SDAS167C - APRIL 1982 - REVISED NOVEMBER 1999

- D-Type Flip-Flops in a Single Package With 3-State Bus Driving True Outputs
- Full Parallel Access for Loading
- Buffered Control Inputs
- Package Options Include Plastic Small-Outline (DW) Packages, Ceramic Chip Carriers (FK), and Standard Plastic (N) and Ceramic (J) DIPs

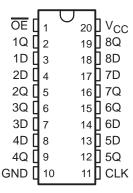
#### description

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

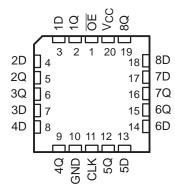
On the positive transition of the clock (CLK) input, the Q outputs are set to the logic levels set up at the data (D) inputs.

A buffered output-enable ( $\overline{OE}$ ) input places 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.

SN54ALS374A, SN54AS374 . . . J PACKAGE SN74ALS374A, SN74AS374 . . . DW OR N PACKAGE (TOP VIEW)



SN54ALS374A, SN54AS374 . . . FK PACKAGE (TOP VIEW)



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

The SN54ALS374A and SN54AS374 are characterized for operation over the full military temperature range of –55°C to 125°C. The SN74ALS374A and SN74AS374 are characterized for operation from 0°C to 70°C.

# FUNCTION TABLE (each flip-flop)

	INPUTS	OUTPUT	
OE	CLK	D	Q
L	$\uparrow$	Н	Н
L	$\uparrow$	L	L
L	H or L	Χ	Q <sub>0</sub>
Н	X	Χ	Z

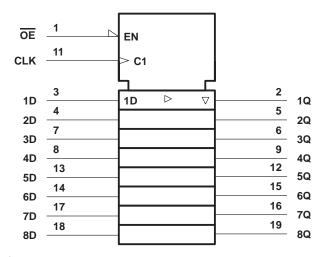


Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.

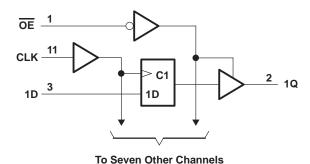


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### logic symbol<sup>†</sup>



### logic diagram (positive logic)



### absolute maximum ratings over operating free-air temperature range (unless otherwise noted)‡

Supply voltage range, V <sub>CC</sub>	0.5	$V \ to \ 7 \ V$
Input voltage range, V <sub>I</sub>	0.5	$\mbox{V}$ to 7 $\mbox{V}$
Voltage applied to a disabled 3-state output	0.5 V	to 5.5 V
Package thermal impedance, θ <sub>JA</sub> (see Note 1): DW package		58°C/W
N package		69°C/W
Storage temperature range, T <sub>stg</sub>	65°C t	to 150°C

<sup>‡</sup> Stresses beyond those listed under "absolute maximum ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under "recommended operating conditions" is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

NOTE 1: The package thermal impedance is calculated in accordance with JESD 51.

#### recommended operating conditions

		SN5	4ALS37	'4A	SN74ALS374A		'4A	UNIT
		MIN	NOM	MAX	MIN	NOM	MAX	UNIT
Vcc	Supply voltage	4.5	5	5.5	4.5	5	5.5	V
VIH	High-level input voltage	2			2			V
VIL	Low-level input voltage			0.7			0.8	V
Іон	High-level output current			-1			-2.6	mA
loL	Low-level output current			12			24	mA
T <sub>A</sub>	Operating free-air temperature	-55		125	0		70	°C

