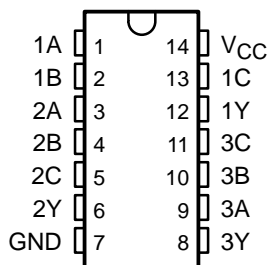


# SN54ALS11A, SN54AS11, SN74ALS11A, SN74AS11 TRIPLE 3-INPUT POSITIVE-AND GATES

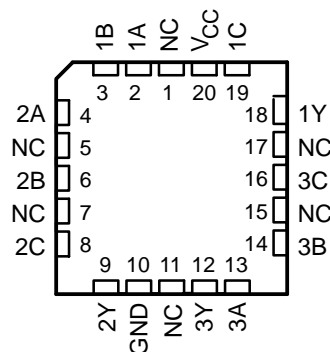
SDAS009D – MARCH 1984 – REVISED NOVEMBER 2002

- 4.5-V to 5.5-V  $V_{CC}$  Operation
- Max  $t_{pd}$  of 5.5 ns at 5 V

SN54ALS11A, . . . J OR W PACKAGE  
SN54AS11 . . . J PACKAGE  
SN74ALS11A, SN74AS11 . . . D, N, OR NS PACKAGE  
(TOP VIEW)



SN54ALS11A, SN54AS11 . . . FK PACKAGE  
(TOP VIEW)



NC – No internal connection

## description/ordering information

These devices contain three independent 3-input positive-AND gates. They perform the Boolean functions  $Y = A \cdot B \cdot C$  or  $Y = \overline{A} + \overline{B} + \overline{C}$  in positive logic.

## ORDERING INFORMATION

$T_A$	PACKAGE†		ORDERABLE PART NUMBER	TOP-SIDE MARKING	
0°C to 70°C	PDIP – N	Tube	SN74ALS11AN	SN74ALS11AN	
			SN74AS11N	SN74AS11N	
	SOIC – D	Tube	SN74ALS11AD	ALS11A	
			Tape and reel		SN74ALS11ADR
			Tape and reel	SN74AS11D	AS11
				SN74AS11DR	
SOP – NS	Tape and reel	SN74ALS11ANSR	ALS11A		
		SN74AS11NSR	74AS11		
–55°C to 125°C	CDIP – J	Tube	SNJ54ALS11AJ	SNJ54ALS11AJ	
			SNJ54AS11J	SNJ54AS11J	
	CFP – W	Tube	SNJ54ALS11AW	SNJ54ALS11AW	
	LCCC – FK	Tube	SNJ54ALS11AFK	SNJ54ALS11AFK	
SNJ54AS11FK			SNJ54AS11FK		

† Package drawings, standard packing quantities, thermal data, symbolization, and PCB design guidelines are available at [www.ti.com/sc/package](http://www.ti.com/sc/package).



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.

PRODUCTION DATA information is current as of publication date. Products conform to specifications per the terms of Texas Instruments standard warranty. Production processing does not necessarily include testing of all parameters.

 **TEXAS  
INSTRUMENTS**

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On products compliant to MIL-PRF-38535, all parameters are tested unless otherwise noted. On all other products, production processing does not necessarily include testing of all parameters.

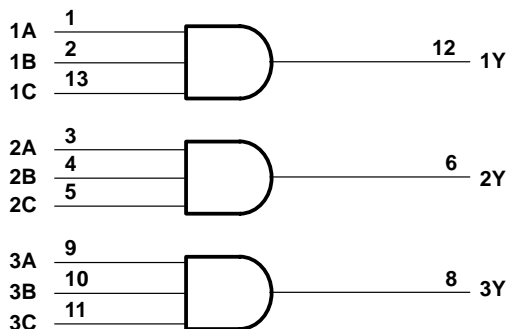
# SN54ALS11A, SN54AS11, SN74ALS11A, SN74AS11 TRIPLE 3-INPUT POSITIVE-AND GATES

SDAS009D – MARCH 1984 – REVISED NOVEMBER 2002

FUNCTION TABLE  
(each gate)

INPUTS			OUTPUT
A	B	C	Y
H	H	H	H
L	X	X	L
X	L	X	L
X	X	L	L

## logic diagram, each gate (positive logic)



Pin numbers shown are for the D, J, N, NS, and W packages.

