

SNx4AHCT374 Octal Edge-Triggered D-Type Flip-Flops With 3-State Outputs

1 Features

- Inputs are TTL-Voltage compatible
- Latch-up performance exceeds 250 mA per JESD 17

2 Applications

- Programmable Logic Controller (PLC)
- DCS and PAC: Analog Input Module
- Trains, Trams, and Subway Carriages
- AC Inverter Drives
- Printers

3 Description

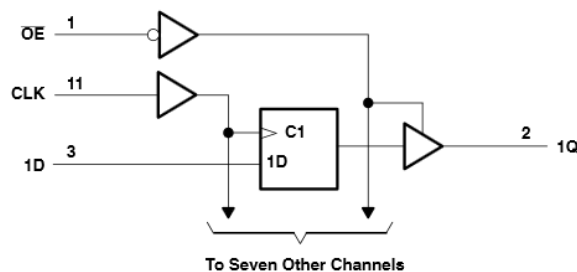
The 'AHCT374 devices are octal edge-triggered D-type flip-flops that feature 3-state outputs designed specifically for driving highly capacitive or relatively low-impedance loads. This device is particularly suitable for implementing buffer registers, I/O ports, bidirectional bus drivers, and working registers.

On the positive transition of the clock (CLK) input, the Q outputs are set to the logic levels of the data (D) inputs.

Package Information

PART NUMBER	PACKAGE ¹	BODY SIZE (NOM)
SN74AHCT374	DB (SSOP, 20)	7.20 mm × 5.30 mm
	DW (SOIC, 20)	12.80 mm × 7.50 mm
	N (PDIP, 20)	24.33 mm × 6.35 mm
	PW (TSSOP, 20)	6.50 mm × 4.40 mm

1. For all available packages, see the orderable addendum at the end of the data sheet.



Logic Diagram (Positive Logic)



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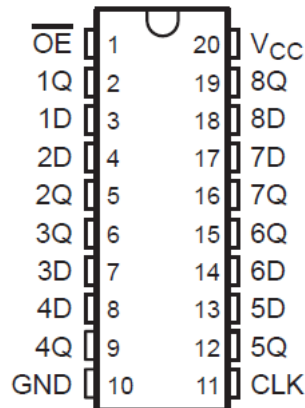
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4 Revision History

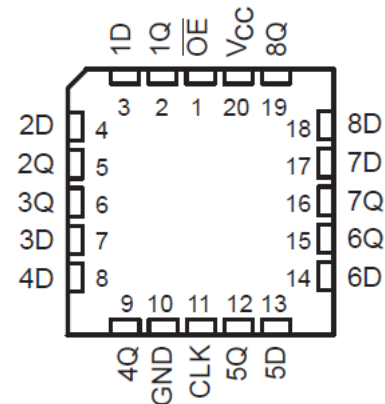
NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

Changes from Revision L (July 2003) to Revision M (April 2023)	Page
• Added <i>Applications</i> , <i>Package Information</i> table, <i>Pin Functions</i> table, <i>ESD Ratings</i> table, <i>Thermal Information</i> table, <i>Device Functional Modes</i> , <i>Application and Implementation</i> section, <i>Power Supply Recommendations</i> section, <i>Layout</i> section, <i>Device and Documentation Support</i> section, and <i>Mechanical, Packaging, and Orderable Information</i> section.....	1

5 Pin Configuration and Functions



J, DB, DW, N, NS, or PW Package
20-Pin CDIP, SSOP, SOIC, PDIP, SO, or TSSOP
(Top View)



FK Package
20-Pin LCCC
(Top View)

Table 5-1. Pin Functions

PIN		TYPE	DESCRIPTION
NAME	NO.		
\overline{OE}	1	I	Enable pin
1Q	2	O	Output 1
1D	3	I	Input 1
2D	4	I	Input 2
2Q	5	O	Output 2
3Q	6	O	Output 3
3D	7	I	Input 3
4D	8	I	Input 4
4Q	9	O	Output 4
GND	10	–	Ground pin
CLK	11	I	Clock pin
5Q	12	O	Output 5
5D	13	I	Input 5
6D	14	I	Input 6
6Q	15	O	Output 6
7Q	16	O	Output 7
7D	17	I	Input 7
8D	18	I	Input 8
8Q	19	O	Output 8
V_{CC}	20	–	Power pin

6 Specifications

6.1 Absolute Maximum Ratings

over operating free-air temperature range (unless otherwise noted) ¹

			MIN	MAX	UNIT
V_{CC}	Supply voltage		-0.5	7	V
V_I	Input voltage ⁽²⁾		-0.5	7	V
V_O	Output voltage ⁽²⁾		-0.5	$V_{CC} + 0.5$	V
I_{IK}	Input clamp current	$(V_I < 0)$		-20	mA
I_{OK}	Output clamp current	$(V_O < 0 \text{ or } V_O > V_{CC})$		± 20	mA
I_O	Continuous output current	$(V_O = 0 \text{ to } V_{CC})$		± 25	mA
	Continuous current through V_{CC} or GND			± 75	mA
T_{stg}	Storage temperature		-65	150	°C

(1) The input and output voltage ratings may be exceeded if the input and output current ratings are observed.