<sup>†</sup> This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

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

DADAMETED	TEST OF	ANDITIONS	SN5	4ALS374	IA	SN7	4ALS374	IA.	UNIT
PARAMETER	1551 00	ONDITIONS	MIN	TYP <sup>†</sup>	MAX	MIN	TYP <sup>†</sup>	MAX	UNII
VIK	$V_{CC} = 4.5 \text{ V},$	$I_{I} = -18 \text{ mA}$			-1.5			-1.5	V
	$V_{CC} = 4.5 \text{ V to } 5.5 \text{ V},$	$I_{OH} = -0.4 \text{ mA}$	V <sub>CC</sub> -2			V <sub>CC</sub> -2			
Voн	V-2 - 4 5 V	$I_{OH} = -1 \text{ mA}$	2.4	3.3					V
	V <sub>CC</sub> = 4.5 V	$I_{OH} = -2.6 \text{ mA}$				2.4	3.2		
Voi	V00 - 45 V	I <sub>OL</sub> = 12 mA		0.25	0.4		0.25	0.4	V
VOL	V <sub>CC</sub> = 4.5 V	I <sub>OL</sub> = 24 mA					0.35	0.5	V
lozh	V <sub>CC</sub> = 5.5 V,	V <sub>O</sub> = 2.7 V			20			20	μΑ
l <sub>OZL</sub>	$V_{CC} = 5.5 \text{ V},$	V <sub>O</sub> = 0.4 V			-20			-20	μΑ
lį	$V_{CC} = 5.5 \text{ V},$	V <sub>I</sub> = 7 V			0.1			0.1	mA
lН	V <sub>CC</sub> = 5.5 V,	V <sub>I</sub> = 2.7 V			20			20	μΑ
I <sub>Ι</sub> Γ	V <sub>CC</sub> = 5.5 V,	V <sub>I</sub> = 0.4 V			-0.2			-0.2	mA
I <sub>O</sub> ‡	V <sub>CC</sub> = 5.5 V,	V <sub>O</sub> = 2.25 V	-20		-112	-30		-112	mA
		Outputs high		11	20		11	19	
lCC	V <sub>CC</sub> = 5.5 V	Outputs low		19	28		19	28	mA
		Outputs disabled		20	31		20	31	

 $<sup>\</sup>uparrow$  All typical values are at V<sub>CC</sub> = 5 V, T<sub>A</sub> = 25°C.

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

			SN54AL	S374A	SN74AL	S374A	UNIT
			MIN	MAX	MIN	MAX	UNII
fclock	Clock frequency			30		35	MHz
t <sub>W</sub>	Pulse duration	CLK high or low	16.5		14		ns
t <sub>su</sub>	Setup time	Data before CLK↑	10		10		ns
t <sub>h</sub>	Hold time	Data after CLK↑	4		0		ns

# switching characteristics over recommended operating conditions (unless otherwise noted (see Figure 3)

PARAMETER	FROM	то	SN54AL	S374A	SN74AL	S374A	UNIT
PARAMETER	(INPUT)	(OUTPUT)	MIN	MAX	MIN	MAX	UNIT
fmax			30		35		MHz
t <sub>PLH</sub>	CLK		3	14	3	12	ns
<sup>t</sup> PHL	OLK	Q	5	17	5	16	115
<sup>t</sup> PZH	ŌĒ	_	3	18	3	17	ne
t <sub>PZL</sub>	ÜE	Q	5	21	5	18	ns
<sup>t</sup> PHZ	ŌĒ	Q	1	11	1	10	ns
t <sub>PLZ</sub>	OE	Q .	2	19	2	18	115



<sup>&</sup>lt;sup>‡</sup> The output conditions have been chosen to produce a current that closely approximates one half of the true short-circuit output current, IOS.

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### recommended operating conditions

		SI	N54AS37	'4	SN74AS374		<b>'</b> 4	UNIT
		MIN	NOM	MAX	MIN	NOM	MAX	UNIT
Vcc	Supply voltage	4.5	5	5.5	4.5	5	5.5	V
VIH	High-level input voltage	2			2			V
VIL	Low-level input voltage			0.7			0.8	V
Іон	High-level output current			-12			-15	mA
loL	Low-level output current			32			48	mA
TA	Operating free-air temperature	-55		125	0		70	°C

