure 2. Logic Symbol

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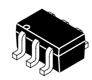
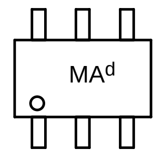
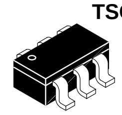
MARKING DIAGRAMS



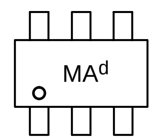
SC–88 / SOT–363/SC–70
DF SUFFIX
CASE 419B



Pin 1
d = Date Code



TSOP–6/SOT–23/SC–59
DT SUFFIX
CASE 318G



Pin 1
d = Date Code

PIN ASSIGNMENT

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 (Note 1.)

Symbol	Parameter	Condition	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 HIGH or LOW State.(Note 3.)	$-0.5 \le V_O \le V_{CC} + 0.5$	V
I_{IK}	DC Input Diode Current	V_I < GND	–50	mA
I_{OK}	DC Output Diode Current	V_O < GND	–50	mA
		V_O > V_{CC}	+50	mA
I_O	DC Output Source/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	per derating (Note 2.)	200	mW
V_{ESD}	ESD Withstand Voltage	Human Body Model (Note 4.) Machine Model (Note 5.) Charged Device Model (Note 6.)	> 2000 > 200 > 3000	V
$I_{Latch–Up}$	Latch–Up Performance	Above V_{CC} and Below GND at 85°C (Note 7.)	±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. Derating — SC–88 Package: –3 mW/°C from 65° to 125°C
   — TSOP–6 Package: –5 mW/°C from 65° to 125°C
3. I_O absolute maximum rating must be observed.
4. Tested to EIA/JESD22–A114–A
5. Tested to EIA/JESD22–A115–A
6. Tested to JESD22–C101–A
7. Tested to EIA/JESD78

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter		Min	Max	Unit
V_{CC}	Supply Voltage	Operating Data Retention Only	2.0 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
I_{OH}	HIGH Level Output Current	V_{CC} = 4.5 V – 5.5 V V_{CC} = 3.0 V – 3.6 V V_{CC} = 2.7 V – 3.0 V V_{CC} = 2.3 V – 2.7 V		– 32 – 24 – 12 – 8	mA
I_{OL}	LOW Level Output Current	V_{CC} = 4.5 V – 5.5 V V_{CC} = 3.0 V – 3.6 V V_{CC} = 2.7 V – 3.0 V V_{CC} = 2.3 V – 2.7 V		+ 32 + 24 + 12 + 8	mA
T_A	Operating Free–Air Temperature		–40	+85	°C

6The θ_{JA} of the package is equal to 1/Derating. Higher junction temperatures may affect the expected lifetime of the device per the table and figure below.