## absolute maximum ratings over operating free-air temperature range (SN54ALS11A, SN74ALS11A) (unless otherwise noted)<sup>†</sup>

Supply voltage, $V_{CC}$	7 V
Input voltage, $V_I$	7 V
Package thermal impedance, $\theta_{JA}$ (see Note 1): D package	86°C/W
N package	80°C/W
NS package	76°C/W
Storage temperature range	-65°C 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 51-7.

## recommended operating conditions (see Note 2)

	SN54ALS11A			SN74ALS11A			UNIT
	MIN	NOM	MAX	MIN	NOM	MAX	
$V_{CC}$ Supply voltage	4.5	5	5.5	4.5	5	5.5	V
$V_{IH}$ High-level input voltage	2			2			V
$V_{IL}$ Low-level input voltage			0.8 <sup>‡</sup>			0.8	V
			0.7 <sup>§</sup>				
$I_{OH}$ High-level output current			-0.4			-0.4	mA
$I_{OL}$ Low-level output current			4			8	mA
$T_A$ Operating free-air temperature	-55		125	0		70	°C

<sup>‡</sup> Applies over temperature range -55°C to 70°C

<sup>§</sup> Applies over temperature range 70°C to 125°C

NOTE 2: All unused inputs of the device must be held at  $V_{CC}$  or GND to ensure proper device operation. Refer to the TI application report, *Implications of Slow or Floating CMOS Inputs*, literature number SCBA004.



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# SN54ALS11A, SN54AS11, SN74ALS11A, SN74AS11 TRIPLE 3-INPUT POSITIVE-AND GATES

SDAS009D – MARCH 1984 – REVISED NOVEMBER 2002

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

PARAMETER	TEST CONDITIONS	SN54ALS11A		SN74ALS11A		UNIT		
		MIN	TYP†	MAX	MIN		TYP†	MAX
$V_{IK}$	$V_{CC} = 4.5\text{ V}$ , $I_I = -18\text{ mA}$			-1.5		-1.5	V	
$V_{OH}$	$V_{CC} = 4.5\text{ V to }5.5\text{ V}$ , $I_{OH} = -0.4\text{ mA}$			$V_{CC} - 2$		$V_{CC} - 2$	V	
$V_{OL}$	$V_{CC} = 4.5\text{ V}$			0.25	0.4	0.25	0.4	V
						0.35	0.5	
$I_I$	$V_{CC} = 5.5\text{ V}$ , $V_I = 7\text{ V}$				0.1		0.1	mA
$I_{IH}$	$V_{CC} = 5.5\text{ V}$ , $V_I = 2.7\text{ V}$				20		20	$\mu\text{A}$
$I_{IL}$	$V_{CC} = 5.5\text{ V}$ , $V_I = 0.4\text{ V}$				-0.1		-0.1	mA
$I_{O\ddagger}$	$V_{CC} = 5.5\text{ V}$ , $V_O = 2.25\text{ V}$	-20		-112		-30		mA
$I_{CCH}$	$V_{CC} = 5.5\text{ V}$ , $V_I = 4.5\text{ V}$		1	1.8		1	1.8	mA
$I_{CCL}$	$V_{CC} = 5.5\text{ V}$ , $V_I = 0$		1.6	3		1.6	3	mA

† All typical values are at  $V_{CC} = 5\text{ V}$ ,  $T_A = 25^\circ\text{C}$ .

‡ The output conditions have been chosen to produce a current that closely approximates one half of the true short-circuit output current,  $I_{OS}$ .

## switching characteristics (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	$V_{CC} = 4.5\text{ V TO }5.5\text{ V}$ , $C_L = 50\text{ PF}$ , $R_L = 500\ \Omega$ , $T_A = \text{MIN TO MAX}\S$				UNIT
			SN54ALS11A		SN74ALS11A		
			MIN	MAX	MIN	MAX	
$t_{PLH}$	A, B, or C	Y	2	14	2	13	ns
$t_{PHL}$			2	12.5	2	10	

§ For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.