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

DADAMETED	TEST CO	MOITIONS	SN	154AS37	4	SN	74AS374	4	UNIT
PARAMETER	1231 00	ONDITIONS	MIN	TYP <sup>†</sup>	MAX	MIN	TYP†	MAX	UNIT
VIK	V <sub>CC</sub> = 4.5 V,	I <sub>I</sub> = -18 mA			-1.2			-1.2	V
	$V_{CC} = 4.5 \text{ V to } 5.5 \text{ V},$	I <sub>OH</sub> = -2 mA	V <sub>CC</sub> -2			V <sub>CC</sub> -2			
VOH	V00 - 45 V	I <sub>OH</sub> = -12 mA	2.4	3.2					V
	V <sub>CC</sub> = 4.5 V	I <sub>OH</sub> = -15 mA				2.4	3.3		
V	V45V	I <sub>OL</sub> = 32 mA		0.29	0.5				V
V <sub>OL</sub>	V <sub>CC</sub> = 4.5 V	I <sub>OL</sub> = 48 mA					0.34	0.5	V
lozh	V <sub>CC</sub> = 5.5 V,	V <sub>O</sub> = 2.7 V			50			50	μА
lozL	V <sub>CC</sub> = 5.5 V,	V <sub>O</sub> = 0.4 V			-50			-50	μА
IĮ	V <sub>CC</sub> = 5.5 V,	V <sub>I</sub> = 7 V			0.1			0.1	mA
lіН	V <sub>CC</sub> = 5.5 V,	V <sub>I</sub> = 2.7 V			20			20	μА
OE, CLK	V 55V	V- 0.4.V			-0.5			-0.5	A
l <sub>IL</sub> Data	V <sub>CC</sub> = 5.5 V,	$V_1 = 0.4 V$			-3			-2	mA
IO <sup>‡</sup>	V <sub>CC</sub> = 5.5 V,	V <sub>O</sub> = 2.25 V	-30		-112	-30		-112	mA
		Outputs high		77	120		77	120	
Icc	V <sub>CC</sub> = 5.5 V	Outputs low		84	128		84	128	mA
		Outputs disabled		84	128		84	128	

<sup>&</sup>lt;sup>†</sup> All typical values are at  $V_{CC} = 5 \text{ V}$ ,  $T_A = 25^{\circ}\text{C}$ .

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

			SN54A	S374	SN74A	S374	UNIT
			MIN	MAX	MIN	MAX	UNIT
fclock	Clock frequency			100*		125	MHz
	Pulse duration	CLK high	5.5*		4		20
t <sub>W</sub>	ruise duration	CLK low	3*		3		ns
t <sub>su</sub>	Setup time	Data before CLK↑	3*		2		ns
t <sub>h</sub>	Hold time	Data after CLK↑	3*		2		ns

<sup>\*</sup> On products compliant to MIL-PRF-38535, this parameter is not production tested.



<sup>‡</sup> The output conditions have been chosen to produce a current that closely approximates one half of the true short-circuit output current, IOS.

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# switching characteristics over recommended operating conditions (unless otherwise noted) (see Figure 3)

PARAMETER	FROM	то	SN54A	\S374	SN74A	S374	UNIT
FARAWETER	(INPUT)	(OUTPUT)	MIN	MAX	MIN	MAX	UNIT
fmax			100*		125		MHz
t <sub>PLH</sub>	CLK		3	11	3	8	no
<sup>t</sup> PHL	CLK	Q	4	11.5	4	9	ns
<sup>t</sup> PZH	ŌĒ		2	7	2	6	nc
t <sub>PZL</sub>	OE	Q	3	11	3	10	ns
<sup>t</sup> PHZ	ŌĒ	Q	2	10	2	6	ne
t <sub>PLZ</sub>	OE .	l <sup>q</sup>	2	7	2	6	ns

<sup>\*</sup> On products compliant to MIL-PRF-38535, this parameter is not production tested.

#### **APPLICATION INFORMATION**

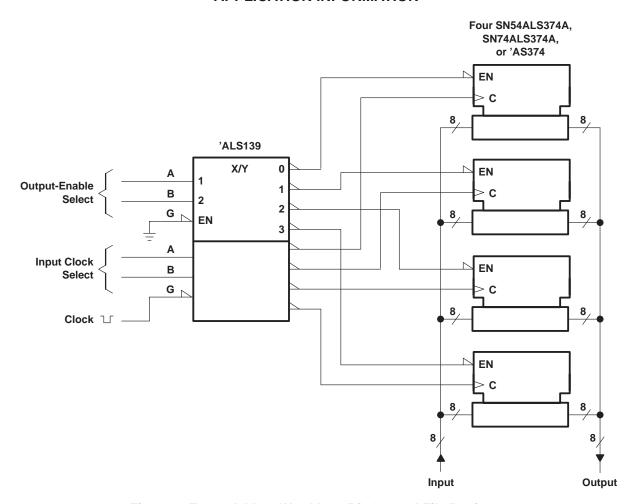


Figure 1. Expandable 4-Word by 8-Bit General File Register



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#### **APPLICATION INFORMATION**

