

Product Preview

Inverter with Schmitt-Trigger Input

The MC74HC1G14 is a high speed CMOS inverter with Schmitt-Trigger input fabricated with silicon gate CMOS technology. It achieves high speed operation similar to equivalent LSTTL while maintaining CMOS low power dissipation.

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

The MC74HC1G14 output drive current is 1/2 compared to MC74HC series.

- High Speed: $t_{PD} = 7\text{ns}$ (Typ) at $V_{CC} = 5\text{V}$
- Low Power Dissipation: $I_{CC} = 1\mu\text{A}$ (Max) at $T_A = 25^\circ\text{C}$
- High Noise Immunity
- Balanced Propagation Delays ($t_{PLH} = t_{PHL}$)
- Output Drive Capability: 5 LSTTL
- Symmetrical Output Impedance ($I_{OH} = I_{OL} = 2\text{mA}$)
- ESD Performance: HBM > 2000V; MM > 200V

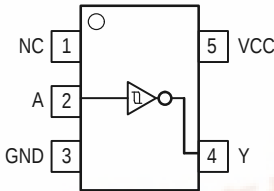


Figure 1. Pinout (Top View)

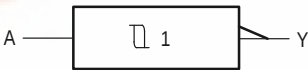
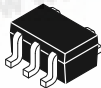


Figure 2. Logic Symbol

MC74HC1G14



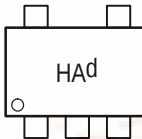
DF SUFFIX
5-LEAD SOT-353 PACKAGE
SC-88A
CASE 419A-01



DT SUFFIX
5-LEAD TSSOP PACKAGE
TSOP5
CASE TBD

FUNCTION TABLE

Inputs	Outputs
L	H
H	L



Pin 1
d = Date Code

Marking Diagram

DEVICE ORDERING INFORMATION

Device Order Number	Device Nomenclature						Package Type	Tape and Reel Size
	Motorola Circuit Indicator	Temp Range Identifier	Technology	Device Function	Package Suffix	Tape and Reel Suffix		
MC74HC1G14DFT1	MC	74	HC1G	14	DF	T1	SC-88A	7-Inch/3000 Unit
MC74HC1G14DTT1	MC	74	HC1G	14	DT	T1	TSOP5	7-Inch/3000 Unit

MC74HC1G14

MAXIMUM RATINGS*

Characteristics	Symbol	Value	Unit
DC Supply Voltage	V _{CC}	−0.5 to +7.0	V
DC Input Voltage	V _{IN}	−0.5 to V _{CC} + 0.5	V
DC Output Voltage	V _{OUT}	−0.5 to V _{CC} + 0.5	V
Input Diode Current	I _{IK}	±20	mA
Output Diode Current (V _{OUT} < GND; V _{OUT} > V _{CC})	I _{OK}	±20	mA
DC Output Current, per Pin	I _{OUT}	±12.5	mA
DC Supply Current, V _{CC} and GND	I _{CC}	±25	mA
Power dissipation in still air	P _D	200 450	mW
Lead temperature, 1 mm from case for 10 s	T _L	260	°C
Storage temperature	T _{stg}	−65 to +150	°C

* 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.

†Derating — SC–88A Package: −3 mW/°C from 65° to 125°C
— TSOP5 Package: −6 mW/°C from 65° to 125°C

RECOMMENDED OPERATING CONDITIONS

Characteristics	Symbol	Min	Max	Unit
DC Supply Voltage	V _{CC}	2.0	6.0	V
DC Input Voltage	V _{IN}	0.0	V _{CC}	V
DC Output Voltage	V _{OUT}	0.0	V _{CC}	V
Operating Temperature Range	T _A	−55	+125	°C
Input Rise and Fall Time	t _r , t _f	0	1000	ns
		0	600	
		0	500	
		0	400	