6.2 ESD Ratings

			VALUE	UNIT
$V_{(ESD)}$	Electrostatic discharge	Human-Body Model (A114-A) ⁽¹⁾	± 2000	V
		Charged-device model (CDM), per JEDEC specification JESD22-C101 ⁽²⁾	± 1000	
		Machine Model (A115-A)	± 200	

(1) JEDEC document JEP155 states that 500-V HBM allows safe manufacturing with a standard ESD control process.

(2) JEDEC document JEP157 states that 250-V CDM allows safe manufacturing with a standard ESD control process.

6.3 Recommended Operating Conditions

over operating free-air temperature range (unless otherwise noted) ⁽¹⁾

			SN54AHCT374		SN74AHCT374		UNIT
			MIN	MAX	MIN	MAX	
V _{CC}	Supply voltage		4.5	5.5	4.5	5.5	V
V _{IH}	High-level input voltage	V _{CC} = 2 V	2		2		V
V _{IL}	Low-level input voltage	V _{CC} = 2 V		0.8		0.8	V
V _I	Input voltage		0	5.5	0	5.5	V
V _O	Output voltage	High or low state	0	V _{CC}	0	V _{CC}	V
I _{OH}	High-level output current	V _{CC} = 2 V		-8		-8	mA
I _{OL}	Low-level output current	V _{CC} = 2 V		8		8	mA
Δt/Δv	Input transition rise or fall rate	V _{CC} = 2.3 V to 2.7 V		20		20	ns/V
T _A	Operating free-air temperature		-55	125	-40	85	°C

(1) All unused inputs of the device must be held at V_{CC} or GND to ensure proper device operation. See [Implications of Slow or Floating CMOS Inputs](#), SCBA004.

6.4 Thermal Information

THERMAL METRIC ⁽¹⁾		SN74AHCT374				UNIT
		DB (SSOP)	DW (SOIC)	N (PDIP)	PW (TSSOP)	
		20 PINS	20 PINS	20 PINS	20 PINS	
R _{θJA}	Junction-to-ambient thermal resistance	70	58	69	83	°C/W

(1) For more information about traditional and new thermal metrics, see the [Semiconductor and IC Package Thermal Metrics](#) application report.

6.5 Electrical Characteristics

over recommended operating free-air temperature range (unless otherwise noted)

PARAMETER	TEST CONDITIONS	V _{CC}	T _A = 25°C			SN54AHCT374		SN74AHCT374		UNIT
			MIN	TYP	MAX	MIN	MAX	MIN	MAX	
V _{OH}	I _{OH} = -50 μA	4.5 V	4.4	4.5		4.4		4.4	V	
	I _{OH} = -8 mA		3.94			3.8		3.8		
V _{OL}	I _{OL} = 50 μA	4.5 V			0.1			0.1	V	
	I _{OL} = 8 mA				0.36		0.44	0.44		
I _I	V _I = 5.5 V or GND	0 V to 5.5 V			±0.1			±1	μA	
I _{OZ}	V _O = V _{CC} or GND, V _I = V _{IH} or V _{IL}	5.5 V			±0.25			± 2.5	μA	
I _{CC}	V _I = V _{CC} or GND, I _O = 0	5.5 V			4			40	μA	
ΔI _{Cac†}	One input at 3.4 V, Other inputs at V _{CC} or GND	5.5 V			1.35			1.5	mA	
C _i	V _I = V _{CC} or GND	5 V			4			10	pF	
C _o	V _O = V _{CC} or GND	5 V			9				pF	

6.6 Timing Requirements

over recommended operating free-air temperature range, V_{CC} = 5 V ± 0.5 V (unless otherwise noted) (see [Load Circuit and Voltage Waveforms](#))

PARAMETER		T _A = 25°C		SN54AHCT373		SN74AHCT373		UNIT
		MIN	MAX	MIN	MAX	MIN	MAX	
t _w	Pulse duration, CLK high or low	6.5		6.5		6.5		ns
t _{su}	Setup time, data before CLK↑	2.5		2.5		2.5		ns
t _h	Hold time, data after CLK↑	2.5		2.5		2.5		ns