## absolute maximum ratings over operating free-air temperature range (SN54AS11, SN74AS11) (unless otherwise noted)¶

Supply voltage, $V_{CC}$	7 V
Input voltage, $V_I$	7 V
Package thermal impedance, $\theta_{JA}$ (see Note 1): D package	86°C/W
N package	80°C/W
NS package	76°C/W
Storage temperature range	-65°C to 150°C

¶ 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 51-7.

# SN54ALS11A, SN54AS11, SN74ALS11A, SN74AS11 TRIPLE 3-INPUT POSITIVE-AND GATES

SDAS009D – MARCH 1984 – REVISED NOVEMBER 2002

## recommended operating conditions (see Note 2)

		SN54AS11			SN74AS11			UNIT		
		MIN	NOM	MAX	MIN	NOM	MAX			
V <sub>CC</sub>	Supply voltage	4.5	5	5.5	4.5	5	5.5	V		
V <sub>IH</sub>	High-level input voltage	2			2			V		
V <sub>IL</sub>	Low-level input voltage	0.8			0.8			V		
I <sub>OH</sub>	High-level output current	-2			-2			mA		
I <sub>OL</sub>	Low-level output current	20			20			mA		
T <sub>A</sub>	Operating free-air temperature	-55			125			0	70	°C

NOTE 3: All unused inputs of the device must be held at V<sub>CC</sub> or GND to ensure proper device operation. Refer to the TI application report, *Implications of Slow or Floating CMOS Inputs*, literature number SCBA004.

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

PARAMETER	TEST CONDITIONS	SN54AS11			SN74AS11			UNIT
		MIN	TYP†	MAX	MIN	TYP†	MAX	
V <sub>IK</sub>	V <sub>CC</sub> = 4.5 V, I <sub>I</sub> = -18 mA	-1.2			-1.2			V
V <sub>OH</sub>	V <sub>CC</sub> = 4.5 V to 5.5 V, I <sub>OH</sub> = -2 mA	V <sub>CC</sub> -2			V <sub>CC</sub> -2			V
V <sub>OL</sub>	V <sub>CC</sub> = 4.5 V, I <sub>OL</sub> = 20 mA	0.35 0.5			0.35 0.5			V
I <sub>I</sub>	V <sub>CC</sub> = 5.5 V, V <sub>I</sub> = 7 V	0.1			0.1			mA
I <sub>IH</sub>	V <sub>CC</sub> = 5.5 V, V <sub>I</sub> = 2.7 V	20			20			μA
I <sub>IL</sub>	V <sub>CC</sub> = 5.5 V, V <sub>I</sub> = 0.4 V	-0.5			-0.5			mA
I <sub>O</sub> ‡	V <sub>CC</sub> = 5.5 V, V <sub>O</sub> = 2.25 V	-30 -112			-30 -112			mA
I <sub>CCH</sub>	V <sub>CC</sub> = 5.5 V, V <sub>I</sub> = 4.5 V	4.3 7			4.3 7			mA
I <sub>CCL</sub>	V <sub>CC</sub> = 5.5 V, V <sub>I</sub> = 0	11.2 18			11.2 18			mA