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

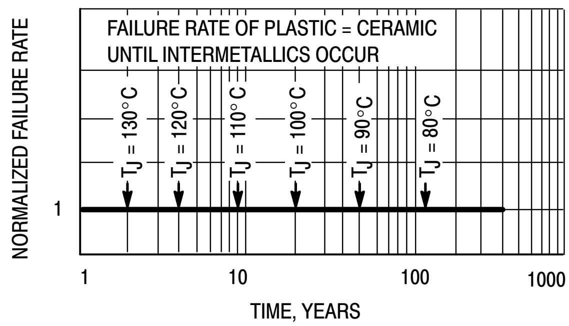


Figure 3. Failure Rate vs. Time Junction Temperature

DC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Condition	V_{CC} (V)	T_A = 25°C Min	T_A = 25°C Typ	T_A = 25°C Max	$T_A \leq$ 85°C Min	$T_A \leq$ 85°C Max	Unit
V_{T+}	Positive Input Threshold Voltage		2.3	1.0	TBD	1.8	1.0	1.8	V
			2.7	1.2	TBD	2.0	1.2	2.0	
			3.0	1.3	TBD	2.2	1.3	2.2	
			4.5	1.9	TBD	3.1	1.9	3.1	
			5.5	2.2	TBD	3.6	2.2	3.6	
V_{T-}	Negative Input Threshold Voltage		2.3	0.4	TBD	1.15	0.4	1.15	
			2.7	0.5	TBD	1.4	0.5	1.4	
			3.0	0.6	TBD	1.5	0.6	1.5	
			4.5	1.0	TBD	2.0	1.0	2.0	
			5.5	1.2	TBD	2.3	1.2	2.3	
V_H	Input Hysteresis Voltage		2.3	0.25	TBD	1.1	1.25	1.1	V
			2.7	0.3	TBD	1.15	0.3	1.15	
			3.0	0.4	TBD	1.2	0.4	1.2	
			4.5	0.6	TBD	1.5	0.6	1.5	
			5.5	0.7	TBD	1.7	0.7	1.7	
V_{OH}	Minimum High–Level Output Voltage $V_{IN} = V_{IH}$ or V_{IL}	I_{OH} = 100 µA	2.3 to 5.5	V_{CC} – 0.1	V_{CC}		V_{CC} – 0.1		V
		I_{OH} = –8 mA	2.3	1.9	TBD		1.9		
		I_{OH} = –12 mA	2.7	2.2	TBD		2.2		
		I_{OH} = –16 mA	3.0	2.4	TBD		2.4		
		I_{OH} = –24 mA	3.0	2.3	TBD		2.3		
		I_{OH} = –32 mA	4.5	3.8	TBD		3.8		
V_{OL}	Maximum Low–Level Output Voltage $V_{IN} = V_{IH}$ or V_{IL}	I_{OL} = 100 µA	2.3 to 5.5			0.1		0.1	V
		I_{OL} = 8 mA	2.3		TBD	0.3		0.3	
		I_{OL} = 12 mA	2.7		TBD	0.4		0.4	
		I_{OL} = 16 mA	3.0		TBD	0.4		0.4	
		I_{OL} = 24 mA	3.0		TBD	0.55		0.55	
		I_{OL} = 32 mA	4.5		TBD	0.55		0.55	
I_{IN}	Maximum Input Leakage Current	V_{IN} or V_{OUT} = V_{CC} or GND	0 to 5.5			±0.1		±0.1	µA
I_{OFF}	Maximum Off–State Leakage Current	V_{OUT} = 5.5 V	0			1		10	nA
I_{CC}	Maximum Quiescent Supply Current	V_{IN} = V_{CC} or GND	5.5			1		10	µA

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

Symbol	Parameter	Condition	V_{CC} (V)	T_A = 25°C Min	Typ	Max	$T_A \leq$ 85°C Min	Max	Unit
t_{PLH} t_{PHL}	Maximum Propagation Delay Input A to Y Figure 4. and 5.	R_L = 1 MΩ, C_L = 15 pF	2.5 ± 0.2	1.8	4.3	7.4	1.8	8.1	ns
		R_L = 1 MΩ, C_L = 15 pF	3.3 ± 0.3	1.5	3.3	5.0	1.5	5.5	
		R_L = 500 Ω, C_L = 50 pF		1.8	4.0	6.0	1.8	6.6	
		R_L = 1 MΩ, C_L = 15 pF	5.0 ± 0.5	1.0	2.7	4.1	1.0	4.5	
		R_L = 500 Ω, C_L = 50 pF		1.2	3.2	4.9	1.2	5.4	

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 8.)	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

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

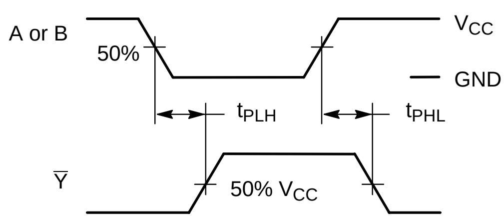
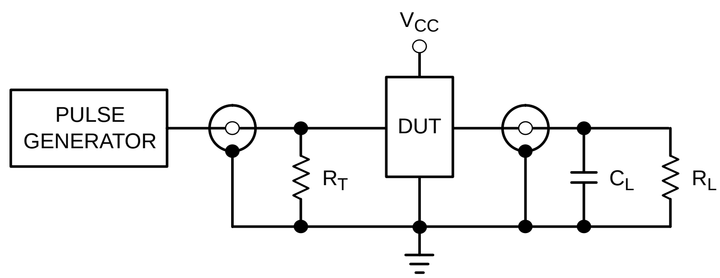