6.7 Switching Characteristics

over recommended operating free-air temperature range, $V_{CC} = 5\text{ V} \pm 0.5\text{ V}$ (unless otherwise noted)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	LOAD CAPACITANCE	$T_A = 25^\circ\text{C}$			SN54AHCT374		SN74AHCT374		UNIT
				MIN	TYP	MAX	MIN	MAX	MIN	MAX	
f_{max}			$C_L = 15\text{ pF}$	90 ⁽¹⁾	140 ⁽¹⁾		80 ⁽¹⁾		80		MHz
			$C_L = 50\text{ pF}$	85	130		75		75		
t_{PLH}	CLK	Q	$C_L = 15\text{ pF}$		5.6 ⁽¹⁾	9.4 ⁽¹⁾	1 ⁽¹⁾	10.5 ⁽¹⁾	1	10.5	ns
t_{PHL}					5.6 ⁽¹⁾	9.4 ⁽¹⁾	1 ⁽¹⁾	10.5 ⁽¹⁾	1	10.5	
t_{PZH}	$\overline{\text{OE}}$	Q	$C_L = 15\text{ pF}$		6.5 ⁽¹⁾	10.2 ⁽¹⁾	1 ⁽¹⁾	11.5 ⁽¹⁾	1	11.5	ns
t_{PZL}					6.5 ⁽¹⁾	10.2 ⁽¹⁾	1 ⁽¹⁾	11.5 ⁽¹⁾	1	11.5	
t_{PHZ}	$\overline{\text{OE}}$	Q	$C_L = 15\text{ pF}$		6.2 ⁽¹⁾	10.2 ⁽¹⁾	1 ⁽¹⁾	11 ⁽¹⁾	1	11	ns
t_{PLZ}					6.2 ⁽¹⁾	10.2	1 ⁽¹⁾	11 ⁽¹⁾	1	11	
t_{PLH}	CLK	Q	$C_L = 50\text{ pF}$		6.4	10.4	1	11.5	1	11.5	ns
t_{PHL}					6.4	10.4	1	11.5	1	11.5	
t_{PZH}	$\overline{\text{OE}}$	Q	$C_L = 50\text{ pF}$		7.3	11.2	1	12.5	1	12.5	ns
t_{PZL}					7.3	11.2	1	12.5	1	12.5	
t_{PHZ}	$\overline{\text{OE}}$	Q	$C_L = 50\text{ pF}$		7	11.2	1	12	1	12	ns
t_{PLZ}					7	11.2	1	12	1	12	
$t_{\text{sk(o)}}$			$C_L = 50\text{ pF}$			1 ⁽²⁾					

(1) On products compliant to MIL-PRF-38535, this parameter is not production tested.

6.8 Noise Characteristics

$V_{CC} = 5\text{ V}$, $C_L = 50\text{ pF}$, $T_A = 25^\circ\text{C}$ ⁽¹⁾

PARAMETER	SNx4AHCT374			UNIT
	MIN	TYP	MAX	
$V_{\text{OL(P)}}$ Quiet output, maximum dynamic V_{OL}		0.8	1.2	V
$V_{\text{OL(V)}}$ Quiet output, minimum dynamic V_{OL}		-0.8	-1.2	V
$V_{\text{OH(V)}}$ Quiet output, minimum dynamic V_{OH}	3.8			V
$V_{\text{IH(D)}}$ High-level dynamic input voltage	2			V
$V_{\text{IL(D)}}$ Low-level dynamic input voltage			0.8	V

(1) Characteristics are for surface-mount packages only.

6.9 Operating Characteristics

$T_A = 25^\circ\text{C}$

PARAMETER	TEST CONDITIONS	TYP	UNIT
C_{pd} Power dissipation capacitance	No load, $f = 1\text{ MHz}$	27	pF