DC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Test Conditions	V _{CC} (V)	T _A = 25°C			T _A ≤ 85°C		T _A ≤ 125°C		Unit
				Min	Typ	Max	Min	Max	Min	Max	
V _{T+}	Positive-going Input Threshold Voltage	V _{OUT} = 0.1V I _{OUT} ≤ 20μA	2.0 3.0 4.5 6.0	1.00 1.50 2.30 3.00		1.50 2.15 3.15 4.20	0.95 1.45 2.25 2.95	1.60 2.20 3.15 4.20	0.90 1.40 2.20 2.90	1.60 2.20 3.15 4.20	V
V _{T-}	Negative-going Input Threshold Voltage	V _{OUT} = V _{CC} - 0.1V I _{OUT} ≤ 20μA	2.0 3.0 4.5 6.0	0.30 0.50 0.90 1.20		0.90 1.40 2.00 2.60	0.30 0.50 0.90 1.20	0.95 1.45 2.05 2.65	0.30 0.50 0.90 1.20	1.00 1.50 2.10 2.70	V
V _H	Hysteresis Voltage	V _{OUT} = 0.1V or V _{OUT} = V _{CC} - 0.1V I _{OUT} ≤ 20μA	2.0 3.0 4.5 6.0	0.20 0.25 0.40 0.50		1.25 1.65 2.25 3.00	0.20 0.25 0.40 1.20	1.25 1.65 2.25 3.00	0.20 0.25 0.40 1.20	1.25 1.65 2.25 3.00	V
V _{OH}	Minimum High-Level Output Voltage V _{IN} = V _{IH} or V _{IL}	V _{IN} = V _{IH} or V _{IL} I _{OH} = -20μA	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} = -2mA I _{OH} = -2.6mA	4.5 6.0	4.18 5.68	4.31 5.80		4.13 5.63		4.08 5.58		V
V _{OL}	Maximum Low-Level Output Voltage V _{IN} = V _{IH} or V _{IL}	V _{IN} = V _{IH} or V _{IL} I _{OL} = 20μA	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} = 2mA I _{OL} = 2.6mA	4.5 6.0		0.17 0.18	0.26 0.26		0.33 0.33		0.40 0.40	V
I _{IN}	Maximum Input Leakage Current	V _{IN} = 6.0V or GND	0 to 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 (C_{load} = 50 pF, Input t_r = t_f = 6.0ns)

Symbol	Parameter	Test Conditions	T _A = 25°C			T _A ≤ 85°C		T _A ≤ 125°C		Unit
			Min	Typ	Max	Min	Max	Min	Max	
t _{PLH} , t _{PHL}	Maximum Propagation Delay, Input A to Y	V _{CC} = 5.0V C _L = 15 pF		11	21		27		35	ns
		V _{CC} = 2.0V C _L = 50 pF V _{CC} = 3.0V V _{CC} = 4.5V V _{CC} = 6.0V		48 32 12 9.0	100 45 20 17		235 90 48 40		300 135 60 50	
t _{TLH} , t _{THL}	Output Transition Time	V _{CC} = 5.0V C _L = 15 pF		4.0	8.0		13		18	ns
		V _{CC} = 2.0V C _L = 50 pF V _{CC} = 3.0V V _{CC} = 4.5V V _{CC} = 6.0V		50 22 14 12	125 35 25 21		145 45 30 24		200 60 35 31	
C _{IN}	Maximum Input Capacitance			5	10		10		10	pF

CPD	Power Dissipation Capacitance (Note 1.)	Typical @ 25°C, V _{CC} = 5.0V	pF
		10	

1. CPD 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)} = CPD • V_{CC} • f_{IN} + I_{CC}. CPD is used to determine the no-load dynamic power consumption; P_D = CPD • V_{CC}² • f_{IN} + I_{CC} • V_{CC}.