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

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

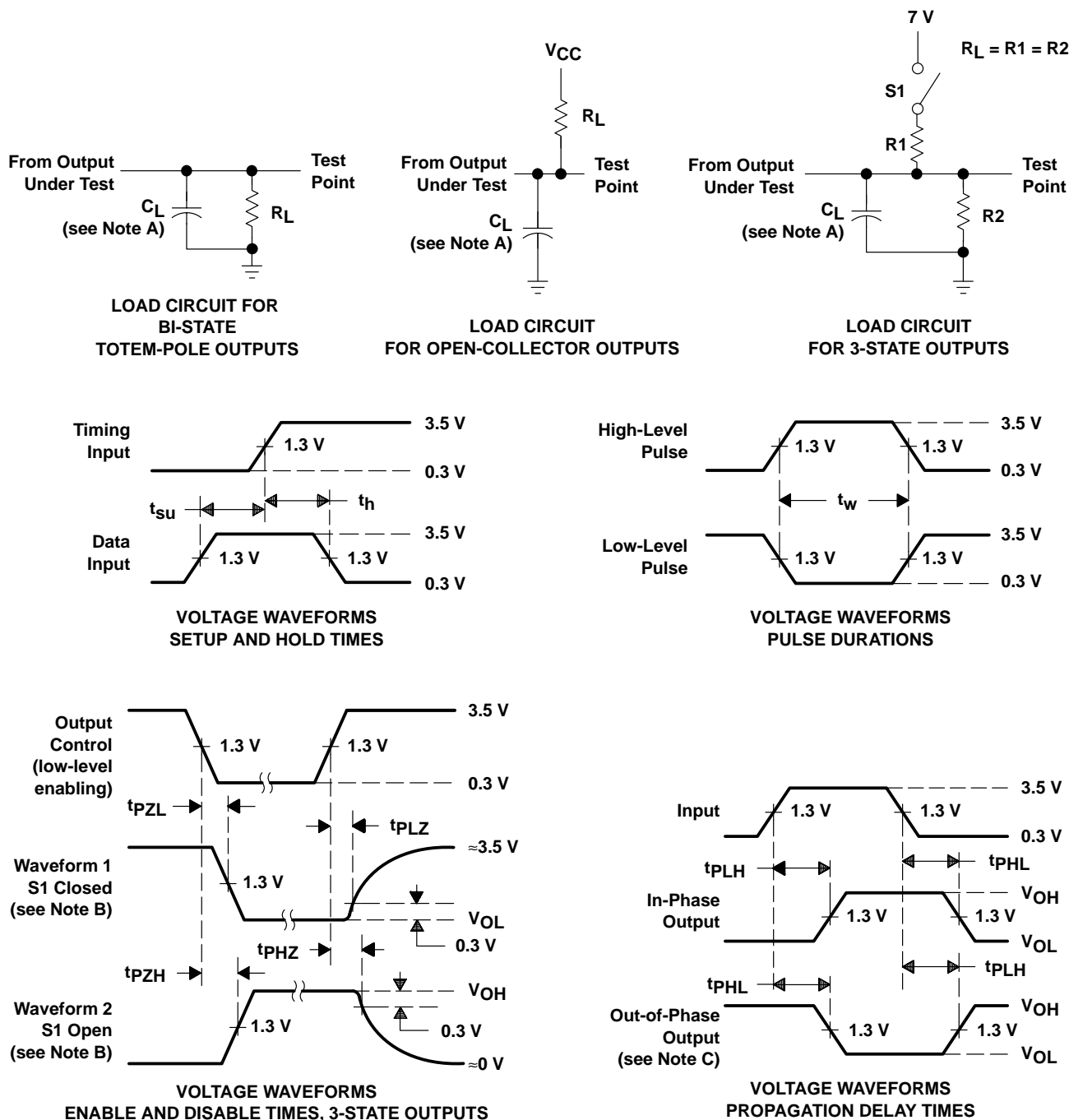
## switching characteristics (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V <sub>CC</sub> = 4.5 V TO 5.5 V, C <sub>L</sub> = 50 PF, R <sub>L</sub> = 500 Ω, T <sub>A</sub> = MIN TO MAX§				UNIT
			SN54AS11		SN74AS11		
			MIN	MAX	MIN	MAX	
t <sub>PLH</sub>	A, B, or C	Y	1	6.5	1	6	ns
t <sub>PHL</sub>			1	6.5	1	5.5	

§ For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.



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



- NOTES: 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. 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,  $t_r = t_f = 2$  ns, duty cycle = 50%.  
 E. The outputs are measured one at a time with one transition per measurement.