7 Parameter Measurement Information

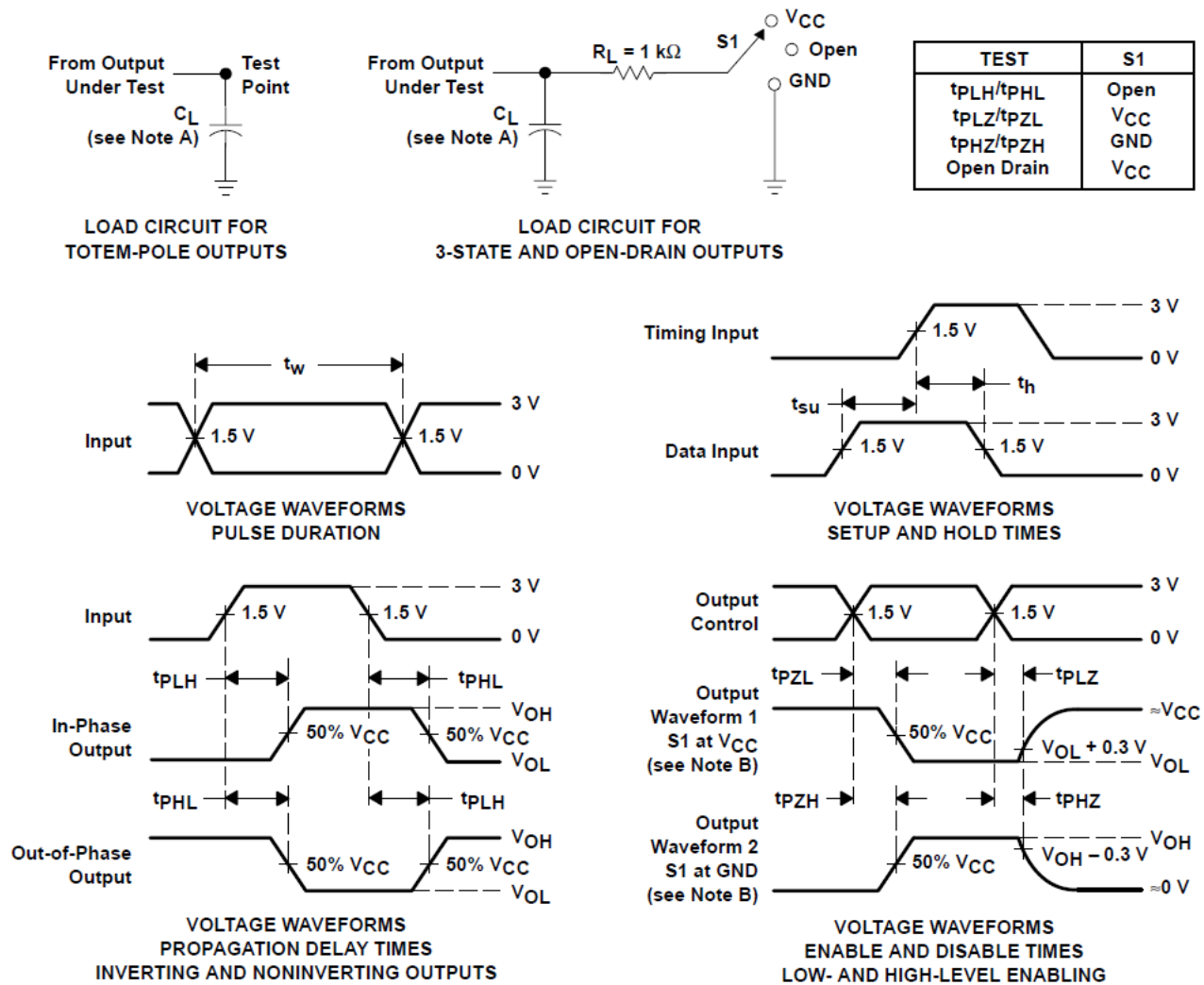


Figure 7-1. Load Circuit and Voltage Waveforms

A. C_L includes probe and jig capacitance.

B. Waveform 1 is for an output with internal conditions such that the output is low except when disabled by the output control. Waveform 2 is for an output with internal conditions such that the output is high except when disabled by the output control.

C. All input pulses are supplied by generators having the following characteristics: $PRR \leq 1\text{ MHz}$, $Z_O = 50\ \Omega$, $t_r \leq 3\text{ ns}$, $t_f \leq 3\text{ ns}$.

