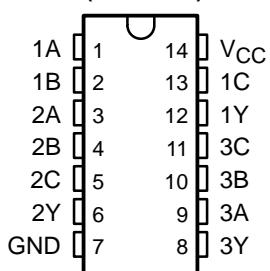
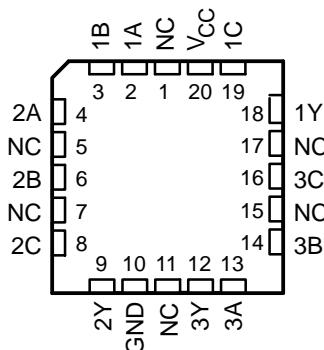


- 4.5-V to 5.5-V  $V_{CC}$  Operation
- Max  $t_{pd}$  of 5.5 ns at 5 V

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  $Y = A \bullet B \bullet C$  or  $Y = \overline{A} + \overline{B} + \overline{C}$  in positive logic.

## ORDERING INFORMATION

TA	PACKAGE <sup>†</sup>		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	
		Tube	SN74AS11D	
		Tape and reel	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

<sup>†</sup> 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).



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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.



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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.

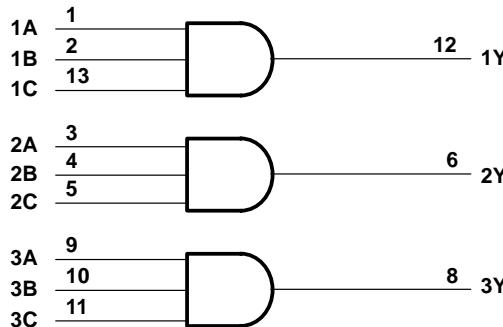
# **SN54ALS11A, SN54AS11, SN74ALS11A, SN74AS11 TRIPLE 3-INPUT POSITIVE-AND GATES**

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>

<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 JEDEC 51-7.

#### **recommended operating conditions (see Note 2)**

		SN54ALS11A			SN74ALS11A			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 <sup>‡</sup>			0.8	V
				0.7 <sup>§</sup>				
I <sub>OH</sub>	High-level output current			-0.4			-0.4	mA
I <sub>OL</sub>	Low-level output current			4			8	mA
T <sub>A</sub>	Operating free-air temperature	-55		125	0		70	°C

† Applies over temperature range -55°C to 70°C.

§ Applies over temperature range 70°C to 125°C

NOTE 2: 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 SCRA004.



# 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	TYPT <sup>†</sup>	MAX	MIN	TYPT <sup>†</sup>	MAX	
V <sub>IK</sub>	V <sub>CC</sub> = 4.5 V, I <sub>I</sub> = -18 mA			-1.5			-1.5	V
V <sub>OH</sub>	V <sub>CC</sub> = 4.5 V to 5.5 V, I <sub>OH</sub> = -0.4 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> = 4 mA		0.25	0.4		0.25	0.4
		I <sub>OL</sub> = 8 mA					0.35	0.5
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			-0.1			-0.1	mA
I <sub>O</sub> <sup>‡</sup>	V <sub>CC</sub> = 5.5 V, V <sub>O</sub> = 2.25 V	-20	-112	-30	-112			mA
I <sub>CCH</sub>	V <sub>CC</sub> = 5.5 V, V <sub>I</sub> = 4.5 V		1	1.8		1	1.8	mA
I <sub>CCL</sub>	V <sub>CC</sub> = 5.5 V, V <sub>I</sub> = 0		1.6	3		1.6	3	mA

<sup>†</sup> All typical values are at  $V_{CC} = 5$  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)	$V_{CC} = 4.5 \text{ V TO } 5.5 \text{ V}$ , $C_L = 50 \text{ PF}$ , $R_L = 500 \Omega$ , $T_A = \text{MIN TO MAX}^\dagger$				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)¶

¶ 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	
$V_{CC}$	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			0.8	V
$I_{OH}$	High-level output current			-2			-2	mA
$I_{OL}$	Low-level output current			20			20	mA
$T_A$	Operating free-air temperature	-55		125	0		70	°C

NOTE 3: 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.