Figure 1. Load Circuits and Voltage Waveforms

**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
5962-86841012A	ACTIVE	LCCC	FK	20	55	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	5962- 86841012A SNJ54ALS 11AFK	<a href="#">Samples</a>
5962-8684101CA	ACTIVE	CDIP	J	14	25	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	5962-8684101CA SNJ54ALS11AJ	<a href="#">Samples</a>
5962-8684101DA	ACTIVE	CFP	W	14	25	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	5962-8684101DA SNJ54ALS11AW	<a href="#">Samples</a>
5962-9756101QCA	ACTIVE	CDIP	J	14	25	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	5962-9756101QC A SNJ54AS11J	<a href="#">Samples</a>
JM38510/37402BCA	ACTIVE	CDIP	J	14	25	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	JM38510/ 37402BCA	<a href="#">Samples</a>
M38510/37402BCA	ACTIVE	CDIP	J	14	25	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	JM38510/ 37402BCA	<a href="#">Samples</a>
SN54ALS11AJ	ACTIVE	CDIP	J	14	25	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	SN54ALS11AJ	<a href="#">Samples</a>
SN54AS11J	ACTIVE	CDIP	J	14	25	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	SN54AS11J	<a href="#">Samples</a>
SN74ALS11ADR	ACTIVE	SOIC	D	14	2500	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	0 to 70	ALS11A	<a href="#">Samples</a>
SN74ALS11AN	ACTIVE	PDIP	N	14	25	RoHS & Green	NIPDAU	N / A for Pkg Type	0 to 70	SN74ALS11AN	<a href="#">Samples</a>
SN74ALS11ANSR	ACTIVE	SO	NS	14	2000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	0 to 70	ALS11A	<a href="#">Samples</a>
SN74AS11D	ACTIVE	SOIC	D	14	50	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	0 to 70	AS11	<a href="#">Samples</a>
SN74AS11N	ACTIVE	PDIP	N	14	25	RoHS & Green	NIPDAU	N / A for Pkg Type	0 to 70	SN74AS11N	<a href="#">Samples</a>
SNJ54ALS11AFK	ACTIVE	LCCC	FK	20	55	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	5962- 86841012A SNJ54ALS 11AFK	<a href="#">Samples</a>
SNJ54ALS11AJ	ACTIVE	CDIP	J	14	25	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	5962-8684101CA SNJ54ALS11AJ	<a href="#">Samples</a>

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
SNJ54ALS11AW	ACTIVE	CFP	W	14	25	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	5962-8684101DA SNJ54ALS11AW	<a href="#">Samples</a>
SNJ54AS11J	ACTIVE	CDIP	J	14	25	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	5962-9756101QC A SNJ54AS11J	<a href="#">Samples</a>

(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.

**OBsolete:** 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 <=100ppm threshold. Antimony trioxide based flame retardants must also meet the <=1000ppm 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.

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**OTHER QUALIFIED VERSIONS OF SN54ALS11A, SN54AS11, SN74ALS11A, SN74AS11 :**

- Catalog : [SN74ALS11A](#), [SN74AS11](#)
- Military : [SN54ALS11A](#), [SN54AS11](#)

## 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
SN74ALS11ADR	SOIC	D	14	2500	330.0	16.4	6.5	9.0	2.1	8.0	16.0	Q1
SN74ALS11ANSR	SO	NS	14	2000	330.0	16.4	8.2	10.5	2.5	12.0	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)
SN74ALS11ADR	SOIC	D	14	2500	356.0	356.0	35.0
SN74ALS11ANSR	SO	NS	14	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)
5962-86841012A	FK	LCCC	20	55	506.98	12.06	2030	NA
5962-8684101DA	W	CFP	14	25	506.98	26.16	6220	NA
SN74ALS11AN	N	PDIP	14	25	506	13.97	11230	4.32
SN74ALS11AN	N	PDIP	14	25	506	13.97	11230	4.32
SN74AS11D	D	SOIC	14	50	506.6	8	3940	4.32
SN74AS11N	N	PDIP	14	25	506	13.97	11230	4.32
SN74AS11N	N	PDIP	14	25	506	13.97	11230	4.32
SNJ54ALS11AFK	FK	LCCC	20	55	506.98	12.06	2030	NA
SNJ54ALS11AW	W	CFP	14	25	506.98	26.16	6220	NA

## MECHANICAL DATA

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

PLASTIC SMALL-OUTLINE PACKAGE

14-PINS SHOWN



- NOTES:
- 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.