Figure 4. Switching Waveforms



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

Figure 5. Test Circuit

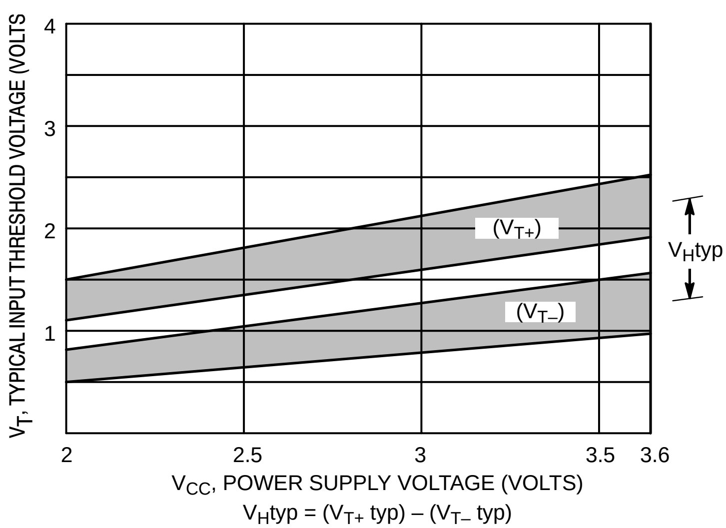


Figure 6. Typical Input Threshold, V_{T+}, V_{T-} versus Power Supply Voltage

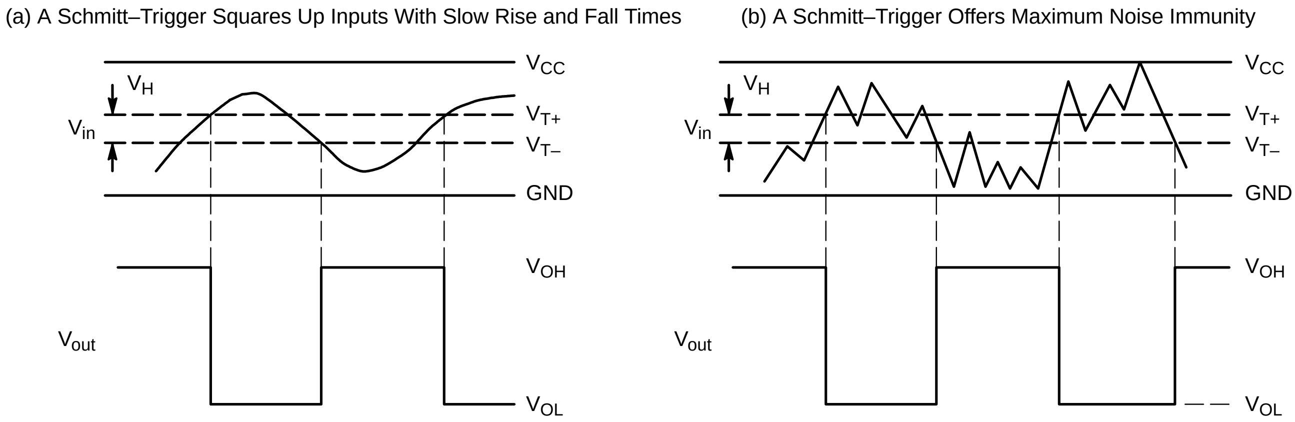


Figure 7. Typical Schmitt–Trigger Applications

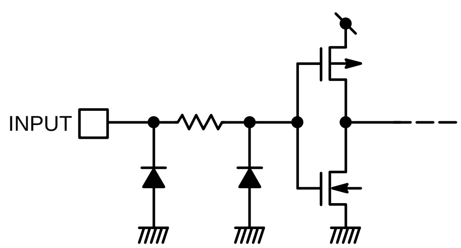


Figure 8. Input Equivalent Circuit

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 / SC–70	178 mm (7”) 3000 Unit
NL27WZ14DFT4	NL	2	7	WZ	14	DF	T4	SC–88 / SOT–363 / SC–70	330 mm (13”) 10000 Unit
NL27WZ14DTT1	NL	2	7	WZ	14	DT	T1	TSOP–6 / SOT–23 / SC–59	178 mm (7”) 3000 Unit
NL27WZ14DTT3	NL	2	7	WZ	14	DT	T3	TSOP–6 / SOT–23 / SC–59	330 mm (13”) 10000 Unit