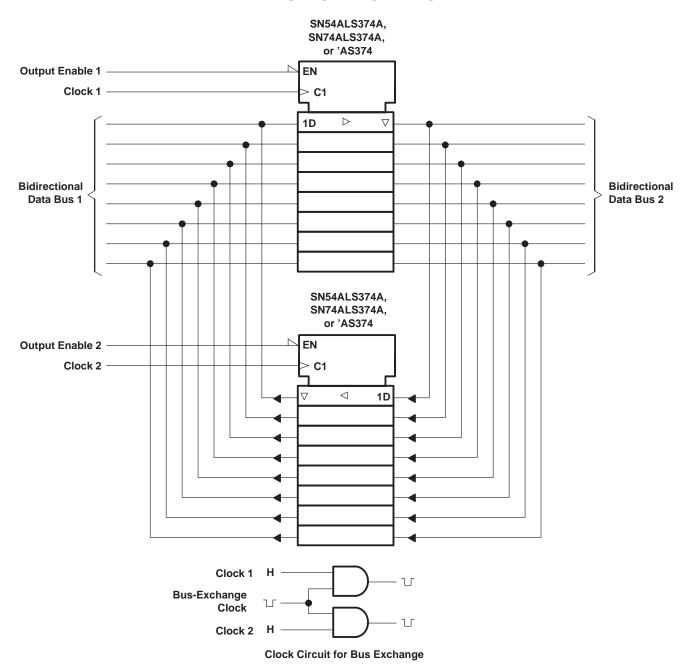
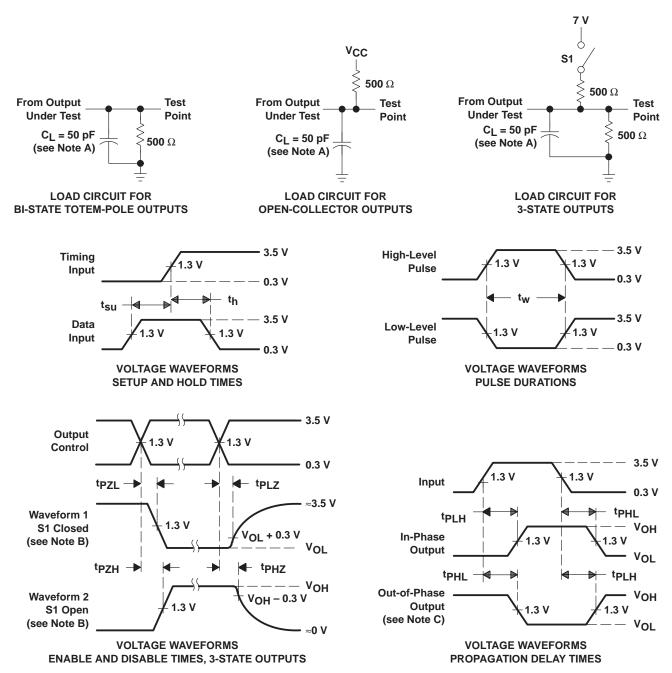


Figure 2. Bidirectional Bus Driver

# PARAMETER MEASUREMENT INFORMATION SERIES 54ALS/74ALS AND 54AS/74AS DEVICES



NOTES: A. C<sub>I</sub> 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. When measuring propagation delay items of 3-state outputs, switch S1 is open.
- D. All input pulses have the following characteristics: PRR  $\leq$  1 MHz,  $t_{\Gamma} = t_{f} = 2$  ns, duty cycle = 50%.
- E. The outputs are measured one at a time with one transition per measurement.

Figure 3. Load Circuits and Voltage Waveforms



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### **PACKAGING INFORMATION**

