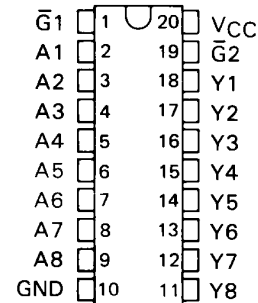


# SN54ALS2540, SN54ALS2541, SN74ALS2540, SN74ALS2541 OCTAL LINE DRIVERS/MOS DRIVERS WITH 3-STATE OUTPUTS

JUNE 1984—REVISED MAY 1986

- 3-State Outputs Drive Bus Lines or Buffer Memory Address Registers
- P-N-P Inputs Reduce DC Loading
- Outputs Have 25- $\Omega$  Series Resistor, So No External Resistors are Required
- Package Options Include Plastic "Small Outline" Packages, Plastic and Ceramic Chip Carriers, and Standard Plastic and Ceramic 300-mil DIPs
- Dependable Texas Instruments Quality and Reliability

SN54ALS2540, SN54ALS2541 . . . J PACKAGE  
SN74ALS2540, SN74ALS2541 . . . DW OR N PACKAGE  
(TOP VIEW)



## description

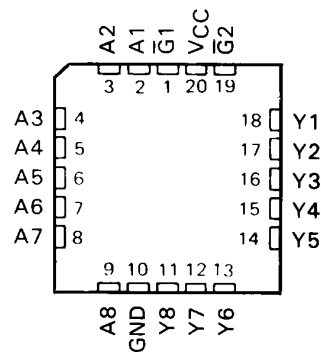
These octal buffers and line drivers are designed to drive capacitive input characteristics of MOS devices and have the performance of the popular SN54ALS240A/SN74ALS240A series. At the same time, they offer a pinout with inputs and outputs on opposite sides of the package. This arrangement greatly enhances printed-circuit-board layout.

The three-state control gate is a 2-input AND with active-low inputs such that if either  $\bar{G}1$  or  $\bar{G}2$  is high, all eight outputs are in the high-impedance state.

The 'ALS2540 offers inverting data and the 'ALS2541 offers true data at the outputs.

The SN54ALS' is characterized for operation over the full military temperature range of  $-55^{\circ}\text{C}$  to  $125^{\circ}\text{C}$ . The SN74ALS' is characterized for operation from  $0^{\circ}\text{C}$  to  $70^{\circ}\text{C}$ .

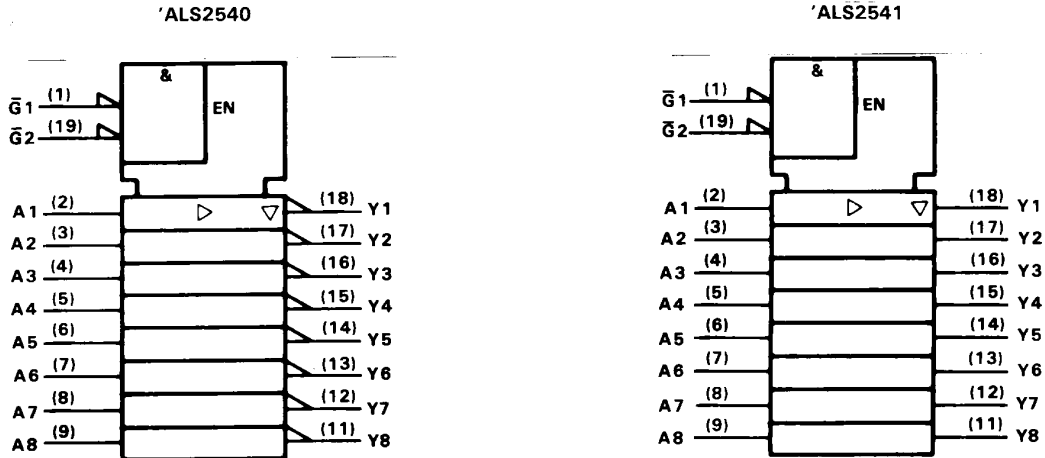
SN54ALS2540, SN54ALS2541 . . . FK PACKAGE  
(TOP VIEW)