D. The outputs are measured one at a time with one input transition per measurement.

E. All parameters and waveforms are not applicable to all devices.

8 Detailed Description

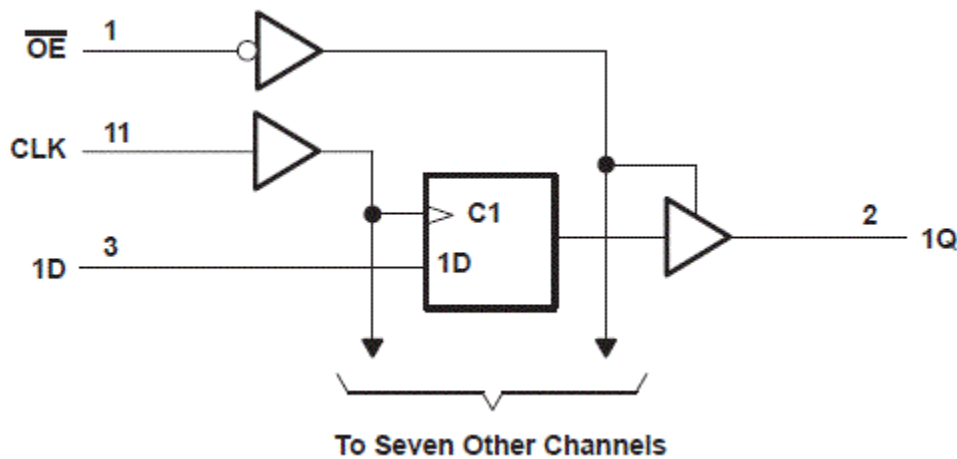
8.1 Overview

A buffered output-enable (\overline{OE}) input can be used to place the eight outputs in either a normal logic state (high or low logic levels) or the high-impedance state. In the high-impedance state, the outputs neither load nor drive the bus lines significantly. The high-impedance state and the increased drive provide the capability to drive bus lines without interface or pullup components.

\overline{OE} does not affect internal operations of the flip-flop. Old data can be retained or new data can be entered while the outputs are in the high-impedance state.

To ensure the high-impedance state during power up or power down, \overline{OE} should be tied to V_{CC} through a pullup resistor; the minimum value of the resistor is determined by the current-sinking capability of the driver.

8.2 Functional Block Diagram



8.3 Device Functional Modes

**Table 8-1. Function Table
(Each Flip-Flop)**

INPUTS			OUTPUT
\overline{OE}	CLK	D	Q
L	↑	H	H
L	↑	L	L
L	H or L	X	Q_0
H	X	X	Z

9 Application and Implementation

Note

Information in the following applications sections is not part of the TI component specification, and TI does not warrant its accuracy or completeness. TI's customers are responsible for determining suitability of components for their purposes, as well as validating and testing their design implementation to confirm system functionality.

9.1 Power Supply Recommendations

The power supply can be any voltage between the MIN and MAX supply voltage rating located in the [Section 6.3](#) table.

Each V_{CC} pin should have a good bypass capacitor to prevent power disturbance. For devices with a single supply, 0.1 μF is recommended. If there are multiple V_{CC} pins, 0.01 μF or 0.022 μF is recommended for each power pin. It is acceptable to parallel multiple bypass caps to reject different frequencies of noise. A 0.1 μF and 1 μF are commonly used in parallel. The bypass capacitor should be installed as close to the power pin as possible for best results.

9.2 Layout

9.2.1 Layout Guidelines

When using multiple bit logic devices inputs should not ever float. In many cases, functions or parts of functions of digital logic devices are unused, for example, when only two inputs of a triple-input AND gate are used or only three of the four buffer gates are used. Such input pins should not be left unconnected because the undefined voltages at the outside connections result in undefined operational states. Specified below are the rules that must be observed under all circumstances. All unused inputs of digital logic devices must be connected to a high or low bias to prevent them from floating. The logic level that should be applied to any particular unused input depends on the function of the device. Generally they will be tied to GND or V_{CC} whichever make more sense or is more convenient. Floating outputs is generally acceptable, unless the part is a transceiver. If the transceiver has an output enable pin it will disable the outputs section of the part when asserted. This will not disable the input section of the I.O's so they also cannot float when disabled.

9.2.1.1 Layout Example

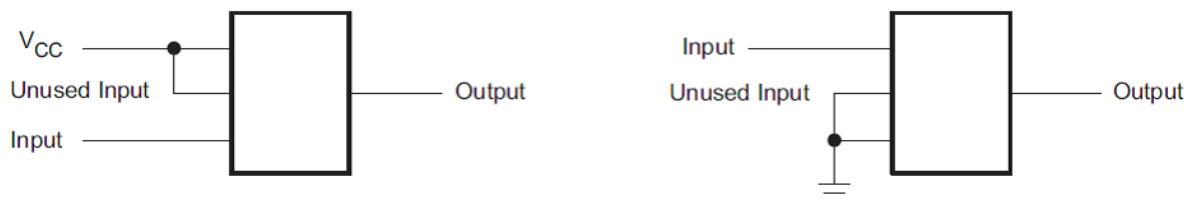


Figure 9-1. Layout Example

10 Device and Documentation Support

10.1 Documentation Support

10.1.1 Related Documentation

For related documentation see the following:

[Implications of Slow or Floating CMOS Inputs](#), SCBA004

10.2 Receiving Notification of Documentation Updates

To receive notification of documentation updates, navigate to the device product folder on [ti.com](#). Click on *Subscribe to updates* to register and receive a weekly digest of any product information that has changed. For change details, review the revision history included in any revised document.

10.3 Support Resources

[TI E2E™ support forums](#) are an engineer's go-to source for fast, verified answers and design help — straight from the experts. Search existing answers or ask your own question to get the quick design help you need.