Orderable part number	Status (1)	Material type (2)	Package   Pins	Package qty   Carrier	<b>RoHS</b> (3)	Lead finish/ Ball material	MSL rating/ Peak reflow	Op temp (°C)	Part marking (6)
5962-9756201QRA	Active	Production	CDIP (J)   20	20   TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	5962-9756201QR A SNJ54AS374J
83020022A	Active	Production	LCCC (FK)   20	55   TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	83020022A SNJ54ALS 374AFK
8302002RA	Active	Production	CDIP (J)   20	20   TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	8302002RA SNJ54ALS374AJ
8302002SA	Active	Production	CFP (W)   20	25   TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	8302002SA SNJ54ALS374AW
JM38510/37204B2A	Active	Production	LCCC (FK)   20	55   TUBE	No	SNPB	N/A for Pkg Type	-	JM38510/ 37204B2A
JM38510/37204B2A.A	Active	Production	LCCC (FK)   20	55   TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	JM38510/ 37204B2A
JM38510/37204BRA	Active	Production	CDIP (J)   20	20   TUBE	No	SNPB	N/A for Pkg Type	-	JM38510/ 37204BRA
JM38510/37204BRA.A	Active	Production	CDIP (J)   20	20   TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	JM38510/ 37204BRA
M38510/37204B2A	Active	Production	LCCC (FK)   20	55   TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	JM38510/ 37204B2A
M38510/37204BRA	Active	Production	CDIP (J)   20	20   TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	JM38510/ 37204BRA
SN54ALS374AJ	Active	Production	CDIP (J)   20	20   TUBE	No	SNPB	N/A for Pkg Type	-	SN54ALS374AJ
SN54ALS374AJ.A	Active	Production	CDIP (J)   20	20   TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	SN54ALS374AJ
SN54AS374J	Active	Production	CDIP (J)   20	20   TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	SN54AS374J
SN54AS374J.A	Active	Production	CDIP (J)   20	20   TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	SN54AS374J
SN74ALS374ADW	Obsolete	Production	SOIC (DW)   20	-	-	Call TI	Call TI	0 to 70	ALS374A
SN74ALS374ADWR	Active	Production	SOIC (DW)   20	2000   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	0 to 70	ALS374A
SN74ALS374ADWR.A	Active	Production	SOIC (DW)   20	2000   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	0 to 70	ALS374A
SN74ALS374AN	Active	Production	PDIP (N)   20	20   TUBE	Yes	NIPDAU	N/A for Pkg Type	0 to 70	SN74ALS374AN
SN74ALS374AN.A	Active	Production	PDIP (N)   20	20   TUBE	Yes	NIPDAU	N/A for Pkg Type	0 to 70	SN74ALS374AN
SN74ALS374ANSR	Active	Production	SOP (NS)   20	2000   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	0 to 70	ALS374A



-55 to 125

N/A for Pkg Type

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SNJ54AS374J

5962-9756201QR Α SNJ54AS374J



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Orderable part number	Status (1)	Material type (2)	Package   Pins	Package qty   Carrier	RoHS (3)	Lead finish/ Ball material	MSL rating/ Peak reflow	Op temp (°C)	Part marking (6)
						(4)	(5)		
SN74ALS374ANSR.A	Active	Production	SOP (NS)   20	2000   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	0 to 70	ALS374A
SN74AS374N	Active	Production	PDIP (N)   20	20   TUBE	Yes	NIPDAU	N/A for Pkg Type	0 to 70	SN74AS374N
SN74AS374N.A	Active	Production	PDIP (N)   20	20   TUBE	Yes	NIPDAU	N/A for Pkg Type	0 to 70	SN74AS374N
SNJ54ALS374AFK	Active	Production	LCCC (FK)   20	55   TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	83020022A SNJ54ALS 374AFK
SNJ54ALS374AFK.A	Active	Production	LCCC (FK)   20	55   TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	83020022A SNJ54ALS 374AFK
SNJ54ALS374AJ	Active	Production	CDIP (J)   20	20   TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	8302002RA SNJ54ALS374A.
SNJ54ALS374AJ.A	Active	Production	CDIP (J)   20	20   TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	8302002RA SNJ54ALS374A
SNJ54ALS374AW	Active	Production	CFP (W)   20	25   TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	8302002SA SNJ54ALS374AV
SNJ54ALS374AW.A	Active	Production	CFP (W)   20	25   TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	8302002SA SNJ54ALS374AV
SNJ54AS374J	Active	Production	CDIP (J)   20	20   TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	5962-9756201Q

SNJ54AS374J.A

Active

Production

CDIP (J) | 20

20 | TUBE

No

**SNPB** 

<sup>(1)</sup> Status: For more details on status, see our product life cycle.

<sup>(2)</sup> Material type: When designated, preproduction parts are prototypes/experimental devices, and are not yet approved or released for full production. Testing and final process, including without limitation quality assurance, reliability performance testing, and/or process qualification, may not yet be complete, and this item is subject to further changes or possible discontinuation. If available for ordering, purchases will be subject to an additional waiver at checkout, and are intended for early internal evaluation purposes only. These items are sold without warranties of any kind.