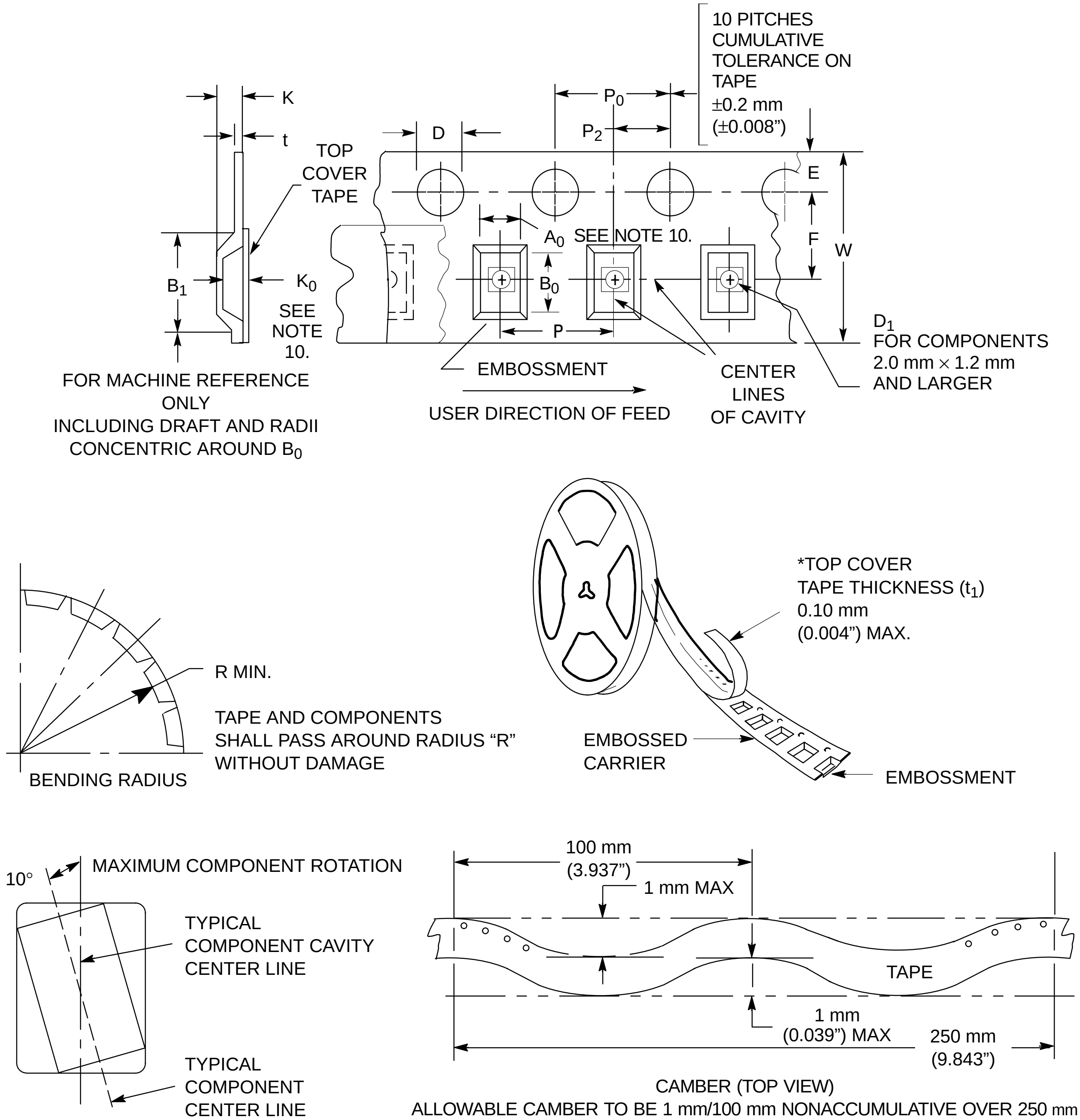


Figure 9. Carrier Tape Specifications

EMBOSSED CARRIER DIMENSIONS (See Notes 9. and 10.)