# SN54ALS2540, SN54ALS2541, SN74ALS2540, SN74ALS2541 OCTAL LINE DRIVERS/MOS DRIVERS WITH 3-STATE OUTPUTS

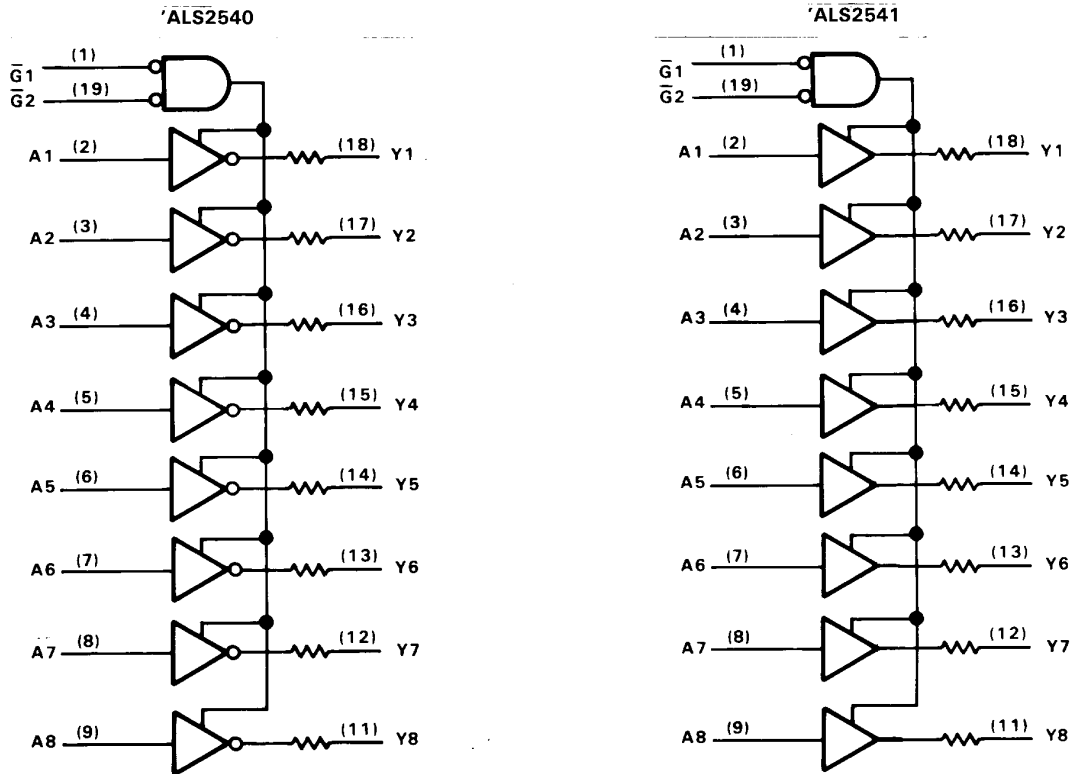
JUNE 1984—REVISED MAY 1986

## logic symbols†



†These symbols are in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

## logic diagrams (positive logic)



All output resistors are 25  $\Omega$ .

# SN54ALS2540, SN54ALS2541, SN74ALS2540, SN74ALS2541 OCTAL LINE DRIVERS/MOS DRIVERS WITH 3-STATE OUTPUTS

JUNE 1984—REVISED MAY 1986

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

Supply voltage, $V_{CC}$ .....	7 V
Input voltage .....	7 V
Voltage applied to a disabled 3-state output .....	5.5 V
Operating free-air temperature range: SN54ALS2540, SN54ALS2541 .....	-55°C to 125°C
SN74ALS2540, SN74ALS2541 .....	0°C to 70°C
Storage temperature range .....	-65°C to 150°C

## recommended operating conditions

		SN54ALS2540			SN74ALS2540			UNIT
		SN54ALS2541			SN74ALS2541			
		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			0.7			0.8	V
$I_{OH}$	High-level output current			-0.4			-0.4	mA
$I_{OL}$	Low-level output current			12			12	mA
$T_A$	Operating free-air temperature	-55		125	0		70	°C