<sup>(3)</sup> RoHS values: Yes, No, RoHS Exempt. See the TI RoHS Statement for additional information and value definition.

<sup>(4)</sup> Lead finish/Ball material: Parts 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.

### **PACKAGE OPTION ADDENDUM**

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(5) MSL rating/Peak reflow: The moisture sensitivity level ratings and peak solder (reflow) temperatures. In the event that a part has multiple moisture sensitivity ratings, only the lowest level per JEDEC standards is shown. Refer to the shipping label for the actual reflow temperature that will be used to mount the part to the printed circuit board.

(6) Part marking: There may be an additional marking, which relates to the logo, the lot trace code information, or the environmental category of the part.

Multiple part markings will be inside parentheses. Only one part marking contained in parentheses and separated by a "~" will appear on a part. If a line is indented then it is a continuation of the previous line and the two combined represent the entire part marking for that device.

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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 SN54ALS374A, SN54AS374, SN74ALS374A, SN74AS374:

Catalog: SN74ALS374A, SN74AS374

Military: SN54ALS374A, SN54AS374

NOTE: Qualified Version Definitions:

- Catalog TI's standard catalog product
- Military QML certified for Military and Defense Applications

# **PACKAGE MATERIALS INFORMATION**

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#### TAPE AND REEL INFORMATION





	-
A0	Dimension designed to accommodate the component width
В0	Dimension designed to accommodate the component length
K0	Dimension designed to accommodate the component thickness
W	Overall width of the carrier tape
P1	Pitch between successive cavity centers

#### QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



#### \*All dimensions are nominal

Device	Package Type	Package Drawing		SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
SN74ALS374ADWR	SOIC	DW	20	2000	330.0	24.4	10.8	13.3	2.7	12.0	24.0	Q1
SN74ALS374ANSR	SOP	NS	20	2000	330.0	24.4	8.4	13.0	2.5	12.0	24.0	Q1

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#### \*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN74ALS374ADWR	SOIC	DW	20	2000	356.0	356.0	45.0
SN74ALS374ANSR	SOP	NS	20	2000	356.0	356.0	45.0

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#### **TUBE**



\*All dimensions are nominal

Device	Package Name	Package Type	Pins	SPQ	L (mm)	W (mm)	T (µm)	B (mm)
83020022A	FK	LCCC	20	55	506.98	12.06	2030	NA
8302002SA	W	CFP	20	25	506.98	26.16	6220	NA
JM38510/37204B2A	FK	LCCC	20	55	506.98	12.06	2030	NA
JM38510/37204B2A.A	FK	LCCC	20	55	506.98	12.06	2030	NA
M38510/37204B2A	FK	LCCC	20	55	506.98	12.06	2030	NA
SN74ALS374AN	N	PDIP	20	20	506	13.97	11230	4.32
SN74ALS374AN.A	N	PDIP	20	20	506	13.97	11230	4.32
SN74AS374N	N	PDIP	20	20	506	13.97	11230	4.32
SN74AS374N.A	N	PDIP	20	20	506	13.97	11230	4.32
SNJ54ALS374AFK	FK	LCCC	20	55	506.98	12.06	2030	NA
SNJ54ALS374AFK.A	FK	LCCC	20	55	506.98	12.06	2030	NA
SNJ54ALS374AW	W	CFP	20	25	506.98	26.16	6220	NA
SNJ54ALS374AW.A	W	CFP	20	25	506.98	26.16	6220	NA

# W (R-GDFP-F20)

# CERAMIC DUAL FLATPACK



- A. All linear dimensions are in inches (millimeters).
- 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



### **MECHANICAL DATA**

# NS (R-PDSO-G\*\*)

# 14-PINS SHOWN

#### PLASTIC SMALL-OUTLINE PACKAGE



- A. All linear dimensions are in millimeters.
- B. This drawing is subject to change without notice.
- C. Body dimensions do not include mold flash or protrusion, not to exceed 0,15.



#### 14 LEADS SHOWN



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

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.



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# N (R-PDIP-T\*\*)

# PLASTIC DUAL-IN-LINE PACKAGE

16 PINS SHOWN



- 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.





SOIC



- 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.



SOIC



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.



SOIC



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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