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

PARAMETER	TEST CONDITIONS	SN54AS11			SN74AS11			UNIT
		MIN	TYP†	MAX	MIN	TYP†	MAX	
$V_{IK}$	$V_{CC} = 4.5$ V, $I_I = -18$ mA			-1.2			-1.2	V
$V_{OH}$	$V_{CC} = 4.5$ V to 5.5 V, $I_{OH} = -2$ mA	$V_{CC}-2$			$V_{CC}-2$			V
$V_{OL}$	$V_{CC} = 4.5$ V, $I_{OL} = 20$ mA	0.35	0.5		0.35	0.5		V
$I_I$	$V_{CC} = 5.5$ V, $V_I = 7$ V		0.1			0.1		mA
$I_{IH}$	$V_{CC} = 5.5$ V, $V_I = 2.7$ V			20			20	µA
$I_{IL}$	$V_{CC} = 5.5$ V, $V_I = 0.4$ V			-0.5			-0.5	mA
$I_O^{\ddagger}$	$V_{CC} = 5.5$ V, $V_O = 2.25$ V	-30	-112		-30	-112		mA
$I_{CCH}$	$V_{CC} = 5.5$ V, $V_I = 4.5$ V	4.3	7		4.3	7		mA
$I_{CCL}$	$V_{CC} = 5.5$ V, $V_I = 0$	11.2	18		11.2	18		mA

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

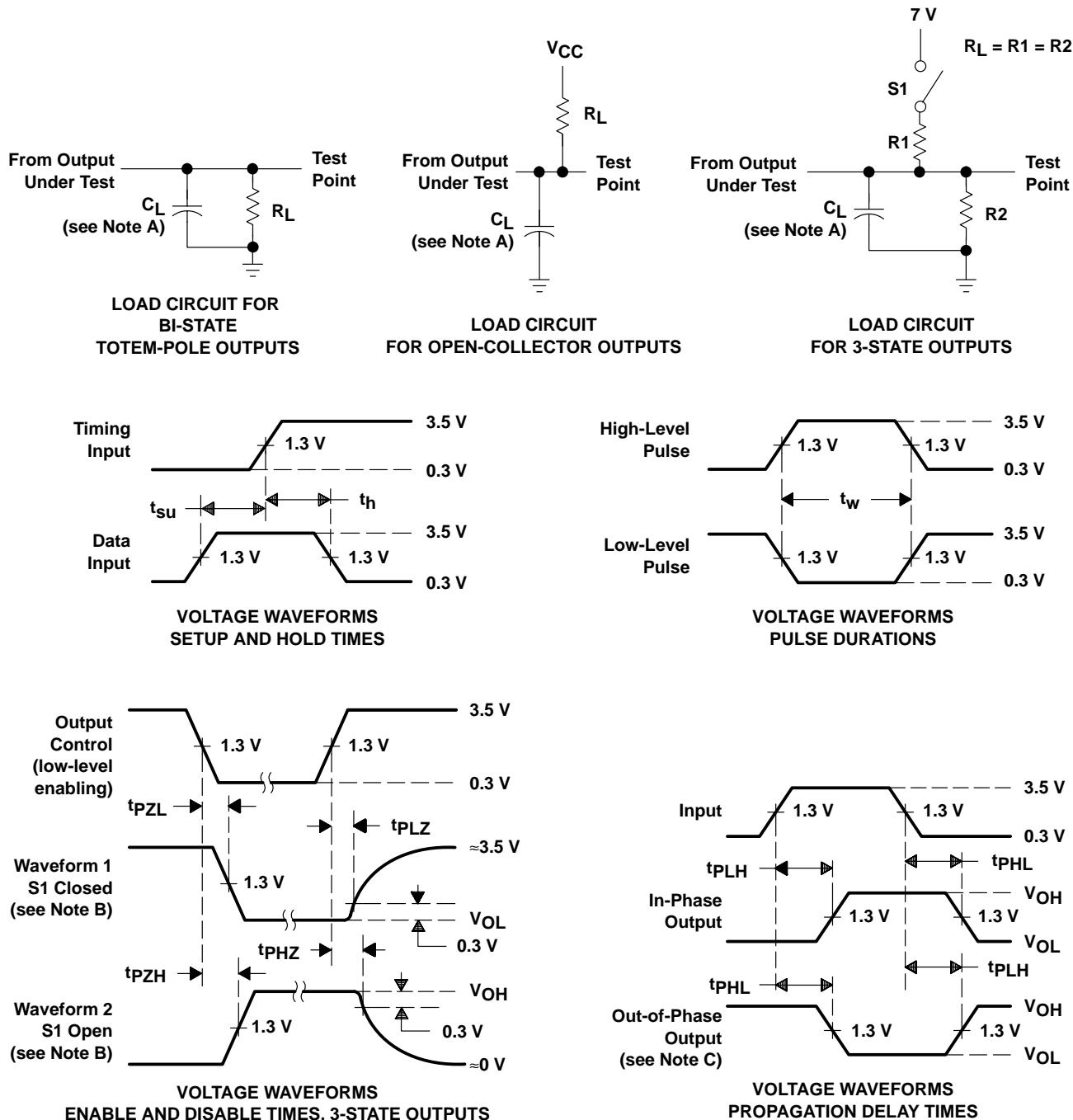
‡ The output conditions have been chosen to produce a current that closely approximates one-half of the true short-circuit output current,  $I_{OS}$ .