Linked content is provided "AS IS" by the respective contributors. They do not constitute TI specifications and do not necessarily reflect TI's views; see TI's [Terms of Use](#).

10.4 Trademarks

TI E2E™ is a trademark of Texas Instruments.
All trademarks are the property of their respective owners.

10.5 Electrostatic Discharge Caution



This integrated circuit can be damaged by ESD. Texas Instruments recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage.

ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet its published specifications.

10.6 Glossary

[TI Glossary](#) This glossary lists and explains terms, acronyms, and definitions.

11 Mechanical, Packaging, and Orderable Information

The following pages include mechanical, packaging, and orderable information. This information is the most current data available for the designated devices. This data is subject to change without notice and revision of this document. For browser-based versions of this data sheet, refer to the left-hand navigation.

PACKAGING INFORMATION

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead finish/ Ball material (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
5962-9686501Q2A	ACTIVE	LCCC	FK	20	1	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	5962-9686501Q2A SNJ54AHCT 374FK	Samples
5962-9686501QRA	ACTIVE	CDIP	J	20	1	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	5962-9686501QR A SNJ54AHCT374J	Samples
5962-9686501QSA	ACTIVE	CFP	W	20	1	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	5962-9686501QS A SNJ54AHCT374W	Samples
SN74AHCT374DBR	ACTIVE	SSOP	DB	20	2000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 85	HB374	Samples
SN74AHCT374DW	ACTIVE	SOIC	DW	20	25	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 85	AHCT374	Samples
SN74AHCT374DWR	ACTIVE	SOIC	DW	20	2000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 85	AHCT374	Samples
SN74AHCT374N	ACTIVE	PDIP	N	20	20	RoHS & Non-Green	NIPDAU	N / A for Pkg Type	-40 to 85	SN74AHCT374N	Samples
SN74AHCT374PWR	ACTIVE	TSSOP	PW	20	2000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 85	HB374	Samples
SNJ54AHCT374FK	ACTIVE	LCCC	FK	20	1	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	5962-9686501Q2A SNJ54AHCT 374FK	Samples
SNJ54AHCT374J	ACTIVE	CDIP	J	20	1	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	5962-9686501QR A SNJ54AHCT374J	Samples
SNJ54AHCT374W	ACTIVE	CFP	W	20	1	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	5962-9686501QS A SNJ54AHCT374W	Samples

(1) The marketing status values are defined as follows:

ACTIVE: Product device recommended for new designs.

LIFEBUY: TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.

NRND: Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.

PREVIEW: Device has been announced but is not in production. Samples may or may not be available.

OBSELETE: TI has discontinued the production of the device.

(2) **RoHS:** TI defines "RoHS" to mean semiconductor products that are compliant with the current EU RoHS requirements for all 10 RoHS substances, including the requirement that RoHS substance do not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, "RoHS" products are suitable for use in specified lead-free processes. TI may reference these types of products as "Pb-Free".

RoHS Exempt: TI defines "RoHS Exempt" to mean products that contain lead but are compliant with EU RoHS pursuant to a specific EU RoHS exemption.

Green: TI defines "Green" to mean the content of Chlorine (Cl) and Bromine (Br) based flame retardants meet JS709B low halogen requirements of ≤ 1000 ppm threshold. Antimony trioxide based flame retardants must also meet the ≤ 1000 ppm threshold requirement.

(3) MSL, Peak Temp. - The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

(4) There may be additional marking, which relates to the logo, the lot trace code information, or the environmental category on the device.

(5) Multiple Device Markings will be inside parentheses. Only one Device Marking contained in parentheses and separated by a "~" will appear on a device. If a line is indented then it is a continuation of the previous line and the two combined represent the entire Device Marking for that device.

(6) Lead finish/Ball material - Orderable Devices may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead finish/Ball material values may wrap to two lines if the finish value exceeds the maximum column width.

Important Information and Disclaimer:The information provided on this page represents TI's knowledge and belief as of the date that it is provided. TI bases its knowledge and belief on information provided by third parties, and makes no representation or warranty as to the accuracy of such information. Efforts are underway to better integrate information from third parties. TI has taken and continues to take reasonable steps to provide representative and accurate information but may not have conducted destructive testing or chemical analysis on incoming materials and chemicals. TI and TI suppliers consider certain information to be proprietary, and thus CAS numbers and other limited information may not be available for release.

In no event shall TI's liability arising out of such information exceed the total purchase price of the TI part(s) at issue in this document sold by TI to Customer on an annual basis.