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

PARAMETER	TEST CONDITIONS	SN54ALS2540			SN74ALS2540			UNIT	
		SN54ALS2541			SN74ALS2541				
		MIN	TYP†	MAX	MIN	TYP†	MAX		
$V_{IK}$	$V_{CC} = 4.5\text{ V}$ , $I_I = -18\text{ mA}$			-1.2			-1.2	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	
$V_{OL}$	$V_{CC} = 4.5\text{ V}$ , $I_{OL} = 1\text{ mA}$		0.15	0.5		0.15	0.5	V	
	$V_{CC} = 4.5\text{ V}$ , $I_{OL} = 12\text{ mA}$		0.35	0.8		0.35	0.8		
$I_{OZH}$	$V_{CC} = 5.5\text{ V}$ , $V_O = 2.7\text{ V}$			20			20	$\mu\text{A}$	
$I_{OZL}$	$V_{CC} = 5.5\text{ V}$ , $V_O = 0.4\text{ V}$			-20			-20	$\mu\text{A}$	
$I_{OH}$	$V_{CC} = 4.5\text{ V}$ , $V_O = 2\text{ V}$	-15			-15			mA	
$I_{OL}$	$V_{CC} = 4.5\text{ V}$ , $V_O = 2\text{ V}$	30			30			mA	
$I_I$	$V_{CC} = 5.5\text{ V}$ , $V_I = 7\text{ V}$			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	
$I_{O\ddagger}$	$V_{CC} = 5.5\text{ V}$ , $V_O = 2.25\text{ V}$	-15		-70	-15		-70	mA	
$I_{CC}$	'ALS2540	$V_{CC} = 5.5\text{ V}$	Outputs high		5	10	5	10	mA
			Outputs low		13	22	13	22	
			Outputs disabled		11	19	11	19	
	'ALS2541	$V_{CC} = 5.5\text{ V}$	Outputs high		6	14	6	14	mA
			Outputs low		15	25	15	25	
			Outputs disabled		13.5	22	13.5	22	

† 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,  $I_{OS}$ .

# SN54ALS2540, SN54ALS2541, SN74ALS2540, SN74ALS2541 OCTAL LINE DRIVERS/MOS DRIVERS WITH 3-STATE OUTPUTS

JUNE 1984 – REVISED MAY 1986

## 'ALS2540 switching characteristics (see Note 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V <sub>CC</sub> = 5 V, C <sub>L</sub> = 50 pF, R <sub>1</sub> = 500 Ω, R <sub>2</sub> = 500 Ω, T <sub>A</sub> = 25°C		V <sub>CC</sub> = 4.5 V to 5.5 V, C <sub>L</sub> = 50 pF, R <sub>1</sub> = 500 Ω, R <sub>2</sub> = 500 Ω, T <sub>A</sub> = MIN to MAX		UNIT		
			'ALS2540		SN54ALS2540			SN74ALS2540	
			TYP		MIN	MAX		MIN	MAX
t <sub>PLH</sub>	A	Y	7.5	2	14	2	12	ns	
t <sub>PHL</sub>			5.6	2	13	2	11		
t <sub>PZH</sub>	$\bar{G}$	Y	9	5	18	5	15	ns	
t <sub>PZL</sub>			12.6	8	24	8	20		
t <sub>PHZ</sub>	$\bar{G}$	Y	4	1	12	1	10	ns	
t <sub>PLZ</sub>			7	2	14	2	12		

## 'ALS2541 switching characteristics (see Note 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V <sub>CC</sub> = 5 V, C <sub>L</sub> = 50 pF, R <sub>1</sub> = 500 Ω, R <sub>2</sub> = 500 Ω, T <sub>A</sub> = 25°C		V <sub>CC</sub> = 4.5 V to 5.5 V, C <sub>L</sub> = 50 pF, R <sub>1</sub> = 500 Ω, R <sub>2</sub> = 500 Ω, T <sub>A</sub> = MIN to MAX		UNIT		
			'ALS2541		SN54ALS2541			SN74ALS2541	
			TYP		MIN	MAX		MIN	MAX
t <sub>PLH</sub>	A	Y	8.7	2	17	2	15	ns	
t <sub>PHL</sub>			7	2	14	2	12		
t <sub>PZH</sub>	$\bar{G}$	Y	9	5	18	5	15	ns	
t <sub>PZL</sub>			12.6	8	24	8	20		
t <sub>PHZ</sub>	$\bar{G}$	Y	4	1	12	1	10	ns	
t <sub>PLZ</sub>			7	2	14	2	12		

NOTE 1: Load circuit and voltage waveforms are shown in Section 1.