## switching characteristics (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	$V_{CC} = 4.5$ V TO 5.5 V, $C_L = 50$ pF, $R_L = 500$ Ω, $T_A = \text{MIN TO MAX}^{\$}$				UNIT	
			SN54AS11		SN74AS11			
			MIN	MAX	MIN	MAX		
$t_{PLH}$	A, B, or C	Y	1	6.5	1	6	ns	
$t_{PHL}$			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:  $PRR \leq 1 \text{ MHz}$ ,  $t_r = t_f = 2 \text{ ns}$ , 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 <sup>(1)</sup>	Package Type	Package Drawing	Pins	Package Qty	Eco Plan <sup>(2)</sup>	Lead/Ball Finish	MSL Peak Temp <sup>(3)</sup>
5962-86841012A	ACTIVE	LCCC	FK	20	1	TBD	Call TI	N / A for Pkg Type
5962-8684101CA	ACTIVE	CDIP	J	14	1	TBD	Call TI	N / A for Pkg Type
5962-8684101DA	ACTIVE	CFP	W	14	1	TBD	Call TI	N / A for Pkg Type
5962-9756101Q2A	ACTIVE	LCCC	FK	20	1	TBD	Call TI	N / A for Pkg Type
5962-9756101QCA	ACTIVE	CDIP	J	14	1	TBD	Call TI	N / A for Pkg Type
JM38510/37402B2A	ACTIVE	LCCC	FK	20	1	TBD	Call TI	N / A for Pkg Type
JM38510/37402BCA	ACTIVE	CDIP	J	14	1	TBD	Call TI	N / A for Pkg Type
SN54ALS11AJ	ACTIVE	CDIP	J	14	1	TBD	Call TI	N / A for Pkg Type
SN54AS11J	ACTIVE	CDIP	J	14	1	TBD	Call TI	N / A for Pkg Type
SN74ALS11AD	ACTIVE	SOIC	D	14	50	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74ALS11ADE4	ACTIVE	SOIC	D	14	50	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74ALS11ADR	ACTIVE	SOIC	D	14	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74ALS11ADRE4	ACTIVE	SOIC	D	14	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74ALS11AN	ACTIVE	PDIP	N	14	25	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type
SN74ALS11ANE4	ACTIVE	PDIP	N	14	25	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type
SN74ALS11ANSR	ACTIVE	SO	NS	14	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74ALS11ANSRE4	ACTIVE	SO	NS	14	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74AS11D	ACTIVE	SOIC	D	14	50	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74AS11DE4	ACTIVE	SOIC	D	14	50	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74AS11DR	ACTIVE	SOIC	D	14	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74AS11DRE4	ACTIVE	SOIC	D	14	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74AS11N	ACTIVE	PDIP	N	14	25	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type
SN74AS11NE4	ACTIVE	PDIP	N	14	25	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type
SN74AS11NSR	ACTIVE	SO	NS	14	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74AS11NSRE4	ACTIVE	SO	NS	14	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SNJ54ALS11AFK	ACTIVE	LCCC	FK	20	1	TBD	Call TI	N / A for Pkg Type
SNJ54ALS11AJ	ACTIVE	CDIP	J	14	1	TBD	Call TI	N / A for Pkg Type
SNJ54ALS11AW	ACTIVE	CFP	W	14	1	TBD	Call TI	N / A for Pkg Type
SNJ54AS11FK	ACTIVE	LCCC	FK	20	1	TBD	Call TI	N / A for Pkg Type
SNJ54AS11J	ACTIVE	CDIP	J	14	1	TBD	Call TI	N / A for Pkg Type