OTHER QUALIFIED VERSIONS OF SN54AHCT374, SN74AHCT374 :

● Catalog : [SN74AHCT374](#)

● Military : [SN54AHCT374](#)

NOTE: Qualified Version Definitions:

● Catalog - TI's standard catalog product

● Military - QML certified for Military and Defense Applications

TAPE AND REEL INFORMATION

QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE


*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
SN74AHCT374DBR	SSOP	DB	20	2000	330.0	16.4	8.2	7.5	2.5	12.0	16.0	Q1
SN74AHCT374DWR	SOIC	DW	20	2000	330.0	24.4	10.8	13.3	2.7	12.0	24.0	Q1
SN74AHCT374PWR	TSSOP	PW	20	2000	330.0	16.4	6.95	7.1	1.6	8.0	16.0	Q1

TAPE AND REEL BOX DIMENSIONS


*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN74AHCT374DBR	SSOP	DB	20	2000	356.0	356.0	35.0
SN74AHCT374DWR	SOIC	DW	20	2000	367.0	367.0	45.0
SN74AHCT374PWR	TSSOP	PW	20	2000	356.0	356.0	35.0

TUBE


*All dimensions are nominal

Device	Package Name	Package Type	Pins	SPQ	L (mm)	W (mm)	T (μm)	B (mm)
5962-9686501Q2A	FK	LCCC	20	1	506.98	12.06	2030	NA
5962-9686501QSA	W	CFP	20	1	506.98	26.16	6220	NA
SN74AHCT374DW	DW	SOIC	20	25	507	12.83	5080	6.6
SN74AHCT374N	N	PDIP	20	20	506	13.97	11230	4.32
SNJ54AHCT374FK	FK	LCCC	20	1	506.98	12.06	2030	NA
SNJ54AHCT374W	W	CFP	20	1	506.98	26.16	6220	NA

DB0020A



PACKAGE OUTLINE

SSOP - 2 mm max height

SMALL OUTLINE PACKAGE



4214851/B 08/2019

NOTES:

1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.15 mm per side.
4. This dimension does not include interlead flash. Interlead flash shall not exceed 0.25 mm per side.
5. Reference JEDEC registration MO-150.

EXAMPLE BOARD LAYOUT

DB0020A

SSOP - 2 mm max height

SMALL OUTLINE PACKAGE



LAND PATTERN EXAMPLE
EXPOSED METAL SHOWN
SCALE: 10X



4214851/B 08/2019

NOTES: (continued)

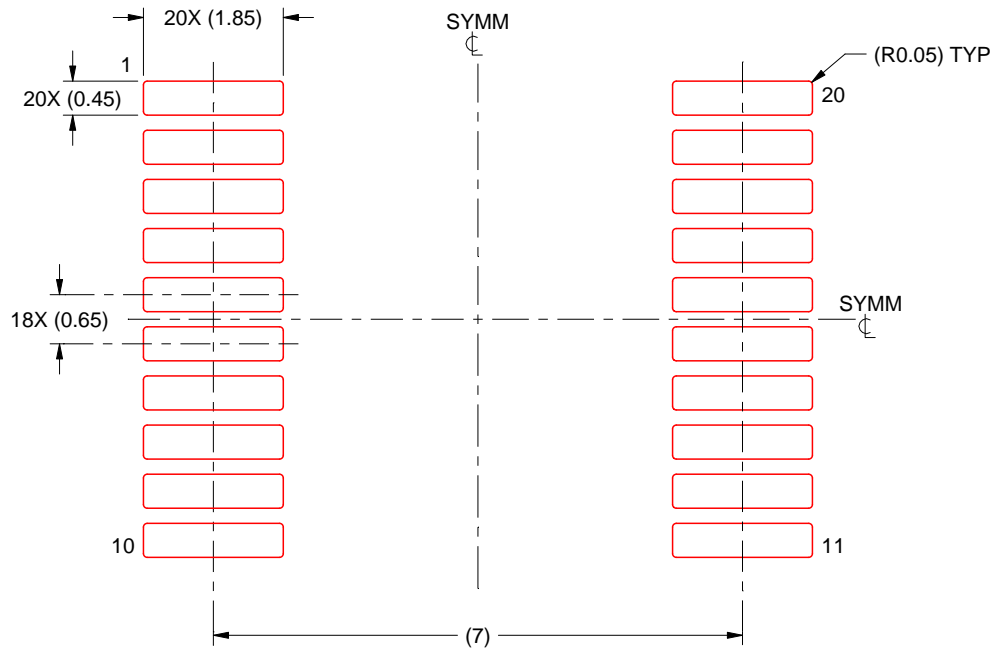
- 6. Publication IPC-7351 may have alternate designs.
- 7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

EXAMPLE STENCIL DESIGN

DB0020A

SSOP - 2 mm max height

SMALL OUTLINE PACKAGE



SOLDER PASTE EXAMPLE
BASED ON 0.125 mm THICK STENCIL
SCALE: 10X

4214851/B 08/2019

NOTES: (continued)

8. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.
9. Board assembly site may have different recommendations for stencil design.