**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>
SN74ALS2540N	OBSOLETE	PDIP	N	20		TBD	Call TI	Call TI
SN74ALS2541DW	OBSOLETE	SOIC	DW	20		TBD	Call TI	Call TI
SN74ALS2541DWR	ACTIVE	SOIC	DW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74ALS2541DWRE4	ACTIVE	SOIC	DW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74ALS2541DWRG4	ACTIVE	SOIC	DW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74ALS2541NE4	ACTIVE	PDIP	N	20		TBD	Call TI	Call TI
SN74ALS2541NSRE4	ACTIVE	SO	NS	20		TBD	Call TI	Call TI
SN74ALS2541NSRG4	ACTIVE	SO	NS	20		TBD	Call TI	Call TI

<sup>(1)</sup> 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.

<sup>(2)</sup> 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.

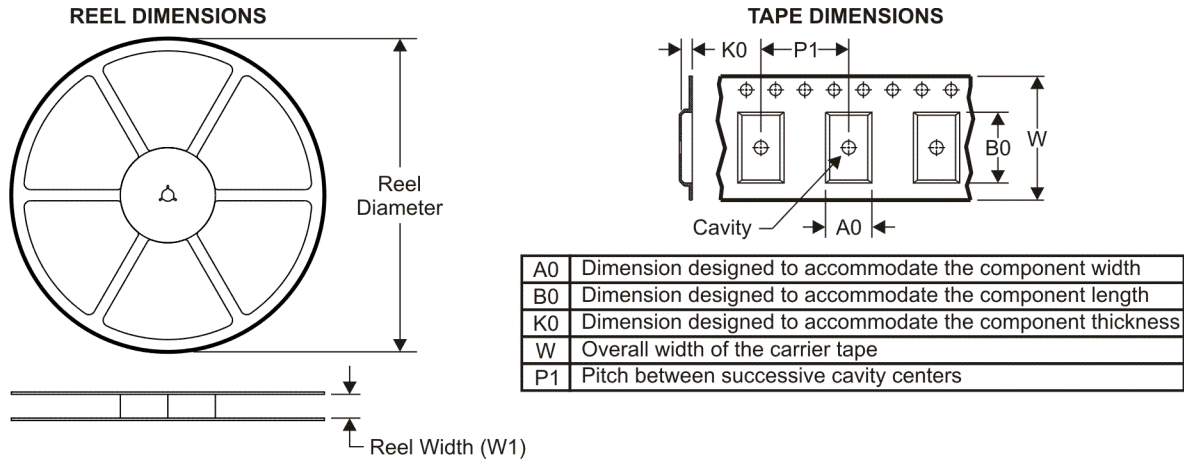
**Green (RoHS & no Sb/Br):** TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

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

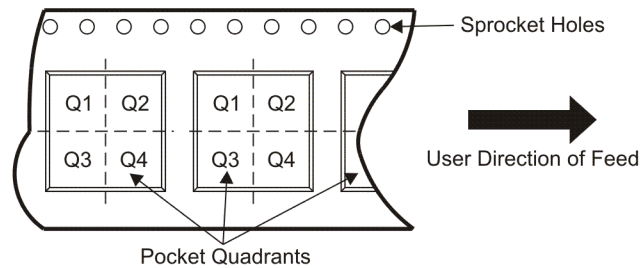
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## TAPE AND REEL INFORMATION



### 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
SN74ALS2541DWR	SOIC	DW	20	2000	330.0	24.4	10.8	13.0	2.7	12.0	24.0	Q1