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(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) Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), or Green (RoHS & no Sb/Br) - please check <http://www.ti.com/productcontent> for the latest availability information and additional product content details.

**TBD:** The Pb-Free/Green conversion plan has not been defined.

**Pb-Free (RoHS):** TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.

**Pb-Free (RoHS Exempt):** This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package, or 2) lead-based die adhesive used between the die and leadframe. The component is otherwise considered Pb-Free (RoHS compatible) as defined above.

**Green (RoHS & no Sb/Br):** TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

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

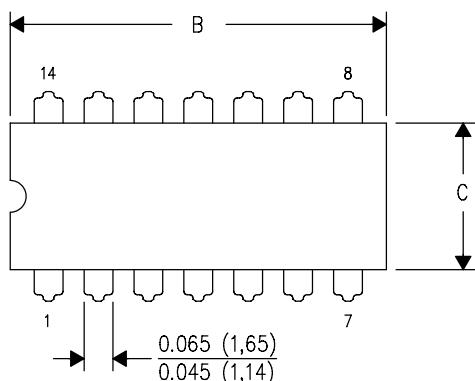
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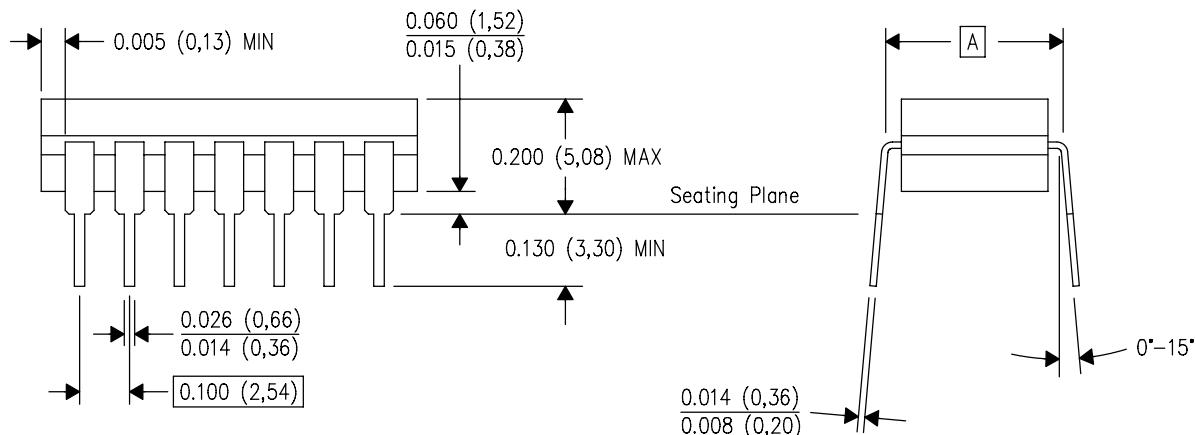
J (R-GDIP-T\*\*)

14 LEADS SHOWN

CERAMIC DUAL IN-LINE PACKAGE



PINS ** DIM	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)