W (R-GDFP-F14)

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 GDFP1-F14

## GENERIC PACKAGE VIEW

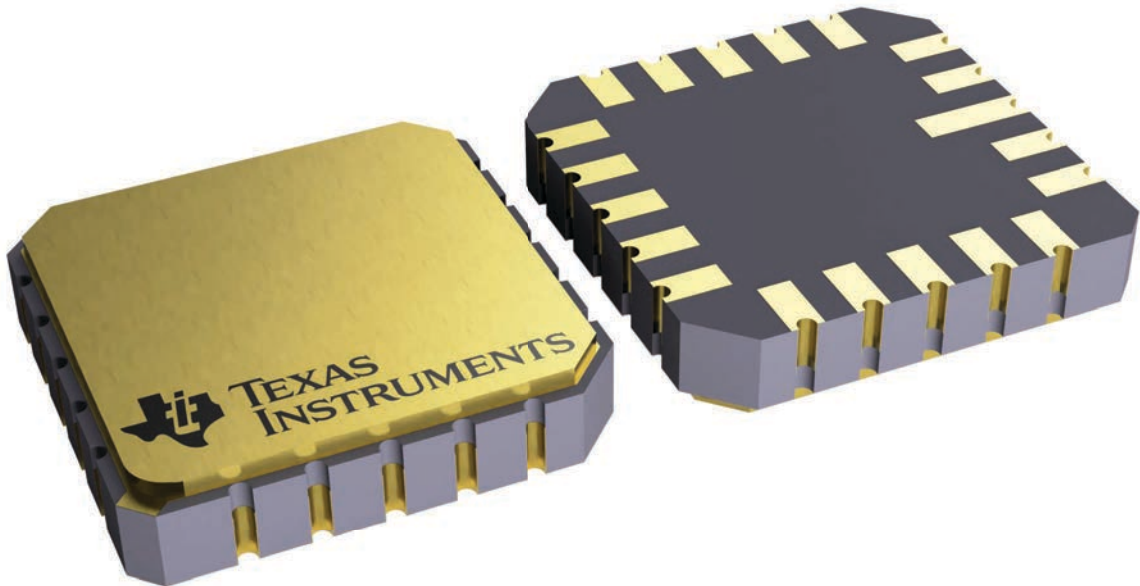
**FK 20**

**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\

J 14

**GENERIC PACKAGE VIEW**  
**CDIP - 5.08 mm max height**  
CERAMIC DUAL IN LINE PACKAGE



Images above are just a representation of the package family, actual package may vary.  
Refer to the product data sheet for package details.

4040083-5/G

# J0014A



## PACKAGE OUTLINE

CDIP - 5.08 mm max height

CERAMIC DUAL IN LINE PACKAGE



4214771/A 05/2017

### NOTES:

1. All controlling linear dimensions are in inches. Dimensions in brackets are in millimeters. Any dimension in brackets or parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This package is hermetically sealed with a ceramic lid using glass frit.
4. Index point is provided on cap for terminal identification only and on press ceramic glass frit seal only.
5. Falls within MIL-STD-1835 and GDIP1-T14.