**TAPE AND REEL BOX DIMENSIONS**



\*All dimensions are nominal

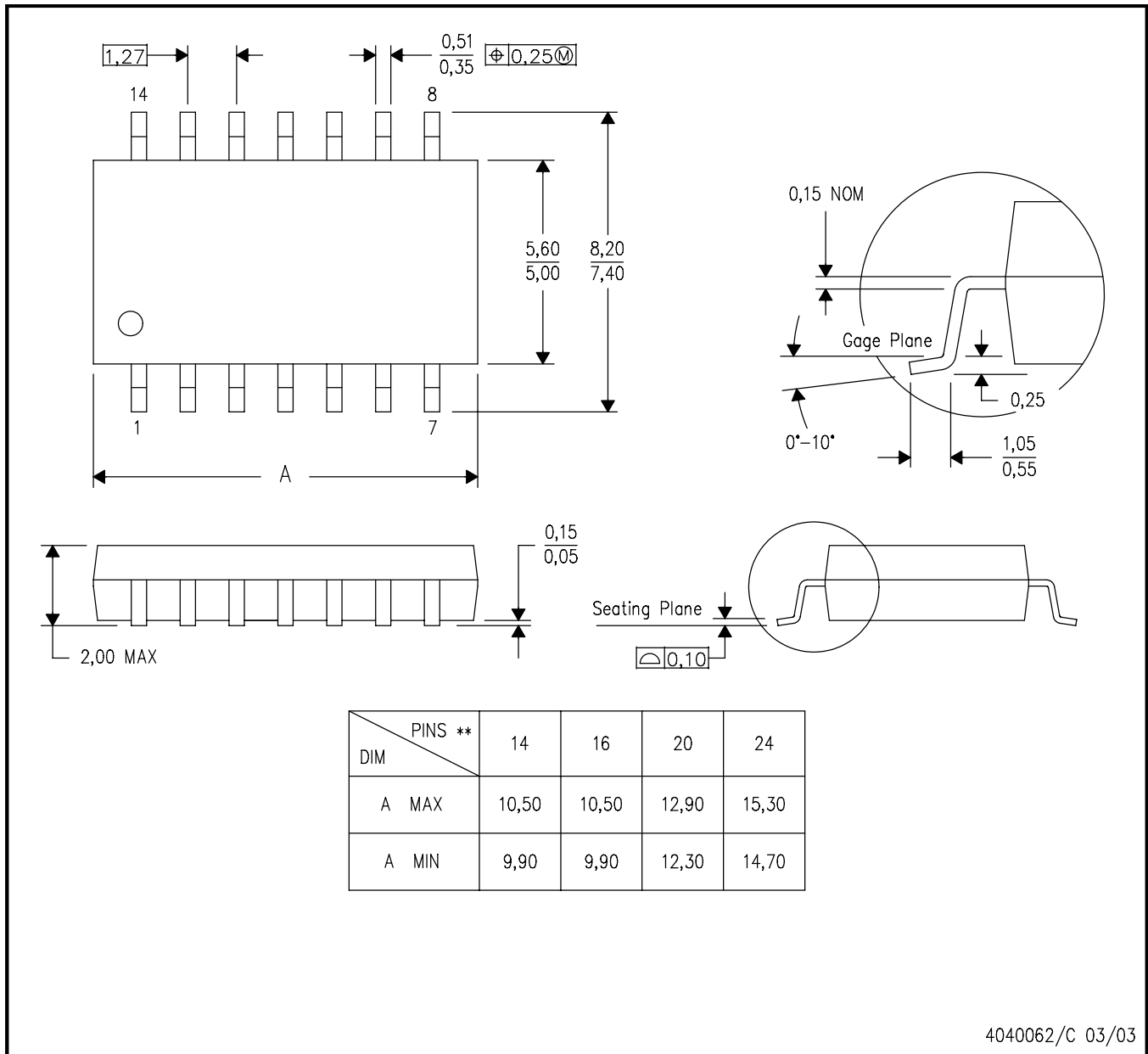
Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN74ALS2541DWR	SOIC	DW	20	2000	346.0	346.0	41.0