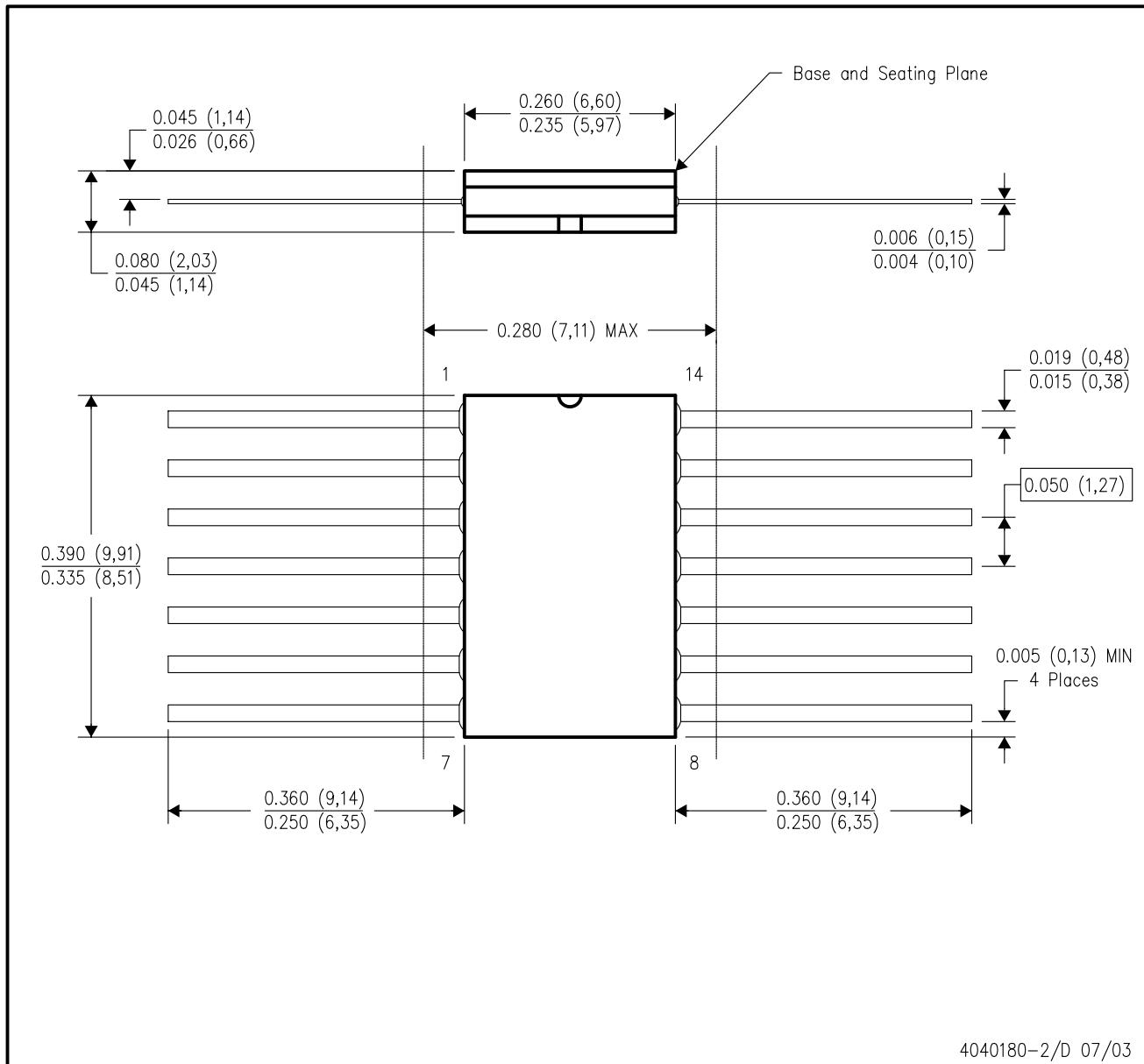


4040083/F 03/03

NOTES: 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.