Tape Size	B_1 Max	D	D_1	E	F	K	P	P_0	P_2	R	T	W
8 mm	4.35 mm (0.171")	1.5 +0.1/ –0.0 mm (0.059 +0.004/ –0.0")	1.0 mm Min (0.039")	1.75 ±0.1 mm (0.069 ±0.004")	3.5 ±0.5 mm (1.38 ±0.002")	2.4 mm (0.094")	4.0 ±0.10 mm (0.157 ±0.004")	4.0 ±0.1 mm (0.156 ±0.004")	2.0 ±0.1 mm (0.079 ±0.002")	25 mm (0.98")	0.3 ±0.05 mm (0.01 +0.0038/ –0.0002")	8.0 ±0.3 mm (0.315 ±0.012")

9. Metric Dimensions Govern–English are in parentheses for reference only.
10. A_0, B_0, and K_0 are determined by component size. The clearance between the components and the cavity must be within 0.05 mm min to 0.50 mm max. The component cannot rotate more than 10° within the determined cavity

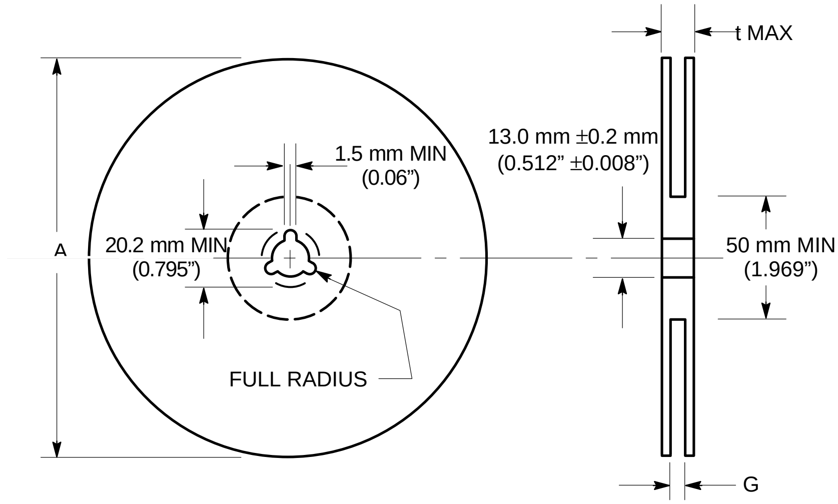


Figure 10. Reel Dimensions

REEL DIMENSIONS

Tape Size	T&R Suffix	A Max	G	t Max
8 mm	T1, T2	178 mm (7")	8.4 mm, +1.5 mm, –0.0 (0.33" + 0.059", –0.00)	14.4 mm (0.56")
8 mm	T3, T4	330 mm (13")	8.4 mm, +1.5 mm, –0.0 (0.33" + 0.059", –0.00)	14.4 mm (0.56")