# MECHANICAL DATA

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

PLASTIC SMALL-OUTLINE PACKAGE

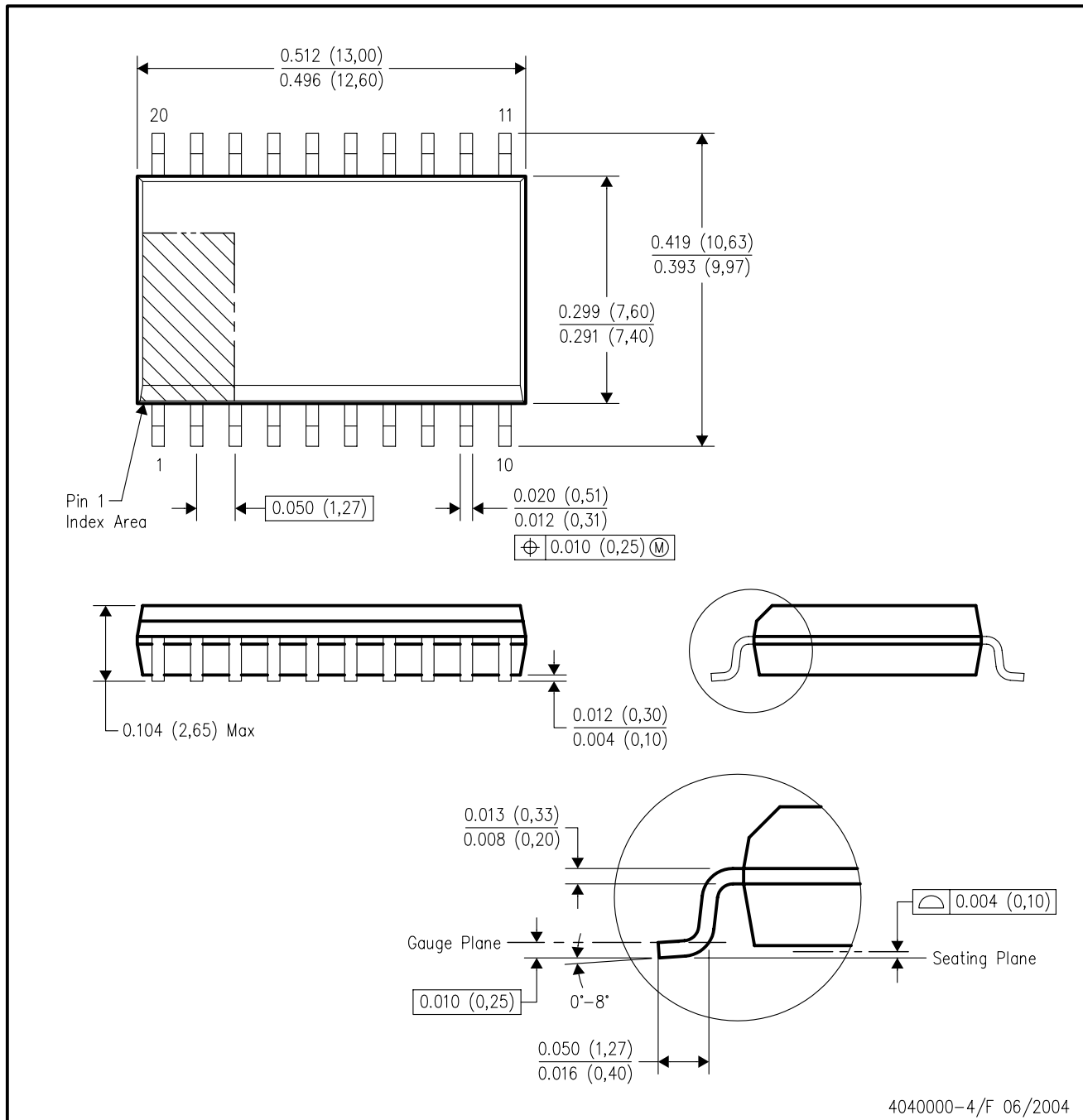
14-PINS SHOWN



- 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.