W (R-GDFP-F14)

CERAMIC DUAL FLATPACK



4040180-2/D 07/03

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 and JEDEC MO-092AB

## FK (S-CQCC-N\*\*)

## LEADLESS CERAMIC CHIP CARRIER

## 28 TERMINAL SHOWN



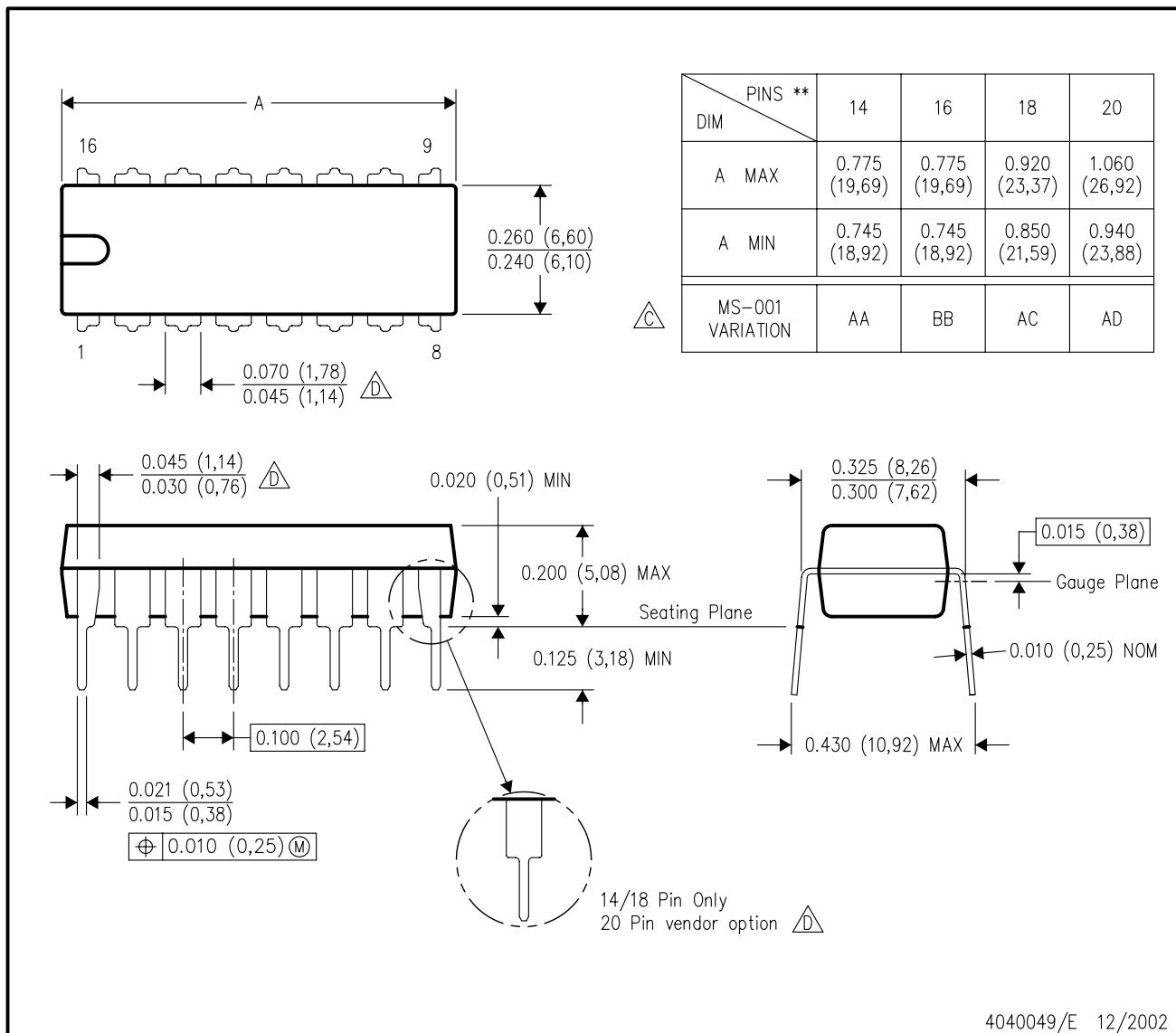
NOTES:

- 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 metal lid.
- D. The terminals are gold plated.
- E. Falls within JEDEC MS-004