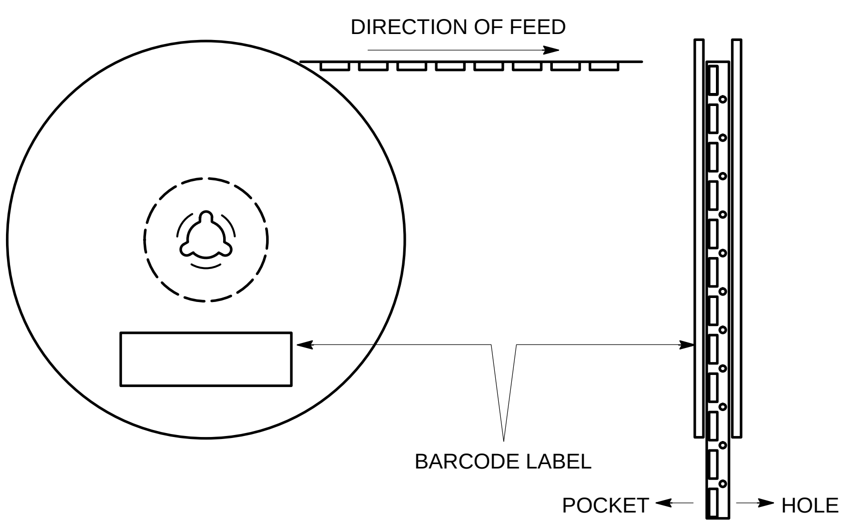


Figure 11. Reel Winding Direction

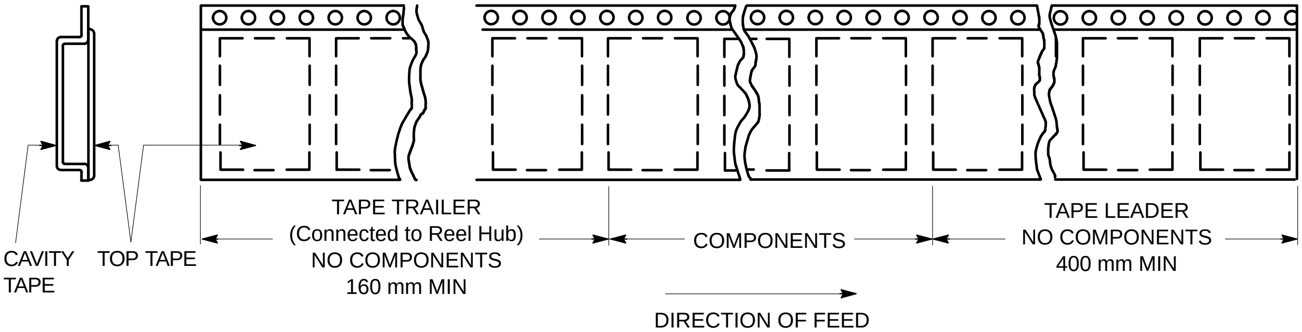


Figure 12. Tape Ends for Finished Goods

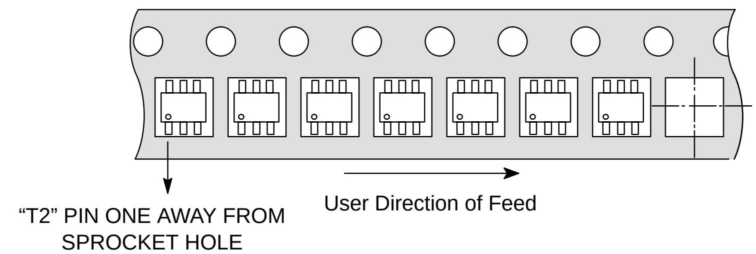


Figure 13. DFT2 and DFT4 (SC88) Reel Configuration/Orientation

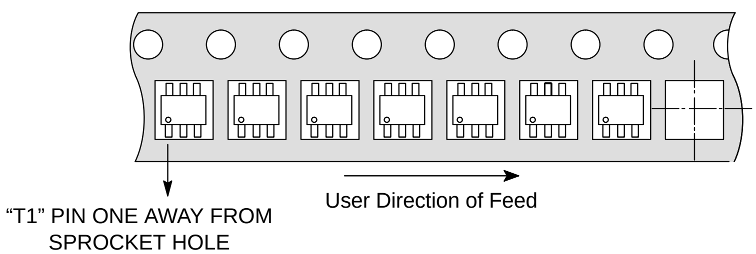
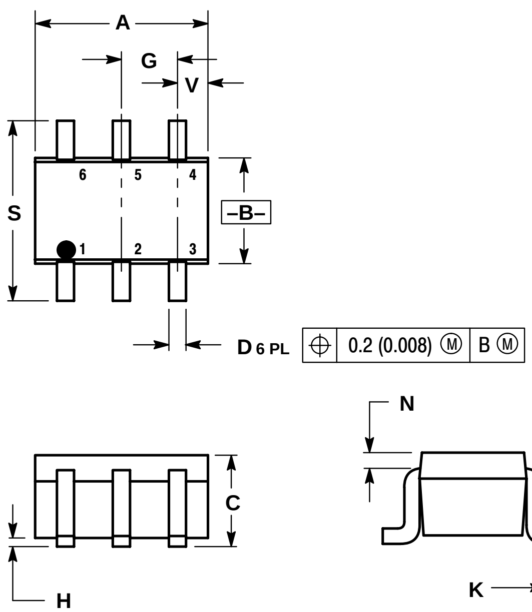


Figure 14. DTT1 and DTT3 (TSOP6) Reel Configuration/Orientation

PACKAGE DIMENSIONS

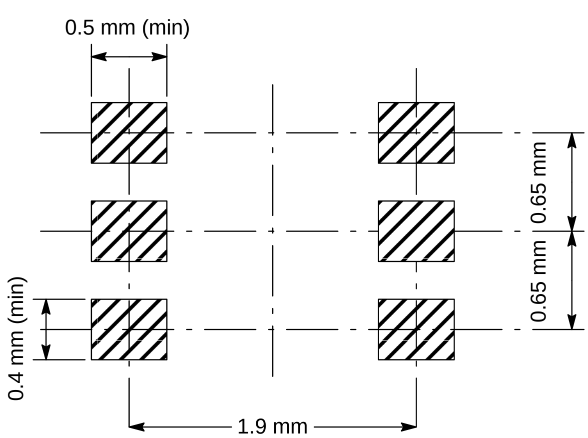
SC–88/SOT–363/SC–70
DF SUFFIX
CASE 419B–01
ISSUE G