MC74HC1G14

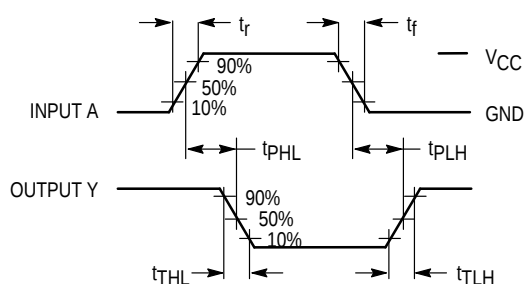
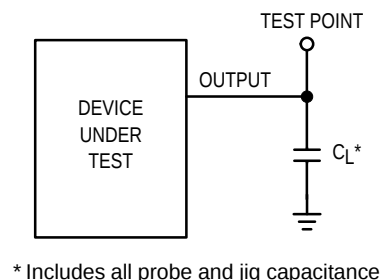


Figure 3. Switching Waveforms

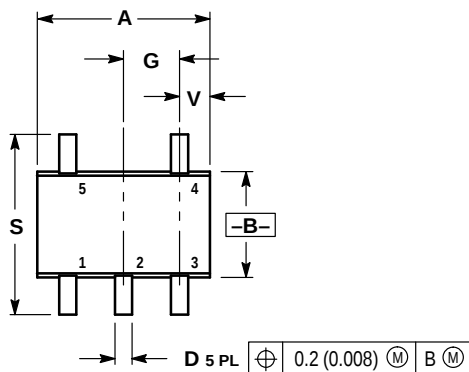


* Includes all probe and jig capacitance

Figure 4. Test Circuit

OUTLINE DIMENSIONS

DF SUFFIX
5-LEAD SOT-353 PACKAGE
SC-88A
CASE 419A-01
ISSUE B

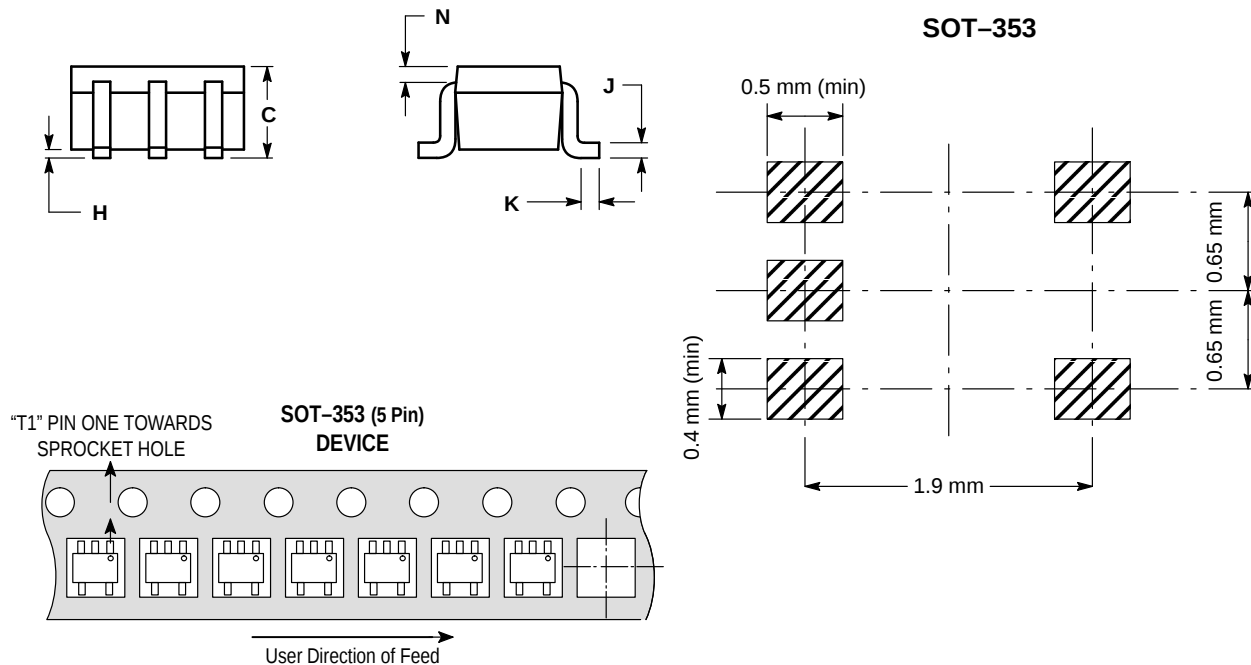


NOTES:

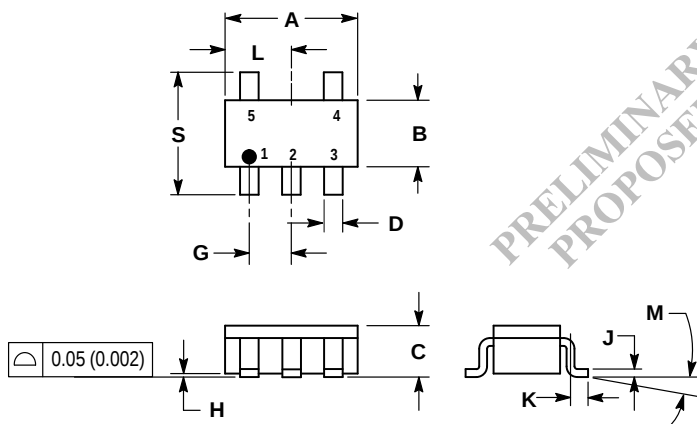
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MM.

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
V	0.012	0.016	0.30	0.40

SOT-353



PROPOSED DT SUFFIX
5-LEAD TSSOP PACKAGE
 TSOP5
 CASE TBD
 ISSUE TBD

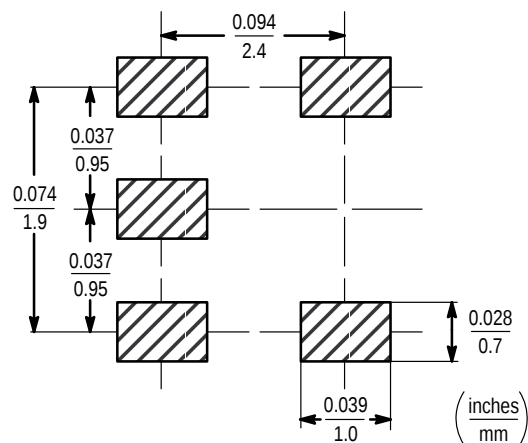
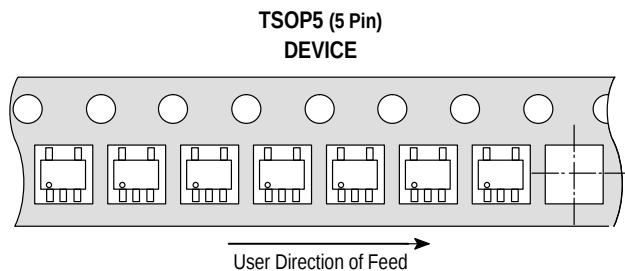


NOTES:

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

**DO NOT DESIGN WITH THESE
 DIMENSIONS - PRELIMINARY**



MC74HC1G14

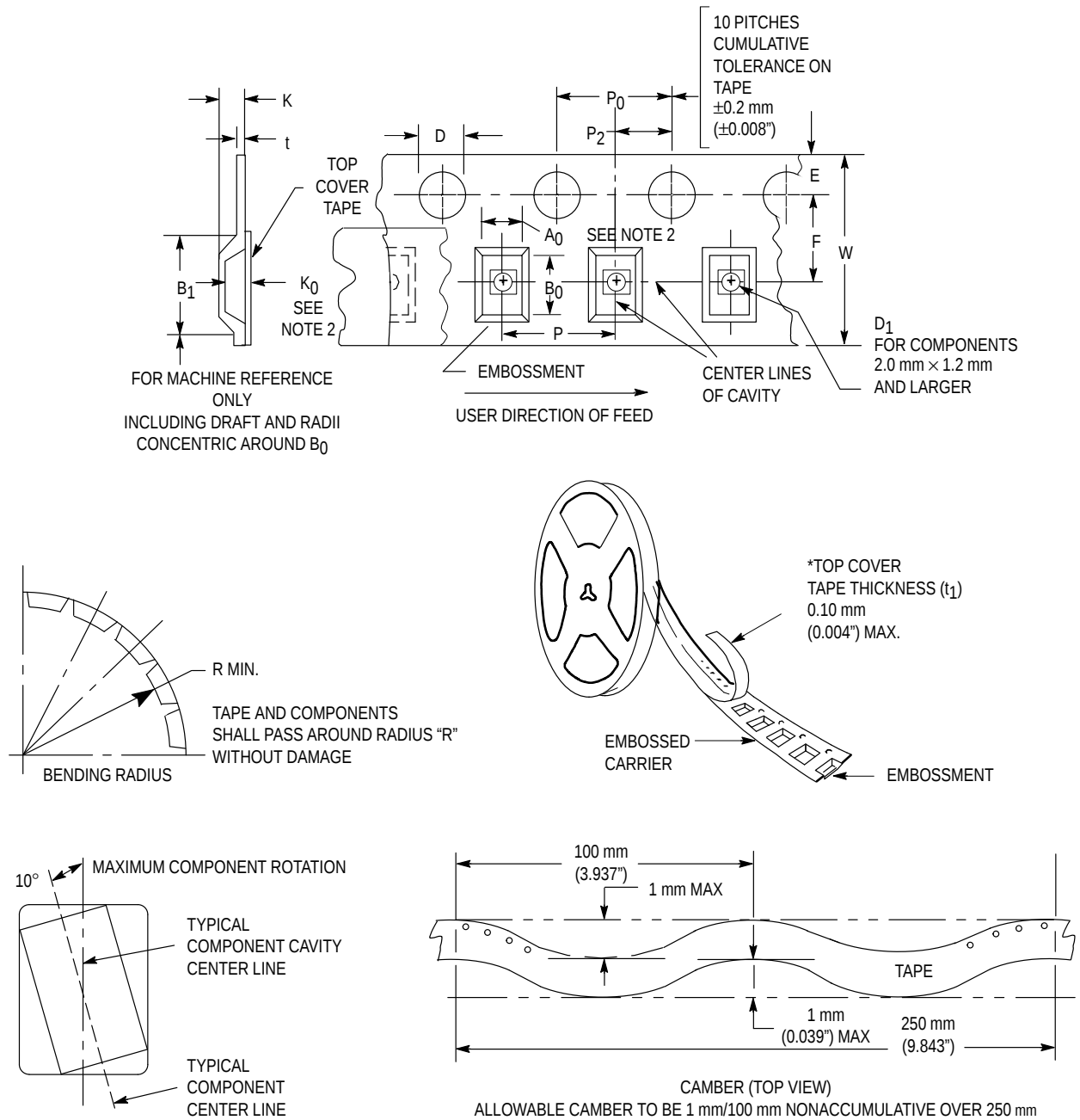


Figure 5. Carrier Tape Specifications

EMBOSSED CARRIER DIMENSIONS (See Notes 1 and 2)

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 ")

1. Metric Dimensions Govern—English are in parentheses for reference only.
2. 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