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

16 PINS SHOWN

## PLASTIC DUAL-IN-LINE PACKAGE



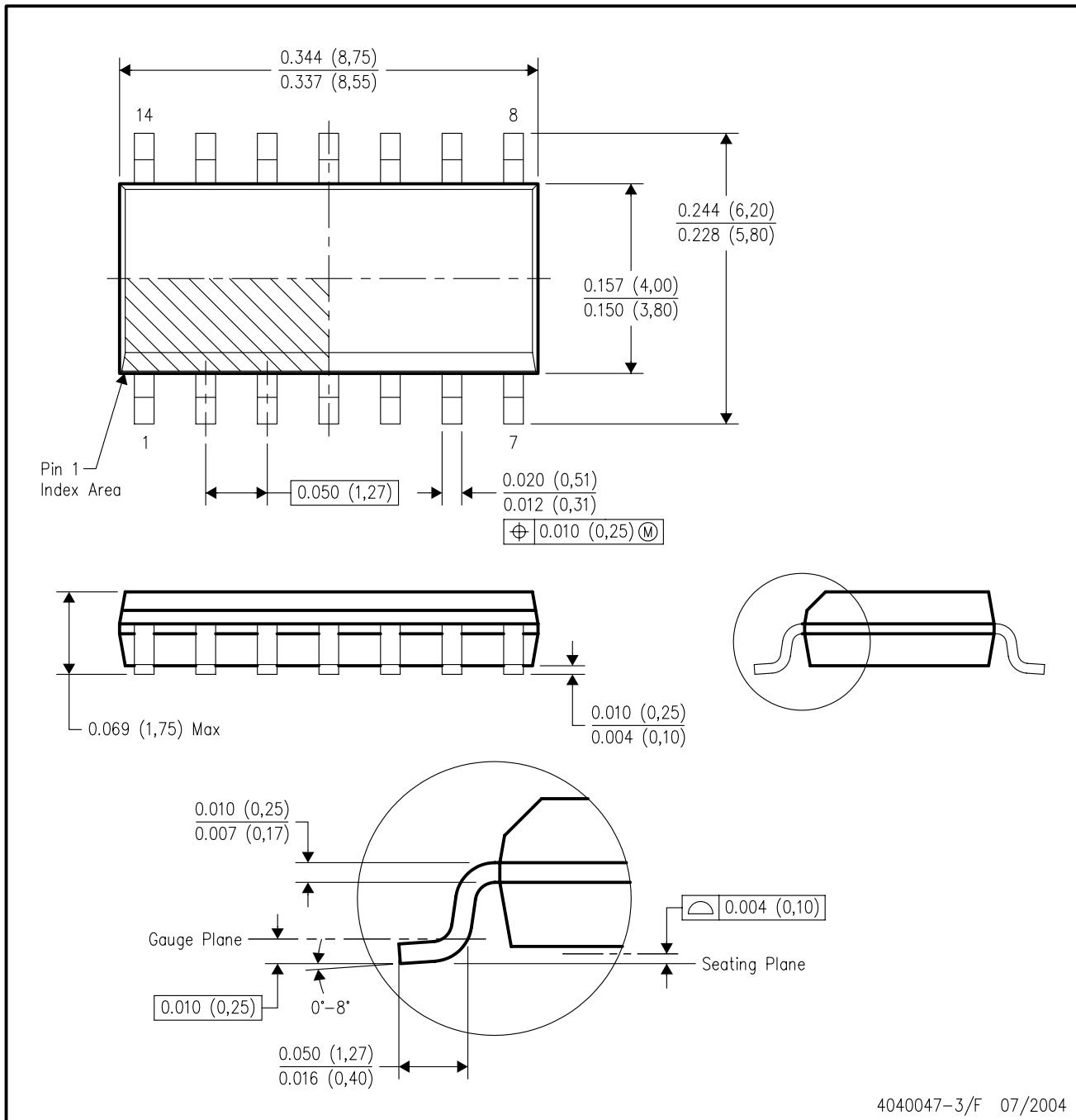
NOTES: A. All linear dimensions are in inches (millimeters).  
B. This drawing is subject to change without notice.

△ 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.

## D (R-PDSO-G14)

## PLASTIC SMALL-OUTLINE PACKAGE



NOTES:

- All linear dimensions are in inches (millimeters).
- This drawing is subject to change without notice.
- Body dimensions do not include mold flash or protrusion not to exceed 0.006 (0,15).
- Falls within JEDEC MS-012 variation AB.

## 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.

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