SCALE 4:1



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

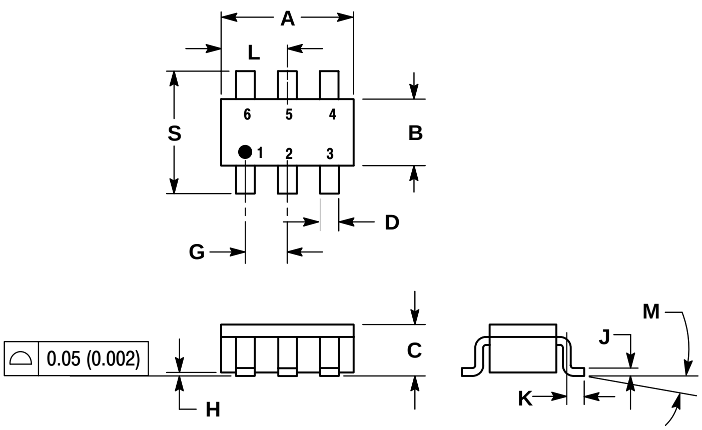
DIM	INCHES MIN	INCHES MAX	MILLIMETERS MIN	MILLIMETERS MAX
A	0.071	0.087	1.80	2.20
B	0.045	0.053	1.15	1.35
C	0.031	0.043	0.80	1.10
D	0.004	0.012	0.10	0.30
G	0.026 BSC		0.65 BSC	
H	---	0.004	---	0.10
J	0.004	0.010	0.10	0.25
K	0.004	0.012	0.10	0.30
N	0.008 REF		0.20 REF	
S	0.079	0.087	2.00	2.20
V	0.012	0.016	0.30	0.40



PACKAGE DIMENSIONS

TSOP–6/SOT–23/SC–59
DT SUFFIX
CASE 318G–02
ISSUE G

SCALE 2:1



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.

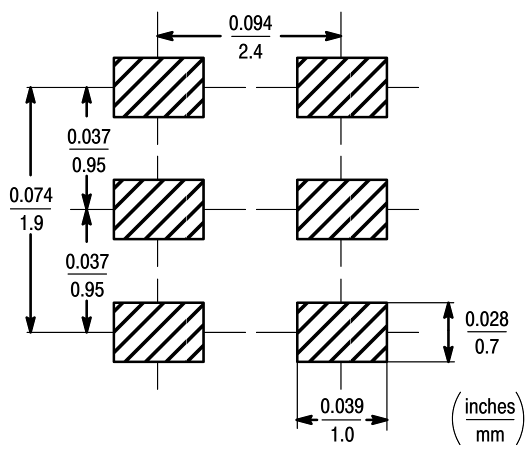
	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	2.90	3.10	0.1142	0.1220
B	1.30	1.70	0.0512	0.0669
C	0.90	1.10	0.0354	0.0433
D	0.25	0.50	0.0098	0.0197
G	0.85	1.05	0.0335	0.0413
H	0.013	0.100	0.0005	0.0040
J	0.10	0.26	0.0040	0.0102
K	0.20	0.60	0.0079	0.0236
L	1.25	1.55	0.0493	0.0610
M	0°	10°	0°	10°
S	2.50	3.00	0.0985	0.1181

STYLE 1:
PIN 1. DRAIN
2. DRAIN
3. GATE
4. SOURCE
5. DRAIN
6. DRAIN

STYLE 2:
PIN 1. EMITTER 2
2. BASE 1
3. COLLECTOR 1
4. EMITTER 1
5. BASE 2
6. COLLECTOR 2

STYLE 3:
PIN 1. ENABLE
2. N/C
3. R BOOST
4. Vz
5. V in
6. V out

STYLE 4:
PIN 1. N/C
2. V in
3. NOT USED
4. GROUND
5. ENABLE
6. LOAD



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