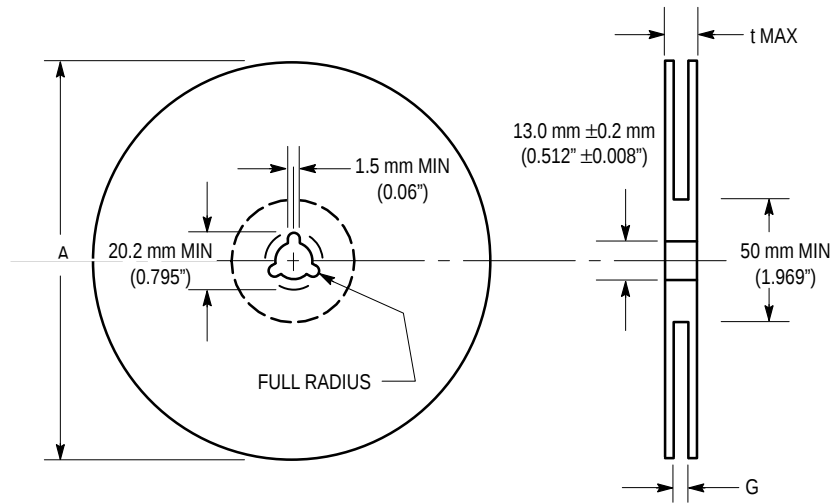


Figure 6. Reel Dimensions

REEL DIMENSIONS

Tape Size	A Max	G	t Max
8 mm	330 mm (13")	8,400 mm, +1.5 mm, -0.0 (0.33", +0.059", -0.00)	14.4 mm (0.56")

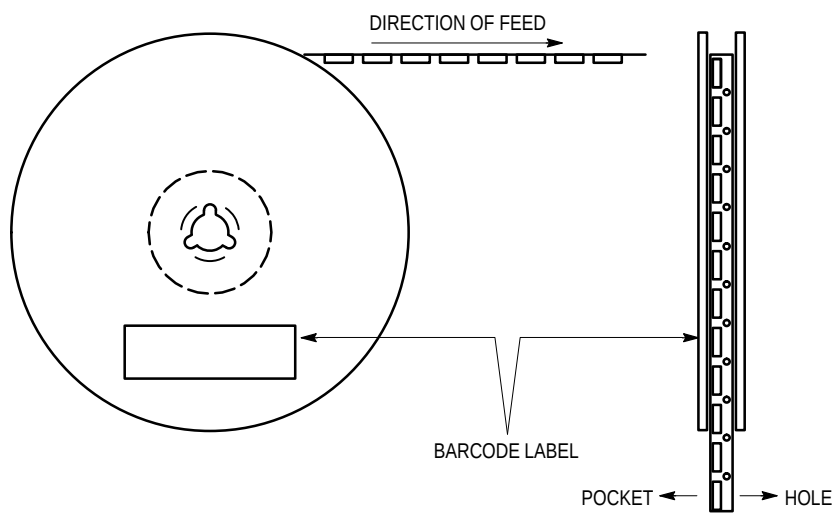


Figure 7. Reel Winding Direction

MC74HC1G14

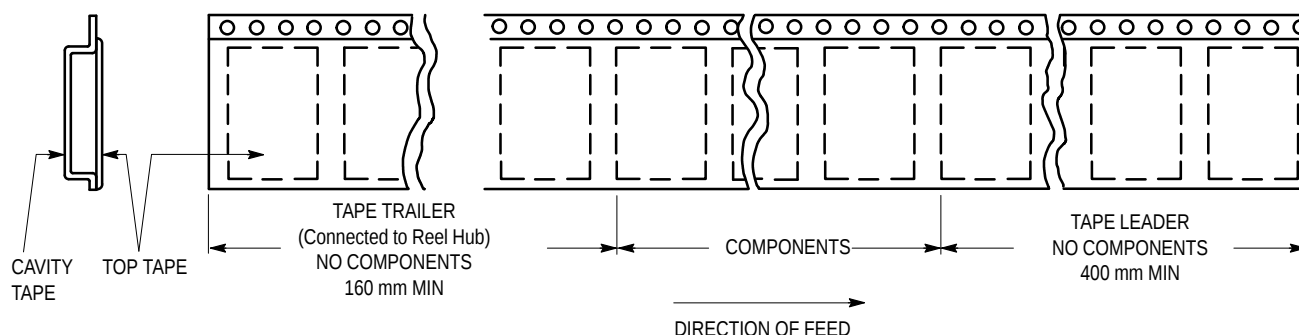


Figure 8. Tape Ends for Finished Goods

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