DW (R-PDSO-G20)

PLASTIC SMALL-OUTLINE PACKAGE

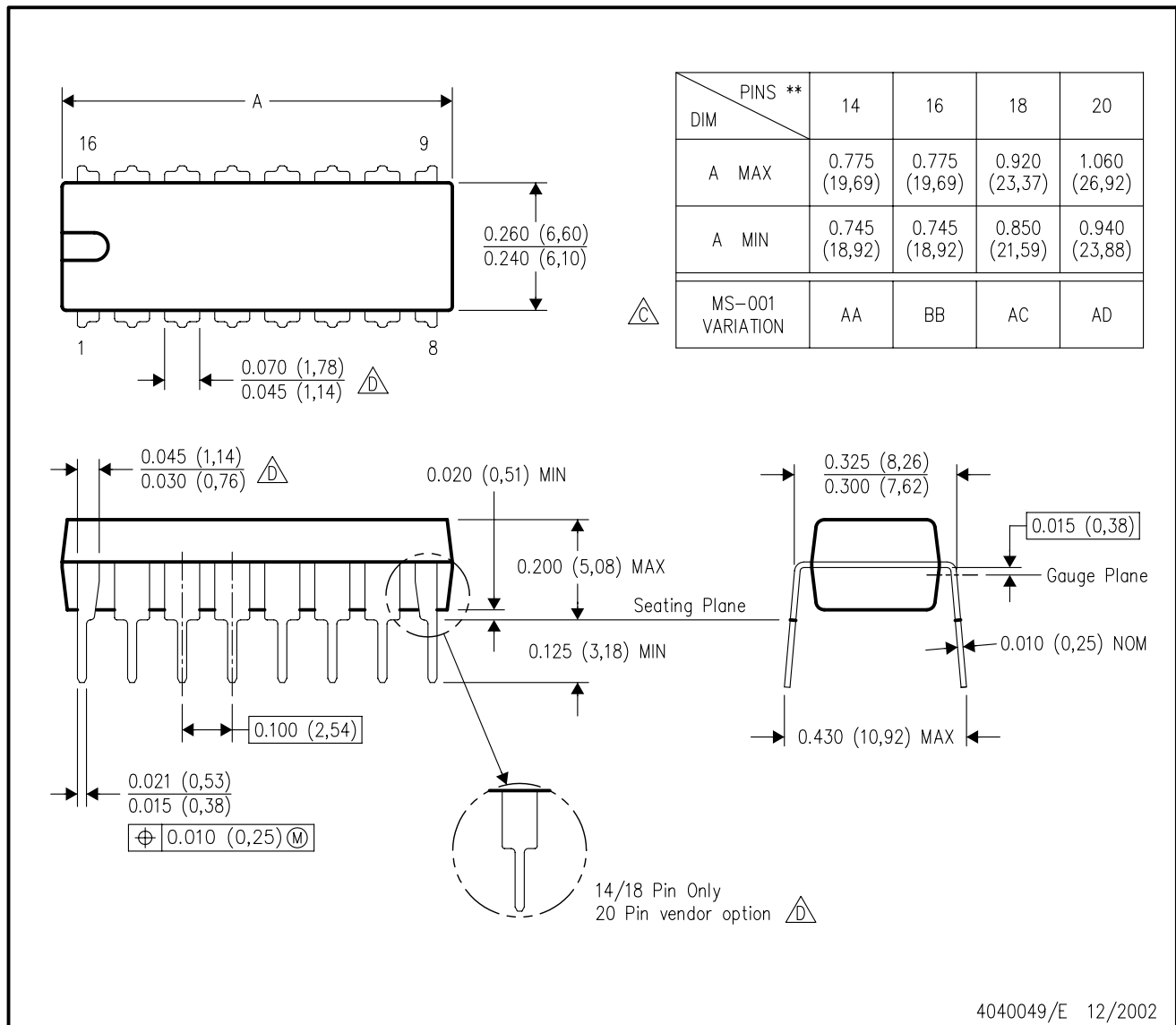


- NOTES:
- A. All linear dimensions are in inches (millimeters).
  - B. This drawing is subject to change without notice.
  - C. Body dimensions do not include mold flash or protrusion not to exceed 0.006 (0,15).
  - D. Falls within JEDEC MS-013 variation AC.

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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