# EXAMPLE BOARD LAYOUT

J0014A

CDIP - 5.08 mm max height

CERAMIC DUAL IN LINE PACKAGE



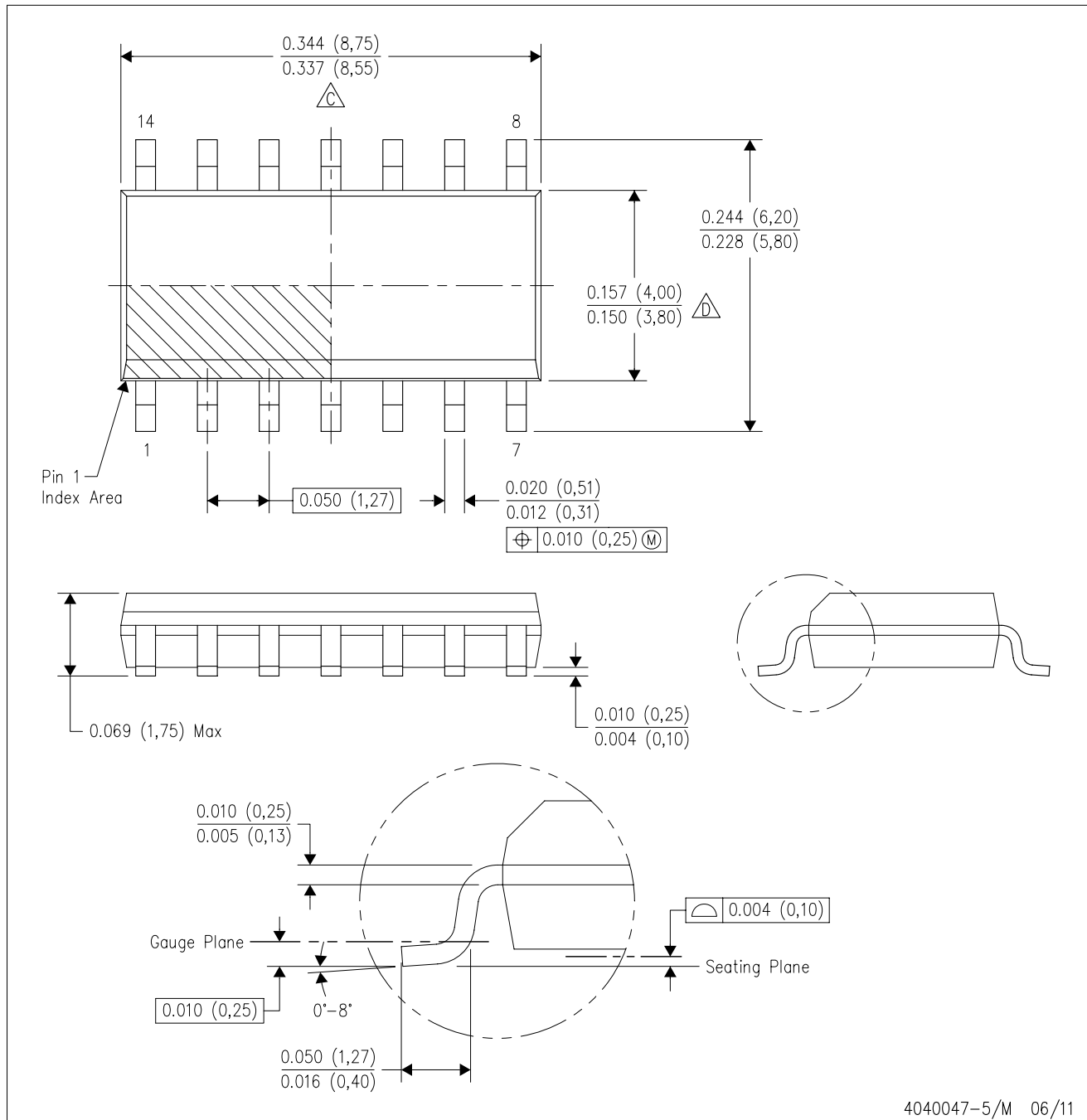
LAND PATTERN EXAMPLE  
NON-SOLDER MASK DEFINED  
SCALE: 5X





4214771/A 05/2017

D (R-PDSO-G14)

PLASTIC SMALL OUTLINE



- NOTES:
- A. All linear dimensions are in inches (millimeters).
  - B. This drawing is subject to change without notice.
  -  Body length does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.006 (0,15) each side.
  -  Body width does not include interlead flash. Interlead flash shall not exceed 0.017 (0,43) each side.
  - E. Reference JEDEC MS-012 variation AB.

D (R-PDSO-G14)

PLASTIC SMALL OUTLINE



4211283-3/E 08/12

- NOTES:
- All linear dimensions are in millimeters.
  - This drawing is subject to change without notice.
  - Publication IPC-7351 is recommended for alternate designs.
  - Laser cutting apertures with trapezoidal walls and also rounding corners will offer better paste release. Customers should contact their board assembly site for stencil design recommendations. Refer to IPC-7525 for other stencil recommendations.
  - Customers should contact their board fabrication site for solder mask tolerances between and around signal pads.

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

PLASTIC DUAL-IN-LINE PACKAGE

16 PINS SHOWN



4040049/E 12/2002

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

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