J (R-GDIP-T**)

14 LEADS SHOWN

CERAMIC DUAL IN-LINE PACKAGE



DIM \ PINS **	14	16	18	20
A	0.300 (7,62) BSC	0.300 (7,62) BSC	0.300 (7,62) BSC	0.300 (7,62) BSC
B MAX	0.785 (19,94)	.840 (21,34)	0.960 (24,38)	1.060 (26,92)
B MIN	—	—	—	—
C MAX	0.300 (7,62)	0.300 (7,62)	0.310 (7,87)	0.300 (7,62)
C MIN	0.245 (6,22)	0.245 (6,22)	0.220 (5,59)	0.245 (6,22)



4040083/F 03/03

- NOTES:
- All linear dimensions are in inches (millimeters).
 - This drawing is subject to change without notice.
 - This package is hermetically sealed with a ceramic lid using glass frit.
 - Index point is provided on cap for terminal identification only on press ceramic glass frit seal only.
 - Falls within MIL STD 1835 GDIP1-T14, GDIP1-T16, GDIP1-T18 and GDIP1-T20.

GENERIC PACKAGE VIEW

FK 20

LCCC - 2.03 mm max height

8.89 x 8.89, 1.27 mm pitch

LEADLESS CERAMIC CHIP CARRIER

This image is a representation of the package family, actual package may vary.
Refer to the product data sheet for package details.



4229370VA\

N (R-PDIP-T**)

PLASTIC DUAL-IN-LINE PACKAGE

16 PINS SHOWN



- NOTES:
- A. All linear dimensions are in inches (millimeters).
 - B. This drawing is subject to change without notice.
 - Falls within JEDEC MS-001, except 18 and 20 pin minimum body length (Dim A).
 - The 20 pin end lead shoulder width is a vendor option, either half or full width.

DW0020A



PACKAGE OUTLINE

SOIC - 2.65 mm max height

SOIC



4220724/A 05/2016

NOTES:

1. All linear dimensions are in millimeters. Dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.15 mm per side.
4. This dimension does not include interlead flash. Interlead flash shall not exceed 0.43 mm per side.
5. Reference JEDEC registration MS-013.

EXAMPLE BOARD LAYOUT

DW0020A

SOIC - 2.65 mm max height

SOIC



LAND PATTERN EXAMPLE
SCALE:6X



SOLDER MASK DETAILS

4220724/A 05/2016

NOTES: (continued)

- 6. Publication IPC-7351 may have alternate designs.
- 7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

EXAMPLE STENCIL DESIGN

DW0020A

SOIC - 2.65 mm max height

SOIC



SOLDER PASTE EXAMPLE
BASED ON 0.125 mm THICK STENCIL
SCALE:6X

4220724/A 05/2016

NOTES: (continued)

8. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.
9. Board assembly site may have different recommendations for stencil design.

W (R-GDFP-F20)

CERAMIC DUAL FLATPACK



- NOTES:
- A. All linear dimensions are in inches (millimeters).
 - B. This drawing is subject to change without notice.
 - C. This package can be hermetically sealed with a ceramic lid using glass frit.
 - D. Index point is provided on cap for terminal identification only.
 - E. Falls within Mil-Std 1835 GDFP2-F20

PW0020A



PACKAGE OUTLINE

TSSOP - 1.2 mm max height

SMALL OUTLINE PACKAGE



NOTES:

1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.15 mm per side.
4. This dimension does not include interlead flash. Interlead flash shall not exceed 0.25 mm per side.
5. Reference JEDEC registration MO-153.

EXAMPLE BOARD LAYOUT

PW0020A

TSSOP - 1.2 mm max height

SMALL OUTLINE PACKAGE



LAND PATTERN EXAMPLE
EXPOSED METAL SHOWN
SCALE: 10X



SOLDER MASK DETAILS

4220206/A 02/2017

NOTES: (continued)

- 6. Publication IPC-7351 may have alternate designs.
- 7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

EXAMPLE STENCIL DESIGN

PW0020A

TSSOP - 1.2 mm max height

SMALL OUTLINE PACKAGE



SOLDER PASTE EXAMPLE
BASED ON 0.125 mm THICK STENCIL
SCALE: 10X

4220206/A 02/2017

NOTES: (continued)

8. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.
9. Board assembly site may have different recommendations for stencil design.

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